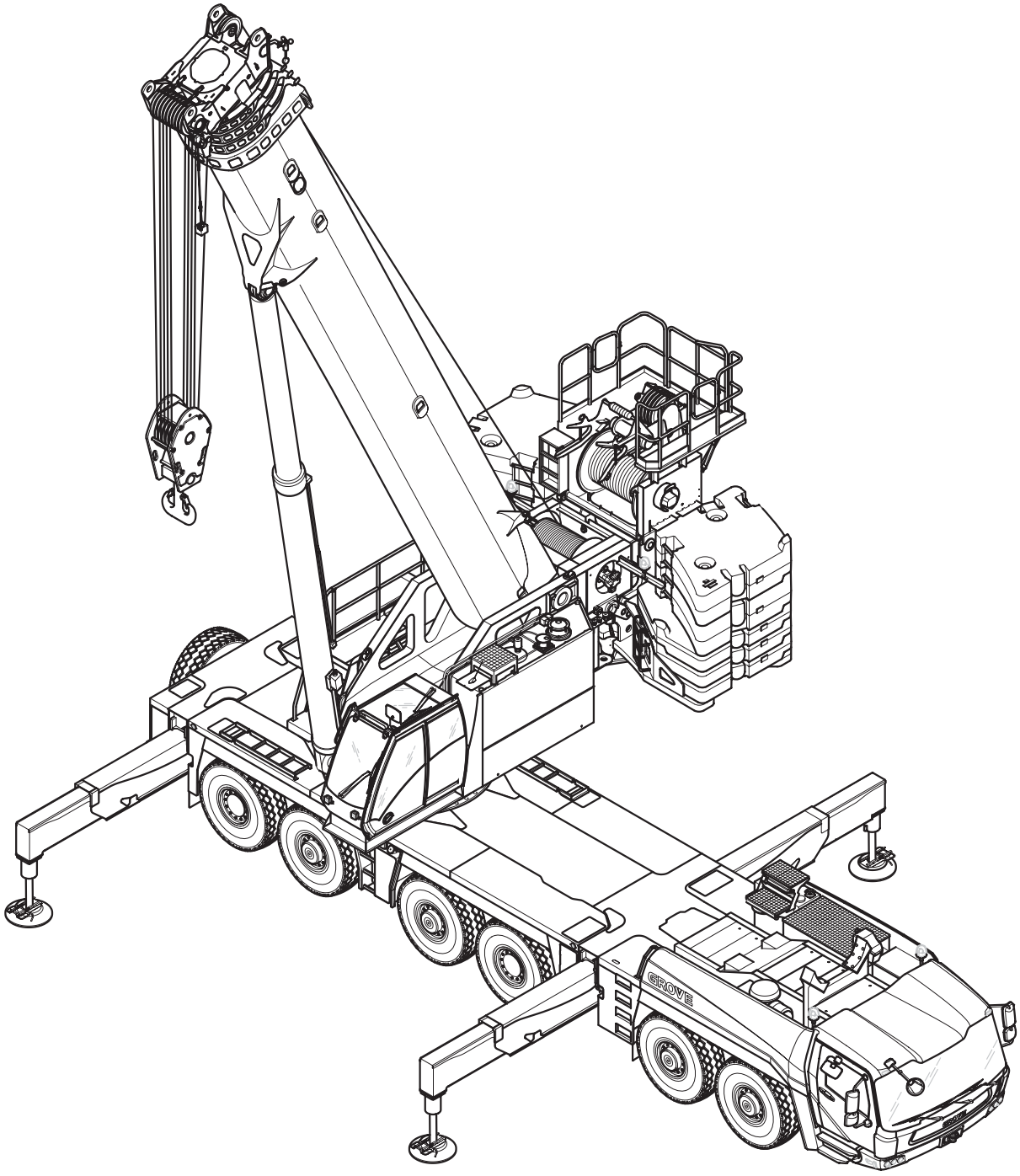
Grove GMK 6400

Operating manual
Part 1 – Driving



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Grove Manitowoc National Crane Potain

Manitowoc

Important note

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12.07.2013

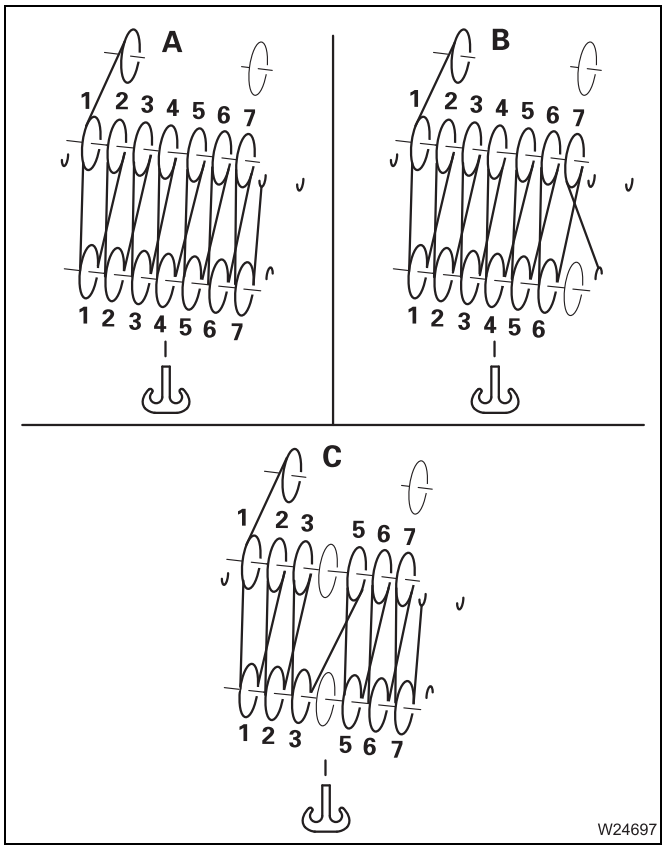
Correction sheet
Possible reeving methods on the main boom

Contrary to the information specified in the operating manual, there are corrected hoist rope reevings on the main boom for the GMK6400 truck crane.

Only reeve the hoist rope as described/illustrated in this correction sheet.

It is important that you still observe all notes and safety instructions regarding rigging work on the main boom in the operating manual supplied.

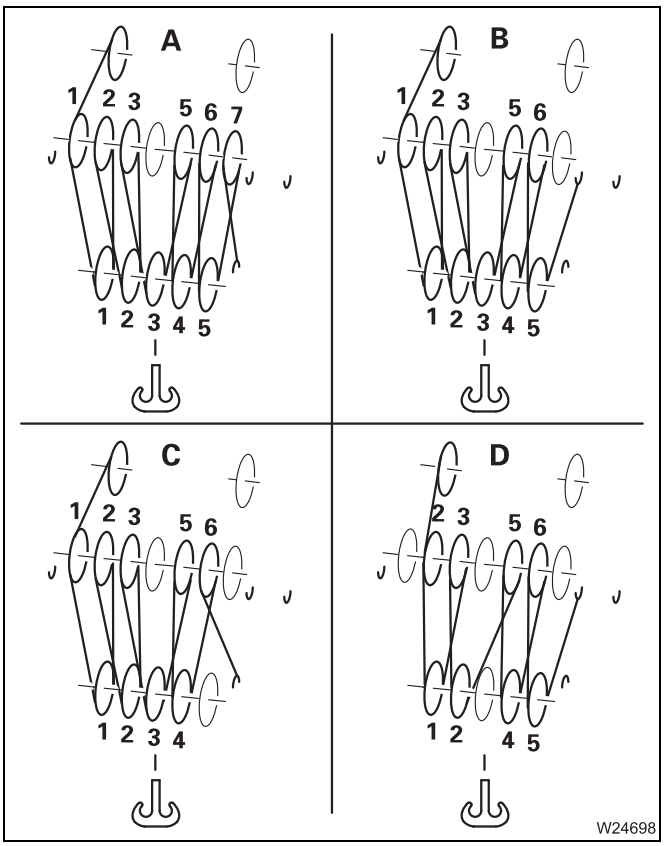
With 7 head sheaves



7 sheave hook block

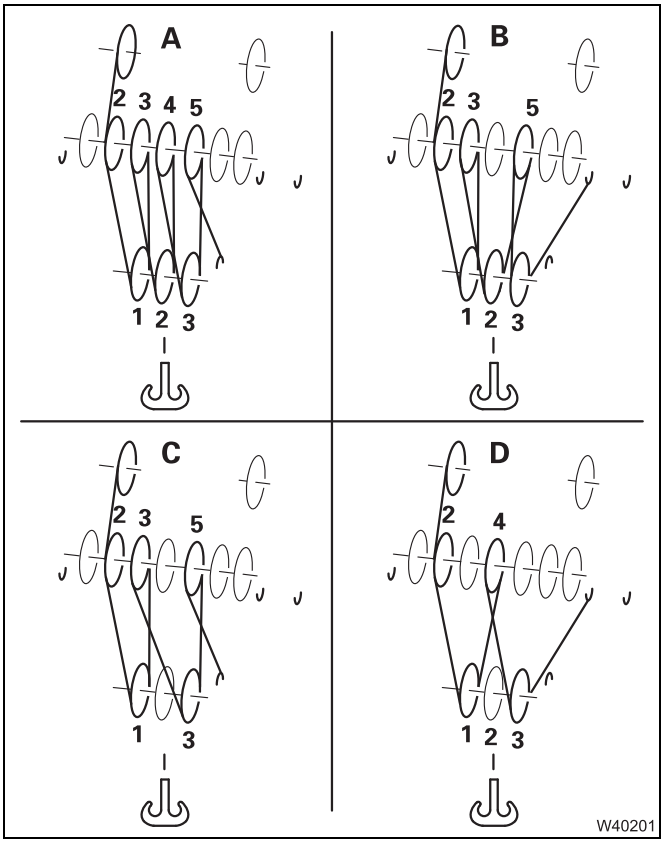
	Reeving
A	14x
B	13x
C	12x

27.08.2018



5 sheave hook block

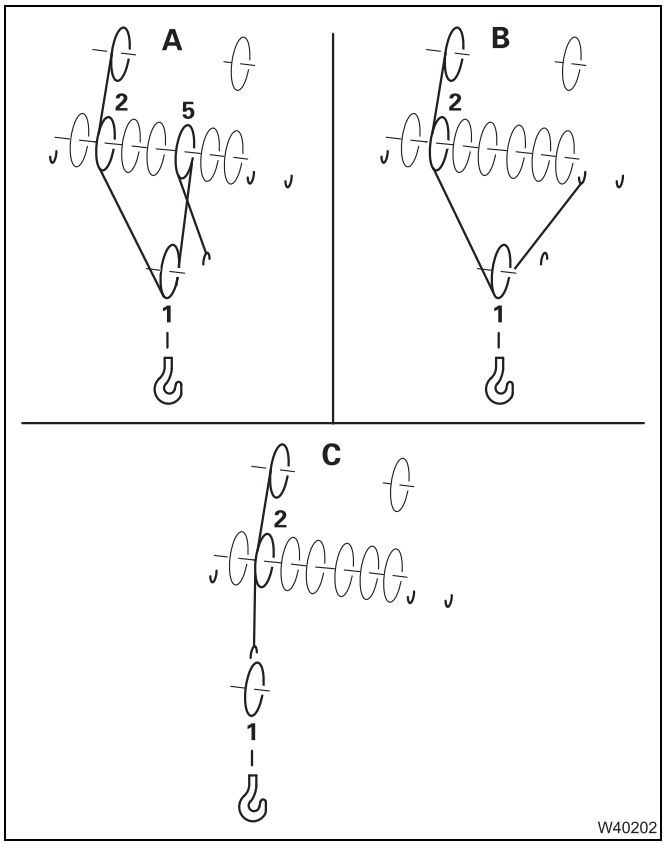
	Reeving
A	11x
B	10x
C	9x
D	8x



3 sheave hook block

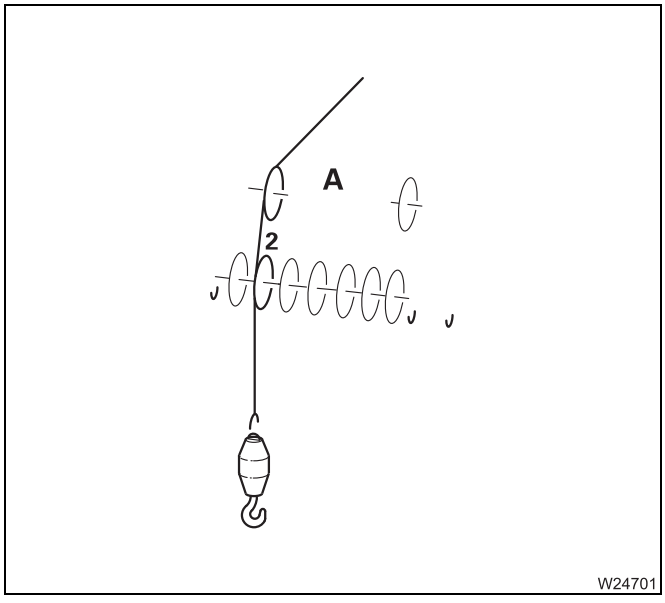
	Reeving
A	7x
B	6x
C	5x
D	4x

27.08.2018



1 sheave hook block

	Reeving
A	3x
B	2x
C	1x

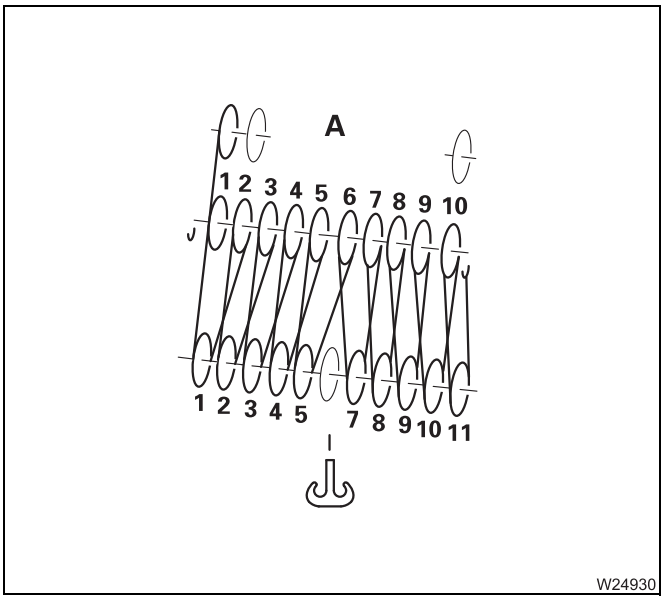


Hook tackle

	Reeving
A	1x

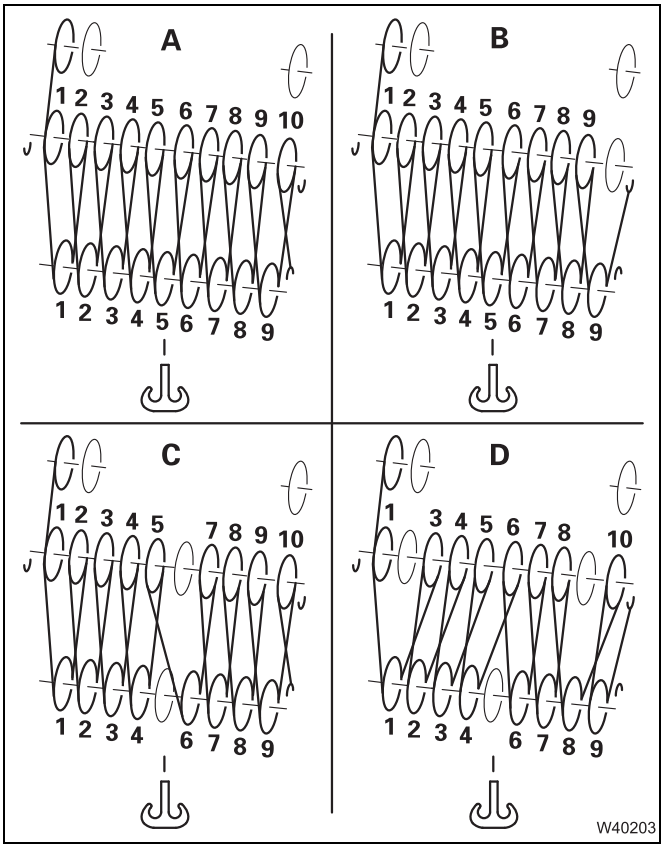
27.08.2018

With 10 head sheaves



11 sheave hook block

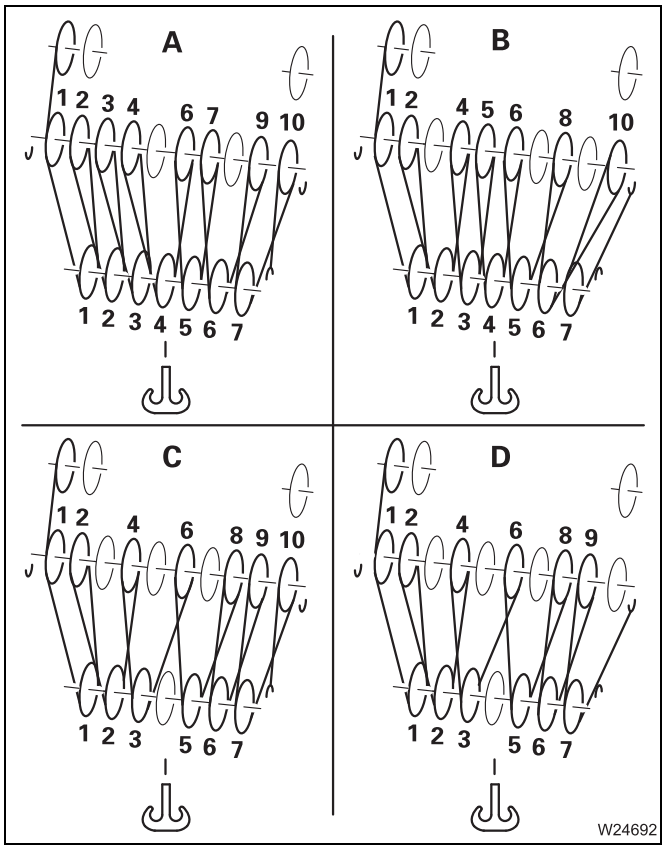
	Reeving
A	20x



9 sheave hook block

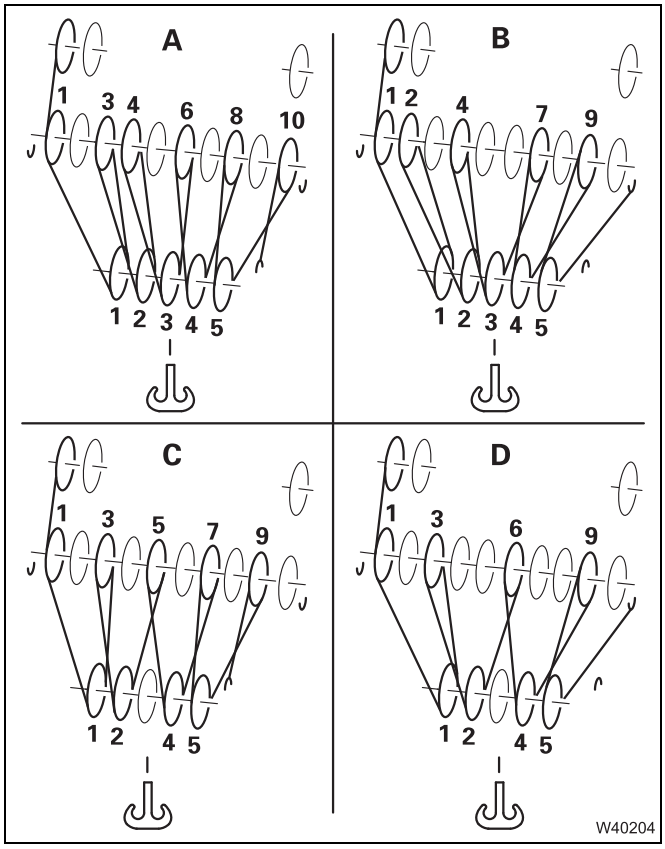
	Reeving
A	19x
B	18x
C	17x
D	16x

27.08.2018



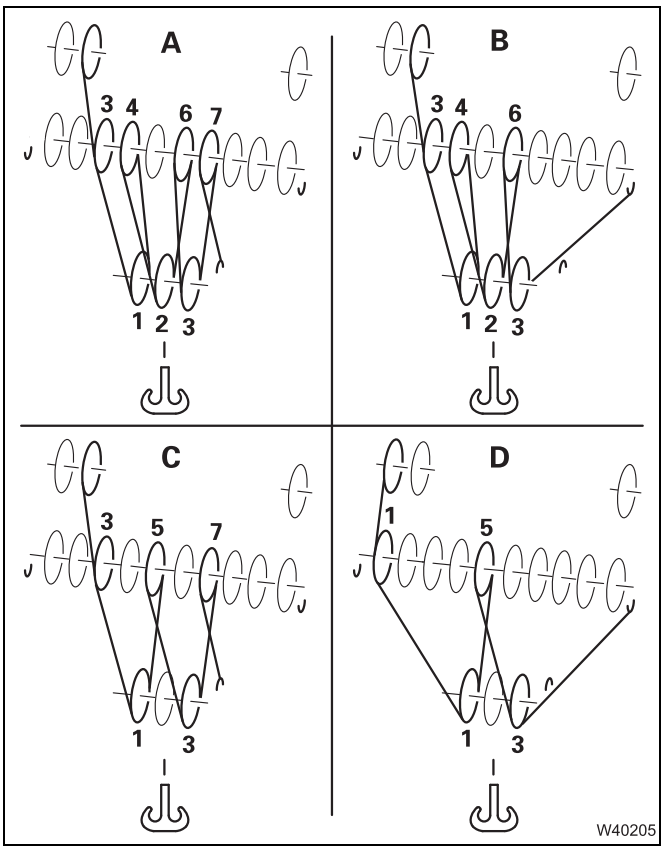
7 sheave hook block

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



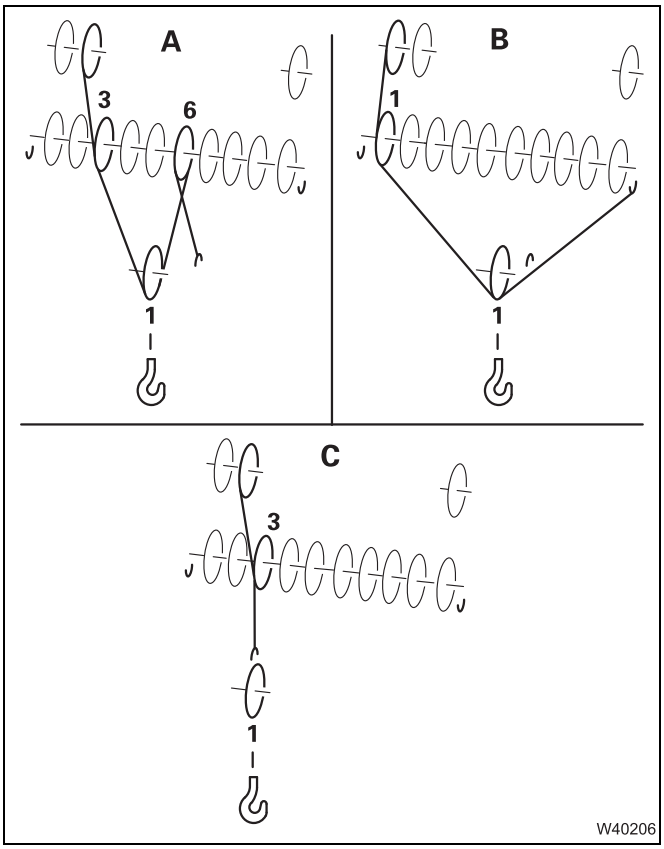
5 sheave hook block

	Reeving
A	11x
B	10x
C	9x
D	8x



3 sheave hook block

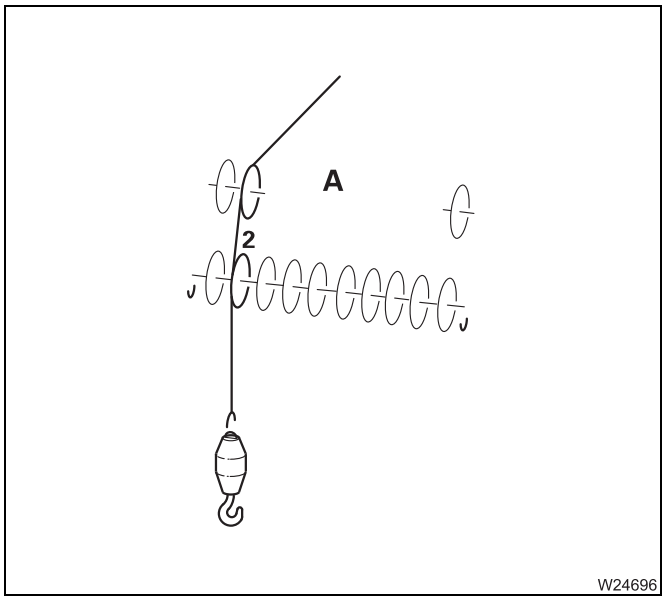
	Reeving
A	7x
B	6x
C	5x
D	4x



1 sheave hook block

	Reeving
A	3x
B	2x
C	1x

27.08.2018



Hook tackle

	Reeving
A	1x

27.08.2018

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Technical data

Contrary to the information given in the operating instructions supplied, the technical data have changed in part.

Operating speeds

The specified operating speeds only apply to an engine speed of about 1300 rpm without load.

Main hoist:	Rope speed when lifting and lowering		
	Normal speed:	maximum 50 m/min (164 ft/min)	
	High-speed mode:	maximum 120 m/min (394 ft/min)	
Auxiliary hoist:	Rope speed when lifting and lowering		
	Normal speed:	maximum 42 m/min (138 ft/min)	
	High-speed mode:	maximum 104 m/min (341 ft/min)	
Telescoping mechanism:	Extending from 15.4 to 60.0 m (50.5 to 196.9 ft)		
	approx. 420 s	In automatic mode during uninterrupted locking and telescoping processes	

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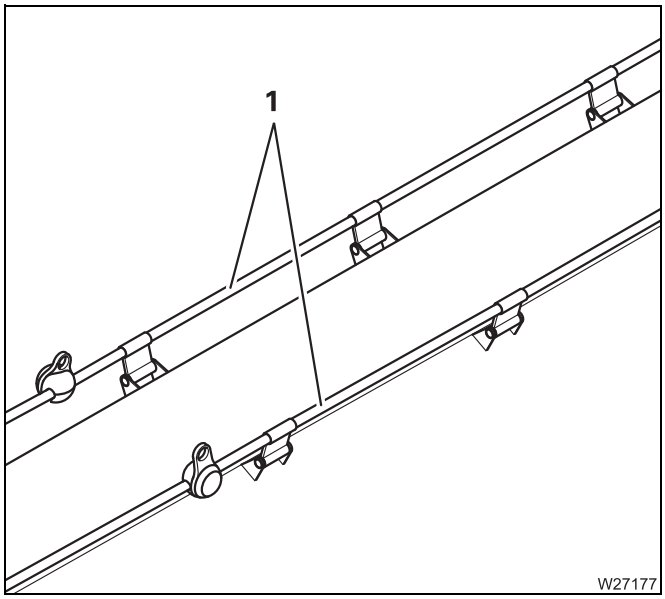
Safety harness on the main boom



This truck crane is equipped with a safety harness (**1**) on the main boom. The safety harness is fixed securely to the main boom.

The safety harness consists of two ropes with spacers and wear pads.

Always secure yourself with the safety harness and your personal protective equipment when you have to step on the main boom, e.g. to rig the rope from the main hoist.

Risk of accidents when stepping
Read through the procedure in this section before stepping between the main boom and the stand surface or between the stand surface and the main boom.

Risk of accidents due to unsuitable fall prevention safety system
Always secure yourself with a fall prevention safety system that is permissible in the country in which you are working and includes a shoulder, waist and seat belt with a two-point catch belt.
The fall prevention safety system must ensure that you are always secured against falling when you step on the main boom.

Risk of damage to the safety harness.
Never fasten loads or other objects to the safety harness. This will prevent damage and overload to the safety harness.

22.01.2014

Prerequisites

The safety harness only ensures secure protection from falling if a suitable fall prevention safety system (personal protective equipment) is worn. This fall prevention safety system must be attached to the safety harness on the truck crane.

Requirements

The fall prevention safety system must correspond to the requirements of the applicable standards and regulations in the country in which you are working. If you are unsure, find out which standards and regulations apply for the country in which you are working.

The fall prevention safety system must consist of:

– a combined shoulder, waist and seat belt,

– a catch belt with two lines for fastening at feet height.

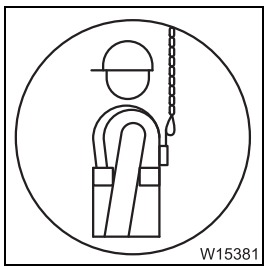
Only one person at a time is allowed to be secured by the safety harness. The weight of the person to be secured must not exceed 140 kg (309 lbs).

If you are unsure about which type of fall prevention safety system is required, please contact **Manitowoc Crane Care**.

22.01.2014

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

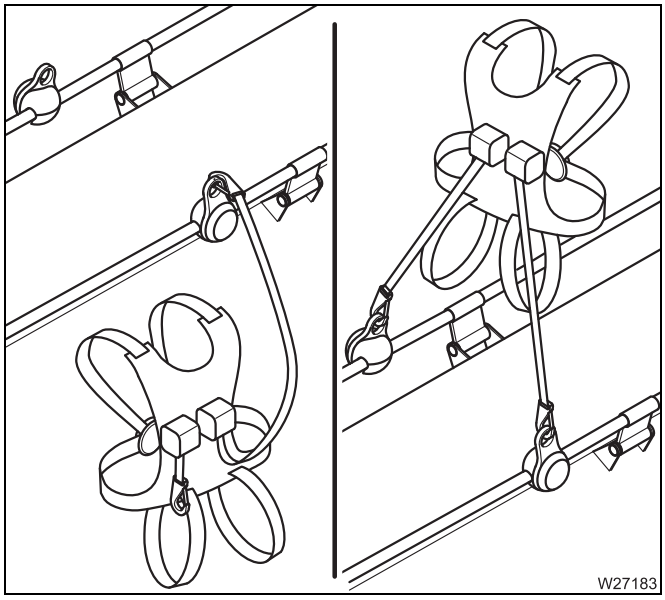
Attachment



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

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

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



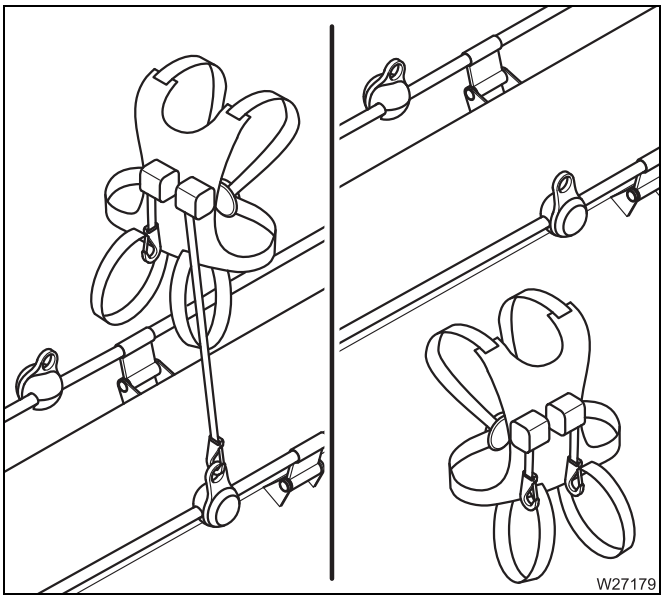
- Use the available ladders and access ladders on the truck crane to climb up; ➠ *Operating manual*.
- Make sure you always attach one line of the fall prevention safety system with the safety harness before entering the main boom.
- Attach the second line of the fall prevention safety system with the safety harness once you are located on the main boom.

22.01.2014

Detachment

Risk of accidents due to incomplete safety system
Only detach the second line of the catch belt once you have reached a secure position on a ladder or access ladder.
This will prevent falling due to an incomplete safety system.

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



- First of all, detach the line that faces away from the ladder or access later.

  You may only detach the second line of the catch belt once you have reached a secure position.

- Use the available ladders and access ladders on the truck crane to climb down;
  ➠ *Operating manual*.

22.01.2014

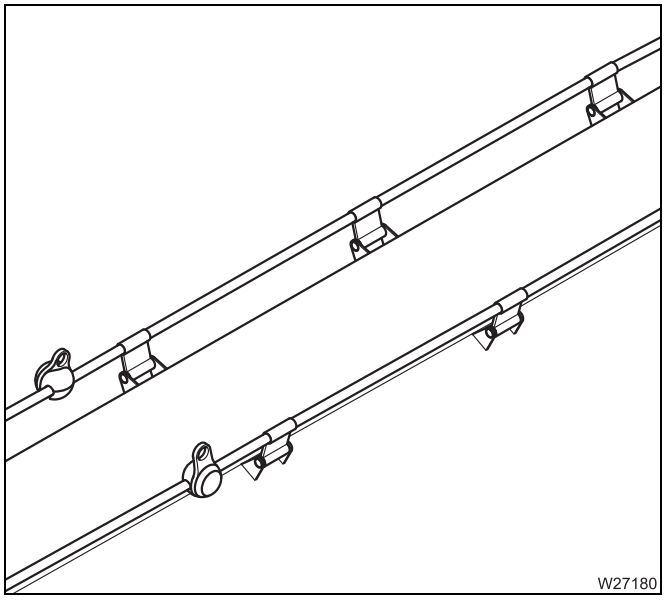
Inspecting/replacing safety harness

Risk of accidents if inspections are not carried out
Make sure the safety harness is inspected regularly.
This will prevent component failure in cases of danger.
A safety harness only ensures protection from falling if it is regularly inspected.

Make sure your personal protective equipment is also regularly inspected. In order to do this, observe the information provided by the manufacturer.

Inspection

The safety harness on the main boom must be inspected for damage at regular intervals.



- Check all fastening and connecting parts for damage, wear, mobility and deformations.

Replacement

Make sure damaged, worn, or deformed fastening or connecting parts are immediately replaced by **Manitowoc Crane Care** or an authorised GROVE dealer or your repair crew.

The safety harness must **always** be replaced completely following stress caused by a fall, even if no damage can be detected.

22.01.2014

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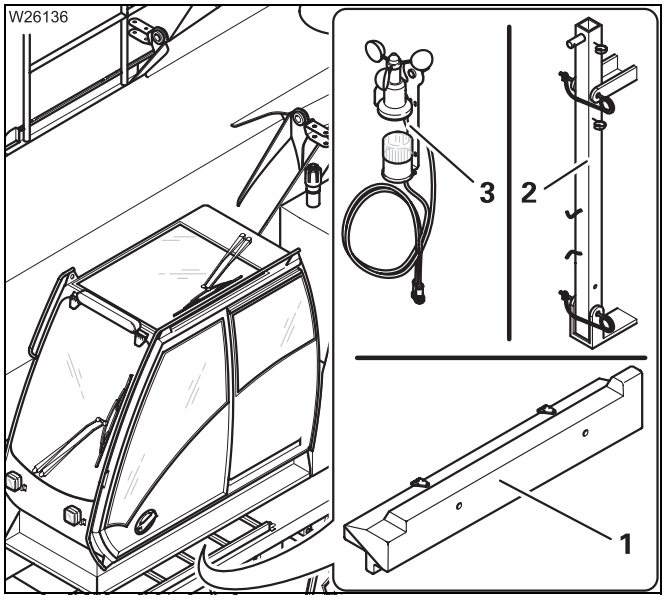
22.01.2014

Anemometer and air traffic control light

Transport



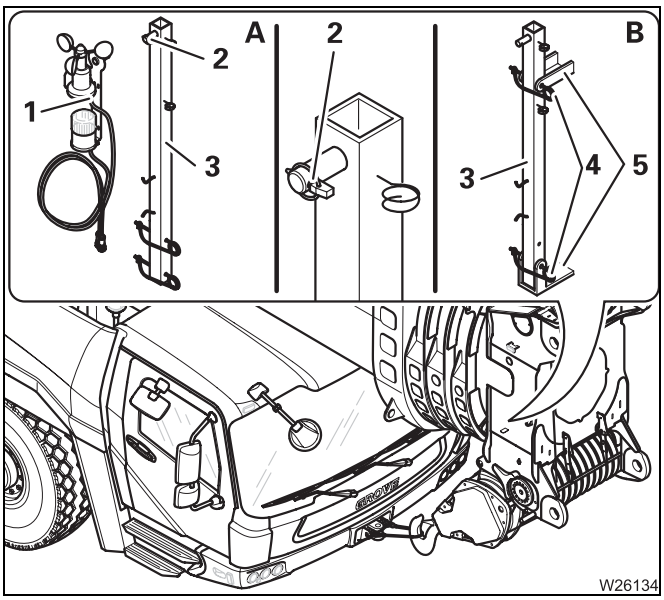
The storage compartment (**1**) for anemometers and air traffic control lights described in the accompanying *operating manual* is only available for certain versions of truck crane.

In this case the rod (**2**) is fastened to the main boom head for transport and the anemometer (**3**) and air traffic control lights are transported in the crane cab.

Risk of damage during on-road driving

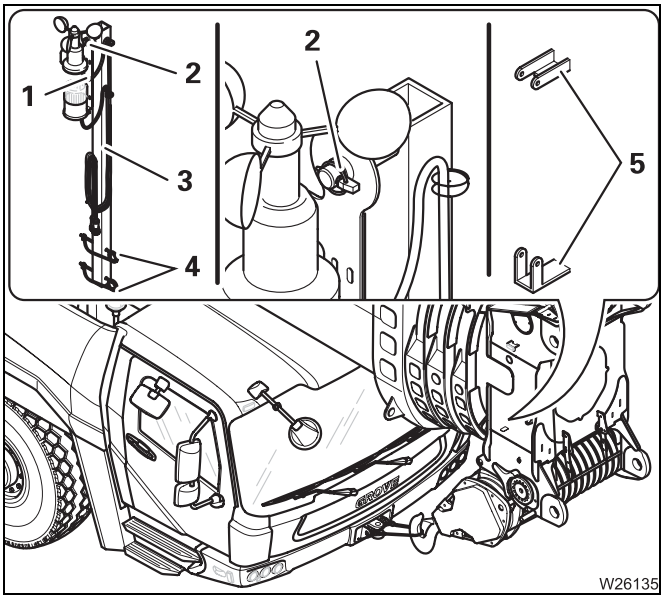
Always store the anemometer and the air traffic control lights in the crane cab before on-road driving and fasten the rod to the transport retainer. This prevents the specified overall height from being exceeded at on-road level, and the anemometer from getting damaged due to unfavourable air currents.

11.09.2013



For transport

- Dismount the anemometer; ➠ *Operating manual*.
- (**A**) – Remove the anemometer (**1**) and the air traffic control lights – if available – from the rod (**3**).
- Fasten the linchpin (**2**) to the rod (**3**).
- (**B**) – Place the rod (**3**) in the clamp (**5**).
- Secure the rod with the retaining pins (**4**).

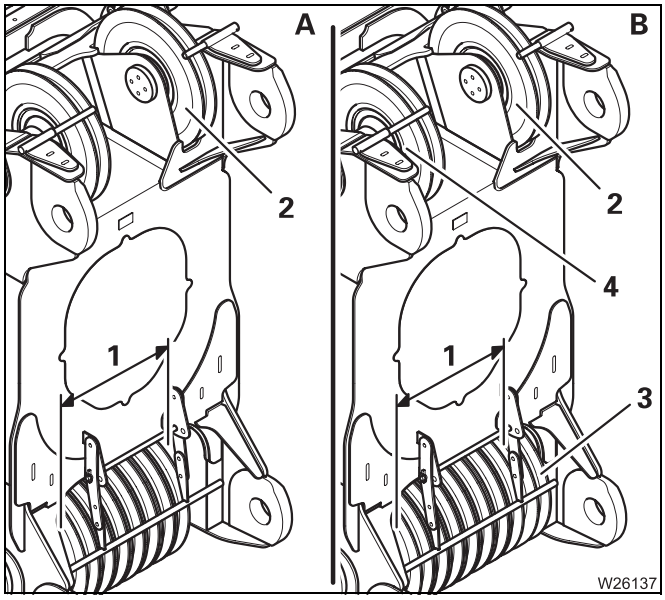


For operation

- Remove the pin (**3**) from the clamps (**5**). You will need the retaining pins (**4**) later for assembly.
- Fit the anemometer (**1**) and the air traffic control lights onto the rod (**3**).
- Secure the anemometer with the linchpin (**2**).
- Assemble the anemometer; ➠ *Operating manual*.

11.09.2013

Use of additional head sheaves



These additional pages only apply for GMK 6400 that

– are equipped with a second head sheave (**2**) and

– **(A)** – are equipped with 7 head sheaves (**1**)

or

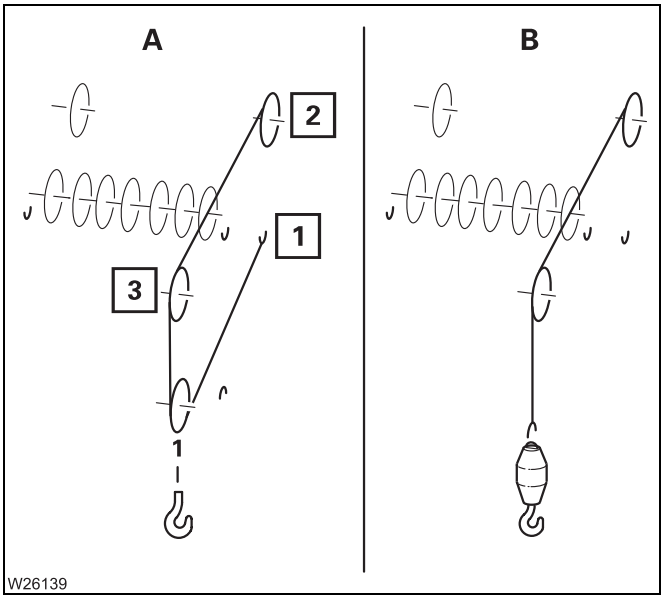
– **(B)** – are equipped with 7 head sheaves (**1**) and an additional head sheave (**3**).

The additional head sheave (**3**) is only designed for operation via the second head sheave (**2**). For operation via the head sheave (**4**) only reeve the hoist rope in the way described in the accompanying *operating manual*.

Risk of accidents if the procedure is not carried out correctly
Observe the information on the permissible usage of the auxiliary hoist in the accompanying operating manual.

10.09.2013

Risk of accident due to a damaged hoist rope
Always use the second head sheave together with the additional head sheave located underneath it or with the auxiliary single-sheave boom top. This prevents the hoist rope from becoming overloaded, snapping during operation and letting the load fall.



With 7 head sheaves

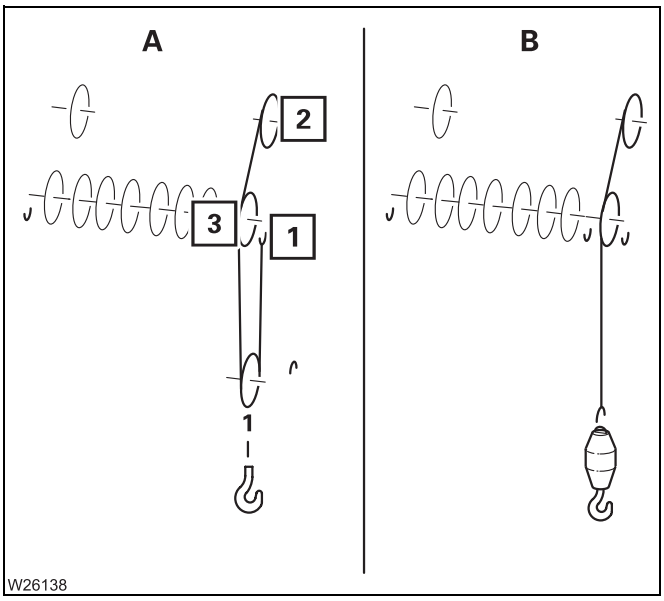
For use of the second head sheave (**2**) you will need an auxiliary single-sheave boom top (**3**).

- Use the outer rope attachment point (**1**) for 2-fall reeving.

Reeving

A 2-fall

B 1-fall



With 7 head sheaves and additional head sheave

- Only use the second head sheave (**2**) together with the additional head sheave (**3**).
- Use the outer rope attachment point (**1**) for 2-fall reeving.

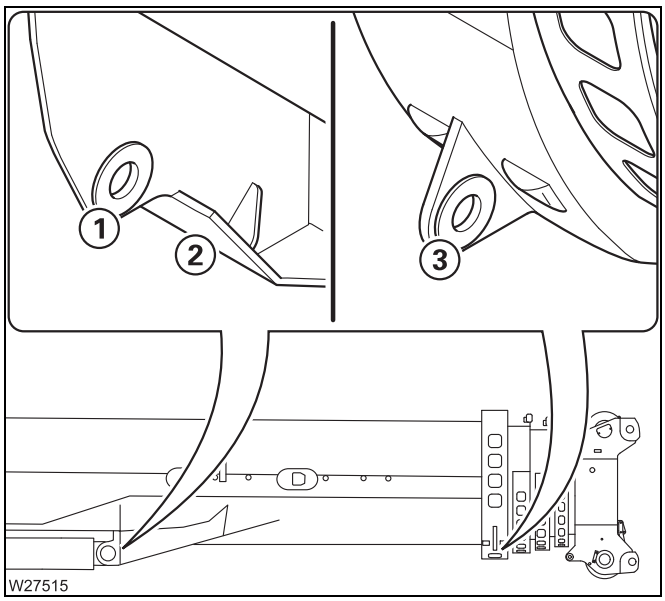
Reeving

A 2-fall

B 1-fall

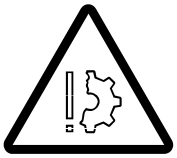
10.09.2013

Instructions for operation with a trailer



For operation with a trailer there are support points (**2**), locking points (**3**) and lashing eyelets (**1**) on each side of the main boom.

- Always set the main boom down on a trailer so that the support points (**2**) and locking points (**3**) are in contact with the corresponding counter bearings of the trailer on both sides and completely support the weight of the main boom.
- Secure the boom against lifting by the lashing eyelets (**1**). The weight of the main boom must not be supported by the lashing eyelets (**1**).
- Always lock the trailer on both sides by the locking points (**3**).

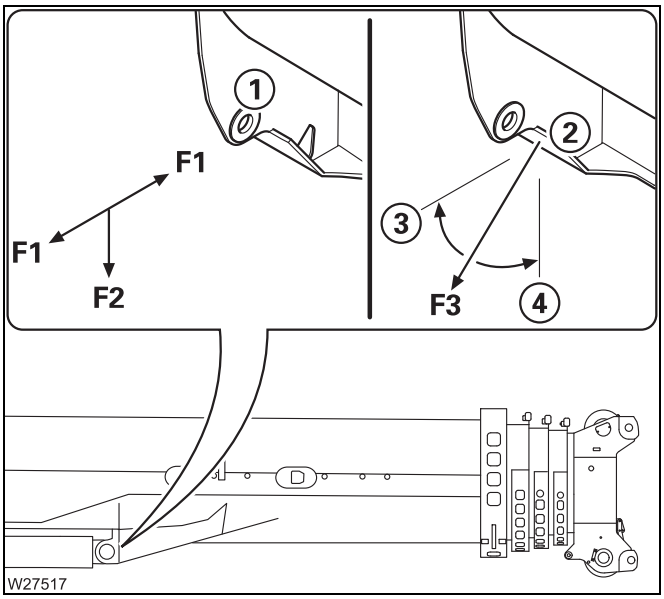


Risk of damage if procedure is incorrect
Only use trailers where it is guaranteed that all support points and locking points can be used on the main boom as intended and ensure that the trailer can support the maximum occurring forces in the appropriate directions.
Ensure that the weight of the main boom is not supported by the lashing eyelets.
This prevents the basic section from being damaged due to overloading.

27.02.2014

Maximum permitted load

The lashing eyelets, support points and locking points are designed for the maximum forces listed below.



Lashing eyelets

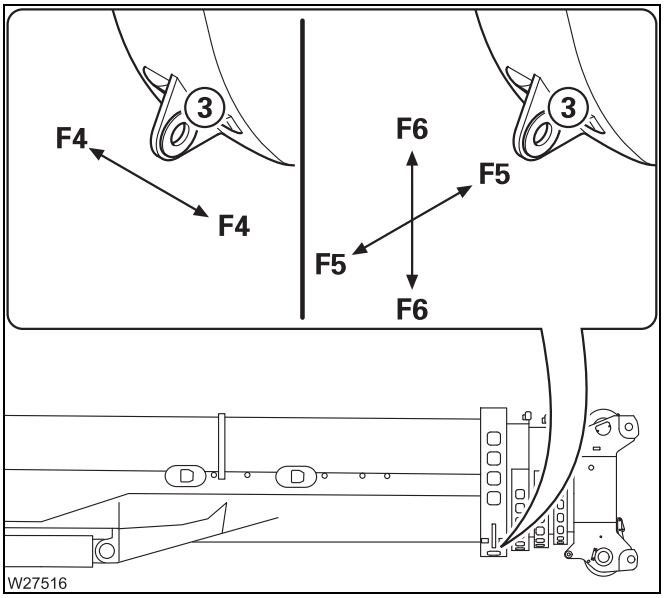
The maximum forces permitted for the lashing eyelets (**1**) are **F1** and **F2** in the direction indicated.

- Horizontally: **F1** = max. 45 kN (10 115 lbf)
- Vertically: **F2** = max. 45 kN (10 115 lbf)

Support points

The maximum force permitted for the support points (**2**) is **F3** in the angle range between the horizontal (**3**) and vertical (**4**) axes.

F3 = max. 258 kN (58 000 lbf)



Locking points

The maximum forces permitted for the locking points (**3**) are **F4, F5** and **F6** in the direction indicated.

- In the direction of travel: **F4** = max. 65 kN (14 600 lbf)
- Horizontally: **F5** = max. 65 kN (14 600 lbf)
- Vertically: **F6** = max. 112 kN (25 150 lbf)

27.02.2014

This operating manual is divided into two parts:

Part 1 – Driving

Part 2 – Crane operation

Contents overview of part 1:

You will find chapter 9 to chapter 15 in part 2 – Crane Operation.

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1 Overview

12.07.2013

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1 Overview

1.1 Accidents

In the case of an accident, contact the relevant branch office of **Manitowoc Crane Care** in the country in which you are working and specify your crane type and serial number.

Adhere to the requirements regarding the obligation to report accidents prevalent in the country in which you are working and inform the supervisory authorities responsible for that particular type of accident (e.g. material damage, injuries to persons).

12.07.2013

1.2 Branch offices

1.2.1 Manitowoc Crane Care

If you need help or support with the operation on your truck crane, you can contact our branches at the following addresses **Manitowoc Crane Care**.

http://www.manitowoccranes.com/MCG_CARE/Contact_Us/EN/ContactUs.asp

1.2.2 Dealer list

Visit the following address for a global list of dealers:

http://www.manitowoccranegroup.com/DealerLocator/locator.asp

1.3 Warranty specifications

Please see the separately enclosed warranty certificate for information.

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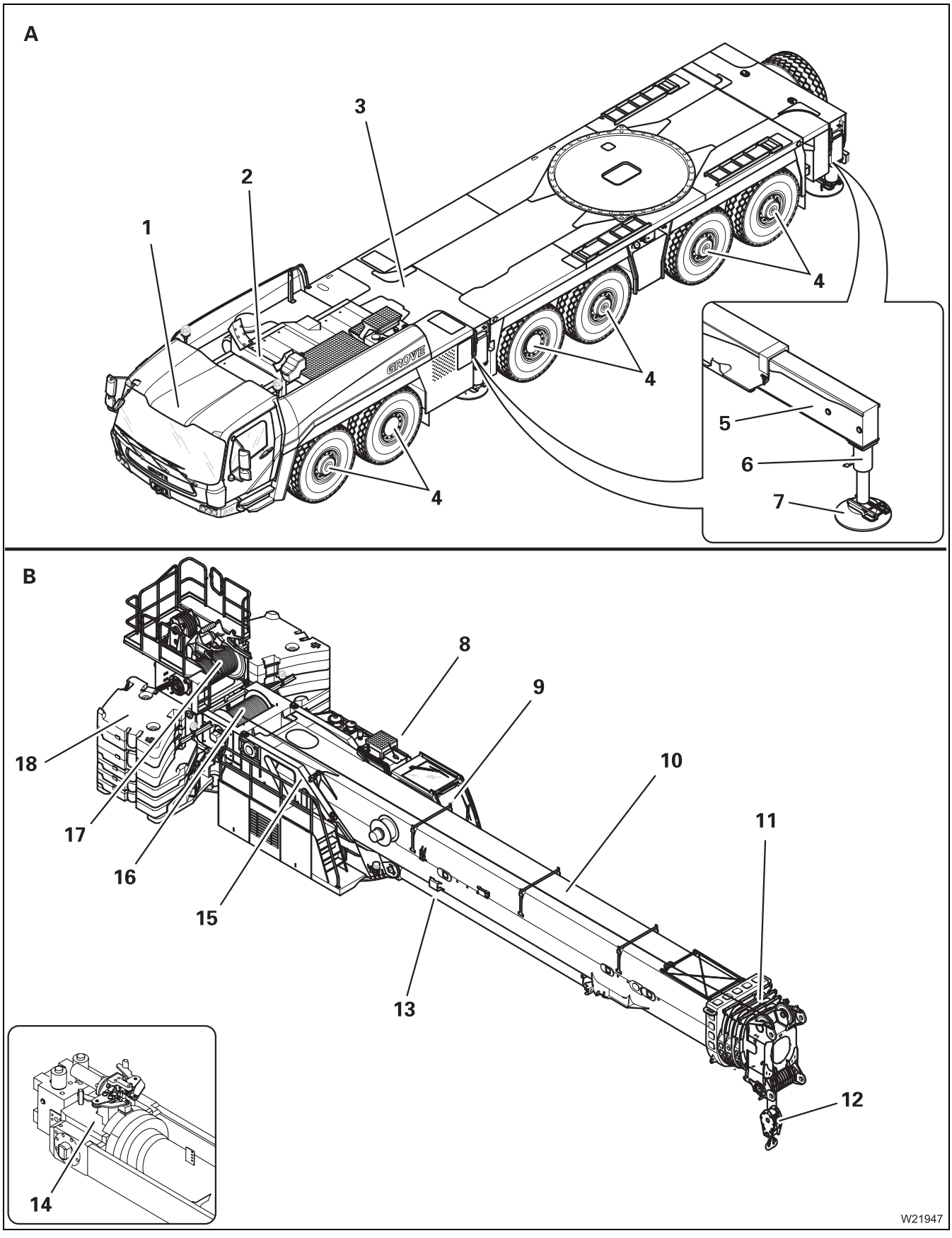
1.4 Terms used



12.07.2013

(A) – Carrier

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

(B) – Superstructure

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

[1)] Additional equipment

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1.5 Technical data

GROVE crane GMK 6400

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

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

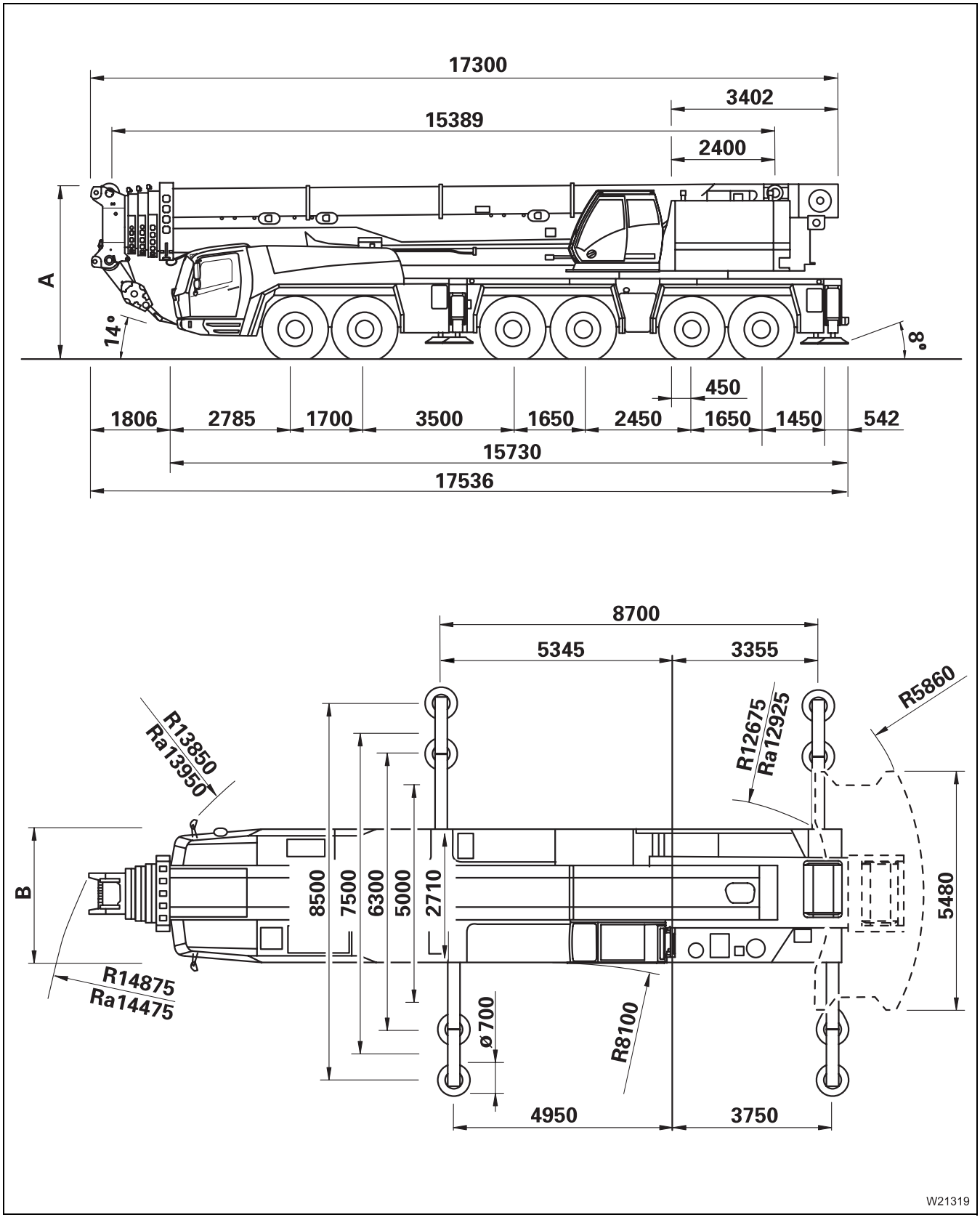
1.5.1 Maximum lifting capacity

Max. load bearing capacity:	235 t (514 000 lbs)
Max. load moment	
– Within the 360° slewing range:	1080 tm (72 t x 15 m)
– In working position 0° to the rear:	1092 tm (84 t x 13 m)

12.07.2013

1.5.2 Dimensions and weights of the truck crane, axle loads

All dimensions in the illustration are in mm.



12.07.2013

Dimensions

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

Length without auxiliary hoist:		17.58 m (57.7 ft)
A	Height:	At on-road level:
	– 385/95 R25	3.95 m (13 ft)
	– 445/95 R25; 525/80 R25	4.00 m (13.1 ft)
	Max. level change	–130/+170 mm (–5.1/+6.7 in)
B	Width:	
	– 385/95 R25	3.00 m (9.8 ft)
	– 445/95 R25	3.00 m (9.8 ft)
	– 525/80 R25	3.10 m (10.2 ft)
Angle of negotiable banks:		At on-road level (385/95 R25)
Front:		approx. 14°
Rear:		approx. 8°

Weight and axle loads

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

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

Total weight:	depending on driving mode 72 t (158 730 lbs)
Axle loads:	depending on driving mode, 12 t (26 500 lbs)
Axle loads:[1)]	24 t (52 911 lbs) in free-standing working position

[1)] The axle loads given relate to driving with a rigged truck crane and the maximum load liftable according to *Lifting capacity table*.

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1.5.3 Dimensions and weights of removable parts

This section contains the dimensions and weights of the parts that can be removed for on-road driving; ➠ *Driving modes*, p. 6 - 1.

Spare wheel

Designation	Length x width x height in m (ft)	Weight in kg (lbs)
Spare wheel 385/95 R 25	1.36 x 1.36 x 0.40 (4.45 x 4.45 x 1.30)	245 (540)
Spare wheel 445/95 R 25	1.50 x 1.50 x 0.45 (4.95 x 4.95 x 1.50)	310 (685)
Spare wheel 525/80 R 25	1.50 x 1.50 x 0.53 (4.92 x 4.92 x 1.74)	355 (785)

Outriggers

Designation	Length x width x height in m (ft)	Weight in kg (lbs)
Plastic outrigger pad diameter	0.70 x 0.14 (2.30 x 0.46)	43 (95)
Front outrigger[1)], complete per packet	2.98 x 0.37 x 1.20 (9.78 x 1.21 x 3.94)	1 252 (2760)
Rear outriggers[1)], complete, per packet	2.98 x 0.37 x 1.10 (9.78 x 1.21 x 3.60)	1 365 (3009)
Rear outrigger, complete with outrigger beams, outrigger cylinders and outrigger pads (ROB)[2)]	3.41 x 1.26 x 1.53 (11.19 x 4.13 x 5.02)	5 125 (11 300)

1) Consists of two complete packets

2) Additional equipment

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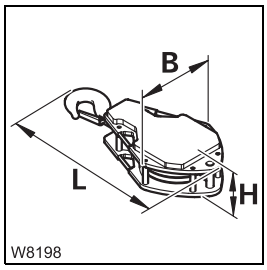
Main boom

Designation	Length x width x height in m (ft)	Weight in kg (lbs)
Complete main boom	16.0 x 2.0 x 2.0 (52.5 x 6.6 x 6.6)	27 500 (60 630)

Hook blocks and hook tackle



Designation	Length x width x height (L) x (B) x (H) In m (ft)	Weight In kg (lbs)
Double hook, 11 sheaves	2.40 x 1.05 x 0.75 (7.87 x 3.44 x 2.46)	3 500 (7 720)
Double hook, 9 sheaves	2.30 x 0.95 x 0.75 (7.55 x 3.12 x 2.46)	3 000 (6 615)
Double hook, 7 sheaves	2.00 x 0.85 x 0.75 (6.56 x 2.79 x 2.46)	2 400 (5 290)
Double hook, 5 sheaves	1.85 x 0.65 x 0.75 (6.07 x 2.13 x 2.46)	1 600 (3 530)
Single hook, 3 sheaves	1.75 x 0.40 x 0.75 (5.74 x 1.31 x 2.46)	1 300 (2 870)
Double hook, 3 sheaves	1.95 x 0.40 x 0.75 (6.40 x 1.31 x 2.46)	1 300 (2 870)
Single hook, 1 sheave	1.50 x 0.25 x 0.75 (4.92 x 0.82 x 2.46)	850 (1 875)
Hook tackle	0.91 x 0.45 x 0.45 (3.00 x 1.48 x 1.48)	450 (992)

Lifting capacity of the hook blocks; ➠ p. 12 - 119.

Auxiliary hoist

Designation	Length x width x height in m (ft)	Weight in kg (lbs)
Complete auxiliary hoist	2.40 x 2.85 x 2.10 (7.87 x 9.35 x 6.89)	5 000 (11 023)

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Counterweight-sections version A

Designation	Length x width x height in m (ft)	Weight in kg[1] (lbs)
15 t base plate	5.48 x 2.50 x 1.71 (17.98 x 8.20 x 5.61)	15 000 (33 070)
each 10 t plate	1.95 x 2.45 x 0.38 (6.40 x 8.04 x 1.25)	10 000 (22 050)
each 10 t block	1.65 x 1.82 x 0.73 (5.41 x 5.97 x 2.40)	10 000 (22 050)

Counterweight-sections version B

Designation	Length x width x height in m (ft)	Weight in kg[1] (lbs)
15 t base plate	5.48 x 2.50 x 1.71 (17.98 x 8.20 x 5.61)	15 000 (33 070)
each 10 t plate	1.85 x 2.14 x 0.56 (6.07 x 7.02 x 1.84)	10 000 (22 050)
each 10 t block	1.68 x 2.21 x 0.64 (5.51 x 7.25 x 2.11)	10 000 (22 050)

1) There may be deviations of up to ± 3% due to the manufacturing procedure.

The stability of the crane rigged with the counterweight sections delivered has been tested.

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1.5.4 Carrier

Engine

Mercedes-Benz:	OM 502 LA	
Engine emission:	EUROMOT 3A \ EPA \ CARB (off road)	EUROMOT 3B[1)] \ EPA \ CARB (off road)
Power:	450 kW (612 HP) at 1800 rpm (80/1269 - 89/491 EEC – including all modifications)	405 kW (550 HP) at 1800 rpm (80/1269 - 89/491 EEC – including all modifications)
Fuel tank:	1 x approx. 410 l (108 gal) and 1 x approx. 355 l (94 gal)	
DEF tank[1)]:		approx. 40 l (10.6 gal)

Transmission ZF-AS Tronic 3002 with integrated transmission retarder[1)] with 12 forward gears and 2 reverse gears.

[1)] Additional equipment

Transfer case Kessler VG 2500

Axle lines

Drive:	**12 x 8 x 12**
1. axle line:	Steered and driven axle line
2. axle line:	Steered and driven axle line
3. axle line:	Steered axle line
4. axle line:	Steered and driven axle line, hydraulic drive (MegaDrive) up to approx. 20 km/h
5. axle line:	Steered and driven axle line, hydraulic drive (MegaDrive) up to approx. 20 km/h
6. axle line:	Steered axle line

Steering Dual-circuit hydraulic steering with engine-independent emergency steering pump

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Tyres

12 x 385/95 R 25 on disc wheels 9.50-25/1.7
12 x 445/95 R 25[1)] on disc wheels 11.00-25/1.7
12 x 525/80 R 25[1)] on disc wheels 17.00-25/1.7

[1)] Additional equipment

Torque for wheel nuts: 650 Nm (480 lbf ft).

Tyre pressure with cold tyres for axle loads up to max. 12 t

385/95 R25[2)]:	10 bar (145 psi)
445/95 R25:	9 bar (131 psi)
525/80 R25:	7 bar (102 psi)
[2)] Michelin X-Crane	9 bar (131 psi)

Electrical system

Alternator:	28 V/100 A
Batteries:	2, each of 12 V/170 Ah
Voltage:	24 V

Tool

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

Towing coupling

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

[1)] Only permissible at certain tension angles; ➠ p. 5 - 65.

Driving speeds

At an engine speed of 1800 rpm.

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

Climbing ability

Transport weight 72 t (158 760 lbs)

	Climbing ability in %	
Drive	385/95 R25 tyres	525/80 R25 tyres 445/95 R25 tyres
12 x 8 x 12	50%	50%

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Outriggers

Design:	4-point telescoping outrigger system
Control system:	Can be controlled from both sides on the carrier and individually from the crane cab
Outrigger spans:	8.70 x 8.50 m (28.5 x 27.9 ft) 8.70 x 7.40 m (28.5 x 24.3 ft) 8.70 x 6.30 m (28.5 x 20.4 ft) 8.70 x 5.00 m (28.5 x 16.4 ft) 8.70 x 2.71 m (28.5 x 8.9 ft) 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft)
Outrigger pads	Diameter: 700 mm (27.6 in) Surface: 3848 cm^2 (596 in^2)
Stroke of support cylinders	550 mm (21.7 in)
Maximum outrigger pressure:	
– Outrigger span 8,70 x 8,50 m (28,5 x 27,9 ft)	front: 106 t (233 700 lbs) rear: 32 t (209 050 lbs)
– Outrigger span 8,70 x 2,71 to 7,40 m (28,5 x 8,9 to 24,3 ft)	front: 106 t (233 700 lbs) rear: 135 t (297 650 lbs)
Inclination indicator:	On the hand-held control, in the crane cab, on the *outrigger* control units.
Outrigger pressure display:	In the outriggers, integrated with a display in the crane cab and on the *outrigger* control units depending on design.

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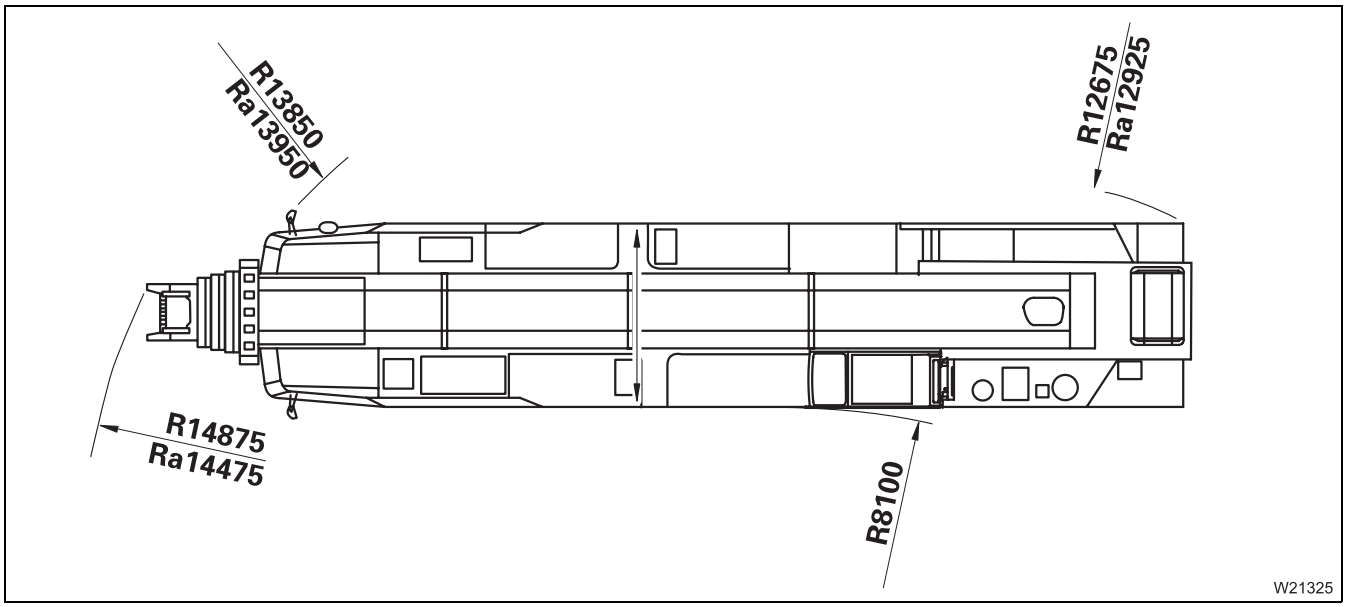
Turning radii All dimensions in the illustration are in mm.

R = values for normal steering mode

Ra = values for all-wheel steering



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1.5.5 Superstructure

Main hoist

Drum diameter:	464 mm (18.27 in) (rope centre to rope centre)
Rope diameter:	24 mm (0.95 in)
Rope length:	380 m (1 246 ft)
Rope pull:	110 kN/line (24 730 lbf)
Power unit group:	M 3 (in accordance with ISO 4301 - 2)
Load spectrum:	L 1
Factor of the load spectrum:	Km = 0.125
Theoretical service life:	D = 3 200 h

Auxiliary hoist

Drum diameter:	502 mm (19.76 in) (rope centre to rope centre)
Rope diameter:	24 mm (0.95 in)
Rope length:	690 m (2 263.8 ft)
Rope pull:	104 kN/line (23 380 lbf)
Power unit group:	M 3 (in accordance with ISO 4301 - 2)
Load spectrum:	L 1
Factor of the load spectrum:	Km = 0.125
Theoretical service life:	D = 3 200 h

Slewing gears

Make:	Siebenhaar
Type:	01 DD
Power unit group:	M2 (in accordance with ISO 4301 - 2)

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Derricking gear

Cylinder:	Differential cylinder
Adjusting angle (main boom):	–1.5° to + 83° from horizontal position
Power unit group:	M2 (in accordance with ISO 4301 - 2)

Main boom

Main boom lengths:	15.4 m to 60.0 m (50.5 ft to 196.9 ft)
Main boom head:	7 sheaves 10 sheaves[1)]
Cylinder:	One single-level telescoping cylinder with locking/unlocking mechanism
Power unit group:	M 1 (in accordance with ISO 4301 - 2)
Telescoping mechanism:	

[1)] Additional equipment

Lattice extension As additional equipment; ➠ *Lattice extension operating instructions*.

Operating speeds The specified operating speeds only apply to an engine speed of about 2000 rpm without load.

Main hoist:	Rope speed when lifting and lowering		
	Normal speed:	maximum 63 m/min (207 ft/min)	
	High-speed mode:	maximum 126 m/min (413 ft/min)	
Auxiliary hoist:	Rope speed when lifting and lowering		
	Normal speed:	maximum 63 m/min (207 ft/min)	
	High-speed mode:	maximum 126 m/min (413 ft/min)	
Slewing gear:	0 to 1.3 revolutions per minute		
Telescoping mechanism:	Extending from 15.4 to 60.0 m (50.5 to 196.9 ft)		
	approx. 740 s	In automatic mode during uninterrupted locking and telescoping processes	
Derricking gear:	Derricking between –1.5° and 83°		
	Normal speed:	To raise:	approx. 130 s
	High-speed mode:	To raise:	approx. 95 s

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1.6 Documentation supplied

The precise number of documents supplied depends on the rigging mode of the truck crane. The following documents are included in delivery:

– **Operating manual**

  Contains information on driving and crane operation.

– **Lattice extension operating manual**

  Is only supplied when the truck crane is equipped with a lattice extension or other parts for extending the main boom (e.g. auxiliary single-sheave boom top and heavy load lattice extension).

– **Operating instructions for additional equipment**

  These are only supplied when the truck crane is supplied with additional equipment which is not described in the operating instructions for driving and crane operation.

– **Documents from other manufacturers**

  Original documentation for parts not manufactured by **Manitowoc Crane Group Germany GmbH**, such as the engine and central lubrication system, as well as the tachograph, auxiliary heaters, radio and, where appropriate, other additional equipment.

– **Maintenance manual**

  Contains solely information on maintenance work and contains no instructions for repair work.

– **Safety manual**

  Provides information on the safe operation of the truck crane.

– **Circuit diagrams**

  Circuit diagrams for the electrical systems, hydraulic systems and pneumatic systems are supplied.

– **Lifting capacity table**

  Information on the lifting capacity when the truck crane is in different rigging modes.

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– **Outrigger pressure table**

  Information on the outrigger pressure when the truck crane is in different rigging modes.

– **Spare parts list and list with standard and trade parts**

  For procurement of spare parts. Information about the position and quantity of plating.

1.6.1 Questions on documentation

Consult your dealer if you have questions on the documentation supplied for your truck crane.

You can find your responsible dealer here: ➠ *Dealer list*, p. 1 - 2.

You can also send questions in either German or English directly to:

E-mail: whv-techpublications@manitowoc.com

In case of repeat orders for documentation, please contact our EMEA service.

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1.7 Notes on the operating instructions

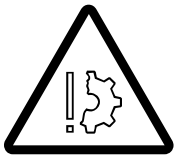
These operating instructions are not a training manual for prospective crane operators. All descriptions have been written explicitly for crane operators who have been trained to operate truck cranes.
These operating instructions are designed as a reference manual. They provide either a brief or a detailed explanation to the crane driver, based on his prior knowledge, of the individual operating steps and procedures.

1.7.1 What do the symbols used mean?

The following designations and symbols are used in the operating instructions and in the maintenance manual to highlight particularly important information.

The vertical line to the left of the hazards and warnings indicates that: This text, regardless of its length, relates to the warning symbol.

This symbol indicates hazards related to the described operation, which can endanger persons. The type of danger (e.g. danger to life, risk of injury or risk of crushing) usually precedes the warning.



This symbol indicates dangers which represent a hazard to objects, e.g. damage to the truck crane or other parts which are located within the working range.

This symbol warns you about situations where there is a danger of electric shock.

This symbol indicates that you are working with substances which pose a risk to the environment. Take particular care. For further information on handling substances that are harmful to the environment; ➠ *Maintenance manual*, chapter on *Safety and environmental protection*.

The hand with the pointing finger indicates passages that contain additional instructions and tips regarding truck crane operation.

This symbol indicates that the topic is continued on the next page. Turn to the next page.

Horizontal lines always indicate the start or the end of an example. The text used for examples is in a different font.

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1.7.2 How are the operating instructions structured?

Division

The operating instructions are divided into two parts.

- **Part 1** with chapters **1** to **8** contains a description of how to drive the truck crane.
- **Part 2** with chapters **9** to **15** contains a description of the crane operation.

One part on its own does not constitute a complete set of operating instructions; both parts must be carried along with the truck crane.
The basic safety instructions, and for crane operation, too, are included in **chapter 2** only. Please read these safety instructions and observe them.

Structure of the chapters

Chapters **3** and **9** are structured according to the product, and give an overview of all operating elements on the truck crane. You will find cross-references to the associated brief descriptions, and from there, to further chapters.

Chapters **4** to **7** and **10** to **14** describe procedures, and are therefore structured relative to these operations. For more extensive processes, the description is given with **checklists** and **operating instructions**.

- The checklists show the procedure in the required sequence, e.g. for rigging work. From there, cross-references take you to the corresponding operation descriptions.
- The operation descriptions describe the work in detail, including the required **warnings and safety instructions**.
  You are obliged to read these sections before using the truck crane for the first time **and** if you are still unsure about how to operate the truck crane.

Risk of accidents when only referring to the checklists during operation
The checklists and operating instructions should always be regarded as a single unit for the description of the complete rigging.
It is only safe to operate the truck crane by referring to the checklists when you are familiar with all the dangers which may occur, and are confident in completing the necessary steps as described in the relevant operating instructions.
If in doubt, always first read the section which is referred to in the checklist.

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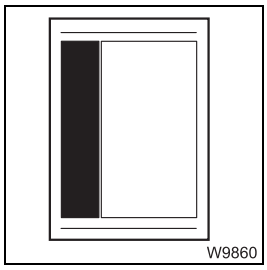
Structure of the pages

Each page of the operating instructions is divided into a wide text column and a narrow column.



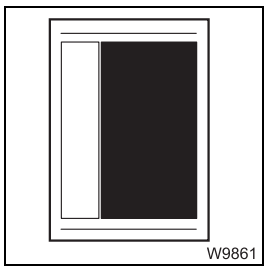
The **narrow column** contains various pieces of information:

– Chapter and section numbers

– Headings of the subsections

– Information and warning symbols

– Images with individual operating elements with parts of the truck crane or with pictograms



Different methods of emphasis are used in the **text column**:

– When a section is preceded by a hyphen (as in this section, for example), you will find a list.

– When a section is preceded by a bullet, you will be required to take concrete action, e.g.

  • Shift the transmission to neutral.

– The following text passages are highlighted in *italics*:

  – Designations of operating elements and switching states, such as *automatic* or *manual*.

  – Headings of sections to which a reference is made.

  – The names of other documents to which a reference is made.

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1.7.3 How do I find the information I need?

The operating instructions contain the following guides for orientation.

- The **Contents** at the front in sections 1 and 2 list all the chapters in the section.
- The **Table of contents** ahead of each chapter provides an overview of the topics it contains.
- The **Index** in chapters **8** and **15** gives an alphabetic list of keywords and search terms with a reference to the relevant page in the operating instructions.
- Cross-references are labelled with an arrow (➠) and refer to other pages in the operating instructions. These pages contain more detailed information, or information that relates to the topic in question.
  Furthermore, you can use the cross-references to systematically familiarize yourself with general to specific information on the truck crane or look up the functioning of individual elements.

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

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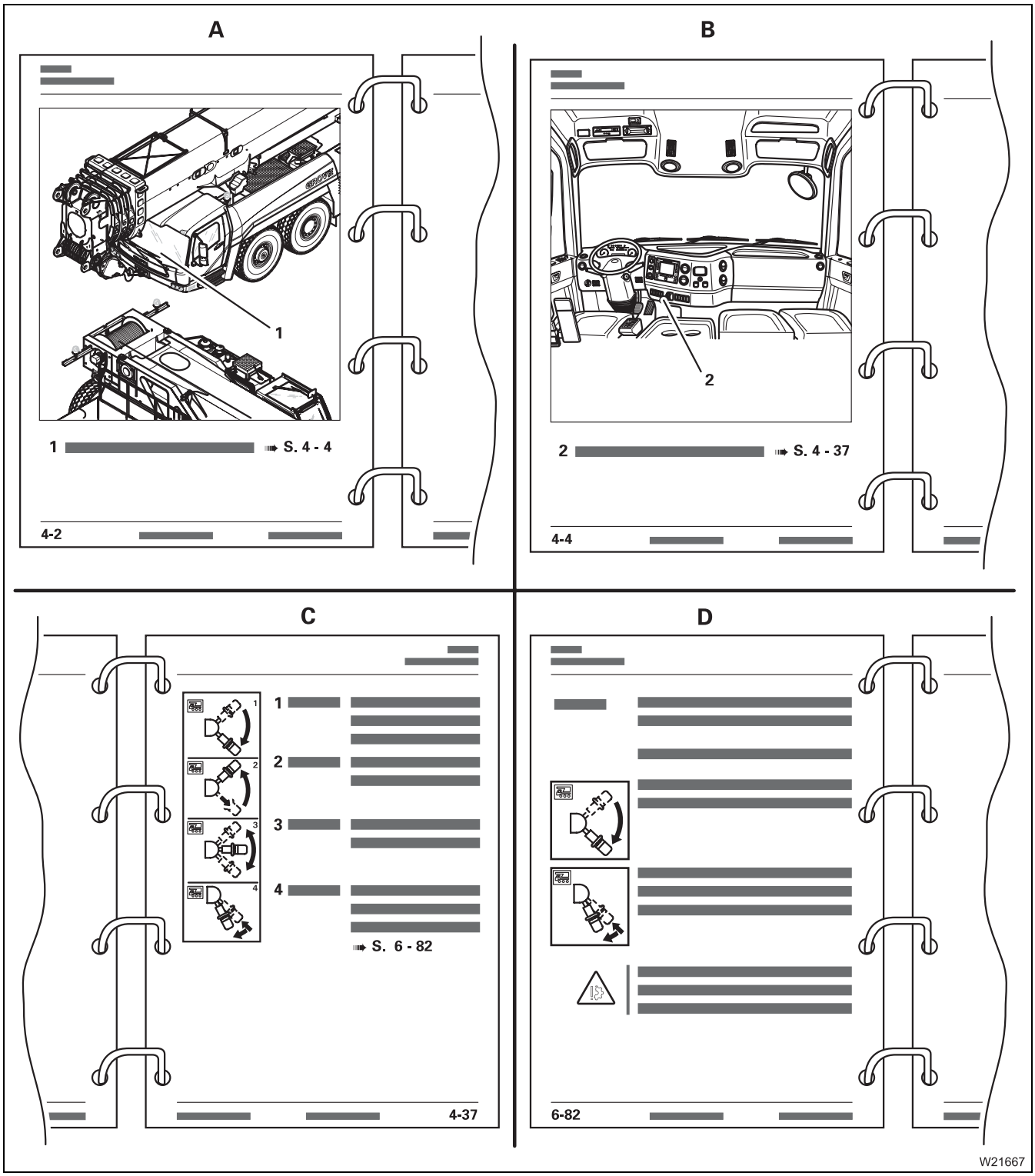
Cross-references example

The illustrations and texts in this section are only an example and may differ from the conditions on your truck crane.



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

A In this example, the general overview is shown on page 4 - 2.
The driver's cab is labelled as number **1**. The related table contains a cross-reference in the form

1 Driver's cab ➠ p. 4 - 4

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

2 Parking brake ➠ p. 4 - 37

C Page 4 - 37 gives a brief description of all the functions of the parking brake.
If further information is available, the brief description contains a cross-reference, e.g.

4	**Test position for towing a trailer:**	– Pull the lever down until it locks into place – Press in the lever and pull it further backwards The parking brake for the trailer is released; ➠ p. 6 - 82.

D Follow the cross-reference to page 6 - 82. Here, the test position of the parking brake when towing a trailer is described in detail, with all the preliminary requirements and safety instructions.

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

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1.7.4 What information is available for operations planning?

Extensive information is required for operations planning in order to guarantee safe, smooth and efficient operation of the truck crane:

The operating instructions contain

– dimensions and weights of the truck crane; ➠ p. 1 - 8,

– driving modes permitted on public roads; ➠ p. 6 - 1,

– dimensions and weights of parts of equipment that can be removed; ➠ p. 1 - 10,

– turning radii; ➠ p. 1 - 16,

– the permitted outrigger spans; ➠ p. 12 - 32,

– the size of the outrigger pads; ➠ p. 1 - 15.

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1.8 Conversion table for US measuring units

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

Converting from	in	Multiply by
mm	in	0.03937
in	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	ft lbf	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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1.9 Training – Information

For the EMEA (**E**urope, **M**iddle **E**ast, **A**frica) area, **Manitowoc Crane Group Germany GmbH** offers comprehensive training for crane types GMK and GTK.

Our training centre is located in a maritime environment, on Germany's North Sea coast in Wilhelmshaven. It is there where we train our qualified service staff and provide you, as the customer (or sales and marketing employee), with a training programme specific to your target group.

Knowledge of crane technology, components and systems used, crane functions and measures for the prevention of accidents that is acquired from the training is tailored to each target group and designed for safe, time-saving operation of your crane or else consolidates your specialist know-how of sales, marketing and service.

Our range of training programmes includes more than 20 different courses. Take advantage of our services:

- Training for prevention of accidents and crane operation.
- Crane technology training.
- Training tailored to your needs and level of experience, for different levels of difficulty from beginner to specialist.
- Theoretical and practical training, on simulators and on (your) crane.
- Training in the vicinity of GMK and GTK production.
- Training courses with the duration required by the individual; from two days to several weeks.
- Our coaches can also visit you to provide you with training on your own crane.

Have us design a suitable training programme for you today.
We would be pleased to advise you

TrainingCenter Wilhelmshaven
Tel: +49 4421 294 623
Fax: +49 4421 294 244
TrainingscenterWHV@manitowoc.com

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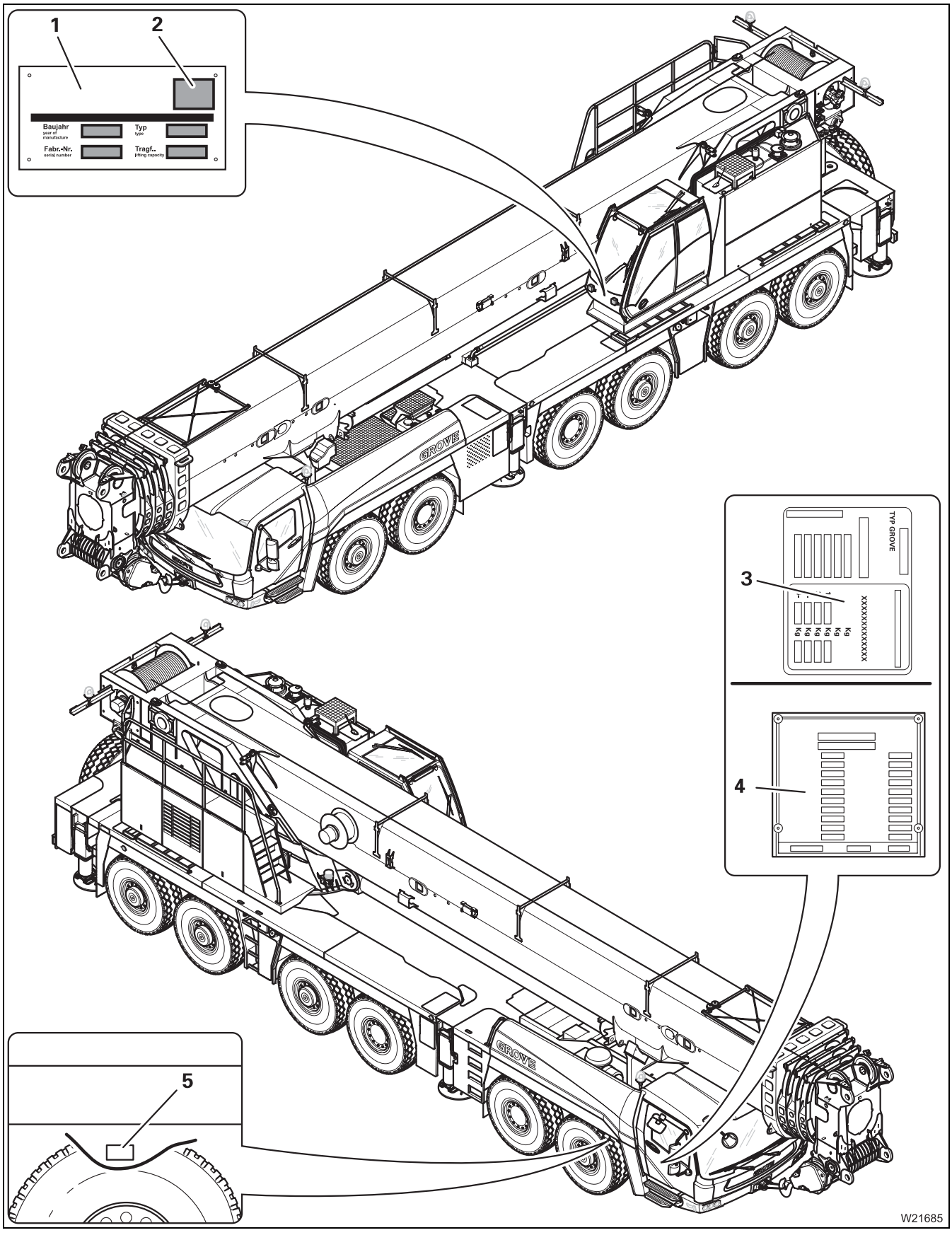
1.10 Identification



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The following plates and numbers are attached to the truck crane for identification purposes:

1 Serial number and crane type

2 The CE mark, only with truck cranes that are delivered in member countries of the EU.

3 The serial number of the driver's cab

4 The chassis number and crane type

5 The chassis number in front of the first axle line in the frame.

The location of the identification numbers on removable rigging parts (e.g. counterweights, lattice extension) is described in the corresponding chapters or in the relevant operating instructions provided.

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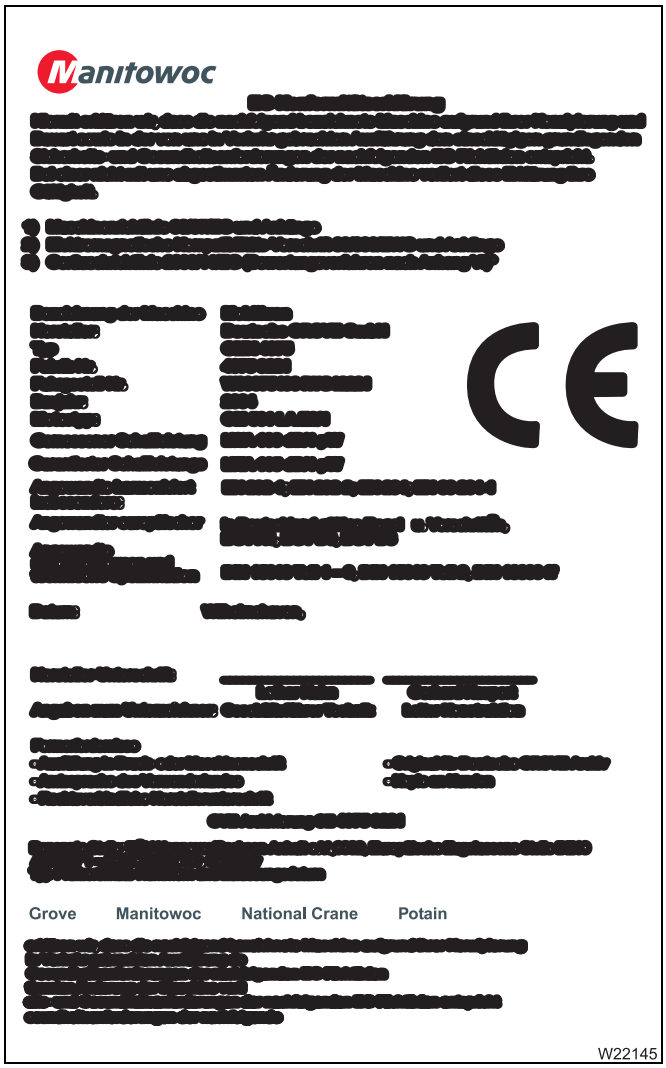
1.11 EC Declaration of Conformity

On initial delivery, operators of truck cranes receive a Declaration of Conformity as a supplement to the delivery protocol. An illustration of the Declaration of Conformity is shown below.



This Declaration of Conformity is only valid if the rated capacity limiter of the truck crane is programmed in accordance with the standards and technical specifications stated in the relevant EC Declaration of Conformity and if the truck crane specified here is in rigging mode for initial delivery state or rigging mode for completed state. Only then does the truck crane receive a CE mark upon delivery. If the truck crane is programmed otherwise on delivery, no CE mark is given. If this truck crane is later imported into an EC member state, the importer is responsible for checking and confirming that the truck crane's rated capacity limiter programming and current rigging mode correspond to guidelines specified in the Declaration of Conformity enclosed with the truck crane. For the purposes of checking and confirming, we recommend contacting the crane manufacturer or a person authorised by the same. After successful confirmation, the truck crane can be assigned a CE mark and the original CE Declaration of Conformity enclosed becomes valid. Consequently, the standards and requirements valid at the time of initial delivery thereafter apply to this crane.

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2 Basic safety instructions

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2 Basic safety instructions

Notes on the warnings used; ➠ *What do the symbols used mean?*, p. 1 - 21.

2.1 Intended use

The GMK 6400 is a state-of-the-art truck crane, designed in accordance with approved safety regulations. Nevertheless, the operator or third parties can still be endangered and the crane or other property put at risk while using it.

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

The GMK 6400 truck crane may only be used when it is in perfect technical condition and for its intended purpose and with due attention paid to safe operation and possible hazards.
Any malfunctions that could impair safety must be eliminated immediately.

The GMK 6400 truck crane may only be operated without the corresponding special equipment within the permitted temperature range; ➠ *Technical data*, p. 1 - 7.

The GMK 6400 truck crane is designed solely for lifting loads which are within the permitted GMK 6400 lifting capacities. The load must be slung as prescribed to a hook block which is positioned vertically over the load prior to lifting.

Intended use also includes

– Observing the entire crane documentation, consisting of the operating instructions, the lifting capacity table, the outrigger pressure table and the safety manual.

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

The GMK 6400 may only be operated with parts of equipment which are permitted by **Manitowoc Crane Group Germany GmbH** and which are labelled with the serial number of the GMK 6400.

The manufacturer is not liable for any damage caused by improper or unauthorized use of the GMK 6400 truck crane. The user alone bears the risk.

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2.1.1 Improper use

Manitowoc Crane Group Germany GmbH is not liable for damage resulting from improper or unauthorized use of the GMK 6400 truck crane. The user alone bears the risk.

Improper use includes:

- Transporting loads on the carrier.
- Pushing, pulling or lifting loads with the level adjustment system, outrigger beams or outrigger cylinders.
- Pushing or pulling loads or lifting them off the ground using the slewing gear, derricking gear or telescoping mechanism.
- Pulling off fixed objects with the crane.
- Two-hook operation with the boom extension and two-hook operation on the main boom head without additional equipment.
- Setting RCL codes that do not correspond to the actual rigging mode.
- Working with an overridden RCL or overridden lifting limit switch.
- After RCL shutdown, increasing the working radius by pulling the raised load at an angle (e.g. with a chain hoist).
- Misuse of the outrigger pressure display as a safety function to prevent the crane from overturning (outrigger pressure higher than 0 t).
- On-road driving in an unauthorized driving mode (axle load, dimension).
- Moving the rigged crane in an impermissible driving mode.
- Using equipment that is not permitted for the crane.
- Transporting people in any way using the lifting tackle, on the load, or in the crane cab while driving.
- Transporting passengers outside the driver's cab.
- Loading and unloading work, i.e. continuous operation without a sufficiently long break.
- Usage for any kind of sport or recreation event, especially for bungee jumping.

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2.2 Organisational measures

The operating instructions and the lifting capacity table should be kept in the truck crane for immediate access at all times, and must not be removed from the truck crane. You must have read and understood the operation and safety instructions in these operating instructions and comply with them when working.

In addition to the operating instructions and the lifting capacity table, observe all general, statutory and otherwise applicable regulations concerning accident prevention and environmental protection. You must have read and understood these and observe them when operating the crane and driving.

They could include:

– How to deal with hazardous materials

– The wearing of personal protective equipment

– Road traffic regulations and

– All applicable requirements concerning the operation of a crane.

Make sure that persons who will work on the truck crane are provided with the required information prior to starting operations. Instruct your personnel (e.g. banksmen, slingers, rigging personnel) accordingly.

Make sure the maintenance personnel have the necessary expertise for safe crane operation. Make sure the maintenance personnel have access to the operating manual.

Only qualified or trained personnel may carry out work on the truck crane. Responsibilities regarding the operation of the crane, rigging, maintenance and repair work must be clearly defined.

Make sure only authorised personnel carry out work on the truck crane.

Do not leave long hair untied or wear loose clothing or jewellery (including rings) during work. These could get caught or pulled into the unit and result in injury.

Use your personal protective gear whenever necessary or prescribed.

Observe all safety instructions and warnings on the truck crane.

Keep all safety instructions and warnings on the truck crane in a legible condition.

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Observe the operational organization at the site. Report your arrival to site management. Ask for the personnel authorised to instruct you.

Find out where the fire extinguishers are and how to operate them at every site.

Note the fire alarm and fire fighting facilities.

Should the operating behaviour of the truck crane change in such a manner that safety is impaired or if you are in doubt about the operational safety of the truck crane, stop the truck crane immediately and inform the responsible departments or persons.

Do not make any changes to the programmable control systems (e.g. the RCL).

Do not modify or retrofit the truck crane without the consent of the manufacturer if such changes would affect the safety. This also applies to

– The installation of safety devices

– The adjustment of safety devices and valves

All welding work (especially on load carrying members) may only be performed by qualified professional personnel with the prior written permission of **Manitowoc Crane Group Germany GmbH**.
To avoid damage, especially to electronic parts, there are certain measures you must take before doing any welding work. You should therefore always consult **Manitowoc Crane Care** before any welding work.

Make sure that the prescribed intervals and the intervals specified in the operation and maintenance manual for periodic inspections, tests and maintenance work are adhered to.

Replace the hydraulic hose lines, or have them replaced, at the prescribed intervals, even if no safety defects are noticeable.

Spare parts must fulfil the technical requirements defined by the manufacturer. Genuine spare parts always meet these requirements.

Appropriate servicing equipment is absolutely necessary in order to carry out maintenance work.

Observe national regulations that apply to transport when loading the truck crane. Also observe the additional safety measures prescribed by the forwarder (e.g. shipping or railway transportation company).

Monitor the work of personnel, at least occasionally, and make sure they work in accordance with the operating instructions in a safe and conscientious manner.

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2.3 Qualifications of the staff

These operating instructions are not a training manual for prospective crane operators.
All descriptions are written explicitly for crane operators who have been trained to operate truck cranes.

Personnel in training may only operate the truck crane under supervision.

Only reliable staff may operate or carry out work on the truck crane.

As a crane operator you must fulfil a number of requirements:

- You must possess a driving license for this type of vehicle that is valid in the country in which you are working.
- You must have general knowledge about working with cranes and the qualifications required in the country in which you are working.
- You must be familiar with and understand the operating instructions.
- You must be familiar with and have understood the accident prevention regulations.
- You must fulfil all physical and mental requirements for truck crane operation, e.g. perfect sight and hearing and the ability to react quickly.

Please also refer to the section in the *Safety manual* titled *You as driver and crane operator*.

Only experienced staff who are familiar with the valid accident prevention regulations are authorised to sling loads and instruct the crane operator.

Your responsibilities as a crane operator (including those concerning traffic requirements) must be clearly defined. You must be in a position to refuse instructions given to you by third parties that violate the safety regulations.

Only trained personnel with special knowledge and experience in the fields of hydraulics, pneumatics and electrical equipment and electronics may carry out maintenance work on the truck crane.

Manitowoc Crane Group Germany GmbH conducts general and type-specific crane operator courses and technical courses.

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2.4 Safety instructions for driving the truck crane

Walk around and inspect the truck crane before you start the vehicle. 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 that all covers and safety devices are fitted properly and that they are in good condition before starting the vehicle.

Use the appropriate access aids when checking overhead crane parts. Do not use parts of the crane as access aids.

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

Keep all electric and hydraulic connections free from dirt. Check the connecting points for dust, foreign bodies and moisture before installation. This also applies to protective caps and bridging plugs.

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.

After driving, secure the truck crane against unauthorized use.

2.5 Safety instructions for crane operation

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

Walk around the truck crane and inspect it before beginning crane operation. Check the condition of the truck crane carefully using the checklists in the operating 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 (RCL, lifting limit switch, dead man's switch, emergency stop switches) every day before you start work.

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

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

Always use a ladder for work above head height.

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

Keep all electric and hydraulic connections free from dirt. Check the connecting points for dust, foreign bodies and moisture before installation. This also applies to protective caps and bridging plugs.

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

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

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

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

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

Always level the truck crane before operating the crane.

Only use parts of equipment (counterweight sections, lattice extension) that belong to your truck crane. Both the truck crane and the equipment must have the same serial number.

Lifting loads simultaneously with two cranes is particularly dangerous. Carry out this type of work with special care.

Always set the load down when you interrupt work, and never leave the truck crane as long as a load is raised.

Secure the truck crane against unauthorized use whenever you leave it.

Crane operation carried out in the vicinity of live electrical cables as well as oil, gas or other supply lines is dangerous and requires that special precautionary measures be taken. Please observe the instructions in the section titled *Crane operation under special operating conditions* in the *Safety manual* and the respective national regulations.

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2.6 Notes on transporting persons

The truck crane is intended for lifting loads. Transporting persons is considered improper use of the truck crane.

It is prohibited to:

- Transport persons in any way with the lifting tackle or on the load.
- Transport persons outside the driver's cab.
- Transport persons on the lattice extensions or boom extensions.
- Use the truck crane for any kind of sport or recreation event, especially for “bungee” jumping.
- Directly attach equipment for lifting persons on a luffing jib.
- Transport persons with the truck crane when another, less dangerous method of transporting persons is possible.

In addition to these specifications in this section, also always observe the legal requirements and guidelines for transporting persons applicable in the country in which you are working.

Equipment for lifting persons

To lift persons, only use equipment for lifting persons that comply with the requirements specified in the standards and regulations applicable in the country in which you are working.

The equipment for lifting persons must be fastened and secured as prescribed.

The prescribed personal protection equipment must be available and used (safety harnesses, etc.).

Personnel

Only authorised and properly qualified personnel are permitted to transport persons.

The crane operator must comply with the specifications of the manufacturer and the restrictions with regard to the lifting accessories (hooks, lifting gear, equipment for lifting persons, etc).

The crane operator must have knowledge of and meet the requirements of the relevant legal regulations and standards (e.g. the BGR 159 in Germany or the ASME B30 in the USA).

The crane operator must have the necessary knowledge for operating the truck crane and the equipment used for lifting persons.

The crane operator and the persons to be transported must be made aware of all the known dangers involved when transporting persons.

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Operation

Operations planning for transporting persons must be carried out with special care. If official registration is required in the country in which you are working, this must be done with the relevant authorities in good time.

The truck crane must be equipped as prescribed and be level.

Before transporting persons, the crane operator must make sure that the safety devices and emergency operation functions are in perfect working order.

Before transporting persons, the crane operator must make sure that the lifting limit switch is **not** overridden.

The *Operating manual* and the *Lifting capacity table* must be in the crane cab and within easy reach of the crane operator.

All crane movements must be performed slowly and with extreme care.

The crane operator is not allowed to leave the crane cab until the equipment for lifting persons has been set down and the person transported has left it.

The crane operator must take care that the degree of utilisation does not exceed 50% during operation.

The number of reeved rope lines must be selected such that the load on the hoist rope does not exceed 50% of the rope pull. At the same time, the total weight of the lifted load must be considered, consisting of the weights of the hook block, the lifting gear and the equipment for lifting persons including the maximum payload.

When transporting persons, the crane operator must maintain the safe distances from electrical lines applicable in the country in which he is working. The distances are normally greater than the distances for lifting loads specified in the *Safe distance from electrical lines* section.

The transported person must have radio contact to the crane operator.

When used for transporting persons, the truck crane must not be used for other tasks.

The crane operator is not permitted to exceed the maximum permissible wind speeds and wind loads for transporting persons applicable in the country in which he is working. These values are normally lower than those for lifting loads specified in the *lifting capacity table*.

When the equipment for lifting persons is being used and is in a stationary position, then the slewing gear, hoist, derricking gear and telescoping mechanism must be secured against accidental use by being switched off.

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Truck crane

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

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

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

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3 Operating elements for driving

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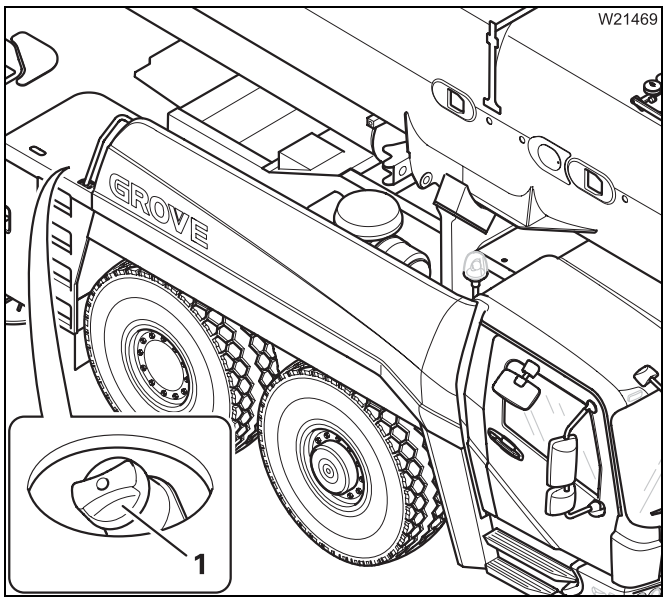
3 Operating elements for driving

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



If the receptacle (**1**) is present, then the truck crane is equipped with the additional equipment *DEF system*[1)].

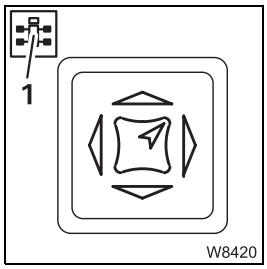
The *DEF system* is only present on truck cranes that comply with the exhaust emissions in TIER4i or Euromot 3B.

[1)] DEF (**D**iesel **E**xhaust **F**luid), operating fluid for exhaust gas aftertreatment e.g. *AdBlue*. For *AdBlue,* there are registered trademarks of Kruse GmbH & Co KG, BASF SE and the German Association of the Automotive Industry.

3.1 Overview of the operating elements

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

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



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

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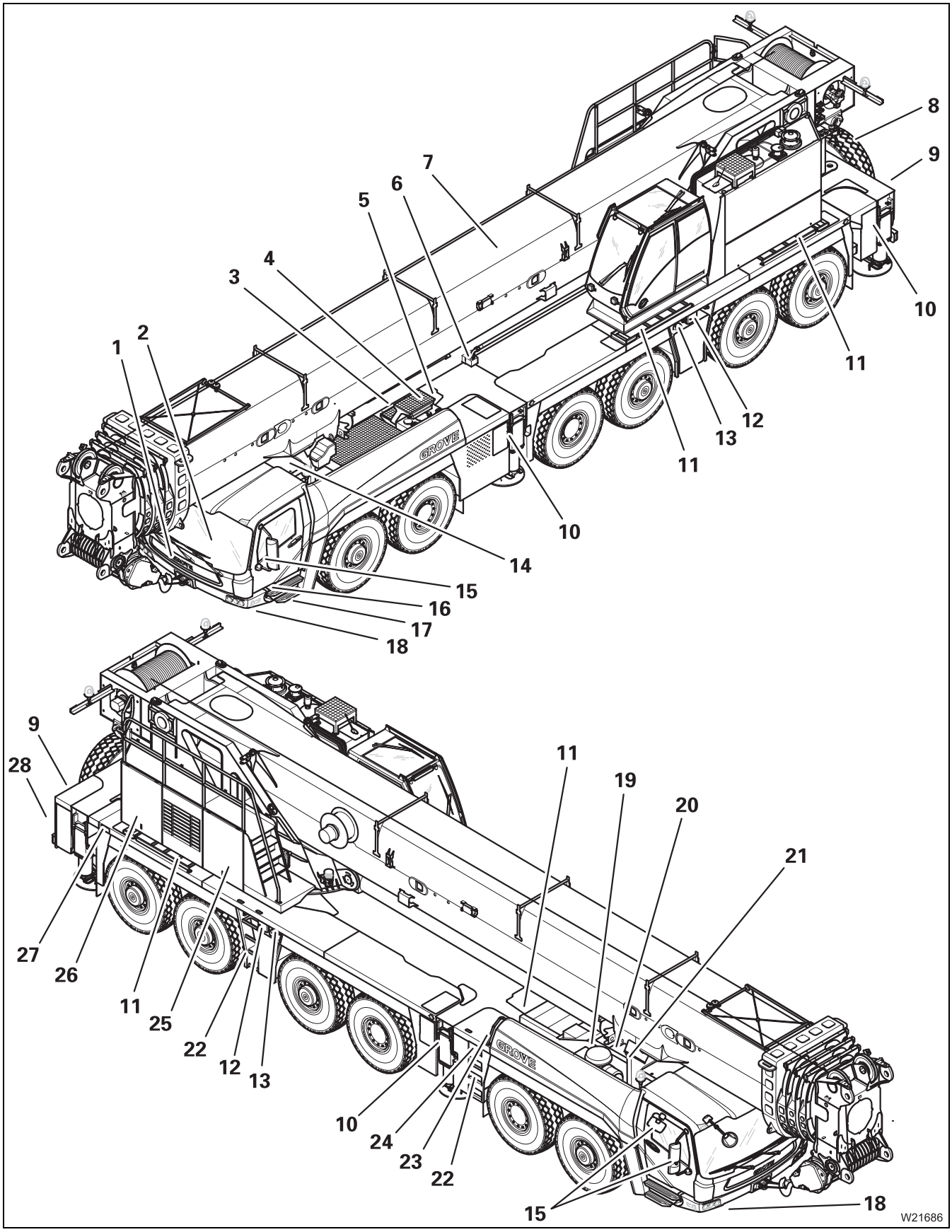
3.1.1 On the outside of the truck crane



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1	Front flap	p. 3 - 64
2	Driver's cab	p. 3 - 4
3	Valves on hydraulic tank	p. 4 - 11
4	Hydraulic oil cooler, second cooler[1)]	
5	Hydraulic emergency operation	p. 14 - 59
6	Switching on boom floating position Switching on boom pre-tensioning	p. 6 - 8 p. 6 - 9
7	Removal of the main boom[1)]	
8	Spare wheel[1)]	p. 1 - 10
9	Chocks	p. 5 - 53
10	Outriggers, operation Outrigger lighting Installing/removing outrigger beams Installing/removing the supporting box [1)]	p. 12 - 29 p. 3 - 57 p. 6 - 35 p. 6 - 53
11	Ladders	p. 4 - 5
12	Outrigger control units[1)] Emergency stop switch Sockets for hand-held control	p. 3 - 29 p. 4 - 26 p. 3 - 28
13	Fuel tank Dual system fuel tank[1)]	p. 4 - 8 p. 4 - 9
14	Connection for battery charger[1)]	p. 7 - 11
15	Adjusting the mirrors	p. 5 - 6
16	Battery master switch	p. 4 - 12
17	Filler connection for the compressed air system Tyre inflator connection	p. 7 - 6 p. 7 - 17
18	Warning plates for vehicle width	p. 5 - 8
19	Air intake inhibitor[1)]	p. 4 - 27
20	Engine	p. 4 - 1
21	External starting socket[1)]	p. 7 - 11
22	Access ladders	p. 4 - 4
23	DEF tank[1)]	
24	Battery master switch	p. 4 - 12
25	Switching on the slewing gear freewheel[1)]	p. 6 - 7
26	Switching the superstructure driving lights on/off[1)]	p. 6 - 10
27	Control unit – Locking pin – Auxiliary supports	p. 3 - 30
28	Reverse camera	

[1)] Additional equipment

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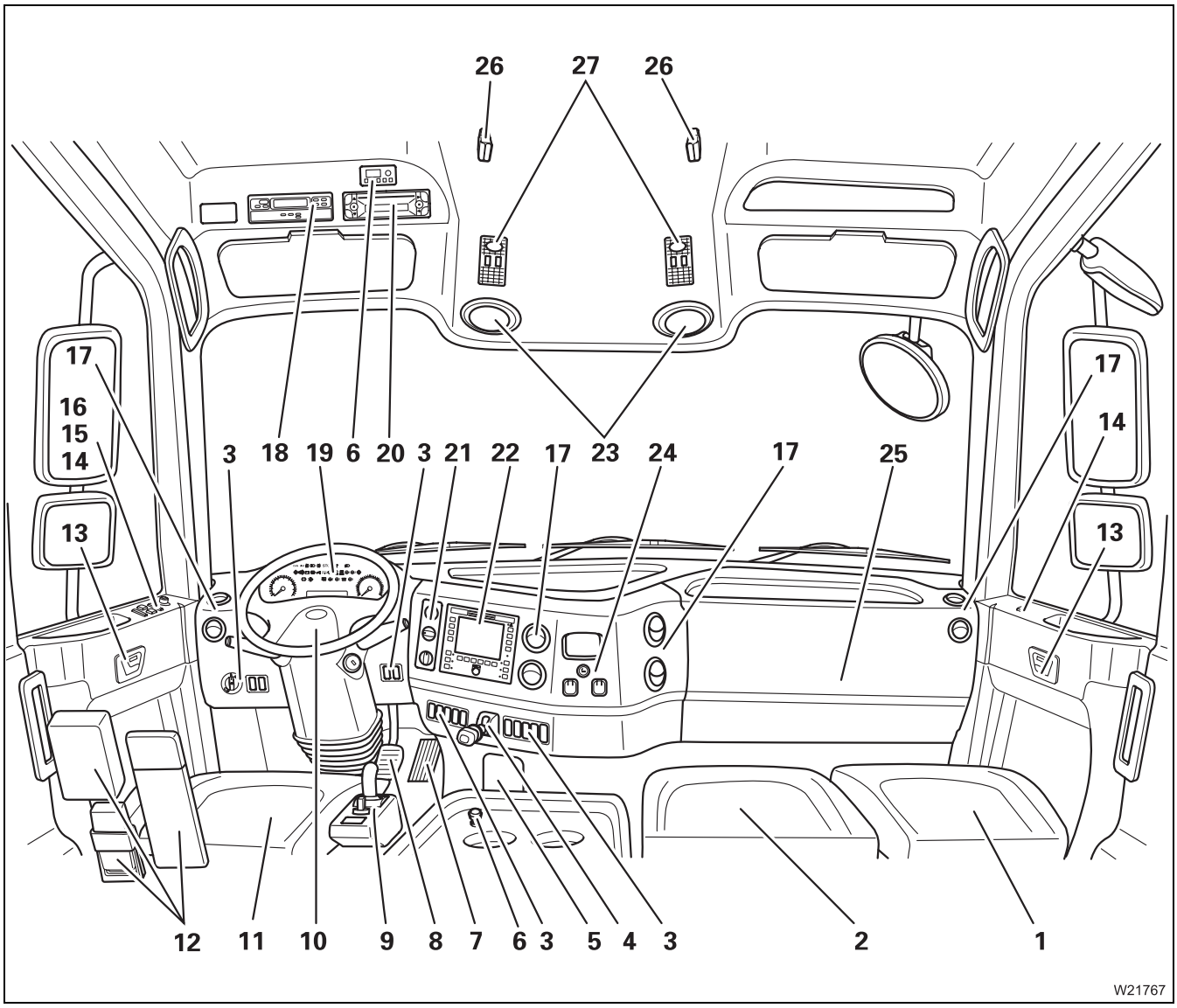
3.1.2 Driver's cab

Overview



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1	Passenger's seat	➠ p. 5 - 12
2	Storage space or 2nd passenger seat[1)]	
3	Instrument panel	➠ p. 3 - 7
4	Parking brake	➠ p. 3 - 49
5	Diagnostics Hydraulic emergency operation on/off[1)]	➠ p. 3 - 61 ➠ p. 14 - 59
6	Auxiliary water heater[1)]	➠ p. 5 - 75
7	Accelerator	➠ p. 5 - 46
8	Service brake	➠ p. 5 - 32
9	Transmission operating elements	➠ p. 3 - 14
10	Steering column/steering wheel	➠ p. 3 - 13
11	Driver's seat	➠ p. 5 - 11
12	Behind driver's seat – Warning triangle[1)] – First-aid kit[1)] – Warning lamp[1)]	
13	To open/lock door	➠ p. 3 - 63
14	Separate steering	➠ p. 3 - 52
15	Window winder	➠ p. 3 - 62
16	– Adjusting the mirrors – Mirror heating	➠ p. 5 - 6 ➠ p. 5 - 7
17	Adjusting the air vents	➠ p. 5 - 71
18	Tachograph or cover	➠ p. 3 - 15
19	Instrument panel	➠ p. 3 - 8
20	Radio/cassette/CD[1), 2)]	
21	Heating/Air-conditioning system	➠ p. 3 - 26
22	ECOS control unit Monitor, reverse camera	➠ p. 3 - 16 ➠ p. 3 - 46
23	Loudspeakers	
24	Sockets 12 V/24 V Cigarette lighter Ashtray	➠ p. 3 - 39
25	Behind the cover	➠ p. 3 - 6
26	Fastening the folding berth[1)]	➠ p. 5 - 56
27	Cab lighting	➠ p. 3 - 58

[1)] Additional equipment

[2)] ➠ *Separate operating manual*

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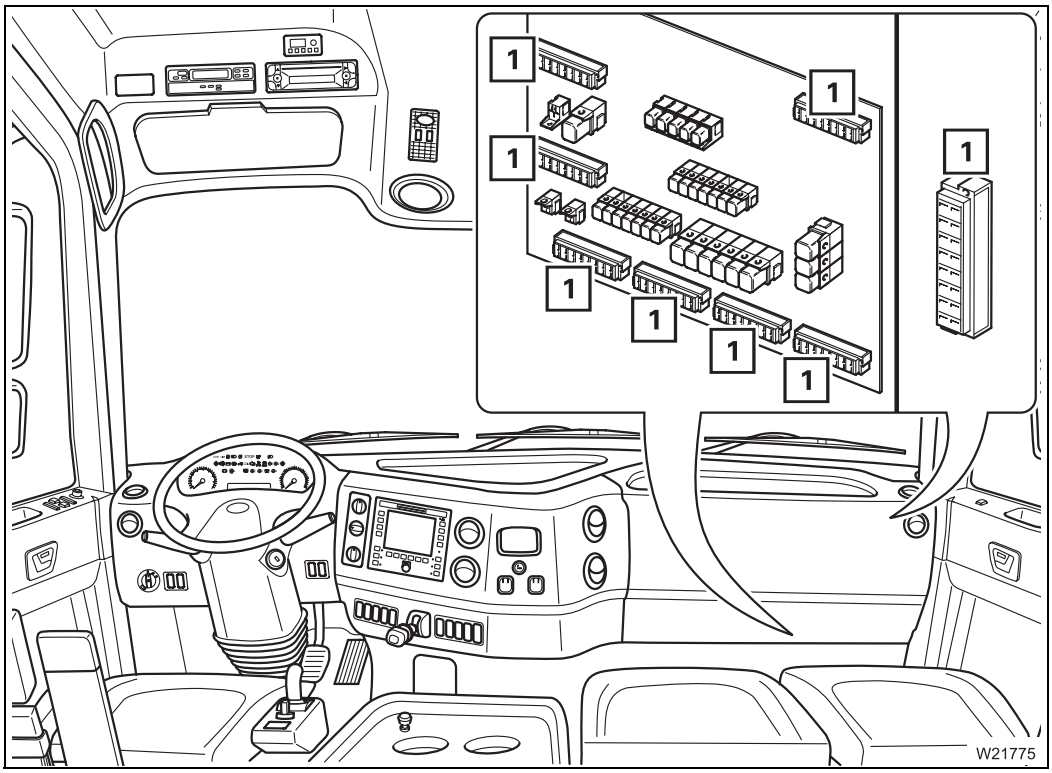
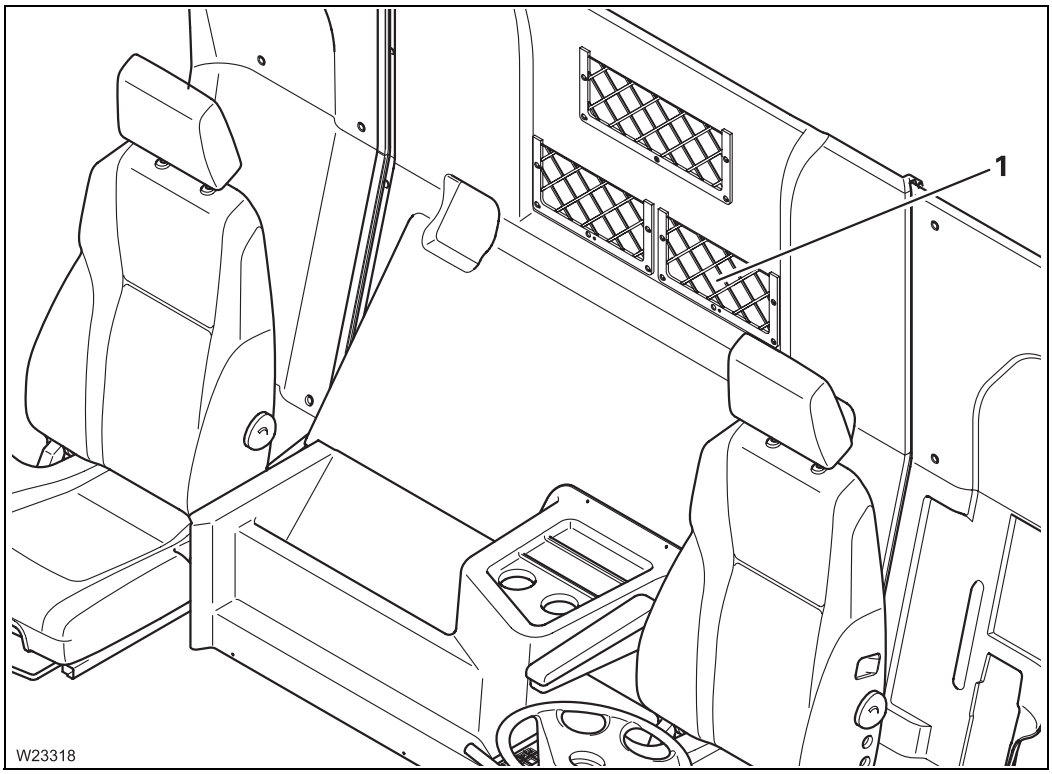
Behind the cover



1 Fuses ➠ p. 7 - 19

In the rear of the driver's cab



1 Spare key, spare selector handle for battery master switch, radio equipment

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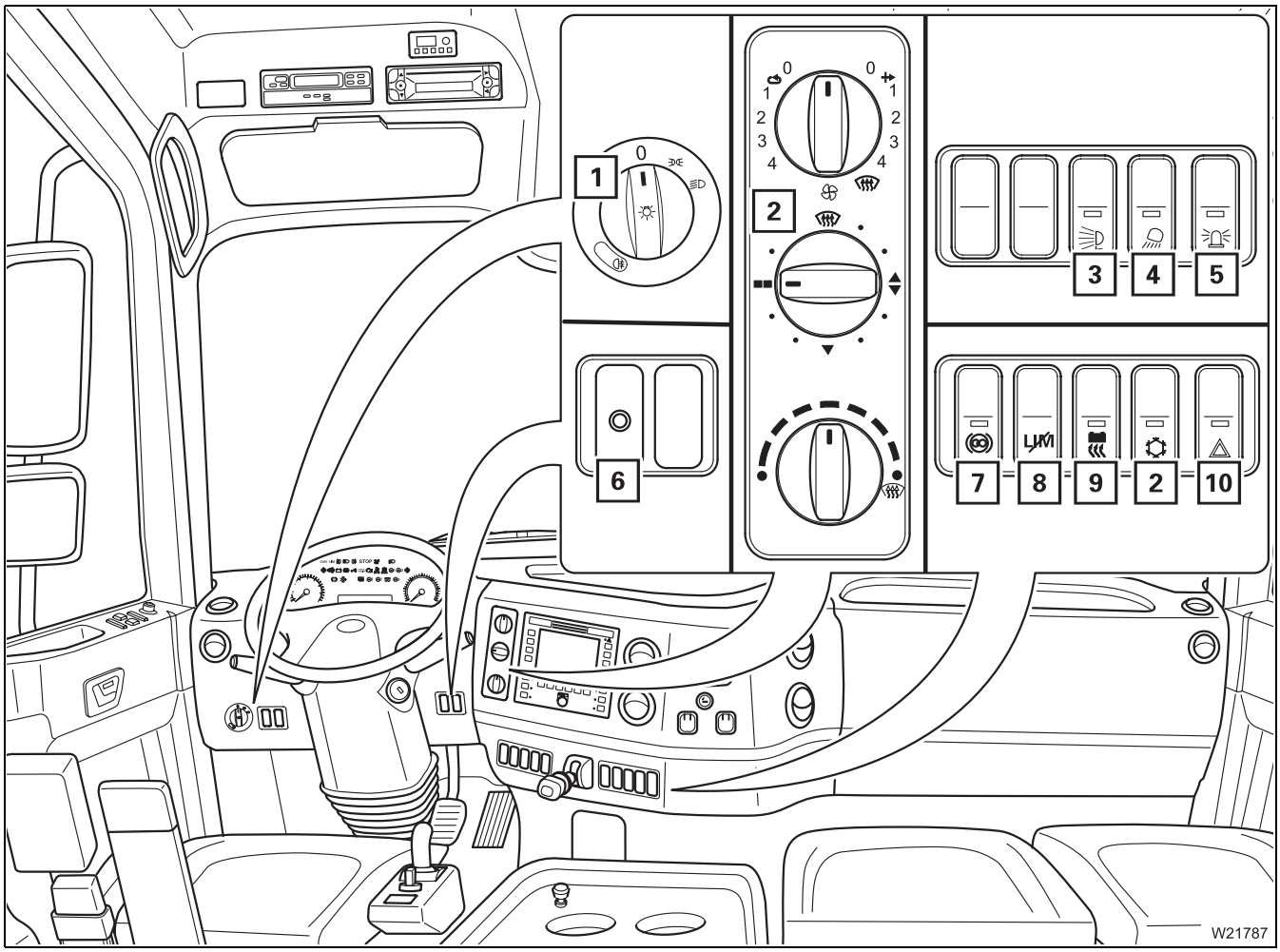
3.1.3 Instrument panel

Left/right



1	Lighting on/off	➠ p. 3 - 56
2	Heating/Air-conditioning system[1)]	➠ p. 3 - 26
3	Spotlights on the rear of the carrier[1)]	➠ p. 3 - 57
4	Outrigger lighting on/off	➠ p. 3 - 57
5	Rotating beacon on/off	➠ p. 3 - 57
6	Check – dual tank	➠ p. 4 - 9
7	Switching the transmission retarder function on/off	➠ p. 3 - 49
8	Overriding torque reduction[1)]	➠ p. 5 - 52
9	Battery heater on/off[1), 2)]	➠ p. 3 - 39
10	Hazard warning system on/off	➠ p. 3 - 56

[1)] Additional equipment

[2)] ➠ *Separate operating manual*

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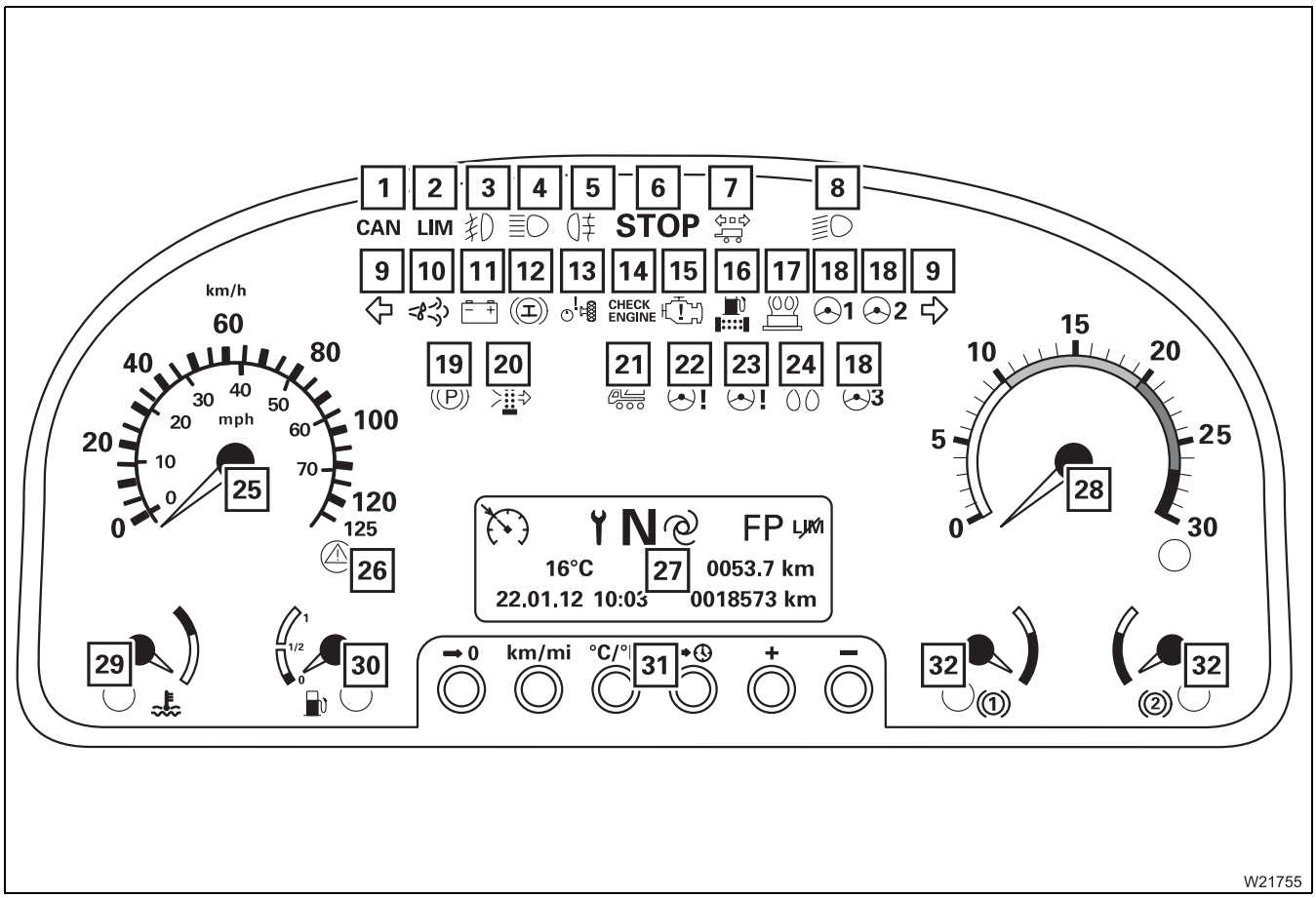
Middle



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1	CAN BUS system malfunction	➠ p. 5 - 50
2	Torque reduction indicator lamp[1)]	➠ p. 5 - 52
3	Fog light indicator lamp[1)]	➠ p. 3 - 55
4	Headlight – full beam indicator lamp	➠ p. 3 - 55
5	Fog tail light indicator lamp	➠ p. 3 - 56
6	STOP warning	➠ p. 3 - 35
7	Indicator lamp for trailer turn signal indicator[1)]	➠ p. 3 - 56
8	Parking light/headlight indicator lamp	➠ p. 3 - 57
9	Indicator lamp for turn signal indicator	➠ p. 3 - 56
10	DEF level indicator lamp[1)]	➠ p. 3 - 37
11	Voltage monitoring warning	➠ p. 3 - 23
12	Additional brake indicator lamp	➠ p. 3 - 48
13	Hydraulic drive (MegaDrive) indicator lamp	➠ p. 3 - 44
14	Engine warning lamp	➠ p. 3 - 35
15	Engine malfunction	➠ p. 3 - 35
16	Fuel filter inspection lamp[3)]	
17	Flame start system warning lamp	➠ p. 3 - 35

[1)] Additional equipment

[2)] ➠ *Maintenance manual*

[3)] Additional equipment, currently not available

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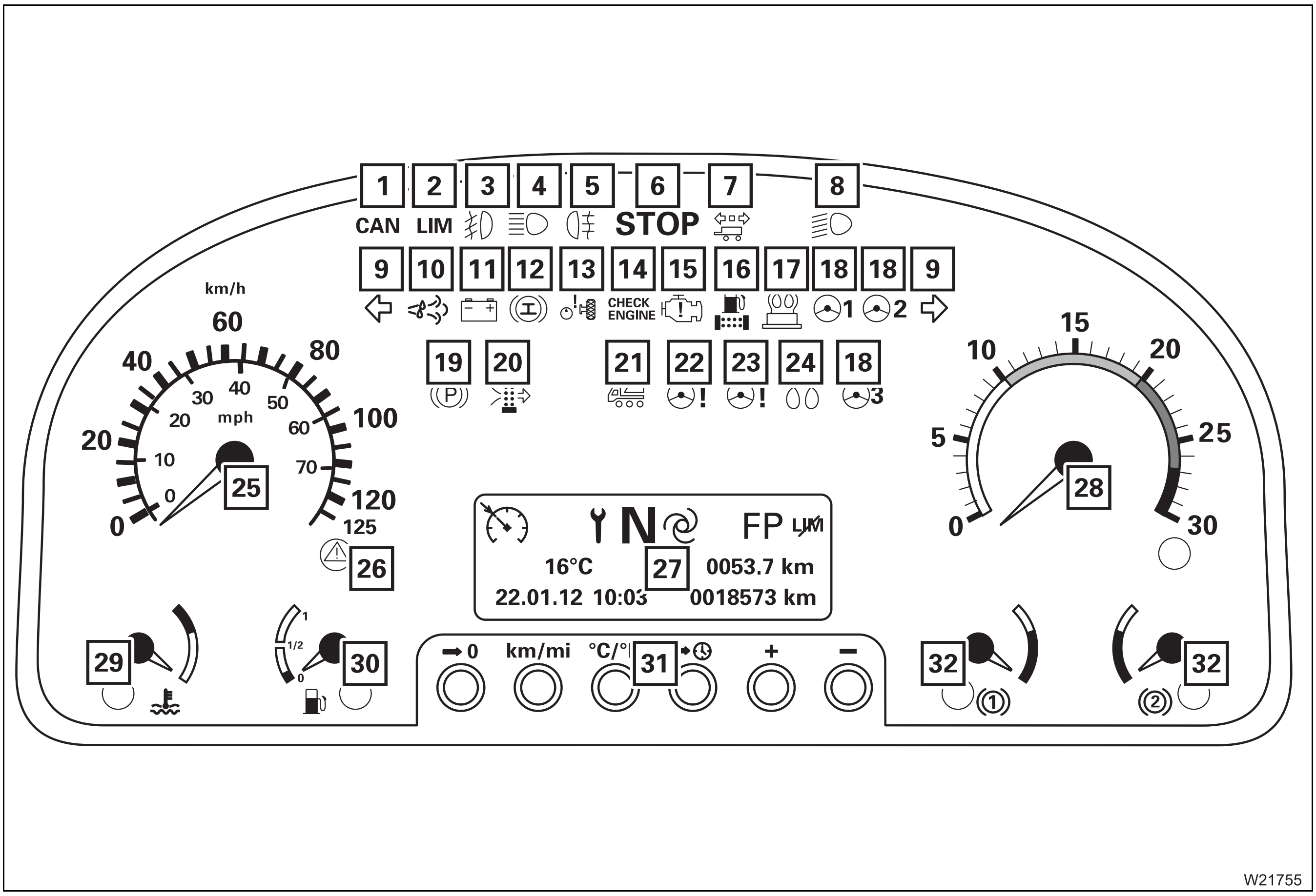
Middle



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18 Steering circuit warning lamp ➠ p. 3 - 50
19 Parking brake indicator lamp ➠ p. 3 - 49
20 Air filter indicator lamp[2)]
21 Superstructure ignition indicator lamp ➠ p. 3 - 36
22 Steering malfunction ➠ p. 3 - 50
23 Steering warning lamp ➠ p. 3 - 51
24 Flame start system monitoring[1)] ➠ p. 3 - 35
25 Speedometer ➠ p. 3 - 60
26 Tachograph malfunction warning[1)] ➠ p. 5 - 16
27 Display, driving mode ➠ p. 3 - 12
28 Tachometer ➠ p. 3 - 35
29 Coolant temperature display ➠ p. 4 - 22
30 Fuel level display ➠ p. 4 - 22
31 Keypad for driving display ➠ p. 3 - 12
32 Display – supply pressure in brake circuits ➠ p. 3 - 48

[1)] Additional equipment
[2)] ➠ *Maintenance manual*
[3)] Additional equipment, currently not available

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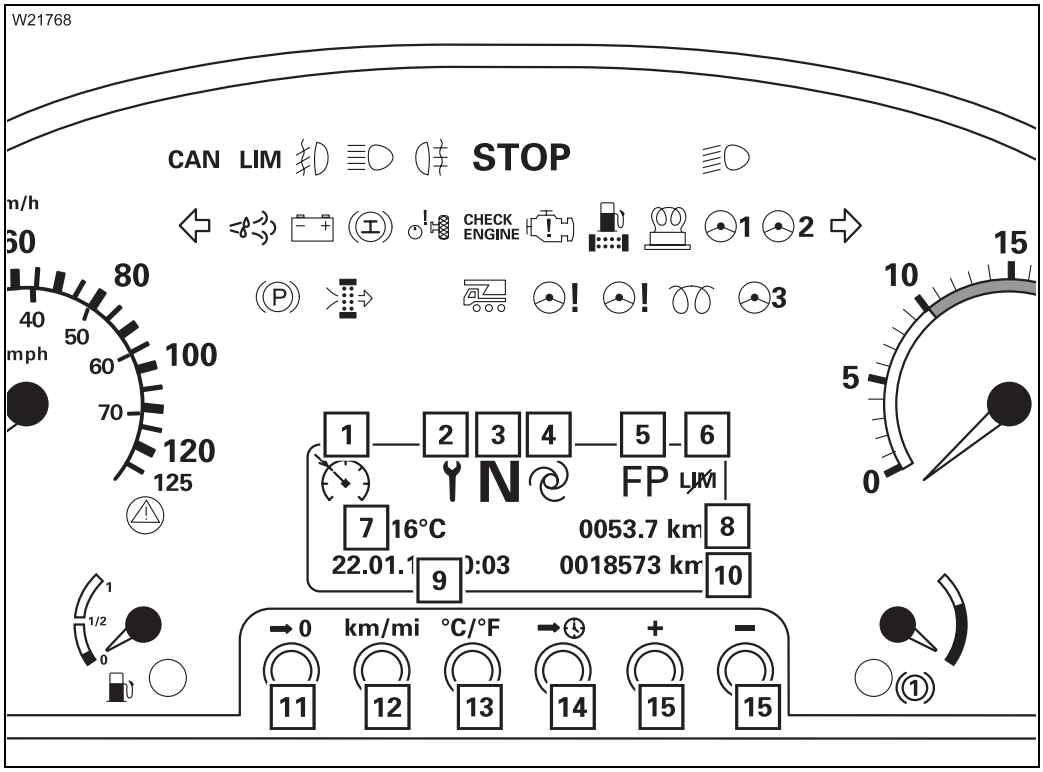
3.1.4 Display, driving mode



1	Tempomat display	➠ p. 5 - 22
2	Display for gearbox malfunctions	➠ p. 7 - 30
3	Transmission display	➠ p. 3 - 43
4	Automatic/manual operating mode display	➠ p. 5 - 27
5	Transmission error messages display	➠ p. 7 - 30
6	Torque reduction display override[1)]	➠ p. 5 - 52
7	Outside air temperature display	➠ p. 5 - 22
8	Day's kilometre counter	➠ p. 5 - 22
9	Date/time display	➠ p. 5 - 22
10	Kilometre counter	➠ p. 5 - 22
11	Resetting the day's kilometre counter	➠ p. 5 - 22
12	Switching between km/mi	➠ p. 5 - 22
13	Switching between degrees Celsius and Fahrenheit	➠ p. 5 - 22
14	Setting the date/time	➠ p. 5 - 22
15	Setting the instrument lighting/date/time	➠ p. 5 - 22

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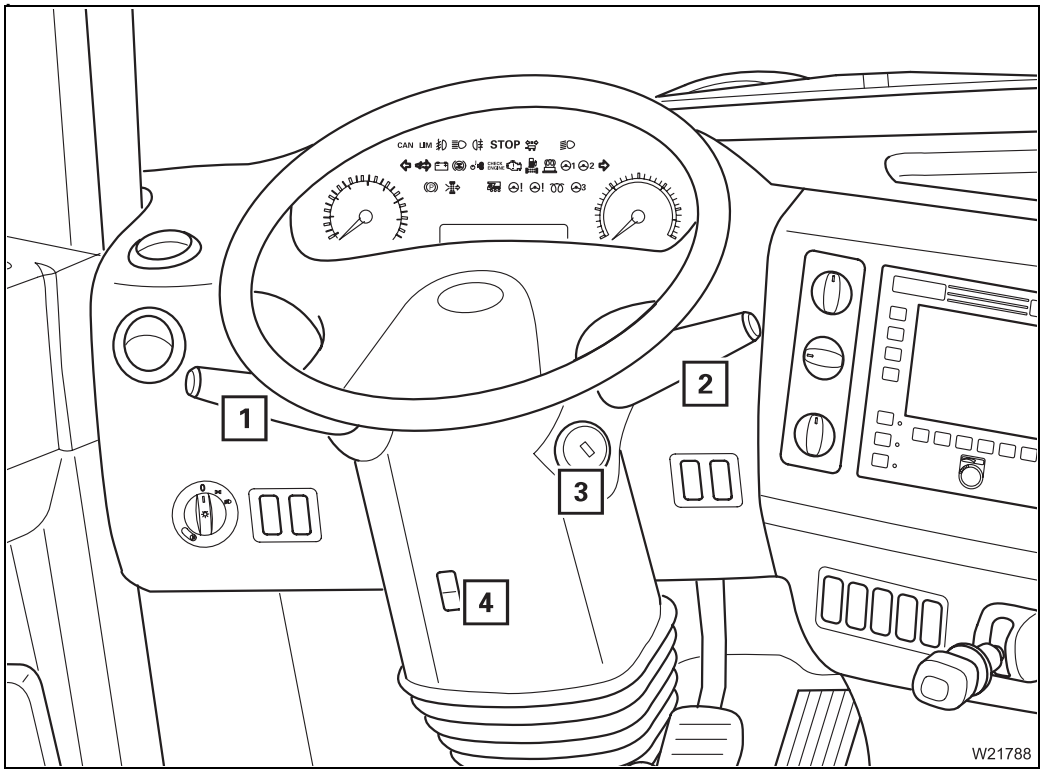
3.1.5 Steering column/steering wheel



1 Horn/headlight flasher/headlight – full beam p. 3 - 55
Turn signal indicator/wiper-washing system p. 3 - 55

2 – Set idling speed p. 3 - 34
– Setting the Tempomat p. 3 - 34
– Setting the Temposet p. 3 - 34
– Engine retarder/transmission retarder[1)] p. 3 - 48

3 Ignition lock p. 3 - 34

4 Adjusting the steering column p. 5 - 13

[1)] Additional equipment

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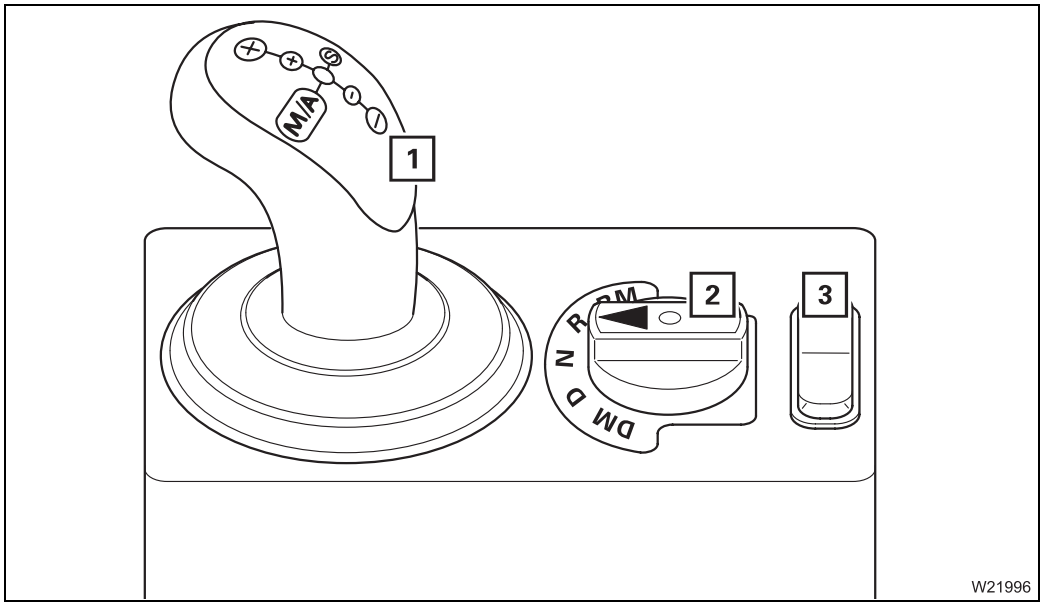
3.1.6 Transmission operating elements



1 Switch lever p. 3 - 45

2 Selecting the transmission mode p. 3 - 42
Reverse camera on p. 3 - 46

3 without function

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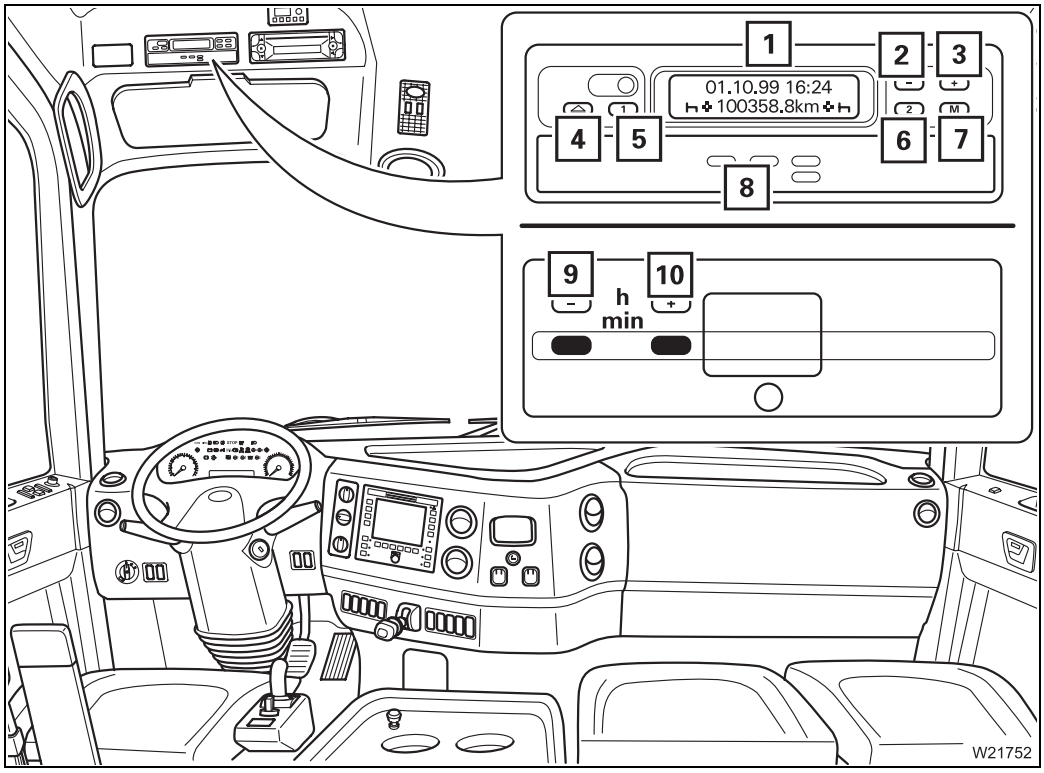
3.1.7 Tachograph



Tachograph

1 Display p. 5 - 19
2 Time correction –: p. 3 - 60
3 Time correction +: p. 3 - 60
4 Opening the drawer p. 5 - 17
5 Setting the time group – driver 1 p. 5 - 18
6 Setting the time group – driver 2 p. 5 - 18
7 Correction of time p. 3 - 60
8 Drawer p. 5 - 17

Setting the driving display time p. 5 - 22

9 Time correction –: p. 3 - 60
10 Time correction +: p. 3 - 60

[1)] Additional equipment

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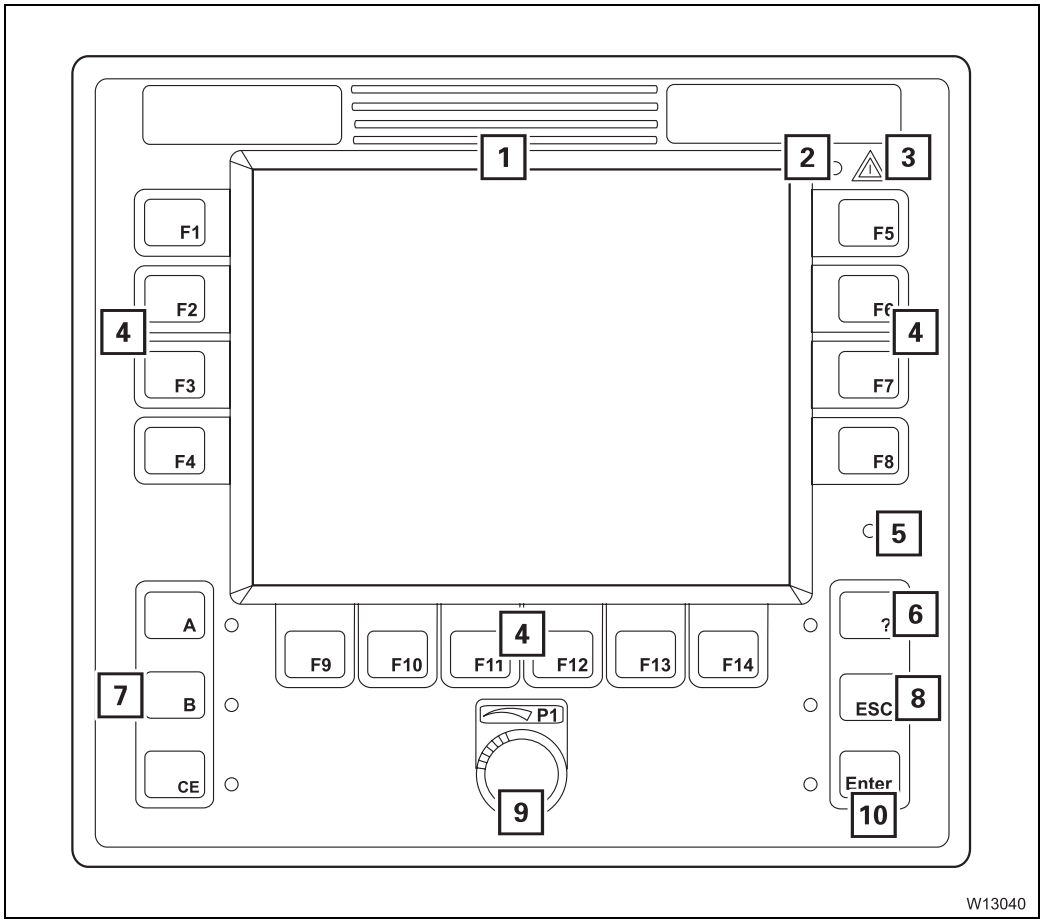
3.1.8 ECOS control unit



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1	ECOS display	p. 3 - 41
	Main menu overview	p. 3 - 18
	Reverse camera display	p. 3 - 46
2	Sensor for brightness[1)]	p. 3 - 41
3	Error/warning message	p. 3 - 40
4	Buttons F1 to F14	p. 3 - 39
5	Sensor for brightness[1)]	p. 3 - 41
6	Errors submenu	p. 5 - 53
	Submenu overview	p. 3 - 25
7	Warning submenu	p. 5 - 47
	Submenu overview	p. 3 - 24
8	Exiting the submenu/input mode	p. 3 - 40
9	Entering values	p. 3 - 40
10	Input confirmation	p. 3 - 40

[1)] Either **2** or **5**

Various menus are shown on the ECOS display.
The menus are operated using buttons F1 to F14. The individual buttons have a different function in each menu. The functions of the buttons in the displayed menu correspond to the symbols next to or above the buttons; p. 3 - 39.

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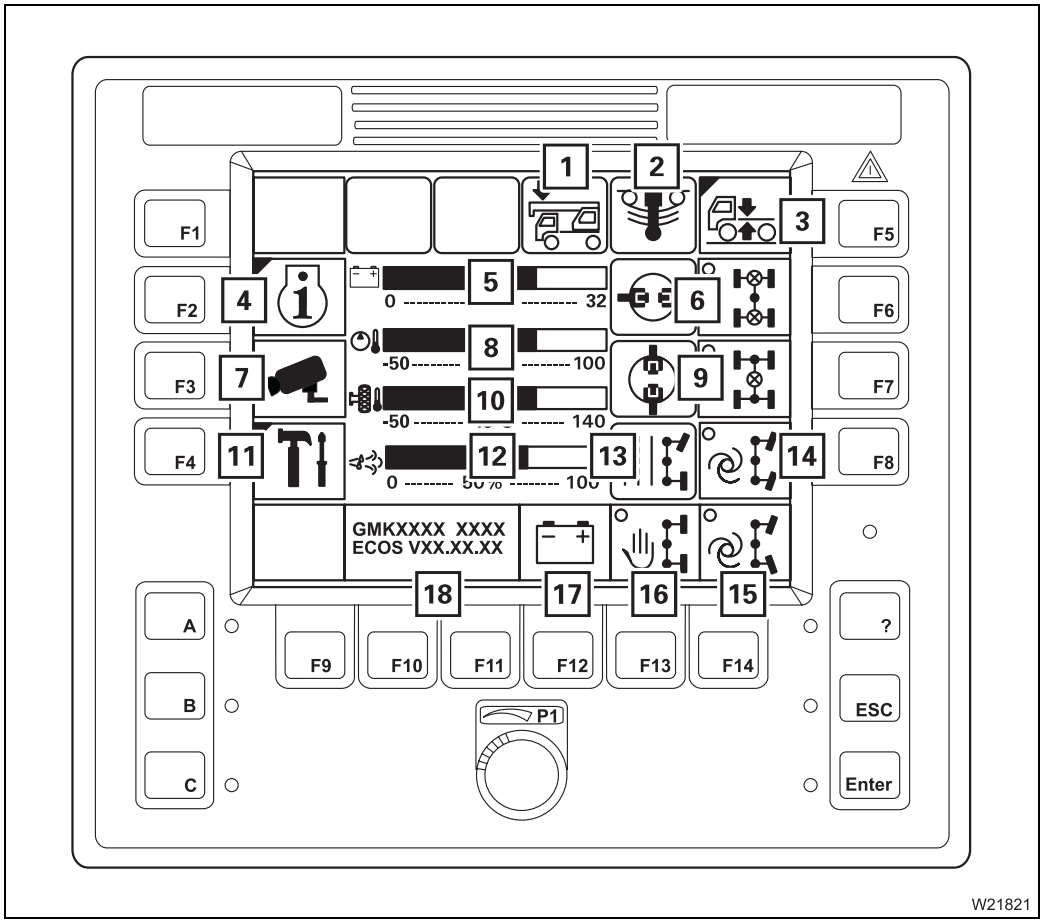
3.1.9 ECOS display – Main menu



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1	Displaying vehicle height[1)]	p. 5 - 8
2	Suspension display	p. 3 - 53
3	Level adjustment system submenu	p. 3 - 20
4	Monitoring submenu	p. 3 - 23
5	Voltage monitoring display	p. 3 - 23
6	Transverse differential locks display Transverse differential locks on/off	p. 3 - 47 p. 3 - 47
7	Reverse camera on/off	p. 3 - 46
8	Hydraulic oil temperature display	p. 3 - 23
9	Longitudinal differential locks display Longitudinal differential locks on/off	p. 3 - 47 p. 3 - 47
10	Hydraulic oil temperature display, hydraulic drive	p. 3 - 23
11	Settings submenu	p. 3 - 22
12	DEF level display[1)]	p. 3 - 23
13	Steering mode display	p. 3 - 52
14	Separate steering crab travel mode on/off	p. 3 - 51
15	Separate steering driving around corners on/off	p. 3 - 51
16	Separate steering, manual on/off	p. 3 - 51
17	Warning display	p. 3 - 41
18	Serial number/program version display	p. 3 - 41

[1)] Additional equipment

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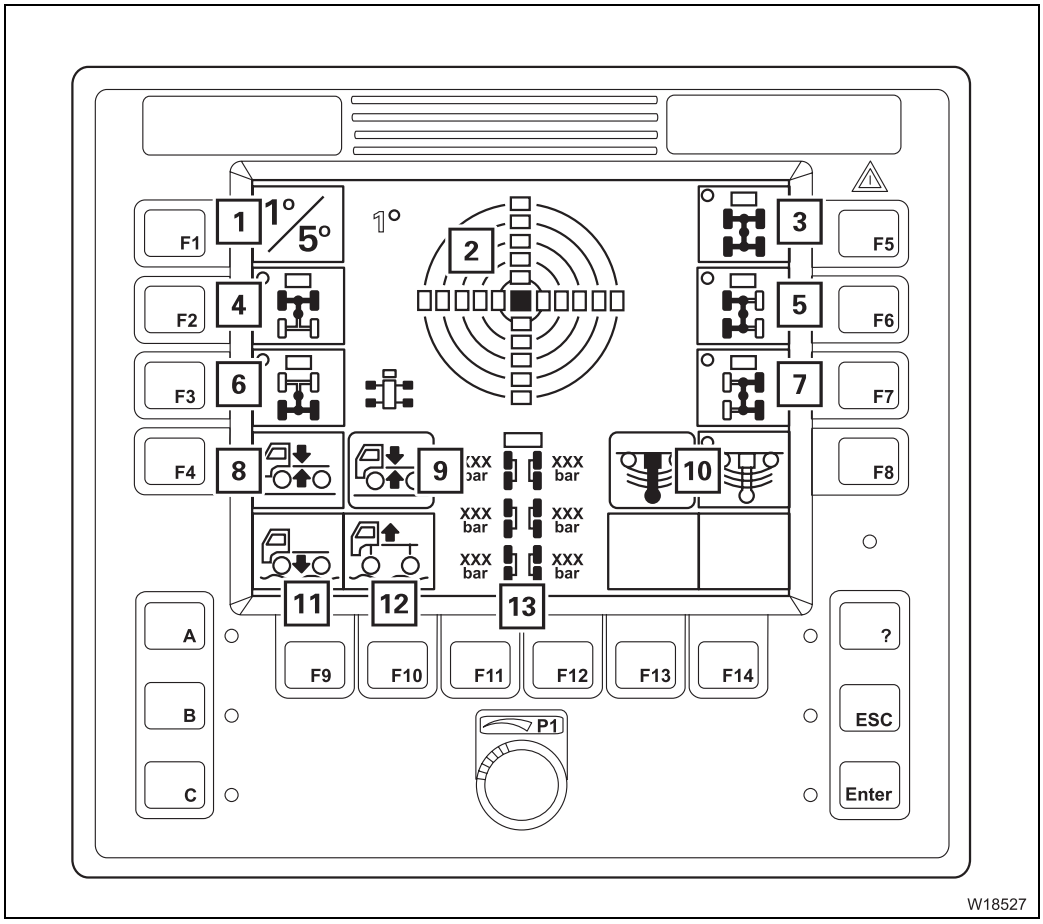
3.1.10 ECOS display – Submenus

Level adjustment system submenu



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1 Switch between measuring ranges p. 3 - 60
2 Display of current inclination p. 3 - 59
3 Overall level pre-selection p. 3 - 58
4 Front level pre-selection p. 3 - 58
5 Left level pre-selection p. 3 - 58
6 Rear level pre-selection p. 3 - 58
7 Right level pre-selection p. 3 - 58
8 Setting the on-road level p. 3 - 59
9 Vehicle level display p. 3 - 59
10 Suspension display p. 3 - 53
Suspension on/off p. 3 - 53
11 Lowering/raising the level p. 3 - 59
12 Lowering/raising the level p. 3 - 59
13 Suspension operation pressure gauge p. 3 - 53

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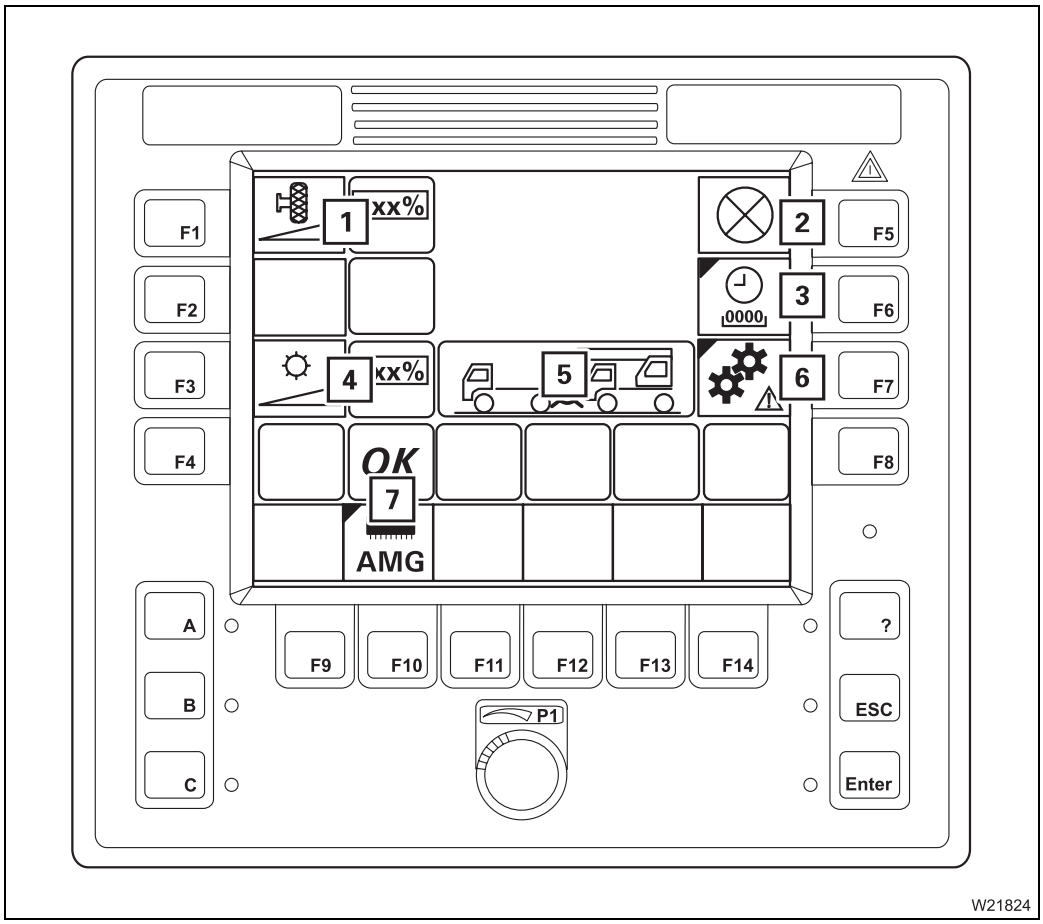
Settings submenu



1 Setting the speed, transmission mode **DM** and **RM** p. 5 - 34
2 Lamp test p. 4 - 13
3 Operating hours submenu p. 3 - 24
4 Display – setting the brightness p. 4 - 15
5 Towing mode on/off display p. 7 - 7
6 Switching towing mode on/off p. 7 - 7
7 AMG diagnostics[1)] p. 3 - 61

[1)] For service personnel only

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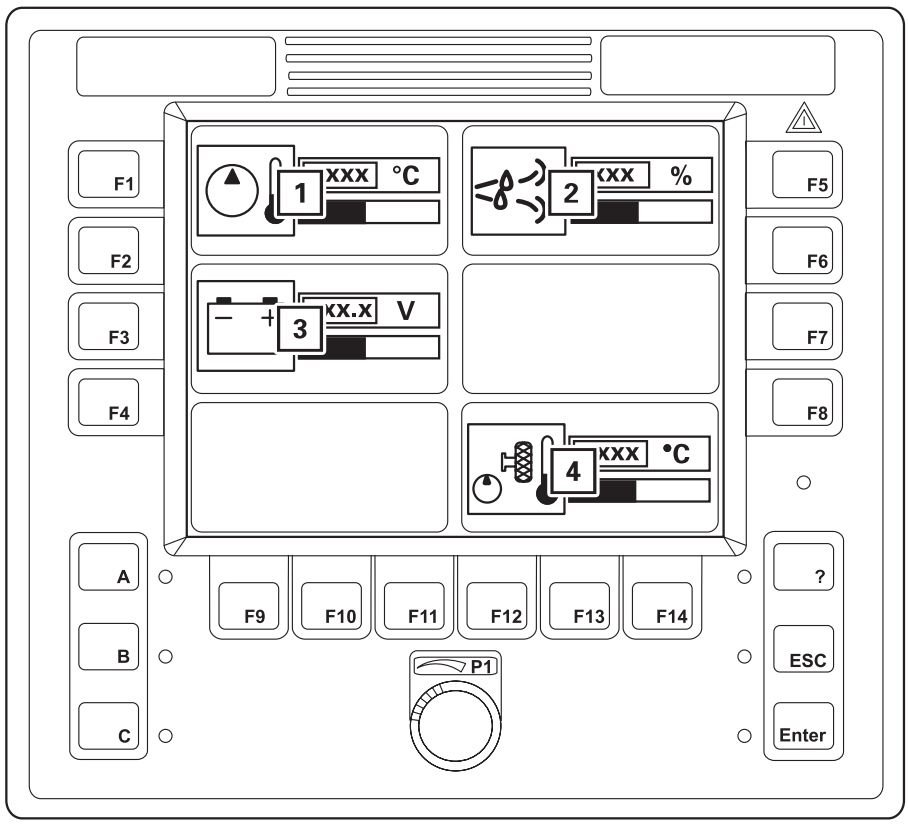
Submenu Checking



1 Hydraulic oil temperature display ➠ p. 4 - 23

2 DEF supply display[1)] ➠ p. 4 - 23

3 Voltage monitoring display ➠ p. 4 - 23

4 Hydraulic drive temperature gauge, axles 4 and 5 ➠ p. 4 - 23

[1)] Additional equipment

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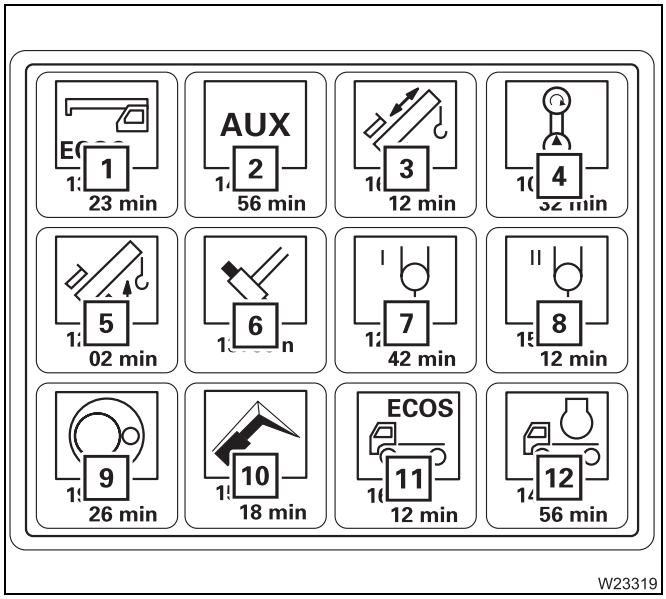
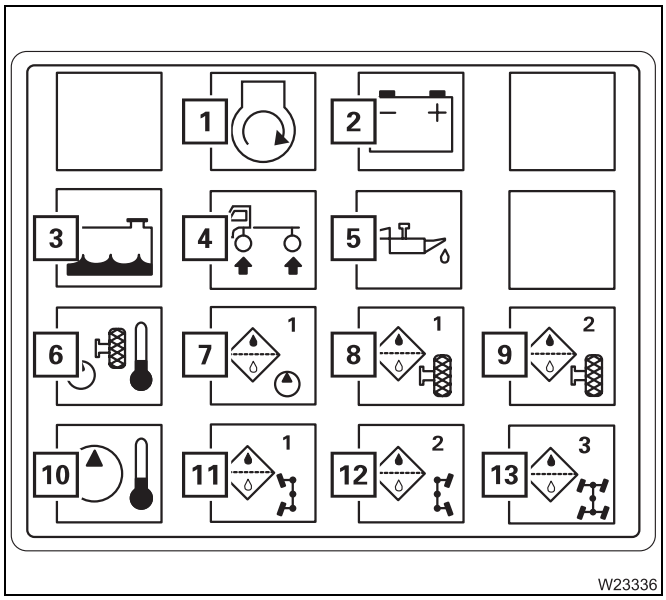
Operating hours submenu Description of the displays; ➠ *Displaying the operating hours*, p. 5 - 21.



1 ECOS – superstructure
2 Auxiliary drive gears
3 Telescoping mechanism
4 Hydraulic system drive in the superstructure
5 Derricking gear
6 Locking system
7 Main hoist
8 Auxiliary hoist[1)]
9 Slewing gear
10 Lattice extension[1), 2)]
11 ECOS – carrier
12 Engine

[1)] Additional equipment
[2)] ➠ *Lattice extension operating instructions*

Warning submenu Description of the displays; ➠ *Warning submenu*, p. 5 - 47.



1 Air intake inhibitor triggered
2 Voltage monitoring
3 Coolant level too low
4 Axle load or sideways tilt exceeded
5 Oil pressure too low
6 Hydraulic oil drive too hot
7 Replacing the hydraulic oil filter, drive 1
8 Replacing the hydraulic oil filter, drive 2
9 Hydraulic oil too hot
10 Replace the hydraulic oil filter
11 Replacing the hydraulic oil filter of steering circuit 1
12 Replacing the hydraulic oil filter of steering circuit 2
13 Replacing the hydraulic oil filter of steering circuit axle 3 and 4

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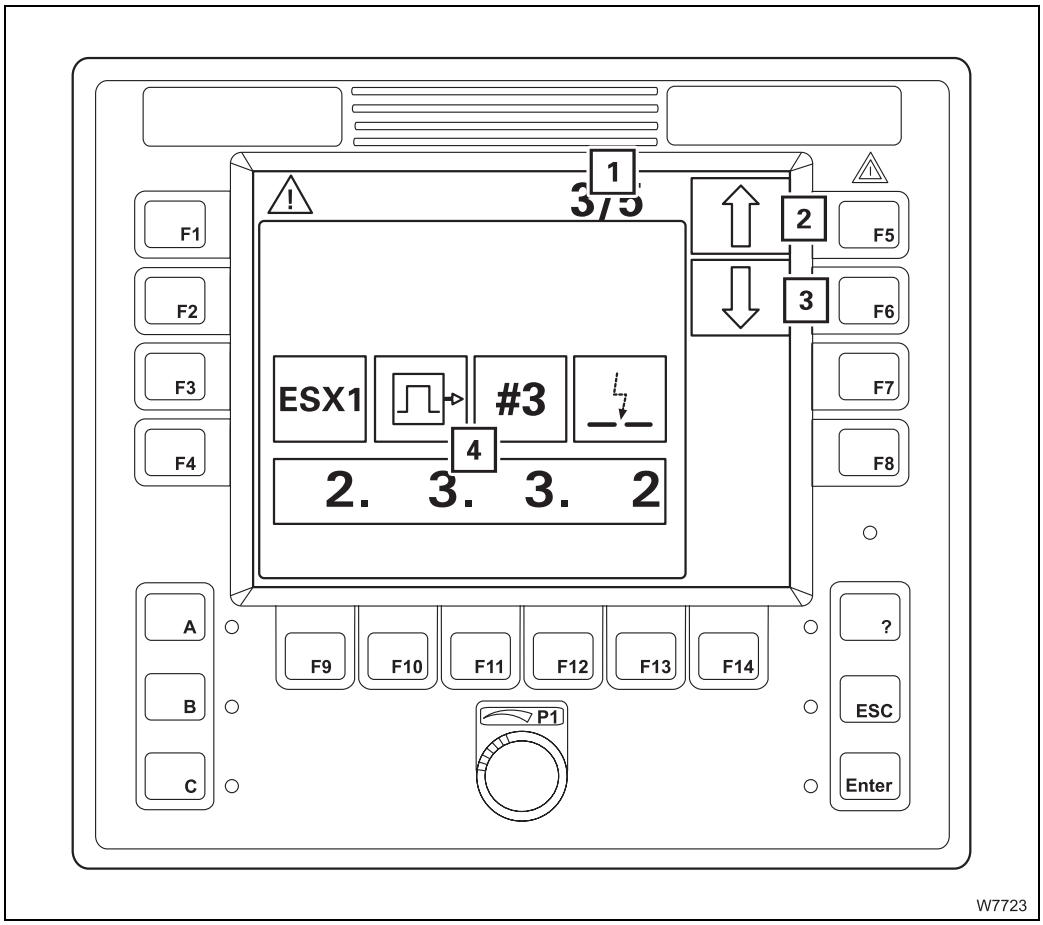
Error submenu



1 Displaying errors/total errors p. 7 - 36

2 Next error p. 7 - 36

3 Previous error p. 7 - 36

4 Error display p. 7 - 37

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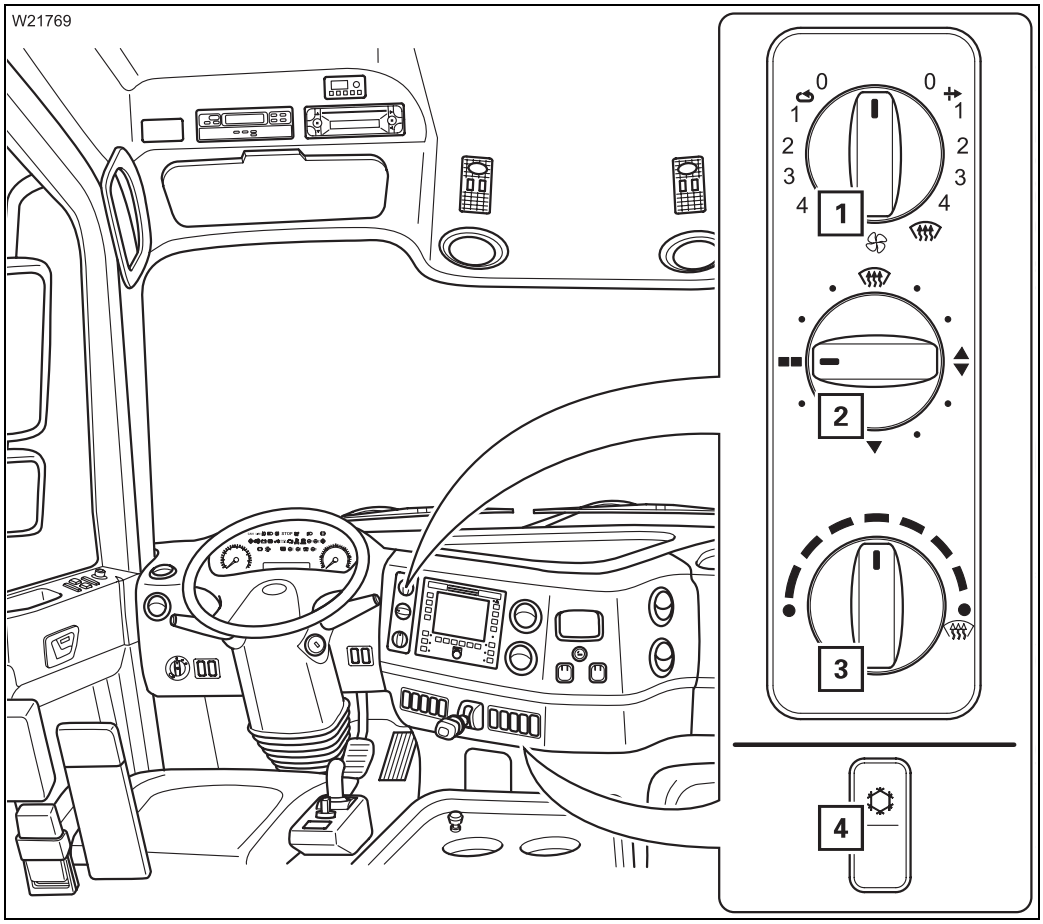
3.1.11 Heating/Air-conditioning system

Standard heating system



1 Setting the blower/fresh air/recirculated air p. 5 - 70

2 Air distribution p. 5 - 71

3 Setting the temperature p. 5 - 70

4 Air-conditioning system p. 5 - 73

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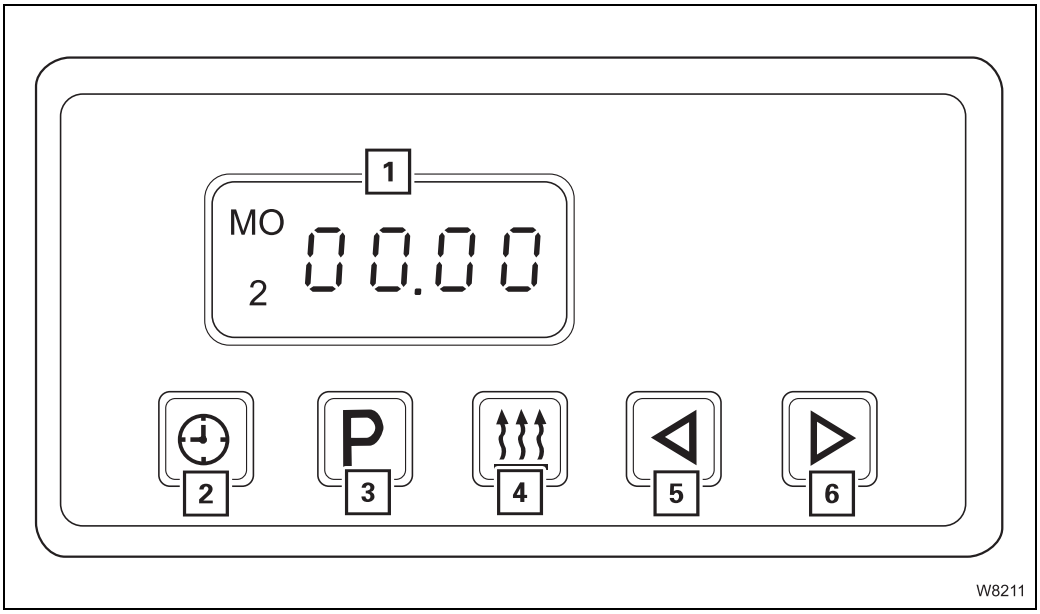
Auxiliary water heating system



1 Heating display p. 5 - 78

2 Setting the time and weekday p. 5 - 78

3 – Saving the automatic heating start p. 5 - 79
– Switching the automatic heating start on and off p. 5 - 80

4 – Switching on the auxiliary heater p. 5 - 77
– Switching off the auxiliary heater p. 5 - 78

5 Input – p. 5 - 78

6 Input + p. 5 - 78

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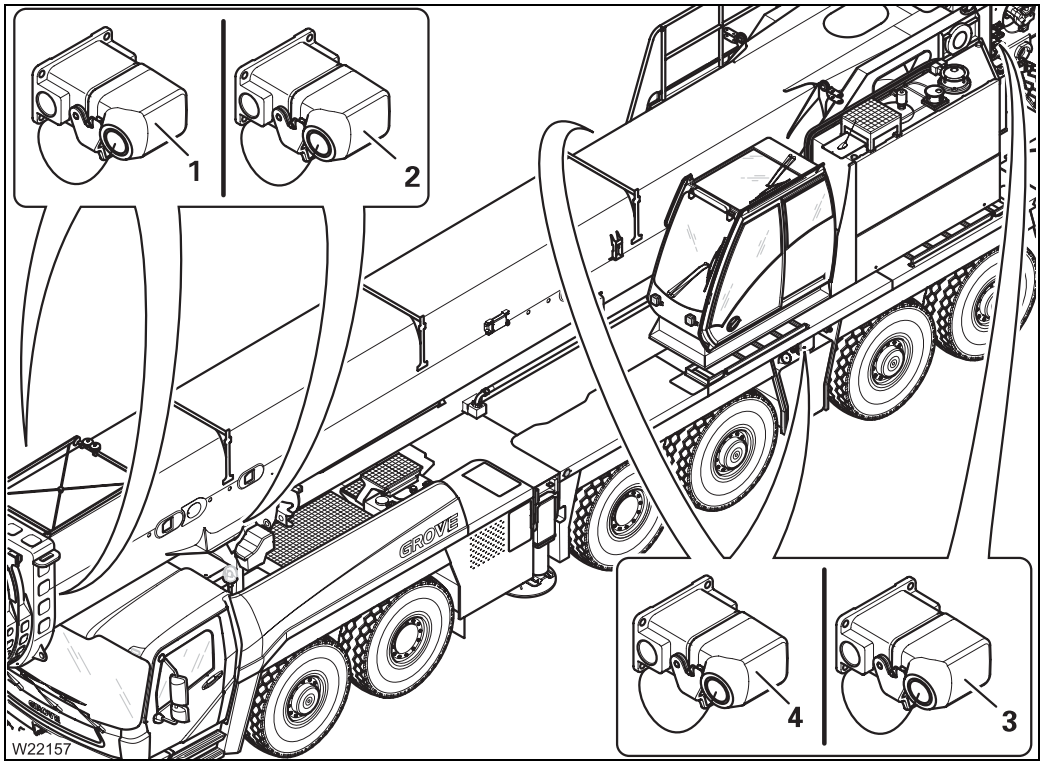
3.1.12 Sockets for hand-held control



There are sockets (**4**) on the carrier and sockets (**1**) to (**3**) on the superstructure for the hand-held controls supplied.

The hand-held controls contain the operating elements for the outrigger, the inclination indicator, for rigging work and for driving the power units in case of emergency.
Since these operating elements are required for crane operation, they are described in Part 2 *Crane operation*; ➠ *Hand-held controls*, p. 9 - 49.

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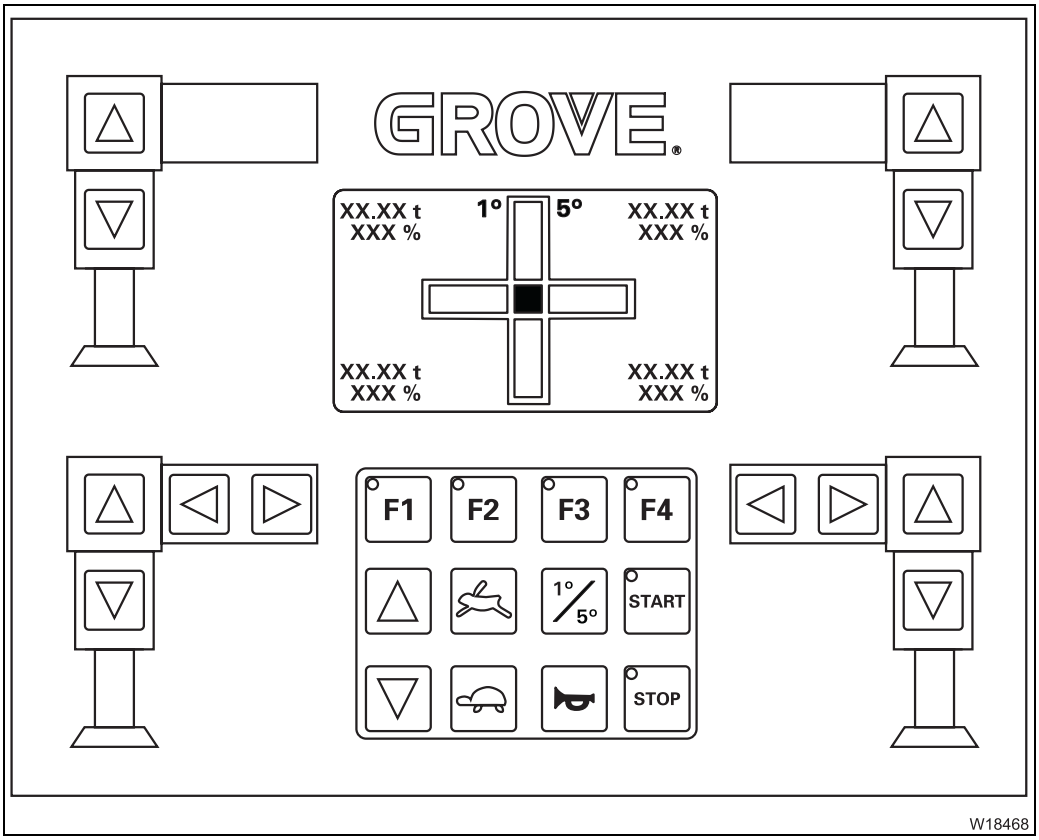
3.1.13 Outrigger control units



Contain operating elements for crane operation; ➠ *Outrigger control units*, p. 9 - 52.

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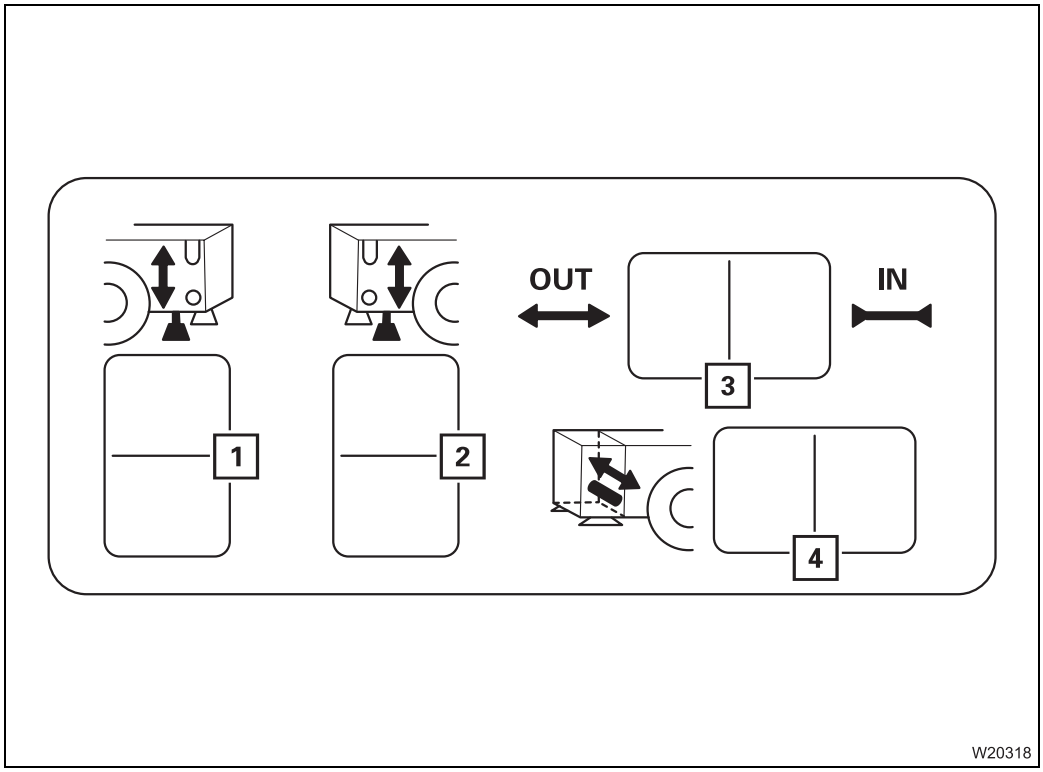
3.1.14 Control unit of the rear outrigger box



1 Left auxiliary support control p. 3 - 54
2 Right auxiliary support control p. 3 - 54
3 Extending/Retracting the pre-selection p. 3 - 54
4 Locking pin control p. 3 - 54

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3.2 Short description of the operating elements

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

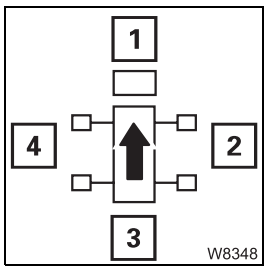
This section does not contain all the requirements that must be fulfilled for several operating elements to be active.
If some operating elements do not work, first read the following chapters which are referred to at the respective places before contacting **Manitowoc Crane Care**.

3.2.1 Definition of direction information

Basic rule

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

On the carrier

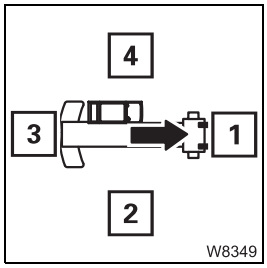


The driver's cab is always at the front, which means that:

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

Forwards always means the driver's cab is to the front.
Backwards always means the rear lights on the carrier are to the front.

On the superstructure



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

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

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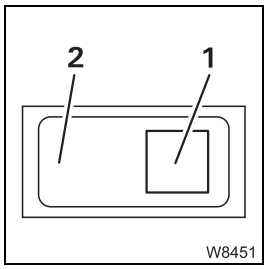
Switches and buttons

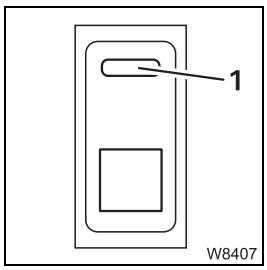
For switches and buttons, the terms **down** and **up** are used.



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

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

3.2.2 General notes on the operating elements



Some switches have a lock button (**1**). The lock button is not mentioned again during operation. The following applies to all switches with a lock button:

- **Switching on:**
  - First press the lock button
  - then press the lower switch down
- **To switch off:** Press upper switch down until the lock button latches into place

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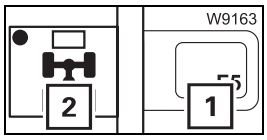
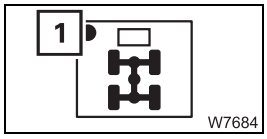
3.2.3 General rules for buttons and symbols on the display

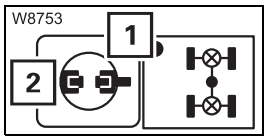
The symbols shown as an example are not present on all crane types. The following rules apply in all menus:



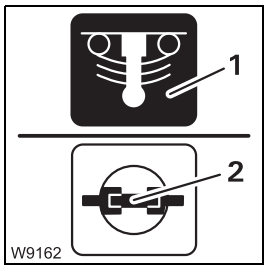
– A button (**1**) is only active when the corresponding symbol (**2**) is black. Buttons next to a grey symbol always have no function.



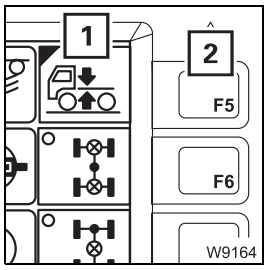
– Some symbols have a dot (**1**). The colour of the dot indicates the current switching state of the button.
  - **– Green:** Button on – the corresponding gear change is being carried out
  - **– Black:** Button off – the corresponding gear change is not being carried out



For some elements, the dot (**1**) only indicates that the gear change has been completed. Here, you will also receive a report on the current gear change on an extra display (**2**).



– In these operating instructions, we always refer to colours in terms of "The symbol is red", for instance,
regardless of whether the background (**1**) of a symbol is red or whether only parts (**2**) of a symbol are red. This applies to all symbols and all colours.



– If the instruction given in this section is to "Press the button once...", for instance, this always refers to the button (**2**) next to or below the symbol (**1**) shown. Even when the button itself is not visible in the illustration.

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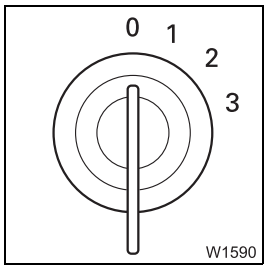
3.2.4 Engine

Steering column



Ignition lock

0 Ignition off, engine off, key can be removed

1 Power supply on for:
Heating system, engine/transmission diagnostics, radio/telephone, enabling of steering lock

2 Ignition on, driving position, daytime driving light on

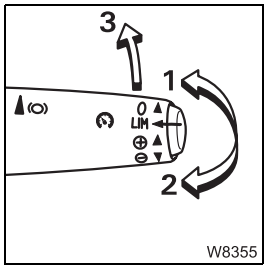
3 Starting position

➠ p. 4 - 12

Lock/unlock steering column; ➠ p. 5 - 13

Multipurpose switch

Different functions are carried out by activating the multipurpose switch in the same way.

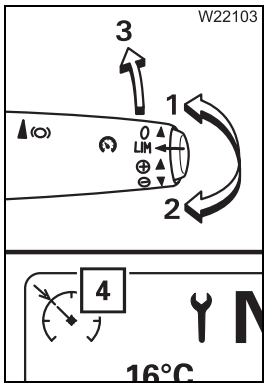


– Set idling speed

The truck crane is stationary.

1	**Up:**	Increasing the idling speed
2	**Down:**	Reduces the idling speed
3	**To the front:**	Idling speed setting off

➠ p. 4 - 24



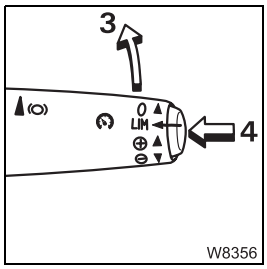
– Setting the Tempomat

The truck crane drives at least 15 km/h (9 mph).

1	**Up:**	Switches on or increases the speed – Display symbol (**4**)
2	**Down:**	Switches on or reduces the speed
3	**To the front:**	Switching off

Tempomat on = current speed is maintained

➠ p. 5 - 40



– Setting the Temposet

The truck crane drives at least 15 km/h (9 mph).

4	**Press 1 x:**	Current speed = maximum
3	**Forwards 2 x:**	Temposet off

➠ p. 5 - 41

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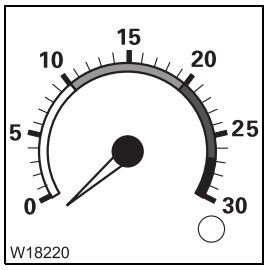
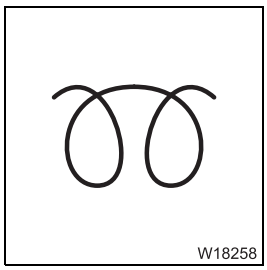
Instrument panel



Tachometer

Display, engine speed in rpm; ➠ p. 4 - 22



Flame start system monitoring

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

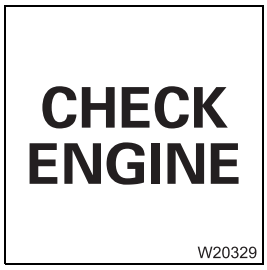
– **Off:** Engine is ready to start

➠ p. 4 - 18

STOP warning

– **On:** Turn engine off as quickly as possible – warning buzzer sounds, warning message displayed

➠ p. 5 - 50

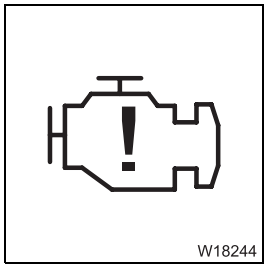


Engine warning

– **On:** Engine off – ignition on
or
Engine on – engine malfunction

– **Off:** Engine on – no malfunction

➠ p. 5 - 50



Engine malfunction

– **On:** Engine off – ignition on
or
Engine on – severe engine malfunction

– **Off:** Engine on – no malfunction

➠ p. 5 - 50

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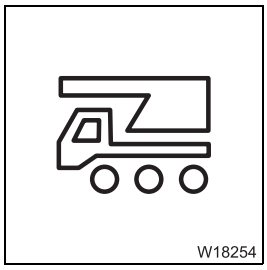

Superstructure ignition indicator lamp

– **On:** Ignition in the crane cab on,
engine for driving cannot be started

– **Off:** Ignition in the crane cab off,
engine for driving can be started

p. 4 - 16

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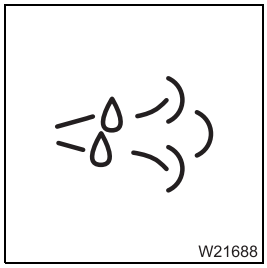
3.2.5 DEF system

If the GMK 6400 truck crane complies with TIER 4i and Euromot 3B exhaust gas emissions, there are additional display and operating elements in the driver's cab.

Instrument panel



DEF warning

- **Off:** Level sufficient
- **On:** Reserve
- **Flashing:** Empty

p. 5 - 52

Torque reduction indicator lamp

- **Off:** Torque reduction off
- **On:** Torque reduction on
- **Flashing:** Reduction in torque on the next time the engine is started

p. 5 - 52

Torque reduction override button

- **Press down 1 x:** Torque reduction overridden for 30 minutes
  after 30 minutes
- **Press down again:** Torque reduction overridden for 30 minutes
  after 30 minutes
- **Press down again:** Torque reduction overridden for 30 minutes

p. 5 - 52

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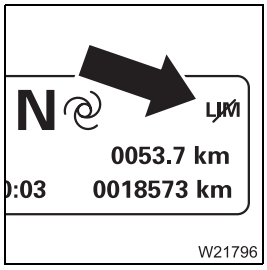
Display, driving mode

Torque reduction display override

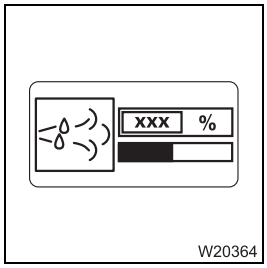


The ignition is switched on or the engine is running.

– **Off:** Torque reduction not overridden
– **On:** Torque reduction overridden

p. 5 - 52

ECOS display



DEF supply monitoring submenu

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

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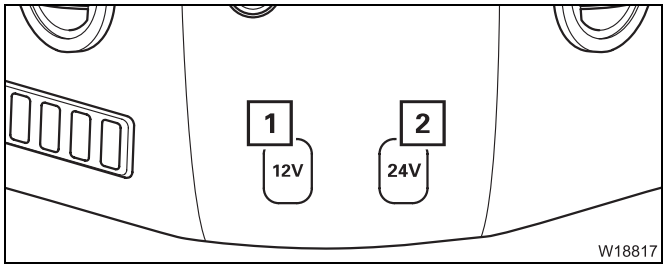
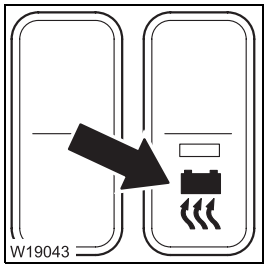
3.2.6 Electrical system



Sockets 12 V/24 V

1 Socket 12 V

2 Socket 24 V



Battery heater on/off

– **Down:** Heating system on

– **Up:** Heating system off

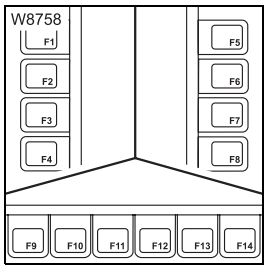
Further information on operation; ➠ *Separate operating manual*.

3.2.7 ECOS crane control

The truck crane GMK 6400 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, a control unit in the driver's cab and several control units (ESX0, ESX1, ESX2 etc.) and I/O circuit boards (I/O 0, I/O 1 etc.), which are distributed on the superstructure and carrier.

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.

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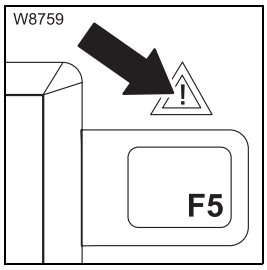
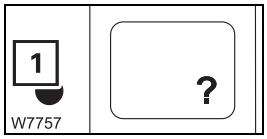


Error/warning message

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

p. 11 - 114

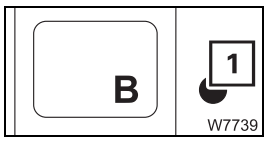


Opening the Error submenu

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

– **To open:** Press button 1 x – submenu opens

p. 11 - 114

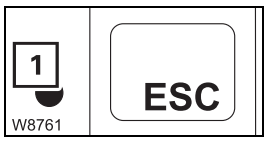


Opening the Warning submenu

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

– **To open:** Press button 1 x – submenu opens

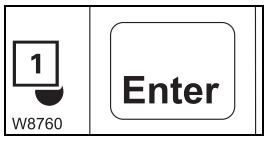
p. 5 - 47



Exiting the submenu/input mode

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

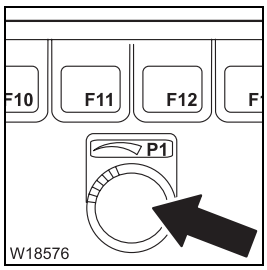
– **Press the button 1 x:**
  – The opened submenu closes – the menu from the next higher level is opened
  – Input mode is deactivated



Input confirmation

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

– **Press the button 1 x:** A newly entered value is stored



Entering values

The input mode is switched on.

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

Slow turning changes the value slowly.
Fast turning changes the value fast.

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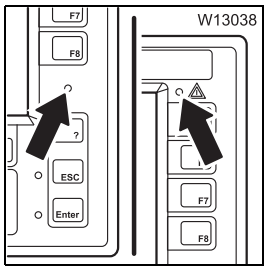
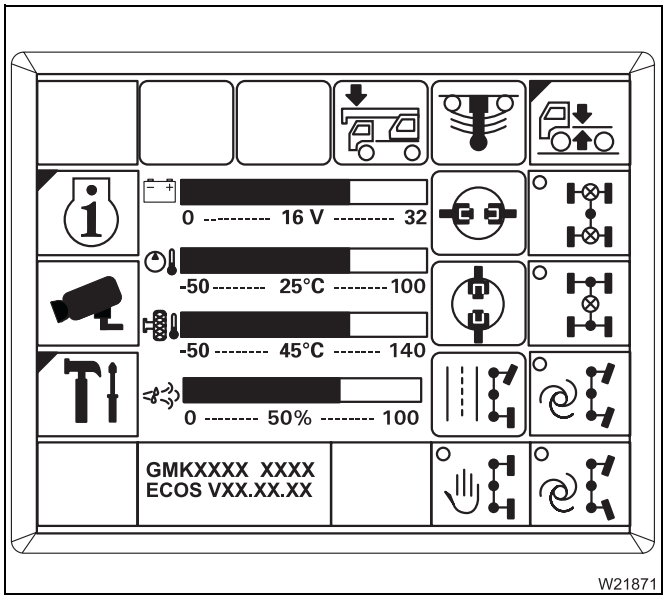


Sensor for brightness

Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted.
Manual input; ➠ p. 4 - 15.

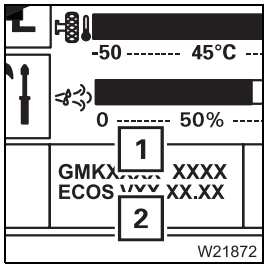


ECOS display

The main menu appears after switching on the ignition.

Symbols which represent submenus are indicated at the top left by a blue corner.

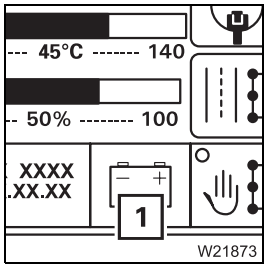
Submenus are opened by pressing the button next to or under the respective symbol.



Serial number/program version display

1 Serial number

2 Current ECOS program version – always state in the event of malfunctions; ➠ p. 7 - 35.



Warning display

1 Shows the symbol of a current warning message – for several warning messages, the displays are shown one after the other in continuous sequence; ➠ p. 5 - 47.

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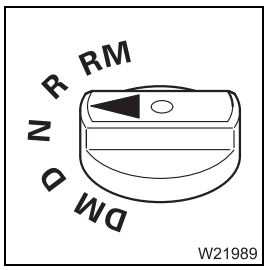
3.2.8 Transmission

➠ *Operating the transmission*, p. 5 - 23.

Transmission control unit

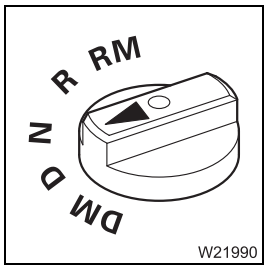
Selecting the transmission mode

The engine is running.



W21989

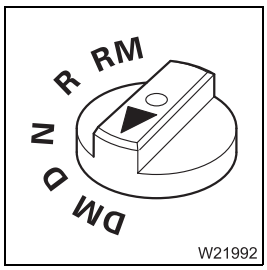
– **Position N:** Neutral position on – No gear engaged



W21990

– **Position D:**

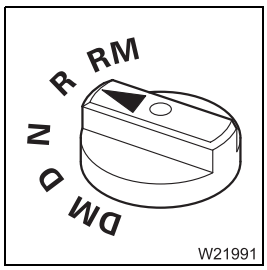
At a standstill –	Forward starting gear on
For driving forwards –	Suitable gear on, Clutch closes
For driving in reverse –	Neutral position on



W21992

– **Position DM:**

At a standstill –	Hydraulic drive, forwards on
For driving forwards –	Transmission in neutral position, clutch open
For driving in reverse –	Neutral position on



W21991

– **Position R:**

At a standstill –	Reverse starting gear on
For driving in reverse –	No gear change
For driving forwards –	Neutral position on

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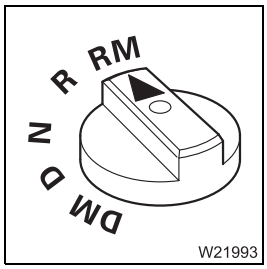
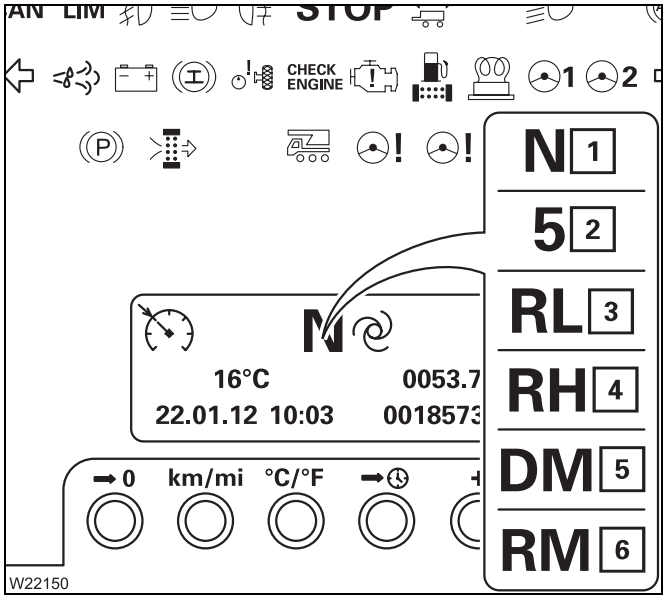


– Position RM:	At a standstill –	Hydraulic drive, reverse on
	For driving in reverse –	Transmission in neutral position, clutch open
	For driving forwards –	Neutral position on

Display, driving mode



Transmission display

1 Neutral position switched on

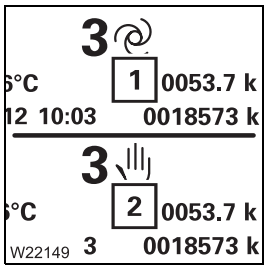
2 Currently engaged gear – forwards (1 to 6), e.g. 5

3 Currently engaged gear – reverse, 1st gear

4 Currently engaged gear – reverse, 2nd gear

5 Hydraulic drive, forwards

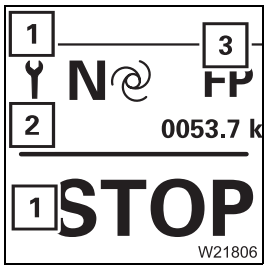
6 Hydraulic drive, reverse



Operating mode display

1 *Automatic* operating mode

2 *Manual* operating mode



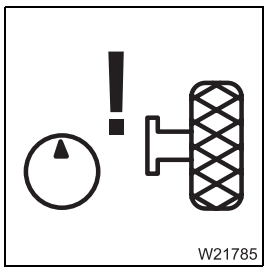
Error messages display

1 Severe malfunction – stop the truck crane

2 Other malfunction

3 Error messages entry

Error messages; ➠ p. 7 - 41



Hydraulic drive (MegaDrive) indicator lamp

– **On:** Engine off – ignition on
or
Engine on – hydraulic drive malfunction

– **Off:** Engine on – no malfunction

➠ p. 5 - 51

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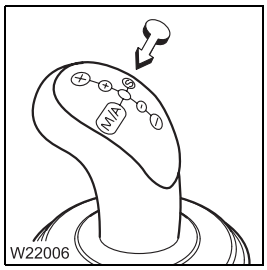

Switch lever

The truck crane is stationary or driving.

– **1 x to the left:** Change over between *automatic* and *manual* operating mode – without change of gear

➠ p. 5 - 27

The truck crane is stationary.

– **Push forwards 1 x:** Shift up starting gear – 1 gear

– **Push to the rear 1 x:** Shift down starting gear – 1 gear

The truck crane is in motion.

– **Push forwards 1 x:** Shift up – 1 gear
Manual operating mode on

– **Push to the rear 1 x:** Shift down – 1 gear
Manual operating mode on

➠ p. 5 - 31

The parking brake is engaged and neutral position is activated.

– The brake pedal is activated.

  – **To the front:** All current error codes are shown.

– The brake pedal is **not** activated.

  – **To the front:** All stored error codes are shown.

The error codes are displayed one after the other as long as the gearshift lever is pressed.

➠ p. 7 - 30

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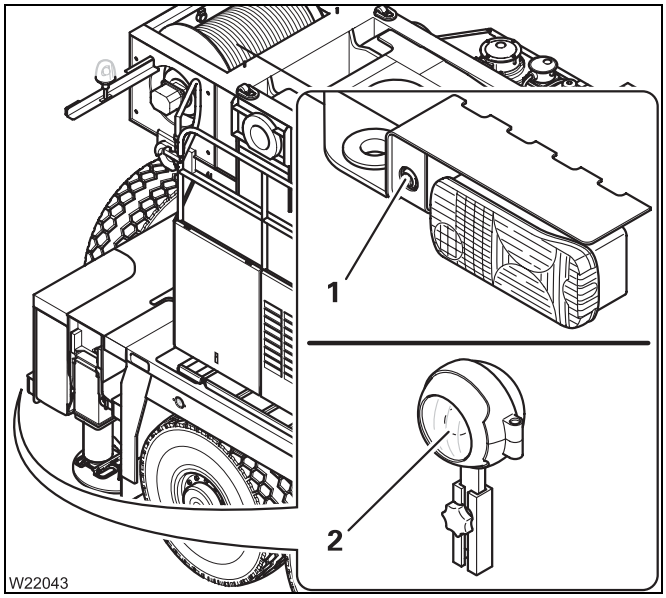
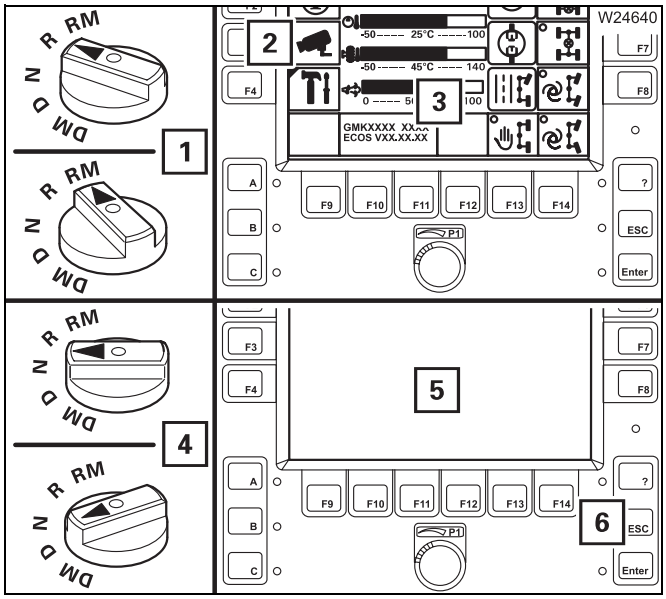
3.2.9 Reverse camera



The truck crane GMK 6400 is equipped with a reverse camera (**1**) or (**2**). The reverse camera displays the area behind the truck crane on the ECOS display in the driver's cab.

➠ *Installing the reverse camera*, p. 6 - 68



Switching on

– Automatically, when reversing (**1**),

– Manually, press button (**2**)

The display (**5**) shows the area behind the truck crane

Switching off

– Automatically, when driving forwards or in neutral position (**4**),

– Manually, press button (**6**)

The display (**3**) shows the ECOS menu

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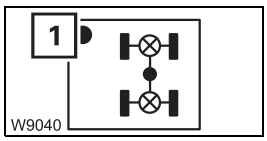
3.2.10 Final drive

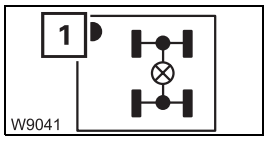
➠ *Longitudinal and transverse differential locks*, p. 5 - 58



Transverse differential locks on/off

– **Switching on:** Press button 1 x – dot (**1**) green, maximum 20 km/h (12 mph)

– **Switching off:** Press button 1 x – dot (**1**) black

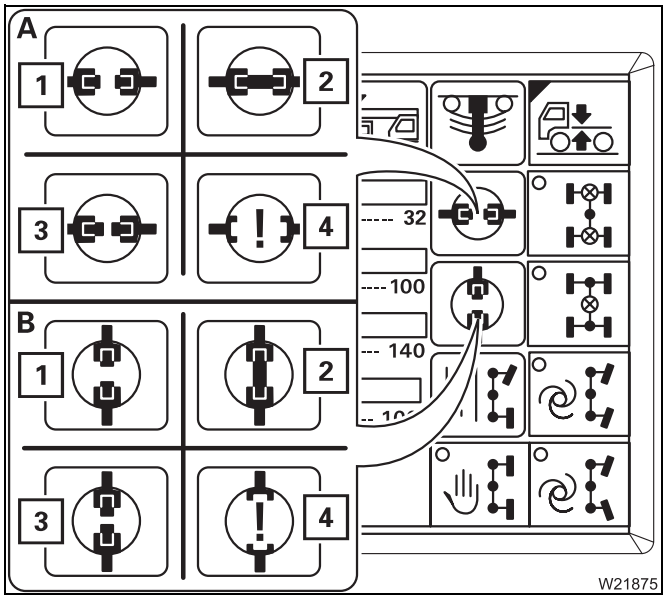


Longitudinal differential locks on/off

– **Switching on:** Press button 1 x – dot (**1**) green, maximum 20 km/h (12 mph)

– **Switching off:** Press button 1 x – dot (**1**) black

With additional equipment, the drive of the second axle line is switched on and off simultaneously.



A Transverse differential locks display

B Longitudinal differential locks display

The current status is shown using different symbols:

1 Green – locks off

2 Red – locks on

3 Yellow – intermediate position

4 Violet – error

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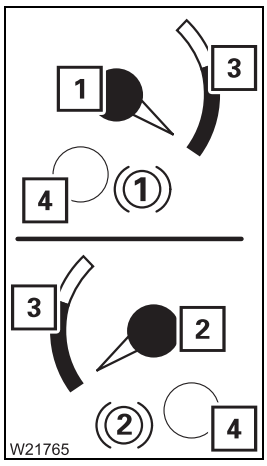
3.2.11 Brakes

Service brake



Display – supply pressure in brake circuits

1 Current supply pressure in brake circuit 1

2 Current supply pressure in brake circuit 2

3 **Red** – supply pressure insufficient
White – supply pressure sufficient

Warning – supply pressure in the displayed brake circuit too low

4 **– On:** Supply pressure below approx. 5 bar (73 psi)

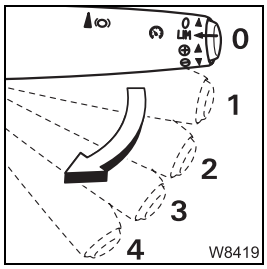
– Off: Supply pressure above 5.5 bar (80 psi)

➠ p. 5 - 9

Additional brakes

Engine retarder/transmission retarder
➠ *Additional brakes*, p. 5 - 44

Multipurpose switch



0 **To the front:** Engine retarder and transmission retarder off

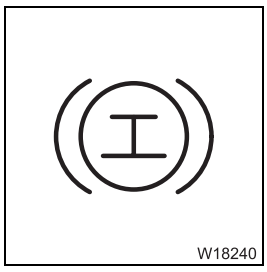
1 **To the rear:** Engine retarder

2 **To the rear:** Engine retarder, transmission retarder 50%

3 **To the rear:** Engine retarder, transmission retarder 75%

4 **To the rear:** Engine retarder, transmission retarder 100%

Instrument panel

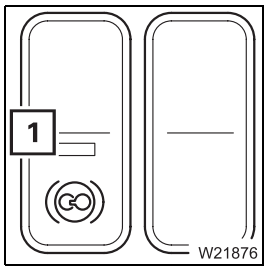


Additional brake indicator lamp

– On: Transmission retarder on

– Off: Transmission retarder off

12.07.2013

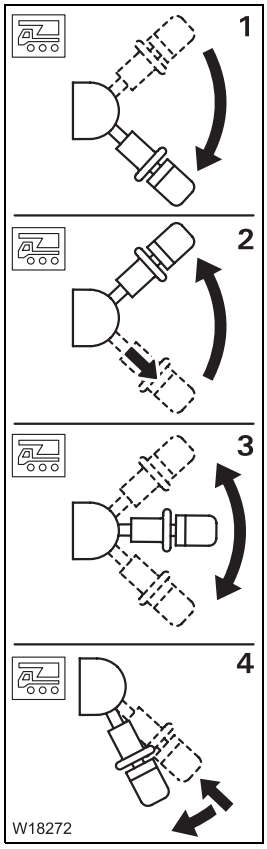


Switching the transmission retarder function on/off

– **Switching on:** Press upper switch in – light (**1**) out
– **Switching off:** Press lower switch in – light (**1**) on

p. 5 - 44

Parking brake

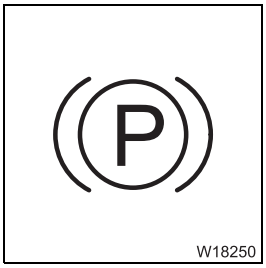


1 To engage the parking brake: Pull the lever down until it locks into place

2 To release the parking brake: Lift the lever and push it up until it latches into place

3 Operating as auxiliary brake: Shift the lever to intermediate position
The braking force is increased continuously by moving the lever from top to bottom.

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



Parking brake indicator lamp

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

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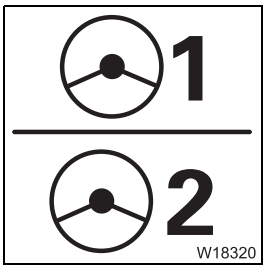
3.2.12 Steering/separate steering

➠ *Separate steering*, p. 5 - 66

Instrument panel

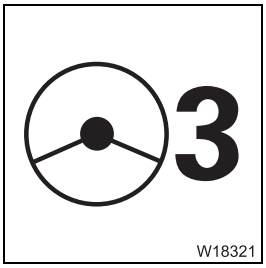


Steering circuit 1 and 2 warning lamp

– **On:** Engine off – ignition on
or
Engine on – malfunction, stop – check oil loss

– **Off:** Engine on – no malfunction

➠ p. 5 - 37

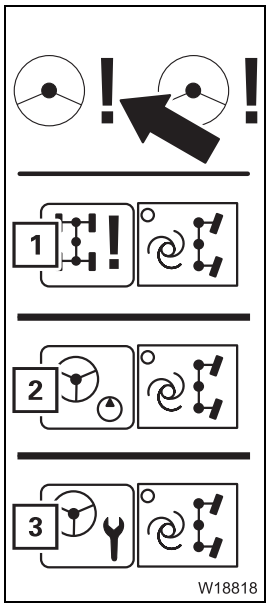


Emergency steering pump warning lamp

– **On:** Approx. 10 km/h (6 mph) not reached
or
Steering malfunction – stop and check for oil loss

– **Off:** Emergency steering pump ready to function

➠ p. 5 - 37



Error in steering system

– **On:** Engine off – ignition on:
– Display symbol (**2**) – goes out after engine start
– Display symbol (**3**) – ignition off/on, symbol goes out

While driving:
– Display symbol (**1**) – 5th and 6th axle still in straight running position, forward drive possible

– **Flashing:** After engine start:
Steering angle on the 5th and 6th axle incorrect,
Steer front axle lines – steering angle is adapted

– **Off:** No error in the steering system

After engine start; ➠ p. 4 - 20
While driving; ➠ p. 5 - 37

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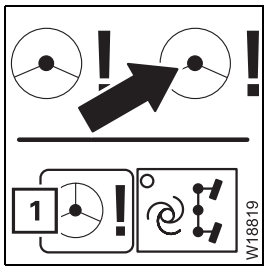


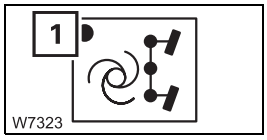
Steering system warning

– **On:** Steering system defective – stop immediately.
Display symbol (**1**) – 5th and 6th axle cannot be steered; if it is possible, it can only be steered in straight running position – max. 20 km/h (12 mph)

– **Off:** No error in the steering system

After engine start; ➠ p. 4 - 20
While driving; ➠ p. 5 - 37

ECOS display Main menu

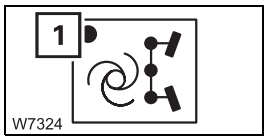


Separate steering crab travel mode on/off

– **Switching on:** Press button 1 x – dot (**1**) green, maximum 5 km/h (3 mph)
  – Steering wheel steers 1st and 2nd axle lines
  – 3rd to 6th axle line steer in the same direction

– **Switching off:** Press button 1 x – dot (**1**) black

➠ p. 5 - 66

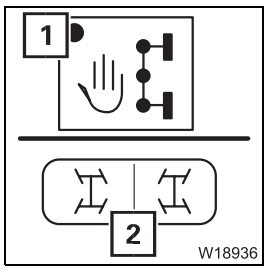


Separate steering for driving around corners on/off

– **Switching on:** Press button 1 x – dot (**1**) green, maximum 5 km/h (3 mph)
  – Steering wheel steers 1st and 2nd axle lines
  – 3rd to 6th axle lines steer for the smallest turning circle

– **Switching off:** Press button 1 x – dot (**1**) black

➠ p. 5 - 66



Manual separate steering on/off

– **Switching on:** Press button once – dot (**1**) green, maximum 5 km/h (3 mph)
  – Steering wheel steers 1st and 2nd axle lines
  – Rocker button (**2**) steers the 5th and 6th axle line
  – 3rd and 4th axle line steer in a suitable manner for crab travel mode or driving around corners, depending on the position of the axle lines.

– **Switching off:** Press button once – dot (**1**) black

➠ p. 5 - 66

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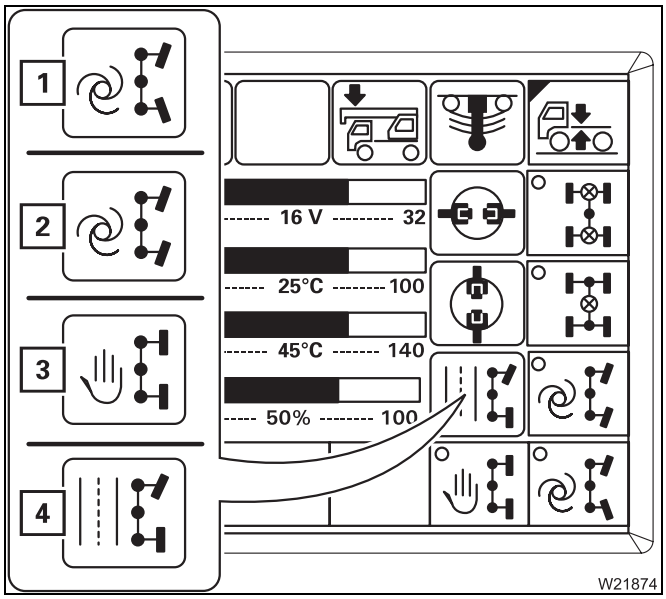


Steering mode display

The steering mode switched on is shown using different symbols:

1 Separate steering – driving around corners

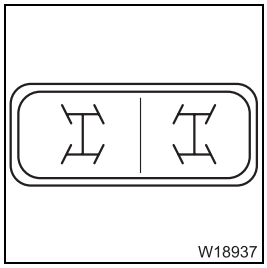
2 Separate steering – crab travel mode

3 Separate steering – manual

4 Normal steering mode – on-road driving, separate steering off

p. 5 - 66

Driver's door



Separate steering

The separate steering is switched on.

Press button and hold

– **To the left:** 5th and 6th axle lines – turn to the left

– **To the right:** 5th and 7th axle lines – turn to the right

p. 5 - 67

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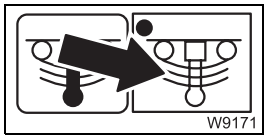
3.2.13 Suspension

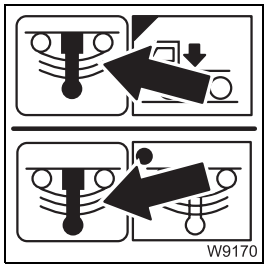
➠ *Switching the suspension on/off*, p. 5 - 14.



Suspension on/off

– **Switching on:** Press button 1 x – dot green
– **Switching off:** Press button 1 x – dot black

➠ p. 5 - 15

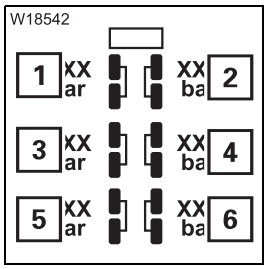


Suspension display

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

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

➠ p. 5 - 15



Suspension operation pressure gauge

1 Suspension pressure, 1st and 2nd axle lines, left-hand side
2 Suspension pressure, 1st and 2nd axle lines, right-hand side
3 Suspension pressure, 3rd and 4th axle lines, left-hand side
4 Suspension pressure, 3rd and 4th axle lines, right-hand side
5 Suspension pressure, 5th and 6th axle lines, left-hand side
6 Suspension pressure, 5th and 6th axle lines, right-hand side

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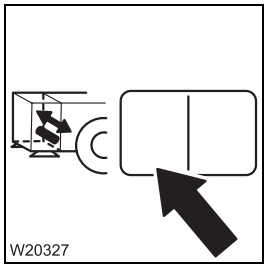
3.2.14 Control unit of the rear outrigger box

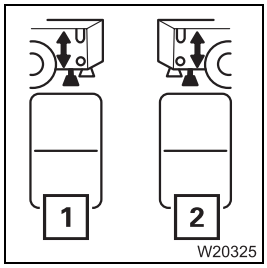
➠ *Installing/removing the supporting box*, p. 6 - 53



Locking pin pre-selection

– **Press in to the left:** Locking pin pre-selection

➠ p. 6 - 71

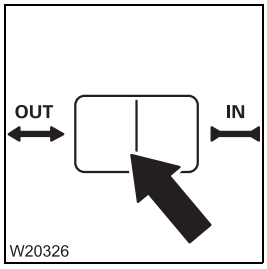


Left/right auxiliary supports pre-selection

1 – **Press in at bottom:** Pre-selection, left auxiliary support

2 – **Press in at bottom:** Pre-selection, right auxiliary support

➠ p. 6 - 59



Extending/retracting

– **Press in to the left:** Extending the auxiliary support or locking pin

– **Press in to the right:** Retracting the auxiliary support or locking pin

➠ p. 6 - 59

The movement stops after a button is released or when an end position is reached.

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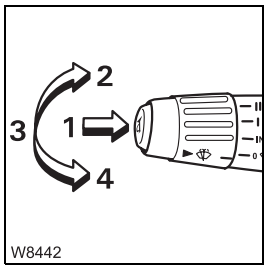
3.2.15 Lighting/windscreen wipers/horn

Steering column Multipurpose switch



Horn/headlight flasher/headlight – full beam

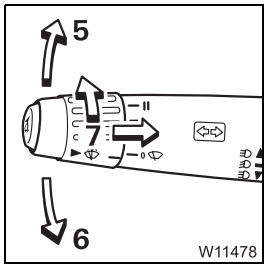
1 Horn: Press the button

2 Headlight flasher: Upward

The parking light/headlight is switched on:

3 Parking light/headlight: Middle position

4 Headlight – full-beam: Down – latches into place



Turn signal indicator/wiper-washing system

5 Right turn signal indicator: Forwards

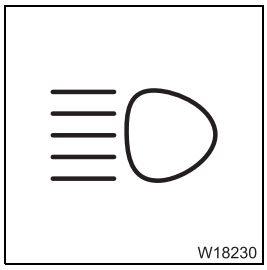
6 Left turn signal indicator: Backwards

7 Windscreen wiper/washing system: Press

7 Windscreen wiper: Turn – off (0), intermittent, slow, fast

7 Adjusting the wiper stroke interval:
- Switch on intermittent
- Switch off after the first wipe (0)
- Wait for the required time (maximum 20 seconds)
- Switch on the interval – required time = pause between wipes

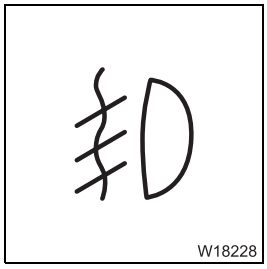
Instrument panel



Headlight – full beam indicator lamp

– On: Headlight – full beam on

– Off: Headlight – full beam off



Fog light indicator lamp

– On: Fog light on

– Off: Fog light off

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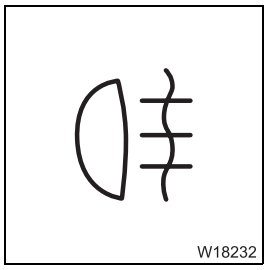
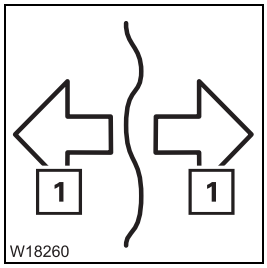


Fog tail light indicator lamp

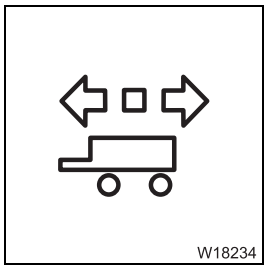
- **On:** Fog tail light on
- **Off:** Fog tail light off



Indicator lamp for turn signal indicator

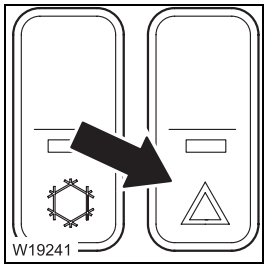
1 – **Flashing:** Turn signal indicator on

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



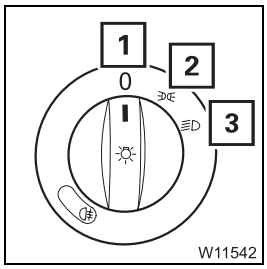
Indicator lamp for trailer turn signal indicator

- **Flashing:** Turn signal indicator on and trailer electrically connected
- **Flashes 1 x:** Turn signal indicator on and trailer not electrically connected
- **Off:** Turn signal indicator off



Hazard warning system on/off

- **Switching on:** Press downwards – light in the switch flashes
- **Switching off:** Press in above – gone out



Lighting on/off

1 **Light off**

2 **Parking light on** Instrument lighting on

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

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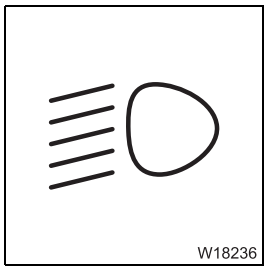
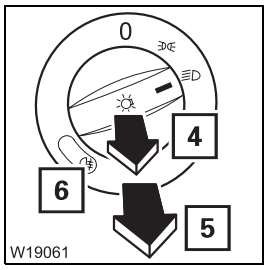


Headlight indicator lamp

- **On:** Headlight on
- **Off:** Headlight off

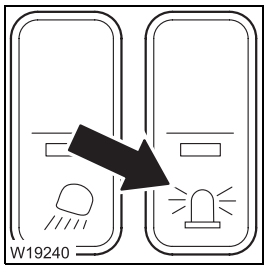


The headlight or parking light is switched on.

4 Fog light on

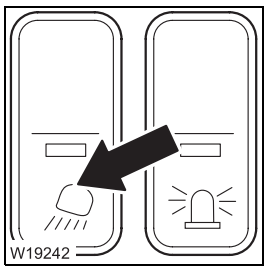
5 Fog tail light on

6 – on



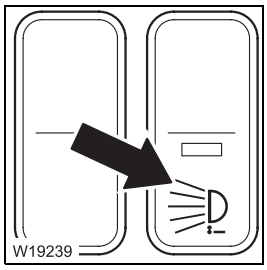
Rotating beacon on/off

- **Switching on:** Press down
- **Switching off:** Press up



Outrigger lighting on/off

- **Switching on:** Press down
- **Switching off:** Press in at top – position for driving on road



Spotlights on rear of carrier on/off

- **Switching on:** Press down
- **Switching off:** Press in at top – position for driving on road

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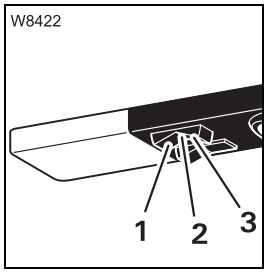
Roof

The lamps on the driver's and passenger's side are identical.

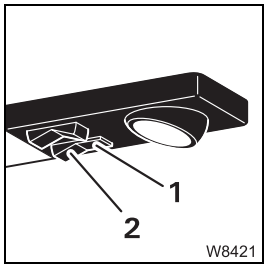


Cab lighting

1 Permanently on

2 Permanently off

3 On/off via door contact



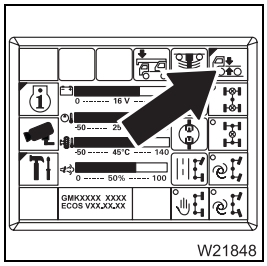
Reading lamp

1 On

2 Off

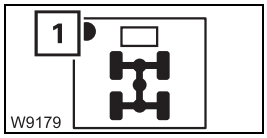
3.2.16 Level adjustment system

➠ *Operating the level adjustment system*, p. 5 - 60.



Level adjustment system submenu

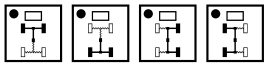
– **To open:** Press button 1 x – submenu opens



Overall level pre-selection

– **Suspension struts pre-selection:** Press button 1 x – dot (**1**) green – pre-selection on
After 5 seconds – dot (**1**) black – pre-selection off

➠ p. 5 - 61



The following functions are operated in the same manner:

– **Front level pre-selection**
– **Rear level pre-selection**
– **Right level pre-selection**
– **Left level pre-selection**

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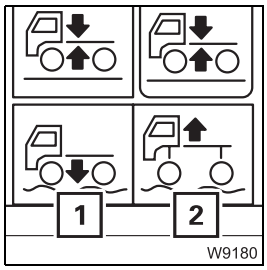


Lowering/raising the level

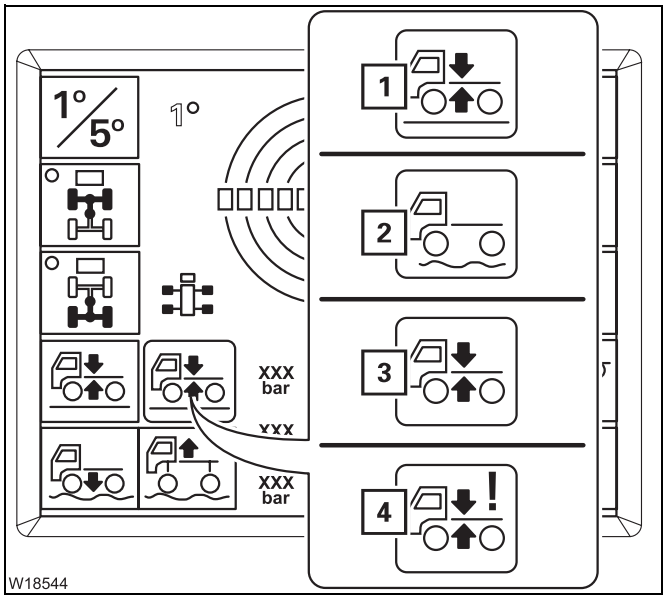
Suspension struts are pre-selected.

1 To lower: Press button – suspension struts retract

2 To lift: Press button – suspension struts extend

p. 5 - 62

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



Vehicle level display

The current status is shown using different symbols:

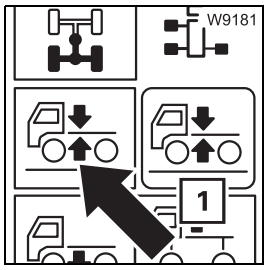
1 Green – on-road level

2 White – no on-road driving level

3 Yellow – level change

4 Violet – error

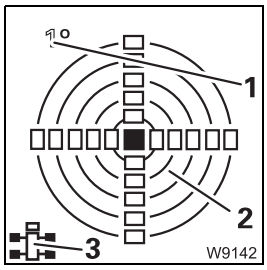
p. 5 - 60



Setting the on-road level

– To set the on-road level: Press the button until the symbol (**1**) is green

p. 5 - 61



Display of current inclination

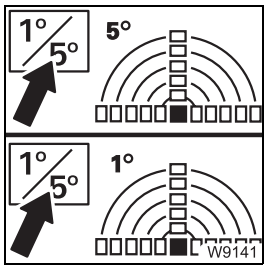
1 Measuring range display

2 Inclination indicator

3 Directional indicator

p. 5 - 62

12.07.2013



Switch between measuring ranges

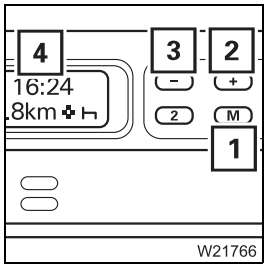
– **To switch over:** Press button once – the current measuring range 1° or 5° is shown

➠ p. 5 - 62

3.2.17 Tachograph/speedometer

➠ *Setting the tachograph*, p. 5 - 16.

Tachograph Correction of time

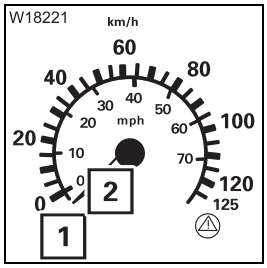


1 Open the time menu: Press the button – the time correction menu opens

2 Time correction +: Press the button – the time (**4**) is increased

3 Time correction –: Press the button – the time (**4**) is decreased

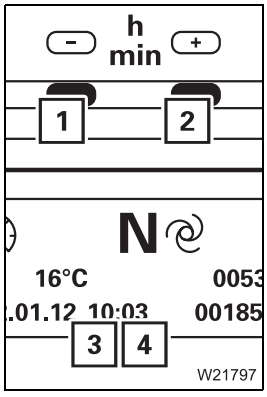
Speedometer



Speed indicator

1 Indicates the speed in km/h

2 Indicates the speed in mph



Setting the driving display time

1 Press the button – the time is increased

2 Press the button – the time is decreased

Setting the hours (**3**): Press buttons (**1**) + (**2**) 1 x – press the button for setting within 10 seconds

Setting the minutes (**4**): Ignition on or
do not press a button for approx. 10 seconds

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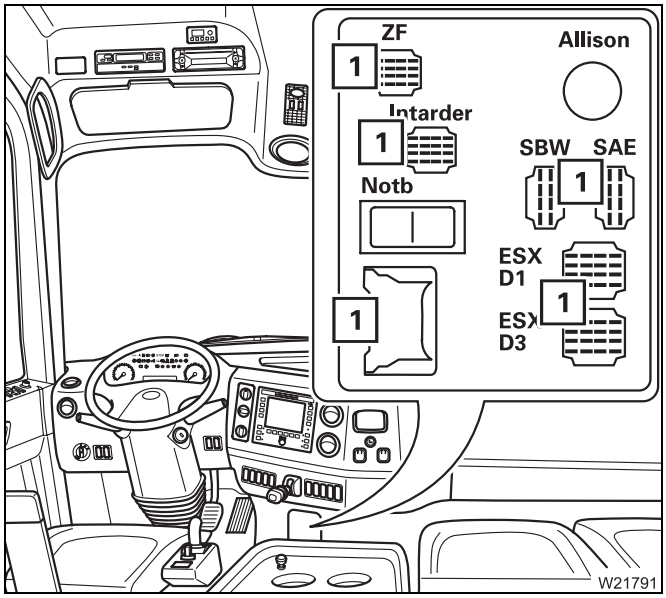
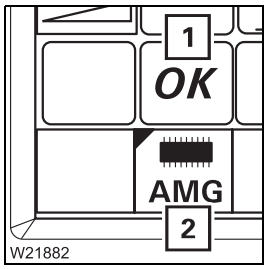
3.2.18 Diagnostics



The diagnostics connections (**1**) may only be operated by service staff from the engine and transmission manufacturer, or by **Manitowoc Crane Care**.

Displays/ submenu

Settings submenu



1 AMG diagnostics
OK, STOP or the service symbol (spanner) is displayed, depending on the severity of the error

2 Diagnostics submenu
If there is a malfunction, press button (**2**) 1 x, read the values in the submenu and report to **Manitowoc Crane Care**.

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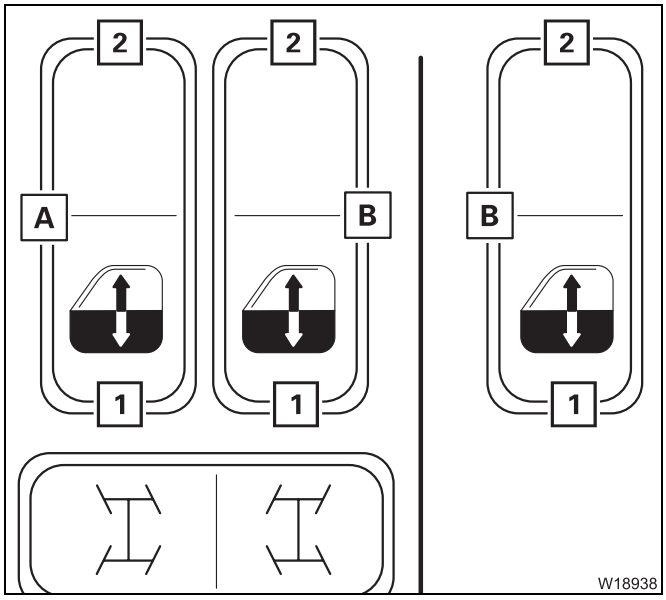
3.2.19 Windows, doors, keys

Window winder

Risk of crushing when closing the windows.
If the window winders encounter resistance, they do not stop but keep on moving at reduced power.



Button assignment

A Window winder, driver's door

B Window winder, passenger door

1 To open the window

2 To close the window

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

Jog function

Press button (**1**) briefly – the window opens all the way to the end position.

Press button (**2**) briefly – the window closes all the way to the end position.

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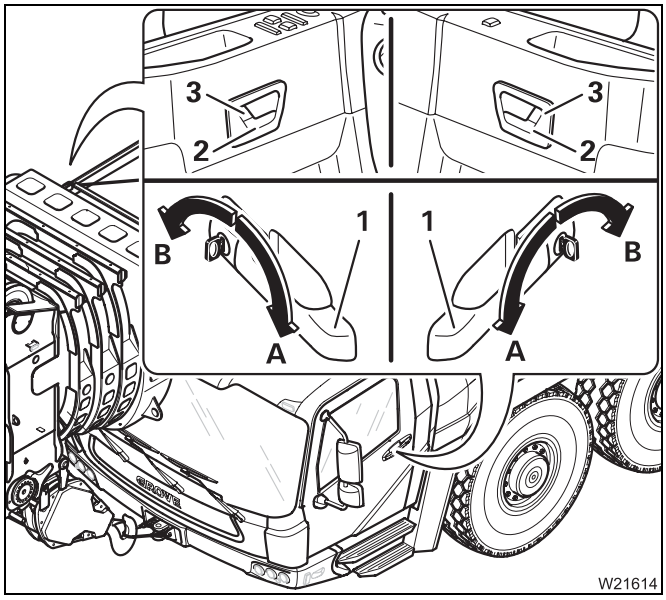
Doors

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

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



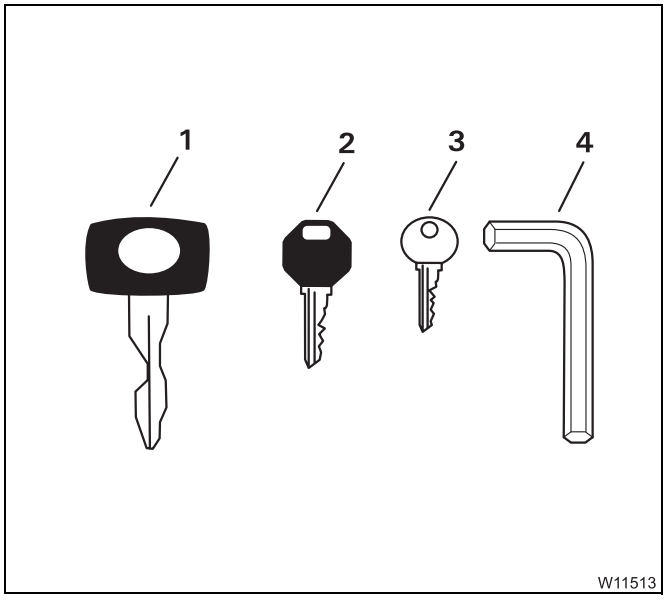
Locking
- Turn the key towards **B**, or
- Press in the handle (**3**)

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

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

Keys

Different keys are supplied.



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

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

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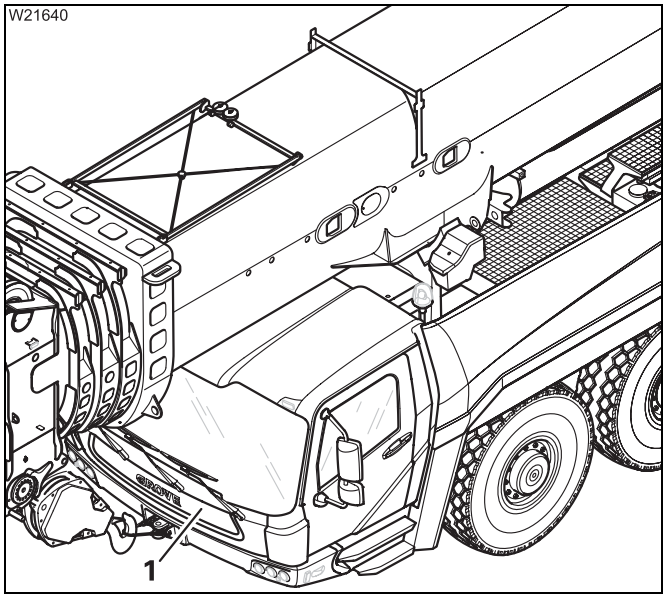
3.2.20 Front flap



Opening

- Move the front flap (**1**) up as far as it will go, holding it by the lower edge.

The front flap is held in the open position.

Closing

- Fold the front flap (**1**) down, holding it by the upper edge.
- Press the front flap against the driver's cab on both sides until you can hear it latch into place.

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4 Starting/turning off the engine for driving

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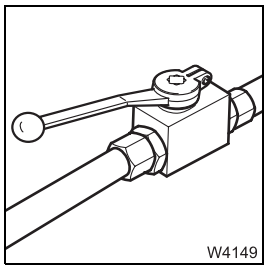
4 Starting/turning off the engine for driving

4.1 Starting the engine from the driver's cab

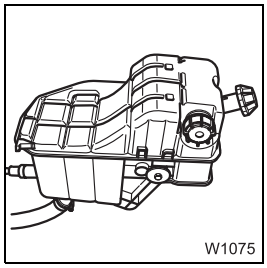
This section describes how to start the engine from within the driver's cab. You can also start the engine using the hand-held control, or from the crane cab; ➠ *Starting the engine for driving for rigging work*, p. 12 - 23.

4.1.1 CHECKLIST: Starting the engine

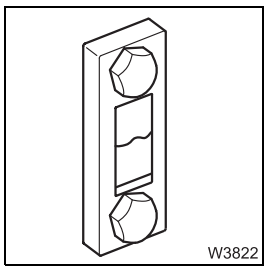
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified there.



1. Check that the valves on the hydraulic tank are open; ➠ p. 4 - 11.



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



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

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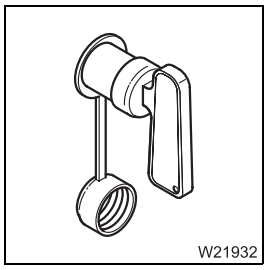
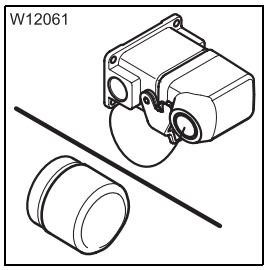
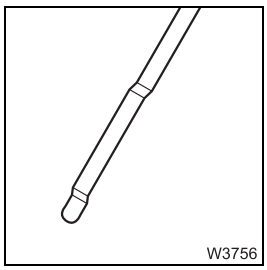


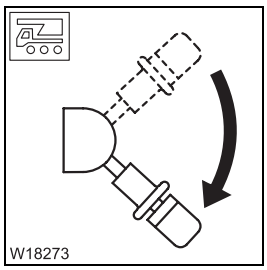
4. Switch on the battery master switch; ➠ p. 4 - 12.



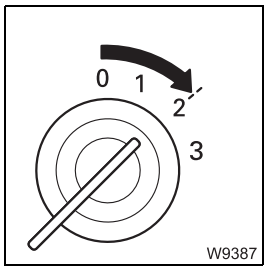
5. Check that
– The bridging plugs are inserted in the sockets for hand-held control; ➠ p. 10 - 4.
– All emergency stop switches have been reset; ➠ p. 4 - 26.



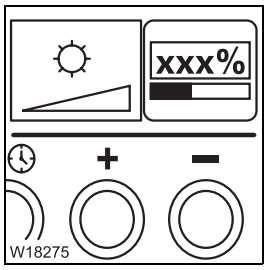
6. Check the oil level in the engine and gearbox; ➠ *Maintenance manual*.



7. Check that the parking brake is engaged.



8. Switch on the ignition and check the instruments and displays; ➠ p. 4 - 12.



9. If necessary, set the brightness,
– on the *ECOS* display; ➠ p. 4 - 15,
– of the instrument lighting; ➠ p. 5 - 22.

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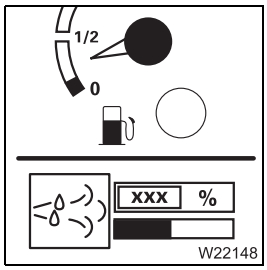
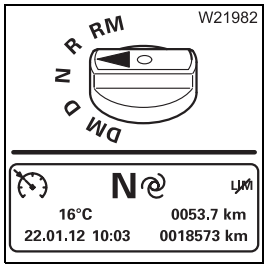


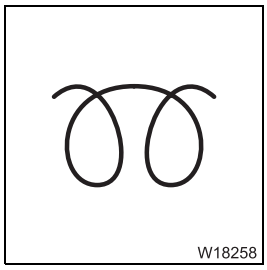
10. Check the consumables level;

– ➠ *Refuelling*, p. 4 - 8,

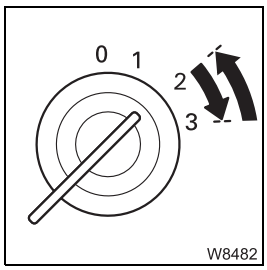
– ➠ *DEF*, p. 4 - 10.



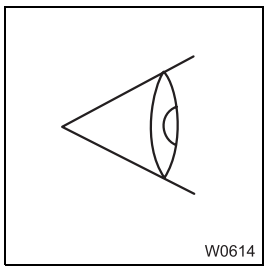
11. Shift the transmission to the neutral position; ➠ p. 5 - 24.



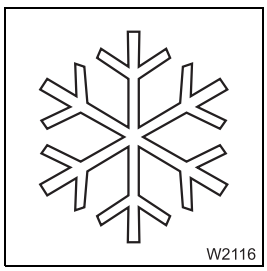
12. If the truck crane has a flame start system, wait until the lamp goes out; ➠ p. 4 - 18.



13. Start the engine; ➠ p. 4 - 16.



14. Conduct the necessary checks after starting the engine; ➠ p. 4 - 19.



15. In the event of low outside temperatures; ➠ *CHECKLIST: At low temperatures*, p. 4 - 4.

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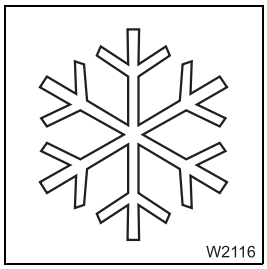
4.1.2 CHECKLIST: At low temperatures



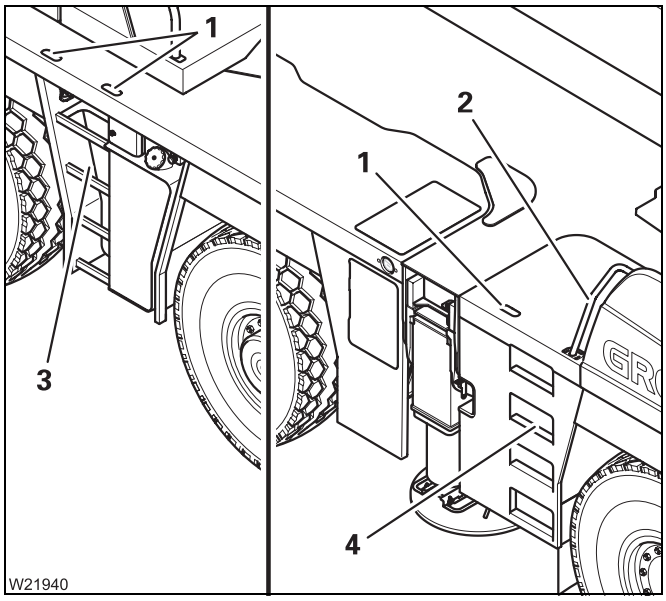
You must also observe the following points when operating the truck crane at low outside temperatures:

1. The fuel and engine oil must be suited for use in the outside temperature in question; ➠ *Separate engine manufacturer's operating manual*.
2. The engine coolant must contain sufficient antifreeze; ➠ *Separate engine manufacturer's operating manual*.
3. The windscreen washing system must contain sufficient antifreeze; ➠ *Maintenance manual*.

4.1.3 Ladders and access ladders

Access ladders

The access ladders are firmly attached.



There are two access ladders on the right-hand side.

Access ladder (**3**) has hand holes (**1**).

Access ladder (**4**) has a hand hole (**1**) and you can reach the handrail (**2**).

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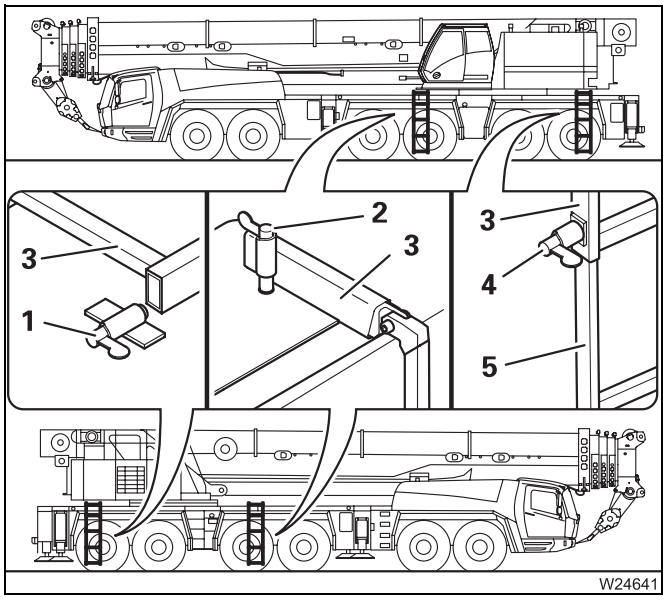
Ladders

There are different ladders on the truck crane.

Risk posed by ladders falling down.
Always secure the ladders before driving. The prevents the ladders from falling down while driving and endangering other vehicles.

There are fold-out access ladders on the right-hand and left-hand side.

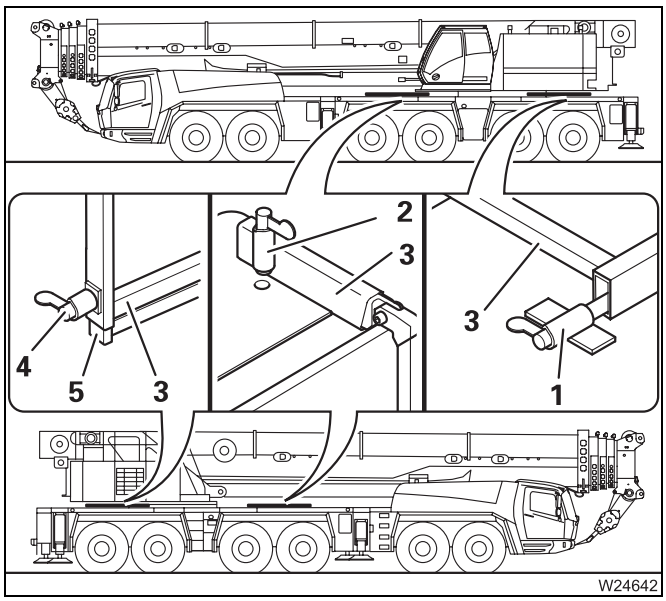


Folding out

- Unlock the spring latch (**1**).
- Turn the ladder (**1**) outwards and fold it down.
- Secure this with the spring latch (**2**).

If necessary, you can pull out an additional stair (**5**) from the ladder.

- Unlock the spring latch (**4**) and pull out the step (**5**).



Folding in

- Unlock the spring latch (**4**) and slide in the step (**5**).
- Unlock the spring latch (**2**) and pivot the ladder (**3**) out of the carrier.
- Secure this with the spring latch (**1**).

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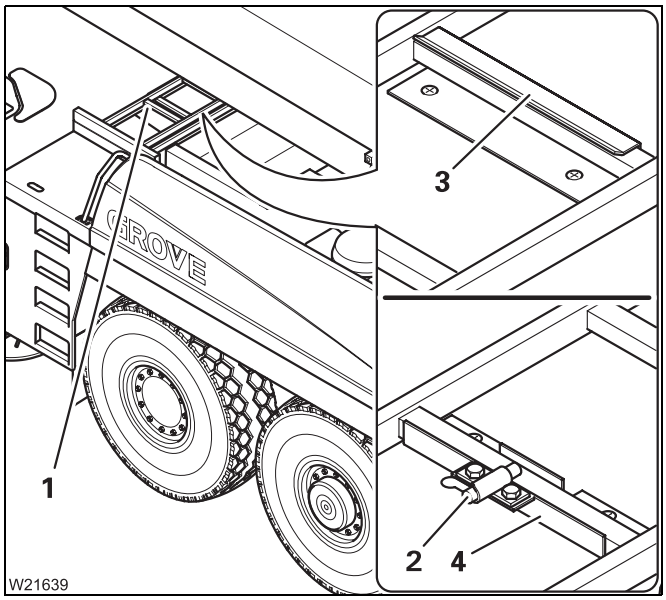
A folding ladder is also mounted on the carrier.



You can fold out the ladder (**1**)).

While driving

- Push the ladder (**1**) into the holders (**3**) and (**4**) and secure it with the spring latch (**2**).

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4.1.4 Refuelling

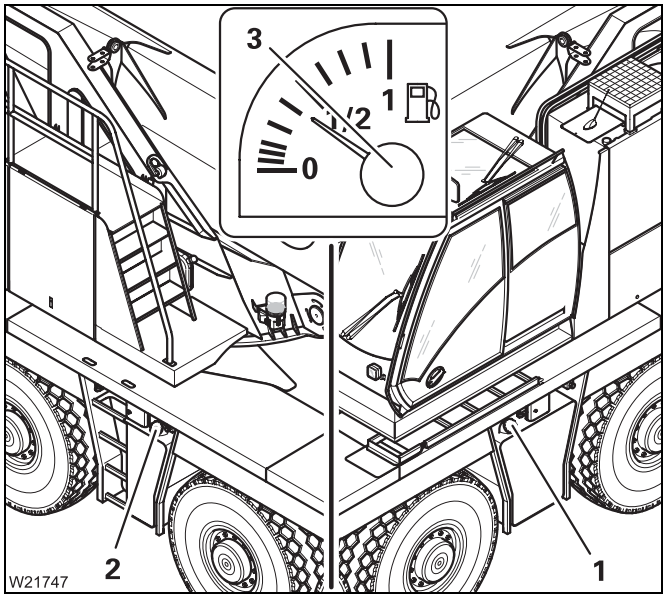
Use only permissible consumables; ➠ *Separate engine manufacturer's operating manual*.

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

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

Risk of damage to the engine and catalytic converter
Non-authorised consumables can damage the engine and catalytic converter and will make any warranty claims void. Use only consumables approved by the engine manufacturer.

Standard tank



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

The fuel tanks can be refuelled via a filler neck.

- Always open both filler necks when refuelling.
- Refill the fuel at appropriate times, and close the tanks (**1**) and (**2**) with the cap. Leave sufficient space for the fuel to be able to expand.

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

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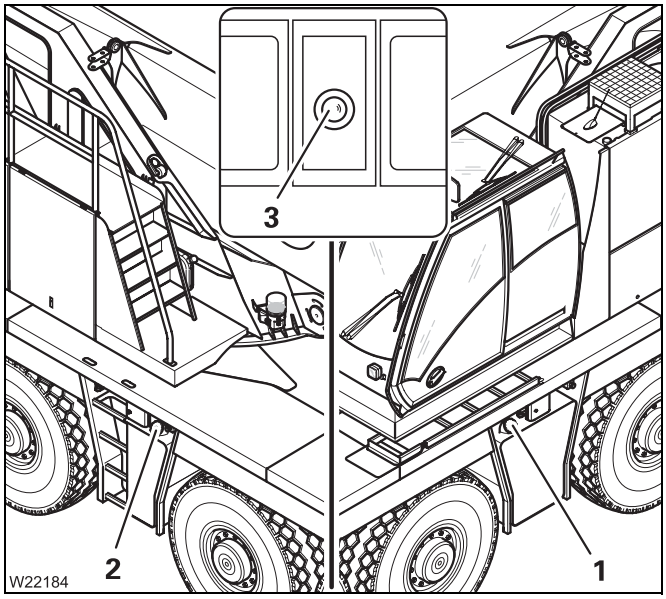
Dual tank

The dual tank system makes it possible to operate the truck crane in driving mode and crane operation mode with different types of fuel, provided this complies with the local regulations in the country in which you are working.



The fuel tank (**1**) is filled with the fuel for driving.

The fuel tank (**2**) is filled with the fuel for crane operation.

- Open the filler neck to refuel.
- Refill the appropriate fuel in due time, and close the tanks (**1**) and (**2**) with the cap. Leave sufficient space for the fuel to be able to expand.

Switching over the fuel supply

When fitted with the dual tank system, the fuel supply is automatically switched over when you start the motor from the crane cab.

– The driving fuel tank is in use when the *Dual tank* indicator lamp (**3**) is out.

– The crane fuel tank is in use when the *Dual tank* indicator lamp (**3**) is illuminated.

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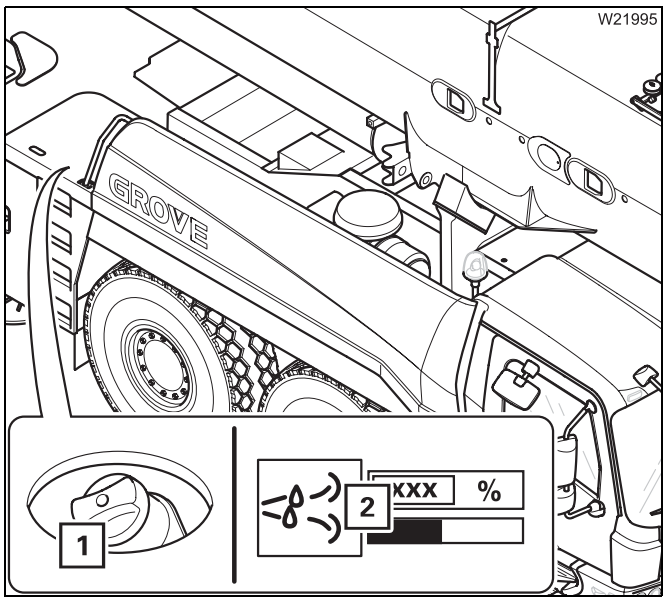
DEF



When additional equipment is in use, the submenu *Inspection* shows the fill level of the DEF tank (**1**).

The display (**2**) indicates the current level as a percentage. 100% corresponds to about 40 l (0.9 gal).

The level indicator below the display changes colour depending on the level:

Green: Over 10% – over 4 l (0.9 gal)

Yellow: 5 to 10% – 2 to 4 l (0.4 to 0.9 gal)

Red: Below 5% – less than 2 l (0.4 gal)

- Refill the DEF tank (**1**) in good time and close it using the cap.

When the DEF tank is used up, the engine control system will reduce the motor torque. You can override this torque reduction; ➠ *Overriding torque reduction*, p. 5 - 52.

Risk of injury from ammonia vapours
Ammonia vapours can escape if the DEF tank is opened at high outside temperatures. Ammonia vapours can irritate mucous membranes, skin and eyes.
Ensure that there is adequate fresh air supply and do not breathe in the escaping ammonia vapours.

Risk of damage to painted or aluminium surfaces.
DEF can corrode these surfaces. Clean up spilled DEF with water immediately.

In order to comply with exhaust emission regulations, the truck crane may only be driven with DEF. Driving with an empty DEF tank will invalidate the truck crane's licence for use on public roads.

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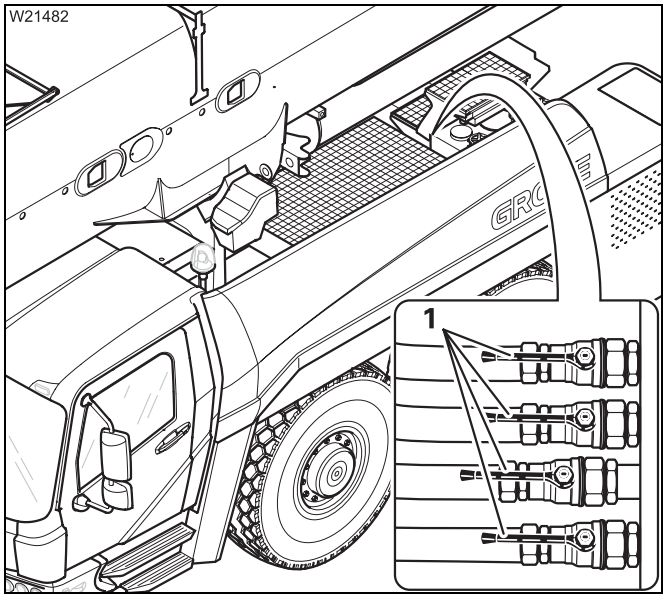
4.1.5 Inspections before starting the engine

On the hydraulic tank

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

Risk of damage to the hydraulic pumps.
You may only start the engine when all the valves on the hydraulic tank are open.



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

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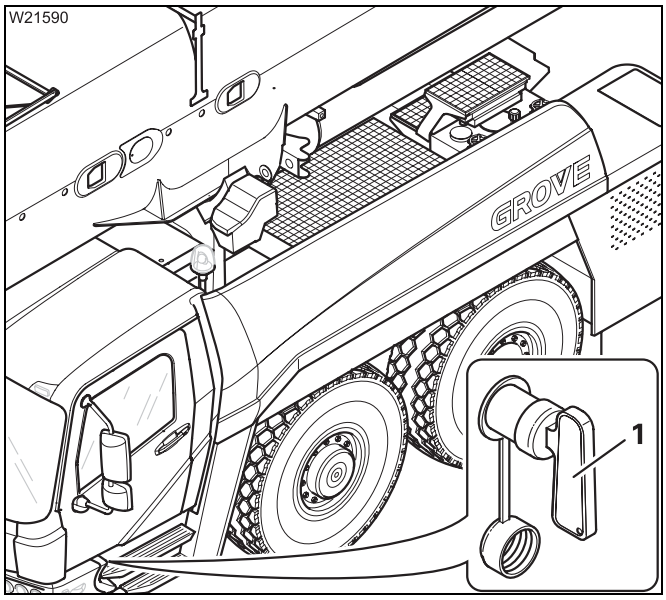
Battery master switch

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



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

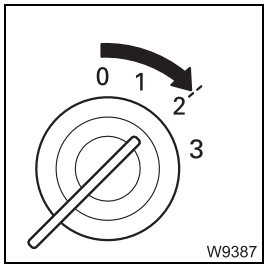
The battery master switch is switched on if you are unable to pull off the selector handle.

Checking the hand-held control

Check that the hand-held control has been removed, and that the bridging plugs for the hand-held control are inserted into all sockets; ➠ p. 3 - 28.

4.1.6 Switch on the ignition

The ignition can only be switched on if the bridging plugs have been inserted in all sockets for hand-held control; ➠ *Sockets for hand-held control*, p. 3 - 28.



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

After switching on the ignition, a lamp test is carried out, and switching states are checked.

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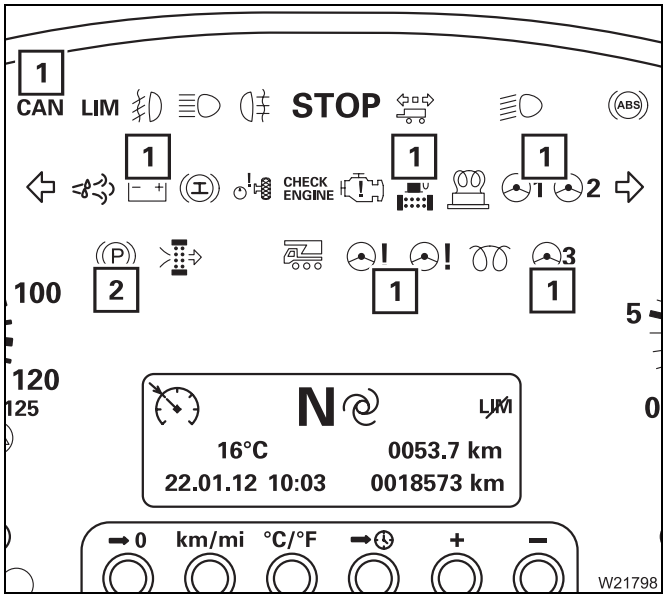
4.1.7 Lamp test/equalisation of the switching states

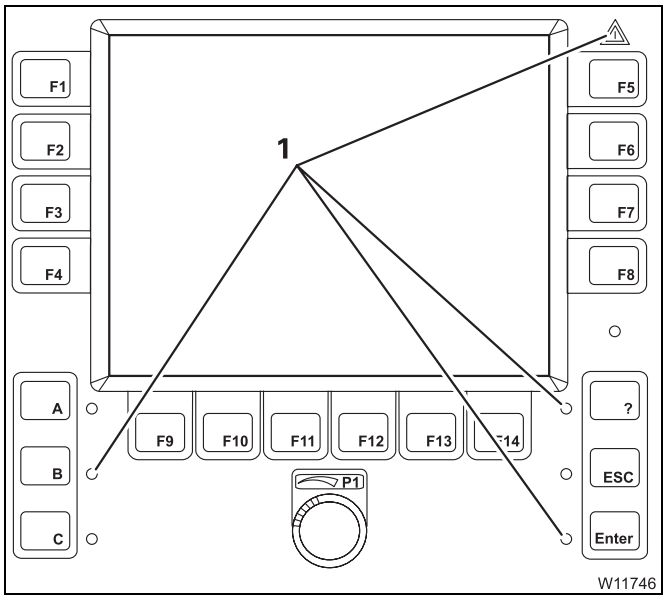
Lamp test

After the ignition has been switched on, a lamp test is conducted.

Risk of accidents due to faulty lamps.
The lamps that are used to provide warnings and information during operation light up for control purposes whenever the ignition is switched on. Always perform the following lamp tests and immediately replace faulty lamps or have them replaced.
In this way, you will avoid accidents and damage that occur when malfunctions are not identified in time.



- Check that the lamps (**1**) light up briefly, if they are present. If the specified time is insufficient, switch on the ignition again.
- If necessary, engage the parking brake and check that the lamp (**2**) lights up continuously.



- Check that the lamps go on for about two seconds after switching on the ignition (**1**):

Contact **Manitowoc Crane Care** if one or more lamps do not light up.

If you could not check all the lamps in the specified time, you can conduct the lamp test again as follows.

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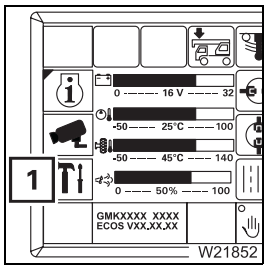
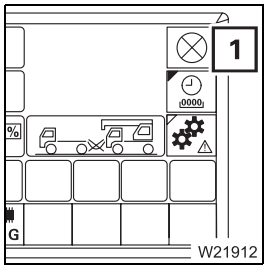


Conducting the lamp test

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

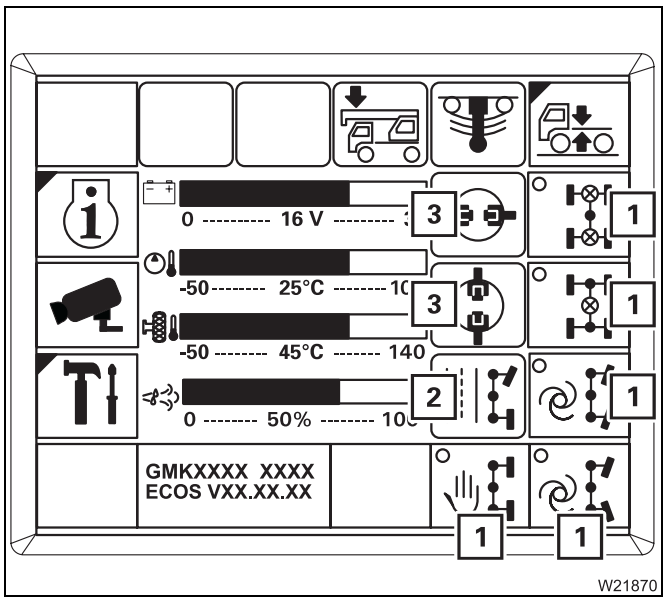


- Press the button (**1**).
  The lamps on the ECOS control unit remain lit until you let go of the button again.

If necessary, you can set the minimum brightness of the display;
➠ p. 4 - 15.

Equalisation of the switching states

When the ignition is switched on, the switching states of the differential locks and the separate steering are compared.



The state last saved is retrieved.

In the main menu, the corresponding symbols (**1**) are shown and the electronics system triggers the switching operations.

The displays (**2**) and (**3**) show the current switching states.

If the display (**2**) does not show the symbol that corresponds to the switching process, you must actuate the steering so that the locking processes are performed mechanically;
➠ *Switching to normal steering mode*, p. 5 - 69.

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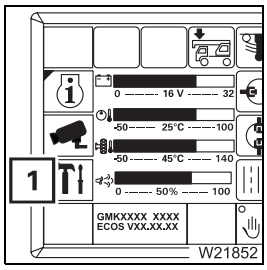
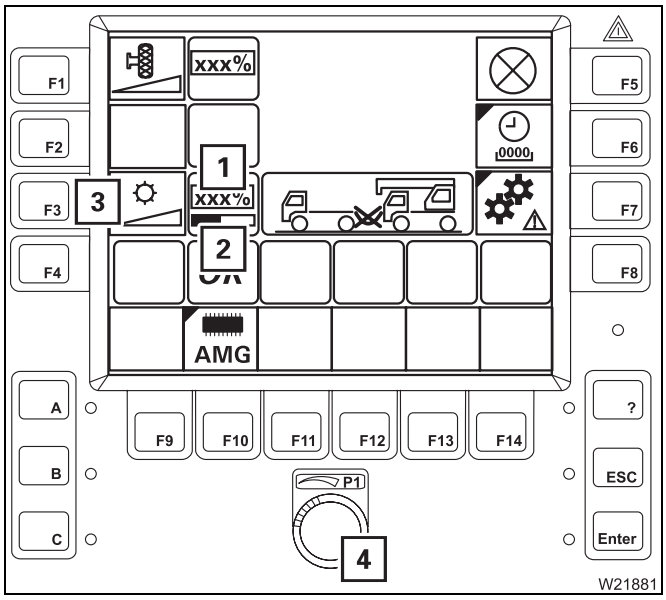
4.1.8 Display – setting the brightness

The brightness of the displays is regulated automatically by the *ECOS*, depending on the ambient brightness. You can set a minimum degree of brightness manually, which is always observed when the brightness is regulated.



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



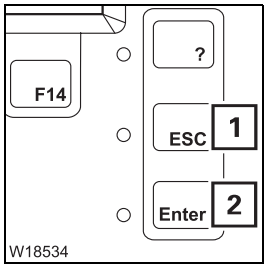
- Press the button (**3**) once.

A red bar (**2**) appears below the display (**1**).

- Set the required minimum brightness with the switch (**4**).

The brightness of the display changes during the setting procedure and you can view the set value (0 to 100%) on the display (**1**).
The degree of brightness which you set here is the minimum value for automatic regulation.

There is no automatic regulation if you set 100%.
The displays always have maximum brightness.



You can cancel the entry at any time using button (**1**). The settings are then reset.

- Adopt the **minimum brightness** entered – press the button (**2**) 1 x.
  The red bar below the display disappears. The brightness is automatically regulated between the newly set value and 100%.

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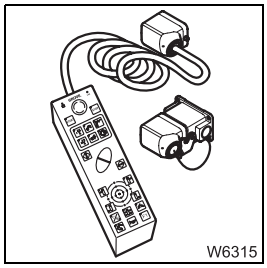
4.1.9 Start the engine

This section describes only how to start the engine from the driver's cab. You can also start the engine with the hand-held control; ➠ p. 12 - 23,

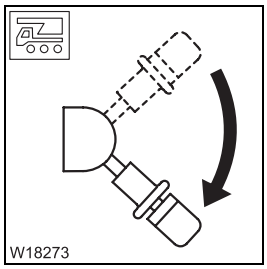
or from the operating elements of the outriggers; ➠ p. 12 - 23.

Refer to the separate operating instructions provided by the engine manufacturer for the operation of the engine. The engine can only be started if



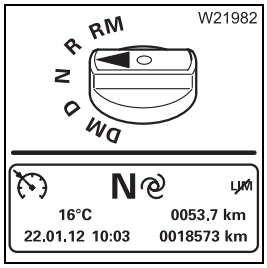
– The bridging plugs have been inserted in all sockets of the carrier and superstructure for the hand-held control; ➠ p. 3 - 28.

– The lamp (**1**) has gone out (superstructure ignition off).



- Check that the vehicle parking brake is locked.

  If the brake is engaged, the parking brake lever will point downwards.



- Switch the transmission to neutral position **N**; ➠ p. 5 - 24.
  Only in this shift position can the engine be started.

If the engine is equipped with a flame start system; ➠ *With flame start system*, p. 4 - 18.

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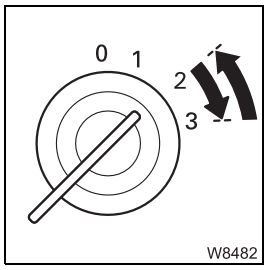
Without flame start system

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

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

- Do not press the accelerator.



- Turn the ignition key to position **3** and hold it there until the engine starts.
- Let go of the ignition key after the engine starts.

If the engine does not start, abort the starting procedure after about 15 seconds and wait one minute before trying again.

If the engine does not start after several attempts; ➠ *Malfunctions in the engine*, p. 7 - 27.

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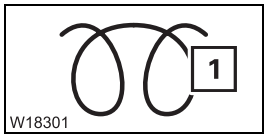
With flame start system

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

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

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

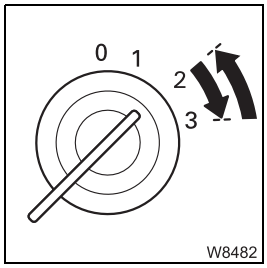
The flame start system is activated each time the ignition is turned on:



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

If the lamp (**1**) does not go out, there is a malfunction on the flame start system; ➠ *Malfunctions in the engine*, p. 7 - 27.

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



- Turn the ignition key to position **3** and hold it there until the engine starts.
- Let go of the ignition key after the engine starts.
- If the engine does not start, abort the starting procedure after about 15 seconds and wait one minute before trying again.

If the engine does not start after several attempts; ➠ *Malfunctions in the engine*, p. 7 - 27.

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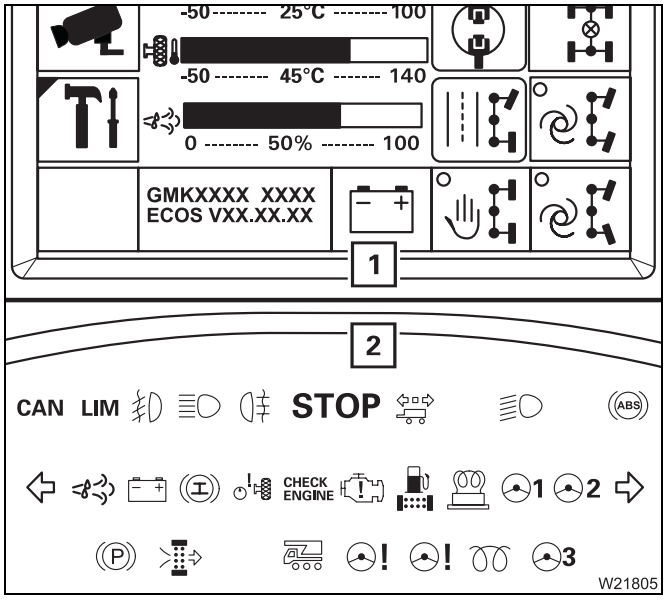
4.1.10 Inspections after starting the engine

Checking in the main menu

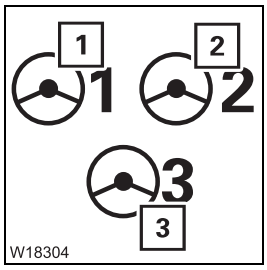
Risk of damage to the engine.
If symbol (**1**) lights up or the **STOP** lamp comes on and the warning buzzer sounds, switch the engine off immediately. The engine can be damaged by running it when the oil pressure is too low.



- In the main menu, check the displays (**1**) and (**2**):
  - Display (**1**) – when the symbol is red; ➠ *Right after starting*, p. 5 - 37.
  - Display (**2**) – when a warning message is shown; ➠ *Warning or malfunction messages on the instrument panel*, p. 5 - 50.

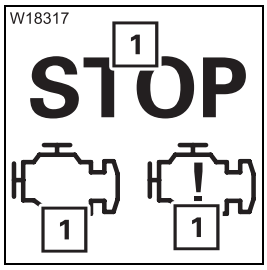
Indicator lamps on the instrument panel

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

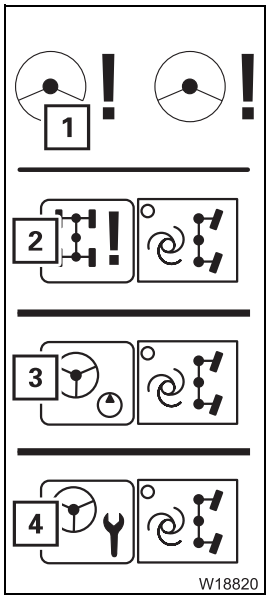


- Check that the lamps (**1**) and (**2**) go out.
  If one or both lamps are lit, refer to the information in section *Right after starting*; ➠ p. 5 - 37.

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



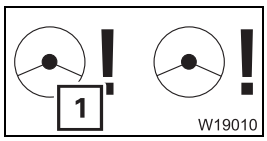
- **Stop the engine immediately** if one of the lamps (**1**) is lit.



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

– When the lamp (**1**) **lights up**:
The main menu shows a symbol.

With the symbol (**2**):	The oil supply for the steering is still being built up. If the symbol has not yet gone out, contact **Manitowoc Crane Care**
With the symbol (**3**):	Service mode on. Briefly turn off the ignition and then on again. If the symbol is still not shown, contact **Manitowoc Crane Care**.
With the symbol (**4**):	The 5th and 6th axle lines are brought into the straight running position, as far as is possible, and can no longer be steered. It is possible to steer the 1st to 2nd axle lines. Arrange for the error to be rectified.



– If the lamp (**1**) **flashes**:
The steering angle of the 5th and 6th axle line does not relate correctly to the 1st to 2nd axle line.
  - Steer using the steering wheel – the steering angle is automatically offset, and the lamp (**1**) goes out.

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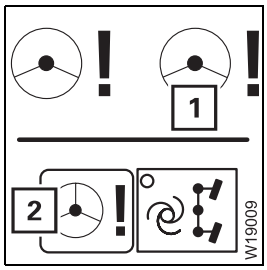

- Check that the lamp (**1**) goes out.
  If the lamp (**1**) **is lit**, the symbol (**2**) is shown. The steering system has failed. You may not under any circumstances drive the truck crane.
  Contact **Manitowoc Crane Care** and arrange for the error to be rectified.

Risk of accidents due to the fact that the truck crane cannot be steered.
Under no circumstances should you drive the truck crane when the red lamp (**1**) is lit. The truck crane can no longer be steered safely.
The 5th and 6th axle can steer in an uncontrolled manner, which may lead to serious accidents, even when driving at reduced speed.

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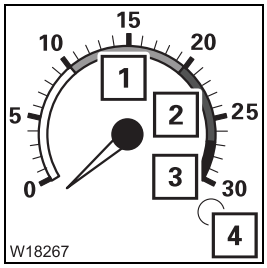
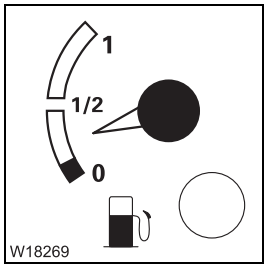
4.1.11 Monitoring elements

Instrument panel



Tachometer

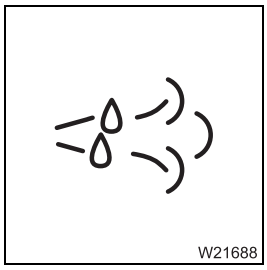
1	**Green:**	Economic consumption
2	**Yellow:**	Engine brake active
3	**Red:**	Engine speed too high – danger; ➠ *Checks when driving downhill*, p. 5 - 43
4	**Lights up**	Engine speed is too high



Fuel level display

Never run the fuel tank completely dry; always refuel in time; ➠ p. 4 - 8.

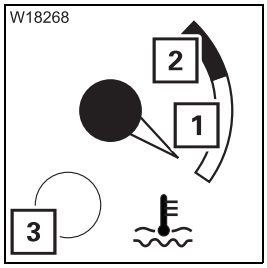
If the fuel tank is almost empty, air can be sucked in and the fuel system must be bled; ➠ *Maintenance manual*.



DEF level display

On:	DEF fuel almost empty
Flashing:	DEF tank empty

➠ p. 4 - 10



Coolant temperature display

1	**White:**	Coolant temperature normal
2	**Red:**	Coolant temperature too high
3	**Red, flashing**	

Cause and remedy; ➠ p. 7 - 39.

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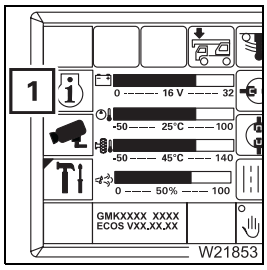
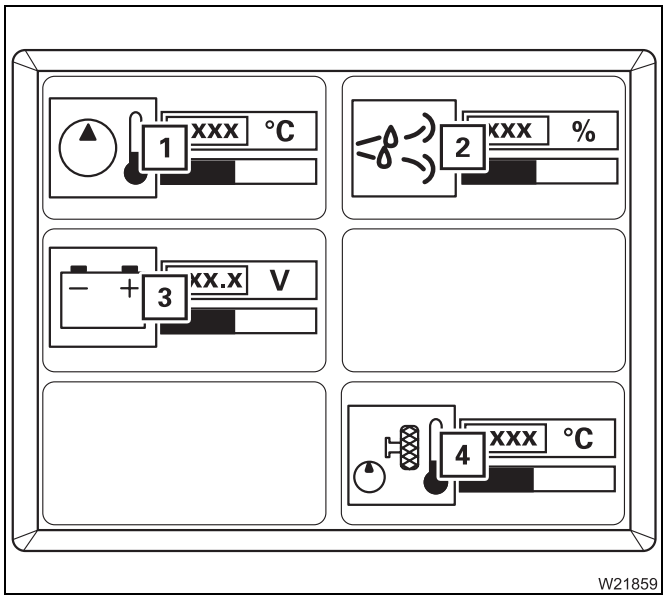
4.1.12 Monitoring submenu

The *Monitoring* submenu provides an overview of the most important measured values.



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



The *Monitoring* submenu opens.

The following values are displayed:

1 The hydraulic oil temperature in °C (°F)

2 DEF supply in per cent

3 Voltage in Volts

4 Oil temperature hydraulic drive axle line 4 and 5 in °C (°F)

The colour of the bar below the values indicates in which area the value can be found.

Green: Value O.K.

Yellow: Limit value almost reached

Red: Limit value exceeded (or not reached) – warning message; p. 5 - 47.

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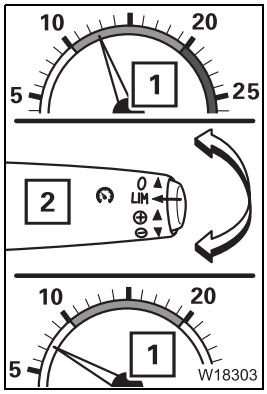
4.1.13 Setting the idling speed

After the engine is started, the idling speed is regulated automatically. If necessary, you can adjust the idling speed manually using the multipurpose switch.

You can only set the idling speed when the truck crane is stationary.

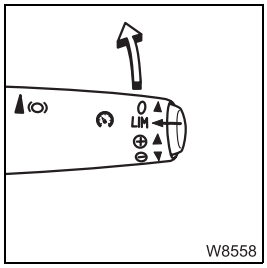


Increasing/reducing the idling speed

- Press the switch (**2**) up/down until the required engine speed (**1**) has been reached.

  or

- Press the switch (**2**) upwards/downwards once. The engine speed (**1**) is increased/reduced by 20 rpm.



Switching off the idling speed change:

- Push the switch forwards once. The idling speed is set automatically.

  or

- Accelerate over 20 km/h (12 mph).

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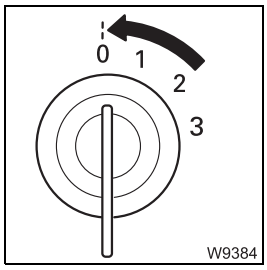
4.2 Turning off the engine

4.2.1 On the ignition lock/with hand-held control/on the outrigger control units

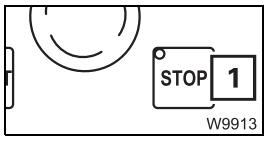
Risk of accidents due to the fact that the truck crane cannot be steered.
Only turn off the engine once the truck crane is at a standstill. If you remove the ignition key, the steering will lock and you will lose control of the moving truck crane.

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



If the hand-held control is not connected:

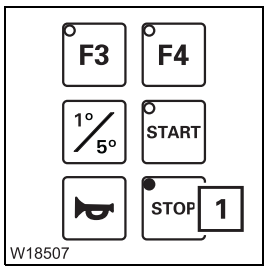
- Turn the ignition key to position **0** – the engine will stop.



If the hand-held control is connected:

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

In this case it is not possible to switch off the engine with the ignition lock.



On the outrigger control units, if the hand-held control is not connected:

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

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

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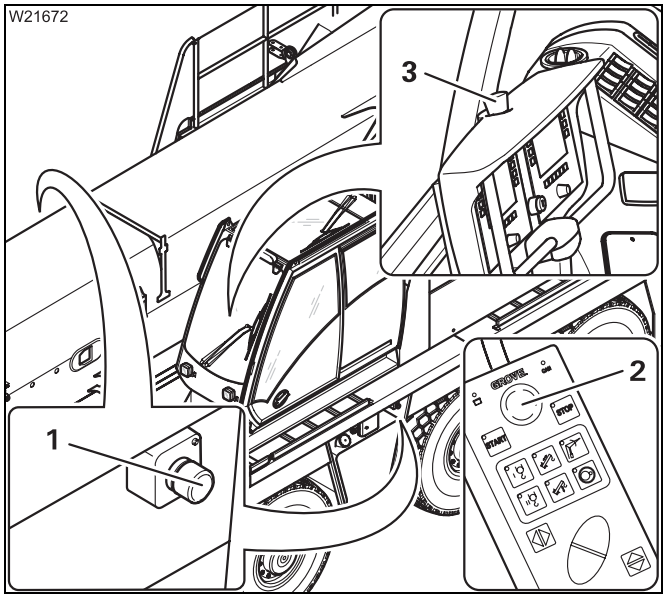
4.2.2 Using the emergency stop switches



Emergency stop switch

Four emergency stop switches are provided for an emergency:

1 On the carrier

2 On the hand-held control

3 In the crane cab

- Press an emergency stop switch (**1**), (**2**) or (**3**). The switch engages.

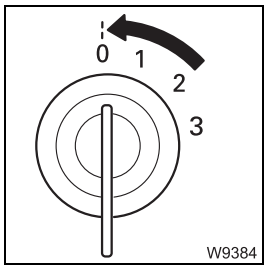
The engine shuts down.

If an air intake inhibitor is present, it is triggered.

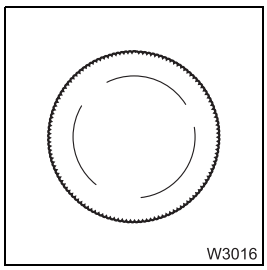
Do not operate the emergency stop switch to turn off the engine in normal operation. Only operate the emergency stop switch in an emergency situation.

Resetting the emergency stop switch

You can only restart the engine after you have reset the emergency stop switch.



- Switch off the ignition.



- Turn the actuated emergency stop switch until it disengages again.

If an air intake inhibitor is fitted, it must be loosened; ➠ *Releasing the air intake inhibitor*, p. 4 - 27.

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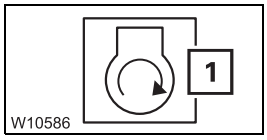
4.3 Air intake inhibitor

If the air intake inhibitor is triggered, a flap in the air intake line will close and the engine will stop running. The air intake inhibitor is triggered,

– if an emergency stop switch is actuated or



– when the maximum permissible engine speed is exceeded. In this case, the symbol (**1**) will turn **red** – at the *Warning* display and in the *Warning* submenu. The symbol stays red until the ignition has been turned off.

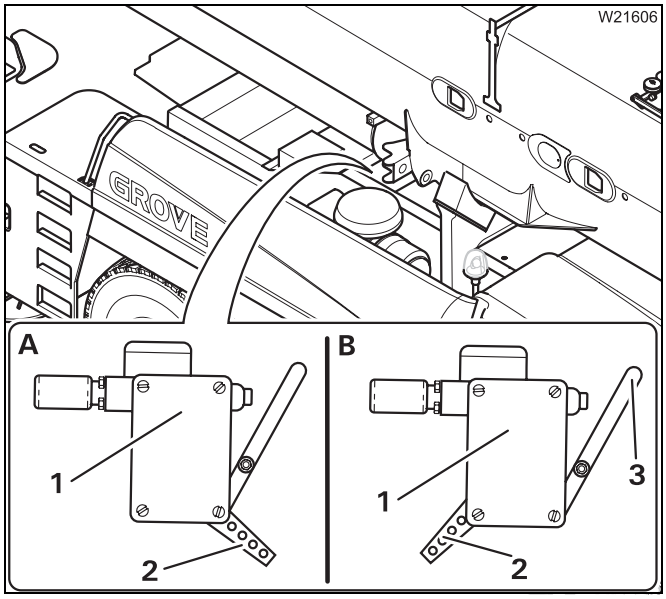
The engine can only be restarted after the air intake inhibitor has been released.

Releasing the air intake inhibitor

The following requirements must be met in order to release the air intake inhibitor:

– The ignition is switched off.

– The emergency stop switch is reset.



The indicator (**2**) shows the current state of the air intake inhibitor (**1**).

(**A**) – The indicator (**2**) is in the *Closed* position.

(**B**) – Turn the indicator (**2**) clockwise until it engages into the *Released* position.

You can close the air intake inhibitor manually with the lever (**3**).

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5 Driving

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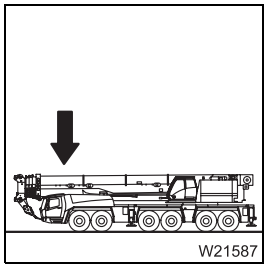
5 Driving

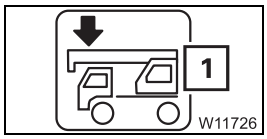
5.1 Before driving

5.1.1 CHECKLIST: Checks before on-road driving

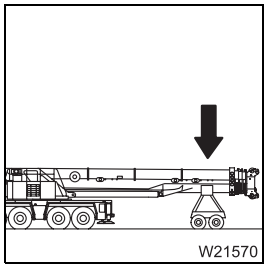
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified there.



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. 11 - 103.



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



2. **When the main boom is resting on a trailer**
   - All telescopic sections are locked.
   - The slewing gear is switched off; ➠ p. 11 - 103.
   - The boom floating position is switched on; ➠ p. 6 - 8.
   - The slewing gear freewheel is switched on; ➠ p. 6 - 7.
   - The boom pre-tensioning may be switched on; ➠ p. 6 - 9.
   - The houselock may be switched off; ➠ p. 11 - 15.
   - The superstructure is unlocked; ➠ p. 11 - 13.

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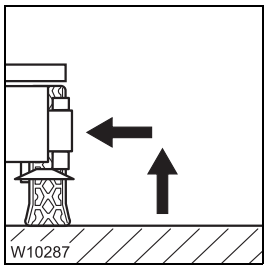
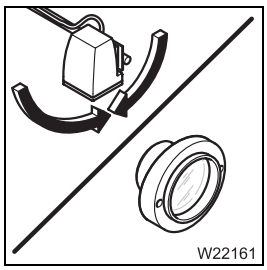


3. On the outriggers

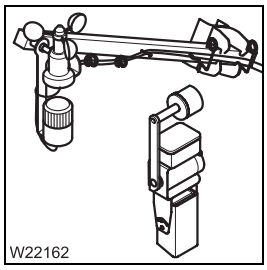
– All outrigger beams are fully retracted and secured to prevent extension; ➠ p. 12 - 34.

– The outrigger pads are in the driving position; ➠ p. 12 - 43.



4. The spotlight is turned downwards (if present); ➠ p. 11 - 109.

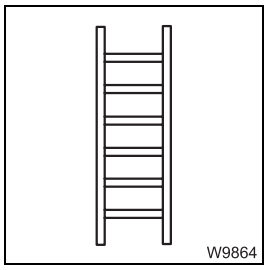
The lighting on the outrigger is switched off; ➠ p. 3 - 57.



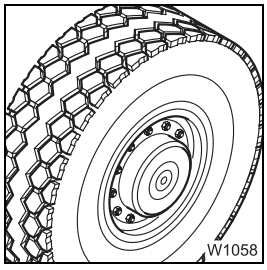
5. Anemometer, air traffic control light and camera on the main boom are dismantled;

➠ *Anemometer and air traffic control light*, p. 12 - 132,

➠ *Camera on main boom*, p. 12 - 137.



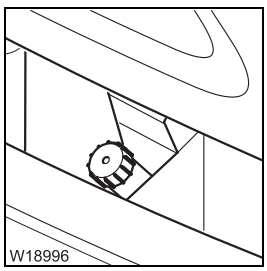
6. All ladders are secured; ➠ *Ladders*, p. 4 - 5.



7. Check the tyres:

– Tyre pressure when tyres are cold in on-road mode; ➠ p. 1 - 14.

– Other checks; ➠ *Maintenance manual*.



8. Windscreen washing system – check level; ➠ *Maintenance manual*.

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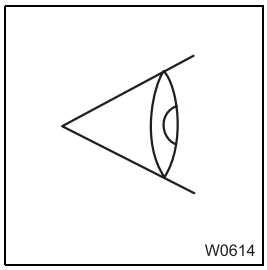
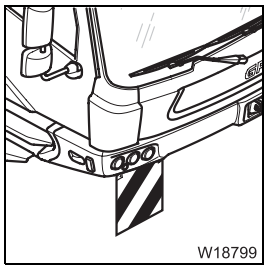
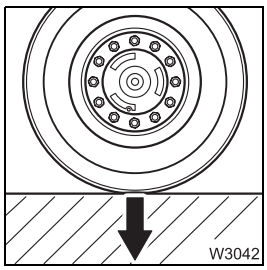


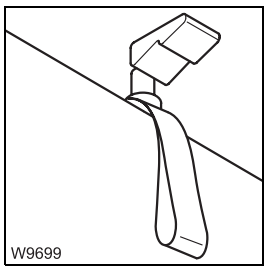
9. Inspect the truck crane, looking out in particular for any leaking fluids (oil, fuel or water).



10. The warning signs for marking the vehicle width are folded down (only for vehicle widths over 2.75 m [9.0 ft]);
Vehicle width; ➠ p. 1 - 8,
Warning signs; ➠ p. 5 - 6.

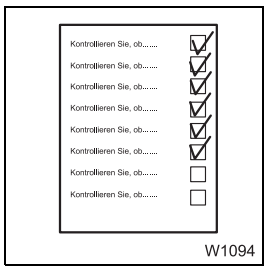


11. The detachable equipment parts are stripped down so that they fulfil the regulations of the country in which you are working as regards permissible weights and axle loads, lengths, widths, height, etc.
For a driving mode with a maximum axle load of 12 t (26 500 lbs);
➠ *Driving modes*, p. 6 - 1.



12. The fold-up berth is folded up and secured; ➠ p. 5 - 56.

13. All additional parts which may be transported are secured against falling down.



14. Carry out all activities and checks required for starting the engine;
➠ *CHECKLIST: Starting the engine*, p. 4 - 1.

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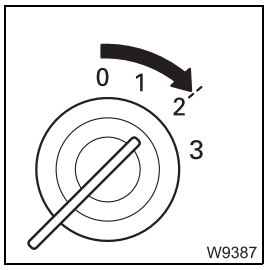
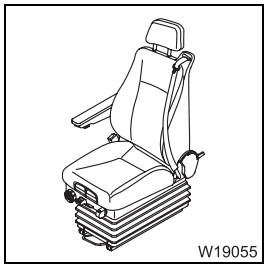
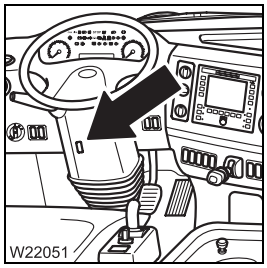


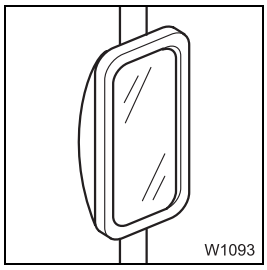
15. Switch on ignition; ➠ p. 4 - 12.



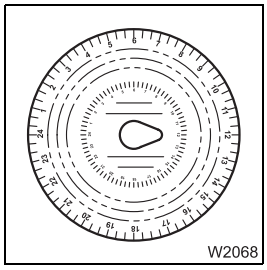
16. Adjust the driver's seat; ➠ p. 5 - 11.



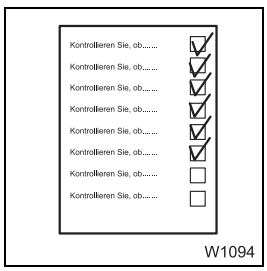
17. Adjust the steering column; ➠ p. 5 - 13.



18. Adjust the mirrors; ➠ p. 5 - 6.



19. Set the tachograph, insert the diagram sheet; ➠ p. 5 - 16.



20. Start the engine and carry out all inspections; ➠ *Inspections after starting the engine*, p. 4 - 19.

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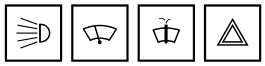
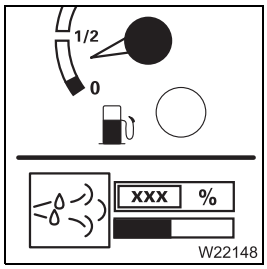
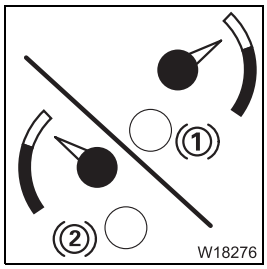


21. Check the electrical system; ➠ p. 5 - 6.

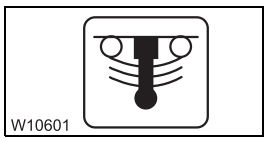


22. Check the fluid supply;
- ➠ *Refuelling*, p. 4 - 8,
- ➠ *DEF*, p. 4 - 10.

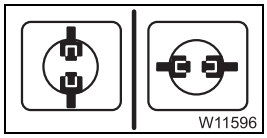


23. Check compressed air and brake systems; ➠ p. 5 - 9.

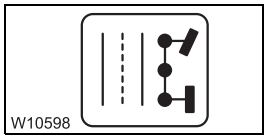
24. Check that all switching states for on-road driving are set, and that the corresponding symbols are shown:



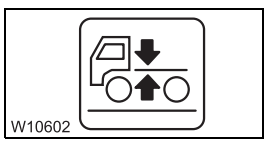
– Suspension switched on; ➠ p. 5 - 15.



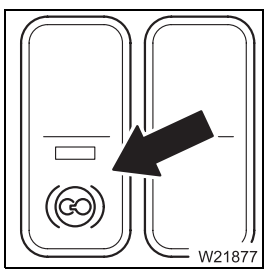
– Central and transverse differential locks switched off; ➠ p. 5 - 58.



– Separate steering switched off – the symbol for on-road driving is shown; ➠ p. 5 - 69.



– On-road level is set; ➠ p. 5 - 61.



– The retarder function should be switched on or off depending on the condition of the road; ➠ p. 5 - 44.

Establish the switching states for on-road driving if necessary.

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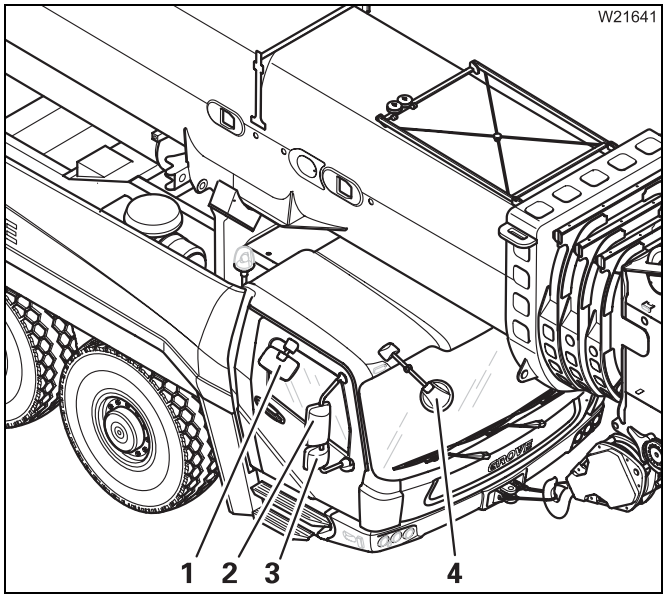
5.1.2 Checking the condition of the truck crane

Electrical system

- Check the following functions and arrange for faulty parts to be repaired:
  - Parking light/headlight, rotating beacons, fog tail light, side marker lights
  - Hazard warning system
  - Brake lights
  - Reversing lamp/buzzer
  - Full-beam headlight
  - Turn signal indicators
  - Windscreen wipers
  - Windscreen washing system
  - Horn

Adjusting the mirrors

Adjust all the mirrors to suit your sitting position.



Manual adjustment

- Manually adjust the mirrors (**1**), (**3**) and (**4**).

The mirrors (**2**) are adjusted electrically on both sides.

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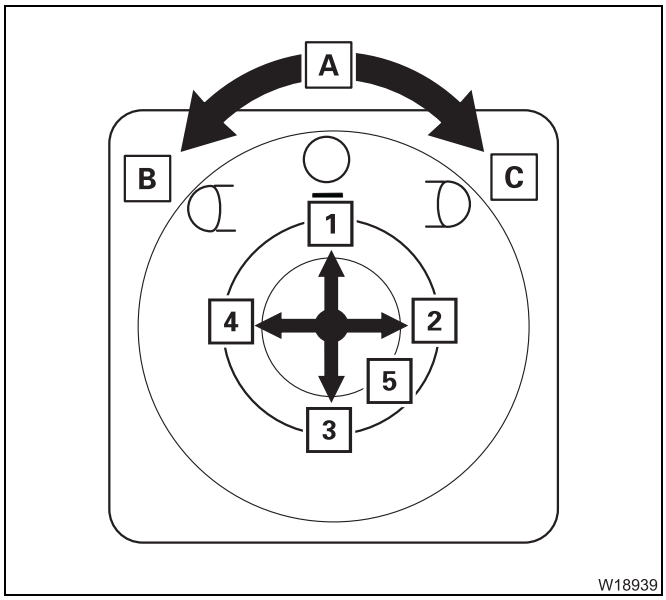
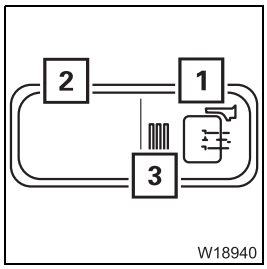


Electrical adjustment

- Turn the button to position
  - **A** Neutral position
  - **B** Mirror on the driver's side
  - **C** Mirror on the passenger side
- Press the button (**5**) – the mirror moves:
  - **1** Up
  - **2** Right
  - **3** Down
  - **4** Left



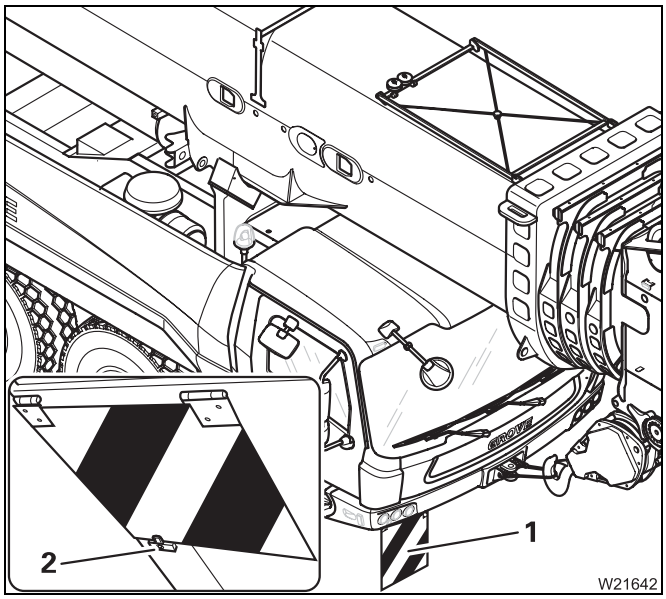
Mirror heating

1 Switching on: Press button once – lamp (**3**) turns on

2 Switching off: Press button once – lamp (**3**) turns off

Warning plates for vehicle width

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



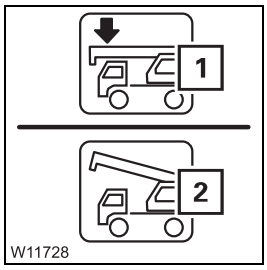
The warning plates (**1**) must be folded down to indicate the vehicle width during on-road driving.

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

Displaying vehicle height

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

- Open the main menu Esc



When the display (**1**) is present, the position of the main boom in the boom rest is monitored.

- Check that the (**1**) symbol is shown.
- When the (**2**) symbol is shown, derrick the main boom out until the (**1**) symbol appears.

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

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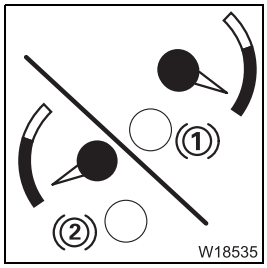
Supply pressure

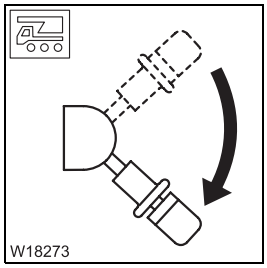
The brake system and some consumers (e.g. differential locks, driver's seat, etc.) require sufficient supply pressure in order function properly.



- Check that the supply pressure is approx. 8 bar (116 psi).

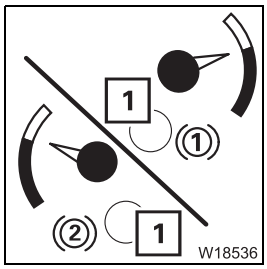
If the supply pressure is too low, such as after repairs, you can build it up as follows.

Building supply pressure



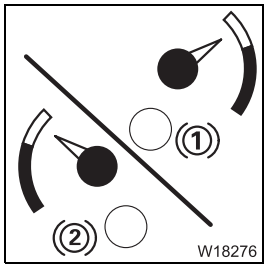
- Check that the parking brake is applied.

Risk of accident by truck crane moving unintentionally
Make sure that the lever is pointing down before building up the supply pressure.
This prevents the parking brake from releasing as soon as sufficient pressure is available and the truck crane moving unintentionally.



- Allow the engine to keep running. The supply pressure builds up and you can speed up this process by pressing the accelerator.

Light (**1**) turns off once the supply pressure reaches approx. 5.5 bar (80 psi).



- Build the supply pressure until:
  - Approx. 8 bar (116 psi) is reached,
  - A valve audibly releases pressure.

There is now sufficient supply pressure.

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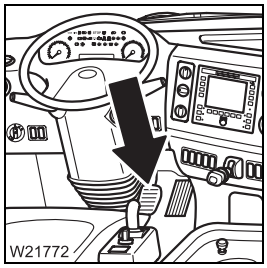
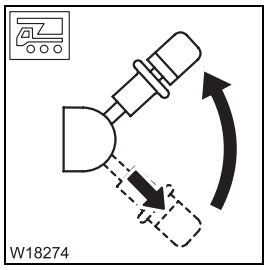
Parking brake

Check the function of the parking brake.



- Apply the service brake.

Risk of accident by truck crane moving unintentionally
Always apply the service brake before releasing the parking brake.
This prevents the truck crane from rolling in an uncontrolled manner when the parking brake is released.



- Release the parking brake.

The parking brake is released and the (**1**) light turns off when the supply pressure is sufficient.

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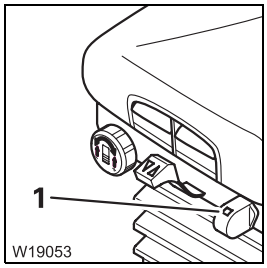
5.1.3 Adjusting the seats and steering column

Driver's seat



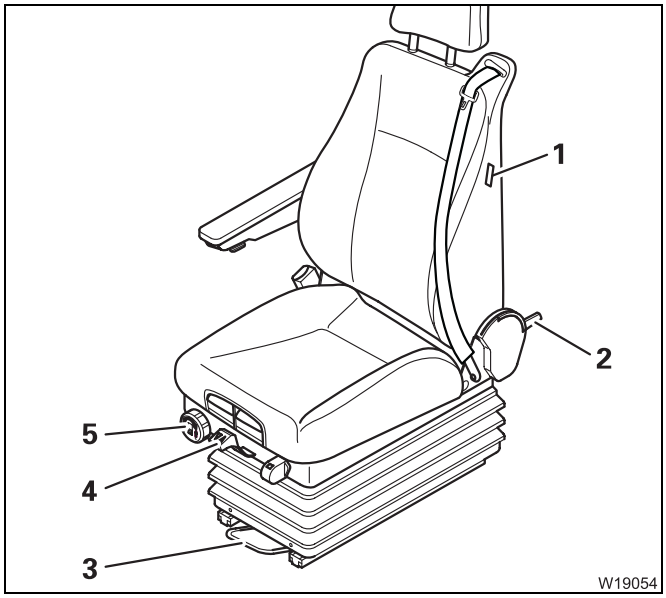
The seat height and lumbar support are adjusted pneumatically. You can only make these adjustments when:

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

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

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

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



Settings for body size

1 Seat heating on/off[1)]

2 Back rest – angle

3 Seat – longitudinal adjustment

4 Seat – height

5 Adjusting suspension stiffness to body weight

[1)] Additional equipment

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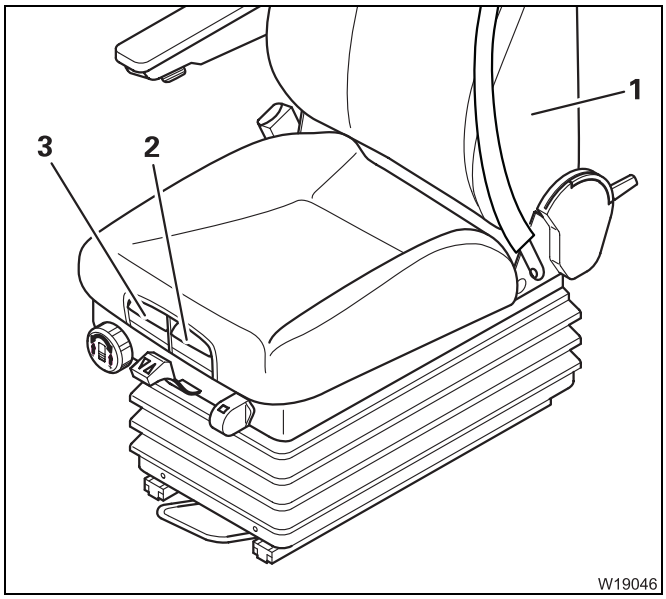
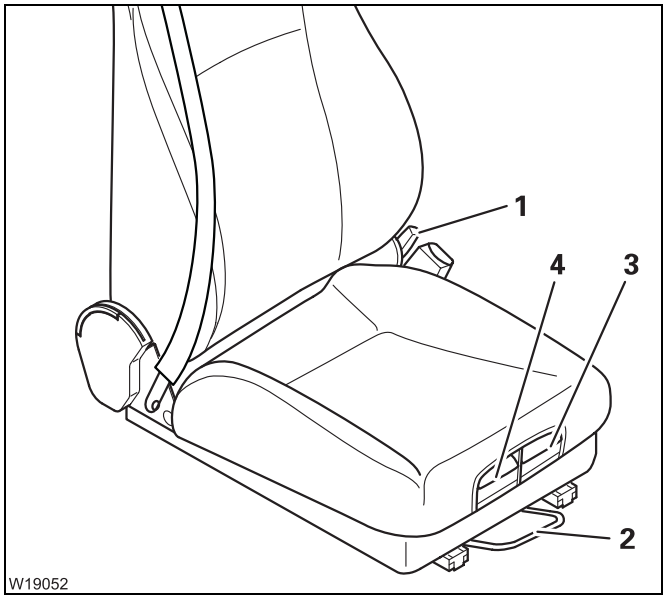


Settings for body shape

1 Lumbar area support
2 Seat cushion – longitudinal adjustment
3 Seat cushion – angle

Passenger's seat The passenger's seat is adjusted mechanically.



1 Back rest – angle
2 Seat – longitudinal adjustment
3 Seat cushion – longitudinal adjustment
4 Seat cushion – angle

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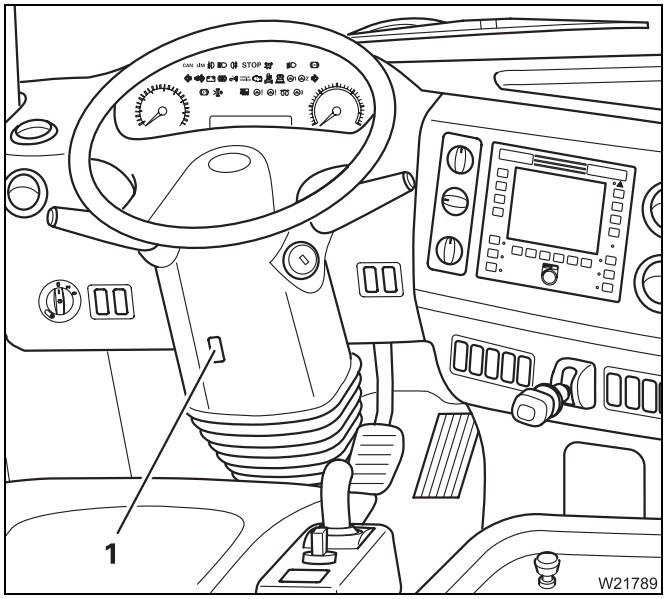
Adjusting the steering column

The steering column is unlocked pneumatically.

Risk of accident by unlocked steering column
Always stop the truck crane before you unlock the steering column.
You can no longer steer safely after unlocking the steering column.

The steering column is only unlocked when sufficient supply pressure is available; ➠ *Building supply pressure*, p. 5 - 9.



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

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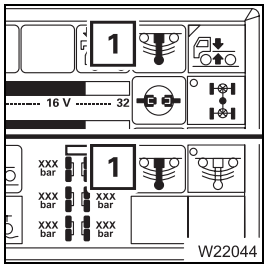
5.1.4 Switching the suspension on/off

The suspension is switched off whenever the ignition is switched off.

The suspension must be switched on for on-road driving.



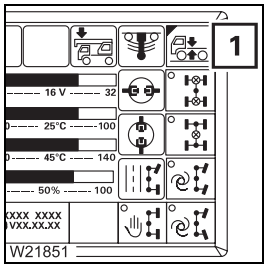
The current switching state of the suspension is shown on the (**1**) displays under the main menu and in the *Suspension* submenu.

Symbol is green:	The suspension is switched on
Symbol is red:	The suspension is switched off

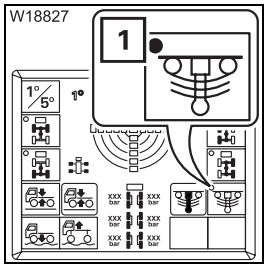
To switch the suspension on and off, you must open the *Level Adjustment System* submenu.

Opening the submenu

You can only open the submenu when the truck crane is stationary, or when the current speed is below approx. 5 km/h (3 mph).



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



This opens the *Level Adjustment System* submenu.

The (**1**) dot indicates the selected switching state:

Dot is green:	Switch on suspension has been selected
Dot is black:	Switch off suspension has been selected

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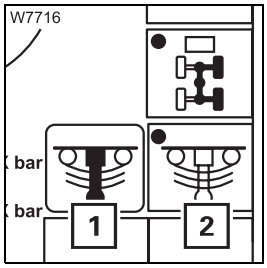
Switching on the suspension

The suspension cylinders are enabled when the suspension is switched on. This state must be established for on-road driving.

Danger of overturning when switching on the suspension
Only switch on the suspension when the truck crane has been rigged for on-road driving and the main boom has been set down.
Were the rigged truck crane on wheels, the suspension struts would be suddenly pushed together when the crane was switched on, causing them to be damaged and possibly causing the truck crane to overturn.



- Press the (**2**) button once – dot is **green.**

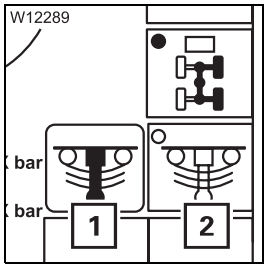
When the suspension is switched on, the (**1**) symbol is **green**.

When the (**1**) symbol stays **red**, the supply pressure may be too low. In this case the suspension would only be switched on if sufficient supply pressure is built up; ➠ *Building supply pressure*, p. 5 - 9.

Switching off the suspension

The suspension cylinders are locked when the suspension is switched off. This state is only intended for crane operation.

Risk of damage to the axle lines
Always switch on the suspension for on-road driving.
The axle lines may become damaged and the steering behaviour may change if the suspension is switched off.



- Press the (**2**) button once – dot is **black.**

When the suspension is switched off, the (**1**) symbol is **red**.

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5.1.5 Setting the tachograph

The diagram sheets (24-hour discs) can be inserted in the tachograph for two drivers simultaneously.

As a crane operator, you are obligated to set each activity on the tachograph.

This section only describes the basic operation of the tachograph (inserting diagram sheets, setting time groups, operating errors).
Before operation, also observe the information in the tachograph manufacturer's separate operating instructions.
There you will find detailed information (marking the diagram sheets, malfunctions, etc.).

Risk of damage to the tachograph drawer
Open the tachograph drawer only to insert or remove diagram sheets and do not use the opened drawer as a shelf or surface (e.g. to mark the diagram sheets). This prevents contamination and damage.

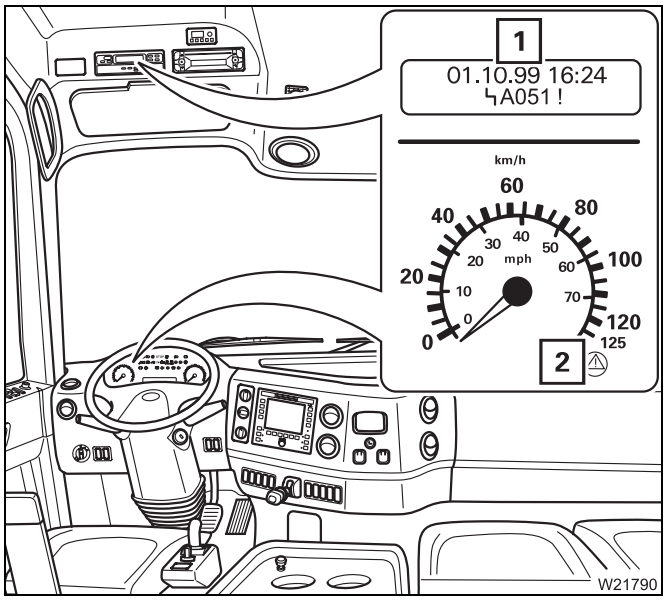
Requirements

To set the tachograph, the following requirements must be met:

- The ignition is switched on
- The truck crane is stationary
- No error message is displayed

If malfunction occurs

Check that a malfunction has occurred.



If there is a malfunction in the tachograph (**1**), the lamp (**2**) on the tachometer lights up.

If a malfunction has occurred, the *Tachograph* display (**1**) will show an error message; ➠ *Separate operating manual* by the tachograph manufacturer.

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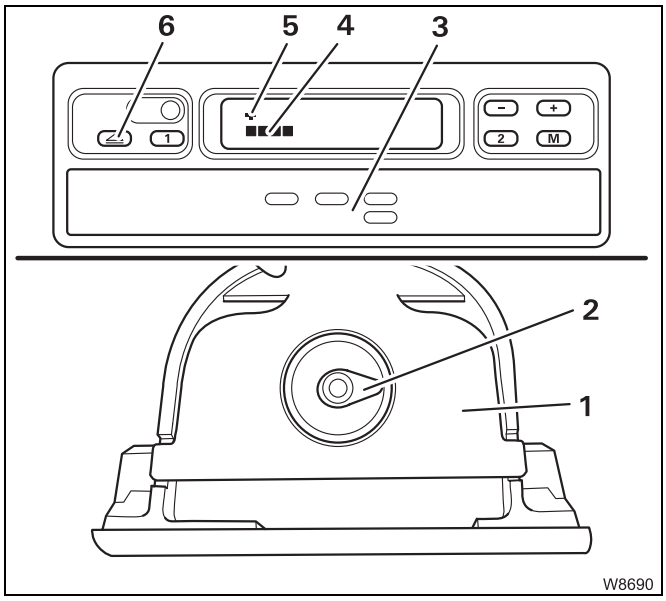
Setting the tachograph

To set the tachograph, you must first open the drawer and check the time setting. You can then insert the diagram sheets and set the time groups.



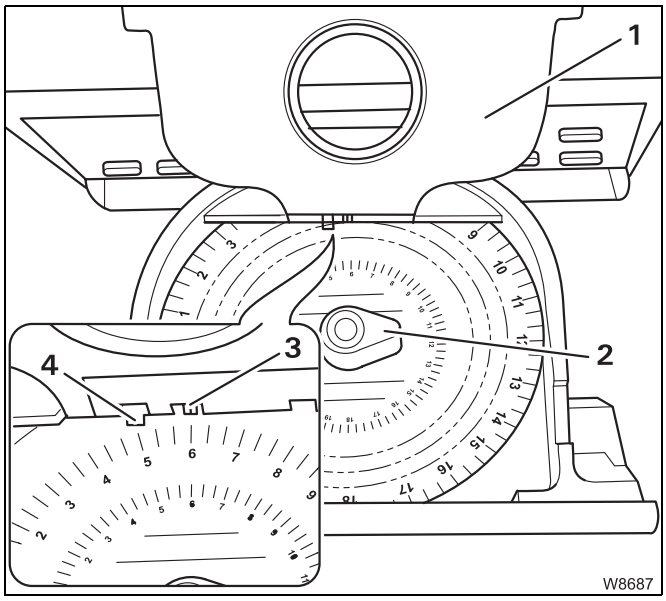
Opening the drawer

- Press the (**6**) button once.

First the symbol (**5**) and the running bar (**4**) appear, then the drawer (**3**) opens.

- Pull out the drawer (**3**) as far as it will go.

The diagram sheet mounting (**2**) and an isolating plate (**1**) are in the drawer.



Checking the time setting

- First check the time setting for the the diagram sheet mounting (**2**), fold the isolating plate (**1**) upwards to do this.
- Insert a diagram sheet. Make sure that the diagram sheet is under the spring (**4**).
- Check whether the diagram sheet's time scale on the marking (**3**) is showing the current time.

Correcting the time

- Take all the diagram sheets out of the diagram sheet mounting.
- Close the drawer.
  The time setting is corrected automatically.
- Open the drawer and insert the required diagram sheets.

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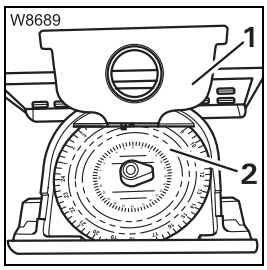
Inserting diagram sheets

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

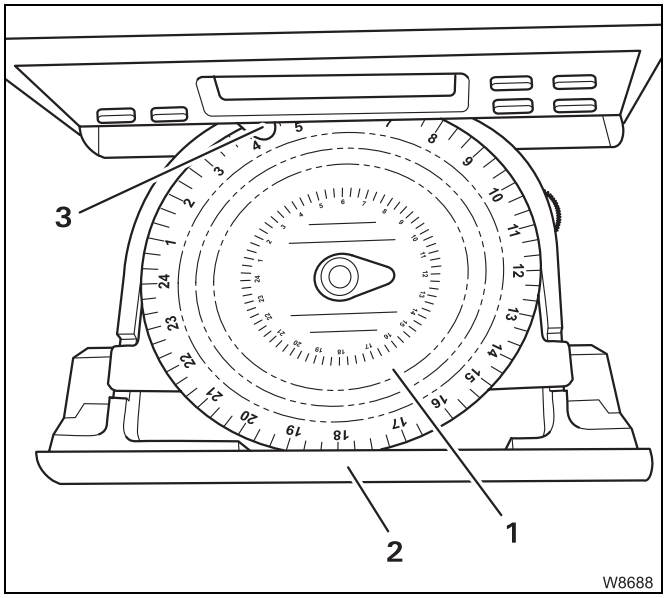
Risk of malfunctions in the electronics
If a diagram sheet has been damaged by being marked several times, this might cause malfunctions in the electronics. Always insert the plastic sheet diagram supplied should you not need to use the tachograph.



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

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

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



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

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

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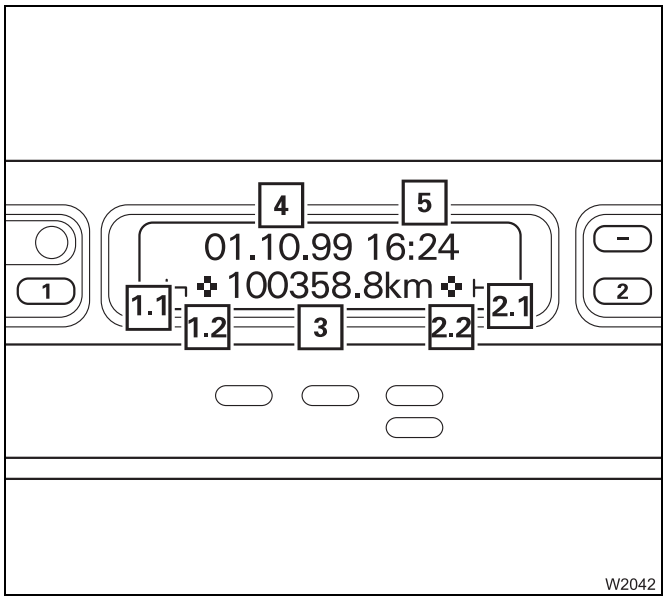
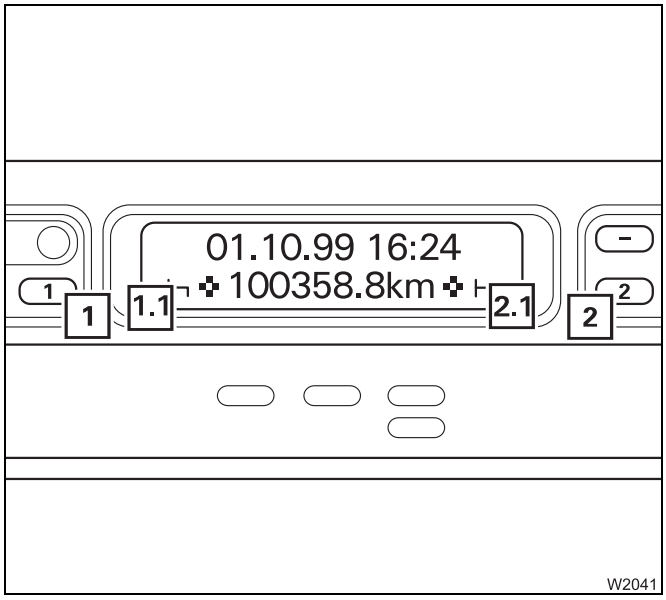


Display

If no malfunction has occurred, the *Tachograph* display now shows the basic display:

- Date (**4**) and time (**5**),
- Driver 1 time group (**1.1**),
- Driver 1 diagram sheet inserted (**1.2**),
- Total kilometres of the truck crane (**3**),
- Driver 2 time group (**2.1**),
- Driver 2 diagram sheet inserted (**2.2**).



Setting time groups

Set the time group for driver 1 using the button (**1**).
The set time group is shown with the symbol (**1.1**).

Set the time group for driver 2 using the button (**2**).
The set time group is shown with the symbol (**2.1**).

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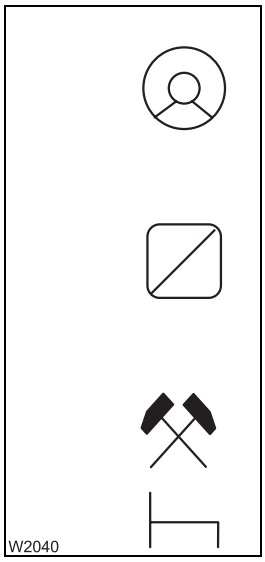
The different time groups are shown with the following symbols:



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 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 presence at the truck crane, e.g. crane operation, maintenance work, passenger time, etc.

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

If the drivers swap 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 entered for driver 1 in **single-driver operation**. Otherwise an error message will appear.

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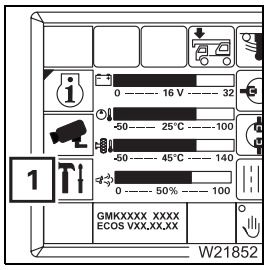
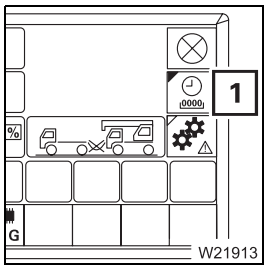
5.1.6 Displaying the operating hours

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

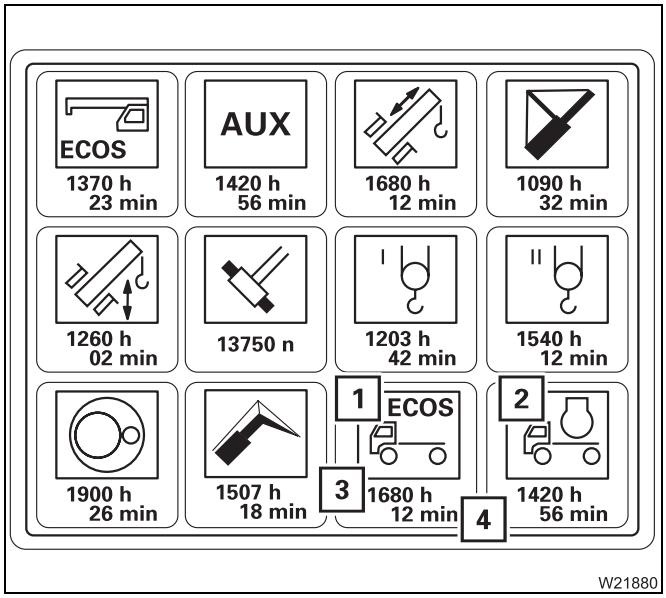


- If necessary, open the main menu Esc and press the (**1**) button once.



This opens the *Settings* submenu.

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



The *Operating hours* submenu opens.

When driving, the ECOS operating hours (**1**) for the carrier and the engine (**2**) are recorded:

– The value (**3**) indicates the hours, e.g. 1680 hours,

– The value (**4**) indicates the minutes, e.g. 12 minutes.

The other displays relate to crane operation;
➠ *Displaying the operating hours*, p. 11 - 110.

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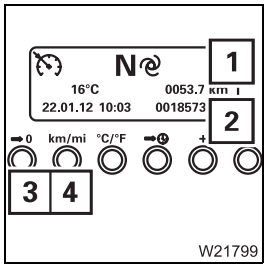
5.1.7 Settings/indications on the driving display

You can enter settings, e.g. the time and date, and have information displayed, e.g. the outside temperature.

The ignition is switched on.



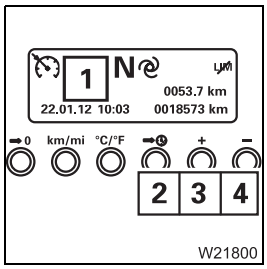
Kilometre counter

1 Daily kilometre counter – position after the decimal point: 1 = 100 m (33 ft)

2 Overall route in kilometres

3 Reset daily kilometre counter

4 Switch between km/mi



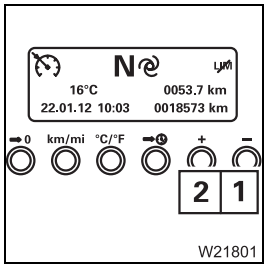
Time/date

1 Time/date

2 Select the day, month, year, hours, minutes

3 Increase the selected unit

4 Reduce the selected unit

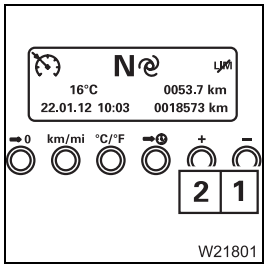


Instrument lighting

The headlight or parking light is switched on.

1 Instrument lighting dimmer

2 Instrument lighting brighter



Outside air temperature display

1 Outside air

2 Switch between temperature units (°C/°F)

Tempomat display

– **On:** Tempomat switched on

– **Off:** Tempomat switched off

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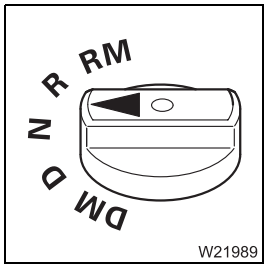
5.2 Operating the transmission

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

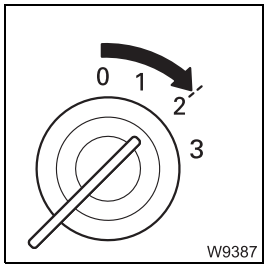
5.2.1 Switching on



The transmission is in neutral position N if the ignition is switched off.

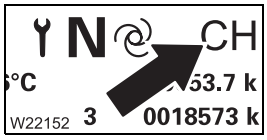
- Shift to position **N**.

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

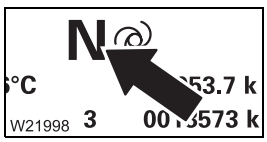


- Switch the ignition on.

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



The electronic gear system conducts a check – **CH** entry.



When the check is completed, the entry **N** appears.

If the electronic gear system detects an error, an error message appears; ➠ *Error messages*, p. 7 - 41.

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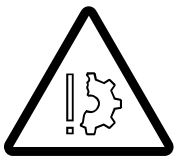
5.2.2 Switching the transmission to neutral position

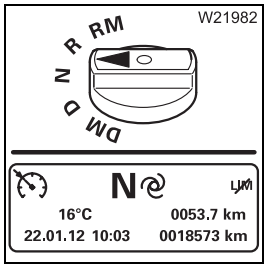
You can switch the transmission to neutral position at any time.

Risk of accident when switching on while driving
If you switch the transmission to neutral position while driving, the drive line will be interrupted. As a result you will no longer be able to accelerate the truck crane, when trying to avoid an obstacle for example, and the engine retarder will have no effect.

Risk of accident from rolling truck crane
Always apply the parking brake or the service brake before you switch to the neutral position. This prevents the truck crane from rolling away unintentionally.



Risk of damage to the transmission
When stationary for a longer period (e.g. in a traffic jam or at a train crossing), always switch the gear to **N**.
This avoids excessive wear on the gear components.



- Shift to position **N**.

The neutral position is switched on when the entry **N** appears.

Switch the transmission to neutral position to start the engine. The engine may only be started in this position.

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5.2.3 Selecting the direction of travel and starting gear

Selecting the driving direction

Before driving at temperatures below –20°C (–4°F); ➠ p. 5 - 36

The following requirements must be met before selecting the driving direction:

– The truck crane is stationary,
– The parking brake is applied,
– The accelerator is not pressed.

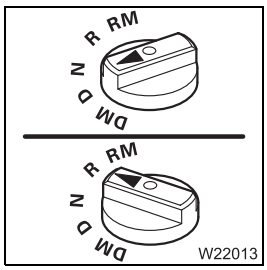
• Start the engine; ➠ p. 4 - 16

If the supply pressure does not suffice in order to shift the transmission, the display will indicate **AL** (airless).

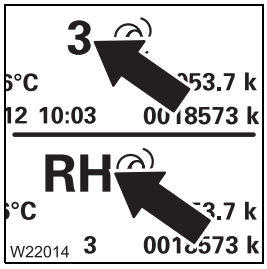
If necessary, wait until the supply pressure has built up, and the **AL** entry goes out; ➠ *Building supply pressure*, p. 5 - 9.

• Release the accelerator.

Risk of accident from uncontrolled forward motion
When you press the accelerator, the clutch is engaged immediately after the start-up gear is (automatically) selected, and the truck crane will start to move.



• In order to:
  – Drive **forward**, shift to position **D**,
  – Drive **backward**, shift to position **R**. An acoustic signal sounds if additional equipment is present.



The operating mode *Automatic* is now selected. An appropriate starting gear is selected and displayed:

– For forward travel, e.g. 3rd gear,

– For reverse travel, e.g. 2nd gear.

The clutch is not engaged (only when you press the accelerator).

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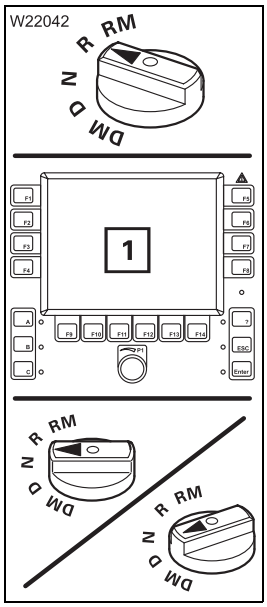


For reverse travel

The reverse camera is switched on.

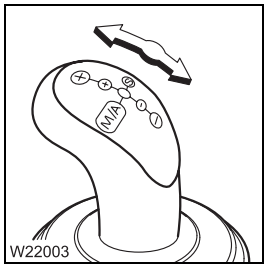
The display (**1**) shows the area behind the truck crane.

If you choose the gear position **N**, **D** or **DM**, the camera is switched off and the display (**1**) shows the ECOS menu.

Selecting the starting gear

You can also change the automatically engaged starting gear.

Only change the starting gear if it is absolutely necessary to do so. Starting gears which are too high cause premature clutch wear.



- Press the switch lever forwards once.
  The starting gear is upshifted by one gear.
- Pull the switch lever backwards once.
  The starting gear is shifted back by one gear.

The altered starting gear is shown on the display.

By changing the starting gear, you also change the transmission over to *Manual* mode at the same time. For on-road driving, you should switch over to *Automatic* mode.

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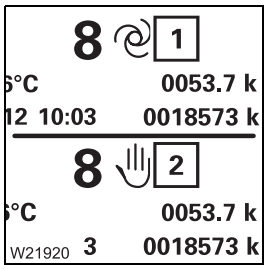
5.2.4 Changing the operating mode



The display shows which operating mode is switched on.

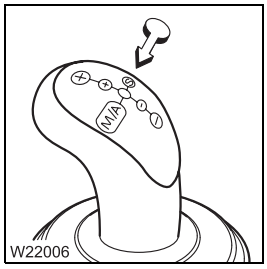
– Symbol (**1**) – *Automatic* operating mode on.

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

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

Change to automatic mode

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



• Press the switch lever to the left once.

The transmission switches to the *Automatic* operating mode

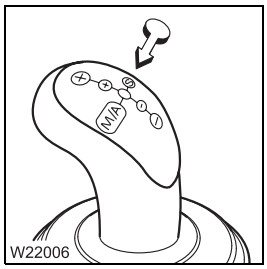
– When at a standstill, a suitable starting gear is engaged,

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

Change to manual mode

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

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



Changing without gear change

• Press the switch lever to the left once.

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

Changing with gear change

• Press the switch lever forwards or backwards once.

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

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5.2.5 Starting

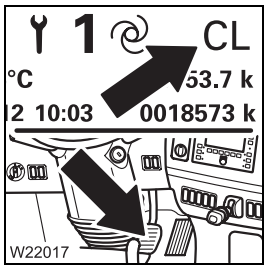
Danger by unexpected rolling
Also apply the parking brake before starting on sloping ground. The gear will only be engaged after you step on the accelerator. This can lead to the truck crane starting to move (also backwards) while you are moving your foot from the brake pedal to the accelerator.

To **start moving**, you have to:

– Apply the parking brake,

– Step on the accelerator (starts clutching),

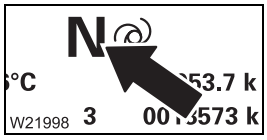
– Release the parking brake after coupling (motor sound changes).



Warning when starting
When the load during starting is so large that it would cause the clutch to overheat, a warning buzzer sounds. The warning message **CL** is also displayed.

- In this case, remove your foot from the accelerator immediately and apply the service brake.

Risk of clutch damage
Always release the accelerator when the **CL** warning is shown. The clutch will become overheated and damaged if you do not stop the starting procedure.



- Switch to the neutral position **N** and leave the vehicle engine running until the coupling has cooled down and **CL** is no longer shown on the display.
- Select a lower starting gear.
- Start to move again.

If you do not release the accelerator, the gear is engaged automatically within a few seconds. This can cause the engine to be throttled, or the wheels to spin.
Exception: Gears **1** and **R** are not engaged automatically. Be careful not to allow the clutch to overheat.

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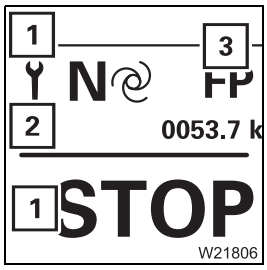
In manoeuvring mode, the truck crane responds more sensitively to the accelerator. The gear positions **DM** and **RM** are provided for manoeuvring; ➠ *DM and RM transmission mode*, p. 5 - 33.



If a transmission malfunction is detected, the corresponding entries (**1**), (**2**) or (**3**) are displayed; ➠ *Error messages*, p. 7 - 41.

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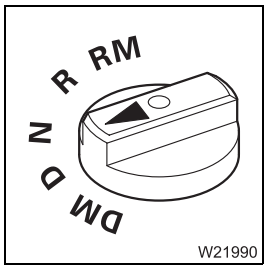
5.2.6 Driving and changing gears

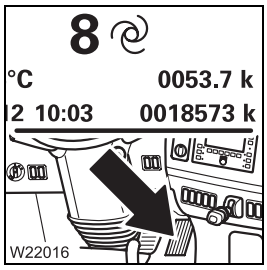


- When driving, always leave the switch in the position for the current driving direction, e.g. in position **D** for forward travel.

Risk of accident when changing while driving
If you change over to a position while driving which deviates from the current driving direction, the transmission shifts to the neutral position. In this position, you cannot accelerate the truck crane, even in an emergency, and the engine retarder does not work.

In automatic operating mode

In this operating mode, the transmission changes to the gear suitable for the current load, engine speed and position of the accelerator.



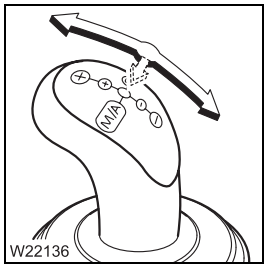
Automatic upshifting

You can influence upshifting by using the accelerator.

– Pressing the accelerator slightly: Upshifting at low engine speed
– Pressing the accelerator harder: Upshifting at high engine speed

Automatic downshifting

– When you slow down the truck crane by braking, the transmission shifts down when the appropriate engine speed is reached,
– When you step on the accelerator to the full (kick down), the transmission first shifts to a lower gear. After that, it will shift to a higher gear once a higher engine speed has been reached in order to attain maximum acceleration.



If you execute a manual gear change using the transmission lever, you simultaneously switch to *Manual* operating mode.

The transmission will only perform an automatic shift after you have switched to *Automatic* operating mode (push the switch lever to the left once).

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In manual operating mode

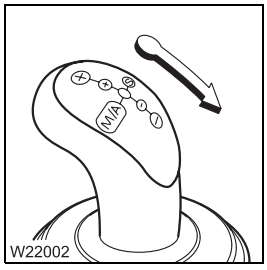
In this operating mode, the transmission only shifts when you actuate the switch lever.

Manual upshifting

To upshift, you must press the gearshift lever forwards briefly:

– Upshifting one gear: Push forwards once
– Upshifting two gears: Briefly push forwards twice
– Upshifting three gears: Briefly push forwards three times

The newly selected gear will be shown in the display.



Manual downshifting

To downshift, you must pull the switch lever backwards briefly:

– Shift one gear down: Push to the rear once
– Shift two gears down: Briefly push backwards twice
– Shift three gears down: Briefly push backwards three times

The newly selected gear will be shown in the display.

If you initiate a gear change in which the maximum permitted speed would be exceeded, the transmission does not shift.
In that case, slow the truck crane down until a maximum permissible engine speed is reached and downshift again.

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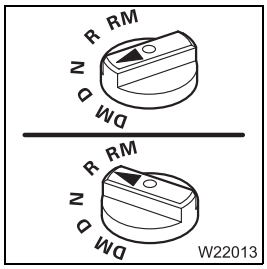
5.2.7 Changing the driving direction

- Stop the truck crane.

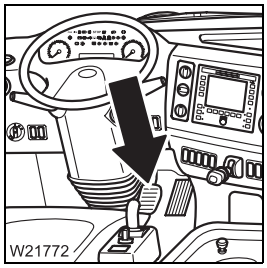


- Shift to the position for the opposite direction.
  At a standstill, you can shift two levels in succession immediately.
  You do not need to wait for the intermediate position **N** to appear.

The newly selected gear will be shown in the display.

The transmission switches to neutral position if you switch between the positions **D** and **R** directly when the truck crane is moving or you are driving it.

5.2.8 Stopping



- In order to stop, remove your foot from the accelerator and press the brake pedal.

The transmission decouples shortly before the vehicle comes to a halt. The current gear remains engaged.

Stopping for long periods

If you stop for more than 1 to 2 minutes with the engine running, you need to perform the following to preserve the coupling:

– Apply the parking brake,

– Shift the transmission to neutral position.

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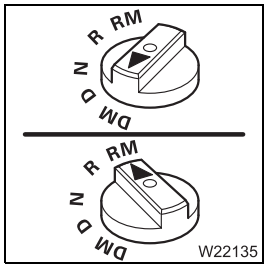
5.2.9 DM and RM transmission mode

The **DM** and **RM** transmission modes are intended for manoeuvring the vehicle without changing gears, e.g. for moving the truck crane while loaded. In these transmission modes, only the 4th and 5th axles are (hydraulically) driven.

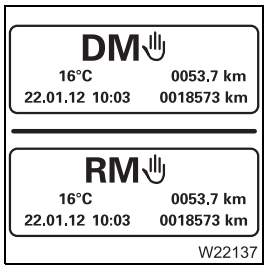
You can restrict the maximum speed.

Switching on

- Stop the truck crane and release the accelerator.
- Wait until the engine runs at idle speed.

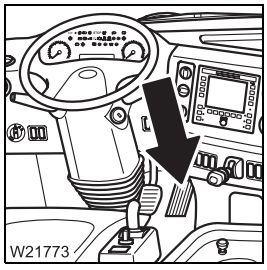


- Shift into **DM** or **RM** position for the required direction of travel.



The appropriate transmission mode is selected and appears on the display.

In the transmission modes **DM** and **RM:**
– The transmission does not shift
– Manual gear shifting is not possible



- Press the brake pedal.

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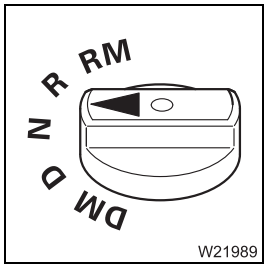
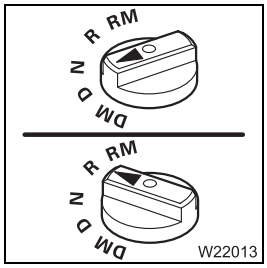
Switching off

- Release the accelerator.
- Stop the truck crane just in case.
- Wait until the engine runs at idle speed.



- Shift to position **N**.



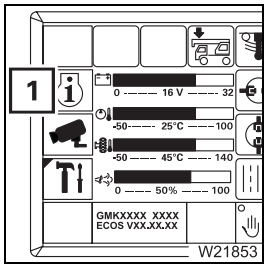
- Shift to position **D** or **R** for the required direction
  - When the truck crane is stationary, the corresponding starting gear will be engaged,
  - If the truck crane is still moving, a gear appropriate to the speed will be engaged.

The newly selected gear will be shown in the display.

The transmission mode **DM** or **RM** is switched off, and:
– The transmission shifts automatically,
– Manual gear change is possible.

Limiting maximum speed

For especially sensitive manoeuvring, you can restrict the top speed in the **DM** and **RM** transmission modes.



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

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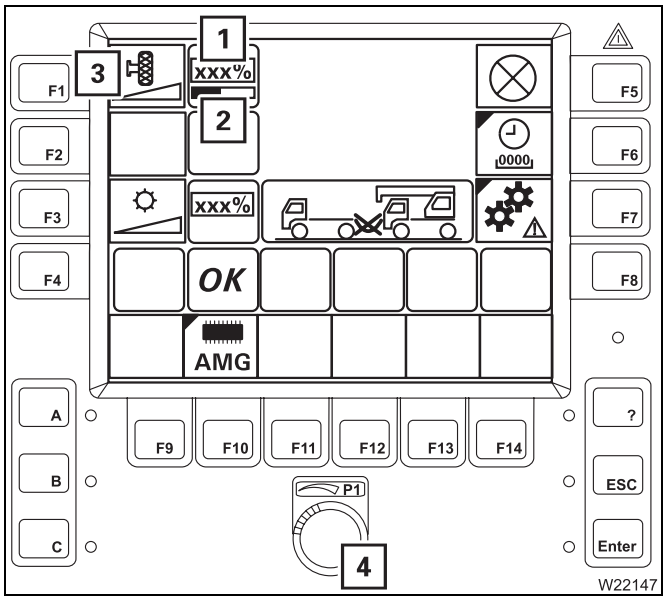


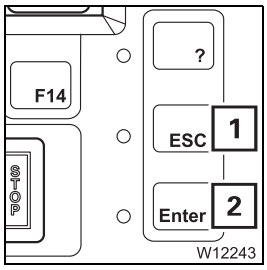
- Press the (**3**) button once.

A red bar (**2**) appears below the display (**1**).

- Set the required top speed with the switch (**4**).

While making the setting, you can read the value setting from the display (**1**) (0 to 100%).

The speed setting is only reached when you press the accelerator down fully.



You can cancel the entry at any time using the (**1**) button. The settings are then reset.

- Apply the **top speed** entered – press the button (**2**) once.
  The red bar below the display disappears.

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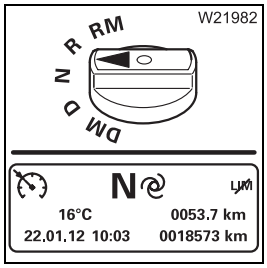
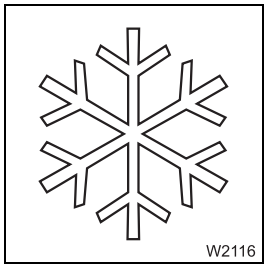
5.2.10 On the roller type dynamometer

Danger of unexpectedly moving off rollers
Always shift to the neutral position on the roller type dynamometer.
In position **D** or **R**, a suitable gear is engaged for the speed. The engine braking power is applied against the rollers and the truck crane can drive out of them.



- Always switch to neutral position after driving onto a roller type dynamometer.

5.2.11 Preheating transmission



When the outside temperature is between –20°C and –25°C (–4°F and –13°F), the gear oil must be preheated before you start driving the truck crane.

Let the engine run at idling speed for at least 10 minutes before you start driving.

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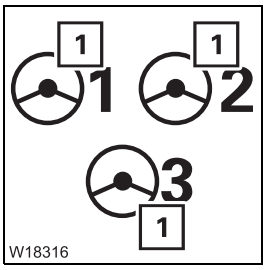
5.3 Driving and turning off the truck crane

Risk of accident by out-of-control truck crane
Never switch off the ignition or remove the ignition key while the truck crane is moving!
In this way you prevent the steering from locking and do not lose control of the moving truck crane.

Risk of accident when the ignition is switched off
Never switch off the ignition while driving.
After switching off the ignition the 5th and 6th axle lines are brought into forward alignment and can no longer be moved.
This changes the turning radius of the truck crane.

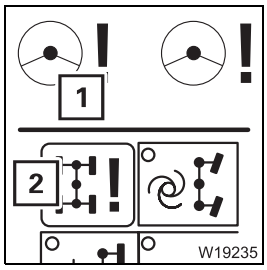
5.3.1 Checks while driving

Right after starting



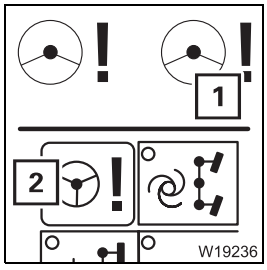
- Check the service and parking brakes for correct functioning immediately after starting out.
- Check the lamps (**1**).

At speeds above 10 km/h (6 mph), **all** the lamps (**1**) must go out. If a lamp does not go out, this indicates a malfunction in the steering.



– The lamp (**1**) lights up when an error is detected in the steering system – the symbol (**2**) is shown. The 5th and 6th axles are brought into the straight running position and can no longer be steered. It is possible to continue driving. Steering is now only possible with the 1st and 2nd axle lines – the turning radius increases accordingly.

- Have the error resolved as soon as possible.



– The lamp (**1**) lights up when a severe error is detected in the steering system – the symbol (**2**) is shown. The 5th and 6th axle lines can longer be steered in a controlled manner.

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

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Risk of accident from unsteerable truck crane
Stop as quickly as possible when the red lamp lights up.
When driving, the 5th and 6th axles may move uncontrollably, which can cause a serious accident even at low speeds.

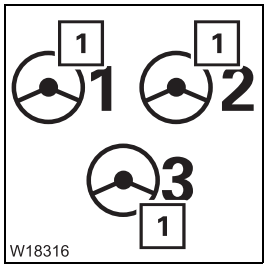
Risk of accident if the steering circuits fail
If one or all of the symbols are red, stop the truck crane immediately and switch off the engine.
Check whether oil has been lost. Depending on the size of a leak, the oil supply in a steering circuit may be lost within 2 minutes.

If oil has leaked out

- Warn any vehicles on the road behind you.
- Do not continue driving Refer to **Manitowoc Crane Care**.

If no oil has leaked out

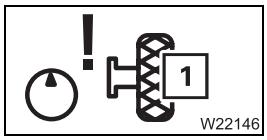
- Start the engine.



– If all 3 lamps (**1**) light up:
  - Switch off the engine. Refer to **Manitowoc Crane Care**.

– If **at most** 2 lamps (**1**) light up:
  - Drive at a speed of over approx. 10 km/h (6 mph).
    – If only one lamp is still lit, drive **slowly** to the next repair shop. The steering may be sluggish,
    – If two lamps are still lit, stop immediately. Refer to **Manitowoc Crane Care**.

➠ *Steering malfunctions*, p. 7 - 32



– The lamp (**1**) lights up when a severe malfunction is detected in the hydraulic drive (MegaDrive).

If oil has leaked out

- Warn any vehicles on the road behind you.
- Do not continue driving. Refer to **Manitowoc Crane Care**.

➠ *Malfunctions in the hydraulic drive (MegaDrive)*, p. 7 - 30

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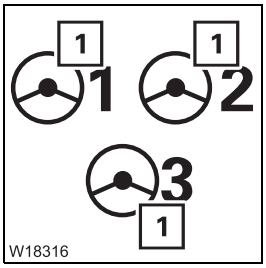
While driving

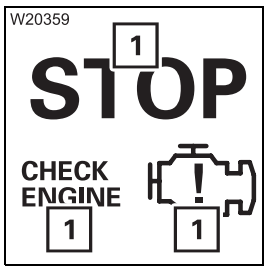
- Observe all warning messages.

Risk of damage if warning messages are not observed
After a warning message appears (on the *ECOS* display or *combination instrument* display), always promptly observe all information in the section titled *Warning submenu*, and take the appropriate corrective measures. This prevents these malfunctions from causing malfunctions in the truck crane.

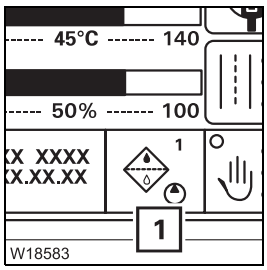
On the instrument panel



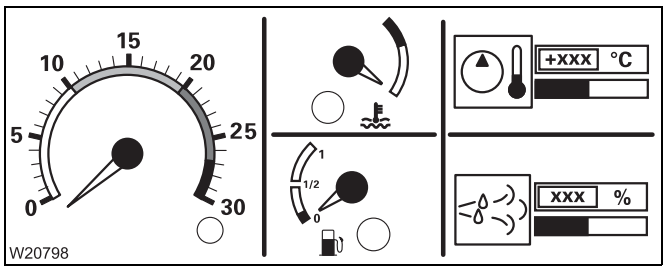
– If one of the lamps (**1**) which has already been checked lights up again, observe the information in the previous section.



– When one of the lamps (**1**) lights up, stop the truck crane immediately and check the message; ➠ p. 5 - 53.



– When the *ECOS* display shows a warning message (**1**); ➠ *Warning submenu*, p. 5 - 47.



- Also note the control elements for fuel supply and if necessary, DEF supply, engine speed, coolant temperature, transmission and hydraulic oil temperature; ➠ p. 4 - 22.

1) Additional equipment

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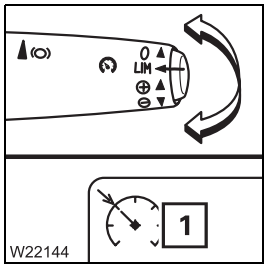
5.3.2 Cruise control

Cruise control enables you to drive at a constant speed without pressing the accelerator.

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

Switching on

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



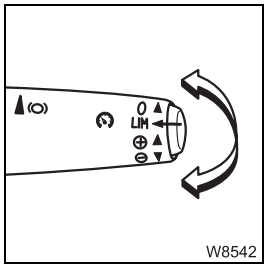
- Press the switch upwards or downwards once.

Cruise control is switched on. The symbol (**1**) is displayed in the Driving display.

The current speed is maintained.

You can exceed this speed with the accelerator. After the accelerator is released, cruise control goes back down to the set speed.

On downhill slopes, the speed set may be exceeded since cruise control does not brake the truck crane. Switch cruise control off on downhill slopes.



Increasing/reducing the speed

- Press the switch up/down until the required speed has been reached.

  or

- Push the switch upwards/downwards once. The speed will increase/decrease by 0.5 km/h (0.3 mph).

The set speed is maintained.

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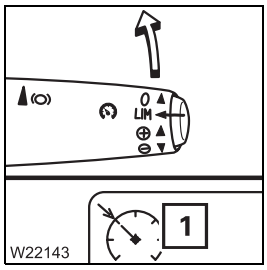
Switching off



- Push the switch forwards once. Cruise control is switched off. The symbol (**1**) goes out in the Driving display.

Cruise control is also switched off:

– When the service brake or additional brake is applied.

– When 10 km/h (6 mph) is exceeded.

– When the cruise control function is switched on.

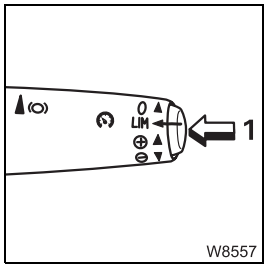
– When the ignition is switched off.

5.3.3 Cruise control

You can use cruise control to limit the maximum speed.

Switching on

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

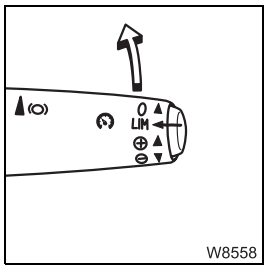


- Press the (**1**) button once.

Cruise control is switched on. The current speed is regarded as the maximum speed.

You can exceed the speed by pressing the accelerator as far down as it will go (kick-down). Cruise control only goes back down to the speed when you release the accelerator and press it again.

Switching off



- Press the switch forwards twice.

Cruise control is switched off.

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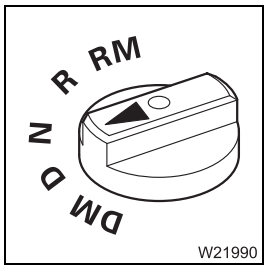
5.3.4 Driving downhill

Risk of accident when driving in neutral position
Never switch into neutral position while driving.
In neutral position, the truck crane may accelerate and the engine retarder is ineffective.

Starting

The engine must be running.



To **start moving forward**, you must do the following:

– Shift into **D** position.

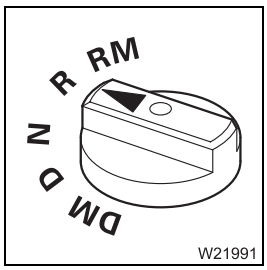
– Release the parking and service brakes.

– Press the accelerator if you wish to accelerate.

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

When the truck crane starts to move forwards in neutral position you can still switch to position **D**. A gear which is suited to the speed is engaged and the engine brake power is effective.

Danger when starting in reverse
Always hold the truck crane with the parking brake until the gears have engaged when starting to reverse. If the truck crane starts rolling before (when changing from brake pedal to accelerator), no gear will be engaged, and you can only stop the truck crane by braking.



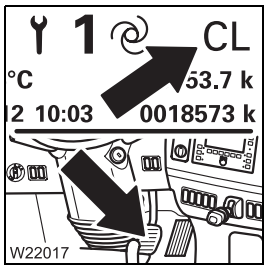
To **start moving backward**, you must do the following:

– Shift into **R** position.

– Apply the parking brake.

– Press the accelerator.

– Release the parking brake after coupling.



If the **CL** warning appears when starting:

- Remove your foot from the accelerator immediately and actuate the service brake. For the subsequent procedure; ➠ *Warning when starting*, p. 5 - 28.

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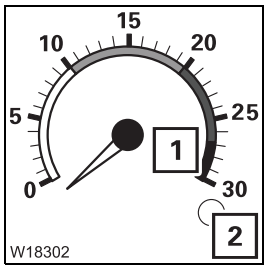
Checks when driving downhill

While driving, the engine speed may not exceed 2300 min^{-1} (rpm). The engine speed is not automatically limited.

Risk of damage due to excessive engine speed
Shift to a higher gear or slow the truck crane down when the maximum permissible engine speed has been reached.
This prevents damage to the engine or transmission.



- Check the current speed on the tachometer while driving.
- Brake the truck crane before the speed exceeds 2300 min^{-1} (rpm).

Risk of damage from resonance vibrations
Always maintain a speed below 85 km/h (53 mph). Stop the truck crane promptly.

When driving downhill, you can also slow down the truck crane as follows, in addition to using the service brake:

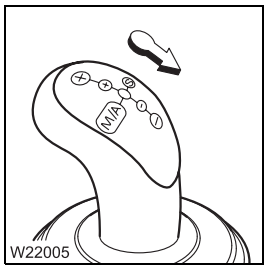
– By shifting down; ➠ p. 5 - 43.

– With the engine retarder; ➠ p. 5 - 44.

– With the eddy current retarder; ➠ p. 5 - 44.

Downshifting

To increase the braking force of the engine, you can select a lower gear.



- Pull the switch lever backwards once.

The *Manual* operating mode is switched on, and if possible, one gear is shifted down.

If you initiate a gear change in which the maximum permitted speed would be exceeded, the transmission does not shift.
In that case, slow the truck crane down until a maximum permissible engine speed is reached and downshift again.

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Additional brakes

Engine retarder

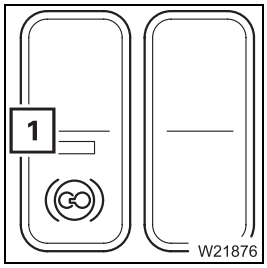
The truck crane has an engine flap brake which it uses as an engine retarder. The engine retarder only becomes effective at an engine speed of 900 min^{-1} (rpm) and can be used up to a maximum speed of 2300 min^{-1} (rpm).

Risk of accident from unexpected acceleration
Maintain sufficient distance when the engine retarder is switched on. The effectiveness of the engine retarder is interrupted during gear shifting. This may cause the truck crane to accelerate briefly.

Retarder

The truck crane can also be rigged with a transmission retarder. The braking force of the transmission retarded depends on the speed. The higher the speed, the higher the braking power.

Risk of accident in unfavourable road conditions
Deactivate the retarder function when road conditions are unfavourable, e.g. in icy conditions. This prevents over-braking of the truck crane and prevents it coming off the road.



Deactivate the retarder function e.g. in icy conditions.

- Press switch (**1**) below down – the light inside the switch lights up.

  Re-activate the retarder function when conditions improve again.

- Press the switch (**1**) above – the light in the switch goes out.

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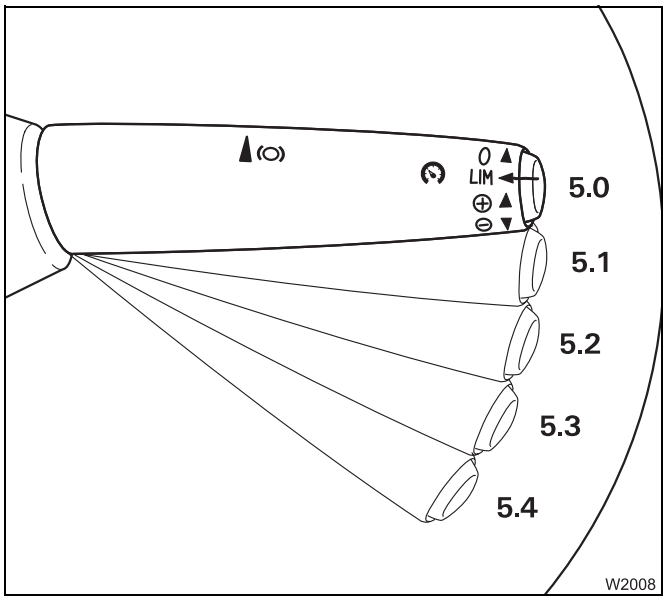
For long downhill drives, we recommend that you use level **2**. When the eddy current retarder is switched on, you cannot regulate the speed with the accelerator.



Switching on the additional brakes

- Pull the switch back to the required level (latch into place briefly at each level)

  5.1 Only engine retarder

  Connection to the retarder power:

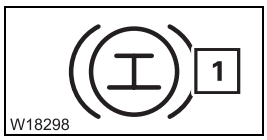
  5.2 50% power, engine retarder

  5.3 75% power, engine retarder

  5.4 100% power, engine retarder

Switching off the additional brakes

- Press the switch forwards to level **5.0.**



The lamp (**1**) illuminates when the retarder is switched on.

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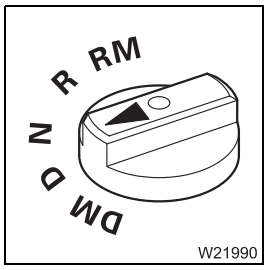
5.3.5 Driving uphill

Starting

The engine must be running.

Danger of the truck crane starting to roll in an unexpected direction
Always hold the truck crane with the parking brake until the gears have engaged when starting to move forward. If the truck crane starts rolling before (when changing from brake pedal to accelerator), no gear will be engaged, and you can only stop the truck crane by braking.



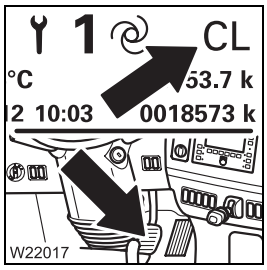
To **start moving forward**, you must do the following:

– Shift into **D** position.

– Apply the parking brake.

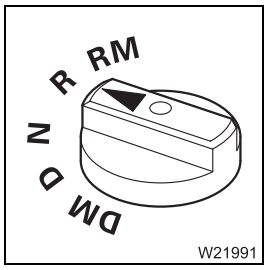
– Press the accelerator.

– Release the parking brake after coupling.



If the **CL** warning appears when starting:

- Remove your foot from the accelerator immediately and apply the service brake. For the subsequent procedure; ➠ *Warning when starting*, p. 5 - 28.



To **start moving backward**, you must do the following:

– Shift into **R** position.

– Release the parking and service brakes.

– Apply the accelerator if you wish to accelerate.

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

Driving

The transmission can switch between two gears for certain gradients. In that case, either release the accelerator slightly or downshift by one gear.

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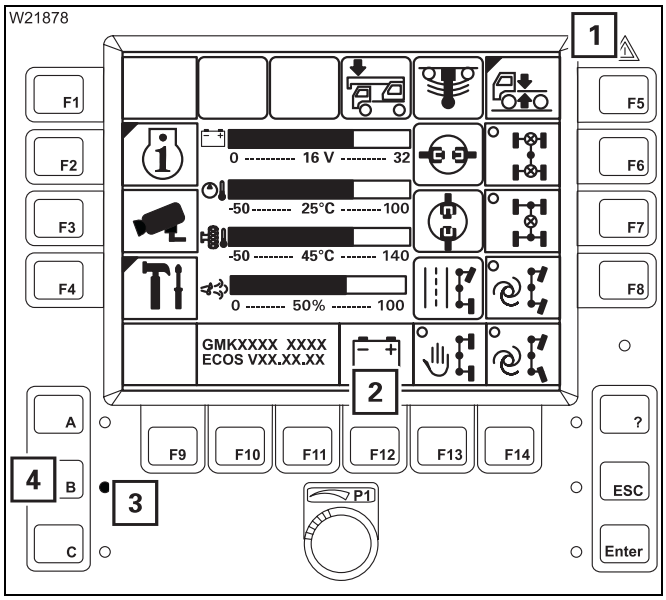
5.3.6 Warning submenu

ECOS differentiates between warning messages and error messages (error messages; ➠ *Errors submenu*, p. 5 - 53). A warning message indicates that certain values do not correspond to a target value.

Further warning messages can be displayed on the instrument panel; ➠ p. 5 - 50.



When a warning message occurs:

– The lamps (**1**) and (**3**) flash.

– The display (**2**) shows the red symbol for the pending warning message.

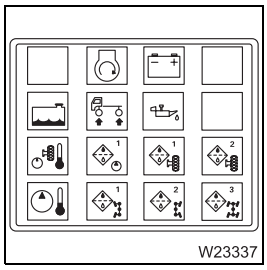
For more information

• Press button (**4**) once – the *Warning* submenu opens.

The warning message has been acknowledged – the lamp (**3**) lights up (no longer flashes).

Meaning of the symbols

The colour of the symbols indicates whether a warning message is active in the corresponding area.



– Symbol is **grey** – no warning message.

– Symbol is **red** – warning message.

Perform the following checks a symbol is displayed in **red**.

Risk of damage if warning messages are not observed
Observe the following information promptly and take the appropriate corrective measures if a warning message appears. This prevents these malfunctions from causing malfunctions in the truck crane.

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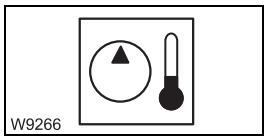
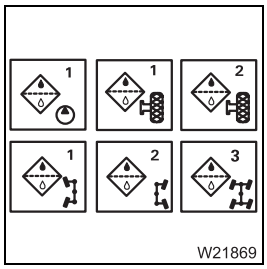


Hydraulic oil too hot

The hydraulic oil is hotter than 80°C (176°F).
Current temperature display; ➠ p. 4 - 22.
Possible cause and solution; ➠ p. 7 - 33.

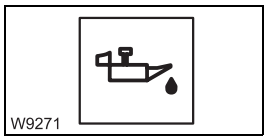
Danger of overheating

There is a fault if the hydraulic oil temperature exceeds 80°C (176°F). Stop the truck crane at the next opportunity and try to find the cause.
Stop the truck crane immediately and turn off the vehicle engine if the temperature of the hydraulic oil rises to over 100°C (212°F).



Replace the hydraulic oil filter

Replace the appropriate hydraulic oil filter as quickly as possible;
➠ *Maintenance manual*.



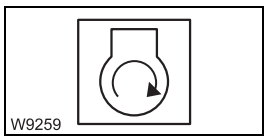
Oil pressure too low

A warning buzzer sounds at the same time.

- Stop the truck crane as quickly as possible while observing the traffic situation and turn off the engine.
- Check the oil level; ➠ *Maintenance manual*.

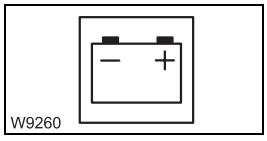
Risk of damage to the engine if the oil pressure drops

Turn off the engine as soon as possible and look for the cause if the lamp lights up or the warning buzzer sounds.
Never restart the engine before you have found the cause and eliminated the problem; ➠ p. 7 - 27.



Air intake inhibitor triggered

The air intake inhibitor was triggered because the maximum permissible engine speed was exceeded. It is only possible to start the engine after the air intake inhibitor has been released manually; ➠ p. 4 - 27.



Voltage monitoring

The voltage in the carrier electrical system is too high or too low.
Current voltage display; ➠ p. 4 - 22.

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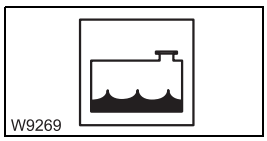
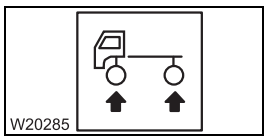


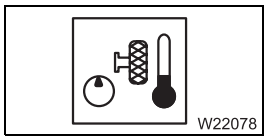
Coolant level too low

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



Pressure in the suspension struts or permissible lateral tilt exceeded

- Immediately bring the truck crane to a halt and check the pressure in the suspension struts and the lateral tilt; ➠ *Warnings while driving*, p. 13 - 9.

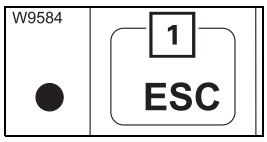


Hydraulic oil drive for axles 4 and 5 too hot

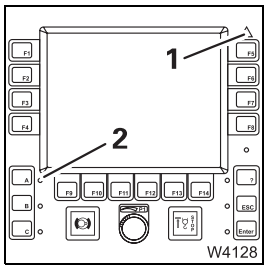
The hydraulic oil is hotter than 80°C (176°F).
Current temperature display; ➠ p. 4 - 22.
Possible cause and solution; ➠ p. 7 - 33.

Exiting the submenu

You can exit the submenu at any time.



- Press the (**1**) button once.
  The same menu opens which was open before the *Warning* submenu opened.



If the same warning messages are still present, the lamps (**1**) and (**2**) light up.

If no warning message is present, both lamps will have gone out.

Both lamps start flashing again as soon as a new warning message occurs.

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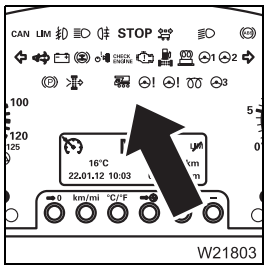
5.3.7 Warning or malfunction messages on the instrument panel

Meaning of the lamps

The colour of the lamps indicates whether a warning or malfunction message is active in the corresponding area.



W21803

– Lamp goes out – no message.
– Lamp is **red** – warning message.
  • Stop the truck crane immediately, taking into account the traffic situation, and identify the cause.
– Lamp is **orange** – malfunction message.
  • Identify the cause at the next opportunity.

Perform the following checks a symbol is displayed in **red**.

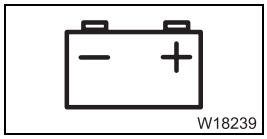
Risk of damage if warning or malfunction messages are not heeded
Observe the following information promptly and take the appropriate corrective measures if a warning or malfunction message appears. This prevents these malfunctions from causing malfunctions in the truck crane.

W18223

STOP warning
When the STOP lamp lights up, further messages are displayed on the instrument panel.
Switch off the engine as soon as possible; ➠ *Malfunctions in the engine*, p. 7 - 27.

W18227

CAN BUS system interrupted
If the lamp continues to light up, switch off the ignition and switch it back on after 15 seconds; notify **Manitowoc Crane Care**.


W18239

Battery charge indicator warning
The voltage in the carrier electrical system is too high or too low.
Current voltage display; ➠ *Monitoring elements*, p. 4 - 22.

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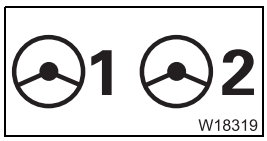
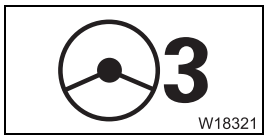


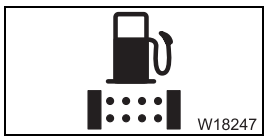
Steering circuit 1 or 2 warning

Malfunction in steering circuit 1 or 2 – check for loss of oil; ➠ *Steering malfunctions*, p. 7 - 32.



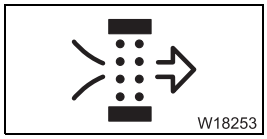
Steering circuit 3 warning (emergency steering pump)

Malfunction in steering circuit 3 – check for loss of oil; ➠ *Steering malfunctions*, p. 7 - 32.



Change the fuel filter

The fuel filter is soiled; ➠ *Maintenance manual*.



Replace the air filter

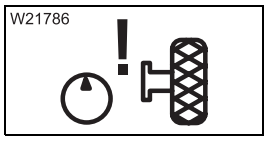
The air filter is soiled; ➠ *Maintenance manual*.

Malfunction in steering circuit 1 or 2

The 5th and 6th axles were centred and can no longer be moved; ➠ *Steering malfunctions*, p. 7 - 32.

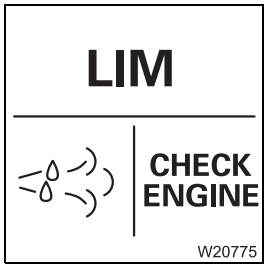
Steering circuit 1 or 2 warning

The 5th and 6th axles were not centred and can no longer be moved; ➠ *Steering malfunctions*, p. 7 - 32.



Malfunction in the hydraulic drive (MegaDrive)

Malfunction in the hydraulic drive – check for loss of oil; ➠ *Malfunctions in the hydraulic drive (MegaDrive)*, p. 7 - 30.



DEF system

- Also check the control elements for the DEF system; ➠ *Malfunctions in the DEF system*, p. 7 - 29.

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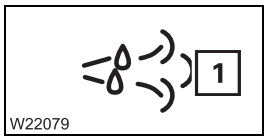
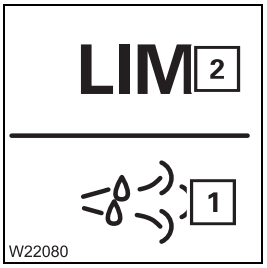
5.3.8 Overriding torque reduction

When the DEF supply is empty, the torque reduction is activated via the engine control system.

You can override torque reduction up to 3 times.

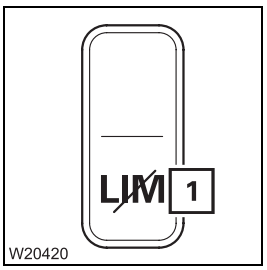


– If the DEF supply drops to the reserve level, the lamp (**1**) lights up.



– If the DEF supply is used up, the lights (**1**) and (**2**) will light up.

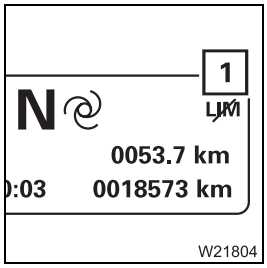
– If lamp (**1**) flashes, the engine torque is reduced the next time the engine is started.



The engine torque is reduced.

- Press button (**1**) down to override torque reduction.

  You can override torque reduction up to 3 times.



The (**1**) symbol is displayed.

- Refill with DEF immediately; ➠ *DEF*, p. 4 - 10.

  After the next engine start the torque reduction is deactivated.
  The symbol (**1**) disappears.

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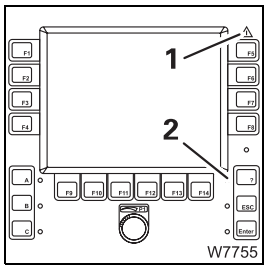
5.3.9 Errors submenu

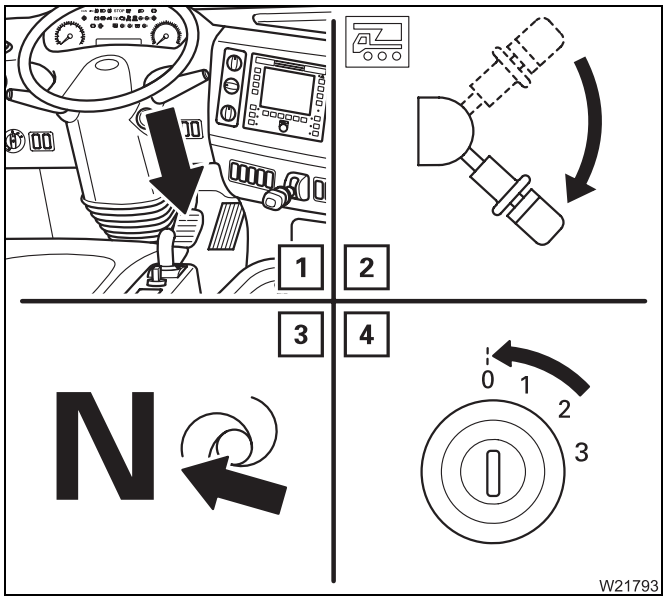
ECOS differentiates between error messages and warning messages (warning messages; ➠ *Warning submenu*, p. 5 - 47).



In the event of an error message, the lamps (**1**) and (**2**) flash.

Further information can be found on the *Warning* submenu; ➠ *Malfunctions on the ECOS carrier*, p. 7 - 35.

5.3.10 Turning off the truck crane



To turn off the truck crane, you must:

1. Stop the truck crane
2. Apply the parking brake
3. Switch to neutral position; ➠ p. 5 - 24
4. Turn off the engine; ➠ p. 4 - 25

Securing against rolling away

The number of wheel chocks supplied varies according to country.

Risk of accident by truck crane moving unintentionally
Secure the truck crane on uphill and downhill roads by using wheel chocks together with the parking brake.

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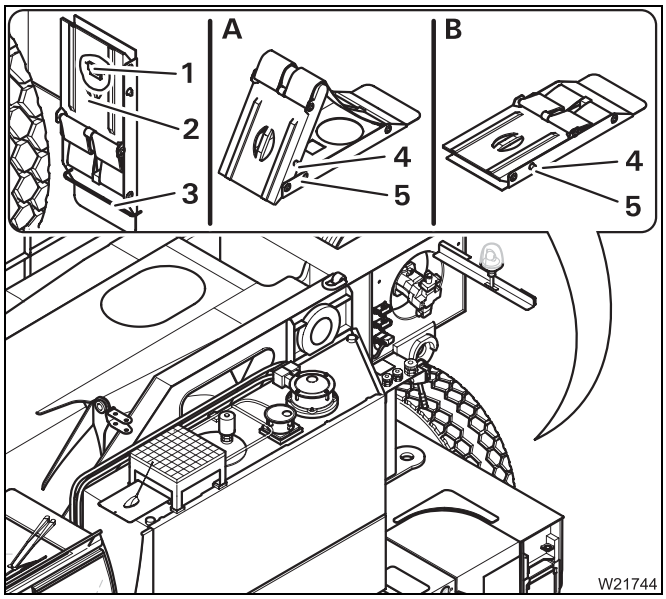


Transport at the rear of the carrier

- Push the chock (**2**) behind the bracket (**3**) and hang it on the holder (**1**).

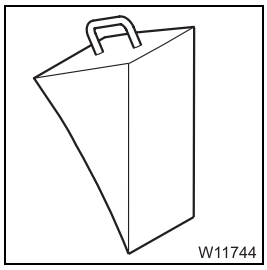
(A) – Folding out

- Press the locking bar (**4**) through the bore (**5**).

The chock folds out by spring force.

(B) – Folding up

Press the chock together until the locking bar (**4**) engages in the bore (**5**).

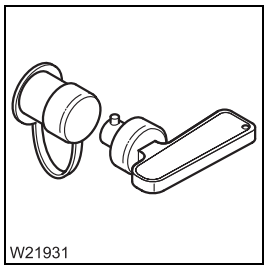


Using additional equipment, other chocks can be transported on the rear of the truck crane.

When stationary for more than 8 hours

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

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



- Switch off the battery master switch.

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Securing the truck crane against unauthorised use

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

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

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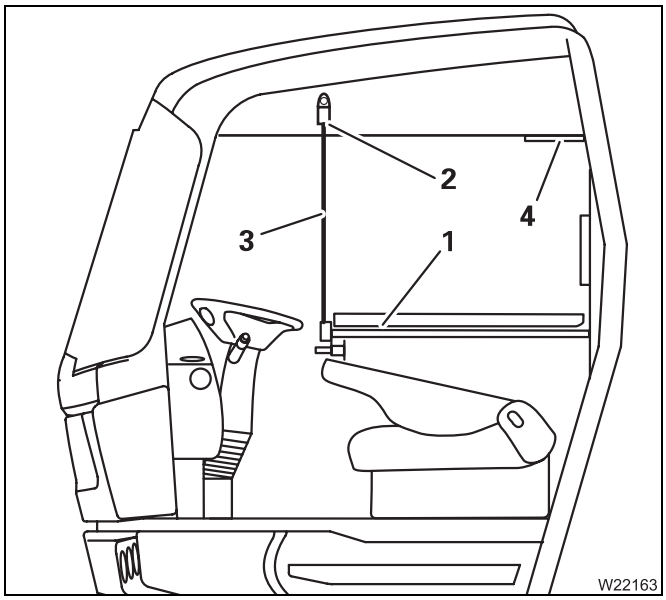
5.3.11 Folding berth

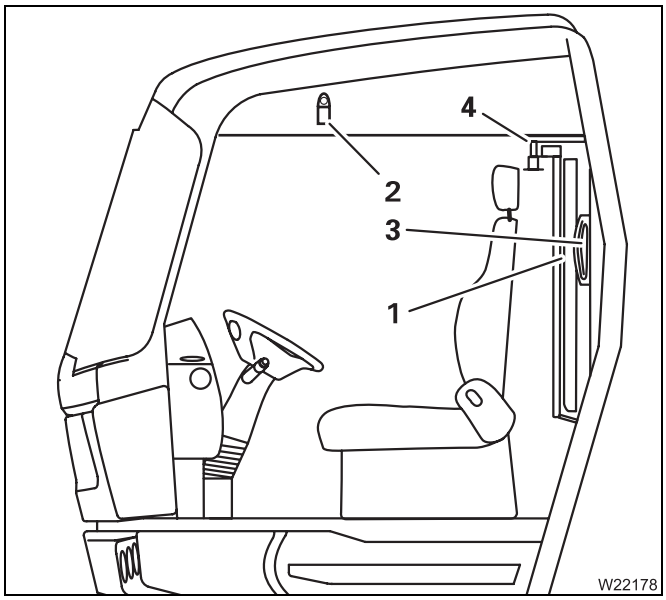
The berth must always be folded up for driving.

Risk of accident due to the berth folding down
Check that the locking bar is engaged and put up the back rest of the seats before driving. This prevents the berth from folding down when braking, resulting in uncontrolled manoeuvres due to fright.



Folding down

- Place the steering column forwards, upright; ➠ *Adjusting the steering column*, p. 5 - 13.
- Put the seats in the rear-most position
  - ➠ *Driver's seat*, p. 5 - 11;
  - ➠ *Passenger's seat*, p. 5 - 12.
- Remove the neck-rests from the seats and tilt the back rests of the seats forwards.
- Release the berth (**1**) from the retainer (**4**) and fold it downwards.
- Fasten both belts (**3**) in the retainers (**2**).



Folding up

- Release the belts (**3**) from the retainers (**2**) and place them on the berth.
- Fold up the berth (**1**) and fasten it in the retainer (**4**).
- Put up the back rests of the seats and fasten the neck-rests.
- Bring the seats and the steering column into the desired position:
  - ➠ *Driver's seat*, p. 5 - 11;
  - ➠ *Passenger's seat*, p. 5 - 12;
  - ➠ *Adjusting the steering column*, p. 5 - 13.

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5.4 Off-road driving

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

Adjustments to the transmission

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

– Shift to a lower starting gear; ➠ p. 5 - 25.

– Select the *Manual* operating mode. This way you will be able to drive carefully and promptly shift gears; ➠ *Changing the operating mode*, p. 5 - 27.

Connections

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

– Then switch on the **central differential locks**; ➠ p. 5 - 58.

– Then switch on the **transverse differential locks**; ➠ p. 5 - 58.

Changing the vehicle level

You can also adapt the truck crane to the off-road inclination using the level adjustment system, or lift and lower the truck crane; ➠ p. 5 - 60.

Rocking the vehicle free and towing

If the truck crane is stuck in terrain; ➠ *Freeing truck crane stuck in terrain*, p. 5 - 64.

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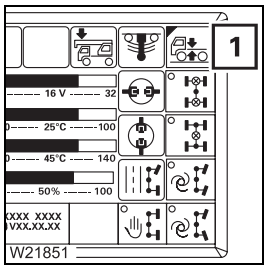
5.4.1 Longitudinal and transverse differential locks

– The longitudinal differential locks prevent individual axle lines from spinning when driving on a slippery surface

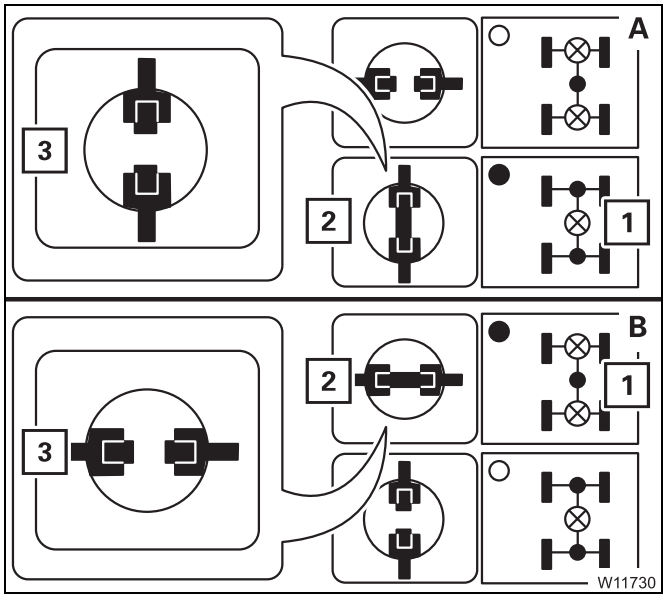
– The transverse differential locks prevent individual wheels from spinning when driving on a slippery surface

Risk of damage to the differential locks
Leave the transverse differential locks switched on only for as long as necessary. Always switch off the transverse differential locks before driving on a firm surface



- Stop the truck crane.
- Straighten the steering.
- Open the main menu, if necessary (**1**).

For switching on and off, the current speed needs to be under about 5 km/h (3 mph).

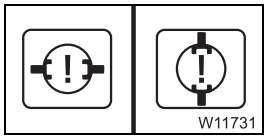


Switching on

- Press button (**1**) once for:
  – Central differential locks (**A**)
  – Transverse differential locks (**B**)

  The dot turns **green**.

- Start moving slowly – Display:
  – The symbol (**3**) first turns yellow
  – Then symbol (**2**) turns **red**, differential locks on



If the error symbol is displayed, contact **Manitowoc Crane Care**.

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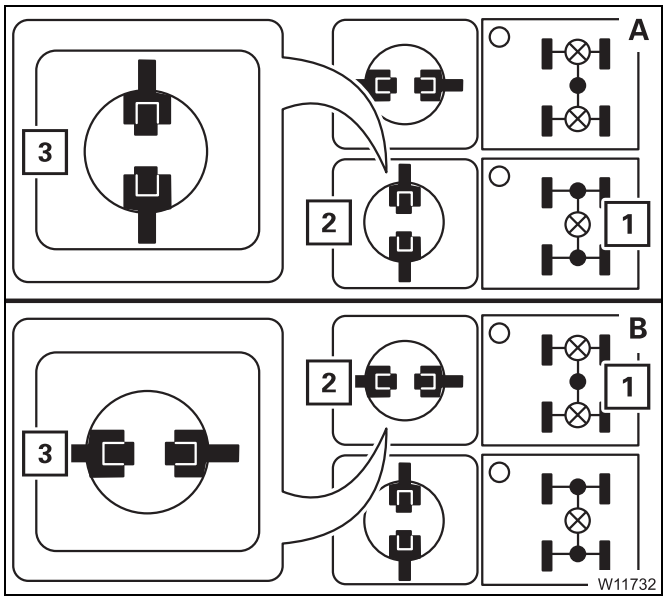

Switching off

- Press button (**1**) once for:
  - Central differential locks (**A**)
  - Transverse differential locks (**B**)

  The dot turns **black**.

Display:

- The symbol (**3**) first turns yellow
- Then symbol (**2**) turns **green**, differential locks off

If symbol (**2**) is not displayed, then drive back and forth slowly.

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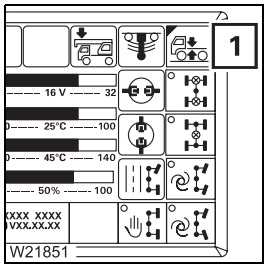
5.4.2 Operating the level adjustment system

You can use the level adjustment system to set the on-road driving level, change the overall level and incline the truck crane.

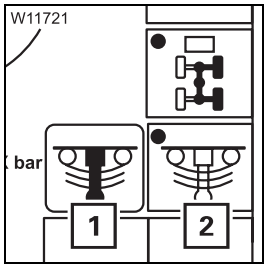
Opening the submenu

You can only open the *Level adjustment system* submenu when the current speed is below approx. 5 km/h (3 mph).



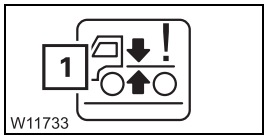
- If necessary, open the main menu Esc and press the (**1**) button once.

This opens the *Level adjustment system* submenu.



- Check that the symbol (**1**) is **green** (suspension on).
- If the symbol (**1**) is red, press the button (**2**) once to switch on the suspension

When the suspension has been switched on, you can:
– Set the on-road driving level,
– Pre-select the suspension struts and change the vehicle level.



If the symbol (**1**) is shown for an error during a level adjustment, refer to **Manitowoc Crane Care**.

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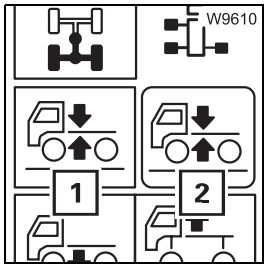
Setting the on-road level

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.

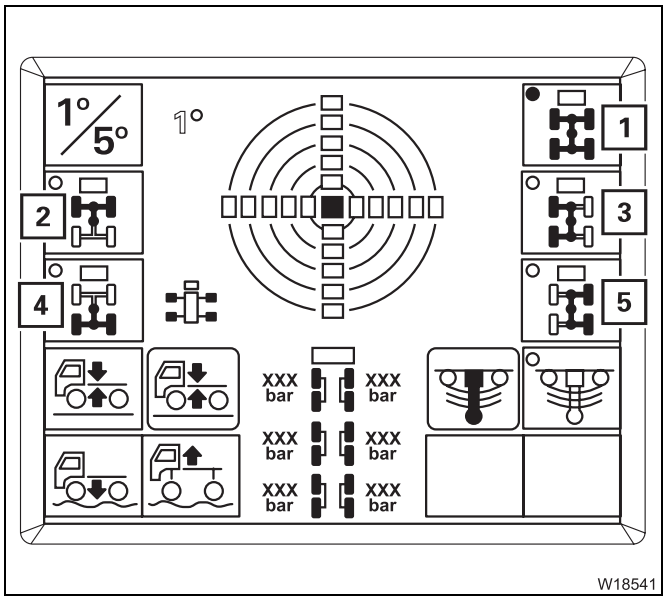


- Press button (**1**) until symbol (**2**) turns **green.**

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

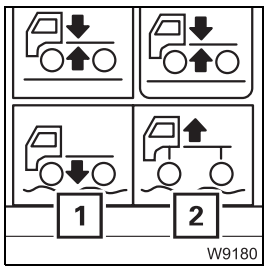
2 Front level – suspension strut for the 1st to the 3rd axle line

3 Left level – all suspension struts on the left

4 Rear level – suspension struts for the 4th to 6th 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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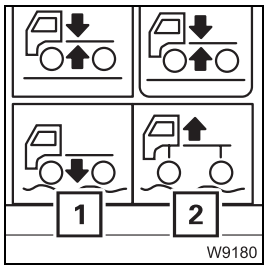
Changing the vehicle level

You can extend or retract the pre-selected suspension struts to change the vehicle level.

Risk of accident by exceeding total permissible height
Always bring the truck crane to on-road level before driving on roads after changing the level.
If the truck crane is on a higher level, then the specified overall height will be exceeded.



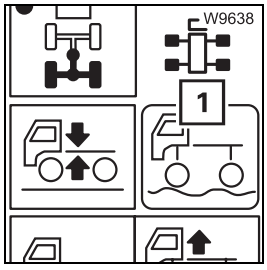
Lower level

- Press the (**1**) button.
  The pre-selected suspension struts retract.

Raise the level

- Press the (**2**) button.
  The pre-selected suspension struts extend.

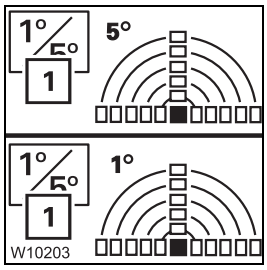
The level is continuously changed until you release the button or the end position is reached.



During the entire procedure, the symbol for the current state is shown, e.g. after the truck crane is inclined, the symbol (**1**) – *No on-road level is shown*.

Viewing the current inclination

The inclination indicator shows the current alignment.



Switch between measuring ranges

You can change the measuring range between 1° and 5°.

- Press the (**1**) button once.
  The current measuring range is displayed.

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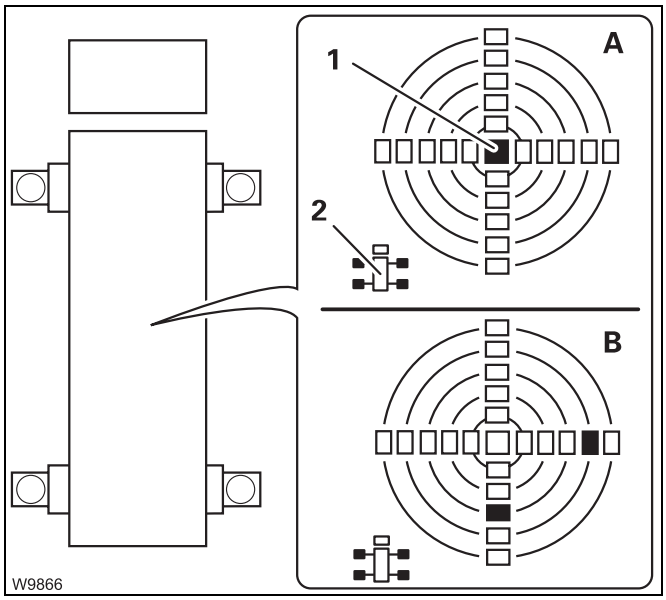


(**A**) – When the truck crane is level, only the lamp (**1**) in the middle lights up.

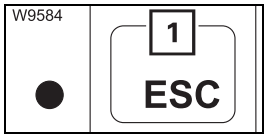
The other lamps show the sides of the truck crane which are higher.

The assignment to the carrier is given by the directional indicator (**2**).

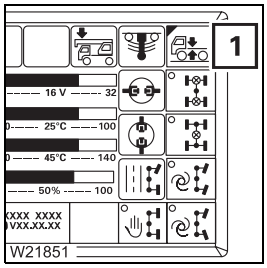
(**B**) – In this example, the carrier would be standing higher to the rear on the right hand side.

Exiting the submenu

You can exit the *Level adjustment system* submenu at any time.



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



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

The main menu opens.

The *Level adjustment system* submenu automatically closes as soon as the current speed rises above approx. 5 km/h (3 mph).

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5.4.3 Freeing truck crane stuck in terrain

Rocking the truck crane free

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

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

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

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

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Towing free forward

- Fasten a steel rope to the front towbar coupling.

Risk of damage to the chassis
Only tow the truck crane free while observing the procedure given for the pulling direction.
Jerking the truck crane or pulling it at an angle can cause damage to the chassis.

The front towbar coupling is designed for a maximum tensile force of 100 kN (approx. 10 t) (22 480 lbf [approx. 22 050 lbs]), when:

– The direction of pull runs forward along the longitudinal axis or at an angle of 45° to the right or left of the longitudinal axis.

– The direction of pull runs along the longitudinal axle towards the rear without diverting up or down.

Towing free backward

- Fasten a steel rope to one of the towing eyes on the rear chassis wall using a shackle on a towing eye.

Risk of damage to the chassis
Only tow the truck crane free while observing the procedure given for the pulling direction. Otherwise the chassis may be damaged or the towing eyes may be torn off or bend.

The towing eyes on the vehicle tail or the ROB are designed for a maximum tensile force of 75 kN (approx. 7.5 t) (16 860 lbf [approx. 16 530 lbs]) when:

– The direction of pull runs along the level of the longitudinal axis.

– The direction of pull runs along the longitudinal axle towards the rear without diverting up or down.

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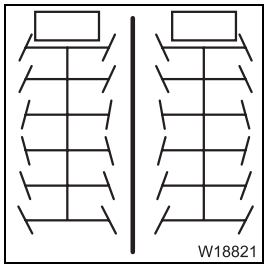
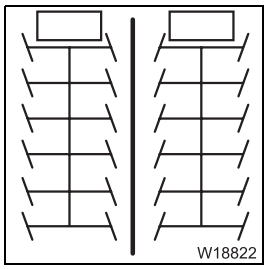
5.5 Separate steering

There are two types of steering with separate steering.



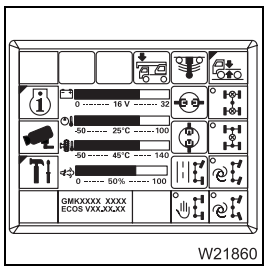
– **Driving around corners:**

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



– **Crab travel mode:**

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



• Open the main menu, if necessary.

5.5.1 Switching to separate steering

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

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

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

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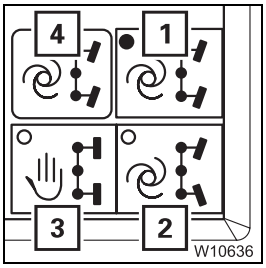


- Press the button for the required steering mode once.
  - **1** Crab travel mode, 6th axle line steered automatically
  - **2** Driving around corners, 6th axle line steered automatically
  - **3** Manual, 6th axle line is steered manually for driving around corners/ crab travel mode

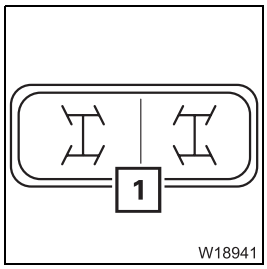
The dot in the symbol turns **green**. The display (**4**) automatically shows the related symbol, e.g. for crab travel mode.

When separate steering is switched on, the speed is limited to approx. 20 km/h (12 mph).

If the error symbol is displayed, contact **Manitowoc Crane Care**.

Manual

- Steer the 1st and 2nd axle lines with the steering wheel.



- Steer the 6th axle line with the button (**1**).
  - **– To turn to the left:** • Push the button to the left
  - **– To turn to the right:** • Push the button to the right

Axle lines 3, 4 and 5 are steered automatically depending on the 1st and 6th axle lines and on the steering mode selected.

The axle lines are steered as long as you keep the button pressed or until an end position is reached.

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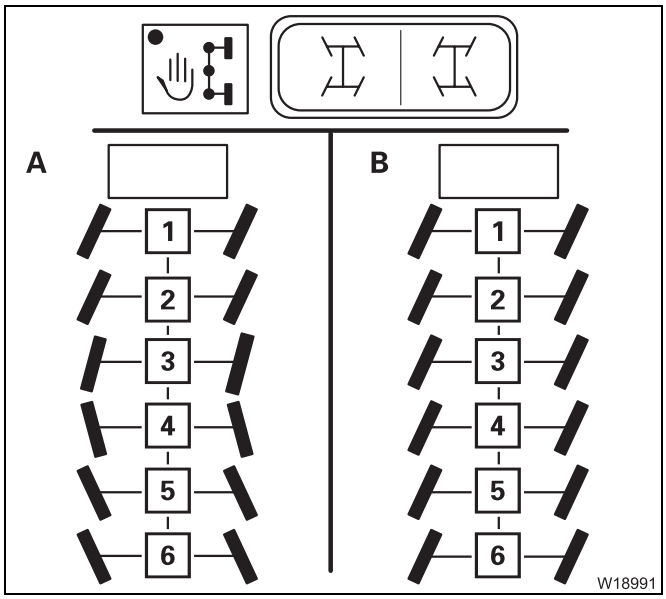


(A) – for driving around corners

- Steer the 6th axle line opposite to the 1st and 2nd axle lines.

The other axle lines are steered to suit the turning radius.

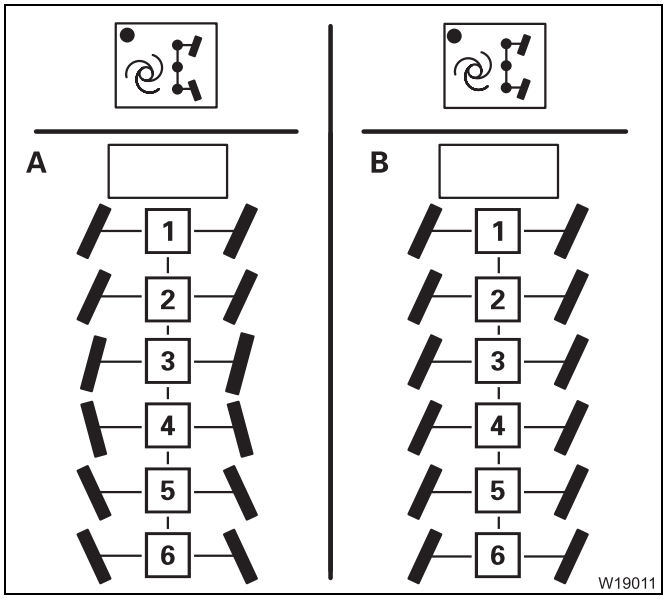
(B) – for crab travel mode

- Steer the 6th axle line in the same direction as the 1st and 2nd axle lines.

The other axle lines are always steered in the same direction.

Automatic

- Steer the 1st and 2nd axle lines with the steering wheel.



(A) – for driving around corners

The other axle lines are steered out in line with the turning radius, and with or against the steering angle on the 1st and 2nd axle lines.

(B) – for crab travel mode

The other axle lines are steered in the same direction as the 1st and 2nd axle lines.

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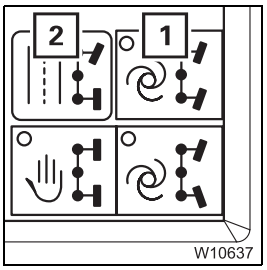
Switching to normal steering mode

Switching off the separate steering is possible during standstill and while travelling, up to a speed of approx. 5 km/h (3 mph).



- Press the button for the steering mode which is switched on, e.g. the button (**1**) for crab travel mode. The dot in the symbol turns **black.**

  When no steering mode is switched on, the separate steering will be switched off. The display (**2**) shows the symbol for on-road driving. Now:

  – Steer the 1st and 2nd axle lines with the steering wheel,

  – The 3rd and 4th axle lines remain facing forward,

  – Steer the 5th and 6th axle lines according to the turning radius.

If the error symbol is displayed, contact **Manitowoc Crane Care**;
➠ p. 7 - 32.

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5.6 Heating and air-conditioning system

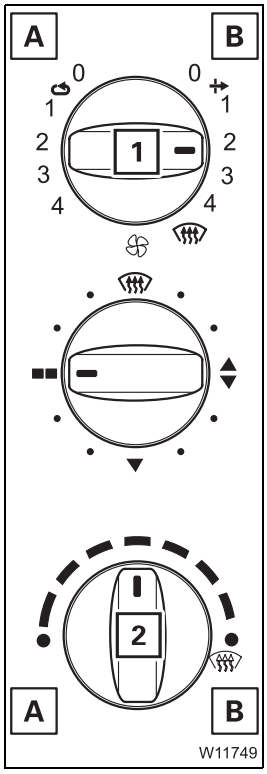
5.6.1 Standard heating system

Switching on

- Start the engine. The heating output is only provided when the engine is running.

Heating

You must set the blower and the temperature.



Setting the blower/fresh air/recirculated air

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

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

B Fresh air – outer air is sucked in.

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

Setting the temperature

- Turn the switch (**2**) to the desired position.

A Colder

B Warmer

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

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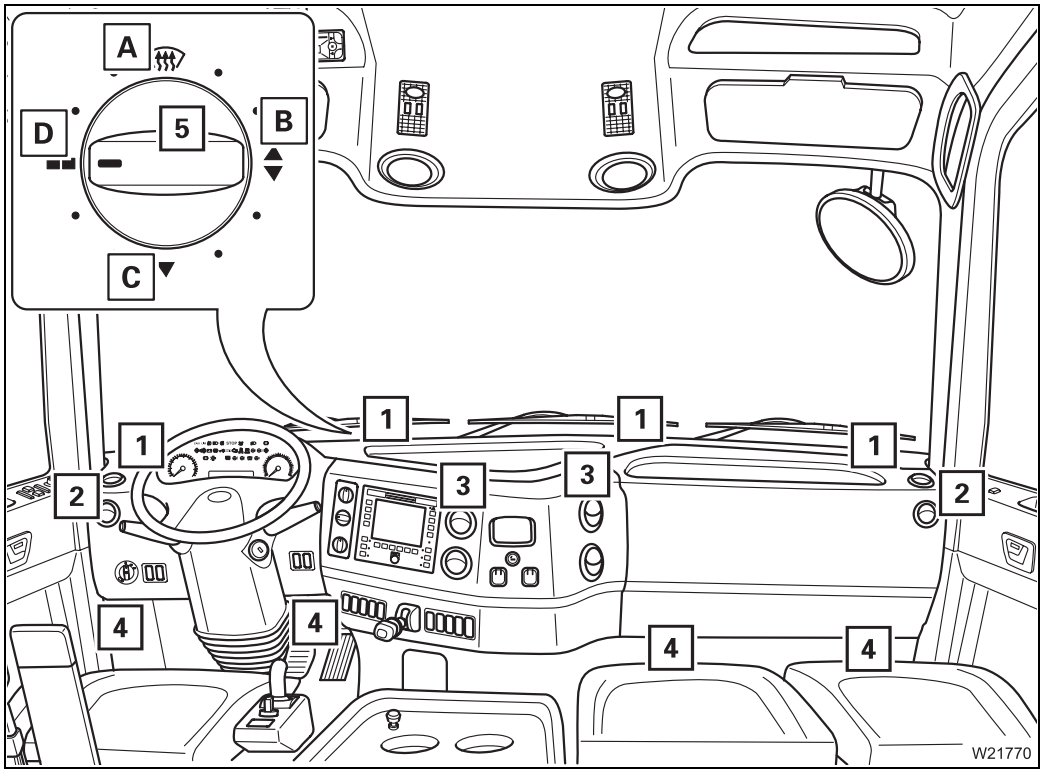
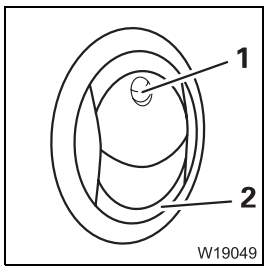
Air distribution

You can allow the air to flow out from various air vents.



- Turn the switch (**5**) to the position for the required air vents.
  - **A** Air vents (**1**), (**2**) – front windscreen, side
  - **B** Air vents (**1**) to (**4**)
  - **C** Air vents (**2**), (**3**), (**4**) – side, centre, below
  - **D** Air vents (**2**), (**3**) – side, centre

You can adjust air vents (2) and (3).



Adjusting the air vents

1	– To open:	Press in and position lengthwise
	– To close:	Position crosswise
	– To direct the air flow:	In intermediate position
2	– To direct the air flow:	Rotate

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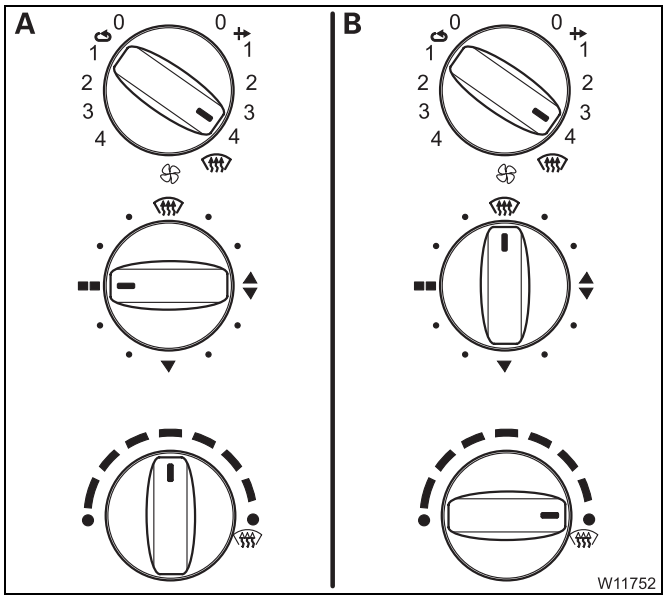
Examples

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



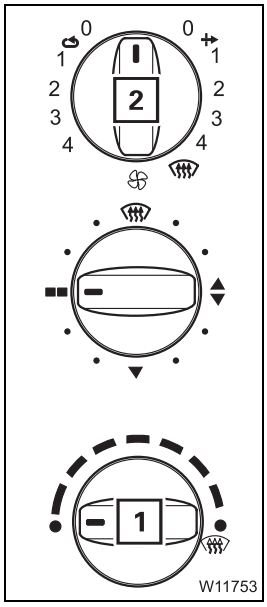
(A) – Ventilating

– Turn the switch into the positions shown,
– If necessary, open the air vents for the side and centre.

(B) – Defrosting the front windscreen

– Turn the switch into the positions shown,
– Close the air vents for the side and centre.

Switching off



Switching off the heater

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

Switching off ventilation

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

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5.6.2 Air-conditioning system

You can cool the driver's cab and dry the air using the air conditioning system.

Notes

Do not cool the air too much.
The difference between the outside temperature and the inside temperature should be at the most 10°C to 14°C (18°F to 25°F).
If the cooling is too severe, you may frequently feel physically uncomfortable, usually only after you leave the cool room.

Avoid having cold air blowing directly onto your body.

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

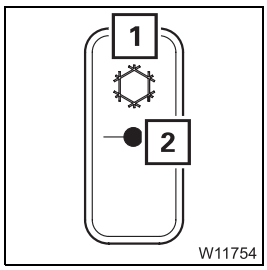
If the truck crane has been exposed to strong sunlight for a long period of time, for example, the air conditioning system should initially be operated at the highest blower level with the engine running.
The door or at least the windows should be left open for a short while to air thoroughly. The cooling-down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

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

Set the fan to a lower level once the inside temperature has reached the desired temperature.

Switching on/off

- Start the engine. The air-conditioning system operates only when the engine is running.
- Switch off the auxiliary heater; ➠ p. 5 - 78.



– **Switching on:**
  - Press the button (**1**) above –
    The lamp (**2**) lights up

– **Switching off:**
  - Press the button (**1**) below –
    The lamp (**2**) goes out

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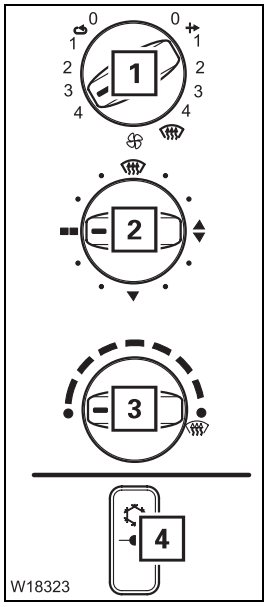
Cooling

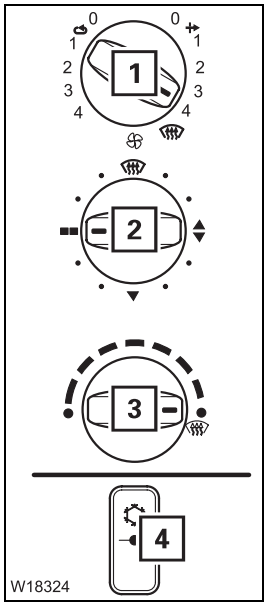
The illustration only shows one sample setting. Always adjust the setting to the current conditions.



- Switch the air conditioning on – the lamp (**4**) lights up.
- Turn the switch (**3**) as far as it will go, to *Cold.*
- Turn the switch (**1**) to the desired level – with recirculating air, you will be able to cool more quickly, but no oxygen is fed in.
- Set the air distribution with switch (**2**) – open the air vents if necessary; ➠ p. 5 - 71.

Drying

You can dry the air in the driver's cab.



- Switch the air conditioning on – the lamp (**4**) lights up.
- Turn the switch (**3**) as far as it will go, to *Warm*.
- Turn the switch (**1**) to the desired level – adjust the fresh air/recirculating air setting to the current conditions (humidity and temperature of the outside air).
- Set the air distribution with switch (**2**) – open the air vents if necessary; ➠ p. 5 - 71.

When drying, the air conditioning system and the heating system work against each other. After drying, switch off the device that you do not require.

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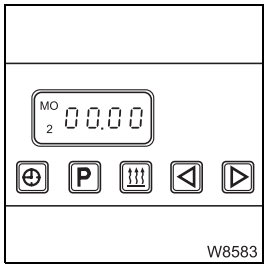
5.6.3 Auxiliary water heater

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



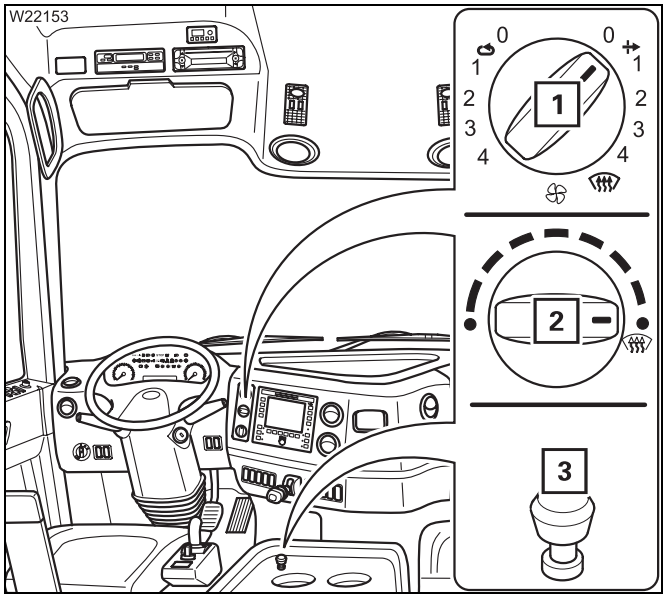
You can use the auxiliary water heater to:

– Preheat just the engine,

– Preheat the engine and driver's cab simultaneously.

Preheating the engine

If only the engine is to be preheated, adjust the heating system as follows:



- Switch (**2**) to *Warm* setting.
- Switch (**1**) to *Fan off* setting.
- Knob (**3**) pressed.

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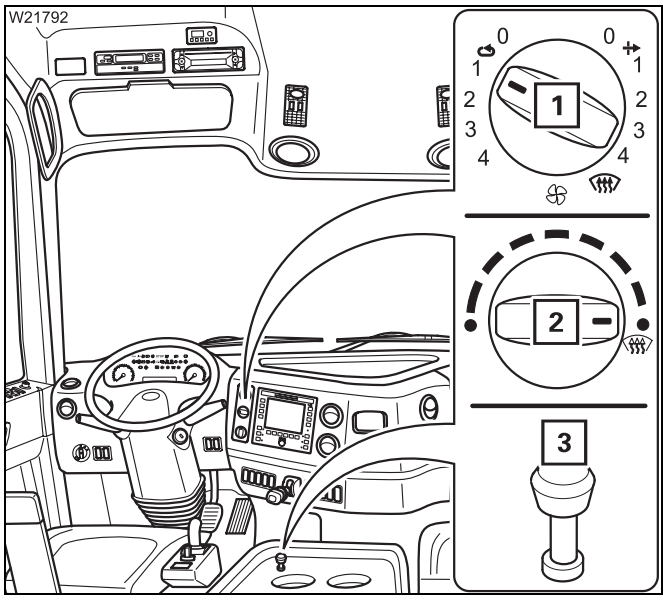
Preheating the driver's cab

Adjust the heating system as follows if the driver's cab is to be preheated in addition to the engine:



- Switch (**2**) to *Warm* setting.
- Switch (**1**) on the *Recirculated air* symbol, level **1.**
- Open the air vents; ➠ p. 5 - 71.
- Button (**3**) pulled.

If you heat the driver's cab at the same time, the amount of time required to preheat the engine will increase significantly.

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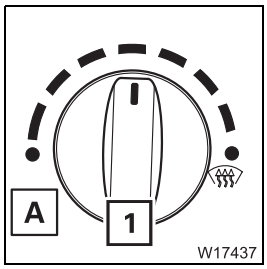
Switching on the auxiliary heater

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

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

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

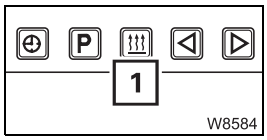


- Turn switch (**1**) to the desired temperature.

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

This section describes how to switch on the heater manually. The auxiliary heater can also be switched on automatically; ➠ *Saving the automatic heating start*, p. 5 - 79.

- Turn on the ignition; ➠ *Switch on the ignition*, p. 4 - 12.



- Press the (**1**) button once.
  The auxiliary heater switches itself on and the insert lights up.

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

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

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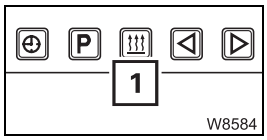
Switching off the auxiliary heater

This section only describes how to switch off the heater manually. The auxiliary heater is switched off again after a certain heating period if it was switched on automatically. You can set this heating period; ➠ *Setting the heating period*, p. 5 - 80.



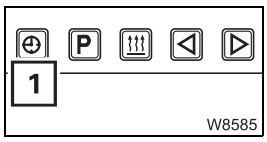
- To **switch off**, press the button (**1**) once. The auxiliary heater is switched off immediately.

If you turn off the ignition while the auxiliary heater is in operation, the auxiliary heater continues to run for a certain period of time. You can set this remaining time; ➠ *Air-conditioning system*, p. 5 - 73.

Setting the time and weekday

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

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



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

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

- Wait five seconds. The new time is saved and then the weekday flashes, e.g. **MO** for Monday.

- Set the current day of the week on the flashing display.

The display stops flashing after five seconds and the current time is displayed. The weekday goes out.

The time and weekday have now been set.

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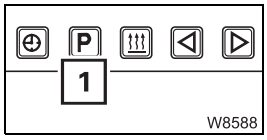
Saving the automatic heating start

Heating is started automatically on schedule only if the time and the day of the week have been correctly set; ➠ p. 5 - 78.

You can set three different automatic heating starts – up to seven days in advance.

If you call up values in order to change them during the following setting process, they flash for 5 seconds. The entry must be made within this period. The value stops flashing after 5 seconds and is saved as the new value.



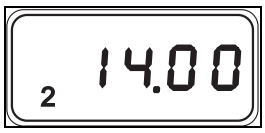
- To retrieve a storage location, press the button (**1**) once.

Flashing displays:
– The retrieved storage location, e.g. 2,
– The last saved heating start, e.g. 6.00.

- Set the time for the desired heating start, e.g. 8.00

Wait for approx. 5 seconds until the day of the week for the heating start flashes, e.g. **MO** for Monday.

- Set the day of the week for the desired heating start.



Wait for approx. 5 seconds until the current time is shown, e.g. 14.00 hrs. The new heating start has now been saved and switched on.

If you wish to store one or two more heating starts, retrieve a new storage location using the P button and repeat the procedure.

After you have saved the heating start, you can also set the heating period; ➠ *Setting the heating period*, p. 5 - 80.

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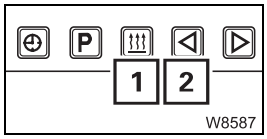
Setting the heating period

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



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

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

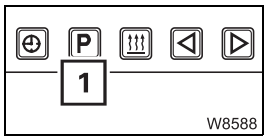
- Set the desired heating period on the flashing display. You can set a heating period of 10 to 120 minutes.

Wait for approx. 5 seconds until the current time is shown, e.g. 14:00 hrs.

A new heating period has now been set.

Switching the automatic heating start on and off

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



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

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

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

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

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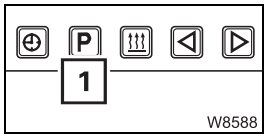
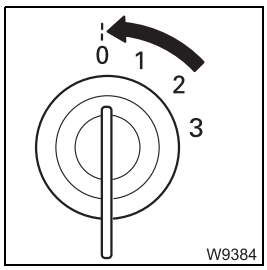
Setting the remaining time

If the ignition is turned off while the auxiliary heater is running, the auxiliary heater continues to run for the remaining time.



- Switch on the auxiliary heating using the (**1**) button.



- Turn off the ignition.

The auxiliary heating continues to run and the residual run time set last flashes, e.g. 48 minutes.

- Set the desired remaining time on the flashing display. You can set a remaining time of 1 to 120 minutes.

- Wait for 5 seconds until the current time is shown.
  The remaining time is now set.

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5.7 Towing a trailer

When towing a trailer, a towbar coupling is fitted to the back of the carrier.

Please observe the permissible trailer load of your truck crane.

Risk of accident by trailer moving unintentionally
Before coupling or uncoupling the trailer, it must be secured with the trailer parking brake as well as with chocks to prevent it from rolling away. Ensure that it is still possible to swivel the front axle of the trailer.

Before coupling the trailer, adjust the towbar to the height of the towbar coupling.

Risk of accident when coupling the trailer
No one may be between the truck crane and trailer when coupling the two vehicles.

Risk of accident from unexpected acceleration
When you move slowly to the trailer, the transmission automatically shifts into manoeuvring mode. If the warning buzzer sounds, release the accelerator **immediately**.
If you do not release the accelerator, the electronics will engage automatically within a few seconds. The truck crane could accelerate unexpectedly and people might be crushed between the trailer and the truck crane.

Please observe the relevant national regulations regarding coupling and uncoupling of the trailer.

Effects on the axle loads

Observe the effects on the axle loads when towing a trailer. The axle loads of your truck crane change in the following manner when operating with central axle trailers:

– For every 100 kg (220 lbs) of drawbar load, the axle loads on the 1st and 2nd axle lines are reduced by 36 kg (80 lbs).

– For every 100 kg (220 lbs) of drawbar load, the axle loads on the 3rd to 6th axle lines are reduced by 43 kg (95 lbs).

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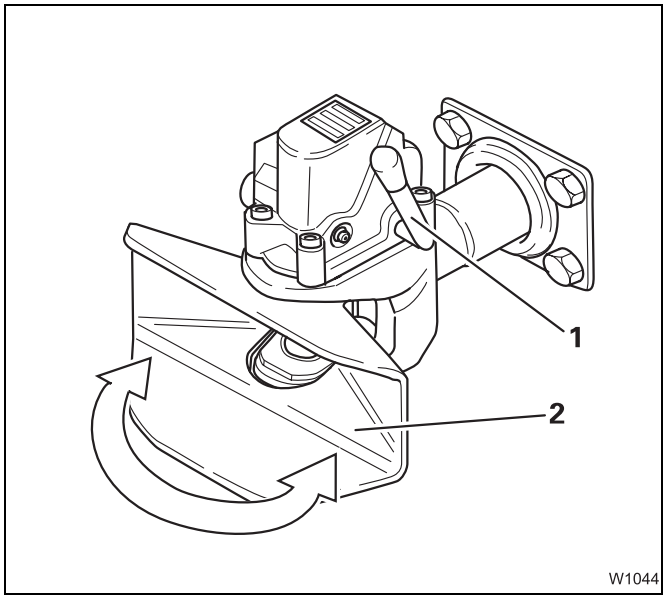
Coupling the trailer

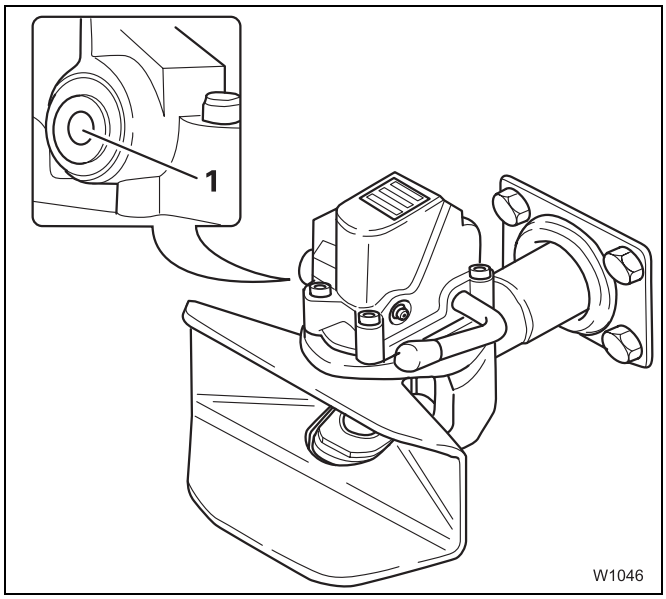
Risk of injury when the automatic closing device is triggered
Do not put your hand into the coupling jaw when the towbar coupling is open.
This may activate the automatic closing device, causing the coupling pin to move down with great force, seriously injuring your hand.



- Open the towbar coupling.
  Push the lever (**1**) up until it latches into place.
- Check whether the coupling jaw (**2**) is stable. It may not be allowed to move to the left or the right when the towbar coupling is open.
- Carefully drive the truck crane backwards so that the towbar of the trailer is pushed into the coupling jaw.

The towbar coupling closes automatically, and the lever (**1**) swings downwards.

Make sure you check the prescribed condition of the coupling after each coupling procedure.



The pin (**1**) may no longer protrude from the guide bushing after the coupling procedure.

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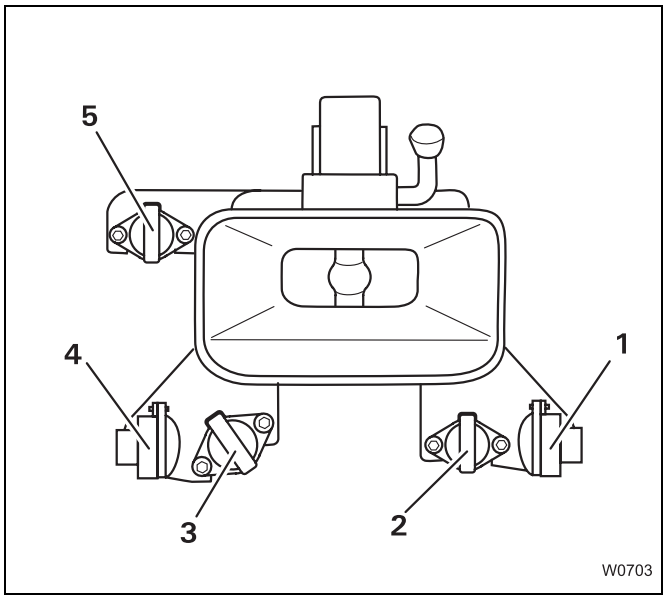
Risk of accident if the trailer is coupled improperly
If the pin is protruding from the guide bushing, the trailer is not coupled properly and could become disengaged from the towbar coupling while driving.

Connecting the supply lines



- Insert the plug of the trailer's electrical system into the socket (**5**).
- If necessary, insert the ABS connection cable into the socket (**3**).
- First connect the hose of the brake cable to the yellow coupling head (**4**).
- Then connect the hose of the supply line to the red coupling head (**1**).

This socket (**2**) is designed for special equipment.

Risk of accident if the hoses are too short or installed improperly
The hose lines may not come off even when driving around corners. When connecting the hoses, make sure they are long enough and have enough clearance.

- Check the function of the trailer lighting.
- Test the service brake and parking brake immediately after setting off.

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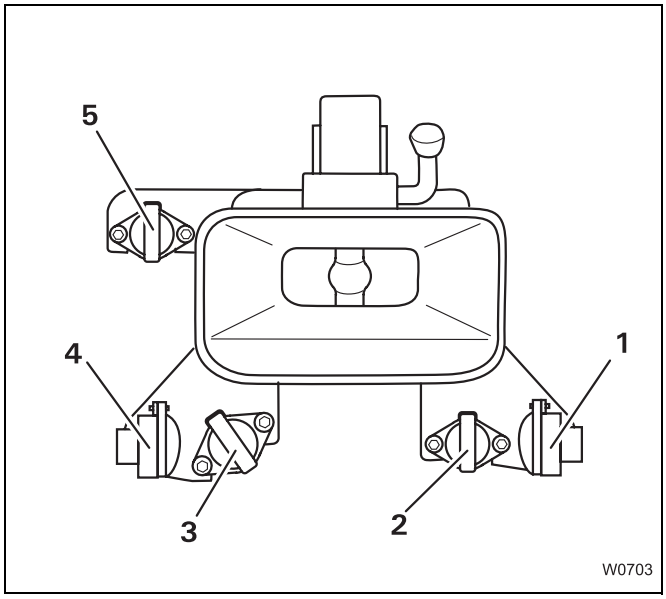
Removing supply lines

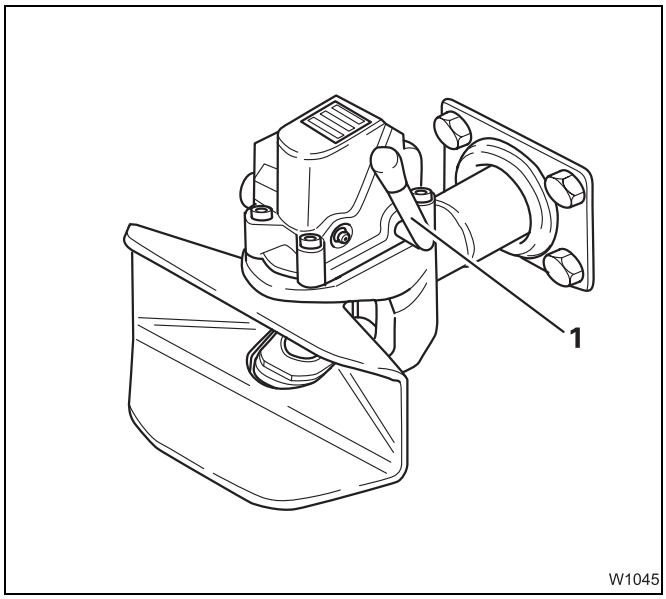
Risk of accident due to trailer moving unintentionally
Always first remove the hose from the supply line so that the trailer is braked. This prevents the trailer from moving when you remove the brake hose.



- Proceed as follows:
  - First disconnect the hose of the supply line from the red coupling head (**1**). Now the trailer is braked.
  - Then disconnect the hose of the brake line from the yellow coupling head (**4**).
- Remove the plug (**5**) of the trailer electrical system from the socket.
- If necessary, remove the plugs (**2**) and (**3**) from the sockets (ABS and special fittings).

Uncoupling the trailer

Risk of injury when the automatic closing device is triggered
Never put your hand into the coupling jaw when the towbar coupling is open.
This prevents the coupling from closing automatically, and the coupling bolt causing serious injury to your hand.



- Secure the trailer with the service brake and chocks as prescribed to prevent it from rolling away.
- Open the towbar coupling.
  Push the lever (**1**) up until it latches into place.
- Drive the truck crane carefully away from the trailer.

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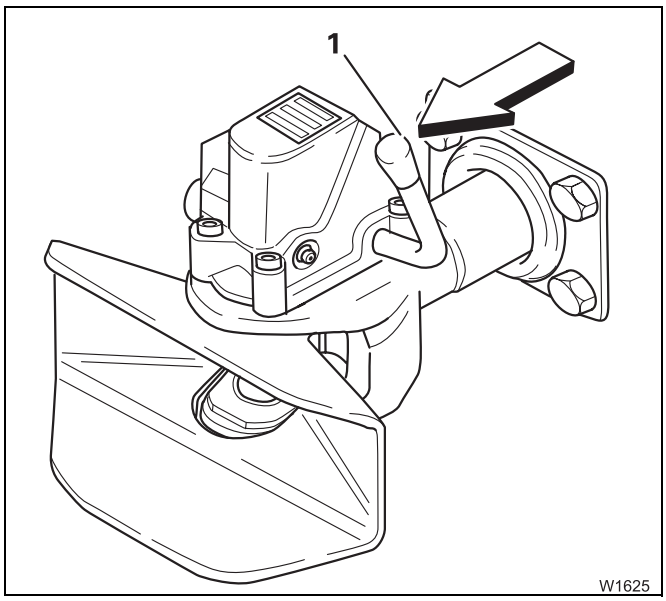
Risk of injury when manually closing the towbar coupling
When closing, the lever moves down with great force in the direction of the coupling jaw. Start the closing process only by moving the lever briefly in the direction of the coupling jaw with the ball of your hand.
If you hold the lever and move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



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

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

The lever swings downwards and the towbar coupling is closed.

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

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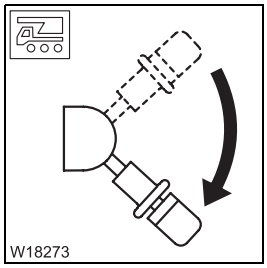
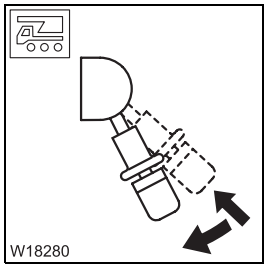
Checking the braking force

When a trailer is coupled and connected, you can check whether the braking force of the truck crane alone is sufficient for braking the truck crane and the trailer on uphill or downhill roads (e.g. when a brake hose has burst).

To check this, you can release the parking brake of the trailer on its own.



- Engage the parking brake.



- Press the lever in and pull it further down.
  As long as you hold the lever in this position, the parking brake on the trailer is released – the parking brake on the truck crane remains engaged.

This allows you to check whether the braking force of the parking brake on the truck crane alone is sufficient to brake the truck crane and the trailer.

- Let go of the lever. The lever latches into position and the parking brake of the trailer is engaged.

Risk of accident from truck crane moving unintentionally
When parking on downhill or uphill roads, always secure the truck crane and trailer against rolling away with wheel chocks in addition to the parking brake. Even when checking the parking brake has delivered a positive result. Observe the corresponding regulations in your country when doing this.

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6 Driving modes and rigging for on-road driving

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6 Driving modes and rigging for on-road driving

This chapter contains:

- Tables with driving modes of the GMK 6400, in which the maximum axle load is 12 t (26 500 lbs)
- Rigging work required in order to set down the main boom on a trailer
- Installation/removal of the main boom

6.1 Driving modes

Information on the axle loads

The GMK 6400 truck crane is designed for driving with maximum axle loads of 12 t (26 500 lbs). **Manitowoc Crane Group Germany GmbH** notes that driving with an axle load exceeding 12 t (26 500 lbs), the brake system can overheat and the braking deceleration required by the EU partial type-approval cannot be ensured.

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

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

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

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6.1.1 Information on how to use the tables

The tables consist of two parts:

– The driving mode of your truck crane is specified in the top part, next to **Equipment**. Find out which driving mode applies to your truck crane. Each truck crane has one driving mode only
– The required rigging mode for this driving mode and the accessories you are allowed to transport are specified in the middle section, next to **Rigging mode**

Example of how to use the table:

Assuming your truck crane is equipped with 445/95 tyres, aluminium rims and transmission retarder.

In this case the driving mode in the upper part, next to equipment, is **2**.

According to the specifications in the lower part, next to rigging mode:

– counterweight, lattice extension, auxiliary hoist, Mega Wing Lift and spare wheel must be removed.
– all hook blocks must be transported on a separate vehicle.

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6.1.2 Tables for a maximum axle load of 12 t (26 500 lbs)

This section only shows some standard driving modes. For further information on additional or individual driving modes, please contact **Manitowoc Crane Care**.

If you remove indicated parts from the truck crane in driving mode, then the total weight decreases but can be distributed in such a way that the front or rear axle loads are over 12 t (26 500 lbs).

Without removable supporting box

Also observe the effects on the axle loads when towing a trailer;
➠ p. 5 - 82.

		Driving mode		
		1	2	3
Equipment	385/95 R 25 tyres	✔		
	445/95 R25 tyres		✔	
	525/80 R 25 tyres			✔
	Steel rims	✔		
	Aluminium rims		✔	✔
	Transmission retarder	✔	✔	✔
Rigging mode	Counterweight, lattice extension, auxiliary hoist, Mega Wing Lift and spare wheel are removed	●	●	●
	Hook blocks on separate vehicle	●	●	●
	Outrigger beams front and rear removed			●

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With removable supporting box

		Driving mode 1
Equipment	385/95 R 25 tyres or 445/95 R25 tyres or 525/80 R 25 tyres	✔
	Steel rims or aluminium rims	✔
Rigging mode	Front outrigger beam removed	●
	Supporting box removed	●

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6.1.3 Maximum permitted speeds with an axle load of over 12 t (26 500 lbs)

Should your national regulations allow driving with axle loads over 12 t (26 500 lbs), you may under no circumstances exceed the maximum permitted speed given here.

Risk of accident from overloading tyres
Never exceed the maximum permitted speed which is given for the current axle load and tyre size.
This prevents the rope tyres from becoming overloaded and rupturing.

The maximum permissible speed depends on the size of the tyres and the axle load. The following values only apply to the given tyre pressure, and are maximum values. Also note the information provided by the tyre manufacturer regarding the maximum permitted load duration.

Tyre size/ tyre pressure in bar (psi)	Current axle load in t (lbs)	Maximum permissible speed in km/h (mph)
385/95 R 25[1)]/10 (145.0)	up to 13.5 (29 800)	58 (36)
	up to 14.5 (32 000)	45 (28)
	up to 15.5 (34 200)	32 (20)
	up to 16.5 (36 400)	22 (14)
445/95 R 25/9 (130.5) **525/80 R 25/7 (101.5)**	up to 13.5 (29 800)	65 (40)
	up to 14.5 (32 000)	65 (40)
	up to 15.5 (34 200)	65 (40)
	up to 16.5 (36 400)	58 (36)

[1)] Michelin X-Crane **9 bar (130.5 psi)**

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6.2 Rigging work for driving with a trailer

To reduce the axle loads to the specifications applicable in the country in which you are working, you can set the main boom onto a trailer (dolly) when driving.
For this purpose, the truck crane must be fitted with a slewing gear freewheel, boom floating position and if necessary, with a boom pre-tensioning device.

Before driving with the trailer, you must:

– Switch on the slewing gear freewheel; ➠ p. 6 - 7

– Switch on the boom floating position; ➠ p. 6 - 8

– Switch on boom pre-tensioning, if necessary; ➠ p. 6 - 9

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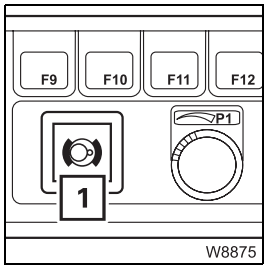
6.2.1 Switching on the slewing gear freewheel

When the main boom is set down on a trailer, the superstructure must be able to slew when driving around corners. You must switch on the slewing gear freewheel for this purpose.

- If a houselock is fitted, switch it off; ➠ *Switching off the houselock*, p. 11 - 17

Risk of accident from houselock being switched on
Always switch off the houselock before setting down the main boom on the trailer. Otherwise the superstructure will be unable to slew when driving around corners.

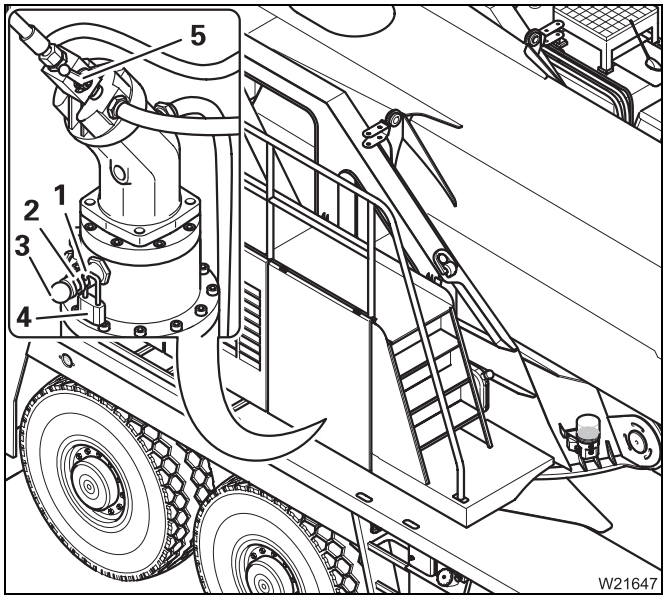
- Place the boom on the trailer as described in section *Switching on boom floating position*, p. 6 - 8



Requirements

– The engine is running

– The slewing gear brake is released, the lamp (**1**) has gone out; ➠ *Releasing the slewing gear brake*, p. 11 - 99



Switching on

- Remove the lock (**4**) from the bore (**2**)
- Push the pin (**3**) inward as far as it will go
- Secure the pin with the lock in the bore (**1**) and remove the key
- Fit and secure the pin (**3**) on the other slewing gear in the same way
- Open the valve (**5**) – the slewing gear freewheel is switched on

Switching off the slewing gear freewheel; ➠ p. 12 - 18.

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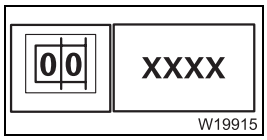
6.2.2 Switching on boom floating position

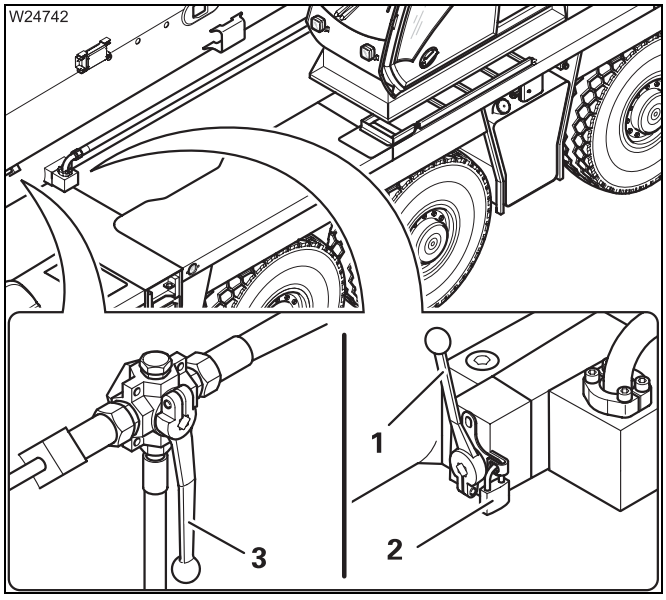
If the main boom has been placed on a trailer, the boom floating position must be switched on so that the main boom can move up and down.

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



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

Risk of accident from the main boom falling down
You may only switch on the boom floating position when the main boom is already set down on the trailer.
This prevents the raised main boom from falling down.



- Remove the padlock (**2**).
- Switch over valve I – lever (**1**) upwards.
- Secure the lever (**1**) with the padlock (**2**).
- Switch the valve IV – lever (**3**) points downwards.

The boom floating position is now switched on.

Switching off the boom floating position; ➠ p. 12 - 17.

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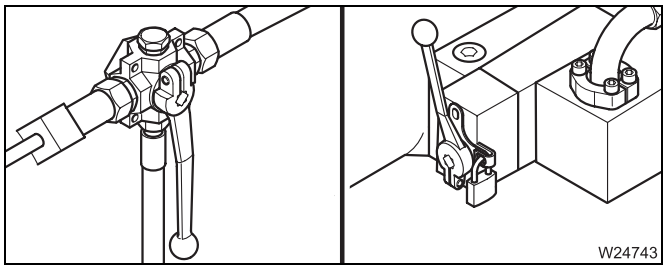
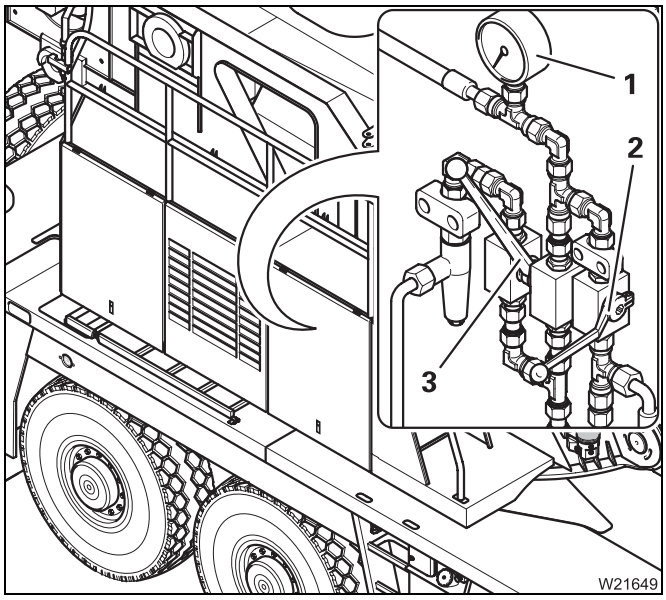
6.2.3 Switching on boom pre-tensioning

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



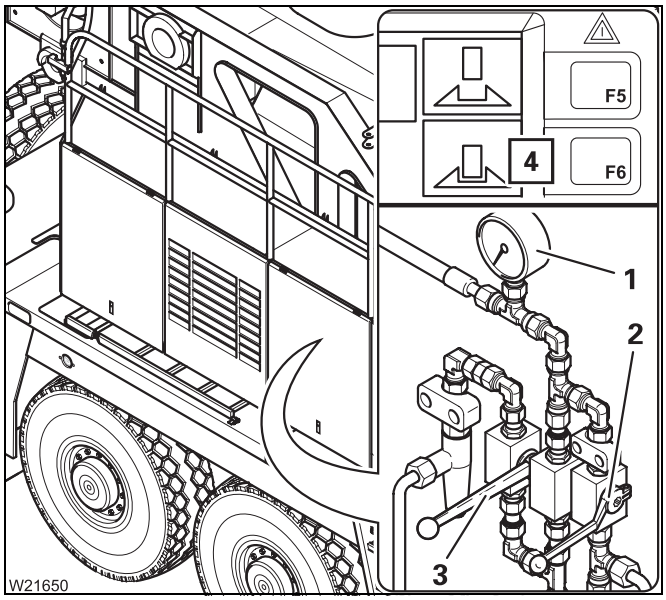
- Switch on the boom floating position;
  ➠ p. 6 - 8



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

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

You can now fill the pressure accumulator.



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

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

Now the boom pre-tensioning is switched on.

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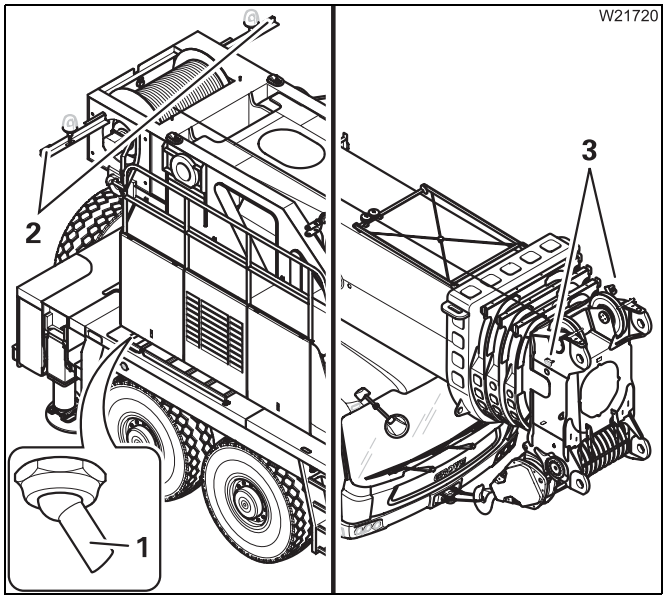
6.2.4 Switching the superstructure driving lights on/off



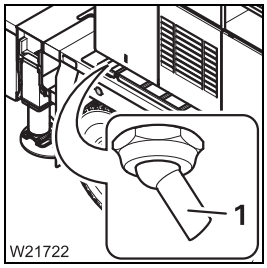
The lighting for the *Superstructure* includes lamps (**2**) and (**3**).

With standard equipment, the lamps (**2**) and (**3**) are always switched on or off together with the parking light and the headlights.

With additional equipment consisting of the switch (**1**), the lamps (**2**) and (**3**) can be switched on or off separately when the parking light or headlights are switched on.

Switching off

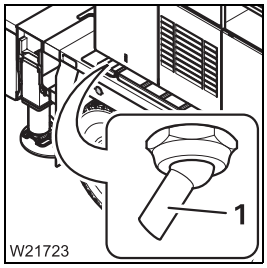
When the boom is set down on a trailer, you can switch off the *Superstructure* driving lights when necessary, e.g. in order to conform to country-specific regulations for the colour of front and rear lights.



- Push the switch (**1**) to the right – outwards

Switching on

When the main boom is on the boom rest, the *Superstructure* driving lights must be switched on.



- Push the switch (**1**) to the left – towards the turntable

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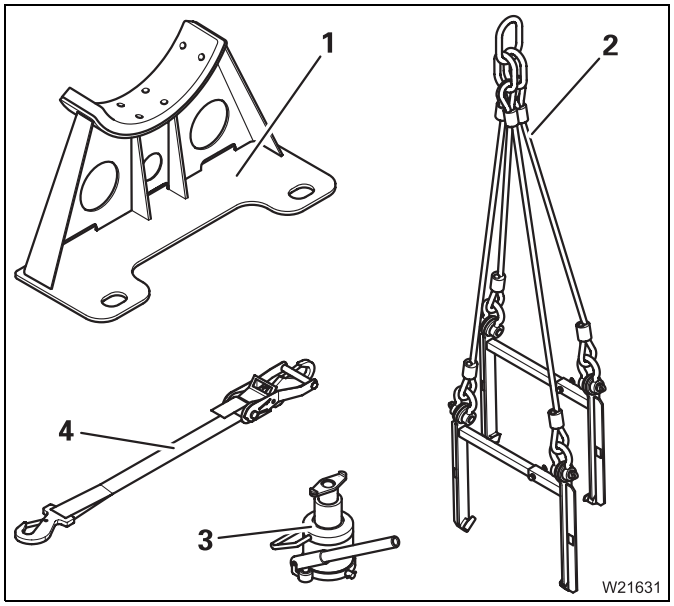
6.3 Removing/installing main boom

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

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

Additional equipment required

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



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

as well as

- An auxiliary crane with sufficient lifting capacity
- A separate vehicle with sufficient load bearing capacity and loading area

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

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6.3.1 CHECKLIST: Removing the main boom

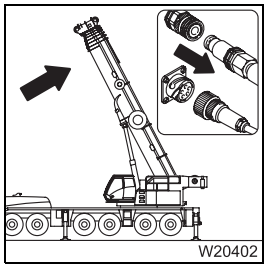
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.

Observe the warnings and safety instructions specified there.

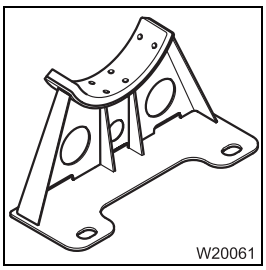
Requirements

- The auxiliary hoist has been unrigged
- The counterweight is unrigged
- All lattice extensions have been removed
- The Mega Wing Lift is removed.
- All telescopic sections are fully retracted and locked
- The hook block has been unreeved and the hoist rope has been reeled on the drum up to the main hoist
- The superstructure is slewed to the front.
- The truck crane is supported by an outrigger span of at least 8.70 x 2.71 m (28.5 x 8.9 ft)

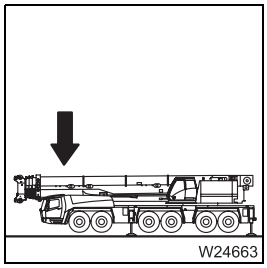
Checklist



1. Raise the main boom and disconnect the hydraulic/electrical connections; p. 6 - 27.



2. Place the derricking cylinder support on the counterweight platform; p. 6 - 21.



3. Place the main boom on the boom rest.

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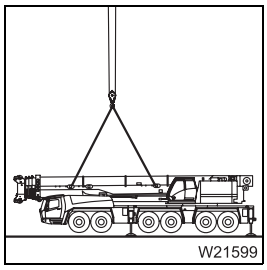
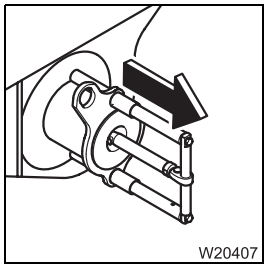


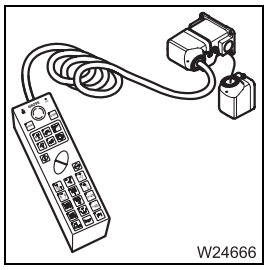
4. Sling the main boom to an auxiliary crane; ➠ p. 6 - 18.



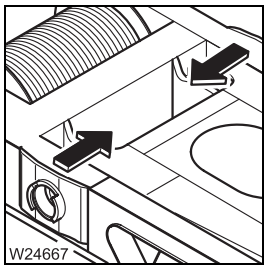
5. On the derricking cylinder head axle:

- Take the load off of the head pin
- Release the head pin
- Pull the head pins out;

➠ p. 6 - 21.



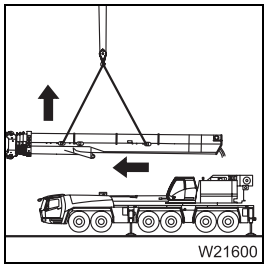
6. Connect the hand-held control on the turntable; ➠ *Connecting/disconnecting the hand-held control*, p. 12 - 21.



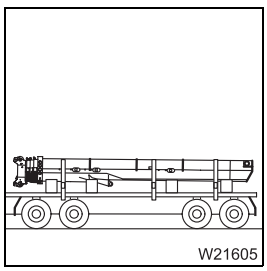
7. On the boom pivot pin:

- Switch the hydraulic circuit over
- Prepare the pulling device
- Retract the pivot pin;

➠ p. 6 - 24.



8. Raise the main boom from the turntable; ➠ p. 6 - 29.



9. Put the main boom on the separate vehicle and secure for transport; ➠ p. 6 - 32.

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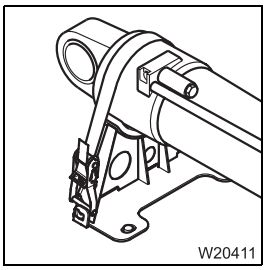


10. Secure the derricking cylinder with a tightening belt; ➠ p. 6 - 31.

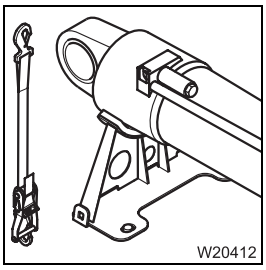
6.3.2 CHECKLIST: Installing the main boom

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

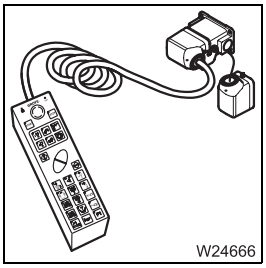
Requirements

The truck crane is supported by an outrigger span of at least 8.70 x 2.71 m (28.5 x 8.9 ft).

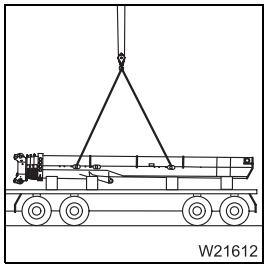
Checklist



1. Remove the tightening belt from the derricking cylinder; ➠ p. 6 - 31.



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



3. Sling the main boom to an auxiliary crane; ➠ p. 6 - 18.

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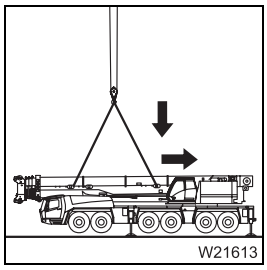
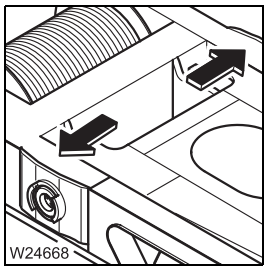
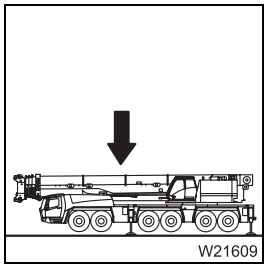


4. Lift the main boom into the turntable and align the connecting points;
➠ p. 6 - 31.

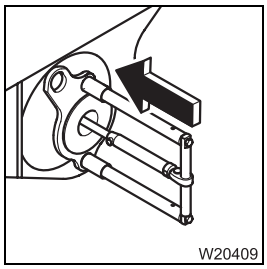


5. On the boom pivot pin:
- Open the hydraulic circuit,
- Extend the pivot pin,
- Secure the pulling device
- Close the hydraulic circuit;

➠ p. 6 - 24.

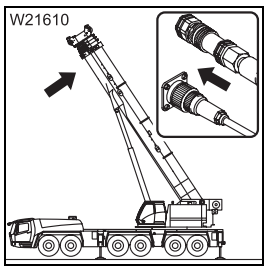


6. Set down the main boom in the boom rest with the auxiliary crane and remove the sling gear.



7. On the derricking cylinder head:
- Level the derricking cylinder
- Fit the head pin
- Secure the head pin;

➠ p. 6 - 21.



8. Raise the main boom and connect the hydraulic/electrical connections;
➠ p. 6 - 27.

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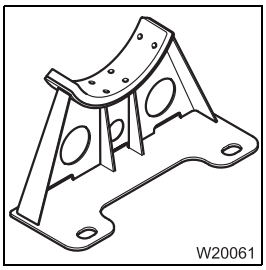
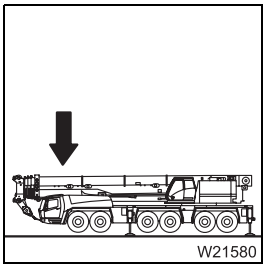
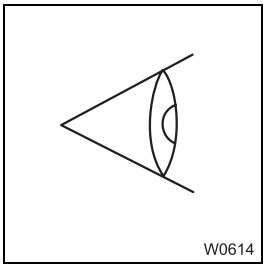


9. Remove the derricking cylinder support from the counterweight platform.



10. Place the main boom on the boom rest.



11. Carry out the checks with the main boom set down; ➠ p. 6 - 33.

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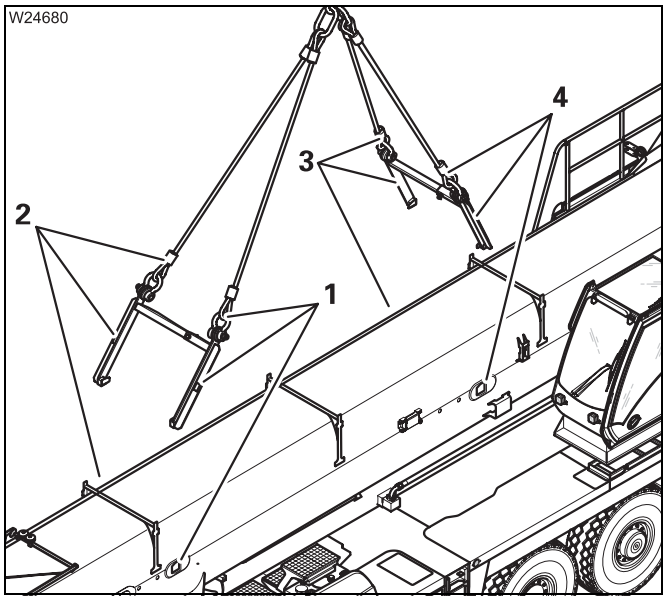
6.3.3 Slinging the main boom

Slings are fitted to the main boom when rigging and it is lifted with an auxiliary crane. Note the equipment necessary for this; ➠ p. 6 - 11.

Risk of accident from incorrect procedure
Only use the lifting gear included in the delivery and proceed as described in the following section.

Marking

The lifting gear is labelled.

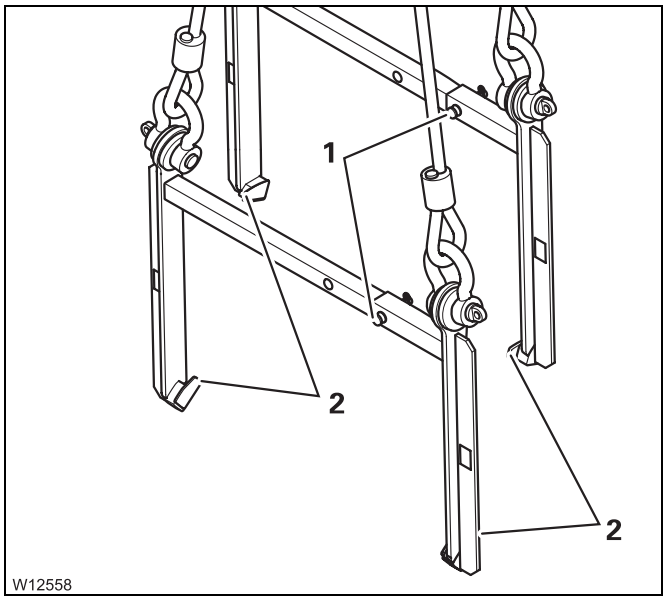


Only connect the parts of the lifting gear that have the same marking.

Only fasten the lifting gear to the slinging points intended for this purpose. The markings are of following significance:

1 VL – Front left
2 VR – Front right
3 HR – Rear right
4 HL – Rear left

Installing the lifting gear



- If the installation is correct, the load-bearing equipment (**2**) of both brackets point to each other
- Lock both brackets in the wide position Secure the pins (**1**) using the retaining pins
- Install the front bracket first. It hangs on longer ropes, which makes installing the back bracket easier

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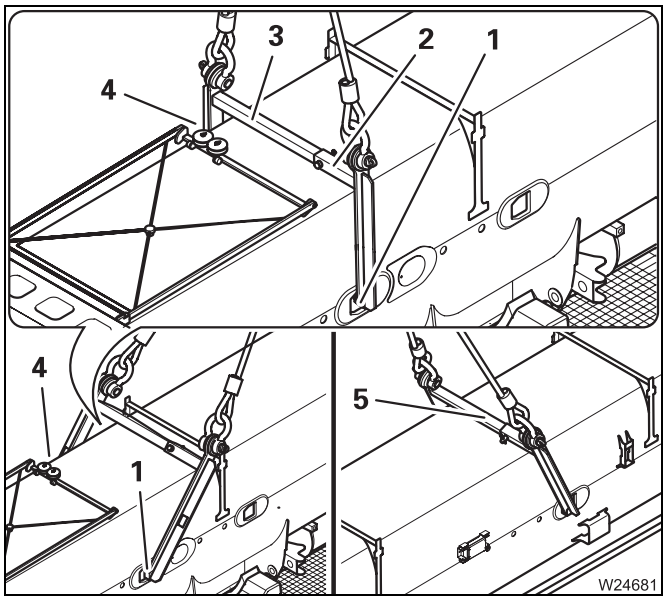
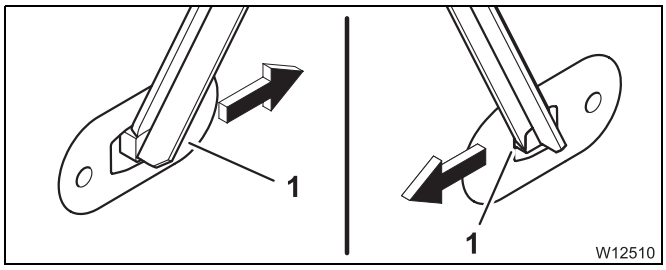
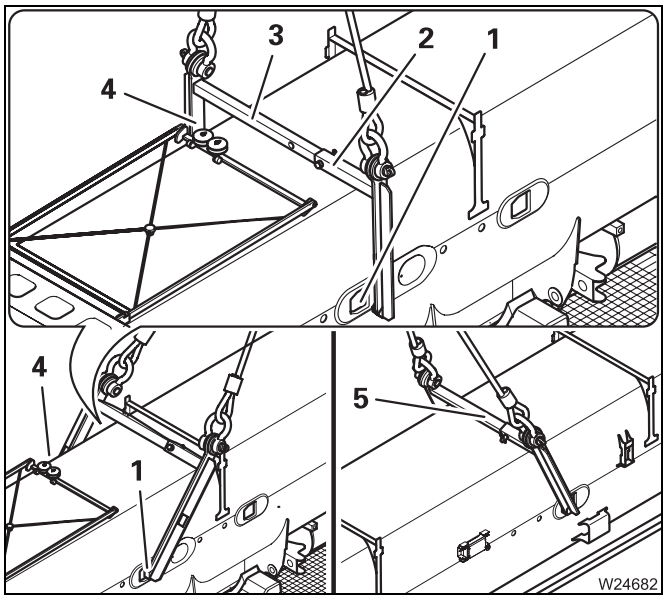


- Insert the bracket (**3**) into the slinging point (**1**). Pull the pin (**2**)
- Insert the bracket into the lifting gear (**4**)
- Secure the bracket with the pin (**2**) and the retaining pin
- Pull the bracket to the centre – the bracket must rest on the slinging point on both sides
- Install the bracket (**5**) in the same manner



- Before lifting, make sure the brackets on both sides are resting on the slinging point (**1**)

Removing the sling gear



- Remove the pin (**2**) and pull the bracket (**3**) out of the slinging point (**4**)
- Secure the bracket with the pin (**2**) and the retaining pin
- Pull the bracket out of the slinging point (**1**)
- Install the bracket (**5**) in the same manner
- Remove the brackets

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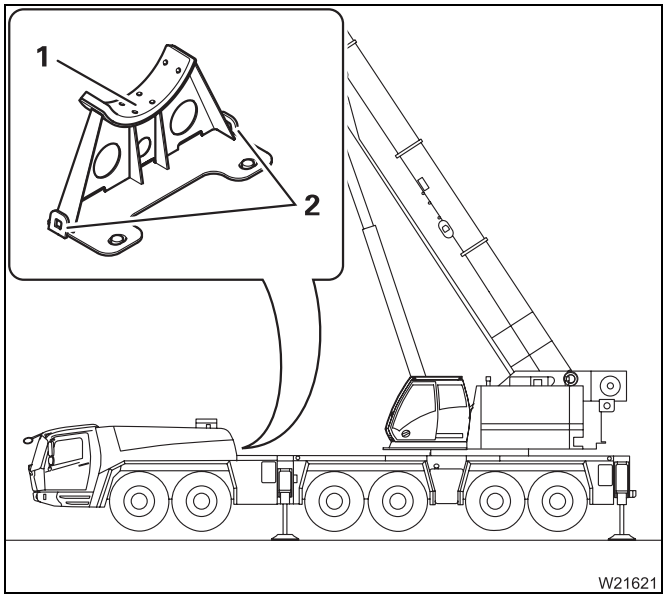
6.3.4 Retracting/fitting the derricking cylinder head pin

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

Derricking cylinder support

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



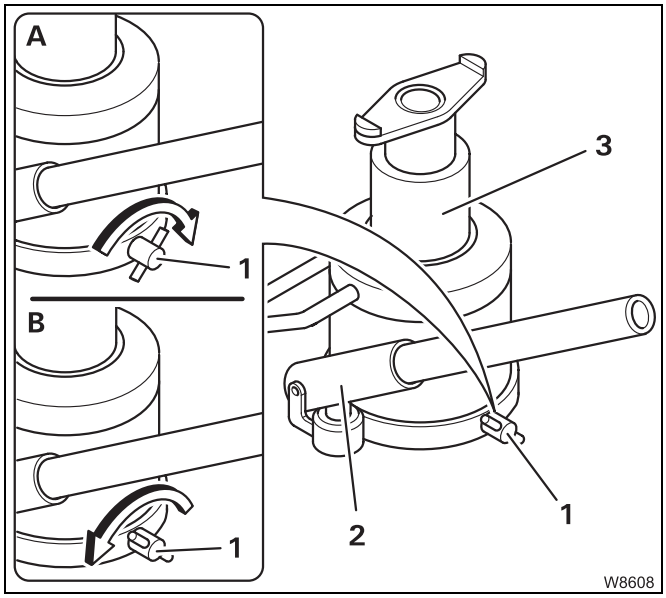
- Place the derricking cylinder support (**1**) between the holders (**2**)
- Set down the main boom on the boom rest

Operating the lifting device

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

Danger from using unsuitable lifting device

Have the lifting device serviced in time before the maintenance interval specified on the label expires.



- Attach the lever in the holder (**2**)

(**A**) – Raising

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

(**B**) – Lowering

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

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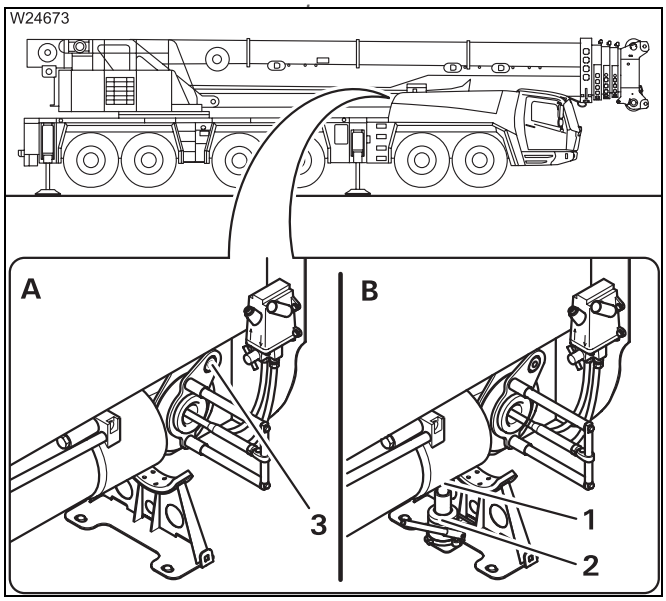
Retracting the derricking cylinder head axle

After you have pulled the head pin, you can no longer derrick the main boom.



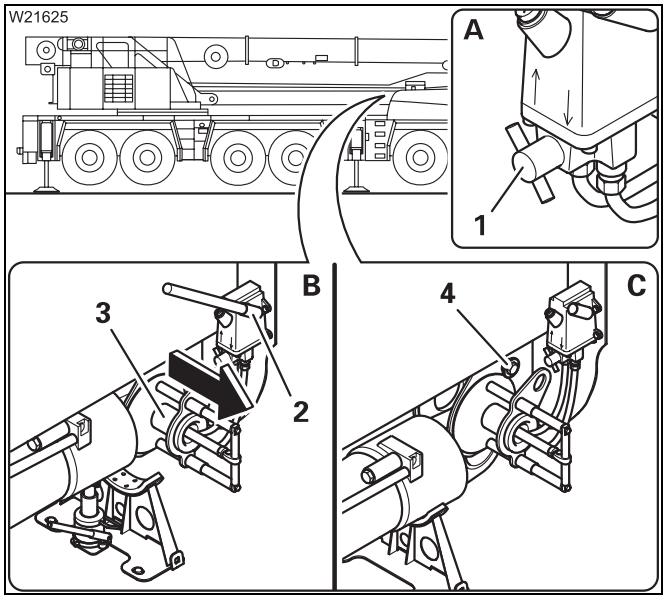
(A) – Releasing the head pin

- Loosen the bolt (**3**) and remove the disc

(B) – Relieving the head pin

- Place the lifting device (**2**) underneath the middle of the derricking cylinder
- Carry out the movement *Raise* until the bracket (**1**) is resting firmly on the derricking cylinder

Risk of accident from falling derricking cylinder
Always take the load off of the derricking cylinder using the lifting device before retracting the head pin. This prevents the derricking cylinder from falling down, injuring people or being damaged when the bolts are undone.



Pulling out the head pin

- (**A**) – Turn the switch (**1**) to the *Pull* ↑ position
- (**B**) – Insert the lever into the clamp (**2**)
- Pump until the head pin (**3**) is completely drawn out
- Carry out the movement *Lower* until the derricking cylinder is in the derricking cylinder support
- (**C**) – Fasten the disc with the bolt (**4**)
- Stow away the lever and the lifting device

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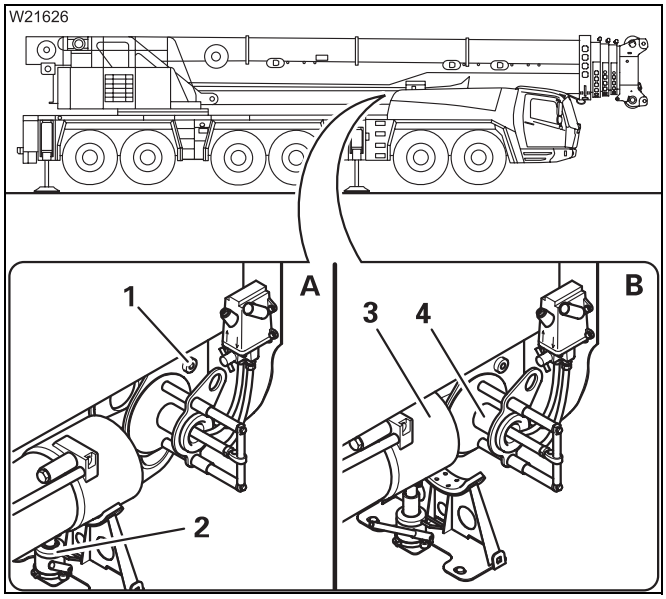
Fitting the derricking cylinder head axle

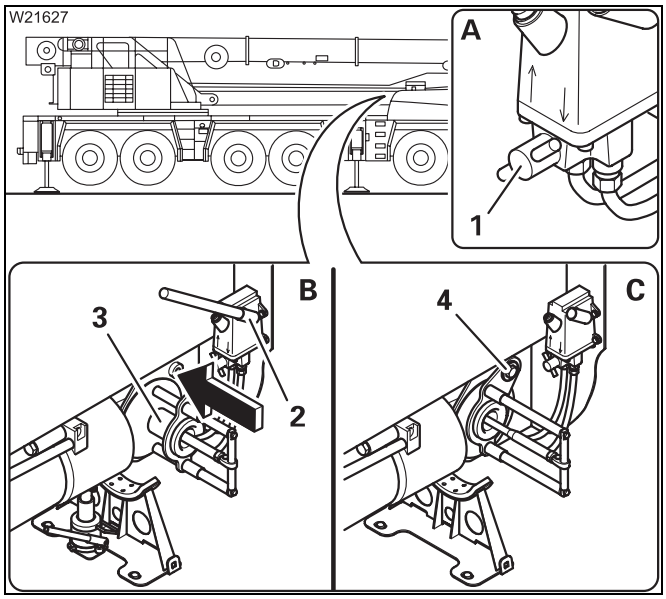
- Check to see if the tightening belt of the derricking cylinder is taken off



Aligning the derricking cylinder

- (**A**) – Remove the bolt (**1**) and remove the disc
- Place the lifting device (**2**) underneath the middle of the derricking cylinder
- (**B**) – Carry out the movement *Raise* until the head pin (**4**) is aligned with the bearing in the derricking cylinder (**3**)

Risk of damage to the bearings in the derricking cylinder head
Make sure that the bearings in the derricking cylinder are aligned with the head pin before fitting the head pin.
This prevents the head pin from damaging the bearing.



Fitting the head pin

- (**A**) – Turn the switch (**1**) to the *Pull* ↓ position
- (**B**) – Insert the lever into the clamp (**2**)
- Pump until the head pin (**3**) is inserted as far as possible

Securing the head pin

- (**C**) – Fasten the disc with the bolt (**4**)
- Stow away the lever and the lifting device so that it is safe to drive on the road

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6.3.5 Retracting/extending the boom pivot pin

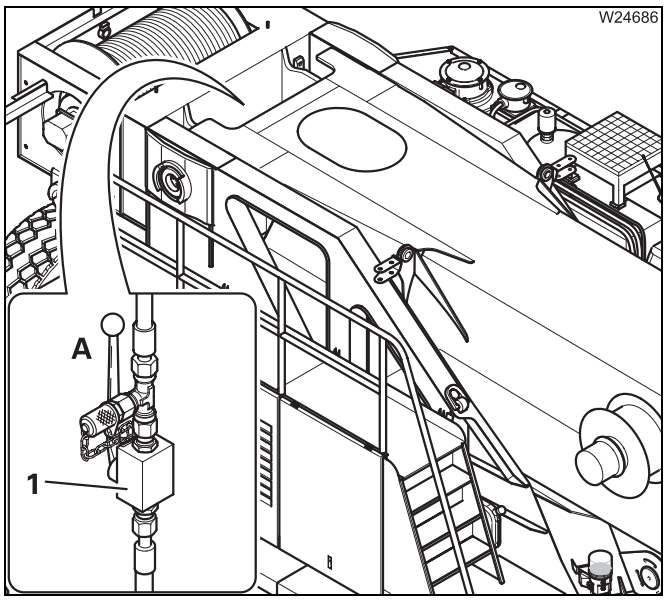
The boom pivot pin is retracted and extended with a hydraulic pulling device.

Before retracting

Before retracting the boom pivot pin you must:

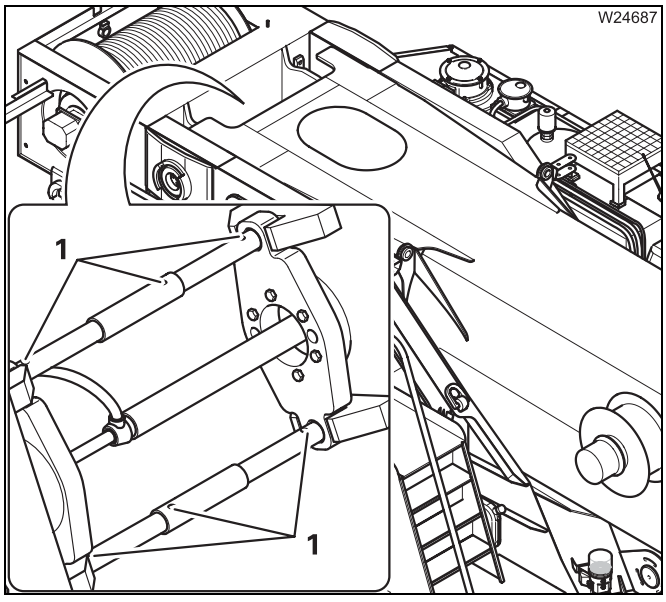
– Open the hydraulic circuit,

– unlock the pulling device.



Opening the hydraulic circuit

- Open valve (**1**) – Position **A**.



Unlocking the pulling device

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

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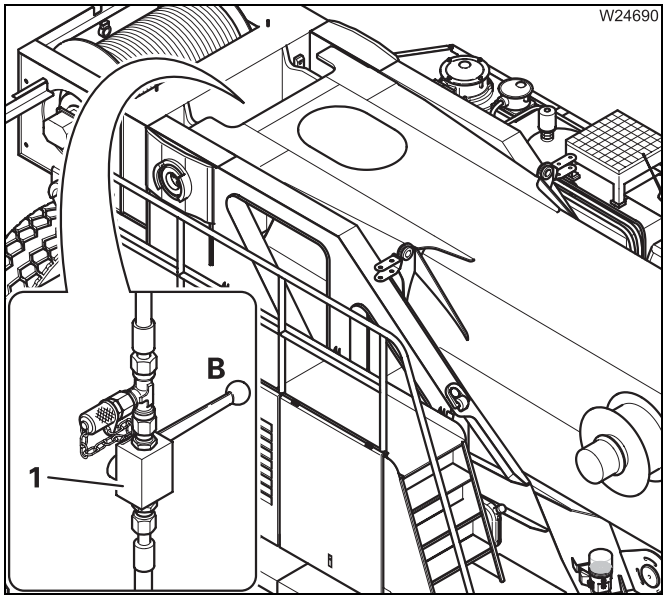
After extending After extending the boom pivot pin you must:

– Close the hydraulic circuit again,

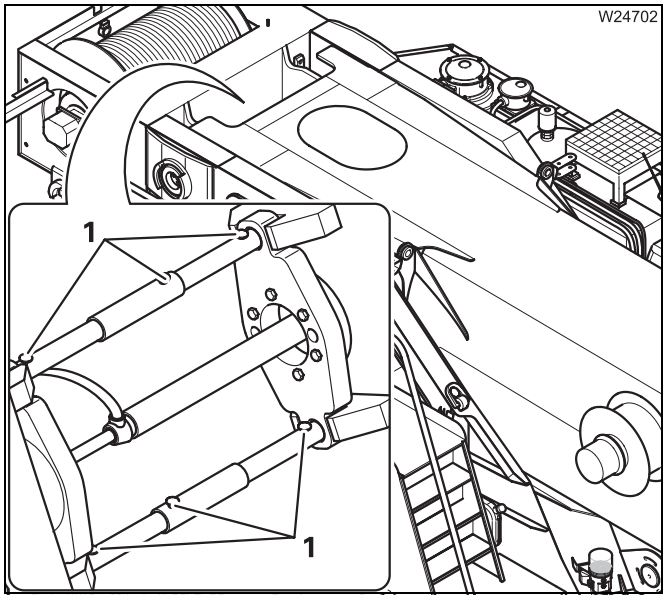
– secure the pulling device.



Closing the hydraulic circuit

Switch the valve (**1**) – Position **B**.

Risk of accidents from falling main boom!
Always secure the pulling device with the pins.
This prevents the boom pivot pin from retracting by itself and the main boom from falling and injuring people or being damaged.



Securing the pulling device

- Insert the pins (**1**) and secure them with the retaining pins.

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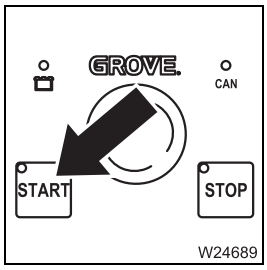
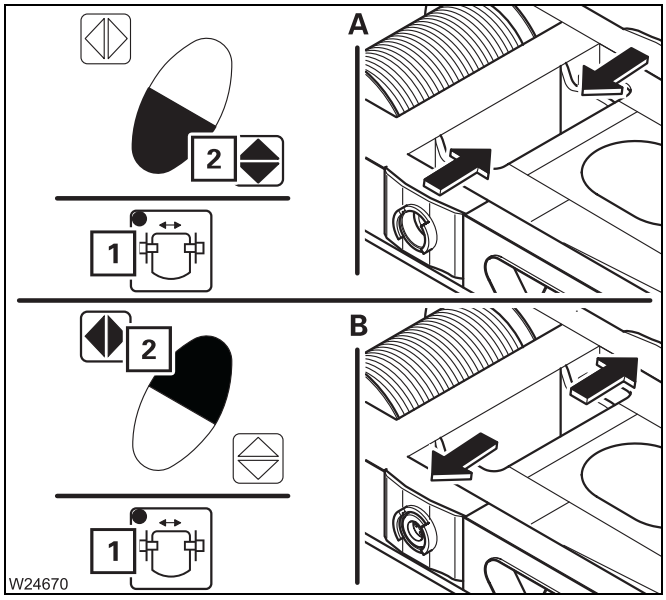
Retracting/ extending the pivot pin

Risk of damage to the main boom!
Before **retracting**, the main boom must be slung and all other sling gear must be tightened.
Before **extending**, the bearing points on the turntable must be aligned with the boom pivot pin.



- Start the engine using the hand-held control.

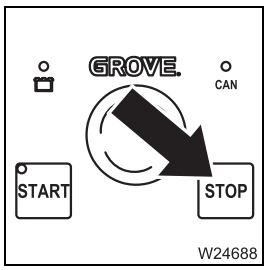


(A) – Retracting

- Press button (**1**). The lamp lights up.
- Press the key combination (**2**).
  The pivot pin is retracted.

(B) – Extending

- Press button (**1**). The lamp lights up.
- Press the key combination (**2**).
  The pivot pin is extended.
- Secure the pulling device; ➠ p. 6 - 25.



- Switch off the engine.

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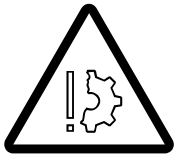
6.3.6 Disconnecting/connecting hydraulics/electrical

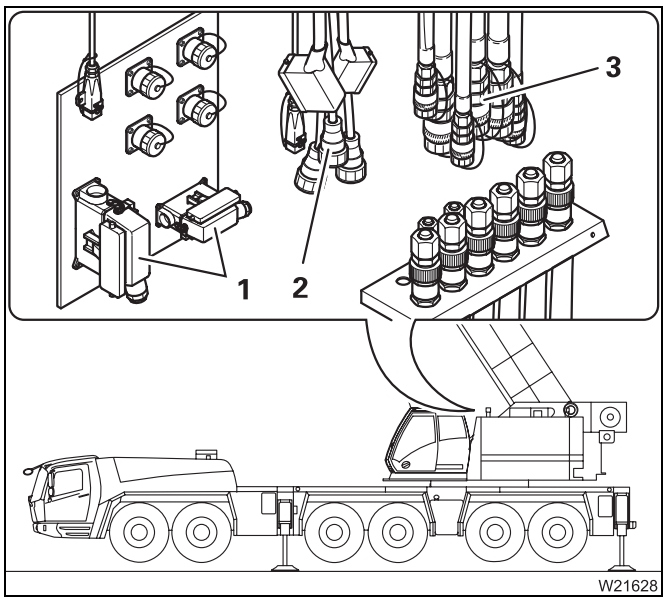
Disconnecting

The number of hoses/cables depends on how the truck crane is equipped.

– The main boom must be raised.



Risk of malfunction in the superstructure electronics!
Always turn off the ignition in the crane cab before you establish or separate the electrical connection. This prevents malfunctions in the electronics and corresponding error messages in the subsequent crane operation.



- Remove the hoses (**3**) from the ports.
- Remove the plugs (**2**) from the sockets.
- Insert the bridging plugs (**1**).
- Close all hoses, connections, plugs and sockets.
- If necessary, secure all the hoses/cables so that they do not swing loose when the main boom is raised.

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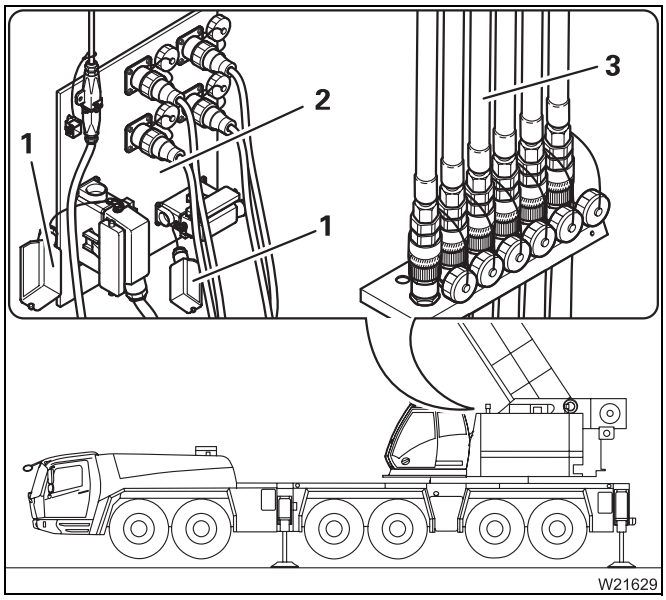
Establishing

The number of hoses/cables depends on how the truck crane is equipped.

– The main boom must be raised.

Risk of malfunction in the superstructure electronics!
Always turn off the ignition in the crane cab before you establish or separate the electrical connection. This prevents malfunctions in the electronics and corresponding error messages in the subsequent crane operation.



- Remove the bridging plugs (**1**).
- Connect the plugs (**2**) to the sockets.
  The assignment is given by the number of poles and the shape of the plug.
- Connect all hoses (**3**).
  The assignment is given by the size and colour designations.

Lay the hoses/cables so that they will not be damaged.

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6.3.7 Lifting the main boom off/on the turntable

– The main boom is slung; ➠ p. 6 - 18.

– The hydraulic/electrical connections are disconnected; ➠ p. 6 - 27.

– The boom pivot pin is retracted; ➠ p. 6 - 24.

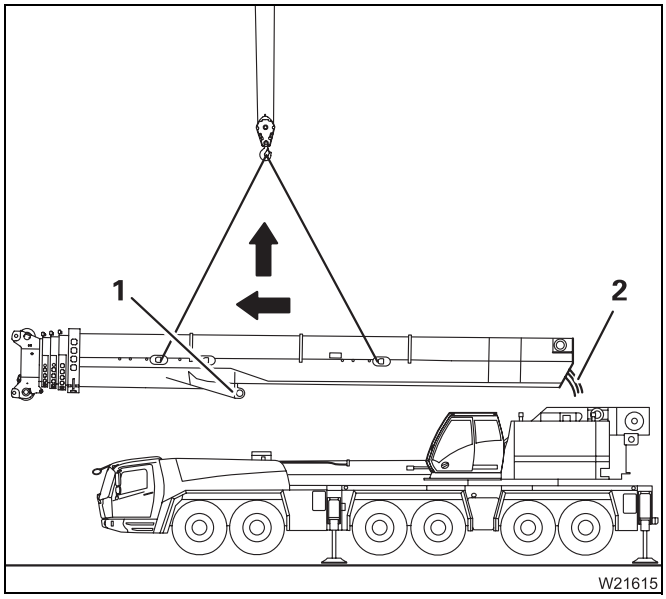
– The derricking cylinder is separated from the main boom; ➠ p. 6 - 21.

Lifting from the turntable

- Align the auxiliary crane in such a way that the main boom can be raised vertically without swinging.

Risk of damage to driver's cab
Lift the main boom far enough to ensure that the pivot point of the derricking cylinder does not damage the driver's cab.

Danger of hands and arms being crushed
Whilst rigging the crane, maintain sufficient distance from the main boom and do not reach in between the connecting points. This will prevent you from being crushed between the turntable and the main boom.



- Lift the main boom forwards and upwards from the turntable. Make sure that:
  – The connection lines (**2**) do not hang loose.
  – The pivot point (**1**) is higher than the driver's cab.

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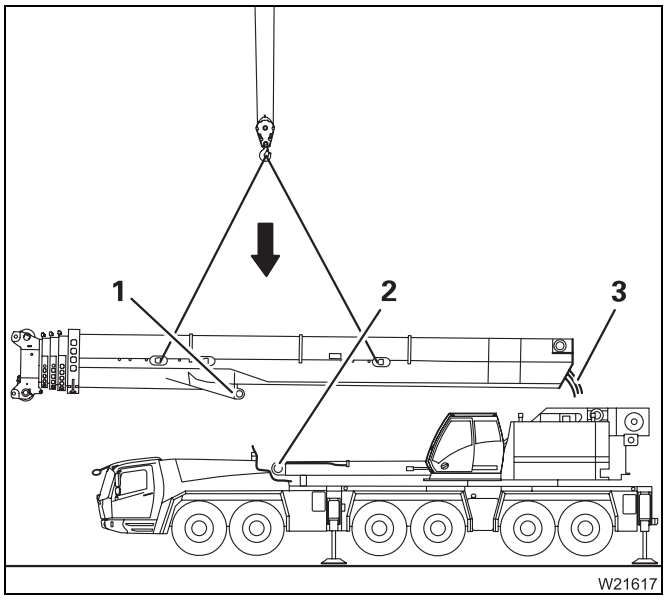
Lifting on to the turntable



- Lift the main boom backwards and downwards on to the turntable. Make sure that:
  - The connection lines (**3**) do not hang loose.
  - The pivot point (**1**) is higher than the driver's cab.
  - The pivot point (**1**) is located forwards of the derricking cylinder (**2**).
  - The connecting points are not tilted.

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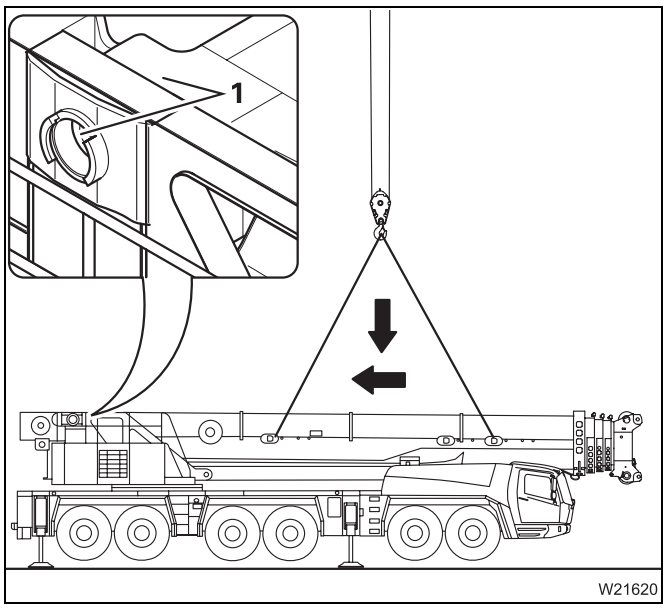
6.3.8 Aligning the connecting points

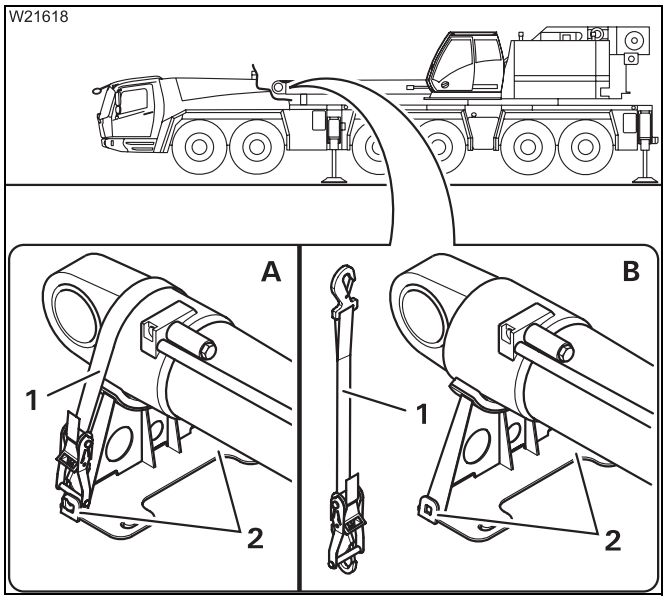
Risk of damage to the turntable and the connection lines
Make sure that the connection lines are located within the turntable and that the main boom does not swing when you raise it for insertion into the turntable.



Aligning the connecting points

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

6.3.9 Securing/releasing the 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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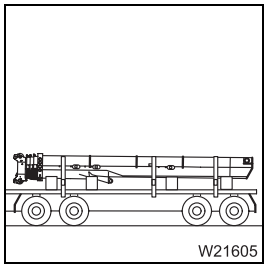
6.3.10 Transporting the main boom

Transport the main boom only on a separate vehicle which is of sufficient size and has sufficient lifting capacity.
Transport dimensions and weight; ➠ *Operating instructions*.

Risk of damage to the main boom
Always place the main boom onto a suitable packing. If you lay the main boom on its side, add-on parts will be damaged.



- Always place the main boom onto a suitable packing.
- Secure the main boom against slipping using the holding ropes.
- Load the main boom in such a way that other road users are not put at risk.
- Load the transport vehicle in such a way that the weight is evenly distributed.
- Secure the connection lines so that they will not slip and be damaged during transport.
- Keep the connecting points free of contamination.

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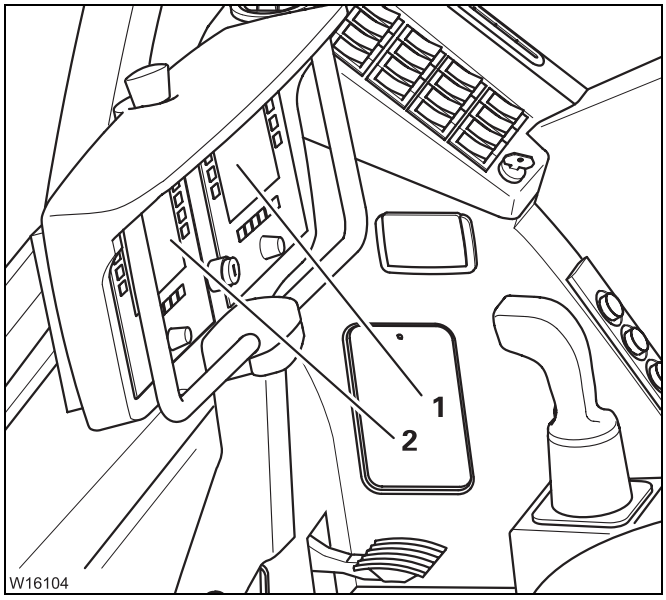
6.3.11 Inspections after main boom mounting



- Turn on the ignition.
- Check if the *RCL* control unit (**1**) or *ECOS* (**2**) show an error message.
- If an error message is displayed, check that all electrical connections are established; ➠ p. 6 - 27.

The following requirements must be met for the subsequent inspection:

– The truck crane is supported on outriggers.

– The main boom is resting in the boom rest.

– The current rigging mode is set on the RCL.

- Telescope the telescopic section approx. 1 m out and back in.
- Retract the telescoping cylinder into another telescopic section and mechanically lock it there.
- Check to see if the hydraulic connections in the turntable are sealed.

Before operating for the first time, carry out the movement *Incline lattice extension* with the hydraulically derricking lattice extension and check if the corresponding connections in the turntable are sealed.

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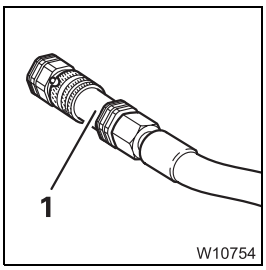
6.4 Installing/removing outrigger beams

If the truck crane is fitted with a removable supporting box (ROB), you can only assemble/disassemble the front outrigger beams.

➠ *Installing/removing the supporting box*, p. 6 - 53.



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

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

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

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

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

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

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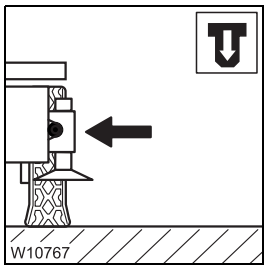
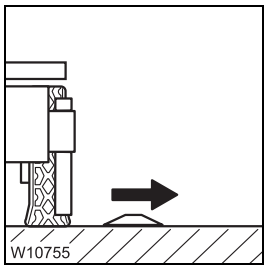
6.4.1 CHECKLIST: Removing the outrigger beams

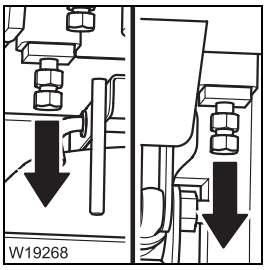
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified there.



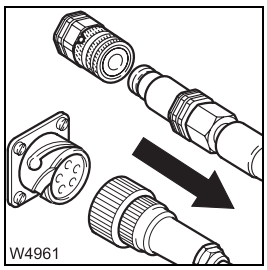
1. Prepare the truck crane – label the outrigger beams, retract, release and bolt them to each other; p. 6 - 40.



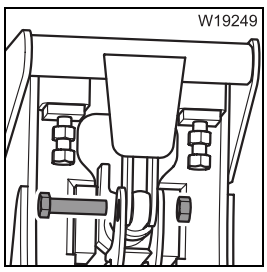
2. If necessary remove outrigger pad; p. 6 - 41.



3. Unscrew the spacer; p. 6 - 45.



4. – Remove the hydraulic connections; p. 6 - 43
– Separate the electrical connection if necessary; p. 6 - 44.



5. Release the connection to the support box; p. 6 - 47.

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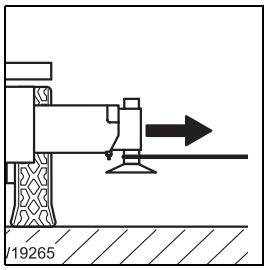
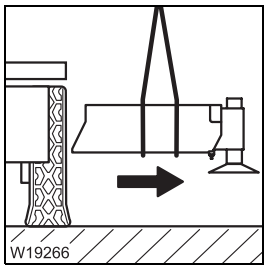


6. Sling the outrigger beam and pull it out of the outrigger box until it reaches the centre of gravity; ➠ p. 6 - 47.

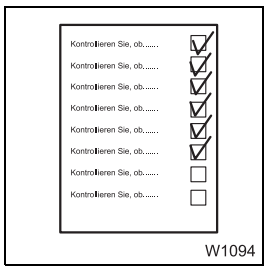


7. – Sling the outrigger beams in the centre of gravity and pull them out of the outrigger box.

– Lift the outrigger beams onto the separate vehicle.

– Attach the connecting elements on the outrigger box.

➠ *Extending outrigger beam*, p. 6 - 47
➠ *Transporting the outrigger beams*, p. 6 - 51



8. Remove all necessary outrigger beams in the same way in accordance with this checklist.

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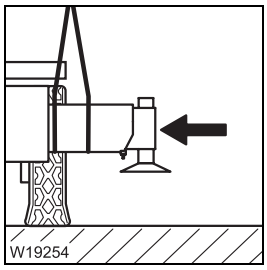
6.4.2 CHECKLIST: Installing the outrigger beams

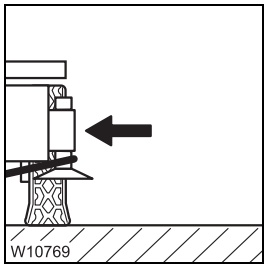
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified there.

1. Prepare the truck crane for the installation of the outrigger beams; ➠ p. 6 - 40.

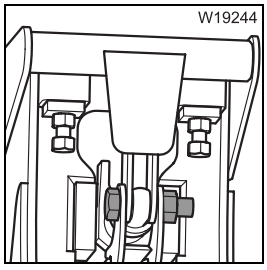


2. – Remove the connection elements from the outrigger box.
– Sling the outrigger beams at their centre of gravity.
– Lift the outrigger beams into the outrigger boxes and remove the lifting gear.

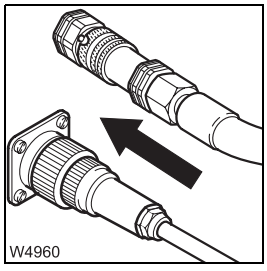
➠ *Inserting the outrigger beam*, p. 6 - 49



3. Sling the outrigger beams and pull into the outrigger boxes until the connection points align; ➠ p. 6 - 49.



4. Establish the connection to the support box; ➠ p. 6 - 47.



5. – Make the hydraulic connections; ➠ p. 6 - 43.
– Establish the electrical connection if necessary; ➠ p. 6 - 44.

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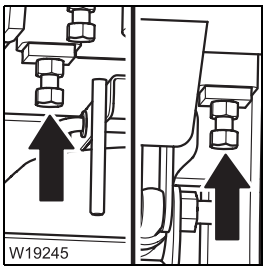
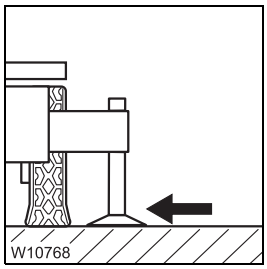
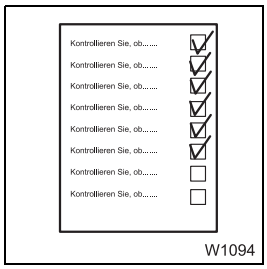


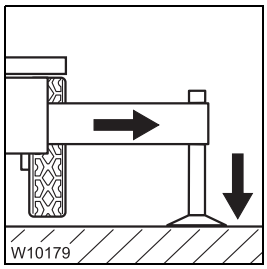
6. Screw in the spacers; ➠ p. 6 - 45.



7. If necessary put outrigger pads into position; ➠ p. 6 - 41.

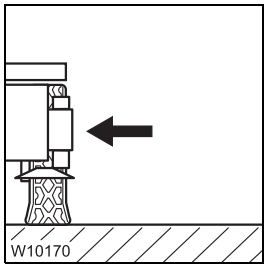


8. Mount all necessary outrigger beams in the same way in accordance with this checklist.



9. If the truck crane is at the site:

Extend the outrigger beams to the necessary outrigger span, secure them and stabilize the truck crane.



10. If the truck crane still has to be driven to the site:

Fully retract and secure the outrigger beams.

➠ *Extending/retracting outrigger beams*, p. 12 - 37.

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6.4.3 Preparing the truck crane

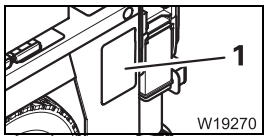
Requirements

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

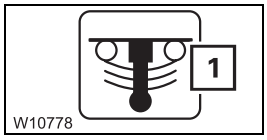
– All rigging work which involves slewing the superstructure was completed.

– The parking brake is engaged.

– The truck crane has been levelled with the level adjustment system; ➠ p. 5 - 60.



– The corresponding covers have been removed (**1**).



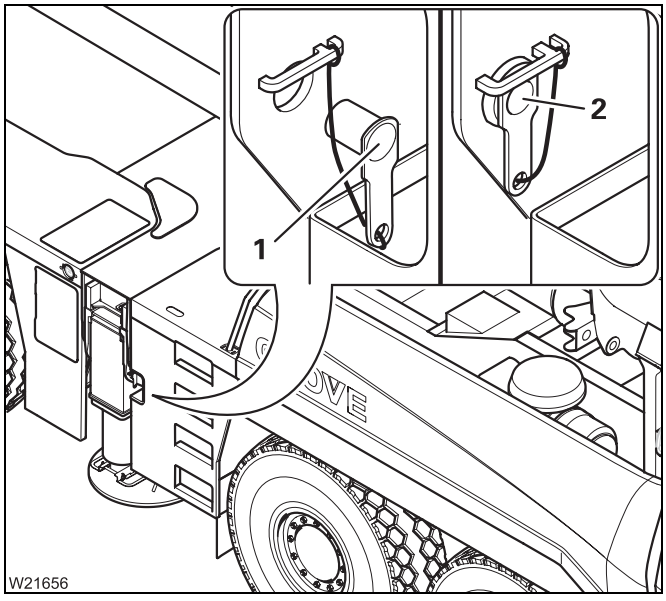
– The suspension is switched off (blocked), and the symbol (**1**) is red; ➠ p. 5 - 14.

For removal

Each outrigger beam is designed 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.

Labelling 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 outriggers

All outrigger beams are retracted.

• Pull out the pin (**1**).

Lock the outrigger beams together

• Insert the pins (**2**).

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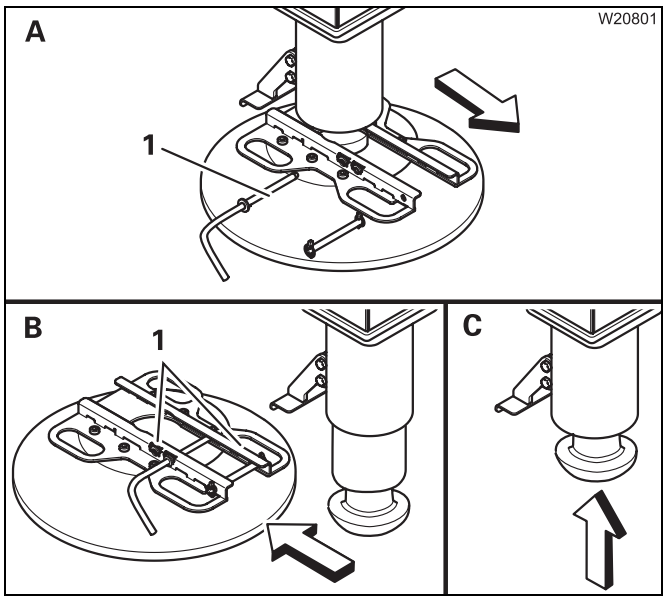
6.4.4 Removing/attaching outrigger pads

You only need remove the outrigger pads if the outrigger beams are to be transported lying on their side.
For transportation in a suitable holding frame, the outrigger beams can be set down on the outrigger pad.

Removing outrigger pads

Handling is easier if you remove the outrigger pad before removing the outrigger beams.



- (**A**) – Move the outrigger pad into the operating position.
- Remove the pins (**1**).
- Extend the outrigger cylinder until the outrigger pad just touches the ground but is not yet under strain.
- (**B**) – Pull the outrigger pad off the outrigger cylinder.
- Insert the pins (**1**) and secure them.
- (**C**) – Fully retract the outrigger cylinder.
- Remove the other outrigger pads in the same way.

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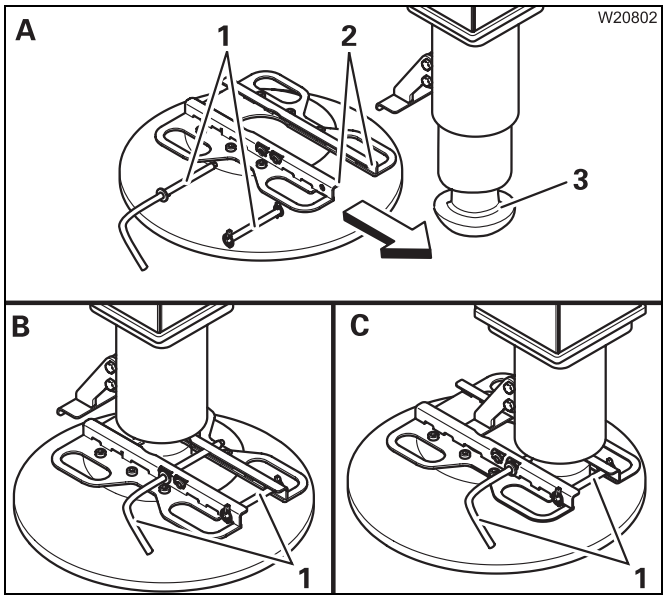
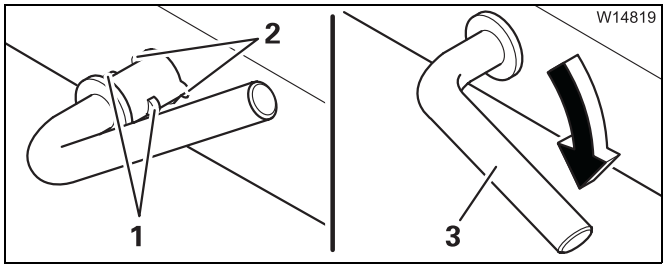
Attaching outrigger pads

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



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



Securing the pin

- Plug the pin with the peg (**1**) through the cut-out (**2**).
- Turn the grip (**3**) downward.

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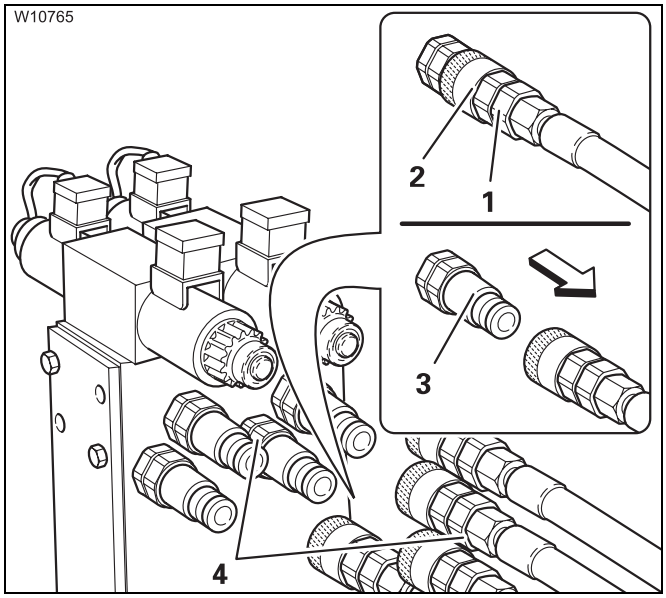
6.4.5 Disconnecting/establishing the hydraulic connection

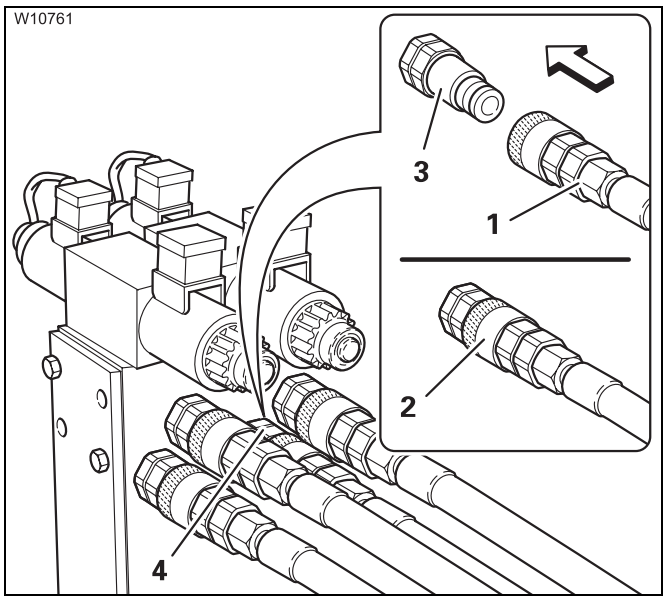
There is a valve block on each outrigger beam. The position of the valve block may differ from the drawings, depending on the outrigger beam.



Disconnecting

Always disconnect all connections (**4**).

- Hold the hose firmly (**1**).
- Pull the lock (**2**) against the stop. The hose is pushed out of the connection (**3**).
- Seal all connecting points.



Establishing

Always establish all connections (**4**). The assignment is differentiated by colour designations.

- Insert the hose (**1**) into the connection (**3**).
- The lock (**2**) engages.

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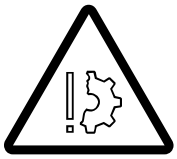
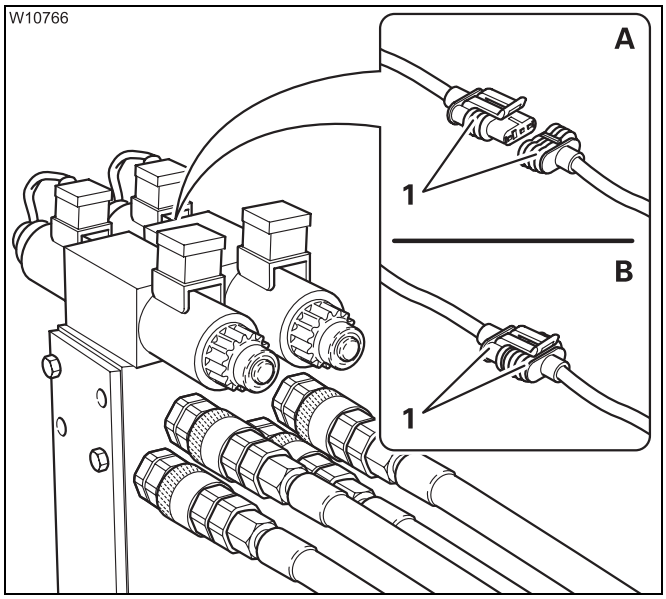
6.4.6 Establishing/disconnecting the electrical connection

The electrical connection is only present on truck cranes with an outrigger pressure indicator.



Risk of malfunctions in the electronic system
Always turn off the ignition before you disconnect or establish the electrical connection. This prevents malfunctions and corresponding error messages in the subsequent crane operation.



(A) – Separating the connection

- Pull the plugs (**1**) apart. Protect the plugs against dirt and moisture.

(B) – Connecting

- Put the plugs (**1**) together.
- Protect the separating points against dirt and moisture.

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6.4.7 Unscrewing/screwing in the spacers

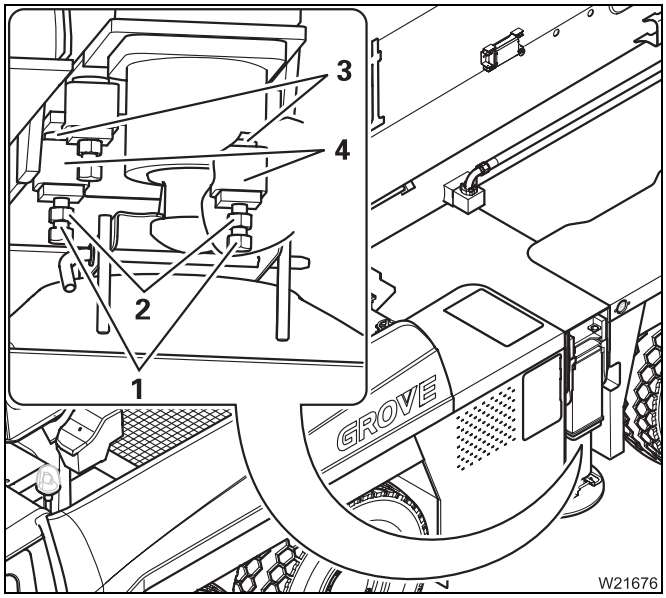
There are two spacers for each outrigger beam:

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

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

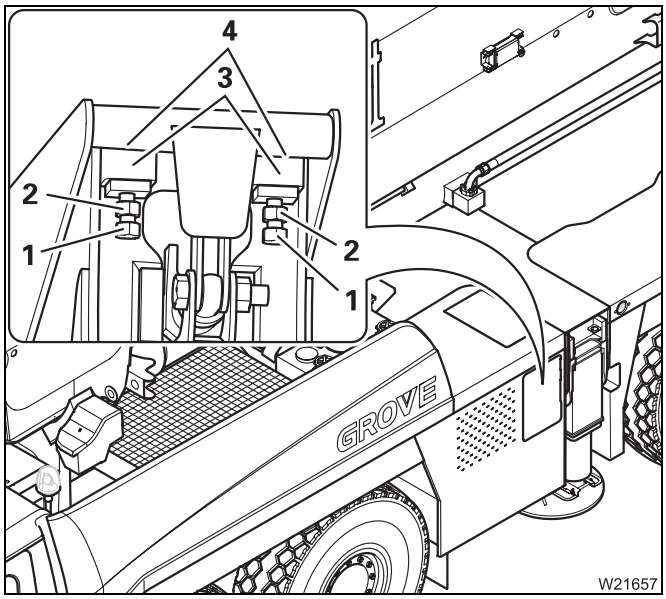
Unscrewing

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



At the outrigger box

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

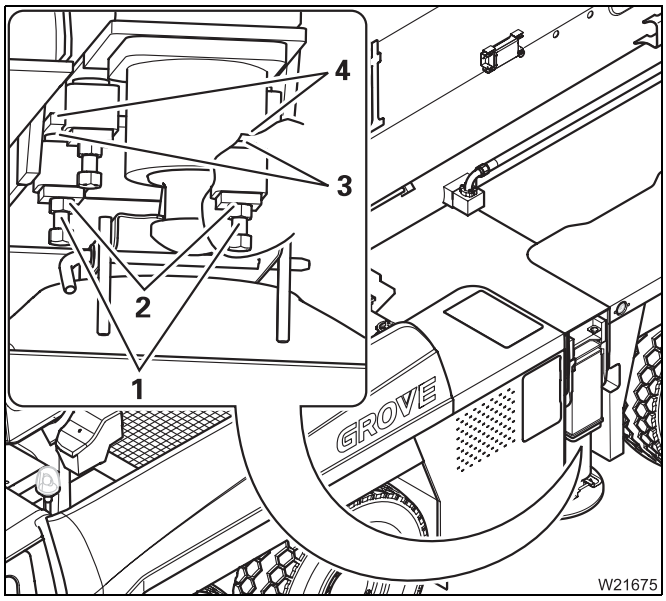


At the outriggers

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

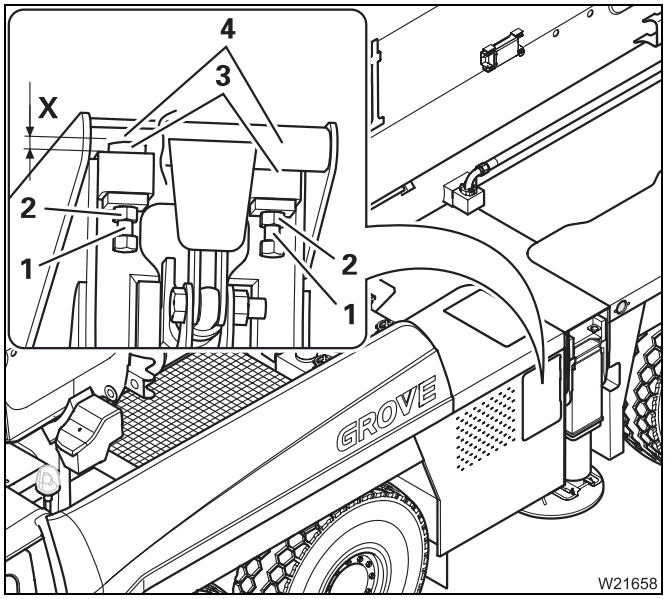
Screwing in

Before you retract/extend an outrigger beam after mounting, you must screw in the spacers.



At the outrigger box

- Screw in the screws (**1**) as far as possible until the spacers (**3**) are touching the outrigger beam (**4**) at the top.
- Ensure that the outrigger beam is aligned horizontally.
- Lock the screws in place with the nuts (**2**).



At the outriggers

- Screw in the screws (**1**):
  - Until the spacers (**3**) lie on top on the outrigger box (**4**).
  - Until the distance (**X**) to the outrigger box (**4**) is an even 4 mm over the entire width.
- Lock the screws in place with the nuts (**2**).

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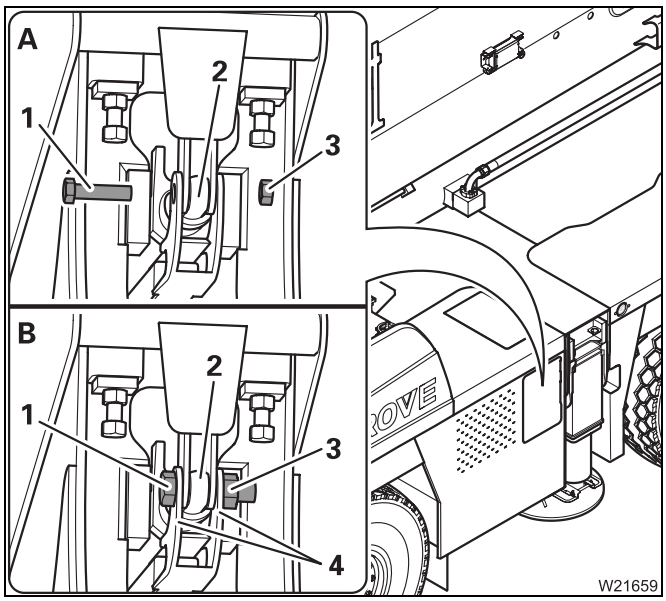
6.4.8 Disconnecting/establishing the connections to the outrigger box

The illustrations show as an example the connecting points for the outrigger beam on the rear right hand side.



(A) – To disconnect

- Undo the lug nuts (**3**).
- Remove the bolts (**1**) from the connecting points (**2**).

(B) – Connecting

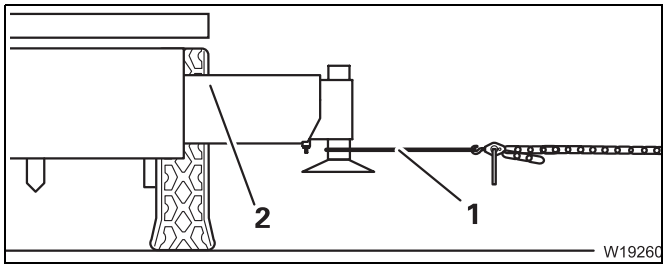
- Fasten the bolts (**1**) with the nuts (**3**) in the connecting points (**2**) just tight enough that the attachment plates (**4**) still have lateral play.

6.4.9 Extending/retracting the outrigger beam

Extending outrigger beam

- Check that the outrigger beams are released and are secured between each other; ➠ *Preparing the truck crane*, p. 6 - 40

Risk of damage to hydraulic lines
Ensure that the hydraulic lines on the outrigger beam do not remain hanging on the outrigger box and become damaged.



- Fasten the lifting gear (**1**) and a chain hoist.
- Pull the outrigger beam out so far that the centre of gravity (**2**) is accessible.

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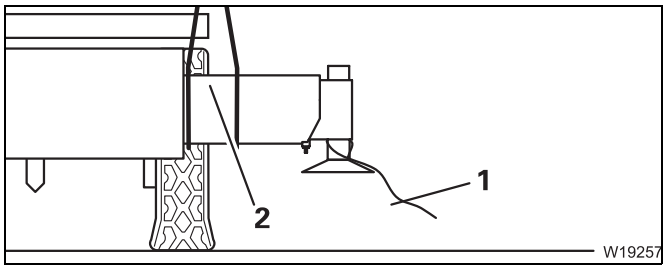
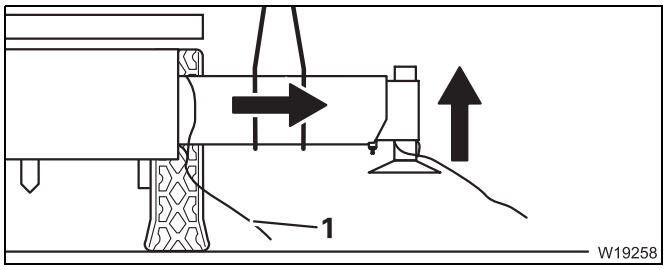
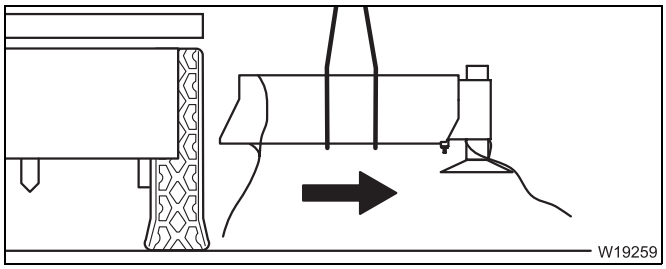


- Using the auxiliary crane, sling the outrigger beam in the centre of gravity (**2**).
- Remove the chain hoist and lifting gear.
- Fasten a guide rope (**1**).

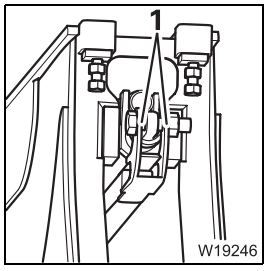


- Lift the outrigger beam slightly to ease the load.
- Lift the outrigger beam almost completely out of the outrigger box.
- Fasten another guide rope (**1**).

Risk of being crushed by the swinging outrigger beam
Secure the outrigger beam with the guide ropes as it is lifted out of the outrigger box.
Keep a suitable distance to avoid injuring yourself or others on the swinging outrigger beam.



- Lift the outrigger beam out of the outrigger box.
- Lift the outrigger beam onto a separate vehicle; ➠ p. 6 - 51.



- Fasten the connecting elements to the connecting points (**1**) of the supports.

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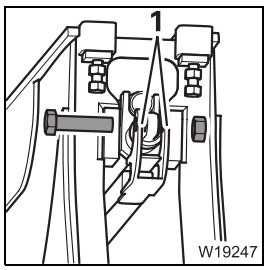
Inserting the outrigger beam

- Only insert the outrigger beam at the correct installation point. Note the information on the label.

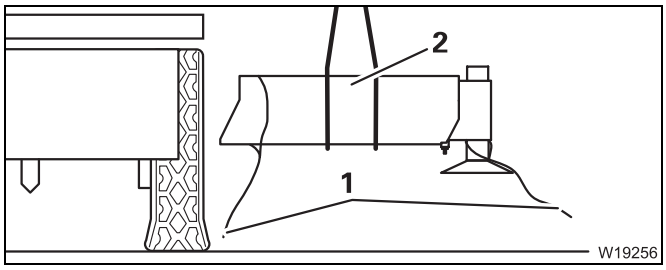
Risk of being crushed by the swinging outrigger beam
Do not guide the outrigger beam with your hands when inserting it. Always used guide ropes and keep a suitable distance. This will prevent limbs from being crushed between the outrigger box and the outrigger beam.

Risk of damage to hydraulic lines
Ensure that the hydraulic lines on the outrigger beam do not remain hanging on the outrigger box and become damaged.

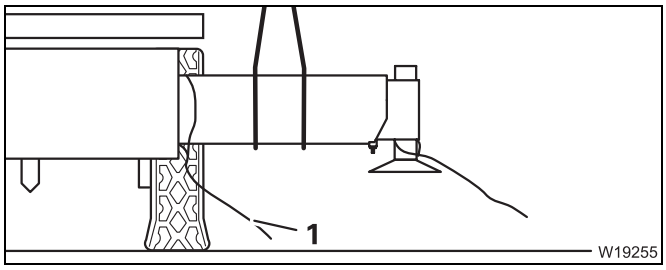
Risk of damage to the spacers
Check that all spacers have been screwed in completely.
The prevents the spacers from remaining hanging in the outrigger box and becoming damaged.



- Remove the connecting elements from the connecting points (**1**) of the supports.



- Sling the outrigger beam at the centre of gravity (**2**).
- Fasten two guide ropes (**1**).



- Set the outrigger beam in the outrigger box.
- Remove the guide rope (**1**).

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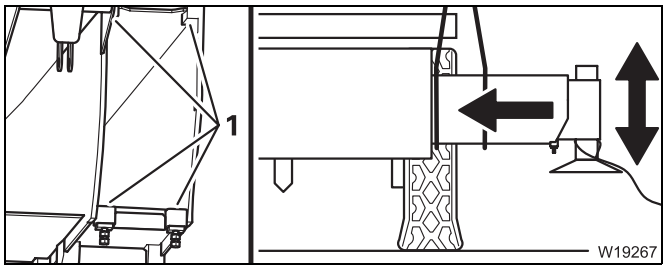
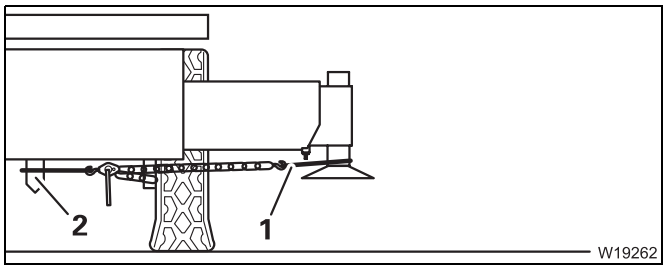
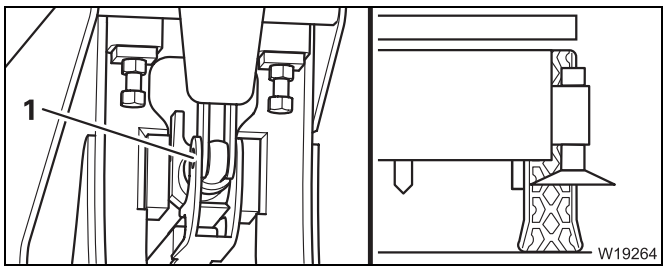


- Lift the outrigger beam as far as possible into the outrigger box.
  Correct the height so that it does not remain hanging on the edges (**1**).



- Remove the lifting gear from the centre of gravity.
- Fasten the lifting gear (**1**) and a chain hoist.
- Fasten 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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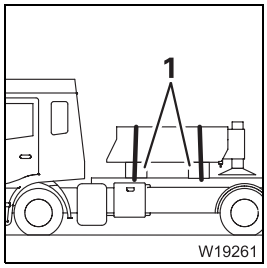
6.4.10 Transporting the outrigger beams

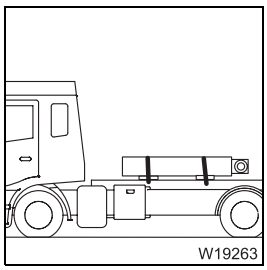
- For transportation, only use a separate vehicle with sufficient lifting capacity. Transport dimensions and weight; ➠ p. 1 - 10.
- Load the separate vehicle in such a way that the weight is evenly distributed.
- Load the outrigger beam so that it that does not endanger other traffic.



When the outrigger pads are mounted

- Place the outrigger beam onto a suitable device (**1**).
- Secure the outrigger beam from slipping.

Risk of damage to the outrigger beams and outrigger pads
When outrigger pads are mounted, always use a device to set them down. If you lay the outrigger beams onto the side, connections may tilt and become damaged.



When the outrigger pads are dismounted:

- Lay the outrigger beam onto the side.
- Secure the outrigger beam from slipping.
- Lay the outrigger pads onto the separate vehicle and secure them for transportation.

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6.5 Installing/removing the supporting box

The rear support mechanism comes from the rear supporting box. When using additional equipment, this can be completely removed with supporting cylinders and outrigger beams for driving on roads.

Risk of overturning when slewing the superstructure
Support the truck crane with an outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) and set the corresponding RCL code before slewing the superstructure.
Never override the RCL when slewing is switched off; ➠ *Crane movements during installation and removal*, p. 6 - 69.

Equipment required

– Appropriate lifting gear (chain or rope suspension gear) of sufficient lifting capacity and guide ropes.
– A separate vehicle of sufficient load bearing capacity with a sufficient loading area.

Dimensions and weights of removable parts;

➠ *Dimensions and weights of removable parts*, p. 1 - 10.

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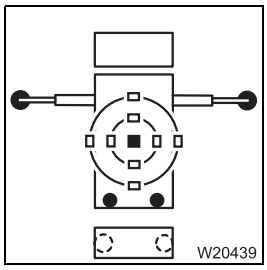
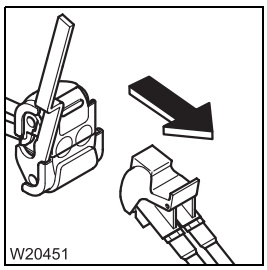
6.5.1 CHECKLIST: Removing the supporting box

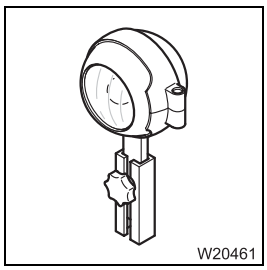
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified there.



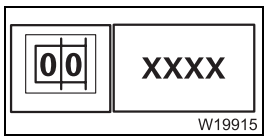
1. Rig the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) and align the truck crane horizontally; ➠ p. 6 - 59.



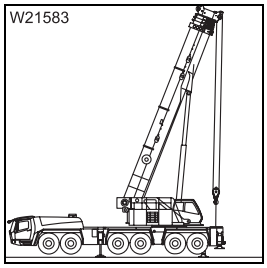
2. Disconnect the pneumatic connections between the carrier and outrigger box; ➠ p. 6 - 62.



3. Install the reverse camera to the carrier; ➠ p. 6 - 68.



4. With the RCL set accordingly, raise the main boom and slew the superstructure to the rear;
➠ *Crane movements during installation and removal*, p. 6 - 69.



5. Sling the outrigger box to the truck crane; ➠ *Slinging points on the supporting box*, p. 6 - 70.

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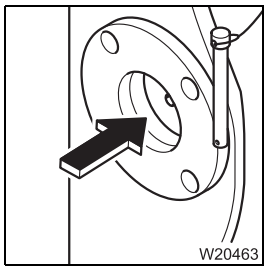
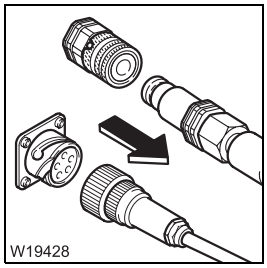
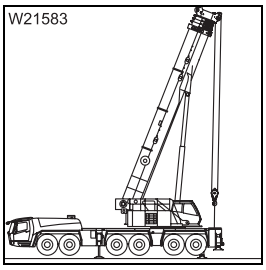


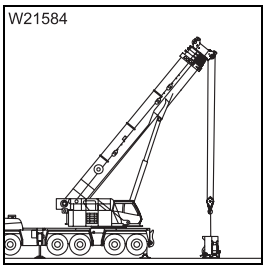
6. Release the locking pin between the outrigger box and carrier;
➠ p. 6 - 71.



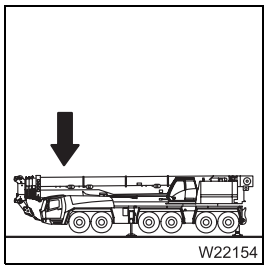
7. – Remove the hydraulic connections; ➠ p. 6 - 64,
– Breaking the electrical connection; ➠ p. 6 - 63.



8. If the outrigger box is to be transported:
Turn off and secure the supporting box with truck crane on the separate vehicle;
➠ *Attaching/raising the supporting box with the truck crane*, p. 6 - 65,
➠ *Transporting the supporting box on the separate vehicle*, p. 6 - 73.



9. If the outrigger box is to be set down:
Turn off the supporting box with truck crane on the supports;
➠ p. 6 - 66.



10. If the main boom is to be set down on the boom rest:
– With the RCL set accordingly, slew the superstructure to the front and set down the main boom; ➠ *After removal*, p. 6 - 69.

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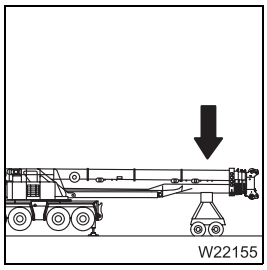
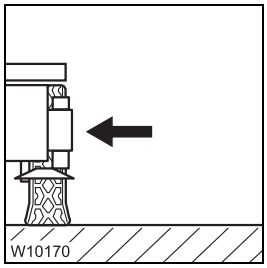


11. If the main boom is to be set down on a trailer:

With the RCL set accordingly, slew the superstructure to the rear and lower the main boom;
➠ *Crane movements during installation and removal*, p. 6 - 69.



12. On the outriggers:

– Retract the front outrigger cylinders and outrigger beams and secure;
➠ *CHECKLIST: Retracting the outriggers*, p. 12 - 31.

– Retract auxiliary support; ➠ *Auxiliary supports*, p. 6 - 60.

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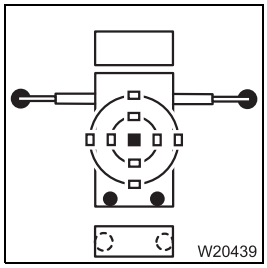
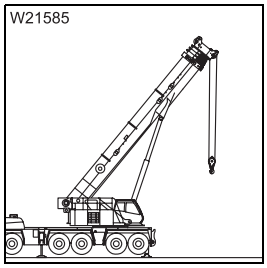
6.5.2 CHECKLIST: Installing the supporting box

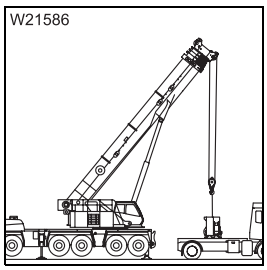
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified there.



1. Rig the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) and align the truck crane horizontally; ➠ p. 6 - 59.

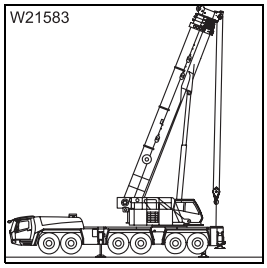


2. With the RCL set accordingly, raise the main boom and slew the superstructure into the position for raising the outrigger box;
➠ *Crane movements during installation and removal*, p. 6 - 69.



3. Sling the supporting box to the truck crane and remove from the separate vehicle; ➠ *Slinging points on the supporting box*, p. 6 - 70.

If the outrigger box was placed on the supports:
Retract the supports; ➠ p. 6 - 67.



4. Suspend the rear outrigger box in the holders on the carrier;
➠ p. 6 - 65.

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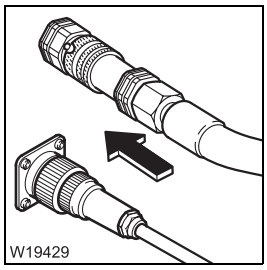
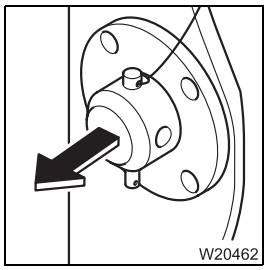
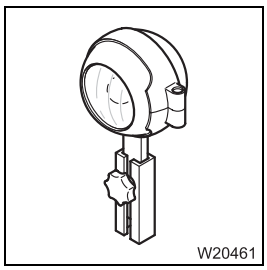


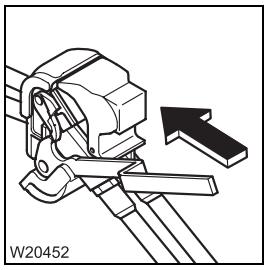
5. – Establishing an hydraulic connection; ➠ p. 6 - 64,
– Establishing an electrical connection; ➠ p. 6 - 63.



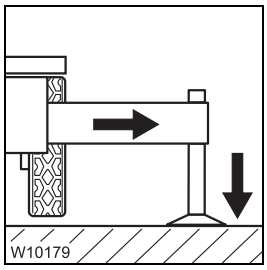
6. Pin the outrigger box to the carrier; ➠ p. 6 - 71.



7. Install the reverse camera on the carrier; ➠ p. 6 - 68.



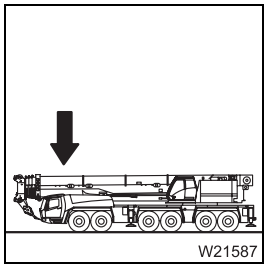
8. Where necessary, disconnect the pneumatic connections between the carrier and outrigger box; ➠ p. 6 - 62.



9. If the truck crane is at the site:

– Retract auxiliary support; ➠ p. 6 - 60,

– Extend all outrigger beams to the necessary outrigger span, secure them and stabilize the truck crane; ➠ *CHECKLIST: Extending the outriggers*, p. 12 - 29.



10. If the truck crane has to be driven to the site:

With the RCL set accordingly, slew the superstructure to the front and set down the main boom; ➠ *Crane movements during installation and removal*, p. 6 - 69.

– Retract the front outrigger cylinders and outrigger beams and secure; ➠ *CHECKLIST: Retracting the outriggers*, p. 12 - 31,
– Place the outrigger pads in the driving position; ➠ p. 12 - 43.
– Retract auxiliary support; ➠ p. 6 - 60.

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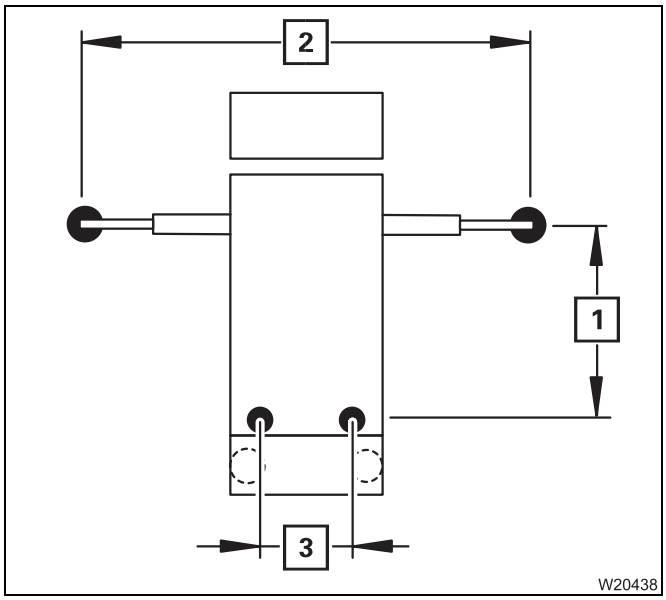
6.5.3 Rigging the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft)



With this outrigger span, the truck crane is stabilised at the front to an outrigger width (**2**) 8.50 m (26.1 ft). The auxiliary supports must be extended at the rear. This produces the outrigger span (**3**) of 1.00 m (3.3 ft) and the outrigger length (**1**) of 7.98 m (26.1 ft).

You must rig this outrigger span before:

- Slewing the superstructure with the rear outrigger box removed,
- Removing/installing the supporting box,
- Setting down the main boom on a separate trailer, or raising the main boom from a trailer.

Risk of damage to the suspension struts and tyres
Always extend the auxiliary supports before you perform one of the list processes.
This prevents the suspension struts and tyres from becoming overloaded and damaged.

Loads of up to 55.7 t (122 789 lbs) can arise on the outrigger pads of the auxiliary supports when the truck crane only stands on the supports. If the ground cannot support these loads, you must determine the required support area and install the supports.

➠ *Determining the required ground bearing area*, p. 12 - 9,
➠ *Enlarging the ground bearing area*, p. 12 - 44.

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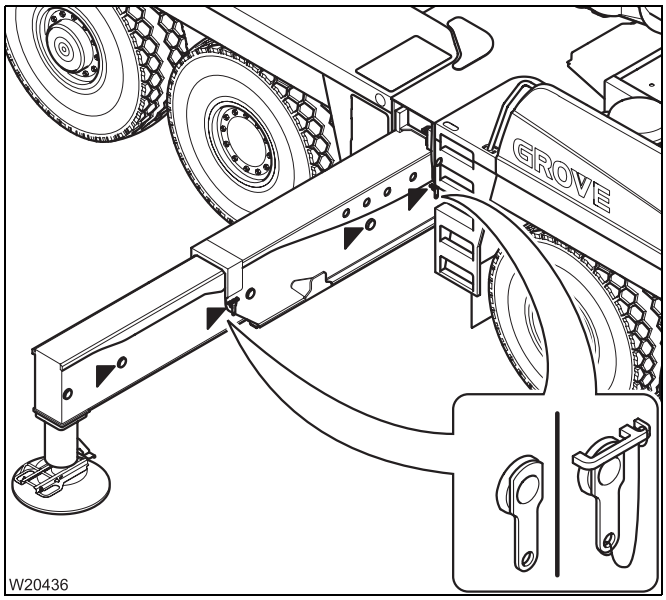
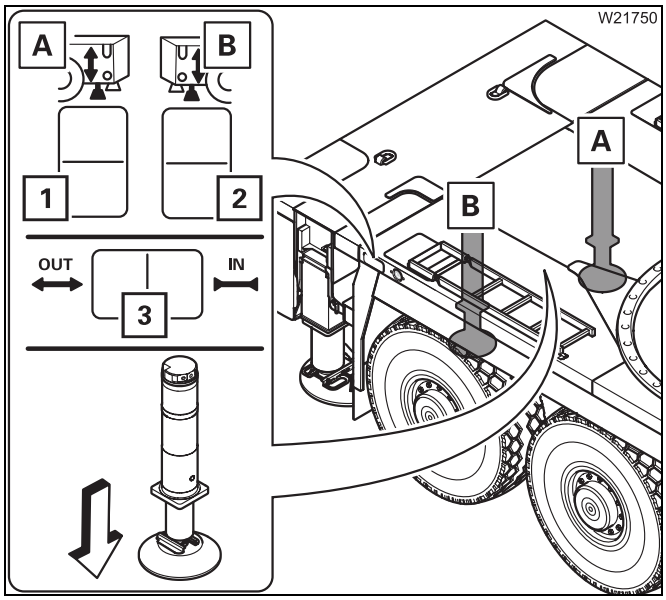
Front outrigger



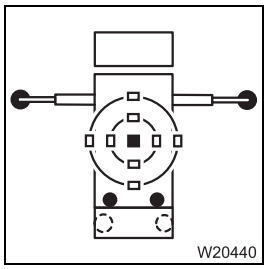
- At the front outrigger, set the span to 8.50 m (26.1 ft); ➠ *Setting the outrigger spans*, p. 12 - 34.
- Extend the support cylinders until they make contact with the ground.

Auxiliary supports



Extending

- (**A**) – Left auxiliary support – Press and hold down the button (**1**) below.
- Press the button (**3**) left.
- (**B**)– Right auxiliary support – Press and hold down the button (**2**) below.
- Press the button (**3**) left.
- Extend the auxiliary supports until the outrigger pads make contact with the ground.



- Extend the auxiliary supports on both sides until the truck crane is aligned horizontally and no wheel is touching the ground

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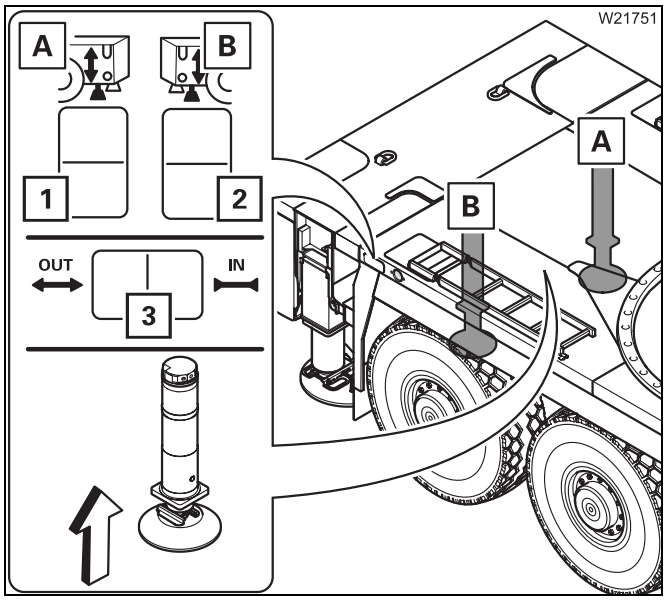

Retracting

- (**A**) – Left auxiliary support – Press and hold down the button (**1**) below.
- Press the button (**3**) on the right.
- (**B**) – Right auxiliary support – Press and hold down the button (**2**) below.
- Press the button (**3**) on the right.
- Retract the auxiliary supports until they reach the stop.

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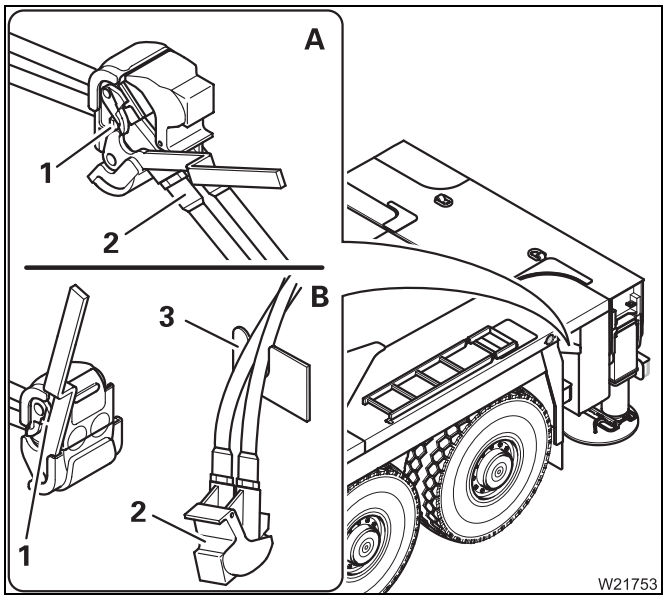
6.5.4 Establishing/disconnecting the pneumatic connection

When additional equipment is in use, there is a pneumatic connection between the carrier and the supporting box.



(A) – Making a connection

- Open the connection (**1**).
- Connect the hoses (**2**) to the connection (**1**).

(B) – Disconnecting the connection

- Open the connection (**1**) and remove the hose (**2**).
- Suspend the hoses in the clamp (**3**).

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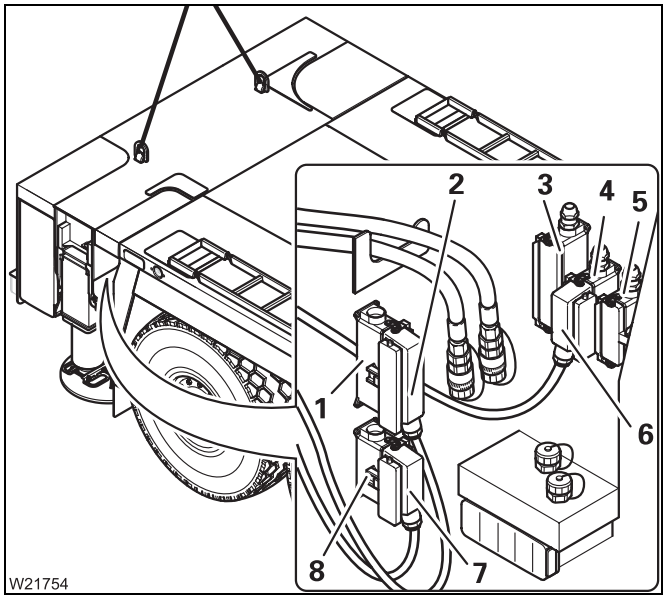
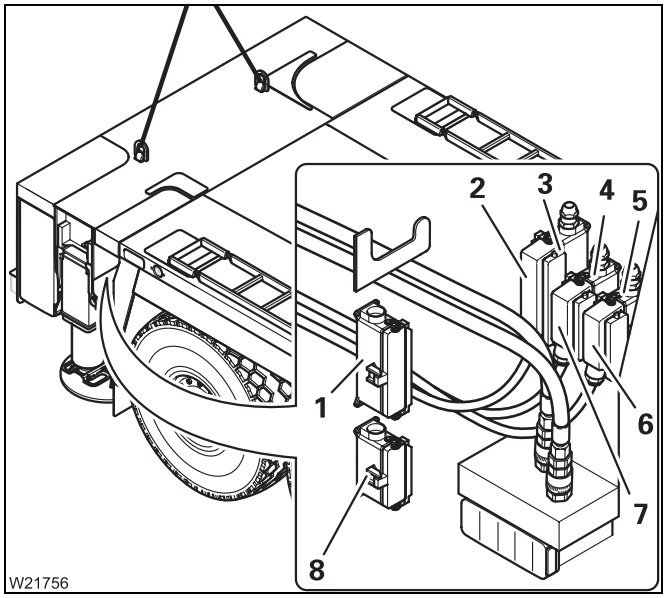
6.5.5 Establishing/disconnecting the electrical connection

Risk of malfunctions in the carrier electronics
Always turn off the ignition before you establish or break the electrical connection. This prevents malfunctions and error messages in the carrier electronics.



Disconnecting

- Pull connecting cable (**2**) and (**7**) from sockets (**3**) and (**5**).
  Insert them into the dummy sockets (**1**) and (**8**).
- Remove the plug (**6**) from the socket (**5**) and plug it into the socket (**4**).
- Seal sockets (**3**) and (**5**) with the protective caps.



Establishing

- Remove the plug (**6**) from the socket (**4**) and plug it into the socket (**5**).
- Pull connecting cable (**2**) and (**7**) from dummy sockets (**1**) and (**8**)
  Insert them into the sockets (**3**) and (**4**).
- Seal dummy sockets (**1**) and (**8**) with the protective caps.

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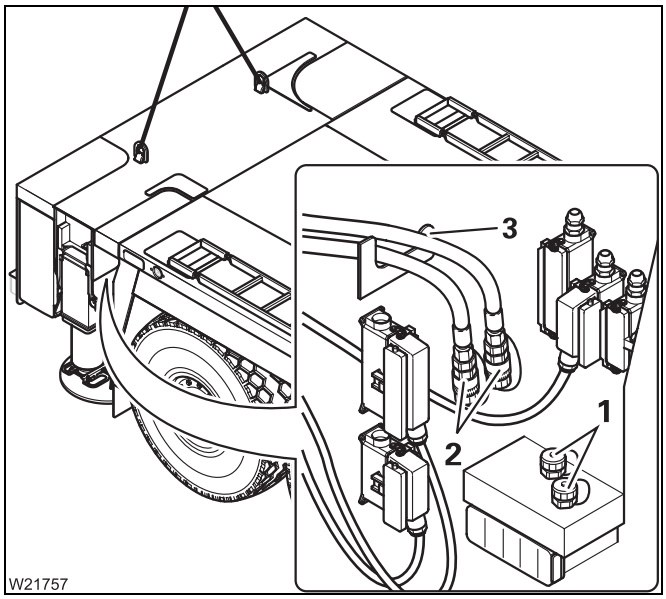
6.5.6 Disconnecting/establishing the hydraulic connection

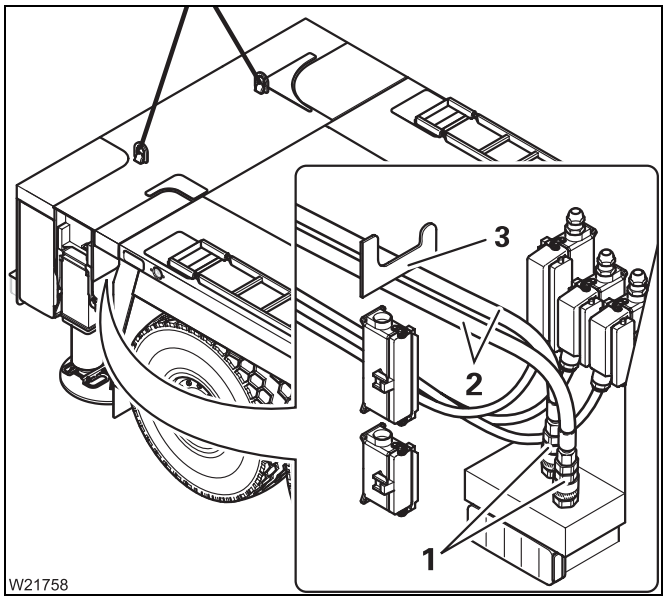
The hydraulic connection between the supporting box and carrier consists of two hoses with couplings.

Always close off hoses or connections you do not need with appropriate caps.



Disconnecting

- Remove the hoses (**2**) from the connections (**1**).
- Place the hoses in the clamp (**3**).



Establishing

- Remove the hoses (**2**) from the holder (**3**).
- Connect the hoses to the connections (**1**).

The assignment is defined by the size.

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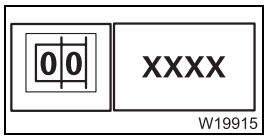
6.5.7 Attaching/raising the supporting box with the truck crane

Requirements



– The RCL code for the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) as stated in the *Lifting capacity table*, has been entered.

– The auxiliary support on the rear of the truck crane has been extended; ➠ p. 6 - 59.

– The outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) has been established and the truck crane is horizontally aligned; ➠ p. 12 - 50.

– The locking pin on the outrigger box has been released; ➠ p. 6 - 71.

– The electrical, hydraulic, and pneumatic connections are disconnected before removing the outrigger box.

Risk of damage to the suspension struts and tyres
Always extend the auxiliary support before you raise the supporting box with the truck crane.
This prevents the suspension struts and tyres from becoming overloaded and damaged.

Risk of overturning with the raised outrigger box
Always enter an RCL code for the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) with the working position required before lifting the outrigger box with the truck crane and slewing the truck crane. You may not override the RCL even if the RCL goes off at a small working radius! When the working radius increases after RCL shutdown, the stability is no longer guaranteed.

Risk of being crushed when attaching and raising the outrigger box
Always guide the outrigger box from the rear with guide ropes when attaching and raising it. This will help prevent you being crushed between the outrigger box and the carrier.

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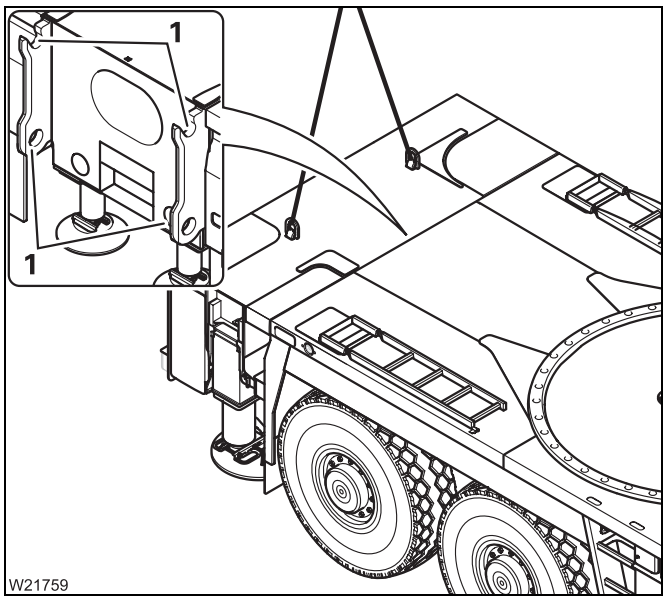
Lifting

- Raise the main boom until you are able lift the outrigger box upwards in an upright position.

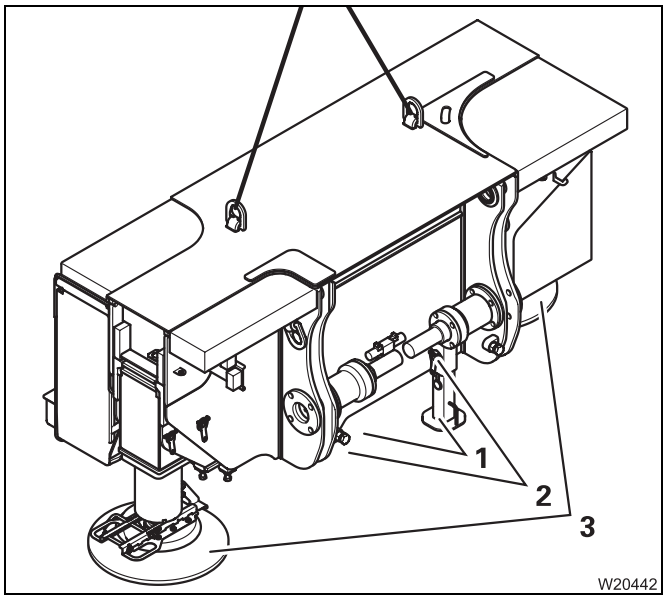
If the outrigger box is to be placed on a separate vehicle:

- Move the separate vehicle up to the truck crane so that you can set down the outrigger box without overriding the RCL; ➠ p. 6 - 73



Do not override the RCL!

- Lift the outrigger box vertically out of the carrier retainers (**1**) with the truck crane.



- Hold the supports (**1**) and remove the retaining pins (**2**).
- Extend the supports (**1**).
- Secure the supports (**1**) by inserting the locking bolts (**2**) into the upper hole.
- Bring the outrigger pad (**2**) to the working-position; ➠ p. 12 - 43.

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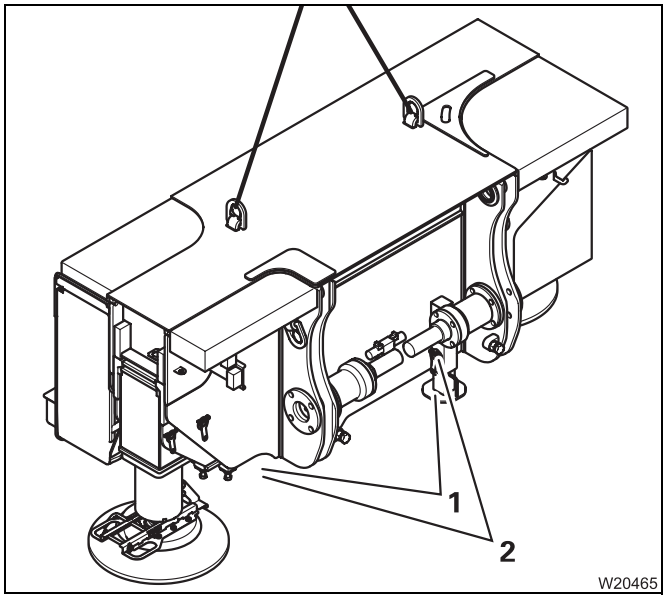
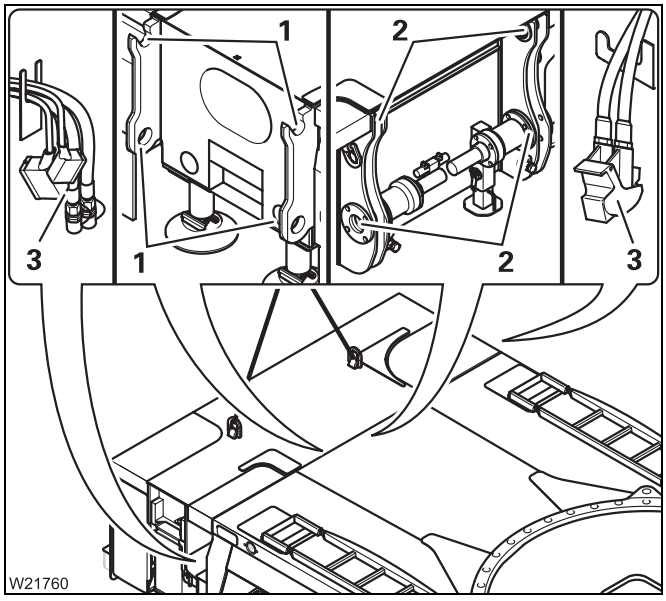
Attaching

The supporting box is within one of the radii permitted by the RCL.

The supports must be retracted before hanging the box.



- Sling the outrigger box.
- Pull the locking pins (**2**).
- Retract the supports (**1**).
- Secure the supports; by inserting the locking pins into the lower hole.
- Where necessary to do so, bring all the outrigger pads into driving position;
  ➠ p. 12 - 43.



Do not override the RCL!

- Hoist the outrigger box onto the carrier in such a way that the pins (**2**) on the outrigger box are vertically above the mountings (**1**) on the rear of the vehicle.
- Hang the outrigger box in the mountings (**1**).

  Take care that the cables and hoses (**3**) are not trapped and damaged.

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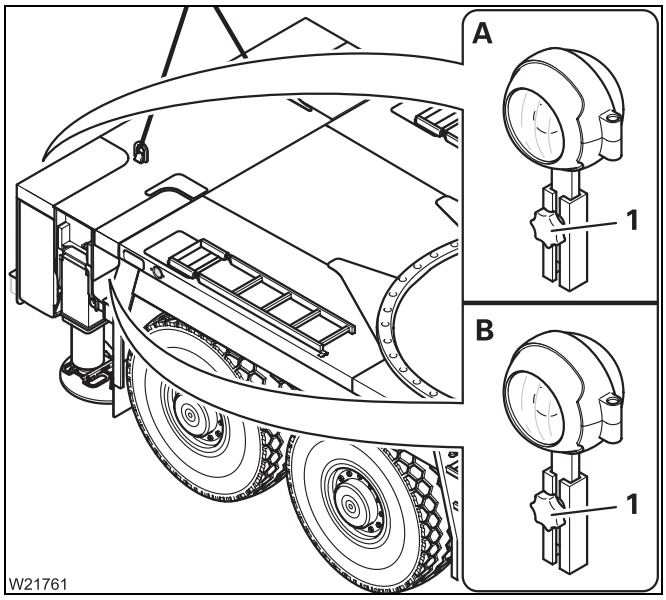
6.5.8 Installing the reverse camera

Depending on the driving mode, you can install the reverse camera on the carrier or the outrigger box.



(A) – On the supporting box

(B) – On the carrier

- Fasten the reverse camera with the bolt (**1**).
- Install and secure the connecting camera so that it safe for use on roads.

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6.5.9 Crane movements during installation and removal

When the rear outrigger box is removed, the setting down and raising of the main boom and the slewing of the superstructure is monitored by RCL. There are RCL codes for different working positions for an outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft).

Risk of overturning when slewing the superstructure
Always support the truck crane with an span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) (with auxiliary supports at the rear) and set the corresponding RCL code before slewing the superstructure.
Do not override the RCL if slewing is switched off.

Requirements

The following prerequisites must be met:

- The auxiliary hoist has been removed,
- The counterweight is completely unrigged,
- The truck crane is rigged with an outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft); ➠ p. 6 - 59,
- The truck crane must be level,
- All telescopic sections are retracted and locked.

Before installation

- Enter the RCL code for an outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) for the current main boom position (code for 0° position to the rear or 180° position to the front).
- Raise the main boom.
- Enter the RCL code for the outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) for the 360° slewing range.
- Rotate the superstructure into the position for mounting the rear support.
- Enter the RCL code for the outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) for the limited slewing range of ±20° to the rear.

After removal

- Enter the RCL code for the outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) for the 360° slewing range.
- Slew the superstructure into the position for setting down the main boom (0° to the rear, 180° to the front or ±15° to the rear).
- Enter the RCL code for the outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) for the current main boom position.
- Set down the main boom on the boom rest or on a trailer.

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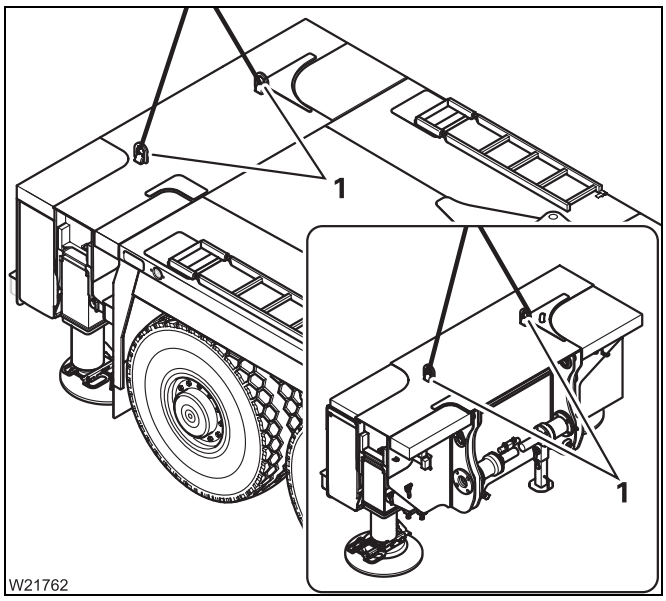
6.5.10 Slinging points on the supporting box

Risk of accident if used improperly
Attach the outrigger box only to the designated points and only use lifting gear of sufficient lifting capacity. Weight of the outrigger box;
➠ *Dimensions and weights of removable parts*, p. 1 - 10.



At the top of the outrigger box there are two slinging points (**1**).

Use only these slinging points for fastening the lifting gear.

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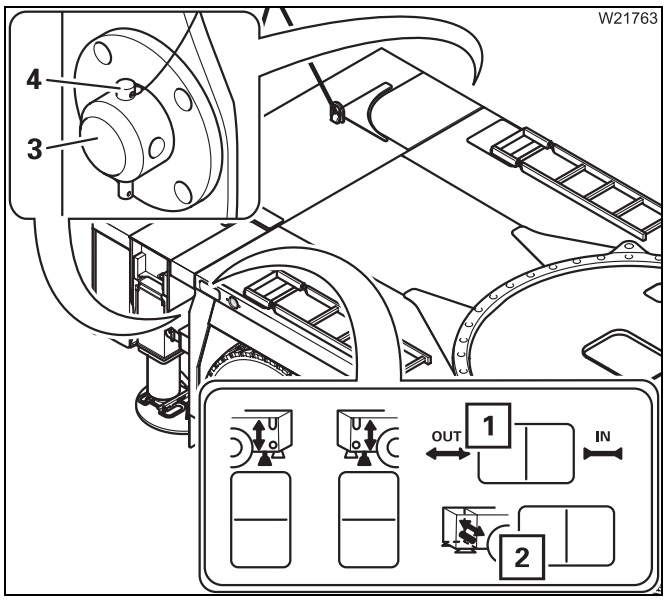
6.5.11 Fixing/releasing the outrigger pins

Risk of crushing when extending/retracting the pins
The pins on both sides are always moved at the same time from the *Supporting box* control unit. Make sure that no-one is in the vicinity of the carrier retainers on the other side of the vehicle when you extend or retract the pins.

Risk of damage to the securing plugs
Make sure that the securing plugs with the chains are not pushed inwards through the retainers on the carriage. This prevents the chains or the securing plugs being severed when the pins are extended or retracted.

Locking



- Press the button (**2**) and button (**1**) on the left.
- Extend the pins (**3**) completely through the mountings.

The movement continues till you release the button or the end position is reached.

- Secure all pins (**3**) using the retaining pins (**4**).
- Push the retaining plugs in until the balls at the bottom of the plugs are pushed out.

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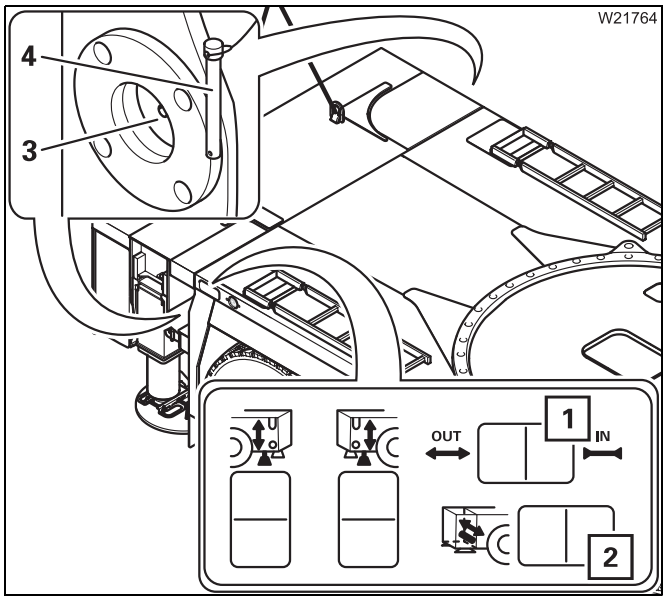
Releasing the locking pin



- Sling the outrigger box before releasing the pins.
- Pull the securing plugs (**4**) out of the two pins (**3**).
- Press the button (**2**) on the left and the button (**1**) on the right.
- Fully insert the pins (**3**).

The movement continues till you release the button or the end position is reached.

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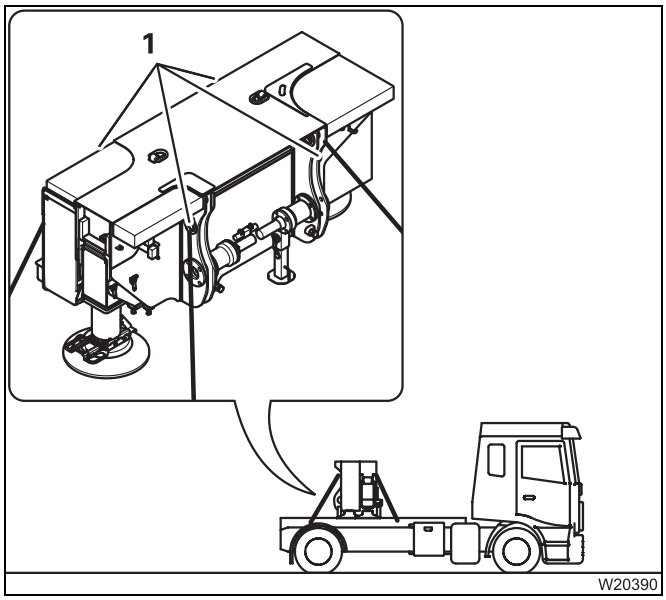
6.5.12 Transporting the supporting box on the separate vehicle

Risk of damage to add-on parts on the outrigger box and outrigger pads
Always secure the supporting box against slipping and overturning. This will prevent damage.

Risk of accident if used improperly
For transport, attach the supporting box to the provided lashing eyelets only and only use lifting gear of sufficient lifting capacity.

- Check that the outrigger beams are secured against extension during transportation with the locking pin; ➠ p. 12 - 34.
- Move the outrigger pads into operating position; ➠ p. 12 - 43.
- Load the outrigger box in such a way that no motorists and cyclists are put at risk.
- Secure the outrigger box and mounting equipment with holding ropes to prevent them from falling from the transport vehicle, slipping or damaging other parts.
- Load the transport vehicle in such a way that the weight is evenly distributed.
- Transport the outrigger box only on a separate vehicle of sufficient lifting capacity; ➠ *Dimensions and weights of removable parts*, p. 1 - 10.

Lashing eyelets



- Fasten the supporting box for the transport to the lashing eyelets (**1**) with holding ropes.

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7 Malfunctions in driving mode

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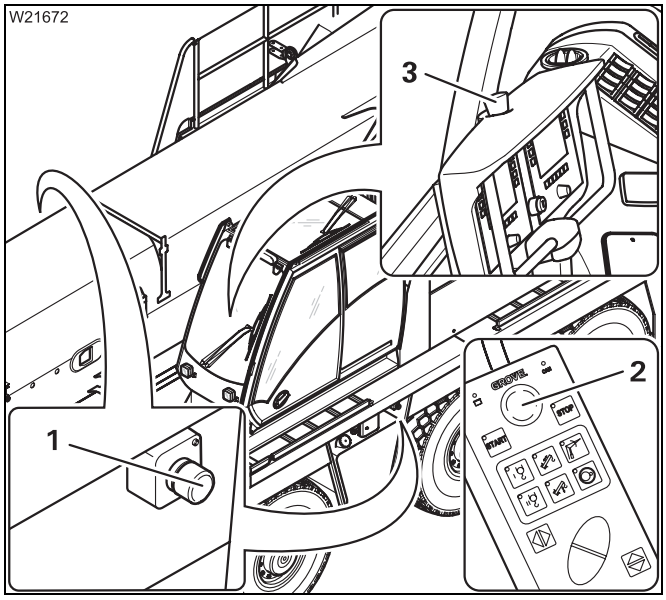
7 Malfunctions in driving mode

7.1 Emergency stop switch



Four emergency stop switches are available in an emergency:

1 On the carrier

2 On the hand-held control

3 In the crane cab

- Press an emergency stop switch (**1**), (**2**) or (**3**). The switch engages.

The engine shuts down.

After activating an emergency stop switch;
➠ *Resetting the emergency stop switch*, p. 4 - 26.

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

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7.2 What to do when a malfunction occurs in road traffic

If the truck crane can no longer be driven due to an accident or another malfunction, observe the following:

- Keep calm.
- Stop the truck crane. Observe the traffic behind you.
- Stop at a place safe for you and for the traffic behind you.

Risk of accident due to poor visibility
If possible, do not stop in a tunnel or directly after a curve.

- Secure the truck crane in compliance with the legal regulations applicable in the country in which you are working.

Risk of accident during repair work in danger areas
Even simple repairs in danger areas can be dangerous (e.g. tunnels, intersections, motorway bridges).
When in a danger area, only carry out the repair work required to leave the danger area.

If you are unable to repair the damage yourself, notify **Manitowoc Crane Care** or have the truck crane towed; ➠ *Towing the truck crane*, p. 7 - 5.

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7.3 Towing the truck crane

Observe the following when towing the truck crane:

– The truck crane may only be towed away with a tow-rod. Attach the tow-rod to the tow-rod coupling on the front bumper.

– Be sure to observe the statutory regulations of the country in which you are working concerning the overall length of the towing and towed vehicle, including tow-rod.

– If the engine, steering and service brake still work, you can tow the truck crane with a lorry.

– The wheels of the fifth and sixth axle lines must be in the forward position. If the wheels can no longer be steered into the forward position, notify **Manitowoc Crane Care** prior to towing.

– If the engine, steering or service brake no longer function properly, the truck crane must be towed with a special breakdown truck.

– Towing mode must be switched on; ➠ p. 7 - 7.

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

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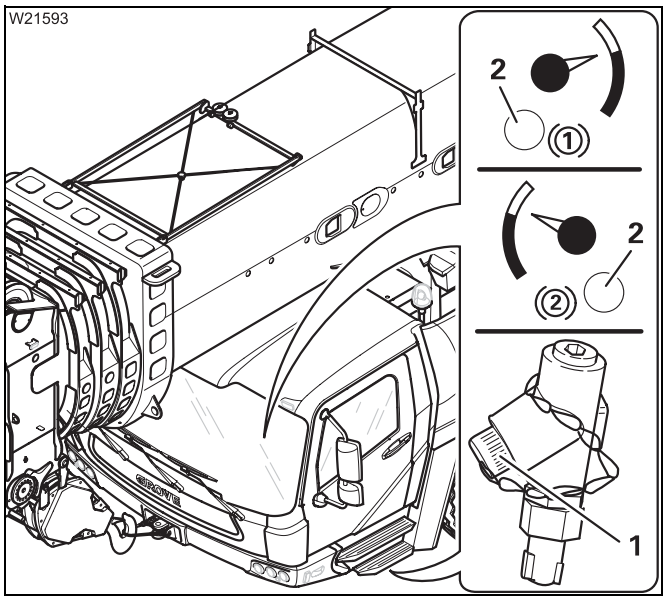
7.3.1 Towing after engine/transmission damage

The following information only applies to towing the truck crane out of the immediate danger area in the event of damage to the engine or transmission.

Risk of accident and damage when towing the truck crane long distances
Tow the truck crane at a maximum speed of 10 km/h (6 mph) and a maximum distance of 1 km (0.62 mi). Additional measures must be taken for longer distances, refer to **Manitowoc Crane Care**.

Compressed-air supply

When the engine fails, the truck crane must be supplied with compressed air by the towing vehicle so that the brake system is still operable.



- Connect the filler connection (**1**) with the *supply* coupling head of the towing vehicle.

A supply pressure of at least 6 bar (87 psi) must be displayed and the lamps (**2**) must not light up in the driver's cab when towing.

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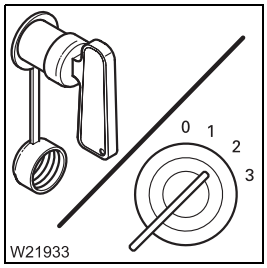
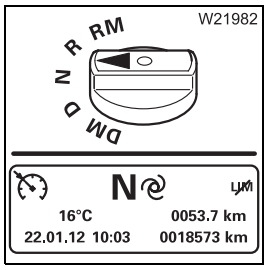
Electric power supply

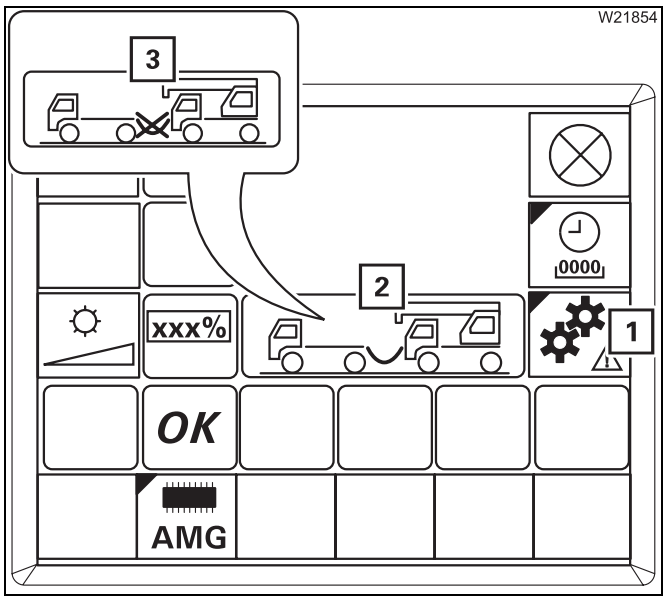


- Switch on the battery master switch.
- Turn on the ignition.

On the transmission



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



Switching on towing mode

- Press the (**1**) button once.
  The symbol (**2**) shows – green.

Towing mode is switched on.

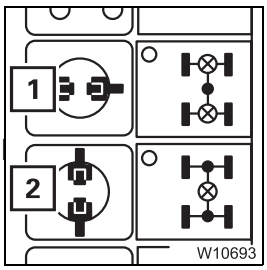
Switching off towing mode

- Press the (**1**) button once.
  The symbol (**3**) shows – red.

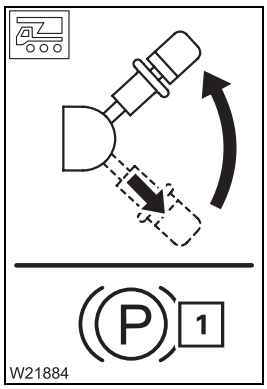
Towing mode is switched off.

Axle drives

- Switch off all differential locks.



The **green** symbols (**1**) and (**2**) must be shown; ➠ *Switching off*, p. 5 - 59.



- Release the parking brake.
  The lamp (**1**) must go out.

If the lamp (**1**) continues to light up, the supply pressure may be too low. Let the engine of the truck crane or towing vehicle run on the compressed-air supply until the supply pressure has been built up; ➠ *Building supply pressure*, p. 5 - 9.

If the lamp (**1**) fails to go out, the parking brake has been damaged; refer to **Manitowoc Crane Care**.

Risk of accident by faulty brakes
If the service brake system has been damaged, you may only tow the truck crane from the immediate danger area after consulting with **Manitowoc Crane Care**.

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Towing the truck crane out of the danger area

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

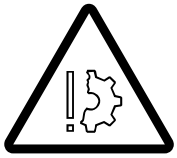
- Ensure that the tractor-vehicle only accelerates slowly.

Risk of damage to the chassis
Starting to tow too quickly or in jolts can damage the chassis.

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

Risk of accident from sluggish steering
The truck crane is barely steerable at speeds under 2 km/h (1.2 mph).

- Tow the truck crane at a **maximum of 10 km/h** (6 mph).
- Ensure that the towing distance is a maximum of **1 km** (0.62 mi).



Risk of accident and damage when towing the truck crane long distances
Tow the truck crane at a maximum speed of 10 km/h (6 mph) and a maximum distance of 1 km (0.62 mi). Additional measures must be taken for longer distances, refer to **Manitowoc Crane Care**.

7.3.2 Starting to tow

It is **not** possible for the truck crane to start towing for transmission reasons.

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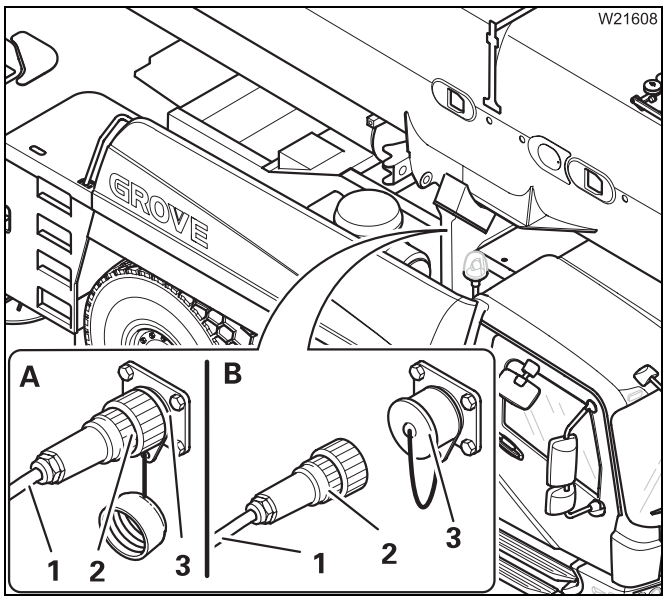
7.4 Other emergency operations

If the batteries on the carrier are discharged, you can:

– Externally start the truck crane.

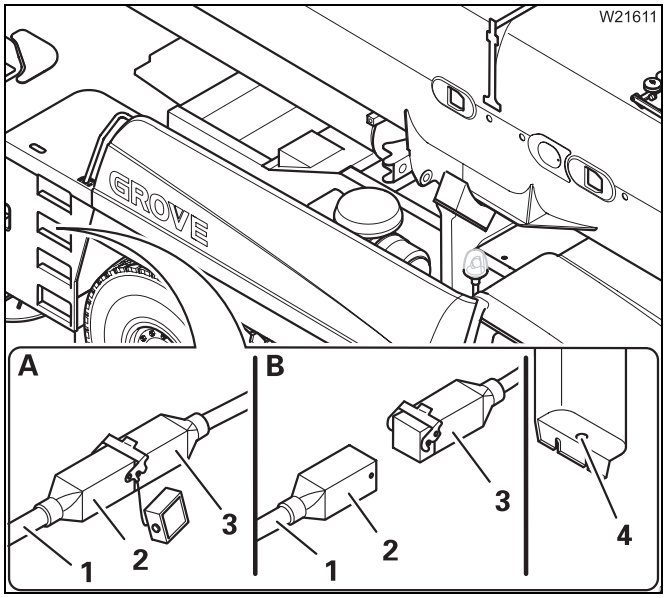
– Charge the batteries with a battery charger.

7.4.1 Externally starting the truck crane



- Start the engine of the auxiliary vehicle.
- (**A**) – Connect the cable (**1**) to the auxiliary vehicle's power supply (24 V).
- Insert the plug (**2**) in the socket (**3**).
- Start the engine of the *carrier.*
- (**B**) – Remove the plug (**2**).
- Close the socket (**3**).
- Remove the cable (**1**) from the auxiliary vehicle.

7.4.2 Battery charger



Connecting

The battery charging unit is located in the battery box.

- (**A**) – Connect the cable (**1**) with the plug (**2**) to the socket (**3**) and to a power source.

The battery charger switches on, and the light (**4**) on the battery charger indicates the status:

– **Flashing:** The battery is being charged

– **On:** Charging complete

Disconnecting

- (**B**) – Remove the cable (**1**) with the plug (**2**) and close the socket (**3**).

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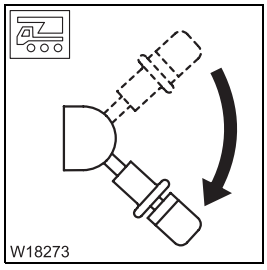
7.5 Wheels and tyres

This section contains all the information about changing a wheel and about using the tyre inflator connection.

7.5.1 Wheel change

- If a puncture occurs while driving, stop the truck crane, taking the following traffic into account, and secure the truck crane as outlined in the applicable legal stipulations of the country in which you are working.
- Select an even place, if possible, to change the wheels.

Risk of accident by falling wheel
If you briefly lean a wheel against the truck crane while changing it, secure it with a rope to prevent it from falling over.
Only move the outriggers when no wheel is leaning against the truck crane.



- Engage the parking brake.

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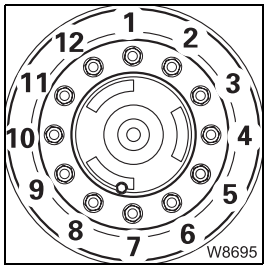
Removing a damaged wheel

- Switch off the suspension; ➠ p. 5 - 15.
- Raise the truck crane with the outriggers until the wheel to be changed just barely leaves the ground.

Risk of accident by falling wheel
When unscrewing the final lug nuts, the wheel can slip off the hub and fall toward you. Secure the wheel and step back quickly if the wheel begins to tip.



- Remove the lug nuts (**1**) to (**12**) and remove the damaged wheel.
- Secure the wheel against falling over if you set it down temporarily.

On the spare wheel holder

When changing a wheel, you must remove the spare wheel from the spare wheel holder and mount the damaged wheel onto the spare wheel holder.

You can use a chain hoist or the truck crane to lift the wheel.

- If you lift the wheel with the truck crane, then:
  - Support the truck crane.
  - Enter the current rigging mode on the RCL.

Danger of overturning if the truck crane is free-standing
Always support the truck crane on outriggers before rotating the superstructure.
Never operate the truck crane in the *Free-standing* position if the tyres are damaged.

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. 12 - 89.

- Lift the spare wheel using only lifting gear with sufficient load bearing capacity; ➠ *Spare wheel*, p. 1 - 10.

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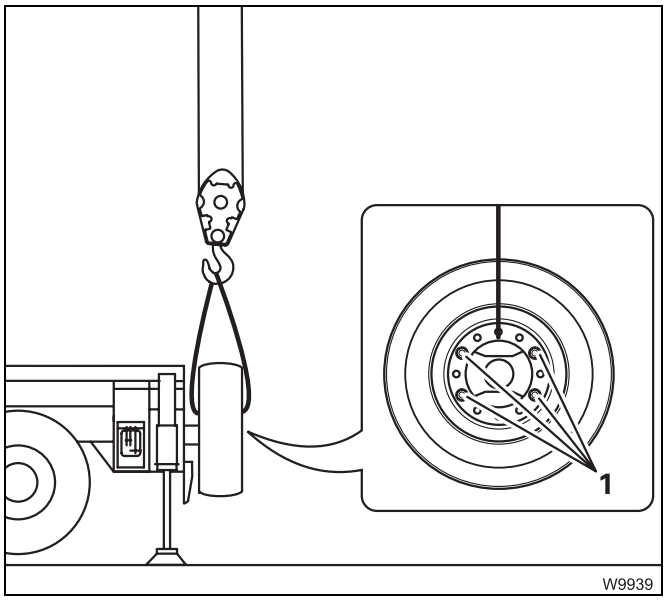

Removing a wheel

- Undo the lug nuts (**1**).
- Lift the spare wheel off the spare wheel holder.
- Secure the spare wheel against falling over if you put it down temporarily.

Mounting a wheel

- Lift the wheel onto the spare wheel holder.
- Secure the wheel with the lug nuts (**1**) and tighten them to 500 Nm (370 lbf ft).

Mounting a wheel

- Check whether the bearing surfaces of the wheel rim and hub are clean (no paint, grease or oil).
- Lightly grease the wheel studs.

Risk of accident
Check the wheel rim, tyres, lug nuts and wheel studs for damage before mounting the spare wheel.
Damaged parts may not be mounted.
Mount only the original wheel as listed in the spare parts list or a permitted wheel of the same size and load bearing capacity.

- Put the wheel on the hub in an upright position.
- Extend or retract the outrigger cylinders until the holes in the wheel rims are in line with the wheel studs.
- Push the wheel onto the wheel studs Make sure the threads of the wheel studs are not damaged.

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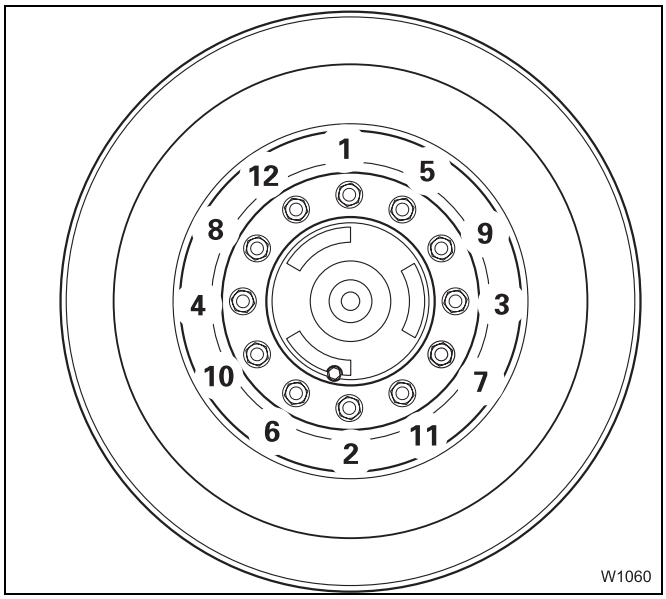

- Hand-tighten the lug nuts (**1**) and (**2**) to secure the wheel.
- Tighten the remaining lug nuts.
- Always tighten the lug nuts in the order (**1**) to (**12**).
  - First all lug nuts to 200 Nm (150 lbf ft).
  - Then all lug nuts to 400 Nm (300 lbf ft).
  - Finally, all lug nuts to 650 Nm (480 lbf ft).

Tighten all lug nuts after 50 km (30 mi) and 150 km (90 mi) once more to 650 Nm (480 lbf ft).

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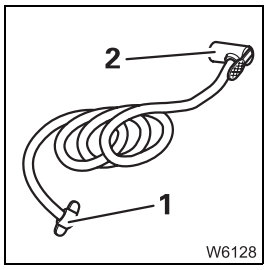
7.5.2 Inflating the tyres yourself

In emergencies you can inflate the tyres with the compressed air system of the truck crane if an appropriate filling hose is available.
The tyres can be inflated up to a maximum pressure of about 8 bar (116 psi).
This pressure might not correspond to the prescribed tyre pressure, depending on the tyres; ➠ *Tyres*, p. 1 - 14.

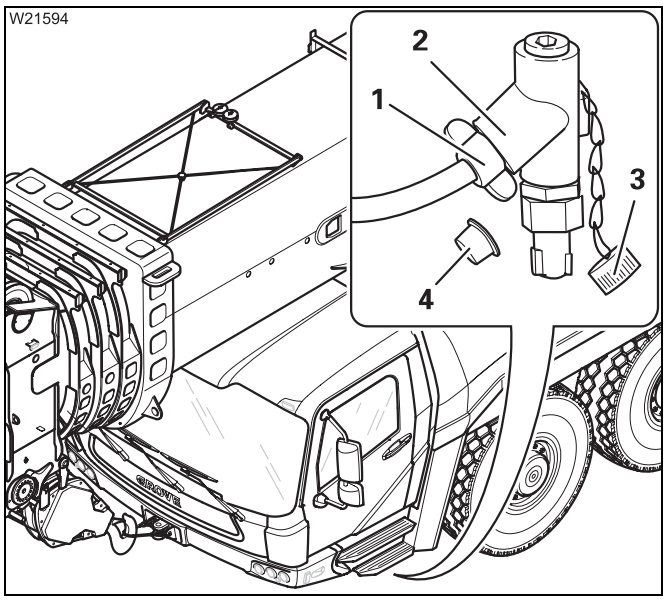
Risk of accident due to excessive tyre pressure
If the maximum pressure is above the specified tyre pressure, inflate the tyres up to the maximum specified pressure.
This prevents the tyres from becoming damaged and bursting while driving.

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



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

Connecting the filling hose

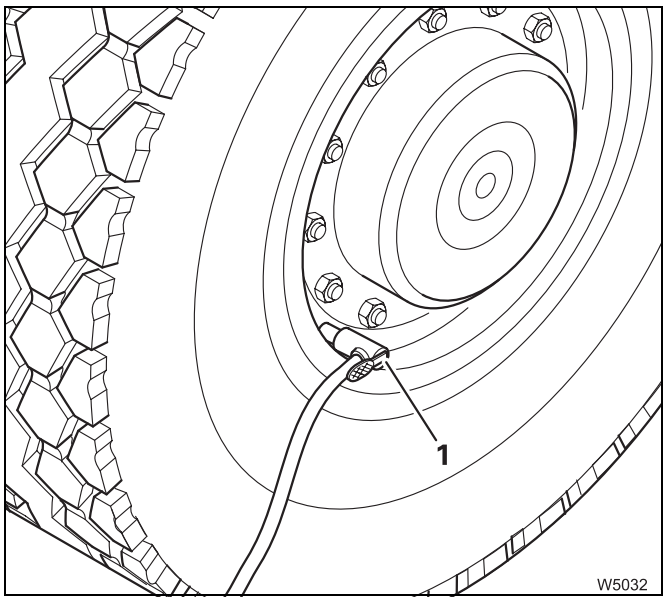


- Remove the caps (**3**) and (**4**).
- Fasten the connection (**1**) to the filler connection (**2**).

You can now inflate the tyres.

Inflating the tyres

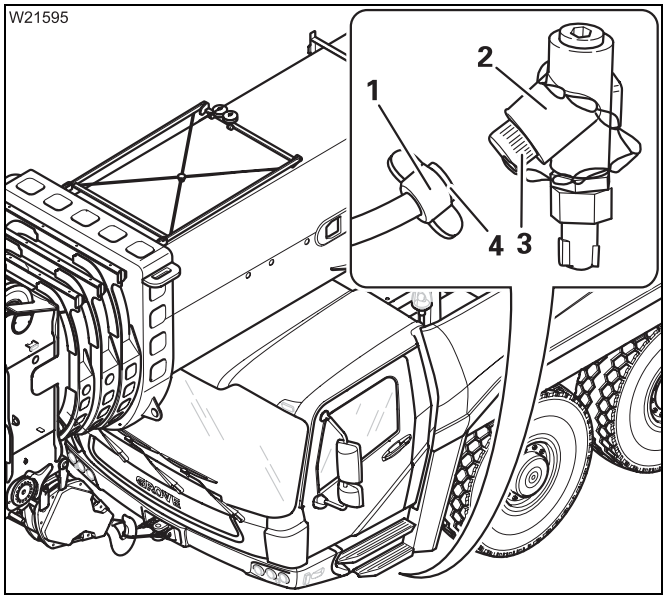
The compressed air system's maximum operation pressure of 8 bar (116 psi) can only be reached with the engine running.



- Start the engine; ➠ p. 4 - 16.
- Fasten the tyre connection (**1**) to the tyre valve.
- Press the button on the tyre connection and inflate the tyre.
- Disconnect the tyre connection (**1**) from the tyre valve.

Removing the filling hose

Before driving, you must remove the filling hose from the filler connection.



- Remove the connection (**1**) from the filler connection (**2**).
- Close the filler connection and the connection with the caps (**3**) and (**4**).
- Stow the filling hose away.
- Drive to a service station or workshop and adjust the tyre pressure.

Risk of damage to the compressed air system
Always close the filler connection with the cap.
This prevents damage to and contamination in the compressed air system.

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7.6 Fuses

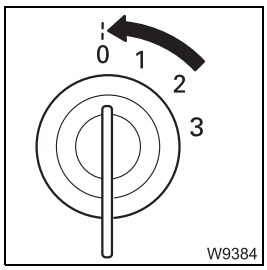
The fuses are divided into groups and are at various points on the carrier:

– In the driver's cab,

– In the battery box.

Information on replacing fuses

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



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

Risk of damage when the ignition is switched on
Always switch off the ignition whenever a fuse has to be replaced. This prevents the new fuse from being damaged by the increased starting current immediately after being installed.

Risk of damage by overloading
Replace blown fuses only with new fuses of the same amperage. This prevent parts from being overloaded and damaged or the fuse from being immediately damaged again.
Notify **Manitowoc Crane Care** if a fuse with the same amperage fails again once the ignition is switched on.

Risk of fire
Never repair a blown fuse with other electrically conductive materials.

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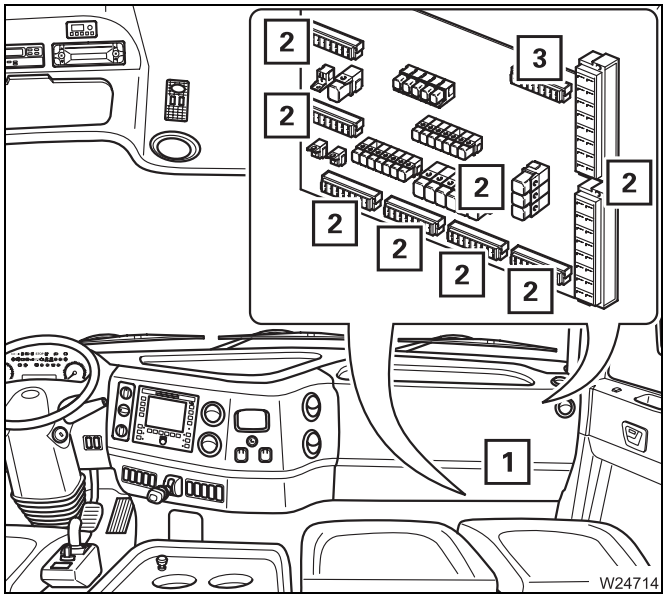
7.6.1 Fuses in the driver's cab



- Remove the covers (**1**)

2 Fuse groups F1 to F10

3 Reserve fuses

The following sections show the designations of the individual fuses, including their amperage and functions.

Group F1

The fuses are labelled with the numbers.

- Observe the instructions on changing fuses; ➠ p. 7 - 19.

Designation	Amperage (A)	Function
F1/1	20	Automatic parking light[1)]
F1/2	10	Diagnostics plug, cab lighting Cigarette lighter
F1/3	20	Oil cooler, 24 V/12 V voltage transformer
F1/4	10	Hazard warning system, light switch, power supply[1)]
F1/5	5	Engine electronic system, ECOS control unit
F1/6	10	Electronic gear system
F1/7	15	ABS trailer
F1/8	–	Unassigned

[1)] Additional equipment

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Group F2

Designation	Amperage (A)	Function
F2/1	10	Tachograph, radio, control unit ESX 3
F2/2	15	Warm water auxiliary heater[1)]
F2/3	3	Ignition lock
F2/4	15	Heater fan
F2/5	10	Automatic parking light[1)] Power supply[1)]
F2/6	10	Retarder[1)], air-conditioning system[1)]
F2/7	15	ABS trailer
F2/8	3	Low-beam headlight[1)]

Group F3

Designation	Amperage (A)	Function
F3/1	15	Rotating beacon
F3/2	10	Flame start system[1)], vehicle height monitoring[1)]
F3/3	15	Warm water auxiliary heater[1)], ignition lock
F3/4	20	Air drier, mirror adjustment, window winder
F3/5	15	Outrigger lighting, rear carrier spotlights[1)]
F3/6	10	Turn signal indicators
F3/7	10	Windscreen wiper/washing system, horn
F3/8	10	Reversing lamps, trailer socket

[1)] Additional equipment

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Group F4

Designation	Amperage (A)	Function
F4/1	15	Instrument lighting, trailer socket, engine brake
F4/2	10	Battery heating[1)], particulate filter[1)]
F4/3	10	Central lubrication
F4/4	10	Power supply
F4/5	10	Tachograph
F4/6	10	Engine electronic system, ECOS control unit
F4/7	10	Diagnostics plug
F4/8	10	TCM supply

Group F5

Designation	Amperage (A)	Function
F5/1	5	Generator
F5/2	5	Emergency stop system, air intake inhibitor[1)]
F5/3	5	Power supply CAN BUS
F5/4	20	Power supply ESX3 control unit
F5/5	5	Air intake inhibitor[1)]
F5/6	10	Engine electronic system (ADM, SCR)
F5/7	2	Emergency operation, ESX 3 control unit
F5/8	5	Fog tail light

[1)] Additional equipment

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Group F6

Designation	Amperage (A)	function
F6/1	5	Left-hand side marker lights and parking light
F6/2	10	Right-hand side marker lights[1)] and parking light
F6/3	10	Left-hand marker light and tail lamps Instrument lighting
F6/4	5	Right-hand marker light and tail lamps
F6/5	5	Left full-beam headlight
F6/6	5	Right-hand full beam headlight, indicator lamp for full beam headlight
F6/7	5	Headlight, left
F6/8	5	Headlight, right

Group F7

Designation	Amperage (A)	Function
F7/1	2	Control unit ESX 4
F7/2	5	ESX 4 sensors, fuse monitoring
F7/3	20	Control unit ESX 4
F7/4	2	Control unit ESX 5
F7/5	5	ESX 5 sensors, fuse monitoring
F7/6	20	Control unit ESX 5
F7/7	7.5	Fog light[1)]
F7/8	7.5	Rocker

[1)] Additional equipment

Group F8

Designation	Amperage (A)	Function
F8/3	5	Fixed voltage controller 5V

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Group F9

Designation	Amperage (A)	Function
F9/1	10	MegaDrive control
F9/2	10	MegaDrive control
F9/3	1	MegaDrive control
F9/4	1	MegaDrive control
F9/5	1	MegaDrive control
F9/6	3	MegaDrive control
F9/7	1	MegaDrive control
F9/8	Unassigned	

Group F10

Designation	Amperage (A)	Function
F10/1	3	Radio
F10/2	Unassigned	
F10/3	15	Outrigger lighting
F10/4	Unassigned	
F10/5	Unassigned	
F10/6	Unassigned	
F10/7	7.5	Window winder
F10/8	5	Auxiliary heater time switch[1)]

[1)] Additional equipment

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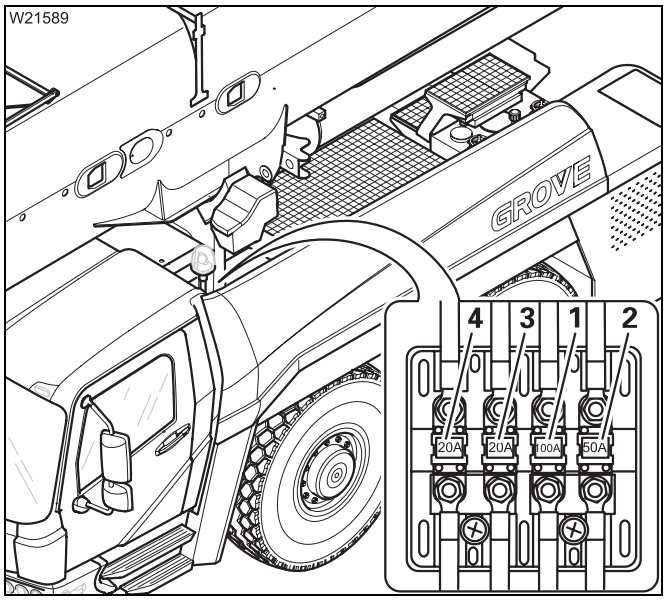
7.6.2 Fuses in the battery box

Fuses F7 to F10 are contained in the battery box.

Danger from lead and lead compounds on battery
Battery poles, battery terminals and parts of the battery itself contain lead and lead compounds. Wash your hands after working on these parts or in these areas.



- Open the battery box.

The fuses are in a terminal box next to the batteries.

- Remove the lid from the terminal box:
  - **1** Fuse F7
  - **2** Fuse F8
  - **3** Fuse F9
  - **4** Fuse F10

Designation	Amperage (A)	Function
F7	100	Carrier central fuse
F8	50	Flame start system
F9	20	Preliminary fuse for auxiliary heater switch timer, tachograph and radio
F10	20	Unassigned

- Observe the instructions on changing fuses; ➠ p. 7 - 19

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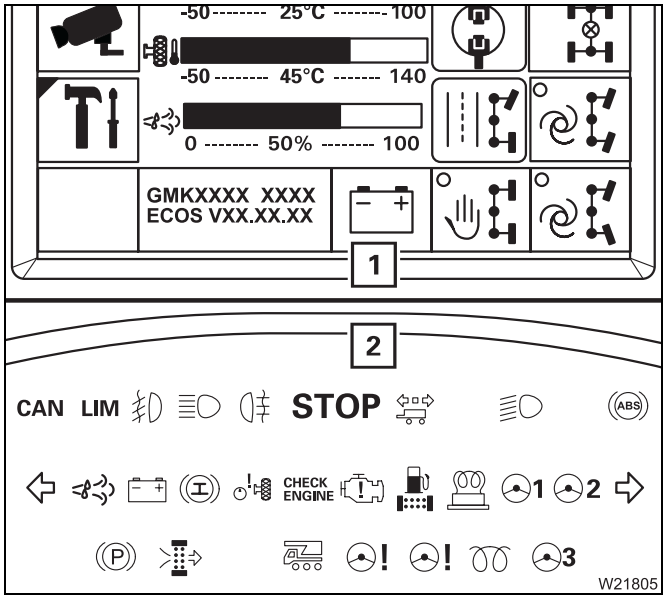
7.7 Troubleshooting



This section does not include all malfunctions.

– If a warning is shown in the display (**1**); ➠ p. 5 - 47.
– If the lamp on the instrument panel (**2**) lights up; ➠ p. 5 - 50.

7.7.1 Malfunctions in the engine

In addition to this information; ➠ *Separate engine manufacturer's operating manual*.

Malfunction		Cause	Solution
	Engine does not start – Starter does not turn	Battery master switch is switched off	Switch on the battery master switch; ➠ p. 4 - 12
		Ignition off	➠ *Switch on the ignition*, p. 4 - 12
		Transmission not in neutral position	➠ *Switching the transmission to neutral position*, p. 5 - 24
		Parking brake released	Apply the parking brake; ➠ p. 3 - 49
		Fuse F1/5 on carrier blown	Replace blown fuse; ➠ p. 7 - 20
		Bridging plug for the hand-held control not inserted	Insert bridging plug; ➠ p. 12 - 22
		Emergency stop switch pressed	Reset emergency stop switch; ➠ p. 4 - 26

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Malfunction		Cause	Solution
	Engine does not start – Starter turns	Batteries insufficiently charged	Charge the batteries; ➠ *Maintenance manual*
		Fuel tank empty	1. Refuel; ➠ p. 4 - 8
			2. Bleed the fuel system; ➠ *Maintenance manual* ➠ *Separate engine manufacturer's operating manual*
		Air intake inhibitor closed	➠ *Releasing the air intake inhibitor*, p. 4 - 27
		Fuse F4/6 on carrier blown	Replace blown fuse; ➠ p. 7 - 20
	The truck crane cannot exceed 20 km/h (12 mph)	A locking procedure is not yet completed	Lock the differential locks or steering
	Coolant temperature too high	Coolant level too low	Top up coolant; ➠ *Maintenance manual*
		Oil level in the transmission too low	Check the oil level; ➠ *Maintenance manual*
		Outer surface of heat exchanger dirty	Clean the heat exchanger
		V-belt of coolant pump at engine loose	Tighten V-belt; ➠ *Separate engine manufacturer's operating manual*
		The fan wheel on the engine does not turn	Switch the fan wheel to emergency operation; ➠ p. 7 - 39
	Engine cannot be turned off with ignition key	Malfunction in the electronics	Turn off the engine with theemergency-stop device; ➠ p. 7 - 1
	Motor brake (engine retarder) cannot be switched on	Fuse F4/1 on carrier blown	Replace blown fuse; ➠ p. 7 - 20
	Engine/transmission diagnostics plug not working	Fuses F1/2, F4/7 blown	Replace blown fuse; ➠ p. 7 - 20
	The engine performance is reduced	The coolant is too hot or another malfunction. The engine is not switched off in order to drive on to the next place where it is possible to stop	Coolant too hot: Wait until the coolant has cooled down – the performance will increase again Other malfunctions: **Manitowoc Crane Care** must be notified

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7.7.2 Malfunctions in the DEF system

Malfunction		Cause	Remedy
	– **Lights up** – **Flashes**	DEF level in tank at reserve level DEF tank empty	Refill DEF; ➠ p. 4 - 10
 	– **Light up**	– DEF reservoir sensor faulty – Error in the DEF dosing unit – DEF lines blocked – Temperature sensor faulty – Cable break in DEF system – Exhaust gas sensor faulty	Have the exhaust system checked by **Manitowoc Crane Care**, an authorised GROVE retailer or an authorised specialised workshop

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7.7.3 Malfunctions in the transmission

	Malfunction	Cause	Remedy
	Transmission only shifts up to second gear	Gear oil too hot	➠ *On the transmission*, p. 7 - 7
		Transmission oil colder than approx. –7°C (20°F)	Wait until transmission oil temperature rises
	Transmission no longer shift up at speeds over approx. 20 km/h (12 mph)	A locking procedure is not yet completed	Lock the differential locks
	Transmission not shifting	Retarder switched on	➠ *Switching off the additional brakes*, p. 5 - 45
	The transmission does not react to the operating elements	Fuse F1/6 on carrier blown	Replace blown fuse; ➠ p. 7 - 19
	Symbol is red	Transmission cannot shift down since the maximum permissible engine speed would otherwise be exceeded	Slow down the truck crane until the symbol goes out
	Driving display has a malfunction	The electronic gear system has detected a malfunction	➠ *Procedure during transmission malfunctions*, p. 7 - 41
	Transmission diagnostics plug not working	Fuses F1/2, F4/7 blown	Replace blown fuse; ➠ p. 7 - 19

7.7.4 Malfunctions in the hydraulic drive (MegaDrive)

	Malfunction	Cause	Remedy
	**– Lights up**	– Loss of oil	Checking the hydraulic lines
		– Solenoid valve faulty	**Manitowoc Crane Care** must be notified
		– Malfunction in the electronics	Switch off the ignition and switch it back on again after around 15 seconds. If error persists, notify **Manitowoc Crane Care**
	The hydraulic drive cannot be switched on	Current speed over approx. 20 km/h (12 mph)	Slow down or stop the truck crane
		Fuse F9/1, F9/2, F9/3, F9/4, F9/5, F9/6 or F9/7 blown	Replace blown fuse; ➠ p. 7 - 19

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7.7.5 Service brake malfunctions

Malfunction		Cause	Remedy
	**Lights up while driving or goes out after the engine is started**	The air pressure in one of the two circuits has fallen below 5.5 bar (80 psi)	The vehicle can be driven slowly to the next 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 - 6
 	**Parking brake unable to be released** **– Does not go out** **– Off**	Supply pressure is too low	➠ *Building supply pressure*, p. 5 - 9
	**Also lights up at over 6 km/h (4 mph)**	The trailer ABS has failed	Drive vehicle to next garage; braking without ABS support is still possible
The retarder cannot be switched off		Fuse F2/6 blown Retarder function switched off	Replace blown fuse; ➠ p. 7 - 20 Retarder function switched on; ➠ p. 5 - 44

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7.7.6 Steering malfunctions

	Malfunction	Cause	Remedy
	Steering wheel hard to turn, grating noises when steering	Oil level in the hydraulic oil tank too low	Check hydraulic oil level; ➠ *Maintenance manual*
	Symbol ⚙ or ⚙ is red	Oil level in the hydraulic oil tank too low	Stop and check whether oil has run out ➠ *If oil has leaked out*, p. 5 - 38 ➠ *If no oil has leaked out*, p. 5 - 38
		Steering circuit has failed, e.g. pump faulty	
	Symbol ⚙ and ⚙ are red	Both steering circuits have failed	The truck crane cannot be driven any further, since it can no longer be steered.
	Separate steering cannot be activated	Current speed over approx. 5 km/h (3 mph)	Slow down or stop the truck crane
	Separate steering cannot be switched off	Current speed over approx. 5 km/h (3 mph)	
	Separate steering not working	Fuse F7/1, F7/2 or F7/3 blown	Replace blown fuse; ➠ p. 7 - 20
	Separate steering not working and the *ECOS* display shows an error message	ECOS malfunction	Read out error messages (➠ p. 7 - 35) and notify **Manitowoc Crane Care**

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7.7.7 Differential lock malfunctions

	Malfunction	Cause	Remedy
	Differential locks cannot be switched on	Current speed over approx. 5 km/h (3 mph)	Slow down or stop the truck crane
		Drive train under tension	Slowly drive truck crane back back and forth, ➠ p. 5 - 58
		Compressed air system insufficiently filled	➠ *Building supply pressure*, p. 5 - 9
		Fuses F2/1, F4/6, F5/4, F5/7 blown	Replace blown fuse; ➠ p. 7 - 20
	Differential locks cannot be switched off	Current speed over approx. 5 km/h (3 mph)	Slow down or stop the truck crane
		Drive train under tension	Slowly drive truck crane back back and forth, ➠ p. 5 - 58
	Error symbol is displayed	ECOS malfunction	Read out error messages (➠ p. 7 - 35) and notify **Manitowoc Crane Care**

7.7.8 Malfunctions in the hydraulic system/hydraulic oil cooler

Malfunction	Cause	Remedy
Hydraulic oil temperature above 80°C, fan in the hydraulic oil cooler is running	Hydraulic system under extreme strain and ambient temperature very high	Stop the truck crane while taking the traffic situation into account and run the engine until the oil has cooled down
Hydraulic oil temperature above 80°C, fan in the hydraulic oil cooler is not running	Fuse F1/3 on carrier blown	Stop the truck crane while taking the traffic situation into account, and replace the defective fuse; ➠ p. 7 - 20
	Defective temperature sensor in the hydraulic system (error message is displayed)	Have the temperature sensor replaced

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7.7.9 Malfunctions on the suspension

Malfunction	Cause	Remedy
Suspension cannot be activated	Current speed over approx. 5 km/h (3 mph)	Slow down or stop the truck crane
	Compressed air system insufficiently filled	➠ *Building supply pressure*, p. 5 - 9
Suspension cannot be switched on or off	Fuses F1/5, F2/1, F4/6, F5/4 blown	Replace blown fuse; ➠ p. 7 - 20
Error symbol is displayed	ECOS malfunction	Read out error messages (➠ p. 7 - 35) and notify **Manitowoc Crane Care**

7.7.10 Malfunctions on the level adjustment system

Malfunction	Cause	Remedy
Level adjustment system not working	Suspension switched off	➠ *Switching on the suspension*, p. 5 - 15
	Fuses F1/5, F2/1, F4/6, F5/4 blown	Replace blown fuse; ➠ p. 7 - 20
Error symbol is displayed	ECOS malfunction	Read out error messages (➠ p. 7 - 35) and notify **Manitowoc Crane Care**

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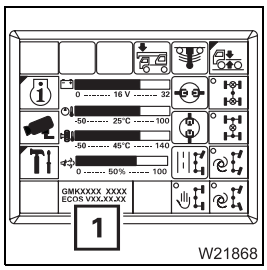
7.7.11 Malfunctions on the ECOS carrier

This section contains general malfunctions, and malfunctions which generate an error display. It also contains information on reading error messages on the *Outrigger* control units.

ECOS program version

Always note the number of the programme version before referring to **Manitowoc Crane Care** for malfunctions.

- If required, open the main menu Esc.



The display (**1**) shows the number of the current programme version.

General malfunctions

The following table contains information on troubleshooting and possible solutions.

Malfunction	Cause	Remedy
Ignition on – *ECOS* display does activate	Fuses F1/5, F4/6 blown	Replace the blown fuse; ➠ p. 7 - 20

If further malfunctions occur, the appropriate error messages are shown in the *ECOS* display.

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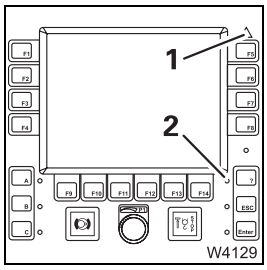
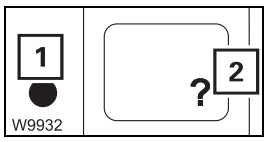
Error messages

If ECOS detects an error, an error message is indicated:



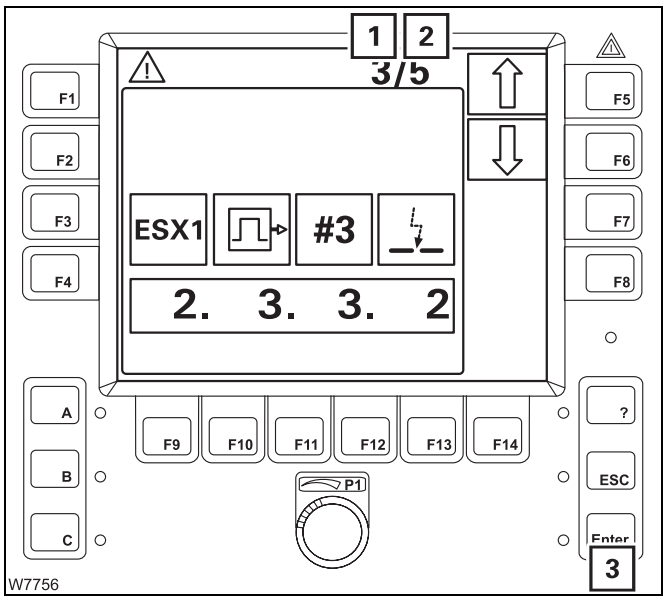
– Lamp (**1**) flashes.
– Lamp (**2**) flashes.

Open the *Errors* submenu for more information.



- Press the (**2**) button once. The button is only active when the lamp (**1**) flashes or lights up.

  This opens the *Errors* submenu.



Displaying errors/total errors

Display (**2**) shows the error total, and display (**1**) shows which error is displayed.

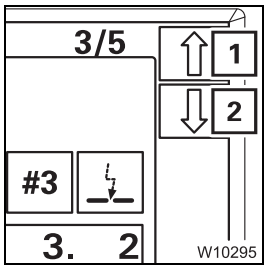
3/5, for example, means:
– Error **3** is shown,
– There is a total of **5** errors.

If the error shown is not acknowledged, the lamp next to the button (**3**) lights up.

Acknowledging errors

- Press the (**3**) button once.

If there are further errors, the next error is displayed and can be acknowledged.



- When all errors have been acknowledged, you can retrieve any pending errors using the buttons next to the symbols (**1**) and (**2**).

  1 Next error

  2 Previous error

Every time you press the button, the next error will be displayed.
When you keep a button pressed, all errors are shown one after the other continuously.

If not all errors have been acknowledged, the buttons ⇧ and ⇩ have no function – the symbols are grey.

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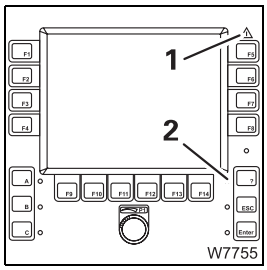
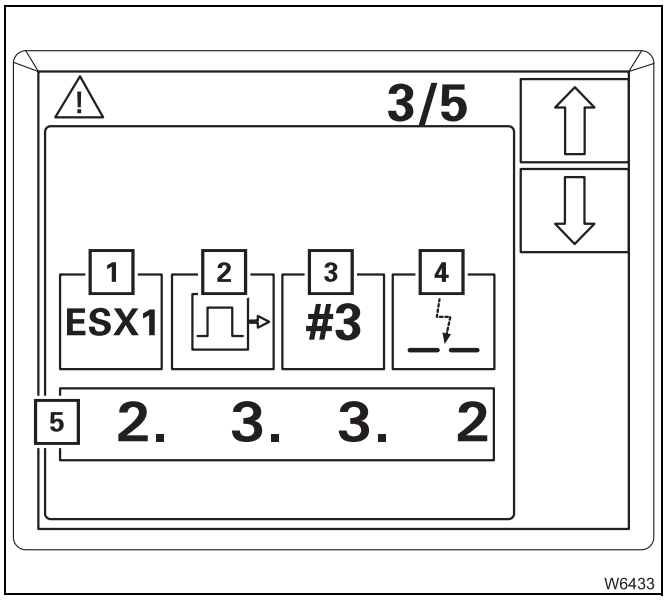


When all error messages have been acknowledged, the displays change:

– Lamp (**1**) lights up,
– Lamp (**2**) lights up.

Both displays start to flash again as soon as a new error occurs.



Error display

Each error is defined by an error code (**5**) and the symbols (**1**) to (**4**).

The symbols stand for:

1 The faulty device

2 The error group

3 The index within the group

4 The error type

The error code (**5**) consists of four digits, e.g. **2332**.

- Always note the error code before contacting **Manitowoc Crane Care**.

Exiting the submenu

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

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

The same menu opens that was open before the *Errors* submenu opened.

All errors remain saved until you switch off the ignition, even errors that have since been remedied. All existing errors are treated as new errors and displayed again after turning on the ignition.

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7.8 Procedure during malfunctions

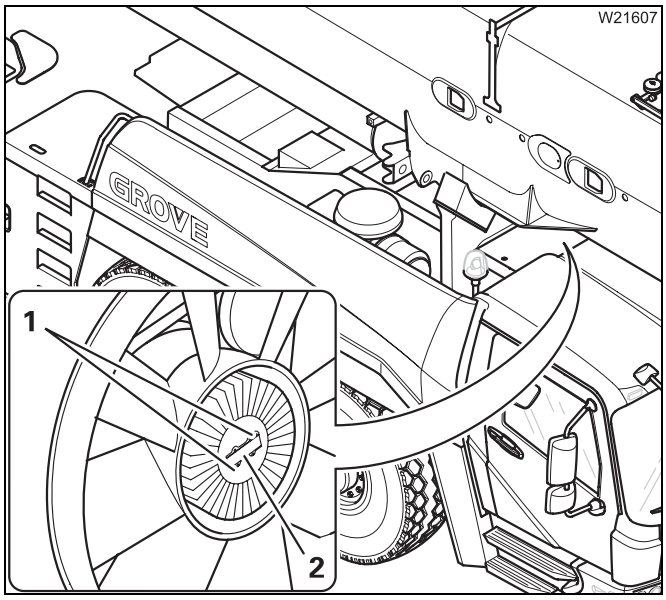
7.8.1 Switching on emergency operation in coolant circuit

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

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

Risk of accident by turning fan wheel
Always switch off the engine and secure it against unauthorised start before switching on emergency operation.
This prevents the fan wheel from turning suddenly and injuring you.

Risk of burns when engine is hot!
During operation, the engine and the add-on parts heat up greatly.
Wear appropriate protective gloves and be careful not to touch hot parts.



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

- Remove the bolts (**1**).
- Turn the metal plate (**2**) and remove it.
- Press in the pin under the metal plate.
- Emergency operation is switched on and the fan wheel runs continuously as long as the engine is switched on.

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

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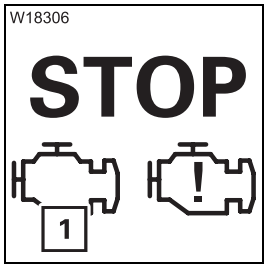
7.8.2 Procedure during engine malfunctions

The displays when an engine malfunction occurs depend on:

– Whether an engine malfunction has occurred,

– Whether a severe engine malfunction has occurred.

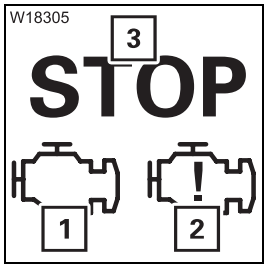


Engine malfunction

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

Engine performance falls continuously.

- Drive on until you have a chance to stop.
- Stop immediately and switch the engine off.
- If necessary, note the error messages (➠ p. 7 - 36) and refer to **Manitowoc Crane Care**.



Severe engine malfunction

The **STOP** warning lamp (**3**) lights up.

In addition the following lamps light up:

– Lamps (**1**) and (**2**)

- Stop the truck crane immediately while taking into account the traffic situation.
- Switch off the engine.

Risk of damage to the engine

Turn off the engine immediately after stopping the truck crane.
Do not by any means restart the engine. This will prevent serious damage to the engine.

- If necessary, note the error messages (➠ p. 7 - 36) and refer to **Manitowoc Crane Care**.

In the event of engine malfunctions, the electronic system will try to establish a secure operating condition with the remaining functions.

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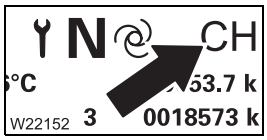
7.8.3 Procedure during transmission malfunctions

If the transmission malfunctions, the electronic system will try to establish a secure operating condition with the remaining functions.

Even if the transmission still shifts, always notify **Manitowoc Crane Care**. This avoid situations where another small error could lead to transmission failure.

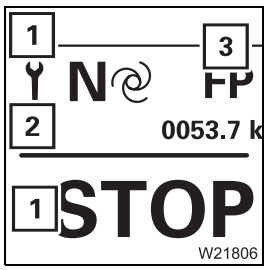
Error messages

If a malfunction occurs, the display shows different error messages.



CH entry

The transmission electronic system conducts a check.



Serious fault (1)

The STOP and Service symbol are displayed.

Service symbol (2)

It is possible to continue driving. However, depending on the type of error, there may be restrictions in *Automatic* operating mode or you can only shift the transmission in *Manual* operating mode.

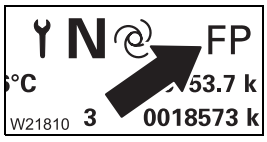
Entry, error message (3)

The entry displays the error messages.

– entry

- Drive on until you have a chance to stop.
- Switch off the ignition and wait about 15 seconds, then switch it on again.

If **–** continues to be shown and the transmission does not shift, refer to **Manitowoc Crane Care**.



FP entry

- Bring the accelerator to neutral position.

If **FP** continues to be shown, stop the truck crane, observing the traffic situation.

Do not continue driving under any circumstances – refer to **Manitowoc Crane Care**.

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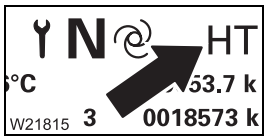
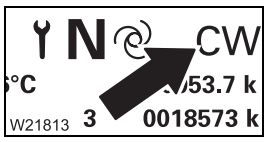


HT entry

- Release the accelerator after 30 seconds at the latest in order to prevent overheating of the coupling.



CW entry

Short error message – clutch wear.
If **CW** is shown (approx. 10 seconds after switching on the ignition), then refer to **Manitowoc Crane Care**. Repairs will be necessary in the near future.

AL entry

The supply pressure is insufficient.

- Top up the supply pressure, ⇛ p. 5 - 9

If **AL** is still displayed, check the compressed air system on the truck crane.

CL entry

- Release the accelerator after 30 seconds at the latest in order to prevent overheating of the coupling.

NS entry

- Shift to position **N**.

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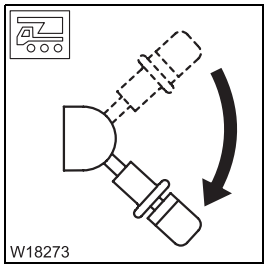
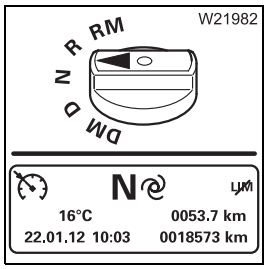
Displaying error codes

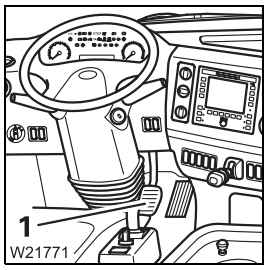
An error code is stored for each malfunction. Always note the error code before referring to **Manitowoc Crane Care**.



- Engage the parking brake.



- Shift to position **N**.

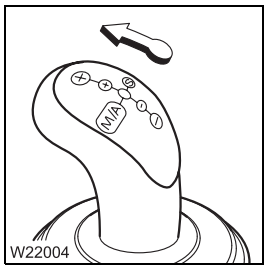


– For current error codes – pending

- Do **not** depress the brake pedal (**1**).

– For stored error codes – currently not pending

- Depress the brake pedal (**1**).



- Push the *Transmission* switch lever forward.

As long as you push the switch lever forward, the display shows the current or stored error codes in repeated succession.

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8 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 9 *Truck Crane Description*.

From there you will as usual be referred to more detailed descriptions of these elements.

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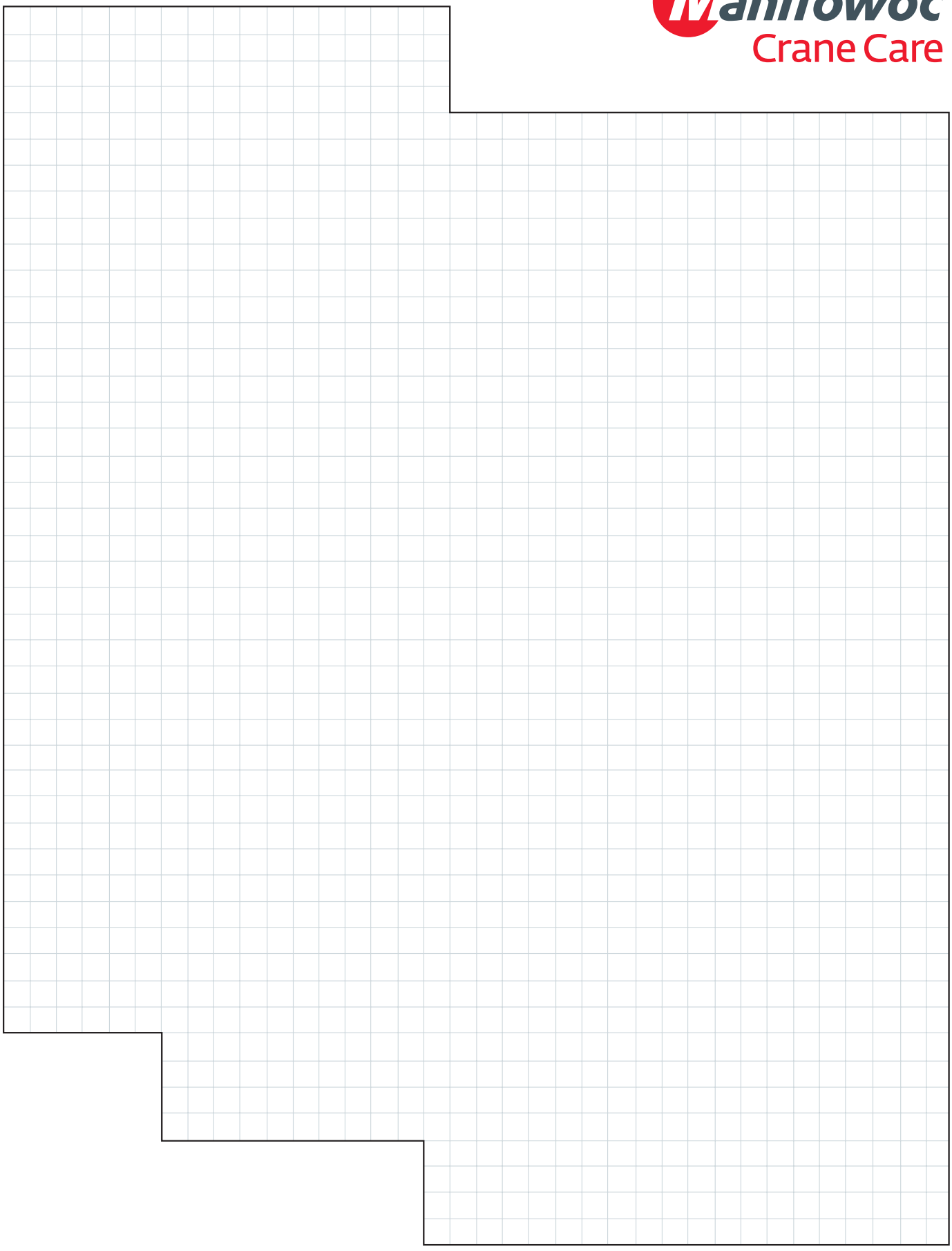
Manitowoc Crane Care



Grove Manitowoc National Crane Potain

W16978

Manitowoc Crane Group Germany GmbH
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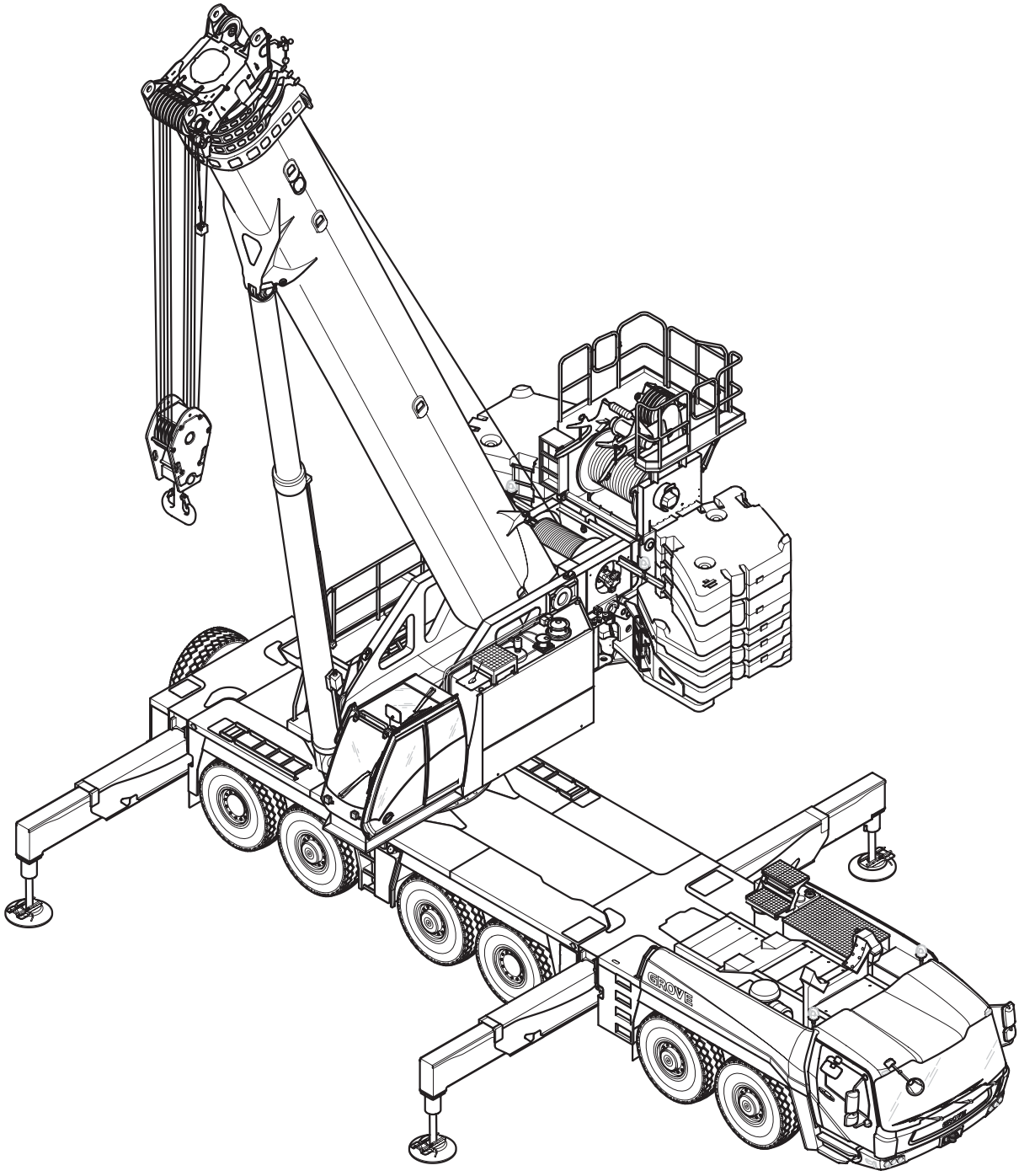
Grove Manitowoc National Crane Potain

Grove GMK 6400

Operating manual
Part 2 – Crane operation



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12.07.2013

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Important note

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12.07.2013

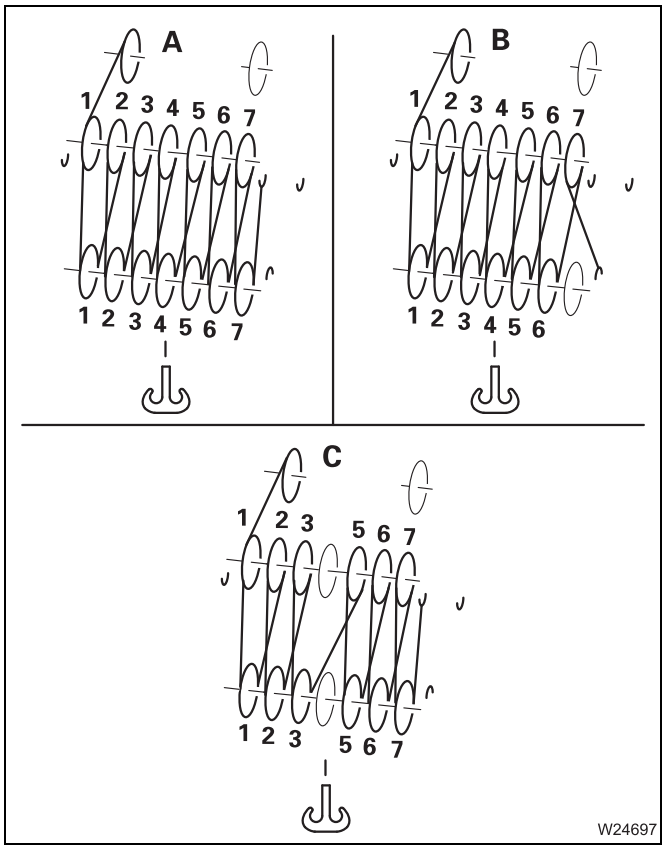
Correction sheet
Possible reeving methods on the main boom

Contrary to the information specified in the operating manual, there are corrected hoist rope reevings on the main boom for the GMK6400 truck crane.

Only reeve the hoist rope as described/illustrated in this correction sheet.

It is important that you still observe all notes and safety instructions regarding rigging work on the main boom in the operating manual supplied.

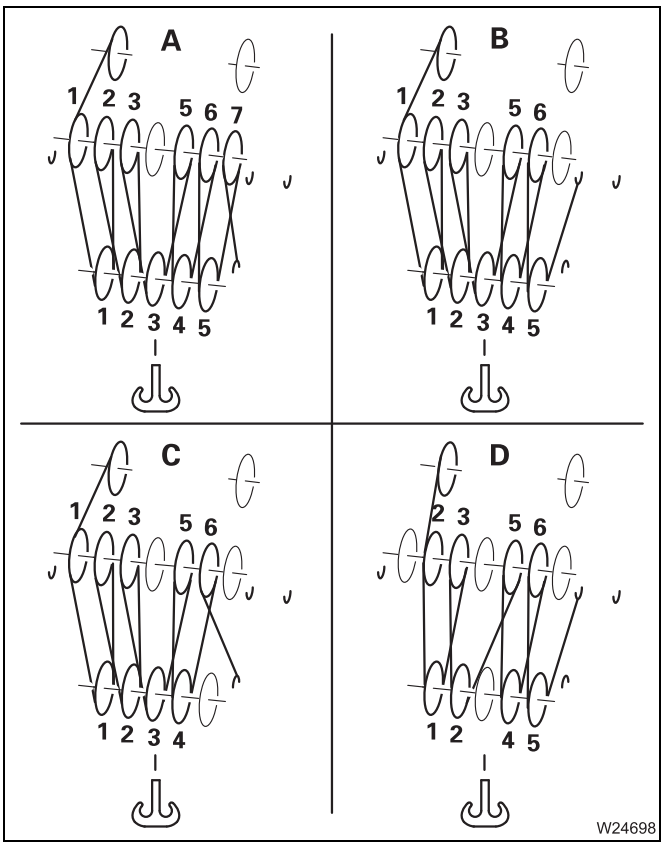
With 7 head sheaves



7 sheave hook block

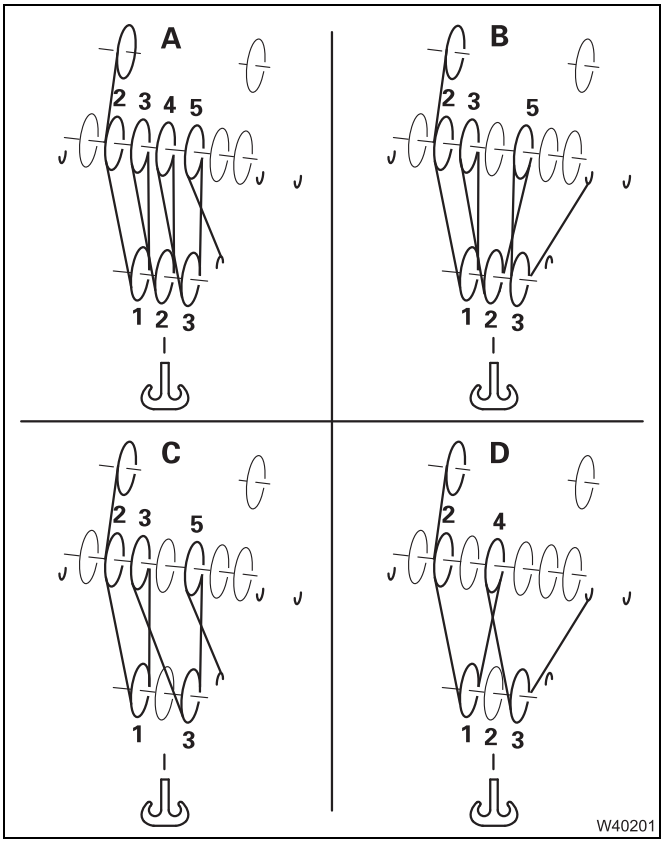
	Reeving
A	14x
B	13x
C	12x

27.08.2018



5 sheave hook block

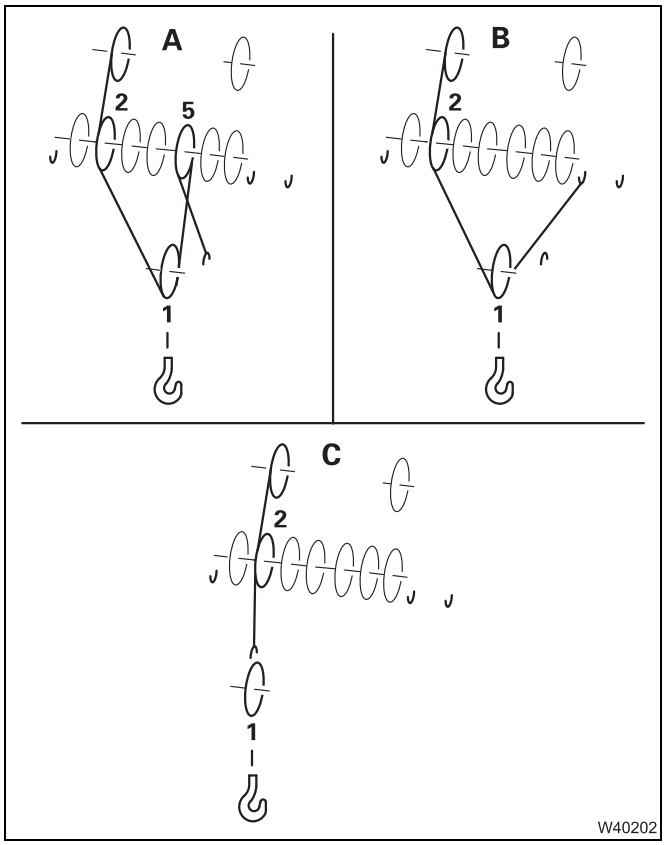
	Reeving
A	11x
B	10x
C	9x
D	8x



3 sheave hook block

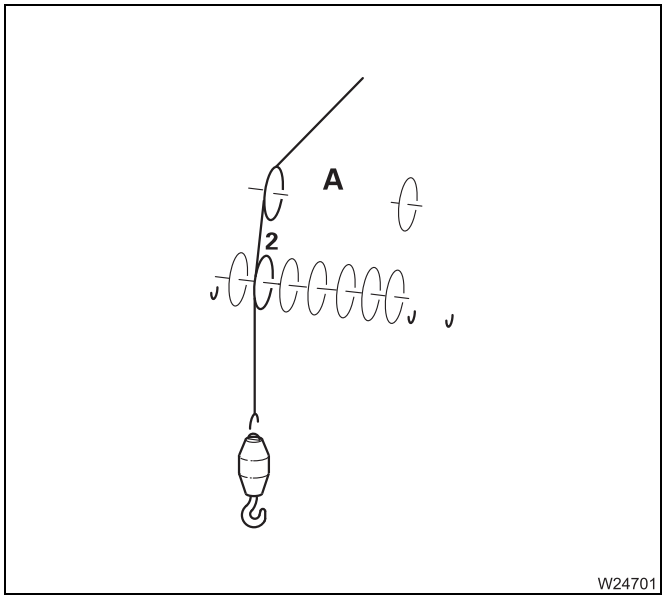
	Reeving
A	7x
B	6x
C	5x
D	4x

27.08.2018



1 sheave hook block

	Reeving
A	3x
B	2x
C	1x

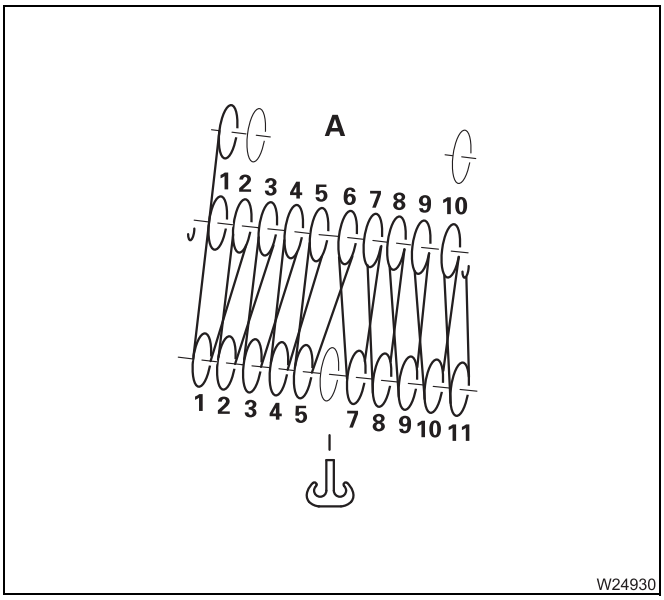


Hook tackle

	Reeving
A	1x

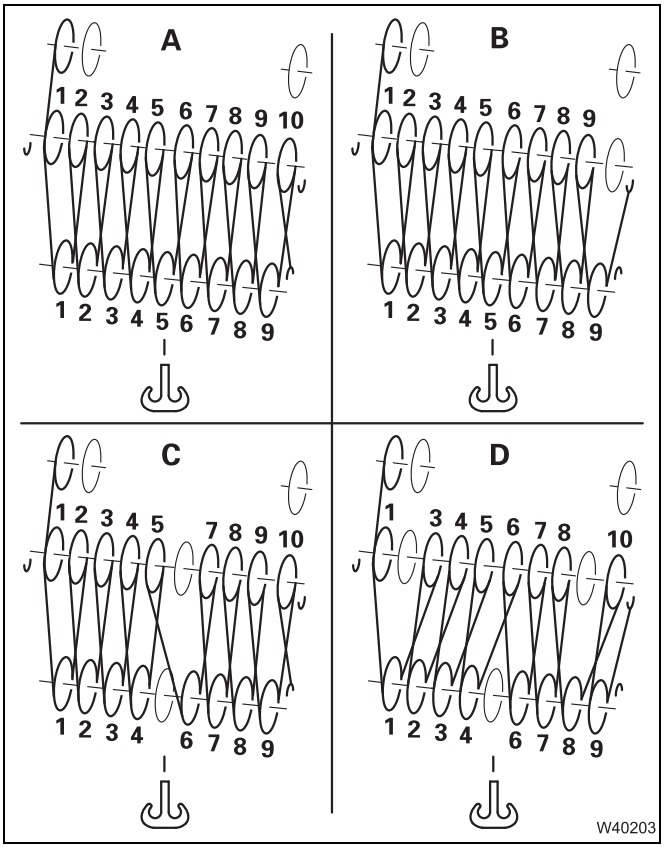
27.08.2018

With 10 head sheaves



11 sheave hook block

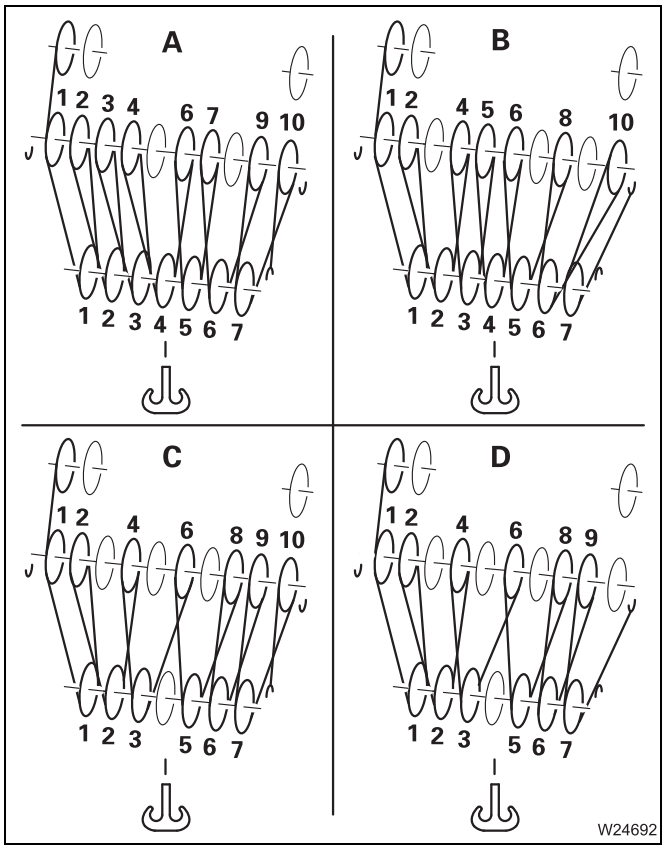
	Reeving
A	20x



9 sheave hook block

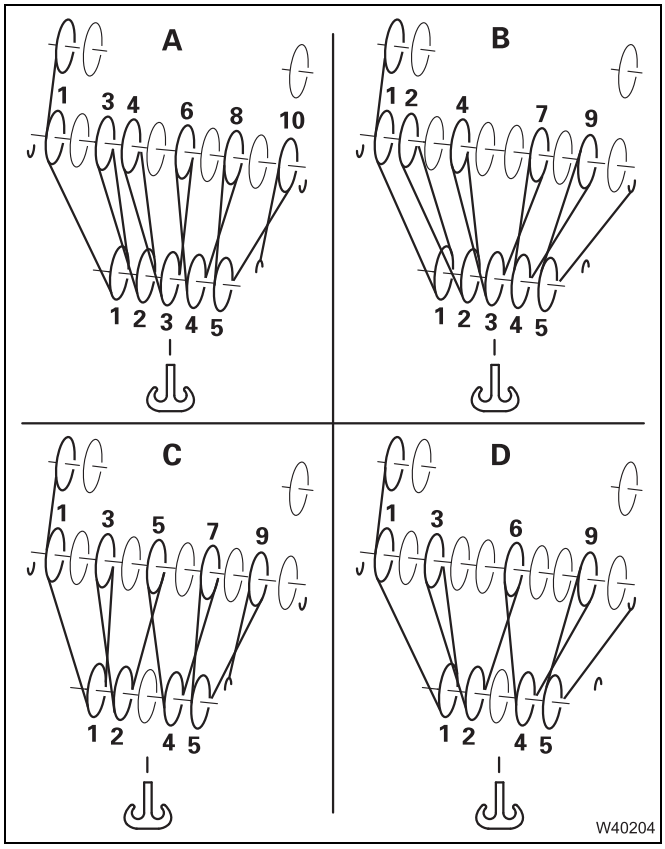
	Reeving
A	19x
B	18x
C	17x
D	16x

27.08.2018



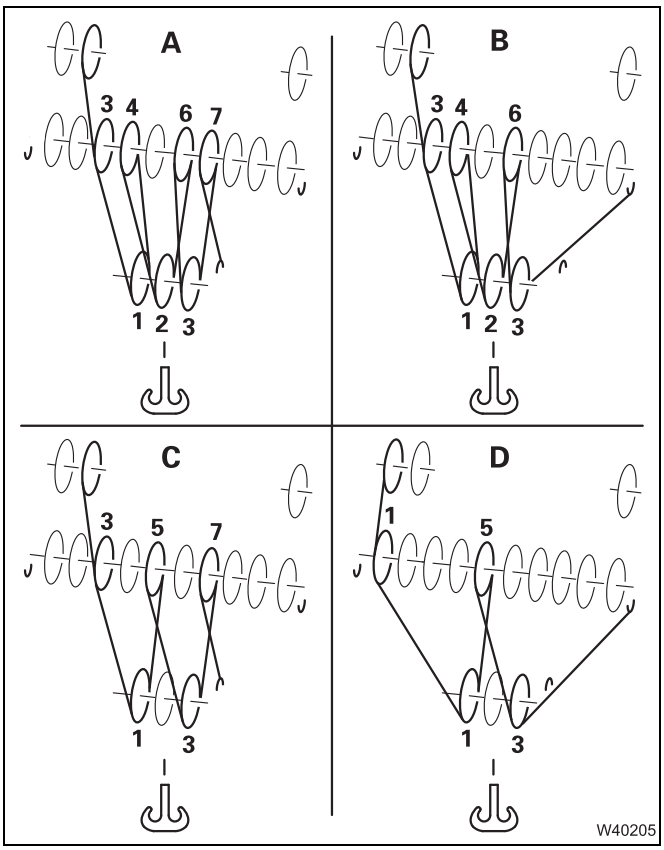
7 sheave hook block

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



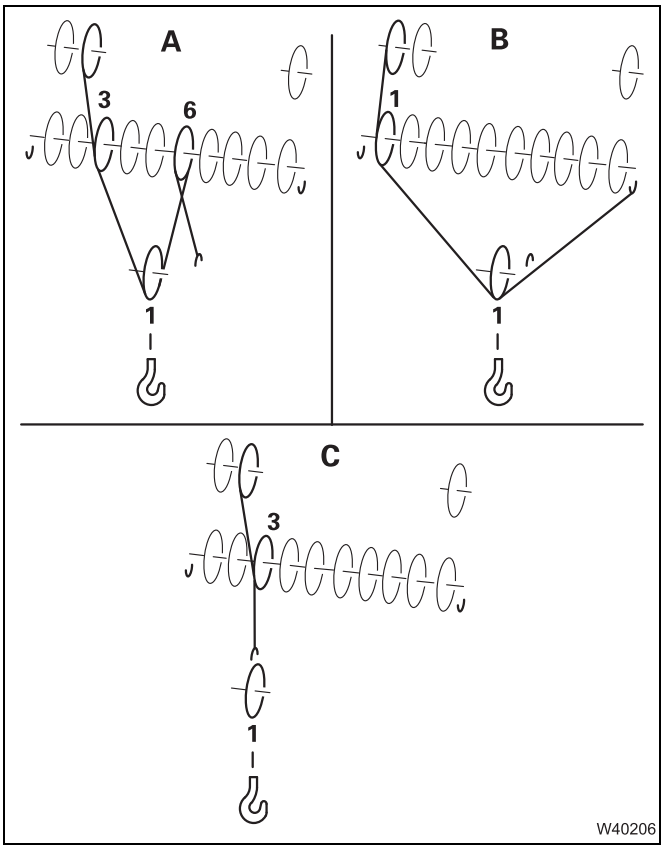
5 sheave hook block

	Reeving
A	11x
B	10x
C	9x
D	8x



3 sheave hook block

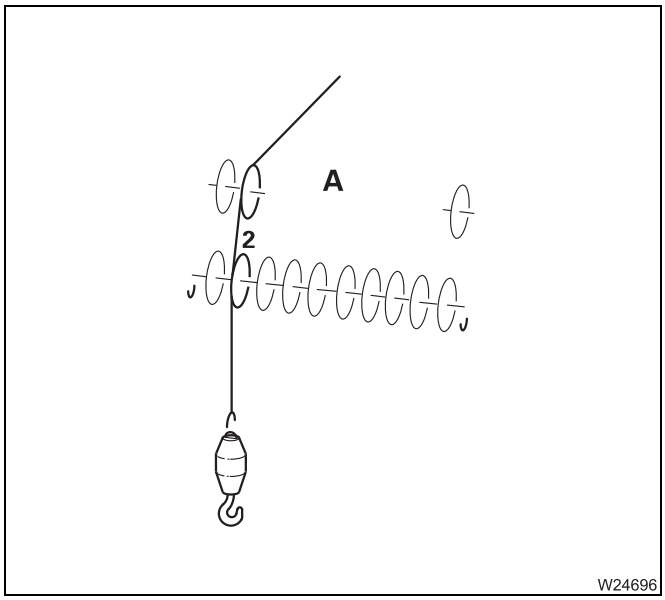
	Reeving
A	7x
B	6x
C	5x
D	4x



1 sheave hook block

	Reeving
A	3x
B	2x
C	1x

27.08.2018



Hook tackle

	Reeving
A	1x

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Technical data

Contrary to the information given in the operating instructions supplied, the technical data have changed in part.

Operating speeds

The specified operating speeds only apply to an engine speed of about 1300 rpm without load.

Main hoist:	Rope speed when lifting and lowering		
	Normal speed:	maximum 50 m/min (164 ft/min)	
	High-speed mode:	maximum 120 m/min (394 ft/min)	
Auxiliary hoist:	Rope speed when lifting and lowering		
	Normal speed:	maximum 42 m/min (138 ft/min)	
	High-speed mode:	maximum 104 m/min (341 ft/min)	
Telescoping mechanism:	Extending from 15.4 to 60.0 m (50.5 to 196.9 ft)		
	approx. 420 s	In automatic mode during uninterrupted locking and telescoping processes	

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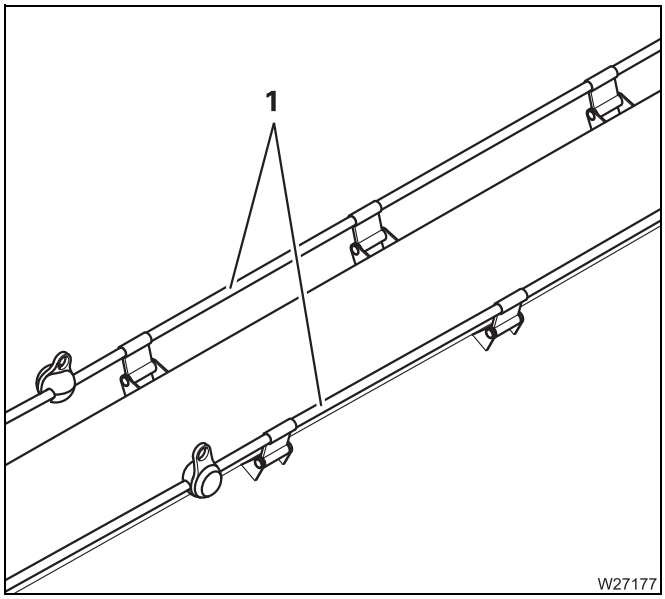
Safety harness on the main boom



This truck crane is equipped with a safety harness (**1**) on the main boom. The safety harness is fixed securely to the main boom.

The safety harness consists of two ropes with spacers and wear pads.

Always secure yourself with the safety harness and your personal protective equipment when you have to step on the main boom, e.g. to rig the rope from the main hoist.

Risk of accidents when stepping
Read through the procedure in this section before stepping between the main boom and the stand surface or between the stand surface and the main boom.

Risk of accidents due to unsuitable fall prevention safety system
Always secure yourself with a fall prevention safety system that is permissible in the country in which you are working and includes a shoulder, waist and seat belt with a two-point catch belt.
The fall prevention safety system must ensure that you are always secured against falling when you step on the main boom.

Risk of damage to the safety harness.
Never fasten loads or other objects to the safety harness. This will prevent damage and overload to the safety harness.

22.01.2014

Prerequisites

The safety harness only ensures secure protection from falling if a suitable fall prevention safety system (personal protective equipment) is worn. This fall prevention safety system must be attached to the safety harness on the truck crane.

Requirements

The fall prevention safety system must correspond to the requirements of the applicable standards and regulations in the country in which you are working. If you are unsure, find out which standards and regulations apply for the country in which you are working.

The fall prevention safety system must consist of:

– a combined shoulder, waist and seat belt,

– a catch belt with two lines for fastening at feet height.

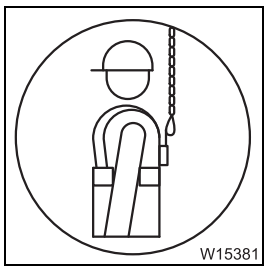
Only one person at a time is allowed to be secured by the safety harness. The weight of the person to be secured must not exceed 140 kg (309 lbs).

If you are unsure about which type of fall prevention safety system is required, please contact **Manitowoc Crane Care**.

22.01.2014

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

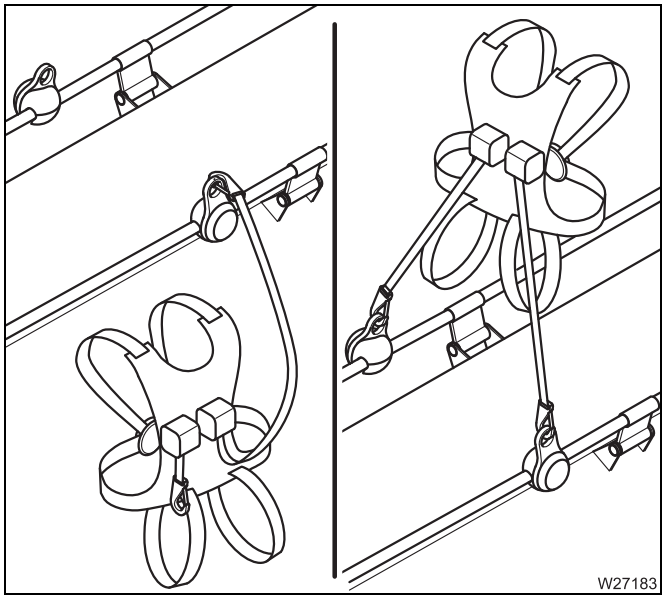
Attachment



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

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

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



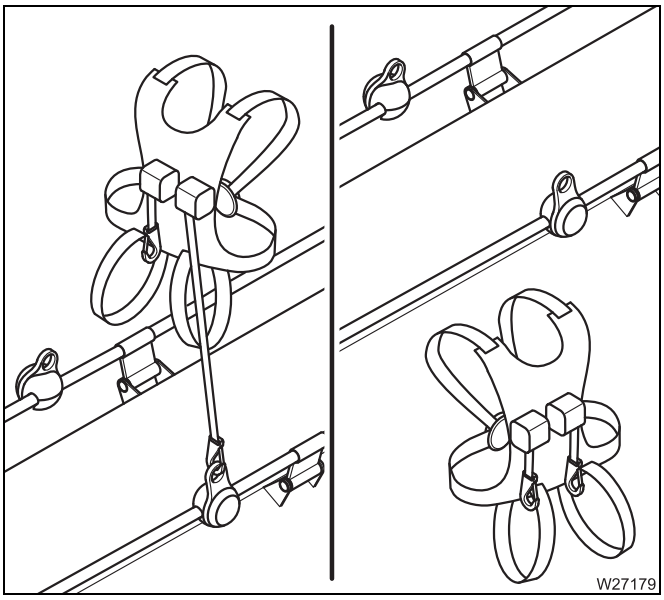
- Use the available ladders and access ladders on the truck crane to climb up; ➠ *Operating manual*.
- Make sure you always attach one line of the fall prevention safety system with the safety harness before entering the main boom.
- Attach the second line of the fall prevention safety system with the safety harness once you are located on the main boom.

22.01.2014

Detachment

Risk of accidents due to incomplete safety system
Only detach the second line of the catch belt once you have reached a secure position on a ladder or access ladder.
This will prevent falling due to an incomplete safety system.

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



- First of all, detach the line that faces away from the ladder or access later.

  You may only detach the second line of the catch belt once you have reached a secure position.

- Use the available ladders and access ladders on the truck crane to climb down;
  ➠ *Operating manual*.

22.01.2014

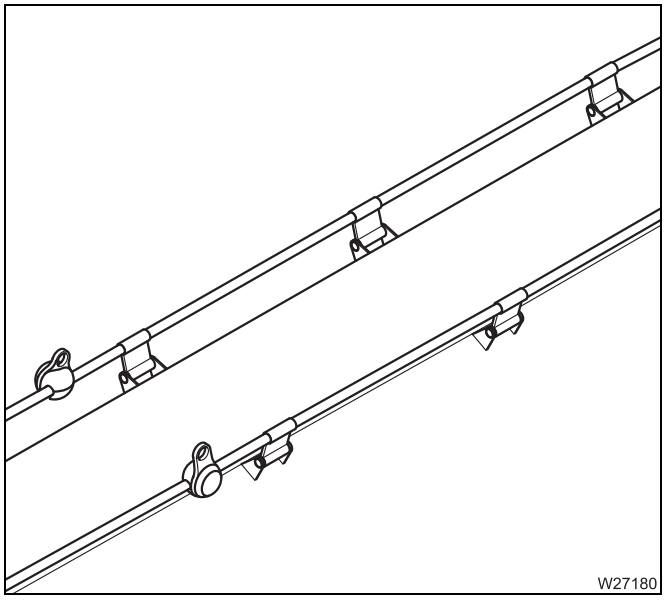
Inspecting/replacing safety harness

Risk of accidents if inspections are not carried out
Make sure the safety harness is inspected regularly.
This will prevent component failure in cases of danger.
A safety harness only ensures protection from falling if it is regularly inspected.

Make sure your personal protective equipment is also regularly inspected. In order to do this, observe the information provided by the manufacturer.

Inspection

The safety harness on the main boom must be inspected for damage at regular intervals.



- Check all fastening and connecting parts for damage, wear, mobility and deformations.

Replacement

Make sure damaged, worn, or deformed fastening or connecting parts are immediately replaced by **Manitowoc Crane Care** or an authorised GROVE dealer or your repair crew.

The safety harness must **always** be replaced completely following stress caused by a fall, even if no damage can be detected.

22.01.2014

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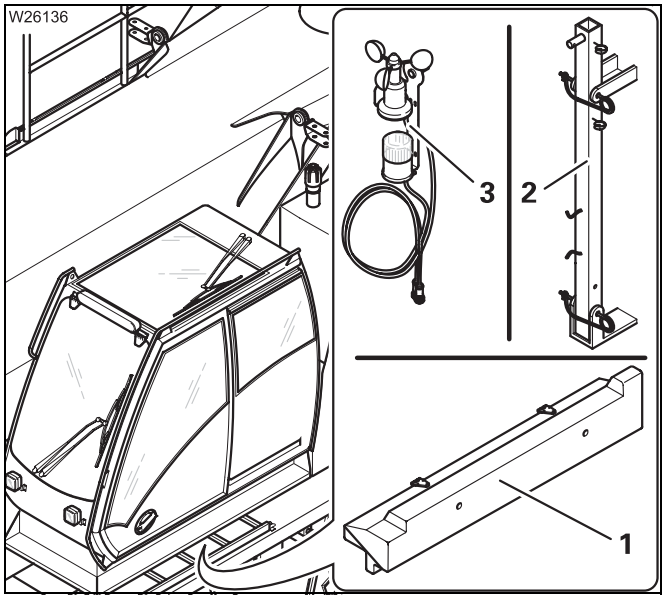
Anemometer and air traffic control light

Transport



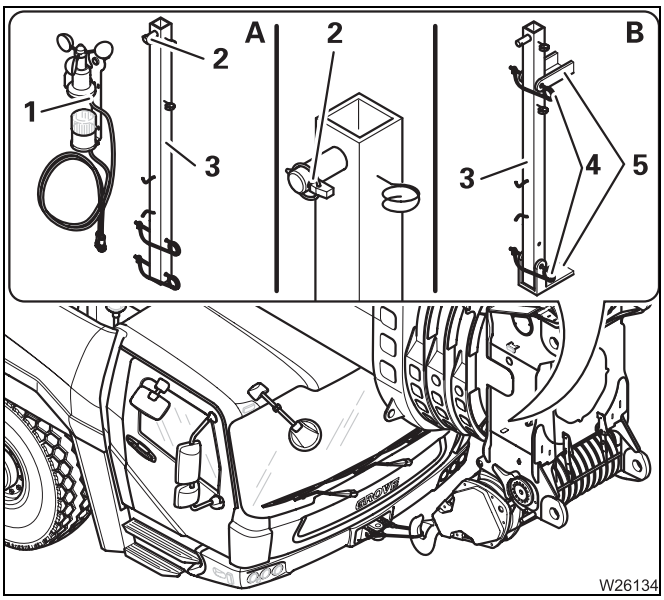
The storage compartment (**1**) for anemometers and air traffic control lights described in the accompanying *operating manual* is only available for certain versions of truck crane.

In this case the rod (**2**) is fastened to the main boom head for transport and the anemometer (**3**) and air traffic control lights are transported in the crane cab.

Risk of damage during on-road driving

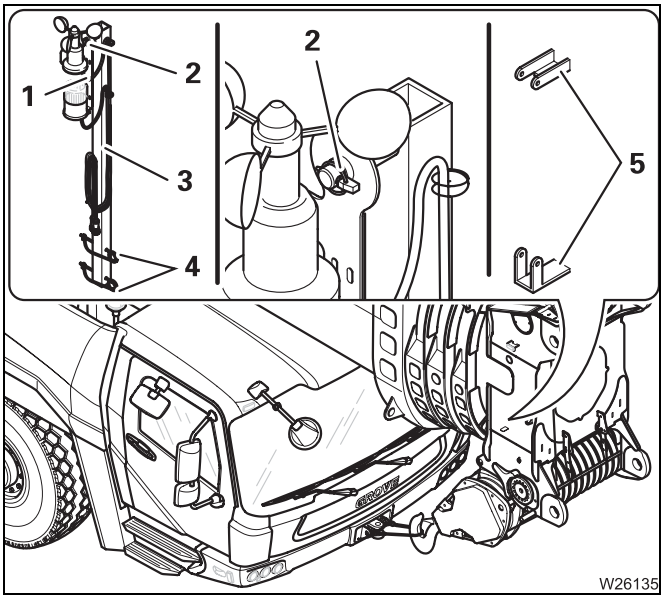
Always store the anemometer and the air traffic control lights in the crane cab before on-road driving and fasten the rod to the transport retainer. This prevents the specified overall height from being exceeded at on-road level, and the anemometer from getting damaged due to unfavourable air currents.

11.09.2013



For transport

- Dismount the anemometer; ➠ *Operating manual*.
- (**A**) – Remove the anemometer (**1**) and the air traffic control lights – if available – from the rod (**3**).
- Fasten the linchpin (**2**) to the rod (**3**).
- (**B**) – Place the rod (**3**) in the clamp (**5**).
- Secure the rod with the retaining pins (**4**).

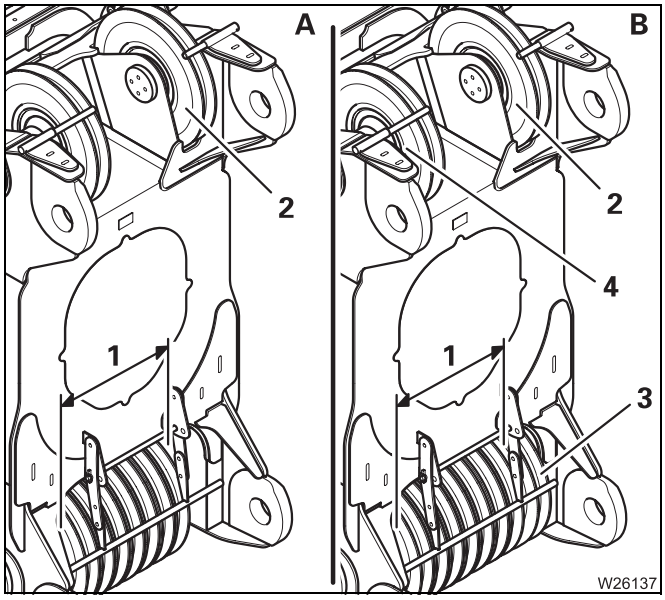


For operation

- Remove the pin (**3**) from the clamps (**5**). You will need the retaining pins (**4**) later for assembly.
- Fit the anemometer (**1**) and the air traffic control lights onto the rod (**3**).
- Secure the anemometer with the linchpin (**2**).
- Assemble the anemometer; ➠ *Operating manual*.

11.09.2013

Use of additional head sheaves



These additional pages only apply for GMK 6400 that

– are equipped with a second head sheave (**2**) and

– **(A)** – are equipped with 7 head sheaves (**1**)

or

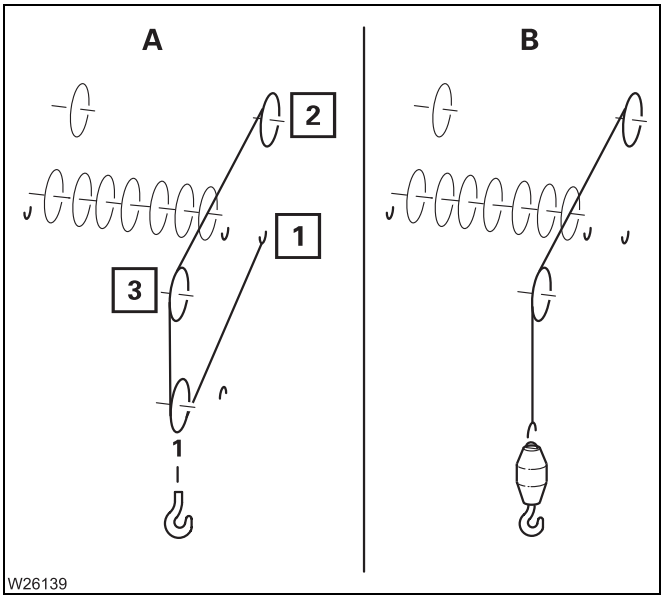
– **(B)** – are equipped with 7 head sheaves (**1**) and an additional head sheave (**3**).

The additional head sheave (**3**) is only designed for operation via the second head sheave (**2**). For operation via the head sheave (**4**) only reeve the hoist rope in the way described in the accompanying *operating manual*.

Risk of accidents if the procedure is not carried out correctly
Observe the information on the permissible usage of the auxiliary hoist in the accompanying operating manual.

10.09.2013

Risk of accident due to a damaged hoist rope
Always use the second head sheave together with the additional head sheave located underneath it or with the auxiliary single-sheave boom top. This prevents the hoist rope from becoming overloaded, snapping during operation and letting the load fall.



With 7 head sheaves

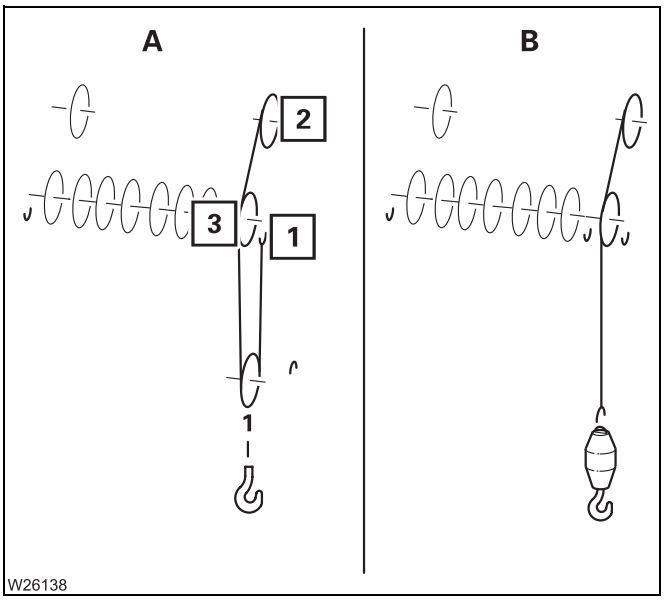
For use of the second head sheave (**2**) you will need an auxiliary single-sheave boom top (**3**).

- Use the outer rope attachment point (**1**) for 2-fall reeving.

Reeving

A 2-fall

B 1-fall



With 7 head sheaves and additional head sheave

- Only use the second head sheave (**2**) together with the additional head sheave (**3**).
- Use the outer rope attachment point (**1**) for 2-fall reeving.

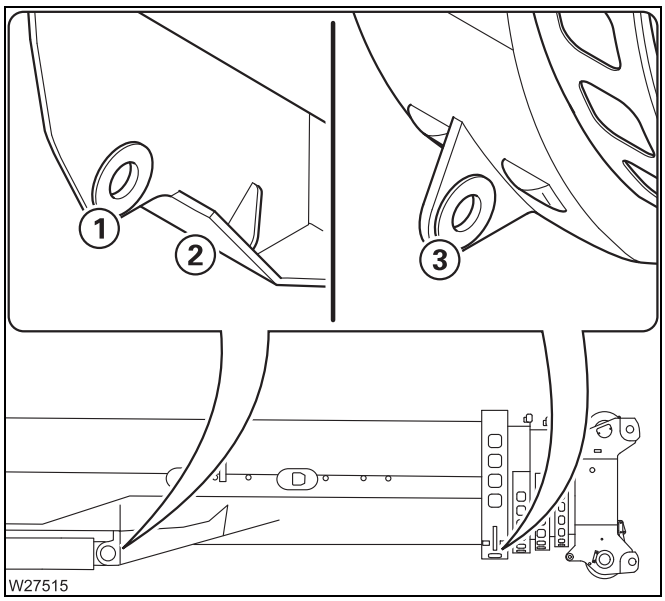
Reeving

A 2-fall

B 1-fall

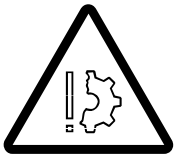
10.09.2013

Instructions for operation with a trailer



For operation with a trailer there are support points (**2**), locking points (**3**) and lashing eyelets (**1**) on each side of the main boom.

- Always set the main boom down on a trailer so that the support points (**2**) and locking points (**3**) are in contact with the corresponding counter bearings of the trailer on both sides and completely support the weight of the main boom.
- Secure the boom against lifting by the lashing eyelets (**1**). The weight of the main boom must not be supported by the lashing eyelets (**1**).
- Always lock the trailer on both sides by the locking points (**3**).

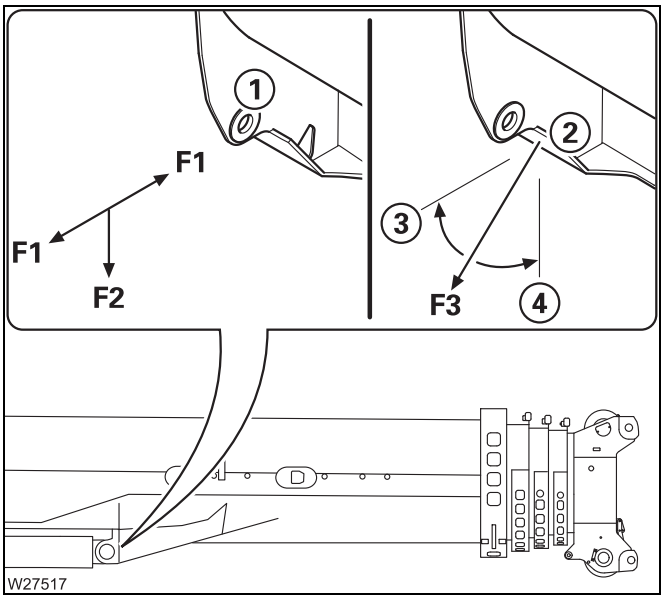


Risk of damage if procedure is incorrect
Only use trailers where it is guaranteed that all support points and locking points can be used on the main boom as intended and ensure that the trailer can support the maximum occurring forces in the appropriate directions.
Ensure that the weight of the main boom is not supported by the lashing eyelets.
This prevents the basic section from being damaged due to overloading.

27.02.2014

Maximum permitted load

The lashing eyelets, support points and locking points are designed for the maximum forces listed below.



Lashing eyelets

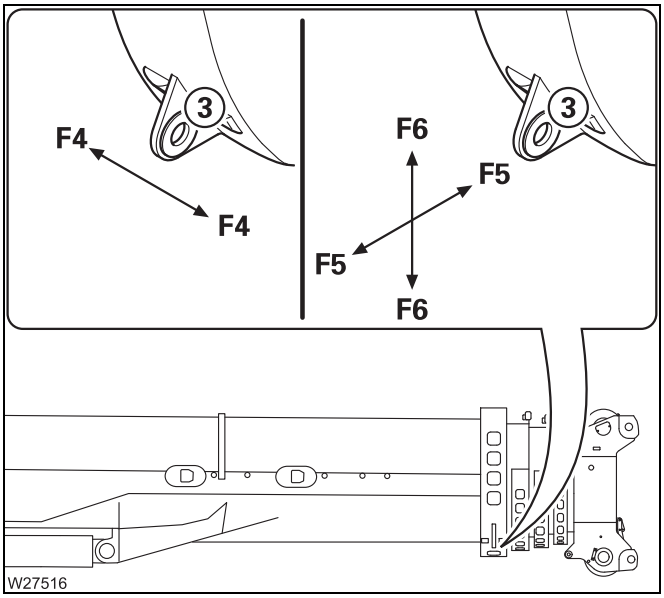
The maximum forces permitted for the lashing eyelets (**1**) are **F1** and **F2** in the direction indicated.

- Horizontally: **F1** = max. 45 kN (10 115 lbf)
- Vertically: **F2** = max. 45 kN (10 115 lbf)

Support points

The maximum force permitted for the support points (**2**) is **F3** in the angle range between the horizontal (**3**) and vertical (**4**) axes.

F3 = max. 258 kN (58 000 lbf)



Locking points

The maximum forces permitted for the locking points (**3**) are **F4, F5** and **F6** in the direction indicated.

- In the direction of travel: **F4** = max. 65 kN (14 600 lbf)
- Horizontally: **F5** = max. 65 kN (14 600 lbf)
- Vertically: **F6** = max. 112 kN (25 150 lbf)

27.02.2014

This operating manual is divided into two parts:

Part 1 – Driving

Part 2 – Crane operation

Content overview of Part 2:

Chapters 1 to 8 are in Part 1 – Driving

This section alone does not constitute the entire operating manual.
The basic safety instructions for crane operation can be found in Part 1, Chapter 2.

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9 Operating elements for crane operation

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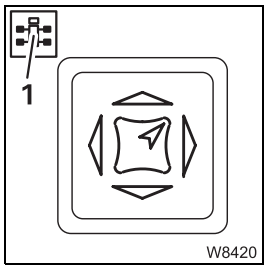
9 Operating elements for crane operation

All operating elements for driving are described in chapter 3.

9.1 Overview of the operating elements

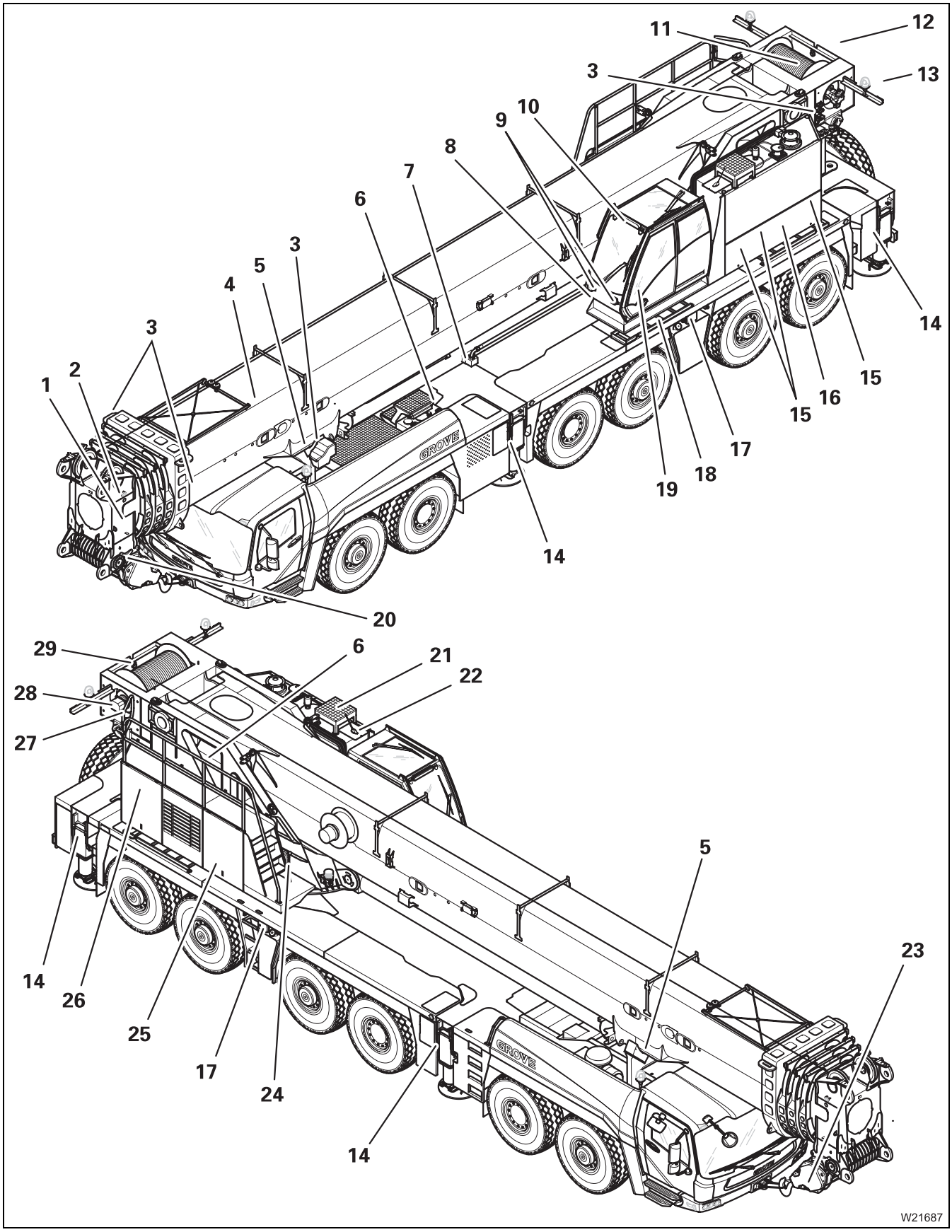
This section shows the position and designations of the operating elements for crane operation. This also includes display elements such as lights or displays.

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



Some figures show details from a different perspective than the general overview. The perspective is indicated in these figures by the symbol (**1**).

9.1.1 Exterior of the truck crane



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1	Lifting limit switch – function	➠ p. 11 - 62
	Lifting limit switch – rigging	➠ p. 12 - 126
2	Anemometer and air traffic control light[1)]	➠ p. 12 - 133
3	Connections for hand-held control	➠ p. 9 - 50
4	Remove/install main boom[1)]	
5	Slewable spotlight[1)]	➠ p. 11 - 109
6	Control panel for hydraulic emergency operation[1)]	➠ p. 14 - 59
	Emergency supply connections for hydraulic emergency operation[1)]	➠ p. 14 - 68
7	Boom floating position[1)]	➠ p. 6 - 8
	Boom pre-tensioning[1)]	➠ p. 6 - 9
8	Key-operated RCL override switch	➠ p. 11 - 47
9	Spotlights[1)]	➠ p. 9 - 104
10	RCL status display	➠ p. 11 - 41
11	Main hoist	➠ p. 9 - 76
12	Auxiliary hoist[1)], removed	➠ p. 9 - 77
13	Counterweight, removed	➠ p. 12 - 59
14	Outriggers	➠ p. 12 - 29
	Outrigger lighting[1)]	➠ p. 3 - 57
15	Shut-off valves on the superstructure hydraulics	➠ p. 10 - 3
16	Drive unit[2)]	
17	Outrigger control units	➠ p. 9 - 54
	Control units for raising the axles	➠ p. 9 - 54
	Emergency stop switch	➠ p. 14 - 1
18	Storage compartment for anemometer and air traffic control light	
19	Crane cab	➠ p. 9 - 4
20	Camera on main boom	➠ p. 12 - 137
21	Hydraulic oil cooler[1)]	➠ p. 11 - 104
22	CraneSTAR system	➠ p. 11 - 145
23	Hook block	➠ p. 12 - 109
24	Fuel tank auxiliary heater	➠ p. 11 - 5
25	Slewing gear	➠ p. 11 - 98
	Slewing gear freewheel[1)]	➠ p. 6 - 7
	Turntable lock	➠ p. 9 - 89
26	Distribution box, with fuses behind it	➠ p. 14 - 6
27	Railings on the turntable	➠ p. 12 - 136
28	Lowering limit switch	➠ p. 11 - 63
29	Hoist camera	➠ p. 12 - 137

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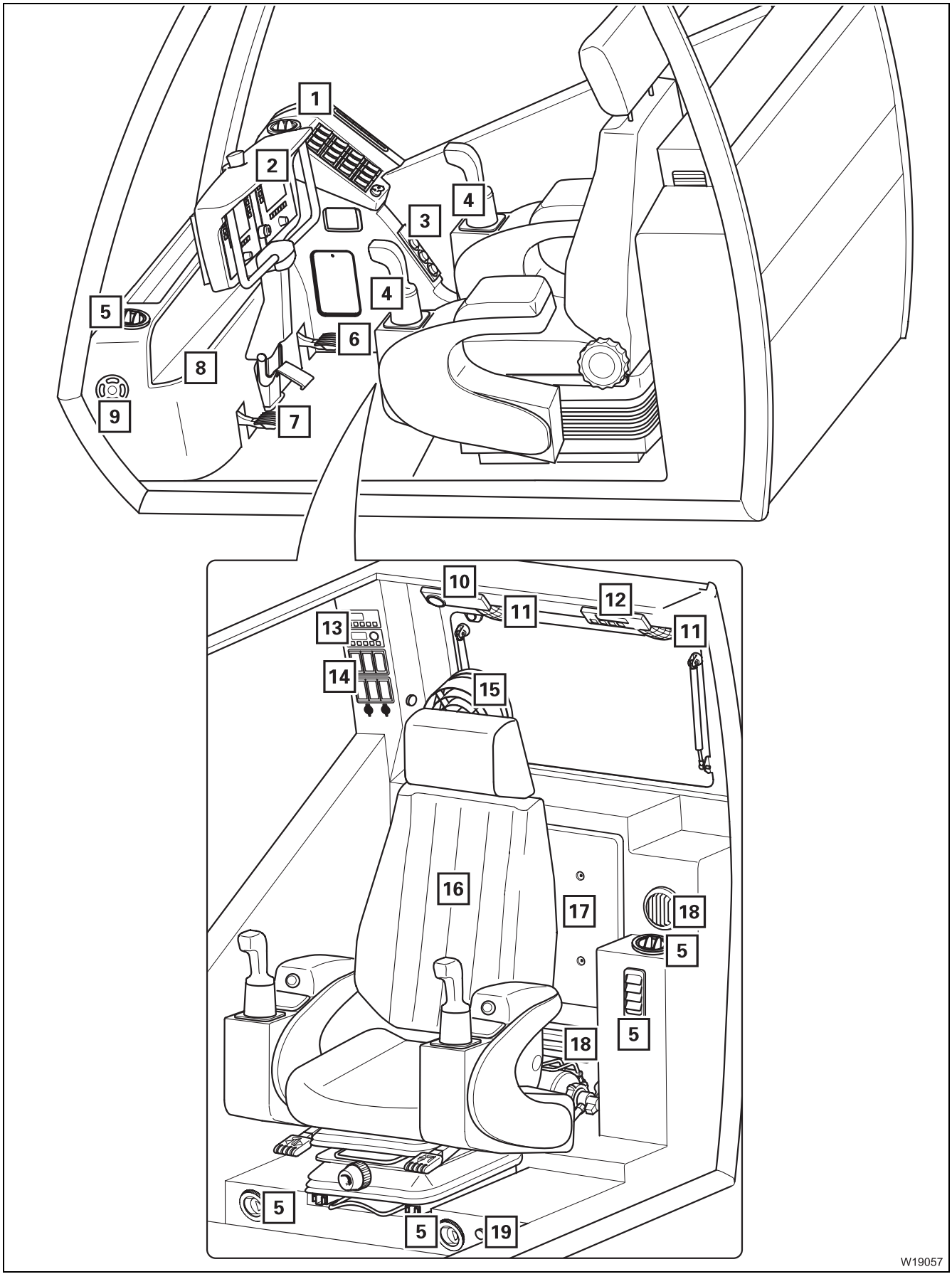
[1)] Additional equipment

[2)] ➠ *Maintenance manual*

9.1.2 Crane cab



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1	Side panel	➠ p. 9 - 7
2	Front panel	➠ p. 9 - 6
3	Standard heating system	➠ p. 9 - 11
4	Control panels	➠ p. 9 - 14
5	Air vent	➠ p. 11 - 132
6	Accelerator	
7	Slewing gear brake – switchable on/off	➠ p. 11 - 98
8	Storage compartment	
9	Windscreen washing system reservoir[3)]	
10	Cab lighting	➠ p. 9 - 105
11	Loudspeakers	
12	Radio/cassette[1), 2)] Radio/CD player[1)]	
13	Auxiliary water heater Auxiliary air heater	➠ p. 9 - 12 ➠ p. 9 - 13
14	Console, rear	➠ p. 9 - 10
15	Fan with switch[1)]	
16	Crane cab seat – Version 1 Crane cab seat – Version 2 Seat contact switch	➠ p. 11 - 7 ➠ p. 11 - 7 ➠ p. 9 - 63
17	Cover, with fuses behind it	➠ p. 14 - 9
18	Intake/air vents	➠ p. 11 - 131
19	Door unlocking mechanism	➠ p. 9 - 112

[1)] Additional equipment

[2)] ➠ *Separate operating manual*

[3)] ➠ *Maintenance manual*

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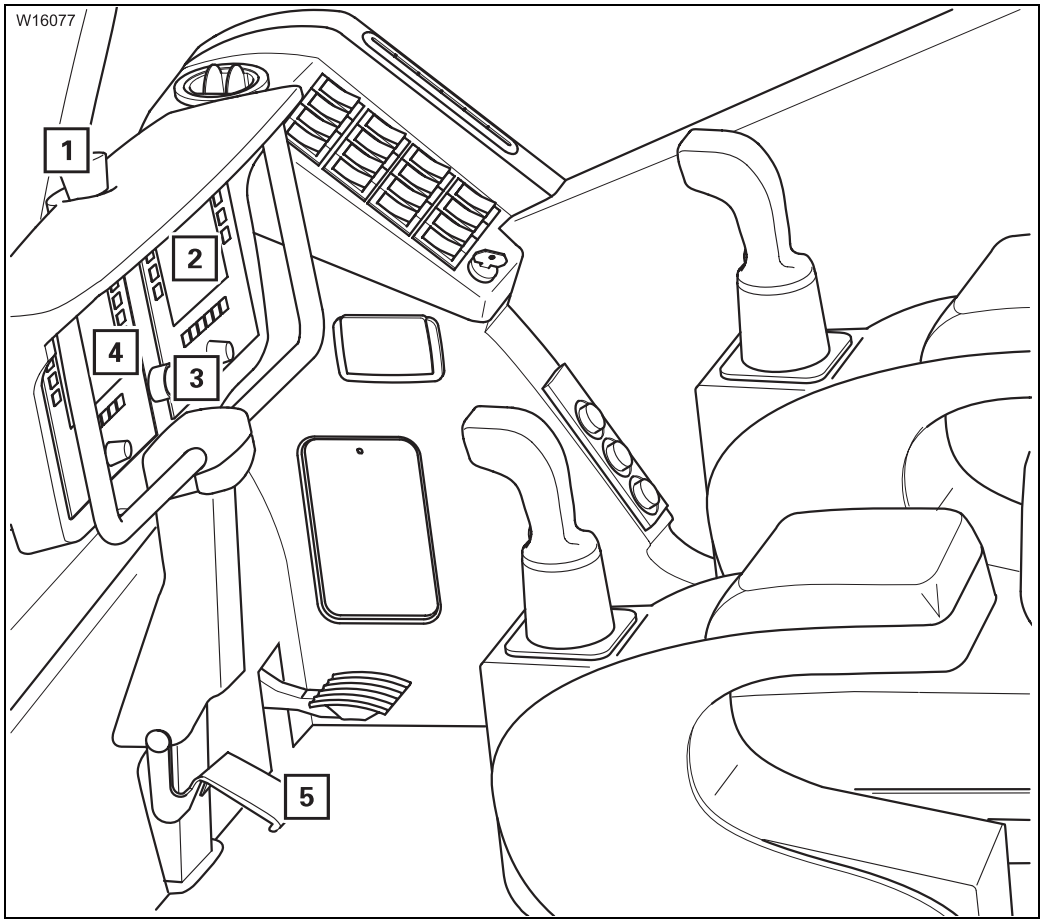
9.1.3 Front panel



1 Emergency stop switch ➠ p. 9 - 66

2 RCL control unit (**R**ated **C**apacity **L**imiter) ➠ p. 9 - 38

Depending on the version:

3 – Key-operated RCL override switch – symbol (A) ➠ p. 11 - 45

or

– Key-operated RCL override switch ➠ p. 11 - 47
– For RCL
– Lifting limit switch

4 ECOS control unit ➠ p. 9 - 18

5 Front panel ➠ p. 11 - 8

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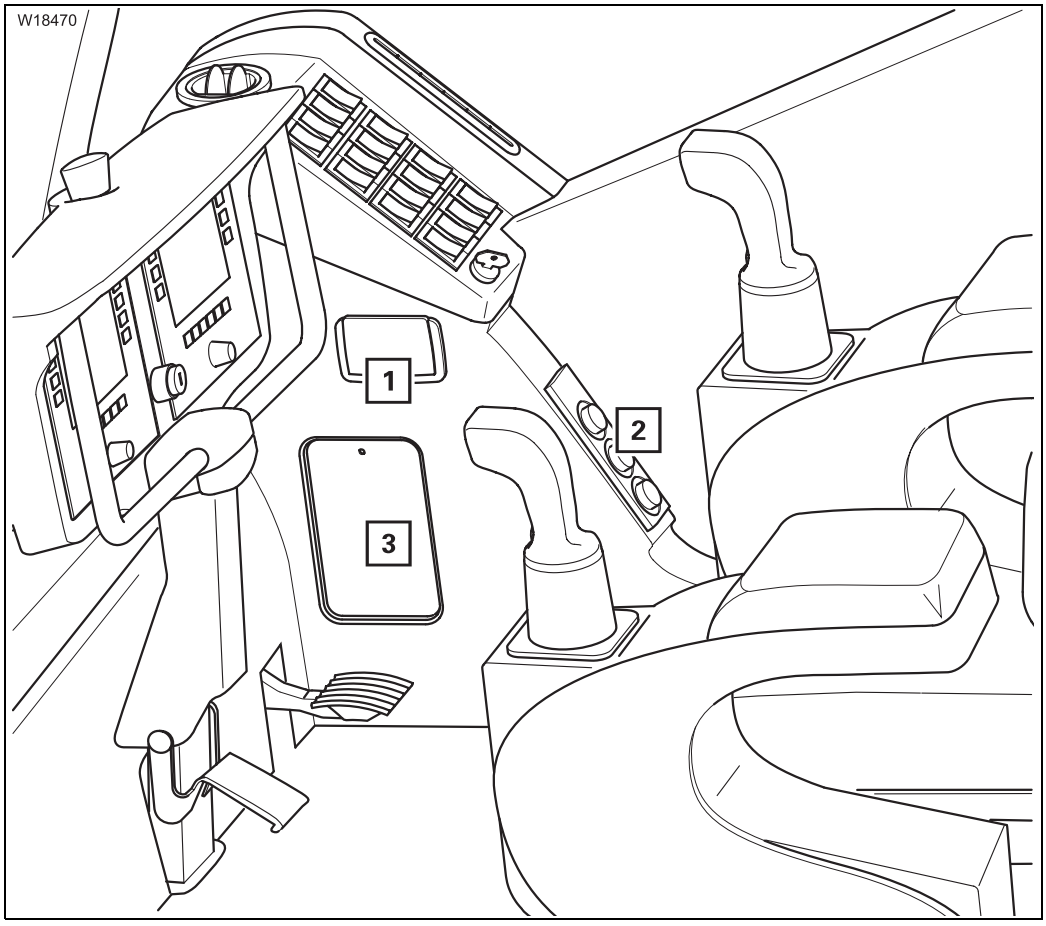
9.1.4 Side panel

Below



1 Ashtray

2 Standard heating system p. 9 - 11

3 Diagnostics (behind lid) p. 9 - 113

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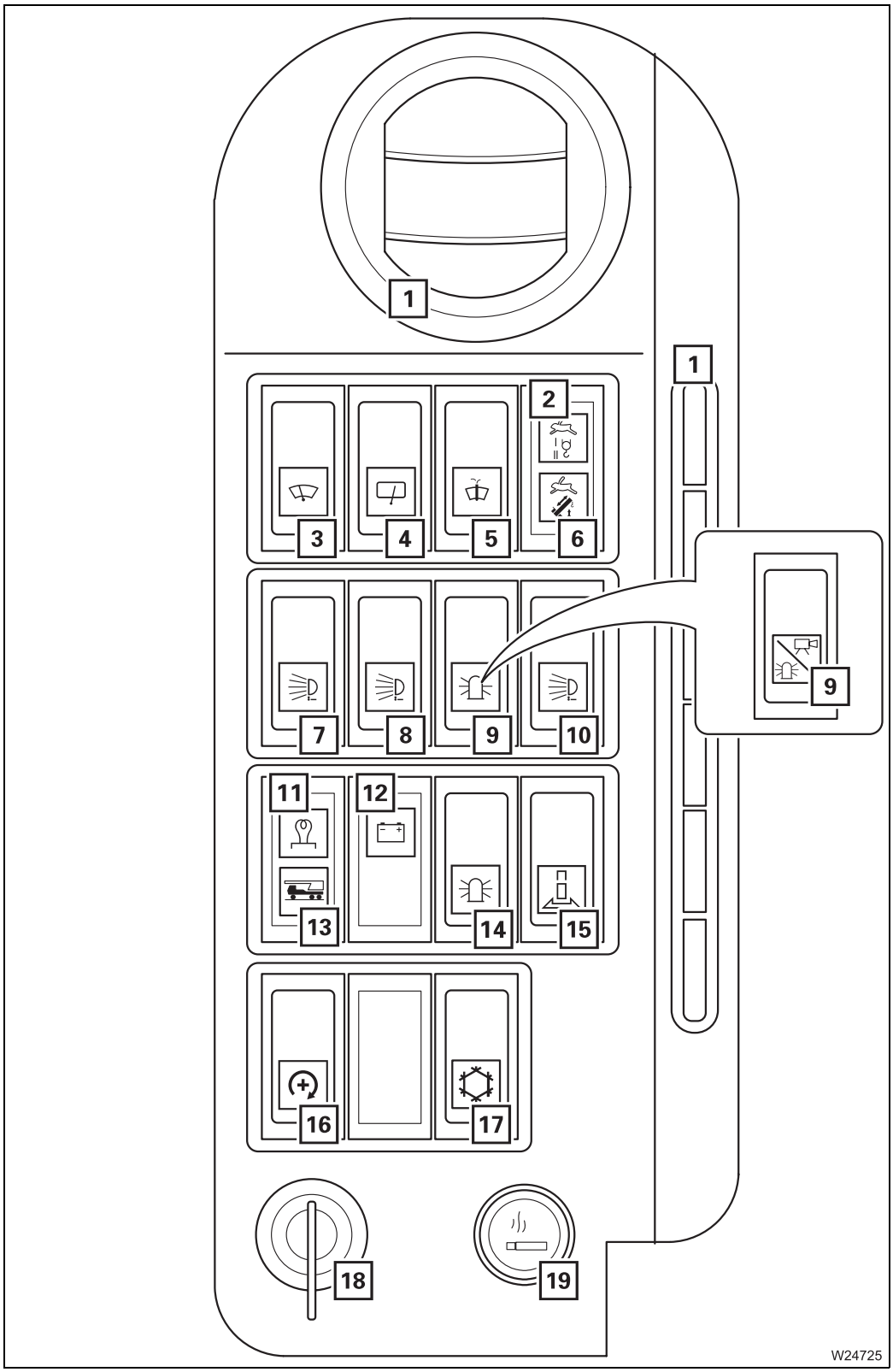
Above



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1	Air vents	p. 11 - 132
2	High speed indicator lamp for hoists	p. 9 - 76
3	Windscreen wiper on/off	p. 9 - 106
4	Roof window wiper on/off	p. 9 - 106
5	Windscreen washing system	p. 9 - 106
6	High-speed indicator lamp for derricking gear/telescoping mechanism	p. 9 - 80
7	Spotlight sockets on/off	p. 9 - 104
8	Slewable spotlight on/off[1)]	p. 9 - 104
9	Air traffic control light/camera on/off/camera[1) 2)]	p. 9 - 104
10	Swinging the spotlight[1)]	p. 9 - 105
11	Flame start system indicator lamp[1)]	p. 9 - 61
12	Voltage monitoring warning	p. 9 - 104
13	Carrier ignition indicator lamp	p. 9 - 61
14	Rotating beacon on/off[1)]	p. 9 - 104
15	Houselock on/off[1)]	p. 9 - 90
16	Setting idling speed	p. 9 - 61
17	Air-conditioning system[1)]	p. 11 - 133
18	Ignition lock	p. 9 - 61
19	Cigarette lighter (24 volts)	

[1)] Additional equipment

[2)] Symbol according to version

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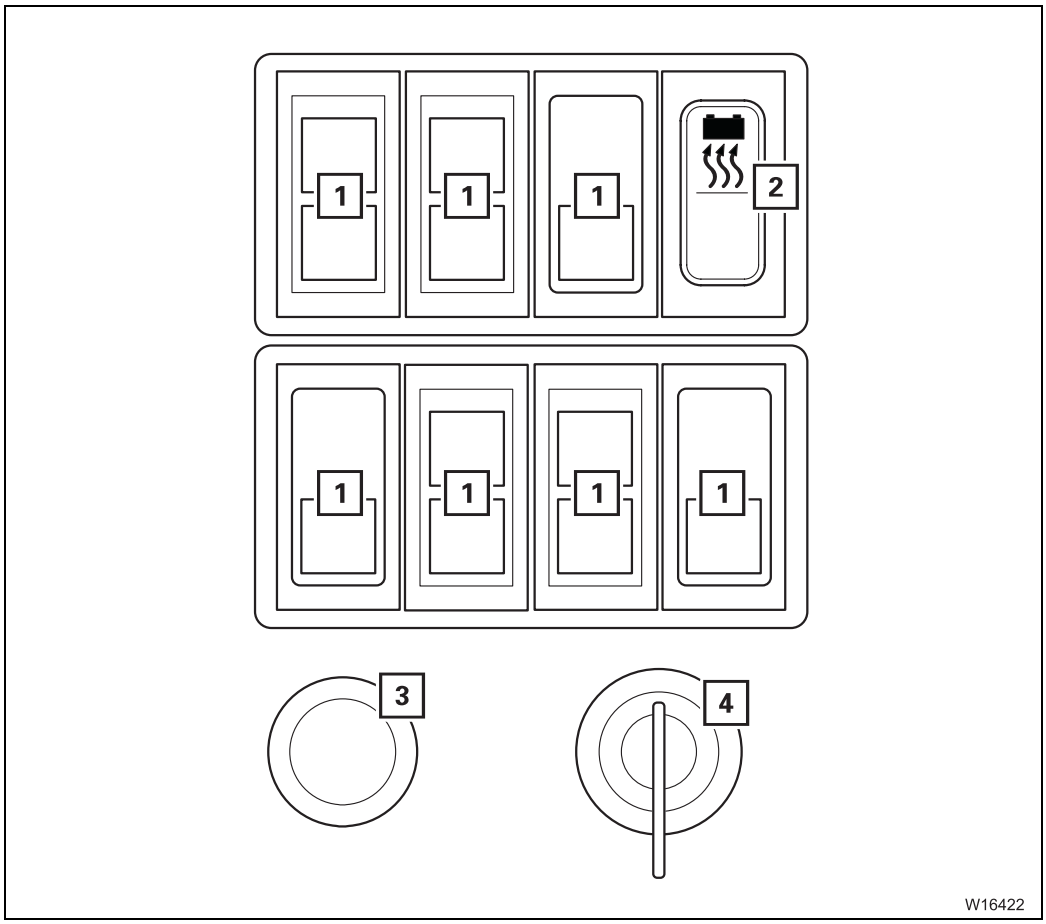
Console, rear



1 Configuration according to version[1)]

2 Battery heater[1) 2)] ➠ p. 9 - 62

3 Socket (12 V)[1)]

4 Key-operated switch[1) 2)]

[1)] Additional equipment

[2)] ➠ *Separate operating manual*

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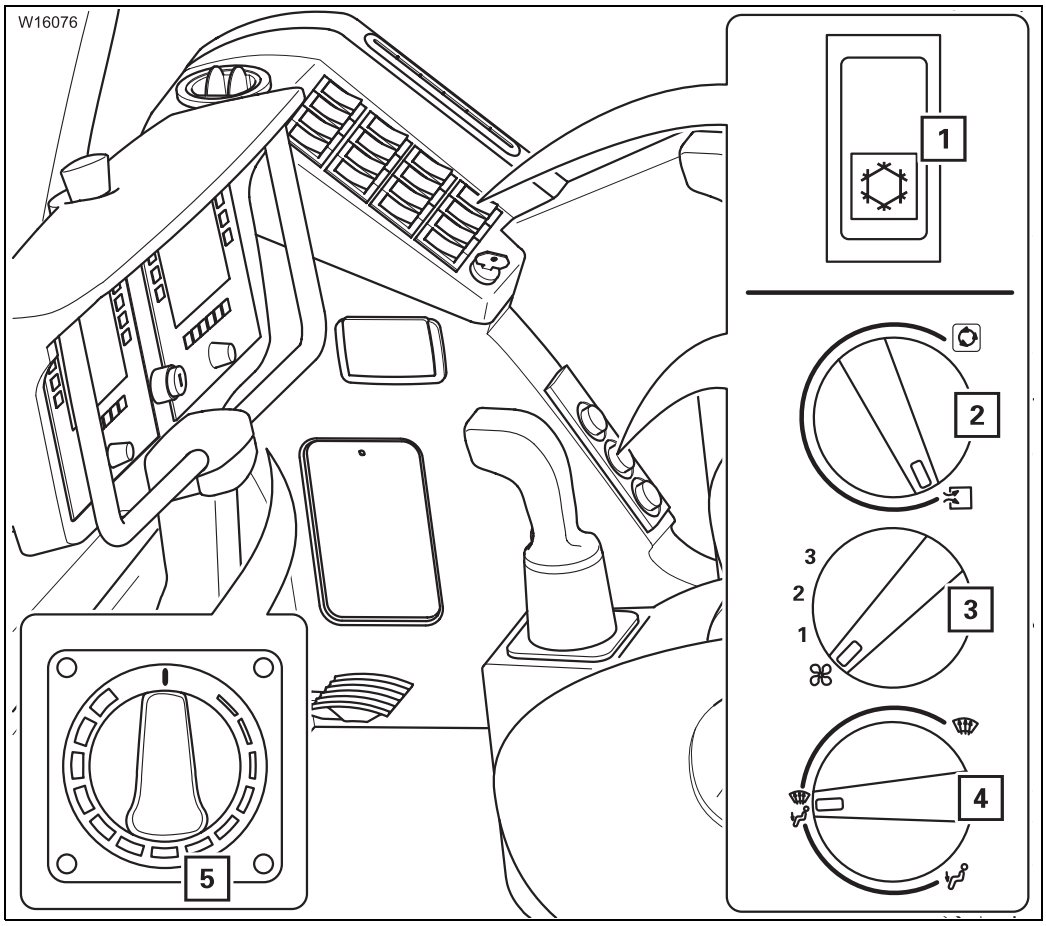
Standard heating system



1 CraneSTAR systemAir-conditioning system[1)] p. 11 - 133
2 Setting fresh air/recirculated air/mixed air p. 11 - 131
3 Setting the fan p. 11 - 131
4 Air distribution p. 11 - 132
5 Setting the temperature p. 11 - 131

[1)] Additional equipment

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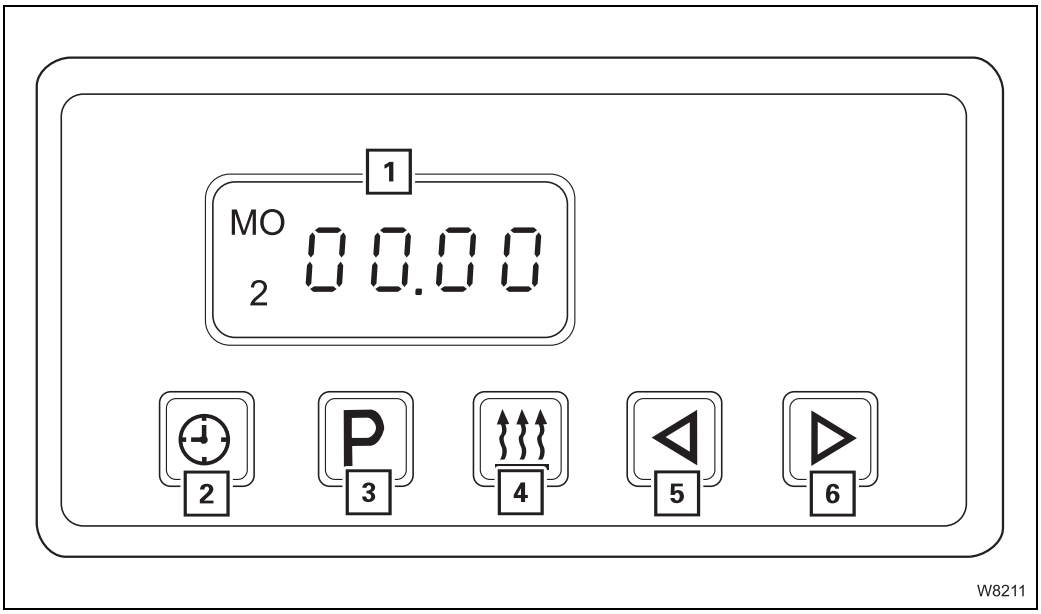
Auxiliary water heater



1 Heating display p. 11 - 137

2 Setting the day and time p. 11 - 138

3 – Storing the heating start p. 11 - 139
– Switching heating start on/off p. 11 - 140

4 – Switching on p. 11 - 137
– Switching off p. 11 - 141

5 Input – p. 11 - 138

6 Input + p. 11 - 138

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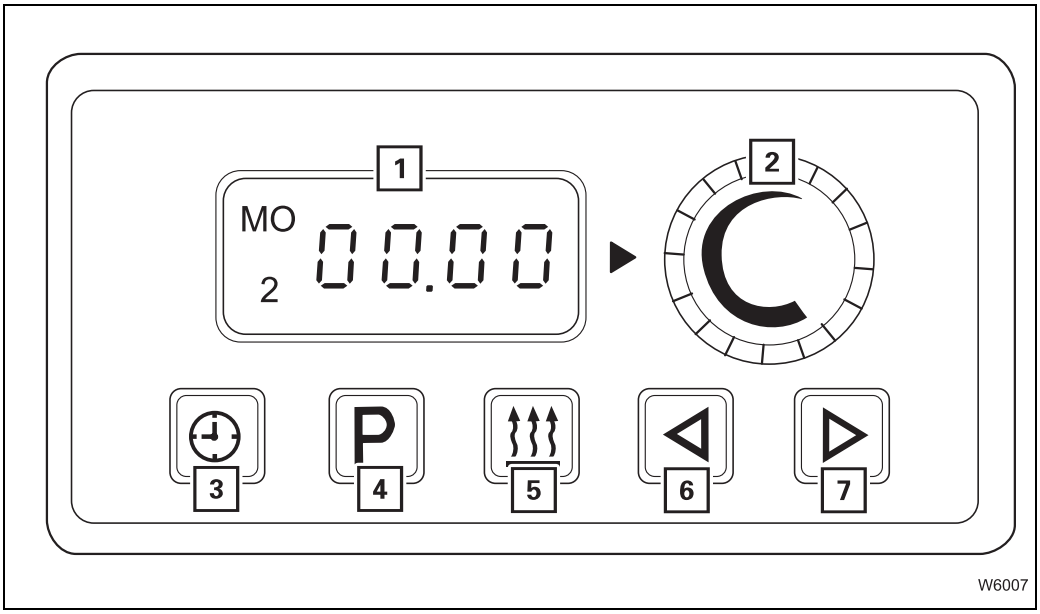
Auxiliary air heater



1 Heating display p. 11 - 142

2 Temperature p. 11 - 143

3 Setting the time/day p. 11 - 143

4 – Storing the heating start p. 11 - 143
– Switching heating start on/off p. 11 - 143

5 – Switching on p. 11 - 142
– Switching off p. 11 - 143

6 Input – p. 11 - 143

7 Input + p. 11 - 143

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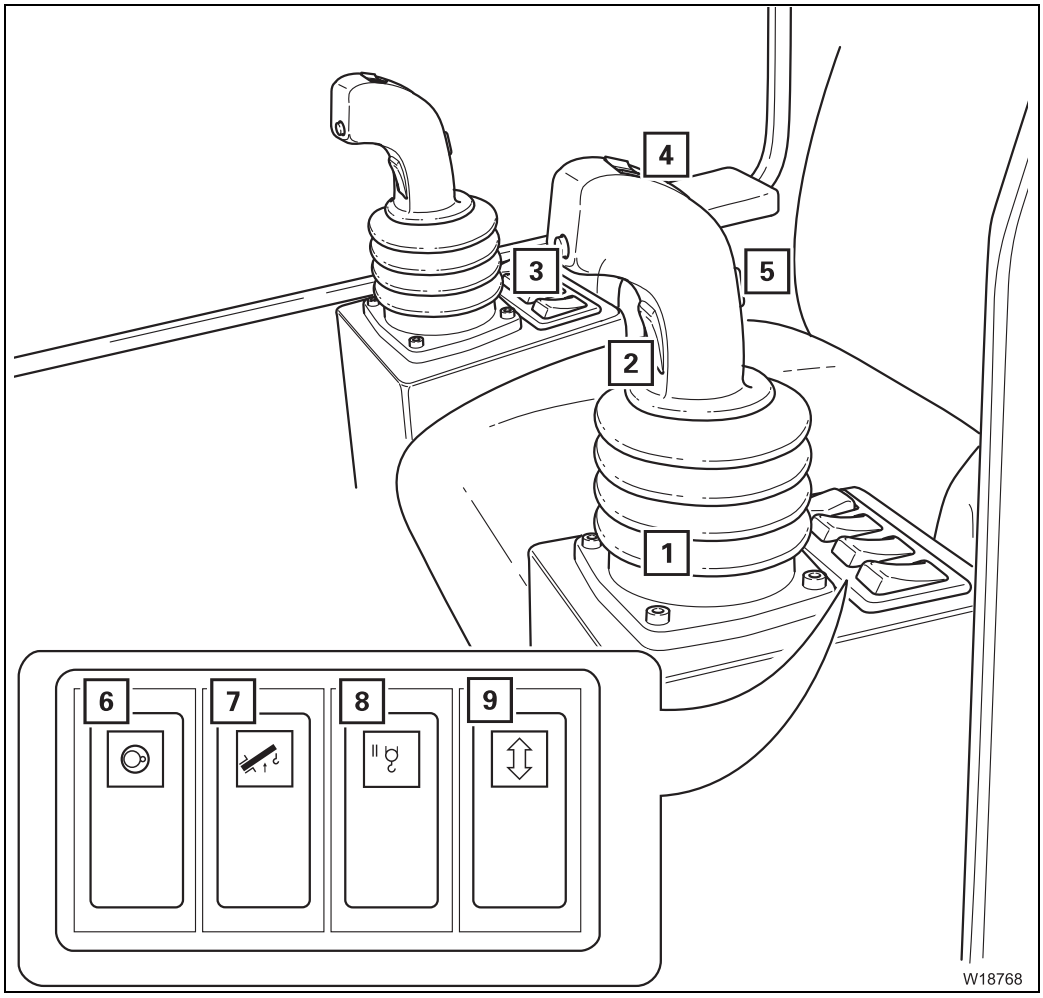
9.1.5 Control panels

Left



1 Left control lever (configuration according to version) ➠ p. 9 - 16

2 Dead man's switch ➠ p. 9 - 63

3 Horn button
or
Slewing gear freewheel[1)] ➠ p. 9 - 78

4 Depending on which function is activated, button for:
– Derricking gear/telescoping mechanism high-speed mode on/off ➠ p. 9 - 80

5 Auxiliary hoist slewing indicator ➠ p. 11 - 60

6 Slewing gear on/off ➠ p. 9 - 78

7 Raise switch ➠ p. 9 - 81

8 Auxiliary hoist on/off[1)] ➠ p. 9 - 77

9 Inclining the crane cab[1)] ➠ p. 9 - 88

[1)] Additional equipment

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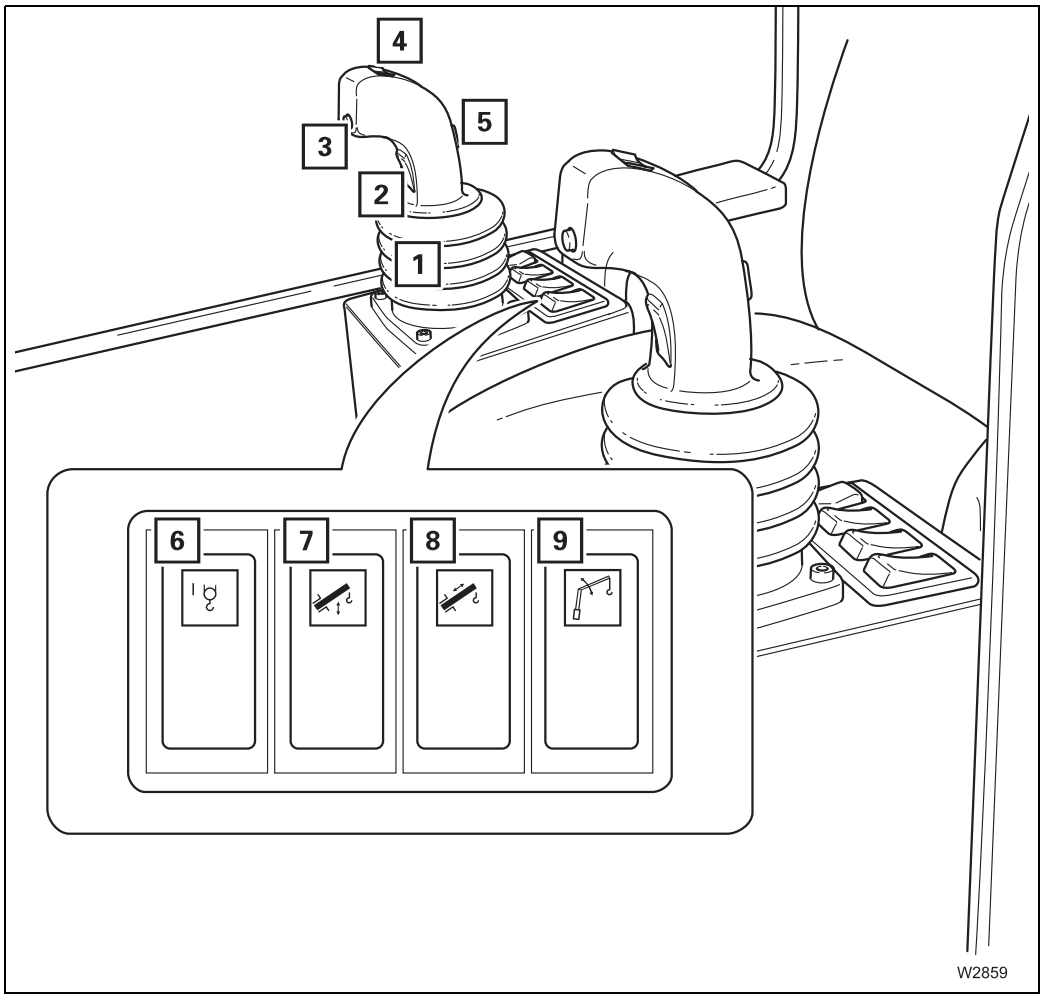
Right



1 Right control lever (configuration according to version) ➠ p. 9 - 16

2 Dead man's switch ➠ p. 9 - 63

3 Horn button

4 Hoist high-speed mode on/off ➠ p. 9 - 76

5 Main hoist slewing indicator ➠ p. 11 - 57

6 Main hoist on/off ➠ p. 9 - 76

7 Derricking gear on/off ➠ p. 9 - 80

8 Telescoping mechanism on/off ➠ p. 9 - 81

9 Derrick lattice extension on/off[1), 2)]

[1)] Additional equipment

[2)] ➠ *Lattice extension operating instructions*

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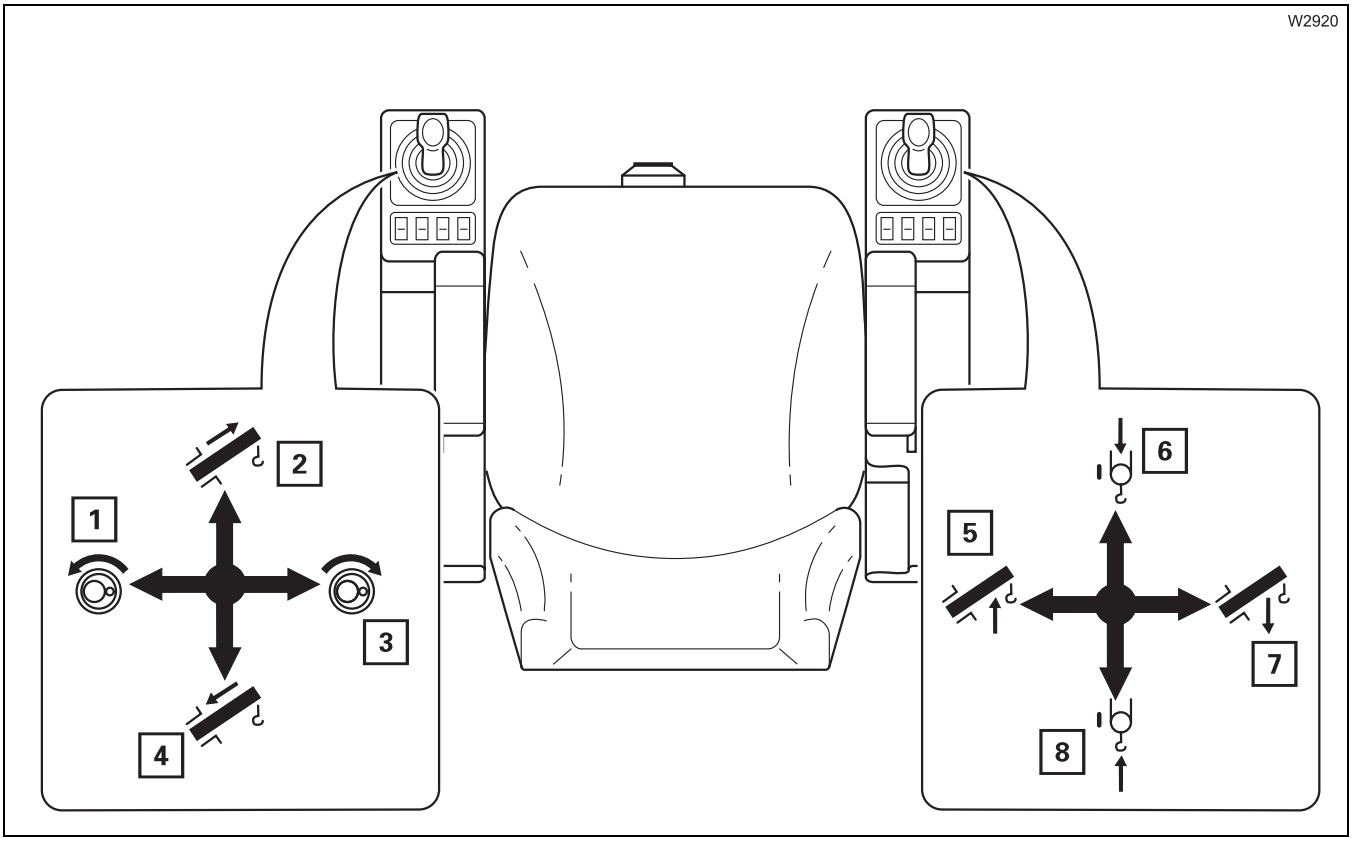
9.1.6 Control lever configuration

The truck crane can be equipped with two different control lever configurations. The current configuration of the control levers is indicated by symbols on the control levers.

Version 1

In version 1, the left control lever is configured with the *Telescope* function.



Left control lever

1 Slew to the left
3 Slew to the right
2 Extend
4 Retract

Right control lever

5 Raise the boom
7 Lower the boom
6 Lower the main hoist
8 Lift the main hoist

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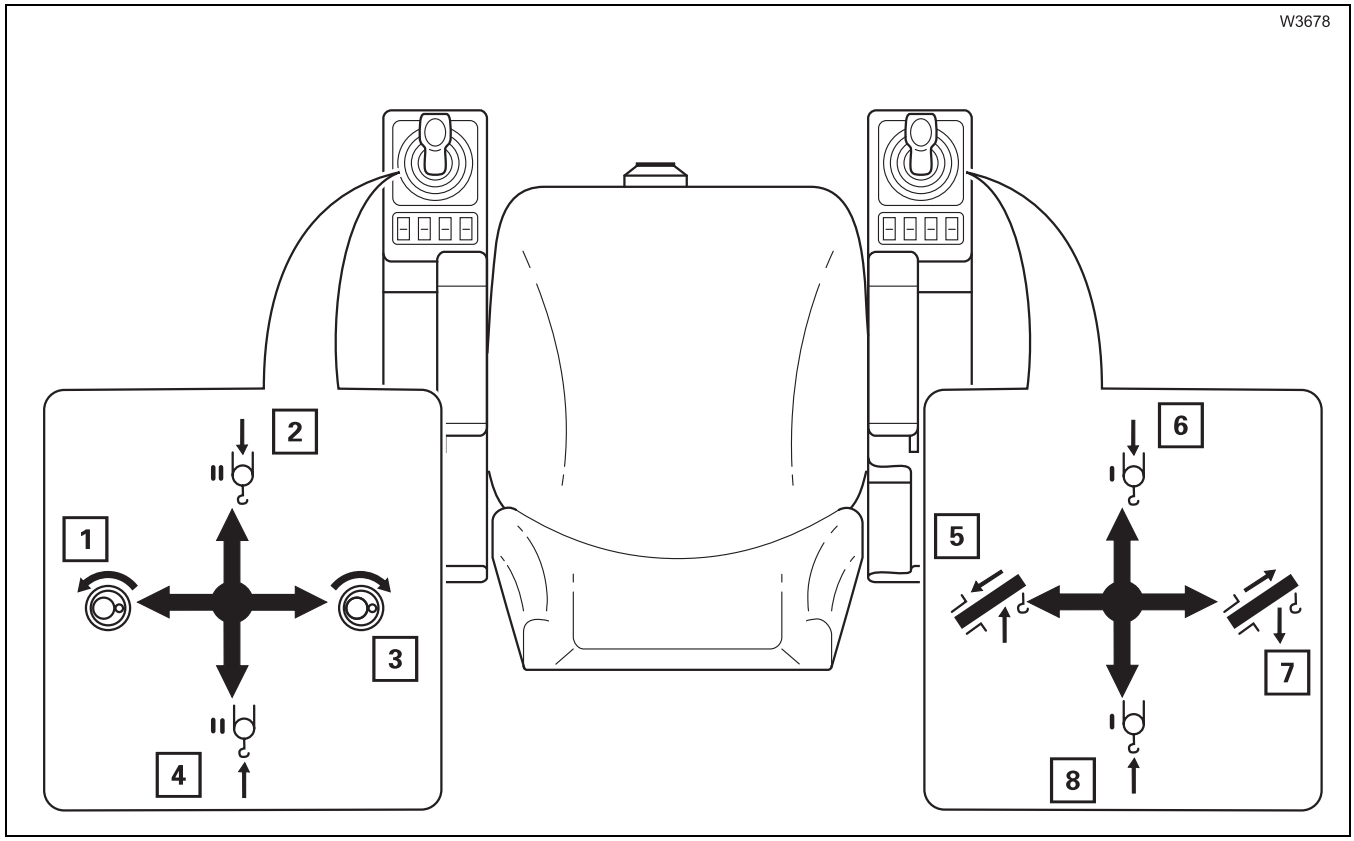
Version 2 In version 2, the right control lever is configured with the *Telescope* function.



Left control lever

1 Slew to the left

3 Slew to the right

2 Lower the auxiliary hoist[1)]

4 Raise the auxiliary hoist [1)]

Right control lever

5 Raise/retract[2)]

7 Lower/extend[2)]

6 Lower the main hoist

8 Lift the main hoist

[1)] Additional equipment

[2)] Derrick the lattice extension; ➠ *Lattice extension operating instructions*

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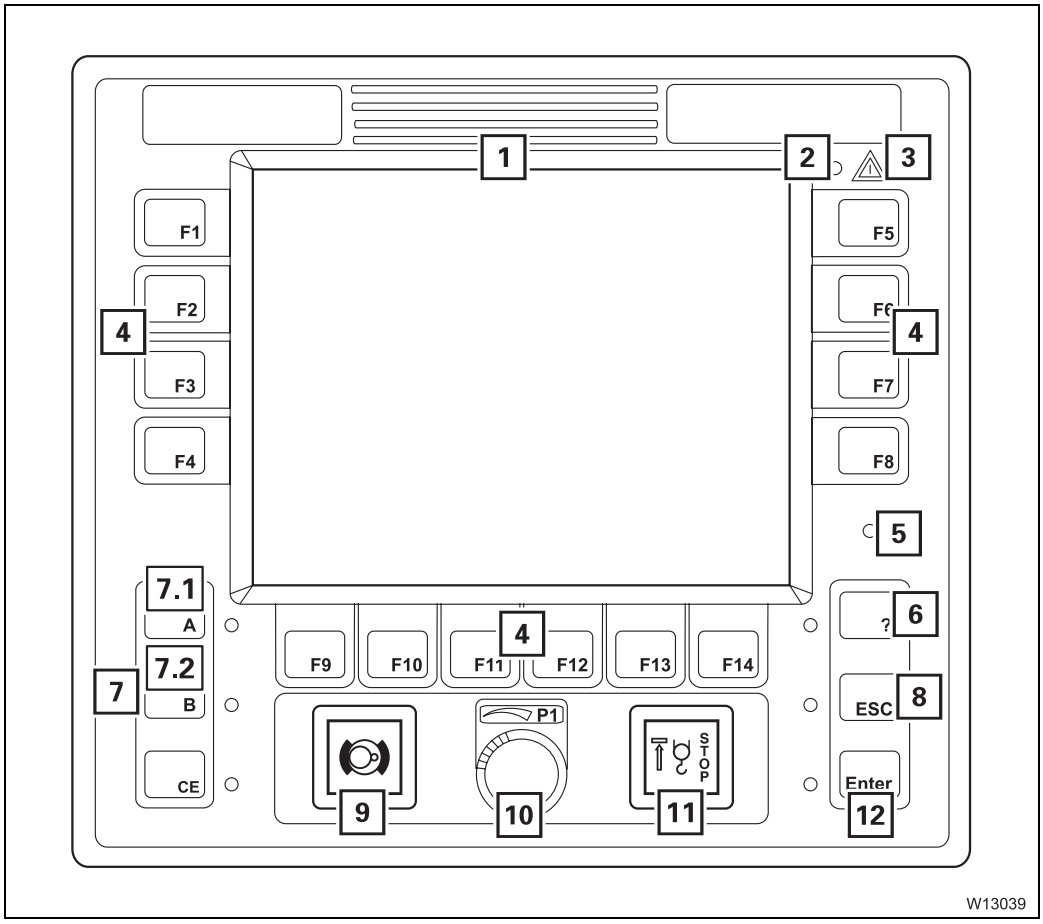
9.1.7 ECOS control unit



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1	ECOS display	p. 9 - 66
	Main menu overview	p. 9 - 20
2	Brightness sensor[1)]	p. 9 - 66
3	Error/warning message	p. 9 - 64
4	Buttons F1 to F14	p. 9 - 64
5	Brightness sensor[1)]	p. 9 - 66
6	Opening Errors submenu	p. 9 - 64
	Submenu overview	p. 9 - 36
7	Keycode entry	p. 9 - 65
7.1	Open Warning submenu	p. 9 - 64
	Submenu overview (superstructure)	p. 9 - 33
7.2	Open Warning submenu	p. 9 - 65
	Submenu overview (carrier)	p. 9 - 34
8	Exiting submenu/input mode	p. 9 - 65
9	Slewing gear brake engaged/released	p. 9 - 78
10	Entering values	p. 9 - 65
11	Warning for lifting limit switch shutdown	p. 9 - 76
12	Input confirmation	p. 9 - 65

[1)] Either **2** or **5**

Various menus are shown on the *ECOS* display.
The menus are operated using buttons F1 to F14. The individual buttons have a different function in each menu. The functions of the buttons in the displayed menu correspond to the symbols next to or above the buttons; p. 9 - 64.

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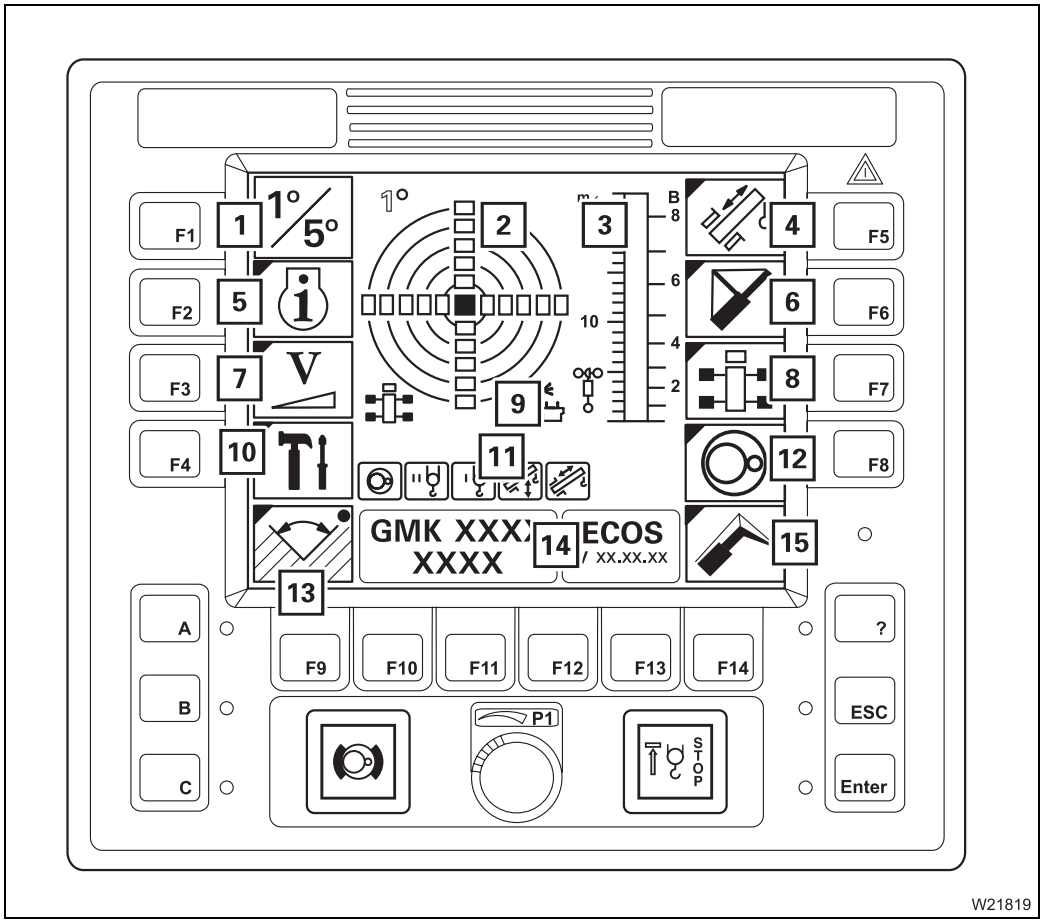
9.1.8 ECOS display – main menu

The main menu displays symbols for further submenus and symbols for current displays.



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1 Switch between measuring ranges
2 Current inclination indicator ➠ p. 9 - 72
3 Anemometer display[1)] ➠ p. 9 - 75
4 Telescoping submenu ➠ p. 9 - 26
5 Monitoring submenu ➠ p. 9 - 29
6 Mega Wing Lift submenu[1), 4)]
7 Power unit speeds submenu ➠ p. 9 - 28
8 Outriggers submenu ➠ p. 9 - 24
9 Remote control display[1), 3)]
10 Settings submenu ➠ p. 9 - 30
11 Power units display
– Slewing gear ➠ p. 9 - 78
– Auxiliary hoist ➠ p. 9 - 77
– Main hoist ➠ p. 9 - 76
– Derricking gear ➠ p. 9 - 80
– Telescoping mechanism ➠ p. 9 - 81
12 Superstructure lock submenu[1)] ➠ p. 9 - 23
13 Working range limiter submenu[1)] ➠ p. 9 - 36
14 Serial number and programme version displays ➠ p. 9 - 66
15 Derrick Lattice submenu[1), 2)]

[1)] Additional equipment
[2)] ➠ *Lattice extension operating instructions*
[3)] ➠ *Separate operating manual*
[4)] ➠ *Mega Wing Lift operating instructions*

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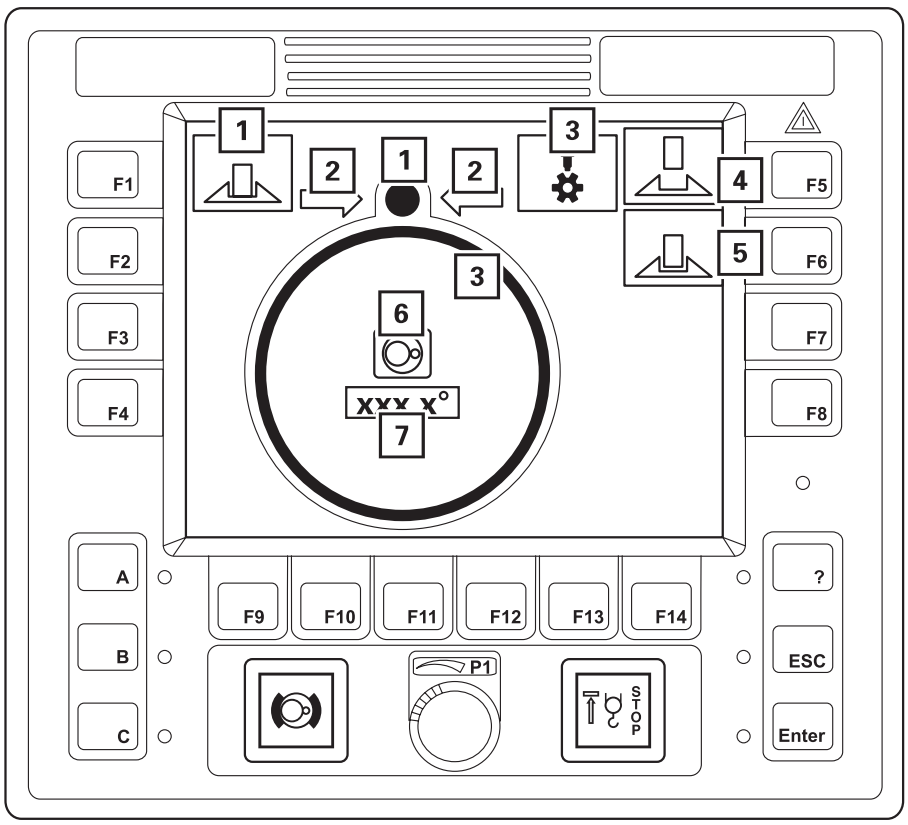
9.1.9 ECOS display – submenus

Superstructure lock submenu



1 Superstructure locking status displays ➠ p. 9 - 89
2 Display slewing direction to 0°/180° ➠ p. 9 - 90
3 Houselock locking status displays[1)] ➠ p. 9 - 90
4 Unlock turntable ➠ p. 9 - 89
5 Lock turntable ➠ p. 9 - 89
6 Slewing gear display ➠ p. 9 - 79
7 Current slewing angle display ➠ p. 9 - 79

[1)] Additional equipment

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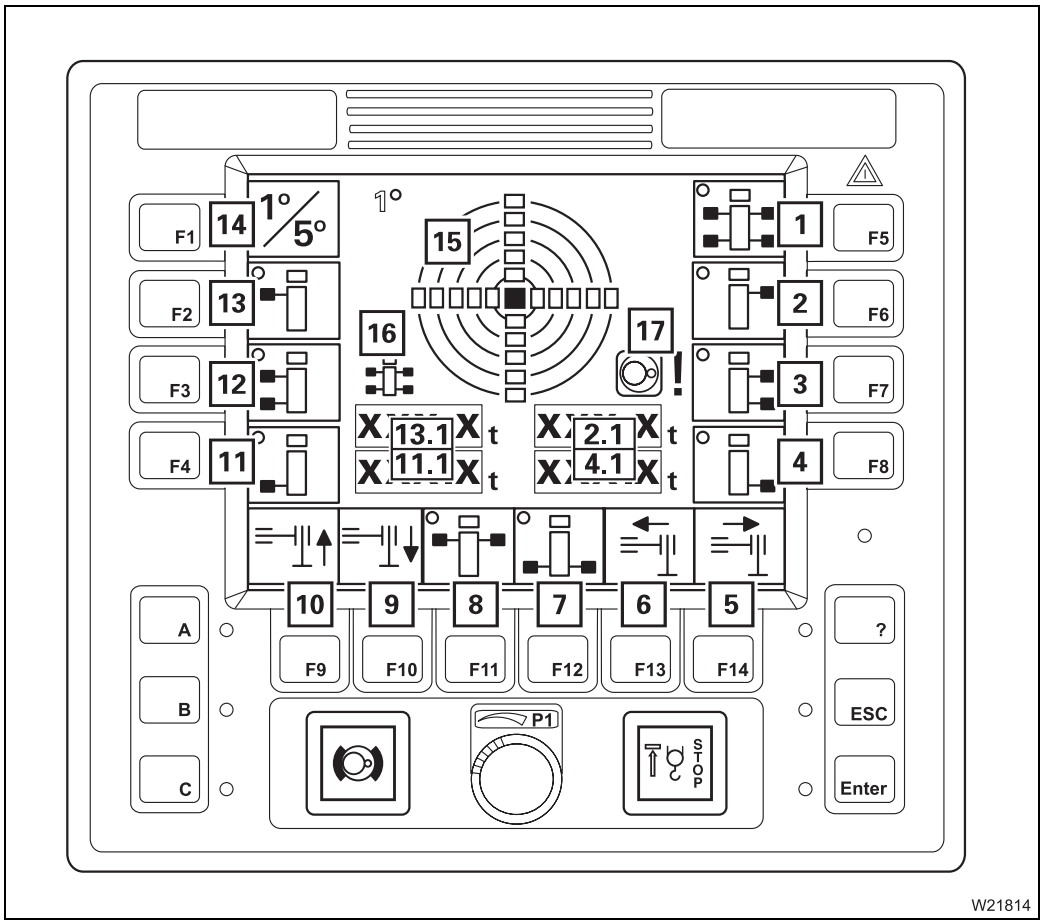
Outriggers submenu



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1	All supporting cylinders	p. 9 - 69
2	Front right outriggers	p. 9 - 69
2.1	Front right-hand outrigger pressure display[1)]	p. 9 - 75
3	Right supporting cylinder	p. 9 - 69
4	Rear right outriggers	p. 9 - 69
4.1	Rear right-hand outrigger pressure display[1)]	p. 9 - 75
5	Extend outrigger beam	p. 9 - 69
6	Retract outrigger beam	p. 9 - 69
7	Rear supporting cylinder	p. 9 - 69
8	Front supporting cylinder	p. 9 - 69
9	Extend supporting cylinders	p. 9 - 69
10	Retract supporting cylinders	p. 9 - 69
11	Rear left outriggers	p. 9 - 69
11.1	Rear left-hand outrigger pressure display[1)]	p. 9 - 75
12	Left supporting cylinder	p. 9 - 69
13	Front left outriggers	p. 9 - 69
13.1	Front left-hand outrigger pressure display[1)]	p. 9 - 75
14	Switch measuring range	p. 9 - 72
15	Current inclination indicator	p. 9 - 72
16	Angle direction display	p. 9 - 72
17	Slewing gear/movements locked display	p. 9 - 68

[1)] Additional equipment

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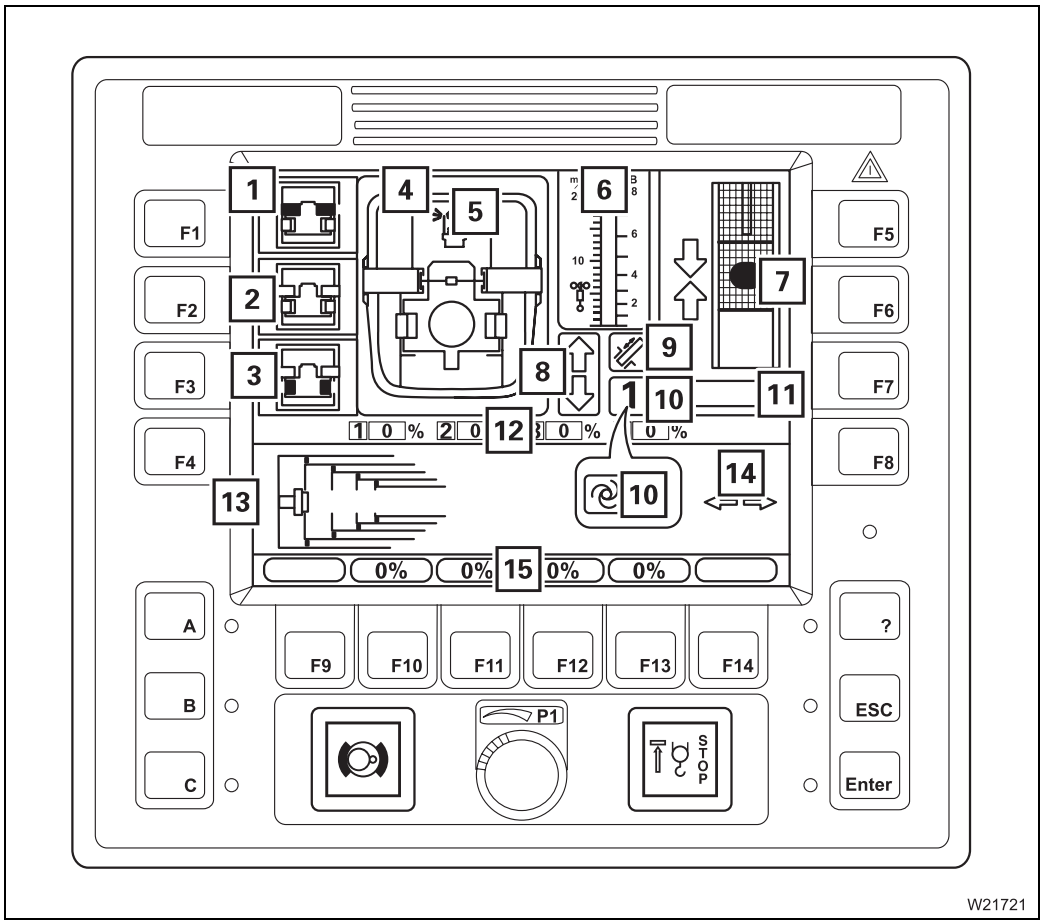
Telescoping submenu



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1 Unlock telescopic section selection ➠ p. 9 - 84
2 Lock selection ➠ p. 9 - 84
3 Unlock telescoping cylinder selection ➠ p. 9 - 83
4 Locking status display ➠ p. 9 - 83
5 Remote control display[1), 2)]
6 Anemometer display ➠ p. 9 - 75
7 Locking point display ➠ p. 9 - 85
8 Enable telescoping display ➠ p. 9 - 85
9 Display for telescoping mechanism on/off ➠ p. 9 - 82
10 – Telescoping cylinder in the telescopic section display ➠ p. 9 - 82
– Teleautomation on display/Manual telescoping on ➠ p. 9 - 86
11 Telescoping cylinder length display ➠ p. 9 - 84
12 Current telescoping display ➠ p. 9 - 82
13 Telescope diagram display ➠ p. 9 - 83
14 Teleautomation direction display ➠ p. 9 - 86
15 Entering target value for teleautomation ➠ p. 9 - 85

1) Additional equipment

2) ➠ *Separate operating manual*

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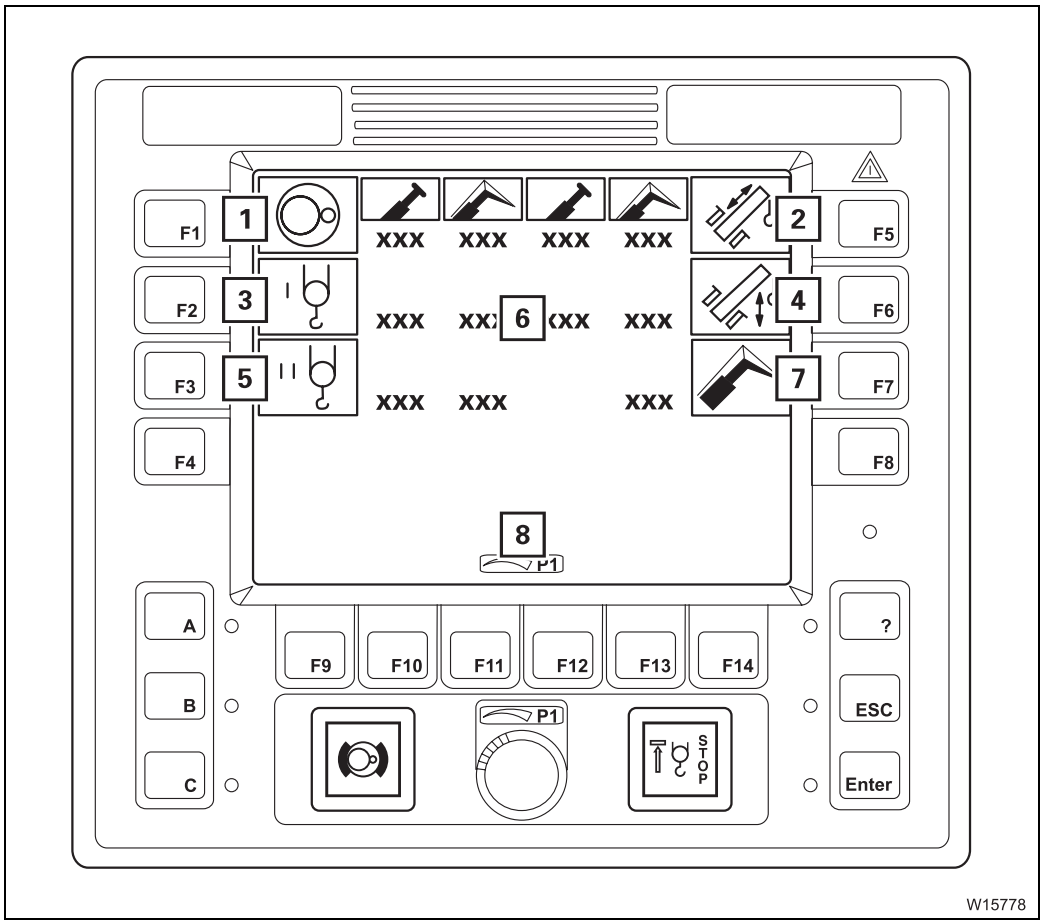
Power unit speeds submenu



1 Enter slewing gear speed ➠ p. 11 - 107
2 Enter telescoping mechanism speed ➠ p. 11 - 107
3 Enter main hoist speed ➠ p. 11 - 107
4 Enter derricking gear speed ➠ p. 11 - 107
5 Enter auxiliary hoist speed ➠ p. 11 - 107
6 Entered speed displays ➠ p. 11 - 107
7 Enter speed for lattice extension derricking gear[1)]
8 Input mode display on

[1)] Additional equipment; ➠ *Lattice extension operating instructions*

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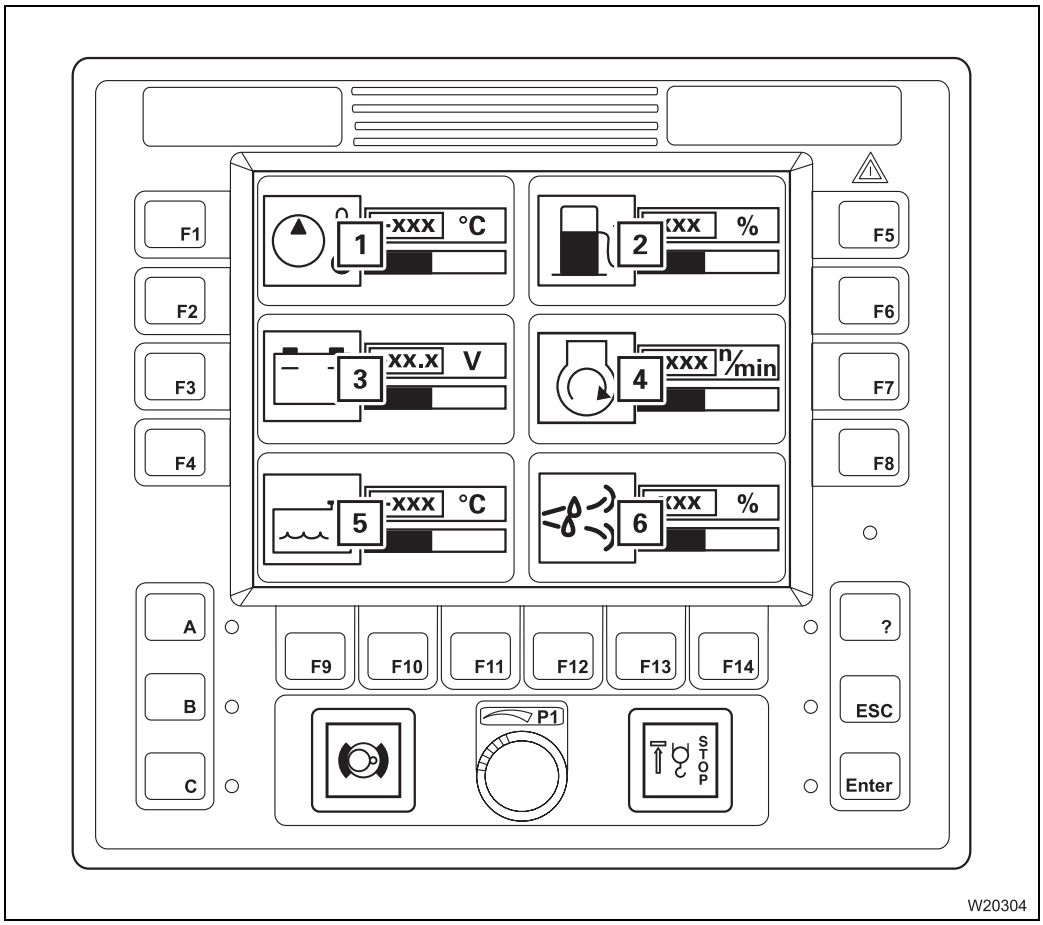
Monitoring submenu



1 Hydraulic oil temperature display ➠ p. 10 - 11

2 Fuel level display ➠ p. 10 - 11

3 Voltage monitoring display ➠ p. 10 - 11

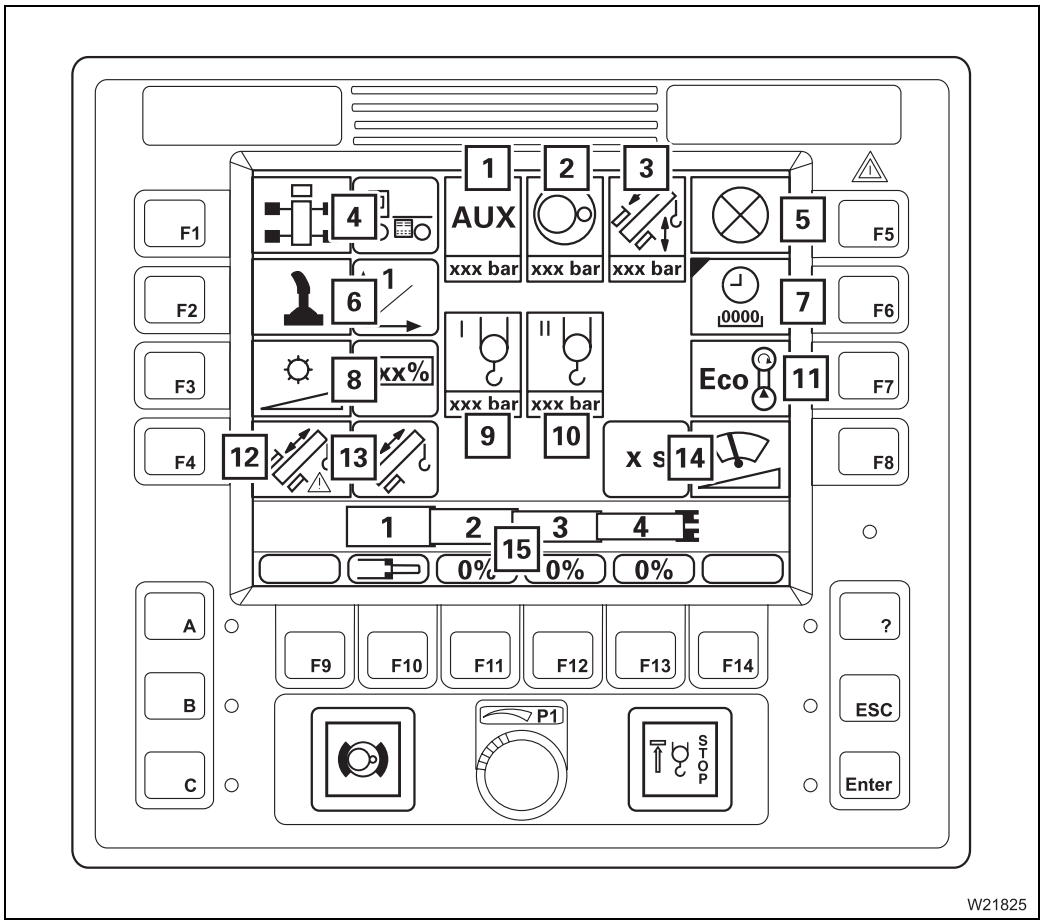
4 Engine speed display ➠ p. 10 - 11

5 Coolant temperature display ➠ p. 10 - 11

6 DEF supply display[1)]

[1)] Additional equipment

Settings submenu



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1	Auxiliary drive gears pressure display	
2	Slewing gear hydraulic circuit pressure display	p. 9 - 88
3	Telescoping cylinder pressure display	p. 9 - 88
4	Outrigger control units on/off[1)]	p. 9 - 69
5	Lamp test	p. 10 - 5
6	Setting the characteristic curves for the control levers	p. 11 - 108
7	Operating hours submenu	p. 9 - 32
8	Adjusting display brightness	p. 10 - 7
9	Main hoist pressure display	
10	Auxiliary hoist pressure display	
11	Switching Economy mode on/off	p. 10 - 13
12	Telescoping emergency programme access	p. 9 - 86
13	Current telescoping mechanism status display	p. 9 - 87
14	Adjusting the wiper stroke interval	p. 9 - 106
15	Entering the current telescoping	p. 14 - 53

[1)] Additional equipment

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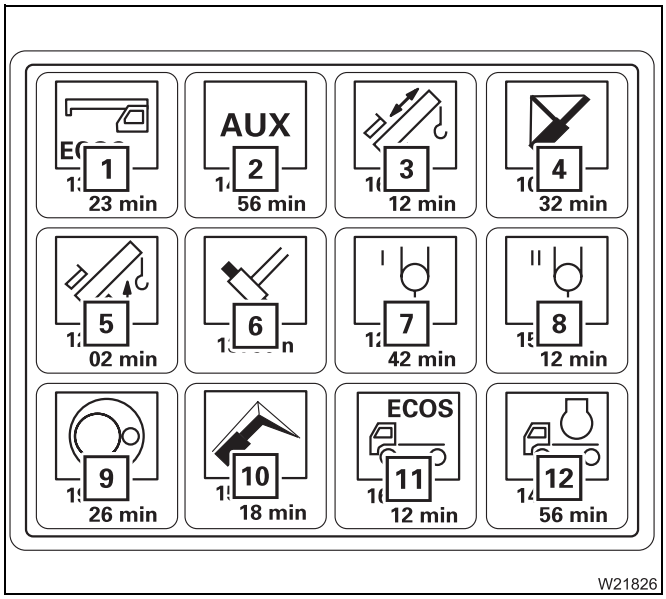
Operating hours submenu

Description of the displays; ➠ *Displaying the operating hours*, p. 11 - 110.



1 ECOS – superstructure
2 Auxiliary drive gears
3 Telescoping mechanism
4 Mega Wing Lift[1), 2)]
5 Derricking gear
6 Locking system
7 Main hoist
8 Auxiliary hoist[1)]
9 Slewing gear
10 Lattice extension[1)]
11 ECOS – carrier
12 Engine

[1)] Additional equipment

[2)] Only active with additional equipment;
➠ *Mega Wing Lift operating instructions*

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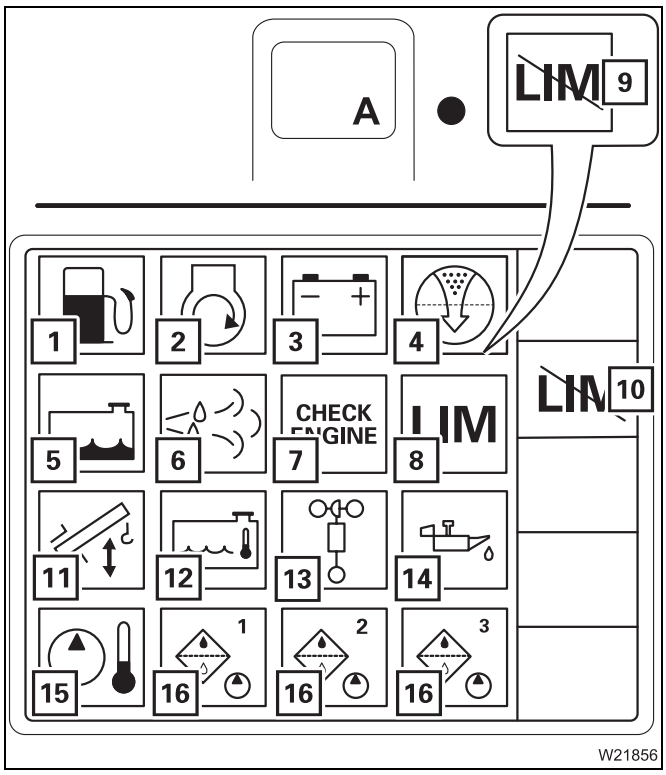
Warning submenu Description of the displays; ➠ *Warning submenu*, p. 11 - 111.



For the superstructure

1 Refuel
2 Air intake inhibitor triggered[1)]
3 Voltage monitoring
4 Replace air filter
5 Coolant level too low
6 Top up DEF[1)]
7 Engine malfunction
8 Torque reduction[1)]
9 Torque reduction overridden[1)]
10 Torque reduction override button[1)]; ➠ p. 10 - 14
11 Correct main boom angle
12 Coolant too hot
13 Anemometer not connected
14 Oil pressure too low
15 Hydraulic oil too hot
16 Replace hydraulic oil filter

[1)] Additional equipment

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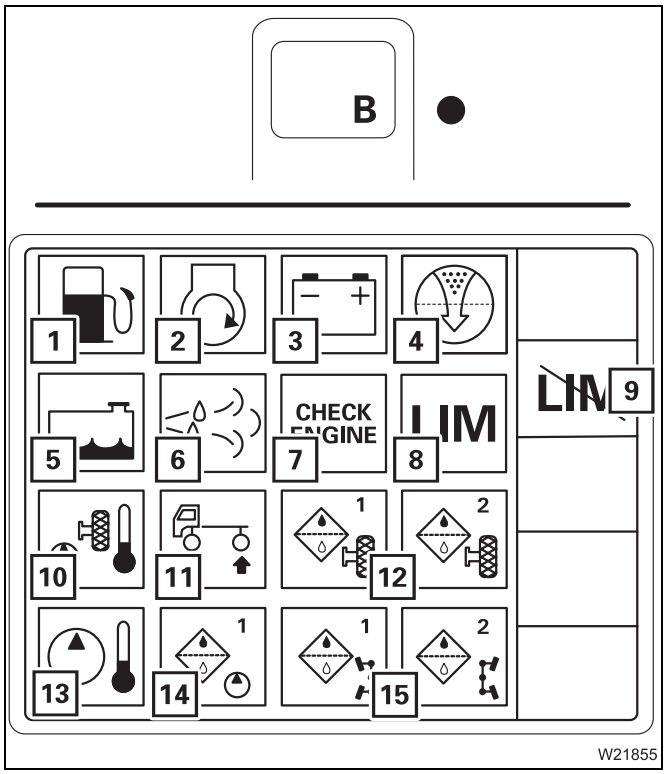

For the carrier

1 Refuel

2 Air intake inhibitor triggered[1)]

3 Voltage monitoring

4 Replace air filter

5 Coolant level too low

6 Top up DEF[1)]

7 Engine malfunction

8 Torque reduction

9 Torque reduction override button;
➠ p. 10 - 14

10 MegaDrive hydraulic oil too hot

11 Axle load or sideways tilt exceeded

12 Replace MegaDrive hydraulic oil filter

13 Hydraulic oil too hot

14 Replace the hydraulic oil filter

15 Replace hydraulic oil filter of steering circuit 1 or 2

[1)] Additional equipment

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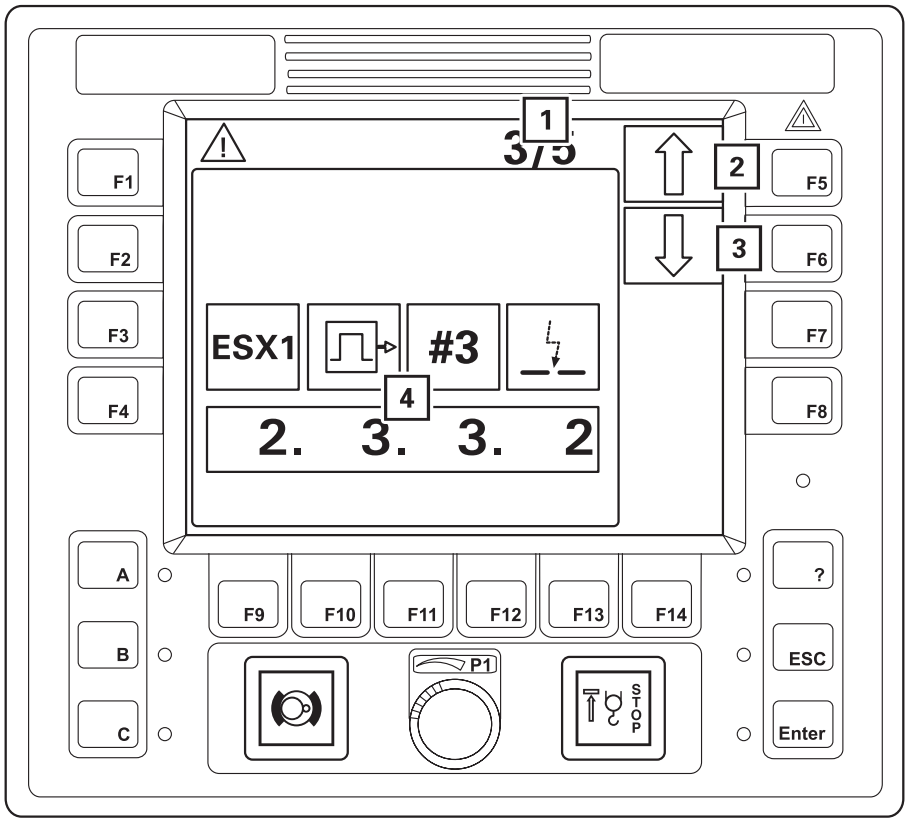
Errors submenu



1 Current errors/total errors display p. 14 - 32

2 Next error p. 14 - 32

3 Previous error p. 14 - 32

4 Error display p. 14 - 32

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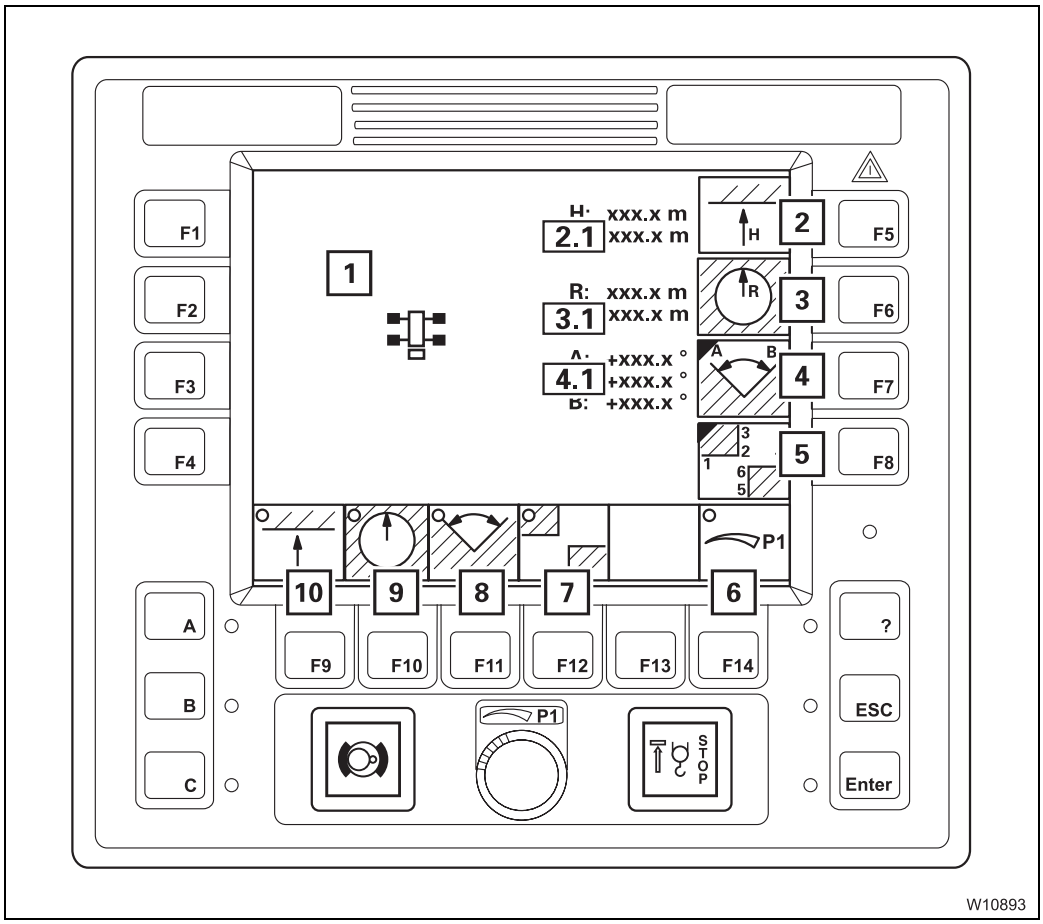
Working range limiter submenu



1	Working range limiter display	➠ p. 11 - 126
2	Enter maximum overall height	➠ p. 11 - 118
2.1	Maximum overall height display	➠ p. 11 - 118
3	Enter maximum working radius	➠ p. 11 - 118
3.1	Maximum/current working radius display	➠ p. 11 - 118
4	Enter slewing angle submenu	➠ p. 11 - 119
4.1	Maximum/current slewing angle display	➠ p. 11 - 119
5	Enter objects submenu	➠ p. 11 - 121
6	Manual input on/off	➠ p. 11 - 124
7	Object monitoring on/off	➠ p. 11 - 126
8	Slewing angle monitoring on/off	➠ p. 11 - 126
9	Working radius monitoring on/off	➠ p. 11 - 126
10	Overall height monitoring on/off	➠ p. 11 - 126

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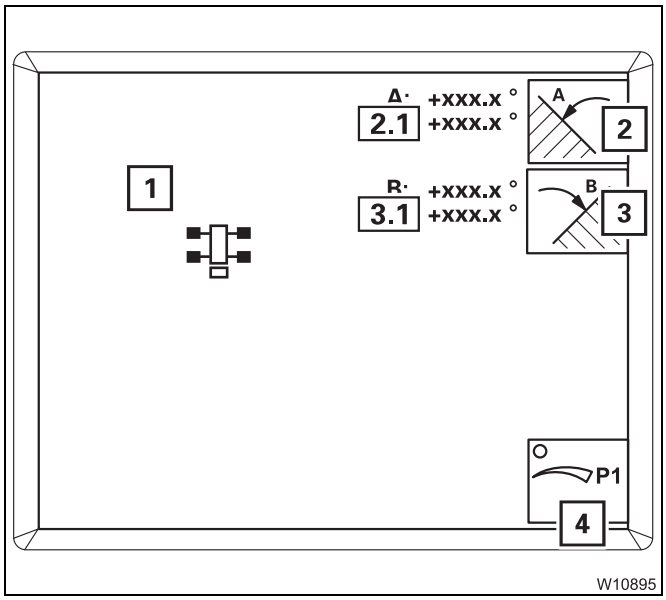
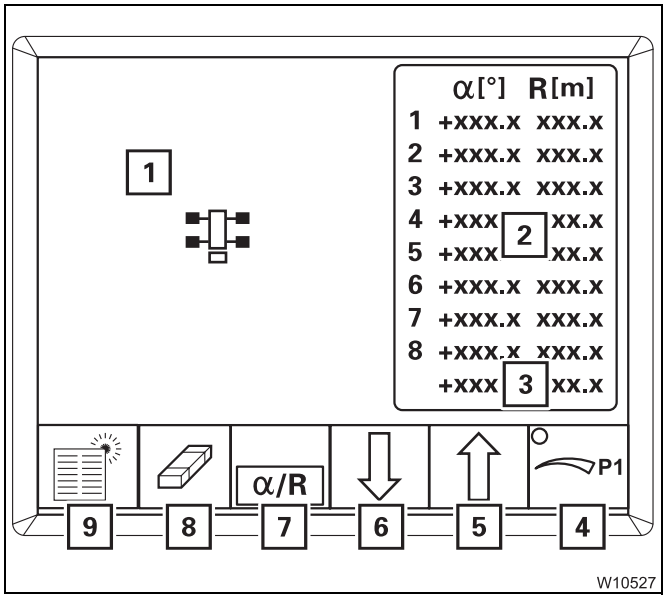


Enter slewing angle submenu

1 Limited slewing angle display
2 Select slewing angle A
2.1 Maximum/current slewing angle A display
3 Select slewing angle B
3.1 Maximum/current slewing angle B display
4 Manual input on/off

Slewing angle, p. 11 - 119.

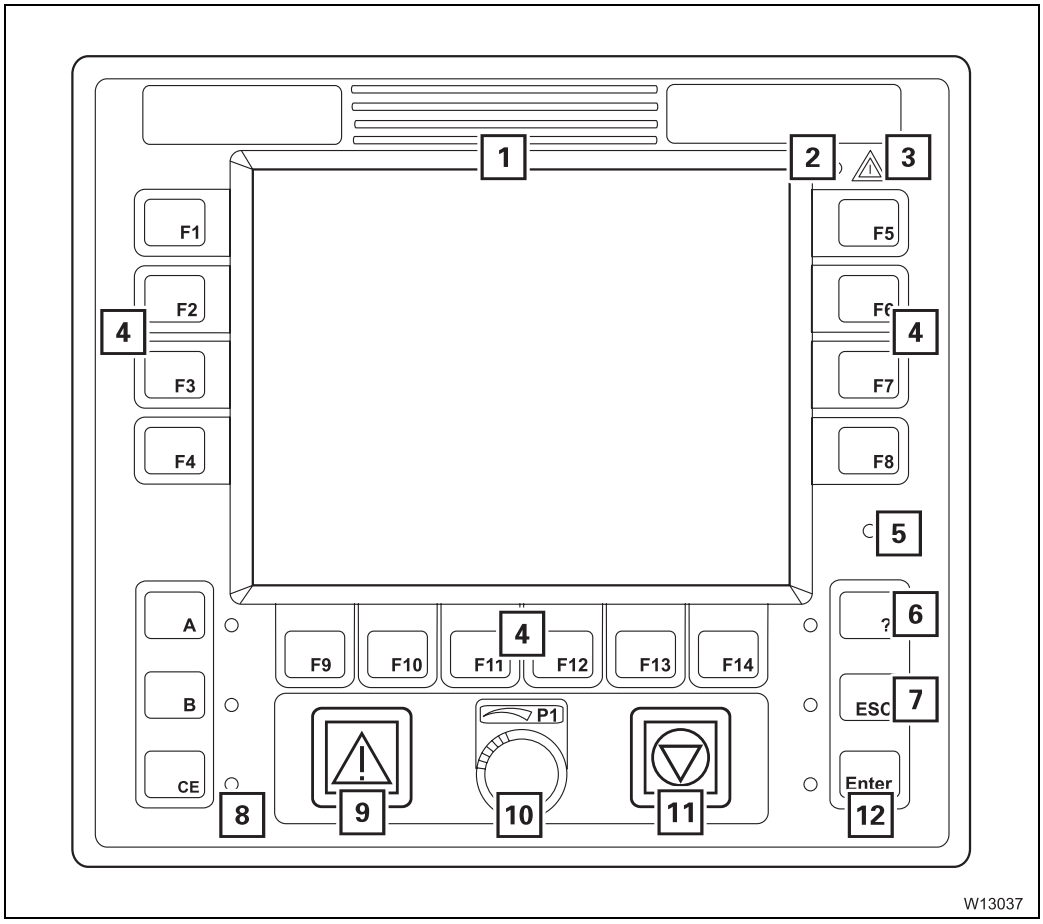


Enter objects submenu

1 Limitation by object display
2 Point data display
3 Current point data display
4 Manual input on/off
5 Select previous point
6 Select next point
7 Select angle/working radius
8 Delete selected point data
9 Delete all point data

Entering objects, p. 11 - 121.

9.1.10 RCL control unit



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1	RCL display	p. 9 - 93
	Main menu overview	p. 9 - 4
2	Brightness sensor[1)]	p. 9 - 92
3	Error/warning message	p. 9 - 64
4	Buttons F1 to F14	p. 9 - 64
5	Brightness sensor[1)]	p. 9 - 92
6	Opening Errors submenu	p. 9 - 64
	Submenu overview	p. 9 - 47
7	Exiting submenu/input mode	p. 9 - 65
8	Acknowledging	p. 9 - 92
9	RCL early warning	p. 9 - 92
10	Entering values	p. 9 - 65
11	RCL shutdown	p. 9 - 92
12	Input confirmation	p. 9 - 92

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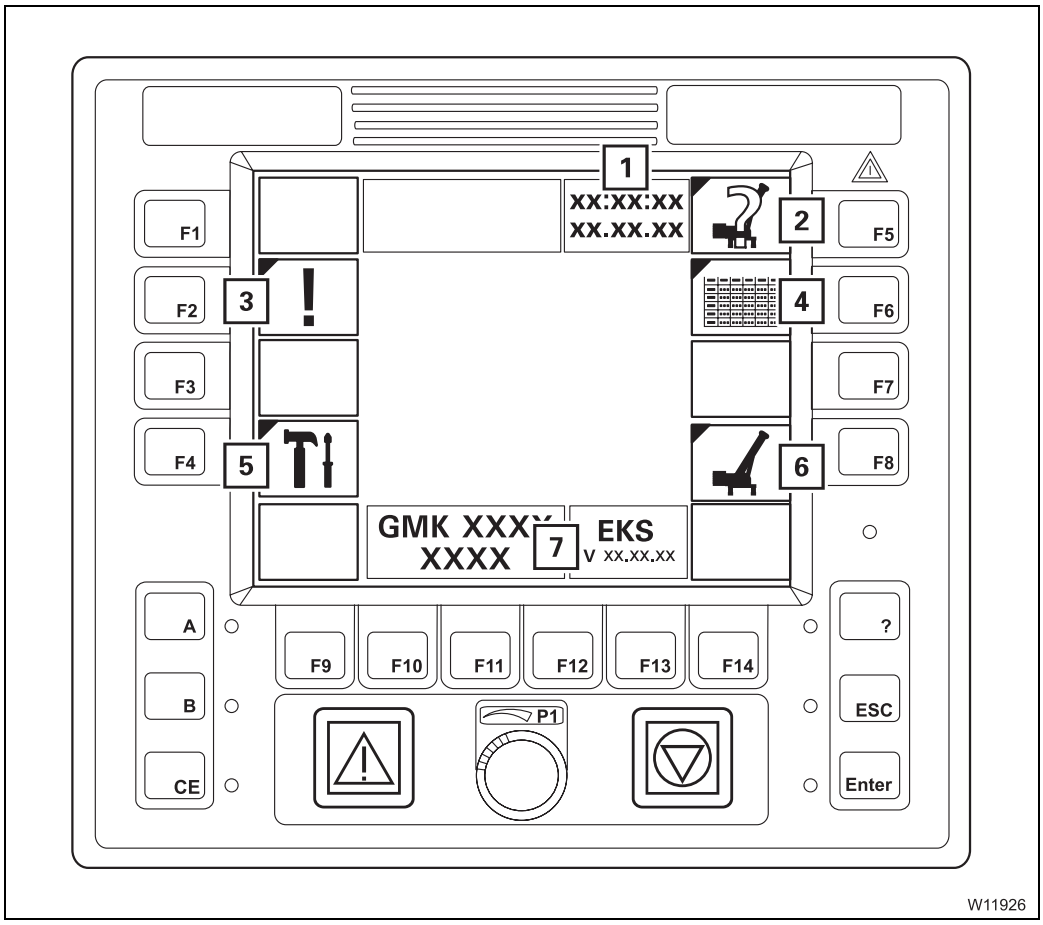
9.1.11 RCL display – main menu

The main menu shows symbols for further submenus and symbols for current displays.



1 Date/time display p. 9 - 93
2 Enter rigging mode submenu p. 9 - 41
3 Errors submenu p. 9 - 47
4 Lifting capacity table submenu p. 9 - 45
5 Settings submenu p. 9 - 49
6 Monitoring submenu p. 9 - 42
7 Serial number and programme version displays p. 9 - 66

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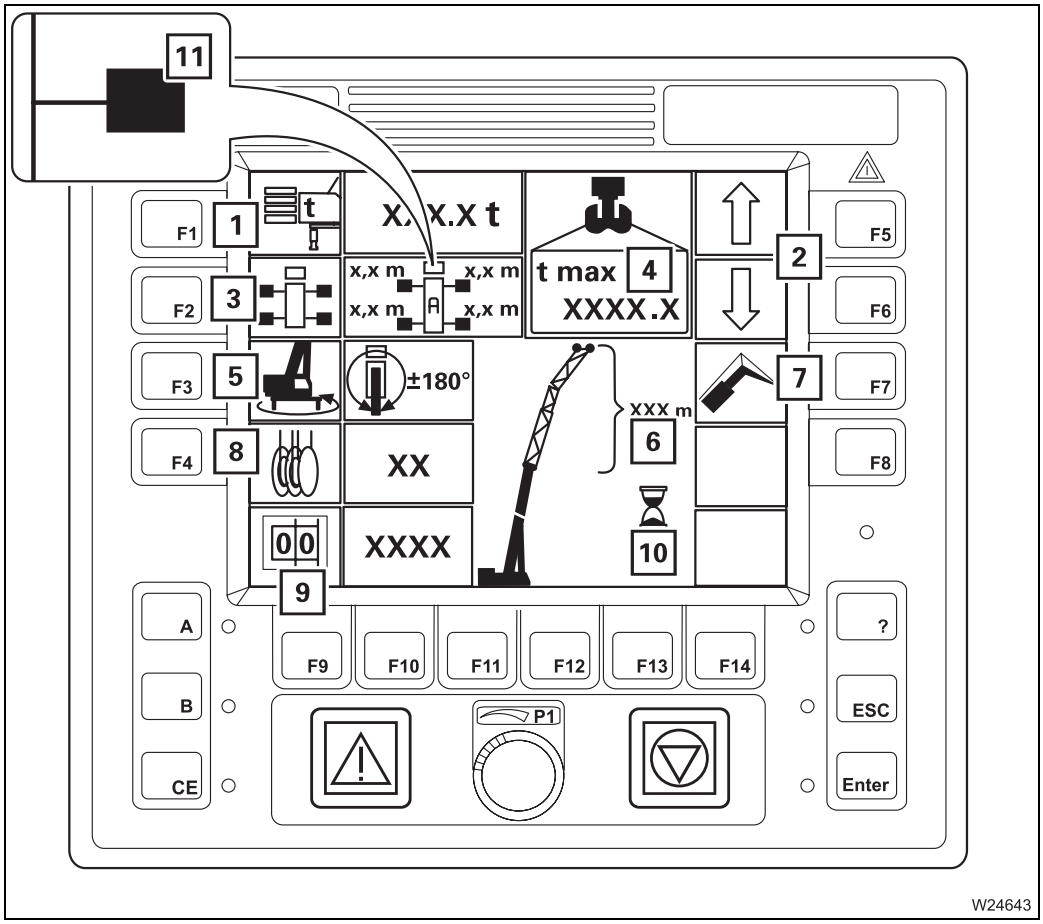
9.1.12 RCL display – submenus

Enter rigging mode submenu



[1)] Additional equipment

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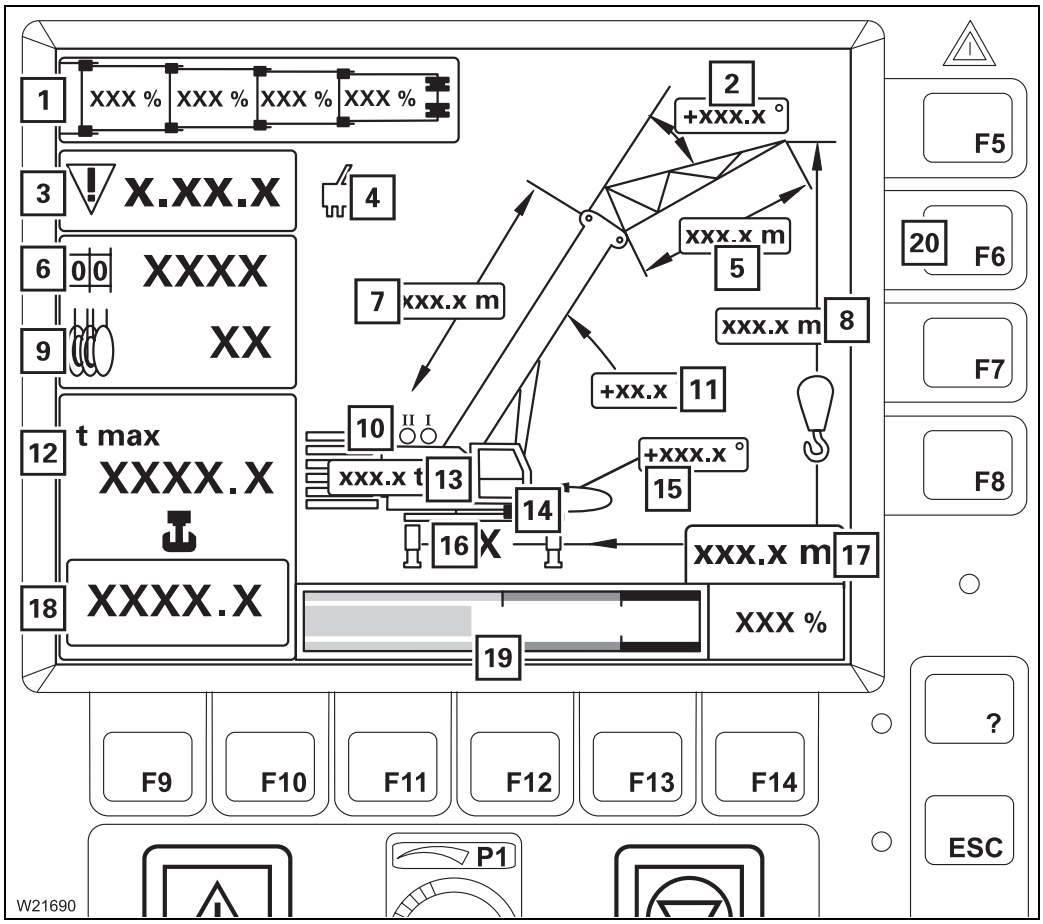
Monitoring submenu



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1	Current telescoping display	p. 9 - 99
2	Lattice extension inclination display[1)]	p. 9 - 100
	Lattice extension angle display[1)]	p. 9 - 99
3	Error display	p. 9 - 101
4	Service symbol display	p. 9 - 101
5	Current lattice extension length[1)]	p. 9 - 101
6	RCL code display	p. 9 - 98
7	Current main boom length	p. 9 - 101
8	Current overall height	p. 9 - 101
9	Reeving display	p. 9 - 98
10	Hoists display	p. 9 - 98
11	Current main boom angle display	p. 9 - 100
12	Maximum load display	p. 9 - 100
13	Counterweight display	p. 9 - 98
14	Turntable lock display	
15	Current slewing angle display	p. 9 - 101
16	Outrigger span display	p. 9 - 98
17	Current working radius	p. 9 - 101
18	Current load display	p. 9 - 99
19	Current degree of utilisation display	p. 9 - 100
20	Lifting capacity table submenu	p. 9 - 99
	Submenu overview	p. 9 - 45

[1)] Additional equipment

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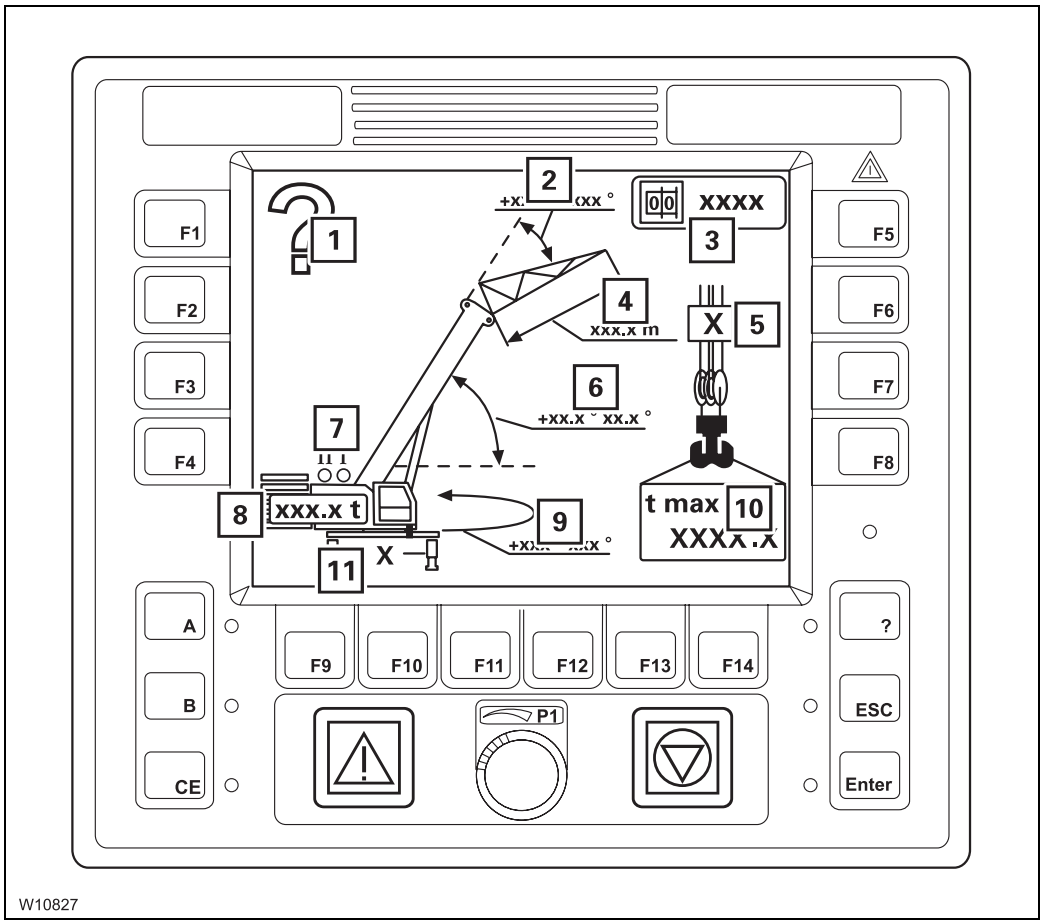
Rigging mode monitoring submenu



1 Query – accept rigging mode?
2 Permissible lattice extension working range[1)]
3 RCL code
4 Length of lattice extension
5 Reeving
6 Permissible main boom working range
7 Hoists display
8 Counterweight
9 Permissible slewing range
10 Maximum load
11 Outrigger span

➠ *Accepting the rigging mode*, p. 11 - 29

[1)] Additional equipment

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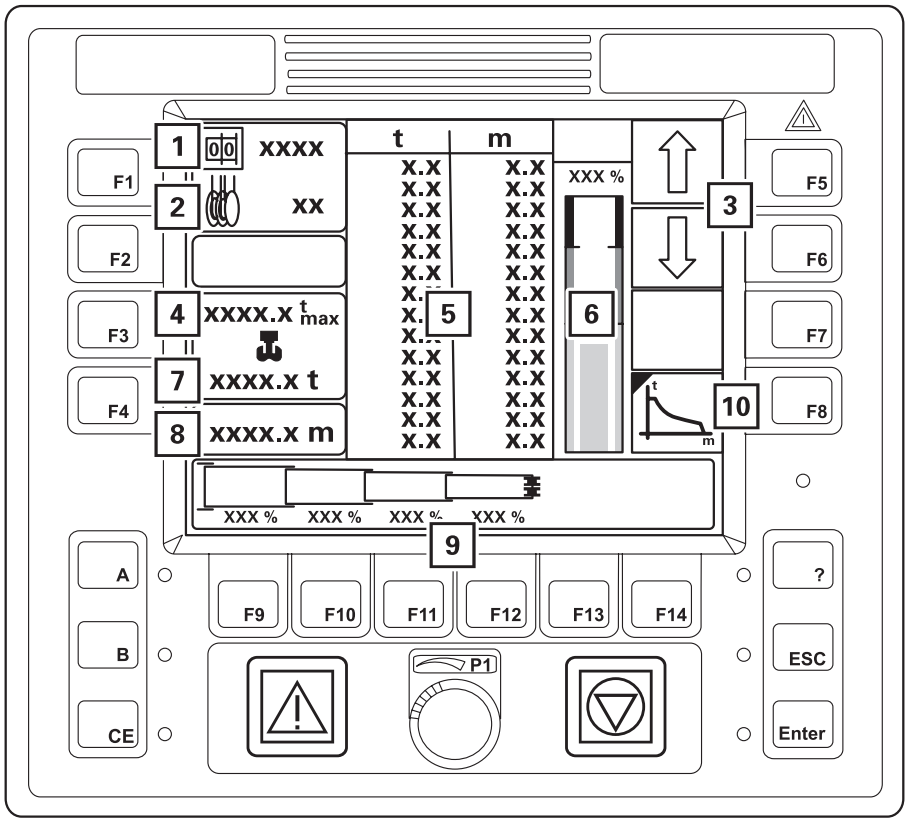
Lifting capacity table submenu



1 RCL code display ➠ p. 9 - 102

2 Reeving display ➠ p. 9 - 102

3 Selection

4 Maximum load display ➠ p. 9 - 102

5 Lifting capacity table display ➠ p. 9 - 102

6 Current degree of utilisation display ➠ p. 9 - 102

7 Current load display ➠ p. 9 - 102

8 Current working radius display ➠ p. 9 - 102

9 Telescope status display/input ➠ p. 9 - 102

10 Working range submenu[1)] ➠ p. 9 - 46

[1)] Additional equipment

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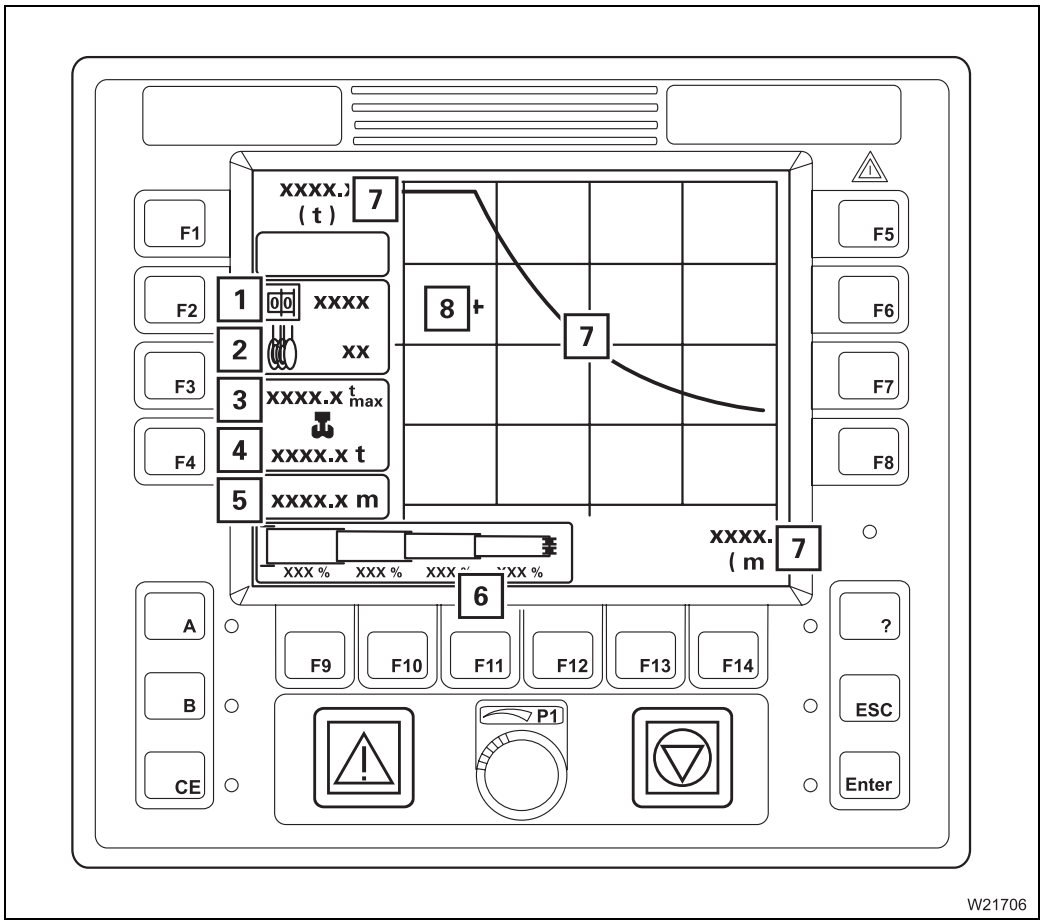
Working range submenu



1 RCL code display ➠ p. 9 - 103
2 Reeving display ➠ p. 9 - 103
3 Maximum load display ➠ p. 9 - 103
4 Current load display ➠ p. 9 - 103
5 Current working radius display ➠ p. 9 - 103
6 Telescope status display/input ➠ p. 9 - 103
7 Permissible working range display ➠ p. 9 - 102
8 Current position display ➠ p. 9 - 103

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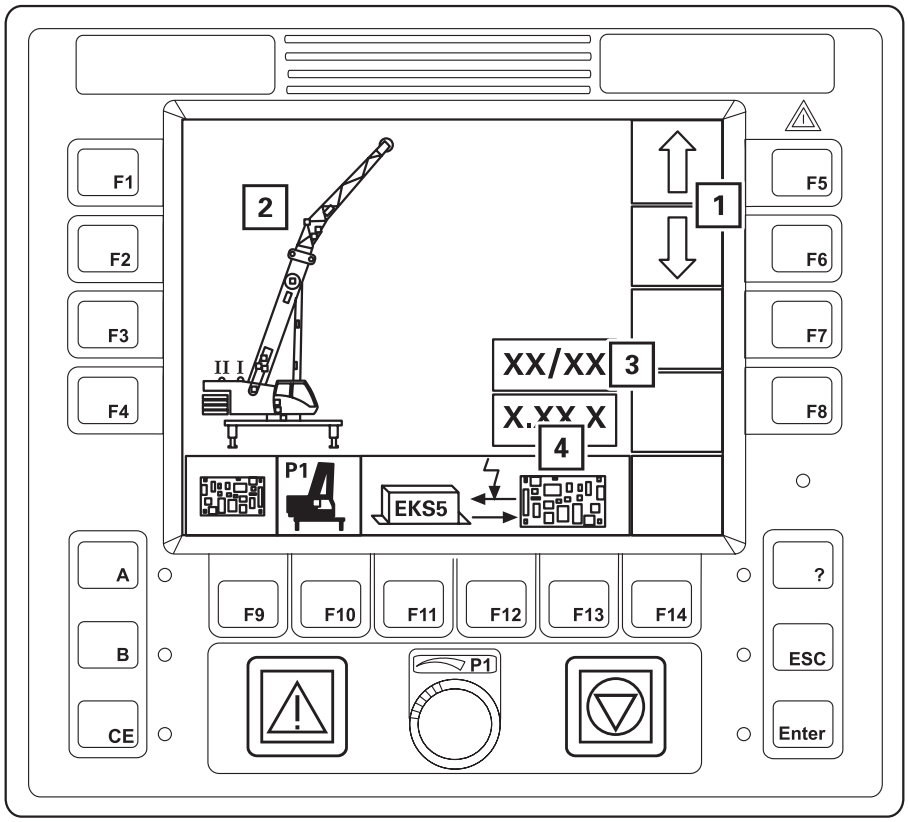
Errors submenu



1 Selection p. 14 - 25

2 Display error location p. 14 - 25

3 Display of current errors/total errors p. 14 - 25

4 Errors display p. 14 - 25

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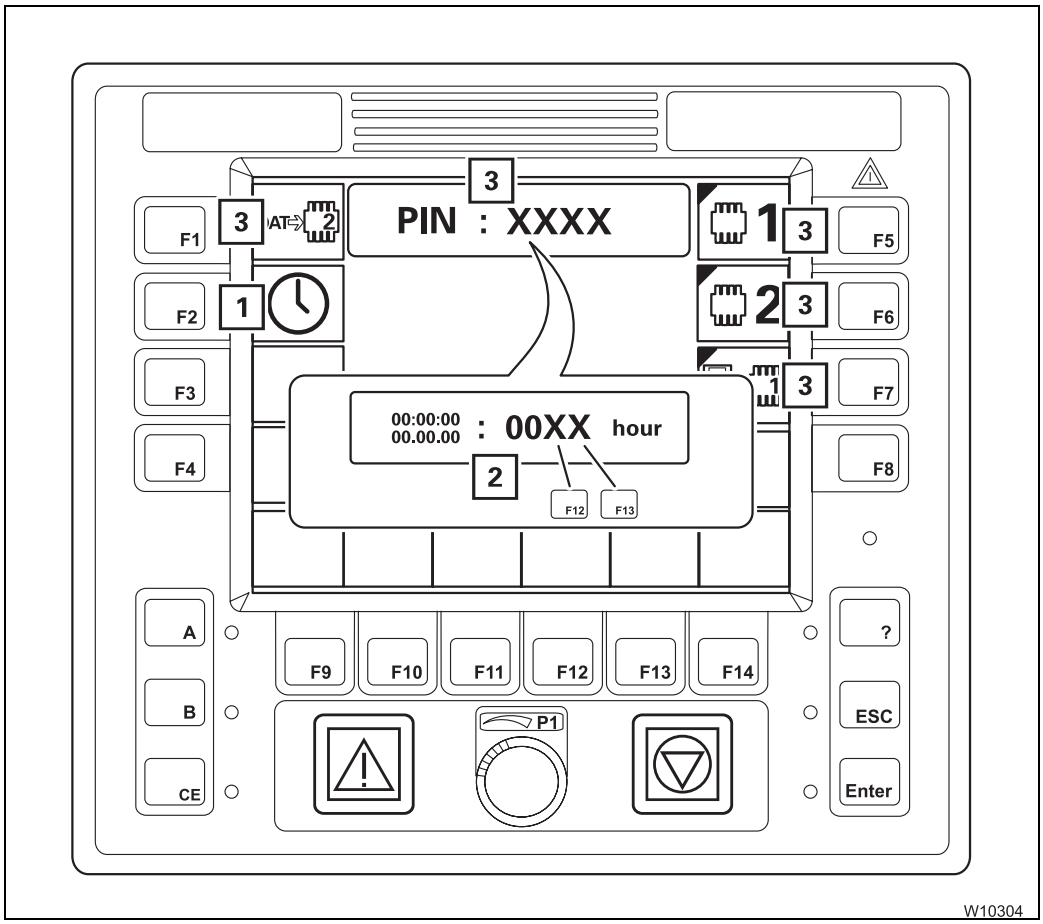
Settings submenu



1 Enter time/date p. 11 - 51

2 Enter time/date display p. 11 - 51

Buttons/displays (**3**) are only shown if a service device is connected. For this reason, these functions are not described in these operating instructions.

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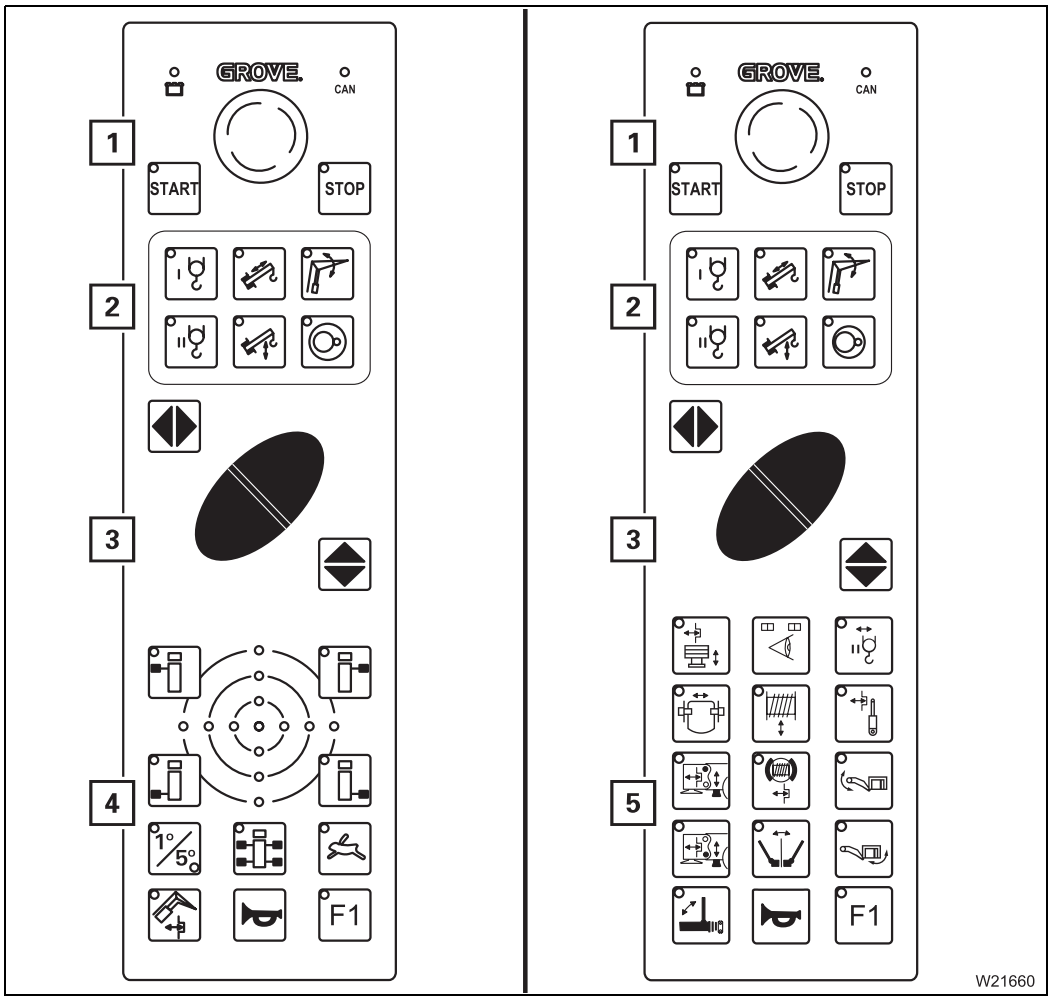
9.1.13 Hand-held controls



1 Engine control panel ➠ p. 9 - 108
2 Pre-select emergency operation ➠ p. 9 - 109
3 Function buttons ➠ p. 9 - 109
4 Outriggers control panel ➠ p. 9 - 51
5 Rigging control panel ➠ p. 9 - 52

Required connections for the various movements; ➠ p. 9 - 107.

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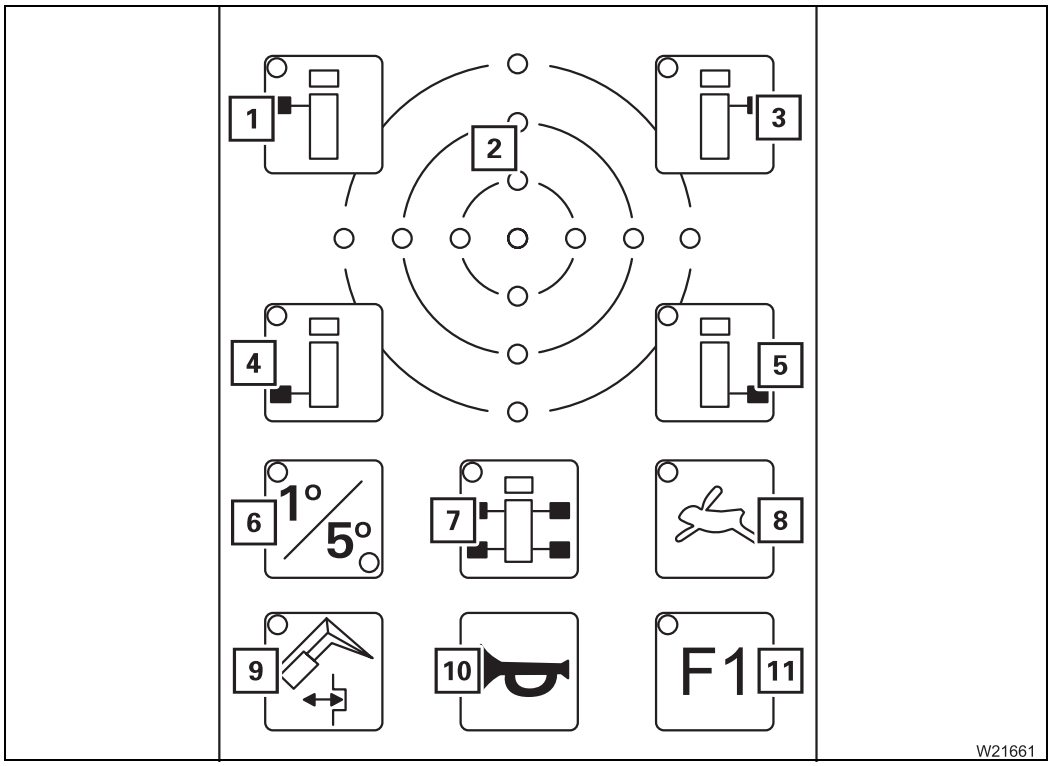
Outriggers control panel



1 Front left outriggers ➠ p. 9 - 67

2 Current inclination indicator ➠ p. 9 - 72

3 Front right outriggers ➠ p. 9 - 67

4 Rear left outriggers ➠ p. 9 - 67

5 Rear right outriggers ➠ p. 9 - 67

6 Switch measuring range ➠ p. 9 - 72

7 – Pre-selecting all supporting cylinders ➠ p. 9 - 67
– Pre-select automatic alignment (as additional function F1) ➠ p. 9 - 67

8 Pre-select high-speed/normal speed mode ➠ p. 9 - 67

9 Additional function F1 on

10 Horn ➠ p. 9 - 108

11 Additional function F1 on ➠ p. 9 - 67

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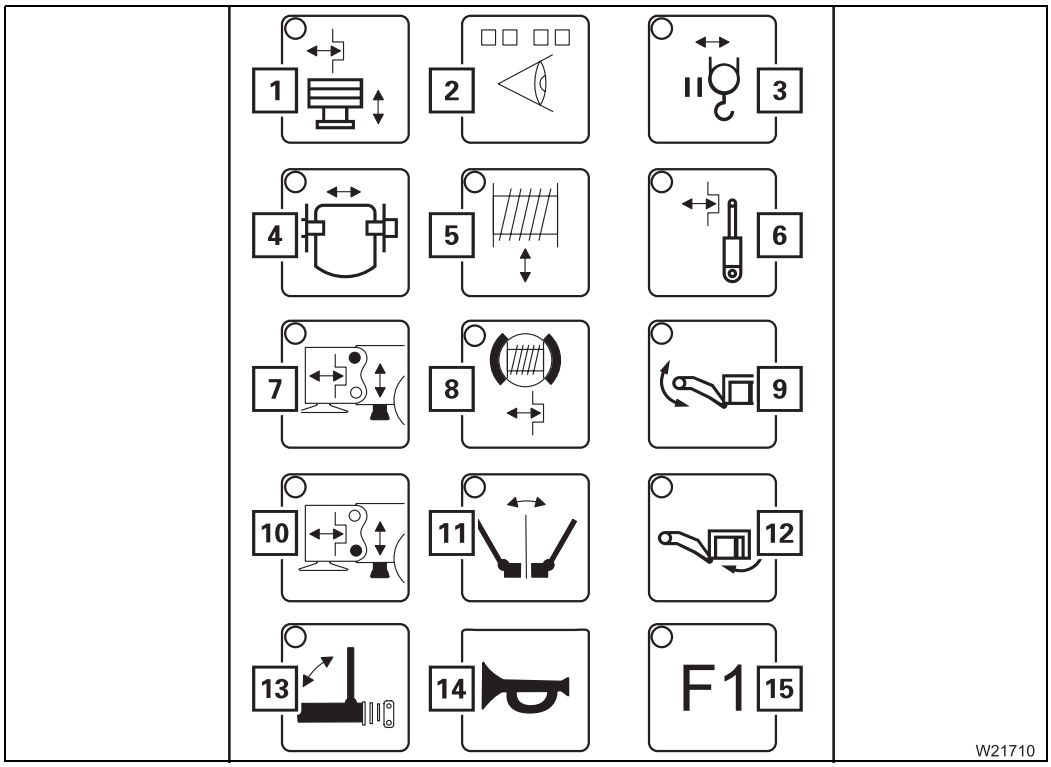
Rigging control panel



1 Rigging counterweight ➠ p. 12 - 84
2 Locking status
3 Rig auxiliary hoist ➠ p. 12 - 102
4 Boom pivot pin pulling device ➠ p. 6 - 26
5 Rigging winch[1)]
6 no function
7 no function
8 Special function[1)]
9 no function
10 no function
11 Special function[1)]
12 no function
13 Special function[1)]
14 Horn
15 Special function[1)]

[1)] ➠ *Mega Wing Lift operating instructions*

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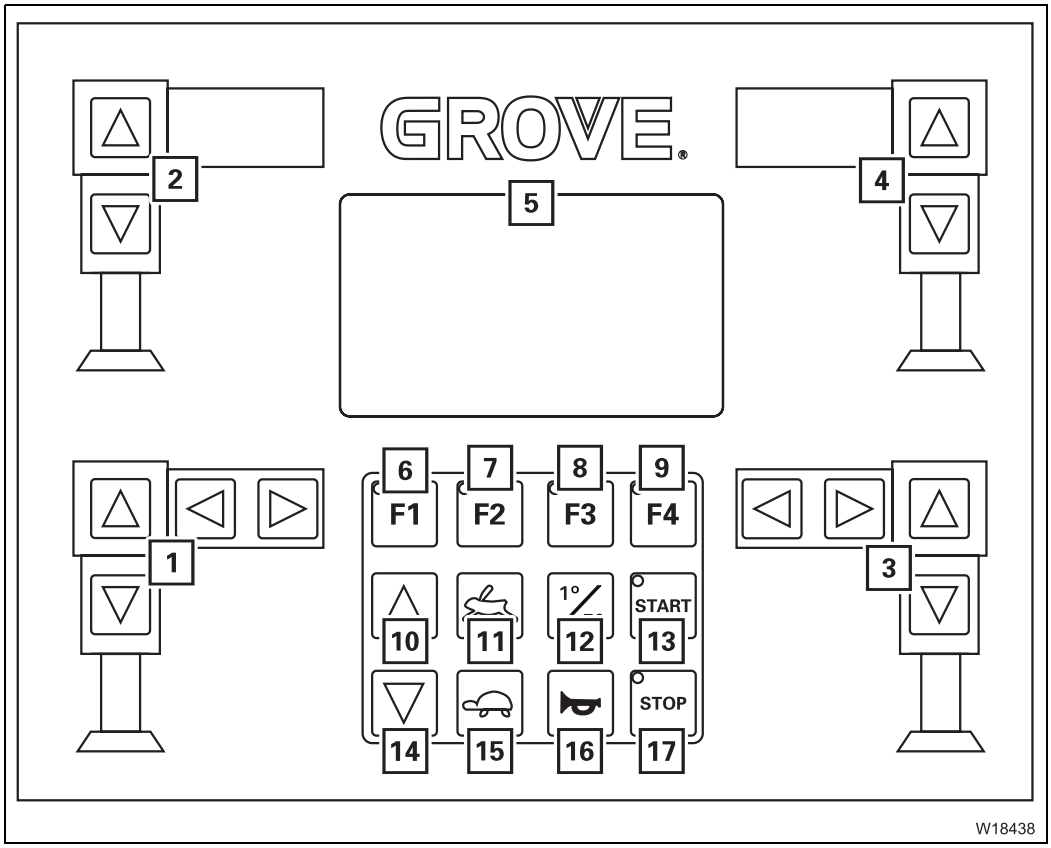
9.1.14 Outrigger control units

Button



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

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

Outrigger button

1 Operate left outrigger ➠ p. 9 - 70

2 Operate left outrigger, opposite ➠ p. 9 - 70

3 Operate right outrigger ➠ p. 9 - 70

4 Operate right outrigger, opposite ➠ p. 9 - 70

5 Inclination indicator ➠ p. 9 - 56
Raise axle display ➠ p. 9 - 57
Outrigger pressure display ➠ p. 9 - 56

6 Additional function F1 on/Position lights for indicator lamps ➠ p. 9 - 71

7 Additional function F2 Select axle pairs ➠ p. 9 - 73

8 Additional function F3 Select axle pairs ➠ p. 9 - 73

9 Additional function F4 Menu selection ➠ p. 9 - 73
– Outriggers
or
– Raise axle

10 In the Outrigger menu ➠ p. 9 - 71
– Retract all supporting cylinders
In the Raise axle menu
– Raise axles ➠ p. 9 - 73

11 Pre-select high-speed mode ➠ p. 9 - 70

12 Switch measuring range ➠ p. 9 - 72

13 START engine

14 In the Outrigger menu ➠ p. 9 - 71
– Extend all supporting cylinders
In the Raise axle menu
– Lower axles ➠ p. 9 - 73

15 – Pre-select normal speed ➠ p. 9 - 70
– Automatic levelling (as additional function F1) ➠ p. 9 - 71

16 Horn

17 Engine STOP

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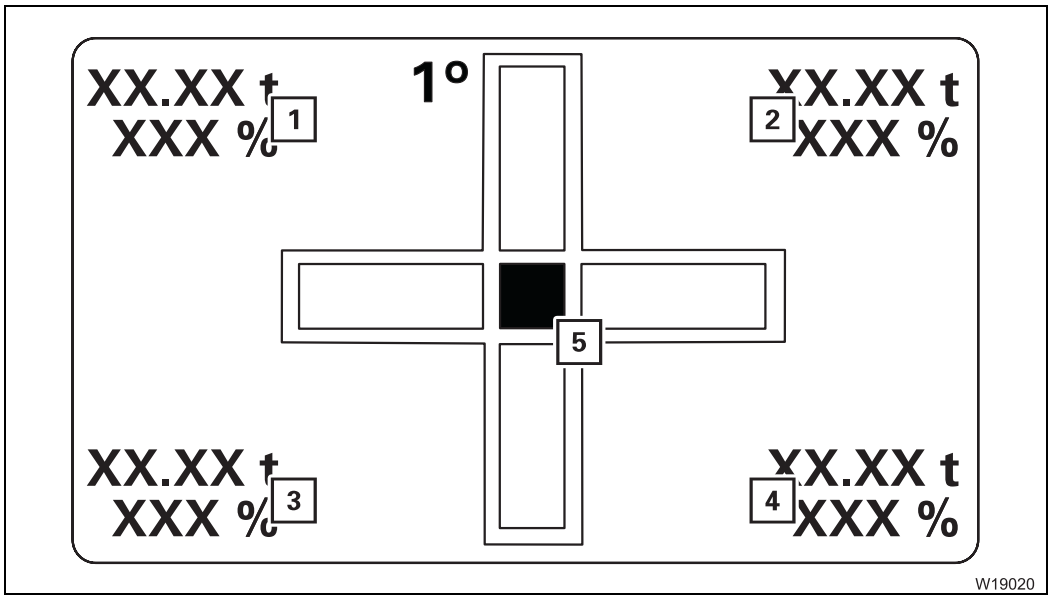
Inclination and outrigger pressure display



1 Left-hand outrigger pressure display, opposite ➠ p. 9 - 75
2 Right-hand outrigger pressure display, opposite ➠ p. 9 - 75
3 Left-hand outrigger pressure display ➠ p. 9 - 75
4 Right-hand outrigger pressure display ➠ p. 9 - 75
5 Current inclination display ➠ p. 9 - 72

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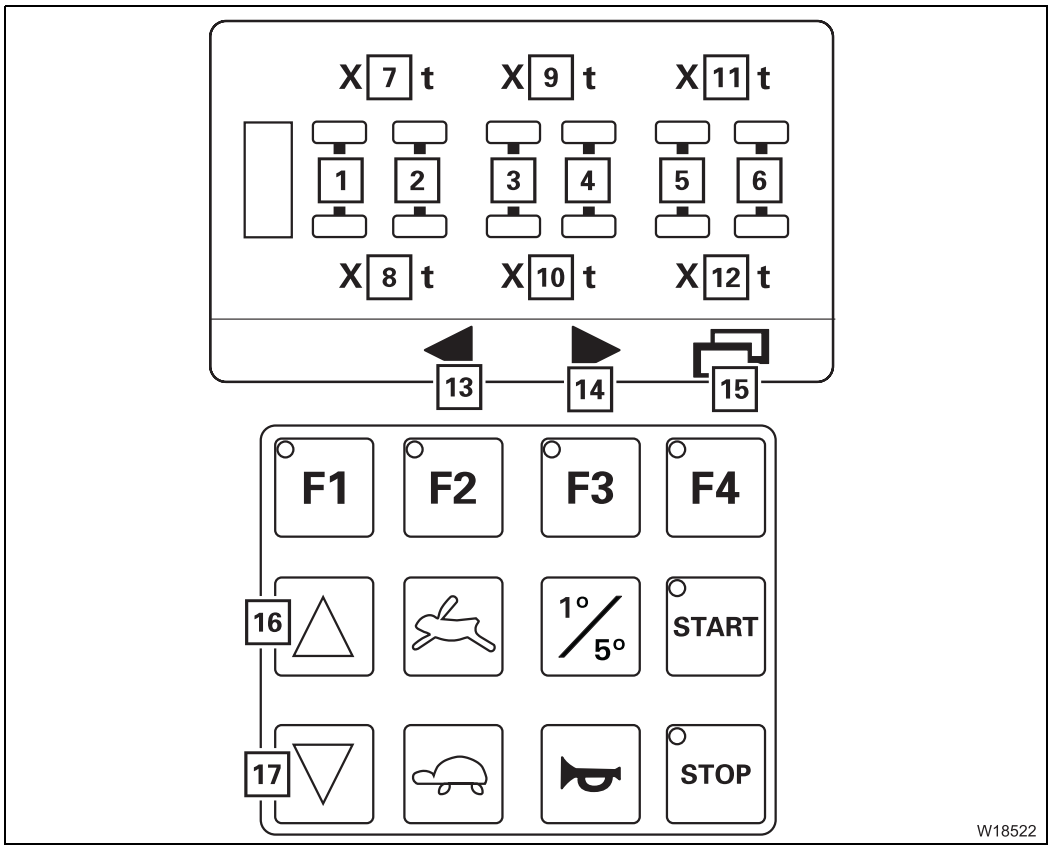
Raise axle display



1 Axle line 1 p. 9 - 73
2 Axle line 2 p. 9 - 73
3 Axle line 3 p. 9 - 73
4 Axle line 4 p. 9 - 73
5 Axle line 5 p. 9 - 73
6 Axle line 6 p. 9 - 73
7 Axle load display for 1st and 2nd axle lines, opposite p. 9 - 74
8 Axle load display for 1st and 2nd axle lines p. 9 - 74
9 Axle load display for 3rd and 4th axle lines, opposite p. 9 - 74
10 Axle load display for 3rd and 4th axle lines p. 9 - 74
11 Axle load display for 5th and 6th axle lines, opposite p. 9 - 74
12 Axle load display for 5th and 6th axle lines p. 9 - 74
13 Axle selection p. 9 - 73
14 Axle selection p. 9 - 74
15 Switch menu p. 9 - 73
16 Raise axles p. 9 - 74
17 Lower axles p. 9 - 74

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9.2 Short description of the operating elements

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

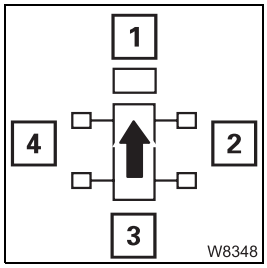
This section does not contain all the requirements that must be fulfilled for several operating elements to be active.
If some operating elements do not work, first read the following chapters which are referred to at the respective places before contacting **Manitowoc Crane Care**.

9.2.1 Definition of direction references

Basic rule

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

On the carrier

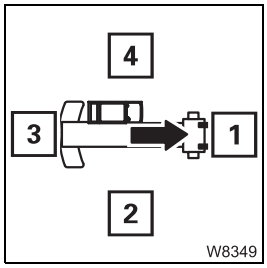


The driver's cab is always at the front, which means that:

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

Forward always means the driver's cab is to the front of the direction of travel
Backward always means the rear lights on the carrier are to the front of the direction of travel

On the superstructure

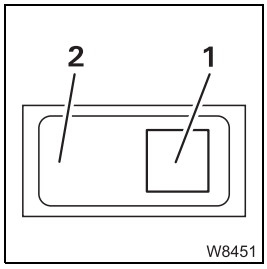


The main boom head is always at the front, which means that:

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

Switches

The terms **down** and **up** are used for switches and buttons.



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

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

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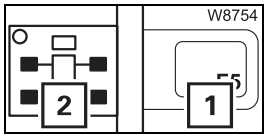
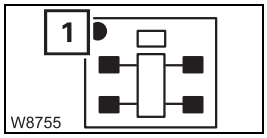
9.2.2 General rules for buttons and symbols on the display

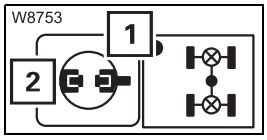
The symbols shown as an example are not present on all crane types. The following rules apply in all menus:



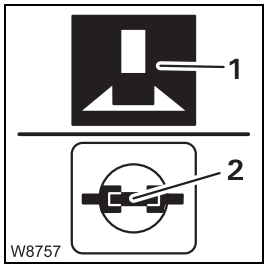
– A button (**1**) is only active when the corresponding symbol (**2**) is black. Buttons next to a grey symbol always have no function.



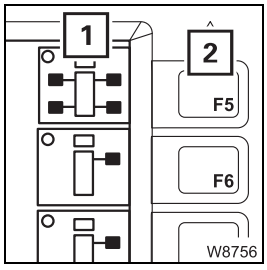
– Some symbols have a dot (**1**). The colour of the dot indicates the current switching state of the button.
  - **Green:** button on – the corresponding gear change is being carried out
  - **Black:** button off – the corresponding gear change is not being carried out



For some elements, the dot (**1**) only indicates that the switching operation has been completed. Here, you will also receive a report on the current gear change on an extra display (**2**).



– In these operating instructions, we always refer to colours in terms of "The symbol is red", for instance,
regardless of whether the background (**1**) of a symbol is red or whether only parts (**2**) of a symbol are red. This applies to all symbols and all colours.



– If it says in this section, e.g. to "Press the button (**1**)...", this always refers to the button (**2**) next to or below the symbol (**1**) shown. This applies even when the button itself is not visible in the illustration.

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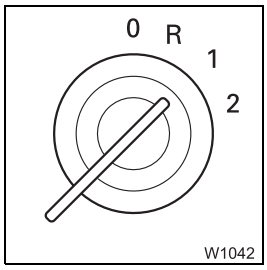
9.2.3 Engine

Side panel

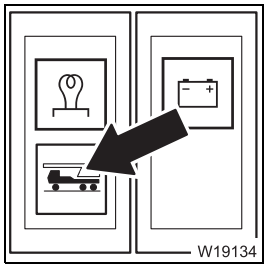
➠ *Start the engine*, p. 10 - 8.

Ignition lock



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

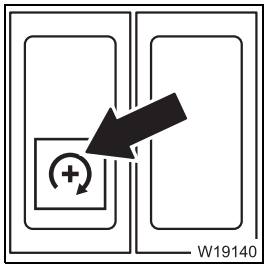
➠ p. 10 - 5



Carrier ignition indicator lamp

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

➠ p. 10 - 8



Setting idling speed

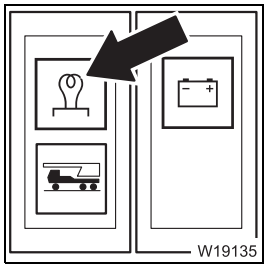
– The engine is off::

- **Press down 1 x:** Engine starts,
  idling speed = standard

– The engine is running:

- **Press down:** Increase idling speed
- **Press up:** Decrease idling speed,
  after about 6 seconds: engine stop

➠ p. 10 - 12



Flame start system indicator lamp

- **On:** Engine not ready to start – warming up
- **Off:** Engine is ready to start

➠ p. 10 - 9

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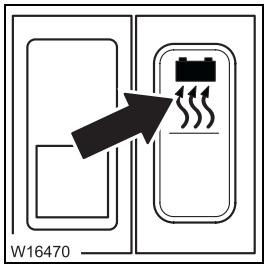
Console, rear



Battery heating system on/off

- **Up:** Heating system on
- **Down:** Heating system off

Further information on operation; ➠ *Separate operating manual*.

ECOS display

There is no short description of the displays in the submenus;
➠ *Monitoring submenu*, p. 10 - 11;
➠ *Warning submenu*, p. 11 - 111.

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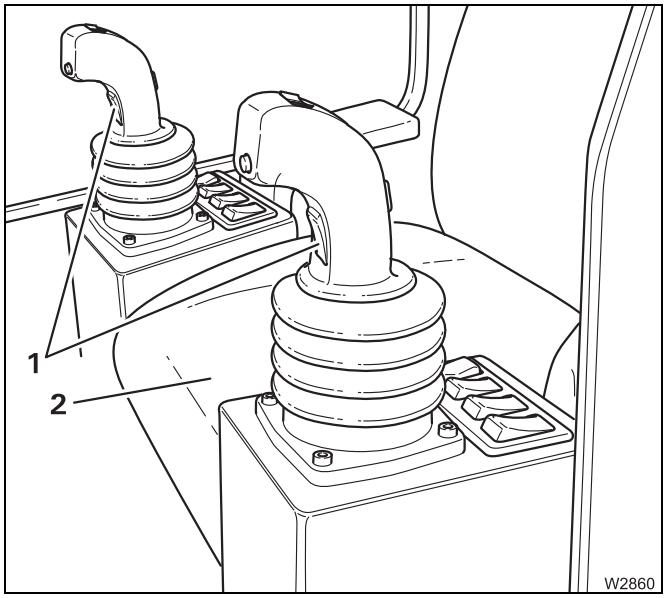
9.2.4 Seat contact switch and dead man's switch

The seat contact switch and the dead man's switch are safety devices for releasing crane functions.



Releasing crane functions

– Sit down – seat contact switch (**2**) on.

or

– Press at least one dead man's switch (**1**).

Safety function on

– Get off seat – seat contact switch off.

and

– Both dead man's switches (**1**) not pressed.

All operating elements for crane functions in the crane cab are locked.

Any crane movements are slowed down to standstill within 3 seconds and then locked.

Crane cab seat – version 2

The seat contact switch is very sensitive. It is recommended that you also press the dead man's switch in order to avoid unintentional shutdown.

➠ *Seat contact switch*, p. 11 - 11

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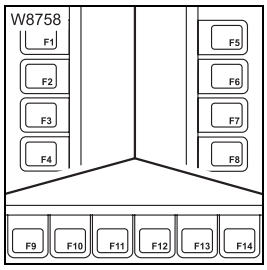
9.2.5 ECOS crane control

The truck crane GMK 6400 is equipped with the **ECOS** electronic crane control (**E**lectronic **C**rane **O**perating **S**ystem). The 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/O circuit boards (I/O 0, I/O 1 etc.) distributed on the superstructure and carrier.

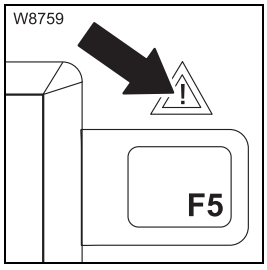
Control unit

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



Buttons F1 to F14

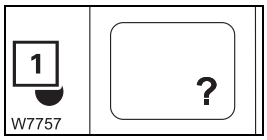
The function of buttons F1 to F14 is shown on the symbol next to or above the button. After the button is pressed, the function displayed is executed if it has been released.



Error/warning message

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

p. 11 - 114

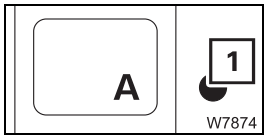


Opening Errors submenu

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

- **Press the button 1 x:** This opens the *Errors* submenu

p. 11 - 114



Open Warning submenu

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

- **Press the button 1 x:** This opens the *Warning* submenu for the superstructure

p. 11 - 111

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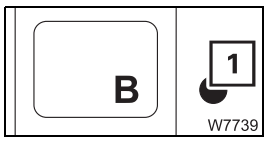
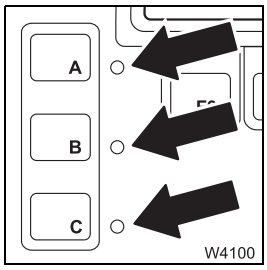


Open Warning submenu

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

– **Press the button 1 x:** This opens the *Warning* submenu for the carrier

➠ p. 11 - 111

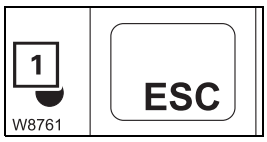


Keycode entry

The lamps next to all three buttons are lit.

– **Enter keycode:** Press buttons in the required sequence and confirm keycode

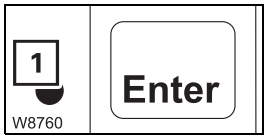
➠ *Telescoping emergency programme*, p. 14 - 43



Exiting submenu/input mode

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

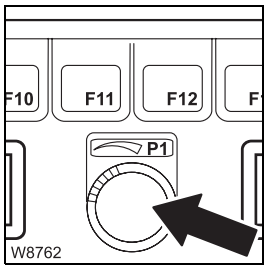
– **Press the button 1 x:**
  – The opened submenu closes – the menu from the next highest level is opened
  – Input mode is deactivated



Input confirmation

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

– **Press the button 1 x:** A newly entered value is saved



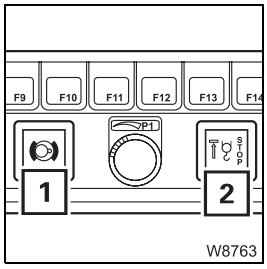
Entering values

Input mode is switched on.

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

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

Slowly turning changes the value gradually
Quickly turning changes the value quickly



Other

1 Slewing gear brake indicator lamp; ➠ p. 9 - 78

2 Lifting limit switch warning; ➠ p. 9 - 78

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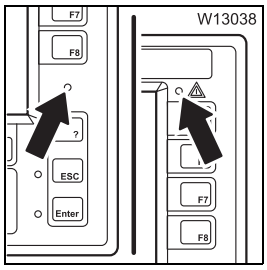
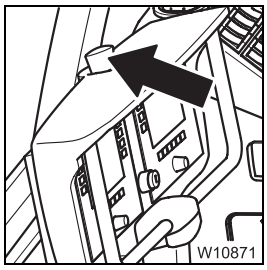


Brightness sensor

Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted.
Manual input; ➠ p. 10 - 5.

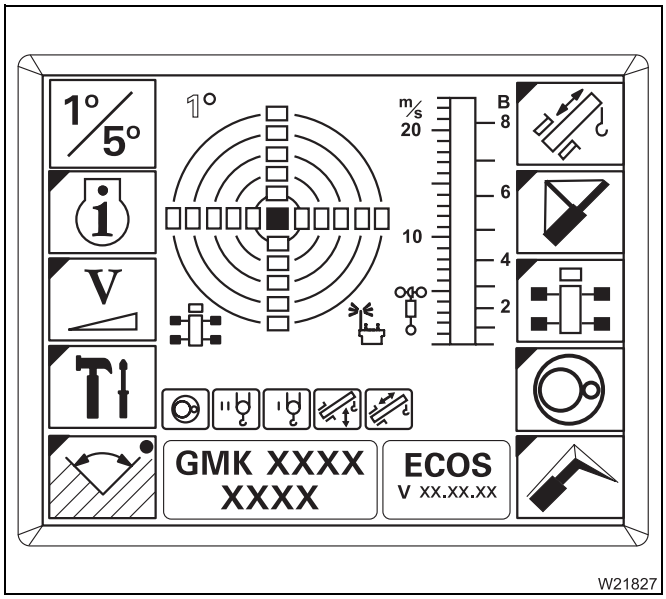


Emergency stop switch

May only be used in an emergency.

- **Press:** Engine off – crane functions stop immediately. Switch engages
- **Turn switch while pressing:** Switch returns to initial position – crane functions released

➠ p. 10 - 18

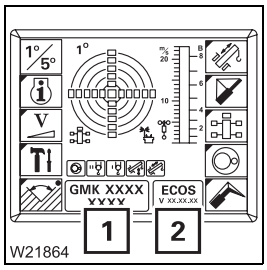


ECOS display

Ignition on – Main menu display

Symbols with blue corner = submenu

Open submenu – Press the button next to the symbol 1 x.



Serial number and programme version displays

1 Serial number

2 Current ECOS programme version – always include in the event of a malfunction; ➠ p. 14 - 31

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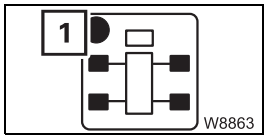
9.2.6 Outriggers

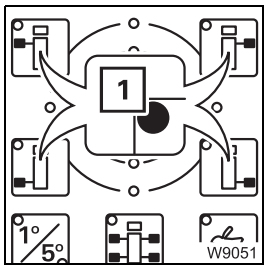
Extending/retracting outrigger beams, p. 12 - 37
Extending/retracting supporting cylinders, p. 12 - 45

Hand-held control All directional information refers to the carrier; p. 9 - 59.

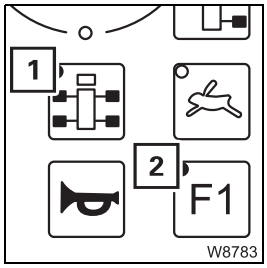


Pre-selecting all supporting cylinders

– **Pre-select:** Press button 1 x – lamp (**1**) lights up – pre-selection on
After 10 seconds – lamp (**1**) goes out – pre-selection off

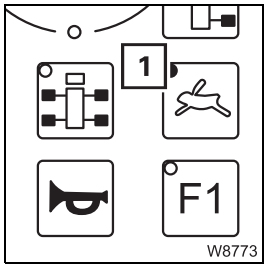


The following functions are pre-selected in the same way:
– **Front left outriggers**
– **Front right outriggers**
– **Rear left outriggers**
– **Rear right outriggers**
As long as the lamp (**1**) is on, you can pre-select additional outriggers.



Pre-select automatic alignment

– **Pre-select:** Press button F1 1 x, press button 1 x,
Lamps (**1**) and (**2**) light up – pre-selection on
After 10 seconds – lamps go out – pre-selection off



Pre-select high-speed/normal speed mode

– **Pre-select:**
– Press button 1 x – lamp (**1**) lights up – High-speed mode pre-selection on
– Press button 1 x – lamp (**1**) goes out – Normal speed mode pre-selection on

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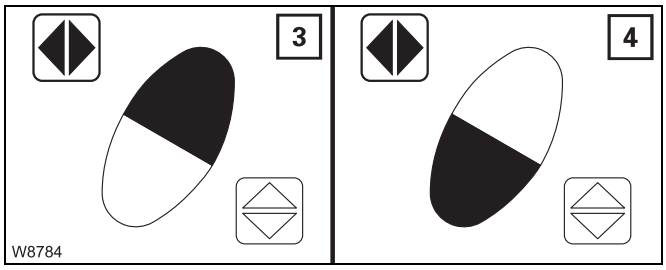
Function buttons

There are four button combinations to execute the pre-selected functions. Engaged buttons are shown in black:



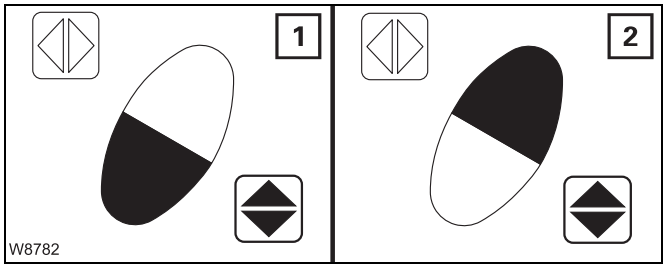
Outrigger beams

Only supports on the same side are pre-selected.

3 Extend

4 Retract

➠ p. 12 - 39



Supporting cylinders

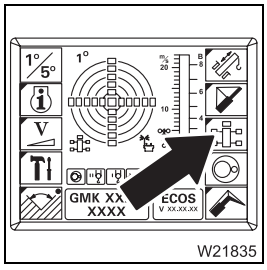
1 Extend
Automatic alignment

2 Retract

➠ p. 12 - 47

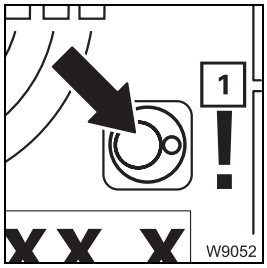
In the Outriggers submenu

All directional information refers to the carrier; ➠ p. 9 - 59.



Outriggers submenu

– **To open:** Press button 1 x – submenu opens



Slewing gear/movements locked display

– **Red:** Slewing gear switched off

– **Green:** Slewing gear switched on – outrigger movement disabled, symbol (**1**) appears after pre-selection of the outrigger

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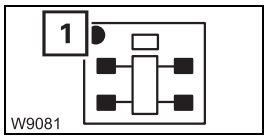
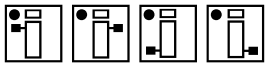
Pre-selecting the outrigger

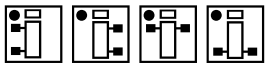
All supporting cylinders



– **Pre-select:** Press button 1 x – dot (**1**) turns green – pre-selection on
After 10 seconds – dot (**1**) turns black – pre-selection off



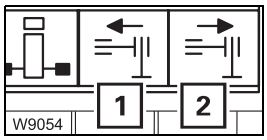
The following functions are pre-selected in the same way:
– **Front left outriggers**
– **Front right outriggers**
– **Rear left outriggers**
– **Rear right outriggers**



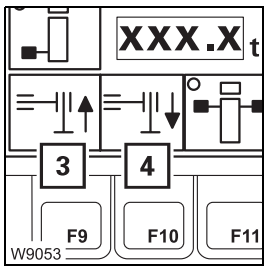
– **Left supporting cylinder**
– **Right supporting cylinder**
– **Front supporting cylinder**
– **Rear supporting cylinder**

Retracting/extending supporting cylinders

Slewing gear is switched off – outrigger pre-selection on.



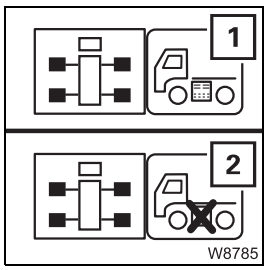
1 To retract: Press button – outrigger beam retracts
2 To extend: Press button – outrigger beam extends
p. 12 - 41



3 To retract: Press button – supporting cylinder retracts
4 To extend: Press button – supporting cylinder extends
p. 12 - 48

Movement stops after the button is released and when an end position is reached.

In the Settings submenu



Outrigger control units on/off

– **Switching on:** Press button until symbol (**1**) appears
– **Switching off:** Press button until symbol (**2**) appears
p. 12 - 33

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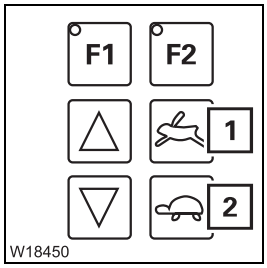
On the outrigger control units

All directional information refers to the carrier; ➠ p. 9 - 59.

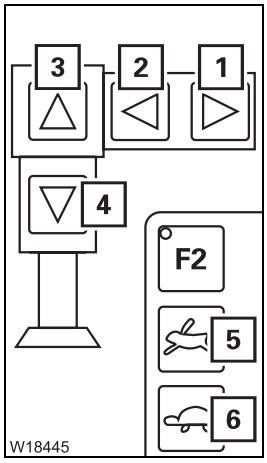
The display fields in the *Settings* submenu need to be switched on to operate in crane mode.



Pre-selecting high-speed/normal speed mode

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

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



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

Button (**5**) or (**6**) is pressed.

1 To retract: Press button – outrigger beam retracts[1)]

2 To extend: Press button – outrigger beam extends[1)]

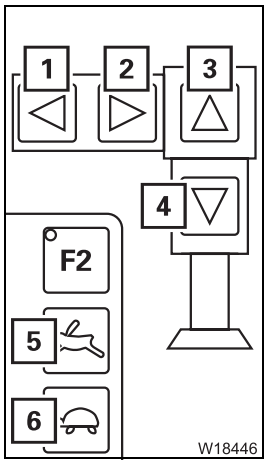
3 To retract: Press button – supporting cylinder retracts

4 To extend: Press button – supporting cylinder extends

[1)] only on operator's side

Outrigger beams; ➠ p. 12 - 38
Supporting cylinders; ➠ p. 12 - 46

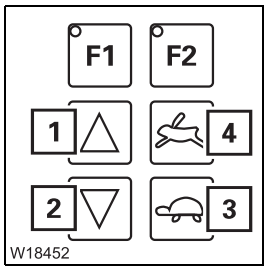
Movement stops after the button is released, and when an end position is reached.



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

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

12.07.2013



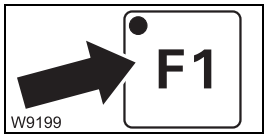
Extending/retracting all supporting cylinders

Button (**3**) or (**4**) is pressed.

1 To retract: Press button – all supporting cylinders retract

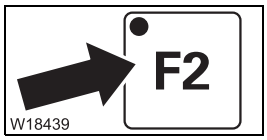
2 To extend: Press button – all support cylinders extend

Movement stops after the button is released, and when an end position is reached; ➠ p. 12 - 46.



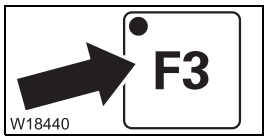
Additional function F1 on

Always use in combination with other buttons.



Additional function F2 Raise axle is on

Select the axle pairs.

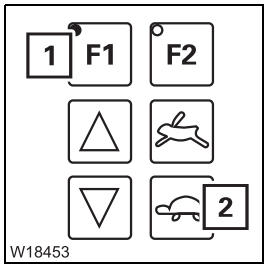


Additional function F2 Raise axle is on

Select the axle pairs.

Additional function F4

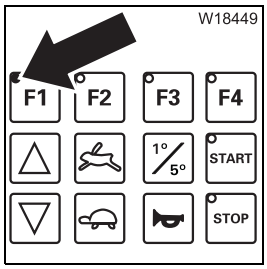
Switch between Inclination display/Raise axle menu.



– **Automatic levelling**

Press button (**1**) and button (**2**) –
Truck crane is levelled horizontally.
The process stops as soon as the truck crane is levelled horizontally or the button is released.

➠ p. 12 - 53



Position lights for indicator lamps

Light up when the ignition is on.

– **Display field lighting off:** Ignition on and no button engaged yet or no button engaged within the last 10 seconds.

– **Display field lighting on:** Press any button.

➠ p. 12 - 38

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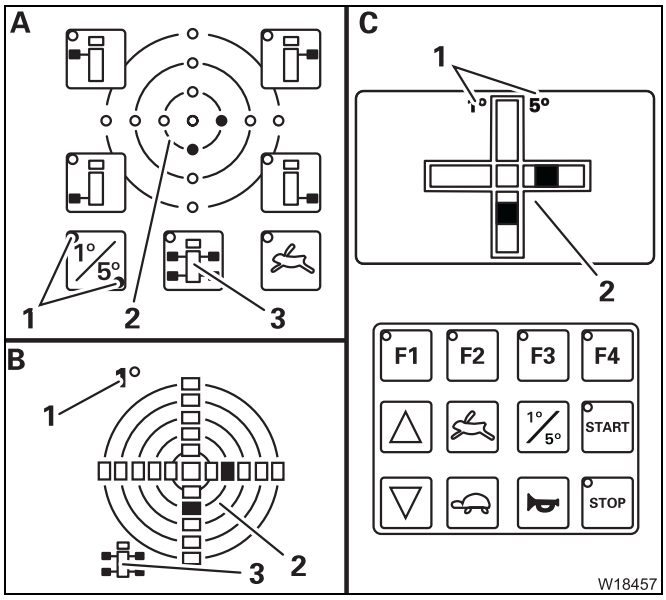
9.2.7 Inclination indicators

➠ *Inclination indicators*, p. 12 - 50



Current inclination indicator

A On the hand-held control

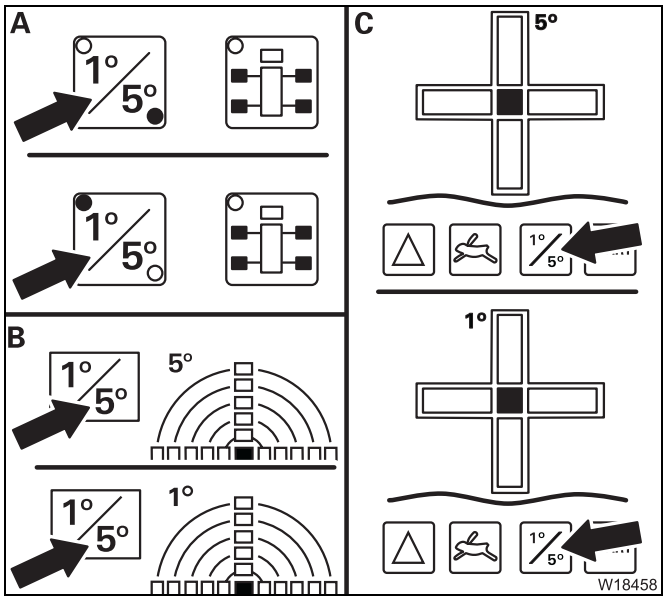
B In the main menu
In the *Outriggers* submenu

C On the *Outrigger* control units

1 Measuring range display

2 Inclination indicator

3 Directional indicator



Switch measuring range

A On the hand-held control

Press button 1 x – lamp for current measuring range 1° or 5° lights up

B In the *Outriggers* submenu

C On the *Outrigger* control units

Press button 1 x – the current measuring range 1° or 5° is shown

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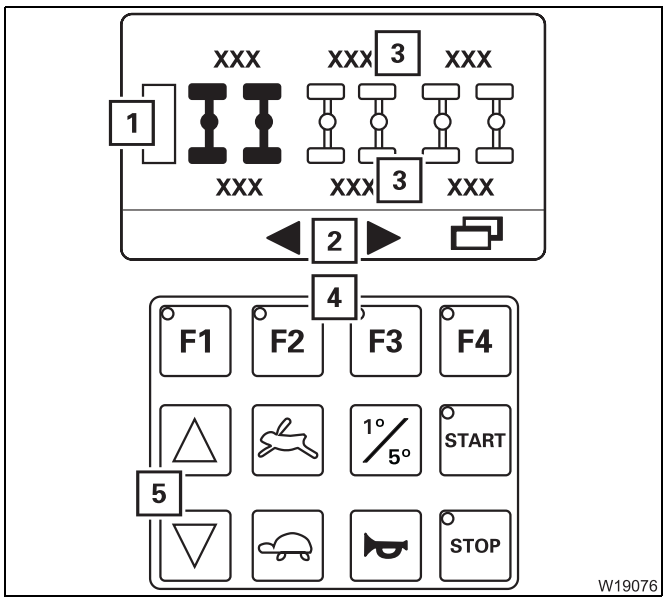
9.2.8 Raise axle

When the suspension is switched off (blocked), the *Raise axle* function can be used to raise or lower axle lines or axle pairs, depending on the selection made.

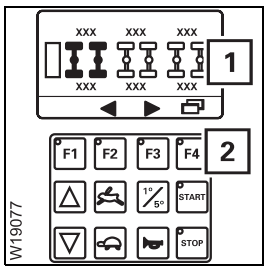
Outrigger control units



Raise axle display

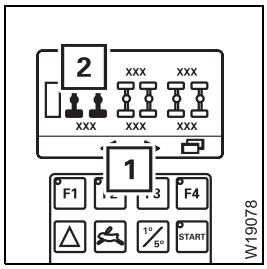
1 Selected axle pairs display
2 Directional indicator
3 Axle load display
4 Axle selection
5 Raise/lower axles

➠ p. 13 - 7



Switching on axle raising

Press button (**2**) until display (**1**) appears.



Axle selection

Pre-select: Press button (**1**) – the selected axle pairs (**2**) or axle lines turn black
Pressing the button (**1**) again changes the selection

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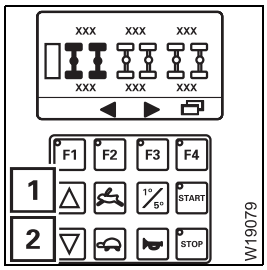
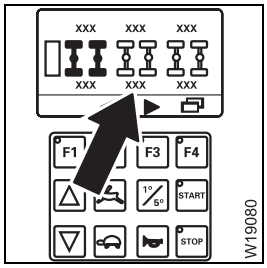
When you raise/lower the axles, the carrier's horn will sound once.



Raising/lowering axles

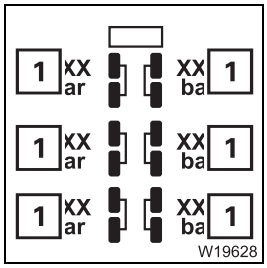
Raise:	Press button (**1**) – the selected axles are raised and the truck crane is lowered
Lower:	Press button (**2**) – the selected axles are lowered and the truck crane is raised

Movement stops after the button is released.



Axle load display

– **Unit of measurement:** Displayed depending on setting
  – **t** – tons or
  – **klbs –** kilopounds – (1 kilopound = 1000 lbs)



Cannot lower the axles

If the maximum permissible operation pressure (**1**) of 210 bar (3045 psi) per axle pair has been exceeded, then

– It is not possible to lower these axles any further,

– Only the other axles can be moved.

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

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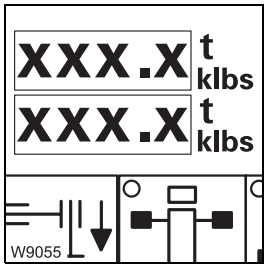
9.2.9 Outrigger pressure displays

Outriggers submenu

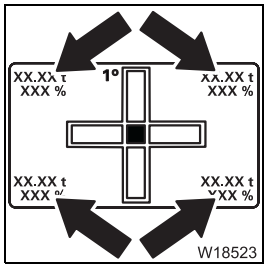


Outrigger pressure display

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

➠ p. 12 - 57

Outriggers control units



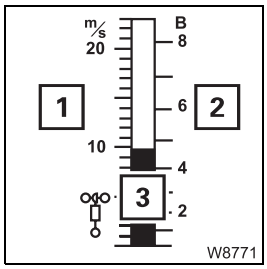
Outrigger pressure display

– **Unit of measurement:** Lights up depending on setting
  – **t** – tons or
  – **klbs** – kilopounds – (1 kilopound = 1 000 lbs)
– **Precision:** When in **t**, one decimal place
  When in **klbs**, no decimal point

➠ p. 12 - 57

9.2.10 Anemometer display

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 Wind speed display

➠ p. 11 - 54

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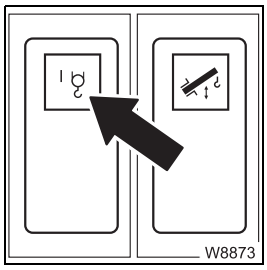
9.2.11 Main hoist

➠ *Main hoist*, p. 11 - 56.

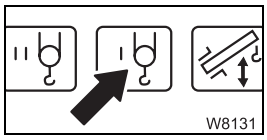


Main hoist on/off

There is a lamp in the button.

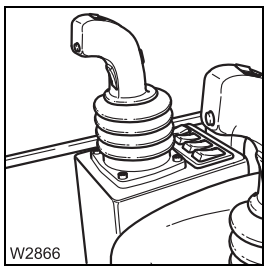
– **Press 1 x:** – Lamp bright – main hoist on
– Lamp dim – main hoist off

➠ p. 11 - 57



Power units display

– **Green:** Main hoist on
– **Red:** Main hoist off



Right control lever

– **Back:** Lift
– **Forward:** Lower

➠ p. 11 - 57

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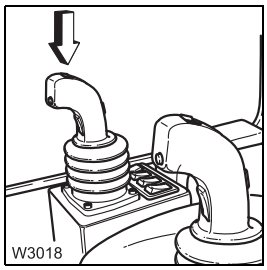
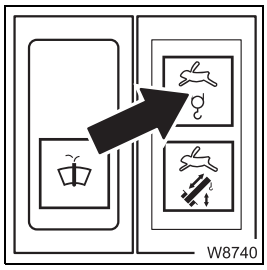


Hoist high-speed mode on/off

The parking brake must be engaged.

- **Left:** High-speed mode on, off when released
- **1 x to right:** High-speed mode on – continuous operation
- **1 x to right or 1 x to left:** High-speed mode off

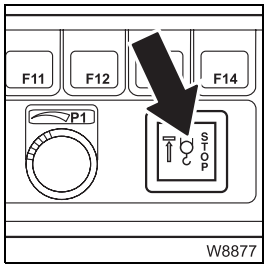
p. 11 - 97



High speed indicator lamp for hoists

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

p. 11 - 97



Warning for lifting limit switch shutdown

- **On:** Lifting limit switch triggered – hoist stops
- **Flashing:** Lifting limit switch triggered – shutdown overridden
- **Off:** Lifting limit switch not triggered

p. 11 - 62

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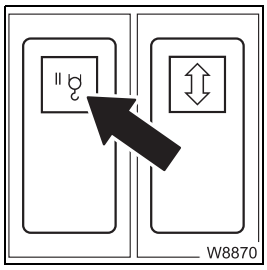
9.2.12 Auxiliary hoist

Auxiliary hoist, p. 11 - 59.

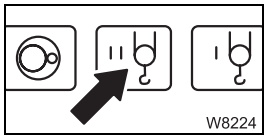


Auxiliary hoist on/off

There is a lamp in the button.

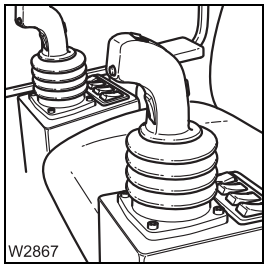
– **Press 1 x:** – Lamp bright – auxiliary hoist on
– Lamp dim – auxiliary hoist off

p. 11 - 59



Power units display

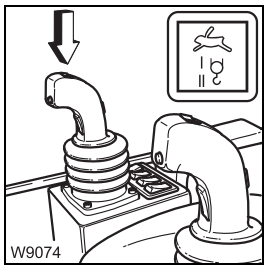
– **Green:** Auxiliary hoist on
– **Red:** Auxiliary hoist off



Left control lever

– **Back:** Lift
– **Forward:** Lower

p. 11 - 60



Button and lamp for hoist high-speed mode

Short description with main hoist; p. 9 - 76

Warning lamp for lifting limit switch shutdown

Short description with main hoist

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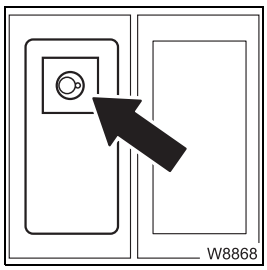
9.2.13 Slewing gear

Slewing gear, p. 11 - 98.

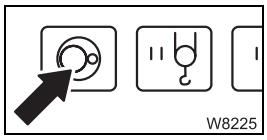


Slewing gear on/off

There is a lamp in the button.

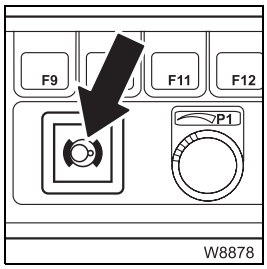
– **Press 1 x:** – Lamp bright – slewing gear on
Slewing gear brake released
– Lamp dim – slewing gear off
Slewing gear brake engaged

p. 11 - 99



Power units display

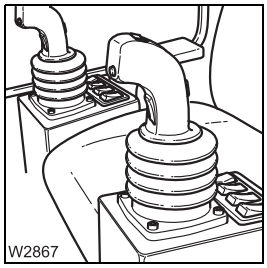
– **Green:** Slewing gear on
– **Red:** Slewing gear off



Slewing gear brake engaged/released

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

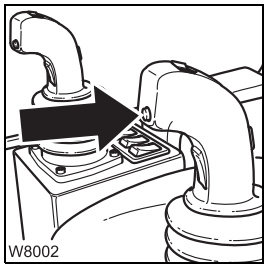
p. 11 - 99



Left control lever

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

p. 11 - 100



Slewing gear freewheel

– **To switch on:** Move control lever to zero position and press button – slewing gear brake released, lamp goes out

– **To switch off:** Release button – slewing gear brake engaged, lamp lights up

p. 11 - 102

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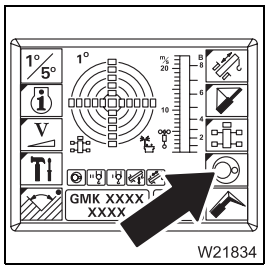
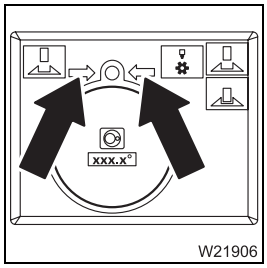
Submenu



Slewing gear/houselock submenu

– **To open:** Press button 1 x – submenu opens

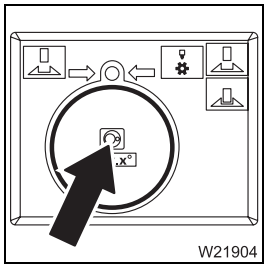


Display slewing direction to 0°/180°

Current position ± 20° in front of the 0° or 180° superstructure position.

– **Both arrows:** 0° or 180° superstructure position reached

– **One arrow:** Arrow direction = slewing direction to reach 0° or 180°

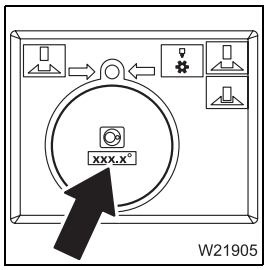


Slewing gear display

– **Green:** Slewing gear switched on

– **Red:** Slewing gear switched off

➠ p. 11 - 99



Current slewing angle display

0°: Position *0° to the rear*

180°: Position *180° to the front*

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

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

➠ p. 11 - 101

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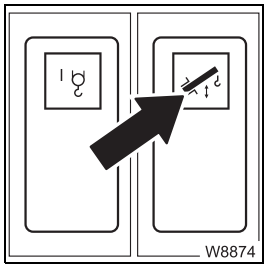
9.2.14 Derricking gear

➠ *Derricking gear*, p. 11 - 64.

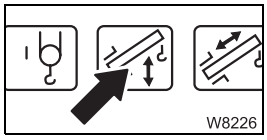


Derricking gear on/off

There is a lamp in the button.

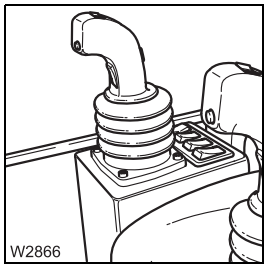
– **Press 1 x:** – Lamp bright – derricking gear on
Power units with the same control lever configuration off
– Lamp dim – derricking gear off

➠ p. 11 - 64



Power units display

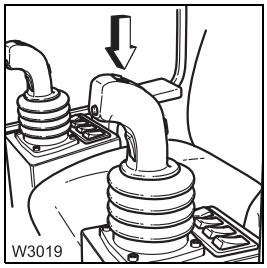
– **Green:** Derricking gear on
– **Red:** Derricking gear off



Right control lever

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

➠ p. 11 - 65

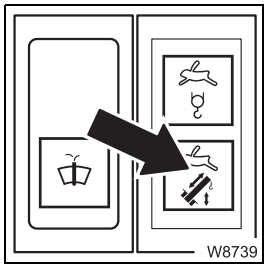


Derricking gear/telescoping mechanism high-speed mode on/off

The parking brake is engaged.

– **Left:** High-speed mode on, off when released
– **1 x to the right:** High-speed mode on – continuous operation
– **1 x to the right or 1 x to the left:** High-speed mode off

➠ p. 11 - 96



High-speed indicator lamp for derricking gear/telescoping mechanism

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

➠ p. 11 - 96

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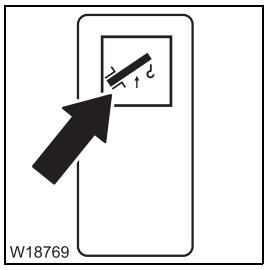

Raise button, shutdown bypassed

– **On:** Shutdown bypassed

– **Off:** Shutdown not bypassed

p. 11 - 44

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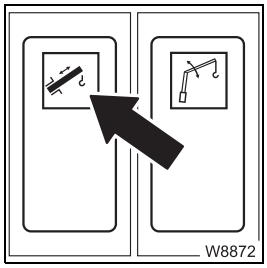
9.2.15 Telescoping mechanism

Control panels ➠ *Telescoping mechanism*, p. 11 - 68.



Telescoping mechanism on/off

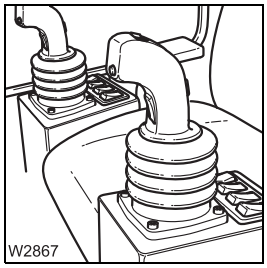
There is a lamp in the button.

– **Press 1 x:**
  – Lamp bright – telescoping mechanism on, Power units with the same control lever configuration off
  – Lamp dim – telescoping mechanism off

➠ p. 11 - 76

Power units display

– **Green:** Telescoping mechanism on
– **Red:** Telescoping mechanism off

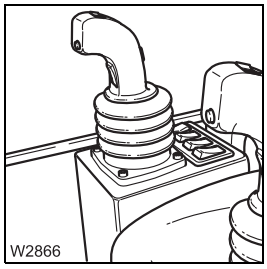


Left control lever

Control lever configuration – version 1

– **Back:** Retract
– **Forward:** Extend

➠ p. 11 - 76

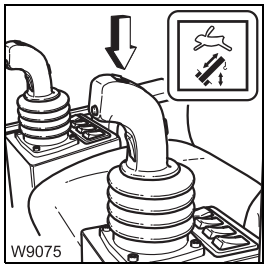


Right control lever

Control lever configuration – version 2

– **To the left:** Retract
– **To the right:** Extend

➠ p. 11 - 76



Button and lamp for derricking gear/telescoping mechanism high-speed mode

Short description with derricking gear; ➠ p. 9 - 80.

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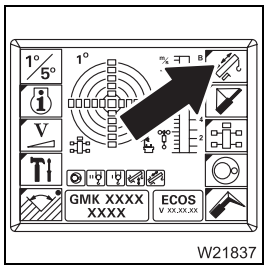
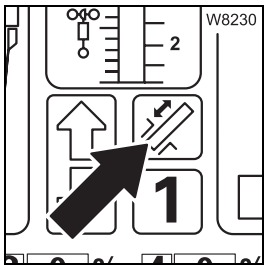
Submenu



Telescoping submenu

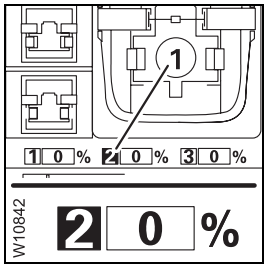
– **To open:** Press button 1 x – submenu opens



Display for telescoping mechanism on/off

– **Green:** Telescoping mechanism on
– **Red:** Telescoping mechanism off

➠ p. 11 - 79



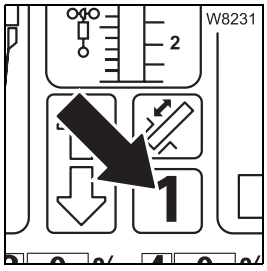
Current telescoping display

1 Extended length of the telescopic sections in per cent (%)

2 Telescopic section display is green

– **On:** Telescoping cylinder is locked here
– **Flashing:** Next possibility for locking telescoping cylinder

➠ p. 11 - 80



Telescoping cylinder in the telescopic section display

Displayed telescopic section, e.g. telescopic section I:

– **On:** Telescoping cylinder is locked here
– **Flashing:** Next possibility for locking telescoping cylinder
– **Off:** Telescoping cylinder in this telescopic section – distance to the locking point greater than 1 m (3.3 ft)
or
Teleautomation on – symbol is displayed

➠ p. 11 - 80

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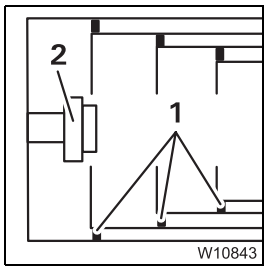


Telescope diagram display

Current relation between the telescopic sections – section of top view.

Locking pin

1 On the telescopic section

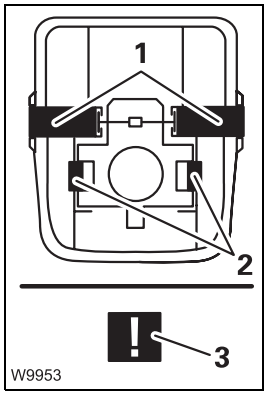
2 On the telescoping cylinder

Display 1 and 2

– **Green:** Locked

– **None:** Unlocked or intermediate position

➠ p. 11 - 80



Locking status display

The locking pins change the position and colour.

Locking pin

1 On the telescopic section

2 On the telescoping cylinder

Display 1 and 2

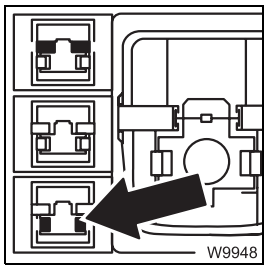
– **Green:** Locked

– **Red:** Unlocked

– **Yellow:** Intermediate position

– **Violet:** Error – symbol (**3**)

➠ p. 11 - 81

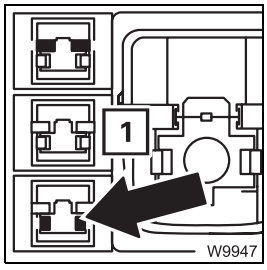


Unlock telescoping cylinder selection

– **Display** **Yellow:** Telescoping cylinder unlocked

Grey: Telescoping cylinder locked

Flashing: (yellow/grey) Unlock selected



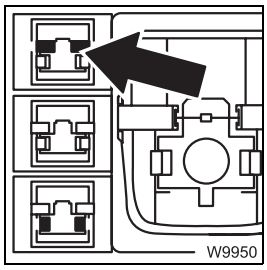
– **To select:** Press button 1 x

– Telescopic section locked:
Unlock selected – executed after moving the control lever

– Telescopic section unlocked:
Unlock not selected – symbol (**1**) flashes (yellow/grey) as a prompt to *Lock telescopic section*

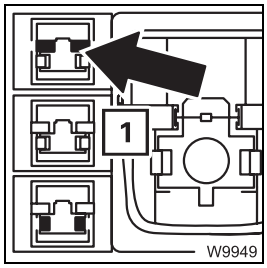
➠ p. 11 - 81

12.07.2013



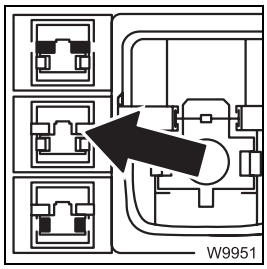
Unlock telescopic section selection

– **Display** **Yellow:** Telescopic section unlocked
Grey: Telescopic section locked
Flashing: (yellow/grey) Unlock selected



– **To select:** Press button 1 x
– Telescoping cylinder locked:
Unlock selected – executed after moving the control lever
– Telescoping cylinder unlocked:
Unlock not selected – symbol (**1**) flashes (yellow/grey) as a prompt to *Lock telescoping cylinder*

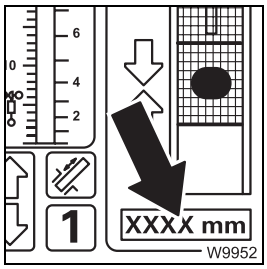
➠ p. 11 - 86



Lock selection

– **Display** **Yellow:** Telescoping cylinder and telescopic section locked
Grey: Telescoping cylinder or telescopic section unlocked
Flashing: (yellow/grey) Lock selected

➠ p. 11 - 85, ➠ p. 11 - 89



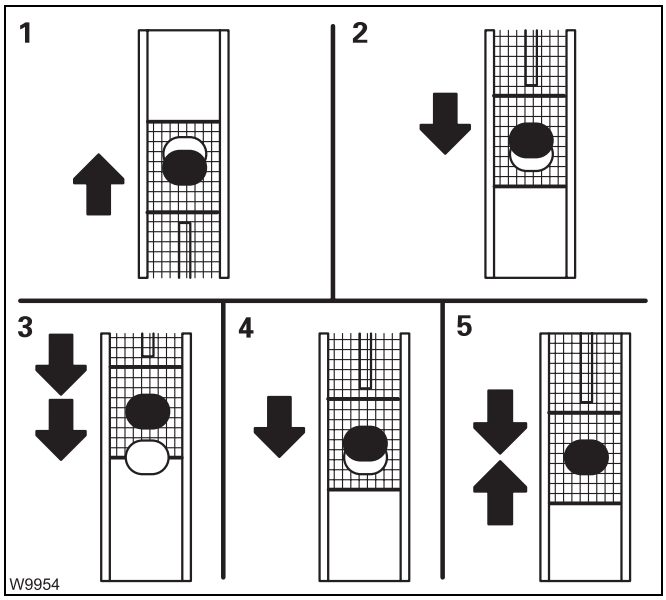
Telescoping cylinder length display

– **Display:** Current extended length of the telescoping cylinder

– **Unit of measurement:** Displayed depending on setting, mm (millimetres) or ft (feet)

➠ p. 11 - 84

12.07.2013



Locking point display

– Direction of travel to the locking point

1 Extend telescoping cylinder

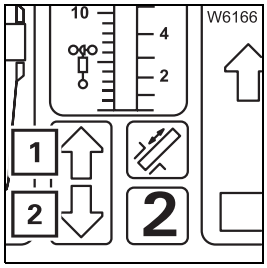
2 Retract telescoping cylinder

– Distance to the locking point

3 Yellow: approx. 1 m (3.3 ft)

4 Yellow less than 1 m (3.3 ft)

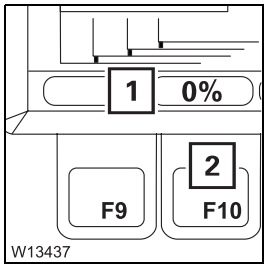
5 Green: At the locking point



Enable telescoping display

1 Extend – **Red:** Blocked
– **Green:** Enabled

2 Retract – **Red:** Blocked
– **Green:** Enabled



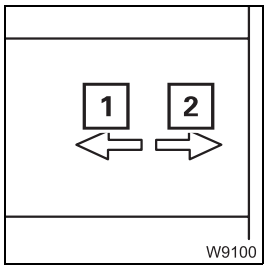
Entering target value for teleautomation

1 – **Red:** Teleautomation off
– **Yellow:** Enter target value
– **Green:** Teleautomation on

2 Press button first time – target value input on
Press button 1 x – target value to next fixed length

➠ p. 11 - 91

12.07.2013



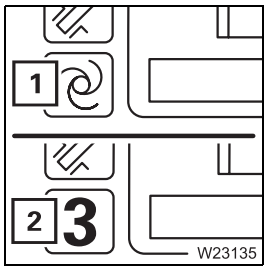
Teleautomation direction display

1 On: Start teleautomation with *Extending*

2 On: Start teleautomation with *Retracting*

Flashing = control lever movement incorrect

➠ p. 11 - 91



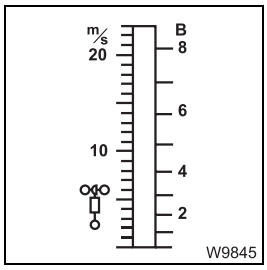
Teleautomation on display/Manual telescoping on

1 Teleautomation on

➠ *Telescoping with teleautomation*, p. 11 - 91

2 Manual telescoping on

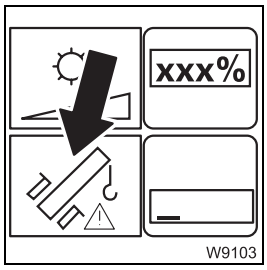
➠ *Manual telescoping*, p. 11 - 79



Anemometer display

Same as in main menu; ➠ p. 9 - 75.

In the Settings submenu



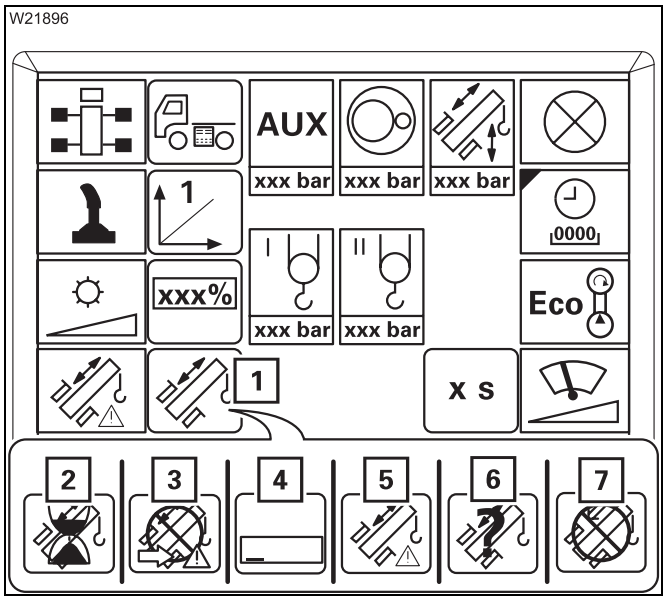
Telescoping emergency programme access

The right dead man's switch is pressed.

– Press the button 1 x: After entering the keycode, the *Telescoping* emergency programme opens

➠ p. 14 - 43

12.07.2013



Current telescoping mechanism status display

The current status is shown using different symbols:

1 Normal

2 Waiting

3 Emergency programme access

4 Keycode input

5 Emergency programme

6 Telescope status divergence

7 Inactive

➠ p. 14 - 17

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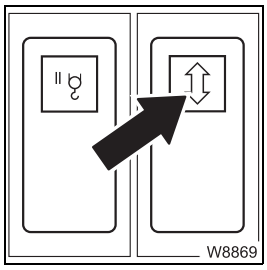
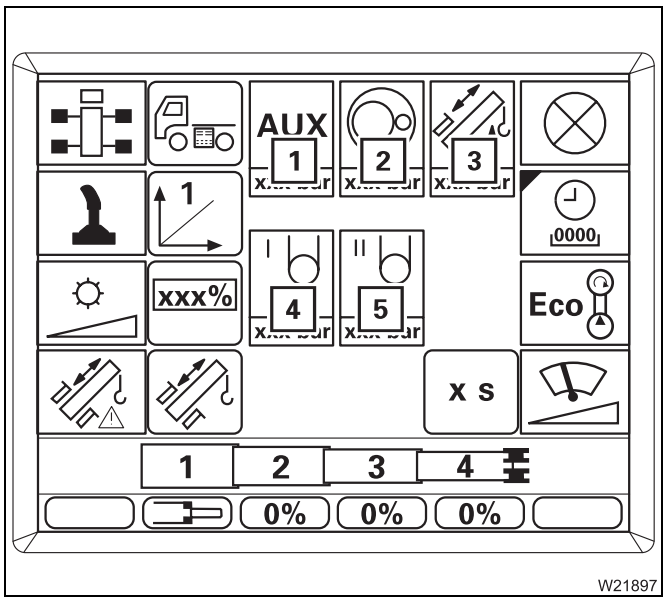
9.2.16 Hydraulic system



Inclining the crane cab

- **Press down:** Incline back
- **Press up:** Incline forward

p. 11 - 105



In the Settings submenu

Current pressure in bar for movements of the

1 Auxiliary drive gears:
- Derricking gear
- Counterweight hoist unit
- Incline cab
- Locking units

2 Slewing gear

3 Telescoping mechanism

4 Main hoist

5 Auxiliary hoist

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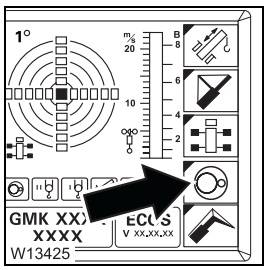
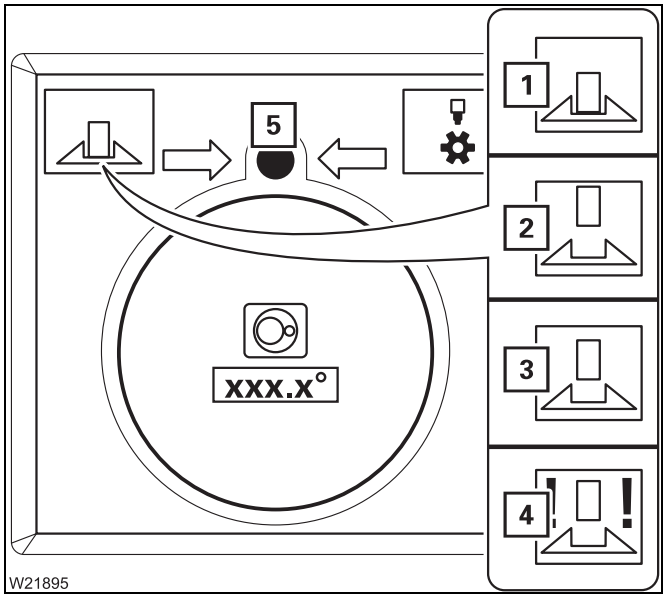
9.2.17 Superstructure lock/houselock submenu



Superstructure lock submenu

– **To open:** Press button 1 x – submenu opens



Superstructure locking status displays

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

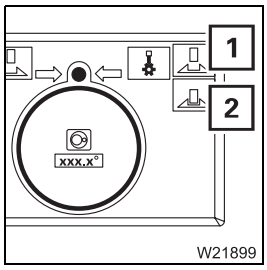
1 and 5 Green – locked

2 and 5 Red – unlocked

3 and 5 Yellow – intermediate position

4 and 5 Violet – error

➠ p. 11 - 14



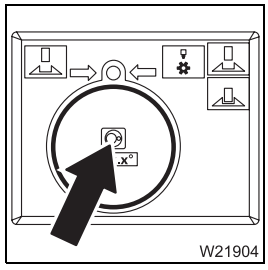
Locking/unlocking turntable

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

1 To lock: Press button – locking pin extends

2 To unlock: Press button – locking pin retracts

➠ p. 11 - 14



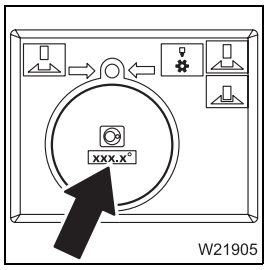
Slewing gear display

– **Green:** Slewing gear switched on

– **Red:** Slewing gear switched off

➠ p. 11 - 99

12.07.2013



Current slewing angle display

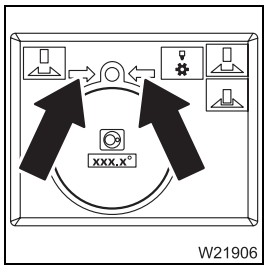
0°: Position *0° to the rear* – locking point

180°: Position *180° to the front* – locking point

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

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

➠ p. 11 - 101



Display slewing direction to 0°/180°

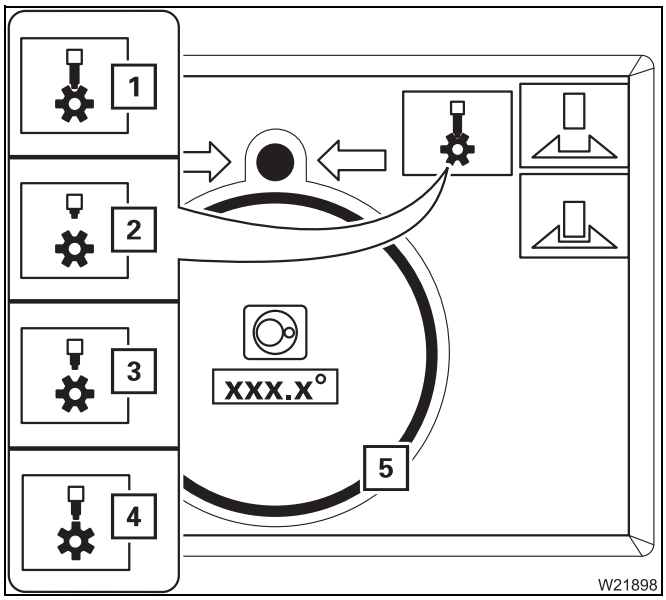
Current position ± 20° in front of the 0° or 180° superstructure position.

– **Both arrows:** 0° or 180° superstructure position reached

– **One arrow:** Arrow direction = slewing direction to reach 0° or 180°

➠ *Locking/unlocking the superstructure*, p. 11 - 13

Houselock ➠ *Switching the houselock on/off*, p. 11 - 15.

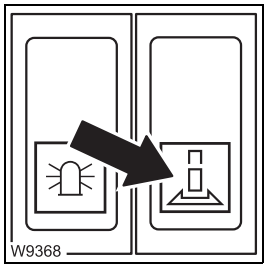


Houselock locking status displays

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

1 and 5	**Green:**	Locked
2 and 5	**Red:**	Unlocked
3 and 5	**Yellow:**	Intermediate position
4 and 5	**Yellow/red:**	Blocked, locking pin in front of a tooth

➠ p. 11 - 15



Houselock on/off

The slewing gear is switched off

– **Press up:** Switch on – pin extends

– **Press down:** Switch off – pin retracts

➠ p. 11 - 15

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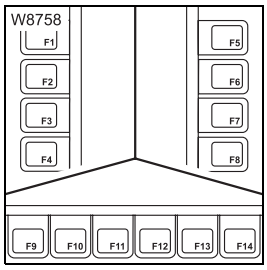
9.2.18 Rated capacity limiter (RCL)

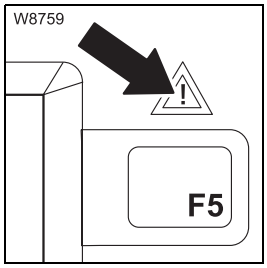
Control unit

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 provided it has been released.

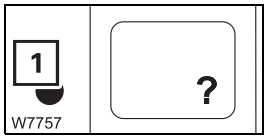


Error

– **On:** Error has occurred

– **Off:** No errors

➠ p. 11 - 39



Opening Errors submenu

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

– **Press the button 1 x:** This opens the *Errors* submenu

➠ p. 14 - 25

Exiting submenu/input mode

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

– **Press the button 1 x:**
  – The opened submenu closes – the menu from the next highest level is opened
  – Input mode is deactivated

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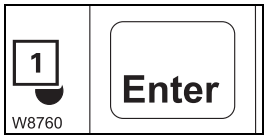


Input confirmation

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

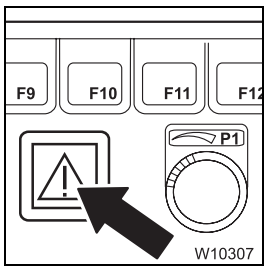
– **In the Rigging mode submenu:** Press button 1 x – *Rigging mode monitoring* submenu opens

– **In the Rigging mode monitoring submenu:** Press button 1 x – Rigging mode is accepted, *Monitoring* submenu opens, lamp (**1**) goes out

Acknowledging

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

– **Press the button 1 x:** Buzzer tone off, error message acknowledged



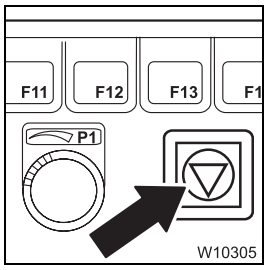
RCL early warning

– **Flashing:** Degree of utilisation 90 – 100% – buzzer tone on

– **On:** Degree of utilisation about 100% – buzzer tone on – shutdown

– **Off:** Degree of utilisation 0 – 90%

p. 11 - 37

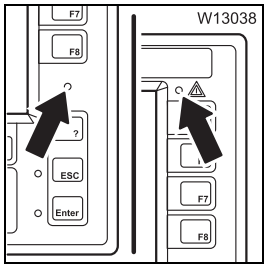


RCL shutdown

– **On:** Shutdown – buzzer tone on
  – Degree of utilisation about 100% or
  – Error

– **Off:** No shutdown

p. 11 - 37



Brightness sensor

Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted; p. 11 - 22.

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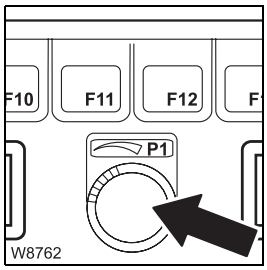


Entering values

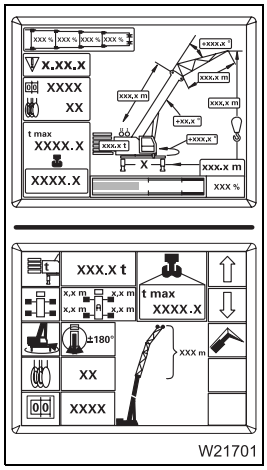
The input mode for the RCL code is switched on.

– **To the right:** Next greater value

– **To the left:** Next smaller value

Slowly turning – changes the value gradually
Quickly turning – changes the value quickly

➠ p. 11 - 28



RCL display

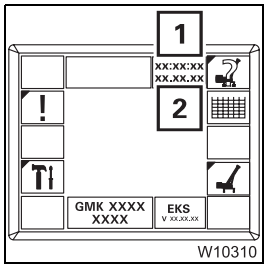
– **After a standstill of up to 48 hours**

Ignition on – *Monitoring* submenu opens; ➠ p. 11 - 21

– **After a standstill of more than 48 hours**

Ignition on – *Enter rigging mode* submenu opens; ➠ p. 11 - 22

Main menu

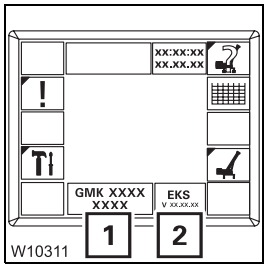


Date/time display

1 Time

2 Date

➠ *Entering the time/date*, p. 11 - 51



Serial number and programme version displays

1 Truck crane serial number

2 RCL programme version – always state in the event of a malfunction; ➠ p. 14 - 22

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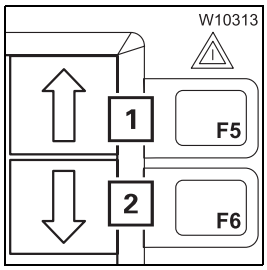
Rigging mode entry submenu

➠ *Entering the rigging mode*, p. 11 - 23

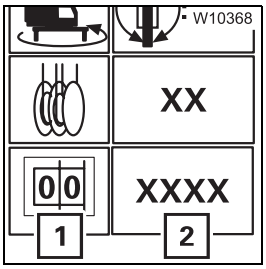


Selection

In input mode

1 Press button 1 x – display next highest value

2 Press button 1 x – display next lowest value

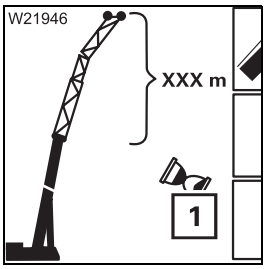


RCL code entry

– Input mode on: Press button (**1**) 1 x – symbol turns green

– Input: In input mode, press button ⇧ ⇩ 1 x – next RCL code on display (**2**)

➠ p. 11 - 28

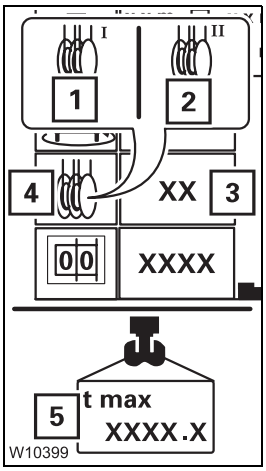


Determining RCL code display

– Symbol (1): RCL code is determined after selecting Rigging mode

– No display: New RCL code is displayed

➠ p. 11 - 25



Entering reeving

– Input mode on:
- For main hoist: Press button (**4**) until symbol (**1**) is green
- For auxiliary hoist: Press button (**4**) until symbol (**2**) is green

– Input: In input mode, press button ⇧ ⇩ 1 x
- Reeving +1 on display (**3**)
- Relevant maximum load on display (**5**)

➠ p. 11 - 24

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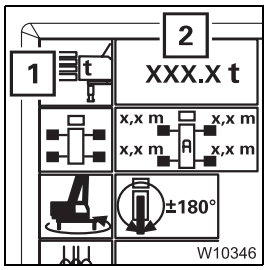
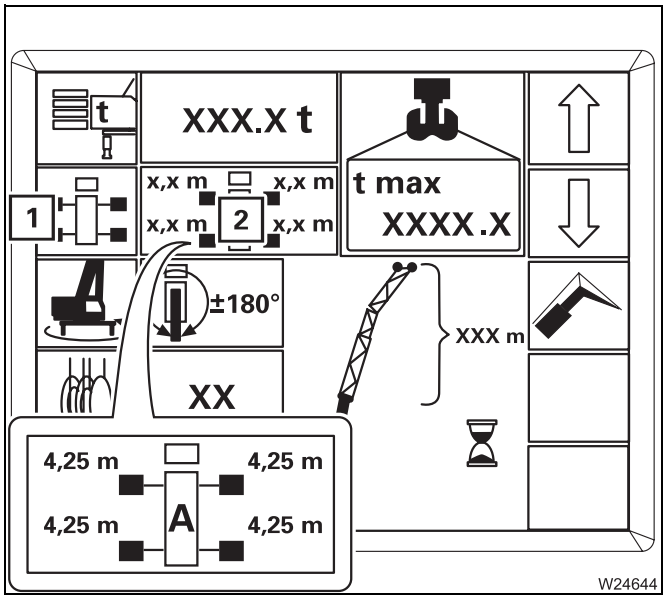


Entering counterweight

– **Input mode on:** Press button (**1**) 1 x – symbol turns green

– **Input:** In input mode, press button ⇧ ⇩ 1 x – next combination on display (**2**)

➠ p. 11 - 24



Entering outrigger span

– **Input mode on**
Press button (**1**) 1 x – symbol turns green

– **Input**
In input mode, press button ⇧ ⇩ 1 x – next outrigger span on display (**2**)

A 8.70 x 8.50 m (28.5 x 27.9 ft)

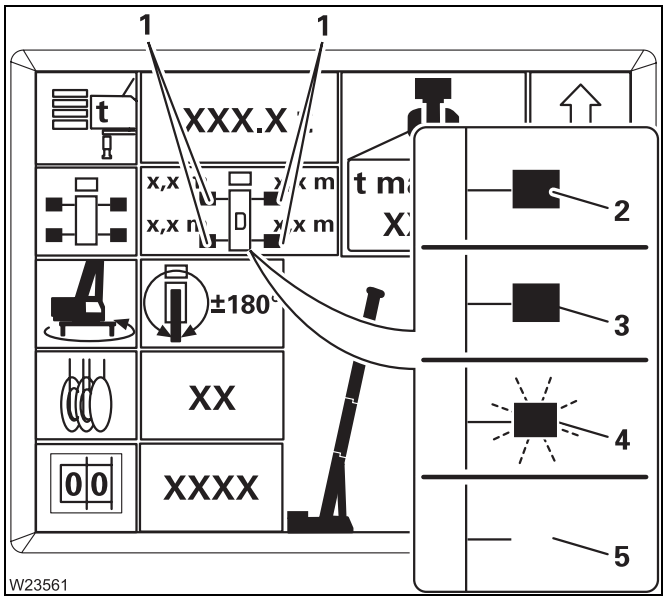
B 8.70 x 7.40 m (28.5 x 24.3 ft)

C 8.70 x 6.30 m (28.5 x 20.4 ft)

D 8.70 x 5.00 m (28.5 x 16.4 ft)

M 8.70 x 2.71 m (28.5 x 8.9 ft)

➠ p. 11 - 24



Outrigger span monitoring display

The display (**1**) is identical for all outrigger beams (**2**).

(**3**) Illuminated – The required outrigger span is rigged

(**4**) Flashes – The required outrigger span is not rigged

(**5**) No display – The current outrigger span is not permitted

With displays (**4**) and (**5**) an error message is displayed after applying the rigging code; ➠ p. 11 - 24.

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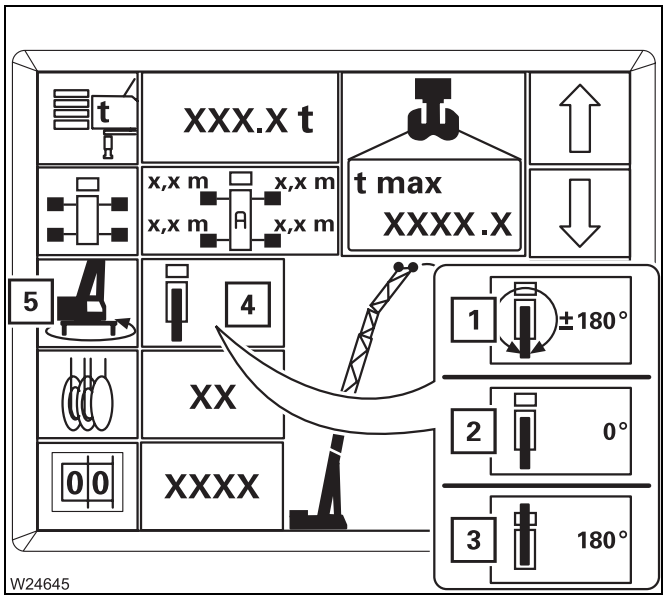


Entering slewing range

– **Input mode on**
Press button (**5**) 1 x – symbol turns green

– **Input**
In input mode, press button ⇧ ⇩ 1 x – next permissible slewing range on display (**4**)

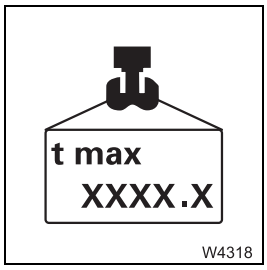
1 360° slewing range

2 Operating position 0° to the rear[1)]

3 Operating position 180° to the front[1)]

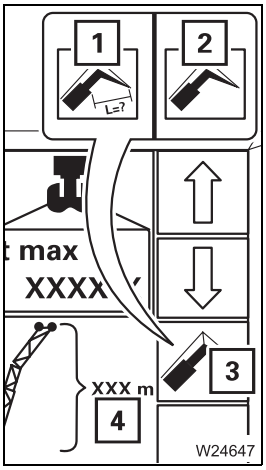
[1)] To accept, switch off slewing gear

➠ p. 11 - 24



Maximum load display

Short description with *Monitoring* submenu; ➠ p. 9 - 100.



Boom system entry

– **Input mode on:**
– For boom system:
Press button (**3**) until symbol (**2**) is green
– For lattice extension length and angle:
Press button (**3**) until symbol (**1**) is green

– **Input:**
In input mode, press button (**3**) 1 x – next length on display (**4**)

➠ p. 11 - 24

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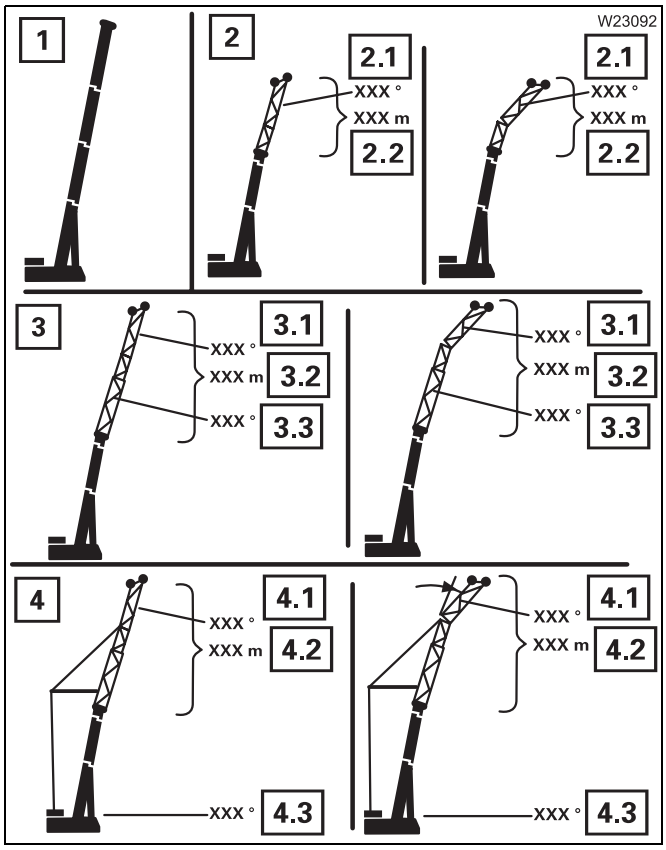

Boom system display

Boom system for displayed RCL code,

1 Main boom/auxiliary single-sheave boom top

2 Heavy load lattice extension

- **2.1** Angle
- **2.2** Length

3 Boom extension

- **3.1** Angle
- **3.2** Length
- **3.3** Angle

4 Luffing jib

- **4.1** Length
- **4.2** Angle
- **4.3** Main boom angle

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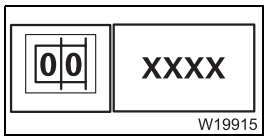
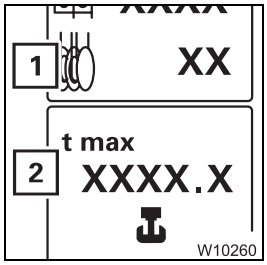
Monitoring submenu

Displays – depend on rigging mode; ➠ *Checks before operating the crane*, p. 11 - 31.



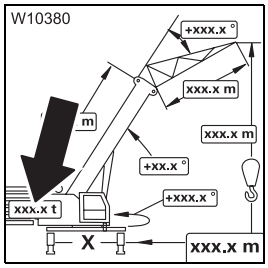
RCL code display

RCL code, four digits



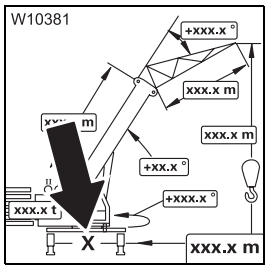
Reeving display

1 Required quantity of reeved ropes for displayed, maximum load (**2**)



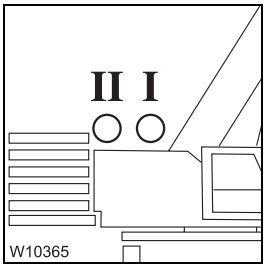
Counterweight display

Required counterweight combination in tons (t) – for displayed RCL code.



Outrigger span display

Required outrigger span for displayed RCL code – displayed in letters – overview of outrigger spans; ➠ p. 9 - 95.



Hoists display

- **– I on:** Main hoist switched on first – displayed reeving applies to main hoist
- **– II on:** Auxiliary hoist switched on first – displayed reeving applies to auxiliary hoist
- **– I or II flashing:** Corresponding hoist switched on as well – displayed reeving applies to the other hoist
- **– I or II off:** Corresponding hoist switched off

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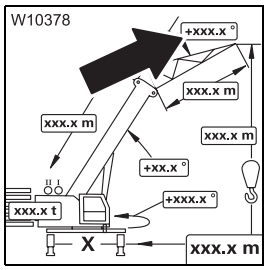
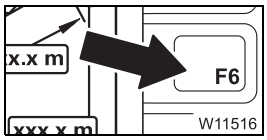


Lattice extension angle display

The inclinable lattice extension is connected.

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

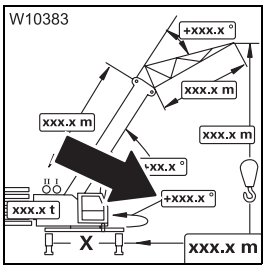
➠ p. 11 - 35



Lifting capacity table submenu

– **Press the button 1 x:** The *Lifting capacity table* submenu opens

➠ p. 11 - 49



Current slewing angle display

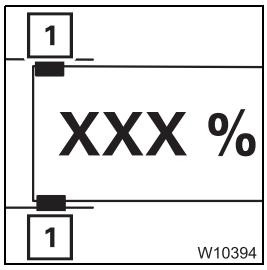
0°: Position *0° to the rear*

180°: Position *180° to the front*

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

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

➠ p. 11 - 35



Current telescoping display

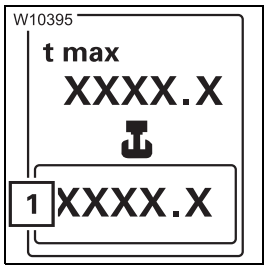
Telescope status of all telescopic sections in percent – locking pins (**1**):

– **Green:** Fixed length – locked and set down

– **Flashing:** Intermediate length – locked, not set down

– **Black:** Intermediate length – not locked

➠ p. 11 - 34



Current load display

– **Display:** Currently raised load in tons (t) or kilopounds (klbs) – accurate to ± 5% of actual load
Example: 55.2 klbs equal 55 200 lbs

➠ p. 11 - 36

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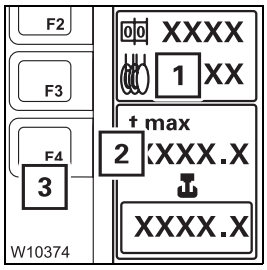
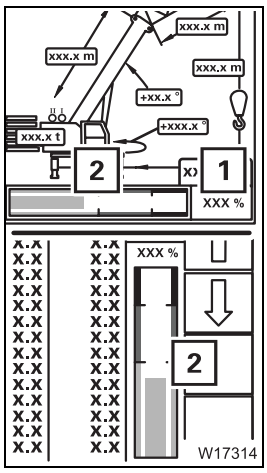


Maximum load display

– **Display:** Maximum load in tons (t) or kilopounds (klbs) for displayed RCL code
– Symbol (**1**) is red – maximum load reduced by reeving Press button (**3**) 1 x – display (**2**) briefly shows maximum load for displayed RCL code

➠ p. 11 - 36



Current degree of utilisation display

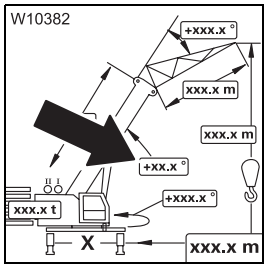
Degree of utilisation = 100 x current load/maximum load

1 Display in percent

2 Colour display:

– **Blue:** 0 - 90%
– **Yellow:** approx. 90 - 100% – early warning
– **Red:** greater than 100% – shutdown

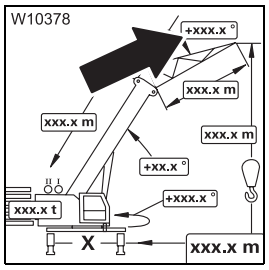
➠ p. 11 - 36



Current main boom angle display

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

➠ p. 11 - 35

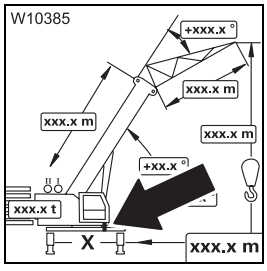


Lattice extension inclination display

The luffing jib is connected.

– **Display:** Current angle between the lattice extension and main boom in degrees (°)

➠ p. 11 - 35



Turntable lock display

– **Lights up green:** Turntable locked
– **No display:** Turntable unlocked
– **Flashes yellow:** Locking pin in intermediate position
– **Flashes red:** Error code displayed

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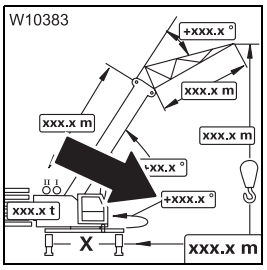


Current slewing angle display

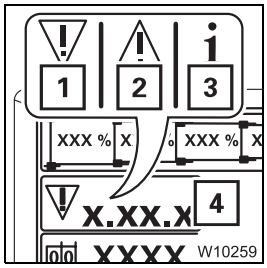
0°: Position *0° to the rear*

180°: Position *180° to the front*

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

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

➠ p. 11 - 35



Error display

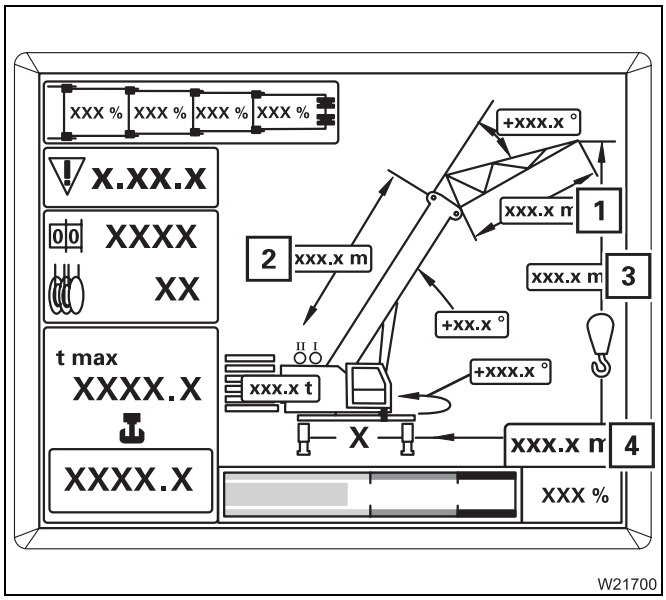
1 Error

2 Warning

3 Information

4 Corresponding number code,
press button F2 1 x – next available number code

➠ p. 11 - 39



Other displays

Display in metres (m) or feet (ft)

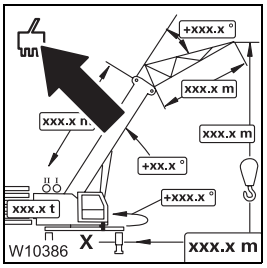
1 Current lattice extension length

2 Current main boom length

3 Current overall height

4 Current working radius

➠ p. 11 - 34

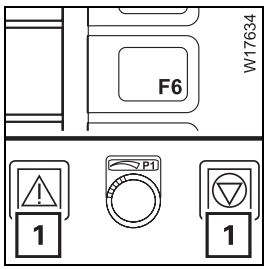


Service symbol display

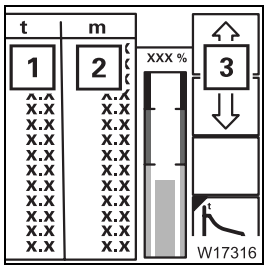
Symbol displayed – service device connected

Lifting capacity table submenu

➠ *Displaying the lifting capacity tables*, p. 11 - 49



– **To open:** Press the button 1 x – submenu opens, all crane movements are blocked, the lights (**1**) light up



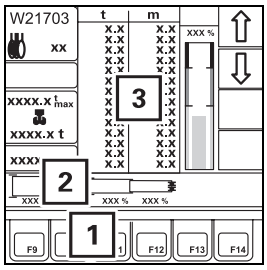
Lifting capacity table display

Values for displayed RCL code and displayed telescope status

1 Lifting capacity in tons (t) or in kilopounds (klbs)

2 Working radius in metres (m) or feet (ft)

3 Show other values given in the table



Telescope status display/input

– **Display:** Telescope status (**2**) in percent

– **Input:** Press button (**1**)
  – New telescope status on display (**2**)
  – Corresponding table on display (**3**) or all values 0 = no table available

Other displays

Function as in *Monitoring* submenu:

– RCL code display ➠ p. 9 - 98
– Reeving display ➠ p. 9 - 98
– Maximum load display ➠ p. 9 - 100
– Current load display ➠ p. 9 - 99
– Current working radius display ➠ p. 9 - 101
– Current degree of utilisation display ➠ p. 9 - 100

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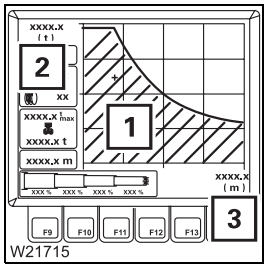
Working range submenu

➠ *Displaying the lifting capacity tables*, p. 11 - 49



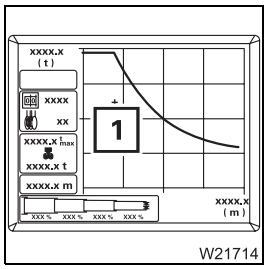
Permissible working range display

Applies to displayed RCL code and displayed telescope status

1 Permissible working range – surface under the curve

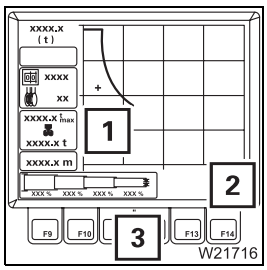
2 Maximum possible load

3 Maximum possible working radius



Current position display

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



Telescope status display/input

– **Display:** Telescope status (**2**) in percent

– **Input:** Press button (**3**)
  – New telescope status on display (**2**)
  – Corresponding working range on display (**1**)
    or no display = telescope status outside the working range

Other displays

Function as in *Lifting capacity table* submenu

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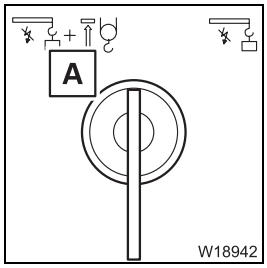
Other

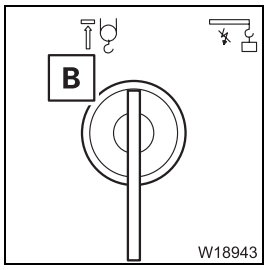
The key-operated switches have different functions, depending on the symbol (**A**) or (**B**).



Key-operated RCL override switch – symbol (A)

– **Turn to the right:** *RCL* shutdown overridden – crane functions released, no more monitoring; ➠ p. 11 - 40

– **Turn to the left:** *Lifting limit switch* shutdown bypassed – crane functions released, no more monitoring; ➠ p. 11 - 63



Key-operated RCL override switch – symbol (B)

– **Turn to the right:** *RCL* shutdown overridden – crane functions released up to 110%; ➠ p. 11 - 40

– **Turn to the left:** *Lifting limit switch* shutdown bypassed – crane functions released; ➠ p. 11 - 63

– **Pressed:** Speed of movements increasing load moment max. 15%

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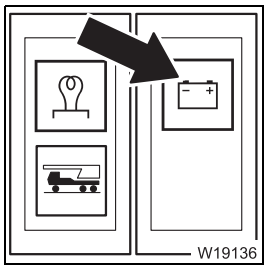
9.2.19 Electrical system



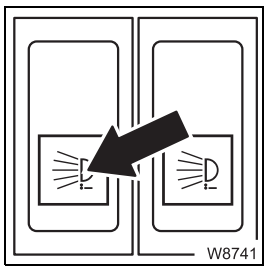
Voltage monitoring warning

- **On:** Engine off – ignition on
  or
  Engine on – power failure – switch off engine
- **Off:** Engine on – no malfunction

➠ p. 10 - 3

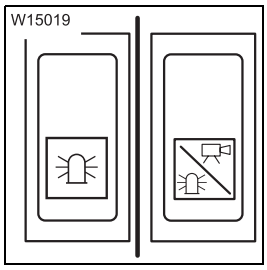
9.2.20 Lighting, windscreen wiper/washing system

Lighting



Spotlight sockets on/off

- **Switching on:** Press down – voltage on (both sockets)
- **Switching off:** Press up – voltage off (both sockets)

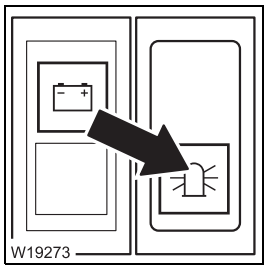


Air traffic control light/camera on/off

- **Switching on:** Press down – voltage on socket switched on/camera on
- **Switching off:** Press up – voltage on, socket switched off/camera off

➠ *Anemometer and air traffic control light*, p. 12 - 133

➠ *Camera on main boom*, p. 12 - 138



Rotating beacon on/off

- **Switching on:** Press down – lamp in button on
- **Switching off:** Press up – lamp in button off

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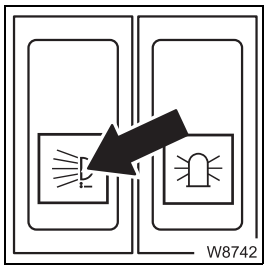
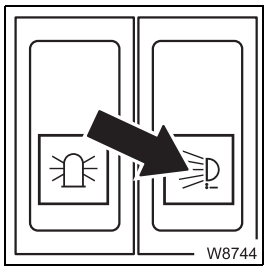


Slewable spotlight on/off

- **Switching on:** Press down
- **Switching off:** Press up

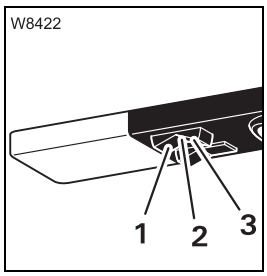
p. 11 - 109



Swinging the spotlight

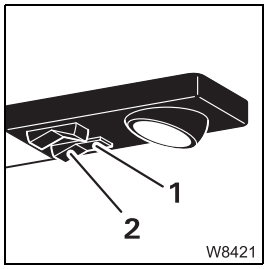
- **Back:** Press down
- **Forward:** Press up

p. 11 - 109



Cab lighting

1 Always on
2 Always off
3 On/off if door open/closed



Reading lamp

1 On
2 Off

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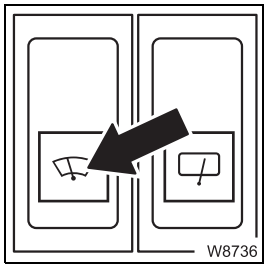
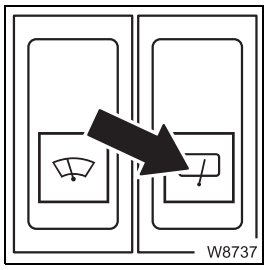
Windscreen wiper/washing system



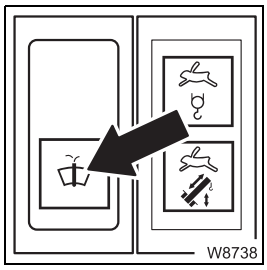
Windscreen wiper on/off

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



Roof window wiper on/off

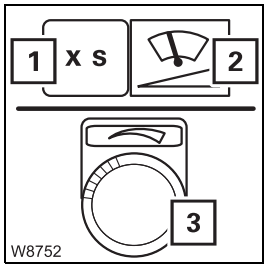
- **Off:** Press up – wiper goes to end position
- **Interval:** Middle position
- **Continuous operation:** Press down



Windscreen washing system

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

No additional wiping function is performed



Adjusting the wiper stroke interval

In the *Settings submenu*

1 Interval display

2 Press 1 x – input mode on

3 Turn – change interval

➠ p. 11 - 106

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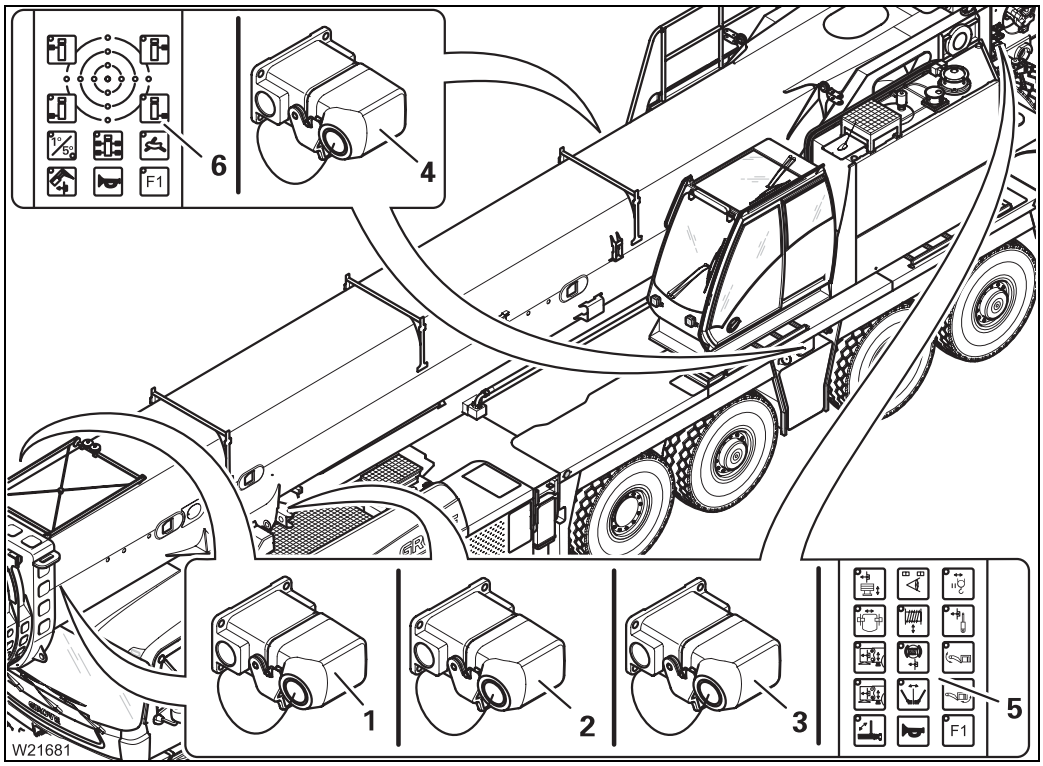
9.2.21 Hand-held control

Sockets for hand-held control

The following applies to all sockets:

- **Pull plug:** Engine off – ignition off
- **Insert plug:** Ignition on

p. 12 - 21



The hand-held control (**6**) is only active when it is connected to the socket (**4**). The hand-held control (**5**) is only active when it is connected to the socket (**1**) to (**3**).

	Released operations
1	– Rigging Mega Wing Lift[1)]
2	– Emergency operation for crane movements (except for telescoping mechanism) – Derrick lattice extension[1)]
3	– Emergency operation for crane movements – Rigging counterweight – Rigging the auxiliary hoist[1)]
4	– Operating outriggers

[1)] Additional equipment

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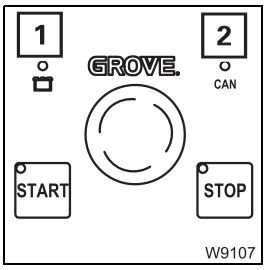
Engine control panel

➠ *Starting the engine – with the hand-held control*, p. 10 - 15

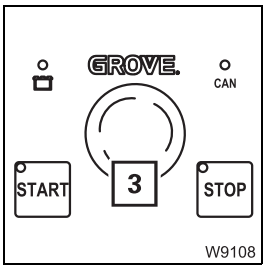


1 Voltage monitoring

- **On:** Ignition on
- **Off:** Ignition off

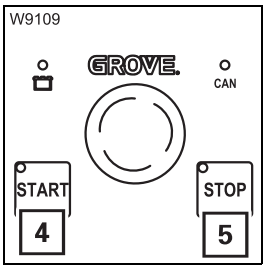
2 CAN monitoring

- **On:** Hand-held control connected – no malfunction – goes out after 20 seconds
- **Flashing:** **Hand-held control connected – malfunction**



3 Emergency stop switch
May only be used in an emergency.

- **Press:** Engine off – crane functions stop immediately Switch engages
- **Turn the engaged switch:** Switch returns to initial position – crane functions released



4 START engine

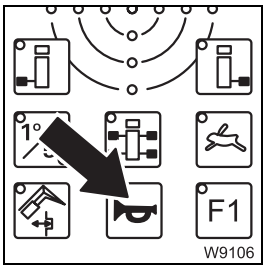
- **Press 1 x:** Engine on

5 STOP engine

- **Press 1 x:** Engine off

Horn

The ignition is switched on.



- **Press 1 x:**
  - Hand-held control on the superstructure socket – Superstructure horn on
  - Hand-held control on the carrier socket – Carrier horn on

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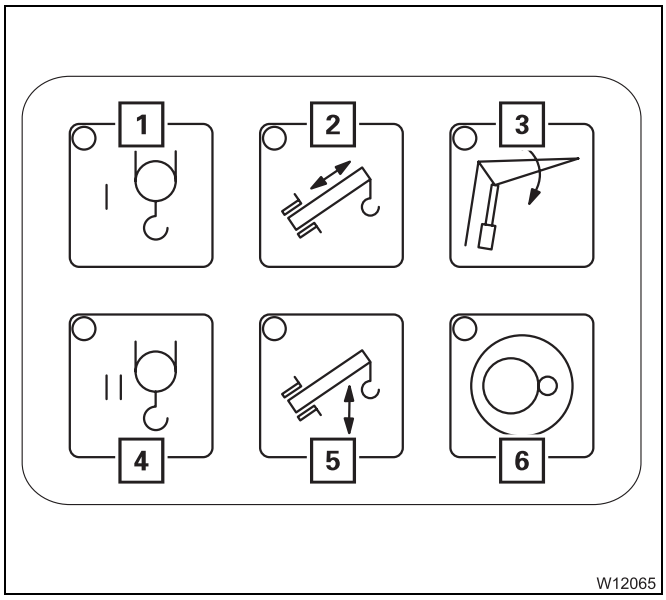
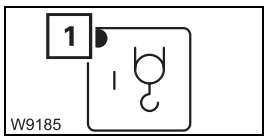
Outriggers control panel Brief description; ➠ *Outriggers control panel*, p. 9 - 51.



Pre-select emergency operation

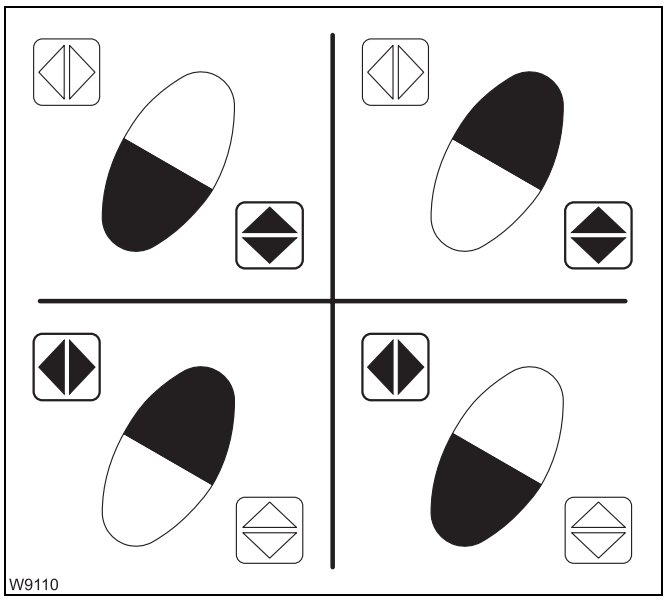
1 Main hoist
2 Telescoping mechanism
3 Derrick lattice extension[1)]
4 Auxiliary hoist
5 Derricking gear
6 Slewing gear

[1)] Luffing jib



Operation is the same for all buttons

– **Pre-select:** Press button 1 x – lamp (**1**) lights up – pre-selection on until another pre-selection is made



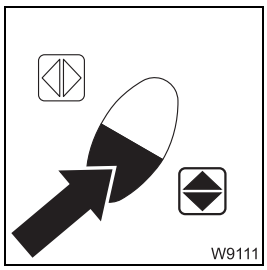
Function buttons
The operations are not monitored by the RCL.

There are four button combinations; engaged buttons are shown in black:

– **Pre-selected function on**
Press the required button combination.

– **Pre-selected function off**
Release one or both the buttons.

Press a non-assigned button combination – pre-selection off.



– **Faster movement:** Increase pressure on button
– **Slower movements:** Decrease pressure on button

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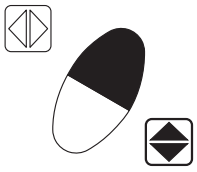
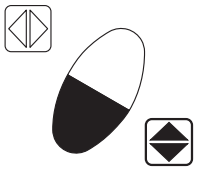
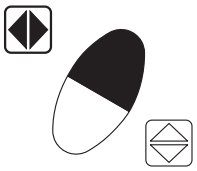
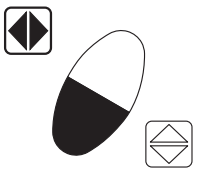
Button combination	Pre-selected power unit				
	Telescoping mechanism	Derricking gear	Slewing gear	Hoists	Lattice extension
 W3851	None	Lower	None	Lower	Lower
 W3850	Retract	Raise	None	Lift	Raise
 W3849	None	None	Slew to right	None	None
 W3848	None	None	Slew to left	None	None

➠ *Emergency operation with the hand-held control*, p. 14 - 55

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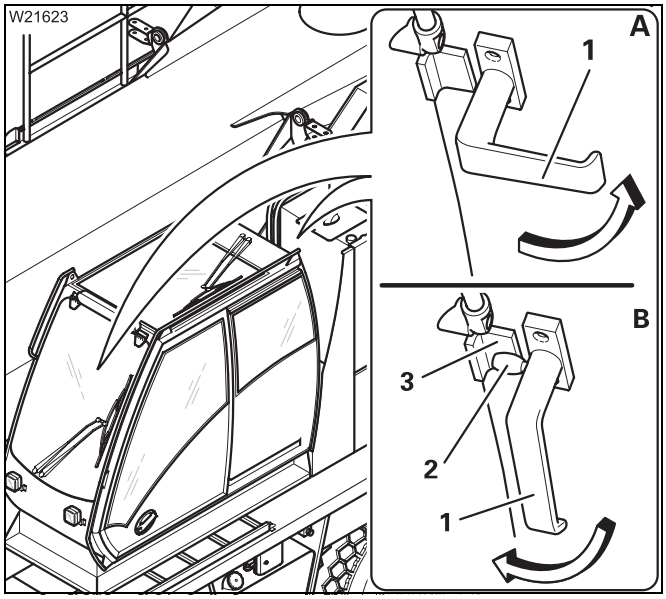
9.2.22 Windows, doors, keys

Windows

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

Risk of damage to the windscreen
Do not open the windscreen if the Mega Wing Lift is in the rigging position. This avoids a collision between the windscreen and the Mega Wing Lift, which could damage the windscreen.



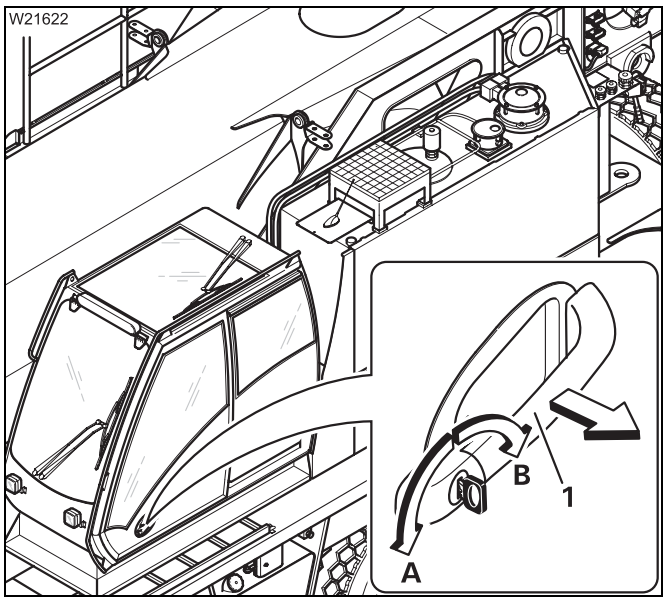
Open window (A)

- Turn both handles (**1**) inward
- Push the window forward

Close window (B)

- Pull the window closed
- Turn both handles down – pegs (**2**) located behind the holder (**3**)

Crane cab door



From outside

Unlock
- Turn the key in direction **A**

Lock
- Turn the key in direction **B**

Open/close
- Pull the handle (**1**)
- Slide the door

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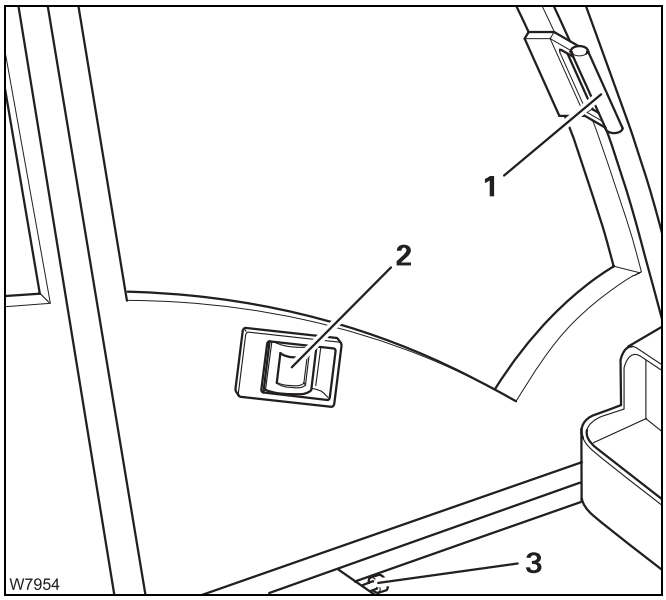
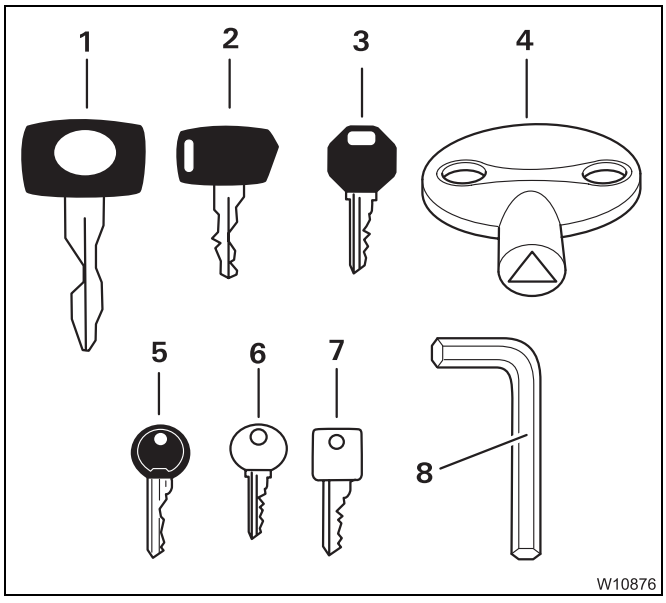


From inside

– **Closing**
Pull unlocking lever (**3**), push door forwards by handle (**1**) – engages.
Locking from inside not possible.

– **Opening**
Pull unlocking lever (**2**), push door back by handle (**1**) – engages.

Keys Different keys are supplied.



1 Crane cab door lock
2 Crane cab ignition lock
3 Key-operated override switch
4 Distribution box
5 Windscreen washing system reservoir
6 Boom floating position lock [1)]
7 Slewing gear freewheel lock[1)]
8 Covers

[1)] Additional equipment

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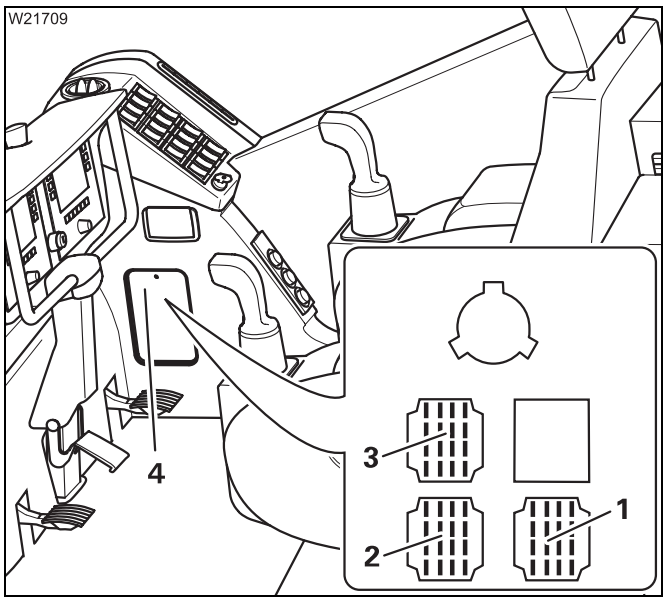
9.2.23 Diagnostics

The diagnostics connections may only be operated by the service staff.



The following connections are below the cover (**4**).

1 ECOS diagnostics – (serial interface)

2 ECOS diagnostics – Can bus

3 RCL diagnostics

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10 Starting/turning off the engine – for crane operation

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10 Starting/turning off the engine – for crane operation

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

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

The procedure depends on whether you:

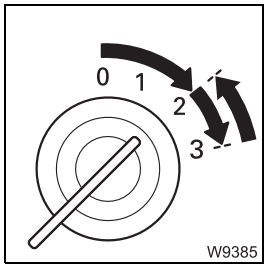
– Start the (cold) engine for the first time of the day

– Start the engine from the crane cab; ➠ p. 10 - 8

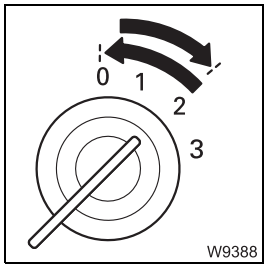
– Start the engine with the hand-held control; ➠ p. 10 - 15

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

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



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



- Switch the engine off and turn off the ignition

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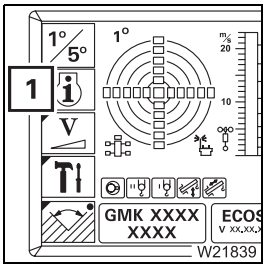
10.1.1 Refuelling

Only use permissible consumables; ➠ *Separate engine manufacturer's operating manual*.

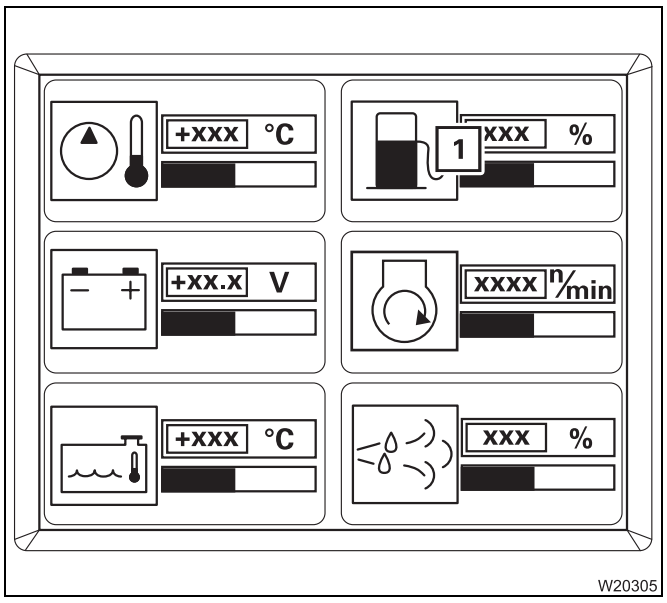
Danger of fire from flammable gases
Switch off the engine, the heater and all additional heaters before refuelling.

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



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

Fuel



The display (**1**) indicates the current level in percent. 100% corresponds to about 765 l (202 gal).

The level indicator below the display changes colour depending on the level:

Green: over 10% – over 76.5 l(20.2 gal)

Yellow: 5 to 10% – 38.25 to 76.5 l (10.1 to 20.2 gal)

Red: below 5% – less than 38.25 l (10.1 gal)

➠ *Standard tank*, p. 4 - 8,

➠ *Dual tank*, p. 4 - 9

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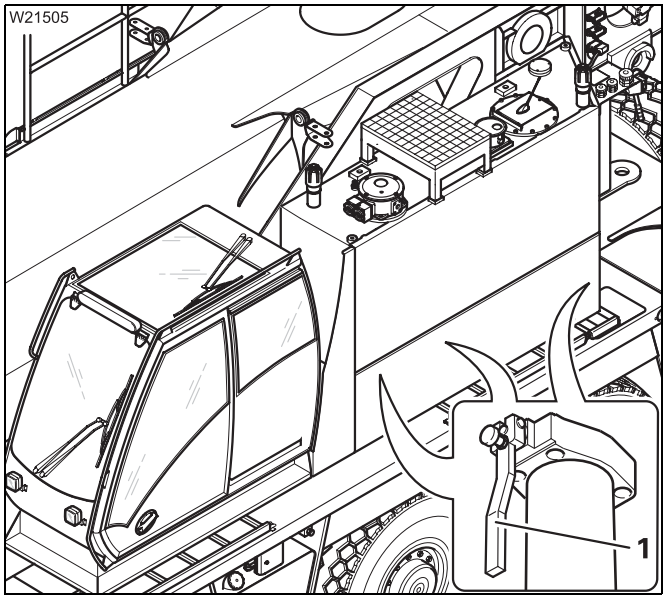
10.1.2 Checks before starting the engine

On hydraulic tank The valve on the hydraulic tank must be open before starting the engine.

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



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

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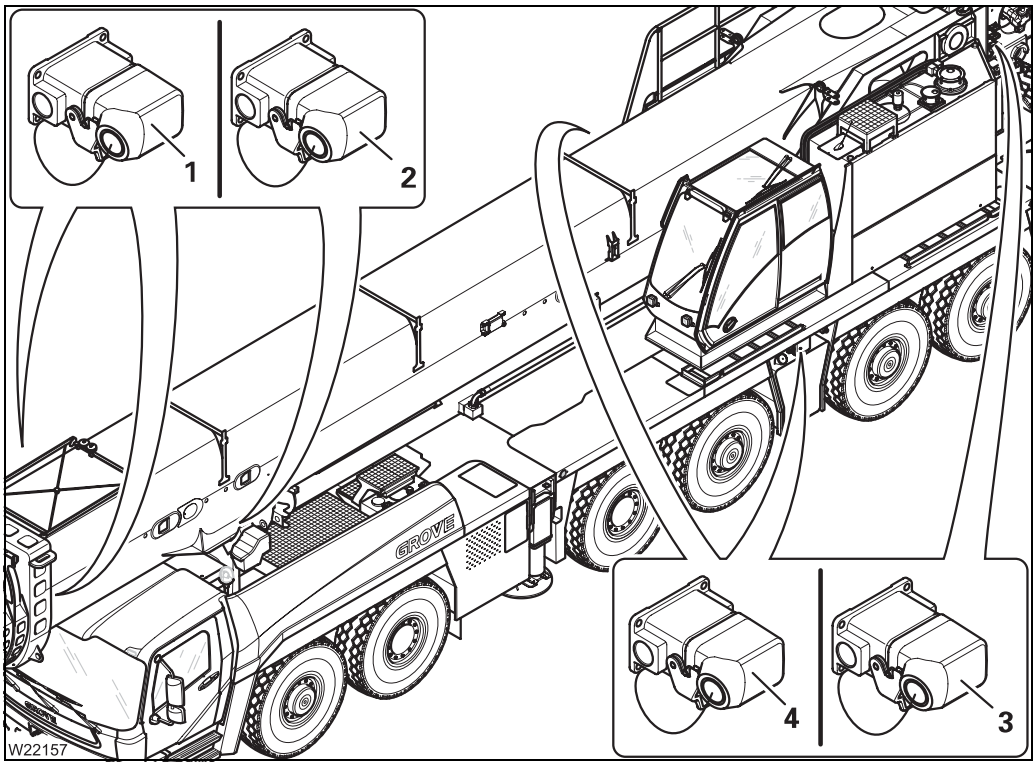
Checking hand-held control

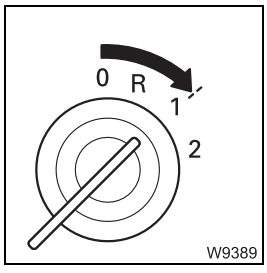


The hand-held control must be removed for crane operation from the crane cab.

- Check whether bridging plugs (**1**) to (**4**) are inserted in all the sockets; ➠ p. 12 - 22.

You can start the engine from the crane cab, but if the hand-held control is connected, the operating elements for crane operation are disabled.

10.1.3 Switching on the ignition



- Insert the ignition key into the ignition lock and turn the key to position **1**.

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

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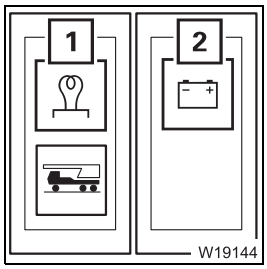
10.1.4 Lamp test/switching state equalisation

Lamp test

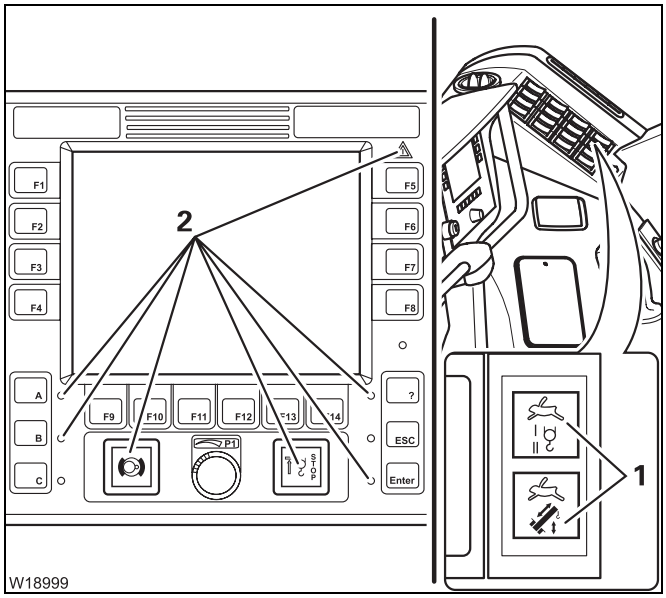
After the ignition has been switched on, a lamp test is performed.

Risk of accident from faulty lamps
The lamps that are used to provide warnings and information during operation light up for control purposes whenever the ignition is switched on. Always perform the following lamp tests and immediately replace faulty lamps or have them replaced.
This prevents accidents and damage caused by detecting malfunctions too late.



- Check whether lamps (**1**) and (**2**) light up briefly.

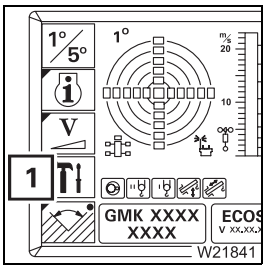
If the specified time is insufficient, switch on the ignition again.



- Check whether lamps (**1**) and (**2**) light up briefly.

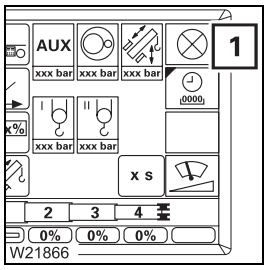
If one or more lamps do not light up, refer to **Manitowoc Crane Care**.

If the specified time is insufficient, you can perform the lamp test again as follows.



Performing lamp test

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



- Press the button (**1**).
  The specified lamps light up until you release the button again.

You can adjust the minimum brightness of the display if necessary;
p. 10 - 7.

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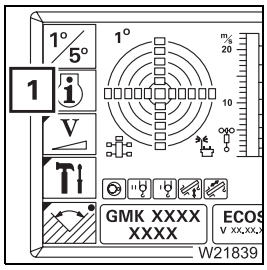
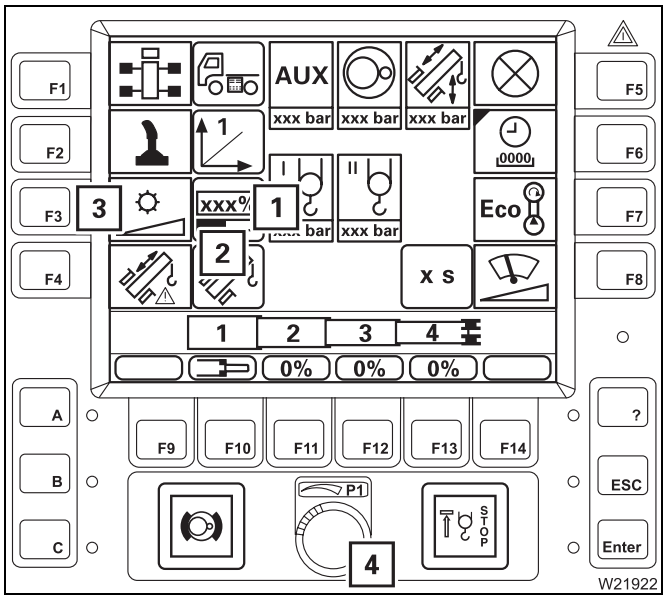
10.1.5 Adjusting display brightness

The brightness of the displays is automatically regulated by the *ECOS* and the *RCL* displays and depends on the brightness of the operating environment. You can manually set a default minimum brightness for the *ECOS* and *RCL* displays.



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



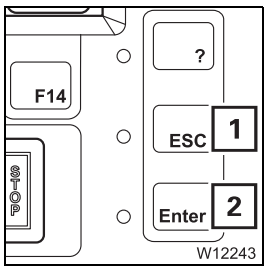
- Press the (**3**) button once.

A red bar (**2**) appears below the display (**1**).

- Set the desired minimum brightness with the switch (**4**).

The brightness of the display changes while setting and you can view the set value (0 to 100%) on the display (**1**).
The brightness set here is the minimum value for automatic regulation.

There is no automatic regulation if you set the brightness to 100%.
The displays then always show maximum brightness.



You can cancel the entry at any time using the button (**1**). The settings are then reset.

- Apply the entered **minimum brightness** – press the button (**2**) once. The red bar below the display disappears. The brightness is automatically regulated between the newly set value and 100%.

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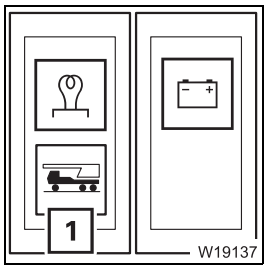
10.1.6 Start the engine



Refer to the separate operating manual provided by the engine manufacturer for operating the engine. The engine can only be started if:

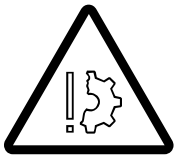
– The bridging plugs have been inserted in all carrier and superstructure sockets for hand-held control; ➠ p. 12 - 22.

– The lamp (**1**) has gone out (carrier ignition off).

If the engine is equipped with a flame start system; ➠ *With flame start system*, p. 10 - 9.

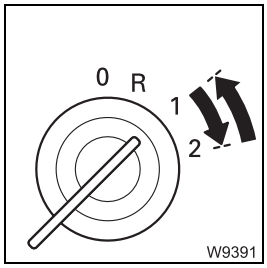
Without flame start system

This section pertains to starting a warm and cold engine.



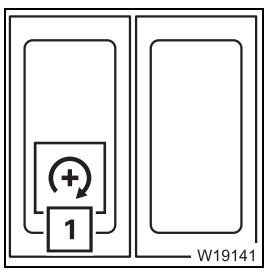
Danger of explosion when using starter fuel
The engine may never be started with the aid of starter fuel. The starter fuel sprayed into the suction unit can ignite.

- Do not press the accelerator.
- Turn the ignition key to position **2** and hold it there until the engine starts.
- Let go of the ignition key after the engine starts.



If the engine does not start, release the ignition key after about 15 seconds and wait one minute before trying again.

If the engine does not start after multiple attempts; ➠ *Malfunctions on the engine*, p. 14 - 12.



You can also start the engine by pressing the button (**1**) down once with the ignition turned on. After starting, the idling speed corresponds to the standard value. To set the idling speed; ➠ p. 10 - 12.

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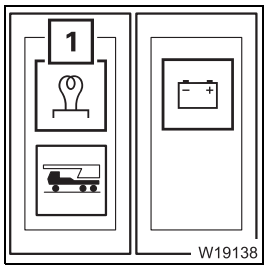
With flame start system

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

This section pertains to starting a warm and cold engine.

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

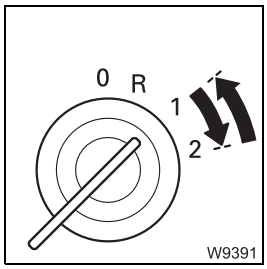
The flame start system is activated each time the ignition is turned on:



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

If the lamp (**1**) does not go out, there is a fault in the flame start system; refer to **Manitowoc Crane Care**.

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



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

If the engine does not start after multiple attempts; ➠ *Malfunctions on the engine*, p. 14 - 12.

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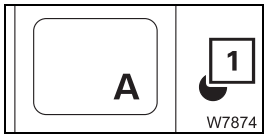
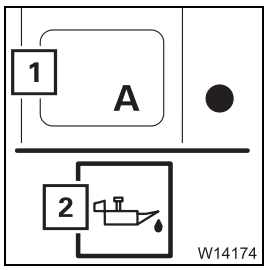
10.1.7 Checks after starting the engine



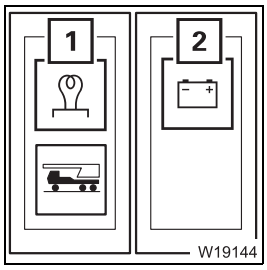
- Check the lamp (**1**) on the *ECOS* control unit immediately after starting the engine.
  The lamp (**1**) must go out approx. 10 seconds after starting the engine.

Risk of damage to the engine
If the lamp (**1**) does not go out after about 10 seconds, perform the following check and, if necessary, turn off the engine immediately.
The engine can be damaged by running it when the oil pressure is too low.



- Press the button (**1**) once. This opens the *Warning* submenu.
- If the symbol (**2**) is **red**, switch off the engine immediately.
- Check the oil level; ➠ *Maintenance manual*.
- Add oil if necessary. If the error message persists, refer to **Manitowoc Crane Care**.

If other symbols in this menu are displayed in red; ➠ *Warning submenu*, p. 11 - 111.



- Also check the following lamps on the side panel.

– If the lamp (**2**) does not go out or lights up while the engine is running, switch the engine off and look for the cause.

– If the lamp (**1**) does not go out or lights up while the engine is running, there is a malfunction in the flame start system.

➠ *Malfunctions in the engine*, p. 7 - 27

More information can be found in the *Monitoring* submenu; ➠ p. 10 - 11.

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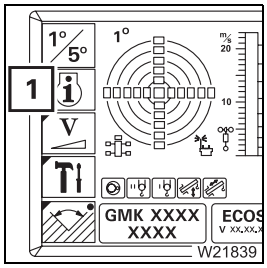
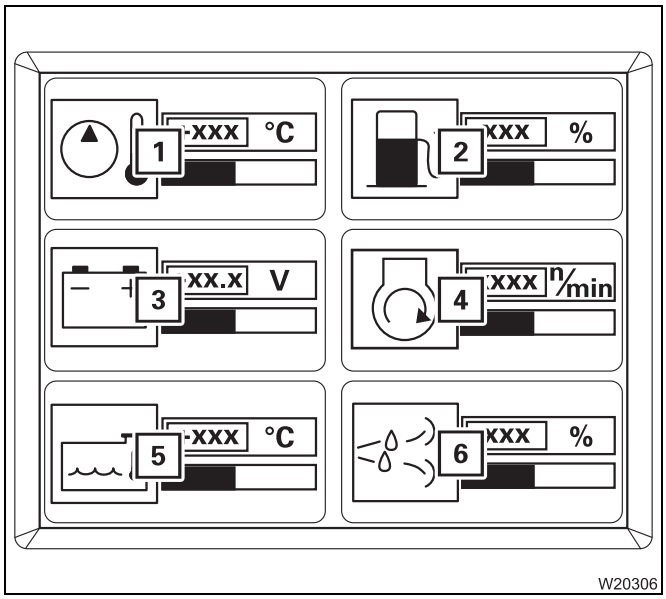
10.1.8 Monitoring submenu

The *Monitoring* submenu shows the most important measured values.



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



This opens the *Monitoring* submenu.

The following values are displayed:

1 Hydraulic oil temperature in°C (°F)

2 Fuel supply in percent

3 Voltage in volts

4 Engine speed in min^{-1} (rpm)

5 Coolant temperature in°C (°F)

6 DEF supply in percent

The colour of the bar below the values indicates the area in which the value can be found.

Green: Value OK

Yellow: Limit value almost reached

Red: Limit value exceeded (or not reached) – warning message;
➠ p. 11 - 111

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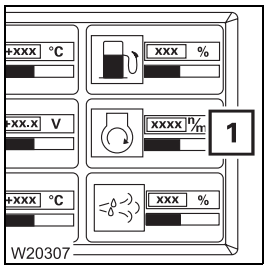
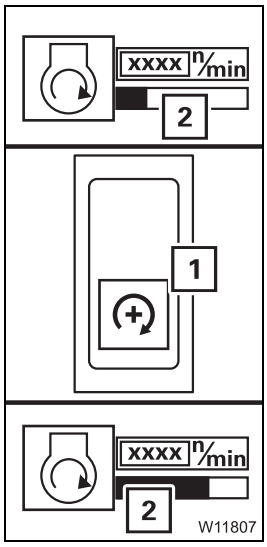
10.1.9 Setting the idling speed

- Start the engine; ➠ p. 10 - 8



The display (**1**) in the *Monitoring* submenu shows the current engine speed.

You can increase the idling speed for crane operation.
Release the accelerator in order to be able to view the settings below the current engine speed.

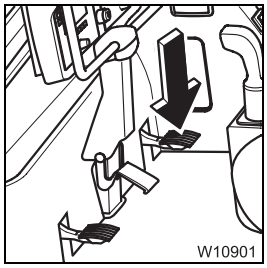


Increasing/reducing idling speed

- Press the (**1**) button up/down until the required engine speed has been reached. When reducing:
  – After about 3 seconds, idling speed = standard value.
  – After about another 3 seconds = engine off.
  It is only possible to restart the engine when approx. 7 seconds have elapsed.

or

- Press the button up/down once. The idling speed (**2**) increases/reduces by one level.



Exceeding idling speed

You can exceed the idling speed at any time using the accelerator.
The engine speed is reduced to the pre-set idling speed if you release the accelerator.

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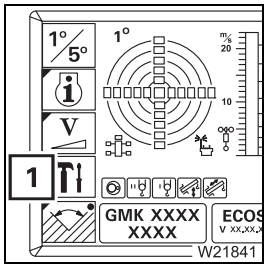
10.1.10 Switching off Economy mode

The Economy mode provides more efficient fuel consumption during crane operation. The Economy mode is switched on when you start the engine for crane operation.

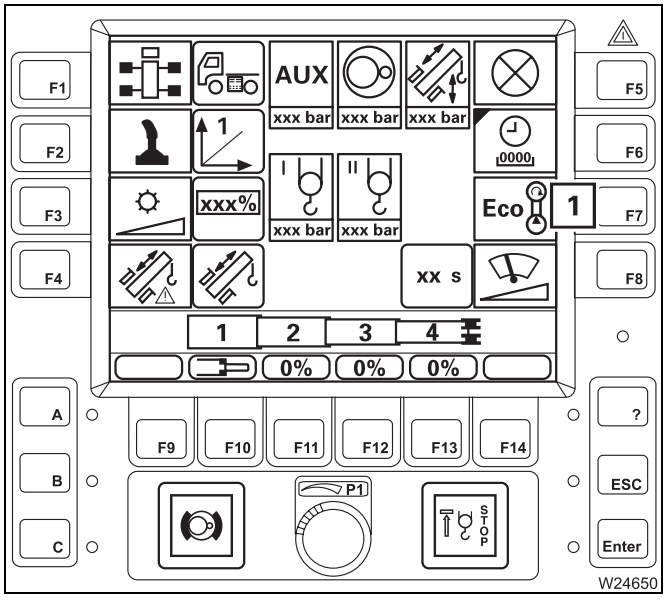
When the control lever is not moved for a period of four minutes then the engine speed is reduced first and the hydraulic drive is then switched off after this.

You can also switch off the Economy mode.



- To do so, open the main menu and press the button (**1**) once.

  This opens the *Settings* submenu.



- Press the (**1**) button once – Economy is off.

The Economy mode is switched on again when the ignition is switched on again.

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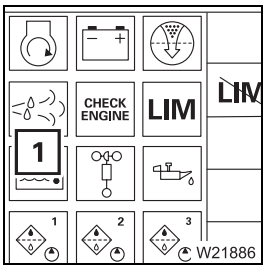
10.1.11 Overriding torque reduction

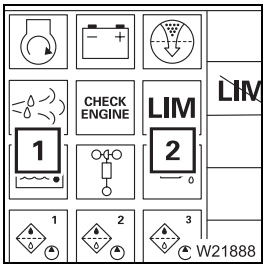
When the DEF supply is empty, torque reduction is activated via the engine control system.

The monitoring elements are found in the *Warning* submenu.

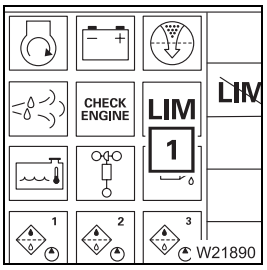
Further information can be found on the *Warning* submenu; ➠ p. 11 - 111.



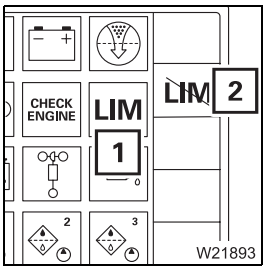
– If the DEF supply falls to the reserve level, then the (**1**) symbol is displayed in **yellow**.



– If the DEF supply is empty, the symbols (**1**) and (**2**) are displayed in **yellow**.



– If the symbol (**1**) flashes, the engine torque is reduced after the next engine start.



The engine torque is reduced.

- Press the button (**2**) down to override torque reduction.
  The symbol (**1**) is displayed.

  You can override torque reduction up to 3 times.
- Refill with DEF immediately; ➠ *DEF*, p. 4 - 10

  After the next engine start the torque reduction is deactivated.
  The symbol (**1**) disappears.

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10.2 Starting the engine – with the hand-held control

Requirements

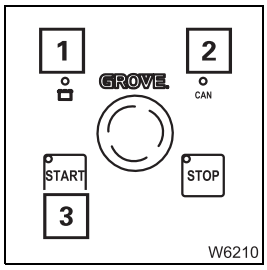
You can only start the engine, if:

– The bridging plug is inserted in all unneeded sockets; p. 10 - 4,

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

Starting the engine

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



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

If the lamp (**2**) does not go on or flash after about 20 seconds, there is a malfunction; p. 14 - 20.

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

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

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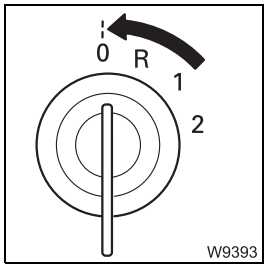
10.3 Turning off the engine

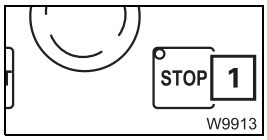
10.3.1 During normal operation, with the ignition lock/with the hand-held control

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



If the hand-held control is not connected:

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



If the hand-held control is connected:

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

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

After turning off

Observe the notes in the appropriate sections;
➠ *In case of short work breaks*, p. 11 - 128,
➠ *In case of work breaks of more than 8 hours*, p. 11 - 129.

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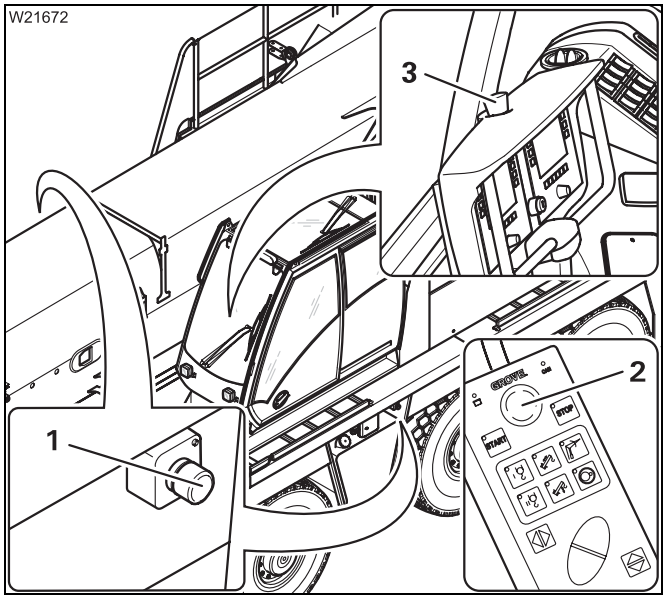
10.3.2 In emergencies, with the emergency stop switches

Risk of overloading if used improperly
Use the emergency stop switches only in an emergency, i.e. if the crane functions no longer respond to the control levers.
Stopping crane movements suddenly may cause the truck crane to become overloaded under unfavourable conditions.



Four emergency stop switches are provided for an emergency:

1 On the carrier

2 On the hand-held control

3 In the crane cab

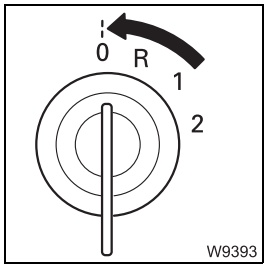
- Press an emergency stop switch (**1**), (**2**) or (**3**). The switch engages.

The engine shuts down.

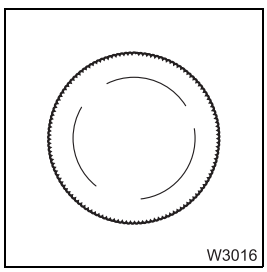
If an air intake inhibitor is present, this is then triggered.

Resetting the emergency stop switch

You can only restart the engine after you have reset the emergency stop switch.



- Turn off the ignition.



- Turn the used emergency-stop switch until it disengages again.

If an air intake inhibitor is present, this must be loosened;
➠ *Releasing the air intake inhibitor*, p. 4 - 27.

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11 Crane operation

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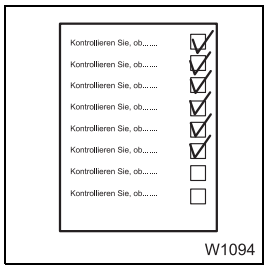
11 Crane operation

11.1 Before operating the crane

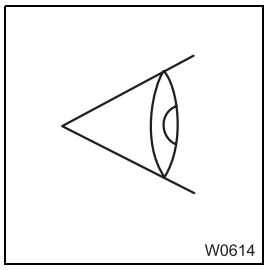
11.1.1 CHECKLIST: Checks before operating the crane

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

This checklist only applies to working with a rigged truck crane (supported and rigged with counterweight). If the truck crane is not yet rigged;
➠ *CHECKLIST: Rigging*, p. 12 - 1.



1. The truck crane has been rigged for the operation to be carried out as described in the *CHECKLIST: Rigging*; ➠ p. 12 - 1.



2. Inspect the truck crane, looking out in particular for any leaking fluids (oil, fuel or water).

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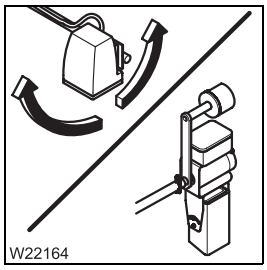
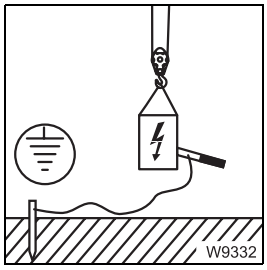
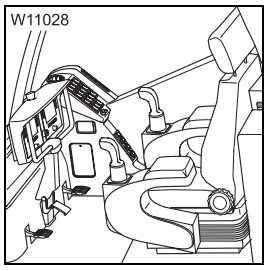


3. – Switch on the cameras for the operation of the crane; ➠ p. 12 - 136.

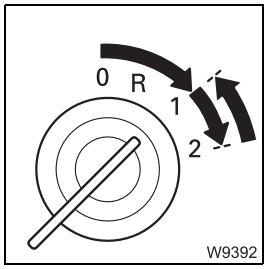
– Adjust the slewable spotlights if necessary; ➠ p. 11 - 109.



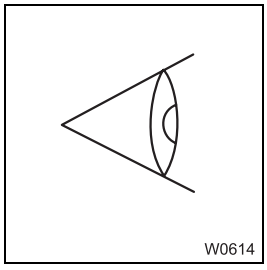
4. Earth the load, if necessary; ➠ p. 11 - 12.



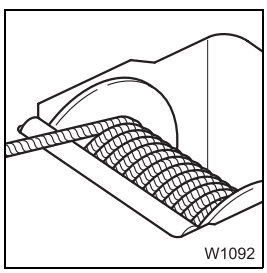
5. Adjust crane cab seat and front panel;
➠ *Adjusting the crane cab seat and front control panel*, p. 11 - 7.



6. Start the engine for crane operation; ➠ p. 10 - 8.



7. Check
– RCL,
– Lifting limit switch,
– Seat contact switch and dead man's switch,
– Emergency stop switch,
for correct operation. Have faulty units repaired; ➠ p. 11 - 9.



8. Check the position of the hoist ropes; ➠ p. 11 - 6.

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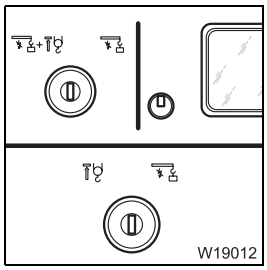
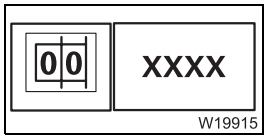
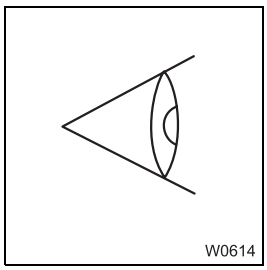


9. Remove key from the key-operated *Override* switches; ➠ p. 11 - 40.

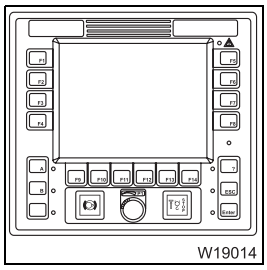


10. Compare current rigging mode to display on RCL – enter current rigging mode, if necessary; ➠ p. 11 - 23.

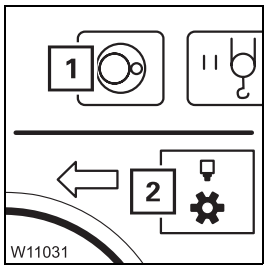
11. Compare current reeving of hoist used against the display on the RCL – enter current reeving, if necessary; ➠ p. 11 - 29.



12. Check telescoping; ➠ *Checks before starting work*, p. 11 - 75.

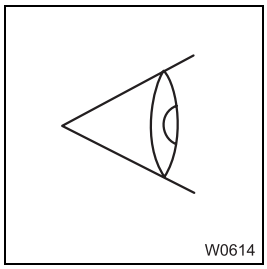


13. Perform lamp test on the RCL; ➠ p. 11 - 20.

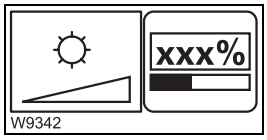


14. – Switch off the slewing gear for 0° and 180° working positions – symbol (**1**) is red; ➠ p. 11 - 103.

– Switch off houselock for other working positions – symbol (**2**) is red; ➠ p. 11 - 17.



15. Check the electrical system for correct operation; ➠ p. 11 - 6.



16. Adjust the brightness on the *ECOS display and the RCL* display as required; ➠ p. 10 - 7.

Additional information on inspections during crane operation, on permissible working positions and on how to operate the individual power units; ➠ *Crane operation with main boom*, p. 11 - 53.

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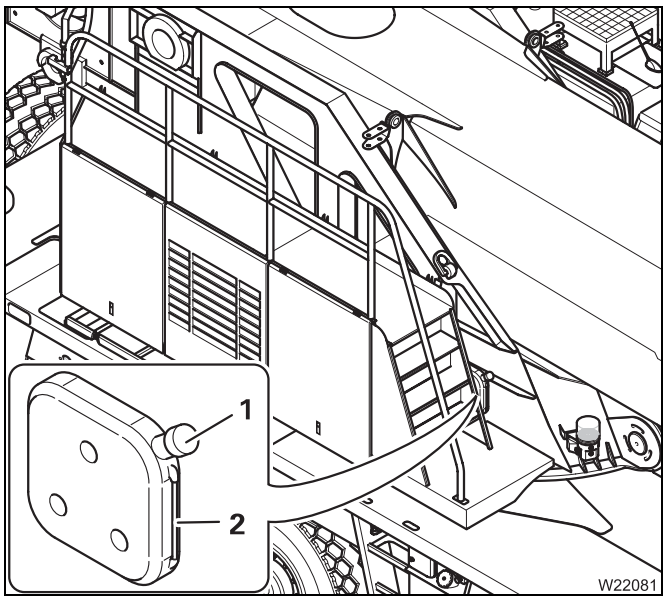
11.1.2 Checking the condition of the truck crane

Fuel tank auxiliary heater

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

Danger of fire from flammable gases
Turn off the engine and heating systems before refuelling.



- The display (**2**) shows the fuel level in the tank (**1**).
- Refill the fuel in due time, and close the tank (**1**) with the lid.

Visual inspection

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

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

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

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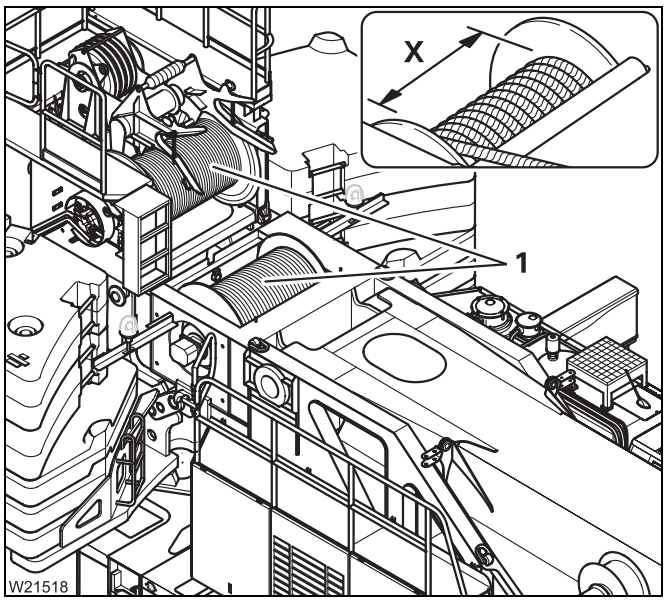
Checking the position of the hoist ropes

The hoist mirrors need to be folded out; ➠ p. 12 - 136.

Risk of crushing due to turning rope drum
Keep away from the rope drum while it is turning.
This will prevent your limbs from being drawn in and getting crushed.



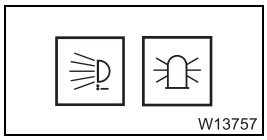
Always check the entire length of the winding of the ropes (**1**).

- Slowly perform the *lowering* movement until the rope has moved over the complete width (**X**) of the rope drum.
  - The rope needs to be evenly wound.
  - The rope turns on the drum must be evenly spaced at a distance of 0 to 2 mm (0 to 0.08 in).
  - The cross-over points must be at an angle of about 180°.

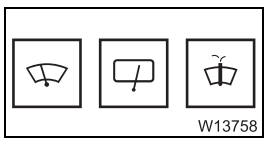
The ropes of the top layer lie over the ropes of the bottom layer at the cross-over points.

Checking the electrical system

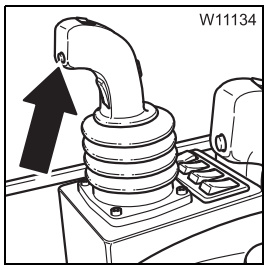
- Check the following functions and have faulty parts repaired.



– Spotlights, air traffic control light, rotating beacons



– Windscreen wipers, windscreen washing system



– Horn

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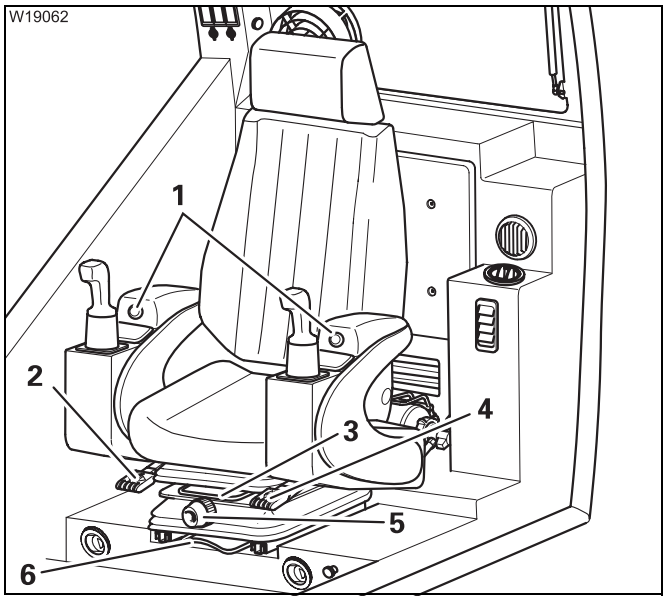
11.1.3 Adjusting the crane cab seat and front control panel

Crane cab seat You can adjust the crane cab seat to your height.



Version 1

1 Control panel – height

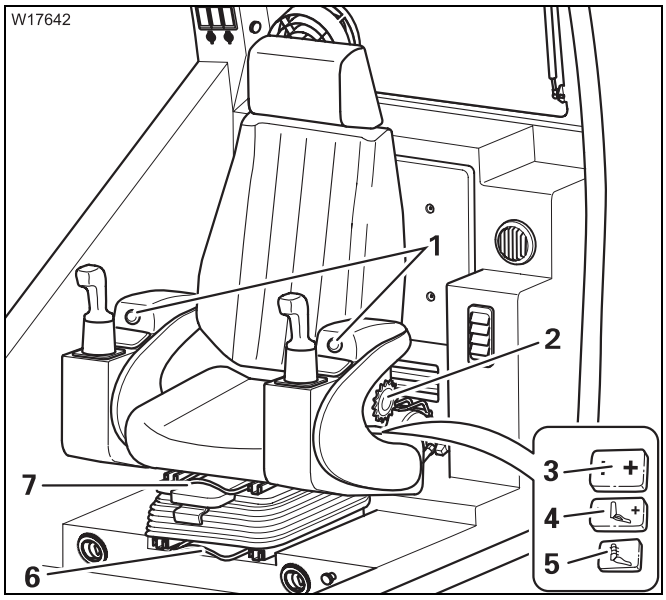
2 Back rest – angle (on both sides)

3 Seat – length adjustment without control panels

4 Seat – height

5 Adjust suspension stiffness to body weight

6 Seat – length adjustment with control panels



Version 2

1 Control panel – height

2 Back rest – angle (on both sides)

3 Seat – length adjustment without control panels

4 Seat – length adjustment with control panels

5 Seat heating on/off

6 Lumbar area support[1)]

7 Seat – height[1)]

[1)] Requirement – ignition is on

- For version 2, pay attention to the seat contact switch; ➠ p. 9 - 61.

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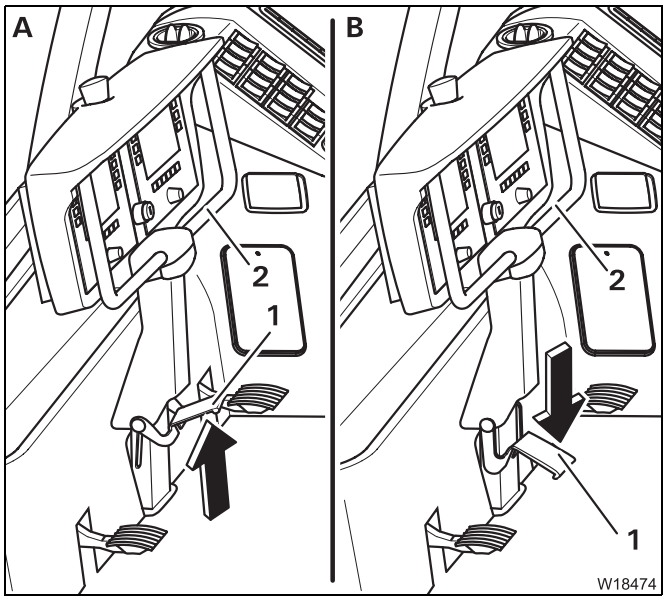
Front panel You can adjust the height of the front control panel.



- (**A**) – Hold the front control panel by the handle (**2**).
- Fold the pedal (**1**) upwards.
- (**B**) – Adjust the front control panel to the desired height.
- Fold down the pedal (**1**) to lock the front control panel.

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11.1.4 Checking the safety equipment

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

Rated capacity limiter

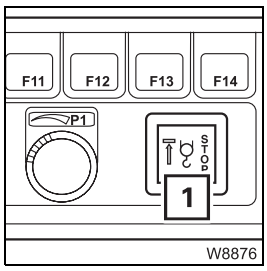
- Switch on the rated capacity limiter, do all of the checks and enter the current rigging mode; ➠ *Switching on the RCL*, p. 11 - 20.

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

If the rated capacity limiter is not working correctly, do not start work with the crane but notify **Manitowoc Crane Care**.

Lifting limit switch

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



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

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

If the lift limit switch is not working correctly, do not start work with the crane but notify **Manitowoc Crane Care**.

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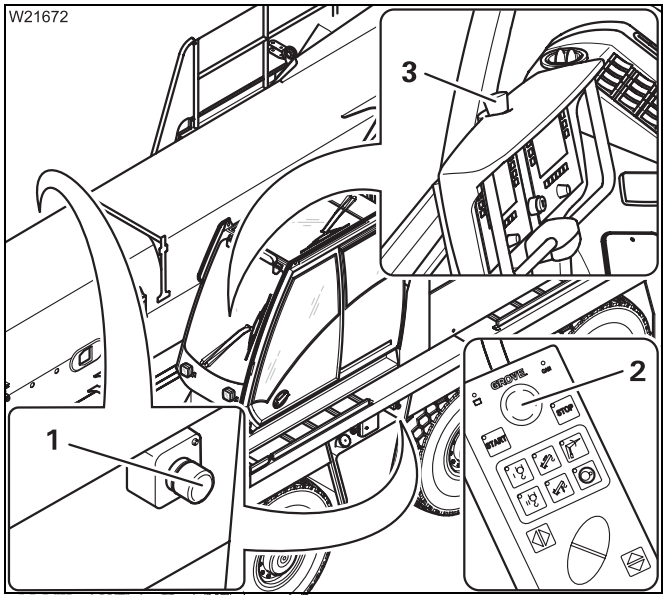
Emergency stop switch

- Set down the load and let go of both control levers.



- Press the emergency stop switch (**3**) so that it engages.
- Check whether the engine stops.
- Turn the emergency stop switch until it disengages.
- Release the air intake inhibitor if required; *Air intake inhibitor*, p. 4 - 27.
- Repeat the checks with the emergency stop switches (**1**) and (**2**).

If the emergency off switch is not working correctly, do not start work with the crane but notify **Manitowoc Crane Care**.

Do not operate the emergency stop switch to turn off the engine in normal operation. Only operate the emergency stop switch in an emergency situation.

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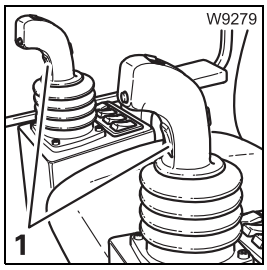
Seat contact switch

This check is carried out together with the dead man's switch.

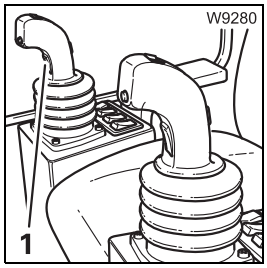
Danger of accident if the seat contact switch is faulty
Always stand inside the crane cab when you do this check.
If you stand next to the crane cab, you may be pushed off the carrier if the superstructure slews as a result of a faulty dead man's switch.

Checks while stationary



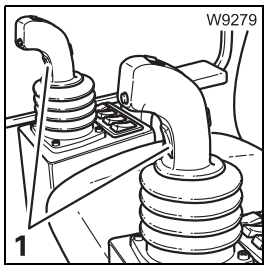
- Do not sit down on the crane cab seat.
- Do not press any dead man's switch (**1**).
- Move the control levers one after the other for all the crane movements and check whether all the crane movements are switched off.

Checks during operation



– Dead man's switch

- Do not sit down on the crane cab seat.
- Press the right dead man's switch (**1**) and slowly lift the hook block.
- With the control lever actuated, let go of the right dead man's switch and check whether the crane movement comes to a standstill within approx. 3 seconds.
- Repeat the check with the dead man's switch on the left control lever.



– Seat contact switch

- Do not press any dead man's switch (**1**).
- Sit down on the crane cab seat and slowly lift the hook block.
- With the control lever actuated, stand up and check whether the crane movement comes to a standstill within approx. 3 seconds.

If the dead man's switch system is not working correctly, do not start work with the crane but notify **Manitowoc Crane Care**.

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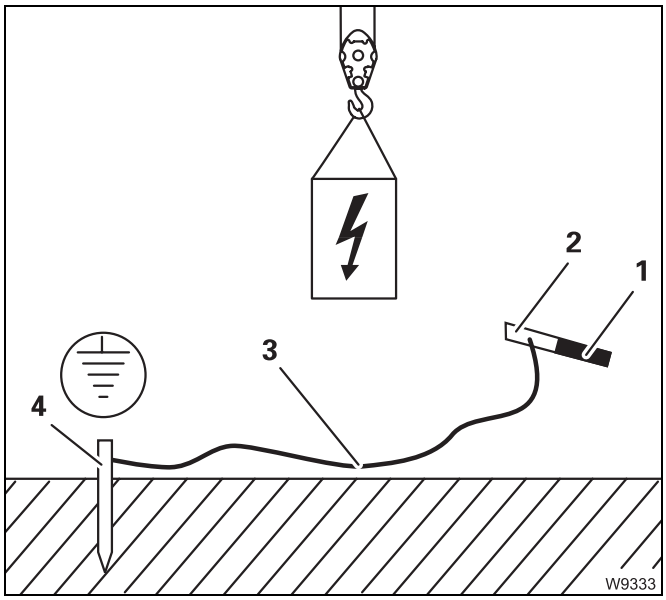
11.1.5 Earthing the load

Even if the truck crane is already earthed (➠ p. 12 - 13), the load may become charged with static electricity. For example, if a hook block with synthetic sheaves or non-conducting sling gear is used.

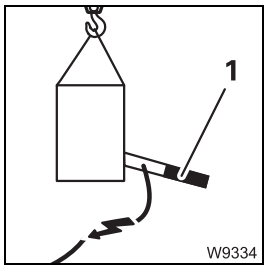
Risk of accident due to electric shock
Always earth the load before operating the crane:
– Near strong transmitters (radio transmitters, radio stations, etc.)
– Near high-frequency switchgears
– If a thunder storm is forecast
If the load is charged with static electricity, you must always earth the load before touching it.



Use electrically conducting material for earthing.

- Hammer a metal rod (**4**) (length approx. 2.0 m [6.6 ft]) at least 1.5 m (5 ft) deep into the ground.
- Dampen the soil around the metal rod (**4**) for better conductivity.
- Clamp an insulated cable (**3**) to the metal rod (**4**) (cross-section of at least 16 mm^2 [0.025 in^2]).
- Clamp the other end of the cable (**3**) to a metal rod (**2**) with an insulated grip (**1**).

Risk of accident due to electric shock
Ensure that the connections between the cable and the metal rods are electrically conductive. When earthing, hold the metal rod only by the insulated handle and keep a sufficient distance to the metal rod in the ground.



- Hold the metal rod by the insulated grip (**1**).
- To earth, touch the load with the metal rod.

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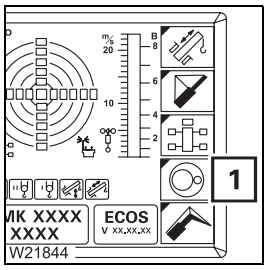
11.1.6 Locking/unlocking the superstructure

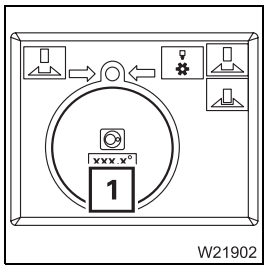
To lock, a pin can extend on the turntable and engage in two locking points on the carrier.

Locking points

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



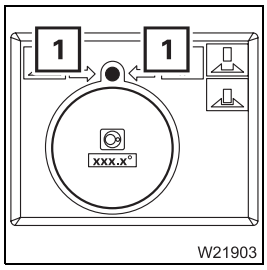
- If necessary, open the main menu Esc and press the (**1**) button once. The *Superstructure lock* submenu will open.



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

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

The display (**1**) shows positive and negative values. For an overview; ➠ p. 11 - 101.



At the locking point, both arrows (**1**) are shown.

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

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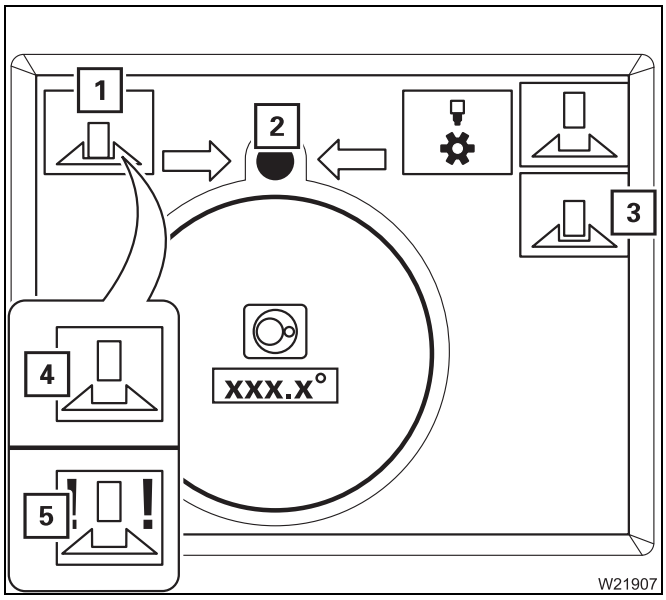
Locking the superstructure

The superstructure needs to be at one of the locking points (0° or 180°).



- Press button (**3**) until symbol (**1**) turns **green.**

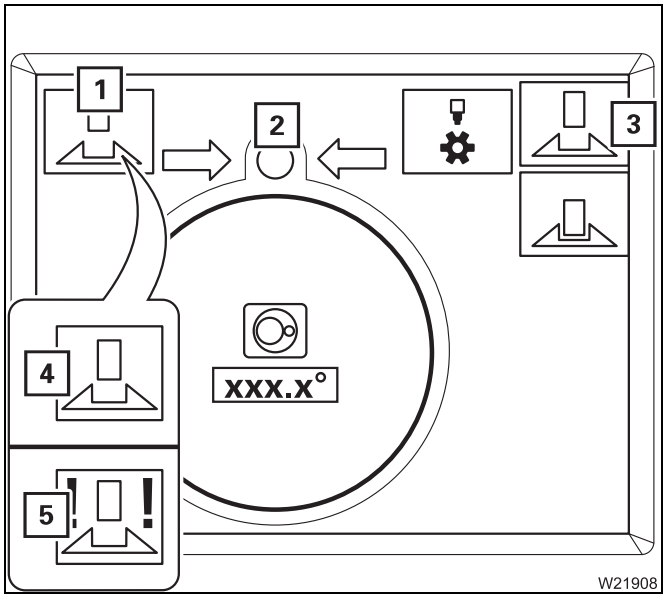
The display will first show symbol (**4**) in **yellow** and when the turntable is locked, it will show symbol (**1**) in **green.**

The locking pin bolt (**2**) always has the same colour as the displayed symbol (**1**).

If the error symbol (**5**) is displayed, contact **Manitowoc Crane Care**.

Unlocking the superstructure

The RCL shutdown procedure will be triggered and slewing disabled if you unlock the turntable when an RCL code for 0° to the rear has been entered. To acknowledge the shutdown procedure, you must either lock the superstructure or set down the load and enter an RCL code for a working range of 360°.



- Press button (**3**) until symbol (**1**) turns **red.**

The display will first show symbol (**4**) in **yellow** and when the turntable is unlocked, it will show symbol (**1**) in **red.**

The locking pin bolt (**2**) always has the same colour as the displayed symbol (**1**).

If the error symbol (**5**) is displayed, contact **Manitowoc Crane Care**.

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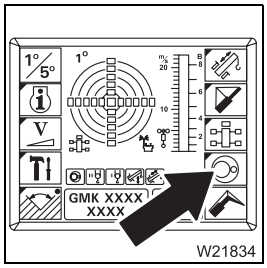
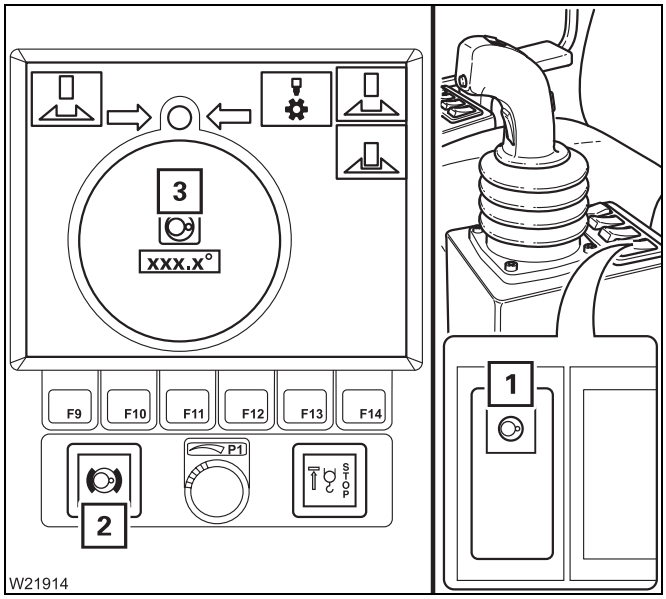
11.1.7 Switching the houselock on/off

If the truck crane is equipped with a houselock, the turntable can be locked in the entire slewing range. For locking, a pin extends and blocks the slewing gear.

Switching on the houselock

- Slew the superstructure to the position in which it is to be locked and then stop the slewing movement.
- If necessary, open the main menu Esc and press the button once.
  The *Superstructure lock* submenu will open.





Switching off the slewing gear

The slewing gear brake must be engaged when operating the houselock.

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

The slewing gear will be switched off and the slewing gear brake engaged.

– Symbol (**3**) is **red**

– The lamp (**2**) lights up

Risk of damage during slewing
Always switch off the slewing gear before you operate the houselock. The system will be damaged if the superstructure is slewed during the locking procedure.

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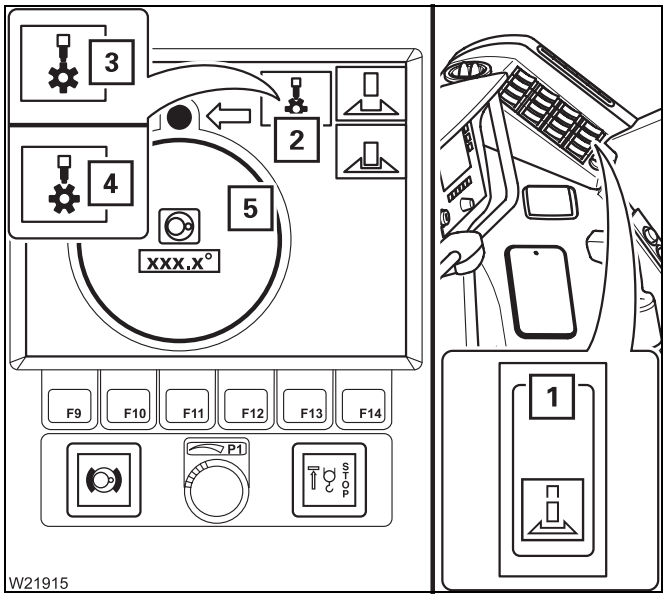


Switching on the houselock

- Press in button (**1**) at the top until symbol (**2**) turns **green**

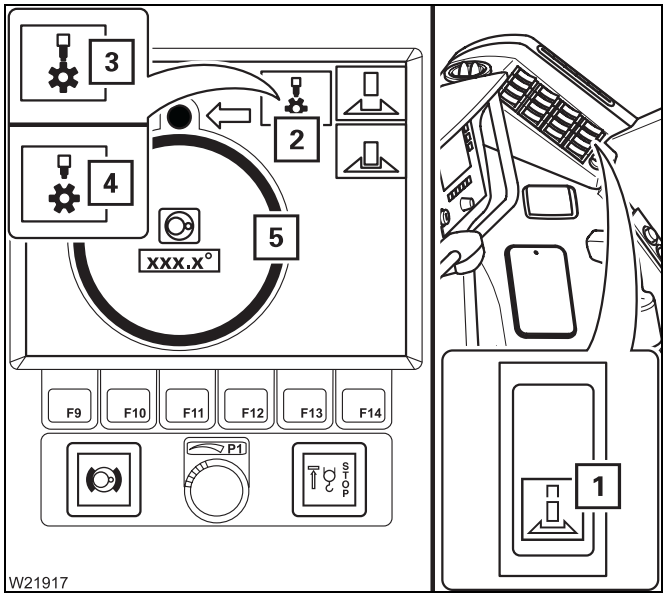
The display will first show symbol (**4**) in **yellow** and when the houselock is switched on, it will show symbol (**2**) in **green**.

The slewing ring (**5**) will be displayed in the same colour as the displayed symbol (**1**) during the entire procedure.

If symbol (**3**) is **red/yellow**:

- Release button (**1**).
  The lock is blocked and you need to correct the position of the superstructure as follows.

Risk of damage due to slewing with blocked lock
Before slewing, make sure the symbol is displayed in **red** (houselock off). Otherwise the system will be damaged during slewing.



- Switch the houselock off – press in the button (**1**) at the bottom until the symbol (**4**) turns **red.**
- Switch on the slewing gear and slew the superstructure a little further (minimally).
- Switch off the slewing gear.
- Press in button (**1**) at the top until symbol (**2**) turns **green.**

The slewing ring (**5**) will be displayed in the same colour as the displayed symbol (**1**) during the entire procedure.

- If symbol (**3**) is still shown, you must again correct the position of the superstructure.

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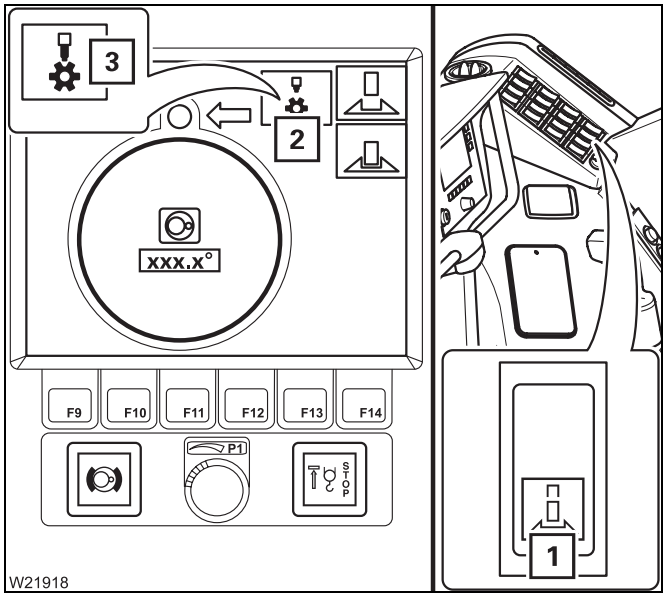
Switching off the houselock

- Check that the slewing gear is switched off, and switch if off if it is not; ➠ *Switching off the slewing gear*, p. 11 - 15.

Risk of damage during slewing
Always switch off the slewing gear before you operate the houselock. The system will be damaged if the superstructure is slewed during the locking procedure.



- Press in button (**1**) at the bottom until symbol (**2**) turns **red**.

The display will first show symbol (**3**) in **yellow** and when the houselock is switched off, it will show symbol (**2**) in **red**.

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11.2 Operation of the rated capacity limiter

If the truck crane's current rigging mode is registered properly, the RCL will prevent the permissible lifting capacity from being exceeded and the truck crane from being overloaded.

Risk of accident due to incorrectly set RCL
Before operating the crane, ensure that the current rigging mode is correctly entered. An incorrect entry will give you a false sense of security. This may result in the truck crane overloading and causing an accident.

The current rigging mode is based on measured values and manually entered values.

Registered based on measured values	Registered based on manually entered values
– Main boom length	– Counterweight
– Main boom angle	– Length of lattice extension
– Current load	– Lattice extension angle[2)]
– Lattice extension inclination[1)]	– Reeving
– Outrigger span[3)]	– Outrigger span[4)]

[1)] Luffing jib

[2)] Lattice extension – inclinable

[3)] For versions with outrigger span monitoring

[4)] For versions without outrigger span monitoring

During the operation of the crane, a visual and acoustic early warning is issued before the load limit is reached and then the functions are shut down that would lead into the overload range.

Risk of accident due to overridden or faulty RCL
The RCL must never be overridden.
It is prohibited to work if the RCL is switched off, overridden, out of service or faulty.

Danger of overturning in two-hook operation
The rated capacity limiter only ensures safety for single hook operation. Two-hook operation is not permitted.

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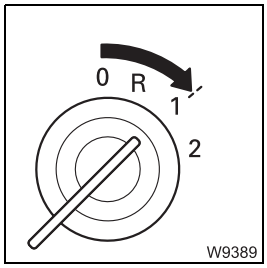
11.2.1 Switching on the RCL

The RCL will not be switched off if you turn the ignition key to position **R** instead of position **0** to restart the engine. This means that the test program will not run and you will not have to acknowledge the settings again.

Switching on

The RCL is switched on together with the ignition.

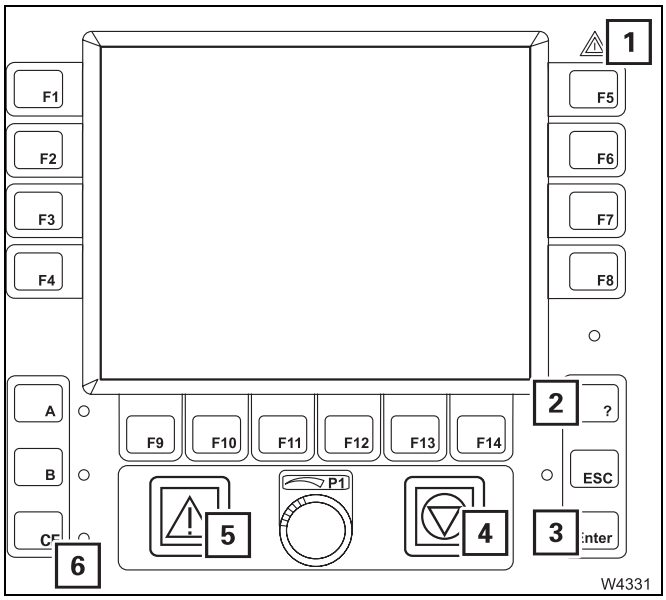


- Turn on the ignition.

A test programme runs after switching on the ignition. A continuous buzzer tone sounds for about 2 seconds and a lamp test is performed.

- Check whether you can hear a buzzer tone.

Risk of accident if the safety devices are faulty
If the lamps or buzzer fail, notify **Manitowoc Crane Care** and have the error corrected.
In the meantime, pay particular attention to the lamps in the event of a failure of the buzzer tone and vice versa.



Lamp test

- Check that lamps (**1**) to (**6**) light up briefly after turning on the ignition.

If the specified time is insufficient, switch on the ignition again.

If one or more lamps do not light up, refer to **Manitowoc Crane Care**.

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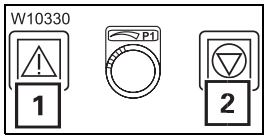
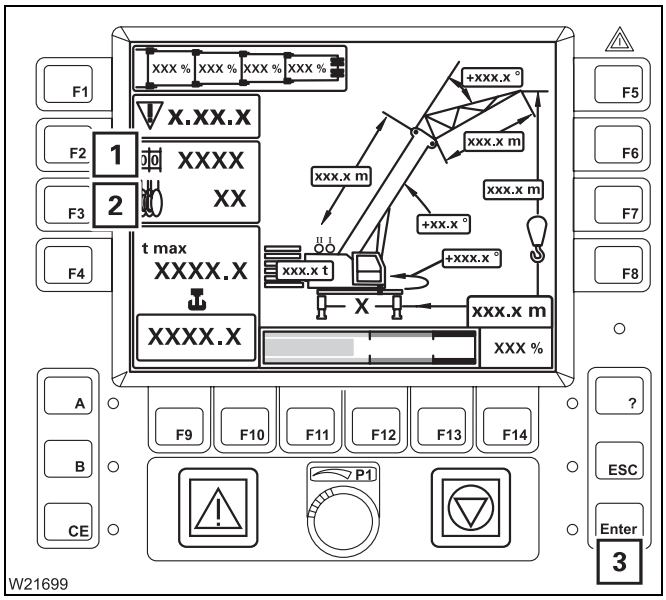


After the test programme:
– The lamps (**1**) and (**2**) light up
– All power units are disabled

The current display depends on whether the RCL either:
– Had been switched off for up to 48 hours
– Had been switched off for more than 48 hours



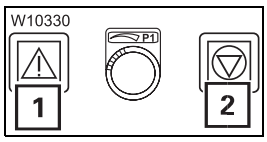
After a standstill of up to 48 hours

The *Monitoring* submenu will open.

The last set rigging mode will be displayed, and symbols (**1**) and (**2**) will be green and flash.

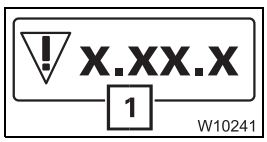
You can accept the displayed values if they correspond to the current rigging mode:

- Press button (**3**) once – symbols (**1**) and (**2**) will stop flashing.



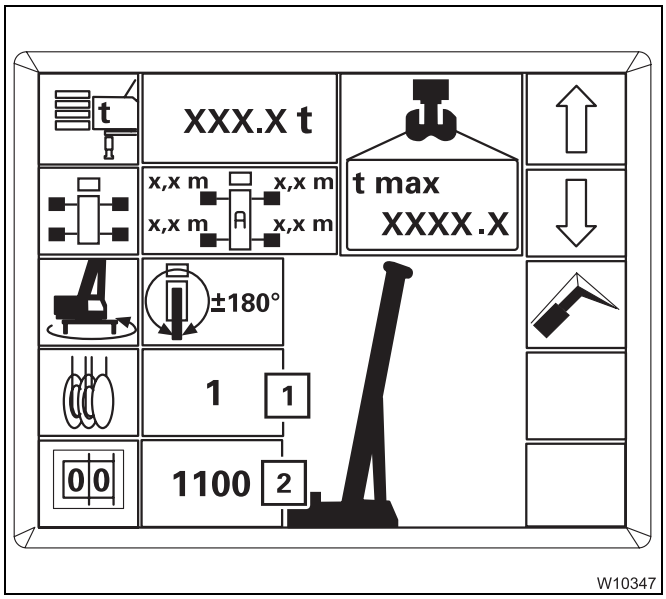
The lamps (**1**) and (**2**) go out. The RCL code has been applied.

If no error message is displayed, the RCL is set for crane operation and crane movements are enabled; ➠ *Checks before operating the crane*, p. 11 - 31.



Any pending errors are indicated on the display (**1**); ➠ *Display during errors*, p. 11 - 39.

You must re-enter the current rigging mode if the displayed values do not correspond to the current rigging mode of the truck crane; ➠ *Entering the rigging mode*, p. 11 - 23.



After a standstill of more than 48 hours

The *Enter rigging mode* submenu will open.

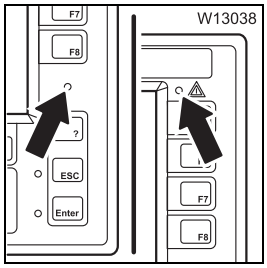
Display (**2**) will show RCL code **1100** – the corresponding rigging mode will be displayed.

The display (**1**) shows the last reeving entered, e.g. **1**.

- Enter the current rigging mode;
  ➠ p. 11 - 23.

Brightness of the displays

The brightness of the *RCL* display will adjust automatically to the ambient lighting after turning on the ignition.



Do not cover sensor (**1**) and keep it clean to avoid contamination that can affect the brightness adjustment.

You can also adjust the brightness manually; ➠ *Adjusting display brightness*, p. 10 - 7.

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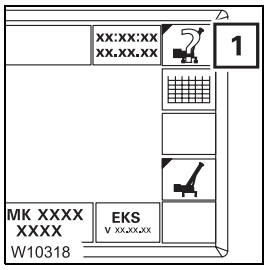
11.2.2 Entering the rigging mode

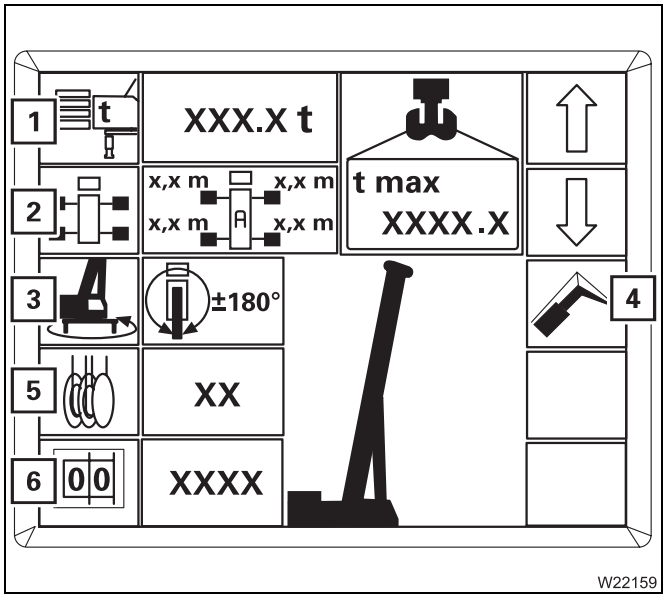
For a complete rigging mode input, you must enter, confirm and accept the rigging mode and the reeving.



Opening the submenu

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

The Esc button is only active if all crane movements have been stopped.



The *Enter rigging mode* submenu will open.

There are two ways of entering the current rigging mode.

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

– **Or** enter the RCL code (**6**) and the reeving (**5**).

Then you must confirm and accept the newly entered rigging mode.

The following section describes the input procedure based on the individual components. If you want to enter the rigging mode based on the RCL code; ➠ *Entering the RCL code*, p. 11 - 28.

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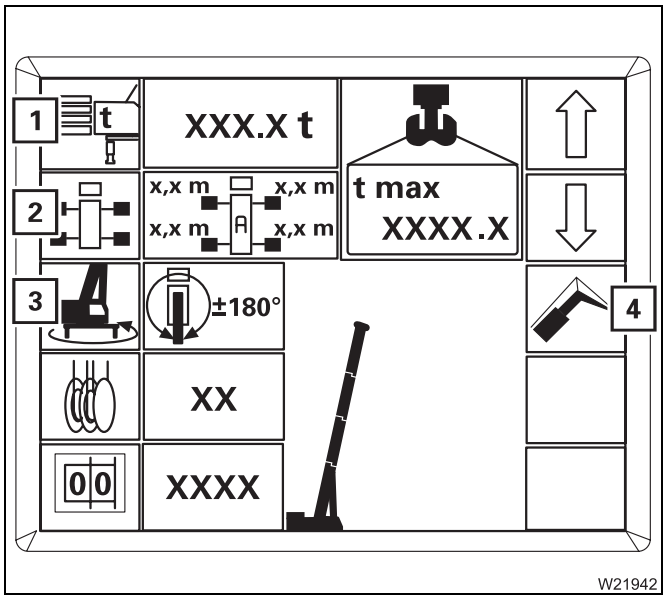
Entering individual components

With this type of input, select all the components of the rigging mode one after the other.

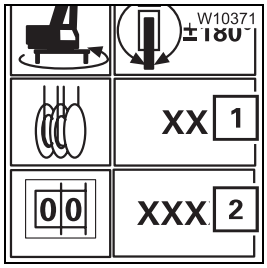
Danger of overturning due to incorrectly set rigging mode
Values which have already been set may change when entering individual components. For this reason, you should always compare the displayed rigging mode with the current rigging mode of the truck crane after making the entry. This prevents the RCL from calculating with incorrectly set components and the truck crane from becoming overloaded or from overturning.



When re-entering the rigging mode completely, you can prevent already entered components from changing by making entries in the following order:

- Counterweight (**1**)
- Boom system (**4**)
- Outrigger span (**2**) - only for versions without outrigger span monitoring
- Slewing range (**3**)
- Outrigger span check - only for versions with outrigger span monitoring

In this order, the values that can be selected for the current entry are always restricted by the previous entry. As a result, already entered values do not change.



When entering the components, the corresponding RCL code (**2**) is displayed at the same time.

Then you must enter the current reeving (**1**) and accept the indicated rigging mode.

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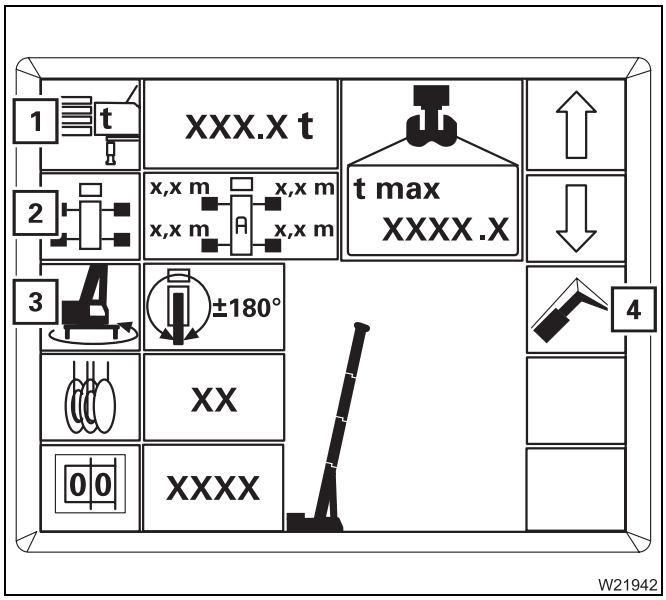
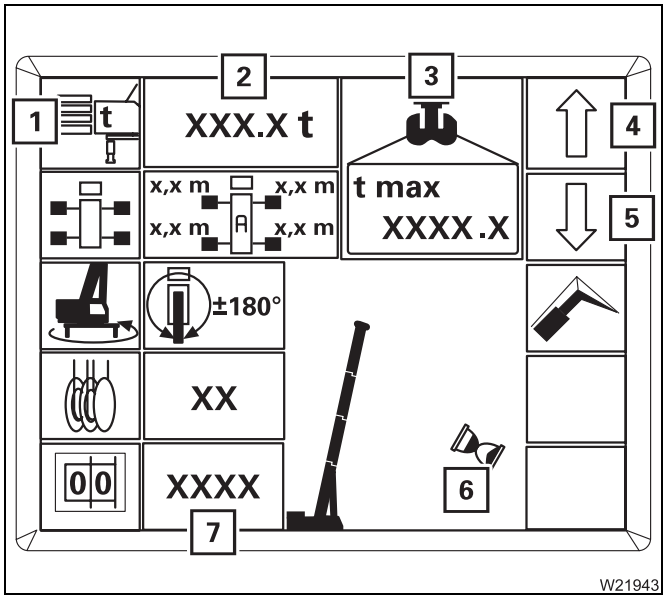


To switch on input mode

- Press one of 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.

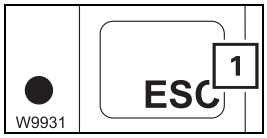
- Press button (**4**) or (**5**) repeatedly until display (**2**) shows the rigged counterweight version.

  4 Larger combinations

  5 Smaller combinations

The display (**7**) indicates the corresponding RCL code – the symbol (**6**) is indicated while the RCL 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 (**1**) button
The main menu opens.

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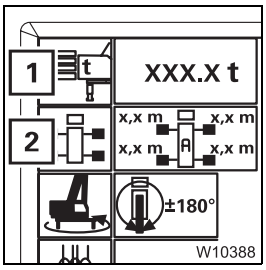
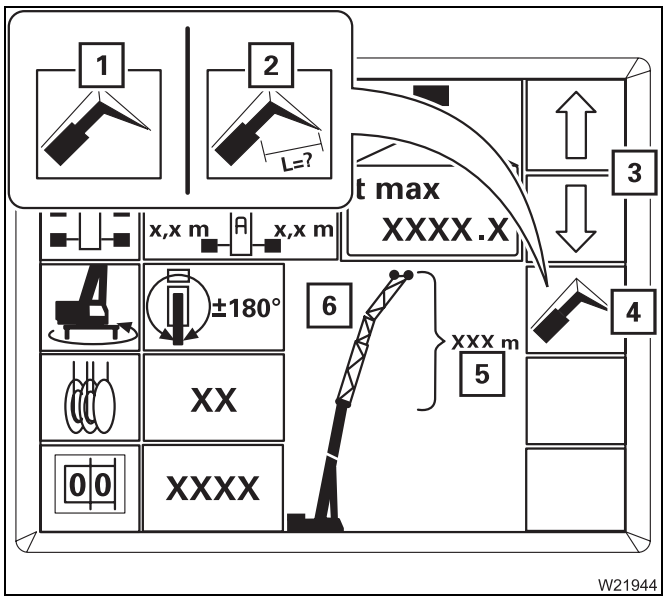


After the selection procedure, there are three options:

– Switching off the input mode.
  • Press button (**1**) once – symbol is grey.
– Switching over the input mode.
  • Press the button for the next component once, e.g. button (**2**) – symbol is green.
– Accept the displayed rigging mode; ➠ *Accepting the rigging mode*, p. 11 - 29.

Enter the other components of the current rigging mode in the same way.



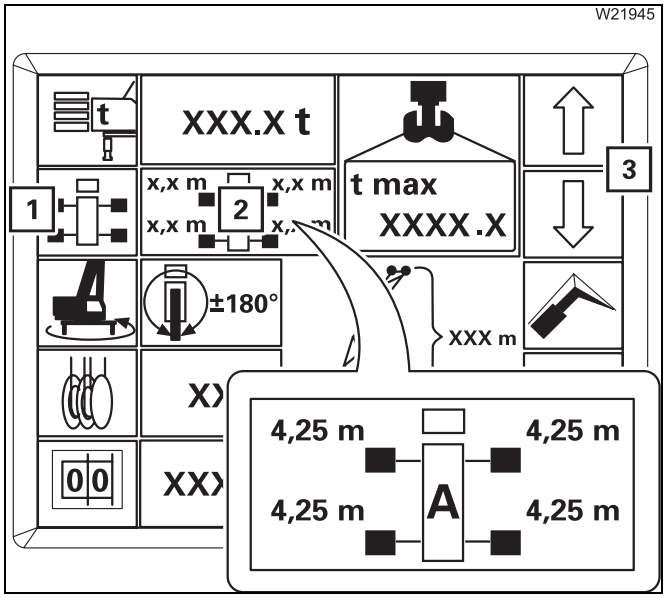
– Boom system

• Press button (**4**) repeatedly until the symbol for the required input is **green**.

1 Boom system entry

2 Lattice extension length/angle input

• Press button (**3**) repeatedly until:
  – The display (**6**) shows the rigged boom system, e.g. the lattice extension **or**
  – Until display (**5**) shows the rigged lattice extension length, and in the case of an inclinable lattice extension, the rigged lattice extension angle.



– Outrigger span – without outrigger span monitoring

Symbol (**1**) is green. Press buttons (**3**) repeatedly until display (**2**) indicates the current outrigger span, e.g. outrigger span **A**.

The display indicates half the outrigger span each on the left and right, e.g. 4.25 m (13.9 ft) for an outrigger span of 8.50 m (27.9 ft) in the case of outrigger span **A**.

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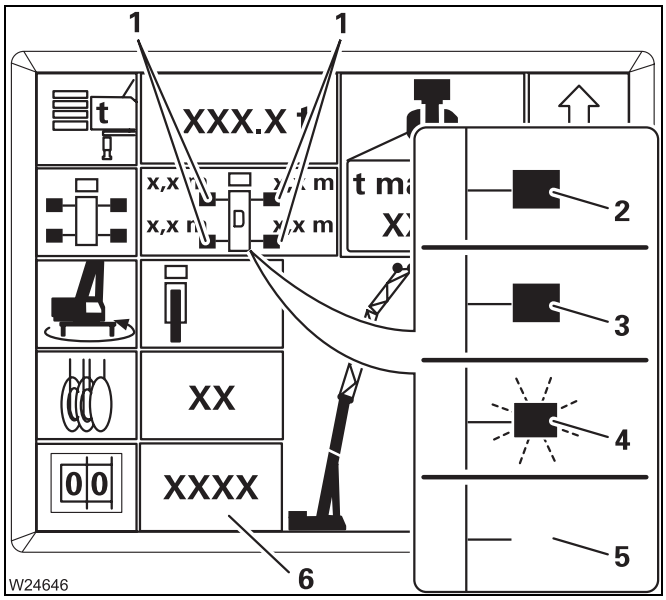

– Outrigger span – with outrigger span monitoring

The display (**1**) indicates if the outrigger span corresponding to the RCL code (**6**) is rigged.

The display is identical for all outrigger beams (**2**).

(**3**) Illuminated – The required outrigger span is rigged

(**4**) Flashes – The required outrigger span is not rigged

(**5**) No display – The current outrigger span is not permitted

- Check that the correct RCL code (**6**) for the planned operation is displayed.
- Check display (**1**).

If an incorrect or impermissible outrigger span is rigged then you must rig the correct outrigger span that is required. Otherwise an error message is displayed after applying the rigging code; ➠ p. 14 - 27.

Risk of accident due to incorrectly supported truck crane!
A shutdown is not initiated as standard when an outrigger span monitoring error message is issued. When an error message is displayed, compare the rigged outrigger span with the required outrigger span and rig the required outrigger span.
This prevents the truck crane from tilting due to an outrigger span that is too low.

The error message can be supplemented by the shutdown as necessary.

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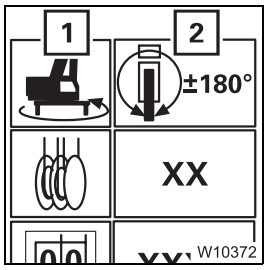


– Slewing range

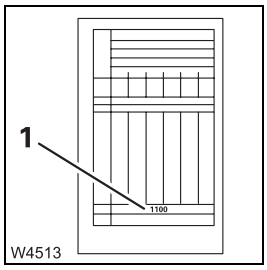
Symbol (**1**) is green. Press buttons ⇧ ⇩ repeatedly until the display (**2**) indicates the required slewing range, e.g. 360°.

You can only confirm rigging modes for slewing ranges other than 360°:

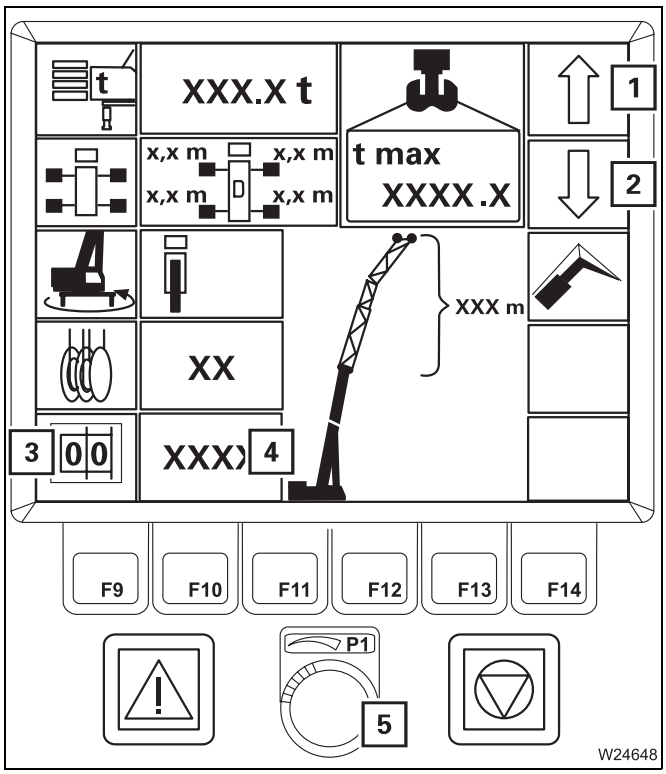
– If the superstructure is in the entered slewing range. If necessary, first enter the 360° slewing range and slew the superstructure into the required position.

Entering the RCL code

You must enter the RCL code for the rigging mode according to the *Lifting capacity table*.



- Refer to the *Lifting capacity table* for the current rigging mode. The corresponding RCL code (**1**) is specified at the bottom of the table (e.g. **1100**).



- Press button (**3**) once – symbol is **green.**
- Press button (**1**) or (**2**) repeatedly until display (**4**) shows the required RCL code.

or

- Select the RCL code with switch (**5**).

The other displays will show the corresponding rigging mode.

Now you can enter the reeving and accept the rigging mode.

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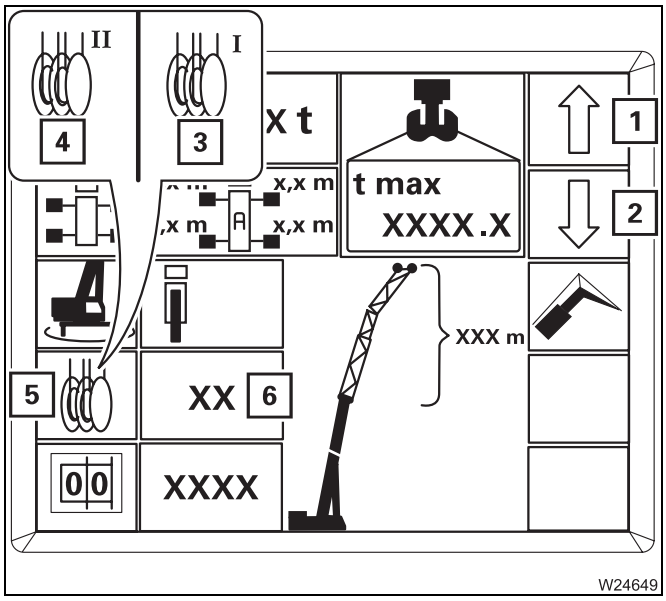
Entering the reeving value

Entering the reeving does not have an effect on any other component that has already been entered.



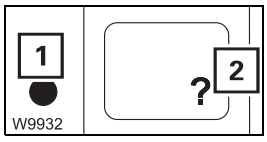
- Press button (**5**) repeatedly until the symbol for the hoist with which you want to lift the load has turned **green**.
  - **3** Symbol for main hoist
  - **4** Symbol for auxiliary hoist
- Press button (**1**) or (**2**) repeatedly until display (**6**) shows the number of currently reeved rope lines.

Accepting the rigging mode

Prior to crane operation, you must confirm and accept the newly entered rigging mode.

Confirming the rigging mode

- Press the (**2**) button once.
  - If the rigging mode is permissible, lamp (**1**) will go out. The *Rigging mode monitoring* submenu will open and you can accept the rigging mode.



  - If the rigging mode is not permissible, the lamp (**1**) lights up. Press button (**2**) once to display the error codes; ➠ p. 14 - 27.

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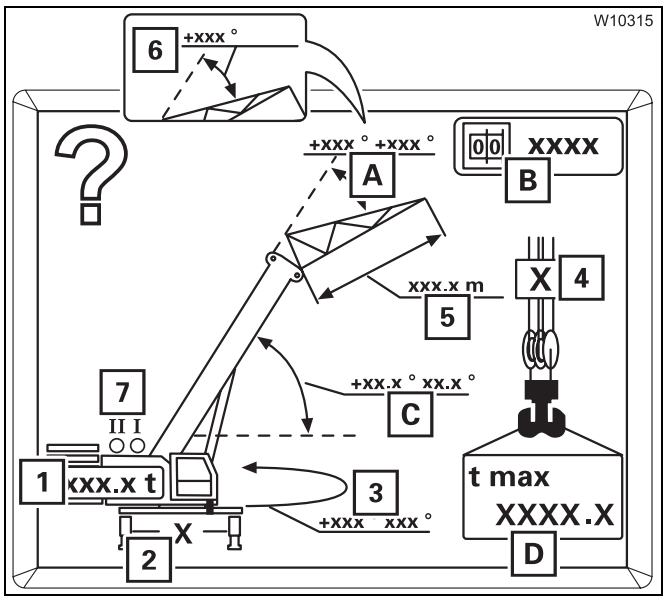
Accepting the rigging mode

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

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

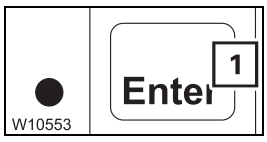


- Check:
  - **1** The rigged counterweight
  - **2** The rigged outrigger span
  - **3** The slewing range for the planned job
  - **4** The number of reeved rope lines
  - **5** The length of the rigged lattice extension
  - **6** The angle of the rigged lattice extension – inclinable
  - **7** The hoist that is switched on – switch hoists over; ➠ p. 11 - 32

For the rigging mode, the following is displayed:

A The permissible working range of the lattice extension
B The RCL code
C The permissible working range of the main boom
D The maximum load

- If you need to correct some values, press the button (**1**).
  The *Enter rigging mode* submenu opens.



If the current rigging mode is displayed, press the button (**1**). The *Monitoring* submenu opens and the crane movements are enabled provided no error is pending; ➠ p. 11 - 31.

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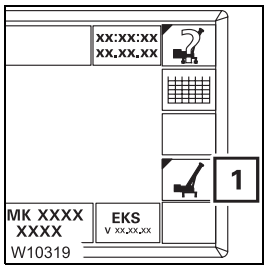
11.2.3 Checks before operating the crane

Opening the submenu

Crane operation is only enabled when the *Monitoring* submenu is open.

After a standstill of less than 48 hours and after accepting a rigging mode, the *Monitoring* submenu will open automatically.



You can also open the submenu manually.

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

The *Monitoring* submenu will open.

You can only quit the *RCL monitoring* submenu when all crane movements have stopped – control lever in zero position.

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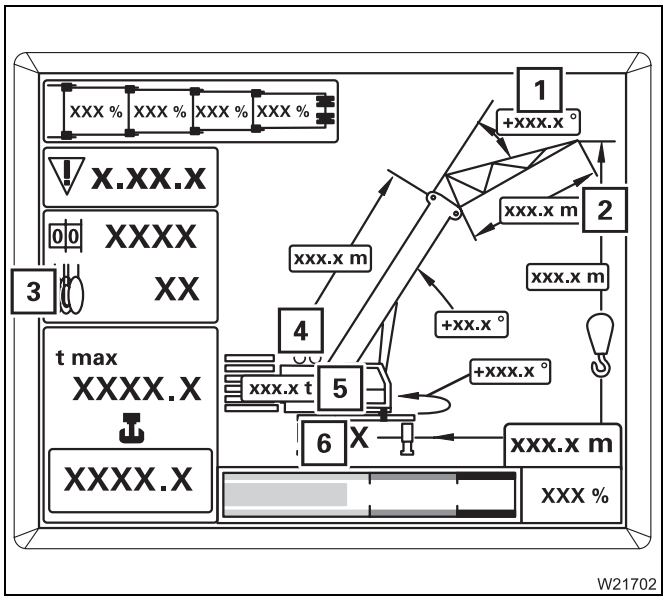
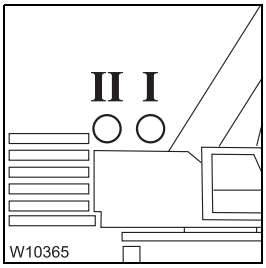
Checks

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

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



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

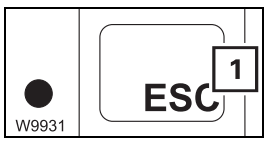


Hoists display

The lamp that lights up must always be for the hoist with which the load is to be lifted:

Lamp I:	Must light up if the load is to be raised with the main hoist
Lamp II:	Must light up if the load is to be raised with the auxiliary hoist

- Switch over the display if necessary; ➠ *Example of how to switch over the display*, p. 11 - 33.



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

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

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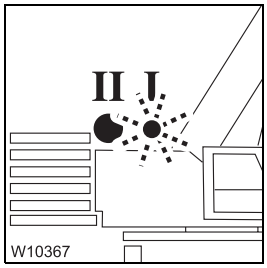
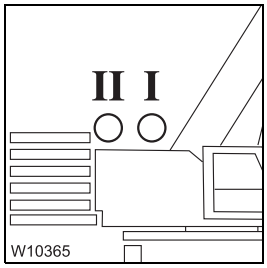


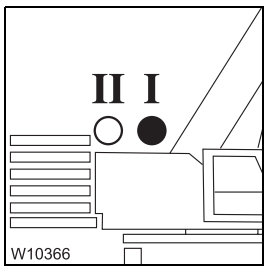
Example of how to switch over the display

The load should be raised with the main hoist, for example. However, lamp **II** for the auxiliary hoist lights up and lamp **I** for the main hoist flashes.

Switch over the display as follows:

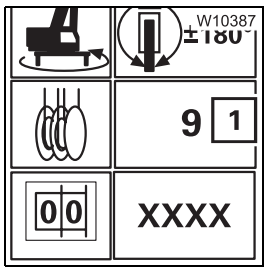


- Switch off both hoists. The lamps **I** and **II** go out



- Switch on the main hoist.

Now the lamp **I** for the main hoist is on



The display (**1**) shows the reeving value entered last for the main hoist (e.g. **9**).

If no reeving has been entered yet, the RCL selects reeving **1**.

- If necessary, enter the current reeving; p. 11 - 29

Risk of accident due to incorrectly set RCL
After switching over the hoists, always check whether the displayed reeving value corresponds to the current reeving value of the displayed hoist and, if necessary, enter the current reeving value.
In this way, you can prevent the RCL from making calculations based on an incorrect reeving value and the truck crane from becoming overloaded or from overturning.

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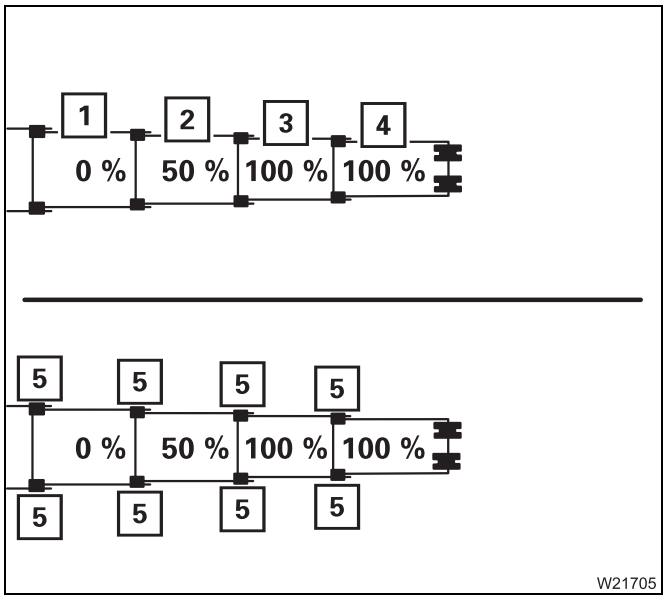
11.2.4 Displays during crane operation

The following information is constantly displayed in addition to the displays of the rigging mode:

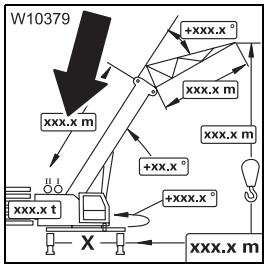


The current telescoping

The displays (**1**) to (**4**) show the current telescoping of the telescopic sections I to IV in percent, e.g. **50%**.

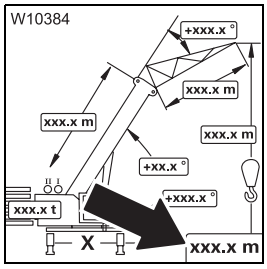
Fixed and intermediate lengths differ in the locking pins (**5**).

- **Green:** Fixed length
- **Black:** Intermediate length
- **Flashing:** Telescopic section at fixed length not set down or unlocked



The current main boom length

Shows the current main boom length in metres (m) or feet (ft).



The current working radius

Shows the current working radius = horizontal distance between the turntable axis and the hook block axis.
The displayed value is calculated on the basis of the telescoping and the main boom or lattice extension angle.
The value is displayed either in metres (m) or feet (ft), depending on the setting.

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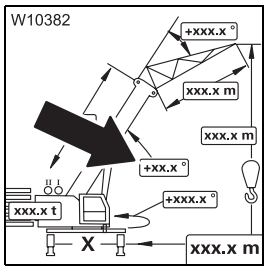
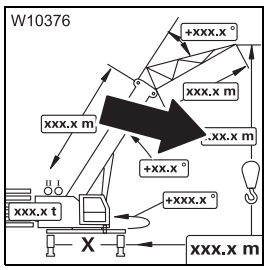


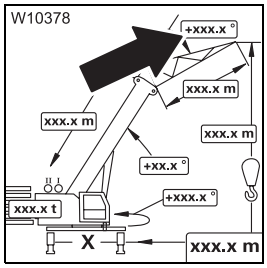
The current main boom angle

Shows the current main boom angle in relation to the horizontal. Angles below the horizontal are displayed with a minus sign, e.g. – 3°.



The current overall height

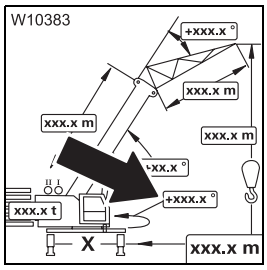
Overall height = vertical distance between the lower edge of the outrigger pad and the highest point of the main boom or lattice extension. The displayed value applies to fully extended support cylinders on the largest outrigger span.
The value is displayed either in metres (m) or in feet (ft), depending on the setting.



The current lattice extension inclination

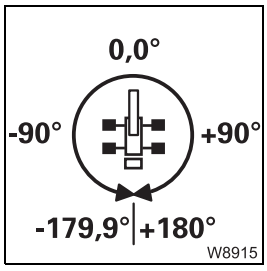
– **Lattice extension, luffable**: Shows the current lattice extension inclination in relation to the main boom in degrees.
– **Lattice extension, inclinable**: Shows the angle of the lattice extension corresponding to the RCL code in degrees.

If the displayed RCL code does not apply to a lattice extension, nothing will be displayed.



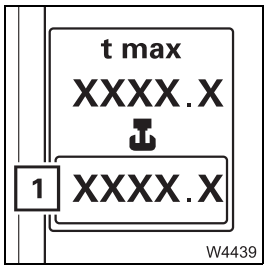
The current slewing angle

Shows the angle of the current superstructure position.
0° means that the superstructure is slewed to the rear.



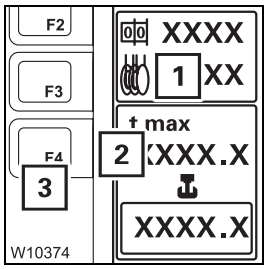
A full turn from this working position is divided into two semi-circles.

– Angles in the **right semi-circle** are displayed as **positive** values (0° to 180.0°).
– Angles in the **left semi-circle** are displayed as **negative** values (0° to –179.9°).



The currently raised load

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



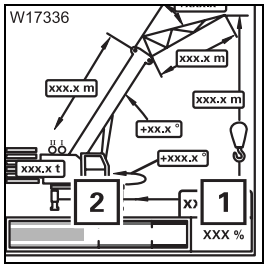
The maximum load

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 reeving entered, symbol (**1**) will be red.

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

- Press the (**3**) button once.
  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. Display (**1**) shows the percentage value. Display (**2**) shows the ranges in different colours:

Blue: 0 – 90%

Yellow: Approx. 90 – 100%

Red: Greater than 100%

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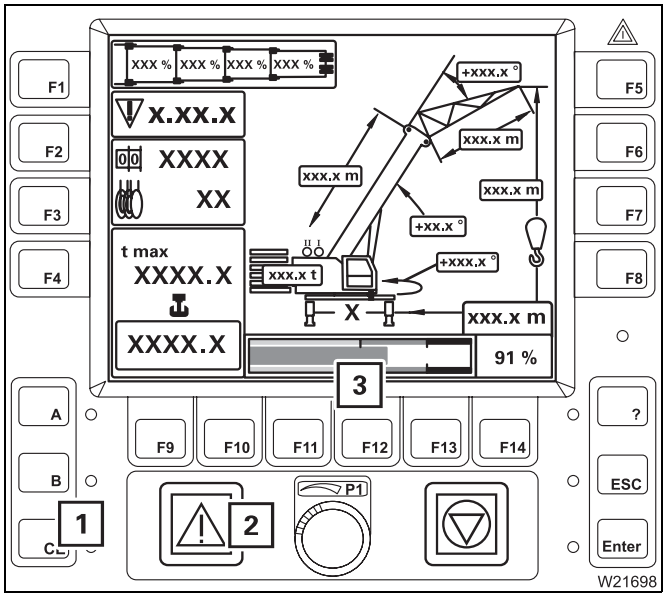
11.2.5 RCL early warning



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

– An intermittent buzzer tone will sound. After five seconds, you can switch off the buzzer tone using button (**1**).

– The lamp (**2**) lights up.

– Display (**3**) shows the current degree of utilisation, e.g. 91%; the bar is **yellow.**

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

11.2.6 RCL shutdown

There are different types of RCL shutdown:

– Shutdown due to overload,

– Shutdown due to an error; ➠ *Error message with shutdown*, p. 14 - 24.

Shutdown due to overload

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

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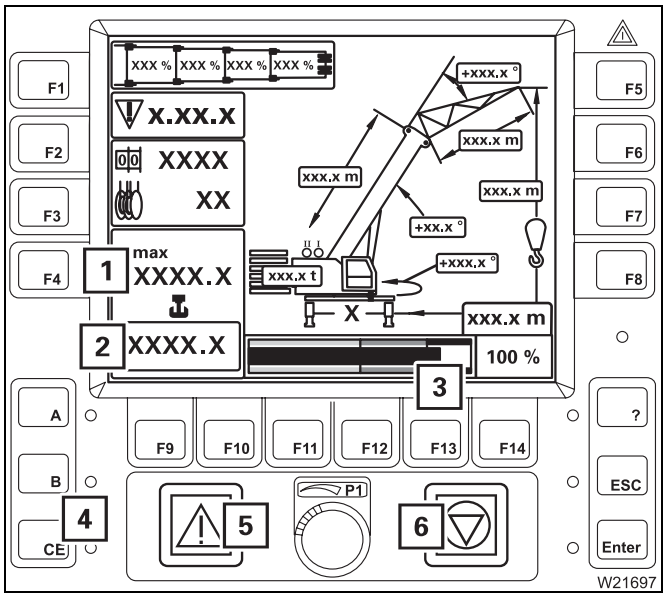


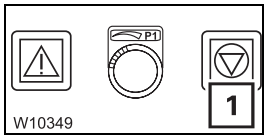
– All crane movements which increase the load moment will be switched off.
– A continuous buzzer tone will sound. After five seconds, you can switch off the buzzer tone using button (**4**).
– Lamps (**5**) and (**6**) light up.
– Display (**3**) shows the current degree of utilisation, e.g. 100%, the bar is **red.**
– The value on display (**2**) is equal to or greater than the value on display (**1**).

Cancelling a shutdown

- Turn off the buzzer tone if necessary.
- Leave the shutdown range by moving the crane according to the following table.

Switched off crane movements	Permitted crane movements
Lift loads	Lower loads
Lower the main boom	Raise the main boom[1)]
Extend the main boom	Retract the main boom[1)]
Slew to the left	Slew to the right
Slew to the right	Slew to the left
Lower the lattice extension	Raise the lattice extension

[1)] In some cases, the RCL will also switch off these movements. In this case, leave the shutdown range through other enabled movements. If this is not possible, set down the load.



If you have left the shutdown range, the lamp (**1**) goes out.
After pressing button CE the crane movements will be enabled.

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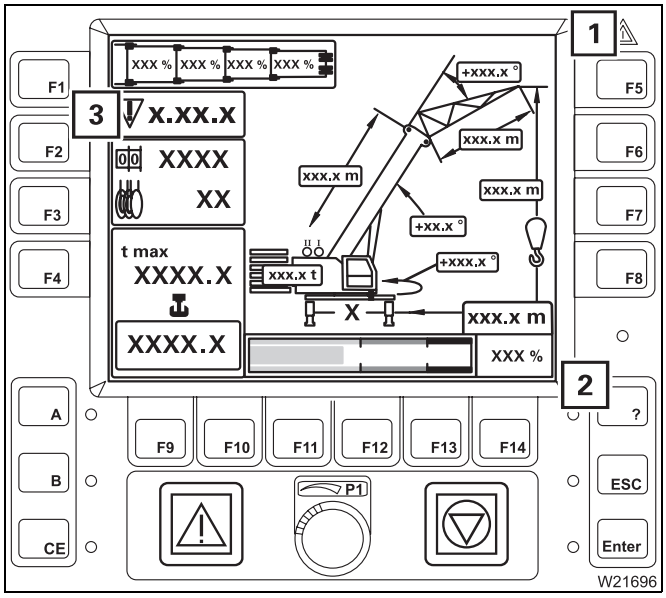
11.2.7 Display during errors



If an error occurs, it will be displayed as follows.

– Depending on the type of error, the buzzer tone sounds once or as a continuous buzzer tone.
– Lamps (**1**) and (**2**) light up.
– Display (**3**) shows an error code and the associated symbol flashes.

Further indications depend on the type of error; ➠ *Error messages in the Monitoring submenu*, p. 14 - 23.

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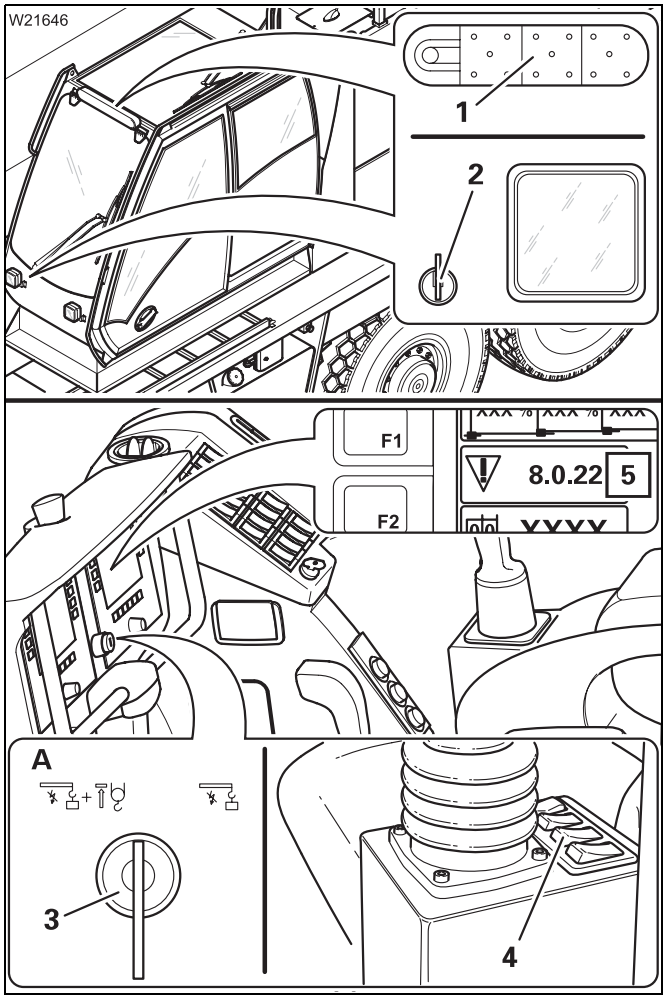
11.2.8 RCL override

There are two types of RCL override, depending on the version.

Risk of accident due to overridden or faulty RCL
It is not permitted to work with an overridden or faulty RCL.
Set down the load immediately and stop operating the crane if the RCL is faulty.
You may only override the RCL if it becomes absolutely necessary in the event of an emergency. This is to put the truck crane into a safe condition in the event of a malfunction. In this case, do not perform any movements that would increase the load moment.



RCL override – symbol (A)

The operating elements (**1**), (**2**) and (**4**) have not been assigned functions.

- Insert the key into the key-operated switch (**3**).
- Turn the key to the right and hold it in this position.

The display (**5**) shows the error message **8022**.

Cancelling the override

- Let go of the key.
- Remove the key.
- Press button CE once; the error message is acknowledged.

If additional equipment is used, the status display (**1**) indicates this in the same way as the RCL display in the crane cab:

Green: 0 - 90%

Yellow: Approx. 90 - 100%

Red: Greater than 100%

Risk of accident due to accidental override
The key must not remain in the key-operated switch while the crane is operating.
This prevents the RCL from overriding unintentionally.

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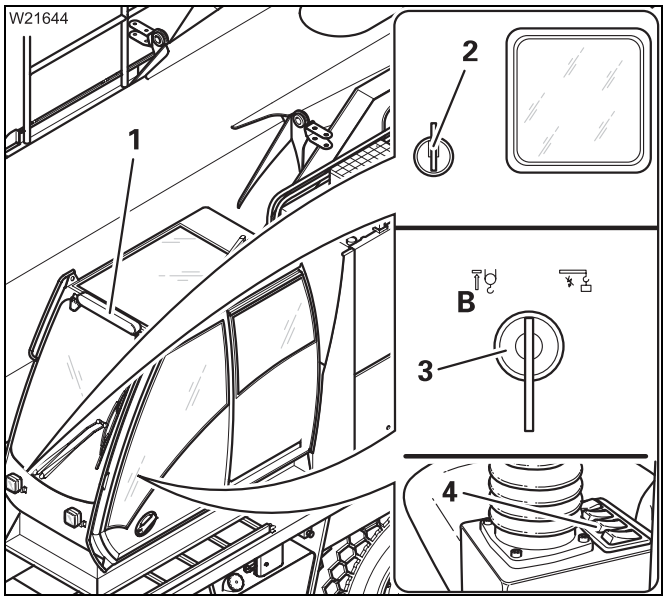


RCL override – symbol (B)

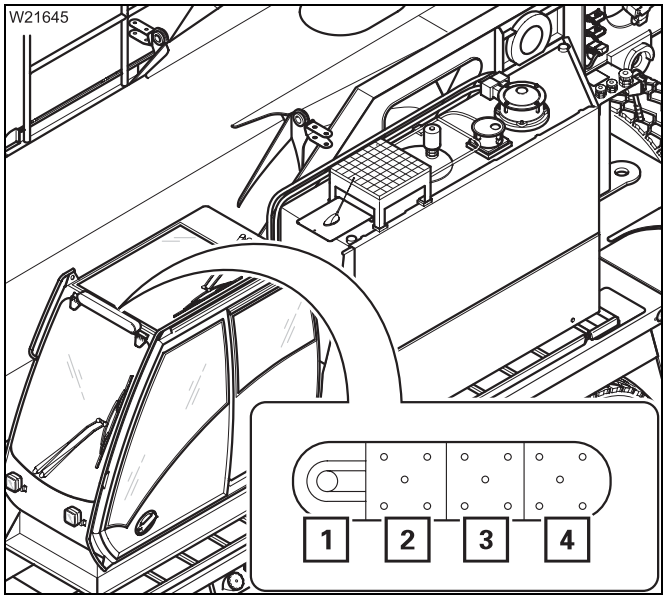
The status display (**1**) is active.

The following operating elements can be used to override the RCL:

2 Key-operated RCL override switch

3 Key-operated rigging switch

4 Raise switch



Status display

The status display informs people in the danger area of the truck crane:

– About the current degree of utilisation,
– In case of an RCL shutdown or early warning,
– When the RCL has been overridden.

The warning will be visual and, in part, audible.

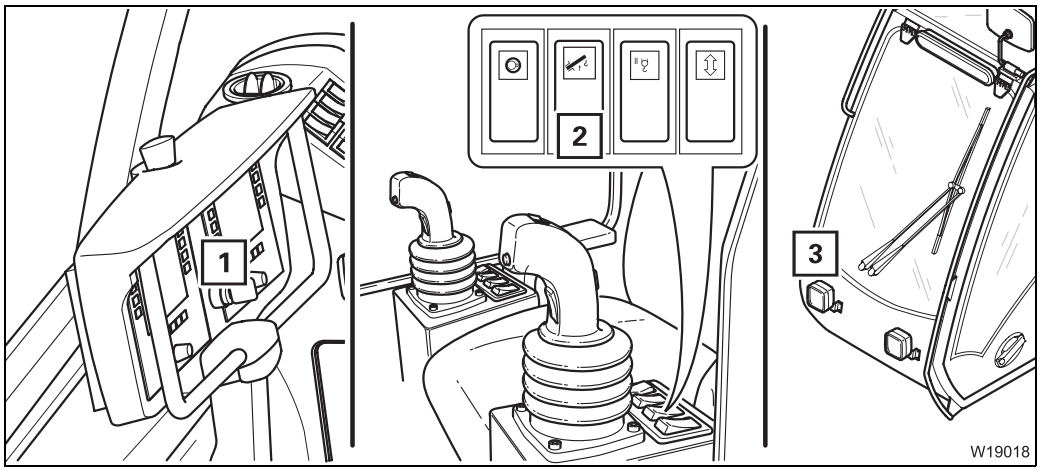
1 Loudspeaker (warning signal)

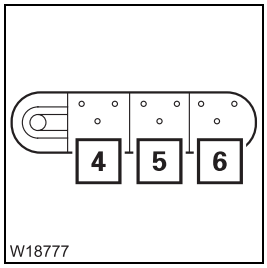
2 Lamp, green

3 Lamp, yellow

4 Lamp, red

The lamps of the status display light up or flash depending on the RCL degree of utilisation and operation of the switches.





Switch pressed	Degree of utilisation		
	0 - 90%	approx. 90 - 100%	greater than 100%
No switch (normal operation)	Display (**4**) green	Display (**5**) yellow	Display (**6**) red
Key-operated rigging switch (**1**)	Display (**4**) green	Display (**5**) yellow	Display (**5**) yellow, flashing
Button (**2**) Raise the boom	Display (**4**) green	Display (**5**) yellow	Display (**4**) green, flashing
Key-operated override switch (**3**)	Display (**6**) red, flashing	Display (**6**) red, flashing	Display (**6**) red, flashing

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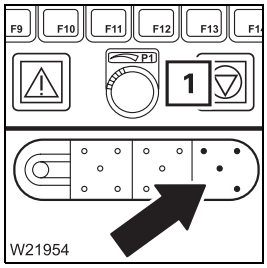
RCL shutdown

There are different types of RCL shutdown:

– Shutdown due to overload, approx. 100% of the maximum permissible load is exceeded,

– Shutdown due to an error.

If the RCL has shut down the crane movements, then:



– Depending on the version, lamp (**1**) lights up,

– A continuous buzzer tone sounds,

– The status display lights up **red.**

Now you can:

➠ *Raising after RCL shutdown*, p. 11 - 44;

➠ *Overriding RCL or lifting limit switch for rigging work*, p. 11 - 45;

➠ *Overriding the RCL in an emergency*, p. 11 - 47.

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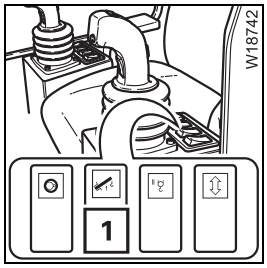
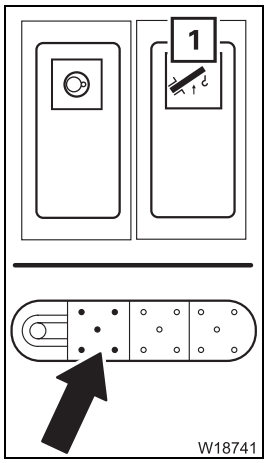
Raising after RCL shutdown



You can re-enable raising with the switch (**1**) in order to leave the shutdown range.
The speed will then be reduced to 50%.

Requirement

– The engine for crane operation is running.

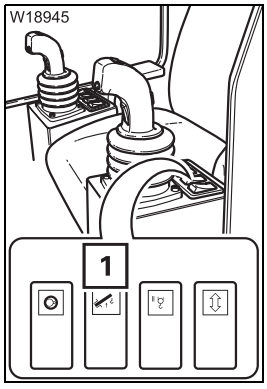


Raising the main boom

- Press the (**1**) button up once.
  – Raising is enabled.
  The RCL will show an information code; ➠ p. 11 - 48.
  – The status display will flash green.
- Raise the main boom with the control lever until the degree of utilisation is less than 100%.

  The crane movements will then be enabled again.

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



If the degree of utilisation is over 100%, you can cancel the function by:
– Pressing switch (**1**) up again,
– Switching off the ignition.

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Overriding RCL or lifting limit switch for rigging work

For rigging work, you can:

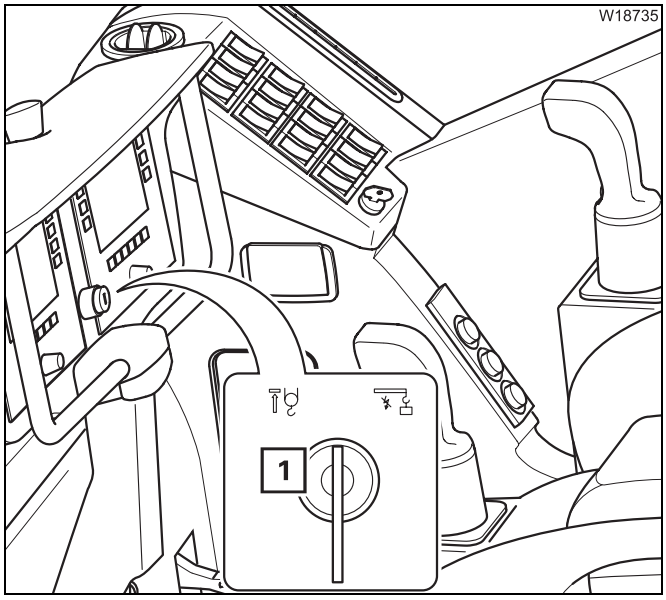
– Override the lifting limit switch,

– Override the RCL and thus enable a degree of utilisation of up to 110%.

For both overrides the speed of the movements which increase the load moment is reduced to 15%.
The speed of the movements which increase the load moment is not reduced.

Requirement

– The engine for crane operation is running.



Overriding the lifting limit switch

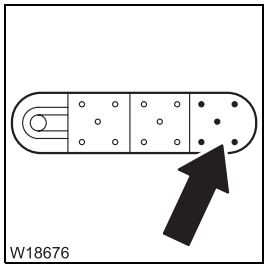
• Turn the key-operated switch (**1**) once anti-clockwise.

Once the lifting limit switch has been activated, the crane movement will only be stopped **once** and will then no longer be monitored.

Overriding the RCL

• Turn the key-operated switch (**1**) once clockwise.

Now a degree of utilisation of up to 110% is enabled.



After overriding

– The status indicator will light up **red.**

– The RCL will show an information code; ➠ p. 11 - 48.

If you do not trigger a control lever movement within 10 seconds, you must press the key-operated switch again.

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Cancelling the override

The override will be cancelled when you:

– Press the key-operated switch again.

– Do not activate the control lever for 10 seconds.

– Switch off the ignition.

Risk of accident due to accidental override
The key must not remain in the key-operated switch while the crane is operating.
This prevents the RCL from overriding unintentionally.

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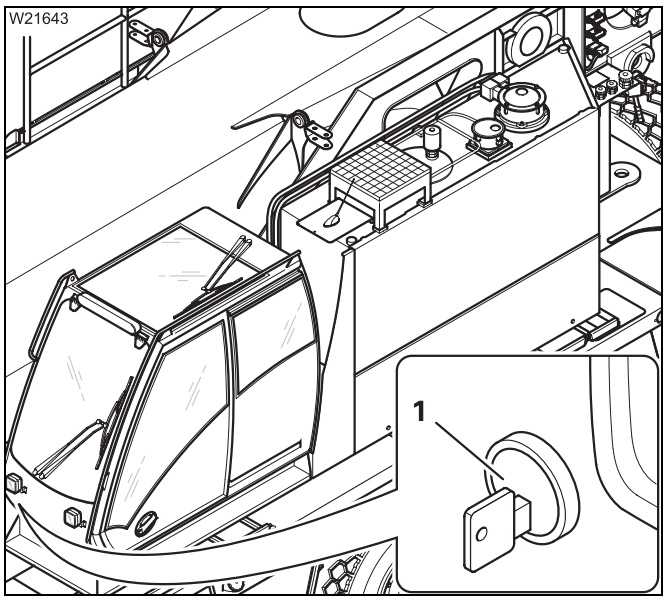
Overriding the RCL in an emergency

Risk of accident due to overridden or faulty RCL
It is not permitted to work with an overridden or faulty RCL.
Set down the load immediately and stop operating the crane if the RCL is faulty.
You may only override the RCL if it becomes absolutely necessary in the event of an emergency. This is to put the truck crane into a safe state in the event of a malfunction. In this case, do not perform any movements that would increase the load moment.



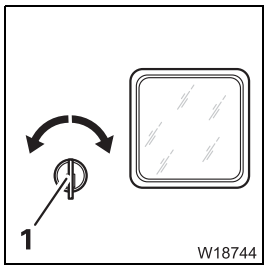
If the RCL has shut down all crane movements, you can cancel the shutdown with the key-operated switch (**1**).

Once the shutdown is cancelled, the crane operation is no longer monitored and the switched off crane movements are enabled again.

The power unit speeds are reduced to 15%.

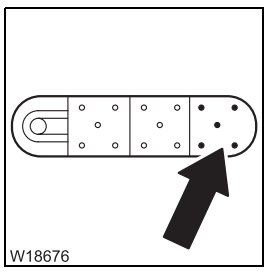
Requirement

– The engine for crane operation is running.



Cancelling a shutdown

- Turn the key-operated switch (**1**) to the left or right once.
  – Now all crane movements will be enabled for 30 minutes. The crane movements will no longer be monitored by the RCL .
  – The RCL will show an information code; ➠ p. 11 - 48.



The status display will flash **red**.
At a degree of utilisation over 110% the warning signal will sound; ➠ p. 11 - 42.

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Cancelling the override

The override will be cancelled when you:

– Switch off the ignition,

– Press the key-operated switch again.

The override will automatically be cancelled 30 minutes after the key-operated switch has been pressed.

Risk of accident due to accidental override
The key must not remain in the key-operated switch while the crane is operating.
This prevents the RCL from overriding unintentionally.

Table – error/ information codes

The following table contains error and information codes, their causes and possible solutions.

Error code			Cause	Solution
8	**04**	**4**	Key-operated rigging switch pressed, no override effective	– Start the engine; – Reduce degree of utilisation to less than 110% – Move the control lever within 10 seconds after operation
8	**05**	**4**	Raise switch pressed, no override effective	– Start the engine; – Press switch again
8	**06**	**4**	Key-operated RCL override switch pressed, no override effective	– Start the engine; – Press switch again
8	**04**	**5**	**Information code:** Key-operated rigging switch pressed, override effective	No measures required
8	**05**	**5**	**Information code:** Raise switch pressed, override effective	
8	**06**	**5**	**Information code:** Key-operated RCL override switch pressed, override effective	

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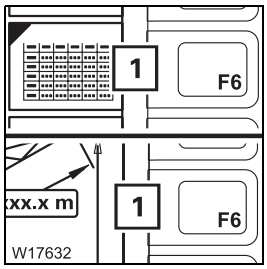
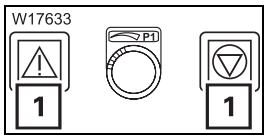
11.2.9 Displaying the lifting capacity tables



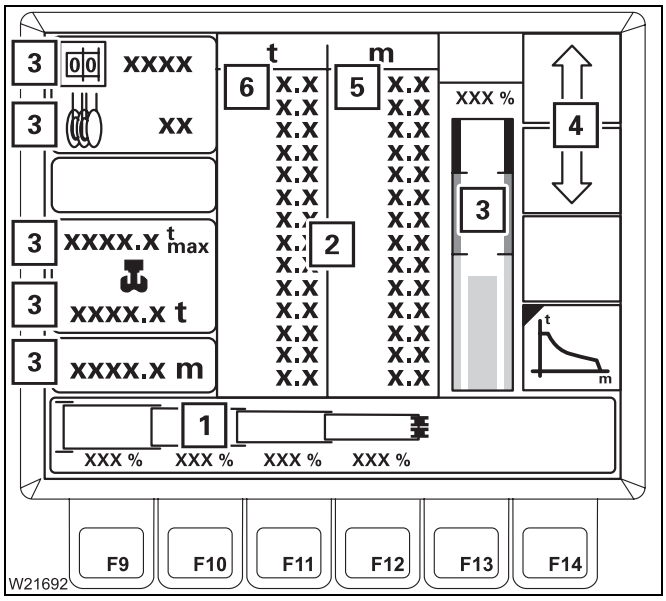
Opening the submenu

- Stop all crane movements – control lever in initial position.
- In the main menu or *Monitoring* or submenu, press button (**1**) once.



The *Lifting capacity table* submenu opens.

The lights (**1**) light up and all crane movements are blocked.



Displaying tables

The indicators (**3**) show the current status.

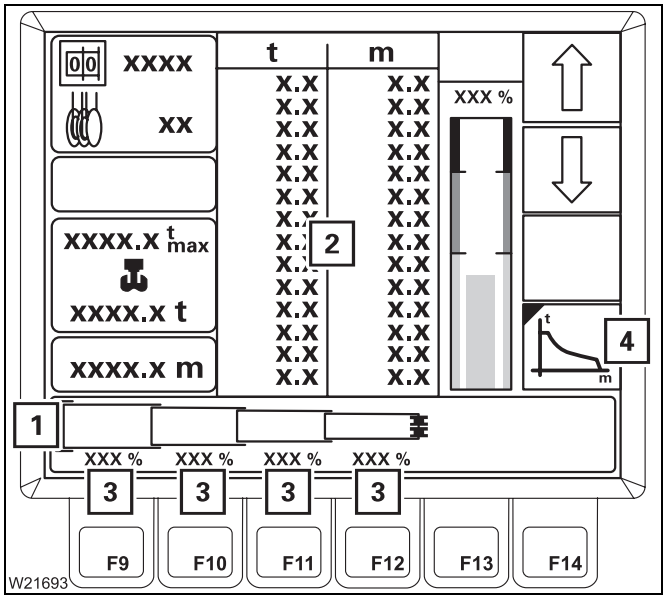
The lifting capacity table (**2**) applies to:

– The entered RCL code,

– The displayed telescoping (**1**) – first the current telescoping is displayed.

The maximum load (**6**) applies to working radius (**5**).

For longer tables, press buttons (**4**) to display more values.



You can have the lifting capacity tables displayed for all permissible telescoping statuses:

- Enter the desired telescoping status (**1**) with the buttons (**3**).

The corresponding lifting capacity table (**2**) will be displayed.
In the event of impermissible telescoping statuses, all values in the lifting capacity table are 0.

Displaying the working range

- Press the (**4**) button once.

The *Working range* submenu will open.

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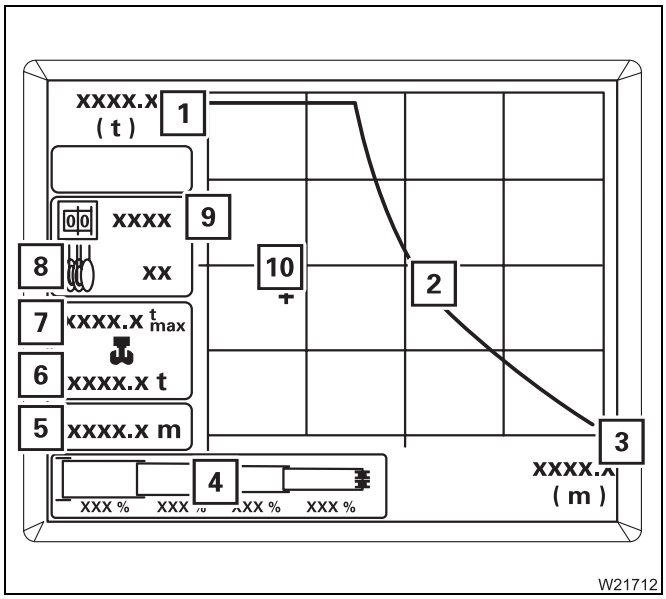
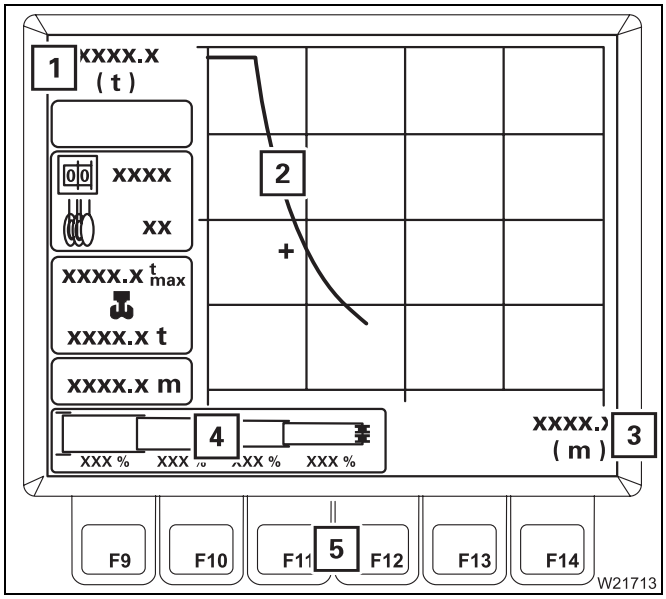


Curve (**2**) shows the permissible working range for the entered RCL code (**9**) and the telescope status (**4**).

The working range ends at the maximum possible working radius (**3**). Reduction of the working radius increases the enabled load along the curve (**2**) up to the maximum possible load (**1**). There has to be enough reeving for this load.

The maximum load (**7**) applies to the current reeving (**8**).

The cross (**10**) indicates the position in the working range for the current load (**6**) and the current working radius (**5**).



The working range for all permissible telescope statuses can be displayed:

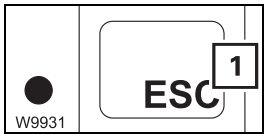
- Enter the desired telescoping status (**4**) with the buttons (**5**).

The displays (**1**), (**2**) and (**3**) show the respective permissible working range.

If the telescoping status is not within the working range:

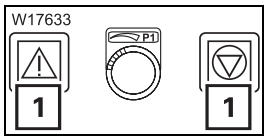
– The displays (**1**) and (**3**) will show the value **0**,

– No curve (**2**) will be shown.



Exiting the submenu

- Press button (**1**) once – the previously displayed menu will open.



If no RCL shutdown or RCL pre-warning occurs, then lights (**1**) will go out and the crane movements will be unblocked in the *Monitoring* submenu.

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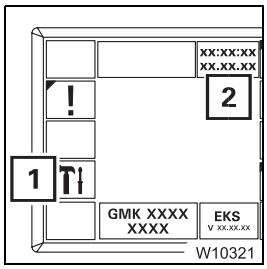
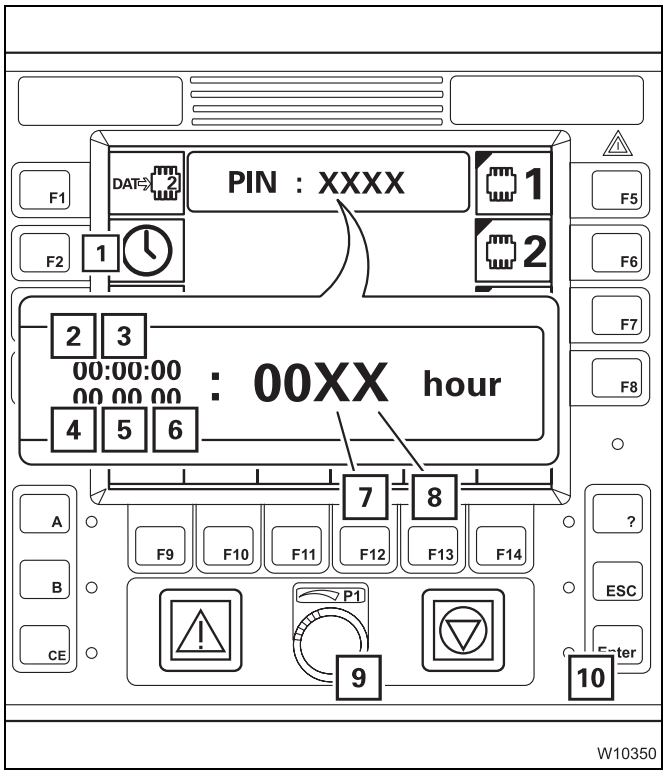
11.2.10 Entering the time/date



You can enter the time and date for the display (**2**).

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

This opens the *Settings* submenu.



- Press button (**1**) repeatedly until the desired value flashes.
  - **2** Hours
  - **3** Minutes
  - **4** Day
  - **5** Month
  - **6** Year
- Enter the new value with the buttons (**7**) and (**8**) or with the switch (**9**).
- Enter all the required values.
- Press button (**10**) once – the newly entered values will be accepted and displayed in the main menu.

Illogical values (e.g. 77 seconds) will not be accepted and the display will continue to flash.

You can **cancel the input** at any time. Press the button (**1**).
None of the values will be changed.

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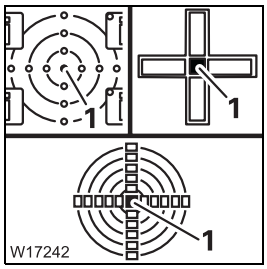
11.3 Crane operation with main boom

11.3.1 Checks during crane operation

Horizontal alignment

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

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



- Check the horizontal alignment of the truck crane during crane operation on the display (**1**); ➠ p. 12 - 50.

Due to deformation of the frame, the horizontal alignment can change by up to 2° when the superstructure is turned from the 0° or 180° position.
If the truck crane does not return to the horizontal position after being turned back to the 0° or 180° position, you must immediately determine the cause and eliminate it and, if necessary, realign the crane. Observe the position of the superstructure when doing so; ➠ *Levelling the truck crane on outriggers*, p. 12 - 50.

Safe distances

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

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

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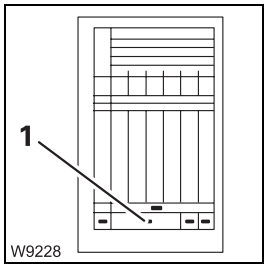
Checking the wind speed

Strong winds can result in the truck crane becoming overloaded.

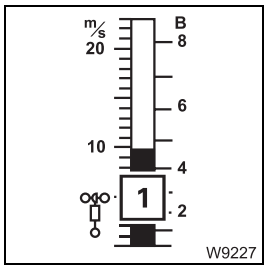
- Prior to and during crane operation, check whether the current wind speed is lower than the maximum permissible wind speed.



Maximum permissible wind speed

The maximum permissible wind speed (**1**) for the current rigging mode is specified at the bottom of the corresponding *Lifting capacity table*.

In certain cases, the specified permissible wind speed must be reduced; ➠ *Lifting capacity table*.



Current wind speed

The current wind speed is displayed in the main menu and in the *Telescoping* submenu. The colour of the bar (**1**) changes depending on the displayed range:

0 to 6 m/s:	Green bar
6 to 12 m/s:	Yellow bar
Over 12 m/s:	Red bar

The colour of the bar only depends on the value of the current wind speed. The maximum permissible wind speed does not affect the colour of the bar.

If an anemometer is not available or in the event of a fault, you can find out which speeds have been forecasted from the respective weather stations.

The *Lifting capacity table* contains an overview of the wind strengths, wind speeds and their effects.

If the maximum permitted wind speed is exceeded

No automatic shutdown occurs if the maximum permissible wind speed is exceeded.

- Immediately cease crane operation.
- Bring the truck crane into the rigging mode specified for the current wind speed in the *Lifting capacity table.*

Risk of accident from excessively high wind speeds
If the current wind speed is higher that the maximum permissible wind speed, immediately stop operating the crane and set up the corresponding rigging mode *Lifting capacity table*.
This will prevent the truck crane from overturning due to overloading.

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11.3.2 Permissible slewing ranges and working positions

The following ranges are permissible for crane operation 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 RCL code for the 360° slewing range according to the *Lifting capacity table*; ➠ *Entering the rigging mode*, p. 11 - 23.
- Rig a counterweight combination 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. 12 - 89.
- Slewing is not permissible if the truck crane is free-on-wheels; ➠ *Slewing with rigged counterweight*, p. 12 - 89.

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°; ➠ *Braking the slewing movement*, p. 11 - 102.
- Switch off the slewing gear; ➠ p. 11 - 103.
- Enter an RCL code for the *0° to the rear* according to *Lifting capacity table*; ➠ *Entering the rigging mode*, p. 11 - 23.
  The RCL will only accept this code if the slewing gear has been switched off and the superstructure is in the 0° position.

All slewing operations are disabled if an RCL code is entered for the *0° to the rear* working position. An RCL shutdown will be 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. 12 - 89), set down the load and enter an RCL code for the 360° slewing range.

- Observe the additional information if the truck crane is free on wheels; ➠ *Main hoist*, p. 11 - 56.

180° to the front rigging position

The same lifting capacity tables and RCL codes apply to this position as to the 360° slewing range.

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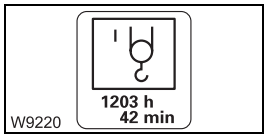
11.3.3 Main hoist

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

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

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

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



You can have the operating hours of the hoist displayed; ➠ p. 11 - 110.

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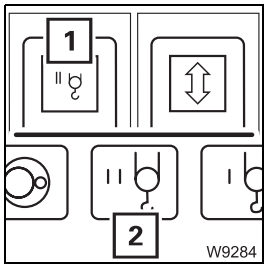
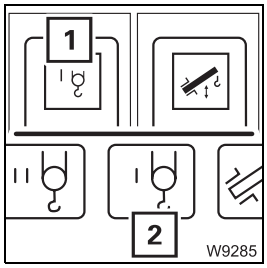
Switching on the main hoist

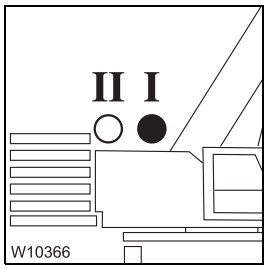
After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will only light up dimly.



- Check whether the auxiliary hoist is switched off and therefore secured against unintentional operation.
  - The lamp in button (**1**) should light up only dimly.
  - Symbol (**2**) must be **red.**



- Press the (**1**) button once.
  - The lamp in button (**1**) will light up brightly.
  - Symbol (**2**) is **green** when the main hoist is switched on.



- On the RCL, check whether the lamp **I** is **on**.
  If lamp **I** **flashes**, switch over the display; ➠ p. 11 - 33.

- Check that the current reeving of the main hoist is displayed, e.g. **10**.
  Correct the reeving if necessary; ➠ p. 11 - 29.

Lifting and lowering

You can adjust the sensitivity of the control levers to suit the operating conditions; ➠ *Setting the characteristic curves for the control levers*, p. 11 - 108.

Risk of accident due to gaps in monitoring
Operation of the hoist will only be monitored fully if:
– The lifting limit switch is correctly installed; ➠ p. 12 - 126
– The lifting limit switch is not overridden; ➠ p. 11 - 62
– The lowering limit switch is correctly set; ➠ p. 11 - 62

Risk of accident by 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.

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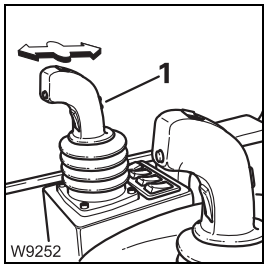
The maximum rope speed is continuously decreased automatically from a degree of utilisation of 80% onwards. Higher speeds are only enabled again when the degree of utilisation is below 80% and the control lever has been put in the initial position once.

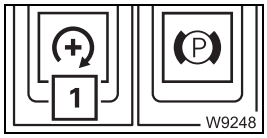


Raising: • Pull the control lever backwards

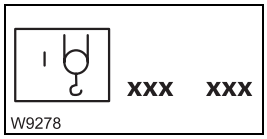
Lowering: • Push the control lever forwards

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

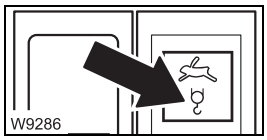
You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.



You can set the desired engine speed (idling speed) with the button (**1**); ➠ p. 10 - 12.



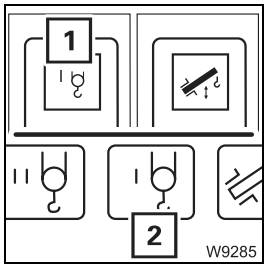
You can limit the maximum hoist speed; ➠ p. 11 - 107.



You can switch on the high-speed mode for a higher speed; ➠ p. 11 - 96.

Switching off the main hoist

If you no longer require the main hoist, you should switch it off to avoid unintentional use.



- Press the (**1**) button once.
  - The lamp in the button (**1**) will light up dimly.
  - Symbol (**2**) is **red** when the main hoist is switched off.

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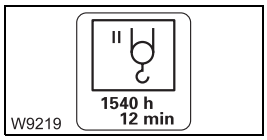
11.3.4 Auxiliary hoist

Risk of accident when operating the auxiliary hoist
Read and observe all of the safety instructions in the section titled *Main hoist*, p. 11 - 56 before operating the auxiliary hoist.
All safety instructions for the operation of the main hoist also apply to the auxiliary hoist, along with the information in this section.

Risk of accident due to a damaged hoist rope
If you reeve the auxiliary hoist rope in addition to the main hoist rope, make sure the hoist ropes do not rub against each other and that the auxiliary hoist rope does not touch the rotating flanged wheel of the main hoist during subsequent operation. Raise the main boom to at least 20° before lifting loads.
This prevents damage to the hoist ropes that results in the ropes tearing.

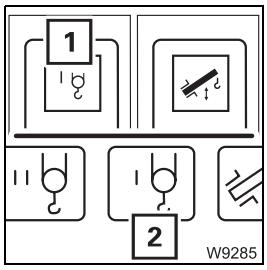
If you run the auxiliary hoist rope over the left head sheave, you must extend a telescopic section to the middle fixed length before lifting a load. Otherwise, the rope angle would exceed the maximum permissible value.



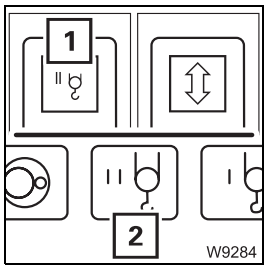
You can have the operating hours of the hoist displayed; ➠ p. 11 - 110.

Switching on the auxiliary hoist

After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will only light up dimly.



- Check whether the main hoist is switched off and therefore secured against unintentional operation.
  - The lamp in button (**1**) should light up only dimly.
  - Symbol (**2**) must be **red.**



- Press the (**1**) button once.
  - The lamp in button (**1**) will light up brightly.
  - Symbol (**2**) is **green** when the auxiliary hoist is switched on.

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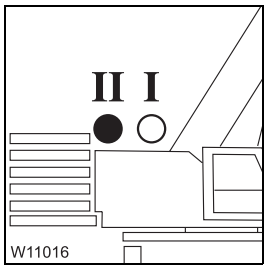


- On the RCL, check whether the lamp **II** is **on**.

  If lamp **II** **flashes**, switch over the display; ➠ p. 11 - 33.

- Check whether the current reeving of the auxiliary hoist is displayed, e.g. **10**. Correct the reeving if necessary; ➠ p. 11 - 29.

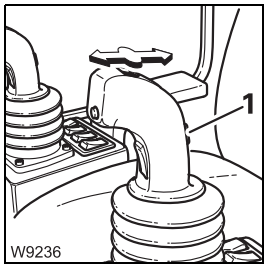
Lifting and lowering

You can adjust the sensitivity of the control levers to suit the operating conditions; ➠ *Setting the characteristic curves for the control levers*, p. 11 - 108.

Risk of accident due to gaps in monitoring
Operation of the hoist will only be monitored fully if:
– The lifting limit switch is correctly rigged; ➠ p. 12 - 126
– The lifting limit switch is not overridden; ➠ p. 11 - 62
– The lowering limit switch is correctly set; ➠ p. 11 - 62

Risk of accident by suspended loads
Never turn off the engine with a suspended load. 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.

The maximum rope speed is continuously decreased automatically from a degree of utilisation of 80% onwards. Higher speeds are only enabled again when the degree of utilisation is below 80% and the control lever has been put in the initial position once.

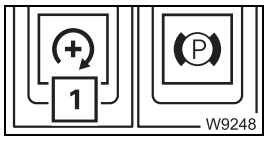


Raising: • Pull the control lever backwards

Lowering: • Push the control lever forwards

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

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



You can set the desired engine speed (idling speed) with the button (**1**); ➠ p. 10 - 12.

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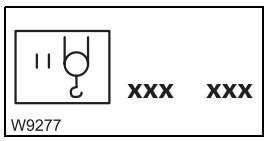
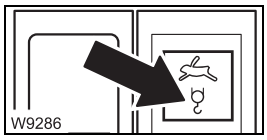


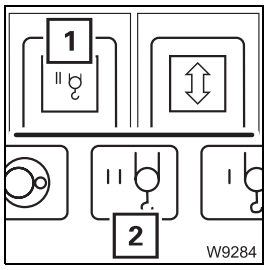
You can limit the maximum hoist speed; ➠ p. 11 - 107.



You can switch on the high-speed mode for a higher speed; ➠ p. 11 - 96.

Switching off the auxiliary hoist

If the auxiliary hoist is not required, it should be switched off to avoid unintentional use.



- Press the (**1**) button once.
  - The lamp in the button (**1**) will light up dimly.
  - Symbol (**2**) is **red** when the auxiliary hoist is switched off.

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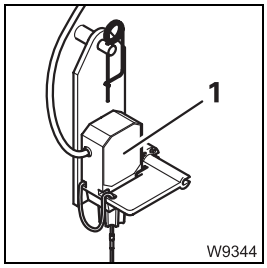
11.3.5 Lifting limit switch and lowering limit switch

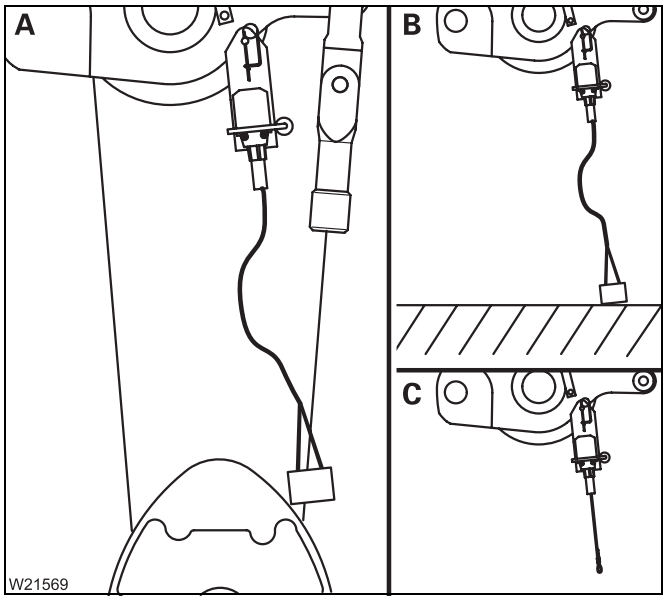
Lifting limit switch To install/remove the lifting limit switch; ➠ p. 12 - 126.



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

The lifting limit switch only works if it has been unlocked; ➠ p. 12 - 131.

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



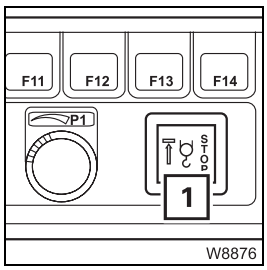
The lifting limit switch will be triggered if:

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

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

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

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



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

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

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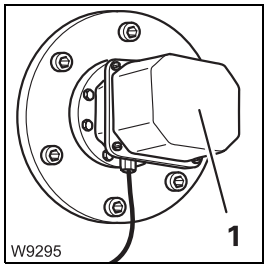
Overriding the lifting limit switch

When overriding, the shutdown of the lifting limit switch is cancelled and the crane operation is no longer completely monitored; ➠ *Overriding RCL or lifting limit switch for rigging work*, p. 11 - 45

Risk of accident if the lifting limit switch is overridden
You may only override the lifting limit switch if this is specified in the operating instructions when carrying out maintenance or rigging work.
With the lifting limit switch overridden, you may drive only at the minimum speed and without a load.

Risk of accident due to gaps in monitoring
If the lifting limit switch is overridden, crane operation is no longer completely monitored.
When hoisting the lifting limit switch weight, the crane movement will be stopped once. After moving the control lever again, the crane movement will again be enabled and will not be switched off again.

Lowering limit switch



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

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

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

Risk of accident 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.
This prevents the lowering limit switch from switching off too late or not switching off at all, the hoist rope from being damaged and the from load being dropped.

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11.3.6 Derricking gear

You can raise and lower the main boom.

Depending on the size of the load and the rigging mode, the RCL will switch off the lowering process of the boom as soon as the working area specified in the *Lifting capacity table* is left.

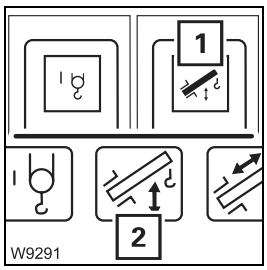
To lower the boom out of the working range; ➠ *Lowering the main boom to a horizontal position*, p. 11 - 67.

The derricking gear is not intended for lifting loads. If an overly heavy load is lifted by derricking, the RCL will switch this process off.

You can have the operating hours of the derricking gear displayed; ➠ p. 11 - 110.

Switching on the derricking gear

After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will only light up dimly.



- Press the (**1**) button once.
  - The lamp in button (**1**) will light up brightly.
  - Symbol (**2**) will be **green** if the derricking gear is switched on.

If the control lever is assigned more than one function, all other power units which are assigned the same control lever operation are switched off; ➠ *Control lever configuration*, p. 9 - 16.

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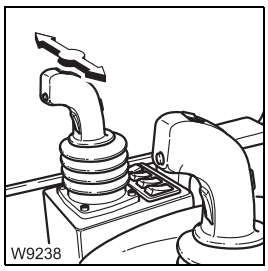
Raising and lowering

You can adjust the sensitivity of the control levers to suit the operating conditions; ➠ *Setting the characteristic curves for the control levers*, p. 11 - 108.

Risk of accident due to unexpected crane movements
If assigned more than one function, check whether the *Derricking* control lever function is switched on before you move the control lever for derricking.
This prevents accidents due to unexpected crane movements.

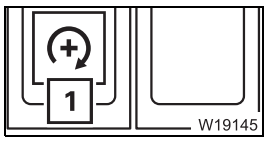


Lowering: • Push the control lever to the right – the main boom is lowered

Raising: • Push the control lever to the left – the main boom is raised

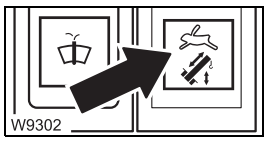
You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.

The maximum derricking speed will automatically be reduced as the system length is increased. If you now reduce the working radius (e.g. by retracting the telescoping), the derricking speed will automatically be increased again.



You can set the desired engine speed (idling speed) with the button (**1**); ➠ p. 10 - 12.

You can limit the maximum derricking speed; ➠ p. 11 - 107.



You can switch on the high-speed mode for a higher speed; ➠ p. 11 - 96.

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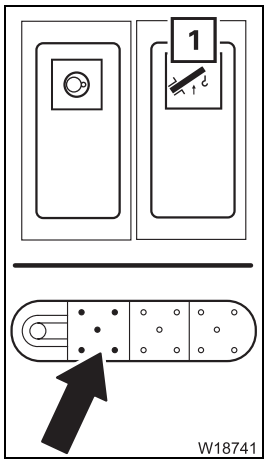
Re-enabling raising function

If the RCL has switched off the raising function due to an overload, you can re-enable the raising function with switch (**1**). The speed will then be reduced to 50%.



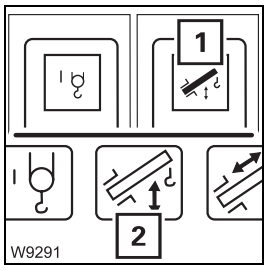
- Press the (**1**) button up once.
- Use the control lever to raise the main boom.

The status display will flash green.

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

Switching off the derricking gear

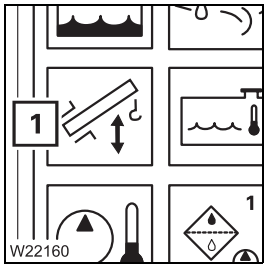
If the derricking gear is not required, it should be switched off to avoid unintentional use.



- Press the (**1**) button once.
  - The lamp in the button (**1**) will light up dimly.
  - Symbol (**2**) will be **red** if the derricking gear is switched off.

If the control lever is assigned more than one function, the derricking gear will also be switched off if you switch on another power unit which is assigned to the same control lever movement; ➠ *Control lever configuration*, p. 9 - 16.

Derricking gear warning



If the derricking gear is switched off, the position of the main boom will be monitored. If the main boom is lowered by more than 3°, then you must switch on the derricking gear and derrick the main boom to a permissible position; ➠ p. 11 - 64.

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Lowering the main boom to a horizontal position

Lowering the boom out of the working range is enabled only without a load and if there is a rigging table for the current rigging mode.
Enabling is automatic, the rigging tables cannot be entered manually.
The same tables apply to raising the boom outside of the working range.

- Set down the load.

Danger of overturning with overridden RCL
Do not under any circumstances override the RCL. If the RCL shuts down the lowering procedure, the truck crane is in a condition in which the main boom may not be lowered beyond the working range (e.g. the load or working radius is too large).
The truck crane will overturn if you continue to lower the boom with the RCL overridden.

- Lower the main boom.

The RCL switches off the lowering procedure at about 10 - 15° if there are no rigging tables for the current rigging mode. In this case, you must bring the crane into a rigging mode for which a rigging table exists (e.g. retracting, setting down the load, other superstructure position).
All rigging modes for which rigging tables exist can be found in the *Lifting capacity tables*.

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11.3.7 Telescoping mechanism

A telescoping process requires locking and unlocking processes in the main boom. You can telescope the main boom in two ways.

– **Manual telescoping**
  For manual telescoping, you must initiate all locking and unlocking processes at the right time.

– **Telescoping with teleautomation**
  When telescoping with teleautomation, you enter a telescoping value and ECOS controls all the locking and unlocking processes automatically. You may then need to manually telescope to an intermediate length.

With both ways, control is possible on the *ECOS* control unit in addition to the control levers. Here you initiate processes, receive feedback and can monitor the telescoping process.

The *ECOS* display shows various sectional views of the main boom. To make you familiar with these representations more quickly, the following section begins with an overview of the telescoping mechanism and a telescoping process.

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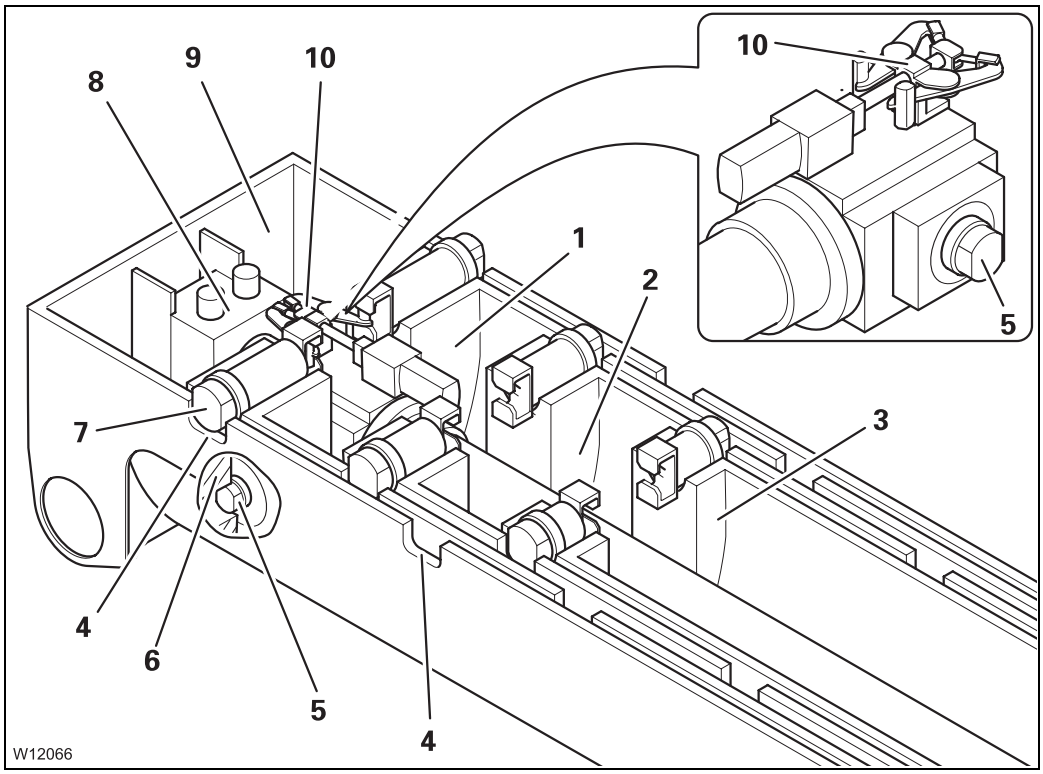
Overview

This illustration shows the completely retracted main boom with the basic section (**9**) and the first three telescopic sections I to III (**1**) to (**3**).



Each telescopic section is equipped with two locking pins (**7**) which are extended by spring force.

The locking pins (**7**) are pushed into the cutouts (**4**) of the telescopic section above at the locking points – the telescopic section is locked.

The telescoping cylinder is attached to the basic section (**9**) with the piston rod (**8**). The telescoping cylinder has two locking pins (**5**) at the bottom and a mechanism at the top (**10**).

When the telescoping cylinder is positioned at a locking point:

– The locking pins (**5**) can be extended into the cutouts (**6**) – the telescoping cylinder is locked
– The mechanism (**10**) engages into the locking pins (**7**) and can retract them – the telescopic section is unlocked.

Telescoping process

This state should be the starting point for a telescoping process. A telescoping processes consist of 4 steps:

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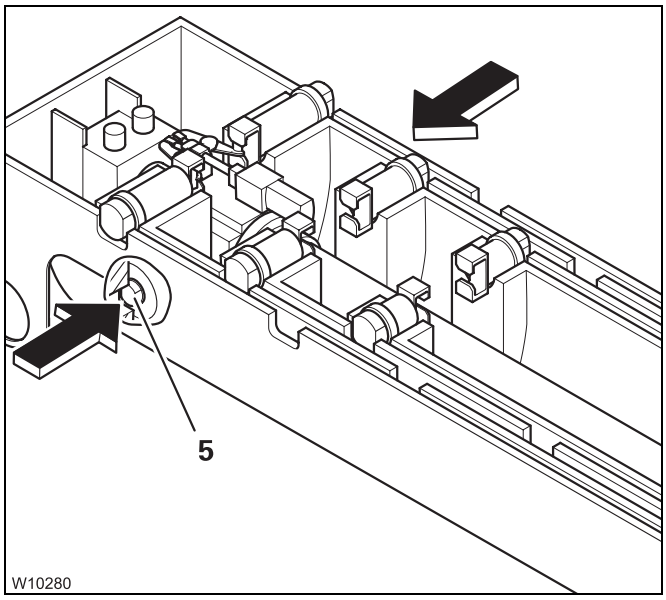
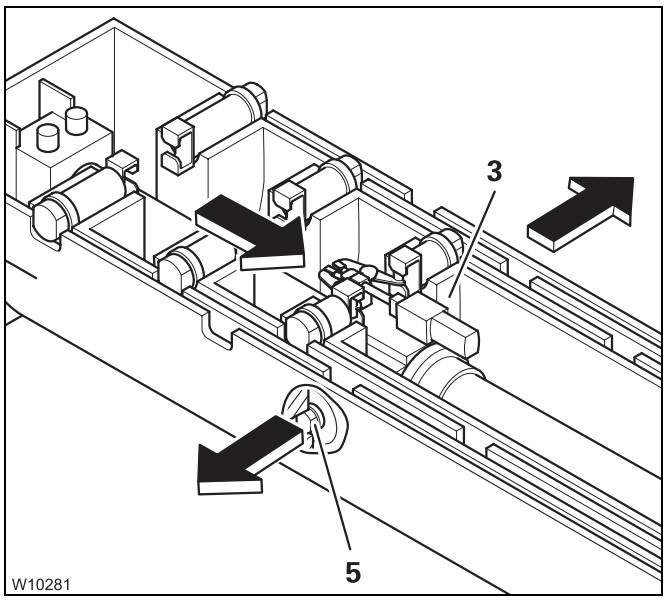


1. Unlocking the telescoping cylinder

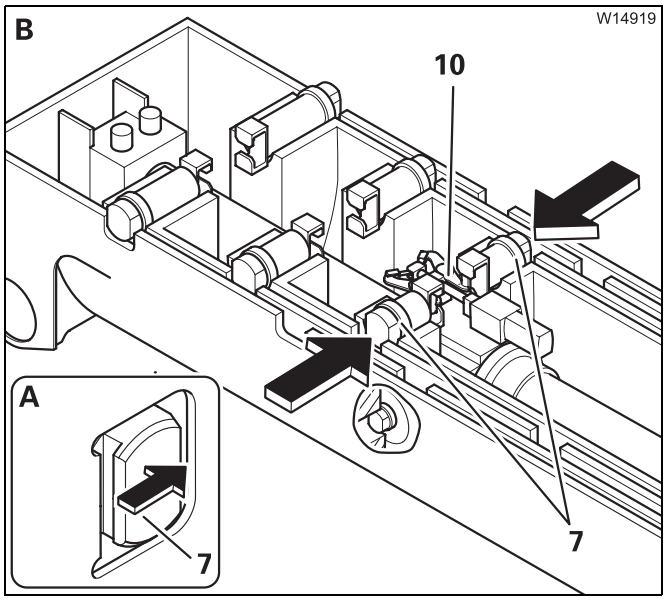
The locking pins (**5**) retract – the telescoping cylinder is unlocked.



2. Moving and locking the telescoping cylinder

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

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



3. Unlock the telescopic section

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

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

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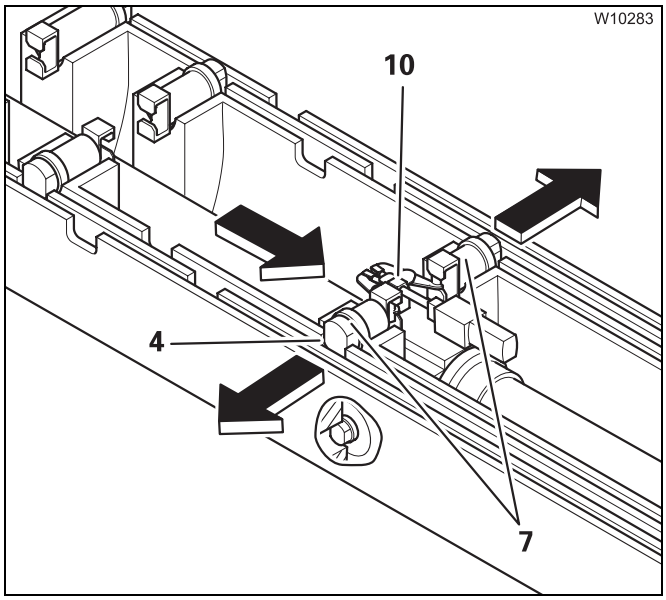
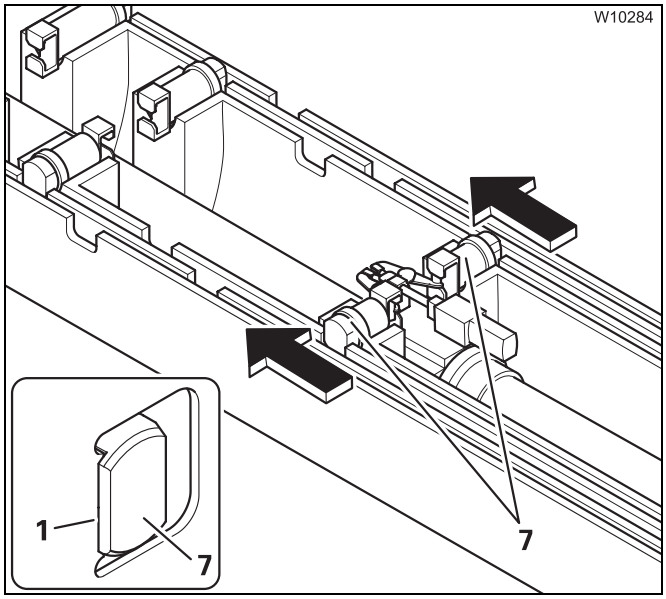


4. Telescoping, locking and setting down a telescopic section

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

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



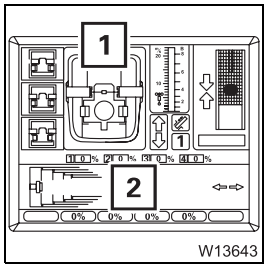
The telescopic section is automatically set down.

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

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

Assignment for display

The *Telescoping* submenu of the *ECOS* display shows two sectional views of the main boom.



1 Sectional view from the rear

2 Sectional view from above

The following elements are displayed.

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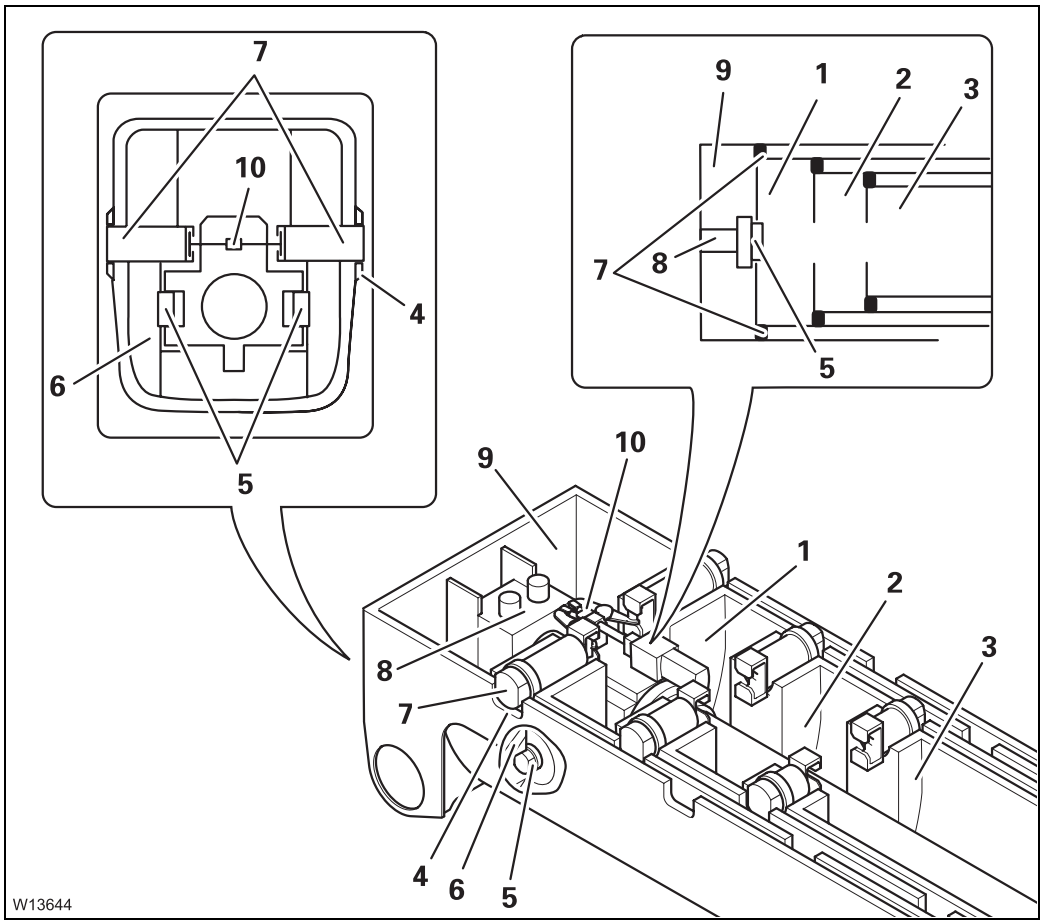

1 Telescopic section I
2 Telescopic section II
3 Telescopic section III
4 Cutouts
5 Locking pins on the telescoping cylinder
6 Cutouts
7 Locking pin on the telescopic section
8 Telescoping cylinder (piston rod)
9 Basic section
10 Mechanism

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Fixed length, intermediate length, telescoping length

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

Main boom fixed length

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

Main boom intermediate length

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

Main boom telescoping length

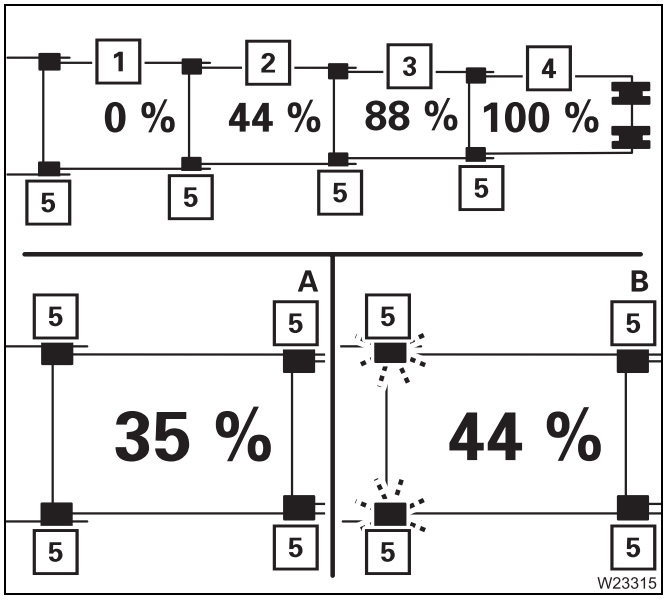
The main boom is at a telescoping length if it is extended to an intermediate length and may be telescoped with the current load. The size of the load that can be telescoped depends on the angle of inclination and on the degree of lubrication of the main boom.

Telescope status

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 RCL. The telescoping is also shown on the *ECOS* display; ➠ p. 11 - 88.

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



Fixed lengths

Possible fixed lengths (**1**) - (**4**) are 0%, 44%, 88% and 100%.

The locking pins (**5**) are green.

Intermediate lengths

A Locking pins (**5**) are black – e.g. to 35%

B Locking pins (**5**) are flashing – e.g. to 44% and telescopic section
– unlocked
– not set down

Telescoping sequence

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

When **Extending** you must always extend the telescopic section with the highest numbering first, then the telescopic section with the next lower numbering, etc. (e.g. IV, III, II, I).

The telescopic sections are always **Retracted** in the reverse order of Extending.

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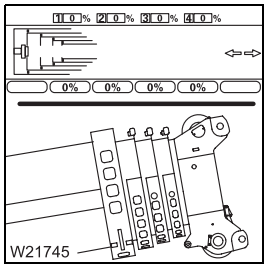
Checks before starting work

When the ignition is turned on, ECOS registers the displayed telescoping status from the current status of the telescoping mechanism and the previously saved locking and unlocking procedures.

Normally, ECOS detects differences between the current and the displayed telescoping and displays the corresponding error message; ➠ *Telescoping mechanism error messages*, p. 14 - 17.

If a **malfunction** results in values being deleted, ECOS can no longer calculate the current telescoping and will not issue an error message.

Risk of damage to the telescoping mechanism
Before the first telescoping, always check whether the *ECOS* display is showing the current telescoping.
This prevents the telescoping mechanism from being damaged when telescoping.



- Before telescoping the first boom, compare the telescoping shown on the *ECOS* display with the current telescoping.

If the current telescope status is not correctly displayed, enter the current telescope status; ➠ *Entering the current telescoping*, p. 14 - 53.

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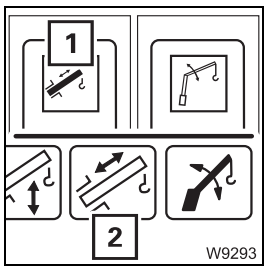
Switching on the telescoping mechanism

After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will only light up dimly.



- Press the (**1**) button once.
  - The lamp in button (**1**) will light up brightly.
  - The symbol (**2**) will be **green** if the telescoping mechanism is switched on.

If the control lever is assigned more than one function, all other power units which are assigned the same control lever operation are switched off; ➠ *Control lever configuration*, p. 9 - 16.

You can have the operating hours of the telescoping mechanism displayed; ➠ p. 11 - 110.

Function of the control lever

This section only describes the function of the control lever. Before telescoping, a number of prerequisites need to be fulfilled as well.

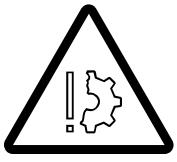
– Before manual telescoping; ➠ p. 11 - 79.

– Before telescoping with teleautomation; ➠ p. 11 - 91.

You can adjust the sensitivity of the control levers to suit the operating conditions; ➠ *Setting the characteristic curves for the control levers*, p. 11 - 108.

Risk of accident due to unexpected crane movements
In the case of multiple configuration, check whether the control lever function *Telescoping* is switched on before you move the control lever for telescoping.
This prevents accidents caused by unexpected derricking.

Risk of accident due to gaps in monitoring
Boom extension will only be monitored completely if
– The lifting limit switch is correctly rigged; ➠ p. 12 - 126
– The lifting limit switch is not overridden; ➠ p. 11 - 62



Risk of damage to the hoist rope
The rope can become slack if the hook block touches the ground during retraction operations. Rope loops will form, which can cause the load to slip and destroy the hoist rope

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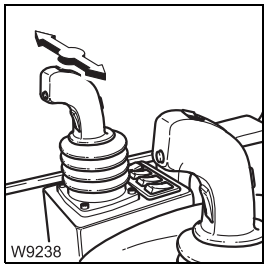
The distance between the hook block and the boom head changes during telescoping. Ensure that the hook block does not trigger the lifting limit switch or touch the ground.

- Additionally carry out the following movements:
  - *Lower hoist* when extending
  - *Lift hoist* when retracting

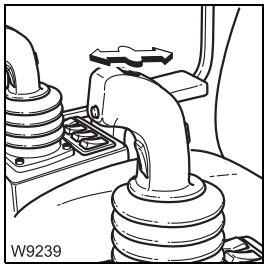
The control lever movements for telescoping vary depending on the configuration.



– With telescopic extension on the right-hand side

To extend: • Push the control lever to the right

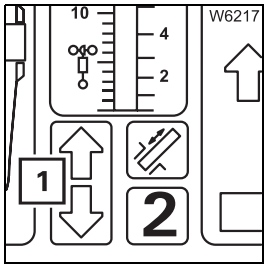
To retract: • Push the control lever to the left



– With telescopic extension on the left-hand side

To extend: • Push the control lever forwards

To retract: • Pull the control lever backwards



Telescoping starts only if the arrow (**1**) for the selected telescoping direction is **green**.
If the arrow is red, extension operations are disabled in the indicated direction. This may have different causes, e.g. the telescopic section being in final position, a lifting limit switch shutdown, a malfunction etc.

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

With certain telescoping states, the RCL will switch telescoping off, e.g. when you leave the telescoping lengths or when the working range limit has been reached; ➠ *RCL shutdown*, p. 11 - 37.

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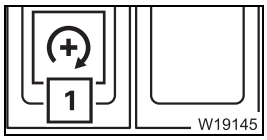
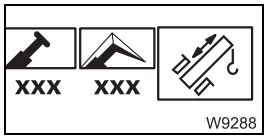
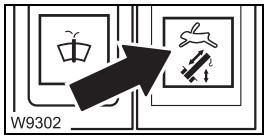


You can set the desired engine speed (idling speed) with the button (**1**); ➠ p. 10 - 12.



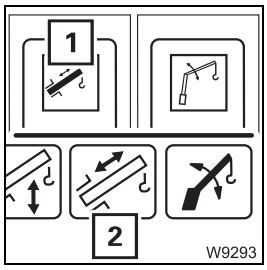
You can limit the maximum telescoping speed in the *Power unit speeds* submenu; ➠ p. 11 - 107.



You can switch on the high-speed mode for a higher speed; ➠ p. 11 - 96.

Switching off the telescoping mechanism

If the telescoping mechanism is not required, it should be switched off to avoid unintentional use.



- Press the (**1**) button once.
  - The lamp in the button (**1**) will light up dimly.
  - The symbol (**2**) is **red** if the telescoping mechanism is switched off.

If the control lever is assigned more than one function, the telescoping mechanism will also be switched off if you switch on another power unit which is assigned to the same control lever movement; ➠ *Control lever configuration*, p. 9 - 16.

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Manual telescoping

To telescope manually, you must initiate all locking and unlocking processes. The locking and unlocking processes are carried out automatically.

The following sections describe the operating procedures:

– Checking the initial position,

– Unlocking the telescoping cylinder; ➠ p. 11 - 81,

– Moving the telescoping cylinder (without telescopic section); ➠ p. 11 - 84,

– Locking telescoping cylinder; ➠ p. 11 - 85,

– Unlocking telescopic section; ➠ p. 11 - 86,,

– Telescoping the telescopic section; ➠ p. 11 - 88,

– Locking the telescopic section; ➠ p. 11 - 89,

The operating order depends on the current initial position. For an overview of a telescoping process (example); ➠ p. 11 - 69.

The lengths given in the following illustrations are purely sample values, and may differ from the current display.

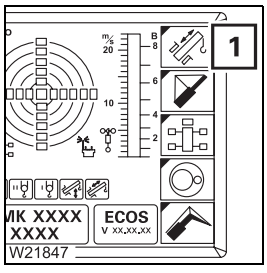
Checking the initial position

Before telescoping, you must check the following statuses:

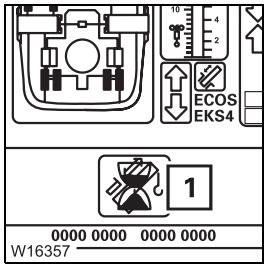
– **The current telescoping**

– **The position of the telescoping cylinder**

– **The position of the locking pins**



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



The *Telescoping* submenu opens.

If an "error" (**1**) is indicated, all operating elements will be disabled; ➠ *Telescoping mechanism error messages*, p. 14 - 17.

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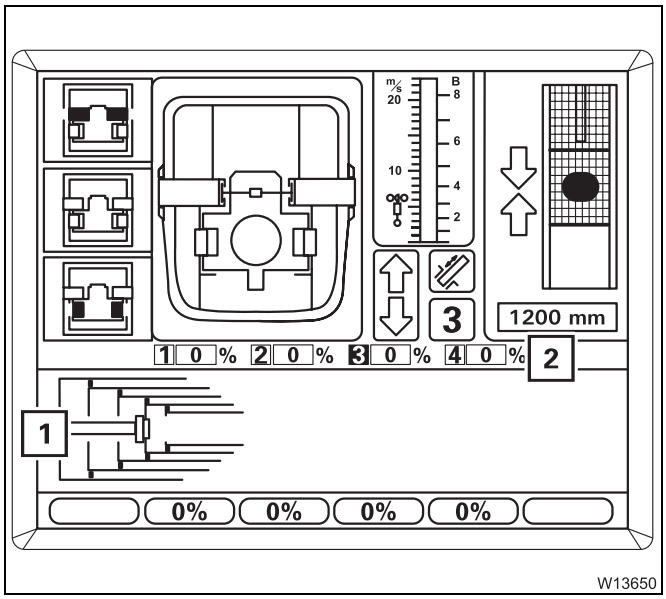
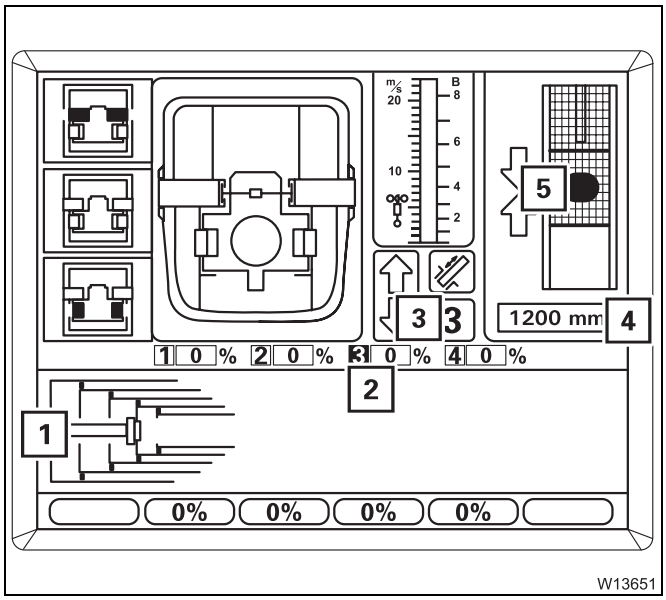


Current telescoping

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

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



Position of the telescoping cylinder

The display (**4**) shows how far the telescoping cylinder is extended, e.g. 1200 mm (3.93 ft).

If the telescoping cylinder is near a locking point:

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

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

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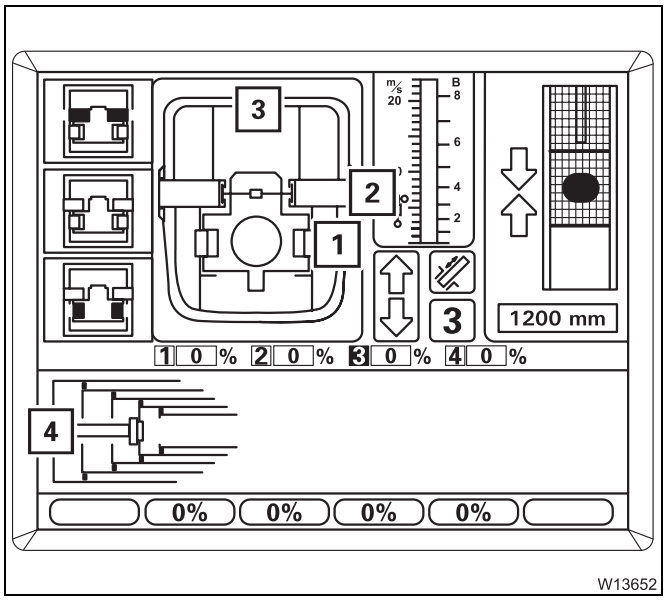


Position of the locking pins

The display (**3**) shows the current positions of the locking pins.

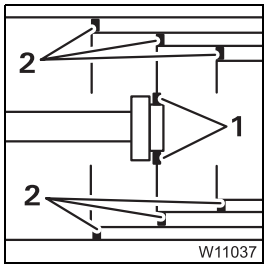
1 On the telescoping cylinder

2 On the telescopic section

The current settings are shown in different colours.

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

The display (**4**) shows the same settings:



1 Locking pins on the telescoping cylinder

2 Locking pins on the telescopic sections

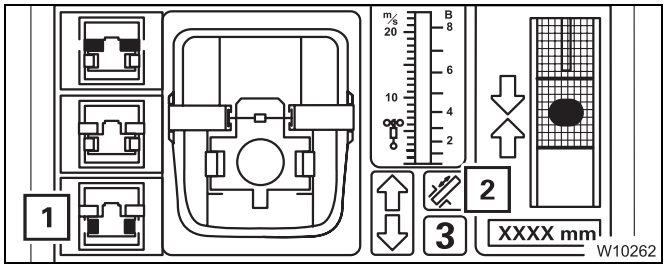
The settings are shown as follows:

– **Green:** Locked
– **No display:** Unlocked or intermediate position

Unlocking the telescoping cylinder

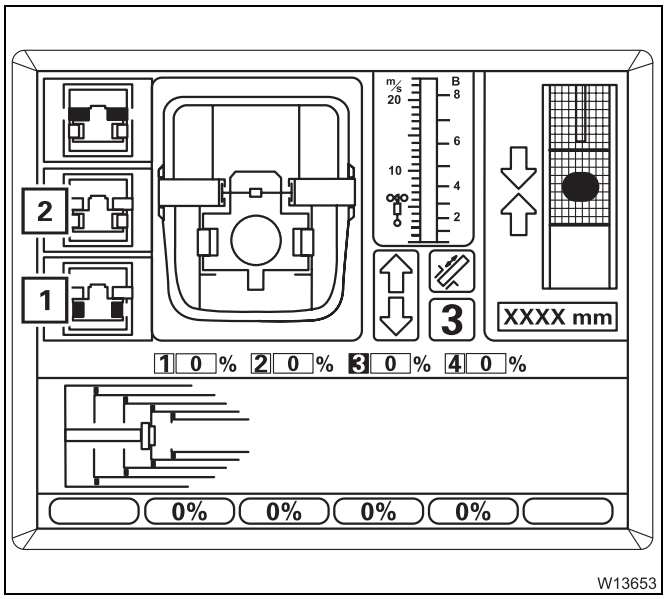
Unlocking the telescoping cylinder is required for the telescoping cylinder to be moved separately (without telescopic section).

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



Requirements

– Telescoping mechanism on – symbol (**2**) is green.
– Telescoping cylinder locked – symbol (**1**) is grey.



To select unlock

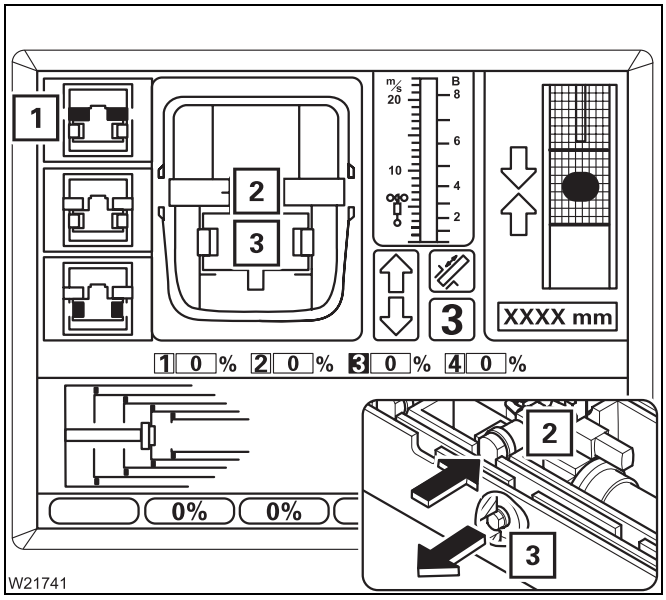
- Press the (**1**) button once.

– If the telescopic section is locked: Symbol (**1**) will flash – *Unlock telescoping cylinder* is selected.

– If the telescopic section is unlocked: Symbol (**2**) will flash – the following is selected.

  1. *Locking the telescopic section*
  2. *Unlock the telescoping cylinder*

  In the next step, both selections are carried out one directly after the other.



Unlocking the telescoping cylinder

- Move the control lever for telescoping.

If required, extend the locking pins (**2**) first.

The locking pins (**3**) retract.

– **Yellow:** Intermediate position

– **Red:** Unlocked

In the *Unlocked* position, symbol (**1**) will be yellow.

If the control lever is moved, the telescoping cylinder will move immediately.

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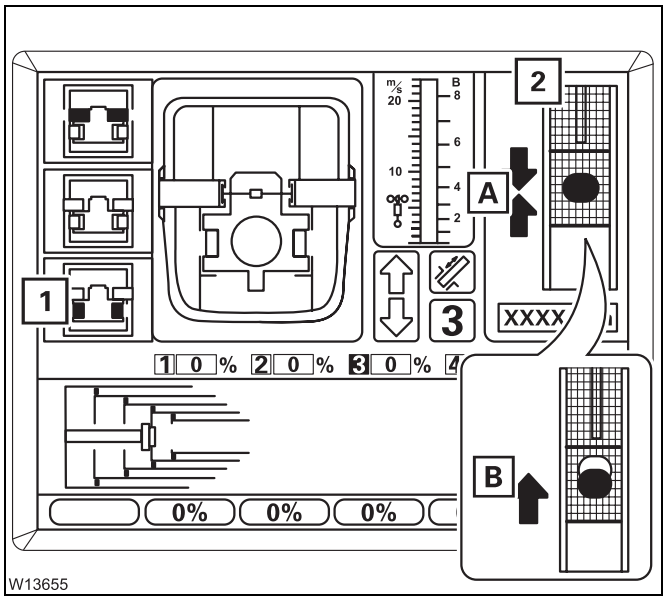

If symbol (**1**) is still flashing after approx. 10 seconds, this means that the locking pins are under load.

- Release the control lever.

The display (**2**) shows which movement you need to carry out to take the load off:

– **A:** Retracting

– **B:** Extending

Risk of damage to the boom system
If extending and retracting several times does not lead to the lock being released, you must not telescope any further against the stop.

If removing the load does not cause the lock to be released, you must lock the telescoping cylinder (➠ p. 11 - 85) and then restart unlocking.

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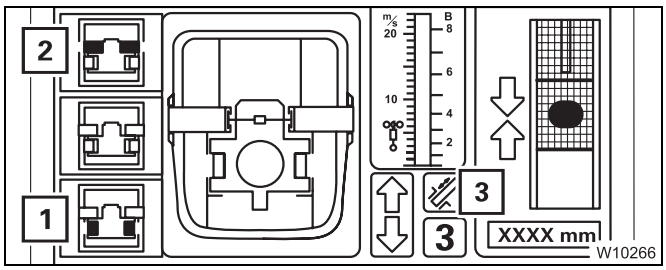
Extending/retracting the telescoping cylinder

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

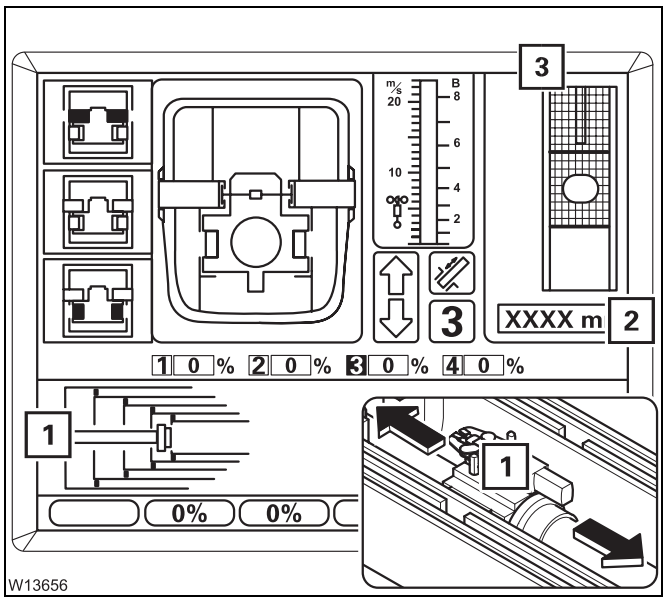


Requirements

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

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

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



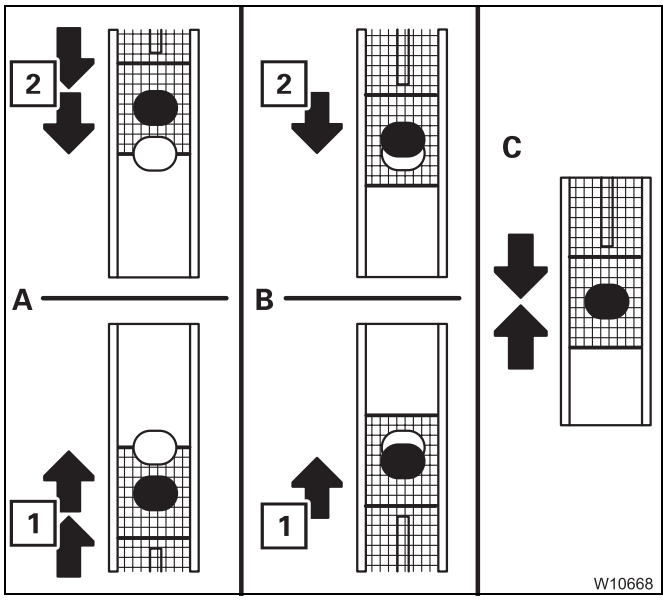
Extending/retracting

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

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 less 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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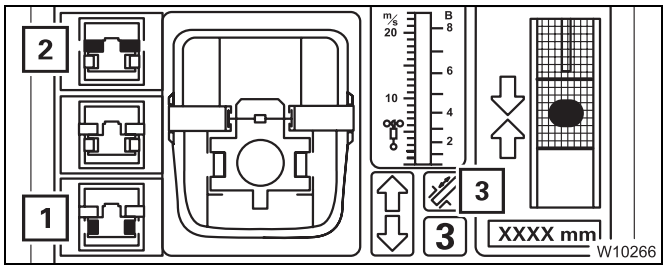
Locking the telescoping cylinder

The telescoping cylinder must be locked to a telescopic section so that the telescopic section can be telescoped.

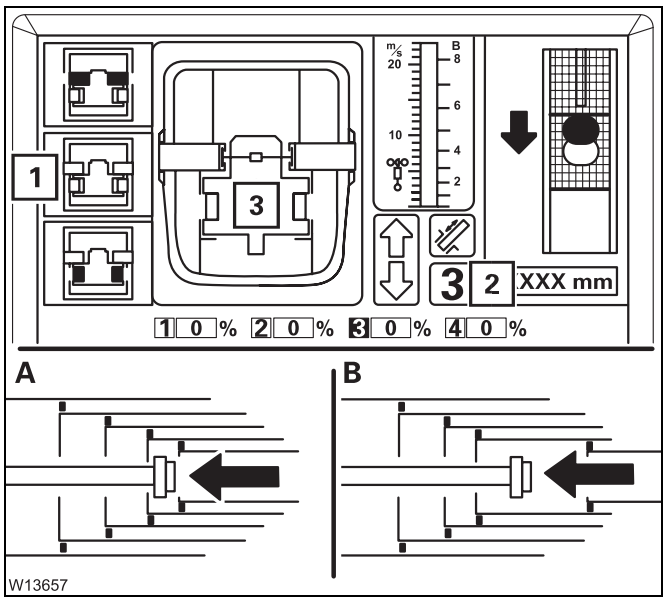


Requirements

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

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

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



To select lock

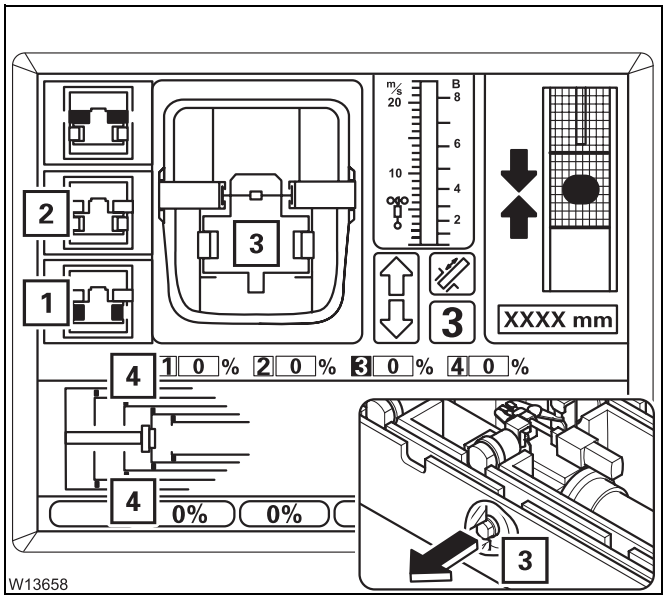
• Move the telescoping cylinder to the desired locking point, e.g. to telescopic section III.

Wait until the display (**2**):

– (**A**) shows the desired telescopic section,

– (**B**) shows no telescopic section and the desired locking point is reached next.

• Press the (**1**) button once.
Symbol (**1**) will flash – *Lock telescoping cylinder* is selected.



Locking the telescoping cylinder

• Move the control lever until locking is complete.

The locking pins (**3**) extend at the locking point.

– **Yellow:** Intermediate position

– **Green:** Locked

In *Locked* position:

– Symbol (**1**) is yellow,

– Symbol (**2**) is grey,

– The locking pins (**4**) are green.

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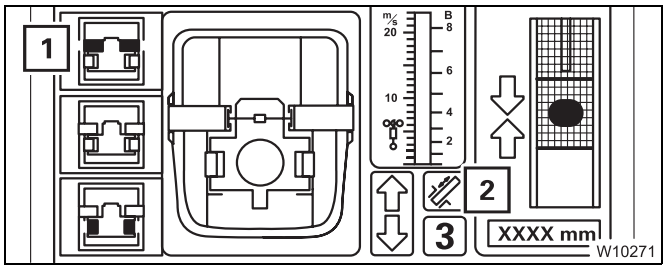
Unlocking the telescopic section

Unlocking a telescopic section is required for the telescopic section to be telescoped.

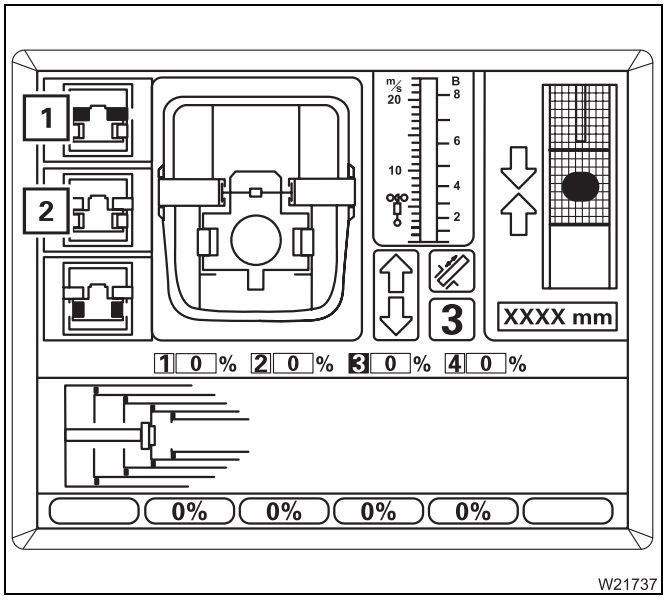
The telescoping cylinder and the telescopic section cannot be unlocked simultaneously.



Requirements

– Telescoping mechanism on – symbol (**2**) is green

– Telescopic section locked – symbol (**1**) is grey



To select unlock

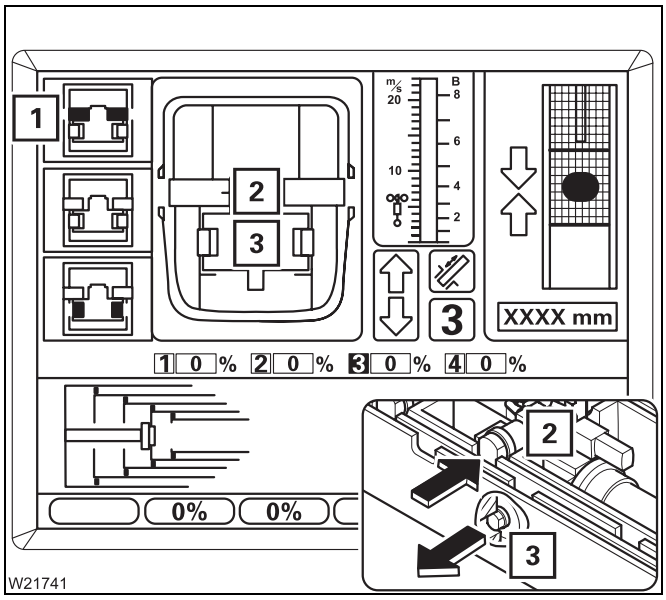
• Press the (**1**) button once.

– If the telescoping cylinder is locked: Symbol (**1**) will flash – *Unlock telescopic section* is selected.

– If the telescoping cylinder is unlocked: Symbol (**2**) will flash – the following is selected:

1. *Lock the telescoping cylinder*
2. *Unlock the telescopic section*

In the next step, both selections are carried out one directly after the other.



Unlocking the telescopic section

• Move the control lever for telescoping.

If required, extend the locking pins (**3**) first.

The locking pins (**2**) retract.

– **Yellow**: Intermediate position

– **Red**: Unlocked

In the *Unlocked* position, symbol (**1**) will be yellow.

If the control lever is moved, the telescopic section will immediately be telescoped.

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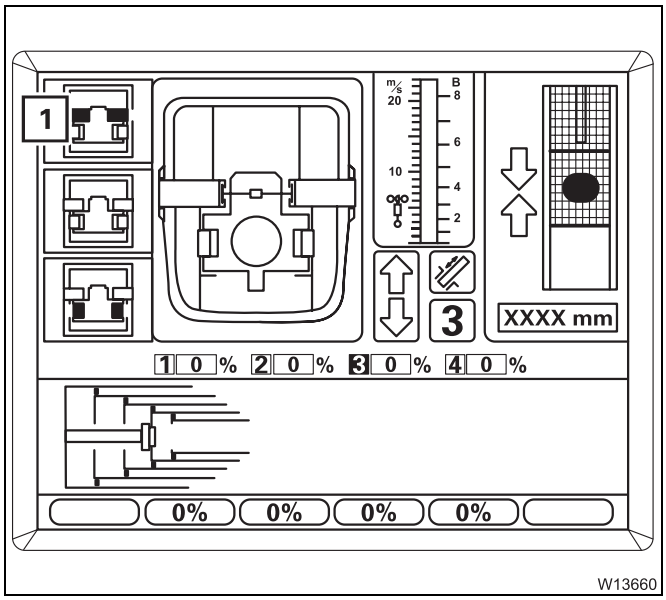

If symbol (**1**) is still flashing after approx. 10 seconds, this means that the locking pins are under load.

- Release the control lever.

To relieve the load, carefully retract and extend a little.

Risk of damage to the boom system
If extending and retracting several times does not lead to the lock being released, you must not telescope any further against the stop.

If removing the load does not cause unlocking, you must lock the telescopic section (➠ p. 11 - 89) and restart unlocking.

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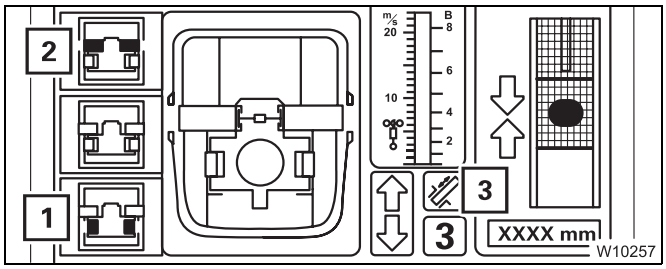
Telescoping the telescopic section

You can telescope the telescopic section once it is unlocked.

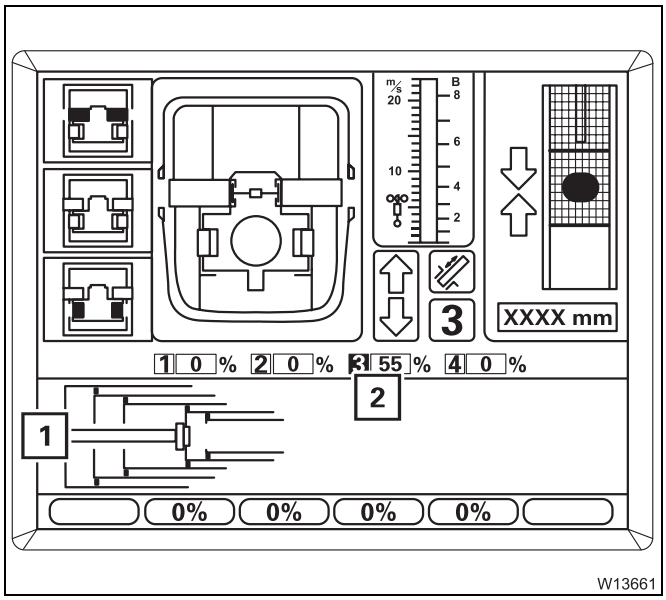


Requirements

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

– Telescoping cylinder locked – symbol (**1**) is grey

– Telescopic section unlocked – symbol (**2**) is yellow



Telescoping

• Move the control lever in the desired telescoping direction.

The display (**2**) will show the currently extended length (telescoping), e.g. 55% for telescopic section III.

The current telescope diagram on the display (**1**) will change continually.

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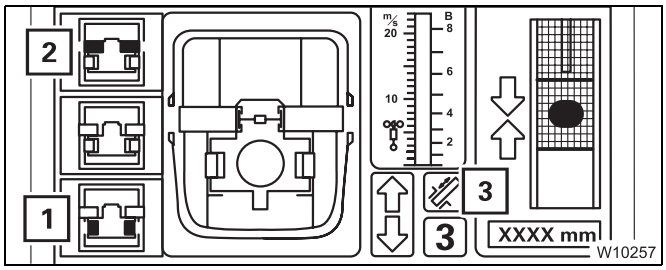
Locking telescopic sections

Every telescopic section can be locked at the fixed lengths – fixed lengths; ➠ p. 11 - 73.

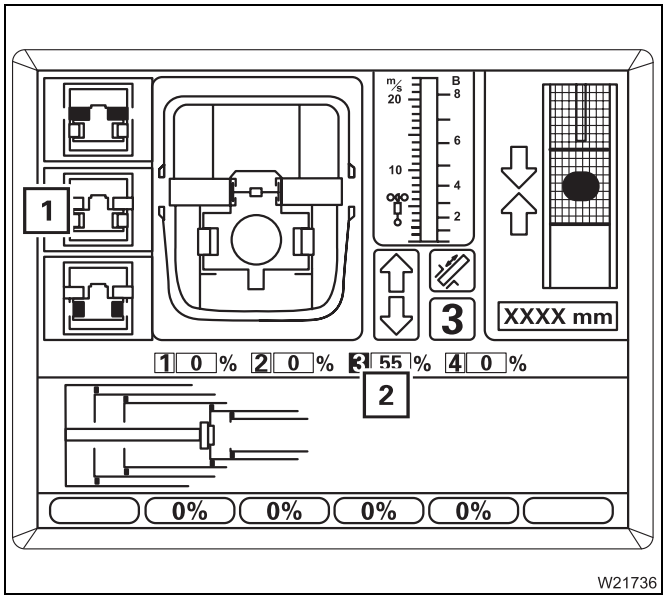


Requirements

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

– Telescopic section unlocked – symbol (**2**) is yellow

– Telescoping cylinder locked – symbol (**1**) is grey

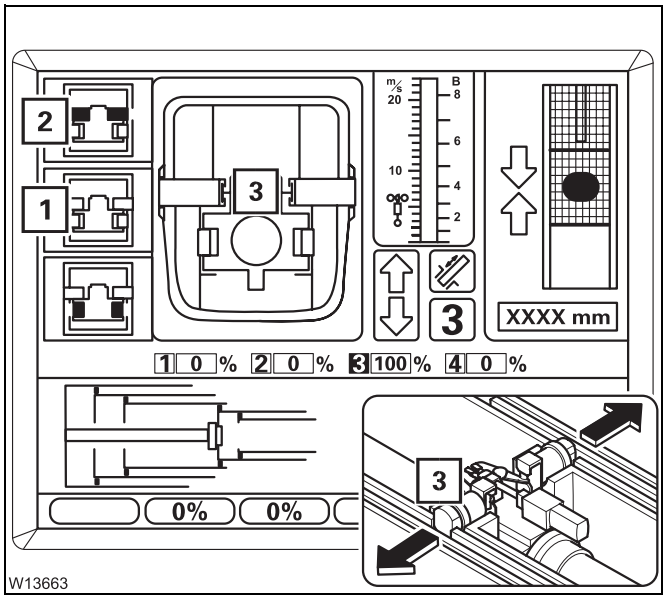


To select lock

• Telescope to the desired fixed length, e.g. telescopic section III to 100%.

If necessary, wait until the telescopic section moves past a non-desired fixed length by approx. 5%, e.g. at 50% – display (**2**).

• Press the (**1**) button once.
Symbol (**1**) flashes – *Lock telescopic section* is selected.



Locking the telescopic section

• Move the control lever until locking is complete.

The locking pins (**3**) extend at the locking point.

– **Yellow:** Intermediate position

– **Green:** Locked

The telescopic section is set down; ➠ p. 11 - 71.

In *Locked* position:

– Symbol (**1**) is yellow

– Symbol (**2**) is grey

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Risk of damage to the telescoping cylinder
Move the control lever until the telescopic section is locked **and set down** – the symbol ⊡ must be yellow.
This prevents the load from exerting pressure on the telescoping cylinder and allow the load to be enabled for fixed lengths.

Locking the telescopic section for on-road driving

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

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

If another telescopic section was retracted last, you must do the following before selecting locking:
– Unlock the telescoping cylinder; ➠ p. 11 - 81,
– Move the telescoping cylinder into telescopic section I; ➠ p. 11 - 84,
– Lock the telescoping cylinder; ➠ p. 11 - 85.

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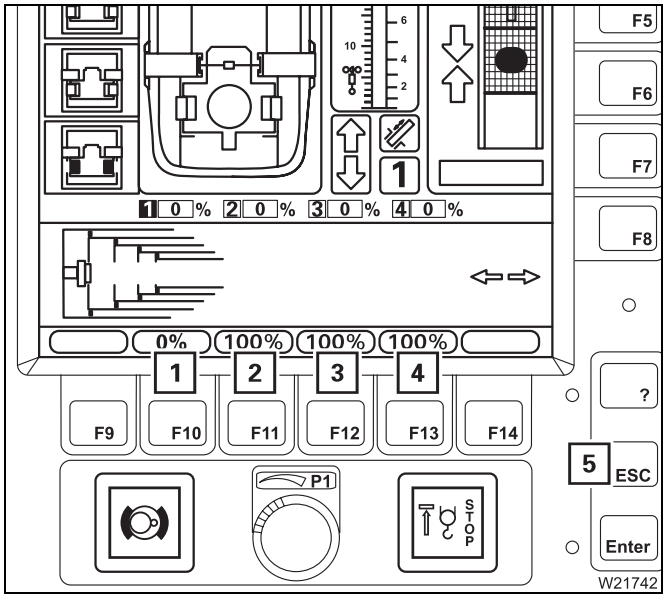
Telescoping with teleautomation

When telescoping with teleautomation, you enter the desired fixed lengths and then move the control lever in the required direction. Switching between the telescopic sections is carried out automatically by ECOS.

If the desired telescoping status is not a fixed length, you can first telescope to the next closest fixed length with the teleautomation and then telescope further to the desired length manually.

- Switch the telescoping mechanism on and open the *Telescoping* submenu; p. 11 - 76.



Display

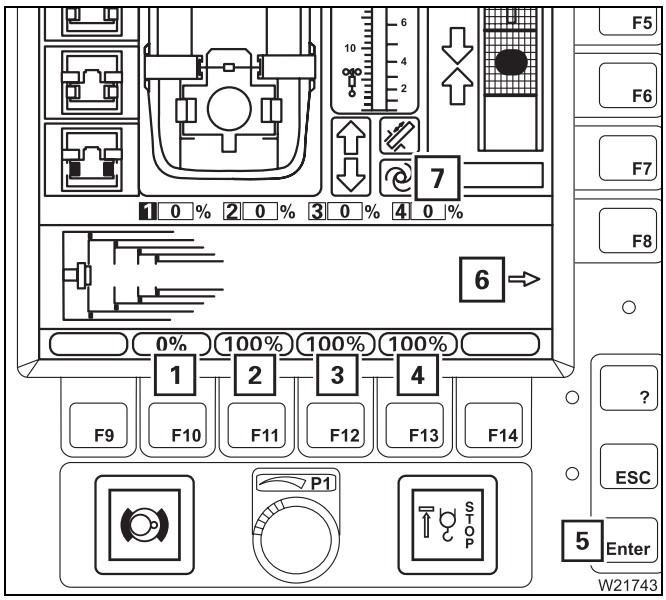
(**1**) to (**4**) – desired telescope status = objective of teleautomation:
– Red values: Teleautomation off
– No values: Teleautomation disabled

Telescope status input

- Press one of the buttons (**1**) to (**4**)
  Values are **yellow** – input on.

To cancel input – press button (**5**) once.

- Enter the telescope status using buttons (**1**) to (**4**), e.g. 0%, 100%, 100%, 100%.



Confirming the entry

- Press the (**5**) button once:

– Values (**1**) to (**4**) are **red** – telescoping **not permissible** – teleautomation off,

– Values (**1**) are (**4**) are **green** – display of symbol (**7**) – teleautomation on.

Telescoping

- Move the control lever for the displayed telescope direction (**6**), e.g. for extending.

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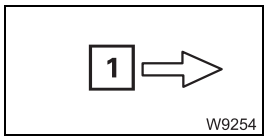
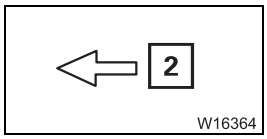
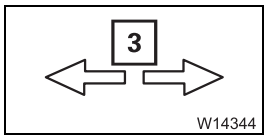


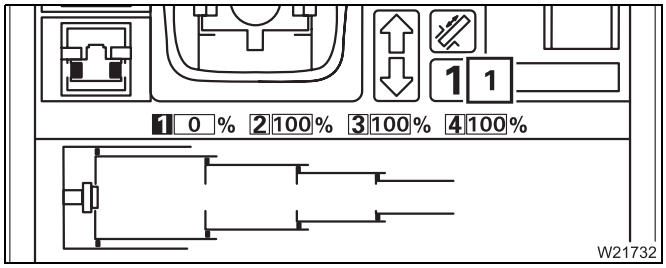
– The displayed symbol, e.g. symbol (**1**) will flash if the control lever is moved incorrectly.



– If the control lever movement is correct, ECOS telescopes automatically till a change in direction is required. Then the symbol for the new movement will be displayed, e.g. (**2**) for *Retracting*.



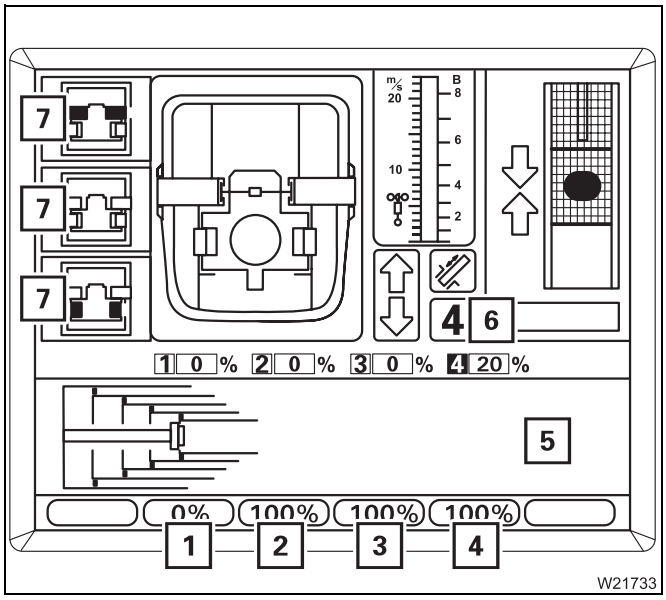
– In the case of empty trips of the telescoping cylinder (without telescopic section), symbol (**3**) is displayed.



Ending teleautomation

The teleautomation will stop when the entered telescope status is reached.

- Move the control lever to its initial position. Display (**1**) – teleautomation off.



Cancelling teleautomation

- Press button (**7**) once.

Telescoping stop – teleautomation off:

– Values (**1**) to (**4**) are **red,**

– Display (**5**) goes out,

– Display (**6**) – teleautomation off.

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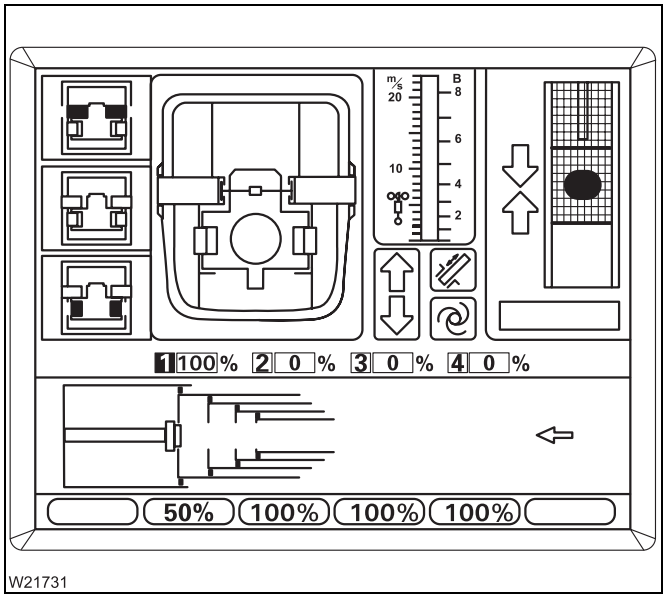
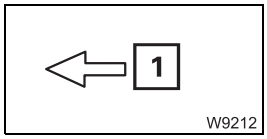
Example of telescoping with teleautomation



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

ECOS will calculate the following telescoping sequence:

– Telescopic section I	retract	to 0%
– 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

Telescopic section I is fully retracted. The following processes are carried out automatically for this.

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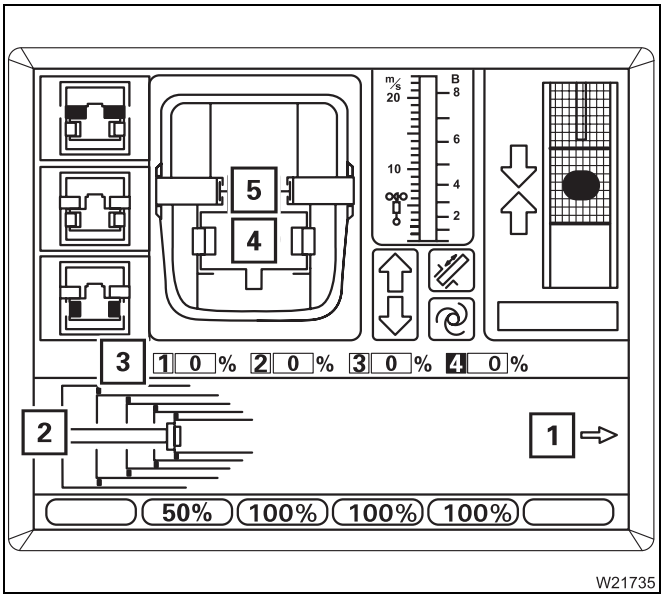
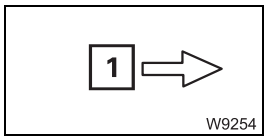


1. Retract telescopic section I – display (**3**) 0%
2. Lock telescopic section I – pins (**5**) are green
3. Unlock telescoping cylinder – pins (**4**) are red
4. The telescoping cylinder moves into telescopic section IV – display (**2**)
5. Lock telescoping cylinder – pins (**4**) are green

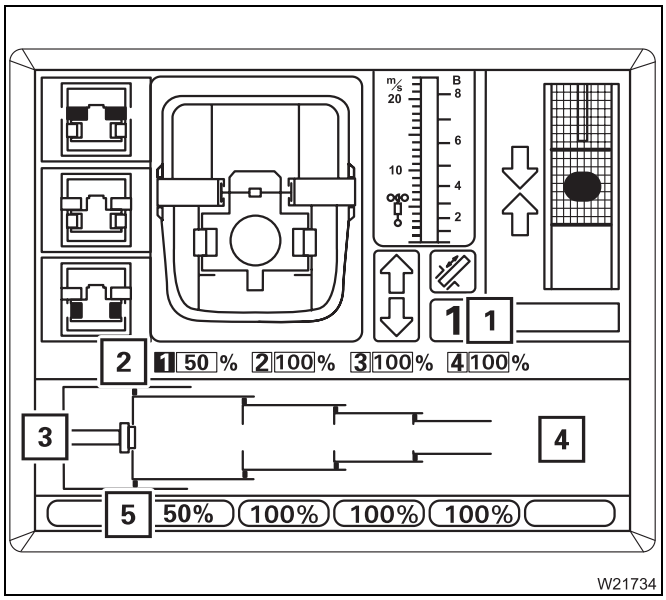
The arrow (**1**) shows the new telescoping direction – extending.



The arrow (**1**) flashes as long as you are still holding the control lever to retract.

- Move the control lever for extending and hold it there

ECOS will now automatically fully extend telescope sections IV, III and II and will stop when section I reaches the set value of 50%.



- Move the control lever to its initial position

– Display (**4**) goes out

– Display (**1**) – teleautomation off

– Values (**5**) are **red**

– Displays (**2**) and (**3**) – current telescoping

Teleautomation is switched off.

To extend telescopic section I to 60%, for example, you can now further extend this telescopic section manually.

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Telescoping the main boom when horizontal

- Derrick the main boom to the horizontal position as described in section *Lowering the main boom to a horizontal position*; ➠ p. 11 - 67.

The RCL will automatically switch to the corresponding rigging table. This table specifies the maximum permissible telescoping at which extending will be switched off (shutdown values; ➠ *Lifting capacity table*).

- Set down the load.
- Extend the main boom only until the RCL switches off the extension procedure.

If you continue to extend the main boom after an RCL shutdown, you may enter ranges in which you can neither perform retraction operations nor raise the boom.

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11.3.8 High-speed mode

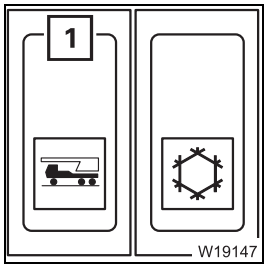
The slewing gear cannot be operated at high speed.

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

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

Switch on function

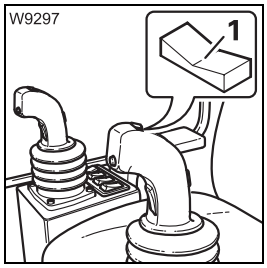
The *High speed* function will only be enabled if the carrier ignition is switched off.



- Turn off the carrier ignition, if necessary. Press the (**1**) button up once. The lamp in the button should go out.

Derricking gear/ telescoping mechanism

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

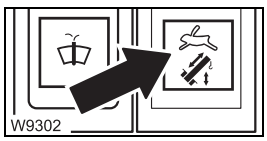


To switch on briefly

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

Continuous operation

- Press button (**1**) down on the left – outwards.
  High-speed mode will be enabled until you press the button again.



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

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

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

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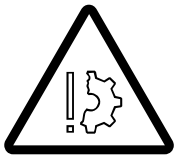
Hoists

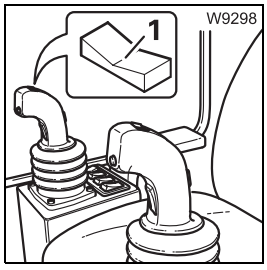
The main hoist and auxiliary hoist are always switched simultaneously to high-speed mode.

Risk of accident due to overloading
Make sure the lifted load is no more than 50% of the maximum load according to the *Lifting capacity table* (maximum degree of utilisation of 50%) before operating the hoists in high-speed mode.

Danger of slack rope with a lightweight hook block
If you switch on high-speed mode at high speeds, a light hook block will not be able to keep the hoist rope taut if it is hoisted up high with a small number of reevings and a large boom length.



Danger of slack rope with large number of reevings
If you switch on high-speed mode with a large number of reevings and without a load, slack rope may form because the hook block is lowered too slowly due to the high degree of friction.

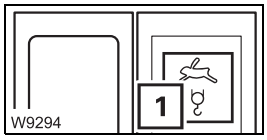


To switch on briefly

- Press button (**1**) down on the left – inwards.
  High-speed mode will be active until you release the button.

Continuous operation

- Press button (**1**) down on the right – outwards.
  High-speed mode will be enabled until you press the button again.



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

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

The speed of the hoists will only be significantly increased by switching to high-speed mode if you have deflected the control lever by more than 70%.

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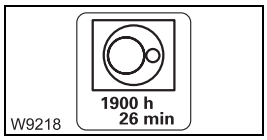
11.3.9 Slewing gear

Danger of overturning when slewing with a rigged counterweight
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. 12 - 89.

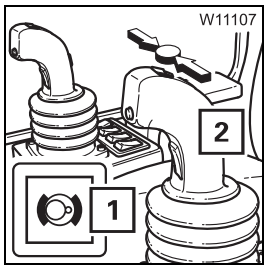


You can have the operating hours of the slewing gear displayed; ➠ p. 11 - 110.

Braking the slewing movement

You may only brake the slewing movement with the slewing gear brake.

Risk of the main boom buckling
On no account switch the slewing gear off to brake it; only switch the slewing gear off when the superstructure has stopped rotating.



- Move control lever (**2**) towards its initial position – the slewing movement will be braked.

At the initial position, the slewing movement will be stopped. At the same time the slewing gear brake will engage, and lamp (**1**) will light up.

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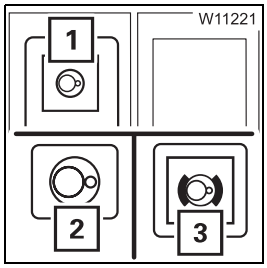
Switching on the slewing gear

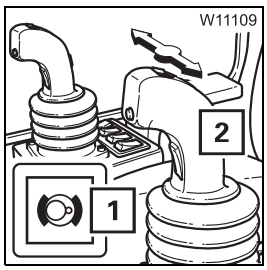
After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will only light up dimly.



- Press button (**1**) once.
  - The lamp in button (**1**) will light up brightly.
  - Symbol (**2**) will be **green** if the slewing gear is switched on.
  - The slewing gear brake will be released – lamp (**3**) will extinguish.

If an RCL code has been entered for the working position *0° to the rear* or *Free-on-wheels*, an RCL shutdown will occur after switching on the slewing gear, and slewing will be disabled. To acknowledge the shutdown, you must either switch off the slewing gear or set down the load and enter an RCL code for the 360° working range.

Releasing the slewing gear

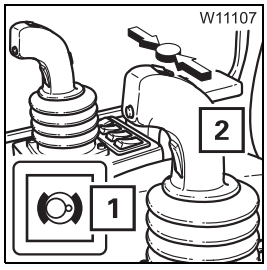


The slewing gear brake will be released as soon as you deflect the control lever (**2**).

Lamp (**1**) will extinguish if the slewing gear brake has been released.

Engaging the slewing gear brake

The slewing gear brake will engage when you switch off the slewing gear; p. 11 - 103.



The slewing gear brake will also engage if control lever (**2**) is in its initial position.

Lamp (**1**) will light up if the slewing gear brake has been engaged.

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Slewing

The following prerequisites must be fulfilled before slewing:

– Houselock is switched off; ➠ p. 11 - 15.

– The superstructure is unlocked.

– Slewing is permissible with the current rigging mode; ➠ p. 12 - 89.

– The current rigging mode is entered on the RCL.

If slewing is not permissible with the current rigging mode, the slewing gear will be disabled.

Danger of overturning when slewing with an incorrectly set RCL
Before slewing, always check whether the RCL code valid for the current rigging mode is displayed.
This prevents slewing operations from being enabled within impermissible ranges, which would cause the truck crane to overturn.

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

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

You can adjust the sensitivity of the control levers to suit the operating conditions; ➠ *Setting the characteristic curves for the control levers*, p. 11 - 108.

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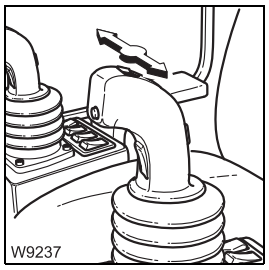
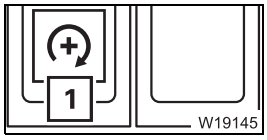


To slew to the left: • Push the control lever to the left.

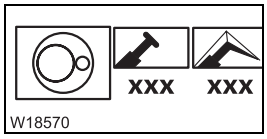
To slew to the right: • Push the control lever to the right.

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

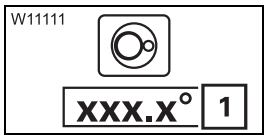
The maximum slewing speed is automatically reduced as the working radius is increased. At a degree of utilisation above 50%, the speed will be halved again.
At a degree of utilisation under 50%, the speed will only be increased again if the control lever is brought into its initial position and the slewing gear is stationary.



You can set the desired engine speed (idling speed) with button (**1**); ➠ p. 10 - 12.

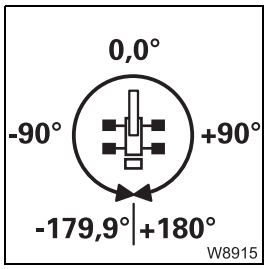


You can limit the maximum slewing speed; ➠ p. 11 - 107.



Reading off the slewing angle

In the *Slewing gear/houselock* submenu – display (**1**) shows the current position.



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

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

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

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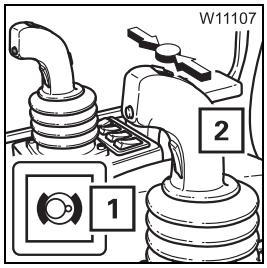
Braking the slewing movement

You may only brake the slewing movement with the slewing gear brake.

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.

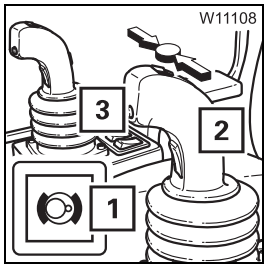


- Move the control lever (**2**) towards its initial position – the slewing movement will be braked.

At the initial position, the slewing movement will be stopped. At the same time the slewing gear brake will engage, and lamp (**1**) will light 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.



- Switch on the slewing gear.
- Shift the control lever (**2**) to its initial position.
- Press button (**3**).
  The slewing gear brake will be released – lamp (**1**) will not light up.

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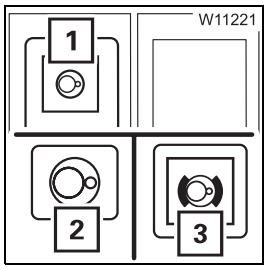
Switch off the slewing gear

If the slewing gear is not required, it should be switched off to avoid unintentional use.

Risk of damage to the main boom
Brake the slewing movement down to a standstill before you switch off the slewing gear. The slewing gear brake is automatically engaged when the slewing gear is switched off.
In this way, you can prevent lateral forces from affecting the main boom due to long delays or swinging loads.



- Press button (**1**) once.
  - The lamp in the button (**1**) will light up dimly.
  - Symbol (**2**) will be **red** if the slewing gear is switched off.
  - The slewing gear brake is engaged – lamp (**3**) lights up.

11.3.10 Possible movement combinations

- The main hoist, telescoping mechanism, derricking gear and slewing gear can be operated in almost any combination simultaneously. Restrictions are specified for the respective power units.
  The telescoping mechanism and derricking gear can only be operated simultaneously when the control lever assignment is from *Version 1*; ➠ p. 9 - 16.
- The auxiliary power units – tilt crane cab, counterweight lifting unit – cannot be operated with the *Extending* movement.
  Moving the auxiliary power units in combination with other power units can result in reductions of speed.
- Lattice extension derricking gear
  The lattice extension derricking gear cannot be operated in combination with the *Extending* movement.

Certain movement combinations can reduce the speed in high-speed mode.

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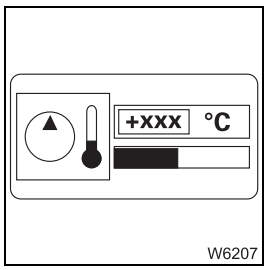
11.3.11 Hydraulic oil cooling

Depending on the truck crane version, there are one or two hydraulic oil coolers that regulate the hydraulic oil temperature automatically.

- In addition to this, you should ensure that the maximum permissible hydraulic oil temperature of 80°C (176°F) is not exceeded



The current hydraulic oil temperature is displayed in the *Monitoring* submenu. If the maximum permissible temperature has been reached, the bar below the display will turn **red**. A warning message is issued additionally; *Warning submenu*, p. 11 - 111.

If the hydraulic oil temperature reaches 80°C (176°F):

- Stop operating the crane
- Let the hydraulic oil cool down while the engine is running

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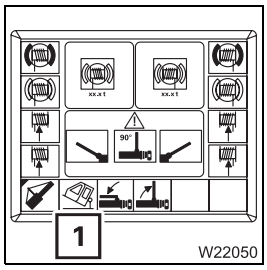
11.4 Settings and displays for crane operation

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

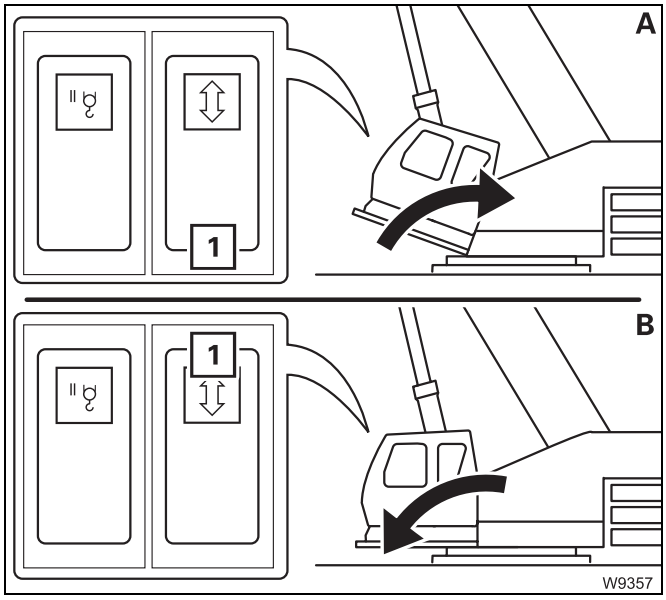
11.4.1 Inclining the crane cab

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



For Mega Wing Lift additional equipment, if this is in the rigging position, then inclining the cab will be disabled – in the rigging submenu, the Mega Wing Lift symbol (**1**) will be red.

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



(A) – To incline to the rear

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

(B) – To incline to the front

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

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

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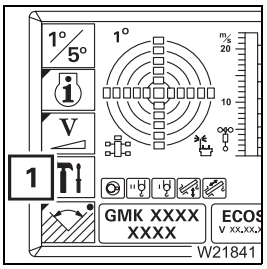
11.4.2 Setting idling speed

➠ *Setting the idling speed*, p. 10 - 12.

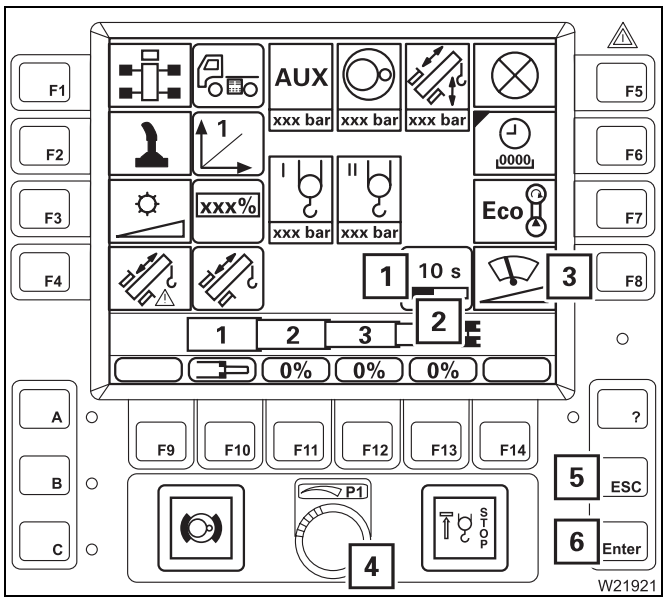
11.4.3 Adjusting the wiper stroke interval of the windscreen wiper

You can set a value between 3 and 30 seconds for the front and roof window wiper stroke interval.

The higher the selected value is, the longer the pauses between the strokes of the wiper are.



• If necessary, open the main menu Esc and press (**1**) button once
This opens the *Settings* submenu.



The display (**1**) will show the current value.

• Press the (**3**) button once
Bar (**2**) is **red** – input on

To cancel the input – press button (**5**) once.

• Change the value using switch (**4**)

• Confirm the changed value – press button (**6**) once

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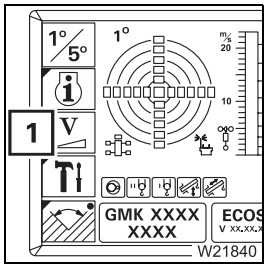
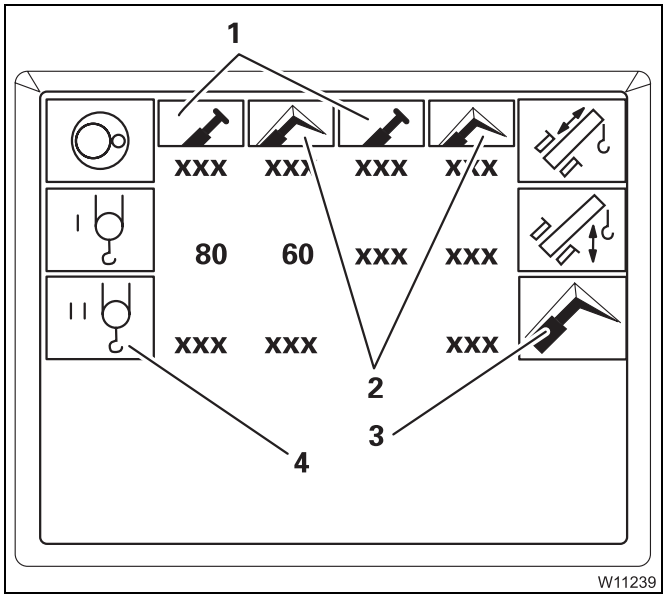
11.4.4 Limiting the power unit speeds

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



- If necessary, open the main menu Esc and press (**1**) button once
  The *Power unit speeds* submenu will open.



Symbols (**1**) or (**2**) for the current operation are **green**.

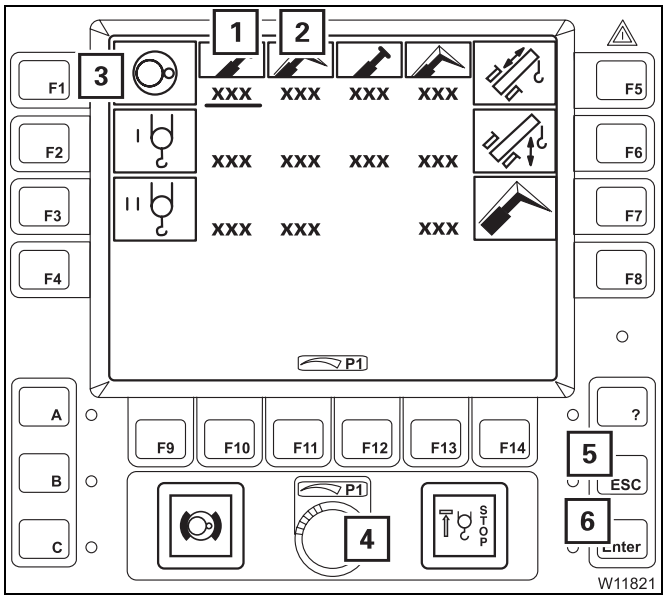
1 Main boom operation

2 Working with the lattice extension – button (**3**) active

The values below the green symbols will be used, e.g. 80% for the main hoist in main boom operation.

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

Button (**4**) will only be active if the auxiliary hoist is connected.



Changing values

- Repeatedly press, for example, button (**3**) for the slewing gear until the bar under the desired value is at (**1**) or (**2**) – input on

To cancel the input – press button (**5**) once.

- Change the value using switch (**4**)
- If necessary, change the values for other power units in the same way
- Confirm the changed values – press button (**6**) once. All changed values will be accepted

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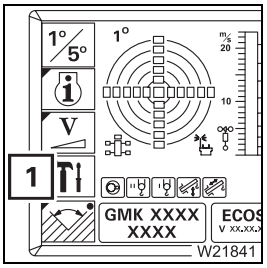
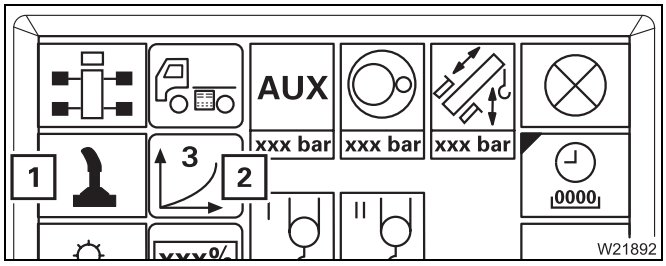
11.4.5 Setting the characteristic curves for the control levers

The control lever characteristic curve determines how high the power unit speed should be for a particular control lever movement.

The set control lever characteristic curve always applies to both control levers and to all power units moved with the control levers.



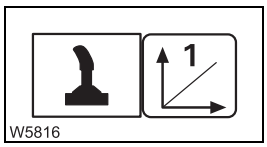
- If necessary, open the main menu Esc and press (**1**) button once
This opens the *Settings* submenu



The set characteristic curve will be shown on the display (**2**).

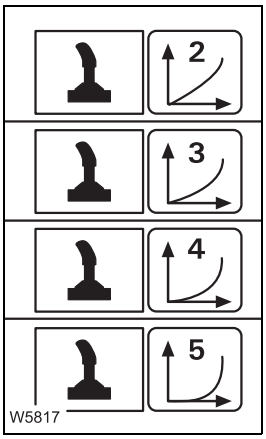
- Repeatedly press button (**1**) until the desired characteristic curve is displayed, e.g. characteristic curve (**3**)

There are five characteristic curves:



Linear characteristic curve (1)

The deflection of the control levers evenly increases the speed. Even small movements of the control lever will produce a high speed.



Progressive characteristic curves (2) to (5)

The speed is kept lower in the front range of the movement than with characteristic curve (**1**) and increases only with larger movements.

The higher the number of the characteristic curve, the further the control lever must be moved to get a clear increase in speed.

With characteristic curve (**5**), you can work particularly sensitively with the control lever.

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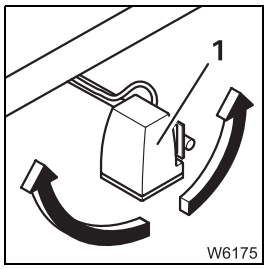
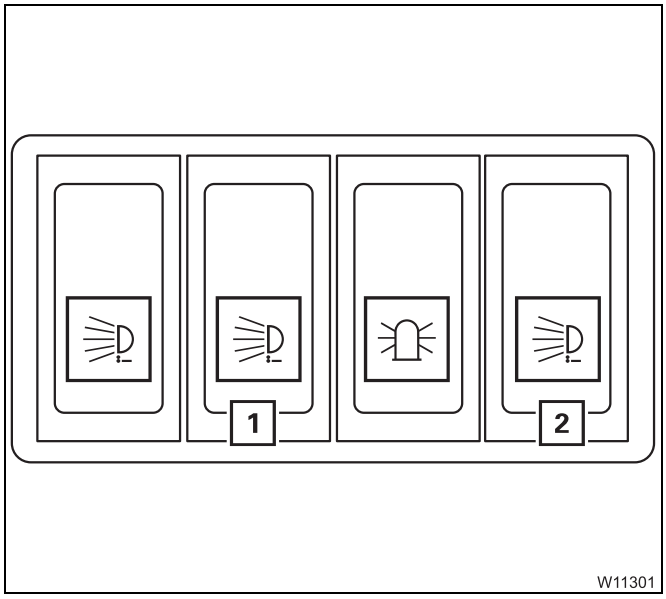
11.4.6 Using the slewable spotlights



With the relevant equipment, the slewable spotlights (**1**) are located on the main boom. They are controlled from the crane cab.

Risk of accident due to being dazzled during on-road driving
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 and other drivers from being dazzled and causing accidents.



Switching on
- Press switch (**1**) down

Switching off
- Press switch (**1**) up

To direct the spotlights forwards
- Press button (**2**) up

To direct the spotlights backwards
- Press button (**2**) down

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

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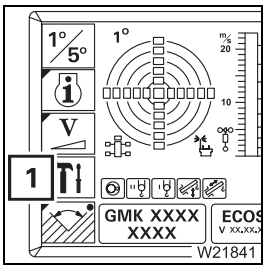
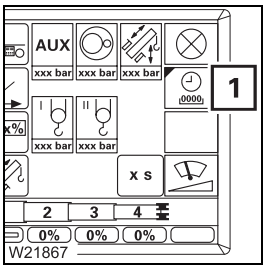
11.4.7 Displaying the operating hours

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

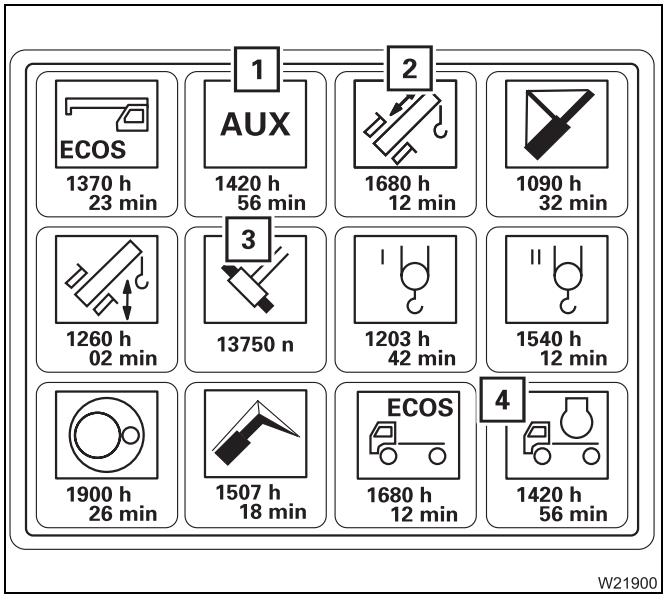


If necessary, open the main menu Esc and press (**1**) button once.



This opens the *Settings* submenu

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



The *Operating hours* submenu opens.

The operating hours are displayed below the symbols, e.g. 1680 hours and 12 minutes for the telescoping mechanism (**2**) or for the engine (**4**).

Exception: The value below the symbol (**3**) indicates how often the cycle *Unlock telescopic section* has been operated, e.g. 13 750 times.

Auxiliary power units (**1**) include:

– Derricking gear
– Locking units
– Counterweight hoist unit
– Crane cab inclination

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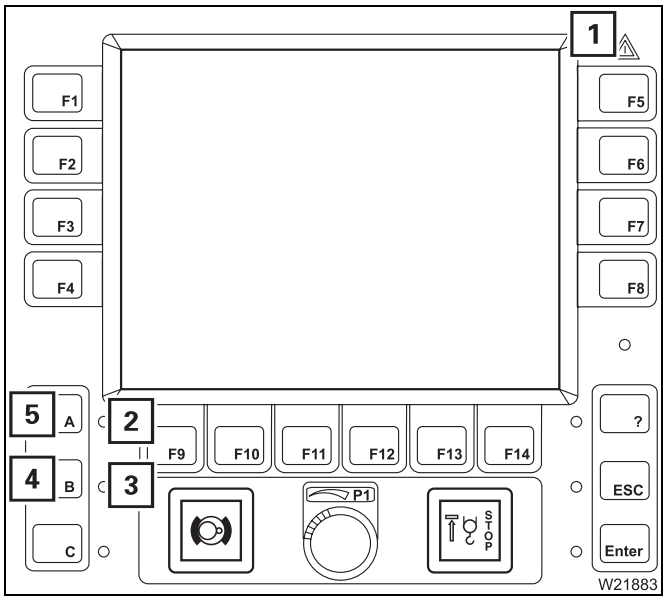
11.4.8 Warning submenu

ECOS differentiates between warning messages and error messages (error messages; ➠ p. 11 - 114). A warning message indicates that certain values do not correspond to a target value.



In the event of a warning message, the following lamps will flash:

– The lamp (**1**)

– The lamp (**2**) for *Superstructure* warning

– The lamp (**3**) for *Carrier* warning will flash

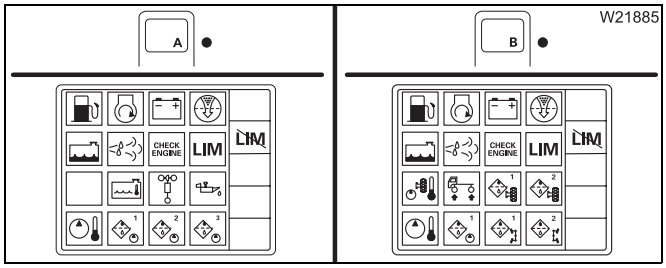
For more information

• Press button (**4**) or (**5**) next to the flashing lamp once – the corresponding *Warning* submenu will be opened

The warning message is acknowledged – lamp (**2**) or (**3**) lights up (will no longer flash).

Meaning of the symbols

The colour of the symbols indicates whether a warning message is active in the corresponding area.



– Symbol is **grey** – no warning message

– Symbol is **red** – warning message

Perform the following checks a symbol is displayed in **red**.

This section deals with the symbols in the *Superstructure* and *Carrier* warning submenus. Symbols which are present in both submenus are only explained once. Follow the cross-references for continued procedures in part 1 or part 2, depending on the submenu opened.

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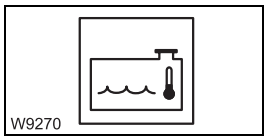
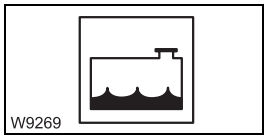
Risk of damage if warning messages are not observed
Observe the following information in good time and take the appropriate remedial measures if a warning message appears. This prevents these malfunctions from causing malfunctions in the truck crane.



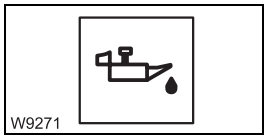
Coolant too hot

The coolant in the engine is hotter than approx. 95°C (205°F).
Current temperature display; ➠ p. 10 - 11.
Possible cause and solution; ➠ p. 14 - 20.



Coolant level too low

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



Oil pressure too low

A warning buzzer sounds at the same time.

- Set down the load as soon as possible and turn off the engine
- Check the oil level; ➠ *Maintenance manual*
- Add oil if necessary If the error message persists, refer to **Manitowoc Crane Care**

Risk of damage to the engine if the oil pressure drops
Turn off the engine as soon as possible and look for the cause if the lamp lights up or the warning buzzer sounds.
Never restart the engine before you have found the cause and eliminated the problem; ➠ p. 14 - 12, ➠ p. 7 - 27

Engine electronic system

Malfunction in the engine electronics:
– Immediately switch off the motor; ➠ *Malfunctions in the engine*, p. 7 - 27

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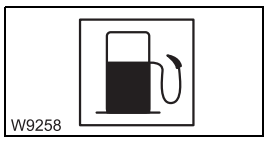
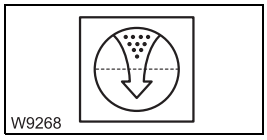


Refuelling

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

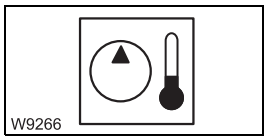
- Refuel before the fuel is used up; ➠ p. 10 - 2, ➠ p. 4 - 8

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



Replacing the air filter

- Replace the air filter as soon as possible; ➠ *Maintenance manual*

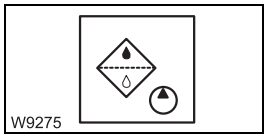


Hydraulic oil too hot

The hydraulic oil is hotter than 80°C (176°F).
Current temperature display; ➠ p. 10 - 11.
Possible cause and solution; ➠ p. 14 - 20.

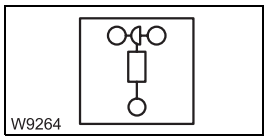
Danger of overheating

There is a fault if the hydraulic oil temperature exceeds 80°C (176°F). Set down the load as soon as possible and try to find the cause.
Set down the load as soon as possible and turn off the engine if the temperature of the hydraulic oil exceeds 100°C (212°F).



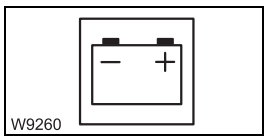
Replacing the hydraulic oil filter

- Replace the corresponding hydraulic oil filter as quickly as possible; ➠ *Maintenance manual*



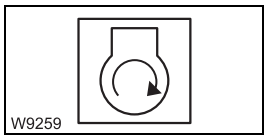
Anemometer not connected

- Connect the anemometer to the electrical power supply; ➠ p. 12 - 132



Voltage monitoring

The voltage in the superstructure electrical system is too high or too low.
Current voltage display; ➠ p. 10 - 11.



Air intake inhibitor triggered

The air intake inhibitor was triggered because the maximum permissible engine speed was exceeded. It is only possible to start the engine after the air intake inhibitor has been released manually; ➠ p. 4 - 27.

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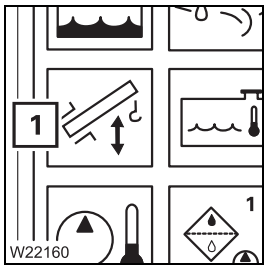
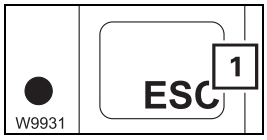


Main boom lowers itself

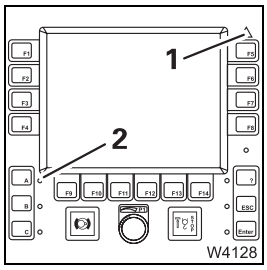
With the derricking gear switched off, the main boom has dropped by more than 3°; ➠ *Switching on the derricking gear*, p. 11 - 64

Exiting the submenu

You can exit the submenu at any time.



- Press the (**1**) button once.
  The same menu opens which was open before the *Warning* submenu opened



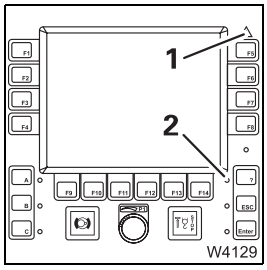
If the same warning messages are still present, the lamps (**1**) and (**2**) light up.

If no warning message is present, both lamps will have gone out.

Both lamps start flashing again as soon as a new warning message occurs.

11.4.9 Errors submenu

ECOS differentiates between error messages and warning messages (warning messages; ➠ p. 11 - 111).



In the event of an error message, the lamps (**1**) and (**2**) flash.

More information on error messages; ➠ *Error messages*, p. 14 - 32.

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11.5 Working range limiter

You can set and monitor four different limits in the working range limiter submenus:

– A maximum overall height

– A maximum working radius

– A maximum slewing angle

– Objects in the working range

The monitoring of the programmed limits can be switched on and off separately.

Risk of accident due to situations which cannot be monitored
The working range limiter only serves as an additional safety device. Brake the crane movement before contact with the obstacle becomes imminent. Do not deliberately move into the shutdown range. You, the crane operator, are still responsible for monitoring the working range, so that you can react appropriately if situations arise which cannot be monitored electronically.

Risk of accident due to limits set too low
When entering the limit values, bear in mind that, even after switching off the engine, movements can still occur that would bring the load into the shutdown range (e.g. due to the load swinging or the boom bending). For this reason, always enter the limit values with sufficient safety distance to the object.

Risk of accident due to insufficient safe distances
Always observe all safety distances in accordance with the national legal regulations (e.g. concerning electrical cables) even if the working range limiter is switched on.

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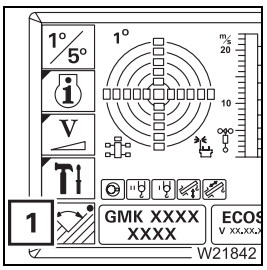
11.5.1 Opening the working range limiter submenu



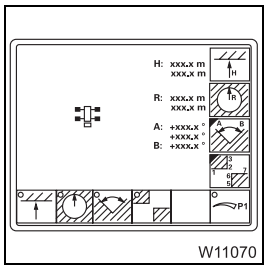
- If required, open the main menu Esc.

The dot in symbol (**1**) indicates whether limit values are being monitored:

– **Dot is black:** Monitoring switched off

– **Dot is green:** Monitoring switched on

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

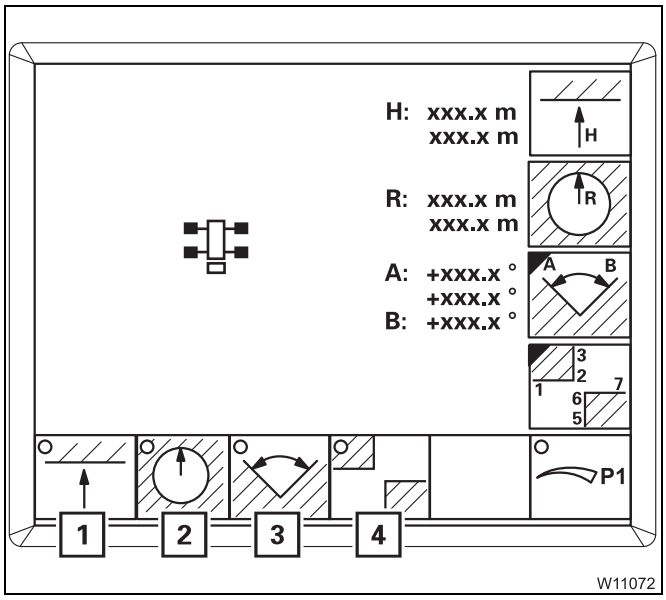


The *Working range limiter* submenu opens.

Units of measurement are displayed – metres (m) or feet (ft).

11.5.2 Viewing current settings

The *Working range limiter* submenu shows switched on monitoring functions, the limits entered and current values.



Monitoring on/off

The dots in the symbols (**1**) to (**4**) indicate the current status.

1 Overall height monitoring

2 Working radius monitoring

3 Slewing angle monitoring

4 Object monitoring

– **Dot is black:**
Monitoring switched off

– **Dot is green:**
Monitoring switched on, the monitored area is displayed; p. 11 - 126

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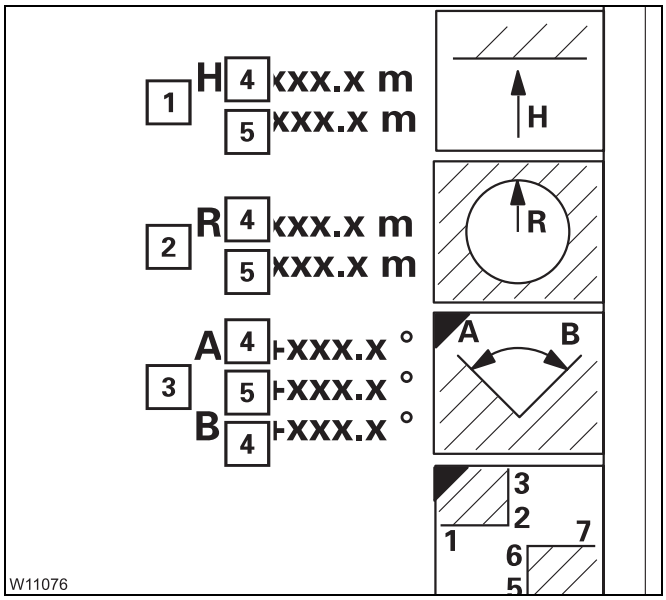


Limit values/current values

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

1 Overall height

2 Working radius

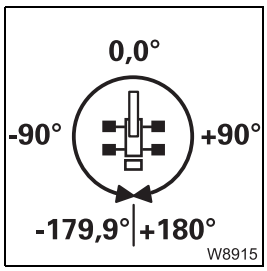
3 Slewing angle

Every display shows the following values:

4 Limit value – red

5 Current value – blue

In case of manual and switched on input, display (**5**) changes; ➠ p. 11 - 124.



The following applies to the slewing angle display:

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

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

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

Viewing the limit values for object monitoring; ➠ *Objects*, p. 11 - 125.

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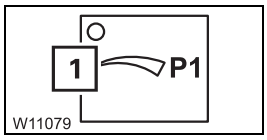
11.5.3 Entering limit values

This section describes how to enter unknown limit values by moving to the shutdown points.

You can enter known limit values directly; ➠ *Entering limit values/objects manually*, p. 11 - 124.

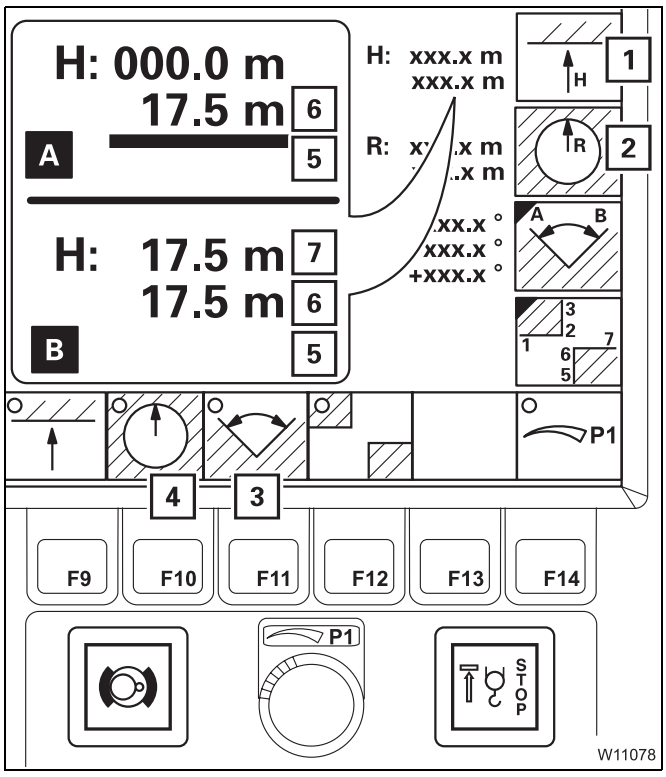


Requirement
Manual input must be switched off.
- Press button (**1**) repeatedly until the dot turns **black**

Risk of accident due to limits set too low
When entering the limit values, bear in mind that, even after switching off the engine, movements can still occur that would bring the load into the shutdown range (e.g. due to the load swinging or the boom bending). For this reason, always enter the limit values with sufficient safety distance to the object.

Overall height/ working radius

The limit values for the overall height and the working radius are entered in the same way.



The relevant monitoring function (**3**) or (**4**) must be switched off – dot is **black**;
➠ p. 11 - 126.

- Press the button once:
  - **1** For the overall height
  - **2** For the working radius

  Bar (**5**) is red – input on. Cancel input – press button Esc once.
- (**A**) – Move the main boom head to just before the shutdown point without a load, e.g. at 17.5 m – value (**6**)
- (**B**) – Press button Enter once
  - – The current value (**6**) will be accepted as the limit value (**7**)
  - – The bar (**5**) goes out
- Switch on monitoring; ➠ p. 11 - 126

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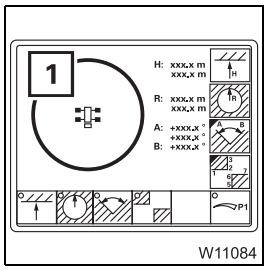
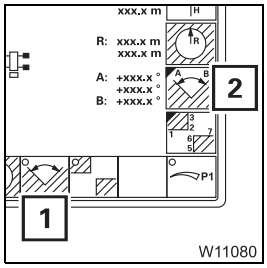


The limit value for the working radius affects the representation of defined objects.
Only points that are within the limit value (**1**) will be displayed.

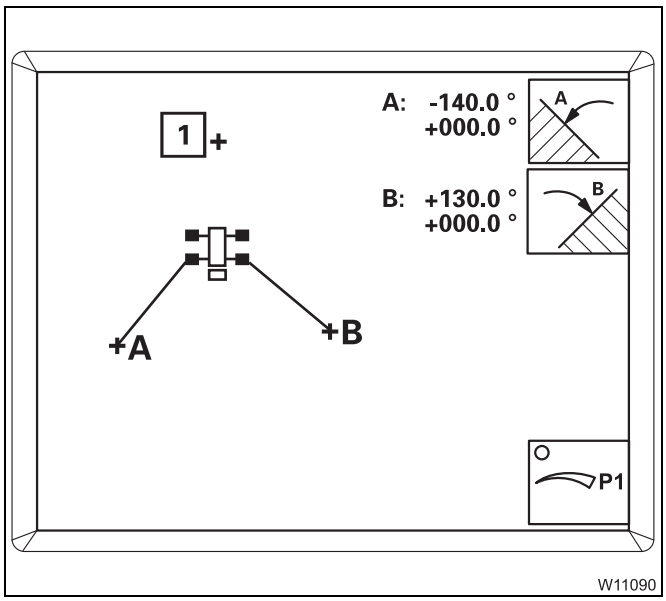
Slewing angle

Slewing angles are entered in a submenu.



Before entering values, monitoring (**1**) must be switched off – dot is **black**; ➠ p. 11 - 126.

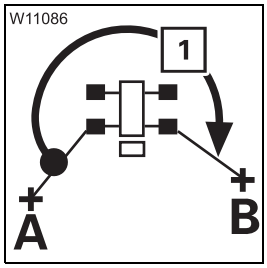
- Press the (**2**) button once.
  The *Enter slewing angle* submenu will open



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

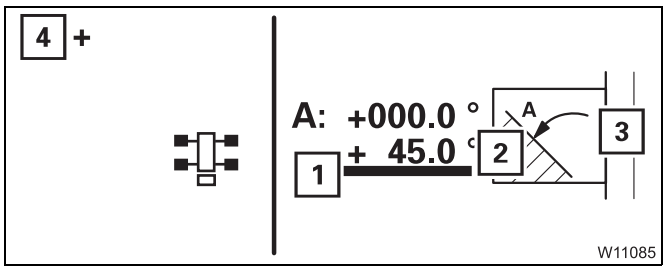


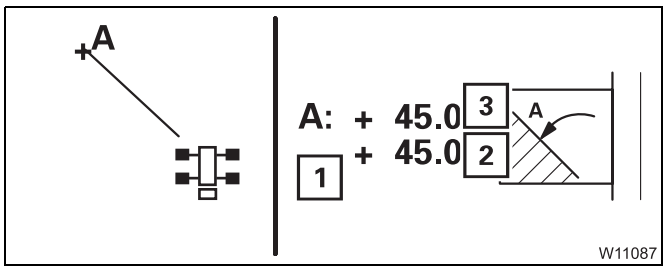
The permissible slewing range is represented by the angle stretching clockwise from **A** to **B**.
Approx. 270° in this illustration – arrow (**1**).

Entering the permissible slewing range

You must enter the slewing angles **A** and **B** separately.

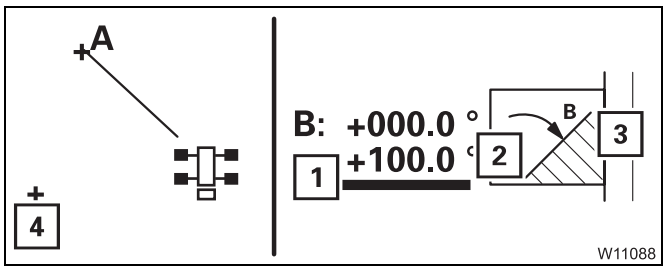
Risk of accident due to incorrectly set slewing angles
Always slew the main boom to the shutdown point from the right with slewing angle **A** and from the left with slewing angle **B**.
This prevents slewing into the impermissible range from being enabled.

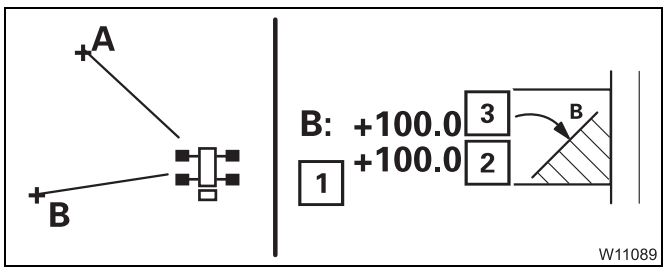




Slewing angle **A**:

- Press the (**3**) button once.
  Bar (**1**) is red – input on. Cancel input – press button Esc once
- Slew the main boom (**4**) to the shutdown point from the right, e.g. value (**2**) 45°
- Press button Enter once
  - The slewing angle **A** will be displayed
  - The value (**2**) will be accepted as the limit (**3**)
  - The bar (**1**) goes out





Slewing angle **B**:

- Press the (**3**) button once.
  Bar (**1**) is red – input on. Cancel input – press button Esc once
- Slew the main boom (**4**) to the shutdown point from the left, e.g. value (**2**) 100°
- Press button Enter once
  - The slewing angle **B** will be displayed
  - The value (**2**) will be accepted as the limit (**3**)
  - The bar (**1**) goes out

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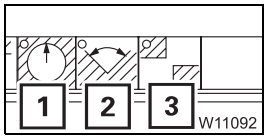
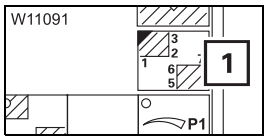
Entering objects

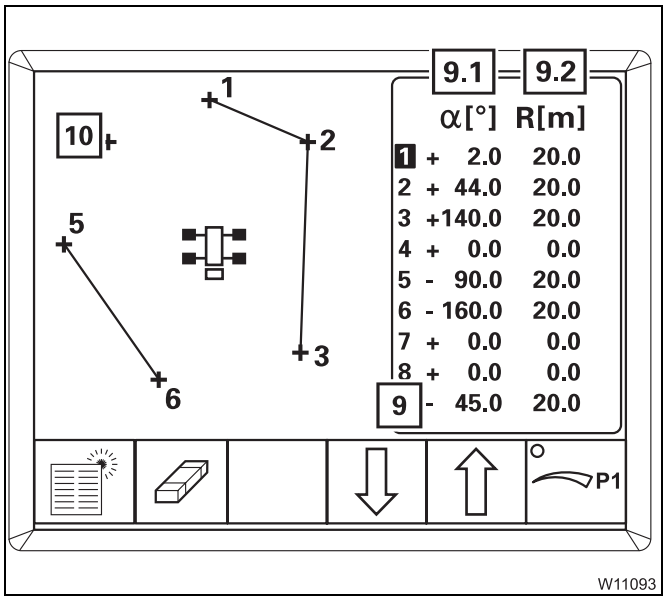
Objects are entered in a submenu.



Before entering values, the monitoring functions (**1**) to (**3**) must be switched off – dot is **black**; ➠ p. 11 - 126.



- Press the (**1**) button once.
  The *Enter objects* submenu will open



Representation of points and objects

Each point shown is numbered and defined by the point data *slewing angle* (**9.1**) and *working radius* (**9.2**) – **red**.

An object is made up of points that are connected by lines, e.g. the points **1** to **3** and the points **5** and **6**.

The cross (**10**) and the point data (**9**) show the current position of the main boom – **blue**.

Only those points are displayed that are located within the entered, maximum working radius. You may need to enlarge the maximum working radius in order to display the point; ➠ p. 11 - 124.

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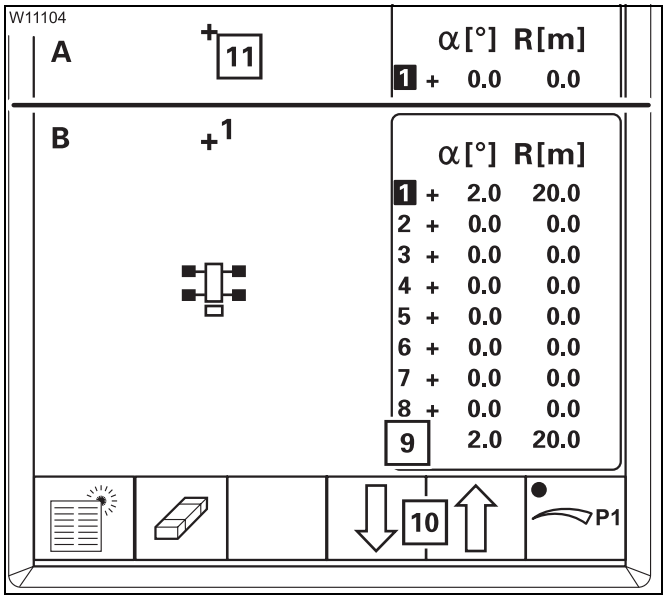
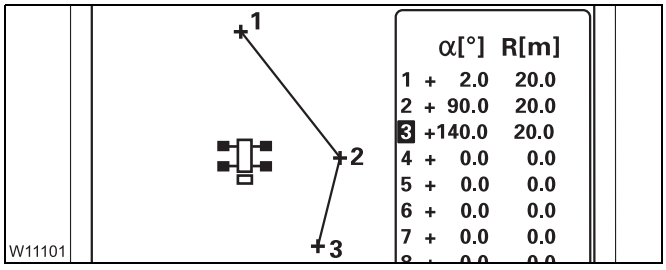


Entering objects

- (**A**) – With the buttons (**10**), select the first point, e.g. point (**1**) – blue
- Move the main boom head (**11**) to just before the first point of the object

- (**B**) – Press button Enter once
  - The point (**1**) will be displayed
  - The current point data (**9**) will be accepted for point (**1**), e.g. 2° and 20 m

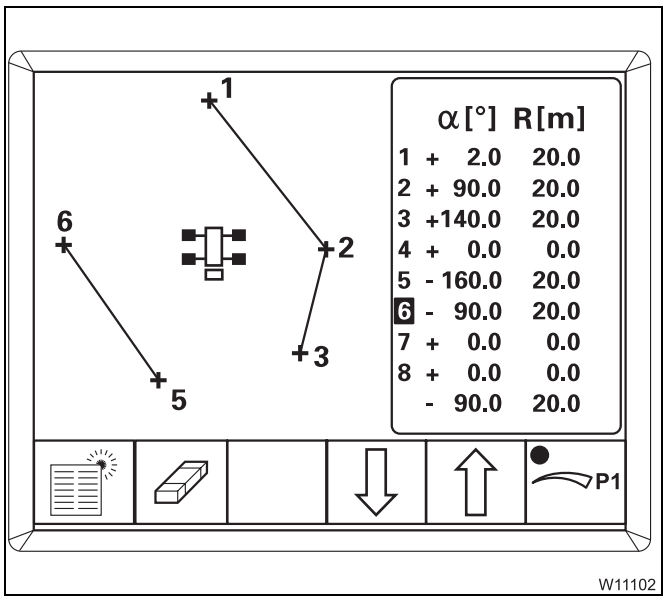
The first point has now been entered.



- Enter the next point (**2**) in the same manner, e.g. +90° and 20 m

The point is connected with point (**1**) – an object has been entered.

To enlarge the object, you can enter subsequent points 3 to 8, e.g. point (**3**).



You can also add objects:

- Delete the subsequent point, e.g. point (**4**) – point data 0.0; ➠ p. 11 - 123
- Enter the next point, e.g. point (**5**) at –160° and 20 m

This point (**5**) will be the first point for the new object. The following point will be added to this object, e.g. point (**6**).

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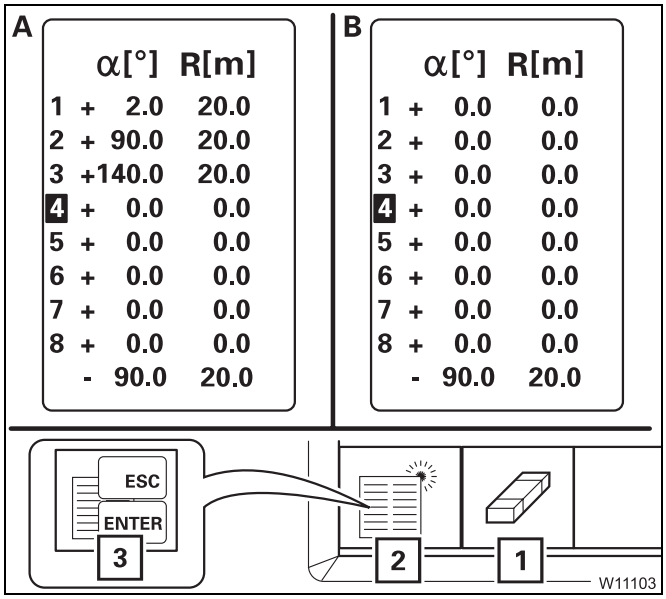
Deleting points

You can delete selected, individual points or delete all points at once.



(A) – Selected points

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

The selected point will be deleted, e.g. point (**4**) – point data 0.0.

(B) – All points

- Press button (**2**) once – symbol (**3**) will appear

You can cancel the process with the Esc button.

- Press button Enter once – all points will be deleted

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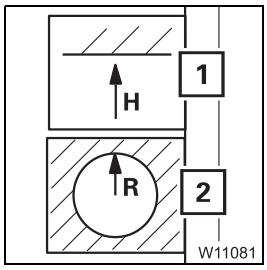
11.5.4 Entering limit values/objects manually

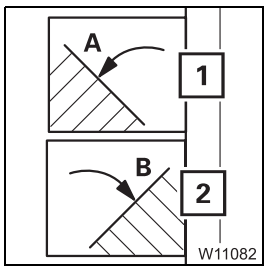
Limit values

The limit values for the overall height, the working radius, and the slewing range are entered in the same way.



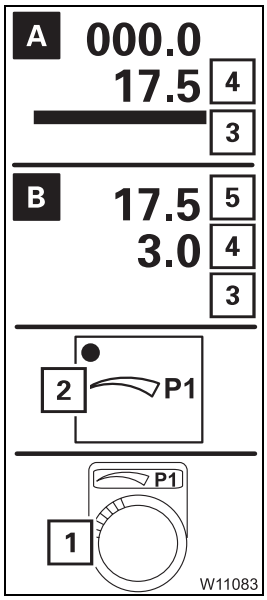
– For overall height/working radius

- Press the button once:
  - **1** For the overall height
  - **2** For the working radius



– For slewing angles

- Open the *Enter slewing angle* submenu
- Press the button once:
  - **1** For slewing angle A
  - **2** For slewing angle B



Entering a limit value

The bar (**3**) is red – input on.
To cancel the input – press button Esc once.

- Press button (**2**) once – the dot will turn **green**, manual input on
- (**A**) – Enter the new limit value, e.g. 17.5, with the switch (**1**) on display (**4**)
- (**B**) – Press button Enter once
  - Display (**5**) = new limit value
  - Display (**4**) = current value, e.g. 3.0
  - Bar (**3**) goes out
  - Dot (**2**) is **black**, manual input off

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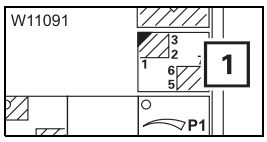
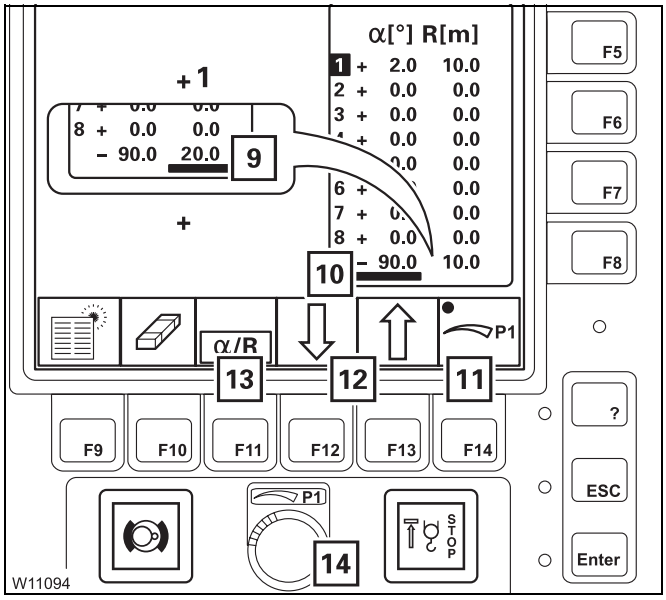
Objects

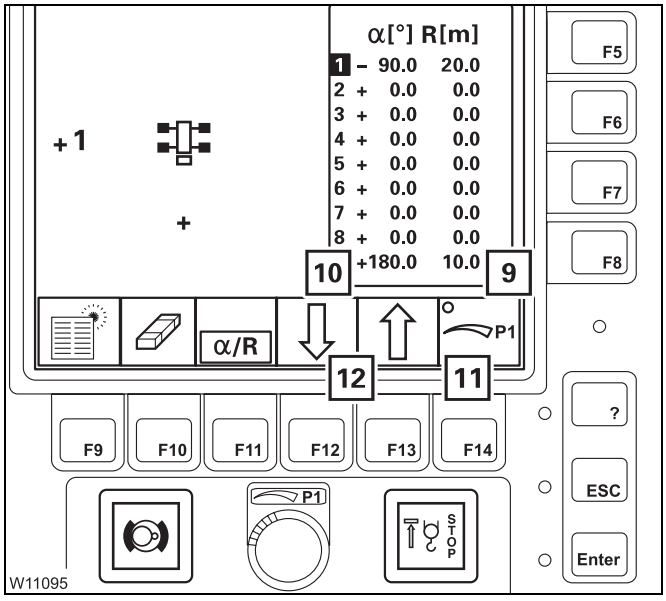
Objects are entered in a submenu.



- Press the (**1**) button once.
  The *Enter objects* submenu will open



- With the buttons (**12**), select the desired point, e.g. point (**1**) – blue
- Press button (**11**) once – the dot will turn **green**, manual input on
- With button (**13**) select one of the following:
  – The slewing angle – bar (**10**) is red
  – The working radius – bar (**9**) is red
  Input on. Cancel input – press button Esc once.
- Enter the new values, e.g. –90.0° and 20.0 m with switch (**14**)



- Press button Enter once.
  The new values for point (**1**) will be accepted

You can enter additional points in the same way – button (**12**).

- To end your input, press the Esc button once
  – Bar (**9**) or (**10**) goes out – display = current main boom position
  – Dot (**11**) is **black** – manual input off

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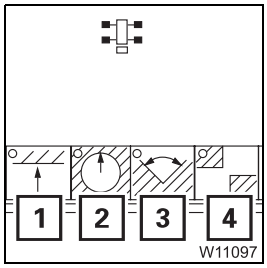
11.5.5 Switching monitoring functions on/off

After turning on the ignition, all monitoring functions are switched on that were on before the ignition was turned off.



- Press the buttons for the required monitoring functions once

1 Overall height **2** Working radius

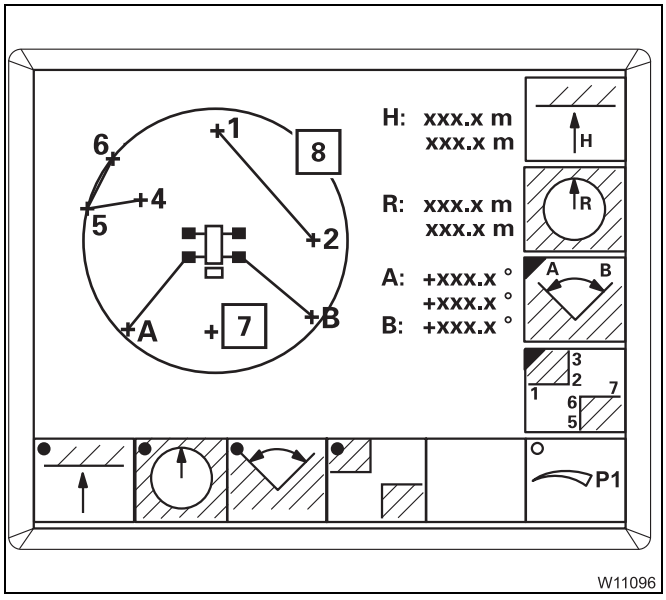
3 Slewing angle **4** Objects

Dot is green: Monitoring switched on

Dot is black: Monitoring switched off

Danger of accident due to incorrectly set limit values
After switching on the monitoring function, slowly approach all limits and check that the system switches off in time.
If necessary, enter new values with larger safety distances.

With monitoring switched on, the speed of all power units is limited to 50%. Limits below 50% continue to be active. We recommended limiting the slewing gear speed to between 30% and 50%.



The monitored area will be displayed:

- **Working radius**
  Circle (**8**) – red
- **Permissible slewing angle**
  Circle sector, clockwise from **A** to **B**
- **Objects**
  Points and lines, e.g. **1** to **2** and **4** to **6**
- **Overall height**
  No display

The current main boom position (**7**) is always displayed.

It is impossible to move behind a defined object whenever a monitoring function is switched on.

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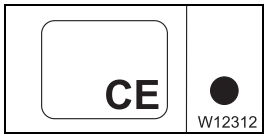
11.5.6 Shutdown by working range limiter

If a limit value is reached, RCL shutdown will occur. All movements that would go closer to the limit value will be disabled. Shutdown will remain active even if you switch off the monitoring function.

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



The RCL also shows an error message. To enable the movements, you must leave the shutdown range and acknowledge the error message; ➠ *Error codes table*, p. 14 - 27.

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

If you override the RCL, the shutdown will be overridden and all movements enabled.

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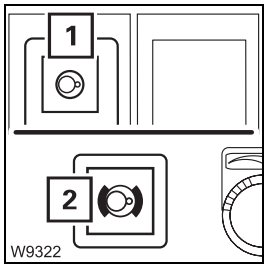
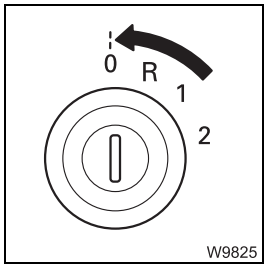
11.6 Work break

11.6.1 In case of short work breaks

Risk of accident by 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 (**1**) button must be dimly lit
  - 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; ➠ *To secure the truck crane*, p. 11 - 129

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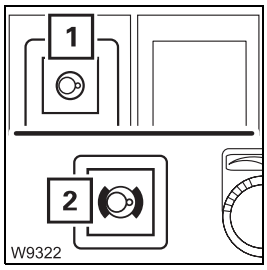
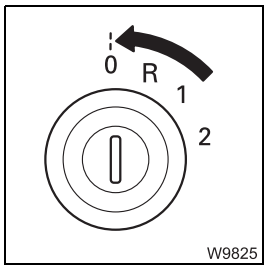
11.6.2 In case of work breaks of more than 8 hours

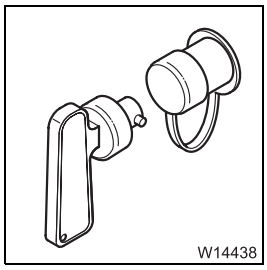
- Retract all telescopic sections
- Set down the main boom on the boom rest



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



- Switch the engine off, turn the ignition key to position **0** and remove it
- Switch off all electrical loads



- Switch off the battery master switch. This will not interrupt the run-down period of the heater.

To secure the truck crane

- Secure the truck crane against unauthorised use by:
  - Stowing away the hand-held control in the crane cab
  - Removing the ignition key
  - Locking the crane cab

Danger due to unauthorised use.
Always lock the hand-held controller before you leave the truck crane. In this way you can prevent unauthorised persons from starting the engine with the hand-held control.

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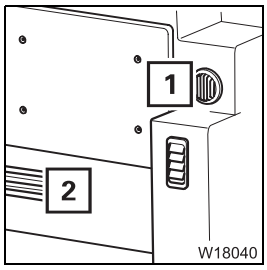
11.7 Heating and air-conditioning system



- Do not cover grilles (**1**) and (**2**)
  - Air is drawn in through grilles (**1**) and (**2**)

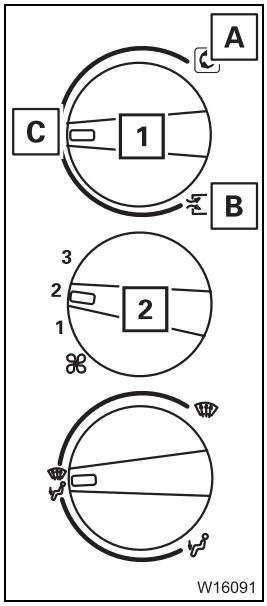
11.7.1 Standard heating system

Switching on

- Start the engine. The heating output is only provided when the engine is running

Heating

You must set the fan, fresh air/recirculated air and the temperature.



Setting the fan

- Turn switch (**2**) to the required level **1** to **3**, depending on the desired air quantity

Setting fresh air/recirculated air/mixed air

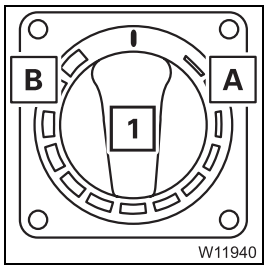
You can set the air to be sucked in by the fan.

- Turn switch (**1**) to the position for:

A Recirculated air – air is sucked out of the crane cab.
Change to fresh air often to ensure that oxygen is supplied

B Fresh air – outer air is sucked in

C Mixed air – outside air and air from the crane cab will be sucked in.
The percentage of the corresponding air type can be smoothly increased by turning the knob in direction (**B**) or (**A**).



Setting the temperature

- Turn switch (**1**) in the required direction

A Colder

B Warmer

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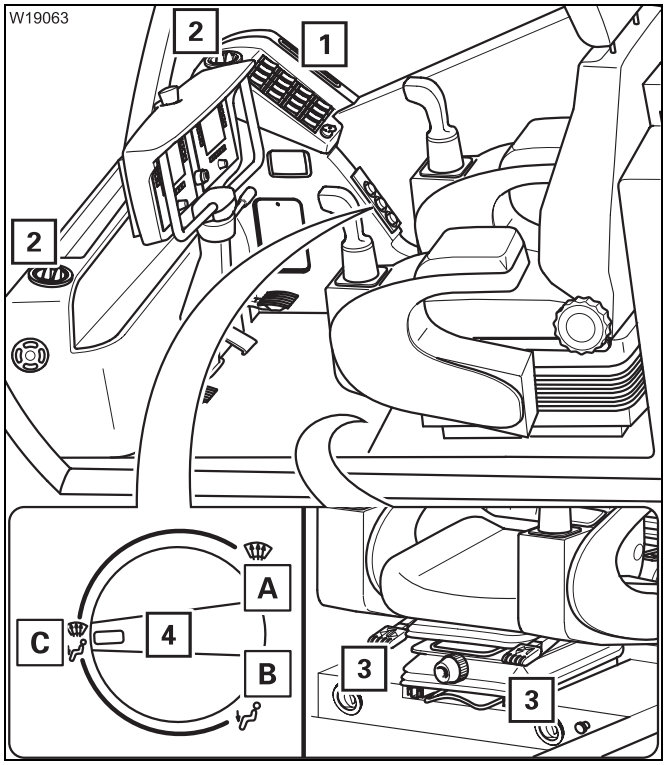
Air distribution You can allow the air to flow out from various air vents.



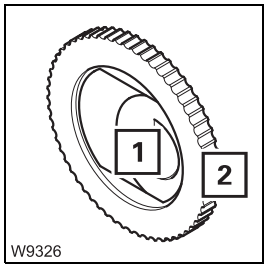
- Turn the switch (**4**) to the position for the required air vents

  A Air vents (**1**), (**2**), windscreen, centre

  B Air vents (**3**), cab floor

  C Air vents (**1**), (**2**), (**3**)

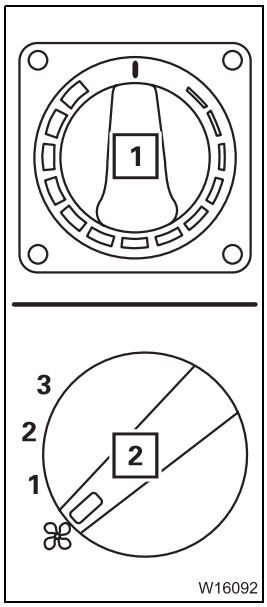
You can adjust air vents (**2**) and (**3**).



Adjusting the air vents

1	– To open:	Press in and position lengthwise
	– To close:	Position crosswise
	– To direct the air flow:	In intermediate position
2	– To direct the air flow:	slewing

Switching off



Switching off the heater

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

Switching off ventilation

- Turn the switch (**2**) to the level 0

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11.7.2 Air-conditioning system

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

Warnings

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

Avoid having cold air blowing directly onto your body.

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

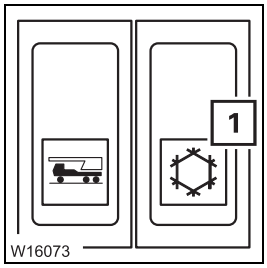
If the truck crane has been exposed to strong sunlight for a long period of time, for example, the air conditioning system should initially be operated at the highest blower level with the engine running.
The door or at least the windows should be left open for a short while to air thoroughly. The cooling-down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

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

Set the fan to a lower level once the inside temperature has reached the desired temperature.

Switching on/off

- Start the engine. The air-conditioning system operates only when the engine is running
- Switch off the auxiliary heaters
  - Auxiliary water heater; ➠ p. 11 - 140
  - Auxiliary air heater; ➠ p. 11 - 141



- **– Switching on:** • Press switch (**1**) down
- **– Switching off:** • Press switch (**1**) up

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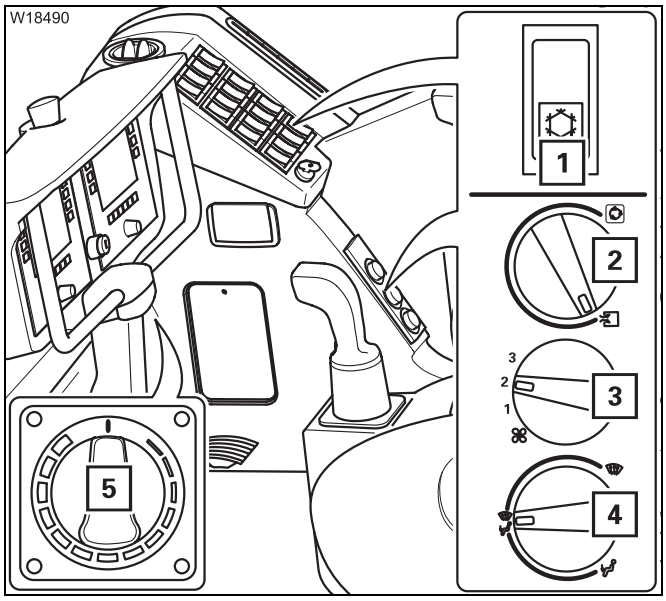
Cooling

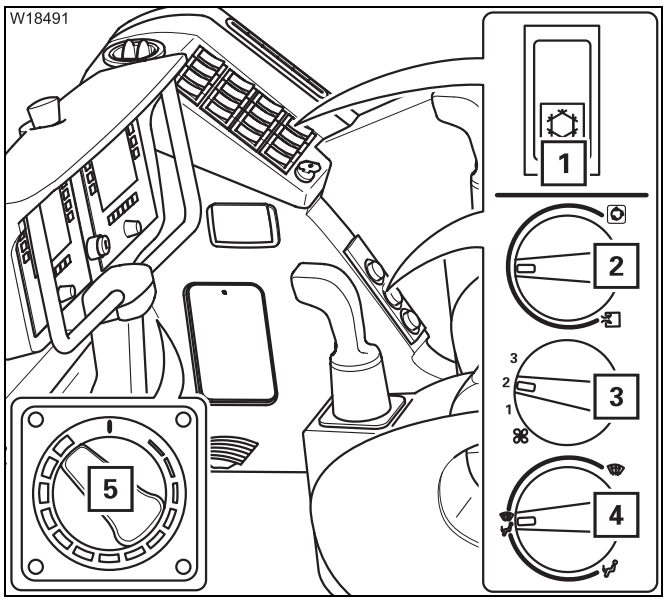
The illustration only shows one sample setting. Always adjust the setting to the current conditions.



- Press switch (**1**) down
- Turn the switch (**5**) as far as it will go, to *Cold*
- Turn switch (**3**) to the required level
- Set the air distribution with switch (**4**) – open the air vents if necessary
- If switch (**2**) is set to recirculated air, cooling will be quicker. However, no oxygen will be supplied

Drying the air

You can dry the air in the crane cab.
Here however, no heating or only a small amount will be produced.



- Press switch (**1**) down
- Turn the switch (**5**) as far as it will go, to *Warm*
- Turn switch (**3**) to the required level
- Adjust the setting for fresh air/recirculated air to the current conditions (humidity and temperature of the outer air) using switch (**2**)
- Set the air distribution with switch (**4**) – open the air vents if necessary

When drying, the air conditioning system and the heating system work against each other. After drying, switch off the device that you do not require.

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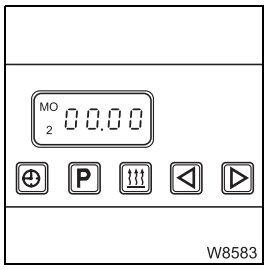
11.7.3 Auxiliary water heater

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



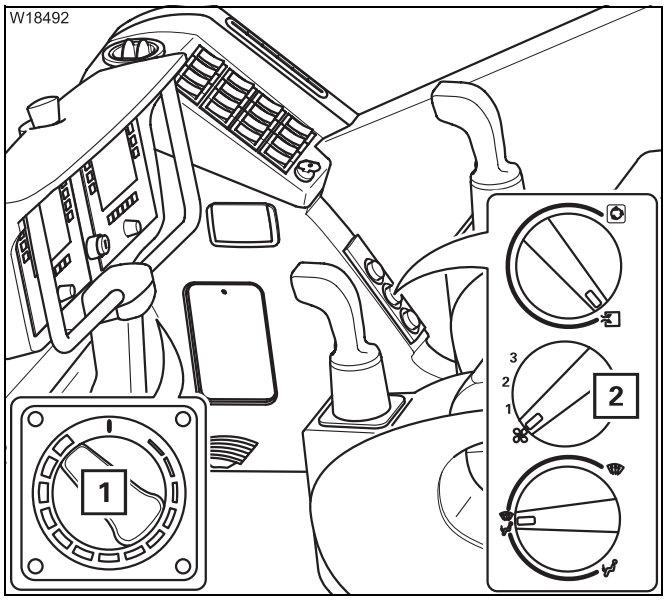
You can use the auxiliary water heater to:

– Preheat just the engine

– Preheat the engine and crane cab simultaneously

Preheating the engine

If only the engine is to be preheated, adjust the heating system as follows:



- Switch (**1**) to *Warm* setting
- Switch (**2**) to position *Fan off*

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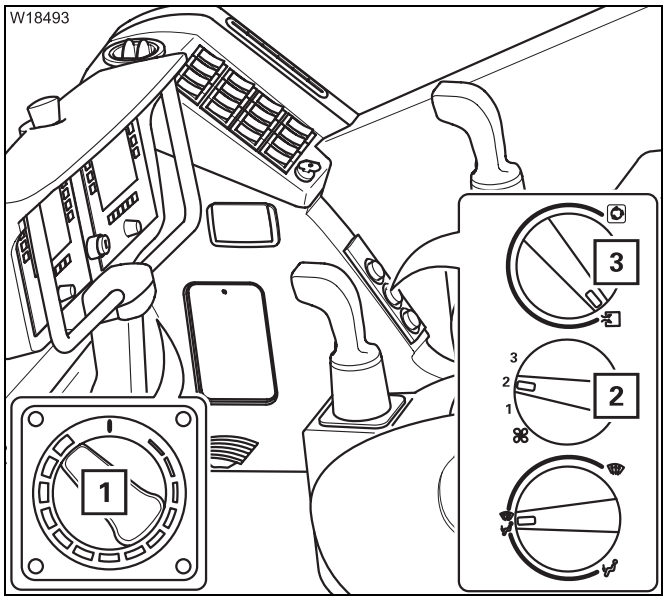
Preheating the crane cab

If the crane cab is to be preheated in addition to the engine, adjust the heating system as follows:



- Switch (**1**) to *Warm* setting
- Switch (**3**) to the *Recirculated air* symbol
- Turn switch (**2**) to the required fan level
- Open the air vents; ➠ p. 11 - 131

The amount of time required to preheat the engine will be increased significantly by simultaneously heating the crane cab.

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Switching on

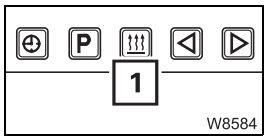
- Check whether the auxiliary heater is allowed to be operated at the current site of the truck crane before switching it on. Find out whether there are any possible sources of danger that could result in an explosion

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

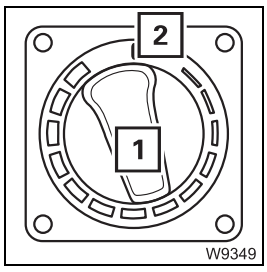
Danger of suffocation when operating the auxiliary heater
Do not use the auxiliary heater in closed spaces (e.g. a garage).

This section describes how to switch on the heater manually. The auxiliary heater can also be switched on automatically; ➠ *Storing the heating start*, p. 11 - 138.

- Turn on the ignition; ➠ *Switching on the ignition*, p. 10 - 4



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



Setting the temperature

- Turn switch (**1**) to the desired temperature

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

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

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

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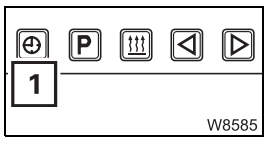
Setting the day and time

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

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



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

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

- Wait five seconds. The new time is saved and then the weekday flashes, e.g. **MO** for Monday

- Set the current day of the week on the flashing display

The display stops flashing after five seconds and the current time is displayed. The weekday goes out.

The time and weekday have now been set.

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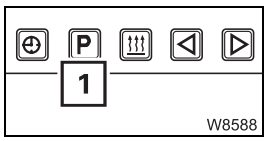
Storing the heating start

Heating is started automatically on schedule only if the time and the day of the week have been correctly set; ➠ p. 11 - 137.

You can set three different automatic heating starts – up to seven days in advance.

If you call up values in order to change them during the following setting process, they flash for 5 seconds. The entry must be made within this period. The value stops flashing after 5 seconds and is saved as the new value.



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

Flashing displays:
– The retrieved storage location, e.g. 2
– The last saved heating start, e.g. 6.00

- Set the time for the desired heating start, e.g. 8.00

Wait for approx. 5 seconds until the day of the week for the heating start flashes, e.g. **MO** for Monday.

- Set the day of the week for the desired heating start

Wait for approx. 5 seconds until the current time is shown, e.g. 14.00 hrs. Now, the new heating start has been saved and switched on.

If you wish to store one or two more heating starts, retrieve a new storage location using the P button and repeat the procedure.

After you have saved the heating start, you can also set the heating period; ➠ p. 11 - 139.

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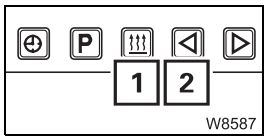
Setting the heating period

After an automatic start, the heating system will switch off automatically as soon as the set heating period has elapsed.
The heating period applies to all saved 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.

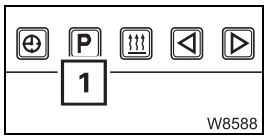
- Set the desired heating period on the flashing display. You can set a heating period of 10 to 120 minutes

Wait for approx. 5 seconds until the current time is shown, e.g. 14:00 hrs.

A new heating period has now been set.

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

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

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

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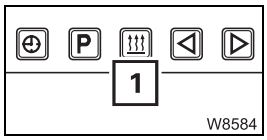
Switching off

This section only describes how to switch off the heater manually. If the auxiliary heater was switched on automatically, it will be switched off after a particular heating period. You can set this heating period; ➠ *Setting the heating period*, p. 11 - 139.

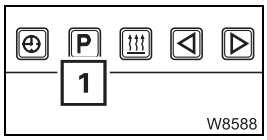


- To **switch off**, press the button (**1**) once. The auxiliary heater is switched off immediately

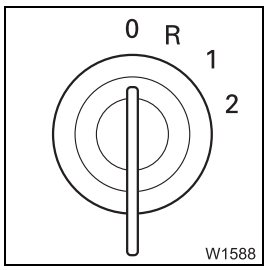
If you turn off the ignition while the auxiliary heater is in operation, the auxiliary heater continues to run for a certain period of time. You can set this remaining time; ➠ *Setting the remaining time*, p. 11 - 140.

Setting the remaining time

If the ignition is turned off while the auxiliary heater is running, the heating system will continue to run for the remaining run time.



- Switch on the heater using the (**1**) button



- Turn off the ignition

The heater continues to run and the remaining run time set last flashes, e.g. 48 minutes.

- Set the desired remaining time on the flashing display. You can set a remaining time of 1 to 120 minutes

- Wait for 5 seconds until the current time is shown.
  The remaining time is now set

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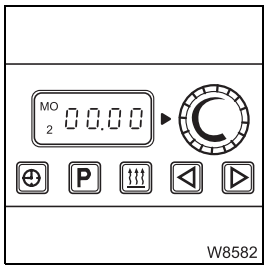
11.7.4 Auxiliary air heater



You can use the auxiliary air heater to preheat the crane cab or provide additional heating.

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

Switching on

To switch the auxiliary heater on and off, you can:

– Switch the auxiliary heater on and off manually; the ignition must be switched on for this

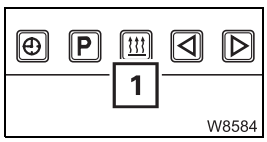
– Set an automatic heating start and heating period with the timer; ➠ *Additional functions*, p. 11 - 142

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

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

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

• Turn on the ignition; ➠ *Switching on the ignition*, p. 10 - 4



• Press the (**1**) button once.
The auxiliary heater switches on automatically – the control field lights up.

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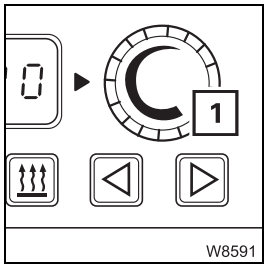
Temperature

You can preselect a temperature for the crane cab. The preselected temperature is automatically set and maintained.



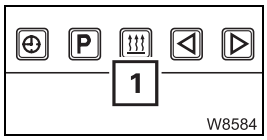
Increasing the temperature:
- Turn the switch (**1**) clockwise

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

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

Switching off

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



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

Additional functions

The auxiliary air heater has the same functions as the auxiliary water heater.

– Setting the time/day ➠ p. 11 - 137
– Storing the heating start ➠ p. 11 - 138
– Switching heating start on/off ➠ p. 11 - 139
– Setting the heating period ➠ p. 11 - 139
– Setting the remaining time ➠ p. 11 - 140

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11.8 CraneSTAR system

11.8.1 Overview

Your truck crane is equipped with the CraneSTAR system.
The CraneSTAR system is used to transmit crane data via mobile phone or satellite and thus offers various possibilities for remote diagnostics and for localising the truck crane.

Transmission is primarily via mobile phone (GSM). If transmission via mobile phone is disrupted, the device will automatically switch to transmission via satellite.

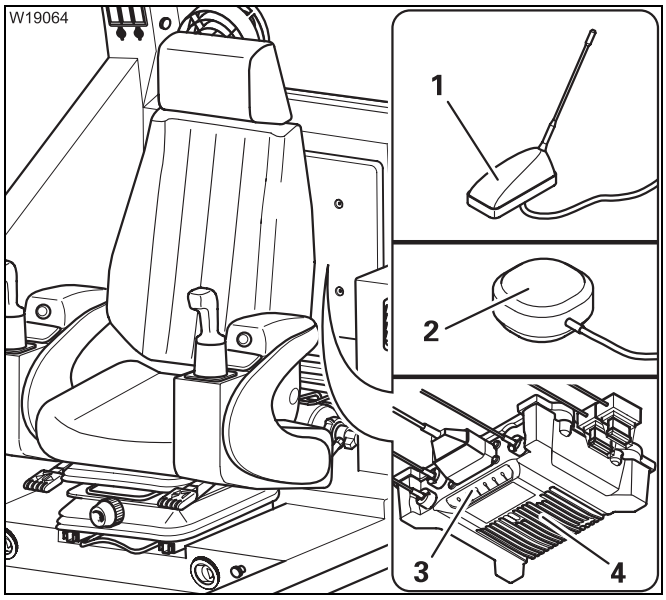
The CraneSTAR system works automatically, no controls must be operated. This document just shows the position of the associated components and gives tips on troubleshooting.

The CraneStar system will only be activated at the request of the crane operator.
Information on viewing the transmitted data in the Internet can be found in the separate *CraneSTAR Operating instructions* and at:

www.cranestar.net – here, you will find all of the information about activating the CraneStar system.

11.8.2 Position of the components

The CraneSTAR system includes two antennas and a *TCU* (**T**elematic **C**ontrol **U**nit = control unit for data transmission).



The satellite antenna (**1**) is located on the rear right or left of the turntable.

The antenna (**2**) is a combined GSM/GPS antenna for transmission via mobile phone (GSM) and for the navigation system (GPS).

The antennas are connected to the *TCU* (**4**).

The lights (**3**) are used for troubleshooting;
➠ p. 14 - 34

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12 Rigging work

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12 Rigging work

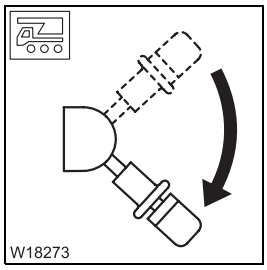
If the truck crane on the site has already been rigged, proceed according to the *CHECKLIST: Checks before operating the crane*, p. 11 - 1.

12.1 Rigging work checklists for crane operation with the main boom

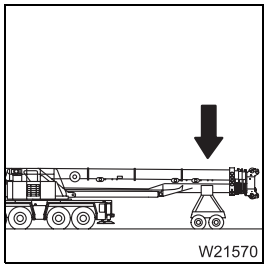
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified there.

12.1.1 CHECKLIST: Rigging

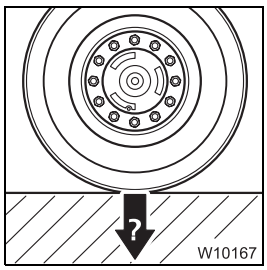
1. Choose a suitable site; ➠ *Choosing a suitable site*, p. 12 - 9



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



3. **If the main boom is resting on a trailer:**
   – Switching off the boom floating position; ➠ p. 12 - 17
   – Switch off the slewing gear freewheel; ➠ p. 12 - 18
   – If necessary, switch off boom pre-tensioning; ➠ p. 12 - 19



4. **For the working position** *free on wheels*
   – Check whether the tyre pressure has been correctly set; ➠ p. 1 - 14
   – Check whether the ground will support the maximum axle loads; ➠ *Weight and axle loads*, p. 1 - 9; ➠ *Determining the required ground bearing area*, p. 12 - 9

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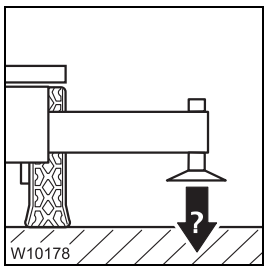
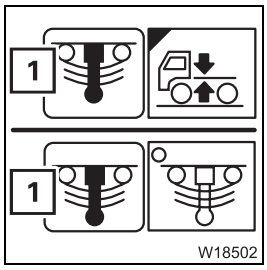
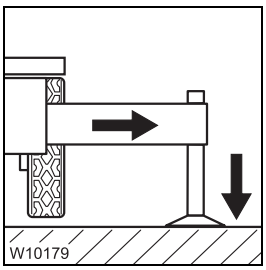
Danger of overturning if the truck crane is free-standing
When the truck crane is free on wheels, the superstructure may not be slewed.
For the *free on wheels* working position, the truck crane is first supported and fully rigged. The truck crane is then placed on the wheels.
For this reason, always follow all items in this checklist.
This prevents the truck crane from overturning when slewing.



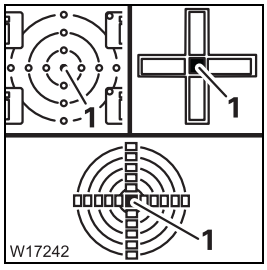
5. Check whether the ground will support the maximum occurring outrigger pressures; ➠ *Determining the required ground bearing area*, p. 12 - 9



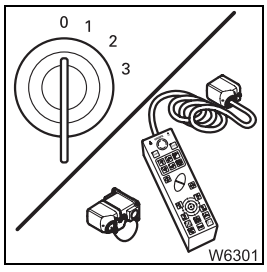
6. Switch off (lock) the suspension.
The symbol (**1**) must be **red** (suspension off); ➠ p. 5 - 15



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



8. Align the truck crane horizontally.
The lamp (**1**) lights up in the measuring range **1°**; ➠ p. 12 - 50



9. Turn off the engine and remove the hand-held control;

➠ *Starting/turning off the engine with the hand-held control*, p. 12 - 23,

➠ *Disconnecting the hand-held control*, p. 12 - 22.

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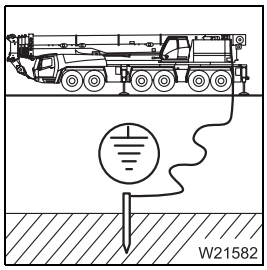
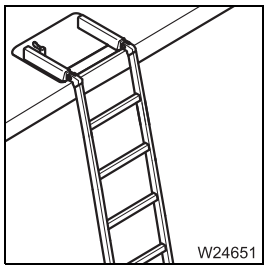
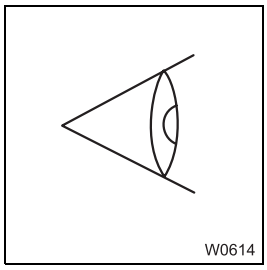


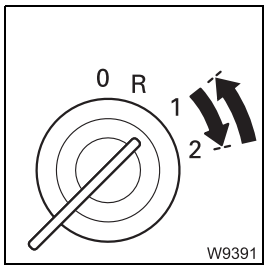
10. Earth the truck crane, if necessary; ➠ *Earthing the truck crane*, p. 12 - 13



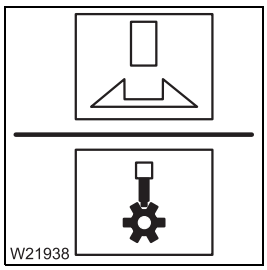
11. Fold out **all** ladders; ➠ *Ladders*, p. 4 - 5.



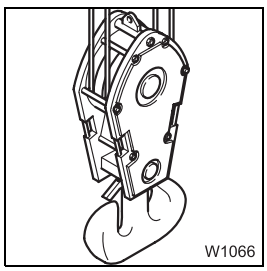
12. Inspect the truck crane, while looking out in particular for any leaking fluids (oil, fuel or water)



13. Start the engine for crane operation; ➠ p. 10 - 8



14. If necessary, switch off the houselock and unlock the superstructure;
➠ *Switching off the houselock*, p. 11 - 17
➠ *Unlocking the superstructure*, p. 11 - 14



15. Pick up the hook block and reeve the hoist rope again, if necessary;
➠ *Hook block on a separate vehicle*, p. 12 - 111,
➠ *Hook block on the bumper*, p. 12 - 109,
➠ *Reeving and unreeving the hoist rope*, p. 12 - 114.

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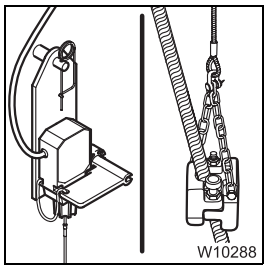
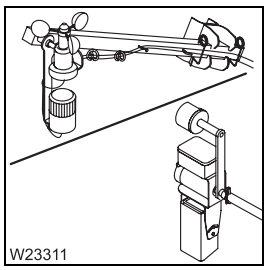
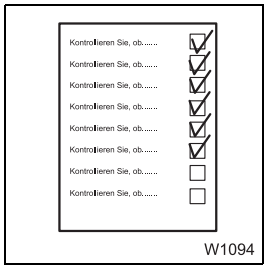


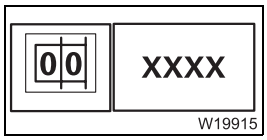
16. Install the lifting limit switch; ➠ p. 12 - 126



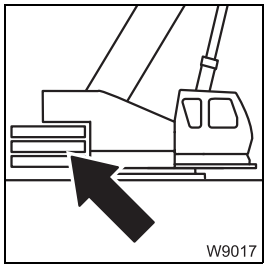
17. Install anemometer, air traffic control light and camera on main boom;
➠ *Anemometer and air traffic control light*, p. 12 - 132,
➠ *Camera on main boom*, p. 12 - 137.



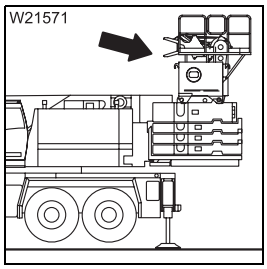
18. Perform all the required checks prior to crane operation;
➠ *CHECKLIST: Checks before operating the crane*, p. 11 - 1



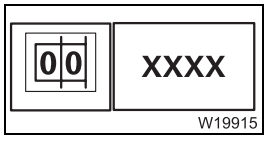
19. Enter the current rigging mode on the RCL; ➠ p. 11 - 23



20. With the RCL adjusted accordingly, rig the counterweight combination required for the operation according to the *Lifting capacity table*;
➠ *CHECKLIST: Counterweight, rigging*, p. 12 - 62



21. If required, assemble the auxiliary hoist; ➠ *CHECKLIST: Mounting the auxiliary hoist*, p. 12 - 94



22. Enter the current rigging mode with the newly rigged counterweight version on the RCL; ➠ p. 11 - 23

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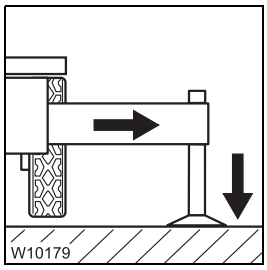
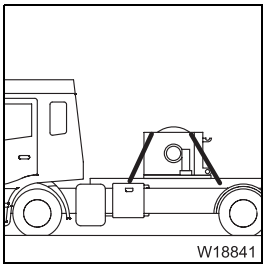
12.1.2 CHECKLIST: Unrigging

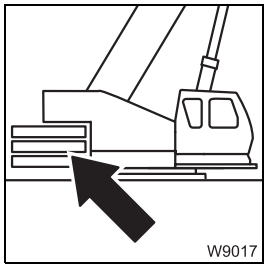
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified there.



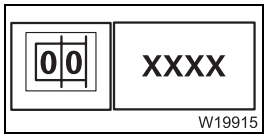
1. **If the truck crane is in the *Free on wheels* working position:**
   Support the truck crane with the outrigger span required for the job according to the *Lifting capacity table* and raise until none of the wheels touches the ground; ➠ *Outriggers*, p. 12 - 29



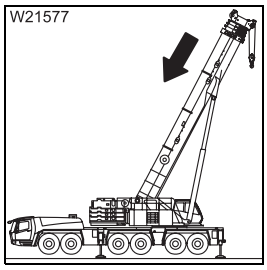
2. If required, remove the auxiliary hoist; ➠ *CHECKLIST: Removing the auxiliary hoist*, p. 12 - 96



3. With the RCL adjusted accordingly, unrig the counterweight; ➠ *CHECKLIST: Counterweight, unrigging*, p. 12 - 65



4. Enter the current rigging mode with the newly rigged counterweight version on the RCL; ➠ p. 11 - 23



5. Retract main boom, lock telescopic sections and lock telescoping cylinder with telescopic section I for on-road driving; ➠ *Locking the telescopic section for on-road driving*, p. 11 - 90

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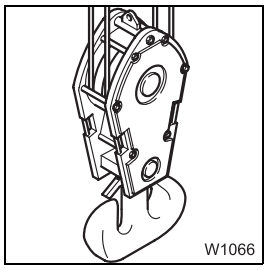
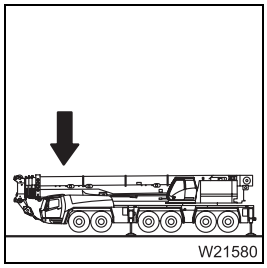


6. Depending on transport:

– Attach the hook block to the bumper; ➠ p. 12 - 110

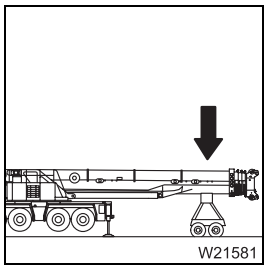
– Set down the hook block and unreeve the hoist rope;
➠ *Setting down the hook block*, p. 12 - 112,
➠ *Unreeving the hoist rope*, p. 12 - 118.



7. For on-road driving without trailer:

– Turn superstructure to the 180° position to the front with the RCL adjusted accordingly

– Place the main boom on the boom rest



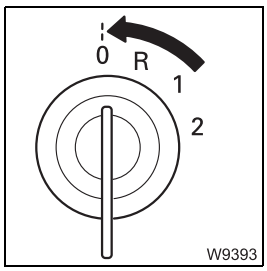
8. For on-road driving with a trailer:

– Set down the superstructure on a trailer with the RCL adjusted accordingly and switch on the boom floating position; ➠ p. 6 - 8

– Switch on slewing gear freewheel; ➠ p. 6 - 7

– Switch on boom pre-tensioning if necessary; ➠ p. 6 - 9

– Switch off the houselock; ➠ p. 11 - 15



9. Turn off the engine for crane operation; ➠ p. 10 - 17

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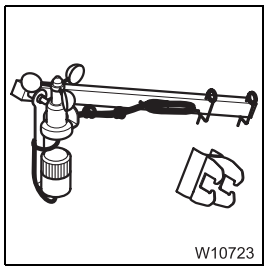
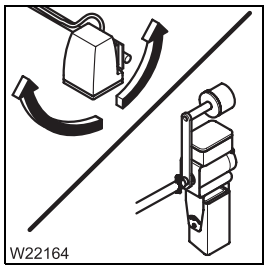
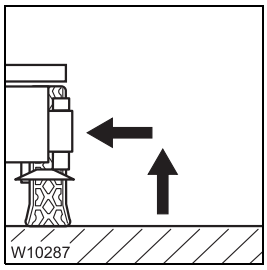


10. Remove anemometer and the air traffic control light; ➠ p. 12 - 132

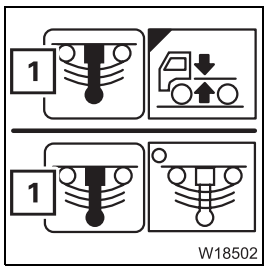


11. Remove camera on main boom;
➠ *Camera on main boom*, p. 12 - 137.

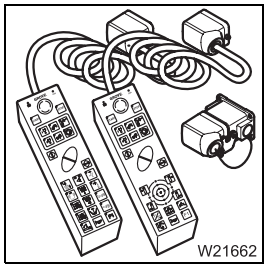
Lower the slewable spotlights; ➠ p. 11 - 109



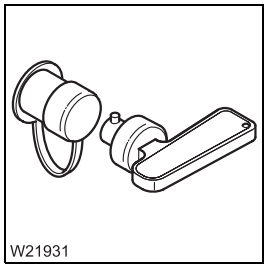
12. Retract the outriggers; ➠ *CHECKLIST: Retracting the outriggers*, p. 12 - 31



13. Activate (unlock) the suspension.
The symbol (**1**) must be **green** (suspension on); ➠ p. 5 - 15



14. Turn off the engine and, if necessary, remove the hand-held control and stow it away in the driver's cab; ➠ *Disconnecting the hand-held control*, p. 12 - 22



15. When the truck crane is no longer being used; ➠ *In case of work breaks of more than 8 hours*, p. 11 - 129

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12.2 Choosing a suitable site

Choose the position of your truck crane at the site with care. Observe the following aspects:

– Check whether the ground has sufficient load bearing capacity. You may need to enlarge the ground bearing area; ➠ p. 12 - 9

– Observe the required safe distances from slopes and pits; ➠ p. 12 - 12

– Earth the truck crane if there is a danger of it being charged with static electricity; ➠ p. 12 - 13

– Keep a safe distance away from electrical lines; ➠ p. 12 - 13

– Choose the site such that the unevenness of the ground can be compensated for by adjusting the outrigger cylinders. Maximum hoist of the outrigger cylinders; ➠ p. 1 - 15

– Choose a location where it is possible to keep the working radius to a minimum and where no obstacles are within the slewing range of the crane

12.2.1 Determining the required ground bearing area

The stability of the truck crane primarily depends on the load bearing capacity of the ground. The load bearing capacity of the ground and the occurring outrigger pressure determine the ground bearing area required for the operation.

$$\text{surface area } (m^2) = \frac{\text{outrigger pressure (t)}}{\text{loadbearing capacity of the ground } \left(\frac{t}{m^2}\right)}$$

Outrigger pressure

• Determine the outrigger pressure for the operation planned using the *Outrigger pressure table*.

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Load bearing capacity of the ground

- Find the load bearing capacity of the ground using the table.

APPROXIMATE VALUES FOR THE LOAD BEARING CAPACITY OF THE GROUND		Load bearing capacity t/m^2 (lbs/ft^2)
Backfilled, not artificially compacted ground:		0 to 10 (0 to 2050)
Natural, apparently untouched ground:		
Mud, peat, marsh		0
Non-cohesive ground which is sufficiently firm:	Fine to medium sand	15 (3 070)
	Coarse sand to gravel	20 (4 100)
Cohesive ground:	Mushy	0
	Soft	4 (820)
	Stiff	10 (2 050)
	Semi-solid	20 (4 100)
	Hard	40 (8 200)
Rock with minimal fissures in sound, unweathered condition and with favourable strata:	In compact succession of beds	150 (30 700)
	In massive or columnar formation	300 (61 400)

If you are unsure about the load bearing capacity of the ground, please have the ground tested.

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Ground bearing area

- Now calculate the required ground bearing area
- Check that the surface of the outrigger pad (➠ p. 1 - 15) is larger than the calculated ground bearing area. If the surface of the outrigger pad is smaller, you will need to enlarge the ground bearing area

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

Example for calculating the required ground bearing area:

If the outrigger pressure is 25 t and the ground has a bearing capacity of 40 t/m^2, then the required ground bearing area for this supporting cylinder is 0.625 m^2 (= 6250 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. 12 - 44.

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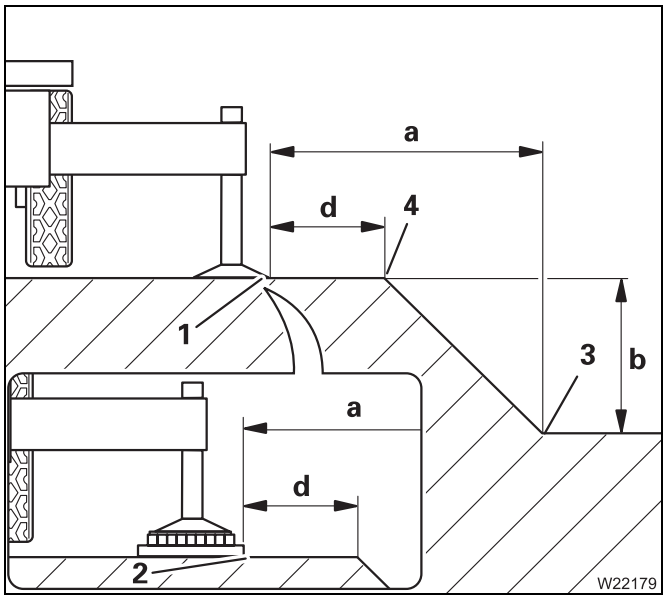
12.2.2 Safe distance from slopes and pits

Erect the crane at a safe distance from slopes and pits. The distance also depends on the type of ground if the slopes and pits are not supported.



Rule of thumb:

If you are working on *non-cohesive or filled-in* ground, the safety distance (**a**) must be twice as large as the pit depth (**b**).

a = 2 x b

If you are working on *cohesive or undisturbed* ground, the safe distance (**a**) be as great as the depth of the pit (**b**).

a = 1 x b

The safe distance is measured from the base of the pit (**3**).

In addition to this, the safe distance (**d**) between the outrigger pads (**1**) or support material (**2**) and the pit border (**4**) must always be more than 2.00 m (6.6 ft).

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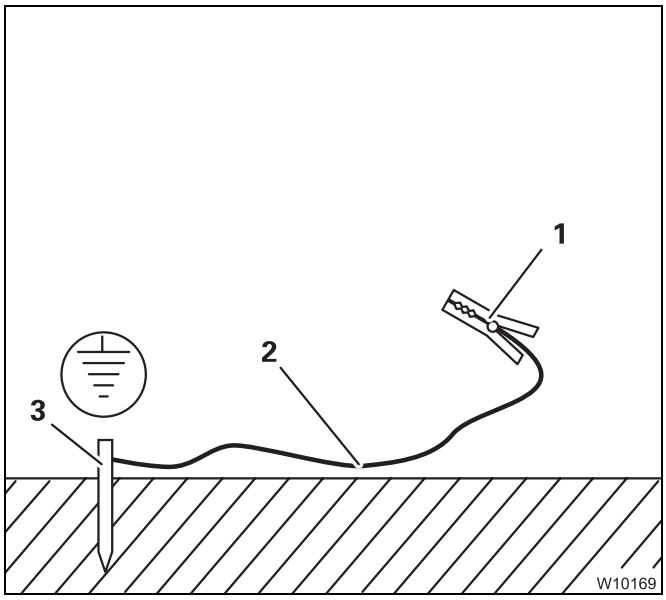
12.2.3 Earthing the truck crane

The truck crane may become charged with static electricity. This may occur especially when using outrigger pads made of plastic or when the outrigger pads are packed with insulating material (e.g. wooden planks).

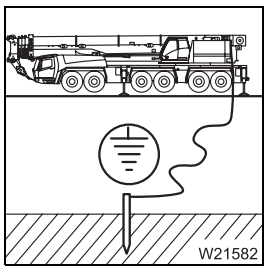
Risk of accident due to electric shock
Earth the truck crane before you start to work with it:
– Near strong transmitters (radio transmitters, radio stations, etc.)
– Near high-frequency switchgears
– If a thunder storm is forecast



Use electrically conducting material for earthing.

- Hammer a metal rod (**3**) (length approx. 2.0 m [6.6 ft]) at least 1.5 m (5 ft) into the ground
- Dampen the soil around the metal rod (**3**) for better conductivity
- Clamp an insulated cable (**2**) to the metal rod (**3**) (cross-section of at least 16 mm^2 [0.025 in^2])
- Connect the free end of the cable with a clamp (**1**)

Risk of accident due to electric shock
Ensure that the connections between the cable and the clamp are electrically conductive.
Do not attach the clamp to parts that are screwed on, such as valves, covers or similar parts.



- Attach the clamp to the main boom or to the superstructure

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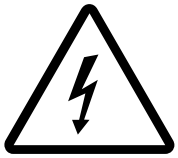
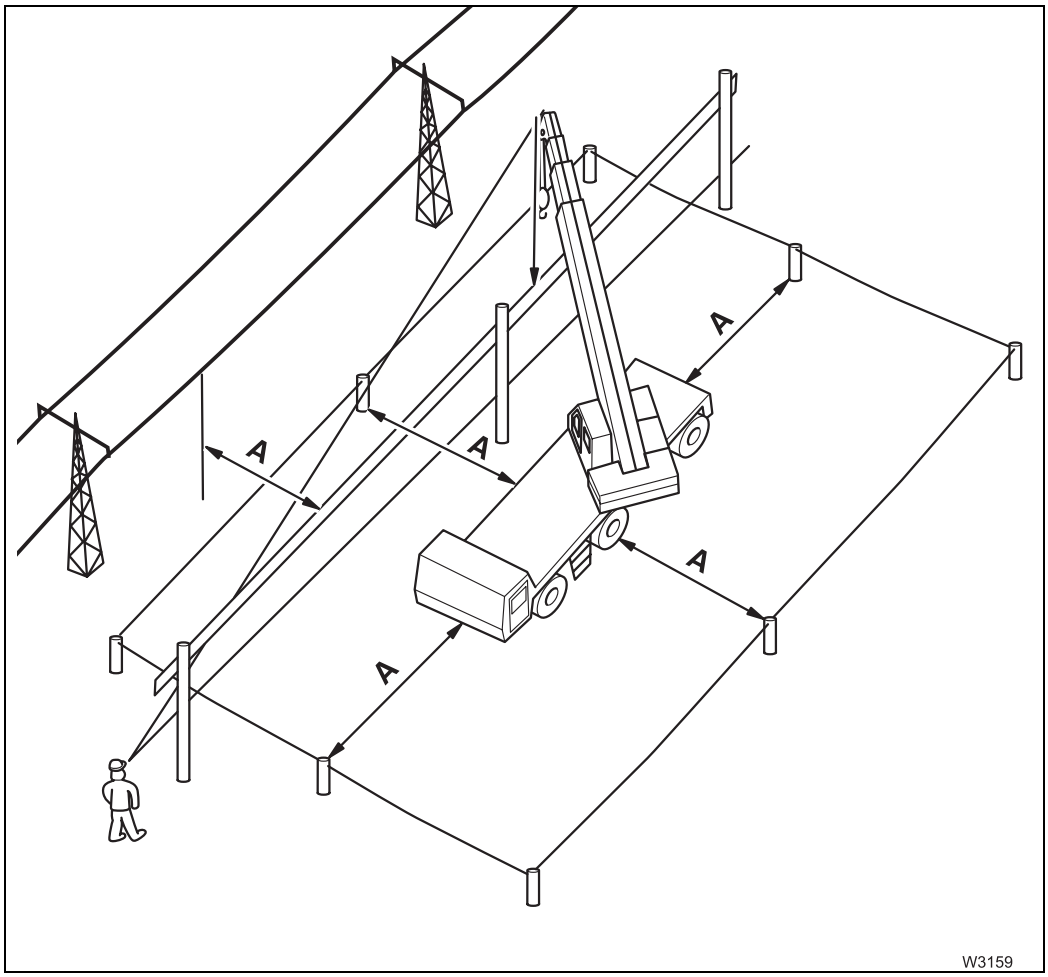
12.2.4 Safe distance from electrical cables

Always observe the respective national regulations when working in the vicinity of electrical lines.



Risk of accident due to electric shock
This truck crane is not insulated.
If the truck crane, its equipment, its load/lifting tackle or the guide ropes touch an electric cable, this will cause serious injury or even death.

- If there are electric cables in the working range of the truck crane, have these cables disconnected from the source of power, if possible



If this is not possible, you must at least observe the prescribed safe distance (**A**).

Different safe distances are recommended by the respective national regulations:

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For example, according to DIN VDE 0105

Voltage	Safe distance (A)
up to 1 000 V	1 m (3.3 ft)
from 1 000 V to 110 000 V	3 m (9.8 ft)
from 110 000 V to 220 000 V	4 m (13.1 ft)
over 220 000 V to 380 000 V	5 m (16,4 ft)

For example as per ASME B 30,5 (USA)

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

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

If you have touched the electric cable:

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

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12.3 Rigging work after driving with a trailer

If the main boom was resting on a trailer (dolly) while driving the truck crane, you must perform the following before working with the crane:

– Switch off the slewing gear freewheel; p. 12 - 18

– Switch off the boom floating position; p. 12 - 17

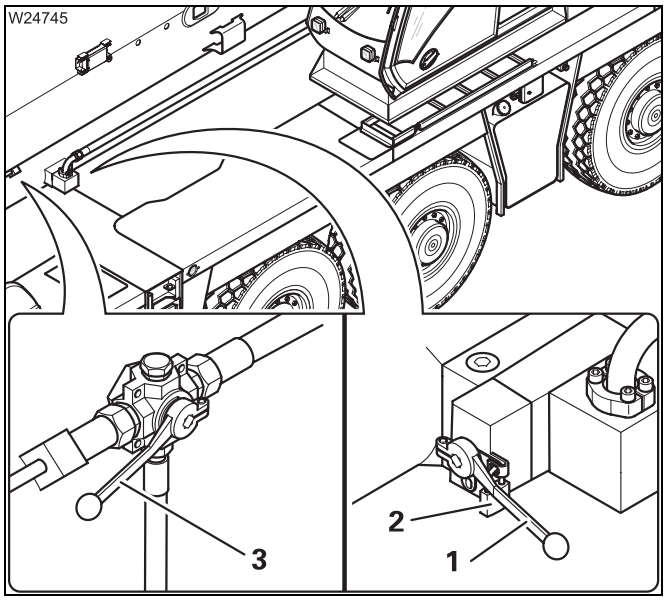
– Switch off boom pre-tensioning, if necessary; p. 12 - 19

12.3.1 Switching off the boom floating position

You must switch off the boom floating position before you raise the main boom off the trailer.

Risk of accident from the main boom falling down
Always secure the lever with the padlock after switching off the boom floating position.

This prevents the raised main boom from falling down when actuating the lever.



- Remove the padlock (**2**)
- Switch over valve I – lever (**1**) horizontal and pointing outward.
- Secure the lever (**1**) with the padlock (**2**)
- Switch the valve IV over – lever (**3**) points forwards

The boom floating position is now switched off.

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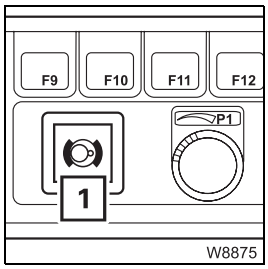
12.3.2 Switching off the slewing gear freewheel

If the slewing gear freewheel is switched on, switch it off prior to working with the crane.

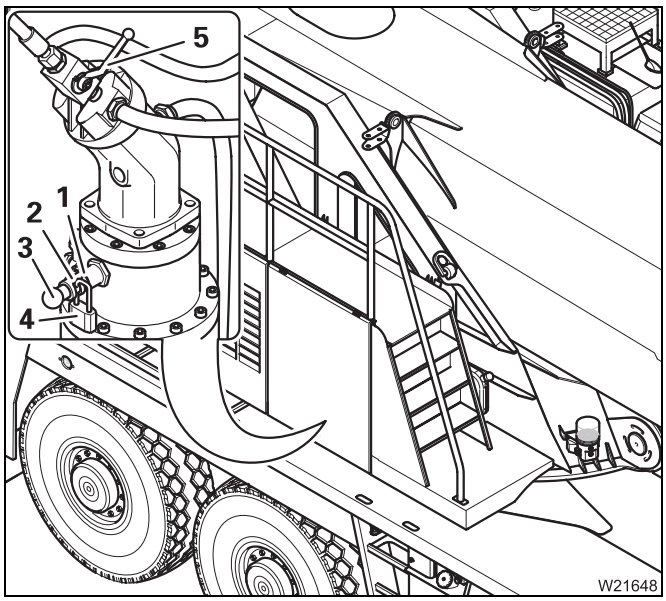
Risk of accident with the slewing gear freewheel switched on
Switch off the slewing gear freewheel before working with the crane.
If it is not switched off, the slewing gear brake does not work and you cannot stop slewing movements in time.



Requirements

– The engine for crane operation is running

– The slewing gear brake is released, the lamp (**1**) has gone out;
➠ *Releasing the slewing gear brake*, p. 11 - 99



Switching off

- Remove the lock (**4**) from the bore (**1**)
- Pull the pin (**3**) out as far as possible
- Secure the pin with the lock in the bore (**2**) and remove the key
- Pull and secure the pin (**3**) on the other slewing gears in the same way
- Close the valve (**5**) – the slewing gear freewheel is switched off

Before slewing

Support the truck crane with the necessary outrigger span, enter the corresponding RCL code and derrick the main boom to an angle permissible within the working range.

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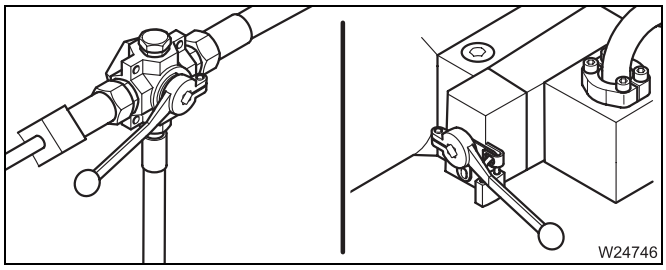
12.3.3 Switching off boom pre-tensioning

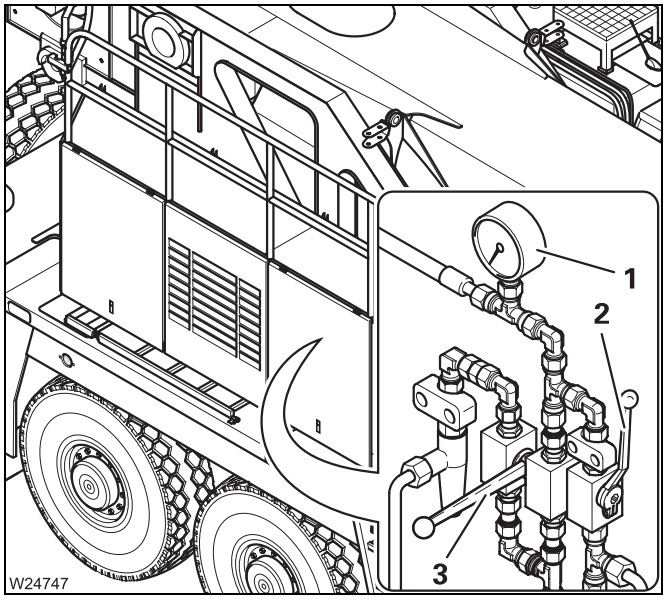
You must switch off the boom pre-tensioning before you raise the main boom off the trailer.

To switch off boom pre-tensioning, you must bring the valves I to IV into the required positions, which will empty the pressure accumulator.

Danger of the hydraulic oil overheating
Always switch the valve IV over (lever in horizontal position) before operating the crane.
This prevents the pressure in the hydraulic circuit from rising and the hydraulic oil from exceeding the permissible temperature of 80 °C (176 °F).



- Switch off the boom floating position;
  ➠ p. 12 - 17



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

- Open valve II – the lever (**2**) is vertical

The pressure accumulator is emptied. The pressure on the pressure gauge (**1**) must drop to 0 bar (0 psi).

Valve III stays closed – the lever (**3**) points downwards.

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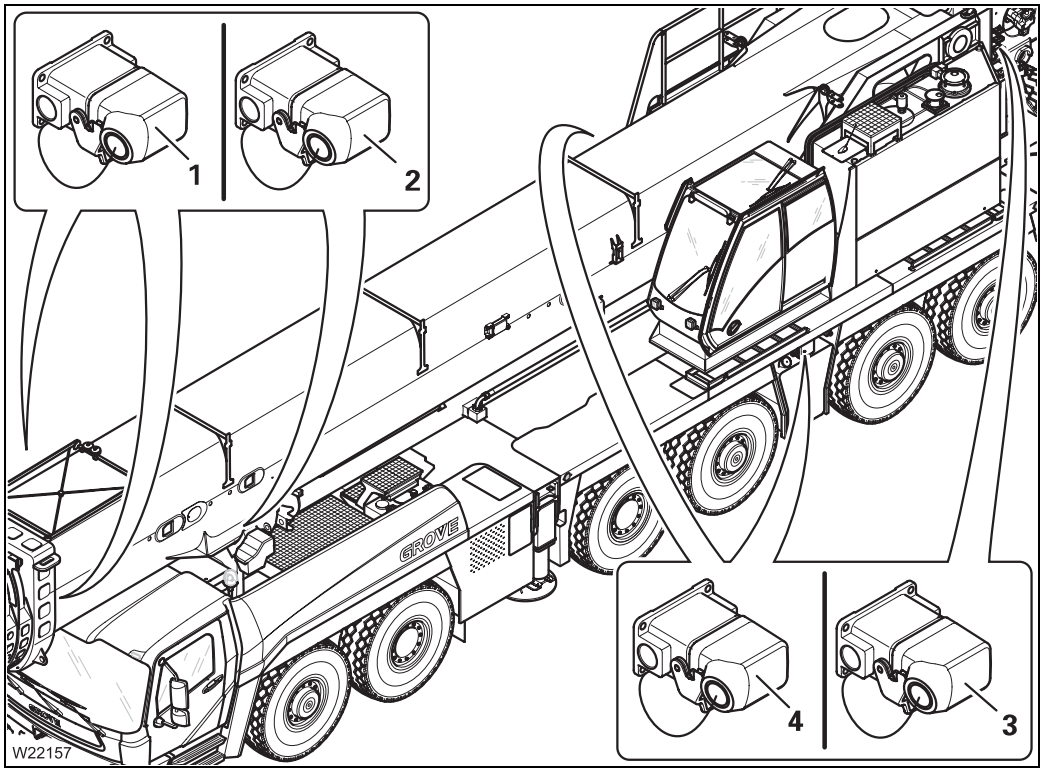
12.4 Connecting/disconnecting the hand-held control

Functionality of the sockets



Socket		Released operations
1	At the front of the main boom	– Rigging MWL
2	On the derricking cylinder	– Derricking gear emergency operation
3	At the rear on the turntable	– Counterweight lifting cylinder – Counterweight lock – Locking, unlocking auxiliary hoist – Raising/setting down auxiliary hoist, catcher 2 – Pulling device, main boom pivot pin – Emergency operation for slewing gear, turntable lock, main hoist, auxiliary hoist – Rigging winch
4	On the carrier	– Outrigger

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

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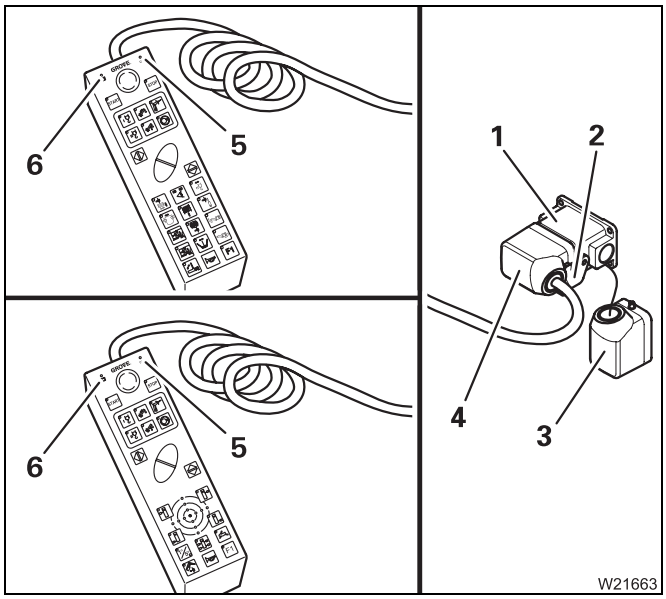
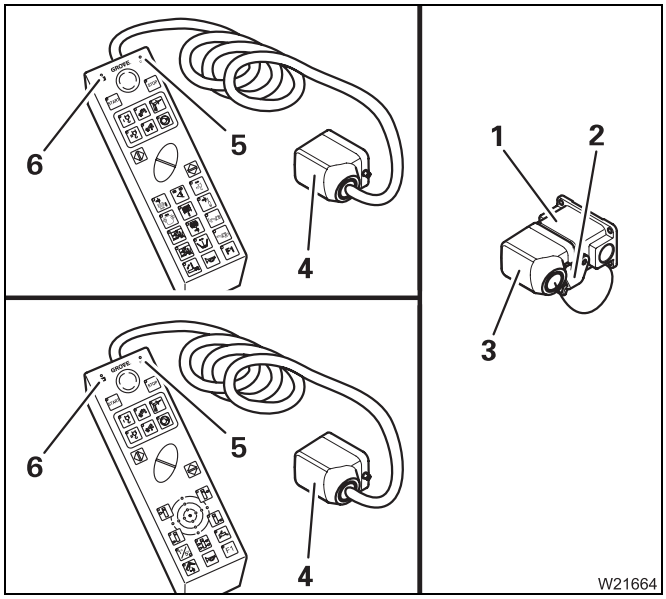


Connecting the hand-held control

- 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 about 20 seconds, the lamps (**5**) and (**6**) light up – the ignition is switched on

There is a malfunction if the lamp (**5**) does not light up or flash; ➠ p. 14 - 20.

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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12.5 Starting the engine for driving for rigging work

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

– With the hand-held control

– From the crane cab

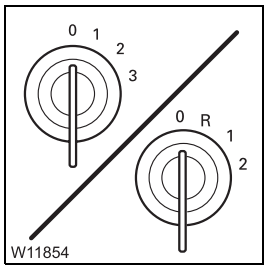
– From the operating elements of the outriggers

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

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

Requirements

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



– The ignition is switched off in the crane cab

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

• Connect the hand-held control to a socket on the carrier; p. 12 - 22

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

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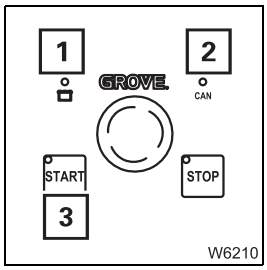
Starting the engine

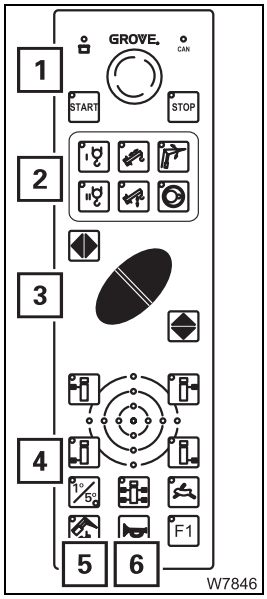
All activities and inspections required to start the engine must be carried out before starting the engine; p. 4 - 1.



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

If the lamp (**2**) does not go on or flash after about 20 seconds, there is a malfunction; p. 14 - 20.

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



The following buttons are now active on the hand-held control:

– All buttons on the control panel (**1**)

– The function buttons (**3**)

– All buttons on the control panel (**4**)

– The button (**6**) for the horn on the carrier

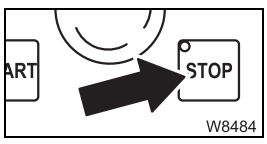
The button (**2**) and button (**5**) are inactive.

The *Outrigger* control units are locked after connection of the hand-held control.

You can start the engine from the crane cab, but the operating elements for crane operation are disabled after starting the vehicle engine with the hand-held control.

Turning off the engine

You cannot turn off the engine with the ignition lock in the driver's cab, if it was started with the hand-held control.



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

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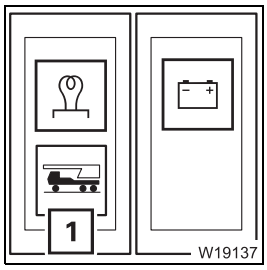
12.5.2 Starting/turning off the engine from the crane cab

Requirements

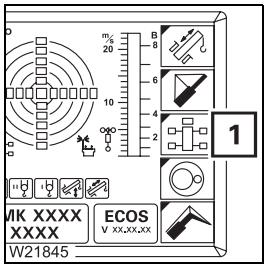
The following requirements must be met before you can start the engine from the crane cab:



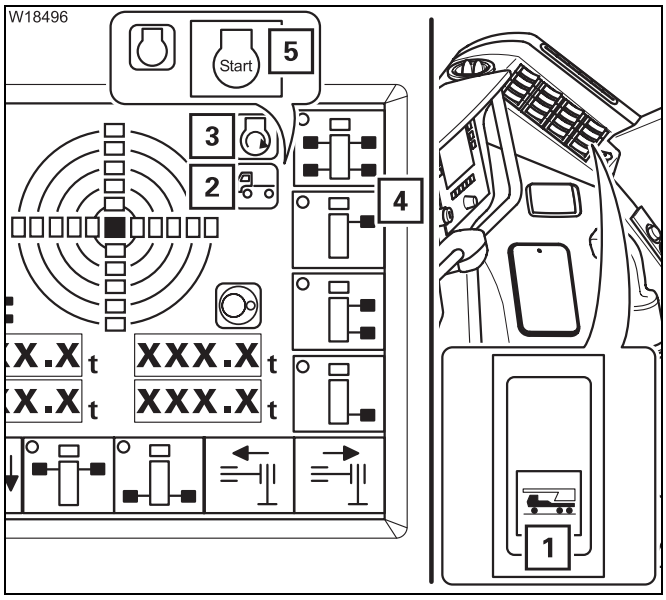
– The hand-held control has been disconnected and bridging plugs have been plugged into all superstructure and carrier sockets
– The carrier ignition is switched off and the ignition key is removed. The lamp (**1**) in the crane cab has gone out
– The superstructure ignition has been switched on for approx. 30 seconds

Starting the engine

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



• If necessary, open the main menu Esc and press the (**1**) button once. The *Outriggers* submenu opens



• Press the (**1**) button **down** once

The carrier ignition is turned on:

– The indicator lamp in the button (**1**) flashes
– The symbol (**2**) turns **green**

• Press the (**5**) button once. The engine starts

When the engine is running:

– The symbols (**3**) and (**4**) are displayed
– The lamp in the button (**1**) lights up

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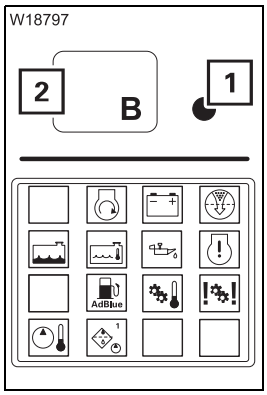
After starting the engine

The engine runs at idling speed. The engine speed cannot be changed.

You can operate the functions from the crane cab in the *Outriggers* submenu; ➠ p. 12 - 41.



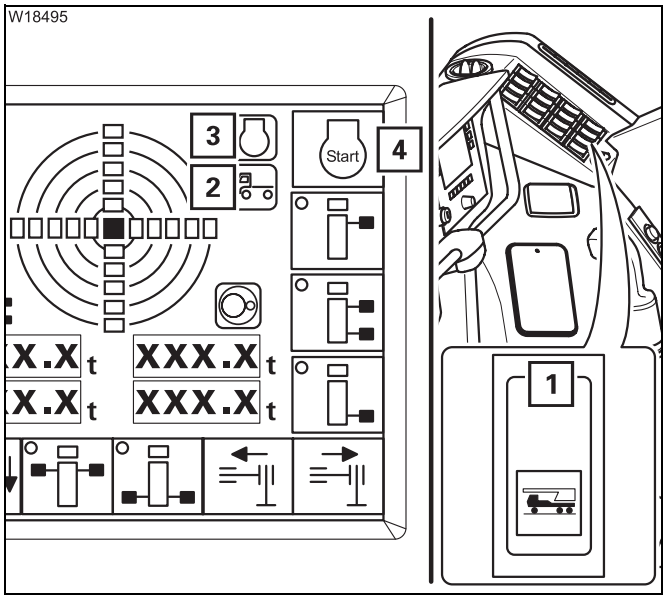
In the event of a warning message on the carrier, the lamp (**1**) flashes.

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

The *Warning* submenu (carrier) opens. The corresponding symbol is **red**; ➠ p. 11 - 111.

Turning off the engine

Your can turn off the engine from the crane cab or using any of the emergency stop switches on the superstructure or the carrier.



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

  The carrier ignition is turned off and the engine is switched off.

  – The lamp in the button (**1**) goes out
  – The symbol (**2**) turns **red**
  – The symbols (**3**) and (**4**) are displayed

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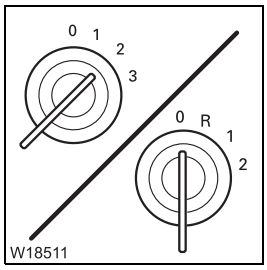
12.5.3 Starting/turning off the engine from the outrigger control units

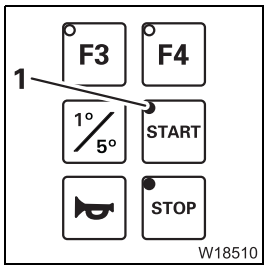
Requirements

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



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

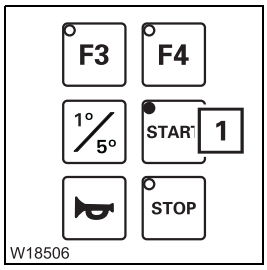
– The ignition is switched off in the crane cab



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

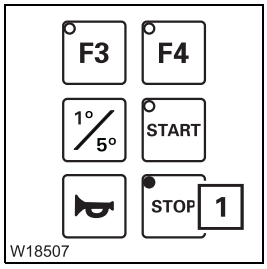
Starting the engine

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



• Press the (**3**) button once – the engine starts

Turning off the engine



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

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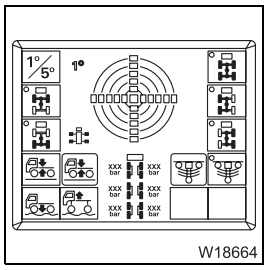
12.6 Outriggers

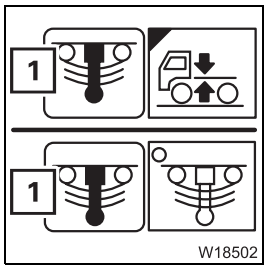
Danger of crushing from extending outrigger beams
You may only activate the outriggers if you yourself or a banksman with whom you are in visual contact have an unobstructed view of their movements.

12.6.1 CHECKLIST: Extending the outriggers

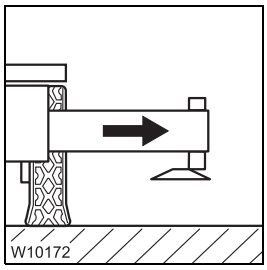
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified there.



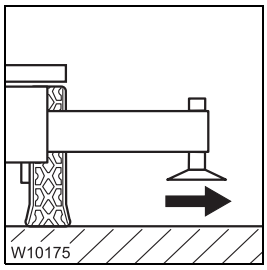
1. Level the truck crane with the level adjustment system and lower it as far as possible; ➠ p. 5 - 60.



2. Switch off (lock) the suspension.
The symbol (**1**) must be **red** (suspension off); ➠ p. 5 - 15.



3. Extend all outrigger beams to the required span;
➠ *Permissible outrigger spans*, p. 12 - 32,
➠ *Setting the outrigger spans*, p. 12 - 34,
➠ *Extending/retracting outrigger beams*, p. 12 - 37.



4. Move the outrigger pads into working position and secure them;
➠ p. 12 - 43.

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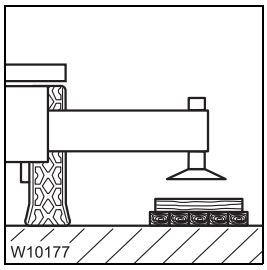
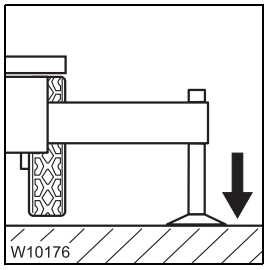
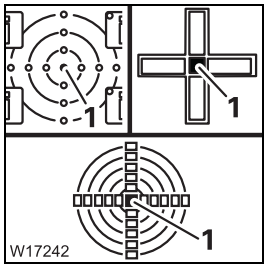


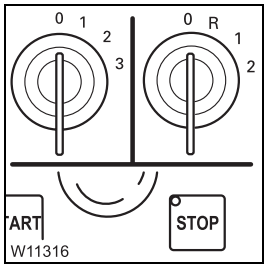
5. Enlarge the ground bearing area if necessary;
➠ *Determining the required ground bearing area*, p. 12 - 9,
➠ *Enlarging the ground bearing area*, p. 12 - 44.



6. Extend the supporting cylinders until none of the wheels are touching the ground; ➠ p. 12 - 45.



7. Level the truck crane with the outriggers.
The lamp (**1**) lights up in the measuring range **1°**; ➠ p. 12 - 50.



8. Turn off the engine:
– After operating it with the hand-held control; ➠ p. 12 - 24,
– After operating it from the control units; ➠ p. 4 - 25,
– After operating it from the crane cab; ➠ p. 12 - 26.

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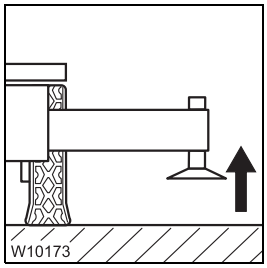
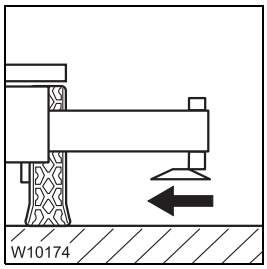
12.6.2 CHECKLIST: Retracting the outriggers

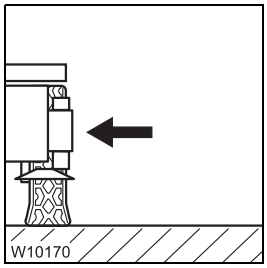
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified there.



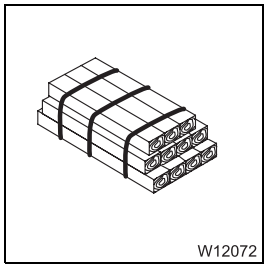
1. Retract the outrigger cylinders as far as possible; ➠ p. 12 - 45.



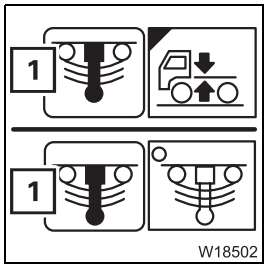
2. Move the outrigger pads into driving position and secure them;
➠ *Moving them into driving position*, p. 12 - 43.



3. Fully retract and secure all outrigger beams;
➠ *Permissible outrigger spans*, p. 12 - 32,
➠ *For on-road driving*, p. 12 - 36,
➠ *Extending/retracting outrigger beams*, p. 12 - 37.



4. Stow away packing material safely, if applicable.



5. Activate (unlock) the suspension.
The symbol (**1**) must be **green** (suspension on); ➠ p. 5 - 15.

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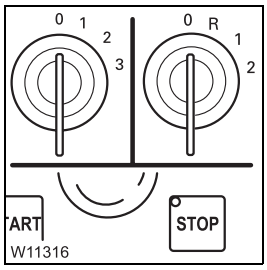
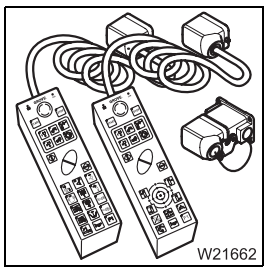


6. Turn off the engine:

– After operating it from the control units; ➠ p. 4 - 25.

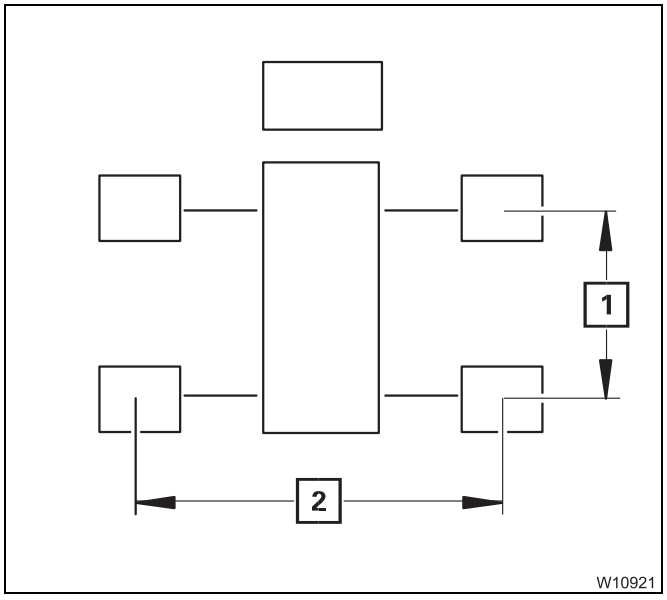
– After operating it from the crane cab or using the hand-held control; ➠ p. 10 - 17.



7. If necessary, disconnect the hand-held control and stow it away; ➠ p. 12 - 22.

12.6.3 Permissible outrigger spans

Risk of overturning when slewing the superstructure
With some outrigger spans, slewing is only permissible with certain counterweight combinations and boom positions; ➠ *Slewing with rigged counterweight*, p. 12 - 89.



The *Lifting capacity table* specifies the permissible outrigger spans in metre x metre (feet x feet):

A 8.70 x 8.50 m (28.5 x 27.9 ft)

B 8.70 x 7.40 m (28.5 x 24.3 ft)

C 8.70 x 6.30 m (28.5 x 20.4 ft)

D 8.70 x 5.00 m (28.5 x 16.4 ft)

M 8.70 x 2.71 m (28.5 x 8.9 ft)

7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) (rear outriggers)

The first value represents the outrigger length (**1**), e.g. 8.70 m (28.5 ft).

The second value specifies the required outrigger span (**2**), e.g. 8.50 m (27.9 ft).

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12.6.4 Preparing the truck crane

In the driver's cab

Levelling the truck crane

- Align the truck crane horizontally with the level adjustment system; ➠ *Operating the level adjustment system*, p. 5 - 60.

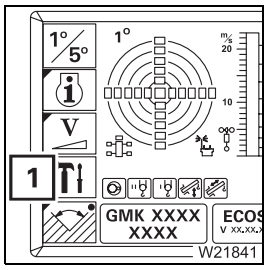
Locking the suspension

- Switch off the suspension; ➠ p. 5 - 14.

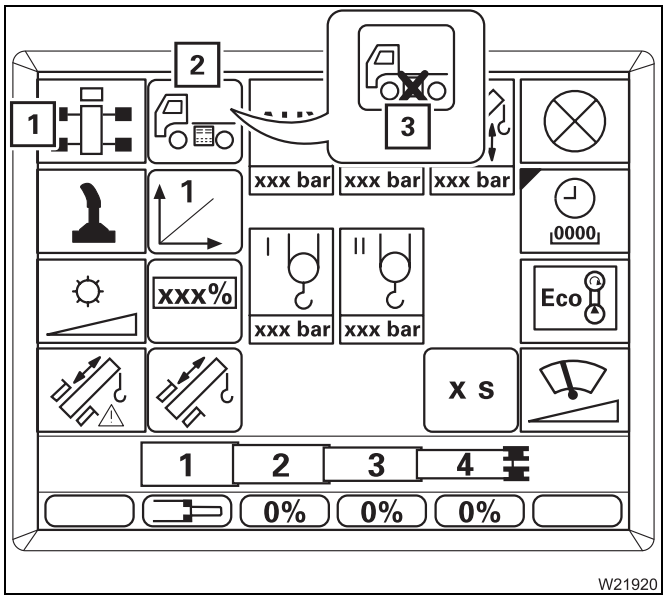
The operating elements for the outriggers are only released if the suspension is switched off. If the suspension is switched off, the wheels are lifted when the crane is put on outriggers.

Outriggers control units

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



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



This opens the *Settings* submenu.

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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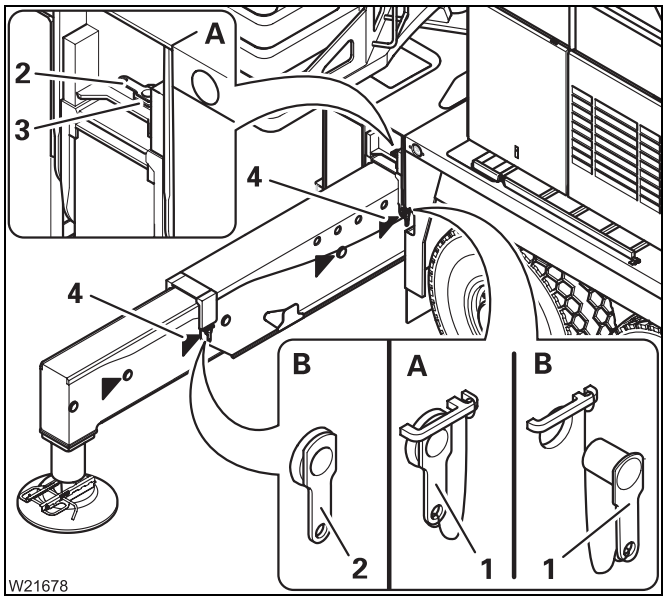
12.6.5 Setting the outrigger spans

Only extend the outrigger beams to the permissible span.

Danger of overturning if the outrigger beams are not correctly extended
Always extend **all** outrigger beams to the required outrigger span even if you are only working on one side. Otherwise the rear stability for the rigging mode according to the RCL code is no longer guaranteed.

This section describes how to release and secure the outrigger beams, as well as the markers for the outrigger spans.
There are various ways to move the outrigger beams; ➠ *Extending/retracting outrigger beams*, p. 12 - 37.



Outrigger span 8.70 x 8.50 m (28.5 x 27.9 ft)

(**A**) – Requirements

- Pin (**1**) is removed
- Pin (**2**) inserted in holder (**3**)

(**B**) – Setting and securing

- Extend the outrigger beam up to the marking (**4**).
- Secure the outrigger beam with the pin (**1**) and (**2**).
- Set the outrigger span on the other outrigger beam in the same way.

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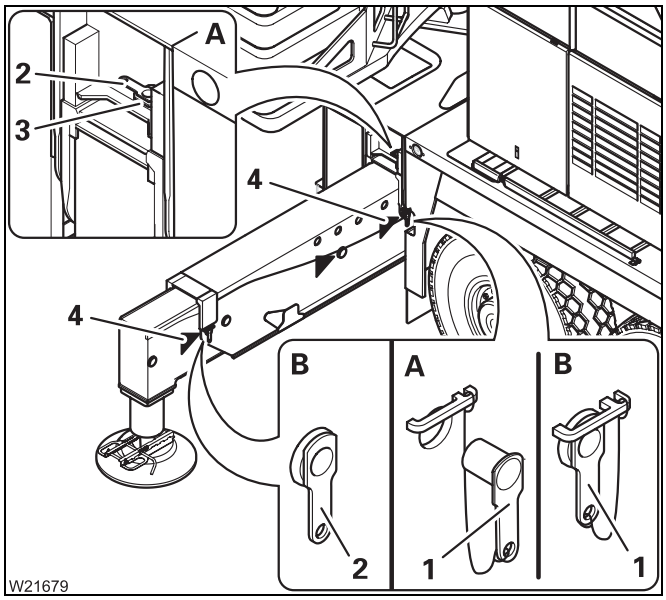


Outrigger span 8.70 x 7.40 m (28.5 x 24.3 ft)

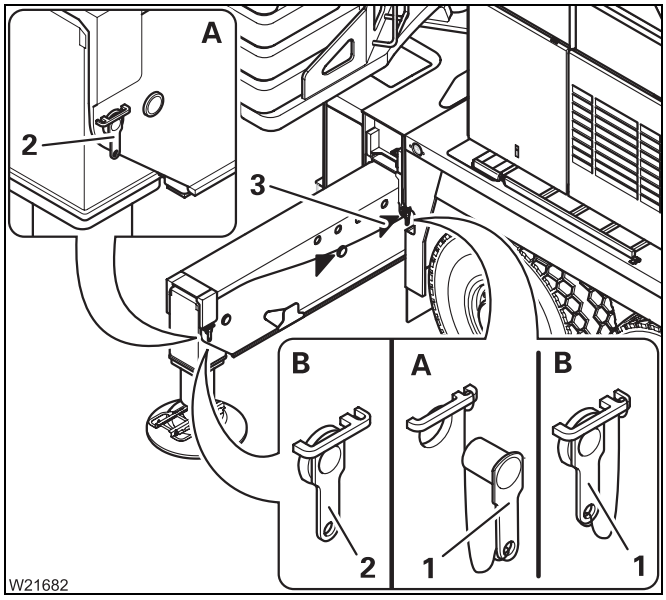
(**A**) – Requirements

– Pin (**1**) is removed

– Pin (**2**) inserted in holder (**3**)

(**B**) – Setting and securing

- Extend the outrigger beam up to the marking (**4**).
- Secure the outrigger beam with the pin (**1**) and (**2**).
- Set the outrigger span on the other outrigger beam in the same way.



Outrigger span 8.70 x 6.30 m (28.5 x 20.4 ft)

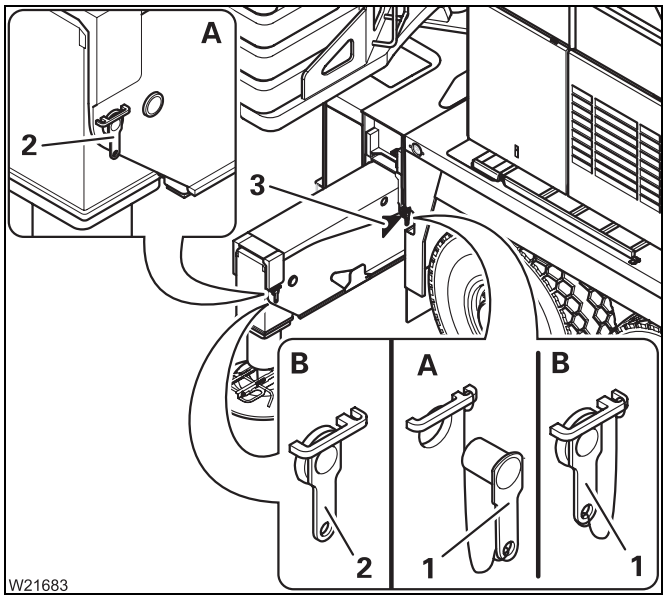
(**A**) – Requirements

– Pin (**1**) is removed

– Pin (**2**) is inserted

(**B**) – Setting and securing

- Extend the outrigger beam up to the marking (**3**).
- Secure the outrigger beam with the pin (**1**).
- Pin (**2**) remains inserted.
- Set the outrigger span on the other outrigger beam in the same way.



Outrigger span 8.70 x 5.00 m (28.5 x 16.4 ft)

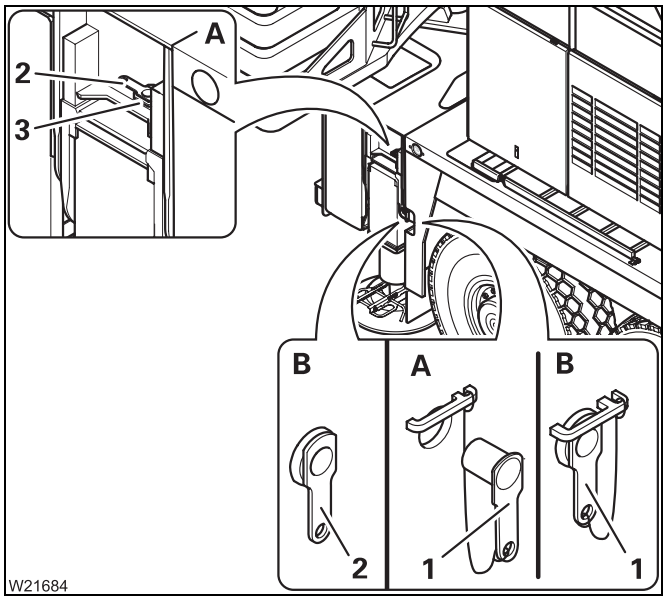
(**A**) – Requirements

– Pin (**1**) is removed

– Pin (**2**) is inserted

(**B**) – Setting and securing

- Extend the outrigger beam up to the marking (**3**).
- Secure the outrigger beam with the pin (**1**).
- Pin (**2**) remains inserted.
- Set the outrigger span on the other outrigger beam in the same way.



Outrigger span 8.70 x 2.71 m (28.5 x 8.9 ft)

(**A**) – Requirements

– Pin (**1**) is removed

– Pin (**2**) inserted in holder (**3**)

(**B**) – Setting and securing

- Completely retract the outrigger beam.
- Secure the outrigger beam with the pin (**1**) and (**2**).
- Set the outrigger span on the other outrigger beam in the same way.

For on-road driving

- Set an outrigger span of 8.70 x 2.71 m (28.5 x 8.9 ft) on all outrigger beams and secure them.
- Secure all the outrigger pads in the driving position; ➠ p. 12 - 43.

Risk of accident if outriggers/outrigger pads are not secured
Always secure all retracted outrigger beams and all outrigger pads in the driving position. Avoid serious accidents caused by outrigger beams/outrigger pads slipping out.

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12.6.6 Extending/retracting outrigger beams

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

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

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

- Check that the pins are inserted/removed as specified in the prerequisites (**A**) for the desired outrigger span; ➠ p. 12 - 34.

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

– On the *outrigger* control units; ➠ p. 12 - 41,

– On the hand-held control; ➠ p. 12 - 39,

– In the crane cab; ➠ p. 12 - 41.

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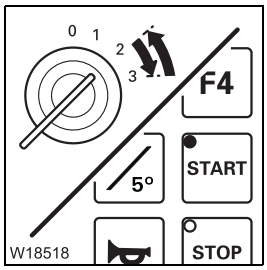
From the control units

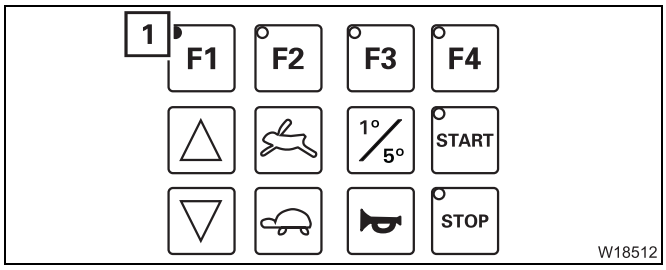
If the hand-held control is connected, the *Outrigger* operating units are inactive.



Starting the engine

- Remove the hand-held control if necessary, and start the engine from the driver's cab; ➠ p. 4 - 16.

  You can also start the engine from the control units; ➠ p. 12 - 27.



Switching on the lighting

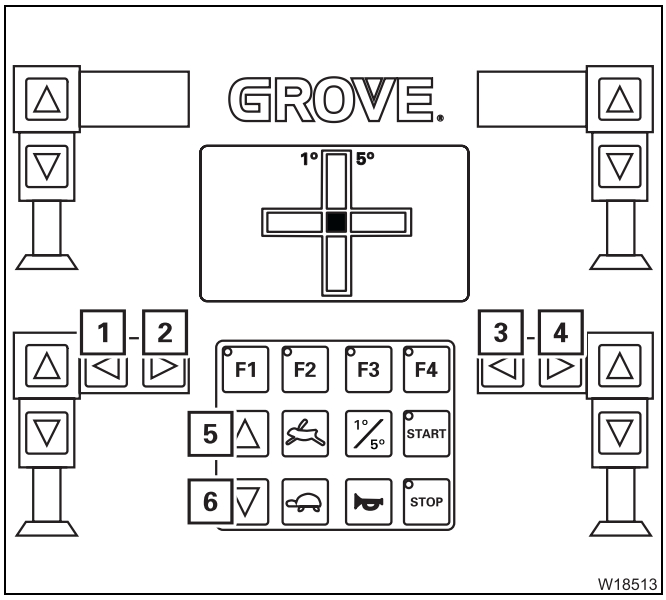
Only the lamp (**1**) lights up after opening the door.

- Press any button.
  The lights are switched on.

Moving the supports

You can only operate the outrigger beams to the left and right of the operating unit on the operator's side.

- Observe the safety instructions for operating the outrigger beams; ➠ p. 12 - 37.



- Press the button:
  - **5** For high-speed mode
  - **6** For normal speed
- Additionally press the button for the desired outrigger beam:
  - **1** Extend left
  - **2** Retract left
  - **3** Retract right
  - **4** Extend right
  - **1 + 4** Extend both
  - **2 + 3** Retract both

The outrigger beams move until you let go of the respective button or until the respective end position has been reached.

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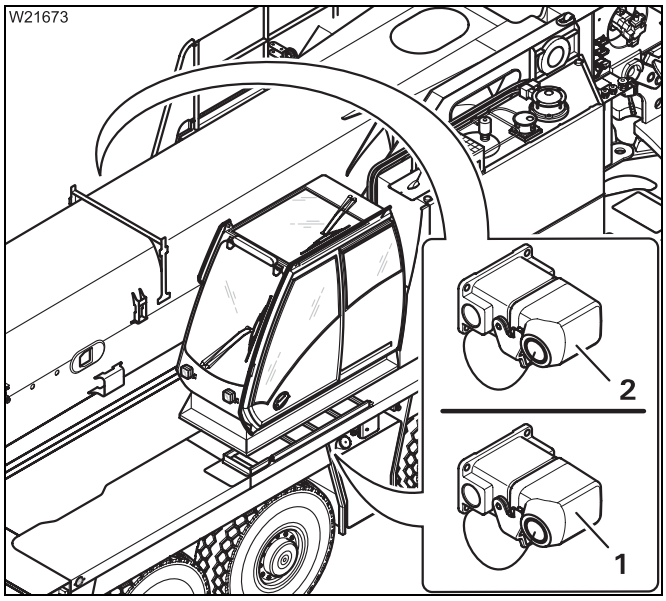
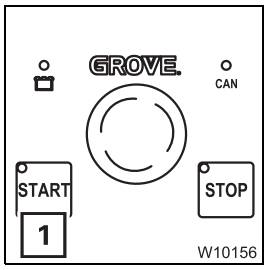
With the hand-held control

The hand-held control needs to be connected to the carrier.



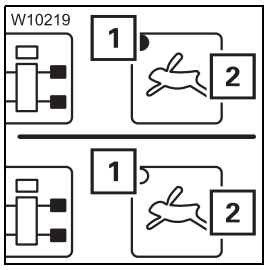
- Connect the hand-held control to the required socket (**1**) or (**2**):
  - **1** For the right-hand outrigger beam
  - **2** For the left-hand outrigger beam

Information on connecting; ➠ *Connecting the hand-held control*, p. 12 - 22.



Starting the engine

- Press the button (**1**) – the engine starts; ➠ p. 10 - 15.



Pre-selecting high-speed mode/normal speed

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

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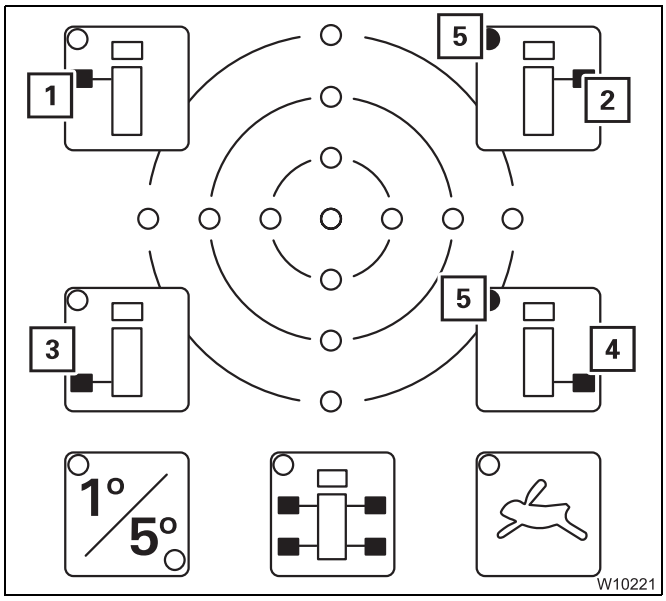
Pre-selecting outriggers

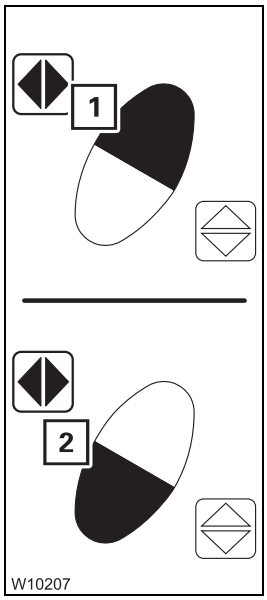
You can only pre-select outriggers on the side to which the hand-held control is connected.



- Press the button for the required outriggers once:
  - **1** Front left
  - **2** Front right
  - **3** Rear left
  - **4** Rear right
  - **1 + 3** Both on left
  - **2 + 4** Both on right

Pre-selection is switched on and the lamp in the corresponding button lights up, e.g. the lamps (**5**).

After about 10 seconds, the pre-selection is switched off.



Extending/retracting outrigger beams

- Observe the safety instructions for operating the outrigger beams; p. 12 - 37.
- Press the button combination for the desired movement:
  - **1** Extend
  - **2** Retract

The pre-selected outriggers move until you let go of the respective button or until the respective end position has been reached.

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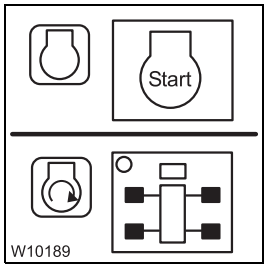
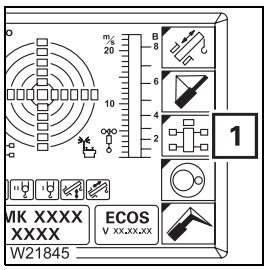
From the crane cab

The following operating elements are found in the *Outriggers* submenu.



Starting the engine

- Start the engine from the crane cab; ➠ p. 10 - 8.
- Switch off the slewing gear.



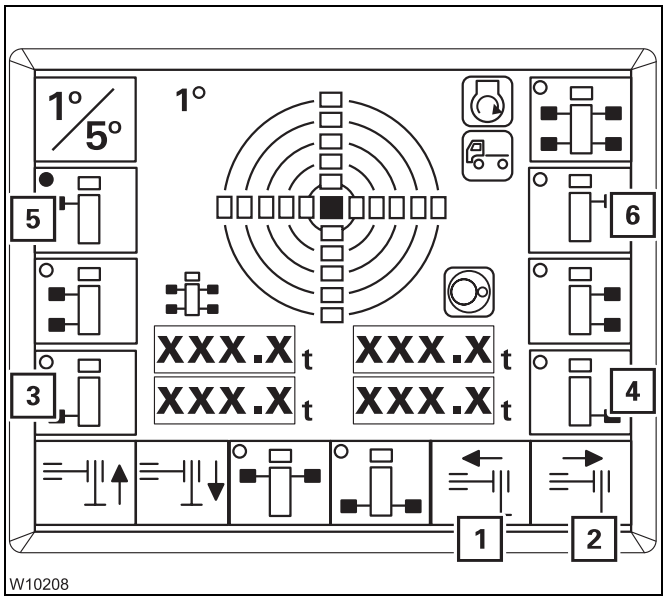
Opening the submenu

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

The *Outriggers* submenu opens.

Pre-selecting outriggers

Only pre-select one outrigger. If you pre-select several outriggers, operation of the outriggers is not enabled.



- Press the button once next to the symbol for the desired outrigger:
  - **3** Rear left
  - **4** Rear right
  - **5** Front left
  - **6** Front right

Pre-selection is switched on.

– The dot in the symbol turns **green**, e.g. in symbol (**5**),

– The symbols (**1**) and (**2**) turn **black.**

After about 10 seconds, the pre-selection is switched off.

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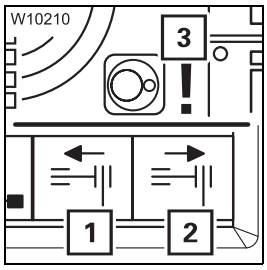
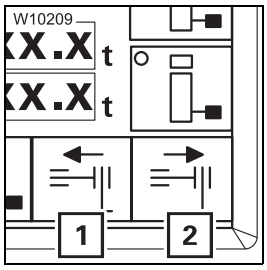


If the symbol (**3**) appears, this means that the slewing gear is switched on – the symbols (**1**) and (**2**) remain grey.

- Switch off the slewing gear.

Extending/retracting outrigger beams

- Observe the safety instructions for operating the outrigger beams; p. 12 - 37



- Press the button below the symbol for the desired movement:
  - **1** Retract
  - **2** Extend

The pre-selected outrigger moves until you let go of the respective button or until the respective end position has been reached.

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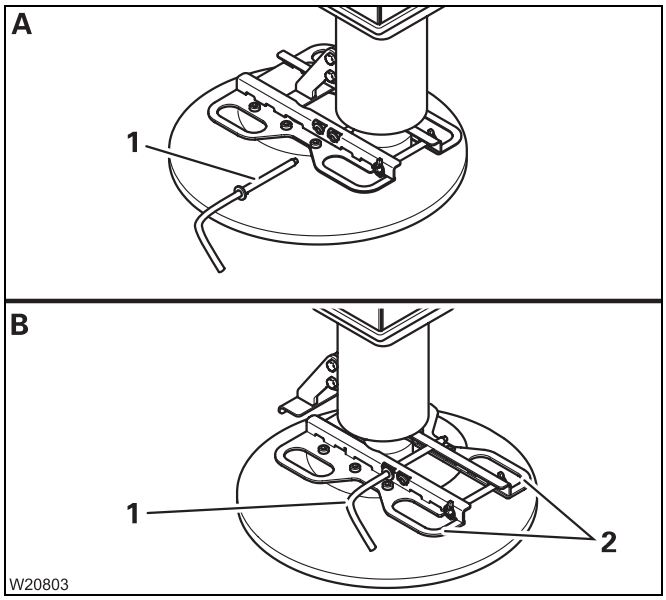
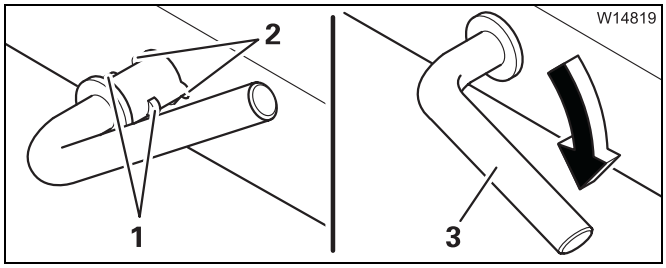
12.6.7 Moving the outrigger pads into working/driving position

The illustrations show one outrigger pad. The pulling direction of the other outrigger pads may differ from this.



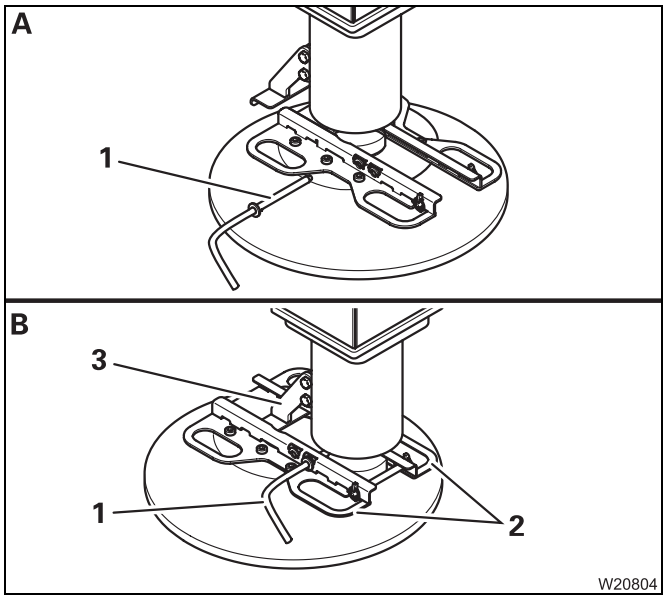
Moving them into working position

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



Securing pin

- Plug the pin with the peg (**1**) through the cut-out (**2**).
- Turn the grip (**3**) downward.



Moving them into driving position

- (**A**) – Pull out the pin (**1**).
- (**B**) – Push the outrigger pad by the handles (**2**) as far as possible back onto the clamp (**3**).
- 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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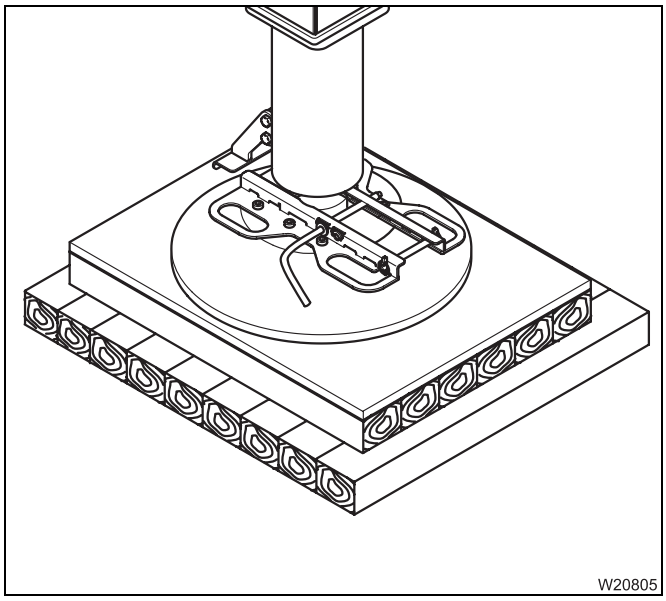
12.6.8 Enlarging the ground bearing area

If the surface of the outrigger pads is too small, you must enlarge the ground bearing area by packing the outrigger pads; ➠ *Determining the required ground bearing area*, p. 12 - 9.

For packing, use only suitable materials that will withstand the outrigger pressure, e.g. straight hardwood of similar cross-sections or steel plates with welded-on strips that will keep the outrigger pads in position.

Risk of accident if the packing is insufficient
Only use materials of sufficient strength.
This will prevent the packing from giving way and causing the truck crane to tilt and overturn.

Danger of overturning if the packing or truck crane is at an angle
Level the packing and the truck crane.
This prevents the outrigger pads from slipping off the inclined packing and causing the truck crane to overturn.



Level the packing; the outrigger pad must not be at an angle.

Ensure that the outrigger pressure is evenly distributed over the packing:

- The outrigger pad must be positioned in the centre of the packing
- The outrigger pad must cover all the wooden planks
- If the packing has several layers, each layer must be placed below the other offset by 90°
- The packing must lie flat on the ground

Consult your supervisor if you are in doubt.

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12.6.9 Extending/retracting supporting cylinders

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

Risk of accident if supporting cylinders cannot be seen
No one is allowed to be in the area of the supporting cylinders.
Observe the moving supporting cylinders or have them observed by a banksman who is in visual contact with you.

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

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

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

There are various operating elements for moving the outrigger beams:

– On the *Outrigger* control units; ➠ p. 12 - 46,
– On the hand-held control; ➠ p. 12 - 47,
– In the crane cab; ➠ p. 12 - 48.

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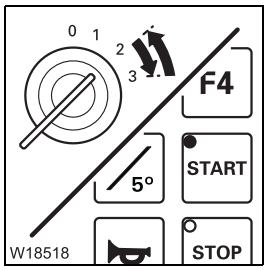
From the control units

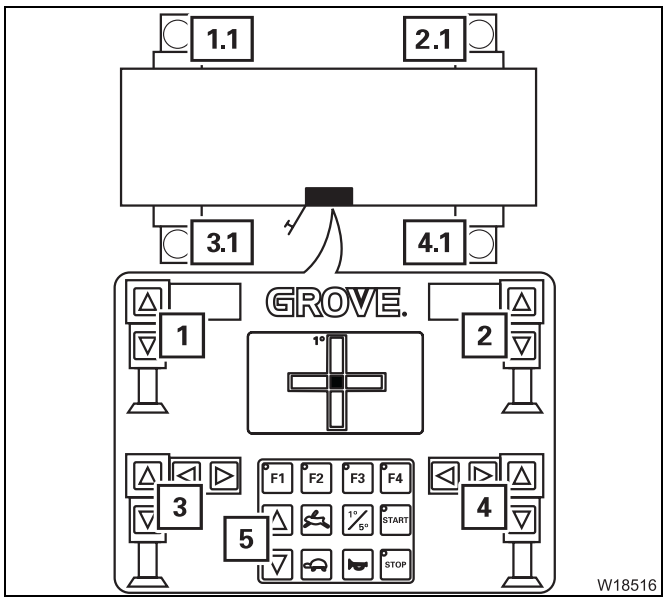
If the hand-held control is connected, the *Outrigger* operating units are inactive.



Starting the engine

- Disconnect the hand-held control, if necessary, and start the engine either:

– From the driver's cab; ➠ p. 4 - 16
or
– From the control units; p. 12 - 27

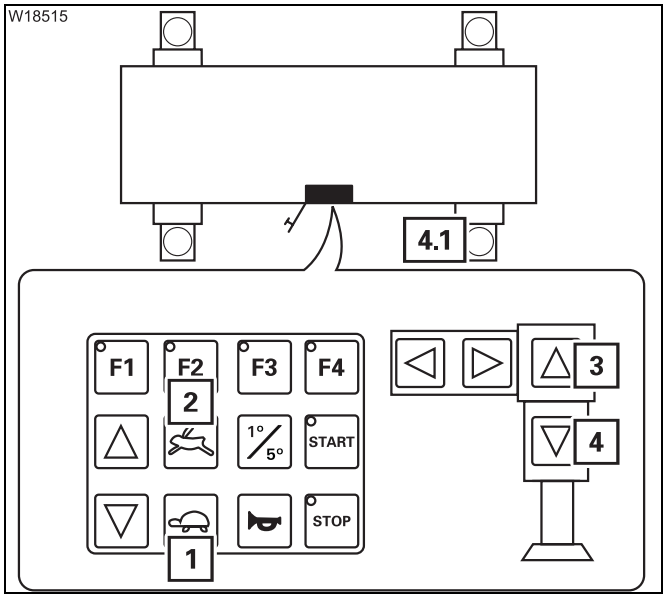


Moving the supporting cylinders

Assignment of buttons:

1 Supporting cylinder **1.1**
2 Supporting cylinder **2.1**
3 Supporting cylinder **3.1**
4 Supporting cylinder **4.1**
5 All supporting cylinders (**1.1**) to (**4.1**)

- Observe the safety instructions for operating the supporting cylinders; ➠ p. 12 - 45.



The operation is the same for all supporting cylinders.

- Press the button
  1 For normal speed
  2 For high-speed mode

- Also press the button for the desired supporting cylinder, e.g. for **4.1**
  3 For retracting
  4 For extending

You can also operate several supporting cylinders at the same time.

The outrigger cylinders move until you let go of the respective button or until the respective end position has been reached.

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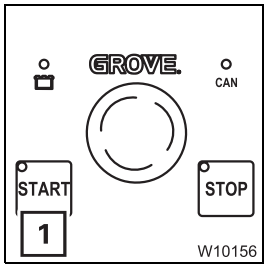
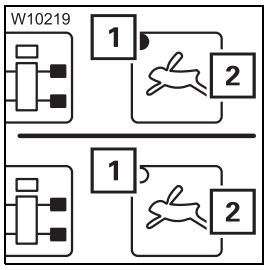
With the hand-held control

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



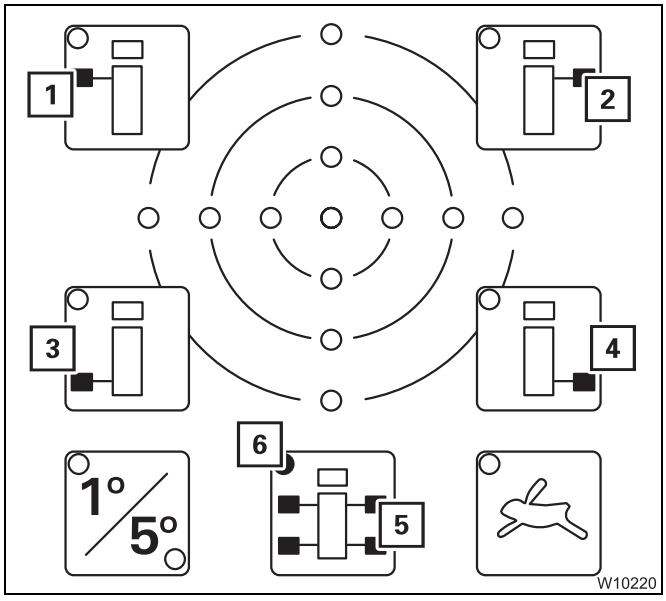
Starting the engine

- Press the button (**1**) – the engine starts; ➠ p. 10 - 15.



Pre-selecting high-speed mode/normal speed

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



Pre-selecting outriggers

- Press the button for the required outriggers once.

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

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

After about 10 seconds, the pre-selection is switched off.

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

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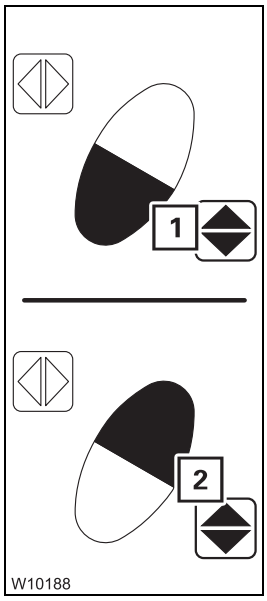


Extending/retracting supporting cylinders

- Observe the safety instructions for operating the supporting cylinders; p. 12 - 45
- Press the button combination for the desired movement:

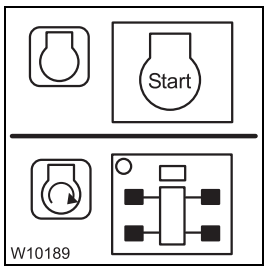
  1 Extend

  2 Retract

The pre-selected supporting cylinders move until you let go of the respective button or until the respective end position has been reached.

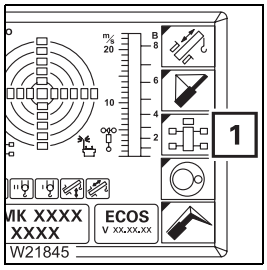
From the crane cab

The following operating elements are found in the *Outriggers* submenu.



Starting the engine

- Start the engine from the crane cab; p. 10 - 8.
- Switch off the slewing gear.



Opening the submenu

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

The *Outriggers* submenu opens.

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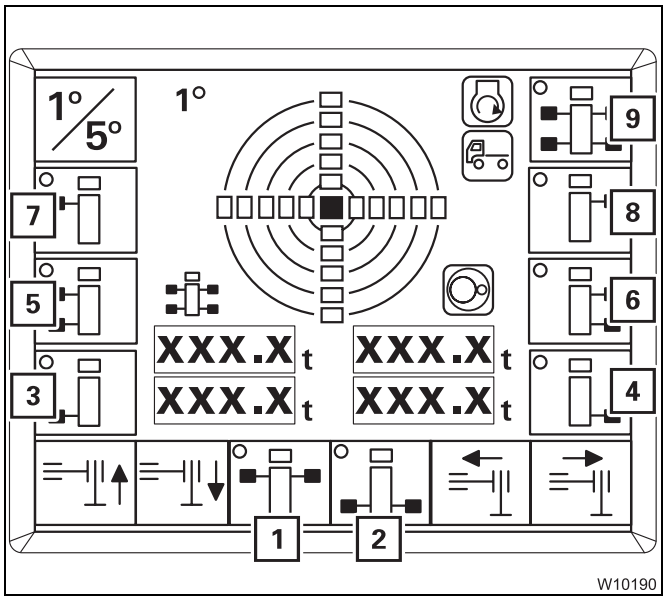
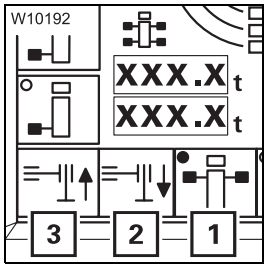


Pre-selecting outriggers

- Press the button once next to the symbol for the desired outrigger

  1 Both at front
  2 Both at rear
  3 Rear left
  4 Rear right
  5 Both on left
  6 Both on right
  7 Front left
  8 Front right
  9 All

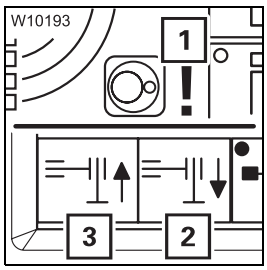


Pre-selection is switched on.

– The dot in the symbol turns **green**, e.g. in symbol (**1**).

– The symbols (**2**) and (**3**) turn **black.**

After about 10 seconds, the pre-selection is switched off.

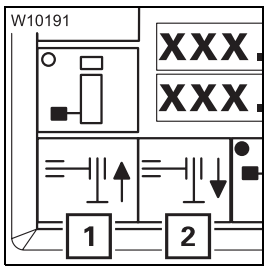


If the symbol (**1**) appears, this means that the slewing gear is switched on – the symbols (**2**) and (**3**) remain grey.

- Switch off the slewing gear.

Extending/retracting supporting cylinders

- Observe the safety instructions for operating the supporting cylinders; ➠ p. 12 - 45.



- Press the button below the symbol for the desired movement:

  1 Retract
  2 Extend

The pre-selected supporting cylinders move until you let go of the respective button or until the respective end position has been reached.

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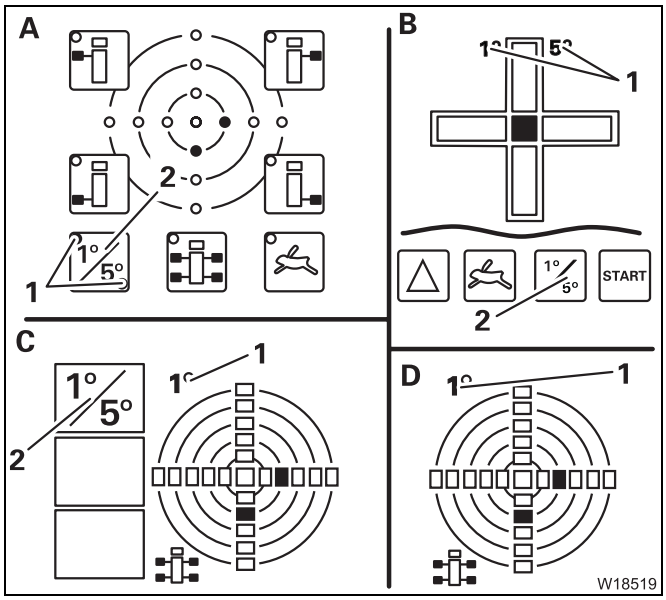
12.6.10 Levelling the truck crane on outriggers

You must level the truck crane before crane operation and possibly correct its horizontal alignment during crane operation.

Inclination indicators

After switching on the ignition, various inclination indicators display the current alignment.



A On the hand-held control

B On the *Outrigger control units*

On the *ECOS display*

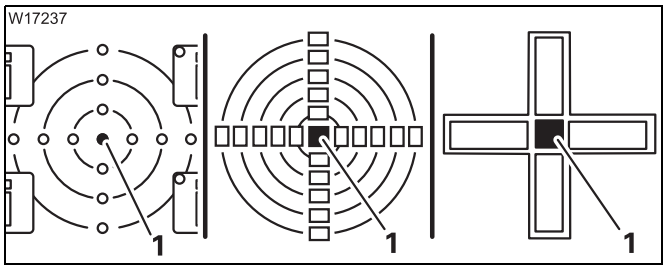
C In the *Outriggers submenu*

D In the main menu

Switching between measuring ranges

You can change the measuring range between 1° and 5°.

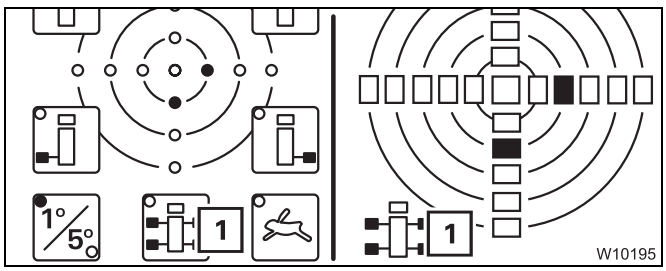
- Press the (**2**) button once.
  The current measuring range (**1**) is displayed.



Reading the display

Only the lamp (**1**) at the centre is on if the truck crane is level.

The other lamps show the sides of the truck crane which are higher.



– *ECOS hand-held control/display*

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

In this example, the carrier would be standing higher to the rear on the right hand side.

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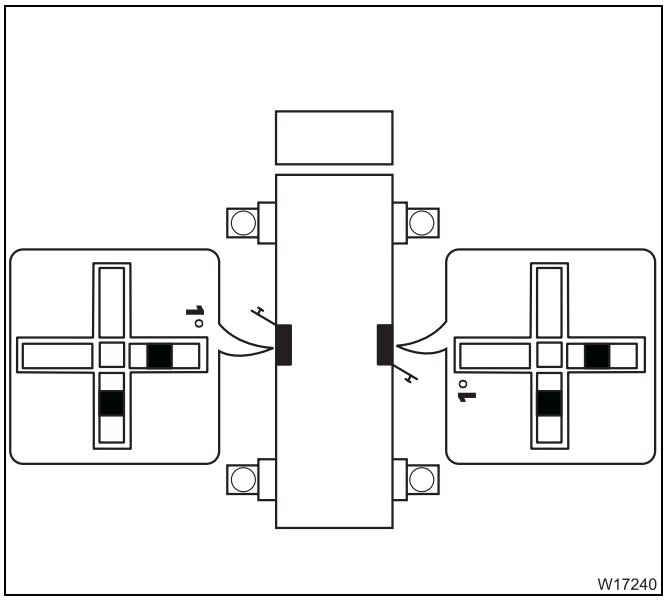


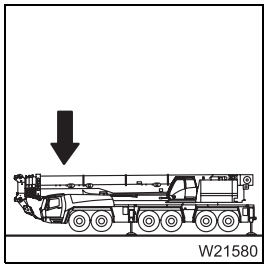
– Outriggers *control units*

The assignment to the carrier corresponds to the top view.

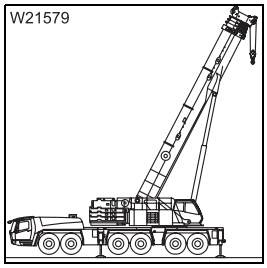
Due to the position of the control units, the displays on both sides differ.

In this example, the carrier would be standing higher to the rear on the right hand side.

Requirements The following prerequisites apply to manual and automatic alignment.



The main boom must be resting on the boom rest.



or

– The main boom must be raised.
– The load has been set down.
– The superstructure is in the 0° or 180° position.

Risk of overloading the main boom
Always slew the superstructure to the 0° or 180° position and set down the load before levelling the truck crane.
In other positions, the deformation of the carrier will distort the indicated inclination and the truck crane will be at an angle. This could cause the outrigger beam to become overloaded during crane operation.

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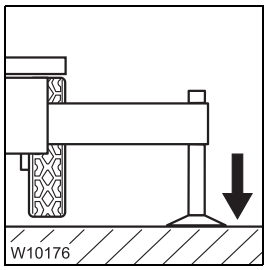
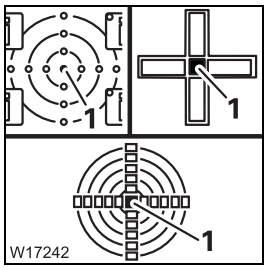
Manual alignment

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



- Extend all supporting cylinders until none of the wheels is touching the ground.



- Level the truck crane with the supporting cylinders horizontally until the lamp (**1**) is the only one lighting up in the measuring range **1°**; ➠ p. 12 - 45.
- Only lift the truck crane as far as necessary.

Checks to be performed after levelling

During levelling, the ground may give way and the packing may slip.

Risk of accident due to incorrectly supported truck crane
Perform the following checks each time you have levelled the truck crane and correct any misalignments.
Otherwise the truck crane may overturn even when lifting a load released by the RCL.

- Check after you have levelled the truck crane:
  - Whether all the wheels are lifted off the ground
  - Whether the ground under one of the outrigger pads has given way
  - Whether the packing is correct for the enlarged ground bearing area

If slewing is permissible in the current rigging mode:

- Slew the superstructure within the permissible slewing range
- Perform the specified checks again
- Check the horizontal alignment on the inclination indicator

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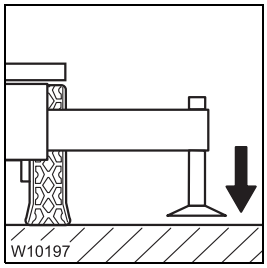
Automatic alignment

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

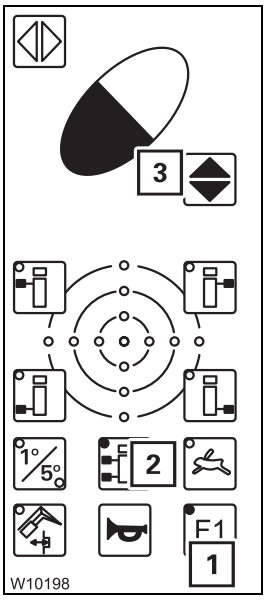
- Check that the prerequisites are met; ➠ p. 12 - 51.



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

Starting procedure

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



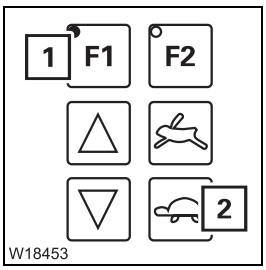
– On the hand-held control

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

The lights in the buttons go on.

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

The procedure begins.

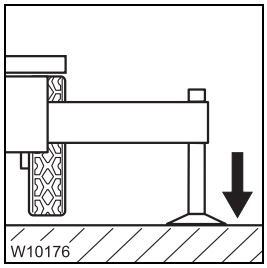


– On the control units

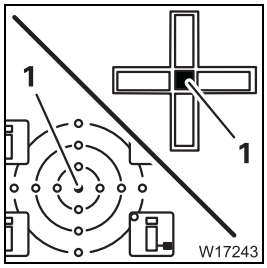
- Press the (**1**) button.
- Additionally, press the button (**2**).

The procedure begins.

Automatic procedure



1. All supporting cylinders are extended one after the other until the outrigger pads touch the ground.
2. All supporting cylinders extend simultaneously so that none of the wheels touch the ground anymore.



3. The truck crane is automatically levelled.

   This procedure is performed:

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

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

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

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

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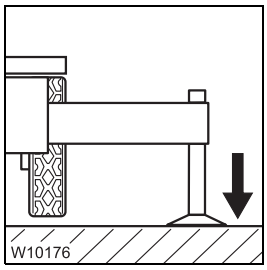
12.6.11 Levelling the free-standing truck crane

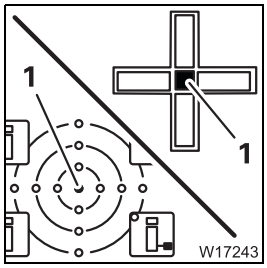
The suspension is deactivated (locked) if the truck crane is in the *Free on wheels* working position.
The suspension has to remain switched off until the truck crane is on outriggers.

Danger of overturning if the supporting cylinders are operated unevenly
Extend or retract the supporting cylinders as evenly as possible.
This prevents the truck crane from overturning when operating individual supporting cylinders.

- Set down the load.



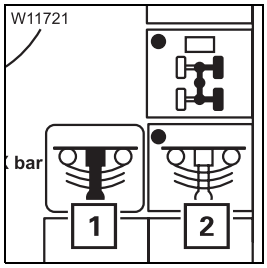
- Extend the supporting cylinders until all wheels are just above the ground.



Levelling the truck crane

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

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



Switching on the suspension

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

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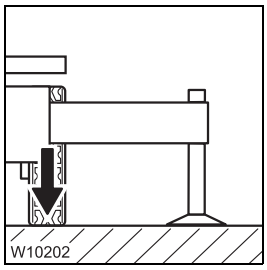
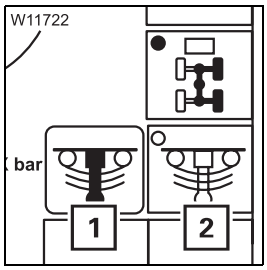
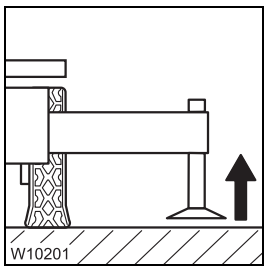


Now all wheels are lowered to the ground and are in the right position for the horizontal alignment.



To switch off the suspension

- Press the (**2**) button once – dot is **black**.
  The symbol (**1**) is **red** if the suspension is switched off.



To secure the truck crane

- Retract the supporting cylinders until the outrigger pads are about 5 to 10 cm (2 to 4 in) above the ground. Leave the outrigger beams extended.

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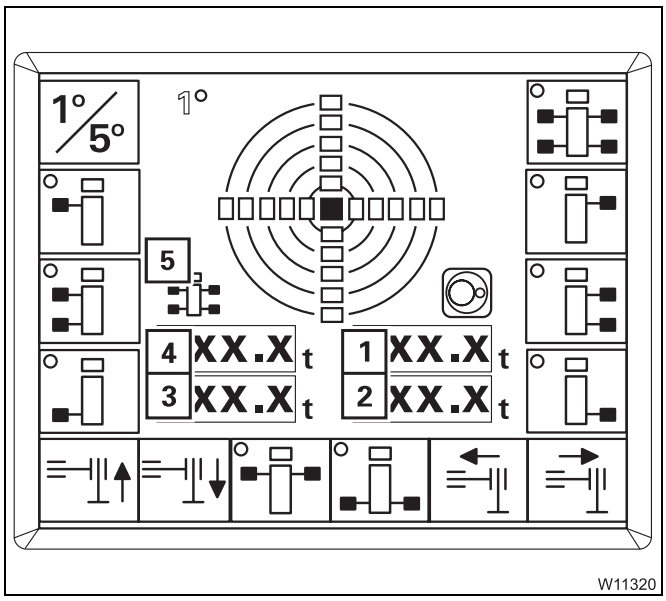
12.6.12 Outrigger pressure display

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

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

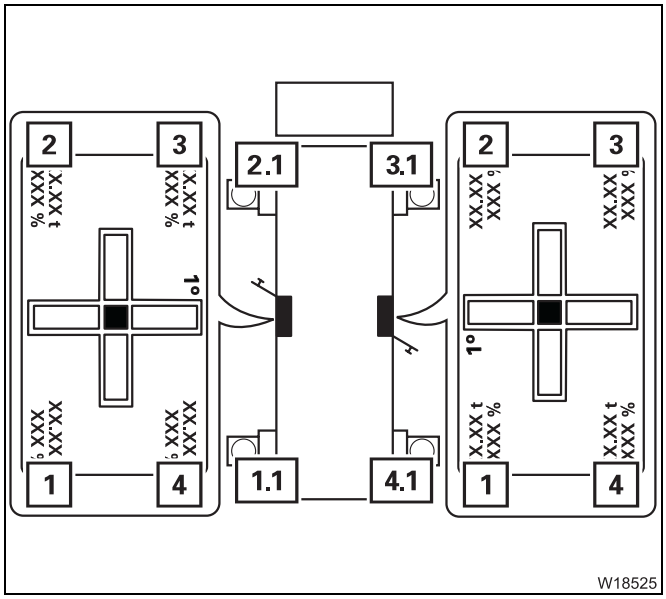
Risk of accident when misused
A displayed outrigger pressure over 0 t does nor guarantee protection against overturning or overloading. For this reason, never override the RCL.



In the Outriggers submenu

The assignment of the displays to the carrier is given by the directional indicator (**5**).

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



On the outrigger control units

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

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

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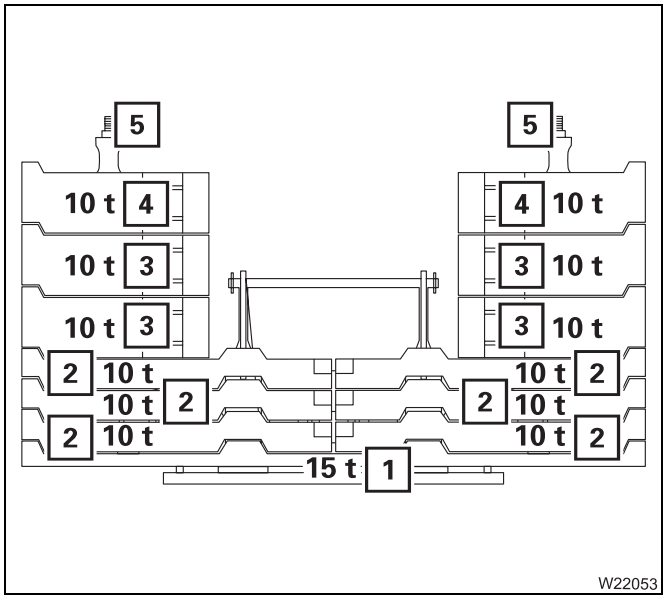
12.7 Rigging/unrigging the counterweight

Depending on the version, the GMK 6400 can be equipped with a counterweight mass of 15 t (33 069 lbs) to 135 t (297 624 lbs).

12.7.1 Counterweight sections

Depending on the execution, there is version **A** or **B**.

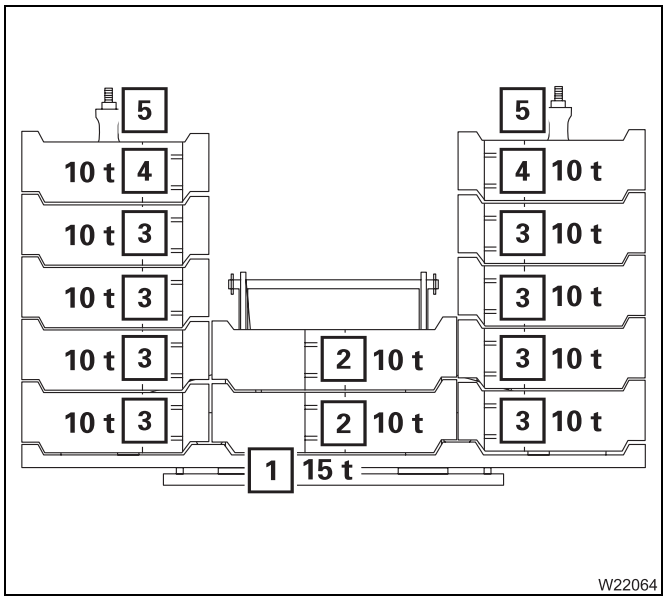
Version A The counterweight combinations can be comprised of:



- One 15 t base plate (**1**)
- Six 10 t counterweight sections (**2**)
- Four 10 t counterweight sections (**3**)
- Two 10 t counterweight sections[1)] (**4**)
- Two tensioning devices (**5**)

[1)] Additional equipment

Version B The counterweight combinations can be comprised of:



- One 15 t base plate (**1**)
- Two 10 t counterweight sections (**2**)
- Eight 10 t counterweight sections (**3**)
- Two 10 t counterweight sections[1)] (**4**)
- Two tensioning devices (**5**)

[1)] Additional equipment

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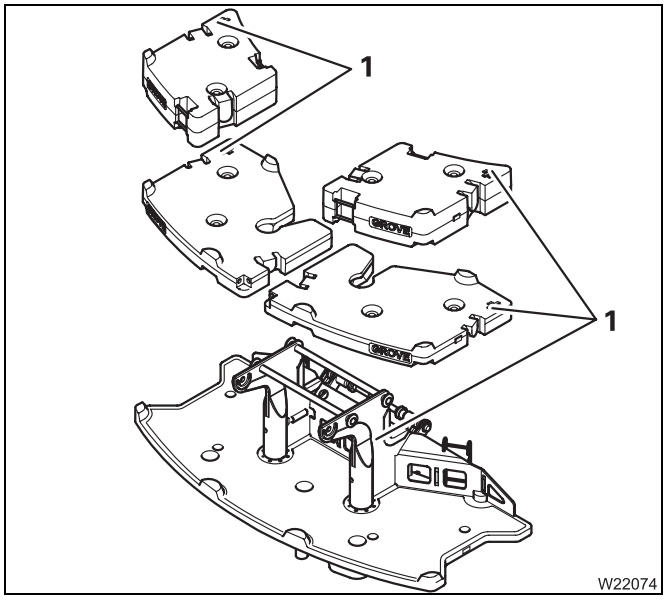
12.7.2 Identification

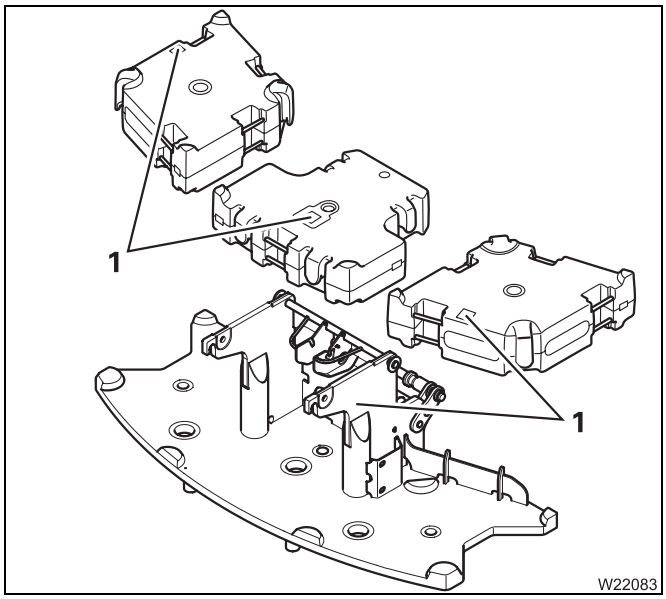
The truck crane and its corresponding counterweight sections are labelled with the same serial number.

Danger if counterweight sections are interchanged
Operate the truck crane only with the counterweight sections that belong to it. The truck crane and counterweight sections are labelled with the same serial number.
Other or additional counterweight sections may not be rigged.



Version A

The base plate and the counterweight sections are labelled with the serial number (**1**).



Version B

The base plate and the counterweight sections are labelled with the serial number (**1**).

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12.7.3 Slinging points on the counterweight sections

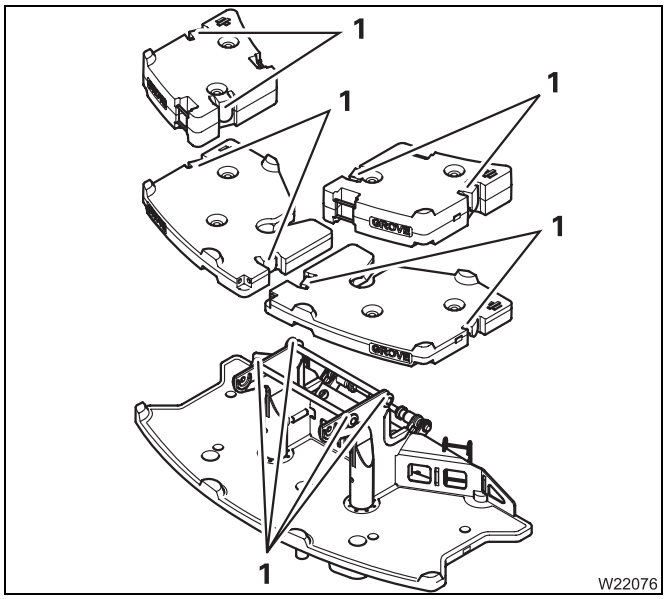
Risk of accident if used improperly
Attach the various counterweight sections only to the intended slinging points and use lifting gear of sufficient lifting capacity.
Only lift the sections one by one, since the slinging points are not designed for lifting stacked sections.

- Only use lifting gear of sufficient lifting capacity

  Weights:

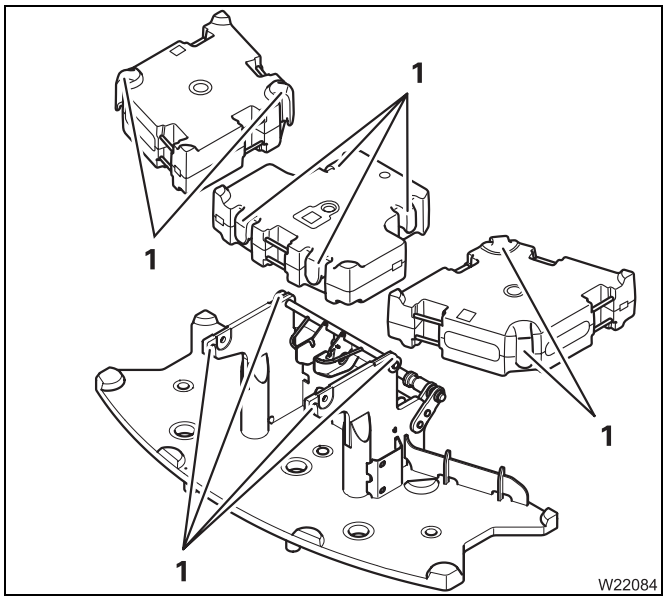
  – ➠ *Counterweightsections version A*, p. 1 - 12
  – ➠ *Counterweightsections version B*, p. 1 - 12

In versions **A** and **B** the slinging points (**1**) are designed differently.



Version A

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



Version B

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

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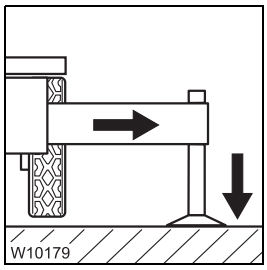
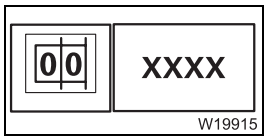
12.7.4 CHECKLIST: Counterweight, rigging

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

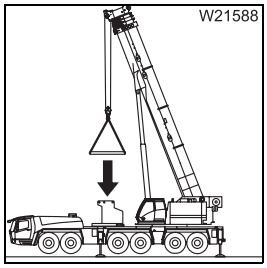
Danger of overturning when slewing with a rigged counterweight
Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius).
Correct the rigging mode if necessary; ➠ *Slewing with rigged counterweight*, p. 12 - 89.



1. The truck crane is stabilised with the outrigger span required for crane work according to the *Lifting capacity chart*; ➠ *Permissible outrigger spans*, p. 12 - 32.

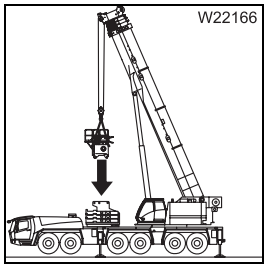


2. Enter the current rigging mode on the RCL; ➠ p. 11 - 23.



3. Assemble the required combination of counterweights:
   - Lower 15 t base plate on the counterweight platform; ➠ p. 12 - 70.

     If the auxiliary hoist is to be installed, then you may now only assemble the counterweight combination up to 75 t.
   - Lift and set down counterweight sections individually, one after the other; ➠ p. 12 - 67.



4. If required, assemble the auxiliary hoist; ➠ *Rigging the auxiliary hoist*, p. 12 - 91.

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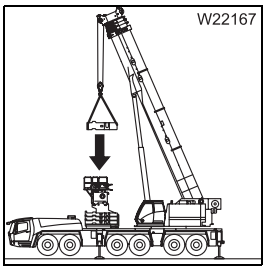
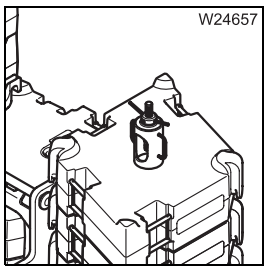
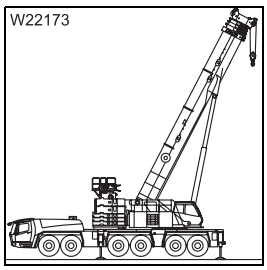


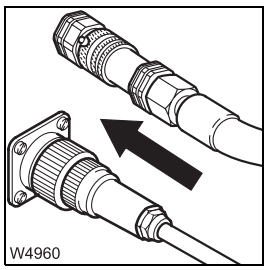
5. If necessary, lift and set down further counterweight sections individually, one after another; ➠ p. 12 - 67.



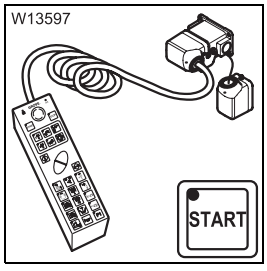
6. Secure the counterweight sections; ➠ p. 12 - 79.



7. Slew the superstructure into the *0° to the rear position* and lock;
➠ *Braking the slewing movement*, p. 11 - 102,
➠ *Locking/unlocking the superstructure*, p. 11 - 13.



8. Establish the hydraulic and electrical connections between the 15 t base plate and the turntable;
➠ *Establishing/disconnecting the hydraulic connection*, p. 12 - 100,
➠ *Making/breaking the electrical connection*, p. 12 - 101.



9. Connect the hand-held control to the rear right of the turntable and start the crane engine;
➠ *Starting/turning off the engine with the hand-held control*, p. 12 - 23.

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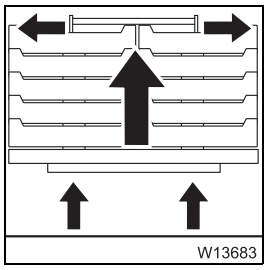
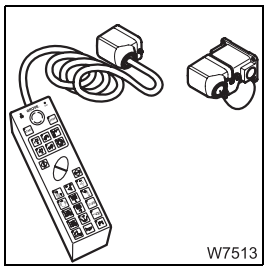


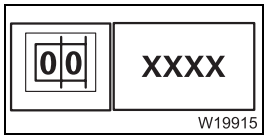
10. Lift the counterweight onto the turntable, lock it and retract the lifting cylinder;

➠ *Rigging counterweight*, p. 12 - 83.



11. Disconnect the hand-held control;

➠ *Connecting/disconnecting the hand-held control*, p. 12 - 21.



12. Enter the current rigging mode with the newly rigged counterweight version on the RCL; ➠ p. 11 - 23.

13. Only switch on the slewing gear if slewing is permissible for the current outrigger span; ➠ *Slewing with rigged counterweight*, p. 12 - 89.

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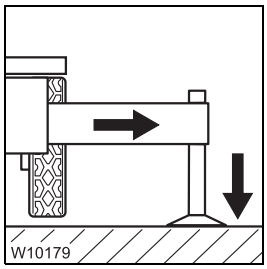
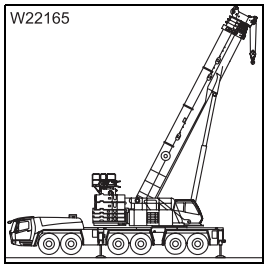
12.7.5 CHECKLIST: Counterweight, unrigging

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

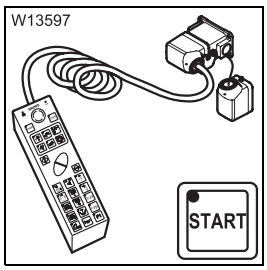
Danger of overturning when slewing with a rigged counterweight
Before slewing with the rigged counterweight, check whether slewing is permissible with the rigged outrigger span or with the truck free on wheels;
➠ *Slewing with rigged counterweight*, p. 12 - 89.



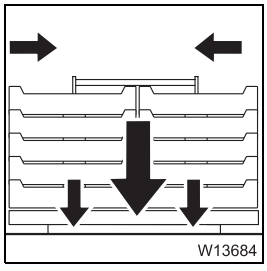
1. The truck crane is stabilised with the outrigger span required for crane work according to the *Lifting capacity chart*; ➠ *Permissible outrigger spans*, p. 12 - 32.



2. Slew the superstructure into the *0° to the rear position*, with the RCL set accordingly;
➠ *Slewing with rigged counterweight*, p. 12 - 89.



3. Connect the hand-held control to the rear right of the turntable and start the crane engine;
➠ *Connecting/disconnecting the hand-held control*, p. 12 - 21.



4. Extend the lifting cylinder, unlock the counterweight and lower the counterweight onto the counterweight platform;
➠ *Rigging counterweight*, p. 12 - 83.

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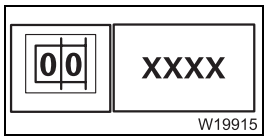
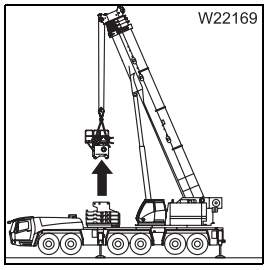
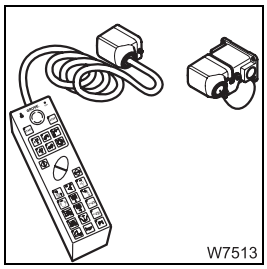


5. Enter the current rigging mode with the presently rigged counterweight version on the RCL; ➠ p. 11 - 23.

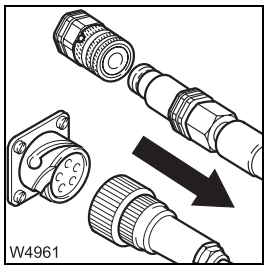


6. If required, remove the auxiliary hoist; ➠ *Rigging the auxiliary hoist*, p. 12 - 91.



7. Disconnect the hand-held control;

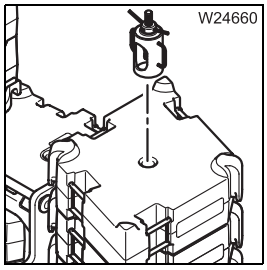
➠ *Connecting/disconnecting the hand-held control*, p. 12 - 21.



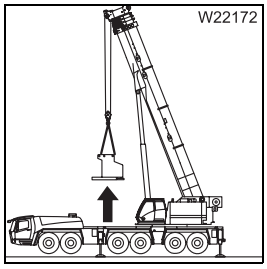
8. Remove the hydraulic and electrical connections between the 15 t base plate and the turntable;

➠ *Establishing/disconnecting the hydraulic connection*, p. 12 - 100,

➠ *Making/breaking the electrical connection*, p. 12 - 101.



9. Release the counterweight sections; ➠ p. 12 - 79.



10. Lift counterweight sections:

– Lift 10 t counterweight sections individually, one after another; ➠ p. 12 - 67.

– Lift 15 t base plate off the counterweight platform; ➠ p. 12 - 70.

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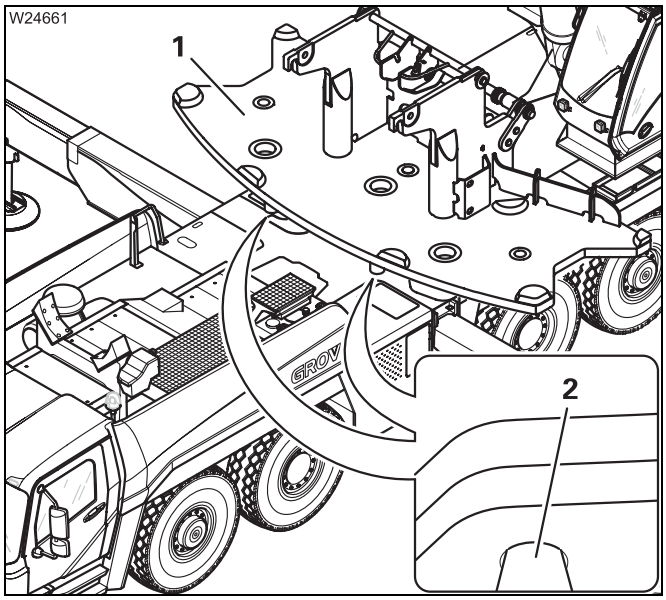
12.7.6 Assembling counterweight combination

Danger of overturning when slewing with a rigged counterweight
When a counterweight version is rigged, check whether slewing is permitted with the current rigging mode (outrigger span, working radius). Correct the rigging mode if necessary; ➠ *Slewing with rigged counterweight*, p. 12 - 89.

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

Danger of crushing when slewing the superstructure
Anyone who climbs onto the carrier using one of the access ladders is within the slewing range of the superstructure.
Make sure nobody uses the access ladders (e.g. helpers) while you lift a section onto the carrier.

Risk of accident due to falling counterweight sections
Only attach the counterweight sections to the appropriate slinging points and use lifting gear of sufficient lifting capacity.
The counterweight sections should be lifted only one at a time. The slinging points are not designed for hoisting stacked counterweight sections.



Set down 15 t (33,069 lbs) **base plate**

- Place the 15 t base plate (**1**) so that it fits into the guides (**2**).

For larger counterweight combinations, now set additional counterweight sections onto the 15 t base plate.

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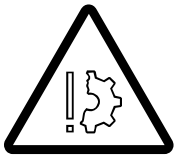
Setting down 10 t sections/blocks version A

The counterweight version **A** illustrated here shows a special equipping version that is no longer available.

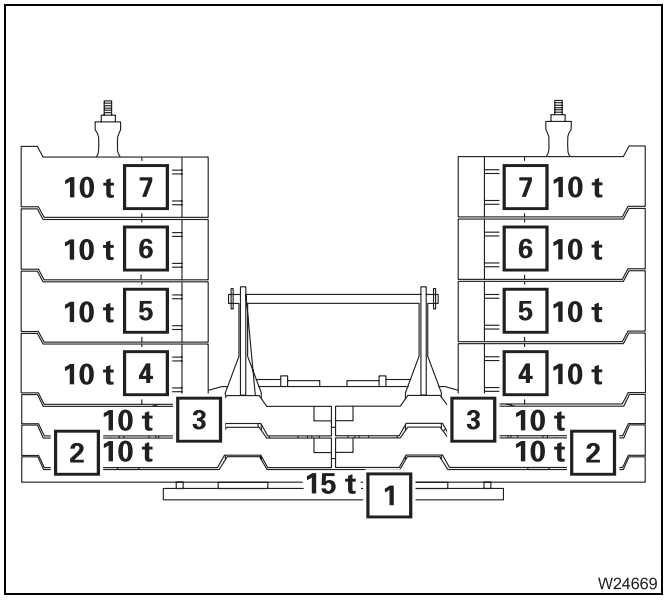
Counterweight version **B** shows the standard equipment; ➠ *Setting down 10 t sections/blocks version B*, p. 12 - 74.



Risk of overturning if counterweight rigging sequence is incorrect
When rigging, always place/raise the 10 t sections and 10 t blocks alternately at the left and right sides. Otherwise the truck crane will be overloaded at one side or the counterweight may fall from the carrier.

All the sections for the right side are interchangeable between themselves and all the sections for the left side are interchangeable between themselves. This also applies to the counterweight blocks.

When rigging with an installed auxiliary hoist you require special lifting gear; ➠ *Raising and lowering 10 t counterweight blocks with a mounted auxiliary hoist*, p. 12 - 88.



- Always place the 10 t sections and 10 t blocks alternately at the left and right sides.

Counterweight	Counterweight section
15 t	1
35 t	1 and 2
55 t	1 to 3
75 t	1 to 4
95 t	1 to 5
115 t **2)**	1 to 6
135 t **1), 2)**	1 to 7

1) Additional equipment

2) ➠ *Securing 10 t blocks*, p. 12 - 80

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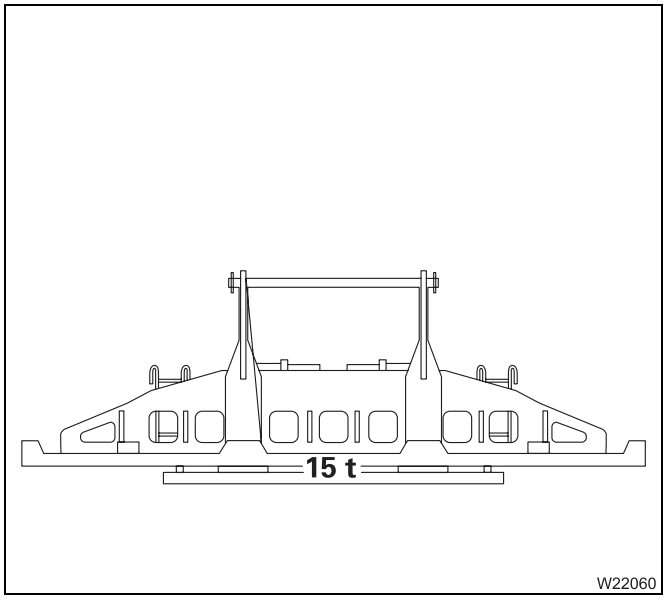
Combinations for the basic equipment in version A

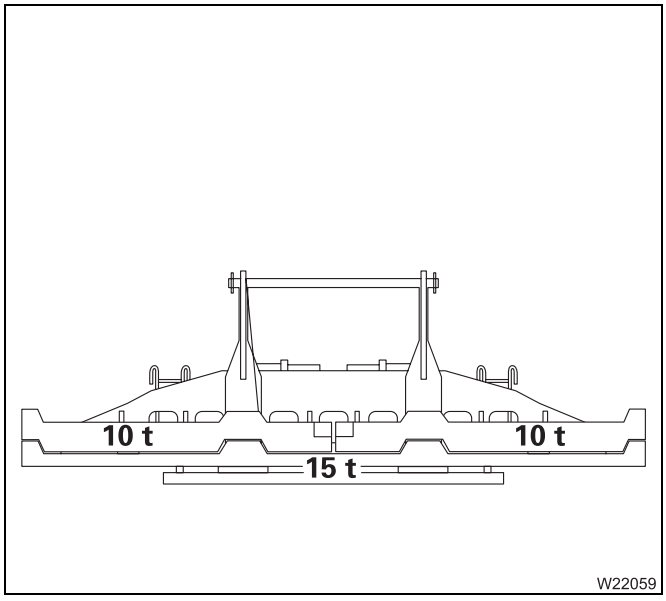
The following counterweight combinations can be combined on the counterweight platform.

Risk of accident due to an incorrect counterweight mass
Only combine the counterweights in such a manner that the counterweight mass corresponds to the specifications in this section and in the *Lifting capacity table*. Other combinations are not permitted.



15 t (33 069 lbs)

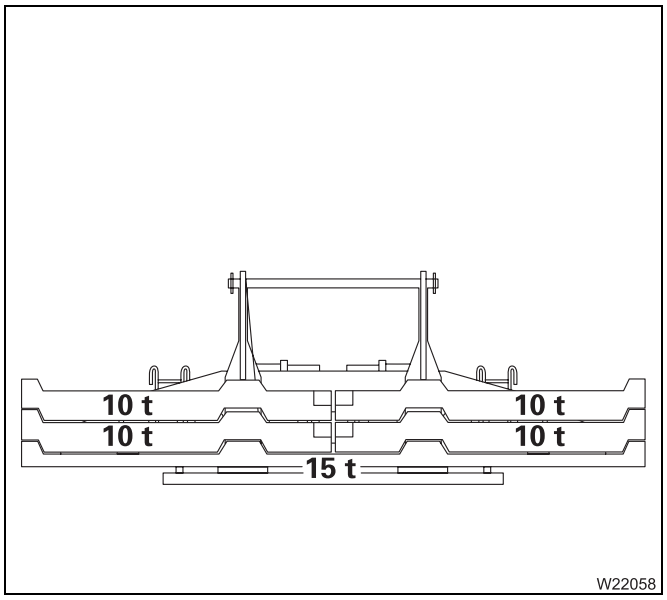
– 15 t base plate



35 t (77 162 lbs)

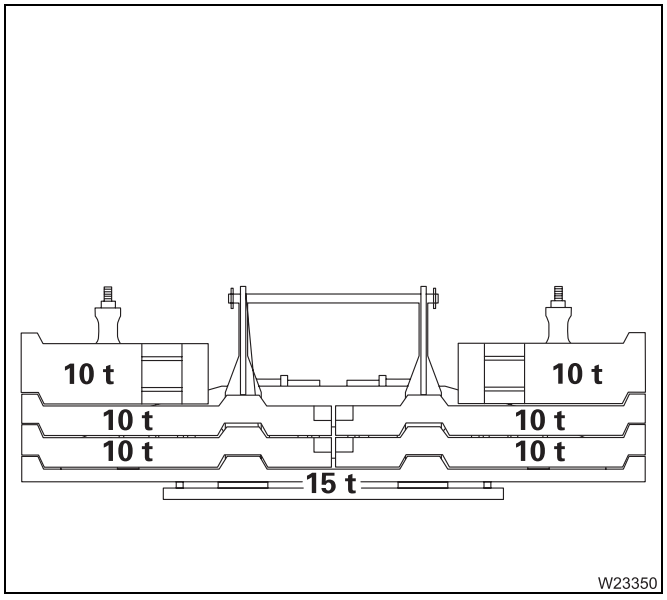
– 15 t base plate
– Two 10 t sections

12.07.2013



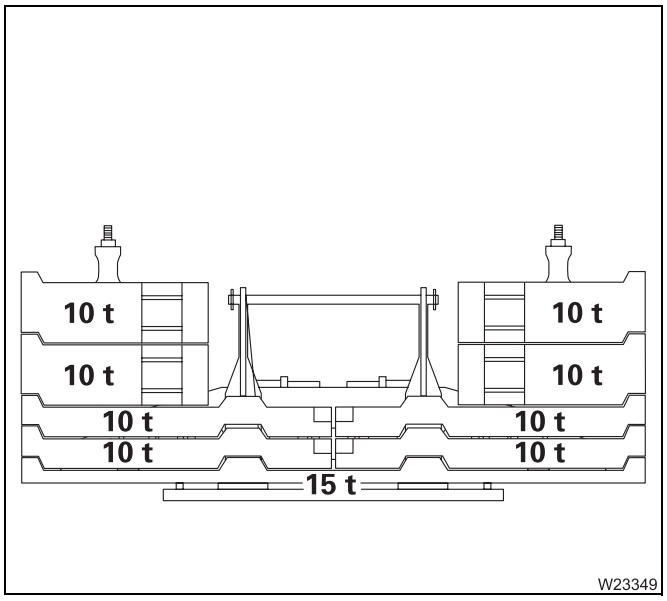
55 t (121 254 lbs)

– 15 t base plate
– Four 10 t sections



75 t (165 347 lbs)

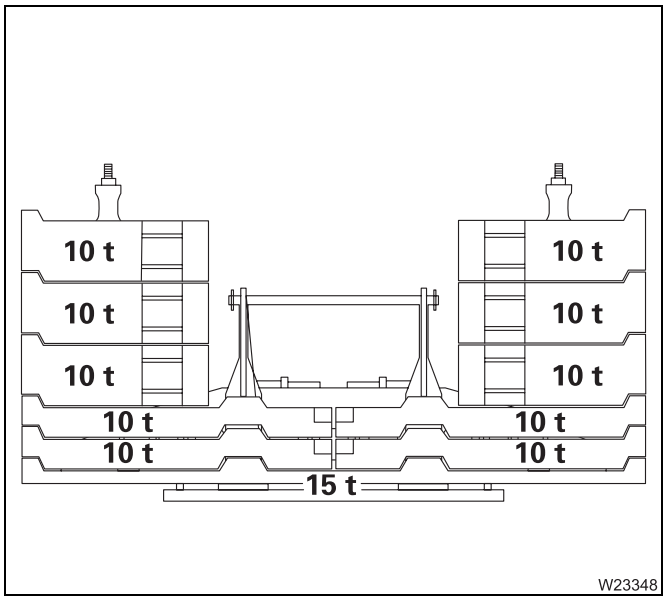
– 15 t base plate
– Four 10 t plates
– Two 10 t blocks



95 t (209 439 lbs)

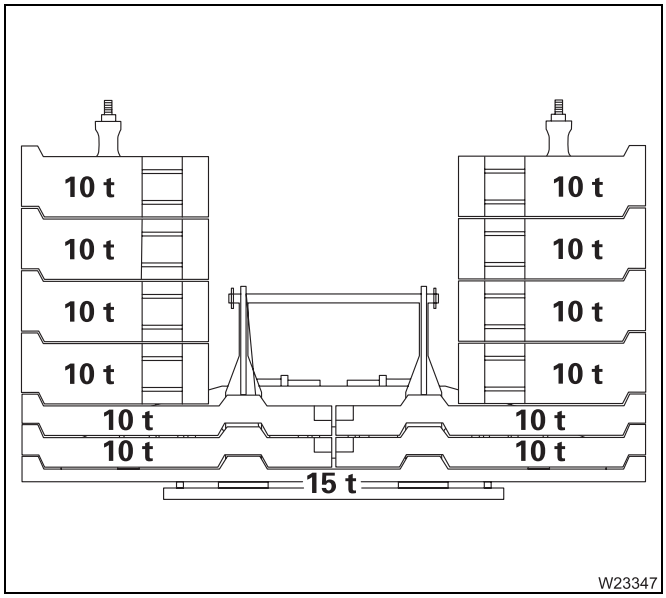
– 15 t base plate
– Four 10 t plates
– Four 10 t blocks

12.07.2013



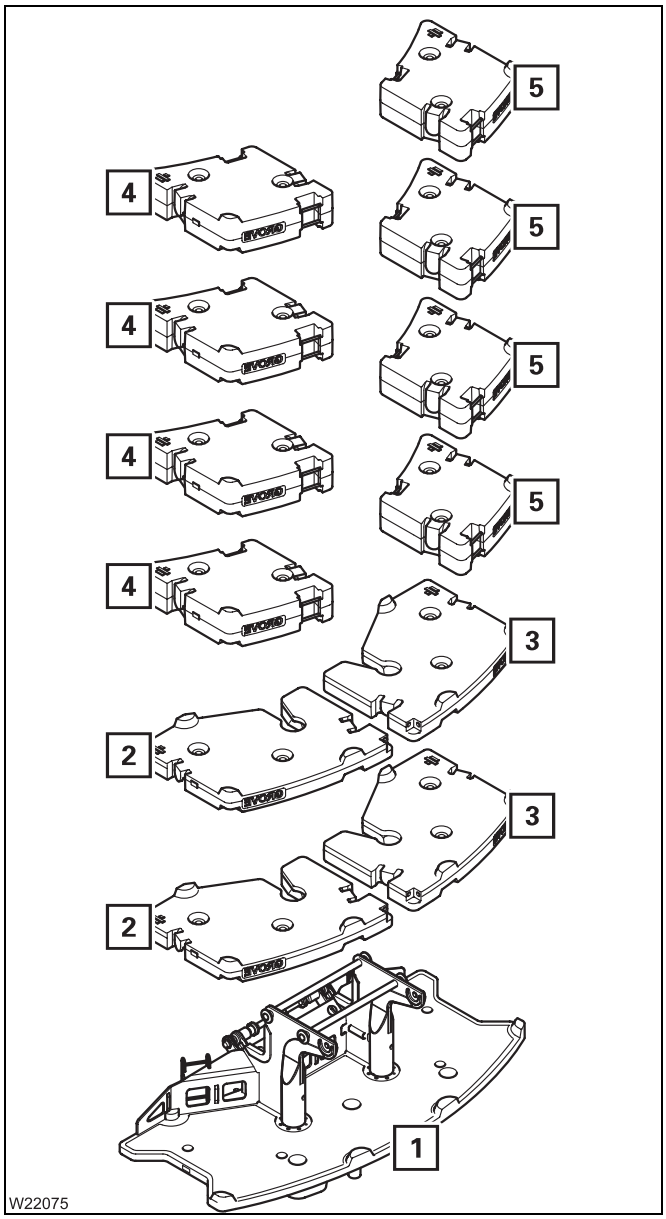
115 t (253 532 lbs)

– 15 t base plate
– Four 10 t plates
– Six 10 t blocks



135 t (297 624 lbs)

– 15 t base plate
– Four 10 t plates
– Eight 10 t blocks



All counterweight sections with additional equipment are illustrated in the diagram with the maximum counterweight mass of 135 t (297 624 lbs).

- The base plate (**1**) must always be at the bottom
- The counterweight sections (**2**) can be exchanged among each other
- The counterweight sections (**3**) can be exchanged among each other
- The counterweight blocks (**4**) can be exchanged among each other
- The counterweight blocks (**5**) can be exchanged among each other

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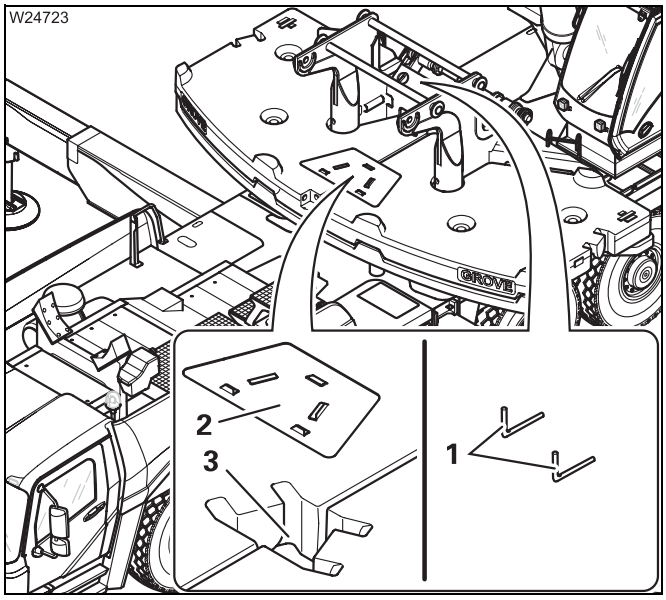
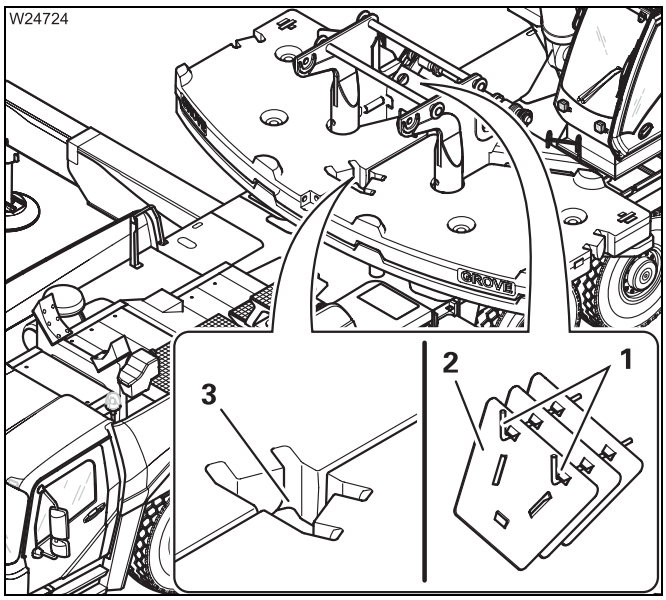
When rigging

Risk of accident due to uncovered openings
Cover the recesses of the slinging points with the covers provided. In this way you avoid stepping into the recesses and injuring yourself.
Do not just place the cover on the last pair of 10 t plates. When you place a cover onto every pair of right and left 10 t plates, then there is no danger of tripping when unrigging.



- Take the cover (**2**) out of the holder (**1**).
- Place the cover (**2**) on the recesses of the slinging points (**3**) such that it does not slip.
- If necessary, place more 10 t plates onto the cover (**2**).

When unrigging



- Remove the cover (**2**) from the recesses (**3**) of the slinging points.
- Place the covers (**2**) into the holders (**1**) and secure them.
- If necessary, remove the 10 t plates.

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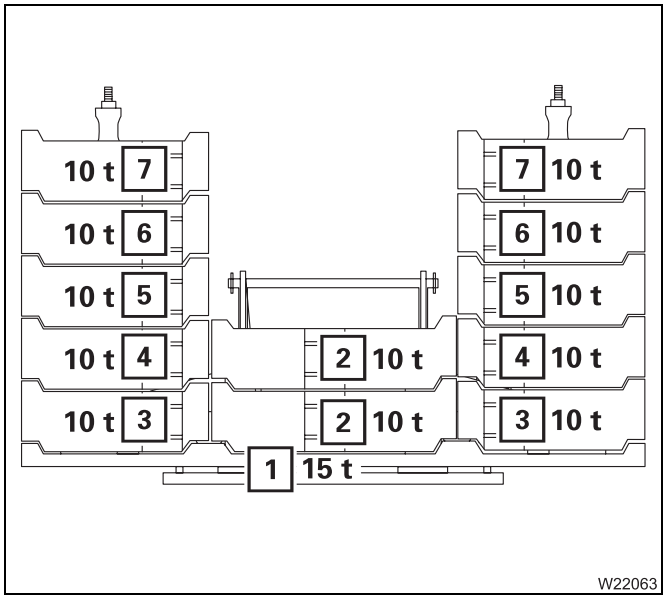
Setting down 10 t sections/blocks version B

Risk of overturning if counterweight rigging sequence is incorrect
When rigging, always place/raise the 10 t blocks alternately on the left and right sides. Otherwise the truck crane will be overloaded at one side or the counterweight may fall from the carrier.

All the sections on the left-hand and right-hand sides are interchangeable.



- Always place the 10 t blocks alternately on the left and right sides.

Counterweight	Counterweight section
15 t	1
25 t	1 and 1 x 2
35 t	1 and 2 or 1 and 3
45 t	1 and 1 x 2 and 3
55 t	1 to 3
75 t	1 to 4
95 t	1 to 5
115 t[2)]	1 to 6
135 t[1), 2)]	1 to 7

[1)] Additional equipment

[2)] *Securing 10 t blocks*, p. 12 - 80

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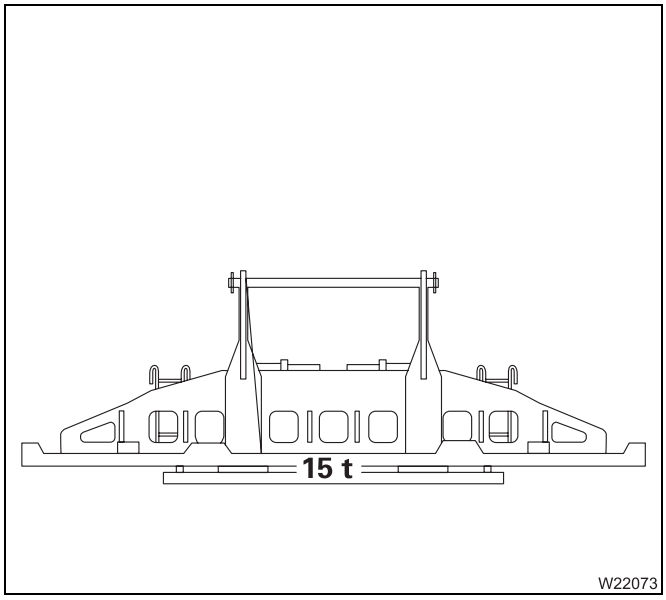
Combinations for the basic equipment in version B

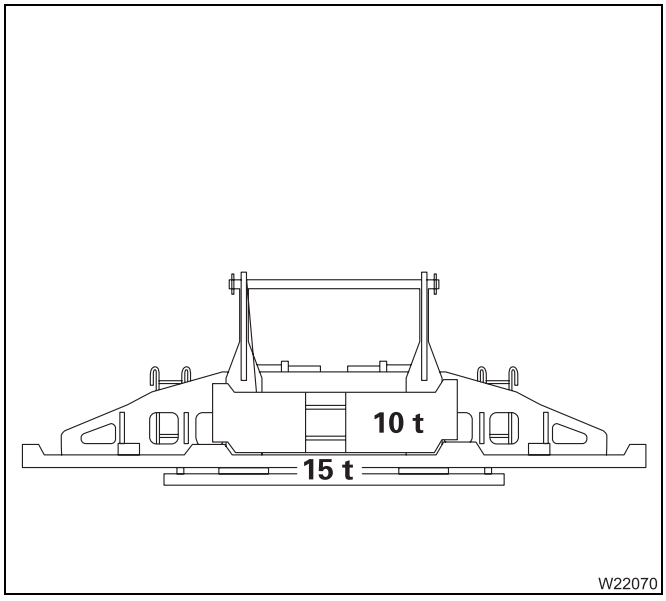
The following counterweight combinations can be combined on the counterweight platform.

Risk of accident due to an incorrect counterweight mass
Only combine the counterweights in such a manner that the counterweight mass corresponds to the specifications in this section and in the *Lifting capacity table*. Other combinations are not permitted.



15 t (33 069 lbs)

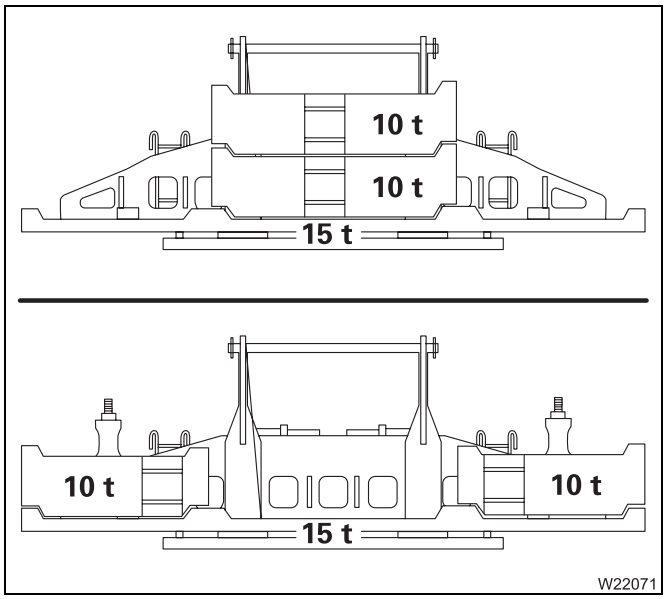
– 15 t base plate



25 t (55 116 lbs)

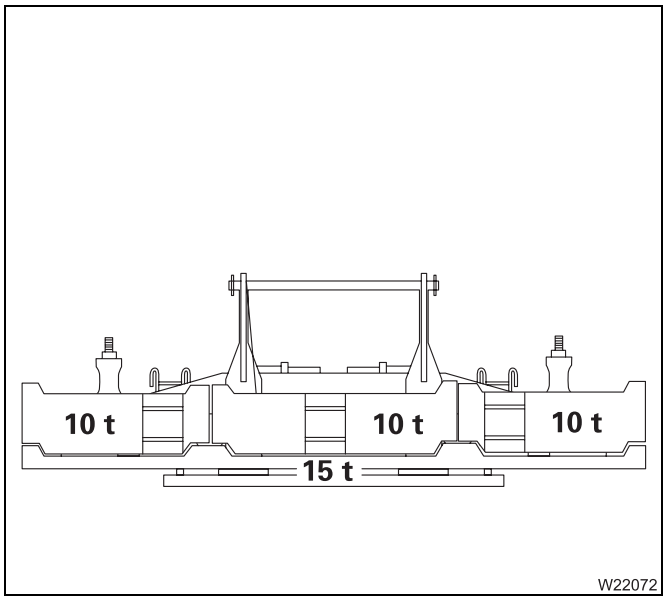
– 15 t base plate
– One 10 t block

12.07.2013



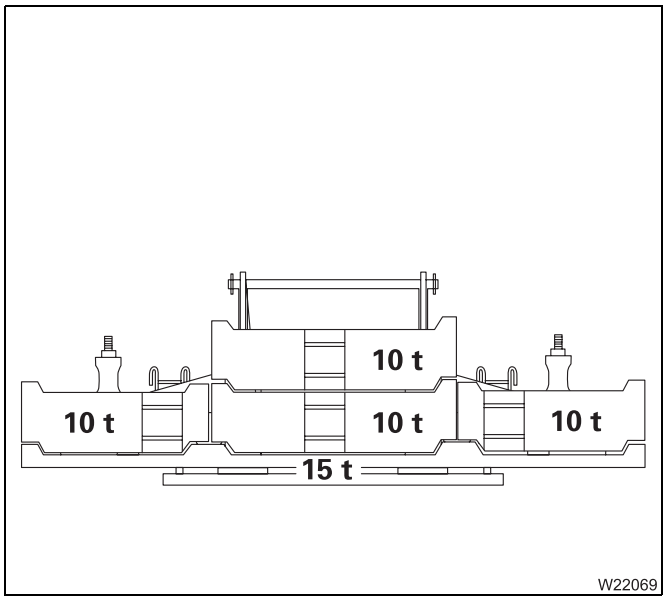
35 t (77 162 lbs)

– 15 t base plate
– Two 10 t blocks



45 t (99 208 lbs)

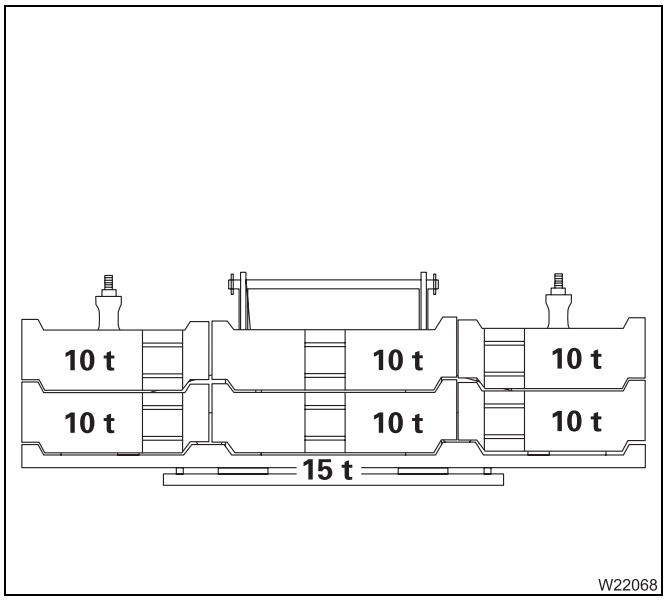
– 15 t base plate
– Three 10 t blocks



55 t (121 254 lbs)

– 15 t base plate
– Four 10 t sections

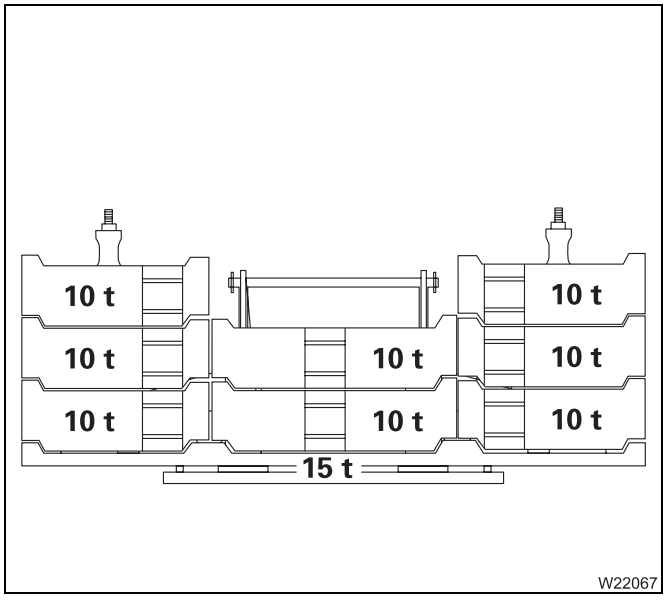
12.07.2013



75 t (165 347 lbs)

– 15 t base plate

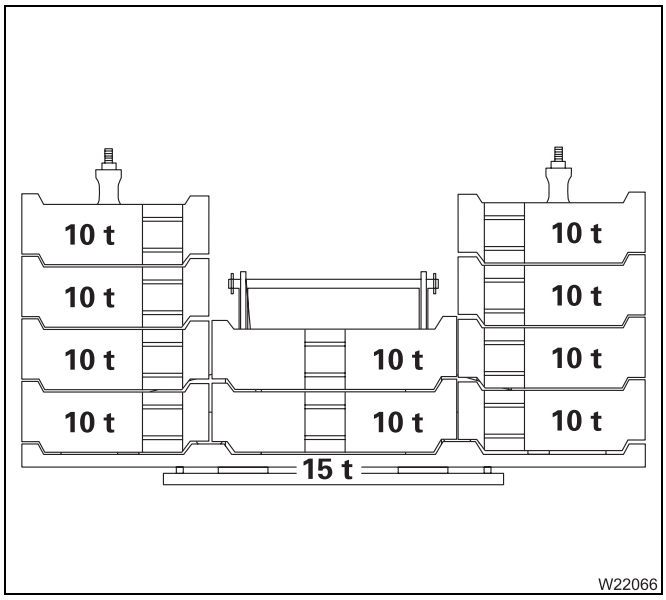
Six 10 t blocks



95 t (209 439 lbs)

– 15 t base plate

– Eight 10 t blocks

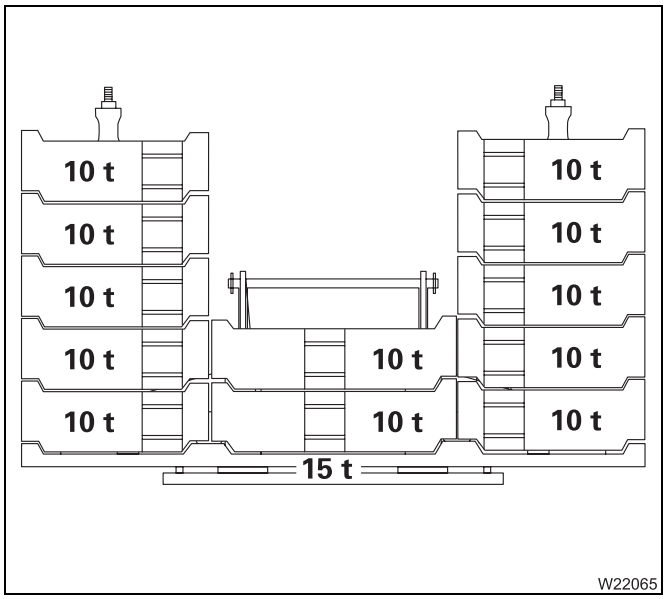


115 t (253 532 lbs)

– 15 t base plate

– Ten 10 t blocks

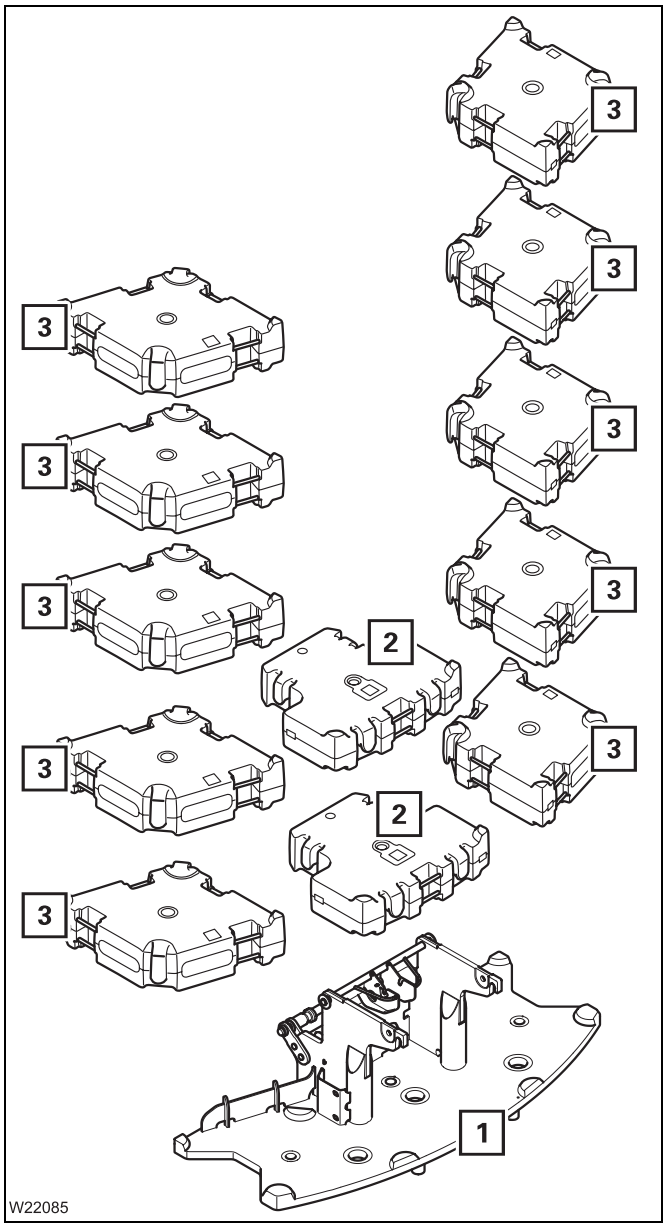
12.07.2013



135 t (297 624 lbs)

– 15 t base plate

– Twelve 10 t blocks



All counterweight sections with additional equipment are illustrated in the diagram with the maximum counterweight mass of 135 t (297 624 lbs).

– The base plate (**1**) must always be at the bottom.

– The counterweight blocks (**2**) can be exchanged among each other.

– The counterweight blocks (**3**) can be exchanged among each other.

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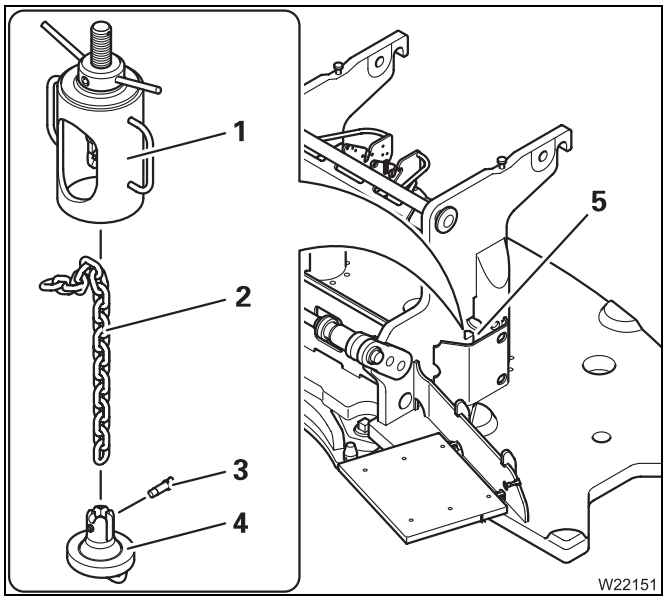
12.7.7 Securing/releasing 10 t blocks

Risk of accident from falling counterweight blocks
Secure the 10 t blocks with the tensioning device.
This prevents the blocks from slipping or falling down and injuring someone.

Tensioning device

In the rigged state, the 10 t blocks must be secured with the tensioning device. There is a tensioning device for each side. The tensioning devices are identical and interchangeable.

Securing the counterweights is identical for versions A and B.



A tensioning device consists of:

1 Chain tensioner
2 Chain
3 Pins
4 Tensioning bearing

When the counterweight is unrigged:

- Always store the tensioning device in the compartment (**5**) on the counterweight base plate.

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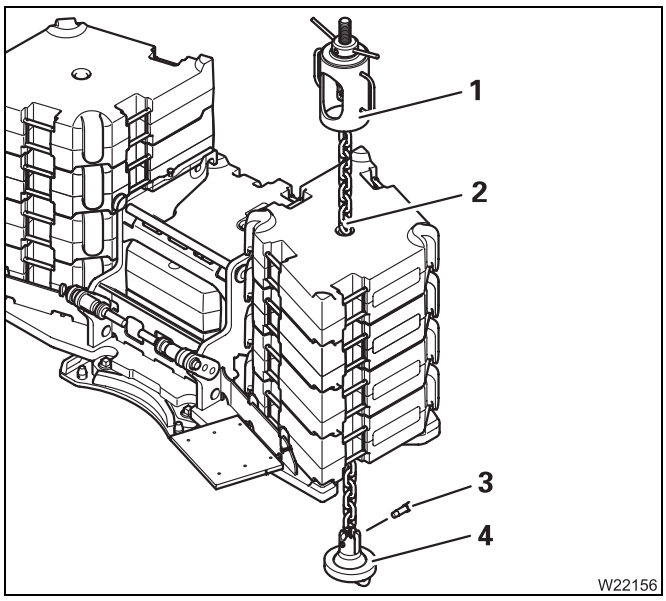
Securing 10 t blocks

The height of a 10-t counterweight section corresponds to the length of approx. 15 chain links.



- Insert the chain (**2**) into the chain tensioner (**1**).
- Feed the chain (**2**) with the chain tensioner (**1**) from above through respective counterweight combination.
- Fasten the tensioning bearing (**4**) to the chain using the pin (**3**).
- Turn the chain tensioner (**1**) firmly (clockwise).

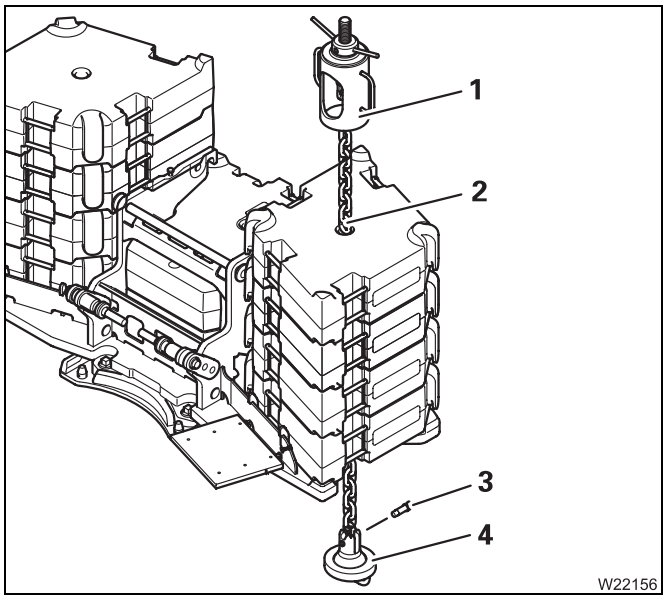
Now the 10 t blocks are secured.

- Secure the blocks on the other side in the same way.

Releasing 10 t blocks

Before you can lift the blocks, you must release them.

Risk of accident due to damage to the lifting gear and the slinging points
Release the blocks before lifting. Otherwise the tensioning device, the lifting gear or the slinging points may be overloaded and damaged.
This can cause the blocks to slip or unexpectedly fall down, through damage that cannot be externally seen.



- Loosen the chain tensioner (**1**) (turn counter clockwise) until you can remove the pin (**3**) and the tensioning bearing (**4**).
- Pull the chain tensioner (**1**) with the chain (**2**) upwards out of the counterweight combination.
- Release the blocks on the other side in the same way.
- Store the tensioning device in the compartment on the base plate.

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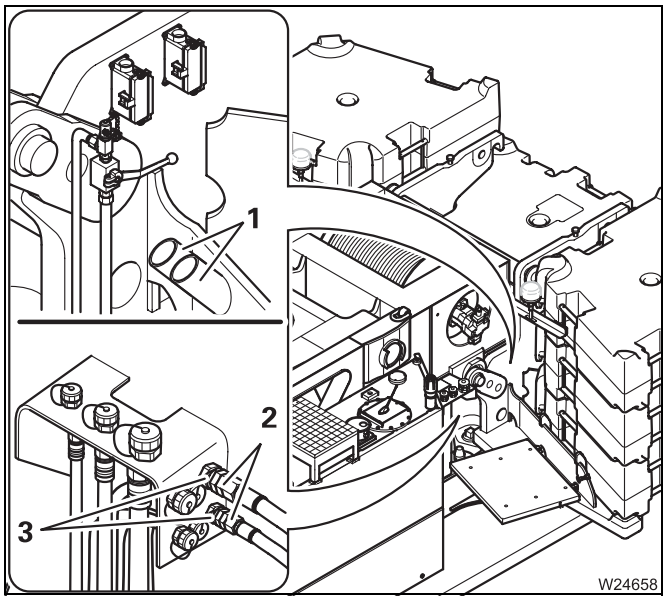
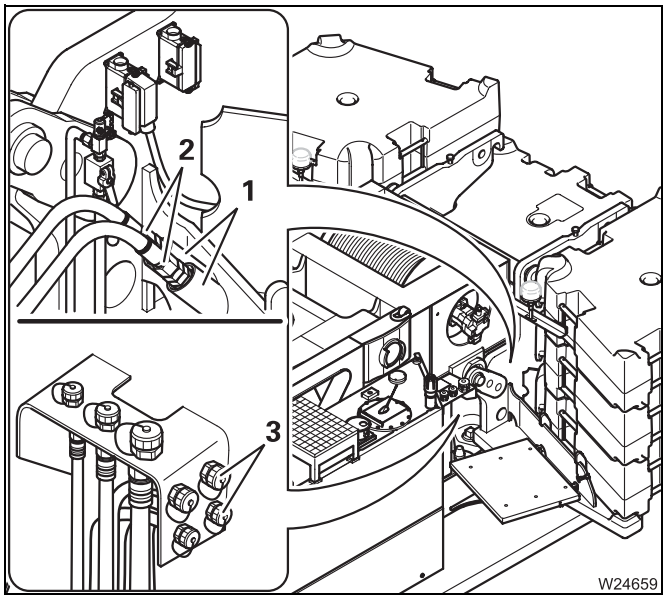
12.7.8 Establishing/disconnecting the hydraulic connection

Establishing



- Remove the caps from the ports (**3**).
- Remove the hoses (**2**) from the brackets (**1**) and connect them to the ports (**3**).

Disconnecting You must disconnect the hydraulic connection before lifting the 15-t base plate from the carrier.



- Remove the hoses (**2**) from the connections (**3**).
- Close all the hoses and connections with the caps.
- Fit the hoses (**2**) into the brackets (**1**).

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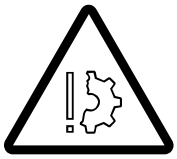
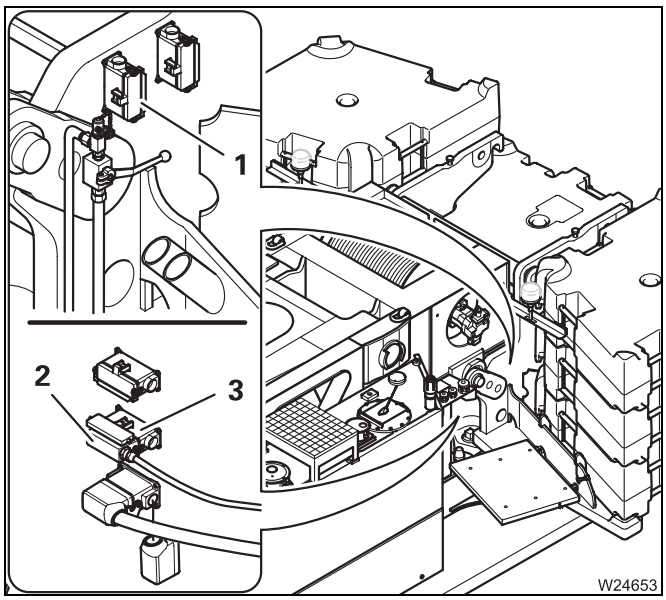
12.7.9 Making/breaking the electrical connection



Risk of malfunction in the superstructure electronics!
Always turn off the ignition in the crane cab before you establish or break the electrical connection. This prevents malfunctions and error messages in the superstructure electronics.

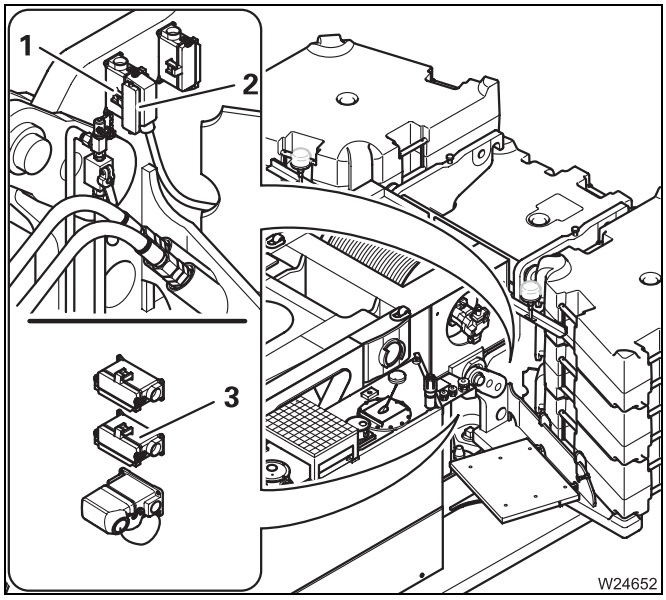
Establishing



- Remove plug (**2**) from socket (**1**) and insert it into socket (**3**).
- Cover the socket (**1**) with the cap.

Disconnecting

The connection must be separated before lifting the 15-t base plate from the carrier.



- Remove plug (**2**) from socket (**3**) and insert it into socket (**1**).
- Cover the socket (**3**) with the cap.

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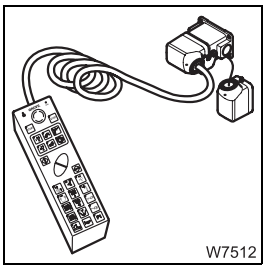
12.7.10 Rigging counterweight

Risk of crushing when raising and lowering
Make sure nobody is on the counterweight platform while the counterweight is being lifted or lowered.
Before raising and lowering, remove all objects that could become jammed or crushed.

Risk of accident from falling counterweight
When the counterweight is locked to the turntable, always check that the safety valve is closed before moving the lifting cylinder; ➠ *Counterweight safety valve*, p. 12 - 87.
This prevents the counterweight from being inadvertently unlocked and falling due to getting the switches mixed up.

Hand-held control You need the hand-held control to rig the counterweight.

Risk of accident due to falling counterweight parts
Only leave the hand-held control connected as long as it is needed for rigging the counterweight.
The counterweight could fall off while the cane is being operated and lead to damage and injuries.



- Connect the hand-held control; ➠ *Connecting/disconnecting the hand-held control*, p. 12 - 21.

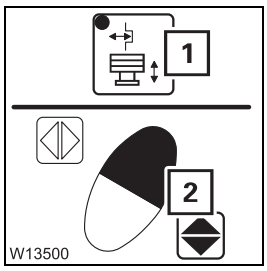
Counterweight rigging

To rig the counterweight, you must extend the lifting cylinder in order to raise the counterweight. Then you must lock the counterweight on the superstructure and then extend the lifting cylinder into the 15 t base plate.

Extending the lifting cylinders

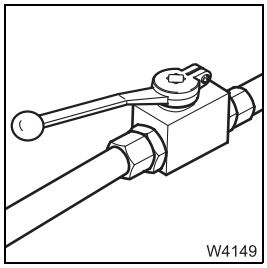
- Check that the lamp (**1**) lights up (locking cylinders are unlocked).

Risk of damage when raising the counterweight
Always check that the two red lamps are lit before lifting the counterweight with the lifting cylinder.
If the green lamps are lit then the locking cylinders are extended. These would be pressed against the mountings on the turntable and damage them.

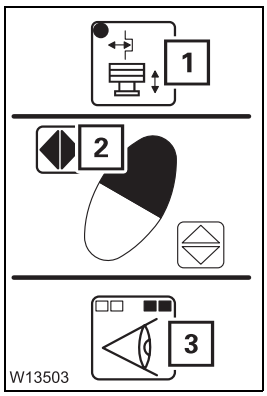


- Press the button (**1**). The lamp lights up.
- Press the key combination (**2**) until the counterweight is fully raised.

Locking the counterweight



- Open the safety valve; p. 12 - 87.



- Press the button (**1**). The lamp lights up.
- Press the key combination (**2**), until the lamps (**3**) are lit.

  The counterweight is now locked at the turntable.

If a locking pin has not yet reached the *Locked* end position, the corresponding lamp will flash.

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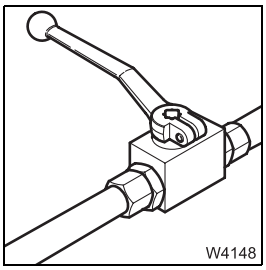
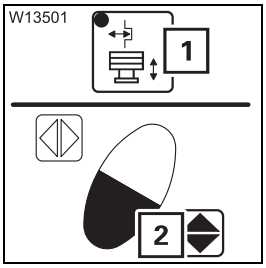


- Closing the safety valve; ➠ p. 12 - 87.

Risk of accident from falling counterweight
Always close the safety valve if the counterweight is locked to the turntable. This prevents the locking pins, for example, from being unintentionally retracted because a button is erroneously pushed, causing the entire counterweight to fall down.

Retracting the lifting cylinders



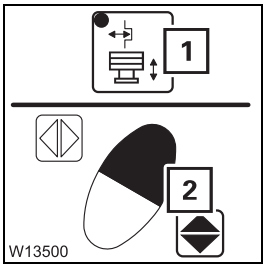
- Press the button (**1**). The lamp lights up.
- Press the key combination (**2**) until the lifting cylinder is fully retracted.

The counterweight is now completely unrigged.

Unrigging counterweight

To unrig the counterweight, you must extend the lifting cylinder in order to secure the counterweight against falling down. Then you must unlock the counterweight on the turntable and then extend the lifting cylinder into the 15 t base plate in order to lower the counterweight onto the counterweight platform.

Extending the lifting cylinders



- Press the button (**1**). The lamp lights up.
- Press the key combination (**2**), until the lifting cylinders are extended into the cylinder mounts on the counterweight platform.

Risk of accident from falling counterweight
Also make sure that the hydraulic cylinders are fully extended into the cylinder mounts on the counterweight platform. This prevents the counterweight from falling when the locking pins are retracted.

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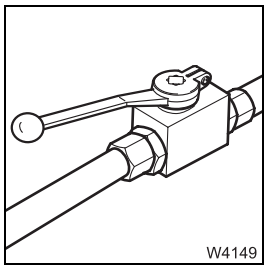
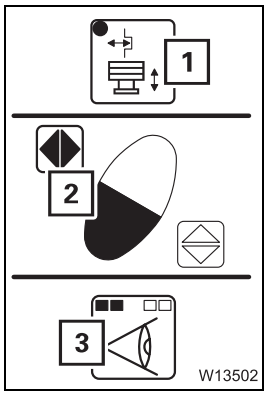
Unlocking the counterweight

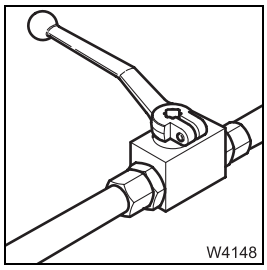


- Open the safety valve; ➠ p. 12 - 87.



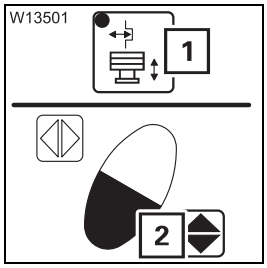
- Press the button (**1**). The lamp lights up.
- Press the key combination (**2**), until the lamps (**3**) are lit.

If a locking pin has not yet reached the *Locked* end position, the corresponding lamp will flash.



- Close the safety valve; ➠ p. 12 - 87.

Retracting the lifting cylinders



- Press the button (**1**). The lamp lights up.
- Press the key combination (**2**) until the lifting cylinder is fully retracted.

The counterweight is now lowered onto the counterweight platform.

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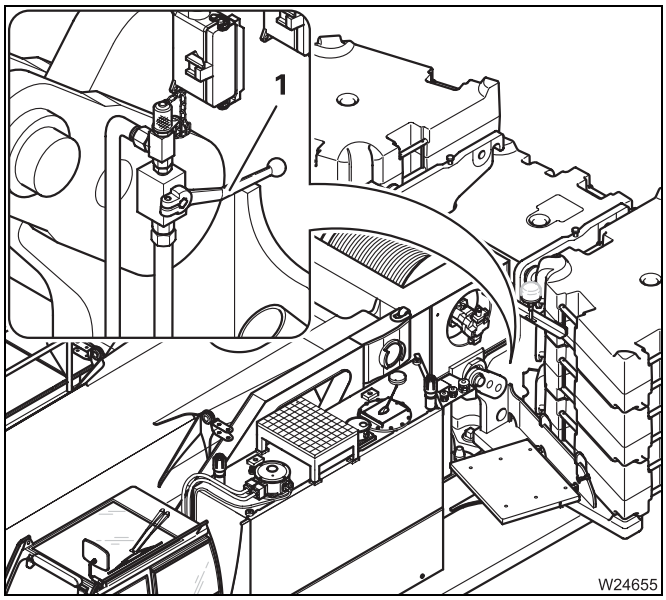
Counterweight safety valve

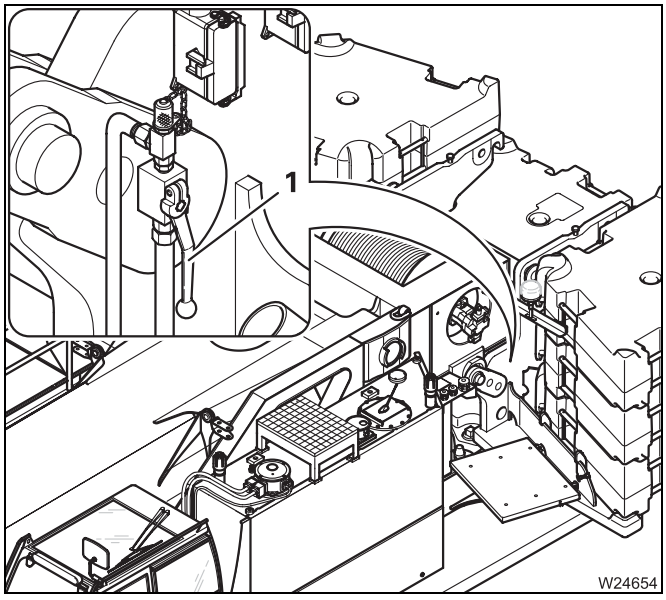


Closing safety valve

After you have locked the counterweight on the turntable:

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

The locking pins are secured against accidental activation.



Opening the safety valve

Before extending or retracting the locking pins:

- Open the valve – lever (**1**) parallel to the line.

The locking pins can now be moved using the hand-held control.

- Close the safety valve after extending the locking pins.

Risk of accident when the safety valve is open
Always close the safety valve if the counterweight is locked to the turntable. This prevents the counterweight from falling down due to unintentional actuation of the locking pins.

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12.7.11 Raising and lowering 10 t counterweight blocks with a mounted auxiliary hoist

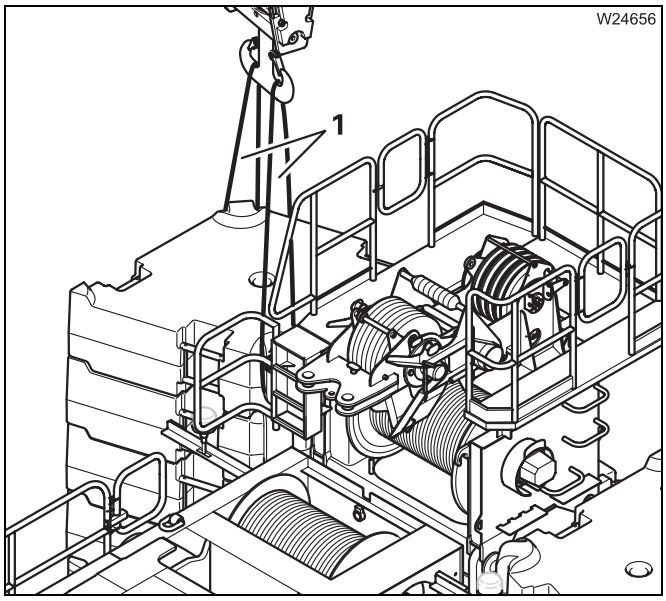
You will require the following equipment with a sufficient load bearing capacity:

– An auxiliary crane (depending on the rigging mode of the truck crane)

– Suitable lifting gear and guide ropes.

➠ *Dimensions and weights of removable parts*, p. 1 - 10.

Risk of damage to the auxiliary hoist and truck crane!
Sling the 10 t counterweight blocks only at the slinging points provided. Always use lifting gear with a sufficient lifting capacity. This prevents damage to the auxiliary hoist or the truck crane.



- Release and remove the securing devices on the 10 t counterweight blocks; ➠ p. 12 - 79.
- Attach the lifting gear (**1**) to the slinging points provided on the 10 t counterweight blocks; ➠ p. 12 - 61.
- Attach the lifting gear into the hook block.
- Carefully raise the 10 t counterweight blocks and set them down on a suitable base.
- Secure the new counterweight combination; ➠ p. 12 - 79.

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12.7.12 Slewing with rigged counterweight

Slewing with a rigged counterweight is only permissible when:

– The necessary outrigger span is rigged

– The respective RCL code is shown

– The permissible working radius according to *Lifting capacity table* is maintained

For slewing with rigged Mega Wing Lift:

➠ *Mega Wing Lift operating instructions*.

Danger of overturning when slewing with an incorrectly set RCL
The RCL only disables the slewing operation if you have entered the RCL code correctly and if the RCL is not overridden.
Therefore always check before slewing whether the RCL code valid for the current rigging mode is displayed.
This prevents slewing operations from being released within impermissible ranges and the truck crane from overturning.

Danger of overturning when slewing with the hand-held control
Crane operations are not monitored by the RCL whenever the hand-held control is connected.
Always check whether a sufficient outrigger span has been set for the rigged counterweight before slewing.
This prevents the truck crane from overturning during slewing due to excess counterweight mass.

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

– Permitted

– Only permitted for certain working radii

– Disabled (with the correct rigging mode)

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Rigged counterweight	Rigged outrigger span 8.70 x (28.5 x)					7.98 x (26.1 x)
	2.71 m (8.9 ft)	5.00 m (16.4 ft)	6.30 m (20.4 ft)	7.40 m (24.3 ft)	8.50 m 27.9 ft)	8.50 m (27.9 ft) 1.00 m (3.3 ft) (auxiliary support)[1]
0 t (0 lbs)						
15 t (33 069 lbs)		Slewing not permissible	Slewing permissible[1]			Slewing not permissible
35 t (77 162 lbs)						
55 t (121 254 lbs)						
75 t (165 347 lbs)						
95 t (209 439 lbs)						
115 t (253 532 lbs)						
135 t (297 624 lbs)						

1) Outrigger span for removable outrigger box

2) Slewing only permitted if the radius permitted in the working range is observed (at least 3.0 m [9.8 ft]); ➠ *Lifting capacity table*

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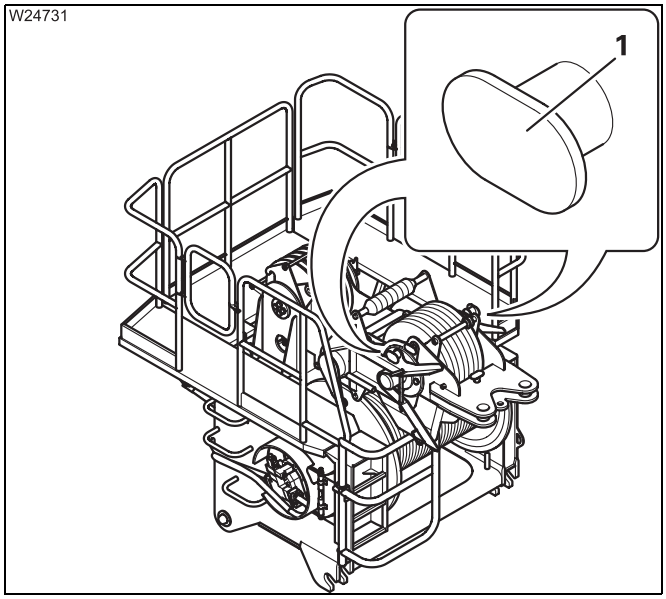
12.8 Rigging the auxiliary hoist

This chapter describes rigging the auxiliary hoist with the truck crane. The auxiliary hoist can also be rigged with an auxiliary crane.

The auxiliary hoist must be removed for on-road driving with a maximum of 12 t axle load.

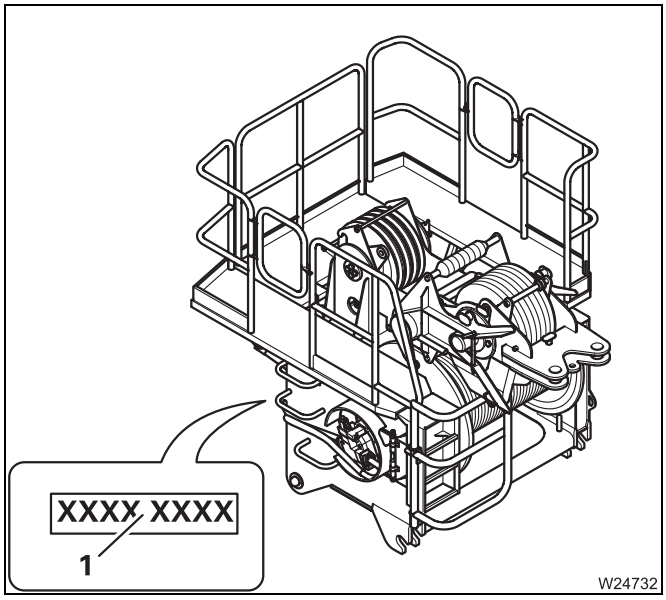


Scope of delivery

- Auxiliary hoist (**1**) with rope
- Lower hook block (**2**)
- Upper hook block (**3**)
- Lifting limit switch

12.8.1 Identification

The auxiliary hoist may only be operated together with a GROVE truck crane GMK 6400 whose serial number is identical with the serial number of the auxiliary hoist.



The serial number (**1**) of the hoist is located on right rear of the hoist frame.

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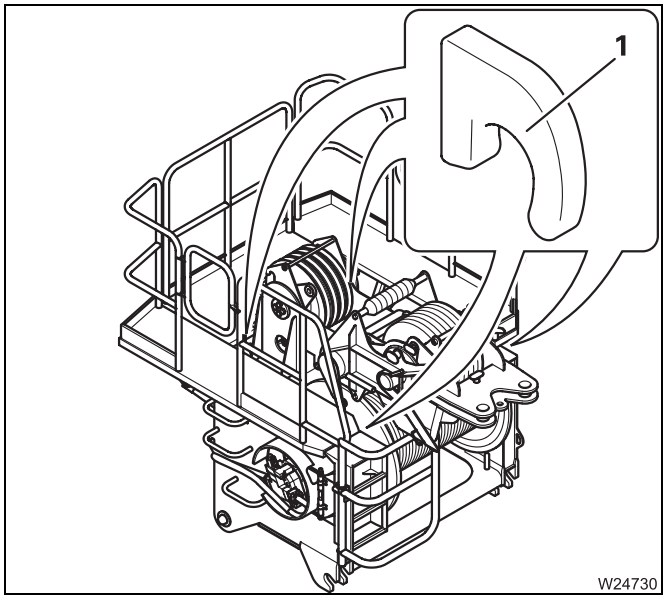
12.8.2 Slinging points and transport

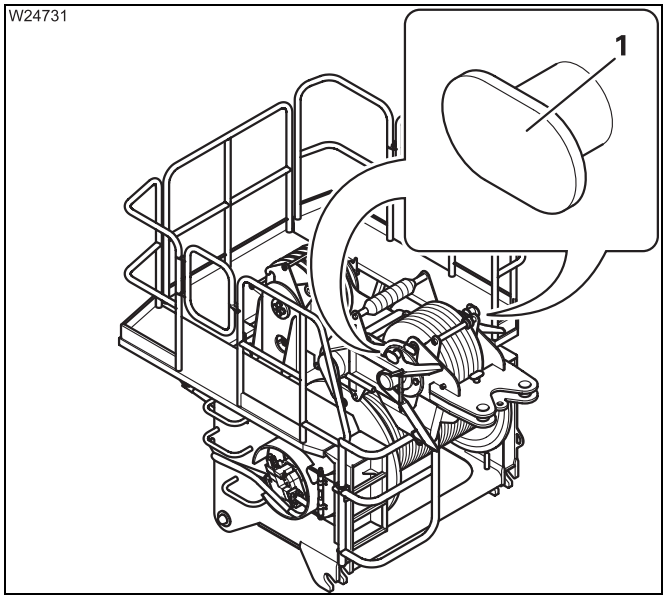
Slinging points

Risk of accident if used improperly
Only attach the auxiliary hoist to the slinging points provided. Always use lifting gear with sufficient lifting capacity; ➠ *Dimensions and weights of removable parts – Auxiliary hoist*, p. 1 - 11.



The auxiliary hoist is equipped with four slinging points (**1**).

- Only attach the auxiliary hoist to the slinging points (**1**).



The catcher is fitted with two slinging points (**1**), on which the catcher is slung together with the upper hook block.

- Only attach the catcher to the slinging points (**1**).

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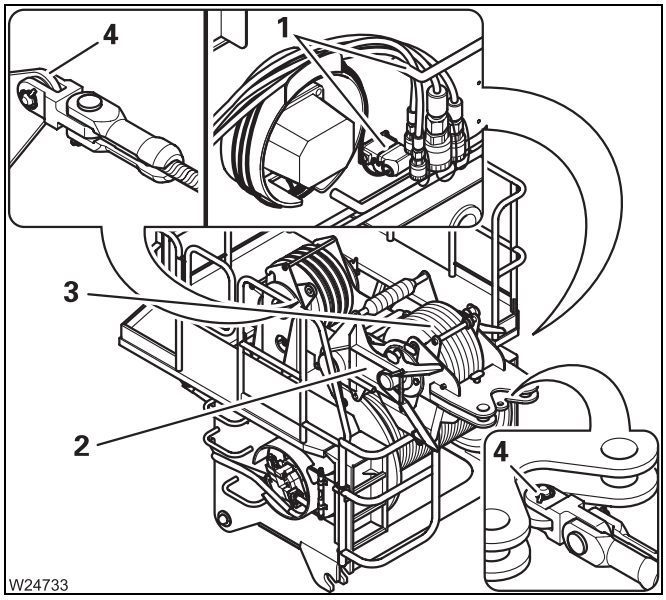
Transport

Risk of damage to the auxiliary hoist
Attach the auxiliary hoist to the separate vehicle so that it cannot slip off.
Insert the hydraulic hoses and the electric cable into the specially designed shaft.

Risk of accident from damaged auxiliary hoist rope
Ensure that the hoist rope is not damaged when loading the auxiliary hoist.
This prevents loads from falling during crane work with an auxiliary hoist.



- Put the auxiliary hoist into the following transport position:

– The hydraulic hoses and connections are inserted into the assigned shaft (**1**); ➠ p. 12 - 100,

– The electric cable is also plugged into the assigned shaft (**1**); ➠ p. 12 - 101,

– The catcher (**2**) has been set down; ➠ p. 12 - 99,

– If necessary, the upper hook block (**3**) is secured in the catcher; ➠ p. 12 - 106,

– The auxiliary hoist rope is fastened to the holder (**4**).

Be aware of the dimensions and weight of the auxiliary hoist when transporting; ➠ p. 1 - 11.

12.8.3 CHECKLIST: Mounting the auxiliary hoist

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

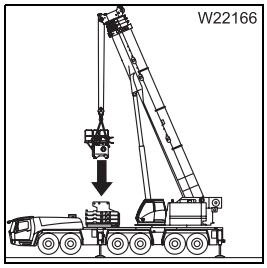
Requirements

– The truck crane is stabilised with the outrigger span required for crane work according to the *Lifting capacity chart*; ➠ *Permissible outrigger spans*, p. 12 - 32,

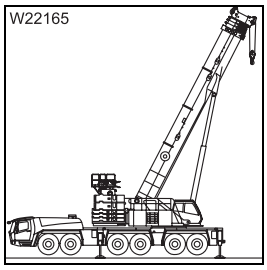
– The required counterweight version is assembled on the counterweight platform and is connected electrically and hydraulically; ➠ *CHECKLIST: Counterweight, rigging*, p. 12 - 62,

– The current rigging code of the truck crane is entered in the RCL; ➠ *Entering the rigging mode*, p. 11 - 23.

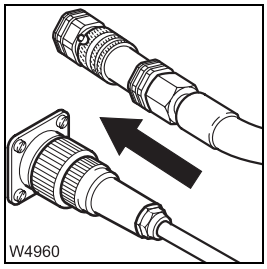
– The railings on the auxiliary hoist are folded in; ➠ p. 12 - 106.



1. Sling the auxiliary hoist with the truck crane and lift up to the 15 t base plate;
➠ *Slinging points and transport*, p. 12 - 92,
➠ *Lifting the auxiliary hoist onto the 15 t base plate*, p. 12 - 98.



2. Slew the superstructure to the rear; ➠ *Slewing*, p. 11 - 100.



3. – Complete the hydraulic connection of the auxiliary hoist; ➠ p. 12 - 100,

– Complete the electrical connection of the auxiliary hoist; ➠ p. 12 - 101.

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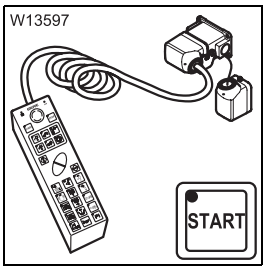
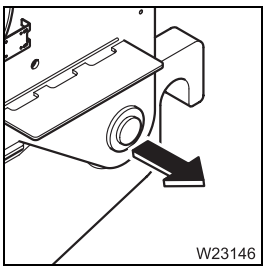
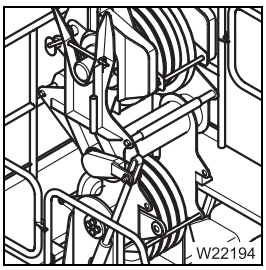


4. Connect the hand-held control to the rear right of the turntable and start the crane engine; ➠ p. 12 - 21.

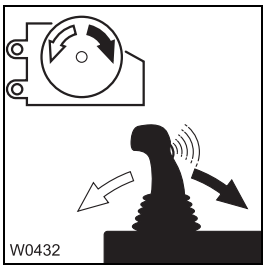


5. Bolt the 15 t base plate to the auxiliary hoist; ➠ p. 12 - 102.

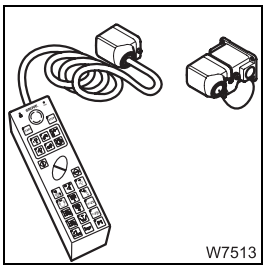
6. Continue rigging the counterweight; ➠ *CHECKLIST: Counterweight, rigging*, p. 12 - 62, point **5.** and point **6.**



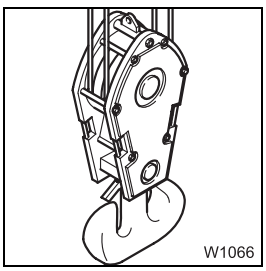
7. Raise the catcher and block it with the support; ➠ p. 12 - 99.



8. Check the auxiliary hoist for correct functioning; ➠ p. 12 - 105.



9. Disconnect the hand-held control; ➠ p. 12 - 22.



10. Reeve the hoist rope and connect the lifting limit switch; ➠ *Reeving and unreeving the hoist rope*, p. 12 - 114.

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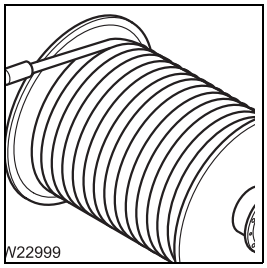
12.8.4 CHECKLIST: Removing the auxiliary hoist

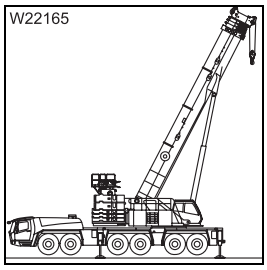
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified there.

Requirements

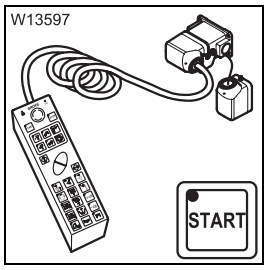
- The truck crane is stabilised with the outrigger span required for crane work according to the *Lifting capacity chart*; ➠ *Permissible outrigger spans*, p. 12 - 32.
- The counterweight and the auxiliary hoist are connected electrically and hydraulically; ➠ p. 12 - 81, ➠ p. 12 - 100.
- The current rigging code of the truck crane is entered in the RCL; ➠ *Entering the rigging mode*, p. 11 - 23.
- The railings on the auxiliary hoist are folded in; ➠ p. 12 - 106.



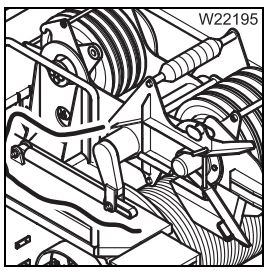
1. Unreeve the auxiliary hoist rope, roll onto the reel and fasten it to the auxiliary hoist.



2. Slew the superstructure to the rear and lock the superstructure.



3. Connect the hand-held control to the rear right of the turntable and start the crane engine; ➠ p. 12 - 21.



4. Lower the catcher; ➠ p. 12 - 99.

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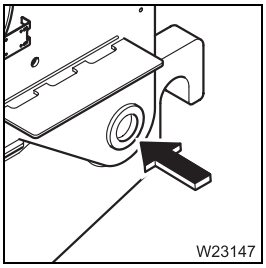
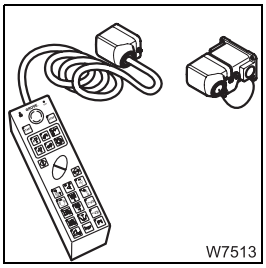
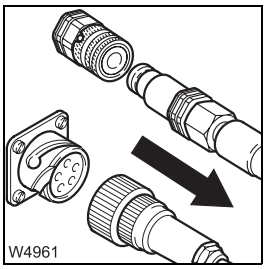
5. Continue rigging the counterweight; ➠ *CHECKLIST: Counterweight, unrigging*, p. 12 - 65, point **5.** and point **6.**



6. Release the locking pin between the auxiliary hoist and the 15 t base plate using the hand-held control; ➠ *Locking/unlocking the auxiliary hoist*, p. 12 - 102.

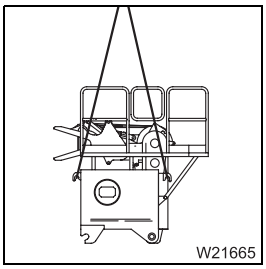


7. Disconnect the hand-held control; ➠ p. 12 - 22.

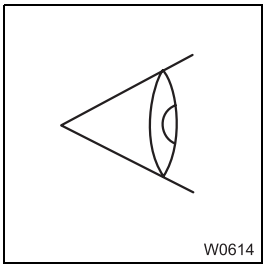


8. – Detach the electrical connection to the auxiliary hoist; ➠ p. 12 - 101.

– Detach the hydraulic connection to the auxiliary hoist; ➠ p. 12 - 100.



9. Sling the auxiliary hoist and place it on the separate vehicle; ➠ *Slinging points and transport*, p. 12 - 92.



10. Check the transport position of the auxiliary hoist; ➠ *Transport*, p. 12 - 93.

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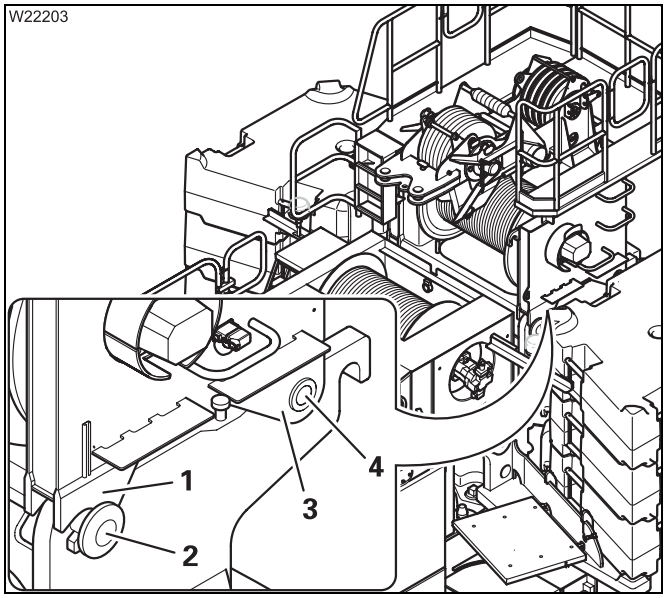
12.8.5 Lifting the auxiliary hoist onto the 15 t base plate



- Sling the auxiliary hoist; ➠ *Slinging points*, p. 12 - 92.
- Hoist the auxiliary hoist onto the 15 t base plate. When doing this, ensure that:
  – Both hooks (**1**) grip round the holders (**2**),
  – The fork elements on both sides (**3**) align with the eyes (**4**).

Now the auxiliary hoist is in the correct position for locking.

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12.8.6 Raising/setting down the catcher

When operating the auxiliary hoist, the catcher must be raised so that the cable run is not impeded by the upper hook block.

To raise and lower the catcher you must:

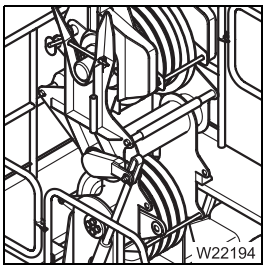
– Connect the hand-held control; p. 12 - 21,

– Check that the upper hook block is secured when it lies in the catcher; p. 12 - 106.

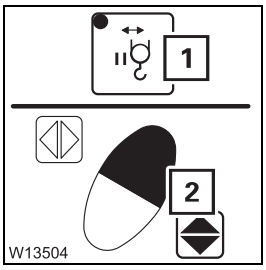
Raising

• Connect the hand-held control; p. 12 - 21.

When the upper hook block lies in the catcher:



• Check that the upper hook block is secured; p. 12 - 106.



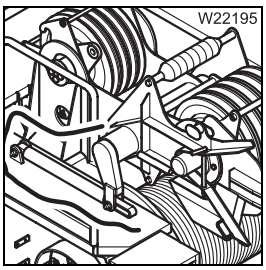
• Press the button (**1**). The lamp lights up.

• Press the key combination (**2**) until the catcher is fully raised.

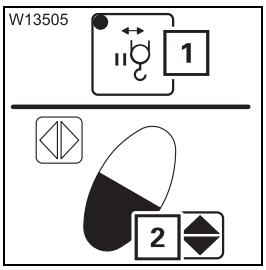
Setting down

• Connect the hand-held control; p. 12 - 21.

When the upper hook block lies in the catcher:



• Check that the upper hook block is secured; p. 12 - 106.



• Press the button (**1**). The lamp lights up.

• Press the key combination (**2**) until the catcher is fully set down.

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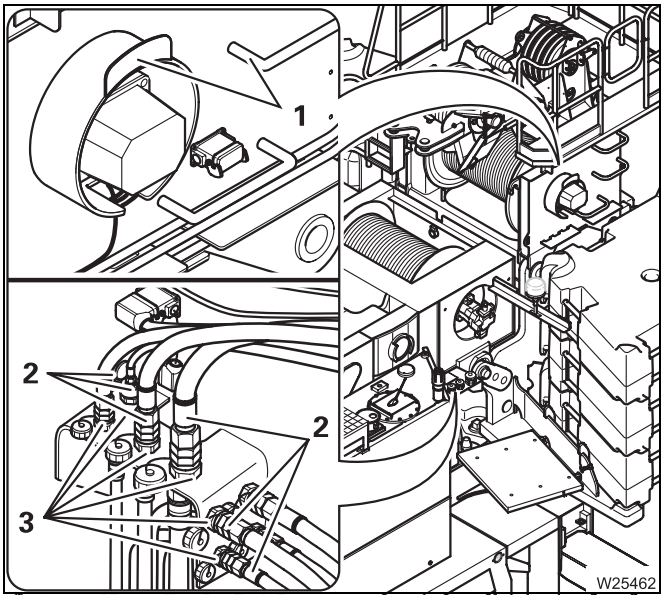
12.8.7 Establishing/disconnecting the hydraulic connection

Establishing

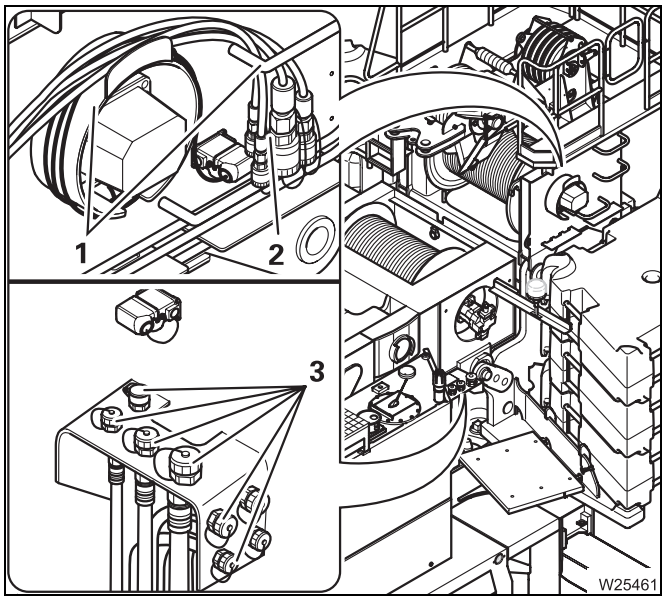
The connection must be established before the auxiliary hoist can be locked and operated.



- Remove the caps from the ports (**3**).
- Remove the hoses (**2**) from the brackets (**1**) and connect them to the ports (**3**).

Disconnecting

The connection must be disconnected before the auxiliary hoist is hoisted from the 15 t base plate.



- Remove the hoses (**2**) from the connections (**3**).
- Close all the hoses and connections with the caps.
- Fit the hoses (**2**) into the brackets (**1**).

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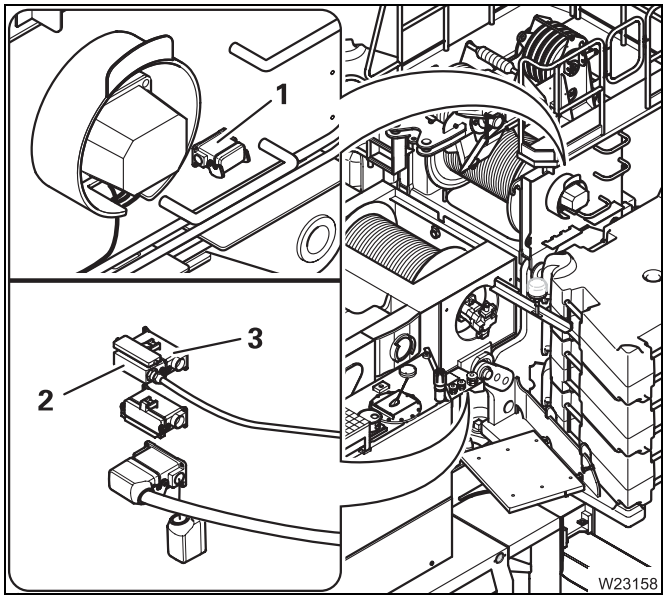
12.8.8 Making/breaking the electrical connection

Establishing

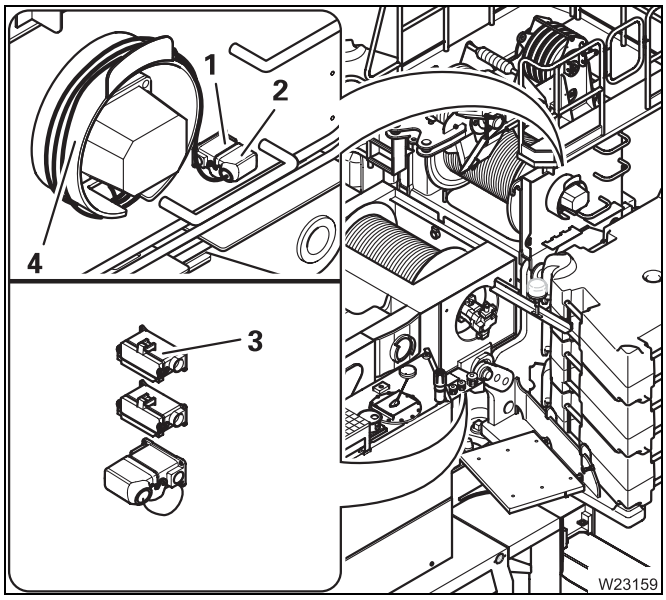
The connection must be established before the auxiliary hoist can be locked and operated.



- Remove plug (**2**) from socket (**1**) and insert it into socket (**3**).
- Cover the socket (**1**) with the cap.

Disconnecting

The connection must be disconnected before the auxiliary hoist is hoisted from the 15 t base plate.



- Remove the plug (**2**) from the socket (**3**).
- Wind the cable onto the bracket (**4**) and insert the plug (**2**) into the socket (**1**).
- Cover the socket (**3**) with the cap.

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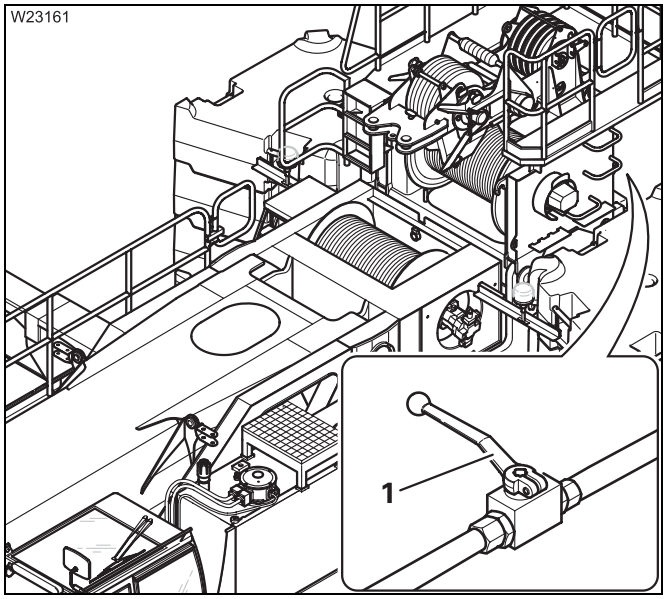
12.8.9 Locking/unlocking the auxiliary hoist

Auxiliary hoist safety valve

The hydraulic cylinders of the locking pins are blocked with a safety valve. The valve is located on the rear right-hand side of the auxiliary hoist, at the same height as the treadle.

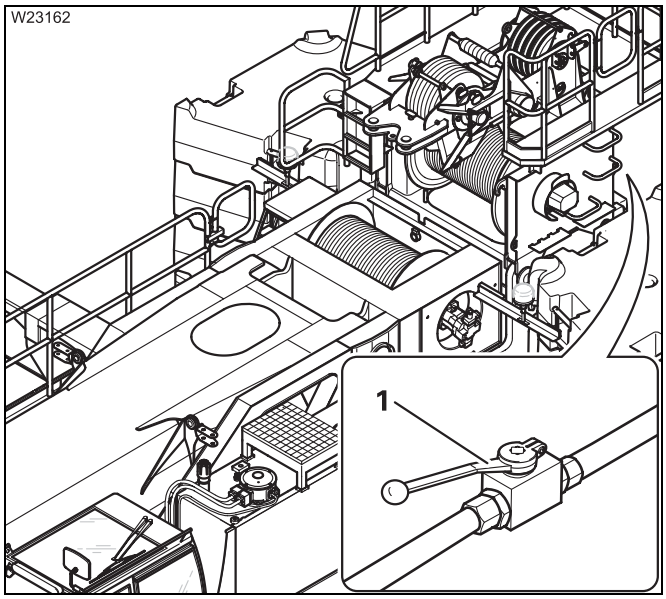


Closing the valve

Always close the valve after you have locked the auxiliary hoist on the 15 t base plate.

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

The pins are secured against accidental activation.



Opening the valve

Before the locking pins are extended or retracted, you have to open the safety valve.

- Open the valve – handle (**1**) parallel to the line.

The pins can now be moved using the hand-held control.

- Close the valve after extending the pins.

Risk of accident when the safety valve is open
Always close the safety valve when the auxiliary hoist on the 15 t base plate is locked. This prevents the auxiliary hoist from being unlocked due to unintentional actuation and from being lifted off the base plate.

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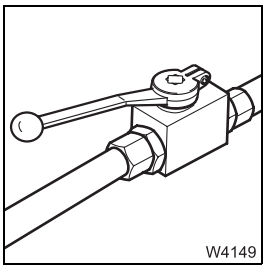
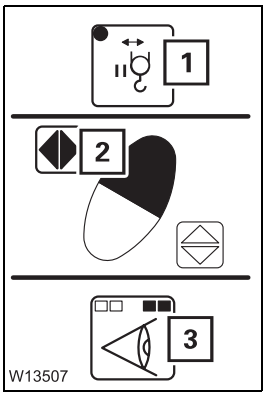
Locking



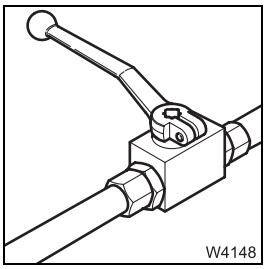
Open the safety valve; ➠ p. 12 - 102.



- Press the button (**1**). The lamp lights up.
- Press the key combination (**2**), until the lamps (**3**) are lit.

  The counterweight is now locked at the turntable.

If a locking pin has not yet reached the *Locked* end position, the corresponding lamp will flash.



- Close the safety valve; ➠ p. 12 - 102.

Risk of accident from falling counterweight
Always close the safety valve when the auxiliary hoist is locked to the counterweight. This prevents the locking pins from (e.g.) being unintentionally retracted when a button is erroneously pushed, causing the entire counterweight to fall down.

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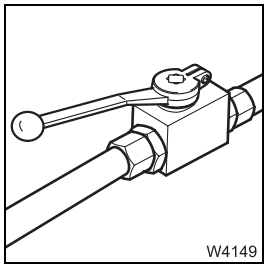
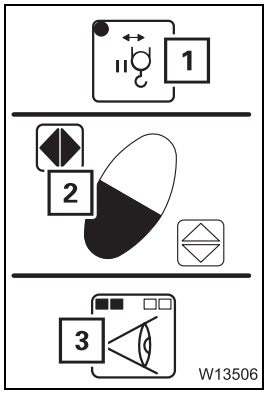
Releasing the locking pin

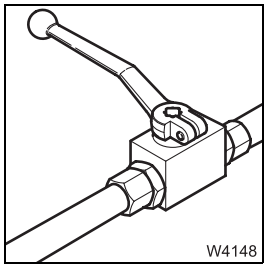


- Open the safety valve; ➠ p. 12 - 102.



- Press the button (**1**). The lamp lights up.
- Press the key combination (**2**), until the lamps (**3**) are lit.

If a locking pin has not yet reached the *Unlocked* end position, the corresponding lamp will flash.



- Close the safety valve for the transport; ➠ p. 12 - 102.

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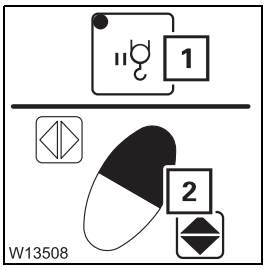
12.8.10 Checking the auxiliary hoist for correct functioning

After mounting the auxiliary hoist you must check that it functions properly when the control lever is extended and check the functioning of the slewing indicator.

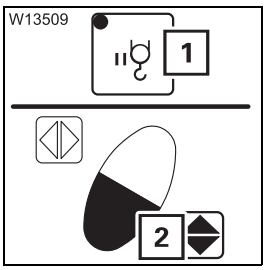
You can carry out a test to check whether the auxiliary hoist is correctly connected using the hand-held control as well as in the crane cab. You can only carry out the test on the control levers in the crane cab.

With the hand-held control



- Press the button (**1**). The lamp lights up.
- Press the key combination (**2**).

The hoist must now drum the cable.

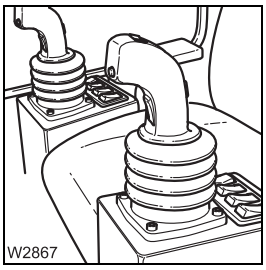


- Press the button (**1**). The lamp lights up.
- Press the key combination (**2**).

The hoist must now reel up the cable.

In the crane cab

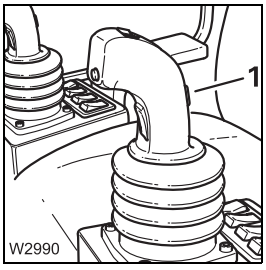
- Switch on the auxiliary hoist; ➠ p. 11 - 59.



- Move the left-hand control lever forward and then back, letting the auxiliary hoist run for about one half revolution in each direction.
- Check whether the direction of rotation for the particular control lever position corresponds with the following specifications.

Shift the control lever to the rear	The auxiliary hoist rope is reeled **onto** the cable drum
Shift the control lever forwards	The auxiliary hoist rope is reeled **off** the cable drum

- While checking, ensure that the rope does not slacken.



- Check the function of the slewing indicator. You have to feel a pulse on the slewing indicator (**1**) when the auxiliary hoist is rotating.

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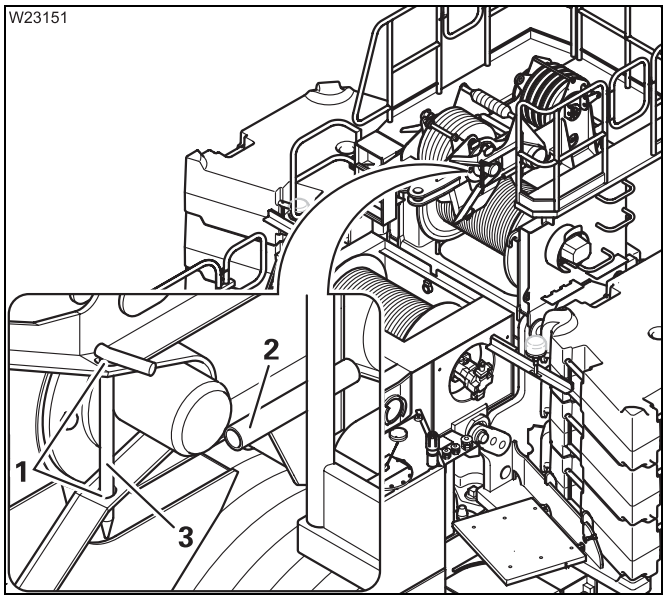
12.8.11 Securing the upper hook block in the catcher

If the upper hook block remains in the catcher during transport or during operation, it must be secured there.



- Check that the pins (**3**) are inserted and secured with retaining pins on both sides.

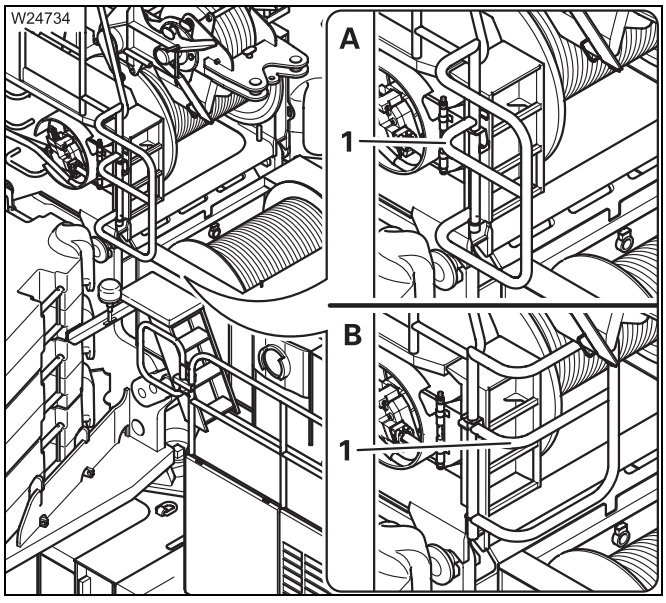
If the upper hook block is not secured, secure it as follows:

- Remove the retaining pins from both sides and pull the pins (**3**) out of the holders (**2**).
- Insert the locking pins on both sides into the holders (**1**).
- Secure the pins using the retaining pins.

12.8.12 Railings on the auxiliary hoist

Risk of accidents when railings are not folded out!
The railings provide protection from falling. Always fold out the railings before moving onto the auxiliary hoist.

- You must also observe the railing notice on the turntable; ➠ p. 12 - 135.



(A) – Folding out

- Lift the railing (**1**) and fold it outwards.

(B) – Folding in

- Lift the railing (**1**) and fold it inwards until it latches into place.

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12.8.13 Permissible applications for the auxiliary hoist

The auxiliary hoist may be used:

– As a replacement for the main hoist; ➠ p. 12 - 107,

– During alternating operation with main hoist and auxiliary hoist on the main boom; ➠ p. 12 - 108,

– For permissible work with the lattice extension; ➠ *Lattice extension operating instructions*.

The following use of the auxiliary hoist is not permitted:

– Two-hook operation on the main boom head is not permitted,

– Impermissible work with the lattice extension; ➠ *Lattice extension operating instructions*.

Replacement for the main hoist

The auxiliary hoist may be used as a replacement for the main hoist:

– For main boom operation,

– For operation with the lattice extension; ➠ *Lattice extension operating instructions*,

- To do so, reeve the auxiliary hoist rope in the same way as the main hoist rope; ➠ *Reeving and unreeving the hoist rope*.
- Attach the lifting limit switch and the lifting limit switch weight exactly as for operation with the main hoist; ➠ *Installing/removing the lifting limit switch*, p. 12 - 126.

The auxiliary hoist is arranged with a lower rope pull (104 KN/10,6 t [23 370 lbs]) than the main hoist (110 KN/11.2 t [27 600 lbs]).

This means that a correspondingly high number of falls must be reeved, so that the same load can be lifted as with the main hoist.

If you run the auxiliary hoist rope over the left head sheave, you must extend the main boom to a total length of at least 21 m (69 ft) before lifting a load. Otherwise, the rope angle would exceed the maximum permissible value.

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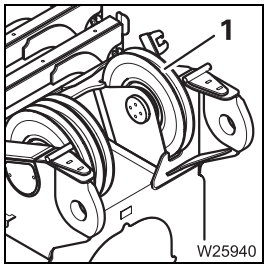
Alternating operation with the main and the auxiliary hoist



For equipment having a second head sheave (**1**) on the main boom, you can simultaneously reeve the main and auxiliary hoist ropes and alternately work with both hoists. To do this, you must install the second lifting limit switch.

Risk of accident during two-hook operation
During alternating operation the load must always hang on only one hook block. If you sling the load on both hook blocks but lift it with only one of the blocks, you are already in the non-permissible two-hook mode which is no longer secured by the RCL.

- Install both lifting limit switches and the associated lifting limit switch weights; ➠ *Installing the lifting limit switch*, p. 12 - 126.
- Enter the current reeving for both hoists at the RCL; ➠ *Entering the reeving value*, p. 11 - 29.
- Switch on the hoist with which you wish to lift the load; ➠ *Hoists display*, p. 11 - 32.

The correct hoist is now set on the RCL and crane operation is secured by the RCL. The maximum loads are reduced by the value of the weight of the second hook block.

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12.9 Rigging work on the main boom

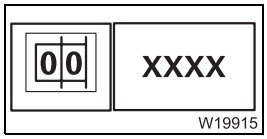
12.9.1 Hook block on the bumper

Picking up the hook block

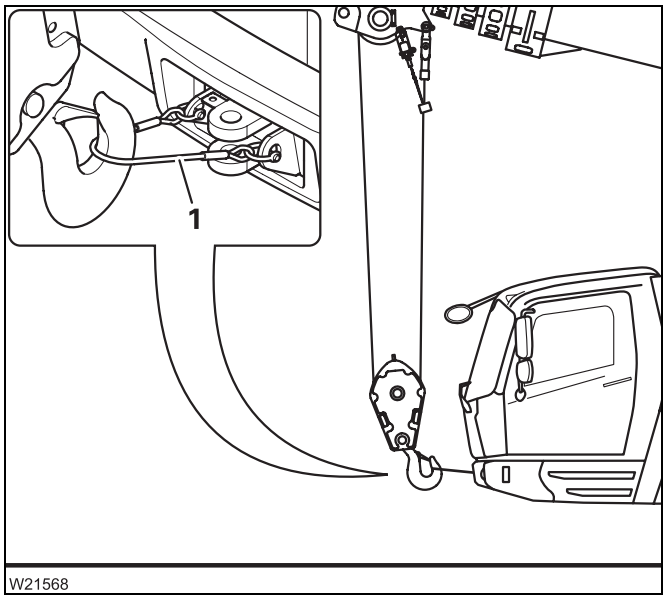
Depending on the driving mode, you must pick up the hook block from the front bumper; ➠ *Driving modes*, p. 6 - 1.

Danger of accident if the view is obstructed
Have someone instruct you when raising the main boom, since the view of the hook block is obstructed. That way you will not raise the boom too far, which would cause the retaining rope to tear.

The main boom is fully retracted.



- Enter the current rigging mode on the RCL.



- Slacken the hoist rope and derrick the main boom simultaneously.
- Derrick the main boom until the boom head is in a vertical position above the hook block.
- Detach the hook block from the retaining rope (**1**).

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Attaching the hook block

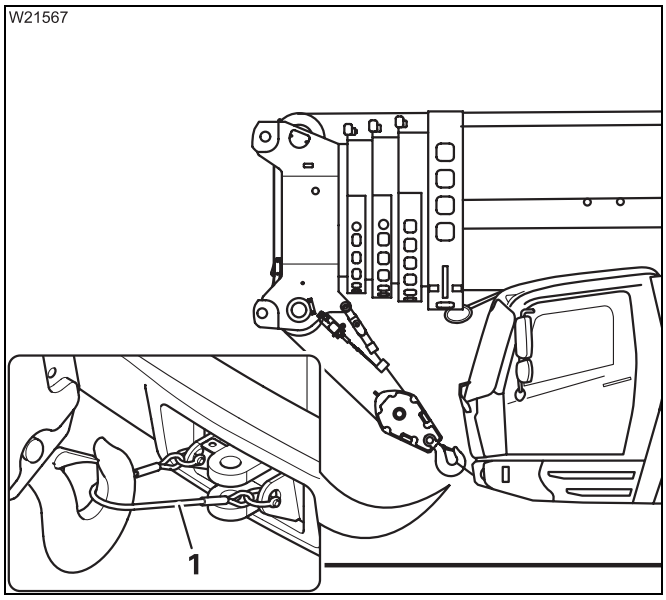
Depending on the driving mode, you can attach the hook block to the front bumper; ➠ *Driving modes*, p. 6 - 1.

Danger of accident if the view is obstructed
The reeved rope lines obstruct the view of the runway. The number of legally permissible rope lines can vary depending on the country in which you are working. According to EU regulations, the hook block may not be reeved more than four times when driving on the road.

Risk of damage to driver's cab
Tension the hoist rope tight enough so that the hook block cannot hit the driver's cab while driving.

Danger of accident from hook block swinging unexpectedly
The hook block will suddenly swing **forward** if the retaining rope for the hook block tears when tightening the hoist rope.
Therefore ensure that the banksman or other persons always stand at a safe distance **to the side** of the hook block.

Do not attach the rope end fitting to the front towing coupling. The towing coupling must be free for a tow-rod in emergencies.



- Raise the hook block vertically above the retaining rope (**1**).
- Lower the hook block and attach the hook block to the retaining rope (**1**).
- Set down the main boom onto the boom rest and pull the hoist rope tight only to the extent that the hook block is stabilised in its position.

If the lifting limit switch is deactivated while you tighten the hoist rope, you can override the shutdown of the lifting limit switch; ➠ p. 11 - 63.

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12.9.2 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. Correct the rigging mode if necessary;
➠ *Slewing with rigged counterweight*, p. 12 - 89.

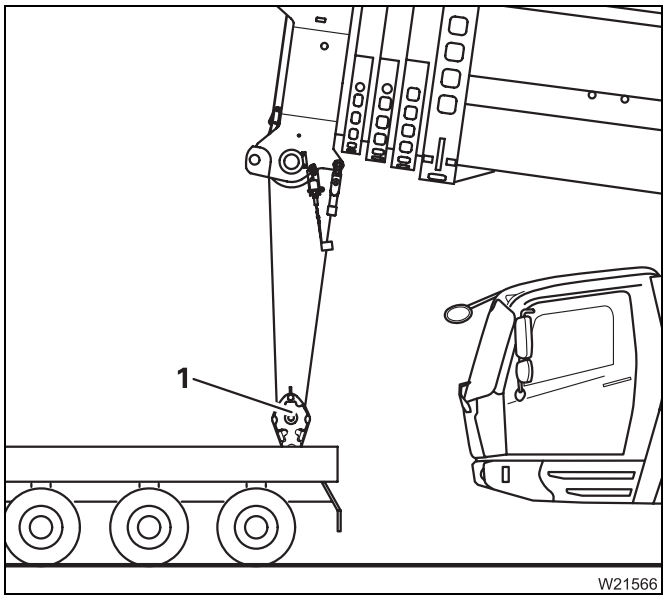
Danger of overturning when slewing with an overridden RCL
Do not override the RCL before slewing the superstructure.
Enter an RCL code for the 360° working range if the slewing operation is not released.
This prevents the superstructure from being slewed into impermissible areas and the truck crane tipping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

Risk of damage to the 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 being destroyed.

Picking up the hook block

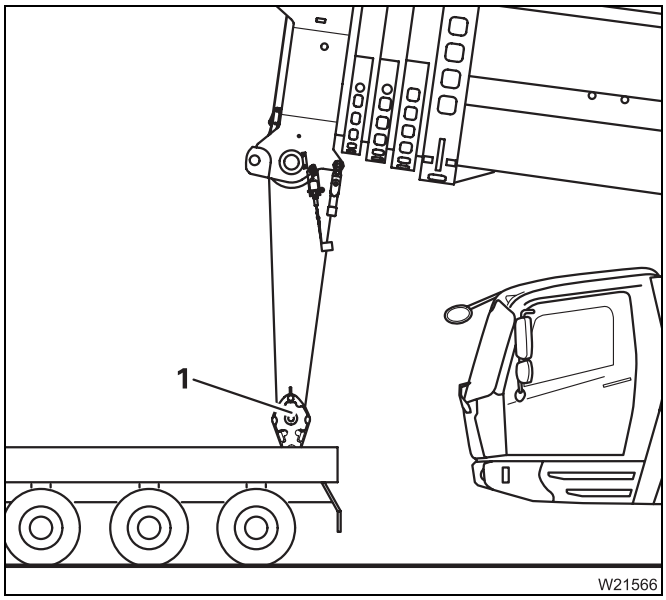
Depending on the driving mode, the hook block can be placed on a separate vehicle; ➠ *Driving modes*, p. 6 - 1.



- If the respective setting has been made in the RCL, slew the superstructure and lower the main boom until the boom head is directly above the hook block (**1**).
- Unreel the hoist rope.
- Reeve the hoist rope into the hook block (**1**); ➠ *Reeving and unreeving the hoist rope*, p. 12 - 114.
- Raise the hook block off the separate vehicle.

Setting down the hook block

Depending on the driving mode, the hook block must be placed on a separate vehicle; ➠ *Driving modes*, p. 6 - 1.



- With the RCL set accordingly, fully retract the main boom.
- Raise the hook block until it is about 1 m (3.3 ft) below the main boom.
- Lower the main boom and set the hook block (**1**) down on the separate vehicle.

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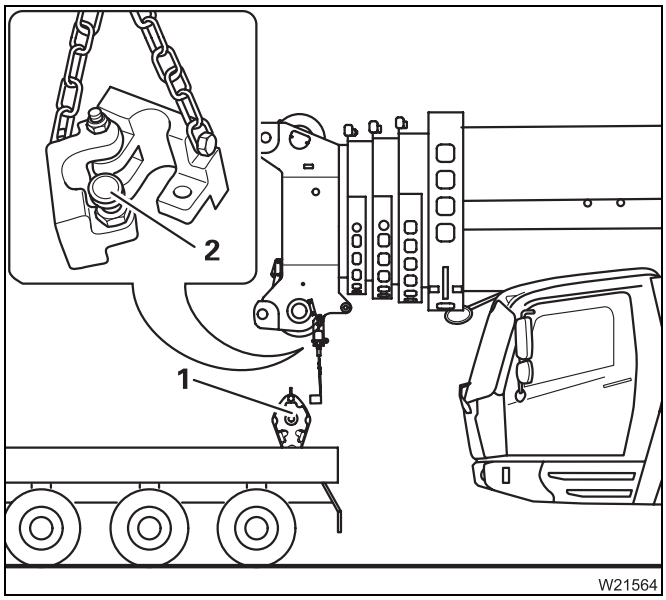
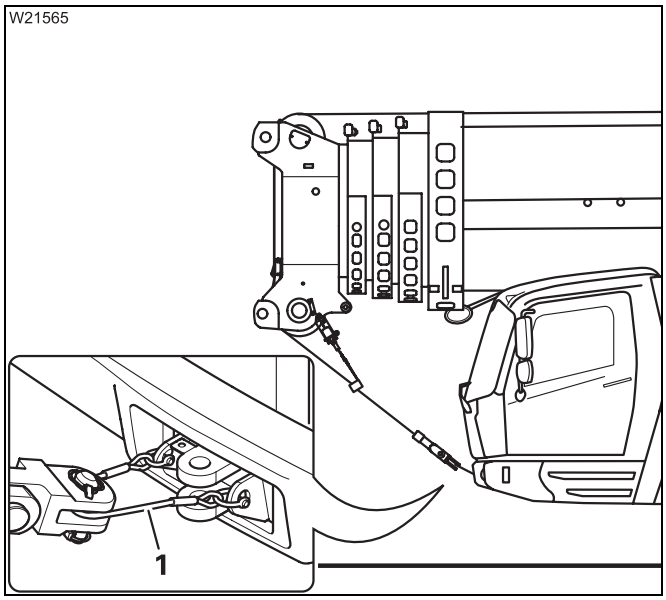


- Detach the lifting limit switch weight (**2**) from the hoist rope; p. 12 - 129.
- Unreeve the hoist rope; p. 12 - 118.
- Secure the hook block (**1**) for transport.
- Set down the main boom on the boom rest.

Fastening the hoist rope to the bumper

Do not attach the rope end fitting to the front towing coupling! The towing coupling must be free for a tow-rod in emergencies.



- Attach the rope end fitting to the retaining rope (**1**).
- Pull the hoist rope slightly taut.
- Fasten the lifting limit switch weight to the hoist rope.

The hoist rope and lifting limit switch weight are now secured for driving.

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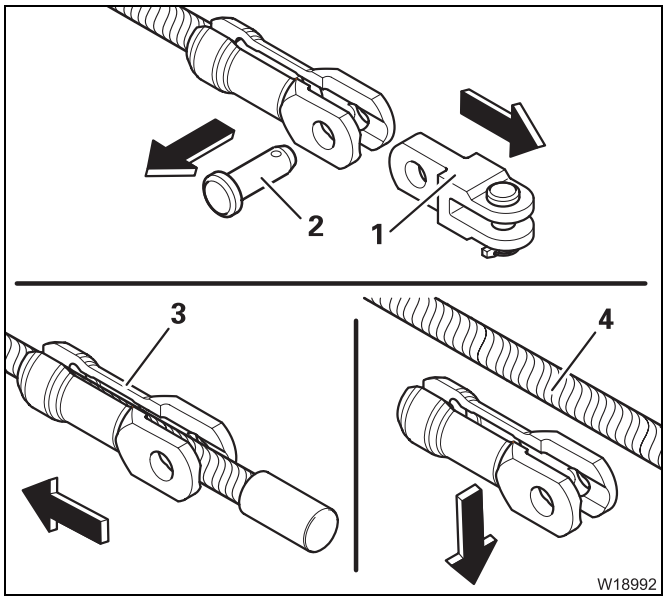
12.9.3 Reeving and unreeving the hoist rope

You must reeve a certain number of rope lines, depending on the required lifting capacity. Four reeved rope lines correspond, for example, to 4-fold reeving.

Possible reevings and the corresponding lifting capacities; ➠ p. 12 - 119.

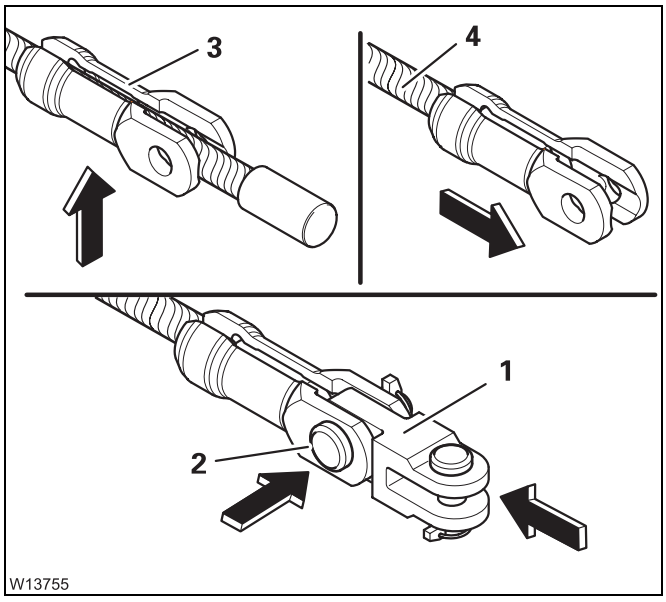
Rope end fitting

To reeve and unreeve the hoisting rope, you must remove the rope end fitting.
After reeving you must reattach the rope end fitting.



Removing the rope end fitting

- Pull the pin (**2**) and remove the fork element (**1**).
- Slide the holder (**3**) back and remove it from the hoist rope (**4**).



Reattaching the rope end fitting

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

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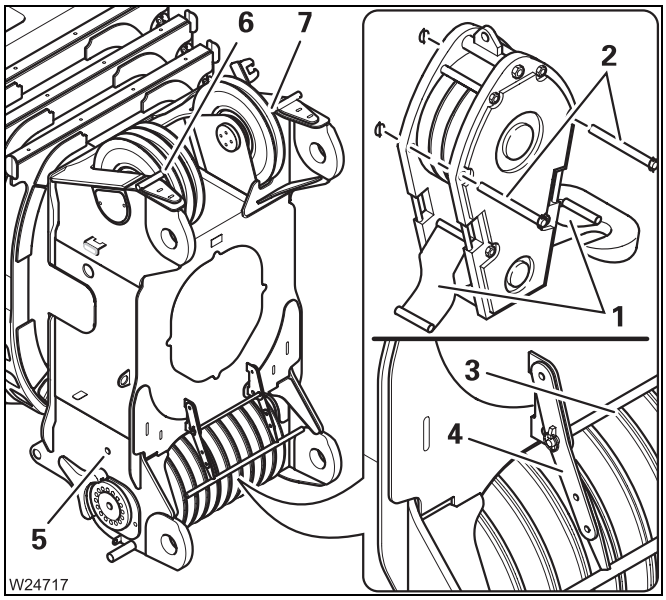
Reeving the hoist rope

Danger due to slack rope

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

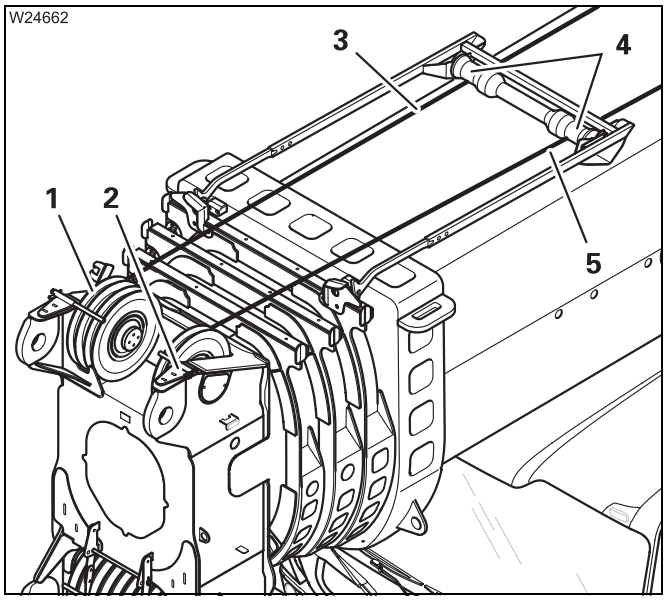


Opening the hook block

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

Positioning the hoist rope

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



Rope grab

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

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

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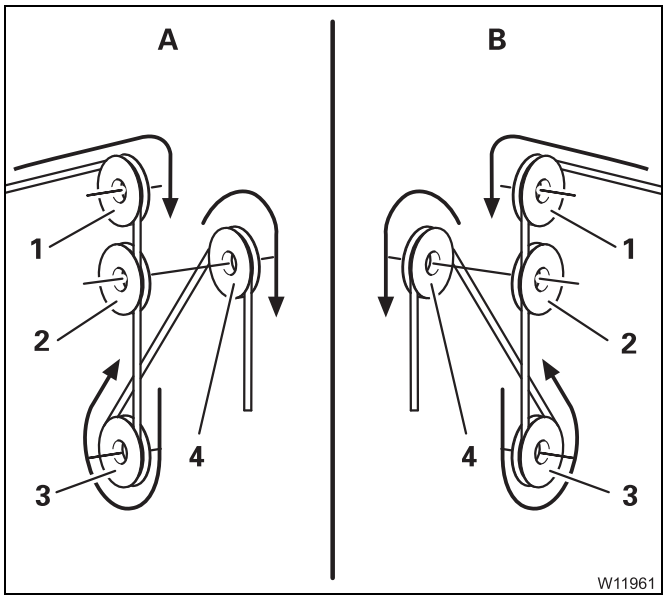


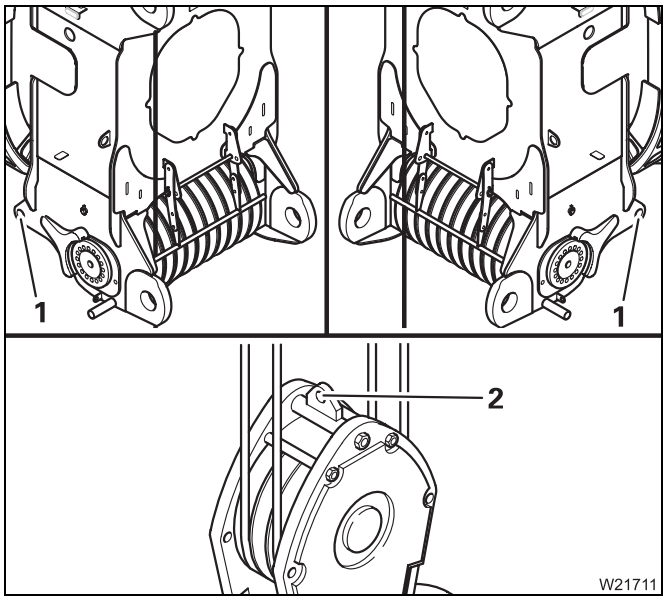
Reeving the hoist rope

A For the main hoist rope

B For the auxiliary hoist rope

- Guide the hoist rope over the upper head sheave (**1**) to the lower head sheave (**2**).
- Guide the hoist rope from the front around the outer pulley (**3**) of the hook block, upwards to the main boom head.
- Guide the hoist rope from the rear over the next required head sheave (**4**), etc.
- Reeve the hoist rope with the required number of lines.

Possible reeving methods; ➠ p. 12 - 119



Fastening the hoist rope

The fixed point used depends on the number of reeved rope lines.

– **Fixed point for an even number of lines**
The rope end fitting is fastened to the fixed point (**1**) for 2-fall, 4-fall, 6-fall reevings, etc.

– **Fixed point for an odd number of lines**
The rope end fitting is fastened to the fixed point (**2**) for 1-fall, 3-fall, 5-fall reevings, etc.

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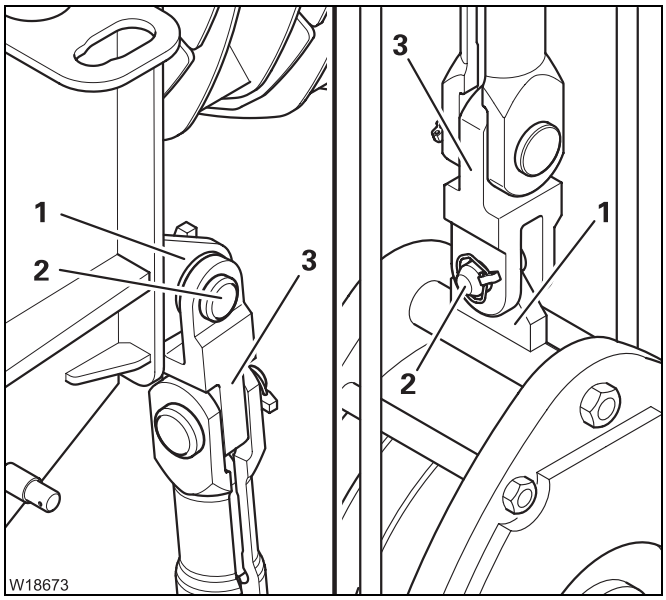
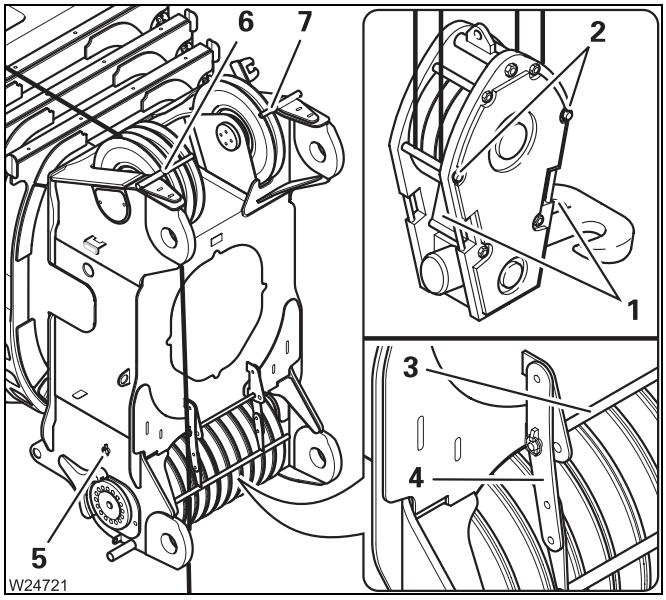


Rope end fitting

- Insert the rope end fitting (**5**) at the fixed point (**1**) and secure the pin (**2**).



Securing the hoist rope

- Pull the rod (**3**) and fold the bracket (**4**) downwards.
- Insert the rods (**3**), (**5**) and (**6**), (**7**).
- Secure all rods using the retaining pins.

Closing the hook block

- Fold up the sheet metals (**1**) on both sides.
- Insert the rods (**2**) and secure them with the linchpins.

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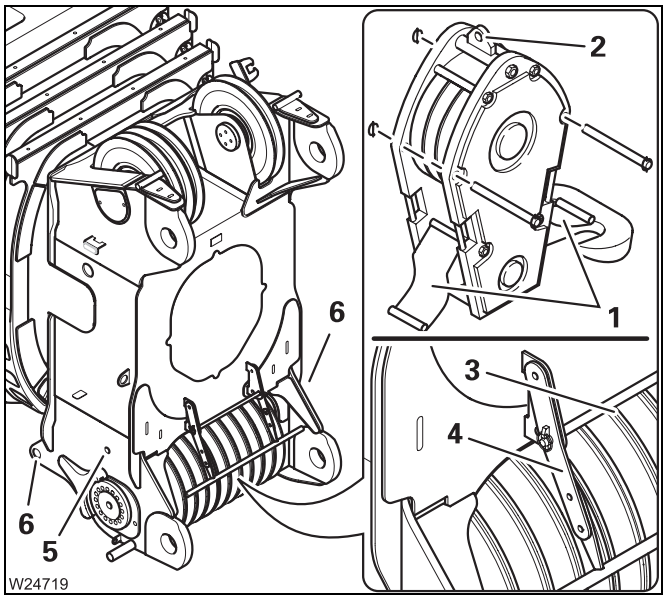
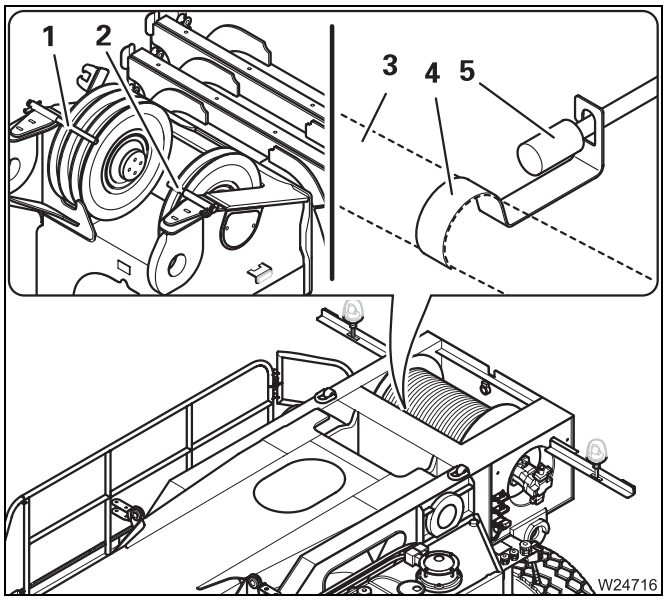
Unreeving the hoist rope



- Pull out the rod (**5**).
- Remove the retaining pins and pull out the rod (**3**). Fold the bracket (**4**) upwards. Insert the rod (**3**).
- Fold down the sheet metals (**1**); ➠ p. 12 - 115.
- Remove the rope end fitting from the fixed point (**2**) or (**6**).
- Unreeve the hoist rope.



Depending on the driving mode, you can:

– Fasten the hoist rope to the bumper; ➠ p. 12 - 113

– Pull out the rods (**1**) and (**2**) and roll the hoist rope onto the drum.

- Secure the main hoist rope (**5**) using the clamp (**4**) on the sheave (**3**).
- Secure the rods (**1**) and (**2**) using the retaining pins.

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12.9.4 Possible reeving methods on the main boom

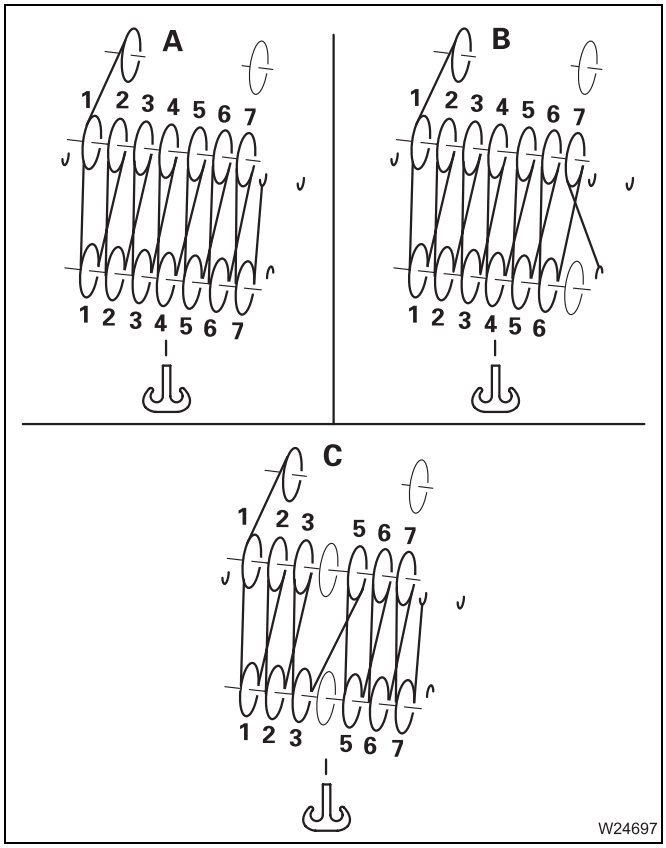
Possible reevings on lattice extensions and the auxiliary single-sheave boom top; ➠ *Lattice extension operating instructions.*

The maximum lifting capacity of individual hook blocks does not correspond to the maximum lifting capacity of the GMK 6400 together with this hook block. The lifting capacity of the GMK 6400 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 lifting gear. You must subtract these weights in order to obtain the actual payload.

The indicated lifting capacities apply to the wire cable of the main hoist. When using the auxiliary hoist, you have to increase the reeving for the same lifting capacity due to the reduced wire cable (wire cable of the hoists; ➠ p. 1 - 17).

With 7 head sheaves



7 sheave hook block

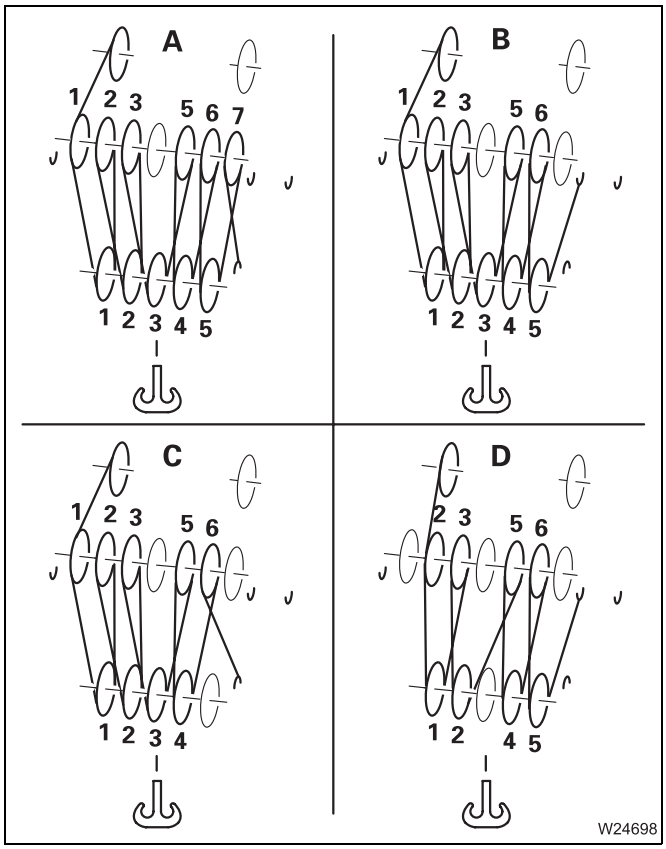
Maximum lifting capacity of the hook block:

200 t (440 900 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	14x	157.0 t (346 100 lbs)
B	13x	145.8 t (321 400 lbs)
C	12x	134.6 t (296 700 lbs)

12.07.2013

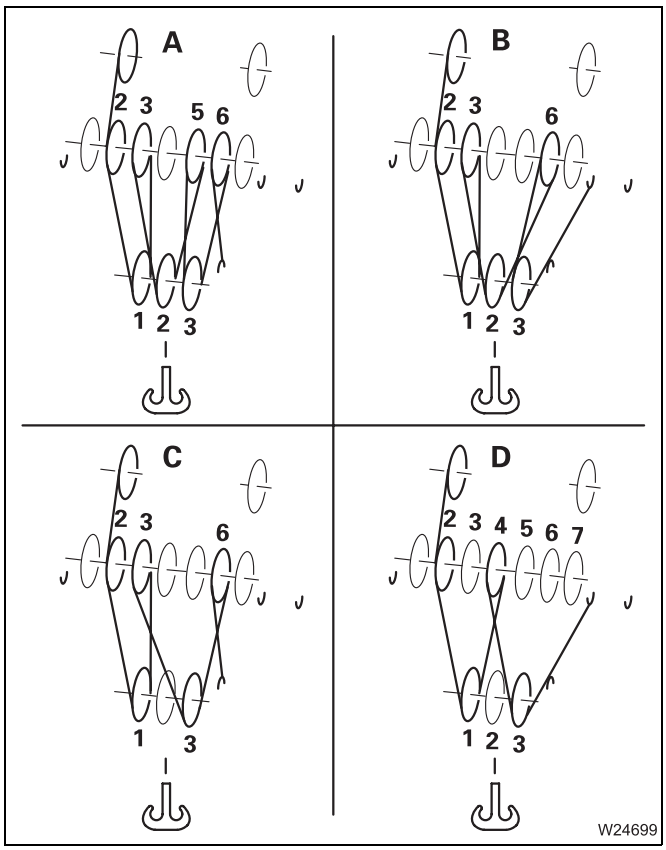


5 sheave hook block

Maximum lifting capacity of the hook block:
160 t (352 740 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	11x	123.3 t (271 800 lbs)
B	10x	112.1 t (247 100 lbs)
C	9x	100.9 t (222 400 lbs)
D	8x	89.7 t (197 700 lbs)



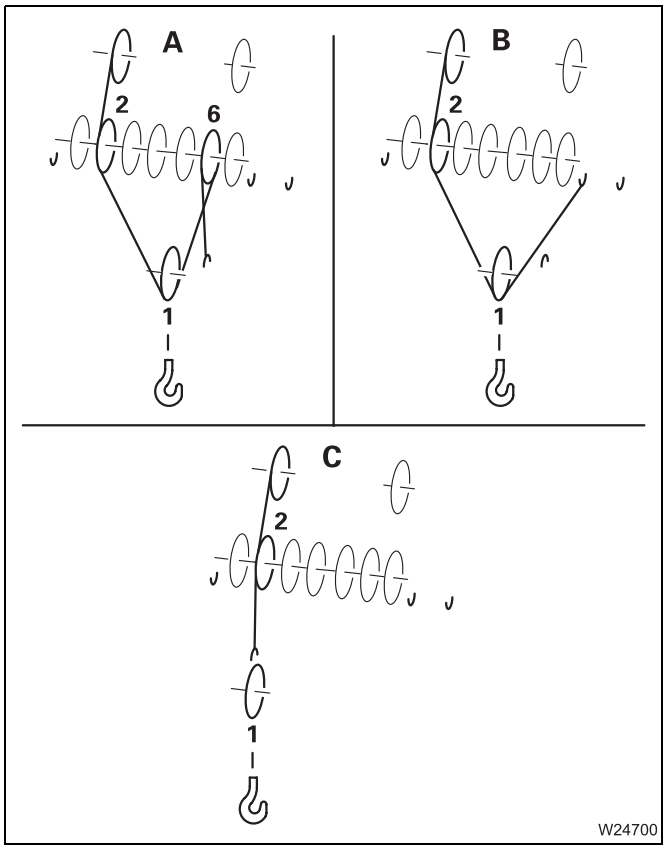
3 sheave hook block

Maximum lifting capacity of the hook block:
100 t (220 462 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	7x	78.5 t (173 000 lbs)
B	6x	67.3 t (148 300 lbs)
C	5x	56.1 t (123 600 lbs)
D	4x	44.9 t (98 900 lbs)

12.07.2013

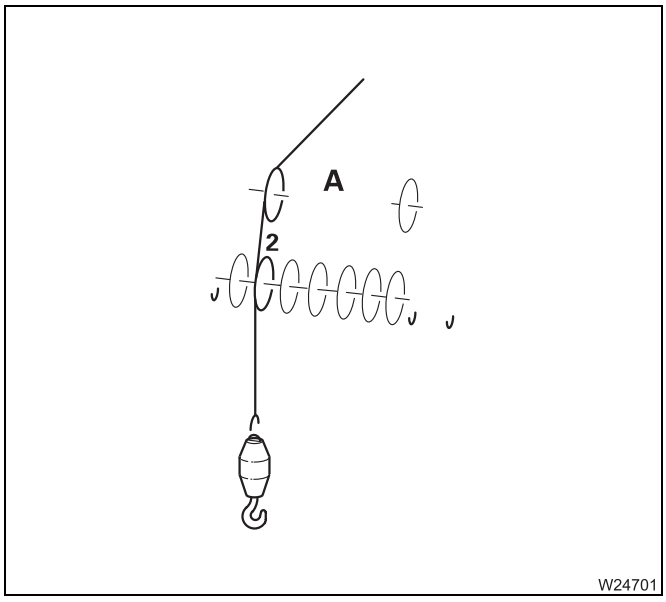


1 sheave hook block

Maximum lifting capacity of the hook block:
40 t (88 185 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	3x	33.6 t (74 000 lbs)
B	2x	22.4 t (49 300 lbs)
C	1x	11.2 t (24 700 lbs)



Hook tackle

Maximum lifting capacity of the hook tackle:
16 t (35 274 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	1x	11.2 t (24 700 lbs)

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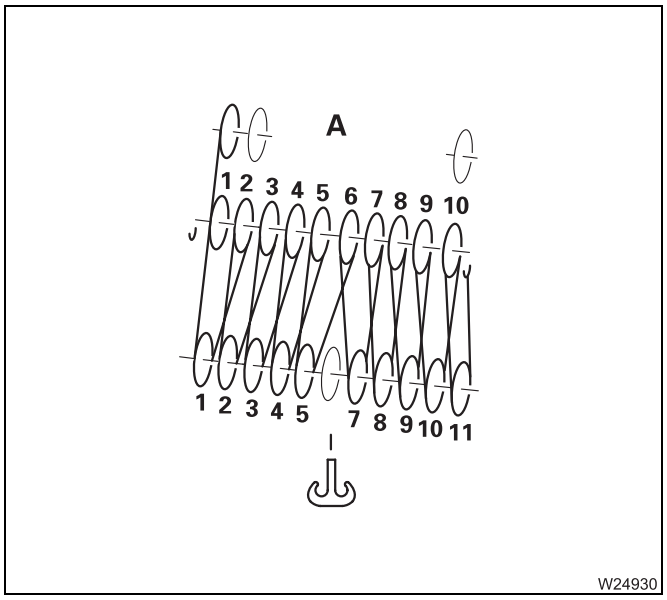
With 10 head sheaves



11 sheave hook block

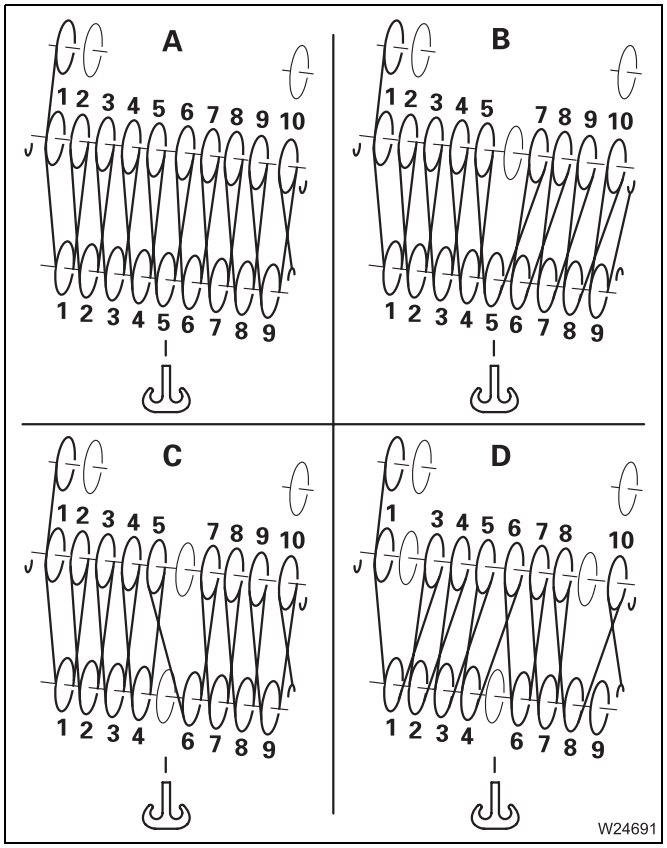
Maximum lifting capacity of the hook block:

320 t (705 500 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	20x	224 t (493 000 lbs)

In case of additional equipment, the hoist rope can be reeved 21 times; ➠ *Maximum reeving*, p. 12 - 125.



9 sheave hook block

Maximum lifting capacity of the hook block:

250 t (551 155 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	19x	213.0 t (469 600 lbs)
B	18x	201.8 t (444 900 lbs)
C	17x	190.6 t (420 200 lbs)
D	16x	179.4 t (395 500 lbs)

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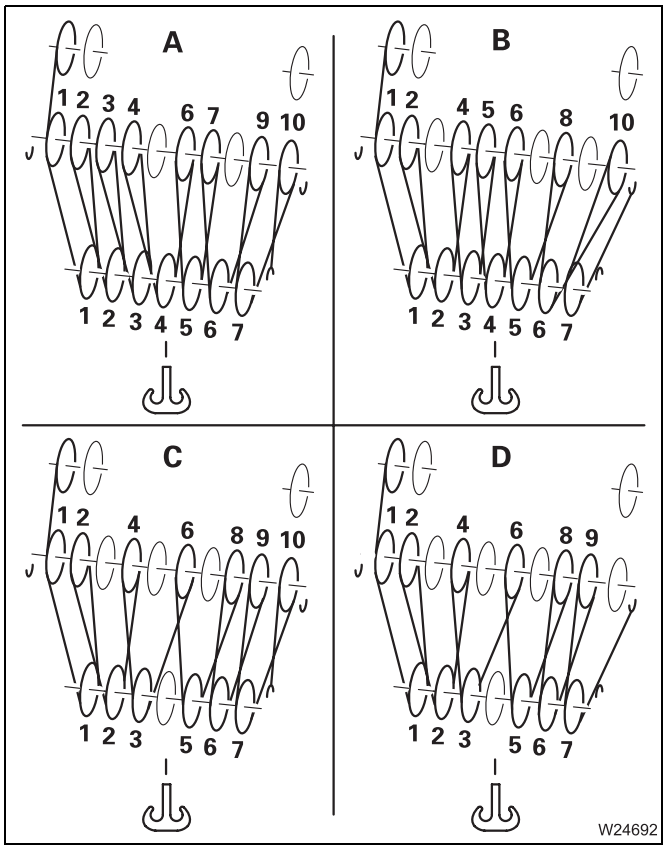
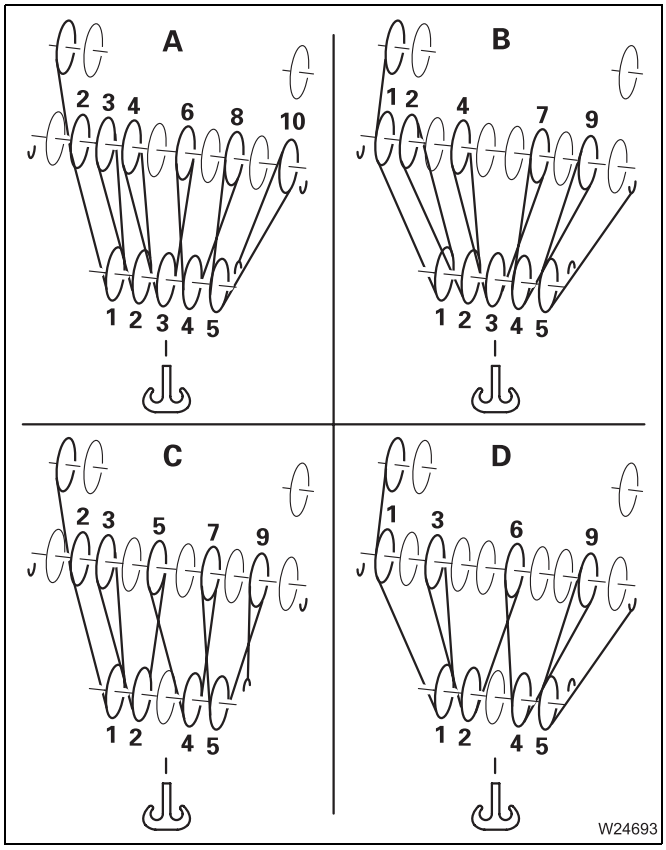


7 sheave hook block

Maximum lifting capacity of the hook block:
200 t (440 900 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	15x	168.2 t (398 600 lbs)
B	14x	157.0 t (346 100 lbs)
C	13x	145.8 t (321 400 lbs)
D	12x	134.6 t (296 700 lbs)



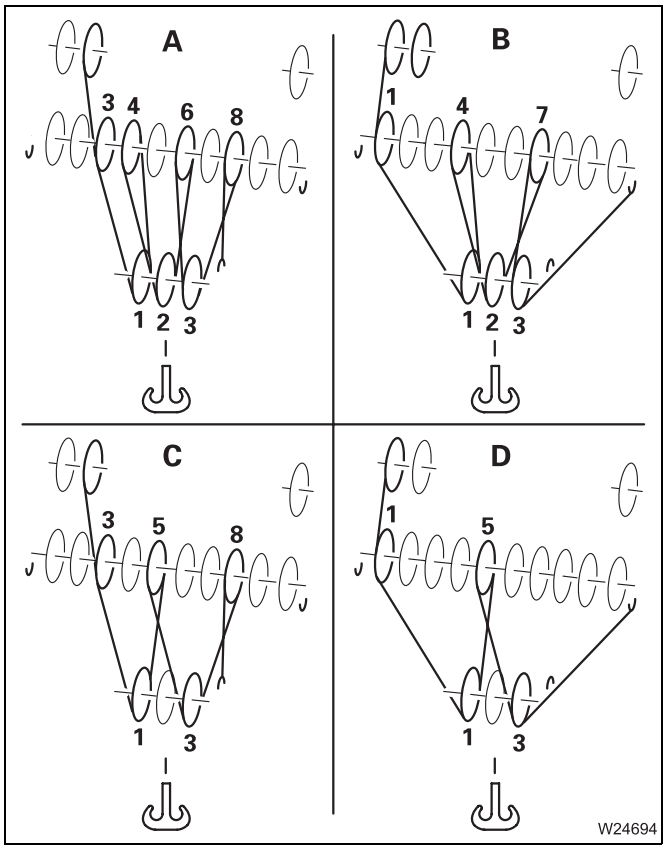
5 sheave hook block

Maximum lifting capacity of the hook block:
160 t (352 740 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	11x	123.3 t (271 800 lbs)
B	10x	112.1 t (247 100 lbs)
C	9x	100.9 t (222 400 lbs)
D	8x	89.7 t (197 700 lbs)

12.07.2013

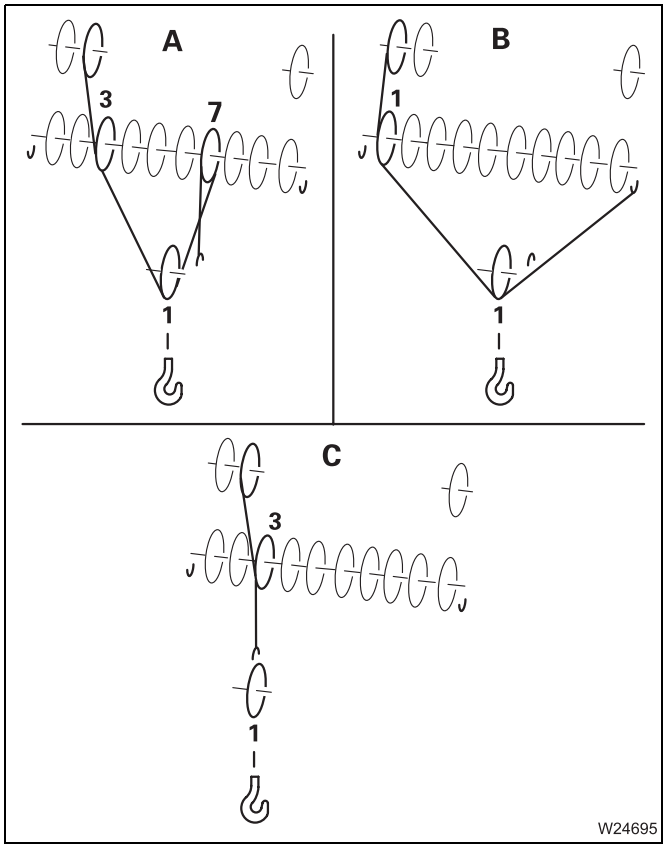


3 sheave hook block

Maximum lifting capacity of the hook block:
100 t (220 462 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	7x	78.5 t (173 000 lbs)
B	6x	67.3 t (148 300 lbs)
C	5x	56.1 t (123 600 lbs)
D	4x	44.9 t (98 900 lbs)



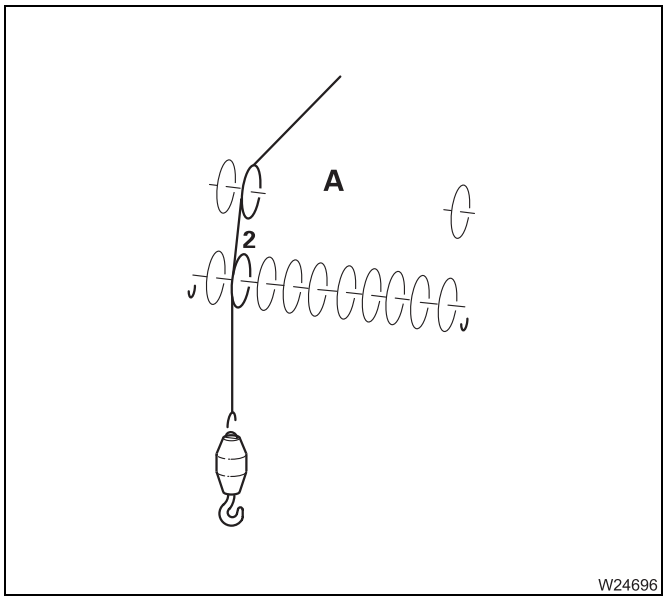
1 sheave hook block

Maximum lifting capacity of the hook block:
40 t (88 185 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	3x	33.6 t (74 000 lbs)
B	2x	22.4 t (49 300 lbs)
C	1x	11.2 t (24 700 lbs)

12.07.2013



Hook tackle

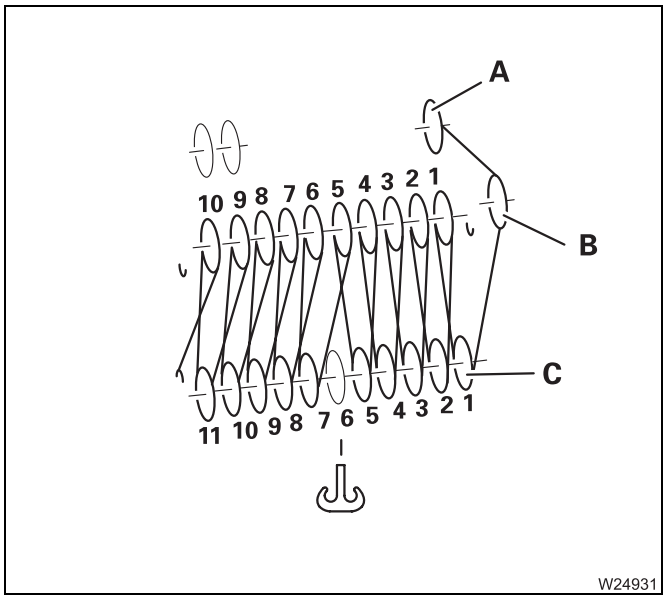
Maximum lifting capacity of the hook tackle:

16 t (35 274 lbs)

Max. lifting capacity with the GMK 6400

	Reeving	Maximum lifting capacity
A	1x	11.2 t (24 700 lbs)

Maximum reeving For maximum reeving, you require an auxiliary single-sheave boom top and a hook block with at least 10 sheaves.



- Rig the auxiliary single-sheave boom top; ➠ *Lattice extension operating instructions*.

- Guide the **main hoist rope**
  - over the head sheave (**A**),
  - over the auxiliary single-sheave boom top (**B**),
  - around the first sheave (**C**) of the hook block.

Max. lifting capacity with the GMK 6400

Reefing	Maximum lifting capacity
21x	235 t (518 000 lbs)

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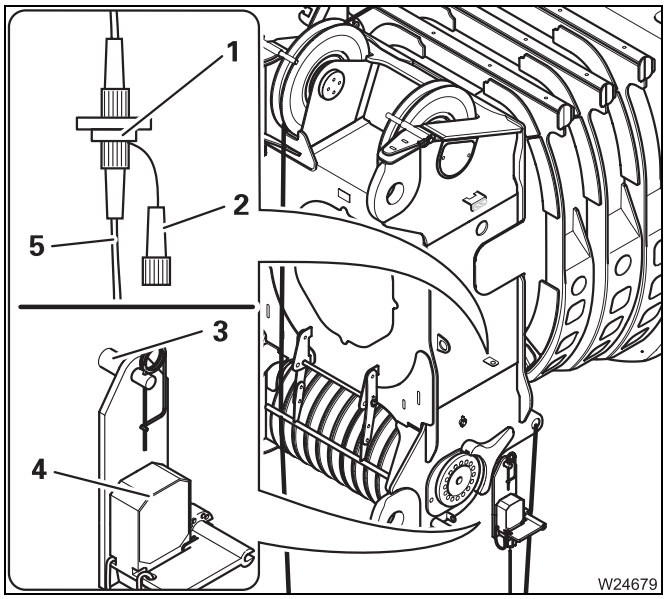
12.9.5 Installing/removing the lifting limit switch

Function of the lifting limit switch; ➠ p. 11 - 62.
For every reeved hoist rope, you must install a lifting limit switch, attach a lifting limit switch weight and place it around the hoist rope.

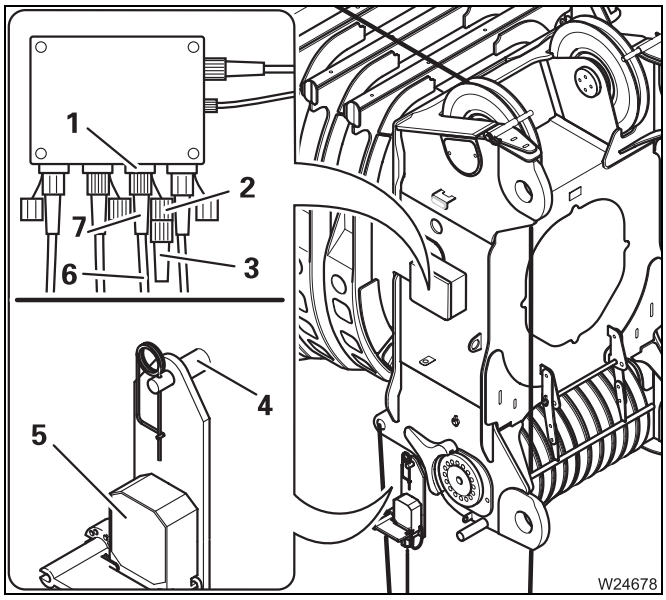
Installing the lifting limit switch

You can attach the lifting limit switch on the right or left side of main boom head. Install the switch on the side that is closer to the last rope line leading upwards. There can also be one lifting limit switch installed on each side.



On the left side

- Fit the lifting limit switch (**4**) onto the holder (**3**) and secure it with the retaining pin.
- Remove the bridging plug (**2**) from the socket (**1**).
- Lay the cable (**5**) in such a way that it will not be damaged during crane operation and connect it to the socket (**1**).



On the right side

- Plug the lifting limit switch (**5**) onto the bracket (**4**) and secure it with the retaining pin.
- Remove the bridging plug (**2**) from the socket (**1**) and plug it into the dummy socket (**5**).
- Lay the cable (**6**) in such a way that it will not be damaged during crane operation and connect it to the socket (**1**).

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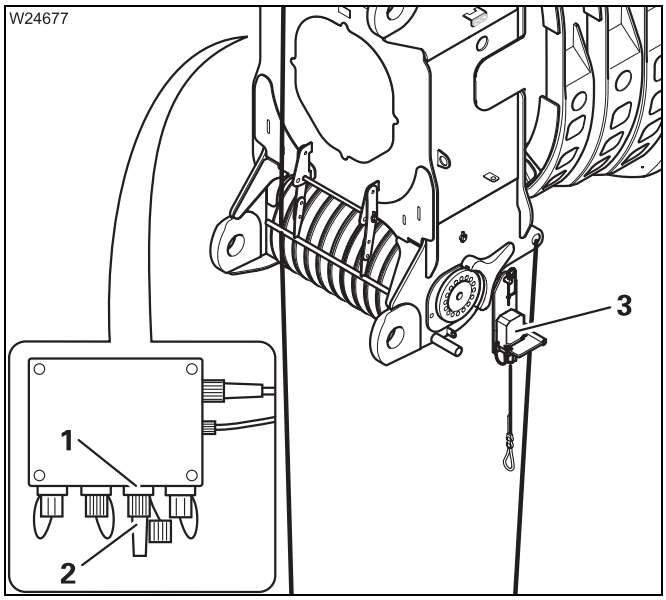


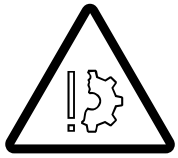
If only one lifting limit switch has been installed

- Check whether the bridging plug is in the socket that is not being used.

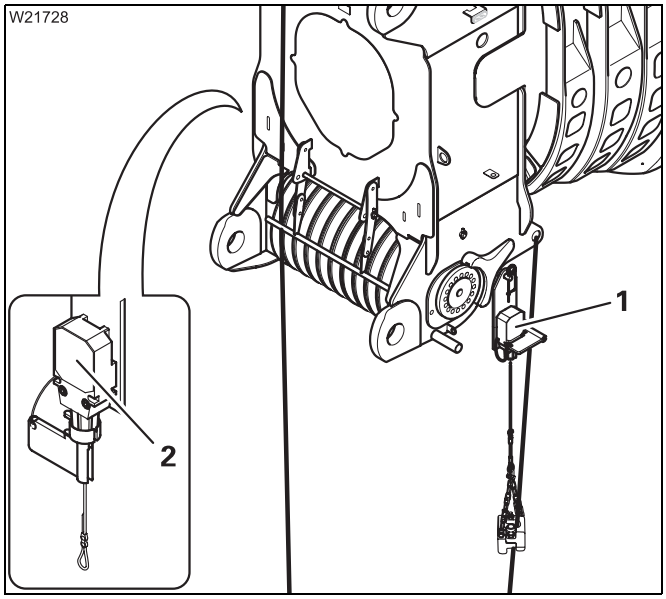
If, for example, the lifting limit switch (**3**) is installed on the left, the bridging plug (**2**) must be in the socket (**1**) on the right.

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

- Check whether the lock on the lifting limit switch (**3**) is released; ➠ *Unlocking*, p. 12 - 131.



Risk of damage if the lifting limit switch is locked!
The lifting limit switch must not be locked. Remove the lock, if necessary. If the lifting limit switch is locked, the hook block could hit the bottom of the main boom head during the lifting procedure, resulting in damage to the hook block, main boom head and hoist rope.



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. 12 - 131.

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; ➠ *Unlocking*, p. 12 - 131.

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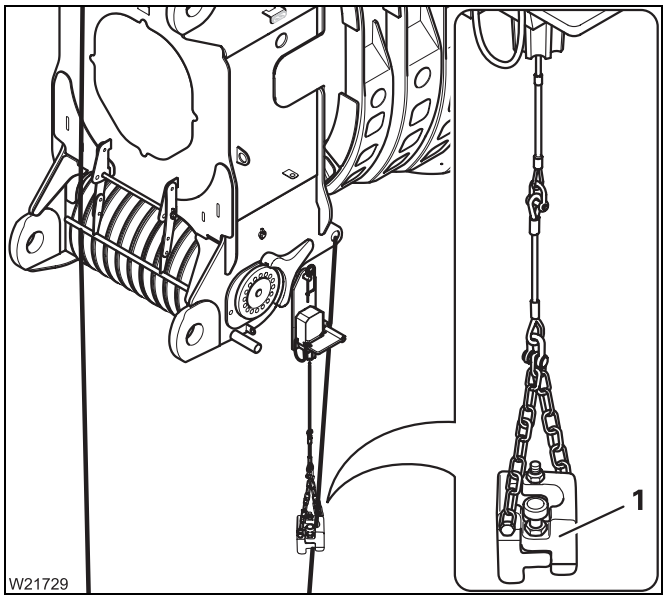
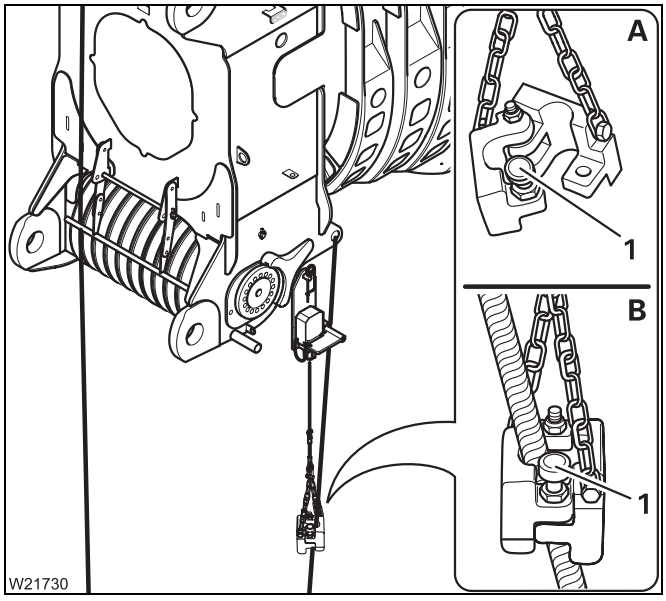


Attaching the lifting limit switch weight

- 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;
Unlocking, p. 12 - 131.



Placing a lifting limit switch weight around the hoist rope

- (**A**) – Pull the safety pin (**1**) out and fold the two halves of the weight apart.
- (**B**) – Place the two halves of the weight around the last rope line leading upwards.
- Pull the safety pin (**1**) out and fold the two halves of the weight back together.
- Make sure the safety pin locks into place and the two halves of the weight are securely attached to each other.

If two hoist ropes are reeved, you must also place a lifting limit switch weight around the second hoist rope.

If you place the lifting limit switch weight around the last rope line leading upwards, less rope will run through the lifting limit switch weight, especially if there is a high number of reevings per lifting operation. This rope line will even be at a standstill if the number of rope lines is even.

This allows you to reduce the wear of the hoist rope and lifting limit switch weight and prevent unintentional deactivation procedures that may be caused by the running hoist rope lifting the lifting limit switch weight.

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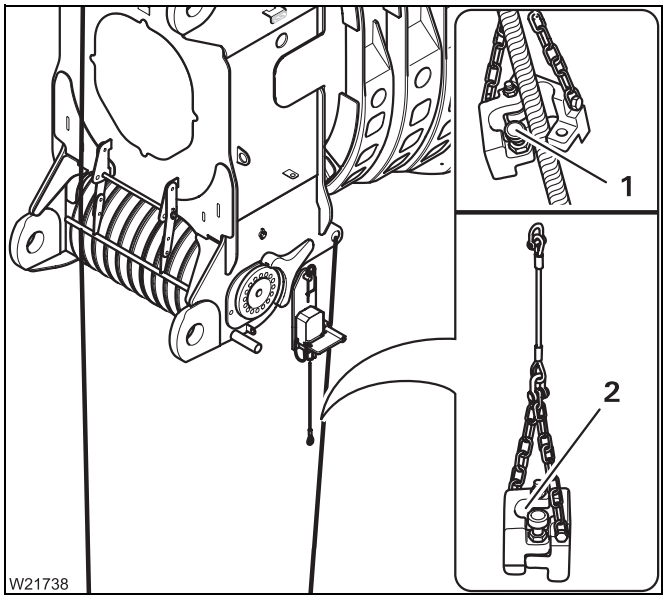
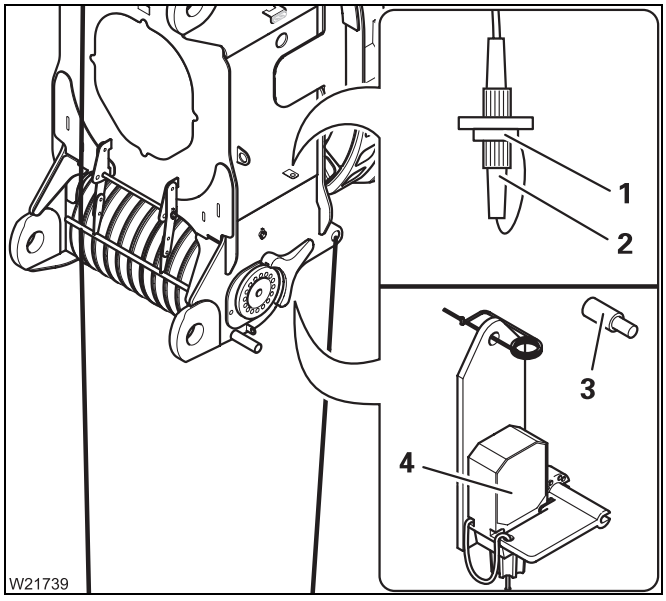
Removing the lifting limit switch

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



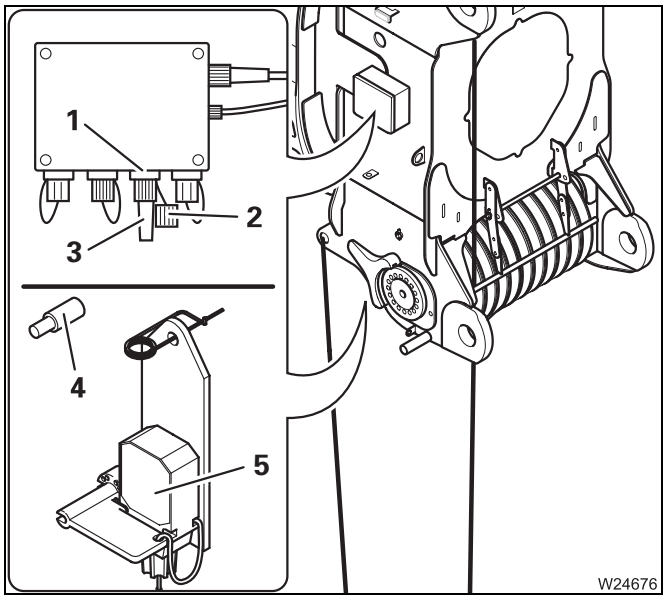
Removing the lifting limit switch weight

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



Removing the left lifting limit switch

- Pull the plug from the socket (**1**).
- Insert the bridging plug (**2**) into the socket (**1**).
- Remove the lifting limit switch (**4**) from the clamp (**3**).
- Fasten the retaining pin to the lifting limit switch.



Removing the right lifting limit switch

- Pull the plug from the socket (**1**).
- Remove the bridging plug (**3**) from the dummy socket (**2**) and plug it into the socket (**1**).
- Remove the lifting limit switch (**5**) from the bracket (**4**).
- Fasten the retaining pin to the lifting limit switch.

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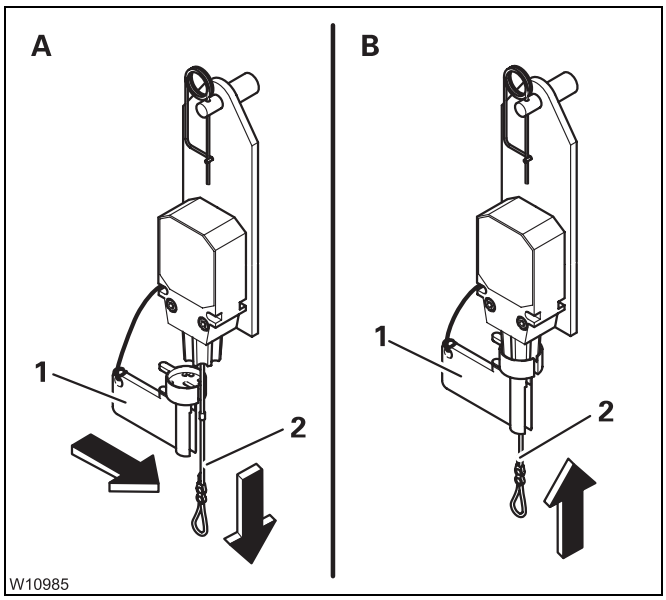
12.9.6 Locking/Unlocking the lifting limit switch

Locking

If a hoist rope has been reeved and two lifting limit switches are installed, you must lock the lifting limit switch not used in order to enable all crane operations.

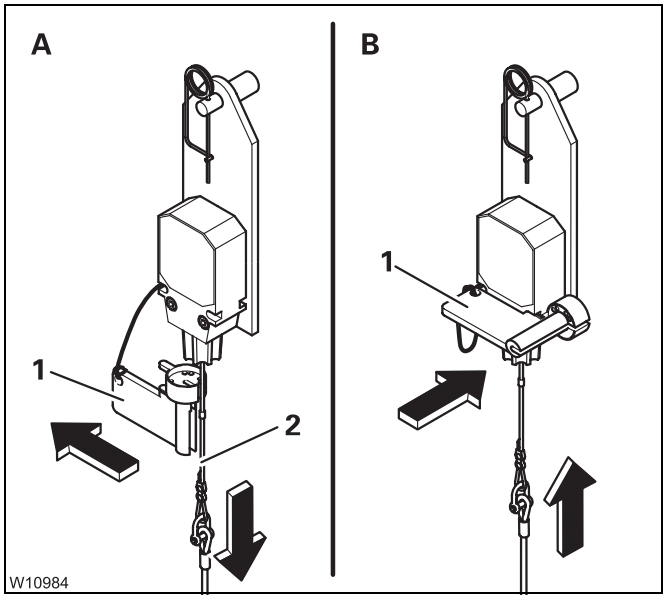
Risk of damage if the lifting limit switch is locked
The lifting limit switch to which the lifting limit switch weight is attached may under no circumstances be locked when operating the crane.
If the lifting limit switch is locked, release the lock.
This prevents the hook block from hitting the main boom head, causing damage to the hook block, main boom head and hoist rope.



- Remove the lifting limit switch weight.
- (**A**) – Remove the cap (**1**).
- Pull down the rope (**2**).
- (**B**) – Secure the rope (**2**) in this position using the cap (**1**) – the lifting limit switch is locked and can no longer be triggered.

Unlocking

You must always remove the lock before you place a lifting limit switch weight around the hoist rope.



- (**A**) – Pull the rope (**2**) down and take off the cap (**1**) – the lock is removed.
- (**B**) – Fit the cap (**1**) onto the lifting limit switch.

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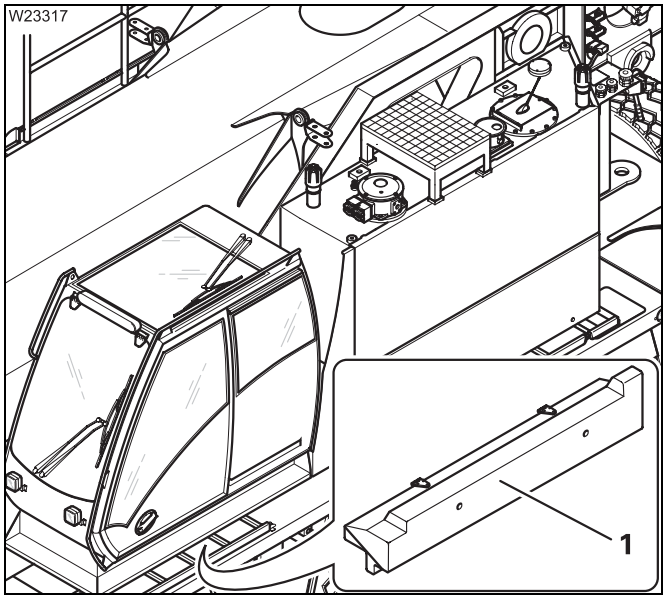
12.9.7 Anemometer and air traffic control light

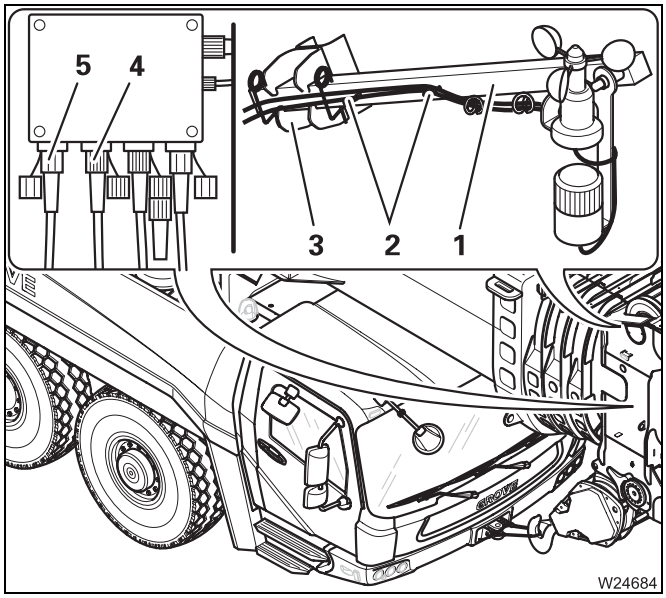
Risk of damage during on-road driving
Always remove the anemometer and air traffic control light before on-road driving.
This prevents the specified overall height from being exceeded at on-road level, and the anemometer from getting damaged due to air currents.

Installing

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



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



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

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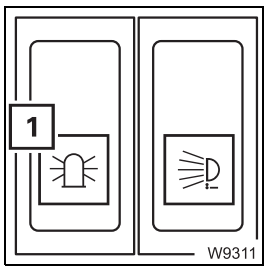


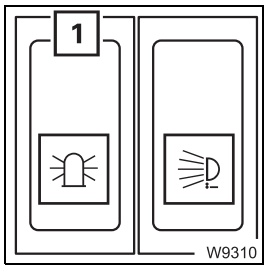
Switching the air traffic control light on and off:

Switching on: Press in switch (**1**) at the bottom

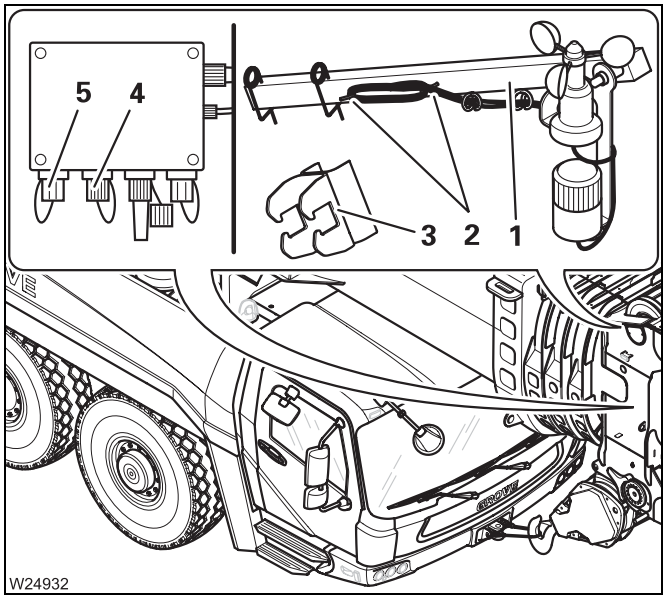
Switching off: Press in switch (**1**) at the top

Removing

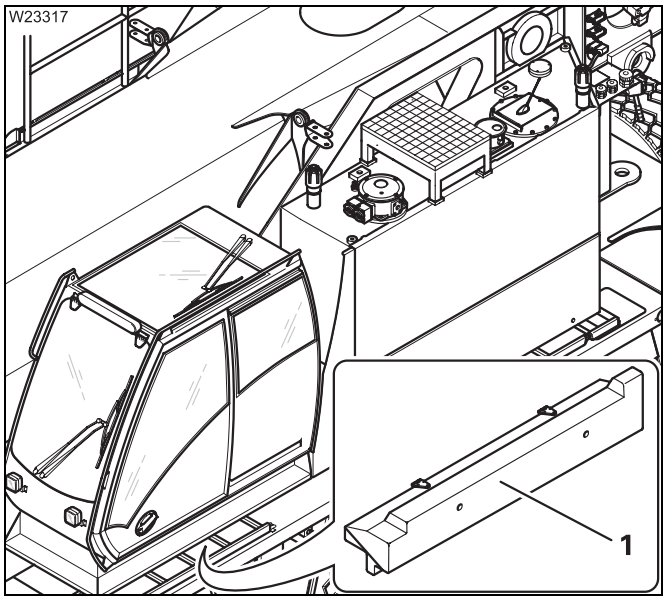
You must remove the rod with the anemometer/air traffic control light before driving on the road; ➠ p. 12 - 132.



- Switch off the air traffic control light – press the switch (**1**) upwards and inwards.



- Remove the plug and close the sockets (**4**) and (**5**) with the protective caps.
- Wind the cables onto the holders (**2**).
- Take the rod (**1**) out of the holder (**3**).
- For transportation, fasten the retaining pins to the rod (**1**).



- If necessary, store the rod in the storage compartment (**1**).

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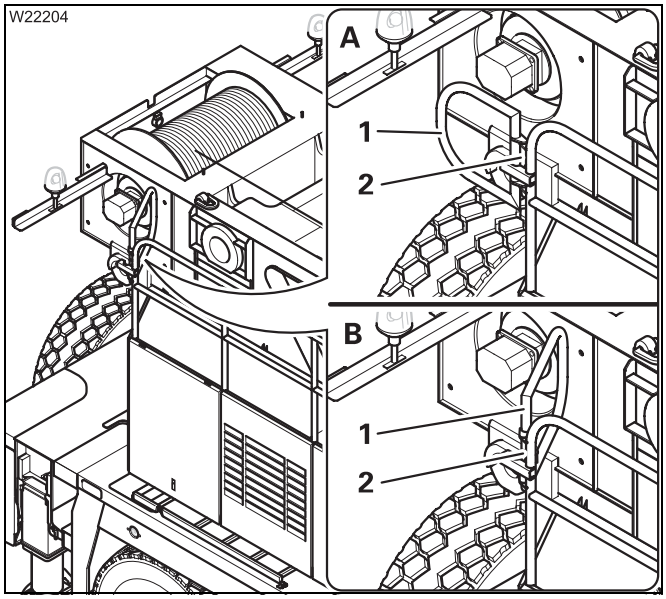
12.10 Other rigging work

12.10.1 Railings on the turntable

Risk of accidents when railings are not folded out!
The railings provide protection from falling. Always fold out the railings before moving onto the auxiliary hoist.

Always fold the railings out when you are standing on the counterweight or the auxiliary hoist to perform rigging work.

You must also observe the railing notice on the auxiliary hoist;
➠ p. 12 - 106.



(A) – Folding out

- Release the locking bar (**2**) and swing the railing (**1**) outward until it engages.

(B) – Folding in

- Release the locking bar (**2**) and swing the railing (**1**) inward until it engages.

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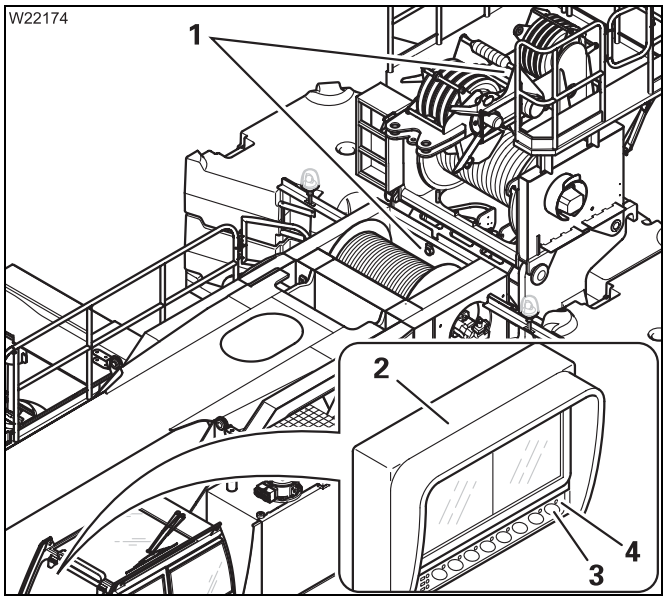
12.10.2 Cameras for crane operation

Cameras on the hoists



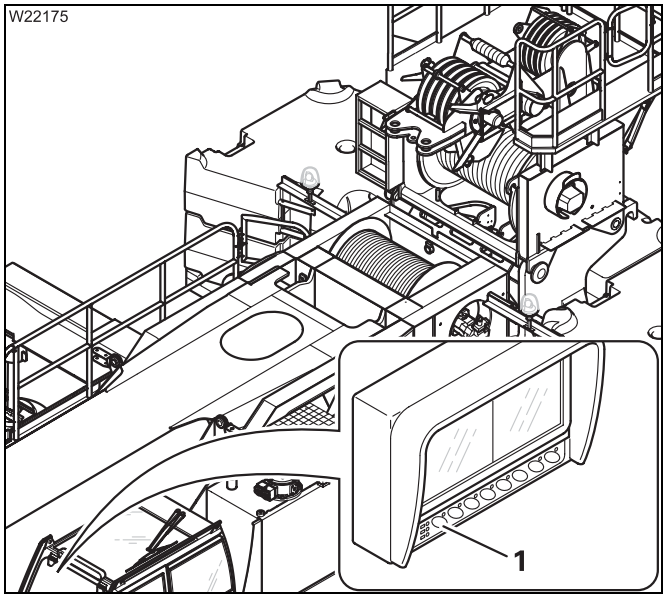
One camera (**1**) on each of the main and auxiliary hoists, transfers the image of the rope drums to the monitor (**2**) in the crane cabin.

Switching on the monitor

- Turn on the ignition.
- Press the button (**3**) once.
  The lamp (**4**) lights up. The image appears on the monitor after a few seconds. If an image does not appear; ➠ p. 14 - 14.

Switching out the monitor

- Press the button (**3**) once.
  The lamp (**4**) and the image go out.



Switching the monitor

- Alternate between the cameras using the button (**1**).

– for main hoist
  C1 lights up or position 1

– for auxiliary hoist
  C2 lights up or position 2

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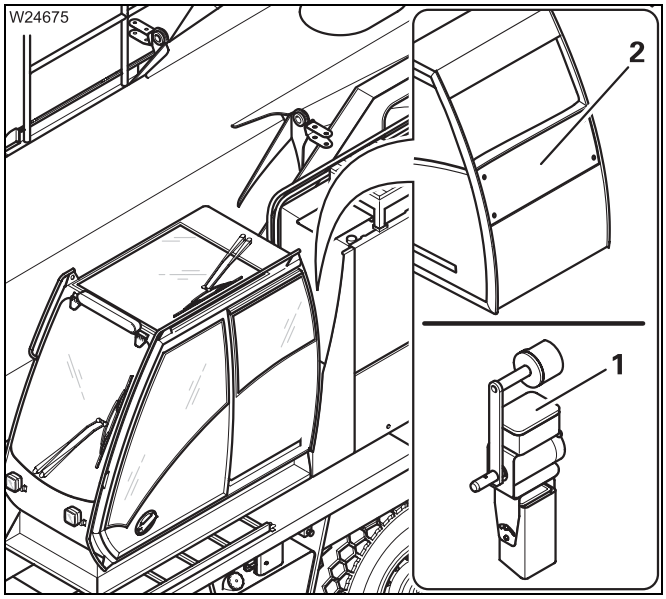
Camera on main boom

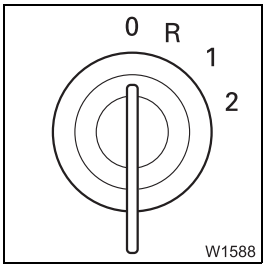
For crane operation you have to install the camera and switch it on.
For on-road driving, you have to switch off the camera again and remove it.



The camera (**1**) may only be installed on a truck crane equipped with the appropriate receiver (**2**). The camera and receiver are coordinated and identified with the same number on the model plate.

- Before installation, compare the numbers on the model plates.

Risk of accident if the wrong camera is installed
If you install the wrong camera in your truck crane, you will not see an image.
If your camera is installed in a neighbouring truck crane, you will see the wrong image.



- Switch off the ignition in the crane cab.

Risk of accident due to falling camera
Always use a retaining pin to hold the camera in the clamp.
This prevents the camera from falling down and injuring someone.

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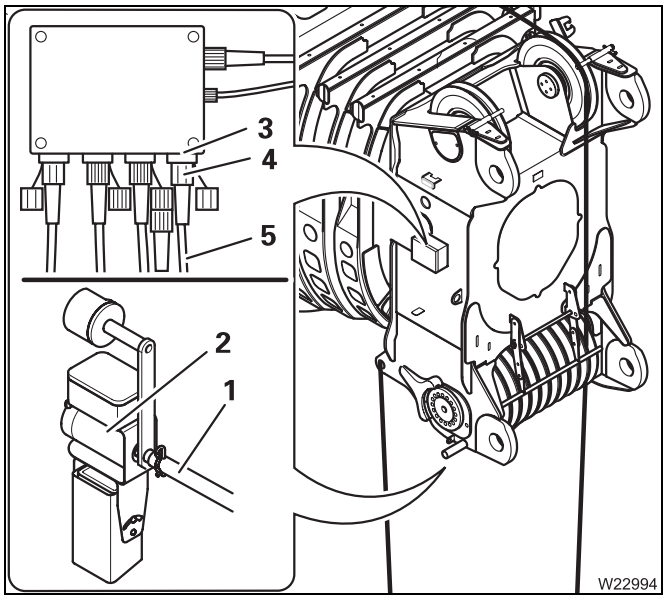
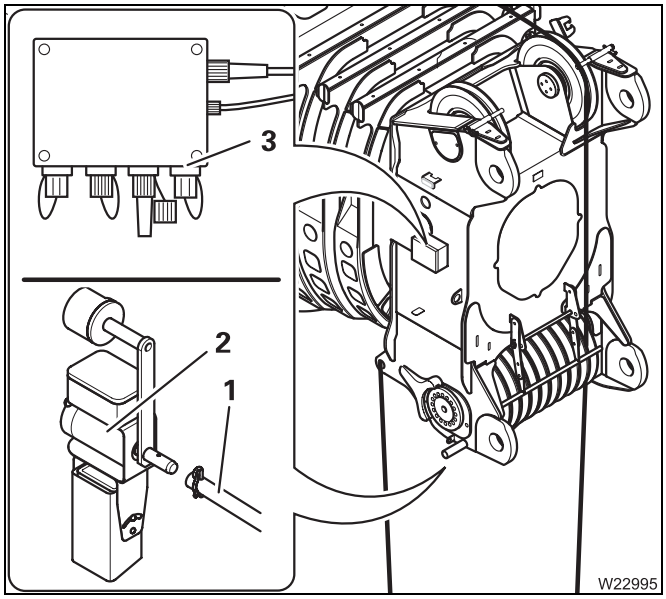


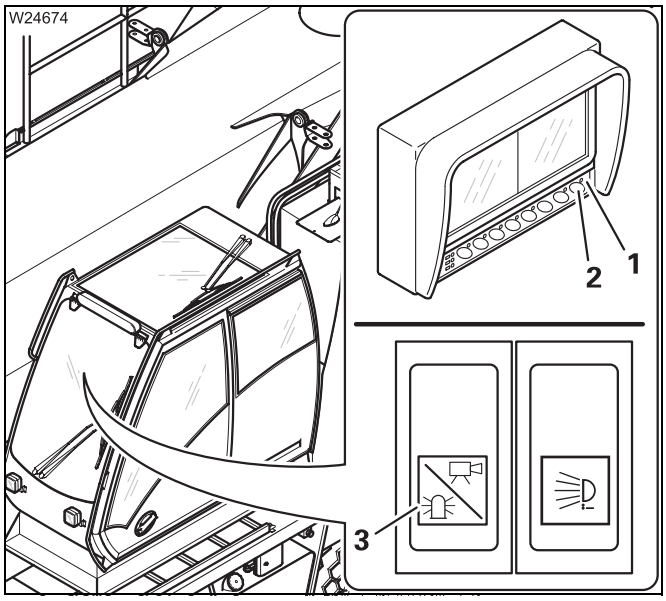
Installing

- Insert the camera (**2**) into the clamp (**1**) and secure it with the retaining pin.
- Insert the plug (**4**) in the socket (**3**).
- Lay the cable (**5**) in such a way that it is not damaged.



Removing

- Pull the plug out of the socket (**3**) and close the socket with the cap.
- Remove the camera (**2**) from the clamp (**1**) and put the retaining pin in the holder (**1**).



Switching on

- Switch the ignition on.
- Press switch (**3**) down.
- Press the (**2**) button once.
  The lamp (**1**) lights up. The image appears on the monitor after a few seconds. If an image does not appear; ➠ p. 14 - 9.

Switching off

- Press the (**2**) button once.
  The lamp (**1**) and the image go out.
- Press switch (**3**) up.

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13 Driving with rigged truck crane

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13 Driving with rigged truck crane

This section describes driving the truck crane with the counterweight rigged. If a lattice extension is rigged as well; ➠ *Lattice extension operating instructions*.

Risk of accident by partially obstructed view of the truck crane
When driving the truck crane, always stay in visual or radio contact with a banksman who can observe the parts you are unable to see, e.g. the raised boom in *0° to the rear*.

Risk of overturning by slewing superstructure
When driving the rigged truck crane, the slewing gear must be switched off – slewing gear brake engaged.

Risk of accident when driving with a lifted load
Driving the truck crane with a load lifted is prohibited. Always set down the load prior to driving the truck crane and secure the hook block so it cannot swing.

13.1 Driving path

The driving path must be even. The level adjustment system cannot compensate for uneven surfaces.

The ground must be stable enough to bear the axle loads.

If the surface pressure of the tyres exceeds the permissible load on the ground, the surface area of the tyres must be increased by packing stable material (e.g. wooden planks).

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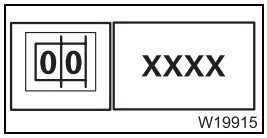
13.2 Permissible rigging modes and axle loads

Depending on the counterweight rigged, you must bring the superstructure and the main boom into certain positions so that the permissible axle loads are not exceeded.

Risk of damage to the axle lines
Only bring the superstructure and the main boom into the specified positions. This prevents excessive strain on the axle lines.



- Enter the RCL code for the actual rigging mode of the truck crane in accordance with the *Lifting capacity table.*

Risk of accident if the RCL is overridden
Always enter the RCL code for the current rigging mode. The specified positions are within the monitored operating ranges.
If the RCL is overridden, the truck crane may overturn even if you move it into the positions specified.

- Bring the superstructure and the main boom into a position that is indicated in the following table for the specified counterweight rigged.
- Tie down the hook block so that it cannot swing around.

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Axle load table

All axle loads specified apply to 445/95 R 25 tyres and a reeved 1-sheave hook block, weight 850 kg (1 875 lbs).

Counter-weight in t (lbs)	Telescope Status I - II - III - IV in %	Main Boom Angle in °	Superstruc-ture Position[1]	Axle Load[2] in t (x 1.000 lbs)	
				front	rear
15,0 (33 069)	44 - 0 - 0 - 0	5	front	14,5 (32,0)	14,2 (31,3)
	0 - 0 - 0 - 44	82	rear	8,4 (18,5)	17,2 (37,9)
25 (55 116)	44 - 44 - 0 - 0	5	front	15,4 (34,0)	16,3 (35,9)
	0 - 0 - 0 - 44	82	rear	11,1 (24,5)	18,5 (40,8)
35,0 (77 162)	88 - 0 - 0 - 0	15	front	13,5 (29,8)	19,7 (43,4)
	0 - 0 - 0 - 44	82	rear	13,6 (30,0)	19,6 (43,2)
45 (99 208)	88 - 0 - 0 - 0	5	front	10,3 (22,7)	23,9 (52,7)
	0 - 0 - 0 - 44	82	rear	16,2 (35,7)	20,9 (46,1)
55,0 (121 254)	not permitted		front	--	--
	0 - 0 - 0 - 44	82	rear	18,7 (41,2)	22,1 (48,7)
75,0 (165 439)	not permitted		front	--	--
	0 - 0 - 0 - 44	82	rear	23,8 (52,5)	24,5 (54,0)
95,0 (209 439)	not permitted		front	--	--
	0 - 0 - 0 - 44	75	rear	26,8 (59,1)	28,0 (61,7)
over 95.0 (209 439)	Driving with rigged truck crane is **not permitted** Unrig the counterweight combination to 95.0 t. (209 439 lbs)				

[1] Rear: Display slewing angle of 0°
Front: Display slewing angle of 180°

[2] Front: Each on the first and second axle line
Rear: Each on the third, fourth, fifth and sixth axle line

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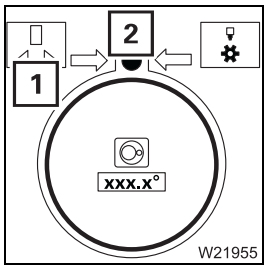
13.3 Before driving

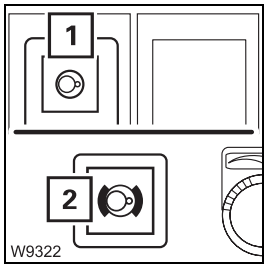
13.3.1 Securing the superstructure against slewing

Danger of overturning by the superstructure slewing while driving the truck crane
Always secure the superstructure before driving the rigged truck crane to prevent it from slewing. Slewing the superstructure while driving the truck crane increases the risk of overturning.



- Lock the superstructure – the (**1**) and (**2**) symbols must be **green.**

  ➠ *Locking/unlocking the superstructure*, p. 11 - 13.



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

  ➠ *Switch off the slewing gear*, p. 11 - 103.

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13.3.2 Checking tyre pressure and wind speed

- Ensure that all the tyres are at the prescribed pressure levels; ➠ *Tyres*, p. 1 - 14.

Risk of damage to the tyres
You may only drive the truck crane if the tyres are at the prescribed pressure level.
Never reduce the tyre pressure in order to increase the tyres' bearing surface.

The same maximum permissible wind speeds for working with the crane apply to driving the truck crane.

- Check the wind speed; ➠ p. 11 - 54.

Risk of accident from excessively high wind speeds
You may not drive the rigged truck crane if the wind speed exceeds the maximum permissible values specified in the *Lifting capacity table*. In this case, you must bring the truck crane into a secure state.

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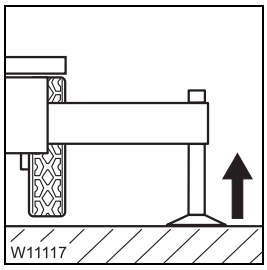
13.3.3 Putting the truck crane on the wheels

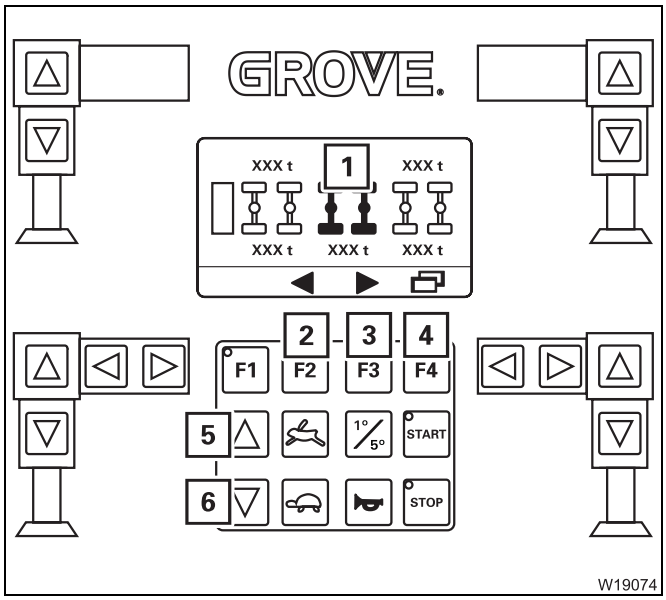
Danger of overturning by unevenly retracting the outrigger cylinders
Retract the outrigger cylinders evenly. This prevents the truck crane from overturning when retracting each outrigger cylinder.

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



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

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



Lowering/raising the axles

- Open the Raise Axle menu – button (**4**) on the outrigger control unit.
- Select the axles that are going to be lowered by pressing the (**2**) or (**3**) button.

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

- Press the button for the desired movement:

  5 Raise the axles

  6 Lower the axles

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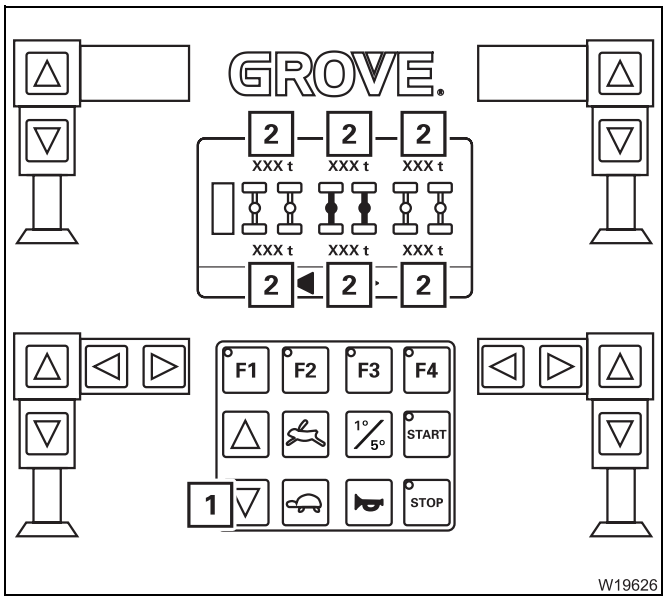
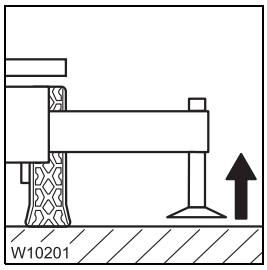
Levelling the truck crane

Risk of damage to the tyres and suspension struts
Do not exceed the maximum permissible axle load of 32 t when levelling the truck crane.
Monitor the display while levelling and adjust the axle loads as necessary.



- Press the (**1**) button until the selected axles touch the ground.
- Repeat the procedure on the other axles until an even axle load is indicated on the display (**2**).

If required, you will have to lower or raise the lowered axles again to achieve an even axle load.



Securing the truck crane

- Retract the outrigger cylinders until the outrigger pads are about 5 to 10 cm (2 to 4 in) above the ground. Leave the outrigger beams extended.

Danger of overturning if outriggers are retracted
Always leave the outriggers extended and the outrigger pads just above the ground to secure the truck crane against overturning.

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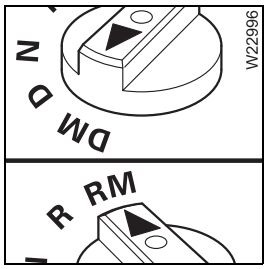
13.3.4 Transmission/connections

Transmission



- In order to
  - **drive forward**, switch to **DM**
  - **drive backward**, switch to **RM**. An acoustic signal is given with additional equipment

  Selecting the transmission mode; ➠ p. 5 - 32.

Switching on separate steering

Separate steering must be switched on while driving the rigged truck crane; ➠ *Switching to separate steering*, p. 5 - 66.

13.4 While driving

- Only drive at the lowest possible speed, **max. 1.5 km/h** (1 mph).
- The turning radius should be as great as possible when driving around corners.
- Only steer the truck crane when it is rolling and avoid sudden steering changes.

Risk of damage to the steering linkage
The steering linkage can be damaged if the steering wheel is moved while the vehicle is stationary.

Risk of damage to the axle lines
The suspension struts could be damaged if the maximum permissible operation pressure in the suspension is exceeded.
Always monitor the operation pressure in the suspension when moving the rigged truck crane.

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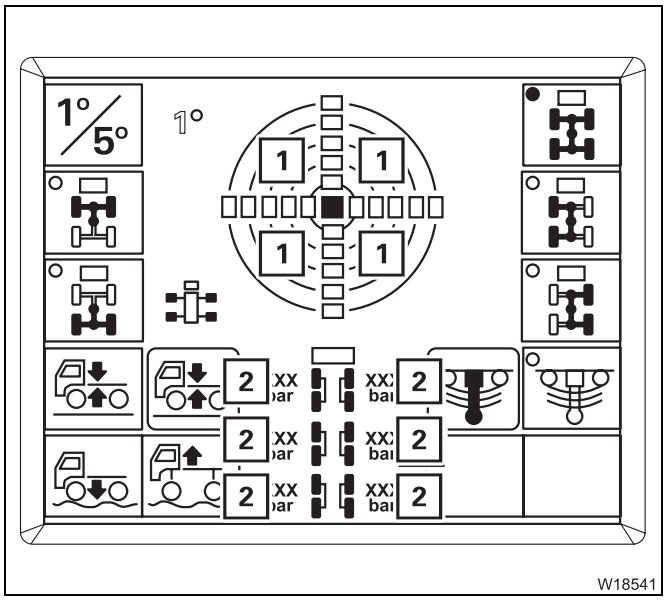

Warnings while driving

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

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

or

– The operation pressure (**2**) of 210 bar (3045 psi) in the suspension has been exceeded

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

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

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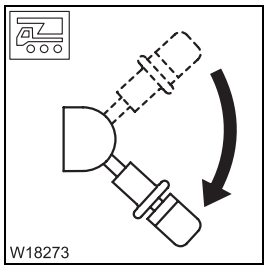
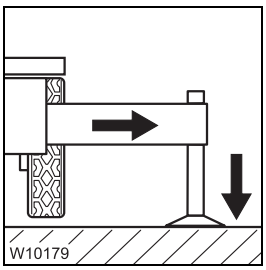
13.5 After driving

- Switch separate steering off after driving; ➠ p. 5 - 69.



- Engage the parking brake.



- Support the truck crane with the outrigger span required for the job according to the *Lifting capacity table* and raise it until none of the wheels touches the ground; ➠ *Permissible outrigger spans*, p. 12 - 32.

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14 Malfunctions during crane operation

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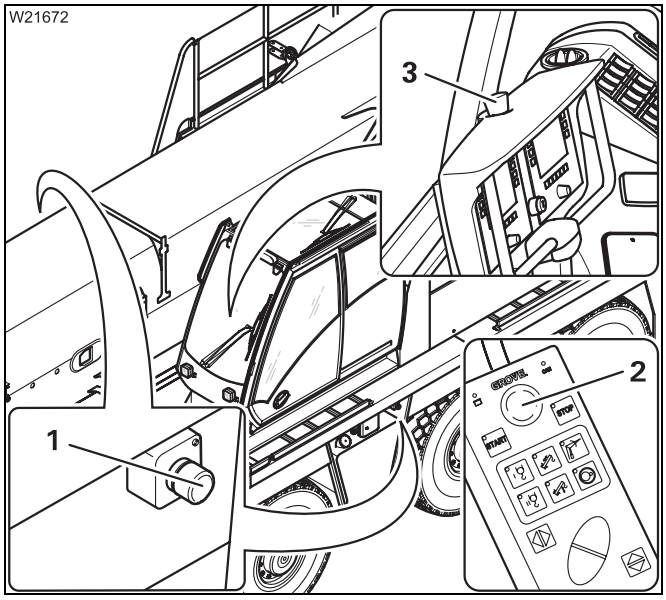
14 Malfunctions during crane operation

14.1 Emergency stop switch

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



- Stop all crane movements.

Four emergency stop switches are provided for an emergency:

1 On the carrier

2 On the hand-held control

3 In the crane cab

- Press an emergency stop switch (**1**), (**2**) or (**3**). The switch engages.

The engine shuts down.

After activating an emergency stop switch;
➠ *Resetting the emergency stop switch*, p. 4 - 26.

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

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14.2 What to do when a malfunction occurs during crane operation

If a malfunction occurs:

- Keep calm.

Risk of accident when carrying out repairs with loads lifted
Repairs must not be carried out as long as a load is lifted.
Always try to lower the load before carrying out repairs.
Only properly qualified personnel may perform crane movements with the solenoid valves.

Load can be lowered

- Set down the load. Retract the main boom completely and set it down on the main boom rest.

If it becomes necessary to override the RCL, observe all the information in the section titled *RCL override*; ➠ p. 11 - 40.

Risk of accident due to overridden or faulty RCL
You may only override the RCL if it becomes absolutely necessary in the event of an emergency. This is to put the truck crane into a safe state in the event of a malfunction. In this case, do not perform any movements that would increase the load moment.

If it is no longer possible to operate the crane from the crane cab, you can use the emergency activation, if necessary;
➠ *Emergency operation with the hand-held control*, p. 14 - 55,
➠ *Hydraulic emergency operation*, p. 14 - 59.

- Lock the truck crane to prevent unauthorised use. Remove the ignition key and lock away the hand-held control.
- Inform your supervisor.
- Try to eliminate the malfunction. Inform **Manitowoc Crane Care** if you cannot correct the malfunction.

Load cannot be lowered

- Secure the danger zone using cordons and warning signs.
- Notify **Manitowoc Crane Care**.

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14.3 Fuses

The fuses are located in different places on the superstructure:

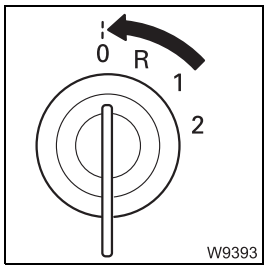
– On the turntable,

– In the crane cab,

– On the RCL.

Information on replacing 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. This prevents the new fuse from being damaged by the increased starting current immediately after being installed.

Risk of damage by overloading
Replace blown fuses only with new fuses of the same amperage. This prevent parts from being overloaded and damaged or the fuse from being immediately damaged again.
Notify **Manitowoc Crane Care** if a fuse with the same amperage fails again once the ignition is switched on.

Risk of fire
Never repair a blown fuse with other electrically conductive materials.

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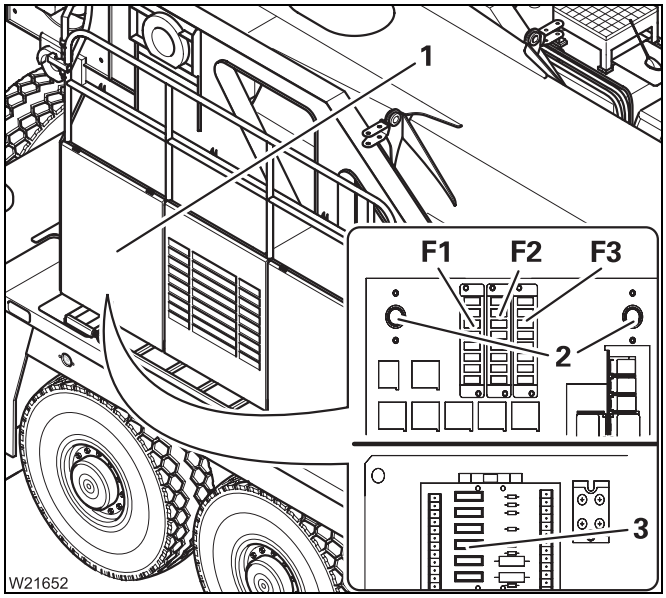
14.3.1 Fuses on the turntable



- Open the cover (**1**).
- Open the distribution box behind it.

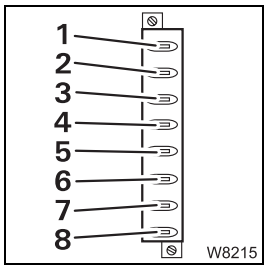
  There are fuse groups **F1**, **F2** and **F3.**
- Remove the screws (**2**) and fold the plate down.

There are other fuses on the circuit board (**3**); ➠ p. 14 - 7.

- Close the distribution box and cover after checking (**1**).
- Observe the instructions on changing fuses; ➠ p. 14 - 5.

Fuse groups F1/F2/F3

The following tables show the designations of the individual fuses, including their amperage and functions.



The designations 1 to 8 in the tables correspond to the order from top to bottom (fuse 1 is the top fuse).

Designation	Amperage (A)	Function
F1/1	20	ESX 0 supply ESX 4 supply
F1/2	20	I/O-4 circuit board ESX 1 supply
F1/3	10	Central lubrication Lattice extension
F1/4	10	Alternator Superstructure rotating beacon
F1/5	20	Air intake inhibitor [1)] Flame start system[1)]
F1/6	5	Air intake inhibitor [1)]
F1/7	3	ESX 4 supply I/O-4 circuit board
F1/8	5	Engine E-control (PLD)

[1)] Additional equipment

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Designation	Amperage (A)	Function
F2/1	2	Lifting limit switch
F2/2	–	Unassigned
F2/3	10	Slewing gear brake
F2/4	20	Flame start system[1)]
F2/5	3	ESX 4 supply
F2/6	3	Emergency operation with hand-held control
F2/7	20	Oil cooler
F2/8	20	Additional oil cooler[1)]

Designation	Amperage (A)	Function
F3/1	3	ESX2 control unit *ECOS control unit supply*
F3/2	2	ESX3 control unit
F3/3	10	*RCL and RCL control unit supply*
F3/4	5	Remote control[1)] Heating pump
F3/5	20	ESX2 control unit
F3/6	5	ESX2 control unit *ECOS control unit supply*
F3/7	5	Control lever
F3/8	–	Engine electronic system (ADM)

[1)] Additional equipment

Fuses on the circuit board

The fuses on the circuit board protect the ECOS control units on the superstructure.

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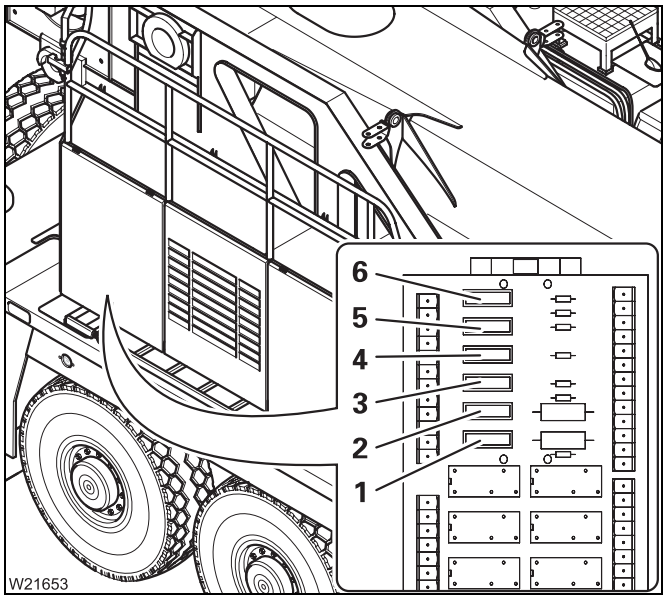

Fuse arrangement:

Pos.	Designation	Amperage (A)
1	ESX 1 UE	3
2	ESX 1 D+	3
3	ESX 1 8.5 V	2
4	ESX 0 UE	3
5	ESX 0 D+	3
6	ESX 0 8.5 V	2

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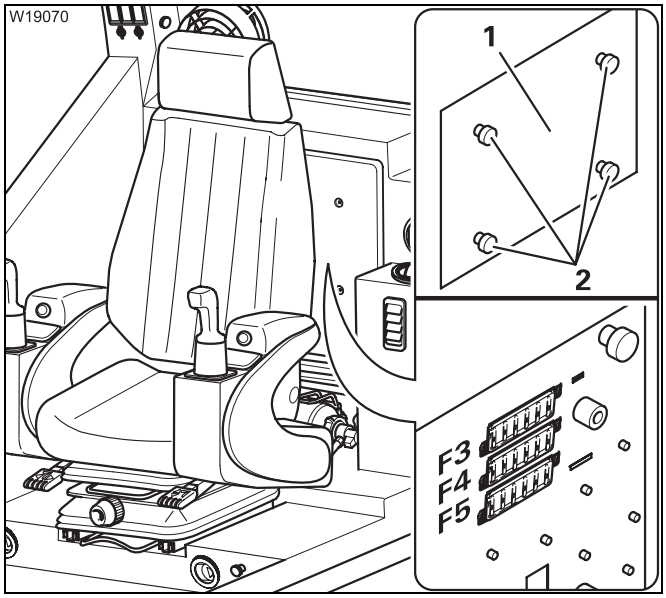
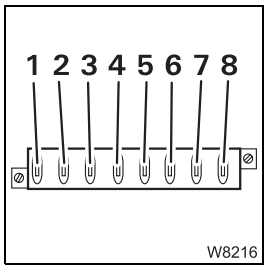
14.3.2 Fuses in the crane cab



- Loosen the screws (**2**) and remove the cover (**1**).

The fuse groups **F3, F4** and **F5** consist of eight fuses each.

The following tables show the designations of the individual fuses, including their amperage and functions.



The designations 1 to 8 in the tables correspond to their order from left to right (fuse 1 is always the left fuse).

- Observe the instructions on changing fuses; ➠ p. 14 - 5.

Designation	Amperage (A)	Function
F3/1	3	ESX 2 supply *ECOS control unit supply*
F3/2	2	ESX 2 supply
F3/3	10	RCL and RCL control unit supply
F3/4	5	Remote control[1)] Heating system
F3/5	20	ESX 2 supply
F3/6	5	ESX 2 supply *ECOS control unit supply*
F3/7	5	Control lever supply
F3/8	5	Engine electronic system (ADM)

1) Additional equipment

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Designation	Amperage (A)	Function
F4/1	10	Engine electronic system (ADM)
F4/2	10	24 V/12 V voltage transformer Crane cab lighting Air traffic control light Radio
F4/3	3	Engine electronic system diagnostics plug Camera on the turntable[1)] Camera on the main boom[1)]
F4/4	25	Air-conditioning system[1)]
F4/5	–	Unassigned
F4/6	15	Auxiliary heater[1)]
F4/7	–	Unassigned
F4/8	20	CraneSTAR system

Designation	Amperage (A)	Function
F5/1	15	Spotlight
F5/2	15	Spotlight RCL status display
F5/3	15	Windscreen wiper/washing system Cigarette lighter
F5/4	10	Fan[1)] Camera on the turntable[1)] Camera on the main boom[1)]
F5/5	5	Instrument panel lighting
F5/6	5	Voltage monitoring Engine electronic system diagnostics plug
F5/7	10	Heater fan
F5/8	10	Battery heater[1)] Auxiliary heater[1)] Camera on the main boom[1)]

[1)] Additional equipment

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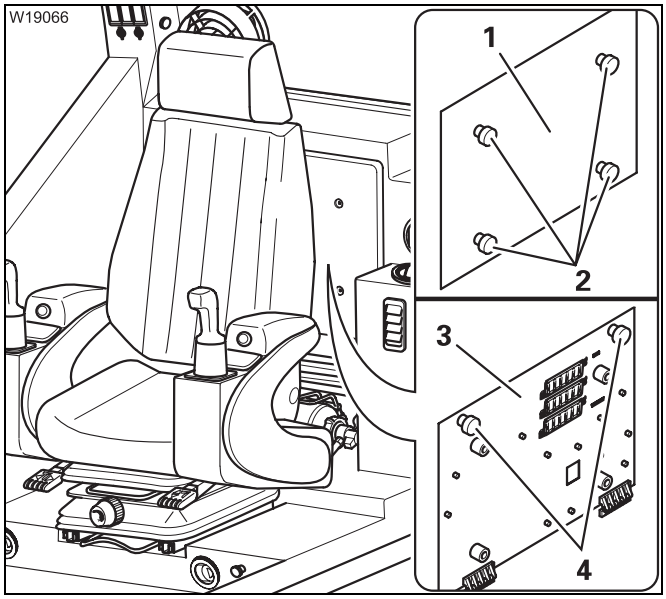
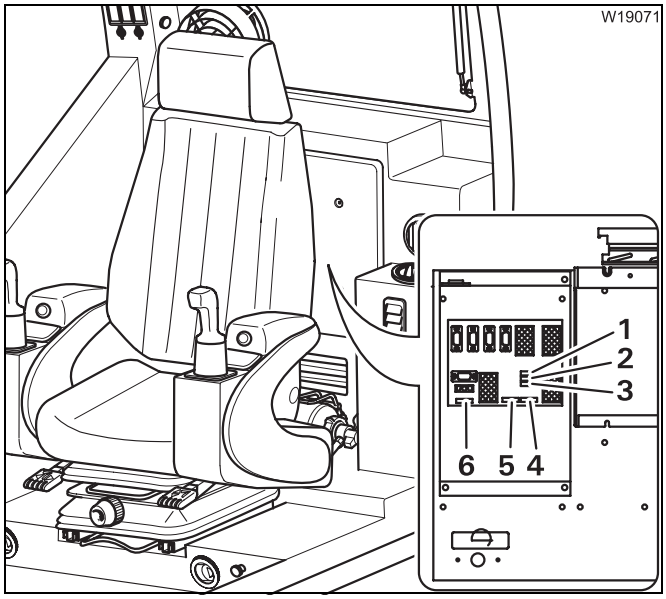
14.3.3 RCL fuses

When a fuse is blown, a corresponding error code is displayed; ➠ *Error codes table*, p. 14 - 27.



- Loosen the screws (**2**) and remove the cover (**1**).
- Loosen the screws (**4**) and fold down the plate (**3**) to the front.
- Observe the instructions regarding fuse changes; ➠ p. 14 - 5.



Fuse arrangement on the RCL control unit:

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

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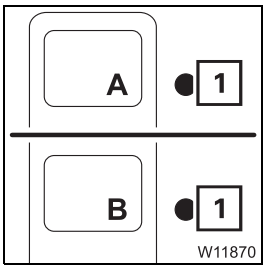
14.4 Troubleshooting



This section does not include all malfunctions. When a lamp (**1**) lights up;
➠ *Warning submenu*, p. 11 - 111.

14.4.1 Malfunctions on the engine

Malfunction	Cause	Solution
Engine does not start – Starter does not turn	Driving mode switched on	Switch over to crane operation

All specifications in the section *Malfunctions in the engine* also apply;
➠ p. 7 - 27.

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14.4.2 Malfunctions on the main hoist/auxiliary hoist

Malfunction	Cause	Solution
Main hoist not working or malfunctioning	Hoist off, lamp in button lights up dimly	➠ *Switching on the main hoist*, p. 11 - 57, ➠ *Switching on the auxiliary hoist*, p. 11 - 59
	Dead man's switch not actuated	Press dead man's switch
	Emergency stop switch on	➠ *Resetting the emergency stop switch*, p. 4 - 26
	Fuses F1/1, F3/1, F3/2, F3/5, F3/6 blown	Replace blown fuse; ➠ p. 14 - 5
	Fuse blown on circuit board	Replace blown fuse; ➠ p. 14 - 7
	Control unit faulty, error message is displayed	Acknowledge error message once; ➠ p. 14 - 32 – if error persists, notify **Manitowoc Crane Care**
	Fuse F3/7 blown	Replace blown fuse; ➠ p. 14 - 9
Only the lifting function works	Lowering limit switch approached	Leave the shutdown range and lift the main hoist
Only the lowering function works	Lifting limit switch approached, lamp lights up	Leave the shutdown range and lower the main hoist
	RCL shutdown, lamp lights up	Leave the shutdown range; ➠ p. 11 - 37
	Fuse F3/3 blown	Replace blown fuse; ➠ p. 14 - 9
Lifting, lowering or high-speed mode function not working	Function disabled by ECOS	If necessary, acknowledge error once and briefly turn off the ignition – if error persists, notify **Manitowoc Crane Care**
No Lifting function	Fuse RCL F6 blown	Replace blown fuse; ➠ p. 14 - 11
	Fuse F3/3 blown	Replace blown fuse; ➠ p. 14 - 9
Lifting or lowering is either not possible at all or only at a low speed	Speed limited	Increase limit; ➠ p. 11 - 107
Lifting or lowering function cannot be switched off	ECOS malfunction	Actuate emergency stop switch; ➠ p. 14 - 1
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Unrig using hand-held control; ➠ p. 14 - 55

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14.4.3 Malfunctions in the hoist cameras

Malfunction	Cause	Solution
No image appears on the monitor after it is switched on.	Fuse on the crane cab blown	Replace blown fuse; ➠ p. 14 - 7
	Fuse blown – in camera or monitor.	Check fuses and replace as necessary; ➠ *Manufacturer's operating manual*.
	Connection between camera and monitor is disconnected.	Check cable connection and notify **Manitowoc Crane Care** if necessary.

14.4.4 Malfunctions in the main boom camera

Malfunction	Cause	Solution
No image appears on the monitor after it is switched on.	Fuse on the crane cab blown	Replace blown fuse; ➠ p. 14 - 7
	Fuse blown – in camera or monitor.	Check fuses and replace as necessary; ➠ *Manufacturer's operating manual*.
	Radio connection between camera and receiver is interrupted.	Adjust the receiver on the crane cab.
	Connection between receiver and monitor is disconnected.	Check cable connection and notify **Manitowoc Crane Care** if necessary.

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14.4.5 Malfunctions in the derricking gear

Malfunction	Cause	Solution
Derricking gear not working or malfunctions	Derricking gear off, lamp in button lights up dimly	Switching on the derricking gear; ➠ p. 11 - 64
	Dead man's switch not actuated	Press the dead man's switch.
	Emergency stop switch on	➠ *Resetting the emergency stop switch*, p. 4 - 26
	Fuses F1/1, F1/2, F2/2, F2/3, F3/1, F3/2, F3/5, F3/6 blown	Replace blown fuse; ➠ p. 14 - 5
	Fuse blown on circuit board	Replace blown fuse; ➠ p. 14 - 7
	Control unit faulty, error message is displayed	Acknowledge error message once; ➠ p. 14 - 32 – if error persists, notify **Manitowoc Crane Care**
	Fuse F3/7 blown	Replace blown fuse; ➠ p. 14 - 6
Lowering function not working	Lifting limit switch approached, lamp lights up	Leave the shutdown range and lower the auxiliary hoist
	RCL shutdown, lamp lights up	Leave the shutdown range; ➠ p. 11 - 37
	Fuse F3/3 blown	Replace blown fuse; ➠ p. 14 - 9
Derricking function not working	Function disabled by ECOS	If necessary, acknowledge error once and briefly turn off the ignition – if error persists, notify **Manitowoc Crane Care**
	Fuse RCL F6 blown	Replace blown fuse; ➠ p. 14 - 11
	Fuse F3/3 blown	Replace blown fuse; ➠ p. 14 - 9
Derricking not possible, or only at low speed	Speed limited	Increase limit; ➠ p. 11 - 107
Derricking cannot be switched off	ECOS malfunction	Emergency stop switch; ➠ p. 14 - 1
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Unrig using hand-held control; ➠ p. 14 - 55

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14.4.6 Malfunctions in the telescoping mechanism

Malfunction	Cause	Solution
Telescoping mechanism not working or malfunctioning	Telescoping mechanism off, lamp in button lights up dimly	➠ *Switching on the telescoping mechanism*, p. 11 - 76
	Dead man's switch system not actuated.	Press dead man's switch
	Emergency stop switch on	➠ *Resetting the emergency stop switch*, p. 10 - 18
	Fuses F1/1, F1/2, F1/7, F3/1, F3/2, F3/5, F3/6 blown	Replace blown fuse; ➠ p. 14 - 5
	Fuse blown on circuit board	Replace blown fuse; ➠ p. 14 - 7
	Control unit faulty, error message is displayed	Acknowledge error message once; ➠ p. 14 - 32 – if error persists, notify **Manitowoc Crane Care**
	Fuse F3/7 blown	Replace blown fuse; ➠ p. 14 - 9
Telescopic section and telescoping cylinder locking/ unlocking function not working	Faulty valve	Note the error code ➠ p. 14 - 32 and notify **Manitowoc Crane Care**
Extending function not working	Fuse F3/3 blown	Replace blown fuse; ➠ p. 14 - 9
	RCL shutdown, lamp lights up	Leave the shutdown range; ➠ p. 11 - 37
	Lifting limit switch approached, lamp lights up	Leave the shutdown range, retract boom
Retracting function not working	Insufficient lubrication	Lubricate main boom; ➠ *Maintenance manual*
	Main boom is not steep enough	Leave the shutdown range and raise the boom
Telescopic section cannot be operated by moving the control lever	Telescopic section locked	➠ *Unlocking the telescopic section*, p. 11 - 86
	Telescoping cylinder unlocked	➠ *Locking the telescoping cylinder*, p. 11 - 85
Telescopic section/telescoping cylinder locking function not working	Fault in hydraulics/electrical system	Note the error codes ➠ p. 14 - 17, ➠ p. 14 - 31 and notify **Manitowoc Crane Care**

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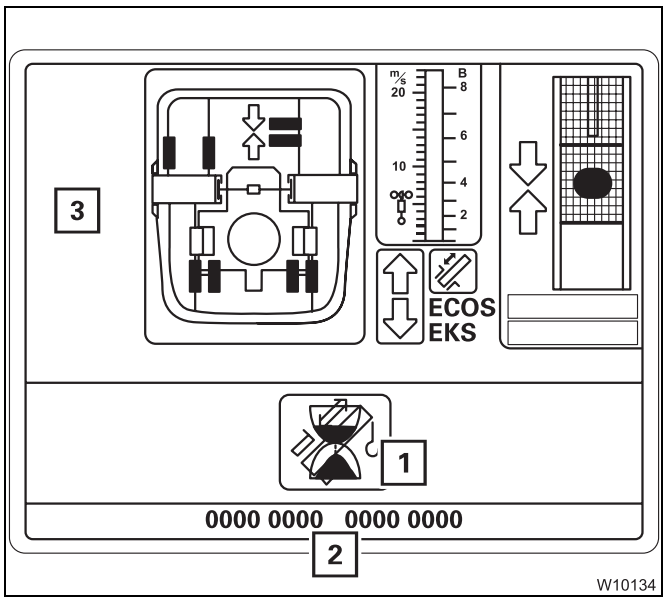
Malfunction	Cause	Solution
Telescoping function not working	Function disabled by ECOS	If necessary, acknowledge error once and briefly turn off the ignition – if error persists, notify **Manitowoc Crane Care**
	Fuse RCL F6 blown	Replace blown fuse; ➠ p. 14 - 11
	Fuse F3/3 blown	Replace blown fuse; ➠ p. 14 - 9
Telescoping not possible, or only at low speed	Speed limited	Increase limit; ➠ p. 11 - 107
Telescoping cannot be switched off	ECOS malfunction	Emergency stop switch; ➠ p. 14 - 1
The main boom can no longer be telescoped; the telescoping cylinder can no longer be moved	The hydraulic supply is interrupted	Retract the telescopic section by means of mechanical emergency operation; ➠ p. 14 - 40
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Unrig using hand-held control; ➠ p. 14 - 55

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 this error code before contacting **Manitowoc Crane Care**.

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

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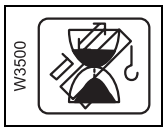
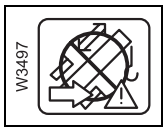
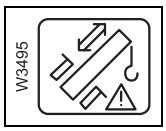


Waiting
The symbol usually disappears shortly after switching on the ignition.
If the symbol does not go out or is displayed while operating the crane, this may be due to an RCL shutdown or blown F1/2 fuse. Contact **Manitowoc Crane Care** if none of these are the cause.

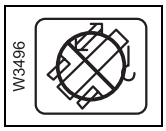
Telescope status divergence
ECOS has detected a difference between the displayed and the current telescope status. Enter the current telescope status; ➠ p. 14 - 53.



Emergency programme access
The telescoping mechanism can only be operated with the emergency programme; ➠ p. 14 - 43.



Emergency programme
The *Telescoping* emergency programme is open; ➠ p. 14 - 43.



Inactive
Contact **Manitowoc Crane Care** if this status is still displayed after repeatedly switching on the ignition.

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14.4.7 Malfunctions in the slewing gear

Malfunction	Cause	Solution
Slewing gear not functioning	Slewing gear off, lamp in button lights up dimly	Switch on the slewing gear; ➠ p. 11 - 99
	Houselock switched on	➠ *Switching the houselock on/ off*, p. 11 - 15
	Dead man's switch system not engaged.	Press dead man's switch
	Emergency stop switch on	➠ *Resetting the emergency stop switch*, p. 4 - 26
	Fuses F1/1, F1/2, F3/1, F3/2, F3/5, F3/6 blown	Replace blown fuse; ➠ p. 14 - 5
	Fuse blown on circuit board	Replace blown fuse; ➠ p. 14 - 7
	Control unit faulty, error message is displayed	Acknowledge error message once; ➠ p. 14 - 32 – if error persists, notify **Manitowoc Crane Care**
	Fuse RCL F6 blown	Replace blown fuse; ➠ p. 14 - 11
	Fuse F3/3 blown	Replace blown fuse; ➠ p. 14 - 9
Slewing function not working	Enter RCL code for the *0° to the rear position*	Enter RCL code for a slewing range
	Function disabled by ECOS	If necessary, acknowledge error once and briefly turn off the ignition – if error persists, notify **Manitowoc Crane Care**
Slewing only possible in one direction	Shutdown angle of a limited slewing range reached (additional equipment).	Enter the RCL code for a slewing range of 360° or slew in the opposite direction to leave the shutdown angle
Slewing not possible or only at low speed	Speed limited	Increase limit; ➠ p. 11 - 107
Slewing cannot be switched off	ECOS malfunction	Emergency stop switch; ➠ p. 14 - 1
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Unrig using hand-held control; ➠ p. 14 - 55

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14.4.8 Malfunctions in the hydraulic system/hydraulic oil cooler

Malfunction	Cause	Solution
Hydraulic oil temperature above 80°C (176°F), fan in the hydraulic oil cooler running	Hydraulic system is under extreme strain	Stop the crane operation and keep the engine running until the oil has cooled down
Hydraulic oil temperature above 80°C (176°F), fan in the hydraulic oil cooler not running	Fuse F1/7, F1/8 blown.	Stop crane operation and replace blown fuse; ➠ p. 14 - 6
	Faulty temperature sensor in the circuit of the hydraulic system, error message is displayed	Have the temperature sensor replaced
Symbol is red	Corresponding hydraulic oil filter soiled	Change hydraulic oil filter; ➠ *Maintenance manual*

14.4.9 Malfunctions when inclining the crane cab

Malfunction	Cause	Solution
Crane cab inclination function not working	Fuse F1/1, F1/7 blown	Replace blown fuse; ➠ p. 14 - 6
	Mega Wing Lift in rigging position	End rigging; ➠ *Separate operating manual*

14.4.10 Malfunctions when operating with the hand-held control

Malfunction	Cause	Solution
CAN lamp flashes or stays off after connecting the hand-held control	A bridging plug is not inserted in another socket	Insert bridging plug; ➠ p. 12 - 22
	Fuse F2/6 blown	Replace blown fuse; ➠ p. 14 - 6
Motor will not start	Ignition in the driver's cab switched on	Switch off the ignition in the driver's cab; ➠ p. 4 - 25
Pre-selected function cannot be performed	Another function has been pre-selected	Pre-select the desired function
Operation not possible	Malfunction in the control system	**Manitowoc Crane Care** must be notified

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14.4.11 Malfunctions on the outriggers

Malfunction	Cause	Solution
Outrigger cylinders and beams can neither be extended nor retracted and the inclination indicator does not work	Driver's cab: Fuses A3F3, A3F13, A3F14 blown.	Replace blown fuse; ➠ p. 7 - 20.
When operating with the hand-held control	Driver's cab: Fuse A2F3 blown	Replace blown fuse; ➠ p. 7 - 20
When operating from the crane cab	Hand-held control connected to the superstructure or a bridging plug not inserted	Disconnect hand-held control or insert bridging plug; ➠ p. 12 - 22
When operating from the control units	Display fields switched off.	Switch on display fields; ➠ p. 12 - 33
	Hand-held control connected to the superstructure or a bridging plug not inserted	Disconnect hand-held control or insert bridging plug; ➠ p. 12 - 22
None of the specified causes apply	Solenoid valves not working	**Manitowoc Crane Care** must be notified

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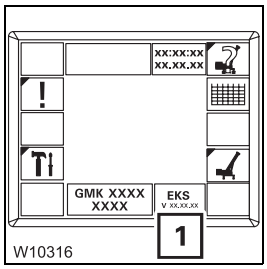
14.4.12 Troubleshooting on the RCL

This section contains general malfunctions which are not displayed on the *RCL* control unit as well as malfunctions which prompt an error display on the *RCL* control unit.

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

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



RCL programme version

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

- If required, open the main menu Esc .

The display (**1**) indicates the programme version.

General malfunctions

Malfunction	Cause	Solution
RCL not working – dark displays, no buzzer tone	Power supply not switched on	Switch on the ignition
	Fuse F2/6 blown	Replace blown fuse; ➠ p. 14 - 6
	Fuse RCL F6 blown	Replace blown fuse; ➠ p. 14 - 11

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Error messages in the Monitoring submenu

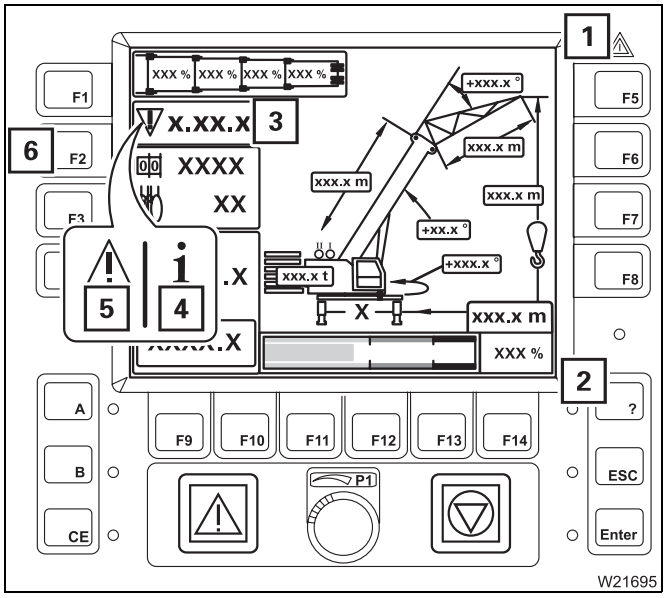
If the rated capacity limiter detects an error, an error message is shown on the *RCL* control unit.

There are different types of error messages:

– Error messages without shutdown

– Error messages with shutdown

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



Error message without shutdown
The error message is displayed either as a warning or information.

– The buzzer tone sounds once.

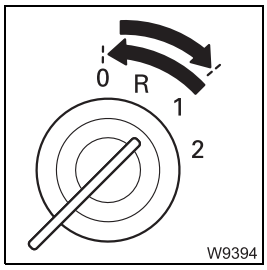
– Lamps (**1**) and (**2**) light up.

– Display (**3**) shows an error code and the associated symbol flashes.

  4 Information symbol

  5 Warning symbol

You can have all existing error messages displayed by repeatedly pressing the button (**6**).



Try to correct the error by turning off the ignition and turning it on again after about 15 seconds.

If the error is displayed again, check whether the error code is contained in the *Error codes* tables. These tables contain information on how to remedy errors; ➠ p. 14 - 27.

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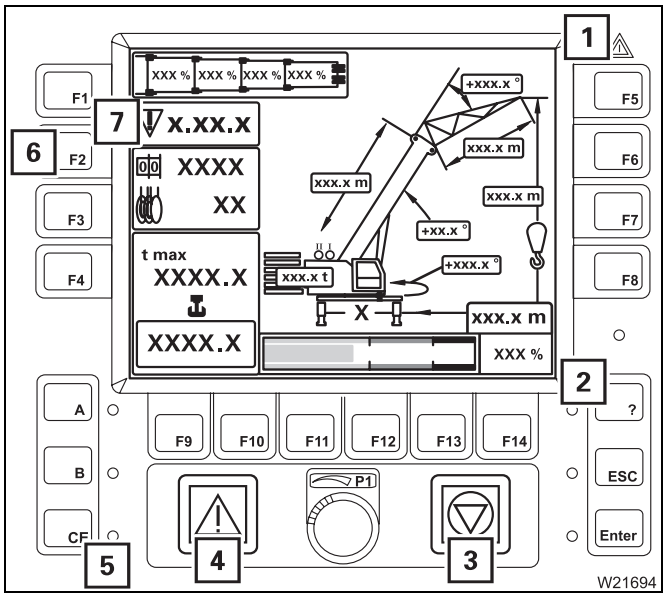

Error message with shutdown

– All crane movements are turned off which are not required for the correction of the error.

– A continuous buzzer tone sounds.
After five seconds, you can switch off the buzzer tone using button (**5**).

– Lamps (**1**) and (**2**) light up.

– Lamps (**3**) and (**4**) light up.

Display (**7**) shows an error code and the error symbol flashes.

You can have all existing error messages displayed by repeatedly pressing the button (**6**).

Check whether the *Error codes* tables contain the error. These tables contain information on how to resolve errors; ➠ p. 14 - 27.

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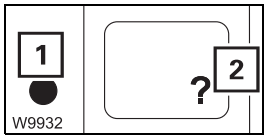
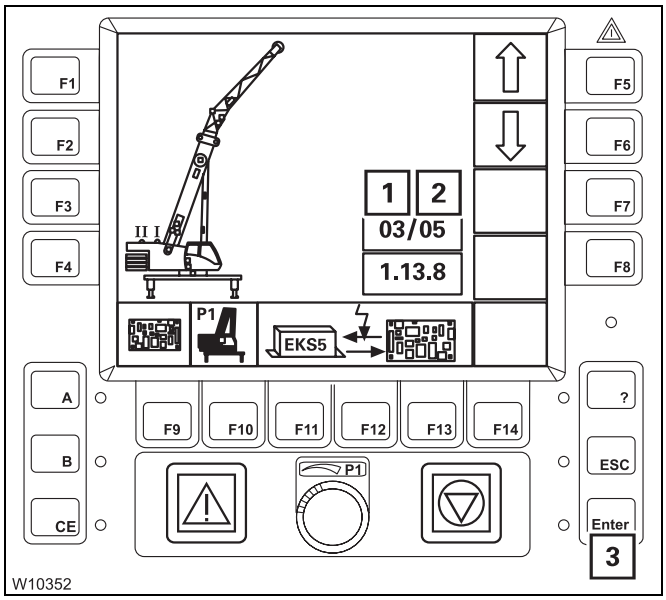
Displays in the Error submenu

- Stop all crane movements and bring both control levers into zero position.



- Press the (**2**) button once. The button is only active when the lamp (**1**) flashes or lights up.



This opens the *Errors* submenu.

Display (**2**) shows the error total, and display (**1**) shows which error is displayed.

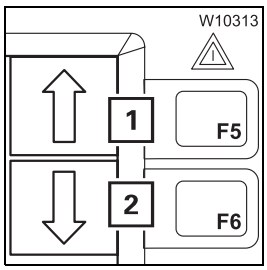
3/5, for example, means:
– Error **3** is shown
– There is a total of **5** errors

If the error shown is not acknowledged, the lamp next to the button (**3**) lights up.

Acknowledging the error

- Press the (**3**) button once.

The next, pending error is displayed and can be acknowledged.



- You can call up all current errors with the buttons (**1**) and (**2**).

  1 Display errors in ascending order

  2 Display errors in descending order

Every time you press, the next error will be displayed.
When you keep a button pressed, all errors are shown one after the other continuously.

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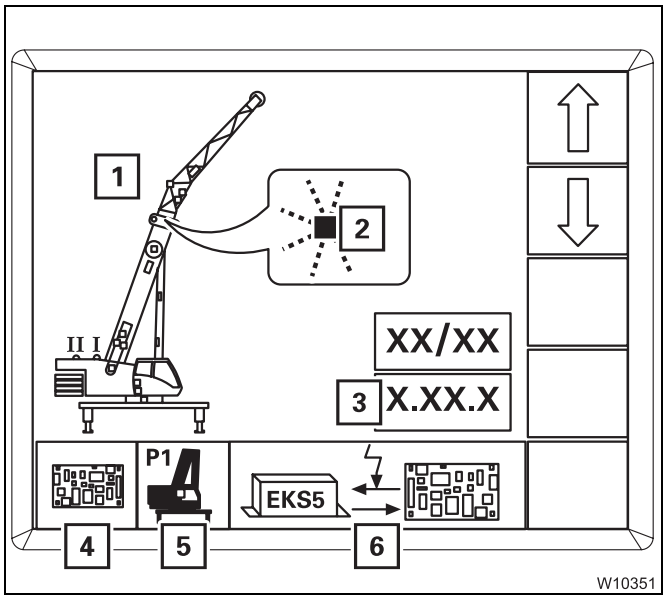

Error message display

For each error there is:

– The error code (**3**)

– The symbols for:

4 The error group

5 The faulty component

6 The error type

– Possibly the error location (**1**) – the respective places (**2**) flash in red

• Check whether the *Error codes* tables contain the error. These tables contain information on how to remedy errors; ➠ p. 14 - 27.

Exiting the submenu

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

• Press the (**1**) button once.

The same menu opens that was open before the *Errors* submenu opened.

All errors remain saved until you switch off the ignition, even those errors of which the cause has been eliminated in the meantime. All existing errors are treated as new errors and displayed again after turning on the ignition.

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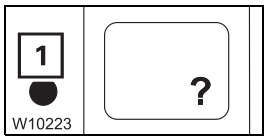
Error codes table

The following table contains a number of error codes, their causes and possible remedies.

An error code consists, from left to right, of a one-digit number (e.g. **5**), a two-digit number (e.g. **01**) and a one-digit number (e.g. **2**).

- Check whether the table contains the displayed error code. If the information in the table does not help resolve the error, note the error code(s) and contact **Manitowoc Crane Care**.



When all errors are remedied, the lamp in the button (**1**) goes out.

Error code			Cause	Solution
1	**01**	**1 - 7**	Error pressure sensor 1 Lower chamber	Switch off pressure sensor 1; ➠ p. 14 - 30
1	**01**	**8**	Pressure sensor 1 switched off	Have malfunction corrected
1	**02**	**1 - 7**	Error pressure sensor 2 Lower chamber	Switch off pressure sensor 2; ➠ p. 14 - 30
1	**02**	**8**	Pressure sensor 2 switched off	Have malfunction corrected
1	**04**	**1 - 7**	Error angle sensor 1 Main boom	Switch off pressure sensor 1; ➠ p. 14 - 30
1	**04**	**8**	Angle sensor 1 switched off	Have malfunction corrected
1	**05**	**1 - 7**	Error angle sensor 2 Main boom	Switch off pressure sensor 2; ➠ p. 14 - 30
1	**05**	**8**	Angle sensor 2 switched off	Have malfunction corrected
1	**13 to 21**	**1**	Lattice extension not connected or sensor faulty	Electrically connect lattice extension; if error persists, notify **Manitowoc Crane Care**

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Error code			Cause	Solution
3	**03**	**3**	Comparison of telescoping diagram between crane control and RCL resulted in differences	Compare the actual telescoping status with the values on the *ECOS* display and, if necessary, re-enter the telescoping status. Accept the ECOS telescoping position data if an incorrect telescoping position is displayed on the RCL: 1. Press the F1 button once and the RCL shows the new values. 2. Acknowledging the error
5	**01**	**1**	There is no capacity diagram available for the entered rigging mode	Re-enter the current rigging mode. If the error is displayed again, check whether the current rigging mode is permissible
5	**01**	**2**	Main boom angle too small (not steep enough)	Raise the main boom
5	**01**	**3**	Main boom angle too large (too steep)	Lower the main boom
5	**02**	**1**	There is no RCL code available for the entered rigging mode	Re-enter the current rigging mode. If the error is displayed again, check whether the current rigging mode is permissible
5	**02**	**4**	Lattice extension inclination is too small	Raise the lattice extension
5	**02**	**5**	Lattice extension inclination is too large	Lower the lattice extension
5	**02**	**6**	Current load greater than derricking load – *Lower lattice extension* movement is disabled	1. Raise the lattice extension 2. Press button CE once 3. If necessary, increase the working radius using the *Lower main boom* movement
5	**04**	**4**	Maximum permissible slewing angle exceeded	Slew into a permissible working range
5	**05**	**5**	Minimum load value not reached	When the main boom is set down, raise main boom and acknowledge the error. Notify **Manitowoc Crane Care** if the error cannot be acknowledged
6	**02**	**1**	Fuse F1 blown	Replace blown fuse; ➠ p. 14 - 11
6	**02**	**2**	Fuse F2 blown	
6	**02**	**3**	Fuse F3 blown	
6	**02**	**4**	Fuse F11 blown	
6	**02**	**5**	Fuse F12 blown	

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Error code			Cause	Solution
8	**01**	**1**	Rigging state unconfirmed	➠ *Confirming the rigging mode*, p. 11 - 29.
8	**02**	**2**	RCL overridden	Cancel override; ➠ p. 11 - 40
8	**03**	**3**	Slewing gear switched on with RCL code for working position *0°*, *180°* or *Free on wheels*	Switch off the slewing gear
8	**14**	**1**	Maximum permissible overall height exceeded[1)]	Retract or lower
8	**14**	**2**	Maximum permissible overall working radius exceeded[1)]	Raise or retract
8	**14**	**3**	Maximum permissible overall slewing range exceeded[1)]	Slew into a permissible working range
8	**14**	**4**	Shutdown area of a monitored object reached[1)]	Move into a permissible working range
8	**17**	**2**	Rigged outrigger span not correct	Check the outrigger span and rig the required outrigger span
8	**17**	**3**	Current outrigger span not permissible	Check the outrigger span and rig the required outrigger span
8	**17**	**4**	Position of the auxiliary supports is not permitted	Check the position of the auxiliary supports and correct if necessary

[1)] With working range limiter switched on

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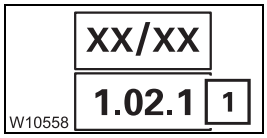
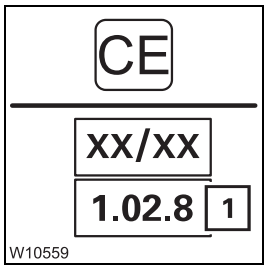
Switch off sensor/ tachogenerator

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 RCL failure
Have the error resolved before the next crane job.
This allows the crane to still be unrigged without RCL 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.



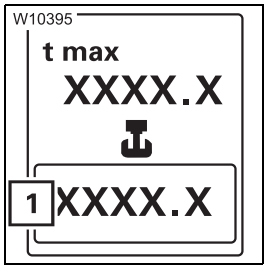
- Press button CE once.

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 a different last digit, e.g. 1.02.5.

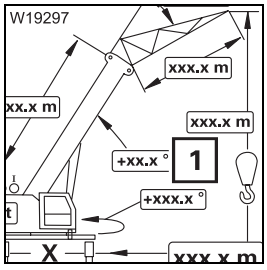
After switching off the faulty sensor/tachogenerator, you should check whether the other sensor/tachogenerator is functioning correctly.

Risk of accident from faulty functioning
After switching off the faulty sensor/tachogenerator, begin crane operation only if the display of the remaining sensor/tachogenerator is correct.
This prevents the RCL from not switching off when leaving the working range and the truck crane overturning as a result.



Checking the pressure sensor function

- Lift the hook block without a load.
- Check whether the display (**1**) indicates the approximate weight of the hook block.



Checking the angle sensor function

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

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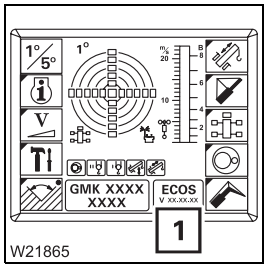
14.4.13 Malfunctions ECOS – superstructure

This section contains general malfunctions and malfunctions that generate an "error" display.

ECOS programme version

Always note down the number of the programme version before notifying **Manitowoc Crane Care** in the event of a malfunction.



- If required, open the main menu Esc .

The display (**1**) shows the number of the current programme version.

General malfunctions

The following table contains information on troubleshooting and possible solutions.

Malfunction	Cause	Solution
The ECOS display remains dark although the ignition is switched on	Fuse F1/1, F1/2 blown	Replace blown fuse; ➠ p. 14 - 6
	Fuses F2/1, F2/2, F3/1, F3/6 blown	
	One or more fuses on the circuit board in the distribution box are blown	

Other malfunctions on the ECOS generate corresponding error messages.

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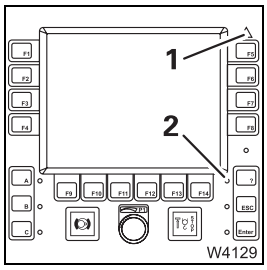
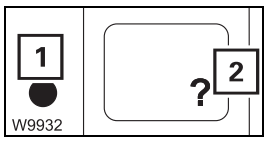
Error messages

If ECOS detects an error, an error message is shown:

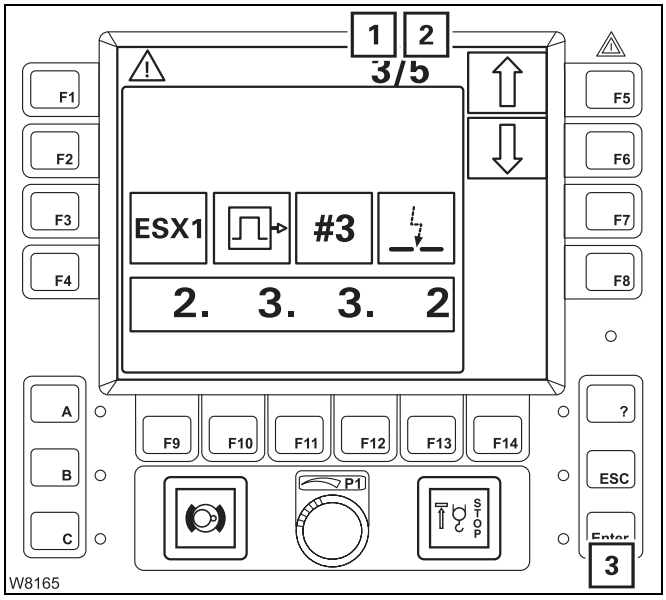


– Lamp (**1**) flashes
– Lamp (**2**) flashes

Open the *Errors* submenu for more information.



- Press the (**2**) button once. The button is only active when the lamp (**1**) flashes or lights up.



This opens the *Errors* submenu.

Display (**2**) shows the error total, and display (**1**) shows which error is displayed.

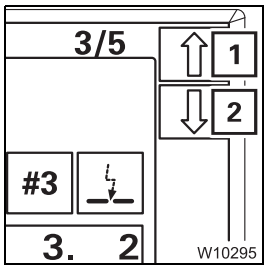
3/5, for example, means:
– Error **3** is shown
– There is a total of **5** errors

If the error shown is not acknowledged, the lamp next to the button (**3**) lights up.

Acknowledging the error

- Press the (**3**) button once.

If there are further errors, the next error is displayed and can be acknowledged.



- When all errors have been acknowledged, you can retrieve any pending errors using the buttons next to the symbols (**1**) and (**2**)

  1 Next error

  2 Previous error

Every time you press the button, the next error will be displayed.
When you keep the button pressed, all errors are shown one after the other continuously.

If not all errors have been acknowledged, the buttons ⇧ and ⇩ have no function – the symbols are grey.

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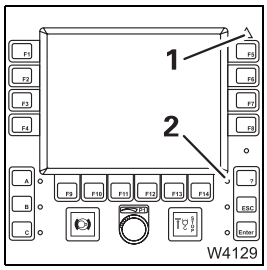
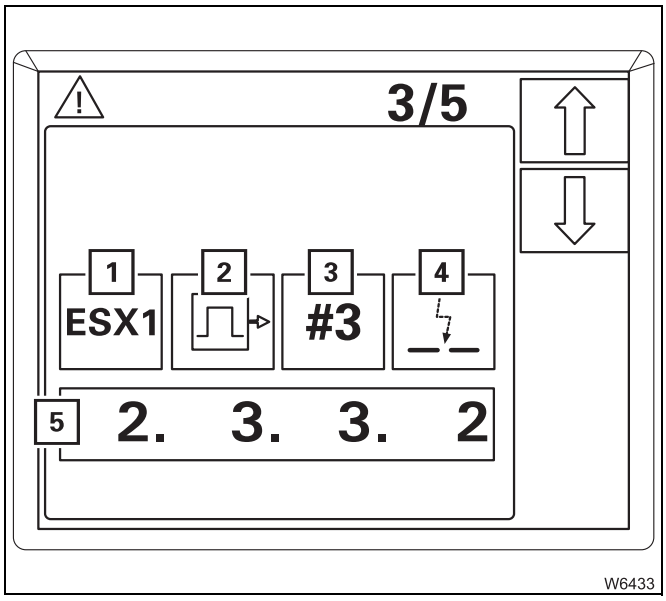


When all error messages have been acknowledged, the displays change:

– Lamp (**1**) lights up
– Lamp (**2**) lights up

Both displays start to flash again as soon as a new error occurs.



Error message display

Each error is defined by an error code (**5**) and the symbols (**1**) to (**4**).

The symbols stand for:

1 The faulty device

2 The error group

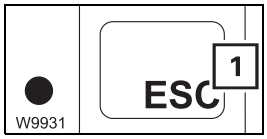
3 The index within the group

4 The error type

The error code (**5**) consists of four digits, e.g. **2332**.

- Always note the error code before contacting **Manitowoc Crane Care**

Exiting the submenu



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

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

The same menu opens that was open before the *Errors* submenu opened.

All errors remain saved until you switch off the ignition, even errors that have since been resolved. All existing errors are treated as new errors and displayed again after turning on the ignition.

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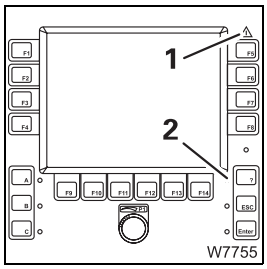
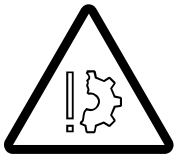
14.4.14 Malfunctions on the CraneSTAR system



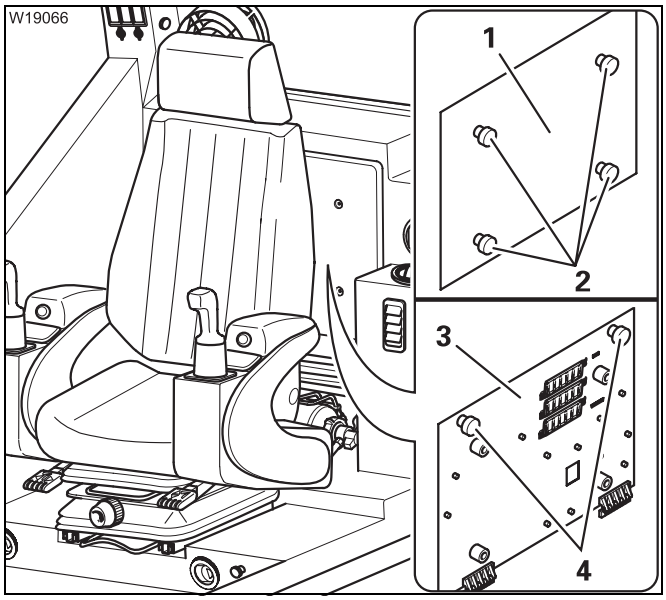
ECOS displays only one error message when the connection between the crane control and the *TCU* control unit is disconnected. The lamps (**1**) and (**2**) light up and the *Errors* submenu shows the error code 29.6.1.0.

Data transmission errors will be reported externally, e.g. by **Manitowoc Crane Care**

If an error occurs, check:
– The fuses
– The antenna plugs
– The lamps on the *TCU*



Risk of damage if procedure is incorrect
Observe the following notes to avoid malfunctions and damage:
– Always switch the ignition off before changing a fuse and before checking the antenna plugs
– Replace blown fuses only with new fuses of the same amperage



Fuses

- Loosen the screws (**2**) and remove the cover (**1**).
- Check the associated fuse on the plate (**3**) and replace it if necessary; ➠ *Fuses in the crane cab*, p. 14 - 9.
- Loosen the screws (**4**) and fold down the plate (**3**) to the front.

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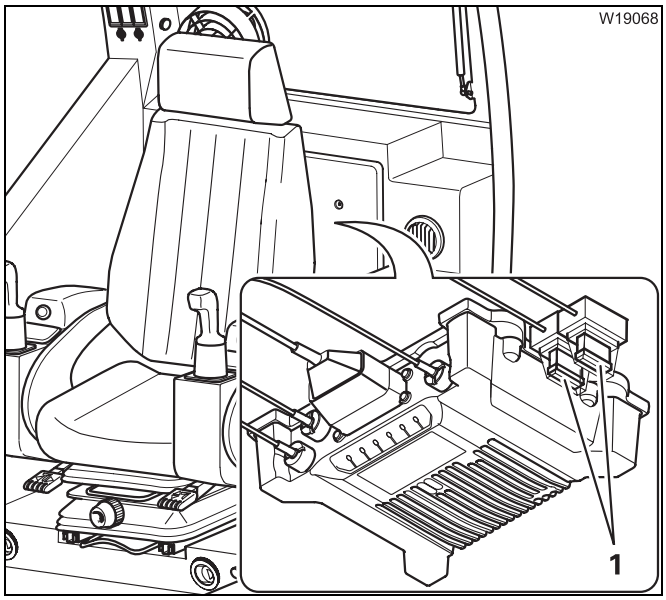
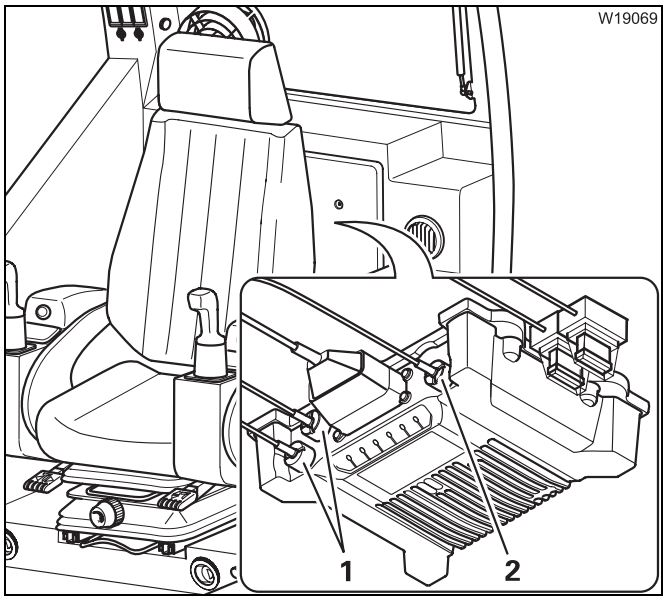


- Check the fuses (**1**) and replace them if necessary.

Designation	Amperage
F3401	5 A
F3402	5 A

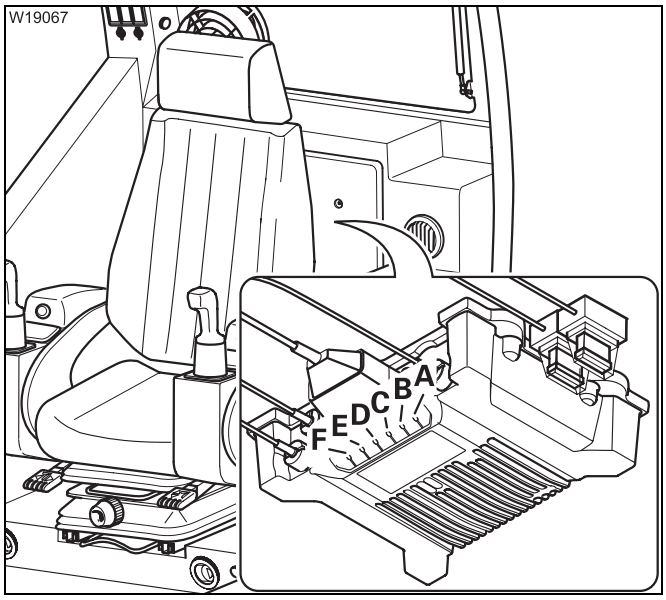


Antenna plugs

- Check whether the plugs (**1**) and (**2**) are plugged in:

  1 Plugs for GSM/GPS antenna

  2 Plug for satellite antenna



Lamp display

The lamps (**A**) to (**F**) display the operating condition and are used for troubleshooting.

- **A** TCU display
- **B** GPS display
- **C** GSM display
- **D** Satellite display
- **E** Can bus display
- **F** GSM or satellite display

Each lamp can show four different functions.

- **On:** Lamp lights up
- **Off:** Lamp goes out
- **Quick flash:** Flashes four times per second
- **Slow flash:** Flashes once per second

• Observe the functions of the lamps and forward the information to **Manitowoc Crane Care** if necessary.

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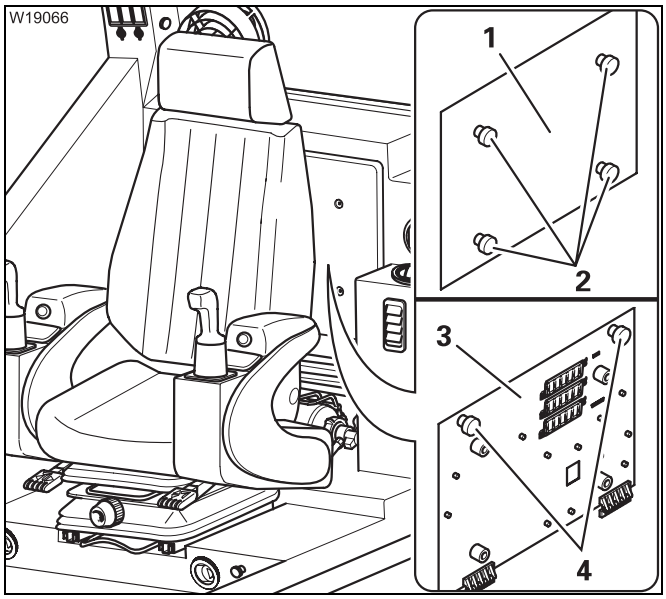
This table assigns possible errors to the lamp functions.

Lamp	Function			
	On	Off	Slow flash	Quick flash
A	– 24 V DC from battery – 24 V DC from ignition	0 V DC from battery or ignition off for a long time	–	– 24 V DC from battery – 0 V DC from ignition
B	3D GPS fix	–	GPS error	Weak signal
C	Connected	–	No connection	–
D	No message queued and satellite in view	No message queued and no satellite in view	Message queued and no satellite in view	Message queued and satellite in view
E	Receiving data on CAN RX	–	No CAN data being received	Receiving data on CAN RX
F	Waiting	Error	Send/receive message	Receive message via GPS



After troubleshooting

- Fold the plate (**3**) up and secure it with the screws (**4**).
- Fasten the cover (**1**) using the screws (**2**).

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14.5 Emergency operations and programmes

This section contains all the information about possible emergency operations and emergency programmes. The following are available:

– Mechanical emergency operation for retracting

– *Telescoping emergency programme* submenu

– Entering the telescoping after an emergency operation

– Operation of the power units with the hand-held control

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14.5.1 Mechanical emergency activation for retracting

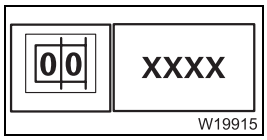
If you can no longer lock and unlock the telescopic sections from within the crane cab because of a malfunction, you can do so manually by performing mechanical emergency operations.

In this case, you need one or two auxiliary cranes.
In the worst case, emergency operation has to be performed by properly trained personnel, because incorrect operation poses the risk of injury and damage to the main boom.

- Always check the following option first.

Checks before emergency operation

First check whether it is permitted to lower the main boom to a horizontal position with the current telescope status. Proceed as follows:



Enter the current rigging mode on the RCL. The corresponding RCL code according to the *Lifting capacity table* must be displayed.

- Lower the main boom.

– **If the RCL allows the boom to be lowered into a horizontal position**
You can reach the locking points with a ladder and need only one auxiliary crane to telescope the unlocked telescopic sections

– **If the RCL is deactivated prior to reaching the horizontal position**
In order to reach the locking points, you need an auxiliary crane with licensed passenger transportation and a second auxiliary crane to secure and telescope the unlocked telescopic sections

If it is possible to lower but there is not sufficient space, you can check whether the truck crane can be driven in the current rigging mode;
➠ p. 13 - 1.
Operation with the lattice extension; ➠ *Lattice extension operating instructions*.

Procedure

The best suitable retracting procedures in your particular case depend on the conditions on site and on the crane functions that are still available.

Select the procedure best suited to your particular case and consult **Manitowoc Crane Care**.

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Mechanical emergency operation

The following requirements must be met before unlocking manually:

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

or

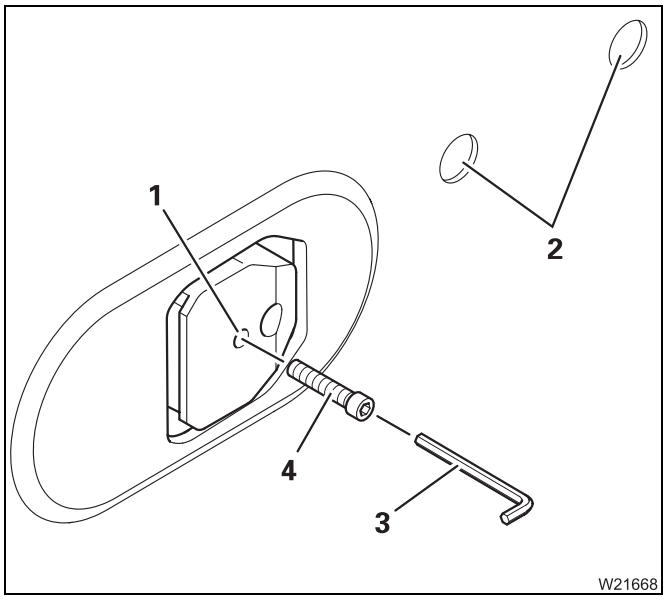
– The telescopic section to be unlocked is secured against retracting by itself by using an auxiliary crane. Telescoping is done with the auxiliary crane

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

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

There are two M8 screws for every telescopic section:

– 200 mm length for telescopic section I
– 150 mm length for telescopic section II
– 110 mm length for telescopic sections III and IV



Screw (**3**) into the locking pins (**1**) to unlock.

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

You will need a suitable socket wrench (**2**), with one shank being at least 200 mm long.

– To unlock, the set screws are screwed in
– To lock, the set screws are screwed out

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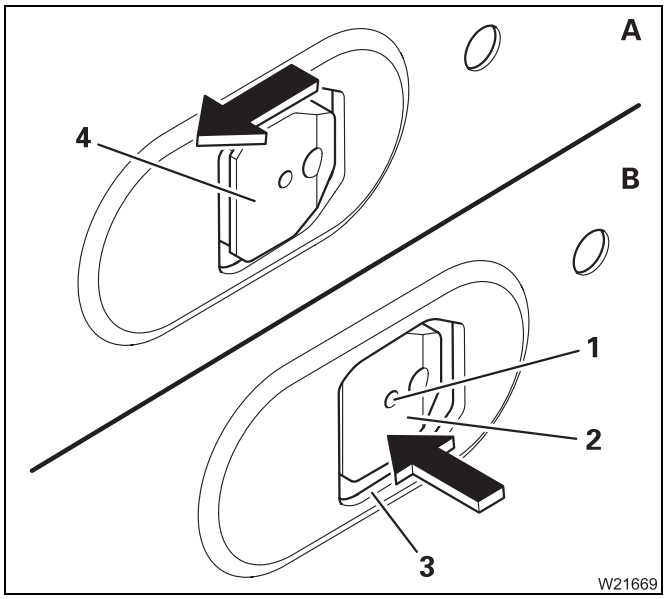
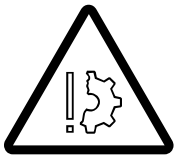
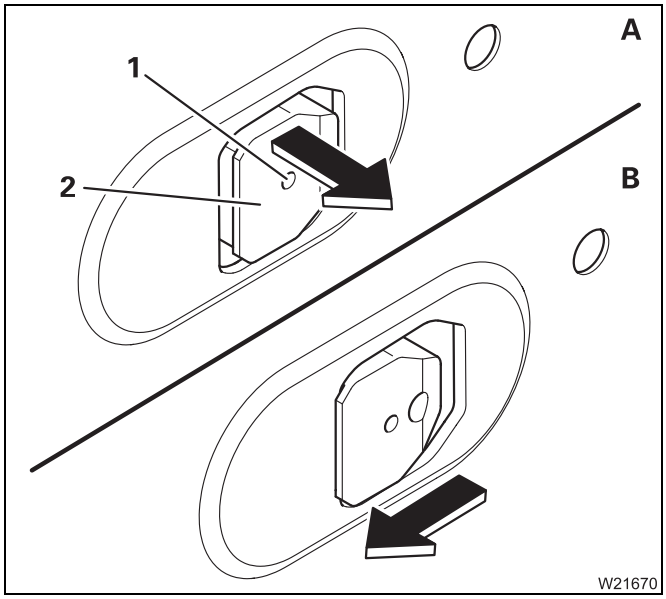


Releasing the lock

- (**A**) – Extend about 35 mm (0.11 ft), so that the cutout (**4**) is accessible.
- (**B**) – Screw a set screw into the bore (**1**). The locking pins (**2**) must retract behind the telescopic section (**3**).
  If necessary, give the locking pin (**2**) a slight knock to help this procedure.
- Unlock the other side of the telescopic section as well.



Risk of damage due to a mechanically released lock
Under no circumstances may you operate the telescoping cylinder as long as the lock is mechanically released. Screw all set screws out of the bore holes immediately after finishing the repair work.
This prevents damage to the telescoping cylinder and the locking system.



Locking the telescopic section

- (**A**) – Retract until the locking pin (**2**) is in the middle of the opening.
- Screw the set screw out of the bore (**1**) until the locking pin is fully extended.
- Take the set screw out of the bore hole.
- (**B**) – Retract further until the telescopic section is set down.

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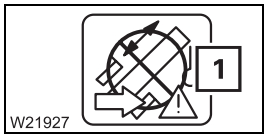
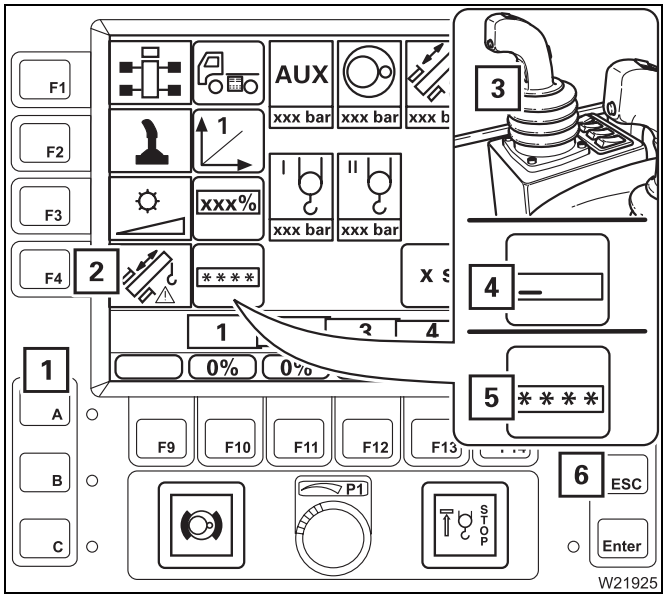
14.5.2 Telescoping emergency programme

In the event of a malfunction in the telescoping mechanism, you can retract the main boom with the *Telescoping* emergency programme.
The emergency programme is not intended for crane operation and is therefore restricted to a certain amount of time.

Starting the emergency programme



Only start the emergency programme when the symbol (**1**) is displayed;
➠ *Telescoping mechanism error messages*, p. 14 - 17.



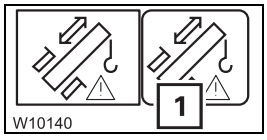
- Press the right dead man's switch (**3**).
- Also press button (**2**) once – symbol (**4**) appears.
- Press the buttons (**1**) in the following order:

B A B C

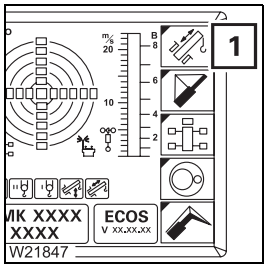
The symbols (**5**) confirm the entry.

If your input was incorrect, all symbols (**5**) go out and you need to re-enter.

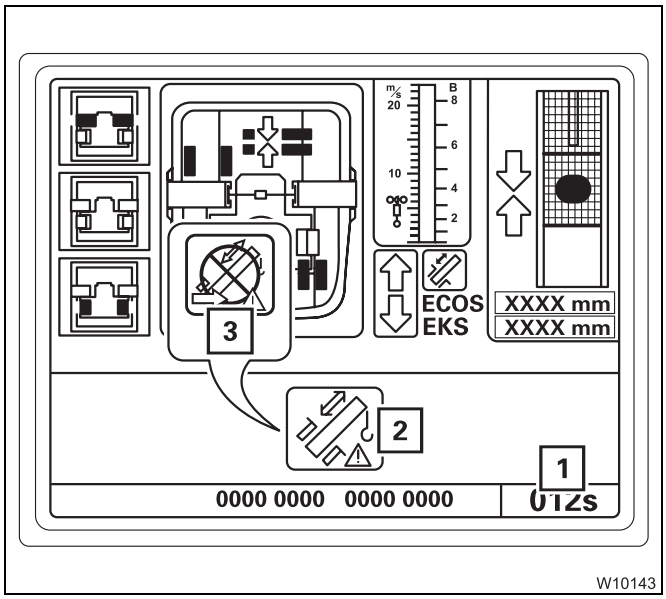
You can cancel the entry at any time using the (**6**) button.



After correct input, the symbol (**1**) is displayed – the *Telescoping* emergency programme starts.



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



The emergency program is active if:

– The symbol (**2**) is displayed

– The display (**1**) is shown for about 360 seconds

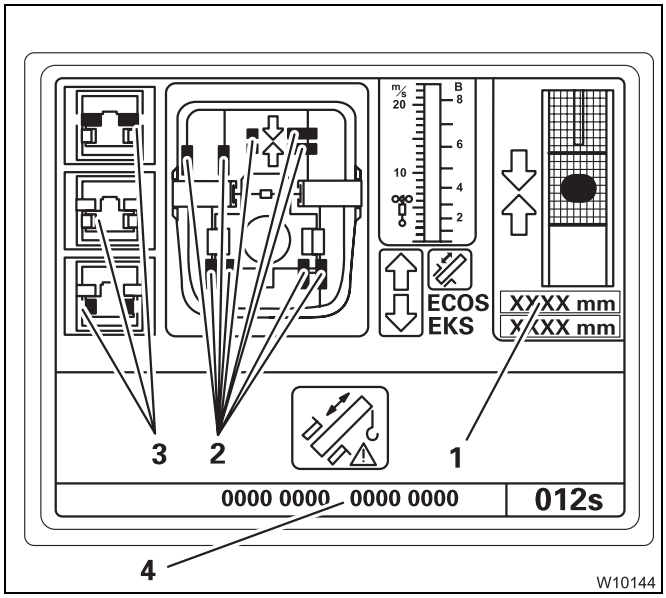
The telescoping mechanism can be operated with the emergency program within this time.

After this time has elapsed, the symbol (**3**) appears and you need to restart the emergency programme.

Determining type of error

- Check which emergency program procedure is suitable for the current error:

Risk of damage to the telescoping mechanism
Ensure that you always have an overview of the current status of the telescoping mechanism before you initiate locking or unlocking.
In emergency mode, there is no monitoring of prerequisites – the function is performed **immediately** after pressing the button.



– If the display (**1**) shows no value, there is an error on the length indicator.

– If a symbol (**2**) is violet, there is an error on the proximity switch.

The buttons next to the symbols (**3**) are active. After pressing the button, locking or unlocking is performed **immediately**.

- Note the error code (**4**) first if you intend to contact **Manitowoc Crane Care** before executing the emergency programme.

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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 programme, all functions for retracting the main boom remain enabled as long as there are no other errors (hydraulic or mechanical).

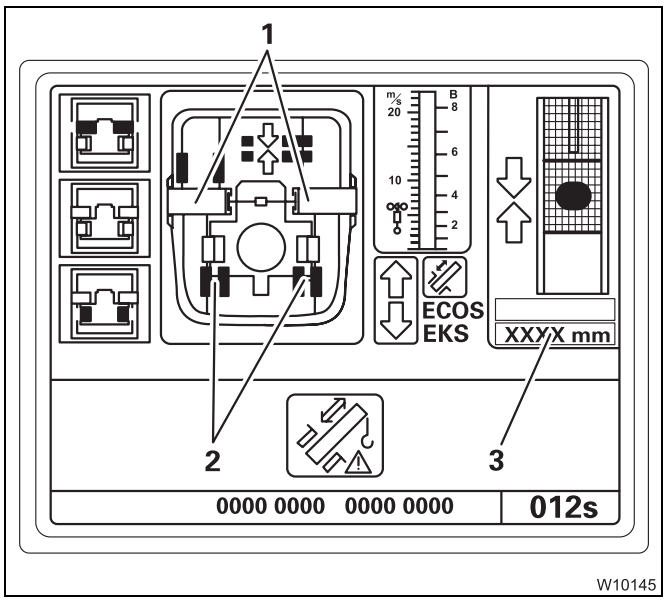
The speed is restricted to approximately 30% of the maximum speed.

– When an error occurs on the proximity switch; ➠ p. 14 - 49

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

Error on 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 RCL measured value for the extended length of the telescoping cylinder.
- Check the telescoping on the RCL.

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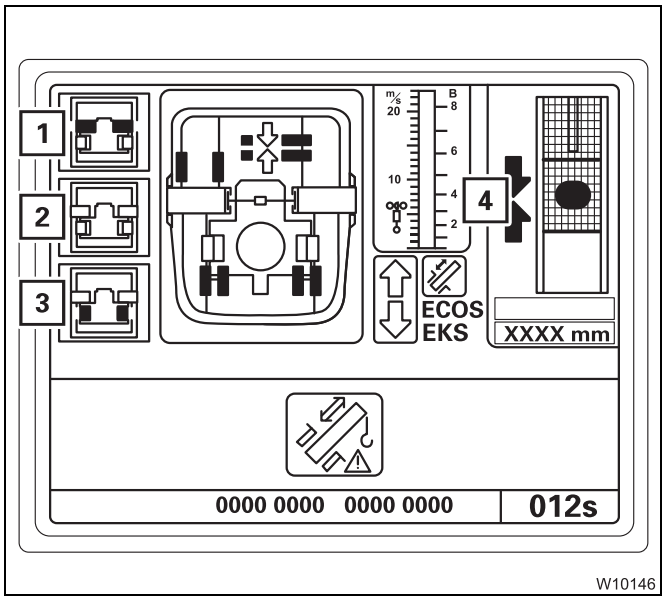
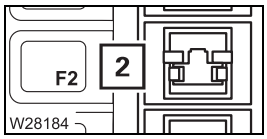
Inspections prior to telescoping

- Before telescoping, check that the following conditions are met:

Risk of accidents from sudden retraction of a telescopic section!
Press the button for unlocking the telescopic section **not more than twice**. If this does not start the unlocking procedure, contact **Manitowoc Crane Care**.

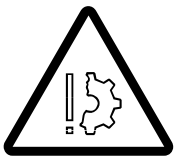


- The telescoping cylinder is locked, symbol (**3**) is **grey**.
- The telescopic section is unlocked (**press not more than 2x)**, symbol (**1**) is **yellow**.
- Locking is not selected, symbol (**2**) is **grey**.
- The telescoping cylinder is at the locking point, the arrows (**4**) are green.



Retracting and locking a telescopic section

During telescoping you may **not** select Lock. **Under no circumstances** should you press the button (**2**).



Risk of damage to the main boom!
If you select Lock during telescoping, the locking pins on the telescopic section are slid out immediately and they can damage or tear the electrical or hydraulic components in the main boom.

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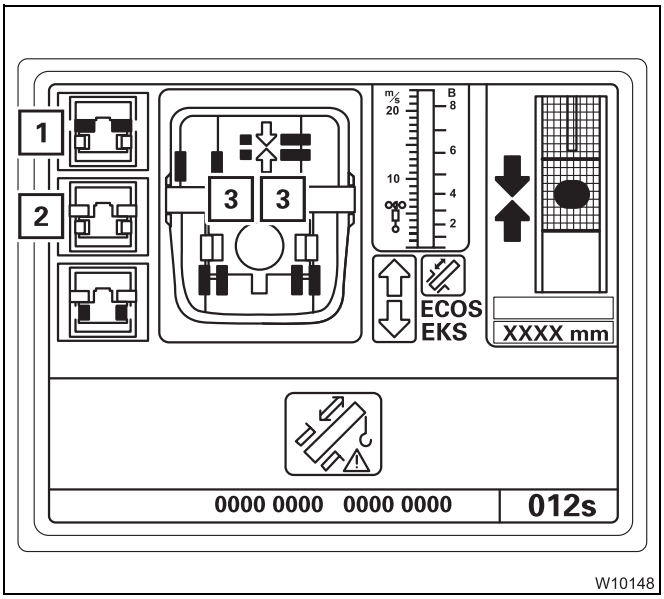


- Retract the telescopic section slowly and as far as possible.
- Press the button (**2**) once.
- Extend to about 35 mm.

The telescopic section is locked. In *Locked* position:

– the locking pins (**3**) are **green**,

– the symbol (**1**) is **grey**,

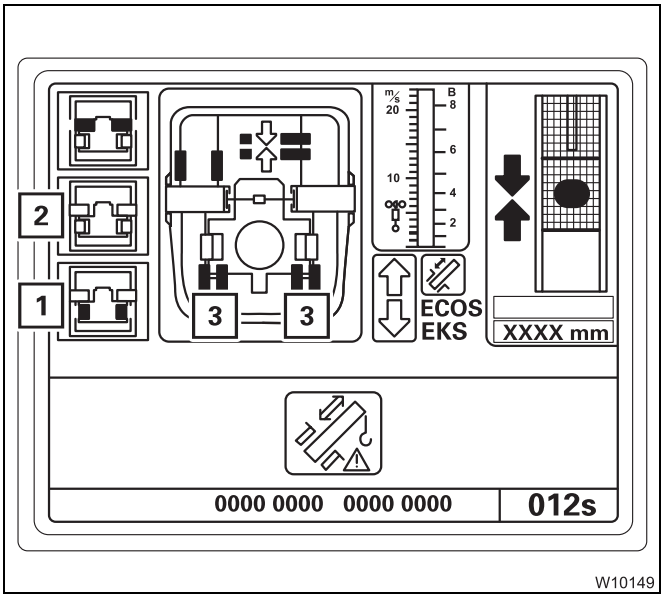
– the symbol (**2**) is **yellow**.

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

Unlock the telescoping cylinder

If the telescopic section is locked, you can now unlock the telescoping cylinder.

Risk of accidents from sudden retraction of a telescopic section!
Press the button for unlocking the telescopic cylinder **not more than twice**. If this does not start the unlocking procedure, contact **CraneCARE**.



- Press the button (**1**) 1x **(at the most 2x)**.

The telescoping cylinder is unlocked. In *Unlocked* position:

– The locking pins (**3**) are **red**,

– the symbol (**1**) is **yellow**,

– The symbol (**2**) is **grey**.

You can now move the telescoping cylinder into the next telescopic section.

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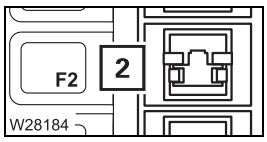
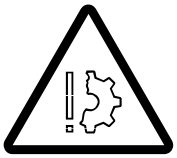


Extending and locking the telescoping cylinder

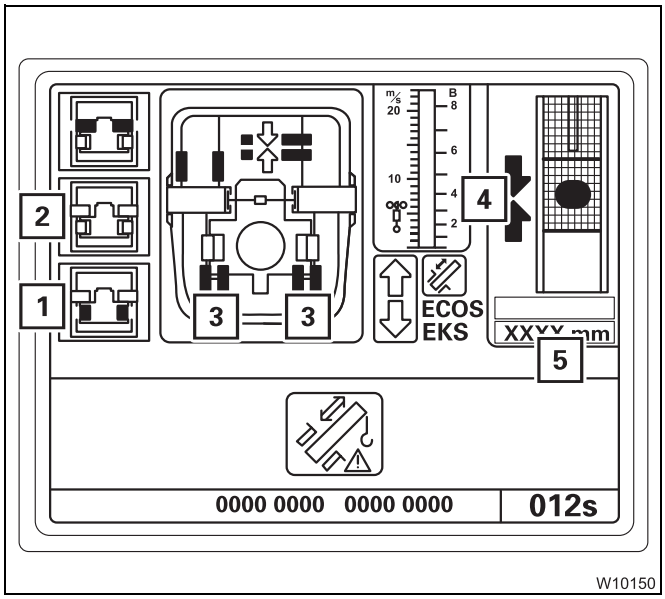
You may **not** select Lock while the telescoping cylinder is retracting or extending. **Under no circumstances** should you press the button (**1**).



Risk of damage to the main boom!

If you select Lock while the telescoping cylinder is moving, the locking pins on the telescopic section are slid out immediately and they can damage or tear the electrical or hydraulic components in the main boom.

- Slowly move the telescoping cylinder into the next extended telescopic section.



At the locking point:

– the arrows (**4**) are green,

– the display (**5**) shows the length for the current locking point; ➠ p. 14 - 51.

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

The telescoping cylinder is locked. In *Locked* position:

– the locking pins (**3**) are **green**,

– the symbol (**1**) is **grey**,

– the symbol (**2**) is **yellow**.

- You can now retract this telescopic section; ➠ p. 1

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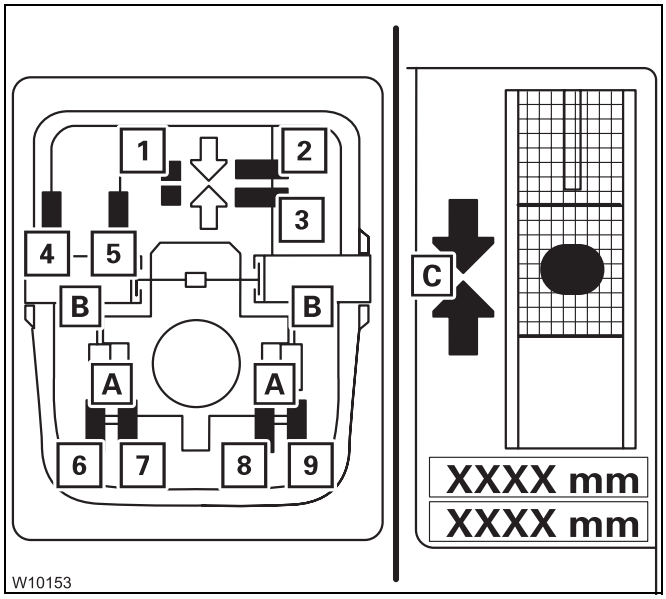
Error on proximity switch

Faulty proximity switches are shown in violet.
The displays (**A**), (**B**) and (**C**) only show the current positions when **all** the corresponding proximity switches are free of error.



Several proximity switches are related to the displays (**A**), (**B**) and (**C**).

For **A**: Proximity switches (**6**) to (**9**)

For **B**: Proximity switches (**4**) and (**5**)

For **C**: Proximity switches (**1**) to (**3**)

When a proximity switch is faulty (violet), then:

– The corresponding locking pins on the displays (**A**) and (**B**) are always yellow

– The corresponding arrows are not shown on the display (**C**)

When an error occurs, you can determine the current position more precisely based on the other, fault-free proximity switches. The proximity switches show the following positions:

– Display (C) – Telescoping cylinder at the locking point

1 At the locking point

2 Behind the locking point

3 In front of the locking point

– Display (B) – Telescopic section locked

4 Locked

5 Unlocked

– Display (A) – Telescoping cylinder locked

6 Locked left

7 Unlocked left

8 Unlocked right

9 Locked right

For fault-free proximity switches, the following applies:

– **Green:** Position reached

– **Red:** Position not reached

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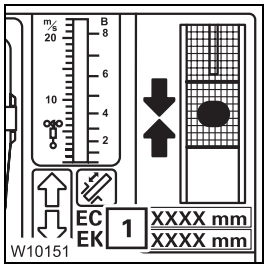
Required checks

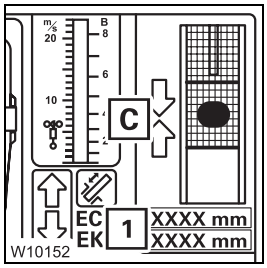


When the *Locked* position can no longer be shown, always conduct the following checks before unlocking:

• Carefully retract and extend the telescoping cylinder or telescopic section
In the *Locked* position, the length shown on the displays (**1**) should vary only slightly, i.e. by the play of the locking pins.

Retracting

The steps for retracting are the same when an error occurs on the proximity switch as for an error on the length indicator.



– When the display (C) fails:

• Calculate the telescoping cylinder length for the locking point;
➠ *Locking points for the telescoping cylinder*, p. 14 - 51; ➠ *Locking points for the telescopic sections*, p. 14 - 52.

• Move the telescoping cylinder to the required length – display (**1**).

Risk of damage if the length specifications are not observed
Extend the telescoping cylinder (without telescopic section) only to the specified length.
This prevents the piston rod from becoming damaged if the telescoping cylinder slides out of the telescopic section.

Terminating emergency programme

The emergency programme is terminated:

– If the displayed time has expired

– When the ignition is turned off

The current telescoping status does not correspond to the telescoping status last saved by ECOS if the *Telescoping* emergency programme was open. You must enter the current telescoping after terminating the emergency programme; ➠ *Entering the current telescoping*, p. 14 - 53.

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Tables for approaching the locking points

The extent to which the telescoping cylinder has to be extended in order to reach a locking point depends on whether you:

– Want to lock the telescoping cylinder

– Want to lock a telescopic section

Locking points for the telescoping cylinder

The following table shows the extended length for locking the telescoping cylinder:

Table for locking the telescoping cylinder			
Telescopic section	**Locking point at fixed length**	**Extended length of telescoping cylinder**	
	in %	**in mm**	**(in ft)**
Telescopic section I	0	30	(0.10)
	44	4930	(16.22)
	88	9830	(32.34)
	100	11175	(36.76)
Telescopic section II	0	410	(1.35)
	44	5310	(17.47)
	88	10210	(33.59)
	100	11520	(37.90)
Telescopic section III	0	770	(2.53)
	44	5670	(18.65)
	88	10570	(34.77)
	100	11975	(39.40)
Telescopic section IV	0	1125	(3.70)
	44	6025	(19.82)
	88	10925	(35.94)
	100	12285	(40.38)

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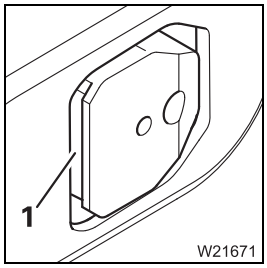

Locking points for the telescopic sections

The telescopic section must not be set down for locking or unlocking.

The cutout (**1**) must be clear. That is why you have to extend the telescoping cylinder further than with a return run.

The following table shows the extended length for locking and unlocking the telescopic sections:

Table for locking/unlocking the telescopic sections

Telescopic section	Locking point at fixed length	Extended length of telescoping cylinder	
	in %	in mm	(in ft)
Telescopic section I	0	33	(0.11)
	44	4958	(16.31)
	88	9858	(32.43)
	100	11203	(36.86)
Telescopic section II	0	413	(1.36)
	44	5338	(17.57)
	88	10238	(33.68)
	100	11548	(37.99)
Telescopic section III	0	773	(2.54)
	44	5698	(18.75)
	88	10598	(34.87)
	100	12003	(39.49)
Telescopic section IV	0	1128	(3.71)
	44	6053	(19.91)
	88	10953	(36.03)
	100	12303	(40.47)

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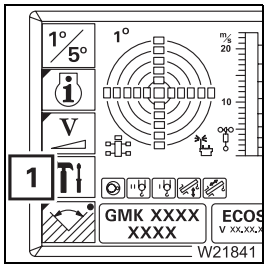
14.5.3 Entering the current telescoping

ECOS no longer displays the current telescoping:

– If you telescoped in emergency mode

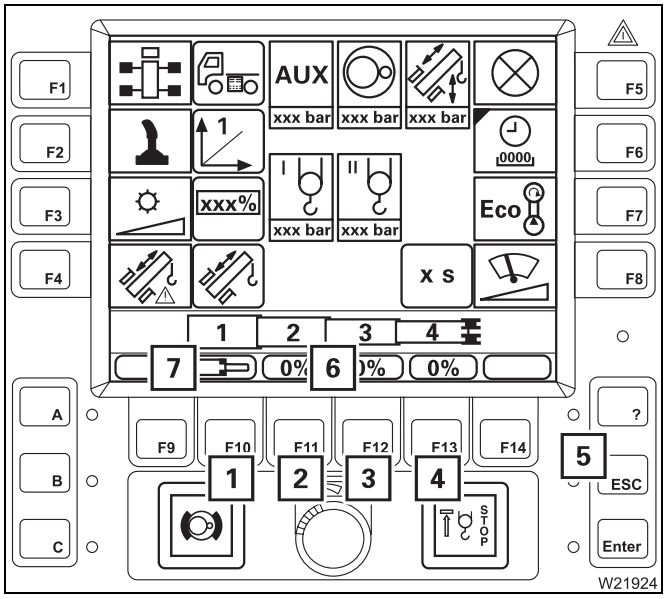
– If the power supply was interrupted in the course of saving data

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



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

This opens the *Settings* submenu.



Entering target values

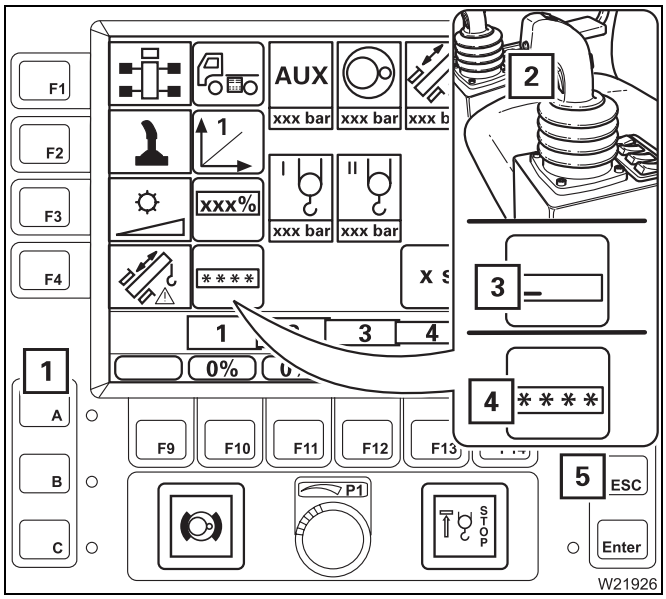
The display (**7**) shows the values for telescopic sections I to IV.

• Press one of the buttons (**1**) to (**4**) – the values in the display (**6**) turn yellow.

Each time you press a button, the corresponding value in the display (**6**) switches continuously between the fixed lengths and the symbol (**7**) for *Unlocked*.

• Enter the desired target values for all telescopic sections, e.g. unlocked, 100%, 100%, 100%.

You can cancel the entry at any time using the (**5**) button.



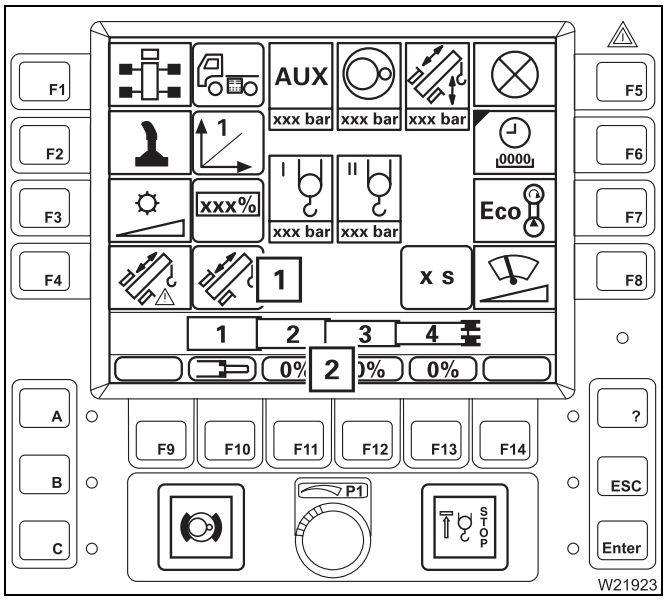
Applying values

- Press the left dead man's switch (**2**).
- Also press button (**5**) once – symbol (**3**) appears.
- Press the buttons (**1**) in the following order:

  A B A C

The symbols (**4**) confirm the entry.

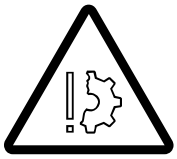
If your input was incorrect, all symbols (**5**) go out and you need to re-enter.



If the target values entered are **not permissible**, the values on the display (**2**) turn **red**.

If the target values entered are **permissible**, the values on the display (**2**) turn **green**.

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



Risk of damage due to incorrect input
Before working with the crane, check whether ECOS indicates the current telescoping and correct if this is not the case.
Entering incorrect values causes malfunctions and may result in damage to the telescoping mechanism.

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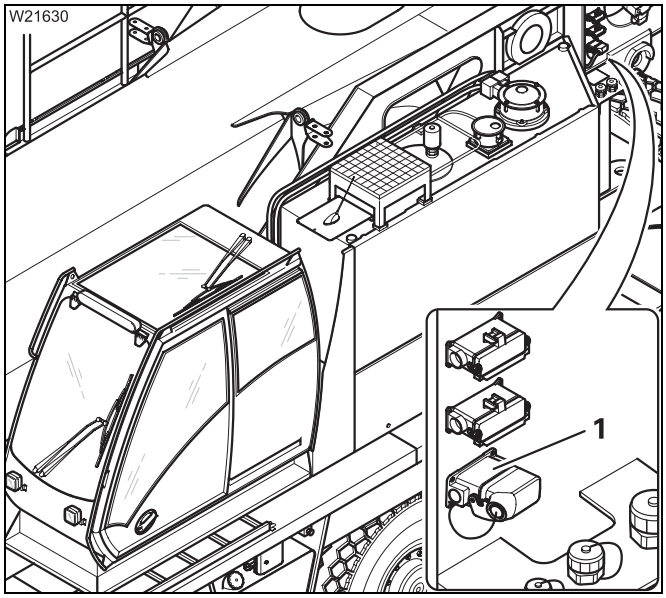
14.5.4 Emergency operation with the hand-held control

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

Operating them with the hand-held control is intended for emergencies only and for bringing the truck crane into a safe state or to shut it down.

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

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

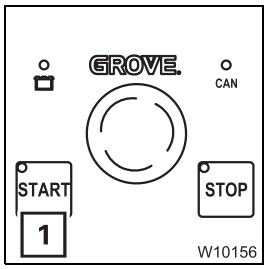


Connecting the hand-held control

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

All power units can be operated from this connection.

Information on connecting; ➠ p. 12 - 22.



Starting the engine

- Press the (**1**) button once – the engine starts; ➠ p. 10 - 15

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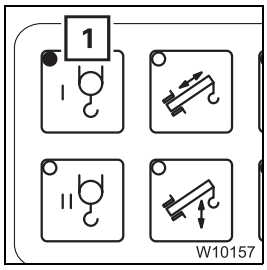


To pre-select a power unit

- Press the button for the desired power unit once, e.g. the button (**1**) for the main hoist

When the function is enabled, the lamp in the button lights up.

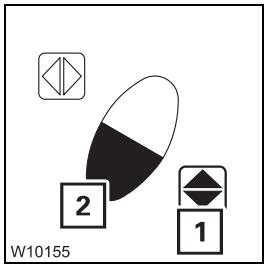
With the telescoping mechanism, teleautomation with the target 0/0/0/0 is always selected at the same time – fully retract.
The extension function is disabled in emergency mode.

Operating a power unit

All the safety instructions contained in the sections on the individual power units also apply to operation with the hand-held control.

Danger of overturning when moving into the shutdown ranges
Avoid lowering the boom. If you cannot avoid lowering, try to set down the load beforehand and ensure that the maximum permissible working radius is not exceeded for the rigging mode as specified in the *Lifting capacity table*. Before slewing, always check whether this is permissible in the current rigging mode; ➠ *Slewing with rigged counterweight*, p. 12 - 89.

Risk of accident when operating the slewing gear
Set down in the crane cab to operate the slewing gear. This prevents you from being pushed off the carrier or being crushed by the carrier as a result of slewing.
Lay the connecting cable of the hand-held control so that it will not catch on anything.



- Press the required function buttons one after the other, e.g. for *Lift main hoist*, press button (**1**) first, and then also button (**2**).

The further you press button (**2**), the quicker the movement is. The maximum speed is limited to about 50% for all power units.

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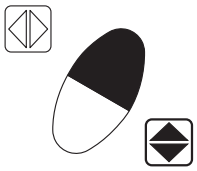
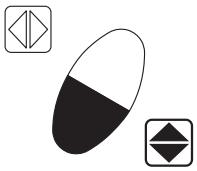
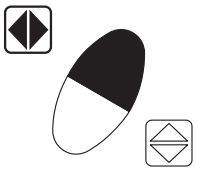
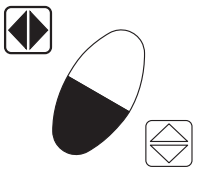
The following table shows all the button combinations. Engaged buttons are shown in black:

Button combination	Pre-selected power unit				
	Telescoping mechanism	Derricking gear	Slewing gear	Hoists	Lattice extension
 W3851	None[1)]	Lower boom	None	Lower	Lower boom
 W3850	Retract	Raise boom	None	Lift	Raise boom
 W3849	None	None	Slew to right	None	None
 W3848	None	None	Slew to left	None	None

[1)] If the telescoping cylinder is unlocked, it will extend.

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Stopping operations

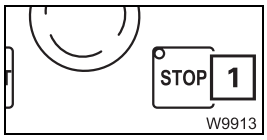
The movement continues until you let go of the function button or the end position is reached.

Stopping movements in emergencies

You can stop operations with the *emergency stop switch* if they do not stop by letting go of the function buttons; ➠ p. 10 - 18.

Turning off the engine

You can only turn off the engine with the hand-held control.
In this case it is not possible to turn off the engine via the ignition lock.



- Stop all crane movements.
- Press the button (**1**) – the engine goes off.

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14.6 Hydraulic emergency operation

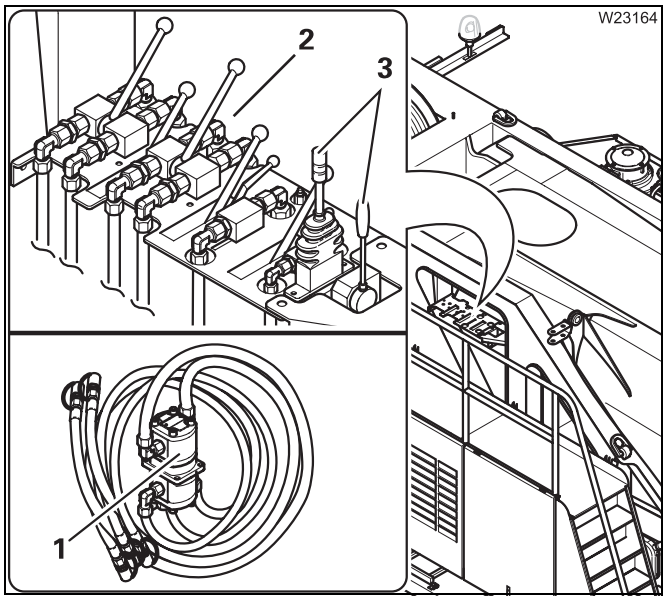
With this additional equipment, the truck crane is equipped with an hydraulic emergency bleed valve in accordance with BGR 159 (4.2.8). This allows small loads to be transported in case of emergency, e.g. in the event of an engine failure.

Risk of accident due to improper use
Operate in hydraulic emergency operation only to transport small loads in emergencies and have the malfunction rectified as soon as possible. Crane operation in hydraulic emergency operation is prohibited since it is not monitored by the RCL.

14.6.1 Functionality

The hydraulic emergency operation BGR 159 enables:

- **Emergency operation** of the main hoist, derricking gear, and slewing gear
- **Emergency supply** of another truck crane that also has a hydraulic emergency operation BGR 159



Emergency operation

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

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

The control levers (**3**) regulates the direction of movement and the speed.

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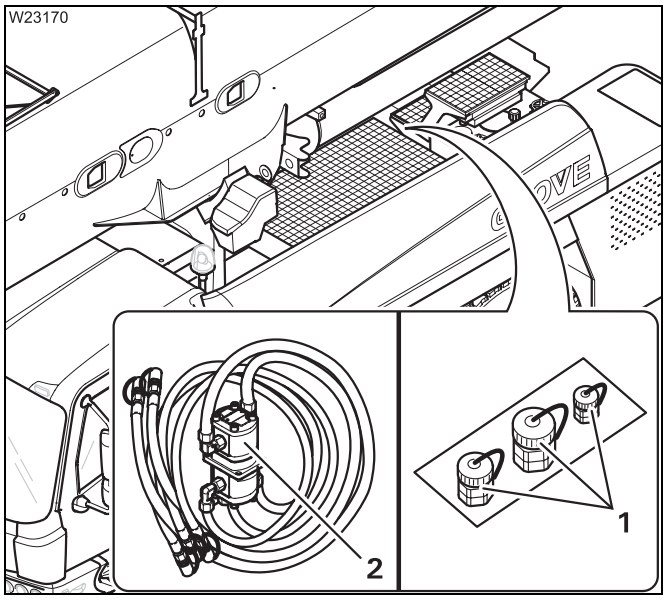


Emergency supply

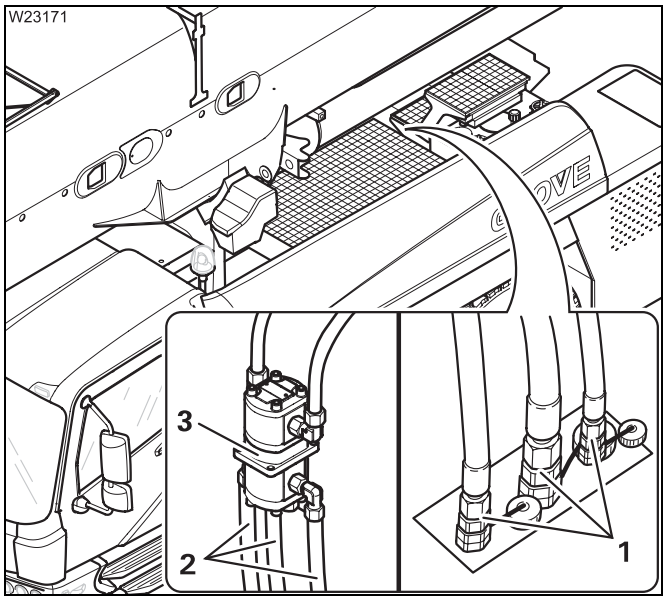
In the event of emergency supply, the connections (**1**) feed a transformer (**2**) which is connected to the hydraulic system of the other crane; ➠ *Emergency supply of another crane*, p. 14 - 68.

14.6.2 Connecting/disconnecting hoses

- Switch off the engine.

Risk of damage to the hoses
Lay the hoses in such a manner that they can be moved freely, so as to prevent them from being crushed or torn or getting caught during subsequent crane movements.

Establishing The hoses are assigned according to the various diameters.



On the carrier

- Attach the transformer (**3**) to the superstructure.
- Connect the hoses (**2**) to the connections (**1**).

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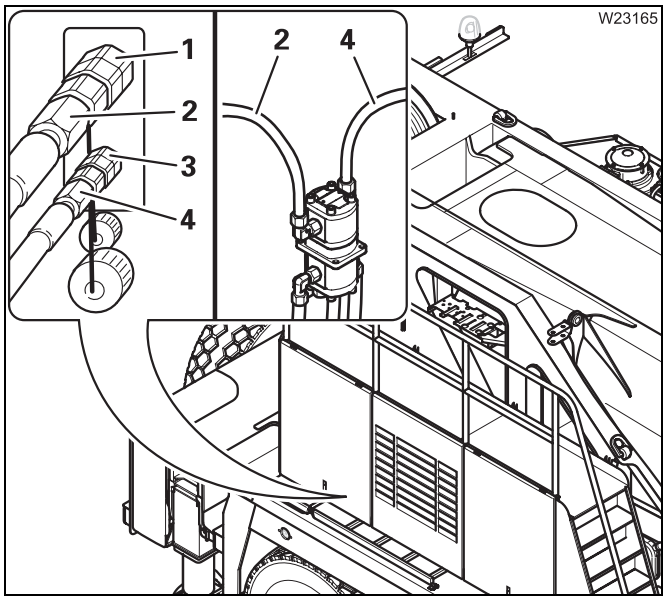
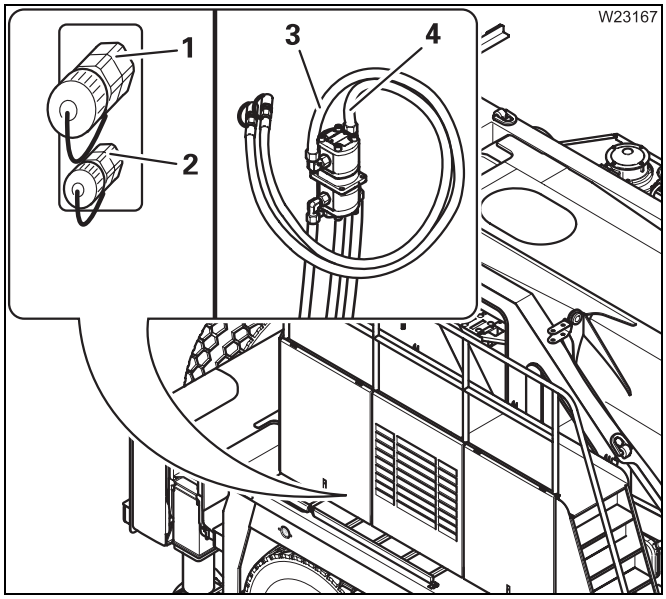


On the superstructure

- Connect the thicker hose (**2**) to the connection (**1**).
- Connect the thinner hose (**4**) to the connection (**3**).

Disconnecting

After the emergency operation, you must disconnect the hoses and the transformer.



On the superstructure

- Remove the hoses (**3**) and (**4**) from the connections (**1**) and (**2**).
- Close the hoses and the connections with the caps.

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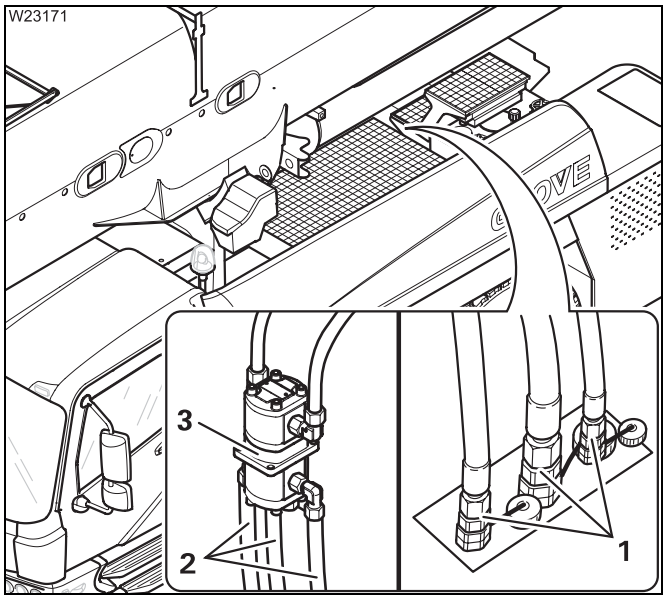
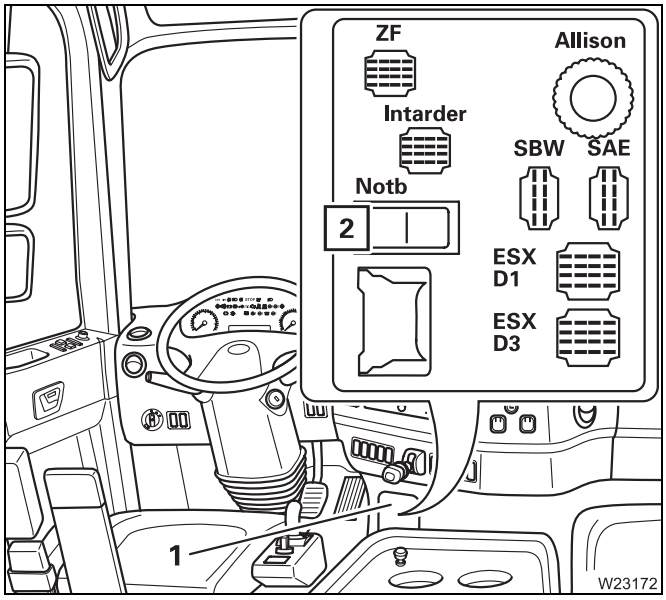


- Remove the hoses (**2**) from the connections (**1**).
- Close the hoses and the connections with the caps.
- Remove the transformer (**3**).

14.6.3 Switching emergency operation on/off

The emergency operation (or emergency supply of another crane) is switched on and off in the driver's cab.



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

Switching on
- Press switch (**2**) down.

Switching off
- Press switch (**2**) up.

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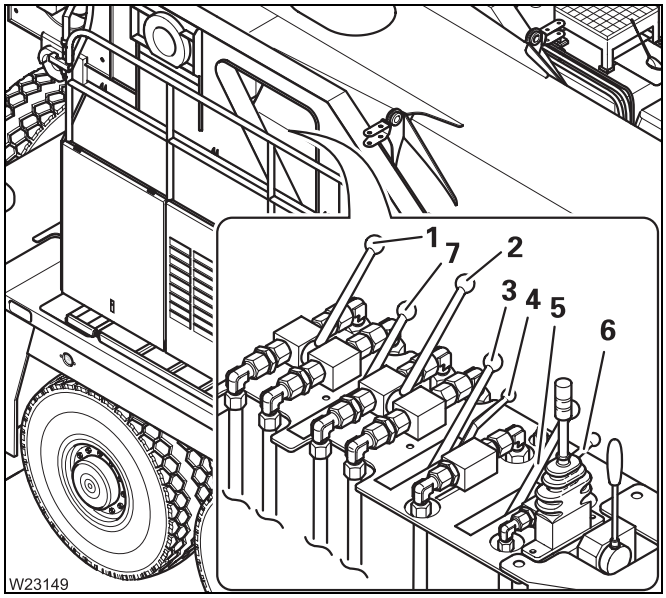
14.6.4 Establishing the required hydraulic circuits

To establish an hydraulic circuit, switch over the required valves.

Switching over valves

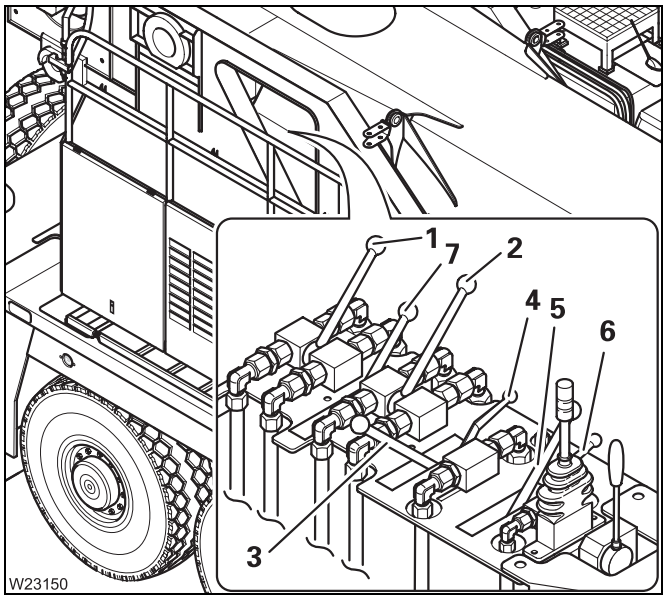
The valves **1** to **7** are numbered.



For crane operation

- Switch the valves **1** to **7 inwards.**

Danger from mutual interference of the power units
For crane operation, always switch **all** the valves **1** to **7** inwards. This prevents the power units from suddenly starting to move.



For emergency operation

- Remove the cover over the valves **1** to **7**.
- Switch the valves **1** to **7** to the positions for the required crane movement – as shown in the following table.

For raising, for example, switch the valve **3 outward**. The valves **1**, **2**, **4, 5** and **7** must be switched inward.

Danger from mutual interference of the power units
Always only switch valves for **one crane movement** up diagonally at a time. This prevents wrong crane movements from being performed and several movements from being performed unintentionally at the same time.

Emergency operation for crane movements	Valves inward (crane operation)	Valves outward (emergency operation)
Lifting or lowering	**2, 3, 4, 6**	**1, 5, 7**
Raising the boom	**1, 2, 4, 5, 6, 7**	**3**
Lowering the boom	**1, 2, 3, 4, 5, 7**	**6**
Slewing to the left or right	**1, 3, 5, 6, 7**	**2, 4**

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14.6.5 Performing emergency operation

If the required hydraulic circuit has been established, you can make the corresponding crane movement.

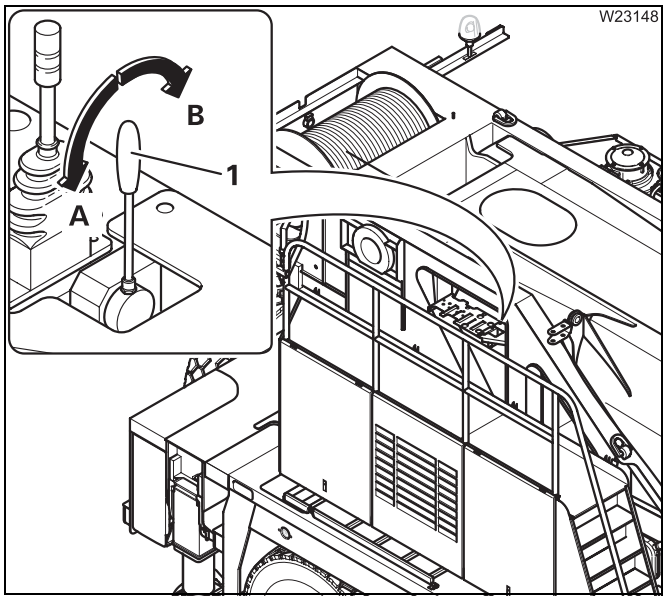
You can control the speed of all power units with the control lever.

Slewing

It is not possible to control the slewing movements with the control lever for emergency operation with the same degree of sensitivity as with the control lever in the crane cab.

Risk of accident during slewing
Do not stand on the carrier. This prevents you from being pushed off the carrier or being crushed by the carrier during slewing.

Risk of damage to the hoses and transformer
Make sure the hoses do not get caught and torn off while performing slewing operations.



- Slowly move the control lever (**1**) in the required direction:
  - **A:** Slew to the right
  - **B:** Slew to the left

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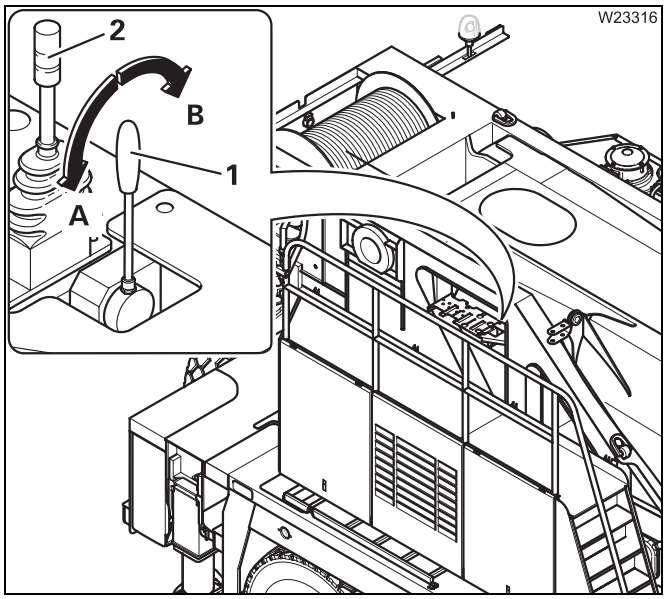
Derricking

- Determine the maximum permissible working radius for the current rigging mode according to *Lifting capacity table*

Danger of overturning if the working radius is too large when lowering the boom

In emergency operation, operations are not shut down by the RCL. This also applies if the RCL displays are still active after switching on the ignition. The truck crane will overturn if you exceed the maximum permissible working radius for the current rigging mode as specified in the *Lifting capacity table*.



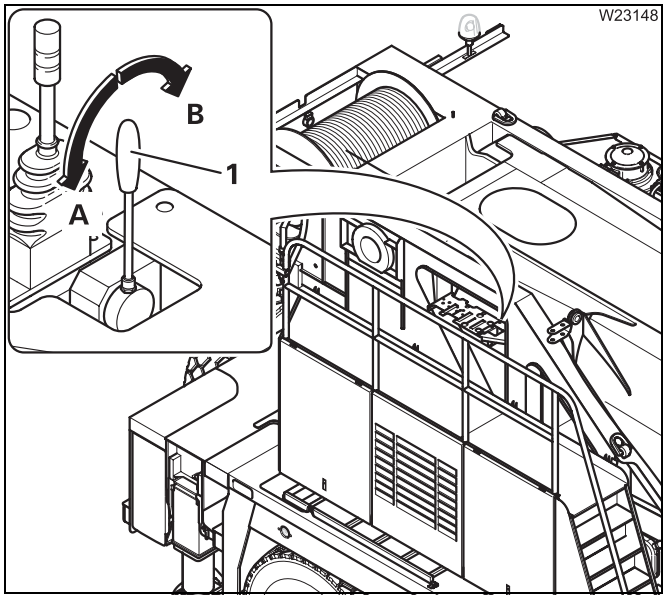
Lowering the boom

- Observe the maximum permissible working radius specified in the *Lifting capacity table* – if necessary by using a measuring tape to check.
- Move the control lever (**2**) towards **B**.

Raising the boom

- Move the control lever (**1**) towards **B**.

Lifting/lowering



- Move the control lever (**1**) in the required direction:

  A: Lowering

  B: Lifting

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14.6.6 After emergency operation

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

Switching off emergency operation

- Switch off emergency operation; ➠ p. 14 - 62.
- Switch off the engine.

Switching over to crane operation

After every emergency operation

- Switch valves **1** to **7** to crane operation; ➠ p. 14 - 63.

Disconnecting the hoses

- Disconnect the hoses; ➠ p. 14 - 61.
- Close all the connections and hoses with the caps.
- Remove the transformer.

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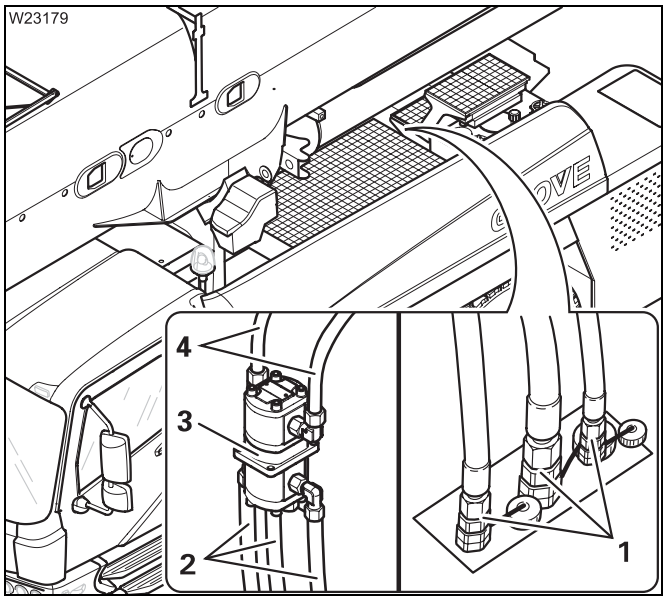
14.6.7 Emergency supply of another crane

For emergency supply

The hoses are assigned according to the various diameters.



On the crane to be supplied

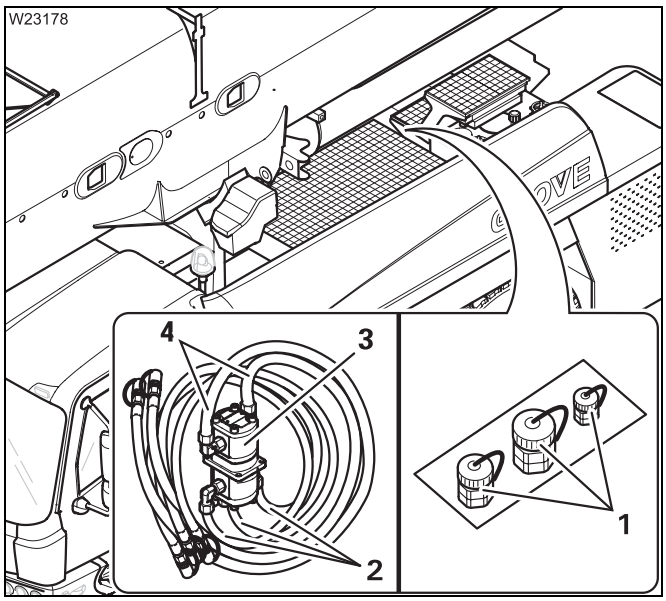
- Attach the transformer (**3**).
- Attach the hoses (**4**); ➠ *Operating manual of the other crane.*

On the GMK 6400

- Turn off the engine for driving.
- Connect the hoses (**2**) to the connections (**1**).
- Switch on the hydraulic emergency operation; ➠ p. 14 - 62.

After emergency supply

- Switch off the hydraulic emergency operation; ➠ p. 14 - 62.



On the GMK 6400

- Remove the hoses (**2**) from the connections (**1**).

On the crane that was supplied

- Remove the hoses (**4**).
- Close all the hoses and connections with the caps.
- Remove the transformer (**3**).

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15 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 9 *Truck Crane Description*.

From there you will as usual be referred to more detailed descriptions of these elements.

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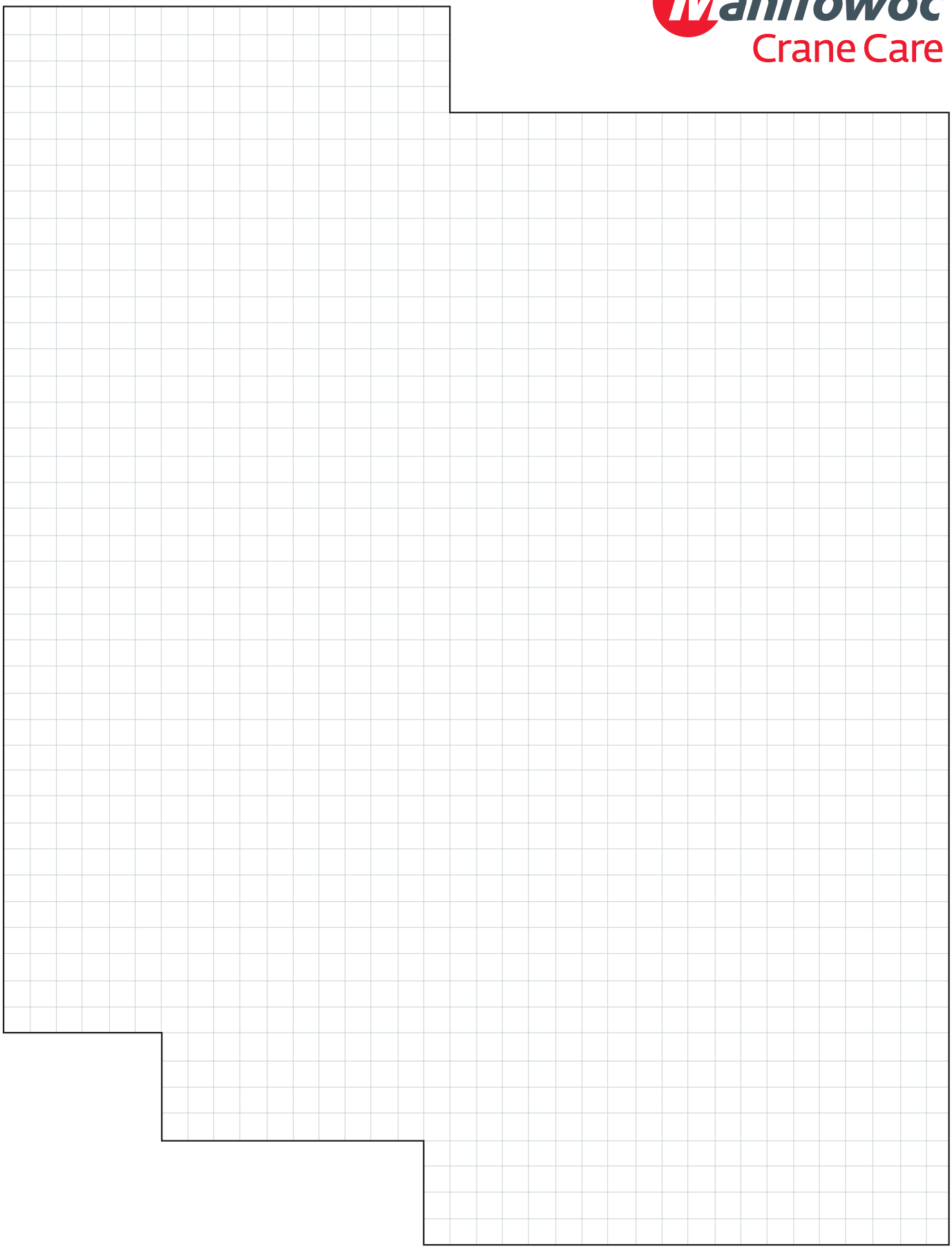

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