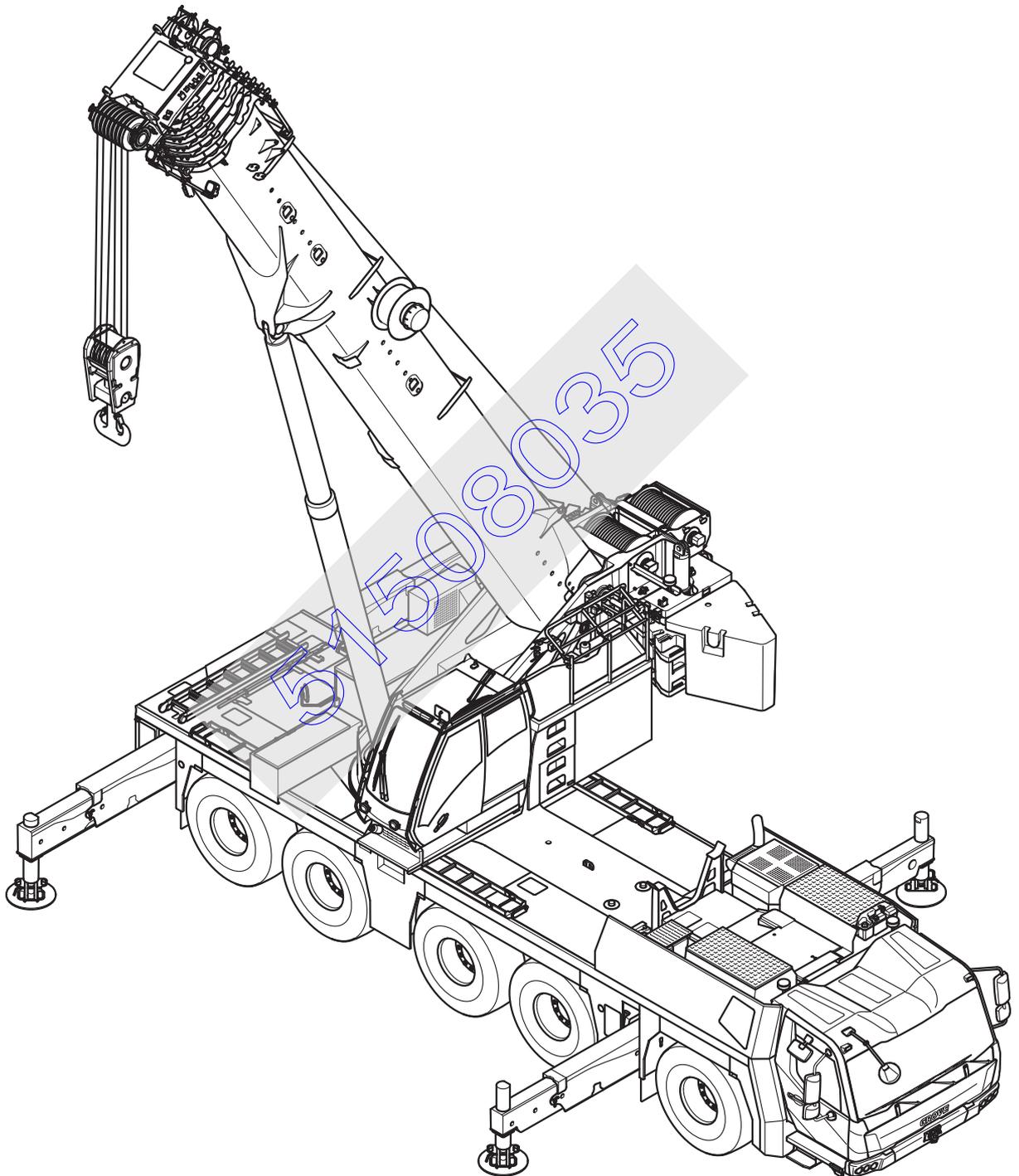


GROVE GMK5150XL

Operating manual



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23.03.2022

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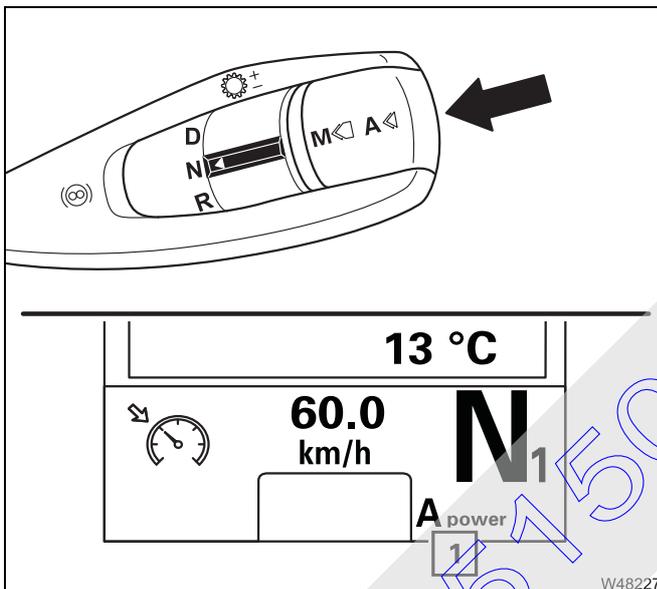
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Transmission

Power driving mode

In addition to what is described in the supplied *Operating manual*, you can select the *Power* driving mode in automatic operating mode. In this driving mode, the transmission only shifts to the next gear at higher engine speeds. Fuel consumption increases.

Switching on Power driving mode

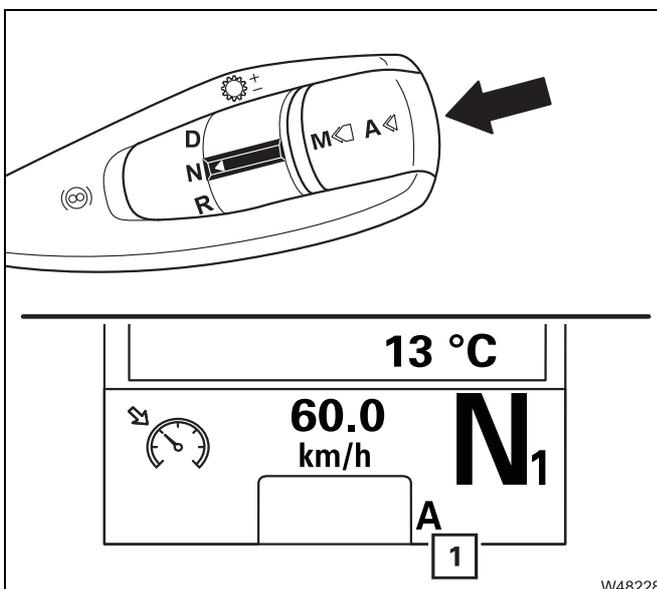


Automatic operating mode is switched on;
Supplied operating manual.

- Briefly press the gearshift lever in once.

The display shows the *Power* driving mode (1).

Switching off Power driving mode

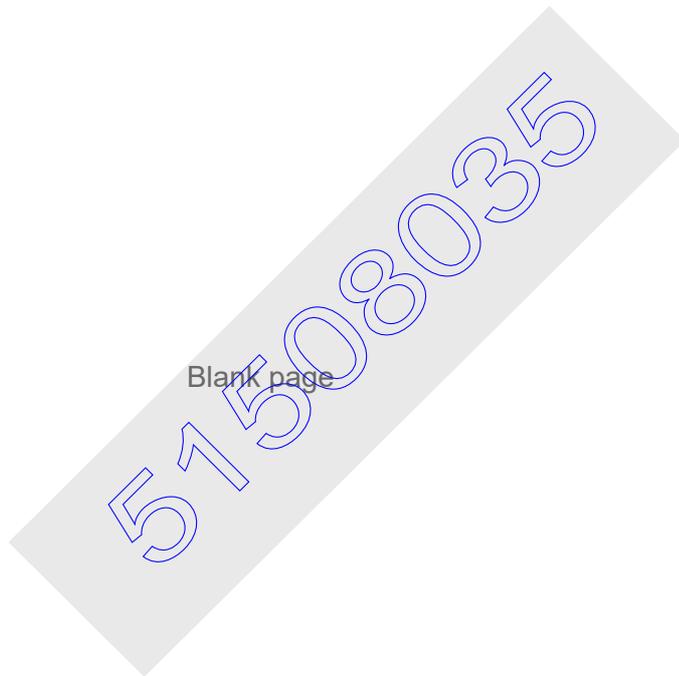


Automatic operating mode is switched on;
Supplied operating manual.

- Briefly press the gearshift lever in again.

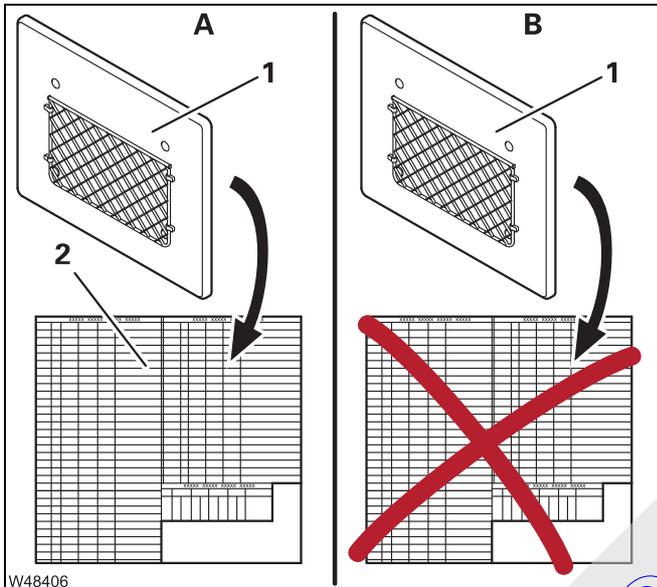
The display shows the driving mode (1).

Power driving mode is also switched off if you switch off the engine and switch off the ignition or shift into reverse gear.



Fuses in the crane cab Modifications

The configuration and arrangement of the fuses in the crane cab can deviate from the specifications in the provided *operating manual* depending on the version of the truck crane.



Version (A)

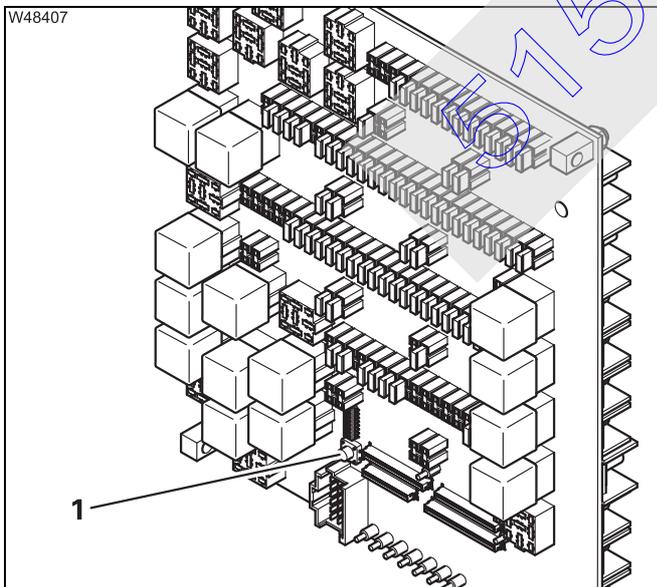
There is an overview (2) on the back of the cover (1).

The assignment of the fuses in the overview (2) applies. Observe the further notes in this additional page.

Version (B)

There is **no** overview on the back of the cover (1).

The assignment of the fuses in the provided *operating manual* applies.



Checking the fuses

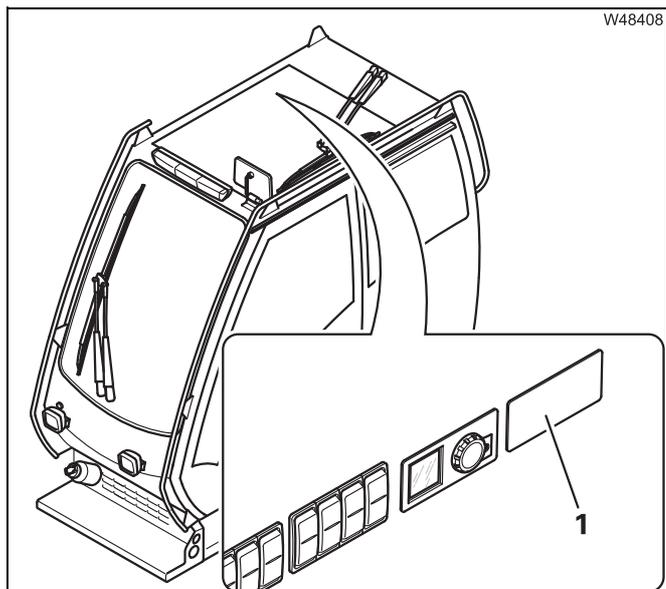
Prerequisites:

- The engine is running.
- The headlight is switched on.
- Press and hold the button (1). In the case of a blown fuse, a lamp in front of the fuse will illuminate **red**.

When replacing a blown fuse, always turn the engine off and switch the ignition off first.

Observe the further safety instructions for replacing fuses in the provided *operating manual*.





Diagnostic connection

The diagnostic connection (1) may only be operated by the service personnel.

The diagnostic connection (1) is located in the console at the top right of the crane cab.

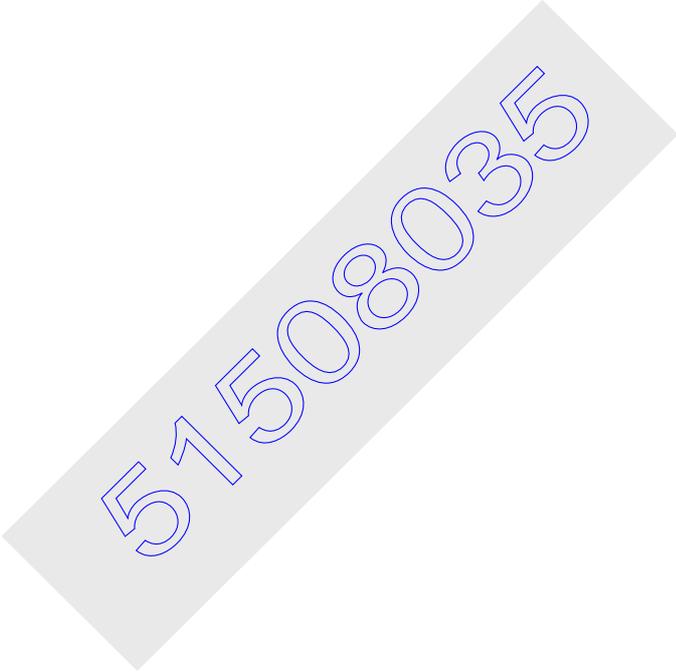
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The operating manual has the following chapters:

- 1 Overview**
- 2 Basic safety instructions**
- 3 Operating elements for driving**
- 4 Starting the engine / switching it off – for driving**
- 5 Driving mode**
- 6 Driving modes / rigging for on-road driving**
- 7 Transport**
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- 9 Operating elements for crane operation**
- 10 Starting/switching off the engine – for crane operation**
- 11 Crane operation**
- 12 Rigging work**
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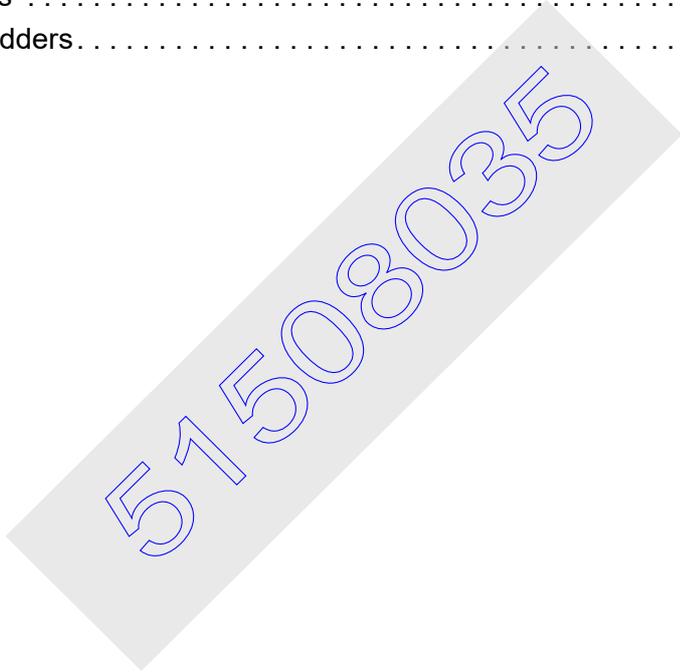
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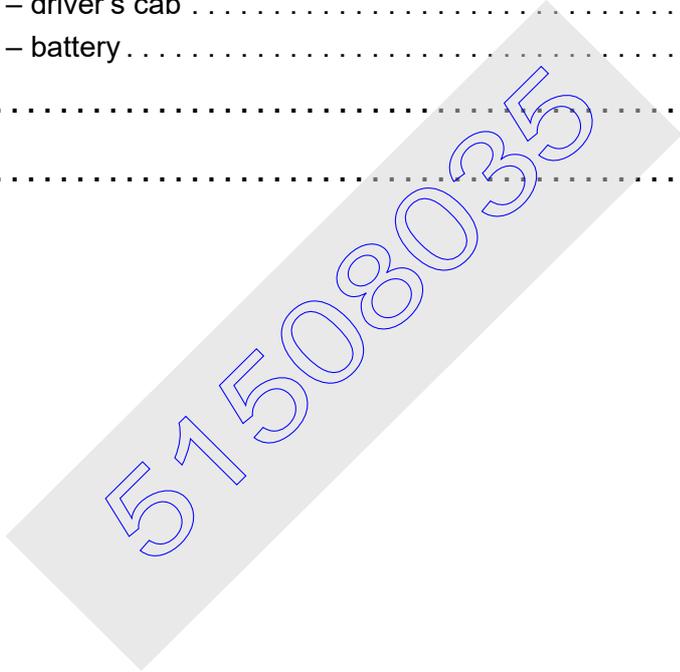
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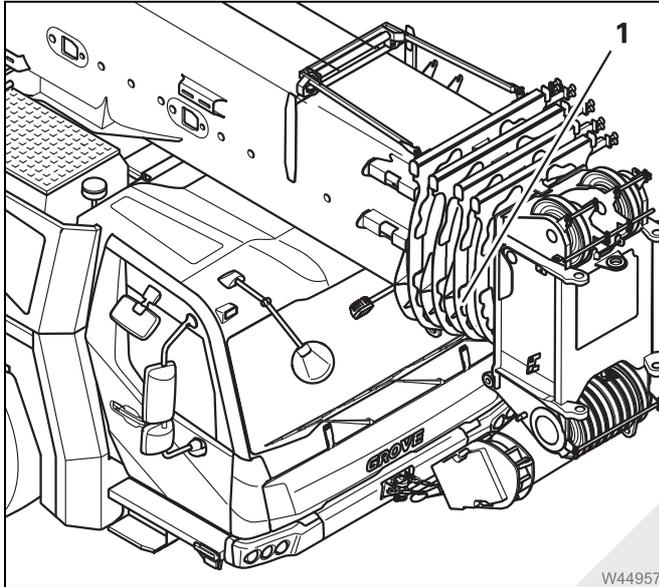




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1 Overview

1.1 General instructions



This operating manual contains illustrations of the GMK5150L-1 with five telescopic sections.

The GMK5150XL has six telescopic sections (1).

The illustrations have only been modified where relevant for operation.

1.2 Accidents

In case of an accident, contact the relevant branch of **Grove Product Support** in the country in which you are working and state your crane type and serial number.

Observe 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 (for example, material damage, injuries to persons).

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1.3

Branch offices

If you need help or support with the operation of your truck crane, you can contact our branches at the following addresses **Grove Product Support**:

<http://www.manitowoccranes.com>



You can also scan the following QR code.

1.3.1

Dealer list

A global list of dealers is provided at the following address:

<http://www.manitowoccranes.com>



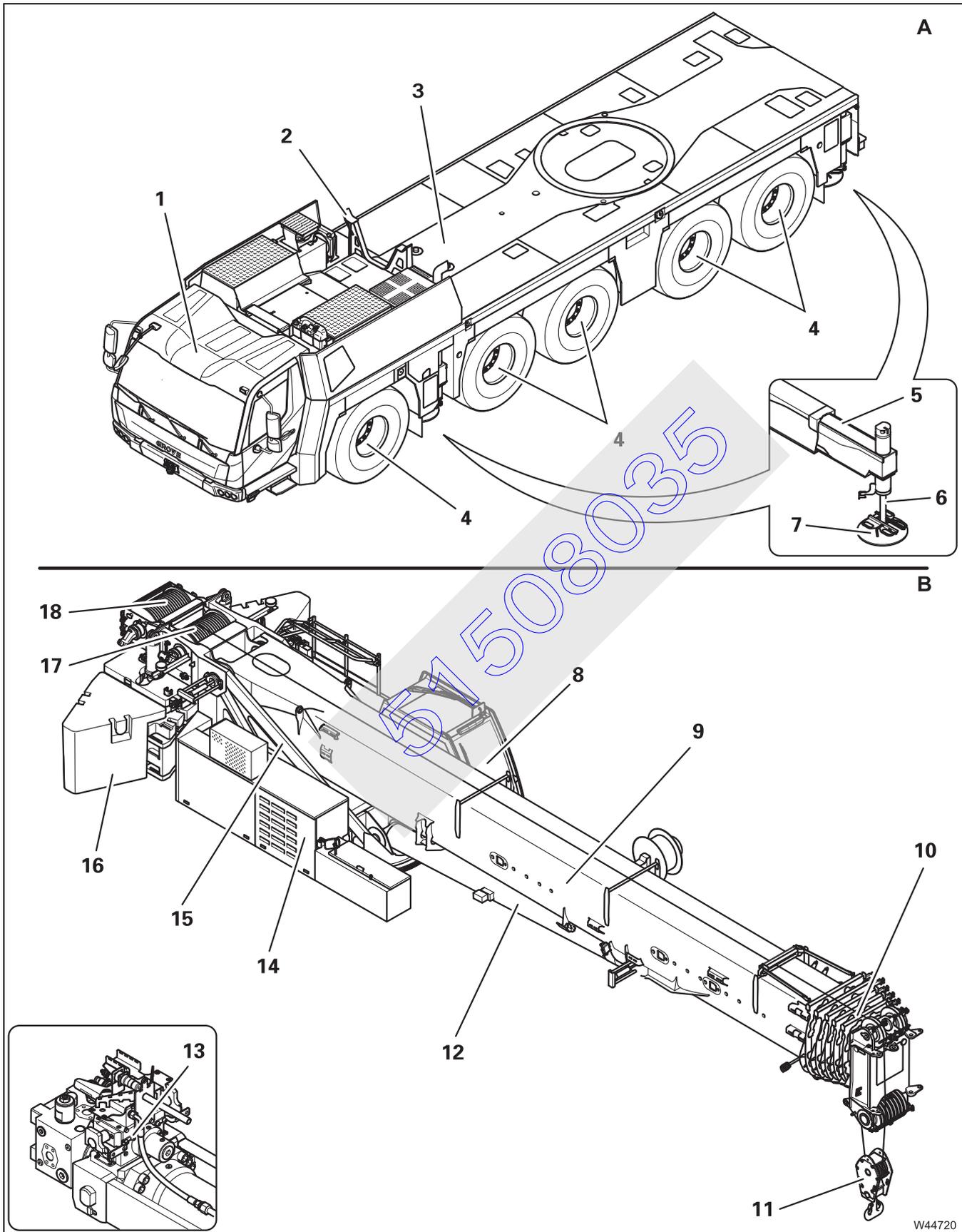
You can also scan the following QR code.

1.4

Warranty information

Please see the separately enclosed warranty certificate for information.

1.5 Terms used



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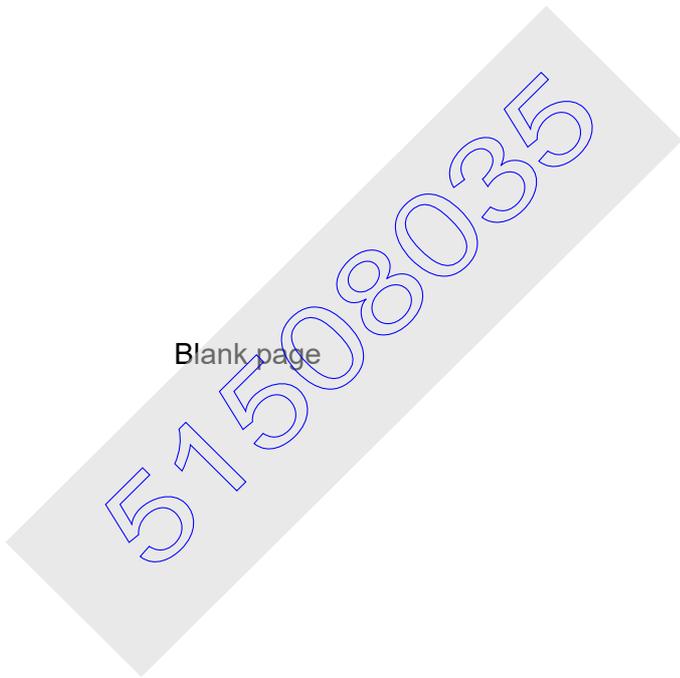
(A) – Carrier

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

(B) – Superstructure

- 8 Crane cab
- 9 Main boom with telescoping mechanism
- 10 Telescopic sections
- 11 Hook block
- 12 Derricking cylinder, derricking gear
- 13 Telescoping cylinder
- 14 Slewing gear
- 15 Turntable
- 16 Counterweight
- 17 Main hoist
- 18 Auxiliary hoist¹⁾

¹⁾ Additional equipment



1.6

Technical data

GROVE crane GMK5150XL

Permissible temperature range: -25 °C to +40 °C (-13 °F to +104 °F)

Crane designation: Mobile crane as per DIN 15 001, Part 1

Crane application: Truck crane as per DIN 15 001, Part 2

Crane classification: Hoist class H1 as per DIN 15 018, Part 1
Crane class A1 as per ISO 4301, Part 2

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

1.6.1

Maximum lifting capacity (ASME B 30.5)

Max. load bearing capacity

- in the 360° slewing range:¹⁾ 108 t (238 000 lbs)
- 0° to the rear:¹⁾ 130 t (286,000 lbs)
- 0° to the rear:²⁾ 159 t (350,000 lbs)

Max. load moment

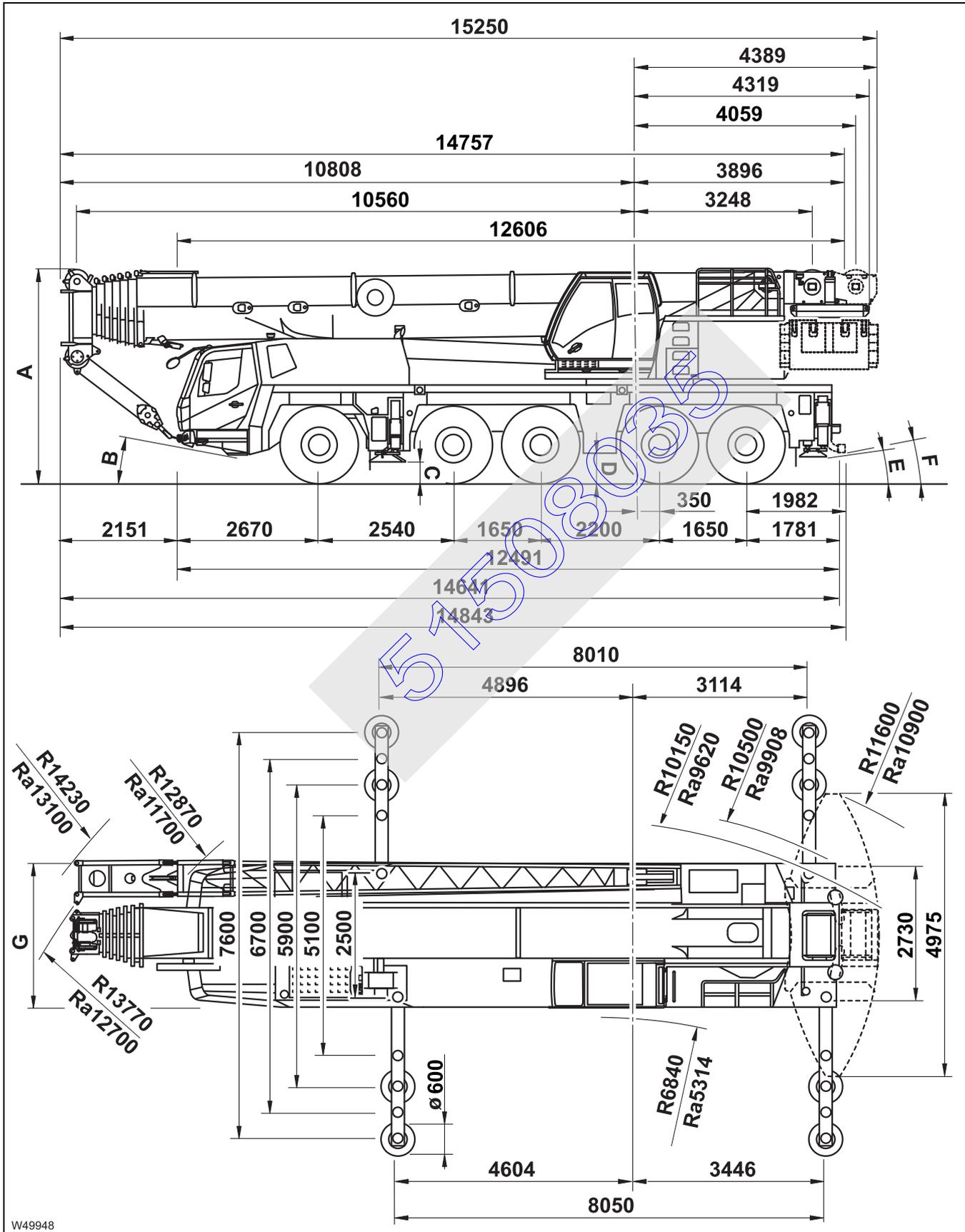
- in the 360° slewing range:

1) with additional equipment

2) with special equipment (currently not available)

1.6.2 Dimensions and weights of the truck crane, axle loads

All dimensions in the illustration are in mm.



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Dimensions

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

Length without auxiliary hoist: 14.75 m (48.4 ft)

At on-road level height, depending on tyres:

A	– 385/95 R25	3.95 m (12.9 ft)
	– 445/95 R25; 525/80 R25	3.99 m (13.1 ft)
	Max. level change	-130/+170 mm (-5.1/+6.7 in)

Width, depending on tyres:

G	– 385/95 R25; 445/95 R25	2.75 m (9.0 ft)
	– 525/80 R25	2.90 m (9.5 ft)

Angle of negotiable banks at on-road level, depending on tyres

B	– 385/95 R25	about 12°
	– 445/95 R25; 525/80 R25	about 14°
E	– 385/95 R25	about 12°
	– 445/95 R25; 525/80 R25	about 15°
F	– 385/95 R25	about 13°
	– 445/95 R25; 525/80 R25	about 16°

Ground clearance at on-road level, depending on tyres

C	– 385/95 R25	285 mm (11.2 in)
	– 445/95 R25; 525/80 R25	335 mm (13.1 in)
D	– 385/95 R25	444 mm (17.5 in)
	– 445/95 R25; 525/80 R25	494 mm (19.4 in)

Turning radii

R = values for normal steering mode

Ra = values for all-wheel steering



1.6.3

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)	
		1)	2)
Spare wheel 385/95 R 25	1.36 x 1.36 x 0.40 (4.45 x 4.45 x 1.30)	245 (540)	201 (443)
Spare wheel 445/95 R 25	1.50 x 1.50 x 0.45 (4.95 x 4.95 x 1.50)	332 (732)	250 (551)
Spare wheel 525/80 R 25	1.50 x 1.50 x 0.53 (4.92 x 4.92 x 1.74)	362 (798)	285 (628)

1) Steel rims

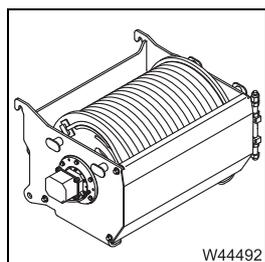
2) Aluminium rims

Outriggers

Designation	Diameter x height in m (ft)	Weight in kg (lbs)
Plastic outrigger pad diameter	0.50 x 0.16 (1.64 x 0.52)	25 (55)
Steel outrigger pad diameter	0.50 x 0.16 (1.64 x 0.52)	50 (110)
Front outrigger ¹⁾ , complete per set	2.80 x 0.30 x 1.10 (9.20 x 1.00 x 3.65)	950 (2,100)
Rear outrigger ¹⁾ , complete, per set	2.80 x 0.35 x 1.10 (8.20 x 1.15 x 3.45)	1,050 (2,315)

1) Consists of two sets

Auxiliary hoist

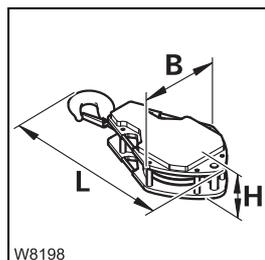


Designation	Length x width x height in m (ft)	Weight in kg (lbs)
Complete auxiliary hoist	0.80 x 1.70 x 0.70 (2.62 x 5.58 x 2.29)	1,200 (2,646)

Main boom

Designation	Length x width x height in m (ft)	Weight in kg (lbs)
Complete main boom	13.55 x 2.15 x 2.10 (44.45 x 7.05 x 6.90)	16,410 (36,178)

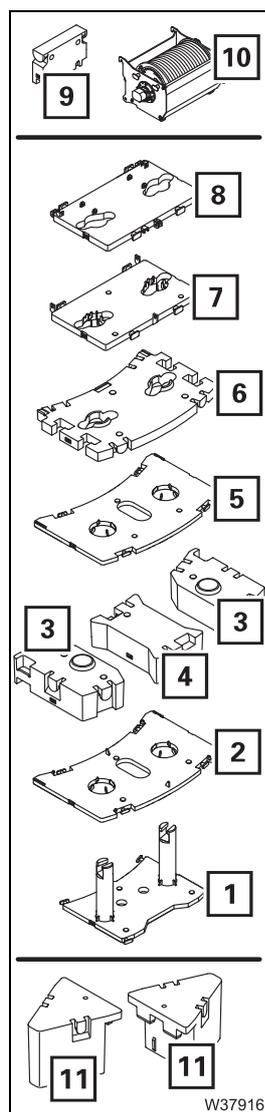
Hook blocks and hook tackle



Designation	Length x width x height (L) x (W) x (H) in m (ft)	Weight in kg (lbs)
Double hook 8 sheaves	1.80 x 0.60 x 0.85 (5.90 x 2.00 x 2.80)	1,600 (3,527)
Single or double hook, 5 sheaves	1.80 x 0.60 x 0.55 (5.90 x 2.00 x 1.80)	1,300 (2,866)
Single or double hook, 3 sheaves (heavy)	1.60 x 0.60 x 0.50 (5.25 x 2.00 x 1.65)	950 (2,094)
Single or double hook, 3 sheaves (light)	1.60 x 0.60 x 0.40 (5.25 x 2.00 x 1.30)	700 (1,543)
Single or double hook, 1 sheaves	1.45 x 0.60 x 0.30 (4.75 x 2.00 x 1.00)	400 (882)
Hook tackle (heavy)	0.80 x 0.35 x 0.35 (2.65 x 1.15 x 1.15)	300 (661)
Hook tackle (light)	0.80 x 0.30 x 0.30 (2.65 x 1.00 x 1.00)	200 (440)

Counterweight sections

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

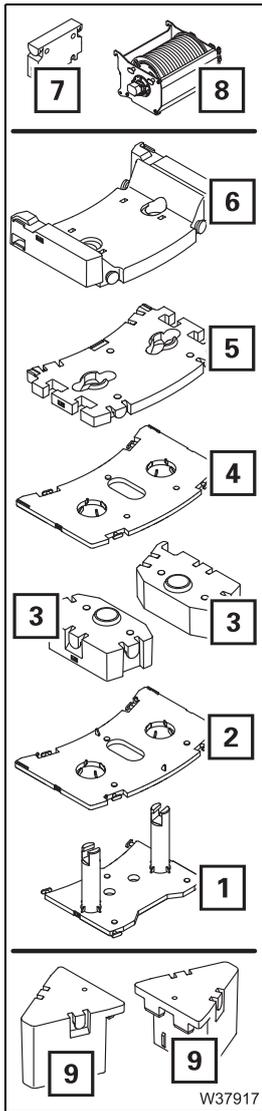


Counterweight – version 1

Pos.	Designation	Length x width x height in m (ft)	Weight in kg ¹⁾ (lbs)
1	2.3 t base plate	1.58 x 1.93 x 1.17 (5.18 x 6.33 x 3.84)	2,300 (5,070)
2	2.3 t plate	1.79 x 2.73 x 0.20 (5.87 x 8.96 x 0.52)	2,300 (5,070)
3	4.6 t block	1.76 x 0.93 x 0.59 (5.77 x 0.28 x 1.94)	4,600 (10,140)
4	4.6 t block	1.59 x 1.12 x 0.55 (0.48 x 0.34 x 1.80)	4,600 (10,140)
5	2.3 t plate	1.79 x 2.73 x 0.16 (5.87 x 8.96 x 0.56)	2,300 (5,070)
6	4.6 t plate	1.79 x 2.73 x 0.18 (5.87 x 8.96 x 0.59)	4,600 (10,140)
7	2.3 t plate	1.47 x 2.15 x 0.22 (4.79 x 7.05 x 0.72)	2,300 (5,070)
8	2.3 t plate	1.48 x 2.15 x 0.21 (4.82 x 7.05 x 0.66)	2,300 (5,070)
9	1.0 t plate	1.0 x 0.64 x 0.26 (3.28 x 2.10 x 0.78)	1,000 (2,205)
10	P. 1 - 12		
11	6.8 t block	1.37 x 1.38 x 1.15 (4.49 x 4.53 x 3.77)	6,800 (14,990)

1) There may be deviations of up to $\pm 3\%$ due to the manufacturing process.

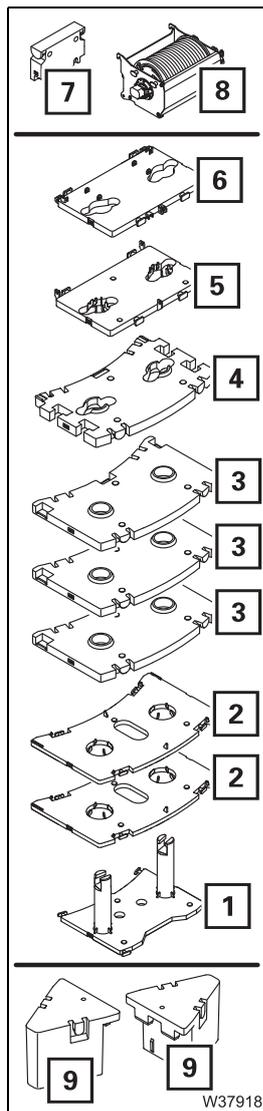




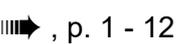
Counterweight – version 2

Pos.	Designation	Length x width x height in m (ft)	Weight in kg ¹⁾ (lbs)
1	2.3 t base plate	1.58 x 1.93 x 1.17 (5.18 x 6.33 x 3.84)	2,300 (5,070)
2	2.3 t plate	1.79 x 2.73 x 0.20 (5.87 x 8.96 x 0.52)	2,300 (5,070)
3	4.6 t block	1.76 x 0.93 x 0.59 (5.77 x 0.28 x 1.94)	4,600 (10,140)
4	2.3 t plate	1.79 x 2.73 x 0.16 (5.87 x 8.96 x 0.56)	2,300 (5,070)
5	4.6 t plate	1.79 x 2.73 x 0.18 (5.87 x 8.96 x 0.59)	4,600 (10,140)
6	9.2 t plate	1.81 x 2.73 x 0.65 (5.93 x 8.96 x 2.15)	9,215 (20,315)
7	1.0 t plate	1.00 x 0.65 x 0.26 (3.28 x 2.15 x 0.78)	1,000 (2,205)
8	 , p. 1 - 12		
9	6.8 t block	1.37 x 1.38 x 1.15 (4.49 x 4.53 x 3.77)	6,800 (14,990)

1) There may be deviations of up to $\pm 3\%$ due to the manufacturing process.

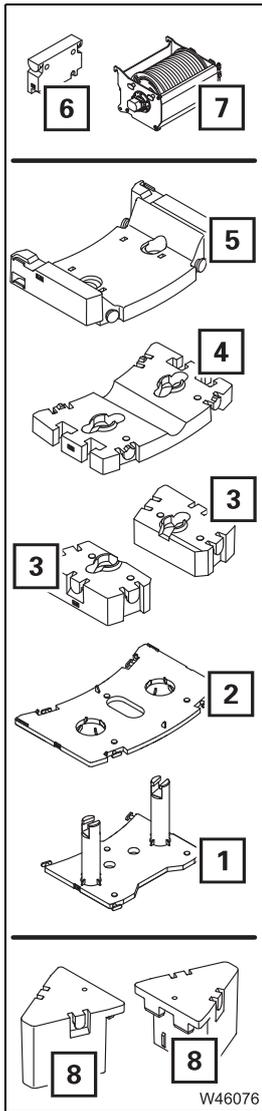


Counterweight – version 3

Pos.	Designation	Length x width x height in m (ft)	Weight in kg ¹⁾ (lbs)
1	2.3 t base plate	1.58 x 1.93 x 1.17 (5.18 x 6.33 x 3.84)	2,300 (5,070)
2	2.3 t plate	1.80 x 2.73 x 0.16 (5.91 x 8.96 x 0.56)	2,300 (5,070)
3	4.6 t plate	1.80 x 2.73 x 0.23 (5.91 x 8.96 x 0.56)	4,600 (10,140)
4	4.6 t plate	1.79 x 2.73 x 0.18 (5.87 x 8.96 x 0.59)	4,600 (10,140)
5	2.3 t plate	1.47 x 2.15 x 0.22 (4.79 x 7.05 x 0.72)	2,300 (5,070)
6	2.3 t plate	1.48 x 2.15 x 0.21 (4.82 x 7.05 x 0.66)	2,300 (5,070)
7	1.0 t plate	1.00 x 0.65 x 0.26 (3.28 x 2.15 x 0.78)	1,000 (2,205)
8	 , p. 1 - 12		
9	6.8 t block	1.37 x 1.38 x 1.15 (4.49 x 4.53 x 3.77)	6,800 (14,990)

1) There may be deviations of up to $\pm 3\%$ due to the manufacturing process.





Counterweight – version 4

Pos.	Designation	Length x width x height in m (ft)	Weight in kg ¹⁾ (lbs)
1	2.3 t base plate	1.58 x 1.93 x 1.17 (5.18 x 6.33 x 3.84)	2,300 (5,070)
2	2.3 t plate	1.79 x 2.73 x 0.20 (5.87 x 8.96 x 0.52)	2,300 (5,070)
3	4.6 t block	1.76 x 0.93 x 0.59 (5.77 x 0.28 x 1.94)	4,600 (10,140)
4	6.9 t plate	1.80 x 2.73 x 0.36 (5.90 x 8.96 x 1.18)	6,900 (15,215)
5	9.2 t plate	1.81 x 2.73 x 0.65 (5.93 x 8.96 x 2.15)	9,215 (20,315)
6	1.0 t plate	1.00 x 0.65 x 0.26 (3.28 x 2.15 x 0.78)	1,000 (2,205)
7	▣▣▣▣▶, p. 1 - 12		
8	6.8 t block	1.37 x 1.38 x 1.15 (4.49 x 4.53 x 3.77)	6,800 (14,990)

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

1.6.4

Carrier

Engine

Mercedes-Benz:	OM 471 LA
Engine emissions: (depending on the version)	EU Tier IIIA (US Tier 3)
	or:
	EU Tier IV (US Tier 4f)
	or:
	EU Tier V (US Tier 4f)
Power ¹⁾ :	390 kW (530 hp) at 1,600 rpm (UN regulation No. 120)
Fuel tank ²⁾ :	2 x approx. 325 l (86 gal)
AdBlue (DEF) tank ³⁾ :	approx. 40 l (10.6 gal)

- 1) EU Tier IIIA/IV: 390 kW (530 hp) at 1,700 rpm
- 2) With additional equipment 2 x approx. 200 l (53 gal)
- 3) Not for EU Tier IIIA

Notes on the engine

The EU Tier IIIA version does not have the AdBlue (DEF) tank and the exhaust cleaning displays and menus.

The EU Tier IV version does not have the exhaust cleaning displays and menus.

Transmission

Mercedes G280 – 16, automatic transmission, 16 forward speeds, 2 reverse speeds

Transfer case

Kessler VG 2600, 2-stage



Axle lines

Drive:	10 x 6 x 10
1st axle line:	Steered axle line
2nd axle line:	Steered and driven axle line
3rd axle line:	Steered axle line
4th axle line:	Steered and driven axle line, steering can be switched on
5th axle line:	Steered and driven axle line

Drive:	10 x 8 x 10¹⁾
1st axle line:	Steered axle line
2nd axle line:	Steered and driven axle line
3rd axle line:	Steered and driven axle line, drive can be switched on
4th axle line:	Steered and driven axle line (steering can be switched on)
5th axle line:	Steered and driven axle line

¹⁾ Additional equipment

Steering

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

Tyres

8 x 385/95 R 25 on disc wheels 9.50-25/1.7
8 x 445/95 R 25¹⁾ on disc wheels 11.00-25/1.7
8 x 525/80 R 25¹⁾ on disc wheels 17.00-25/1.7

¹⁾ Additional equipment

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

Tyre pressure;  *Maintenance manual*

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 span (standard):	Metre (ft) 8.030 m x 7.600 m (26.3 ft x 25.0 ft) 8.030 m x 6.700 m (26.3 ft x 22.0 ft) 8.030 m x 5.900 m (26.3 ft x 19.4 ft) 8.030 m x 5.100 m (26.3 ft x 16.8 ft) 8.030 m x 2.500 m (26.3 ft x 8.2 ft)
Outrigger span (MAXbase):	▶ Released outrigger spans, p. 12 - 29
Outrigger pads:	Diameter: 600 mm (23.6 in) Area: 2.826 cm ² (438 in ²)
Stroke of supporting cylinders:	600 mm (23.6 in)
Maximum outrigger pressure:	front: 64.6 t (142,420 lbs) rear: 74.2 t (163,583 lbs)
Inclination indicator:	In the crane cab, at the <i>Outrigger</i> control units.
Outrigger pressure display ¹⁾ :	With display in the crane cab and at the <i>outrigger</i> control units.

¹⁾ Additional equipment



Electrical system

Alternator: 28 V/150 A
Batteries: 2 each of 12 V/180 Ah
Voltage: 24 V

Tools

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

Towing couplings

Front towing coupling: 100 kN (22,480 lbf) permissible pull¹⁾
Rear tow lug: 75 kN (16,860 lbf) permissible pull¹⁾
1) Only permissible at certain tension angles; ■■■► p. 5 - 78

Driving speeds

At an engine speed of 1,700 rpm

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

Climbing ability

Transport weight 60 t (132,277 lbs)

Drive	Climbing ability in off-road gear with tyres		
	385/95 R25	445/95 R25	525/80 R25
10 x 6 x 10	37%	35%	35%
10 x 8 x 10	40%	37%	37%

1.6.5

Superstructure

Main hoist

Drum diameter:	391 mm (15.39 in)
Rope diameter:	19 mm (0.75 in)
Rope length:	255 m (836 ft)
Rope pull:	76.4 kN/line (17,175 lbf)
Power unit group:	M 3 (in accordance with ISO 4301 - 2)
Load spectrum:	L 1
Load spectrum factor:	Km = 0.125
Theoretical service life:	D = 3,200 h

Auxiliary hoist

Drum diameter:	391 mm (15.39 in)
Rope diameter:	19 mm (0.75 in)
Rope length:	255 m (836 ft)
Rope pull:	76.4 kN/line (17,175 lbf)
Power unit group:	M 3 (in accordance with ISO 4301 - 2)
Load spectrum:	L 1
Load spectrum factor:	Km = 0.125
Theoretical service life:	D = 3,200 h

Slewing gear

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

Derricking gear

Cylinder:	Differential cylinder
Adjusting angle (main boom):	-1.54° to + 83° from horizontal position
Power unit group:	M2 (in accordance with ISO 4301 - 2)



Main boom

Main boom lengths:	13.0 m to 68.7 m (42.7 ft to 225.4 ft)
Main boom head:	6 sheaves 8 sheaves ¹⁾
Cylinder:	One single-level telescoping cylinder with locking/ unlocking mechanism
Power unit group	
Telescoping mechanism:	M 1 (in accordance with ISO 4301 - 2)

¹⁾ Additional equipment

Lattice extension

As additional equipment;  *Lattice extension operating manual.*

Operating speeds

The specified operating speeds only apply to an engine speed of approx. 1,500 rpm/1,850 rpm without load.

Main hoist:	Rope speed when lifting	
	Normal speed:	maximum 60 m/min (197 ft/min)
	High-speed mode:	maximum 120 m/min (394 ft/min)
Auxiliary hoist:	Rope speed when lifting	
	Normal speed:	maximum 60 m/min (197 ft/min)
	High-speed mode:	maximum 120 m/min (394 ft/min)
Slewing gear:	0 to 1.5 revolutions per minute (without load)	
Telescoping mechanism:	Extension	
	from 0 - 0 - 0 - 0 - 0 - 0 bis 100 - 100 - 100 - 100 - 100 - 100	
	approx. 480 s	In automatic mode during uninterrupted locking and telescoping processes
Derricking gear:	Derricking between - 1° and 83°	
	High-speed mode: Raising:	about 50 s

Noise emission Emission sound pressure level at the workplace
At the crane cab seat: 72 db

1.7

Documentation supplied

The precise number of documents supplied depends on the rigging mode of the truck crane. The following documents are included in the 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 (for example, auxiliary single-sheave boom top and heavy load lattice extension).

– **Operating manual for additional equipment**

Is only supplied when the truck crane is equipped with additional equipment that is not described in the operating manual 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. Most of these documents are provided on the USB stick. Further information is provided in the delivery receipt for the documentation.

– **Maintenance manual**

Contains information on maintenance work only and 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.

– **Outrigger pressure table**

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

– **Spare parts list**

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

1.7.1

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 - 3.

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

Email: whv-techpublications@manitowoc.com

For repeat orders for documentation, please contact our EMEA service.

1.8

Notes on the operating manual

This operating manual is not a training manual for prospective crane operators! All descriptions are written explicitly for crane operators who have been trained to operate truck cranes!

This operating manual is designed as a reference manual. It provides either a brief or a detailed explanation to the crane operator, based on his prior knowledge, of the individual operating steps and procedures.

1.8.1

What do the symbols used mean?

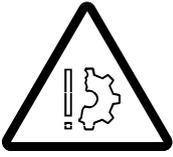
The following designations and symbols are used in the operating manual and in the maintenance manual to highlight particularly important information.

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 relating to the described operation, which can endanger persons. The type of danger (for example, danger to life, risk of injury or risk of crushing) usually precedes the warning.





This symbol indicates dangers, which represent a hazard to objects, for example, damage to the truck crane or other parts within the working range.



This symbol draws your attention to situations where there is a risk of receiving an electric shock.



This symbol is to remind you that you are working with substances, which pose a risk to the environment. Take special care. Further information on handling substances that are harmful to the environment;  *Maintenance manual*, chapter *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. So 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.

1.8.2

How is the operating manual structured?

Division

- Chapters **1** to **8** contain a description of how to drive the truck crane.
- Chapters **9** to **15** contain a description of crane operation.

The complete operating manual must always be stored in the truck crane. The basic safety instructions, and those for crane operation are only provided in **Chapter 2**. 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 corresponding brief descriptions, and from there, to further chapters.

Chapters **4** to **8** and **10** to **14** describe procedures, and are therefore structured according to these operations. For more extensive processes, the description is given with **checklist** and **operating instructions**.

- The checklists show the procedure in the required sequence, for example, 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.

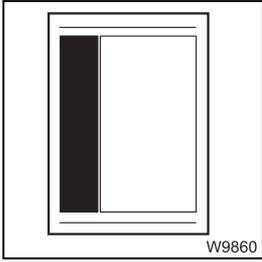


Risk of accidents when only referring to the checklists during operation!
The checklists and operating instructions should always be regarded as a single unit for the comprehensive description of a rigging operation. It is only safe to operate the truck crane by referring to the checklists when you are 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.



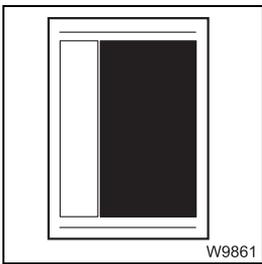
Structure of the pages

Each page in the operating manual 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 highlighting 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, for example,
 - shift the transmission to neutral.
- The following text passages are highlighted in *italics* :
 - Designations of operating elements and switching states, such as e.g. *Automatic* or *Manual*.
 - Headings of sections to which a reference is made.
 - The names of other documents to which a reference is made.

1.8.3

How do I find the information I need?

The operating manual contains the following guides for orientation.

- The **Contents** list all chapters in the operating manual.
- The **Table of contents** provides an overview of the topics.
- The **Index** in chapter **15** gives an alphabetic list of keywords and search terms with reference to the relevant page in the operating manual.
- Cross-references are labelled with an arrow (▬▶) and refer to other pages in the operating manual. These pages contain more detailed information, or information that relates to the topic in question.
Furthermore, you can use the cross-references to systematically familiarise yourself with general to specific information on the truck crane or look up the functioning of individual elements.

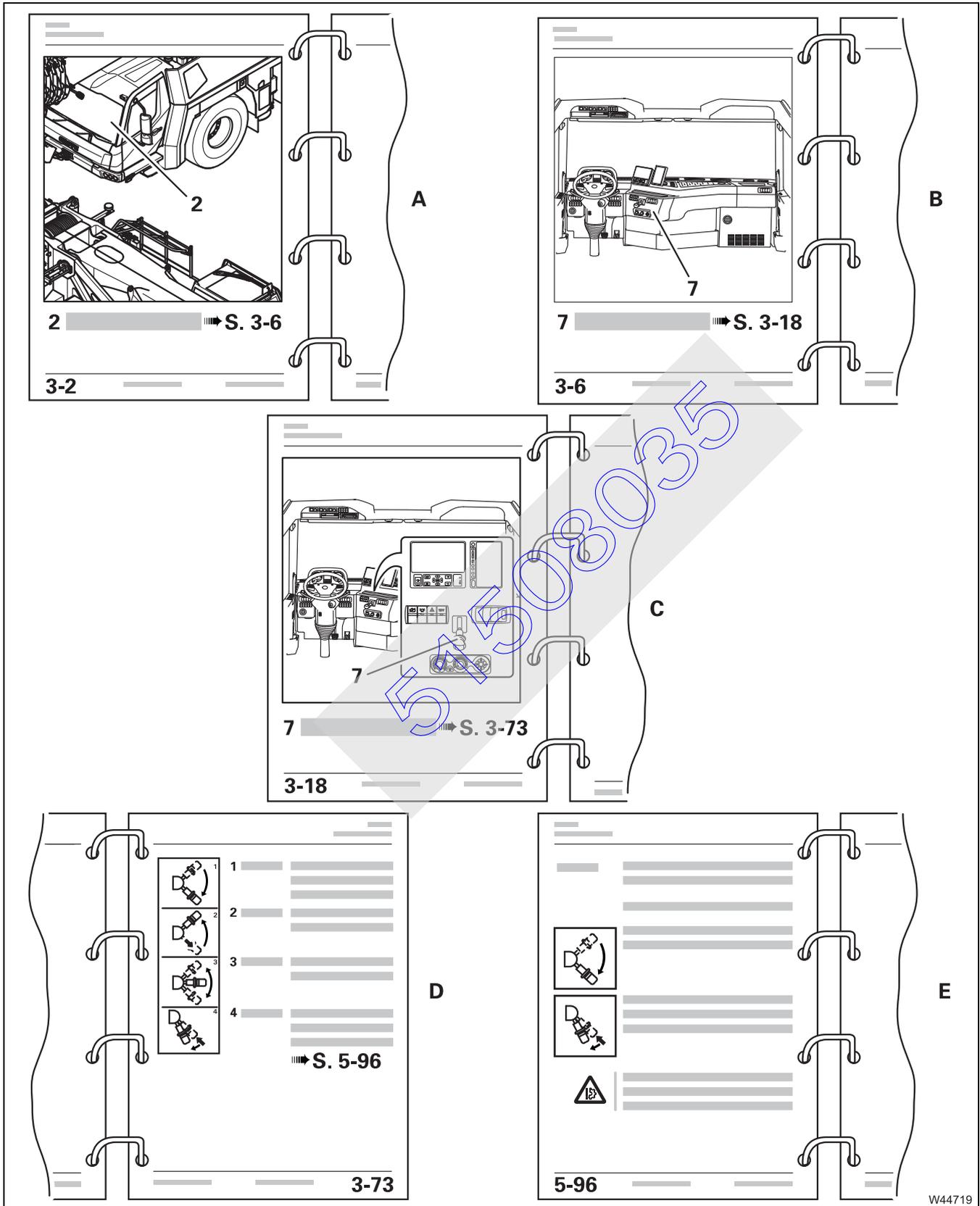
The following pages give an example of how to use the cross-references.



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Cross-reference example

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



1.8.4

What information is available for operations planning?

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

The operating manual contains

- 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 - 11,
- Turning radii; ■■■▶ p. 1 - 9,
- The permissible outrigger spans for the *Standard* slewing range type; ■■■▶ p. 12 - 24,
- The permissible outrigger spans for the *MAXbase* slewing range type; ■■■▶ p. 12 - 29,
- The size of the outrigger pads; ■■■▶ p. 1 - 19.

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1.9**Conversion table for US units of measurement**

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.

Conversion 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	2,204.622
lbs	t	0.0004536
kN	lbf	224.809
daN/cm ²	lbf/in ²	14.50378
lbf/in ²	daN/cm ²	0.06895
bar	psi	14.50378
psi	bar	0.06895
m/s	ft/s	3.28084
km/h or km	mph or mi	0.62137
mph or mi	km/h or km	1.60935
Nm	lbf ft	0.7375
°C	°F	1.8 x °C + 32
°F	°C	(°F - 32)/1.8
t/m ²	lbs/ft ²	204.8
m ² /t	ft ² /lbs	0.04882

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1.10

Training – Information

For the EMEA region (**E**urope, **M**iddle **E**ast, **A**frica) **Manitowoc Crane Group Germany GmbH** offers comprehensive training for all GMK models.

Our training centre is located in a maritime environment, on Germany's North Sea coast at Wilhelmshaven. It is there where we train our qualified service personnel 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 adapted 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 adapted 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 direct vicinity of 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 compile a suitable training programme for you today.

We would be pleased to advise you, your **Training Centre Wilhelmshaven**.

Our contact information and an overview of our current training courses can be found online at:

http://training.manitowoccranes.com/MCG_CARE/Services/EN/Training.asp



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

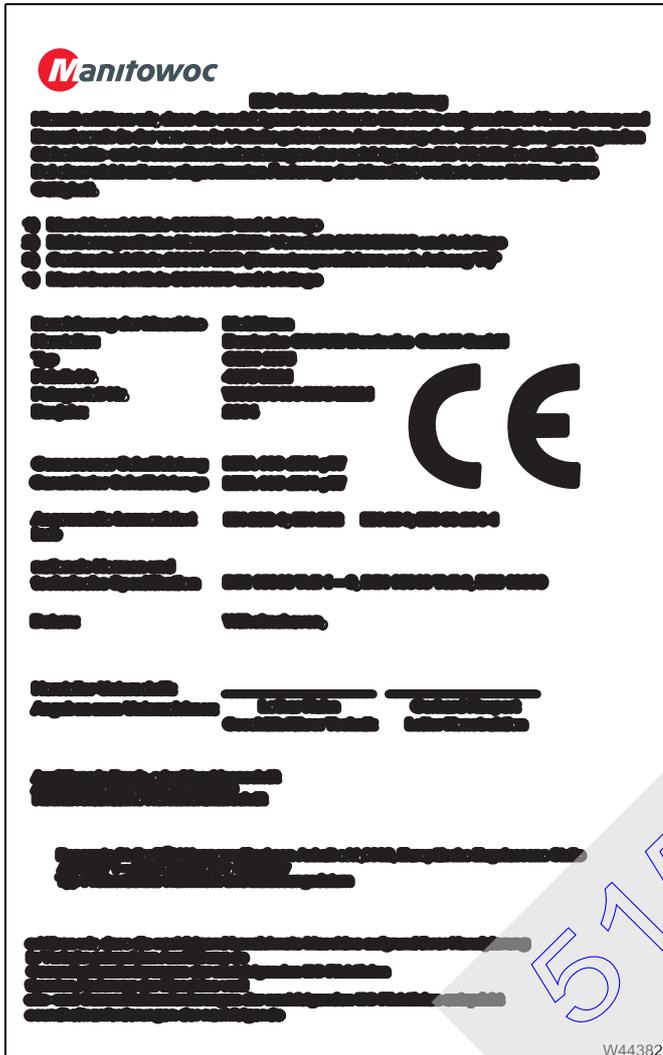
- 1** Serial number and crane type
- 2** the CE marking, which is only applicable to truck cranes whose equipment and configuration comply with the guidelines and standards specified in the supplied EC Declaration of Conformity.
- 3** Driver's cab serial number (at the strut of the door entrance)
- 4** Chassis number and crane type (at the passenger's seat)
- 5** Chassis number and crane type and year of manufacture (at the passenger's seat)¹⁾
- 6** Chassis number (front of the first axle line on the frame)

1) Additional equipment

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

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1.12 EC Declaration of Conformity



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

The enclosed Declaration of Conformity is valid only if the truck crane complies with all guidelines and standards specified in the EC Declaration of Conformity. This applies in particular to the programming and function of the overload protection. Only then is the truck crane given a CE marking on delivery.

The Declaration of Conformity shall become invalid and the CE marking must be removed if any modifications that do not comply with the specified guidelines and standards are made to the crane.

Please refer to the additional information provided on the EC Declaration of Conformity supplied.

2

Basic safety instructions



For a list and explanation of all symbols used in this operating manual for safety instructions and other notes; *What do the symbols used mean?*, p. 1 - 25.

2.1

Observe the safety manual



Risk of accidents if the safety manual is not observed.

The safety manual is an integral part of the documentation supplied with your truck crane.

It is your responsibility as the crane operator to read and understand the safety manual before operating or servicing the GMK5150XL.



This operating manual only contains those safety instructions that must be observed during direct operation of this truck crane. These safety instructions can be found in the corresponding chapters and sections for driving, for crane operation and for rigging work.

In addition, all the information in the *Safety manual* supplied applies separately to the operation of the truck crane. It is an integral part of this operating manual and contains information on the topics listed here.

- Information on organisational measures
- Information on the required qualifications of the personnel used for the operation of the truck crane.
- Notes on the applicable documentation
- Safety instructions for driving the truck crane
- Safety instructions for rigging and working with truck cranes
- Safety instructions for operating the crane under special operating conditions
- Rules of conduct in the event of malfunctions, accidents and fire
- Safety instructions for maintenance and repair
- Safety instructions for transporting the truck crane

2.2

Intended use

The GMK5150XL truck crane is designed in accordance with the latest technology and the recognised 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 approval of **Manitowoc Crane Group Germany GmbH**.

The GMK5150XL truck crane may be used only 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 rectified immediately.

The GMK5150XL truck crane may only be operated without the corresponding special equipment within the permitted temperature range; ■■■► *Technical data*, p. 1 - 7.

The GMK5150XL truck crane is designed solely for lifting loads that are within the permitted GMK5150XL lifting capacities. The load must be slung as prescribed to a hook block or to hook tackle that is positioned vertically over the load prior to lifting.

Intended use also includes

- Observing the entire crane documentation provided, consisting of *operating manuals, lifting capacity tables, outrigger pressure tables* and the *safety manual*.
- Compliance with the inspection and maintenance requirements specified in the maintenance manual.

The GMK5150XL may only be operated with parts of equipment that have been approved by **Manitowoc Crane Group Germany GmbH** and that are labelled with the serial number of the GMK5150XL.

2.3

Improper use

Manitowoc Crane Group Germany GmbH is not liable for damage resulting from improper or unauthorised use of the GMK5150XL. The user alone bears the risk.

Improper use includes

- Transporting loads on the carrier – an exception are equipment parts (e.g. counterweight sections) that are set down on the designated rests as described in the supplied *operating manual*.
- Pushing, pulling or lifting loads using the level adjustment system, the outrigger beams or the supporting cylinders.
- Pushing, pulling or lifting loads by operating the slewing gear, the derricking gear or the telescoping mechanism.
- The tearing loose of stuck objects.
- The ramming and pulling of sheet-pile walls, sheet piles, beams etc..
- Two-hook operation at the main boom head without additional equipment.
- Using two-hook operation in a different way than described in the supplied documentation;  *Lattice extension operating manual*.
- Confirming rigging modes that do not correspond to the actual rigging mode.
- Crane operation with an overridden rated capacity limiter or overridden lifting limit switch
- Increasing the working radius by pulling the raised load at an angle (e.g. with a chain hoist) after shutting down the rated capacity limiter.
- 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 impermissible driving mode (axle load, dimensions).
- Moving the rigged crane in an impermissible rigging mode
- Using equipment parts not approved for the truck crane.
- Transporting persons outside the driver's cab.
- Use for any kind of sport or recreation event, especially for bungee jumping.

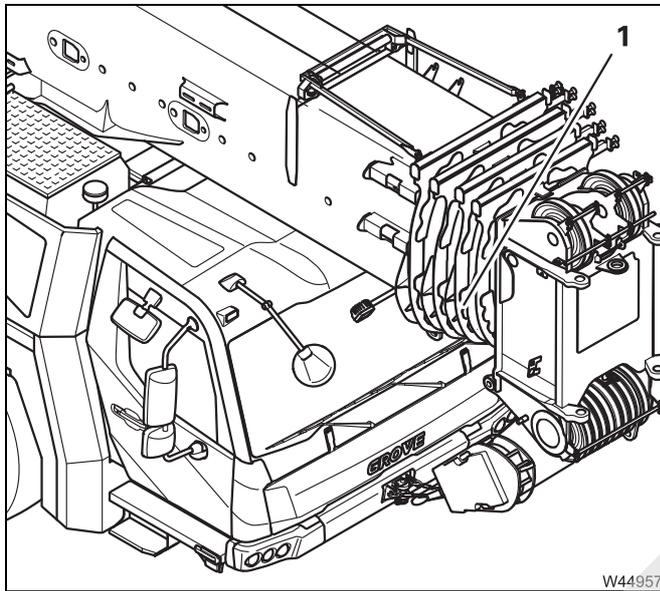
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3

Operating elements for driving

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



This operating manual contains illustrations of the GMK5150L-1 with five telescopic sections.

The GMK5150XL has six telescopic sections (1).

The illustrations have only been modified where relevant for operation.

3.1

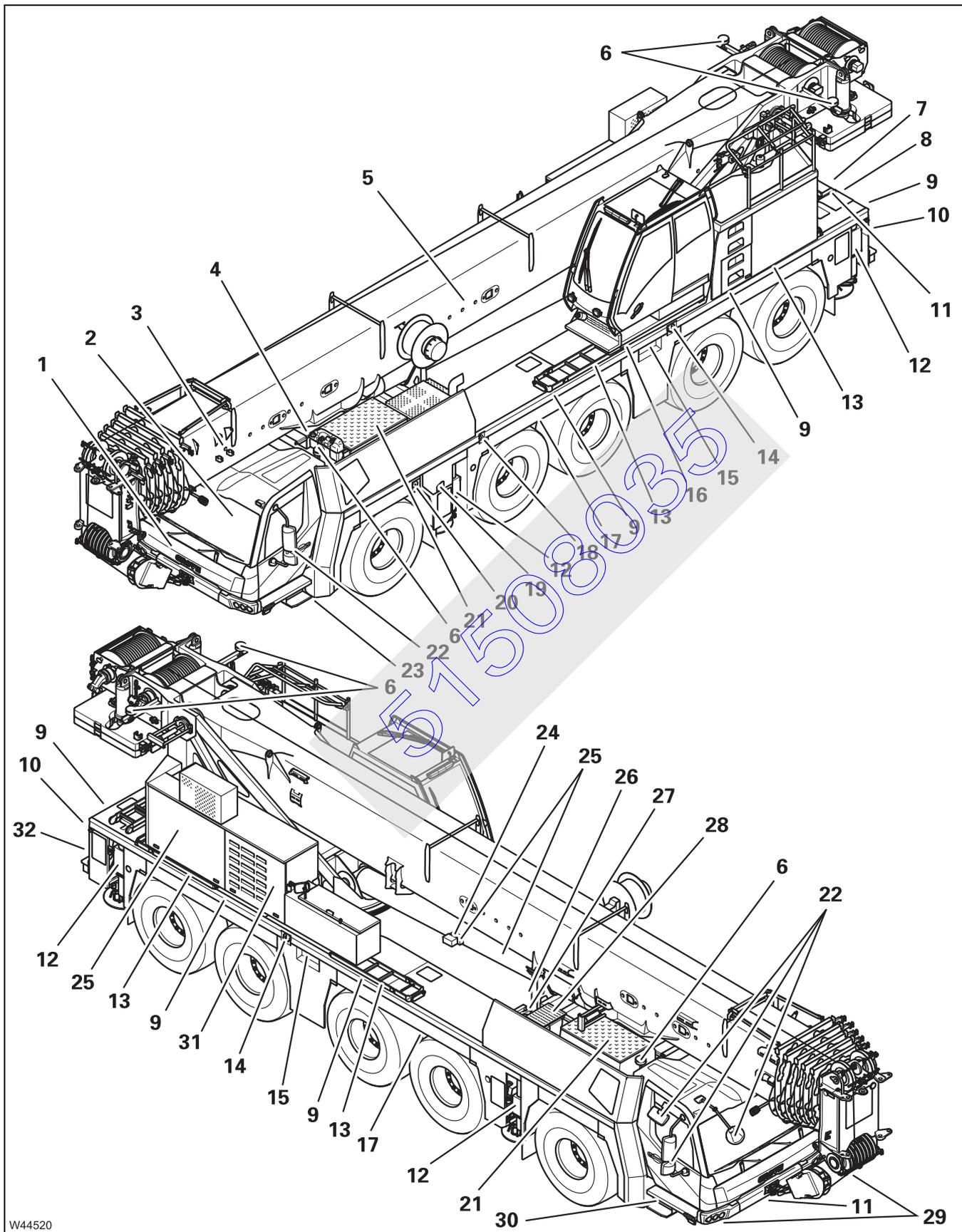
Overview – Notes

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



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

3.2 Overview – Exterior of the truck crane



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1 Front flap	▣▣▣▣ p. 3 - 84
2 Driver's cab overview	▣▣▣▣ p. 3 - 8
3 Hose drum, installation/removal ^{1), 2)}	
4 Engine	▣▣▣▣ p. 4 - 1
5 Rigging the main boom ¹⁾	▣▣▣▣ p. 6 - 17
6 Rotating beacons on/off	▣▣▣▣ p. 3 - 75
7 APS connection/interface (Auxiliary Power Supply) ^{1), 3)}	
8 – Spare wheel ¹⁾	▣▣▣▣ p. 8 - 50
– Towbar coupling ¹⁾	▣▣▣▣ p. 5 - 105
– Additional information Rear light – at rear of carrier/on storage compartment ¹⁾	▣▣▣▣ p. 5 - 13
– Additional rear light – at the spare wheel holder ¹⁾	▣▣▣▣ p. 8 - 52
9 BirdView system 270° – camera ¹⁾	▣▣▣▣ p. 3 - 64
10 Chocks ¹⁾	▣▣▣▣ p. 5 - 88
11 Storage space for the folding ladder ⁴⁾	▣▣▣▣ p. 3 - 89
12 Outriggers	
– Operation	▣▣▣▣ p. 12 - 33
– Lighting – operation in the driver's cab	▣▣▣▣ p. 3 - 47
– Lighting – operation in the crane cab	▣▣▣▣ p. 9 - 44
– Removing/installing the outrigger beams ¹⁾	▣▣▣▣ p. 6 - 39
13 Swing-out ladders	▣▣▣▣ p. 3 - 88
14 Fuel tank	▣▣▣▣ p. 4 - 7
15 – Outrigger control units	▣▣▣▣ p. 3 - 7
– Emergency stop switch	▣▣▣▣ p. 4 - 20
16 Step on the crane cab	
– Automatic operation ¹⁾	▣▣▣▣ p. 12 - 178
– Manual operation	▣▣▣▣ p. 12 - 179

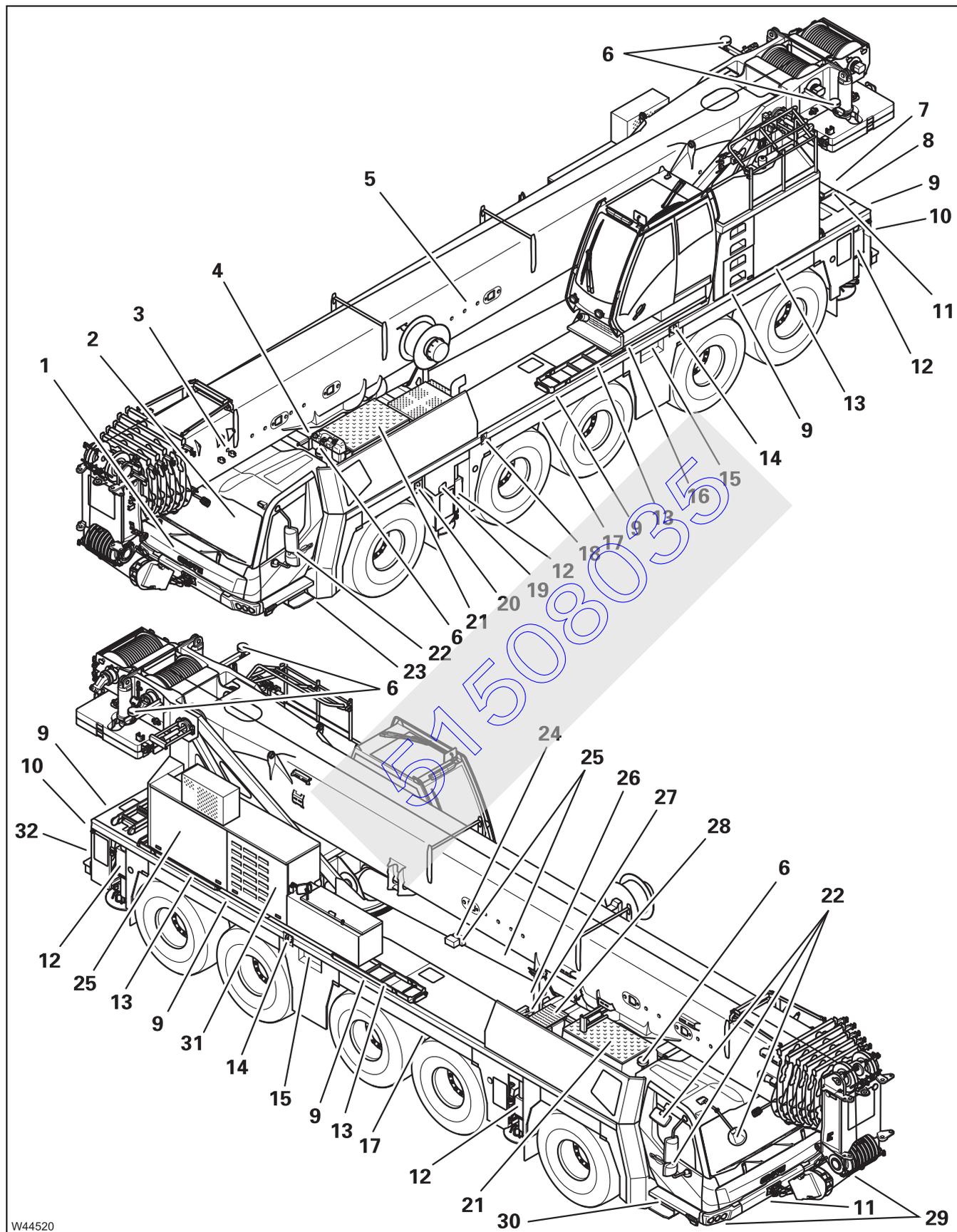
1) Additional equipment

2) ▣▣▣▣ *Lattice extension operating manual*

3) ▣▣▣▣ *Separate operating manual*

4) Depending on the equipment





17 Raising/lowering the 3rd axle line ¹⁾	▣▣▣▣ p. 6 - 15
18 AdBlue (DEF) tank ²⁾	▣▣▣▣ p. 4 - 8
19 Battery master switch II ¹⁾	▣▣▣▣ p. 3 - 55
20 – Externally starting the truck crane ¹⁾	▣▣▣▣ p. 8 - 44
– Battery charger ¹⁾	▣▣▣▣ p. 8 - 45
21 Spotlights III ¹⁾	
– Operating elements	▣▣▣▣ p. 3 - 14
– Retracting and extending	▣▣▣▣ p. 12 - 180
22 Adjusting mirrors ¹⁾	▣▣▣▣ p. 5 - 9
23 Compressed-air supply	▣▣▣▣ p. 8 - 47
Inflating the tyres yourself	▣▣▣▣ p. 8 - 54
24 – Switching on the boom floating position ¹⁾	▣▣▣▣ p. 6 - 13
– Switching off the boom floating position ¹⁾	▣▣▣▣ p. 12 - 19
25 – Switching on boom pre-tensioning ¹⁾	▣▣▣▣ p. 6 - 14
– Switching off boom pre-tensioning ¹⁾	▣▣▣▣ p. 12 - 21
26 – Hydraulic emergency operation with the hand pump	▣▣▣▣ p. 14 - 53
– Hydraulic emergency operation according to DGUV ¹⁾	▣▣▣▣ p. 14 - 61
27 Shut-off valves on the hydraulic tank	▣▣▣▣ p. 4 - 10
28 Hydraulic oil cooler, second cooler ¹⁾	
29 Warning plates for vehicle width ¹⁾	▣▣▣▣ p. 5 - 10
30 Tilt mechanism for driver's cab ¹⁾	▣▣▣▣ p. 8 - 62
31 – Switching on the slewing gear freewheel ¹⁾	▣▣▣▣ p. 6 - 13
– Switching off the slewing gear freewheel ¹⁾	▣▣▣▣ p. 12 - 20
32 – Reversing camera ¹⁾	▣▣▣▣ p. 3 - 63
– Reversing lamp ¹⁾	▣▣▣▣ p. 3 - 63

¹⁾ Additional equipment

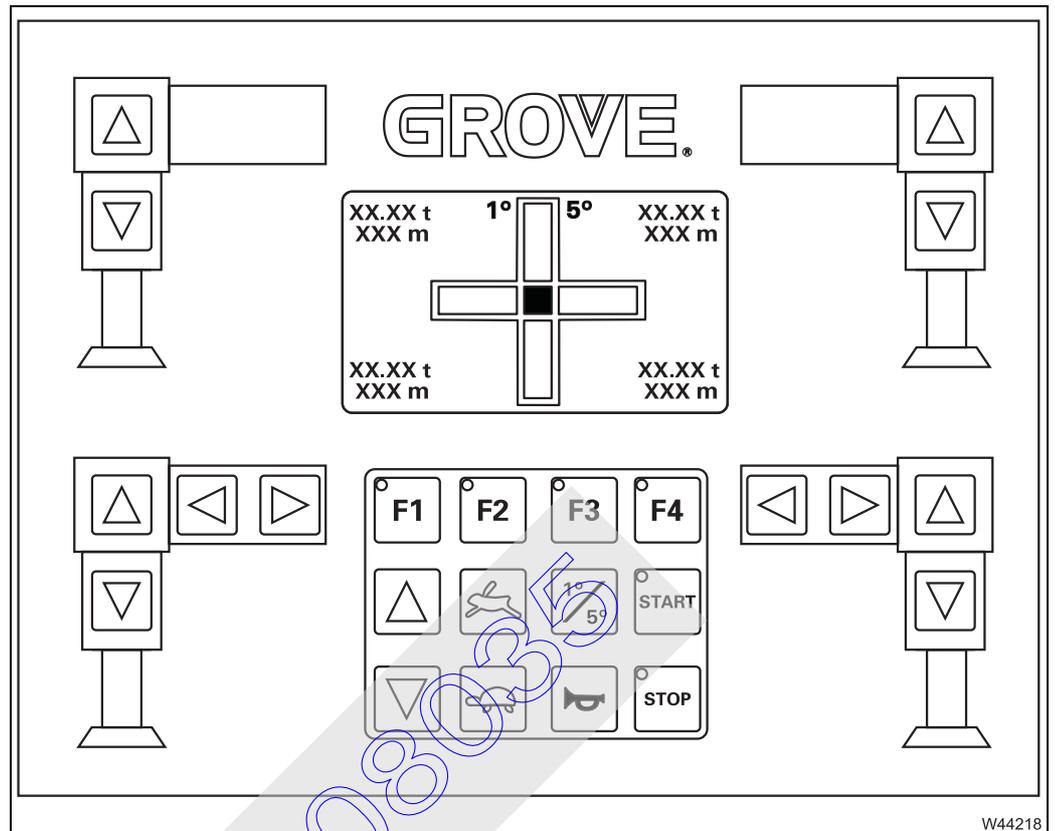
²⁾ Only for EU Tier IV and Tier V

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3.2.1

Outrigger control units



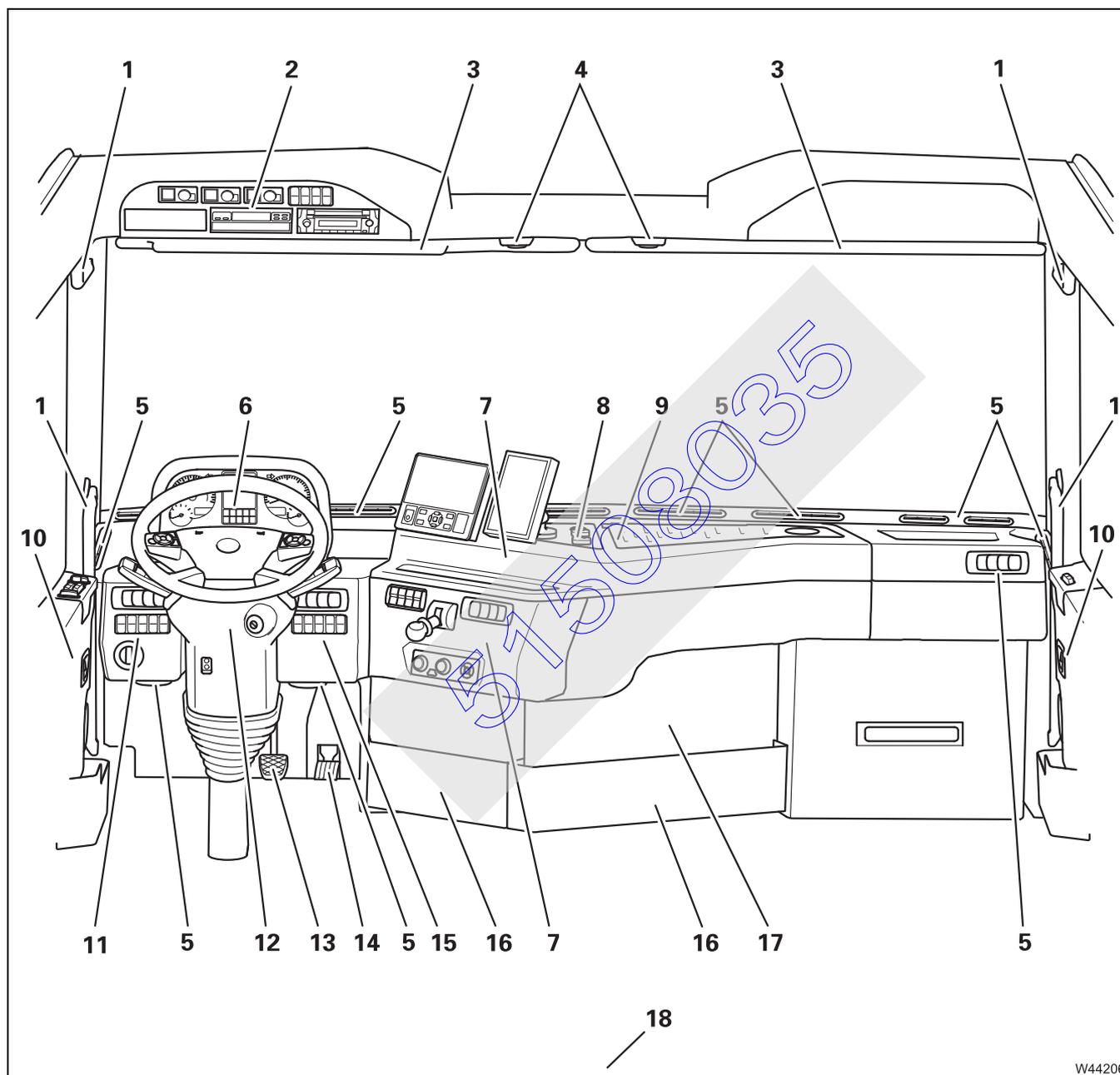
W44218

Contains operating elements for crane operation;

► *Outrigger control units*, p. 9 - 7.

3.3 Driver's cab overview

3.3.1 Front overview

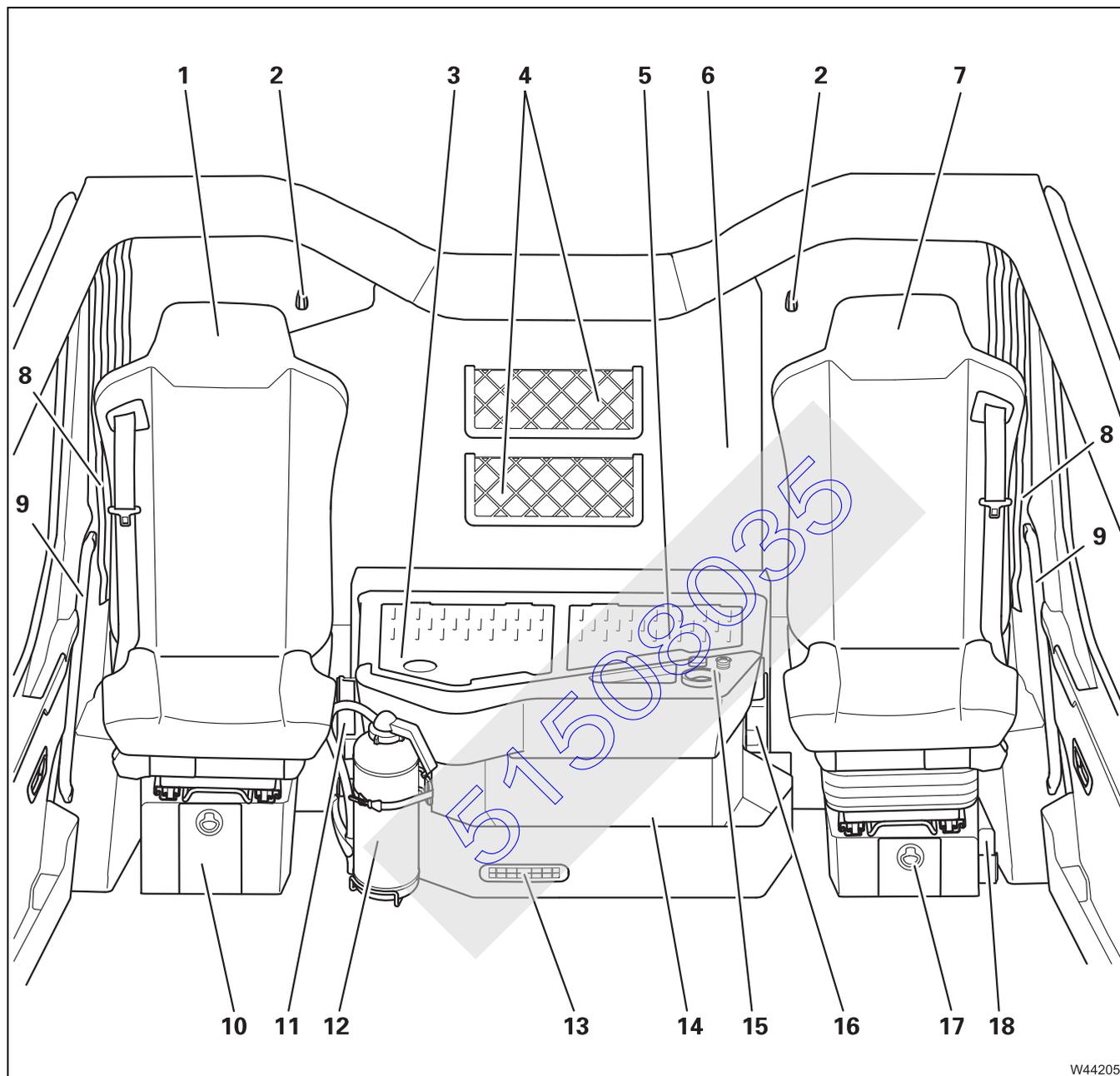


W44206

1 Handle	▣▣▣▣ p. 3 - 87
2 Top operating elements	▣▣▣▣ p. 3 - 12
3 Sun visors	
4 Cab lighting	▣▣▣▣ p. 3 - 77
5 Air vents	▣▣▣▣ p. 5 - 90
6 Centre control unit	▣▣▣▣ p. 3 - 16
7 Side operating elements	▣▣▣▣ p. 3 - 19
8 – 12 V/24 V sockets ¹⁾	▣▣▣▣ p. 3 - 57
– USB connection ¹⁾	▣▣▣▣ p. 3 - 57
9 – Storage compartment	▣▣▣▣ p. 5 - 8
– Diagnostics	▣▣▣▣ p. 3 - 81
10 Door operating elements	▣▣▣▣ p. 3 - 28
11 Left operating elements	▣▣▣▣ p. 3 - 14
12 Steering column/steering wheel operating elements	▣▣▣▣ p. 3 - 20
13 Service brake	▣▣▣▣ p. 3 - 68
14 Accelerator	▣▣▣▣ p. 5 - 62
15 Right operating elements	▣▣▣▣ p. 3 - 15
16 Storage compartment	▣▣▣▣ p. 5 - 8
17 Fuses	▣▣▣▣ p. 8 - 67
18 Rear overview	▣▣▣▣ p. 3 - 10
¹⁾ Additional equipment	

3.3.2

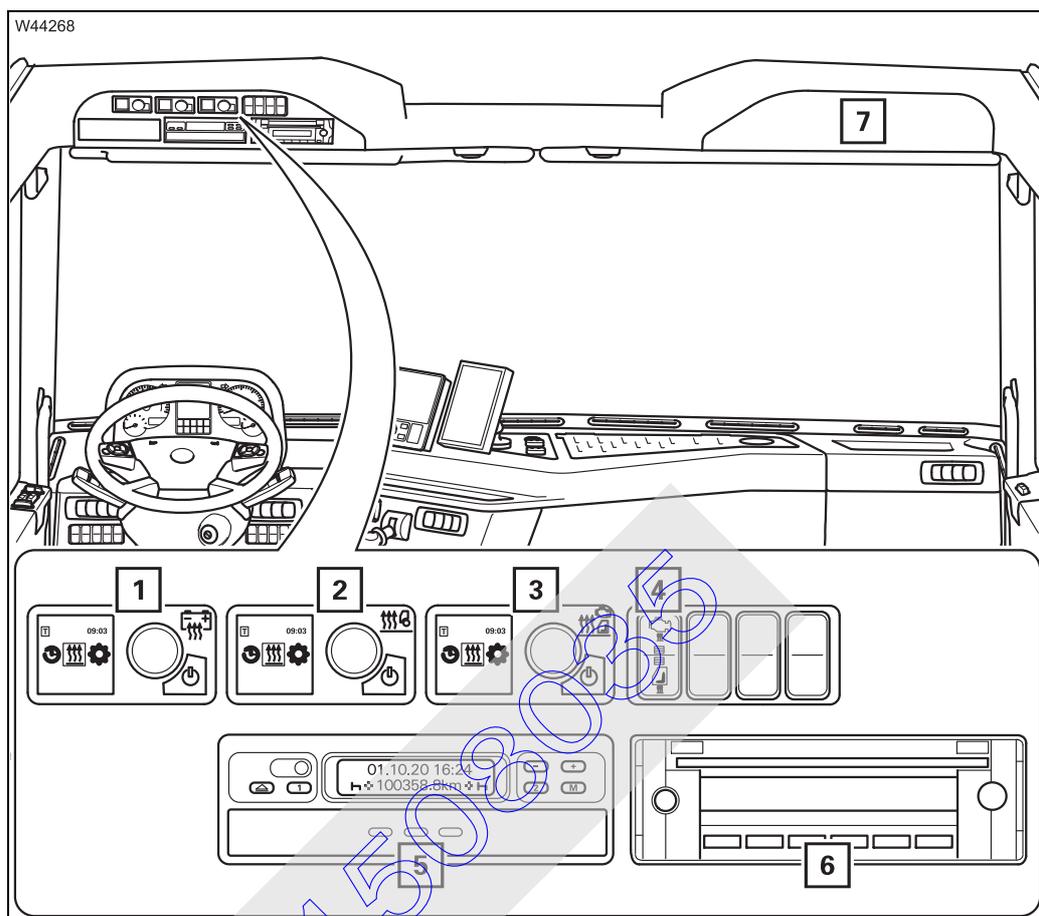
Rear overview



- | | |
|--|-----------------|
| 1 Adjusting the passenger seat | ▣▣▣▣ p. 5 - 15 |
| 2 Coat hook | |
| 3 – Storage compartment | ▣▣▣▣ p. 5 - 8 |
| – Auxiliary air heater – driver's cab ¹⁾ | ▣▣▣▣ p. 5 - 101 |
| 4 Storage compartment, e.g. for keys | ▣▣▣▣ p. 5 - 8 |
| 5 Storage compartment | ▣▣▣▣ p. 5 - 8 |
| 6 Fold-up berth ¹⁾ (not displayed) | ▣▣▣▣ p. 5 - 67 |
| 7 Adjusting the driver's seat | ▣▣▣▣ p. 5 - 14 |
| 8 Driver's cab darkening | |
| 9 Handle | ▣▣▣▣ p. 3 - 87 |
| 10 Storage compartment (e.g. for high-visibility jacket ¹⁾ ;
hand-held control, battery charger ¹⁾) | ▣▣▣▣ p. 5 - 8 |
| 11 First-aid kit ¹⁾ | |
| 12 Fire extinguisher ^{1), 2)} | |
| 13 Ventilation Auxiliary air heater – driver's cab ¹⁾ | ▣▣▣▣ p. 5 - 101 |
| 14 Storage compartment | ▣▣▣▣ p. 5 - 8 |
| 15 – USB connection | ▣▣▣▣ p. 3 - 57 |
| – Cigarette lighter, 24 V | ▣▣▣▣ p. 3 - 57 |
| – Socket, 12 V ¹⁾ | ▣▣▣▣ p. 3 - 57 |
| – Beverage holder/ashtray ¹⁾ | |
| 16 Warning lamp ¹⁾ | |
| 17 Storage compartment, e.g. for high-visibility jacket ¹⁾ | ▣▣▣▣ p. 5 - 8 |
| 18 Warning triangle ¹⁾ | |
- 1) Additional equipment
2) ▣▣▣▣ *Maintenance manual*

3.3.3

Top operating elements

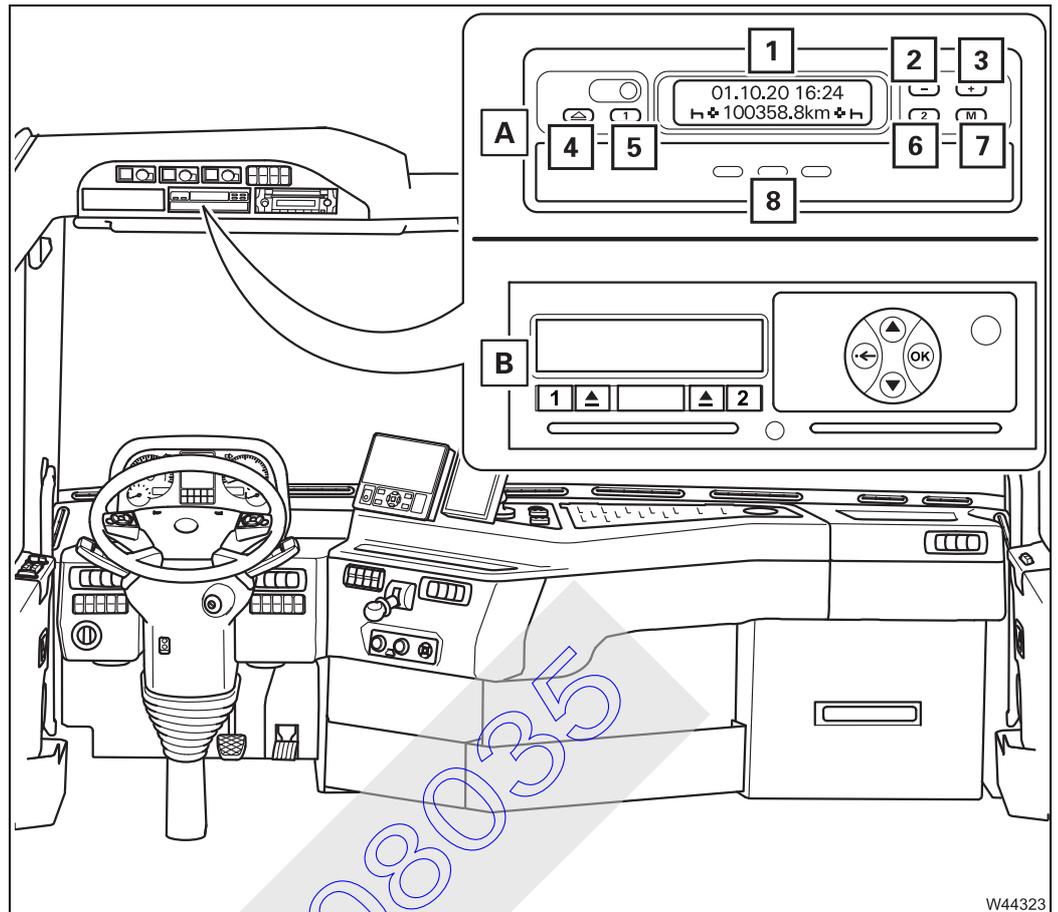


- | | | |
|---|--|--------------|
| 1 | Auxiliary air heater – battery ¹⁾ | ▶ p. 3 - 27 |
| 2 | Auxiliary air heater – driver's cab ¹⁾ | ▶ p. 3 - 27 |
| 3 | Auxiliary water heating system ¹⁾ | ▶ p. 3 - 27 |
| 4 | – Preheating the engine | ▶ p. 5 - 99 |
| | – Preheating the driver's cab | ▶ p. 5 - 99 |
| 5 | Tachograph or cover | ▶ p. 3 - 13 |
| 6 | Radio ^{1), 2)} | ▶ p. 5 - 104 |
| 7 | Forced ventilation for recirculated air
(behind the cover, only automatic on/off) | ▶ p. 5 - 91 |

1) Additional equipment

2) |||▶ *Separate operating manual*

Tachograph



(A) – Tachograph

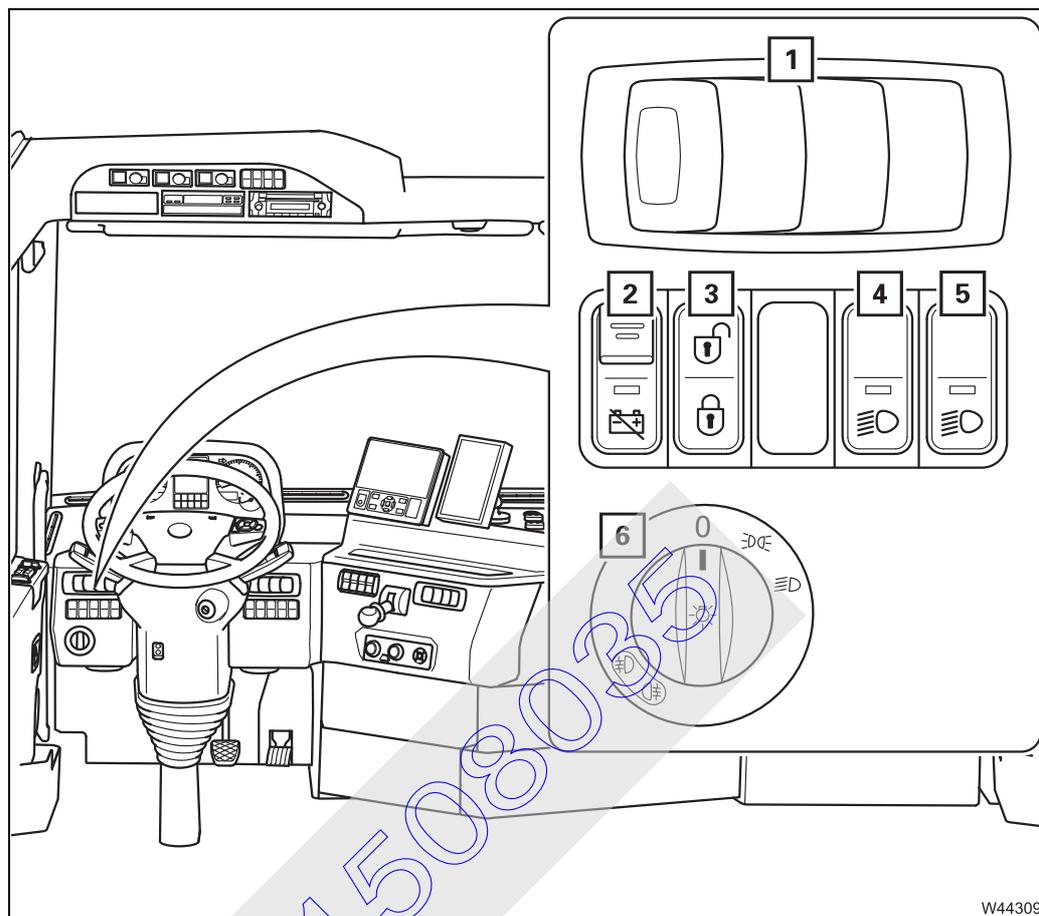
- | | |
|-------------------------------------|----------------|
| 1 Display | ▮▮▮▮ p. 5 - 20 |
| 2 Time correction – | ▮▮▮▮ p. 5 - 23 |
| 3 Time correction + | ▮▮▮▮ p. 3 - 80 |
| 4 Opening the drawer | ▮▮▮▮ p. 3 - 80 |
| 5 Setting the time group – driver 1 | ▮▮▮▮ p. 5 - 21 |
| 6 Setting the time group – driver 2 | ▮▮▮▮ p. 5 - 22 |
| 7 Correction of time | ▮▮▮▮ p. 5 - 22 |
| 8 Drawer | ▮▮▮▮ p. 3 - 80 |
| | ▮▮▮▮ p. 5 - 21 |

(B) – Tachograph 2¹⁾, 2)

- 1) Additional equipment Depending on the equipment (A) or (B) present
- 2) ▮▮▮▮ *Separate operating manual*

3.3.4

Left operating elements



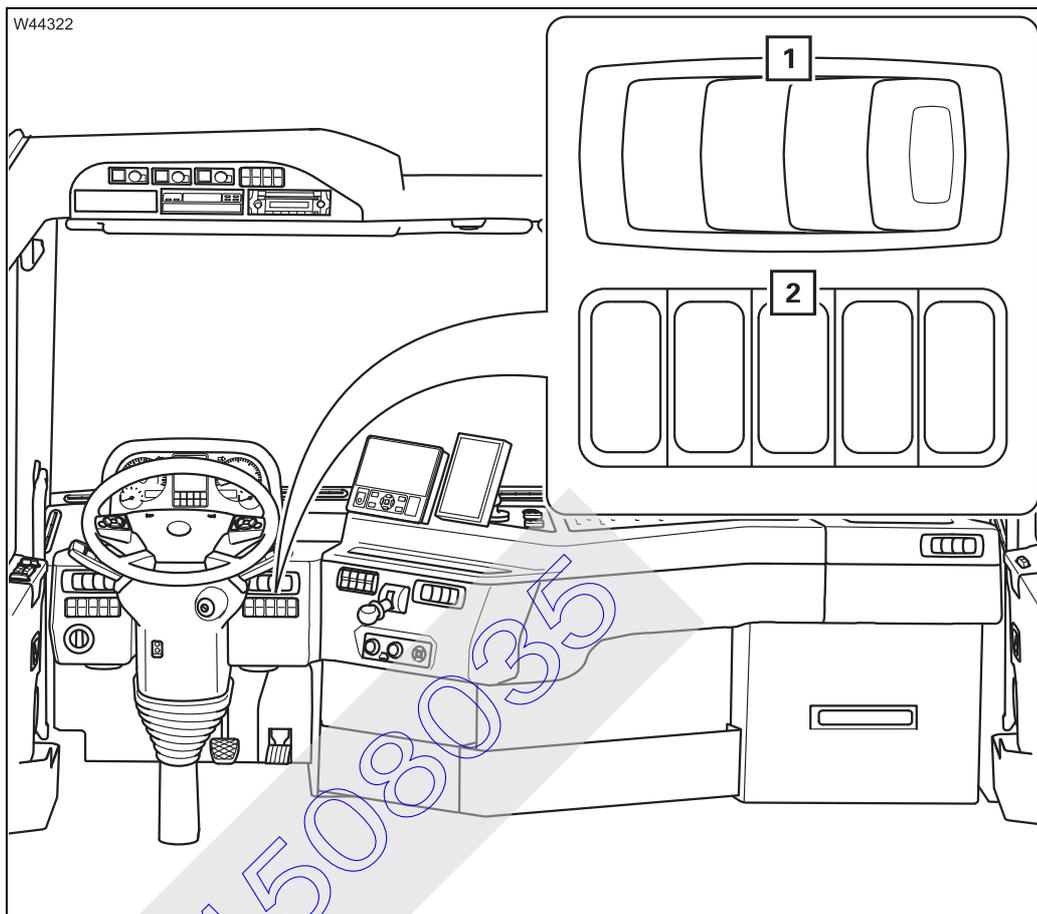
- | | |
|---|----------------|
| 1 Air vent | ▣▣▣▣ p. 5 - 90 |
| 2 Battery master switch I | ▣▣▣▣ p. 3 - 55 |
| 3 Central locking system | ▣▣▣▣ p. 3 - 86 |
| 4 Spotlights III on/off ¹⁾ | ▣▣▣▣ p. 3 - 75 |
| 5 Additional spotlights ^{1,2)} | |
| 6 Lights on/off | |
| – Parking light/headlight | ▣▣▣▣ p. 3 - 76 |
| – Fog tail light | ▣▣▣▣ p. 3 - 76 |
| – Fog light /fog tail light ¹⁾ | ▣▣▣▣ p. 3 - 76 |

1) Additional equipment

2) ▣▣▣▣ *Separate operating manual*

3.3.5

Right operating elements



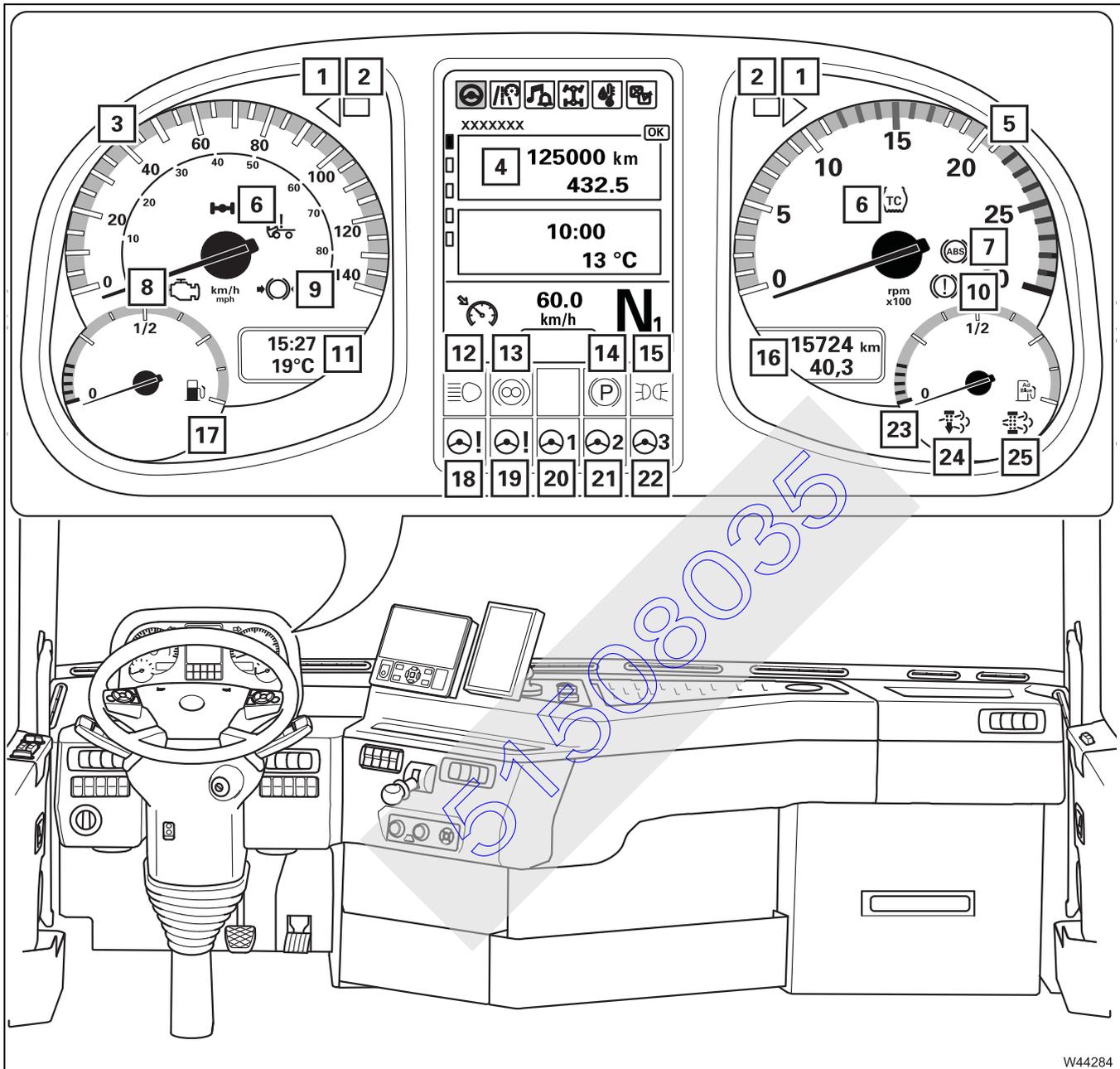
1 Air vent

➡ p. 5 - 90

2 Free for special equipment¹⁾

1) ➡ *Separate operating manual*

3.3.6 Centre control unit



W44284

1 Turn signal indicator lamp	▣▣▣▣ p. 3 - 74
2 Trailer turn signal indicator lamp ¹⁾	▣▣▣▣ p. 3 - 74
3 Speedometer	▣▣▣▣ p. 3 - 80
4 On-board computer operating elements	▣▣▣▣ p. 3 - 22
5 Tachometer	▣▣▣▣ p. 3 - 52
6 No function	
7 ABS/EBS system error	▣▣▣▣ p. 8 - 6
8 Engine malfunction	▣▣▣▣ p. 8 - 6
9 Prompt to brake	▣▣▣▣ p. 8 - 6
10 Brake malfunction	▣▣▣▣ p. 8 - 6
11 Display	
– Time	▣▣▣▣ p. 3 - 80
– Outside temperature	▣▣▣▣ p. 3 - 80
12 Full beam headlight indicator lamp	▣▣▣▣ p. 3 - 74
13 Additional brake indicator lamp	▣▣▣▣ p. 3 - 69
14 Parking brake indicator lamp	▣▣▣▣ p. 3 - 69
15 Lights display	▣▣▣▣ p. 3 - 75
16 Kilometre counter	▣▣▣▣ p. 3 - 80
17 Fuel level display	▣▣▣▣ p. 4 - 7
18 Steering system warning	▣▣▣▣ p. 8 - 5
19 Steering malfunction	▣▣▣▣ p. 8 - 5
20 Steering circuit 1 warning	▣▣▣▣ p. 8 - 4
21 Steering circuit 2 warning	▣▣▣▣ p. 8 - 4
22 Steering circuit 3 warning	▣▣▣▣ p. 8 - 4
23 AdBlue (DEF) tank display	▣▣▣▣ p. 4 - 8
24 Exhaust system manual cleaning active	▣▣▣▣ p. 3 - 53
25 Exhaust system cleaning required	▣▣▣▣ p. 8 - 13

1) Additional equipment

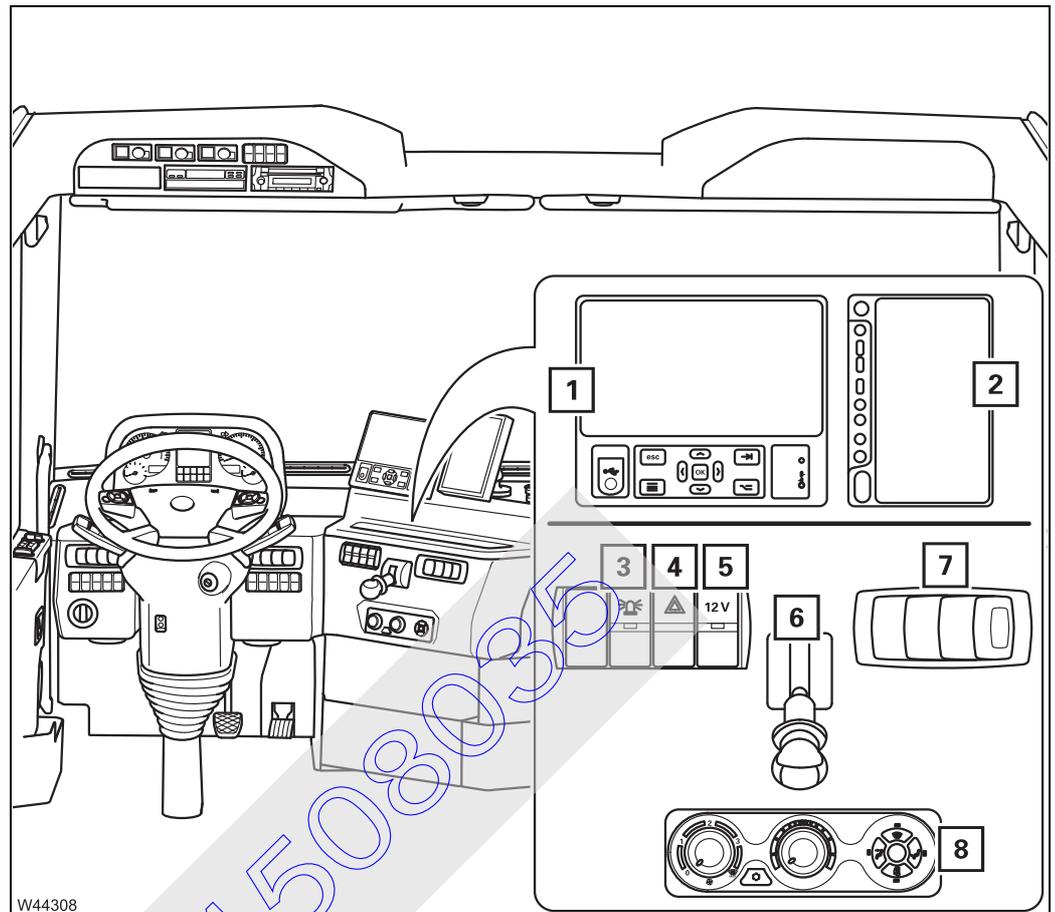


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3.3.7

Side operating elements

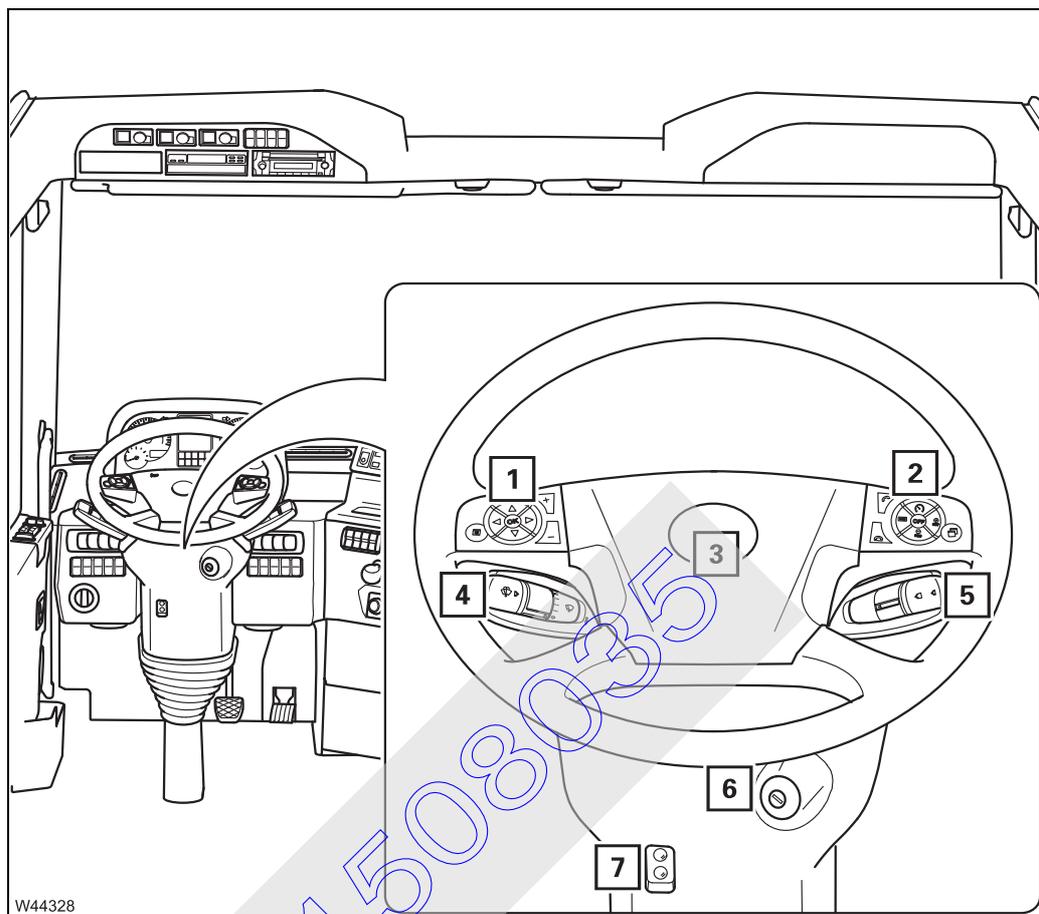


- | | |
|--|---------------|
| 1 CCS control unit | ▮▮▮ p. 3 - 30 |
| 2 BirdView system 270° – monitor ¹⁾ | ▮▮▮ p. 3 - 64 |
| 3 Rotating beacons on/off | ▮▮▮ p. 3 - 75 |
| 4 Hazard warning system on/off | ▮▮▮ p. 3 - 75 |
| 5 12 V sockets on/off ¹⁾ | ▮▮▮ p. 3 - 57 |
| 6 Parking brake | ▮▮▮ p. 3 - 69 |
| 7 Air vent | ▮▮▮ p. 5 - 90 |
| 8 Heating and air-conditioning system operating elements ¹⁾ | ▮▮▮ p. 3 - 26 |

¹⁾ Additional equipment

3.3.8

Steering column/steering wheel operating elements

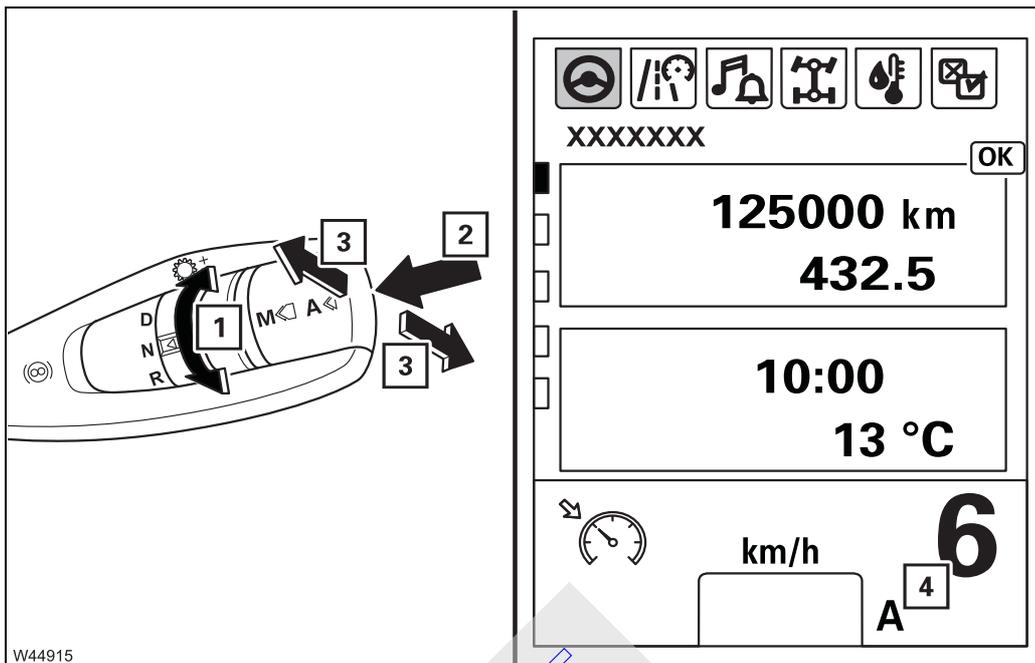


W44328

- | | |
|---|----------------|
| 1 On-board computer operating elements | ▣▣▣▣ p. 3 - 22 |
| 2 Operation: | |
| – Setting idling speed | ▣▣▣▣ p. 3 - 51 |
| – Setting the cruise control | ▣▣▣▣ p. 3 - 52 |
| – Setting the Temposet | ▣▣▣▣ p. 3 - 52 |
| – Mobile phone operating elements | ▣▣▣▣ p. 3 - 84 |
| 3 Horn | ▣▣▣▣ p. 3 - 73 |
| 4 Headlight flasher/full beam headlight | ▣▣▣▣ p. 3 - 73 |
| Turn signal indicator/wiper-washing system | ▣▣▣▣ p. 3 - 74 |
| 5 – Transmission operating elements | ▣▣▣▣ p. 3 - 21 |
| – Engine retarder/transmission retarder ¹⁾ | ▣▣▣▣ p. 3 - 68 |
| 6 Ignition lock | ▣▣▣▣ p. 3 - 51 |
| 7 Adjusting the steering column | ▣▣▣▣ p. 5 - 16 |

¹⁾ Additional equipment

Transmission operating elements

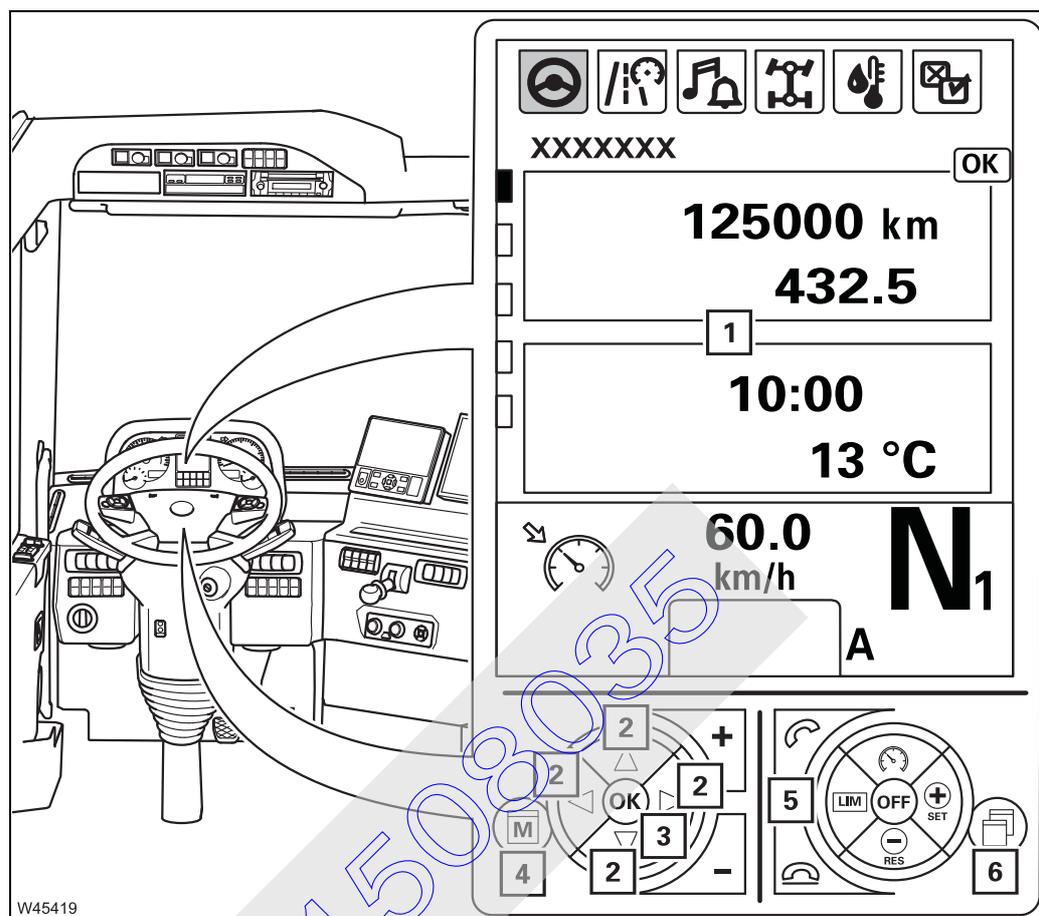


- 1 Select transmission mode
- 2 Change operating mode
- 3 Perform change of gear
- 4 Transmission display

- ▶▶▶▶▶ p. 3 - 61
- ▶▶▶▶▶ p. 3 - 61
- ▶▶▶▶▶ p. 3 - 62
- ▶▶▶▶▶ p. 3 - 62

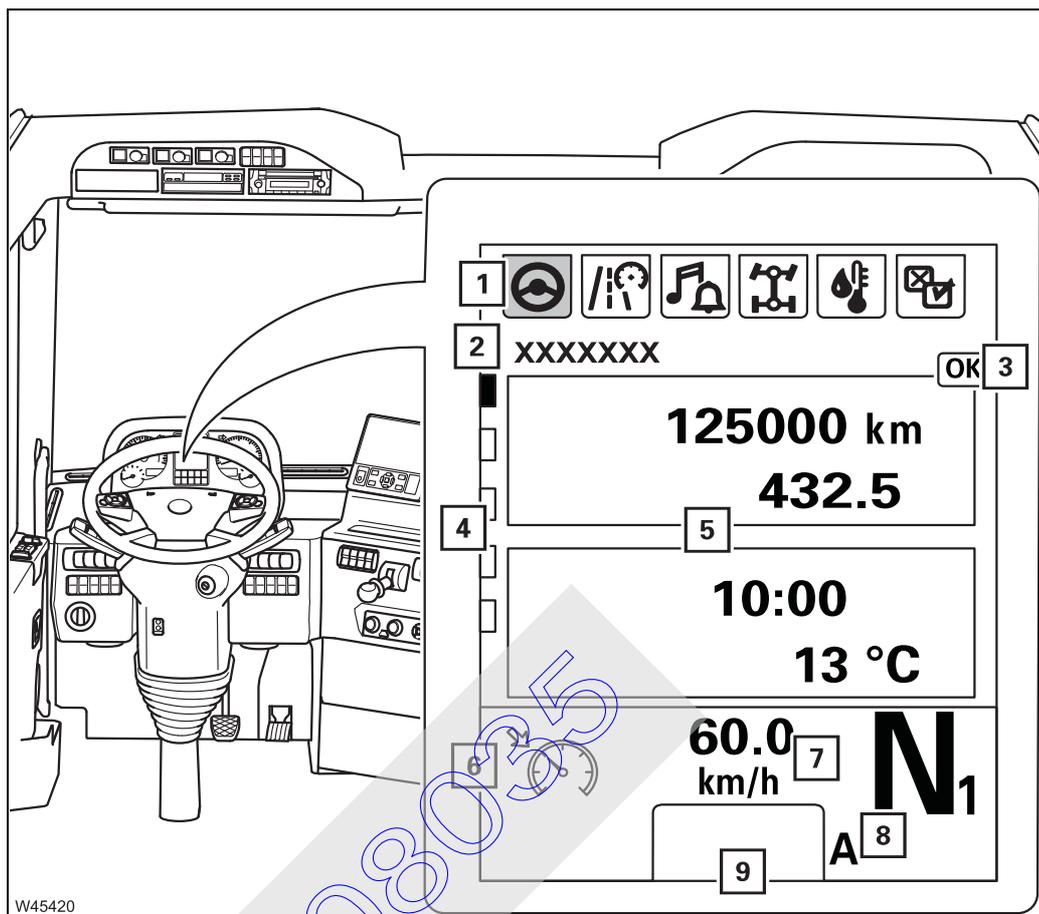
3.3.9

On-board computer operating elements



- | | |
|-------------------------------------|-------------|
| 1 On-board computer display | ➡ p. 3 - 23 |
| 2 Selector buttons | ➡ p. 3 - 82 |
| 3 Opening/closing windows for input | ➡ p. 3 - 83 |
| 4 Saving / retrieving favourites | ➡ p. 3 - 83 |
| 5 Mobile phone operating elements | ➡ p. 3 - 84 |
| 6 Driving systems menu group | |
| – Setting idling speed | ➡ p. 4 - 17 |
| – Idling speed menu | ➡ p. 5 - 39 |
| – Eco Drive menu | ➡ p. 5 - 39 |

On-board computer display

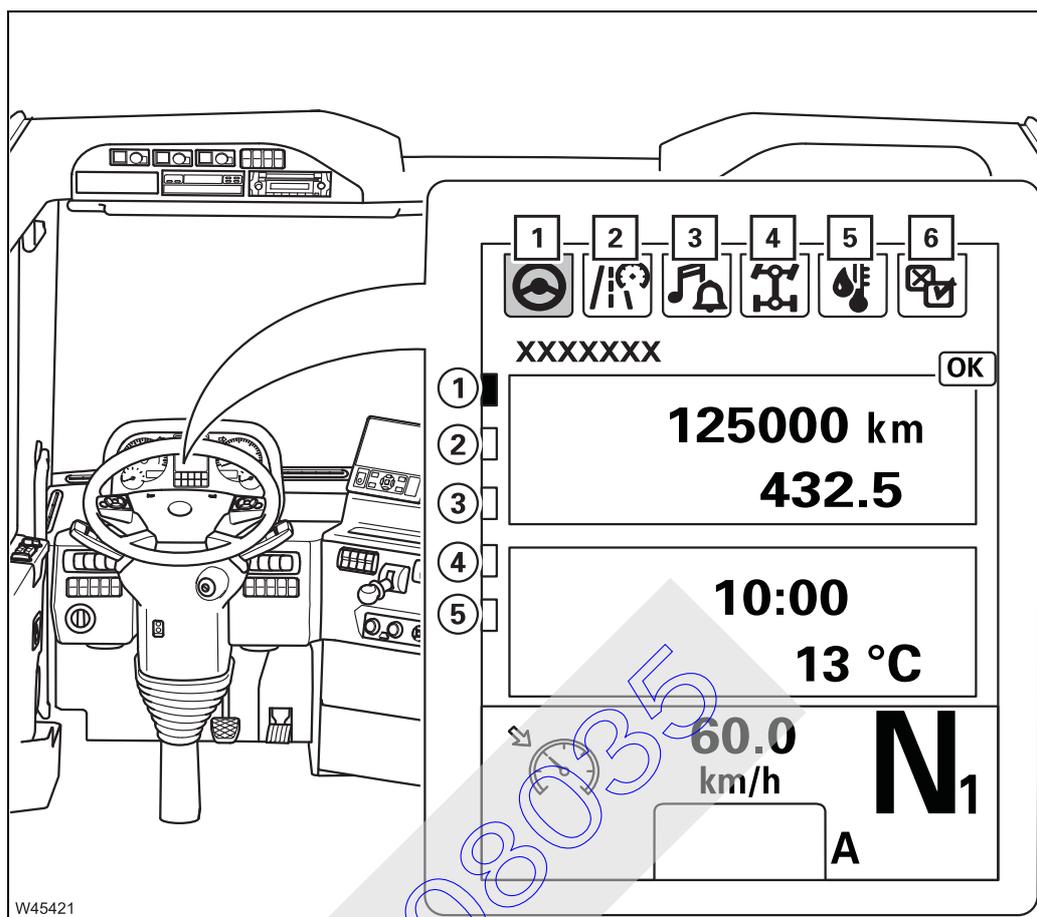


W45420

- | | |
|--|---------------|
| 1 Menu groups | |
| – Overview | ▮▮▮ p. 3 - 24 |
| – Selecting a menu group | ▮▮▮ p. 3 - 82 |
| 2 Display open menu (name) | ▮▮▮ p. 3 - 82 |
| 3 Display input window present | ▮▮▮ p. 3 - 83 |
| 4 Menus | |
| – Overview | ▮▮▮ p. 3 - 24 |
| – Selecting a menu | ▮▮▮ p. 3 - 82 |
| 5 Display area menu | ▮▮▮ p. 3 - 23 |
| Display area message | ▮▮▮ p. 8 - 7 |
| 6 – Cruise control display preselected | ▮▮▮ p. 3 - 52 |
| – Temposet display preselected | ▮▮▮ p. 3 - 52 |
| 7 – Display selected cruise control speed | ▮▮▮ p. 3 - 52 |
| – Display selected Temposet speed | ▮▮▮ p. 3 - 52 |
| 8 Transmission display | ▮▮▮ p. 3 - 62 |
| 9 Display area message | ▮▮▮ p. 8 - 7 |



Overview of menu groups



1 Tour data menu group

- ① Truck info menu ▣▣▣▣ p. 5 - 27
- ② From start menu ▣▣▣▣ p. 5 - 28
- ③ Range menu ▣▣▣▣ p. 5 - 28
- ④ Reset 1 menu ▣▣▣▣ p. 5 - 29
- ⑤ Reset 2 menu ▣▣▣▣ p. 5 - 29

2 Driving menu group

- ① Speed ▣▣▣▣ p. 5 - 29

3 Audio and communication menu group

- ① Alarm menu ▣▣▣▣ p. 5 - 29
- ② Telephone menu¹⁾ ▣▣▣▣ p. 3 - 84

¹⁾ Additional equipment

4 Maintenance menu group

- ① Maintenance menu ▣▣▣▣▶ p. 5 - 30

5 Monitoring and information menu group

- ① Supply pressure menu ▣▣▣▣▶ p. 5 - 32
- ② Coolant menu ▣▣▣▣▶ p. 5 - 32
- ③ Engine menu ▣▣▣▣▶ p. 5 - 33
- ④ Events menu ▣▣▣▣▶ p. 5 - 34
- ⑤ Diagnostics menu ▣▣▣▣▶ p. 5 - 34

6 Settings menu group

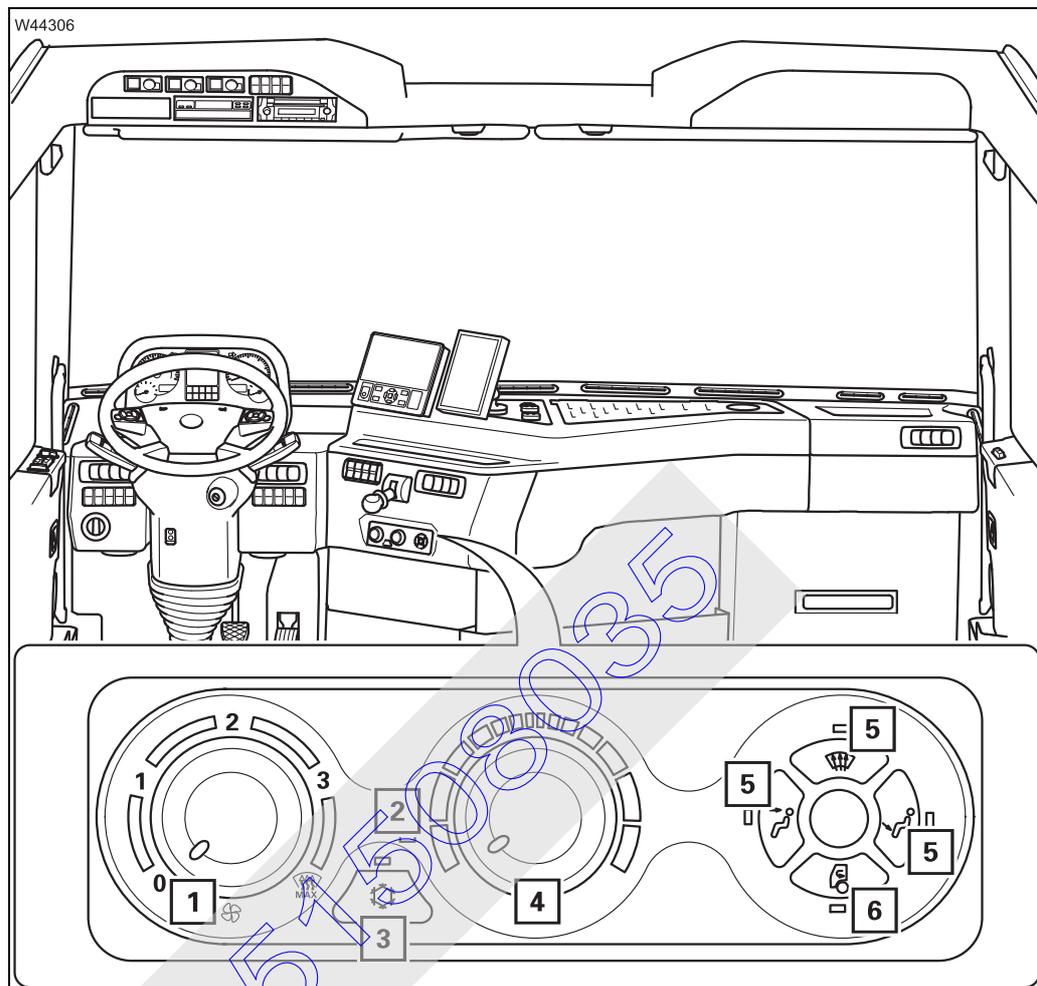
- ① Menu menu ▣▣▣▣▶ p. 5 - 34
- ② Lighting menu ▣▣▣▣▶ p. 5 - 35
- ③ Language menu ▣▣▣▣▶ p. 5 - 36
- ④ Consumables menu ▣▣▣▣▶ p. 5 - 37
- ⑤ Systems menu ▣▣▣▣▶ p. 5 - 37

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3.3.10

Heating and air-conditioning system operating elements

Standard

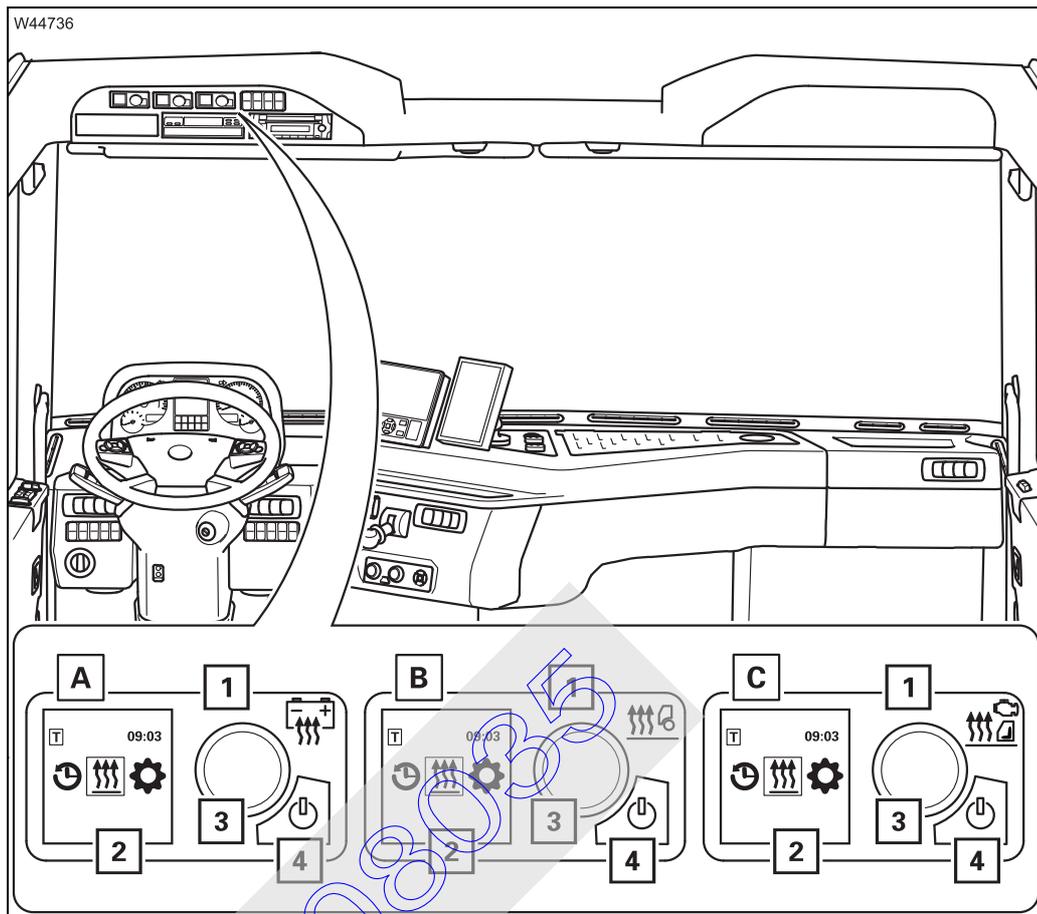


- | | |
|--|-------------|
| 1 Setting the fan | ➡ p. 5 - 89 |
| 2 Preheating display on/off ¹⁾ , 2) | ➡ p. 5 - 98 |
| 3 Air-conditioning system | ➡ p. 5 - 94 |
| 4 Setting the temperature | ➡ p. 5 - 89 |
| 5 Air distribution | ➡ p. 5 - 90 |
| 6 Setting fresh air/recirculated air | ➡ p. 5 - 91 |

1) Additional equipment

2) For auxiliary water heating system only

Auxiliary heater

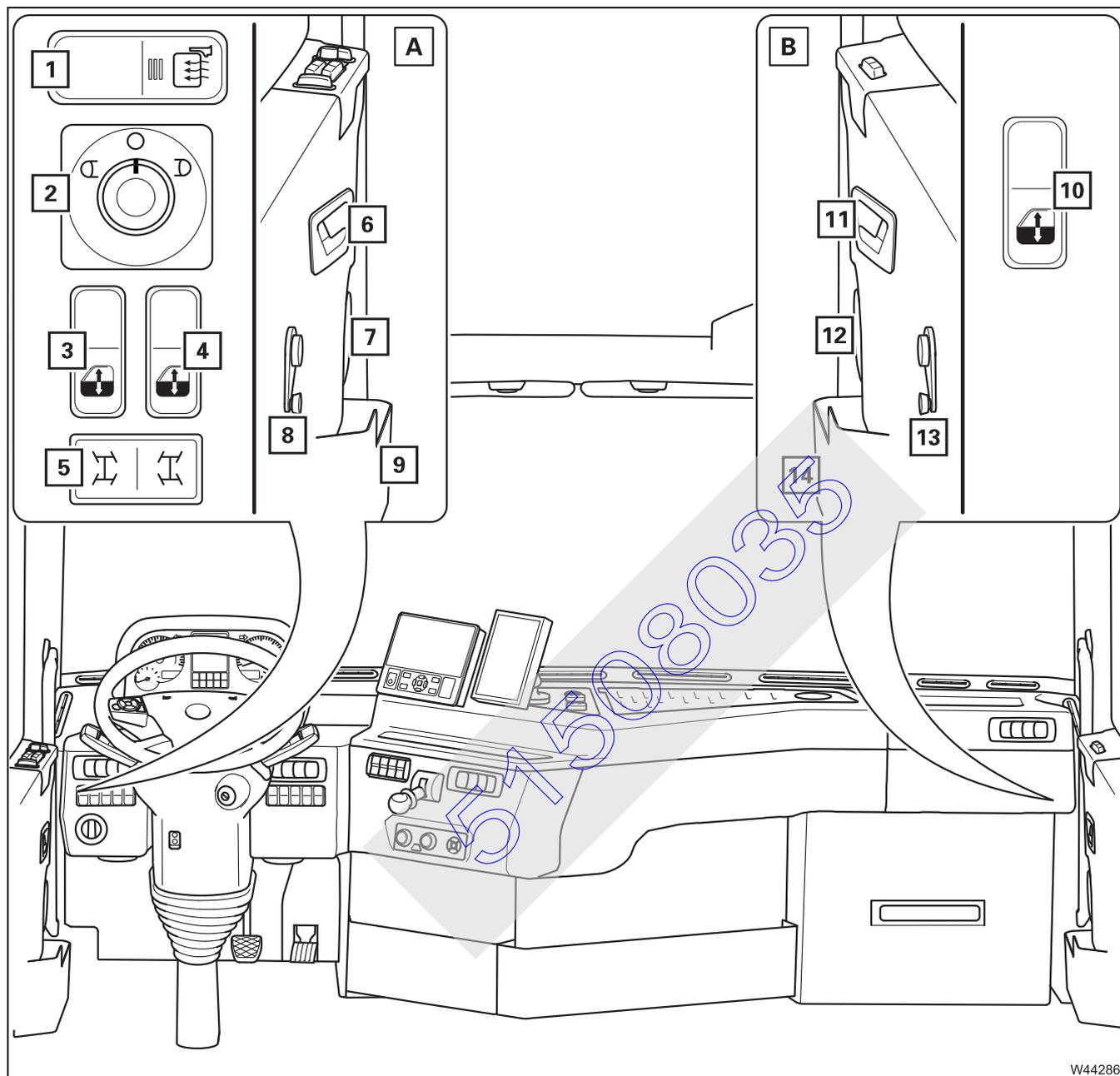


- A** Auxiliary air heater – battery ▣▣▣▣ p. 5 - 103
- B** Auxiliary air heater – driver's cab ▣▣▣▣ p. 5 - 101
- C** Auxiliary water heating system ▣▣▣▣ p. 5 - 98

- 1** UniControl control unit
- 2** Display ▣▣▣▣ p. 11 - 162
- 3** Jog dial
- 4** On/Off switch with lamp

3.3.11

Door operating elements



A Driver's door

- 1 Mirror heating ▶▶▶▶▶ p. 5 - 9
- 2 Adjusting mirrors ▶▶▶▶▶ p. 5 - 9
- 3 Window winder Driver's door²⁾ ▶▶▶▶▶ p. 3 - 85
- 4 Window winder Passenger door²⁾ ▶▶▶▶▶ p. 3 - 85
- 5 Separate manual steering ▶▶▶▶▶ p. 3 - 70
- 6 Open/lock/unlock door
 - Operation with key and handle ▶▶▶▶▶ p. 3 - 86
 - Operation at central locking system ▶▶▶▶▶ p. 3 - 86
- 7 Loudspeakers
- 8 Driver's door window crank²⁾ ▶▶▶▶▶ p. 3 - 85
- 9 Rest ▶▶▶▶▶ p. 3 - 86

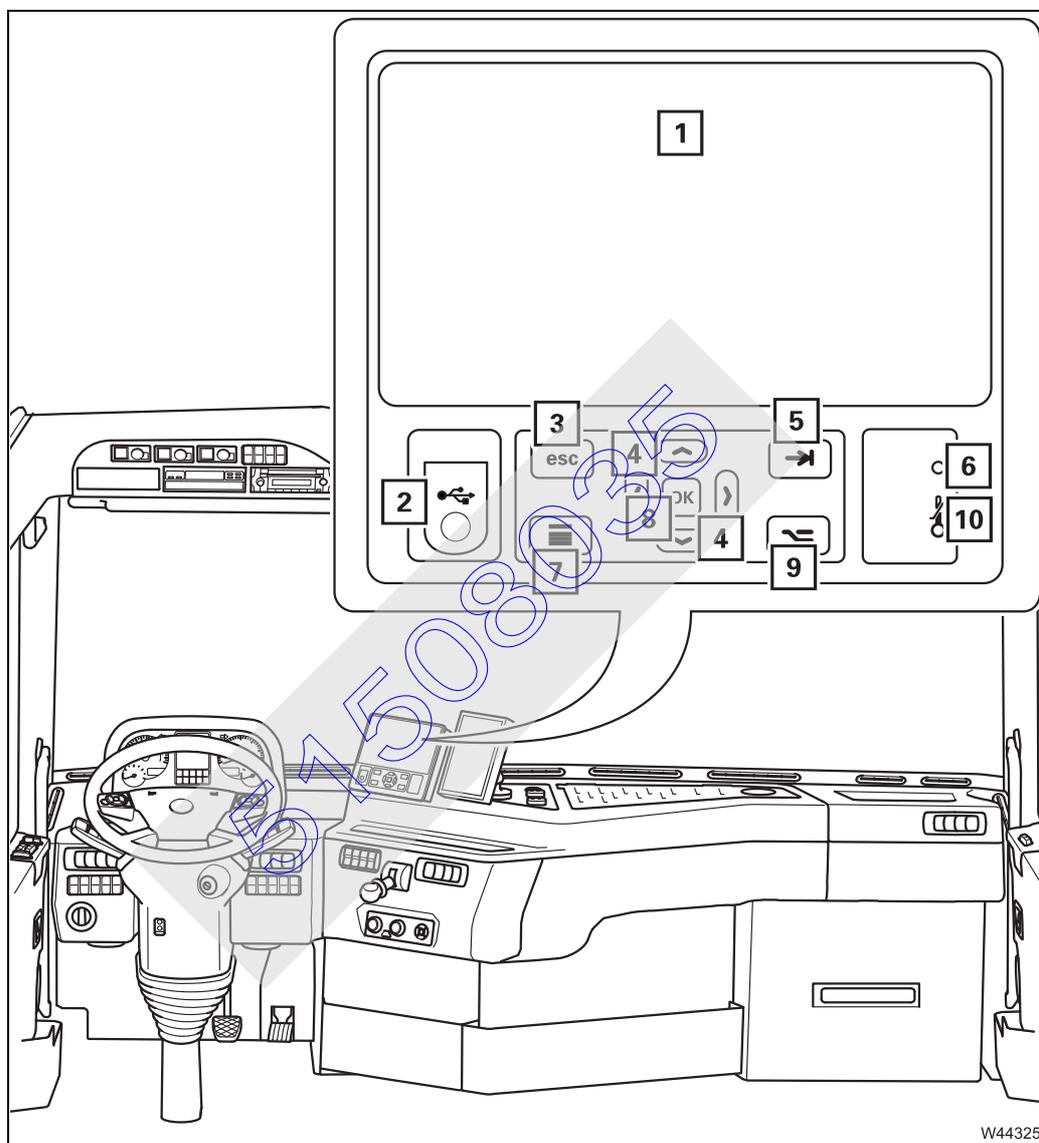
B Passenger door

- 10 Window winder Passenger door²⁾ ▶▶▶▶▶ p. 3 - 85
- 11 Open/lock/unlock door
 - Operation with key and handle ▶▶▶▶▶ p. 3 - 86
 - Operation at central locking system ▶▶▶▶▶ p. 3 - 86
- 12 Loudspeakers
- 13 Passenger door window crank²⁾ ▶▶▶▶▶ p. 3 - 85
- 14 Rest ▶▶▶▶▶ p. 3 - 86

- 1) Additional equipment
- 2) Depending on the equipment

3.4 Crane control operating elements

3.4.1 CCS control unit



W44325

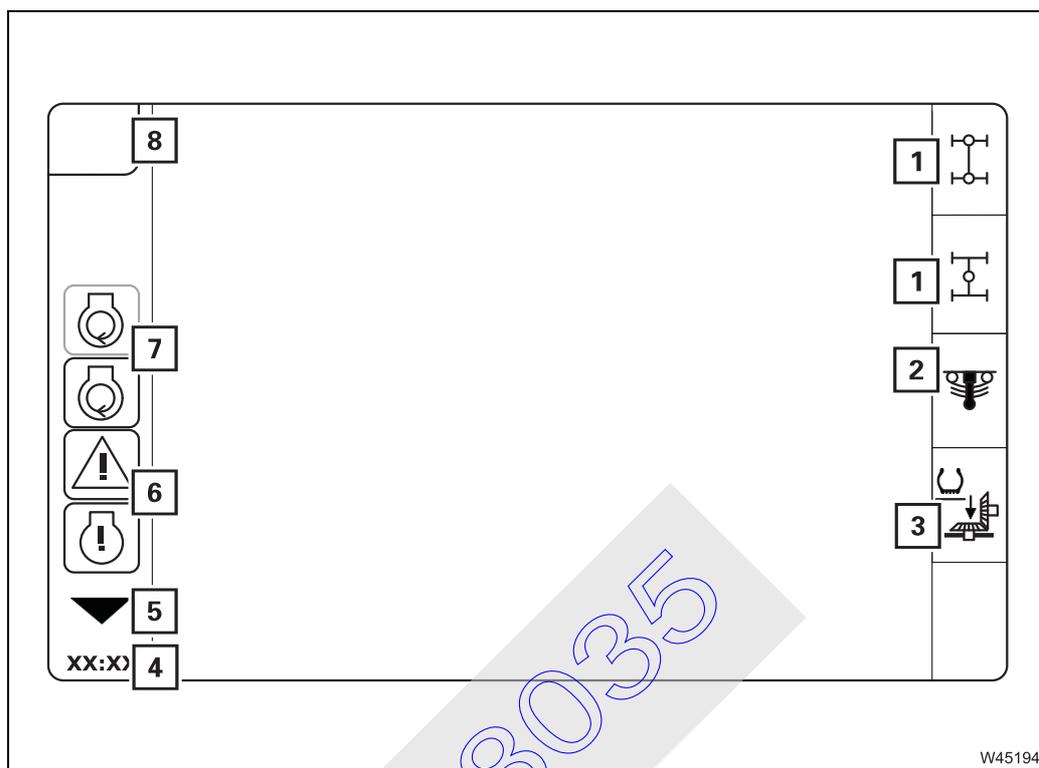
- | | |
|---|-----------------|
| 1 CCS display
Overview start menu | ▣▣▣▣▶ p. 3 - 33 |
| 2 Service/diagnostics connection ¹⁾ | ▣▣▣▣▶ p. 3 - 81 |
| 3 Exit menu/input mode | ▣▣▣▣▶ p. 3 - 58 |
| 4 Selector buttons | ▣▣▣▣▶ p. 3 - 58 |
| 5 Select / deselect favourites | ▣▣▣▣▶ p. 3 - 60 |
| 6 No function | |
| 7 Overview of menu groups – Operation | ▣▣▣▣▶ p. 3 - 59 |
| Overview of menu groups – Overview | ▣▣▣▣▶ p. 3 - 34 |
| 8 Input confirmation | ▣▣▣▣▶ p. 3 - 58 |
| 9 No function | |
| 10 Display temperature warning display | ▣▣▣▣▶ p. 3 - 59 |

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

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3.4.2

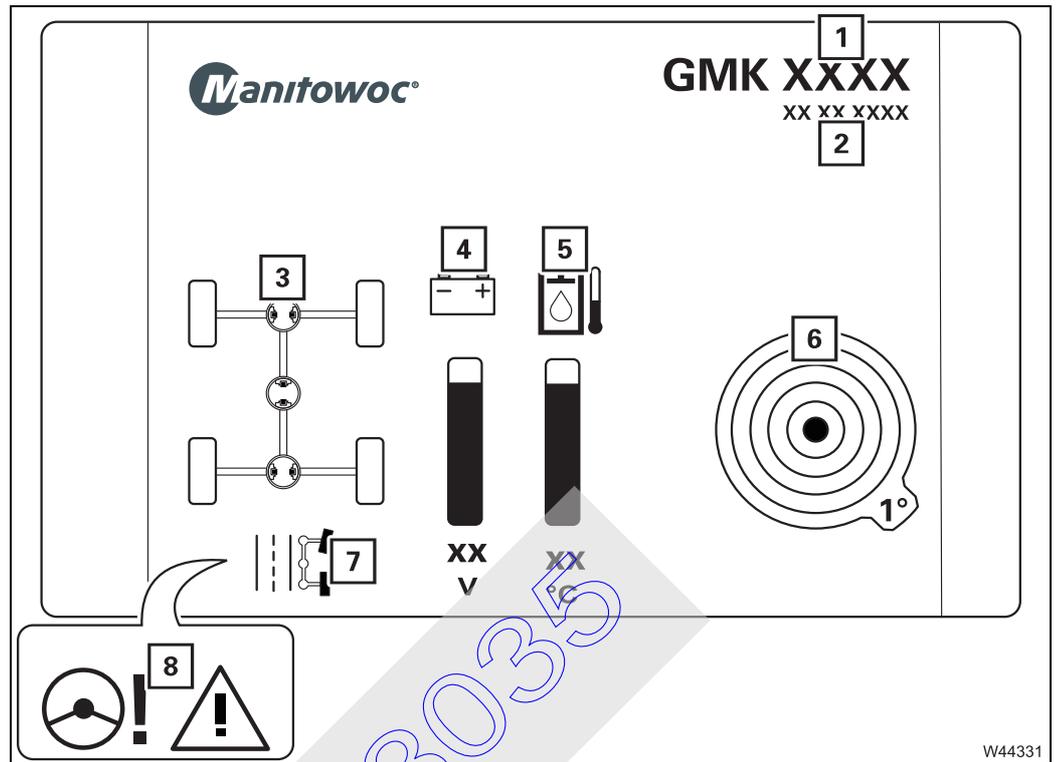
CCS – Menu-dependent displays



- | | | |
|---|---|----------------------------|
| 1 | Transverse differential locks display
Longitudinal differential lock display | ➡ p. 3 - 67
➡ p. 3 - 67 |
| 2 | Suspension display | ➡ p. 3 - 72 |
| 3 | Transfer case display | ➡ p. 3 - 66 |
| 4 | – Time display
– Setting the time | ➡ p. 11 - 20 |
| 5 | Browse | ➡ p. 9 - 104 |
| 6 | Error messages display | ➡ p. 8 - 37 |
| 7 | Warning messages display | ➡ p. 8 - 23 |
| 8 | Current menu display | |

3.4.3

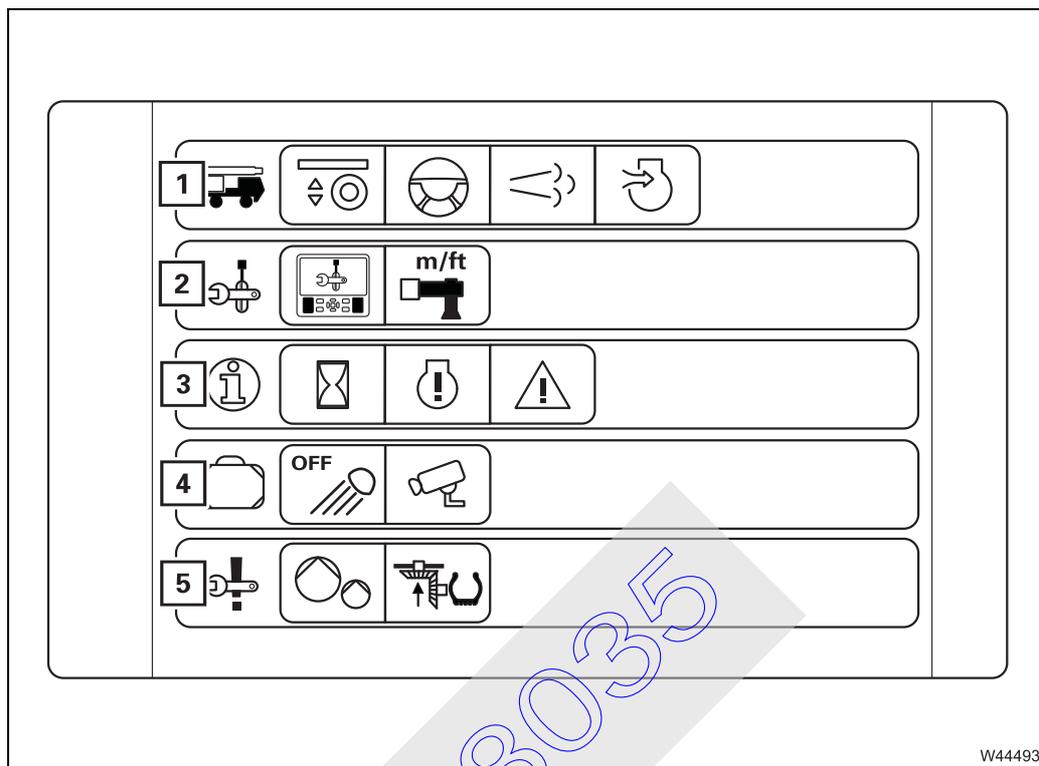
CCS – Start menu



- 1 Crane type display
- 2 Serial number display
- 3 Display of transverse and longitudinal differential locks on/off ▣▣▣▣ p. 3 - 38
- 4 Voltage monitoring display ▣▣▣▣ p. 4 - 15
- 5 Hydraulic oil temperature display ▣▣▣▣ p. 4 - 15
- 6 Current inclination display ▣▣▣▣ p. 3 - 79
- 7 Steering mode display ▣▣▣▣ p. 3 - 70
- 8 – Steering malfunction ▣▣▣▣ p. 8 - 5
- Steering system warning ▣▣▣▣ p. 8 - 5

3.4.4

CCS – Overview of menu groups



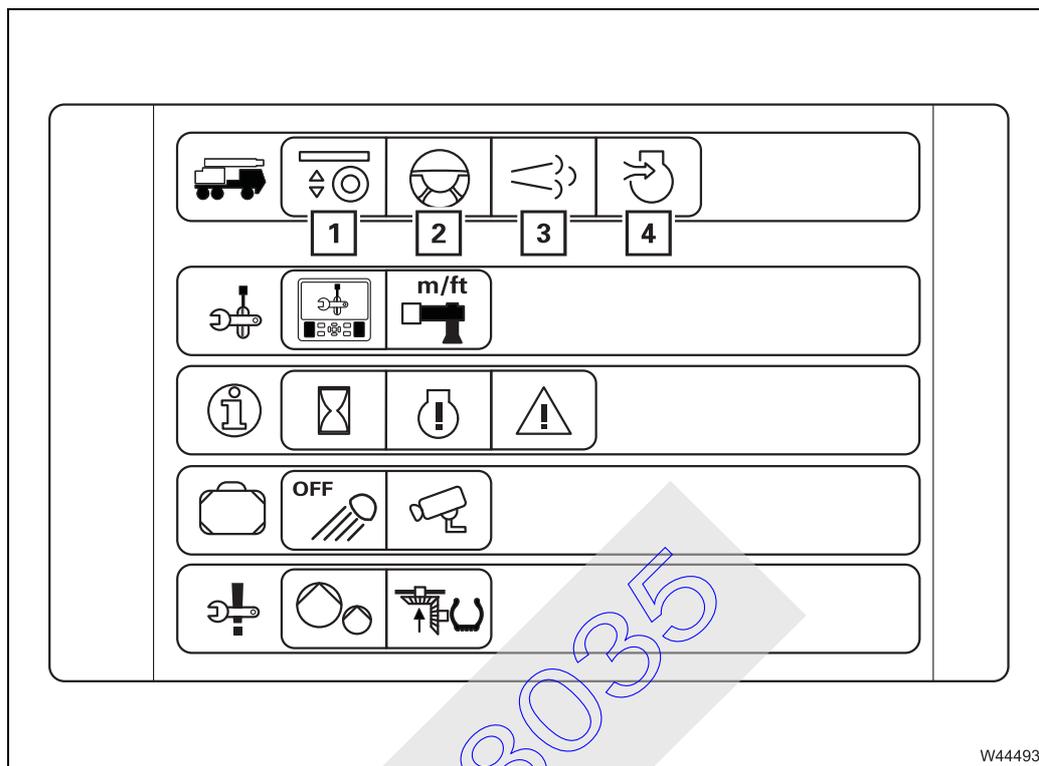
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- 1 Carrier menu group** ▣▣▣▣▶ p. 3 - 36
 - Suspension/level adjustment menu
 - Driving menu
 - Exhaust system menu¹⁾
 - Air intake inhibitor menu¹⁾
- 2 Settings menu group** ▣▣▣▣▶ p. 3 - 41
 - Set display brightness menu
 - Switch over outrigger span display
- 3 Information menu group** ▣▣▣▣▶ p. 3 - 43
 - Operating hours menu
 - Engine/transmission error menu
 - Crane operation error menu
- 4 Various controls menu group** ▣▣▣▣▶ p. 3 - 47
 - Outrigger lighting on/off
 - Reversing camera on/off¹⁾
- 5 Emergency operations menu group** ▣▣▣▣▶ p. 3 - 48
 - Switching emergency operation on/off
 - Switching towing mode on/off

¹⁾ Additional equipment

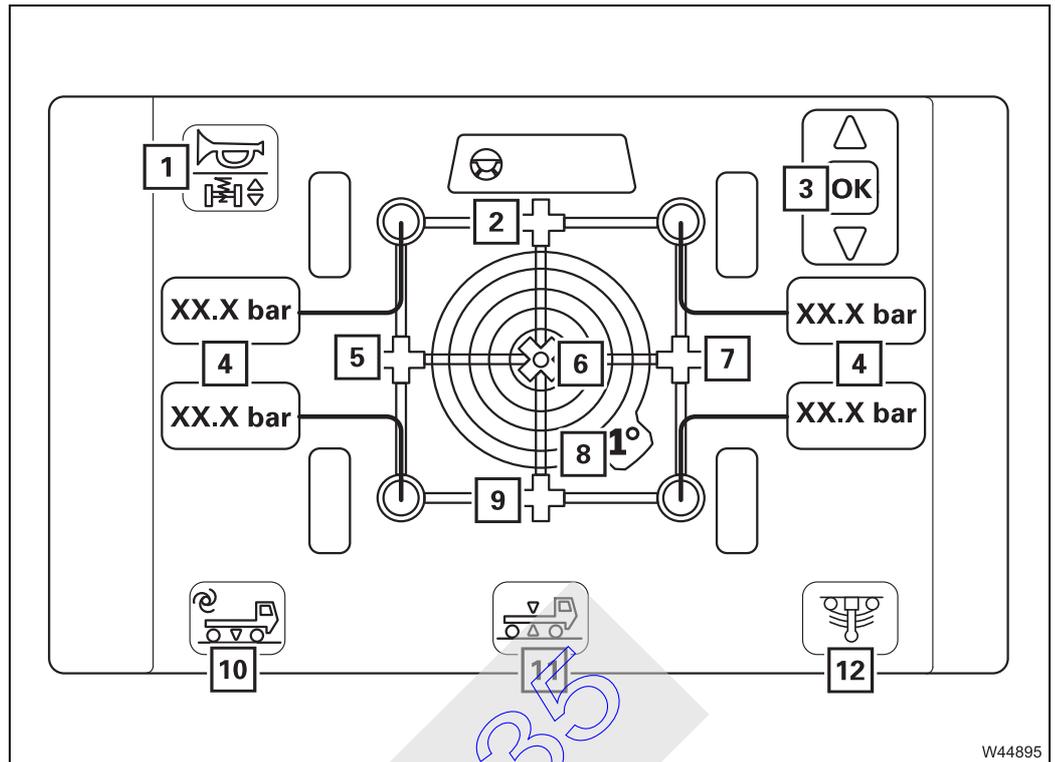
3.4.5

Carrier menu group



- | | |
|------------------------------------|-------------|
| 1 Suspension/level adjustment menu | ➡ p. 3 - 37 |
| 2 Driving menu | ➡ p. 3 - 38 |
| 3 Exhaust system menu | ➡ p. 3 - 39 |
| 4 Air intake inhibitor menu | ➡ p. 3 - 40 |

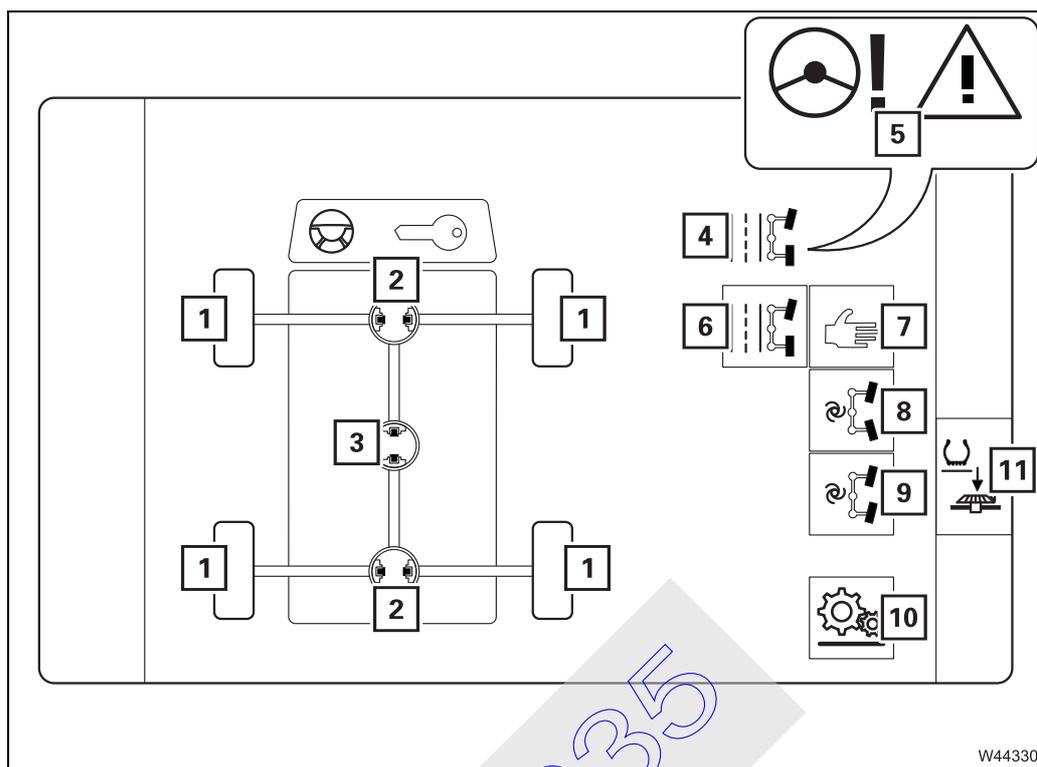
Suspension/level adjustment menu



- | | |
|--|----------------|
| 1 Switching the horn on/off | ▮▮▮▮ p. 3 - 79 |
| 2 Front level pre-selection | ▮▮▮▮ p. 3 - 77 |
| 3 Level adjustment system enabled display | ▮▮▮▮ p. 3 - 78 |
| 4 Suspension operation pressure display | ▮▮▮▮ p. 3 - 73 |
| 5 Left level pre-selection | ▮▮▮▮ p. 3 - 77 |
| 6 Overall level pre-selection | ▮▮▮▮ p. 3 - 77 |
| 7 Right level pre-selection | ▮▮▮▮ p. 3 - 77 |
| 8 Current inclination display | ▮▮▮▮ p. 3 - 79 |
| 9 Rear level pre-selection | ▮▮▮▮ p. 3 - 77 |
| 10 Setting the on-road level | ▮▮▮▮ p. 3 - 78 |
| 11 Vehicle level display | ▮▮▮▮ p. 3 - 78 |
| 12 Suspension on/off | ▮▮▮▮ p. 3 - 72 |

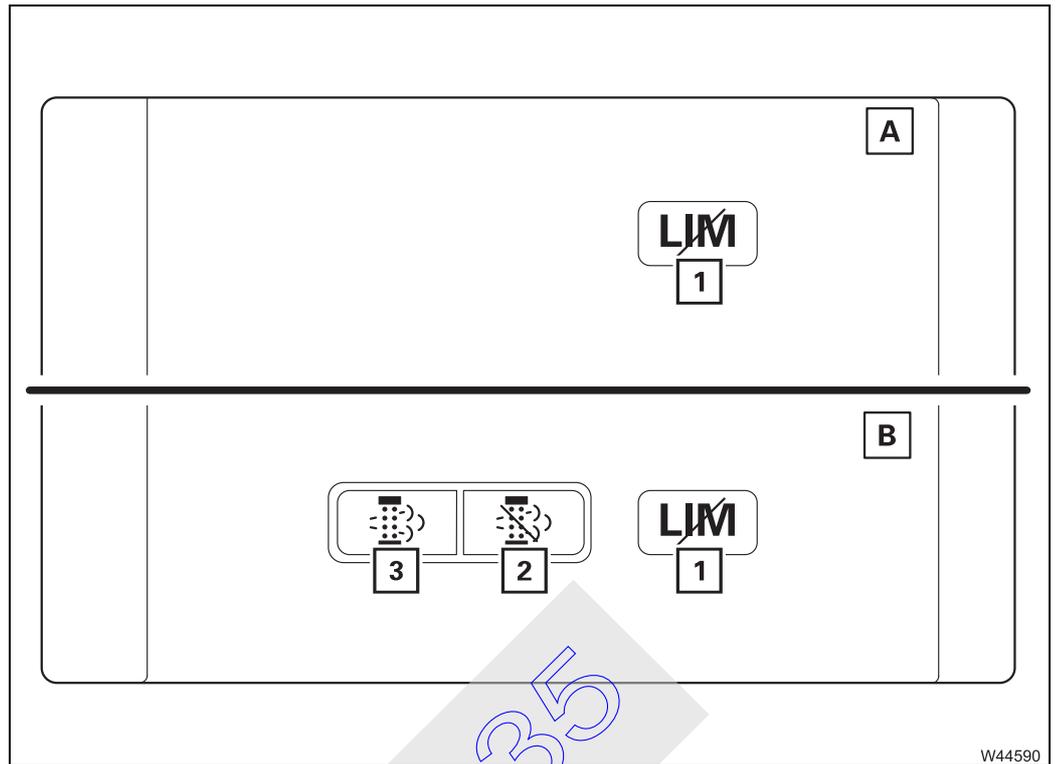


Driving menu



- | | |
|--|----------------|
| 1 Current wheel position display | ▣▣▣▣ p. 3 - 72 |
| 2 – Transverse differential locks display | ▣▣▣▣ p. 3 - 67 |
| – Transverse differential locks on/off | ▣▣▣▣ p. 3 - 67 |
| 3 – Longitudinal differential lock display | ▣▣▣▣ p. 3 - 67 |
| – Longitudinal differential lock on/off | ▣▣▣▣ p. 3 - 67 |
| 4 Steering mode display | ▣▣▣▣ p. 3 - 70 |
| 5 – Steering malfunction | ▣▣▣▣ p. 8 - 5 |
| – Steering system warning | ▣▣▣▣ p. 8 - 5 |
| 6 Normal steering mode, on-road driving on/off | ▣▣▣▣ p. 3 - 71 |
| 7 Manual separate steering on/off | ▣▣▣▣ p. 3 - 71 |
| 8 Separate steering for driving around corners on/off | ▣▣▣▣ p. 3 - 71 |
| 9 Separate steering crab travel mode on/off | ▣▣▣▣ p. 3 - 71 |
| 10 Transfer case off-road gear on/off | ▣▣▣▣ p. 3 - 66 |
| 11 Transfer case display | ▣▣▣▣ p. 3 - 66 |

Exhaust system menu



A Only for EU Tier IV

1 Override torque reduction

➡ p. 3 - 53

B Only for EU Tier V

1 Override torque reduction

➡ p. 3 - 53

2 Disable exhaust system cleaning

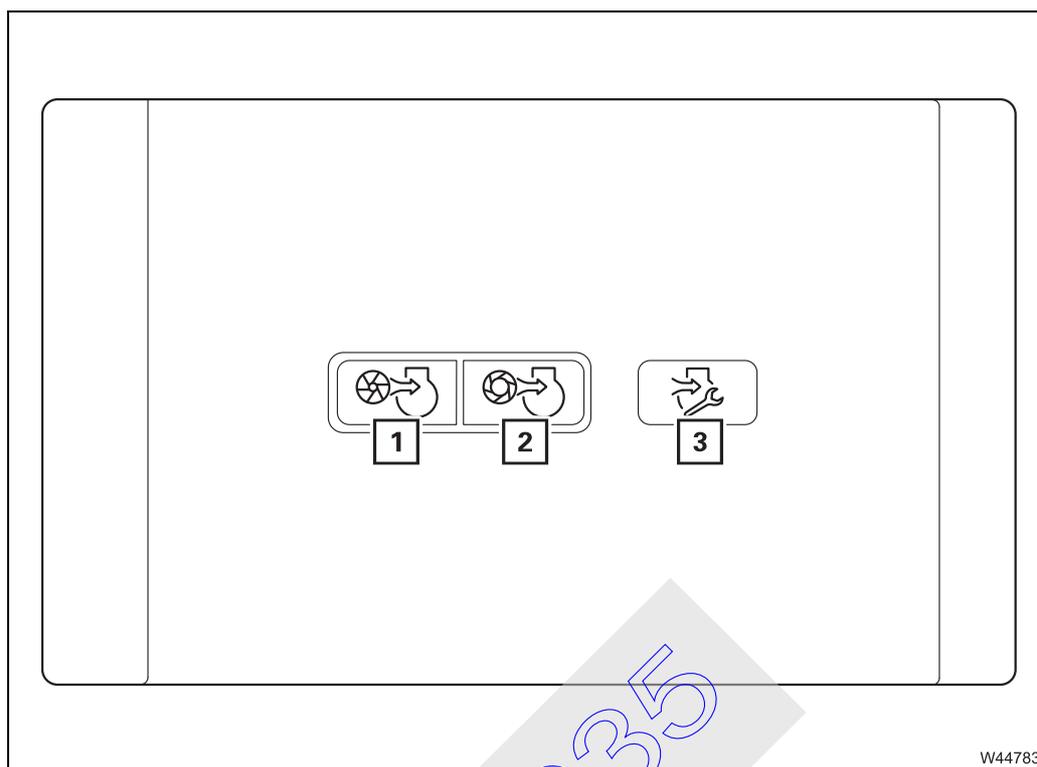
➡ p. 3 - 53

3 Manually start exhaust system cleaning

➡ p. 3 - 53



Air intake inhibitor menu



W44783

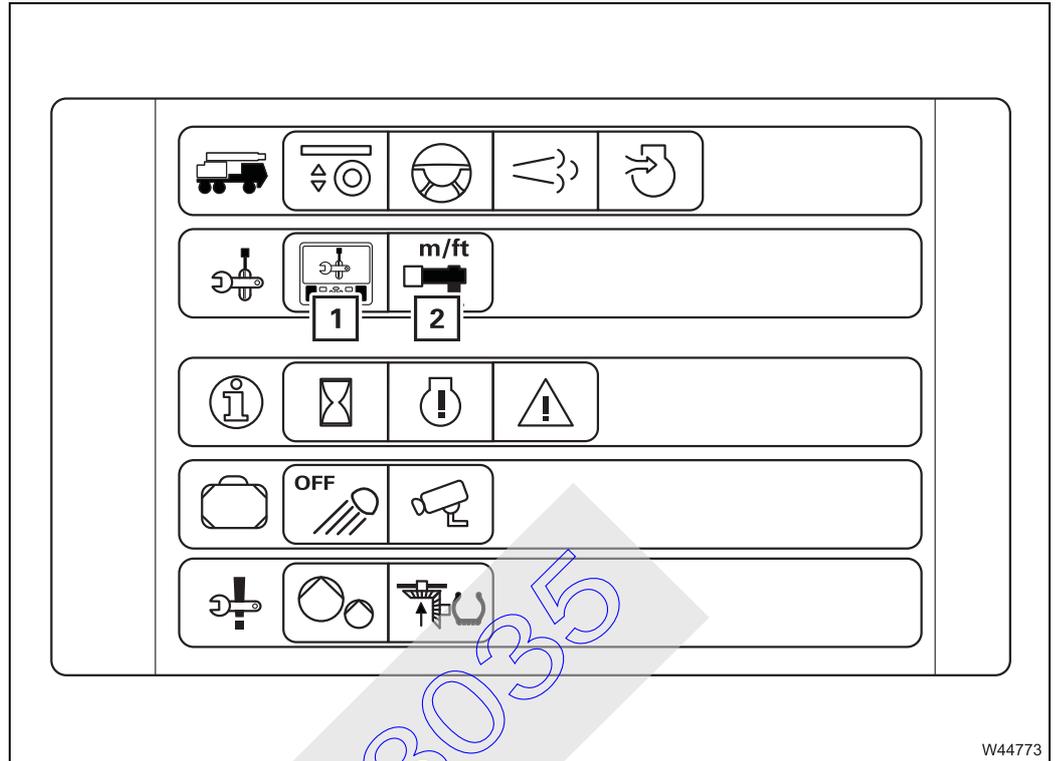
- 1 Close air intake inhibitor^{1), 2)}
- 2 Opening the air intake inhibitor¹⁾
- 3 Air intake inhibitor maintenance^{1), 2)}

▣▣▣▣ p. 3 - 55

- 1) Additional equipment
- 2) Only for check that it is functioning; ▣▣▣▣ *Maintenance manual*

3.4.6

Settings menu group



1 Set display brightness menu

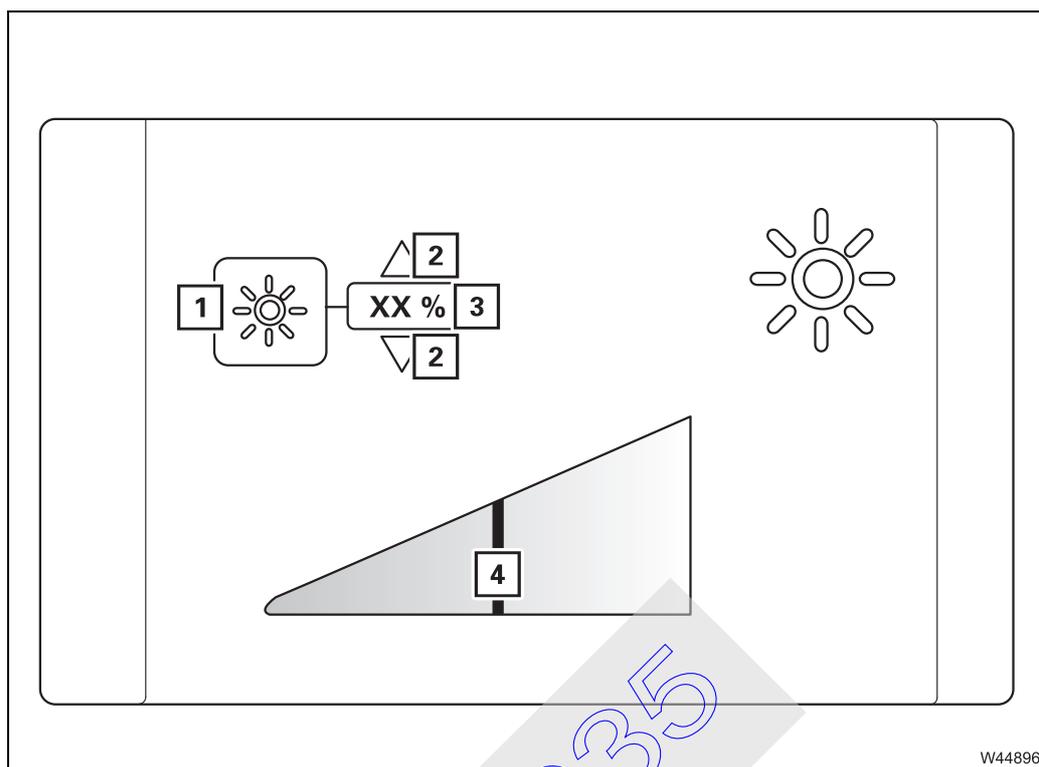
▶▶▶▶ p. 3 - 42

2 Switch over outrigger span display

▶▶▶▶ p. 9 - 113



Set display brightness menu

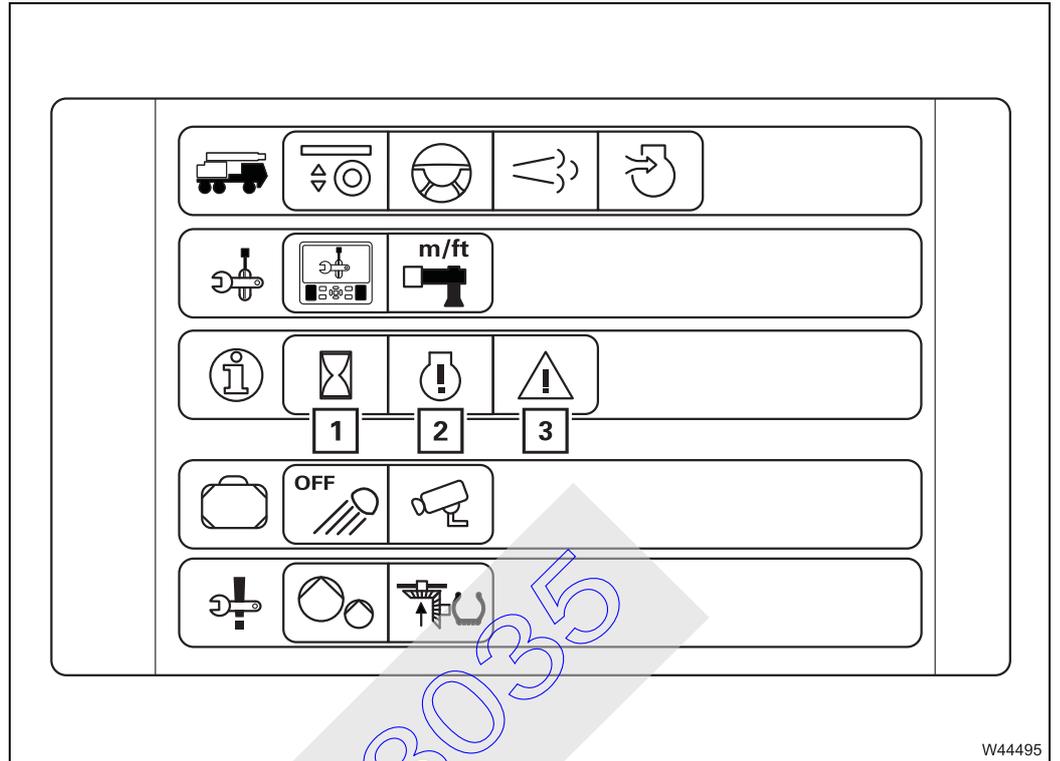


- 1 Set display brightness selection
- 2 Increase/reduce value
- 3 Display in percent
- 4 Display brightness display

▶▶▶ p. 5 - 17

3.4.7

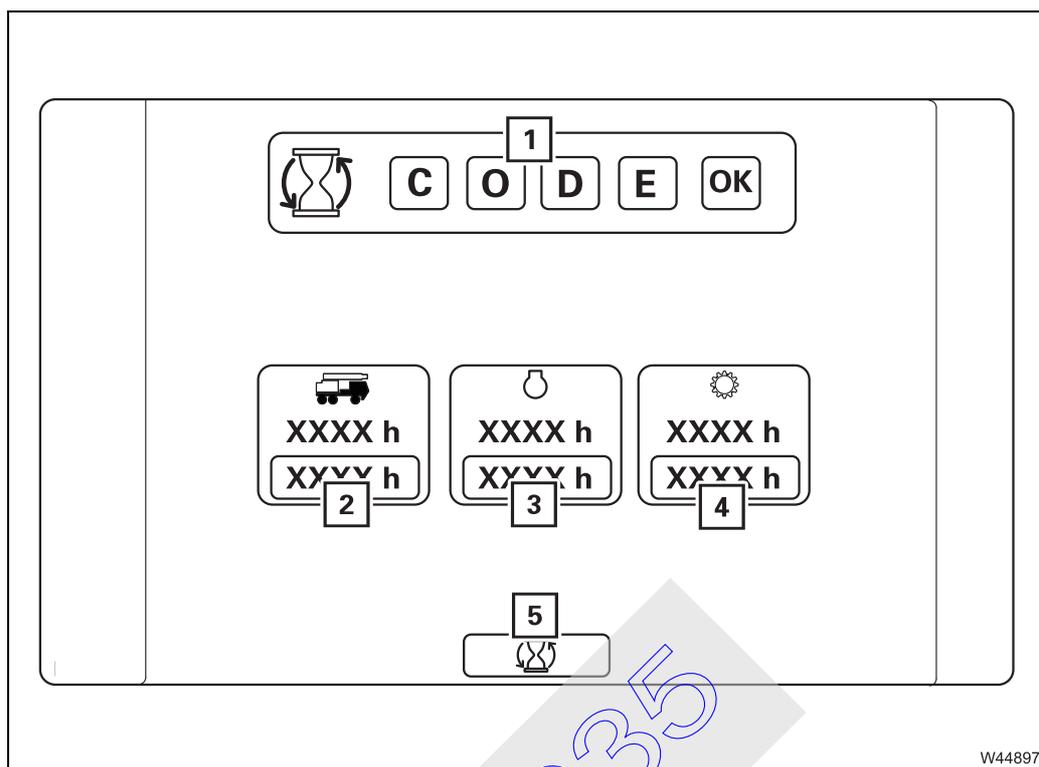
Information menu group



- 1 Operating hours menu ▶▶▶ p. 3 - 44
- 2 Engine/transmission error menu ▶▶▶ p. 3 - 45
- 3 Crane operation error menu ▶▶▶ p. 3 - 46



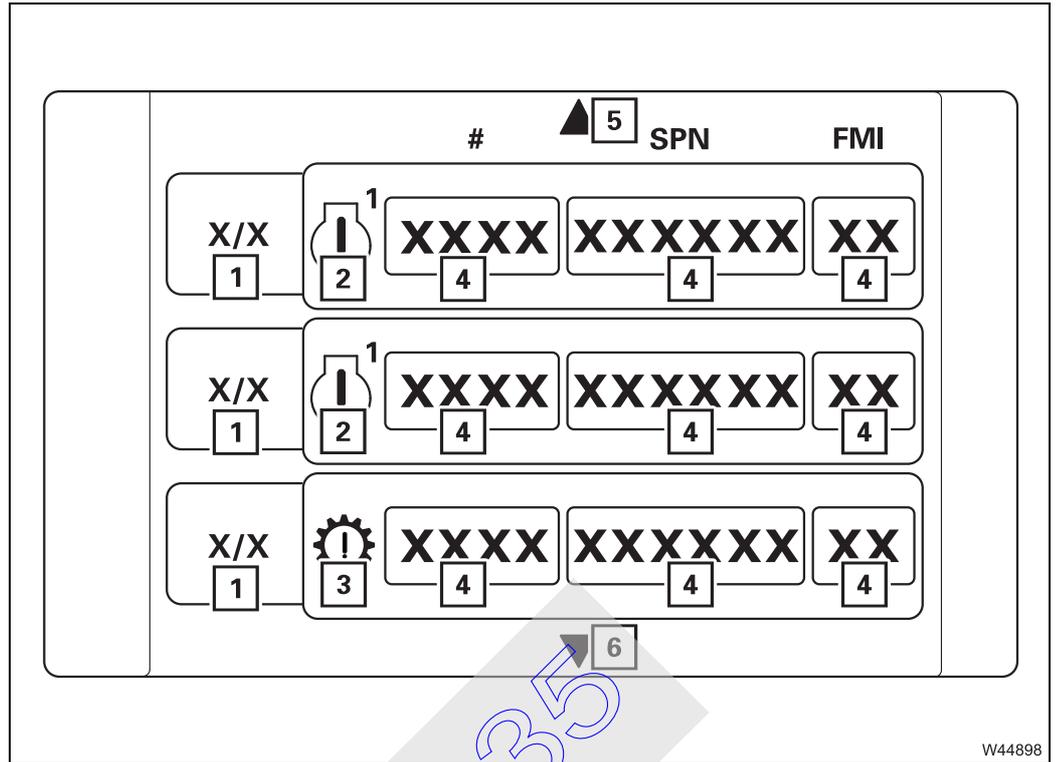
Operating hours menu



- 1 Key code input
- 2 Carrier
- 3 Engine
- 4 Transmission
- 5 Select all

▶▶▶▶▶ p. 5 - 25

**Engine/
transmission
error menu**



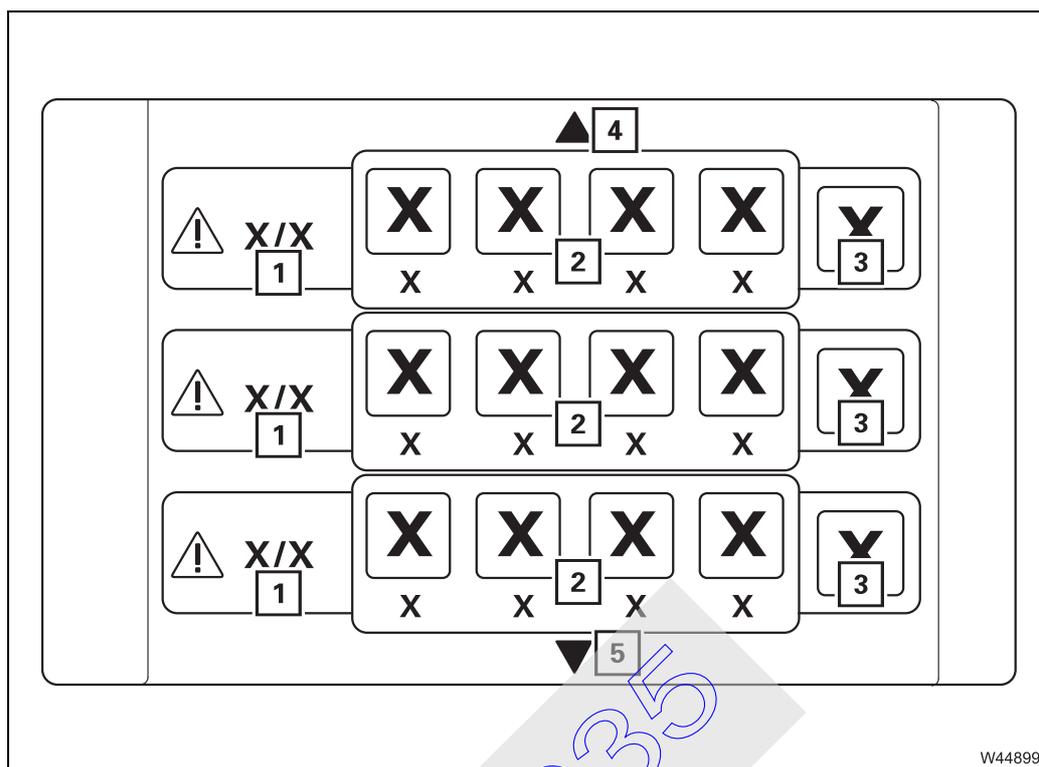
W44898

- 1 Displaying errors / total errors
- 2 Engine symbol display
- 3 Transmission symbol display
- 4 Error code display
- 5 Previous error
- 6 Next error

▣► p. 8 - 37



Crane operation error menu

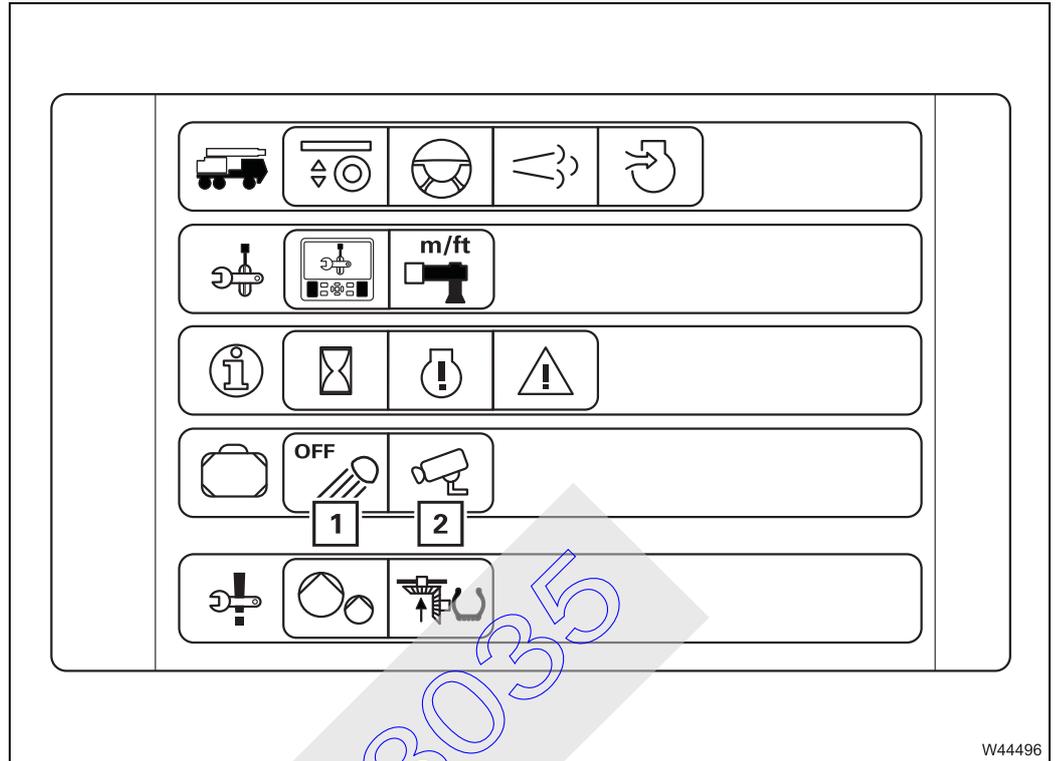


- 1 Current errors / total errors display
- 2 Error code
- 3 Delete error
- 4 Next error
- 5 Previous error

▣▶ p. 14 - 5

3.4.8

Various controls menu group



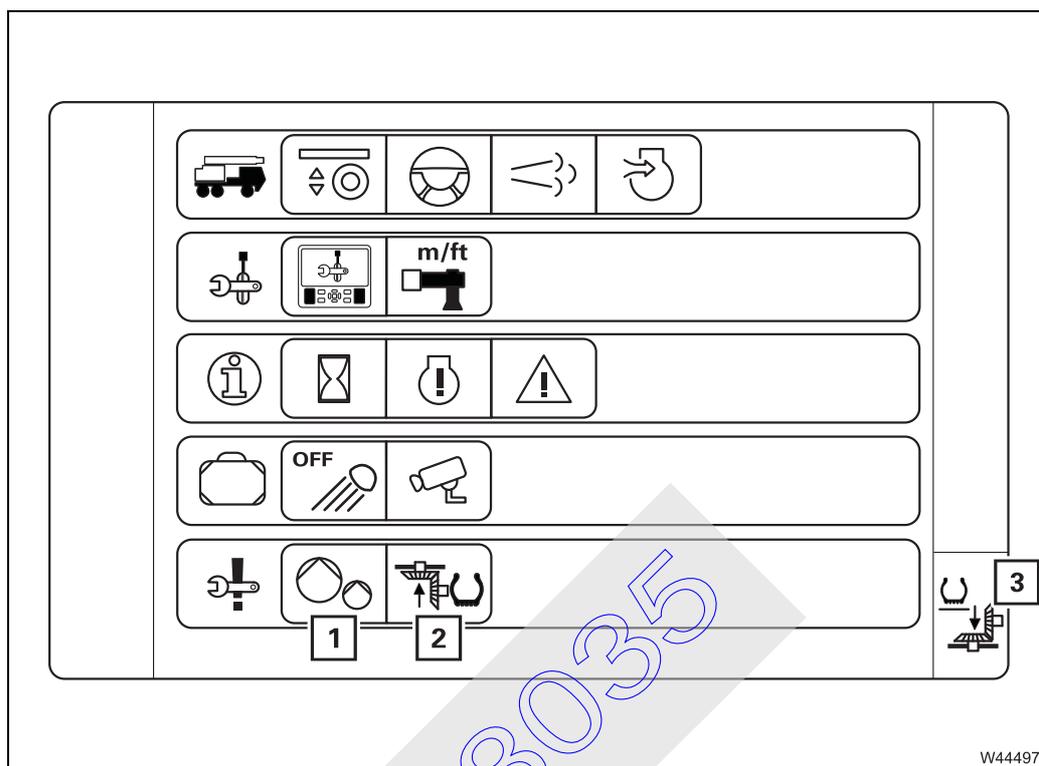
- 1 Outrigger lighting on/off
- 2 Reversing camera on/off

▣▶ p. 3 - 76

▣▶ p. 3 - 63

3.4.9

Emergency operations menu group



- 1 Switching emergency operation on/off ▶▶▶ p. 14 - 67
- 2 Switching towing mode on/off
(Transfer case neutral position on/off) ▶▶▶ p. 8 - 48
- 3 Transfer case display ▶▶▶ p. 8 - 48

3.5

Brief description of the operating elements



Risk of accident by 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 some operating elements to be active.

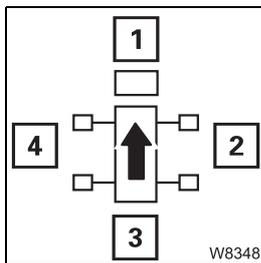
If some operating elements are without function, first read the following chapters which are referred to at the respective points before contacting **Grove Product Support**.

3.5.1

Definition of direction information

Basic rule

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



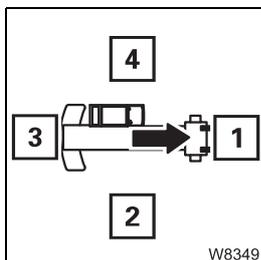
On the carrier

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

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

Forwards always means with driver's cab leading.

Backwards always means the rear lights on the carrier are leading.



On the superstructure

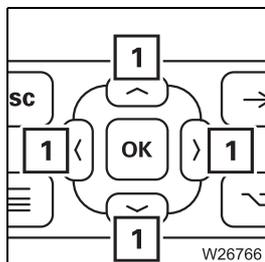
The main boom head is always at the front, which means:

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

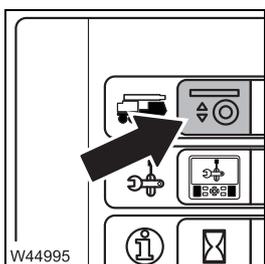
3.5.2

General rules for buttons and symbols on the display

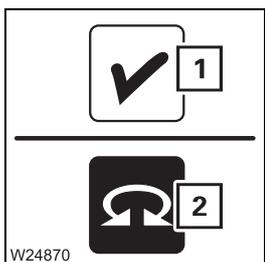
The symbols shown as an example are not present on all crane types.
The following rules apply in all menus:



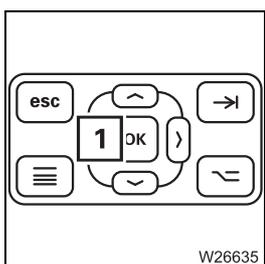
- A menu can only be opened when the corresponding symbol has been selected with the direction buttons (1).



- A selected menu is marked in colour and can be opened.



- In this operating manual, we always refer to colours in the form of e.g. “The symbol is **red**”.
Regardless of whether the background (1) of a symbol is **red** or only parts (2) of a symbol are **red**. This applies to all symbols and all colours.

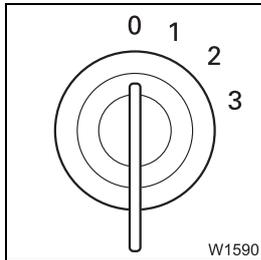


- If the instruction given in this section is to “Press the button once...”, for instance, this always refers to the button (1). This is the case if a menu is opened or a function is to be carried out.

3.5.3

Engine

Steering column



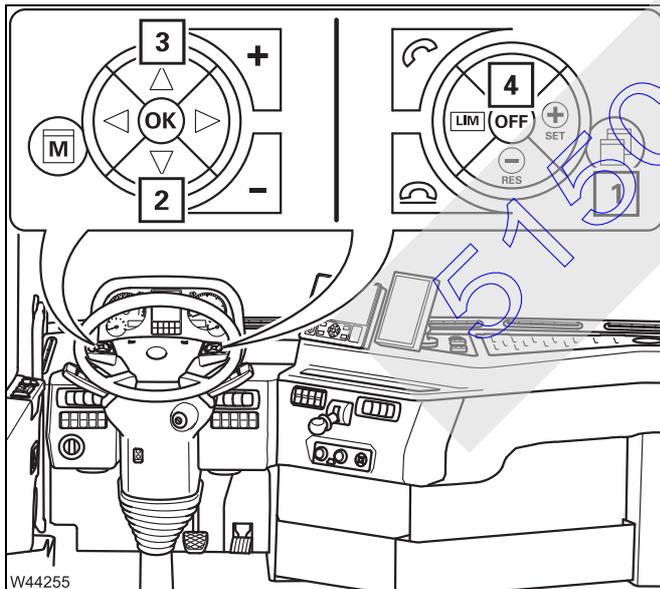
Ignition lock

- 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
- 3 Starting position

▶▶▶▶ p. 4 - 11

Lock/unlock steering column ▶▶▶▶ p. 5 - 16

On the steering wheel



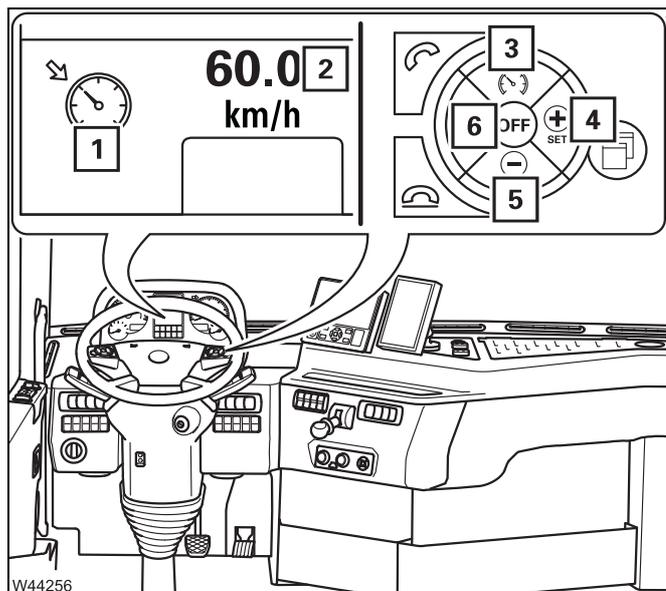
Setting idling speed

The truck crane is stationary.

- 1 Select the *Engine speed* menu
- 2 Reduce idling speed
- 3 Increase idling speed
- 4 Idling speed setting off

▶▶▶▶ *Setting idling speed*, p. 4 - 17



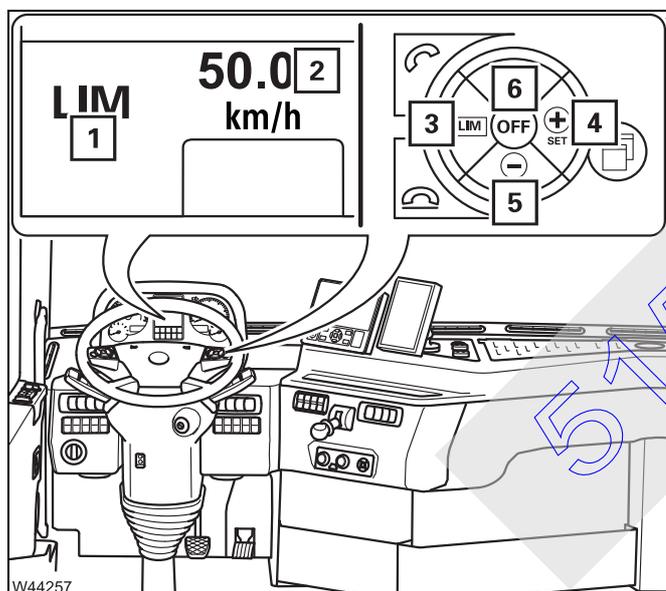


Setting the cruise control

The truck crane is driving at a speed of at least 15 km/h (9 mph).

- 3 Select *Cruise control* – symbol (1) **grey**
- 4 Switches on or increases the speed
 - Symbol (1) **white**
 - Display (2) – selected speed
- 5 Switches on or reduces the speed
- 6 Switching off

▣▣▣▣▶ p. 5 - 55

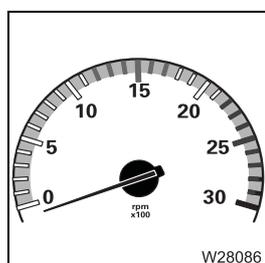


Setting the Temposet

- 3 Select *Temposet* – symbol (2) **grey**
- 4 Switches on or increases the speed limitation
 - Symbol (1) **white**
 - Display (2) – selected speed (minimum = 15 km/h (9 mph))
- 5 Switch off or reduce speed limitation
- 6 Switch *Temposet* off

▣▣▣▣▶ p. 5 - 57

Centre control unit



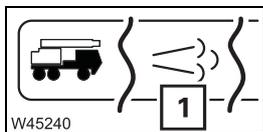
Tachometer

Display engine speed in min^{-1} (rpm); ▣▣▣▣▶ p. 5 - 53

3.5.4

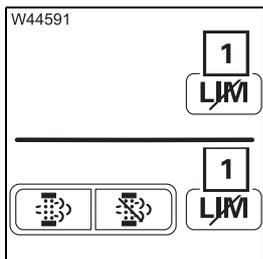
AdBlue (DEF) system

CCS display



Exhaust system menu

- **Open:** Select and confirm symbol (1)



Override torque reduction

Torque reduction is active

- 1 - Select and confirm:**
- Symbol (1) green
 - A warning buzzer sounds
 - Torque reduction overridden
- after 30 minutes:
- Symbol (1) grey
 - Torque reduced
 - Warning buzzer off

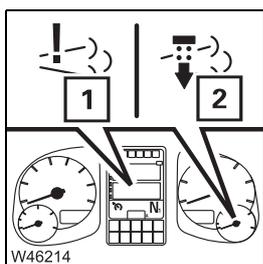
The system can be overridden three times, after this the function is disabled until the next time the engine is restarted; *Overriding the torque reduction*, p. 5 - 63

3.5.5

Exhaust cleaning/regeneration

Centre control unit

Description of further lamps for warning and fault messages;
 Warning messages on the centre control unit, p. 8 - 3.



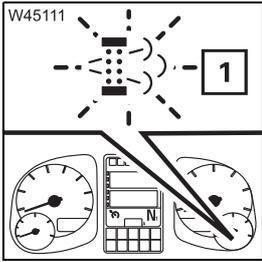
Exhaust system manual cleaning active

The exhaust temperature is above 525 °C (977 °F).

- 1 - Is displayed** Cleaning is carried out and current speed below 8 km/h (5 mph)
- 2 - Lights up:** 8 km/h (5 mph)
- 1 + 2 - Flashing:** Cleaning is carried out and current speed above 8 km/h (5 mph)
- 1 + 2 - Gone out:** No cleaning and exhaust temperature below 525 °C (977 °F)

Cleaning the exhaust system, p. 5 - 64



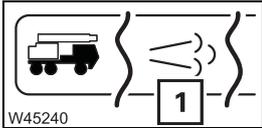


Exhaust system cleaning required

Lights up or flashes in yellow or red, depending on the current status.
 Is always displayed together with other lamps or messages on the on-board computer; **▶▶▶** *Exhaust system messages*, p. 8 - 13.

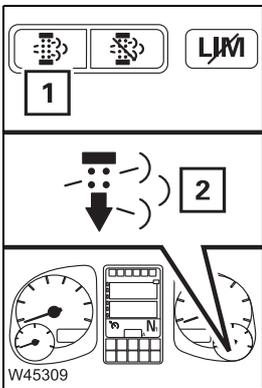
CCS display

Description of further lamps for warning and fault messages;
▶▶▶ *Warning messages on the CCS display*, p. 8 - 23.



Exhaust system menu

– **Open:** Select and confirm symbol (1)

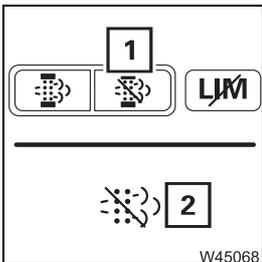


Manually start exhaust system cleaning

The engine is running.

- 1 – Select and confirm:**
- Symbol (1) green
 - Cleaning procedure starts
 - The lamp (2) lights up during cleaning
- After cleaning
- Lamp (2) gone out

▶▶▶ *Cleaning the exhaust system*, p. 5 - 64



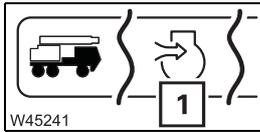
Disable exhaust system cleaning

- 1 – (Grey) Select and confirm:**
- Symbol (1) green
 - Cleaning disabled
 - Symbol (2) displayed
- **(Green) Select and confirm:**
- Symbol (1) grey
 - Cleaning enabled
 - Symbol (2) hidden

▶▶▶ *Cleaning the exhaust system*, p. 5 - 64

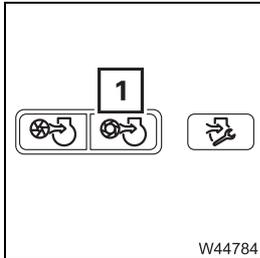
3.5.6

Air intake inhibitor



Air intake inhibitor menu

- **Open:** Select and confirm symbol (1)



Opening the air intake inhibitor

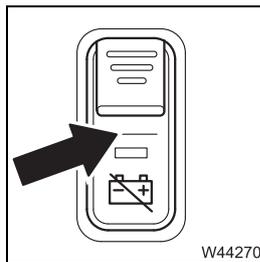
The air intake inhibitor was automatically triggered.

- 1 – Select and confirm:** Symbol (1) green – air intake inhibitor open – the engine can be started

▶▶▶ *Opening the air intake inhibitor, p. 4 - 21*

3.5.7

Battery master switch

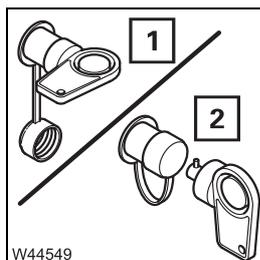


Battery master switch I

In the driver's cab

- **Switch on:** Press at top
- **Switch off:** Unlock and then press at bottom

▶▶▶ p. 4 - 11



Battery master switch II

On the battery box

- 1 – Switch on:** Turn to the right
- 2 – Switch off:** Turn to the left

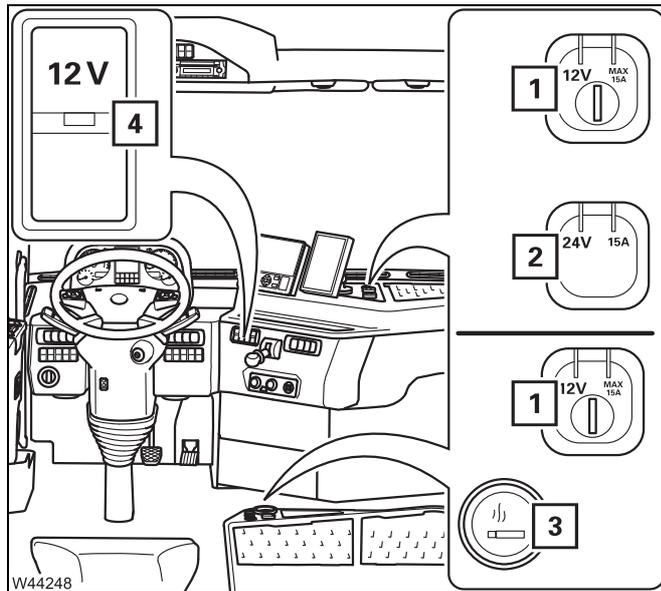
▶▶▶ p. 5 - 87

Blank page

51508035

3.5.8

Electrical system



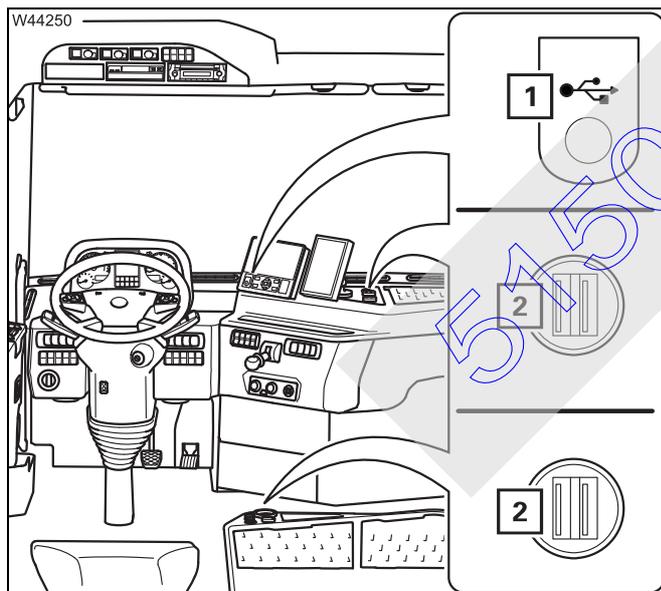
12 V/24 V sockets

- 1 12 V/max. 15 A – can be switched on/off
- 2 24 V/max. 15 A
- 3 Cigarette lighter 24 V/max. 15 A

Only connect electrical devices with the matching specification to the sockets.

12 V sockets on/off

- **Switch on:** (4) Press at top
- **Switch off:** (4) Press at bottom



USB connection

- 1 Service/diagnostics connection
- 2 USB charging connection (5 V / 2 x 2.5 A)

The connection (1) may only be operated by the service personnel.

The connection (1) is not suitable for external devices, such as mobile phones.

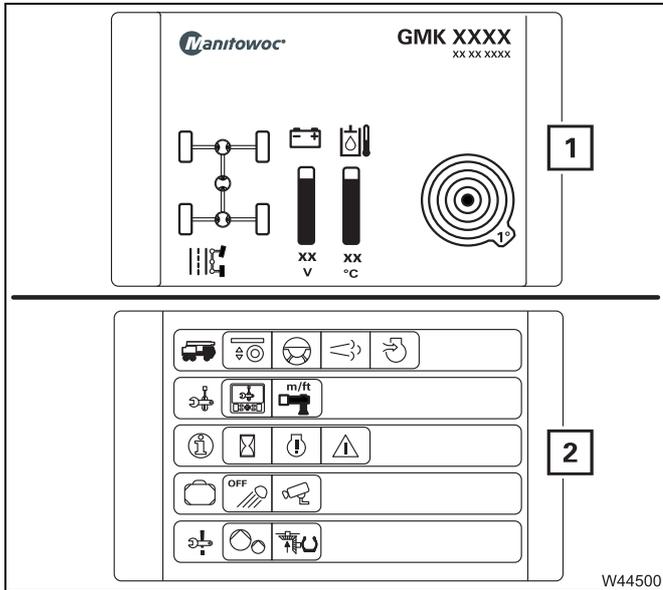


Risk of damage to the crane control!

Do not connect any external devices to the connection (1). This prevents severe malfunctions in the crane control system.

3.5.9 CCS crane control

The GMK5150XL truck crane is equipped with the **CCS** electronic crane control system (**C**rane **C**ontrol **S**ystem). CCS includes a control unit in the driver's cab and several control units (MWSCM and MWCCM) distributed over the super-structure and carrier.



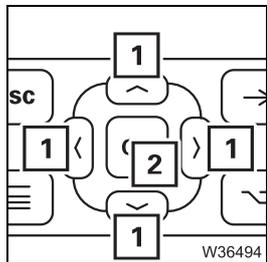
CCS display

The start menu (1) appears after switching on the ignition.

After pressing a button on the CCS control panel, the overview of the menu groups (2) appears.

A symbol is selected with the arrow buttons in order to call up a menu. The selected symbol is shown in **orange**.

Press the OK button on the control panel to open a menu.



Menu operation

Buttons for selecting, activating and confirming areas on the CCS display.

– Select

1 Press

- The selected range is marked.

– Activate / confirm

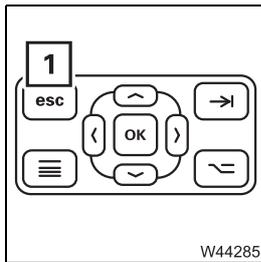
2 Press

- The marked range is activated.
- The entry is confirmed.

The function of the buttons is different depending on the area.

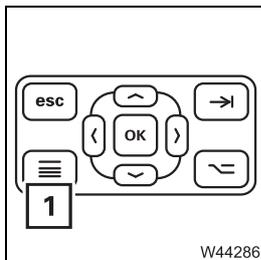
There are three areas, described in more detail in chapter *Operating elements for crane operation*.

- ▣ In the Menu area, p. 9 - 104
- ▣ In the Input area, p. 9 - 104
- ▣ In the Operation area, p. 9 - 105



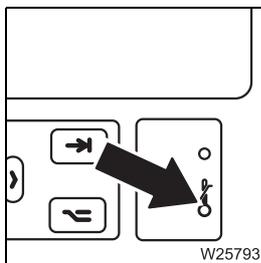
Exit menu/input mode

- 1 Press:**
- The open menu closes – the menu from the next higher level is opened
 - Input mode is disabled.



Overview of menu groups

- 1 Press:**
- After pressing for the first time
Menu groups overview display
 - After pressing again
Next/previous group overview



Display temperature warning display

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

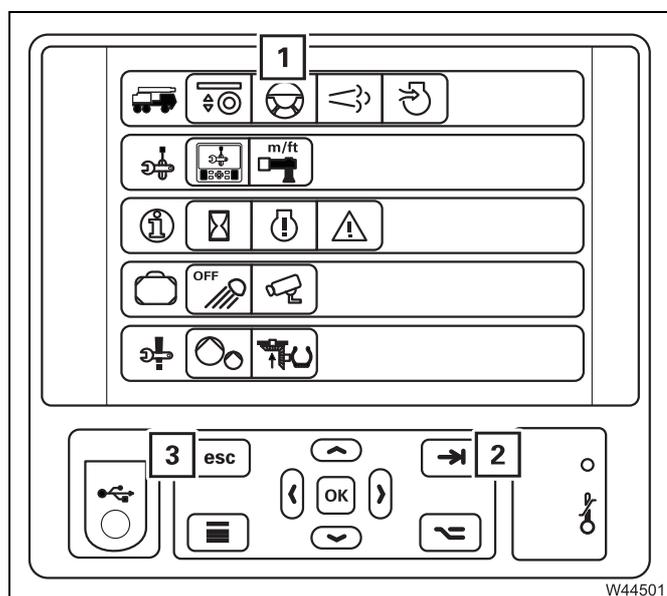
- **Blue, flashing:** Temperature too low – display is not switched on
- **Red, lights up:** Temperature too high:
Brightness is reduced
- **Yellow, flashing:** Display is switched off
- **Red, flashing:** Control unit is switched off

▶▶▶ p. 5 - 17



Select / deselect favourites

Several favourites can be selected. The cursor jumps directly from favourite to favourite when scrolling through the menu groups.



Select

A symbol is selected, such as symbol (1).

2 Press

The symbol is marked as a favourite.

Deselect

- Individually

The favourite symbol is selected.

2 Press

The favourite selection is cancelled.

- All

Any symbol is selected.

2 + 3 Press

All favourite selections are removed.

3.5.10

Transmission

▣▣▣▣ *Operating the transmission, p. 5 - 41.*

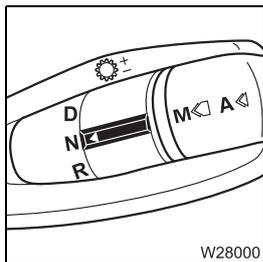
Description of further displays for warning and fault messages;

▣▣▣▣ *Warning and fault messages on the on-board computer, p. 8 - 7.*

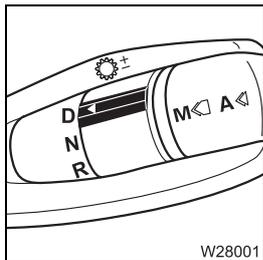
Transmission control unit

Select transmission mode

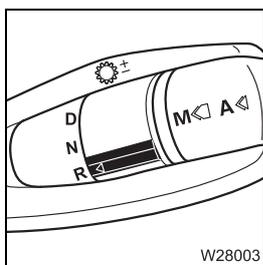
The engine is running.



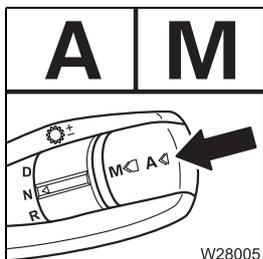
– **Position N:** Neutral position on – no gear selected



– **Position D:** When at a standstill – Forward starting gear on
When driving forwards – Select a suitable gear, The clutch engages
When driving in reverse – Neutral position on



– **Position R:** When at a standstill – Reverse starting gear on
When driving in reverse – No gear change
When driving forwards – Neutral position on



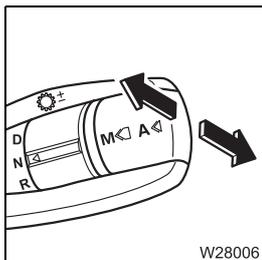
Change operating mode

The truck crane is stationary or driving.

– **Press once:** Switches over between **A** – *Automatic* operating mode and **M** – *Manual* operating mode (without change of gear)

▣▣▣▣ p. 5 - 45



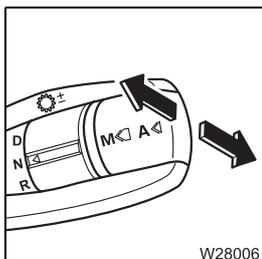


Perform change of gear

The truck crane is stationary

- **Push up once:** Shift up starting gear – 1 gear
- **Push down once:** Shift down starting gear – 1 gear

W28006



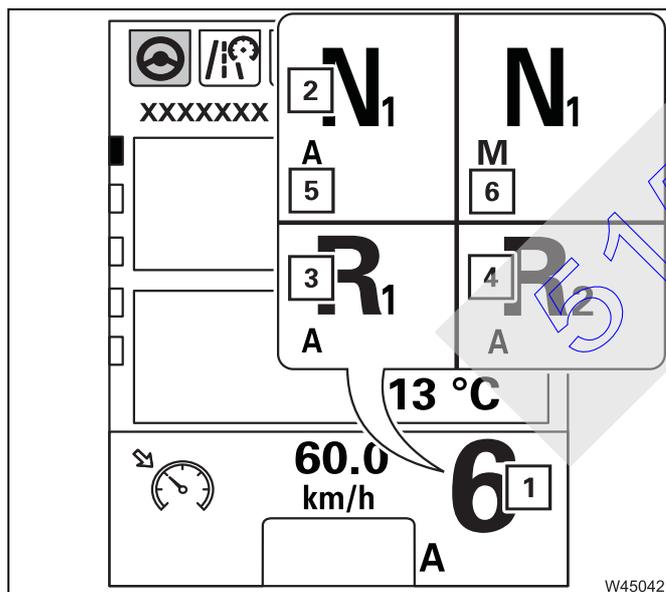
The truck crane is driving

In *Manual* operating mode

- **Push up once:** Shift up – 1 gear
 - **Push down once:** Shift down – 1 gear
- ▣▣▣▣ p. 5 - 48

W28006

On-board computer

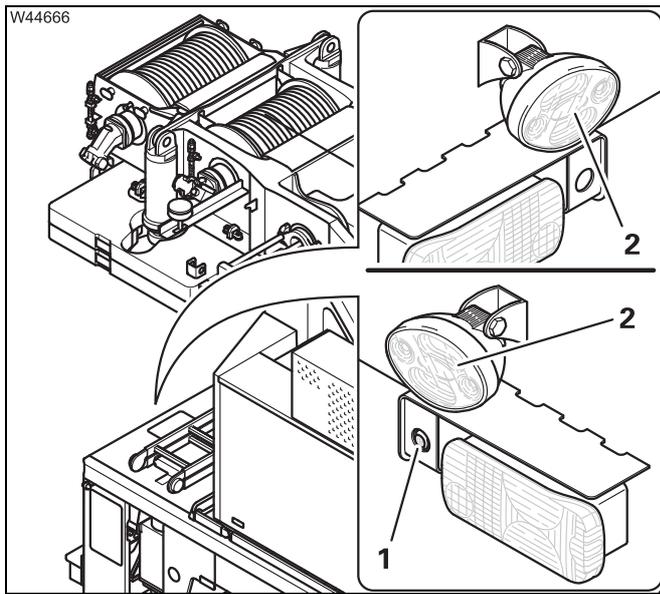


Transmission display

- 1 Currently applied gear – forwards (1 to 16), e.g. 6
- 2 Neutral position switched on
- 3 Currently applied gear – 1st reverse gear
- 4 Currently applied gear – 2nd reverse gear
- 5 *Automatic* operating mode
- 6 *Manual* operating mode

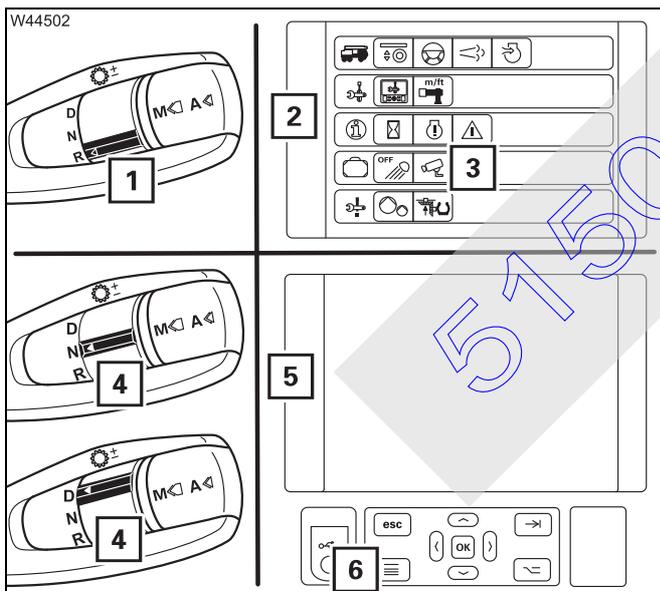
W45042

3.5.11 Reversing camera



The reversing camera (1) displays the area behind the truck crane on the CCS display in the driver's cab.

The reversing lamps (2) are automatically switched on and off, together with the standard reversing lights;  For reverse travel, p. 5 - 44.



Switching on

- Automatically, when reversing (1),
- Manually – select symbol (3) and confirm

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 (2) shows the CCS menu

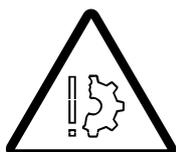
3.5.12

BirdView system 270°

The BirdView system 270° is a driving assistance system.

The BirdView system 270° does not relieve you of the responsibility for maintaining a sufficiently safe distance or braking in time! Drive with due care and attention! The sole responsibility lies with you as the crane operator.

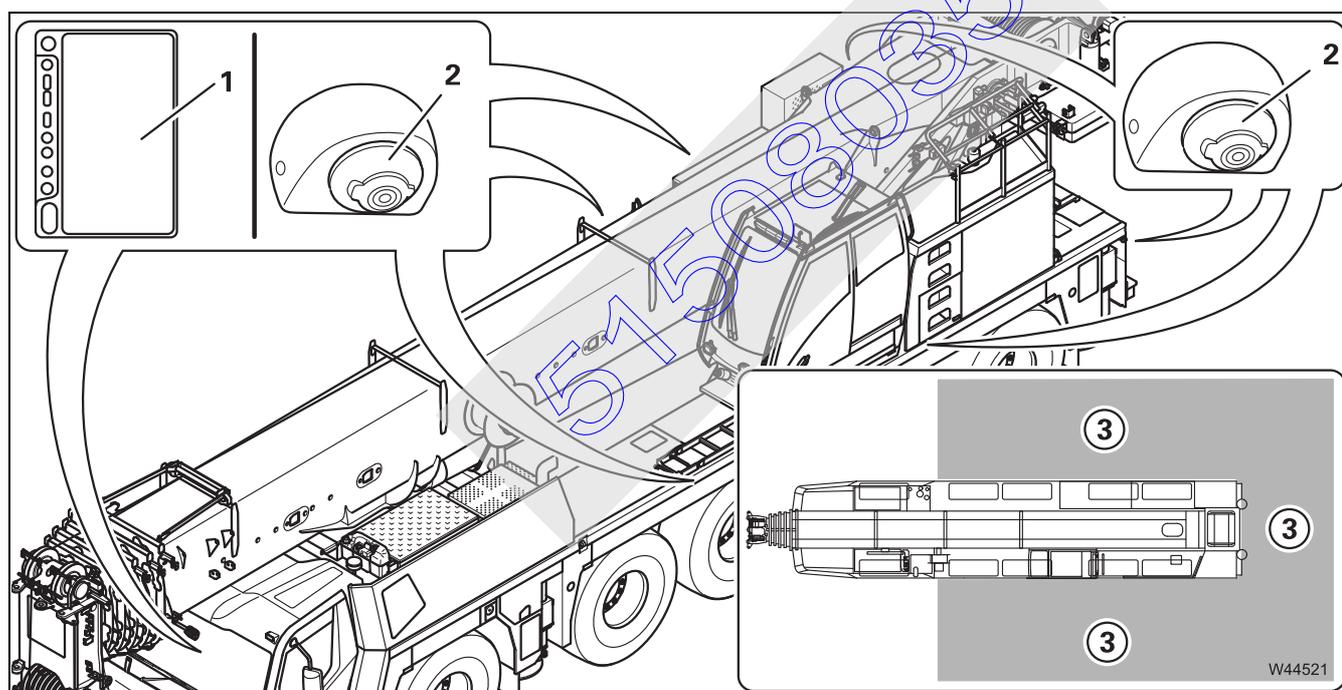
Manitowoc Crane Group Germany GmbH explicitly states that no liability is accepted for damage resulting from a failure to observe these instructions.



Risk of damage in driving mode!

Obstacles in the driving area above the height of the camera are **not** displayed. Always also monitor the driving area using the mirrors. This will avoid damage to the truck crane.

The BirdView system 270° shows the rear and side areas next to the carrier in the driver's cab.



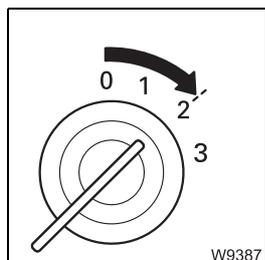
All cameras (2) simultaneously show images on the monitor (1). The monitor (1) shows the area (3) next to and behind the carrier.



The cameras must not be removed or misaligned. If a camera is mounted on the storage box then the storage box must not be removed.

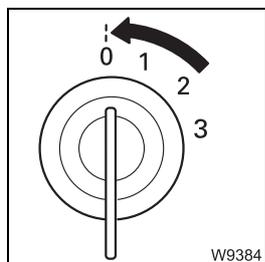


There must be no spare wheel installed on the rear of carrier.



Switching on

- Switch on the ignition – the monitor shows the area around the truck crane.



Switching off

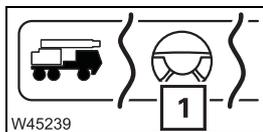
- Switch off the ignition – the monitor switches off.

51508035

3.5.13

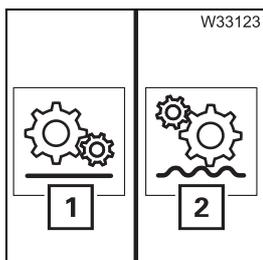
Transfer case

▣▣▣▣ *Transfer case – switching the off-road gear on/off, p. 5 - 70*



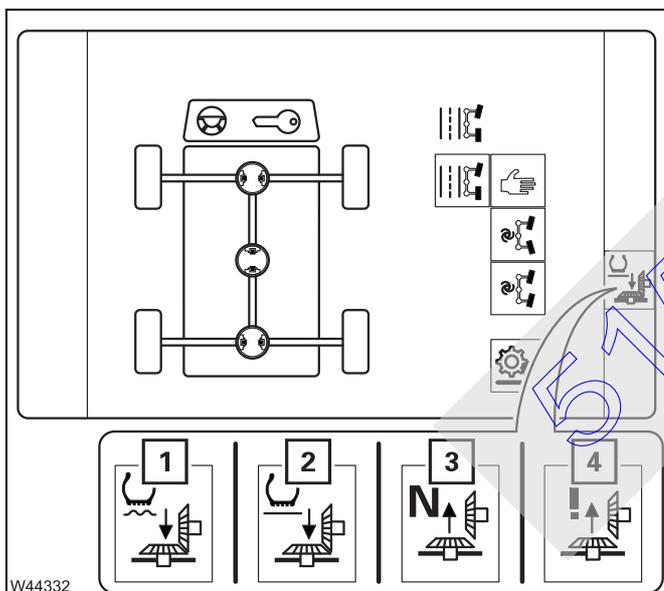
Driving menu

– **Open:** Select and confirm symbol (1)



Transfer case off-road gear on/off

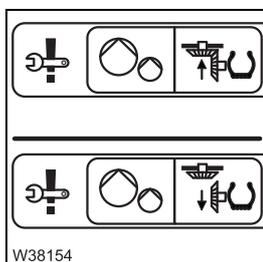
- **Switch on:** Select symbol (2) and confirm – off-road gear engaged
- **Switching off:** Select symbol (1) and confirm – off-road gear disengaged



Transfer case display

The current status is shown using different symbols:

- 1 Off-road gear on
- 2 Off-road gear off – on-road driving
- 3 Neutral position on; ▣▣▣▣ p. 8 - 48
- 4 Error – violet



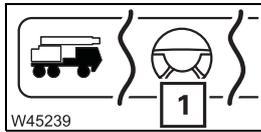
Transfer case neutral position on/off

Switch towing mode on/off; ▣▣▣▣ p. 8 - 48.

3.5.14

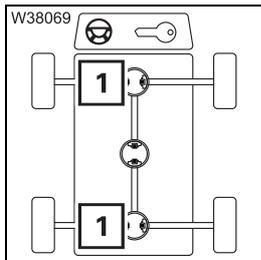
Final drive

▣▣▣▣► *Longitudinal and transverse differential locks, p. 5 - 71*



Driving menu

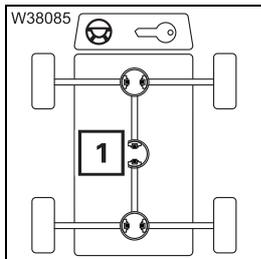
– **Open:** Select and confirm symbol (1)



Transverse differential locks on/off

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

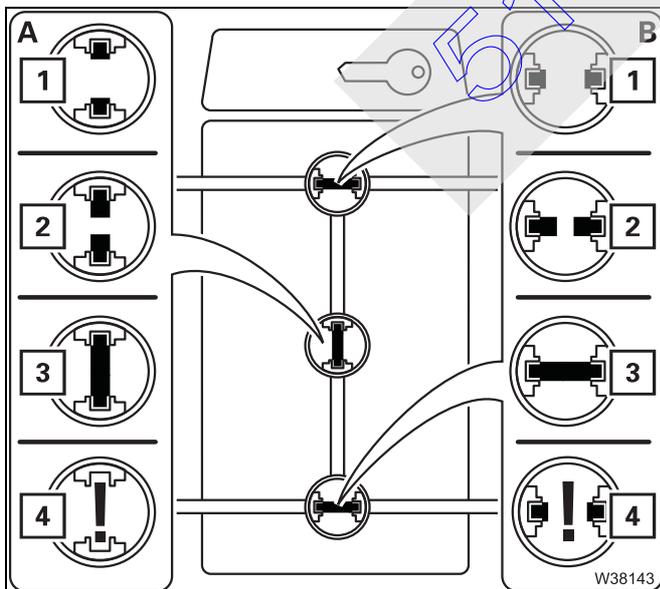
When a symbol (1) is selected **all** transverse differential locks are switched on or off.



Longitudinal differential lock on/off

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

With the 10 x 8 x 10 drive – simultaneously the drive for the 3rd axle line on/off



(A) – Longitudinal differential lock display

(B) – Transverse differential lock display

The current status is indicated by different symbols.

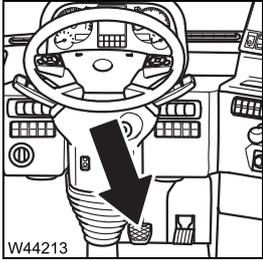
- 1 Green** – locks off
- 2 Yellow** – intermediate position
- 3 Red** – locks on
- 4 Violet** – error

▣▣▣▣► p. 5 - 71

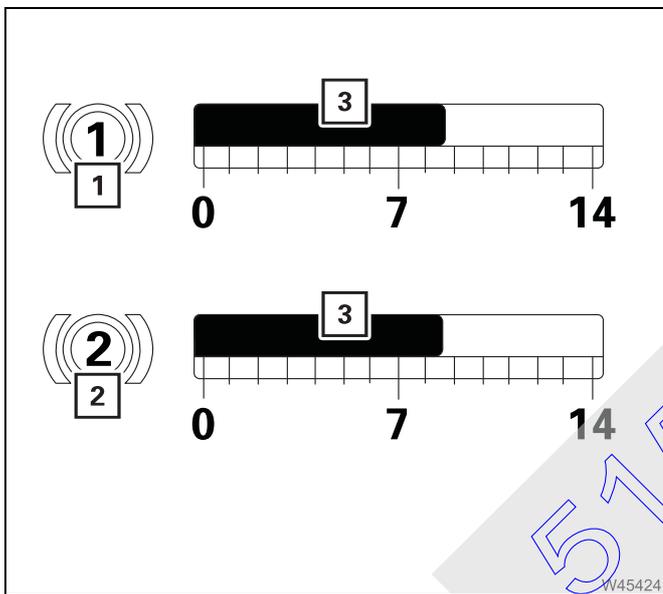
3.5.15 Brakes

Service brake

Description of further symbols for warning and fault messages;
 ■■■► *Warning messages on the centre control unit, p. 8 - 3.*



The braking force can be continuously adjusted with the pedal.



On-board computer

In the *Supply pressure* submenu,

- 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

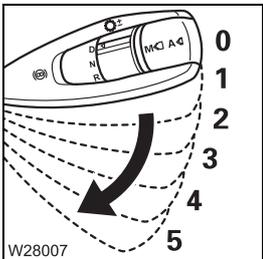
■■■■► p. 5 - 11

Additional brakes

Engine retarder/transmission retarder ■■■► *Additional brakes, p. 5 - 61*

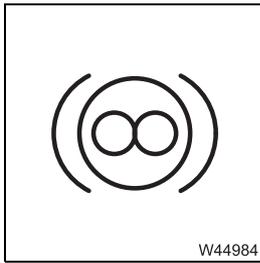
Multipurpose switch

The braking force is the lowest in position (1) and the highest in position (5).



- 0 Forwards:** Engine retarder and transmission retarder off
- 1 Back:** 20% brake power
- 2 Back:** 40% brake power
- 3 Back:** 60% brake power
- 4 Back:** 80% brake power
- 5 Back:** 100% brake power

Centre control unit

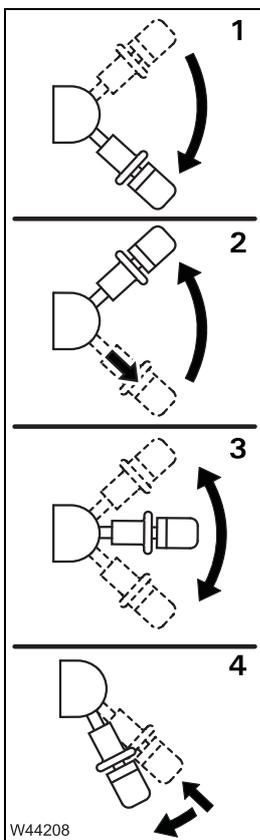


Additional brake indicator lamp

- **Lights up:** Additional brake on
- **Gone out:** Additional brake off
- **Flashing:**
 - Ignition on – multipurpose switch not in setting 0
 - Engine is running – transmission retarder power reduced

▣▣▣▣ *Additional brakes*, p. 5 - 61

Parking brake



1 Apply parking brake

Pull the lever down until it locks into place

2 Release parking brake

Release the lever and push it up until it locks into place

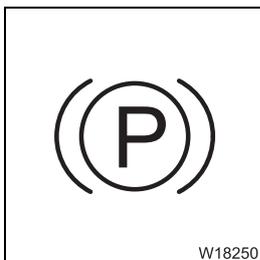
3 Operate as auxiliary brake

Shift the lever to the intermediate position
The braking force is increased continuously by moving the lever from top to bottom.

4 Test position for towing a trailer

- Push the lever backwards and down until it locks into place
 - Press in the lever and pull it down further
The parking brake for the trailer is released;
- ▣▣▣▣ p. 5 - 110.

Parking brake indicator lamp



- **Lights up:** Parking brake applied
- **Gone out:** Parking brake released

3.5.16

Steering

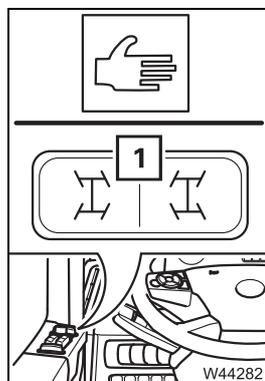
Description of the symbols for warning and fault messages;
▣▣▣▣▶ *Warning messages on the centre control unit, p. 8 - 3.*

3.5.17

Separate steering

▣▣▣▣▶ *Separate steering, p. 5 - 79*

Driver's door



Separate manual steering

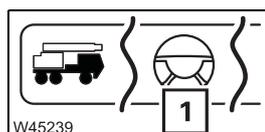
The separate manual steering must be switched on.
Steer 1st and 2nd axle lines with the steering wheel.

Press and hold button (1)

- **To the left:** 3rd to 5th axle lines – turn to the left
- **To the right:** 3rd to 5th axle lines – turn to the right

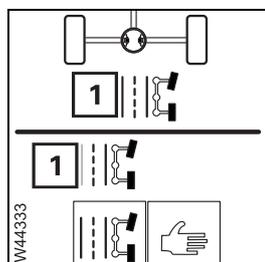
▣▣▣▣▶ p. 5 - 81

CCS display



Driving menu

- **Open:** Select and confirm symbol (1)



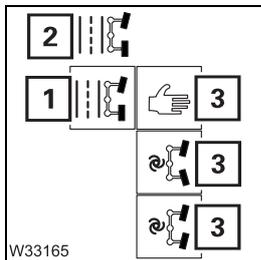
Steering mode display

The display (1) is shown in the *Start menu* and in the *Driving menu*.

- 1 – Orange:** Steering mode switched on display
- **Blue:** Automatic alignment of the steering angle is active

The following applies to all steering modes:

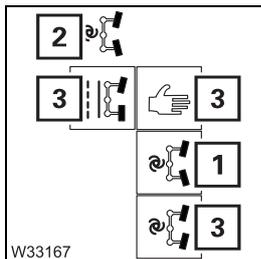
The selected symbol must be confirmed within 2 seconds, otherwise the steering mode remains unchanged.



Normal steering mode, on-road driving on/off

- **Switch on:** Select symbol (1) and confirm – symbol (2) is displayed
- **Switch off:** Select a different steering mode – symbol (3)

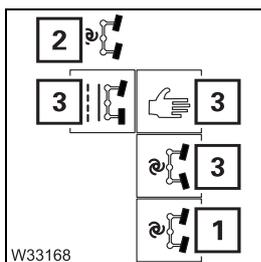
➡ p. 5 - 80



Separate steering for driving around corners on/off

- **Switch on:** Select symbol (1) and confirm – symbol (2) is displayed
- **Switch off:** Select a different steering mode – symbol (3)

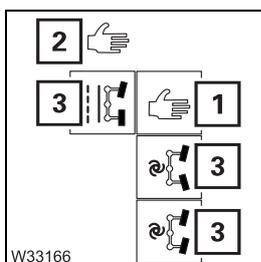
➡ p. 5 - 80



Separate steering crab travel mode on/off

- **Switch on:** Select symbol (1) and confirm – symbol (2) is displayed
- **Switch off:** Select a different steering mode – symbol (3)

➡ p. 5 - 80



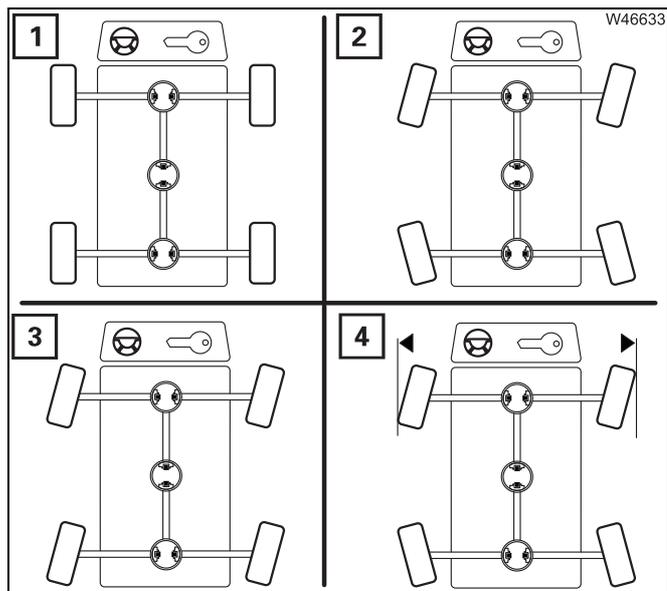
Manual separate steering on/off

- **Switch on:** Select symbol (1) and confirm – symbol (2) is displayed
- **Switch off:** Select a different steering mode – symbol (3)

➡ p. 5 - 80

When separate steering is switched on, the speed is limited.





Current wheel position display

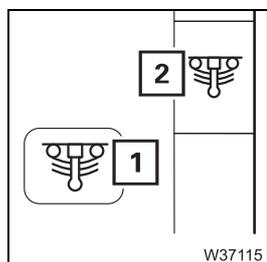
The current status is shown using different symbols:

- 1 Straight ahead
- 2 Driving around corners
- 3 Crab travel mode
- 4 End position reached – e.g. when driving around corners

3.5.18

Suspension

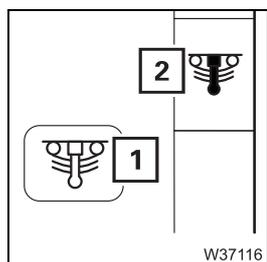
CCS display



Suspension display

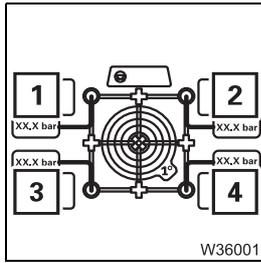
Suspension on/off

- **Switch on:** Select symbol (1) and confirm – symbol (2) **green**,
 Suspension on – enabled for on-road driving



- **Switch off** Select symbol (1) and confirm – symbol (2) **red**
 Suspension off – locked for crane operation

▶▶▶ p. 5 - 18



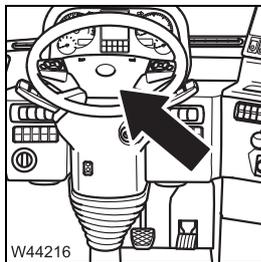
Suspension operation pressure display

- 1 Suspension pressure for 1st and 2nd axle lines on the left
- 2 Suspension pressure for 1st and 2nd axle lines on the right
- 3 Suspension pressure for 3rd to 5th axle lines on the left
- 4 Suspension pressure for 3rd to 5th axle lines on the right

3.5.19

Lighting/windscreen wipers/horn

Steering wheel

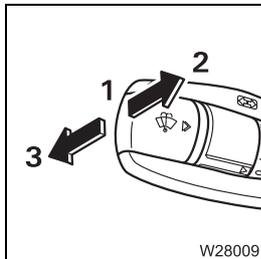


Horn

The ignition is switched on

- Press: Carrier horn on

Steering column



Multipurpose switch

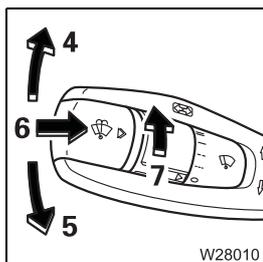
Headlight flasher/full beam headlight

- 1 Parking light/headlight: Middle position
- 2 Headlight flasher: Up

Parking light/headlight is switched on:

- 3 Headlight – full-beam: Down – locks into place

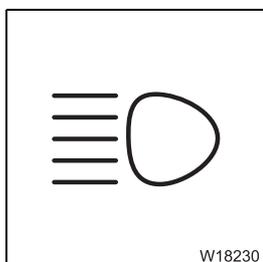




Turn signal indicator/wiper-washing system

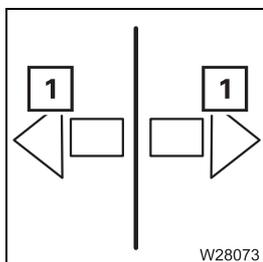
- 4 Right turn signal indicator:** Forwards
- 5 Left turn signal indicator:** Backwards
- 6 Windscreen wiper/washing system:** Press
- 7 Windscreen wiper:** Rotate:
 - Off,
 - Interval – slow
 - Interval – fast
 - Continuous wiping – slow
 - Continuous wiping – fast

Centre operating elements



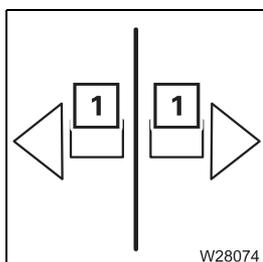
Full beam headlight indicator lamp

- **Lights up:** Full beam headlight or headlight flasher on
- **Gone out:** Full beam headlight and headlight flasher off



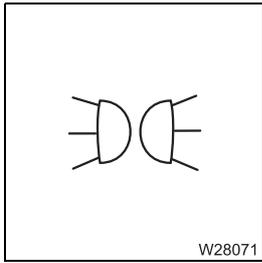
Turn signal indicator lamp

- 1 – Flashing:** Turn signal indicator on
- **Gone out:** Turn signal indicator off, or turn signal indicator on and filament lamp faulty



Trailer turn signal indicator lamp

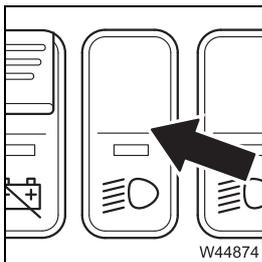
- 1 – Flashing:** Turn signal indicator on and trailer electrically connected
- **Flashes once:** Turn signal indicator on and trailer not electrically connected
- **Gone out:** Turn signal indicator off



Lights display

- **Lights up:** Parking light, low-beam headlight, ambient light or headlight flasher on
- **Gone out:** Lights off

Left operating elements

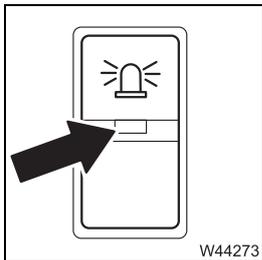


Spotlights III on/off

- **Switch on:** Press at bottom
- **Switch off:** Press at top

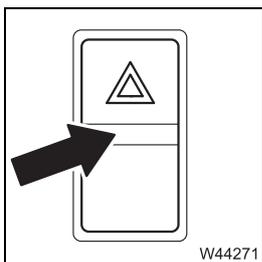
▶ *Spotlights III*, p. 12 - 180

Side operating elements



Rotating beacons on/off

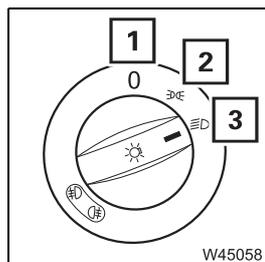
- **Switch on:** Press at top
- **Switch off:** Press at bottom



Hazard warning system on/off

- **Switch on:** Press at top – switch flashes
- **Switch off:** Press at bottom – gone out

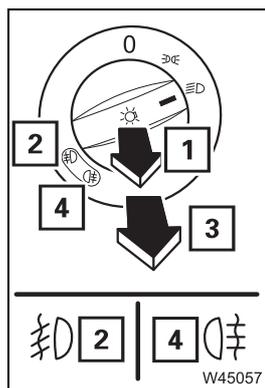




Lights on/off

– Parking light/headlight

- 1 Light off**
- 2 Parking light on** Instrument lighting on
- 3 Headlight on** Full beam headlight can be switched on using the multipurpose switch

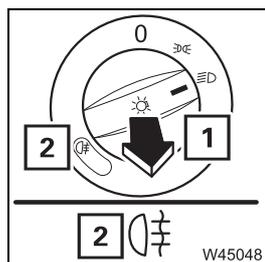


– Fog light /fog tail light

The headlight or parking light is switched on

- 1 Fog light on** – Lamp (2) lights up
- 3 Fog light, Fog tail light on** – Lamps (2) and (4) light up

Press the switch in to switch off



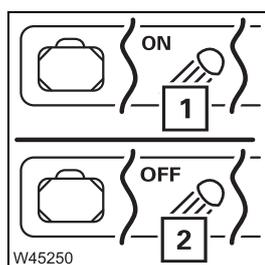
– Fog tail light

The headlight or parking light is switched on

- 1 Fog tail light on** – Lamp (2) lights up

Press the switch in to switch off

CCS display



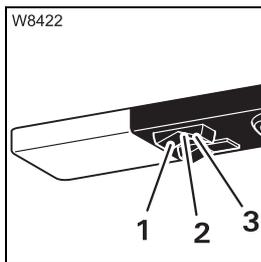
Outrigger lighting on/off

- **Switch on:** Select symbol (2) and confirm – symbol (1) is displayed
- **Switch off:** Select symbol (1) and confirm – symbol (2) is displayed

➡ p. 12 - 36

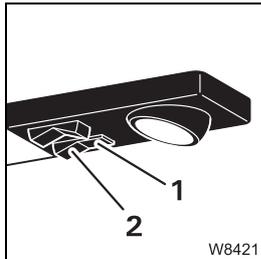
Roof

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



Cab lighting

- 1 Switch on continuously
- 2 Switch off continuously
- 3 On/off via door contact



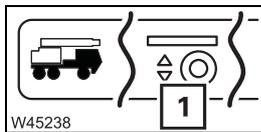
Reading lamp

- 1 Switching on
- 2 Switching off

3.5.20

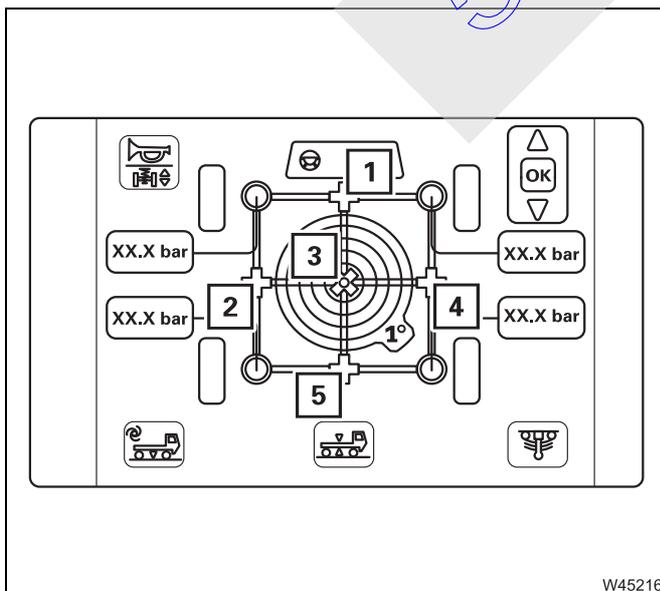
Level adjustment system

Operating the level adjustment system, p. 5 - 73.



Suspension/level adjustment menu

– Open: Select and confirm symbol (1)

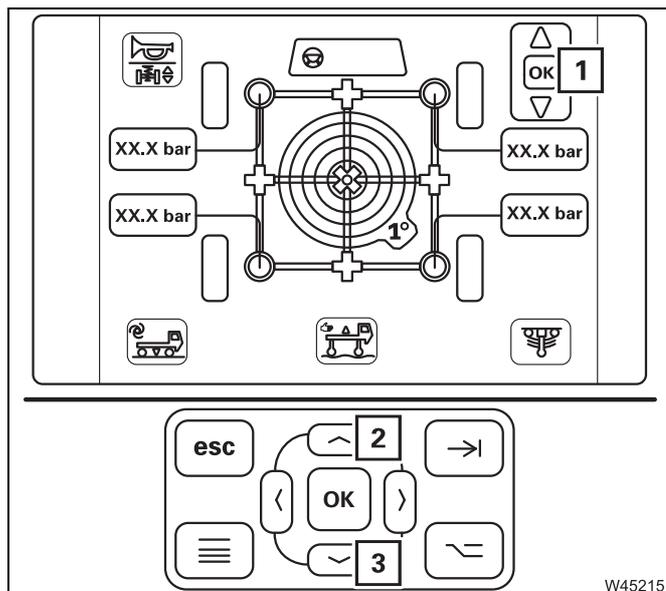


Preselect lift/lower level

The suspension is switched on.
Select and confirm the corresponding symbol.

- 2 Left level pre-selection
- 1 Front level pre-selection
- 4 Right level pre-selection
- 5 Rear level pre-selection
- 3 Overall level pre-selection





Level adjustment system enabled display

1 – Displayed

Level pre-selection on,
 buttons (2) and (3) active.

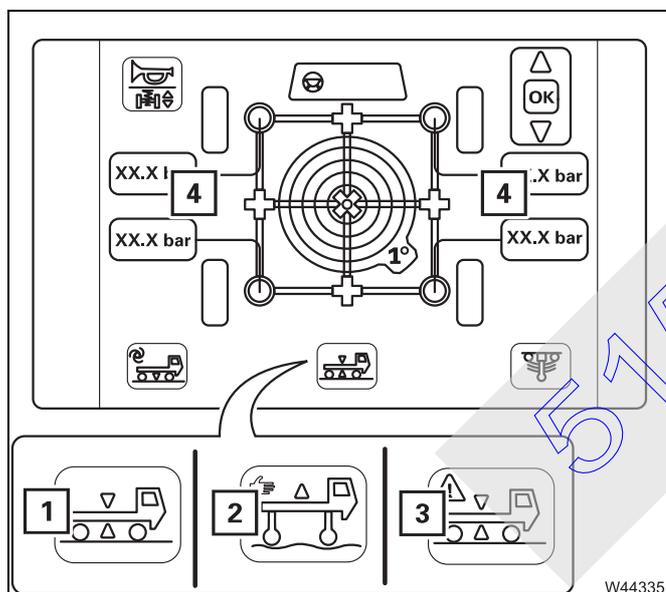
– Hidden

Level pre-selection off,
 buttons (2) and (3) not active.

Level change

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

- 2 Raise level
- 3 Lower level

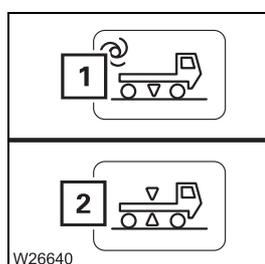


Vehicle level display

The current status is indicated by different
 symbols.

- 1 On-road level
- 2 No on-road level
- 3 Error
- 4 Operation pressure in the suspension struts

➡ p. 5 - 73



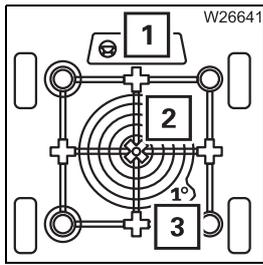
Setting the on-road level

The suspension is switched on.

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

➡ p. 5 - 74

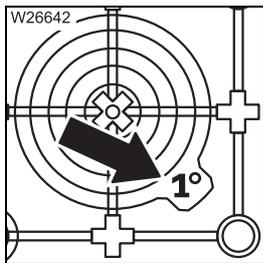
W26640



Current inclination display

- 1 Directional indicator
- 2 Inclination indicator
- 3 Measuring range display

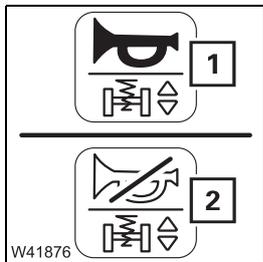
▮▮▮▮▶ p. 5 - 76



Switching over the measuring range

The current measuring range 1° or 5° is displayed – automatic change-over

▮▮▮▮▶ p. 5 - 76



Horn on/off

– **Switch on:**

Select symbol (2) and confirm – symbol (1) is displayed

– **Switch off:**

Select symbol (1) and confirm – symbol (2) is displayed

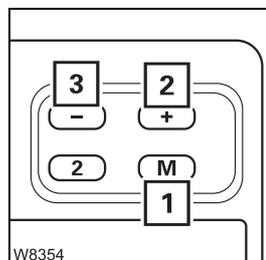
51508035

3.5.21

Tachograph/speedometer

▣▣▣▣▶ *Setting the tachograph*, p. 5 - 20.

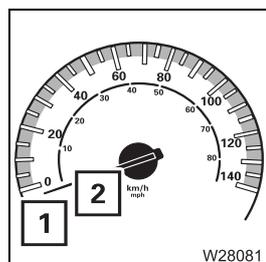
Tachograph



The time correction is carried out for both the tachograph and on-board computer

- 1 Open the time menu:** Press the button – the time correction menu opens
- 2 Time correction +:** Press the button – the time is increased
- 3 Time correction –:** Press the button – the time is decreased

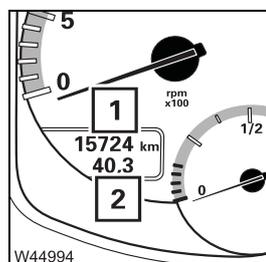
Speedometer



Displays the speed and the route:

Speed indicator

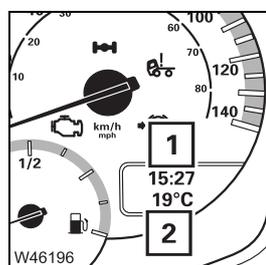
- 1 Indicates the speed in km/h
- 2 Indicates the speed in mph



Kilometre counter

The ignition is switched on.

- 1 Overall distance travelled in kilometres – decimal place: 1 = 100 m
- 2 Daily distance travelled in kilometres – decimal place: 1 = 100 m



Time / outside temperature

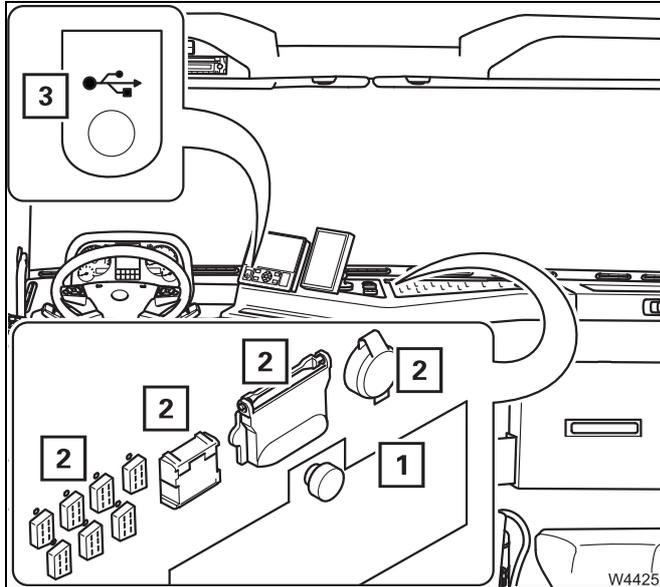
- 1 Time
- 2 Outside temperature

The displays are identical to the displays in the on-board computer. Observe the notes on the outside temperature; ▣▣▣▣▶ *Truck info menu*, p. 5 - 27.

3.5.22

Diagnostics

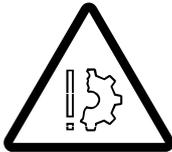
The diagnostic connections may only be operated by service staff from the engine manufacturer/transmission manufacturer, or by **Grove Product Support**.



The diagnostic connections (2) are in the storage compartment, behind the cover (1).

There is an additional diagnostic or service connection on the CCS control units (3).

This connection is not suitable for external devices, such as mobile phones.



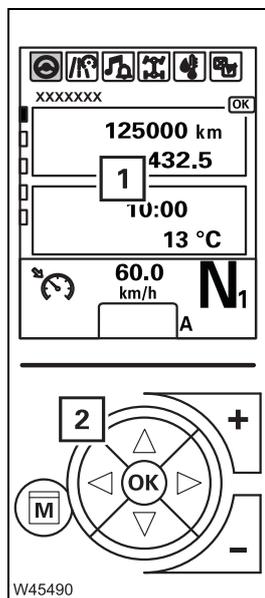
Risk of damage to the crane control!

Do not connect any external devices to the connection (1). This prevents severe malfunctions in the crane control system.

3.5.23

On-board computer

▣▣▣▣▣▣ *Settings and displays at the on-board computer, p. 5 - 26.*



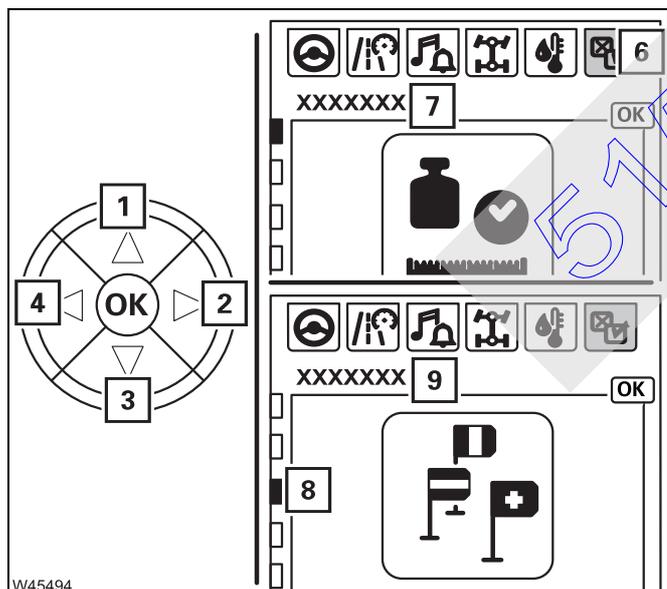
On-board computer display

After switching on the ignition, the display (1) briefly shows the *Start Check* menu and the electronics system records the current state. If there is no message, the menu last used is displayed.

Selector buttons

You can use the buttons (2) to

- Select menu groups
- Select menus
- Open / close input windows
- Enter values / reset counters
- Saving / retrieving favourites



Selecting a menu group

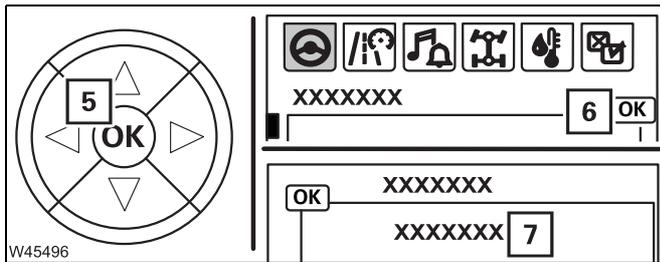
Use button (2) or (4) to select the desired menu group – e.g. (6).

A menu appears – name (7).

Selecting a menu

Use button (1) or (3) to select the desired menu – e.g. (8).

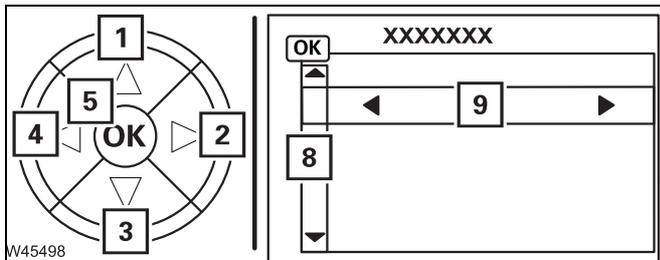
The corresponding menu appears – name (9).



Opening windows for making entries

The symbol (6) is displayed.

Press button (5) the window (7) opens.



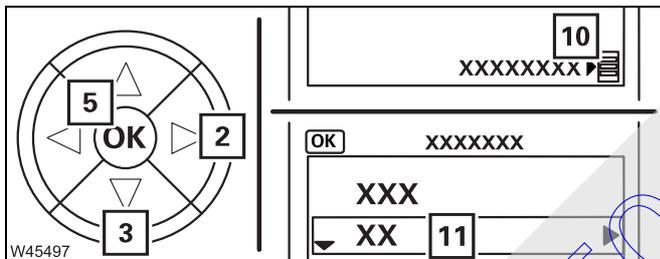
- Entering values / opening further windows

Make the desired selection depending on the menu.

- In column (8) – with button (1) or (3).

- In line (9) – with button (2) or (4).

Apply values or close window – press button (5).



- Resetting the counter

A text and symbol (10) are displayed.

Press button (2).

Press the button (3) to select the line (11) – YES entry.

Press button (2) or (5) for confirmation – the window is closed.

Saving / retrieving favourites

A menu saved as a favourite can be displayed in one step.

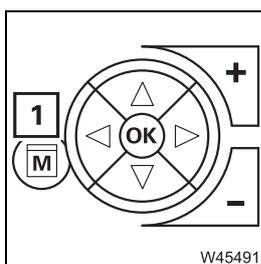
- Save

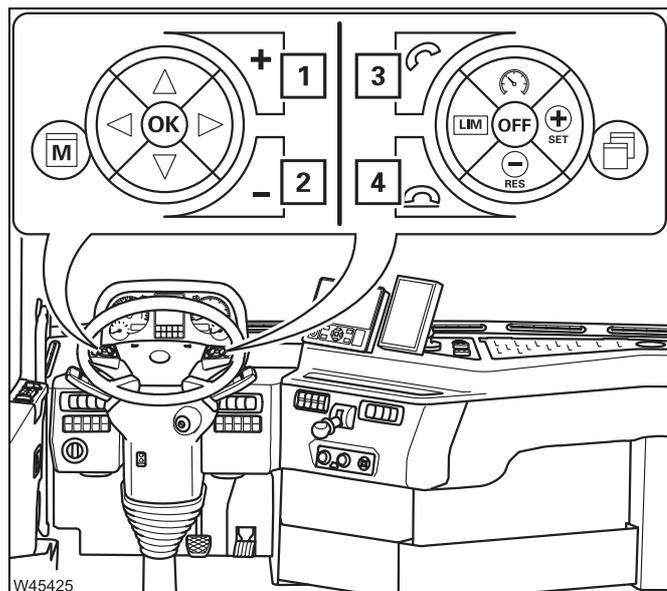
Open desired menu as favourite.

Press the button (1) for about 2 seconds – an acoustic signal sounds.

- Call

Press button (1) once – the saved menu.





Mobile phone operating elements

The buttons are only active if there are a suitable mobile phone and radio. These devices are not included in the scope of delivery. For connecting the devices; *Manufacturer operating instructions.*

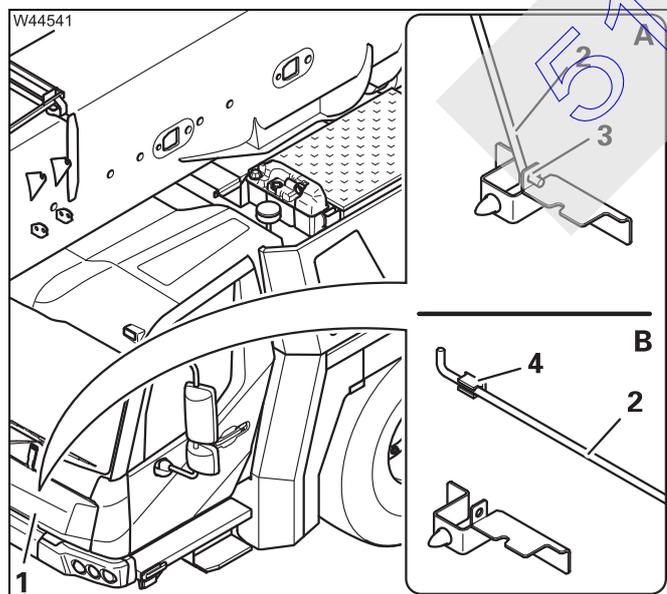
- 1 – Turn up volume
- 2 – Reduce volume
- 3 – Accept call
– Open *Telephone* menu
- 4 – Reject call
– End call



Operation in the *Telephone* menu depends on the device connected.

3.5.24

Front flap



(A) – Open

- Fold up the front flap (1).
- Fasten the support (2) in the clamp (3).

(B) – Close

- Lift the front flap (1).
- Fasten the support (2) in the clamp (4).
- Fold down the front flap (1).
- Press the front flap against the driver's cab on both sides until you can hear it lock into place.

3.5.25

Windows and doors

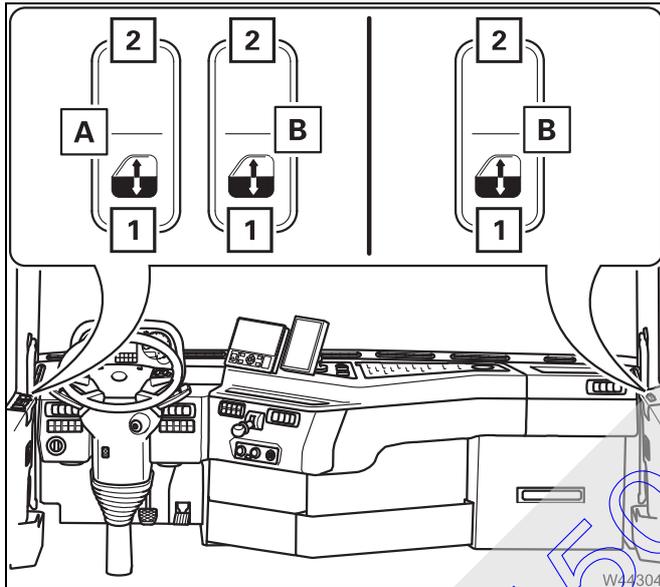
Window winder

There may also be window cranks, depending on the equipment.



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 Open window
- 2 Close window

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

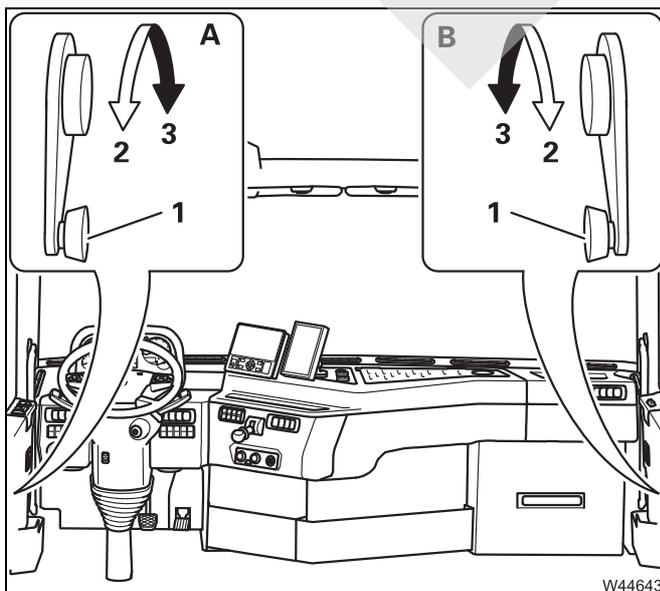
Jog function

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.

Window crank

There may also be window cranks, depending on the equipment.



- A Driver's door window crank
- B Passenger door window crank

Turn window crank (1) in the desired direction.

- 3 Open window
- 2 Close window



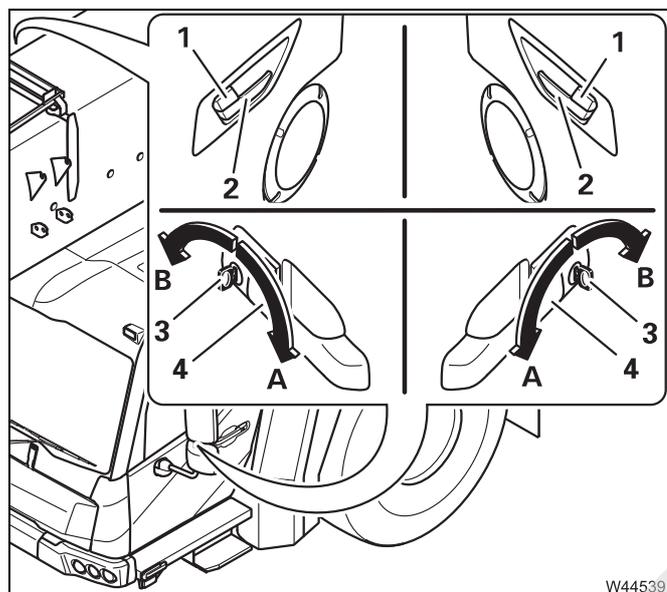
Doors

Operation with key and handle

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



Always take the ignition key with you before closing the door from outside with the handle pressed in (3). Once closed in this manner, the door can only be opened again using the ignition key.



Locking

- Turn the key (3) towards **B** or
- Press in the handle (1).

Unlocking

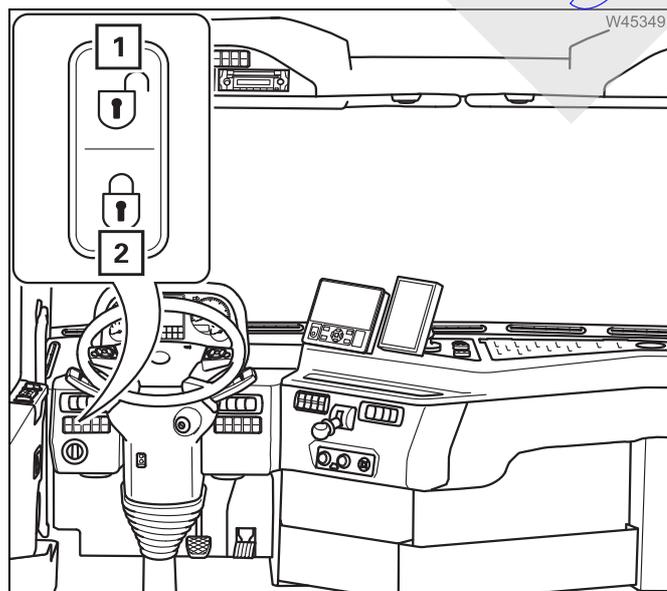
- Turn the key (3) towards **A** or
- Pull the handle (1).

Opening

- Pull the handle (4) or
- Pull the handle (2)

Operation at central locking system

The central locking system can be operated using the buttons in the door and using the remote control.



With buttons

Unlocking doors

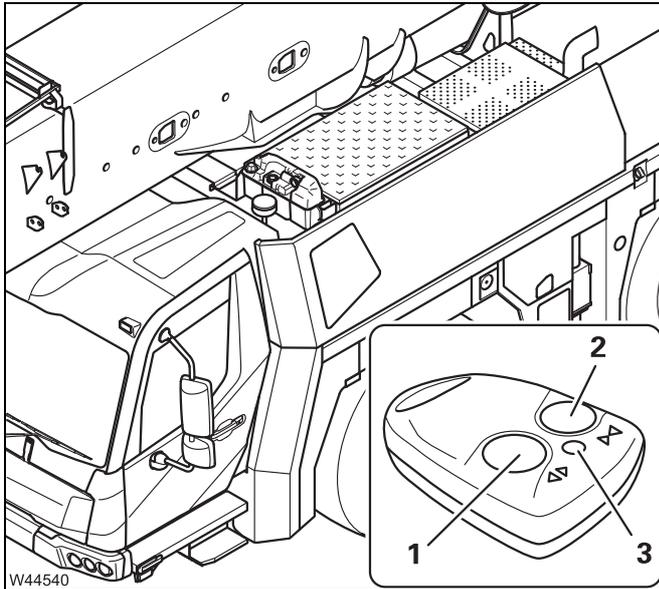
- Press button for symbol (1).

Locking doors

- Press button for symbol (2).

With remote control

The buttons must be pressed for about 1 second for the operation to be carried out.



Unlocking

- Press the button (1) – the lamp (3) flashes – the **driver's door** is unlocked.
- Press the button (1) again – the lamp (3) flashes – the **passenger door** is unlocked.

Open the door within 25 seconds, otherwise it will be locked again.

Locking

- Press the button (2) – the lamp (3) flashes – both doors are unlocked.

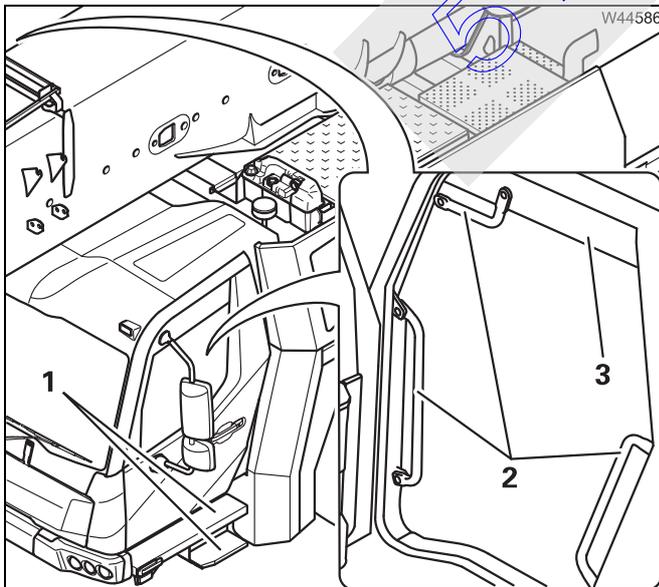
The doors can be opened at any time from the inside using the handle or from the outside using the key.

3.5.26

Access aids and ladders

Access aids

There are various access aids on the truck crane.

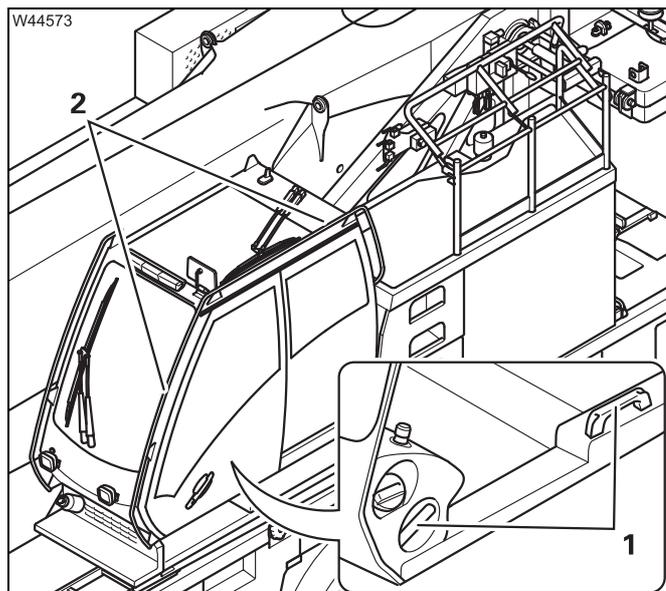


Driver's cab

The steps (1) and the handles (2) are provided as access aids.

Take care that you do not bump into the strut (3) when getting in.





Crane cab

- When the crane cab door is open, you can reach the handle (1).
- The handle (2) is on the outside of the crane cab.

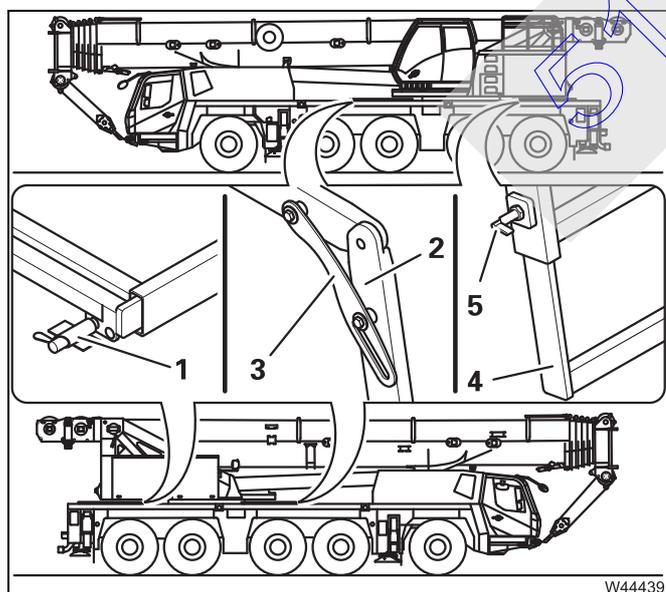
Ladders

There are various ladders on the truck crane depending on the equipment.



Hazard due to unsecured ladders.

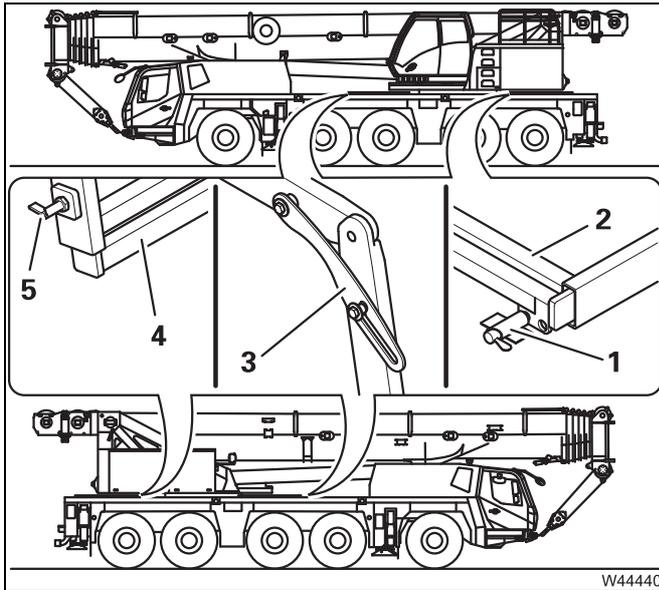
Always secure the ladders before driving. This prevents the ladders falling down or folding out while driving and thus endangering other vehicles.



Swing-out ladders

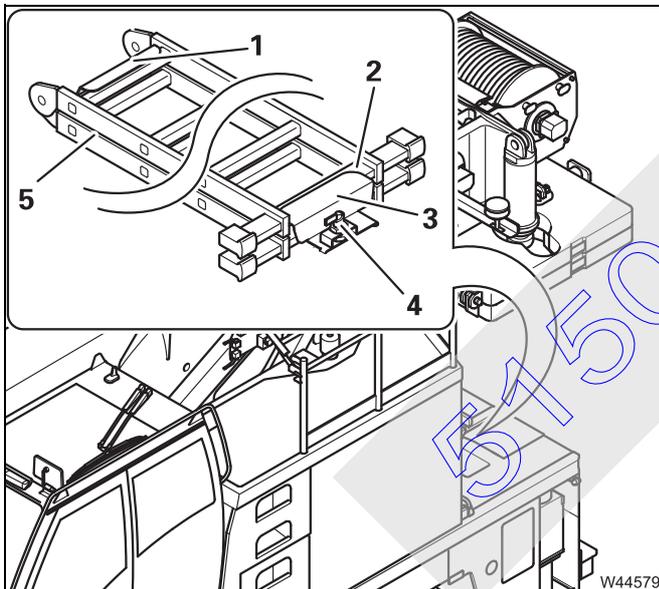
– Folding out

- Release the spring latch (1).
- Swing the ladder (2) outwards and fold it down – the locking bar (3) engages.
- If necessary – release the spring latch (5) and pull out another step (4).



- Folding in

- Release the spring latch (5) and push in the step (4).
- Lift the locking bar (3) for releasing and fold the ladder (2) up.
- Swing the ladder (2) on the carrier.
- Secure the ladder (2) with the spring latch (1).

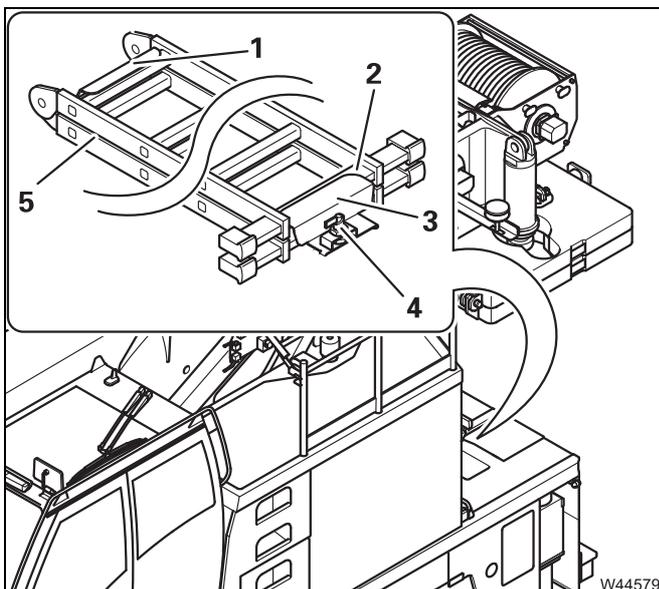


Folding ladder – storage on the rear of carrier

- For use

Ladder (5) – for erecting and fold out.

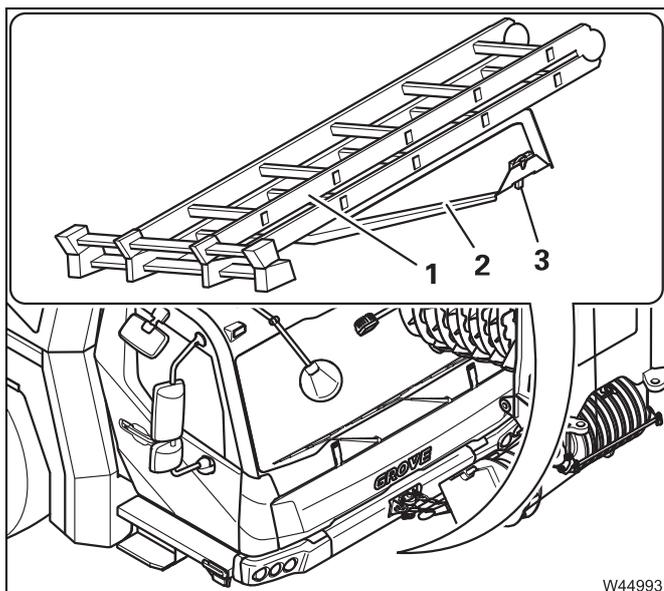
- Take off the clamp (3) and take out the ladder.
- Plug the clamp (3) into the holder on the carrier.
- Push the clamp to the front and secure it with the locking bar (4).



- For driving/crane operation

- Fold the ladder (5) together and push it under the clamp (1).
- Plug the clamp (3) into the holder on the carrier.
- Push the clamp over the rungs (2) and secure it with the locking bar (4).





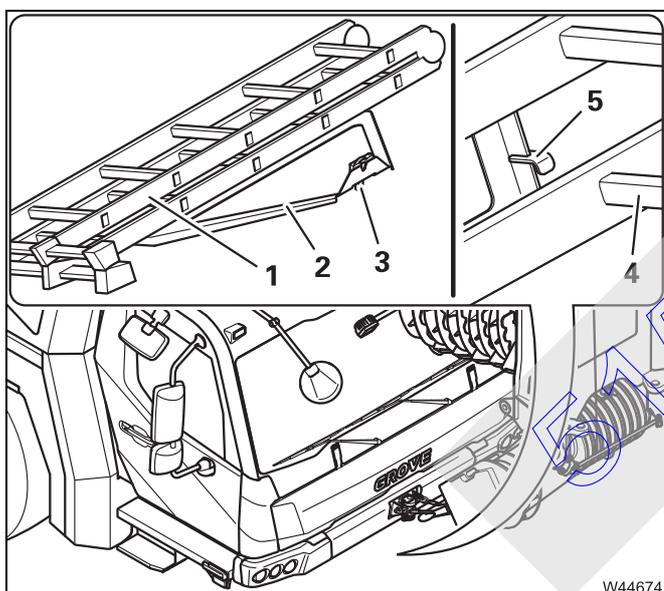
Folding ladder – storage under the driver's cab

For storage on the rear of carrier;  p. 3 - 89.

– For use

Ladder (1) – for erecting and fold out.

- Hold the clamp (2) and open the lock (3).
- Fold down the clamp (2).
- Take out the ladder.
- Fold the clamp (2) up until it engages.



– For driving/crane operation

- Fold the ladder (1) together.
- Place the ladder in the centre of the holder (2).
- Push the ladder back so that the holder (5) engages on a rung (4).
- Fold the clamp (2) up until it engages.
- Always secure the holder (2) before driving, even if no ladder is being transported.

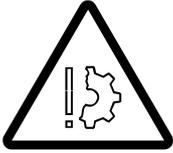
4

Starting the engine / switching it off – for driving



This chapter describes how to start the engine / switch it off from within the driver's cab and at the *outrigger* control units.

For starting the engine / switching it off from within the crane cab or using the hand-held control;  *Starting/switching off the engine – for crane operation*, p. 10 - 1.



Risk of fire!

Starting and running an engine can cause sparks which can start fires in dry vegetation nearby. A spark arrestor for the exhaust system may be required. The crane operator/crane driver must contact the local fire protection authorities for the applicable laws and regulations on fire protection requirements.



Risk of injury from diesel engine exhaust!

The State of California is aware that inhaling diesel engine exhaust can cause cancer. Diesel engine exhaust can also cause birth defects or other reproductive harm. Do not run the engine in an enclosed area. Do not idle the engine except as necessary. Ensure that there is adequate fresh air supply and do not breathe in the diesel engine exhaust. Do not modify or tamper with the exhaust system.

For more information go to www.P65warnings.ca.gov/diesel.

You can also scan the following QR code.



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4.1

Starting the engine from the driver's cab



For Euromot 5 VO engine emissions: Please note that crane operation is not possible while the exhaust system is being cleaned. Always check the status of the exhaust system and always initiate required exhaust cleaning before starting crane operation; *Cleaning the exhaust system*, p. 5 - 64.

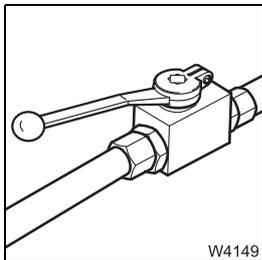
4.1.1

CHECKLIST: Starting the engine

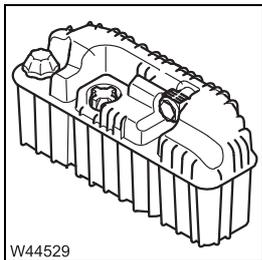


This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.

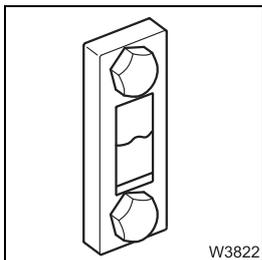
Observe the warnings and safety instructions given there!



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

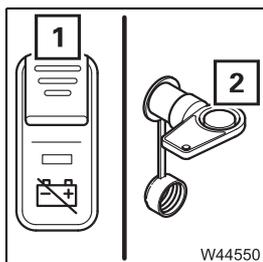


2. Check the coolant level in the engine; *Maintenance manual*.

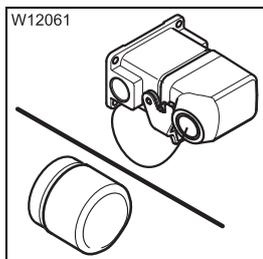


3. Check the oil level in the hydraulic system; *Maintenance manual*.

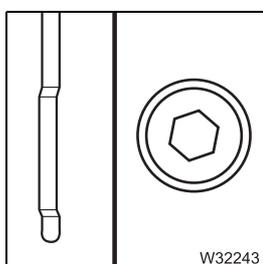




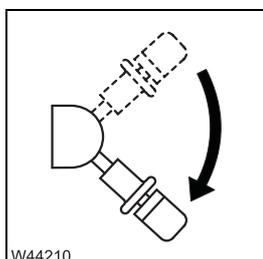
4. – Switch on battery master switch II (2) – if present; ■■■▶ p. 5 - 87.
- Switch on battery master switch I (1); ■■■▶ p. 4 - 11.



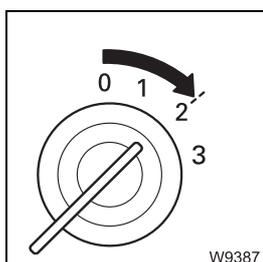
5. – Check that all emergency stop switches have been reset; ■■■▶ p. 4 - 20.
- Check that the bridging plugs are inserted into all sockets for hand-held controls; ■■■▶ p. 14 - 43



6. Check the oil level in the engine and transmission; ■■■▶ *Maintenance manual*.

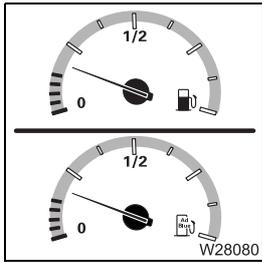


7. Check that the parking brake is applied.



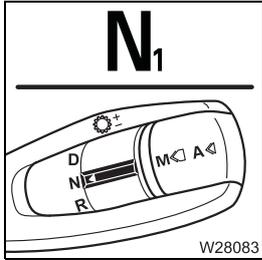
8. Switch on the ignition and check the instruments and displays; ■■■▶ p. 4 - 11.

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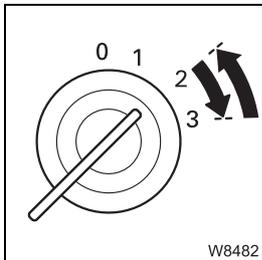


9. Check the consumables supply

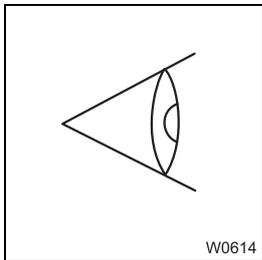
- ▣▣▣▣▶ *Fuel tank*, p. 4 - 7
- ▣▣▣▣▶ *AdBlue (DEF) tank*, p. 4 - 8
- ▣▣▣▣▶ *Crane cab heater fuel tank*, p. 11 - 5



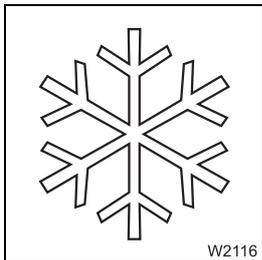
10. Switch the transmission to the neutral position; ▣▣▣▣▶ p. 5 - 42.



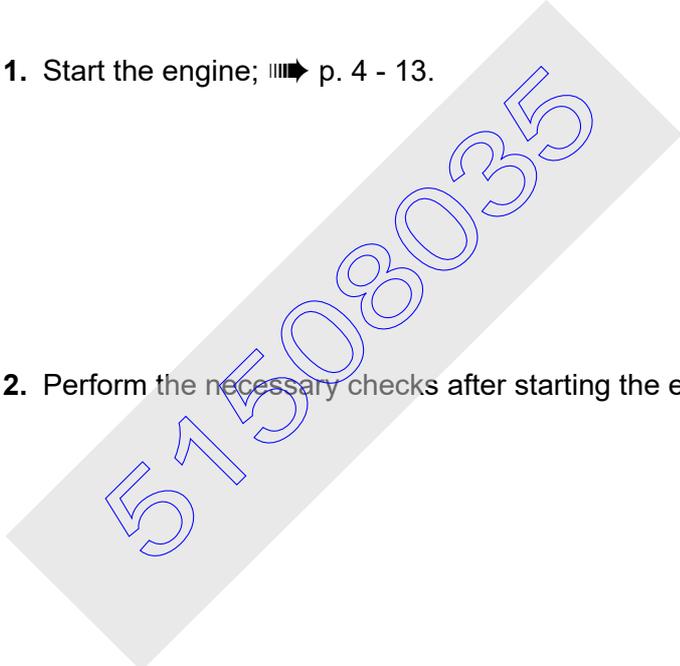
11. Start the engine; ▣▣▣▣▶ p. 4 - 13.



12. Perform the necessary checks after starting the engine; ▣▣▣▣▶ p. 4 - 15.

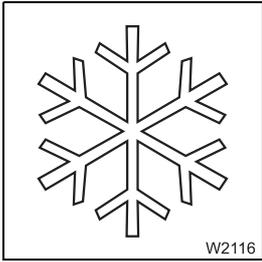


13. At low outside temperatures; ▣▣▣▣▶ *CHECKLIST: At low temperatures*, p. 4 - 6.



4.1.2

CHECKLIST: At low temperatures



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

1. The fuel and engine oil must be suitable for use at the respective outside temperature; ■■■► *Separate engine manufacturer's operating manual.*
2. The engine coolant must contain sufficient antifreeze; ■■■► *Separate engine manufacturer's operating manual.*
3. The windscreen washing systems must contain sufficient antifreeze; ■■■► *Maintenance manual.*
4. Prewarm the gear oil for driving; ■■■► *Warming up the gear oil, p. 5 - 50.*
5. Prewarm the hydraulic oil for crane operation; ■■■► *Prewarming hydraulic oil, p. 11 - 14.*

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4.1.3

Refuelling

Fuel tank

Only use permissible consumables;  *Separate engine manufacturer's operating manual.*



Danger of fire due to flammable gases!

Switch off the engine, the heating system and all auxiliary heaters before refuelling.



Risk of accidents if the tank is not closed!

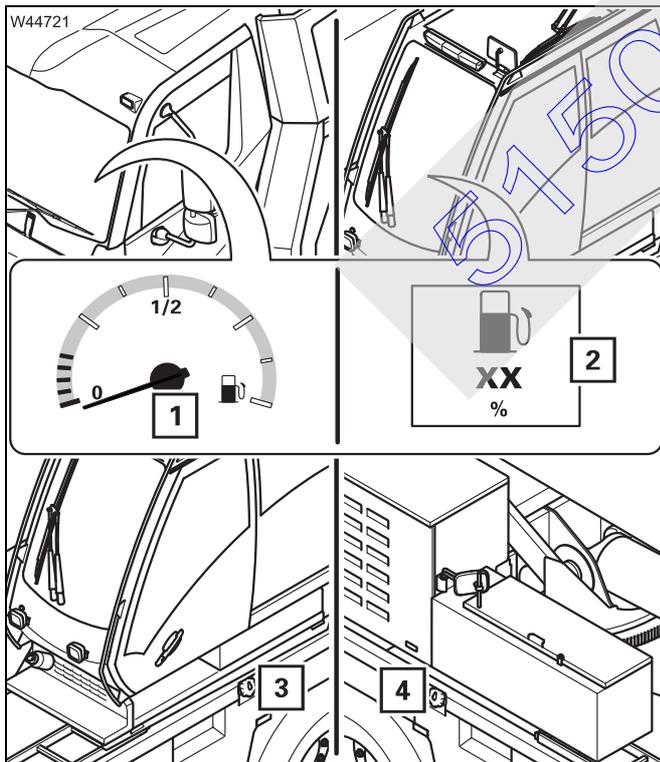
Close the tank each time you refill it.

In this way you can prevent other vehicles being endangered by the cap falling off or consumables escaping.



Risk of damage to the engine and catalytic converter!

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



The displays (1) and (2) show the total fuel level in both tanks.

The tanks are filled together via the filler necks (3) or (4).

- Always open both filler necks (3) and (4) when refuelling.
- Refuel in good time – leave sufficient space for the fuel to expand.
- Close both tanks with the caps after refuelling.

Also fill the tank for the crane cab heating system;  p. 11 - 5.



AdBlue (DEF) tank

AdBlue (DEF) is a consumable for exhaust treatment. For AdBlue (DEF), there are registered trademarks of the Kruse GmbH & Co KG and BASF SE companies and the German Association of the Automotive Industry.

Only use permissible consumables;  *Separate engine manufacturer's operating manual.*



Risk of accidents if the tank is not closed!

Close the tank each time you refill it.

In this way you can prevent other vehicles being endangered by the cap falling off or consumables escaping.



Risk of damage to the engine and catalytic converter!

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



Risk of injury from ammonia vapours!

Ammonia vapours can escape if you open the AdBlue (DEF) tank at high outside temperatures. Ammonia vapours can irritate mucous membranes, skin and eyes.

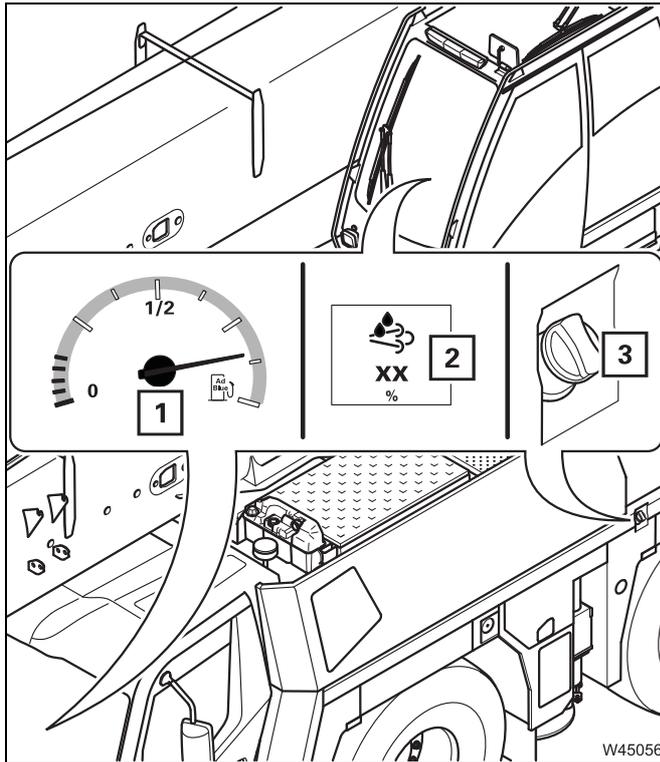
Ensure that there is sufficient fresh air supply and do not inhale the escaping ammonia vapours.



Risk of damage to painted or aluminium surfaces!

AdBlue (DEF) can cause corrosion of these surfaces. Clean up spilled AdBlue (DEF) with water immediately.

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The displays (1) and (2) indicate the AdBlue (DEF) supply.

The tank is refilled via the filler neck (3).

- Top up AdBlue (DEF) in due time, and close the tank with the cap.

If the AdBlue (DEF) supply is running low, warning messages are issued and when the tank is empty, the engine torque is reduced;

▣▣▣▣ *Overriding the torque reduction*, p. 5 - 63.



In order to comply with the exhaust emission regulations, the truck crane may only be driven with AdBlue (DEF). Driving without AdBlue (DEF) will invalidate the licence for using the truck crane on public roads and you may no longer drive it on public roads.

4.1.4

Checks before starting the engine

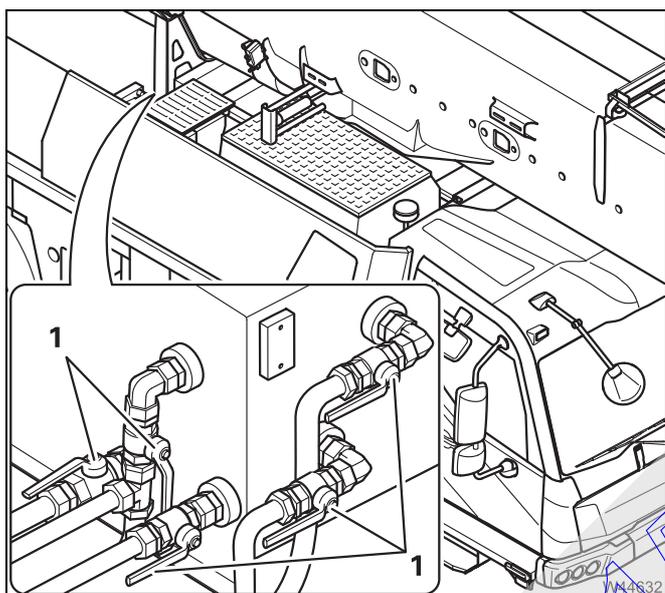
On the hydraulic tank

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 all closed valves.

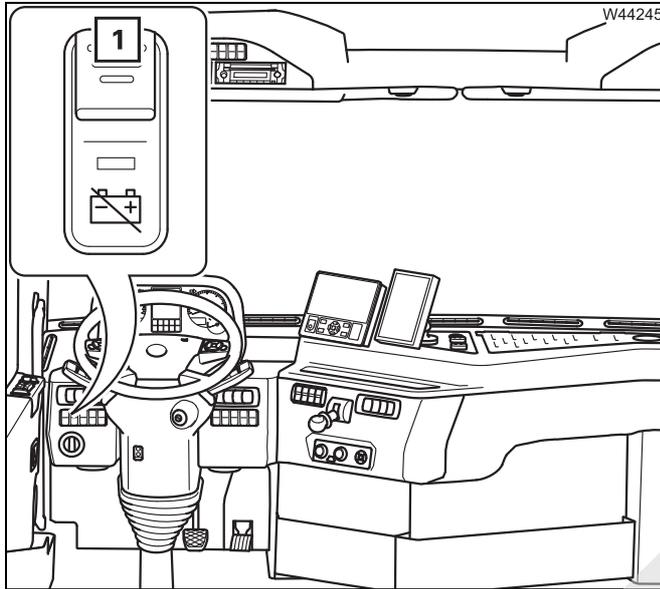
51508035

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. 14 - 43.

Battery master switch

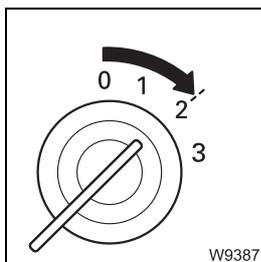
You can only start the engine when the available battery master switches are switched on.



- Before switching it on, make sure that battery master switch II is switched on – if present;  p. 5 - 87.
- Press the switch (1) at the top – battery master switch I is switched on.

4.1.5

Switching on the ignition



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

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



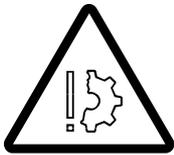
Do not start the engine until the main menu is displayed.

4.1.6

Lamp test/synchronisation of the switching states

Lamp test

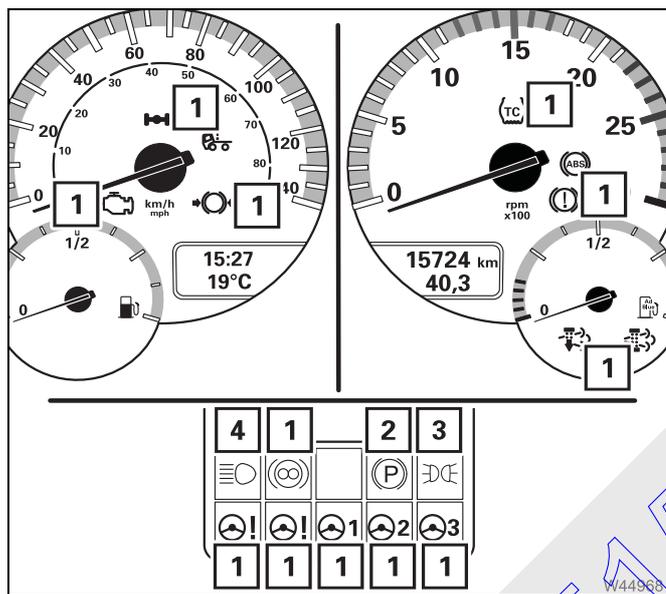
After the ignition has been switched on, a lamp test is performed.



Risk of accidents 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!

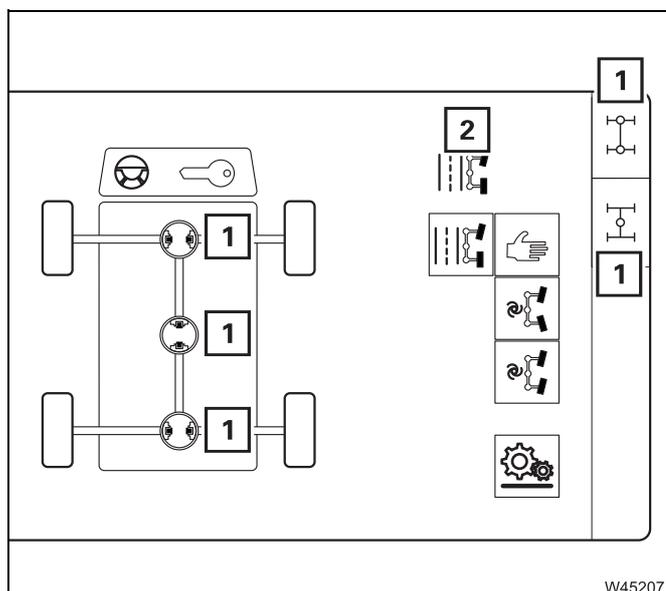
In this way, you will avoid accidents and damage that occur when malfunctions are not identified in time.



- 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, apply the parking brake and check that the lamp (2) lights up continuously.
- Switch on the light and check that the lamp (3) lights up continuously.
- Check the lamp (4) by switching on the headlight or operating the headlight flasher.

Synchronisation of the switching states

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



Differential locks

The state last saved is retrieved.

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

Steering

When you switch the ignition on, the steering is always set to *On-road driving* (2), regardless of what setting was last saved.

4.1.7

Starting the engine

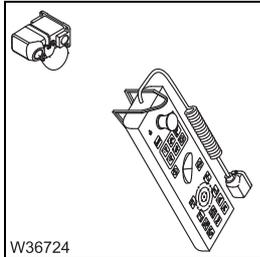


This section only describes how to start the engine from the driver's cab. You can also start the engine at the outrigger control units; p. 4 - 18.

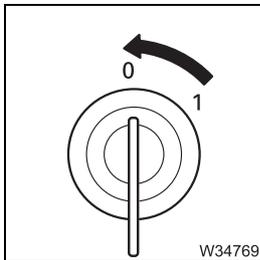
For operating the engine; *Separate engine manufacturer's operating manual.*

The engine can only be started if:

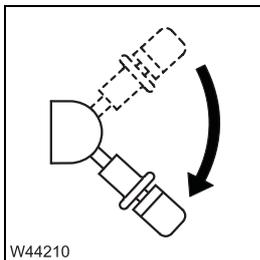
- The bridging plugs have been inserted in all sockets of the superstructure for the hand-held control; p. 14 - 43.



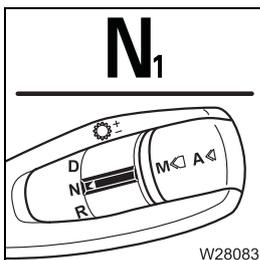
- The ignition is switched off in the crane cab.



- The parking brake is applied.



- The transmission is in neutral position **N**; p. 5 - 42.



This section is for starting a warm and cold engine.



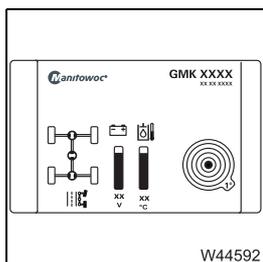
Danger of explosion when using starter fuel!

The engine must never be started with the aid of starter fuel. Starter fuel sprayed into the suction unit can ignite.



Risk of malfunctions in the carrier electronics!

Always wait until the start menu is displayed before starting the engine. This prevents malfunctions in the electronics and corresponding error messages during subsequent driving.



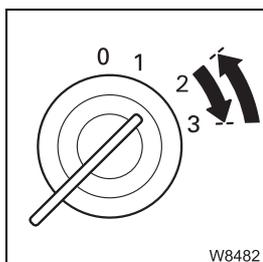
- Wait until the start menu is displayed before switching on the ignition.



Risk of crushing due to turning wheels!

When you start the engine, no persons may be within the steering range of the 3rd to 5th axle lines. These axle lines can be briefly steered during the start of the engine; sometimes with a delay of five seconds.

- Do not press the accelerator.
- Turn the ignition key to position **3** and hold it there until the engine starts.
- Release the ignition key once the engine has started.



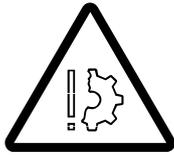
If the engine does not start, release the ignition key after about 15 seconds and wait one minute before trying again.

If the engine does not start after multiple attempts to start;

▶ *Malfunctions at the engine*, p. 8 - 39.

4.1.8

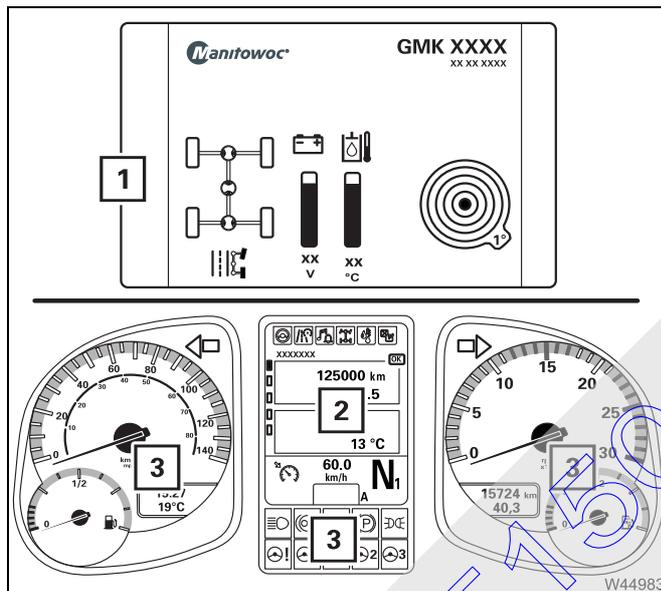
Checks after starting the engine



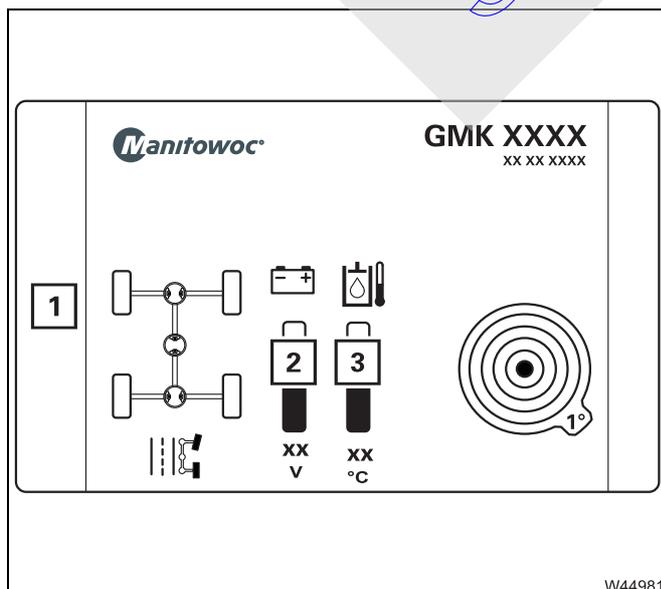
Risk of damage to the engine!

Observe the symbols and messages in the display area of the main menu and in the on-board computer. You thus avoid low oil pressure resulting in engine damage.

Start menu and on-board computer



- Check the symbols in the display area (1) and the indications at the on-board computer (2) immediately after starting the engine.
- Switch off the engine immediately if a symbol or a lamp is red.
 - Display area (1) – when a symbol is red; Warning messages on the CCS display, p. 8 - 23.
 - On-board computer (2) – when a message is red; Warning and fault messages on the on-board computer, p. 8 - 7.

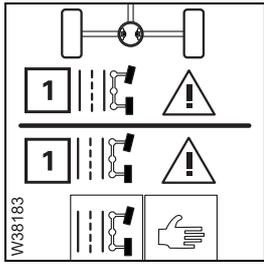


- Also check the following displays
- 2 Voltage in volts
- 3 Hydraulic oil temperature in °C (°F)
- 4 AdBlue (DEF) supply in percent

The colour of the bar under the value indicates the range within which the value is.

- Green:** Value is OK
- Yellow:** Limit value almost reached
- Red:** Limit value exceeded (or not reached) – warning message in display area (1); p. 8 - 23.





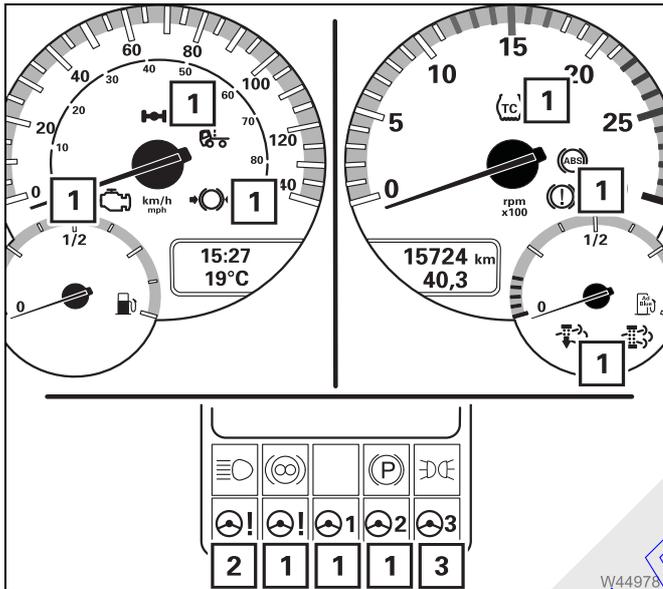
- Check the display (1) in the *Start menu* or in the *Driving menu*.

If the symbol is blue, then the steering angle is not correct based on the 1st and 2nd axle lines.

- Steer using the steering wheel – the steering angle is automatically adapted, and the symbol goes out.

Centre control unit

After the engine start, several lamps must go out.



Check that the lamps (1) and (2) go out. If one or more lamps light up; *Warning messages on the centre control unit*, p. 8 - 3.

The lamp (3) only goes out when the vehicle starts moving.

If the red light (2) does not go out, then you must always perform the required checks before you start driving. p. 8 - 3.



Risk of accidents because the truck crane cannot be steered!

If the red *Steering system warning* lamp lights up, the relevant axle lines can no longer be steered, which can also result in severe accidents at reduced speed.

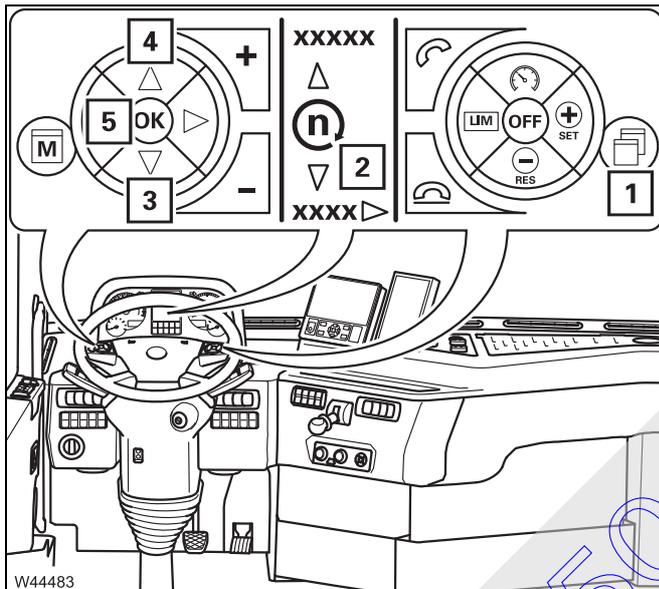
4.1.9

Setting idling speed

After the engine is started, the idling speed is controlled automatically. If necessary, you can adjust the idling speed manually.

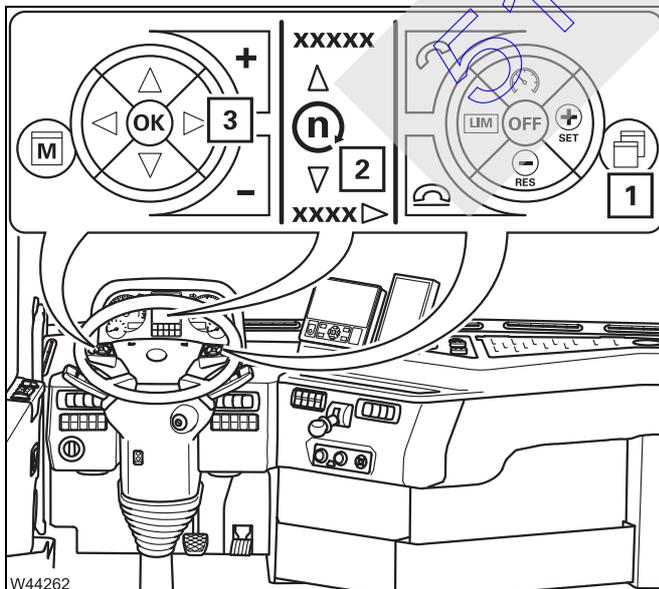


You can only set the idling speed when the truck crane is stationary.



Increasing/reducing the idling speed

- Press button (1) repeatedly until the *Speed* menu (2) is displayed.
- Increase or reduce the speed step-by-step using the buttons (3) or (4). The speed is increased/reduced by 20 rpm.
- Confirm the setting with the button (5).
or
- Wait about 3 seconds – the setting is automatically saved.



Switching off the idling speed change

- Press button (1) repeatedly until the *Speed* menu (2) is displayed.
- Press the button (3).
or
- Accelerate to more than 20 km/h (12 mph).

4.2

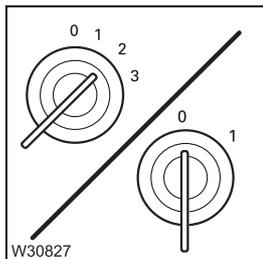
Starting the engine – at the outrigger control units



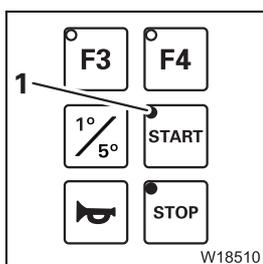
You can generally only start the engine if a bridging plug is inserted in all sockets not required; p. 14 - 43.

Prerequisites

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



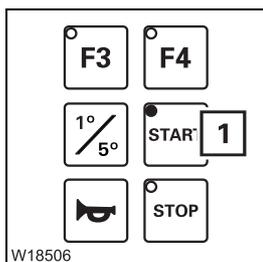
- The ignition in the driver's cab is switched on.
- The ignition is switched off in the crane cab.



- The lamp (1) lights up.

Starting the engine

All activities and checks required to start the engine must be carried out before starting the engine; p. 4 - 3.



- Press the button (1) once – the engine starts.

4.3

Switching off the engine

4.3.1

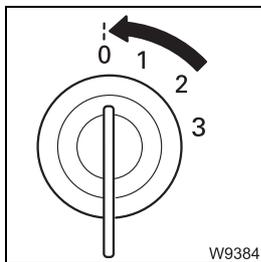
In the driver's cab



Risk of accidents because the truck crane cannot be steered!

Switch the engine off only once the truck crane has come to a standstill. If you remove the ignition key, the steering will lock and you will lose control of the moving truck crane.

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



Ignition lock

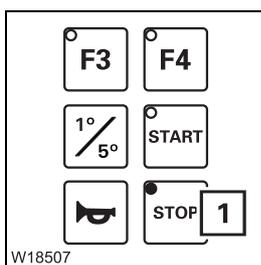
- Turn the ignition key to position **0** – the engine switches off.

After switching off

If you want to stop (park) the truck crane;  p. 5 - 85.

4.3.2

At the outrigger control units



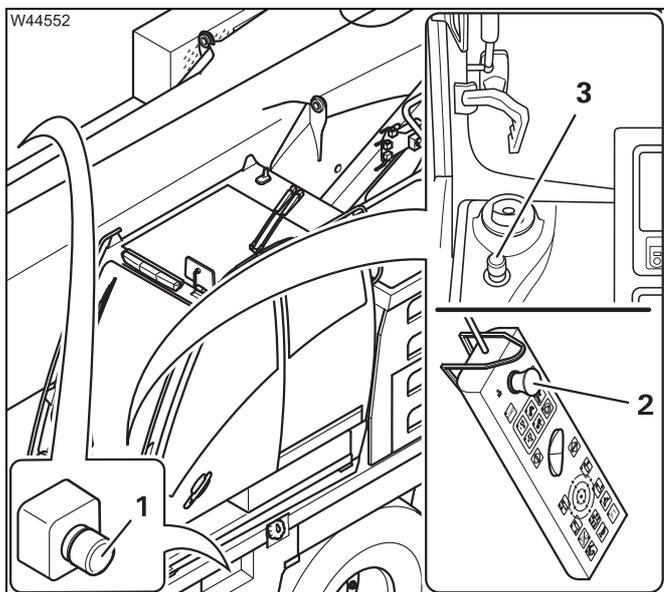
- Press the button (1) once – the engine switches off.

4.3.3

With emergency stop switches



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



Three emergency stop switches are provided for emergency use:

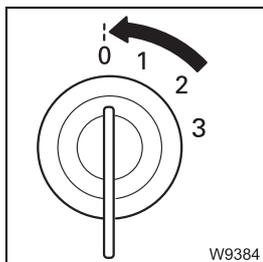
- 1** On the carrier – always active
- 2** Only active with connected hand-held control – in addition to (1) and (3)
- 3** In the crane cab – always active

- Press an active emergency stop switch.
 - The switch engages.
 - The engine is switched off.

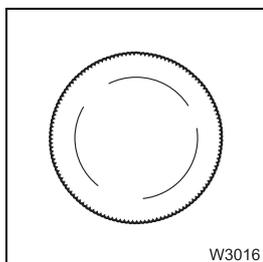
If there is an air intake inhibitor, then it is triggered.

Resetting the emergency stop switch

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



- Switch off the ignition.



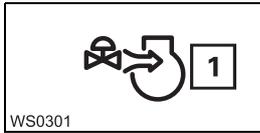
- Turn the actuated emergency stop switch until it disengages again.

If there is an air intake inhibitor, it must be opened;

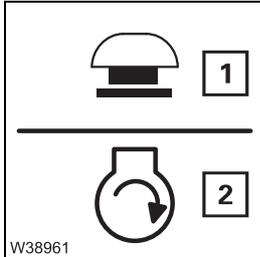
▣▣▣▣ *Opening the air intake inhibitor, p. 4 - 21.*

4.4

Air intake inhibitor



If the air intake inhibitor is triggered, a flap in the air intake line closes and the engine stops running – symbol (1) is displayed.



The air intake inhibitor is triggered,

- When an emergency stop switch is actuated – symbol (1) displayed.
- When the maximum permissible engine speed is exceeded – symbol (2) displayed.

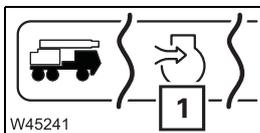
The symbol is displayed until the ignition is switched off.

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

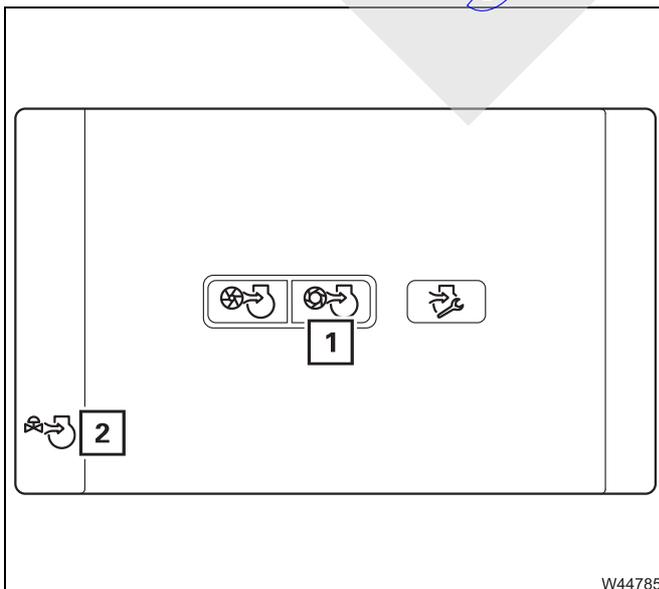
Opening the air intake inhibitor

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

- The ignition must be switched off.
- The emergency stop switch must be reset.
- The engine was switched off at least 30 seconds ago.



- Open the menu (1) – Air intake inhibitor menu.



- Select and confirm the symbol (1),
 - The air intake inhibitor opens,
 - The symbol (2) disappears.

The engine can now be started again.

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5 Driving mode

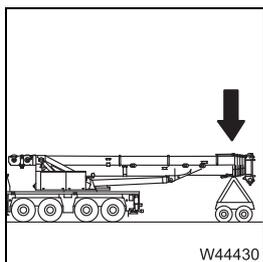
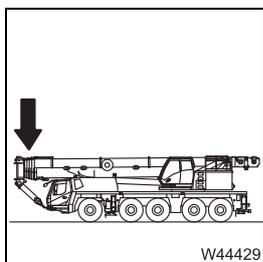
5.1 Before driving

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 given there!



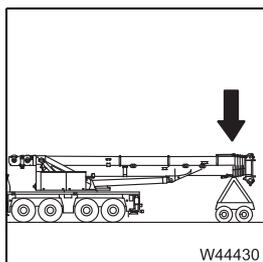
1. For on-road driving without a dolly

- Depending on the driving mode, the counterweight is unrigged;
 ■■■► p. 6 - 1, ■■■► p. 12 - 65.
- The main boom is retracted and the telescoping cylinder is locked in telescopic section I; ■■■► p. 11 - 112.
- The slewing gear is switched off; ■■■► p. 11 - 122.
- The boom is resting in the boom rest, the symbol has gone out – if present;
 ■■■► p. 5 - 10.
- The truck crane has a rigging mode that is permissible according to the requirements for on-road driving applicable in the country in which you are working.

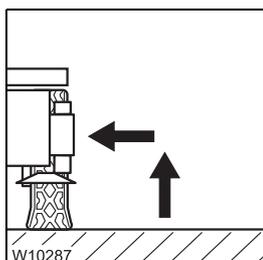
2. When the main boom is resting on a dolly

- All telescopic sections are interlocked and the telescoping cylinder is locked.
- The slewing gear is switched off; ■■■► p. 11 - 122.
- The boom floating position is switched on; ■■■► p. 6 - 13.
- The slewing gear freewheel is switched on; ■■■► p. 6 - 12.
- Boom pre-tensioning is switched on, depending on requirements;
 ■■■► p. 6 - 14.

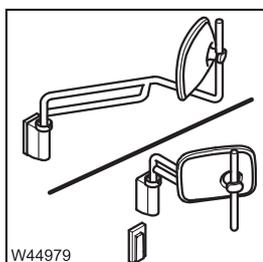




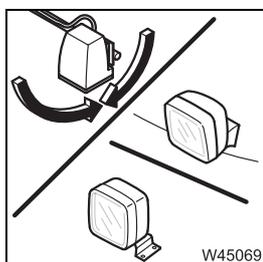
- Depending on requirements, the 3rd axle line is raised; ■■■▶ p. 6 - 15.
- The turntable is unlocked – provided the systems are present;
 - ▶ *Unlocking the superstructure*, p. 11 - 16
 - ▶ *Switching off the houselock*, p. 11 - 19
- The truck crane has a rigging mode that is permissible according to the requirements for on-road driving applicable in the country in which you are working.



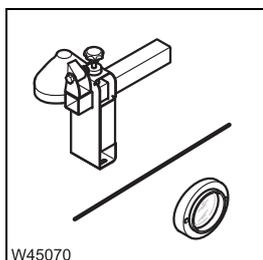
- 3. On the outrigger**
- All outrigger beams are fully retracted and secured to prevent extension;
 - ▶ p. 12 - 39.
 - The outrigger pads are in the driving position; ■■■▶ p. 12 - 47.



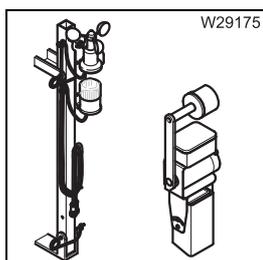
- 4. The mirror for crane operation is folded in or removed; ■■■▶ p. 12 - 170.**



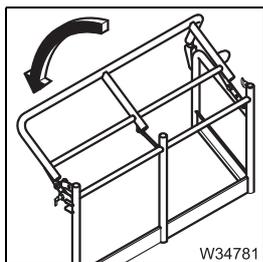
- 5. – The slewable spotlights are switched off and swivelled in such a way that no other drivers are dazzled by reflection; ■■■▶ p. 11 - 132.**
- The spotlights I are switched off; ■■■▶ p. 9 - 155.
 - The spotlights II are switched off; ■■■▶ p. 9 - 156.



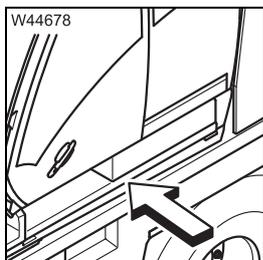
- 6. – The spotlights III are switched off, pushed in and turned down; ■■■▶ p. 12 - 180.**
- The lighting on the outrigger is switched off; ■■■▶ p. 3 - 47.



- 7. Anemometer, air traffic control light and camera system are removed:**
- ▶ *Anemometer and air traffic control light*, p. 12 - 164,
 - ▶ *Camera on the main boom*, p. 12 - 173.

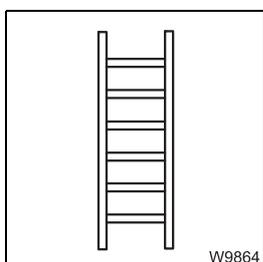


8. All railings are folded in; ■■■▶ p. 12 - 169.

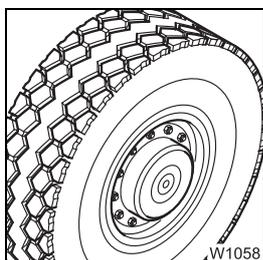


9. The step on the crane cab is retracted or pushed in, depending on the version.

- Retract; ■■■▶ *Automatic operation*, p. 12 - 178
- Push in; ■■■▶ *Manual operation*, p. 12 - 179

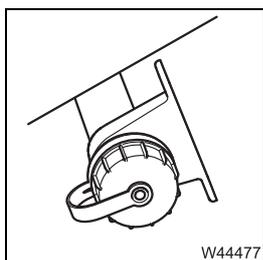


10. All ladders are secured; ■■■▶ p. 3 - 87

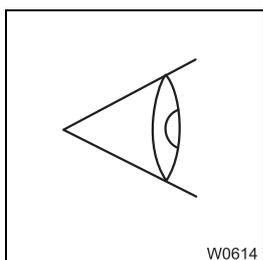


11. Check the tyres.

- Tyre pressure when tyres are cold in on-road mode; ■■■▶ p. 1 - 18
- Other checks; ■■■▶ *Maintenance manual*.

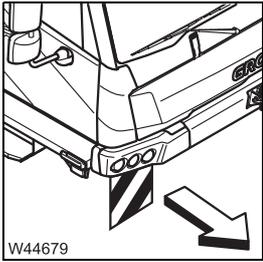


12. Check the level and function of the windscreen washing system; ■■■▶ *Maintenance manual*.

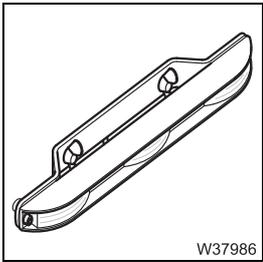


13. Carry out an inspection of the truck crane, looking out in particular for any leaking fluids (oil, fuel or water).

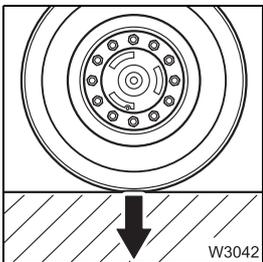




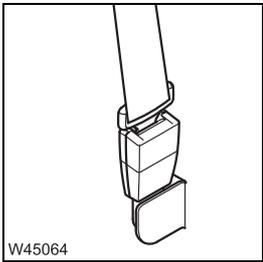
14. The warning signs for marking the vehicle width are folded down (only for vehicle widths of over 2.75 m (9.0 ft));
Vehicle width; ■■■▶ p. 1 - 8,
Warning signs; ■■■▶ p. 5 - 10.



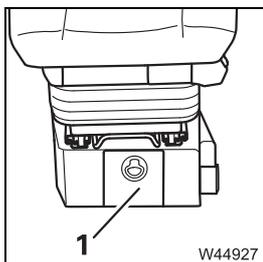
15. If necessary, check whether the additional rear light is correctly connected;
■■■▶ p. 5 - 13.



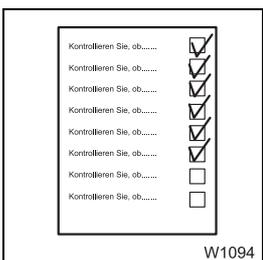
16. The detachable equipment parts must be unriggered so that they fulfil the regulations of the country in which you are working in terms of permissible weights and axle loads, lengths, widths, height, etc.
For a driving mode with a maximum axle load of 12 t (26,500 lbs);
■■■▶ *Driving modes*, p. 6 - 1.



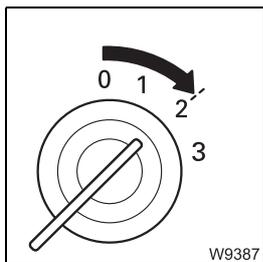
17. The fold-up berth must be folded up and secured; ■■■▶ p. 5 - 67.



18. All storage compartments must be closed and all parts that may be transported must be secured against falling down and slipping; ■■■▶ p. 5 - 8.



Carry out all activities and checks required for starting the engine;
■■■▶ *CHECKLIST: Starting the engine*, p. 4 - 3



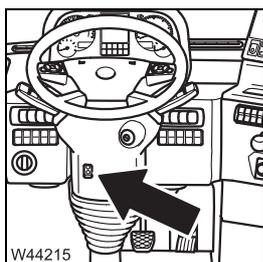
19. Switch on the ignition; p. 4 - 11



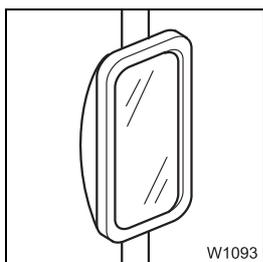
20. The driver's cab is lowered to the end position – the symbol has gone out, if there is any monitoring; p. 8 - 64.



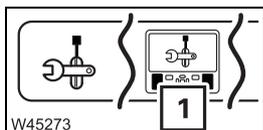
21. Adjust the driver's seat; p. 5 - 14.



22. Adjust the steering column; p. 5 - 16.

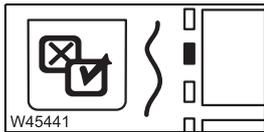


23. Adjust the mirrors; p. 5 - 9.

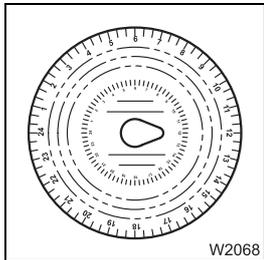


24. Adjust the brightness of the CCS display as necessary; p. 5 - 17.

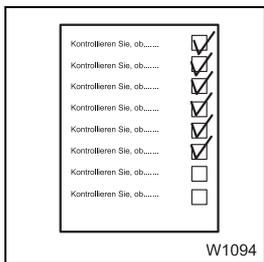




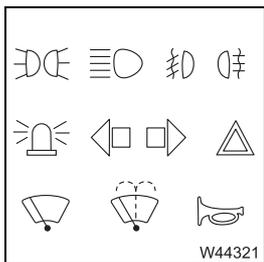
25. Adjust the brightness of the instrument panel as necessary;
 ▶ *Lighting menu*, p. 5 - 35.



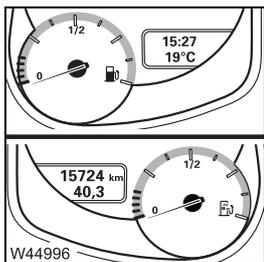
26. Set the tachograph, insert the diagram sheet; ▶ p. 5 - 20.



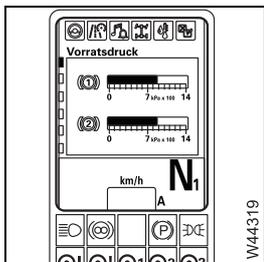
27. Start the engine and carry out all checks; ▶ *Checks after starting the engine*, p. 4 - 15.



28. Check the electrical system; ▶ p. 5 - 8.

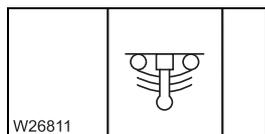


29. Check the consumables supply.
 ▶ *Fuel tank*, p. 4 - 7
 ▶ *AdBlue (DEF) tank*, p. 4 - 8
 ▶ *Crane cab heater fuel tank*, p. 11 - 5

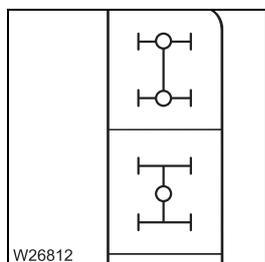


30. Check the compressed air and brake systems; ▶ p. 5 - 11.

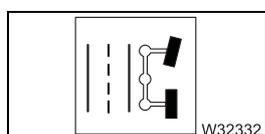
31. Check that all switching states for on-road driving are set, and that the corresponding symbols are shown:



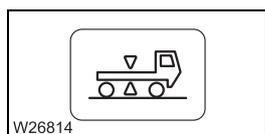
– Suspension switched on; p. 5 - 19,



– Longitudinal and transverse differential locks switched off; p. 5 - 71,

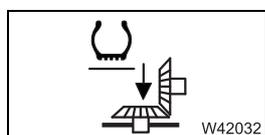


– Separate steering switched off – the symbol for on-road driving is shown; p. 5 - 83.



– On-road level is set; p. 5 - 74

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



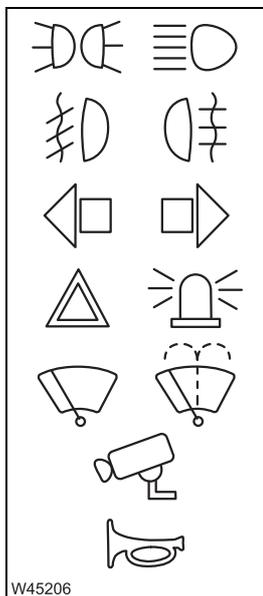
– Transfer case – off-road gear switched off; p. 5 - 70.

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

5.1.2

Checking the condition of the truck crane

Electrical system



- Check the listed functions and have faulty parts repaired.
 - Parking light/headlight, full beam headlight, headlight flasher, side marker lights
 - Brake lights, reversing lights, reversing lamps, buzzer
 - Fog light, fog tail light,
 - Turn signal indicator,
 - Hazard warning system, rotating beacons
 - Windscreen wipers, windscreen washing system
 - Reversing camera, BirdView system 270°,
 - Horn.

Checking the storage compartments

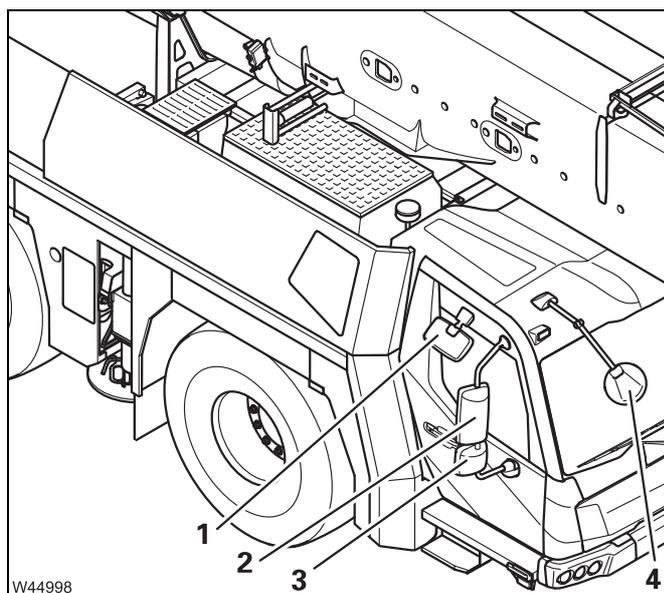


Make sure that all storage compartments are firmly closed for driving and that all objects in non-lockable storage compartments are secured.

Risk of accidents from objects slipping in an uncontrolled manner!

Always close all storage compartments so that they cannot open by themselves and secure all objects in the driver's cab against slipping. This prevents objects from slipping and pedals from blocking when braking, for example.

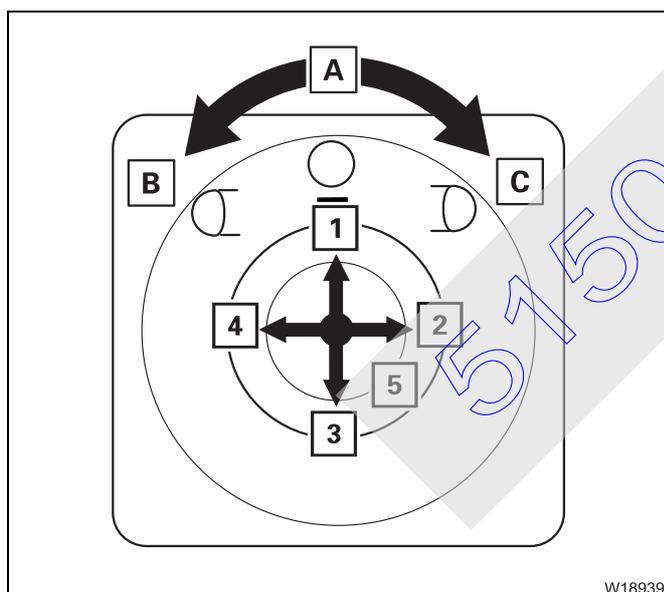
Adjusting mirrors Adjust all the mirrors to suit your sitting position.



Manual adjustment

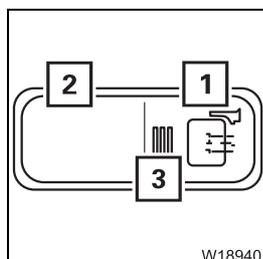
- Manually adjust the mirrors (1), (3) and (4).

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



Electrical adjustment

- Turn the button to position
 - A Neutral position
 - B Mirror on the driver's side or
 - C Mirror on the passenger side.
- Press the button (5) – the mirror moves.
 - 1 top
 - 2 right
 - 3 bottom
 - 4 left



Mirror heating

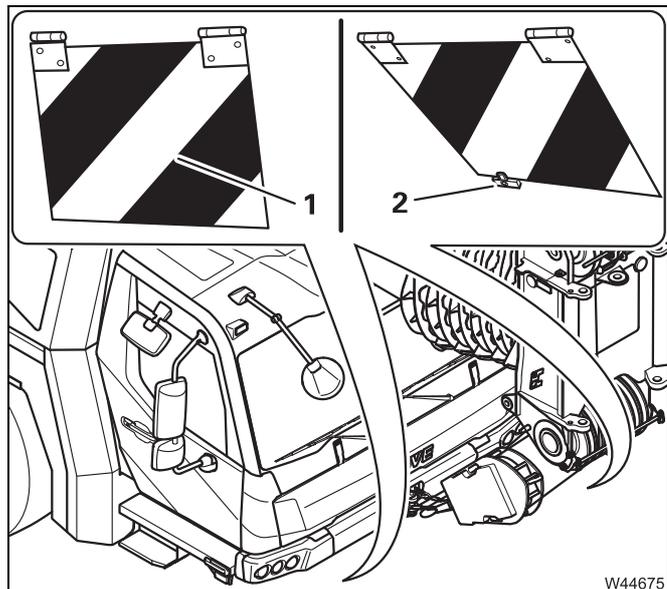
- 1 Switch on:
- 2 Switch off:

Press button once – lamp (3) lights up
Press button once – lamp (3) goes out



Warning plates for vehicle width

Depending on the vehicle width and equipment, folding 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 locking bar (2).

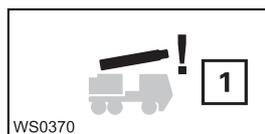
Checking the vehicle height

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



Risk of accidents by exceeding the total permissible height!

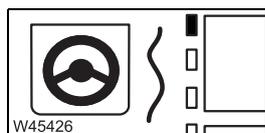
Check whether the main boom is resting on the boom rest.
Otherwise the indicated total height will also be exceeded at on-road level.



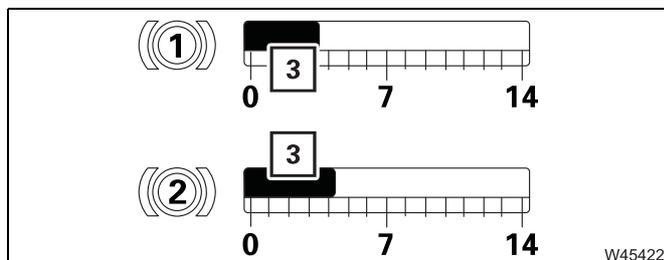
If the *Vehicle height check* function is present, the position of the main boom in the boom rest is monitored. In this case, a corresponding warning (1) is shown on the CCS display if the main boom is not correctly put down; see p. 8 - 23.

Supply pressure

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

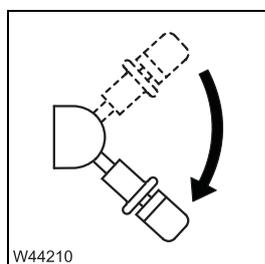


- Open the menu (1) – Supply pressure menu.



- Check that the supply pressure is approx. 8 bar (116 psi) in both brake circuits.

If the supply pressure is too low, – in the red range (3), you must build it up.



Building the supply pressure

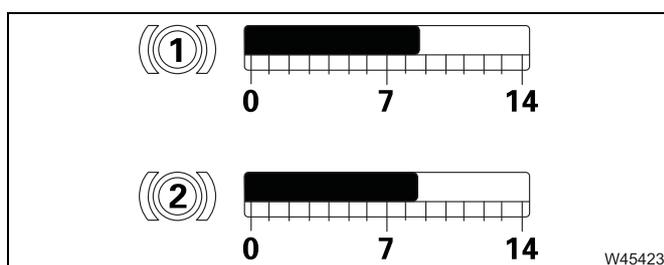
- Check that the parking brake is applied.



Risk of accidents due to the truck crane moving unintentionally!

Make sure that the lever is pointing down before building up the supply pressure. This prevents the parking brake being released as soon as sufficient pressure is available and the truck crane moving unintentionally.

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

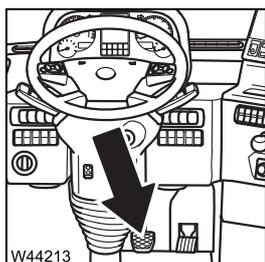


- Build up the supply pressure until
 - about 8 bar (116 psi) is reached **and**
 - a valve audibly discharges pressure.



Parking brake

Check the function of the parking brake.



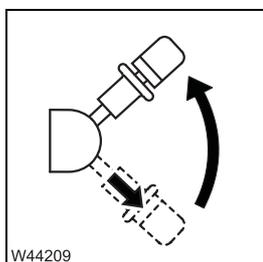
- Operate the service brake.



Risk of accidents due to the truck crane moving unintentionally!

Always apply the service brake before releasing the parking brake.

This prevents the truck crane rolling in an uncontrolled manner when the parking brake is released.



- Release the parking brake.

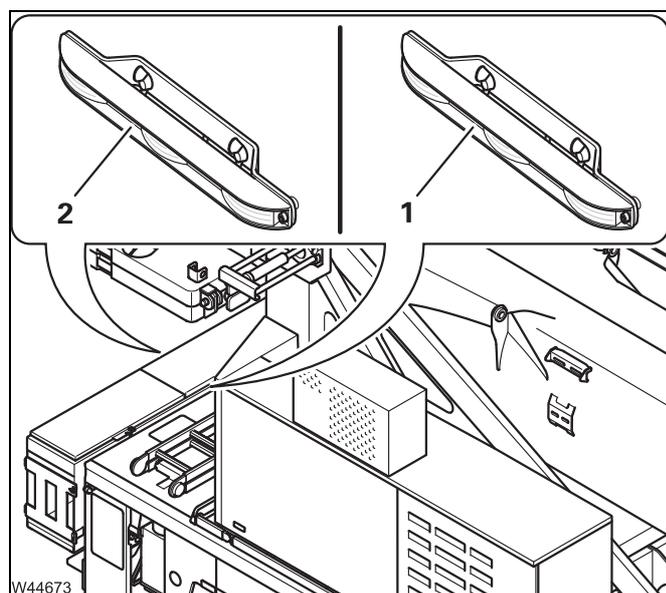


If the supply pressure is sufficient, the parking brake is released and the lamp (1) goes out.

51508035

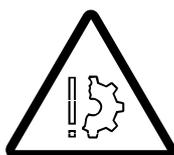
Additional information
Rear light

If there is an additional rear light, then you must check to ensure it is correctly connected.



There is an additional rear light (1) at the rear of carrier.

If there is a storage box present, then there is another additional rear light (2) there.

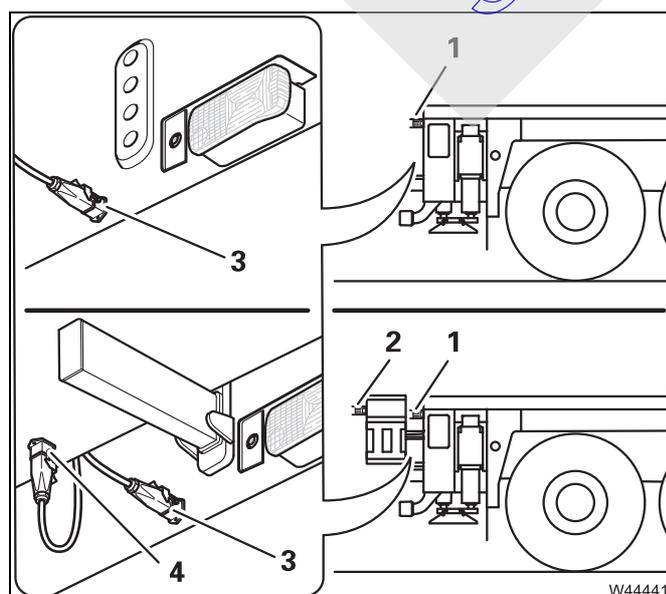


Risk of damage to the connecting cables!

Always check before driving whether the plugs are plugged into the required sockets and always disconnect the connecting cables before removing the storage compartment.

In this way, you can prevent the connecting cables from loosely hanging down and getting dirty, caught or torn off while driving.

Carry out a function check before driving.



For equipment without storage box

For on-road driving, the additional rear light (1) must be connected to the socket (3).

For equipment with storage box

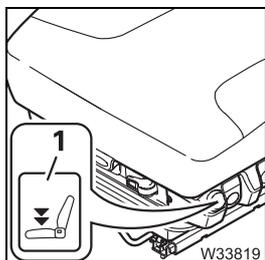
For on-road driving, the additional rear light (2) must be connected to the socket (3).

The plug of the additional rear light (1) must be inserted in the dummy socket (4).

5.1.3

Adjusting the seat and the steering column

Adjusting the driver's seat

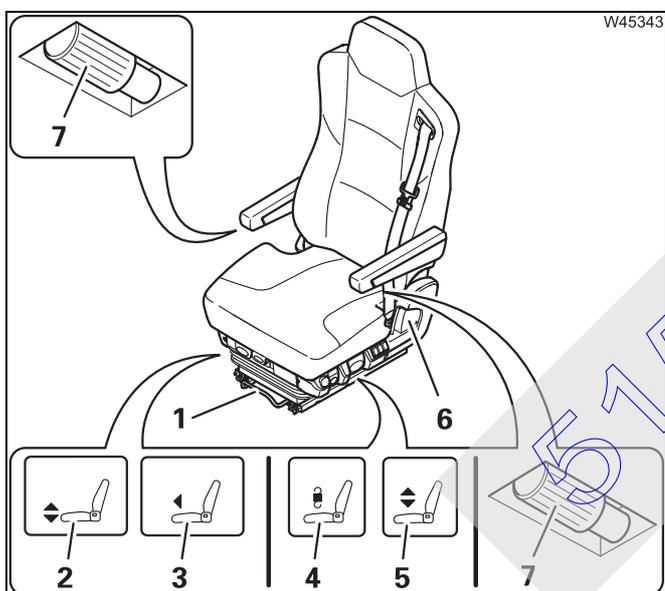


The seat height and lumbar area support are adjusted pneumatically. You can only make these adjustments when:

- the switch (1) on the driver's seat is switched off (not pressed in),
- there is sufficient air pressure in the secondary consumer circuit. You may have to build up supply pressure;  p. 5 - 11.

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

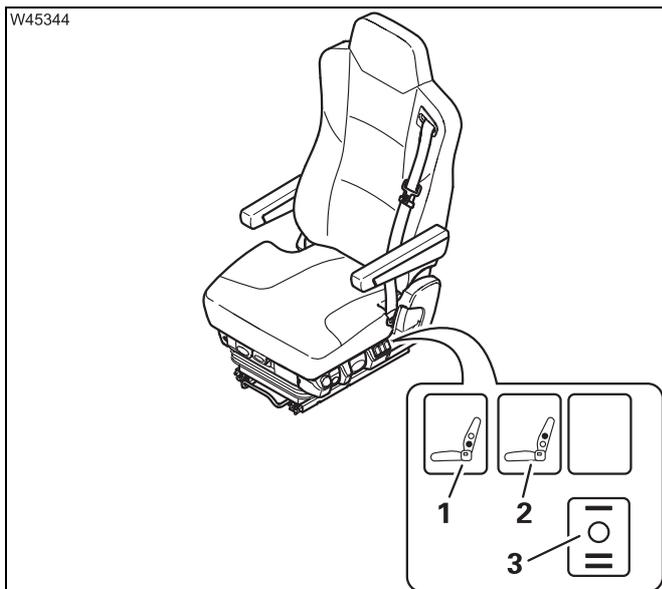
You can make adjustments to suit your body size and shape.



Settings for body size

- 1 Seat – longitudinal adjustment
- 2 Horizontal suspension on/off
- 3 Cushion longitudinal adjustment
- 4 Spring hardness
- 5 Seat – height
- 6 Back rest – angle
- 7 Armrests – inclination¹⁾

1) Additional equipment



Settings for body shape

- 1 Lower lumbar area support
- 2 Upper lumbar area support
- 3 Seat heating on/off¹⁾

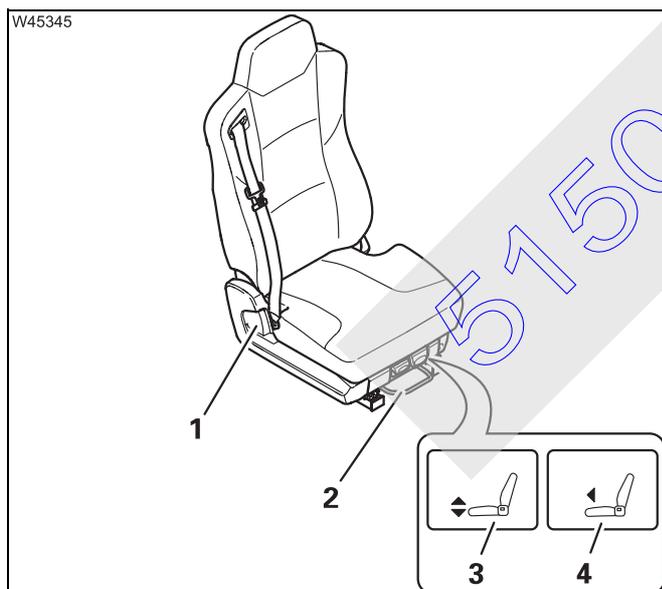
¹⁾ Additional equipment

The settings are made pneumatically.
The following applies to all buttons:

- Deflate the air cushion:** Press –
Inflate the air cushion: Press +

Adjusting the passenger seat

The passenger seat is adjusted mechanically.



- 1 Back rest – angle
- 2 Seat longitudinal adjustment
- 3 Seat – inclination
- 4 Cushion – longitudinal adjustment



Adjusting the steering column



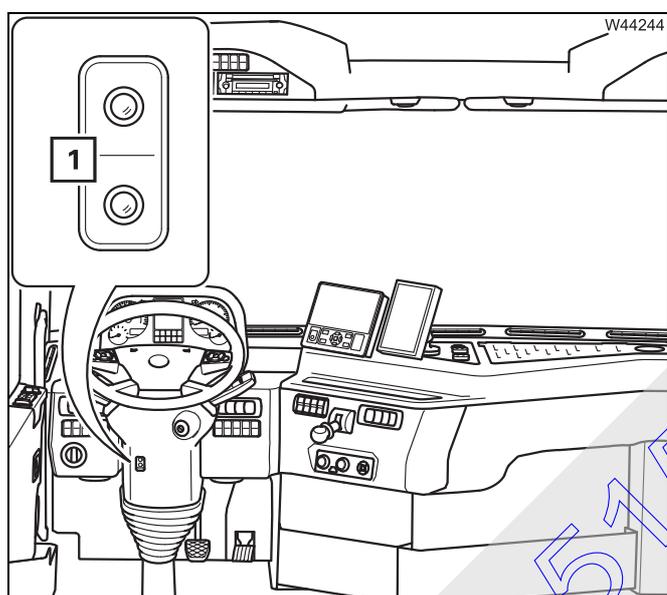
The steering column is unlocked pneumatically.

Risk of accidents by unlocked steering column!

Always stop the truck crane before you unlock the steering column.
Once the steering column is unlocked you can no longer steer safely.



The steering column can be unlocked only when sufficient supply pressure has been built up in the secondary consumer circuit;  *Building the supply pressure*, p. 5 - 11.



- Press the button (1) at the bottom once. The steering column is unlocked for about 6 seconds.
- Move the steering column into the desired position.
- Push the button (1) at the top once. Or wait until the steering column locks automatically (after about 6 seconds).

5.1.4

Display – Adjusting the brightness

The brightness of the display can also be adjusted manually.

In the driver's cab

You can set two brightness values.

- A value when the headlight is switched off.
- A value when the headlight is switched on.

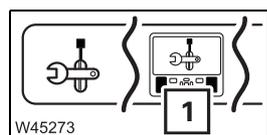
The configured brightness is switched over when the headlight is switched on and off.

In the crane cab

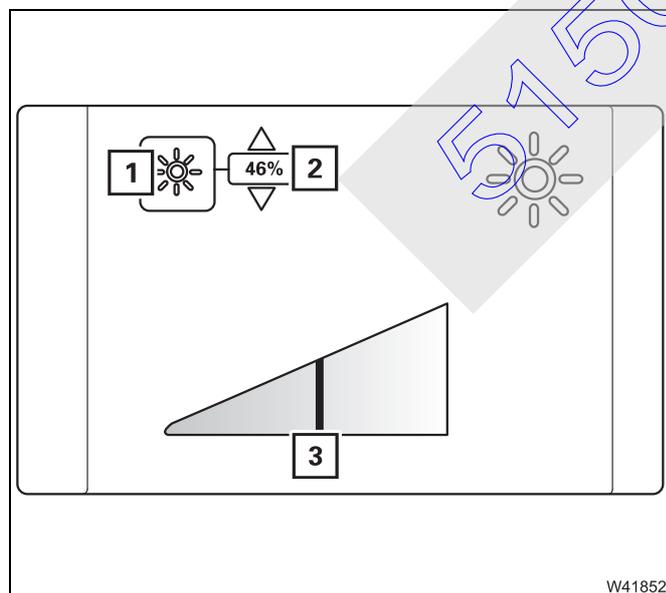
You can set a common brightness value for the *CCS* and the *RCL* displays.

Adjusting the brightness

The adjustment is made in the same manner in the driver's cab and the crane cab.



- Open the menu (1) – Set display brightness menu.



- Select and confirm the symbol (1).
- Set the desired brightness on the display (2).
- Confirm the selection.

The brightness of the display changes while adjusting and you can view the set value (0 to 100%) on the display (2) or (3).

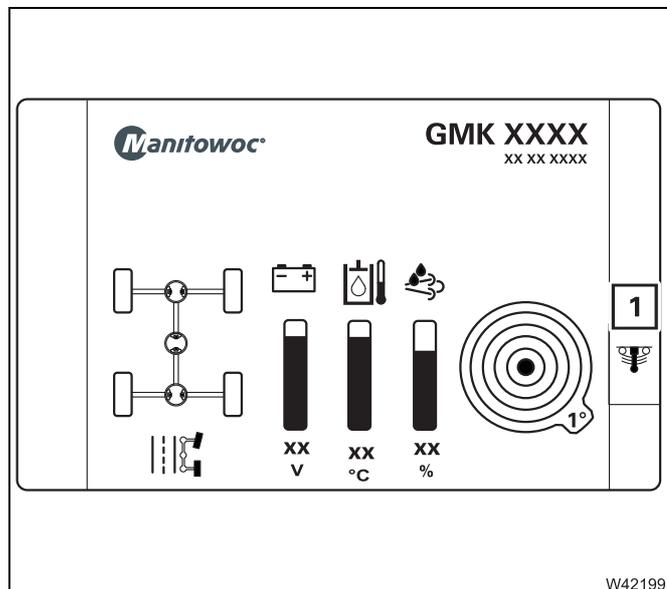
Temperature on the display

If the temperature on the display is too high, the brightness is reduced automatically. If the temperature on the display exceeds around 60 °C (140 °F), then the display is automatically switched off; ■■■▶ *Malfunctions at the CCS/RCL control units*, p. 14 - 22.

5.1.5

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.

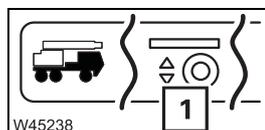


The current switching state of the suspension is shown on the display (1) in all menus.

- Symbol green:** Suspension is switched on
- Symbol red:** Suspension is switched off
- Symbol violet:** Error

To switch the suspension on and off, you must open the *Suspension/Level adjustment* menu.

Opening the menu



- Open the menu (1) – Suspension/level adjustment menu.

Operation in the menu is only enabled if the truck crane is stationary or if the current speed is below about 5 km/h (3 mph).

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!

Do not switch the suspension on unless the truck crane has been rigged for on-road driving and the main boom has been set down.

If the rigged truck crane is standing on its wheels the suspension struts will be suddenly pushed together when the suspension is switched on, causing them to be damaged and possibly causing the truck crane to overturn.

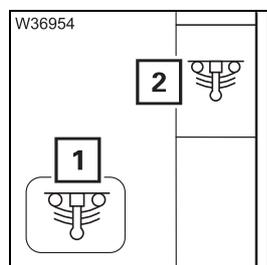


Risk of damage to the suspension struts

Do not switch on the suspension if the truck crane is on outriggers and the axle lines are raised.

The suspension struts on the axle lines spring out abruptly and could get seriously damaged.

Only ever switch on the suspension if the truck crane is on its wheels.



- Select and confirm the symbol (1).

When the suspension is switched on, the symbol (2) turns **green**.

If the symbol (2) remains **red**, the supply pressure may be too low. In this case the suspension would not be switched on until sufficient supply pressure has been built up;  *Building the supply pressure*, p. 5 - 11.

Switching off the suspension

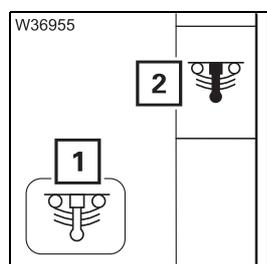
When the suspension is switched off, the suspension cylinders are locked. This state is intended only for crane operation.



Risk of damage to the axle lines!

Always switch the suspension on for on-road driving.

The axle lines may be damaged and the steering behaviour may change if the suspension is switched off.



- Select and confirm the symbol (1).

When the suspension is switched off, the symbol (2) turns **red**.

5.1.6

Setting the tachograph

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

As a crane operator, you are obliged to set each activity at 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 manual.

There you will find detailed information (labelling 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 rest or surface (e.g. to label the diagram sheets). This prevents dirt and damage.

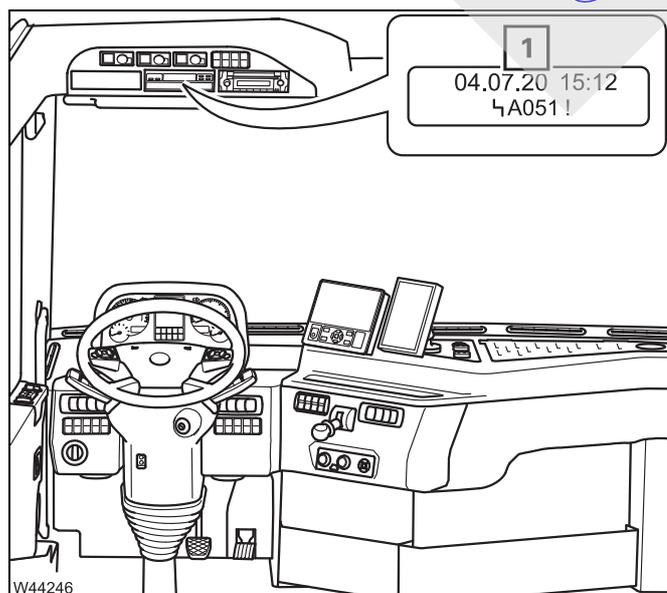
Prerequisites

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.

In the event of malfunctions

Check that a malfunction has occurred.

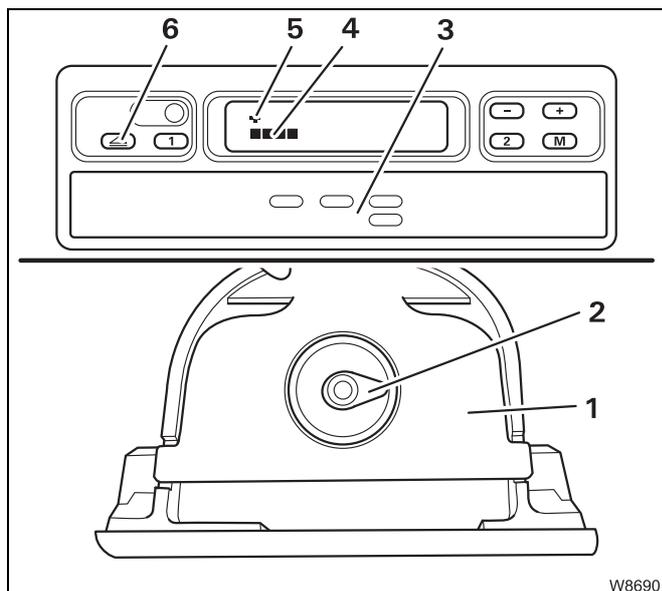


When a malfunction occurs, the tachograph display (1) shows an error message;

➡ *Separate operating manual* of the tachograph manufacturer.

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.



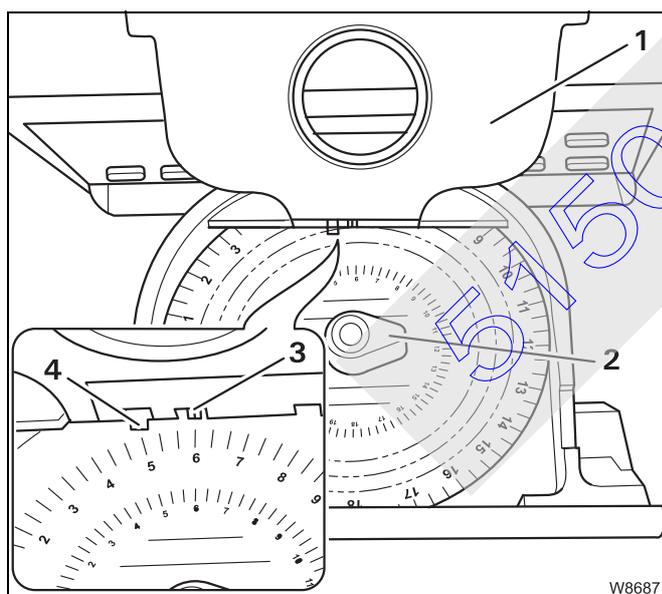
Opening the drawer

- Press the button (6) once.

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

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

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



Checking the time setting

- First check the time setting for the diagram sheet holder (2), fold the isolating plate (1) up to do this.

- Insert a diagram sheet. Make sure that the diagram sheet is under the spring (4).
- Check that the time scale of the diagram sheet time scale is showing the current time at the marking (3).

Correcting the time

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



Inserting diagram sheets

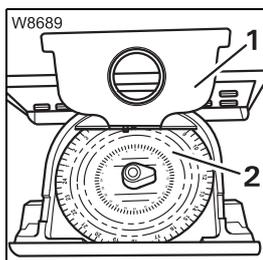


Only insert diagram sheets that are correctly labelled.
The diagram sheets are always inserted with the front facing upwards.



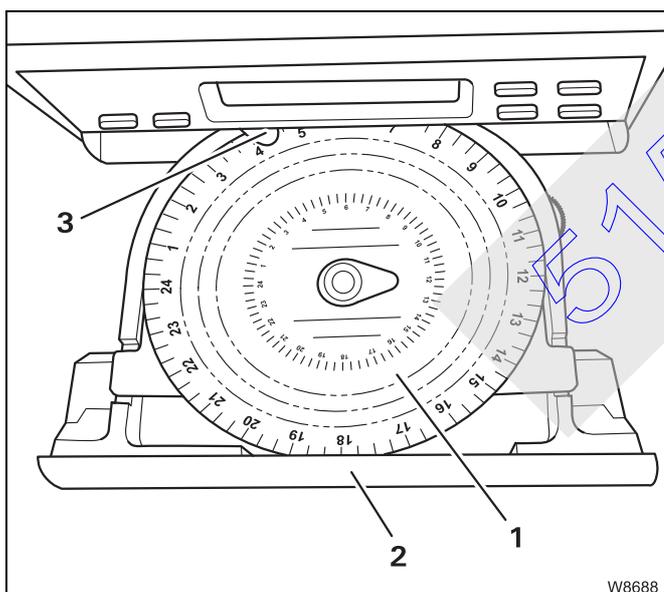
Risk of malfunctions in the electronics!

If a diagram sheet has been damaged by being labelled several times, this might cause malfunctions in the electronics. Always insert the plastic diagram sheet supplied should you not require the tachograph.



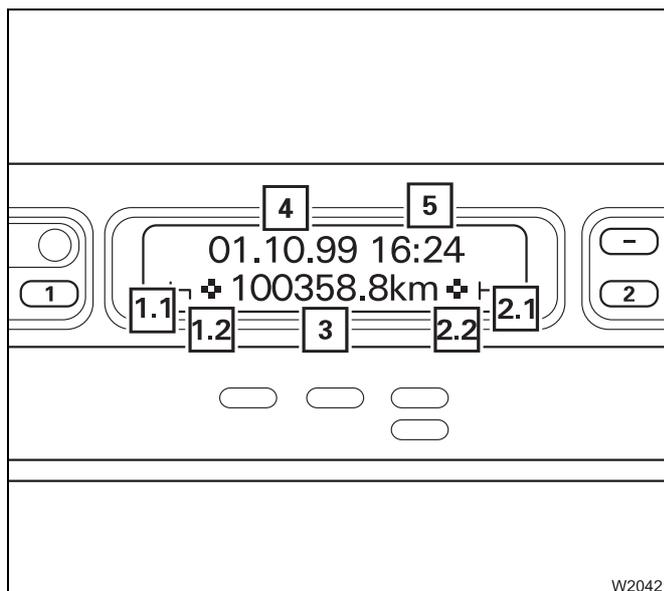
For **2-driver operation** a diagram sheet (2) for driver 2 must be placed below the isolating plate (1):

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

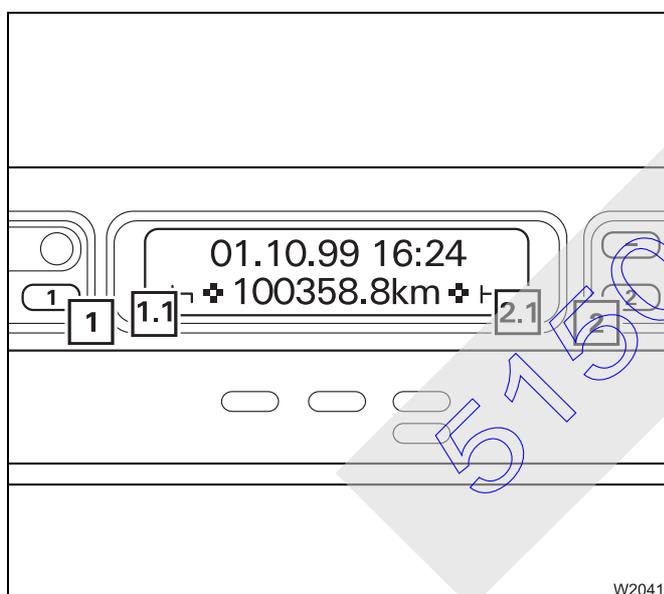
For single-driver operation the diagram sheet holder under the isolating plate is empty and only the diagram sheet (1) for driver 1 is inserted.



Display

If no malfunction 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**).

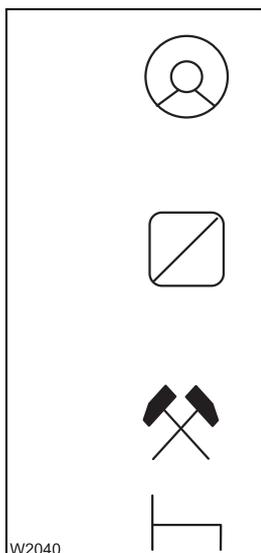
The set time group is shown by the symbol (**1.1**).

Set the time group for driver 2 using the button (**2**).

The set time group is shown by the symbol (**2.1**).



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 two diagram sheets are inserted, the tachograph automatically switches to stand-by time for 2-driver 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 periods of rest: These times are prescribed by law and must be observed.



If the drivers change during **2-driver operation** the diagram sheets in the trip recorder also have to be changed. The driving time is always recorded on the diagram sheet that is on the isolating plate (driver 1).



In **single-driver operation**, the symbol for resting must always be set for driver 2 otherwise an error message will appear.

5.1.7

Setting the time

CCS display

The time is set at the *CCS* display in the crane cab; *Setting the time*, p. 11 - 20.

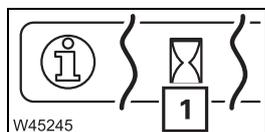
On-board computer display

Switching over the time, p. 5 - 35.

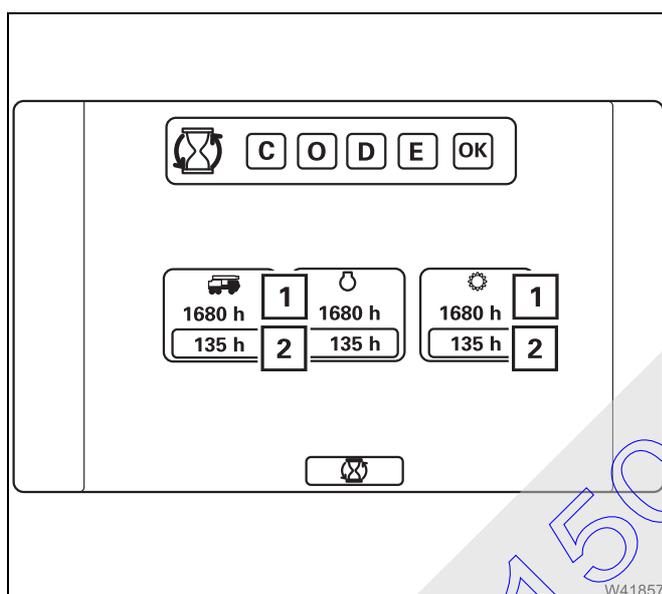
5.1.8

Displaying and resetting operating hours

You can view the total operating hours for all power units in the *Operating hours* menu. You can also delete the recorded operating hours. The total operating hours cannot be deleted.



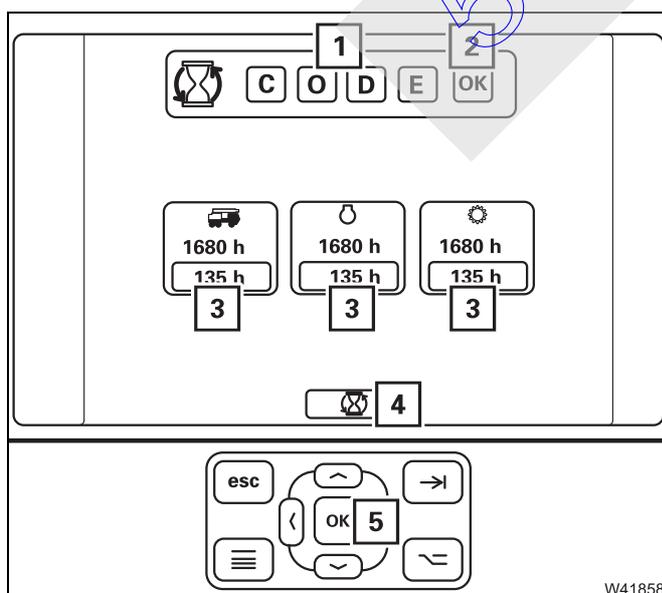
- Open the menu (1) – Operating hours menu.



Displays

The operating hours are recorded as follows:

- The value (1) shows the total operating hours, for example 1,680 hours.
- The value (2) shows the operating hours, which can be reset.



Reset

The displayed operating hours (3) can be reset.

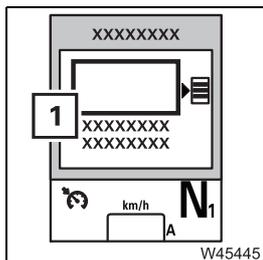
- Select and confirm the symbols (1) one after the other.
- Confirm the entry with the symbol (2).

You can select the power units

- individually – display (3) or
- select all – symbol (4).
- Reset the selected operating hours with button (5).

5.1.9

Settings and displays at the on-board computer



This section only describes those menus that display various values and in which settings can be made.

If the display shows a warning message (1); *Warning and fault messages on the on-board computer*, p. 8 - 7.



The current wording of the texts displayed in your mobile crane may differ from the texts in this section, depending on the language.

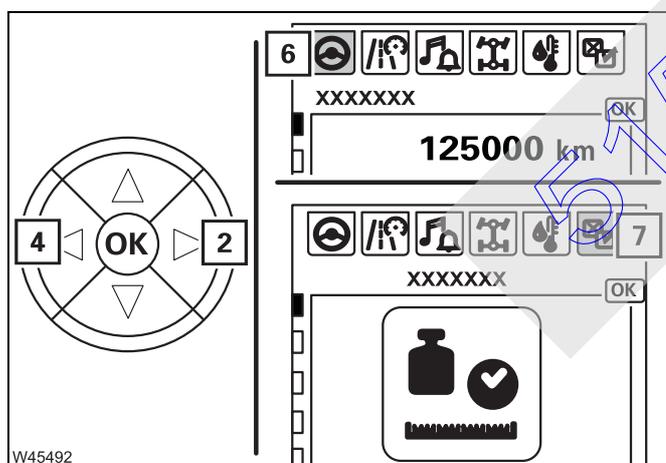
In addition to the menus described here there may be more menus, depending on the equipment of the truck crane.



The illustrations in this section show metric units. Those units are displayed in your truck crane that were set in the Settings menu group;

Menu menu, p. 5 - 34.

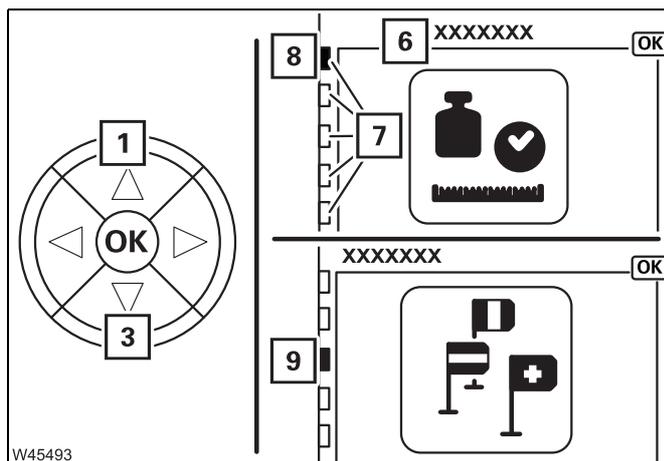
For an overview; *Overview of menu groups*, p. 3 - 24.



Selecting a menu group

The selected menu group is marked – e.g. (6).

- Press the button (2) or (4) to select the desired menu group – e.g. (7).



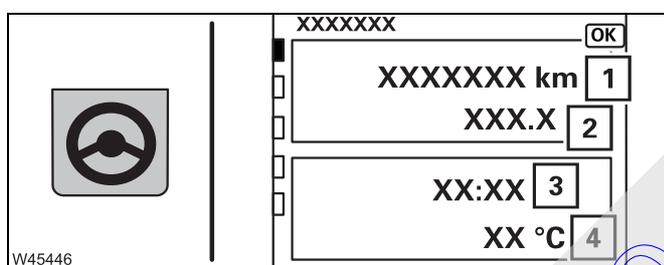
Selecting a menu

The name (6) of the selected menu is displayed.

The marking (7) shows the level of the menu, e.g. the menu (8) at level 1.

- Press the button (1) or (3) to select the desired menu – e.g. the menu (9) at level 3.

Tour data menu group

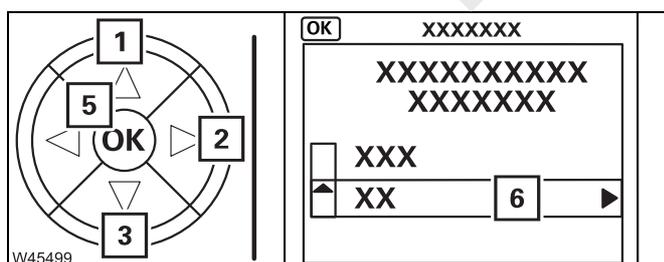


Truck info menu

- 1 Total mileage
- 2 Daily mileage
- 3 Time
- 4 Outside temperature



The outside temperature display records the ambient air and not the temperature of the road. Temperature changes are displayed with a delay. Therefore, at temperatures around 0 °C (32 °F) always observe the condition of the road and adapt vehicle handling accordingly. The outside temperature that is displayed may be higher than the actual outside temperature, particularly when at a standstill and at low speeds, due to heat radiation (engine/auxiliary heating).



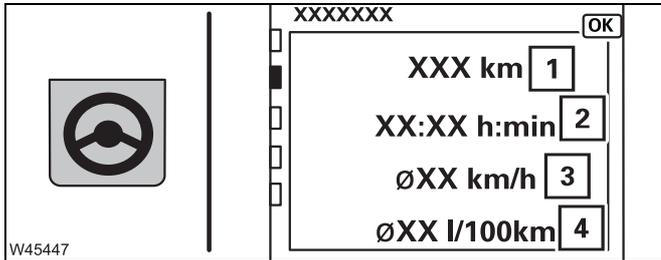
– Resetting the daily mileage

- Open the window – button (5).
- Select line (6) with *YES* – button (1) or (3).
- Confirm the entry – button (2) or (5).

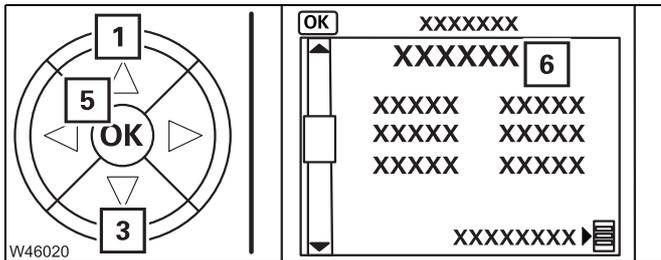


From start menu

Recording the displayed values starts with the last driving start.
After a four hour standstill period, the values are automatically reset.

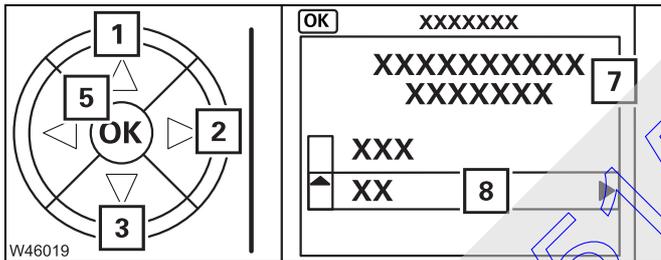


- 1 Driven distance
- 2 Driven time
- 3 Average speed
- 4 Average consumption



- Displaying further information

- Open the window (6) – button (5).
- Switch between information on fuel consumption, time and speed – button (1) or (3).

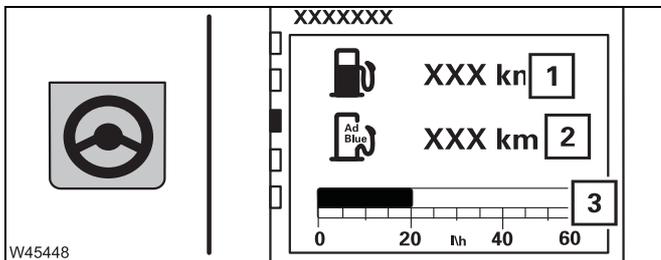


- Resetting values

- Open the window (7) – button (2).
- Select line (8) with YES – button (1) or (3).
- Confirm the entry – button (2) or (5).

Range menu

The specified ranges are average values. The exact range depends on the load while driving.

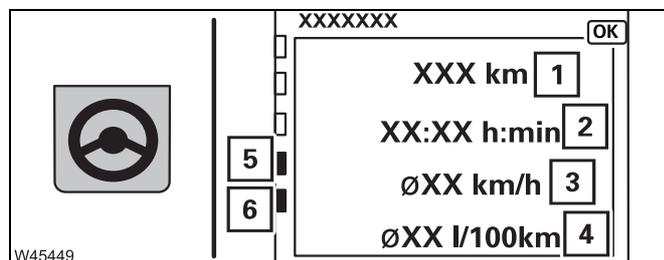


- 1 Range – fuel level
- 2 Range – AdBlue supply
- 3 Current fuel consumption
 - while driving in l/100 km
 - when at a standstill in l/h
 - Display < 50 km – the range is less than 50 km

Reset 1 menu

Reset 2 menu

Recording the displayed values started during the last reset in the corresponding menu.

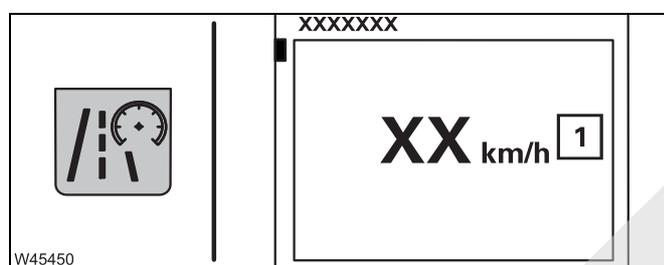


5 Marking for Reset 1 menu

6 Marking for Reset 2 menu

Meaning of the values (1) to (4), display of further values and resetting the values;
 From start menu, p. 5 - 28.

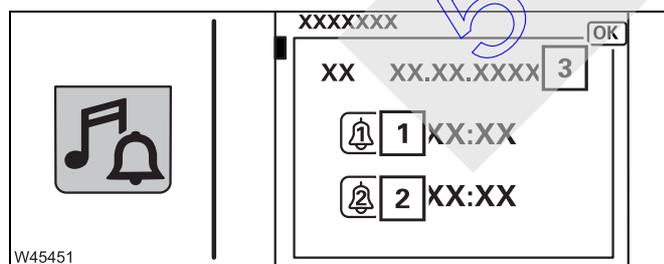
Driving menu group



Speed

1 Current speed

Audio and communication menu group



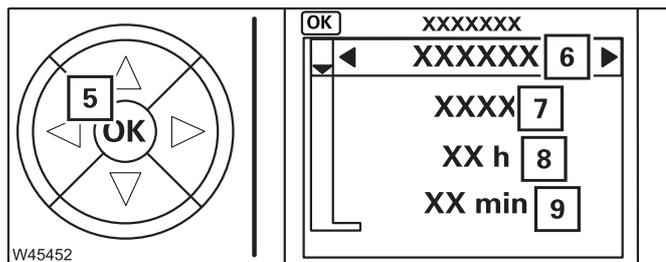
Alarm menu

1 Wake-up time alarm 1

2 Wake-up time alarm 2

3 Day of the week and date

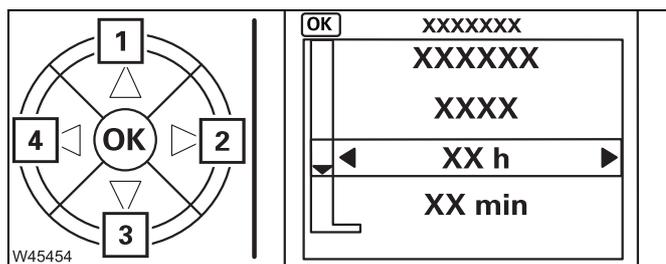




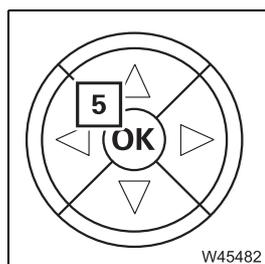
- Setting the alarm

- Open the window – button (5).
- 6 Selection of alarm 1 / alarm 2
- 7 Selection of alarm off / buzzer / audio¹⁾
- 8 Input of alarm time in hours
- 9 Input of alarm time in minutes

1) Suitable audio device required



- Select line – button (1) or (3).
- Change value – button (2) or (4).
- Keep button pressed for rapid input of the time.

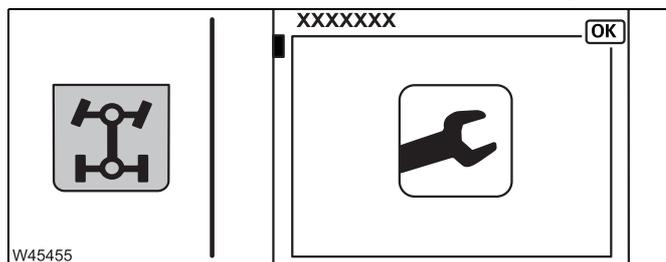


With active alarm – in all menus

- Alarm off – button (5).
Or after about 2 minutes – alarm automatically off.

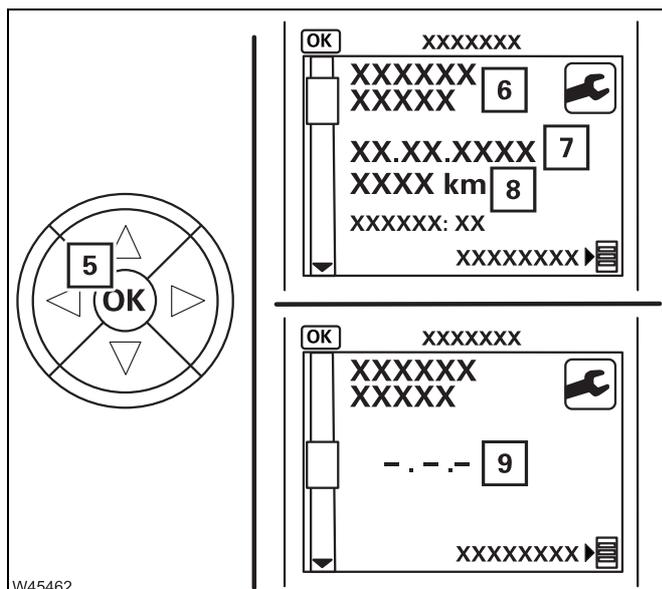
Maintenance menu group

Before maintenance work is due, additional messages are displayed (first message about 14 days beforehand).



Maintenance menu

The menu gives an overview of the maintenance deadlines. The displayed deadlines are automatically calculated by the system.

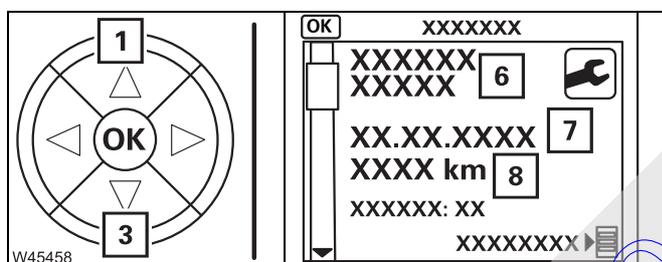


- Displaying deadlines

- Open the window – button (5).
- 6 Component – (time maintenance, engine, transmission, air filter, X axle brake)
- 7 Maintenance deadline
- 8 Remaining distance

If no deadline (7) can be determined yet, (9) is displayed.

Maintenance is due at the latest at the deadline (7) or if the driving distance is (8) 0 km or if a corresponding message is displayed.



- Select component – button (1) or (3).
Displays (6) to (8) change accordingly.



Various maintenance tasks are due during time maintenance;
 *Engine manufacturer's maintenance manual.*



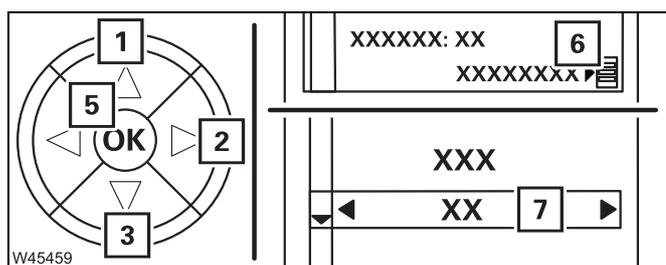
– Resetting deadlines

A deadline may only be reset if the corresponding maintenance task was carried out. If a deadline is accidentally reset, consult **Grove Product Support**.



Risk of damage if the maintenance deadlines are reset!

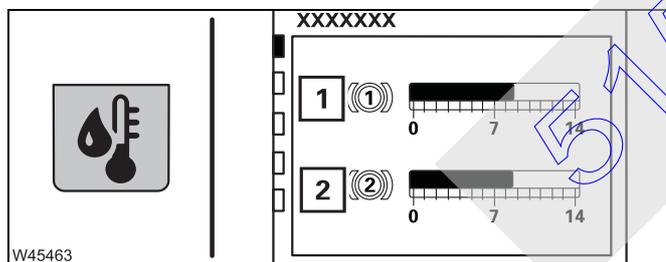
After the reset, the system calculates a new maintenance deadline. Make sure that the reset only takes place if the corresponding maintenance task was carried out in due time. This avoids damage to the corresponding components and premature.



- Open the window (6) – button (2).
- Select line (7) with YES – button (1) or (3).
- Confirm the entry – button (2) or (5).

Monitoring and information menu group

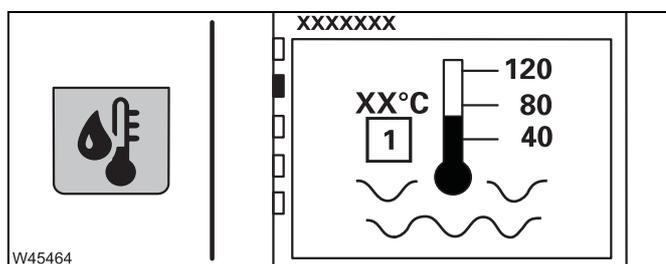
If the supply pressure is too low, a corresponding message is displayed.



Supply pressure menu

Display of the current supply pressure

- 1 In brake circuit 1
- 2 In brake circuit 2



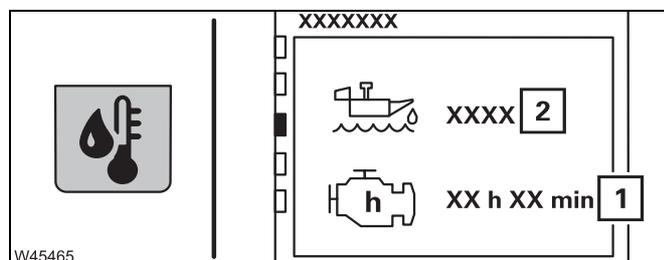
Coolant menu

- 1 Current coolant temperature

Engine menu

For a meaningful oil level display, various prerequisites must be fulfilled.

- The truck crane is horizontal.
- The parking brake is applied.
- After shutting down the engine at least 5 minutes have passed.
- The ignition is switched on.



1 Total engine operating time

2 Text on the current oil level

If no measurement is possible, *No measurement* is displayed – e.g. when the engine is running.

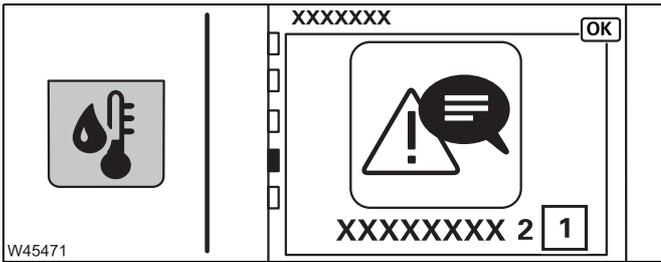
The table shows the other displays



Text (2)	Meaning
OK	Oil level is OK
OK Top up X l	Top up oil at the next opportunity
Too low Top up X l	Oil level too low – top up X litres of oil before starting the engine
Too low Top up -X l	Oil level too high – drain X litres of oil before starting the engine

More information on changing the oil;  *Maintenance manual*.

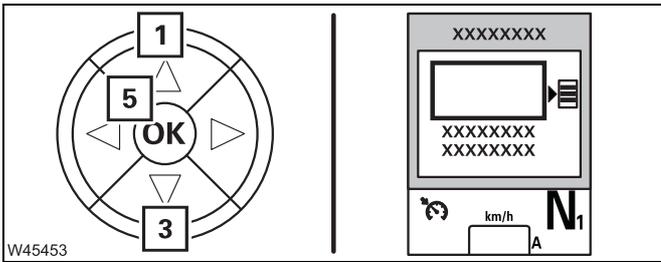




Events menu

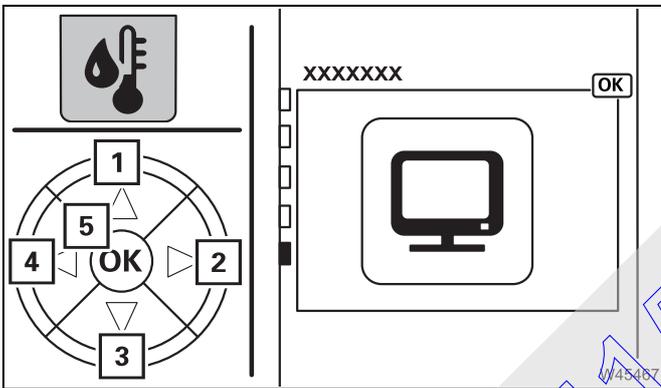
- 1 Number of stored messages, e.g. 2

The messages can be displayed until the cause is eliminated.



– Displaying messages

- Display first message – button (5).
- Display further messages – button (1) or (3).

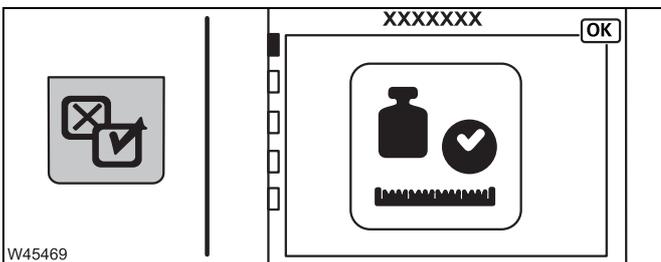


Diagnostics menu

Menu for service personnel

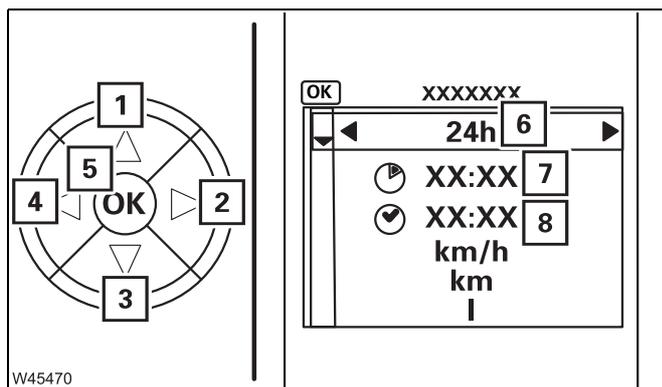
- Display device list – button (5).
- Select device – button (1) or (3).
- Show details – button (2) or (4).

Settings menu group



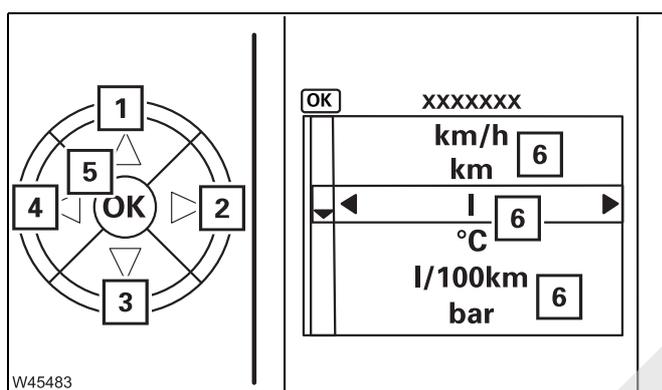
Menu menu

Is for switching over the units displayed in the menus on the on-board computer display.



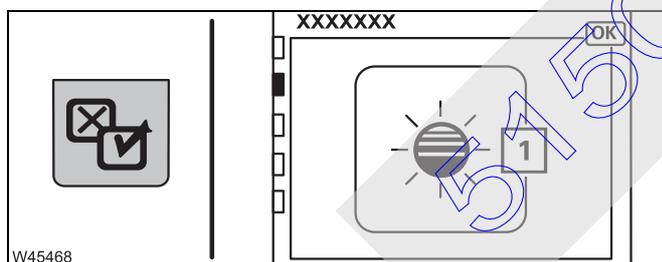
- Switching over the time

- Open the window – button (5).
- Select line – button (1) or (3).
- 6 Switch over 12 h/24 h display – button (2) or (4)
- 7 Enter deviation from the UTC time – button (2) or (4)
- 8 Display set time



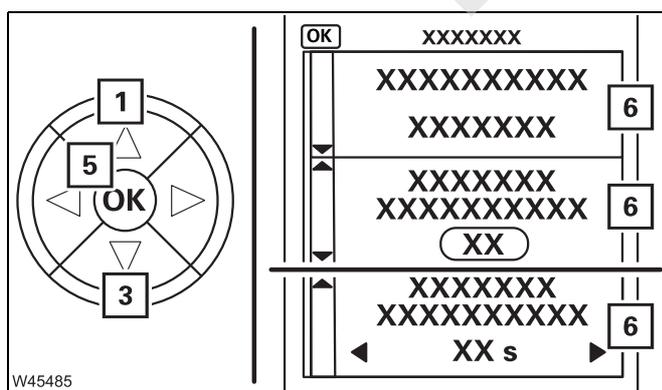
- Switching over units

- Open the window – button (5).
- All units that can be switched over (6) are displayed.
- Select line – button (1) or (3).
 - Switch over unit – button (2) or (4).



Lighting menu

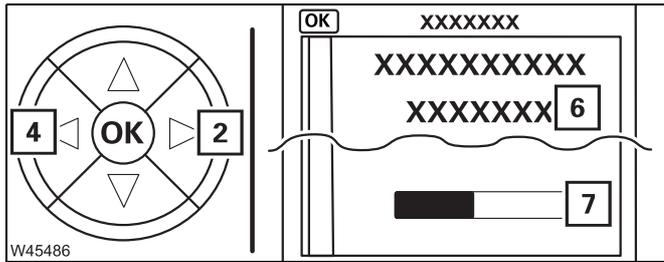
- Three lights can be selected
- Instrument panel
 - Automatic interior light control
 - Follow-up light duration of exterior lighting



- Setting

- Open the window – button (5).
 - Select lighting (6) – button (1) or (3).
- Various different settings are possible, depending on the lighting.



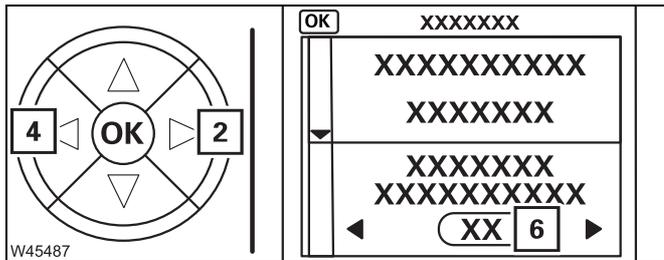


– Instrument panel

No adjustment is possible if the headlight is switched off – (6) *Day mode* is displayed.

If the headlight is switched on, a bar chart (7) is displayed for the adjustment.

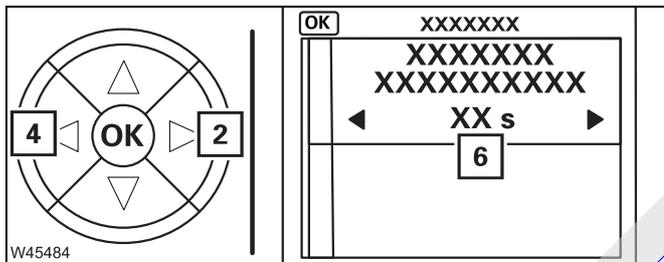
- Adjust the brightness – button (2) or (4).



– Automatic interior light control

With the (6) *On* setting: on opening the door – cab lighting on.

- Select On/Off – button (2) or (4).



– Follow-up light duration of exterior lighting

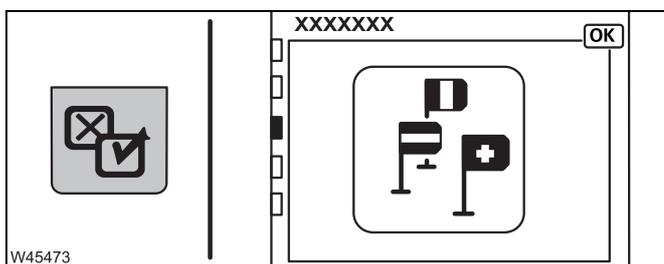
The exterior lighting can automatically be switched on, for a certain time.

- Set the time (6) – button (2) or (4).

The function is switched off if the 0 seconds is the setting.

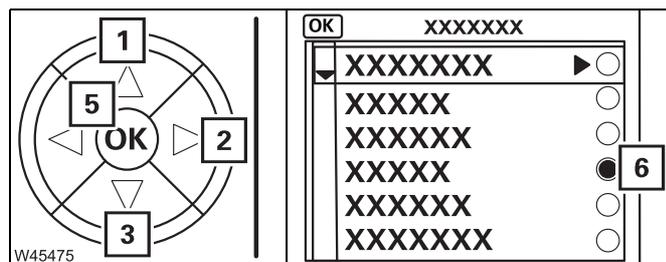
Switching on takes place automatically.

- If a door is opened within 4 minutes after lights off and ignition off.
- If a door is unlocked using the remote control.
- If the door is opened in the dark.



Language menu

For setting the language shown on the *On-board computer* display.



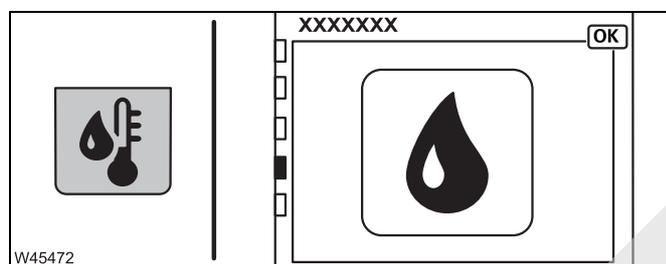
- Setting

- Open the window – button (5).
- The set language (6) is highlighted.
- Select language – button (1) or (3).
- Set language – button (2).

Consumables menu

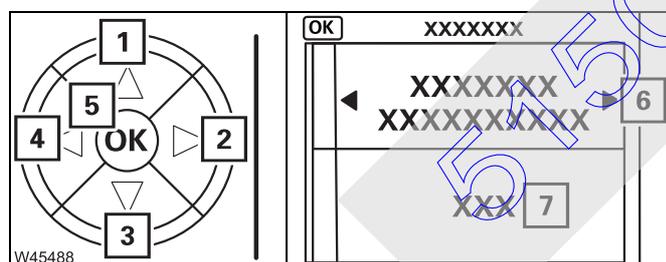
For a meaningful display in the *Maintenance* menu, it is necessary that the values of the currently used consumables are entered.

Only approved consumables may be used; *Maintenance manual*,
 Engine manufacturer's maintenance manual.



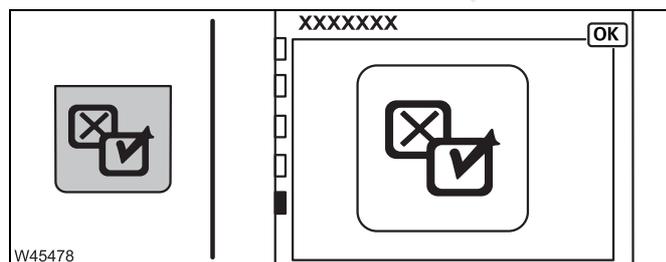
Various values are taken into account

- Engine fuel quality
- Engine oil viscosity
- Engine oil quality
- Transmission oil quality



- Input

- Open the window – button (5).
- Select consumable (6) – button (2) or (4).
- Select value (7) – button (1) or (3).
- Enter value – button (2) or (4).



Systems menu

For switching EcoRoll mode on and off.



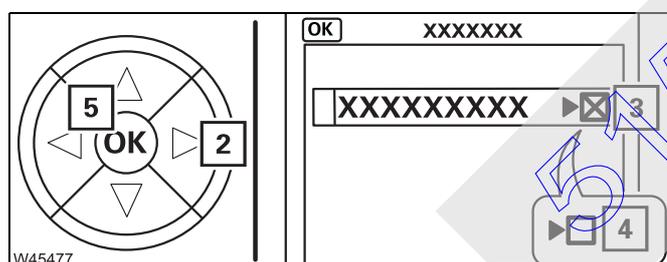
– EcoRoll mode (overview)

After switching on the ignition, EcoRoll mode is switched on and is activated when driving in *Automatic* operating mode.

In EcoRoll mode, the transmission shifts to neutral position depending on the current driving situation when you release the pedal at a speed of at least approx. 55 km/h (34 mph). When EcoRoll mode is activated, *E* appears on the *On-board computer* display.

In the cases listed, the transmission does not shift to neutral position or shift back to a suitable gear.

- When applying the accelerator, the brake or the engine retarder.
- If the set speed is exceeded with Temposet switched on.
- When cruise control is switched on.
- If when cruise control is switched off the stored speed is exceeded by the value set in the *Eco Drive* menu (default setting about 6 km/h (2.5 mph);
 ▶ *Eco Drive menu*, p. 5 - 39.
- If the programmed maximum speed is exceeded by about 4 km/h (2.5 mph).
- If the total weight of the truck crane (and the trailer) is too high.
- If a certain speed range is left

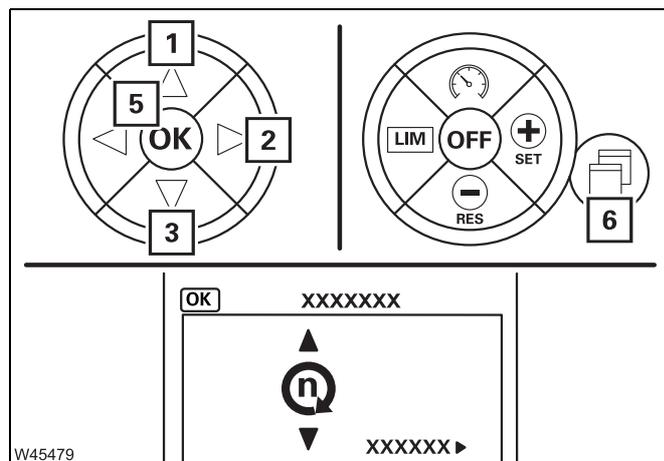


– EcoRoll mode on/off

- Open the window – button (5).
- On/Off – button (2).
 - (3) displayed – On
 - (4) displayed – Off

Driving systems menu group

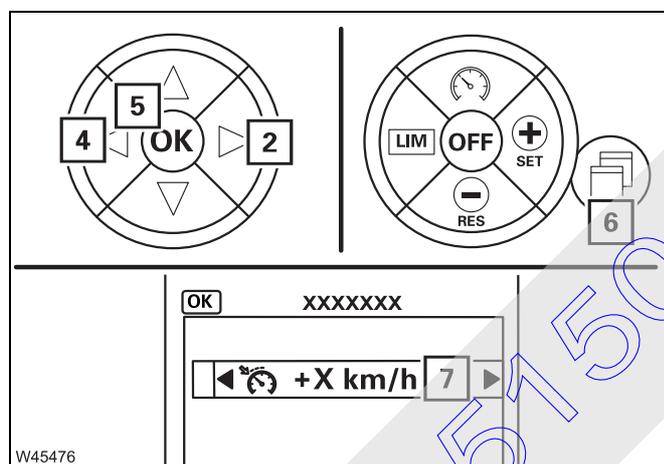
This menu group is not selected via a symbol on the on-board computer display. The menus are opened directly with a button.



Idling speed menu

- Open the window – 1x button (6).
- Set idling speed – button (1) or (3).
- Switch back idling speed to automatic regulation – button (2).
- Close menu – button (5).

Further information; *Setting idling speed*, p. 4 - 17.



Eco Drive menu

To set the maximum speed at which EcoRoll mode is active.

- Open the window – 2x button (6).
- Enter value (7) – button (2) or (4).

When cruise control is switched off. The speed stored at the cruise control plus the value (7) is the maximum speed at which EcoRoll mode is activated.

- Close menu – button (5).

Blank page

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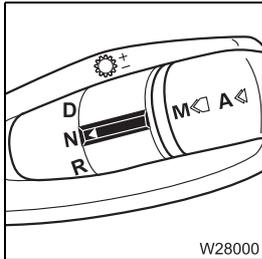
5.2

Operating the transmission

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

5.2.1

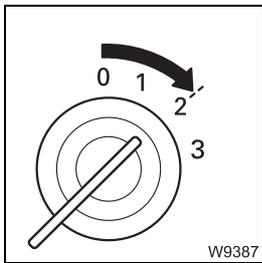
Switching on



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

- Shift to position **N**.

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



- Switch on the ignition.

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

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5.2.2

Switching the transmission to neutral position

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



Risk of accidents 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, for instance when trying to avoid an obstacle, and the engine retarder will have no effect.



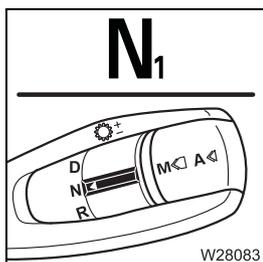
Risk of accident from truck crane moving unintentionally!

Always apply the parking brake or the service brake before you switch to the neutral position. This prevents the truck crane moving unintentionally.



Risk of damage to the transmission!

When stationary for a longer period (for example, in a traffic jam or at a level crossing), always switch the gear to **N**. This avoids excessive wear on the transmission 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.

5.2.3

Selecting the direction of travel and starting gear

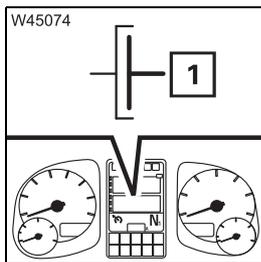
Selecting the direction of travel

Before driving at temperatures below -20 °C (-4 °F);  p. 5 - 50.

The following requirements must be met before selecting the direction of travel:

- The truck crane is stationary,
- The parking brake is applied,
- The accelerator is not operated.

- Start the engine;  p. 4 - 13.



If the supply pressure is not sufficient to shift the transmission, symbol (1) is displayed with a message.

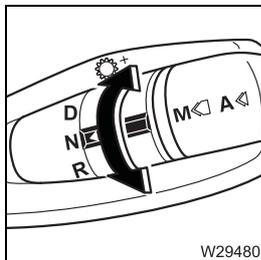
If necessary, wait until the supply pressure has built up, and the message disappears;  *Building the supply pressure*, p. 5 - 11.

- Release the accelerator.

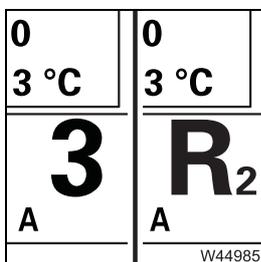


Risk of accidents from uncontrolled starting!

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.



- For
 - **forward travel** switch to position **D**.
 - **reverse travel** switch to position **R**. An acoustic signal sounds if additional equipment is present.

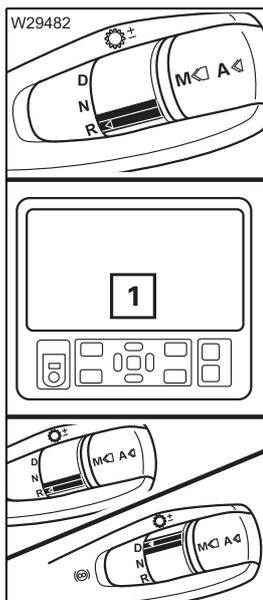


Automatic operating mode is now selected. An appropriate starting gear is selected and displayed:

- 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).





For reverse travel

The reversing lights, reversing lamps and reversing camera are switched on.

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

When you exit transmission mode **R**, the reversing lamp and camera are switched off and the display (1) shows the CCS menu.

Selecting the starting gear

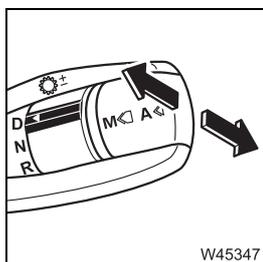


You can also change the gear that is automatically selected on starting.

Only change the gear selected on starting if it is absolutely necessary to do so. Starting in a gear that is too high causes premature clutch wear.

- Pull the gearshift lever up once.
The starting gear is shifted up a gear.
- Press the gearshift lever down once.
The starting gear is shifted down a gear.

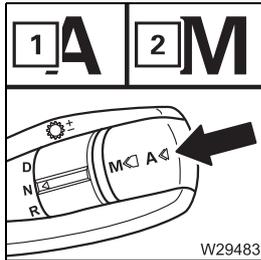
The changed starting gear is shown on the display.



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

5.2.4

Changing the operating mode

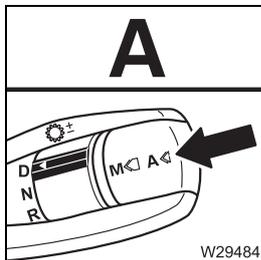


The display shows which operating mode is switched on.

- Symbol (1) – *Automatic* operating mode on.
- Symbol (2) – *Manual* operating mode on.

It is possible to switch between operating modes while the vehicle is stationary or while on the move.

Changing to automatic mode



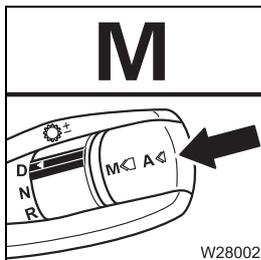
Automatic operating mode is intended for on-road driving.

- Press the gearshift lever in once.

The transmission switches to *Automatic* operating mode

- When at a standstill, a suitable starting gear is engaged.
- While driving, the gears are changed automatically, depending on the load.

Changing to manual mode



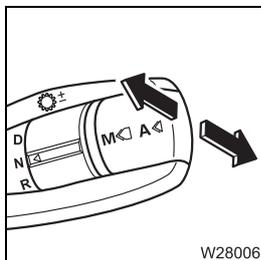
Manual operating mode is intended for off-road driving with load conditions changing at short notice.

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

Changing over without gear change

- Press the gearshift lever in once.

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



Changing over with gear change

- Push or pull the gearshift lever down or up once.

The transmission shifts up a gear (or shifts down a gear) and is now in *Manual* operating mode

5.2.5

Starting

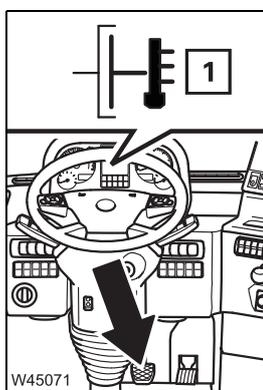


Danger due to unexpected moving!

Also apply the parking brake before starting on slightly sloping ground. The gear is engaged only once you press the accelerator. This can lead to the truck crane starting to move (possibly backwards) while you are moving your foot from the brake pedal to the accelerator.

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

- Apply the parking brake,
- Press the accelerator (now clutch engagement is started)
- Release the parking brake after the clutch is engaged (tone of the engine changes).



Warning message when starting

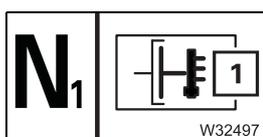
If the load on starting is so high that it would cause the clutch to overheat, a warning buzzer sounds. The symbol (1) with a message is shown at the on-board computer:

- In this event immediately take your foot off the accelerator and apply the service brake.



Risk of clutch damage!

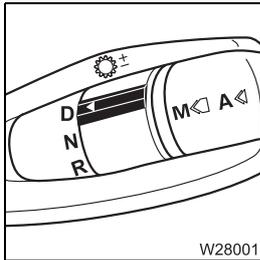
Always release the accelerator when the warning message is shown. The clutch will be overheated and damaged if you do not stop the starting procedure.



- Switch to the neutral position **N** and leave the engine running until the clutch has cooled down and the symbol (1) is no longer shown on the display.
- Select a lower starting gear.
- Start to move again.

5.2.6

Driving and changing gears



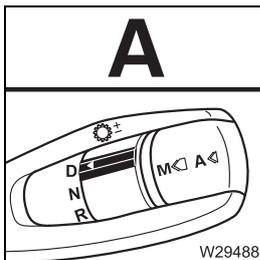
- When driving, always leave the switch in the position for the current driving direction, e.g. in position **D** for forward travel.



Risk of accidents due to changing transmission direction while driving!

If while driving in one direction you select a gear for a position other than the current driving direction, the transmission shifts into 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.

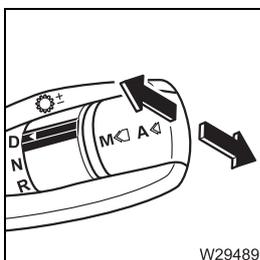
Automatic upshifting

You can influence upshifting using the accelerator.

- Press the accelerator gently: Upshift at low engine speed
- Press the accelerator harder: Upshift 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.
- If you fully press the accelerator (kick down), the transmission first shifts to a lower gear. After that, it will shift to a higher gear only once a higher engine speed has been reached, to achieve maximum acceleration.



If you perform a manual gear change using the gearshift lever, you simultaneously switch to *Manual* operating mode.

The transmission will only automatically shift gears again after you have switched to *Automatic* operating mode (push in the gearshift lever once).



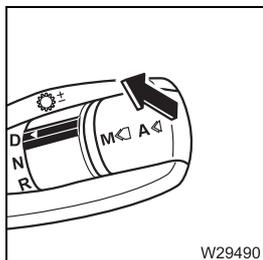
In manual operating mode

In this operating mode, the transmission only shifts gears when you operate the gearshift lever.

Manual upshifting

To upshift, you must pull the gearshift lever up briefly:

- Shift up a gear: Push up once
- Shift up two gears: Briefly push up twice
- Shift up three gears: Briefly push up three times

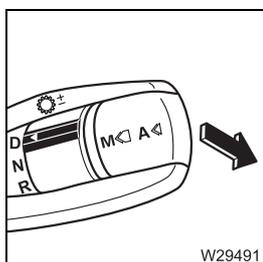


The newly engaged gear is shown on the display.

Manual downshifting

To shift down gears, you must press the gearshift lever down briefly:

- Shift down a gear: Push down once
- Shift down two gears: Briefly push down twice
- Shift down three gears: Briefly push down three times



The newly engaged gear is shown on the display.

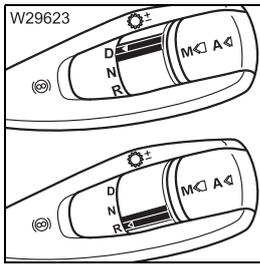


If you initiate a gear change which would cause the maximum permitted engine speed to be exceeded, the transmission will not shift.

In that case, slow the truck crane down until a permissible engine speed is reached, and shift down gears again.

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.

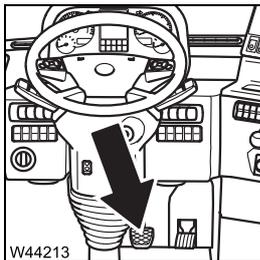
The newly engaged gear is shown on the display.



Up to a speed of about 30 km/h (18 mph), you can pre-select a reverse gear or forward gear when driving. The gear is switched when the truck crane comes to a stop. The shifting operation is complete when the display shows the selected gear.

5.2.8

Stopping



- In order to stop, remove your foot from the accelerator and press the brake pedal.

The transmission disengages shortly before the vehicle comes to a halt.
The current gear remains engaged.

Stopping for a long period of time

If you stop for more than 1 to 2 minutes with the engine running, you need to perform the following to protect the clutch:

- Apply the parking brake and
- shift the transmission to neutral.

5.2.9

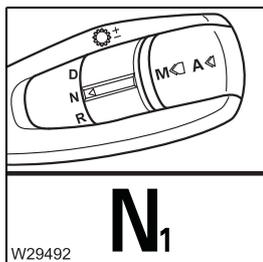
On the roller type dynamometer



Danger of unexpected moving off the rollers!

Always shift to the neutral position on the roller type dynamometer.

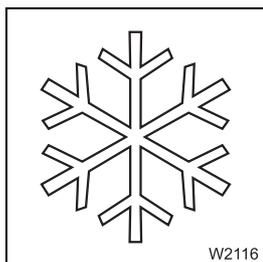
In position **D** or **R**, a suitable gear is engaged for the speed. The engine braking power is applied against the rollers and the truck crane can drive off them.



- Always switch to neutral position after driving on to a roller type dynamometer.

5.2.10

Warming up the gear oil



When the outside temperature is between $-20\text{ }^{\circ}\text{C}$ and $-25\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$ and $-13\text{ }^{\circ}\text{F}$), the gear oil must be warmed up before you start driving the truck crane.

Let the engine run at idling speed for at least 10 minutes before you start driving.

5.3

Driving the truck crane



Risk of accidents because the truck crane cannot be steered!

Never switch off the ignition or remove the ignition key while the truck crane is moving

This precaution prevents the steering locking and consequent loss of control of the moving truck crane.



Risk of accidents when the ignition is switched off!

Never switch off the ignition while driving.

After switching off the ignition the 4th axle line is into a straight ahead position and can no longer be moved.

This changes the turning radius of the truck crane.

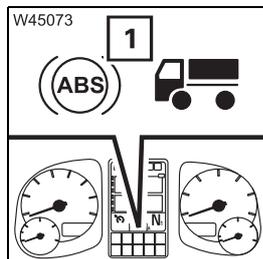
5.3.1

Checks while driving

Brakes

- Check the service and parking brakes for correct functioning immediately after starting to drive. Only continue to drive when the brakes are working perfectly.

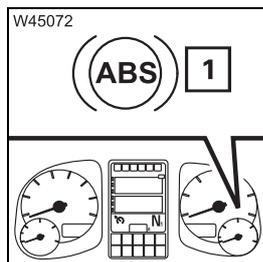
ABS system



- Check the lamps (1).

At speeds above 6 km/h (4 mph), the lamps (1) **must** go out. Then the **Anti-Blocking-System (ABS)** is working and the wheels are prevented from blocking when you brake.

If the symbol does not go out, the corresponding ABS system is faulty, and the wheels will no longer be prevented from blocking. The full braking force is retained.



If the lamp (1) lights up, then the braking operation is supported by the ABS system.



Steering

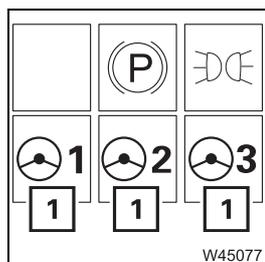
- Always pay attention to all indicator lamps and all information in this and subsequent sections.



Risk of accidents due to truck crane that cannot be steered and leaking oil!

If a warning message appears, make sure to follow the instructions in this section and take all the measures specified.

Failure to observe the warning messages can quickly lead to a failure of the steering system and serious accidents.

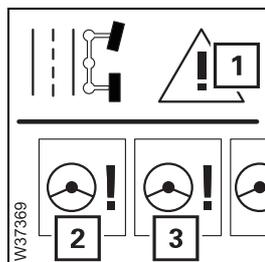


- Check the lamps (1) – at speeds over 10 km/h (6 mph), all the lamps must be out.

– If one or more lamps are on (1)

One or more steering circuits have failed.

- Stop as quickly as possible, switch off the engine and perform the required checks; p. 8 - 4.



- Check the display (1) and the lamps (2) and (3).

– If lamp (3) lights up – symbol (1) yellow

Steering system malfunction (with or without warning buzzer) – driving cannot be continued.

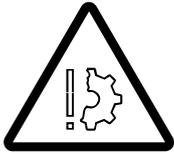
- Pay attention to the subsequent information for the next stop; p. 8 - 5.

– If lamp (2) lights up – symbol (1) red

Steering system warning

- Stop as quickly as possible and perform the required checks; p. 8 - 5.

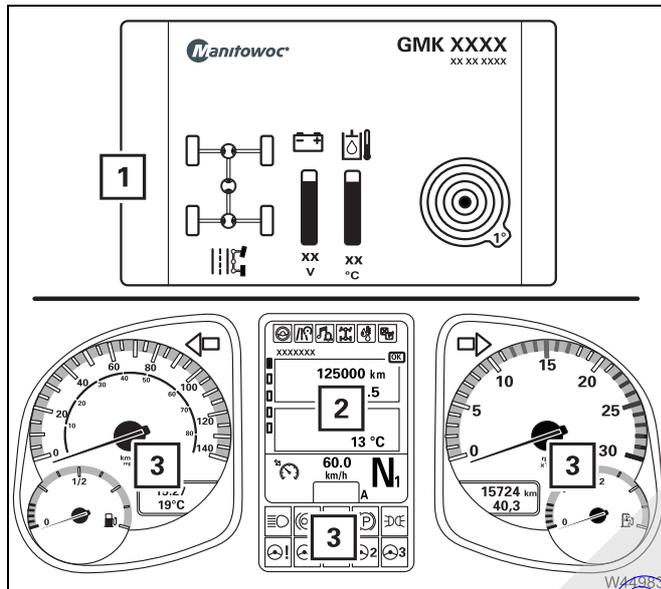
Warning messages



- Observe all error and warning messages.

Risk of damage if warning messages are ignored!

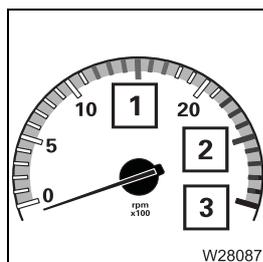
After warning messages are displayed, always observe all information in the corresponding section in good time and take appropriate measures to remedy the situation. This prevents these malfunctions causing defects in the truck crane.



- Observe the warning messages on the *CCS* display (1); p. 8 - 23.
- Observe the warning messages on the *On-board computer* display (2); p. 8 - 7.
- Observe the warning messages at the *centre control unit* (3); p. 8 - 3.

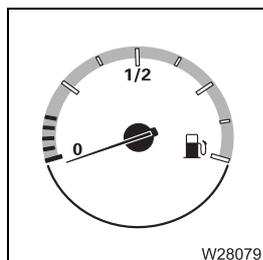
Monitoring elements

- Also pay attention to the monitoring elements.



Tachometer

- 1 Green:** Economic consumption
- 2 Yellow:** Engine brake active
- 3 Red:** Engine speed too high – danger;
 Inspections when driving downhill, p. 5 - 60

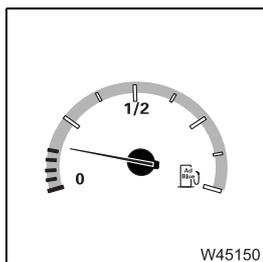


Fuel level display

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

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

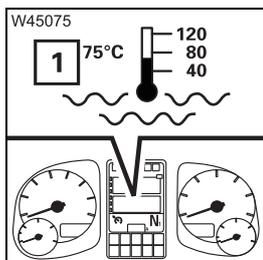




AdBlue (DEF) tank display

Never run the AdBlue (DEF) tank completely empty, always refuel in due time;  p. 4 - 8.

If the AdBlue (DEF) tank is empty the torque is reduced;  p. 5 - 63.



Coolant temperature display

1 Coolant temperature display in degrees Celsius

In the event of malfunctions;  p. 8 - 39

51508035

5.3.2

Cruise control

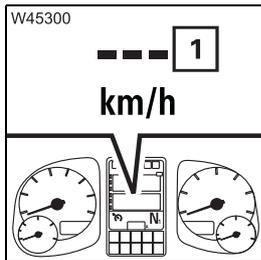
Cruise control enables you to drive at a constant speed without pressing the accelerator.



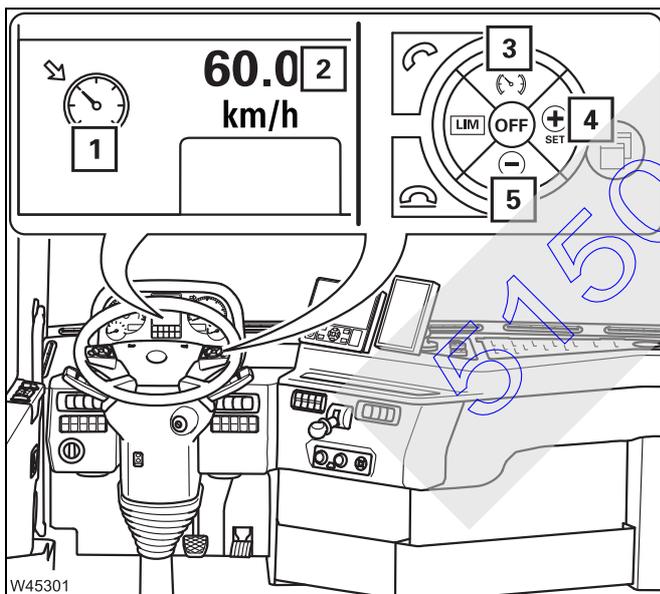
Risk of accidents due to carelessness!

Be ready to brake at all times when cruise control is switched on.

Switch cruise control on only if the traffic situation permits a constant speed.



You can switch on cruise control only at speeds above 15 km/h (9 mph). If the cruise control cannot be switched on, the symbol (1) is shown.



Pre-selecting

- Press the button (3) once – symbol (1) grey.

Switching on

Select current speed

- Press the button (4) once.

or

– Select saved speed

- Press the button (5) once.

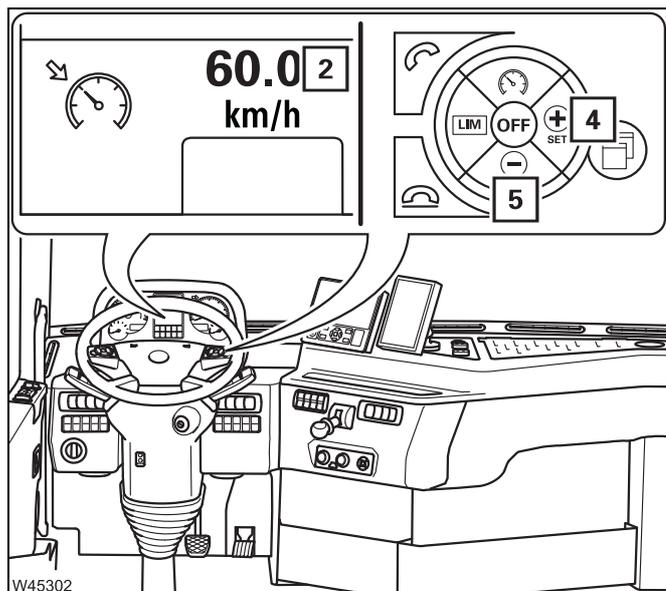
Symbol (1) white – cruise control switched on.

Display (2) – selected speed.

The selected speed is maintained.

You can exceed the set speed with the accelerator. After the accelerator is released, cruise control switches back to the set speed.

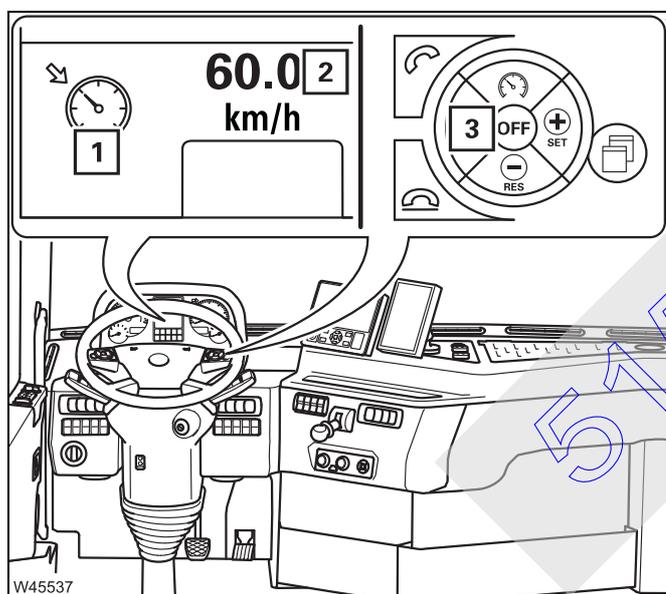




Changing the speed

- Increase – button (4)
- Reduce – button (5)
- Continuous change
 - Keep the button pressed until the desired speed (2) is reached
- Step-by-step change
 - Press the button once. The speed (2) changes by 0.5 km/h (0.3 mph).

The set speed is maintained.



Switching off

- Press the button (3) once.
- or
- Operate the service brake.
- Symbol (1) grey – cruise control pre-selected
- Display (2) grey – speed saved.
- or
- Pre-select Temporet; p. 5 - 57.

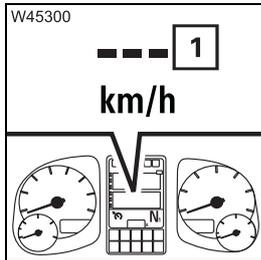
Cruise control is also switched off

- If the speed falls below 10 km/h (6 mph).
- By switching off the ignition.

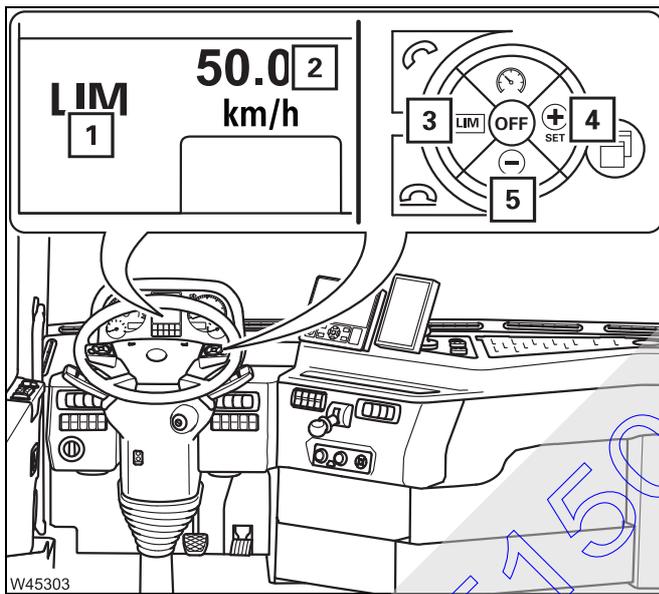
5.3.3

TempoSet

You can use TempoSet to limit the maximum speed.



You can only switch on TempoSet at speeds higher than 15 km/h (9 mph). If TempoSet cannot be switched on, the symbol (1) is shown.



Pre-selecting

- Press the button (3) once – symbol (1) grey.

Switching on

- Select current speed
 - Press the button (4) once.
- or
- Select saved speed
 - Press the button (5) once.

Symbol (1) white – cruise control switched on.

Display (2) – selected speed.

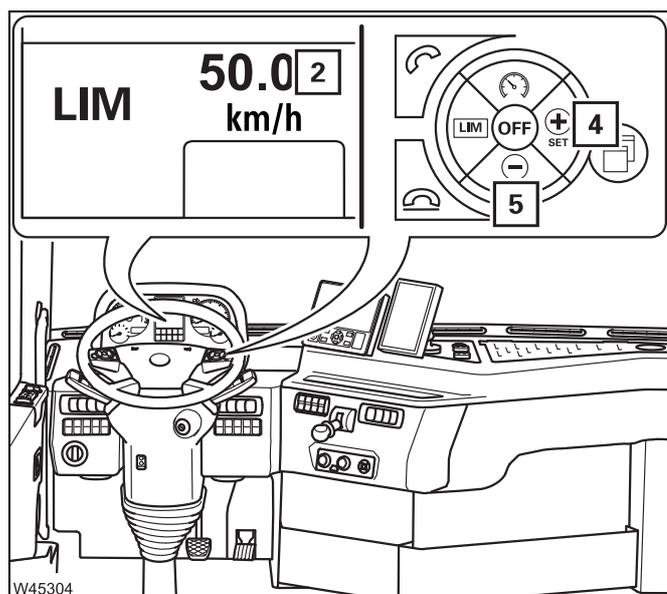
The selected speed is taken as the maximum speed.



You can exceed the speed by pressing the accelerator as far down as it will go (kick-down) – if it is exceeded symbol (1) flashes.

TempoSet limits the speed again only once you release the accelerator and press it again – symbol (1) does not flash any more.

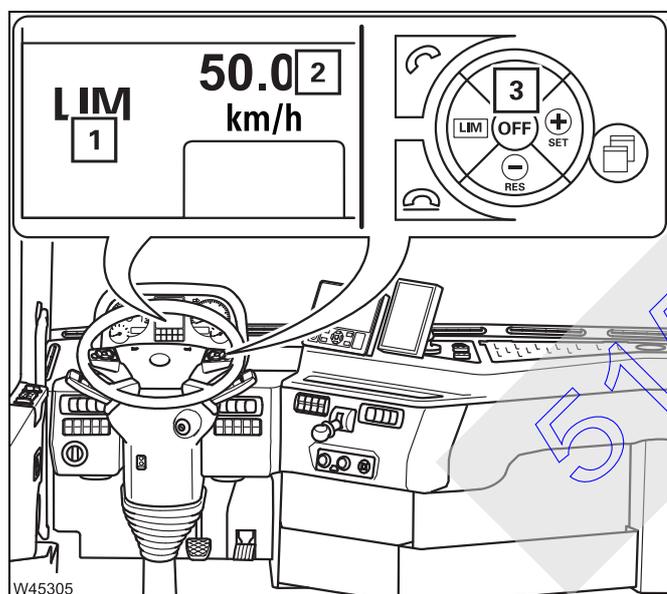




Changing the speed

- Increase – button (4)
- Reduce – button (5)
- In small steps
 - Press the button once. The speed (2) changes by 1 km/h (0.6 mph).
- In large steps
 - Keep the button pressed. The speed (2) changes in steps of 5 km/h (3 mph).

The set speed is maintained.



Switching off

- Press the button (3) once.
 - Symbol (1) grey – cruise control pre-selected
 - Display (2) grey – speed saved.
- or
- Pre-select cruise control;  p. 5 - 55.

5.3.4

Driving downhill



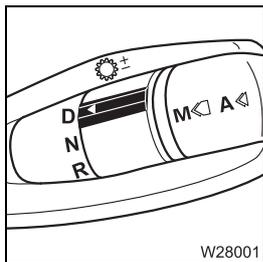
Risk of accidents when driving in neutral position!

Never switch to 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 forwards** you must do the following:

- Shift into **D** position,
- Release the parking brake and service brake,
- Apply the accelerator if you wish to accelerate,
- Do not apply the accelerator if you want to brake with the engine.

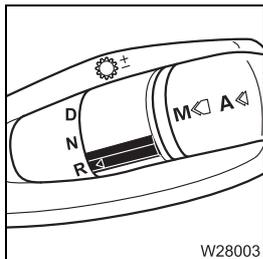


If the truck crane starts to move forwards in neutral position you can still switch to position **D**. A gear corresponding to the speed is engaged and the engine brake power is effective.



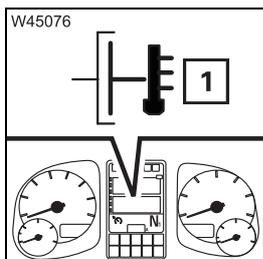
Danger when starting to reverse!

When starting to reverse, always keep the truck crane stationary with the parking brake until the transmission clutch is engaged. If the truck crane starts to move before this (when changing from brake pedal to accelerator), no gear is engaged, and you can only stop the truck crane by braking.



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

- Shift into position **R**
- Apply the parking brake,
- Press the accelerator,
- Release the parking brake after the clutch has engaged.



If the symbol (1) with a message is shown when starting:

- Shift to a lower gear
or
- End the starting operation



Inspections when driving downhill

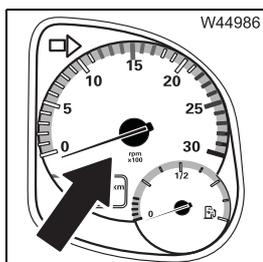


While driving, the engine speed must not exceed 2,300 rpm. The engine speed is not limited automatically.

Risk of damage due to excessive engine speed!

If the maximum permissible engine speed is reached, shift up a gear or slow the truck crane down.

This prevents damage to the engine or transmission.



- Check the current engine speed at the tachometer while driving.
- Brake the truck crane before the engine speed exceeds 2,300 rpm.



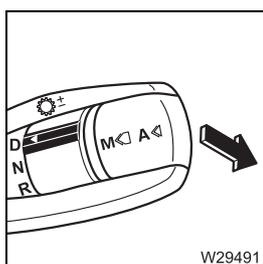
Risk of damage from resonance vibrations!

Always maintain a speed below 85 km/h (53 mph). Slow down the truck crane in due time.

When driving downhill, you can also slow down the truck crane as follows, in addition to using the service brake:

- by shifting down gears;  p. 5 - 60,
- with the engine retarder;  p. 5 - 61,
- with the transmission retarder;  p. 5 - 61.

Downshifting



To increase the braking force of the engine, you can select a lower gear.

- Press the gearshift lever down once.

Manual operating mode is switched on, and if possible, shifting down a gear is carried out.

If you initiate a gear change which would cause the maximum permitted engine speed to be exceeded, the transmission will not shift.

In that case, slow the truck crane down until a permissible engine speed is reached, and shift down gears again.

Additional brakes

Engine retarder

The truck crane has an engine flap brake that it uses as an engine retarder. The engine retarder only becomes effective at an engine speed of 900 rpm and can be used up to a maximum speed of 2,300 rpm.



Risk of accidents from unexpected acceleration!

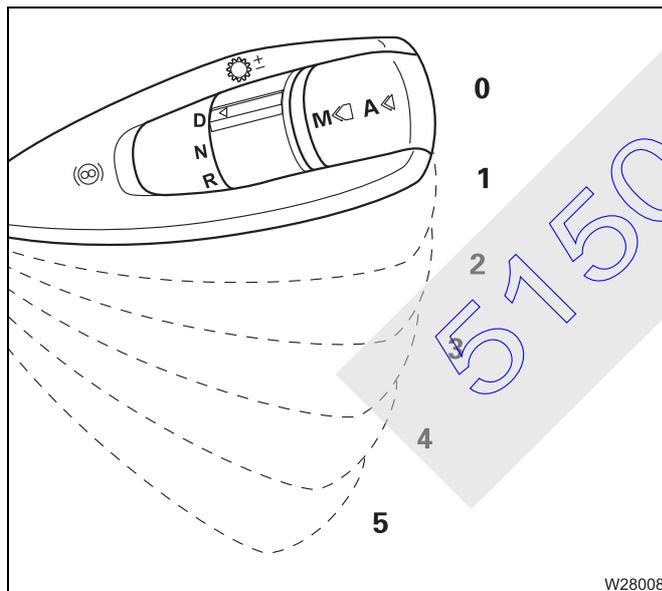
Maintain a sufficient distance when the engine retarder is switched on. The effectiveness of the engine retarder is interrupted when shifting gears. This may cause the truck crane to accelerate briefly.

Transmission retarder

The truck crane can also be equipped with a transmission retarder. The braking force of the transmission retarder depends on the speed. The higher the speed, the higher the brake power.



For long downhill stretches, we recommend that you use level 2. When the transmission retarder is switched on, you cannot control the speed with the accelerator.



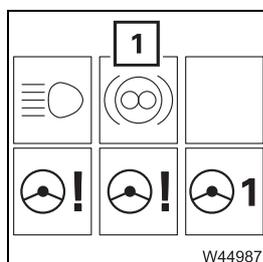
Switching on the additional brakes

- Pull the switch back to the required level (lock into place briefly at each level).

- 1 20% brake power
- 2 40% brake power
- 3 60% brake power
- 4 80% brake power
- 5 100% brake power

Switching off the additional brakes

- Press the switch up to level 0.



While driving

- When the additional brake is switched on, the lamp (1) lights up.
- If the light flashes while driving, the transmission retarder power is reduced; p. 8 - 3.

At a standstill

The lamp flashes after switching on the ignition if the switch is not set to level 0.

5.3.5

Driving uphill

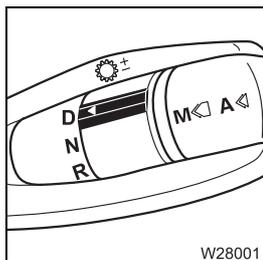
Starting

The engine must be running.



Danger of the truck crane starting to move in the unexpected direction!

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



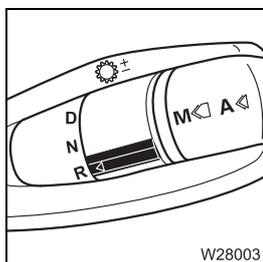
To **start moving forwards** you must do the following:

- Shift into **D** position,
- Apply the parking brake,
- Press the accelerator,
- Release the parking brake after the clutch has engaged.



Pay attention to any messages appearing on the on-board computer display when starting driving;  p. 8 - 7.

- Follow the instructions that are displayed and always take the specified measures in due time.



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

- Shift into position **R**
- Release the parking brake and service brake,
- Apply the accelerator if you wish to accelerate,
- Do not apply the accelerator if you want to brake with the engine.

Driving

On certain gradients, the transmission may switch continuously back and forth between two gears. In this case, either release the accelerator slightly or shift down a gear.

5.3.6

Overriding the torque reduction

A torque reduction can occur for various different reasons.

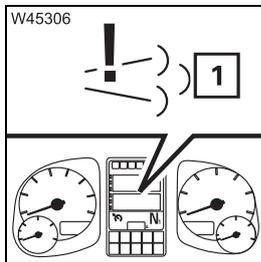
- The AdBlue (DEF) supply is used up.
- A system malfunction has been detected.



Before the torque is automatically reduced, various messages are displayed at the on-board computer, e.g. on the AdBlue supply. Follow the information on the on-board computer in due time, you can thus avoid a torque reduction;

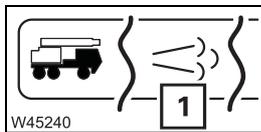
▮▮▮ *Warning and fault messages on the on-board computer, p. 8 - 7.*

You can override the torque reduction three times for a limited time during operation so that the full engine output is available (e.g. for driving to a service station).



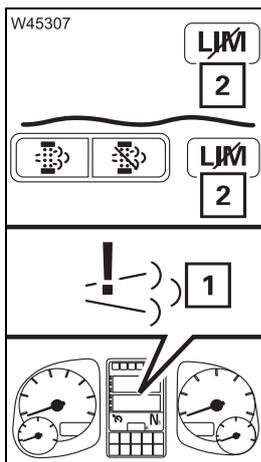
If the torque is reduced, a message (1) is displayed with the text *Engine output reduced*.

You can only switch the transmission in *Manual* operating mode.



Overriding is carried out at the CCS display.

- Open the menu (1) – Exhaust system menu.



- Select and confirm the symbol (2).

- A warning buzzer sounds.
- The torque reduction is overridden and message (1) is hidden.
- *Automatic* operating mode for the transmission is enabled.

After 30 minutes the torque is automatically reduced again and message (1) is displayed.

You can override the reduction three times, after this the symbol (2) will become inactive until the engine is restarted.

The torque is reduced continuously with each override.

5.3.7

Cleaning the exhaust system



Risk of burns during the cleaning procedure!

The exhaust system can heat to over 600 °C (1,110 °F) during automatic and manual cleaning.

Keep away from the exhaust system and ensure that no persons on the carrier are in the vicinity of the exhaust system or exhaust pipe. This will prevent severe burns.

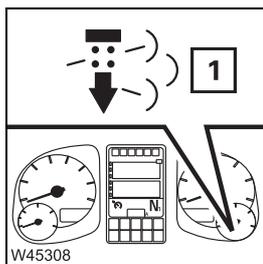


Risk of fire!

Ensure that no inflammable materials or liquids are in the vicinity of the exhaust system or exhaust pipe before performing a cleaning procedure. Maintain a minimum clearance of 2 metres. Also observe all information in the enclosed engine manufacturer's operating manual.

Automatic cleaning

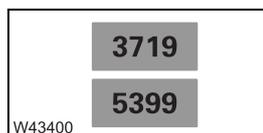
The exhaust system cleaning procedure usually runs automatically in normal operating conditions, unless it has been manually disabled;  *Disabling cleaning*, p. 5 - 66.



The lamp (1) lights up **green** during automatic cleaning.

Avoid driving interruptions when the lamp (1) lights up. This prevents any interruption of automatic cleaning.

The lamp (1) goes out when the cleaning procedure has finished.



Depending on the cleaning mode, a corresponding message is shown on the CCS display.

Manual cleaning

You must perform manual cleaning if automatic cleaning is not performed in time. Depending on the degree of contamination of the exhaust system, manual cleaning needs to be performed within a certain time. Appropriate messages are displayed;  *Exhaust system cleaning required*, p. 8 - 13.

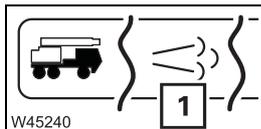
Manual cleaning is only performed when all prerequisites specified here have been fulfilled.

- The engine is running at idling speed.
- The accelerator pedal is not pressed.
- The service brake is not applied.
- The parking brake is applied.

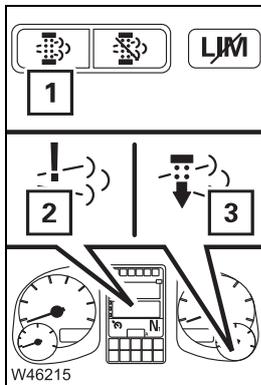


The idling speed increases automatically during the cleaning process. The engine sound changes. The *Engine speed increase* message is shown on the on-board computer.

- Make sure that all prerequisites remain fulfilled during the entire cleaning procedure.



- Open the menu (1) – Exhaust system menu.



- Select and confirm the symbol (1) – the cleaning process starts.

At exhaust temperatures above 525 °C (977 °F) the lamp (3) and the symbol (2) are activated.

- At speeds below 8 km/h (5 mph) – (3) lights up and (2) is displayed.
- At speeds above 8 km/h (5 mph) – (3) and (2) flash.

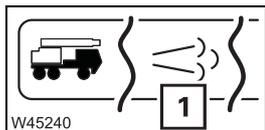
When cleaning is completed and the temperature falls below 525 °C (977 °F), the lamp (3) goes out and the symbol (2) disappears.



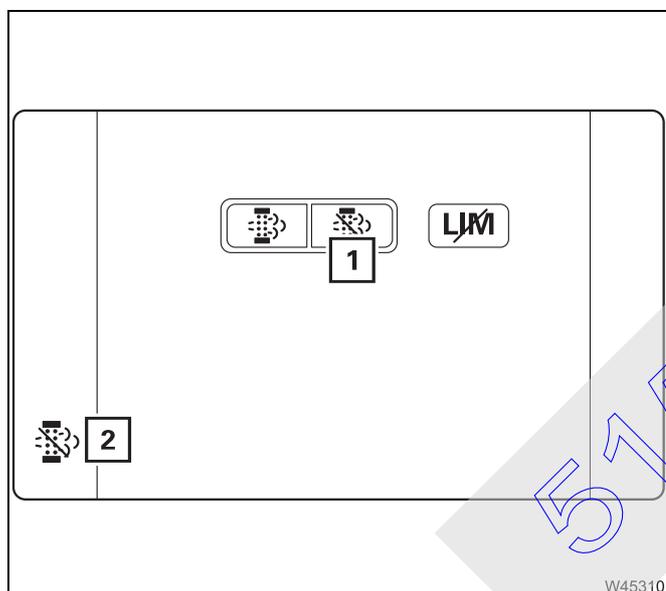
Disabling cleaning Automatic cleaning cannot be performed and manual cleaning cannot be started when cleaning is disabled. This function is for sites where an exhaust temperature higher than 600 °C (1,110 °F) poses a danger.



At normal operating conditions, automatic cleaning is performed without interrupting operation and is the best solution for the exhaust system. Therefore, only disable cleaning when the site makes this necessary. When cleaning is disabled, exhaust cleaning is no longer displayed, even when the engine is restarted. Take care to ensure that cleaning is enabled again when the truck crane is outside the danger area.



- Open the menu (1) – Exhaust system menu.



Disabling cleaning

- Select and confirm the symbol (2) – the symbol turns green.
The symbol (3) is displayed.

Enabling cleaning

- Select and confirm the symbol (2) – the symbol turns grey.
The symbol (3) disappears.

5.3.8

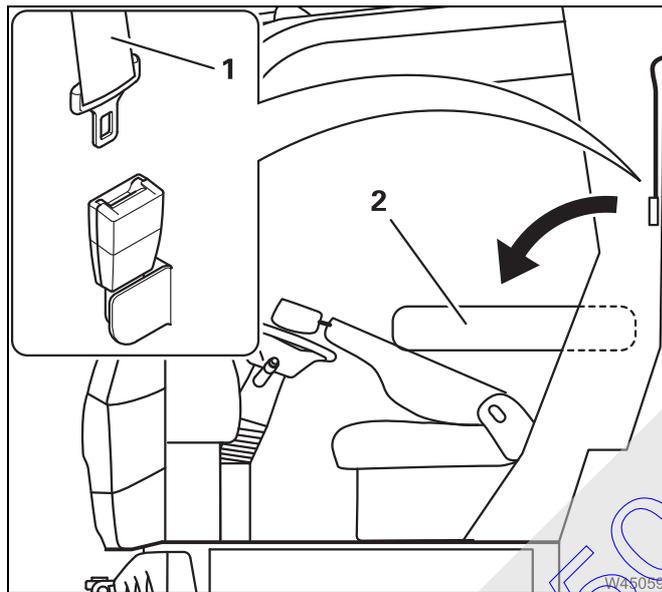
Fold-up berth

The berth must always be folded up and secured for driving.



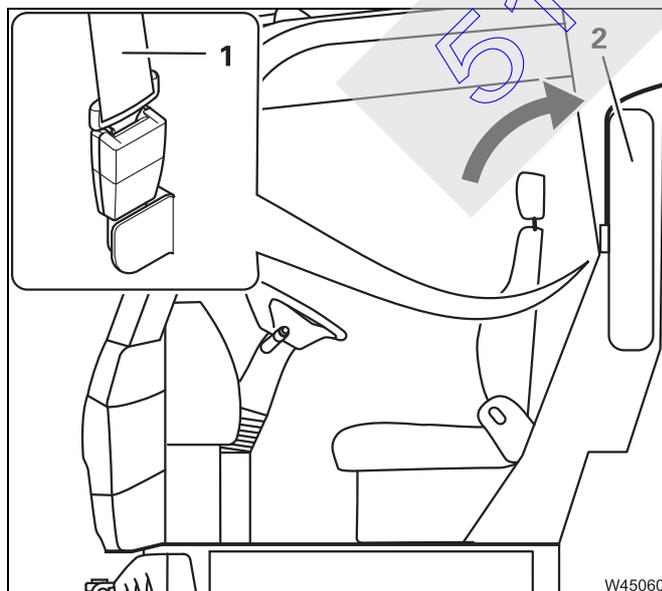
Risk of accidents due to the berth folding down!

Check that the belt has engaged and is pulled taut. Put up the back rests of the seats. This prevents the berth folding down when braking, resulting in uncontrolled manoeuvres due to fright.



Folding down

- Move the steering column to the bottom position; *Adjusting the steering column*, p. 5 - 16.
- Move the seats to their lowest position:
 - *Adjusting the driver's seat*, p. 5 - 14;
 - *Adjusting the passenger seat*, p. 5 - 15.
- Close the storage compartments between the seats and remove all objects from the folding range of the berth (2).
- Remove the belt (1) from the lock and fold the berth (2) down.



Folding up

- Fold up the berth (2).
- Allow the belt (1) to engage in the lock and pull the belt taut.
- Put up the back rests of the seats.
- Move the seats and the steering column into the desired position:
 - *Adjusting the driver's seat*, p. 5 - 14;
 - *Adjusting the passenger seat*, p. 5 - 15;
 - *Adjusting the steering column*, p. 5 - 16.

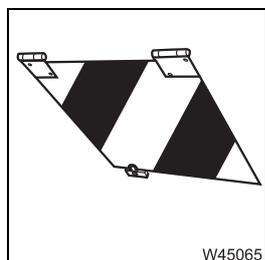
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5.4

Off-road driving

This section describes settings, connections and procedures for adapting the truck crane's vehicle handling to off-road conditions.



The specified angle of negotiable banks applies with the warning signs folded up. It is recommended to drive off-road with the warning signs folded up;

▣▣▣▣ p. 5 - 10.

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 event you can make the following adjustments:

- Shift to a lower starting gear; ▣▣▣▣ p. 5 - 44
- Step on the accelerator as far as it will go when starting – starting mode for load on.
- Select Manual operating mode. This way you will be able to drive carefully and shift gears on time; ▣▣▣▣ p. 5 - 45.

Connections

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

- First, you can switch on the off-road gear in the transfer case; ▣▣▣▣ p. 5 - 70.
- Then switch on the longitudinal differential locks; ▣▣▣▣ p. 5 - 71.
- Then switch on the transverse differential locks; ▣▣▣▣ p. 5 - 71.

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 - 73.

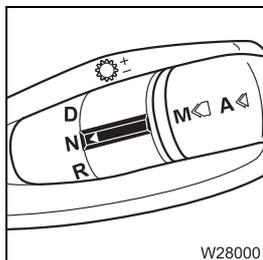
Rocking the vehicle free and towing

If the truck crane is stuck in terrain; ▣▣▣▣ *Freeing a truck crane stuck in terrain*, p. 5 - 77.

5.4.1

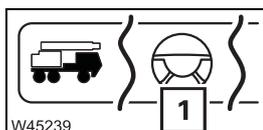
Transfer case – switching the off-road gear on/off

The off-road gear increases the thrust of the driven wheels.

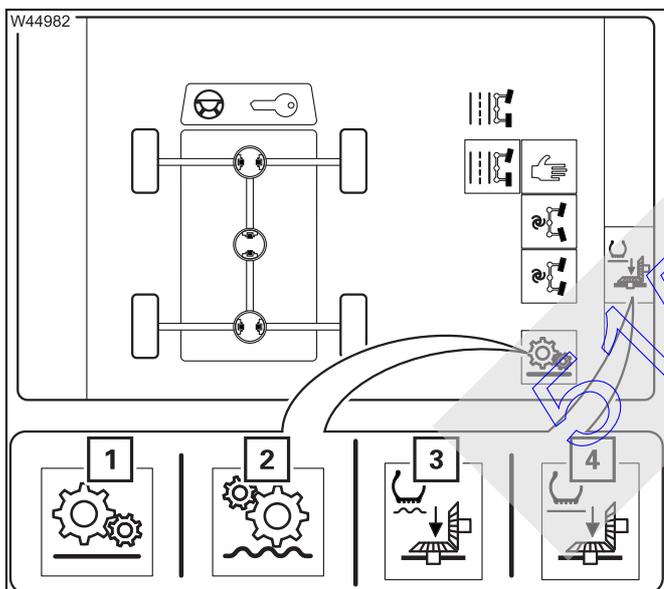


Prerequisites

- Stop the truck crane.
- Shift the transmission to neutral position.



- Open the menu (1) – Driving menu.



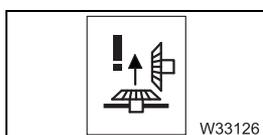
(A) – Switching on

- Select symbol (1) and confirm it – symbol (2) is displayed, off-road gear engaged. The speed is limited to approx. 50 km/h (31 mph).

(B) – Switching off

- Select symbol (3) and confirm it – symbol (4) is displayed, off-road gear is disengaged.

If neither the symbol (2) nor (4) is shown, select a starting gear at the transmission and shift back into neutral, or start up slowly.



If the error symbol is displayed, contact **Grove Product Support**.



Neutral position

The transfer case is switched into neutral position when the towing mode is switched on;  p. 8 - 48

5.4.2

Longitudinal and transverse differential locks

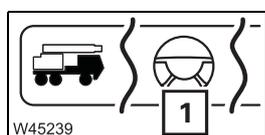
- The longitudinal differential locks prevent individual axle lines spinning when driving on a slippery surface. With the 10 x 8 x 10 drive, the 3rd axle line drive is switched on / off at the same time.
- The transverse differential locks prevent individual wheels spinning when driving on a slippery surface.



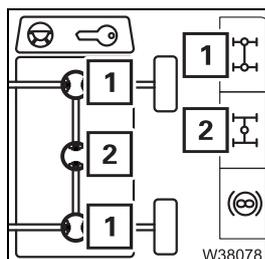
Risk of damage to the differential locks!

Leave the transverse differential locks switched on only for as long as necessary. Always switch off the transverse differential locks before driving on hard surfaces.

For switching on and off, the current speed needs to be below approx. 5 km/h (3 mph).

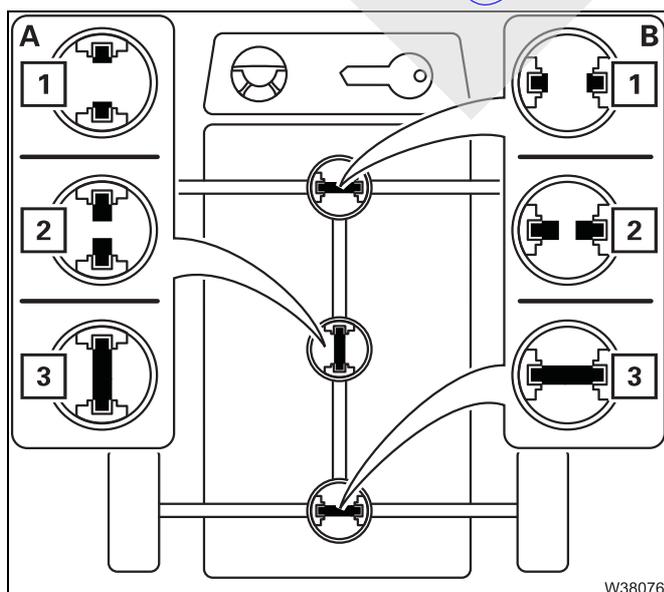


- Open the menu (1) – Driving menu.



- Set the steering to straight ahead.
- Stop the truck crane.

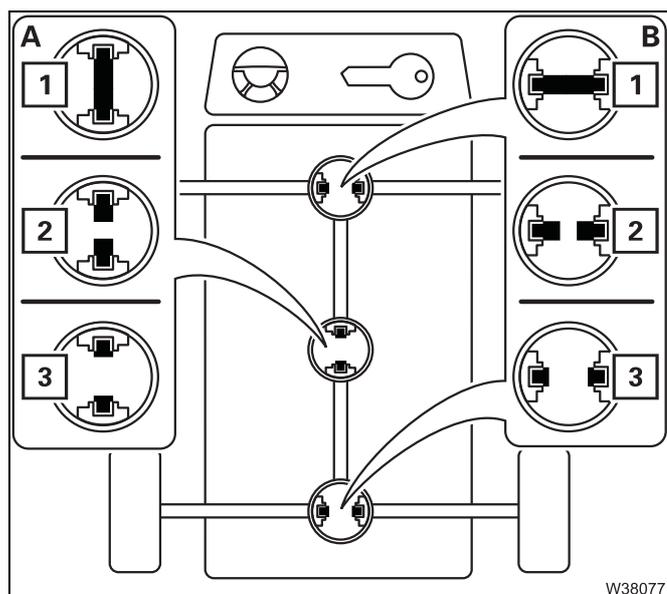
The symbols (1) and (2) indicate the current switching state and have the same colour.



Switching on

- Select and confirm the symbol (1) for the
 - Longitudinal differential locks (A) or
 - Transverse differential locks (B).
- Start moving slowly – display:
 - first symbol (2) – yellow, then symbol (3) – red, differential locks on.





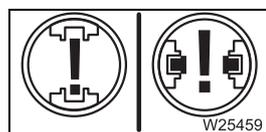
Switching off

- Select and confirm the symbol (1) for the
 - Longitudinal differential locks (A) or
 - Transverse differential locks (B).

Display:

- first symbol (2) – yellow, then symbol (3) – **green**, differential locks off.

If symbol (3) is not **green** then drive back and forth slowly.

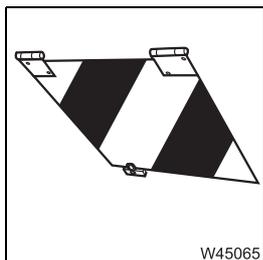


If the error symbol is displayed, contact **Grove Product Support**.

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5.4.3

Operating the level adjustment system

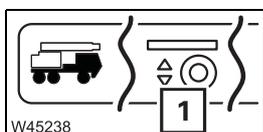


Fold up the warning signs in order that they are not damaged when lowering the truck crane; p. 5 - 10.

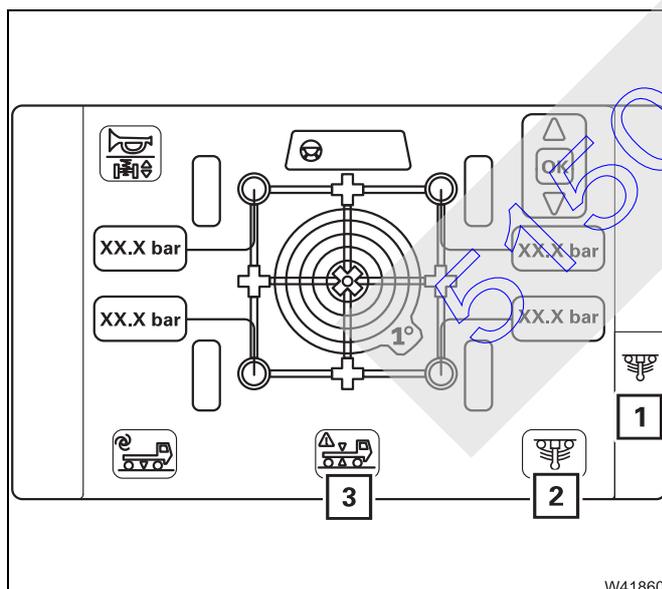
Opening the menu

You can use the level adjustment system to set the on-road level, change the overall level and incline the truck crane.

You can only open the *Level adjustment system* menu when the current speed is less than about 5 km/h (3 mph).



- Open the menu (1) – Suspension/level adjustment menu.



- Check that the symbol (1) is **green** (suspension on).
- If the symbol (1) is red then select and confirm the symbol (2) to switch the suspension on.

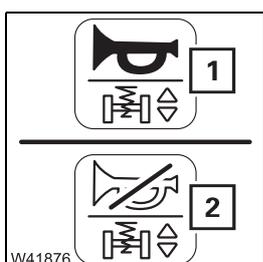
When the suspension has been switched on, you can:

- Set the on-road level,
- Pre-select the suspension struts and change the vehicle level.

If the error symbol (3) is shown during level adjustment, contact **Grove Product Support**.

Switching the horn on/off

The horn sounds once when the level is changed. This function can be switched off and remains active until the ignition is switched off.



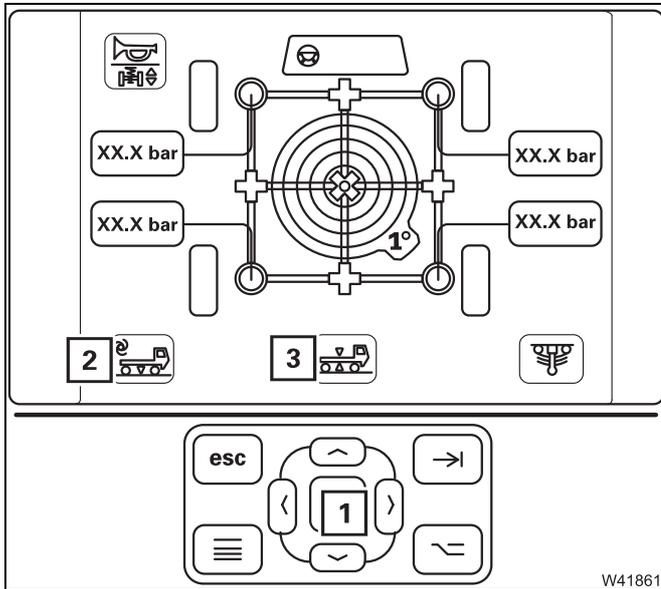
- 1 Select and confirm – Horn off
- 2 Select and confirm – Horn on



Adjusting the on-road level

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

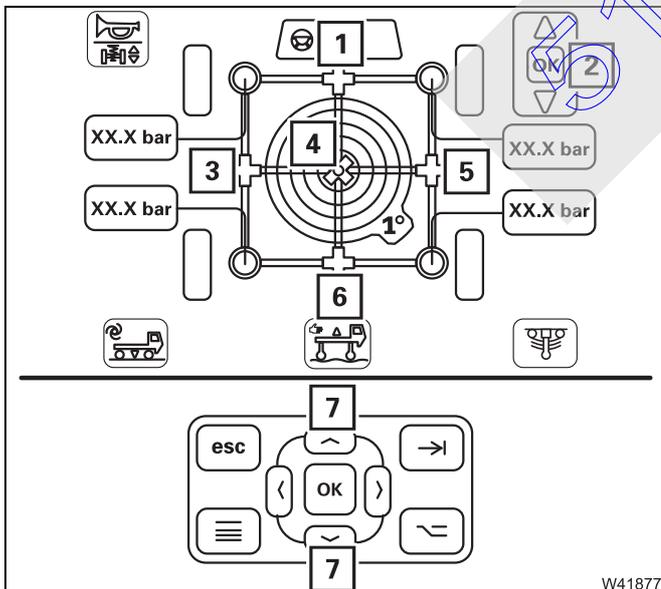
- Park the truck crane on a level surface.
- Set the steering to straight ahead.



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

Pre-selecting suspension struts

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



– For an even level change

- 4 Overall level – all suspension struts

– For inclination

- 1 Front level – suspension strut for the 1st and 2nd axle lines
- 3 Left level – all suspension struts on the left
- 5 Right level – all suspension struts on the right
- 6 Rear level – suspension struts for the 3rd to 5th axle lines

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

Now the vehicle level can be changed with the (7) button.

Changing the vehicle level

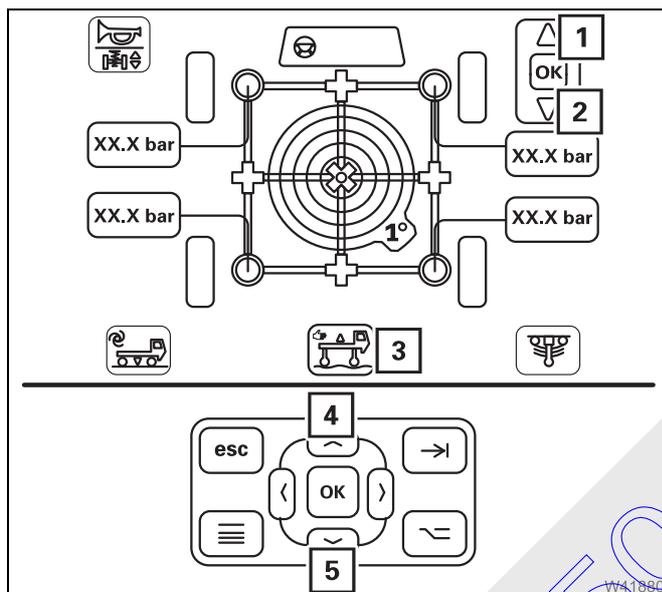
You can extend or retract the pre-selected suspension struts to change the vehicle level.



Risk of accidents by exceeding the 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.



The display (3) always shows the current status during the entire process, for example, the *No road level* symbol.

The level is continuously changed until you release the button or the end position is reached.

Raising the level

- Press the button (4) – the symbol (1) turns orange, the suspension struts extend.

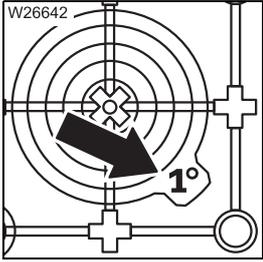
Lowering the level

- Press the button (5) – the symbol (2) turns orange, the suspension struts retract.



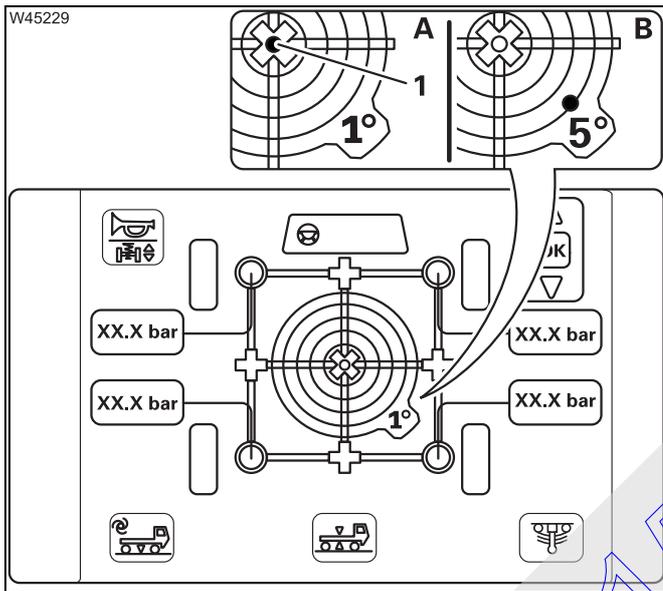
Viewing the current inclination

The inclination indicator shows the current alignment.



Switching over the measuring range

The measuring range is automatically switched between 1° and 5°.

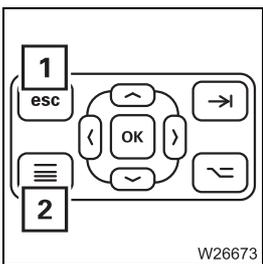


(A) – When the truck crane is level the marking (1) is in the middle.

(B) – In this example, the carrier would be standing higher to the rear on the right-hand side.

Exiting the menu

You can exit the *Suspension/Level adjustment system* menu at any time.



- Press the button (1) once.

The start menu opens.

or

- Press the button (2) once.

The next highest menu is opened.

The *Suspension/Level adjustment system* menu automatically closes as soon as the current speed increases above about 5 km/h (3 mph).

5.4.4

Freeing a 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 it back and forth (rocking it free):

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

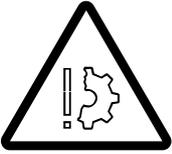
- Switch to transmission mode **D** or **R**.
- Select a smaller starting gear with the gearshift lever.
- Press the accelerator as far as possible.
- Start driving as far as you can as high as possible.
- Release the accelerator. The transmission disengages.
- Let the truck crane roll in the opposite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



It does not make sense 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.



Towing free forwards

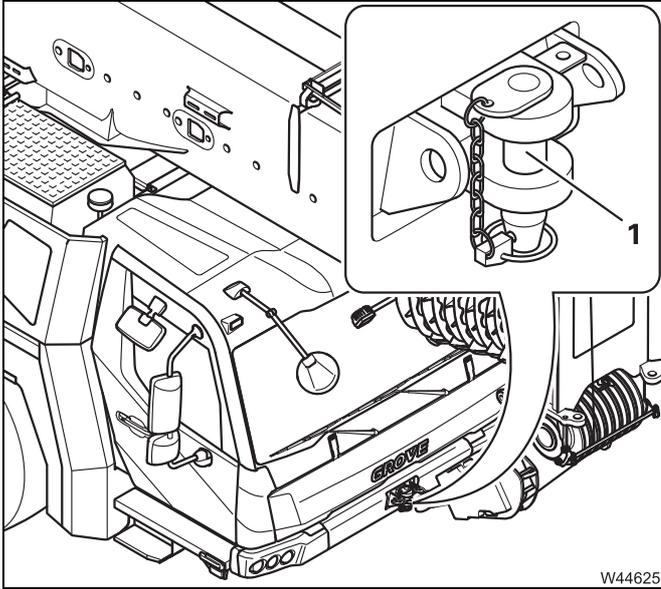


- Fasten a steel rope to the front towbar coupling.

Risk of damage to the chassis!

Only tow the truck crane free while observing the procedure given for the pulling direction.

Pulling out the truck crane abruptly or at an angle may damage the chassis.



The front towbar coupling (1) 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 to the front along the longitudinal axis or at an angle of 45° to the right or left of the longitudinal axis **and**
- The direction of pull runs along the longitudinal axis towards the rear without upward or downward deviation.

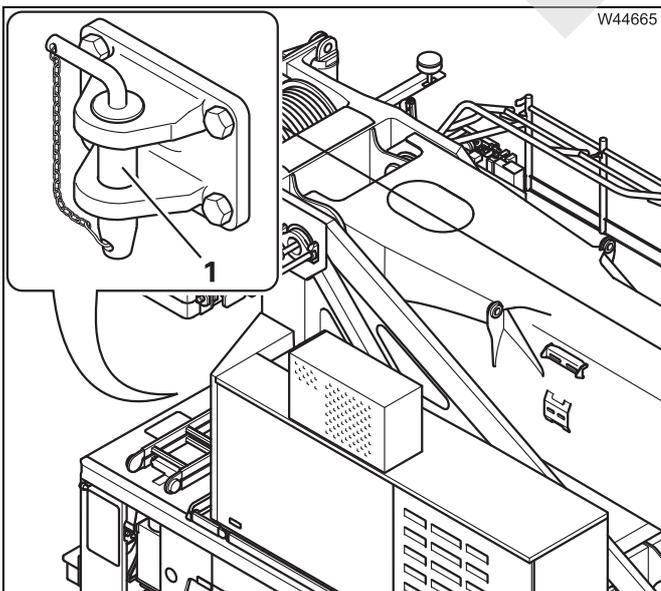
Towing free backwards



- Fasten a steel rope to the towing coupling on the rear chassis wall.

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 rear chassis towing coupling (1) 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 along the level of the longitudinal axle **and**
- The direction of pull runs along the longitudinal axis towards the rear without upward or downward deviation.

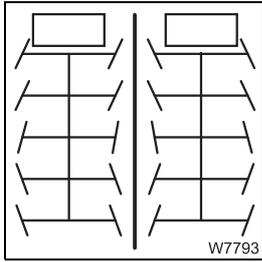
Remove the spare wheel if necessary;

➡ p. 8 - 50.

5.5

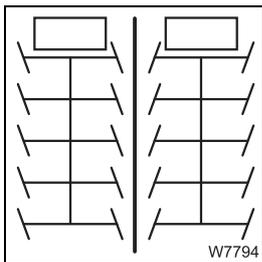
Separate steering

There are two steering modes with separate steering.



– Driving around corners:

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



– Crab travel mode:

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

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5.5.1

Switching to separate steering

Always switch to separate steering when

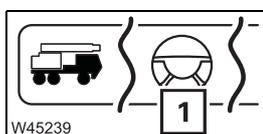
- Driving with the truck crane rigged or
- Steering at low speed



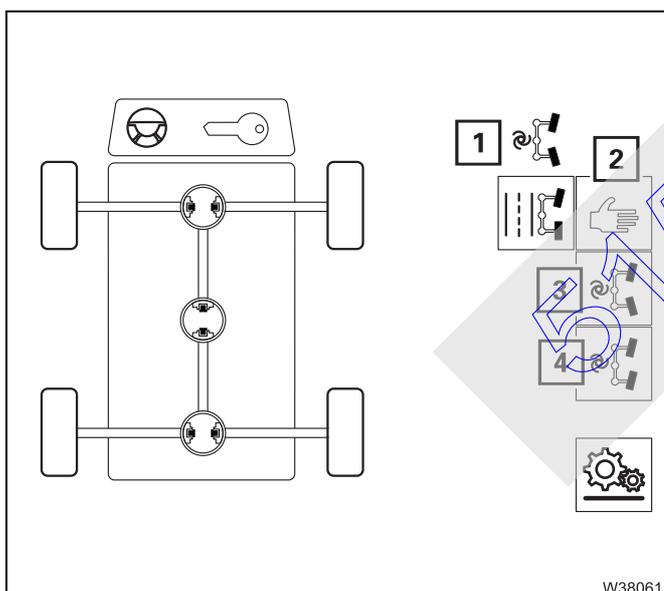
Risk of accidents when driving on-road with unlocked steering!

After driving with separate steering, change over immediately to normal steering mode. The locking status for normal steering mode is only restored once the on-road driving symbol is displayed.

You can only switch to separate steering at low speeds.



- Open the menu (1) – Driving menu.



- Select and confirm the symbol for the desired steering mode.

- 2 Manually
3rd to 5th axle lines steered manually
- 3 Driving around corners
3rd to 5th axle lines steered automatically
- 4 Crab travel mode
3rd to 5th axle lines steered automatically

The symbol (1) indicates the selected steering mode, e.g. *Driving around corners*.



If the error symbol is displayed, contact **Grove Product Support**; p. 8 - 42.

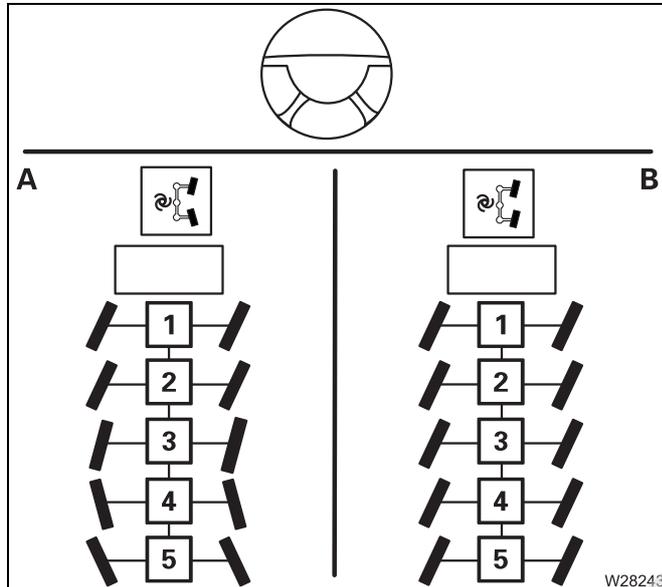


When separate steering is switched on, the speed is limited to about 20 km/h (12 mph).

Steering with separate steering – automatically

- Steer the 1st and 2nd axle lines with the steering wheel.

The electronics system measures the steering angle of the 1st and 2nd axle lines and automatically steers the wheels of the 3rd to 5th axle lines correspondingly.



(A) – When driving around corners

The 3rd to 5th axle lines are moved out of position to suit the turning circle.

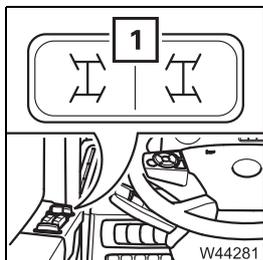
- The 3rd axle line is steered in the same direction as the 1st and 2nd axle lines.
- The 4th and 5th axle lines are steered in the opposite direction to the 1st and 2nd axle lines.

(B) – With crab travel mode

The 3rd to 5th axle lines are steered in the same direction as the 1st to 2nd axle lines.

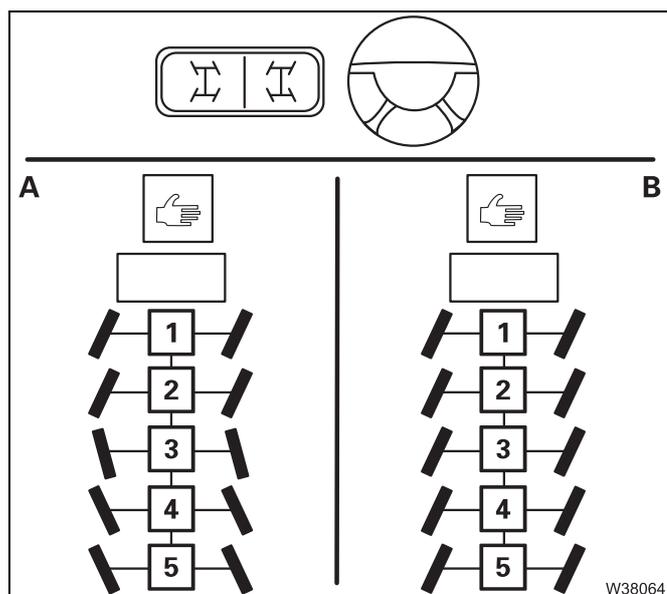
Steering with separate steering – manual

- Steer the 1st and 2nd axle lines with the steering wheel.
- Steer the 3rd to 5th axle lines with the button (1).
 - To turn to the left:
 - Press in button on the left.
 - To turn to the right:
 - Press in button on the right.



The axle lines are steered as long as you keep the button pressed or until an end position is reached.





(A) – For driving around corners

- Steer the 3rd to 5th axle lines opposite to the 1st and 2nd axle lines.

(B) – For crab travel mode

- Steer the 3rd to 5th axle lines in the same direction as the 1st and 2nd axle lines.

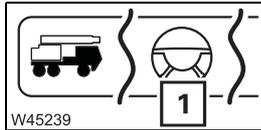
51508035

5.5.2

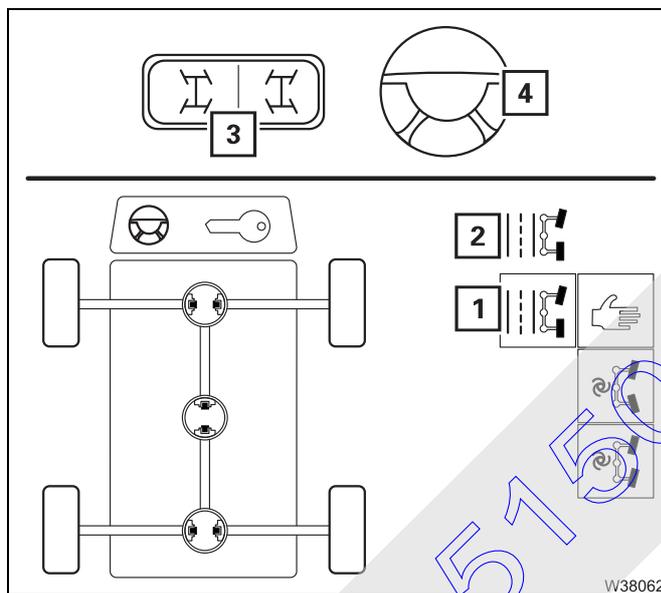
Switching to normal steering mode

After driving with separate steering, change over immediately to normal steering mode.

Switching off the separate steering is possible during a standstill and while driving, up to a speed of about 5 km/h (3 mph).



- Open the menu (1) – Driving menu.



- Use the steering wheel (4) and the button (3) to turn the wheels to the *Straight ahead* position – the current wheel position is displayed.
- Select and confirm the symbol (1) – symbol (2) is displayed.



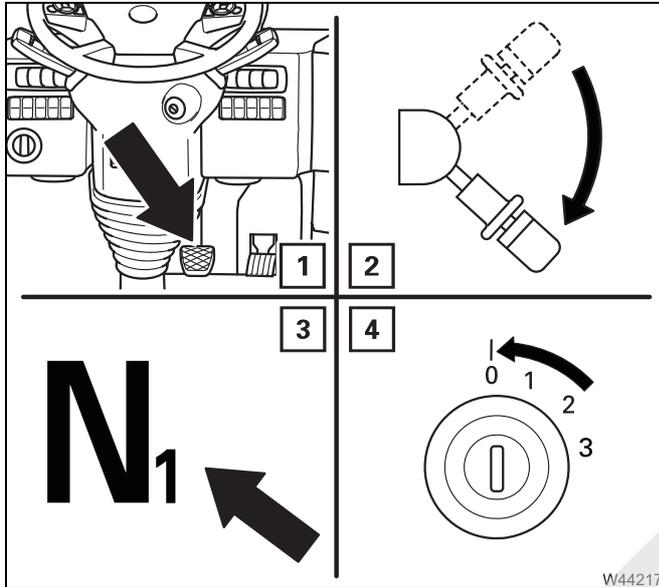
If the error symbol is displayed, contact **Grove Product Support**;  p. 8 - 42.

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5.6 Switching off the truck crane

5.6.1 Every time the truck crane is at a standstill



To switch off the truck crane, you must:

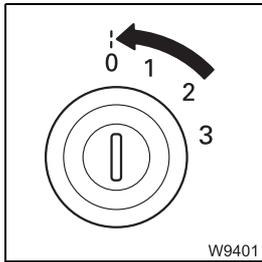
1. Stop the truck crane
2. Apply the parking brake
3. Switch to neutral position; p. 5 - 42
4. Switch off the engine; p. 4 - 19

On uphill and downhill slopes;

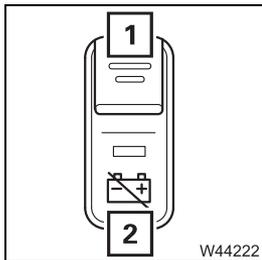
Secure it against moving away, p. 5 - 88.

5.6.2

Every time when stationary for more than 8 hours



- Switch off all current consumers, for example, auxiliary heaters.
- Switch off the engine, turn the ignition key to position **0** and remove it



- Switch off the battery master switch I.
Push the lock (1) down and press the switch (2) in at the bottom.
- Lock the truck crane to prevent unauthorised use.

Securing the truck crane against unauthorised use

- Stow away the hand-held control;  p. 14 - 42.
- Remove the ignition key.
- Lock the crane cab and the driver's cab and take the keys with you.



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.

That prevents unauthorised persons starting the engine using the hand-held control.



If necessary, you can switch off the battery master switch II – if present;
 *When the truck crane is stationary for a longer period, p. 5 - 87.*

5.6.3

When the truck crane is stationary for a longer period

In addition to the measures taken for a standstill exceeding 8 hours, you can switch off the battery master switch II – if present. That prevents battery discharge.

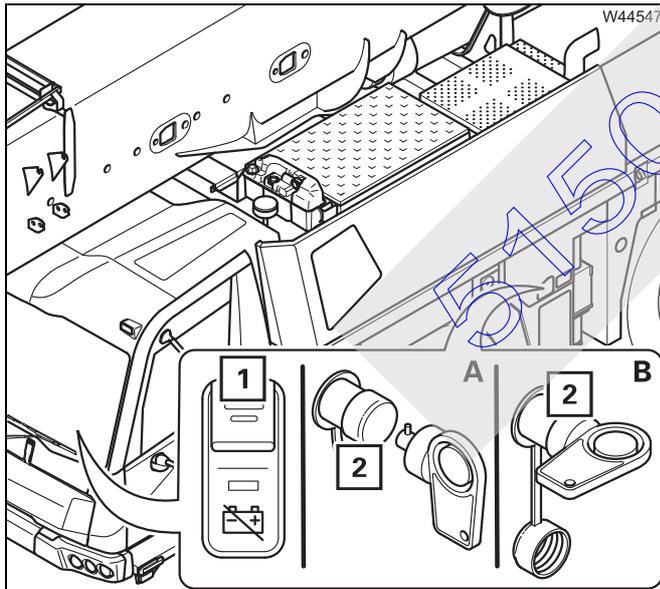


Battery master switch II is also used to disconnect those electrical devices from the power supply that are still supplied with power when battery master switch I is switched off. Therefore, after switching the power supply back on, various settings need to be updated, e.g. on the audio device, the tachograph or the auxiliary heaters.



Risk of damage to the crane control!

Always switch off battery master switch I first and then wait at least three minutes before you switch off battery master switch II. This prevents malfunctions in the crane control.



(A) – Switching off

- Make sure that the battery master switch I (1) has been switched off for at least three minutes.
- Turn the selector handle (2) to the left and remove it.
- Stow away the selector handle in the driver's cab.

(B) – Switching on

- Plug in the selector handle (2) and turn it to the right so that it cannot be pulled off.

5.6.4

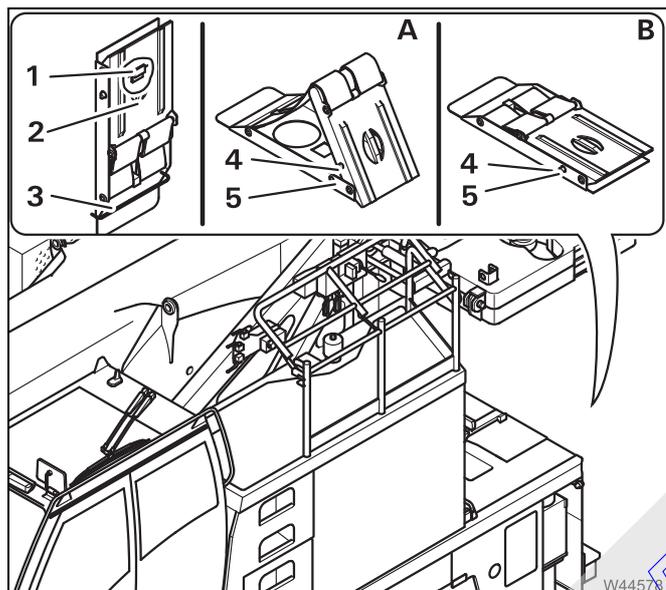
Secure it against moving away

The number of wheel chocks supplied varies according to the regulations in the country.



Risk of accidents due to the truck crane moving unintentionally!

On uphill and downhill gradients secure the truck crane using wheel chocks in addition to the parking brake.



Transport at the rear of the carrier

- Push the chock (2) behind the bracket (3) and attach it to the holder (1).

(A) – Folding out

- Push the locking bar (4) through the bore (5).
The chock unfolds by spring force.

(B) – Folding up

- Push the chock together until the locking bar (4) engages in the bore (5).



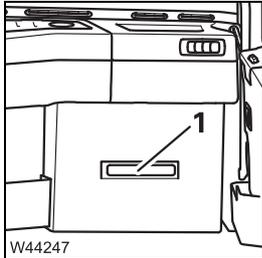
Further wheel chocks can be transported e.g. in the storage compartment on the turntable.

5.7

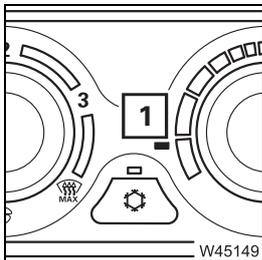
Heating and air-conditioning system

5.7.1

Standard heating system



- Do not cover the opening (1) in order that air can flow into the passenger cab floor.



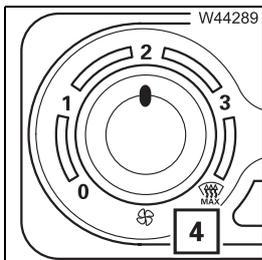
The operating elements for the standard heating system are only active if the auxiliary water heating system is switched off. The lamp (1) must have gone out; Switching off, p. 5 - 100.

Switching on

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

Heating

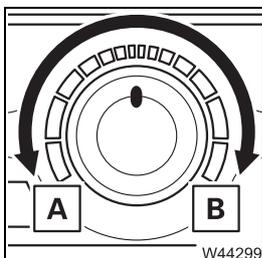
- Set the heating as required.



Setting the fan

- **Switch on and regulate the air volume:** Turn the switch to the desired level 1 to 3
- **Switch off:** Turn the switch to level 0

Position at symbol (4); Defrosting windows, p. 5 - 92.



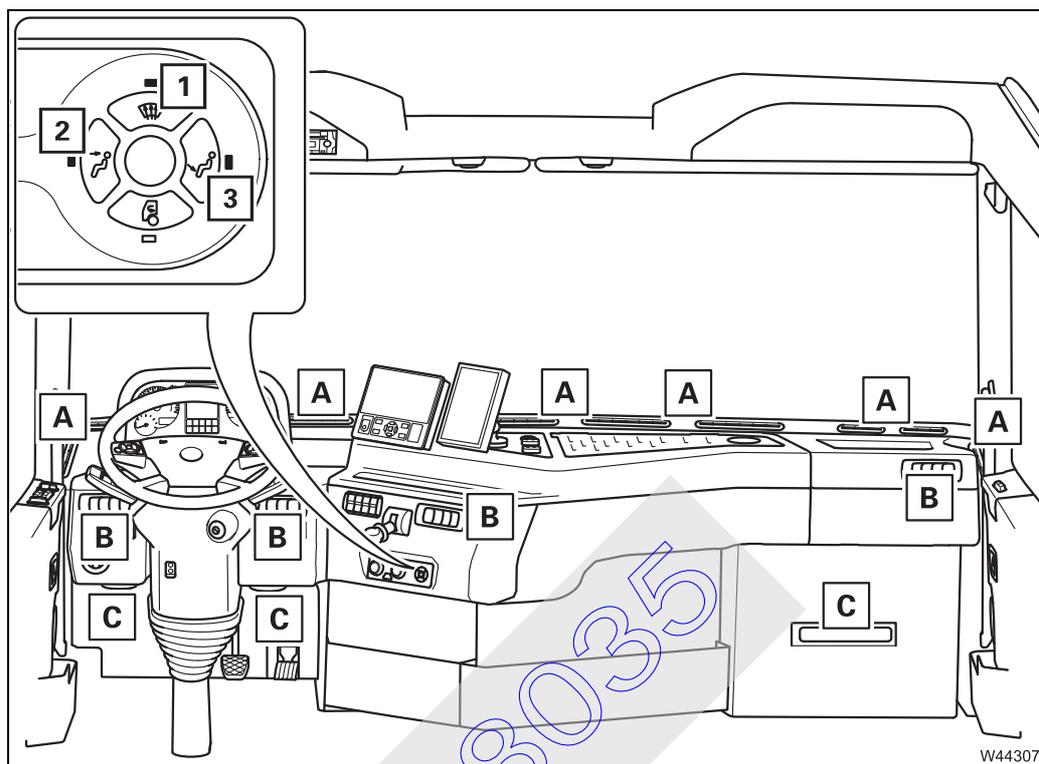
Setting the temperature

- **Colder (A):** Turn anti-clockwise
 - **Warmer (B):** Turn clockwise
- To heat up faster you can set recirculated air; p. 5 - 91



Air distribution

You can direct the air to flow out of various air vents.



Assignment of the air vents

- Button (1) – Air vents (A)
- Button (2) – Air vents (B)
- Button (3) – Air vents (C)

– Activating air vents

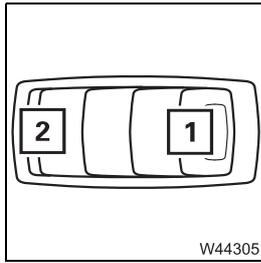
- Press one or more buttons repeatedly until the lamp next to the button lights up.

– Deactivating air vents

- Press the corresponding button repeatedly until the lamp next to the button goes out.

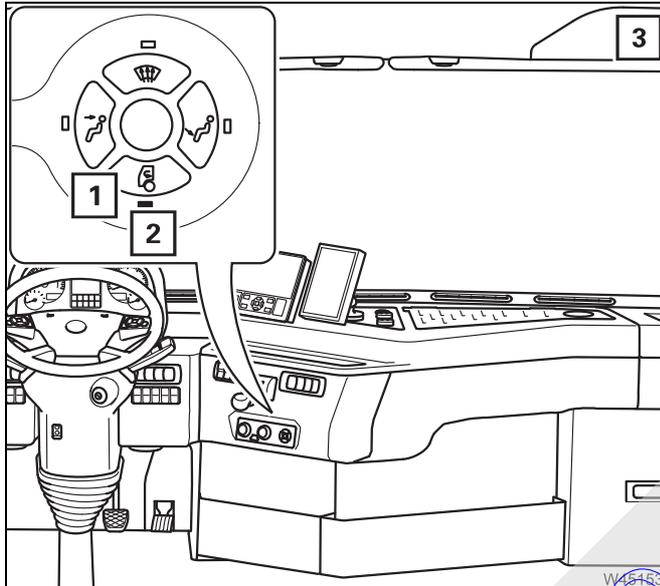


Not all air vents can be deactivated at the same time. If only one lamp lights up, you can only deactivate these air vents after activating other air vents.



Adjusting the air vents

- 1 – Press: Open and direct air flow
- 2 – Turn: Direct the air flow



Setting fresh air/recirculated air

– Fresh air

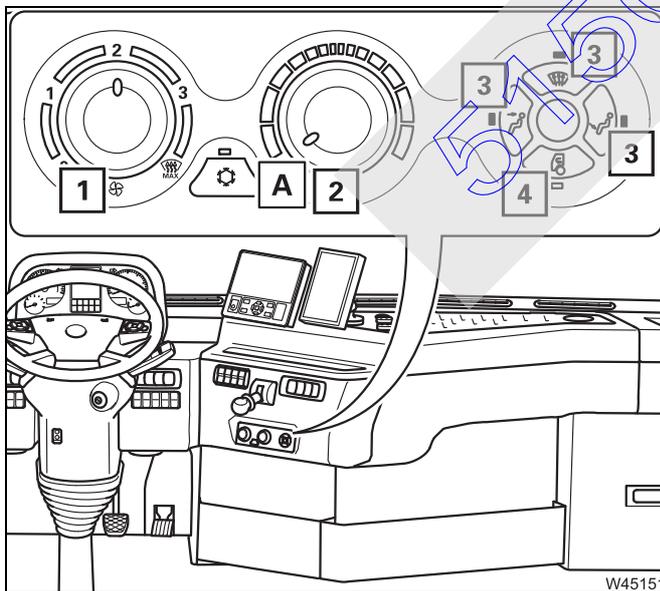
Press button (1) repeatedly until the lamp (2) goes out.

– Recirculated air

Press button (1) repeatedly until the lamp (2) lights up.

Switch to fresh air frequently to ensure that oxygen is supplied.

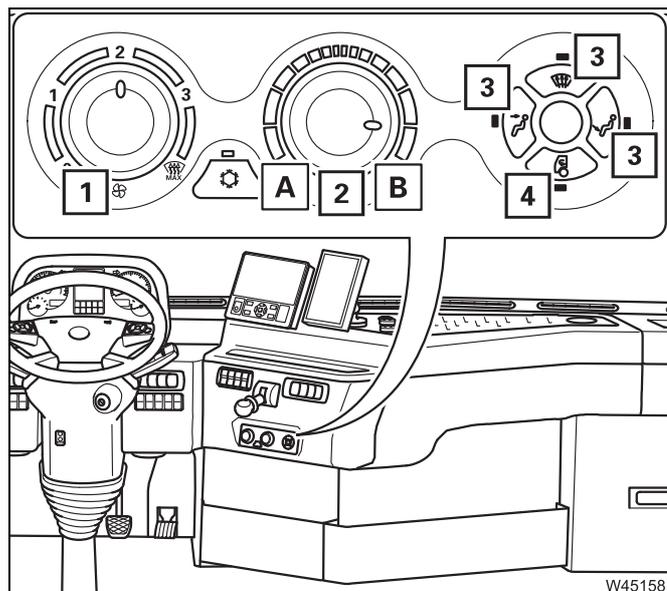
After 60 minutes of continuous recirculated air operation, forced ventilation behind the cover (3) is switched on, until you switch over to fresh air.



Ventilating

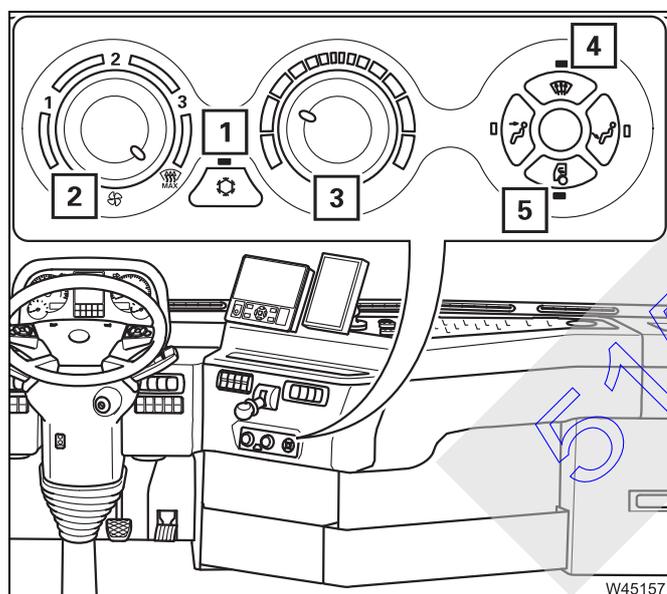
- Turn the switch (2) as far as it will go, to **A** (cold).
- Turn the switch (1) to the desired level, e.g. to level 2.
- Switch to fresh air – lamp (4) gone out.
- Use the buttons (3) to activate the desired air vents; ►► p. 5 - 90.
- Adjust the air vents as required.





Heating

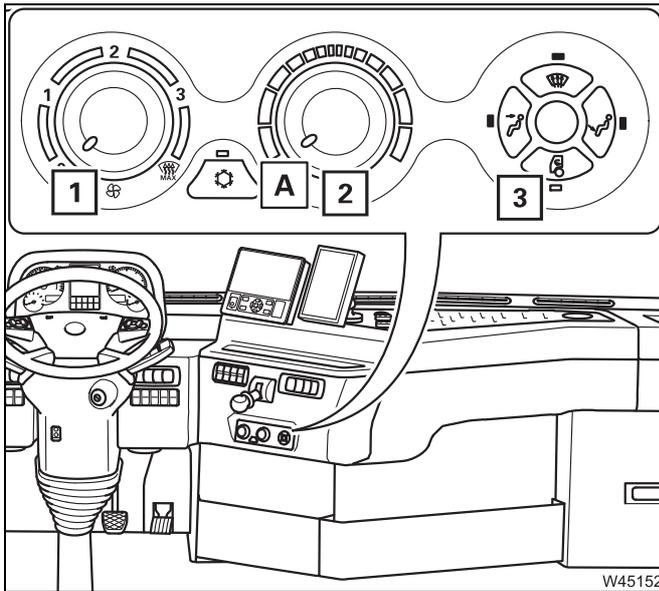
- Turn the switch (2) to the desired position between **A** and **B**.
- Turn the switch (1) to the desired level, e.g. to level 2.
- To heat up faster you can set recirculated air – lamp (4) lights up.
- Use the buttons (3) to activate the desired air vents; ►► p. 5 - 90.
- Adjust the air vents as required.



Defrosting windows

- Turn the switch (2) to the symbol.
- Further settings are made automatically.
- Fan at level 3.
 - Heating on regardless of the position of the switch (3).
- Recirculated air on – lamp (5) lights up, after 60 minutes, forced ventilation on.
- Only the air vents (4) are activated – the lamp lights up.
 - Air-conditioning on (if present) – lamp (1) lights up.
- All operating elements are deactivated until you turn the fan to level 0 to 3.

Switching off



Switching off the heating system

- Turn the switch (2) as far as it will go, to **A** (*cold*).

Switching off the ventilation

- Turn the switch (1) to level **0**.

Switching off recirculated air

- Press the button (3) repeatedly until the lamp goes out.

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5.7.2

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 not exceed 10 °C to 14 °C (18 °F to 25 °F).

If there is too much cooling, you may frequently feel physically uncomfortable, albeit mostly only after you leave the cool environment.

Avoid having cold air blowing directly on to your body.

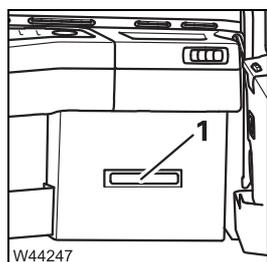
Adjust the cooling output to your actual needs:

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 fan level with the engine running.

The door or at least the windows should be left open for a short while to thoroughly air the cab. The cooling-down process 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.

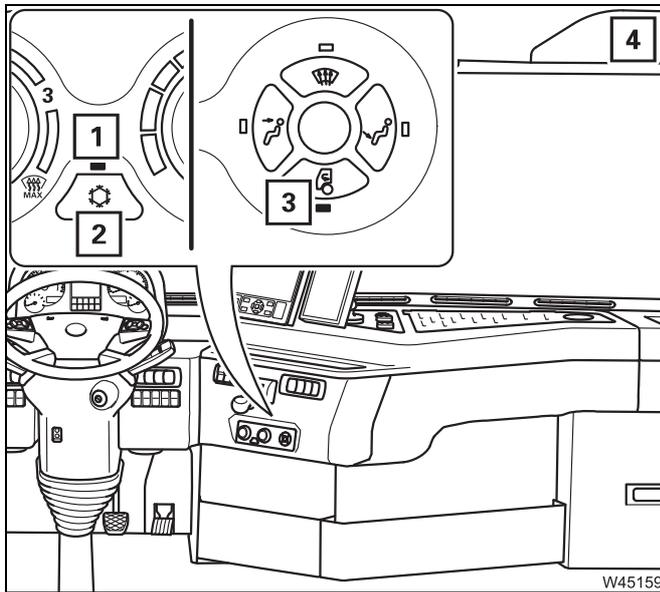
Once the desired inside temperature is reached, set the fan to a lower level.



- Do not cover the opening (1) in order that air can flow into the passenger cab floor.

Switching on

- Start the engine. The air-conditioning system only works when the engine is running.
- Switch off the auxiliary heater;  p. 5 - 98,  p. 5 - 101.

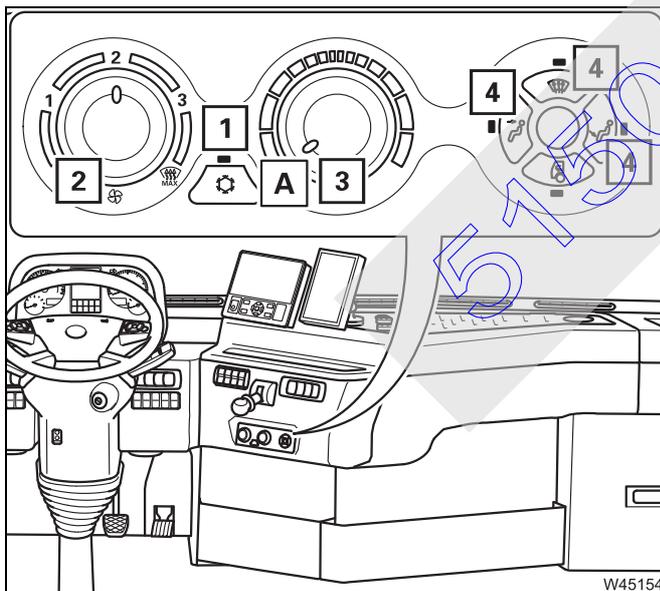


- Press the button (2) repeatedly until lamp (1) lights up.

Further settings are made automatically.

- Recirculated air on – lamp (3) lights up.
- After 60 minutes – forced ventilation on, behind cover (4).

- Adjust the other functions as required.

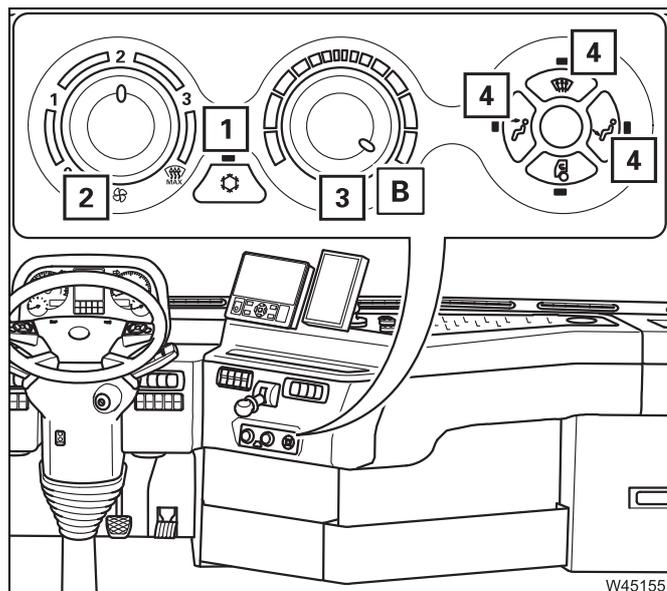


Cooling

The air-conditioning is switched on – lamp (1) lights up.

- Turn the switch (3) as far as it will go, to **A** (cold).
- Turn the switch (2) to the desired level, e.g. to level 2.
- Use the buttons (4) to activate the desired air vents;  p. 5 - 90.
- Adjust the air vents as required.

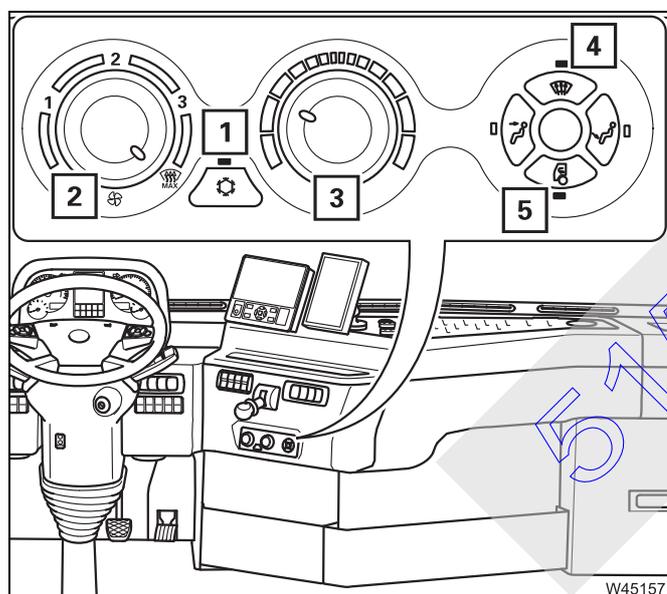




Drying

The air-conditioning is switched on – lamp (1) lights up.

- Turn the switch (3) as far as it will go **B** (*warm*).
- Turn the switch (2) to the desired level, e.g. to level 2.
- Use the buttons (4) to activate the desired air vents; ►► p. 5 - 90.
- Adjust the air vents as required.



Defrosting windows

- Turn the switch (2) to the symbol.

Further settings are made automatically.

- Air-conditioning on – lamp (1) lights up
- Fan at level 3.

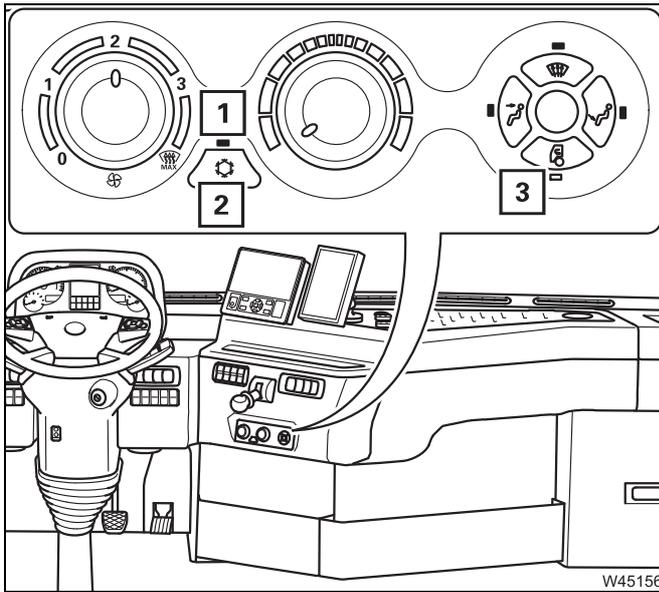
Heating on regardless of the position of the switch (3).

Recirculated air on – lamp (5) lights up, after 60 minutes, forced ventilation on.

- Only the air vents (4) are activated – the lamp lights up.

All operating elements are deactivated until you turn the fan to level 0 to 3.

Switching off



- Press the button (2) repeatedly until the lamp (1) goes out.
Recirculated air is switched off – the lamp (3) goes out.
Forced ventilation is switched off.
- Set the heating as required;
 ▣► *Heating*, p. 5 - 89.

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5.7.3

Auxiliary water heating system



Risk of explosion when operating the auxiliary heater!

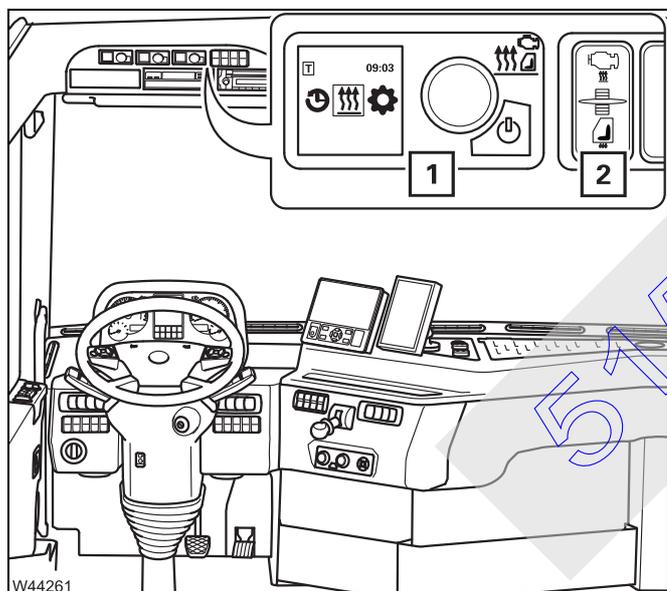
Operating the auxiliary heater is not permitted:

- At service stations and tank farms
- At places where flammable gases or vapours can be found or formed (for example, at places where fuel is stored and in chemical factories),
- At places where explosive dust can be found or formed (e.g. carbon dust, wood dust and grain dust).



Danger of suffocation when operating the auxiliary heater!

Do not use the auxiliary heater in closed spaces (for example, garage).

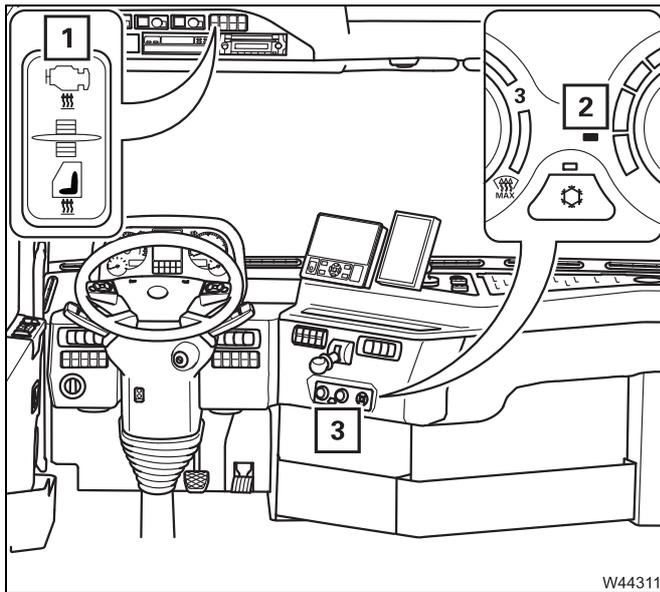


The auxiliary water heating system has two functions.

- Preheating the engine
- Preheating the engine together with the driver's cab

The auxiliary heater is operated using the button (2) and at the *UniControl* (1) control unit.

- Check whether the auxiliary water heater is permitted 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.

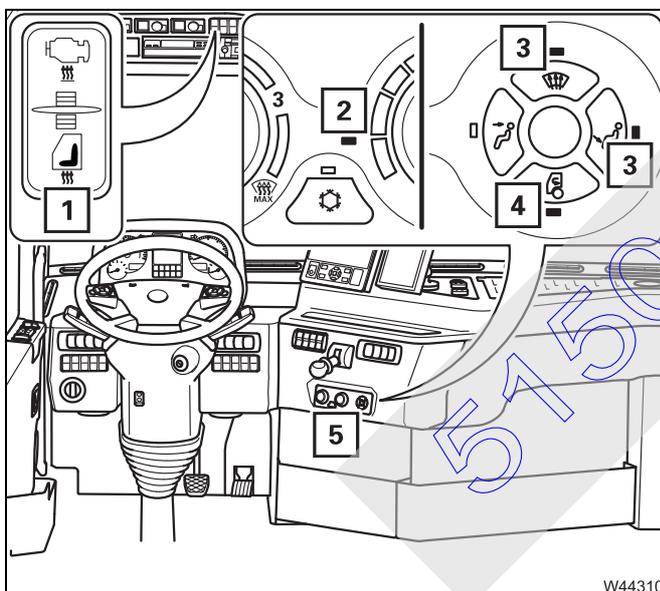


Setting for preheating the engine

- Press the switch next to symbol (1).

After switching on the auxiliary water heater, further settings are made automatically.

- The lamp (2) lights up – preheating on.
- The operating elements at the control unit (3) are deactivated.



Setting for engine/driver's cab/preheating

- Press the switch next to symbol (1).

After switching on the auxiliary water heater, further settings are made automatically.

- The lamp (2) lights up – preheating on.
- The operating elements at the control unit (5) are deactivated.
- Recirculated air on – lamp (4) lights up, after 60 minutes, forced ventilation on.
- The air vents (3) are activated – lamps light up.
- Fan at level 2.



If you heat the driver's cab at the same time, the amount of time required to preheat the engine will increase significantly.



Switching on/off manually

The heating system can be operated when the engine is stationary or running.



Accelerated discharge of battery when the engine is switched off.

The batteries will run flat if you operate the heater with the engine switched off. They will then have to be recharged after shorter periods of time.

- Switch on the ignition; p. 4 - 11.
- Start the engine as required; p. 4 - 3

– Switching on

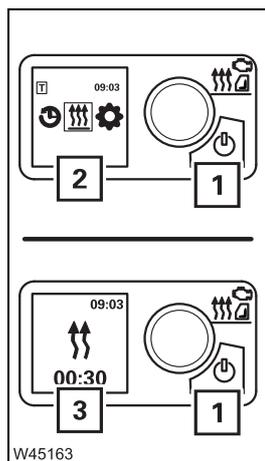
- Press the button (1) – the lamp lights up green.
If the lamp flashes red; *Error messages*, p. 11 - 170.

The heating system switches off and the display shows the *Heating* menu (3) with the currently set heating period.

– Switching off

- Press the button (1) – the lamp lights up white.

The heating system switches off and the display shows the start menu (2).



Operation of other functions (e.g. automatically switching on/off or setting the heating duration) is also carried out at the *UniControl* control unit and is identical to the operation of the crane cab heating; *UniControl control unit*, p. 11 - 162.

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



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

5.7.4

Auxiliary air heater – driver's cab



Risk of explosion when operating the auxiliary heater!

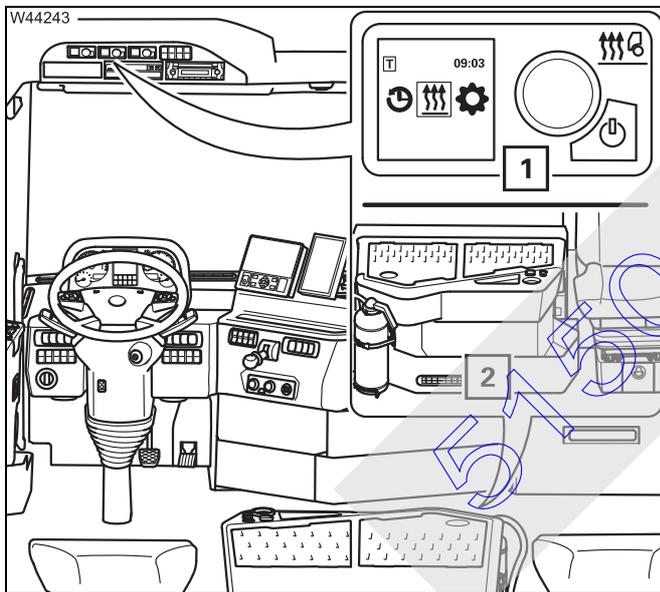
Operating the auxiliary heater is not permitted:

- At service stations and tank farms
- At places where flammable gases or vapours can be found or formed (for example, at places where fuel is stored and in chemical factories),
- At places where explosive dust can be found or formed (e.g. carbon dust, wood dust and grain dust).



Danger of suffocation when operating the auxiliary heater!

Do not use the auxiliary heater in closed spaces (for example, garage).



You can use the auxiliary air heater (1) to preheat the driver's cab or provide additional heating.

The auxiliary heater is operated at the *UniControl* (1) control unit.

- Do not cover the opening (2).
- Check whether the auxiliary air heater is permitted 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.

Switching on/off manually

The heating system can be operated when the engine is stationary or running.

Accelerated discharge of battery when the engine is switched off.

The batteries will run flat if you operate the heater with the engine switched off. They will then have to be recharged after shorter periods of time.



- Switch on the ignition; ■■■▶ p. 4 - 11.
- Start the engine as required; ■■■▶ p. 4 - 3.

– Switching on

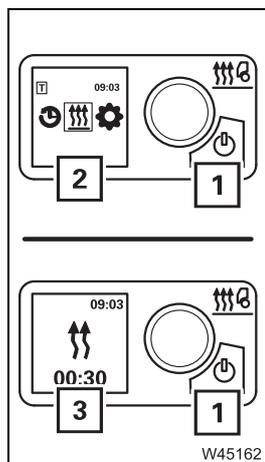
- Press the button (1) – the lamp lights up green.
If the lamp flashes red; ■■■▶ *Error messages*, p. 11 - 170.

The heating system switches off and the display shows the *Heating* menu (3) with the currently set temperature.

– Switching off

- Press the button (1) – the lamp lights up white.

The heating system switches off and the display shows the start menu (2).



Operation of other functions (e.g. automatically switching on/off or setting the temperature) is also carried out on the *UniControl* control unit and is identical to the operation of the crane cab heating; ■■■▶ *UniControl control unit*, p. 11 - 162.

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5.7.5

Auxiliary air heater – battery



Risk of explosion when operating the auxiliary heater!

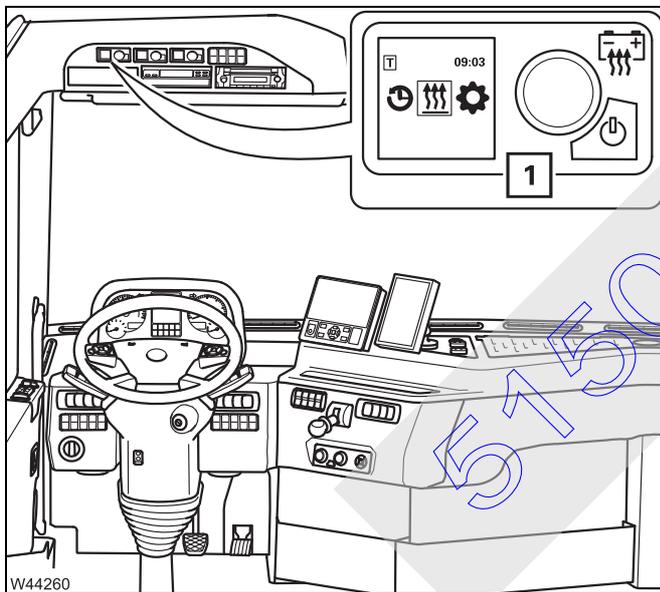
Operating the auxiliary heater is not permitted:

- At service stations and tank farms
- At places where flammable gases or vapours can be found or formed (for example, at places where fuel is stored and in chemical factories),
- At places where explosive dust can be found or formed (e.g. carbon dust, wood dust and grain dust).



Danger of suffocation when operating the auxiliary heater!

Do not use the auxiliary heater in closed spaces (for example, garage).



You can use the auxiliary air heater (1) to prewarm and heat the battery compartment.

This can improve the cold start performance and battery service life.

The auxiliary heater is operated at the *UniControl* (1) control unit.

- Check whether the auxiliary air heater is permitted 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.

Switching on/off manually

The heating system can be operated when the engine is stationary or running.

Accelerated discharge of battery when the engine is switched off.

The batteries will run down if you operate the heater with the engine switched off. They will then have to be recharged after shorter periods of time.



- Switch on the ignition;  p. 4 - 11.
- Start the engine as required;  p. 4 - 3.

– **Switching on**

- Press the button (1) – the lamp lights up green.
If the lamp flashes red;  *Error messages*, p. 11 - 170.

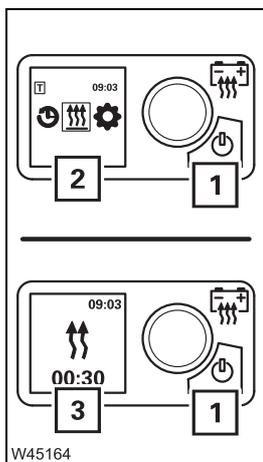
The heating system switches off and the display shows the *Heating* menu (3) with the currently set temperature.

– **Switching off**

- Press the button (1) – the lamp lights up white.

The heating system switches off and the display shows the start menu (2).

Operation of other functions (e.g. automatically switching on/off or setting the temperature) is also carried out on the *UniControl* control unit and is identical to the operation of the crane cab heating;  *UniControl control unit*, p. 11 - 162.



5.8

Audio device

Click [here](#) for notes on operation.

You can also scan the following QR code.



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5.9

Towing a trailer

For 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 accidents 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 rolling away. Ensure that it is still possible to turn the front axle of the trailer.



Before coupling the trailer, adjust the towbar to the height of the towbar coupling.



Risk of accidents when coupling the trailer!

No one may stand between the truck crane and the trailer when coupling the two vehicles.



Risk of accidents from unexpected acceleration!

When you move slowly towards 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 couple automatically within a few seconds. The truck crane could accelerate unexpectedly and persons 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 40 kg (88 lbs) each.
- For every 100 kg (220 lbs) of drawbar load, the axle loads on the 3rd to 5th axle lines are reduced by 60 kg (132 lbs) each.

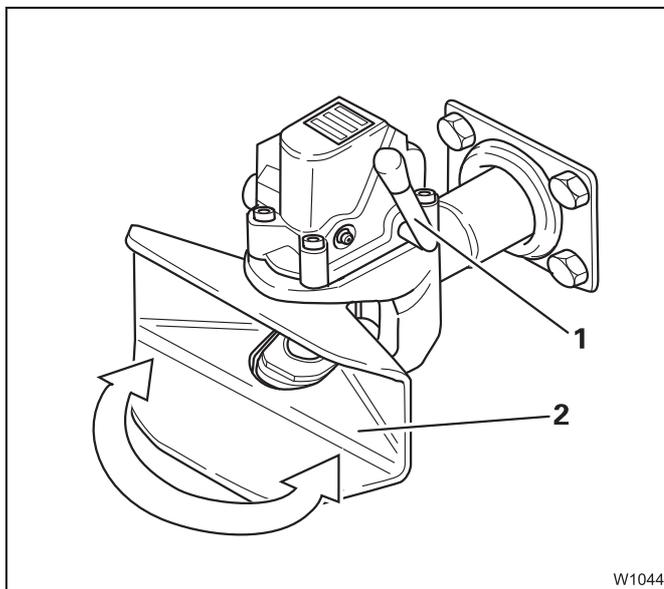


Coupling the trailer



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 cotter pin to move down with great force, seriously injuring your hand.

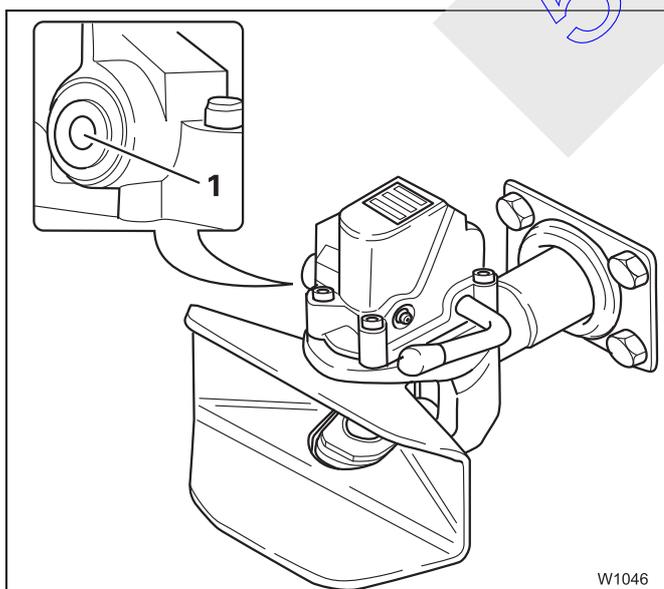


- Open the towbar coupling. Push the lever (1) up until it locks into place.
- Check that the coupling jaw (2) is firm. It must not be possible to move it to the left or the right when the towbar coupling is open.
- Carefully drive the truck crane backwards so that the towbar of the trailer is pushed 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.



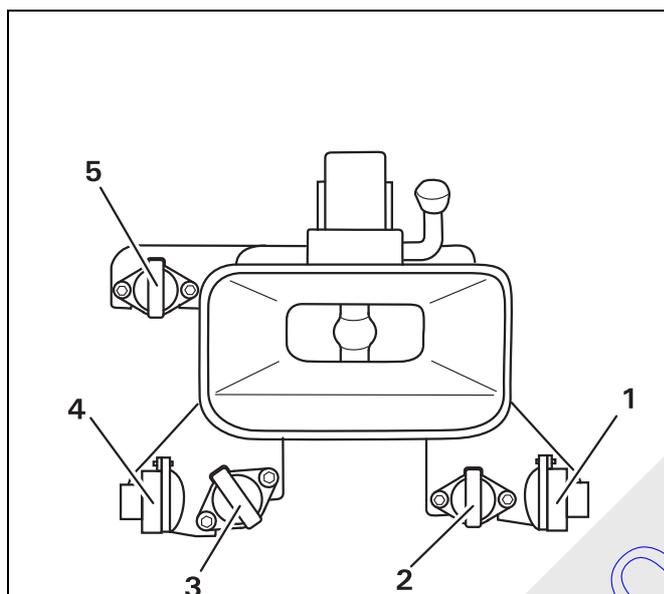
The pin (1) must no longer protrude from the guide bushing after the coupling procedure.



Risk of accidents if the trailer is coupled incorrectly!

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 pipe to the yellow coupling head (4).
- Then connect the hose of the supply line to the red coupling head (1).

The socket (2) is designed for special equipment.



Risk of accidents if the hoses are too short or installed incorrectly!

The hose lines may not come off even when driving around corners. When connecting the hoses, make sure they are long enough and have sufficient free movement.

- Check the function of the trailer lighting.
- Test the service brake and parking brake immediately after setting off.

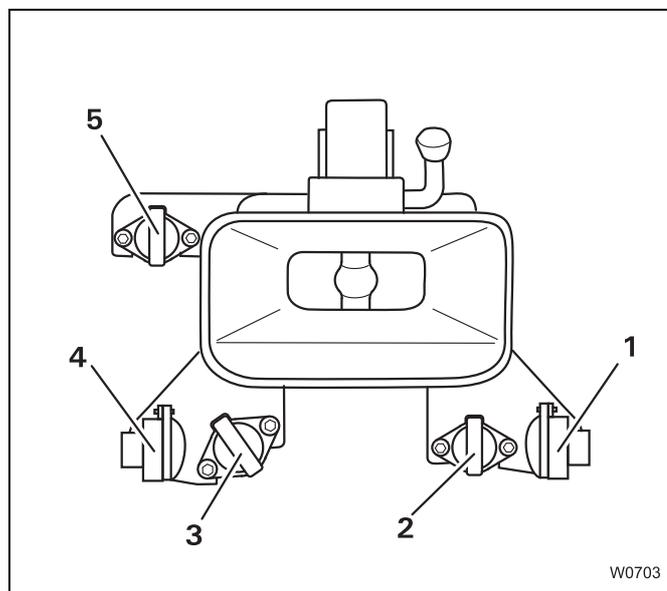


Removing the supply lines



Risk of accidents due to trailer moving unintentionally!

Always first remove the hose from the supply line so that the trailer is braked. This prevents the trailer moving when you remove the brake hose.



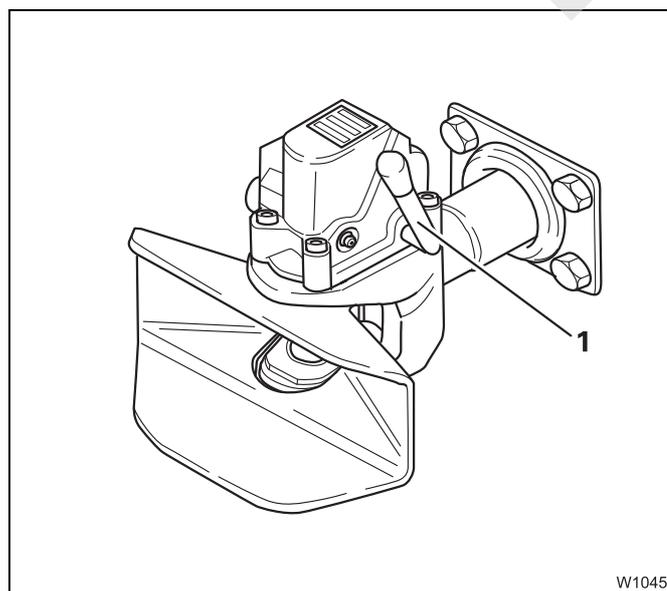
- Proceed as follows:
 - First disconnect the hose of the supply line from the red coupling head (1) – red. Now the trailer is braked.
 - Then disconnect the hose of the brake pipe from the coupling head (4) – yellow.
- Remove the plug (5) of the trailer's electrical system from the socket.
- If necessary, remove the plugs (2) and (3) from the sockets (ABS and special equipment).

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 closing automatically, and the cotter pin causing serious injury to your hand.



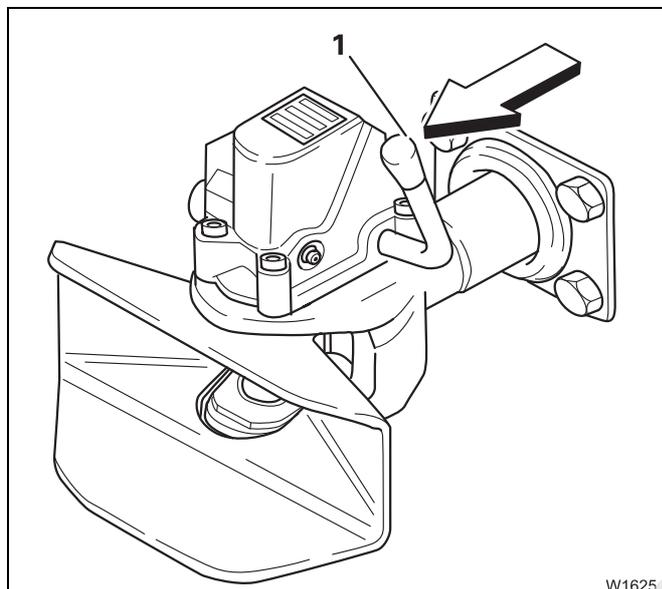
- Use the trailer parking brake and chocks as prescribed to prevent the trailer rolling.
- Open the towbar coupling. Push the lever (1) up until it locks into place.
- Drive the truck crane carefully away from the trailer.



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 pull 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 down and the towbar coupling is closed.



Risk of injury when the automatic closing device is triggered!

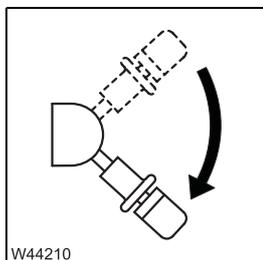
Always close the coupling if no trailer is connected. This prevents persons being injured by the automatic closing device being activated unintentionally.



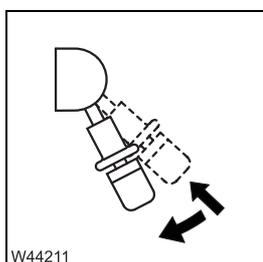
Checking the braking force

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 gradients (e.g. when a brake hose has burst).

To check this, you can release the parking brake of the trailer on its own.



- Apply the parking brake.



- Press the lever in and pull it further to the rear.
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 applied.

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 locks into position and the parking brake of the trailer is applied.



Risk of accidents from truck crane moving unintentionally!

When parking on downhill or uphill gradients, always secure the truck crane and trailer against rolling away with wheel chocks in addition to the parking brake. Even if the parking brake inspection result was positive. Observe the corresponding regulations in your country when doing this.

6

Driving modes / rigging for on-road driving

This chapter contains tables with driving modes of the GMK5150XL, for which the maximum axle load is 12 t (26,500 lbs).

6.1

Driving modes

Information about the axle loads

The GMK5150XL 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) can overheat the brake system 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 heavier than 12 t (26,500 lbs), the crane driver/crane operator bears the sole responsibility for driving in this condition and for any subsequent damage. This also applies to damage due to premature wear.



Risk of accidents from increased braking distance

The braking deceleration required by the EU partial type-approval cannot be met when driving with axle loads of over 12 t (26,500 lbs). Please bear in mind that the braking distance of the truck crane will be increased.



Risk of damage from premature wear

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

6.1.1

Information on how to use the tables



This section only shows some standard driving modes. For further information on additional or individual driving modes, please contact **Grove Product Support**.

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.
- The required rigging mode for this driving mode and the accessories you are allowed to transport are specified in the lower part, next to **Rigging mode**.

Example of how to use the table:

Assume your truck crane is equipped with 385/95 tyres, 6 x 10 x 10 drive. Equipped with a transmission retarder, rear bumper and steel rims. In addition, the auxiliary hoist or the 1.0 t counterweight is mounted.

In this case the driving mode in the upper part, next to equipment, is **1**.

According to the specifications in the lower part, in addition to rigging mode,

- the hose drum is deinstalled on the main boom,
- the 16 m swing-away lattice is folded to the side,
- the add-on parts for the swing-away lattice are installed on the main boom,
- a 2.3 t counterweight is lying on the counterweight platform,
- a 4.6 t counterweight is installed on the turntable,
- the steel outrigger pads are installed.

Additional parts must be transported on a separate vehicle.



If you remove indicated parts from the truck crane in driving mode, then the total weight decreases but might be distributed in such a way that the front or rear axle loads exceed 12 t.

6.1.2

Table for a maximum axle load of 12 t (26,500 lbs)

The driving modes are applicable to all engine types; *Engine*, p. 1 - 17.

**Tyres
385/95 R25**

Also observe the effects on the axle loads when towing a trailer; p. 5 - 105.

		Driving mode				
		1	2	3	4	5
Equipment	Drive 10 x 6 x 10	✓			✓	✓
	Drive 10 x 8 x 10		✓	✓		
	Transmission retarder	✓	✓			✓
	Rear bumper	✓	✓	✓	✓	✓
	Auxiliary hoist or 1.0 t counterweight installed	✓	✓	✓	✓	✓
	Steel rims	✓	✓	✓	✓	
	Aluminium rims					✓
Rigging mode	Storage box at the rear of the carrier	●	●	●	●	
	Outrigger pad (steel) installed	●	●	●	●	●
	Hydraulic hose drum on the main boom					
	Add-on parts for swing-away lattice on the main boom	●	●	●	●	●
	16.2 m swing-away lattice folded to the side	●	●			
	16.2 m swing-away lattice with integrated heavy load lattice extension folded to the side			●	●	
	4.6 t counterweight attached to the turntable	●	●	●	●	●
	2.3 t counterweight on the counterweight platform	●	●	●	●	
	4.6 t counterweight on the counterweight platform					●
	3-sheave hook block (light) attached to the bumper ¹⁾					●

¹⁾ The weight of the hook blocks is based on the information in this operating manual; p. 1 - 12.



Tyres
445/95 R25

Also observe the effects on the axle loads when towing a trailer;  p. 5 - 105.

		Driving Mode					
		1	2	3	4	5	6
Equipment	Drive 10 x 6 x 10	✓	✓			✓	✓
	Drive 10 x 8 x 10			✓	✓		
	Transmission retarder		✓		✓	✓	✓
	Rear bumper	✓	✓	✓	✓	✓	✓
	Auxiliary hoist or 1.0 t counterweight installed	✓	✓	✓	✓	✓	✓
	Steel rims	✓	✓			✓	✓
	Aluminium rims			✓	✓		
Rigging mode	Storage box at the rear of the carrier	●					
	Storage box at the rear of the carrier, loaded with 50 kg			●	●		
	Storage box at the rear of the carrier, loaded with 300 kg					●	
	Storage box at the rear of the carrier, loaded with 500 kg						●
	Outrigger pad (steel) installed	●	●				
	Outrigger pad (plastic) installed			●	●	●	●
	Hydraulic hose drum on the main boom			●	●	●	●
	Add-on parts for swing-away lattice on the main boom	●	●	●	●	●	●
	16.2 m swing-away lattice folded to the side	●	●				●
	16.2 m swing-away lattice with integrated heavy load lattice extension folded to the side			●			
	2.0 m heavy load lattice extension folded to the side				●		
	4.6 t counterweight attached to the turntable	●	●	●	●	●	●
	2.3 t counterweight on the counterweight platform	●	●	●	●	●	
3-sheave hook block (light) attached to the bumper ¹⁾					●	●	

¹⁾ The weight of the hook blocks is based on the information in this operating manual;  p. 1 - 12.

Tyres
525/80 R25

Also observe the effects on the axle loads when towing a trailer;  p. 5 - 105.

		Driving mode		
		1	2	3
Equipment	Drive 10 x 6 x 10	✓	✓	
	Drive 10 x 8 x 10			✓
	Transmission retarder	✓	✓	✓
	Rear bumper	✓	✓	✓
	Auxiliary hoist or 1.0 t counterweight installed	✓	✓	✓
	Steel rims	✓		
	Aluminium rims		✓	✓
Rigging mode	Storage box at the rear of the carrier		●	●
	Outrigger pad (steel) installed	●	●	●
	Hydraulic hose drum on the main boom	●	●	●
	Add-on parts for swing-away lattice on the main boom	●	●	●
	16.2 m swing-away lattice folded to the side			●
	16.2 m swing-away lattice with integrated heavy load lattice extension folded to the side		●	●
	2.0 m heavy load lattice extension, folded to the side			
	4.6 t counterweight attached to the turntable	●	●	●
	2.3 t counterweight on the counterweight platform	●		
	1-sheave hook block attached to the bumper ¹⁾	●		●

¹⁾ The weight of the hook blocks is based on the information in this operating manual;  p. 1 - 12.

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 specified here.

**Risk of accidents from overloading tyres**

Never exceed the maximum permitted speed given for the current axle load and tyre size.

This prevents the tyres from becoming overloaded and bursting.

The maximum permissible speed depends on the size of the tyres and the axle load. The following values only apply to the prescribed tyre pressure (▣▣▣ Maintenance manual) and are maximum values. Also note the information provided by the tyre manufacturer regarding the maximum permitted load duration.

Tyre size	Current axle load in t (lbs)	Maximum permissible speed in km/h (mph)
385/95 R 25	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 25 525/80 R 25	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)

6.2

Weighing the truck crane

Weighing error

The most precise method for determining the total weight of the GMK5150XL is to use calibrated scales of appropriate capacity and a weighbridge on which all the wheels of the truck crane can stand at the same time.

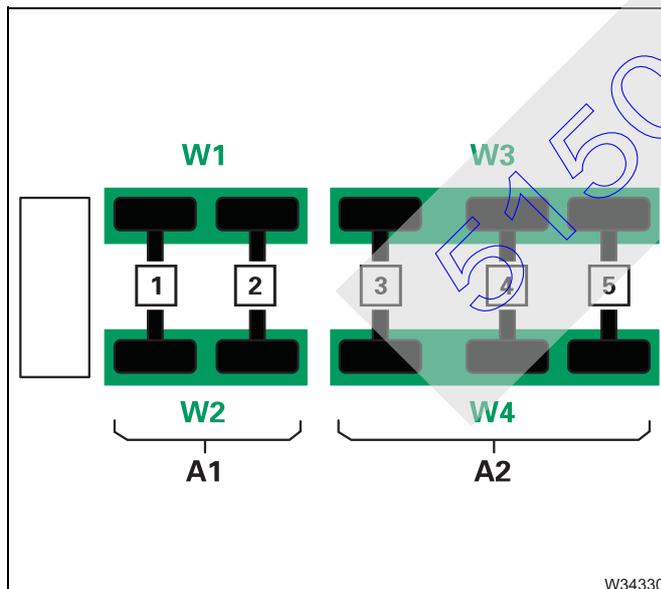
All other weighing procedures are influenced by various factors that can lead to weighing errors. This Operating manual describes a procedure by which the greatest number of sources of weighing errors can be avoided. Also observe all the instructions provided by the manufacturer of the scales.



Faulty measurement of the axle loads and total weight.

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

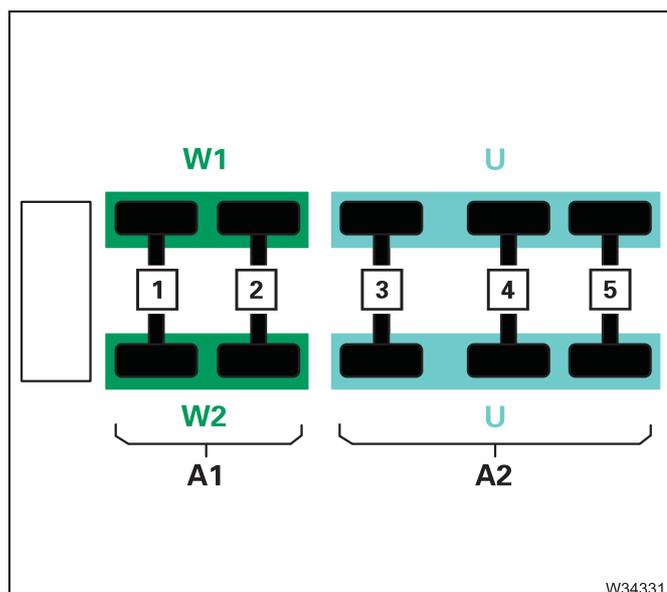
If multiple individual scales are used, allowance must be made for the fact that the axle groups are hydraulically coupled. For this purpose, you will need wheel load scales of sufficient capacity and size.



Determining the total weight

The weights of all axle groups belonging to the crane must be recorded at the same time in a single weighing procedure. In addition, only one set of scales may be used per axle group on each side of the vehicle. The GMK5150XL has two coupled axle groups (A1 to A2), you will require four wheel load scales (W1 to W4).

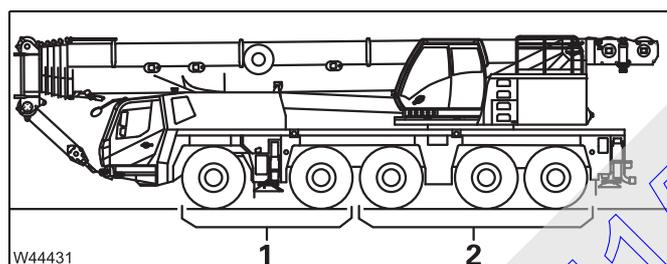




– Determining the axle loads

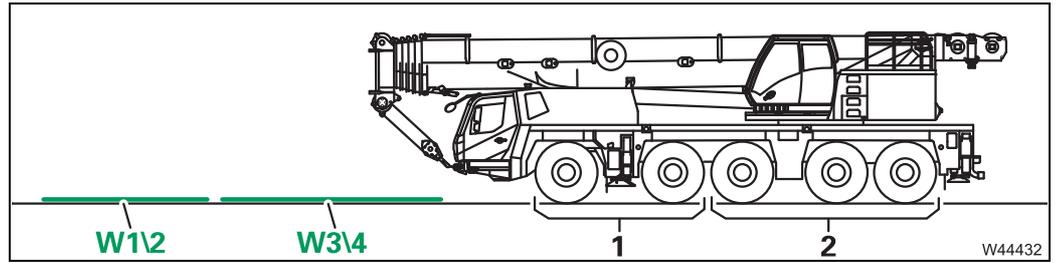
All the axle lines belonging to an axle group must always be weighed. In addition, all the wheels must be at the same level. If for instance only axle group **A1** is to be weighed, then axle group **A2** must be compensated for on a substructure **U** that has the same height as the scales **W1** and **W2**.

Axle groups



- Axle group 1 1st + 2nd axle lines
- Axle group 2 3rd + 4th + 5th axle lines

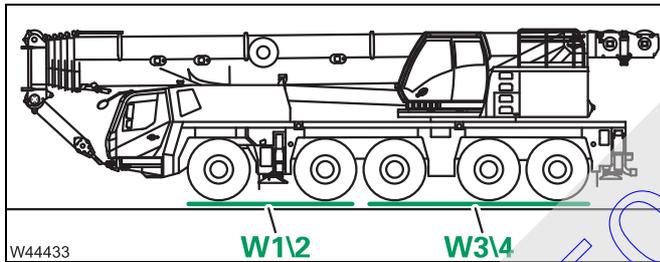
Weighing procedure



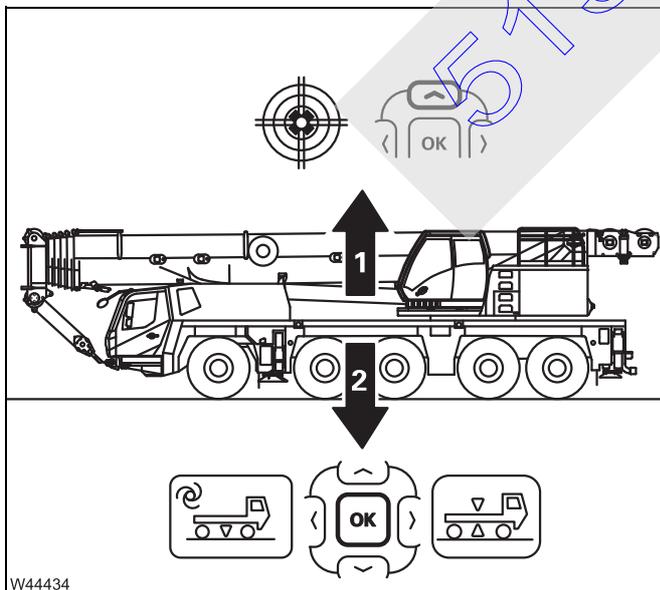
Perform the weighing procedure only with the crane truck standing on firm and horizontal ground. All scales must be at the same height.

- Position the scales **W1** to **W4** (or the necessary substructure) directly in front of the truck crane, so that the distances between the scales are exactly the same as the distances between the axle groups **1** and **2**.

In the next step, drive at only a very low speed without any steering movements, and brake only very gently.



- Drive the truck crane on to the scales **W1** to **W4** (or on to the necessary substructure), so that the axle groups stand centrally on the scales.
- Do **not** apply the parking brake.



- If the truck crane has to be braked while changing the level, only use the service brake very gently.
- (1) – Use the level adjustment system to lift the truck crane to its highest position; see p. 5 - 18.
- (2) – Use the **automatic function** to set the level for on-road driving. If you move the axle groups individually the weighing result will be falsified.
- Read the scales and note down the results.



Evaluation

In the example shown you would get four weighing results. Let us assume you had made a note of the values listed here.

Passenger side: $W1 = 10 \text{ t}$, $W3 = 12 \text{ t}$

Driver's side: $W2 = 10 \text{ t}$, $W4 = 12 \text{ t}$

These values allow you to determine the total weight of the truck crane and the axle loads for the individual axle lines.

For the total weight

- Add together the four results.

Passenger side: $W1 + W3 = 10 \text{ t} + 12 \text{ t} = \mathbf{22 \text{ t}}$

Driver's side: $W2 + W4 = 10 \text{ t} + 12 \text{ t} = \mathbf{22 \text{ t}}$

Total weight = $\mathbf{44 \text{ t}}$

For the axle loads of individual axle lines

- You must determine the weight of the corresponding axle group and divide it by the number of axle lines.

- Determine the weight of the axle group

Axle group 2 was weighed with the scales W3 and W4.

- Add the weighing results

Passenger side: $W3 = 12 \text{ t}$

Driver's side: $W4 = 12 \text{ t}$

Weight of axle group 2 = $\mathbf{24 \text{ t}}$

- Determine the axle load of the 2nd axle line.

Axle group 2 has 3 axle lines.

- Divide the weight of the axle group by the number of axle lines.

Axle load = $\frac{\text{Weight of axle group 2}}{\text{Number of axle lines}} = \frac{24 \text{ t}}{3} = \mathbf{8 \text{ t}}$

6.3

Rigging work for driving with a dolly

To reduce the axle loads to the specifications applicable in the country in which you are working, you can set the main boom on a 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 dolly, you must:

- Switch on the slewing gear freewheel;  p. 6 - 12,
- Switch on the boom floating position;  p. 6 - 13,
- Switch on boom pre-tensioning, if necessary;  p. 6 - 14.
- If necessary, raise the 3rd axle line;  p. 6 - 15.

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6.3.1

Switching on the slewing gear freewheel

When the main boom is set down on a dolly, 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 - 19.



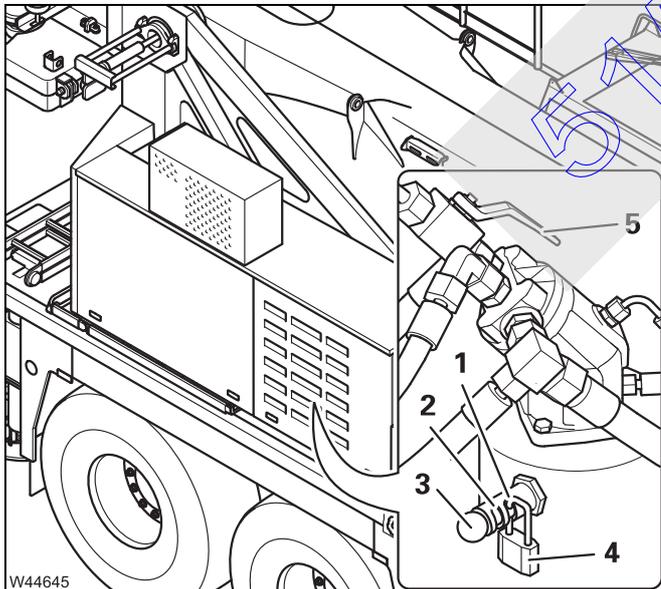
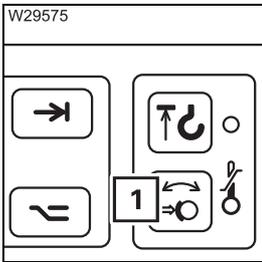
Risk of accidents from the houselock being switched on

Always switch off the houselock before setting down the main boom on the dolly. Otherwise the superstructure will be unable to slew when driving around corners.

- Place the boom on the dolly as described in section *Switching on the boom floating position*, p. 6 - 13.

Prerequisites

- The engine is running.
- The slewing gear brake is released, the lamp (1) has gone out; *Releasing the slewing gear brake*, p. 11 - 118



Switching on

- Remove the lock (4) from the bore (2).
- Push the pin (3) in as far as it will go.
- Secure the pin with the lock in the bore (1) and remove the key.
- Insert 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.



Switch off the slewing gear freewheel; p. 12 - 20.

6.3.2

Switching on the boom floating position

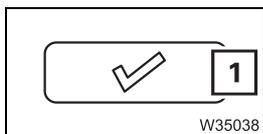
If the main boom is placed on a dolly, the boom floating position must be switched on so that the main boom can move up and down.



Risk of accidents from the boom floating position being switched off

Always switch on the boom floating position when the main boom is resting on a dolly.

This prevents the full weight of the dolly briefly becoming suspended from the main boom on uneven ground, the axle loads increasing abruptly, or the truck crane tipping when driving around corners.



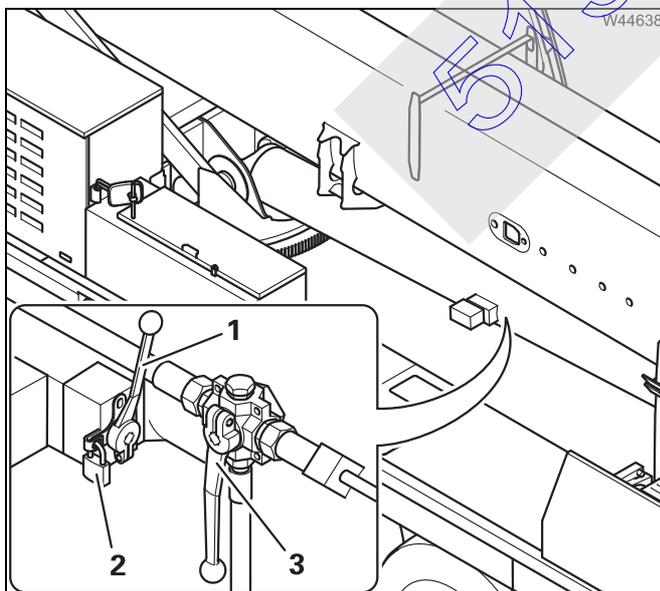
- Confirm the current rigging mode.
- Fully retract the main boom.
- Raise the main boom to a permitted angle within the working range.
- Turn the superstructure to the 0° to the rear operating position and place the main boom on a dolly.



Risk of accidents if the main boom drops down!

You may only switch the boom to the floating position once the main boom has already been set down on the dolly.

This prevents the raised main boom from dropping down.



- Remove the lock (2).
- Switch over valve I – lever (1) up.
- Secure the lever (1) with the lock (2).
- Switch the valve IV – lever (3) down.

The boom floating position is now switched on.

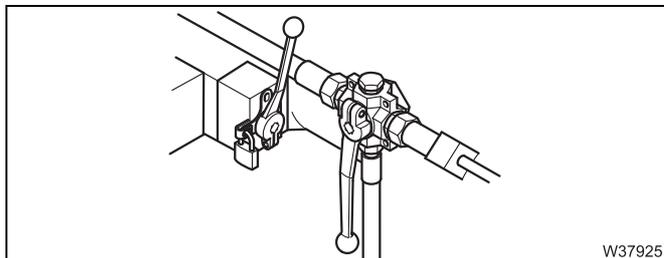


Switch off the boom floating position; p. 12 - 19.

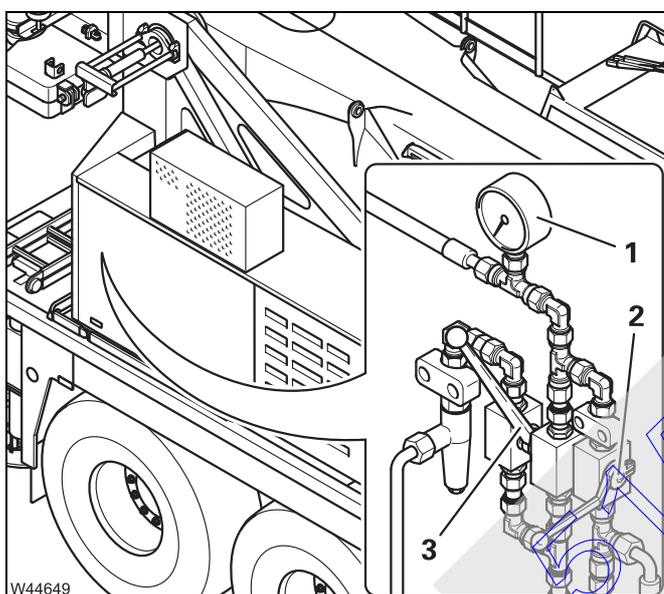
6.3.3

Switching on boom pre-tensioning

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

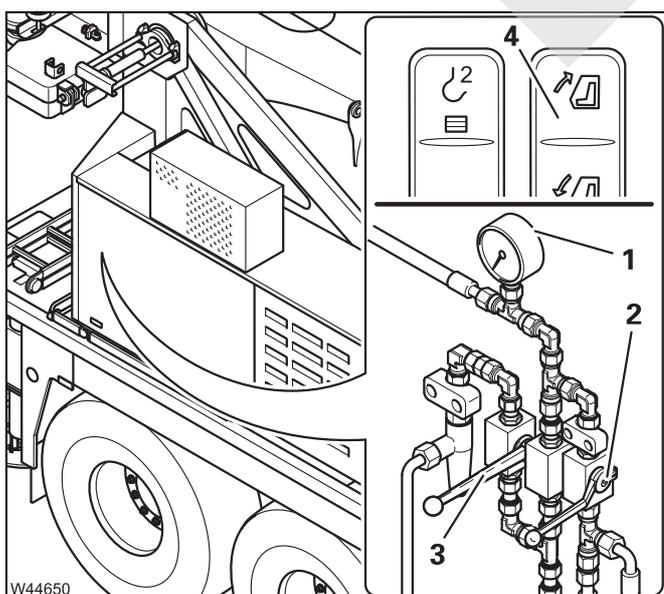


- Switch on the boom floating position;
 ▶▶ p. 6 - 13



Valves II and III are located underneath the pressure gauge (1).

- Close the valve II – lever (2) is horizontal.
 - Open the valve III – lever (3) points up.
- You can now fill the pressure accumulator.



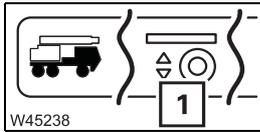
- Press the button (4) in.
 The pressure accumulator is now filled.
- Fill the pressure accumulator until the pressure stops rising at the pressure gauge (1).
- Close the valve III – lever (3) points down.

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

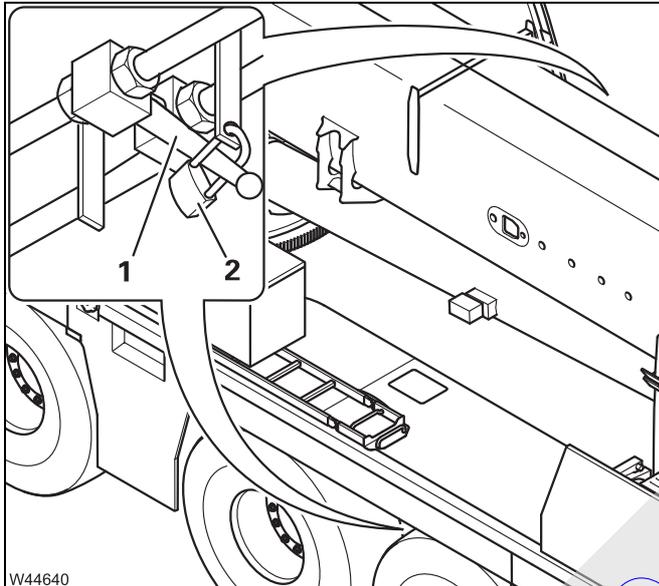
Now boom pre-tensioning is switched on.

6.3.4

Raising/lowering the 3rd axle line

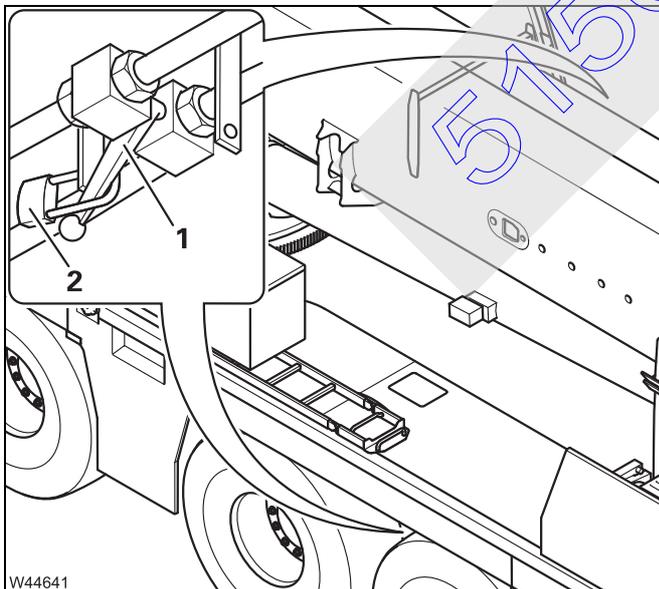


- Open the menu (1) – Suspension/level adjustment menu.



Raising

- Use the level adjustment system to lower the truck crane to its lowest position; ▣▣▣▣ p. 5 - 74.
- Remove the locks (2).
- Switch over valves I and II – levers (1) to the front.
- Secure the levers (1) with the locks (2).
- Establish the on-road level; ▣▣▣▣ p. 5 - 74.



Lowering

- Use the level adjustment system to lower the truck crane to its lowest position; ▣▣▣▣ p. 5 - 74.
- Remove the locks (2).
- Switch over valves I and II – levers (1) to the rear.
- Secure the levers (1) with the locks (2).
- Establish the on-road level; ▣▣▣▣ p. 5 - 74.

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6.4

Rigging the main boom

This section applies only to truck cranes that are equipped with the pulling devices for removing/installing the main boom.

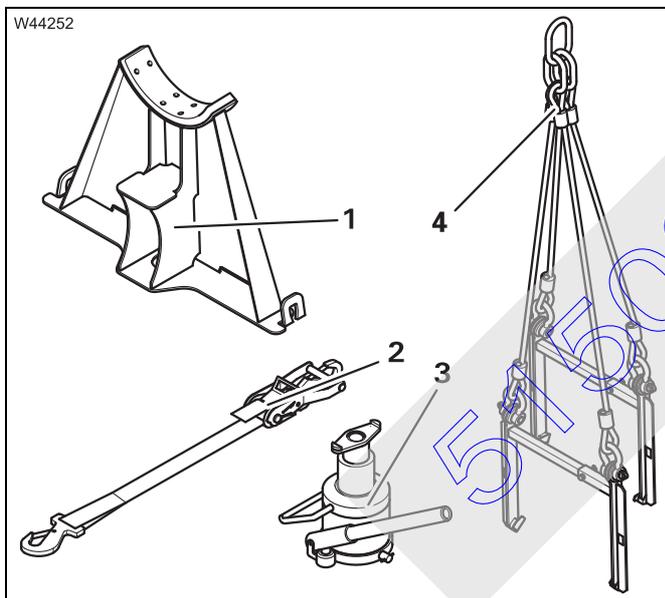


Risk of accidents when removing/installing the main boom without pulling devices

Only remove or install the main boom if the truck crane is equipped with the factory-installed pulling devices and with the necessary accessories. Without these factory-installed pulling devices, the main boom may only be removed by **Grove Product Support**.

Additional equipment required

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



- a derricking cylinder support (1),
 - a tightening belt (2),
 - a lifting device (3),
 - lifting gear (4),
- as well as
- an auxiliary crane with sufficient lifting capacity,
 - a separate vehicle with sufficient load bearing capacity and loading area.

Transport dimensions and weight; p. 1 - 12.

6.4.1

CHECKLIST: Removing the main boom



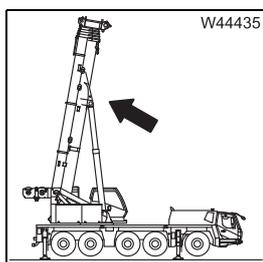
This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.

Observe the warnings and safety instructions specified there!

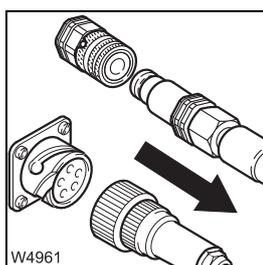
Prerequisites

- The counterweight is unrigged.
- All lattice extensions have been 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 8.030 m x 2.500 m (26.3 ft x 8.2 ft).
Or the parking brake is applied, the truck crane has been levelled with the level adjustment system and the suspension is locked.

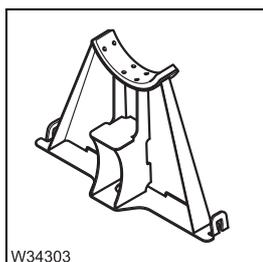
Checklist



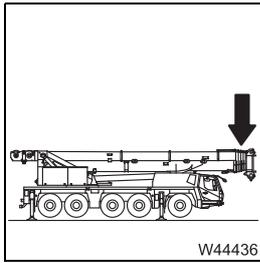
1. Raise the main boom.



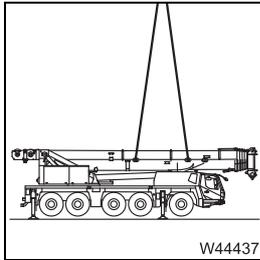
2. Separate the hydraulic/electrical connections; p. 6 - 24.



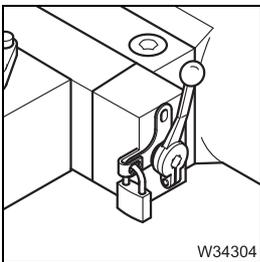
3. Place the derricking cylinder support on the counterweight platform;
 p. 6 - 26.



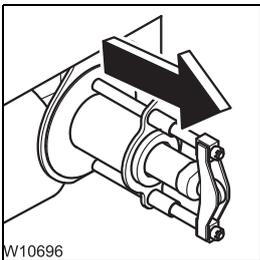
4. Place the main boom on the boom rest.



5. Sling the main boom to an auxiliary crane;  p. 6 - 26.



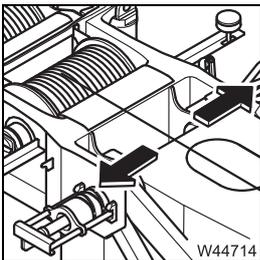
6. Switch on the derricking cylinder pressure relief;  p. 6 - 29.



7. On the derricking cylinder head axle

- Take the load off of the head pin
- Release the head pin
- Pull the head pin out;

 p. 6 - 30.



8. On the boom pivot pin

- Switch over the hydraulic circuit
- Release the pivot pin,
- Pull out the pivot pin;

 p. 6 - 32.



6.4.2

CHECKLIST: Installing the main boom



This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.

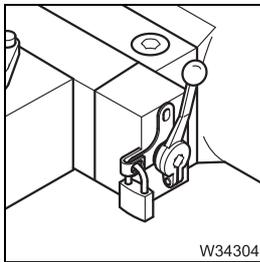
Observe the warnings and safety instructions specified there!

Prerequisites

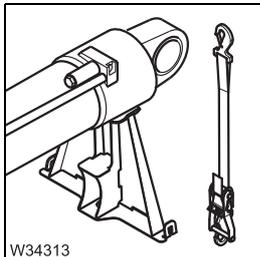
The truck crane is supported by an outrigger span of at least 8.030 m x 2.500 m (26.3 ft x 8.2 ft).

Or the parking brake is applied, the truck crane has been levelled with the level adjustment system and the suspension is locked.

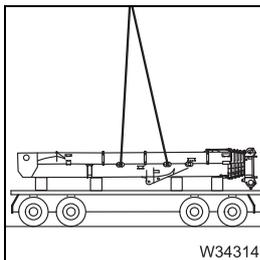
Checklist



1. Check that the pressure relief for the derricking cylinder is switched on; p. 6 - 29.

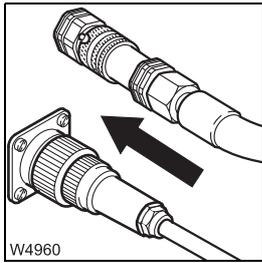


2. Remove the tightening belt from the derricking cylinder; p. 6 - 35.

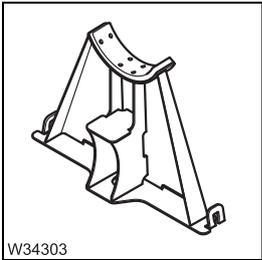


3. Sling the main boom to an auxiliary crane; p. 6 - 26.

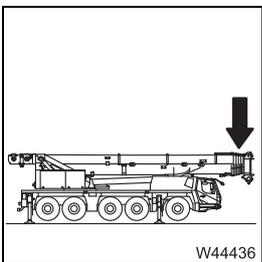




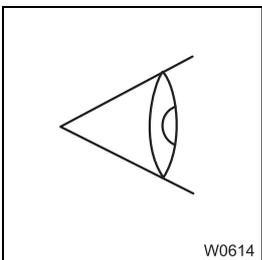
10. Establish the hydraulic/electrical connection; |||▶ p. 6 - 24.



11. Remove the derricking cylinder support from the counterweight platform.



12. Place the main boom on the boom rest.



13. Carry out the checks with the main boom set down; |||▶ p. 6 - 37.

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6.4.3

Establishing/breaking the hydraulic/electrical connection



Risk of malfunction in the superstructure electronics!

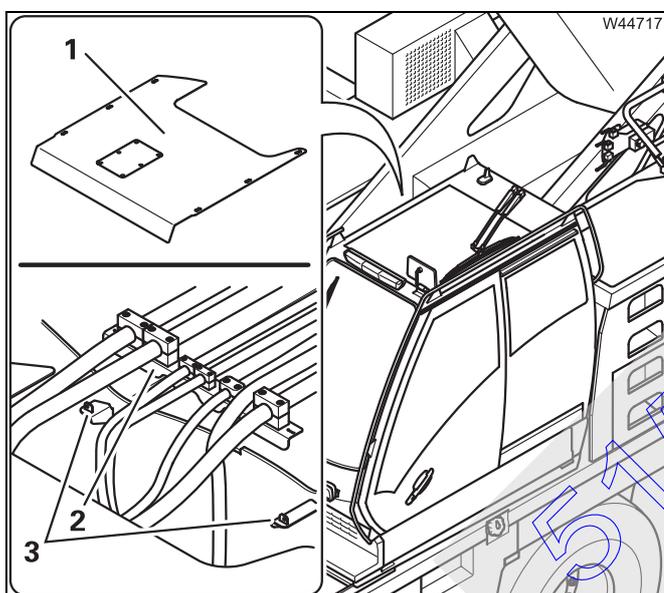
Always turn off the ignition in the crane cab before you establish or break the electrical connection. This prevents malfunctions in the electronics and corresponding error messages during subsequent crane operation.



Danger of hands and arms being crushed.

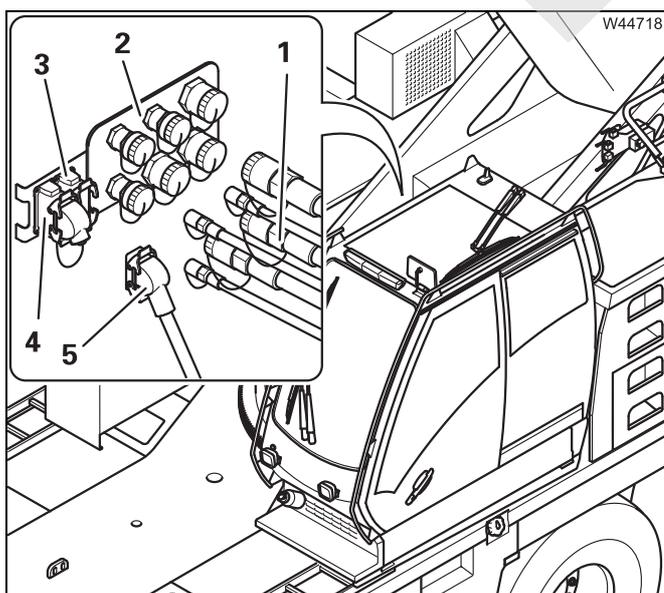
Make sure that the boom pivot pin is pushed in before making or breaking the connections.

You thus prevent a swinging main boom crushing your arms or hands on the turntable.

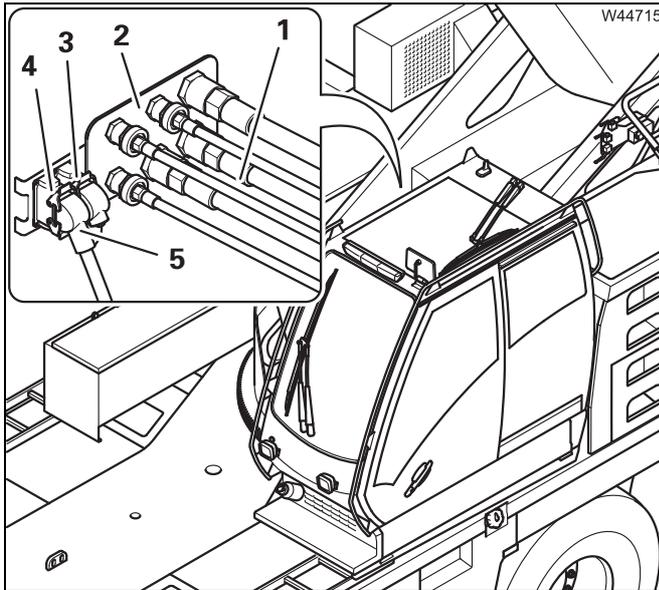


Disconnecting

- Remove the plate (1).
- Remove the clamp (2).
- Fasten the lynchpin on the pin (3).

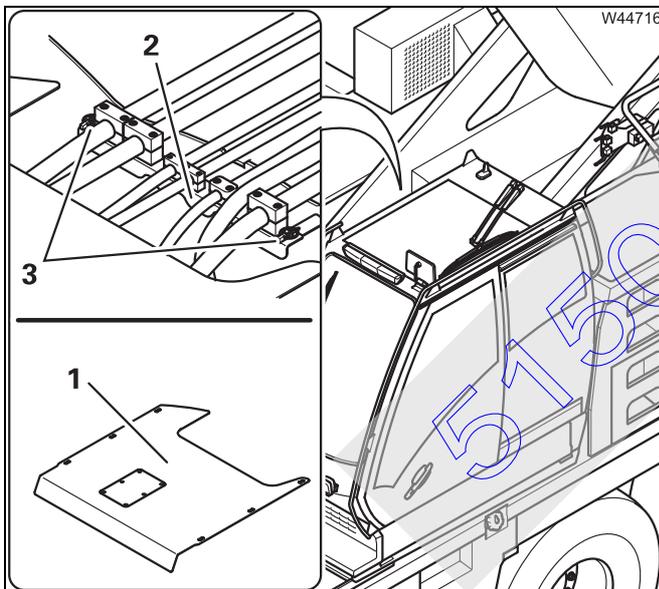


- Remove the hoses (1) from the connections (2).
- Remove the plug (5) from the socket (4).
- Remove the plug from the dummy socket (3) and insert it into the socket (4).
- Close all hoses, connections, plugs and sockets.
- If necessary, secure all the hoses/cables so that they do not swing loose when the main boom is raised.



Establishing

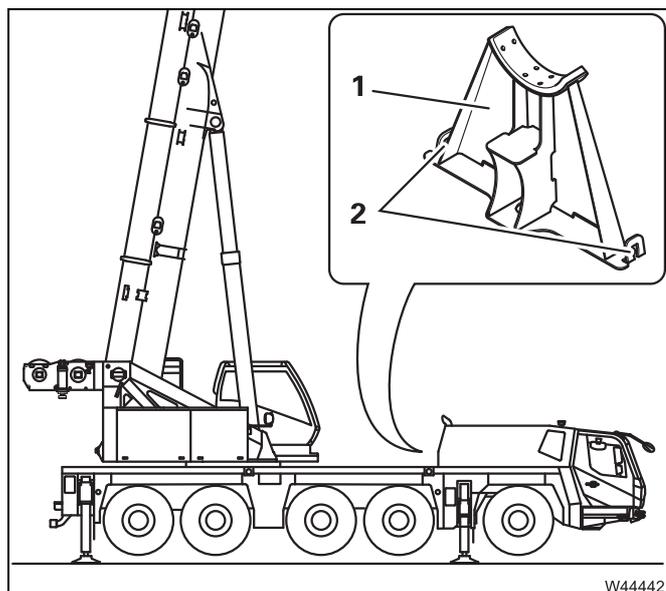
- Remove the plug from the socket (4) and plug it into the dummy socket (3).
- Insert the plug (5) into the socket (4).
- Connect all hoses (1) to the connections (2). The assignment is given by the size and colour designations.
- Route the hoses/cables so that they cannot be damaged.



- Insert the clamp (2) on to the pins (3).
- Secure the clamp using the linchpins.
- Fasten the plate (1).

6.4.4

Derricking cylinder support



Before removal

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.

After installation

- Take the derricking cylinder off before crane operation and before on-road driving.

6.4.5

Slings the main boom

Slings are fitted to the main boom when rigging and it is lifted with an auxiliary crane. Observe the equipment necessary for this;  p. 6 - 17.

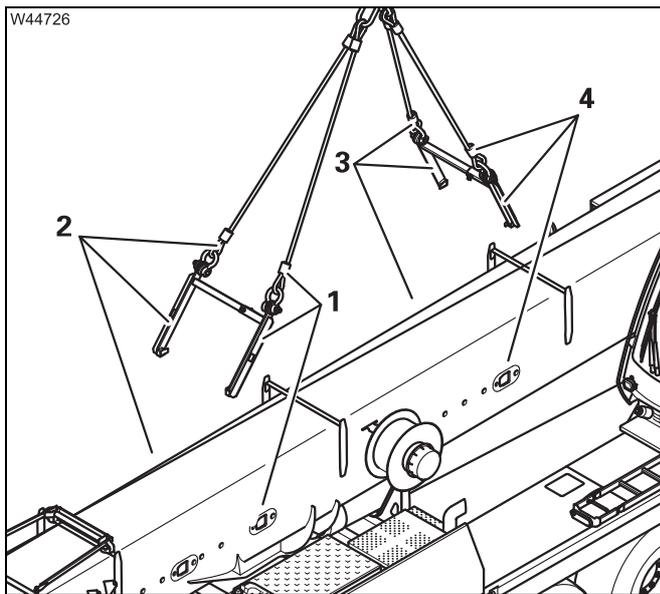


Risk of accidents due to incorrect procedure!

Only use the lifting gear included in the delivery and proceed as described in the following section.

Marking

The lifting gear is marked.

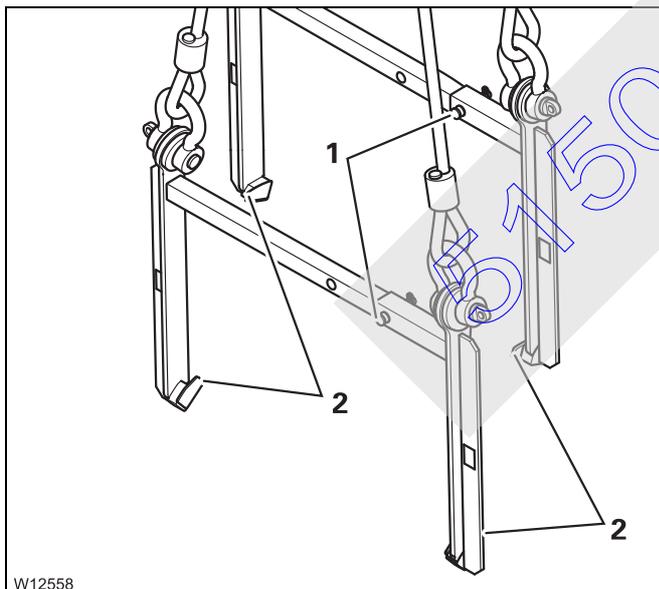


Only connect those parts of the lifting gear that have the same marking.

Only fasten the lifting gear to the slinging points intended for this purpose. The markings have the following meaning:

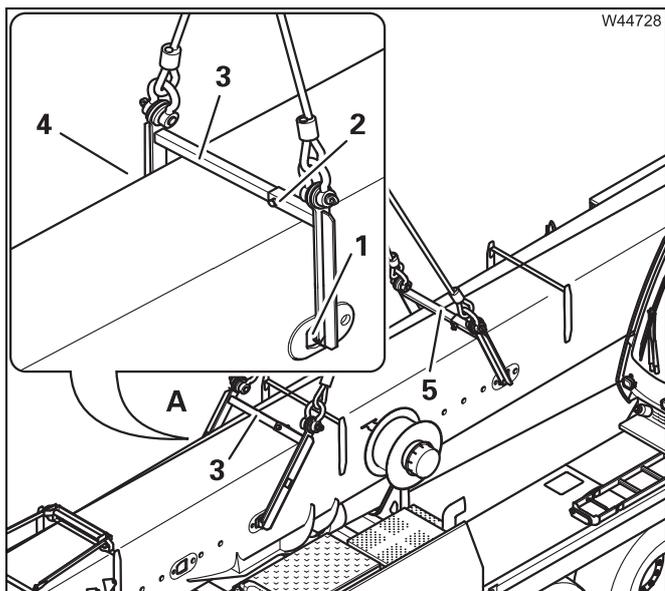
- 1 FL – Front left
- 2 FR – Front right
- 3 BR – Back right
- 4 BL – Back left

Attaching lifting gear

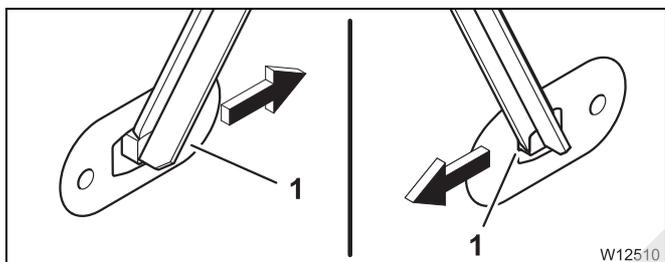


- If the installation is correct, the load-bearing equipment (2) of both brackets point at each other
- Lock both brackets in the wide position. Secure the pins (1) using the retaining pins
- Install the front bracket first. It is suspended from long ropes, which makes installing the rear bracket easier.



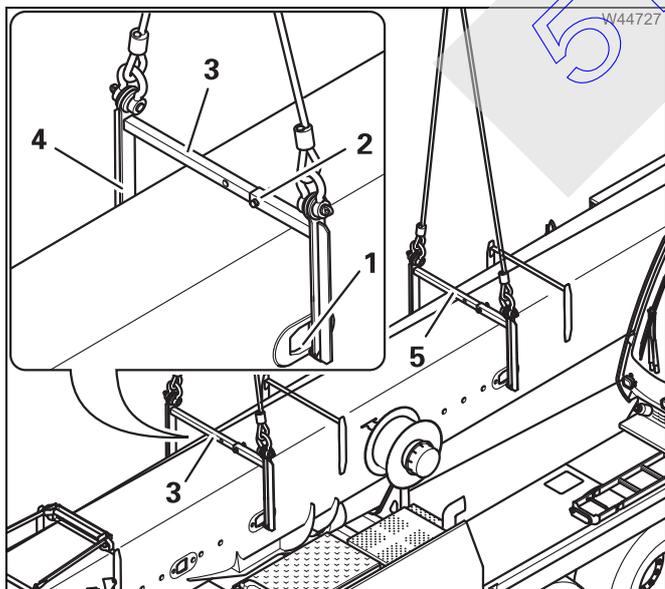


- Insert the bracket (3) into the slinging point (1). Pull the pin (2)
- Insert the bracket into the slinging point (4).
- Secure the bracket with the pin (2) and the retaining pin.
- (A) – Pull the bracket (3) to the centre – the bracket must rest on the slinging point on both sides.
- Install the bracket (5) in the same way.



- (A) – Before lifting, check that the brackets on both sides are resting on the slinging point (1)

Removing the lifting 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)
- Align the lifting gear in such a way that the bracket (5) is relieved.
- Remove the bracket (5) in the same way.
- Put down the lifting gear for transport.

6.4.6

Switching the pressure relief on/off

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

When removing

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

When installing

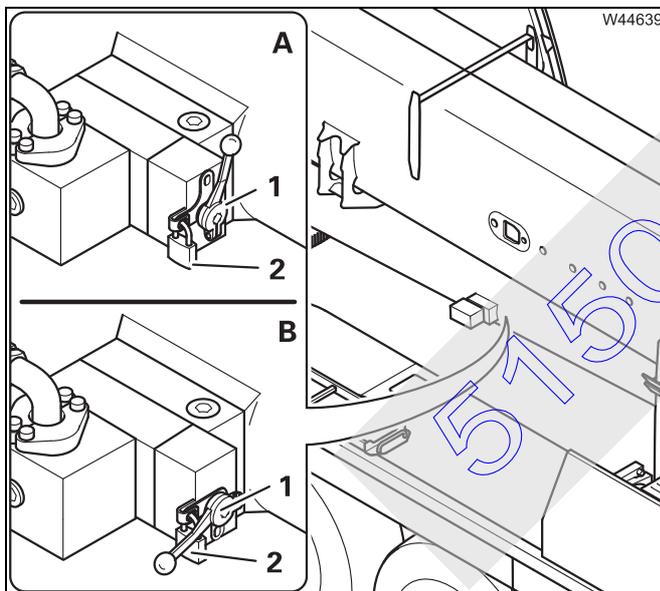
- Only switch off the pressure relief after fitting the derricking cylinder head axle.



Risk of accidents from falling boom!

Check to see whether the main boom is in the boom rest before switching off the pressure relief.

This prevents the raised main boom from dropping down.



- Remove the lock (2).

– (A) – Switching on

- Switch over valve I – lever (1) up.

– (B) – Switching off

- Switch over valve I – lever (1) horizontal and pointing outwards.
- Secure the lever with the lock (2) and remove the key.



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

6.4.7

Pulling/fitting the derricking cylinder head axle

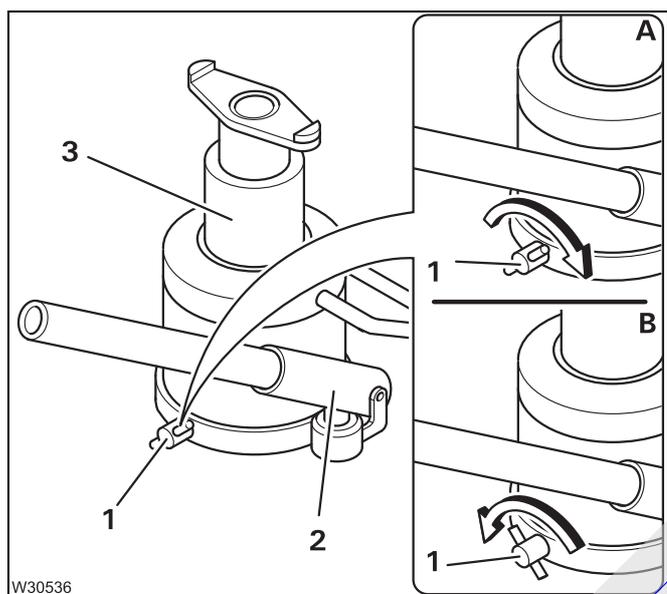
Operating the lifting device



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

Danger from using unsuitable lifting device!

Have the lifting device serviced in time before the maintenance interval specified on the label expires.



- Attach the lever to the holder (2).

(A) – Raise

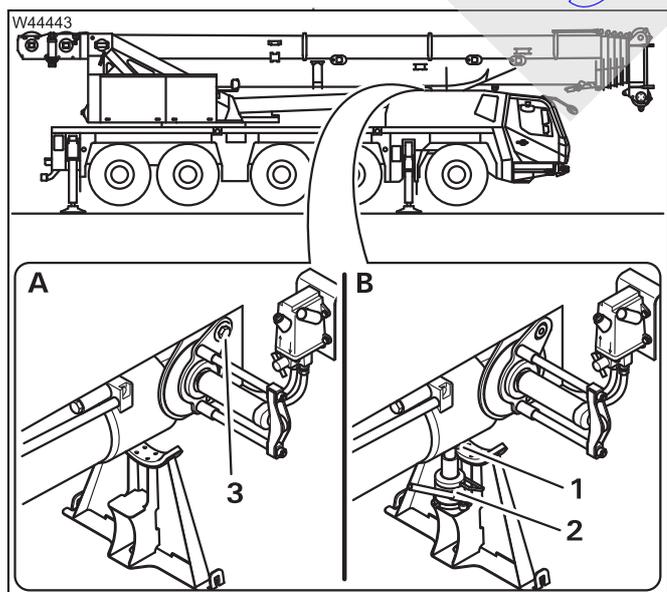
- Close the drain plug (1) and pump the lever. The piston rod (3) extends.

(B) – Lower

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

Pulling the head pin

After you have pulled the head pin, you can no longer derrick the main boom.



(A) – Releasing the head pin

- Remove the disc (3).

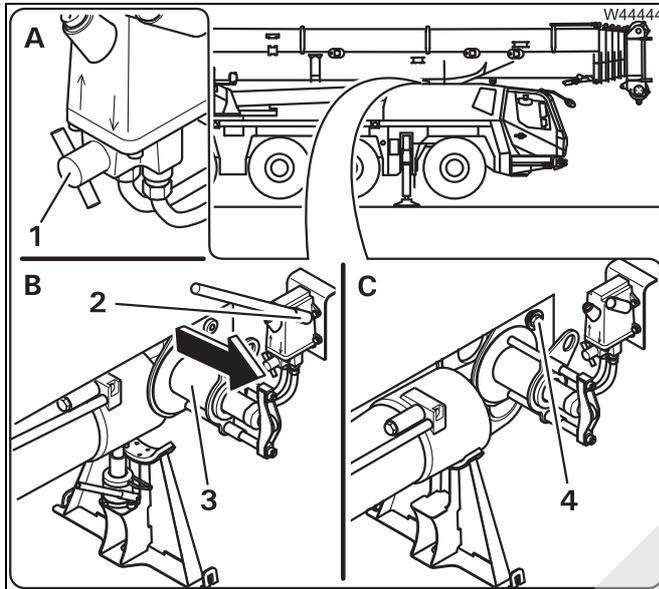
(B) – Relieving the head pin

- Place the lifting device (2) underneath the centre of the derricking cylinder.
- Carry out the *Raise* movement until the rest (1) is resting firmly on the derricking cylinder.



Risk of accidents from falling derricking cylinder!

Always take the load off of the derricking cylinder using the lifting device before pulling the head pin. By doing this, you prevent the derricking cylinder falling down, injuring people or being damaged while pulling the head pin.

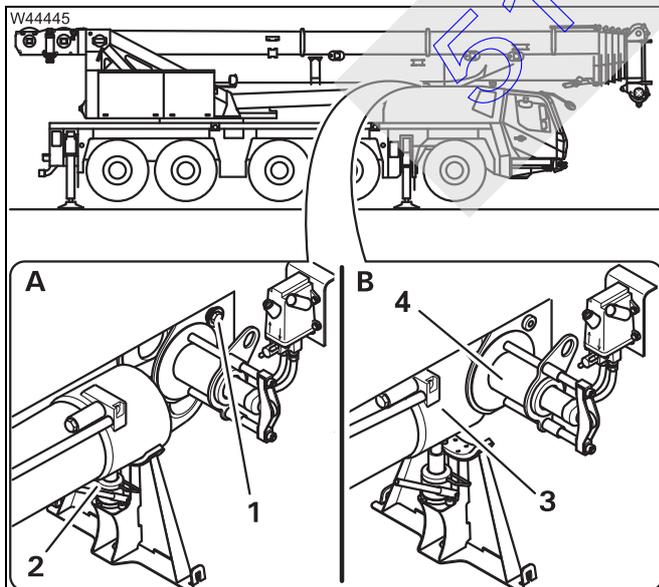


Pulling the head pin

- (A) – Turn the switch (1) to the *Pull*  position.
- (B) – Insert the lever into the holder (2).
- Pump until the head pin (3) is completely pulled out.
- Carry out the *Lower* movement 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.

Fitting the head pin

- Check to see if the tightening belt of the derricking cylinder has been removed.



Aligning the derricking cylinder

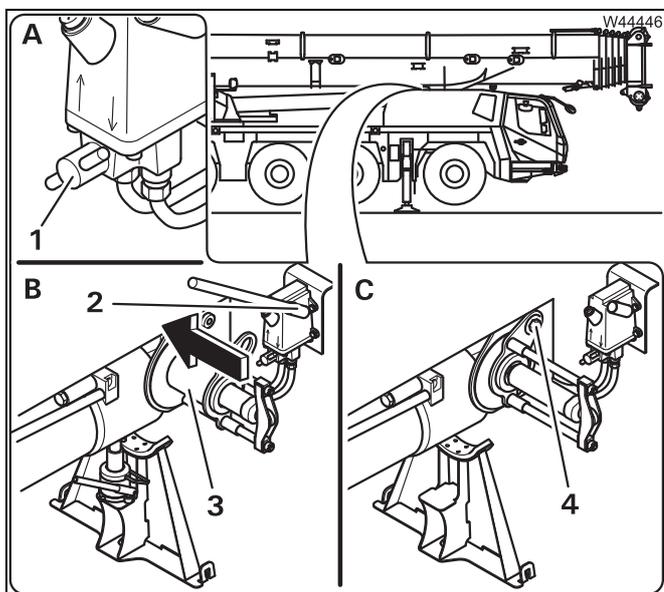
- (A) – Remove the disc (1).
- Place the lifting device (2) underneath the centre of the derricking cylinder.
- (B) – Carry out the *Raise* movement until the head pin (4) is aligned with the bearing in the derricking cylinder (3)





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 *Plug* position .
- (B) – Insert the lever into the holder (2).
- Pump until the head pin (3) is inserted up to the stop.

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.

6.4.8

Extending/retracting the boom pivot pin

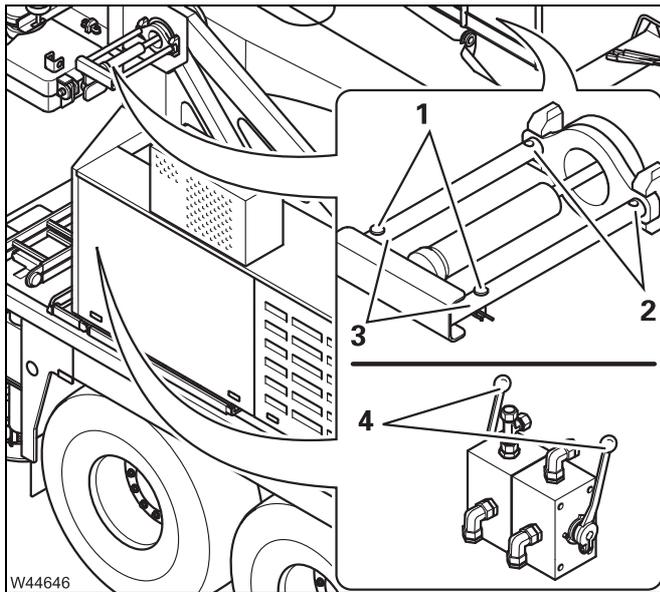


Risk of accidents due to the main boom falling down!

The pulling device secures the main boom pivot pin in the installation position. Do not remove the pulling device for the main boom pivot pin. By leaving it in place you avoid the possibility that the main boom pivot pin can be pushed out while the crane is in operation, which would result in the main boom dropping down.

Pulling out the pivot pin

Before pulling out, you must switch the hydraulic circuit over and the pivot pins must be released.



Switching over the hydraulic circuit

- Switch over the valves – lever (4) vertical.

Releasing the pivot pin

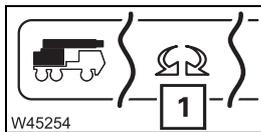
- Remove the pins (1) from the connecting points (2) and insert them into the connecting points (3).
- Secure the pins (1).
- Release the pivot pins on the other side in the same way.

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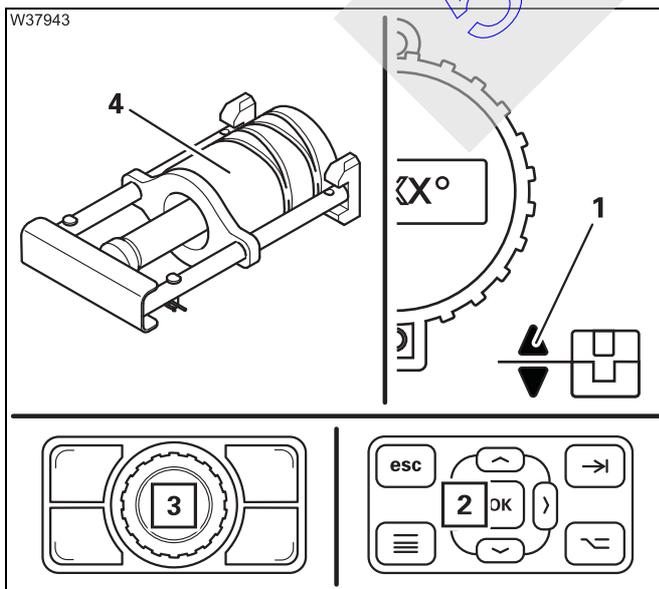
Risk of damage to the main boom!

Before pulling out, the main boom must be slung and all other lifting gear must be tensioned.



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



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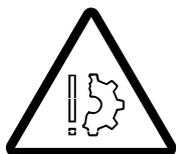
Pulling out the pivot pin

- Start the engine from the crane cab;
▮▮▮▶ p. 10 - 4.
- Select the symbol (1).
- Press and hold button (2) or (3) until the pivot pins (4) are completely pulled out on both sides.
- Switch off the engine.



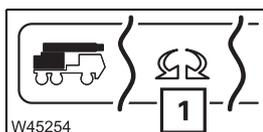
Pushing the pivot pin in

After pushing in, you must secure the pivot pins and switch over the hydraulic circuit.

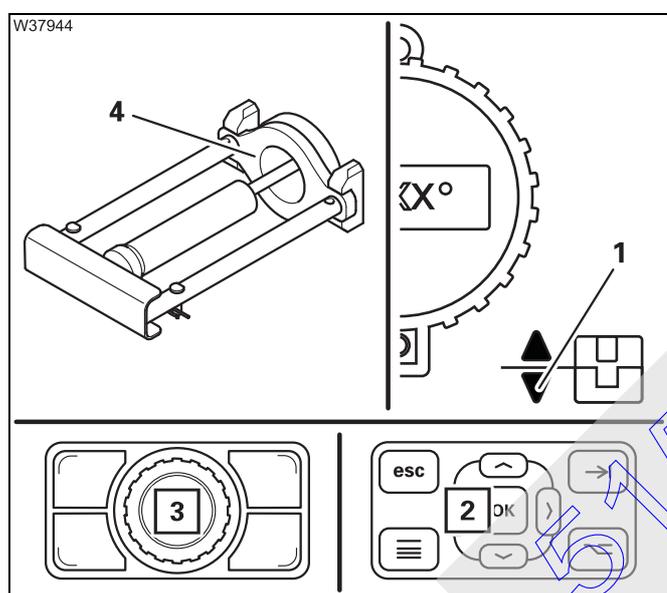


Risk of damage to the main boom!

Before pushing in, the bearing points on the turntable must be aligned with the boom pivot pin.

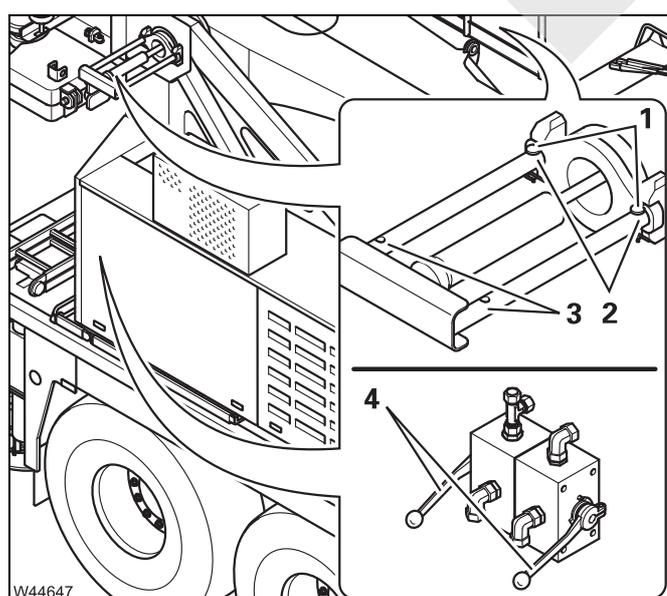


- Open the menu (1) – Superstructure lock menu.



Pushing the pivot pin in

- Start the engine from the crane cab;
▮▮▮▮▶ p. 10 - 4.
- Select the symbol (1).
- Press and hold button (2) or (3) until the pivot pins (4) are completely pushed in on both sides.
- Switch off the engine.



Securing the pivot pins

- Remove the pins (1) from the connecting points (3) and insert them into the connecting points (2).
- Secure the pins (1).
- Secure the pivot pins on the other side in the same way.

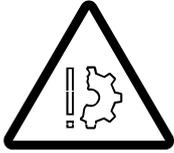
Switching over the hydraulic circuit

- Switch over the valves – lever (4) horizontal.

6.4.9

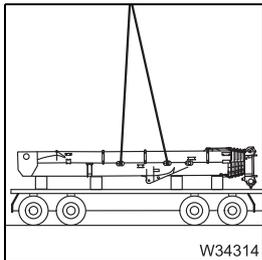
Transporting the main boom

Transport the main boom only on a separate vehicle that is of sufficient size and has sufficient lifting capacity;  p. 1 - 11.



Risk of damage to the main boom!

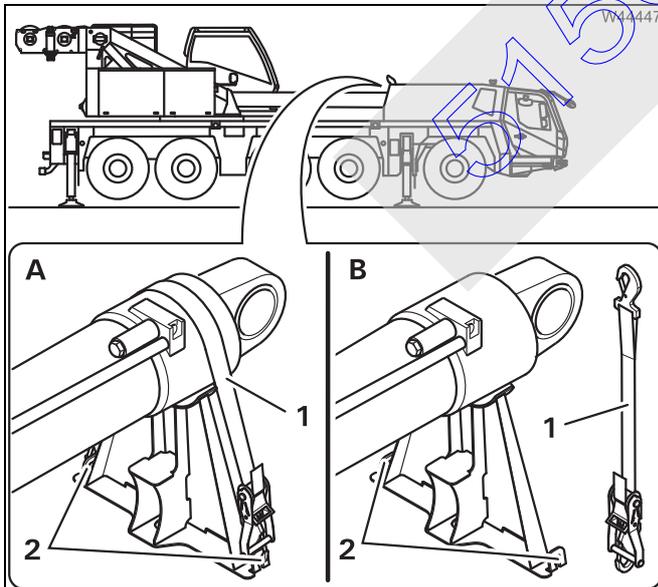
Always place the main boom on a suitable substructure. If you lay the main boom on its side, add-on parts will be damaged.



- Place the main boom on a suitable substructure!
- 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.

6.4.10

Securing/releasing the derricking cylinder



(A) – Securing

- Place the tightening belt (1) over the derricking cylinder and fasten it on to the holders (2).
- Tighten the tightening belt so that the derricking cylinder is lying firmly in the support.

(B) – Releasing

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

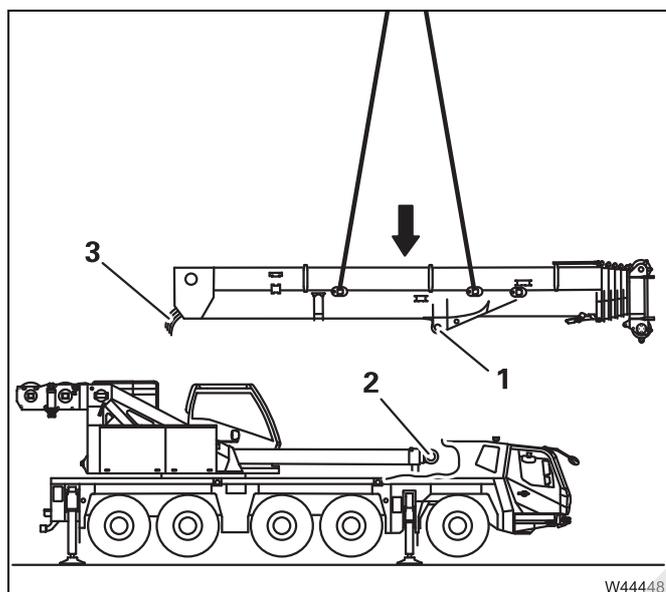
6.4.11

Aligning the connecting points

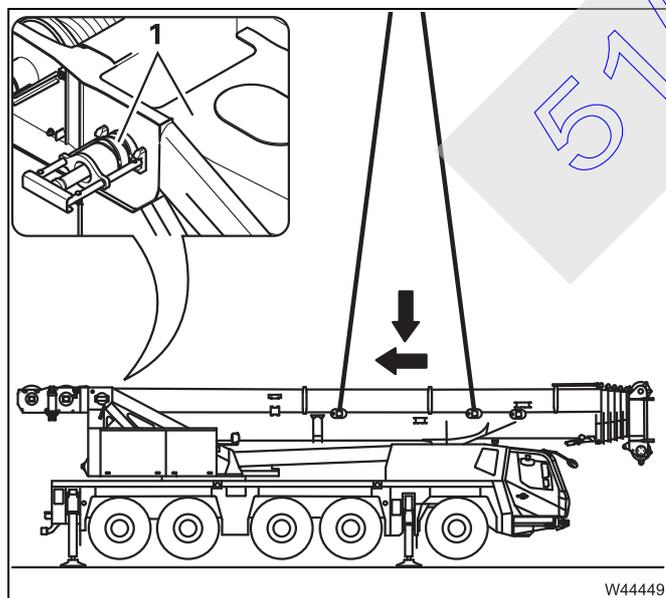


Risk of damage to the turntable and the connection lines!

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.



- Lift the main boom top into the turntable. Make sure that:
 - The hydraulic/electrical connection lines (3) do not get caught,
 - The pivot point (1) is higher than the driver's cab,
 - The connecting points are not tilted.

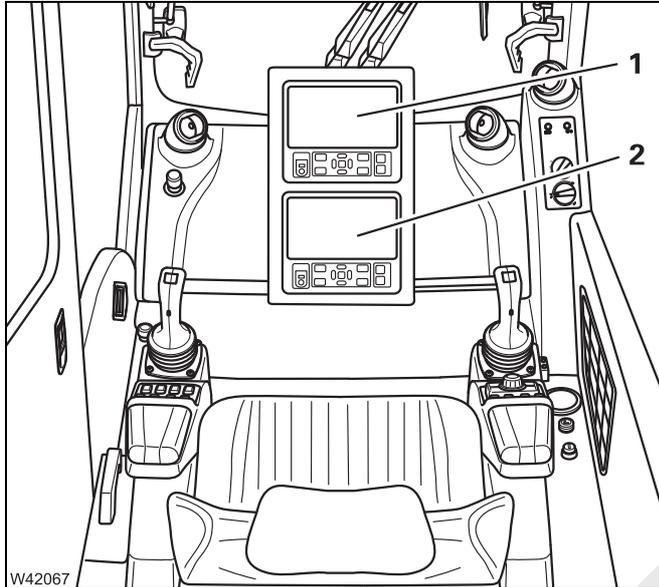


- Route the hoses into the turntable in such a way that they are not damaged during alignment.
- Align the main boom so that the boom pivot pin is aligned with the bearing points (1) in the turntable.
- Hold the main boom in this position until the pivot pin is pushed in.

6.4.12

Checks after installing the main boom

- Check to see if the pressure relief is switched off and is secured with the lock;
 ▶▶▶ p. 6 - 29.



- Switch on the ignition.
- Check if the *RCL* control unit (1) or *CCS* (2) show an error message.
- If an error message is displayed, check that all electrical connections are established;
 ▶▶▶ p. 6 - 24.

The following requirements must be met for the next inspection:

- The truck crane is on outriggers.
- The main boom is resting in the boom rest.
- The current rigging mode has been entered and confirmed on the *RCL* display.

- Telescope the telescopic section approx. 1 m out and then retract it again.
- Retract the telescoping cylinder into another telescopic section and mechanically lock it there.
- Check to see if the hydraulic connections in the turntable are tight.



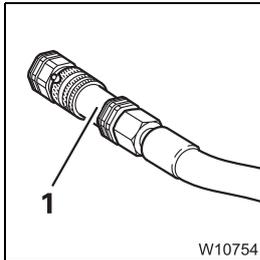
Before initial operation, carry out the *Derricking lattice extension* movements with the luffing jib and check if the corresponding connections in the turntable are tight.

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6.5

Removing/installing the outrigger beams



To rig the outrigger beams, the outriggers must be fitted with hydraulic connections (1) that 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 supported!

Loads may only be lifted when the truck crane is supported on all outrigger beams. The lifting capacity tables for the *Free on wheels* operating position **are not designed** for installation and removal of the outrigger beams. For this reason, always use an auxiliary crane for installation and removal of the outrigger beams.

You 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 - 11.

6.5.1

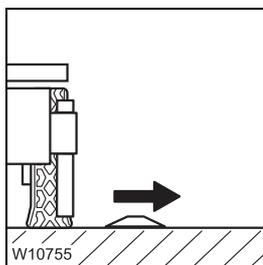
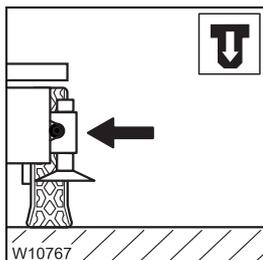
CHECKLIST: Removing the outrigger beams



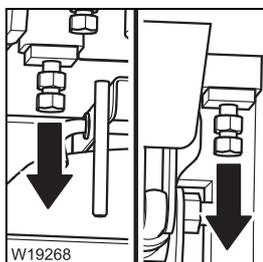
This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.

Observe the warnings and safety instructions given there!

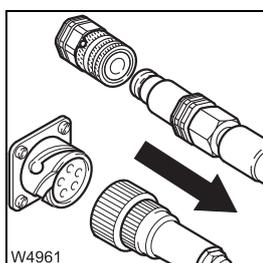
1. Prepare the truck crane; p. 6 - 45.
2. Label the outrigger beams, retract, release and lock them to each other; p. 6 - 44.



3. If necessary remove outrigger pads; p. 6 - 46.

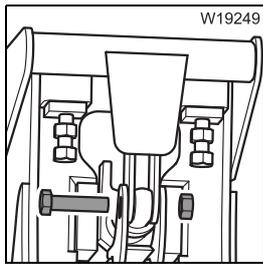


4. Unscrew the spacers; p. 6 - 50.

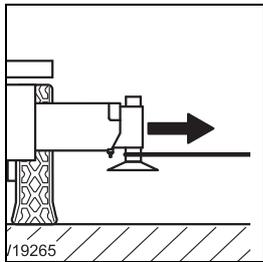


5. – Separate the hydraulic connections; p. 6 - 48.
– Separate the electrical connection if necessary; p. 6 - 49.

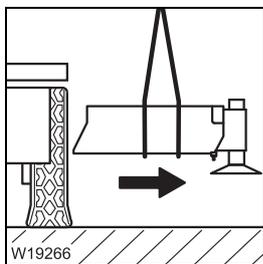
51508035



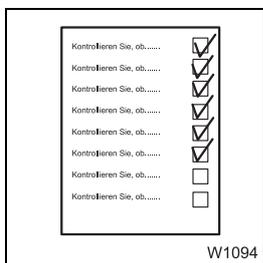
6. Separate the connections to the supporting box; p. 6 - 52.



7. Sling the outrigger beam and pull it out of the supporting box until it reaches the centre of gravity; p. 6 - 52.



8. – Sling the outrigger beams in the centre of gravity and pull them out of the supporting box.
 – Lift the outrigger beams on to the separate vehicle.
 – Fasten the connecting elements to the supporting box.
Extending the outrigger beams, p. 6 - 52
Transporting the outrigger beams, p. 6 - 56



9. Remove all necessary outrigger beams in the same way in accordance with this checklist.

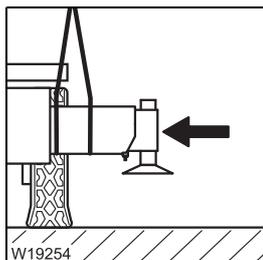
6.5.2

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 given there!

1. Prepare the truck crane; ■■■▶ p. 6 - 45.

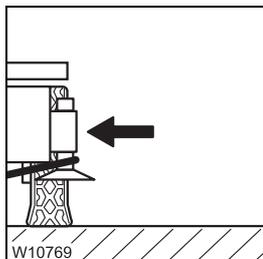


2. – Remove the connection elements from the supporting box.

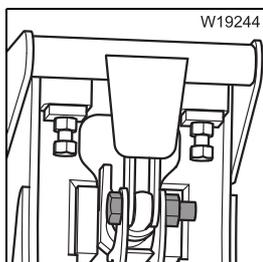
– Sling the outrigger beam at the centre of gravity.

– Lift the outrigger beam into the supporting box and remove the lifting gear.

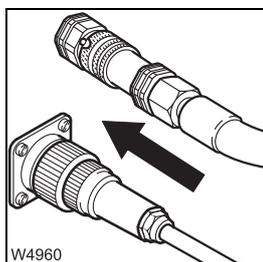
■■■▶ *Inserting the outrigger beam*, p. 6 - 54



3. Sling the outrigger beam and pull it into the supporting box until the connecting points are aligned; ■■■▶ p. 6 - 54.

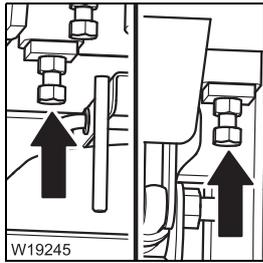


4. Establish the connections to the supporting box; ■■■▶ p. 6 - 52.

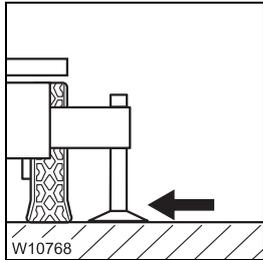


5. – Establish the hydraulic connections; ■■■▶ p. 6 - 48.

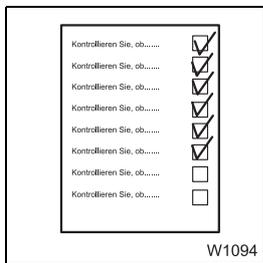
– Establish the electrical connection if necessary; ■■■▶ p. 6 - 49.



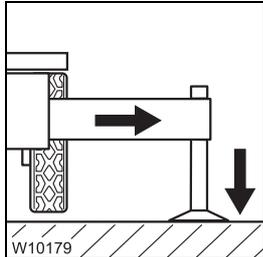
6. Screw in the spacers; p. 6 - 50



7. If necessary, position outrigger pads; p. 6 - 46.

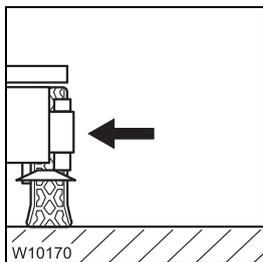


8. Install all necessary outrigger beams in the same way in accordance with this checklist.



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.



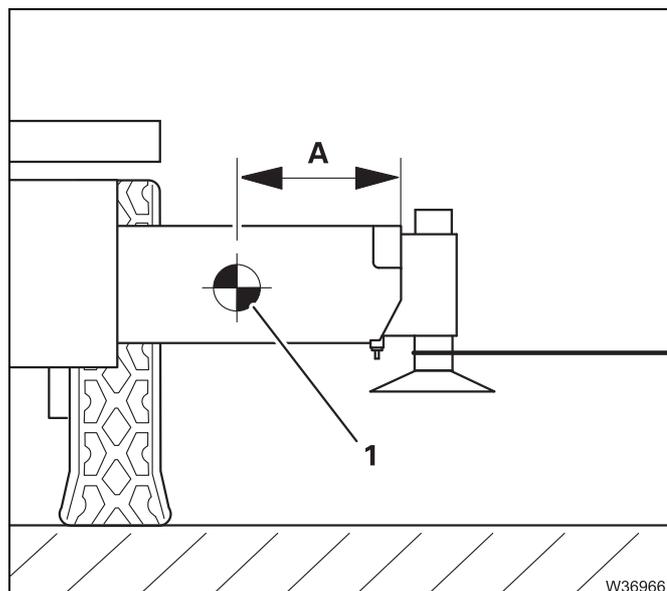
10. If the truck crane still has to be driven to the site:

Fully retract and secure the outrigger beams.

Extending/retracting outrigger beams, p. 12 - 43.

6.5.3

Centre of gravity data



The information in this section refers to a fully retracted outrigger beam package.

The centre of gravity is defined by the distance (A).

Outrigger pads	(A)
Without	840 mm (33.10 in)
Steel	780 mm (30.71 in)
Plastic	800 mm (31.50 in)

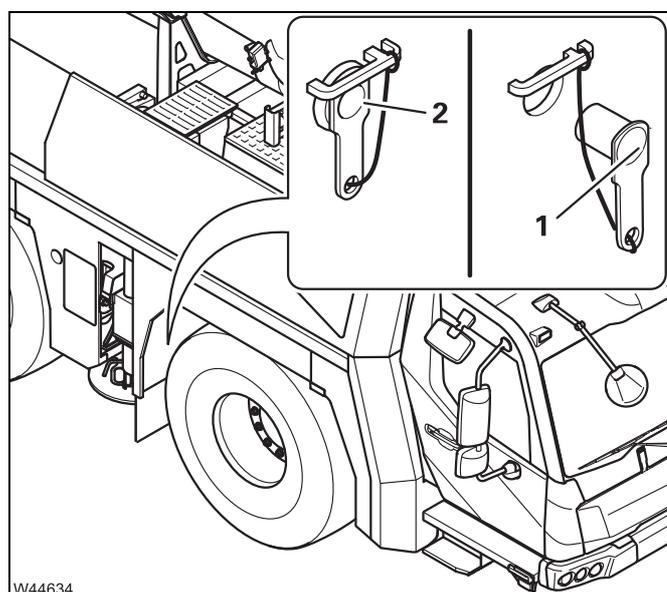
6.5.4

Preparations – for removal

Marking the outrigger beams

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 install the same outrigger beam on the rear left-hand side again.

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



Releasing the outrigger beams

All outrigger beams are retracted.

- Pull out the pin (1).

Locking the outrigger beams together

- Fit the pin (2).

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6.5.6

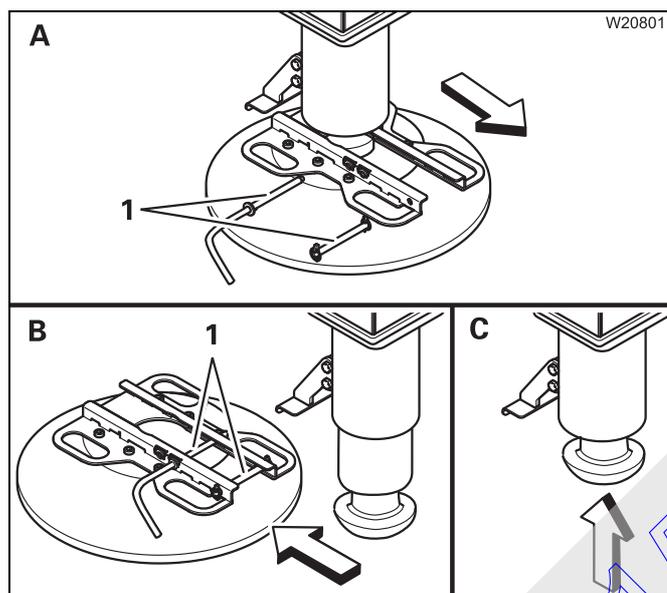
Removing/attaching outrigger pads

You only need remove the outrigger pads if the outrigger beams are to be transported lying on their side.

For transport in a suitable holding frame, the outrigger beams can be set down on the outrigger pad.

Removing the outrigger pad

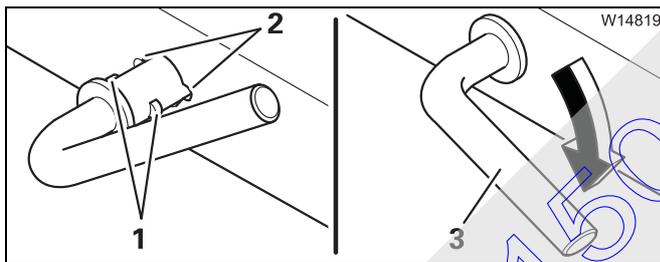
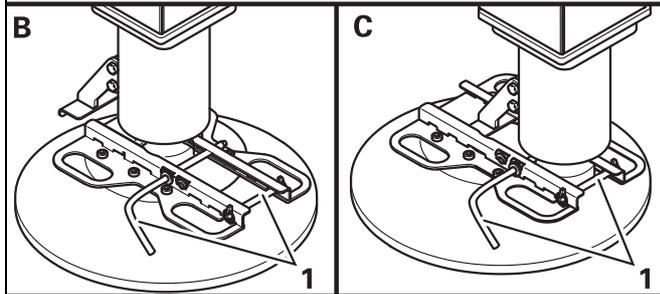
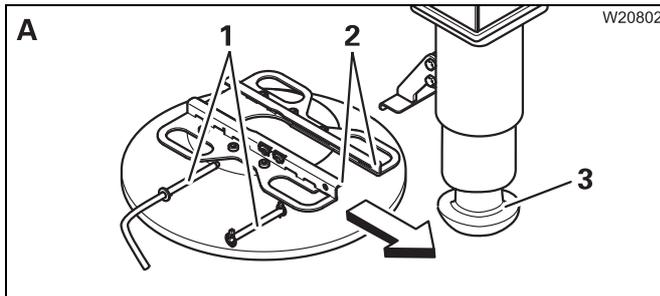
Handling is easier if you remove the outrigger pad before removing the outrigger beam.



- **(A)** – Move the outrigger pad into the operating position.
- Remove the pins (1).
- Extend the supporting cylinder until the outrigger pad just touches the ground but is not yet loaded.
- **(B)** – Pull the outrigger pad off the supporting cylinder.
- Insert the pins (1) and secure them.
- **(C)** – Fully retract the supporting cylinder.
- Remove the other outrigger pads in the same way.

Attaching the outrigger pad

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



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

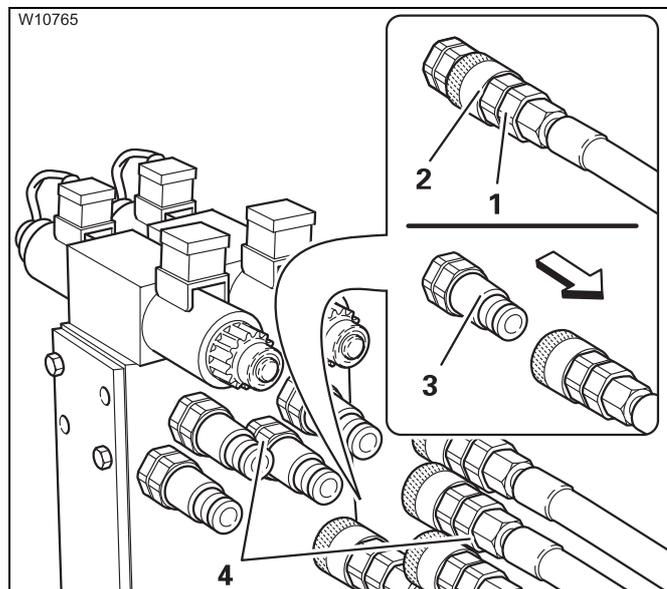
Securing the pins

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

6.5.7

Disconnecting/establishing the hydraulic connection

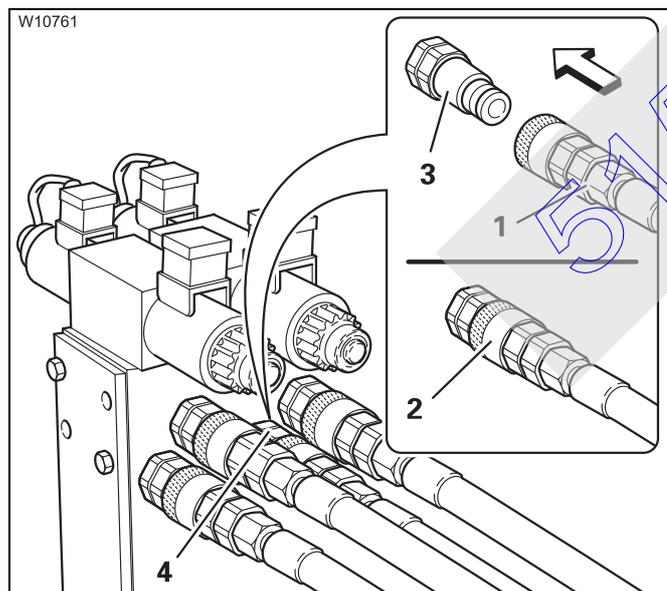
There is a valve block on each outrigger beam. The position of the valve block may differ from the drawings, depending on the outrigger beam.



Removing the connection

Always separate all connections (4).

- Hold the hose (1) firmly.
- Pull the lock (2) against the stop. The hose is pushed out of the connection (3).
- Seal all connecting points.



Establishing the connection

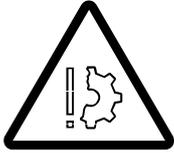
Always establish all connections (4). The assignment is specified by colour designations.

- Push the hose (1) into the connection (3).
- The lock (2) engages.

6.5.8

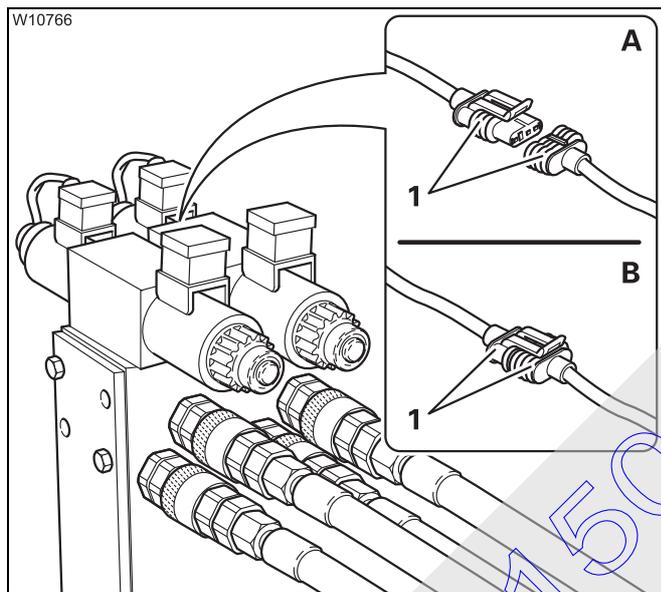
Removing/establishing the electrical connection

The electrical connection is only present on truck cranes equipped with an outrigger pressure display or outrigger span monitoring system.



Danger of malfunctions in the electronic system!

Always turn off the ignition before you remove or establish the electrical connection. This prevents malfunctions and corresponding error messages during subsequent crane operation.



(A) – Separating the connection

- Pull the plugs (1) apart. Protect the plugs against dirt and moisture.

(B) – Establishing the connection

- Connect the plugs (1) together.
- Protect the separator points against dirt and moisture.



Some error messages can occur after separating the electrical connections

▮▮▮▮ *Note on error messages with removed outrigger beams, p. 6 - 56.*

6.5.9

Unscrewing/screwing in the spacers

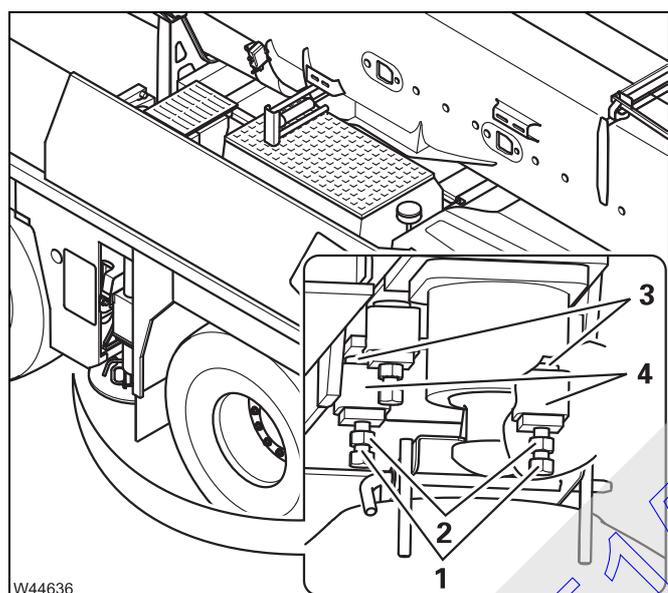
There are two spacers for each outrigger beam

- In the supporting box and
- in the outrigger beam on the opposite side.

The illustrations show as an example the spacers for the outrigger beam on the front right side.

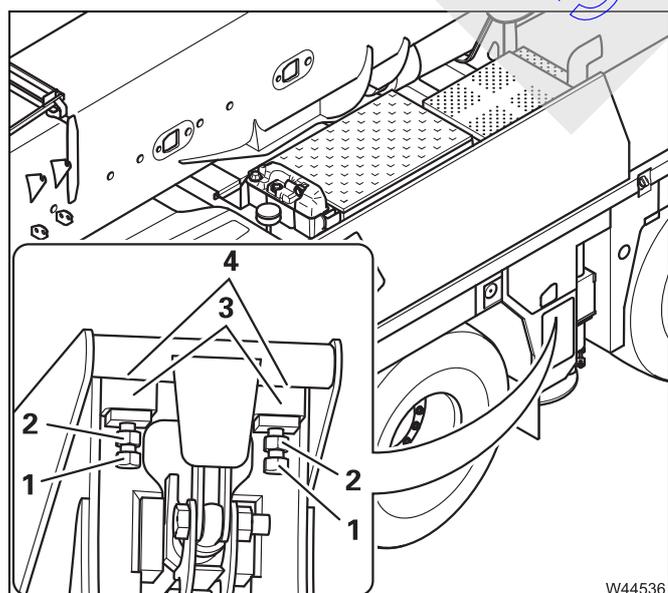
Unscrewing

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



At the supporting box

- Loosen the nuts (2).
- Unscrew the bolts (1) until the spacers (3) are screwed completely into the supporting box (4).

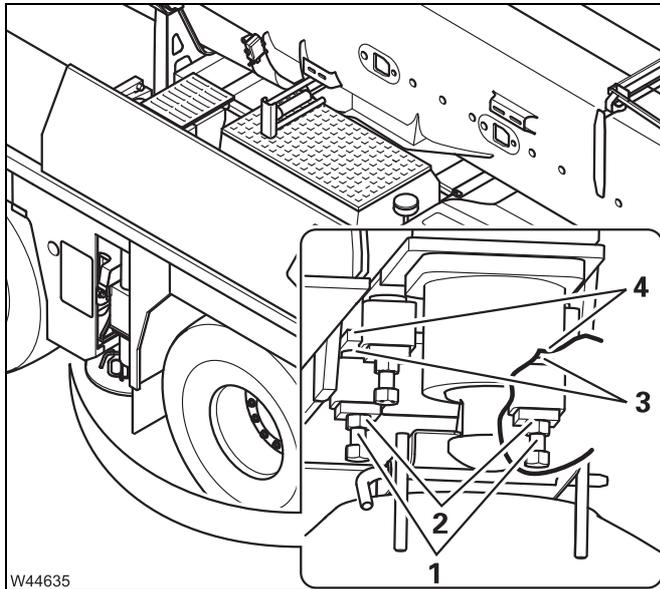


At the outrigger beam

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

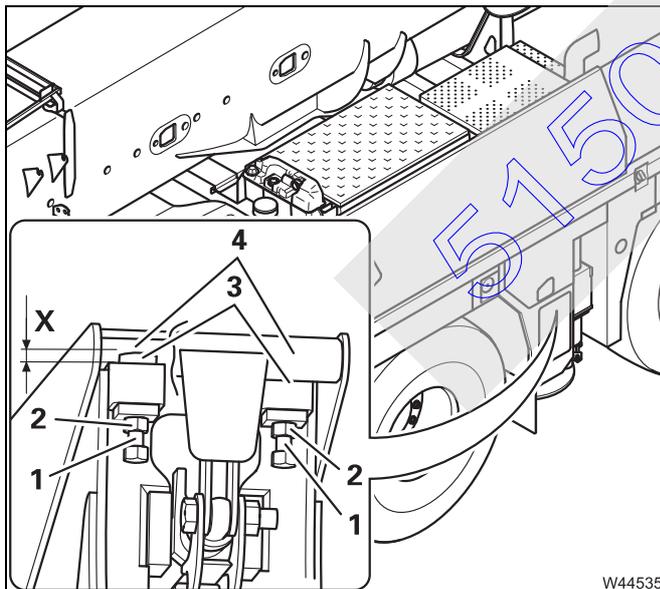
Screwing in

Before you retract/extend an outrigger beam after installation, you must screw in the spacers.



At the supporting box

- Screw in the bolts (1) until the spacers (3) touch the outrigger beam (4) at the top.
- Make sure that the outrigger beam is aligned horizontally.
- Lock the bolts with the nuts (2).



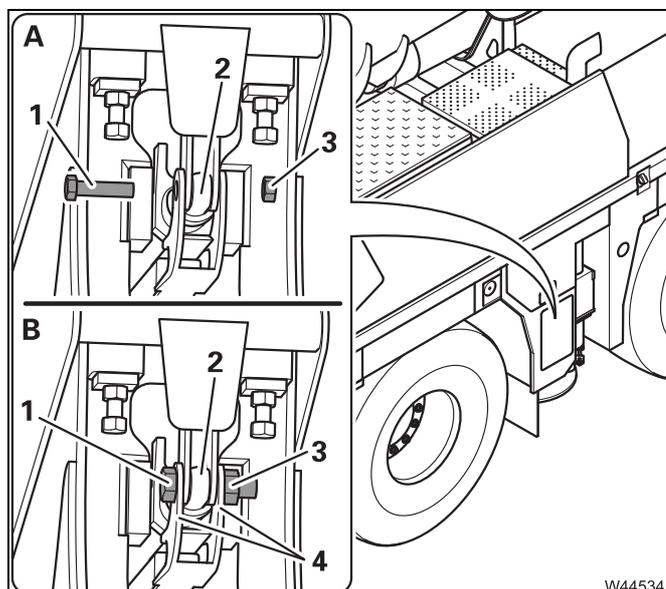
At the outrigger beam

- Screw in the bolts (1),
 - until the spacers (3) lie on top on the supporting box (4) and
 - until the distance (X) to the outrigger box (4) is an even 4 mm (0,16 in) over the entire width.
- Lock the bolts with the nuts (2).

6.5.10

Separating/establishing the connections to the supporting box

The illustrations show the connecting point for the front right outrigger beam as an example.



(A) – Separating the connection

- Remove the nut (3).
- Remove the bolt (1) from the connecting point (2).

(B) – Establishing the connection

- Fasten the bolt (1) to the connecting point (2) using the nut (3). Screw the nut only tightly enough so that the attachment plates (4) still have lateral play.

6.5.11

Extending/retracting the outrigger beams

Extending the outrigger beams

- Check that the outrigger beams are released and are mutually secured;
 ▶ *Preparations – for removal*, p. 6 - 44



Risk of damage to hydraulic lines!

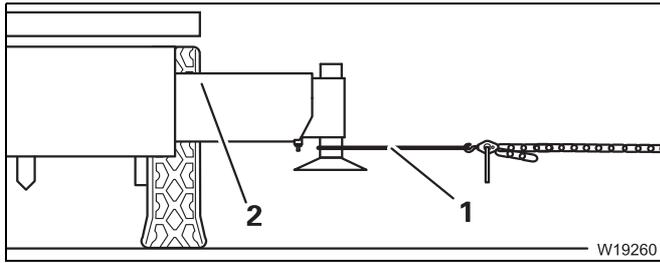
Make sure that the hydraulic lines on the outrigger beam do not remain suspended from the supporting box and get damaged.



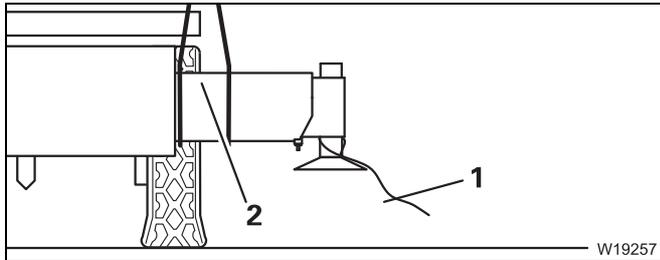
Risk of overloading due to diagonal pull!

Always only pull the outrigger beams as far out of the supporting box (e.g. using a chain hoist) so that you can sling them at their centre of gravity, and then lift them out of the supporting box using the truck crane.

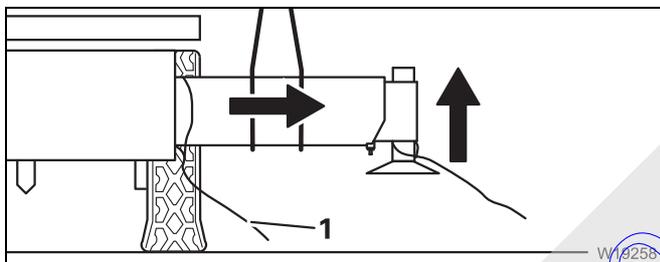
This prevents the truck crane becoming overloaded due to impermissible diagonal pull.



- Fasten lifting gear (1) and a chain hoist.
- Pull the outrigger beam out so far that the centre of gravity (2) is accessible;
 ■■■► *Centre of gravity data, p. 6 - 44.*



- 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).

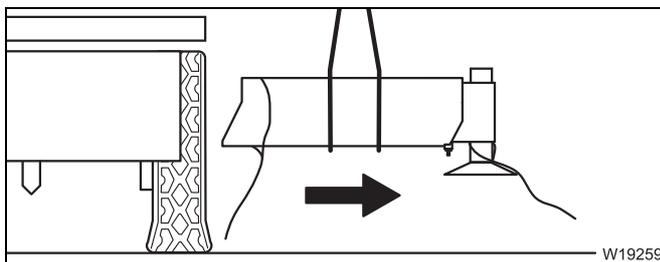


- Lift the outrigger beam slightly to relieve the load.
- Lift the outrigger beam almost completely out of the supporting box.
- Fasten another guide rope (1).

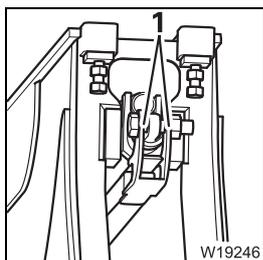


Risk of being crushed by swinging outrigger beam!

Secure the outrigger beam with the guide ropes as it is lifted out of the supporting box.
 Maintain a suitable distance to avoid injuring yourself or others on the swinging outrigger beam.



- Lift the outrigger beam out of the supporting box.
- Lift the outrigger beam on to a separate vehicle;
 ■■■► p. 6 - 56.



- Fasten the connecting elements to the connecting points (1) of the outrigger beams.



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 swinging outrigger beam!

Do not guide the outrigger beam with your hands when inserting it. Always use guide ropes and maintain a suitable distance. This prevents limbs being crushed between the supporting box and the outrigger beam.



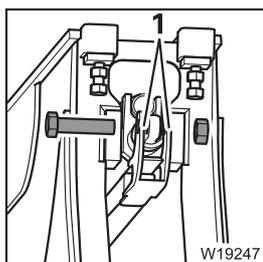
Risk of damage to hydraulic lines!

Make sure that the hydraulic lines on the outrigger beam do not remain suspended from the supporting box and get damaged.

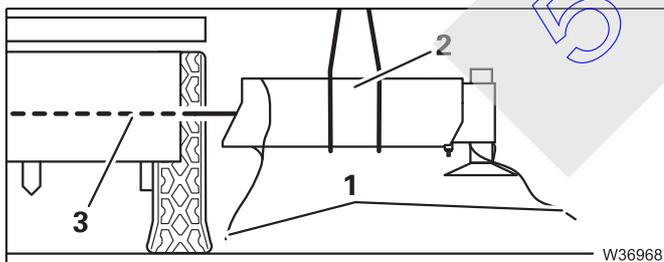


Risk of damage to the spacers!

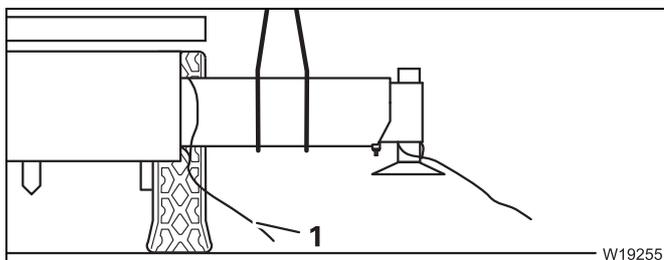
Check that all spacers have been screwed in completely. This prevents the spacers remaining suspended from the supporting box and being damaged.



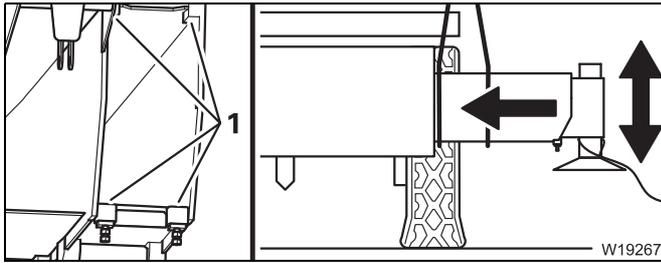
- Remove the connecting elements from the connecting points (1) of the outrigger beam.



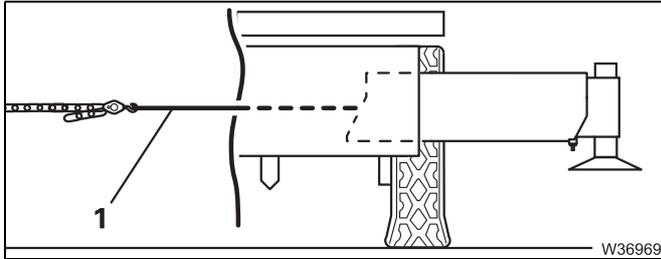
- Feed lifting gear (3) through the supporting box and fasten it to the outrigger beam.
- Sling the outrigger beam at the centre of gravity (2);  *Centre of gravity data*, p. 6 - 44.
- Fasten two guide ropes (1).



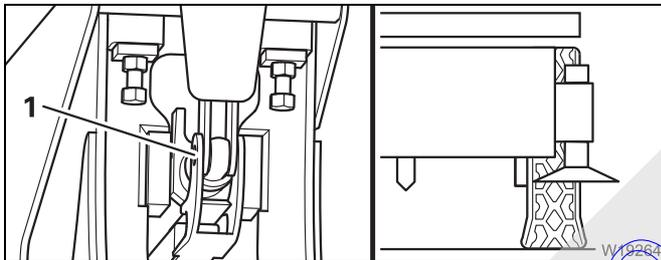
- Place the outrigger beam in the supporting box.
- Remove the guide rope (1)



- Lift the outrigger beam as far as possible into the supporting 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 a chain hoist to the lifting gear (1).



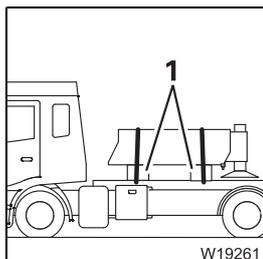
- Pull the outrigger beam in until the connecting points (1) are aligned.
- Remove the chain hoist and lifting gear.

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6.5.12

Transporting the outrigger beams

- For transport, only use a separate vehicle with sufficient load bearing capacity. Transport dimensions and weight;  p. 1 - 11.
- Load the separate vehicle in such a way that the weight is evenly distributed.
- Load the outrigger beams so that they do not endanger other traffic.



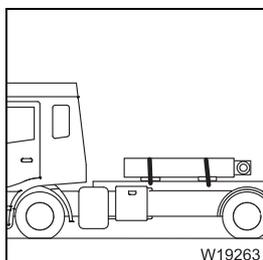
When the outrigger pads are mounted

- Place the outrigger beam on 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 place the outrigger beams to the side, connections may tilt and become damaged.



When the outrigger pads are removed:

- Place the outrigger beam to the side.
- Secure the outrigger beam from slipping.
- Place the outrigger pads on the separate vehicle and secure them for transport.

6.5.13

Note on error messages with removed outrigger beams

When the outrigger beams have been removed, certain error messages appear on the *CCS* display. The error messages only indicate that the electrical connection between the outrigger beams and the crane control is disconnected. Overview of error messages;  *Special error messages*, p. 14 - 7.

7

Transport

Transport should only be carried out by qualified heavy transport companies whose personnel are well-acquainted with loads of these dimensions and weights.

7.1

Transport with transport vehicle



Risk of accidents due to improper transport!

Assign transport to qualified companies only and ensure that the regulations applicable in the country in which you are working are adhered to.



Risk of accidents due to unsuitable means of transport!

Only use suitable lifting gear with sufficient lifting capacity for loading. Only use trailers and vehicles with sufficient loading surface and load bearing capacity for transport and only use the slinging points and lashing points provided.



Risk of accidents due to inadequate information!

Observe the information in the following sections concerning transport. You can thus prevent unsecured parts falling or components being damaged due to improper handling.



Risk of accidents!

Using only a suitable ramp of sufficient load bearing capacity. The ramp inclination must not be greater than 15°.

If the inclination is too steep, unwanted motion of the vehicle may occur. This can cause the truck crane to tip off the ramp. This can cause serious injuries to yourself and other people.



Risk of accidents when lifting the truck crane

Never use the slinging points shown in this section to lift the truck crane. You require special lifting gear to lift the truck crane and you must comply with the maximum permissible angle when lifting.

Before lifting the truck crane, you should therefore consult **Grove Product Support**.

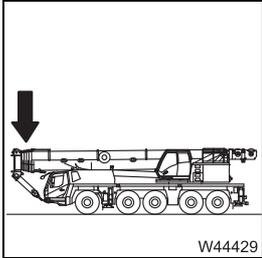
- Note the dimensions and weight of the truck crane for transport;
 ▣▣▣▣ *Dimensions and weights of the truck crane, axle loads, p. 1 - 8.*

7.1.1

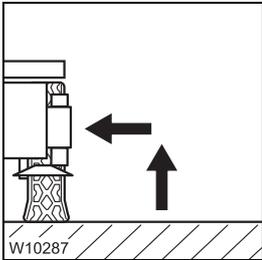
CHECKLIST: Checks before transport



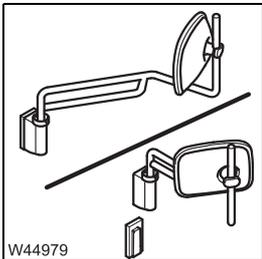
This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.
Observe the warnings and safety instructions given there!



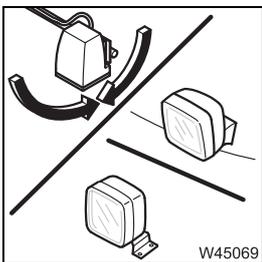
1. – All telescopic sections are interlocked; the telescoping cylinder is locked with telescopic section I.
– The boom is resting in the boom rest.
– The slewing gear is switched off; ■■■▶ p. 11 - 122.
– The superstructure is locked; ■■■▶ p. 11 - 15.
– Depending on the driving mode, the counterweight is unrigged; ■■■▶ p. 6 - 1, ■■■▶ p. 12 - 65.



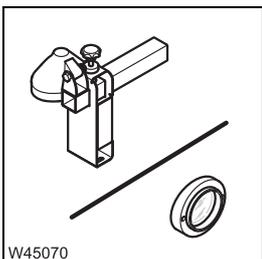
2. On the outrigger
– All outrigger beams are fully retracted and secured to prevent extension; ■■■▶ p. 12 - 39.
– The outrigger pads are in the driving position; ■■■▶ p. 12 - 47.



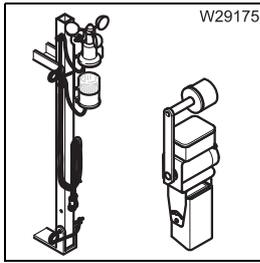
3. The mirror for crane operation is folded in or removed; ■■■▶ p. 12 - 170.



4. – The slewable spotlights are switched off and swivelled in such a way that no other drivers are dazzled by reflection; ■■■▶ p. 11 - 132.
– The spotlights I are switched off; ■■■▶ p. 9 - 155.
– The spotlights II are switched off; ■■■▶ p. 9 - 156.

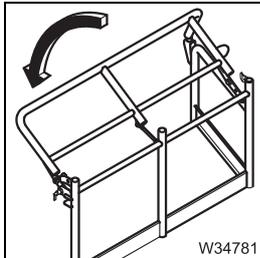


5. – The spotlights III are switched off, pushed in and turned down; ■■■▶ p. 12 - 180.
– The lights on the outrigger are switched off; ■■■▶ p. 3 - 47.

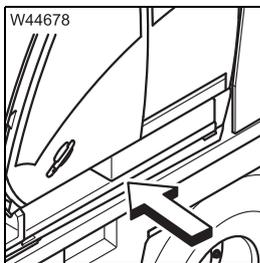


6. Anemometer, air traffic control light and camera system are removed:

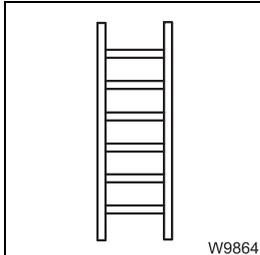
- ▣▣▣▣ ➔ *Anemometer and air traffic control light*, p. 12 - 164,
- ▣▣▣▣ ➔ *Camera on the main boom*, p. 12 - 173.



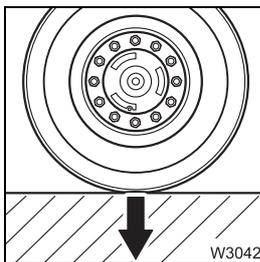
7. All railings are folded in; ▣▣▣▣ ➔ p. 12 - 169.



8. The step on the crane cab is retracted; ▣▣▣▣ ➔ p. 12 - 178.

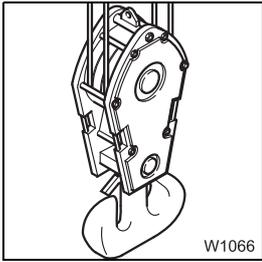


9. All ladders are secured; ▣▣▣▣ ➔ p. 3 - 88

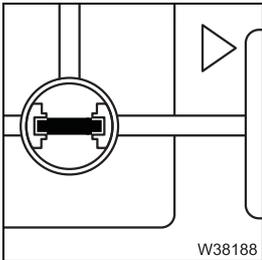


**10. The detachable equipment parts are unrigged so that they fulfil the regulations of the country in which you are working in terms of permissible weights and axle loads, lengths, widths, height, etc.
All additional parts that may be transported are secured against falling down.**





- 11.** The hook block is
- attached to the bumper; ■■■▶ p. 12 - 137 or
 - unreeved; ■■■▶ *Unreeving the hoist rope*, p. 12 - 149.



- 12.** The transverse differential locks are switched on; ■■■▶ p. 5 - 71.

51508035

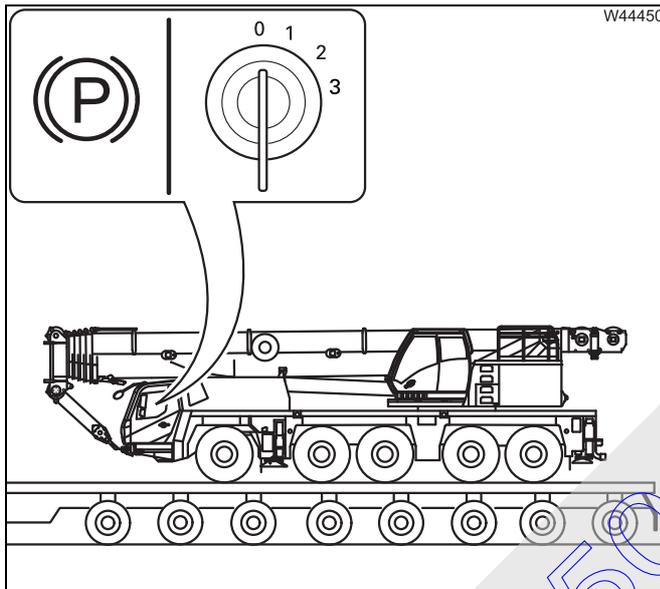
7.1.2

Driving the truck crane on to the transport vehicle



Risk of accidents due to inadequate field of vision!

Always have a banksman on hand to help when driving on to a transport vehicle. Maintain eye contact or radio contact with the banksman at all times while driving on to the transport vehicle. This helps ensure that you do not drive on to the transport vehicle at an angle, resulting in the truck crane falling off the transport vehicle.



Driving on

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

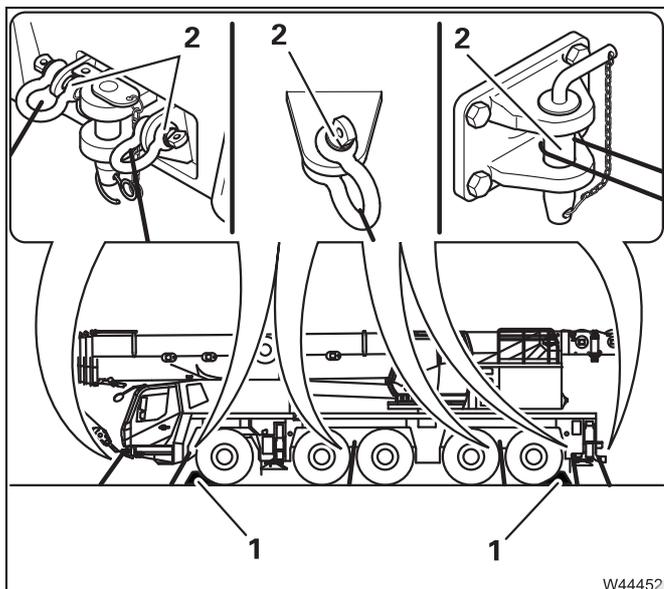
7.1.3

Securing the truck crane against slipping

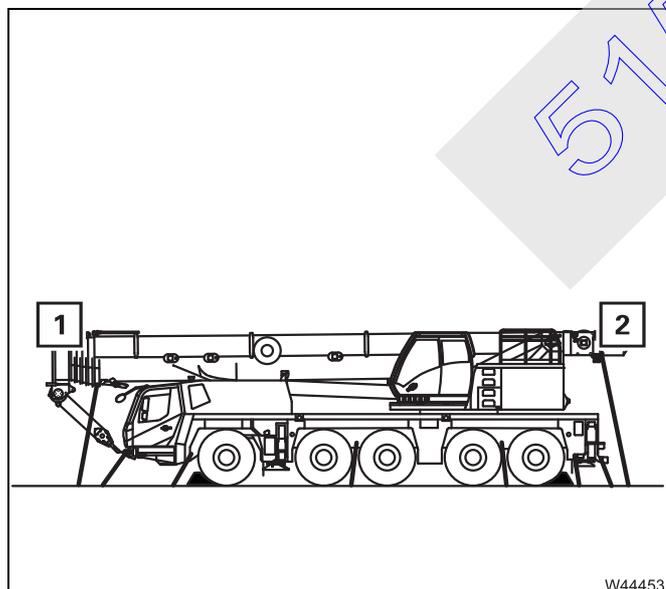


Risk of accidents due to falling parts!

Only use suitable lifting gear with sufficient load bearing capacity and only use the slinging points provided.



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



Additional slinging points are usually necessary when the truck crane is transported on a ship.

- If necessary, use additional points as slinging points.

1 Main boom head

2 Main hoist

Maximum tractive force: 50 kN

7.1.4

Stopping the truck crane for transport

Before transport, carry out the same steps that are required for a standstill period exceeding 8 hours;  *Every time when stationary for more than 8 hours, p. 5 - 86.*

If the truck crane is equipped with a battery master switch II, you can switch it off for transport to spare the batteries.

Observe all the information given in the section for prolonged standstill periods;

 *When the truck crane is stationary for a longer period, p. 5 - 87.*

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Blank page

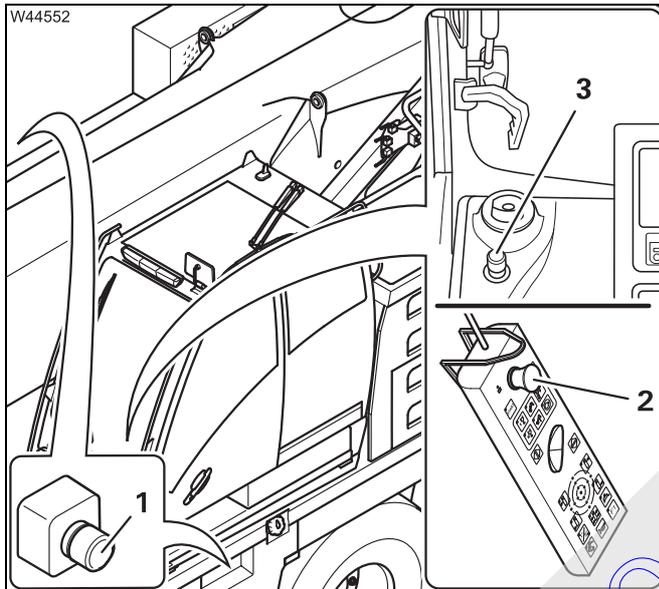
51508035

8

Malfunctions in driving mode

8.1

Emergency stop switches



Four emergency stop switches are provided for emergencies:

- 1 On the carrier – always active (on both sides)
- 2 Only active with connected hand-held control – in addition to (1) and (3)
- 3 In the crane cab – always active

- Press an active emergency stop switch.
 - The switch engages.
 - The engine is switched off.

If there is an air intake inhibitor, then it is triggered.

After activating an emergency stop switch;
▶▶▶▶▶ *Resetting the emergency stop switch*, p. 4 - 20.



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 is switched off.

8.2

What to do in the event of malfunctions

8.2.1

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 accidents 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 accidents during repair work in danger areas!

In danger areas (e.g. tunnels, intersections, motorway bridges), even simple repairs can be dangerous.

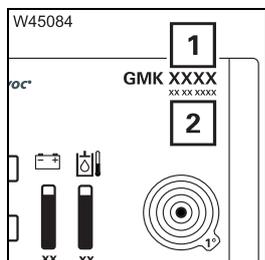
When in a danger area, only carry out the repair work required to leave the danger area.

If you are unable to repair the damage yourself, notify **Grove Product Support** or have the truck crane towed away;  *Towing away the truck crane*, p. 8 - 46.

8.3

Warning and error messages

- Always note down the number of the program version and the serial number after a malfunction occurs before contacting **Grove Product Support**.

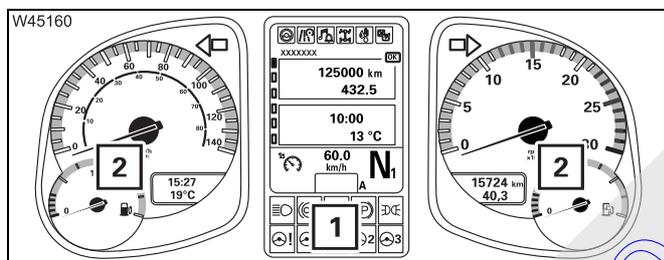


The crane type (1) and the serial number (2) are shown in the start menu.

The program version is displayed in the crane cab; p. 14 - 3.

8.3.1

Warning messages on the centre control unit

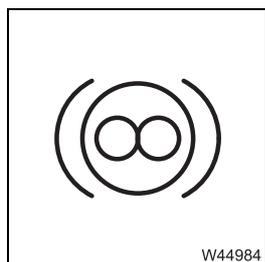


- This section describes the lights in areas (1) and (2).



Risk of damage if warning or fault messages are ignored!

Observe the following information and take the appropriate corrective measures promptly if a warning or fault message appears. This prevents these malfunctions causing defects in the truck crane.



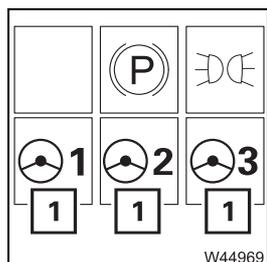
Additional brake indicator lamp

If the light flashes while driving, the transmission retarder power is reduced. Have the transmission retarder checked at the next opportunity.

If the light lights up while driving, the additional brake is switched on; p. 5 - 61.



In range 1



Steering circuits warning

If one or more lamps (1) light up while driving.

Note – The lamp for steering circuit 3 only goes out at a speed of over about 10 km/h (6 mph).

Malfunction in the corresponding steering circuit 1, 2 or 3 (emergency steering pump).

- Stop as quickly as possible, taking the current traffic situation into account.
- Switch off the engine.



Risk of accidents if the steering circuits fail!

If one or more lamps light up, stop the truck crane immediately while paying attention to the current traffic situation and switch off the engine!

Check whether oil was lost. Depending on the extent of a leak, the oil supply in a steering circuit may be lost within a few minutes.

If oil has escaped

- Warn any vehicles on the road behind you.
- Do not continue driving. Contact **Grove Product Support**.

If no oil has escaped

- Check the hydraulic oil level,  *Maintenance manual*.
- Start the engine.

– If all 3 lamps (1) light up

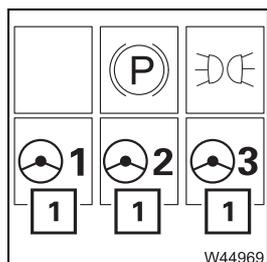
- Switch off the engine. Contact **Grove Product Support**.

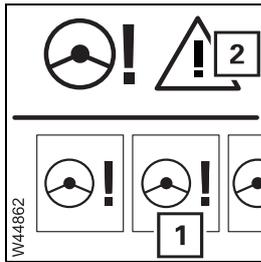
– If **at least 2** lamps (1) light up:

- Drive at a speed higher than approx. 10 km/h (6 mph).

– If only one lamp is still on, drive **slowly** to the next repair shop. The steering may be sluggish.

– If two lamps are still on, stop immediately. Contact **Grove Product Support**.





Steering malfunction

The lamp (1) lights up – on the CCS display symbol (2) **yellow**.

- The lamp (1) only lights up briefly and then goes out.

Error with low priority; continued driving possible.

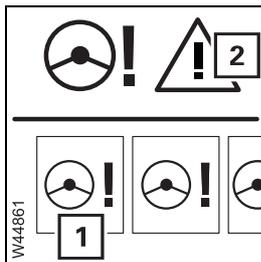
- Pay attention to steering behaviour and have the error read out and corrected at the next opportunity.

- The lamp (1) stays on.

There may be an error at the 3rd axle line or at the 4th axle line or at both axle lines.

The affected axle line is steered into the straight running position or, the next time when the steering goes into the straight ahead position, it is held in this position and no longer steered. It is possible to continue driving.

- Pay attention to steering behaviour and have the error read out and corrected at the next opportunity.



Steering system warning

The lamp (1) lights up, symbol (2) **red**.

- An interrupted buzzer tone sounds as long as the truck crane continues to drive.
- If the speed falls below 20 km/h (12 mph), then the speed is limited to 20 km/h (12 mph). This limit also remains active after a restart, as long as the error still applies.

There may be an error at the 3rd axle line or at the 4th axle line or at both axle lines.

The affected axle line remains on the current steering angle and can no longer be steered.

- Stop as quickly as possible, taking the current traffic situation into account.



Risk of accidents because the truck crane cannot be steered!

Stop the vehicle as soon as possible.

The affected axle lines can no longer be steered, which can lead to serious accidents even at reduced speed.

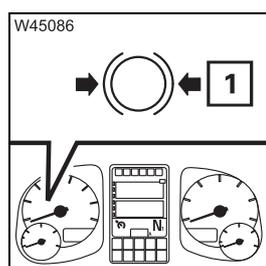


- Briefly switch the ignition off and then on again. If the error is still present, then check the steering angle at the 3rd axle line and at the 4th axle line.

Whether it is possible to continue driving must be decided based on the current situation. Contact **Grove Product Support**.

If necessary, the 3rd axle line and the 4th axle line can be steered into the straight ahead position with emergency operation to make it possible to drive to the repair shop;  *Emergency operation for steering 3rd and 4th axle line*, p. 8 - 56.

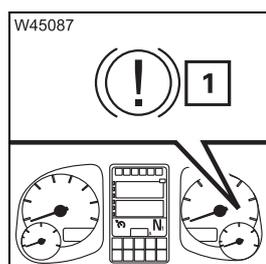
In range 2



Prompt to brake

If the lamp (1) lights up the engine speed is too high.

- Brake the truck crane with the service brake or shift up gears. The lamp (1) goes out when the permitted engine speed is reached.
- Pay attention to further information at the on-board computer.

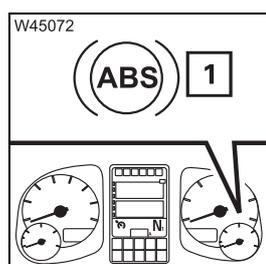


Brake malfunction

Lamp (1) goes out after the engine start when the supply pressure is established.

If the light does not go out or if it lights up while driving, there is a brake system malfunction.

- Stop the truck crane while observing the traffic situation and observe the messages on the on-board computer;  *Brake system messages*, p. 8 - 17.



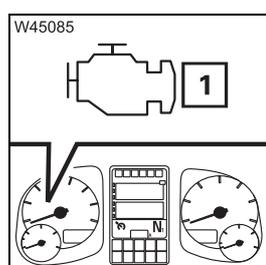
ABS/EBS system error

If the lamp does not go out after the lamp test or if it lights up while driving, then the ABS/EBS system has a malfunction and during braking locking of the wheels is no longer prevented.

The braking force is still available if there is no error at the brake system;

 *Brake system messages*, p. 8 - 17.

- Have the error rectified as soon as possible.



Engine malfunction

An exhaust-relevant fault was identified.

Depending on the type of malfunction, more messages may be displayed.

An error message was stored in the *Engine/transmission error* menu;

 *Error messages on the CCS display*, p. 8 - 37.

8.3.2

Warning and fault messages on the on-board computer



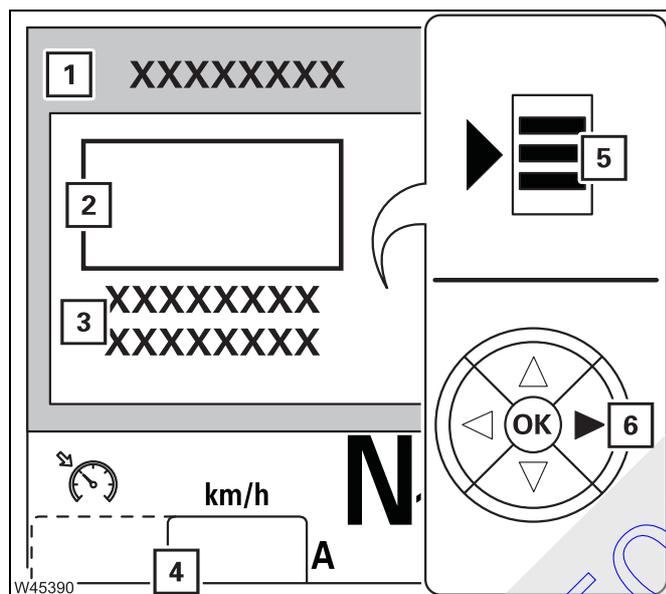
Risk of damage if messages are disregarded!

For all messages, always take note of the text shown.

Follow the requests to stop immediately, taking the traffic situation into account.

Complete the remedial measures shown, and described here, in good time.

This prevents errors and minor damage leading to more serious problems.



Message elements

Messages are indicated by symbols in areas (2) and (4).

Depending on the type of message, a text (3) may also be displayed.

When the symbol (5) is shown, you can display additional text at the steering wheel by pressing the button (6).

The colour of the frame (1) indicates the message type. There are three types of message.

– Red: **Warning message**

Stop as quickly as possible, taking the traffic situation into account. Observe and follow the currently displayed text and information in this section.

– Yellow: **Fault message**

Check the cause at the next stop or stop while observing the traffic situation if the currently displayed text requests that you do so. Observe and follow the currently displayed text and information in this section.

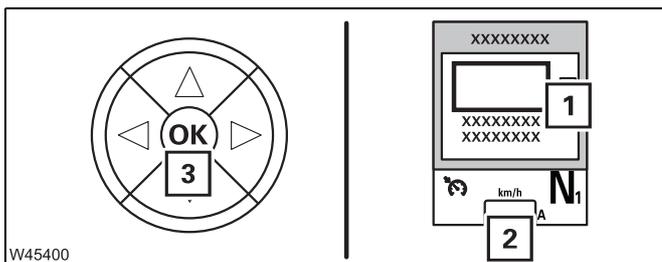
– Grey: **Information**

You can continue driving. Pay attention to further messages.



If there are several messages, they are displayed one after the other – in the order red- yellow – grey.





Acknowledging messages

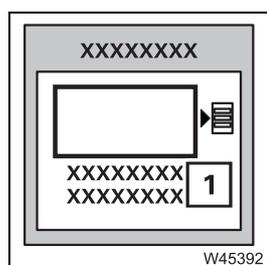
- Press the button (3) once – the message in area (1) goes out.

The corresponding symbols are displayed (2) until the cause of the message has been eliminated.



You can have all currently active messages displayed again;
▣▣▣▣ Events menu, p. 5 - 34.

Notes on the messages



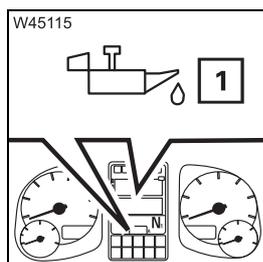
In addition to the messages in this section, further messages may be displayed. The messages shown here can also appear with additional or different texts.

If in doubt, the current text (1) shown on your on-board computer is displayed. Follow the requests to stop immediately, taking the current traffic situation into account. Take the specified measures in due time.

The next sections show possible messages for the different areas.

- Engine messages; ▣▣▣▣ p. 8 - 9
- AdBlue system messages; ▣▣▣▣ p. 8 - 11
- Exhaust system messages; ▣▣▣▣ p. 8 - 13
- Transmission messages; ▣▣▣▣ p. 8 - 15
- Brake system messages; ▣▣▣▣ p. 8 - 17
- Electrical system messages; ▣▣▣▣ p. 8 - 19
- Lighting messages; ▣▣▣▣ p. 8 - 20
- Maintenance messages; ▣▣▣▣ p. 8 - 21
- Various messages; ▣▣▣▣ p. 8 - 22

Engine messages



Red message – symbol (1) is displayed

Text:	<i>Engine oil pressure too low</i>
	<i>Stop vehicle and shut down engine</i>

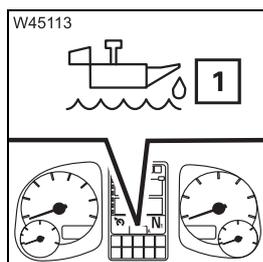
- Stop the truck crane under consideration of the current traffic situation.
- Apply the parking brake and switching off the engine.
- Check the engine oil level and correct it, if necessary.
- If the message is still displayed, notify **Grove Product Support** or an authorised specialist repair shop.



Risk of damage to the engine if the oil pressure drops!

Switch 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.



Message – symbol (1) is displayed

The oil level is far too low

Further messages with text may follow – please observe them!

- Stop the truck crane under consideration of the current traffic situation.
- Apply the parking brake and switching off the engine.

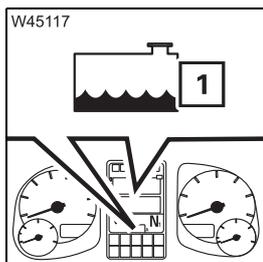
If oil has escaped

- Warn the following traffic.
- **Grove Product Support** or contact an authorised repair shop.

If no oil has escaped

- Check the engine oil level and correct it, if necessary,  *Engine menu*, p. 5 - 33,  *Maintenance manual*.
- If the message is still displayed, notify **Grove Product Support** or an authorised specialist repair shop.

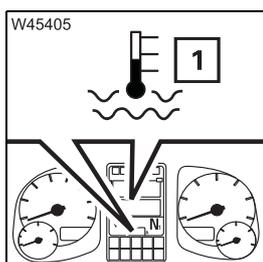




Red message – symbol (1) is displayed

Text:	<i>Coolant level too low</i>
	<i>Top up coolant</i>

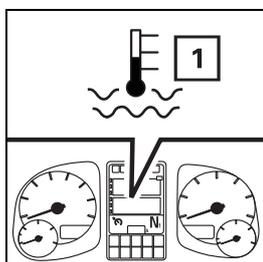
- Stop the truck crane under consideration of the current traffic situation.
- Apply the parking brake and switching off the engine.
- Top up coolant;  *Maintenance manual*.
- Have the cooling system checked as soon as possible for leaks.



Red message – symbol (1) is displayed

Text:	<i>Coolant temperature too high</i>
	<i>Stop vehicle and shut down engine</i>

- Stop the truck crane under consideration of the current traffic situation.
- Apply the parking brake and switching off the engine.
- Allow the engine to cool down.
- If the message is still displayed, notify **Grove Product Support** or an authorised specialist repair shop.

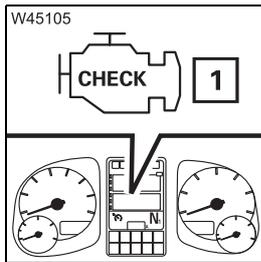


Yellow message – symbol (1) is displayed

Text:	<i>Coolant temperature too high</i> or <i>Engine protection: Engine power reduced</i>
--------------	---

The engine power is automatically reduced.

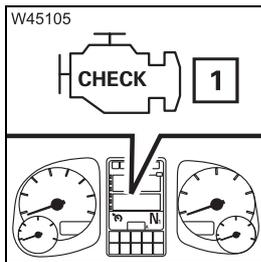
- Reduce the speed and shift down gears.
- or**
- Stop the truck crane under consideration of the current traffic situation.
 - Apply the parking brake and switching off the engine.
 - Check the radiator for dirt and clean it;  *Maintenance manual*.



Yellow message – symbol (1) is displayed

Text:	<i>Engine malfunction</i>
--------------	---------------------------

- At least one system malfunction listed.
 - Engine
 - Engine cooling system
 - Engine control system
 - Fuel system
- Have systems checked as soon as possible.

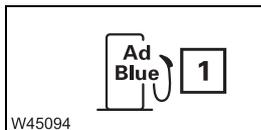


Yellow message – symbol (1) is displayed

Text:	<i>Engine cooling system malfunction</i>
--------------	--

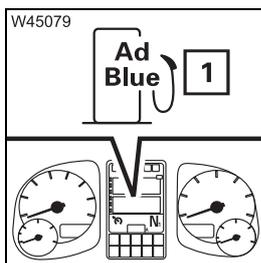
- Have the engine cooling system checked as soon as possible (e.g. V-belt damaged or voltage too low).

AdBlue system messages



If a message is displayed with symbol (1), you must top up AdBlue. If you do not top up AdBlue, further messages are displayed until a torque reduction is carried out.

In order to comply with the exhaust emission regulations, the truck crane may be driven only with AdBlue (DEF). Driving without AdBlue (DEF) will invalidate the licence for using the truck crane on public roads and you may no longer drive it on public roads.

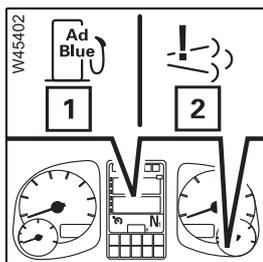


Yellow message – symbol (1) is displayed

Text:	<i>AdBlue reserve</i>
	<i>Please top up AdBlue</i>

- Top up AdBlue as soon as possible;  p. 4 - 8.



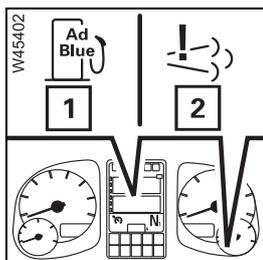


Yellow message – symbol (1) and symbol (2) are displayed

Text:	<i>AdBlue reserve</i>
	<i>Please top up AdBlue</i> <i>Reduction of engine output pending</i>

If the AdBlue level continues to drop, there will be a torque reduction.

- Top up AdBlue as soon as possible;  p. 4 - 8.

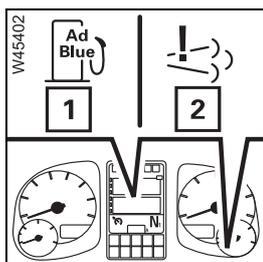


Yellow message – symbol (1) and symbol (2) are displayed

Text:	<i>AdBlue tank almost empty</i>
	<i>Please top up AdBlue</i> <i>Reduction of engine output after standstill</i>

There is a reduction in torque after the next standstill.

- Top up AdBlue as soon as possible;  p. 4 - 8.



Yellow message – symbol (1) and symbol (2) are displayed

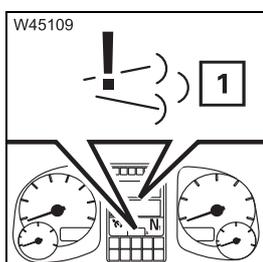
Text:	<i>AdBlue tank empty</i>
	<i>Please top up AdBlue</i> <i>Reduction of engine output after standstill</i>

The AdBlue (DEF) tank is empty.

Torque reduction is activated. The torque reduction can be overridden for a limited time;  p. 5 - 63.

- Immediately top up AdBlue;  p. 4 - 8.

A message on the reduction of the engine output is displayed.



Yellow message – symbol (1) is displayed

Text:	<i>Engine power reduced</i>
	<i>Please top up AdBlue</i>

The AdBlue (DEF) tank is empty.

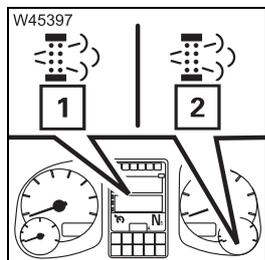
Torque reduction is activated. The torque reduction can be overridden for a limited time;  p. 5 - 63.

- Immediately top up AdBlue;  p. 4 - 8.

Exhaust system messages

In case of messages concerning the exhaust system, additional lamps are active on the *Centre* control unit.

If you do not observe the information on the on-board computer and do not take appropriate measures, then this can result in damage in the exhaust system and to restrictions in operation.



Exhaust system cleaning required

Depending on the degree of contamination of the exhaust system, manual cleaning needs to be performed within a certain time – symbol (1) displayed.

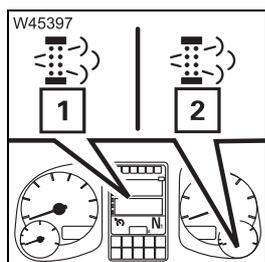
In addition, the lamp (2) is active.

The lamp (2) and the text in the message give corresponding information.

Risk of damage to the exhaust system!

Observe the information in the messages and start manual exhaust gas cleaning in due time, taking the current situation into account.

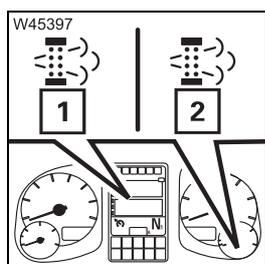
That prevents damage to the exhaust system and automatic and manual cleaning thus no longer being possible.



Yellow message – symbol (1) is displayed, lamp (2) lights up yellow

Text:	<i>Fuel particle filter Level increased</i>
	<i>Initiate regeneration</i>

- Start manual cleaning promptly; p. 5 - 65.

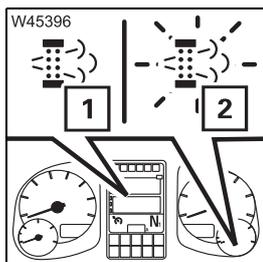


Yellow message – symbol (1) is displayed, lamp (2) lights up yellow

Text:	<i>Fuel particle filter full</i>
	<i>Initiate regeneration immediately</i>

- Start manual cleaning as soon as possible; p. 5 - 65.

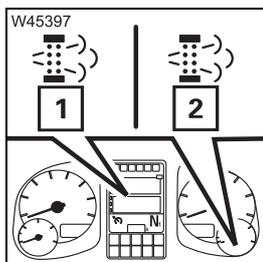




Yellow message – symbol (1) is displayed, lamp (2) flashes yellow

Text:	<i>Fuel particle filter full</i>
	<i>Initiate regeneration immediately</i>

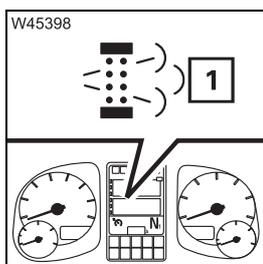
- Start manual cleaning immediately;  p. 5 - 65.



Red message – symbol (1) is displayed, lamp (2) lights up red

Text:	<i>Fuel particle filter full</i>
	<i>Stop vehicle, contact Service, regeneration no longer possible</i>

The engine output is reduced and it is no longer possible to clean. Driving is limited. Contact **Grove Product Support** or an authorised specialist repair shop immediately.

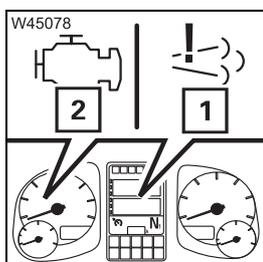


Grey message – symbol (1) is displayed

Text:	<i>Engine speed increase</i>
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“HC Burn Off” function is active – (no exhaust cleaning active).

The engine speed was automatically increased to reduce deposits in the exhaust cleaning system. The message goes out when the function is finished.



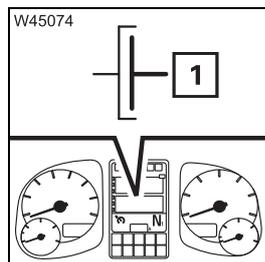
Message – symbol (1) is displayed and lamp (2)

An exhaust-relevant malfunction in the exhaust cleaning system was detected.

A corresponding error message can be read at the *CCS* display;

-  *Error messages on the CCS display*, p. 8 - 37.

Transmission messages



Red message – symbol (1) is displayed

Text:	<i>Clutch malfunction</i>
	<i>Stop vehicle and contact Service</i>

- While paying attention to the current traffic situation, stop driving and apply the parking brake.
- Check if this message appears.

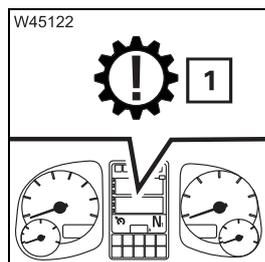
Text:	<i>Transmission/clutch supply pressure too low</i>
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If the message appears

- Build up supply pressure;  p. 5 - 11.
- Stop the engine and restart it after approximately 10 seconds.

If the *Clutch malfunction* message appears again.

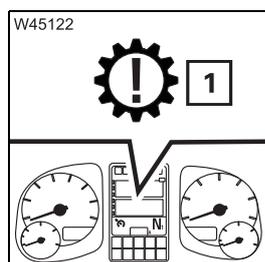
- **Grove Product Support** or contact an authorised repair shop.



Red message – symbol (1) is displayed

Text:	<i>Gear shift malfunction</i>
	<i>Switch off the vehicle safely</i>

- While paying attention to the current traffic situation, stop driving and apply the parking brake.
- **Grove Product Support** or contact an authorised repair shop.

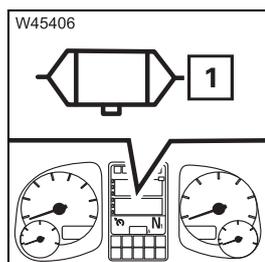


Yellow message – symbol (1) is displayed

Text:	<i>Gear shift malfunction</i>
	<i>Find a repair shop</i>

- It is possible to continue driving with restrictions.
- For support in continuing to drive, read out fault codes ( p. 8 - 37) and notify **Grove Product Support** or an authorised specialist repair shop.

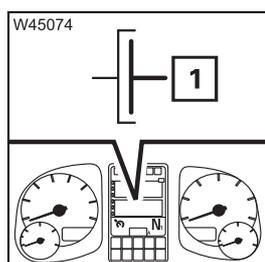




Yellow message – symbol (1) is displayed

Text:	<i>Transmission/clutch supply pressure too low</i>
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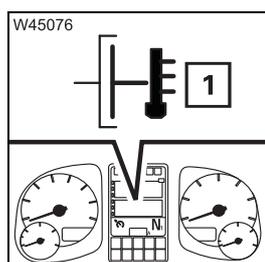
- While paying attention to the current traffic situation, stop driving and apply the parking brake.
- Build up supply pressure; *Supply pressure*, p. 5 - 11.
- If the message goes out – driving can be resumed.
- If the message appears frequently – have the compressed air system checked immediately.



Yellow message – symbol (1) is displayed

Text:	<i>Clutch malfunction</i>
	<i>Find a repair shop</i>

- It is possible to continue driving with restrictions
- Have malfunction rectified as soon as possible.

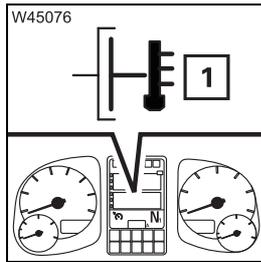


Yellow message – symbol (1) is displayed

Text:	<i>Transmission: Oil temperature too high</i>
	<i>Find a repair shop</i>

Temperature in the transmission or transmission retarder very high, if the cause is not eliminated, transmission damage may result

- While paying attention to the current traffic situation, stop driving and apply the parking brake.
- Switch transmission to the neutral position.
- Run engine for 2 to 3 minutes at 1,200 to 1,500 rpm and then switch it off.
- If the oil temperature does not drop, check transmission oil level and correct it, if necessary.
- If the message is still displayed, notify **Grove Product Support** or an authorised specialist repair shop.



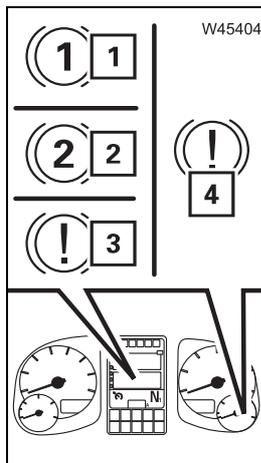
Grey message – symbol (1) is displayed

Text:	<i>Clutch severely loaded</i>
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Temperature in the clutch very high. If the cause is not eliminated, clutch damage could result.

- Only start in 1st gear if possible.
- Make manoeuvring or starting as short as possible.

Brake system messages

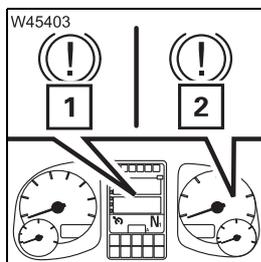


Message red – lamp (4) is displayed with symbol (1) or (2) or (3)

Text:	<i>Brake supply pressure in circuit X too low</i>
--------------	---

The supply pressure in the displayed brake circuit (1 or 2) or brake circuit with trailer symbol (3) is too low.

- While paying attention to the current traffic situation, stop driving and apply the parking brake.
- Build up supply pressure; *Supply pressure*, p. 5 - 11.
- If the lamp (4) goes out – driving can be resumed.
- If the lamp (4) does not go out – have the compressed air system checked immediately.



Yellow message – symbol (1) is displayed and lamp (2).

Text:	<i>Braking force limited</i>
	<i>Adapt driving style</i>

Malfunction in the brake system – the braking capacity may be impaired.



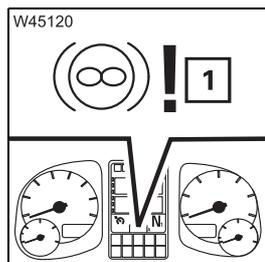
Risk of accidents due to impaired braking!

Take special care when continuing to drive. Drive slowly and maintain an increased distance.

Do not fail to pay attention to and follow other messages and text displays.

- Have the brake system checked immediately in a specialist repair shop.



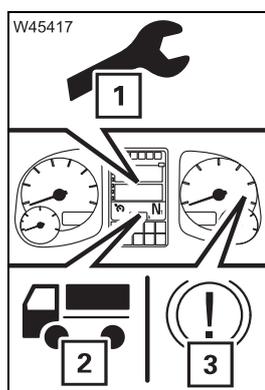


Message – symbol (1) is displayed

Engine retarder malfunction

The braking performance can change.

- If stopping is not possible directly, drive particularly carefully at reduced speed. The braking performance can change abruptly!
- While paying attention to the current traffic situation, stop driving and apply the parking brake.
- Further messages with text may follow – please observe them!
- Have the engine retarder immediately checked and repaired by a specialist workshop.



Yellow message – symbol (1), symbol (2) is displayed and lamp (3).

Text:	<i>Left brake on X axle maintenance immediately</i>
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An important maintenance task has not been carried out!

One or more brakes have reached their wear limit.

- Have the brake system immediately checked by a specialist workshop and faults rectified.



Risk of accidents due to impaired brake power!

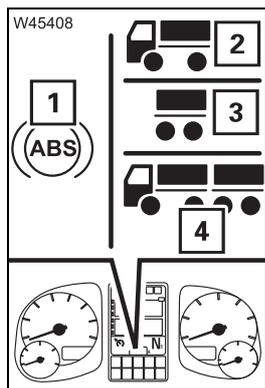
Take special care when continuing to drive. Drive slowly and maintain an increased distance.

Do not fail to pay attention to and follow other messages and text displays.



The *Axle X left* information does not match the points on the truck crane! You must always check the brakes on **both sides** at the corresponding axle line. The table provides an overview.

Text	Affected axle line
<i>Axle 1, left</i>	1st axle line, left / right
<i>Axle 1, right</i>	2nd axle line, left / right
<i>Axle 2, left</i>	3rd axle line, left / right
<i>Axle 2, right</i>	4th axle line, left / right
<i>Axle 3, left</i>	5th axle line, left / right



Message – symbol (1) is displayed with (2) or (3) or (4)

After switching on the ignition, symbols (1) and (2) are displayed briefly.

If symbols are displayed permanently, the ABS system is not available.

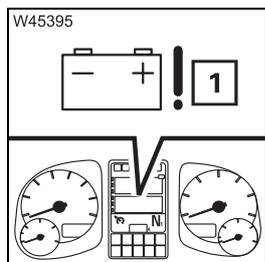
If there is an electronic malfunction at the ABS system, an additional text is displayed – observe and follow the displayed text.

In this case, vehicle handling and the braking performance may change.

If symbol (1) is displayed with (3) or (4)

- While paying attention to the current traffic situation, stop driving and apply the parking brake.
 - Observe the operating manual of the manufacturer of the trailer.
 - Resume driving only if it is ensured that the brakes of the trailer do not block.

Electrical system messages

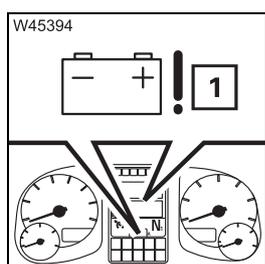


Red message – symbol (1) is displayed

Text:	<i>Overvoltage</i>
	<i>Stop vehicle and contact Service</i>

Vehicle handling may change!

- While paying attention to the current traffic situation, stop driving and apply the parking brake.
- Shut down the engine and switch off the ignition.
- **Grove Product Support** or contact an authorised repair shop.

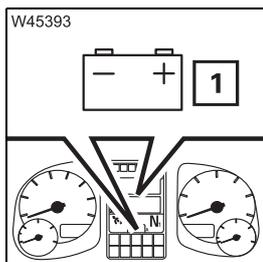


Yellow message – symbol (1) is displayed

Text:	<i>Alternator does not charge battery</i>
	<i>Find a repair shop</i>

- If stopping is not possible directly, drive particularly carefully. Vehicle handling and the braking performance may change!
- Have the alternator and the V-belt checked immediately in an authorised repair shop.





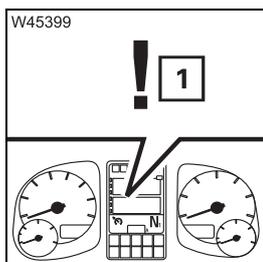
Yellow message – symbol (1) (one or both displays).

Text:	<i>Undervoltage</i>
	<i>Stop vehicle and shut down engine Contact Service and vehicle performance changed</i>

The battery charge level is too low.

Vehicle handling and the braking performance may change!

- If the message is displayed while the engine is running
 - While paying attention to the current traffic situation, stop driving and apply the parking brake.
 - Shut down the engine and switch off the ignition.
 - **Grove Product Support** or contact an authorised repair shop.
- If the message is displayed while the engine is shut down
 - Start the engine or charge the battery.

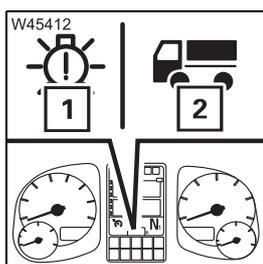


Yellow message – symbol (1) is displayed

Text:	<i>Instrument cluster display and operation malfunction</i>
--------------	---

- The on-board computer display can no longer display important information.
- Continue to drive carefully.
- Have the malfunction rectified immediately by an authorised repair shop.

Lighting messages

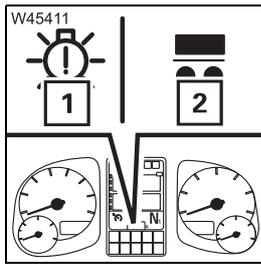


Yellow message – symbol (1) and symbol (2) are displayed

Text:	<i>Replacing the light</i>
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Depending on the equipment, further text may be added for the relevant lighting. The front and rear headlights and the turn signal indicator are monitored.

- Replace the faulty light immediately (▮▮▮▮ Maintenance manual.) or find a repair shop.



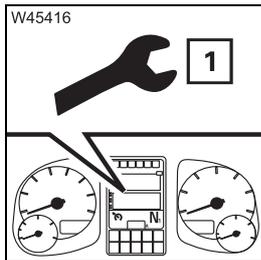
Yellow message – symbol (1) and symbol (2) are displayed

Text:	<i>Turn signal indicator malfunction</i>
--------------	--

The turn signal indicator on the trailer has a malfunction.

- Replace the faulty light immediately or find a repair shop.

Maintenance messages

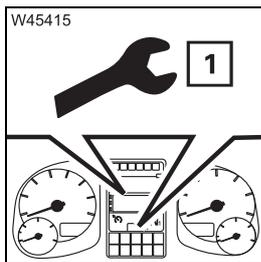


Grey message – symbol (1) is displayed

Text:	The relevant part is displayed, e.g. <i>Engine</i>
--------------	---

The displayed maintenance task is soon due.

- Schedule a maintenance operation in due time.

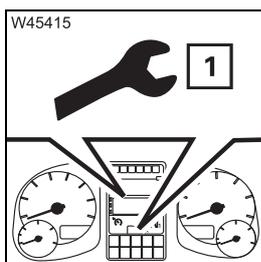


Grey message – symbol (1) is displayed

Text:	The relevant part is displayed, e.g. <i>Engine maintenance due</i>
--------------	---

The displayed maintenance task is due.

- Have the maintenance performed.

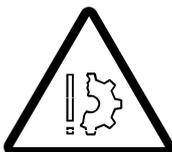


Yellow message – symbol (1) is displayed

Text:	The relevant part is displayed, e.g. <i>Engine maintenance immediately</i>
--------------	--

The deadline for a maintenance task was exceeded significantly.

- Have the displayed maintenance work carried out immediately.

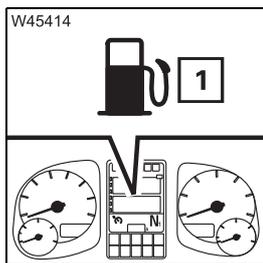


Risk of damage due to insufficient maintenance!

Have the displayed maintenance work carried out immediately.
This prevents damage and increased wear.



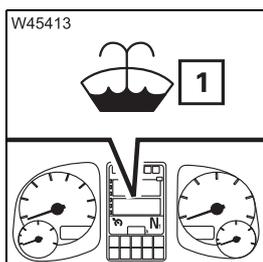
Various messages



Yellow message – symbol (1) is displayed

The fuel tank is in the reserve range.

- Refuel as soon as possible;  *Refuelling*, p. 4 - 7.



Grey message – symbol (1) is displayed

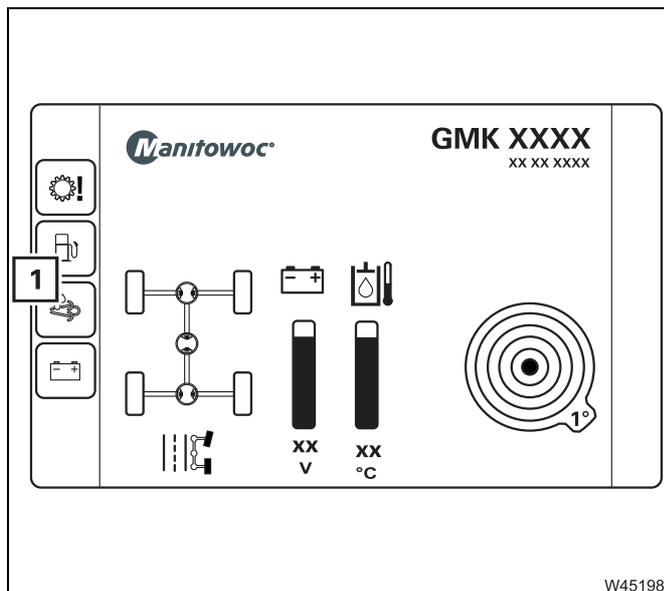
The windscreen washing system tank is almost empty.

- Fill the tank promptly;  *Maintenance manual*.

51508035

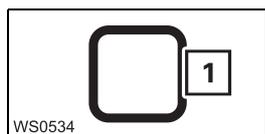
8.3.3

Warning messages on the CCS display



A warning message indicates that certain values deviate from a target value

If CCS detects a warning or a fault then a symbol is displayed in the display area (1).



All symbols are shown within a frame (1). The colour of the frame indicates the message type.

– Red: Warning message

Warning messages usually require action at short notice. The current operation usually needs to be interrupted due to the current situation. Also observe the information in the corresponding sections concerning this.

▮▮▮▮ *What to do when a malfunction occurs in road traffic, p. 8 - 2*

▮▮▮▮ *What to do when malfunctions occur during crane operation, p. 14 - 2*

– Yellow: Fault message

Operation can usually be continued in the case of fault messages, in some cases with restrictions. After operation, the causes of active fault messages must be eliminated to prevent later failures.



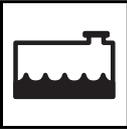
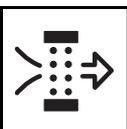
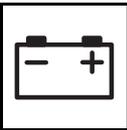
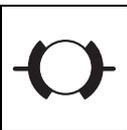
Colours are not used in this overview.

The table provides an overview. The symbols that can be displayed vary according to the crane type and equipment. Also observe the overview provided separately, it may contain additional symbols.



Symbols on the CCS display

Symbol	Cause Details / effect	Remedy
	<p>Engine oil pressure too low</p> <p>Danger of damage to the engine! Possibly also additional displays/error messages and warning buzzer</p>	<p>Due to the current situation, stop operation and switch off the engine</p> <p>Check the oil level and top up if necessary</p> <p>If the oil level is correct, check the additional displays/error messages and notify Grove Product Support.</p>
	<p>Engine malfunction – critical</p> <p>A critical engine malfunction has been detected</p> <p>Error message stored in the <i>Engine/transmission error</i> menu</p> <p>Danger of damage to the engine!</p> <p>Some additional displays are also active</p>	<p>While paying attention to the current traffic situation, stop driving and switch off the engine</p> <p>Check the error messages and additional displays</p> <p>Notify Grove Product Support</p>
	<p>Engine malfunction</p> <p>An engine fault has been detected</p> <p>Error message stored in the <i>Engine/transmission error</i> menu</p> <p>Some additional displays are also active</p>	<p>After driving – check the error messages, check the additional displays and observe the instructions;  p. 8 - 37,  p. 8 - 3</p> <p>At the next opportunity – notify Grove Product Support and have the fault rectified</p>
	<p>Engine speed too high</p> <p>The maximum permissible engine speed has been exceeded</p> <p>Danger of damage to the engine!</p>	<p>– Driving Slow down the truck crane</p> <p>– Crane operation For the active <i>Lower hoist</i> movement – reduce speed</p>
	<p>Fuel tank is almost empty</p> <p>Level at approx. 10%</p>	<p>Refuel before the fuel is used up</p>

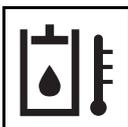
Symbol	Cause Details / effect	Remedy
	Coolant level too low	After driving – top up the coolant. If the message appears again – notify Grove Product Support and have the fault rectified
	Engine preheating active Engine start disabled	Goes out after preheating – enable engine start if there are no other errors
	Replace engine air filter Air filter soiled	At the next opportunity – replace the air filter; ➡ <i>Maintenance manual</i>
	Battery charge level Battery charge level is too low Operation possibly restricted!	– Engine running Due to the current situation, stop operation, switch off the engine and search for the cause. – Engine off Switch off all electrical consumers and start the engine to charge the battery
	Brake circuit pressure too low Pressure below approx. 5.5 bar (80 psi) Modified driving and braking behaviour possible! Some additional displays are also active	Stop the truck crane taking the current traffic situation into account Build up supply pressure; ➡ p. 5 - 11 Notify Grove Product Support if sufficient pressure build-up is not possible



Symbol	Cause Details / effect	Remedy
	<p>Supply pressure too low</p> <p>The supply pressure in the compressed air system is below approx. 6 bar (87 psi).</p> <p>The brakes may be applied of their own accord if the pressure continues to fall!</p>	<p>Before driving – build up supply pressure.</p> <p>While driving – while paying attention to the current traffic situation, stop driving and notify Grove Product Support</p>
	<p>Transmission malfunction – critical (red)</p> <p>A critical transmission fault has been detected</p> <p>Restricted transmission functionality!</p>	<p>While paying attention to the current traffic situation, stop driving and switch off the engine</p> <p>Check the error messages</p> <p>Notify Grove Product Support</p>
	<p>Transmission malfunction (yellow)</p> <p>A critical transmission fault has been detected</p>	<p>After driving – check the error messages</p> <p>At the next opportunity – notify Grove Product Support and have the fault rectified</p>
	<p>Transmission not in neutral position</p> <p>Engine cannot be started because the transmission is not in the neutral position</p> <p>Gear shifting not possible because the supply pressure is too low</p> <p>Supply pressure cannot be built up because the engine is switched off</p>	<p>Supply the truck crane with compressed air via the filler connection and shift the transmission into the neutral position.</p> <p>Notify Grove Product Support if gear shifting is still not possible.</p>

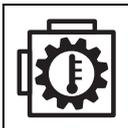
Symbol	Cause Details / effect	Remedy
	External system error (red)	
	<p>Error message from external system (e.g. engine, transmission)</p> <p>Error message stored in the <i>Engine/transmission error</i> menu</p> <ul style="list-style-type: none"> – Flashing – error message not checked yet – Lights up – error message checked but still present <p>Operation possibly restricted!</p> <p>Possibly also additional displays outside the <i>CCS</i> display</p>	<p>Under consideration of the current situation, stop operation</p> <p>Check the error messages and acknowledge the error if necessary;  p. 8 - 37</p> <p>Check the additional displays and observe the instructions;  p. 8 - 3</p> <p>After operation, have the error rectified and notify Grove Product Support</p>
	External system warning (yellow)	
	<p>Error message from external system (e.g. engine, transmission)</p> <p>Error message stored in the <i>Engine/transmission error</i> menu</p> <ul style="list-style-type: none"> – Flashing – error message not checked yet – Lights up – error message checked but still present <p>Possibly also additional displays outside the <i>CCS</i> display</p>	<p>Check the error messages and acknowledge the error if necessary;  p. 8 - 37</p> <p>After operation – check the additional displays and observe the instructions;  p. 8 - 3</p> <p>At the next opportunity notify Grove Product Support and have the fault rectified</p>
	Crane controller error (red)	
	<p>Error message stored in the <i>Crane operation error</i> menu</p> <ul style="list-style-type: none"> – Flashing – error message not checked yet – Lights up – error message checked but still present <p>Operation possibly restricted!</p>	<p>Under consideration of the current situation, stop operation</p> <p>Check the error messages and acknowledge if necessary</p> <p>After operation, have the error rectified and notify Grove Product Support</p>



Symbol	Cause Details / effect	Remedy
	Transfer case oil pressure too low	
	<p>Danger of damage to the transmission</p> <p>Some additional displays are also active</p>	<p>Due to the current situation, stop operation and switch off the engine</p> <p>Check the oil level and top up if necessary</p> <p>Notify Grove Product Support if the oil level is correct</p>
	Transfer case not in crane operation	
	<p>Changing over the transfer case to crane operation has not yet been completed yet or is disabled.</p> <p>No crane functions are available!</p>	<p>Start the engine from the crane cab</p> <p>Take the following measures if the symbol does not go out.</p> <ul style="list-style-type: none"> – Turn the ignition off for a few seconds and then turn it on again – restart the engine – Start the engine from the driver's cab and perform transmission shifting operations. – Notify Grove Product Support
	Starter fault (red)	
	<p>A starter fault has been detected</p> <p>Engine can no longer be started after an engine stop!</p>	<p>Before starting the engine – notify Grove Product Support</p> <p>While driving – if there are no driving restrictions and no warning messages, continue driving and notify Grove Product Support after stopping driving</p>
	Starter disabled (yellow)	
	<p>Conditions for engine start not fulfilled</p>	<p>Check and fulfil the start conditions;  p. 4 - 3.</p> <p>For example.</p> <ul style="list-style-type: none"> – Engine preheated? – Air intake inhibitor closed? – Immobiliser deactivated? – Transmission conditions fulfilled? <p>Notify Grove Product Support if necessary</p>
	Hydraulic oil temperature increased	
	<p>Hydraulic oil temperature above 60 °C (140 °F)</p>	<p>Observe the hydraulic oil temperature – must not go over 80 °C (176 °F)</p>

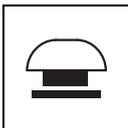
Symbol	Cause Details / effect	Remedy
	<p>Hydraulic oil too hot</p> <p>Hydraulic oil temperature above 80 °C (176 °F)</p> <p>Danger of overheating!</p> <p>Error message stored in the <i>Crane operation error</i> menu</p>	<p>– When driving</p> <p>Reduce power and interrupt operation at the next opportunity.</p> <p>Allow the engine to run until the oil has cooled below 75 °C (176 °F)</p> <p>– During crane operation</p> <p>Under consideration of the current situation, stop operation immediately.</p> <p>Allow the engine to run until the oil has cooled below 75 °C (176 °F)</p>
	<p>Hydraulic oil is preheated</p> <p>The preheating function is activated.</p> <p>Only restricted crane operating is permitted when the oil is cold</p>	<p>Observe the instructions on operation with cold hydraulic oil:  p. 11 - 14</p> <p>Wait until the hydraulic oil has been preheated – the function switches off at approx. 30 °C (86 °F).</p>
	<p>Hydraulic oil filter 1 soiled</p> <p>Filter soiled</p> <p>The number in the symbol identifies the filter – there is one symbol per filter</p> <p>The hydraulic oil can become too hot</p>	<p>At the next opportunity – replace the filter;  <i>Maintenance manual</i></p>
	<p>Angle gear oil level too low</p> <p>Danger of damage to the transmission</p>	<p>Due to the current situation, stop operation and switch off the engine</p> <p>Check oil level</p> <p>Notify Grove Product Support if the oil level is correct</p>



Symbol	Cause Details / effect	Remedy
	Angle gear oil temperature (red)	
	Maximum permissible oil temperature exceeded. Danger of damage to the transmission	Due to the current situation, stop operation and switch off the engine Allow the angle gear to cool down
	Angle gear oil temperature (yellow)	
	The oil temperature has increased.	Reduce the engine speed to relieve the load on the angle gear
	Exhaust system malfunction – critical (red)	
	The AdBlue supply is almost empty or a critical fault has been detected in the exhaust treatment system Operating restrictions will occur soon! Some additional displays are also active	Under consideration of the current situation, stop operation If necessary, top up AdBlue If the AdBlue supply is sufficient – check the additional displays/error messages and notify Grove Product Support
	Exhaust system malfunction (yellow)	
	The AdBlue supply is low or a fault has been detected in the exhaust treatment system Operating restrictions will occur soon! Some additional displays are also active	If necessary, override the torque reduction and top up with AdBlue as soon as possible If the malfunction persists – check the additional displays/error messages and notify Grove Product Support at the next opportunity
	Exhaust system temperature too high	
	Currently high engine load or Exhaust system cleaning is active – additional displays active or Exhaust system fault – additional displays active	Reduce the load on the engine Goes out again when exhaust system cleaning has finished Check the error messages

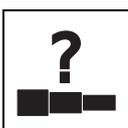
Symbol	Cause Details / effect	Remedy
	Torque reduction active (red)	
	Less than 50% of the power still available Some operations restricted!! Additional displays active	Due to the current situation, stop operation and switch off the engine Check the additional displays/warning messages and notify Grove Product Support
	Torque reduction active (yellow)	
	More than 50% of the power still available Some operations restricted!! Additional displays active	Driving can be continued Observe the additional displays/error messages
	Exhaust system cleaning required	
	Flashing – cleaning is in progress Lights up – cleaning necessary	Goes out when cleaning has finished Start cleaning manually as soon as this is possible;  p. 5 - 64
	Exhaust system cleaning disabled	
	Cleaning was intentionally disabled, e.g. the crane is in a danger area	Enable cleaning when outside the danger area
	Air intake inhibitor malfunction	
	Air intake inhibitor fault detected Operation is endangered!	In a danger area (e.g. refinery) – Under consideration of the current situation, stop operation and notify Grove Product Support Outside the danger area – Carefully continue operation and observe the warning messages. – Notify Grove Product Support
	Air intake inhibitor triggered	
	– Engine stop – Engine start not possible	If necessary, reset the emergency stop switch Open the air intake inhibitor or wait until it opens automatically, depending on the system;  p. 4 - 21

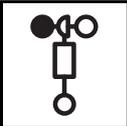


Symbol	Cause Details / effect	Remedy
	Air intake inhibitor – perform function test (red)	
	Function test is overdue	Perform a function test as soon as possible; ▣▣▣▣► <i>Maintenance manual</i>
	Air intake inhibitor – perform function test (yellow)	
	Function test is due	Perform a function test within one week; ▣▣▣▣► <i>Maintenance manual</i>
	Replace steering circuit filter 1	
	Filter soiled – The number in the symbol identifies the filter – there is one symbol per filter	At the next opportunity – replace the filter
	Emergency stop switch operated	
	Engine stop All functions disabled	If no danger exists, reset the emergency stop switch If necessary, open the air intake inhibitor
	Permissible lateral tilt exceeded	
	A warning buzzer sounds The maximum permissible lateral inclination angle (approx. 0.5° to 1°) for driving with a rigged crane was exceeded Continuing driving poses a risk of overturning!	Stop the truck crane! Risk of overturning – the suspension must remain switched off! Align the truck crane horizontally; ▣▣▣▣► p. 12 - 54
	Suspension operating pressure too high	
	A warning buzzer sounds With the suspension switched off, the maximum permissible pressure was exceeded at at least one pressure point – Axle raising movements that would increase the pressure are disabled	When driving with a rigged truck crane Stop and align the truck crane horizontally – using the outriggers if necessary When operating the axle raise system Align the truck crane horizontally by driving with enabled movements

Symbol	Cause Details / effect	Remedy
	Driver's cab not locked	
	The driver's cab can tilt forwards when braking!	Lock the driver's cab
	Main boom not set down	
	The main boom is not resting in the boom rest Risk of accidents by exceeding the total permissible height!	Set down the main boom on the boom rest
	Camera extended	
	The camera on the turntable is extended The specified vehicle height for on-road driving is exceeded	Retract the camera before on-road driving
	Spotlights not in the transport position	
	If the boom is set down further, the slewable spotlights will collide with carrier components	Swing the spotlights to the transport position – the symbol must go out
	Power supply connected	
	An external power supply is connected via a cable Risk of damage when starting driving – warning buzzer sounds when selecting a gear!	Before driving – disconnect the power supply
	Speed too high	
	The current speed is higher than 90 km/h (56 mph)	Slow down the truck crane



Symbol	Cause Details / effect	Remedy
	Cruise control	
	<ul style="list-style-type: none"> – Grey – ready for operation – Black – switched on 	
	Transmission retarder active	
	The transmission retarder has been switched on	Switch off the transmission retarder when it is no longer required
	Hydraulic emergency operation is active	
	Hydraulic emergency operation in accordance with DGUV was enabled for emergency supply of another truck crane	After the emergency supply, switch off hydraulic emergency operation in order to avoid restrictions while driving
	Counterweight – pre-tensioning pressure too low	
	<ul style="list-style-type: none"> – the pre-tensioning pressure is at the lower limit <p>Slewing will be disabled if the pressure falls further!</p>	Pre-tension counterweight
	Slewing disabled by counterweight	
	The pre-tensioning pressure is too low or the counterweight is not completely lifted.	Pre-tension counterweight
	Unknown telescoping	
	<p>Different values recorded for the current telescoping</p> <p>RCL shutdown</p> <p>Or</p> <p>The <i>Telescoping</i> emergency program is active</p>	<p>Enter the current telescoping if possible.</p> <p>Or</p> <p>Retract the main boom using the emergency program – if necessary, after consulting Grove Product Support</p>
	Superstructure lock – pin is not completely retracted	
	Risk of damage during slewing!	Fully unlock the superstructure

Symbol	Cause Details / effect	Remedy
	Anemometer not connected	
	Anemometer input signal interrupted No current wind speed display available!	Query the local weather service for wind speed predictions at the site. Have the error rectified at the next opportunity and notify Grove Product Support
	Left control lever fault	
	Initial position not detected when the ignition is switched on	Move both control levers to the initial position and repeat the query in the current menu If necessary, switch the ignition off and on again
	Right control lever fault	
	Initial position not detected when the ignition is switched on	Move both control levers to the initial position and repeat the query in the current menu If necessary, switch the ignition off and on again
	Swing-away lattice – position not clear	
	The current position of the swing-away lattice cannot be identified Telescoping is disabled!	Measure the current position of the swing-away lattice on the exterior of the truck crane. For telescoping – swing the swing-away lattice to the necessary position using the hand-held control or emergency operation and enable telescoping;  <i>Lattice extension operating manual</i>
	Swing-away lattice – automatic swinging disabled	
	During <i>Swing swing-away lattice</i> emergency operation, telescoping was enabled and this is executed regardless of the position of the swing-away lattice. Risk of damage during telescoping!	Before telescoping – use emergency operation to swing the swing-away lattice to the necessary position for telescoping. Before on-road driving – use emergency operation to swing the swing-away lattice to the necessary position for transport  <i>Lattice extension operating manual</i>



Symbol	Cause Details / effect	Remedy
	Heating tank below the crane cab is almost empty Level below approx. 7 l (1.85 gal)	Refuel before the fuel is used up;  p. 4 - 7
	Telescoping cylinder – end position approached Extension disabled	Retract
	Slewing disabled by auxiliary hoist The lifting frame is not completely raised	Raise lifting frame – operation with hand-held control
	Telescoping mechanism – pressure too low The pressure in the <i>HP</i> pressure accumulator is below the minimum value	Lock the telescopic section or retract it up to the stop
	Telescoping mechanism – pressure too high The pressure in the <i>LP</i> pressure accumulator is above the maximum permissible value	Extend

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8.3.4

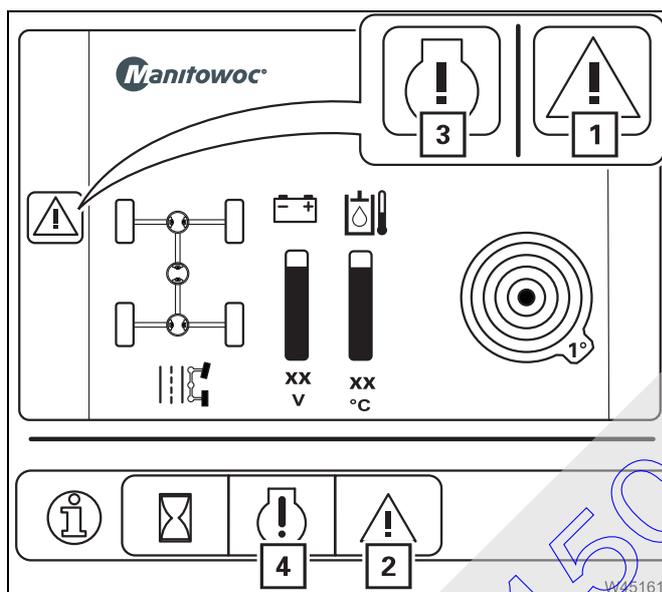
Error messages on the CCS display



Risk of accidents!

The crane control system may only be repaired by trained and qualified personnel.

- If an error message appears, stop while paying attention to the traffic situation;
 ■■■► *What to do when a malfunction occurs in road traffic*, p. 8 - 2.



Symbol (1) or (3) flashes when the CCS detects an error. The symbols flash alternately if both error types apply.

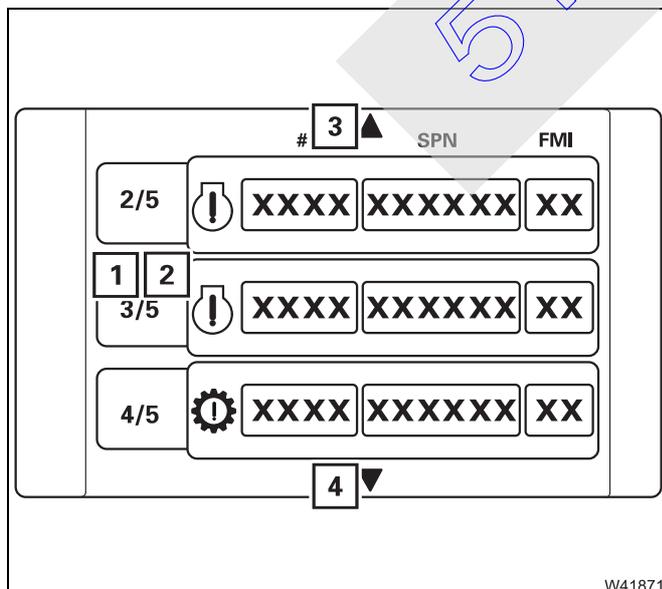
(1) – Crane operation error

The buzzer tone sounds once.

- Open the *Crane operation error* menu (2);
 ■■■► *Special error messages*, p. 14 - 7.

(3) – Engine/transmission error

- Switch off the engine immediately.
- Open the *Engine/transmission error* menu (4).



Displaying errors / total errors

The display (2) shows the error total and the display (1) shows which error is displayed.

3/5 for example, means:

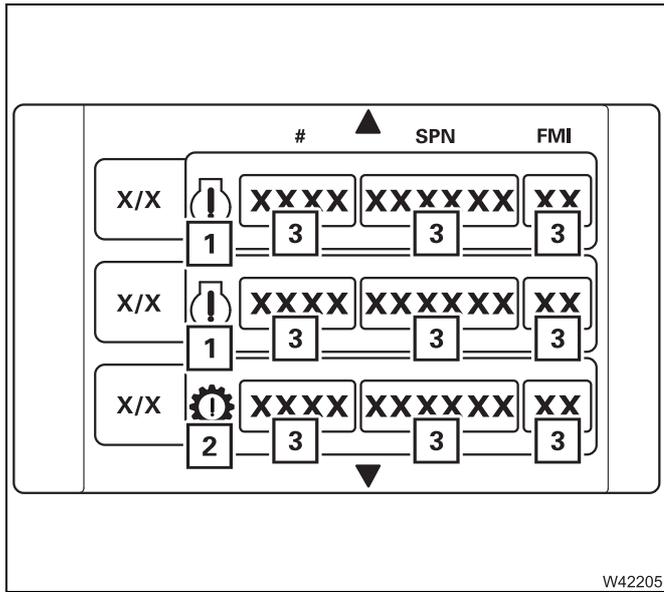
- Error 3 is shown,
- there are a total of 5 errors.

Displaying errors

- Select and confirm the symbol (3) or (4) to show any additional errors.

- 3 Next error
- 4 Previous error





Error message display

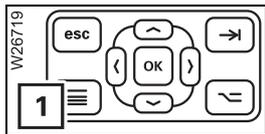
For each error there is

- The error code (3),
- The symbols for the faulty component:

1	Engine
2	Transmission

- Always note the error code before contacting **Grove Product Support**.

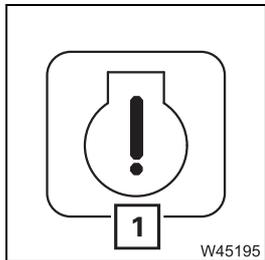
Exit menu



You can exit the *Engine/transmission errors* menu at any time.

- Press the button (1) once.

The next highest menu is opened.

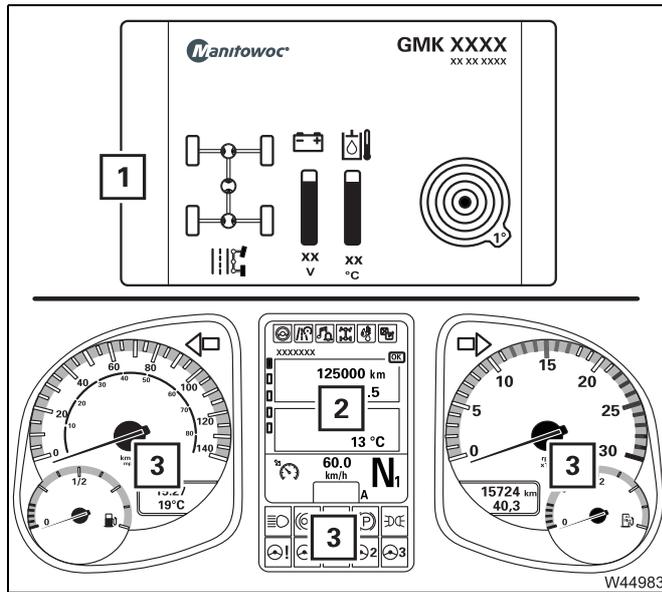


The buzzer tone sounds once when an additional error occurs.

Symbol (1) is displayed until all errors have been corrected.

8.4

Troubleshooting



This section only deals with malfunctions not displayed by the control. If a warning message or error message is displayed, then observe the information in the corresponding section.

In area (1)

▣▣▣▣ Warning messages on the CCS display, p. 8 - 23

In area (2)

▣▣▣▣ Warning and fault messages on the on-board computer, p. 8 - 7

In area (3)

▣▣▣▣ Warning messages on the centre control unit, p. 8 - 3



In addition to the information in this section, check whether a corresponding fuse is faulty; ▣▣▣▣ p. 8 - 67.

8.4.1

Malfunctions at the engine



In addition to this information; ▣▣▣▣ *Separate engine manufacturer's operating manual.*

Malfunction	Cause	Remedy
Engine does not start	Battery master switch switched off	Switch on the battery master switch; ▣▣▣▣ p. 4 - 11
	Ignition off	▣▣▣▣ <i>Switching on the ignition,</i> p. 4 - 11
	Transmission not in neutral position	▣▣▣▣ <i>Switching the transmission to neutral position,</i> p. 5 - 42
	Parking brake released	▣▣▣▣ <i>Apply parking brake,</i> p. 3 - 69



Malfunction	Cause	Remedy
Engine does not start	Emergency stop switch actuated	▣▣▣▣ <i>Resetting the emergency stop switch</i> , p. 4 - 20
Truck crane driving at maximum 20 km/h (12 mph)	A locking procedure is not yet completed	Lock the differential locks or steering
Engine cannot be switched off using the ignition key	Malfunction in the electronics	Switch off the engine with the emergency stop device; ▣▣▣▣ p. 8 - 1
Engine/transmission diagnostics plug not working	Fuse is blown	Replace blown fuses; ▣▣▣▣ p. 8 - 67

8.4.2 Malfunctions in the transmission

Malfunction	Cause	Remedy
Transmission only shifts up to second gear – the symbol is displayed	Gear oil colder than about -7 °C (20 °F)	Wait until gear oil temperature increases
Transmission no longer shifts up gears at speeds over about 20 km/h (12 mph)	A locking procedure is not yet completed	Switch off differential locks; ▣▣▣▣ p. 5 - 72
Transmission does not shift – the symbol is displayed	Transmission retarder switched on	▣▣▣▣ <i>Switching off the additional brakes</i> , p. 5 - 61
The transmission does not respond to the operating elements	Transmission cannot shift down gears otherwise the maximum permissible engine speed would be exceeded at lower gears	Slow down the truck crane
Transmission diagnostics plug not working	Fuse is blown	Replace blown fuses; ▣▣▣▣ p. 8 - 67

8.4.3

Malfunctions of the differential locks

Malfunction	Cause	Remedy
Differential locks cannot be switched on	Current speed above about 5 km/h (3 mph)	Slow down or stop the truck crane
	Drive train under tension	Drive truck crane slowly back and forth in a straight line ▣▣▣▣▶ p. 5 - 71
	Compressed air system insufficiently filled	▣▣▣▣▶ <i>Building the supply pressure</i> , p. 5 - 11
	Control unit fuse blown	Replace blown fuses; ▣▣▣▣▶ p. 8 - 67
Differential locks cannot be switched off	Current speed above about 5 km/h (3 mph)	Slow down or stop the truck crane
	Drive train under tension	Drive truck crane slowly back and forth in a straight line ▣▣▣▣▶ p. 5 - 71

8.4.4

Transfer case malfunctions

Malfunction	Cause	Remedy
Switching operations are not performed	Supply pressure insufficient	▣▣▣▣▶ <i>Building the supply pressure</i> , p. 5 - 11

8.4.5 Malfunctions of the steering

Malfunction	Cause	Remedy
Steering wheel hard to turn, creaking noises when steering	Oil level in the hydraulic oil tank too low	Check the hydraulic oil level; ■■■► <i>Maintenance manual</i> . Then drive at low speed to the nearest repair shop and have the cause checked
Separate steering cannot be switched on	Current speed above about 5 km/h (3 mph)	Slow down or stop the truck crane
Separate steering cannot be switched off	Current speed above about 5 km/h (3 mph)	

8.4.6 Malfunctions at the suspension

Malfunction	Cause	Remedy
Suspension cannot be switched on	Current speed above about 5 km/h (3 mph)	Slow down or stop the truck crane
	Axle loads not evenly set	Use the raise axle function to set the axle loads evenly; ■■■► p. 12 - 60
	Suspension is switched off	■■■► <i>Switching on the suspension</i> , p. 5 - 19

8.4.7 Malfunctions of the level adjustment system

Malfunction	Cause	Remedy
Level adjustment system not working	Suspension is switched off	■■■► <i>Switching on the suspension</i> , p. 5 - 19

8.4.8

Malfunctions in the hydraulic system/hydraulic oil cooler

Malfunction	Cause	Remedy
Hydraulic oil temperature above 80 °C (176 °F), fan in the hydraulic oil cooler not running	Faulty temperature sensor in the circuit of the hydraulic system, error message is displayed	Have the temperature sensor replaced

8.4.9

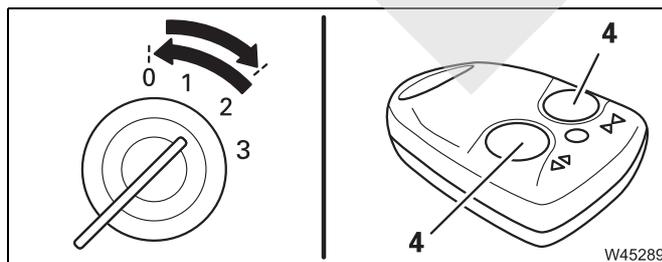
Malfunctions at the CCS/RCL control units

▣▣▣▣ Malfunctions at the CCS/RCL control units, p. 14 - 22

8.4.10

Malfunctions at the central locking system

Malfunction	Cause	Remedy
The locking system does not respond to the remote control	Battery master switch switched off	Switch on battery master switch; ▣▣▣▣ p. 4 - 11.
	Batteries in remote control flat	Change batteries 2 x type CR 1620
	Remote control is not identified (e.g. after changing batteries)	Re-teach the remote control

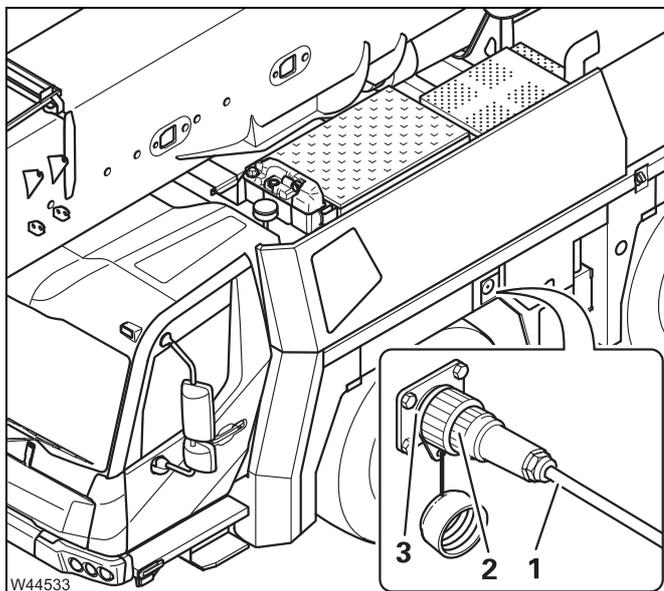


Re-teach the remote control

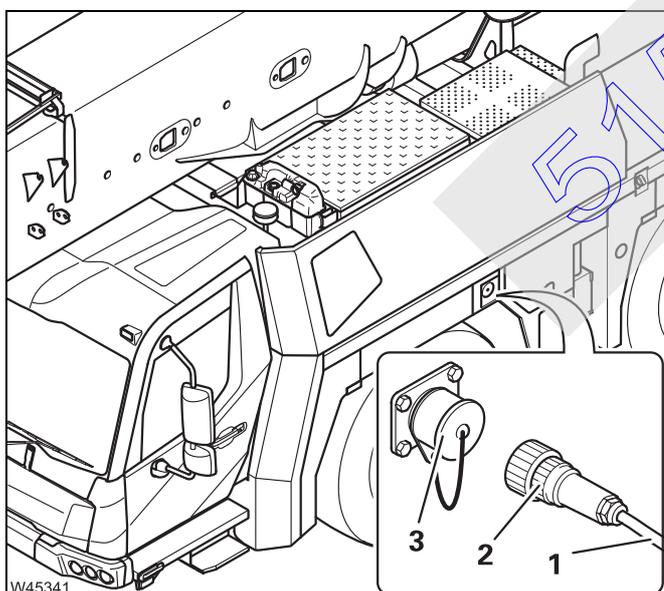
- Turn ignition key to position 2 and to position 0 within 3 seconds
- Press a button (4) 3 times within 20 seconds.

8.5 Emergency operation and breakdown assistance

8.5.1 Externally starting the truck crane



- Start the engine of the auxiliary vehicle.
- Connect the cable (1) to the power supply (24 V) of the auxiliary vehicle.
- Insert the plug (2) into the socket (3).
- Start the truck crane engine.



- Unplug the plug (2).
- Close the socket (3).
- Remove the cable (1) from the auxiliary vehicle.

The socket (3) can also be used as a power source for another vehicle (with a 24 V on-board electrical system).

8.5.2

Battery charger

Prerequisites

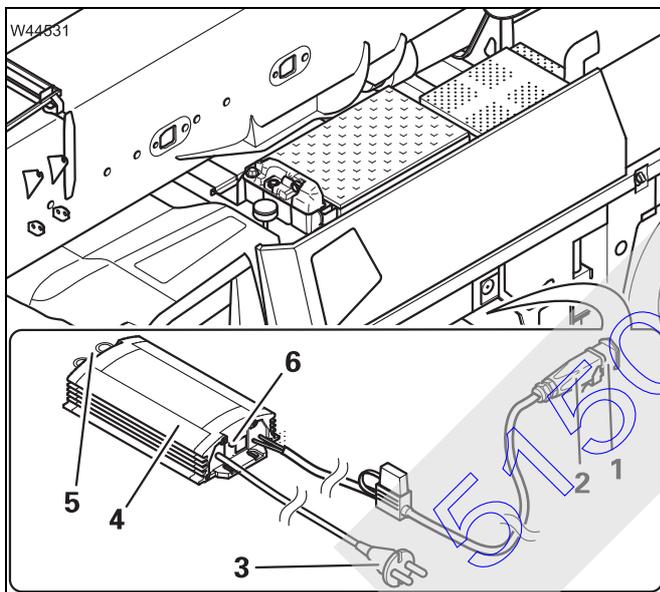
- The engine has been stopped and secured against unauthorised use,
- An external 230 V power supply is available at the location,
- The location is well ventilated and protected against moisture.



Risk of explosion when operating the battery charger!

The battery charger must not be operated:

- At service stations and tank farms
- At places where flammable gases or vapours can be found or formed (for example, at places where fuel is stored and in chemical factories),
- At places where explosive dust can be found or formed (e.g. carbon dust, wood dust and grain dust).

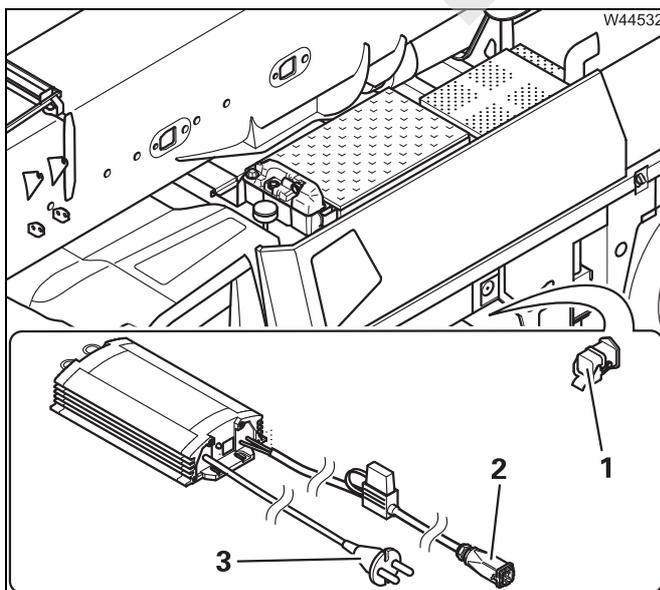


Connecting

- Insert the plug (2) into the socket (1).
- Place the battery charger (4) in a protected place where you can see the indicator lamp (6).
The battery charger can be suspended from the ring eyes (5).
- Insert the plug (3) into the socket of the 230 V power supply at the location.

The battery charger switches on. The lamp (6) on the battery charger indicates the status:

- **Flashing:** The battery is being charged
- **Lights up:** Charging complete



Disconnecting

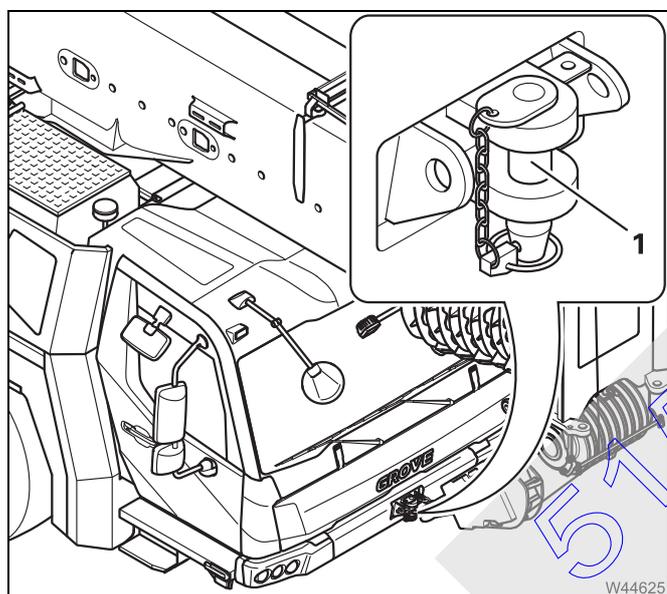
- Remove the plug (3) from the socket.
- Remove the plug (2) from the socket (1).
- Close the socket (1).
- Return the battery charger to the storage compartment in the driver's cab.

8.5.3

Towing away the truck crane

Observe the following if the truck crane has to be towed away:

- 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.
- Make sure to observe the statutory regulations of the country in which you are working concerning the total length of the towing and towed vehicle, including tow-rod.
- If the engine, steering and service brake are still working, you can tow the truck crane with a lorry.
- If the engine, steering or service brake are no longer working properly, the truck crane must be towed away with a special breakdown truck.



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

In the case of engine/transmission damage



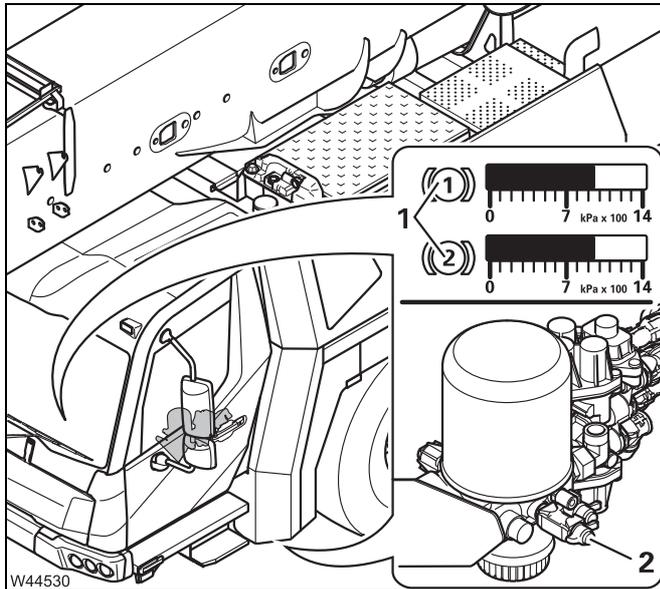
The following information only applies to towing the truck crane out of the immediate danger area in the event of damage to the engine or transmission.

Risk of damage to the drive line!

Always take all the measures given in this section before towing away. Tow the truck crane at a maximum speed of 7 km/h (4 mph) and for a maximum distance of 100 m (330 ft). For longer distances, additional measures must be taken, for these contact **Grove Product Support**.

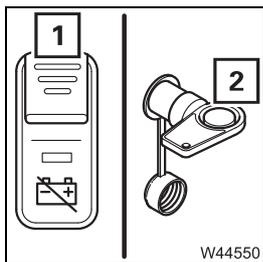
Compressed-air supply

If the engine fails, the truck crane must be supplied with compressed air by the towing vehicle so that the brake system is still supplied with compressed air.



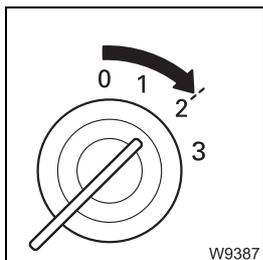
- Connect the filler connection (2) with the *supply* coupling head of the towing vehicle.

A supply pressure of at least 6 bar (87 psi) must be displayed in the driver's cab and the lamps (1) must not light up.

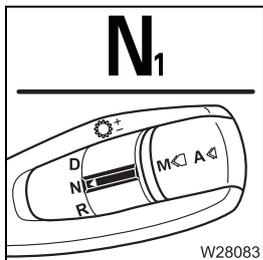


Electric power supply

- Switch on battery master switch 2 (2) first – if available.
- Switch on battery master switch 1 (1).



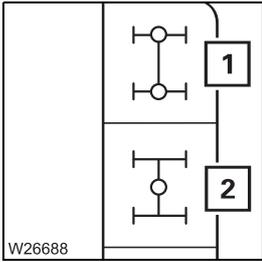
- Switch on the ignition.



On the transmission

- Switch the transmission to neutral position **N**; p. 5 - 42.





Final drives

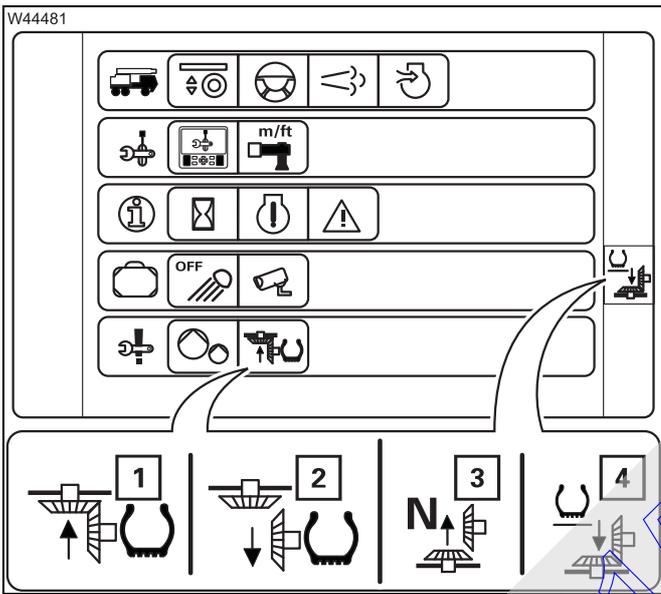
- Switch off all differential locks.

The symbols (1) and (2) must be **green**,

- Transverse differential locks; ■■■► p. 5 - 71,
- Longitudinal differential lock; ■■■► p. 5 - 71.

Transfer case

- Switch on towing mode.



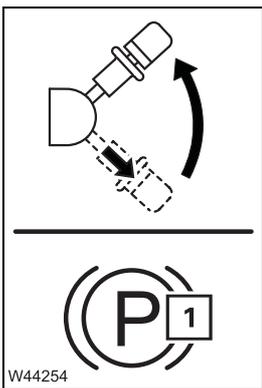
Switching towing mode on/off

Switching on

- Select and confirm the symbol (1).
 - Symbol (2) is displayed – towing mode on.
 - Symbol (3) is displayed – transfer case in neutral position.

Switching off

- Select and confirm the symbol (2)
 - Symbol (1) is displayed – towing mode off.
 - Display (4) – symbol for the current switching state, for example, for on-road driving.



Parking brake

- Release the parking brake.
 The lamp (1) must go out.

If the lamp does not go out, 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 the supply pressure*, p. 5 - 11.

If the lamp (1) does not go out, there is a damage to the parking brake. Contact **Grove Product Support**.

Risk of accidents due to faulty brakes!

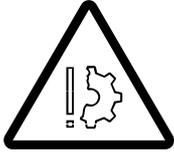
If the service brake system has been damaged, you may only tow the truck crane away from the immediate danger area after consulting **Grove Product Support**.



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 towing vehicle accelerates only slowly.



Risk of damage to the chassis!

Starting abruptly or quickly can damage the chassis!

- Bear in mind that steering is sluggish.
If the engine fails, only the emergency steering pump is available, which supports the steering only at a speed of at least 2 km/h (1.2 mph).



Risk of accidents due to sluggish steering!

At speeds less than 2 km/h (1.2 mph) the truck crane is barely steerable.

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

Longer towing distances

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

- If you need to tow the truck crane further than **100 m** (330 ft) contact **Grove Product Support**.



Risk of accidents and damage when towing the truck crane over long distances!

Tow the truck crane at a maximum speed of 7 km/h (4 mph) and for a maximum distance of **100 m** (330 ft). For longer distances, additional measures must be taken, for these contact **Grove Product Support**.

Tow starting

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

8.5.4

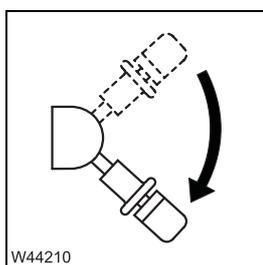
Wheel change

- 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 as flat a place as possible to change the wheel.



Risk of accidents due to a wheel falling over!

If you temporarily lean a wheel against the truck crane while changing it, secure it with a rope to prevent it falling over!
Move the outriggers only when no wheel is leaning against the truck crane.



- Apply the parking brake.



Risk of crushing due to turning wheels!

When you start the engine, no persons may be within the steering range of the 3rd to 5th axle lines. These axle lines can be briefly steered during the start of the engine; sometimes with a delay of five seconds.

Removing a damaged wheel



- Switch off the suspension; p. 5 - 19.
- Raise the truck crane with the outriggers until the wheel to be changed just barely leaves the ground.

Risk of accidents due to a wheel falling over!

When unscrewing the final wheel nuts, the wheel can slip off the hub and fall towards you. Secure the wheel and step back quickly if the wheel begins to tip.

- Remove the wheel 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 on the spare wheel holder.

You can use a chain hoist or the truck crane for lifting.

- If you lift the wheel with the truck crane, then:
 - Support the truck crane and
 - Enter and confirm the current rigging mode.



Danger of overturning if the truck crane is free on wheels!

Always support the truck crane on outriggers before slewing the superstructure. Never operate the truck crane in the *Free on wheels* operating 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).

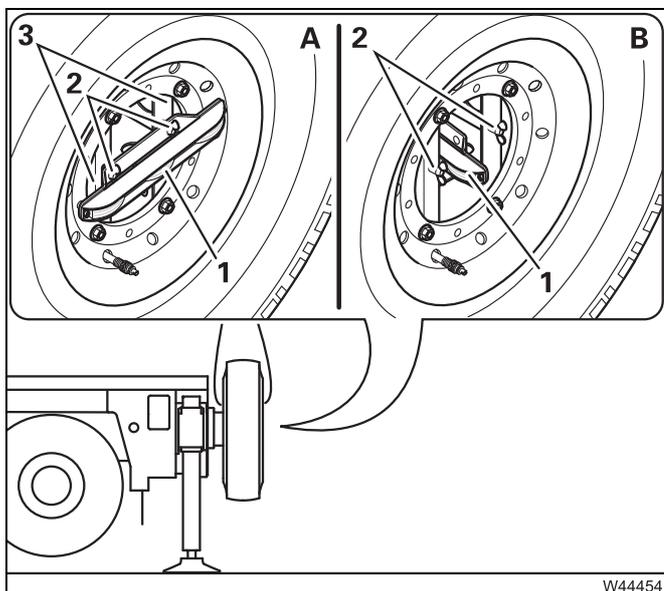
Correct the rigging mode if necessary; *Slewing with rigged counterweight*, p. 12 - 119.

- Attach the spare wheel only using lifting gear with sufficient load bearing capacity; *Spare wheel*, p. 1 - 11.



Additional rear light

If there is an additional rear light, then you must remove it before removing the wheel from the spare wheel holder. Before driving on the road, the additional rear light must be reattached.

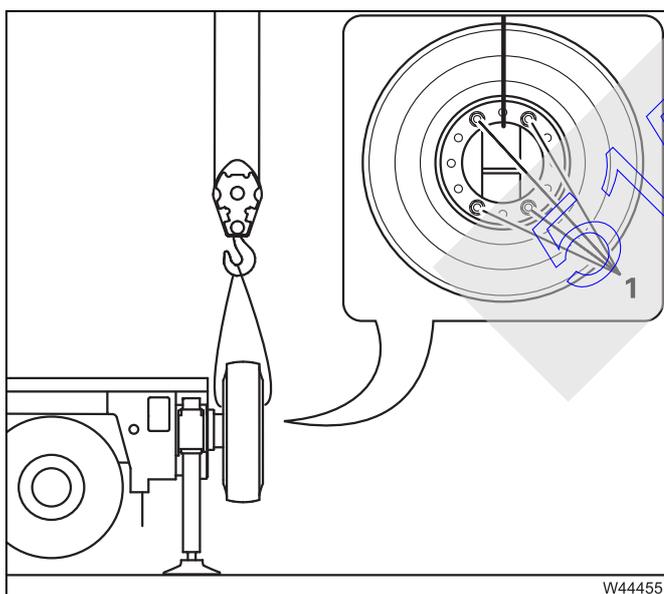


– Removing

- (A) – Remove the nuts (2).
- (B) – Fit the additional rear light (1) into the holder.
- Fasten the nuts (2).

– Attaching

- (B) – Remove the nuts (2).
- (A) – Fit the additional rear light (1) on to the holder (3).
- Secure the rear light with the nuts (2).



Removing a wheel

- Remove the nuts (1).
- Lift the spare wheel off the holder.
- Secure the spare wheel against falling over if you put it down temporarily.

Mounting a wheel

- Lift the wheel on to the holder.
- Secure the wheel with the nuts (1) and tighten them to 500 Nm (370 lbf ft).

Mounting a wheel

- Check that the bearing surfaces of the wheel rim and hub are clean (no paint, grease or oil).
- Slightly grease the wheel studs.



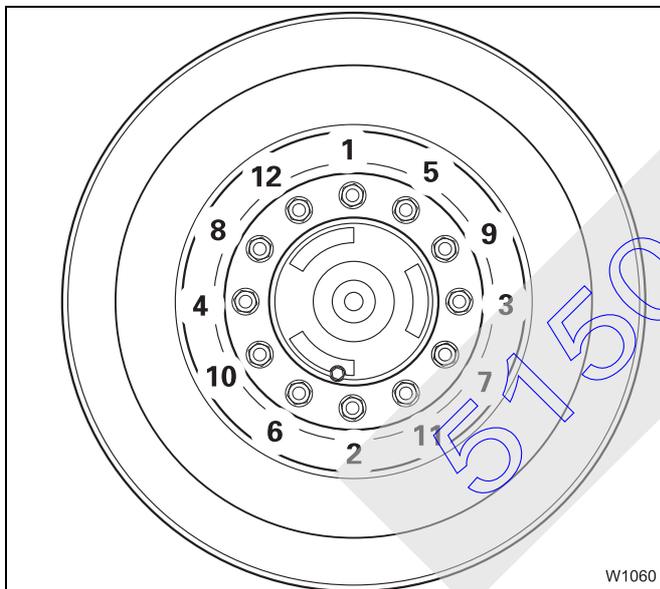
Risk of accidents!

Check the wheel rim, tyres, wheel nuts and wheel studs for damage before mounting the spare wheel.

Damaged parts may not be mounted!

Only mount the original wheel supplied by **Manitowoc Crane Group Germany GmbH** or an approved wheel of the same size and load bearing capacity!

- Place the wheel at the hub in an upright position.
- Extend or retract the supporting cylinders until the holes in the wheel rims are aligned with the wheel studs.
- Push the wheel on to the wheel studs. Make sure the threads of the wheel studs are not damaged.



- Hand-tighten the wheel nuts (1) and (2) to secure the wheel.
- Tighten the remaining wheel nuts hand-tight.
- Always tighten the wheel nuts in the order (1) to (12).
 - Tighten all wheel nuts first to 200 Nm (150 lbf ft).
 - Then tighten all wheel nuts to 400 Nm (300 lbf ft).
 - Finally tighten all wheel nuts to 650 Nm (480 lbf ft).

After 50 km (30 mi) and 150 km (90 mi) re-tighten all wheel nuts to 650 Nm (480 lbf ft).

8.5.5

Inflating the tyres yourself

In an emergency, if an appropriate filling hose is available you can inflate the tyres using the compressed air system of the truck crane.

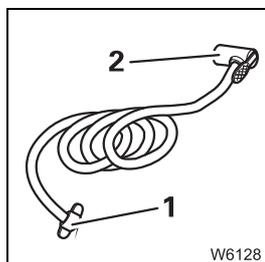
A tyre inflator connection set to a pressure of 10 bar (145 psi) is provided for this purpose. The tyres must not be inflated above this maximum pressure.



Risk of damage if the tyre pressure is too high!

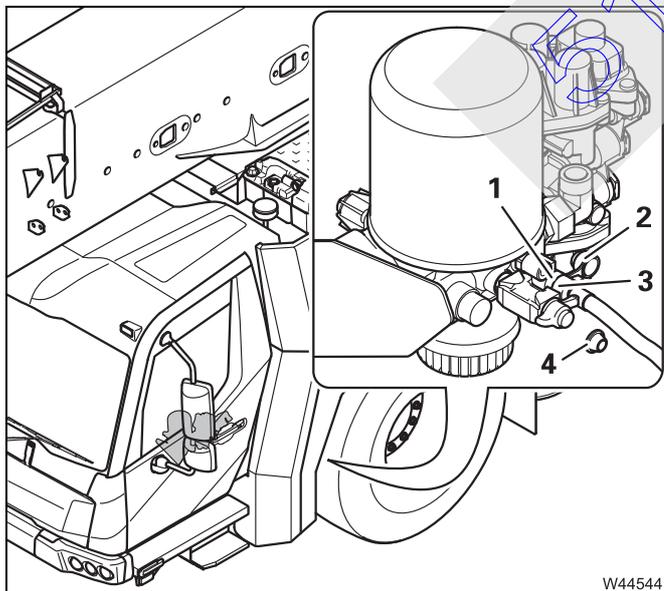
Depending on the size of the tyres, the prescribed pressure may be less than 10 bar (145 psi); *Tyres*, p. 1 - 18. Inflate the tyres to no more than the specified pressure. Interrupt the inflating procedure if necessary. This prevents the tyres becoming damaged and bursting while driving.

After you have inflated the tyres yourself, always drive directly to a service station or repair shop and adjust the tyre pressure.



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

Connecting the filling hose

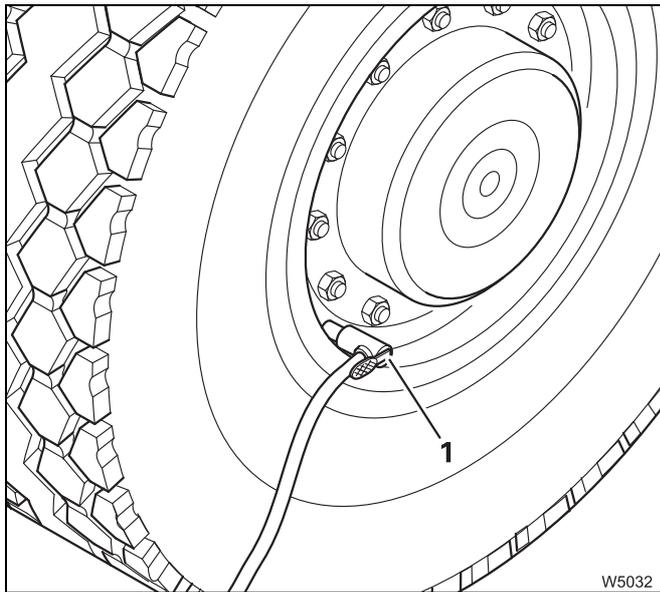


- Remove the caps (2) and (4).
- Fasten the connection (3) to the filler connection (1).

You can now inflate the tyres.

Inflating the tyres

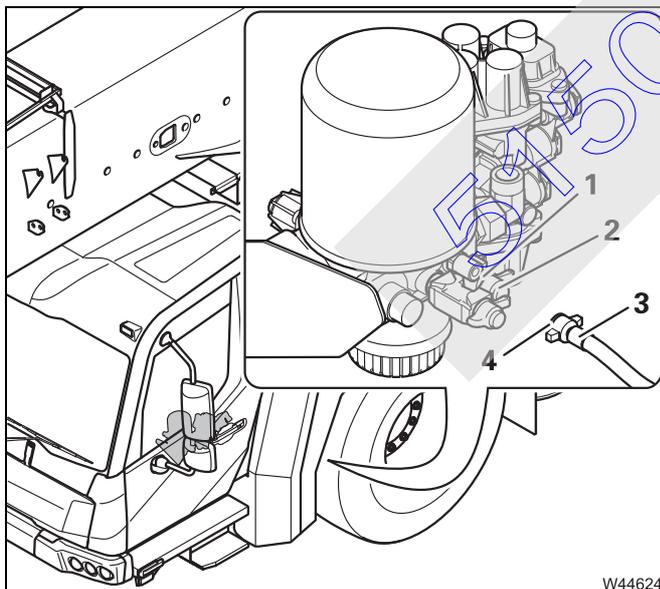
The maximum operation pressure of the compressed air system of 10 bar (145 psi) can only be reached with the engine running.



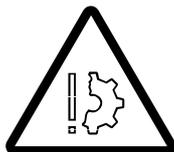
- Start the engine; ►►► p. 4 - 13.
- Fasten the tyre inflator connection (1) to the tyre valve.
- Press the button on the tyre inflator connection and inflate the tyre.
- Disconnect the tyre inflator connection (1) from the tyre valve.

Remove the filling hose

Before driving, you must remove the tyre filling hose from the tyre inflator connection.



- Remove the connection (3) from the filler connection (1).
- Close the filler connection and the connection with the caps (2) and (4).
- Stow the filling hose away.
- Drive to a service station or repair shop and adjust the tyre pressure.



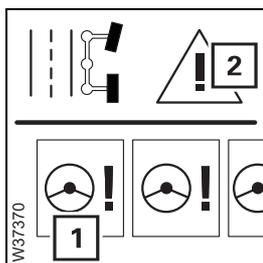
Risk of damage to the compressed air system!

Always close the filler connection with the cap.

This prevents damage to the compressed air system and contamination of it.

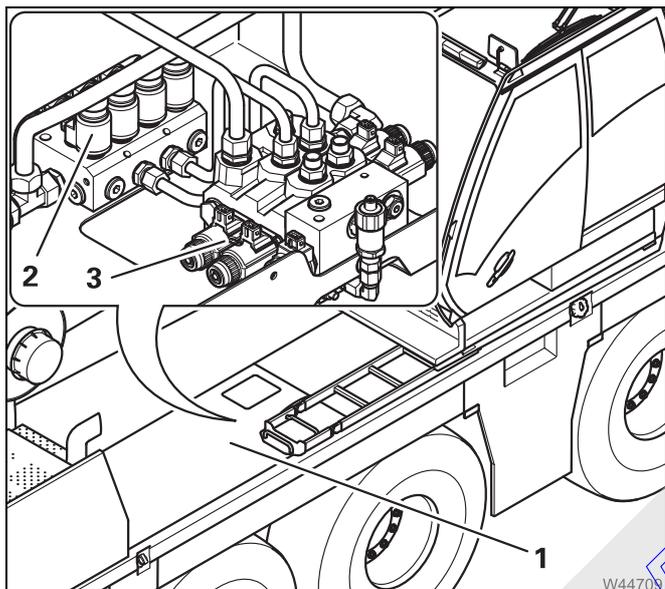
8.5.6

Emergency operation for steering 3rd and 4th axle line



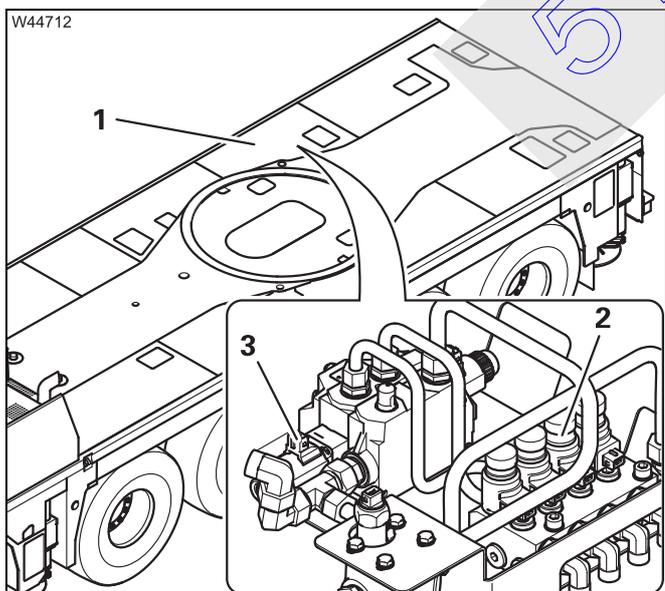
If there is a warning message in the steering system – lamp (1) lights and symbol (2) is red – the steering of the defective axle line is locked. This axle line can then no longer be steered from the driver's cab or from the crane cab.

In this case, you can steer the wheels of the defective axle line with emergency operation to the straight running position to be able to drive to the workshop.



Operating elements of 3rd axle line

- Remove the cover (1).
 - 2 Check valves
 - 3 Valves for operation
- Fasten the cover (1) after emergency operation.



Operating elements of 4th axle line

- Remove the cover (1).
 - 2 Check valves
 - 3 Valves for operation
- Fasten the cover (1) after emergency operation.

Applying emergency operation

If the current situation allows it, you can slightly lift the mobile crane with the support to relieve the axle line.

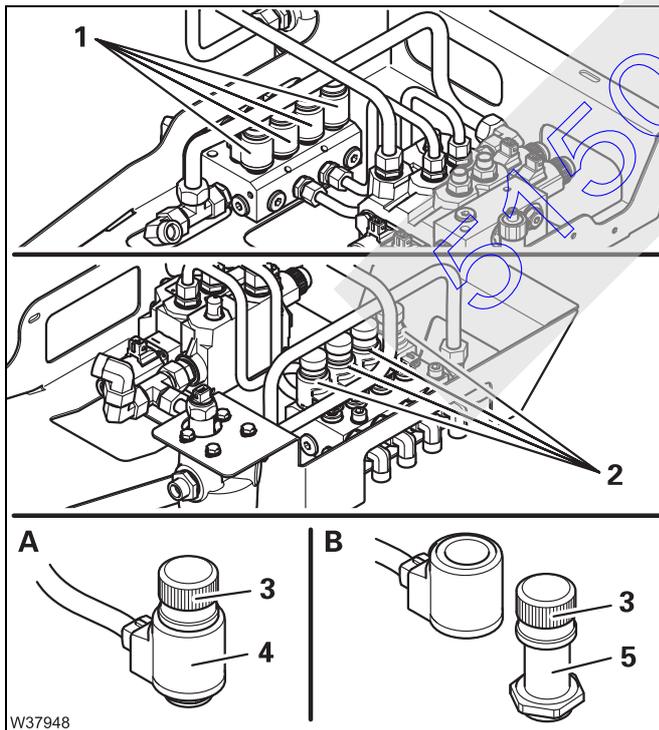
For the operation, you must

- Take out three fuses.
- Switch on continuous operation at the check valves.
- Steer the faulty axle line into the straight ahead position.
- Switch off continuous operation at the check valves.
- Take out three fuses.

Taking out fuses

You must take out three fuses before emergency operation so that the steering system electronics is deactivated.

- Switch off the ignition.
- Take out the fuses **F2/4** and **F2/5**; *Fuses in the driver's cab*, p. 8 - 68.
- Take out the fuse **F10**; *Fuses in the battery box*, p. 8 - 74.



Check valves – switch on continuous operation

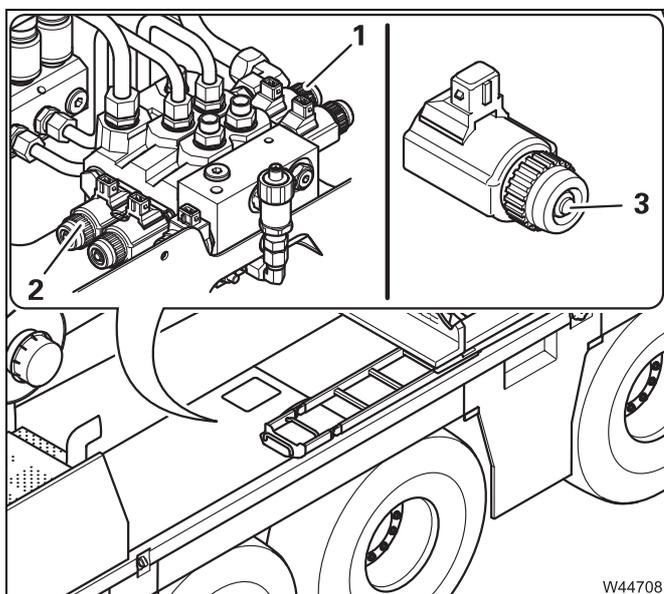
- **For the 3rd axle line**
 - Always switch on continuous operation for all valves (1).
- **For the 4th axle line**
 - Always switch on continuous operation for all valves (2).
- (A) – Remove the nuts (3).
- Remove the magnet (4).
- Mark the magnet in such a way that you can put it back on the corresponding valve later.
- (B) – Turn the nut (3) as far as possible on the valve (5) – do not tighten the nut.





Risk of crushing due to turning wheels!

Make sure that there are no persons near the wheels being steered before steering an axle line with emergency operation.



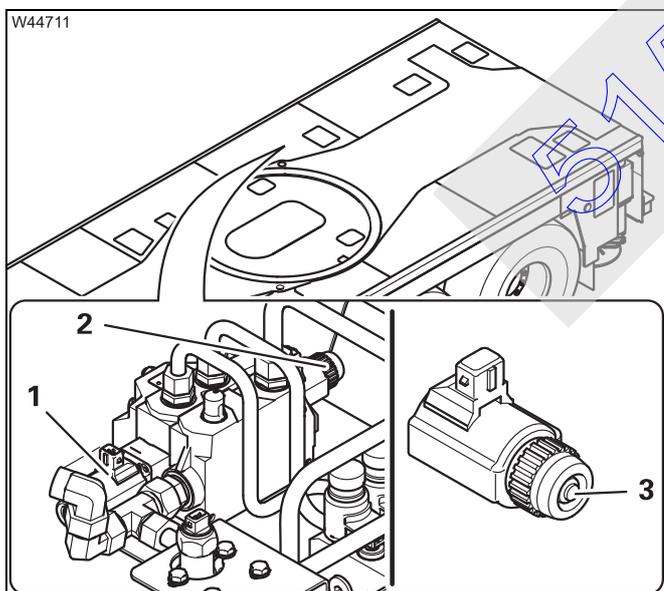
Steering of the 3rd axle line

The valves are labelled.

- 1 Y4903 – Steer to the left
- 2 Y4904 – Steer to the right

The valves are operated by pressing the valves in the middle (3) with a blunt object.

- Actuate the valve for the required steering direction until the 3rd axle line is in the straight-ahead position.



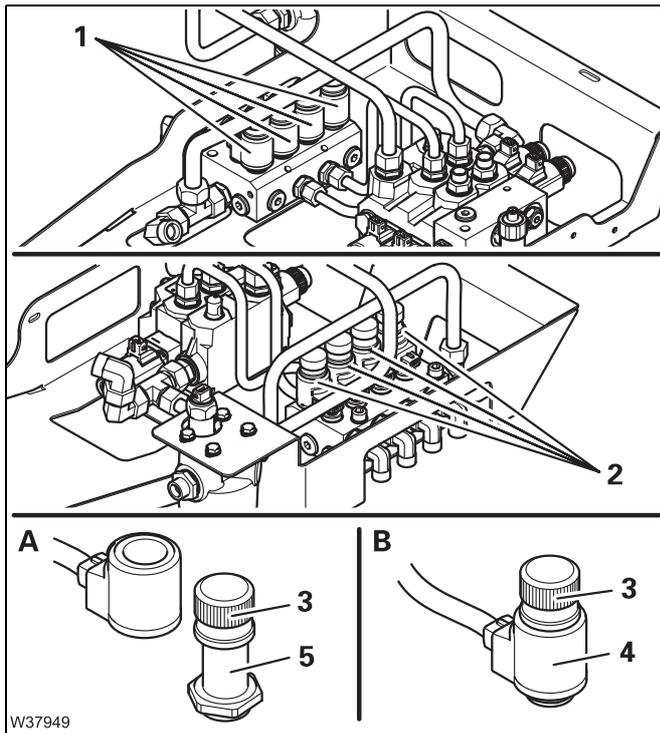
Steering of the 4th axle line

The valves are labelled.

- 1 Y4915 – Steer to the left
- 2 Y4916 – Steer to the right

The valves are operated by pressing the valves in the middle (3) with a blunt object.

- Actuate the valve for the required steering direction until the 4th axle line is in the straight-ahead position.



Check valves – switch off continuous operation

– For the 3rd axle line

- Always switch off continuous operation for all valves (1).

– For the 4th axle line

- Always switch off continuous operation for all valves (2).

- (A) – Remove the nut (3) from the valve (5).

- (B) – Fit the magnets (4) – pay attention to the marking!

- Hand-tighten the nut (3) on the valve (5).

Inserting the fuses

After emergency operation, you must insert the fuses again so that the 5th axle line can be steered while driving.

- Switch off the ignition.
- Insert the fuses **F2/4** and **F2/5**; *Fuses in the driver's cab*, p. 8 - 68.
- Insert the fuse **F10**; *Fuses in the battery box*, p. 8 - 74.

After emergency operation

- Drive directly to the repair shop and have the fault rectified.

The speed may be reduced depending on the extent of the fault.

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8.6

Tilting/lowering the driver's cab

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

This assumes that the engine can be started.



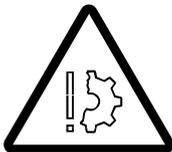
If the engine cannot be started, you must use hydraulic emergency operation to raise the main boom;  p. 14 - 53.

8.6.1

Prerequisites and information on tilting

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

- The truck crane is horizontal.
- All loose objects have been removed from the driver's cab!
- The main boom is raised to the extent (about 1.5 m (4.9 ft)) that the driver's cab does not touch the main boom (nor the hose drum) when tilting!
- Make sure that the hook block is outside the range of the driver's cab and the windscreen.



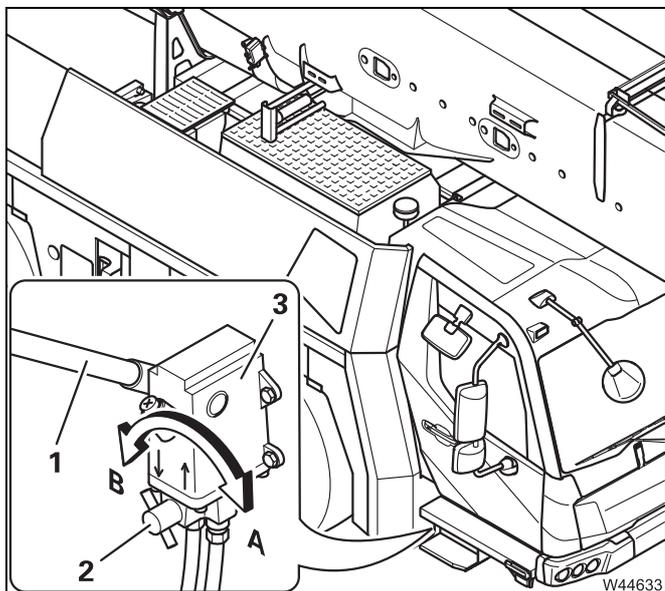
Risk of damage to the steering's universal joint!

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

8.6.2 Tilting/lowering the driver's cab

Operating the hand pump

The driver's cab is tilted and lowered using a hand pump. The lever for the hand pump is below the seats or in the tool box.



- Insert the lever (1) into the hand pump (3).
- To **tilt** the driver's cab, turn the lever (2) forwards, to position **A**.
- To **lower** the driver's cab, turn the lever (2) backwards, to position **B**.

Before tilting the driver's cab, note the prerequisites specified at the beginning of the section;  *Prerequisites and information on tilting*, p. 8 - 61.

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Tilting the driver's cab

- Remove all loose objects from the driver's cab. Close the doors.



Risk of accidents from loose objects and doors swinging open!

Remove all loose objects (e.g. bottles) from the driver's cab so that they do not fall out when the cab is tilted. Close the doors!

This prevents e.g. liquids from getting into the operating elements and doors from swinging open during tilting, thus injuring people.



Risk of accidents due to driver's cab tilting!

When you are tilting the driver's cab forwards and while it is actually tilted forwards, no-one may be in front of the driver's cab.



Risk of damage when the main boom angle is too small!

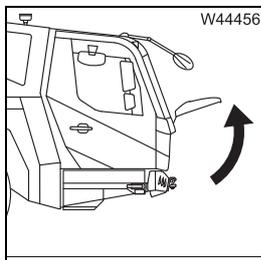
Only tilt the driver's cab when the main boom is sufficiently raised.

If you press the driver's cab against the main boom, the driver's cab may tear off at the pivot point and the steering will be damaged.

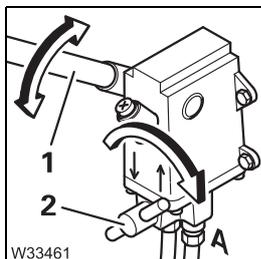


Risk of damage to front flap and the driver's cab!

The driver's cab may only be tilted if the front flap is open. This avoids damage to the front flap and the bumper.

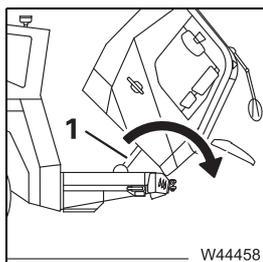


- Open the front flap, see *Front flap*, p. 3 - 84.



- Check that the lever (2) is pointing forwards (A).
- Use the lever to pump (1) – the driver's cab lock opens and the rear of the driver's cab is lifted up.





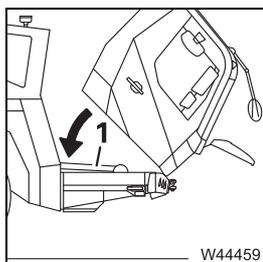
- Continue to pump until the driver's cab tilts no further.
- Secure the driver's cab – fold out the fall-back guard strut (1).



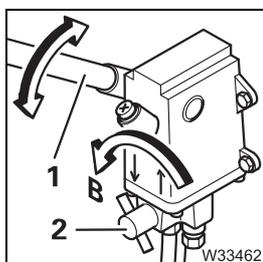
Risk of accidents due to the driver's cab tilting back!

You may only stand under the tilted driver's cab if the fall-back guard strut is folded out.

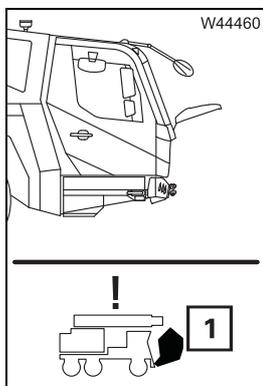
Lowering the driver's cab



- Fold down the fall-back guard strut (1).



- Check that the lever (2) is pointing to the rear (B).
- Use the lever to pump (1) – the driver's cab is lowered.

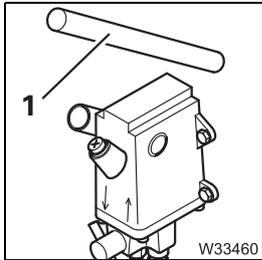


- Lower the driver's cab to its end position – the lock closes audibly.
- Switch on the ignition and check that the symbol (1) has gone out.
- If necessary, lower the driver's cab further until the symbol (1) goes out.

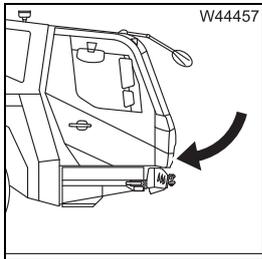


Risk of accidents if the driver's cab is not locked!

Make sure that the driver's cab is locked afterwards every time it is lowered. This prevents the driver's cab tilting forwards when braking.



- Remove the lever (1) and stow it away so that it is safe for driving.



- Close the front flap;  *Front flap*, p. 3 - 84.

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8.7

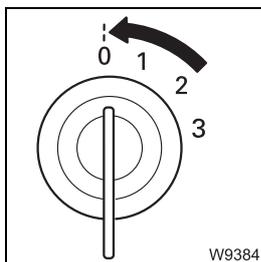
Fuses on the carrier

The fuses are divided into groups and are to be found at various points on the carrier:

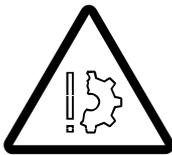
- In the driver's cab,
- In the battery box.

Notes on changing fuses

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



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



Risk of damage if the ignition is switched on!

Switch off the ignition whenever a fuse has to be replaced. This prevents the new fuse being blown immediately by the increased starting current after being installed.



Risk of damage by overloading!

Replace blown fuses only with new fuses of the same amperage. This prevents parts being overloaded and damaged or the fuse being immediately blown again. Notify **Grove Product Support** if a fuse with the same amperage blows again when the ignition is switched on.



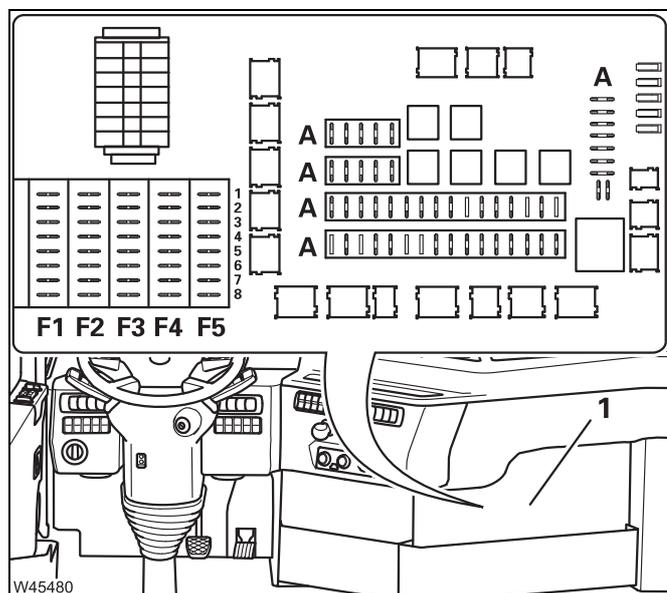
Risk of fire!

Never repair a blown fuse with other electrically conductive materials.

8.7.1

Fuses in the driver's cab

Fuse groups **F** and **A** are in the driver's cab.



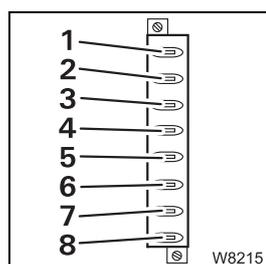
Fuse groups F

Fuse groups A; p. 8 - 71.

- Remove the cover (1).

Fuse groups **F1** to **F5** consist of eight fuses each.

The tables show the designations of the individual fuses, including their amperage and functions.



Designations 1 to 8 in the tables correspond to the order from top to bottom.

- Observe the instructions for changing fuses; p. 8 - 67.

Designation	Amperage (A)	Function
F1/1	15	Control unit UB 1 CCM 11
F1/2	15	Control unit UB 2 CCM 11
F1/3	–	Unassigned
F1/4	5	CCS display
F1/5	–	Unassigned
F1/6	15	Steering of superstructure
F1/7	5	Air intake inhibitor
F1/8	2	8.5V sensor voltage

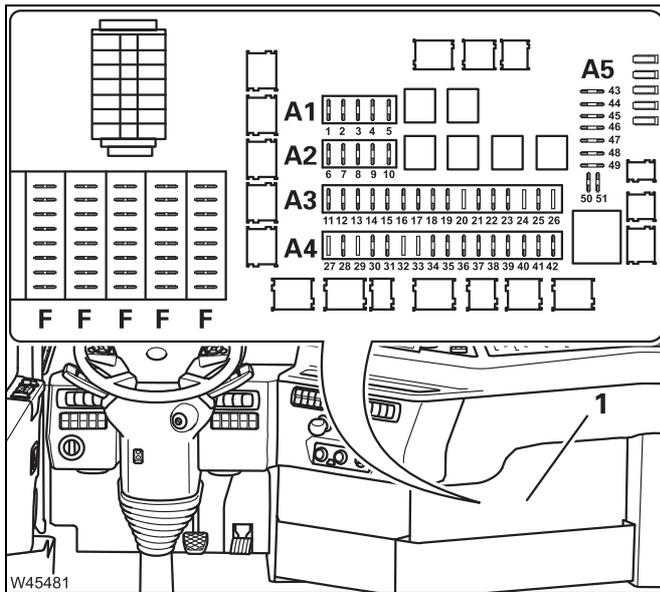
Designation	Amperage (A)	Function
F2/1	15	Control unit UB 1 IOL 32
F2/2	15	Control unit UB 1 IOL 32
F2/3	15	Control unit UB 2 IOL 32
F2/4	15	Control unit UB 2 IOL 32
F2/5	15	Control unit UB 1 IOL 33
F2/6	15	Control unit UB 1 IOL 33
F2/7	15	Control unit UB 2 IOL 33
F2/8	15	Control unit UB 2 IOL 33

Designation	Amperage (A)	Function
F3/1	10	Control unit UB steering system
F3/2	10	Control unit UB steering system
F3/3	15	Blower-heater/air-conditioner
F3/4	5	Auxiliary water heating system
F3/5	5	Auxiliary air heater – driver's cab Auxiliary air heater – battery
F3/6	5	Control unit UE CCM 11
F3/7	5	Control unit UE 2 IOL 32
F3/8	5	Control unit UE 2 IOL 33



Designation	Amperage (A)	Function
F4/1	5	Terminal 15 – steering system SLC01
F4/2	10	Terminal 15 – rotating beacon
F4/3	5	Terminal 15 – steering system SLC02 Monitoring of <i>Boom not set down</i> Terminal 15 – control unit UE 2 IOL 32
F4/4	5	Terminal 15 – CCS / steering system display Terminal 15 – control unit UE 2 IOL 33
F4/5	5	Steering warning lamps Terminal 15 – control unit UE CCM 11 Inclination indicator
F4/6	2	Terminal 15 – steering system
F4/7	2	Terminal 15 – steering system
F4/8	2	Emergency stop

Designation	Amperage (A)	Function
F5/1	7.5	Left low-beam headlight
F5/2	7.5	Right low-beam headlight
F5/3	3	Terminal 15 – clock, auxiliary heaters Fan
F5/4	7.5	Seat heating
F5/5	15	Auxiliary air heater – driver's cab
F5/6	15	Auxiliary water heating system
F5/7	15	Auxiliary air heater – battery
F5/8	15	Central locking system



Fuse groups A

Fuse groups F; p. 8 - 68.

- Remove the cover (1).

Fuse groups **A1** to **A5** consist of eight fuses each.

A1 Fuses F1 to F5

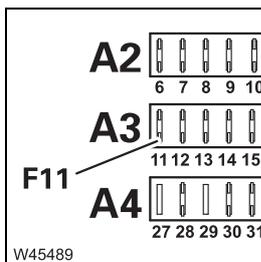
A2 Fuses F6 to F10

A3 Fuses F11 to F26

A4 Fuses F27 to F42

A5 Spare fuses F43 to F49

The tables show the designations of the individual fuses, including their amperage and functions.



In fuse groups **A1** to **A4** the fuse with the smallest number is always on the left, e.g. fuse F11 at A3.

- Observe the instructions for changing fuses; p. 8 - 67.

Fuse group A1

Designation	Amperage (A)	Function
F1	20	Terminal 30 – EBS control
F2	10	OBD 2
F3	15	Unassigned
F4	10	Unassigned
F5	10	Unassigned



Fuse group A2

Designation	Amperage (A)	Function
F6	15	Unassigned
F7	20	Unassigned
F8	15	Terminal 30 – transmission retarder control
F9	10	USB socket
F10	20	Brake light

Fuse group A3

Designation	Amperage (A)	Function
F11	20	Terminal 30 – audio device
F12	20	Terminal 30 - GPC4 Gateway / tachograph
F13	25	12 V voltage transformer 18 A socket
F14	10	Bird View camera system
F15	15	Terminal 30 – transmission control
F16	10	Terminal 15 – ABS trailer
F17	15	Unassigned
F18	20	Terminal 15 – fan
F19	15	12 V voltage transformer 10 A socket
F20	–	Unassigned
F21	10	Compressed air dryer
F22	10	Unassigned
F23	10	Terminal 30 – compressed air dryer Cab lighting
F24	–	Unassigned
F25	20	ABS trailer
F26	20	Terminal 30 – trailer

Fuse group A4

Designation	Amperage (A)	Function
F27	–	Unassigned
F28	15	Window winder, driver's door
F29	–	Unassigned
F30	15	Window winder, passenger door
F31	–	Unassigned
F32	–	Unassigned
F33	–	Unassigned
F34	25	24 V socket
F35	–	Unassigned
F36	5	Terminal 15 – centre control unit Engine control system / exhaust cleaning Transmission control / EBS / tachograph
F37	20	Terminal 30 – EBS control
F38	–	Unassigned
F39	15	Terminal 30 – transmission control
F40	10	Terminal 15 – CPC4 / gateway
F41	20	Terminal 15 – transmission retarder control
F42	5	Cigarette lighter

Fuse group A5

Designation	Amperage (A)	Function
F43	20	Reserve
F44	15	
F45	10	
F46	5	
F47	3	
F48	2	
F49	7.5	
F50	–	Unassigned
F51	–	Unassigned

8.7.2

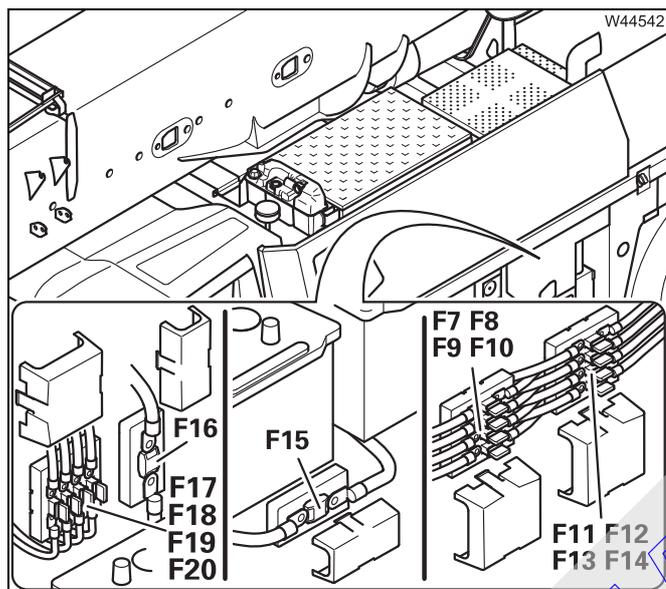
Fuses in the battery box

Fuses **F7** to **F20** are to be found in the battery box.



Danger from lead and lead compounds on batteries!

Battery poles, 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 in front of the batteries.

- Remove the lids from the terminal boxes.

Arrangement

- F7 to F10 from top to bottom
- F11 to F14 from top to bottom
- F17 to F20 from right to left

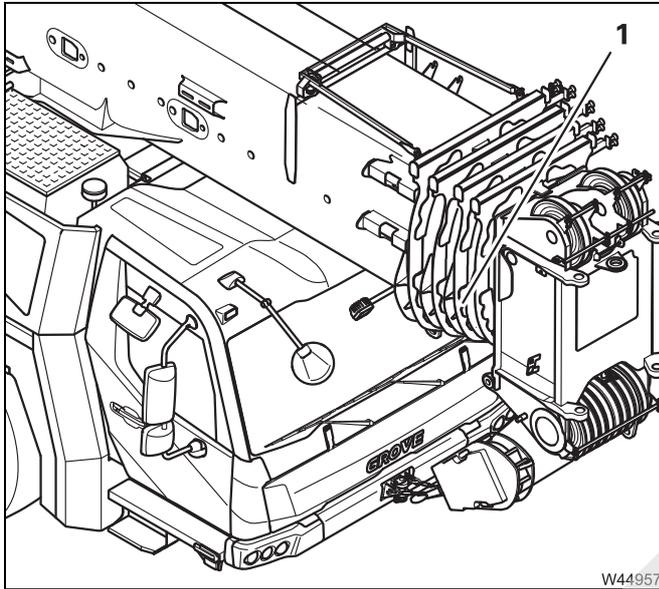
- Observe the instructions for changing fuses; p. 8 - 67.

Designation	Amperage (A)	Function
F7	50	Driver's cab central fuse – terminal 30
F8	25	Battery charger socket
F9	25	Superstructure central fuse – terminal 30
F10	10	Steering (steer by wire)
F11	10	Battery relay fuse
F12	25	Driver's cab central fuse – terminal 30 master switch
F13	10	Unassigned
F14	50	Superstructure central fuse – terminal 30 master switch
F15	150	Crane cab heating supply
F16	175	Back-up protection
F18	20	Alternator
F17, F19, F20	Various	Reserve

9

Operating elements for crane operation

All operating elements for driving are described in Chapter 3.



This operating manual contains illustrations of the GMK5150L-1 with five telescopic sections.

The GMK5150XL has six telescopic sections (1).

The illustrations have only been modified where relevant for operation.

9.1

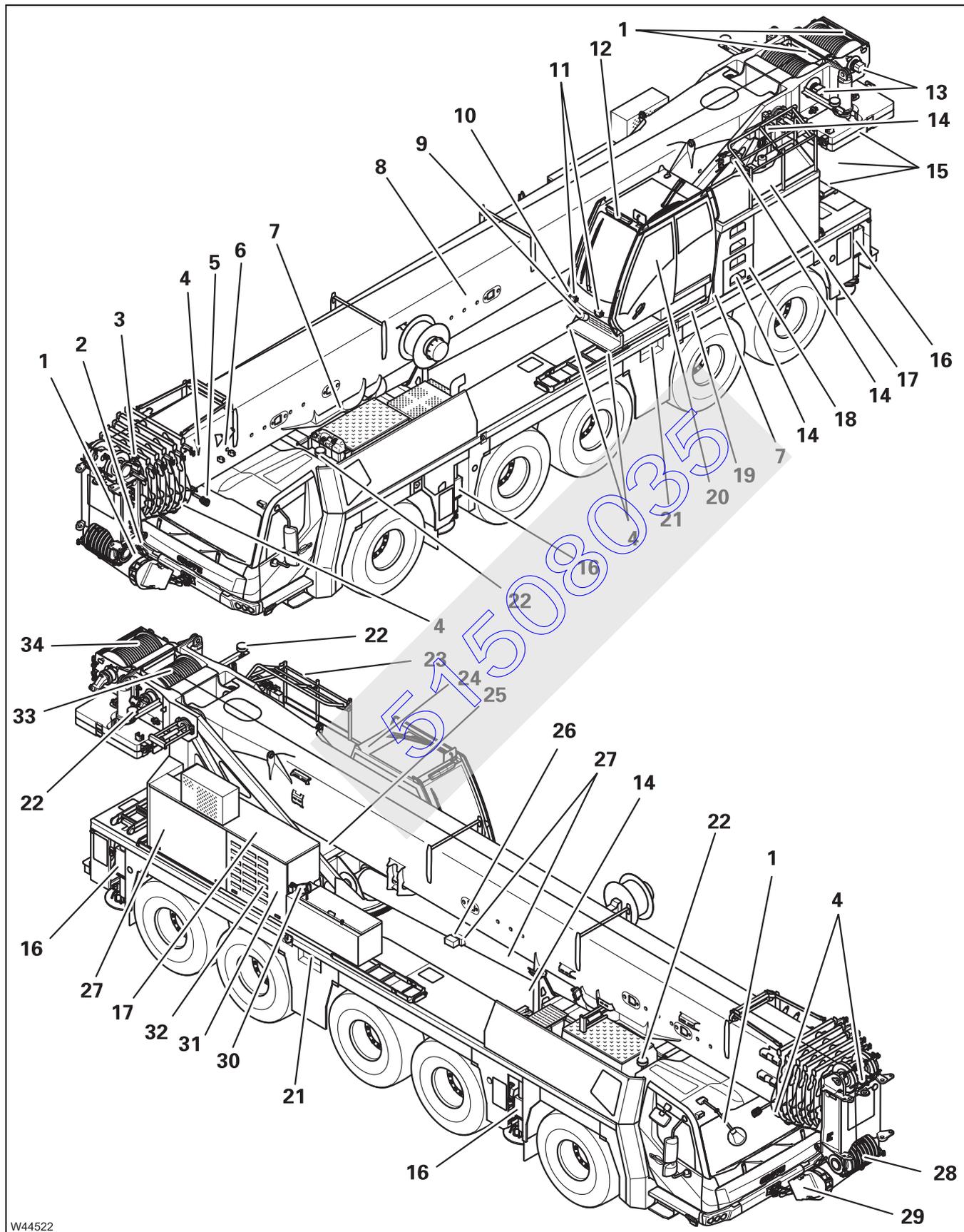
Overview – Notes

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



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

9.2 Overview – Exterior of the truck crane



W44522

23.03.2022

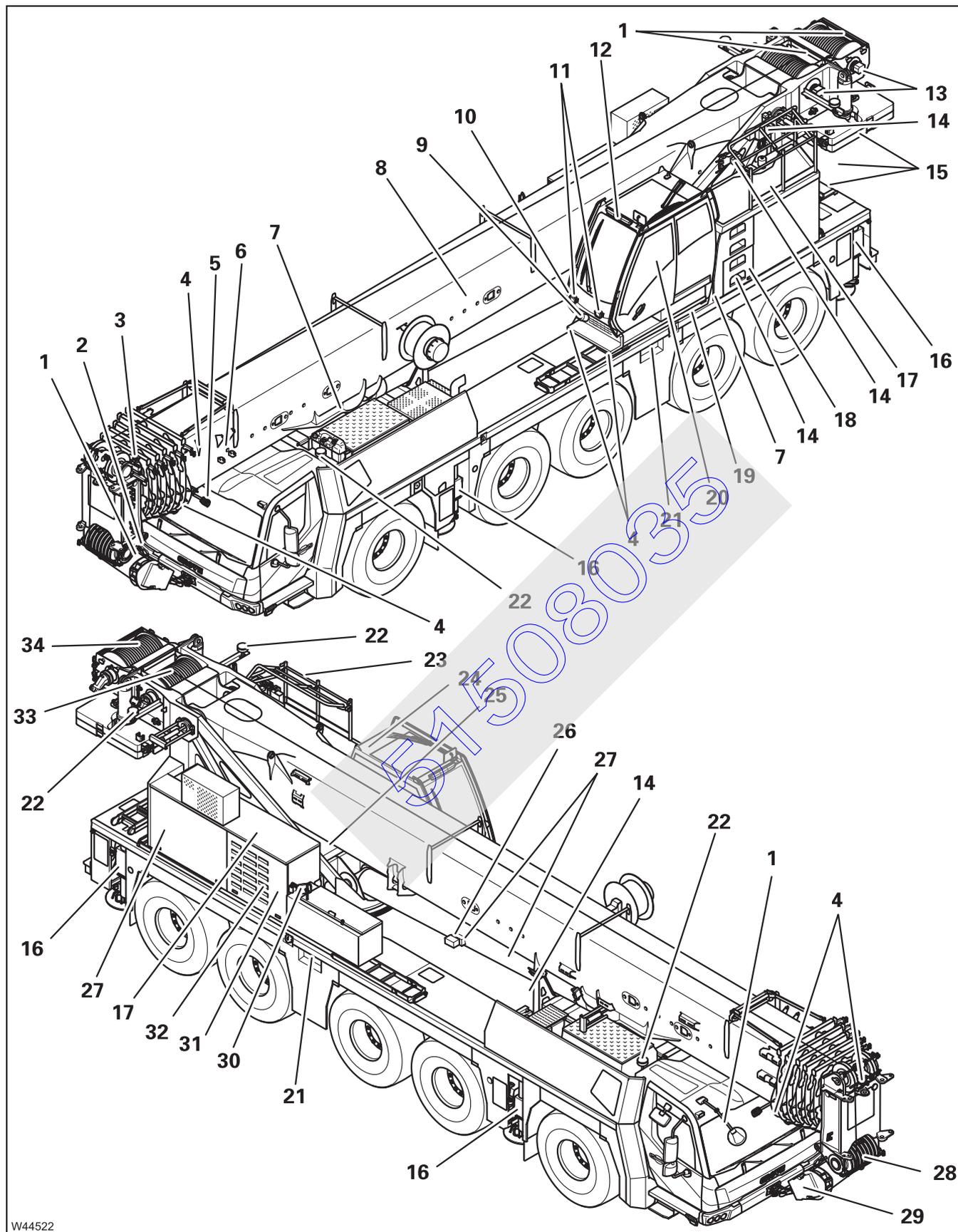
1 – Camera on the main boom ¹⁾	▣▣▣▣ p. 12 - 173
– Cameras on the hoists	▣▣▣▣ p. 12 - 173
– Camera on the driver's cab ¹⁾	▣▣▣▣ p. 12 - 175
2 – Lifting limit switch – function	▣▣▣▣ p. 11 - 84
– Installing/removing the lifting limit switch	▣▣▣▣ p. 12 - 158
3 Anemometer and air traffic control light ¹⁾	▣▣▣▣ p. 12 - 164
4 Slinging points	
– for personal protective clothing	▣▣▣▣ p. 12 - 172
– for fall protection device ¹⁾	▣▣▣▣ p. 12 - 172
5 Slewable spotlight ¹⁾	
– Operating elements	▣▣▣▣ p. 9 - 16
– Slewable spotlights menu	▣▣▣▣ p. 9 - 73
6 Installing/removing the hose drum ^{1), 2)}	
7 Socket for hand-held control	
– Hand-held control – overview	▣▣▣▣ p. 9 - 6
– Emergency operation with the hand-held control	▣▣▣▣ p. 14 - 42
8 Rigging the main boom ¹⁾	▣▣▣▣ p. 6 - 17
9 Crane cab heater fuel tank ¹⁾	▣▣▣▣ p. 11 - 5
10 RCL override – version A ³⁾	
– Key-operated switch for overriding the RCL in an emergency	▣▣▣▣ p. 9 - 152
RCL override – version B ⁴⁾	
– No function	▣▣▣▣ p. 9 - 153
11 Spotlights I	▣▣▣▣ p. 9 - 16
12 RCL status display	▣▣▣▣ p. 11 - 63
13 Lowering limit switch	▣▣▣▣ p. 11 - 86
14 – Hydraulic emergency operation with the hand pump	▣▣▣▣ p. 14 - 53
– Hydraulic emergency operation according to DGUV ¹⁾	▣▣▣▣ p. 14 - 61
15 – Counterweight, partially removed	▣▣▣▣ p. 12 - 65
– Counterweight – rear storage area	▣▣▣▣ p. 12 - 114
16 Outriggers	
– Operation	▣▣▣▣ p. 12 - 33
– Lighting – operation in the driver's cab	▣▣▣▣ p. 3 - 47
– Lighting – operation in the crane cab	▣▣▣▣ p. 9 - 44
– Removing/installing the outrigger beams	▣▣▣▣ p. 6 - 39
17 Spotlights II ¹⁾	▣▣▣▣ p. 9 - 21
18 Shut-off valve on the hydraulic tank	▣▣▣▣ p. 10 - 5

1) Additional equipment

2) ▣▣▣▣ *Lattice extension operating manual*

3) Version A or version B active depending on RCL programming





W44522

23.03.2022

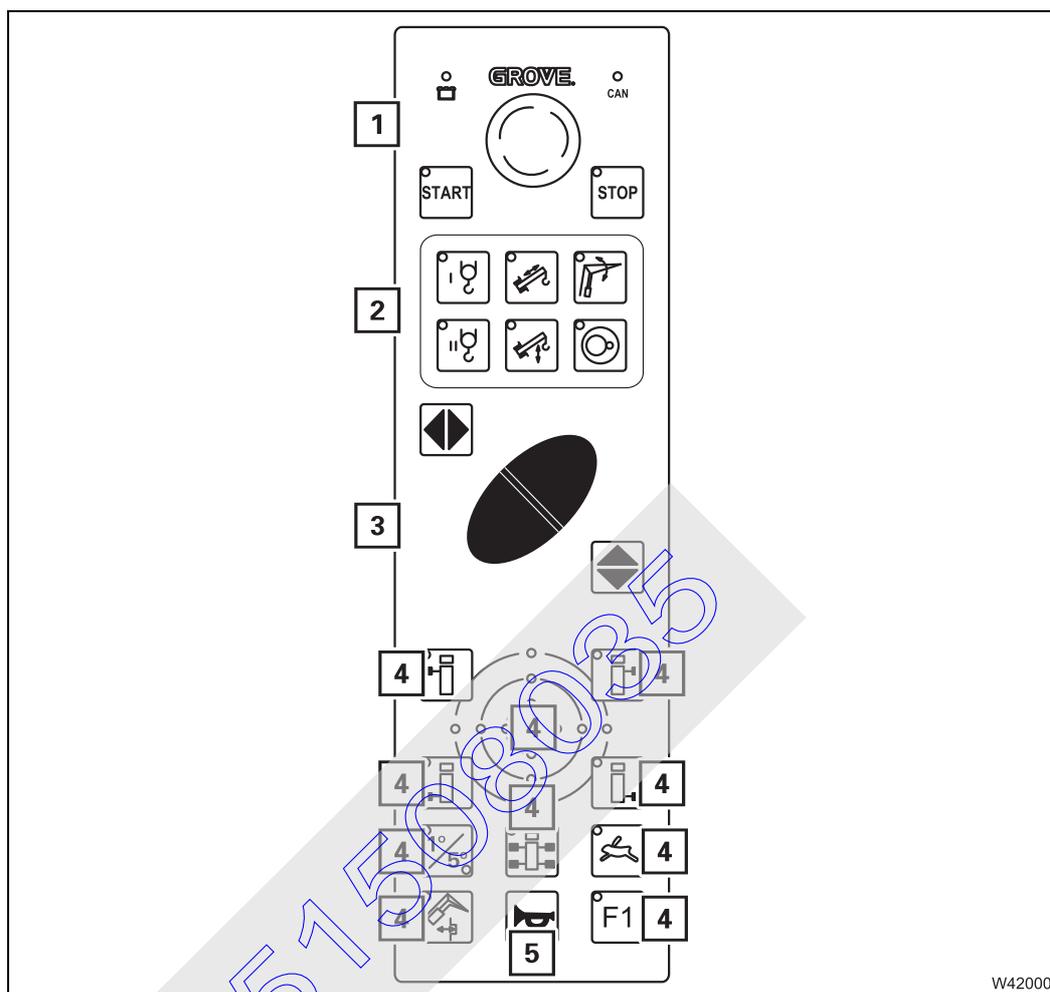
19 Step on the crane cab	
– Automatic operation ¹⁾	▣▣▣▣ p. 12 - 178
– Manual operation	▣▣▣▣ p. 12 - 179
20 Crane cab	▣▣▣▣ p. 9 - 12
21 – Outrigger control units	▣▣▣▣ p. 9 - 7
– Emergency stop switch	▣▣▣▣ p. 10 - 14
22 Rotating beacons on/off	▣▣▣▣ p. 9 - 155
23 Railing on the turntable	▣▣▣▣ p. 12 - 169
24 TELEMATIC system	▣▣▣▣ p. 11 - 175
25 Drive unit ²⁾	
26 – Switching on the boom floating position ¹⁾	▣▣▣▣ p. 6 - 13
– Switching off the boom floating position ¹⁾	▣▣▣▣ p. 12 - 19
27 – Switching on boom pre-tensioning ¹⁾	▣▣▣▣ p. 6 - 14
– Switching off boom pre-tensioning ¹⁾	▣▣▣▣ p. 12 - 21
28 Reeving and unreeving the hoist rope	▣▣▣▣ p. 12 - 142
29 Hook block ¹⁾	▣▣▣▣ p. 12 - 137
30 Mirror for crane operation	▣▣▣▣ p. 12 - 170
31 Storage compartment	
– Anemometer	▣▣▣▣ p. 12 - 164
– Hand-held control	▣▣▣▣ p. 14 - 42
32 Slewing gear:	
– Operation	▣▣▣▣ p. 11 - 117
– Switching off the slewing gear freewheel ¹⁾	▣▣▣▣ p. 12 - 20
– Switching on the slewing gear freewheel ¹⁾	▣▣▣▣ p. 6 - 13
– Turntable lock ¹⁾	▣▣▣▣ p. 9 - 138
33 Main hoist	▣▣▣▣ p. 9 - 123
34 – Auxiliary hoist Operation ¹⁾	▣▣▣▣ p. 9 - 125
– Modifying the auxiliary hoist/1 t plate ¹⁾	▣▣▣▣ p. 12 - 121

¹⁾ Additional equipment

²⁾ ▣▣▣▣ *Maintenance manual*

9.2.1

Hand-held control



W42000

- | | |
|----------------------------------|------------------|
| 1 Engine control panel | ▣▣▣▣▶ p. 9 - 159 |
| 2 Pre-select emergency operation | ▣▣▣▣▶ p. 9 - 160 |
| 3 Function buttons | ▣▣▣▣▶ p. 9 - 160 |
| 4 No function | |
| 5 Horn | ▣▣▣▣▶ p. 9 - 159 |



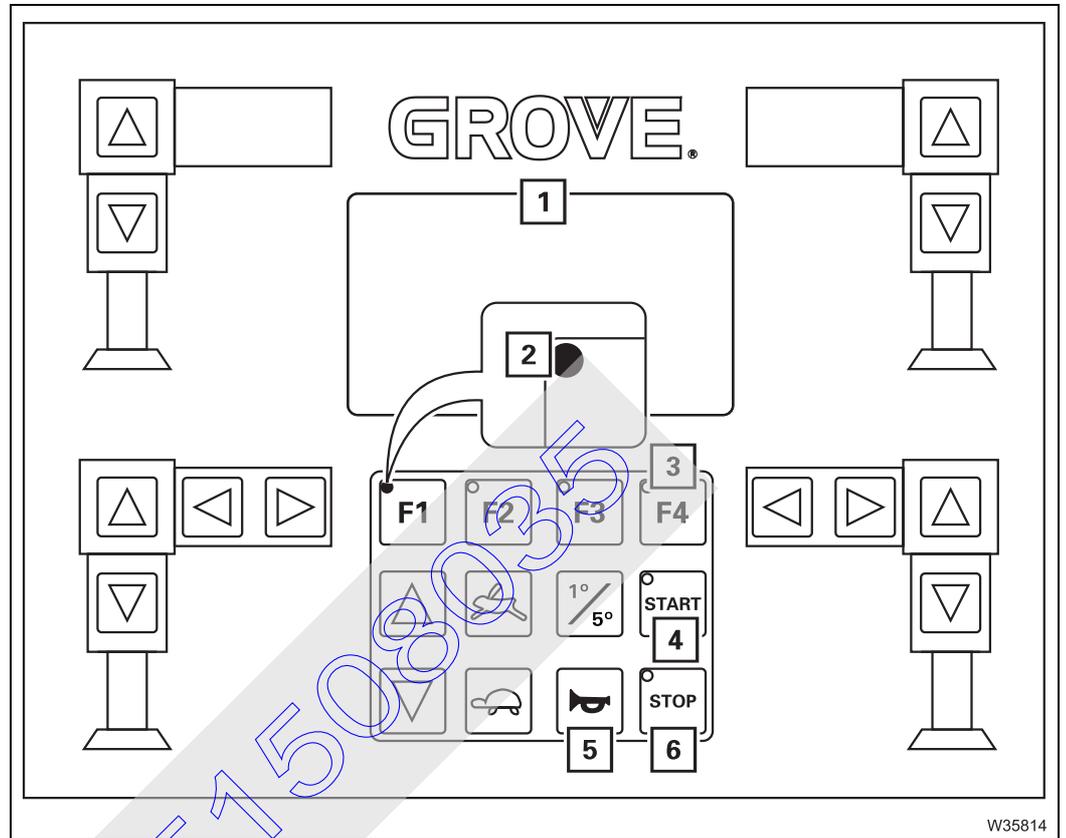
Required connections for the various movements; ▣▣▣▣▶ p. 14 - 43.

9.2.2

Outrigger control units

Menu with independent buttons

This function of the illustrated buttons is the same in all the menus. This function of the other buttons depends on the opened menu.

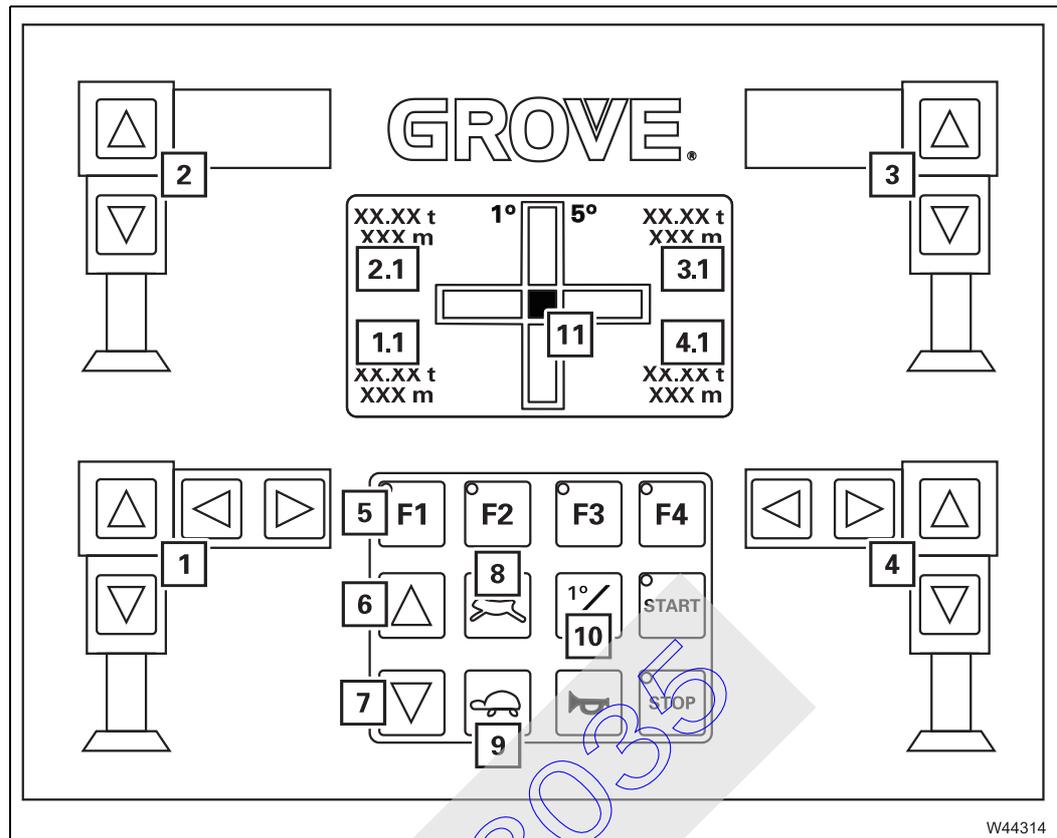


W35814

- | | |
|--|-----------------|
| 1 Outrigger display | ▣▣▣▣ p. 9 - 112 |
| 2 Position lights for indicator lamps | ▣▣▣▣ p. 9 - 112 |
| 3 Menu selection | ▣▣▣▣ p. 9 - 112 |
| – Outrigger menu | ▣▣▣▣ p. 9 - 8 |
| – Raise axle menu | ▣▣▣▣ p. 9 - 10 |
| 4 Engine START | ▣▣▣▣ p. 4 - 18 |
| 5 Horn | ▣▣▣▣ p. 9 - 112 |
| 6 Engine STOP | ▣▣▣▣ p. 4 - 19 |



Outrigger menu





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

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

Outriggers

- 1 Operate left outrigger ▣▣▣▣ p. 9 - 114
- 2 Operate left outrigger, opposite ▣▣▣▣ p. 9 - 114
- 3 Operate right outrigger, opposite ▣▣▣▣ p. 9 - 114
- 4 Operate right outrigger ▣▣▣▣ p. 9 - 114
- 5 Additional function F1
- 6 – Retract all supporting cylinders ▣▣▣▣ p. 9 - 113
– Retract step – as additional function F1 ▣▣▣▣ p. 12 - 178
- 7 – Extend all supporting cylinders ▣▣▣▣ p. 9 - 113
– Extend step – as additional function F1 ▣▣▣▣ p. 12 - 178
- 8 Pre-select high-speed mode ▣▣▣▣ p. 9 - 112
- 9 – Pre-select normal speed ▣▣▣▣ p. 9 - 112
– Automatic alignment – as additional function F1 ▣▣▣▣ p. 9 - 114

Outrigger pressure display

- 1.1 Left-hand outrigger pressure display ▣▣▣▣ p. 9 - 118
- 2.1 Left-hand outrigger pressure display, opposite ▣▣▣▣ p. 9 - 118
- 3.1 Right-hand outrigger pressure display, opposite ▣▣▣▣ p. 9 - 118
- 4.1 Right-hand outrigger pressure display ▣▣▣▣ p. 9 - 118

Outrigger span display

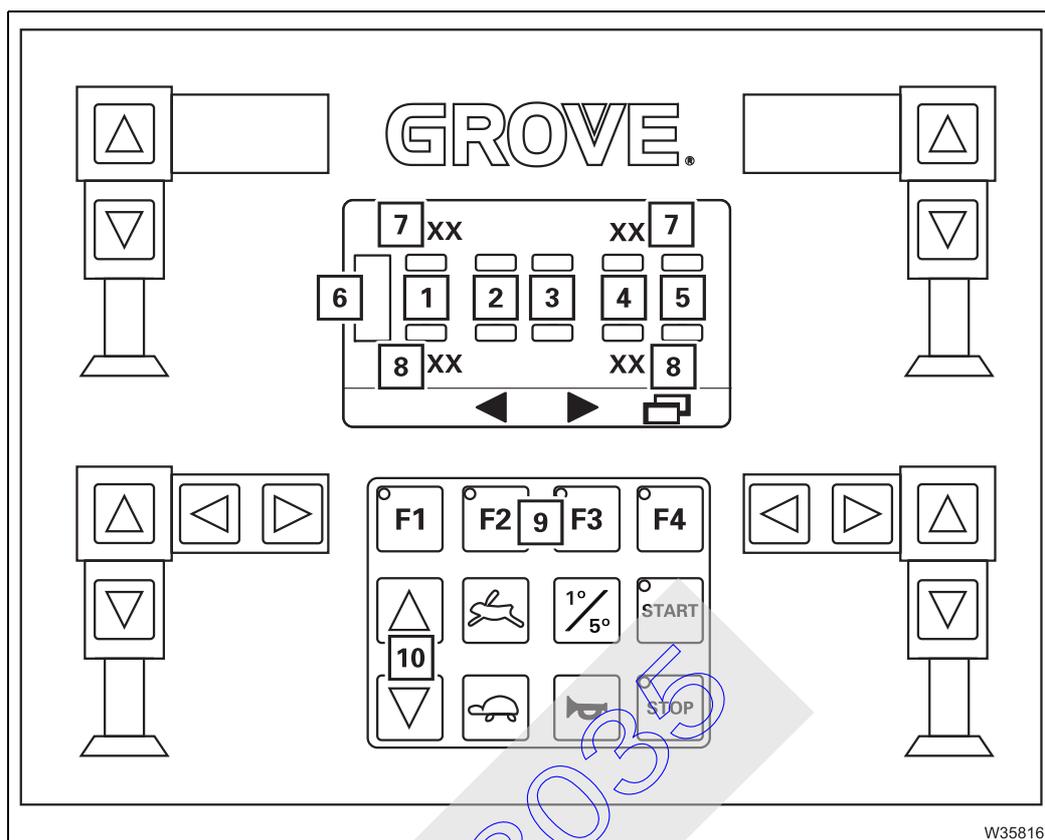
- 1.1 Left individual width ▣▣▣▣ p. 9 - 113
- 2.1 Left individual width, opposite ▣▣▣▣ p. 9 - 113
- 3.1 Right individual width, opposite ▣▣▣▣ p. 9 - 113
- 4.1 Right individual width ▣▣▣▣ p. 9 - 113

Inclination indicator

- 10 Switching over the measuring range ▣▣▣▣ p. 9 - 117
- 11 Current inclination display ▣▣▣▣ p. 9 - 117

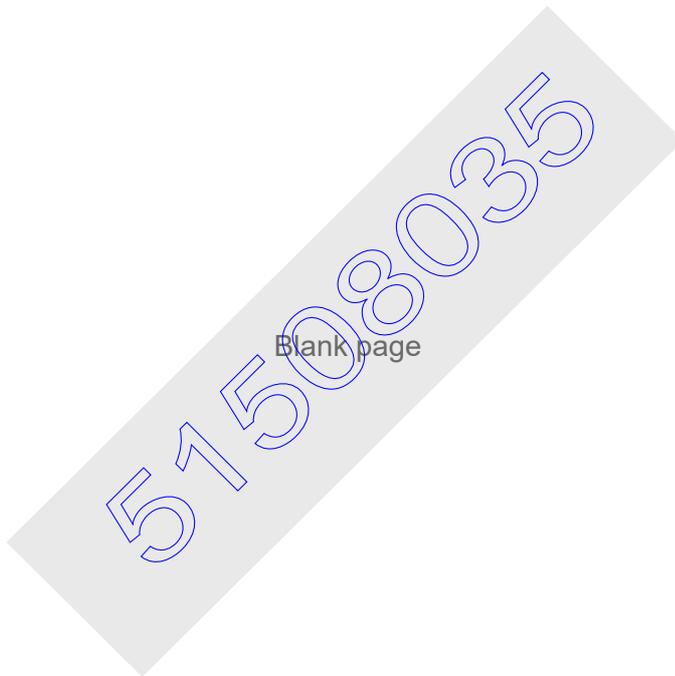


Raise axle menu

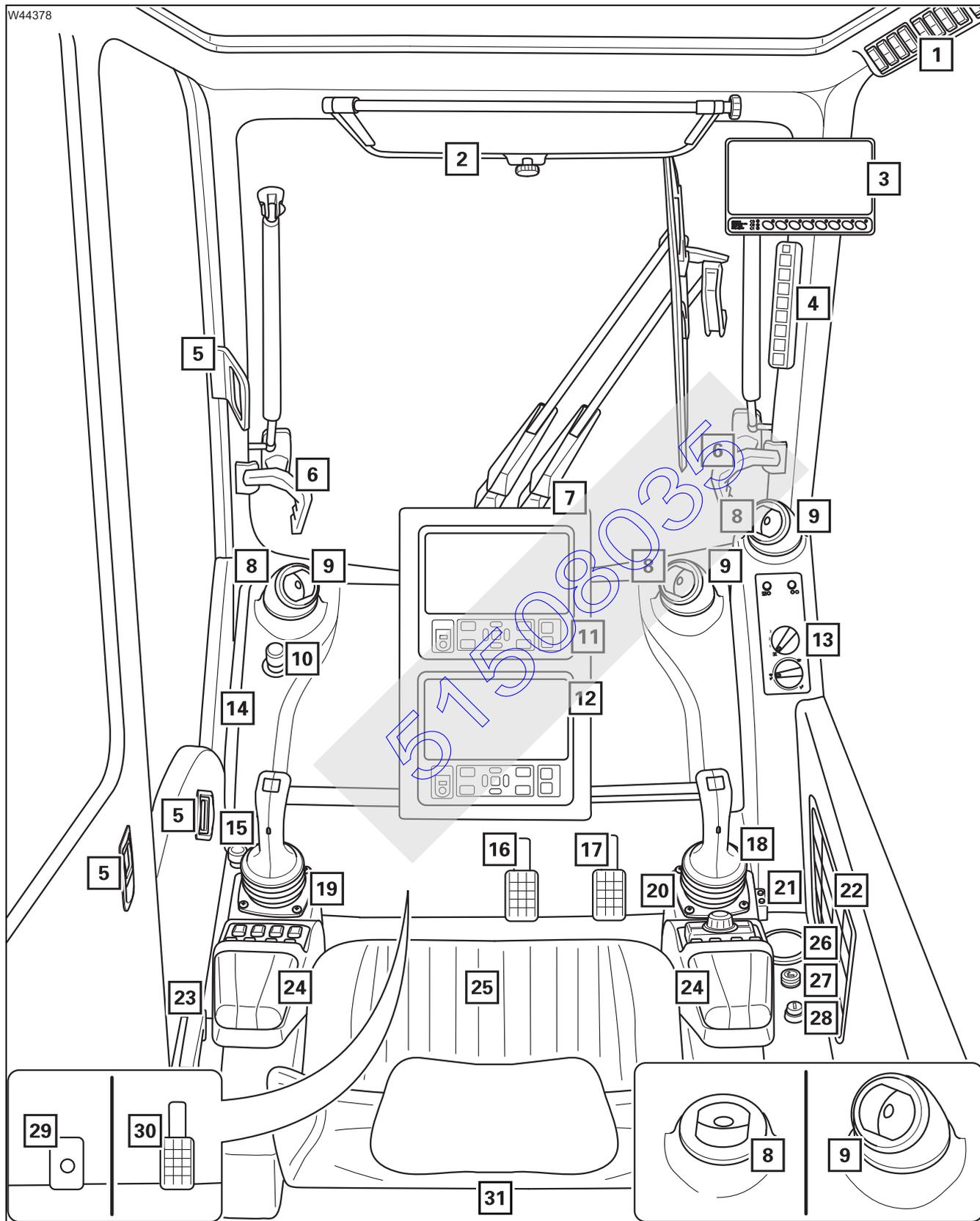


W35816

- | | | |
|---------------|-------------------------------------|--------------|
| 1 to 5 | Pre-selection display | ➡ p. 9 - 115 |
| 6 | Directional indicator | |
| 7 | Wheel load display, opposite | ➡ p. 9 - 116 |
| 8 | Wheel load display, operator's side | ➡ p. 9 - 116 |
| 9 | Pre-selecting wheels | ➡ p. 9 - 115 |
| 10 | Raising/lowering wheels | ➡ p. 9 - 116 |



9.3 Overview of crane cab



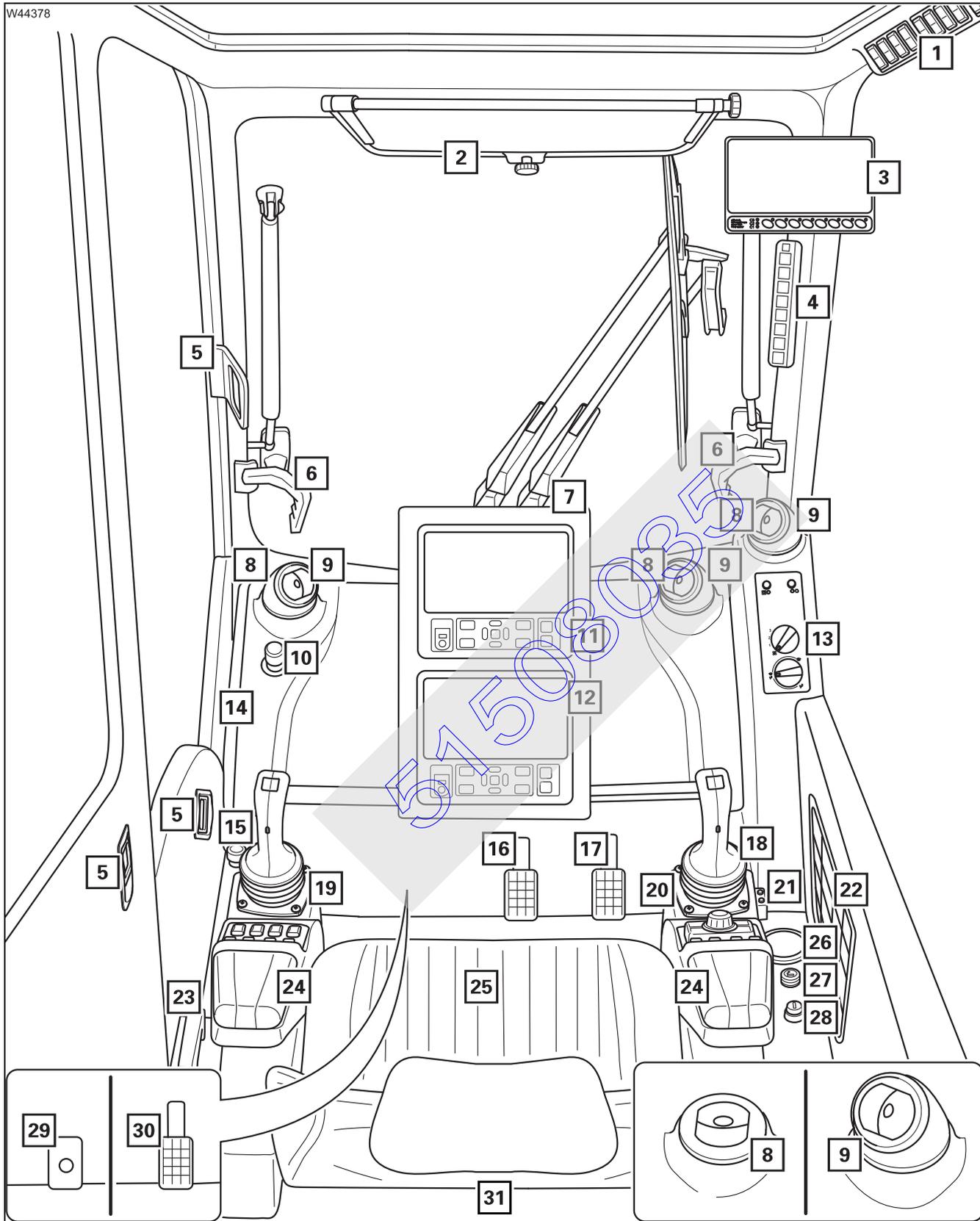
1 Side panel operating elements	➡ p. 9 - 16
2 Sun visor	
3 Monitor ¹⁾	➡ p. 12 - 176
4 Current degree of utilisation display ¹⁾	➡ p. 11 - 51
5 Door unlocking	➡ p. 9 - 162
6 Locking/unlocking windows	➡ p. 9 - 161
7 Adjusting the front panel	➡ p. 11 - 9
8 Air vents	➡ p. 11 - 158
9 Air vents	➡ p. 11 - 158
10 Emergency stop switch	➡ p. 9 - 108
11 RCL control unit (R ated- C apacity- L imiter)	➡ p. 9 - 90
12 Crane control operating elements	➡ p. 9 - 30
13 Heating/air-conditioning system ¹⁾	➡ p. 9 - 28
14 Windscreen washing system tank ²⁾	
15 Unlock step ¹⁾	➡ p. 12 - 179

1) Additional equipment

2) ➡ *Lattice extension operating manual*



51508035

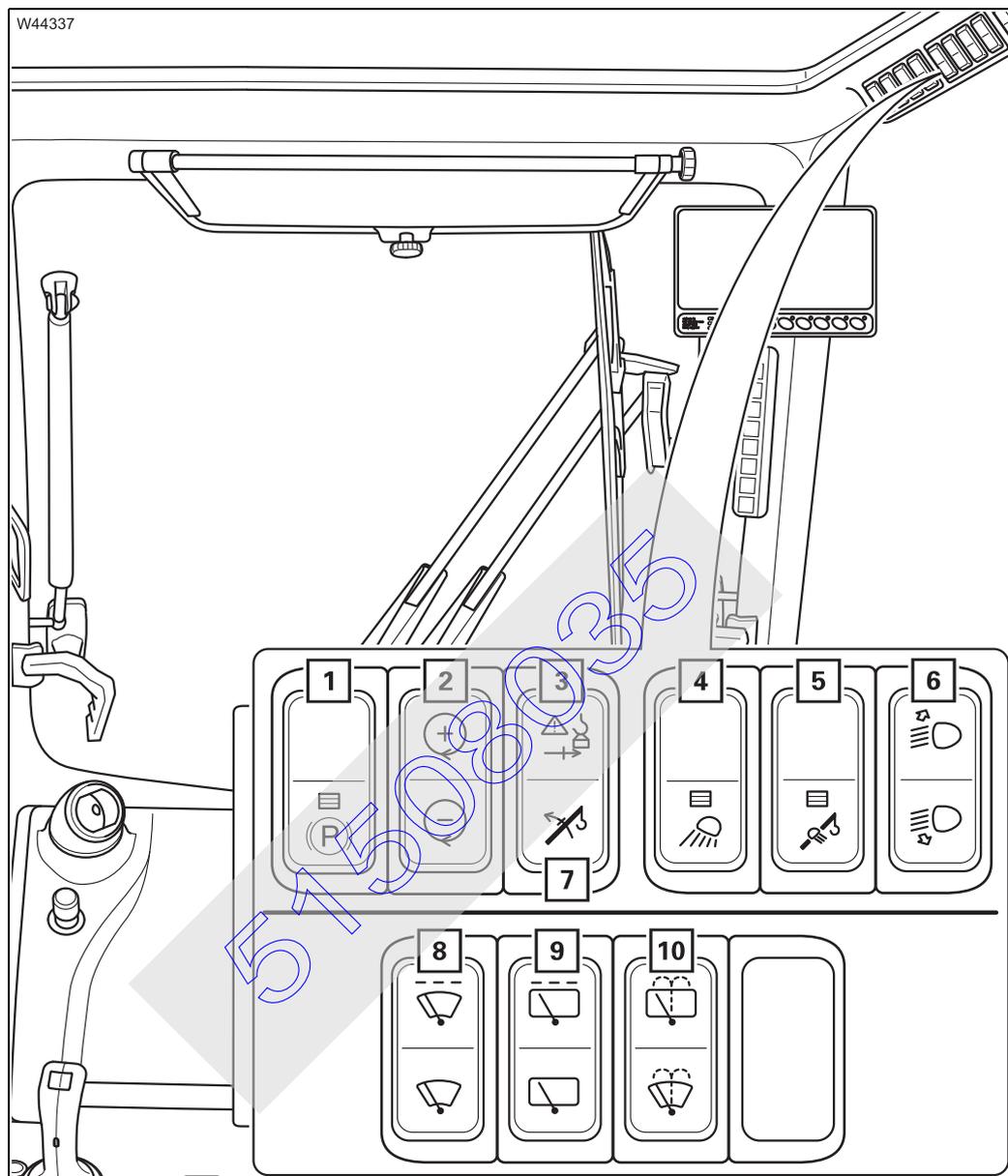


16 Service brake ¹⁾	▣▣▣▣▶ p. 9 - 170
17 Accelerator	
18 USB sockets	▣▣▣▣▶ p. 9 - 154
19 Left-hand control panel	▣▣▣▣▶ p. 9 - 22
20 Right-hand control panel	▣▣▣▣▶ p. 9 - 24
21 Zoom lens operation ¹⁾ (camera on main boom)	▣▣▣▣▶ p. 12 - 176
22 Storage compartment	
23 Handle	▣▣▣▣▶ p. 3 - 88
24 Control panels	▣▣▣▣▶ p. 11 - 8
25 Crane cab seat Seat contact switch	▣▣▣▣▶ p. 11 - 8 ▣▣▣▣▶ p. 9 - 102
26 Ashtray	
27 Cigarette lighter (24 volts)	▣▣▣▣▶ p. 9 - 154
28 Ignition lock	▣▣▣▣▶ p. 9 - 97
29 Slewing gear freewheel with control lever function switched on ¹⁾	▣▣▣▣▶ p. 9 - 127
30 Slewing gear brake pedal – can be switched on/off ¹⁾	▣▣▣▣▶ p. 9 - 128
31 Rear operating elements	▣▣▣▣▶ p. 9 - 18

¹⁾ Additional equipment

9.3.1

Side panel operating elements



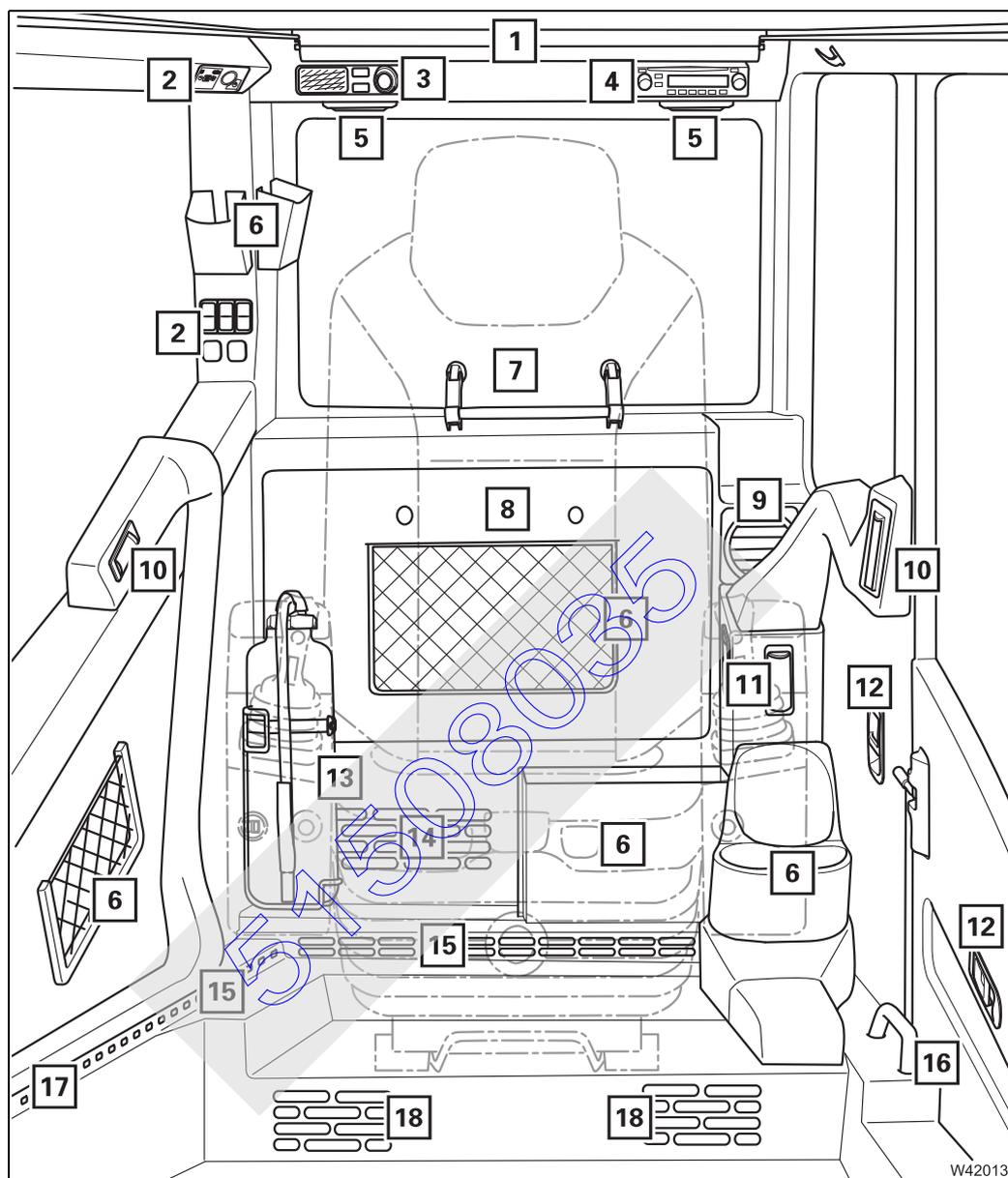
- 1 Applying/releasing the parking brake ▶▶▶▶ p. 9 - 171
- 2 – Starting the engine ▶▶▶▶ p. 9 - 97
 - Setting the idling speed ▶▶▶▶ p. 9 - 97
- 3 RCL override – version A²⁾
 - RCL override ▶▶▶▶ p. 9 - 152
 - RCL override – version B²⁾
 - Overriding the RCL in an emergency ▶▶▶▶ p. 9 - 153
- 4 Spotlight I on/off ▶▶▶▶ p. 9 - 155
- 5 Slewable spotlight on/off¹⁾ ▶▶▶▶ p. 9 - 156
- 6 Slew slewable spotlight¹⁾ ▶▶▶▶ p. 9 - 156
- 7 RCL override – version A²⁾
 - Raise enable after RCL shutdown ▶▶▶▶ p. 9 - 130
 - RCL override – version B²⁾
 - No function ▶▶▶▶ p. 9 - 153
- 8 Windscreen wiper on/off ▶▶▶▶ p. 9 - 157
- 9 Roof window wiper on/off ▶▶▶▶ p. 9 - 157
- 10 Windscreen washing system ▶▶▶▶ p. 9 - 157

- 1) Additional equipment
- 2) Version A or version B active depending on RCL programming



9.3.2

Rear operating elements



W42013

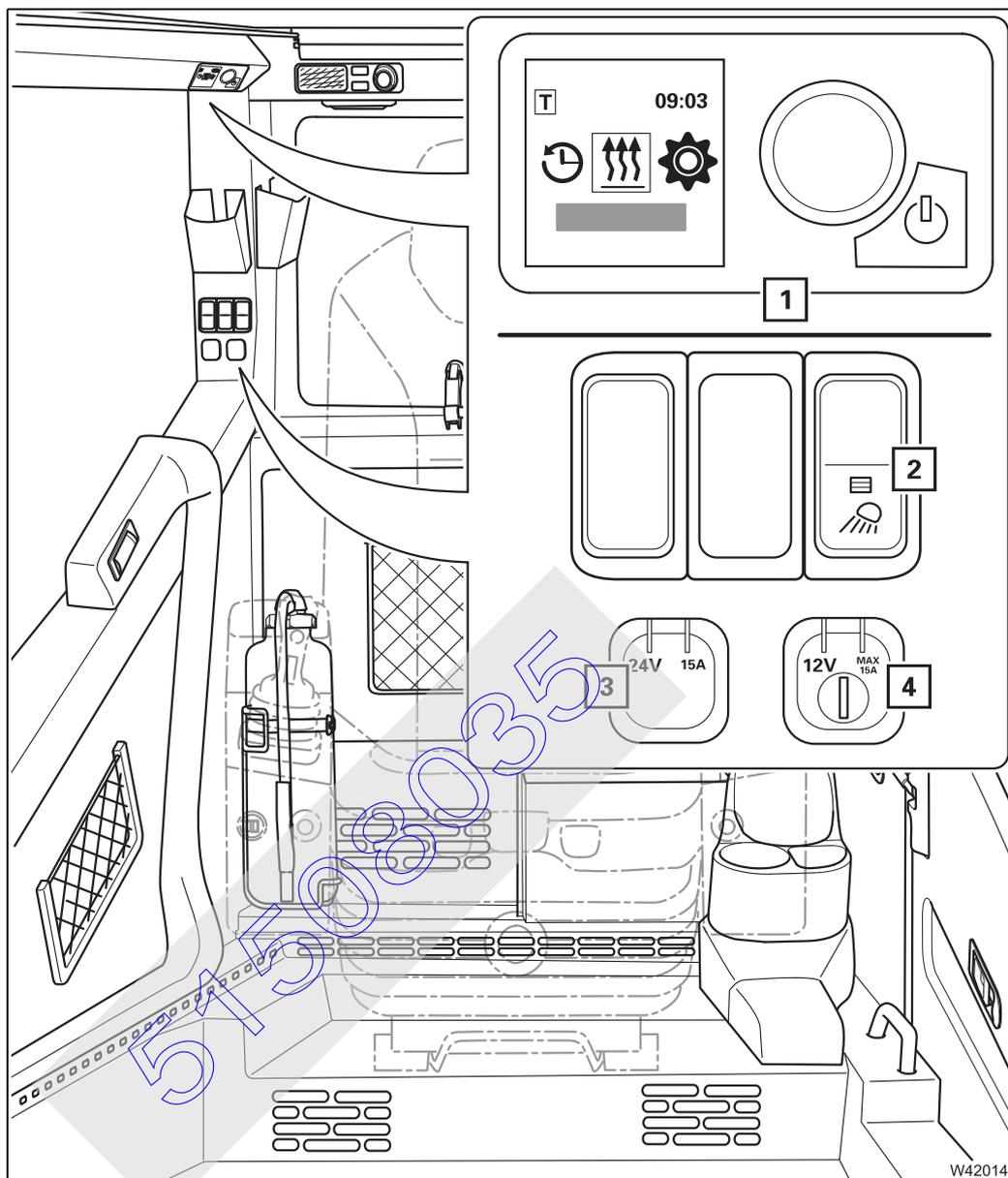
- 1 Sun roller blind
 - 2 Panel operating elements ▣▣▣▣ p. 9 - 21
 - 3 Cab lighting ▣▣▣▣ p. 9 - 157
 - 4 Audio device^{1), 3)}
 - 5 Loudspeaker¹⁾
 - 6 Storage compartment
 - 7 Rear window ▣▣▣▣ p. 9 - 161
 - 8 Cover for:
 - Fuses ▣▣▣▣ p. 14 - 77
 - Diagnostics ▣▣▣▣ p. 9 - 163
 - TELEMATIC system¹⁾ ▣▣▣▣ p. 11 - 175
 - 9 Intake/air vents ▣▣▣▣ p. 11 - 155
 - 10 Air vents (alternatively (10) or (17))¹⁾ ▣▣▣▣ p. 11 - 158
 - 11 Air vents ▣▣▣▣ p. 11 - 158
 - 12 Door unlocking ▣▣▣▣ p. 9 - 162
 - 13 Fire extinguisher²⁾
 - 14 Forced ventilation grille ▣▣▣▣ p. 11 - 155
 - 15 Recirculated air vents ▣▣▣▣ p. 11 - 155
 - 16 Handle
 - 17 Side ventilation (alternatively (10) or (17))¹⁾ ▣▣▣▣ p. 11 - 158
 - 18 Cab floor ventilation
- 1) Additional equipment
2) ▣▣▣▣ *Lattice extension operating manual*
3) ▣▣▣▣ *Separate operating manual*



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Panel operating elements

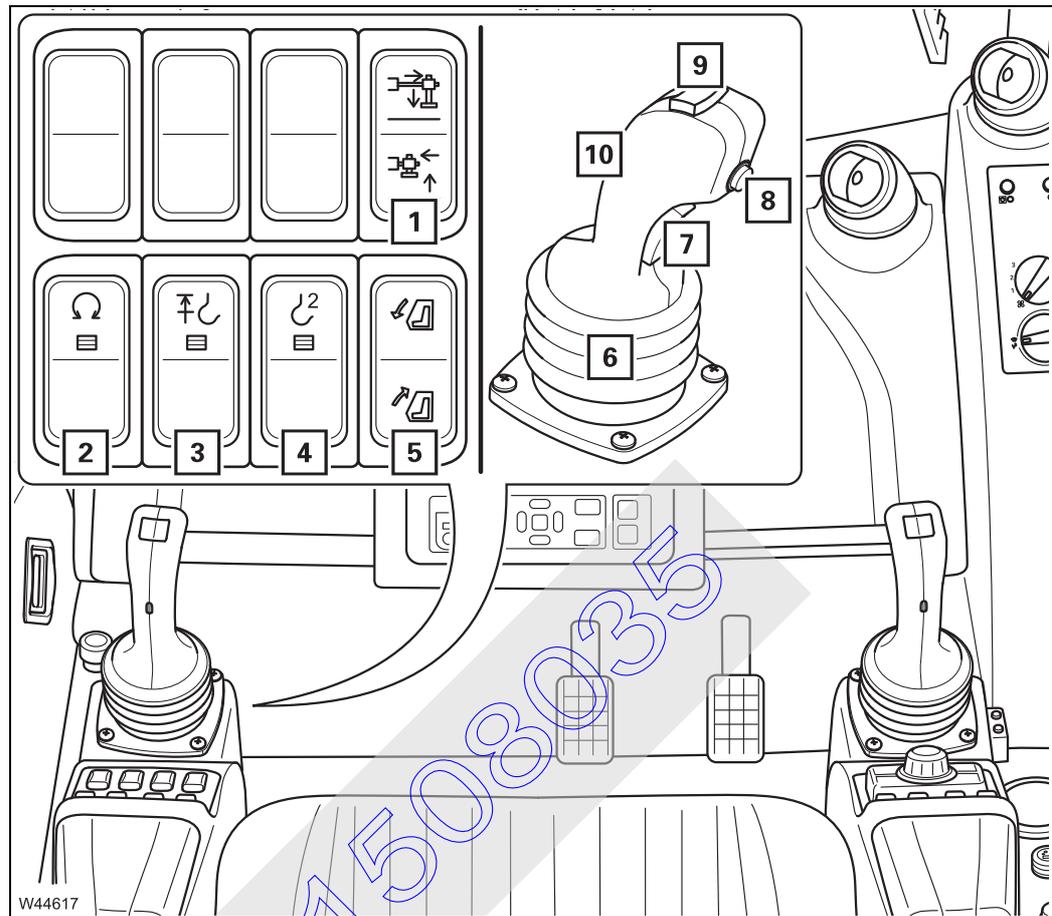


- | | |
|--|--------------|
| 1 Heating system | ➡ p. 9 - 28 |
| 2 Spotlight II on/off ¹⁾ | ➡ p. 9 - 156 |
| 3 24 V socket ¹⁾ | ➡ p. 9 - 154 |
| 4 12 V sockets ¹⁾ | ➡ p. 9 - 154 |

¹⁾ Additional equipment

9.3.3 Control panel operating elements

Left

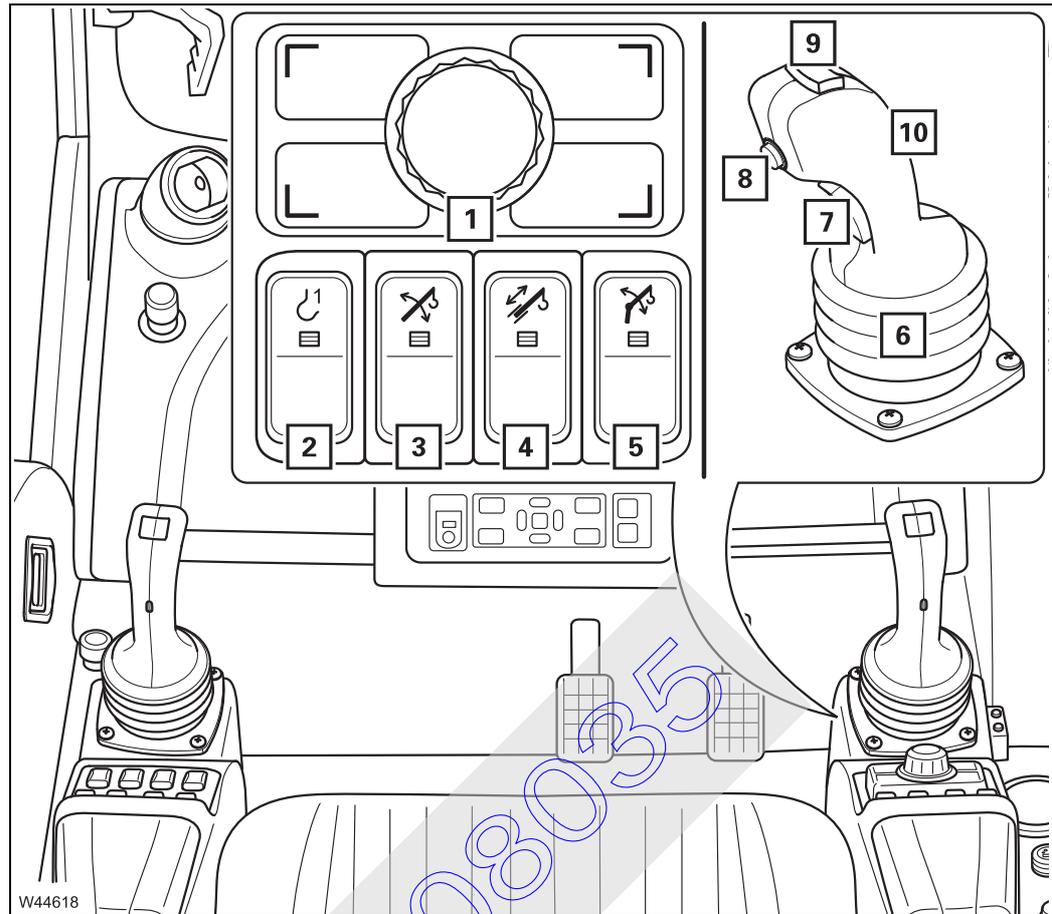


W44617

- | | | |
|---|-------|------------|
| 1 Moving the outrigger | ▣▣▣▣▶ | p. 9 - 111 |
| 2 Slewing gear on/off | ▣▣▣▣▶ | p. 9 - 127 |
| 3 – Lifting limit switch override | ▣▣▣▣▶ | p. 9 - 124 |
| – Override slewing gear shutdown | ▣▣▣▣▶ | p. 9 - 124 |
| – Correct counterweight rigging mode | ▣▣▣▣▶ | p. 9 - 124 |
| 4 Auxiliary hoist ¹⁾ on/off | ▣▣▣▣▶ | p. 11 - 81 |
| 5 Inclining the crane cab | ▣▣▣▣▶ | p. 9 - 137 |
| 6 Left control lever (configuration depending on the version) | ▣▣▣▣▶ | p. 9 - 26 |
| 7 Dead man's switch | ▣▣▣▣▶ | p. 9 - 102 |
| 8 Slewing gear freewheel with control lever function switched on | ▣▣▣▣▶ | p. 9 - 127 |
| 9 Depending on which function is activated, button for: | | |
| – Derricking gear high-speed mode | ▣▣▣▣▶ | p. 9 - 129 |
| – Telescoping mechanism high-speed mode | ▣▣▣▣▶ | p. 9 - 131 |
| – Steering with separate steering | ▣▣▣▣▶ | p. 9 - 175 |
| – Switching on Economy Mode level 3 manually ¹⁾ | ▣▣▣▣▶ | p. 9 - 98 |
| 10 Auxiliary hoist slewing indicator | ▣▣▣▣▶ | p. 11 - 82 |
- ¹⁾ Additional equipment



Right



W44618

- | | |
|---|------------------|
| 1 Jog dial (rotary push button) | ▣▣▣▣▶ p. 9 - 103 |
| 2 Main hoist on/off | ▣▣▣▣▶ p. 9 - 123 |
| 3 Derricking gear on/off | ▣▣▣▣▶ p. 9 - 129 |
| 4 Telescoping mechanism on/off | ▣▣▣▣▶ p. 9 - 131 |
| 5 Lattice extension derricking gear ^{1), 2)} | |
| 6 Right control lever (configuration depends on version) | ▣▣▣▣▶ p. 9 - 26 |
| 7 Dead man's switch | ▣▣▣▣▶ p. 9 - 102 |
| 8 Horn | ▣▣▣▣▶ p. 9 - 158 |
| 9 Depending on which function is activated, button for: | |
| – Hoist high-speed mode on/off | ▣▣▣▣▶ p. 9 - 123 |
| – Steering in normal steering mode | ▣▣▣▣▶ p. 9 - 175 |
| 10 Main hoist slewing indicator | ▣▣▣▣▶ p. 11 - 80 |

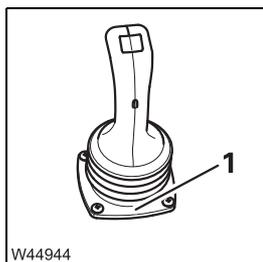
1) Additional equipment

2) ▣▣▣▣▶ *Lattice extension operating manual*

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9.3.4

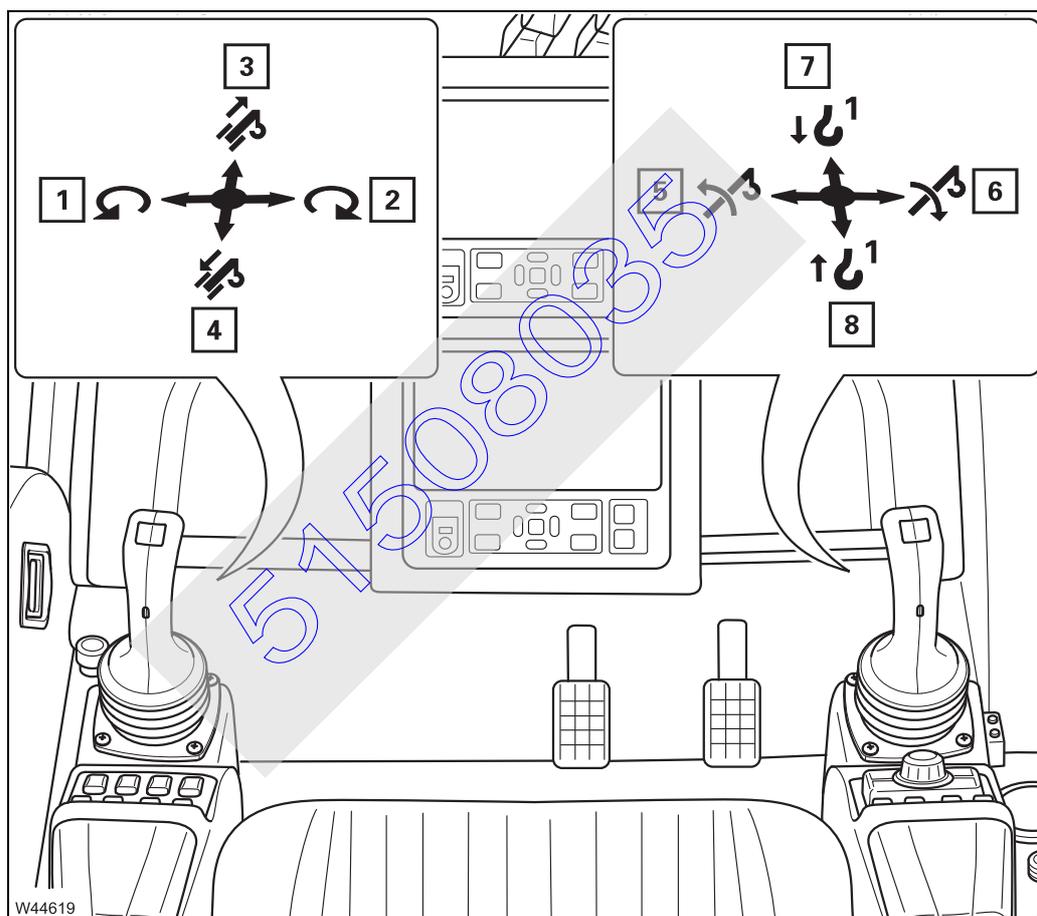
Control lever configuration



The truck crane can be equipped with two different control lever configurations. The current configuration of the control levers is indicated by symbols. The symbols are on the panels (1).

Version 1

With version 1, the left control lever is configured with the *Telescope* function.



Left control lever

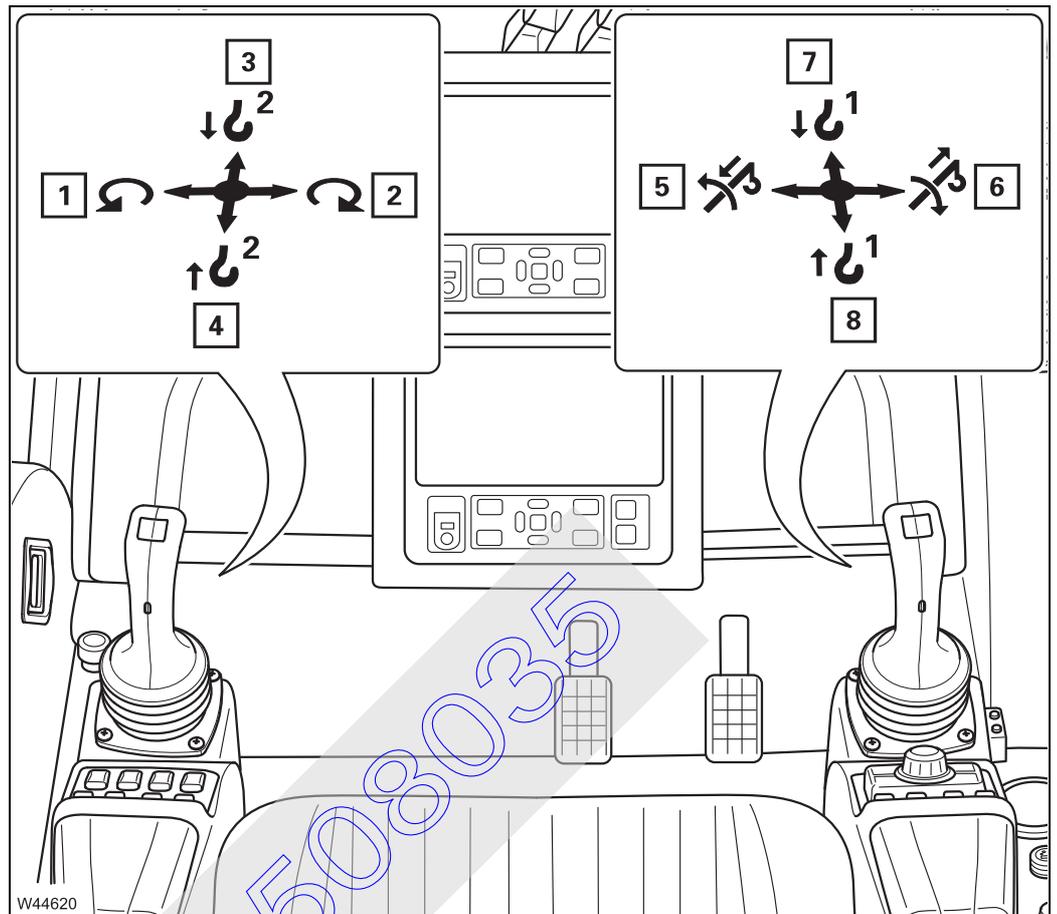
- 1 Slew anti-clockwise
- 2 Slew clockwise
- 3 Extend
- 4 Retract

Right control lever

- 5 Raise
- 6 Lower
- 7 Lower main hoist
- 8 Lift main hoist

Version 2

With version 2, the right control lever is configured with the *Telescope* function.



Left control lever

- 1 Slew anti-clockwise
- 2 Slew clockwise
- 3 Lower auxiliary hoist¹⁾
- 4 Raise auxiliary hoist¹⁾

Right control lever

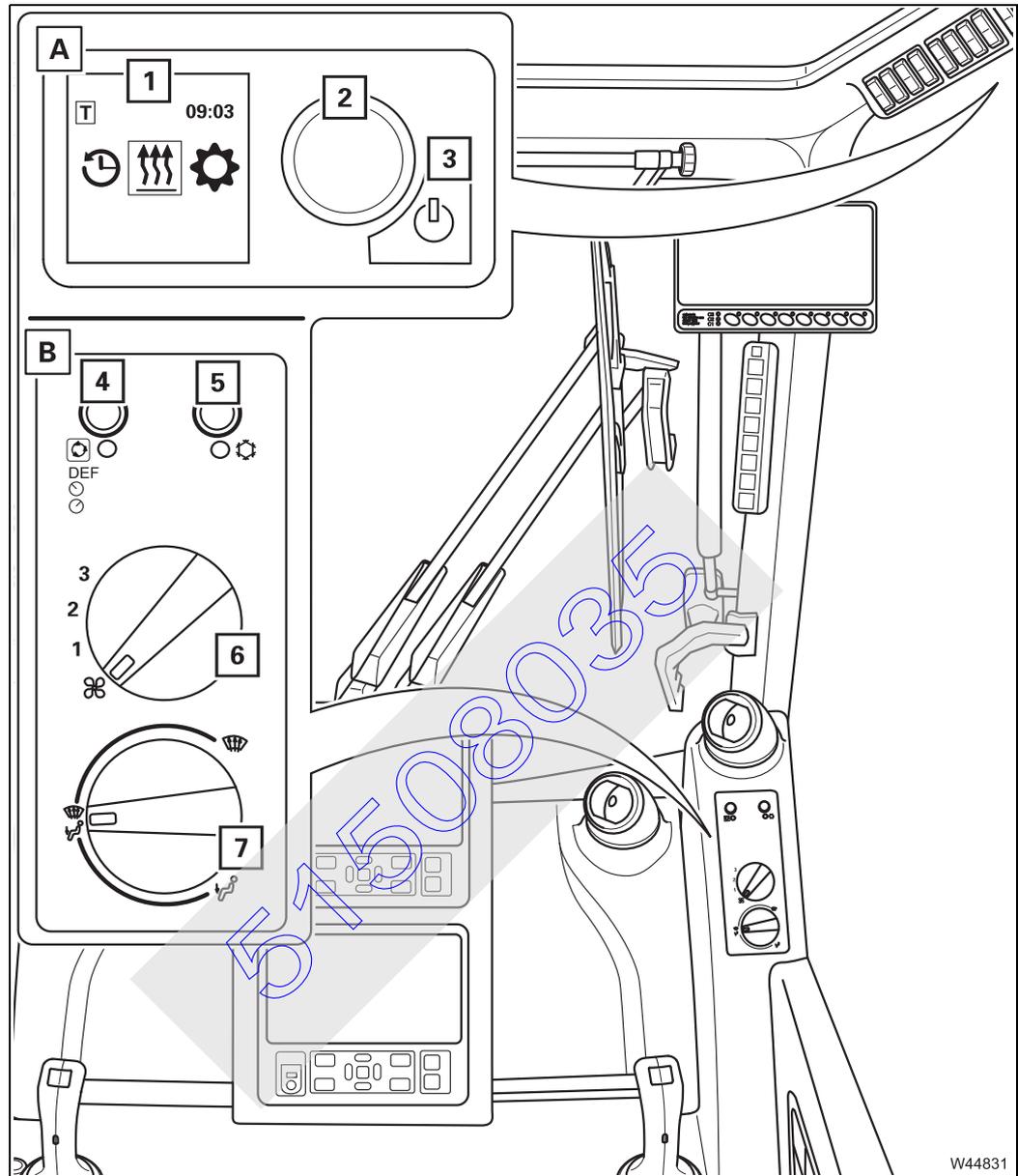
- 5 Raise/retract²⁾
- 6 Lower/extend²⁾
- 7 Lower main hoist
- 8 Lift main hoist

¹⁾ Additional equipment

²⁾ Derrick the lattice extension;  *Lattice extension operating manual*

9.3.5

Heating and air-conditioning system operating elements



(A) – UniControl control unit

▣▣▣▣▶ p. 11 - 162

- 1 Display
- 2 Jog dial
- 3 On/Off switch with lamp

(B) – Heating and air-conditioning system

▣▣▣▣▶ p. 11 - 155

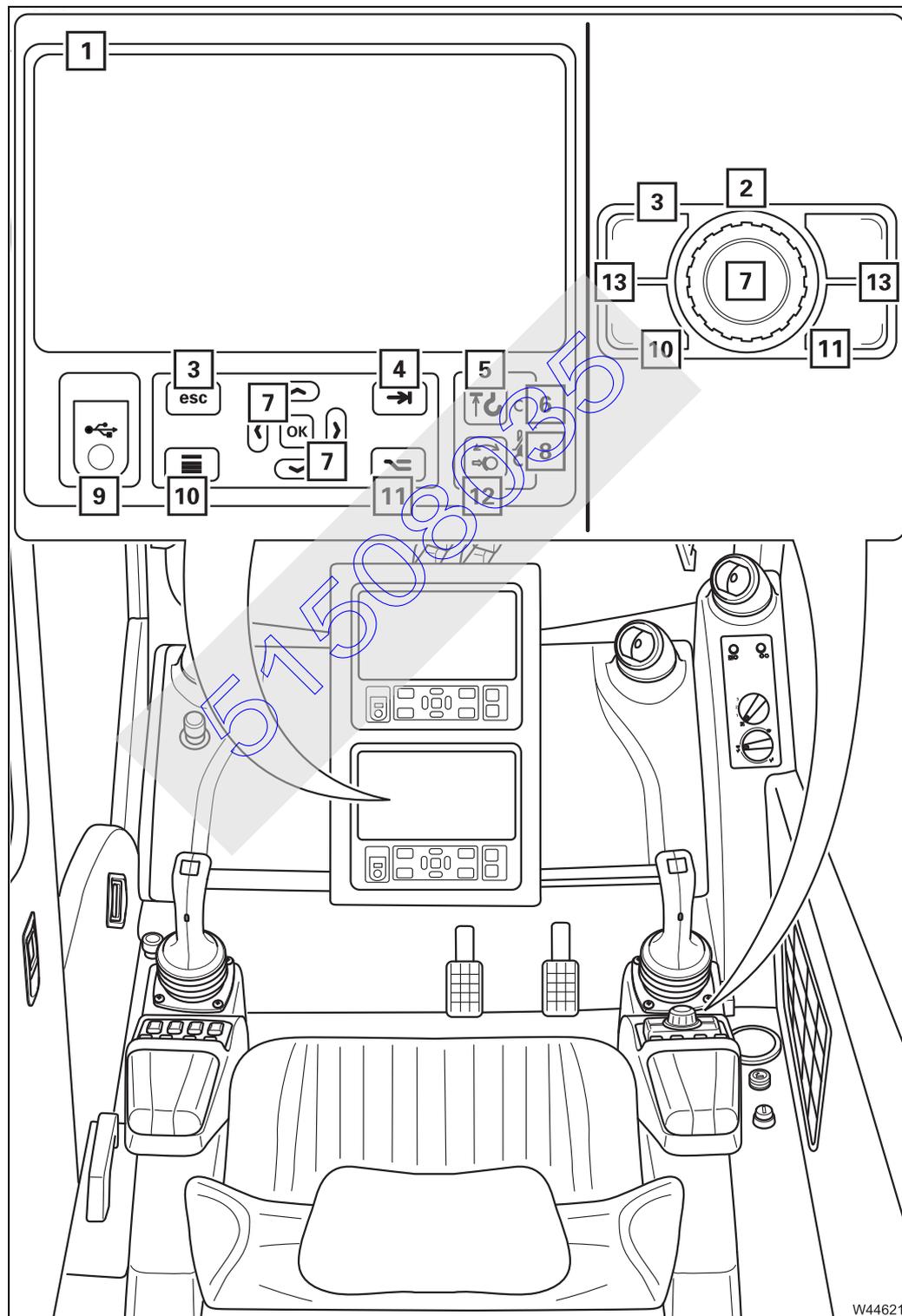
- 4 Setting fresh air / recirculated air ▣▣▣▣▶ p. 11 - 159
- 5 – Switch on air-conditioning system¹⁾ ▣▣▣▣▶ p. 11 - 172
– Switch off air-conditioning system¹⁾ ▣▣▣▣▶ p. 11 - 173
- 6 Setting the fan ▣▣▣▣▶ p. 11 - 157
- 7 Air distribution ▣▣▣▣▶ p. 11 - 158

- 1) Additional equipment

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9.4 Crane control operating elements

9.4.1 CCS control unit



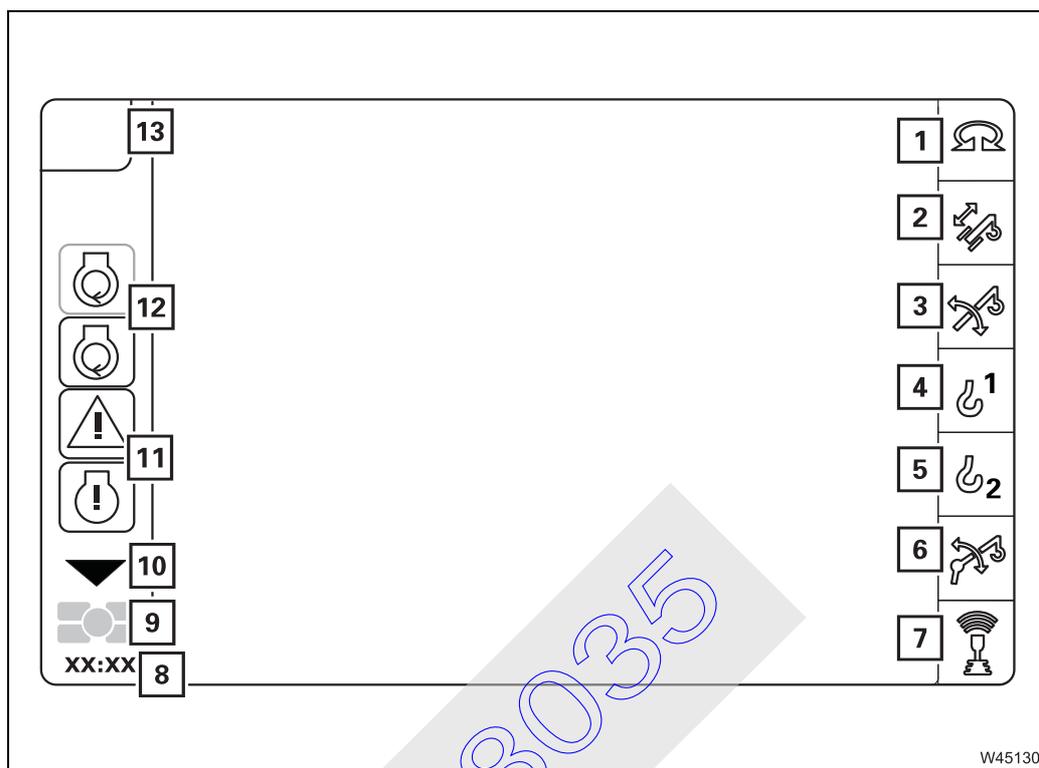
1 CCS display	▣▣▣▣▶ p. 9 - 103
Overview start menu	▣▣▣▣▶ p. 9 - 33
2 Jog dial (rotary push button)	
3 Exit menu/input mode	▣▣▣▣▶ p. 9 - 106
4 Selecting / deselecting favourites	▣▣▣▣▶ p. 9 - 107
5 Warning of lifting limit switch shutdown	▣▣▣▣▶ p. 9 - 124
6 No function	
7 Menu operation	▣▣▣▣▶ p. 9 - 103
Select / activate / confirm	
8 Display temperature warning display	▣▣▣▣▶ p. 9 - 107
9 Service/diagnostics connection ¹⁾	▣▣▣▣▶ p. 9 - 163
10 Overview of menu groups – Operation	▣▣▣▣▶ p. 9 - 106
Overview of menu groups – Overview	▣▣▣▣▶ p. 9 - 36
11 Switch off RCL buzzer sound	▣▣▣▣▶ p. 9 - 106
12 Slewing gear brake applied/released	▣▣▣▣▶ p. 9 - 128
13 Function only in the <i>Outrigger</i> menu	▣▣▣▣▶ p. 9 - 43

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

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9.4.2

CCS – menu-dependent displays



- | | |
|---|-----------------|
| 1 Slewing gear | ▣▣▣▣ p. 9 - 127 |
| 2 Telescoping mechanism | ▣▣▣▣ p. 9 - 131 |
| 3 Derricking gear | ▣▣▣▣ p. 9 - 129 |
| 4 Main hoist | ▣▣▣▣ p. 9 - 123 |
| 5 Auxiliary hoist ¹⁾ | ▣▣▣▣ p. 9 - 125 |
| 6 Lattice extension derricking gear ^{1), 2)} | |
| 7 Remote control display ³⁾ | ▣▣▣▣ p. 9 - 72 |
| 8 – Time display
– Setting the time | ▣▣▣▣ p. 11 - 20 |
| 9 Jog dial display | ▣▣▣▣ p. 9 - 106 |
| 10 Browse | ▣▣▣▣ p. 9 - 104 |
| 11 Error messages display | ▣▣▣▣ p. 14 - 5 |
| 12 Warning messages display | ▣▣▣▣ p. 14 - 3 |
| 13 Current menu display | |

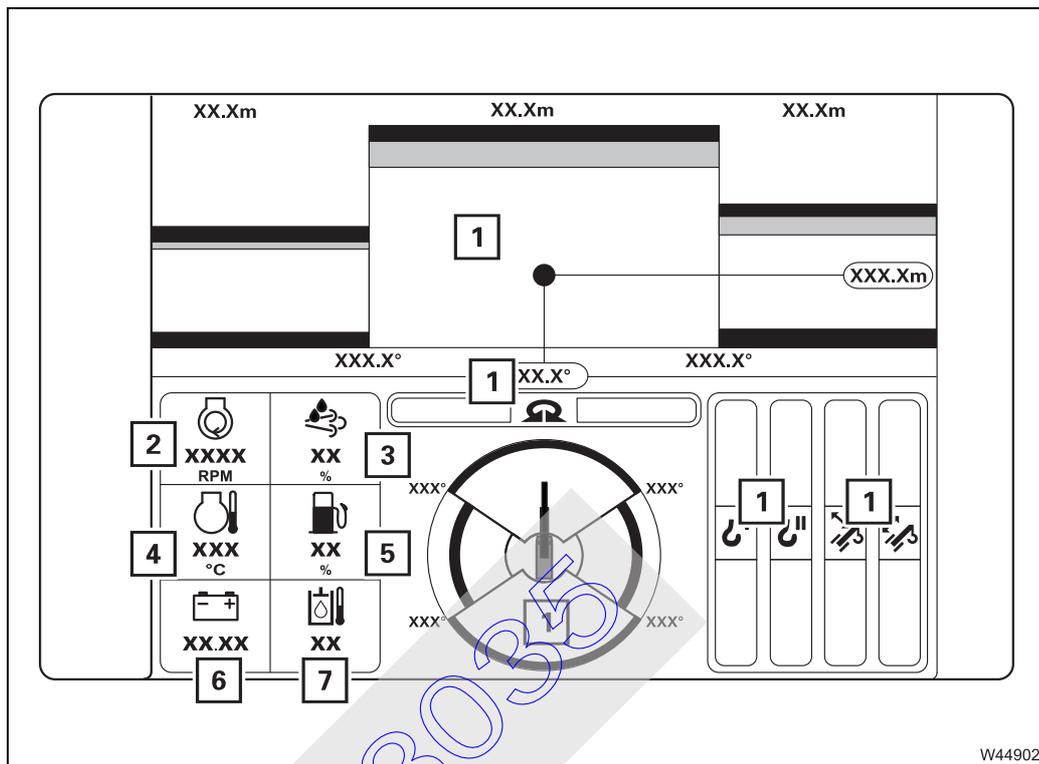
1) Additional equipment

2) ▣▣▣▣ *Lattice extension operating manual*

3) ▣▣▣▣ *Separate operating manual*

9.4.3

CCS – Start menu

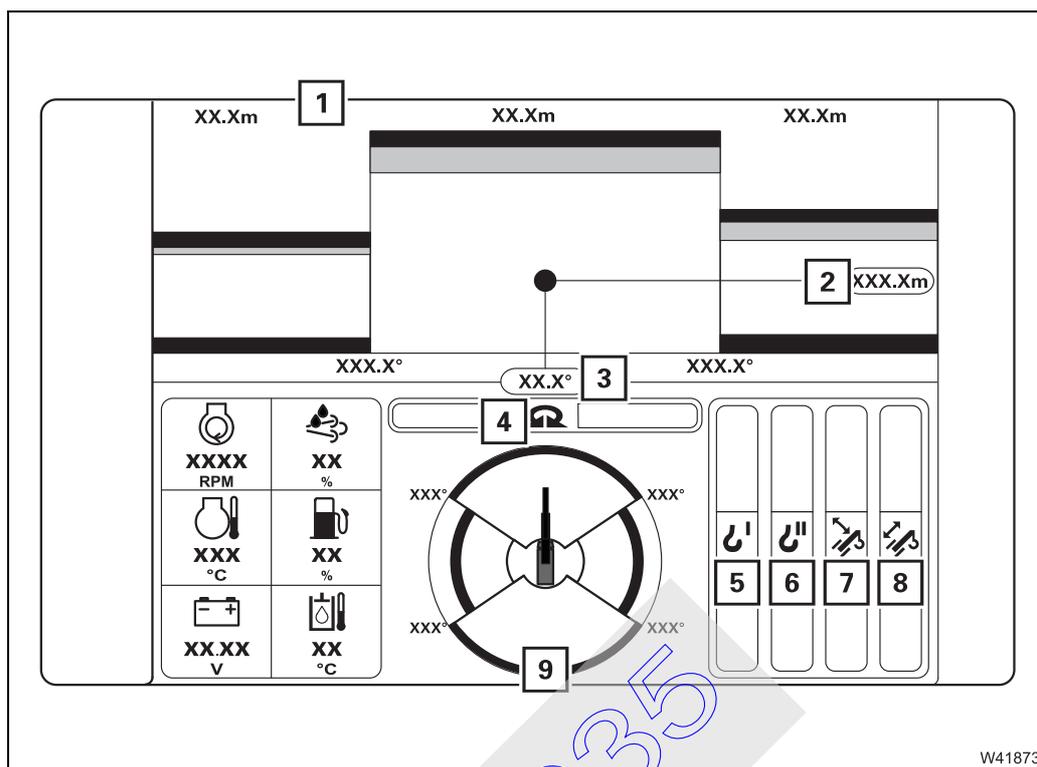


W44902

- | | |
|-------------------------------------|-----------------|
| 1 RCL display | ▣▣▣▣ p. 9 - 34 |
| 2 Engine speed display | ▣▣▣▣ p. 10 - 10 |
| 3 AdBlue (DEF) level display | ▣▣▣▣ p. 10 - 10 |
| 4 Coolant temperature display | ▣▣▣▣ p. 10 - 10 |
| 5 Fuel level display | ▣▣▣▣ p. 10 - 10 |
| 6 Voltage monitoring display | ▣▣▣▣ p. 10 - 10 |
| 7 Hydraulic oil temperature display | ▣▣▣▣ p. 10 - 10 |



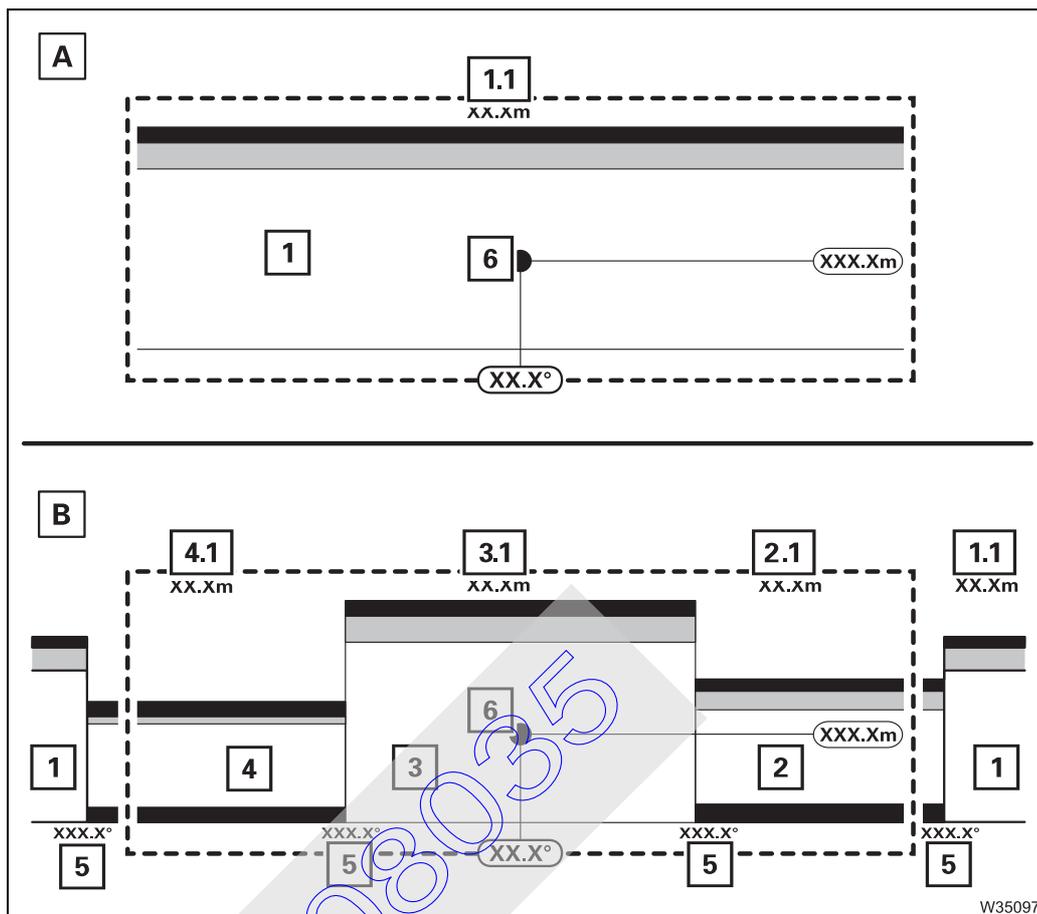
RCL display



- | | |
|---|-----------------|
| 1 Slewing ranges/working radii display | ▮▮▮▮ p. 9 - 35 |
| 2 Current working radius display | ▮▮▮▮ p. 9 - 143 |
| 3 Current slewing angle display | ▮▮▮▮ p. 9 - 143 |
| 4 Maximum permissible speed display – Slewing gear | ▮▮▮▮ p. 9 - 144 |
| 5 Maximum permissible speed display – Main hoist | ▮▮▮▮ p. 9 - 144 |
| 6 Maximum permissible speed display – Auxiliary hoist ¹⁾ | ▮▮▮▮ p. 9 - 144 |
| 7 Maximum permissible speed display – Derricking gear | ▮▮▮▮ p. 9 - 144 |
| 8 Maximum permissible speed display – Telescoping mechanism | ▮▮▮▮ p. 9 - 144 |
| 9 Slewing range display | ▮▮▮▮ p. 9 - 144 |

1) Additional equipment

**Slewing ranges/
working radii
display**



- A** For the *Standard* slewing range type
- B** For the *MAXbase* slewing range type

Current slewing range divisions display

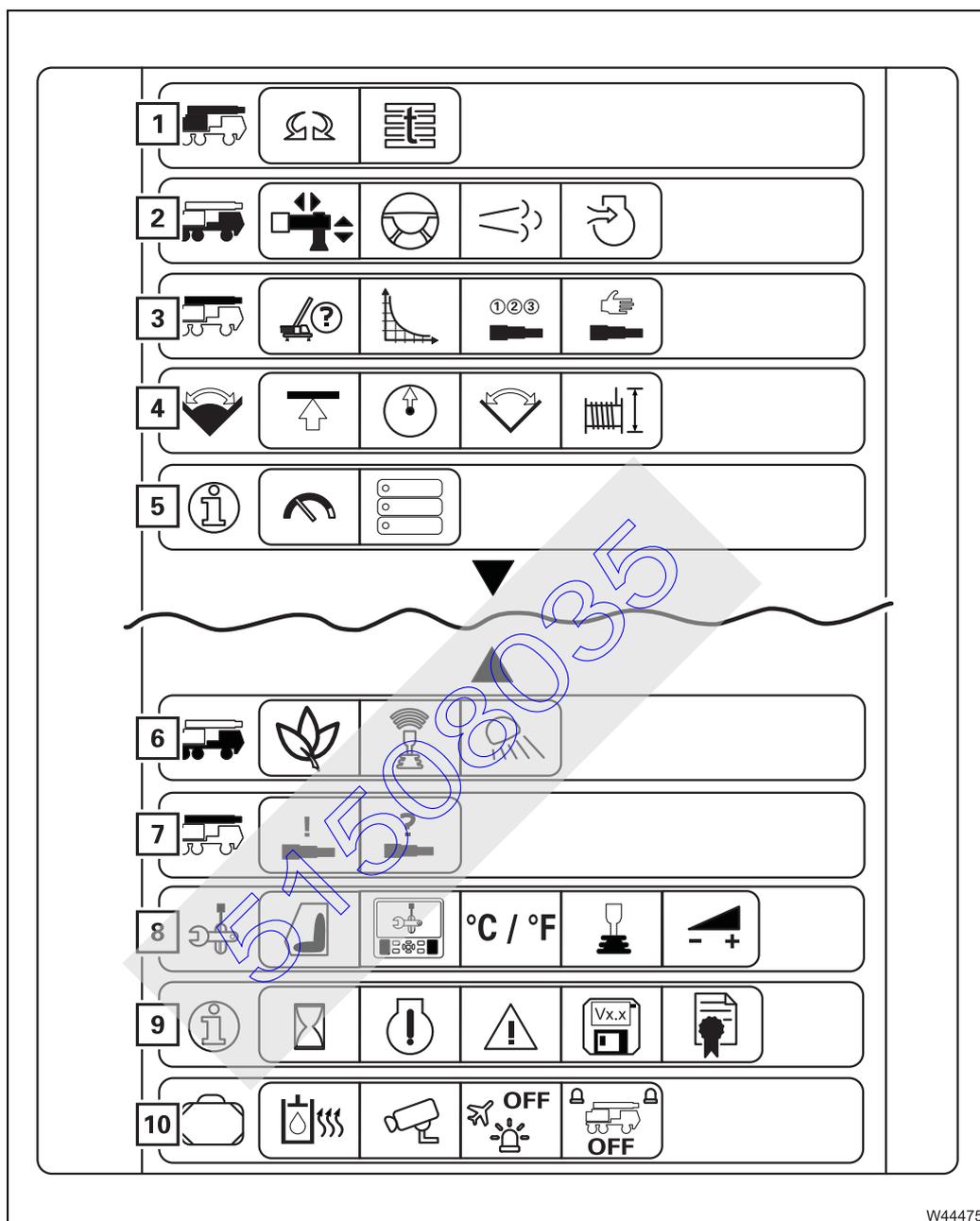
- 1 Slewing range 1 ▣▣▣▣ p. 9 - 142
- 2 Slewing range 2 ▣▣▣▣ p. 9 - 142
- 3 Slewing range 3 ▣▣▣▣ p. 9 - 142
- 4 Slewing range 4 ▣▣▣▣ p. 9 - 142
- 5 Current slewing range limits display ▣▣▣▣ p. 9 - 142
- 6 Current position display ▣▣▣▣ p. 9 - 143

Maximum permissible working radius display

- 1.1 in slewing range 1 ▣▣▣▣ p. 9 - 143
- 2.1 in slewing range 2 ▣▣▣▣ p. 9 - 143
- 3.1 in slewing range 3 ▣▣▣▣ p. 9 - 143
- 4.1 in slewing range 4 ▣▣▣▣ p. 9 - 143

9.4.4

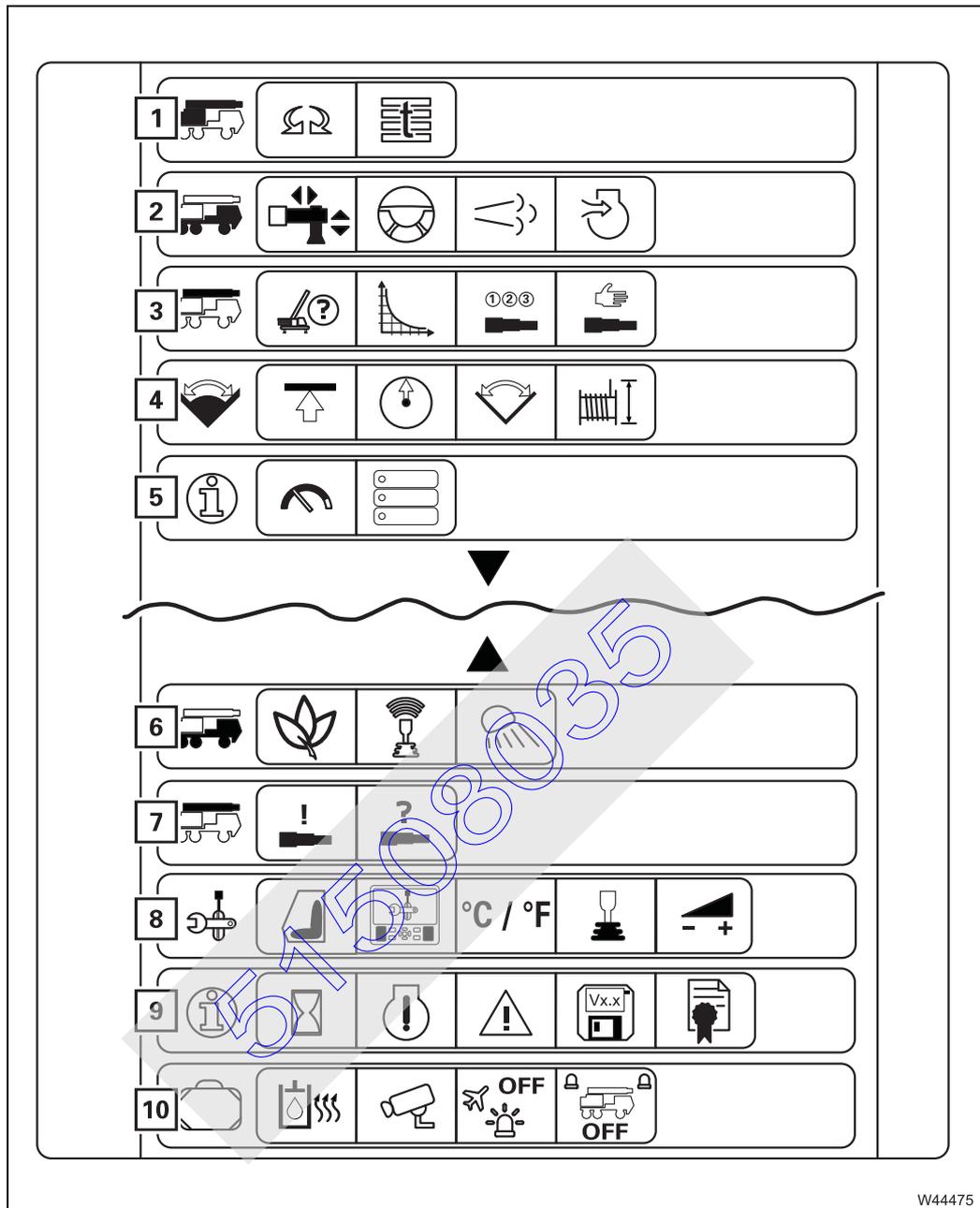
CCS – Overview of menu groups



- 1 Superstructure menu group** ▶▶▶▶ p. 9 - 40
 - Superstructure lock menu¹⁾
 - Counterweight menu
- 2 Outriggers/driving menu group** ▶▶▶▶ p. 9 - 43
 - Outrigger menu
 - Driving menu¹⁾
 - Exhaust system menu¹⁾
 - Air intake inhibitor menu¹⁾
- 3 RCL/Telescoping menu group** ▶▶▶▶ p. 9 - 53
 - Rigging mode/Telescope status input menu
 - Lifting capacity tables menu
 - Semi-automatic telescoping menu
 - Manual telescoping menu
- 4 Active working range limiter menu group** ▶▶▶▶ p. 9 - 63
 - Overall height menu
 - Working radius menu
 - Slewing angle menu
 - Hoist rope travel limitation menu
- 5 Information 1 menu group** ▶▶▶▶ p. 9 - 68
 - Hydraulic pressure and fuel consumption menu
 - Datalogger menu (menu opens on the RCL display)
- 6 Engine/Additional equipment menu group** ▶▶▶▶ p. 9 - 70
 - Economy menu
 - Remote control menu¹⁾
 - Slewable spotlights menu¹⁾
- 7 Telescoping emergency program menu group** ▶▶▶▶ p. 9 - 74
 - Telescoping emergency program menu
 - Unknown telescoping menu

¹⁾ Additional equipment





8 Settings menu group

▶▶▶▶▶ p. 9 - 77

- Crane cab menu
- Set display brightness and date/time menu
- Switch over units menu
- Control lever characteristic curve menu
- Power unit speeds menu

9 Information 2 menu group

▶▶▶▶▶ p. 9 - 83

- Operating hours menu
- Engine/transmission error menu
- Crane operation error menu
- Program version menu
- Disclaimer menu

10 Various controls

▶▶▶▶▶ p. 9 - 88

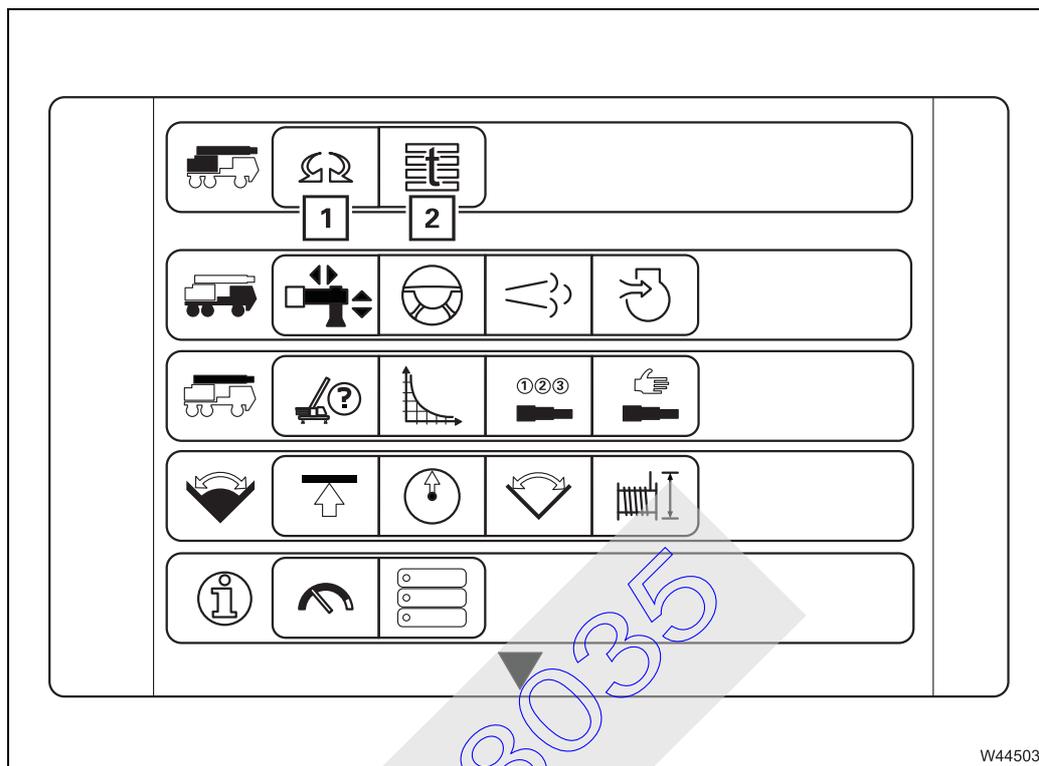
- Prewarming hydraulic oil
- Operating the camera
- Air traffic control light on/off
- Rotating beacons on/off

1) Additional equipment

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9.4.5

Superstructure menu group



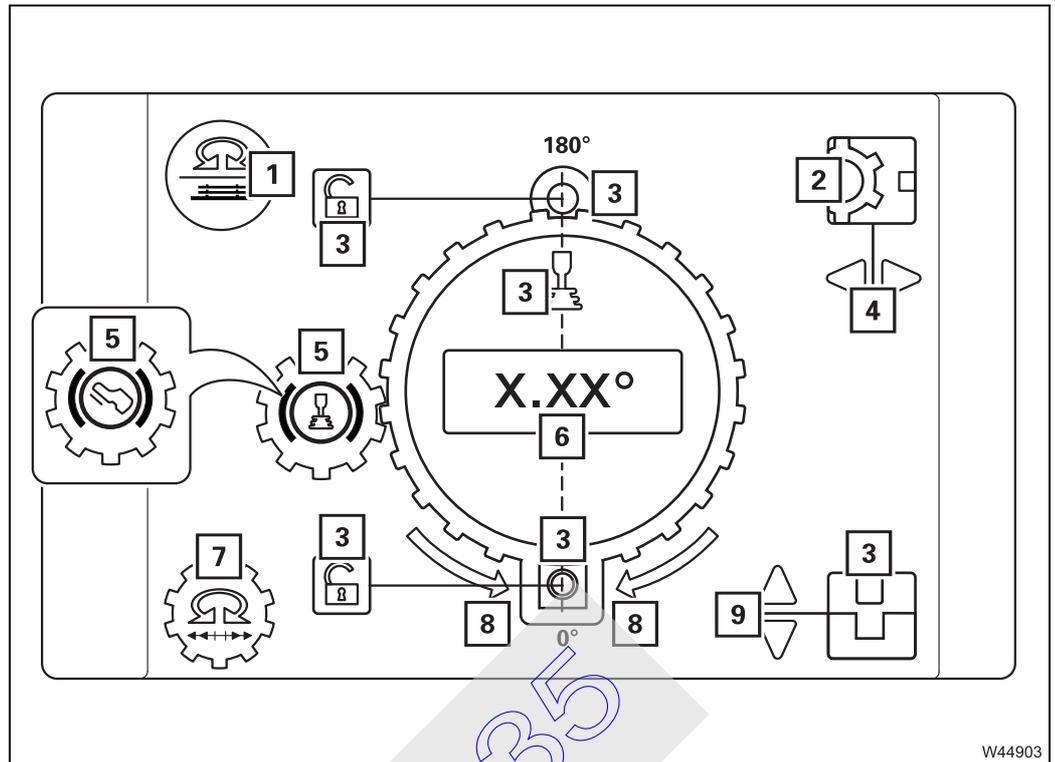
1 Superstructure lock menu

▶▶▶ p. 9 - 41

2 Counterweight menu

▶▶▶ p. 9 - 42

**Superstructure
lock menu**



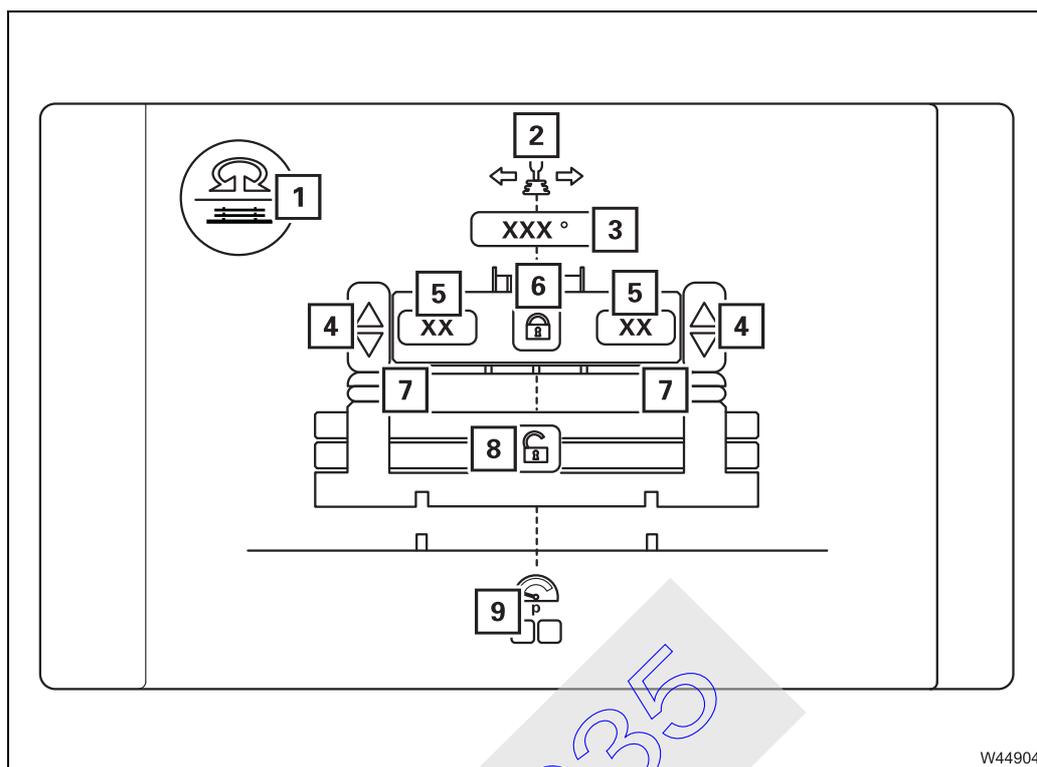
W44903

- 1 Slewing enabled display – identical to the display in the *Counterweight* menu ▣▣▣ p. 9 - 42
- 2 Houselock locking status displays¹⁾ ▣▣▣ p. 9 - 140
- 3 Locking status display¹⁾ ▣▣▣ p. 9 - 138
- 4 Houselock on/off¹⁾ ▣▣▣ p. 9 - 140
- 5 Display/switch function for slewing gear brake¹⁾ ▣▣▣ p. 9 - 128
- 6 Current slewing angle display¹⁾ ▣▣▣ p. 9 - 139
- 7 Slewing speed reduction on/off ▣▣▣ p. 9 - 128
- 8 Display of slewing direction to 0°/180° ▣▣▣ p. 9 - 139
- 9 Locking/unlocking the turntable¹⁾ ▣▣▣ p. 9 - 138

1) Additional equipment



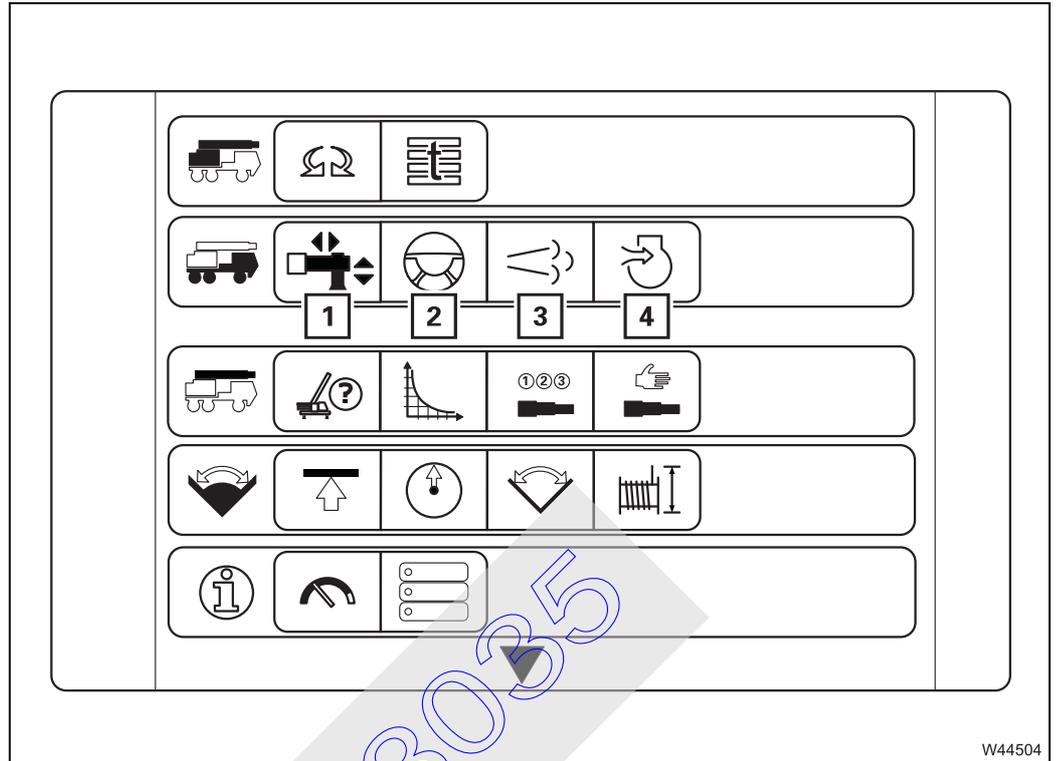
Counterweight menu



- | | |
|--|-----------------|
| 1 Slewing enabled display | ▣▣▣▣ p. 9 - 122 |
| 2 Display of slewing direction for automatic mode | ▣▣▣▣ p. 9 - 119 |
| 3 Current slewing angle display | ▣▣▣▣ p. 9 - 122 |
| 4 Extending/retracting the lifting cylinders | ▣▣▣▣ p. 9 - 121 |
| 5 Lifting cylinder position display | ▣▣▣▣ p. 9 - 121 |
| 6 Rigging automatic mode | ▣▣▣▣ p. 9 - 120 |
| 7 Lifting cylinder position display | ▣▣▣▣ p. 9 - 121 |
| 8 Automatic unrigging | ▣▣▣▣ p. 9 - 120 |
| 9 Pre-tensioning pressure display | ▣▣▣▣ p. 9 - 121 |

9.4.6

Outriggers/driving menu group



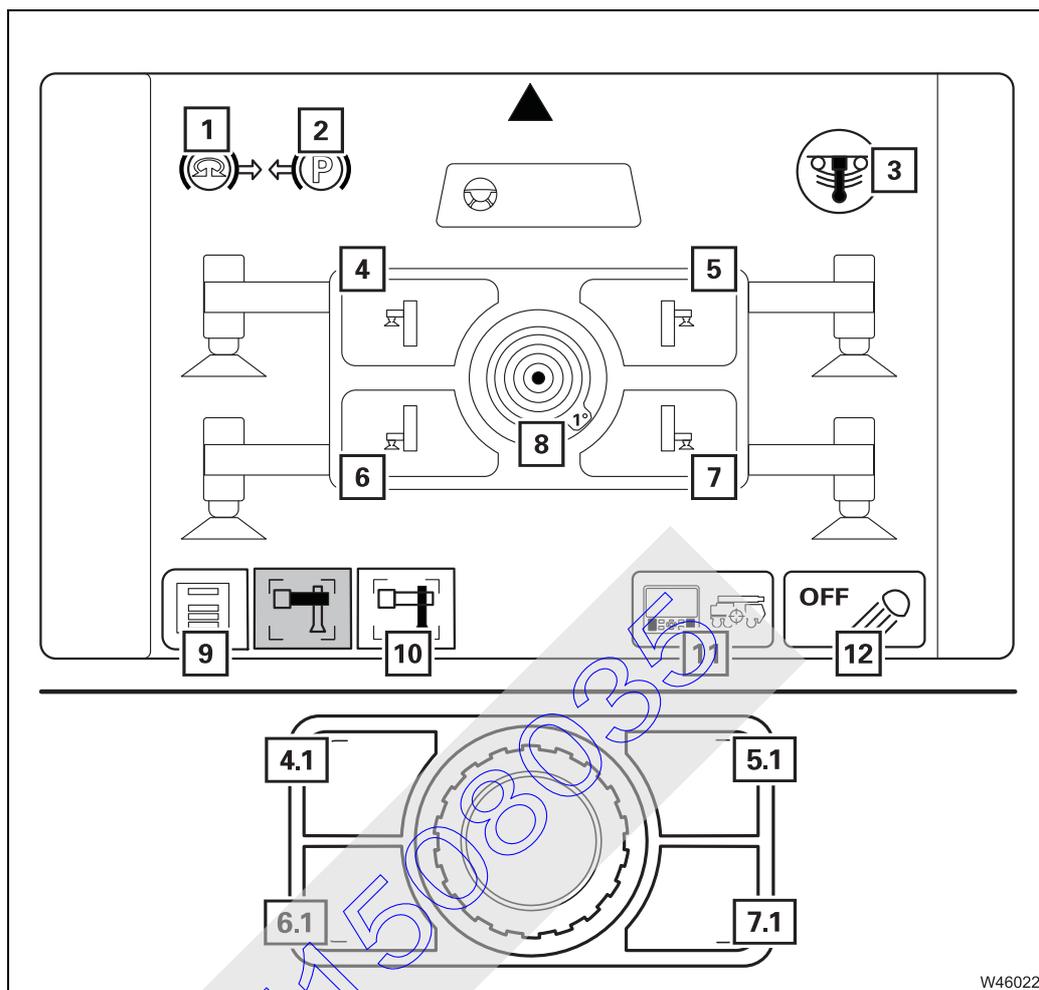
W44504

- 1** Outrigger menu
 - Outrigger beam menu ▣ p. 9 - 44
 - Outrigger cylinders menu ▣ p. 9 - 46
- 2** Driving menu ▣ p. 9 - 48
- 3** Exhaust system menu ▣ p. 9 - 50
- 4** Air intake inhibitor menu ▣ p. 9 - 51

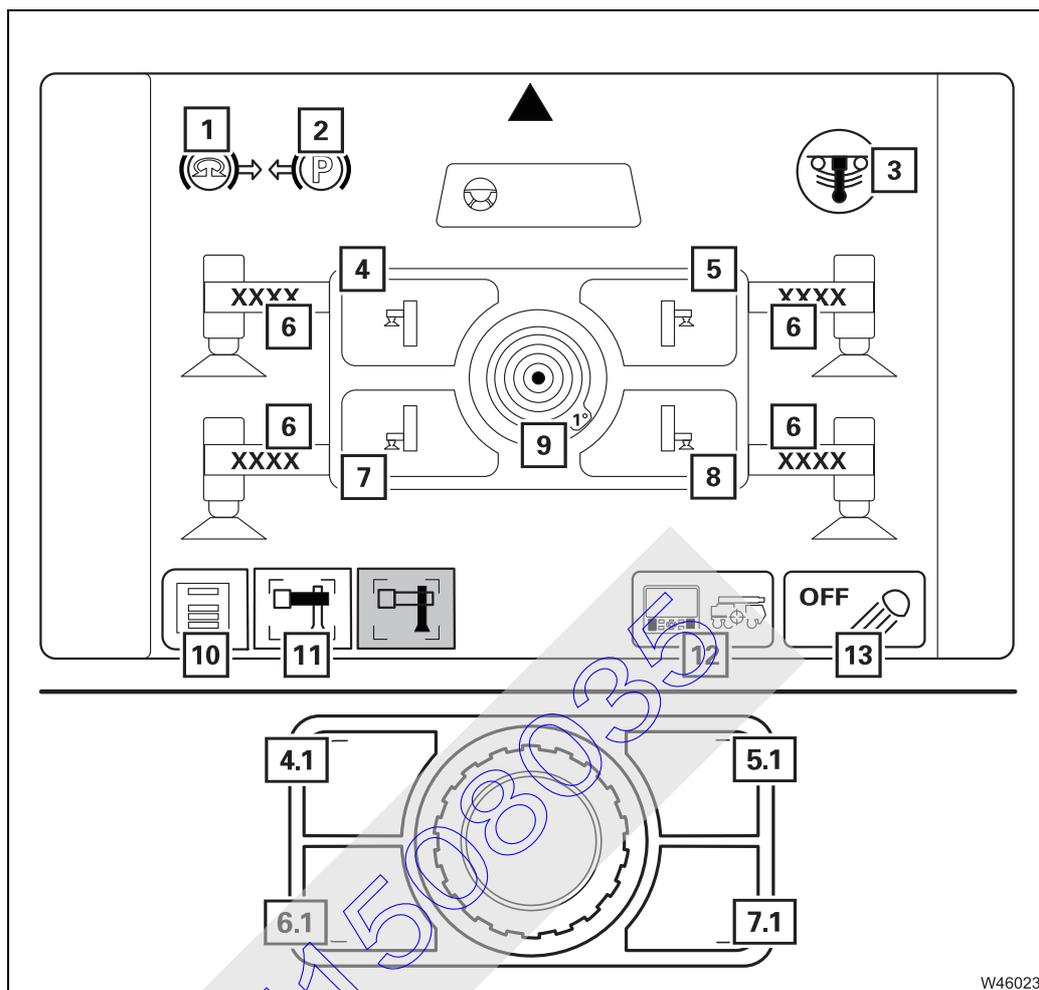


Outrigger menu

Outrigger beam menu



Outrigger cylinders menu



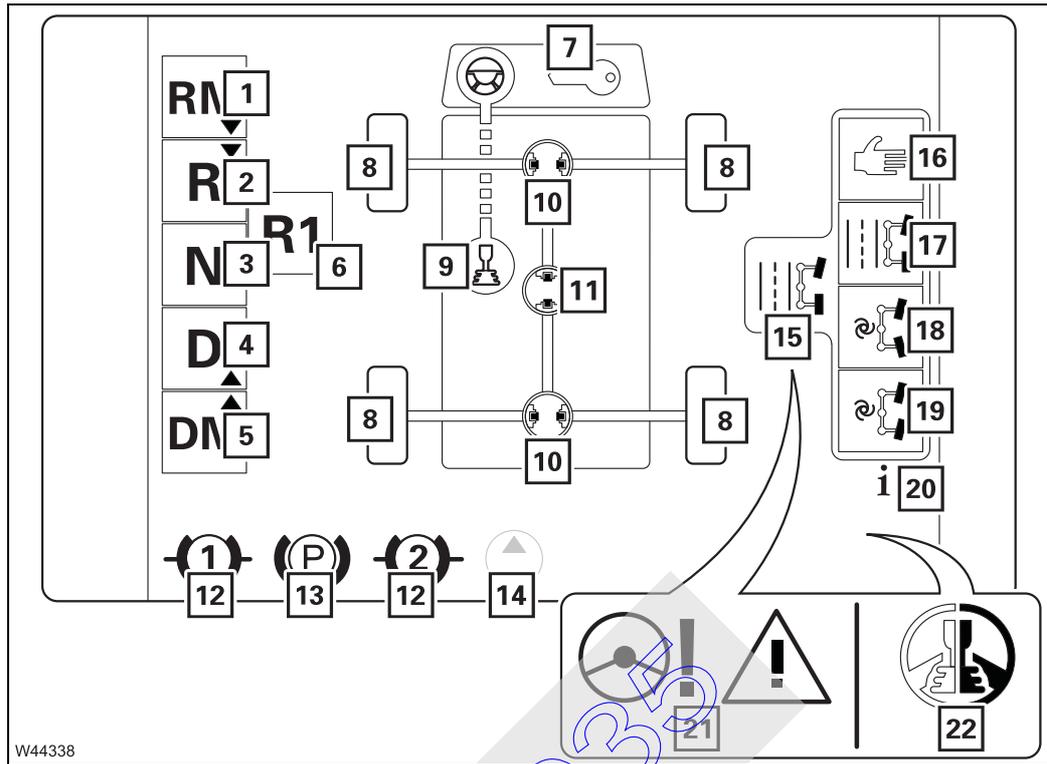
W46023

1 Slewing gear/movements locked display	➡ p. 9 - 109
2 Parking brake/movements disabled display/warning	➡ p. 9 - 110
3 Suspension on/off display/warning	➡ p. 9 - 109
4 Pre-select front left supporting cylinder display	➡ p. 9 - 111
4.1 Pre-select front left supporting cylinder	➡ p. 9 - 111
5 Pre-select front right supporting cylinder display	➡ p. 9 - 111
5.1 Pre-select front right supporting cylinder	➡ p. 9 - 111
6 Outrigger pressure display ¹⁾	➡ p. 9 - 118
7 Pre-select rear left supporting cylinder display	➡ p. 9 - 111
7.1 Pre-select rear left supporting cylinder	➡ p. 9 - 111
8 Pre-select rear right outrigger display	➡ p. 9 - 111
8.1 Pre-select rear right outrigger	➡ p. 9 - 111
9 Current inclination display	➡ p. 9 - 117
10 Exit menu	➡ p. 9 - 111
11 Switch to Outrigger beam menu	➡ p. 9 - 111
12 Display/switch outrigger function	➡ p. 9 - 110
13 Outrigger lighting on/off	➡ p. 9 - 110

1) Additional equipment



Driving menu



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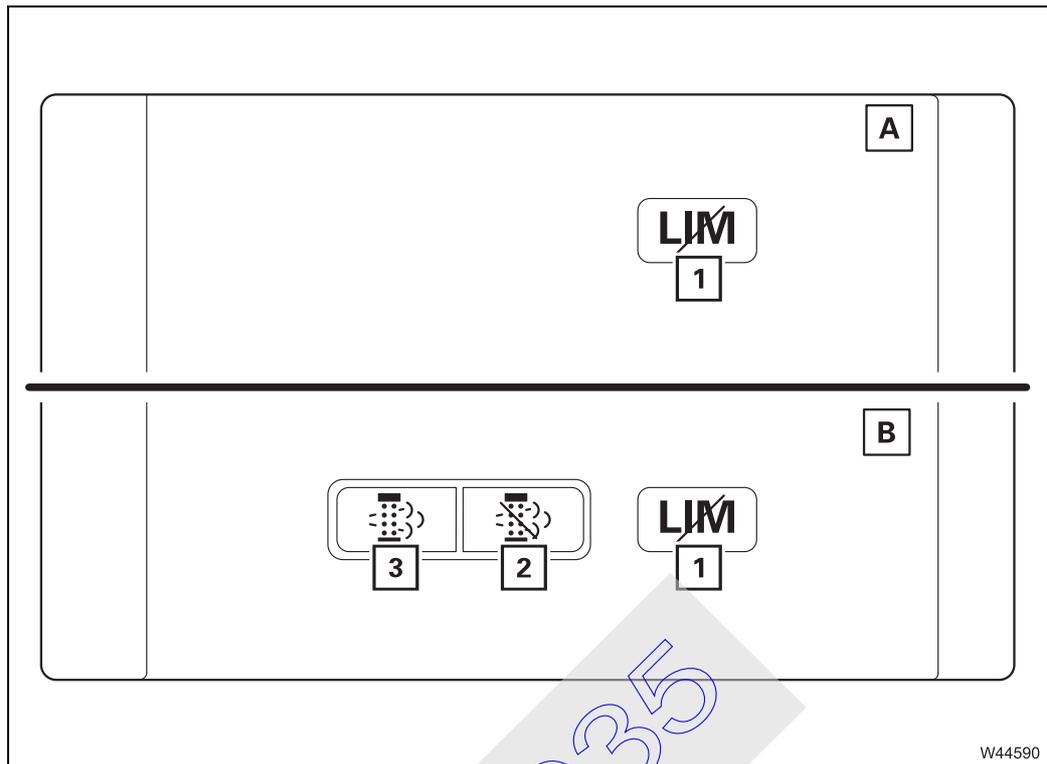
1 Transmission mode RM	▣▣▣▣ p. 9 - 168
2 Transmission mode R	▣▣▣▣ p. 9 - 167
3 Neutral position N	▣▣▣▣ p. 9 - 167
4 Transmission mode D	▣▣▣▣ p. 9 - 167
5 Transmission mode DM	▣▣▣▣ p. 9 - 168
6 Current transmission mode display	
7 Steering lock display	▣▣▣▣ p. 9 - 166
8 Current wheel position display	▣▣▣▣ p. 9 - 171
9 Change-over between crane operation and driving modes	▣▣▣▣ p. 9 - 166
10 Transverse differential locks display	▣▣▣▣ p. 9 - 169
Transverse differential locks on/off	▣▣▣▣ p. 9 - 169
11 Longitudinal differential lock display	▣▣▣▣ p. 9 - 169
Longitudinal differential lock on/off	▣▣▣▣ p. 9 - 169
12 Supply pressure brake circuits 1 and 2 display	▣▣▣▣ p. 9 - 170
13 Parking brake indicator lamp	▣▣▣▣ p. 9 - 170
14 No function	
15 Steering mode switched on display	
16 Manual separate steering on	▣▣▣▣ p. 9 - 173
17 Normal steering mode/on-road driving on	▣▣▣▣ p. 9 - 173
18 Automatic separate steering for driving around corners on	▣▣▣▣ p. 9 - 173
19 Automatic separate steering for crab travel mode on	▣▣▣▣ p. 9 - 173
20 Diagnostics menu ²⁾	
21 Steering malfunction / Steering system warning	▣▣▣▣ p. 9 - 174
22 Changing the steering direction ¹⁾	▣▣▣▣ p. 9 - 172

1) Display depends on carrier illustration; ▣▣▣▣ p. 9 - 165

2) For service personnel only



Exhaust system menu



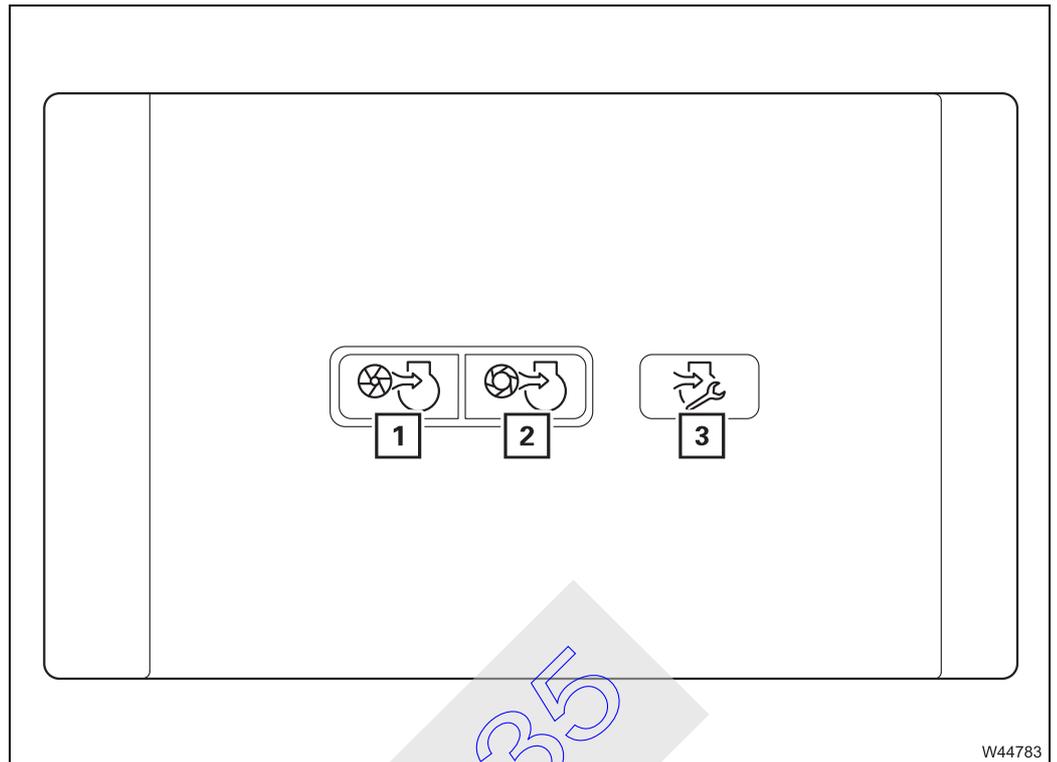
A Only for EU Tier IV

1 Override torque reduction ▶▶▶▶ p. 9 - 99

B Only for EU Tier V

- 1 Override torque reduction ▶▶▶▶ p. 9 - 99
- 2 Disable exhaust system cleaning ▶▶▶▶ p. 9 - 100
- 3 Manually start exhaust system cleaning ▶▶▶▶ p. 9 - 100

Air intake inhibitor menu



- 1 Close air intake inhibitor¹⁾
- 2 Air intake inhibitor
- 3 Air intake inhibitor maintenance¹⁾

▣▣▣▣ p. 9 - 101

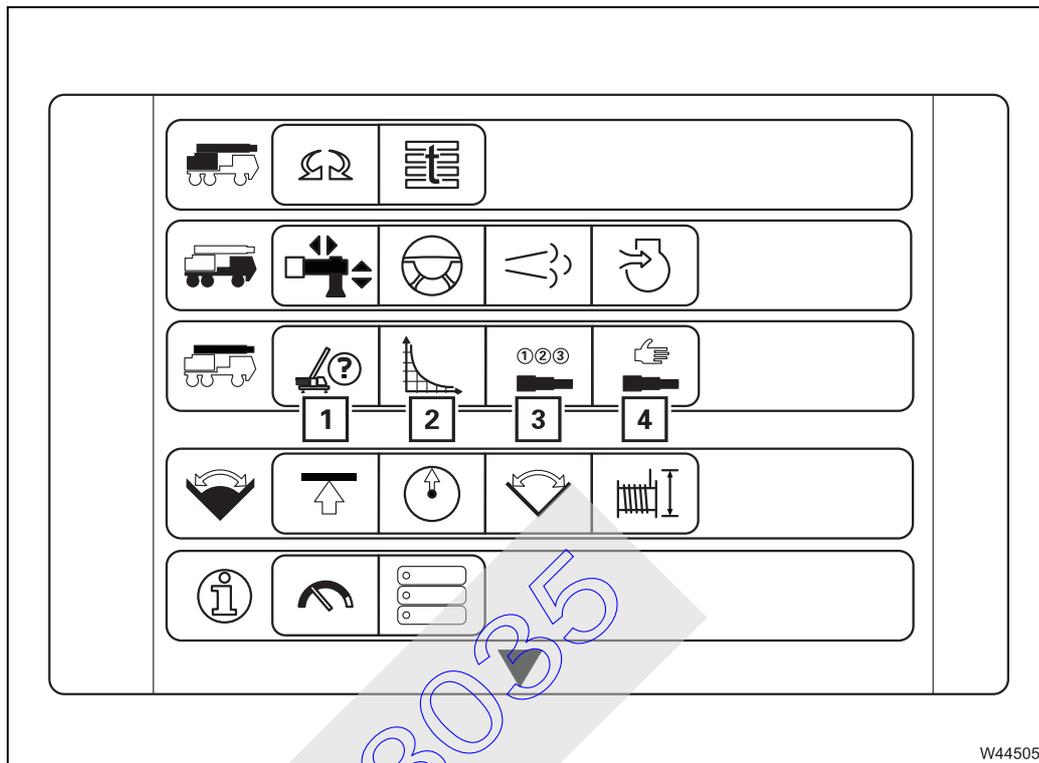
¹⁾ Only for check that it is functioning; ▣▣▣▣ *Maintenance manual*

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9.4.7

RCL/Telescoping menu group

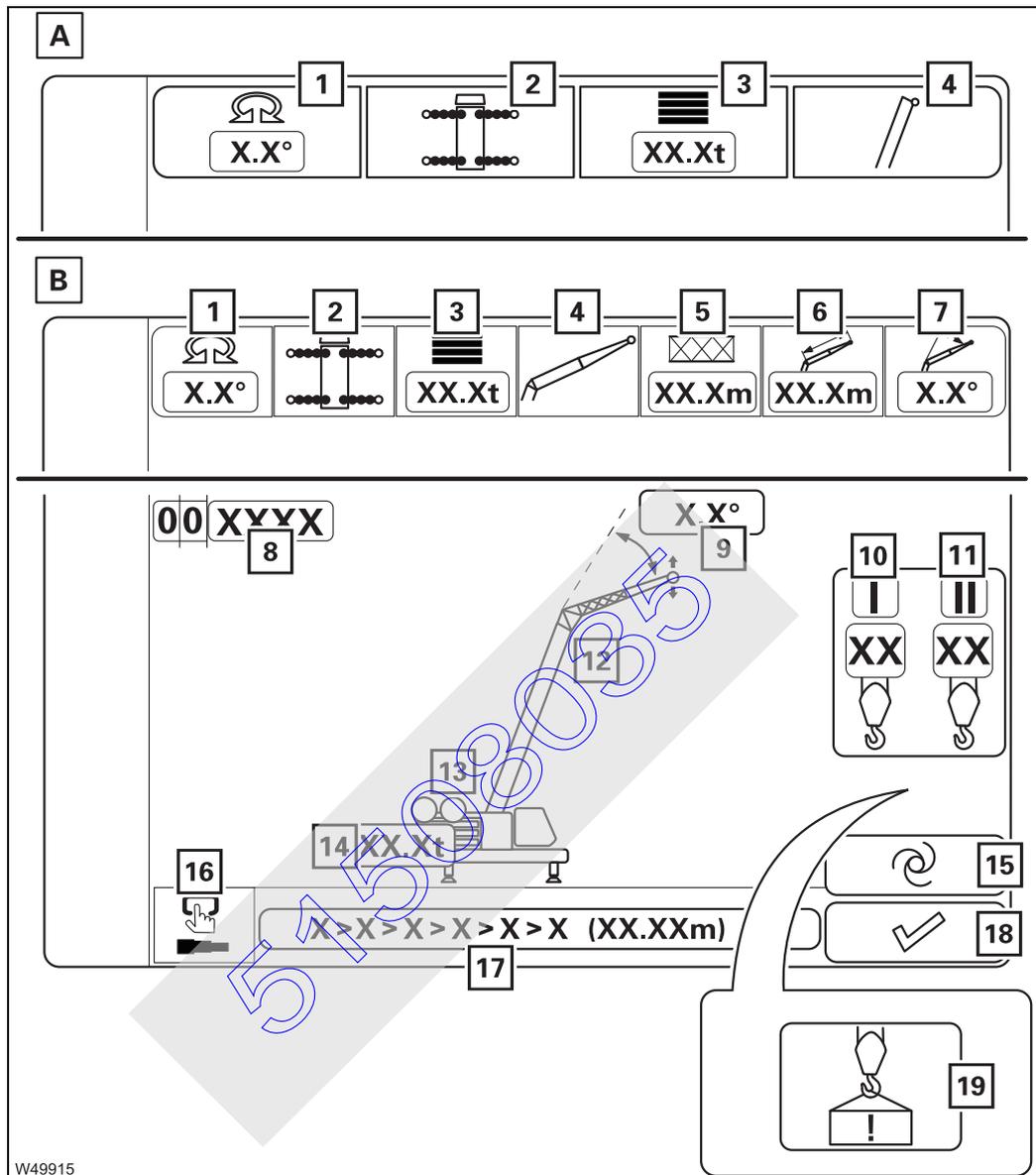


- 1 Rigging mode/Telescope status input menu ▶▶▶▶ p. 9 - 54
- 2 Lifting capacity tables menu ▶▶▶▶ p. 9 - 60
- 3 Semi-automatic telescoping menu ▶▶▶▶ p. 9 - 61
- 4 Manual telescoping menu ▶▶▶▶ p. 9 - 62



**Rigging mode/
 Telescope status
 input menu**

– For the *Standard* slewing range type



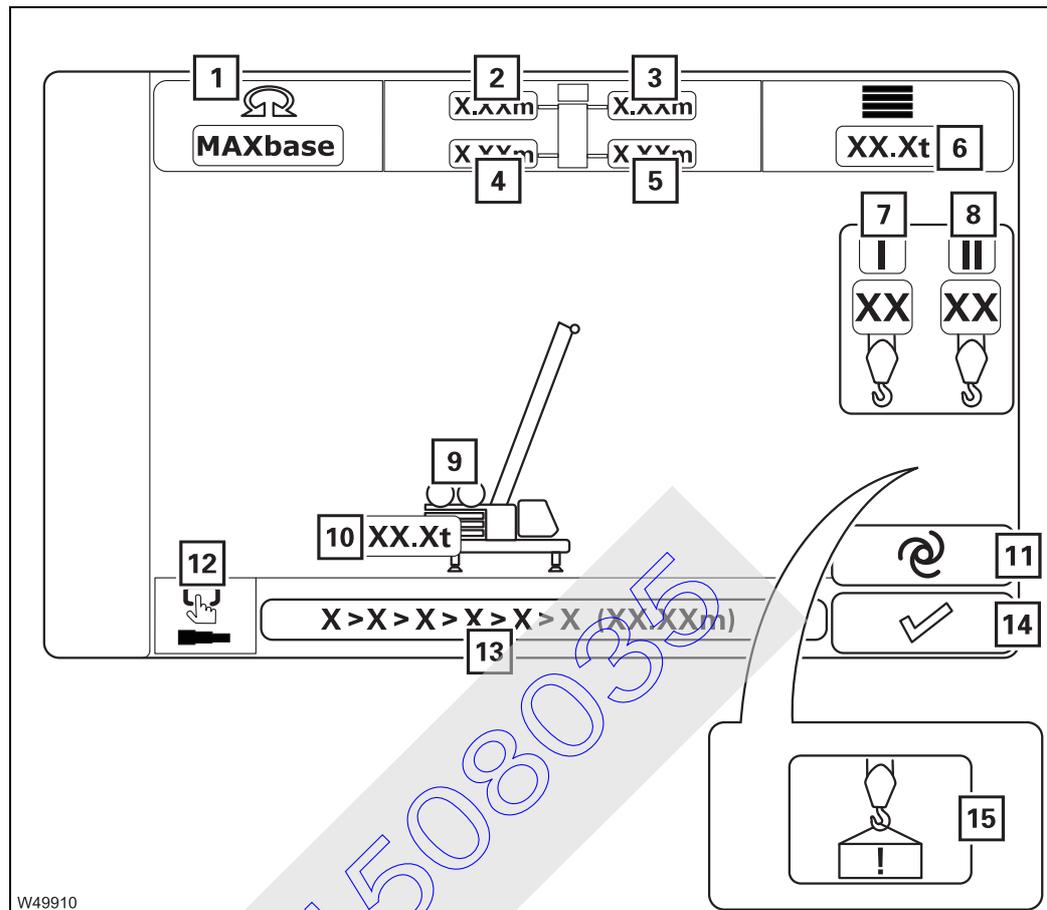
A For the *Main boom* boom system

B For the *Lattice extension* boom system

1 Enter slewing range	▣▣▣▣▶ p. 9 - 145
2 Enter outrigger span	▣▣▣▣▶ p. 9 - 148
Outrigger span monitoring display	▣▣▣▣▶ p. 9 - 149
3 Enter counterweight	▣▣▣▣▶ p. 9 - 145
4 Enter boom system	▣▣▣▣▶ p. 9 - 147
5 Lattice extension input – Length before the angle ¹⁾	▣▣▣▣▶ p. 9 - 147
6 Input lattice extension – Length after the angle ¹⁾	▣▣▣▣▶ p. 9 - 147
7 Lattice extension input – Angle ^{1),2)}	▣▣▣▣▶ p. 9 - 147
8 Enter RCL code	▣▣▣▣▶ p. 9 - 149
9 Lattice extension angle display ^{1),2)}	▣▣▣▣▶ p. 9 - 147
10 Enter reeving – Main hoist	▣▣▣▣▶ p. 9 - 146
11 Enter reeving – Auxiliary hoist	▣▣▣▣▶ p. 9 - 146
12 Boom system display	▣▣▣▣▶ p. 9 - 147
13 Reeving input mode display	▣▣▣▣▶ p. 9 - 146
14 Counterweight display	▣▣▣▣▶ p. 9 - 145
15 Accept the measured outrigger span	▣▣▣▣▶ p. 9 - 148
16 Pre-selection telescoping menu	▣▣▣▣▶ p. 9 - 58
17 Preselected telescoping display	▣▣▣▣▶ p. 9 - 146
18 Confirming rigging mode	▣▣▣▣▶ p. 9 - 146
19 Load lifted display	▣▣▣▣▶ p. 9 - 149
1) Additional equipment	
2) Display only with an inclinable lattice extension	



– For the *MAXbase* slewing range type¹⁾

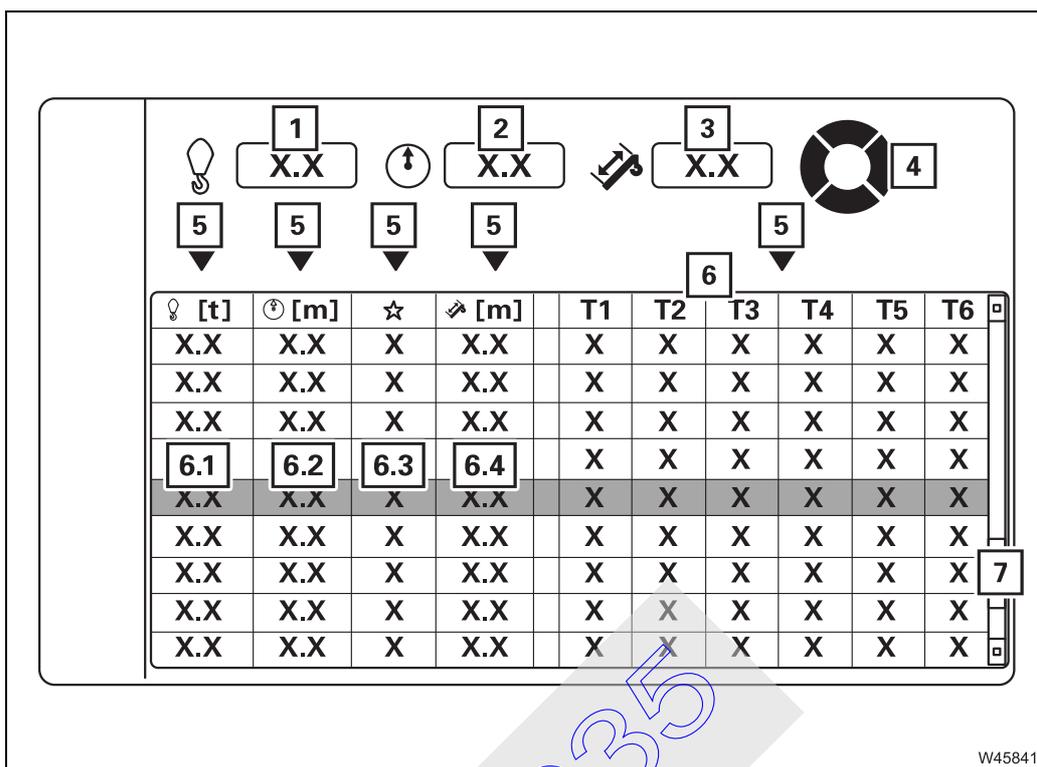


- | | | |
|---|-------|------------|
| 1 Enter slewing range | ▣▣▣▣▶ | p. 9 - 145 |
| 2 Input of front left outrigger span | ▣▣▣▣▶ | p. 9 - 148 |
| 3 Input of front right outrigger span | ▣▣▣▣▶ | p. 9 - 148 |
| 4 Input of rear left outrigger span | ▣▣▣▣▶ | p. 9 - 148 |
| 5 Input of rear right outrigger span | ▣▣▣▣▶ | p. 9 - 148 |
| 2 to 5 Outrigger span monitoring display | ▣▣▣▣▶ | p. 9 - 148 |
| 6 Enter counterweight | ▣▣▣▣▶ | p. 9 - 145 |
| 7 Enter reeving – Main hoist | ▣▣▣▣▶ | p. 9 - 146 |
| 8 Enter reeving – Auxiliary hoist | ▣▣▣▣▶ | p. 9 - 146 |
| 9 Reeving input mode display | ▣▣▣▣▶ | p. 9 - 146 |
| 10 Counterweight display | ▣▣▣▣▶ | p. 9 - 145 |
| 11 Accept the measured outrigger span | ▣▣▣▣▶ | p. 9 - 148 |
| 12 Pre-selection telescoping menu | ▣▣▣▣▶ | p. 9 - 58 |
| 13 Preselected telescoping display | ▣▣▣▣▶ | p. 9 - 146 |
| 14 Confirming rigging mode | ▣▣▣▣▶ | p. 9 - 146 |
| 15 Load lifted display | ▣▣▣▣▶ | p. 9 - 149 |



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**Pre-selection
 telescoping menu**



W45841

Enter desired parameter

- 1 Input of load ▶▶▶▶▶ p. 9 - 150
- 2 Input of working radius ▶▶▶▶▶ p. 9 - 150
- 3 Input of main boom length ▶▶▶▶▶ p. 9 - 150
- 4 Input of slewing range¹⁾ ▶▶▶▶▶ p. 9 - 150

Pre-selection telescoping

- 5 Sort values ▶▶▶▶▶ p. 9 - 150
- 6 Selectable telescoping display ▶▶▶▶▶ p. 9 - 150
 - 6.1 Corresponding maximum load ▶▶▶▶▶ p. 9 - 150
 - 6.2 Corresponding maximum working radius ▶▶▶▶▶ p. 9 - 150
 - 6.3 Corresponding telescoping duration ▶▶▶▶▶ p. 9 - 150
 - 6.4 Corresponding main boom length ▶▶▶▶▶ p. 9 - 150
- 7 Overview of table length

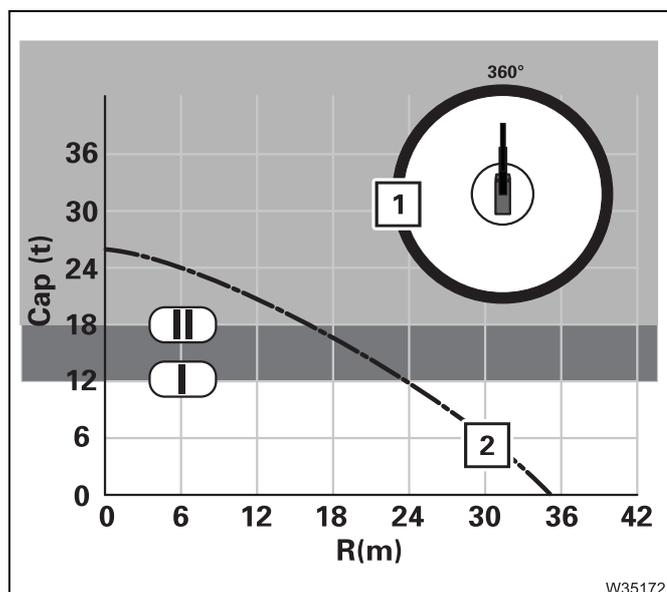
1) Display only with the *MAXbase* slewing range type



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Lifting capacity tables menu

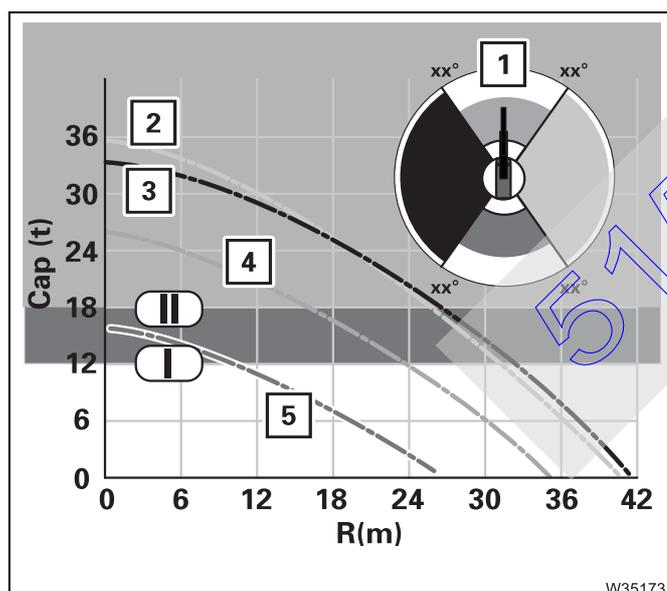
▣▣▣▣ ▶ *Displaying the lifting capacity tables, p. 11 - 59*



- For the *Standard* slewing range type

- 1 Slewing range display
- 2 Permissible working range display (range under the curve)
- I Main hoist display
Limitation due to reeving
- II Auxiliary hoist display
Limitation due to reeving

▣▣▣▣ ▶ p. 11 - 59

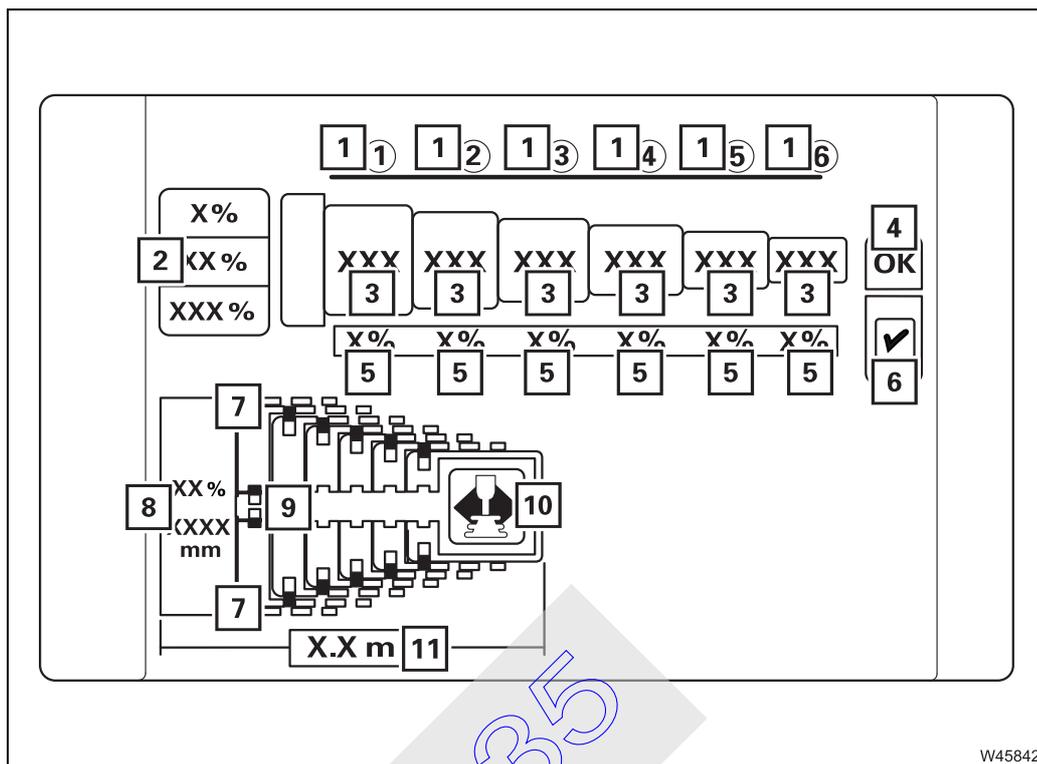


- For the *MAXbase* slewing range type

- 1 Slewing range display (Four slewing ranges, marked in colour)
- 2 Permissible working range display
- 3 - A coloured curve for each slewing range
- 4
- 5
- I Main hoist display
Limitation due to reeving
- II Auxiliary hoist display
Limitation due to reeving

▣▣▣▣ ▶ p. 11 - 61

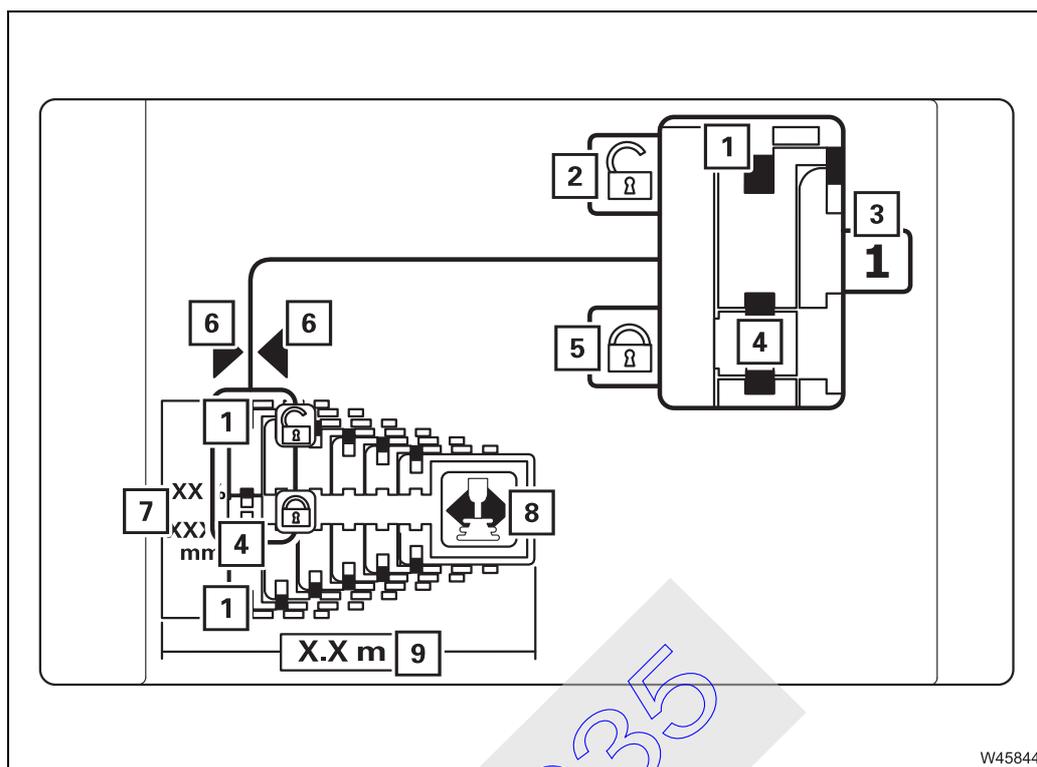
Semi-automatic telescoping menu



- | | |
|---|-----------------|
| 1 Telescopic sections display | ▣▣▣▣ p. 9 - 133 |
| 2 Pre-selection for all telescopic sections | ▣▣▣▣ p. 9 - 133 |
| 3 Pre-selection for individual telescopic sections | ▣▣▣▣ p. 9 - 134 |
| 4 Confirming pre-selection | ▣▣▣▣ p. 9 - 134 |
| 5 Current telescoping display | ▣▣▣▣ p. 9 - 133 |
| 6 Telescoping permitted display
Telescoping not permitted display | ▣▣▣▣ p. 9 - 134 |
| 7 Locking status of telescopic section display | ▣▣▣▣ p. 9 - 132 |
| 8 Telescoping cylinder length display | ▣▣▣▣ p. 9 - 133 |
| 9 Locking status of telescoping cylinder display | ▣▣▣▣ p. 9 - 132 |
| 10 Teleautomation direction display | ▣▣▣▣ p. 9 - 134 |
| 11 Main boom length display | ▣▣▣▣ p. 9 - 133 |



**Manual
 telescoping menu**

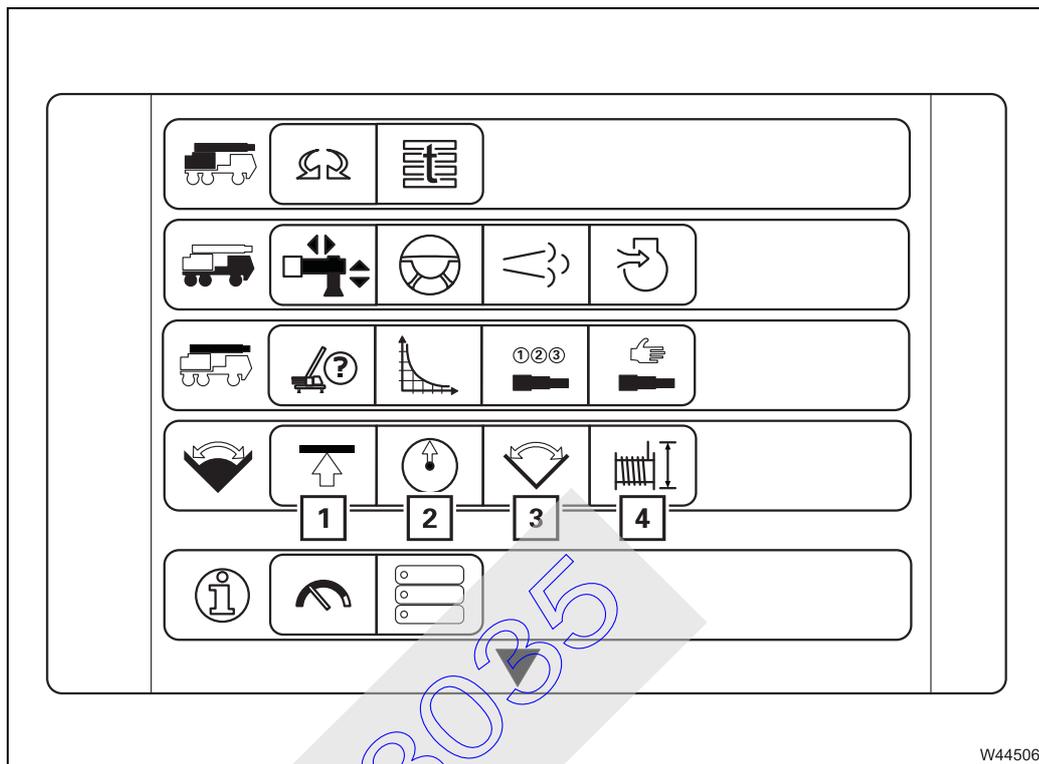


W45844

- | | |
|---|-----------------|
| 1 Locking status of telescopic section display | ▣▣▣▣ p. 9 - 135 |
| 2 Lock/release telescopic section symbol | ▣▣▣▣ p. 9 - 135 |
| 3 Telescoping cylinder in telescopic section display | ▣▣▣▣ p. 9 - 136 |
| 4 Locking status of telescoping cylinder display | ▣▣▣▣ p. 9 - 134 |
| 5 Lock/unlock telescoping cylinder | ▣▣▣▣ p. 9 - 135 |
| 6 Locking point display | ▣▣▣▣ p. 9 - 135 |
| 7 Telescoping cylinder length display | ▣▣▣▣ p. 9 - 135 |
| 8 Telescoping direction display | ▣▣▣▣ p. 9 - 136 |
| 9 Main boom length display | ▣▣▣▣ p. 9 - 136 |

9.4.8

Active working range limiter menu group

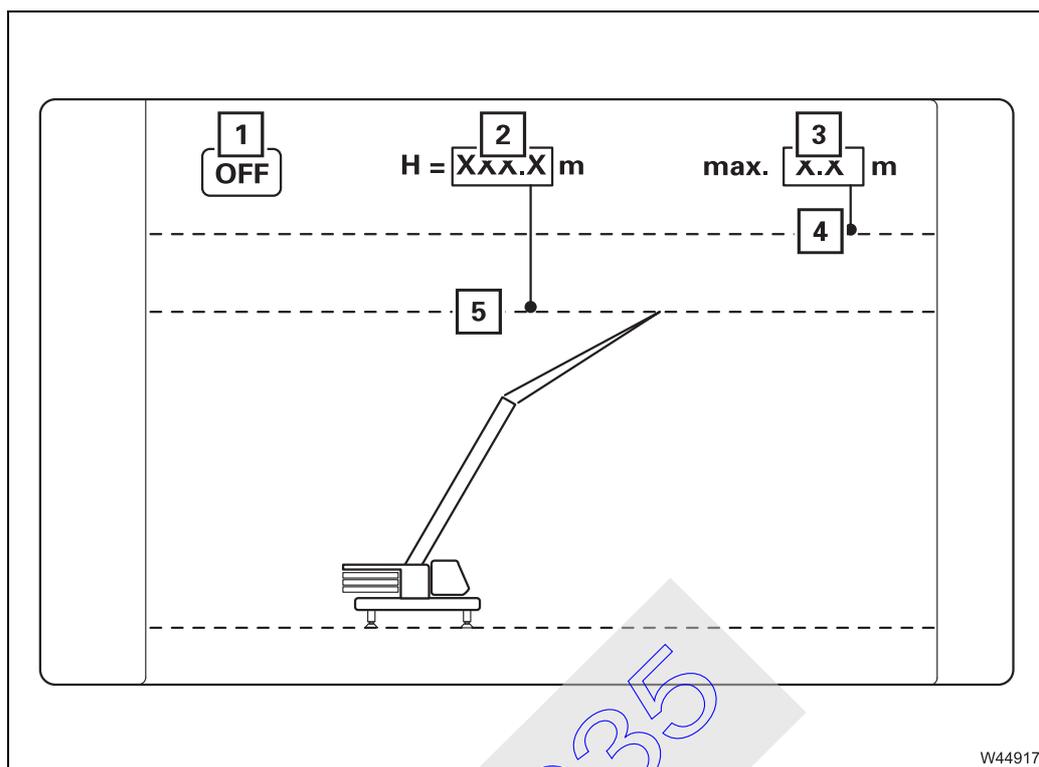


W44506

- | | |
|--|-----------------|
| 1 Overall height menu | ▣▣▣▣▶ p. 9 - 64 |
| 2 Working radius menu | ▣▣▣▣▶ p. 9 - 65 |
| 3 Slewing angle menu | ▣▣▣▣▶ p. 9 - 66 |
| 4 Hoist rope travel limitation menu | ▣▣▣▣▶ p. 9 - 67 |



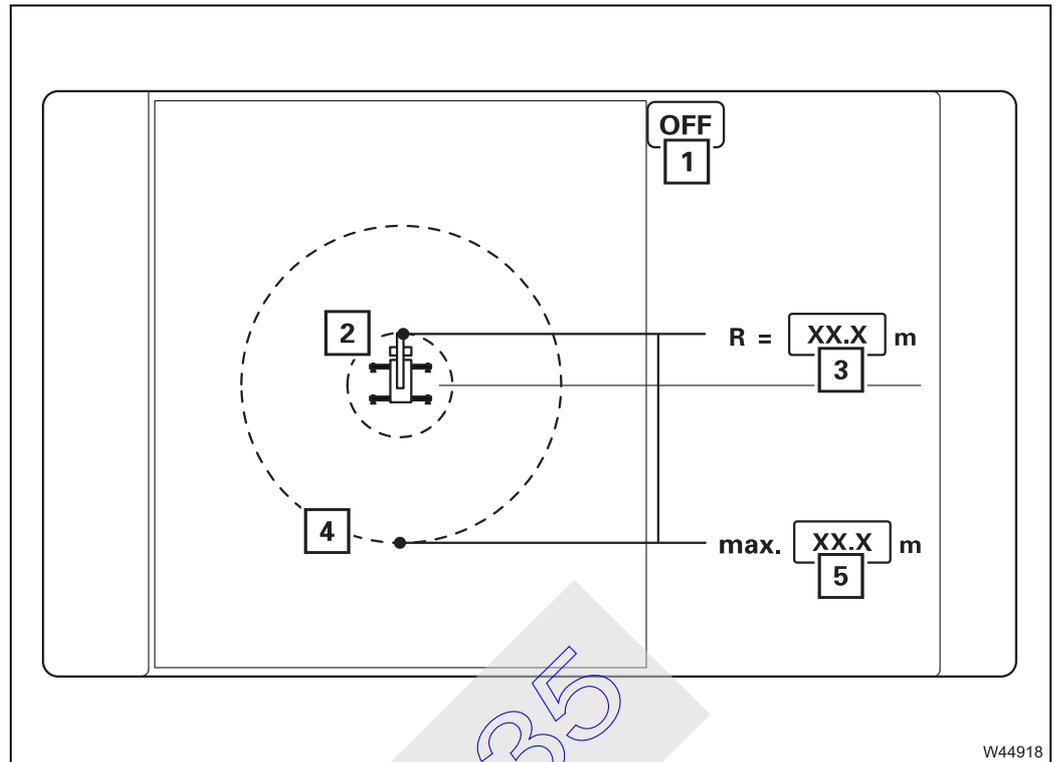
Overall height menu



- 1 Switch monitoring on/off
- 2 – Current overall height display
– Accept limit value
- 3 – Overall height limit value display
– Enter limit value manually
- 4 Overall height limit value display
- 5 Current overall height display

▶▶▶▶▶ p. 11 - 142

Working radius menu

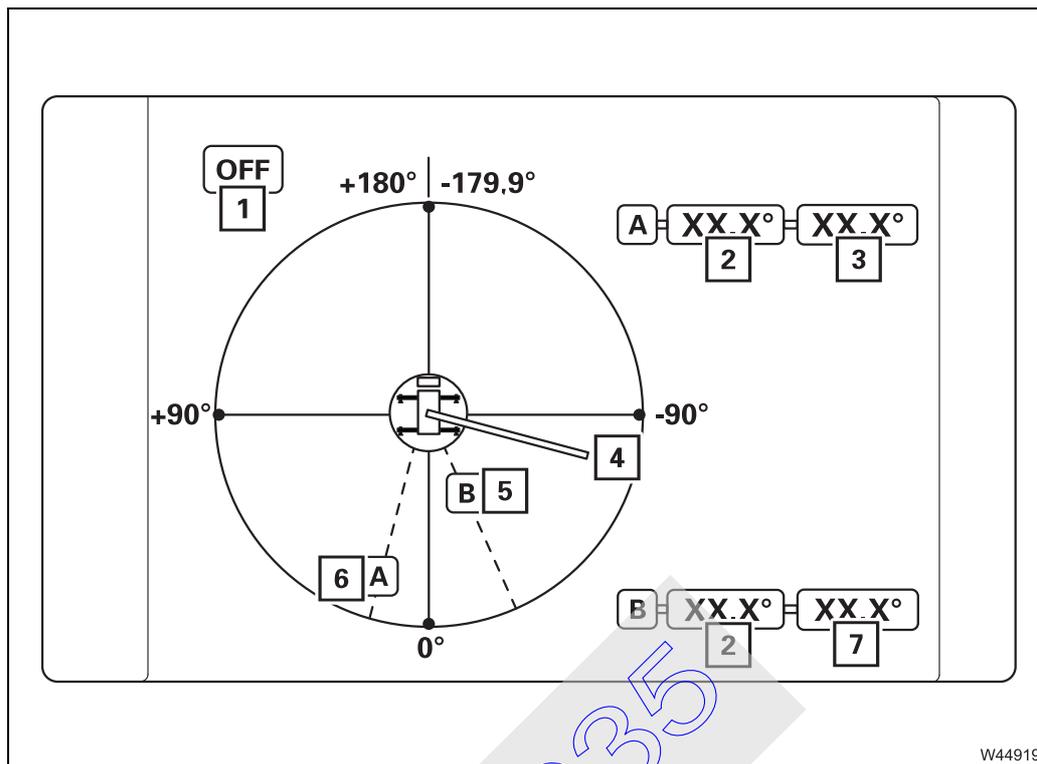


- 1 Switch monitoring on/off
- 2 Current working radius display
- 3 – Current working radius display
– Accept limit value
- 4 Working radius limit value display
- 5 – Working radius limit value display
– Enter limit value manually

► p. 11 - 144



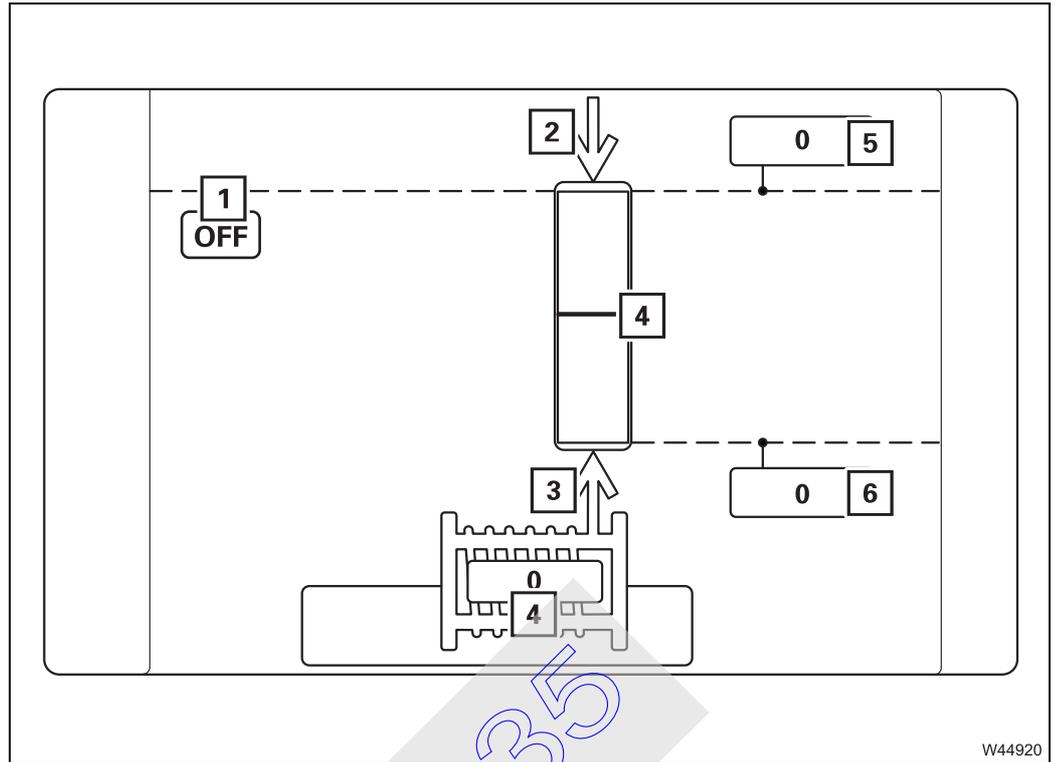
Slewing angle menu



- 1 Switch monitoring on/off
- 2 – Current slewing angle display
– Accept limit value
- 3 – Slewing angle A limit value display
– Manually enter limit value
- 4 Current slewing angle display
- 5 Slewing angle B display
- 6 Slewing angle A display
- 7 – Slewing angle B limit value display
– Manually enter limit value

➡ p. 11 - 146

Hoist rope travel limitation menu

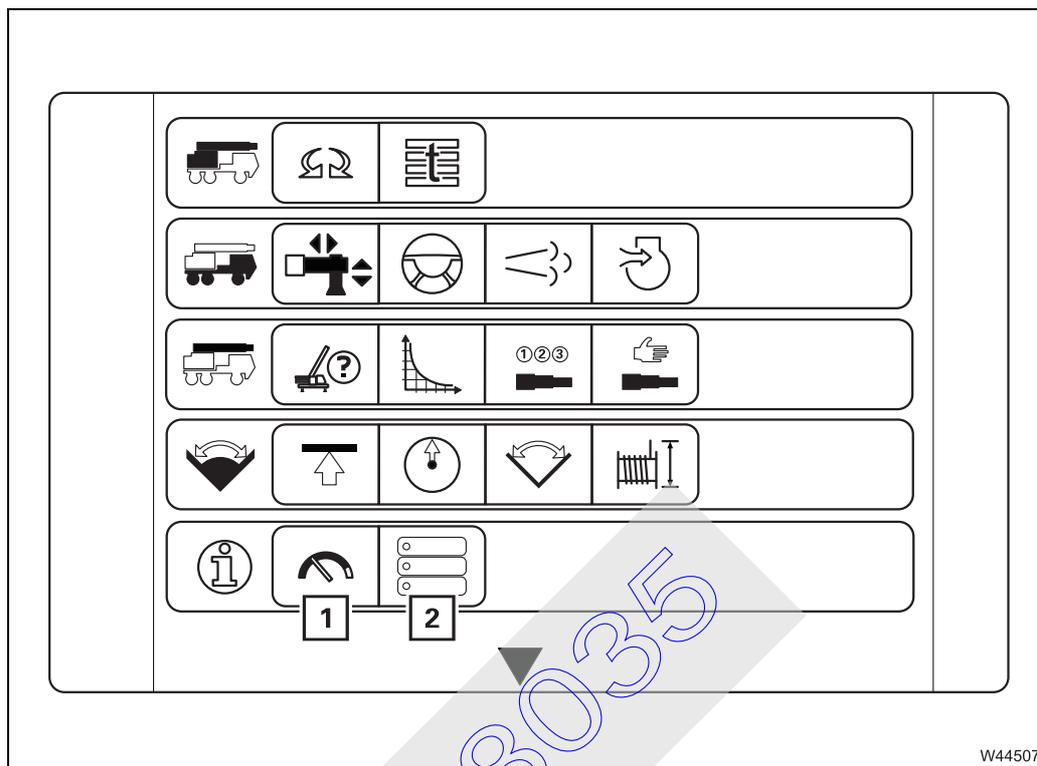


- 1** Switch monitoring on-/off
- 2** Raise input confirmation
- 3** Lower input confirmation
- 4** Current hoist rope position display
- 5** – Raise limit value display
– Accept limit value
- 6** – Lower limit value display
– Accept limit value

▶▶▶ p. 11 - 149

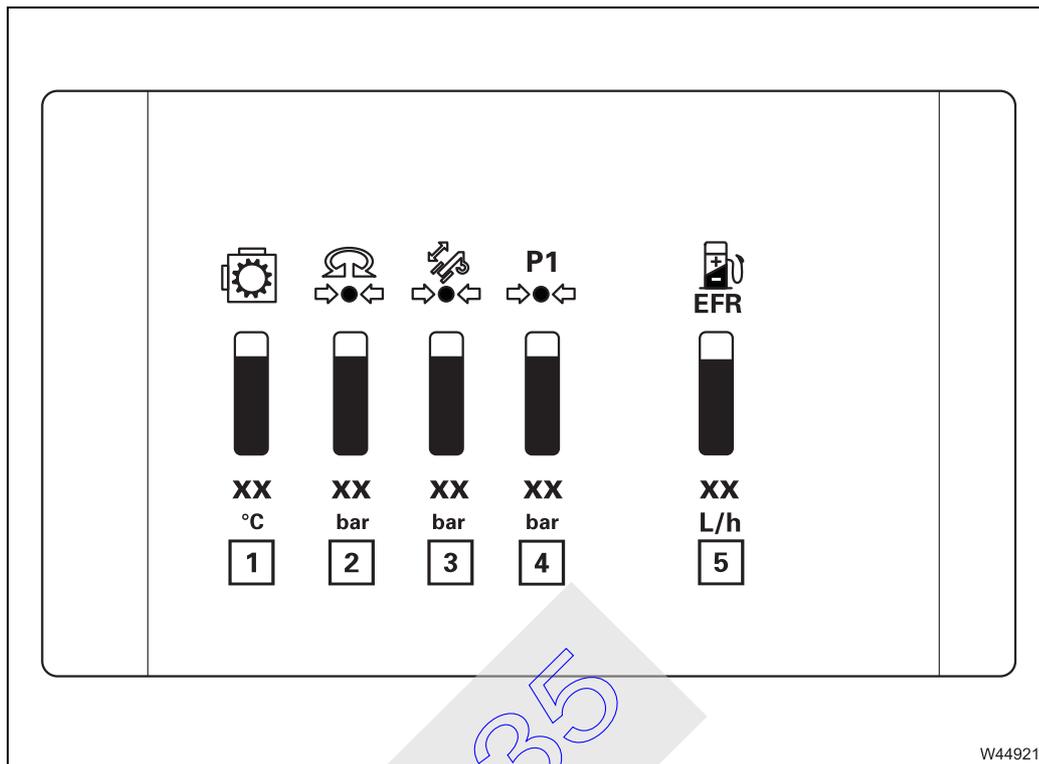
9.4.9

Information 1 menu group



- 1 Hydraulic pressure and fuel consumption menu ■■■► p. 9 - 69
- 2 Datalogger menu (menu opens on the RCL display) ■■■► p. 9 - 94

Hydraulic pressure and fuel consumption menu

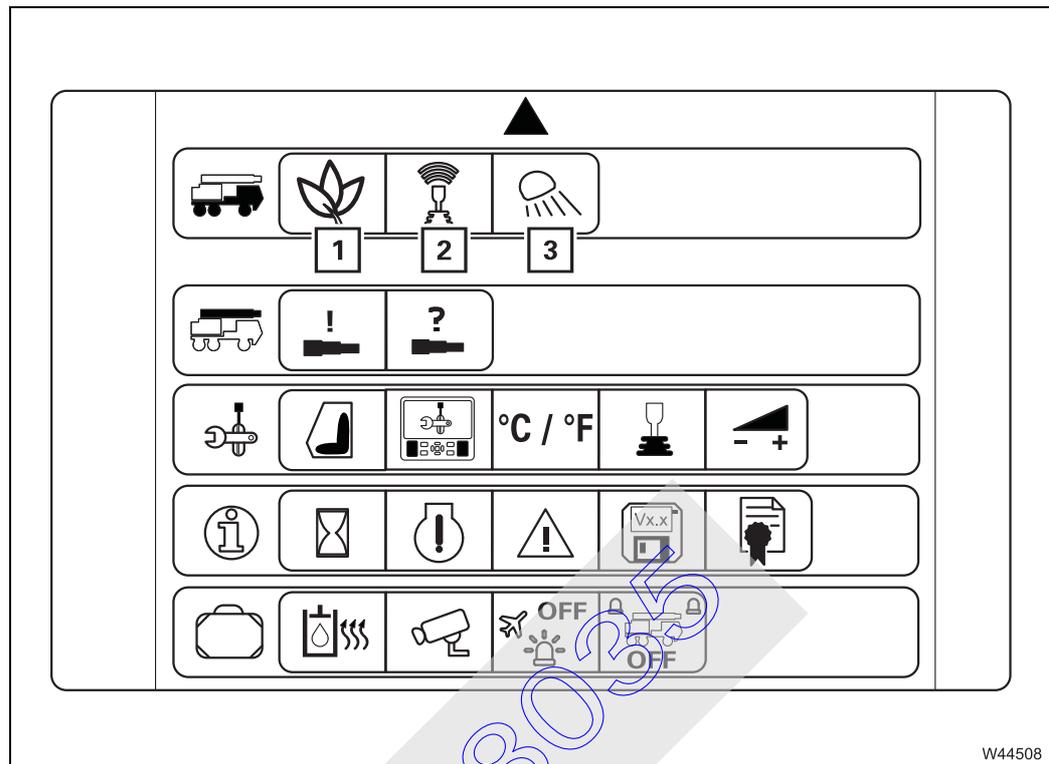


- | | | |
|---|---|--------------|
| 1 | Angle gear temperature display | ▣ p. 9 - 137 |
| 2 | Slewing gear hydraulic circuit pressure display | ▣ p. 9 - 137 |
| 3 | Telescoping cylinder pressure display | ▣ p. 9 - 137 |
| 4 | Hydraulic circuit pressure display | ▣ p. 9 - 137 |
| 5 | Display of consumption in litres per hour ¹⁾ | |

1) Additional equipment

9.4.10

Engine/Additional equipment menu group



1 Economy menu

▶▶▶ p. 9 - 71

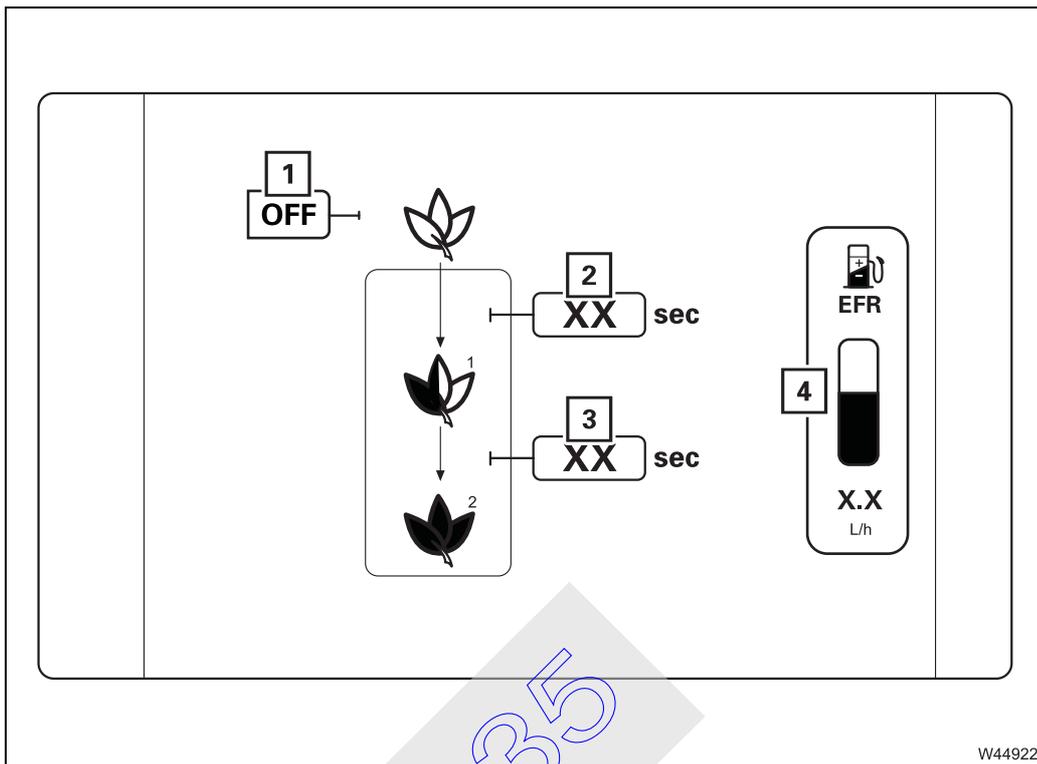
2 Remote control menu

▶▶▶ p. 9 - 72

3 Slewable spotlights menu

▶▶▶ p. 9 - 73

Economy menu



W44922

- 1 Switching off Economy mode on/off
- 2 Setting time interval A
- 3 Setting time interval B
- 4 Average consumption

||| p. 9 - 98

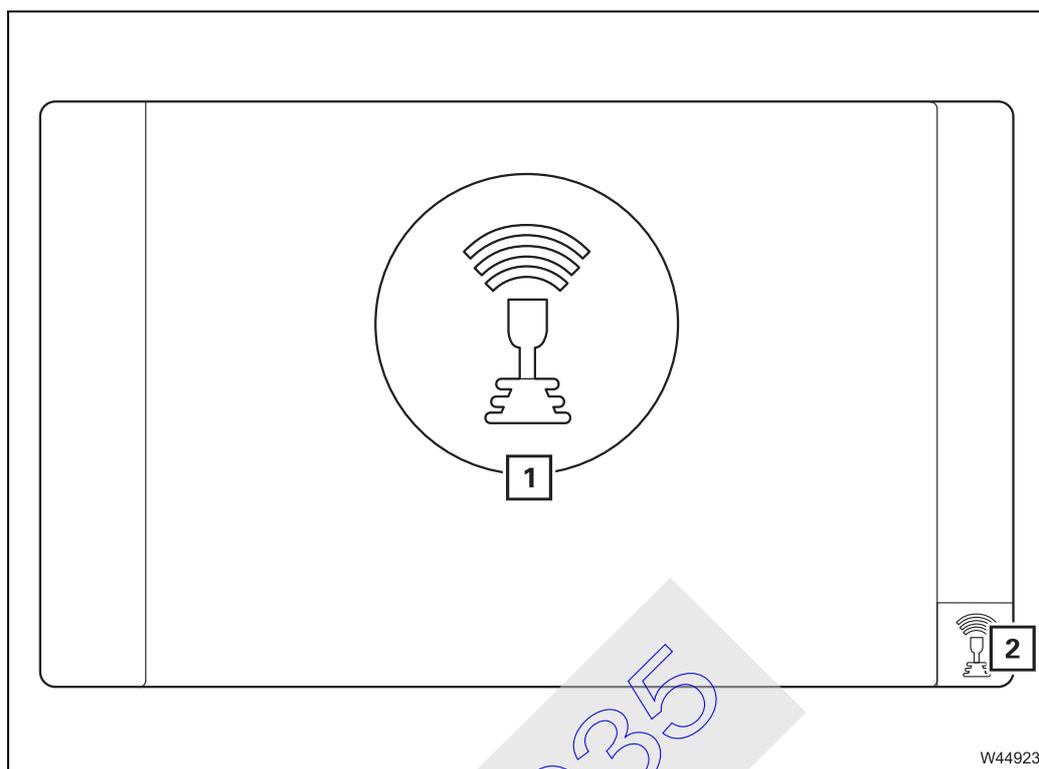
||| p. 9 - 98

||| p. 9 - 98

||| p. 9 - 98



Remote control menu

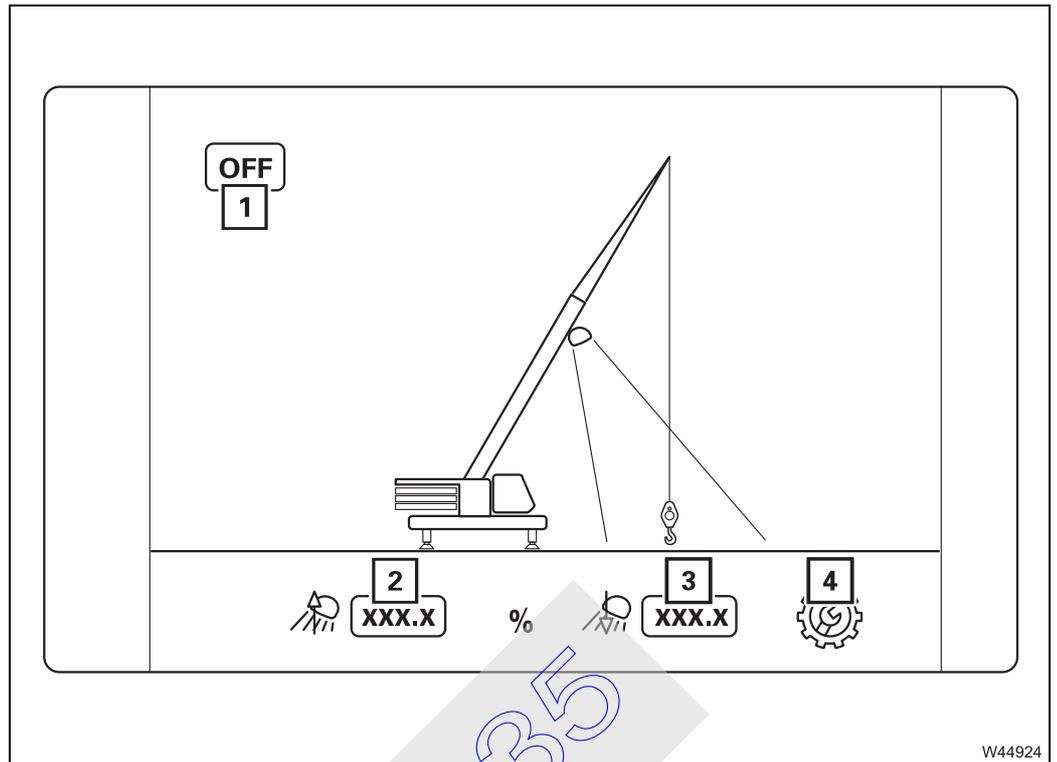


- 1 Remote control menu
- 2 Remote control display

- ▶▶▶▶ p. 9 - 141
- ▶▶▶▶ p. 9 - 141

51508035

Slewing spotlights menu

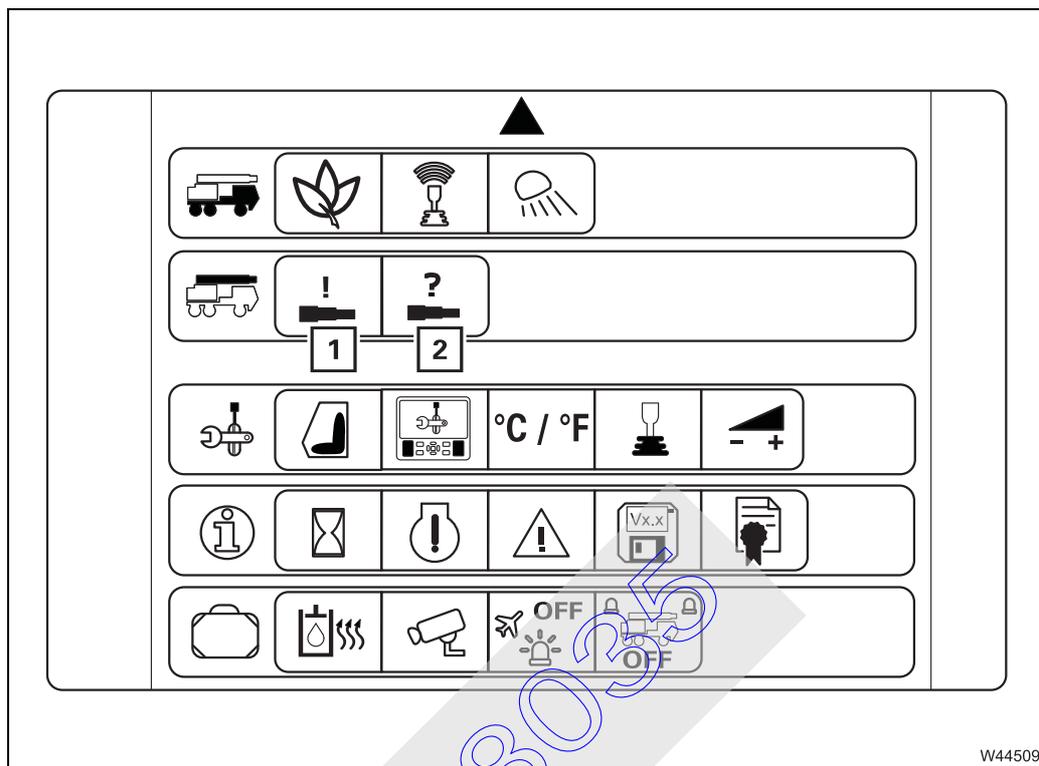


W44924

- | | |
|-------------------------------|--------------|
| 1 Switch load tracking on/off | ➡ p. 9 - 156 |
| 2 Increase the slewing speed | ➡ p. 9 - 156 |
| 3 Reduce the slewing speed | ➡ p. 9 - 156 |
| 4 Open/close speed submenu | ➡ p. 9 - 156 |

9.4.11

Telescoping emergency program menu group



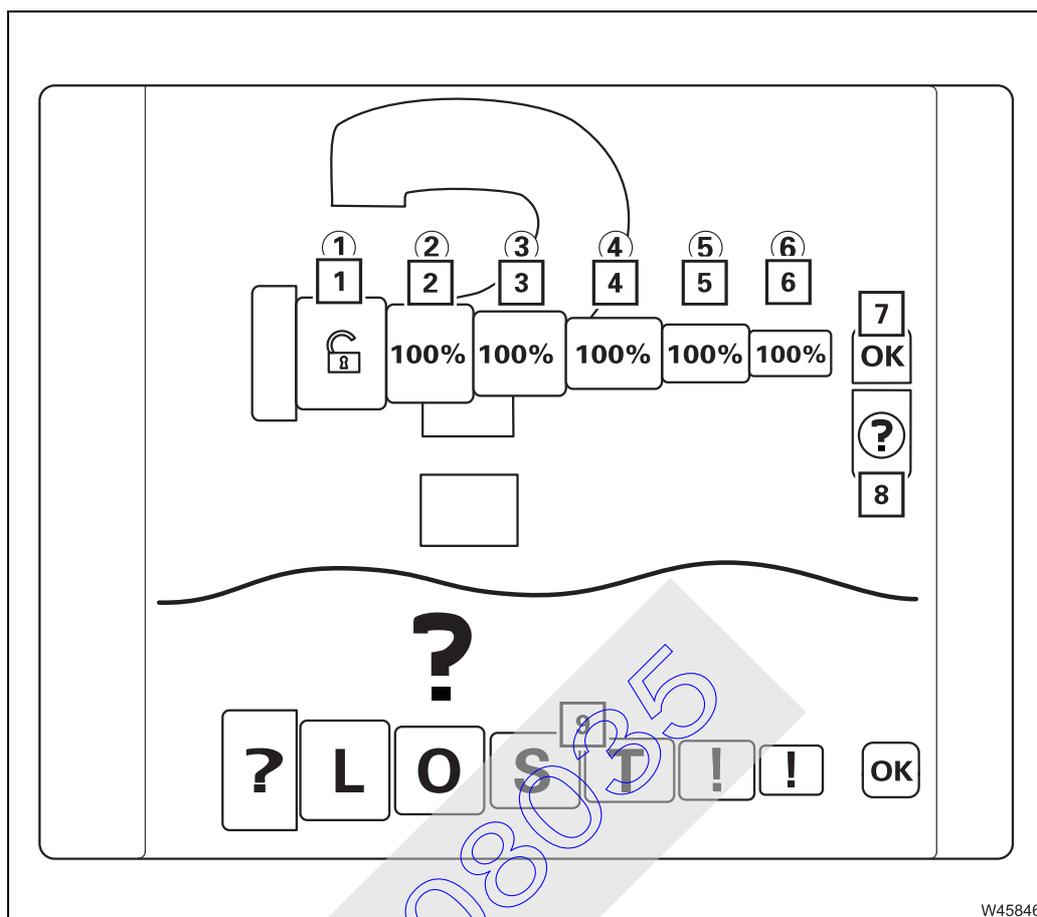
1 Telescoping emergency program menu

▶▶▶ p. 9 - 75

2 Unknown telescoping menu

▶▶▶ p. 9 - 76

Unknown telescoping menu

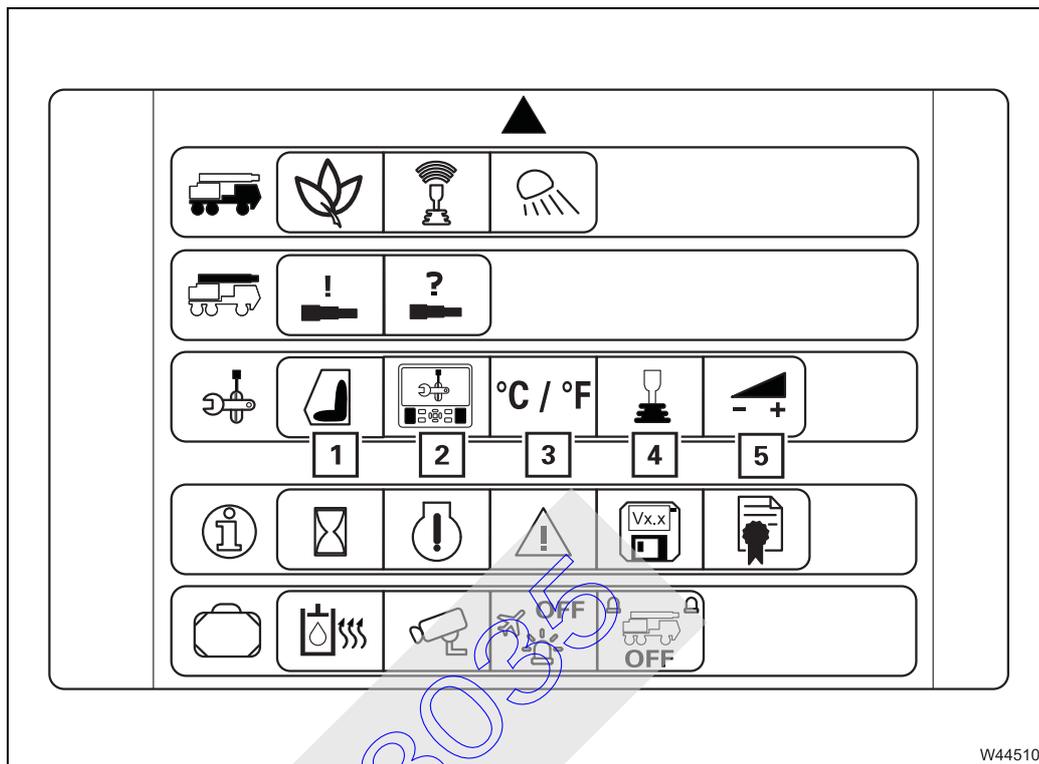


W45846

- | | |
|---|-----------------|
| 1 Input for telescopic section I | ▣▣▣▣ p. 14 - 40 |
| 2 Input for telescopic section II | ▣▣▣▣ p. 14 - 40 |
| 3 Input for telescopic section III | ▣▣▣▣ p. 14 - 40 |
| 4 Input for telescopic section IV | ▣▣▣▣ p. 14 - 40 |
| 5 Input for telescopic section V | ▣▣▣▣ p. 14 - 40 |
| 6 Input for telescopic section VI | ▣▣▣▣ p. 14 - 40 |
| 7 Input confirmation | ▣▣▣▣ p. 14 - 40 |
| 8 Telescoping permitted/not permitted display | ▣▣▣▣ p. 14 - 40 |
| 9 Input of access code unknown telescoping | ▣▣▣▣ p. 14 - 40 |

9.4.12

Settings menu group



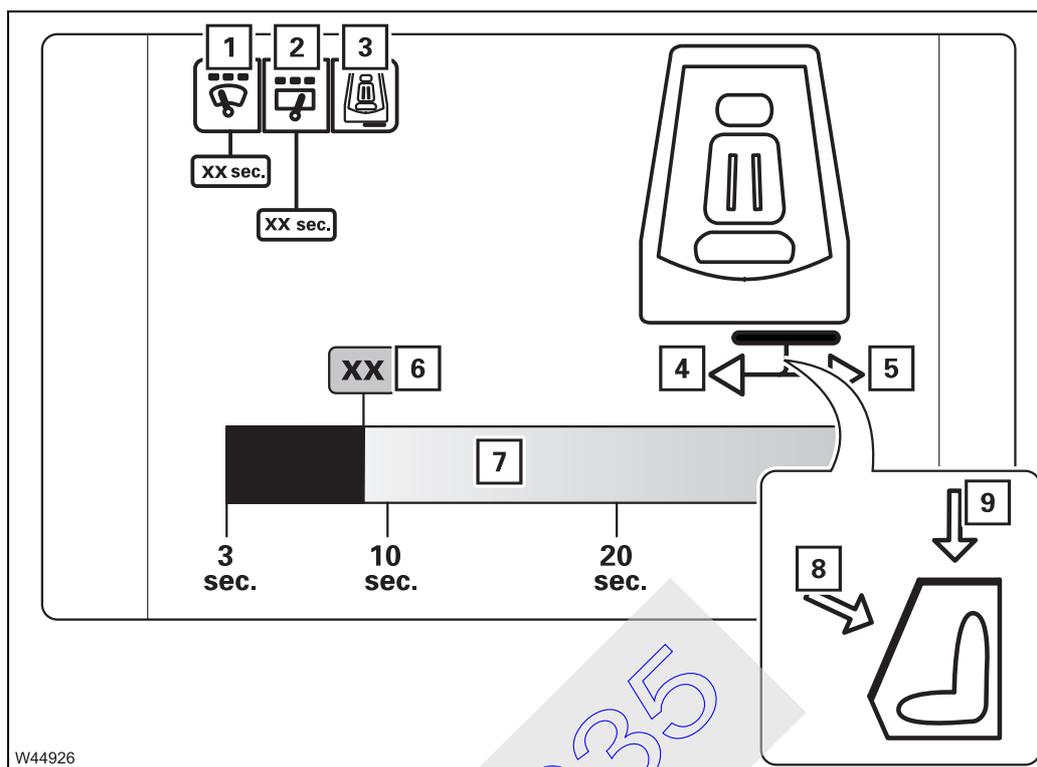
W44510

- | | |
|---|-------------|
| 1 Crane cab menu | ➡ p. 9 - 78 |
| 2 Set display brightness and date/time menu | ➡ p. 9 - 79 |
| 3 Switch over units menu | ➡ p. 9 - 80 |
| 4 Control lever characteristic curve menu | ➡ p. 9 - 81 |
| 5 Power unit speeds menu | ➡ p. 9 - 82 |

1) Additional equipment



Crane cab menu

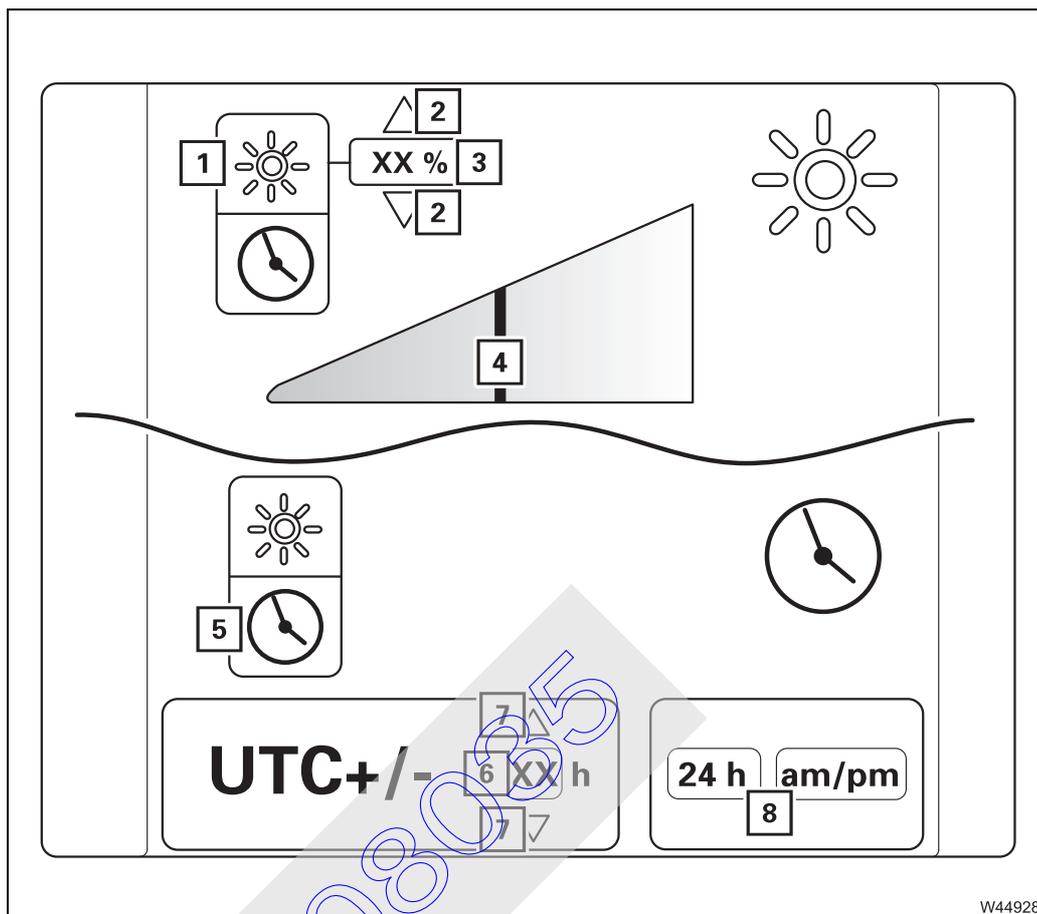


W44926

- | | | |
|---|--|---------------|
| 1 | Windscreen interval duration selection/display | ➡ p. 9 - 158 |
| 2 | Skylight interval duration selection/display | ➡ p. 9 - 158 |
| 3 | Retract/extend step selection | ➡ p. 12 - 178 |
| 4 | Retract step ¹⁾ | ➡ p. 12 - 178 |
| 5 | Extend step ¹⁾ | ➡ p. 12 - 178 |
| 6 | Adjust interval selection | ➡ p. 9 - 158 |
| 7 | Adjust interval display | ➡ p. 9 - 158 |
| 8 | Windscreen selected display | ➡ p. 9 - 158 |
| 9 | Skylight selected display | ➡ p. 9 - 158 |

¹⁾ Additional equipment

**Set display
brightness and
date/time menu**

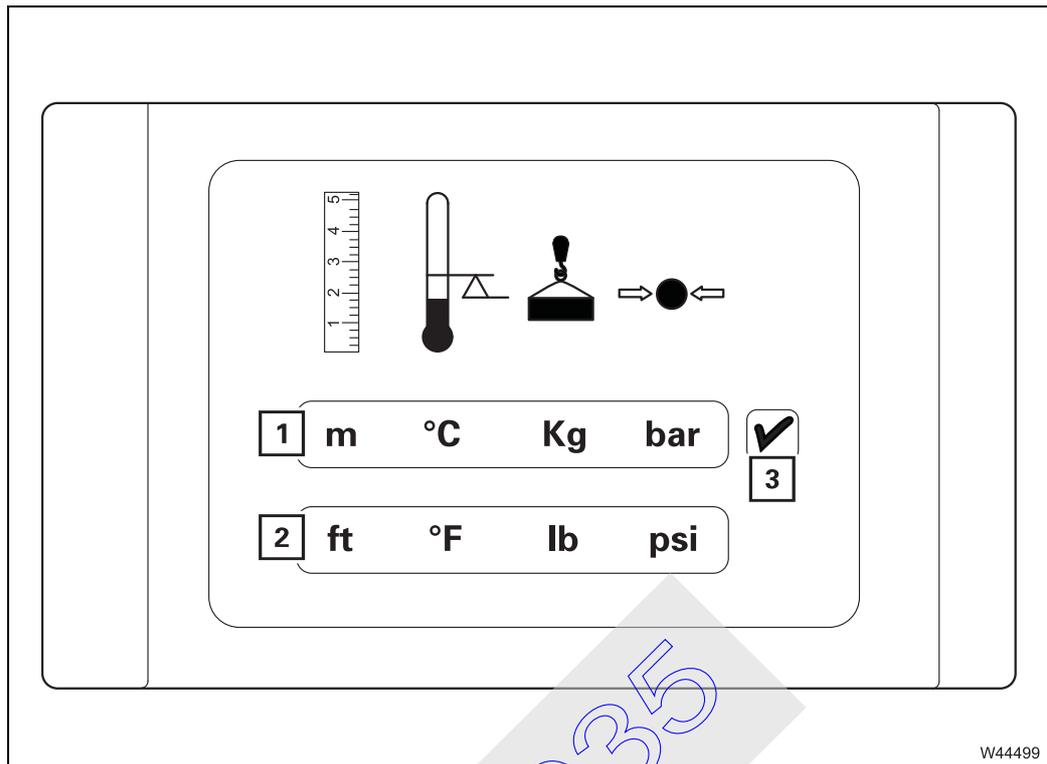


W44928

- | | |
|---|-----------------|
| 1 Set display brightness selection | ▣▣▣▣ p. 5 - 17 |
| 2 Increase/reduce value | ▣▣▣▣ p. 5 - 17 |
| 3 Display in percent | ▣▣▣▣ p. 5 - 17 |
| 4 Brightness display | ▣▣▣▣ p. 5 - 17 |
| 5 Adjust time selection | ▣▣▣▣ p. 11 - 20 |
| 6 Setting the time | ▣▣▣▣ p. 11 - 20 |
| 7 Increase/reduce value | ▣▣▣▣ p. 11 - 20 |
| 8 Switching over the display type | ▣▣▣▣ p. 11 - 20 |



Switch over units menu



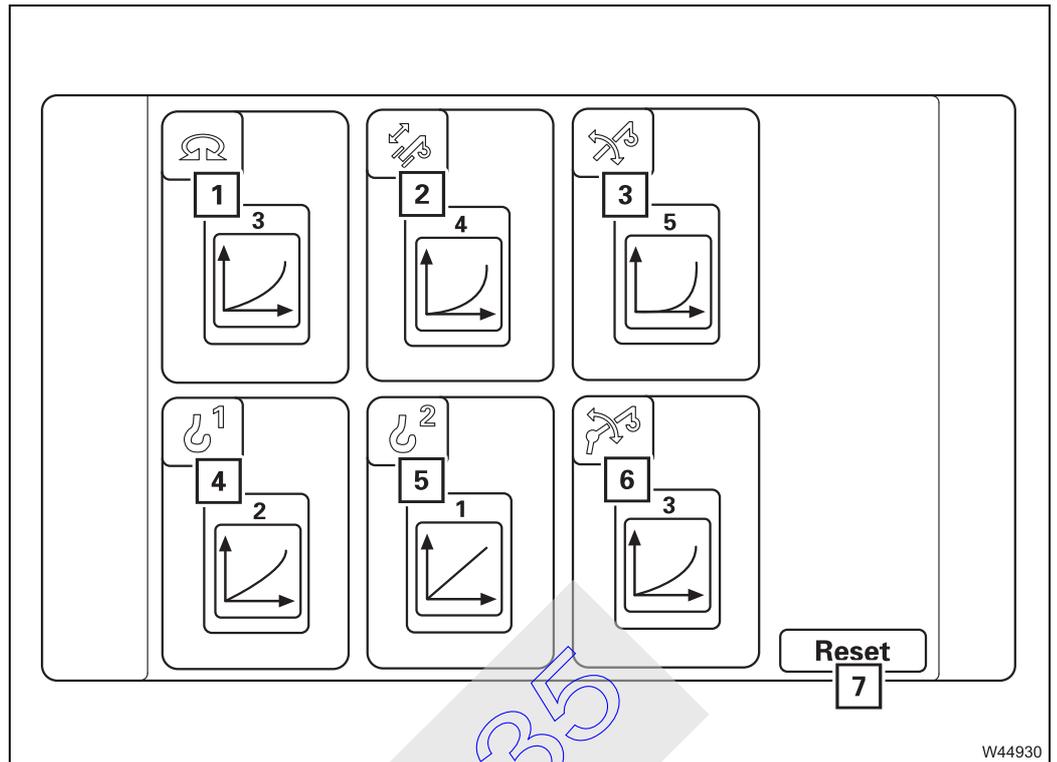
- 1 Display units in:
 - Metres
 - Degrees Celsius
 - Kilograms
 - Bar

- 2 Display units in:
 - Feet
 - Degrees Fahrenheit
 - lbs
 - Psi

- 3 Confirmed selection

➡ p. 11 - 130

Control lever characteristic curve menu



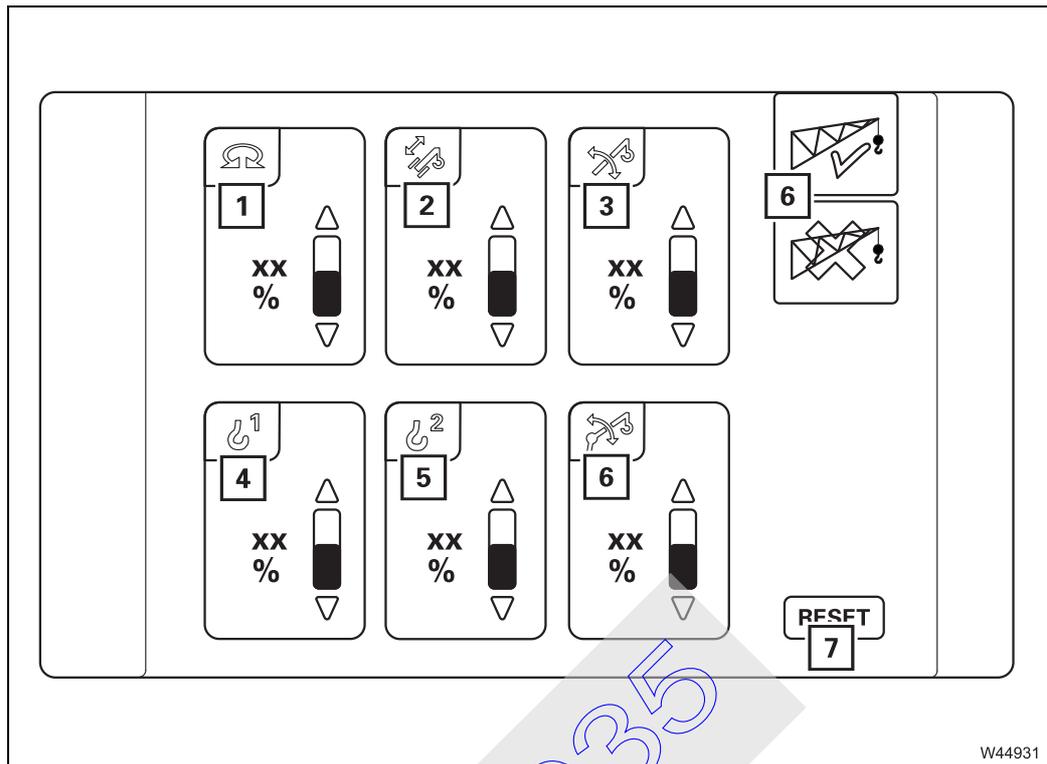
- 1 Slewing gear characteristic curve
- 2 Telescoping mechanism characteristic curve
- 3 Derricking gear characteristic curve
- 4 Main hoist characteristic curve
- 5 Auxiliary hoist characteristic curve¹⁾
- 6 Lattice extension characteristic curve¹⁾
- 7 Reset characteristic curve setting

➡ p. 11 - 131

¹⁾ Additional equipment



Power unit speeds menu



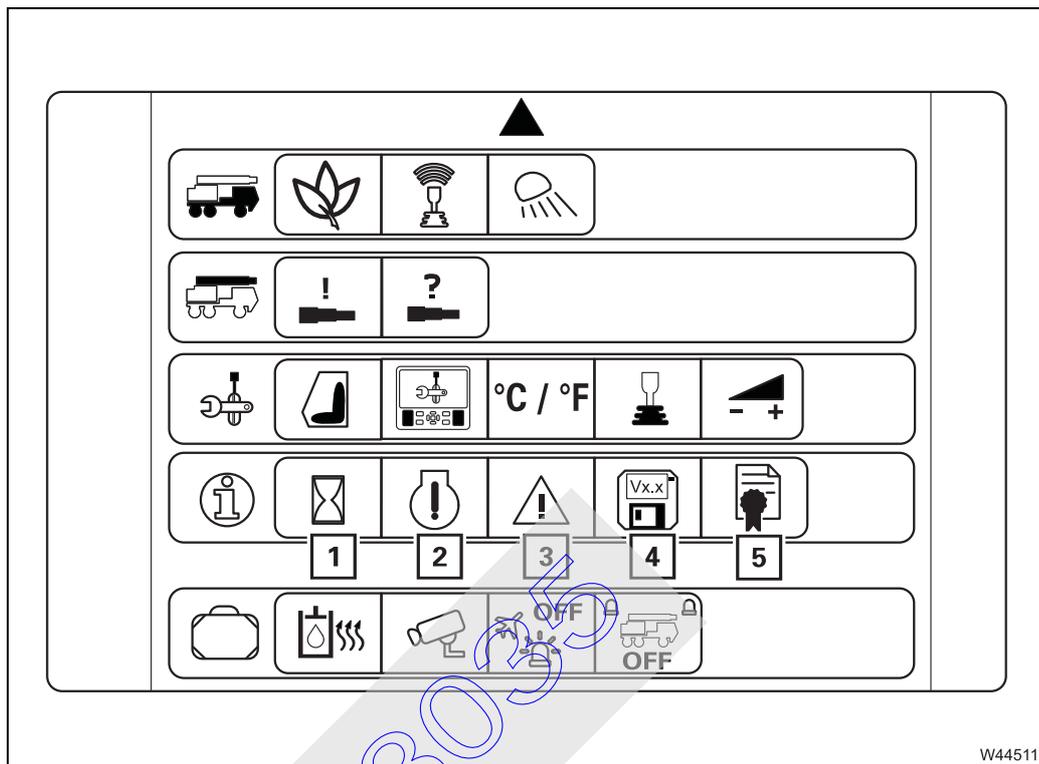
- 1 Enter slewing gear speed
- 2 Enter telescoping mechanism speed
- 3 Enter derricking gear speed
- 4 Enter main hoist speed
- 5 Enter auxiliary hoist speed¹⁾
- 6 Enter speed for derricking gear of lattice extension¹⁾
- 7 Reset power unit speed setting

▶▶▶▶ p. 11 - 127

¹⁾ Additional equipment

9.4.13

Information 2 menu group

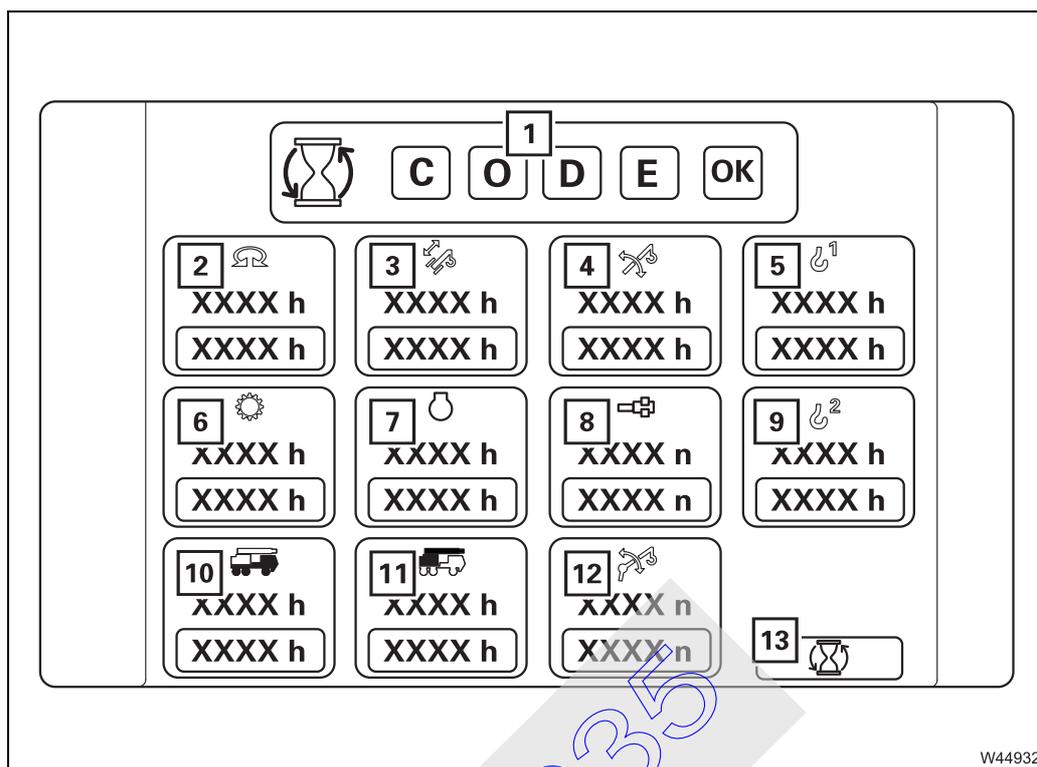


W44511

- | | |
|---|--------------|
| 1 Operating hours menu | ➡ p. 9 - 84 |
| 2 Engine/transmission error menu | ➡ p. 9 - 85 |
| 3 Crane operation error menu | ➡ p. 9 - 86 |
| 4 Program version menu | ➡ p. 9 - 87 |
| 5 Disclaimer menu | ➡ p. 9 - 163 |



Operating hours menu



W44932

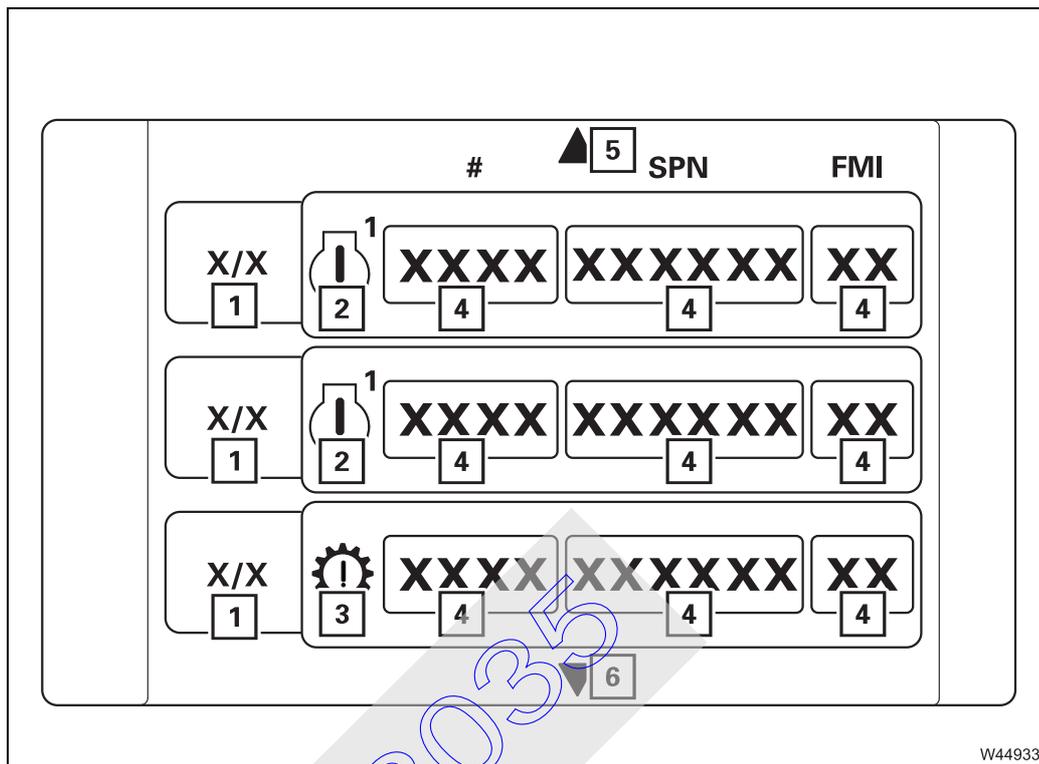
- 1 Key code entry and confirmation
- 2 Slewing gear
- 3 Telescoping mechanism
- 4 Derricking gear
- 5 Main hoist
- 6 Transmission
- 7 Engine
- 8 Locking system
- 9 Auxiliary hoist
- 10 Carrier
- 11 Superstructure
- 12 Lattice extension – derricking¹⁾
- 13 Select all

▣▣▣ p. 11 - 138

¹⁾ Additional equipment

**Engine/
transmission
error menu**

It is used in the same way as in the driver's cab.



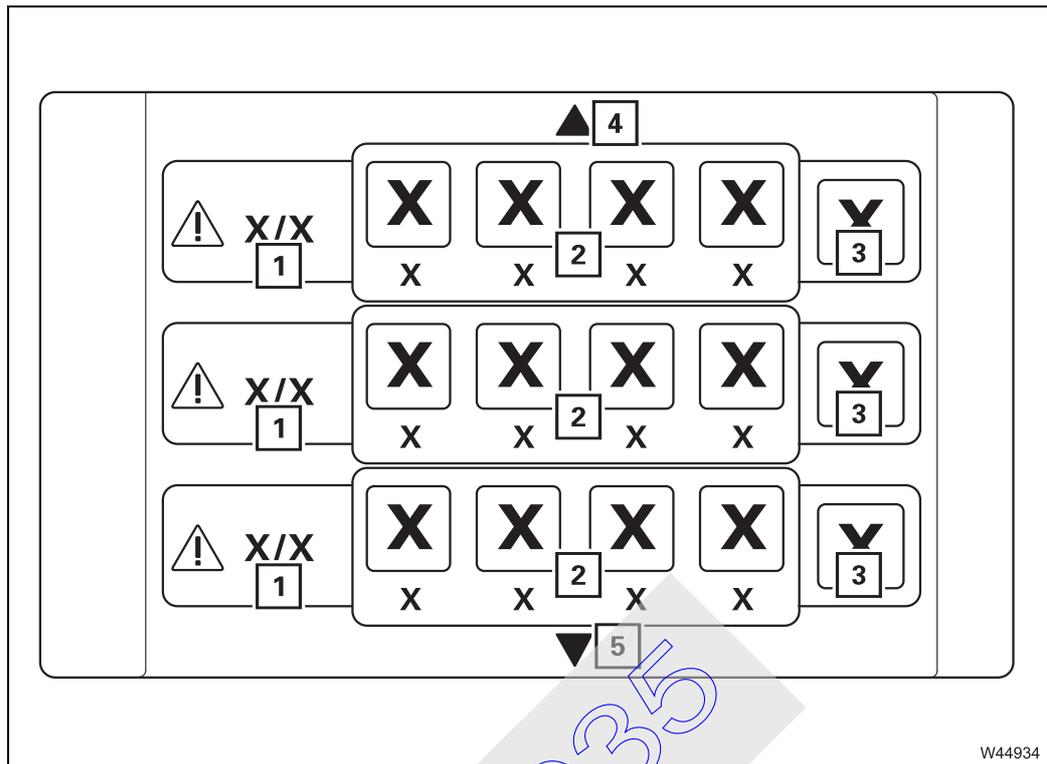
W44933

- 1 Displaying errors / total errors
- 2 Engine symbol display
- 3 Transmission symbol display
- 4 Error code display
- 5 Previous error
- 6 Next error

▶▶▶ p. 8 - 37



Crane operation error menu

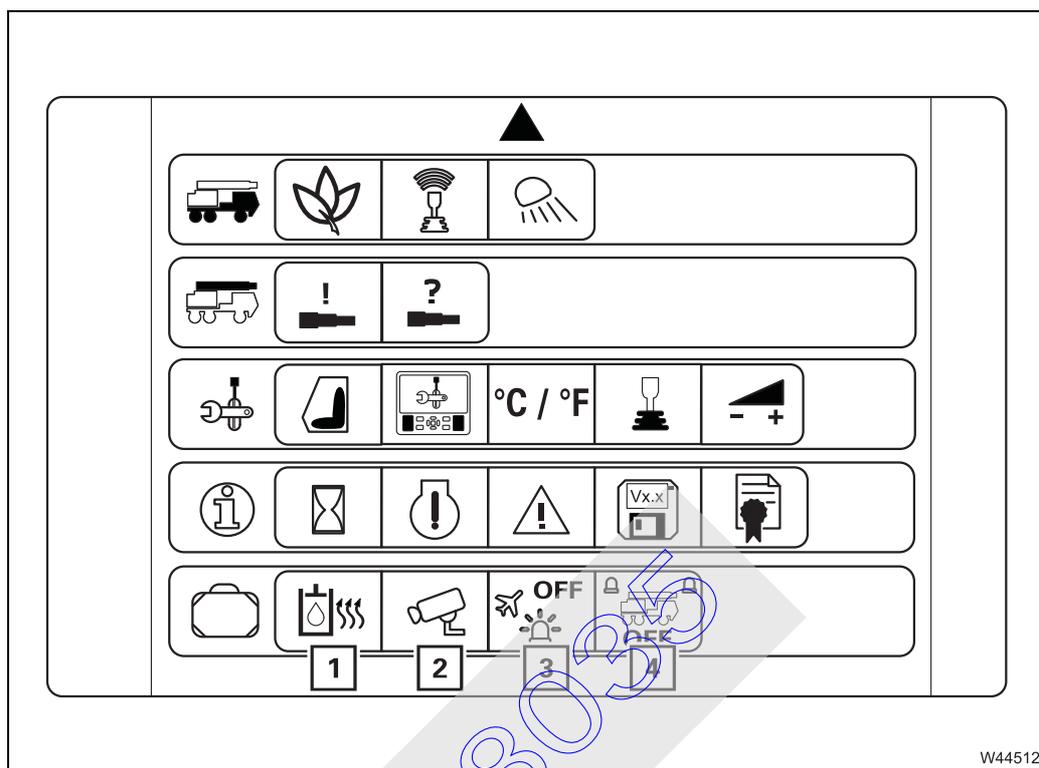


- 1 Displaying errors / total errors
- 2 Error message display
- 3 Acknowledging errors
- 4 Previous error
- 5 Next error

▶▶▶▶▶ p. 14 - 5

9.4.14

Various controls

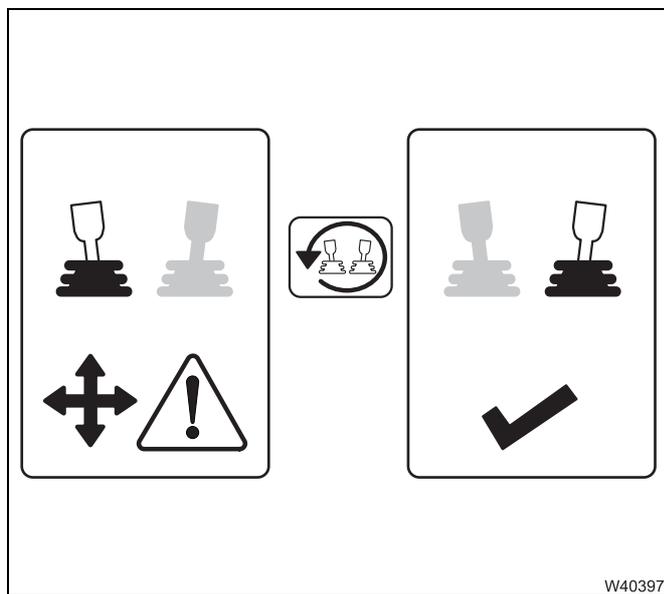


- | | |
|------------------------------------|---------------|
| 1 Prewarming hydraulic oil | ➡ p. 9 - 137 |
| 2 Operating the camera | ➡ p. 12 - 176 |
| 3 Air traffic control light on/off | ➡ p. 9 - 155 |
| 4 Rotating beacons on/off | ➡ p. 9 - 155 |

9.4.15

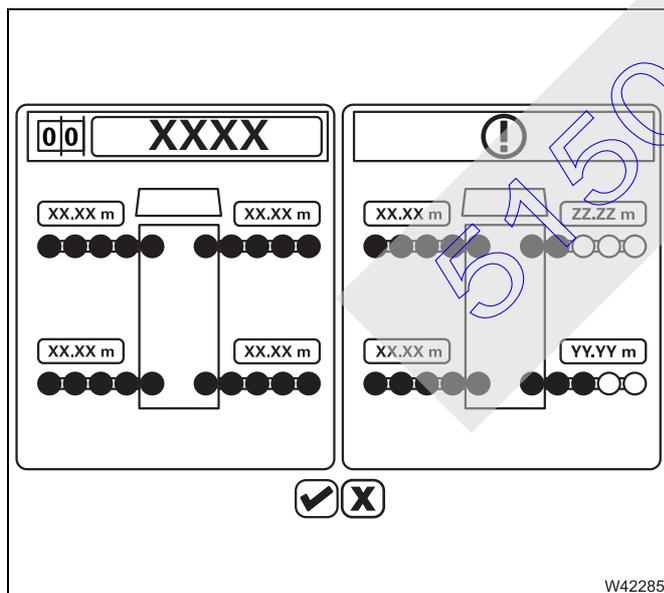
Query menus

The query menus open automatically only.



Control lever actuation query

▣▣▣▣ p. 10 - 7

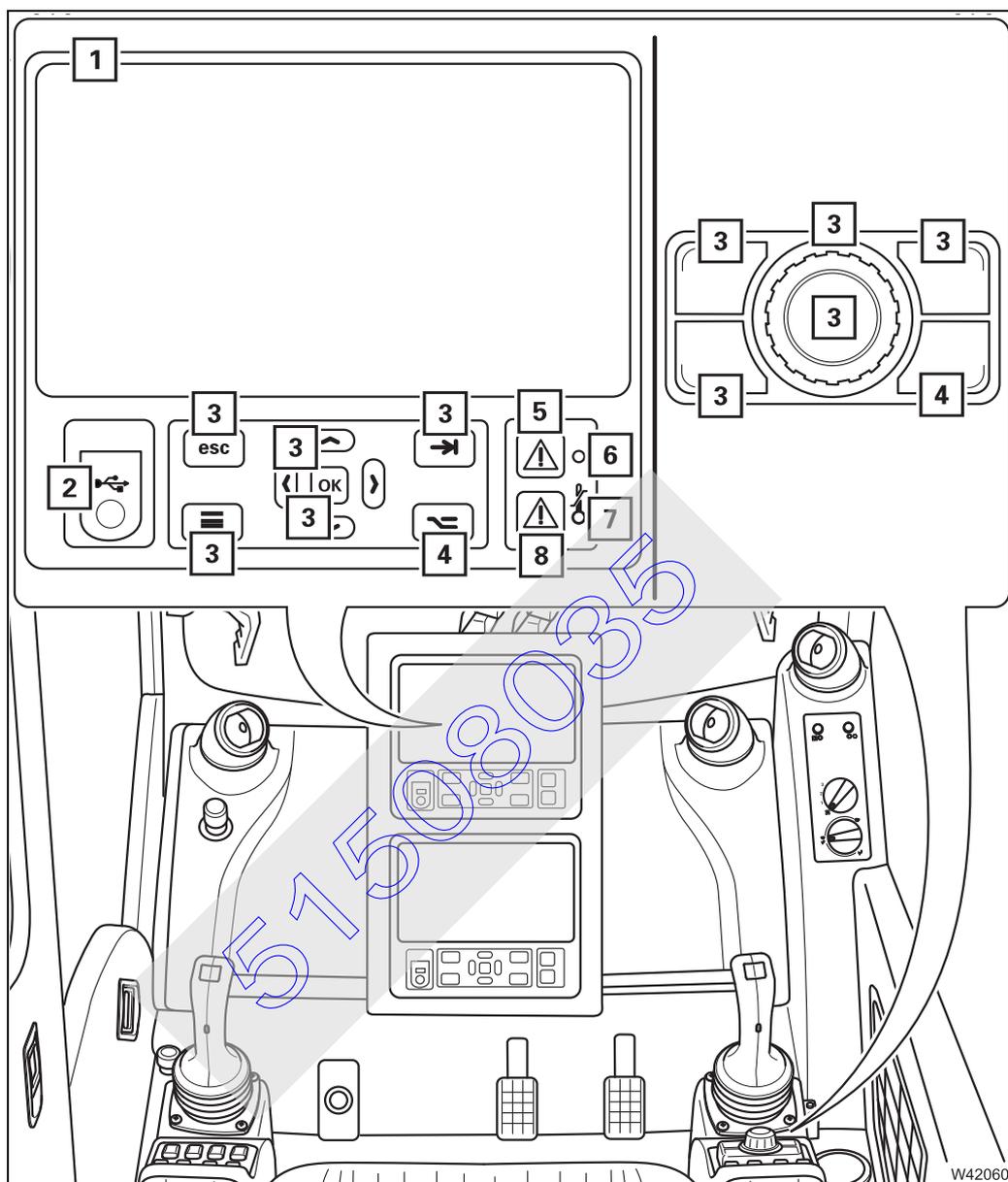


Outrigger span query

▣▣▣▣ p. 11 - 42

9.4.16

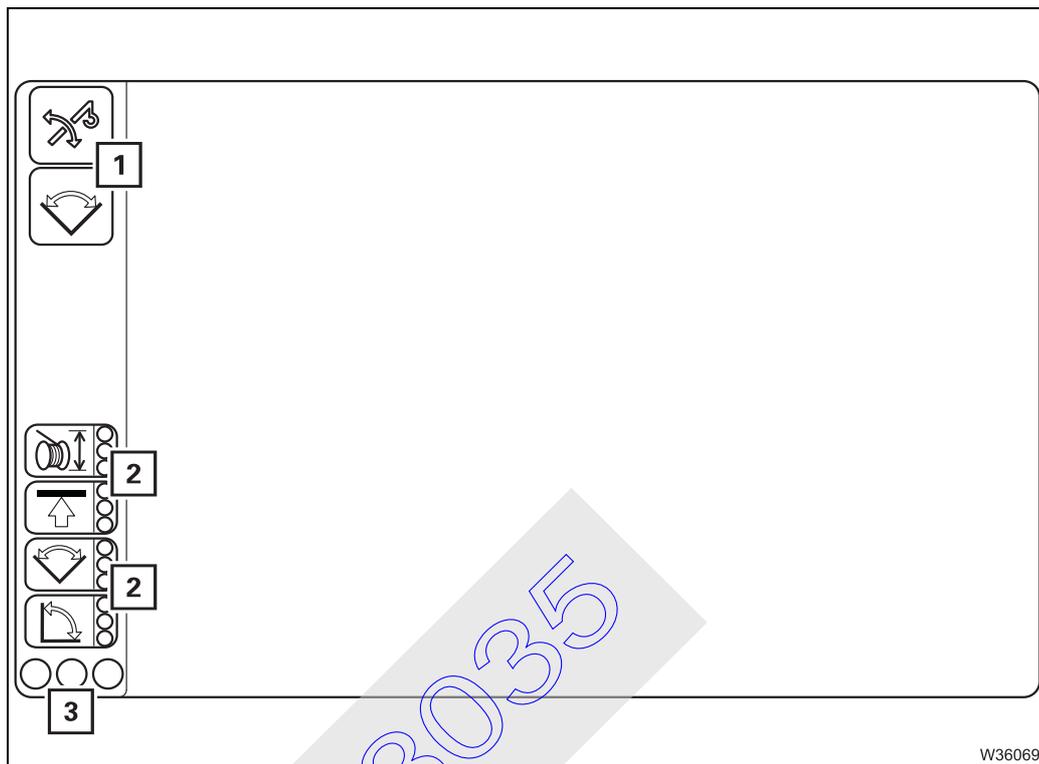
RCL control unit



- 1 RCL display
- 2 USB connection for data export ▶▶▶▶ p. 9 - 151
- 3 No function
- 4 Switch off RCL buzzer ▶▶▶▶ p. 9 - 106
- 5 RCL shutdown ▶▶▶▶ p. 11 - 57
- 6 No function
- 7 Display temperature warning display ▶▶▶▶ p. 9 - 108
- 8 RCL early warning ▶▶▶▶ p. 11 - 57

9.4.17

Menu-independent displays



1 Warning messages display

▣ p. 14 - 8

2 Working range limiter displays

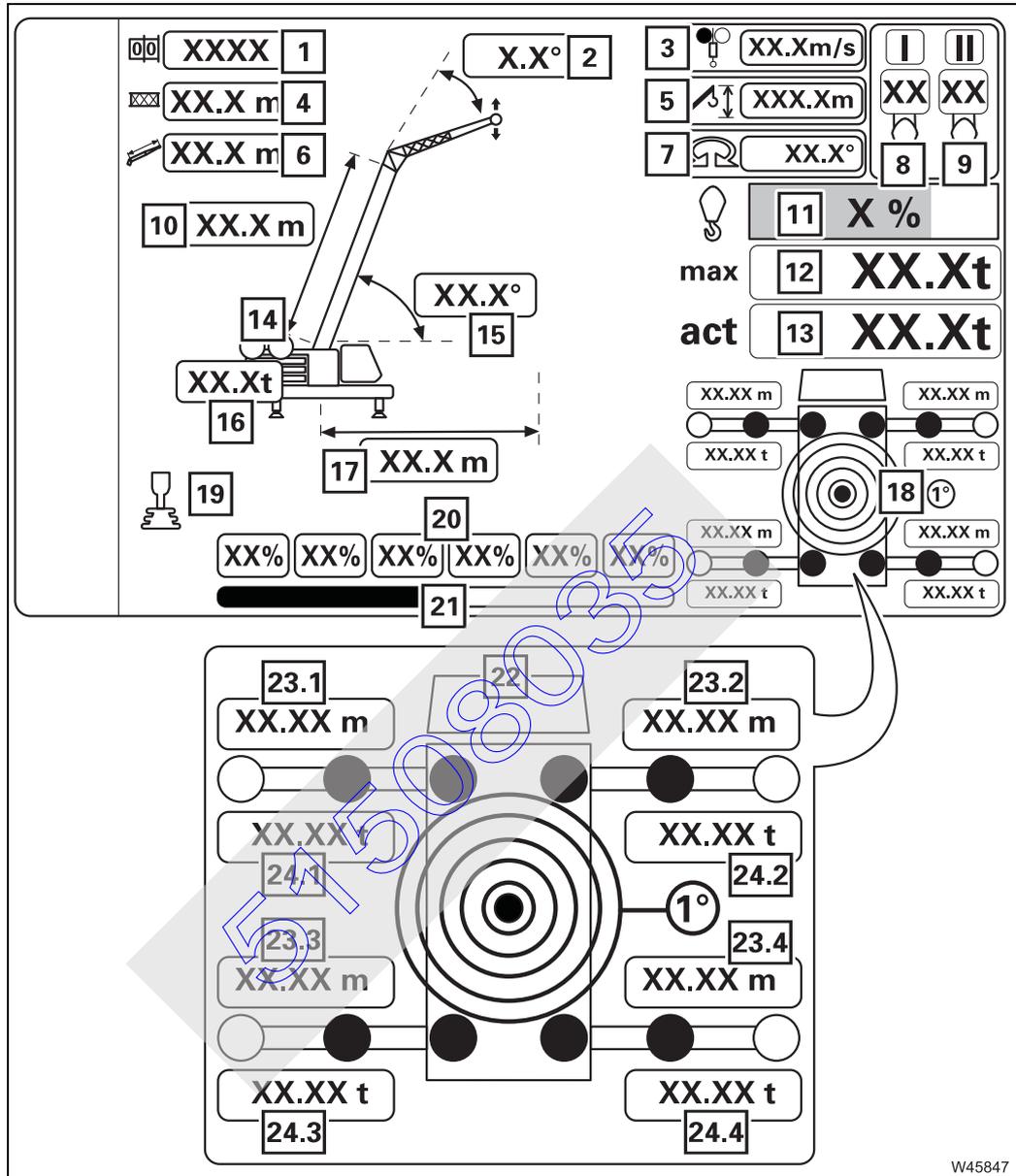
▣ p. 11 - 140

3 RCL status display

▣ p. 11 - 51

9.4.18 RCL menus

Monitoring menu



W45847

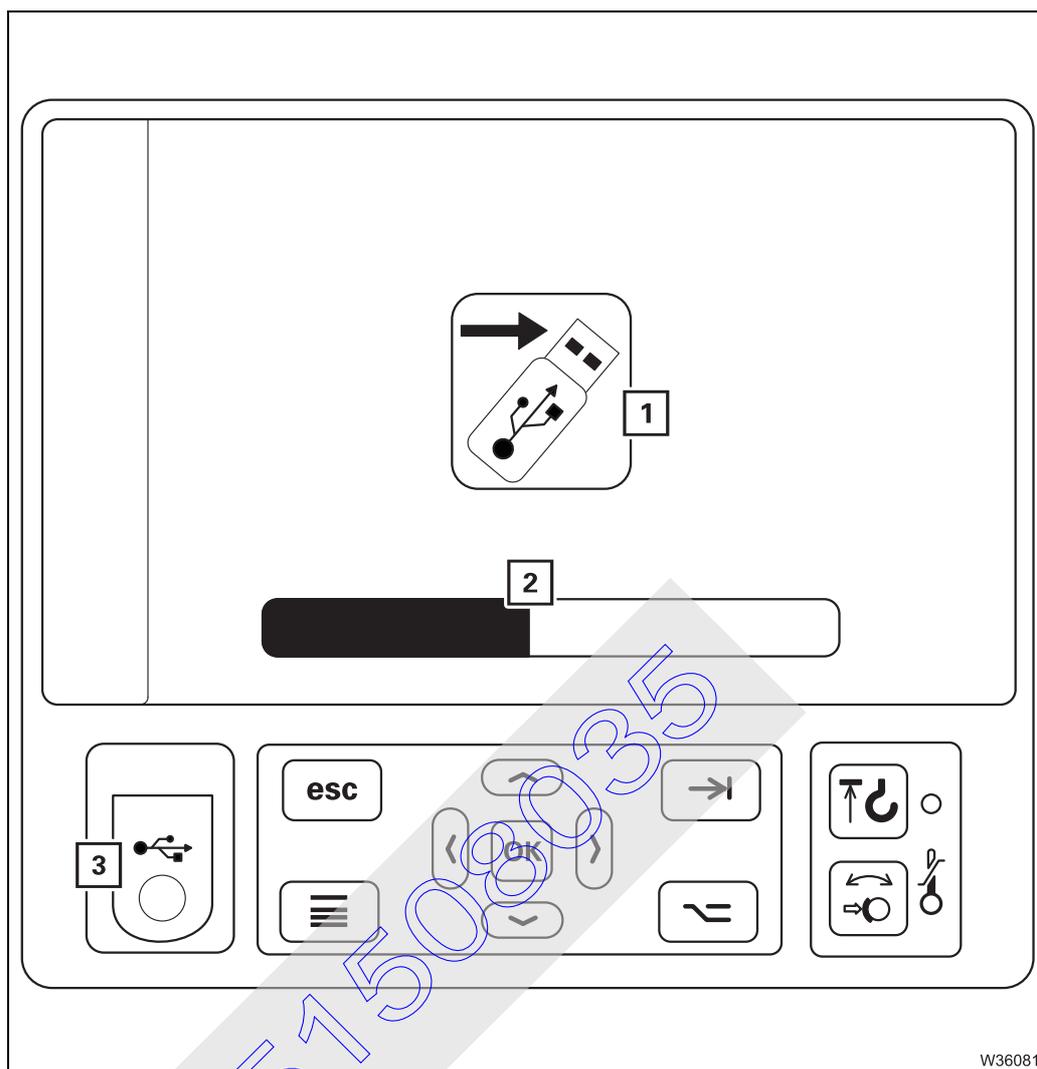
1	RCL code display ²⁾	▶▶▶▶▶ p. 11 - 45
2	Current lattice extension inclination display ^{1),2)}	▶▶▶▶▶ p. 11 - 50
	Angle of lattice extension display ^{1),2)}	▶▶▶▶▶ p. 11 - 46
3	Current wind speed display	▶▶▶▶▶ p. 11 - 52
4	Lattice extension display – length before the angle ^{1),2)}	▶▶▶▶▶ p. 11 - 46
5	Current overall height display	▶▶▶▶▶ p. 11 - 49
6	Lattice extension display – length after the angle ^{1),2)}	▶▶▶▶▶ p. 11 - 46
7	Current slewing angle display	▶▶▶▶▶ p. 11 - 50
8	Main hoist reeving display	▶▶▶▶▶ p. 11 - 46
9	Auxiliary hoist reeving display	▶▶▶▶▶ p. 11 - 46
10	Current main boom length display	▶▶▶▶▶ p. 11 - 49
11	Current degree of utilisation display	▶▶▶▶▶ p. 11 - 51
12	Maximum load display	▶▶▶▶▶ p. 11 - 51
13	Currently raised load display	▶▶▶▶▶ p. 11 - 50
14	Display of reeving used	▶▶▶▶▶ p. 11 - 46
15	Current main boom angle display	▶▶▶▶▶ p. 11 - 50
16	Counterweight display	▶▶▶▶▶ p. 11 - 45
17	Current working radius display	▶▶▶▶▶ p. 11 - 49
18	Current inclination display	▶▶▶▶▶ p. 9 - 117
19	Telescoping direction display	▶▶▶▶▶ p. 11 - 52
20	Current telescoping display	▶▶▶▶▶ p. 11 - 51
21	Telescoping cylinder position display	▶▶▶▶▶ p. 11 - 52
22	Outrigger span display	▶▶▶▶▶ p. 11 - 45
23.1	Front left individual width	▶▶▶▶▶ p. 11 - 45
23.2	Front right individual width	▶▶▶▶▶ p. 11 - 45
23.3	Rear left individual width	▶▶▶▶▶ p. 11 - 45
23.4	Rear right individual width	▶▶▶▶▶ p. 11 - 45
24.1	Front left outrigger pressure	▶▶▶▶▶ p. 9 - 118
24.2	Front right outrigger pressure	▶▶▶▶▶ p. 9 - 118
24.3	Rear left outrigger pressure	▶▶▶▶▶ p. 9 - 118
24.4	Rear right outrigger pressure	▶▶▶▶▶ p. 9 - 118

1) Additional equipment

2) Display only with the *Standard* slewing range type



Datalogger menu



- | | | |
|----------------------------------|-------|------------|
| 1 Export data | ▣▣▣▣▶ | p. 9 - 151 |
| 2 Display of export progress | ▣▣▣▣▶ | p. 9 - 151 |
| 3 USB connection for data export | ▣▣▣▣▶ | p. 9 - 151 |

Lifting capacity tables menu

The same menu is displayed as shown on the *CCS* display; ▣▣▣▣▶ p. 9 - 60.



Either the *Monitoring* menu or the *Lifting capacity table* menu is displayed. Additionally, the *Datalogger* menu can be manually opened (using the *CCS* display).

9.5

Brief description of the operating elements



Risk of accident by 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 some operating elements to be active.

If some operating elements are without function, first read the following chapters which are referred to at the respective points before contacting **Grove Product Support**.

9.5.1

Definition of direction information

Basic rule

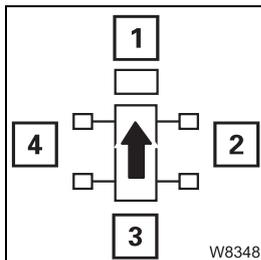
Direction information always depends on whether the carrier or the superstructure is being operated.

On the carrier

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

- | | |
|----------|----------|
| 1: front | 2: right |
| 3: rear | 4: left |

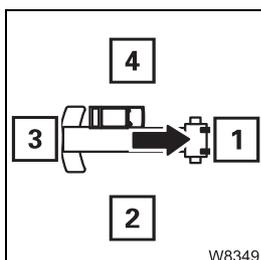
Forwards always means with the driver's cab at the front,
Backwards always means the rear lights on the carrier are to the front.



On the superstructure

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

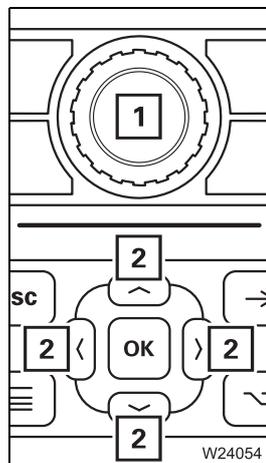
- | | |
|----------|----------|
| 1: front | 2: right |
| 3: rear | 4: left |



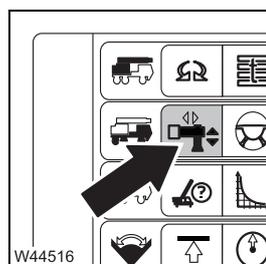
9.5.2

General rules for buttons and symbols on the display

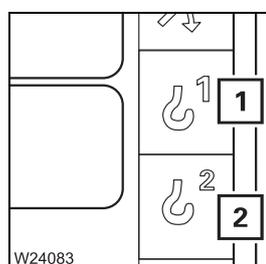
The symbols shown as an example are not present on all crane types.
 The following rules apply in all menus:



- A menu can only be opened if the relevant symbol was selected with the jog dial (1) or direction buttons (2).

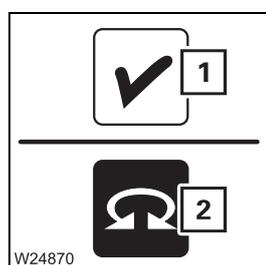


- A selected menu is marked in colour and can be opened.

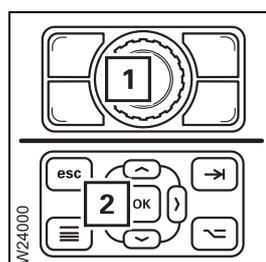


- Symbols can be shown in different colours. The colour of the symbol indicates the current switching state of the relevant power unit.

- 1 Orange:** e.g. main hoist – off
- 2 Green:** e.g. auxiliary hoist – on



- In this operating manual, we always refer to colours in the form of e.g. “The symbol is **red**”.
- Regardless of whether the background (1) of a symbol is **red** or 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 (1) or (2). This is the case if a menu is opened or a function is to be carried out.

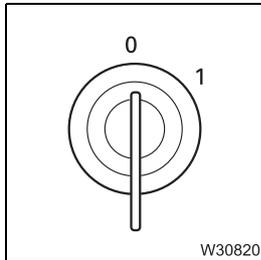
9.5.3

Engine

Side panel

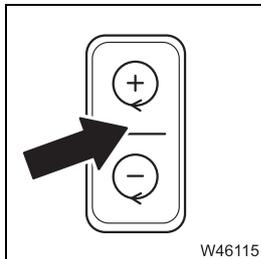
▣▣▣▣▶ *Starting the engine – from the crane cab, p. 10 - 4.*

Ignition lock



- **0** Ignition off, engine off, key can be removed
- **1** Ignition on and power supply on for:
Instrument lighting, CCS, engine control system, RCL

▣▣▣▣▶ p. 10 - 9



Starting the engine

- The engine is off:

- **Press once at the top:**

The engine starts
Idling speed – standard

Setting the idling speed

- The engine is running:

- **Press up:** Increasing the idling speed
- **Press down:** Reduce idling speed,
engine stop after about 10 seconds.

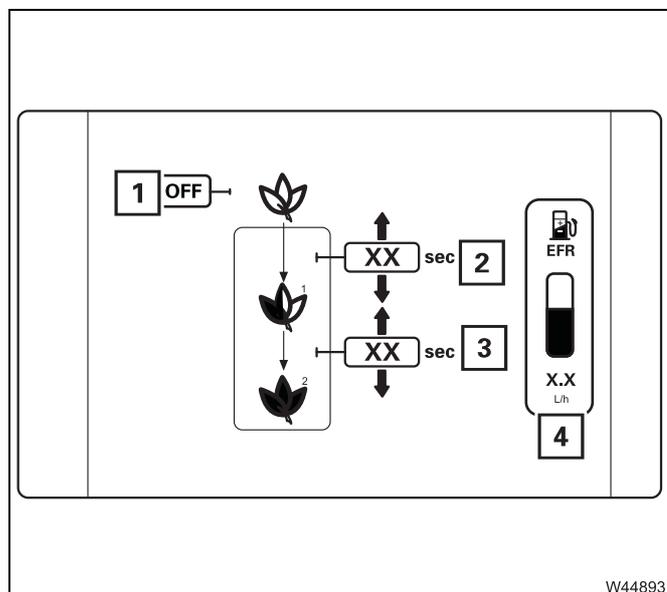
▣▣▣▣▶ p. 10 - 11



Economy menu



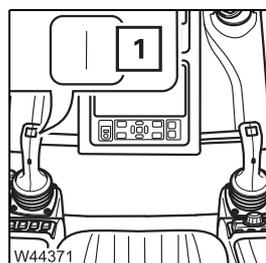
– Open: Select and confirm symbol (1)



Select symbol and confirm for:

- 1 Switching off Economy mode on/off
- 2 Setting time interval A
- 3 Setting time interval B
- 4 Average consumption

➡ p. 11 - 128



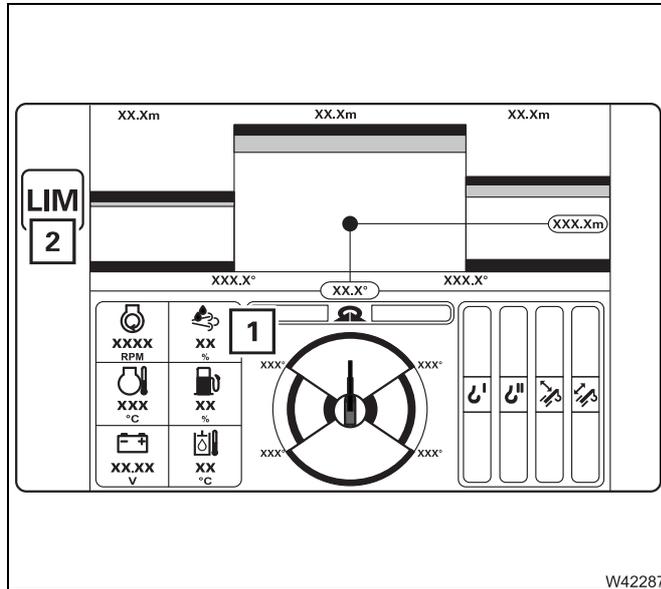
Switching on Economy Mode level 3 manually

- 1 Press and keep pressed for 3 seconds – engine stop / APS on
➡ p. 11 - 128

9.5.4 AdBlue (DEF) system

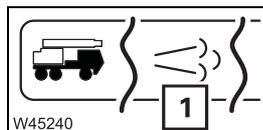
CCS display

Description of further symbols for warning and fault messages;
Warning messages on the CCS display, p. 8 - 23.



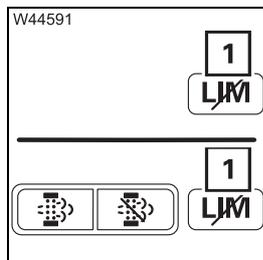
AdBlue (DEF) warning

- 1 – Green:** – AdBlue (DEF) level sufficient
- Yellow:** – AdBlue (DEF) tank almost empty; *AdBlue (DEF) tank, p. 4 - 8*
- Red:** – AdBlue (DEF) tank empty – symbol (2) displayed



Exhaust system menu

- Open:** Select and confirm symbol (1)



Override torque reduction

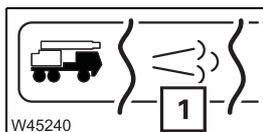
Torque reduction is active

- 1 – Select and confirm:**
 - Symbol (1) green
 - A warning buzzer sounds
 - Torque reduction overridden
- after 30 minutes:
- Symbol (1) grey
 - Torque reduced
 - Warning buzzer off

The system can be overridden three times, after this the function is disabled until the next time the engine is restarted; *Overriding the torque reduction, p. 11 - 134*

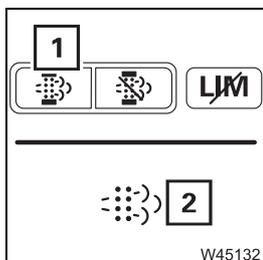
9.5.5

Exhaust cleaning/regeneration



Exhaust system menu

- **Open:** Select and confirm symbol (1)



Manually start exhaust system cleaning

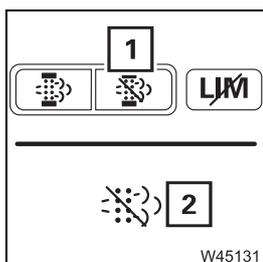
The engine is running.

- 1 – Select and confirm:**
 - Symbol (1) green
 - Cleaning starts
 - Symbol (2) flashes

After cleaning

- Symbol (1) grey
- Symbol (2) hidden

▣▣▣▣ *Cleaning the exhaust system, p. 11 - 135*



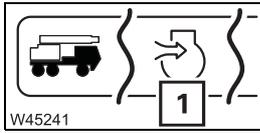
Disable exhaust system cleaning

- 1 – (Grey) Select and confirm:**
 - Symbol (1) green
 - Cleaning disabled
 - Symbol (2) displayed
- **(Green) Select and confirm:**
 - Symbol (1) grey
 - Cleaning enabled
 - Symbol (2) hidden

▣▣▣▣ *Cleaning the exhaust system, p. 11 - 135*

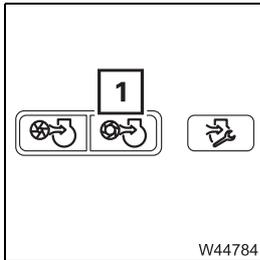
9.5.6

Air intake inhibitor



Air intake inhibitor menu

– **Open:** Select and confirm symbol (1)



Opening the air intake inhibitor

The air intake inhibitor was automatically triggered.

1 – Select and confirm: Air intake inhibitor open – the engine can be started

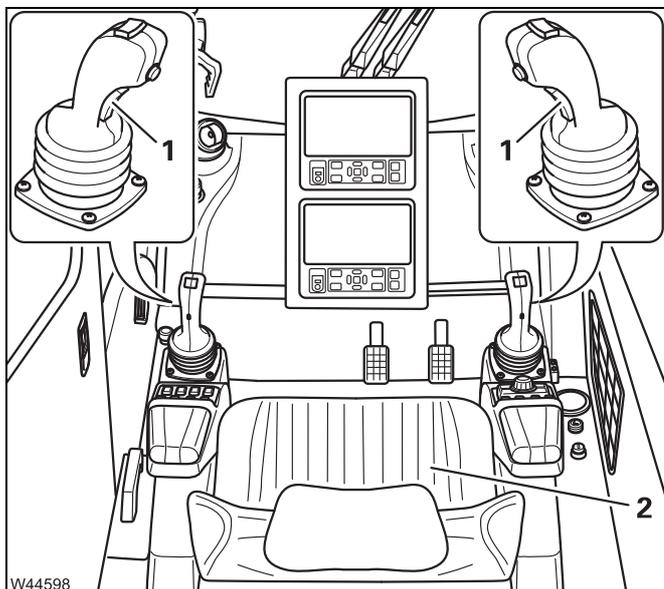
▣▶ *Opening the air intake inhibitor, p. 4 - 21*

51508035

9.5.7

Seat contact switch and dead man's switch

The seat contact switch and the dead man's switch are safety devices for enabling crane functions.



Enabling 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 disabled.

Any crane movements are slowed down to standstill within 3 seconds and then disabled.

Crane cab seat – version 2

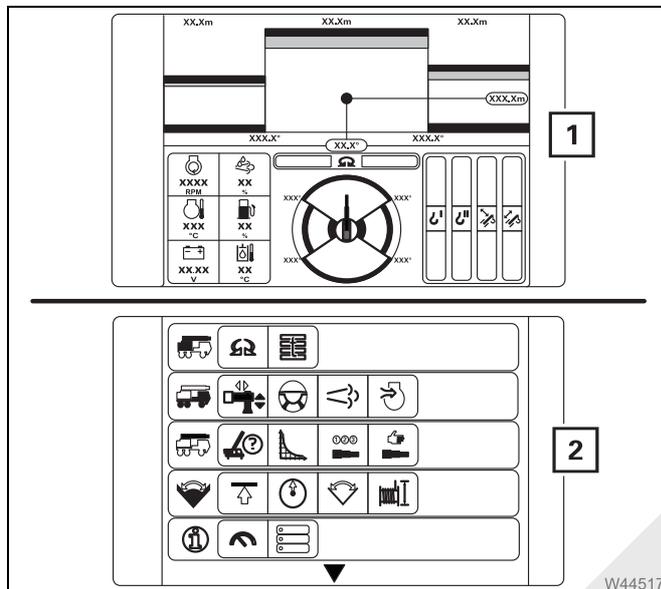
The seat contact switch is highly sensitive. It is recommended that you also press the dead man's switch in order to avoid unintentional shutdown.

▣▣▣▣▶ *Seat contact switch*, p. 11 - 12

9.5.8

CCS crane control

The GMK5150XL truck crane is equipped with the **CCS** crane control system. The crane control system consists of a monitor and control unit in the driver's cab and the crane cab. An additional control unit is located in the right control panel of the crane cab.



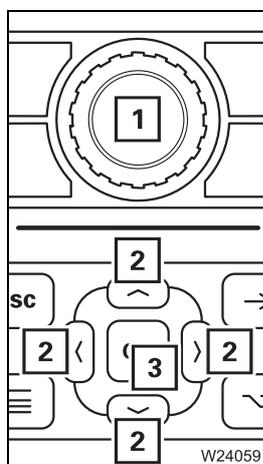
CCS display

The start menu (1) appears after switching on the ignition.

After pressing a button on the jog dial or *CCS* control panel, the overview of the menu groups (2) appears.

A symbol is selected with the jog dial or the selection buttons on the *CCS* control panel to call up a menu. A selected symbol is shown in **orange**.

A menu is opened by pressing the jog dial or the OK button on the control panel.



Menu operation

Buttons for selecting, activating and confirming areas on the *CCS* display.

– Select

1 Slew or 2 Press

– The selected range is marked.

– Activate / confirm

1 Press or 3 Press

– The marked range is activated.

– The entry is confirmed.

The function of the buttons is different depending on the area.

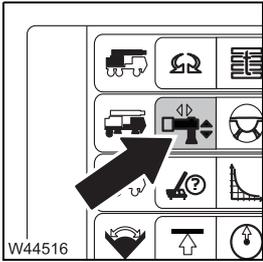
There are three areas.

▣ In the Menu area, p. 9 - 104

▣ In the Input area, p. 9 - 104

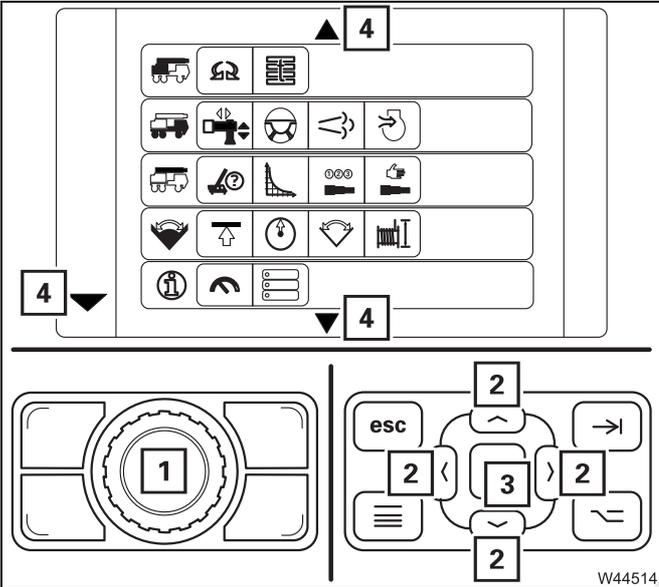
▣ In the Operation area, p. 9 - 105





In the Menu area

- For selecting and opening menus.
 One symbol is always selected.



Selecting a menu

- 1 Slew** or **2 Press**

- The next symbol is highlighted.

Open the menu

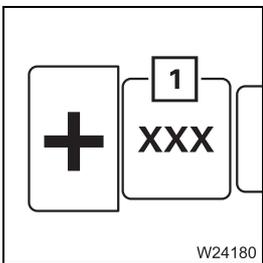
- 1 Press** or **3 Press**

- The corresponding menu is opened.

Browse

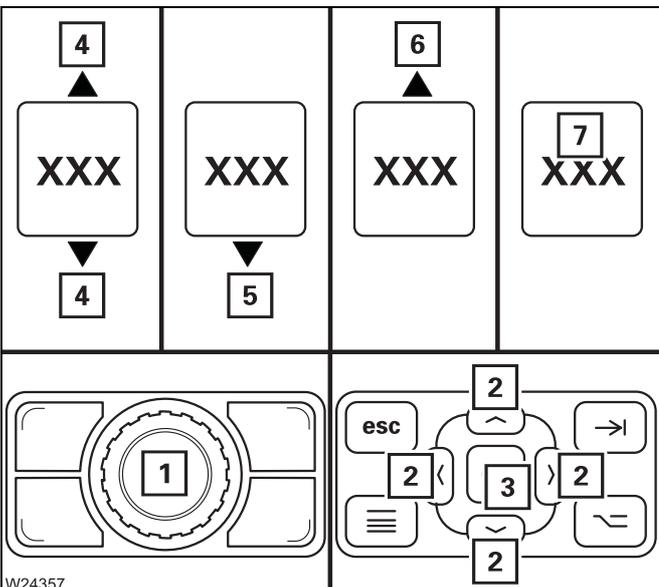
- 4 Select and confirm**

- The next area is displayed



In the Input area

- For selecting and confirming values.
 A field (1) with numbers or letters is highlighted.



Select a value

- 1 Slew¹⁾** or **2 Press**

- 4** Value can be reduced/increased

- 5** Highest value reached

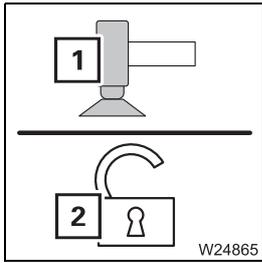
- 6** Lowest value reached

- 1) Keeping pressed and turning results in a rapid change of value.

Confirm value

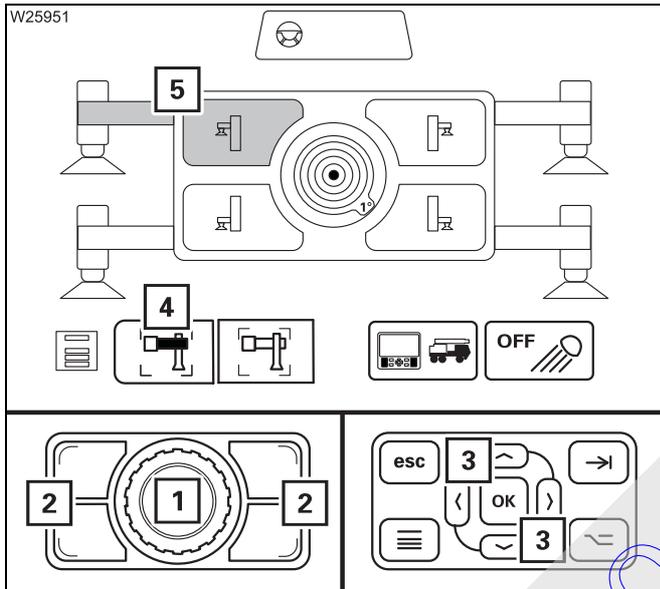
- 1 Press** or **3 Press**

- Displayed value (7) is applied – input mode off.



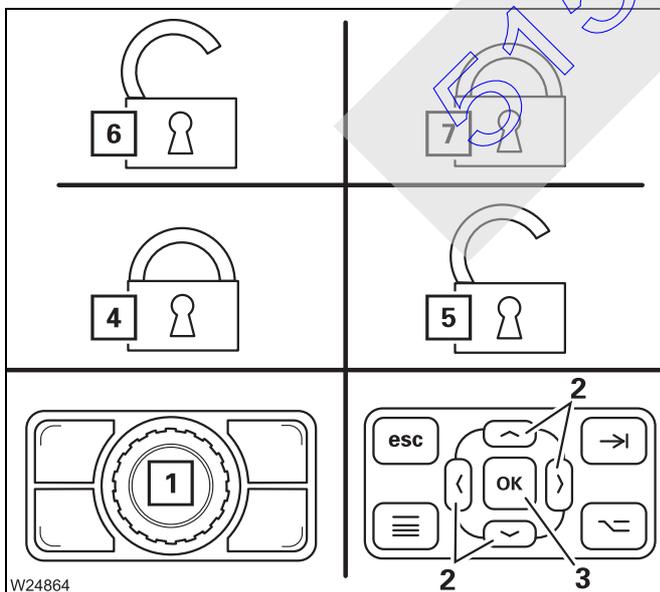
In the Operation area

- For carrying out movements during rigging.
The required element is marked, e.g. supporting cylinder (1).
- For switching on/off and switching over
A symbol for a status is highlighted, e.g. symbol (2).



Execute movements

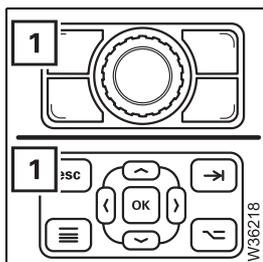
- Select function
3 Press or **1 Slew**
– The marked function (4) or (5) is selected.
- Move function
2 Press
– The selected movement is carried out.



Switching on/off and switching over

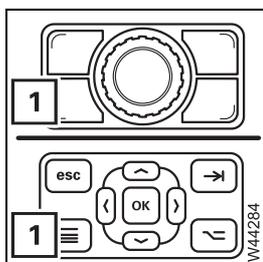
- Select status
2 Press or **1 Slew**
– The marked state (4) or (6) is selected.
- Switch on state
1 Press or **3 Press**
– The selected state (5) or (7) is established.





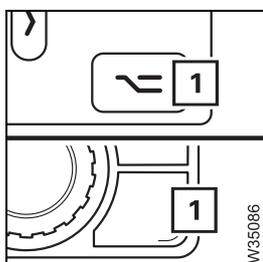
Exit menu/input mode

- 1 Press:**
- The open menu closes – the menu from the next higher level is opened
 - Input mode is disabled.



Overview of menu groups

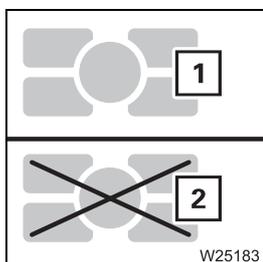
- 1 Press:**
- After pressing for the first time
Menu groups overview display
 - After pressing again
Next/previous group overview



Switch off *RCL* buzzer sound

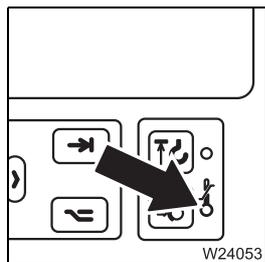
In some cases not active until after 5 seconds

- **Press once:** Buzzer is switched off



Jog dial display

- 1** Jog dial OK
- 2** Jog dial not working
Communication fault or error (error display)



Display temperature warning display

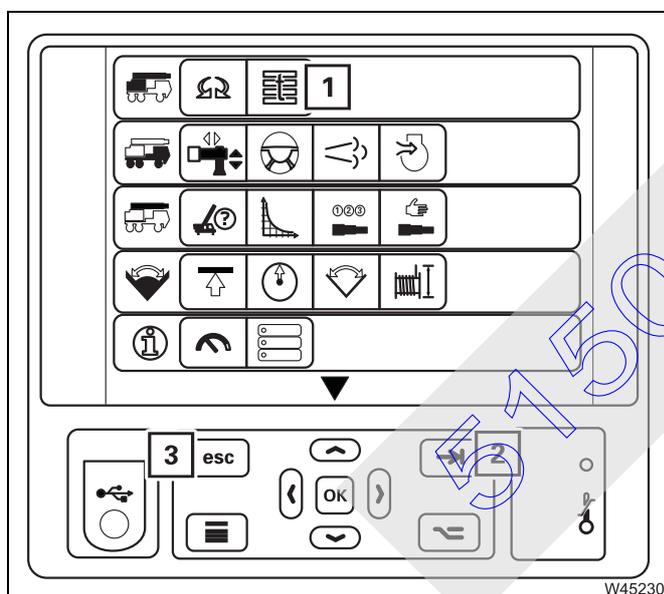
The temperature of the control unit is measured by an internal sensor.

- **Blue, flashing:** Temperature too low – display is not switched on
Temperature too high:
- **Red, lights up:** Brightness is reduced
- **Yellow, flashing:** Display is switched off
- **Red, flashing:** Control unit is switched off

☰➔ *Temperature on the display, p. 11 - 31*

Selecting / deselecting favourites

Several favourites can be selected. The cursor jumps directly from favourite to favourite when scrolling through the menu groups.



Select

A symbol is selected, such as symbol (1).

2 Press

The symbol is marked as a favourite.

Deselect

- Individually

The favourite symbol is selected.

2 Press

The favourite selection is cancelled.

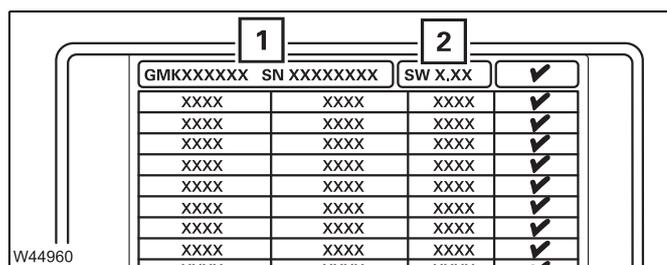
- All

Any symbol is selected.

2 + 3 Press

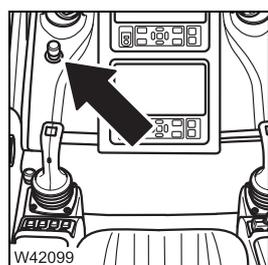
All favourite selections are removed.





Serial number and program version display

- 1 Truck crane serial number
- 2 Current program version of the crane control
 – always state in the event of a malfunction;
 ■■■▶ p. 14 - 3

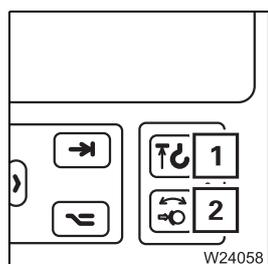


Emergency stop switch

May only be used in an emergency.

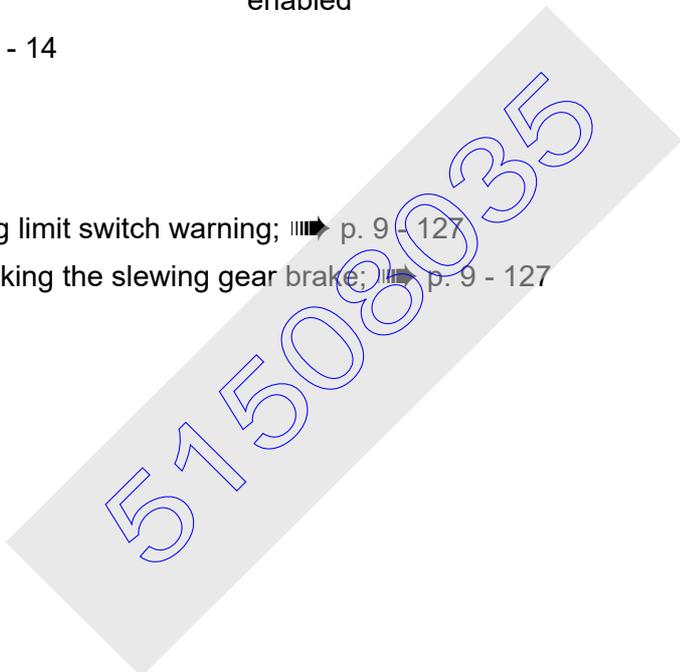
- **Press:** Engine off – crane functions stop immediately.
Switch engages
- **Turn engaged switch:** Switch returns to initial position – crane functions enabled

■■■▶ p. 10 - 14



Other

- 1 Lifting limit switch warning; ■■■▶ p. 9 - 127
- 2 Checking the slewing gear brake; ■■■▶ p. 9 - 127



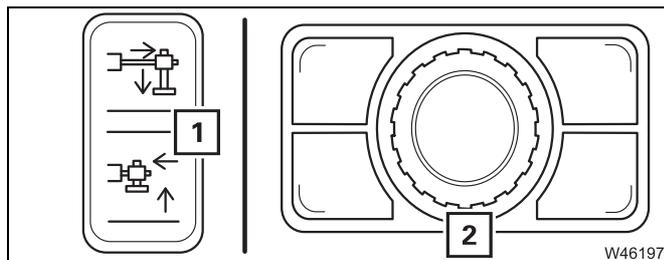
9.5.9

Outrigger – crane cab

- ▣▣▣▣ Extending/retracting outrigger beams, p. 12 - 43
- ▣▣▣▣ Extending/retracting supporting cylinders, p. 12 - 51

The display fields must be switched on for crane operation – in the driver's cab, in the *Settings* menu on the *CCS* display.

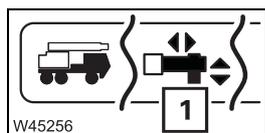
Control panels



Short description on the *CCS* display

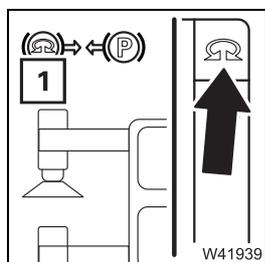
- 1** Left – Moving the outrigger;
▣▣▣▣ p. 9 - 111
- 2** Right – Outrigger pre-selection;
▣▣▣▣ p. 9 - 111

CCS display



Outrigger menu

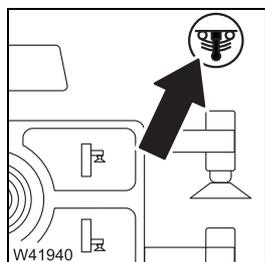
- **Open:** Select symbol (1) and confirm – menu is opened



Slewing gear/movements locked display

- **Red:** Slewing gear switched off – symbol (1) out
- **Green:** Slewing gear switched on – outrigger movements disabled – symbol (1) is displayed

▣▣▣▣ p. 12 - 36

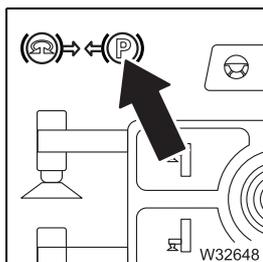


Suspension on/off display/warning

- **Red:** Suspension is switched off
- **Green:** Suspension switched on – outrigger movements disabled – symbol is displayed

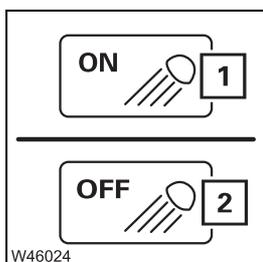
▣▣▣▣ p. 12 - 36





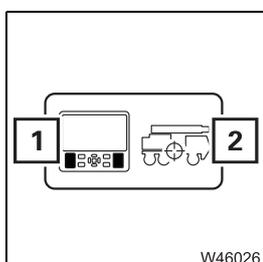
Parking brake/movements disabled display/warning

- **Red:** Parking brake released – outrigger movements disabled
 - **Gone out:** Parking brake applied – outrigger movements enabled
- ▣▣▣▣ p. 12 - 36



Outrigger lighting on/off

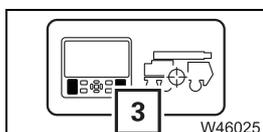
- **Switch on:** Select symbol (2) and confirm – symbol (1) is displayed
 - **Switch off:** Select symbol (1) and confirm – symbol (2) is displayed
- ▣▣▣▣ p. 12 - 37



Display/switch outrigger function

- **Outrigger operation display**
 - 1 Green:** Only operation from the crane cab active
 - 2 Green:** Only operation from the outrigger control units active

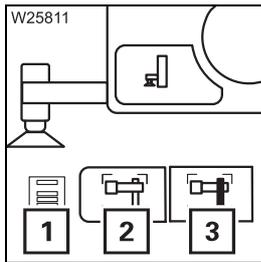
Select and confirm the button (3) until the desired symbol turns green.



– Switching over outrigger operation

- Switch over:** Select and confirm button (3) – Active operation is green

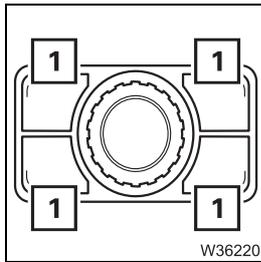
▣▣▣▣ *Switching over outrigger operation, p. 12 - 37*



Switch over/exit the menu

Select symbol and confirm – symbol is green

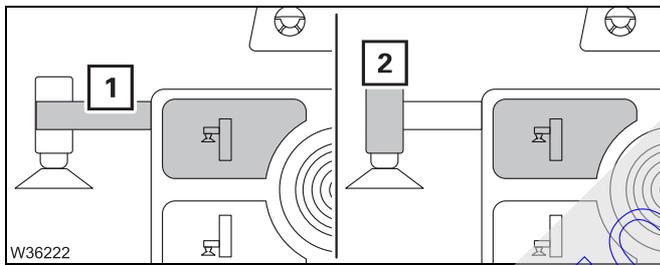
- 1 Exit menu:
- 2 Outrigger beam menu
- 3 Outrigger cylinders menu



Outrigger pre-selection

The corresponding supporting cylinder or outrigger beam is pre-selected, depending on the menu that is open.

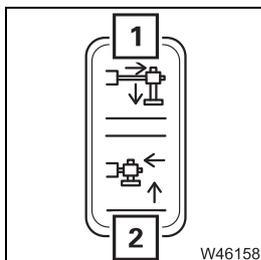
- **Pre-selection on:** Press the required button (1)
- **Pre-selection off:** Release the button



Outrigger pre-selection display

- 1 Outrigger beam pre-selection display
- 2 Outrigger cylinder pre-selection display

- **Orange:** Pre-selection on
- **Blue:** Pre-selection off



Moving the outrigger

A supporting cylinder or outrigger beam is pre-selected.

- 1 **Extend:** Press the button at the top
- 2 **Retract:** Press the button at the bottom

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

9.5.10 Outrigger control units

- ▣▣▣▣▶ *Extending/retracting outrigger beams*, p. 12 - 43
- ▣▣▣▣▶ *Extending/retracting supporting cylinders*, p. 12 - 51

All directional information refers to the carrier; ▣▣▣▣▶ p. 9 - 95.

General information

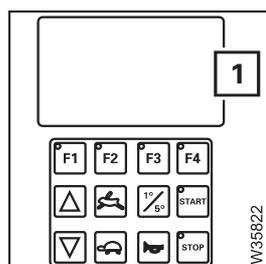
The function of the general operating elements is independent of the menu shown on the *Outrigger* display.



Position lights for indicator lamps

Light up when the ignition is on.

- **Display field lighting off:** Ignition on and no button pressed yet or no button pressed within the last 10 seconds
 - **Display field lighting on:** Press any button
- ▣▣▣▣▶ p. 12 - 44



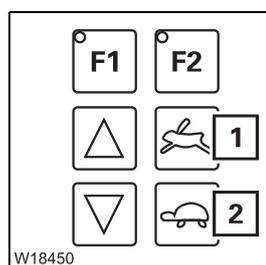
Outrigger display

Display: To display the *Outrigger* and *Raise axle* menus. Some of the buttons under the display can have different functions depending on the menu displayed.



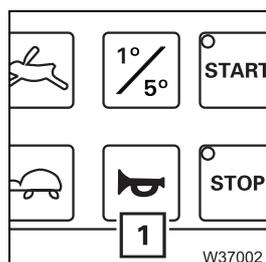
Menu selection

Selection: Press the button – the next menu is shown on the *Outrigger* display



High speed/normal speed pre-selection

- 1 Pre-select:** Press button – high-speed pre-selection on
- 2 Pre-select:** Press button – normal speed pre-selection on



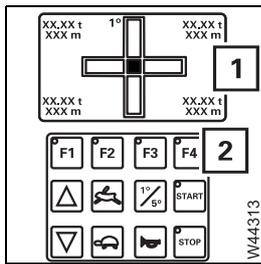
Horn

The ignition is switched on.

- 1 – Press:** Carrier horn on

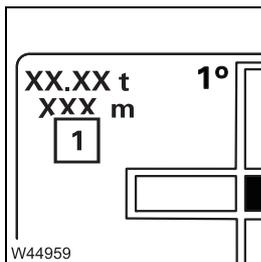
Outrigger menu

The operating elements for the outriggers are only active when the *Outrigger* menu is open.



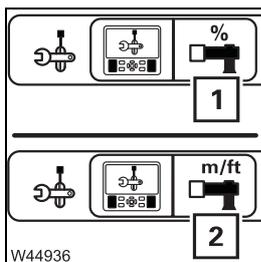
Outrigger menu

- **Open:** Press button (2) repeatedly until display (1) appears.



Outrigger span display

- 1 Individual width – optionally in metres/feet or in percent

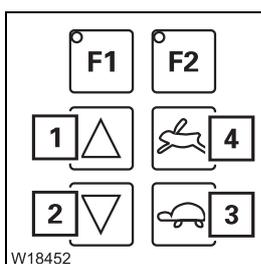


Switch over outrigger span display

On the CCS display in the driver's cab.

- **Switch over to metres/feet:** Select and confirm symbol (1)
Symbol (2) displayed
- **Switch over to percent:** Select and confirm symbol (2)
Symbol (1) displayed

▣▣▣▣ Switching over the outrigger span display, p. 12 - 44



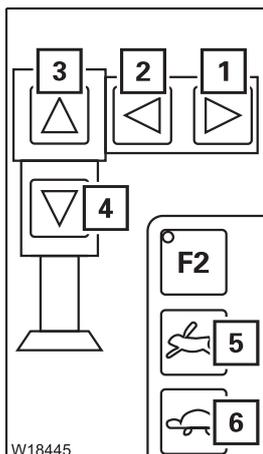
Extend/retract all supporting cylinders

Button (3) or (4) is pressed.

- 1 **Retract:** Press button – all supporting cylinders retract
- 2 **Extend:** Press button – all supporting cylinders extend

The movement stops after the button is released, and when an end position is reached; ▣▣▣▣ p. 12 - 52.





Operating the left outrigger (next to control unit)

Button (5) or (6) is pressed.

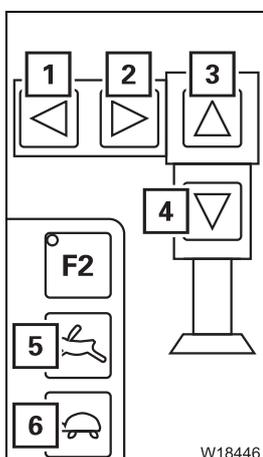
- 1 Retract:** Press button – outrigger beam retracts¹⁾
- 2 Extend:** Press button – outrigger beam extends¹⁾
- 3 Retract:** Press button – supporting cylinder retracts
- 4 Extend:** Press button – supporting cylinder extends

¹⁾ only on operator's side

Outrigger beam; p. 12 - 44

Outrigger cylinder; p. 12 - 52

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



Operating the right outrigger (next to control unit)

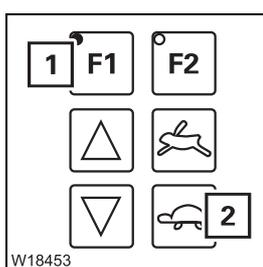
Operation is the same as on the button unit for *Outriggers to the left of the Display field.*

– Automatic alignment

Press button (1) and also press button (2) –
 Truck crane is level

The process stops as soon as the truck crane is levelled or the button is released

p. 12 - 56

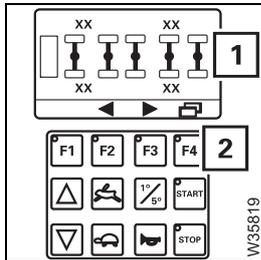


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9.5.11

Raise axle

Operating the axle raising system, p. 12 - 60

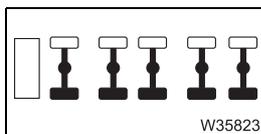


Raise axle menu

The suspension is switched off (locked).

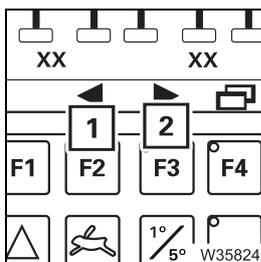
– **Open:** Press button (2) repeatedly until display (1) appears.

The operating elements for raising the axles are only active when the *Raise axle* menu is open.



Pre-selection display

Pre-selected wheels are black, e.g. all wheels on the operator's side.

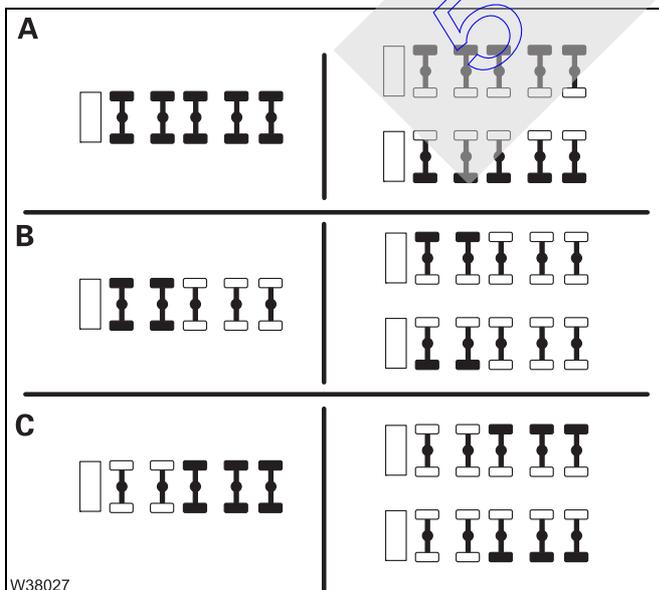


Pre-selecting wheels

Only pre-defined wheel groups can be selected.

1 Forwards: Press button once – next wheel group

2 Back: Press button once – previous wheel group



Selectable wheel groups

A All wheel groups

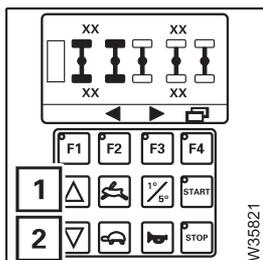
- All wheels
- Opposite wheels
- Operator side wheels

B Front wheel group

C Rear wheel group

- All wheels
- Opposite wheels
- Operator side wheels



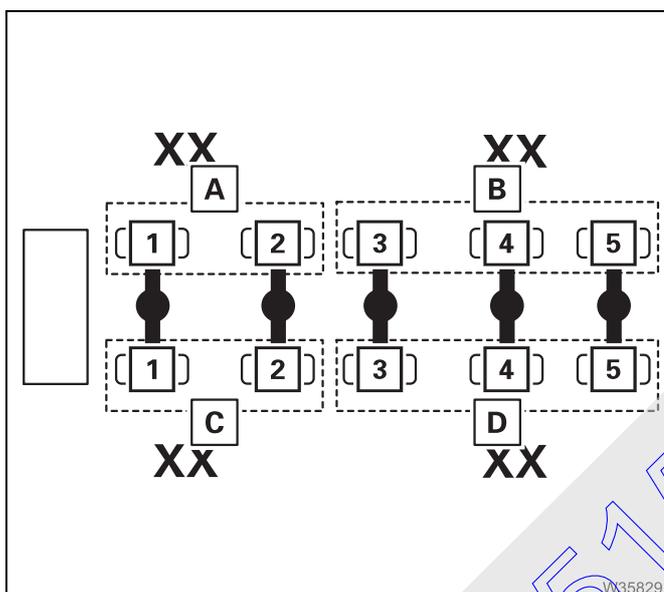


Raising/lowering wheels

The axle load on the pre-selected wheels is in the permissible range.
 The horn sounds when a button is pressed.

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

The movement stops after the button is released or the maximum permissible wheel load is exceeded.



Wheel load display

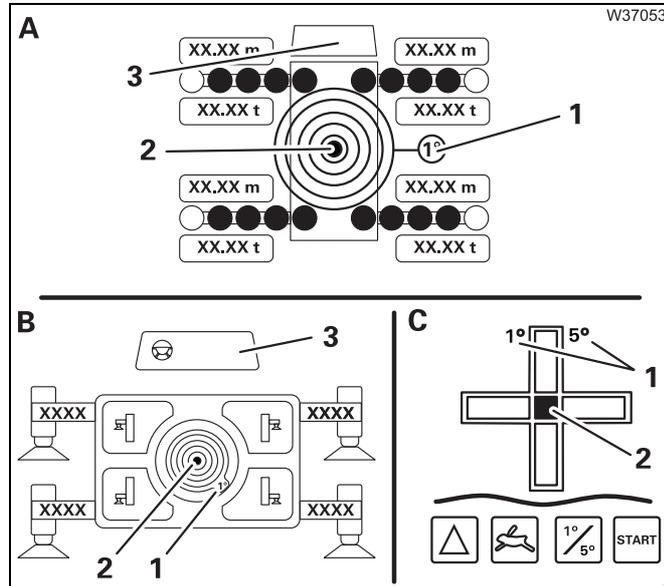
Displays (A) to (D) show the sum of the wheel loads for the corresponding wheels.

- **Opposite the operator's side**
 - A** Wheel load of wheels A1 + A2
 - B** Wheel load of wheels B3 + B4 + B5
- **Operator's side**
 - C** Wheel load of wheels C1 + C2
 - D** Wheel load of wheels D3 + D4 + D5

The display is in tons or kilopounds, depending on the setting – (1 kilopound = 1,000 lbs).

9.5.12 Inclination indicators

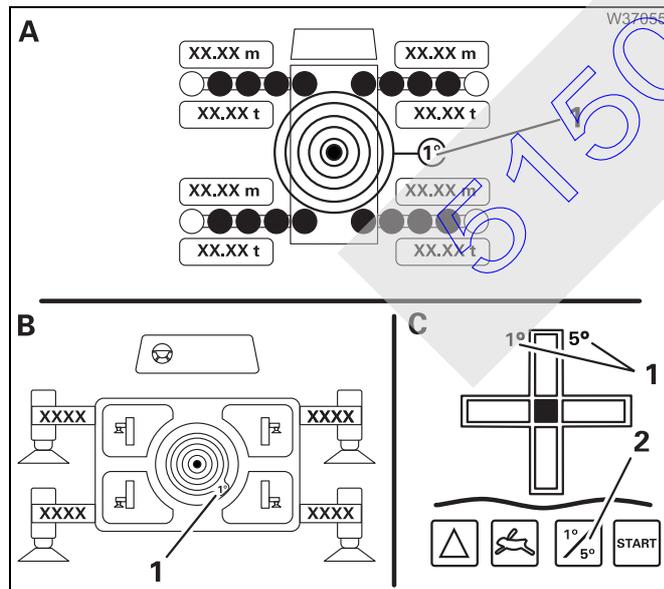
▣▣▣▣ ▸ *Inclination indicators*, p. 12 - 54



Current inclination display

- A In the *Monitoring* menu
- B In the *Outrigger* menu
- C At the *Outrigger* control units

- 1 Measuring range display
- 2 Inclination indicator
- 3 Directional indicator



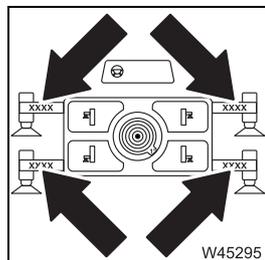
Switching over the measuring range

- A In the *Monitoring* menu
 - B In the *Outrigger* menu
- Change-over is automatic – the current measurement range (1) is displayed, 1° or 5°
- C At the *Outrigger* control units
- Press button (2) once – the current measurement range (1) is displayed, 1° or 5°

9.5.13

Outrigger pressure displays

Outrigger menu

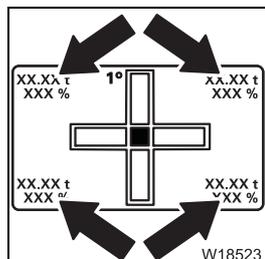


Outrigger pressure display

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

➡ p. 12 - 62

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:** Rounded to integers

➡ p. 12 - 63

9.5.14

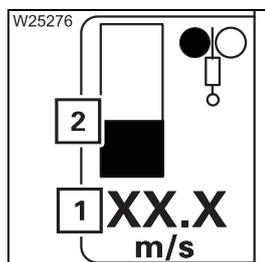
Anemometer displays

This function is the same in all the menus.
 The anemometer is connected to the power supply.

v_{max} = maximum permissible/reduced wind speed as shown in the *Lifting capacity table*

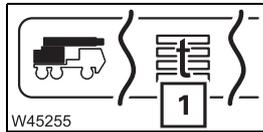
- 1 Display in metres per second (m/sec) or Beaufort scale (B)
- 2 Variable measurement range – 100% = v_{max}
 - **Green:** Display (1) \leq 90% of v_{max}
 - **Red:** Display (1) $>$ 90% of v_{max}

➡ p. 11 - 74

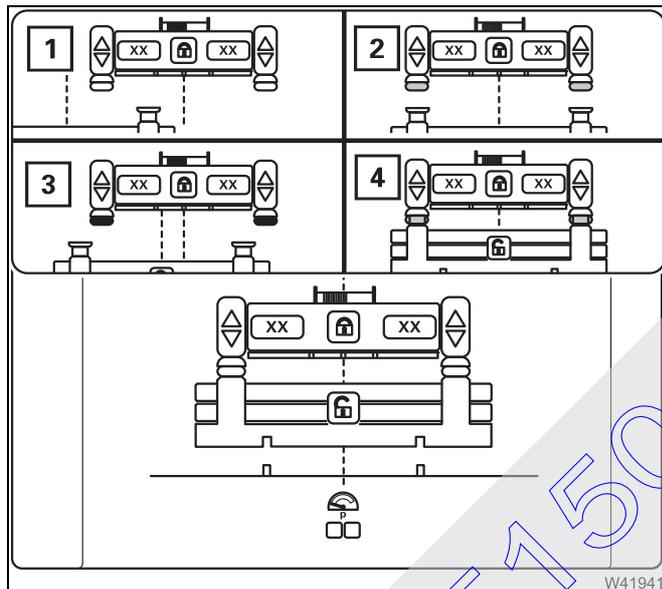


9.5.15 Counterweight menu

- ▣▣▣▣ *Rigging/unrigging the counterweight*, p. 12 - 65,
- ▣▣▣▣ *Counterweight hoist unit*, p. 12 - 104.



– **Open:** Select and confirm symbol (1)



Rigging position display

1 White – not in the rigging range

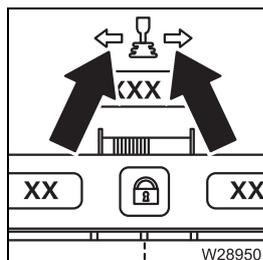
In the rigging range, the following rigging positions are displayed.

2 Green – move lifting cylinder position

3 Red – intermediate position, lifting cylinder movements disabled

4 Green – lift/lower counterweight position (0° position)

▣▣▣▣ p. 12 - 106

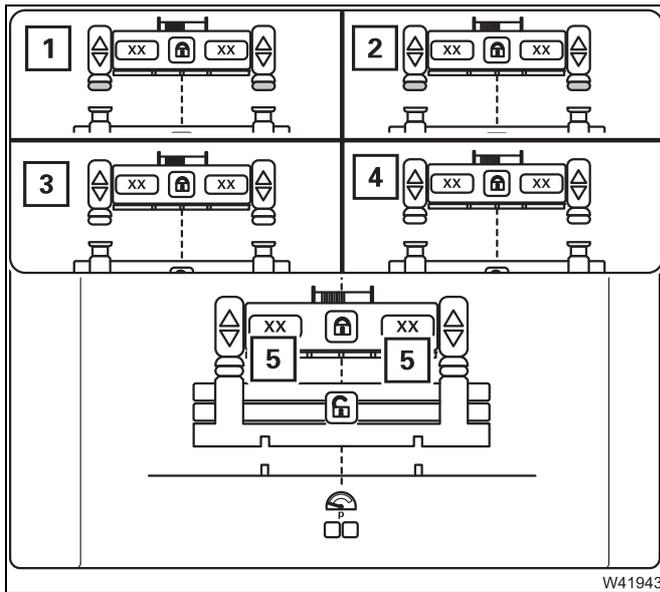


Display of slewing direction for automatic mode

Automatic mode is switched on.

– **Arrow is displayed:** Move control lever for slewing gear in direction of arrow – automatic mode is applied



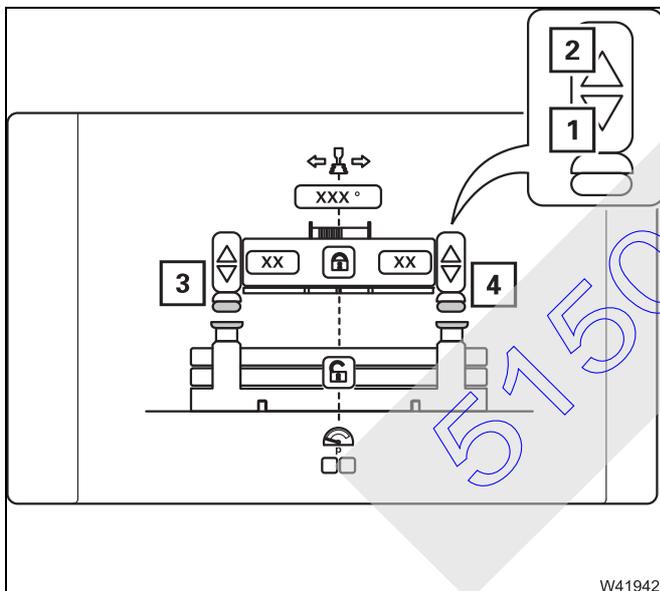


Lifting cylinder position display

The current position of the counterweight lifting cylinders is shown by different symbols:

- 1 Green – extended
- 2 Green – retracted
- 3 Yellow – intermediate position
- 4 Violet – error
- 5 Extended length in percent (%)

➡ p. 12 - 105



Extending/retracting the lifting cylinders

1 Extend:

- (5) displayed and symbol (3) yellow or
- (6) displayed and symbol (4) yellow

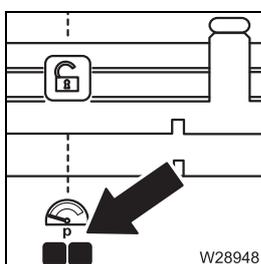
Select symbol and confirm – slewing is disabled after extending

2 Retract:

Select symbol and confirm – after reaching the end position, the counterweight is pre-tensioned

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

➡ p. 12 - 105.

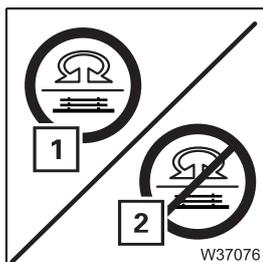


Pre-tensioning pressure display

- Green: Pre-tensioning pressure reached
- Red: Pre-tensioning pressure too low – pre-tension the counterweight

➡ p. 12 - 107

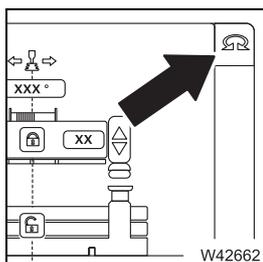




Slewing enabled display

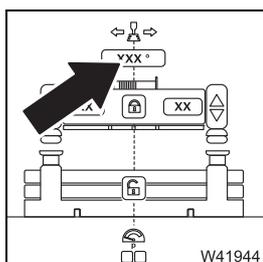
- 1 Green:** Slewing enabled (if no other shutdown occurred).
- 2 Red:** Slewing disabled by counterweight – the corresponding warning is displayed.
The pre-tensioning pressure is too low or the counterweight is not completely lifted.

➡ *Extending/retracting the lifting cylinders*, p. 12 - 105



Slewing gear display

Identical to the display in the *Slewing gear/Houselock* menu; ➡ p. 9 - 127.



Current slewing angle display

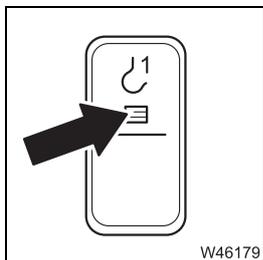
Identical to the display in the *Slewing gear/Houselock* menu; ➡ p. 9 - 138.

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9.5.16

Main hoist

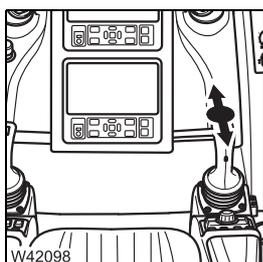
Control panels



Main hoist on/off

- Press once:
 - Lamp bright – main hoist on
 - Lamp dim – main hoist off

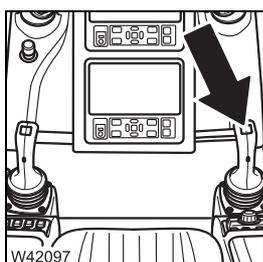
➡ p. 11 - 78



Right control lever

- Back: Lift
- Forwards: Lower

➡ p. 11 - 79



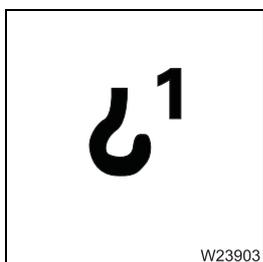
Hoist high-speed mode on/off

The parking brake is applied.

- Left: High-speed mode on, off when released
- Once to the right: Continuous operation high-speed mode on
- Once to the right or once to the left: Continuous operation high-speed mode off

➡ p. 11 - 115

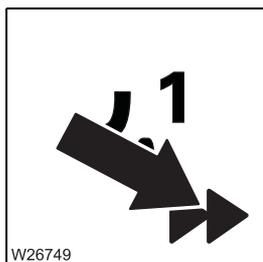
CCS display



Power units display

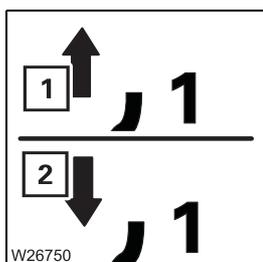
- Green: Main hoist on
- Orange: Main hoist off





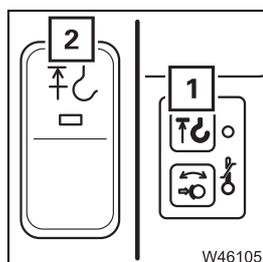
High-speed mode monitoring for hoist

- **Lights up:** High-speed mode on
 - **Gone out:** High-speed mode off
- ▣▣▣▣ p. 11 - 115



Lift/lower hoist display

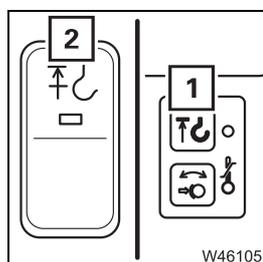
- **Symbol (1):** Lift
- **Symbol (2):** Lower



Lifting limit switch override Override slewing gear shutdown Correct counterweight rigging mode

- 2 – Press:** Shutdown of lifting limit switch overridden
 - Lamp (1) flashes
 - Buzzer tone sounds
 - Crane movements enabled (move the control lever to the initial position if necessary)
 - Slewing gear shutdown overridden
- 2 – Release:** Shutdown of lifting limit switch and shutdown of slewing gear not overridden

- ▣▣▣▣ *Lifting limit switch and lowering limit switch*, p. 11 - 84
- ▣▣▣▣ *Slewing with overridden slewing gear shutdown*, p. 14 - 51
- ▣▣▣▣ *Extending/retracting the lifting cylinders*, p. 12 - 105



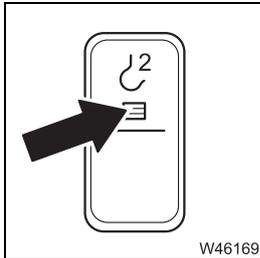
Warning of lifting limit switch shutdown

- 1 – Lights up:** Lifting limit switch triggered – movements that increase the load moment stop
 - 1 – Flashing:** Button (2) pressed
 - 1 – Gone out:** Lifting limit switch not triggered and not overridden
- ▣▣▣▣ p. 11 - 84

9.5.17

Auxiliary hoist

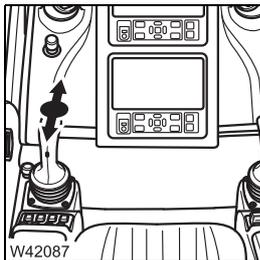
Control panels



Auxiliary hoist on/off

- **Press once:** – Lamp bright – auxiliary hoist on
- Lamp dim – auxiliary hoist off

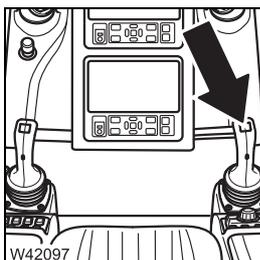
➡ p. 11 - 81



Left control lever

- **Back:** Lift
- **Forwards:** Lower

➡ p. 11 - 82



Hoist high-speed mode on/off

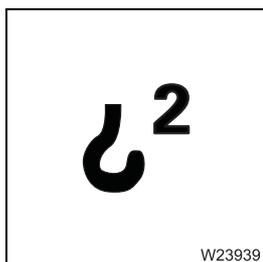
The parking brake is applied.

- **Left:** High-speed mode on, off when released
- **Once to the right:** Continuous operation high-speed mode on
- **Once to the right or once to the left:** Continuous operation high-speed mode off

➡ p. 11 - 115

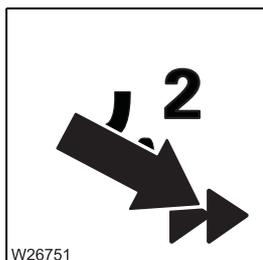


CCS display



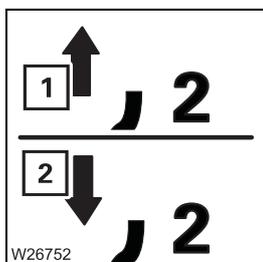
Power units display

- **Green:** Auxiliary hoist on
- **Orange:** Auxiliary hoist off



High-speed mode monitoring for hoists

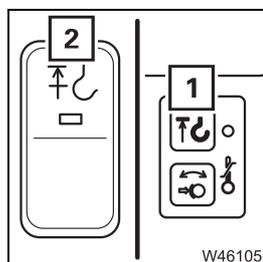
- **Lights up:** High-speed mode on
 - **Gone out:** High-speed mode off
- ▮▮▮▮ p. 11 - 115



Lift/lower hoist display

- **Symbol (1):** Lift
- **Symbol (2):** Lower

▮▮▮▮ p. 11 - 115



Warning of lifting limit switch shutdown

Lifting limit switch override

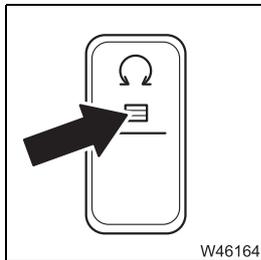
- 1 Short description for main hoist; ▮▮▮▮ p. 9 - 124
- 2 Short description for main hoist; ▮▮▮▮ p. 9 - 124

9.5.18

Slewing gear

▣▣▣▣▶ *Slewing gear*, p. 11 - 117.

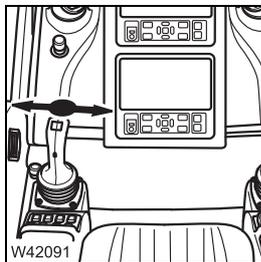
Control panels



Slewing gear on/off

- **Press once:**
 - Lamp bright – slewing gear on
 - Slewing gear brake released
 - Lamp dim – slewing gear off
 - Slewing gear brake applied

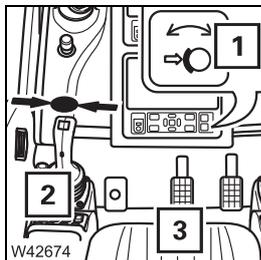
▣▣▣▣▶ p. 11 - 118



Left control lever

- **To the left:** Slew anti-clockwise
- **To the right:** Slew clockwise

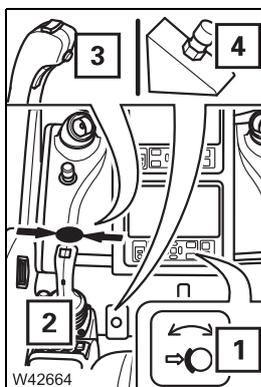
▣▣▣▣▶ p. 11 - 119



Slewing gear freewheel with brake pedal function switched on

- Slewing gear is switched on.
- The control lever (2) is in the initial position.
- **Switch on:** Do not press brake pedal (3) – slewing gear brake released, lamp (1) goes out
- **Switch off:** Press brake pedal (3) – slewing gear brake applied, lamp (1) lights up

▣▣▣▣▶ p. 11 - 121



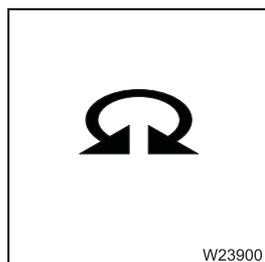
Slewing gear freewheel with control lever function switched on

- Slewing gear is switched on.
- The control lever (2) is in the initial position.
- **Switch on:** Press button (3) or (4) – slewing gear brake released, lamp (1) goes out
- **Switch off:** Release button (3) or (4) – slewing gear brake applied, lamp (1) lights up

▣▣▣▣▶ p. 11 - 121

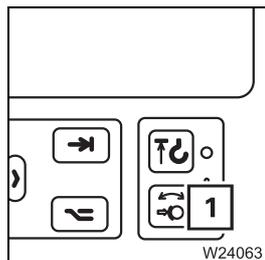


CCS display



Power units display

- **Green:** Slewing gear on
- **Orange:** Slewing gear off



Slewing gear brake applied/released

- 1 Lights up:** Slewing gear brake applied
- 1 Gone out:** Slewing gear brake released

➡ p. 11 - 118



Switch over slewing gear brake function

The slewing gear is switched off

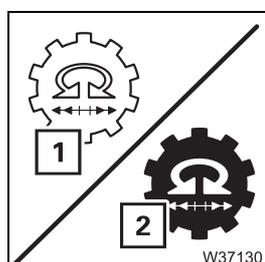
- **Switch over:** Select symbol and confirm – the function is displayed



Slewing gear brake function display

- 1 Brake pedal function**
 Brake slewing movement – press *Slewing gear* brake pedal
- 2 Control lever function**
 Brake slewing movement – control lever in initial position
Slewing gear brake pedal not working

➡ p. 11 - 117



Slewing speed reduction on/off

- Switch off:** Select symbol (1) and confirm – symbol (2) is displayed
- Switch on:** Select symbol (2) and confirm – symbol (1) is displayed

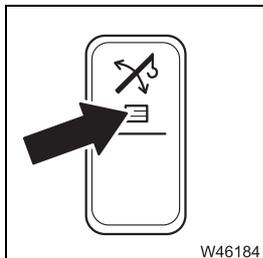
➡ *Switching the slewing speed reduction on and off*, p. 11 - 122

9.5.19

Derricking gear

▣▣▣▣► *Derricking gear*, p. 11 - 87.

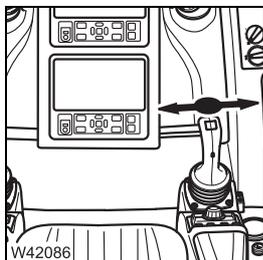
Control panels



Derricking gear on/off

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

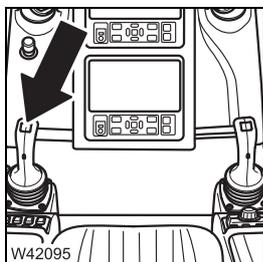
▣▣▣▣► p. 11 - 87



Right control lever

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

▣▣▣▣► p. 11 - 88



Derricking gear/telescoping mechanism high-speed mode on/off

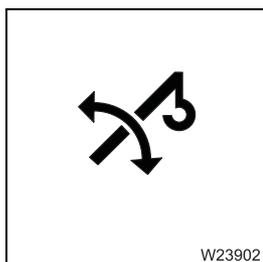
The parking brake is applied.

- **Right:** High-speed mode on, off when released
- **Once to the left:** Continuous operation high-speed mode on
- **Once to the right or Once to the left:** Continuous operation high-speed mode off

▣▣▣▣► p. 11 - 115

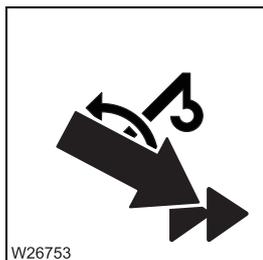


CCS display



Power units display

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

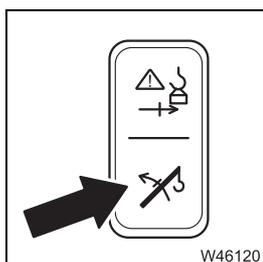


Derricking gear high-speed mode monitoring

- **Lights up:** High-speed mode on
- **Gone out:** High-speed mode off

▮▮▮▮▶ p. 11 - 115

Side panel



Raise enable after RCL shutdown

For RCL override – version A; ▮▮▮▮▶ p. 9 - 152.

For RCL override – version B; ▮▮▮▮▶ p. 9 - 153.

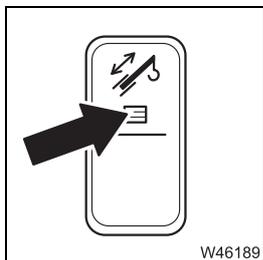
51508035

9.5.20

Telescoping mechanism

Control panels

▣▣▣▣ *Telescoping mechanism*, p. 11 - 91.



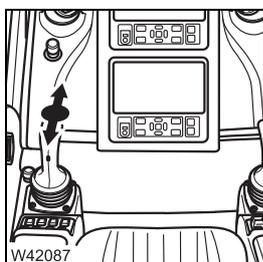
Telescoping mechanism on/off

- **Press once:**
 - Lamp bright – telescoping mechanism on, Power units with the same control lever configuration off
 - Lamp dim – telescoping mechanism off

▣▣▣▣ p. 11 - 100

Control lever

The control lever configuration depends on the version.

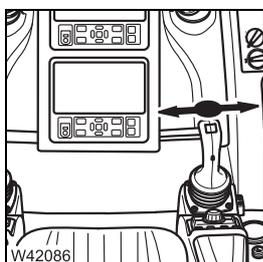


- Version 1

Left control lever

- **Back:** Retract
- **Forwards:** Extend

▣▣▣▣ p. 11 - 100

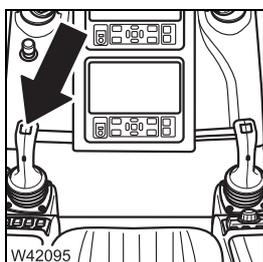


- Version 2

Right control lever

- **To the left:** Retract
- **To the right:** Extend

▣▣▣▣ p. 11 - 100



Derricking gear/telescoping mechanism high-speed mode on/off

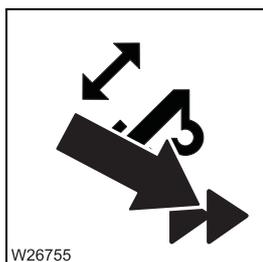
The parking brake is applied.

- **Right:** High-speed mode on, off when released
- **Once to the left:** Continuous operation high-speed mode on
- **Once to the right or Once to the left:** Continuous operation high-speed mode off

▣▣▣▣ p. 11 - 115



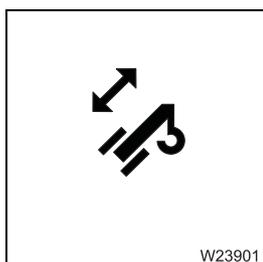
CCS display



Telescoping mechanism high-speed mode monitoring

- **Lights up:** High-speed mode on
- **Gone out:** High-speed mode off

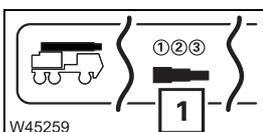
▮▮▮ p. 11 - 115



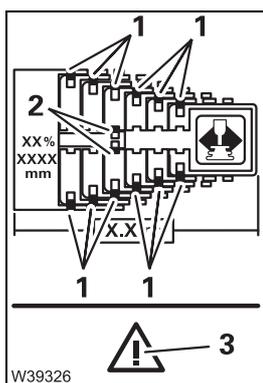
Power units display

- **Green:** Telescoping mechanism on
- **Orange:** Telescoping mechanism off

Semi-automatic telescoping menu



- **Open:** Select and confirm symbol (1)



Telescope diagram display

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

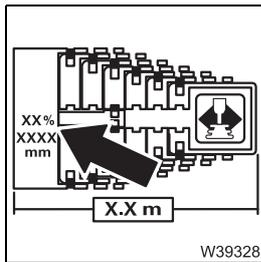
Locking pin

- 1 On the telescopic section
- 2 On the telescoping cylinder
- 3 Error

▮▮▮ p. 11 - 104

Display 1 and 2

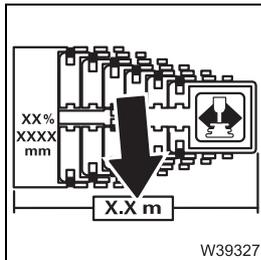
- **Green:** Locked
- **Yellow:** Intermediate position
- **Red:** Unlocked



Telescoping cylinder length display

- **Display:** Current extended length of the telescoping cylinder
- **Unit of measurement:** Displayed in percent (%) and, depending on setting, mm (millimetres) or ft (feet)

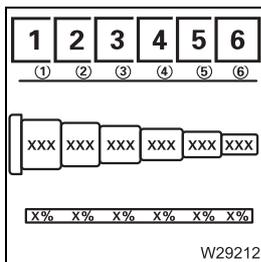
▣▣▣▣ p. 11 - 112



Main boom length display

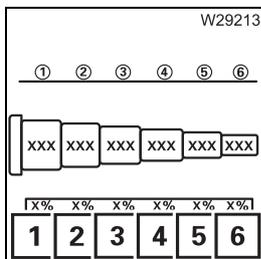
- **Display:** Current extended length of the main boom
- **Unit of measurement:** Displayed depending on setting, in m (meters) or ft (feet)

▣▣▣▣ p. 11 - 112



Telescopic sections display

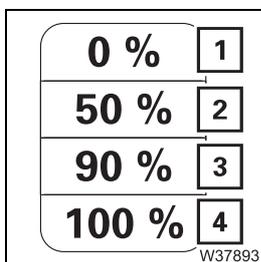
1 - 6 Display of telescopic sections 1 to 6



Current telescoping display

Extended length of the telescopic sections in percent

1 - 6 Display of telescopic sections 1 to 6

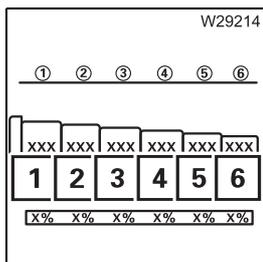


Pre-selection for all telescopic sections

- 1** Telescope status 0% pre-selection
- 2** Telescope status 50% pre-selection – 47% to 56% depending on telescopic section
- 3** Telescope status 90% pre-selection – 89% to 92% depending on telescopic section
- 4** Telescope status 100% pre-selection

Overview of the fixed lengths; ▣▣▣▣ p. 14 - 38





Pre-selection for individual telescopic sections

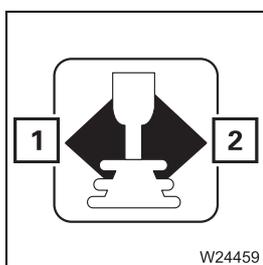
1 - 6 Display of telescopic sections 1 to 6



Confirming pre-selection

- 1 Confirm pre-selected telescoping
- 2 Telescoping permitted display
- 3 Telescoping not permitted display

▣▣▣▣ p. 11 - 112

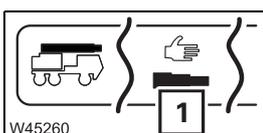


Teleautomation direction display

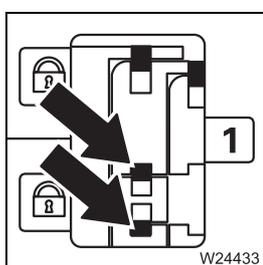
- 1 Start fully automatic telescoping with *Retract*
- 2 Start fully automatic telescoping with *Extend*

▣▣▣▣ p. 11 - 112

Manual telescoping menu



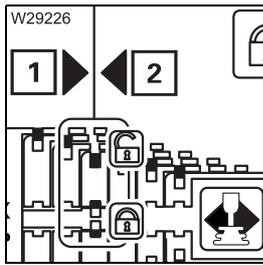
– Open: Select and confirm symbol (1)



Telescoping cylinder locked/released

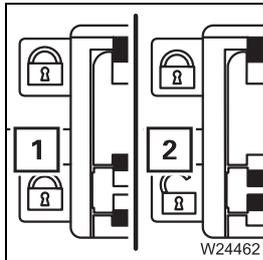
- Display **Yellow:** Locking pins intermediate position
- Green:** Telescoping cylinder locked
- Red:** Telescoping cylinder unlocked

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Locking point display

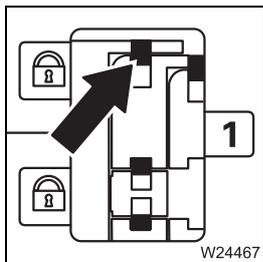
- 1 Extend telescoping cylinder
- 2 Retract telescoping cylinder



Lock/unlock telescoping cylinder

- **To lock:** – Telescopic section is locked:
Select symbol (2) and confirm – telescoping cylinder is locked
- **To unlock:** – Telescopic section is locked:
Select symbol (1) and confirm – telescoping cylinder is unlocked

➡ p. 11 - 105

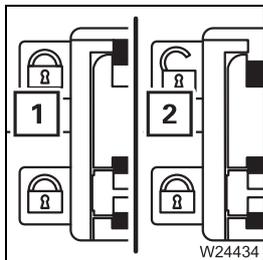


Lock/release telescopic section

- **Display** **Yellow:** Locking pins intermediate position
- Green:** Telescopic section locked
- Red:** Telescopic section unlocked

- **To lock:** – The telescoping cylinder is locked:
Select symbol (2) and confirm – telescopic section is locked
- **To unlock:** – The telescoping cylinder is locked:
Select symbol (1) and confirm – telescopic section is unlocked

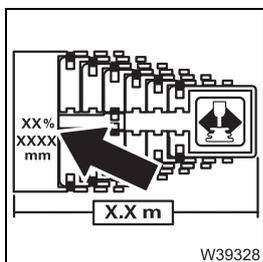
➡ p. 11 - 109

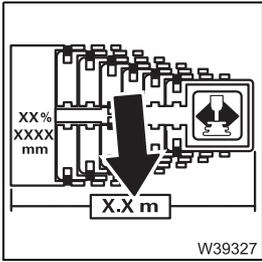


Telescoping cylinder length display

- **Display:** Current extended length of the telescoping cylinder
- **Unit of measurement:** Displayed in percent (%) and, depending on setting, mm (millimetres) or ft (feet)

➡ p. 11 - 103

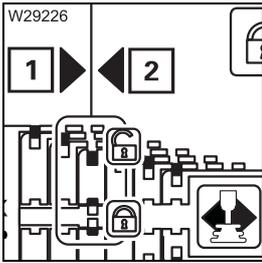




Main boom length display

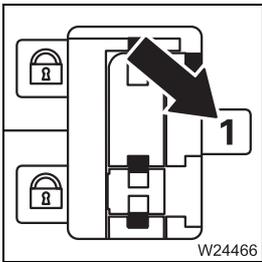
- **Display:** Current extended length of the main boom
- **Unit of measurement:** Displayed depending on setting, in mm (millimetres) or ft (feet)

▶▶▶▶ p. 11 - 103



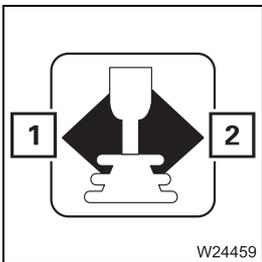
Locking point display

- 1 Extend telescoping cylinder
- 2 Retract telescoping cylinder



Telescoping cylinder in telescopic section display

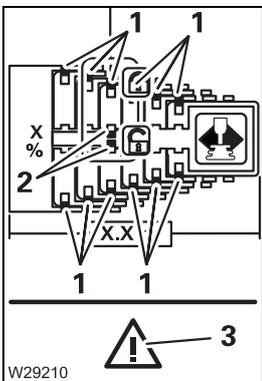
Displayed telescopic section, e.g. telescopic section I



Telescoping direction display

- 1 Start with *Retract*
- 2 Start with *Extend*

▶▶▶▶ p. 11 - 112



Telescope diagram display

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

Locking pin

- 1 On the telescopic section
- 2 On the telescoping cylinder
- 3 Error

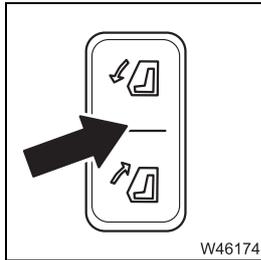
▶▶▶▶ p. 11 - 104

Display 1 and 2

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

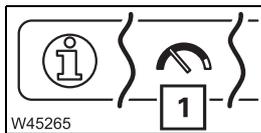
9.5.21

Hydraulic system



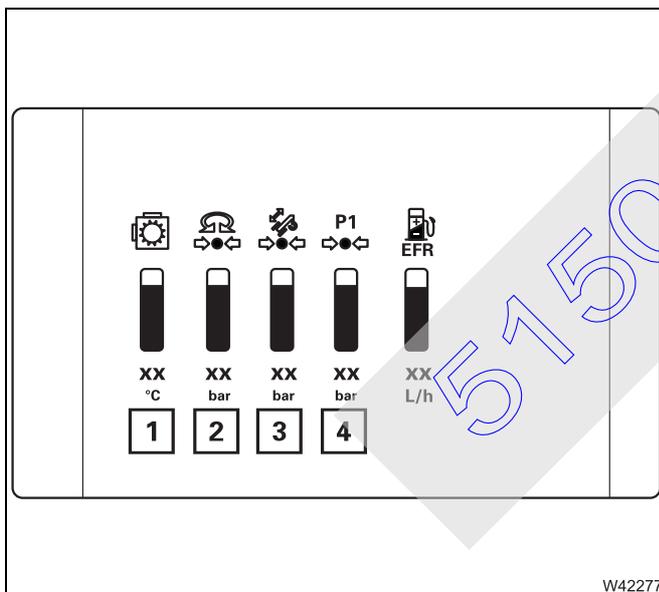
Inclining the crane cab

- **Press at bottom:** Incline to the rear
 - **Press at top:** Incline to the front
- ➡ p. 11 - 125



Hydraulic pressure and fuel consumption menu

- **Open:** Select and confirm symbol (1)

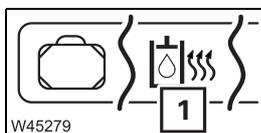


In Information menu

- 1 Angle gear oil temperature

Current pressure in bar for moving:

- 2 Slewing gear
- 3 Telescoping mechanism
- 4 – Hoist
 - Derricking gear
 - Counterweight hoist unit
 - Incline crane cab
 - Locking units

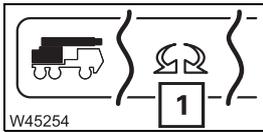


Prewarming hydraulic oil

- **Switch on:** Select symbol (1) and confirm – symbol is **orange**.
 - **Switch off:** Select symbol (1) and confirm – symbol is **grey**
- ➡ p. 11 - 14

9.5.22

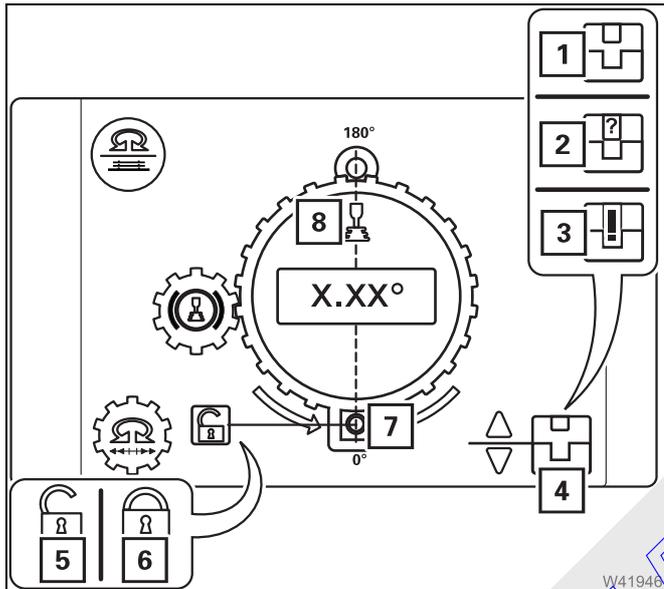
Superstructure lock/houselock menu



– **Open:** Select and confirm symbol (1)

Superstructure lock

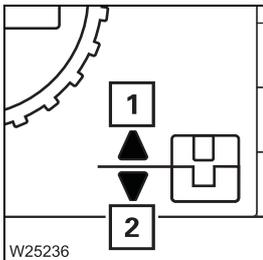
▮▮▮▮ *Locking/unlocking the superstructure*, p. 11 - 15.



Locking status display

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

- 1 and 7** **Red** – unlocked – symbol (8) green
 - 2 and 7** **Yellow** – intermediate position
 - 3 and 7** **Violet** – error
 - 4 and 7** **Green** – locked – symbol (8) hidden and
 - 5** Unlocked
 - 6** Locked
- ▮▮▮▮ p. 11 - 16



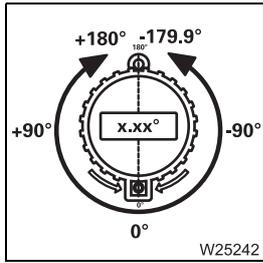
Locking/unlocking the turntable

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

To unlock: Symbol (1) – locking pin is retracted

To lock: Symbol (2) – locking pin is extended

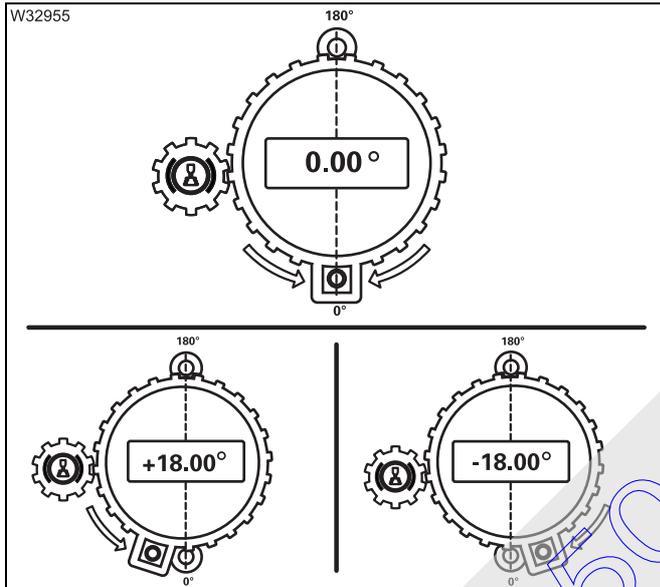
▮▮▮▮ p. 11 - 16



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 clockwise from 0°
- 0.1 to -179.9°:** Turned anti-clockwise from 0°

▣▣▣▣▶ p. 11 - 117



Directional indicator

Current position $\pm 20^\circ$ in front of the locking point.

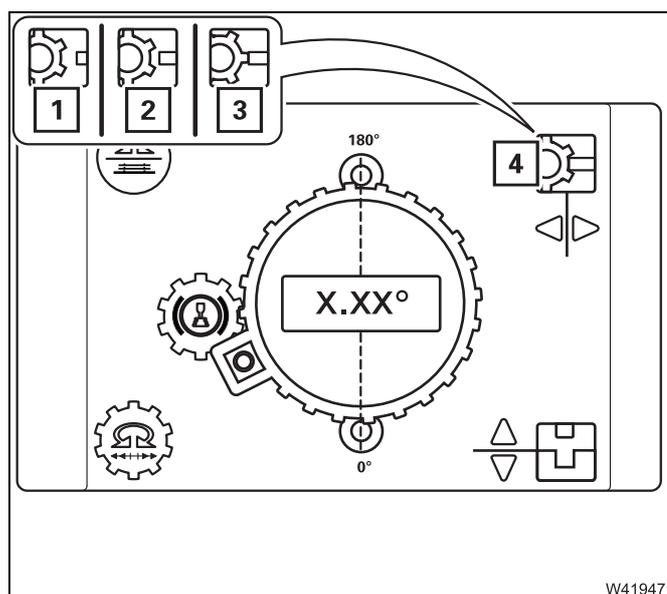
- **Both arrows:** Locking point reached
- **One arrow:** Direction of arrow = turning direction towards the locking point

▣▣▣▣▶ p. 11 - 115



Houselock

Switching the houselock on/off, p. 11 - 17.

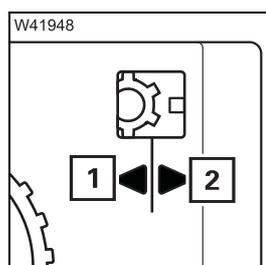


Locking status display

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

- 1 Unlocked
- 2 Intermediate position
- 3 Blocked, locking pin in front of a tooth
- 4 Locked

Switching the houselock on/off, p. 11 - 17



Houselock on/off

Switch on: Symbol (1) – pin is extended

Switch off: Symbol (2) – pin is retracted

Switching the houselock on/off, p. 11 - 17

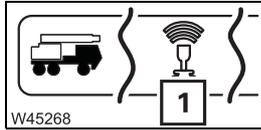
51508035

9.5.23

Remote control

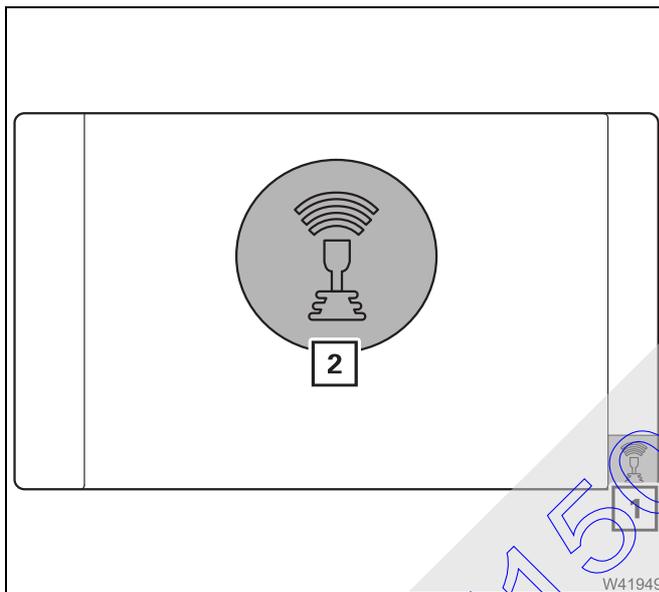


Operation with the remote control is only enabled for the *Standard* slewing range type.



Remote control menu

– **Open:** Select and confirm symbol (1)



Remote control display

1 – Orange:

Remote control connected

1 – Green:

Remote control switched on.
CCS operation from crane cab disabled.
Symbol (2) is shown in green on all menus.

1 – Off:

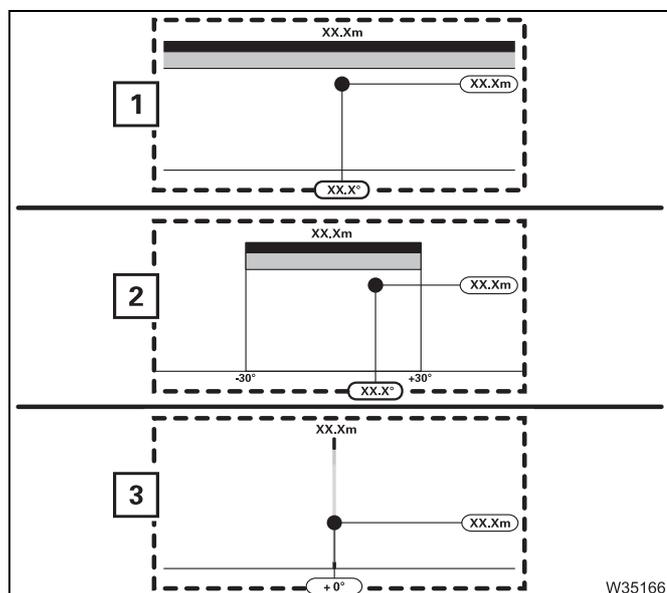
Remote control deactivated

Further information;

▮▮▮▮▮ *Separate operating manual*

9.5.24 Rated capacity limiter (RCL)

CCS display In the Start menu

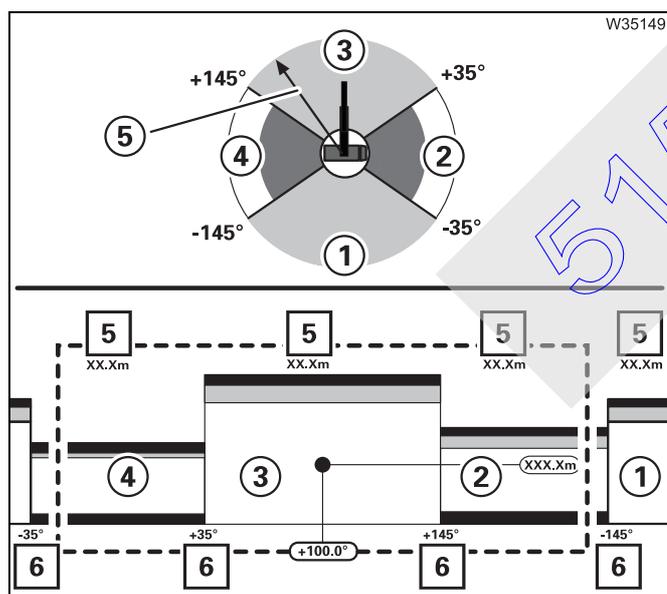


For the *Standard* slewing range type

Only one slewing range is displayed

- 1 360° slewing range
- 2 Limited slewing range, e.g. $\pm 30^\circ$
- 3 Operating position, e.g. 0° to the rear

The displays for working radius, current slewing angle and current position are identical to the displays for the *MAXbase* slewing range type.



For the *MAXbase* slewing range type

- Slewing ranges/working radii display

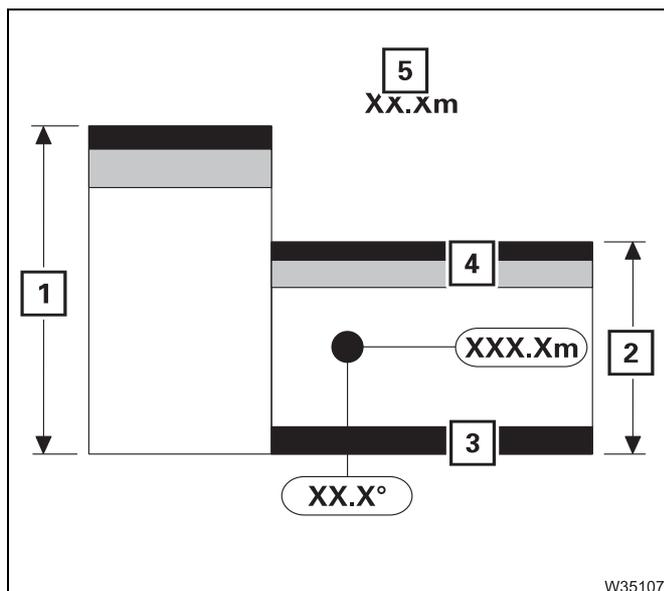
Represents the defined slewing ranges and corresponding maximum permissible working radii ⑤ for the confirmed rigging mode as a diagram.

- Current slewing range divisions display

Shows the currently defined slewing ranges ① to ④ as columns ① to ④. The column width represents the angular range.

- Current slewing range limits display

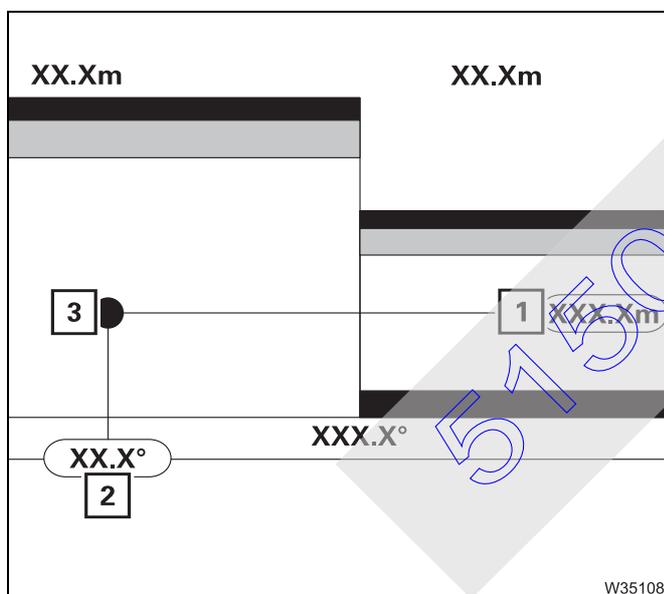
Shows the currently defined slewing range limits (6) in degrees.
 For example $-35^\circ / +35^\circ / +145^\circ / -145^\circ$.



Maximum permissible working radius display

Shows the maximum permissible working radius (5) for each slewing range.

- 1 Display area – always corresponds to the largest maximum working radius (5)
- 2 Maximum permissible working radius in the corresponding slewing range with the currently lifted load
- 3 White – limit range for minimum permissible working radius (display only with active limitation)
- 4 Red/yellow – limit range for maximum permissible working radius



Current working radius display

- 1 Display in the same way as in the *Monitoring* menu; p. 11 - 49.

Current slewing angle display

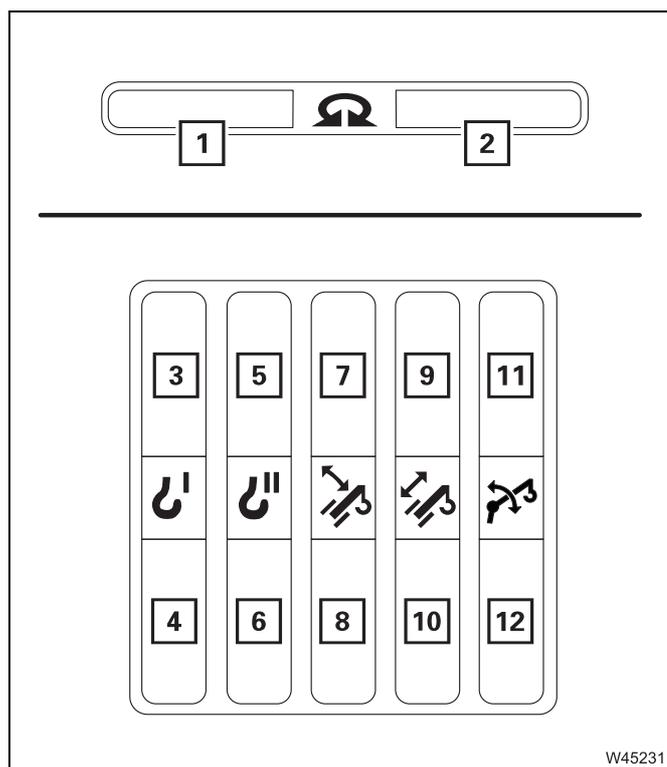
- 2 Display in the same way as in the *Monitoring*; menu p. 11 - 50.

Current position display

- 3 Shows the current position of the boom head in the slewing range and working radius range.

- When slewing
The display (3) remains at the current position. The diagram moves a corresponding distance to the right or left.
 - When telescoping or derricking
The diagram remains at the current position. The display (3) moves a corresponding distance up or down.
- Standard slewing range type*, p. 11 - 53
- MAXbase slewing range type*, p. 11 - 55



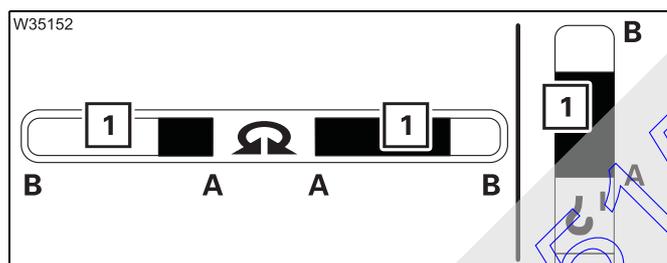


Maximum permissible speed display

Separate displays are provided for each direction of movement.

- 1 Slew anti-clockwise
- 2 Slew clockwise
- 3 Lower main hoist
- 4 Lift main hoist
- 5 Lower auxiliary hoist
- 6 Lift auxiliary hoist
- 7 Lower
- 8 Raise
- 9 Extend
- 10 Retract
- 11 Lower lattice extension
- 12 Raise lattice extension

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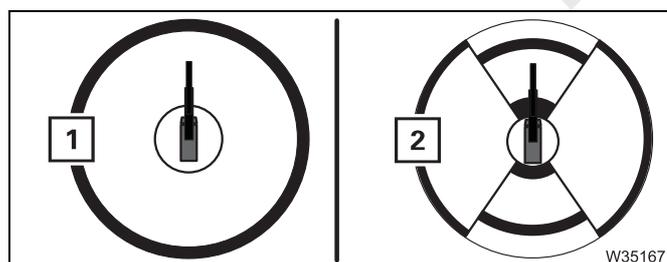


A bar (1) shows the maximum permissible speed scale from 0% (A) to 100% (B).

The colour of the bar (1) changes.

- Red: 0% to 10%
- Yellow: 11% to 25%
- Green: 26% to 100%

On the CCS display, p. 11 - 53



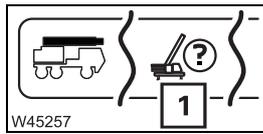
Slewing range display

The function is identical to the display in the *Lifting capacity table* menu.

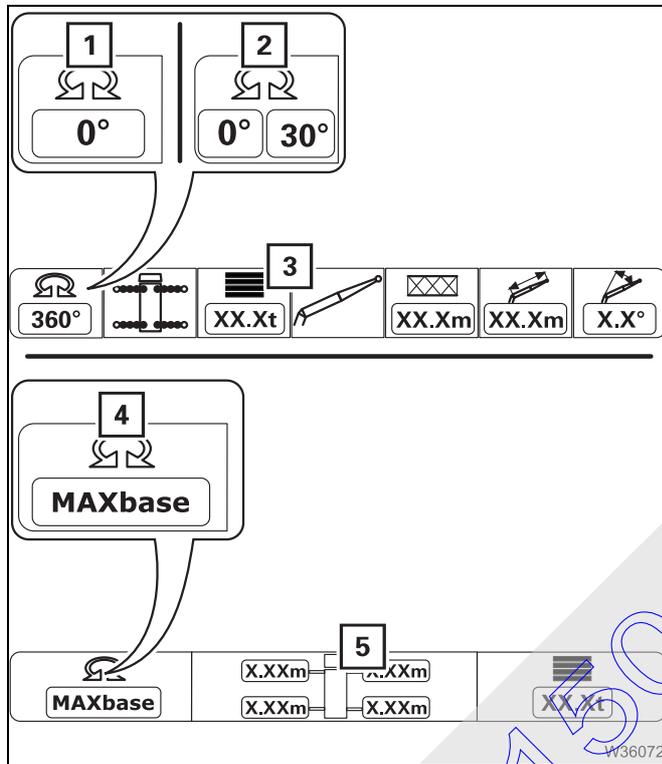
- 1 For *Standard* slewing range type;
 On p. 11 - 60
- 2 For *MAXbase* slewing range type;
 On p. 11 - 62

W35167

In the *Enter rigging mode/telescope status* menu



- **Open:** Select and confirm symbol (1)
- Opens automatically after *ignition on*.



Enter slewing range

In input mode

Select slewing range symbol and confirm

- For the *Standard* slewing range type

- 1 Display for a slewing range of 360° or for operating position¹⁾, e.g. 0° to the front
- 2 Display for limited slewing range, e.g. 0° ± 30°

- After confirmation: Menu display (3)

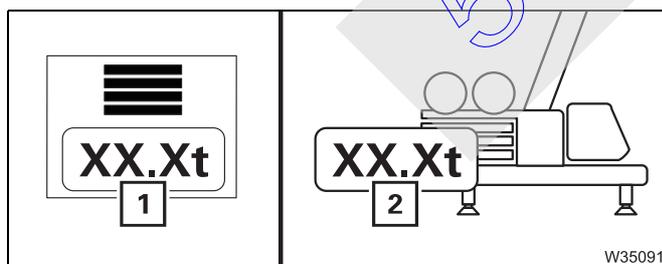
- 1) To accept, switch off the slewing gear

- For the *MAXbase* slewing range type

- 4 MAXbase

- After confirmation: Menu display (5)

Enter the rigging mode, p. 11 - 32



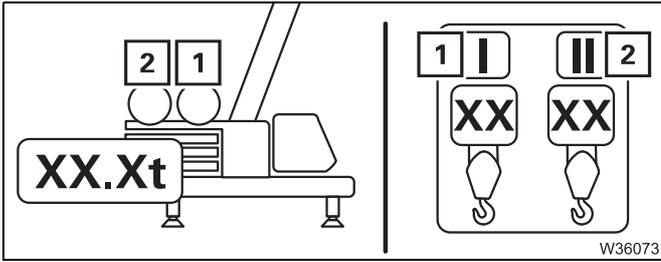
Enter counterweight

Counterweight display

- 1 In input mode – select and confirm counterweight
- 2 Shows the current entry

Enter the rigging mode, p. 11 - 32





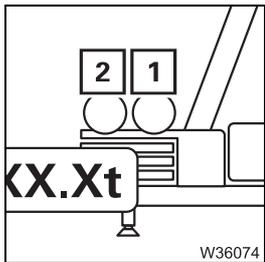
Reeving input mode display

- 1 Main hoist
- 2 Auxiliary hoist

Orange: on

Grey: off

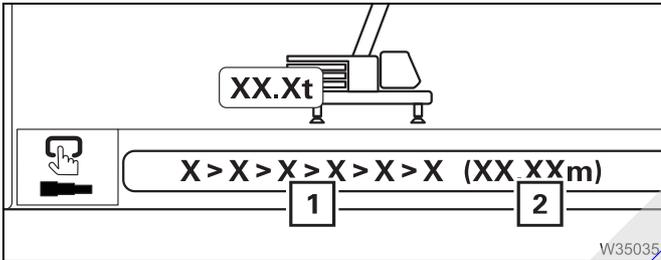
▣▣▣▣ *Entering the rigging mode, p. 11 - 32*



Enter reeving

- 1 Main hoist
In input mode – select and confirm current reeving
- 2 Auxiliary hoist – functions as with (1)

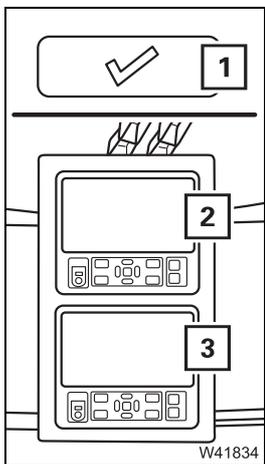
▣▣▣▣ *Entering the rigging mode, p. 11 - 32*



Preselected telescoping display

- 1 Telescope status display in percent (%)
- 2 Preselected main boom length (1) in metres (m) or in feet (ft)

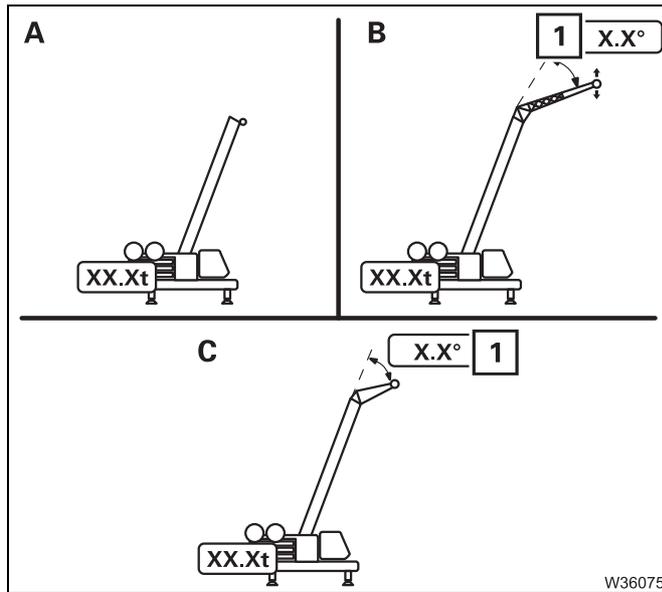
▣▣▣▣ *Entering the rigging mode, p. 11 - 32*



Confirming rigging mode

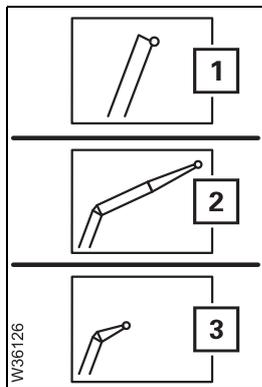
- 1 – **Orange:** Select and confirm
 - Rigging mode and preselected telescope status are applied
 - lifting capacity table is confirmed
 - (2) displayed – *Monitoring* menu on
 - (3) displayed – *Start menu* on
- **Grey:** For MAXbase only – no selection possible
Measured outrigger span ≠ required outrigger span

▣▣▣▣ *Entering the rigging mode, p. 11 - 32*



Boom system display

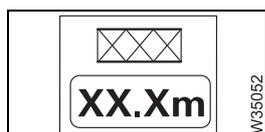
- A Main boom display
- B Lattice extension display
- C Heavy load lattice extension display
- 1 Lattice extension angle display (for inclinable lattice extension)



Enter boom system

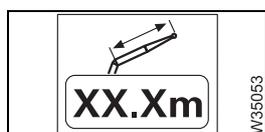
For the *Standard* slewing range type only.
In input mode – select and confirm the boom system

- 1 Main boom
- 2 Lattice extension/boom extension
- 3 Heavy load lattice extension



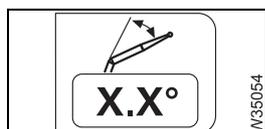
Lattice extension input – Length before the angle

In input mode – select and confirm length.



Input lattice extension – Length after the angle

In input mode – select and confirm length.

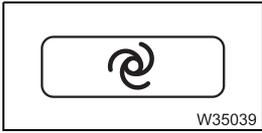


Lattice extension input – Angle

Only for inclinable lattice extensions
In input mode – select and confirm angle.

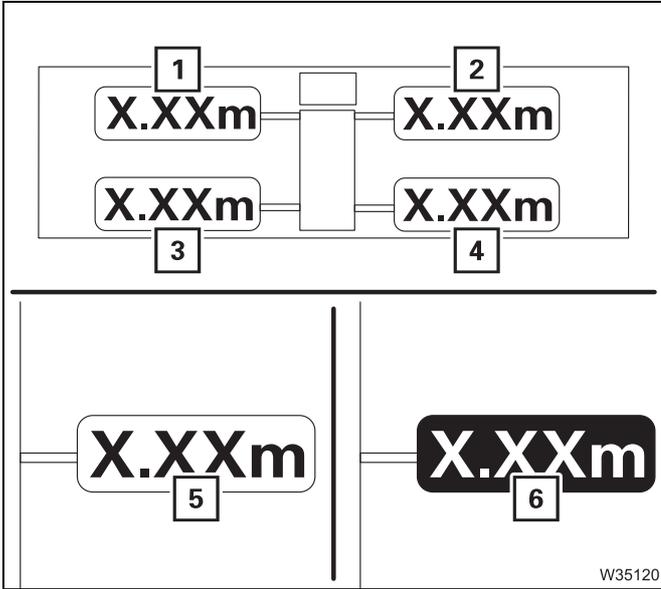
➡ *Entering the rigging mode, p. 11 - 32*





Accept the measured outrigger span

Select and confirm – the outrigger span provided by outrigger span monitoring is applied and shown on the *Enter outrigger span* display; *Confirming the rigging mode and lifting capacity table*, p. 11 - 41.



Enter outrigger span (MAXbase)

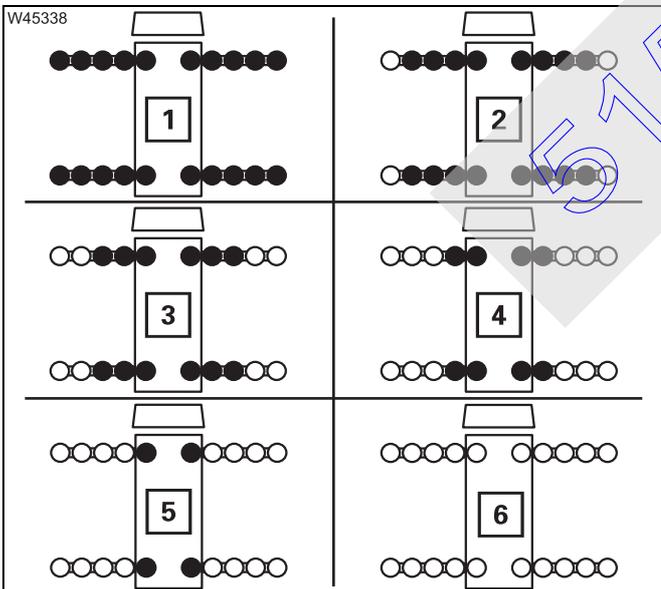
The values are entered individually for outrigger beams (1) to (4).

In input mode – select and confirm individual width.

Outrigger span monitoring display (MAXbase)

- 5 Measured outrigger span = required outrigger span
- 6 Measured outrigger span \neq required outrigger span

Entering the rigging mode, p. 11 - 32



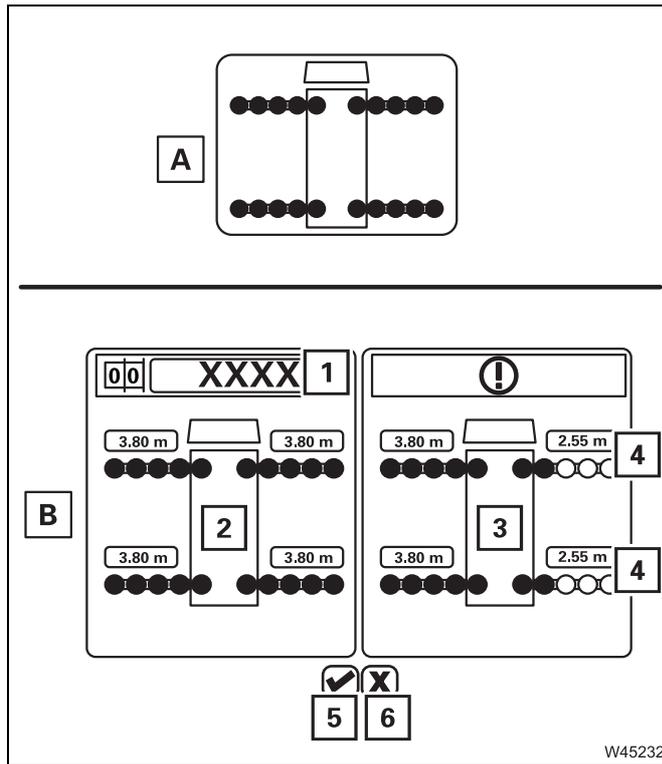
Enter outrigger span (Standard)

The selection is made simultaneously for all outrigger beams – selected outrigger spans are orange.

In input mode – select and confirm outrigger span

- 1 8.030 m x 7.600 m (26.3 ft x 25.0 ft)
- 2 8.030 m x 6.700 m (26.3 ft x 22.0 ft)
- 3 8.030 m x 5.900 m (26.3 ft x 19.4 ft)
- 4 8.030 m x 5.100 m (26.3 ft x 16.8 ft)
- 5 8.030 m x 2.500 m (26.3 ft x 8.2 ft)
- 6 Free on wheels

Entering the rigging mode, p. 11 - 32

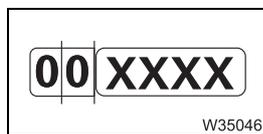


Outrigger span monitoring display (standard)

Query after confirming the rigging mode.

- A** Measured outrigger span = required outrigger span
- B** Measured outrigger span \neq required outrigger span (query menu)
 - 2** Required outrigger span – for RCL code (1)
 - 3** Measured outrigger span
 - 4** Outrigger span not OK for RCL code (1) – red
 - 5** Confirmation
Rigged outrigger span = outrigger span (2),
Enable crane operation
 - 6** Confirmation
Rigged outrigger span \neq outrigger span (2)
Do not enable crane operation

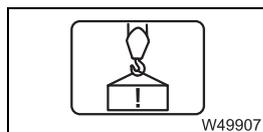
Enter the rigging mode, p. 11 - 32



Enter RCL code

In input mode – select and confirm RCL code.

The corresponding rigging mode is displayed; p. 11 - 40.



Load lifted display

Operating elements for entering the rigging mode locked.

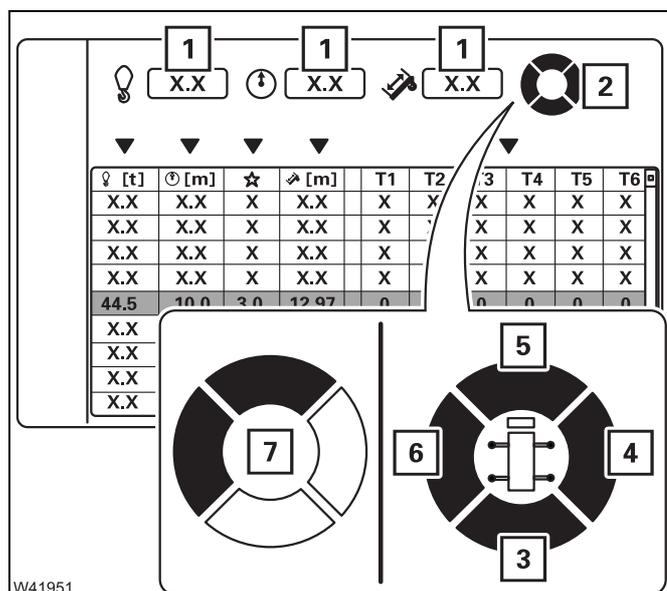
Only the current rigging mode can be confirmed.

Is hidden after the load is set down; p. 11 - 32



In the *Pre-selection of telescoping* menu

▣▣▣▣ *Pre-selecting telescoping*, p. 11 - 40

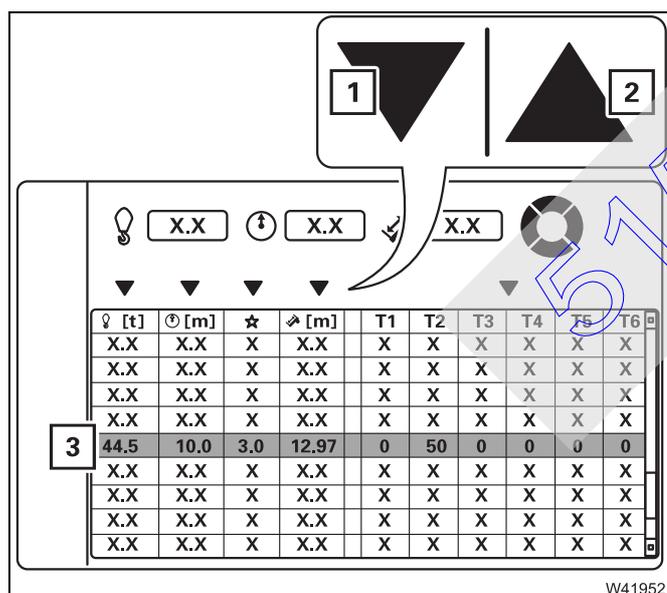


Enter desired parameter

In input mode – select and confirm parameters (1), (2).

- 1 Selection of numerical values
- 2 Selection by marking the segments – marked segments are black
- 3 To the rear
- 4 To the right
- 5 To the front
- 6 To the left
- 7 Example for selecting the slewing range to the front and to the left

The corresponding table is displayed.



Pre-selection telescoping

Sort table by columns – select and confirm the desired symbol.

- 1 Descending sorting
- 2 Ascending sorting

During the telescoping duration, the required telescoping times are compared and provided with values between 1 (shortest time) and 5 (longest time).

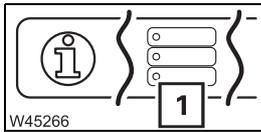
Preselect the telescope status – select and confirm the desired line, e.g. line (3).

- The *Pre-selection telescoping* menu closes
- The *Enter rigging mode/telescope status* menu opens

▣▣▣▣ *Pre-selecting telescoping*, p. 11 - 40

In the *Datalogger* menu

▣▣▣▣ *Datalogger*, p. 11 - 68

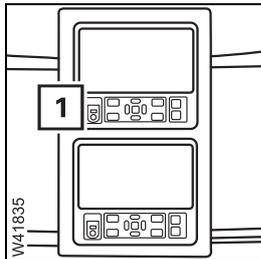


- **Open:** Select and confirm symbol (1)
(Menu opens on the RCL display; ▣▣▣▣ *RCL display*, p. 9 - 151).

RCL display

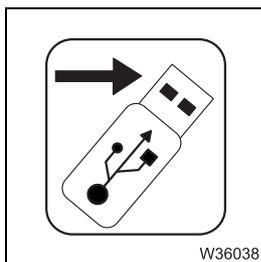
In the *Datalogger* menu

▣▣▣▣ *Datalogger*, p. 11 - 68



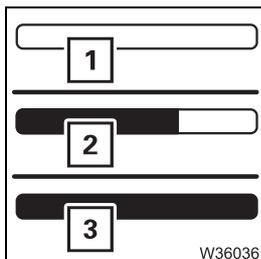
USB connection for data export

- 1 Connect the USB stick – the symbol for export is activated



Export data

Can only be selected when a USB stick is connected to the *RCL* control unit.
Starts data export to the USB stick.



Display of export progress

- 1 0% exported
- 2 75% exported
- 3 100% exported

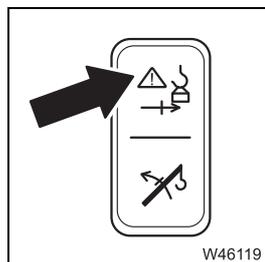
There are no short descriptions for these displays.

- In the *Lifting capacity tables* menu;
▣▣▣▣ *Displaying the lifting capacity tables*, p. 11 - 59
- In the *Monitoring* menu
▣▣▣▣ *Checks before crane operation*, p. 11 - 45,
▣▣▣▣ *Displays during crane operation*, p. 11 - 49.



RCL override – version A

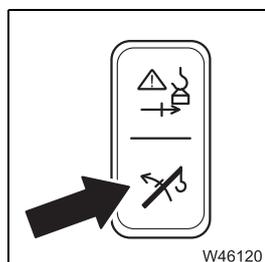
This version only applies to RCL programming according to EN 13000.
For other RCL programming;  p. 9 - 153.



RCL override

- Press once:**
- RCL shutdown overridden – crane functions enabled up to 110% utilisation
 - Crane functions can be started within the next 10 seconds
 - Speed of movements increasing load moment limited to a maximum of 15%

 *RCL override – version A*, p. 11 - 63



Raise enable after RCL shutdown

– Switch on function

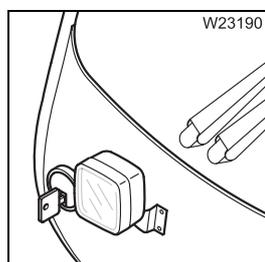
Only active if the current degree of utilisation is higher than 100% – crane movements disabled.

- Press once:**
- Enable the raise function to the permitted working range.
 - If the degree of utilisation is less than 100% – enable disabled crane movements.

– Switch off function

- Degree of utilisation less than 100% Function off automatically.
- Degree of utilisation greater than 100% Press button at the bottom once.

 *RCL override – version A*, p. 11 - 63

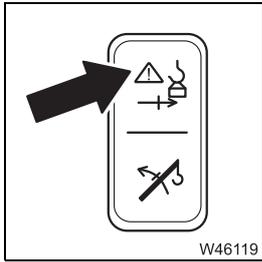


Key-operated switch for overriding the RCL in an emergency

- **Once clockwise or anti-clockwise:** RCL shutdown overridden for 30 minutes – Crane functions enabled;  p. 11 - 66

RCL override – version B

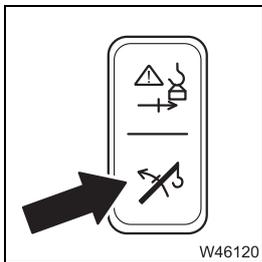
This version only applies to RCL programming deviating from EN 13000. For RCL programming according to EN 13000;  p. 9 - 152.



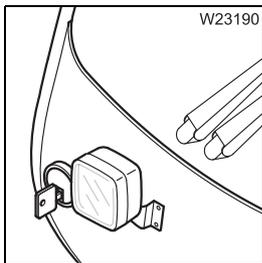
Overriding the RCL in an emergency

- **Press once:** *RCL* shutdown overridden – crane functions enabled
 - Crane functions can be started within the next 10 seconds.
 - Speed of movements increasing load moment limited to a maximum of 15%.

 *RCL override – version B*, p. 11 - 67



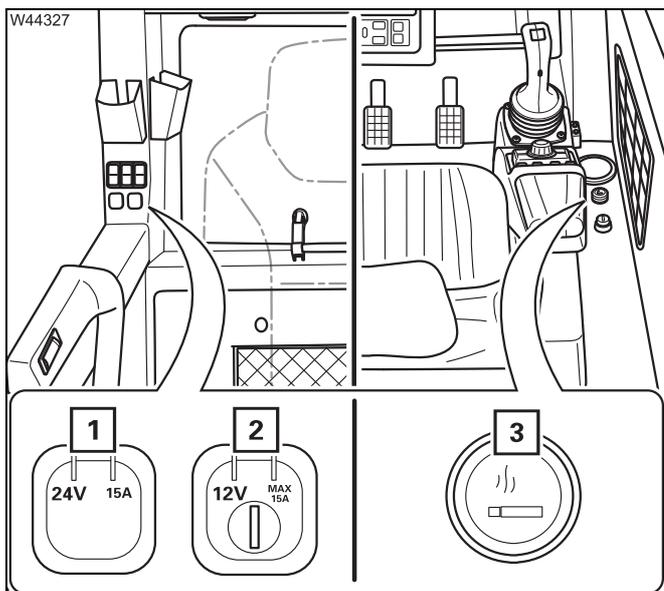
No function



No function

51508035

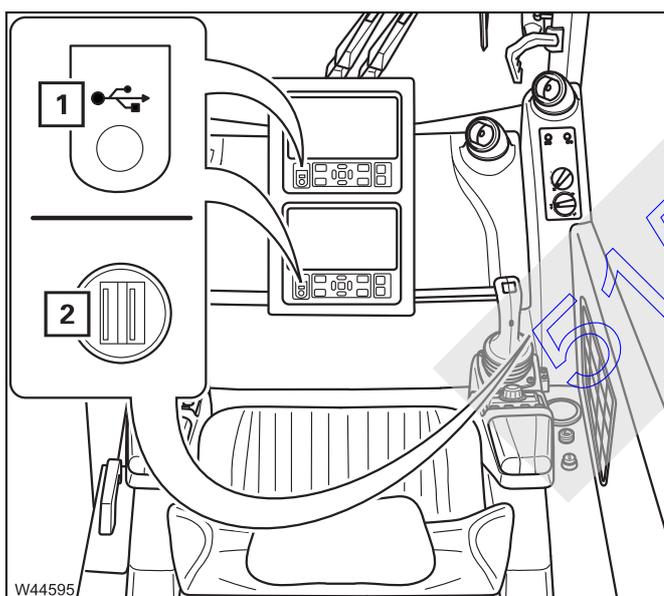
9.5.25 Electrical system



12 V sockets

- 1 12 V/max. 15 A
- 2 24 V/max. 15 A
- 3 Cigarette lighter 24 V/max. 15 A

Only connect electrical devices with the matching specification to the socket.



USB sockets

- 1 Service/diagnostic connection
- 2 USB charging connection (5 V / 2 x 2.5 A)

The connection (1) may only be operated by the service personnel.

The connection (1) is not suitable for external devices, such as mobile phones.



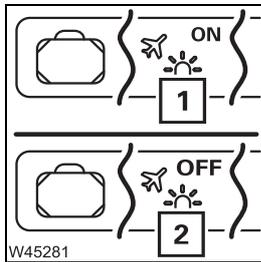
Risk of damage to the crane control!

Do not connect any external devices to the connections (1). This prevents severe malfunctions in the crane control system.

9.5.26

Lighting, windscreen wiper/washing system

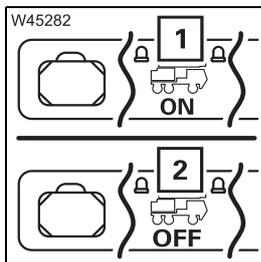
Lighting



Air traffic control light on/off

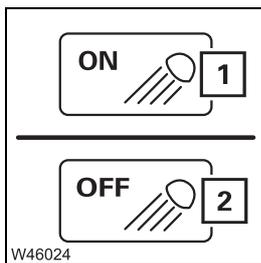
- **Switch on:** Select symbol (2) and confirm – symbol (1) is displayed
- **Switch off:** Select symbol (1) and confirm – symbol (2) is displayed

▶▶▶ p. 12 - 164



Rotating beacons on/off

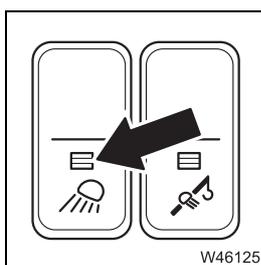
- **Switch on:** Select symbol (2) and confirm – symbol (1) is displayed
- **Switch off:** Select symbol (1) and confirm – symbol (2) is displayed



Outrigger lighting on/off

- **Switch on:** Select symbol (2) and confirm – symbol (1) is displayed
- **Switch off:** Select symbol (1) and confirm – symbol (2) is displayed

▶▶▶ p. 12 - 37

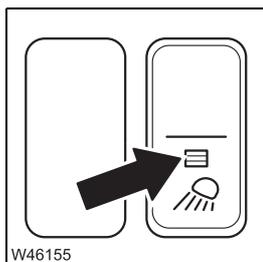


Spotlight I on/off

Headlight at the front of the crane cab

- **Switch on:** Press at the bottom – lamp in the button on
- **Switch off:** Push at the top – lamp in the button off





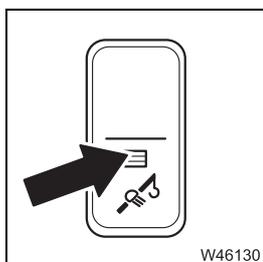
W46155

Spotlight II on/off

Spotlight at the rear on the turntable

Switching on also possible with the ignition switched off.

- **Switch on:** Press at the bottom – lamp in the button on
- **Switch off:** Push at the top – lamp in the button off

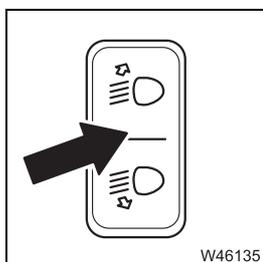


W46130

Slewable spotlight on/off

- **Switch on:** Press at the bottom – lamp in the button on
- **Switch off:** Push at the top – lamp in the button off

➡ p. 11 - 132



W46135

Slew slewable spotlight

- **Down:** Press down
- **Up:** Press up

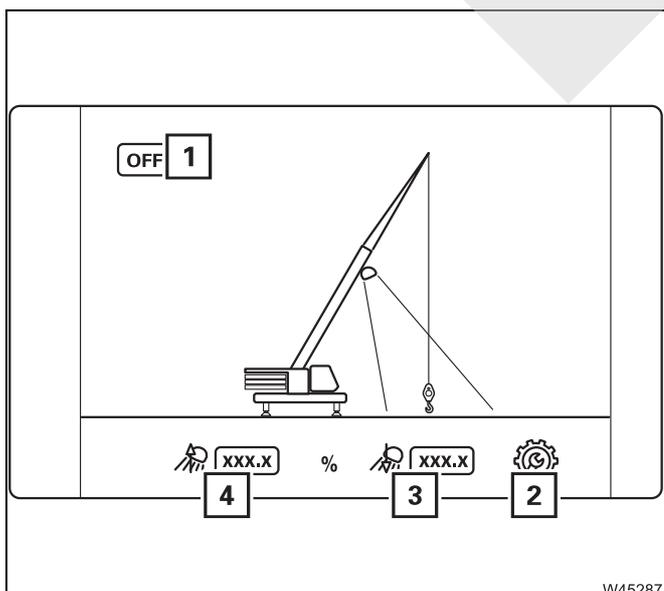
➡ p. 11 - 132



W45269

Slewable spotlights menu

- **Open:** Select and confirm symbol (1)

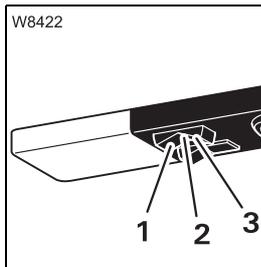


W45287

The spotlights are switched on.

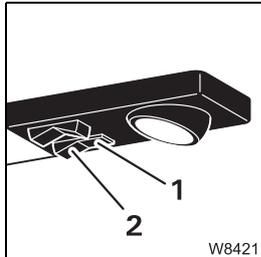
- 1 Switch load tracking on/off
 - 2 Open/close speed submenu
- In the Speed submenu
- 3 Reduce the slewing speed
 - 4 Increase the slewing speed

➡ p. 11 - 133



Cab lighting

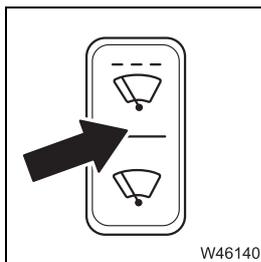
- 1 Switch on continuously
- 2 Switch off continuously
- 3 On/off via door contact



Reading lamp

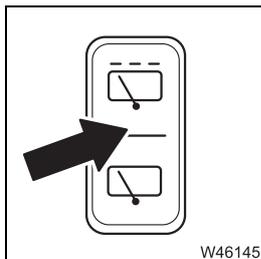
- 1 Switching on
- 2 Switching off

Windscreen wiper/washing system



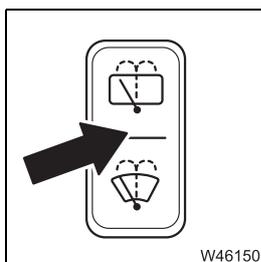
Windscreen wiper on/off

- **Off:** Middle position
- **Interval:** Press at top – wiper moves to end position
- **Continuous operation:** Press at bottom



Roof window wiper on/off

- **Off:** Middle position
- **Interval:** Press at top – wiper moves to end position
- **Continuous operation:** Press at bottom

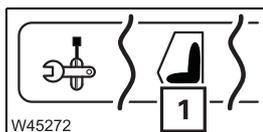


Windscreen washing system

- **Windscreen:** Press down
 - **Skylight:** Press up
- No additional wiping function is performed

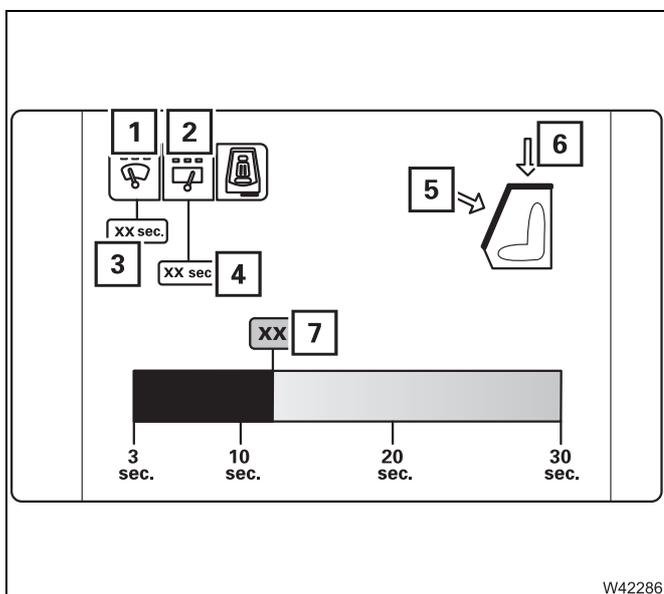
23.03.2022





Crane cab menu

– **Open:** Select and confirm symbol (1)



Adjusting the wiping interval

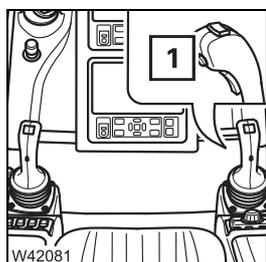
- 1 Windscreen wiper selection, (5) displayed
- 2 Roof window wiper selection, (6) displayed
- 7 Chang interval duration

Wiper interval in seconds for

- 3 Windscreen wiper
- 4 Roof window wiper

▶▶▶ p. 11 - 126

Horn



The ignition is switched on.

1 – **Press:** Superstructure horn on

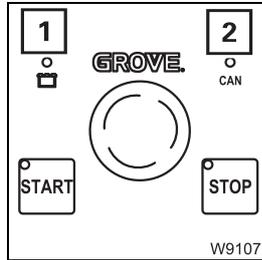
51508035

9.5.27

Hand-held control

Engine control panel

Starting the engine – with the hand-held control, p. 10 - 12

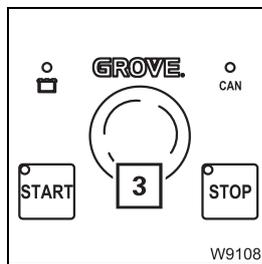


1 Voltage monitoring

- **Lights up:** Ignition on
- **Gone out:** Ignition off

2 CAN monitoring

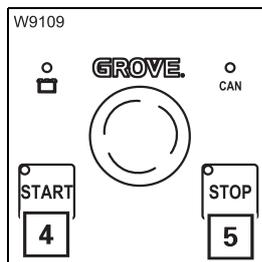
- **Lights up:** Hand-held control connected – no malfunction – goes out after 20 seconds
- **Flashing:** Hand-held control connected – malfunction



3 Emergency stop switch

May only be used in an emergency

- **Press:** Engine off – crane functions stop immediately, Switch engages
- **Turn engaged switch:** Switch returns to initial position – crane functions enabled



4 Engine START

- **Press once:** Engine on

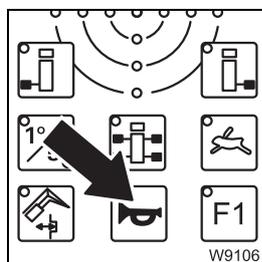
5 Engine STOP

- **Press once:** Engine off

Horn

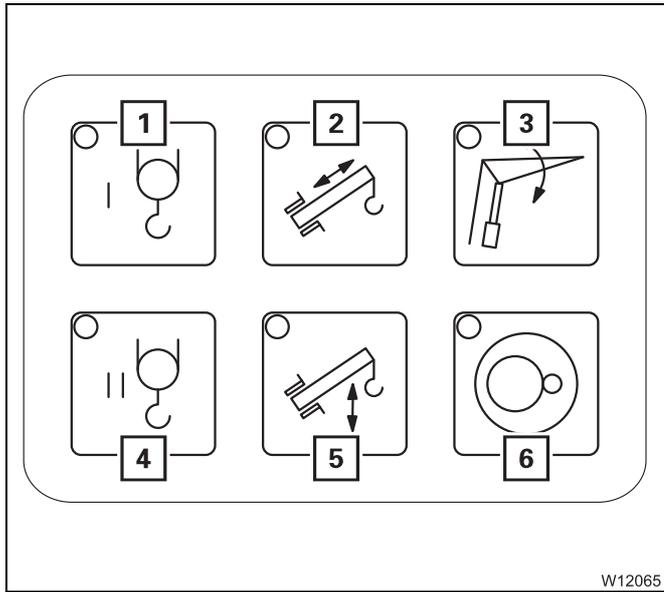
The ignition is switched on.

- **Press:** Hand-held control at superstructure socket – Superstructure horn on



Emergency operation

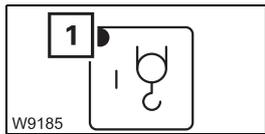
Emergency operation with the hand-held control, p. 14 - 42



Pre-select emergency operation

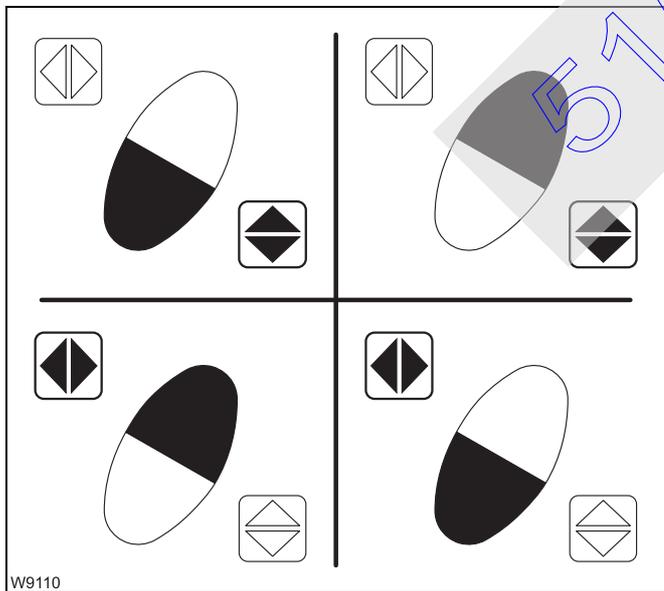
- 1 Main hoist
- 2 Telescoping mechanism
- 3 Lattice extension derricking gear¹⁾
- 4 Auxiliary hoist
- 5 Derricking gear
- 6 Slewing gear

¹⁾ Is also required for rigging work;
 Lattice extension operating manual



The operation is the same for all buttons

– Pre-select: Press button once – lamp (1) lights up – pre-selection on until another pre-selection is made



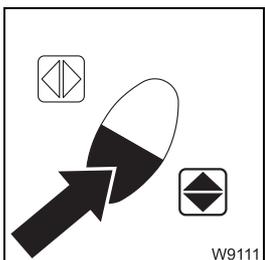
Function buttons

The operations are not monitored by the RCL.

There are four button combinations, pressed buttons are shown in black:

- Pre-selected function on**
Press the required button combination.
- Pre-selected function off**
Release one or both buttons.

Press a non-assigned button combination – pre-selection off.



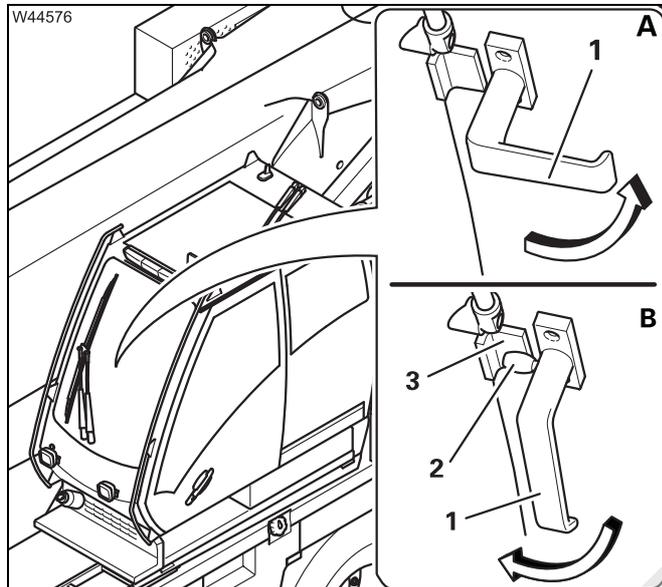
- Faster movement:** Press button more
- Slower movement:** Press button less

9.5.28

Windows and doors

Windows

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



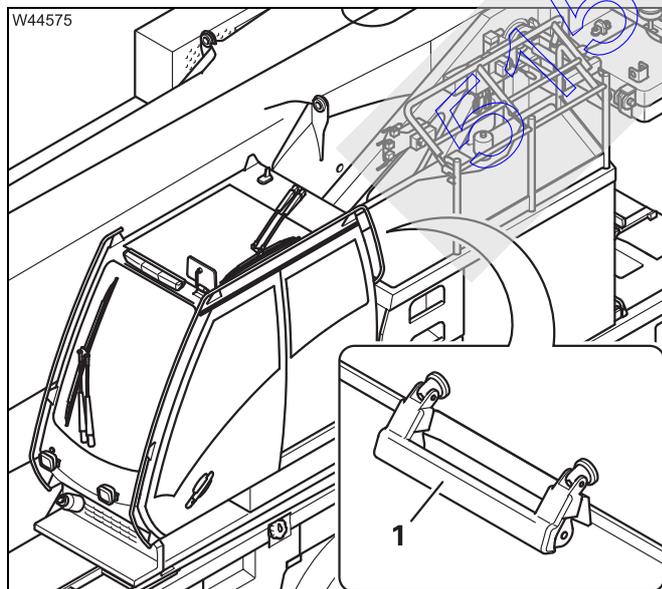
(A) – Open window

- Turn both handles (1) inwards.
- Push the window forwards.

(B) – Close window

- Pull the window closed.
- Turn both handles down – pegs (2) located behind the clamp (3).

Rear window



Open

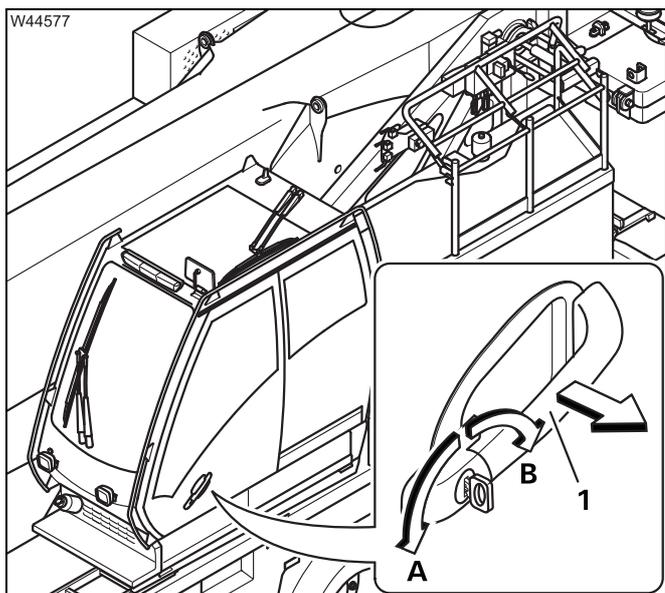
- Raise the handle (1).
- Push window outwards.

Close

- Pull in window.
- Push down the handle (1).



Crane cab door



From outside

Unlock

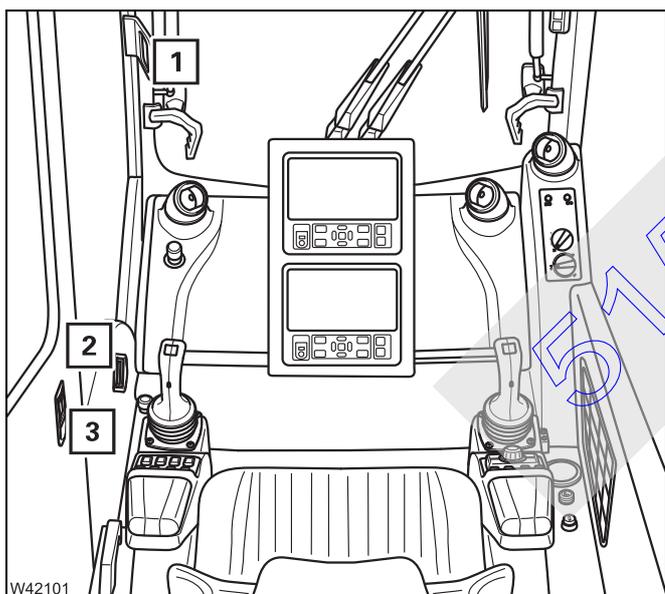
- Turn the key in direction **A**.

Lock

- Turn the key in direction **B**.

Open/close

- Pull the handle (**1**).
- Push the door.



From inside

- Close

Pull release lever (**3**), push door forwards by handle (**1**) – engages.
Locking from inside not possible.

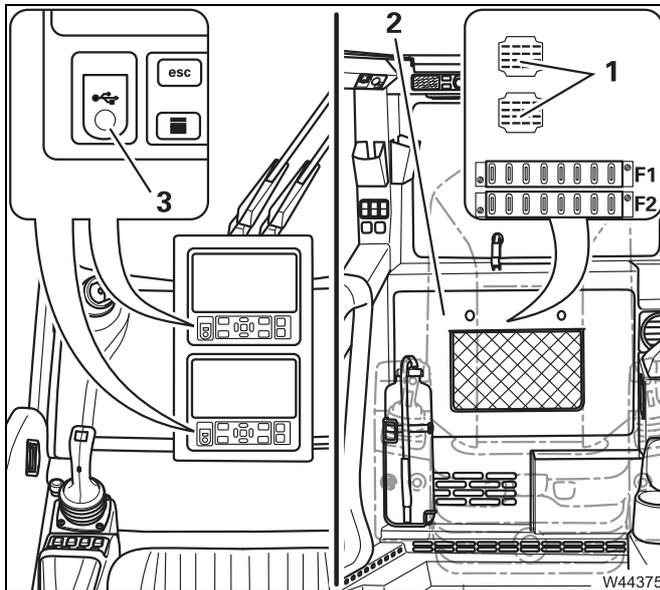
- Open

Pull release lever (**2**), push door back by handle (**1**) – engages.

9.5.29

Diagnostics

The diagnostic connections may only be operated by the service personnel.



The diagnostic connections (1) are behind the cover (2).

Additional diagnostic and service connections are provided on the *CCS* and *RCL* control units (3).

These connections are not suitable for external devices, such as mobile phones.

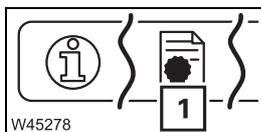


Risk of damage to the crane control!

Do not connect any external devices to the connections (1). This prevents severe malfunctions in the crane control system.

9.5.30

Other



Disclaimer menu

– Open: Select and confirm symbol (1)

Blank page

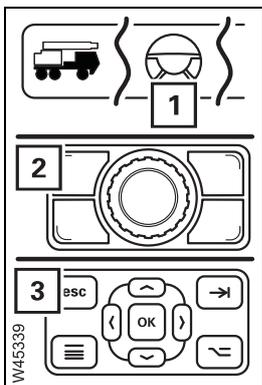
51508035

9.6

Short description of the operating elements – driving from the crane cab

9.6.1

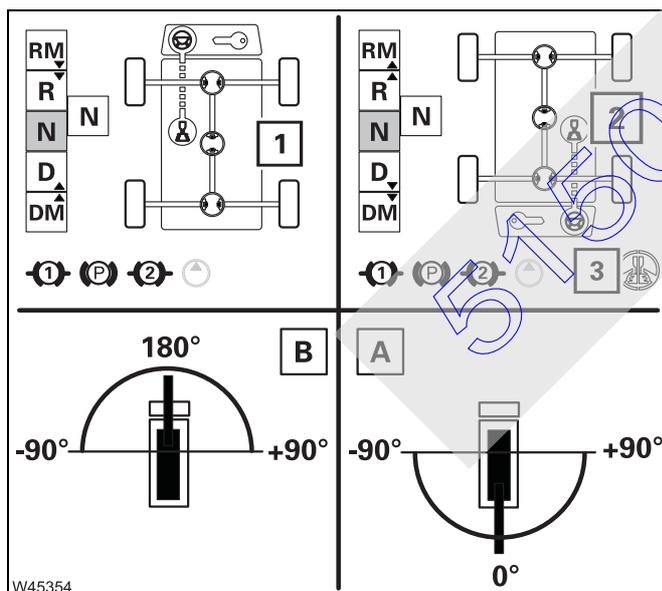
Driving menu



Driving menu

- **Open:** Select symbol (1) and confirm – menu is opened
 The menu is also opened the first time the parking brake is released; p. 9 - 171
 - **Apply:**
 - The parking brake is applied
 - Crane operation is switched on
- Press button (2) or (3) once – menu is closed

p. 13 - 22

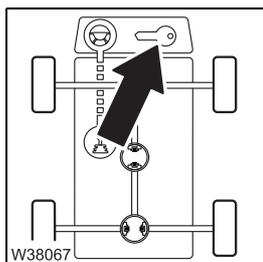


Carrier display

- 1 Display in the front semi-circle (B)
- 2 Display in the rear semi-circle (A) – symbol (3) displayed

p. 13 - 25



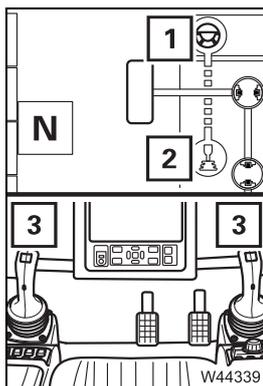


Steering lock display

White: Driver's cab: Ignition key in position **1**
Crane cab: Operating elements for driving active

Red: Driver's cab: Ignition key not in position **1**
Crane cab: Operating elements for driving without function

▣▣▣▣▶ p. 13 - 22



Change-over between crane operation and driving modes

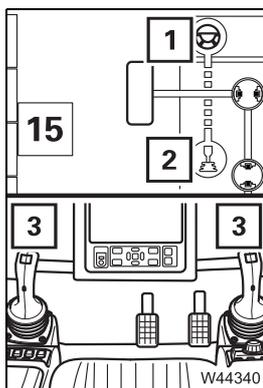
– Switching on driving mode

Crane operation is switched on

Select and confirm symbol **(2)**

- Symbol **(2)** green
- Symbol **(1)** black
- Buttons **(3)** have *Steering* function
- Transmission in neutral position

▣▣▣▣▶ *Selecting the operating mode*, p. 13 - 22



– Switching on crane operation

Driving mode must be switched on

Select and confirm symbol **(2)**

- Symbol **(2)** white
- Symbol **(1)** green
- Buttons **(3)** have *High-speed mode* function
- Transmission in gear 15

▣▣▣▣▶ *Selecting the operating mode*, p. 13 - 22

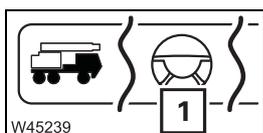
9.6.2

Transmission

Operating the transmission when driving with rigged truck crane;
 ■■■► *Operating the transmission*, p. 13 - 31.

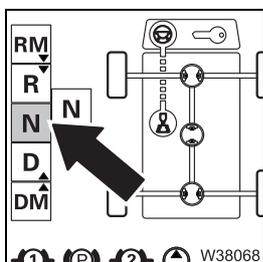
The following applies to all operating elements:

- Driving mode is switched on
- The *Service brake* pedal is pressed,
- The truck crane is stationary.



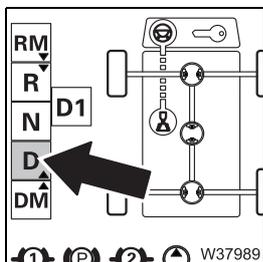
Driving menu

- **Open:** Select and confirm symbol (1)



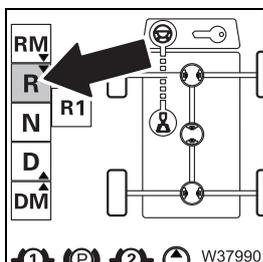
Neutral position N

- **Switch on:** Select and confirm symbol – letter is **white** – no gear selected
- **Switch off:** Shift to a different gear – letter is **blue**



Transmission mode D

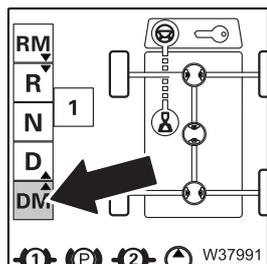
- **Switch on:** Select and confirm symbol – letter is **white** – Forward starting gear on
- **Switch off:** Shift to a different gear – letter is **blue**



Transmission mode R

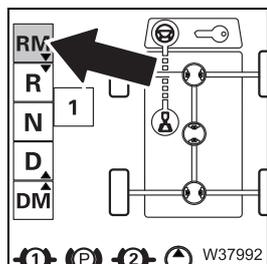
- **Switch on:** Select and confirm symbol – letter is **white** – Reverse starting gear on
- **Switch off:** Shift to a different gear – letter is **blue**





Transmission mode DM

- **Switch on:** Select and confirm symbol – letter is **white**
 - Gear 1 forwards on – transmission does not shift
- **Switch off:** Shift to a different gear – letter is **blue**

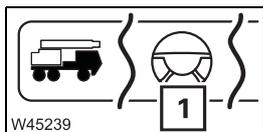


Transmission mode RM

- **Switch on:** Select and confirm symbol – letter is **white**
 - Gear 1 reverse on – transmission does not shift
- **Switch off:** Shift to a different gear – letter is **blue**

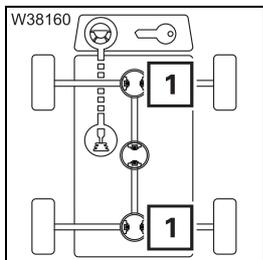
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9.6.3 Final drive



Driving menu

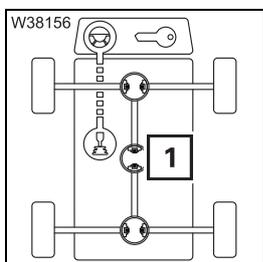
- **Open:** Select and confirm symbol (1)



Transverse differential locks on/off

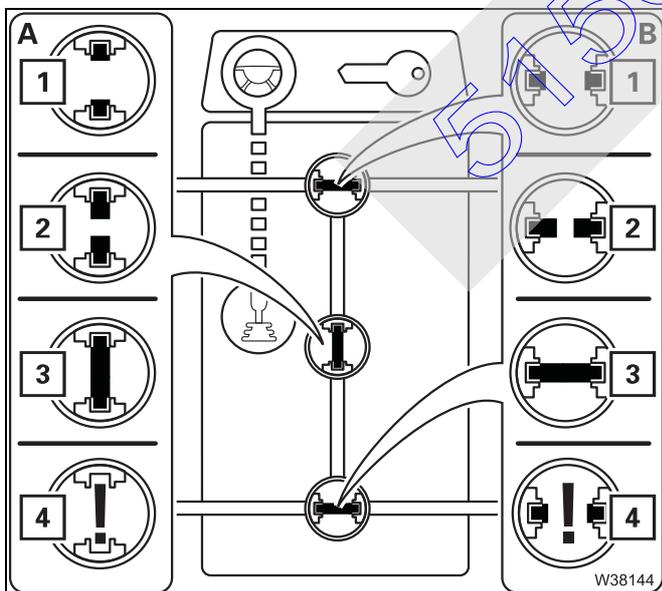
- **Switch on:** Select symbol (1) and confirm – symbol is **red**
- **Switch off:** Select symbol (1) and confirm – symbol is **green**

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



Longitudinal differential lock on/off

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



(A) – Longitudinal differential lock display

(B) – Transverse differential lock display

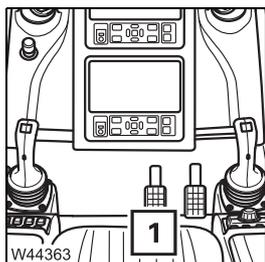
The current status is shown using different symbols:

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

➡ p. 13 - 33

9.6.4

Brakes



Service brake

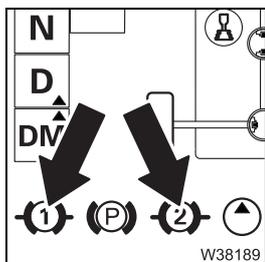
The pedal (1) acts on the carrier brakes – for continuously variable adjustment of the braking force.

CCS display



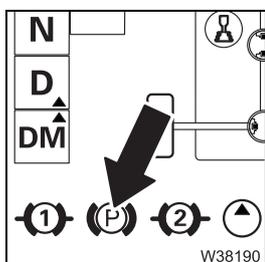
Driving menu

- **Open:** Select and confirm symbol (1)



Supply pressure brake circuits 1 and 2 display

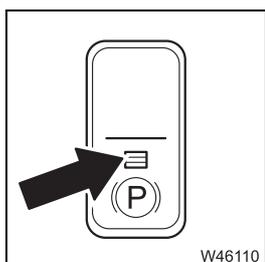
- **Red:** Supply pressure less than about 5 bar
- **Green:** Supply pressure higher than 5.5 bar



Parking brake indicator lamp

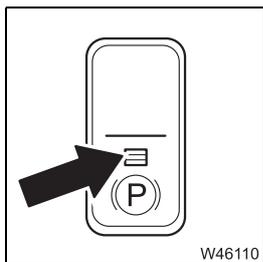
- **Red:** Parking brake applied
- **Grey:** Parking brake released

Side panel from above



Parking brake indicator lamp

- **Lights up:** Parking brake applied
- **Gone out:** Parking brake released



Applying/releasing the parking brake

- **Apply:**
 - Press once at the bottom – the lamp lights up, Parking brake applied
 - ▣▣▣▣ *After driving*, p. 13 - 35
- **Release:**
 - **Releasing for the first time after ignition on**
 - Press once at the top – the *Driving* menu opens
 - Apply the service brake
 - Wait for about 5 seconds
 - Press once at the top – the lamp goes out, Parking brake released

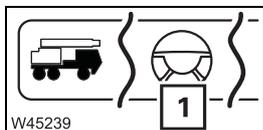
After the first enable

- Apply the service brake
- Press once at the top – the lamp goes out, Parking brake released
- ▣▣▣▣ *Releasing*, p. 13 - 21

9.6.5

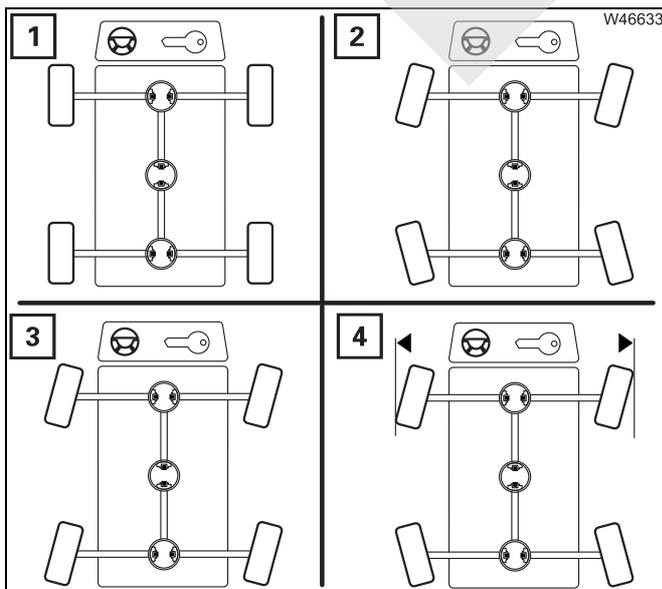
Steering

CCS display



Driving menu

- **Open:** Select and confirm symbol (1)



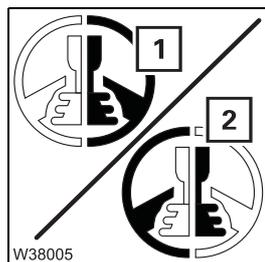
Current wheel position display

- 1 Straight ahead
- 2 Driving around corners
- 3 Crab travel mode
- 4 End position reached – e.g. when driving around corners

▣▣▣▣ p. 13 - 26



CCS display



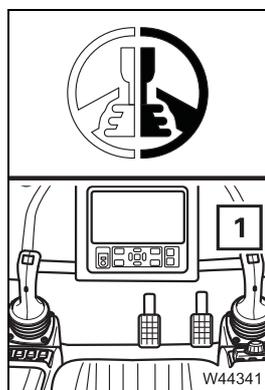
Changing the steering direction

Steering direction display

- 1 *Steering wheel* steering direction
- 2 *Reverse* steering direction (compared to steering wheel)

Switch over:

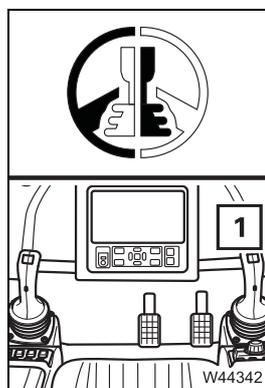
- to *Steering wheel*: Select symbol (2) and confirm – symbol (1) is displayed
- to *Reversed*: Select symbol (1) and confirm – symbol (2) is displayed



– *Steering wheel* steering direction

Function

- Press button (1) to the right = wheels turn to the right – steering wheel turns to the right
- Press button (1) to the left = wheels turn to the left – steering wheel turns to the left



– *Reversed* steering direction

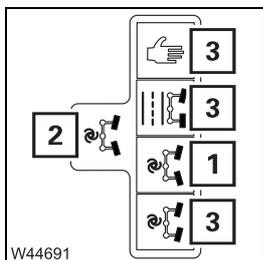
Function

- Press button (1) to the right = wheels turn to the left – steering wheel turns to the left
- Press button (1) to the left = wheels turn to the right – steering wheel turns to the right

▣► *Changing the steering direction*, p. 13 - 26

Switching steering modes on and off

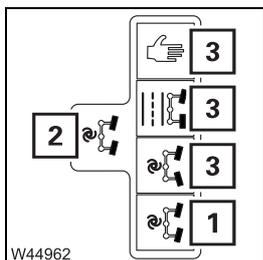
The selected symbol must be confirmed within 2 seconds, otherwise the steering mode remains unchanged.



Automatic separate steering for driving around corners on/off

- **Switch on:** Select symbol (1) and confirm – symbol (2) is displayed
- **Switch off:** Select a different steering mode – symbol (3)

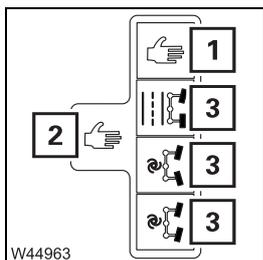
▶▶▶ p. 13 - 27



Automatic separate steering crab travel mode on/off

- **Switch on:** Select symbol (1) and confirm – symbol (2) is displayed
- **Switch off:** Select a different steering mode – symbol (3)

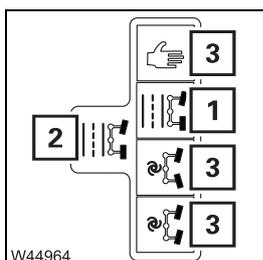
▶▶▶ p. 13 - 27



Manual separate steering on/off

- **Switch on:** Select symbol (1) and confirm – symbol (2) is displayed
- **Switch off:** Select a different steering mode – symbol (3)

▶▶▶ p. 13 - 27

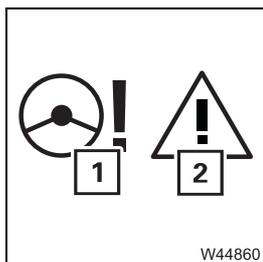


Normal steering mode / on-road driving on/off

- **Switch on:** Select symbol (1) and confirm – symbol (2) is displayed
- **Switch off:** Select a different steering mode – symbol (3)

▶▶▶ p. 13 - 30



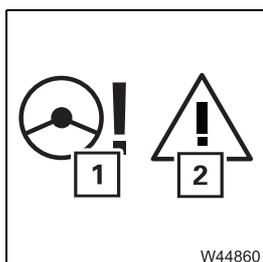


Steering malfunction

(1) symbol displayed and symbol (2) **yellow**.

- Displayed only briefly and goes out again
Continued driving possible, error was saved
- Continuous display
3rd and/or 4th axle only in the straight ahead position,
Continued driving possible, error was saved

▣▣▣▣▶ *Steering malfunction*, p. 8 - 5.



Steering system warning

(1) symbol displayed and symbol (2) **red**.

- Steering system faulty!
- 3rd and/or 4th axle cannot be steered
- Stopping while taking the traffic situation into account
- Repair required

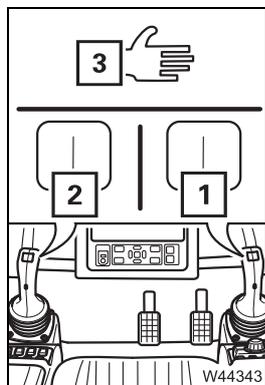
▣▣▣▣▶ *Steering malfunction*, p. 8 - 5.

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Control panels



The information in this section is based on the set *Steering wheel* steering direction.



Steering with separate steering – manual

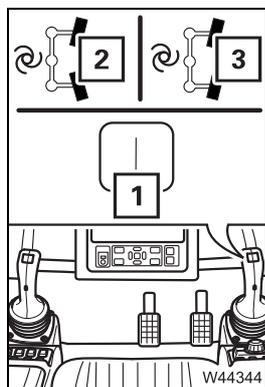
The symbol (3) is displayed.

Steer 1st and 2nd axle lines with the button (1).

Press and hold button (2)

- **To the left:** 3rd to 5th axle lines – turn to the left
- **To the right:** 3rd to 5th axle lines – turn to the right

▣▣▣▣ p. 13 - 29



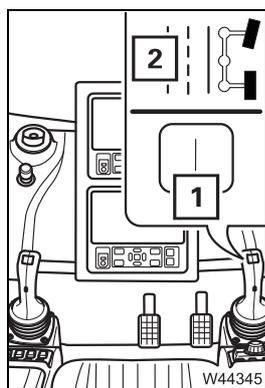
Steering with separate steering – automatic driving around corners/crab travel mode

Symbol (2) or (3) is displayed.

Press and hold button (1)

- **To the left:**
 - 1st and 2nd axle lines – turn to the left
 - 3rd to 5th axle lines – the matching steering angle for steering mode
- **To the right:**
 - 1st and 2nd axle lines – turn to the right
 - 3rd to 5th axle lines – the matching steering angle for steering mode

▣▣▣▣ p. 13 - 28



Steering in normal steering mode

The symbol (2) is displayed.

Steer 1st and 2nd axle lines with the button (1).

- **To the left:**
 - 1st and 2nd axle lines – turn to the left
 - 3rd to 5th axle lines – the matching steering angle for the corner
- **To the right:**
 - 1st and 2nd axle lines – turn to the right
 - 3rd to 5th axle lines – the matching steering angle for the corner

▣▣▣▣ p. 13 - 30

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10

Starting/switching off the engine – for crane operation



This chapter describes how to start the engine / switch it off from within the crane cab and using the hand-held control.

For starting the engine / switching it off from within the driver's cab and at the outrigger control units;  *Starting the engine / switching it off – for driving*, p. 4 - 1.



Risk of fire!

Starting and running an engine can cause sparks which can start fires in dry vegetation nearby. A spark arrestor for the exhaust system may be required. The crane operator/crane driver must contact the local fire protection authorities for the applicable laws and regulations on fire protection requirements.



Risk of injury from diesel engine exhaust!

The State of California is aware that inhaling diesel engine exhaust can cause cancer. Diesel engine exhaust can also cause birth defects or other reproductive harm. Do not run the engine in an enclosed area. Do not idle the engine except as necessary. Ensure that there is sufficient fresh air supply and do not breathe in the diesel engine exhaust. Do not modify or tamper with the exhaust system.

For more information go to www.P65warnings.ca.gov/diesel.

You can also scan the following QR code.



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

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

The procedure depends on whether you:

- Start the (cold) engine for the first time in the day; ■■■▶ p. 10 - 3,
- Start the engine from the crane cab; ■■■▶ p. 10 - 4,
- Start the engine with the hand-held control; ■■■▶ p. 10 - 12.



For Euromot 5 VO engine emissions: Please note that crane operation is not possible while the exhaust system is being cleaned. Always check the status of the exhaust system and always initiate required exhaust cleaning before starting crane operation; ■■■▶ *Cleaning the exhaust system*, p. 5 - 64.

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10.1

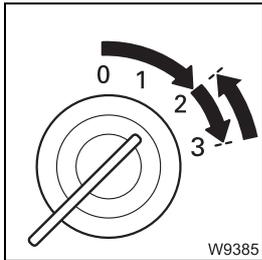
When starting the engine for the first time in the day



Risk of crushing due to turning wheels!

When you start the engine, no persons may be within the steering range of the 3rd to 5th axle lines. These axle lines can be briefly steered during the start of the engine; sometimes with a delay of five seconds.

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

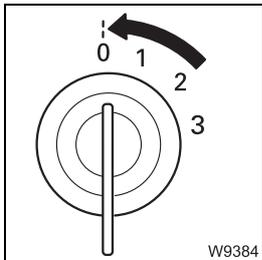


- Carry out all the required tasks and checks for starting the engine;

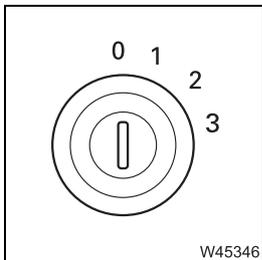
▣▣▣▣ *CHECKLIST: Starting the engine*, p. 4 - 3.

- Start the engine from the driver's cab and perform all the necessary checks;

▣▣▣▣ *Checks after starting the engine*, p. 4 - 15.

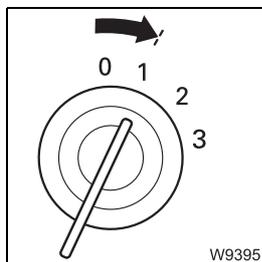


- Switch off the engine and switch off the ignition.



When not driving from the crane cab:

- Remove the ignition key.



If you want to drive from the crane cab:

- Turn the ignition key to position 1.

Driving from the crane cab is enabled and the steering lock is prevented from engaging while driving; ▣▣▣▣ *Preparing to drive*, p. 13 - 20.



Lock the driver's cab for protection against unauthorised use.

10.2

Starting the engine – from the crane cab

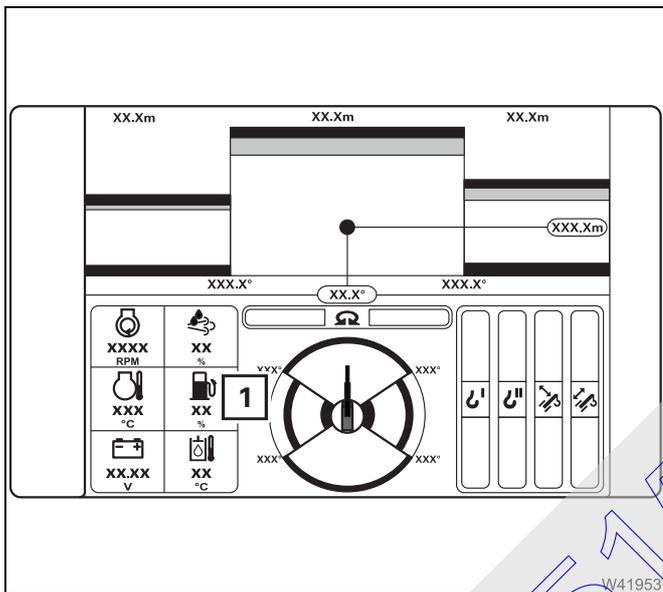
10.2.1

Checking the fuel level and AdBlue (DEF) level

- Check the fuel level, and the AdBlue (DEF) level if necessary, before starting the engine.

After switching on the ignition the display shows the start menu.

Fuel



The display (1) indicates the current level in per cent.

100% corresponds to approx. 650 l (172 gal).

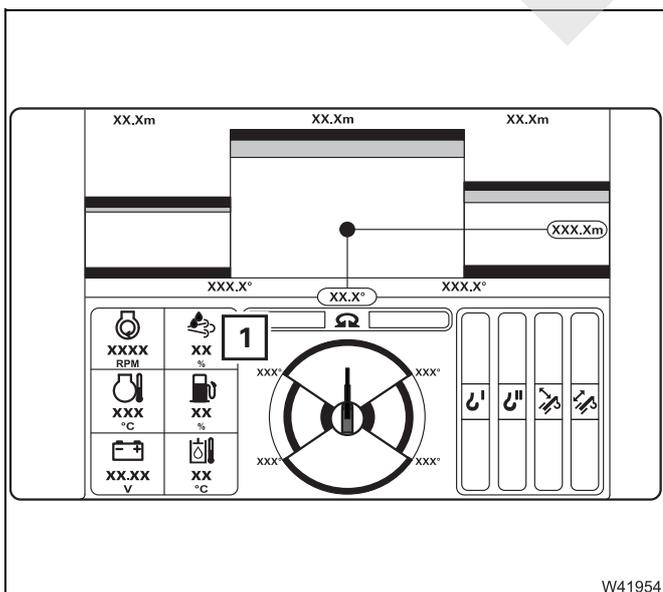
The display changes colour depending on the level:

Green: Over 10% – over 65 l (17.2 gal)

Yellow: 5 to 10% – 33 to 65 l (8.6 to 17.2 gal)

Red: Below 5% – less than 33 l (8.6 gal)

AdBlue (DEF)



The display (1) indicates the current level in per cent.

100% corresponds to approx. 40 l (10.6 gal).

The display changes colour depending on the level:

Green: Over 10% – over 4 l (1.1 gal)

Yellow: 5 to 10% – 2 to 4 l (0.53 to 1.1 gal)

Red: Below 5% – less than 2 l (0.53 gal)

10.2.2

Checks before starting the engine

Checks on the carrier

All checks and switch positions for the first engine start of the day must be performed;  p. 10 - 3.

Checking the hand-held control

Hand-held control removed

- Check that the bridging plugs are inserted into all sockets for hand-held controls;  p. 9 - 159.

Hand-held control connected to the superstructure

After starting the engine, you can use the hand-held control to execute all functions that are provided from this socket.

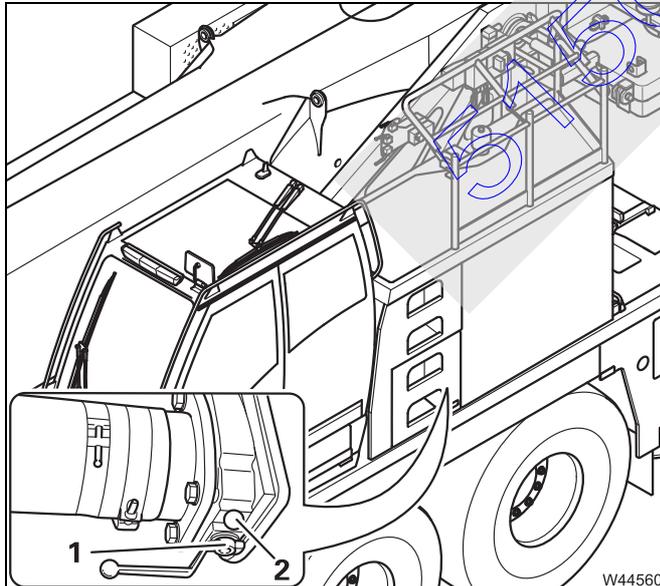
On the hydraulic tank

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!



The valve (1) is located behind the ladder.

- Check that the valve is open – lever (1) parallel to the line.

If the valve is closed

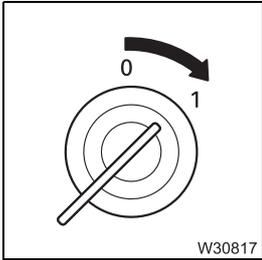
- Pull the knob (2) and open the valve.

10.2.3

Switching on the ignition



Do not start the engine until the *CCS* display shows a menu (usually the *Enter rigging mode* menu).



The control levers must be in their initial positions.

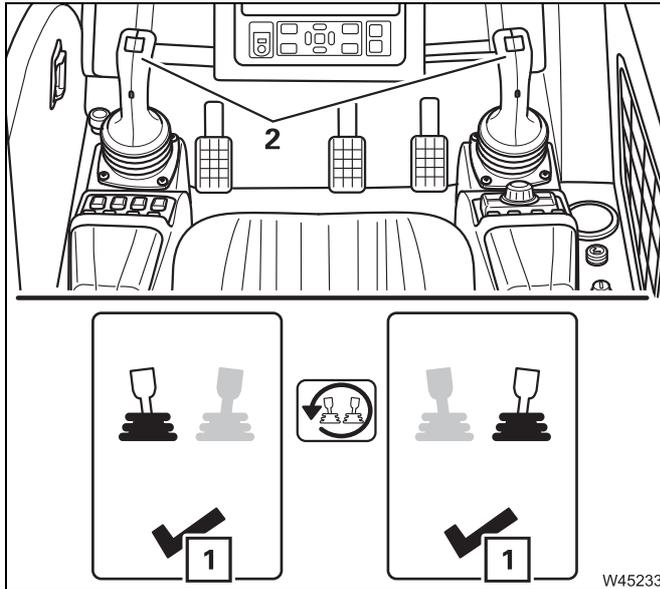
- Turn the ignition key to position **1**.

The ignition is switched on.

- A query regarding the control lever positions is displayed;  *Control lever actuation query*, p. 10 - 7.
- The switching states are compared;  *Synchronisation of the switching states*, p. 10 - 8.

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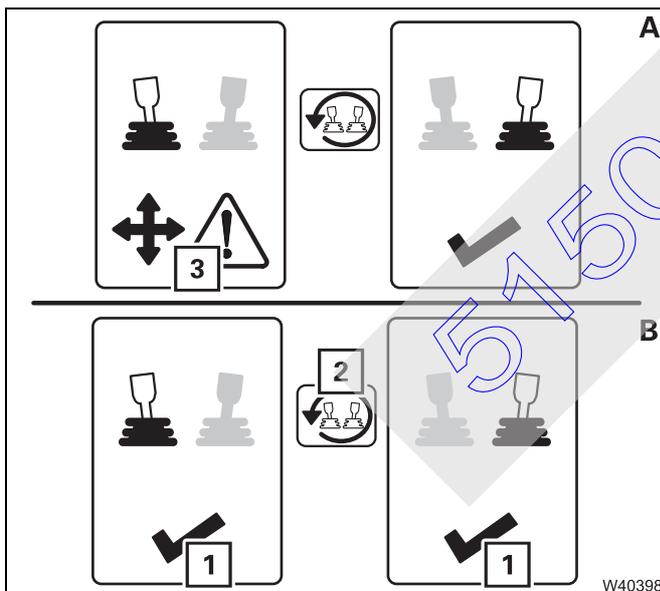
10.2.4 Control lever actuation query



When the ignition is switched on, a query appears asking if both control levers (2) are in their initial positions.

When at the initial position

The menu with the symbols (1) is displayed briefly then the *Start menu* opens.



When the control levers are actuated

(A) – The symbol (3) is displayed, e.g. for the left control lever.

- Move both control levers to their initial positions.

(B) – Repeat the query

- Select and confirm the symbol (2).

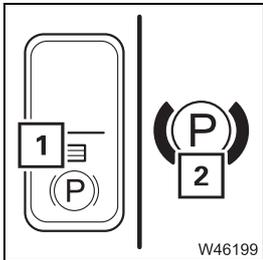
The symbols (1) are displayed briefly then the *Start menu* opens.



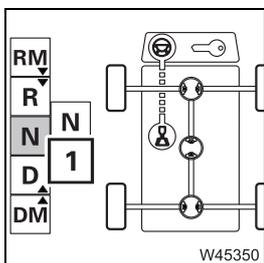
If the start menu is not displayed, you can switch off the ignition and then switch it on again with both control levers at their initial positions.

10.2.5 Synchronisation of the switching states

When the ignition is switched on, various switching operations are performed automatically and the switching states of the differential locks and the steering are synchronised.



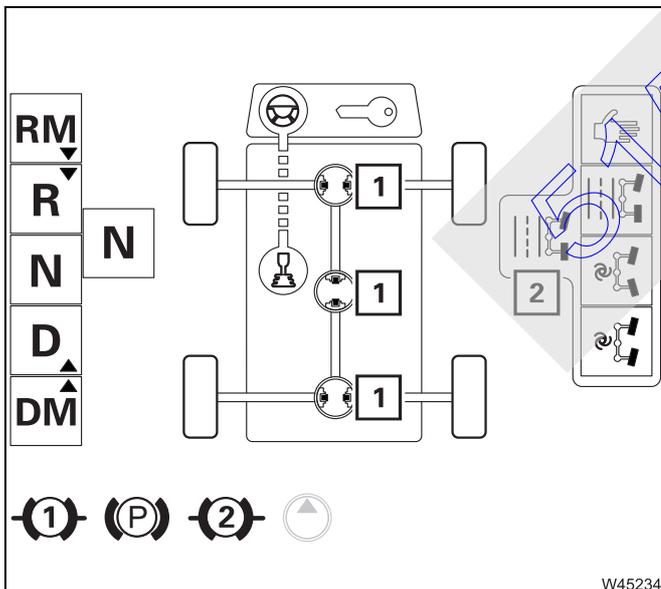
– The vehicle parking brake is applied. The lamp (1) lights up – symbol (2) – red.



– The transmission is switched to neutral position – symbol (1).

If the symbol (1) is grey then switch the ignition off and on again.

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



Differential locks

The state last saved is retrieved.

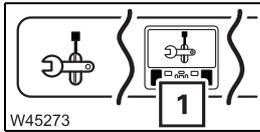
In the *Driving* menu, the corresponding symbols (1) are shown and the electronics system triggers the switching operations.

Steering

When you switch the ignition on, the steering is always set to *On-road driving* (2), regardless of what setting was last saved.

10.2.6

Display – Adjusting the brightness



- Open the menu (1) – Set display brightness and date/time menu.
- It is used in the same way as in the driver's cab;  p. 5 - 17.

10.2.7

Starting the engine

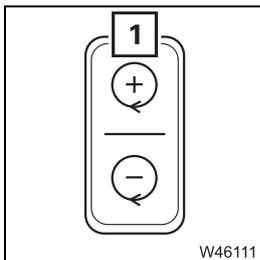
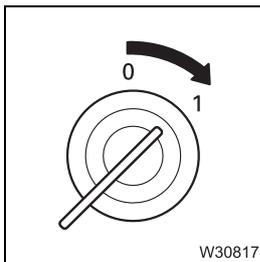
This section is for starting a warm and cold engine.



Danger of explosion when using starter fuel!

The engine must never be started with the aid of starter fuel. Starter fuel sprayed into the suction unit can ignite.

- Do not press the accelerator.
- Turn the ignition key to position 1.



- Press the button (1) at the top.
- Let go of the button after the engine starts.

After starting, the idling speed corresponds to the default value.

If the engine does not start, release the ignition key after about 15 seconds and wait one minute before trying again.

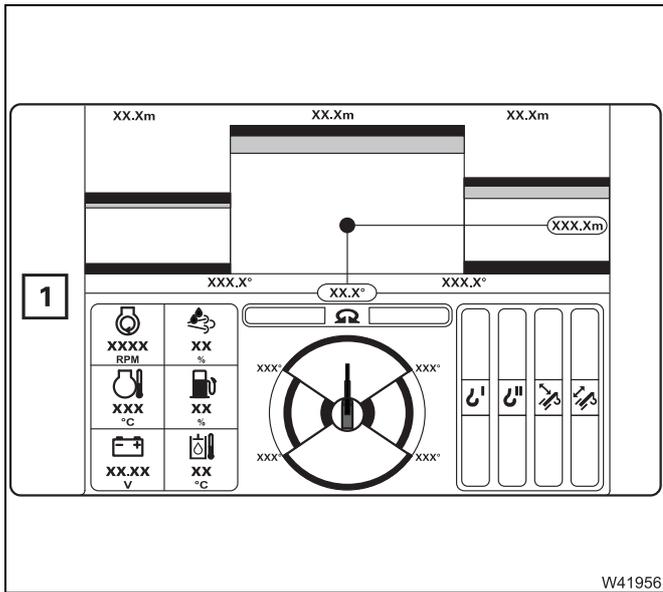
If the engine does not start after multiple attempts to start;

 *Malfunctions at the engine*, p. 8 - 39.



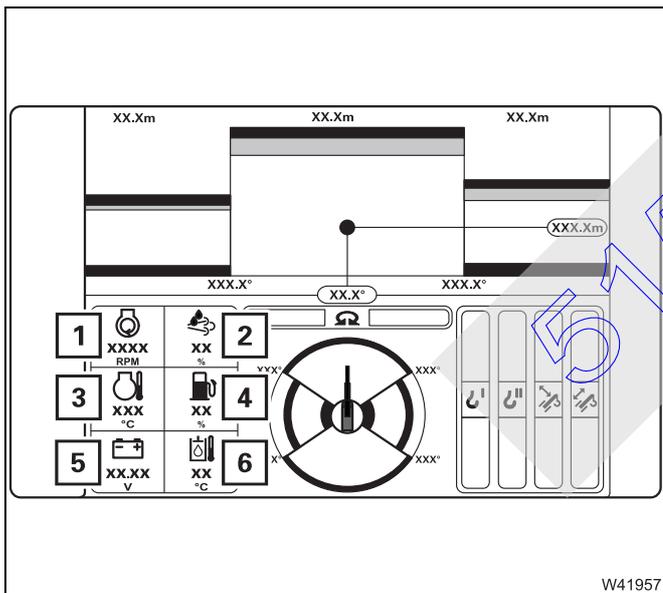
To set the idling speed;  p. 10 - 11.

10.2.8 Checks after starting the engine



- Check the display (1) at the CCS control unit immediately after starting the engine.

When a symbol is displayed in the display area (1); Malfunctions at the engine, p. 8 - 39.

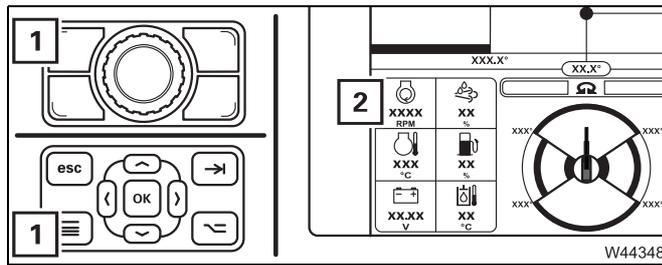


- Also check the displays
 - 1 Engine speed display in rpm
 - 2 AdBlue (DEF) level display in percent
 - 3 Coolant temperature display in °C (°F)
 - 4 Fuel level display in percent
 - 5 Voltage monitoring display in volts
 - 6 Hydraulic oil temperature display in °C (°F)

The colour of the level indicator indicates within which range the value is.

- Green:** Value is OK
- Yellow:** Limit value almost reached
- Red:** Limit value exceeded (or fallen below) – warning message; p. 14 - 3.

10.2.9 Setting the idling speed

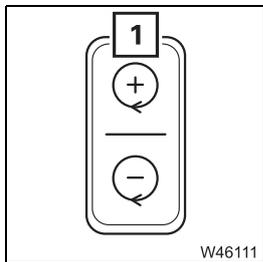


- Start the engine; see p. 10 - 9.
 - Open the start menu – button (1).
- The display (2) shows the current engine speed

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 the idling speed

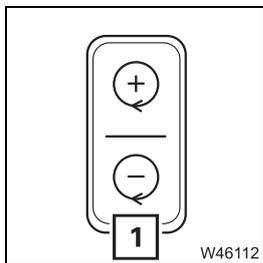


- Press the button (1) at the **top**.
The idling speed increases continuously until you release the button or the maximum value is reached.

Or

- Press the button at the **top** once.
The idling speed is increased by one step.

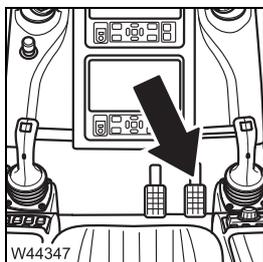
Reducing the idling speed



- Press the button (1) at the **bottom** once.
The idling speed is reduced by one step.

Or

- Press the button (1) at the **bottom** and keep it pressed.
 - After about 3 seconds, the idling speed matches the default value.
 - After roughly another 3 seconds, the engine switches off.
The engine cannot be restarted until approx. 7 seconds have passed.



Exceeding the idling speed

You can exceed the idling speed at any time using the accelerator.

Once you release the accelerator the engine speed is reduced to the pre-set idling speed.

10.3

Starting the engine – with the hand-held control

Starting with the hand-held control is only intended for emergency operation and permits derricking of the lattice extension during rigging.

▣▣▣▣ *Emergency operation with the hand-held control*, p. 14 - 42

▣▣▣▣ *Lattice extension operating manual*

10.4

Switching off the engine



Risk of accidents due to suspended loads!

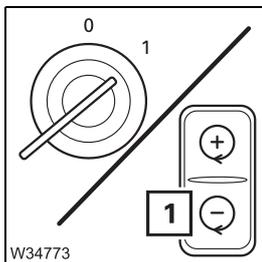
Never switch off the engine while a load is suspended. You must have the control levers at hand to be able to intervene at any time.

Always set down the load before you leave the crane cab.

10.4.1

From the crane cab

With button for idling speed



- Press the button (1) at the **bottom** and keep it pressed.
 - After about 3 seconds, the idling speed matches the default value.
 - After roughly another 3 seconds, the engine switches off – the crane control remains switched on.
- The engine cannot be restarted until approx. 7 seconds have passed.

At the ignition lock

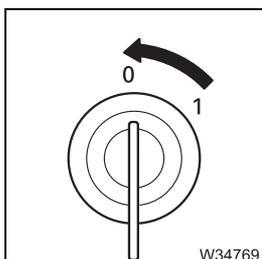
If the crane is equipped with a transmission retarder, then only use the button for the idling speed to shut down the engine!



Risk of damage to the coolant hoses!

Do **not** use the ignition lock to shut down the engine if the crane is equipped with a transmission retarder.

When the engine is switched off with the ignition lock, the transmission retarder generates a brief vacuum which leads to the coolant hoses wearing prematurely.



- Turn the ignition key to position **0** – the engine switches off.
- The crane control is switched off.

10.4.2

With the hand-held control

▣▣▣▣▶ *Switching off the engine*, p. 14 - 48

10.4.3

After switching off

Refer to the instructions in the respective sections for each type of work interruption;

▣▣▣▣▶ *At every work break*, p. 11 - 153,

▣▣▣▣▶ *For every work break longer than 8 hours*, p. 11 - 154.

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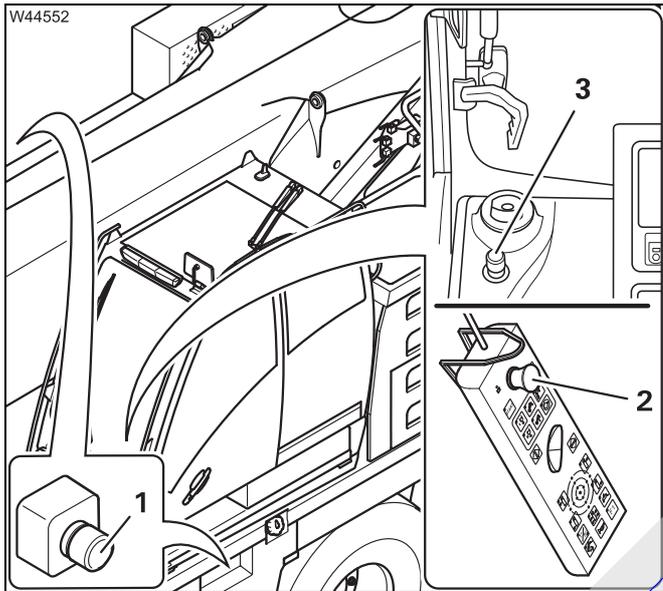
10.4.4 Using the emergency stop switches



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 emergencies:

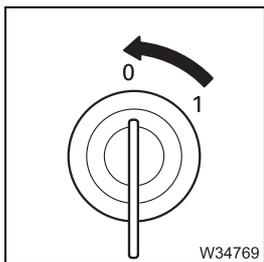
- 1 On the carrier – always active
- 2 Only active with connected hand-held control – in addition to (1) and (3)
- 3 In the crane cab – always active

- Press an active emergency stop switch.
 - The switch engages.
 - The engine is switched off.

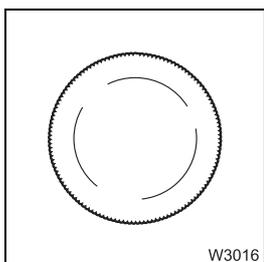
If there is an air intake inhibitor, then it is triggered.

Resetting the emergency stop switch

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



- Switch off the ignition.



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

If there is an air intake inhibitor, it must be opened;

➡ *Opening the air intake inhibitor*, p. 4 - 21.

11 Crane operation

11.1 Before operating the crane

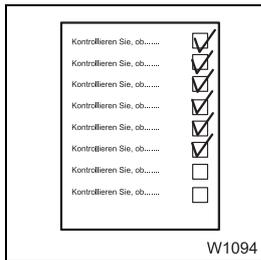
11.1.1 CHECKLIST: Checks before crane operation



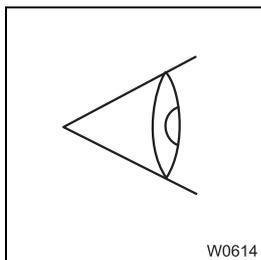
This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references. **Observe the warnings and safety instructions there.**



This checklist only applies to work with a rigged truck crane (supported and rigged with counterweight). If the truck crane is not yet rigged; **▶ CHECKLIST: Rigging, p. 12 - 1.**

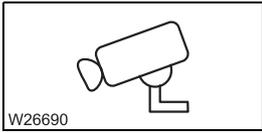


1. The truck crane has been rigged for the operation to be carried out as described in the *CHECKLIST: Rigging*; ▶ p. 12 - 1

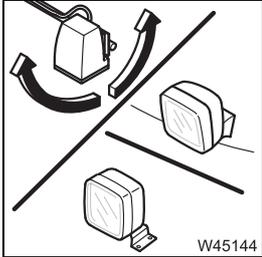


2. Carry out an inspection of the truck crane, looking out in particular for any leaking fluids (oil, fuel or water).

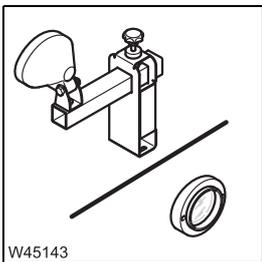




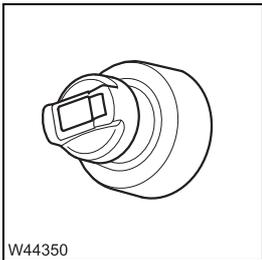
3. Switch on cameras as required.
- ▣▣▣▣ *Cameras on the hoists*, p. 12 - 173
 - ▣▣▣▣ *Camera on the main boom*, p. 12 - 173
 - ▣▣▣▣ *Camera on the driver's cab*, p. 12 - 175



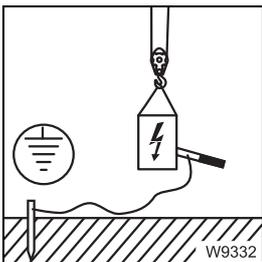
4. Switch on spotlights as required.
- Switch on the slewable spotlights; ▣▣▣▣ p. 11 - 132.
 - Switch on spotlights I; ▣▣▣▣ p. 9 - 155.
 - Switch on spotlights II; ▣▣▣▣ p. 9 - 156.



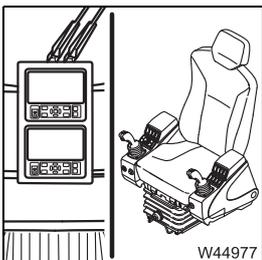
- Extend and switch on spotlights III; ▣▣▣▣ p. 12 - 180.
- Switch on outrigger lighting; ▣▣▣▣ p. 3 - 47



5. Crane cab heater – check the fuel level; ▣▣▣▣ p. 11 - 5.

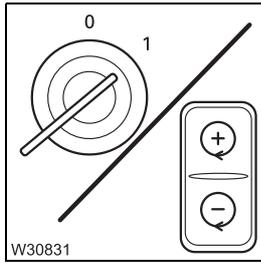


6. Earth the load, if necessary; ▣▣▣▣ p. 11 - 13.

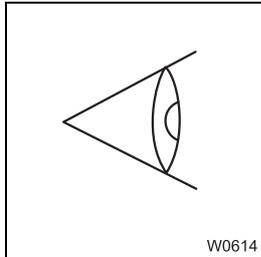


7. Adjust crane cab seat and front panel;
- ▣▣▣▣ *Crane cab seat*, p. 11 - 8,
 - ▣▣▣▣ *Adjusting the front panel*, p. 11 - 9.

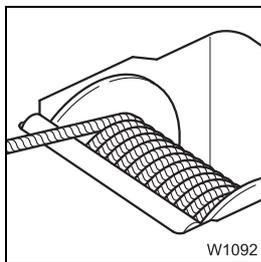
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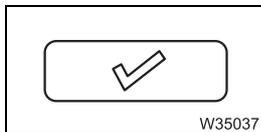
8. Start the engine for crane operation; ■■■▶ p. 10 - 9



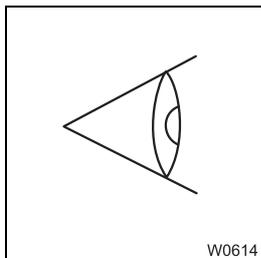
9. Check
– RCL,
– lifting limit switch,
– seat contact switch and dead man's switch,
– emergency stop switch,
for correct operation. Have faulty units repaired; ■■■▶ p. 11 - 10



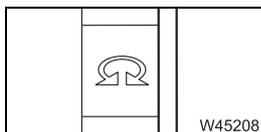
10. Check the position of the hoist ropes; ■■■▶ p. 11 - 6



11. Compare current rigging mode with the RCL display – enter and confirm current rigging mode, if necessary; ■■■▶ p. 11 - 32.



12. Check telescoping; ■■■▶ *Checks prior to starting operations*, p. 11 - 99.

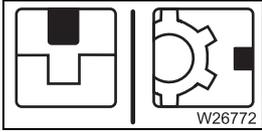


13. For the 0° or 180° operating position
– Switching off the slewing gear – orange symbol; ■■■▶ p. 11 - 122.

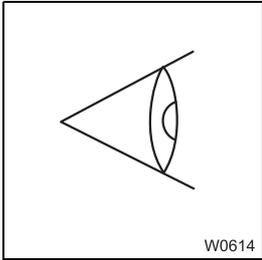


– Lock the turntable if required – provided the systems are present.
■■■▶ *Locking the superstructure*, p. 11 - 16
■■■▶ *Switching on the houselock*, p. 11 - 17

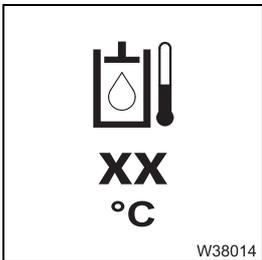




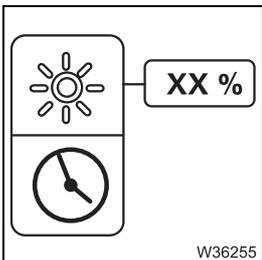
- 14.** For others the operating positions
- Unlock the turntable – provided the systems are present
 - ▣▣▣▣ *Unlocking the superstructure*, p. 11 - 16
 - ▣▣▣▣ *Switching off the houselock*, p. 11 - 19



- 15.** Check the electrical system for correct operation; ▣▣▣▣ p. 11 - 7



- 16.** Check hydraulic oil temperature, prewarm if necessary; ▣▣▣▣ p. 11 - 14.



- 17.** Adjust the brightness of the CCS display as required; ▣▣▣▣ p. 10 - 9.



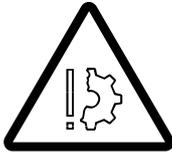
Additional information on inspections during crane operation, on permissible operating positions and on how to operate the individual power units;
▣▣▣▣ *Crane operation with main boom*, p. 11 - 73.

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11.1.2 Checking the condition of the truck crane

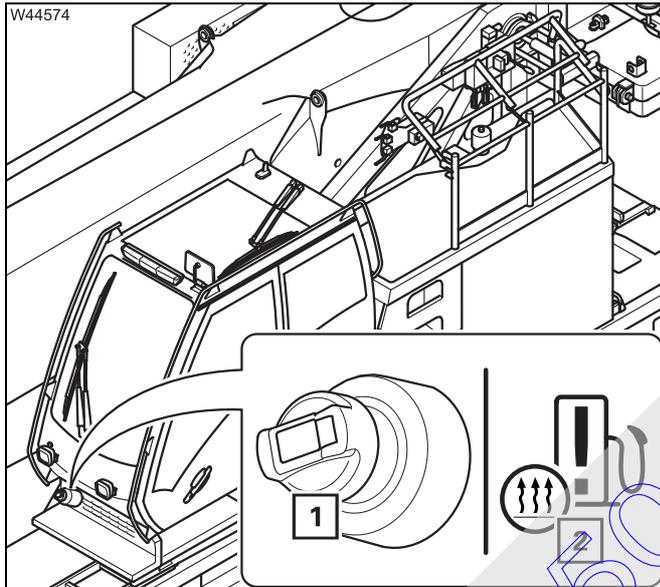
Crane cab heater fuel tank

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



Danger of fire due to flammable gases!

Switch off the engine and heating system before refuelling.



- Symbol (2) is displayed when the reserve level is reached;  Warning messages on the CCS display, p. 14 - 3.
- Refill 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 seeping into the ground or polluting water.

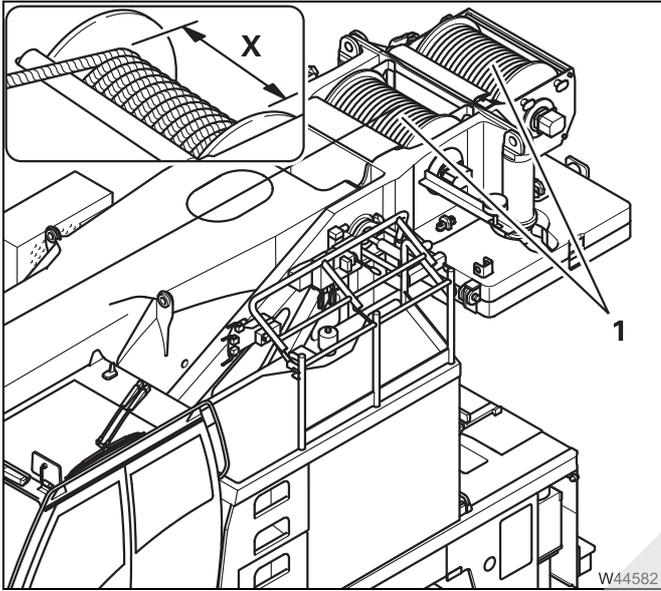


Checking the position of the hoist ropes



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 or crushed.



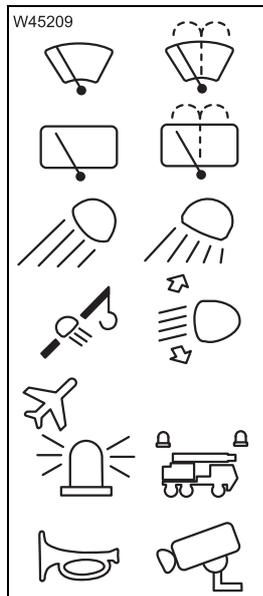
- Always check the entire length of the winding of the ropes (1).
- Slowly perform the *Lower* movement until the rope has moved over a complete width (X) of the rope drum.
 - The rope must be evenly wound.
 - The rope turns on the drum must be evenly spaced, 0 to 2 mm (0 to 0.08 in) apart.
 - The cross-over points must be offset by about 180°.



The top rope lines are laid over the next lower rope lines at the cross-over points.

Checking the electrical system

- Check the listed functions and have faulty parts repaired.



- Windscreen/skylight: Windscreen wipers, windscreen washing system
- Spotlights I, II and III, outrigger lighting
- Slewable spotlights,
- Air traffic control light, anemometer, rotating beacons
- Horn, camera on hoists, camera on main boom

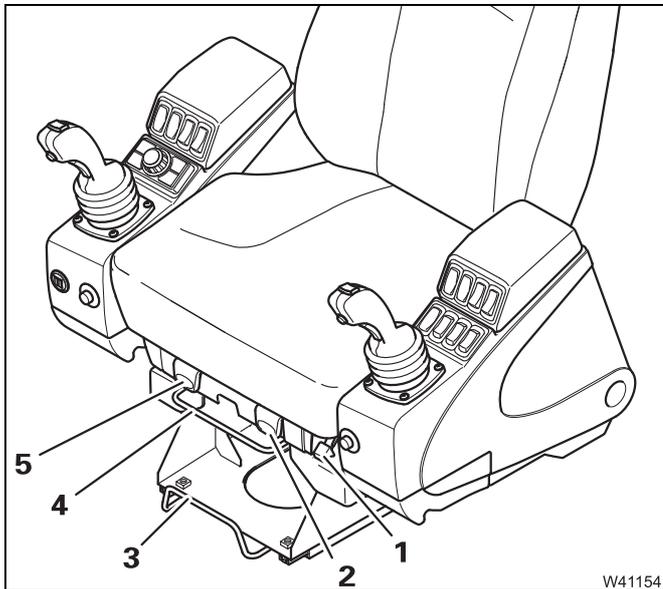
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11.1.3

Adjusting the crane cab seat and control panels

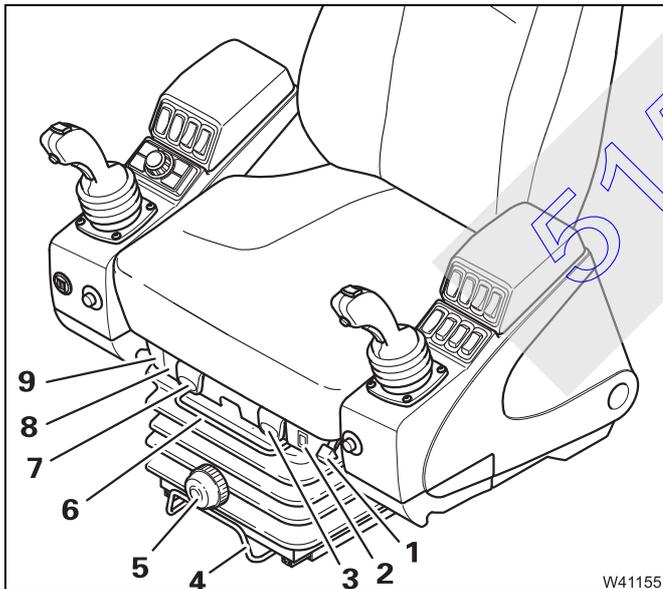
Crane cab seat

You can adjust the crane cab seat to your height.



Version 1

- 1 Back rest – angle
- 2 Seat – height
- 3 Seat – longitudinal adjustment, with control panels
- 4 Seat – longitudinal adjustment, Without control panels
- 5 Seat cushion – angle



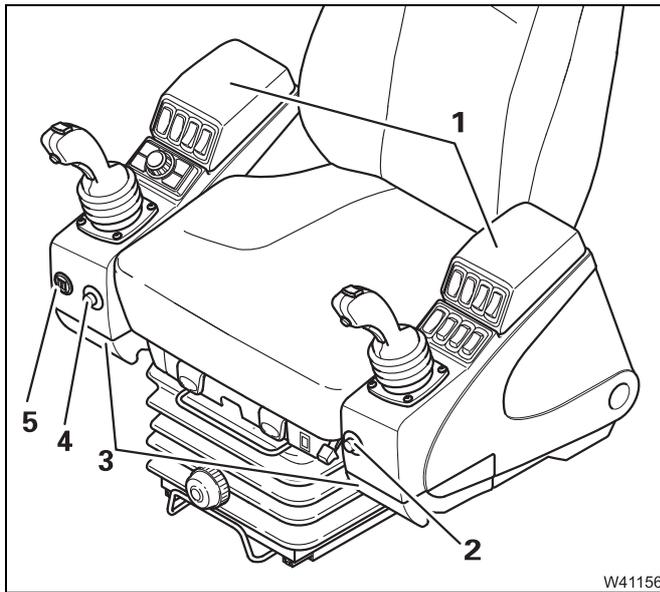
Version 2

- 1 Back rest – angle
- 2 Seat heating¹⁾ on/off
- 3 Seat – height¹⁾
- 4 Seat – longitudinal adjustment, with control panels
- 5 Adjust suspension stiffness to body weight
- 6 Seat – longitudinal adjustment, Without control panels
- 7 Seat cushion – angle
- 8 Upper lumbar area support
- 9 Lower lumbar area support

¹⁾ Requirement – ignition is on

Control panels

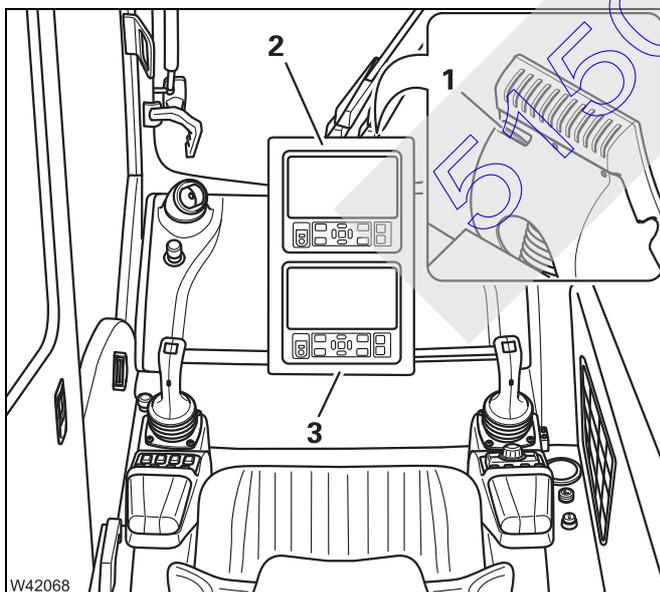
You can adjust the height of the front control panels.



- 1 Storage compartment with lid
- 2 Control panel, left – height
- 3 Drawer
- 4 Control panel, right – height
- 5 USB charging connection (5 V / 2 x 2.5 A)

11.1.4

Adjusting the front panel



You can adjust the height and inclination.

- Pull and hold the handle (1).
- Adjust the front panel to suit your requirements.
- Release the handle (1).

In addition, the inclination of the display can be adjusted:

- Press either (2) or (3).

11.1.5

Checking the safety devices



Risk of accidents when working with faulty safety devices!

It is prohibited to operate the crane with safety devices that are faulty, overridden or out of service!

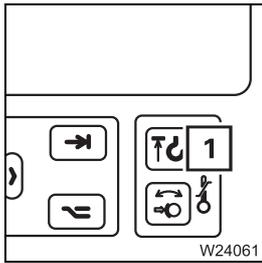
Have faulty safety devices repaired immediately by **Grove Product Support**.

Rated capacity limiter

- Switch on the rated capacity limiter (RCL), perform all checks and enter and confirm the current rigging mode;  *Entering the rigging mode*, p. 11 - 32.
- The RCL is working correctly at this point in time if there is no error message and if crane movements are enabled.

If the RCL is not working correctly, do not start crane operation but instead notify **Grove Product Support**.

Lifting limit switch



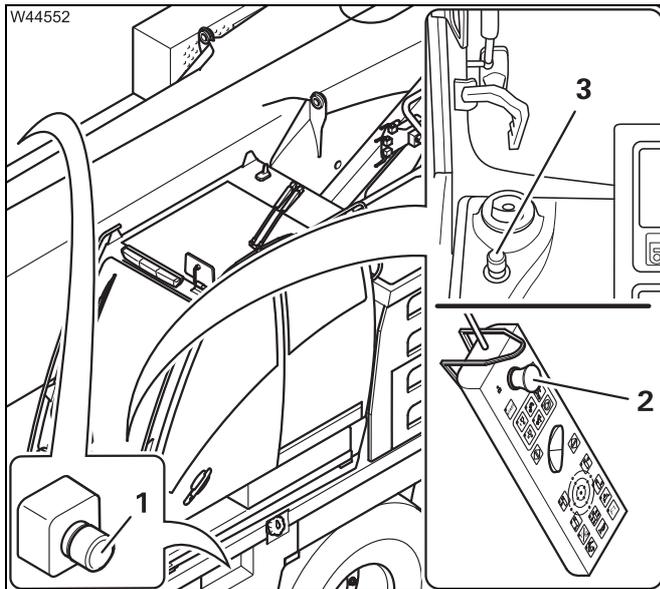
- Raise the main boom until the hook block is lifted off the ground.
- Slowly perform the *Raise* movement until the hook block lifts the lifting limit switch weight.
- Now check that the *Raise* movement is switched off and the lamp (1) lights up.
- Check that the *Lower* and *Extend* movements are 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 instead notify **Grove Product Support**.

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 again.
- Open the air intake inhibitor if required;
 ▣▣▣▣ Air intake inhibitor, p. 4 - 21.
- Repeat the check 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 instead notify **Grove Product Support**.



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Seat contact switch



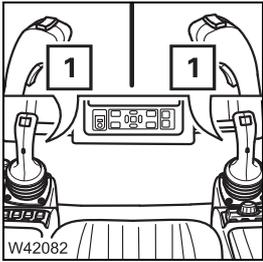
This check is carried out together with the dead man's switch.

Danger of accidents if the seat contact switch is faulty!

Always perform this check inside the crane cab.

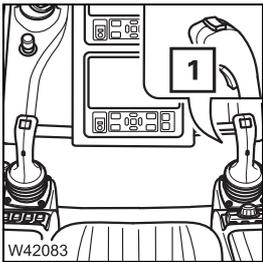
If you stand next to the crane cab, you may be pushed off the carrier if the superstructure slews as a result of a faulty dead man's switch.

Checks during standstill

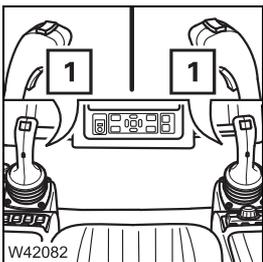


- Do not sit down on the crane cab seat.
- Do not press any dead man's switch (1).
- Move the control levers one after the other for all crane movements and check whether all crane movements are switched off.

Inspection 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 about 3 seconds.
 - Repeat the check with the dead man's switch on the left control lever.



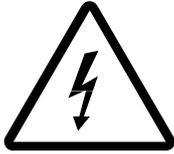
- Seat contact switch
 - Do not press any dead man's switch (1).
 - Sit down on the crane cab seat and slowly lift the hook block.
 - With the control lever actuated, stand up and check whether the crane movement comes to a standstill within about 3 seconds.

If the dead man's switch system is not working correctly, do not start work with the crane but instead notify **Grove Product Support**.

11.1.6

Earthing the load

Even if the truck crane is already earthed (▶ p. 12 - 15), the load may become charged with static electricity. For example, if a hook block with sheaves made of synthetic material or non-conducting sling gear is used.

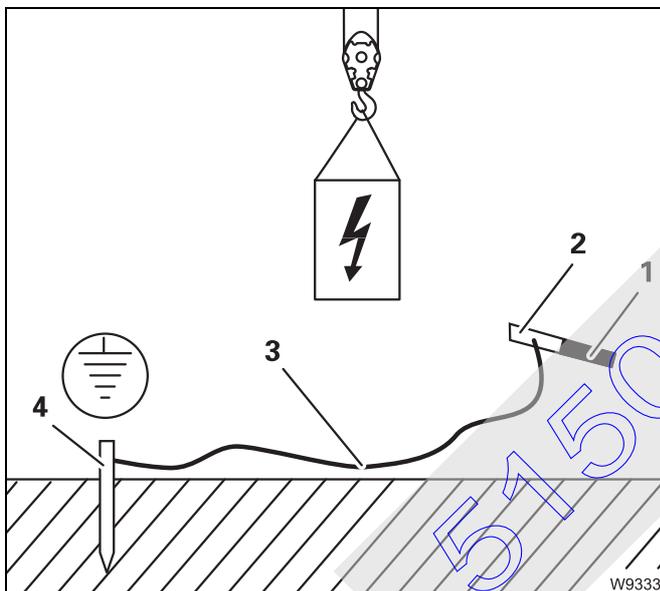


Risk of accidents due to electric shock!

Always earth the load before operating the crane

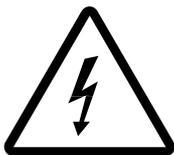
- near strong transmitters (radio transmitters, radio stations, etc.),
- near high-frequency switchgear substations,
- if a thunderstorm is approaching.

If the load is charged with static electricity, you must always earth the load before touching it.



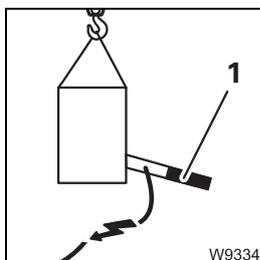
Use electrically conducting material for earthing.

- Drive a metal rod (4) (length of about 2.0 m (6.6 ft)) at least 1.5 m (5 ft) into the ground.
- For better conductivity, dampen the soil around the metal rod (4).
- Clamp an insulated cable (3) to the metal rod (4) (cross-section of at least 16 mm² (0.025 in²)).
- Clamp the other end of the cable (3) to a metal rod (2) with an insulated handle (1).



Risk of accidents due to electric shock!

Make sure 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 maintain a sufficient distance to the metal rod in the ground.



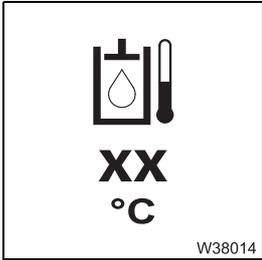
- Hold the metal rod firmly by its insulated handle (1).
- To earth, touch the load with the metal rod.

11.1.7

Prewarming hydraulic oil



It may take some time for the solenoid valves to be switched or the power units may be started abruptly if the oil is cold.



The current hydraulic oil temperature is displayed in the start menu.

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

If the temperatures fall below 10 °C (50 °F), proceed as follows:

– **From 10 °C to 0 °C (50 °F to 32 °F)**

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

– **From 0 °C to -15 °C (32 °F to 5 °F)**

For prewarming, only carry out crane movements **without a load**. Only operate at normal speed, at medium engine speed and medium working speed.

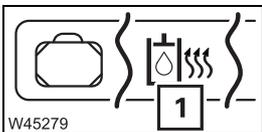
– **Below -15 °C (5 °F)**

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

Prerequisites

- The engine for crane operation is running.
- The seat contact switch or a dead man's switch is actuated.
- The hydraulic oil temperature is not higher than 30 °C (86 °F).

Prewarming



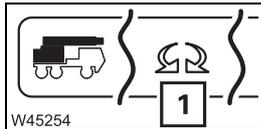
- Select and confirm the symbol (1) – symbol is **orange**.

The engine speed is increased, the hydraulic oil is prewarmed until reaching a temperature of 30 °C (86 °F).

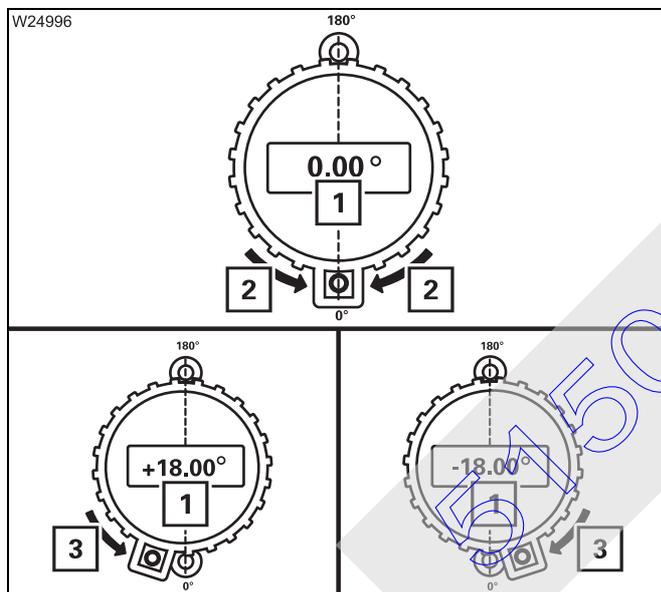
11.1.8 Locking/unlocking the superstructure

In the case of equipment with superstructure 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°.



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



The display (1) shows the current superstructure position.

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

The display (1) shows positive and negative values. For an overview; p. 11 - 120.

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

In the range of $\pm 20^\circ$ around the locking point, an arrow (3) indicates the slewing direction that leads to the locking point.

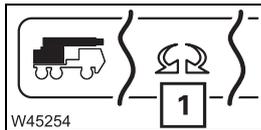


11.1.9 Switching the houselock on/off

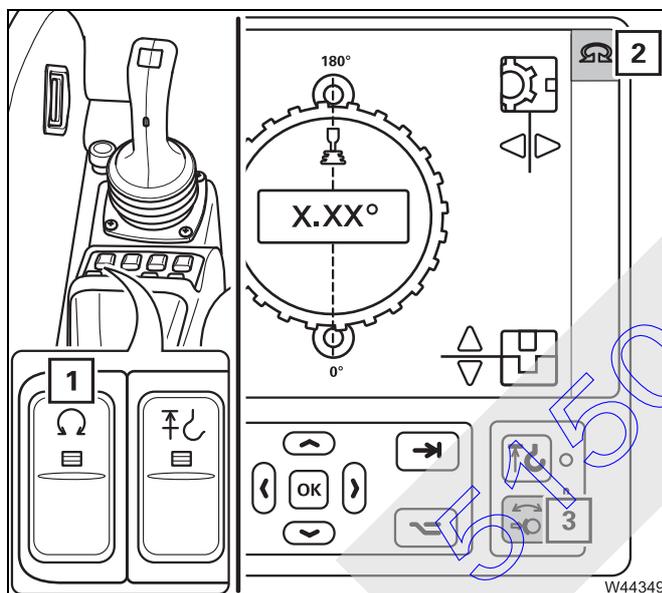
If the truck crane is equipped with a houselock, the turntable can be locked in the entire slewing range. For locking, a pin extends and locks the slewing gear.

Switching on the houselock

Slew the superstructure to the position in which it is to be locked and then stop the slewing movement.



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



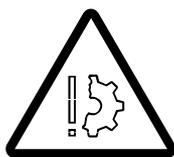
Switching off the slewing gear

The slewing gear brake must be applied when operating the houselock.

- Press the button (1) once.

The slewing gear is switched off and the slewing gear brake applied.

- The symbol (2) is **orange**.
- The lamp (3) lights up.

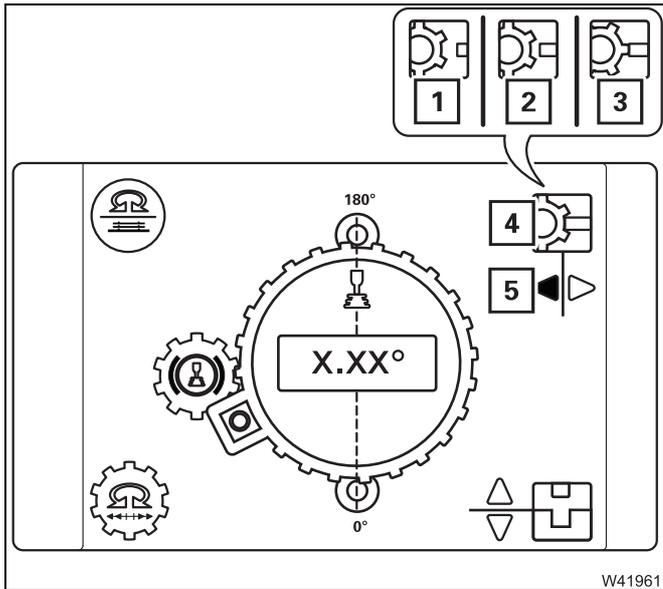


Risk of damage during slewing!

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.





Switching on the houselock

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

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

If symbol (3) is displayed:

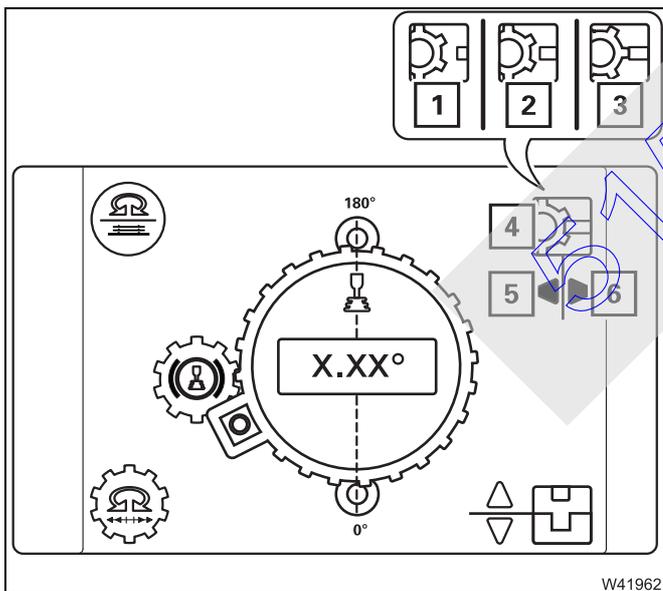
- Let go of the button.

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



Risk of damage due to slewing with blocked lock!

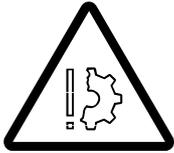
Before slewing make sure that the houselock is switched off. Otherwise the system will be damaged during slewing.



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

Switching off the houselock

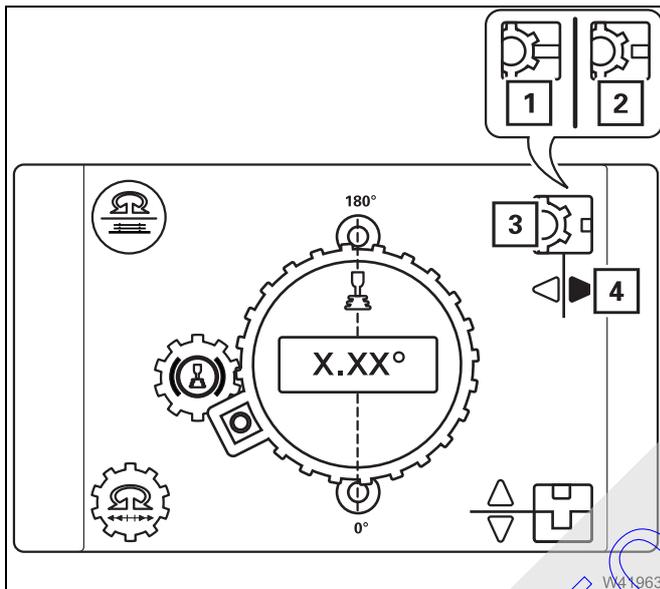
- Check that the slewing gear is switched off, and switch it off if necessary;
 ▶ *Switching off the slewing gear*, p. 11 - 17.



Risk of damage during slewing!

Always switch off the slewing gear before you operate the houselock.

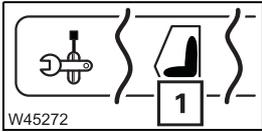
The system will be damaged if the superstructure is slewed during the locking procedure.



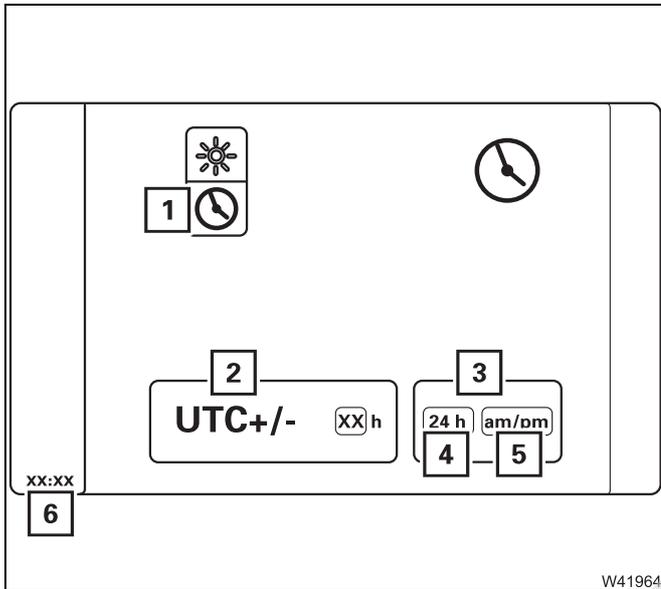
- Select the symbol (4).
- Press the button until the symbol (3) is displayed – *Houselock switched off*.

The display first shows the symbol (1), then symbol (2) in the intermediate position and then symbol (3) when the houselock is switched off.

11.1.10 Setting the time



- Open the menu (1) – Crane cab menu.



- Select and confirm the symbol (1).

Setting the time

- Select and confirm the symbol (2).
- Select the current time – as a deviation from UTC time.
- Confirm the selection. The newly set time is shown on the display (6).

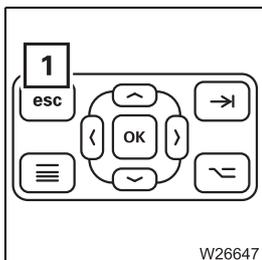
Switching over the display type

- Select and confirm the display (3).
- Select the symbol for the desired display type.

4 - 24 hours

5 - 12 hours AM/PM

Confirm the selection, the selected display type turns orange.



You can **cancel the input** at any time.

- Press button (1) – no values are changed.

11.2

Standard slewing range type

The *MAXbase* slewing range type is available in the case of additional equipment;  *MAXbase slewing range type*, p. 11 - 23.

The *Standard* slewing range type is always available. The lifting capacity tables with symmetrical outrigger spans apply. These lifting capacity tables are also supplied in printed form with the truck crane.

11.2.1

Permissible slewing ranges and operating positions

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 - 32.
- Rig a counterweight combination that does not exceed 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 - 119.

Operating position 0° to the rear

- 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.
- Switch off the slewing gear.
- Lock the turntable if possible.
-  *Locking/unlocking the superstructure*, p. 11 - 15
-  *Switching the houselock on/off*, p. 11 - 17.
- Enter an RCL code for the 0° to the rear operating position according to *Lifting capacity table*;  *Entering the rigging mode*, p. 11 - 32.
- RCL accepts this code only when the superstructure is in the 0° position and the slewing gear is switched off.



All slewing operations are disabled if an RCL code is entered for the 0° to the rear operating position. An RCL shutdown is triggered by switching on the slewing gear or unlocking the turntable. To acknowledge this shutdown, if slewing is permissible with the rigged counterweight ( p. 12 - 119), set down the load and enter a rigging mode for the 360° slewing range.



180° to the front rigging position

The same lifting capacity tables apply to this position as to the 360° slewing range.

Free-on-wheels operating position

- Check that the truck crane has been rigged for free on wheels operation;  *CHECKLIST: Rigging*, p. 12 - 1.
- Enter the correct RCL code for the *Free on wheels* operating position in accordance with the *Lifting capacity table*;  *Entering the rigging mode*, p. 11 - 32.
- Before slewing, check that the maximum of 1.0 t (2,200 lbs) counterweights are rigged (1 t plate or auxiliary hoist) and unrig a further counterweight before you slew the superstructure.



Danger of overturning if the truck crane is free on wheels!

The superstructure of free on wheels truck cranes may only be rotated if the counterweight rigged on the turntable does not weigh more than 1.0 t (2,205 lbs) and the working radius permitted in the working area is maintained according to *Lifting capacity table*.

This way you prevent the truck crane tipping to the rear when slewing the superstructure.



Danger of overturning if the truck crane is free on wheels and the RCL is overridden

If the RCL code for working free on wheels is entered, when the working radius is reached the RCL prevents those crane movements that would reduce the radius any further. This is in order to provide stability to the rear.

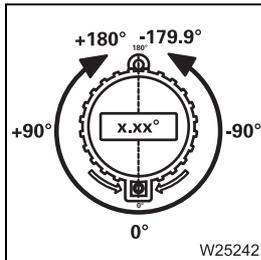
The truck crane will overturn if you override the RCL and reduce the working radius any further.

11.3

MAXbase slewing range type

This slewing range type is available in addition to the *Standard* slewing range type;  *Permissible slewing ranges and operating positions*, p. 11 - 21. You must decide between the two slewing range types when entering the rigging mode.

Lifting capacity tables with different, variable outrigger spans are available for the *MAXbase* slewing range type. These additional lifting capacity tables are supplied in digital form with the truck crane and can be shown as a diagram on the display in the crane cab.



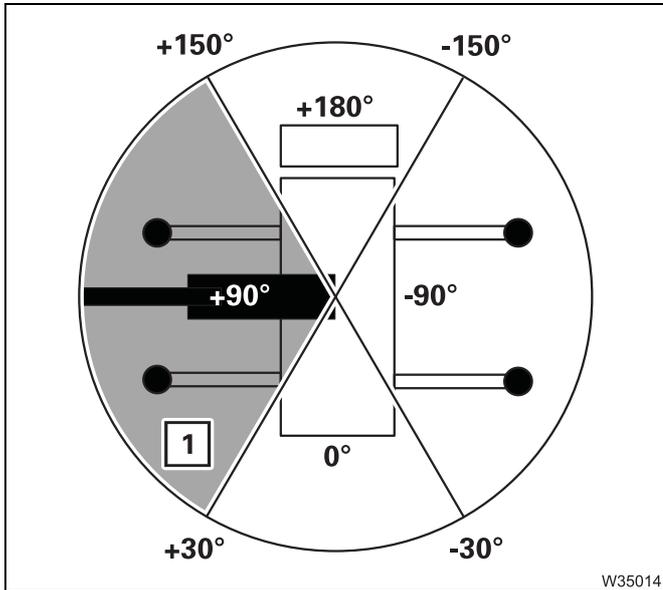
The designation of the slewing angle always refers to the starting point 0° to the rear. A full turn from this operating position is divided into two semi-circles.

- When slewing **clockwise** the slewing angle is displayed as a **positive** value (0° to +180.0°).
- When slewing **anticlockwise** the slewing angle is displayed as a **negative** value (0° to -179.9°).

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11.3.1 Information in the lifting capacity tables

The specified lifting capacities are only enabled for specific slewing ranges.



The *Lifting capacity table* contains directional information for the enabled slewing range, which is assigned to a superstructure position.

Directional information	Superstructure position
To the rear	0°
To the right	-90°
To the front	+180°
To the left	+90°

This superstructure position is the starting point for the enabled slewing range. A complete turn is always divided into four slewing ranges. The size of the slewing range is defined by an angular range around the starting point, e.g. $\pm 60^\circ$ for the slewing range (1).

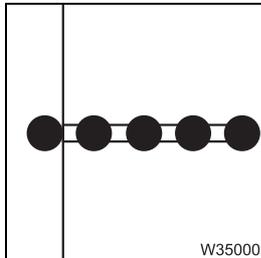
This results in the enabled slewing range (1) between the slewing angles of $+30^\circ$ to $+150^\circ$.

The size of the enabled slewing range depends on the rigged outrigger span. The smallest respective individual width of an outrigger beam is taken into account.

11.3.2

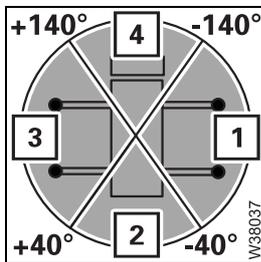
Enabled slewing ranges

The enabled angular ranges around the starting point are given in the *Lifting capacity table*. This section provides an overview of where the enabled slewing ranges begin and end for each slewing angle.

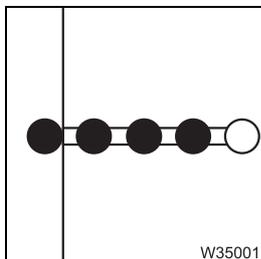


Smallest individual width 3.800 m (12.5 ft)

This case applies only to a symmetrical outrigger span with an outrigger span of 7.600 m (25.0 ft).

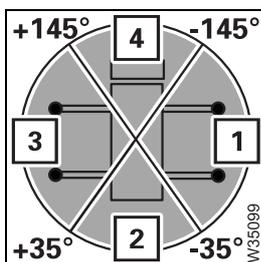


Directional information		Angular range	Enabled slewing range
1	To the right	$\pm 50^\circ$	-140° to -40°
2	To the rear	$\pm 40^\circ$	-40° to $+40^\circ$
3	To the left	$\pm 50^\circ$	$+40^\circ$ to $+145^\circ$
4	To the front	$\pm 40^\circ$	$+140^\circ$ to -140°



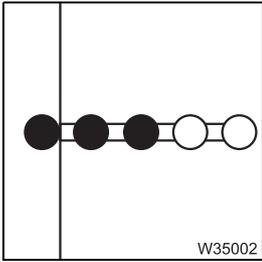
Smallest individual width 3.350 m (11.0 ft)

This case applies if one or more outrigger beams are extended to an outrigger span of 3.350 m (11.0 ft) and all other outrigger beams are extended to larger spans.



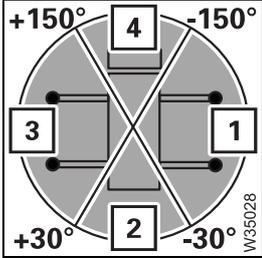
Directional information		Angular range	Enabled slewing range
1	To the right	$\pm 55^\circ$	-145° to -35°
2	To the rear	$\pm 35^\circ$	-35° to $+35^\circ$
3	To the left	$\pm 55^\circ$	$+35^\circ$ to $+145^\circ$
4	To the front	$\pm 35^\circ$	$+145^\circ$ to -145°



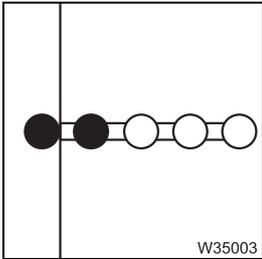


Smallest individual width 2.950 m (9.7 ft)

This case applies if one or more outrigger beams are extended to an outrigger span of 2.950 m (9.7 ft) and all other outrigger beams are extended to larger spans.

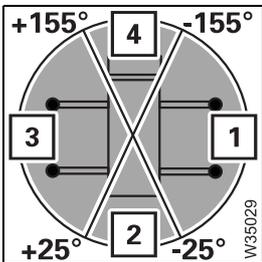


Directional information		Angular range	Enabled slewing range
1	To the right	$\pm 60^\circ$	-150° to -30°
2	To the rear	$\pm 30^\circ$	-30° to $+30^\circ$
3	To the left	$\pm 60^\circ$	$+30^\circ$ to $+150^\circ$
4	To the front	$\pm 30^\circ$	$+150^\circ$ to -150°

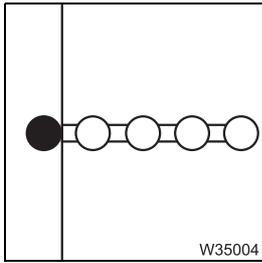


Smallest individual width 2.550 m (8.4 ft)

This case applies if one or more outrigger beams are extended to an outrigger span of 2.550 m (8.4 ft) and all other outrigger beams are extended to larger spans.

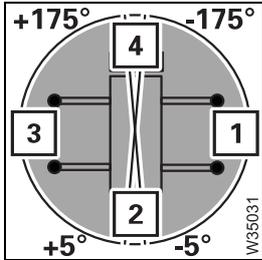


Directional information		Angular range	Enabled slewing range
1	To the right	$\pm 65^\circ$	-155° to -25°
2	To the rear	$\pm 25^\circ$	-25° to $+25^\circ$
3	To the left	$\pm 65^\circ$	$+25^\circ$ to $+155^\circ$
4	To the front	$\pm 25^\circ$	$+155^\circ$ to -155°



Smallest individual width 1.250 m (4.1 ft)

This case applies when one outrigger beam is extended to an outrigger span of 1.250 m (4.1 ft) and all other outrigger beams are extended to larger spans.

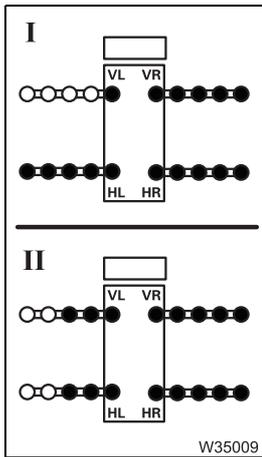


Directional information		Angular range	Enabled slewing range
1	To the right	$\pm 85^\circ$	-175° to -5°
2	To the rear	$\pm 5^\circ$	-5° to $+5^\circ$
3	To the left	$\pm 85^\circ$	$+5^\circ$ to $+175^\circ$
4	To the front	$\pm 5^\circ$	$+175^\circ$ to -175°



11.3.3 Lifting capacities and slewing ranges for outrigger spans without separate lifting capacity tables

In the case of outrigger spans where the opposite outrigger beams at the right and left sides are extended to different lengths, *Lifting capacity tables* are only available for combinations where the outrigger span at the right side is greater than at the left side. This applies to two types of outrigger spans.



Outrigger span type *Three / One*

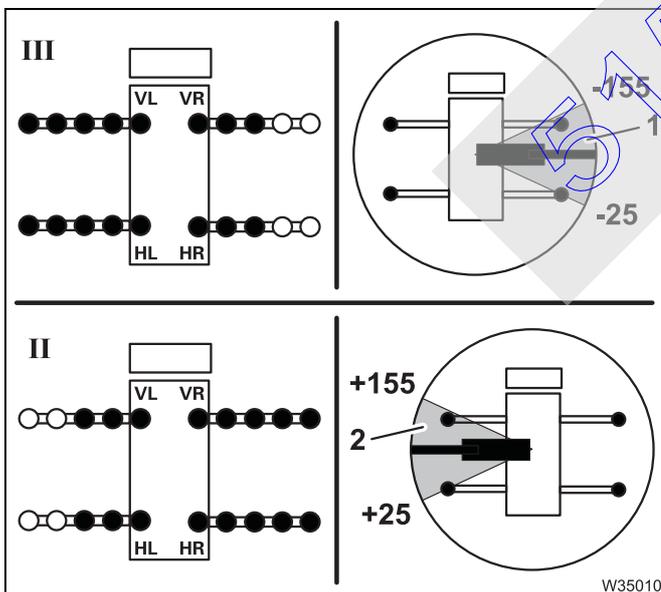
Lifting capacity tables are only provided for the combination *One outrigger beam retracted – left*, e.g. for the outrigger span (I).

Outrigger span type *Right / Left*

Lifting capacity tables are only provided for the combination *Right greater than left*, e.g. for the outrigger span (II).

When the truck crane is supported on outrigger beams with a mirror-inverted outrigger span then the same lifting capacities are enabled in the correspondingly mirror-inverted slewing range.

Example



Assuming that the truck crane is on outrigger beams with the outrigger span (III) and a load is to be lifted in the slewing range *To the right* (1).

Since the outrigger span at the left side is greater than at the right side, the *Lifting capacity table* for the mirror-inverted outrigger span (II) with the mirror-inverted slewing range *To the left* (2) must be used.

The loads specified for the slewing range (2) are enabled in the slewing range (1) for the outrigger span (III).

11.4

Operating the rated capacity limiter

The rated capacity limiter is abbreviated as RCL (**R**ated-**C**apacity-**L**imiter) in this operating manual.

If the truck crane's current rigging mode is entered correctly, the RCL will prevent the permissible lifting capacity being exceeded and the truck crane being overloaded.



Risk of accidents due to an incorrectly set RCL!

Make sure that the current rigging mode is correctly entered before starting crane operation. Incorrect entries will give you a false sense of security. This may easily result in the truck crane overloading, causing an accident!

The current rigging mode is

- entered via measurements,
- acquired via manual input.

Acquired via measurements	Acquired via manual input
– Main boom length	– Counterweight
– Main boom angle	– Length of lattice extension
– Current load	– Angle of lattice extension ²⁾
– Lattice extension angle ¹⁾	– Reeving
– Outrigger span	

1) Lattice extension – derricking

2) Lattice extension – inclinable

During 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 accidents 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!



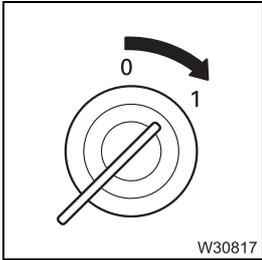
Danger of overturning during two-hook operation!

The rated capacity limiter only ensures safety for single hook operation!

Two-hook operation is not permitted.

11.4.1 Switching on the RCL

Switching on



The RCL is switched on together with the ignition.

- Switch on the ignition.

A test program runs after switching on the ignition.

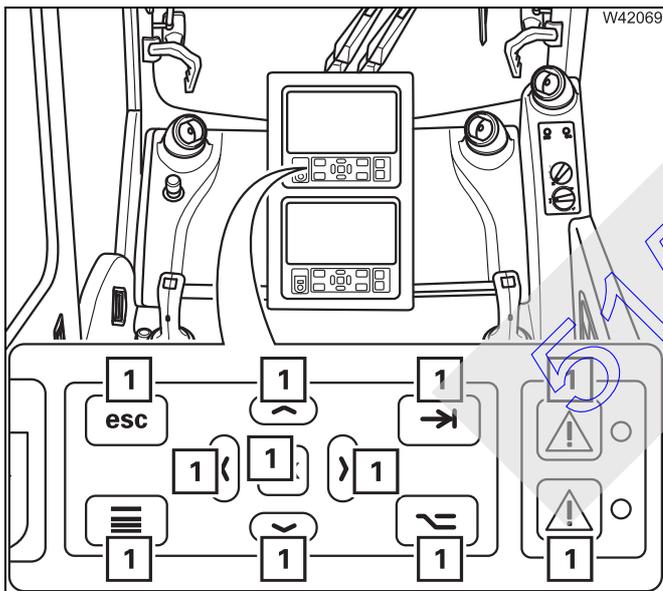
- Check whether you can hear a buzzer tone.



Risk of accidents in the event of faulty safety devices!

If the lamps or buzzer fail, notify **Grove Product Support** and have the fault rectified.

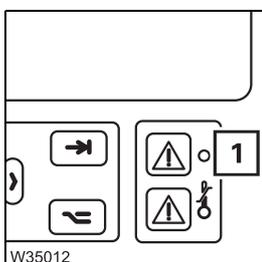
In the meantime, pay particular attention to the lamps in the event of a failure of the buzzer tone and vice versa.



Lamp test

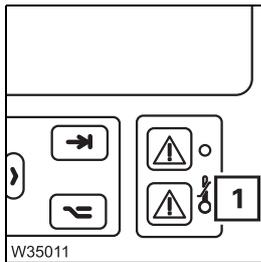
- Check that the lamps (1) light up after switching on the ignition.

If one or more lamps do not light up, contact **Grove Product Support**.



Brightness of the displays

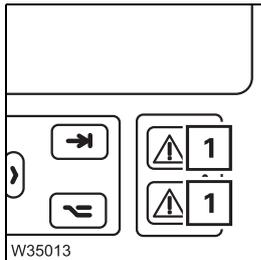
The sensors (1) on the *CCS* and *RCL* displays have no function and the brightness is not automatically regulated. The brightness of the display can be adjusted manually.;  p. 5 - 17.



Temperature on the display

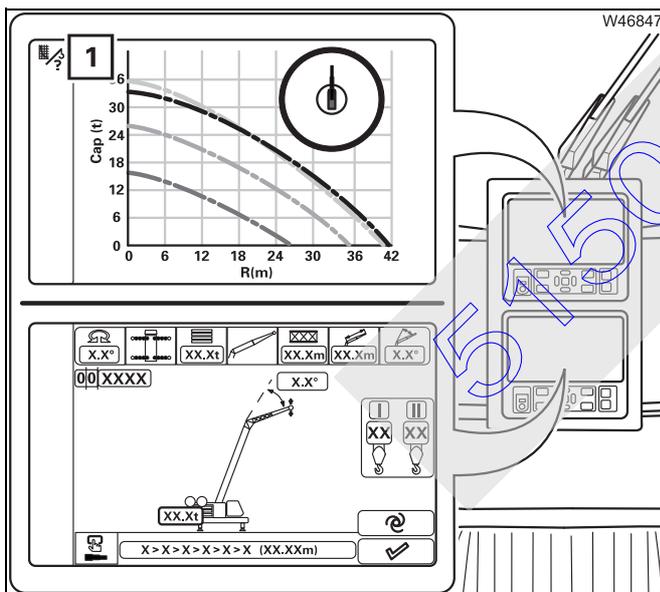
The brightness is reduced automatically if the temperature on a display is too high. If the temperature on the display exceeds around 60 °C (140 °F), then the display is automatically switched off; **▮▮▮▮** *Malfunctions at the CCS/RCL control units*, p. 14 - 22

Do not cover the sensors (1) and keep them clean to avoid contamination that could affect the brightness adjustment.



After completing the test program

- The lamps (1) light up.
- All power units are disabled.



The CCS display shows the last confirmed rigging mode and the RCL display shows the corresponding lifting capacity table.

The symbol (1) indicates that no rigging mode has been confirmed.

If the current rigging mode is displayed, then you can confirm the rigging mode; **▮▮▮▮** p. 11 - 41.

If the current rigging mode is not displayed, then you must enter the current rigging mode; **▮▮▮▮** p. 11 - 32.

11.4.2 Entering the rigging mode

Notes on input

You can enter the rigging mode for various different purposes.

– Input for crane operation

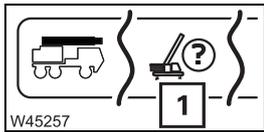
You enter the current rigging mode, select a telescope status according to the lifting capacity table and confirm the rigging mode to enable the crane functions.

– Input for operations planning

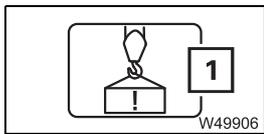
You enter a possible rigging mode to check the lifting capacities, slewing ranges and telescope statuses that are enabled with this rigging mode.



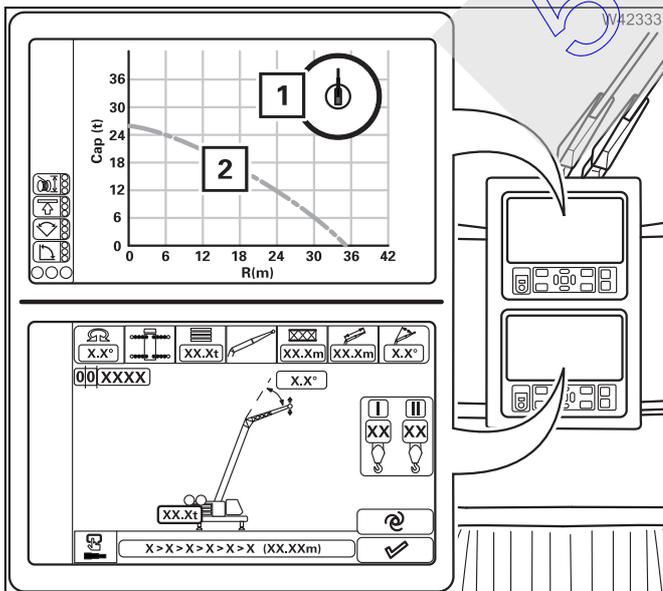
You can only change the rigging mode when all crane movements have stopped – control lever in the initial position – and if no load is lifted.



- Open the menu (1) – Rigging mode/Telescope status input menu.



If the symbol (1) is displayed, then a load is lifted and no new rigging mode can be entered.



The RCL display shows the *Lifting capacity table* menu.

The CCS display shows the *Enter rigging mode/telescope status* menu for the last rigging mode entered.

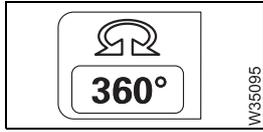
The rigging mode is entered at the CCS display – after each change, the RCL display shows the corresponding lifting capacity table (2) and the enabled slewing range (1).

The input options and the displays are based on the confirmed slewing range type.

First enter the slewing range type; p. 11 - 33.

Entering the slewing range type

Possible types are the *Standard* slewing range type and, with the corresponding equipment, the *MAXbase* slewing range type. Different lifting capacity tables apply depending on the entered slewing range type and these then impact further input of the rigging mode.



– *Standard* slewing range type

The standard lifting capacity tables provided in printed form with the truck crane apply. All rigging modes listed there can be entered.

- The rigging mode can be specified by entering the reeving and RCL code or via the individual components.
- In the case of individual components, the outriggers are always entered as complete outrigger span.
- In the case of individual components, the slewing range is entered according to the *Lifting capacity table*.



An overview of all released standard outrigger spans is provided in the section *Outriggers*;  *Supplied operating manual*.



– *MAXbase* slewing range type

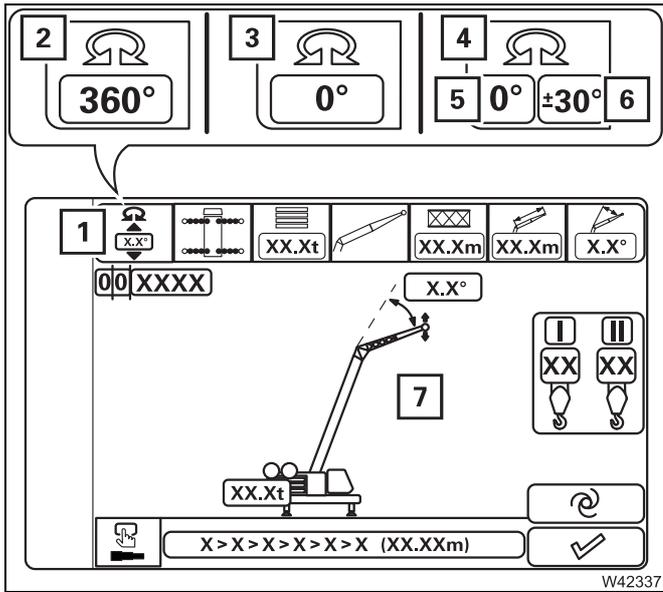
The MAXbase tables apply, which are only provided in digital form due to the wide range of configurations. All rigging modes listed there can be entered.

- The rigging mode is entered via individual components.
- The outriggers are entered as individual widths for each outrigger beam.
- The released slewing range is displayed, divided into four areas with different lifting capacities.



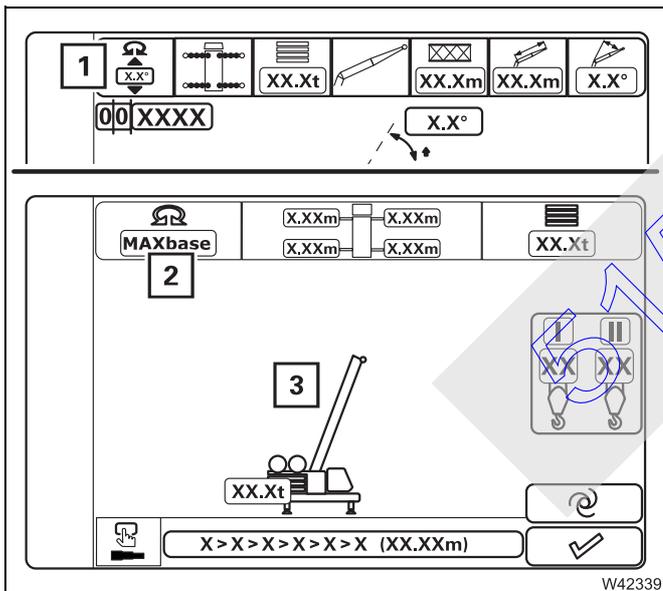
An overview of all released MAXbase outrigger spans is given in the section *Outriggers*;  *Supplied operating manual*.





For the *Standard* slewing range type

- Select and confirm the display (1).
- Select and confirm the symbol for the desired slewing range.
 - 2 360° slewing range
 - 3 Operating position 0° to the rear
 - 4 Limited slewing range
 - 5 Operating position – e.g. 0° to the rear
 - 6 Slewing range – e.g. ±30°
- After confirmation, the menu (7) is displayed for further input of the rigging mode.
 - Input via RCL code; ||||▶ p. 11 - 40.
 - Input via individual components; ||||▶ p. 11 - 34.

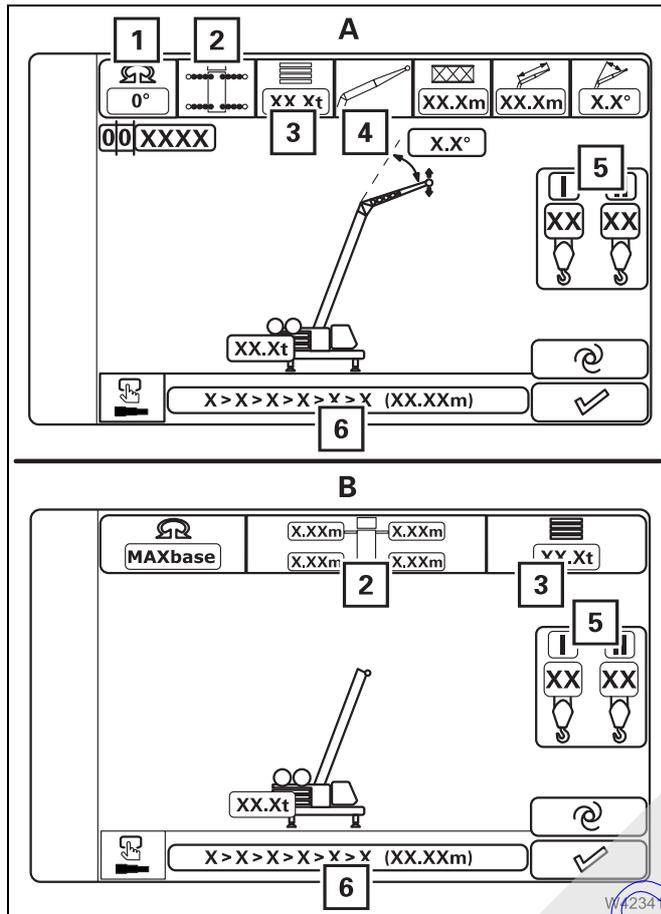


For the *MAXbase* slewing range type

- Select and confirm the display (1).
- Select and confirm the symbol (2).
- After confirmation, the menu (3) is displayed for further input of the rigging mode.
 - Enter the rigging mode; ||||▶ p. 11 - 34.

Entering individual components

Only released rigging modes can be selected. For this reason, the selection options for the individual components are based on the already entered and confirmed components.



The displayed menu depends on the slewing range type.

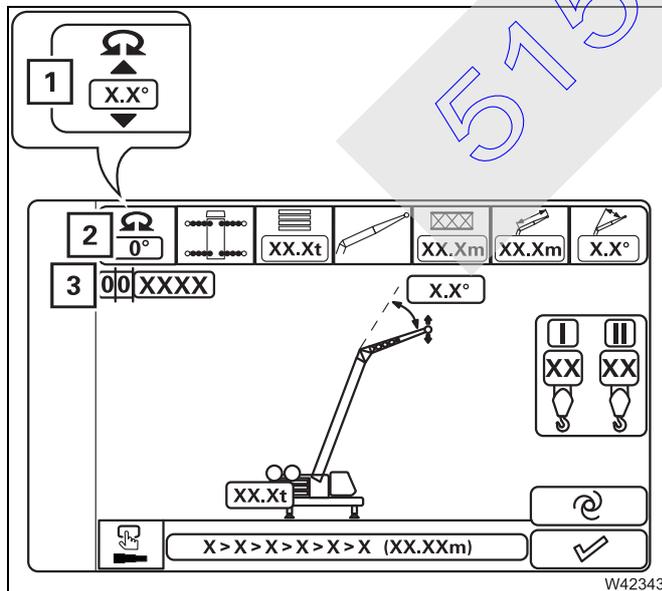
A Menu for *Standard*

B Menu for *MAXbase*

The selection is not limited if you adhere to this sequence when entering the data.

- 1 Slewing range – only with the *Standard* slewing range type
- 2 Outrigger span – can also be applied from outrigger span monitoring
- 3 Counterweight
- 4 Boom system – only with the *Standard* slewing range type
- 5 Reeving

After entering the rigging mode you can preselect a telescope status (6) and then confirm the rigging mode together with the displayed lifting capacity table.



Slewing range

- Select and confirm the display (1).
- Select the required slewing range (2), for example, operating position 0° to the rear.
- Confirm the selection. The corresponding RCL code (3) is displayed.

You can only confirm rigging modes for slewing ranges other than 360° ,

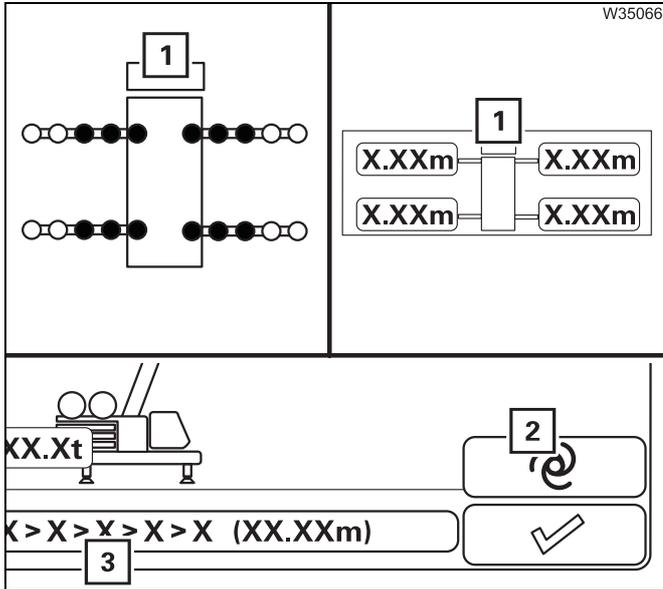
- When the selected operating position is reached and the slewing gear is switched off.
- When the superstructure is in the selected slewing range.

If necessary, first enter the 360° slewing range and slew the superstructure into the required position.



Outrigger span

You can apply the outrigger span provided by outrigger span monitoring or manually enter the outrigger span.



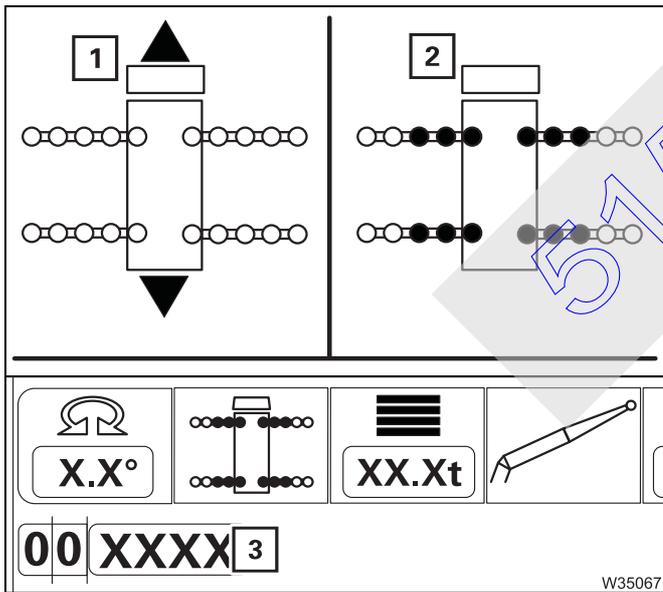
Applying the outrigger span

- Select and confirm the symbol (2).

The outrigger span provided by outrigger span monitoring is applied and shown on the current display (1).

At the same time, the current telescoping is applied and shown on the display (3).

- Always check that the currently rigged outrigger span is displayed before confirming the rigging mode.



Entering the outrigger span (Standard)

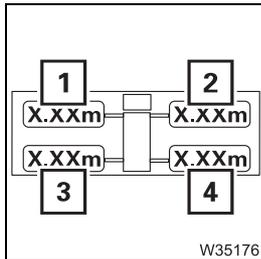
- Select and confirm the display (1).
- Select the rigged outrigger span, e.g. symbol (2) for 8.030 m x 5.900 m (26.3 ft x 19.4 ft).
- Confirm the selection.
The selection and the corresponding RCL code (3) are displayed.

If the outrigger span provided by outrigger span monitoring deviates from the entered value then a query is displayed after confirming the rigging mode; see p. 11 - 42.

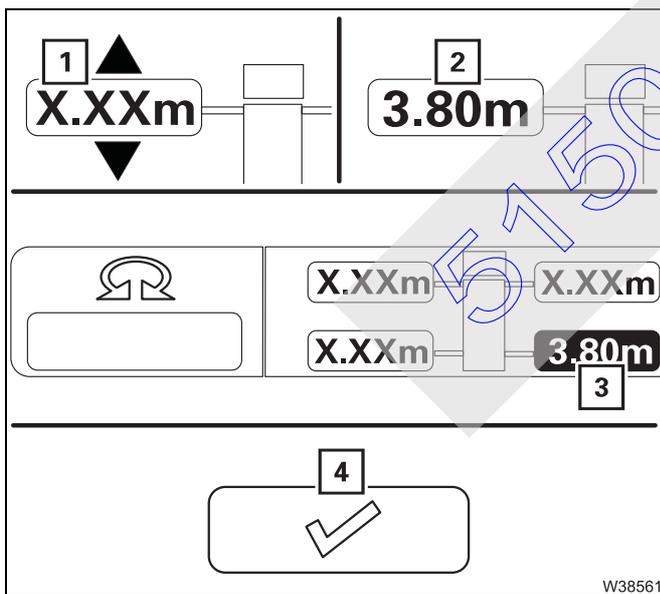
Entering the outrigger span (*MAXbase*)

The outrigger spans are entered as individual widths. If the *Lifting capacity table* specifies an overall width then select the corresponding individual width.

Overall width	Individual width
7.600 m (25.0 ft)	3.800 m (12.5 ft)
6.700 m (22.0 ft)	3.350 m (11.0 ft)
5.900 m (19.4 ft)	2.950 m (9.7 ft)
5.100 m (16.8 ft)	2.550 m (8.4 ft)
2.500 m (8.2 ft)	1.250 m (4.1 ft)



If changing an outrigger span would result in an impermissible outrigger span, then the selection is disabled for this outrigger beam. If necessary, you must re-enter the outrigger spans in the order (1) to (4).



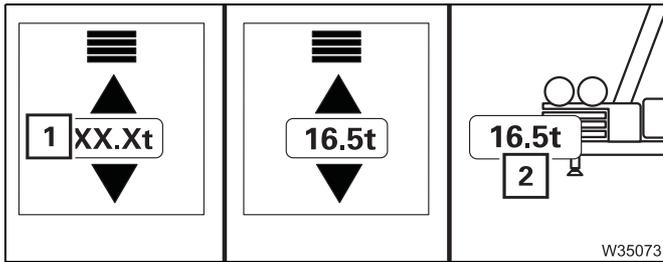
- Select and confirm the display (1) for the desired outrigger beam.
- Select the rigged individual width (2), e.g. 3.800 m (12.5 ft).
- Confirm the selection.

If the outrigger span measured by outrigger span monitoring differs from the entered value then the value (3) is displayed in red.

The symbol (4) turns grey – the rigging mode cannot be applied.

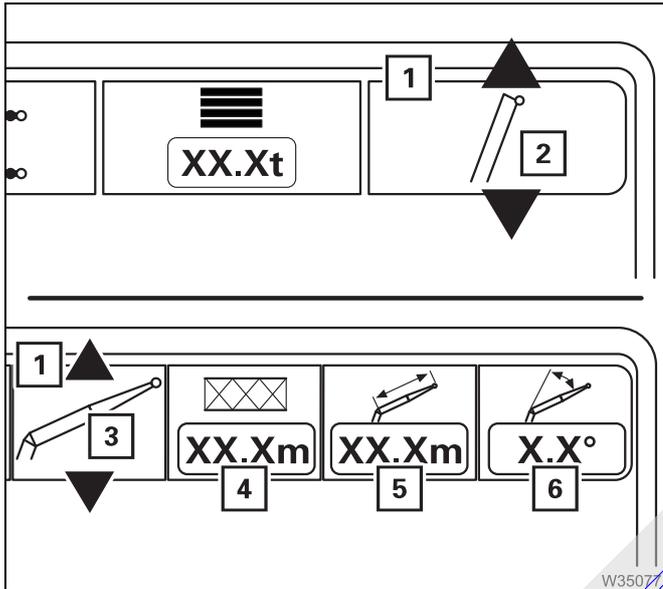
- In this case, rig the necessary outrigger span.





Counterweight

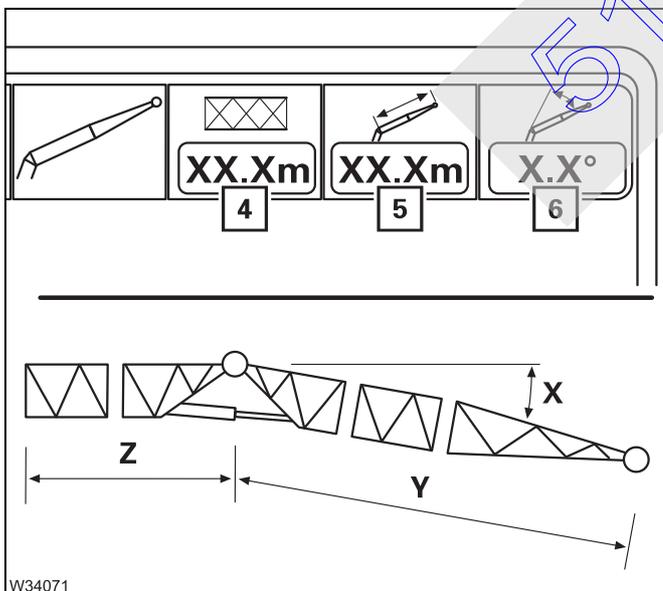
- Select and confirm the display (1).
- Select the rigged counterweight combination, for example, 16.5 t.
- Confirm the selection.
The display (2) shows the entered counterweight combination.



Boom system

For the *Standard* slewing range type only.

- Select and confirm the display (1).
- Select the symbol for the rigged boom system.
 - 2 Main boom
 - 3 Lattice extension
- Confirm the selection.
When selecting *Lattice extension* additional displays (4) to (6) are shown – selection and confirmation is performed in the same manner as with display (1).



– Display (4)

- Select and confirm the current length (Z) before the angle.

– Display (5)

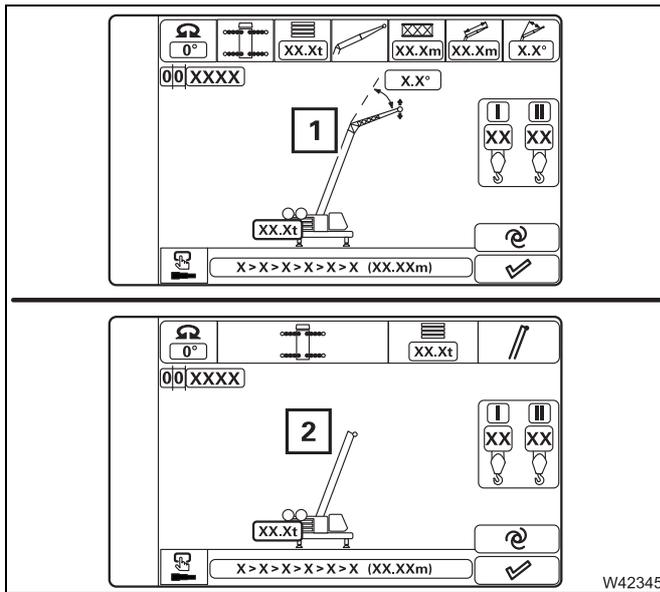
- Select and confirm the current length (Y) after the angle.

– Display (6)

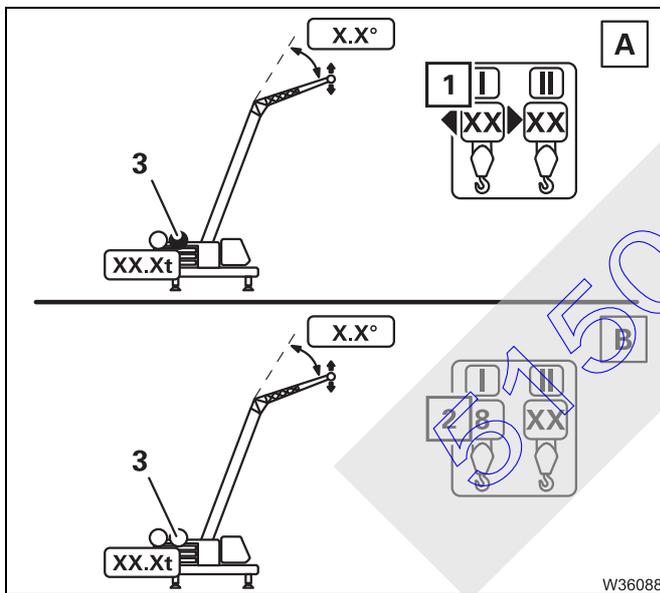
Only for inclinable lattice extensions.

- Select and confirm the currently rigged angle (X).

W34071



The confirmed boom system (1) or (2) is displayed.



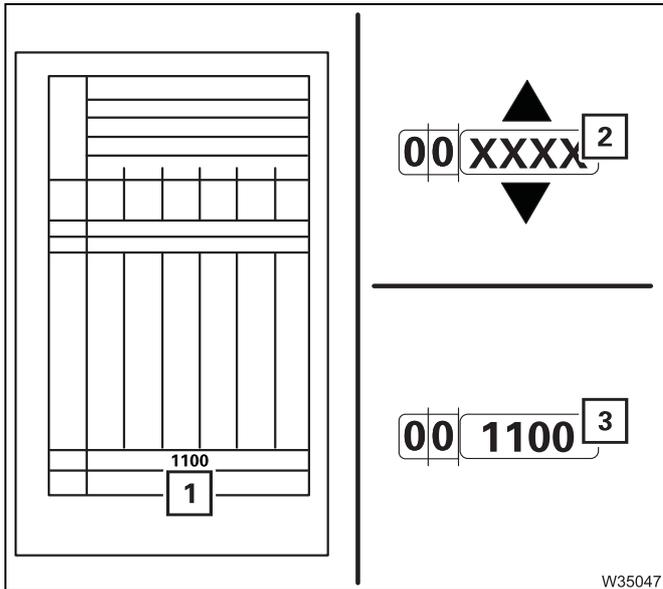
Reeving

- (A) – Select and confirm the display for the hoist to be used for lifting the load, e.g. display (1) for the main hoist – symbol (3) is orange.
- (B) – Select the currently rigged reeving (2), e.g. 8-fall.
- Confirm the selection and leave the display – symbol (3) grey.



Entering the RCL code

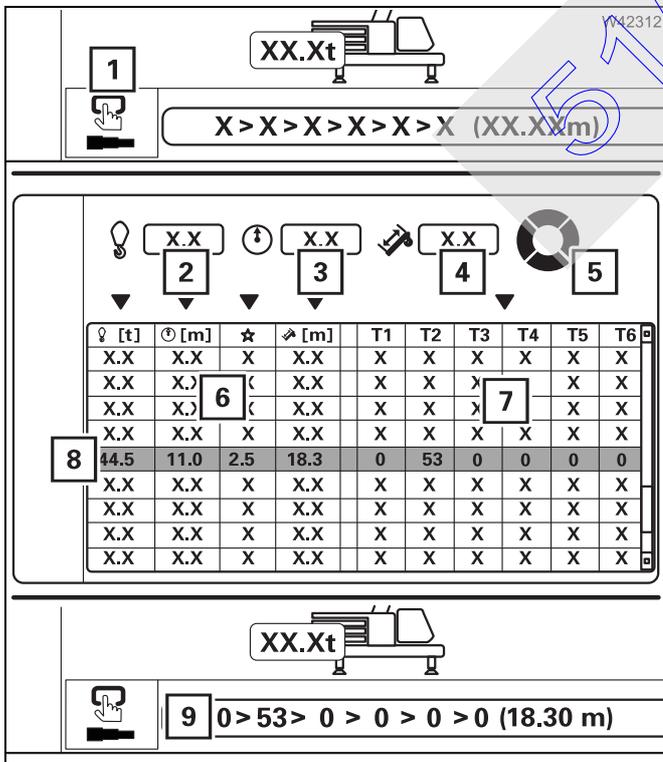
You must enter the RCL code for the rigging mode according to the *Lifting capacity table*.



- Refer to the *Lifting capacity table* for the current rigging mode. The corresponding RCL code (1) is given at the bottom of the table (e.g. 1100).
- Select and confirm the symbol (2).
- Select the necessary RCL code (3), e.g. 1100.
- Confirm the selection.

The other displays show the corresponding rigging mode.

11.4.3 Pre-selecting telescoping



- First enter the current rigging mode.
- Select and confirm the symbol (1). The *Pre-select telescoping* menu opens.
- Enter the desired parameters (2); see p. 9 - 58. The table shows all permissible telescoping (4) and the corresponding parameters (3) for the entered rigging mode and entered parameters.
- Select and confirm the line with the desired telescope status, for example, line (5).

The *Enter rigging mode/telescope status* menu opens – the preselected telescope status (6) is displayed.

11.4.4 Confirming the rigging mode and lifting capacity table

You must confirm the rigging mode together with the displayed lifting capacity table before starting crane operation. Some parts of the procedure are different, depending on the slewing range type entered.

Standard slewing range type

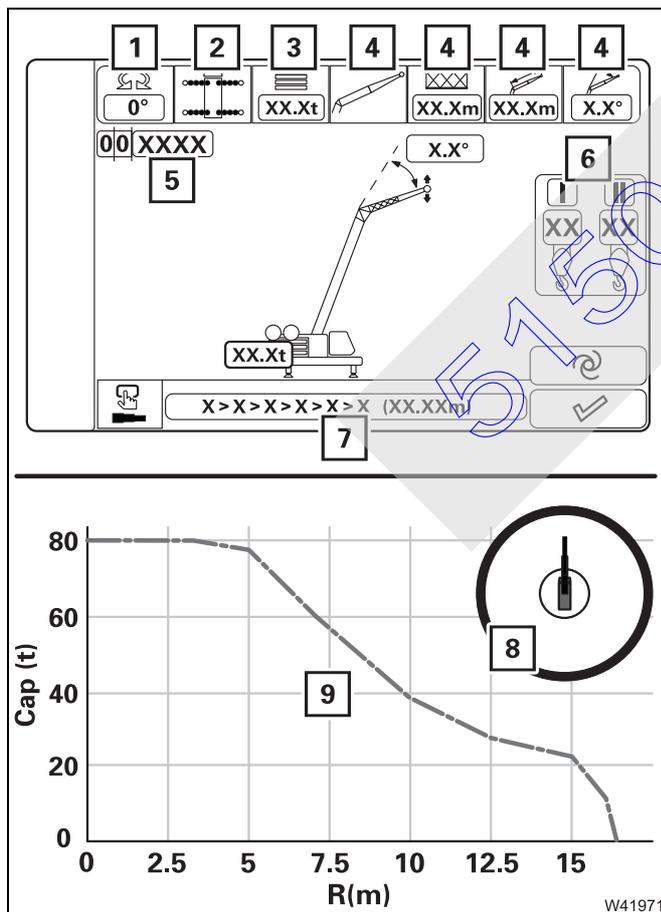
If the *MAXbase* slewing range type was entered; p. 11 - 43.

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



Risk of accidents due to an incorrectly set RCL!

If the current rigging mode deviates 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 certainly be the result.

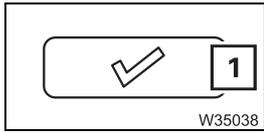


- Check:
 - 1 The slewing range for the planned job
 - 2 The rigged outrigger span
 - 3 The rigged counterweight
 - 4 The rigged boom system
 - 6 The number of reeved hoist rope lines
- Correct any incorrectly entered rigging modes if necessary.

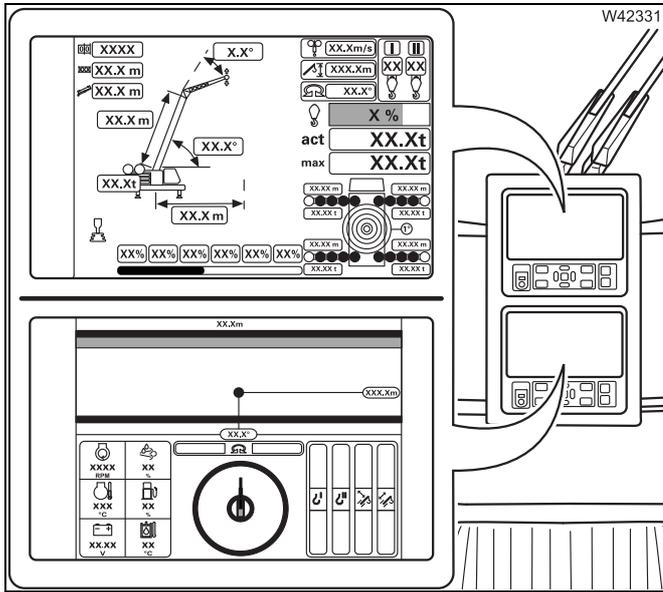
The displayed lifting capacity table (9) applies to the RCL code (5) in the corresponding slewing range (8) and to the preselected telescope status (7).

If the actual rigging mode is displayed correctly and the planned operation can be performed within the displayed working range (8) then you can confirm the rigging mode.





- Select and confirm the symbol (1).



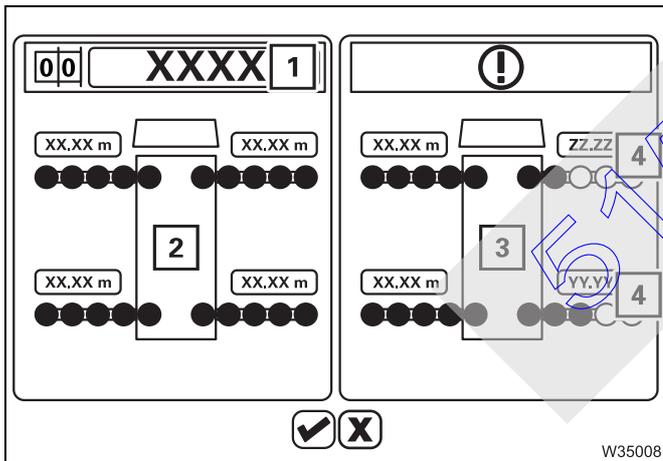
If the rigging mode is permitted

The rigging mode is applied together with the displayed lifting capacity table.

The RCL display shows the *Monitoring* menu.

The CCS display shows the *Start* menu.

The crane movements are enabled if there is no error; Checks before crane operation, p. 11 - 45.



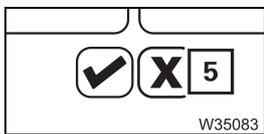
If a deviation in the outrigger span is detected

A query menu opens.

The display (2) shows the outrigger span corresponding to the RCL code (1).

The display (3) shows the entered outrigger span – deviating outrigger spans (4) are red.

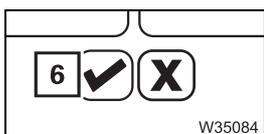
- Check the currently rigged outrigger span.



– If an incorrect outrigger span is rigged

- Select and confirm the symbol (5) – the menu closes and the rigging mode is not applied.

- Rig the required outrigger span.

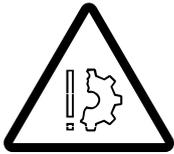


– If the necessary outrigger span is rigged

- Select and confirm the symbol (6).

The rigging mode is applied.

- Have outrigger span monitoring checked after finishing operations.



Risk of accidents due to incorrectly supported truck crane!

A shutdown is not carried out in the standard case 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 inadequate outrigger span.

MAXbase slewing range type

If the *Standard* slewing range type was entered; see p. 11 - 41.

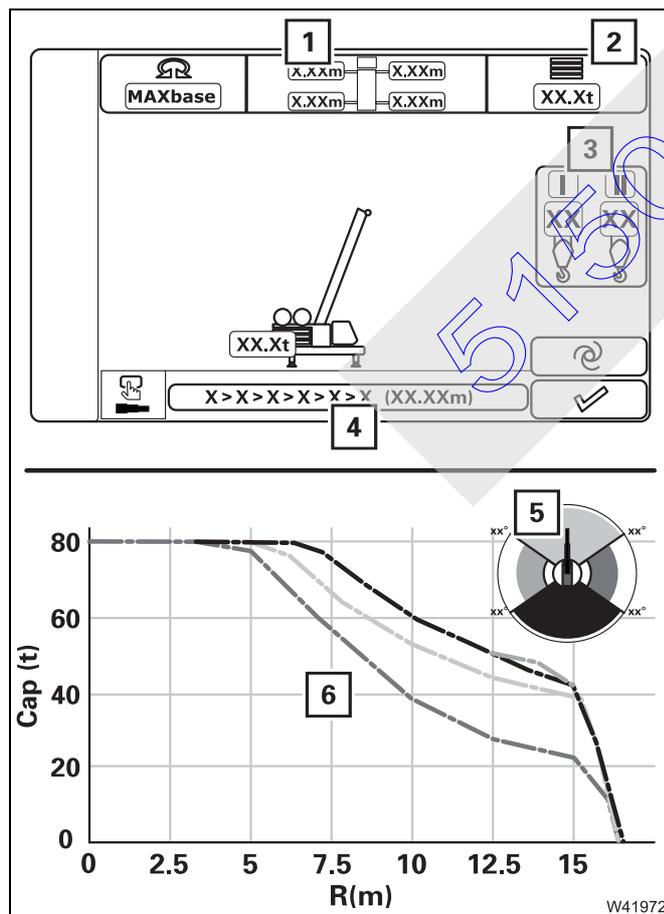
- Check that the current rigging mode of the truck crane corresponds to the displayed rigging mode.



Risk of accidents due to an incorrectly set RCL!

If the current rigging mode deviates 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*.

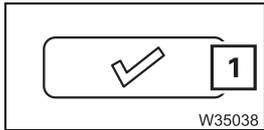
Overloading and accidents will certainly be the result.



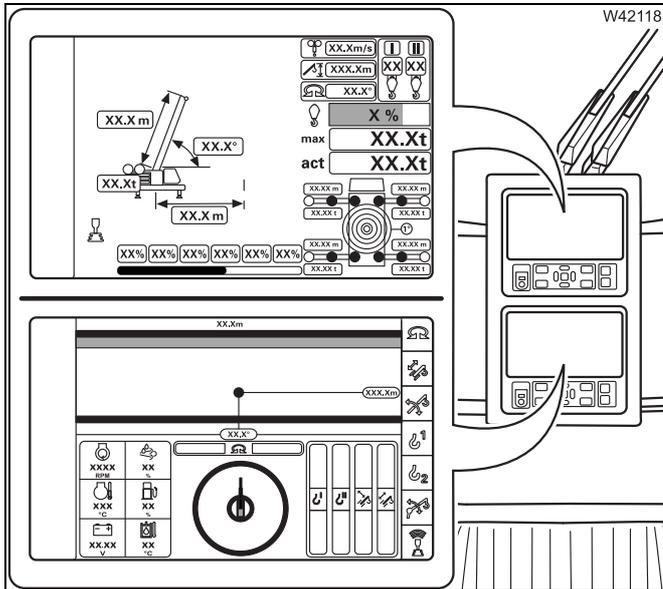
- Check:
 - 1 The rigged outrigger span
 - 2 The rigged counterweight
 - 3 The number of reeved hoist rope lines
- Correct any incorrectly entered rigging modes if necessary.

The displayed lifting capacity tables apply to the preselected telescope status (4) in the corresponding slewing ranges (5).

If the current rigging mode is displayed and the planned operations are within the displayed operating ranges (6), then you can confirm the rigging mode.



- Select and confirm the symbol (1).



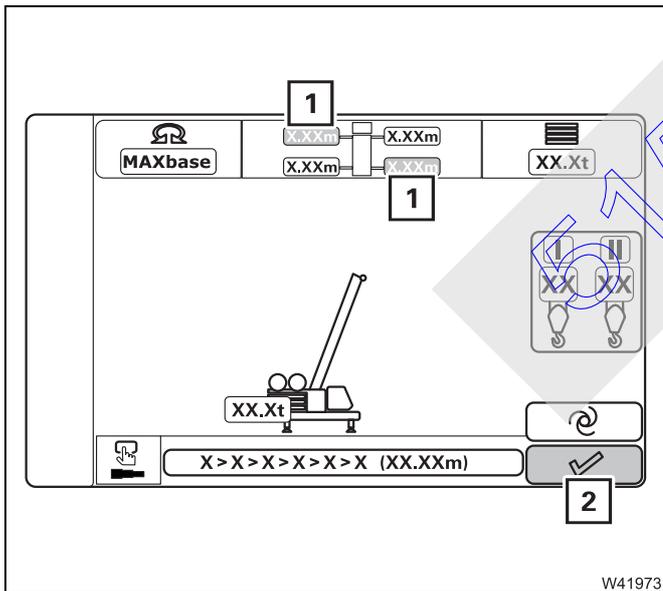
If the rigging mode is permitted

The rigging mode is applied together with the displayed lifting capacity table.

The RCL display shows the *Monitoring* menu.

The CCS display shows the *Start* menu.

The crane movements are enabled if there is no error; Checks before crane operation, p. 11 - 45.



If a deviation in the outrigger span is detected

The symbol (2) is grey.

The rigging mode cannot be confirmed, crane operation is not enabled.

If the value for an outrigger span is red then a deviating outrigger span has been detected, for example, for the values (1).

- Rig the required outrigger spans.

11.4.5

Checks before crane operation

Monitoring menu

Crane operation is only enabled when the *Monitoring* menu is open.

The menu is opened and exited automatically only, as a reaction to operation on the *CCS* display.

- After confirming a permissible rigging mode, the *Monitoring* menu opens;
 p. 11 - 42.
- After opening the *Enter rigging mode/telescope status* menu, the *Monitoring* menu is exited and the *RCL* display opens the *Lifting capacity table* menu;
 p. 11 - 32.

Checking the rigging mode



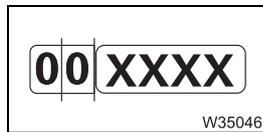
- Check that the *Monitoring* menu displays the current rigging mode of the truck crane.

Risk of accidents due to an incorrectly set RCL!

If the current rigging mode deviates 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 certainly be the result.

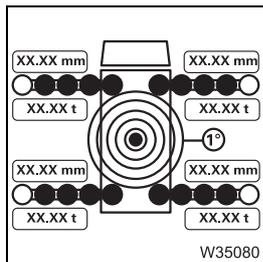
- Check that the displays listed here show the current rigging mode and correct the rigging mode if necessary.



RCL code display

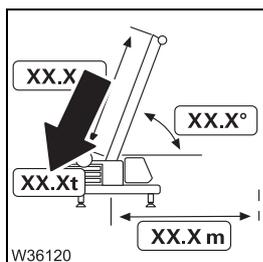
For the *Standard* slewing range type only.

Shows the *RCL* code corresponding to the confirmed rigging mode according to the *Lifting capacity table*.



Outrigger span display

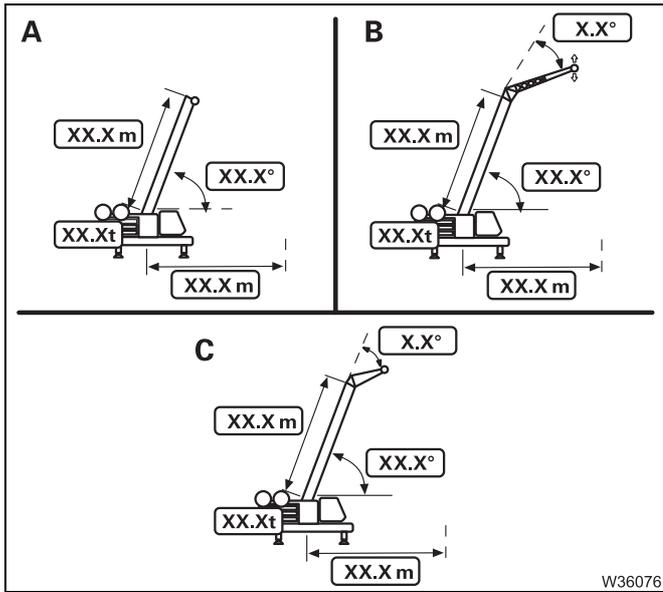
- Numerical values – show the individual widths of the outrigger beams for the confirmed rigging mode, in metres (m) or feet (ft).
- Visual display – shows the required outrigger span in **orange**.
 For the *Standard* slewing range type only – the display is **red** when the outrigger span provided by outrigger span monitoring deviates from the required outrigger span.



Counterweight display

Shows the required counterweight combination in tons (t) for the confirmed rigging mode.



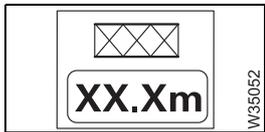


Boom system display

Shows the boom system corresponding to the confirmed rigging mode.

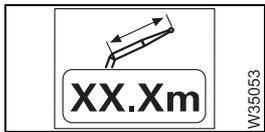
- A Main boom
- B Swing-away lattice extension¹⁾ / boom extension¹⁾
- C Heavy load lattice extension¹⁾

¹⁾ For the *Standard* slewing range type only.
 The lattice extension must be connected to the power supply.



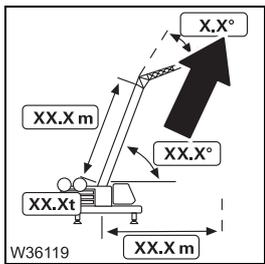
Lattice extension display – length before the angle

Shows the required lattice extension length before the angle according to the confirmed rigging mode – in metres (m) or feet (ft).



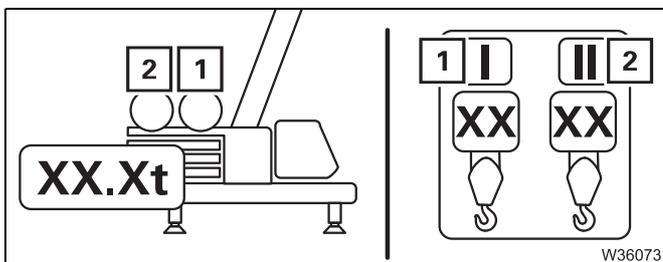
Lattice extension display – length after the angle

Shows the required lattice extension length after the angle according to the confirmed rigging mode – in metres (m) or feet (ft).



Angle of lattice extension display

Only for inclinable lattice extensions
 Shows the required angle of the lattice extension for the confirmed rigging mode.



Display of reeving used

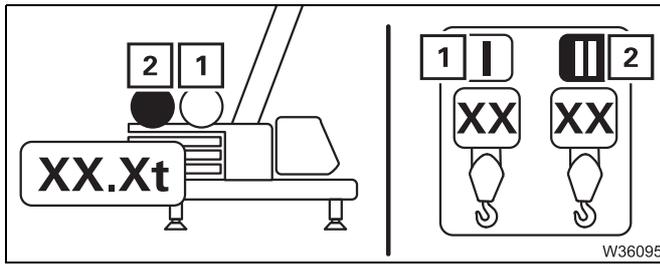
- 1 Main hoist
- 2 Auxiliary hoist

Orange: Used¹⁾
Grey: Not used

¹⁾ The value on the *Maximum load* display applies to this reeving.
 You may need to switch over the display; see p. 11 - 47.

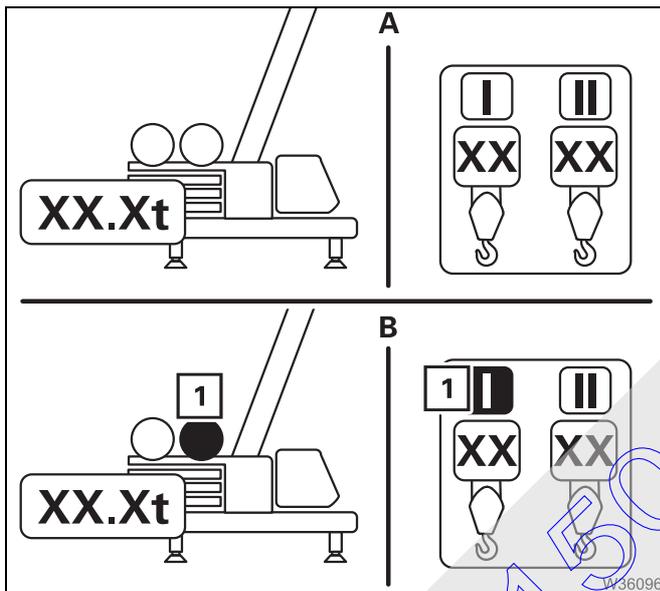
Hoist check

You must check that the RCL uses the correct reeving data.
The RCL always uses the reeving data for the first hoist to be switched on.



- Check the symbol (1) or (2) for the hoist with which you want to lift the load. The symbol must be **orange**.

If the symbol is **grey**, for example, the symbol (1) for the main hoist, then you must switch over the display.



Switching over the display

- (A) – Switch off both hoists – both symbols turn grey.
- (B) – Switch on the hoist with which you want to lift the load. The corresponding symbol turns **orange**, for example, the symbol (1) for the main hoist.



Risk of accidents due to incorrectly entered reeving

Check the displayed reeving each time after switching over and enter the current reeving if necessary.

In this way, you prevent the RCL making calculations based on an incorrect reeving value and the truck crane becoming overloaded or overturning.

If you want to also lift a load with the other hoist during subsequent crane operation then you must first switch over the display accordingly.

Blank page

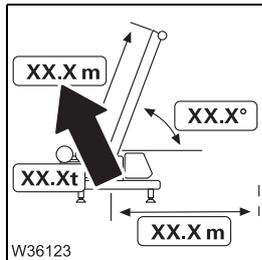
51508035

11.4.6

Displays during crane operation

Various different information is shown on the *RCL* display and *CCS* display. This section only describes the displays that change during crane operation.

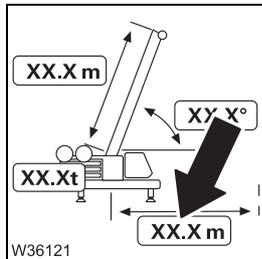
On the *RCL* display



All displays are shown in the *Monitoring* menu.

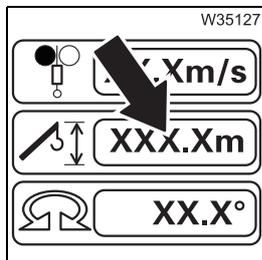
Current main boom length display

Shows the current main boom length in metres (m) or feet (ft).



Current working radius display

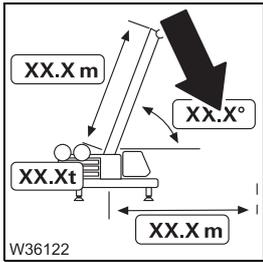
Shows the current working radius = horizontal distance between the turntable axis and hook block axis in metres (m) or feet (ft). The displayed value is calculated on the basis of the telescoping and the main boom or lattice extension angle.



Current overall height display

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 supporting cylinders on the largest outrigger span. The value is displayed either in metres (m) or in feet (ft), depending on the setting.

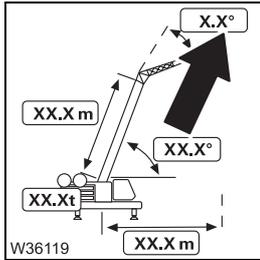




Current main boom angle display

Shows the current main boom angle in relation to the horizontal. Angles below the horizontal are displayed with a minus sign, for example, -3° . A luffing jib is connected.

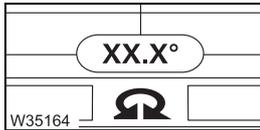
Shows the current angle between the lattice extension and main boom in degrees ($^\circ$).



Current lattice extension inclination display

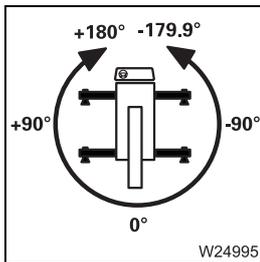
A luffing jib is connected.

Shows the current angle between the lattice extension and main boom in degrees ($^\circ$).

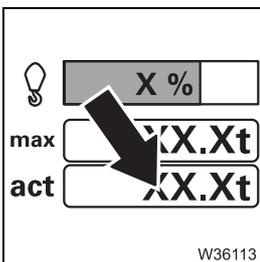


Current slewing angle display

Shows the angle of the current superstructure position.



- 180° means the superstructure is slewed to the front.
- 0° means the superstructure is slewed to the rear.
- A full turn from this operating position is divided into two semi-circles.
- When slewing **clockwise** the slewing angle is displayed as a **positive** value (0° to $+180.0^\circ$).
- When slewing **anticlockwise** the slewing angle is displayed as a **negative** value (0° to -179.9°).



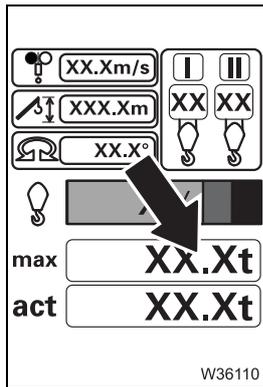
Currently raised load display

Shows the sum of the payload + lifting gear + hook block + reeved hoist rope, that would not be required for lifting the load.

Accuracy of the display: $\pm 5\%$ of the actual load

Values are displayed in tons (t) or in kilopounds (klbs).

Example: 55.2 klbs are equivalent to 55,200 lbs.

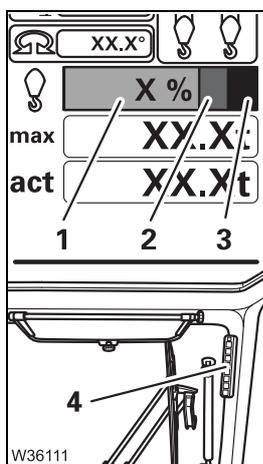


Maximum load display

Shows the maximum load that can be lifted in the current rigging mode with the current working radius.

Values are displayed in tons (t) or in pounds (lbs) – for the confirmed rigging mode.

The corresponding symbol (I) or (II) flashes when the lifting capacity is reduced due to the entered reeving.



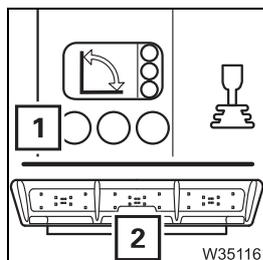
Current degree of utilisation display

The degree of utilisation shows the weight of the current load as a percentage of the maximum possible load. (degree of utilisation = $100 \times \text{current load} / \text{maximum load}$).

The display has three coloured ranges:

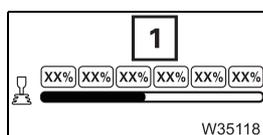
- 1 Green:** 0 - 90%
- 2 Yellow:** about 90 - 100% – early warning
- 3 Red:** greater than 100% – shutdown

Depending on the equipment, the degree of utilisation is shown on a display (4) with coloured lamps.



RCL status display

The green, yellow and red displays (1) are identical to the status displays (2) on the outside of the truck crane.



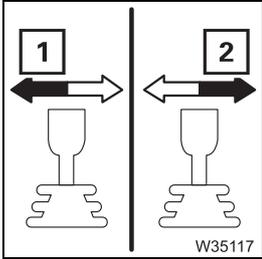
Current telescoping display

The display (1) shows the current telescoping – from left to right for telescopic sections I to VI. When the display is **orange** during telescoping, the telescoping cylinder head is in this telescopic section.



Telescoping cylinder position display

The bar (1) shows the telescoping length of the telescoping cylinder – the total bar length corresponds to 100%.

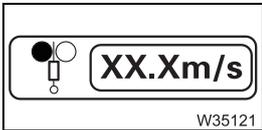


Telescoping direction display

The display is only active when telescoping with teleautomation and shows the direction in which you must move the control lever for which telescoping direction.

- 1 Start with *Retract*
- 2 Start with *Extend*

▣▣▣▣▶ *Telescoping with semi-automatic telescoping, p. 11 - 112*



Current wind speed display

Shows the current wind speed in metres per second (m/sec) or miles per hour (mph). The display flashes in colour in the vicinity of the maximum permissible value (v_{max}).

- Yellow:** about 90 - 100% of v_{max} reached
- Red:** v_{max} exceeded

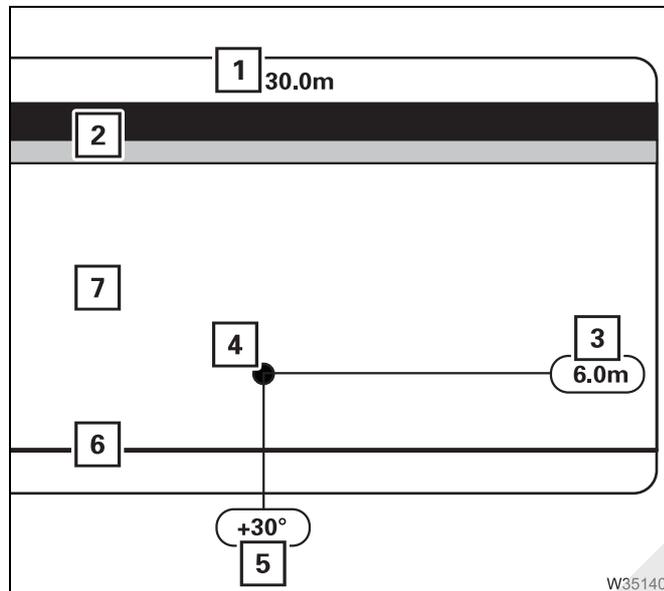
On the CCS display

After confirming a permissible rigging mode, the *Start menu* opens automatically.

Standard slewing range type

If the *MAXbase* slewing range type was entered;  p. 11 - 55.

The RCL display differs according to the confirmed slewing range.



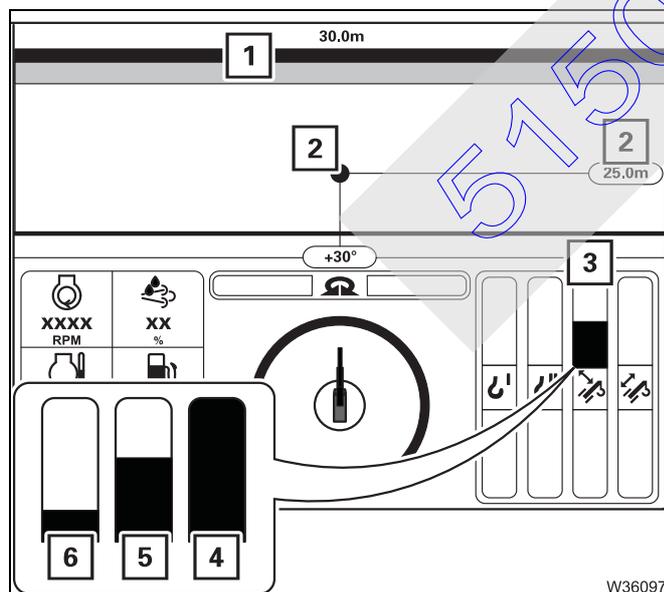
360° slewing range

The diagram (7) covers the entire width. The height of the diagram corresponds to the maximum permissible working radius (1), e.g. 30 m (100 ft).

The current position of the boom head is indicated by the symbol (4) and defined by two displays.

- 3** Current working radius, e.g. 6 m (20 ft)
- 5** Current slewing angle, e.g. +30°

The shutdown range for the maximum working radius (2) is shown in colour and – if active – the shutdown range for the minimum working radius (6) is displayed.



– When telescoping or derricking

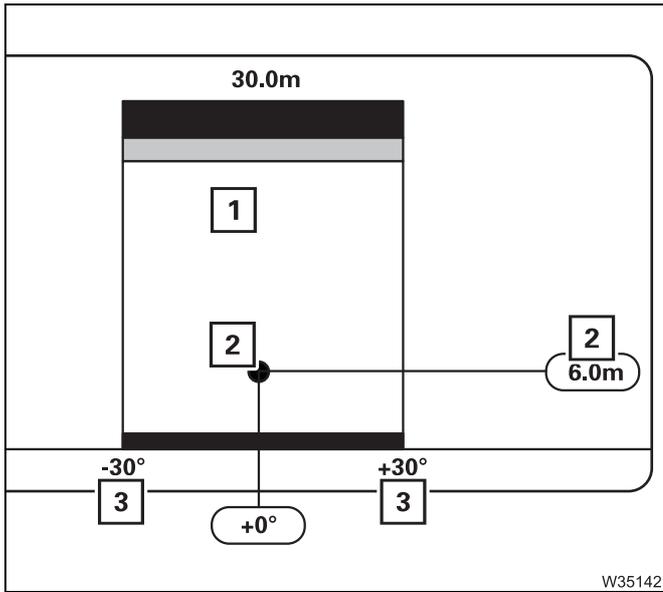
The displays (2) move up and down to show the current working radius, e.g. 25 m (20 ft).

In a shutdown range (1) the movement towards the shutdown limit is continuously reduced until a standstill is reached.

The corresponding display (3) shows the current speed reduction, e.g. for lowering the boom.

- 4 Green:** 26% to 100%
- 5 Yellow:** 11% to 25%
- 6 Red:** 0% to 10%





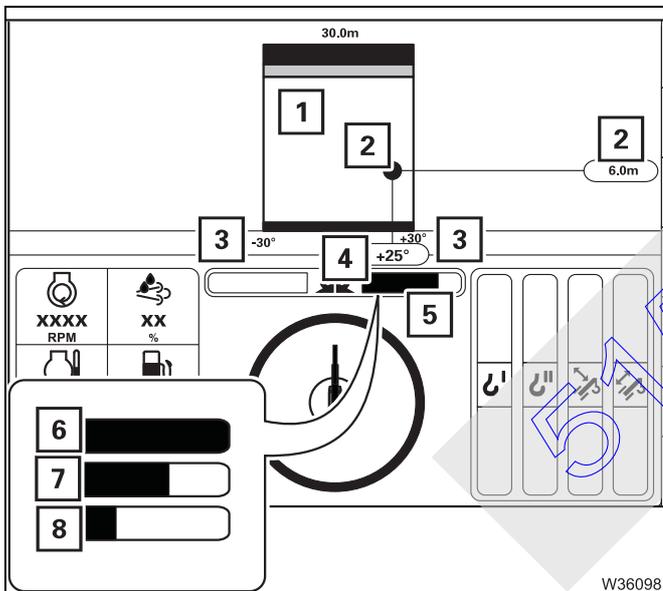
Limited slewing range

The diagram (1) shows the released slewing range and the slewing range limits (3), for example, +30° and -30°.

- When telescoping or derricking

The diagram (1) remains at the current position. The displays (2) move up or down.

Movements leading to a shutdown limit are reduced in the same manner as for the 360° slewing range; see p. 11 - 53.



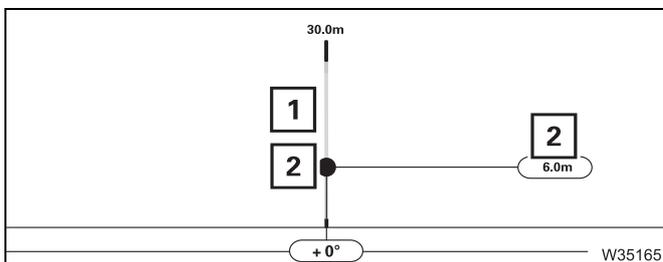
- When slewing

The displays (2) and (4) remain at the current position. The diagram (1) and the displays (3) move to the left or right.

Immediately before the slewing range limits (3), the movement leading to a shutdown limit is continuously reduced until a standstill is reached.

The corresponding display (5) shows the current speed reduction, e.g. for slewing to the right.

- 6 Green:** 26% to 100%
- 7 Yellow:** 11% to 25%
- 8 Red:** 0% to 10%



Operating position

The diagram (1) shows the working range, e.g. 0° to the rear.

- When telescoping or derricking

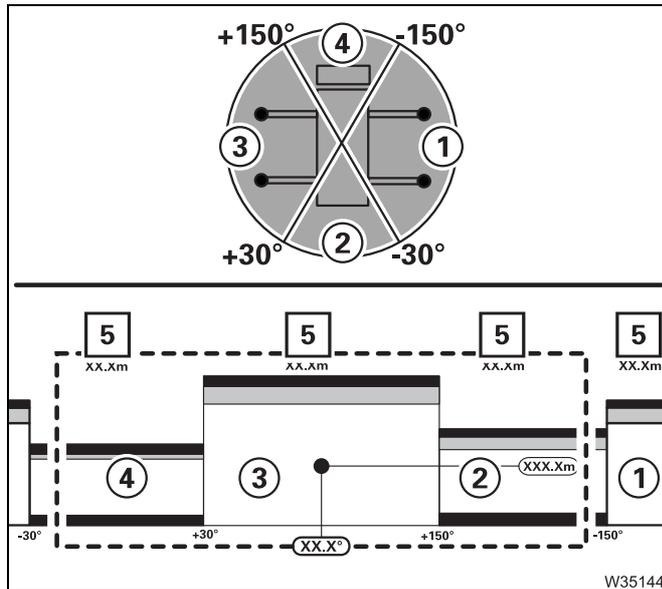
The diagram (1) remains at the current position. The displays (2) move up or down.

Movements leading to a shutdown limit are reduced in the same manner as for the slewing ranges.

- Slewing is disabled.

MAXbase slewing range type

If the *Standard* slewing range type was entered;  p. 11 - 53.



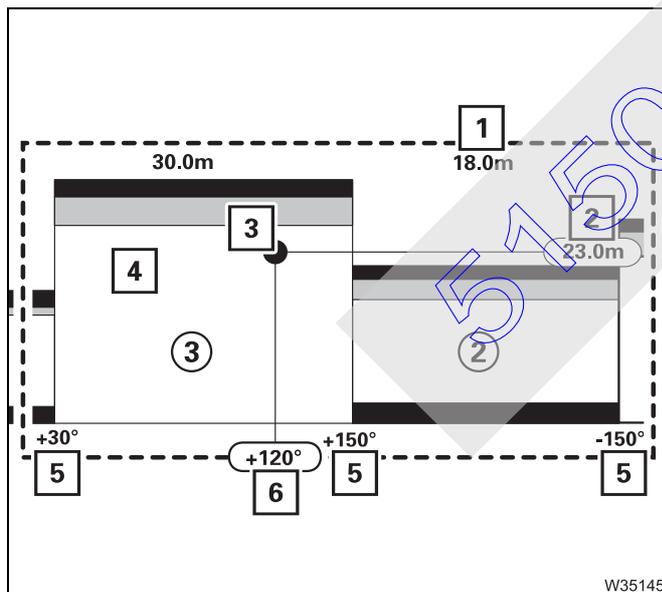
Display of the slewing ranges

The RCL display shows the four enabled slewing ranges ① to ④ in a diagram with four ranges. The maximum permissible working radius (⑤) is shown for each slewing range.

Assuming the confirmed lifting capacity table applies to the angular ranges

- $\pm 60^\circ$ to the left/right
- $\pm 30^\circ$ to the front/rear

According to the definition for the slewing angle display (0° to the rear) the slewing range limits would be $-30^\circ/+30^\circ/+150^\circ$ and -150° .



The RCL display shows an angular range of about 200° . The range of the diagram is always in the middle, corresponding to the current slewing angle (⑥), for example, the range ③ for 120° .

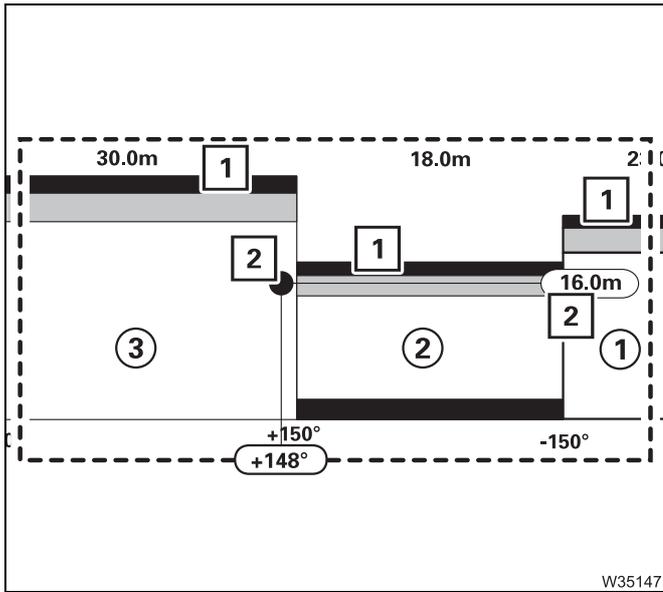
- When slewing
The displays (②), (③) and (⑥) remain at the current position. The diagram (④) and the displays (⑤) move to the left or right.

If the slewing movement would lead into a slewing range (①) in which the maximum permissible working radius is smaller than the current working radius (②), then the movement is continuously reduced until a standstill is reached.

The speed reduction takes place in the same way as for the standard slewing range type;

 p. 11 - 54.





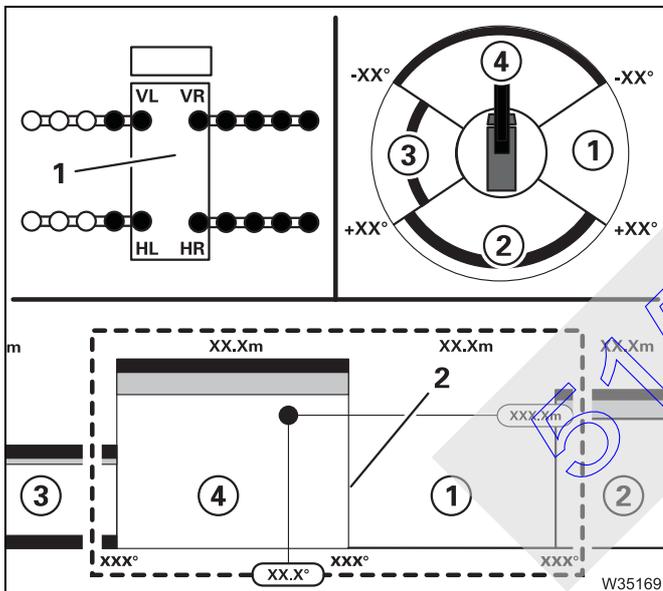
To enable the slewing movement, you must reduce the working radius correspondingly, e.g. to 16 m (52.5 ft) for slewing into the slewing range ②.

– When telescoping or derricking

The diagram remains at the current position. The displays (2) move a corresponding distance up or down.

In a shutdown range (1) a movement towards the shutdown limit is continuously reduced until a standstill is reached.

The speed reduction takes place in the same way as for the standard slewing range type;
 ■▶ p. 11 - 54.



Special case – disabled range

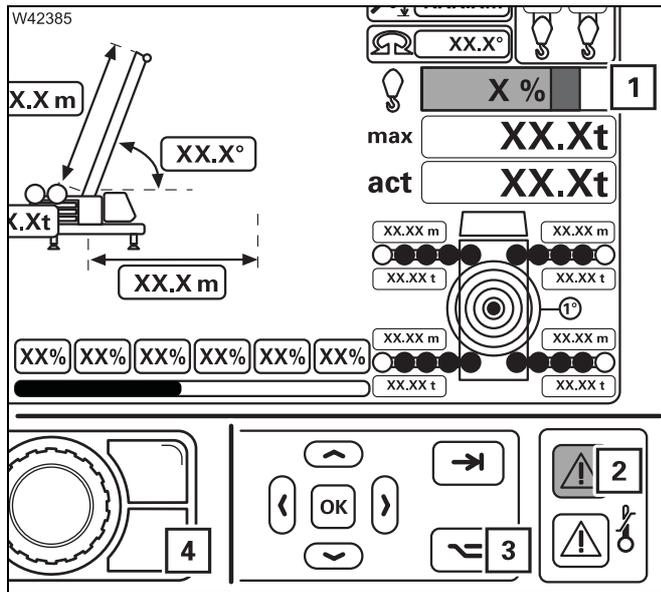
A slewing range can be disabled in certain cases.

If for example, an outrigger span (1) is rigged and operations are to be performed on the right side, with large counterweight combinations, a small working radius and a small load, stability towards the rear may no longer be given within the slewing range ①.

The range ① in the diagram would then be empty and slewing out of the range ④ would be stopped at the range limit (2).

In this case you can increase the working radius – provided this is permitted by the enabled working range and the external conditions. If the required stability is then given, the slewing range ① is enabled and displayed.

11.4.7 RCL early warning



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

- An intermittent buzzer tone sounds. After five seconds, you can switch off the buzzer tone using button (3) or (4).
- The lamp (2) lights up.
- The display (1) is in the yellow range.



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

11.4.8 RCL shutdown

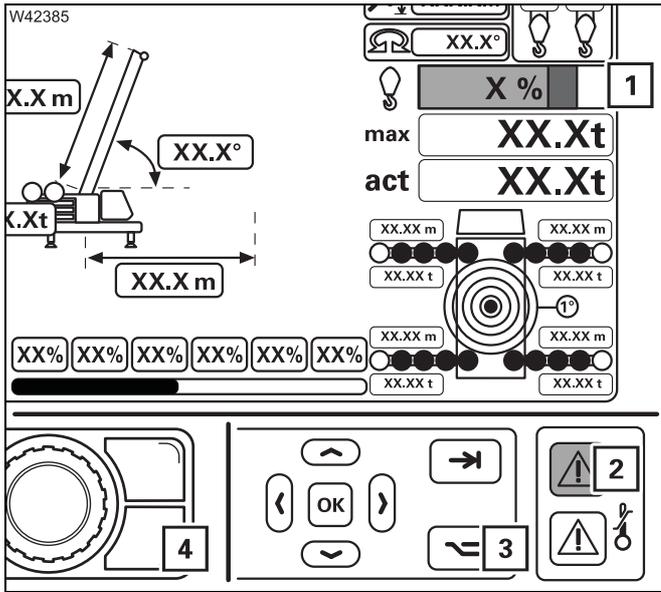
There are different types of RCL shutdowns

- Shutdown due to overload
- Shutdown due to a warning message; ■■■► p. 14 - 8.
- Shutdown due to working range limiter; ■■■► p. 11 - 151.

Shutdown due to overload

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





- All crane movements that increase the load moment are switched off.
- A continuous buzzer tone sounds. After five seconds, you can switch off the buzzer tone using button (6) or (7).
- The lamps (4) and (5) light up.
- The display (1) is in the red range.
- The value on display (2) is greater than or equal to the value on display (3).

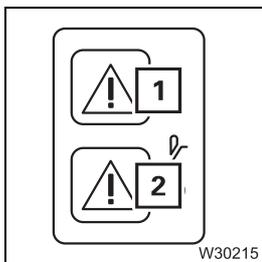
Cancelling a shutdown

- Switch 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 load	Lower load
Lower main boom	Raise main boom ¹⁾
Extend main boom	Retract main boom ¹⁾
Slew anti-clockwise	Slew clockwise
Slew clockwise	Slew anti-clockwise
Lower lattice extension	Raise lattice extension

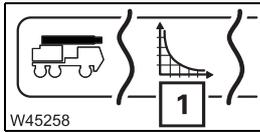


- ¹⁾ In some cases, the RCL will also switch off these movements. In this case, leave the shutdown range through other enabled movements. If this is not possible, set down the load.

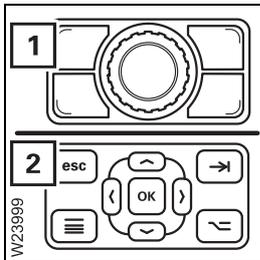


The crane movements are released when you have left the shutdown area – lamps (1) and (2) go out.

11.4.9 Displaying the lifting capacity tables



- Open the menu (1) – Lifting capacity tables menu.

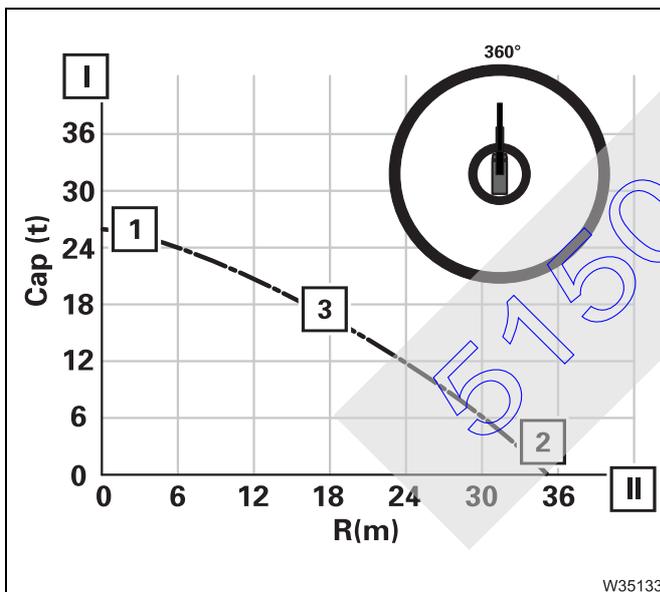


Exit menu

- Press the button (1) or press the button (2) on the CCS control unit once – the start menu opens.

Standard slewing range type

If the *MAXbase* slewing range type was entered; p. 11 - 61.



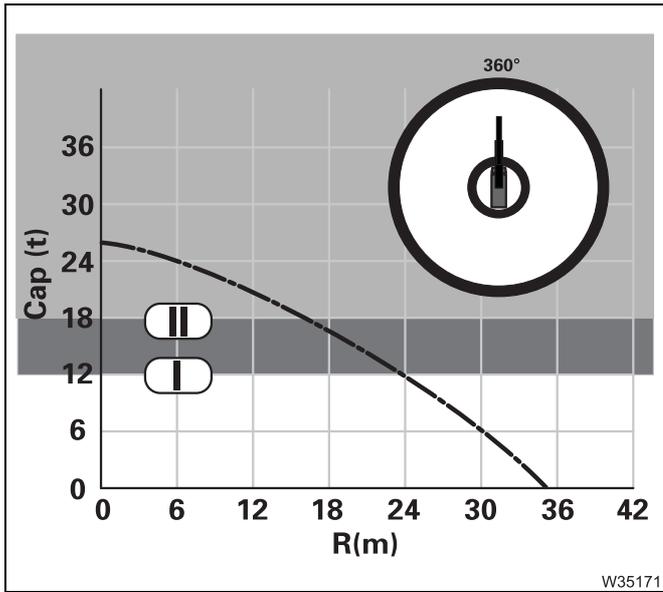
Permissible working range display

The curve (3) applies to the displayed RCL code and the displayed telescope status.

- I Lifting capacity axis – in tons (t) or in kilopounds (klbs)
- II Working radius axis – in metres (m) or feet (ft)

The working range ends at the maximum possible working radius (2). Reduction of the working radius increases the enabled load along the curve (3) up to the maximum possible load (1).

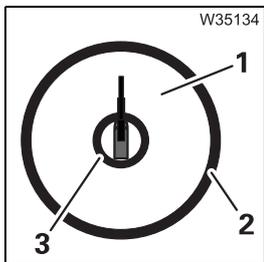




Limitation due to reeving

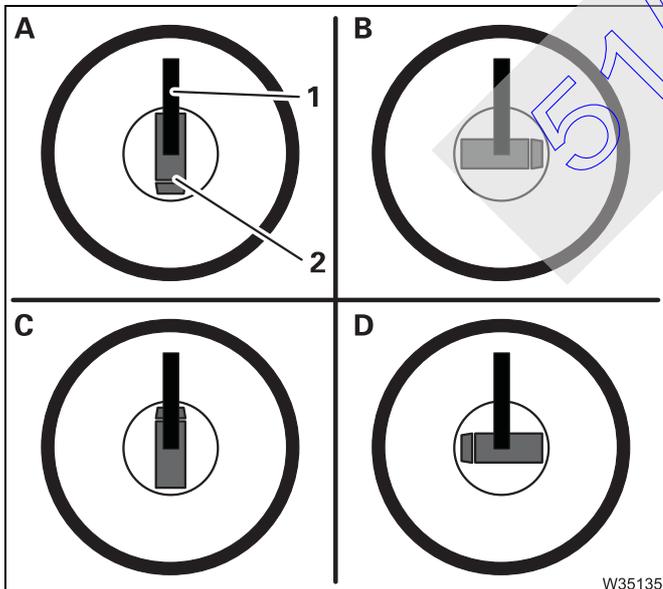
If the maximum load is limited due to the confirmed reeving then the disabled range is marked.

- I Display for main hoist, for example, maximum load 12 t
- II Display for auxiliary hoist, for example, maximum load 18 t



Slewing range display

- 1 Coloured:** Enabled slewing range
- 2 Yellow/red:** Shutdown range for maximum working radius
- 3 White:** Shutdown range for minimum working radius – display only when the lifting capacity table specifies a limitation



When slewing

The symbol (1) for the superstructure always points up and does not move.

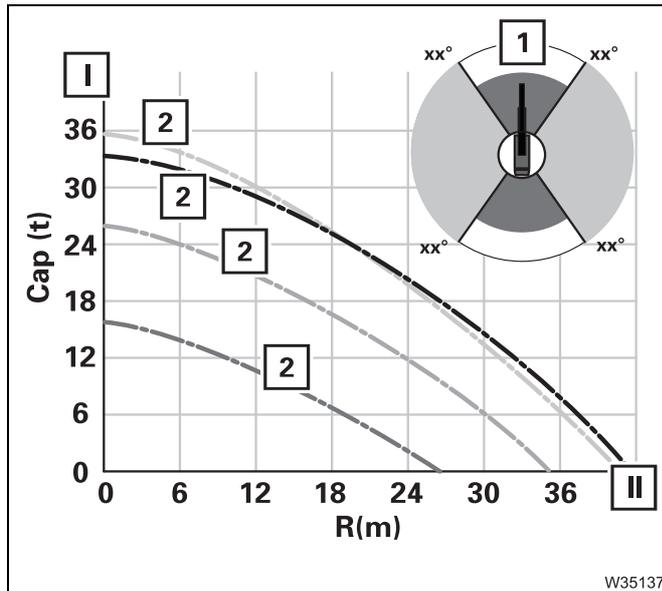
The symbol (2) for the carrier rotates to the position corresponding to the slewing angle.

Examples

- A Current slewing angle 0°
- B Current slewing angle +90°
- C Current slewing angle 180°
- D Current slewing angle -90°

MAXbase slewing range type

If the *Standard* slewing range type was entered;  p. 11 - 59.

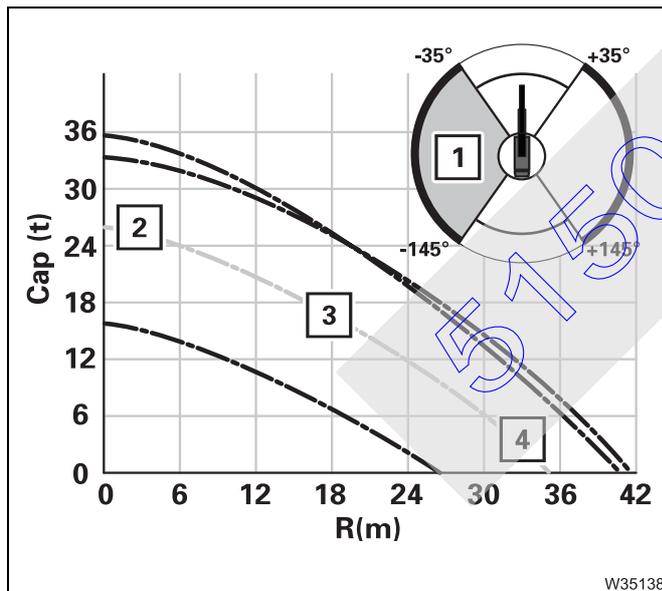


Permissible working range display

The displays apply to the confirmed rigging mode.

- 1 Slewing range display – four slewing ranges, marked in colour
- 2 Permissible working range display – a coloured curve for each slewing range

- I Lifting capacity axis – in tons (t) or in kilopounds (klbs)
- II Working radius axis – in metres (m) or feet (ft)



Example of a permissible working range

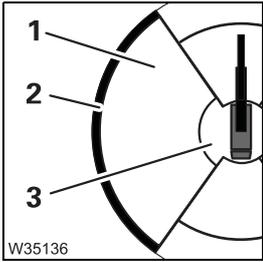
Let us assume the slewing range (1) lies between -35° and -145° .

The corresponding curve has the same colour, e.g. the curve (3).

The working range in slewing range (1) ends at the maximum possible working radius (4). Reduction of the working radius increases the enabled load along the curve (3) up to the maximum possible load (2).

Sufficient reeving is required for this load. The speed reduction due to reeving occurs in the same manner as with the *Standard* slewing range type;  p. 11 - 60.

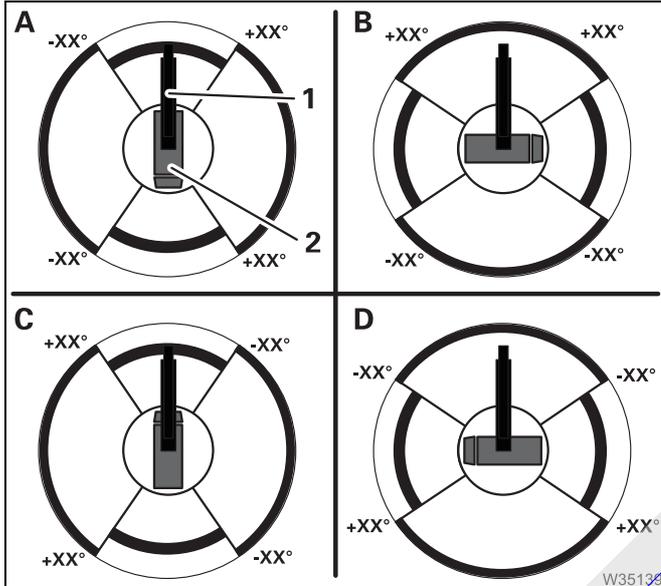




Slewing range display

The display is same in all four slewing ranges.

- 1 Coloured:** Released slewing range, for example, blue
- 2 Yellow/red:** Shutdown range for maximum working radius
- 3 White:** Shutdown range for minimum working radius – display only when the lifting capacity table specifies a limitation



When slewing

The symbol (1) for the superstructure always points up and does not move.

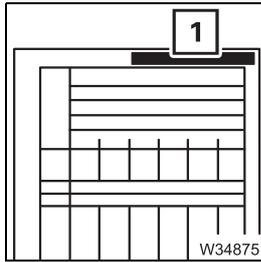
The symbol (2) for the carrier rotates together with the display of the slewing range division to the position corresponding to the slewing angle.

Examples

- A** Current slewing angle 0°
- B** Current slewing angle $+90^\circ$
- C** Current slewing angle $+180^\circ$
- D** Current slewing angle -90°

11.4.10

RCL override – version A



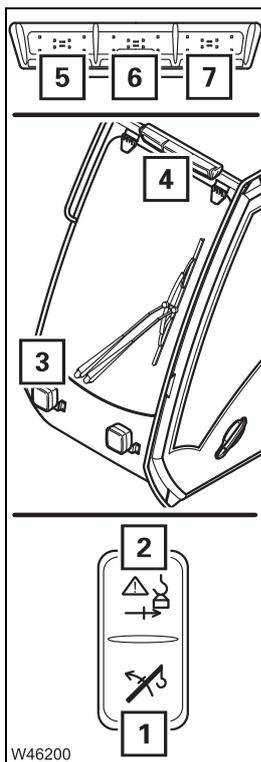
This section applies only when the supplied *Lifting capacity tables* contain the entry *EN 13000* in the header (1).

In the case of other entries; *RCL override – version B*, p. 11 - 67.

If the RCL is overridden, crane operation is not monitored and the switched-off crane movements are enabled again. Once the RCL is switched off, there are three options for overriding.

- **During rigging**, you can override the RCL shutdown or the lifting limit switch for rigging work; *When rigging*, p. 11 - 64.
- **To leave the shutdown range** you can enable raising; *To raise the boom*, p. 11 - 65.
- **In an emergency** you can override the RCL shutdown completely; *In emergencies*, p. 11 - 66.

Overview status display



Lamps (5) to (7) of the status display (4) light up or flash depending on the RCL degree of utilisation and button confirmations.

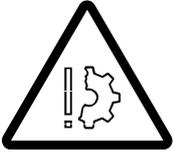
Switch actuated	Degree of utilisation		
	0 - 90%	about 90 - 100%	greater than 100%
No button (normal operation)	Display (5) green	Display (6) yellow	Display (7) red
Button (2) Override for rigging	Display (5) green	Display (6) yellow	Display (6) yellow , flashing
Button (1) Raise	Display (5) green	Display (6) yellow	Display (5) green , flashing
Key-operated switch (3) RCL override in case of an emergency	Display (7) red , flashing	Display (7) red , flashing	Display (7) red , flashing



When rigging

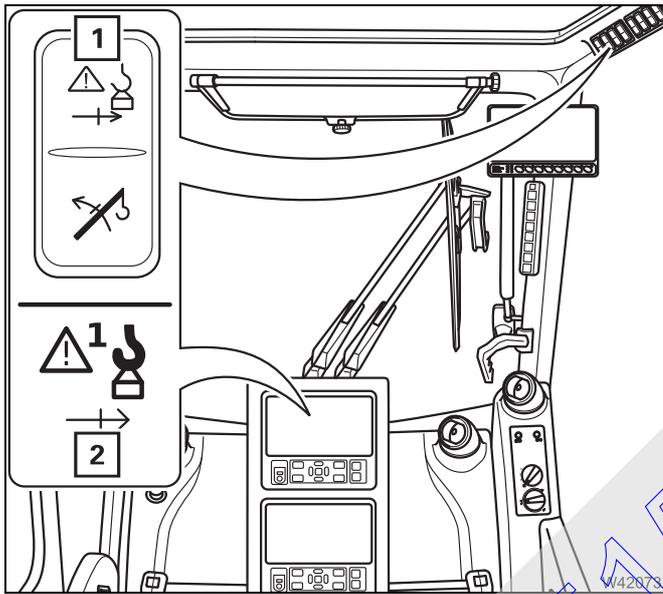
For rigging work, you can:

- override the lifting limit switch;  p. 11 - 85
- or
- override the RCL and thus enable a degree of utilisation of up to 110%.



Risk of accidents if the RCL is overridden

It is not permitted to work with an overridden RCL!
Use this type of override only for rigging.



RCL override

- Press the button (1) once – the information message (2) is displayed.
- Now a degree of utilisation of up to 110% is enabled.
- If you do not trigger a control lever movement within 10 seconds after the override, you must press the button (1) again.
- The power unit speeds are reduced to 50%.

Cancelling the override

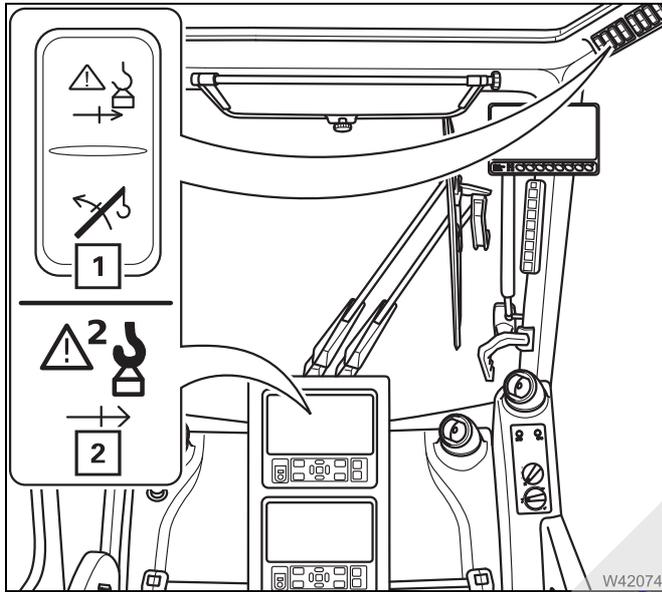
The override is cancelled when you:

- press button (1) again, or
- do not activate the control lever for 10 seconds, or
- switch off the ignition.

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



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



Raising the main boom

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



Raising the main boom is deactivated if the main boom angle is too great. Then all you can do is set the load down.

Switch off function

- At degree of utilisation above 100%
The function is switched off if you:
 - press button (1) again, or
 - switch off the ignition.
- For degree of utilisation below 100%
The function is switched off automatically.



In emergencies

With this type of override, the complete shutdown of the RCL is cancelled and no monitoring takes place.



Risk of accidents due to overridden or faulty RCL!

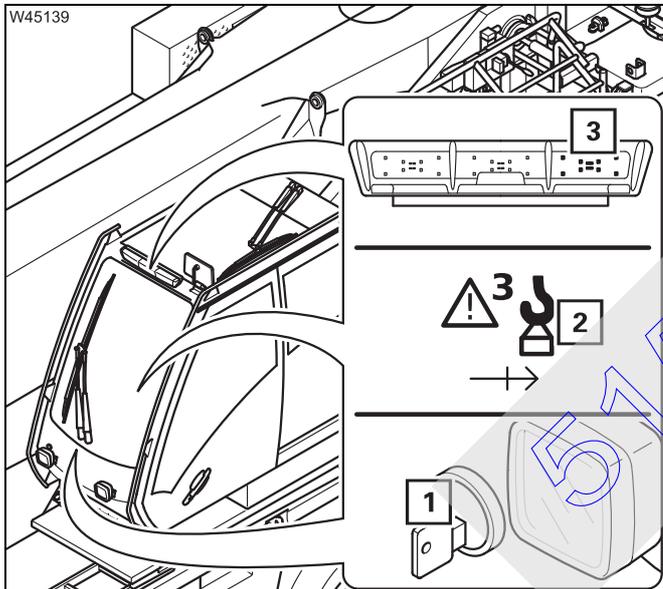
It is not permitted to work with an overridden or faulty RCL!

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 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.



Risk of accidents due to unintentional override!

The key must not remain in the key-operated switch during crane operation! This prevents the RCL being overridden unintentionally.



labelling Cancellling a shutdown

- Insert the key in the key-operated switch (1).
- Turn the key to the left or right once.
The status display (3) flashes red.
The information display (2) appears.
 - All crane movements are enabled for 30 minutes.
 - The power unit speeds are reduced to 15%.
 - At a degree of utilisation over 110% the warning signal will sound.

Cancellling the override

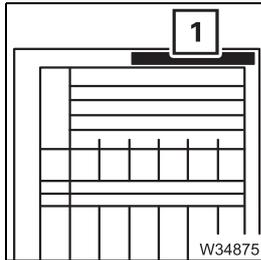
The override is cancelled when you:

- Switch off the ignition
- Press the key-operated switch again.

The override is automatically cancelled 30 minutes after the key-operated switch is pressed.

11.4.11

RCL override – version B



This section only applies when the supplied *Lifting capacity tables* contain an entry other than **EN 13000** in the header (1), e.g. the entry *ASME*.

For standard *EN 13000*; *RCL override – version A*, p. 11 - 63.



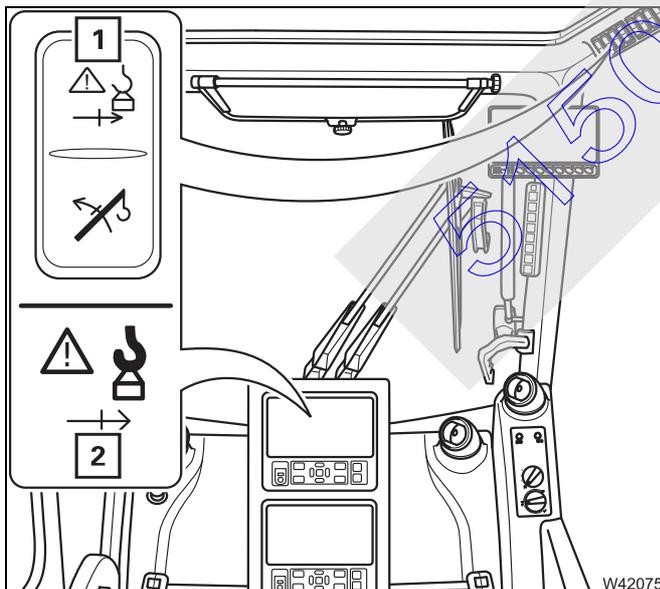
The information in this section only applies when the *Standard* slewing range type is activated. When the *MAXbase* slewing range type is active, the system automatically switches to RCL override version A; p. 11 - 63.



Risk of accidents 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 override the RCL only if it becomes absolutely necessary to do so in 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.



RCL override

- Press the button (1) once – the information message (2) is displayed.
 - The crane movements are enabled.
 - If you do not trigger a control lever movement within 10 seconds after the override, you must press the button (1) again.
 - The speed of the movements that increase the load moment is reduced to 50%.

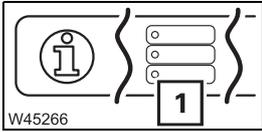
Cancelling the override

The override is cancelled when you:

- press button (1) again, or
- do not activate the control lever for 10 seconds, or
- switch off the ignition.

11.4.12 Datalogger

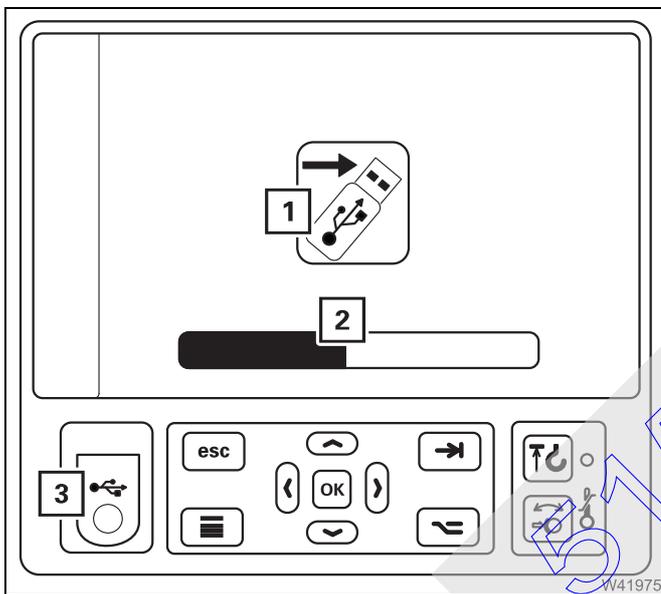
You can export data from the CCS crane control system to a USB stick and display it on a PC using the *CraneEvaluation* program supplied.



- Open the menu (1) – Datalogger menu.
(menu opens on the RCL display).

Exporting data

You need a USB stick (USB 2.0/FAT32 file system / about 500 MB free capacity is recommended).



Exporting data

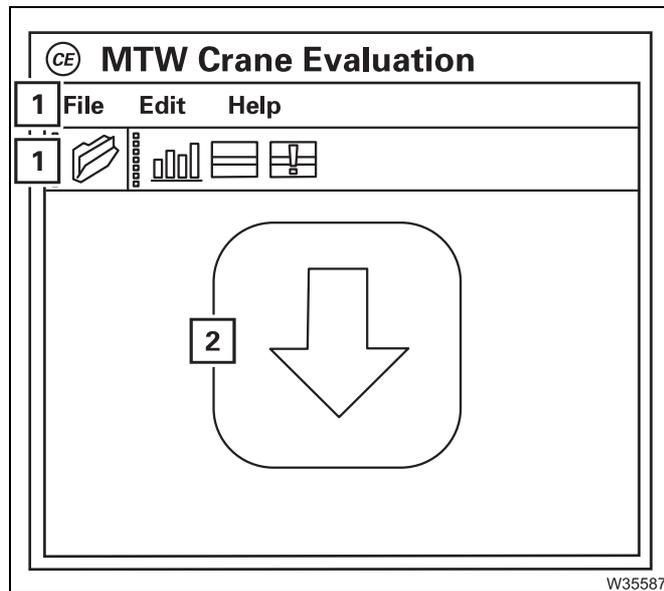
- Plug the USB stick into the connection (3) on the RCL control unit. The symbol (1) is activated.
- Select and confirm the symbol (1).
The display (2) shows the export progress.

All exported files are named with the serial number, start time and end time. Files with various different suffixes are exported.

- | | |
|--------------------------|---|
| xxx.mcd | Contains all exported data – can only be opened with <i>CraneEvaluation</i> . |
| xxxCraneFault.csv | Contains all exported error messages – can be opened for example, with Excel. |

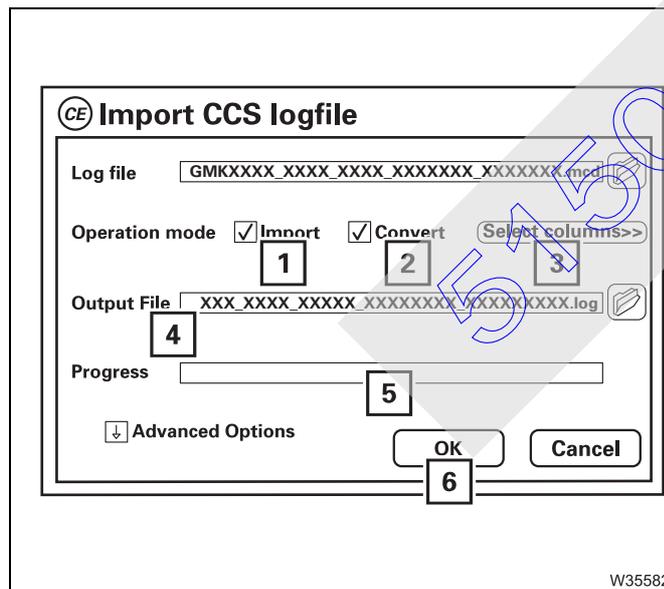
Displaying the data

You need the *CraneEvaluation* program in order to display the exported data. The installation program is located in the *CraneEvaluation* folder on the owner's USB stick supplied.



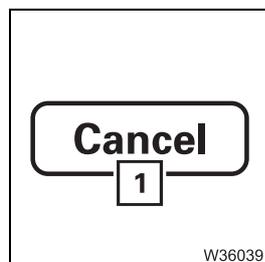
Importing data

- Start the *CraneEvaluation* program.
- Drag the file *xxx.mcd* on to the symbol (2) or open the file via a command (1).



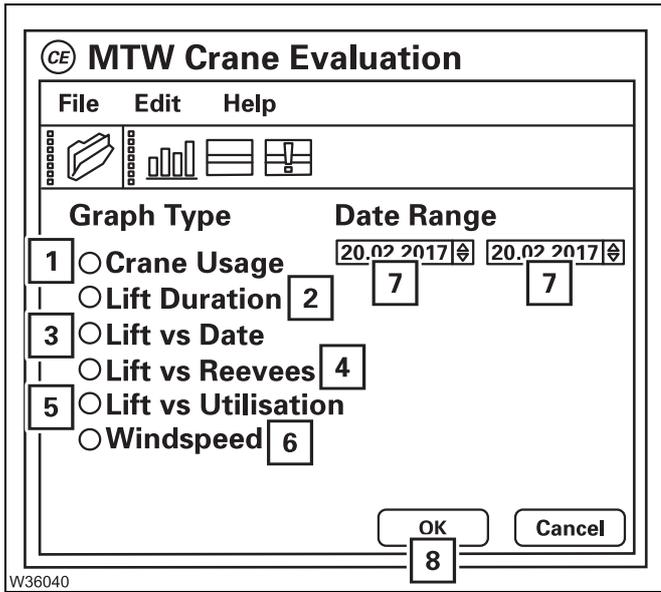
An import window with setting options is displayed.

- 1 *Import* – the data is imported for display in the program.
 - 2 *Convert* – the data is saved to a log file that can be opened for example, with Excel.
 - 3 *Select columns* – with the default setting, all available data is imported. The menu allows individual selection.
 - 4 *Output File* – storage location for the log file
- Confirm the selection with the symbol (6) – the display (5) shows the import progress.



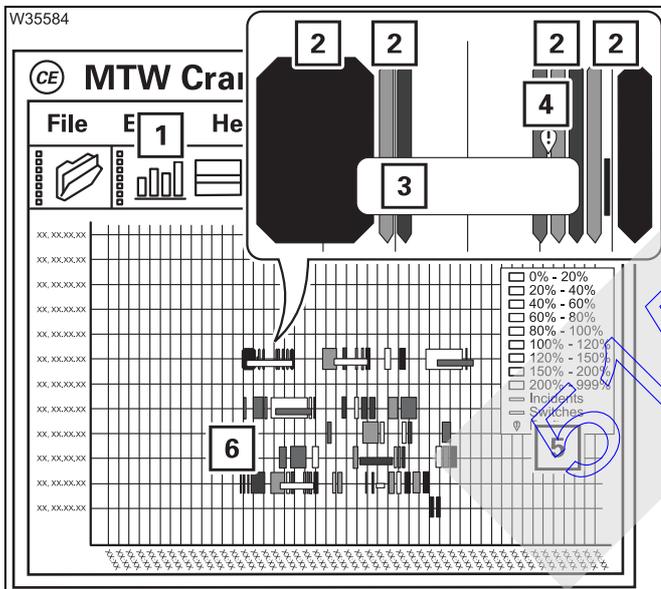
A graphical selection window opens. If you do not want to select a graphic, you can simply close the window – symbol (1); *Displaying tables*, p. 11 - 71.





Displaying the graphic

- Select the desired period (7) and desired graphic.
 - 1 Crane use (offers the greatest variety of information)
 - 2 Lifting duration per utilisation area
 - 3 Number of lifting operations per day
 - 4 Number of lifting operations per reeving
 - 5 Number of lifting operations per utilisation area
 - 6 Wind speed for each day
- Confirm the selection via the symbol (8).



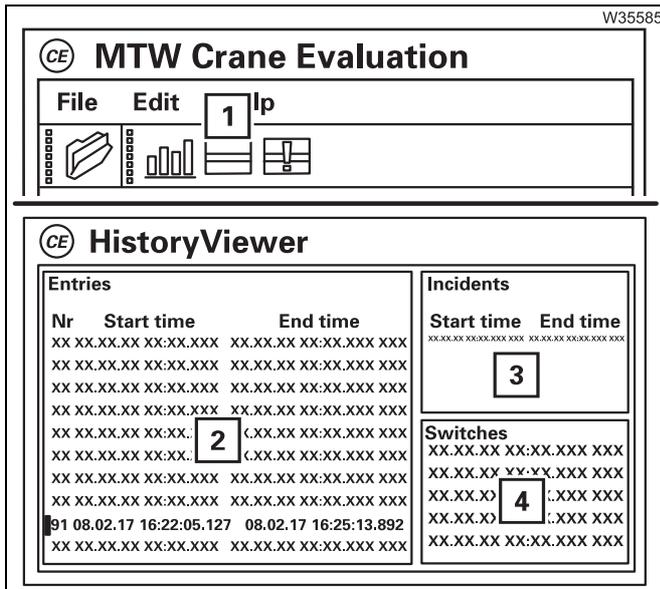
The selected graphic is displayed, for example, the *Crane use* graphic.

All lifting operations are shown as bars (2) – coloured according to the utilisation area. Events and actuates switches are shown as narrow, framed bars (3). Errors are shown as symbols (4).

The legend (5) defines the assignments of the colours and symbols. You can hide and reveal symbols in the graphic by clicking in the legend.

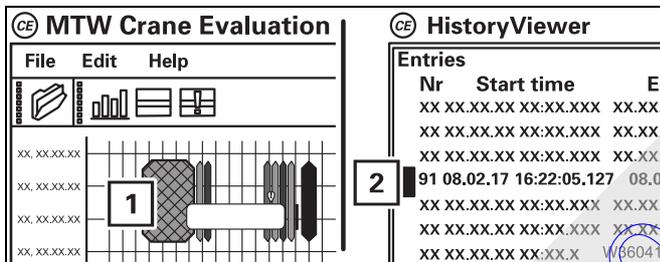
Clicking with the left mouse button provides more details (6) on an element.

Use the symbol (1) to open the graphic selection window.



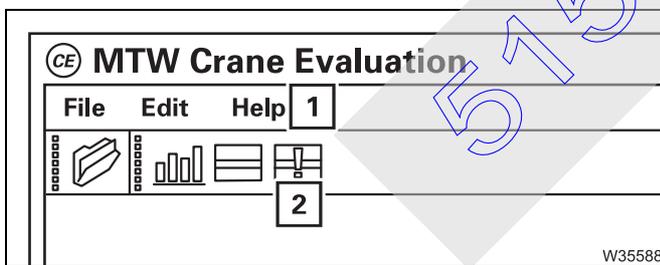
Displaying tables

- Select the symbol (1) – a table is opened.
- 2** List with all lifting operations
- 3** List with all events
- 4** List with all actuated switches



If the *Crane use* graphic is also open, an element is displayed and marked in the respective other window when clicked on.

- 1** Graphic marking
- 2** Table marking



Displaying the error list

- Select the symbol (2) – a table showing all imported errors is displayed.

Other

Select the command (1) for further information.

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11.5

Crane operation with main boom

11.5.1

Checks during crane operation

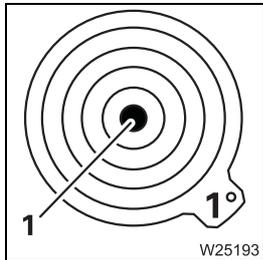
Horizontal alignment

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



Risk of accidents if the truck crane is not level!

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



- Check the horizontal alignment of the truck crane during crane operation on the display (1); p. 12 - 54.

Due to deformation of the frame, the 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 - 54.

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 (for example, gas containers or scaffolding).

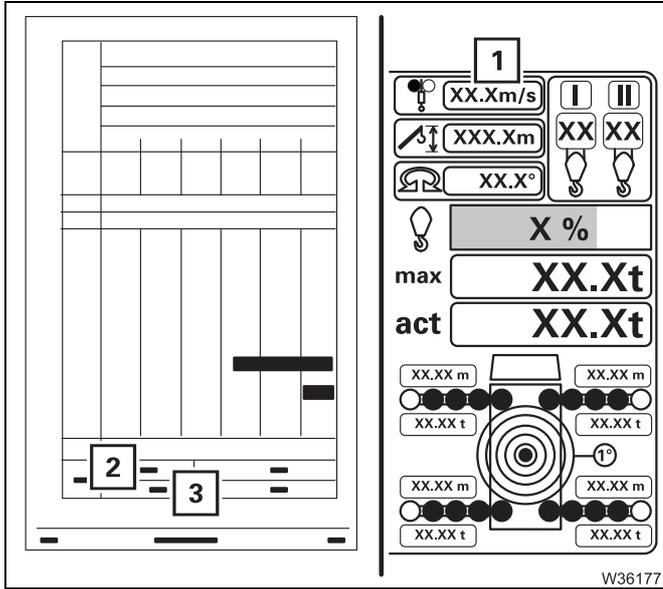
Maintain a safe distance from electrical lines; *Safe distance from overhead power lines*, p. 12 - 16.



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.



The display (1) shows the current wind speed.

The maximum permissible wind speed (2) or the reduced wind speed (3) specified in the *Lifting capacity table* applies to the confirmed rigging mode.

The display (1) flashes in colour in the vicinity of the maximum permissible value v_{max} (2) or (3).

- **Yellow:** about 90 - 100% of v_{max} reached
- **Red:** v_{max} exceeded

If an anemometer is not available, or in the event of a fault, you can find out which speeds are forecast by contacting the relevant weather stations.

The *Lifting capacity table* contains an overview of the wind strengths, wind speeds and their effects.

If the maximum permissible wind speed is exceeded

An automatic shutdown does not occur if the maximum permissible wind speed is exceeded.

- Immediately stop crane operation.
- Switch the truck crane to the rigging mode specified for the current wind speed in the *Lifting capacity table*.



Risk of accidents due to excessively high wind speeds!

If the current wind speed is higher than the maximum permissible wind speed, stop crane operation immediately and establish an appropriate rigging mode. This will prevent the truck crane overturning due to overload.

Deformation of the main boom due to direct sunlight

One-sided direct sunlight can lead to a temperature difference between the left and the right main boom side. This results in a different length extension. A lateral deformation of the main boom is the result. The degree of deformation depends on the actual temperature difference and the current main boom length.

Assuming a temperature difference of 30 °C (86 °F) and a system length of 60 m (196.85 ft), a deformation without load of up to 1 m can occur. This would be a deformation of 1.7%.



Risk of accidents due to overload of the truck crane

An excessively deformed main boom can be overloaded or suffer from invisible damage which can lead to overloading of the main boom on subsequent lifts with permissible deformation or reduce the service life of the main boom.

Make sure that the maximum permissible values for lateral deformation are not exceeded.

Preventive measures

- If possible, turn the superstructure to a (park) position where both main boom sides are heated evenly to prevent deformation.

Before any lifting with deformed main boom

The main boom must be telescoped out to the length required for the lifting operation. The maximum permissible lateral deformation of the **unloaded** main boom (with reeved hook block) is 1% of the main boom length.

- Check the deformation before lifting.
- Only lift the load if the current deformation is permissible.

For any lifting operation with deformed main boom

The maximum permissible lateral deformation of the loaded main boom is 3% of the current boom length.

- Check the deformation during lifting.
- Put the load down before the maximum permissible deformation is exceeded.
- Reduce additional, dynamic influences by wind.
- Carry out crane movements at minimum speed only.

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11.5.2

Main hoist

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



Risk of accidents from accidentally operating a hoist!

Always switch off the hoist that is not in use!

Never operate the hoist if the hook block is unreeled and the hoist rope is completely wound on to the drum.

- The rope will slacken in the course of the *Lower* movement. Rope loops will form, which can cause the load to slip and damage the hoist rope.
- The switch-off point of the lowering limit switch shifts in the course of the *Raise* movement. The lowering limit switch will lose its function as a safety device.



Risk of accidents when raising loads at an angle!

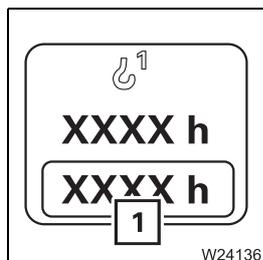
Loads can cause the main boom to bend, resulting in the hoist rope no longer being aligned in a vertical position. Compensate for this bending by lowering the boom so that the load is lifted vertically. This way, you can prevent the load dragging and helpers being injured.

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.

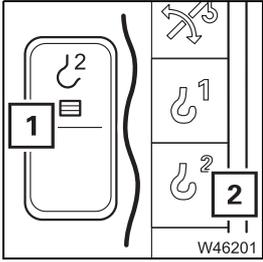


You can have the operating hours (1) of the hoist displayed; see p. 11 - 138.

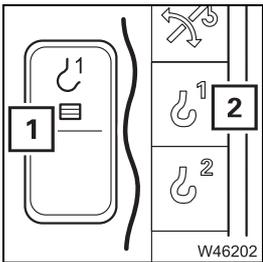


Switching on the main hoist

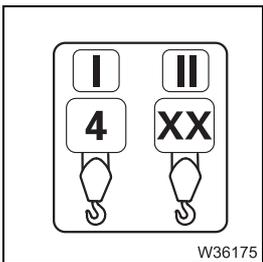
After the ignition is switched on, all power units are switched off and the lamps in the corresponding buttons light up only dimly.



- Check if the auxiliary hoist is switched off and therefore secured against unintentional operation.
 - The lamp (1) should only light up dimly.
 - Symbol (2) must be **orange**.



- Press the button (1) – the lamp lights up brightly.
Symbol (2) is **green** when the main hoist is switched on.



- Check that the current reeving of the main hoist is displayed, for example, **4**.
Correct the reeving if necessary; see p. 11 - 39.

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Lifting and lowering

You can adjust the sensitivity of the control levers to the operating conditions;
▣▣▣▣▶ *Setting the control lever characteristic curve*, p. 11 - 131.



Risk of accidents due to gaps in monitoring!

Operation of the hoist is only fully monitored if:

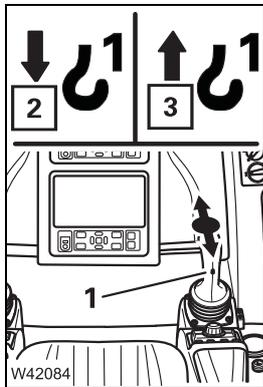
- The lifting limit switch is correctly installed; ▣▣▣▣▶ p. 12 - 158,
- The lifting limit switch is not overridden; ▣▣▣▣▶ p. 11 - 84,
- The lowering limit switch is correctly set; ▣▣▣▣▶ p. 11 - 86.



Risk of accidents due to suspended loads!

Never switch off the engine while a load is suspended. You must have the control levers at hand to be able to intervene at any time.

Always set down the load before you leave the crane cab.

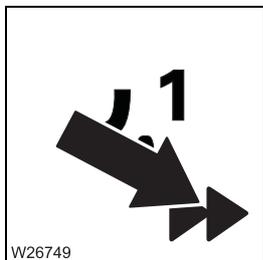


Lift: Pull the control lever to the rear – symbol (3) is displayed.

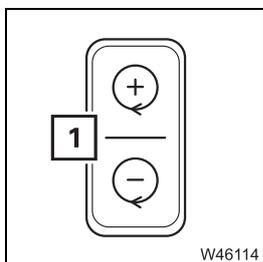
Lower: Push the control lever to the front – symbol (2) is displayed.

When the hoist drum is turning, you will notice a pulse at the slewing indicator (1).

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



You can switch on high-speed mode for a higher speed; ▣▣▣▣▶ p. 11 - 115.



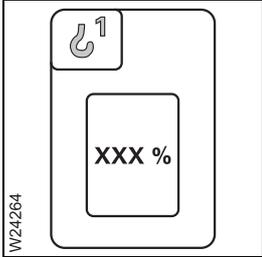
You can set the desired engine speed (idling speed) with the button (1);
▣▣▣▣▶ p. 10 - 11.



Maximum permissible hoist rope speed

The maximum permissible hoist rope speed is limited automatically depending on the degree of utilisation of the lifting capacity and reeving. The scale of the limitation is specified in the supplied lifting capacity table.

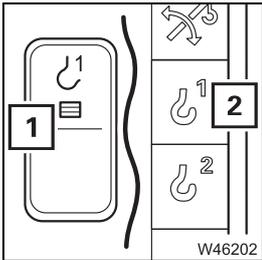
The current speed reduction is displayed in the start menu;  p. 9 - 33.



You can limit the maximum hoist speed in the *Power unit speeds* menu;  p. 11 - 127.

Switching off the main hoist

If you no longer require the main hoist, you should switch it off to avoid unintentional use.



- Press the button (1) once – the lamp lights up dimly.
Symbol (2) is **orange** when the main hoist is switched off.

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11.5.3

Auxiliary hoist



Risk of accidents when operating the auxiliary hoist!

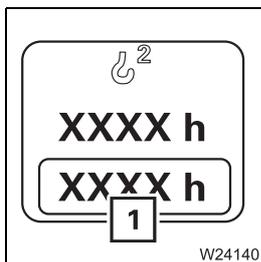
Read and observe all the safety instructions in the section *Main hoist*, p. 11 - 77 before operating the auxiliary hoist.

All safety instructions for operating the main hoist also apply to the auxiliary hoist, along with the information in this section.



Risk of accidents due to a damaged hoist rope!

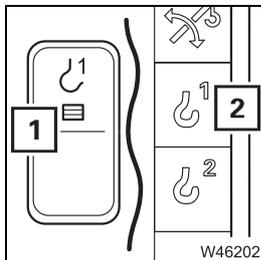
If you reeve the auxiliary hoist rope in addition to the main hoist rope, make sure the hoist ropes do not rub against each other and that the auxiliary hoist rope does not touch the rotating flanged wheel of the main hoist during subsequent crane operation.



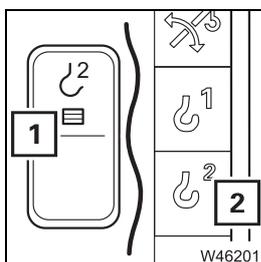
You can have the operating hours (1) of the hoist displayed; p. 11 - 138.

Switching on the auxiliary hoist

After the ignition is switched on, all power units are switched off and the lamps in the corresponding buttons light up only dimly.

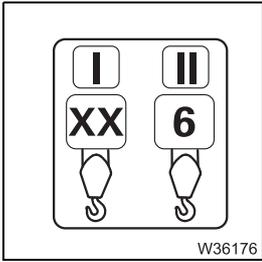


- Check whether the main hoist is switched off and therefore secured against unintentional operation.
 - The lamp (1) should only light up dimly.
 - Symbol (2) must be **orange**.



- Press the button (1) – the lamp lights up brightly.
Symbol (2) is **green** when the auxiliary hoist is switched on.





- Check that the current reeving of the auxiliary hoist is displayed, e.g. **6**. Correct the reeving if necessary; p. 11 - 39.

Lifting and lowering

You can adjust the sensitivity of the control levers to the operating conditions; *Setting the control lever characteristic curve*, p. 11 - 131.



Risk of accidents due to gaps in monitoring!

Operation of the hoist is only fully monitored if:

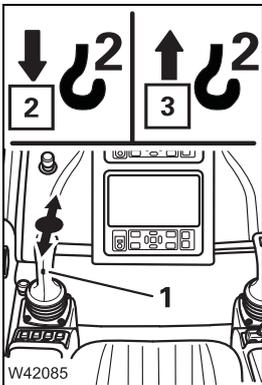
- The lifting limit switch is correctly rigged; p. 12 - 158,
- The lifting limit switch is not overridden, p. 11 - 84,
- The lowering limit switch is correctly set; p. 11 - 84.



Risk of accidents due to suspended loads!

Never switch off the engine while a load is suspended. You must have the control levers at hand to be able to intervene at any time.

Always set down the load before you leave the crane cab.

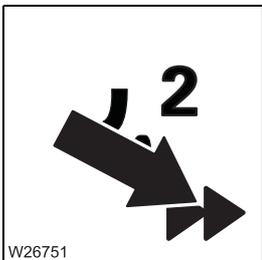


Lift: Pull the control lever to the rear – symbol **(3)** is displayed.

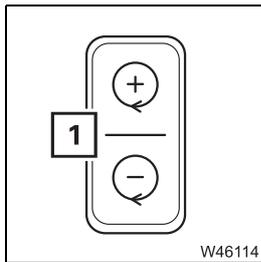
Lower: Push the control lever to the front – symbol **(2)** is displayed.

When the hoist drum is turning, you will notice a pulse at the slewing indicator **(1)**.

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



You can switch on high-speed mode for a higher speed; p. 11 - 115.

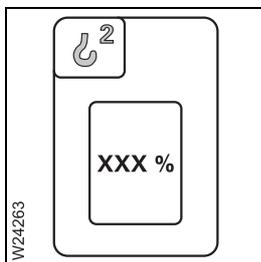


You can set the desired engine speed (idling speed) with the button (1);
▣▣▣▣ p. 10 - 11.

Maximum permissible hoist rope speed

The maximum permissible hoist rope speed is limited automatically depending on the degree of utilisation of the lifting capacity and reeving. The scale of the limitation is specified in the supplied *Lifting capacity table*.

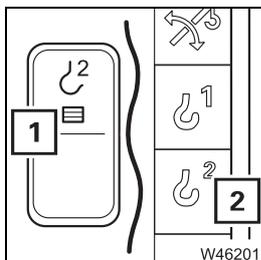
The current speed reduction is displayed in the start menu; ▣▣▣▣ p. 9 - 33.



You can limit the maximum hoist speed in the Power unit speeds menu;
▣▣▣▣ p. 11 - 127.

Switching off the auxiliary hoist

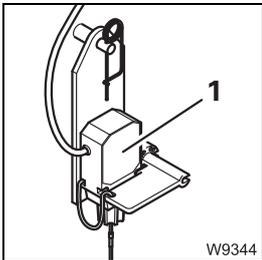
If the auxiliary hoist is not required, it should be switched off to avoid unintentional use.



- Press the button (1) once – the lamp lights up dimly.
Symbol (2) is **orange** when the auxiliary hoist is switched off.

11.5.4 Lifting limit switch and lowering limit switch

Lifting limit switch To install/remove the lifting limit switch;  p. 12 - 158.



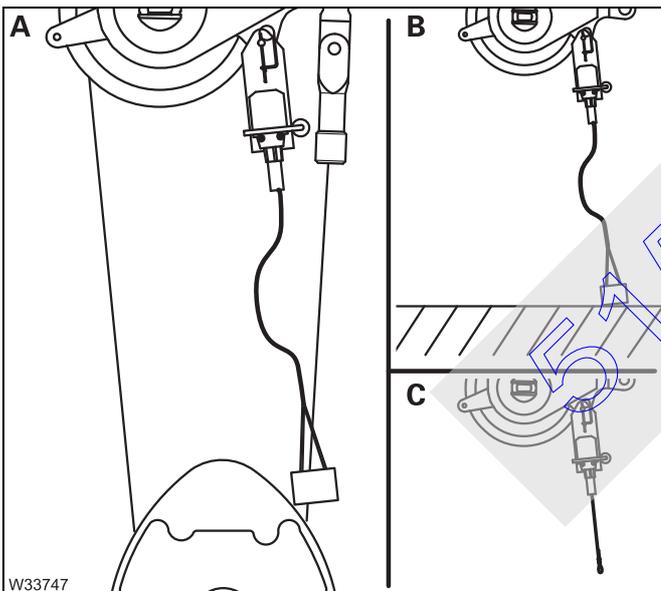
The lifting limit switch (1) prevents the hook block being lifted up to the main boom head and damaging it.

The lifting limit switch only works if it has been unlocked;  p. 12 - 163.



Risk of accidents due to intentionally triggering the lifting limit switch!

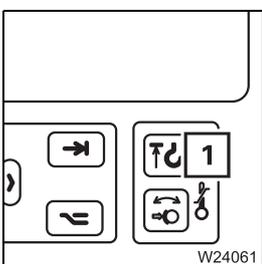
Always complete lifting (and extending) before increasing the lifting limit switch weight. If the lifting limit switch weight is lifted at too high a speed, the hook block may swing into the main boom head and damage the head sheaves and the hoist rope.



The lifting limit switch is triggered if:

- (A) – the hook block raises the lifting limit switch weight or
- (B) – the lifting limit switch weight touches the ground during 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 is triggered.

At the same time, all movements that would increase the load moment are 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.

Lifting limit switch override

When overriding, shutdown of the lifting limit switch is cancelled and crane operation is no longer completely monitored.



Risk of accidents if the lifting limit switch is overridden!

You may only override the lifting limit switch if this is specified in the operating manual for carrying out maintenance or rigging work.
With the lifting limit switch overridden, you may only drive at minimum speed and without a load.



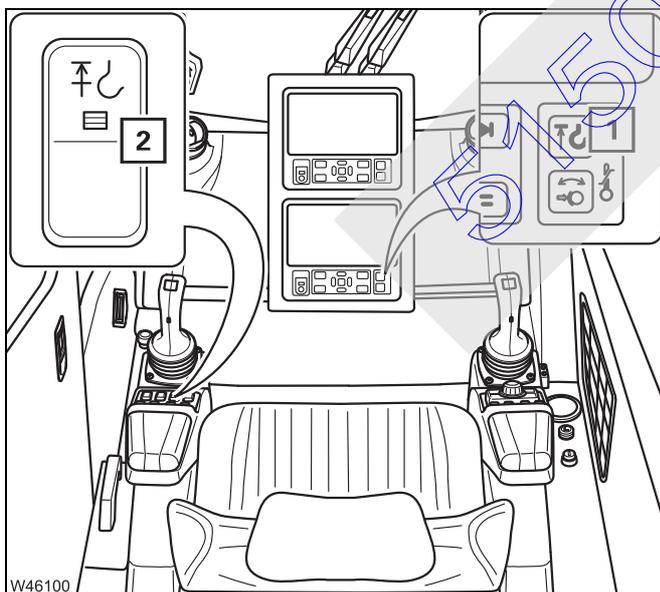
Risk of accidents due to gaps in monitoring!

If the lifting limit switch is overridden, crane operation is no longer completely monitored.
When lifting the lifting limit switch weight, the crane movement is stopped once. After moving the control lever again, the crane movement is enabled again and not switched off any more.



Risk of damage due to overridden slewing gear shutdown.

If the lifting limit switch is overridden, then the load torque related shutdowns of the slewing gear are not enabled (for example, if the pre-tensioning pressure of the counterweights is too low). In this case, avoid moving the control lever for slewing as long as the lifting limit switch is overridden.



- Press the button (2)
 - Lamp (1) flashes.
 - A buzzer tone sounds.

If the lifting limit switch is triggered now, the crane movement is stopped **once**.

The stopped crane movement is enabled again if you bring the control lever to the initial position and then move it again.

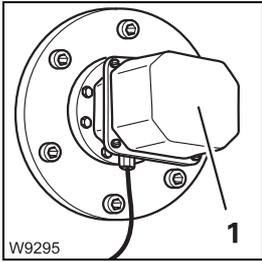
This crane movement is not stopped any more.

Cancelling the override

- Release the button (2) or leave the shutdown range.
 - The lamp (1) goes out.
 - The buzzer tone is switched off.



Lowering limit switch



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

The lowering limit switch works only if the switch-off point is set correctly (for example, after changing a hoist rope);  *Maintenance manual*.



Risk of accidents due to incorrect setting or intended triggering!

Prior to operating the crane, ensure that the lowering limit switch is set correctly and always complete the lowering operation before the lowering limit switch is triggered.

This prevents the hoist rope becoming damaged due to complete unreeling or switching off at high speeds, and the load being dropped as a result.



Risk of accidents from incorrect setting of the lowering limit switch!

Always re-adjust the lowering limit switch when 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 switching off too late or not switching off at all, the hoist rope being damaged and the load being dropped.

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11.5.5

Derricking gear

You can raise and lower the main boom.

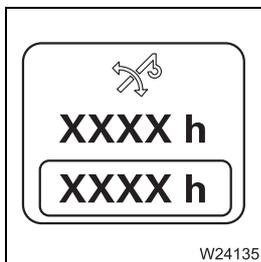
Depending on the size of the load and the rigging mode, the RCL switches off lowering of the boom as soon as the working area is left as specified in the *Lifting capacity table*.



Danger of overturning when lifting loads!

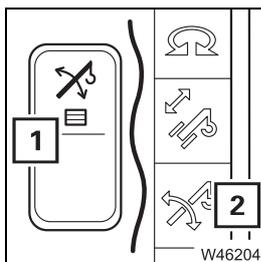
It is not permitted to lift loads by raising the boom, since the RCL does not monitor this procedure!

Raising the boom is a movement that reduces the load moment and that is not switched off by the RCL. However, raising the boom is the movement that can cause the truck crane to overturn if the lifted load is too heavy.



You can have the operating hours of the derricking gear displayed;
▶▶▶▶ p. 11 - 138.

Switching on the derricking gear



After the ignition is switched on, all power units are switched off and the lamps in the corresponding buttons light up only dimly.

- Press the button (1) – the lamp lights up brightly.

Symbol (2) is **green** when the derricking gear is switched on.

If the control lever is assigned more than one function, all other power units that are assigned the same control lever movement are switched off;

▶▶▶▶ *Control lever configuration*, p. 9 - 26.



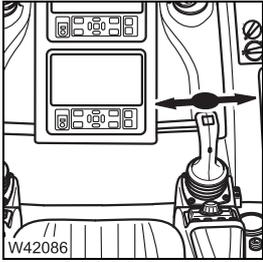
Raising and lowering

You can adjust the sensitivity of the control levers to the operating conditions;  *Setting the control lever characteristic curve*, p. 11 - 131.



Risk of accidents due to unexpected crane movements!

If assigned more than one function, check that the *Derricking* control lever function is switched on before you move the control lever for derricking. This prevents accidents due to unexpected crane movements.



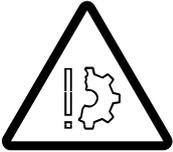
Lowering: Push the control lever to the right – the main boom is lowered.

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.



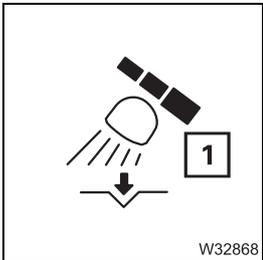
The maximum derricking speed is automatically reduced as the system length is increased. If you now reduce the working radius (for example, by retracting the telescoping), the derricking speed is automatically increased again.



Risk of damage to the slewable spotlights!

Observe the position of the slewable spotlights before setting down the main boom.

This is for preventing a collision between the spotlights and the engine cover.

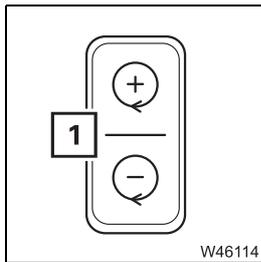


If the symbol (1) is displayed when the main boom is set down

- Correct the position of the slewable spotlights until the symbol (1) goes out;  p. 11 - 132.



You can switch on high-speed mode for a higher speed;  p. 11 - 115.

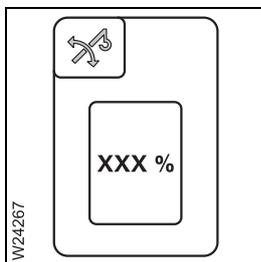


You can set the desired engine speed (idling speed) with the button (1);
▶▶▶▶ p. 10 - 11.

Maximum derricking speed

The maximum permissible derricking speed is limited automatically depending on the system length. The scale of the limitation is specified in the supplied *Lifting capacity table*.

The current speed reduction is displayed in the start menu; ▶▶▶▶ p. 9 - 33.



You can limit the maximum derricking speed in the *Power unit speeds* menu;
▶▶▶▶ p. 11 - 127.

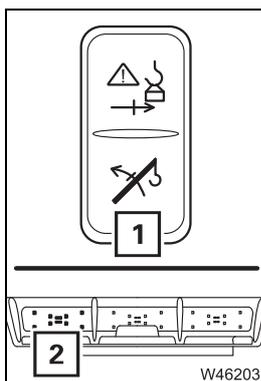
Re-enabling the raising function

For RCL override – version A

If the RCL switched off the raising function due to an overload, you can re-enable the raising function with button (1). The speed is then reduced to 50%.

- Press the button (1) at the bottom once.
- Use the control lever to raise the main boom.

The status display (2) flashes **green**.

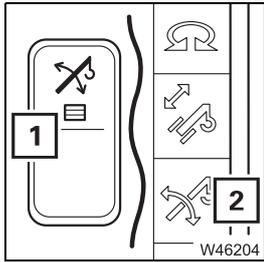


Raising the main boom is deactivated if the main boom angle is too great. Then all you can do is set the load down.



Switching off the derricking gear

If the derricking gear is not required, it should be switched off to avoid unintentional use.



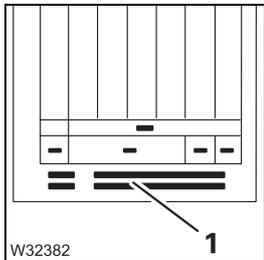
- Press the button (1) once – the lamp lights up dimly.

Symbol (2) is **orange** when the derricking gear is switched off.

If the control lever is assigned more than one function, the derricking gear is also switched off if you switch on another power unit that is assigned to the same control lever movement; *Control lever configuration*, p. 9 - 26.

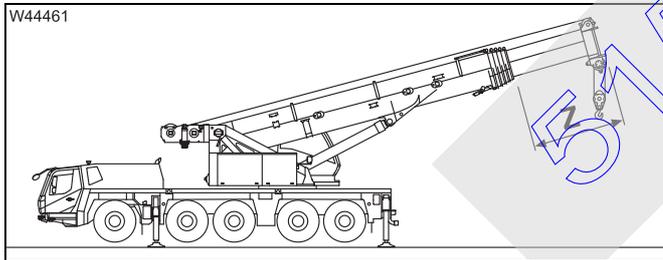
Lowering the main boom to a horizontal position

The main boom can be set down by referring to the working curves within the working range specified in the *Lifting capacity tables*.

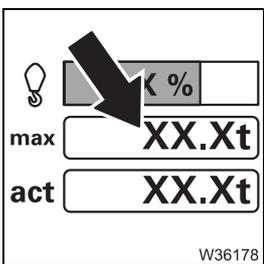


These additional pages supplement the information (1) in the *Lifting capacity tables* supplied for the main boom intermediate lengths.

To prevent any overloading of the derricking cylinder, the derricking cylinder pressure is also monitored here.



In area (Z) of the main boom intermediate lengths it can be the case, particularly with main boom angles below 15°, that loads specified in the *Lifting capacity table* are not reached for shorter main boom lengths.



In this case the RCL shows the reduced maximum load capacity on the *Maximum load* display.

The RCL continuously calculates this value while taking the derricking cylinder pressure into account. If the current load is too big, an RCL shutdown takes place; p. 11 - 57.

11.5.6

Telescoping mechanism

A telescoping process requires locking and unlocking processes in the main boom. You can telescope the main boom in different ways.

– Manual telescoping

For manual telescoping, you must initiate all locking and unlocking processes at the right time.

– Telescoping with semi-automatic telescoping

When telescoping with semi-automatic telescoping, you enter a telescoping value and CCS controls all the locking and unlocking processes automatically. You may then need to manually telescope to an intermediate length.

– Telescoping with pre-selection

When telescoping with pre-selection, you can enter several parameters for lifting the load and the CCS suggests corresponding telescopic extensions that you can use as the starting point for semi-automation. Telescoping with pre-selection has no independently selectable menu. The parameters are entered when entering the rigging mode at the RCL and the telescope status displays are in the RCL *Monitoring* menu.

Operation is done using the control lever. The CCS control unit is still used for operation. Here you initiate processes, receive feedback and can monitor the telescoping process.

The CCS 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.

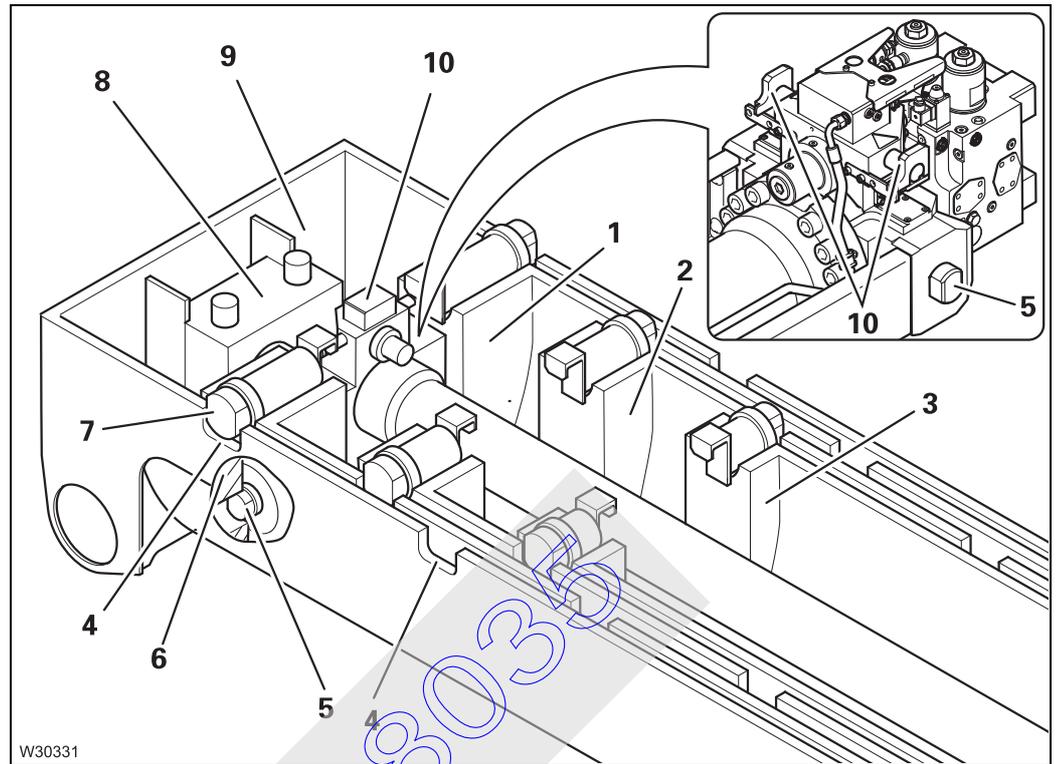


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Overview

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) that 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) via the piston rod (8). The telescoping cylinder has two locking pins (5) at the bottom and a mechanism at the top (10).

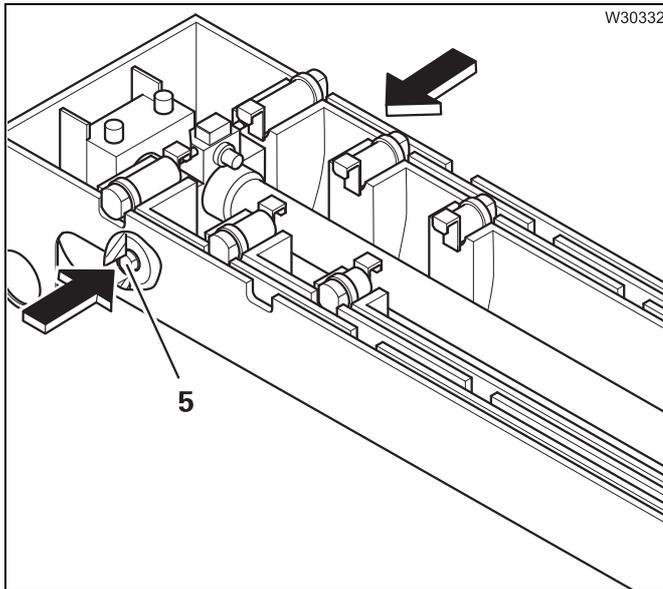
When the telescoping cylinder is positioned at a locking point:

- Then the locking pins (5) can be extended into the cutouts (6) – the telescoping cylinder is locked.
- Then the mechanism (10) engages in the locking pins (7) and can retract them individually – the telescopic section is unlocked.



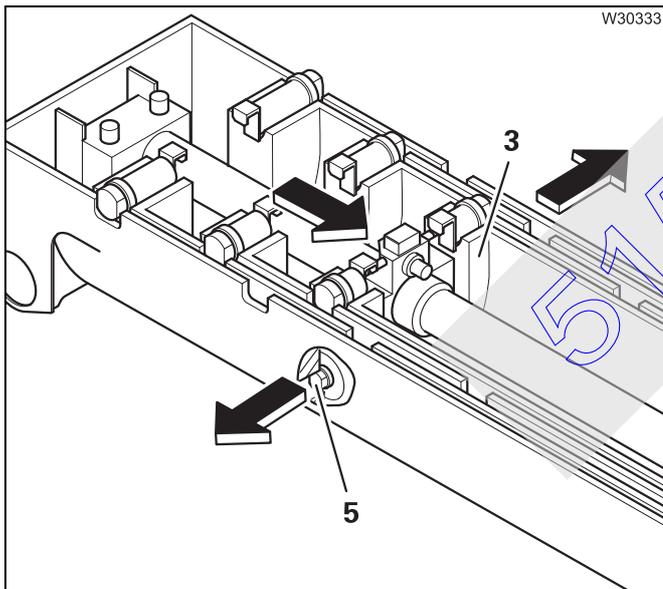
Telescoping process

This state should be the starting point for a telescoping process. A telescoping process consists of 4 steps.



1. Unlocking the telescoping cylinder

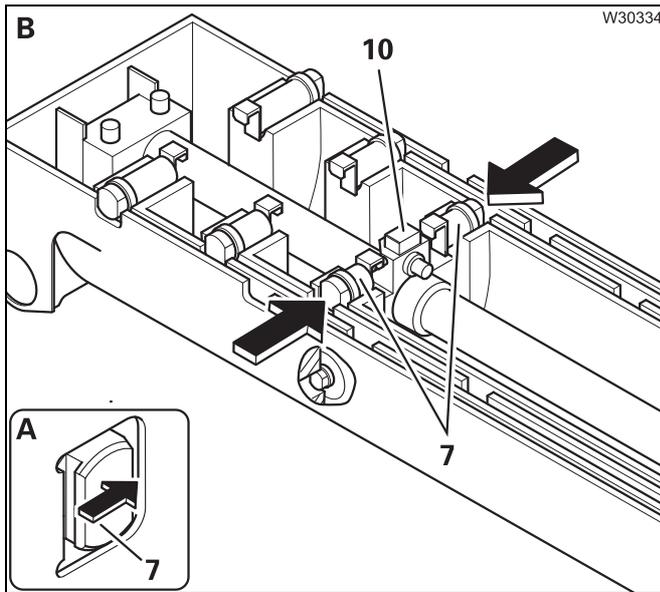
The locking pins (5) are retracted – the telescoping cylinder is unlocked.



2. Moving and locking the telescoping cylinder

The telescoping cylinder moves into the section to be telescoped, for example, telescopic section III (3).

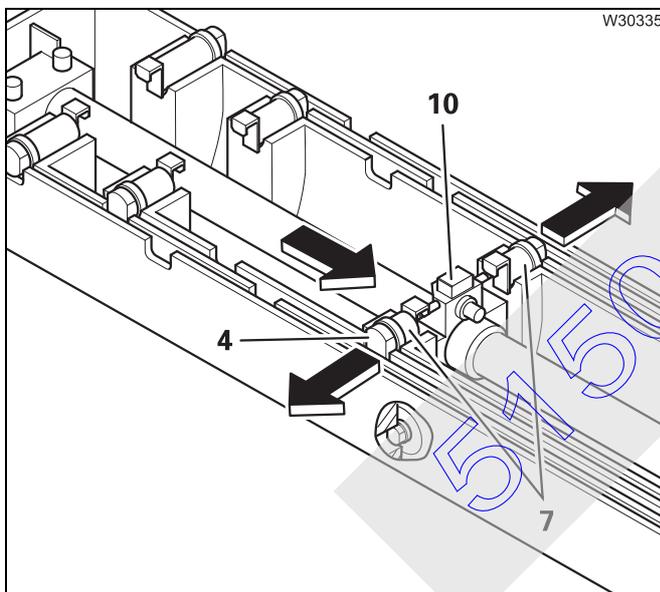
The locking pins (5) are extended – the telescoping cylinder is locked.



3. Unlocking the telescopic section

(A) – The telescoping cylinder is extended until the locking pins (7) are clear.

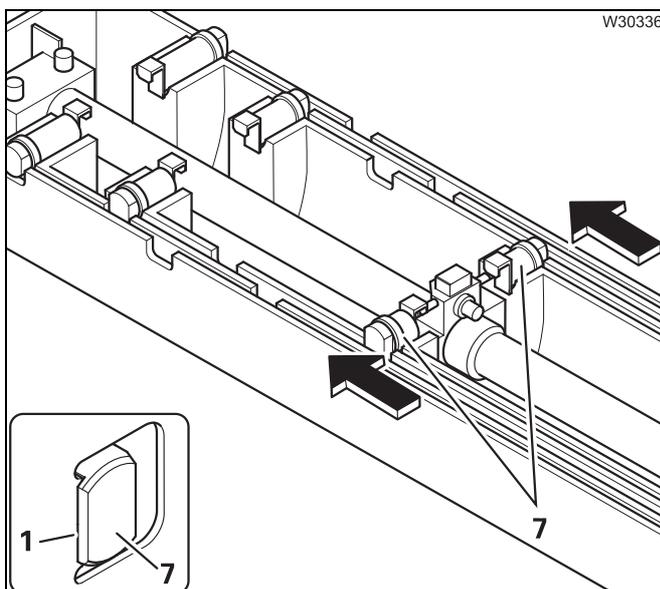
(B) – The mechanism (10) retracts the locking pins (7) – the telescopic section is unlocked.



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 telescoping cylinder is retracted until the locking pins (7) are positioned on the above telescopic section (1).

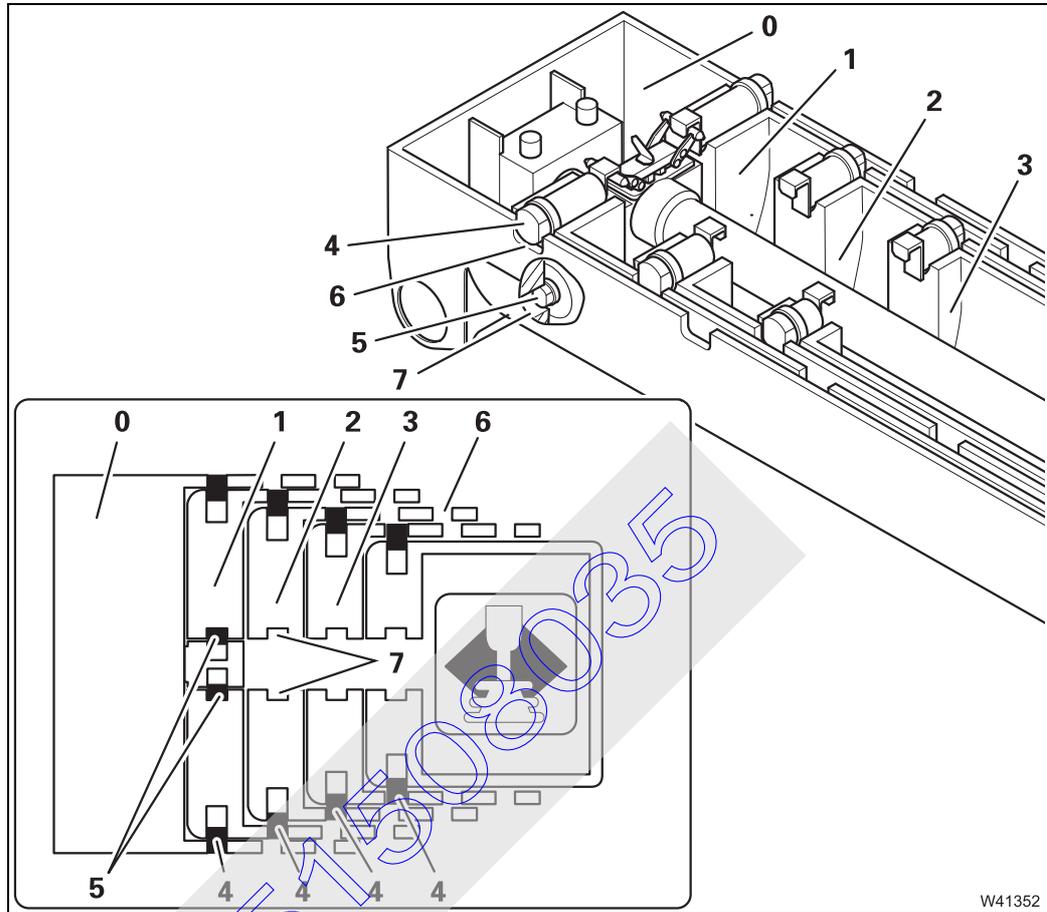
The weight of the load is now on the telescopic sections and not on the telescoping cylinder.



Assignment to display

The *CCS* display shows a sectional view of the main boom in the menus.

The following elements are displayed:



- 0 Basic section
- 1 Telescopic section I
- 2 Telescopic section II
- 3 Telescopic section III
- 4 Locking pin on the telescopic section
- 5 Locking pins on the telescoping cylinder
- 6 Cutouts, external
- 7 Cutouts, internal

**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 identified by the RCL, and the corresponding lifting capacities according to the *Lifting capacity table* are enabled and displayed automatically.

Main boom fixed length

Main boom fixed lengths have the highest 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 lifting the load!

You cannot telescope the boom with the specified lifting capacities for main boom intermediate lengths.

Main boom telescoping length

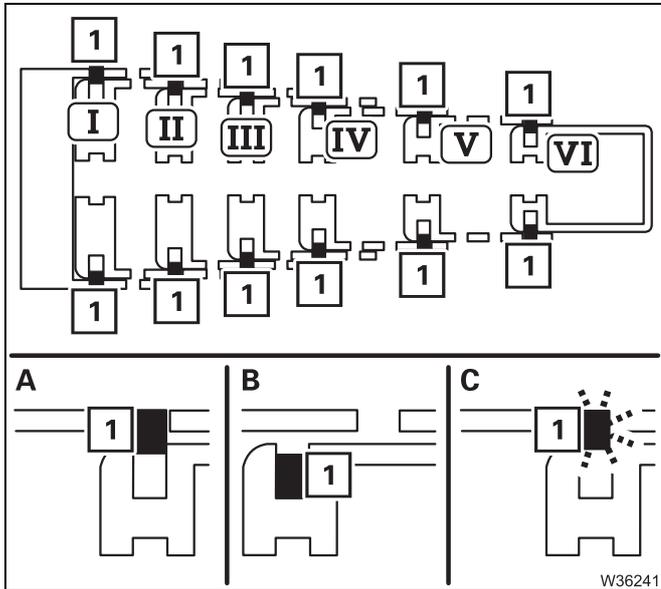
The main boom is at a telescoping length if it is extended to an intermediate length and may be telescoped with the current load. The size of the load that can be telescoped depends on the angle of inclination and on the degree of lubrication of the main boom.



Telescoping

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

The *CCS* display shows main boom fixed lengths and main boom intermediate/telescoping lengths in different ways.



Fixed lengths

(A) – The locking pins (1) are **green**.

Each telescopic section I to VI has four fixed lengths – Fixed lengths overview; p. 14 - 38.

Intermediate lengths/telescoping lengths

(B) – The locking pins (1) are **black**.

or

(C) – The locking pins (1) are **flashing**.

Telescopic section at fixed length and
 – unlocked or
 – locked and not set down.

Telescoping sequence

The telescopic sections can only be telescoped individually, one after the other. When **extending**, the telescopic section (1) to (6) with the highest number must always be extended first, then the telescopic section with the next lower number and so on (e.g. IV, III, II, I).

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

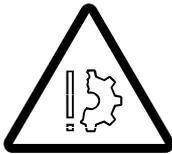
Checks prior to starting operations

When the ignition is turned on, CCS determines the displayed telescoping status from the current status of the telescoping mechanism and the previously saved locking and unlocking procedures.

Normally, CCS detects deviations between the current and the displayed telescope status and displays a corresponding error message;

▣▣▣▣ *Malfunctions at the telescoping mechanism*, p. 14 - 18.

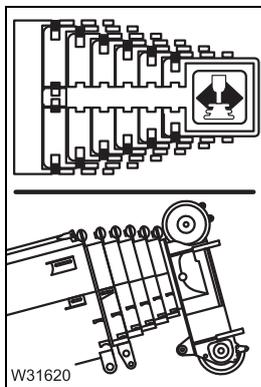
If a **malfunction** results in values being deleted, CCS can no longer calculate the current telescope status and does not issue an error message.



Risk of damage to the telescoping mechanism!

Before the first telescoping, always check whether the *CCS* display is showing the current telescoping.

This prevents the telescoping mechanism being damaged when telescoping.



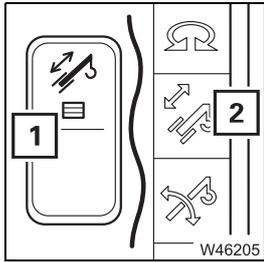
- Before the first telescoping, compare the telescope status indicated on the *CCS* display with the current telescoping.

If the current telescoping is not correctly displayed, enter the current telescoping;

▣▣▣▣ *Current telescoping*, p. 11 - 104.



Switching on the telescoping mechanism



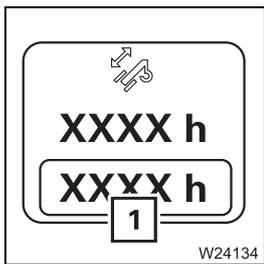
After the ignition is switched on, all power units are switched off and the lamps in the corresponding buttons light up only dimly.

- Press the button (1) – the lamp lights up brightly.

The symbol (2) is **green** when the telescoping mechanism is switched on.

If the control lever is assigned more than one function, all other power units that are assigned the same control lever movement are switched off;

▣▣▣▣▶ *Control lever configuration*, p. 9 - 26.



You can have the operating hours (1) of the telescoping mechanism displayed;

▣▣▣▣▶ p. 11 - 138.

Function of the control lever

This section only describes the function of the control lever. Before telescoping, a number of prerequisites also need to be fulfilled.

- Before manual telescoping; ▣▣▣▣▶ p. 11 - 103.
- Before telescoping with teleautomation; ▣▣▣▣▶ p. 11 - 112.

You can adjust the sensitivity of the control levers to the operating conditions;

▣▣▣▣▶ *Setting the control lever characteristic curve*, p. 11 - 131.



Risk of accidents due to unexpected crane movements!

In the case of multiple assignment, check whether the *Telescoping* control lever function is switched on before you move the control lever for telescoping.

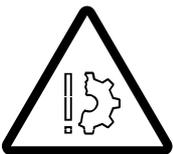
This prevents accidents caused by unexpected derricking!



Risk of accidents due to gaps in monitoring!

Boom extension is only monitored completely if

- The lifting limit switch is correctly rigged; ▣▣▣▣▶ p. 12 - 158,
- The lifting limit switch is not overridden, ▣▣▣▣▶ p. 11 - 84.



Risk of damage to the hoist rope!

The rope can become slack if the hook block touches the ground during retraction. Rope loops will form, which can cause the load to slip and damage the hoist rope.

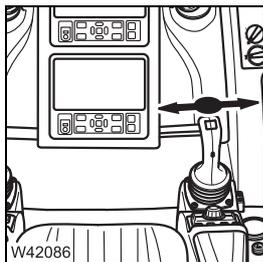
The distance between the hook block and the boom head changes during telescoping. Make sure that the hook block does not trigger the lifting limit switch or touch the ground.

- Additionally carry out the following movements

- Lower hoist when extending and

- Raise hoist when retracting.

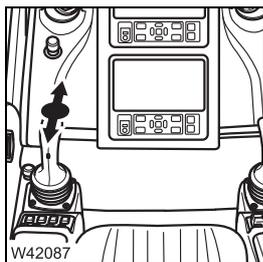
The control lever movements for telescoping vary depending on the configuration.



– **With telescoping assigned to the right-hand lever**

To extend: • Push the control lever to the right.

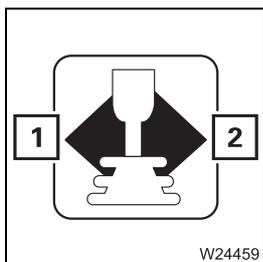
To retract: • Push the control lever to the left.



– **With telescoping assigned to the left-hand lever**

To extend: • Push the control lever forwards.

To retract: • Pull the control lever back.



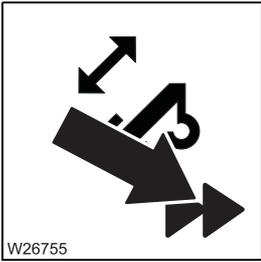
Telescoping will only start if the arrow (1) or (2) for the selected telescoping direction is **green**.

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

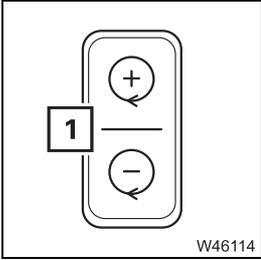


With certain telescoping statuses, the RCL will switch telescoping off, e.g when you leave the telescoping lengths or when the working range limit has been reached;  RCL shutdown, p. 11 - 57.

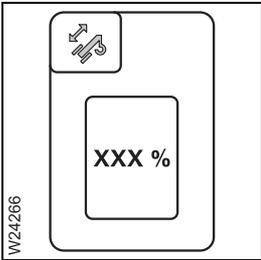




You can switch on high-speed mode for a higher speed; p. 11 - 115.

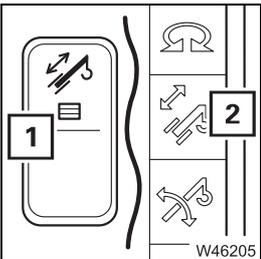


You can set the desired engine speed (idling speed) with the button (1); p. 10 - 11.



You can limit the maximum telescoping speed in the *Power unit speeds* menu; p. 11 - 127.

Switching off the telescoping mechanism



If the telescoping mechanism is not required, it should be switched off to avoid unintentional use.

- Press the button (1) once – the lamp lights up dimly.

Symbol (2) is **orange** when the telescoping mechanism is switched off.

If the control lever is assigned more than one function the telescoping mechanism is also switched off if you switch on another power unit that is assigned to the same control lever movement; *Control lever configuration*, p. 9 - 26.

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 - 105,
- Moving the telescoping cylinder (without telescopic section);  p. 11 - 107
- Locking the telescoping cylinder;  p. 11 - 108,
- Unlocking the telescopic section;  p. 11 - 109,
- Telescoping the telescopic section;  p. 11 - 110,
- Locking the telescopic section;  p. 11 - 111.



The operating order depends on the current initial position. For an overview of a telescoping process example;  p. 11 - 94.

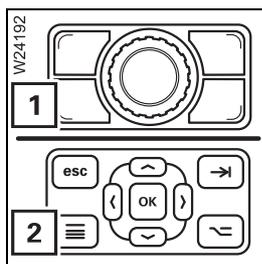


The lengths given in the following illustrations are examples only and may differ from the current display.

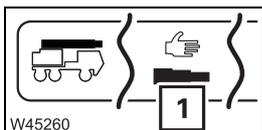
Checking the initial position

Before telescoping, you must check the following statuses:

- **Current telescoping**
- **Position of the telescoping cylinder**
- **Position of the locking pins**

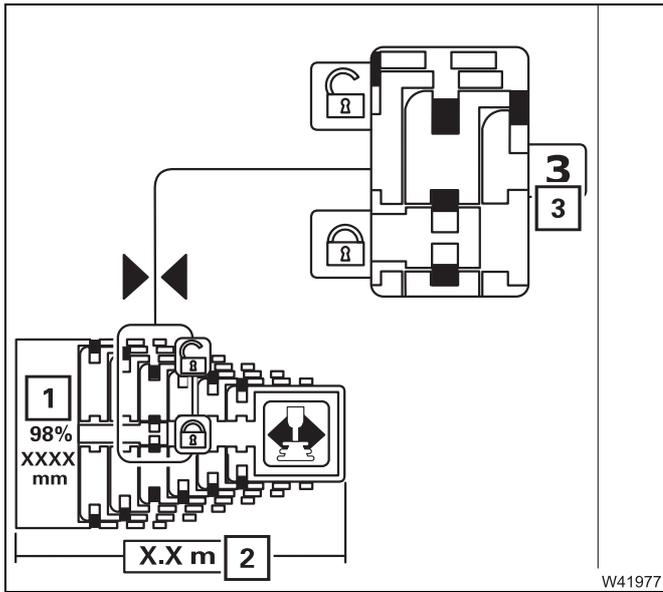


- If necessary, open the overview of the menu groups – press button **(1)** or **(2)** once.



- Open the menu **(1)** – Manual telescoping menu.



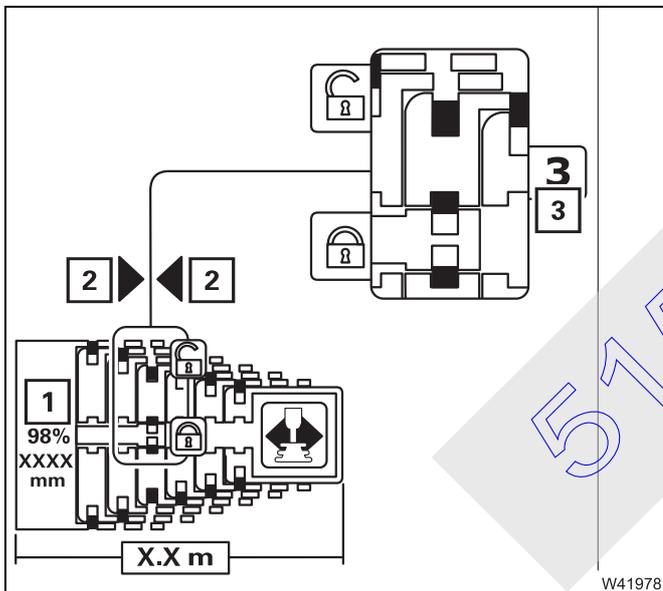


Current telescoping

The display (1) shows how far the telescoping cylinder is extended, for example, 98%.

The display (2) shows the current main boom length.

The display (3) shows the corresponding telescopic section, for example, telescopic section 3.



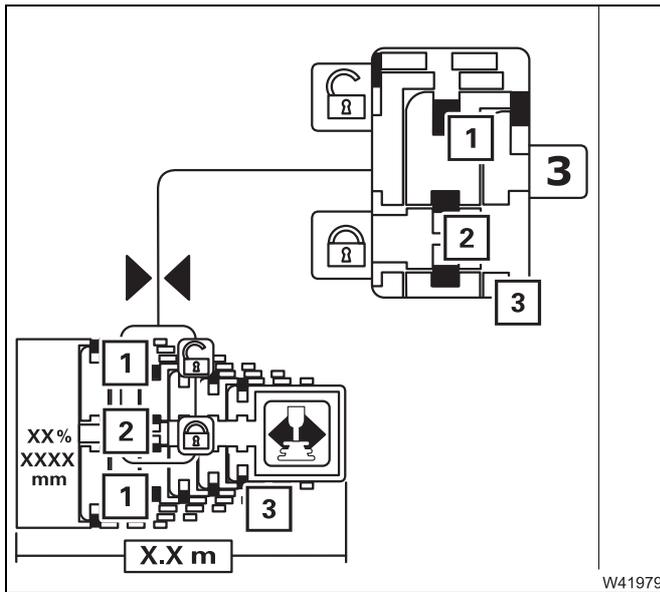
Position of the telescoping cylinder

The display (1) shows how far the telescoping cylinder is extended, for example, 98%.

If the telescoping cylinder is near a locking point:

– The display (3) shows the corresponding telescopic section, for example, telescopic section 3.

The display (2) shows one or two arrows, depending on the distance to the locking point.



Position of the locking pins

The current positions of the locking pins are:

- 1** On the telescopic section
- 2** On the telescoping cylinder

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

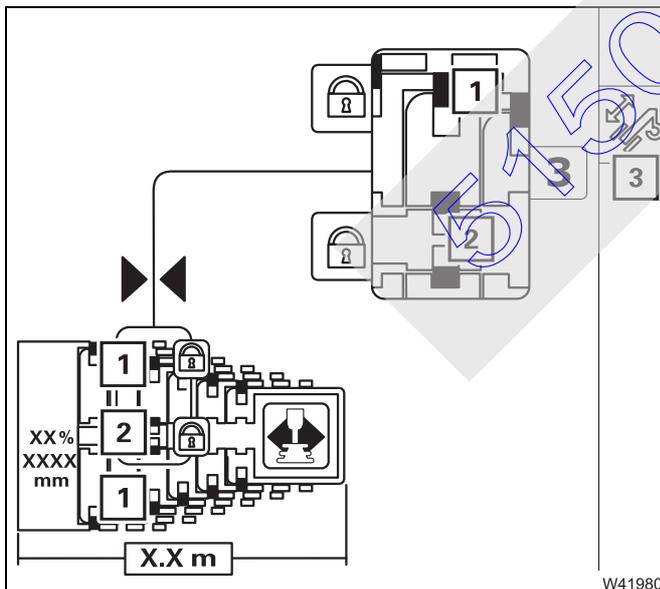
The current settings are shown in different colours.

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

Unlocking the telescoping cylinder

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

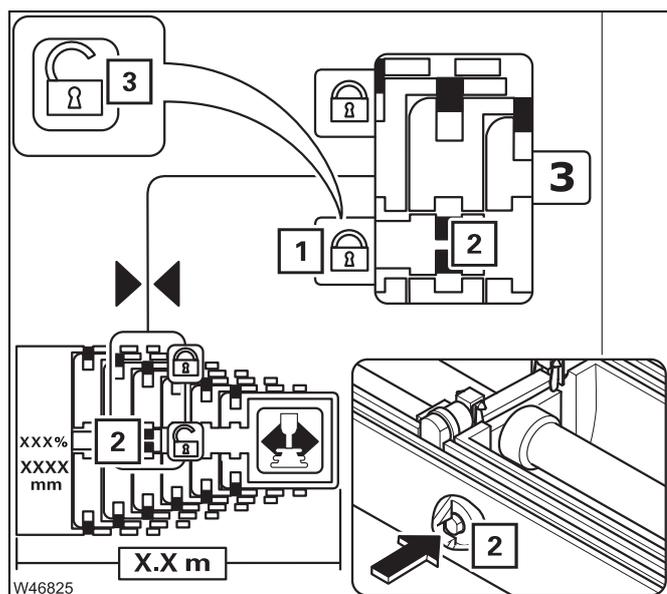
The telescoping cylinder and the telescopic section cannot be unlocked simultaneously.



Prerequisites

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





Unlocking

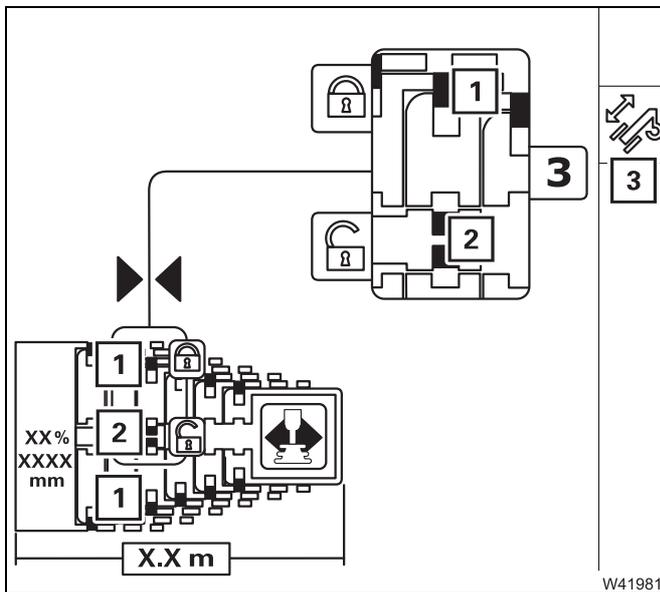
- Select and confirm the symbol (1).

The locking pins (2) are retracted.

- **Yellow:** Intermediate position
- **Red:** Unlocked – symbol (3) displayed

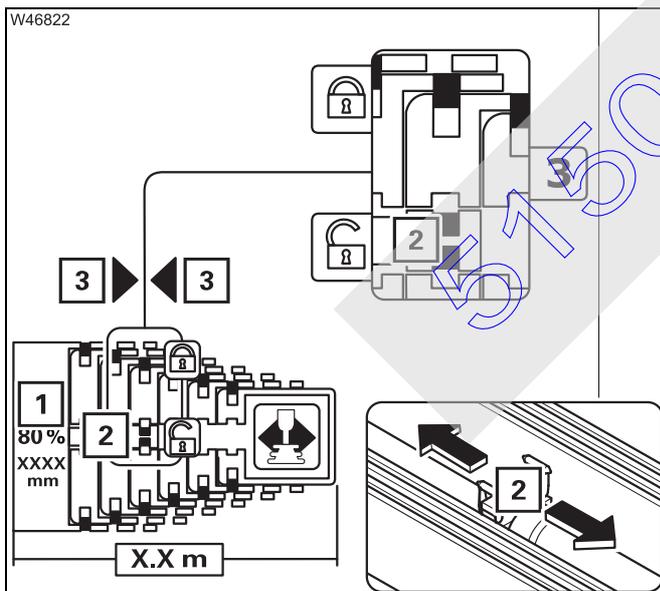
51508035

Extending/ retracting the telescoping cylinder



Prerequisites

- Telescoping mechanism on – symbol (3) **green**
- Telescopic sections locked – symbol (1) **green**
- Telescoping cylinder unlocked – symbol (2) **red**



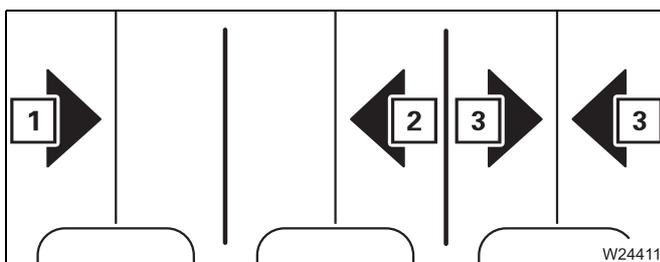
Extending/retracting

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

The telescoping cylinder (2) extends/retracts.

The display (1) shows the currently extended length, for example, 80%.

Near a locking point, the symbols (3) indicate:



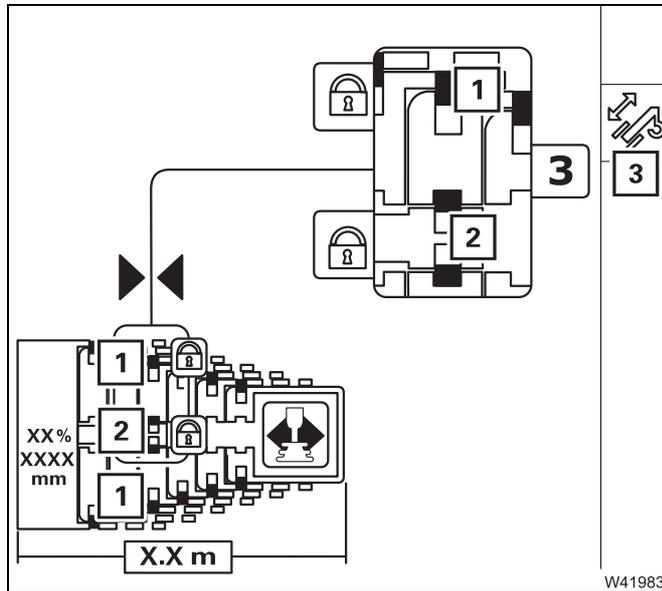
- The direction of travel to the locking point:
 - 1 Extending
 - 2 Retracting
 - 3 At the locking point



Unlocking the telescopic section

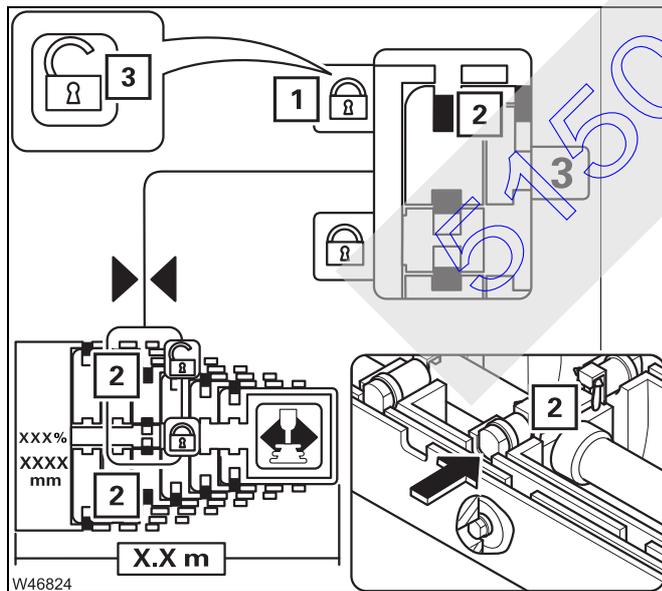
Unlocking a telescopic section is required for the telescopic section to be telescoped.

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



Prerequisites

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



Unlocking

- Select and confirm the symbol (1).
The locking pins (2) are retracted.
 - **Yellow:** Intermediate position
 - **Red:** Unlocked – symbol (3) displayed

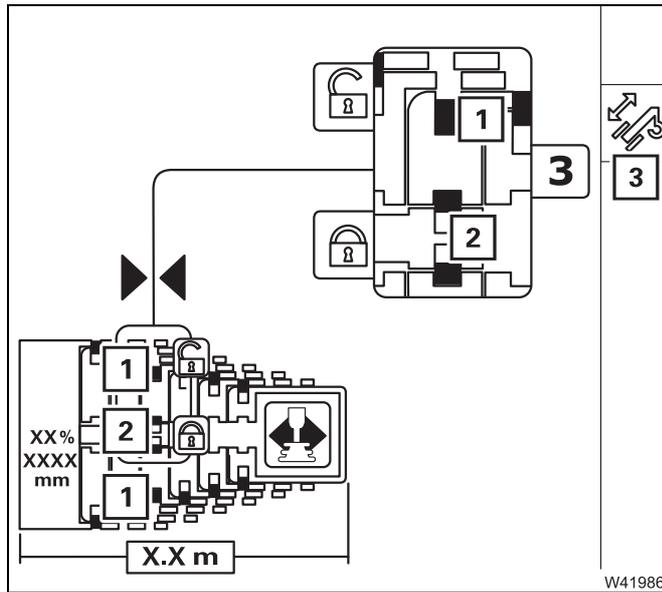
If symbol (2) is not **red** after about 10 seconds, this means the locking pins are under load.

To relieve the load, carefully retract and extend a little.



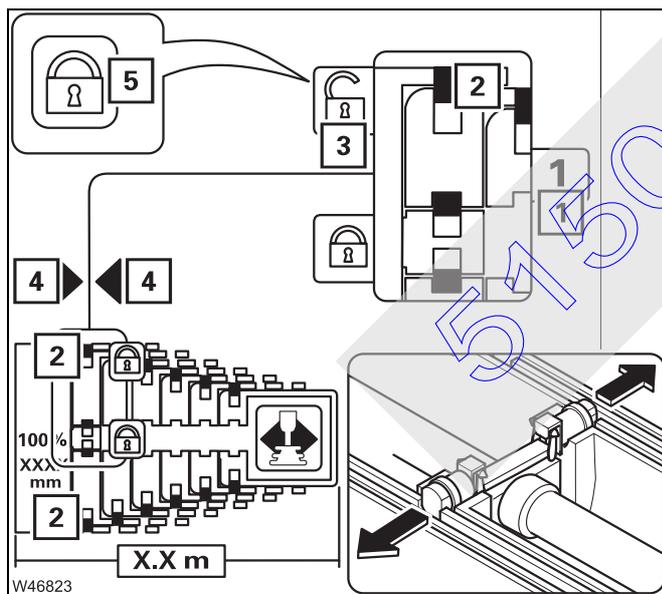
Locking the telescopic section

Every telescopic section can be locked at the fixed lengths – fixed lengths;
 p. 11 - 97.



Prerequisites

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



Locking

- Telescope to the desired fixed length, for example, telescopic section (1) 1 to 100%.
 If the symbol (4) is displayed, you can lock the telescopic section.
- Select and confirm the symbol (3).
 The locking pins (2) are extended.
 - **Yellow:** Intermediate position
 - **Green:** Locked – symbol (5) displayed



Locking the telescopic section for on-road driving

Once you have retracted the main boom for on-road driving, you must 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 - 105,
- Move the telescoping cylinder into telescopic section I; p. 11 - 107 and
- Lock the telescoping cylinder; p. 11 - 108.

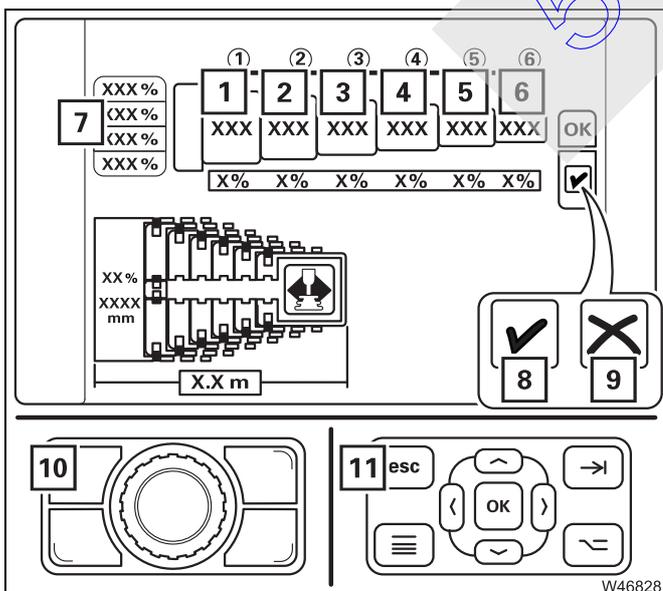
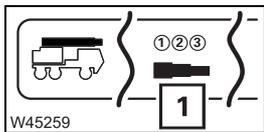
Telescoping with semi-automatic telescoping

When telescoping with semi-automatic telescoping, 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 CCS.



If the desired telescope status is not a fixed length, you can first telescope to the next closest fixed length with semi-automatic telescoping and then telescope further to the desired length manually.

- Switch on the telescoping mechanism; p. 11 - 91.
- Open the menu (1) – Semi-automatic telescoping menu.



Entering the telescope status

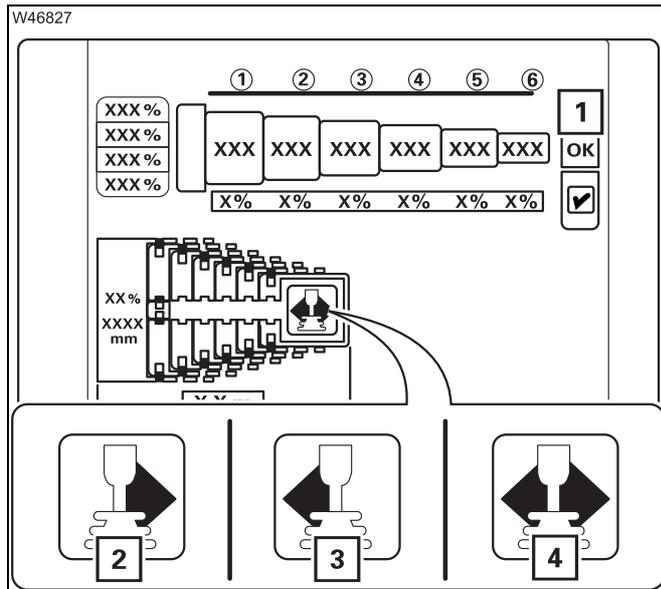
You can cancel the input at any time – press button (10) or (11) once.

Entry for all telescopic sections

- Select and confirm the desired value (7).

Entry for individual telescopic sections

- Select and confirm the desired value (1) to (6).
- Symbol (9) displayed – telescoping **not permitted** – enter a new value.
- Symbol (8) displayed – telescoping permitted – the entry can be confirmed.

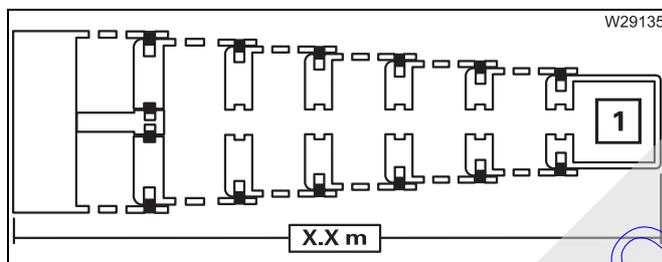


Confirming the entry

- Select and confirm the symbol (1).

Telescoping

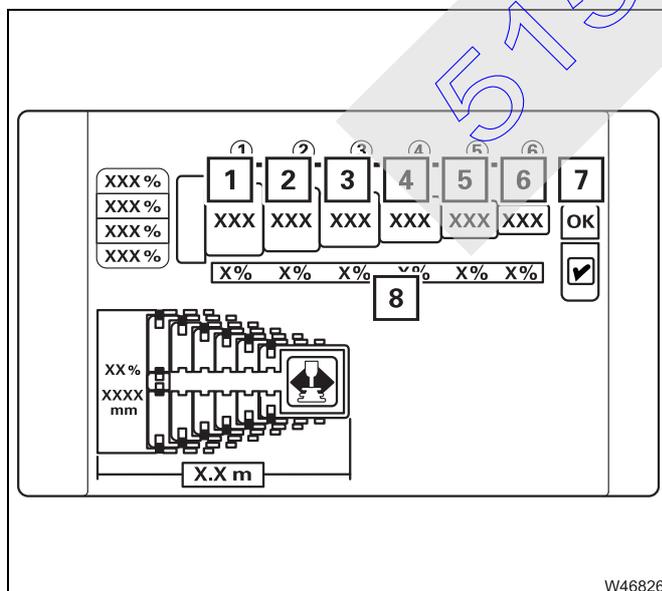
- Move the control lever for the displayed telescoping direction.
 - 2 Extend
 - 3 Retract
 - 4 Display in the case of return runs (without a telescopic section)



Ending semi-automatic telescoping

Teleautomation stops when the entered telescope status is reached – symbol (1) goes out.

- Move the control lever to its initial position – teleautomation off.



Cancelling semi-automatic telescoping

- Release the control lever.

If the telescopic sections are at a fixed length, the current telescope status can be entered as the telescoping destination.

The display (8) shows the current telescoping:

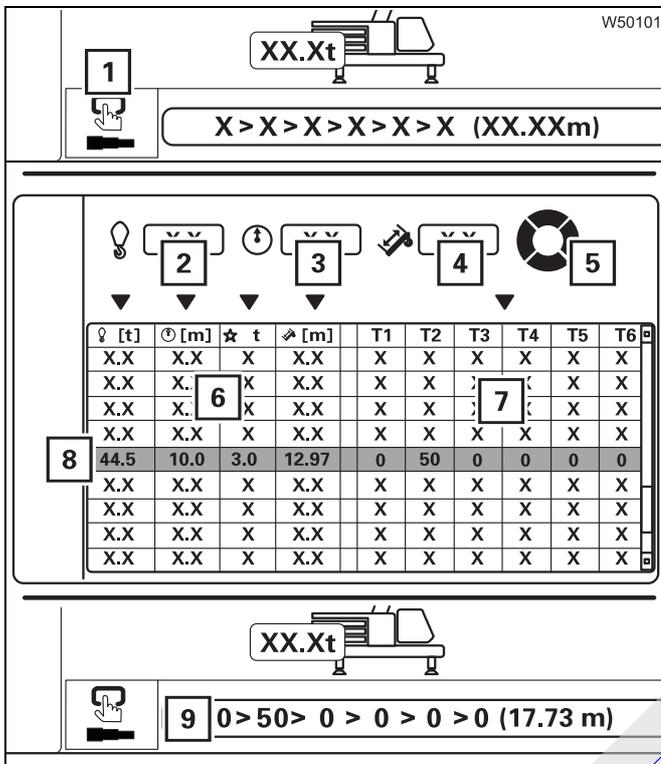
- **Red:** Unlocked
- **Green:** Fixed length and locked

- Enter the current telescoping (1) to (6) and confirm the selection with (7).



Telescoping with pre-selection

No additional telescoping menu needs to be opened for this type of telescoping operation. All displays are shown in the *Monitoring* RCL menu. Pre-selection of the telescope status was already performed when entering the rigging mode at the RCL; *Pre-selecting telescoping*, p. 11 - 40.



Pre-selection – Overview

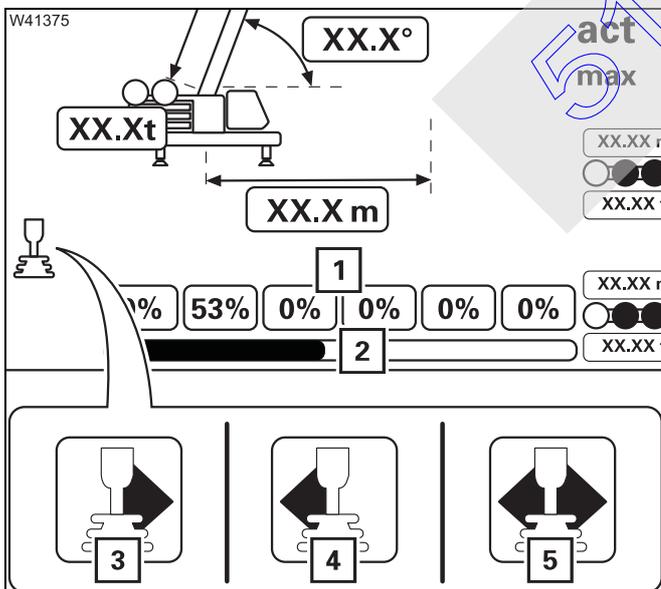
The menu is opened with the symbol (1).

Four parameters can be entered for the loading case.

- 2 Load weight
- 3 Working radius
- 4 Main boom length
- 5 Slewing range – for MAXbase only

The table shows all permissible telescope statuses (6) and the corresponding parameters (7) for the entered rigging mode.

A preselected telescope status (8) is shown on the display (9) after confirmation.



After confirming the rigging mode, the display (1) in the *Monitoring* menu shows the pre-selection.

Telescoping

- Switch on the telescoping mechanism.
 - Move the control lever for the displayed telescoping direction.
- 3 Extend
 - 4 Retract
 - 5 Display in the case of return runs (without a telescopic section)

The display (2) shows the current position of the telescoping cylinder.

11.5.7

High-speed mode



The slewing gear cannot be operated in high-speed mode.



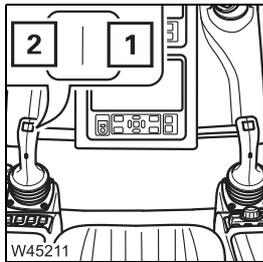
You can switch on high-speed mode for a higher speed.

Risk of accidents due to abruptly accelerating movements!

Reduce the engine speed before starting high-speed mode.

This prevents movements becoming excessively accelerated, which may result in the truck crane starting to sway and overturning.

Derricking gear/ telescoping mechanism



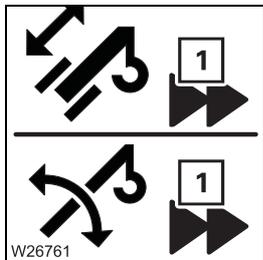
High-speed mode is always switched on and off for the derricking gear and the telescoping mechanism at the same time.

Switching on briefly

- Press the button at (1) – inwards.
High-speed mode is active until you release the button.

Continuous operation

- Press the button at (2) – outwards.
High-speed mode is enabled until you press the button again.



The symbol (1) indicates the current status:

- **Lights up:** High-speed mode switched on
- **Gone out:** High-speed mode switched off



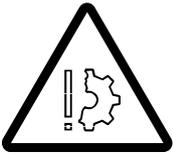
During lowering of the boom, high-speed mode only supports start-up of the derricking procedure from steep boom positions; it does not increase the derricking speed.

High-speed mode is disabled for raising when performing operations with the lattice extension.

Hoists

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





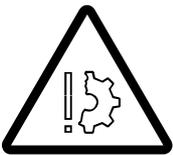
Risk of accidents due to overloading!

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.



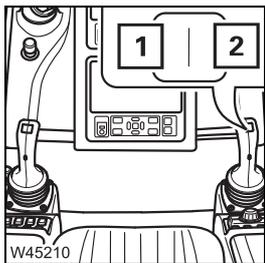
Danger of slack rope with a lightweight hook block!

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 long 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 develop because the hook block is lowered too slowly due to the high degree of friction.

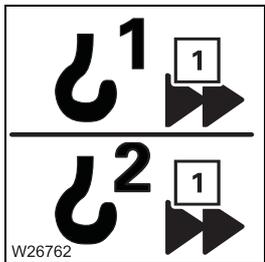


Switching on briefly

- Press the button at (1) – inwards.
 High-speed mode is active until you release the button.

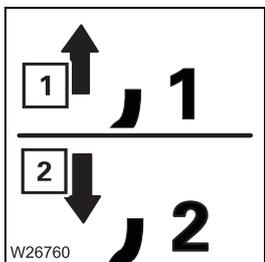
Continuous operation

- Press the button at (2) – outwards
 High-speed mode is enabled until you press the button again.



The symbol (1) indicates the current status:

- **Lights up:** High-speed mode switched on
- **Gone out:** High-speed mode switched off



The symbols show the direction of rotation of the hoist:

- 1 Lifting the hoist
- 2 Lowering the hoist



The speed of the hoists is only significantly increased by switching to high-speed mode if you have moved the control lever by more than 70%.

11.5.8

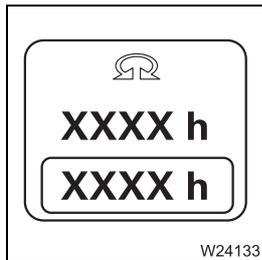
Slewing gear



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 - 119.



You can have the operating hours of the slewing gear displayed; p. 11 - 138.

Slewing gear brake

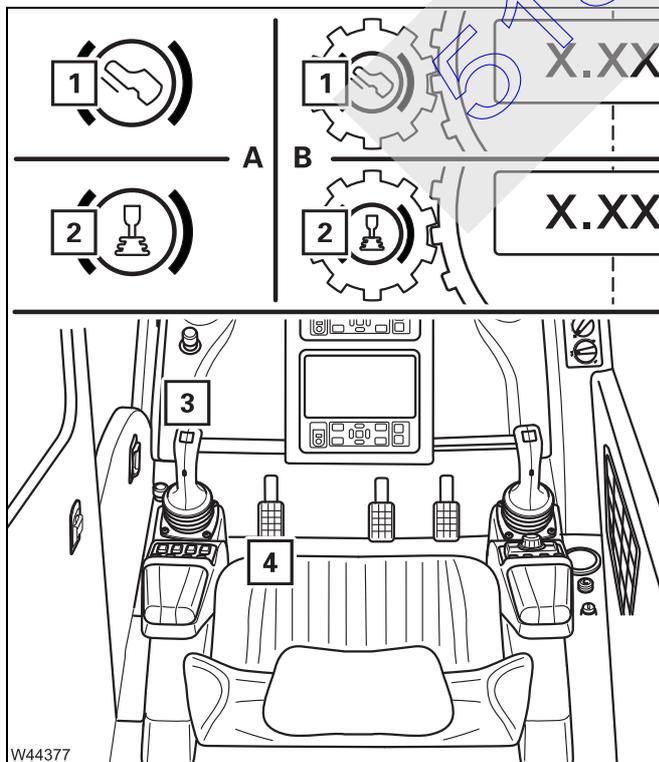
Depending on the function that is switched on, the slewing gear is braked with the brake pedal or with the control lever.



Risk of accidents due to switched-off operating elements

Always check that the slewing gear brake function is switched on and switch to the function you prefer as required.

This prevents the slewing movement from continuing when you use the switched-off operating element for braking.



Checking the function

- Check which function is switched on.

(A) – In the start menu or

(B) – In the *Slewing gear/houselock* menu

1 Brake pedal function

The only means of braking the slewing movement is by using the brake pedal (4).

2 Control lever function

The only means of braking the slewing movement is by using the control lever (3).

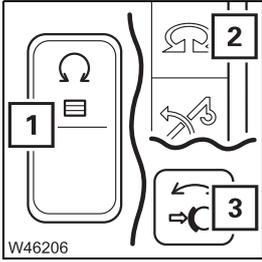
Switching over the function

- Select and confirm the symbol (1) or (2) until the desired function is displayed.



Switching on the slewing gear

After the ignition is switched on, all power units are switched off and the lamps in the corresponding buttons light up only dimly.



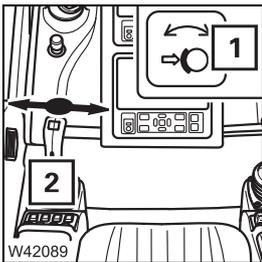
- Press the button (1) – the lamp lights up brightly.
 Symbol (2) is **green** if the slewing gear is switched on.



If a rigging mode is entered for the 0° to the rear operating position, an RCL shutdown will occur after switching on the slewing gear, and slewing is disabled. To acknowledge this shutdown, you must either switch off the slewing gear or set down the load and enter a rigging mode for the 360° working range.

Releasing the slewing gear brake

- With the *Brake pedal* function
 The slewing gear brake is released when you switch on the slewing gear.

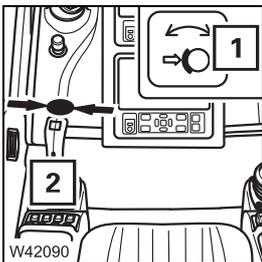


- With the *Control lever* function
 The slewing gear brake is released as soon as you move the control lever (2).

Lamp (1) goes out when the slewing gear brake is released.

Applying the slewing gear brake

- With the *Brake pedal* and the *Control lever* functions
 The slewing gear brake is applied when you switch off the slewing gear;
 ■■■▶ p. 11 - 122.



- With the *Control lever* function
 The slewing gear brake is also applied if control lever (2) is in its initial position.

The lamp (1) light ups when the slewing gear brake is applied.

Slewing

The following requirements must be fulfilled before slewing:

- The turntable is unlocked – provided systems are present
 - ▣▣▣▣ *Unlocking the superstructure*, p. 11 - 16
 - ▣▣▣▣ *Switching off the houselock*, p. 11 - 19
- Slewing is permissible with the current rigging mode; ▣▣▣▣ p. 12 - 119.
- The current rigging mode is shown on the *RCL* display.
- The counterweight is pre-tensioned; ▣▣▣▣ p. 12 - 107

If slewing is not permissible with the current rigging mode, the slewing gear is locked.



Danger of overturning when slewing with an incorrectly set RCL!

Before slewing, always check that the current rigging mode is shown on the *RCL* display.

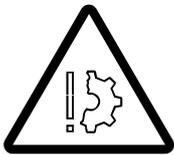
This prevents slewing operations being enabled within the impermissible ranges, which would cause the truck crane to overturn.



Risk of crushing during slewing!

Before slewing, operate the horn and ensure there are no persons in the slewing range.

This prevents persons being crushed between the superstructure and the carrier or between the superstructure and other objects.



Risk of the main boom buckling!

Do not accelerate the slewing speed to such an extent that the load starts swinging.



Risk of damage due to overridden slewing gear shutdown.

If the lifting limit switch is overridden, then the load torque related shutdowns of the slewing gear are not enabled (for example, if the pre-tensioning pressure of the counterweights is too low). For this reason, do not start slewing as long as the lifting limit switch is overridden.

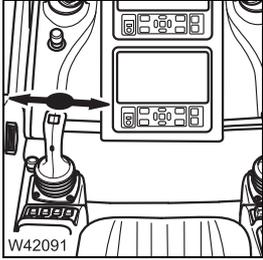
You can adjust the sensitivity of the control levers to the operating conditions;

▣▣▣▣ *Setting the control lever characteristic curve*, p. 11 - 131.



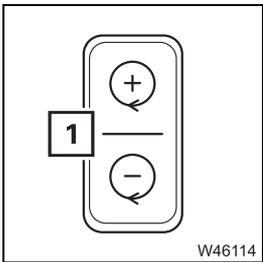


With the *Brake pedal* function switched on, slewing movements are not braked automatically. If you let go of the control lever or move it to the initial position, the slewing movement slowly runs down; *Braking the slewing movement*, p. 11 - 121.

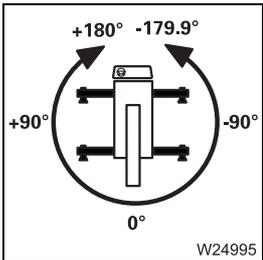


- Slewing to the left:** • Push the control lever to the left.
Slewing to the right: • Push the control lever to the right.

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



You can set the desired engine speed (idling speed) with the button (1); p. 10 - 11.



The current slewing angle is shown in the *Start menu* and in the *Superstructure lock* menu.

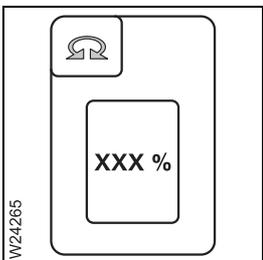
0° means the superstructure is slewed to the rear.

- Angles in the **right semi-circle** are displayed as **positive** values (0° to +180°).
- Angles in the **left semi-circle** are displayed as **negative** values (0° to - 179.9°).

Maximum slewing speed

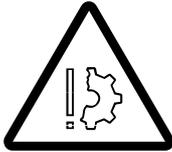
The current speed reduction is displayed in the *Start menu*; p. 9 - 33.

The maximum permissible slewing speed is limited automatically depending on the working radius and degree of utilisation of the lifting capacity. Under certain circumstances, you can switch off this reduction; p. 11 - 122.



You can limit the maximum slewing speed in the *Power unit speeds* menu; p. 11 - 127.

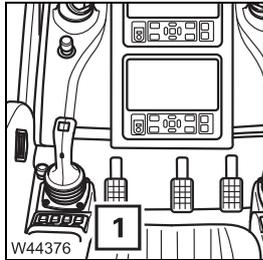
Braking the slewing movement



You may only brake the slewing movement with the slewing gear brake.

Risk of the main boom buckling!

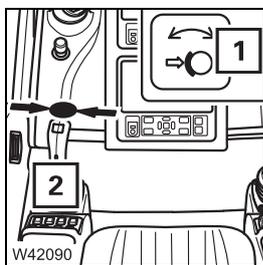
Never switch the slewing gear off to brake it. Only switch the slewing gear off when the superstructure has stopped rotating.



With the *Brake pedal* function active

- Press the brake pedal (1). Do not brake to such an extent that the load starts swinging.

If you only move the control lever to the initial position, the slewing movement slowly runs down.



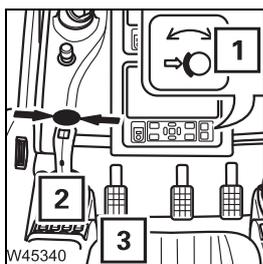
With the *Control lever* function active

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

At the initial position, the slewing movement is stopped. At the same time the slewing gear brake is applied and the lamp (1) lights up.

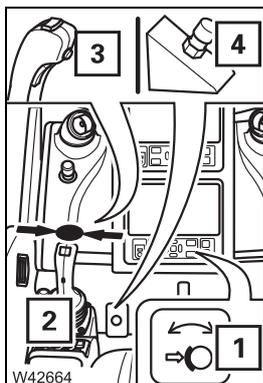
Slewing gear freewheel

The slewing gear freewheel is required if the slewing gear needs to be slewed by external forces, for example, when operating with two cranes.



With the *Brake pedal* function active

- Switch on the slewing gear.
The slewing gear brake is released – lamp (1) goes out.
- Keep the control lever (2) in its initial position.
- Do not press the brake pedal (3).



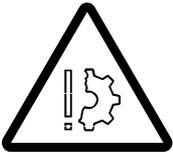
With the *Control lever* function active

- Switch on the slewing gear.
- Keep the control lever (2) in its initial position.
- To do this, press button (3) or button (4) in the case of additional equipment.
The slewing gear brake is released – lamp (1) goes out.



Switching off the slewing gear

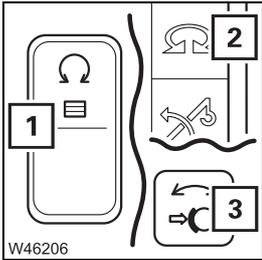
If the slewing gear is not required, it should be switched off to avoid unintentional use.



Risk of damage to the main boom!

Brake the slewing movement to a standstill before you switch off the slewing gear. The slewing gear brake is automatically applied when the slewing gear is switched off.

This prevents excessive lateral forces affecting the main boom due to significant deceleration or swinging loads.



- Press the button (1) once – the lamp lights up dimly.
Symbol (2) is **orange** when the slewing gear is switched off.
The slewing gear brake is applied – lamp (3) lights up.

11.5.9

Switching the slewing speed reduction on and off

When the ignition is switched on the slewing speed reduction is switched on and depending on the degree of utilisation and the working radius, the slewing speeds are automatically reduced to the maximum permissible levels listed in the *Lifting capacity table* under the comments on slewing speed.

Switching the reduction off

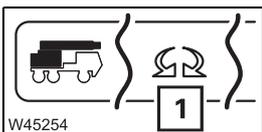
You can only switch off the reduction if the *Standard* slewing range type is entered.



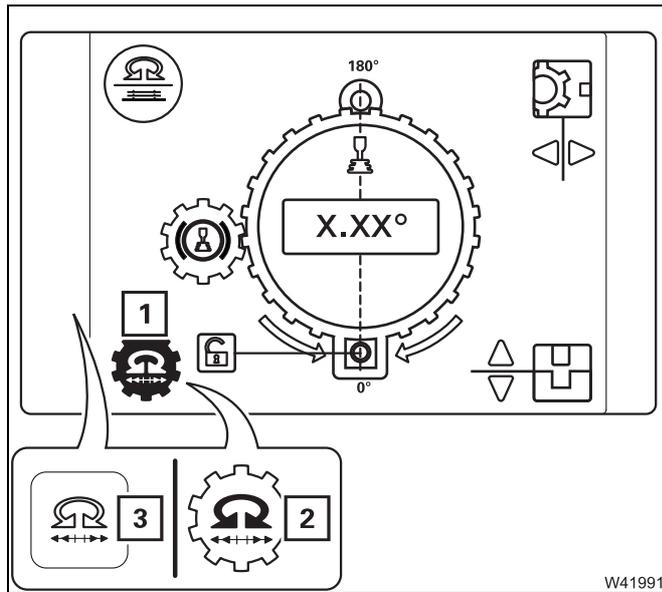
Risk of accidents due to excessive slewing speed!

Observe the specified maximum permissible slewing speeds. This prevents the truck crane being exposed to excessive dynamic loads, which can lead to damage to crane sections and the truck crane overturning. Always slow down and accelerate the slewing movement slowly and avoid swinging loads.

When the reduction is switched off, you as the crane operator are responsible for a slewing speed that is suitable for the current loading case.



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



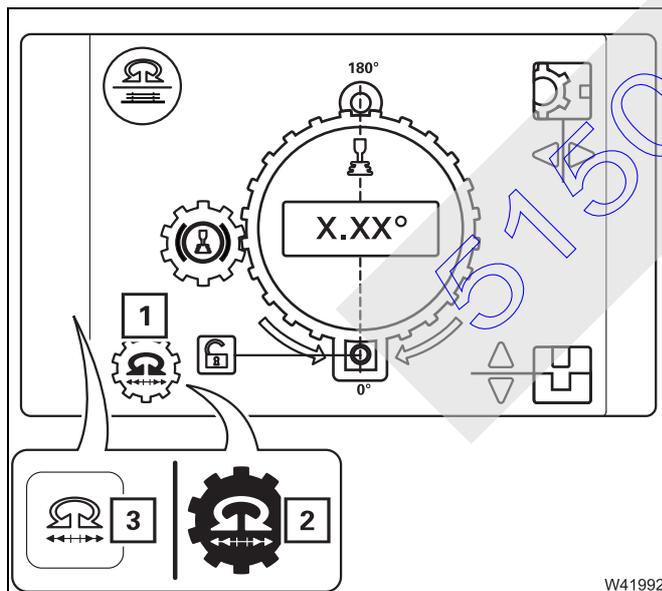
- Select and confirm the symbol (2).
 - Symbol (1) displayed – **green**.
 - Warning message display (3).

The slewing speed is not reduced automatically.

If the maximum permissible slewing speed is exceeded, the buzzer tone sounds once and the warning message (3) is displayed – **red**.



The entered limits for the power unit speed of the slewing gear are still valid and the continuous speed reductions due to the working range limiter are still active.



Switching the reduction on

- Select and confirm the symbol (2).
 - Symbol (1) displayed – **grey**.
 - The warning message (3) disappears.

The slewing speed is reduced automatically.

The reduction is automatically switched on when you enter the *MAXbase* slewing range type.

11.5.10

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 unit.
- The auxiliary power units – superstructure lock, tilt crane cab, counterweight hoist unit – cannot be operated with the *Telescoping* movement. Moving the auxiliary drive gears in combination with other power units can result in speed reductions.
- Lattice extension derricking gear
The lattice extension derricking gear cannot be operated in combination with the *Telescoping out* movement.



Certain movement combinations can reduce the speed in high-speed mode.

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11.6

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.

11.6.1

Inclining the crane cab

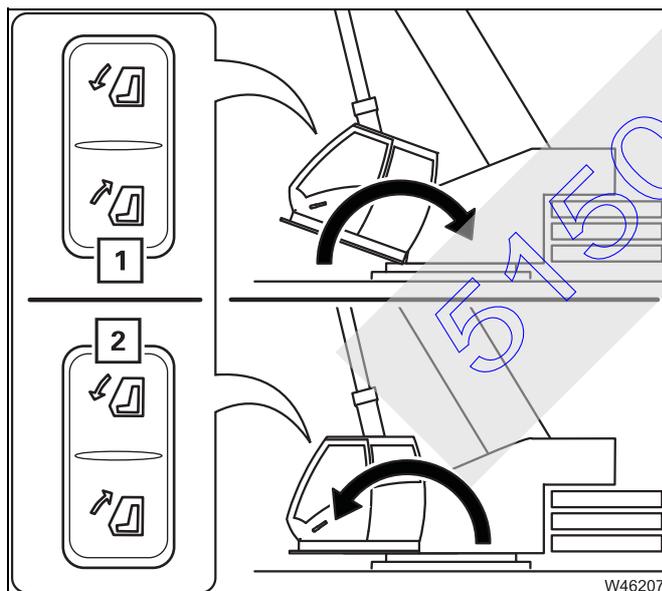
With the appropriate equipment, you can incline the crane cab to the rear in order to establish a more favourable sitting position when working at great heights.



Risk of accidents due to objects falling over in the crane cab!

Close the crane cab door before inclining and remove all loose objects (for example, bottles) from the crane cab.

This prevents objects falling over, the crane cab door opening by itself and unintended operational accidents caused by fright.



- Close the crane cab door.

Incline to the rear

- Press the switch next to symbol (1).

Incline forwards

- Press the switch next to symbol (2).

The crane cab tilts as long as you keep the button pressed or until its end position is reached.

11.6.2 Setting the idling speed

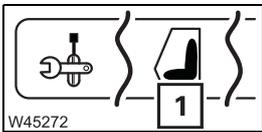
▮▮▮▮▶ *Setting the idling speed, p. 10 - 11*

11.6.3 Adjusting the wiper stroke interval of the windscreen wiper

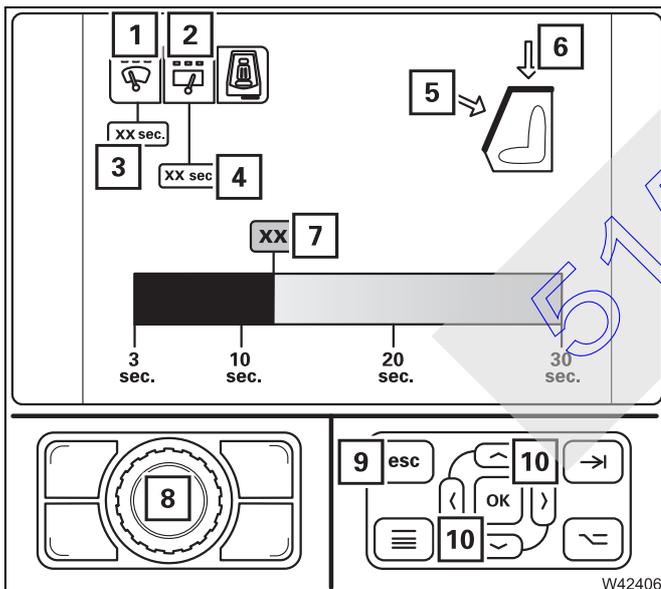
You can set a value between 3 and 30 seconds for the front and roof window wiper stroke interval.



The higher the selected value is, the longer the pauses between the strokes of the wiper are.



- Open the menu (1) – Crane cab menu.



- The displays (3) and (4) show the current values.

- 3 Interval for windscreen wiper
- 4 Interval for roof window wiper

- Select and confirm the symbol:

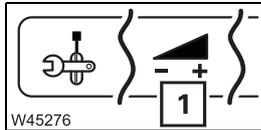
- 1 For the windscreen wiper – symbol (5) displayed – (3) input mode on displayed.
- 2 For the roof window wiper – symbol (6) displayed – (4) input mode on displayed

To cancel the input – press button (9) once.

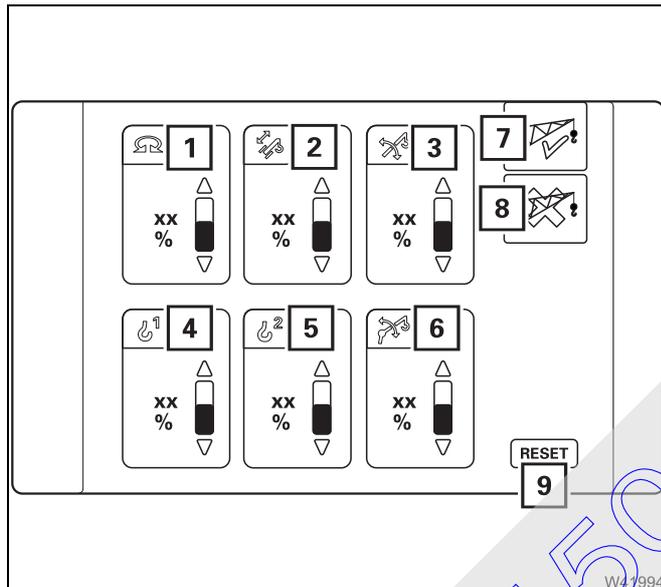
- Change the value using buttons (8) or (10).
(7) shows the current value – entry between 3 and 30 seconds possible.
- Confirm the changed value.

11.6.4 Limiting the power unit speeds

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



- Open the menu (1) – Power unit speeds menu.



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

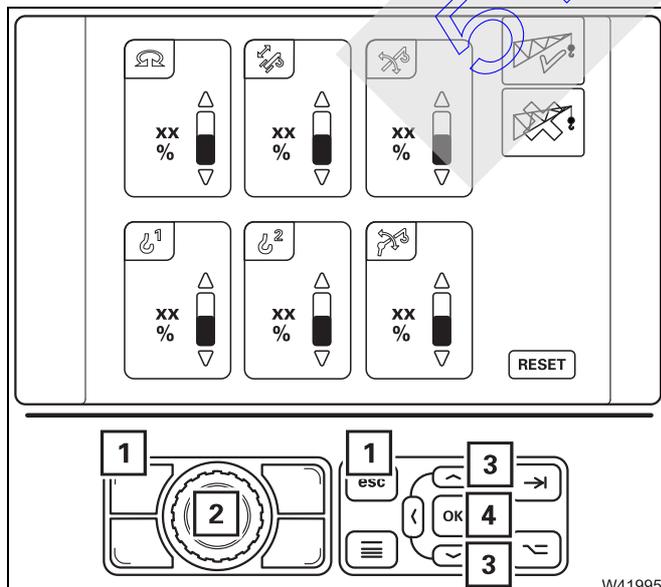
The values for the slewing gear (1) and derricking gear (3) only apply if they are lower than the automatically limited values. The automatically limited values are not displayed.

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

With the preselection symbol for:

- 7 Operation **with** the lattice extension
- 8 Operation **without** the lattice extension

Symbol (9) resets all values without prior selection.



Changing values

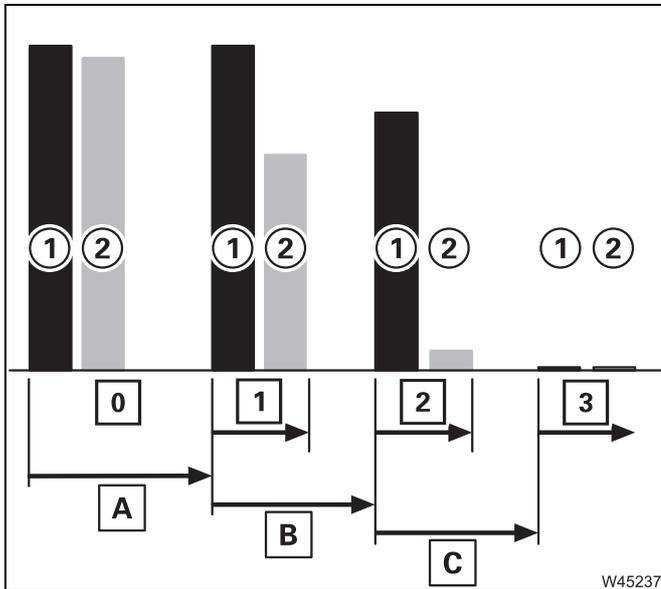
- Select and confirm the symbol for the relevant power unit – symbol **red**.
- Change the value using switch (2) or the buttons (3).

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

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

11.6.5 Economy mode

You can also switch economy mode on/off. If you do not move the control lever with *Economy Mode* switched on, when intervals **A**, **B** and **C** pass, three economy steps are activated in succession.



Economy steps

- | | |
|----------|--|
| 0 | – Work break
– Start interval A |
| 1 | – Start step 1
– Start interval B
– ② Superstructure – power reduced |
| 2 | – Start step 2
– Start interval C = 60 seconds
– ② Superstructure – power significantly reduced
– ① Carrier – engine speed reduced |
| 3 | – Start step 3
– ② Superstructure – drive switched off
– ① Carrier – engine off
– APS ¹⁾ – starts |

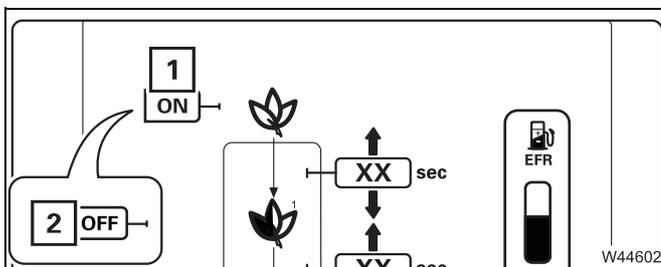
1) Additional equipment

You can set intervals **A** and **B** in the *Economy* menu

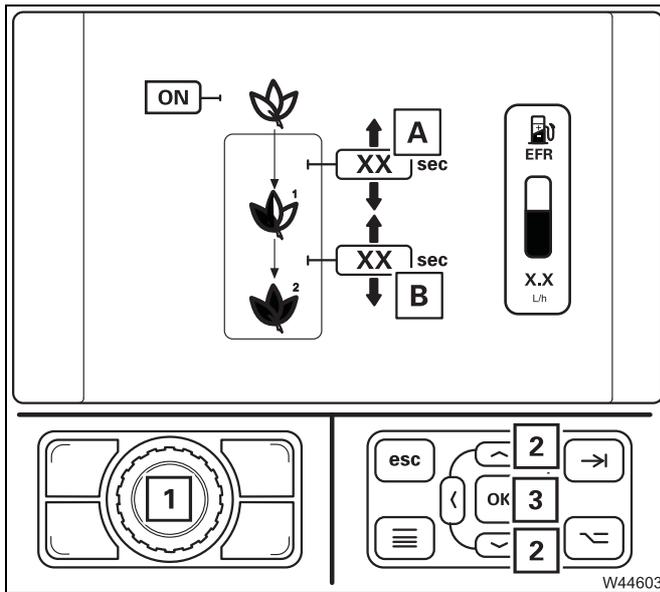


- Open the menu (1) – Economy menu.

Switching on



- Select and confirm the symbol (2) – symbol (1) is displayed.

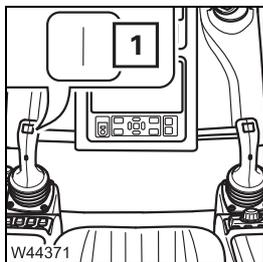


Setting the time interval

- Select and confirm the symbol for interval **(A)** or **(B)**. Change the value of the intervals using switch **(1)** or the buttons **(2)**.

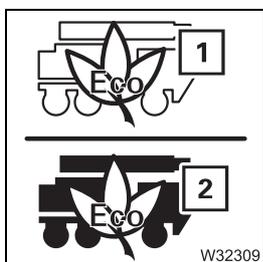
You can set an interval from 10 seconds to 10 minutes.

- Confirm the changed values – press switch **(1)** or button **(3)** once.



Activating step 3 manually

- Press and hold the button **(1)** – for 3 seconds.
 The engine is switched off – APS is started.



Economy Mode display

If *Economy Mode* is active, a background image is shown on the *CCS* display.

- 1** for step **1**
- 2** for steps **2** and **3**

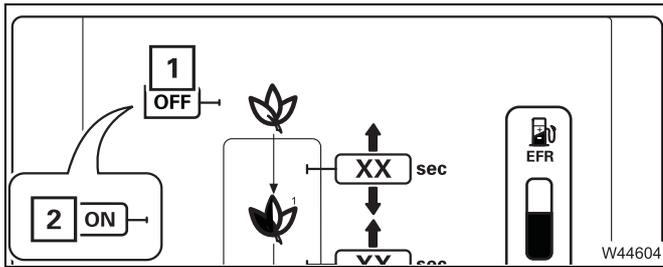


Ending

You can end *Economy Mode* in different ways.

- Press the accelerator.
- Increase the idling speed with the button.
- Move a control lever (not after manual activation).
- Switch on a power unit.

Switching off

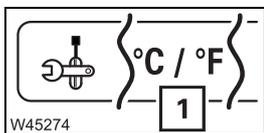


- Select and confirm the symbol (2) – symbol (1) is displayed.

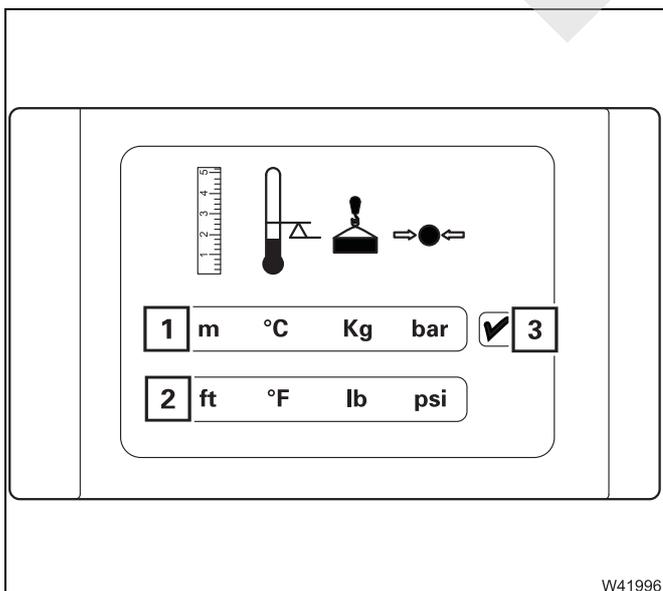
11.6.6

Switching over units

You can switch over the units of the crane control between metric units and US units. The setting applies to all displays on the superstructure and on the carrier.



- Open the menu (1) – Switch over units menu.



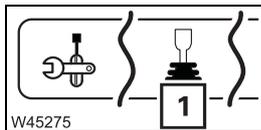
- Select and confirm the symbol:
 - 1 To display metric units
 - 2 To display US units

The symbol (3) shows the respective confirmed selection.

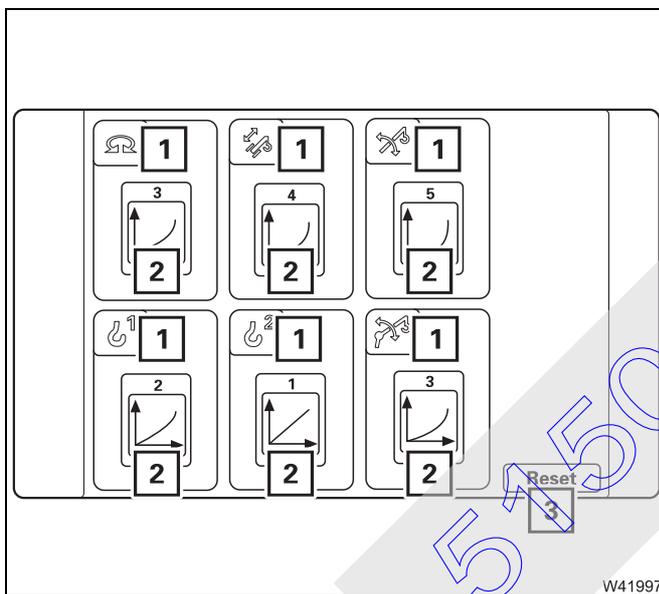
11.6.7 Setting the control lever characteristic curve

The control lever characteristic curve determines how high the power unit speed should be for a particular control lever movement.

You can assign different control lever characteristic curves to the power units.



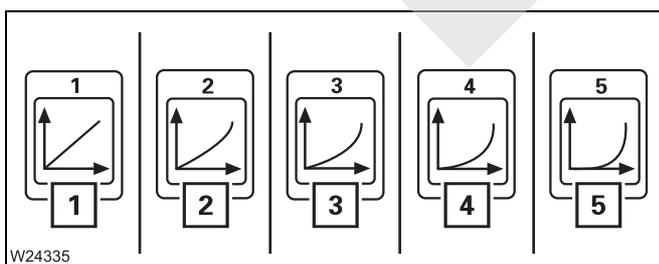
- Open the menu (1) – Control lever characteristic curve menu.



The symbols (2) show the set characteristic curves of the power units (1).

- Select the power unit for which you would like to change the characteristic curve.
- Set the desired characteristic curve.

Select and confirm symbol (3) to reset all power units to characteristic curve 1.



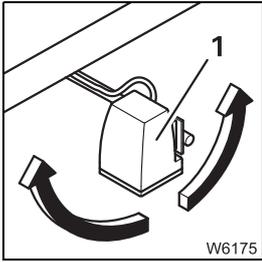
There are five characteristic curves:

The higher the number of the characteristic curve (1) to (5), the further the control lever must be moved to get a significant increase in speed.

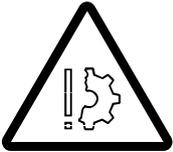
With characteristic curve (5), you can work particularly sensitively with the control lever.

11.6.8

Operating the slewable spotlights



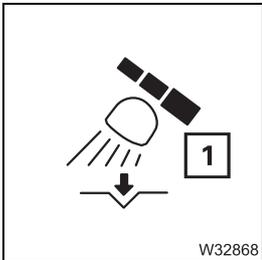
With the corresponding equipment, the slewable spotlights (1) are located on the main boom. They are controlled from the crane cab.



Risk of damage to the slewable spotlights!

Observe the position of the slewable spotlights before setting down the main boom.

This is for preventing a collision between the spotlights and the engine cover.



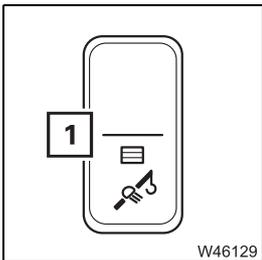
If the symbol (1) is displayed when the main boom is set down

- Slew the spotlights until the symbol (1) goes out.



Risk of accidents due to dazzling 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 being dazzled and causing accidents.



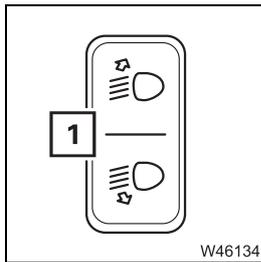
Switching on

- Press switch (1) at the bottom – the lamp lights up.

Switching off

- Press switch (1) at the top – the lamp goes out.

Manually swinging



Swing up

- Press the button (1) at the top.

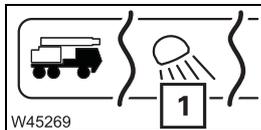
Swing down

- Press the button (1) at the bottom.

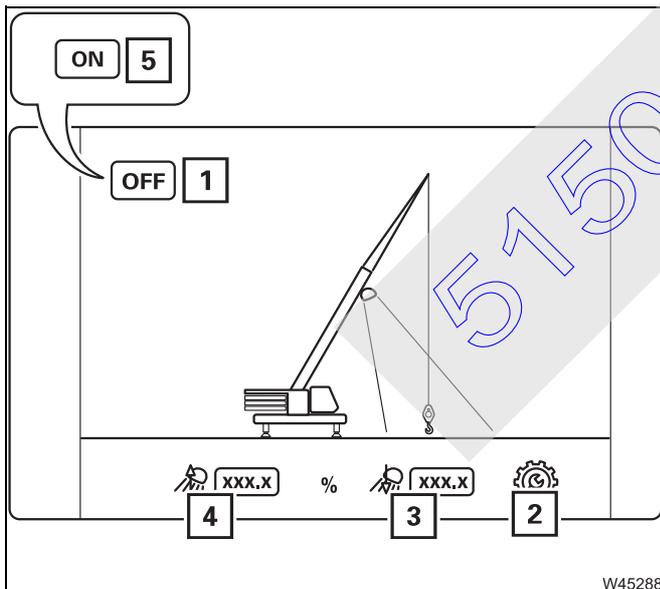
The direction of the spotlights is adjusted until you let go of the button or they reach their end position.

Automatic load tracking

The slewable spotlights must be manually aligned on the load. You can then switch on automatic load tracking. The spotlights automatically follow the load. You can adjusting the pivoting speed of the spotlights.



- Open the menu (1) – Slewable spotlights menu.



Switching on load tracking

- Select and confirm the symbol (1) – symbol (5) is displayed.

Setting the speed

- Select and confirm the symbol (2) – symbols (3) and (4) are displayed.
 - Reduce – change value at (3).
 - Increase – change value at (4).

Switching off load tracking

- Select and confirm the symbol (5) – symbol (1) is displayed.

11.6.9 Overriding the torque reduction

A torque reduction can occur for various different reasons.

- The AdBlue (DEF) supply is used up.
- A system malfunction has been detected.



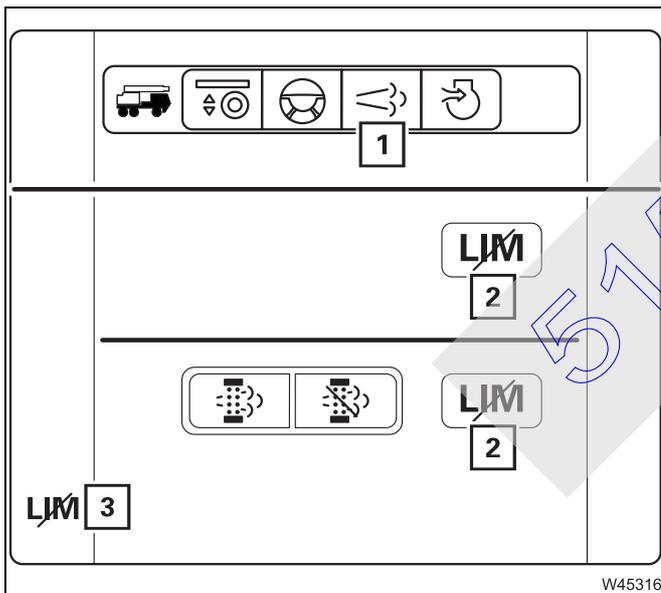
Before the torque is automatically reduced, various messages are displayed on the CCS display, e.g. on the AdBlue supply. Follow the information on the messages, you can thus avoid a torque reduction; *Warning messages on the CCS display*, p. 8 - 23.

You can override the torque reduction three times for a limited time during operation so that the full engine output is available (e.g. for ending a stroke).



If the torque is reduced the symbol (1) is shown.

The symbol is displayed in yellow or red, depending on the amount of reduction.



- Select and confirm the symbol (1) – the *Exhaust system* menu opens.
- Select and confirm the symbol (2).
- A warning buzzer sounds.

The torque reduction is overridden and the symbol (3) is overridden.

After 30 minutes the torque is automatically reduced again and the symbol (3) is displayed.

You can override the reduction three times, after this the symbol (2) will become inactive until the engine is restarted.

The torque is reduced continuously with each override.

11.6.10

Cleaning the exhaust system



Risk of burns during the cleaning procedure!

The exhaust system can heat to over 600 °C (1,110 °F) during automatic and manual cleaning.

Keep away from the exhaust system and ensure that no persons on the carrier are in the vicinity of the exhaust system or exhaust pipe. This will prevent severe burns.



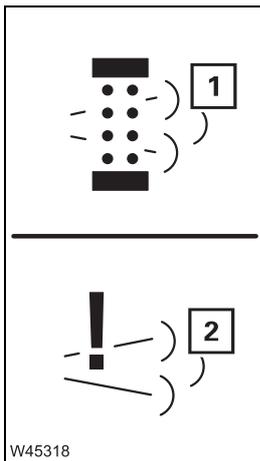
Risk of fire!

Ensure that no inflammable materials or liquids are in the vicinity of the exhaust system or exhaust pipe before performing a cleaning procedure. Maintain a minimum clearance of 2 metres. Also observe all information in the enclosed engine manufacturer's operating manual.

Automatic cleaning

The exhaust system cleaning procedure usually runs automatically in normal operating conditions, unless it has been manually disabled;

▣▣▣▣ *Disabling cleaning*, p. 11 - 137.



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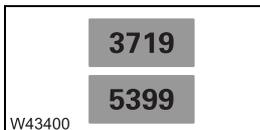
The symbol (1) flashes during automatic cleaning.

Avoid interrupting work if the symbol (1) flashes. This prevents any interruption of automatic cleaning.

The symbol (2) is displayed after a corresponding temperature increase

The symbol (1) is hidden when cleaning is finished.

The symbol (2) is hidden once the exhaust system has cooled to the operating temperature.



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Depending on the cleaning mode, a corresponding message is shown on the CCS display.

Manual cleaning

You must perform manual cleaning if automatic cleaning is not performed in time. Depending on the degree of contamination of the exhaust system, manual cleaning needs to be performed within a certain time. Appropriate messages are displayed;  *Exhaust system cleaning required*, p. 8 - 13.

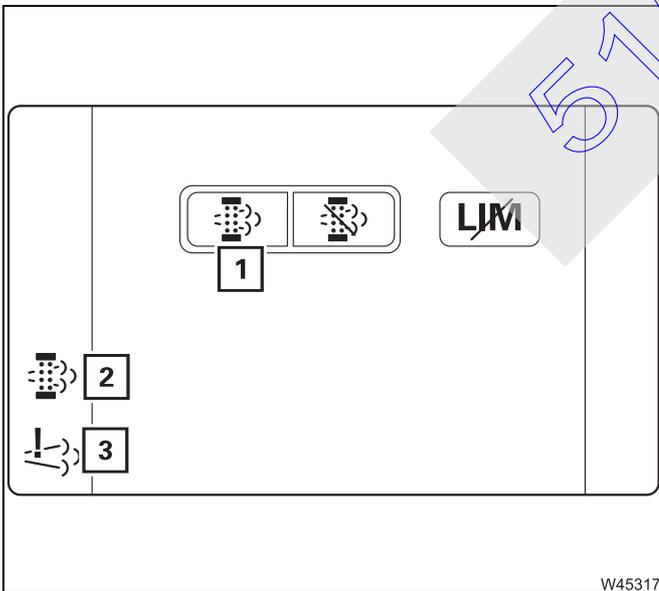
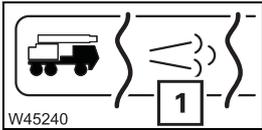
Manual cleaning is only performed when all prerequisites specified here have been fulfilled.

- The engine is running at idling speed.
- The accelerator pedal is not pressed.
- The service brake is not applied.
- The parking brake is applied.



The idling speed increases automatically during the cleaning process. The engine sound changes. The *Engine speed increase* message is shown on the on-board computer.

- Make sure that all prerequisites remain fulfilled during the entire cleaning procedure.
- Open the menu (1) – Exhaust system menu.



- Select and confirm the symbol (1) – the cleaning process starts.
 - The symbol (2) flashes.
 - The symbol (3) is displayed after a corresponding temperature increase.

The symbol (2) is hidden when cleaning is finished.

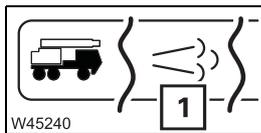
The symbol (3) is hidden once the exhaust system has cooled to the operating temperature.

Disabling cleaning

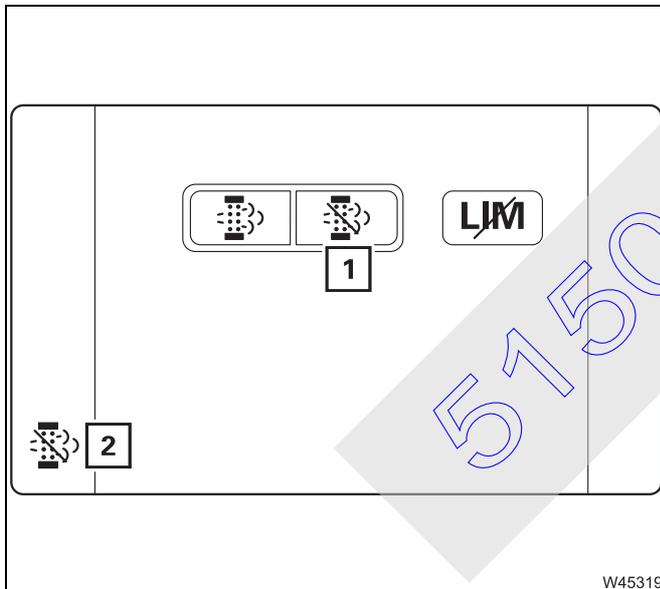
Automatic cleaning cannot be performed and manual cleaning cannot be started when cleaning is disabled. This function is for sites where an exhaust temperature higher than 600 °C (1,110 °F) poses a danger.



At normal operating conditions, automatic cleaning is performed without interrupting operation and is the best solution for the exhaust system. Therefore, only disable cleaning when the site makes this necessary. When cleaning is disabled, exhaust cleaning is no longer displayed, even when the engine is restarted. Take care to ensure that cleaning is enabled again when the truck crane is outside the danger area.



- Open the menu (1) – Exhaust system menu.



Disabling cleaning

- Select and confirm the symbol (1) – the symbol turns green.

The symbol (2) is displayed.

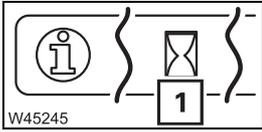
Enabling cleaning

- Select and confirm the symbol (1) – the symbol turns grey.

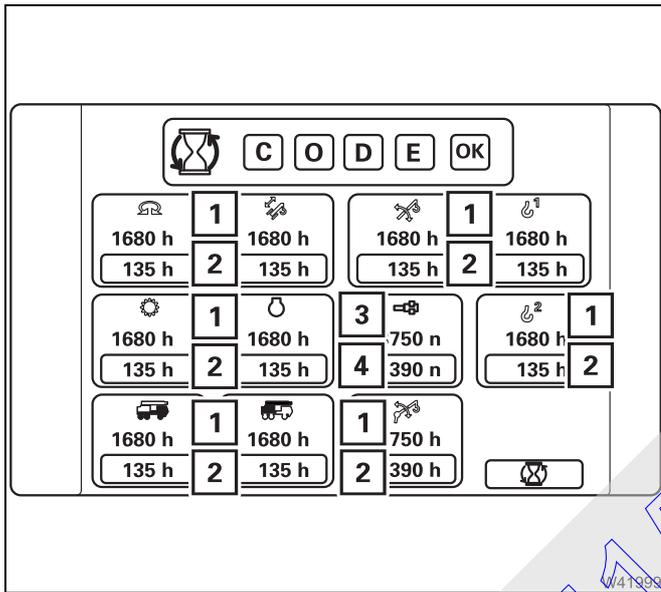
The symbol (2) disappears.

11.6.11 Displaying the operating hours

You can view the total operating hours for all power units in the *Operating hours* menu. You can also delete the recorded operating hours. The total operating hours cannot be deleted.



- Open the menu (1) – Operating hours menu.

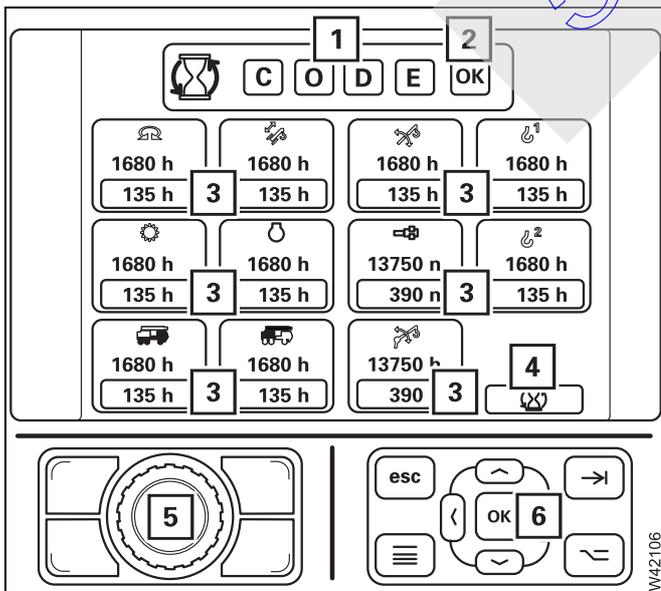


Displays

- The value (1) indicates the total operating hours, for example, 1,680 hours,
- The value (2) shows the operating hours, that can be reset.

Exception: The value below the symbol (3) indicates how frequently the *Unlock telescopic section* cycle was operated, e.g. 13,750 times.

The value (4) shows the cycles that can be reset.



Reset

The displayed operating hours/cycles (3) can be reset.

- Select and confirm the symbols (1) one after the other.
- Confirm the entry with the symbol (2).

You can select the power units

- individually – display (3) or
- select all – symbol (4).
- Reset the selected operating hours with button (5) or (6).

11.7

Working range limiter

You can set and monitor four different limits in the working range limiter menus:

- A maximum overall height,
- A maximum working radius,
- A maximum slewing angle,
- A limited hoist rope travel.

Monitoring of the programmed limits can be switched on and off separately. After switching on the ignition, all monitoring functions are switched on that were on before the ignition was turned off.



Risk of accidents due to situations that cannot be monitored!

The working range limiter is only used as an additional safety device. Brake the crane movement in due time before reaching the obstacle. 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 that cannot be monitored electronically.



Risk of accidents due to limit values 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 area, e.g. due to the load swinging or the boom bending. For this reason, always enter the limit values with sufficiently safe distance to the object.



Risk of accidents due to insufficient safe distances!

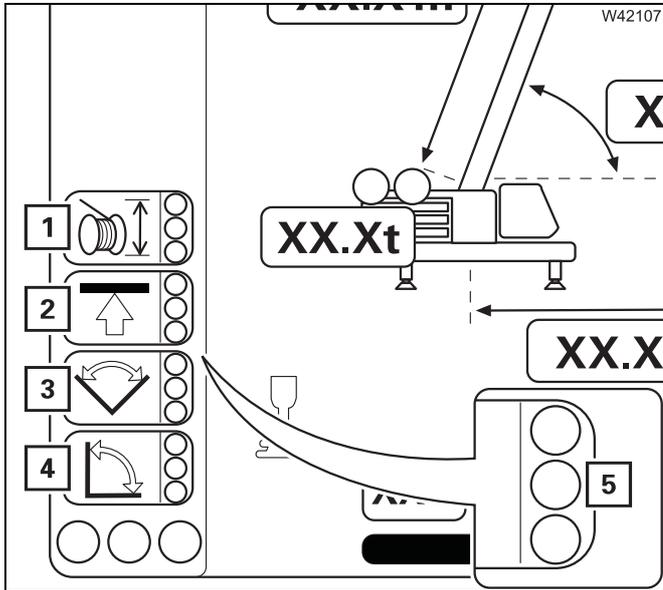
Always observe all safe distances in accordance with the national legal regulations, for example, concerning overhead power lines, even if the working range limiter is switched on.



11.7.1 Viewing current settings

On the RCL display

The displays show monitoring and speed limits that are switched on.

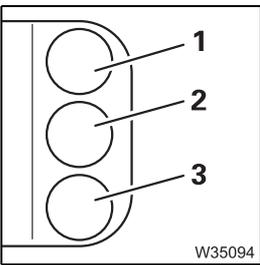


Working range limiter displays

The corresponding symbol is shown when a monitoring system is switched on.

- 1 Hoist rope travel limitation monitoring
- 2 Overall height monitoring
- 3 Slewing angle monitoring
- 4 Working radius monitoring

The display shows (5) if the power unit speed has been reduced.



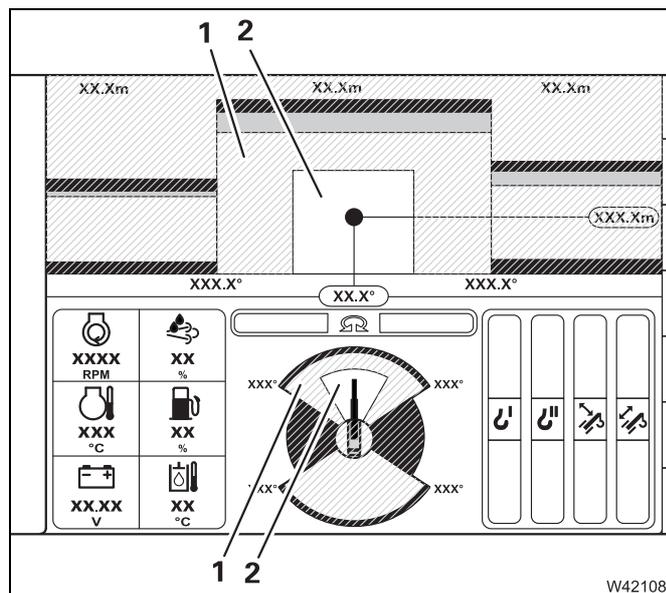
There are three displays.

- 1 **Red:** Movement disabled
- 2 **Yellow:** Speed reduced¹⁾
- 3 **Green:** Speed not reduced

- 1) The maximum enabled power unit speed depends on the distance to the limit value.

In the **CCS Start menu**

The **RCL** shows the limited working range for the *Slewing angle* and *Working radius* monitoring systems.

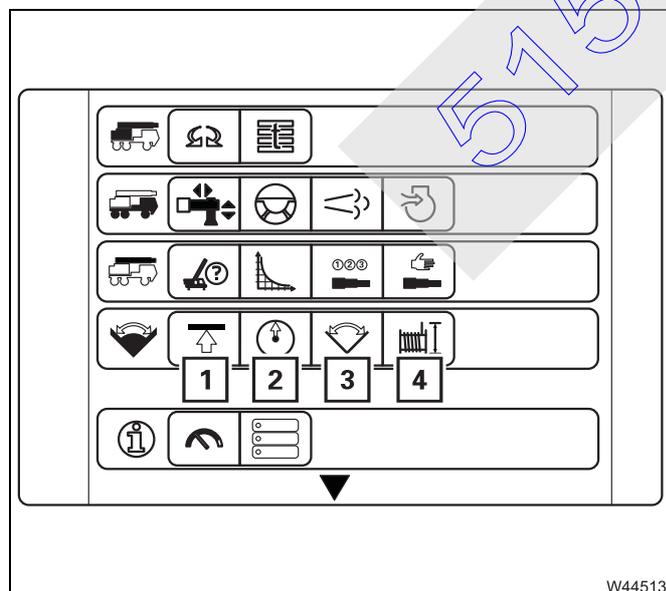


Display examples for switched-on *Slewing angle* and *Working radius* monitoring systems.

- 1 Permissible working range according to the *Lifting capacity table* – shown darkened
- 2 Limited working range – shown brightened

11.7.2

Opening the working range limiter menu



- If necessary, open the overview of the menu groups and select the corresponding symbol (1) to (4).

The corresponding menu opens, and you can enter limit values and switch monitoring on and off.

- 1 For the overall height; p. 11 - 142
- 2 For the working radius; p. 11 - 144
- 3 For the slewing range; p. 11 - 146.
- 4 For hoist rope monitoring; p. 11 - 149



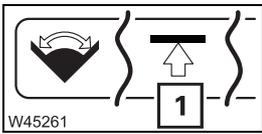
11.7.3 Entering limit values – for the overall height

- For unknown limit values, you can approach a switch-off point and accept the current overall height as **Accept limit value**.
- If the limit values are known, you can **Manually enter limit value**.

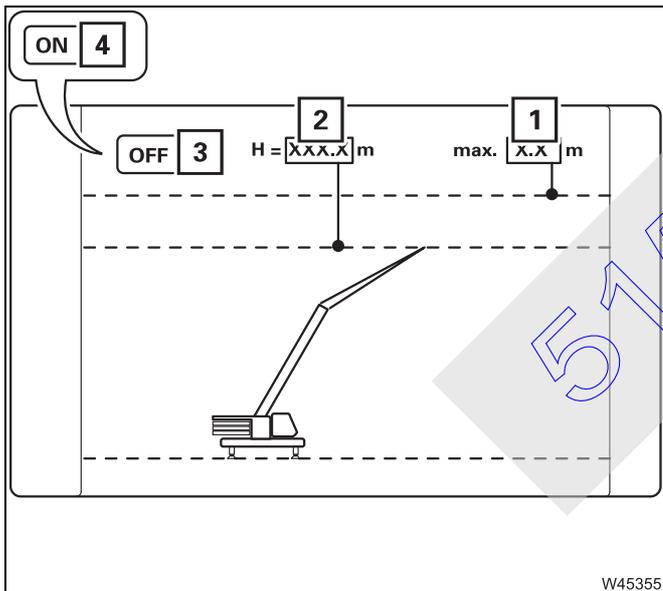


Risk of accidents due to incorrectly set limit values!

When entering the limit values, please note that movements leading further into the shutdown range can still take place even after switching off. Before crane operation, slowly approach all limit values, check that the shutdown is performed in due time and, if necessary, enter new limit values with larger safe distances.



- Open the menu (1) – Overall height menu.



Switching off monitoring

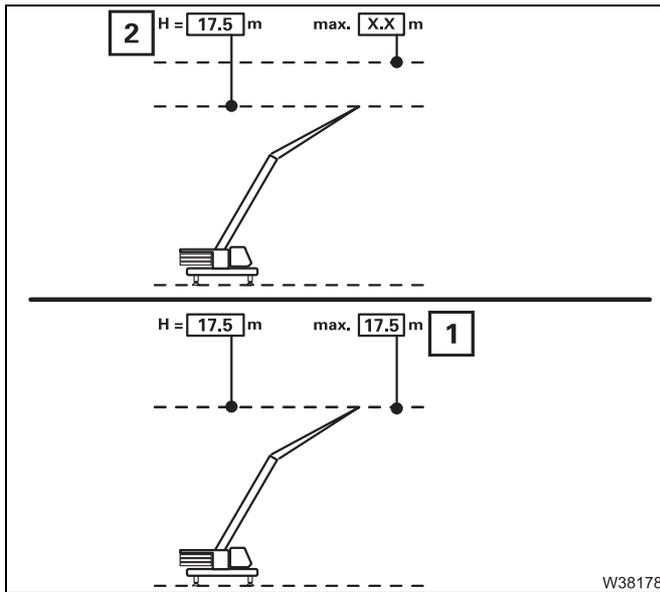
Before you enter a limit value, you must switch off monitoring.

- Select and confirm the symbol (4) – symbol (3) is displayed.

Overall height monitoring is switched off.

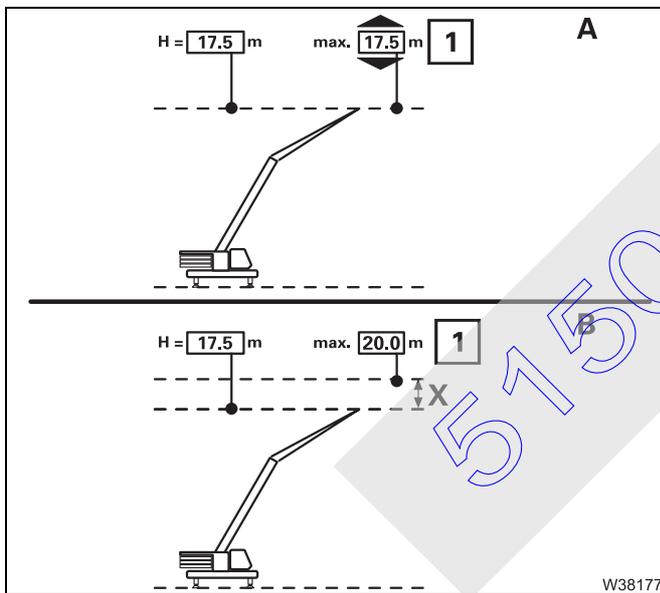
Displays

- 1 Overall height limit value
- 2 Current overall height



Accepting the limit value

- Move the main boom head to just before the shutdown point without a load, e.g. up to 17.5 m – (2) displayed.
- Select and confirm the display (2).
The current value (2) is accepted as the limit value (1).

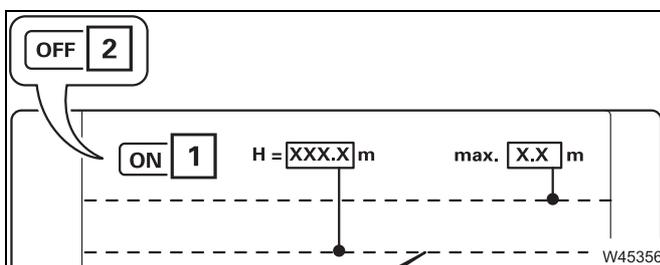


Entering the limit value manually

- (A) – Select and confirm the display (1).
- (B) – Enter the limit value, e.g. 20.0 m and confirm the input.

The display (1) shows the newly entered limit value.

The distance (X) shows the current distance to the shutdown range.



Switching on monitoring

- Select and confirm the symbol (2) – symbol (1) is displayed.
Overall height monitoring is switched on.



The movement towards the shutdown limit is continuously reduced until reaching a standstill. The current limitation is displayed;

▮▮▮ On the RCL display, p. 11 - 140,

▮▮▮ On the CCS display, p. 11 - 53.

11.7.4

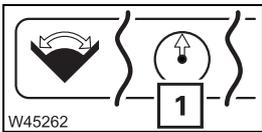
Entering limit values – for the working radius

- For unknown limit values, you can approach a shutdown point and accept the current working radius as **Accept limit value**.
- If the limit values are known, you can **Manually enter limit value**.

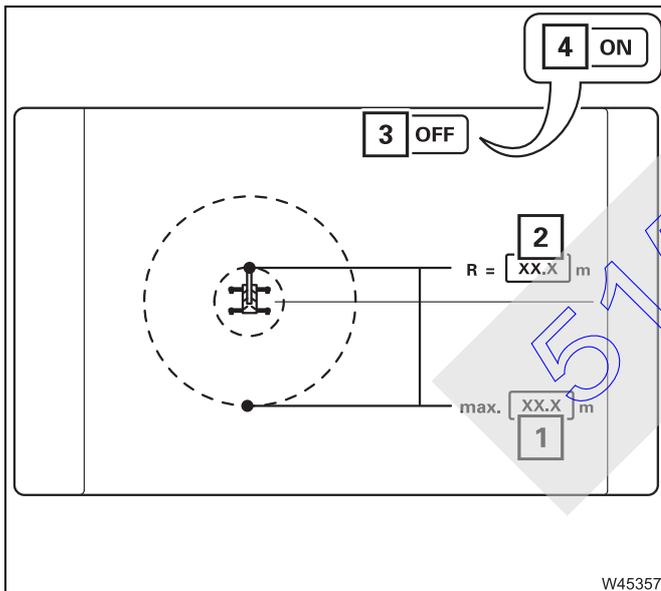


Risk of accidents due to incorrectly set limit values!

When entering the limit values, please note that movements leading further into the shutdown range can still take place even after switching off. Before crane operation, slowly approach all limit values, check that the shutdown is performed in due time and, if necessary, enter new limit values with larger safe distances.



- Open the menu (1) – Working radius menu.



Switching off monitoring

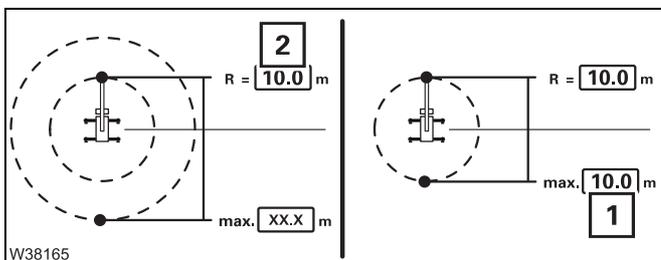
Before you enter a limit value, you must switch off monitoring.

- Select and confirm the symbol (4) – symbol (3) is displayed.

Working radius monitoring is switched off.

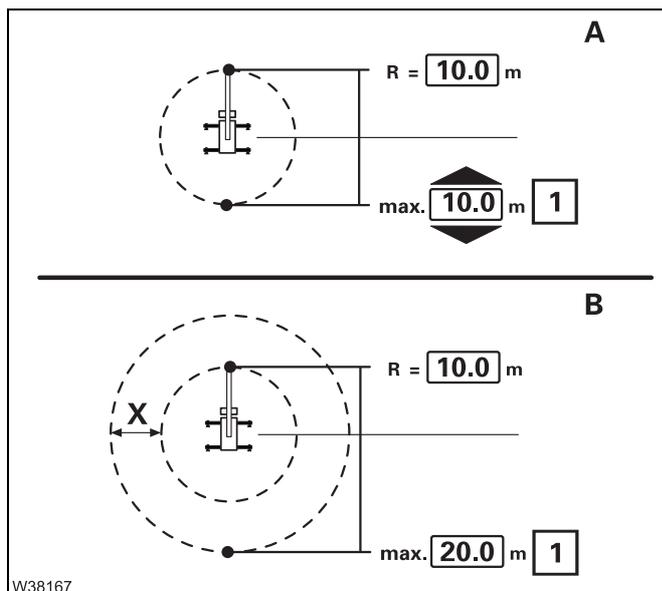
Displays

- 1 Working radius limit value
- 2 Current working radius



Accepting the limit value

- Move the main boom head to just before the shutdown point without a load, e.g. up to 10.0 m – (2) displayed.
- Select and confirm the display (2).
The current value (2) is accepted as the limit value (1).

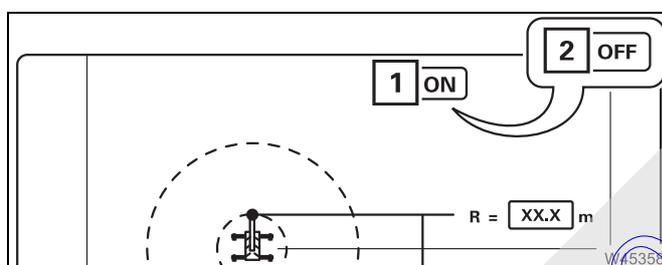


Entering the limit value manually

- (A) – Select and confirm the display (1).
- (B) – Enter the limit value, e.g. 20.0 m and confirm the input.

The display (1) shows the newly entered limit value.

The distance (X) shows the current distance to the shutdown range.



Switching on monitoring

- Select and confirm the symbol (2) – symbol (1) is displayed.
Working radius monitoring is switched on.



The movement towards the shutdown limit is continuously reduced until reaching a standstill. The current limitation is displayed;

- ▣▣▣▣► On the RCL display, p. 11 - 140,
- ▣▣▣▣► On the CCS display, p. 11 - 53.

11.7.5

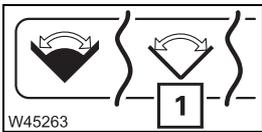
Entering limit values – for the slewing range

- For unknown limit values, you can approach a shutdown point and accept the current slewing angle as **Accept limit value**.
- If the limit values are known, you can **Manually enter limit value**.

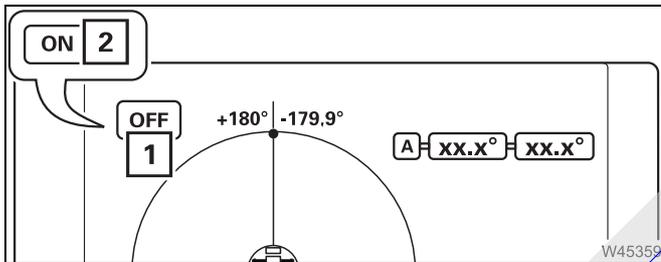


Risk of accidents due to incorrectly set limit values!

When entering the limit values, please note that movements leading further into the shutdown range can still take place even after switching off. Before crane operation, slowly approach all limit values, check that the shutdown is performed in due time and, if necessary, enter new limit values with larger safe distances.



- Open the menu (1) – Slewing angle menu.

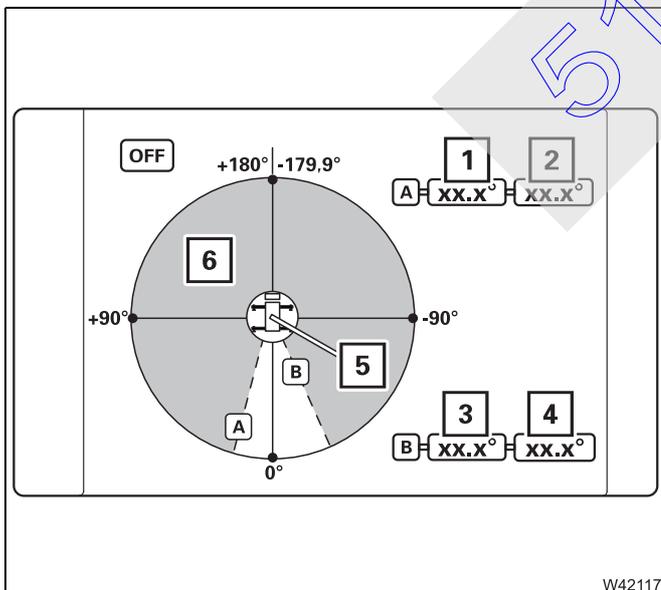


Switching off monitoring

Before you enter a limit value, you must switch off monitoring.

- Select and confirm the symbol (2) – symbol (1) is displayed.

Slewing range monitoring is switched off.



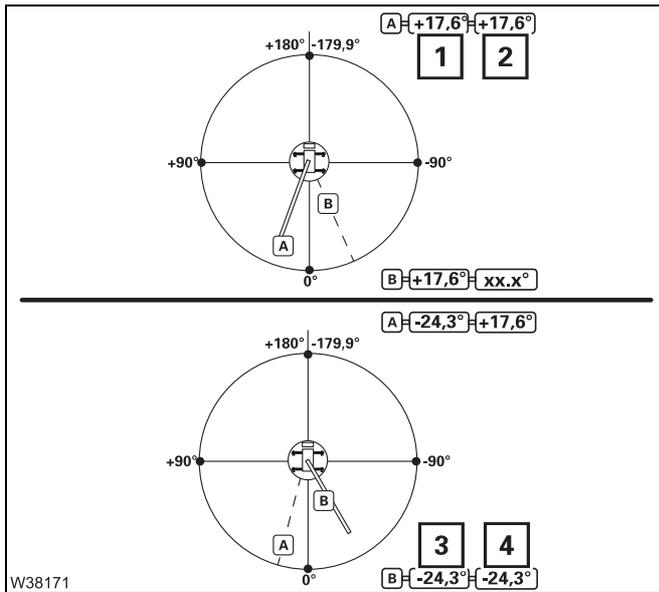
Displays

- 1, 3, 5 Current slewing angle
- 2 Limit value for slewing angle **A**
- 4 Limit value for slewing angle **B**

Permissible slewing range

- Slewing angle **A** limits slewing to the left.
- Slewing angle **B** limits slewing to the right.

The permissible slewing range (6) – **green** – is the angle from **A** clockwise to **B**.



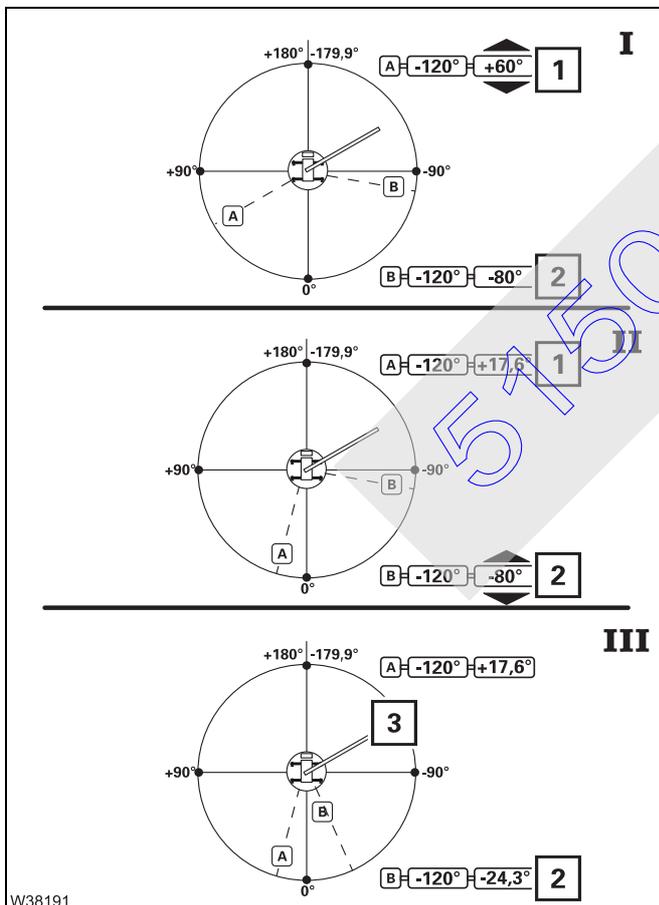
Accepting the limit value

– Slewing angle A

- Slew the main boom to the shutdown point from the right, for example, value (1).
- Select and confirm the display (1). The value (1) is accepted as the limit value (2), for example, +17.6°.

– Slewing angle B

- Slew the main boom to the shutdown point from the left, for example, value (3).
- Select and confirm the display (3). The value (3) is accepted as the limit value (4), for example, -24.3°.



Entering the limit value manually

– Slewing angle A

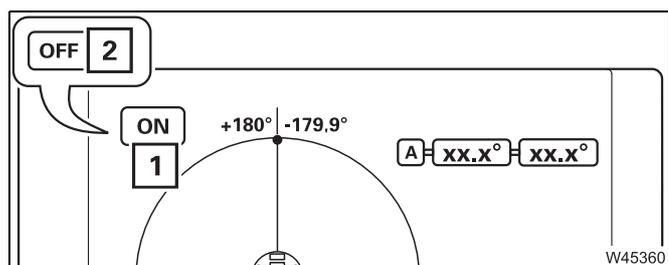
- (I) – Select and confirm the display (1).
- (II) – Enter the limit value, e.g. +17.6° and confirm the input. The display (1) shows the newly entered limit value.

– Slewing angle B

- (II) – Select and confirm the display (2).
- (III) – Enter the limit value, e.g. -24.3° and confirm the input. The display (2) shows the newly entered limit value.

The current slewing angle (3) shows the current position to the shutdown range.





Switching on monitoring

- *Slewing range* monitoring is switched on.



The movement towards the shutdown limit is continuously reduced until reaching a standstill. The current limitation is displayed;

▣▣▣▣► *On the RCL display*, p. 11 - 140,

▣▣▣▣► *On the CCS display*, p. 11 - 53.

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11.7.6

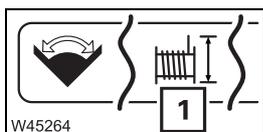
Entering limit values – for the hoist rope travel

The limit values for the hoist rope travel can only be entered by approaching the shutdown points. Manual input is not possible.

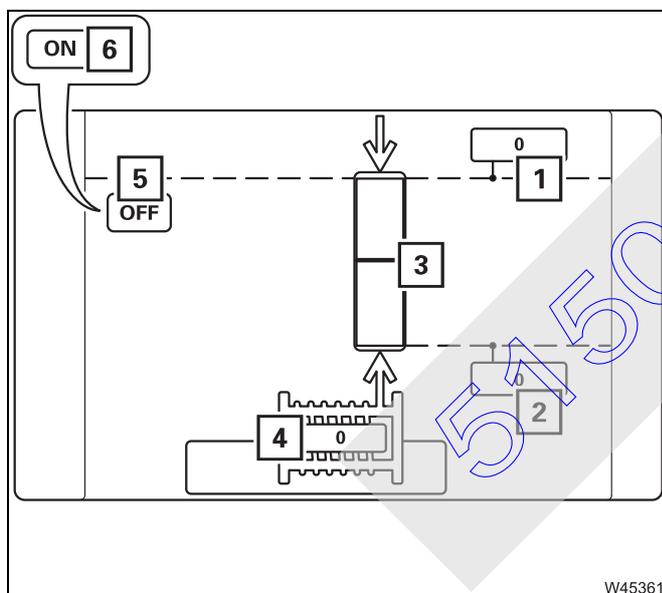


Risk of accidents due to incorrectly set limit values!

When entering the limit values, please note that movements leading further into the shutdown range can still take place even after switching off. Before crane operation, slowly approach all limit values, check that the shutdown is performed in due time and, if necessary, enter new limit values with larger safe distances.



- Open the menu (1) – Hoist rope travel limitation menu.



Switching off monitoring

Before you enter a limit value, you must switch off monitoring.

- Select and confirm the symbol (6) – symbol (5) is displayed.

Hoist rope travel monitoring is switched off.

Displays

- 1 Limit value for the *Lift* movement
- 2 Limit value for the *Lower* movement
- 3 Current position – optical
- 4 Current position – numerical value

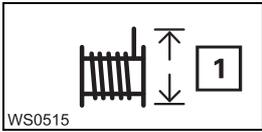


The displayed values are numerical values only from the slewing indicator and can be positive or negative. The values have no relationship to the actual hook height and are only used for limit value acquisition during the current lifting operation.



Entering limit values

The values for hoist rope limitation may not be entered until the telescope status and the boom position for the application have been rigged.



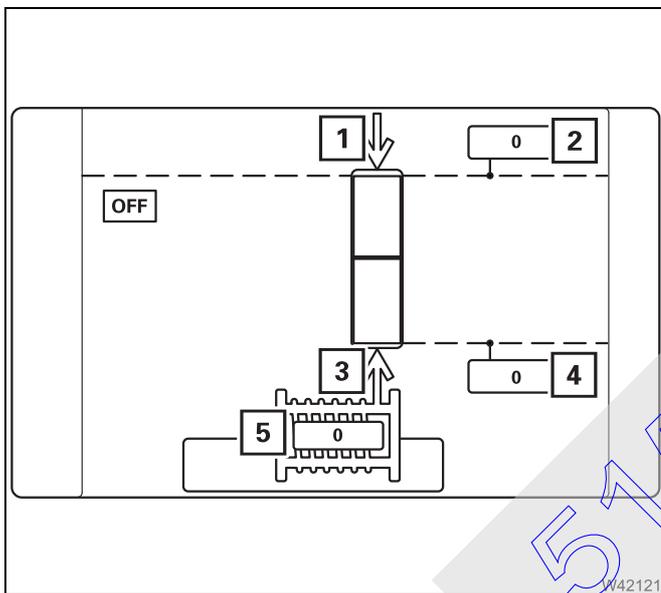
If you change the telescope status or boom position after entering values for hoist rope limitation, then the RCL display shows symbol (1); *Warning messages on the RCL display*, p. 14 - 8.



Risk of accidents due to hoist rope travel limitation being switched off

Always set the telescope status and the boom position for crane operation first before setting limit values.

This way you prevent an interruption of crane operation due to a shutdown.

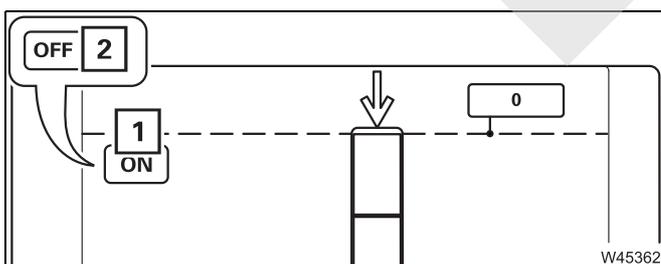


Entering the limit value for *Lift*

- Lift the load to the necessary height.
- Select and confirm the display (2).
The numerical value (5) is set as limit value (2) for *Lift*. The symbol (1) confirms the entry.

Entering the limit value for *Lower*

- Lower the load to the necessary height.
- Select and confirm the symbol (4).
The numerical value (5) is set as limit value (4) for *Lower*. The symbol (3) confirms the entry.



Switching on the monitoring

- Select and confirm the symbol (2) – symbol (1) is displayed.
Hoist rope travel monitoring is switched on.



The movement towards the shutdown limit is continuously reduced until reaching a standstill. The current limitation is displayed;

On the RCL display, p. 11 - 140,

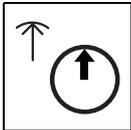
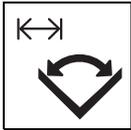
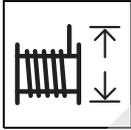
On the CCS display, p. 11 - 53.

11.7.7

Shutdown by working range limiter

If a limit value is reached, an RCL shutdown will occur. All movements that would go closer to the limit value will be disabled. Shutdown remains active even if you switch off the monitoring function.

The *RCL* display also shows a symbol. You must leave the shutdown range to enable the movements.

RCL display	Shutdown point reached for	Disabled movements
	Overall height	<ul style="list-style-type: none"> – Raise – Extend – Lower hoist – Derrick lattice extension
	Working radius	<ul style="list-style-type: none"> – Lower – Extend – Lifting hoist – Derrick lattice extension
	Slewing angle A	– Slew anti-clockwise
	Slewing angle B	– Slew clockwise
	Rope travel limitation Lift	– Lift
	Rope travel limitation Lower	– Lower



Risk of accidents due to overriding shutdown procedures!

Override the RCL only 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 is overridden and all movements are enabled.

Blank page

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11.8

Work break

11.8.1

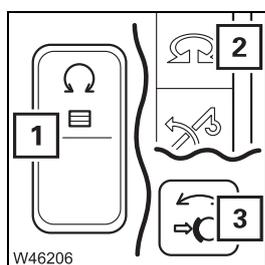
At every work break



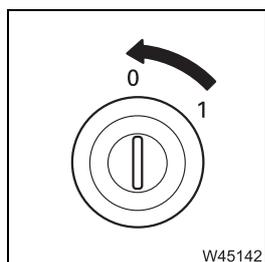
Risk of accidents due to suspended loads!

Never switch off the engine while a load is suspended. You must have the control levers at hand to be able to intervene at any time.

Always set down the load before you leave the crane cab.



- Switch off the slewing gear.
 - The lamp (1) must light up dimly.
 - The symbol (2) is **orange** – slewing gear switched off.
 - Lamp (3) must light up – slewing gear brake applied.



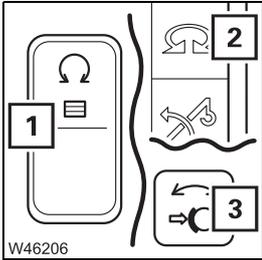
Switch off the engine, turn the ignition key to position **0** and remove it

Make sure that no unauthorised persons can operate the truck crane;

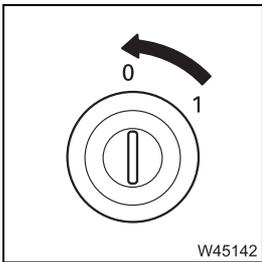
▮▮▮▮ *Securing the truck crane against unauthorised use, p. 11 - 154.*

11.8.2

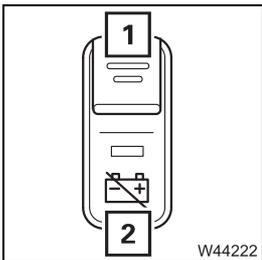
For every work break longer than 8 hours



- Retract all telescopic sections.
- Lower the main boom.
- Switch off the slewing gear.
 - The lamp (1) must light up dimly.
 - The symbol (2) is **orange** – slewing gear switched off.
 - Lamp (3) must light up – slewing gear brake applied.



- Switch off the engine, turn the ignition key to position **0** and remove it
- Switch off all current consumers.



- Switch off the battery master switch I.
Push the lock (1) down and press the switch (2) in at the bottom.
This will not interrupt the run-down period of the heater.
- Lock the truck crane to prevent unauthorised use.

Securing the truck crane against unauthorised use

- Stow away the hand-held control; p. 14 - 42.
- Remove the ignition key.
- Lock the crane cab and the driver's cab and take the keys with you.



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.

That prevents unauthorised persons starting the engine using the hand-held control.



If necessary, you can switch off battery master switch II – if present;
 When the truck crane is stationary for a longer period, p. 5 - 87.

11.9

Heating and air-conditioning system

11.9.1

Heating system



Risk of explosion when operating the heating system!

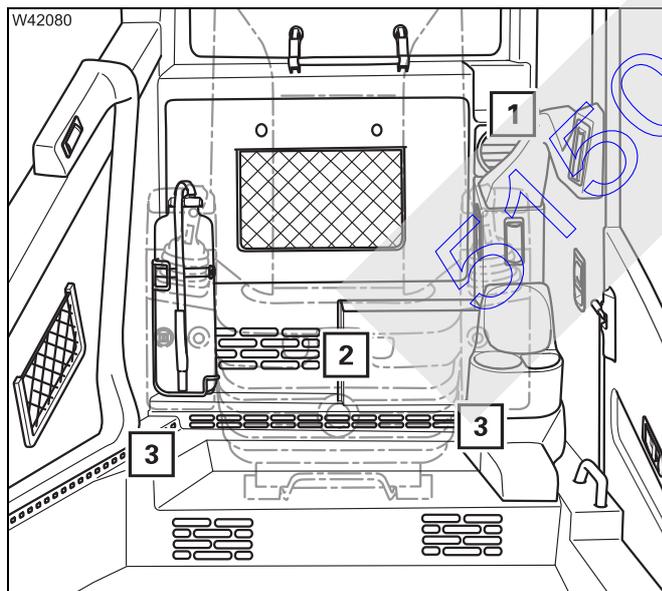
The heating system may not be operated:

- At service stations and tank farms
- At places where flammable gases or vapours can be found or formed (for example, at places where fuel is stored and in chemical factories),
- At places where explosive dust can be found or formed (e.g. carbon dust, wood dust and grain dust).



Risk of suffocation when operating the heating system!

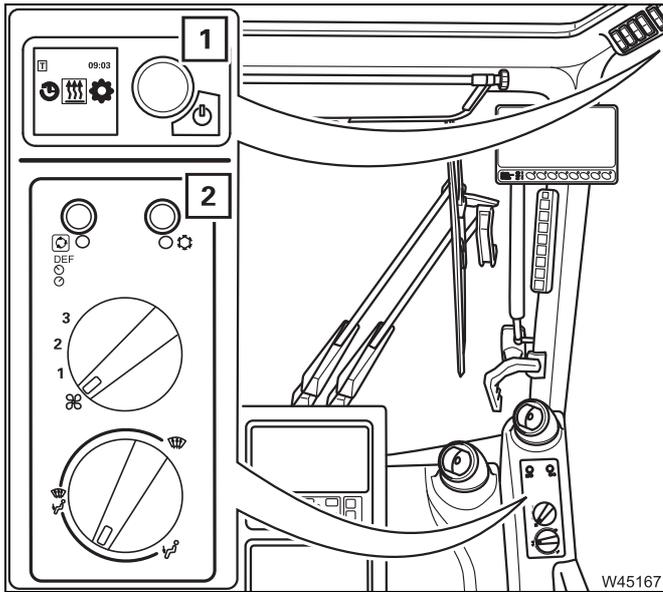
Do not operate the heating system or the heating system with the timer in enclosed rooms (for example, garages).



Grille

- Do not cover the grilles (1), (2) and (3).
 - Air is drawn in through grilles (1) and (3)
 - The grille (1) is used for forced ventilation.





Operating elements

The heating is operated at the (2) control unit and at the *UniControl* (1) control unit.

- Check whether the auxiliary air heater is permitted 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.



The heating system can be operated when the engine is stationary or running.

Accelerated discharge of battery when the engine is switched off.

The batteries will run flat if you operate the heater with the engine switched off. They will then have to be recharged after shorter periods of time.

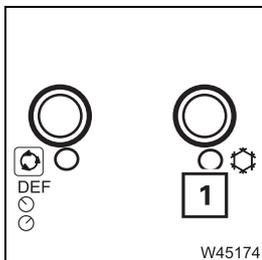
Switching on

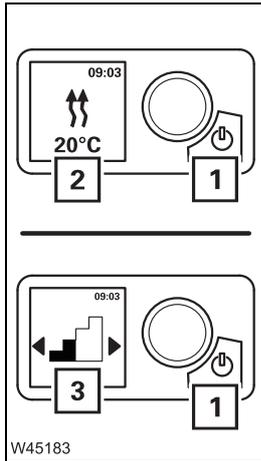


Switching on manually

This section only describes switching on manually for an immediate start of the heating at the *UniControl* control unit. For the expected operation;  *UniControl control unit*, p. 11 - 162.

- Switch on the ignition;  p. 4 - 11.
- Start the engine as required;  p. 4 - 3.
- Switch the air-conditioning system off – lamp (1) gone out;  *Switching off*, p. 11 - 173.

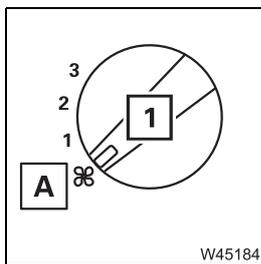




- Press the button (1) – the lamp lights up green.
If the lamp flashes red; *Error messages*, p. 11 - 170.

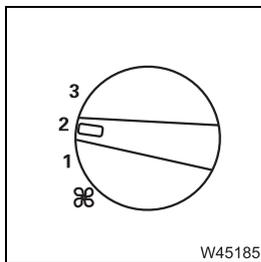
The heating system switches off and the display shows the *Heating* menu (2) with the currently set temperature.

If the *Ventilation* menu (3) is displayed, then you must set *Heating* operating mode for starting manually; *For starting manually*, p. 11 - 167.



If the heating is switched on, the fan at least runs at level 1 – even if the switch is in position (A).

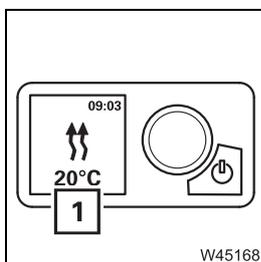
Heating



- Set the heating as required.

Setting the fan

- **Regulating the air volume:** Turn the switch to the desired level 1 to 3
- **Switch off:** Turn the switch anti-clockwise as far as possible – *Off* position.
The fan continues to run at level 1 until you switch off the heating.



Setting the temperature

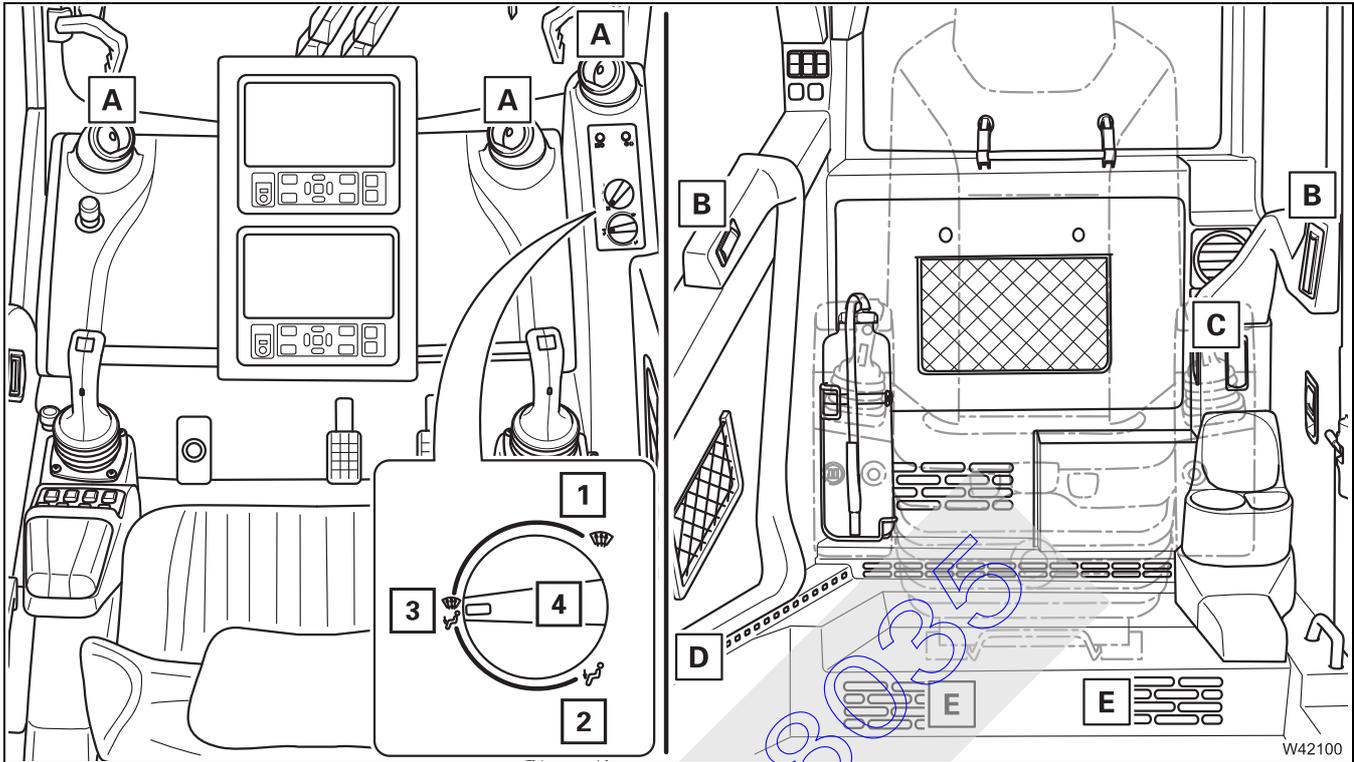
The temperature (1) is set at the *UniControl* control unit;
 With the heating switched on, p. 11 - 165.



Heating

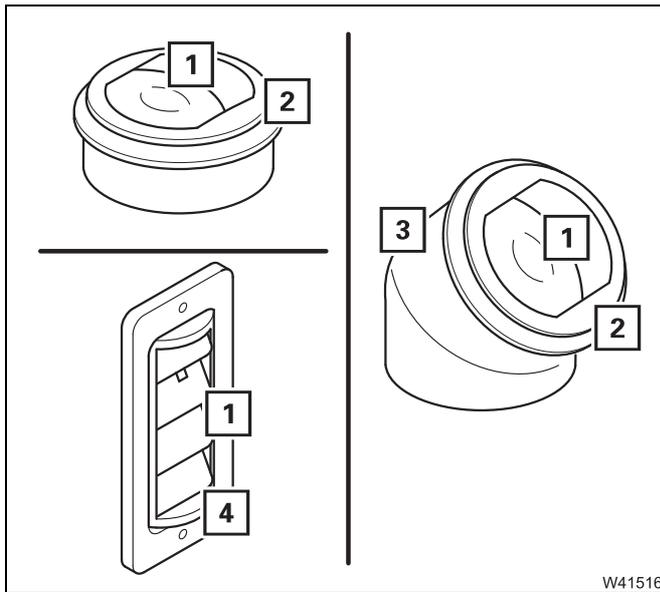
Air distribution

You can direct the air to flow out of various air vents.



- Turn the switch (4) to the desired position
 - (1) – Air vents (A), (C), (B)¹⁾ or (D)²⁾
 - (2) – Air vents (E)
 - (3) – Air vents (A), (C), (E), (B)¹⁾ or (D)²⁾
- 1) Additional equipment
2) A or B present, depending on the version

You can adjust the air vents (A) to (C).



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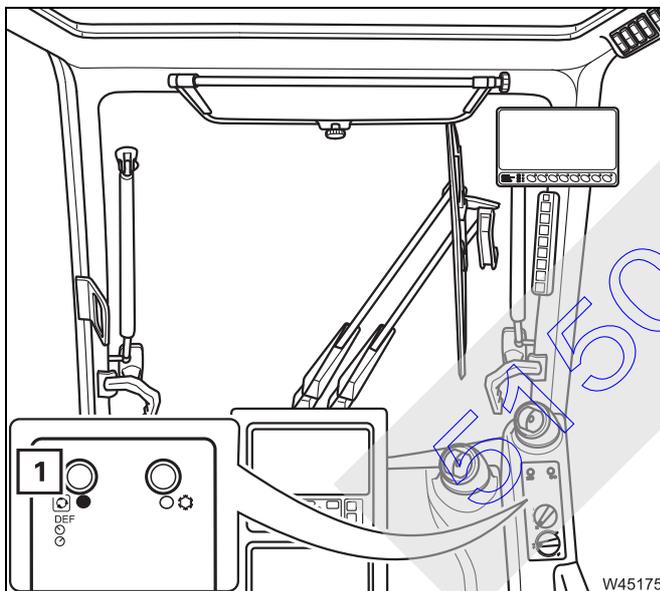
Adjusting the air vents

– Open/close

Fold fins (1) in/out
or turn (4)

– Direct the air flow

Swing the fins (1)
Turn (2), (3) and (4)



W45175

Setting fresh air / recirculated air

– Fresh air

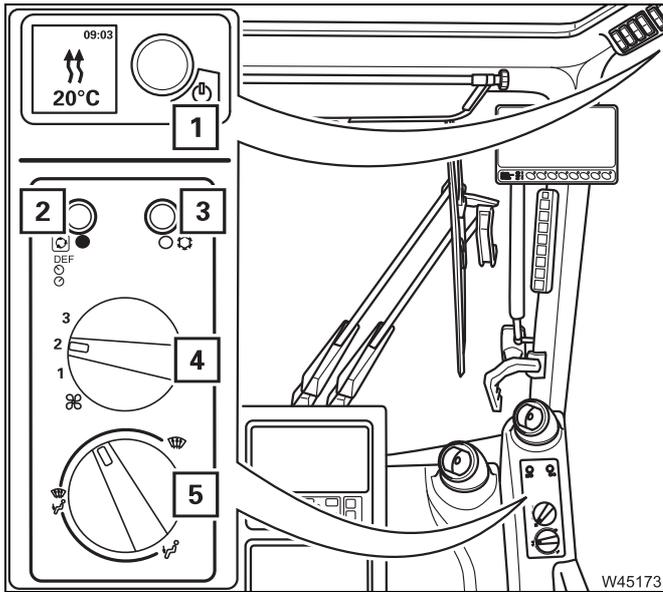
Press button (1) repeatedly until the lamp
goes out.

– Recirculated air

Press button (1) repeatedly until the lamp
lights up.

Switch to fresh air frequently to ensure that
oxygen is supplied.

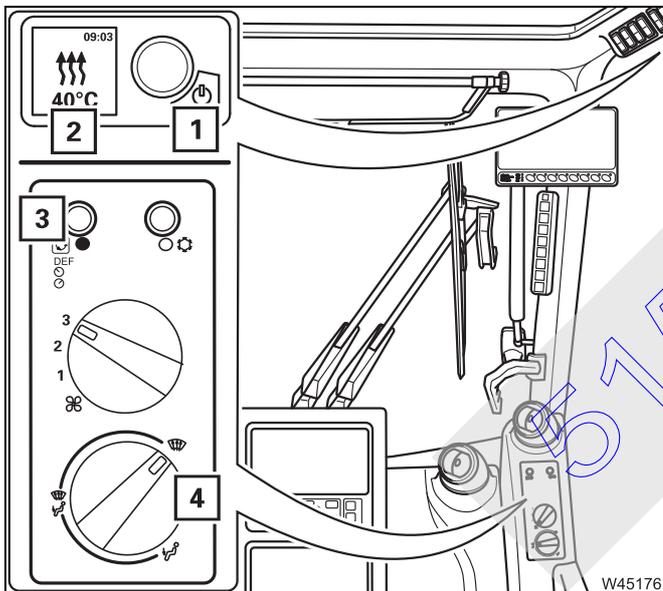




Heating

- Switch the heating system on – lamp (1) green.
- Switch the air-conditioning system off – lamp (3) gone out.
- Turn the switch (4) to the desired level, e.g. to level 2.
- To heat up faster you can set recirculated air – lamp (2) lights up.
- Set the desired air distribution with switch (5) and adjust the air vents as required;
▮▮▮▮ p. 11 - 158.

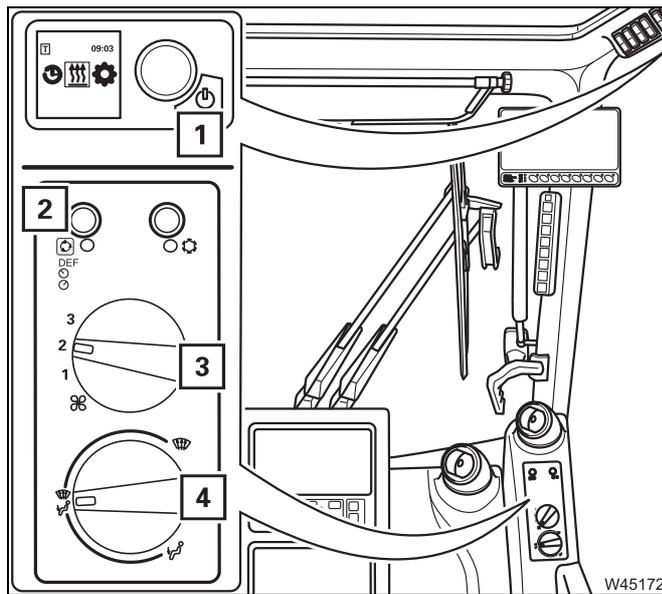
Further operation; ▮▮▮▮ *Settings*, p. 11 - 164.



Defrosting windows

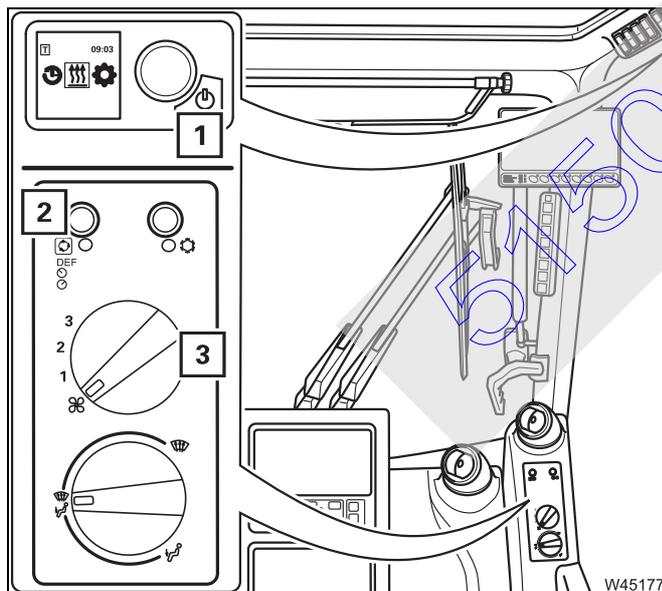
- Switch the heating system on – lamp (1) green.
- Select and confirm the *Rapid* heating level (2) and the desired temperature;
▮▮▮▮ *With the heating switched on*, p. 11 - 165.
- Set recirculated air – the lamp (3) lights up.
- Select *Windscreen* air distribution using the switch (4).
- Close air vents not required.
- Switch on the air conditioning – if present;
▮▮▮▮ p. 11 - 172.

Ventilating



- Switch the heating system off – lamp (1) white.
- Turn the switch (3) to the desired level, e.g. to level 2.
- Switch to fresh air – lamp (2) gone out.
- Set the desired air distribution with switch (4) and adjust the air vents as required.

Switching off



Switching off the heating system

- Press the button (1) – lamp white. The display shows the start menu and the display is switched off after the set time.

Switching off recirculated air

- Press the button (2) – the lamp goes out.

Switching off the fan

- Turn the switch (3) to the *Off* level.

11.9.2

UniControl control unit

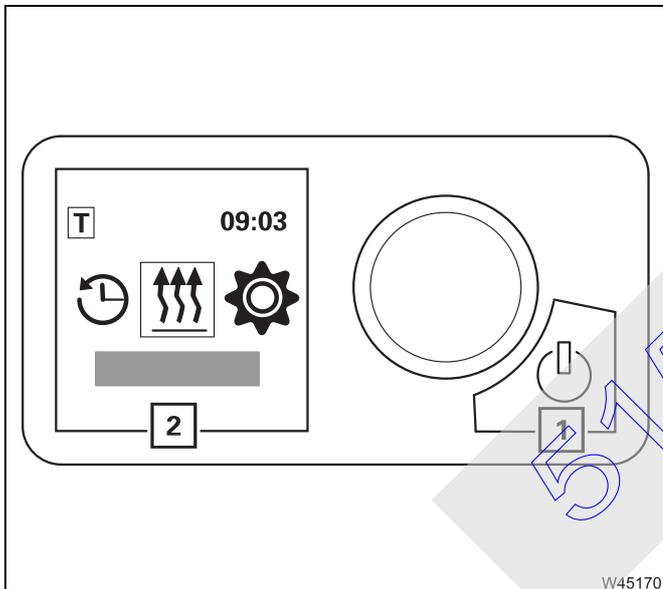
The crane cab heating and all auxiliary heaters on the carrier have one *UniControl* control unit each. Operation is identical for all heating systems.



Before operation, observe all information in the section of the corresponding heating and carry out the steps given there before using the functions described here.

- ▣▣▣▣ Heating system, p. 11 - 155
- ▣▣▣▣ Auxiliary water heating system, p. 5 - 98
- ▣▣▣▣ Auxiliary air heater – driver's cab, p. 5 - 101
- ▣▣▣▣ Auxiliary air heater – battery, p. 5 - 103

Switching on



- Switch on the ignition; ▣▣▣▣ p. 4 - 11.
- Start the engine as required; ▣▣▣▣ p. 4 - 3.
- Press the button (1) – the lamp lights up green.
 - The heating is switched on.
 - The display (2) is illuminated.

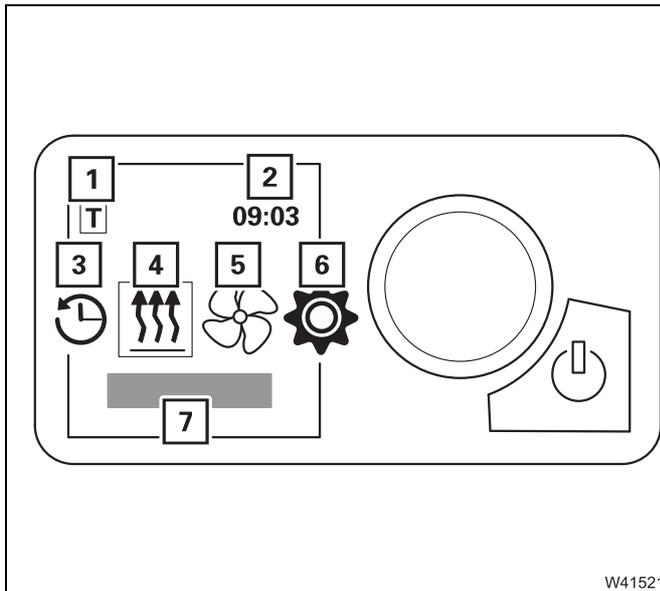
The lamp in button (1) indicates the heating status.

- Lights up**
- **Green:** Heating in operation
 - **Blue:** Fan in operation
 - **White:** Heating system off – operation on

- Flashing**
- **Red:** Error
 - **Green:** Heating operation programmed
 - **Blue:** Fan operation programmed

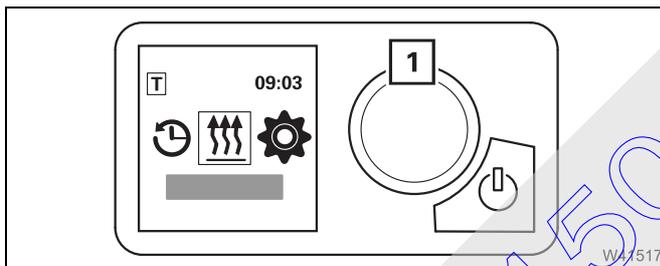
1) Only for auxiliary air heating and depending on equipment

Displays and menus



At the display

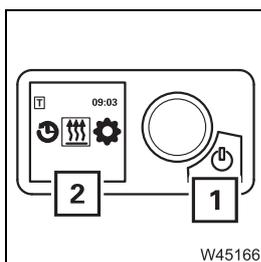
- 1 Activated preselection time
- 2 Time
- 3 Timer menu
- 4 Heating menu
- 5 Ventilation menu
- 6 Settings menu
- 7 Text display for selected menu



Menu operation

- 1 Jog dial (rotary push button)
 - Turn to select
 - Press to confirm

Switching off



- Press the button (1) – the lamp lights up white.

The heating system switches off and the display shows the start menu (2).

If no operation is carried out any more, the display is switched off after a certain time. You can adjust this time – to do this in the *Settings* menu select and confirm the *Switch off display* element.

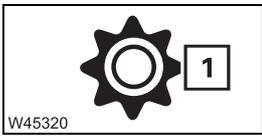


Settings

You can make various settings.

- Basic settings; ■■■▶ p. 11 - 164.
- With the heating switched on; ■■■▶ p. 11 - 165.
- With the heating switched off; ■■■▶ p. 11 - 166.
- For starting manually; ■■■▶ p. 11 - 167.
- For ventilating; ■■■▶ p. 11 - 168.
- Automatic heating mode; ■■■▶ p. 11 - 168.

Basic settings

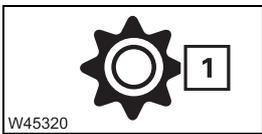


- Select and confirm the *Settings* menu (1).
- Select and confirm the symbol for the desired setting.
The settings listed can be selected

- Day of the week
- Time
- Language
- Temperature unit
- Display shutdown
With *Auto* setting
Heating on – no shutdown
Heating off – shutdown after
10 seconds
- Brightness
- Day/night lighting
- System information
- Stored errors
- Reset
Reset to factory setting, apart from
day of the week, time and language

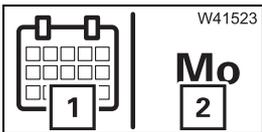


The procedure is the same for all settings. The jog dial is used to select and confirm parameters. How to set the day of the week and the time is described in detail as an example.

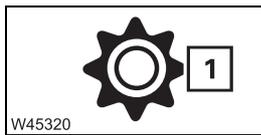


Setting the day of the week

- Select and confirm the *Settings* menu (1).

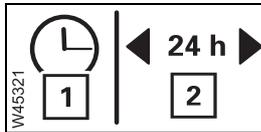


- Select and confirm the *Day of the week* symbol (1).
The set day of the week (2) is displayed – e.g. **Mo** for Monday.
- Select and confirm the desired day of the week.



Setting the time

- Select and confirm the *Settings* menu (2).



- Select and confirm the *Time* symbol (1).
The set time format (2) is displayed.
- Select and confirm the desired time format.



The hours of the time flash.

- Select and confirm the desired hours.



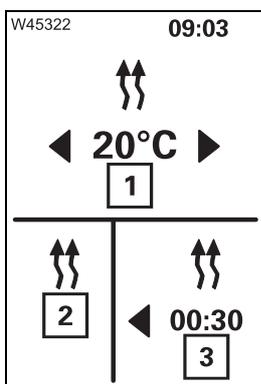
The minutes of the time flash.

- Select and confirm the desired minutes.

With the heating switched on

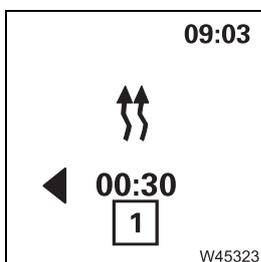
Different settings are possible, depending on the type of heating.

If you wait more than 5 seconds before confirming the setting, you must select the value again.



With auxiliary air heating

- Select and confirm the desired temperature (1).
The heating level (2) is displayed.
- Select and confirm the desired heating level.
The remaining time (3) is displayed.
- Select and confirm the desired remaining time – it can only be reduced.
The *Heating* menu (1) is displayed.



With auxiliary water heating

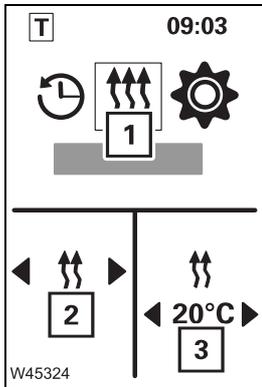
- Select and confirm the desired remaining time (1).



With the heating switched off

Different settings are possible, depending on the type of heating.

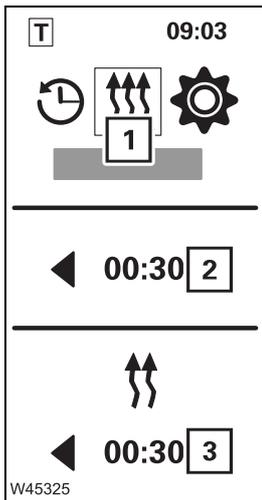
If you wait more than 5 seconds before confirming the setting, you must select the value again.



With auxiliary air heating

- Select and confirm the *Heating* menu (1).
The heating level (2) is displayed.
- Select and confirm the desired heating level.
The temperature (3) is displayed.
- Select and confirm the desired temperature.
 - The heating is switched on.
 - The *Heating* menu (3) is displayed.

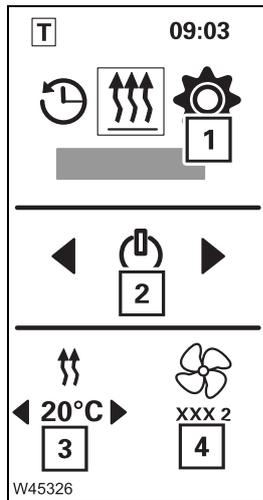
You can set the remaining time with the heating switched off in the settings for starting manually; see p. 11 - 167.



With auxiliary water heating

- Select and confirm the *Heating* menu (1).
The hours of the operating duration (2) flash.
- Select and confirm the desired hours.
The minutes of the operating duration (2) flash.
- Select and confirm the desired minutes.
 - The heating is switched on.
 - The *Heating* menu (3) is displayed.

For starting manually

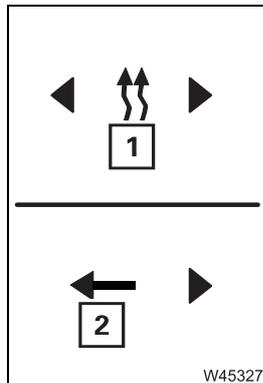


For starting manually, you can set whether to start the heating in *Heating* mode or in *Ventilation* mode.

Setting the operating mode

- Select and confirm the *Settings* menu (1).
- Select and confirm the *Immediate start* symbol (2).
The set operating mode is displayed.
- Select and confirm the desired operating mode.
 - 3 Heating
 - 4 Ventilating

The other settings are based on the selected operating mode.



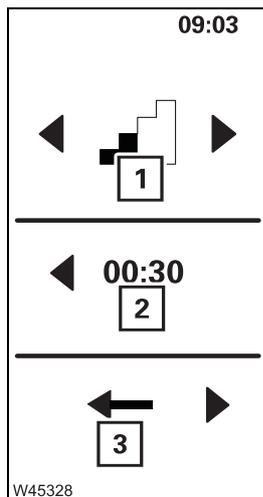
Settings for heating

The set heating level (1) is displayed.

- Select and confirm the desired parameters one after the other.
 - Heating level
 - Temperature (for auxiliary air heating system only)
 - Operating duration

Selection and confirmation take place in the same way as for a switched-off heating; see p. 11 - 166.

- Select and confirm the *Back* function (2).



Settings for ventilating

For auxiliary air heating system only

The set fan level (1) is displayed.

- Select and confirm the desired fan level.

The hours of the operating duration (2) flash.

- Select and confirm the desired hours.
The minutes of the operating duration (2) flash.
- Select and confirm the desired minutes.
- Select and confirm the *Back* function (3).



For ventilating

Ventilation operating mode is only available with the corresponding version.

A maximum of three parameters can be set.

- Fan level (for the fan in the heater, is independent of the fan in the crane cabin)
- Operating duration
- Remaining time.

The settings are made in the same way as for heating.

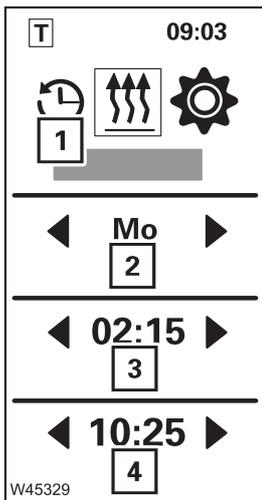
Automatic heating mode

Heating is started automatically on schedule only if the time and the day of the week have been correctly set;  *Basic settings*, p. 11 - 164.

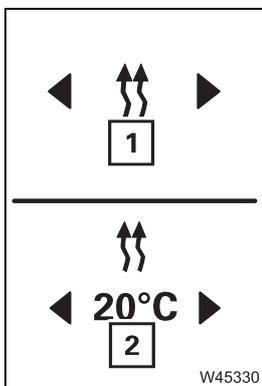
You can set three different automatic heating modes – up to seven days in advance.



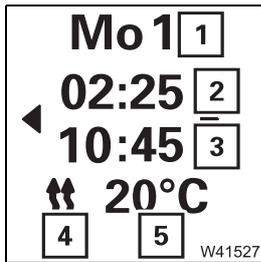
If you call up values in order to change them during the following setting process, they flash for 5 seconds. The entry must be made within this period. The value stops flashing after 5 seconds and is saved as the new value.



- Switch off the heating.
- Select and confirm the *Timer* menu (1).
- Select and confirm the *Add timer* symbol (2).
The day of the week (2) is displayed – e.g. **Mo** for Monday.
- Select and confirm the desired day of the week.
The hours of the switch-on time (3) flash.
- Select and confirm the desired hours.
The minutes of the switch-on time (3) flash.
- Select and confirm the desired minutes.
The hours of the switch-off time (4) flash.
- Select and confirm the desired hours.
The minutes of the switch-off time (4) flash.

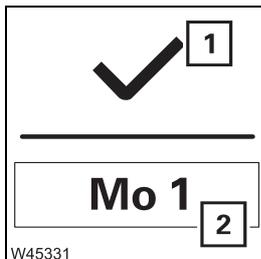


- For auxiliary air heaters only
- The set heating level (1) is displayed.
- Select and confirm the desired heating level.
The temperature (2) is displayed.
- Select and confirm the desired temperature.



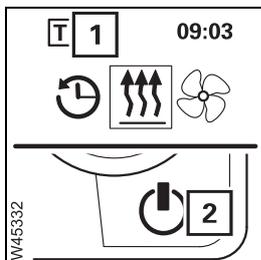
The set values are displayed.

- Day (1)
- Switch-on time (2)
- Switch-off time (3)
- For auxiliary air heaters only
 - Heating mode (4)
 - Temperature (5)
- Confirm the set values.



The *Activate* symbol (1) is displayed.

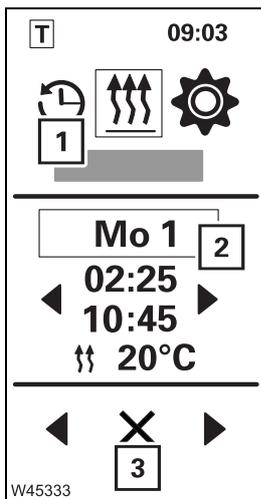
- Select and confirm the activation.
The white marking (2) at the day of the week indicates the activation.



Display and activation outside the *Timer* menu

- The symbol (1) is displayed in the start menu.
- If the display is switched off, the lamp (2) flashes green.

Changing automatic heating mode



You can call and change all set automatic heating modes.

- Switch off the heating.
- Select and confirm the *Timer* menu (1).
- Select and confirm the desired heating mode (2).
A symbol (3) for the change is displayed.
- Select and confirm the desired symbol.

The settings listed can be selected.

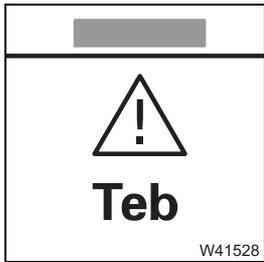
- Activate
- Deactivate
- Edit
- Delete
- Delete all.



Error messages

Error messages are shown on the display and can be saved to an error log.

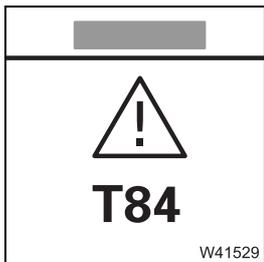
- An error code with a **T** indicates an error at the *UniControl* control unit.
- An error code with an **F** indicates an error at the heater.
- Familiarise yourself with the full scope of the error codes for the UniControl control unit;  *Manufacturer operating instructions*.



Teb

If the **Teb** error code is displayed, the power supply was switched off for longer than 8 minutes.

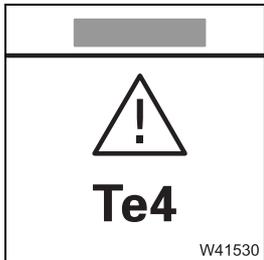
- You must reset the time and the day of the week.
- Always set the current time and current day of the week. These settings are required for the correct switch-on point of the start of automatic heating;  p. 11 - 164.



T84

If the **T84** error code is displayed, the voltage supply has fallen too much (undervoltage).

- Charge the vehicle battery.
- If necessary, have the vehicle's electrical system checked.



Te4

If the **Te4** error code is displayed, then the LED in the On/Off switch with status indicator is faulty.

- Notify **Grove Product Support** or an authorised dealer.
- Have the control unit checked.

11.9.3

Air-conditioning

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

Notes

Do not cool the air in the crane cab too much.

The difference between the outside temperature and the inside temperature should not exceed 10 °C to 14 °C (50 °F to 57.2 °F).

If there is too much cooling, you may frequently feel physically uncomfortable, albeit mostly only after you leave the cool environment.

Avoid having cold air blowing directly on to your body.

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

If the truck crane has been exposed to strong sunlight for a long period of time, for example, the air-conditioning system should initially be operated at the highest fan level with the engine running.

The door or at least the windows should be left open for a short while to thoroughly air the cab.

At very high/low temperatures, it may be necessary to set the heating system/air-conditioning system with a time delay in order that the desired temperature in the crane cab is reached before starting operations.

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

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



When the air-conditioning system is switched on, the crane control does not switch from level 1 to level 2 when in *Economy Mode*.



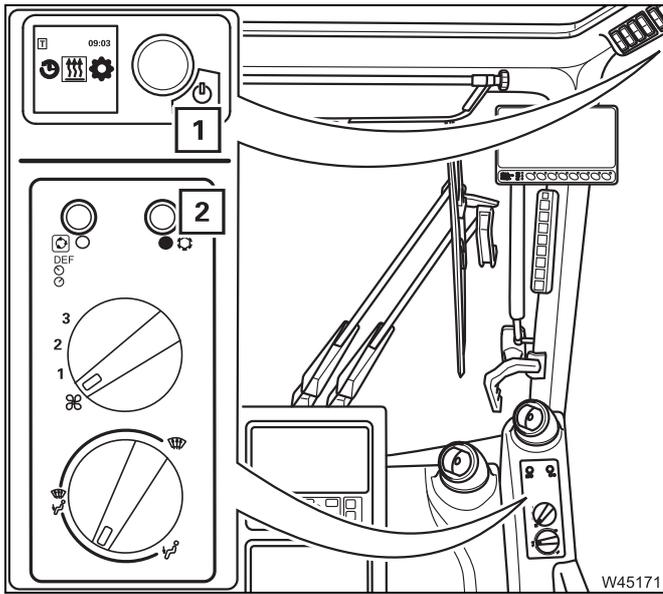
When the air-conditioning system is switched on, you cannot open the *Hydraulic oil prewarming* menu.



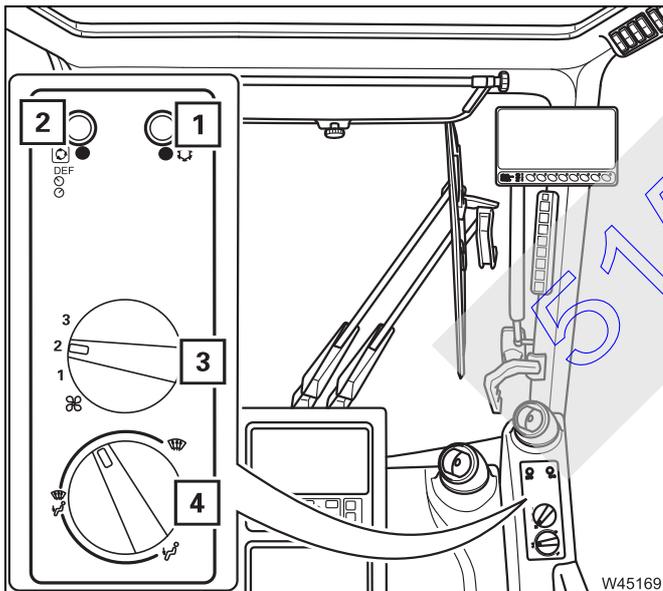
When the air-conditioning system is switched on, the specified operating speeds of the drives may also decrease.



Switching on



- Press the button (1) repeatedly until the lamp in the button lights up in white – heating off.
- Press the button (2) repeatedly until the lamp under the button lights up – air-conditioning on.



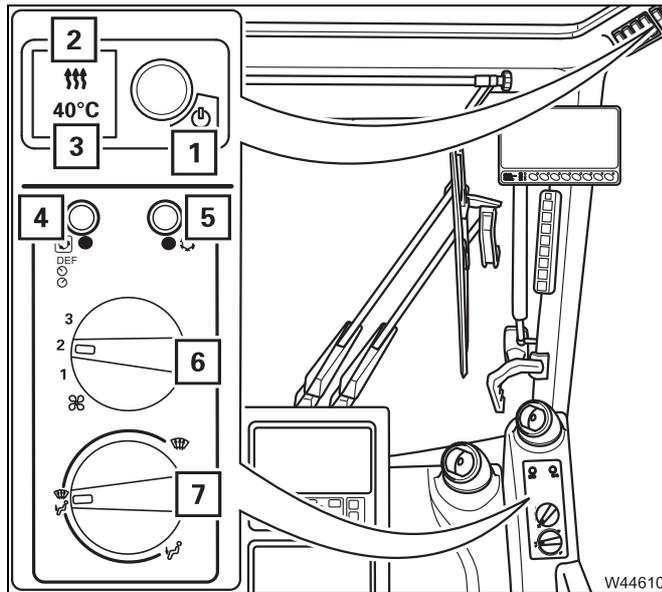
Cooling

The air-conditioning is switched on – lamp (1) lights up.

- Set the desired fan level with the switch (3).
- For faster cooling – press the button (2) repeatedly until the lamp under the button lights up – recirculated air on
- Set the desired air distribution with the switch (4).
- Set the air vents as required; ►► p. 11 - 158.



You can cool the crane cab particularly if you set the switches (3) and (4) as shown above.



Drying the air

The air-conditioning is switched on – lamp (5) lights up.

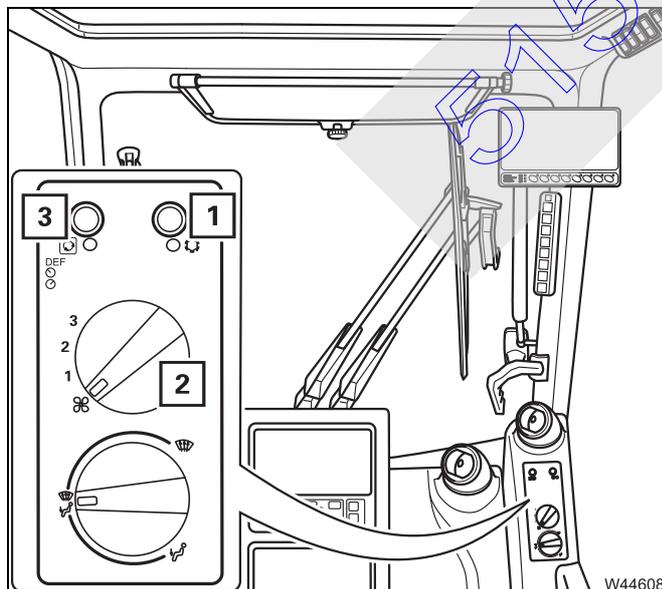
- Press the button (1) repeatedly until the lamp in the button lights up in green – heating on.
- Select and confirm the *Rapid* heating level (2) and the desired temperature (3).
- Turn the switch (6) to the desired level, e.g. to level 2.
- For faster cooling – press the button (5) repeatedly until the lamp under the button lights up – recirculated air on
- Set the desired air distribution with the switch (7).

- Set the air vents as required; ►► p. 11 - 158.



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.

Switching off



Switching off the air-conditioning system

- Press the button (1) – the lamp under the button goes out.

Switching off recirculated air

- Press the button (3) – the lamp under the button goes out.

Switching off the ventilation

- Turn the switch (2) to the *Off* level.

Heating system

- Set the heating as required; ►► *Heating*, p. 11 - 158.

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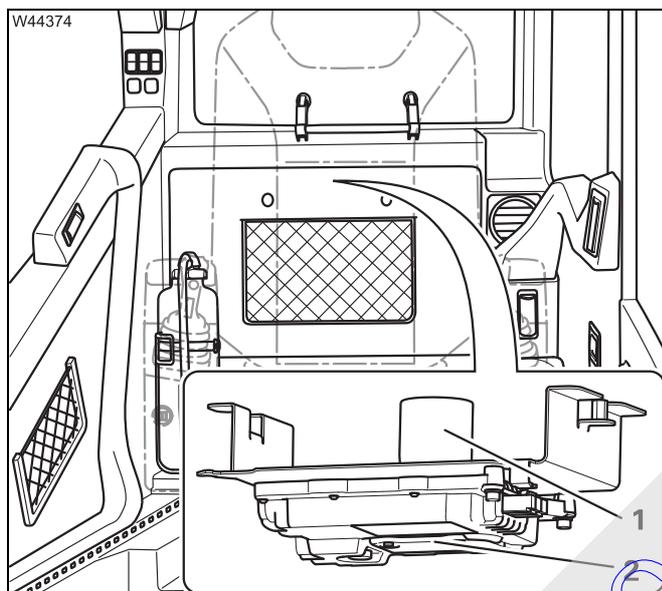
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11.10

TELEMATIC system

Your truck crane is equipped with the TELEMATIC system.
The TELEMATIC system is used to transmit crane data via mobile phone,
thus allowing remote diagnostics and localisation of the truck crane.

The TELEMATIC system works automatically, no controls need to be operated.
This sections shows only the location of the associated components.



Installation point

An antenna (1) belongs to the TELEMATIC system and a control unit (2) for data transmission.

The antenna (1) is a combined GSM/GPS antenna for transmission via mobile radio (GSM) and for receiving positioning data (GPS).

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12

Rigging work

If the truck crane has already been rigged at the site, proceed according to the *CHECKLIST: Checks before crane operation*, p. 11 - 1.

12.1

Rigging work checklists for crane operation with the main boom



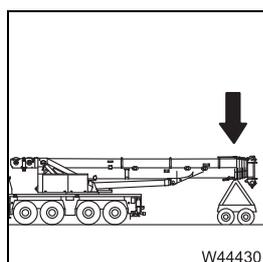
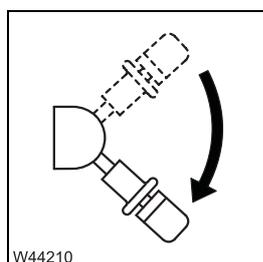
This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.

Observe the warnings and safety instructions given there!

12.1.1

CHECKLIST: Rigging

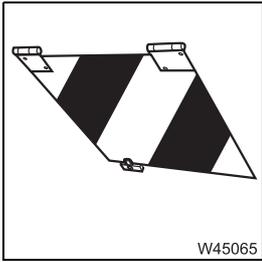
1. Choose a suitable site;  *Choosing a suitable site*, p. 12 - 11
2. Check that the parking brake is applied – if necessary, apply the parking brake.



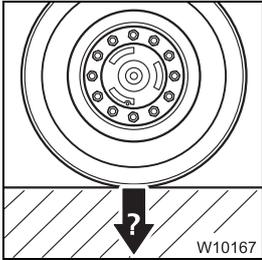
3. If the main boom is set down on a dolly:

- Switch off the boom floating position;  p. 12 - 19,
- Switch off the slewing gear freewheel  p. 12 - 20,
- If necessary, switch off boom pre-tensioning;  p. 12 - 21





4. Fold up warning plates – if present; p. 5 - 10.



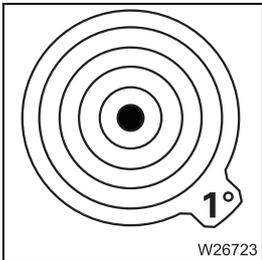
5. For rigging in the *Free-on wheels* operating position

– Check that the tyre pressure is correctly set; *Maintenance manual*.

– Check that the ground can support the maximum axle loads

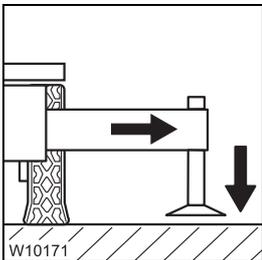
Weight and axle loads, p. 1 - 10,

Determining the required load-bearing area, p. 12 - 11.



– Level the truck crane with the level adjustment system;

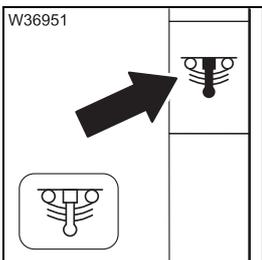
Operating the level adjustment system, p. 5 - 73.



– Extend all outrigger beams as far as possible; p. 12 - 43.

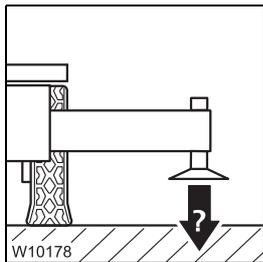
– Move all outrigger pads into the operating position; p. 12 - 47.

– Extend all supporting cylinders far enough so that the outrigger pads are just above the ground; p. 12 - 51.



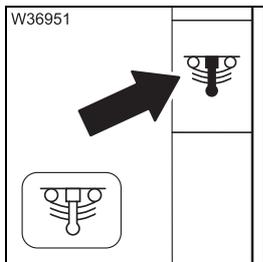
– Switch off (lock) the suspension – symbol **red** (suspension off);

p. 5 - 19.

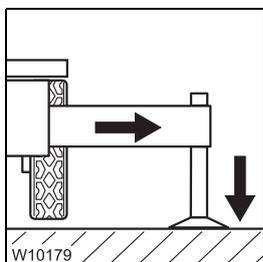


6. For rigging the truck crane on outriggers

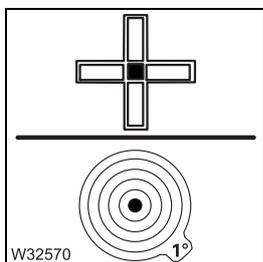
- Check that the ground can support the maximum outrigger pressures that can occur; ■■■► *Determining the required load-bearing area*, p. 12 - 11.



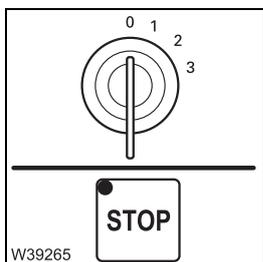
- Switch off (lock) the suspension – symbol **red** (suspension off); ■■■► p. 5 - 19.



- Support the truck crane with the outrigger span required for the job according to the *Lifting capacity table* and lift it until none of the wheels are touching the ground; ■■■► *Outrigger operation*, p. 12 - 33.

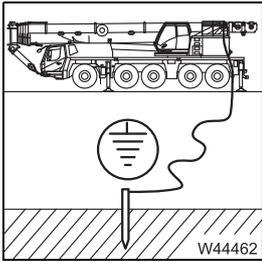


- Level the truck crane; ■■■► p. 12 - 54.

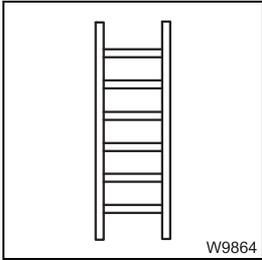


7. Switch off the engine; ■■■► p. 4 - 19.

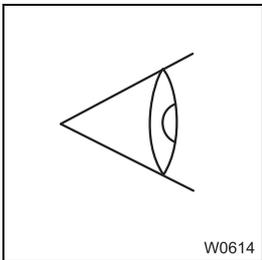




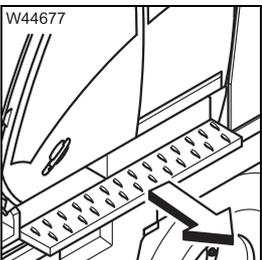
8. Earth the truck crane, if necessary; *Earthing the truck crane*, p. 12 - 15.



9. Fold out all ladders; p. 3 - 87.



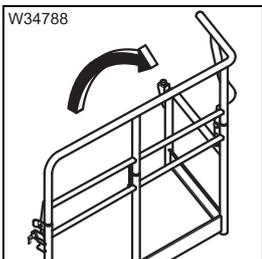
10. Inspect the truck crane, while looking out in particular for any leaking fluids (oil, fuel or water).



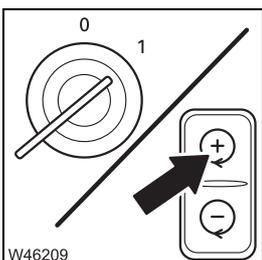
11. Depending on the version, extend or push out the step.

– Extend; *Automatic operation*, p. 12 - 178

– Push out; *Manual operation*, p. 12 - 179



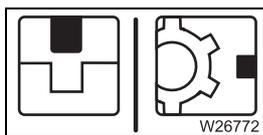
12. Fold out the railing on the turntable; p. 12 - 169.



13. – Switch on the ignition.

– Start the engine for crane operation.

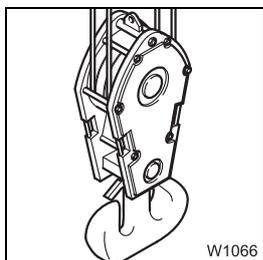
Starting the engine – from the crane cab, p. 10 - 4.



14. Unlock the turntable – provided the systems are present

▣▣▣▣ ➔ *Unlocking the superstructure*, p. 11 - 16

▣▣▣▣ ➔ *Switching off the houselock*, p. 11 - 19

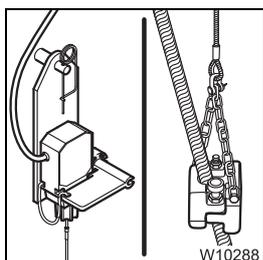


15. Pick up the hook block and reeve the hoist rope again, if necessary;

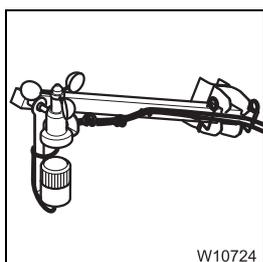
▣▣▣▣ ➔ *Hook block on a separate vehicle*, p. 12 - 139,

▣▣▣▣ ➔ *Hook block on the bumper*, p. 12 - 137,

▣▣▣▣ ➔ *Reeving and unreeving the hoist rope*, p. 12 - 142.

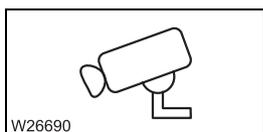


16. Install the lifting limit switch; ▣▣▣▣ ➔ p. 12 - 158.



17. Install the anemometer and air traffic control light;

▣▣▣▣ ➔ *Anemometer and air traffic control light*, p. 12 - 164.

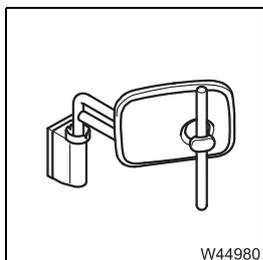


18. Install/switch on cameras as required.

▣▣▣▣ ➔ *Cameras on the hoists*, p. 12 - 173

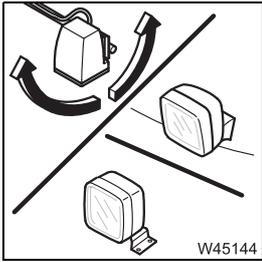
▣▣▣▣ ➔ *Camera on the main boom*, p. 12 - 173

▣▣▣▣ ➔ *Camera on the driver's cab*, p. 12 - 175

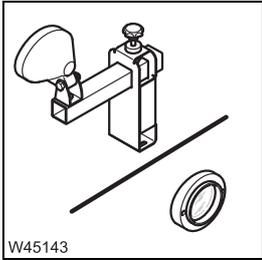


19. Install, fold out and adjust all mirrors for crane operation; ▣▣▣▣ ➔ p. 12 - 170.

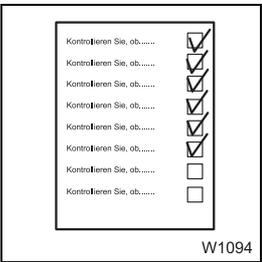




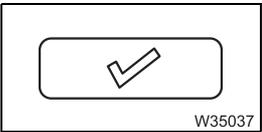
- 20.** Switch on spotlights as required.
- Switch on slewable spotlights; ■■■▶ p. 11 - 132.
 - Switch on spotlights I; ■■■▶ p. 9 - 155.
 - Switch on spotlights II; ■■■▶ p. 9 - 156.



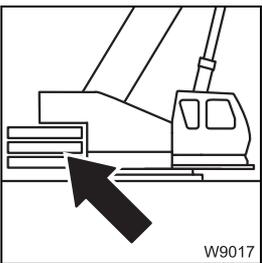
- Extend and switch on spotlights III; ■■■▶ p. 12 - 180.
- Switch on outrigger lighting; ■■■▶ p. 3 - 47



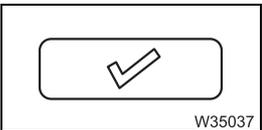
- 21.** Perform all the required checks prior to crane operation;
 ■■■▶ *CHECKLIST: Checks before crane operation, p. 11 - 1.*



- 22.** Enter and confirm the current rigging mode;
 ■■■▶ *Entering the rigging mode, p. 11 - 32.*



- 23.** With the rigging mode confirmed accordingly, rig the counterweight combination required for operation according to *Lifting capacity table*;
 ■■■▶ *CHECKLIST: Rigging the counterweight, p. 12 - 73.*

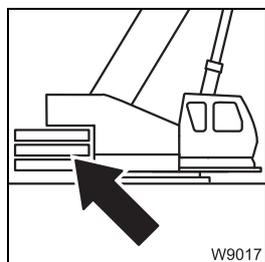


- 24.** Enter the current rigging mode with the newly rigged counterweight combination and confirm it; ■■■▶ *Entering the rigging mode, p. 11 - 32.*

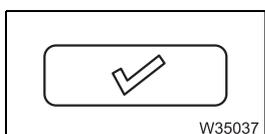
12.1.2**CHECKLIST: Unrigging**

This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.

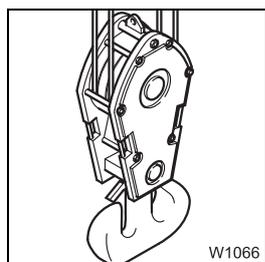
Observe the warnings and safety instructions given there!



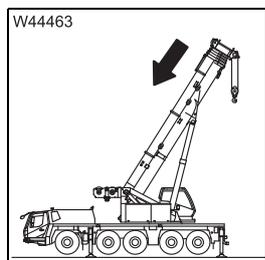
1. With the rigging mode set correspondingly, unrig the counterweight;
 - ▣▣▣▣ *CHECKLIST: Unrigging the counterweight*, p. 12 - 74.



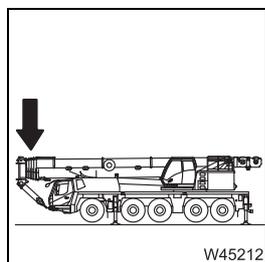
2. Enter the current rigging mode with the newly rigged counterweight combination and confirm it;
 - ▣▣▣▣ *Entering the rigging mode*, p. 11 - 32.



3. Depending on transport:
 - Attach the hook block to the bumper; ▣▣▣▣ p. 12 - 138 or
 - Set down the hook block and unreeve the hoist rope;
 - ▣▣▣▣ *Setting down the hook block*, p. 12 - 140
 - ▣▣▣▣ *Unreeving the hoist rope*, p. 12 - 149

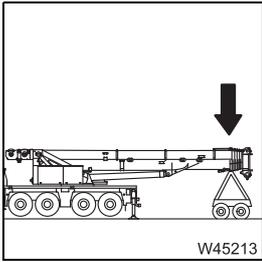


4. Retract the main boom; ▣▣▣▣ p. 11 - 91.



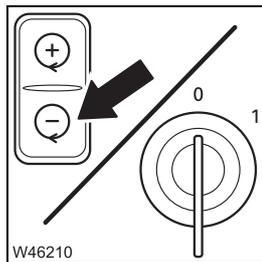
5. **For on-road driving without a dolly:**
 - Turn the superstructure to the 180° position to the front with the RCL set accordingly,
 - Place the main boom on the boom rest.



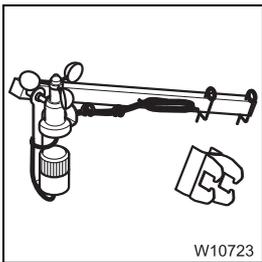


6. For on-road driving with a dolly:

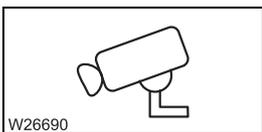
- Make sure that the counterweight and holder have been removed from the rear storage area; ■■■▶ p. 12 - 113.
- Set down the superstructure on a dolly with the RCL set accordingly and switch on the boom floating position; ■■■▶ p. 6 - 13.
- Switching on the slewing gear freewheel; ■■■▶ p. 6 - 12.
- Switch on boom pre-tensioning – if present; ■■■▶ p. 6 - 14.
- Raise 3rd axle line – if possible and required; ■■■▶ p. 6 - 15.
- Switch off the houselock; ■■■▶ p. 11 - 17.



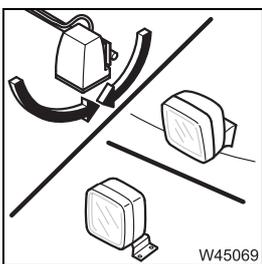
7. – Switch off the engine for crane operation.
- Switch off the ignition.
- ▶ p. 10 - 12.



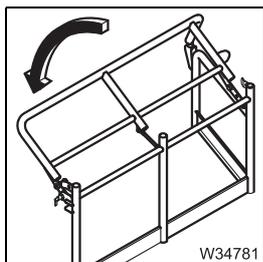
8. Remove the anemometer and air traffic control light – if present; ■■■▶ *Anemometer and air traffic control light*, p. 12 - 164.



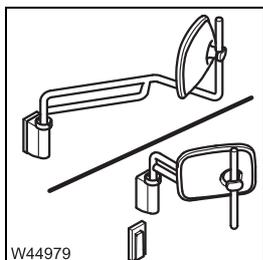
9. – Switch off the cameras; ■■■▶ p. 12 - 177.
- Remove camera on main boom; ■■■▶ p. 12 - 173.



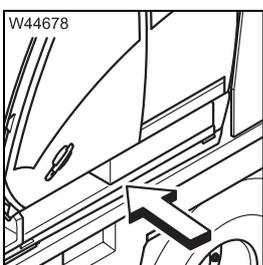
10. – Switch off the slewable spotlights and slew them in such a way that no other drivers are dazzled by reflection; ■■■▶ p. 11 - 132.
- Switch off spotlights I; ■■■▶ p. 9 - 155.
- Switch off spotlights II; ■■■▶ p. 9 - 156.



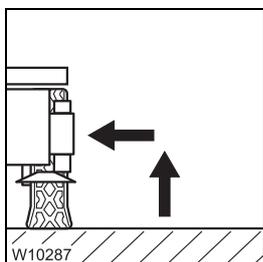
11. Fold in all railings; ■■■▶ p. 12 - 169.



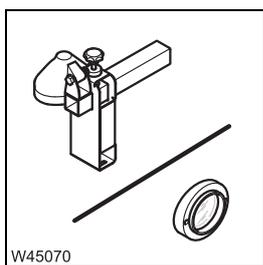
12. Fold in or remove the mirror for crane operation;
■■■▶ *Mirror for crane operation*, p. 12 - 170.



13. Depending on the version, retract or push in the step.
– Retract; ■■■▶ *Automatic operation*, p. 12 - 178
– Push in; ■■■▶ *Manual operation*, p. 12 - 179

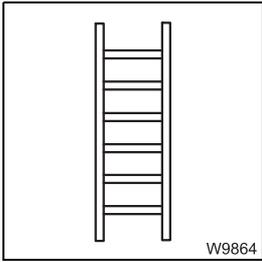


14. Retract the outriggers; ■■■▶ *CHECKLIST: Retracting the outriggers*, p. 12 - 35.

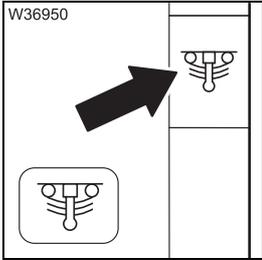


15. – Push in the spotlight III and turn it down; ■■■▶ p. 12 - 180.
– Switch off the outrigger lighting; ■■■▶ p. 3 - 47.

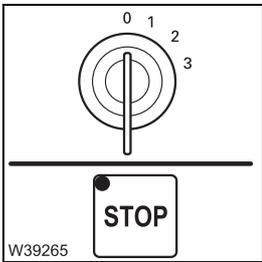




16. Fold in all ladders;  p. 3 - 88.



17. Switch on suspension (release locking) – symbol **green** (suspension on);
 p. 5 - 19.



18. Switch off the engine.
 *In the driver's cab*, p. 4 - 19
 *At the outrigger control units*, p. 4 - 19

19. When the truck crane is no longer being used.
 *At every work break*, p. 11 - 153.
 *For every work break longer than 8 hours*, p. 11 - 154

12.2

Choosing a suitable site

Choose the position of your truck crane at the site with care. Observe the following aspects:

- Check that the ground has sufficient load bearing capacity. You may need to enlarge the load-bearing area;  p. 12 - 11.
- Maintain the required safe distances from slopes and pits;  p. 12 - 14
- If there is a danger of it becoming charged with static electricity, earth the truck crane;  p. 12 - 15.
- Maintain a safe distance from electrical lines;  p. 12 - 15.
- Choose the site such that the unevenness of the ground can be compensated for by adjusting the supporting cylinders. Maximum stroke of the supporting cylinders;  p. 1 - 19.
- 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 load-bearing area

The stability of the truck crane depends significantly on the load bearing capacity of the ground. The load bearing capacity of the ground and the applicable outrigger pressure determine the load-bearing area required for the operation.

$$\text{Load-bearing area (m}^2\text{)} = \frac{\text{Outrigger pressure (t)}}{\text{Load bearing capacity of the ground (}\frac{\text{t}}{\text{m}^2}\text{)}}$$

Outrigger pressure

- Determine the outrigger pressure for the planned operation using the *Outrigger pressure table*.



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 2,050)
Natural, obviously undisturbed ground:		
Mud, peat, marsh		0
Non-cohesive ground that is sufficiently firm:	Fine to medium sand	15 (3,070)
	Coarse sand to gravel	20 (4,100)
Cohesive soil:	mushy	0
	soft	4 (820)
	stiff	10 (2,050)
	half firm	20 (4,100)
	hard	40 (8,200)
Rock with minimal fissures in sound, unweathered condition and with favourable strata:	In a 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, have the ground tested.

Load-bearing area

- Now calculate the required load-bearing area.
- Check that the area of the outrigger pad (▮▮▮ p. 1 - 19) is larger than the calculated ground bearing area. If the area of the outrigger pad is smaller, you will need to increase the load-bearing area.



Danger of overturning if the load-bearing area is too small!

Make sure that the actual load-bearing area is at least as large as specified in the table.

This prevents the ground giving way and the truck crane overturning.

Example for calculating the required load-bearing area:

Let us assume the outrigger pressure is 25 t and the ground has a load bearing capacity of 40 t/m². Then the required load-bearing area for this supporting cylinder is 0.625 m² (= 6,250 cm²).

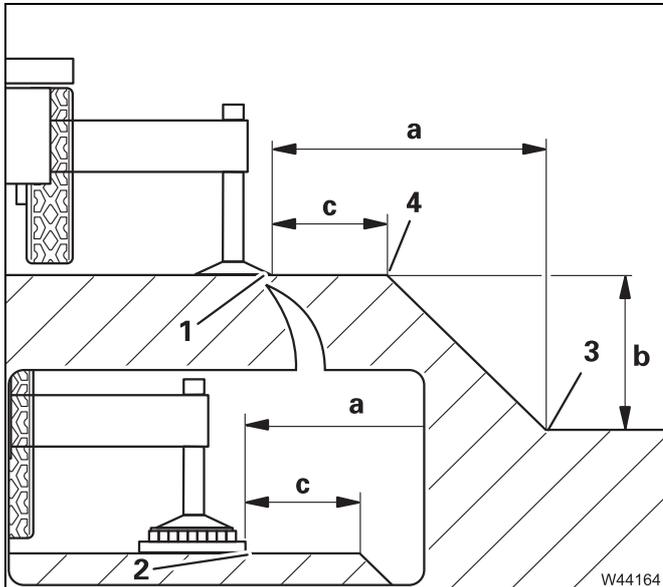
Let us assume the outrigger pad has a surface of 2,000 cm², you would need to increase the ground bearing area by packing the outrigger pads in this case;

▮▮▮ p. 12 - 49.

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12.2.2 Safe distance from slopes and pits

Set up 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.



As a rule of thumb

If you are working on *non-cohesive or backfilled* ground, the safe distance (**a**) must be twice as large as the pit depth (**b**).

$$a = 2 \times b$$

If you are working on *cohesive, undisturbed* ground, the safe distance (**a**) must match the depth of the pit (**b**).

$$a = 1 \times b$$

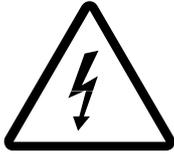
The safe distance is measured from the base of the pit (**3**).

In addition the safe distance (**c**) between the outrigger pad (**1**) or substructure (**2**) and the edge of the pit (**4**) must always be more than 2.00 m (6.6 ft).

12.2.3

Earthing the truck crane

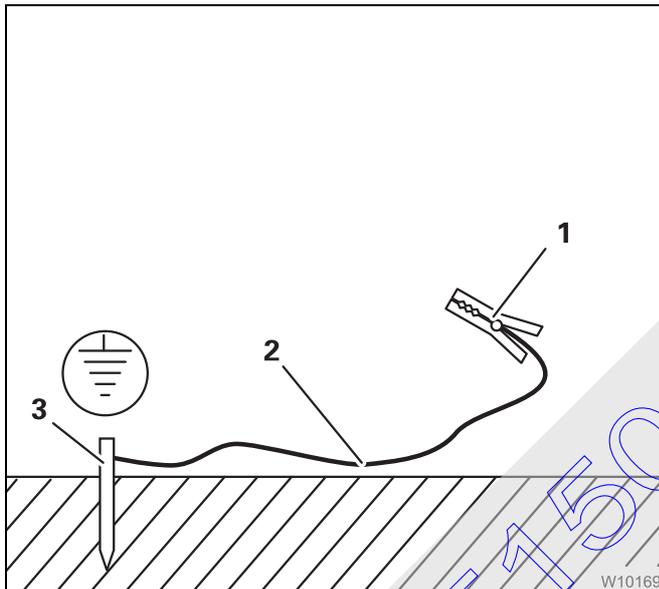
The truck crane may become charged with static electricity. This may occur especially when using outrigger pads made of synthetic material or when the outrigger pads are packed with insulating material (e.g. wooden planks).



Risk of accidents due to electric shock!

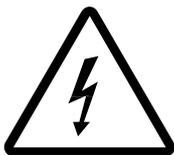
Earth the truck crane before you start to work with it

- near strong transmitters (radio transmitters, radio stations, etc.),
- near high-frequency switchgear substations,
- if a thunderstorm is approaching.



Use electrically conducting material for earthing.

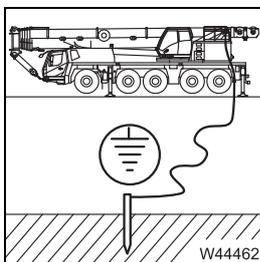
- Drive a metal rod (3) (length about 2.0 m (6.6 ft)) at least 1.5 m (5 ft) into the ground.
- For better conductivity, dampen the soil around the metal rod (3).
- Clamp an insulated cable (2) to the metal rod (3) (cross-section of at least 16 mm² (0.025 in²)).
- Connect the free end of the cable with a terminal (1).



Risk of accidents due to electric shock!

Make sure that the connections between the cable and the terminal are electrically conductive.

Do not attach the terminal to parts that are bolted on, such as valves, cover plates or similar parts.



- Use a cable of sufficient length and route it in such a way that it is not damaged during crane operation.
- Attach the terminal to the main boom or the superstructure.

12.2.4

Safe distance from overhead power lines

Always observe the regulations in the country in which you are working when working in the vicinity of overhead power lines.

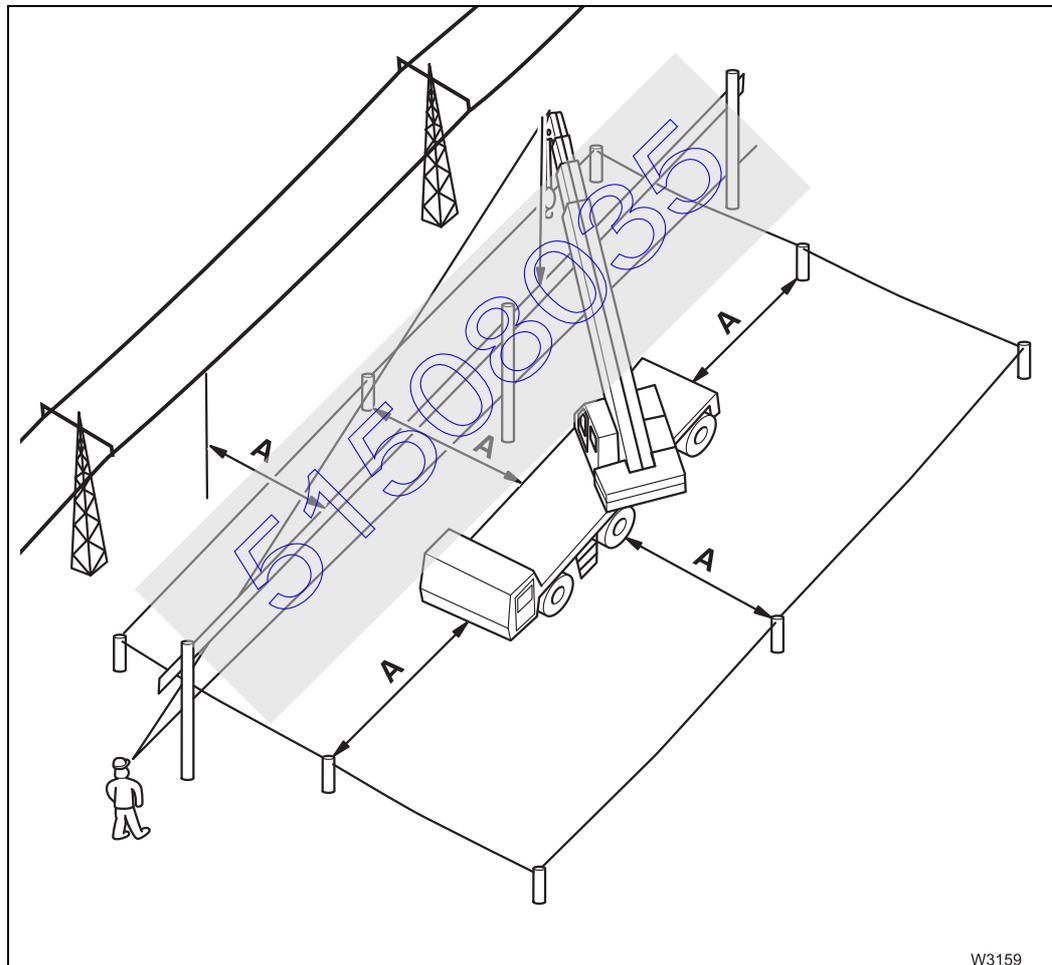


Risk of accidents due to electric shock!

The truck crane is not insulated.

If the truck crane, its equipment, its load/lifting tackle or the guide ropes touch an overhead power line this will cause serious injury or even death.

- If there are overhead power lines within the working range of the truck crane, have these overhead power lines disconnected from the power supply if possible.



If it is not possible to disconnect the overhead power lines, you must at least maintain the prescribed safe distance (**A**).

Different safe distances are recommended by the respective national regulations:

For example, according to DIN VDE 0105

Voltage	Safe distance (A)
up to 1,000 V	1 m (3.3 ft)
over 1,000 V to 110,000 V	3 m (9.8 ft)
over 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)
over 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)
over 350,000 V to 500,000 V	7.62 m (25 ft)
over 500,000 V to 750,000 V	10.67 m (35 ft)
over 750,000 V to 1,000,000 V	13.72 m (45 ft)

- Set up an obstacle at the minimum safe distance (A) from the overhead power line. This will keep the equipment of the truck crane and load/lifting tackle away from the power line. Make allowance for the possibility the load or the cable may swing.
- Cordon off the area around the truck crane at the safe distance (A). This increases the safety area in case the power line is touched.
- Have banksmen in visual or radio contact with you check that you are maintaining the safe distance (A).
- If the load has to be guided, only use guide ropes of non-conductive material.

If you do touch the overhead power cable:

- Keep calm!
- Do not leave the crane cab!
- Tell anyone standing outside not to touch the truck 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 dolly

If the main boom is resting on a dolly while the truck crane is being driven, you must perform the following before working with the crane:

- Switch off the boom floating position;  p. 12 - 19,
- Switch off the slewing gear freewheel;  p. 12 - 20,
- If necessary switch off boom pre-tensioning;  p. 12 - 21.

12.3.1

Switching off the boom floating position

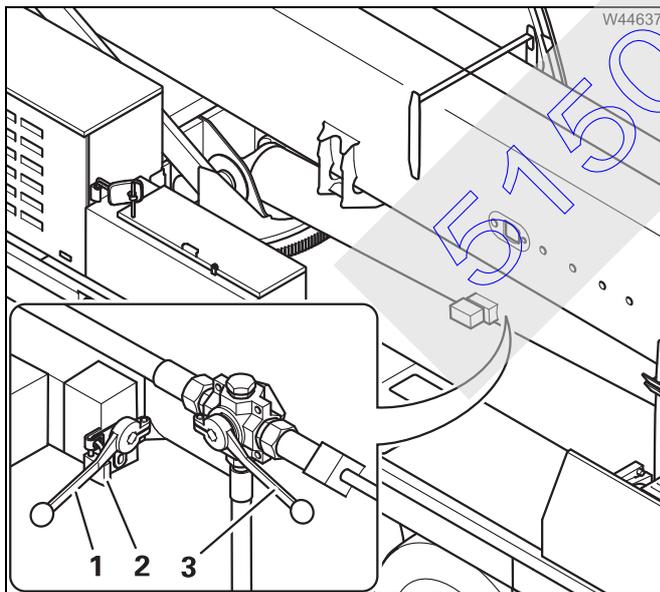
You must switch off the boom floating position before you lift (raise) the main boom off the dolly.



Risk of accidents if the main boom drops down!

Always secure the lever with the lock after switching off the boom floating position.

This prevents the raised main boom falling down when the lever is actuated.



- Remove the lock (2).
- Switch over valve I – lever (1) horizontal and pointing outwards.
- Secure the lever (1) with the lock (2).
- Switch the valve IV over – lever (3) points forwards.

The boom floating position is now switched off.

12.3.2

Switching off the slewing gear freewheel

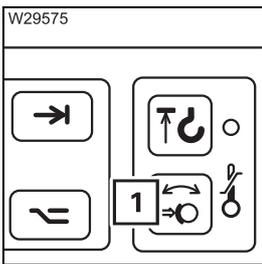
If the slewing gear freewheel is switched on, you must switch it off prior to working with the crane.



Risk of accidents with the slewing gear freewheel switched on!

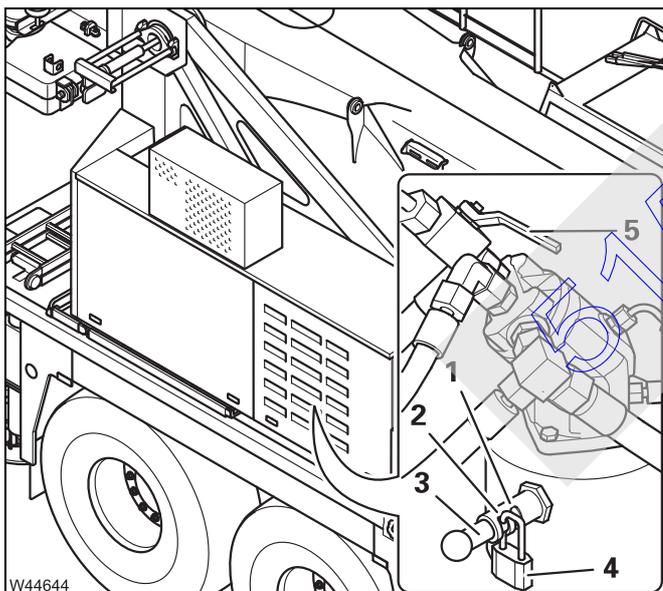
Switch off the slewing gear freewheel before working with the crane.

If it is not switched off, the slewing gear brake will not work and you will be unable to stop slewing movements in time.



Prerequisites

- The engine for crane operation is running.
- The slewing gear brake must be released, the lamp (1) has gone out;
 ▶ *Releasing the slewing gear brake*, p. 11 - 118



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 gear in the same way.
- Close the valve (5) – the slewing gear freewheel is switched off.

Before slewing

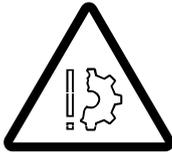
Support the truck crane with the necessary outrigger span, enter the corresponding rigging mode and derrick the main boom to an angle permissible within the working range.

12.3.3

Switching off boom pre-tensioning

You must switch off boom pre-tensioning before you lift (raise) the main boom off the dolly.

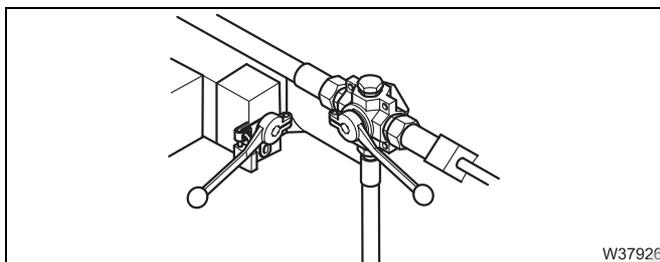
To switch off boom pre-tensioning, you must move the valves I to IV into the required positions, which will empty the pressure accumulator.



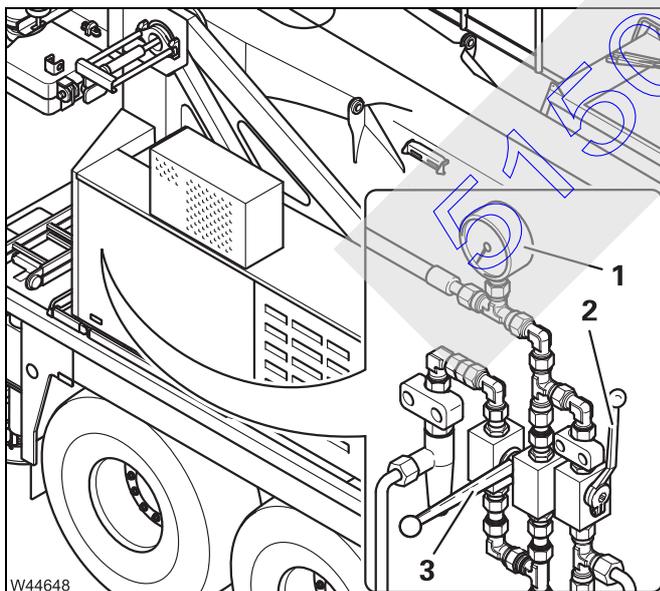
Danger of the hydraulic oil overheating!

Always switch the valve IV (▣▣▣▣ p. 12 - 19) over (lever in horizontal position) before operating the crane.

This prevents the pressure in the hydraulic circuit increasing and the hydraulic oil exceeding the permissible temperature of 80 °C (176 °F).



- Switch off the boom floating position; ▣▣▣▣ p. 12 - 19.



Valves II and III are located underneath the pressure gauge (1).

- Open valve II – lever (2) is vertical.

The pressure accumulator is emptied. The pressure at the pressure gauge (1) must drop to 0 bar (0 psi).

The valve III remains closed – lever (3) is horizontal.

Blank page

51508035

12.4

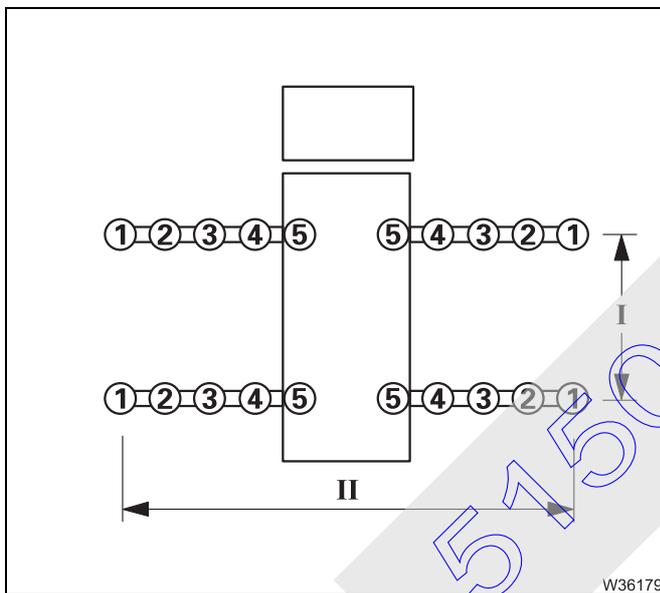
Outriggers – Overview – Standard slewing range type

The information in this section applies only to the *Standard* slewing range type. If you want to operate the truck crane using the *MAXbase* slewing range type; **▮▮▮▮** p. 12 - 25.

All permissible outrigger spans are symmetrical. All outrigger beams are always extended and all outrigger beams are extended to the same outrigger span; **▮▮▮▮** *Released outrigger spans*, p. 12 - 24.

12.4.1

Representation in the lifting capacity tables



The outrigger span is always given in this form in the *Lifting capacity table*.

Outrigger length xxxx – outrigger span yyyy

– Outrigger length

The outrigger length (I) has a permanent value of 8.030 m (26.3 ft) and never changes for a fully supported truck crane.

– Outrigger span

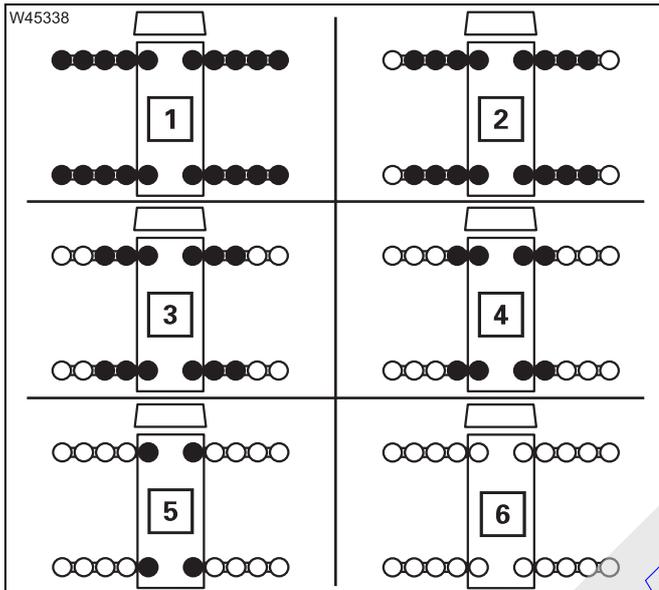
The outrigger span refers to the overall width (II). There are five outrigger spans (1) to (5).

12.4.2 Released 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 - 119.



The tables show the values for the permissible outrigger spans with overall widths (1) to (5).

1	7.600 m (25.0 ft)
2	6.700 m (22.0 ft)
3	5.900 m (19.4 ft)
4	5.100 m (16.8 ft)
5	2.500 m (8.2 ft)

In addition, there are lifting capacity tables for the *Free on wheels* operating position – display (6).

The cover pages of the individual lifting capacity tables provide a brief overview in per cent.

Outrigger span	Percent
1	100%
2	83%
3	66%
4	50%
5	0%



The percentage values shown at the *Outrigger* control units deviate from these values as are they are based on other basic data; p. 12 - 44.

12.5

Outriggers – Overview – MAXbase slewing range type

The information in this section applies to the *MAXbase* slewing range type. If you want to operate the truck crane using the *Standard* slewing range type;
 ■■■▶ p. 12 - 23.

Symmetrical and various variable outrigger spans are enabled. There are several different types of outrigger spans, each with several permissible combinations.

Separate *Lifting capacity tables* for the variable outrigger spans are provided in digital form. Observe all the specifications and definitions in these tables before starting operation.

12.5.1

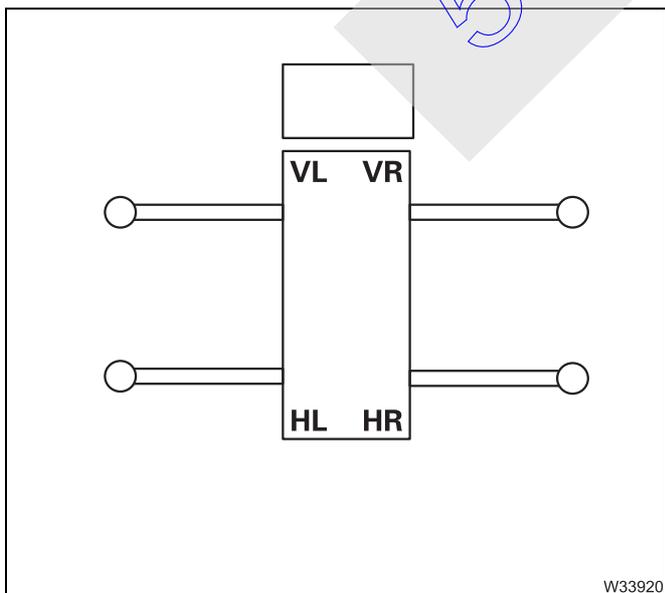
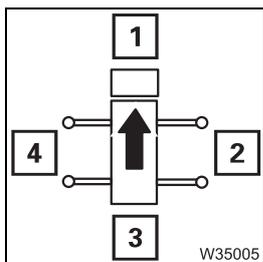
Definitions

Specific terms and graphical illustrations are used in the description.

Directional information

The directional information is always based on the carrier regardless of the position of the superstructure.

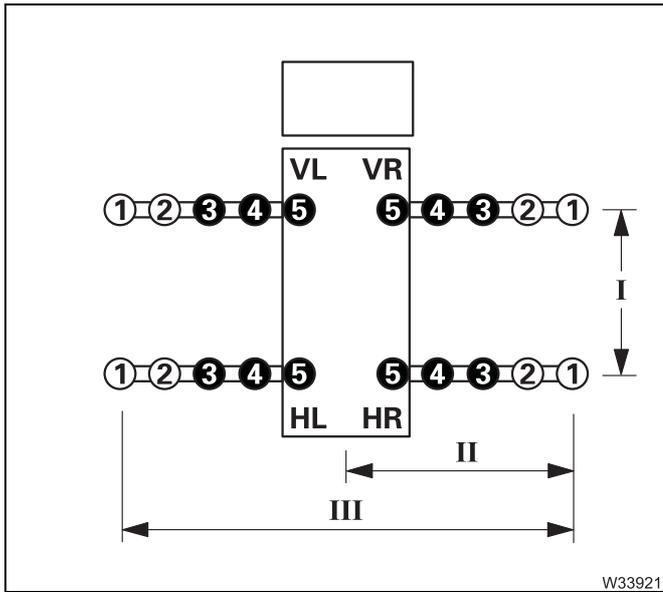
- 1: Front
- 2: Right
- 3: Rear
- 4: Left



Designation of the outrigger beams

VL	Front left
VR	Front right
HL	Rear left
HR	Rear right





Representation of the outrigger spans

– Outrigger length

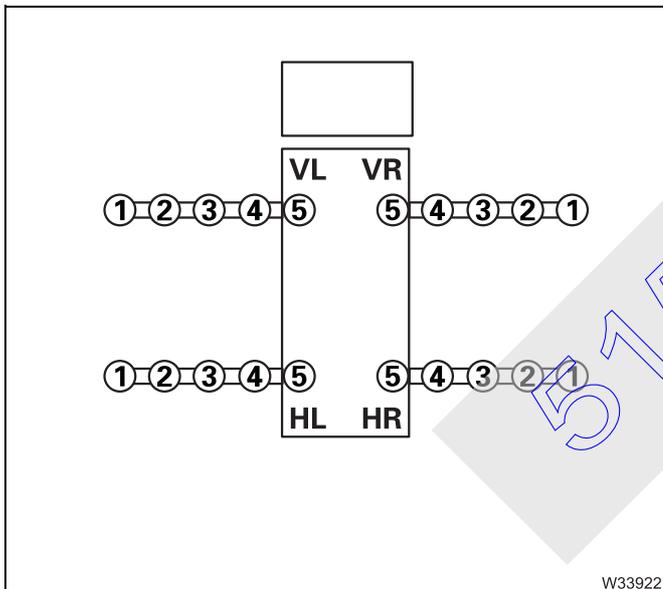
The outrigger length (I) has a permanent value of 8.030 m (26.3 ft) and never changes.

– Outrigger span

All possible outrigger spans (1) to (5) are always shown for all outrigger beams.

For defining an outrigger span, the rigged outrigger spans (and all smaller spans) are shown in black and the illustration shows the outrigger spans (3).

The outrigger span is specified as an individual width (II) or overall width (III) depending on the type of outrigger span.



Individual widths / overall widths

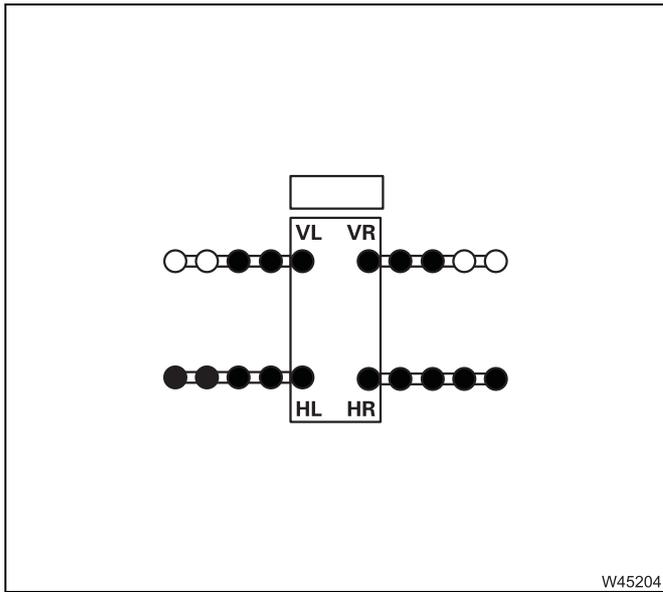
The tables show the values for the outrigger spans (1) to (5).

	Individual widths	Overall widths
1	3.800 m (12.5 ft)	7.600 m (25.0 ft)
2	3.350 m (11.0 ft)	6.700 m (22.0 ft)
3	2.950 m (9.7 ft)	5.900 m (19.4 ft)
4	2.550 m (8.4 ft)	5.100 m (16.8 ft)
5	1.250 m (4.1 ft)	2.500 m (8.2 ft)

The individual widths and overall widths are specified in metres (feet) in the lifting capacity tables.



The cover pages of the lifting capacity tables provide a brief overview in per cent. These percentage values deviate from the percentage values actually displayed at the *Outrigger control units* as they are based on other principles. Overview;
 ■► *At the control units*, p. 12 - 44.

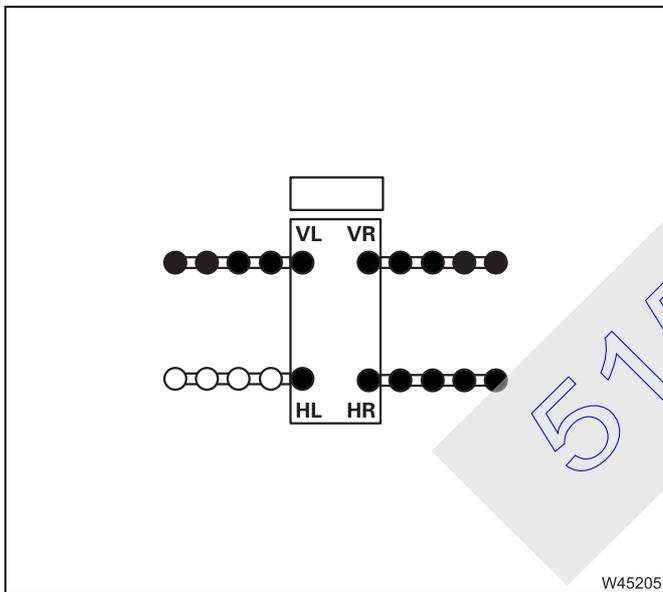


Front / Rear

The outrigger span is the same at the front and the same at the rear – but different between the front and rear.

The overall width is entered for the front and for the rear. For example

- Front outrigger span 5.900 m (19.4 ft)**
- Rear outrigger span 7.600 m (25.0 ft)**



Three / One

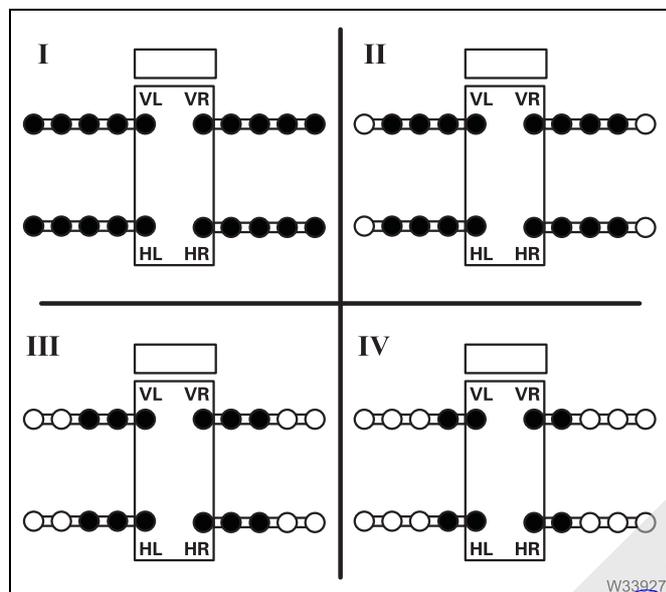
The outrigger span is the same for three outrigger beams and one outrigger beam has a smaller outrigger span.

The overall width is entered once and an individual width is entered once. For example

- Front outrigger span 7.600 m (25.0 ft)**
- Rear outrigger span 3.800 m + 1.250 m
(12.5 ft + 4.1 ft)**

12.5.3 Released outrigger spans

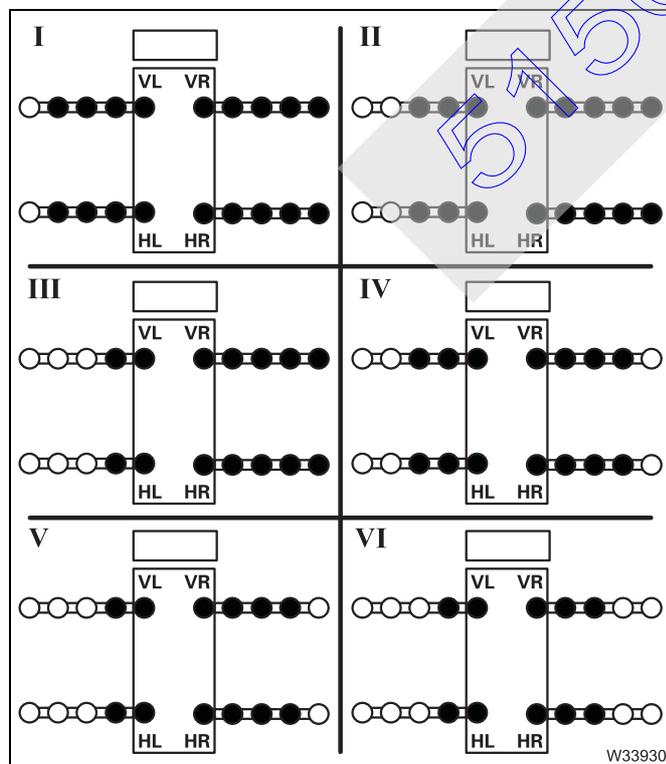
Specific combinations are released for each type of outrigger span. This section shows all released combinations with the associated individual widths of the outrigger beams.



Symmetrical

The outrigger span is the same for all outrigger beams. The table shows the released combinations.

	VL / VR / HL / HR
I	3.800 m (12.5 ft)
II	3.350 m (11.0 ft)
III	2.950 m (9.7 ft)
IV	2.550 m (8.4 ft)



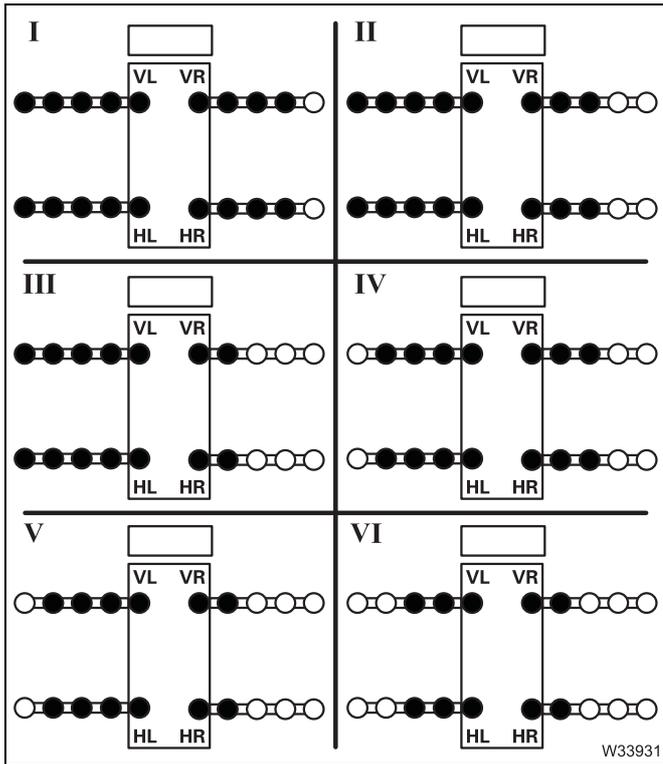
Right / Left

– Right greater than left

The outrigger span is the same at the left and the same at the right. The table shows the permissible combinations.

	VR / HR	VL / HL
I	3.800 m (12.5 ft)	3.350 m (11.0 ft)
II	3.800 m (12.5 ft)	2.950 m (9.7 ft)
III	3.800 m (12.5 ft)	2.550 m (8.4 ft)
IV	3.350 m (11.0 ft)	2.950 m (9.7 ft)
V	3.350 m (11.0 ft)	2.550 m (8.4 ft)
VI	2.950 m (9.7 ft)	2.550 m (8.4 ft)



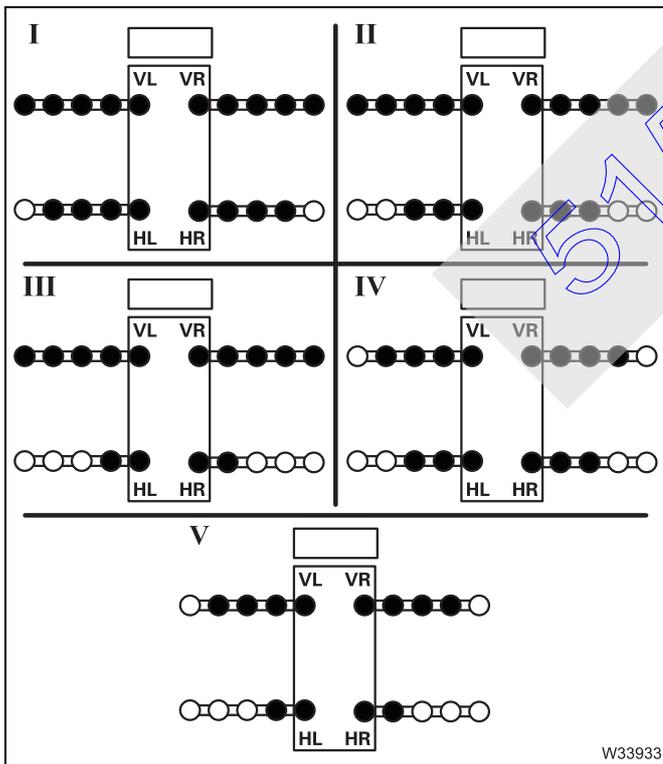


– Left greater than right

The outrigger span is the same at the left and the same at the right. The table shows the permissible combinations.

	VR / HR	VL / HL
I	3.350 m (11.0 ft)	3.800 m (12.5 ft)
II	2.950 m (9.7 ft)	3.800 m (12.5 ft)
III	2.550 m (8.4 ft)	3.800 m (12.5 ft)
IV	2.950 m (9.7 ft)	3.350 m (11.0 ft)
V	2.550 m (8.4 ft)	3.350 m (11.0 ft)
VI	2.550 m (8.4 ft)	2.950 m (9.7 ft)

There are no separate lifting capacity tables for this type. The lifting capacities for the *Right greater than left* type are released in a correspondingly mirrored slewing range. *Lifting capacities and slewing ranges for outrigger spans without separate lifting capacity tables, p. 11 - 28.*

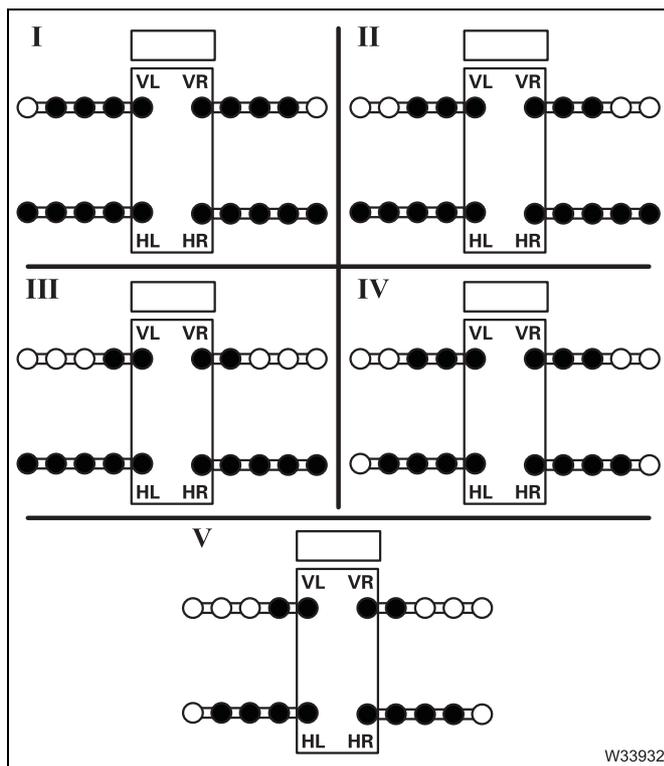


Front / Rear

– Front greater than rear

The front outrigger beams are extended further than the rear outrigger beams. The table shows the permissible combinations.

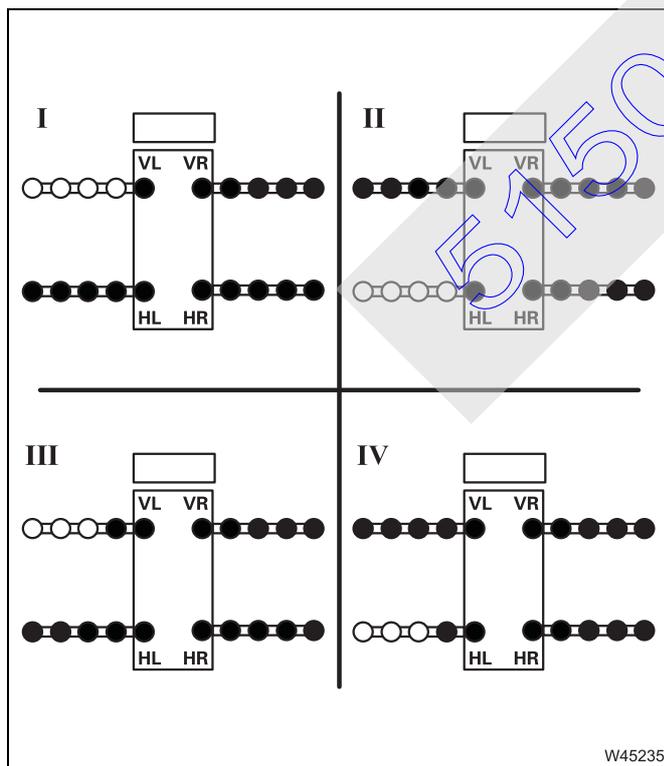
	VR / VL	HR / HL
I	3.800 m (12.5 ft)	3.350 m (11.0 ft)
II	3.800 m (12.5 ft)	2.950 m (9.7 ft)
III	3.800 m (12.5 ft)	2.550 m (8.4 ft)
IV	3.350 m (11.0 ft)	2.950 m (9.7 ft)
V	3.350 m (11.0 ft)	2.550 m (8.4 ft)



– Rear greater than front

The rear outrigger beams are extended further than the front outrigger beams. The table shows the permissible combinations.

	VR / VL	HR / HL
I	3.350 m (11.0 ft)	3.800 m (12.5 ft)
II	2.950 m (9.7 ft)	3.800 m (12.5 ft)
III	2.550 m (8.4 ft)	3.800 m (12.5 ft)
IV	2.950 m (9.7 ft)	3.350 m (11.0 ft)
V	2.550 m (8.4 ft)	3.350 m (11.0 ft)



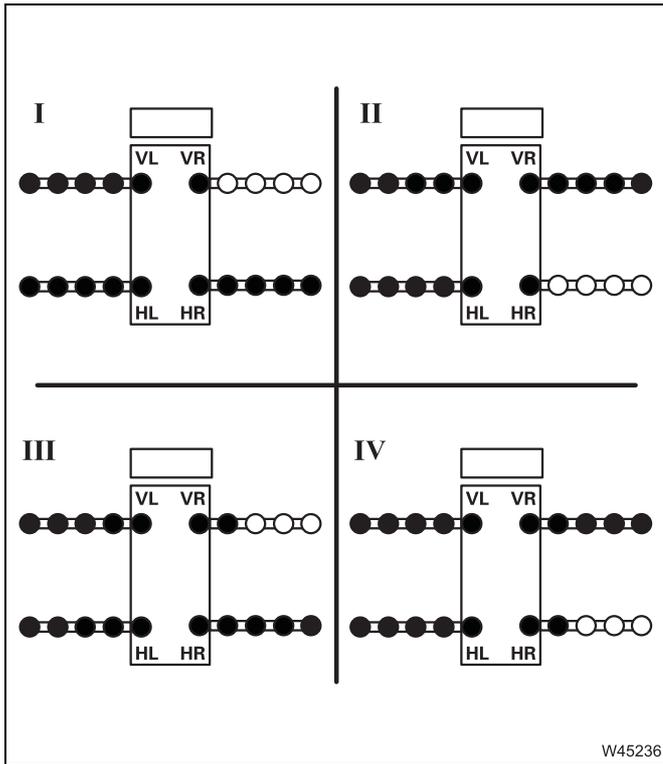
Three / One

One outrigger span smaller – Left

Three outrigger beams are extended the same distance and one outrigger beam has a smaller outrigger span. The table shows the released combinations.

	VR	VL	HR	HL
I	3.800 m (12.5 ft)	1.250 m (4.1 ft)	3.800 m (12.5 ft)	3.800 m (12.5 ft)
II	3.800 m (12.5 ft)	3.800 m (12.5 ft)	3.800 m (12.5 ft)	1.250 m (4.1 ft)
III	3.800 m (12.5 ft)	2.550 m (8.4 ft)	3.800 m (12.5 ft)	3.800 m (12.5 ft)
IV	3.800 m (12.5 ft)	3.800 m (12.5 ft)	3.800 m (12.5 ft)	2.550 m (8.4 ft)





– One outrigger span smaller – Right

Three outrigger beams are extended the same distance and one outrigger beam has a smaller outrigger span. The table shows the released combinations.

	VR	VL	HR	HL
I	1.250 m (4.1 ft)	3.800 m (12.5 ft)	3.800 m (12.5 ft)	3.800 m (12.5 ft)
II	3.800 m (12.5 ft)	3.800 m (12.5 ft)	1.250 m (4.1 ft)	3.800 m (12.5 ft)
III	2.550 m (8.4 ft)	3.800 m (12.5 ft)	3.800 m (12.5 ft)	3.800 m (12.5 ft)
IV	3.800 m (12.5 ft)	3.800 m (12.5 ft)	2.550 m (8.4 ft)	3.800 m (12.5 ft)

There are no separate lifting capacity tables for this type. The lifting capacities for the *One outrigger beam retracted – left* type are released in a correspondingly mirrored slewing range; ■■■▶ *Lifting capacities and slewing ranges for outrigger spans without separate lifting capacity tables, p. 11 - 28.*

12.6

Outrigger operation



Danger of crushing by extending outrigger beams!

You may only operate the outriggers if you yourself or a banksman with whom you are in visual contact have an unobstructed view of their movements.

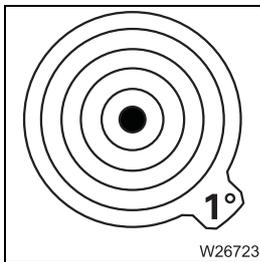
12.6.1

CHECKLIST: Extending the outriggers

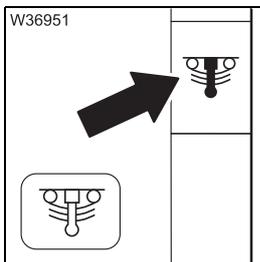


This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.

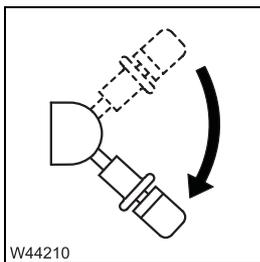
Observe the warnings and safety instructions given there!



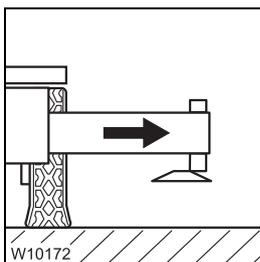
1. Level the truck crane with the level adjustment system and lower it as far as possible; p. 5 - 73



2. Switch off (lock) the suspension – symbol **red** (suspension off); p. 5 - 19.

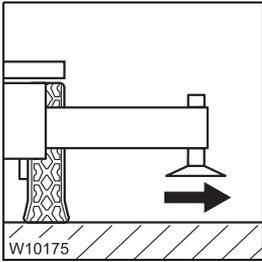


3. Apply the parking brake; p. 5 - 85.

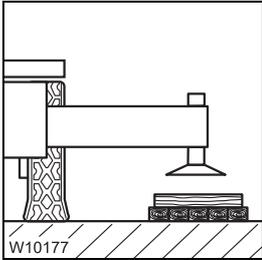


4. Extend all outrigger beams to the required outrigger span;
 - For the *Standard* slewing range type; p. 12 - 24
 - For the *MAXbase* slewing range type; p. 12 - 29
 - Setting the outrigger spans*, p. 12 - 39
 - Extending/retracting outrigger beams*, p. 12 - 43.

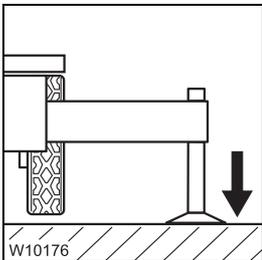




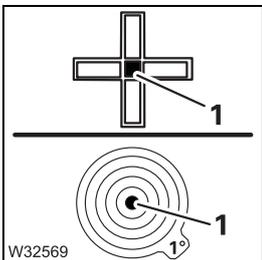
5. Move the outrigger pads into the operating position and secure them;
 ■■■► p. 12 - 47.



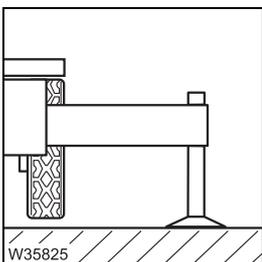
6. Increase the load-bearing area if necessary;
 ■■■► *Determining the required load-bearing area*, p. 12 - 11,
 ■■■► *Enlarging the load-bearing area*, p. 12 - 49.



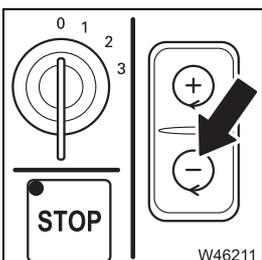
7. Extend the supporting cylinders until none of the wheels are touching the ground; ■■■► p. 12 - 51.



8. Level the truck crane with the outriggers.
 The lamp (1) lights up in the measuring range 1°; ■■■► p. 12 - 54.



9. Check that none of the wheels are touching the ground.
 Raise the wheels if necessary; ■■■► *Operating the axle raising system*,
 p. 12 - 60.



10. Switch off the engine
 – After operating it from the control units; ■■■► p. 4 - 19.
 – After operating it from the crane cab; ■■■► p. 10 - 12.

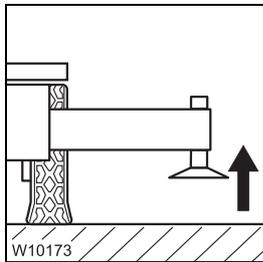
12.6.2

CHECKLIST: Retracting the outriggers

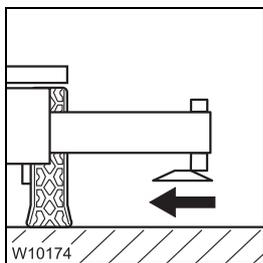


This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.

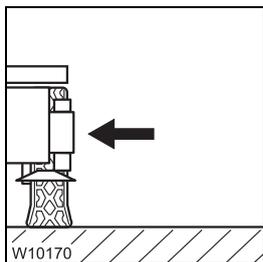
Observe the warnings and safety instructions given there!



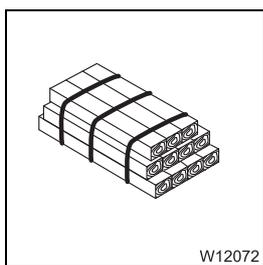
1. Retract the supporting cylinders as far as possible; p. 12 - 51.



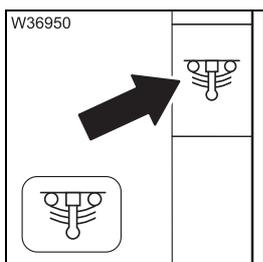
2. Move the outrigger pads into the driving position and secure them;
 Moving into the driving position, p. 12 - 47.



3. Fully retract and secure all outrigger beams;
 For on-road driving, p. 12 - 41,
 Extending/retracting outrigger beams, p. 12 - 43.

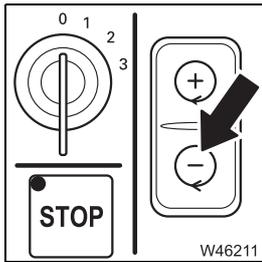


4. Stow away packing material safely, if applicable.



5. Switch on suspension (release locking) – symbol **green** (suspension on);
 p. 5 - 19.





6. Switch off the engine;
- After operating it from the control units; ||||► p. 4 - 19.
 - After operating it from the crane cab; ||||► p. 10 - 12.

12.6.3

Preparing the truck crane

Driver's cab

Levelling the truck crane

- Level the truck crane with the level adjustment system; ||||► *Operating the level adjustment system*, p. 5 - 73.

Locking the suspension

- Switch off the suspension; ||||► *Switching the suspension on/off*, p. 5 - 18.

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

Outrigger lighting on/off

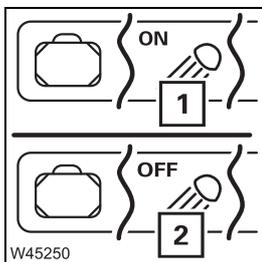
In the Various controls menu group

Switching on

Select symbol (2) and confirm – symbol (1) is displayed.

Switching off

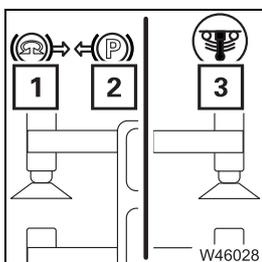
Select symbol (1) and confirm – symbol (2) is displayed.



Crane cab

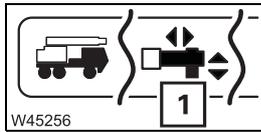
The outriggers can be moved from the crane cab only if the prerequisites listed are complied with.

- The suspension is switched off – symbol (3) is red.
- The parking brake is applied – symbol (2) is hidden.
- The slewing gear is switched off – symbol (1) is hidden.

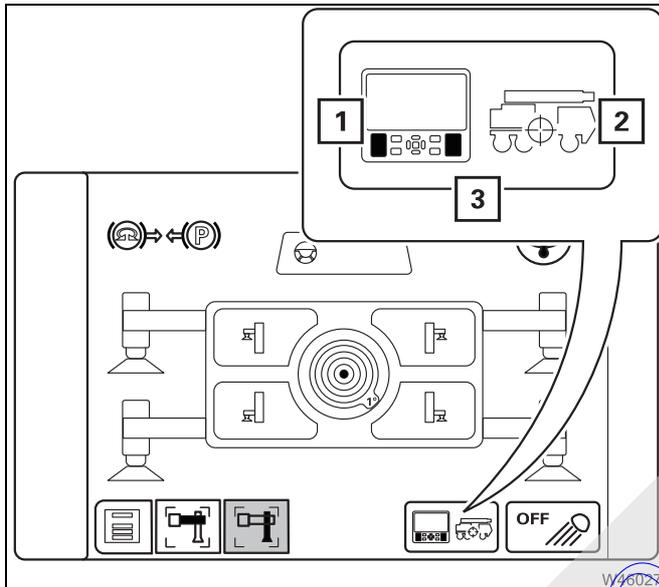


Switching over outrigger operation

You can switch over operation of the outriggers between the *Outrigger* control units and the control units in the crane cab.



- Open the menu (1) – Outrigger menu.

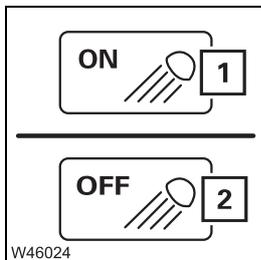


Display

- Symbol (1) **green**
Only the operating elements in the crane cab are active.
- Symbol (2) **green**
Only the *Outrigger* operating elements are active

Switching over

- Select and confirm the button (3) until the desired symbol turns green.



Outrigger lighting on/off

In the *Outrigger* menu

Switching on

Select symbol (2) and confirm – symbol (1) is displayed.

Switching off

Select symbol (1) and confirm – symbol (2) is displayed.

Blank page

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12.6.4

Setting the outrigger spans

Extend the outrigger beams only as far as the permissible outrigger spans.



Danger of overturning if the outrigger beams are not correctly extended!

Extend the outrigger beams only as far as the permissible outrigger spans. Always extend all outriggers to the outrigger spans given in the *Lifting capacity table* for the planned application.

Even when you are only working on one side. Otherwise the rear stability for the rigging mode according to the displayed rigging mode is no longer given.



Risk of accidents from incorrect or missing markings!

Replace missing and illegible markings. First request the correct position from **Grove Product Support**.

You thus prevent the truck crane overturning due to an incorrect outrigger span.



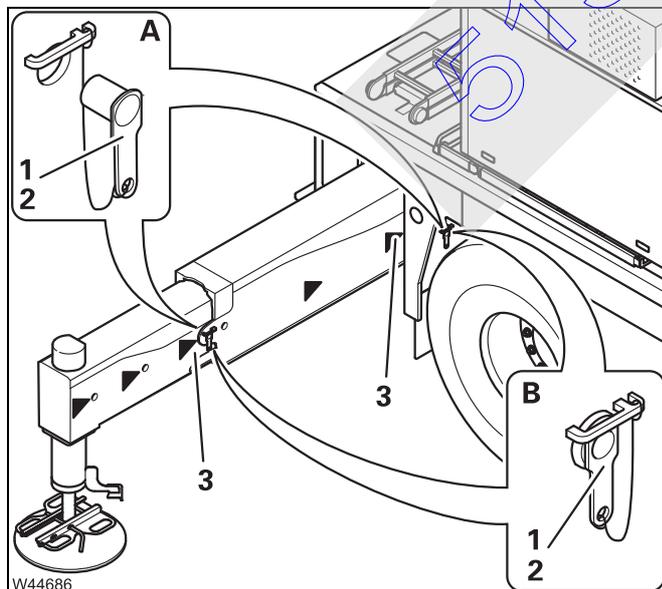
This section describes how to release and secure the outrigger beams, as well as the markings for the outrigger spans.

There are various ways to move the outrigger beams;

▮▮▮ *Extending/retracting outrigger beams*, p. 12 - 43.

The illustrations show only the rear right outrigger beam as an example, the procedure is the same for the other outrigger beams.

The procedure is identical for the overall width and corresponding individual width.



Overall width 7.600 m (25.0 ft)
Individual width 3.800 m (12.5 ft)

(A) – Prerequisite

Pins (1) and (2) have been pulled out

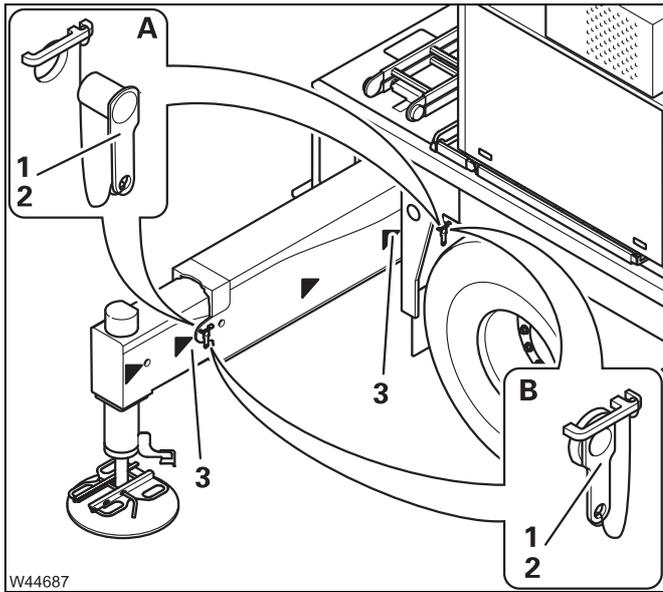
(B) – Setting and securing

- Extend the outrigger beam up to the marking (3).
- Secure the outrigger beam with the pins (1) and (2).

For the overall width

- Set the outrigger span in the same way at the opposite outrigger beam.





Overall width 6.700 m (22.0 ft)
Individual width 3.350 m (11.0 ft)

(A) – Requirements

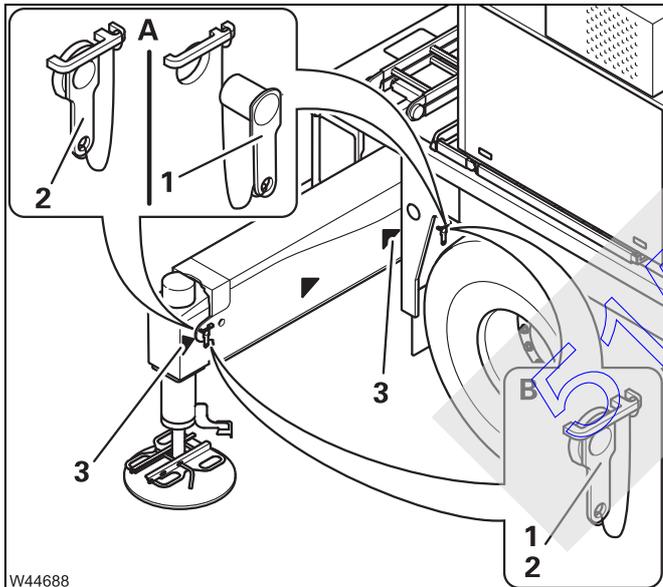
Pins (1) and (2) have been pulled out

(B) – Setting and securing

- Extend the outrigger beam up to the marking (3).
- Secure the outrigger beam with the pins (1) and (2).

For the overall width

- Set the outrigger span in the same way at the opposite outrigger beam.



Overall width 5.900 m (19.4 ft)
Individual width 2.950 m (9.7 ft)

(A) – Requirements

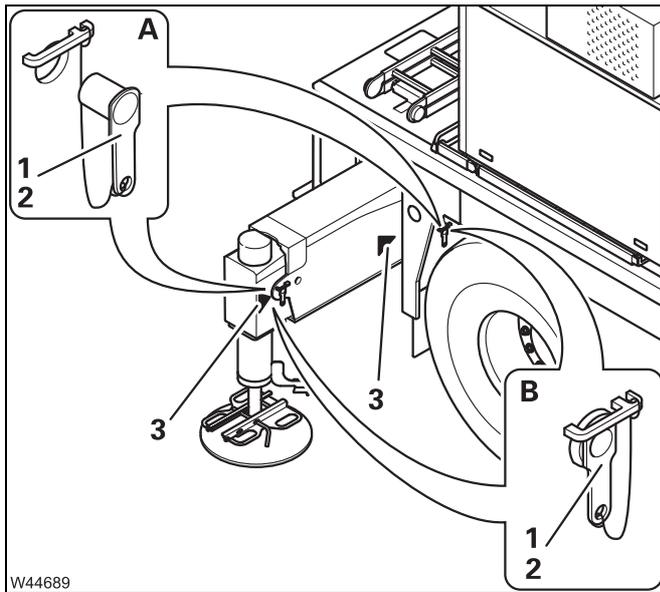
- Pin (1) has been pulled
- Pin (2) has been inserted

(B) – Setting and securing

- Extend the outrigger beam up to the marking (3).
- Secure the outrigger beam with the pin (1).
- The pin (2) remains inserted.

For the overall width

- Set the outrigger span in the same way at the opposite outrigger beam.



Overall width 5.100 m (16.8 ft)
Individual width 2.550 m (8.4 ft)

(A) – Requirements

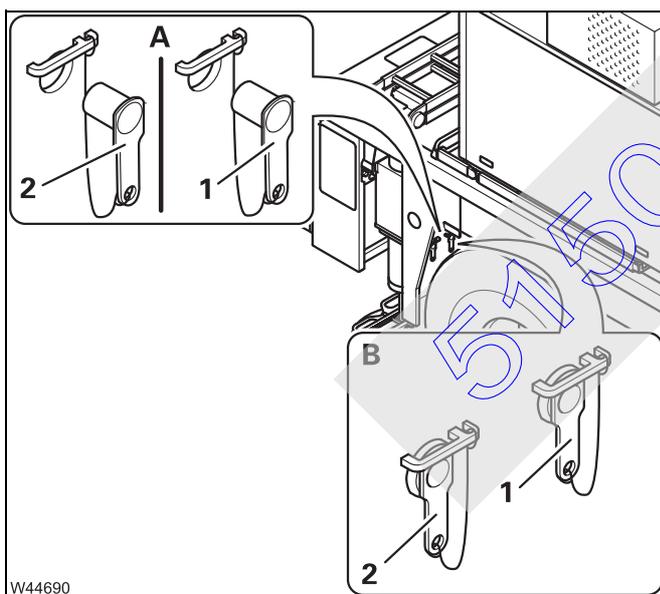
- Pin (1) has been pulled
- Pin (2) has been inserted

(B) – Setting and securing

- Extend the outrigger beam up to the marking (3).
- Secure the outrigger beam with the pin (1).
- The pin (2) remains inserted.

For the overall width

- Set the outrigger span in the same way at the opposite outrigger beam.



Overall width 2.500 m (8.2 ft)
Individual width 1.250 m (4.1 ft)

(A) – Requirements

- Pins (1) and (2) have been pulled out

(B) – Setting and securing

- Completely retract the outrigger beam.
- Secure the outrigger beam with the pins (1) and (2).

For the overall width

- Set the outrigger span in the same way at the opposite outrigger beam.

For on-road driving

- Set an outrigger span of 8.030 m x 2.500 m (26.3 ft x 8.2 ft) on all outrigger beams and secure them.
- Move all outrigger pads into driving position; p. 12 - 47.



Risk of accidents due to outrigger beams sliding out!

Completely retract all outrigger beams and secure them. This prevents the outrigger beams sliding out when driving around corners and causing serious accidents.

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12.6.5

Extending/retracting outrigger beams



Risk of accidents 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** outrigger beams to the required outrigger span required for the specified rigging mode, even if you are only working on one side. Otherwise rear stability according to the displayed rigging mode is no longer guaranteed.



Risk of damage to the outriggers!

Before extending the outrigger beams, always check whether they have been released. This prevents damage to the pins.



Risk of damage to the outriggers and add-on parts!

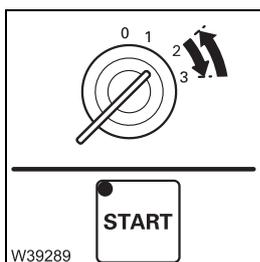
Always move the outrigger pads to the driving position before retracting the outrigger beams.

This prevents damage to the outrigger or add-on parts during retraction.



Risk of damage to the outrigger pads and rear bumper!

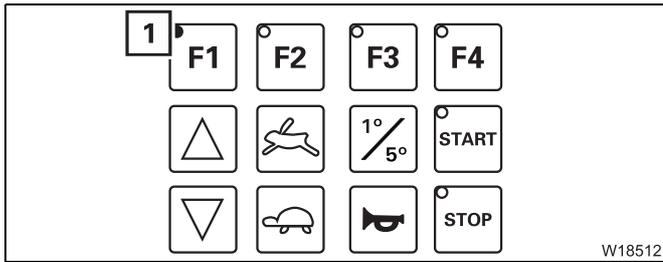
Always check the clearance of the outrigger pad before extending the real left outrigger. This prevents a collision between the outrigger pads and rear bumper.



Starting the engine

- Start the engine.
 - Either from the driver's cab; p. 4 - 13,
 - Or from the control units; p. 4 - 18.





Switching on the lights

Only the lamp (1) lights up after opening the door.

- Press any button.
The lights are switched on.

- Check that the pins are removed/inserted as specified in the prerequisites for the desired outrigger span; p. 12 - 39.

Depending on the equipment, operating elements are provided for moving the outrigger beams

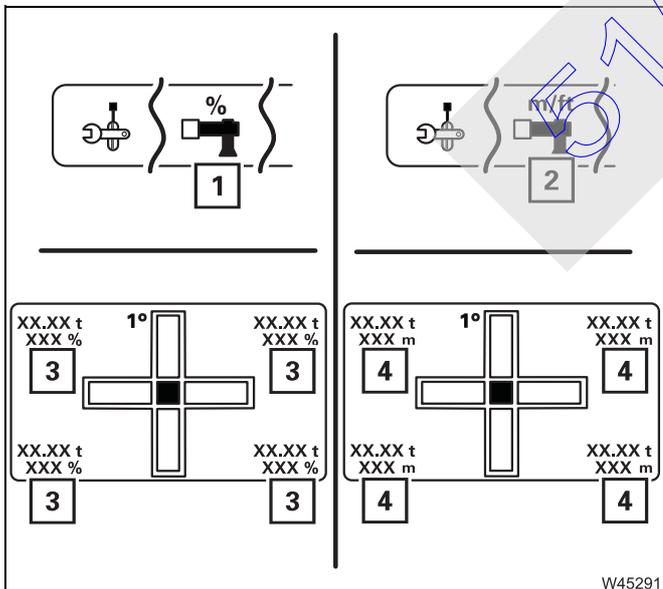
- At the *Outrigger* control units; p. 12 - 46,
- In the crane cab; p. 12 - 46.

At the control units

Operation must be switched over to the *Outrigger* control units; *Switching over outrigger operation*, p. 12 - 37.

Switching over the outrigger span display

You can have the outrigger span displayed in metres/feet or in percent. It is switched over in the driver's cab.



Switching over to metres/feet

- Select and confirm the symbol (1) – symbol (2) is displayed.
The outrigger span (4) is displayed in metres or in feet – depending on the current setting in the crane cab; p. 11 - 130.

Switching over to percent

- Select and confirm the symbol (2) – symbol (1) is displayed.
The outrigger span (3) is displayed in percent (%).



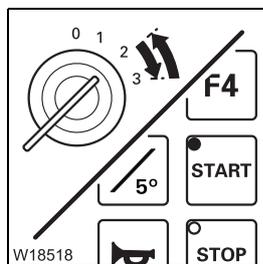
Some percentage values deviate from the percentage data in the *Lifting capacity table*. The table provides an overview.

Length specifications		Percentages	
Overall widths	Individual widths	Control unit	Lifting capacity table
7.600 m (25.0 ft)	3.800 m (12.5 ft)	100%	100%
6.700 m (22.0 ft)	3.350 m (11.0 ft)	81%	83%
5.900 m (19.4 ft)	2.950 m (9.7 ft)	63%	66%
5.100 m (16.8 ft)	2.550 m (8.4 ft)	31%	50%
2.500 m (8.2 ft)	1.250 m (4.1 ft)	0%	0%

Moving the outrigger beams

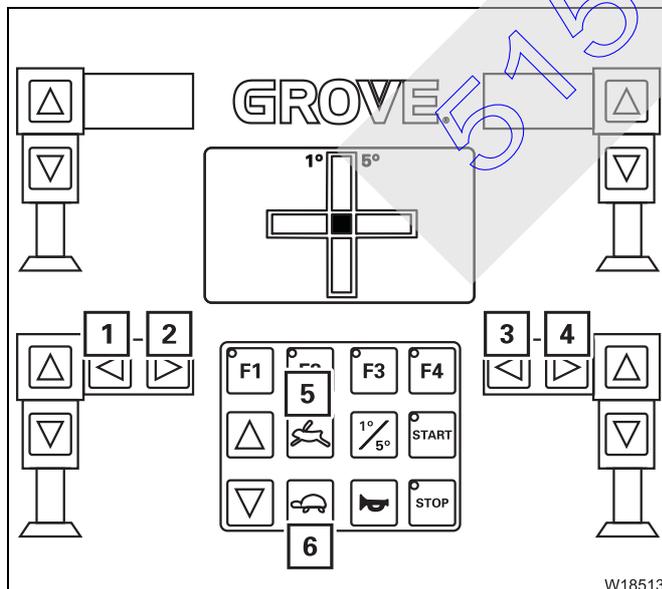


You can only move the outrigger beams to the left and right of the control unit on the operator's side.



Starting the engine

- Start the engine.
 - ▶▶▶▶ Starting the engine from the driver's cab, p. 4 - 3
 - ▶▶▶▶ Starting the engine – at the outrigger control units, p. 4 - 18
- Observe the safety instructions for operating the outrigger beams;
 - ▶▶▶▶ p. 12 - 43



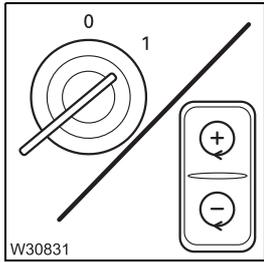
- Press the button
 - 5** for high-speed mode
 - 6** for normal speed.
- Additionally press the button for the desired outrigger beam.
 - 1** Extend left
 - 2** Retract left
 - 3** Retract right
 - 4** Extend right
 - 1 + 4** Extend both
 - 2 + 3** Retract both

The outrigger beams move until you let go of the respective button or until the respective end position is reached.



From the crane cab

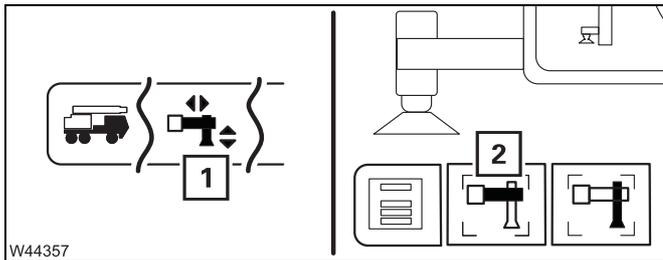
Operation must be switched over to the crane cab;
 ■■■► *Switching over outrigger operation*, p. 12 - 37.



Starting the engine

The parking brake is applied.

- Start the engine from the crane cab; ■■■► p. 10 - 4.
- Switch off the slewing gear; ■■■► p. 11 - 122.

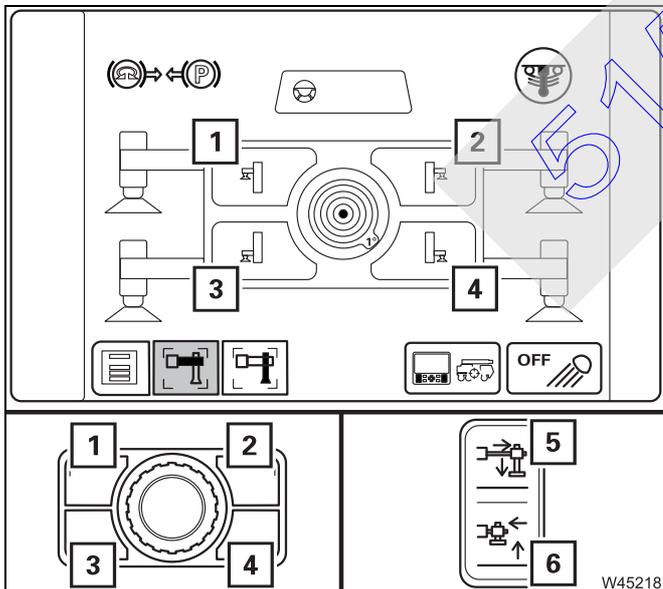


Opening the menu

- Open the menu (1) – Outrigger menu.
- If necessary, open the menu (2) – Outrigger beam menu.

Moving the outrigger beams

- Observe the safety instructions for operating the outrigger beams; ■■■► p. 12 - 43



- Press the button for the desired outrigger beam.

- 1 Front left
- 2 Front right
- 3 Rear left
- 4 Rear right

– Extend

- Press the switch next to symbol (5).

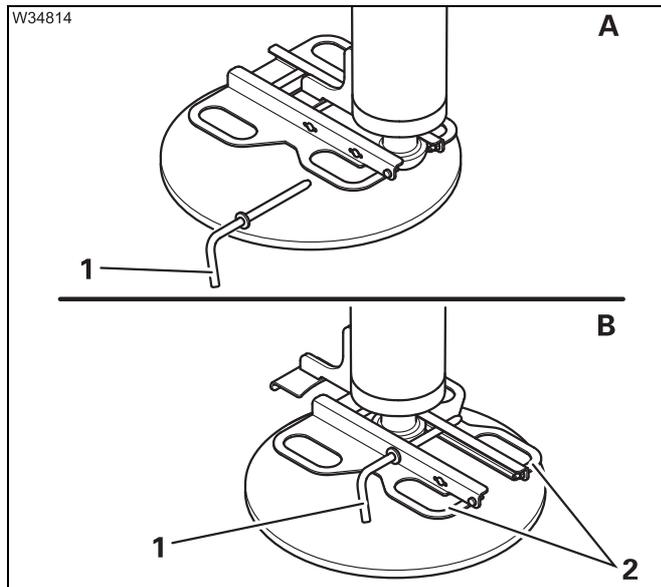
– Retract

- Press the switch next to symbol (6).

The outrigger beam move until you let go of the respective button or until the respective end position is reached.

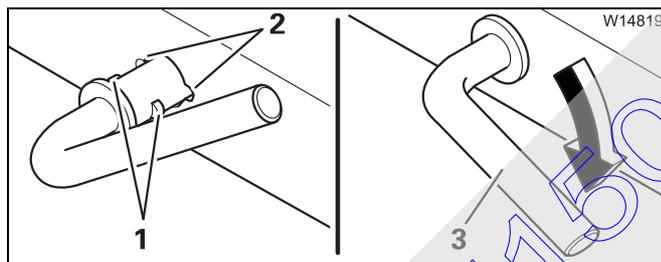
12.6.6

Moving the outrigger pads into operating/driving position



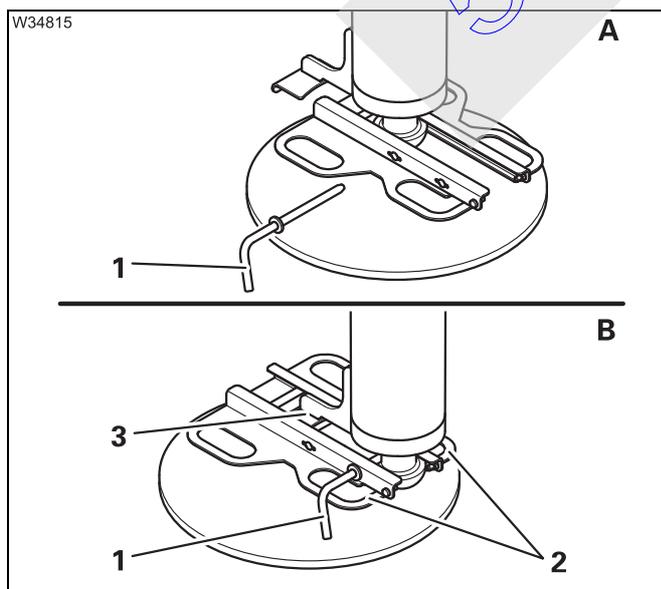
Moving them into operating position

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



Securing the pins

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



Moving into the driving position

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

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12.6.7

Enlarging the load-bearing area

If the area of the outrigger pads is too small, you must enlarge the load-bearing area by packing the outrigger pads;  *Determining the required load-bearing area*, p. 12 - 11.

For packing, only use 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 accidents if the packing is insufficient!

Only use materials of sufficient strength.

This prevents the packing giving way, causing the truck crane to tilt and overturn.



Danger of overturning if the packing or truck crane is at an angle!

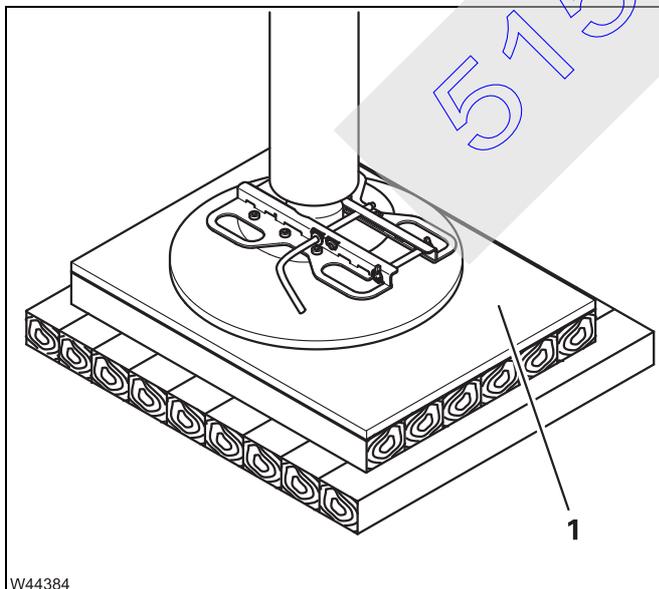
Level the packing and the truck crane.

This prevents the outrigger pads slipping off the inclined packing, causing the truck crane to overturn.



Risk of damage to the outrigger pads!

Always place a steel plate of sufficient strength as the topmost layer of the packing if the truck crane is equipped with plastic outrigger pads. This prevents the outrigger pads being damaged due to one-sided pressure.



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Level the packing; the outrigger pad must not be at an angle.

Make sure 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.



If the truck crane is equipped with plastic outrigger pads then the topmost layer of the packing must always be a steel plate (1) of sufficient strength.

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12.6.8

Extending/retracting supporting cylinders



Danger of overturning due to insufficient load bearing capacity of the ground!

Enlarge the load-bearing area if the ground cannot bear the resulting outrigger pressure.

This prevents the ground under the outrigger pad giving way, causing the truck crane to tilt and overturn.



Risk of accidents if the supporting cylinders are out of sight!

Nobody is allowed to be in the area of the supporting cylinders.

Observe the moving supporting cylinders or have them observed by a banksman who is in visual contact with you.



Risk of damage to the supporting cylinders!

Move the outriggers as evenly as possible on all four support points. This prevents the supporting cylinders being 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 prevents the tyres being punctured or damaged when the truck crane is lowered.



Risk of damage to the suspension struts

Do not switch on the suspension if the truck crane is on outriggers and the axle lines are raised.

The suspension struts on the axle lines spring out abruptly and could get seriously damaged.

Only ever switch on the suspension if the truck crane is on its wheels.



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

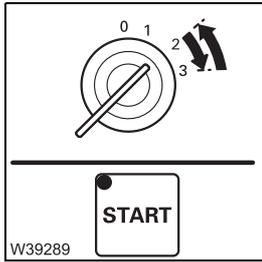
There are various operating elements for moving the outrigger beams

- At the *Outrigger* control units; ■■■► p. 12 - 52,
- In the crane cab; ■■■► p. 12 - 53.



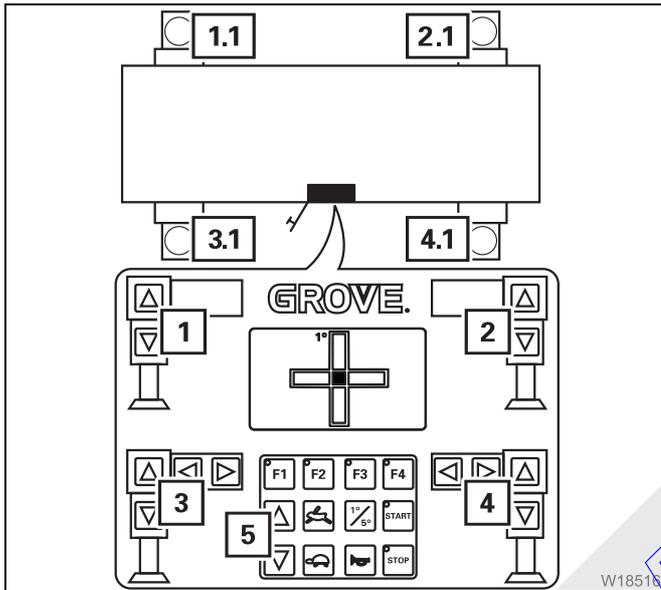
At the control units

Operation must be switched over to the *Outrigger* control units;
 ■■■► *Switching over outrigger operation*, p. 12 - 37.



Starting the engine

- Start the engine.
 - Either from the driver's cab; ■■■► p. 4 - 13,
 - Or from the control units; ■■■► p. 4 - 18.

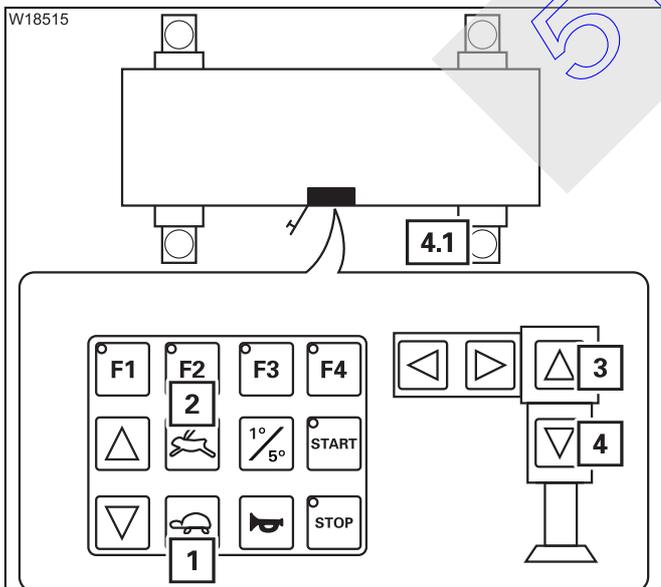


Moving the supporting cylinders

- Observe the safety instructions for operating the supporting cylinders; ■■■► p. 12 - 51.

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)



Operation is the same for all supporting cylinders.

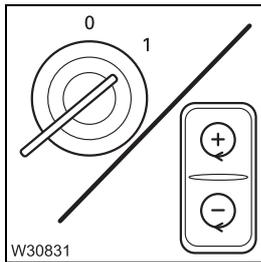
- Press the button
 - 1 for normal speed or
 - 2 for high-speed mode.
- Also press the button for the desired supporting cylinder, e.g. for 4.1.
 - 3 for retracting
 - 4 for extending

You can also operate several supporting cylinders at the same time.

The supporting cylinders move until you let go of the respective button or until the respective end position is reached.

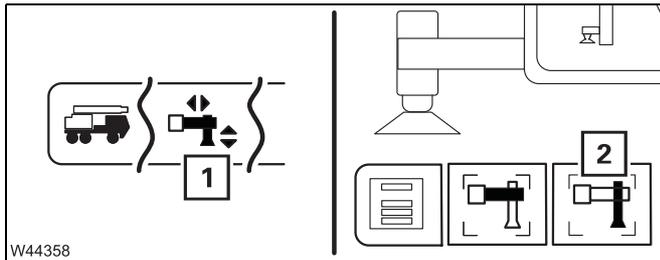
From the crane cab

The following operating elements are to be found in the *Outrigger* menu.



Starting the engine

- Start the engine from the crane cab; p. 10 - 4.
- Switch off the slewing gear.



Opening the menu

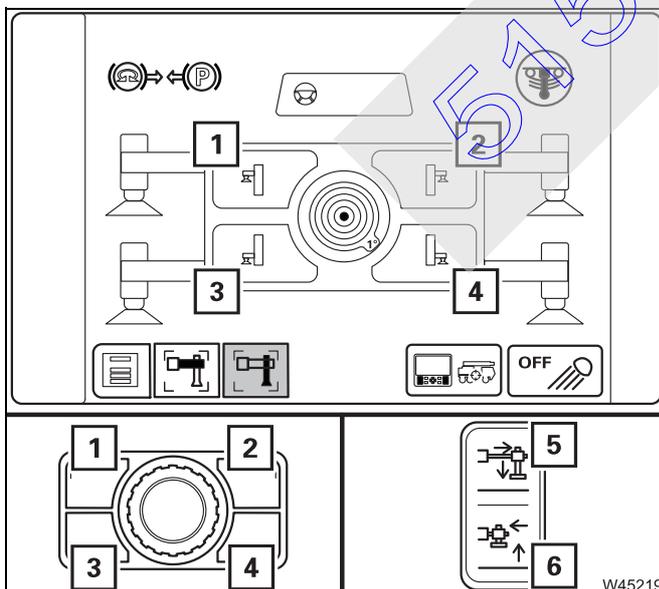
- Open the menu (1) – Outrigger menu.
- Open the menu (2) – Outrigger cylinders menu.

Moving the supporting cylinders

- Observe the safety instructions for operating the supporting cylinders; p. 12 - 51.

Operation must be switched over to the crane cab;

Switching over outrigger operation, p. 12 - 37.



- Press the button for the desired supporting cylinder.

- 1 Front left
- 2 Front right
- 3 Rear left
- 4 Rear right

– Extend

- Press the switch next to symbol (5).

– Retract

- Press the switch next to symbol (6).

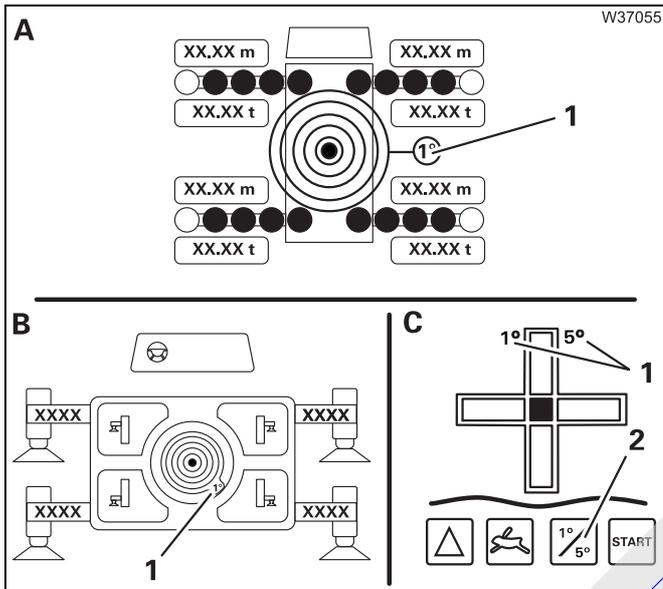
The outrigger beam is moved until you let go of the respective button or until the respective end position is reached.

12.6.9 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 show the current alignment.



A In the *Monitoring* menu

B In the *Outrigger* menu

C On the *Outrigger* control units

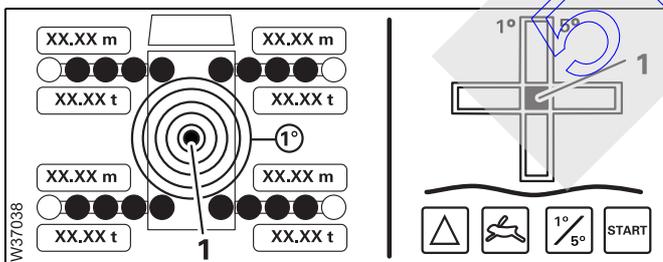
Switching over the measuring range

You can change the measuring range between 1° and 5°.

- Press the button (2) once.

The current measuring range (1) is displayed.

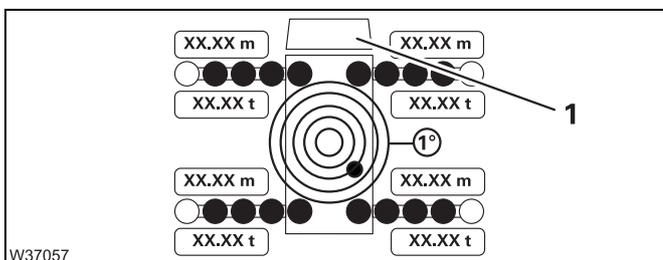
The measuring range is automatically switched over in the *Outrigger* menu and the *Monitoring* menu.



Reading the display

Only the lamp (1) in the centre is on if the truck crane is level.

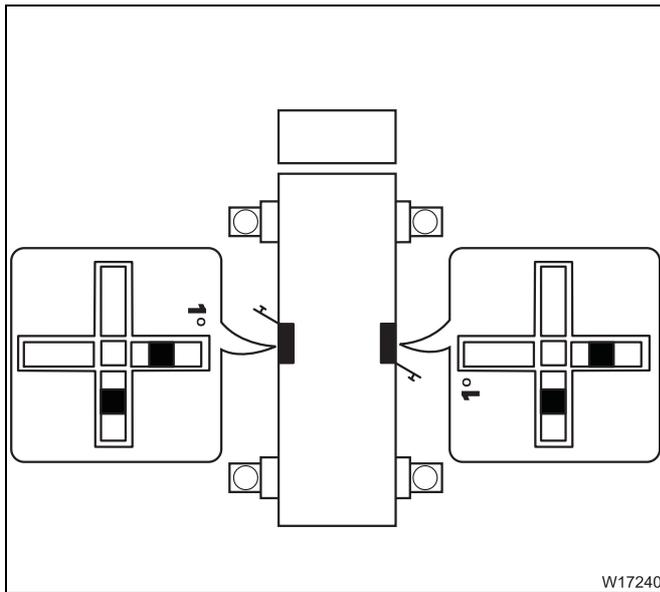
The other lamps show the sides of the truck crane that are higher.



– RCL / CCS display

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

In this example, the carrier would be standing higher at the rear right.



– *Outrigger* control units

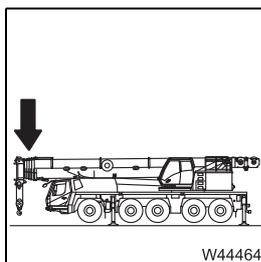
The assignment to the carrier corresponds to the top view.

Due to the position of the control units, the displays on both sides differ.

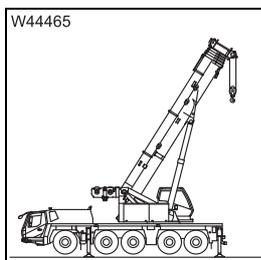
In this example, the carrier would be standing higher at the rear right.

Prerequisites

The following prerequisites apply to manual and automatic alignment.



The main boom is resting in the boom rest.



Or

- The main boom is raised **and**
- The load has been set down **and**
- The superstructure is in the 0° or 180° position.



Risk of overloading the main boom!

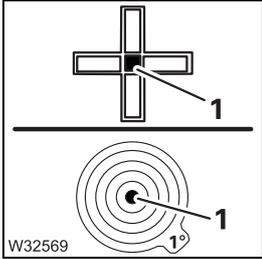
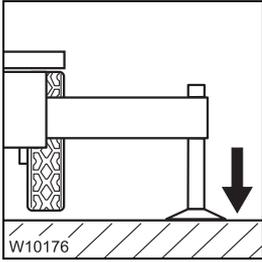
Always slew the superstructure to the 0° or 180° position and set down the load before levelling the truck crane.

In other positions, deformation of the carrier will distort the indicated inclination and the truck crane will be at an angle. This could cause the boom to become overloaded during crane operation.



Manual alignment

- Check that the prerequisites are met;  p. 12 - 55.
- Extend all supporting cylinders until none of the wheels is touching the ground.



- Level the truck crane with the outriggers until only lamp (1) lights up in the measuring range 1°;  p. 12 - 51.
- 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 accidents 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 permitted by the RCL.

- After you have levelled the truck crane, check:
 - that all wheels are lifted off the ground.
 - that the ground has not given way under any of the outrigger pads.
 - that the packing is correct for the enlarged load-bearing area.

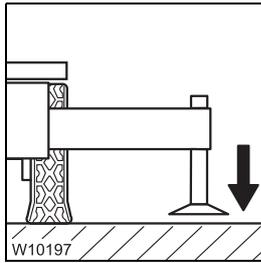
If slewing is permitted in the current rigging mode:

- Slew the superstructure within the permissible slewing range.
- Perform the specified checks again.
- Check the horizontal alignment at the inclination indicator.

Automatic alignment

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

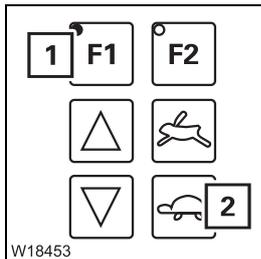
- Check that the prerequisites are met;  p. 12 - 55.



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

Starting the procedure

Depending on the equipment, you can start the procedure using the hand-held control and at the *Outrigger* control units.

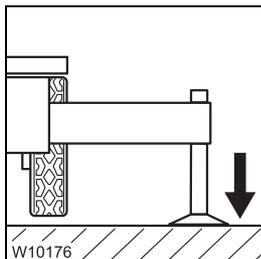


At the control units

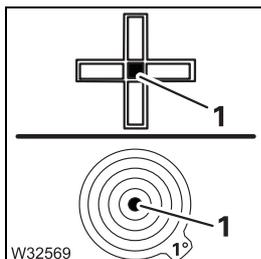
- Press the button (1).
- Additionally, press the button (2).

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 are extended simultaneously so that none of the wheels is touching the ground any more.



3. The truck crane is automatically levelled.

This procedure is performed:

- until horizontal alignment is established, 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. a supporting cylinder is extended up to the stop.



Danger of overturning if the truck crane is not level!

When CCS ends the automatic alignment procedure, the truck crane must not necessarily be level.

Always check the horizontal alignment at the inclination indicator after automatic levelling.

12.6.10 Levelling the free-on-wheels truck crane



This section describes levelling with the outrigger. You can also level the truck crane using the axle raising option; see p. 12 - 60.

The suspension is switched off (locked) if the truck crane is in the *Free on wheels* operating position.

The suspension must remain switched off until the truck crane is on outriggers.

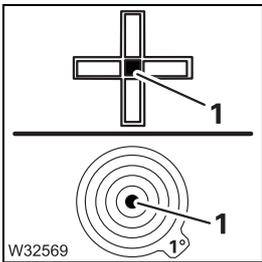
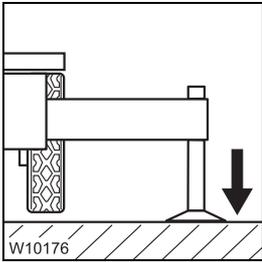


Danger of overturning if the supporting cylinders are operated unevenly!

Extend or retract the supporting cylinders as evenly as possible!

This prevents the truck crane overturning while retracting individual supporting cylinders.

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



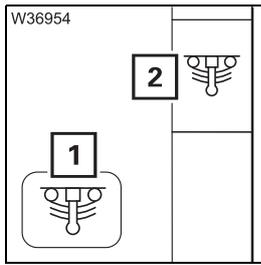
Levelling the truck crane

- Level the truck crane with the outriggers until only lamp (1) lights up in the measuring range 1°.



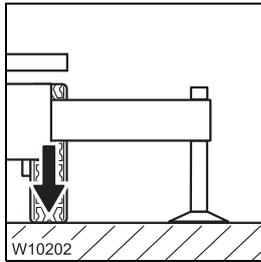
Danger of overturning when switching on the suspension!

You may under no circumstances switch on the suspension as long as the rigged truck crane is on wheels. Switching on the suspension would cause the suspension struts to suddenly collapse, be damaged and the truck crane could overturn.

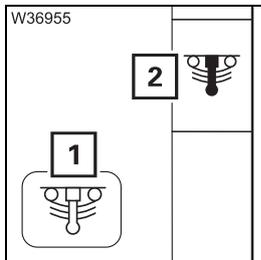


Switching on the suspension

- Select and confirm the symbol (1) once.
Symbol (2) is **green** if the suspension is switched on.

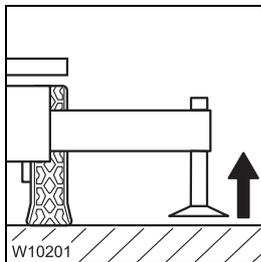


Now all wheels are lowered to the ground and are in the right position for horizontal alignment.



Switching off the suspension

- Select and confirm the symbol (1) once.
Symbol (2) is **red** when the suspension is switched off.



Securing 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.

12.6.11 Operating the axle raising system

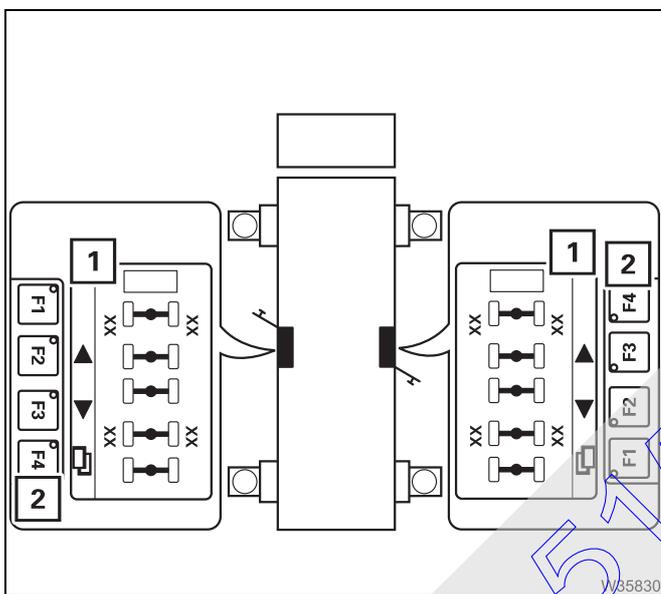
The axle raising system has two functions.

– Raising/lowering wheels

When the truck crane is supported on outriggers, you can raise the wheels (e.g. levelling horizontally) or lower the wheels (e.g. for driving with a rigged mobile crane).

– Aligning the truck crane

When driving with a rigged truck crane, you can level the free-standing truck crane – with a locked suspension, without first supporting the truck crane on outriggers.



Opening the menu

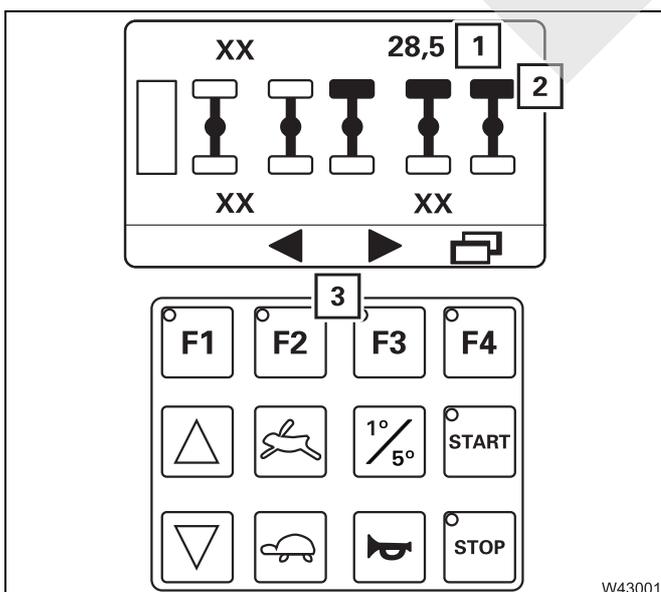
The *Raise axle* menu can only be opened when the suspension is switched off (locked);

▣▣▣▣ *Switching the suspension on/off*, p. 5 - 18.

- Press button (2) repeatedly until the *Raise Axle* menu (1) is displayed.

The assignment to the carrier corresponds to the top view.

Operation is same on both sides.

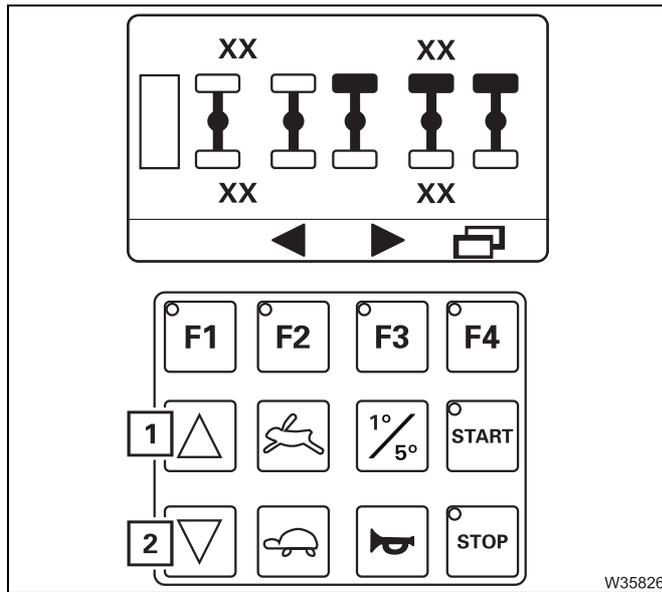


Only certain wheel groups can be selected;

▣▣▣▣ *Selectable wheel groups*, p. 9 - 115.

- Use the buttons (3) to select the required wheels – selected wheels (2) are shown in black.

Movements are only enabled when the wheel load per wheel does not exceed 9.5 t (21 klbs) – e.g. 28.5 t (63 klbs) on the display (1) for a pre-selected wheel group (2).



- Press the button for the desired movement.

Lifting/lowering wheels

- 1 Lifting wheels
- 2 Lowering wheels

Aligning the truck crane

- 1 Lowering the truck crane
- 2 Lifting the truck crane

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12.6.12 Outrigger pressure display



Especially with asymmetrical outrigger spans, the outrigger pressure displays do not provide useful information on correct alignment. Horizontal alignment is the decisive factor for correctly supporting the truck crane; p. 12 - 54.

After switching on the ignition, the outrigger pressure displays indicate the current outrigger pressure for all supporting cylinders. The value shown has an accuracy of $\pm 10\%$, therefore the value specified in the outrigger pressure table always determines the load on the ground.

The set unit (t or klbs) is shown next to the displays.



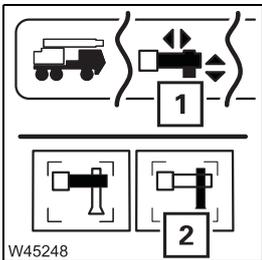
Outrigger cylinders retracted or extended as far as possible will lead to an incorrect outrigger pressure display.

The display will show an ideal reading if the movement performed last was *Extend supporting cylinders*.

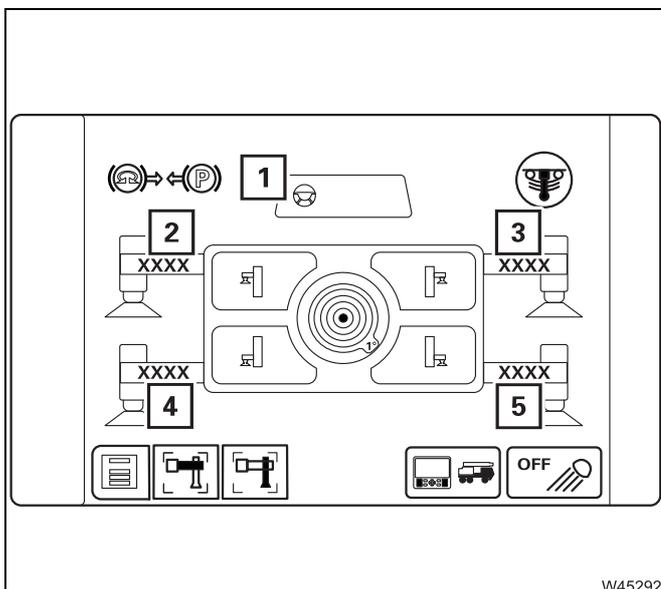


Risk of accidents when misused!

A displayed outrigger pressure over 0 t does not ensure protection against over-turning or overloading. For this reason, never override the RCL.

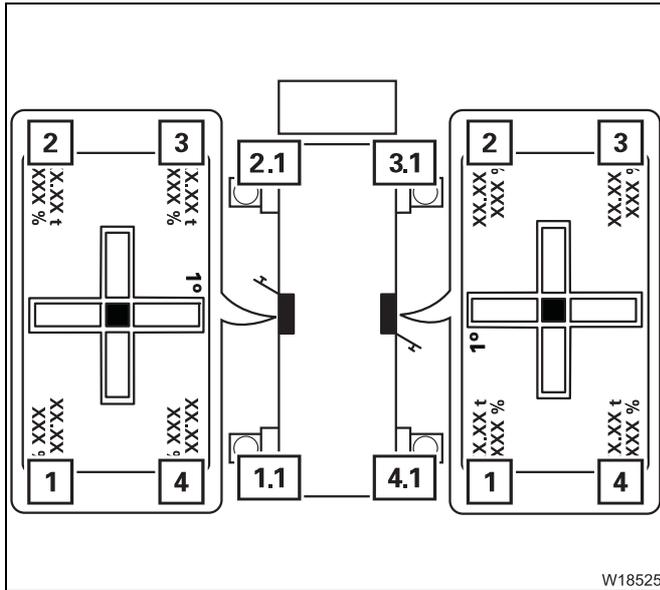


- Open the menu (1) – Outrigger menu.
- If necessary, open the menu (2) – Outrigger cylinders menu.



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

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



On the outrigger control units

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

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

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12.7

Rigging/unrigging the counterweight

For driving, parts of the counterweight must be set down on the counterweight platform, installed on the turntable or removed, depending on the driving mode;

▣▣▣▣▶ *Driving modes*, p. 6 - 1

12.7.1

Information on rigging

Rigging the counterweight is a challenging task. Only experienced and qualified personnel who are familiar with the valid accident prevention regulations are authorised to sling counterweight sections and instruct the crane operator.

When the engine is running for crane operation, the required rigging personnel may only climb on the truck crane when the slewing gear is switched off and the slewing gear brake is applied.

The crane operator and rigging personnel must maintain visual contact during the rigging process.

The rigging process for a single counterweight section is described. Proceed in the same manner when rigging the other counterweight sections and blocks.

When rigging

As the crane operator

- Lift the counterweight section on to the counterweight platform as described in section *Assembling counterweight combinations*.
- Now inform the rigging personnel that they can climb on the truck crane.

As the rigging personnel

- Do not climb on the truck crane until requested by the crane operator.
- Position the counterweight if necessary.



As the crane operator

- Only use the *Raise/lower hoist* or *Raise/lower derricking gear* movements for setting down the counterweight. Execute the movements as slowly as possible.

Notify the rigging personnel if the superstructure needs to be slewed for positioning the counterweight.

- Set down the counterweight section.

As the rigging personnel

- Remove the lifting gear and set down the ends so that the clearance is clearly visible to the crane operator.

- Leave the slewing range of the counterweight and the load.

As the crane operator

- Perform the *Raise hoist* movement at the lowest possible speed until the lifting gear is clear.

When unrigging

As the crane operator

- Lift the lifting gear over the counterweight section.
- Now inform the rigging personnel that they can climb on the truck crane.

As the rigging personnel

- Do not climb on the truck crane until requested by the crane operator.
- Attach the counterweight section at the provided slinging points.

As the crane operator

- Wind on the hoist rope until the lifting gear is tensioned – do not continue lifting the counterweight section.

As the rigging personnel

- Leave the slewing range of the counterweight and the load.

As the crane operator

- Lift the counterweight section off the counterweight platform.

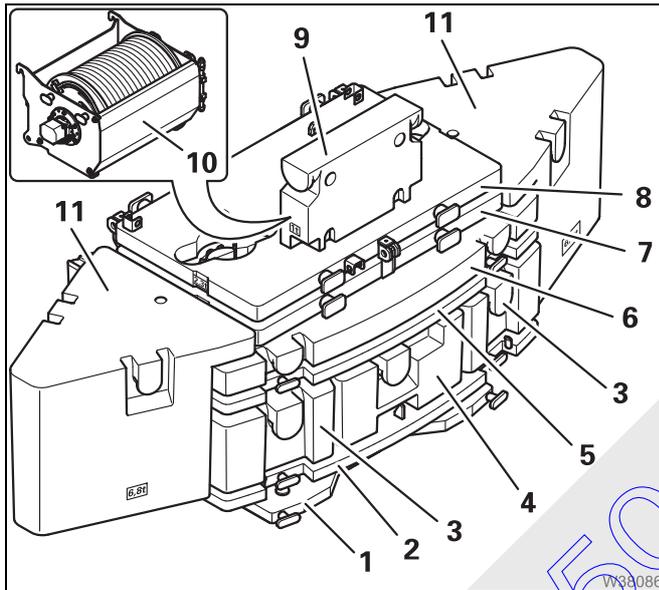
12.7.2 Counterweight sections

The GMK5150XL can be equipped with a counterweight mass of 1.0 t (2,200 lbs) to 44.5 (98,100 lbs).

There are various counterweight sections, depending on the truck crane's version and additional equipment.

Version 1

This version enables you to drive with maximum axle loads of 12 t (26,500 lbs).

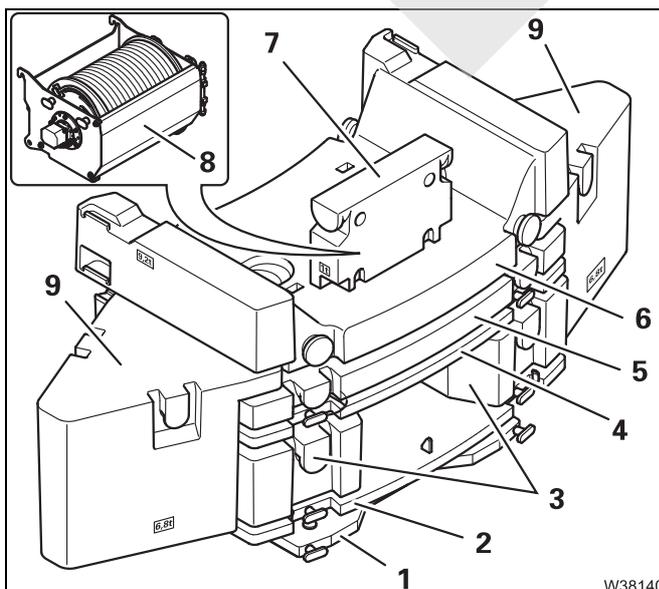


Counterweight

- One 2.3 t base plate (1),
- One 2.3 t plate (2),
- Two 4.6 t blocks (3),
- One 4.6 t block (4),
- One 2.3 t plate (5),
- One 4.6 t plate (6),
- One 2.3 t plate (7),
- One 2.3 t plate (8),
- One 1.0 t plate (9) or
The auxiliary hoist (10),
- Two 6.8 t blocks (11).

Version 2

With this version, a maximum counterweight of 24.0 t (52.900 lbs) can be transported with the truck crane. The axle loads are over 12 t (26,500 lbs).



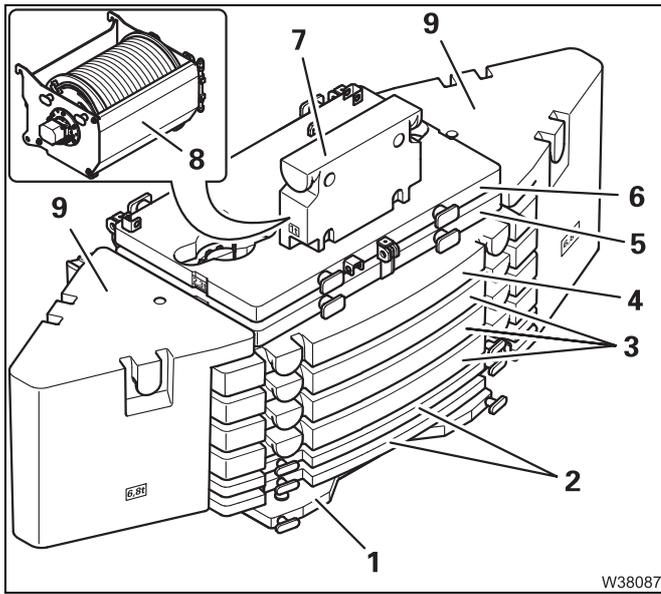
Counterweight

- One 2.3 t base plate (1),
- One 2.3 t plate (2),
- Two 4.6 t blocks (3),
- One 2.3 t plate (4),
- One 4.6 t plate (5),
- One 9.2 t plate (6),
- One 1.0 t plate (7) or
The auxiliary hoist (8),
- Two 6.8 t blocks (9).



Version 3

This version enables you to drive with maximum axle loads of 12 t (26,500 lbs).

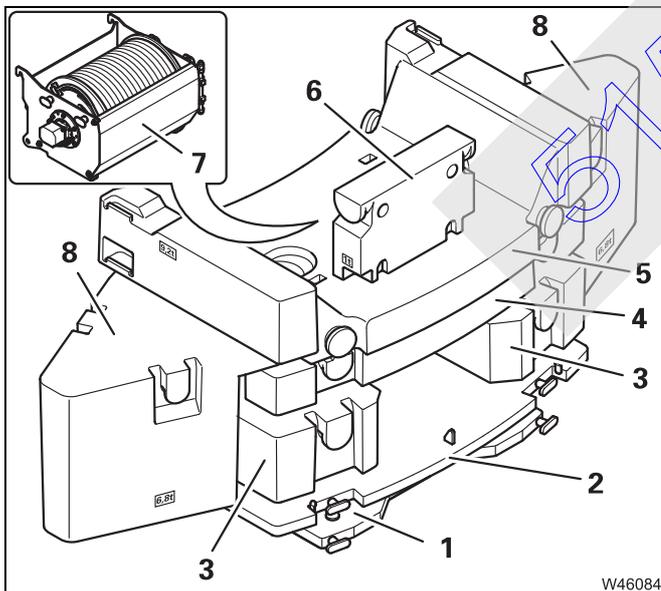


Counterweight

- One 2.3 t base plate (1),
- Two 2.3 t plates (2),
- Three 4.6 t plates (3),
- One 4.6 t plate (4),
- One 2.3 t plate (5),
- One 2.3 t plate (6),
- One 1.0 t plate (7) or
The auxiliary hoist (8),
- Two 6.8 t blocks (9).

Version 4

With this version, a maximum counterweight of 30.9 t (68,100 lbs) can be transported with the truck crane. The axle loads are over 12 t (26,500 lbs).



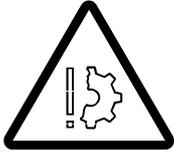
Counterweight

- One 2.3 t base plate (1),
- One 2.3 t plate (2),
- Two 4.6 t blocks (3),
- One 6.9 t plate (4),
- One 9.2 t plate (5),
- One 1.0 t plate (6) or
The auxiliary hoist (7),
- Two 6.8 t blocks (8).

12.7.3

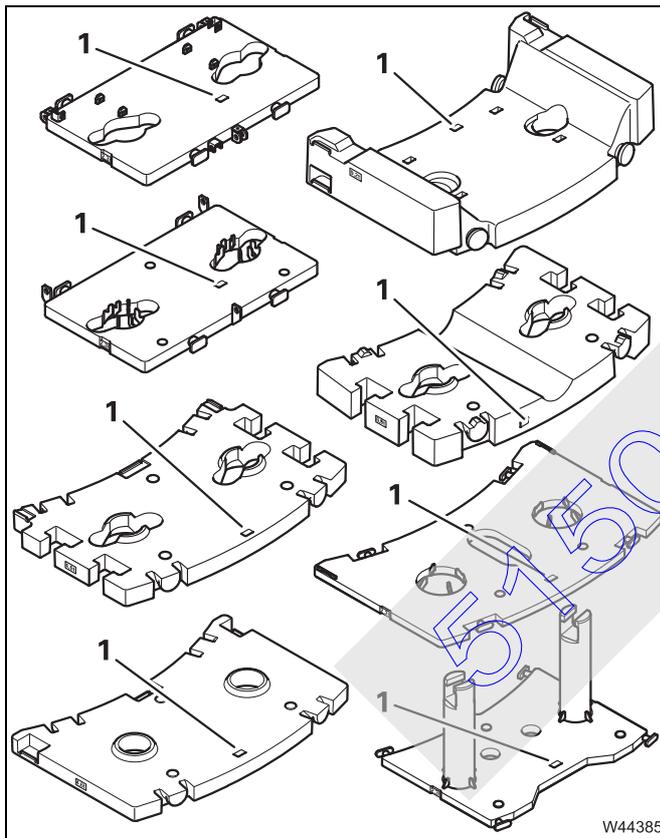
Identification

The truck crane and its corresponding counterweight sections are labelled with the same serial number.



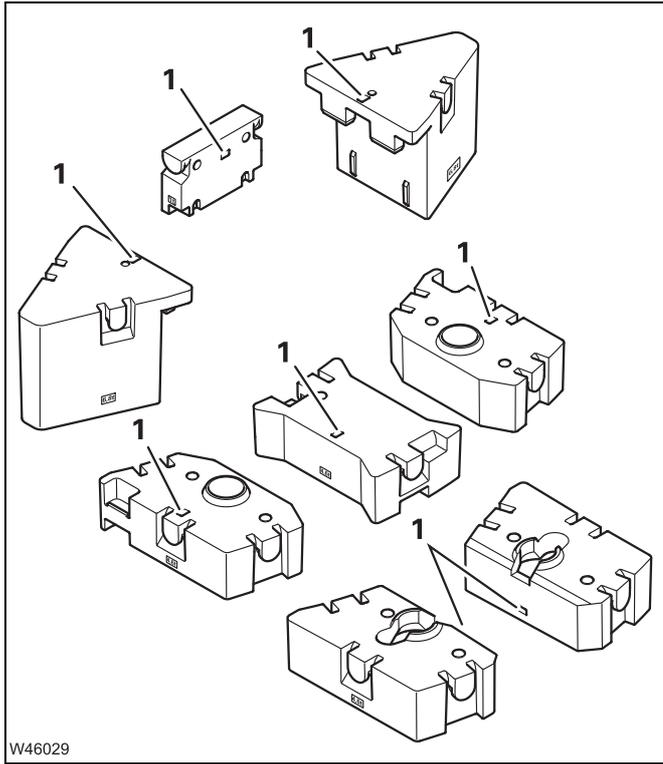
Danger if counterweight sections are confused!

Only use counterweight sections that belong to your truck crane. The truck crane and counterweight sections are labelled with the same serial number. Other or additional counterweight sections must not be rigged.



The counterweight sections are labelled with the serial number (1).





The counterweight blocks are labelled with the serial number (1).

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12.7.4

Slings points



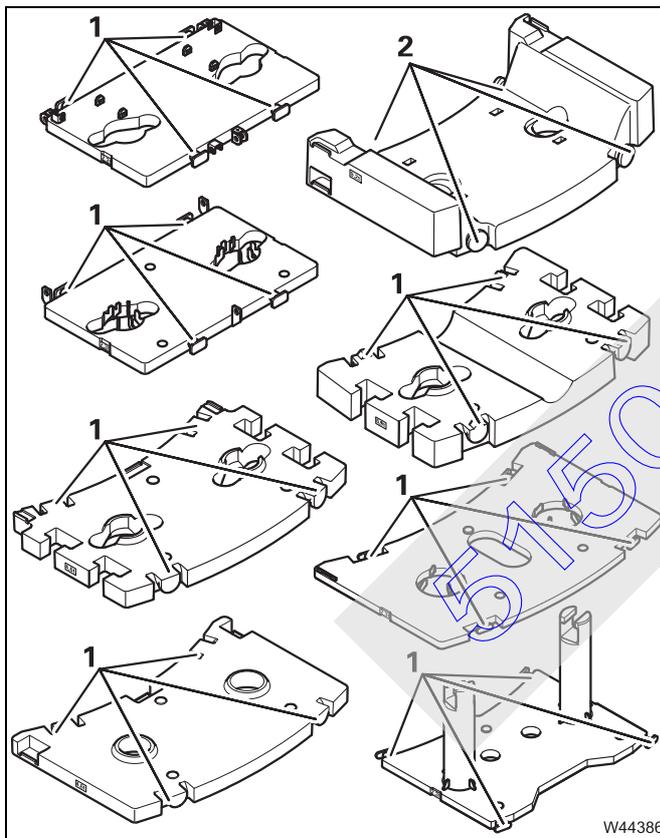
Risk of accidents if used improperly!

Attach the lifting gear to the various counterweight sections only at the appropriate slinging points and only use lifting gear of sufficient lifting capacity.

Lift a maximum of two stacked 4.6 t plates. The slinging points of the other plates are not designed for lifting stacked plates.

- Only use lifting gear of sufficient lifting capacity.

Weights; *Counterweight sections*, p. 1 - 13.



Plates

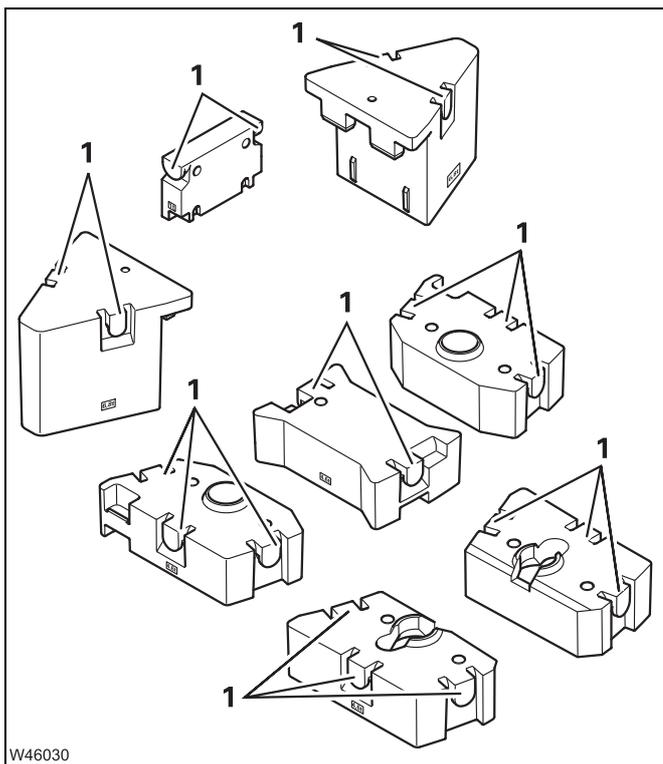
- Attach the counterweight sections at the slinging points (1).

The slinging points (2) are only designed for slinging for transport.

To install and remove the plate you require a suitable lifting gear, e.g. a forklift truck; *Removing/installing the counterweight on the turntable*, p. 12 - 111.



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Blocks

- Attach the blocks at the slinging points (1).

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12.7.5

CHECKLIST: Rigging the counterweight



This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.

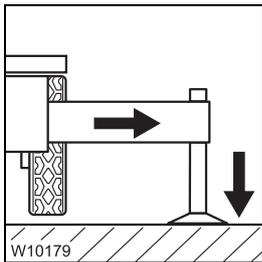
Observe the warnings and safety instructions given there!



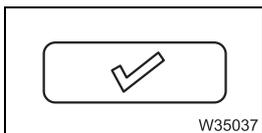
Danger of overturning when slewing with a rigged counterweight!

Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius).

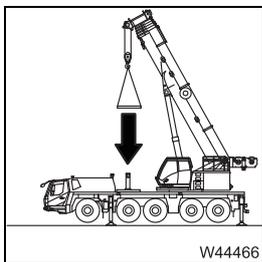
Correct the rigging mode if necessary; *Slewing with rigged counterweight*, p. 12 - 119.



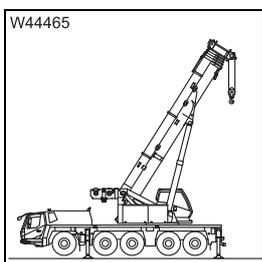
1. The truck crane is on outriggers with the outrigger span required for crane operation according to the *Lifting capacity table*. Released outrigger spans
 - for the *Standard* slewing range type; p. 12 - 24,
 - for the *MAXbase* slewing range type; p. 12 - 29.



2. Enter and confirm the current rigging mode; p. 11 - 32.

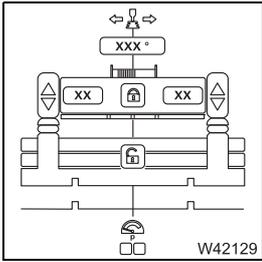


3. Assemble the required counterweight combinations:
 - Slinging points*, p. 12 - 71
 - Assembling counterweight combinations*, p. 12 - 77

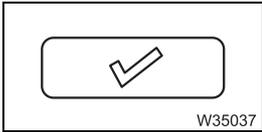


4. Slew the superstructure to the 0° to the rear position; p. 11 - 117.





5. – Open the *Counterweight* menu,
 - Correct the rigging mode, if necessary; ||||► p. 12 - 106,
 - Slew the superstructure into the rigging range and lift the counterweight in automatic mode on to the turntable and pre-tension it; ||||► p. 12 - 108.



6. Enter the current rigging mode with the newly rigged counterweight combination and confirm it; ||||► p. 11 - 32.

7. Only switch on the slewing gear if slewing is permitted for the current outrigger span; ||||► *Slewing with rigged counterweight*, p. 12 - 119.

12.7.6

CHECKLIST: Unrigging the counterweight



This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.

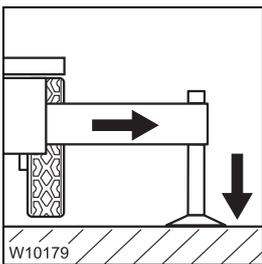
Observe the warnings and safety instructions specified there!



Danger of overturning when slewing with a rigged counterweight!

Before slewing with the rigged counterweight, check that slewing is permitted with the rigged outrigger span or with the truck crane free on wheels;

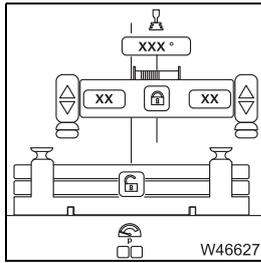
||||► *Slewing with rigged counterweight*, p. 12 - 119.



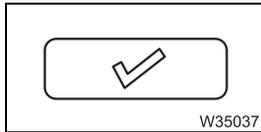
1. The truck crane is on outriggers with the outrigger span required for crane operation according to the *Lifting capacity table*. Enabled outrigger spans
 - for the *Standard* slewing range type; ||||► p. 12 - 24,
 - for the *MAXbase* slewing range type; ||||► p. 12 - 29.



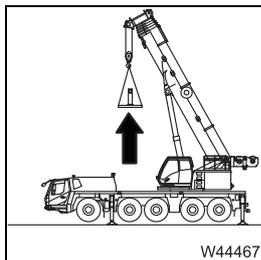
2. Slew the superstructure to the 0° to the rear position; ||||► p. 11 - 117.



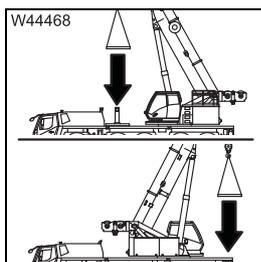
3. – Open the *Counterweight* menu;
 - Correct the rigging mode, if necessary; ||||▶ p. 12 - 106,
 - In automatic mode, lower the counterweight on to the counterweight platform; ||||▶ p. 12 - 108.



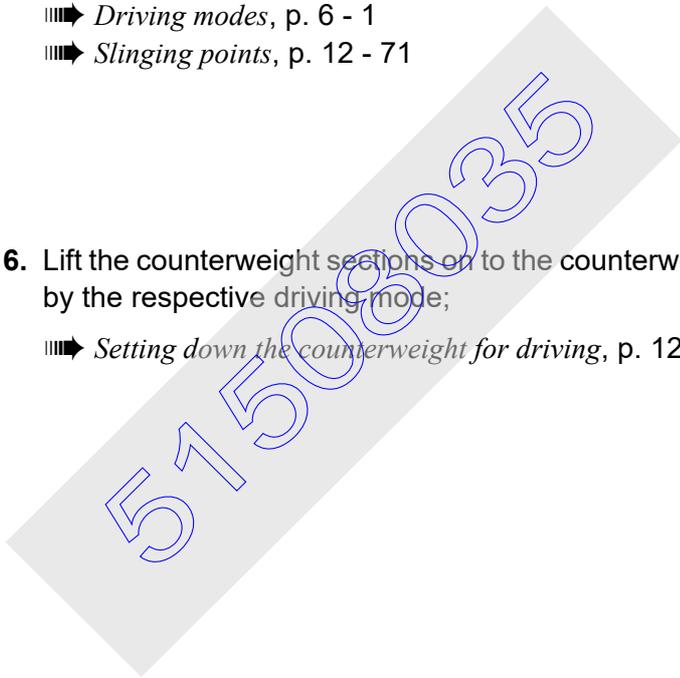
4. Enter the current rigging mode with the currently rigged counterweight combination and confirm it; ||||▶ p. 11 - 32.



5. Lift the counterweight sections off the counterweight platform, as required by the respective driving mode.
 - ||||▶ *Driving modes*, p. 6 - 1
 - ||||▶ *Slinging points*, p. 12 - 71



6. Lift the counterweight sections on to the counterweight platform, as required by the respective driving mode;
 - ||||▶ *Setting down the counterweight for driving*, p. 12 - 113.



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12.7.7

Assembling counterweight combinations



Danger of overturning when slewing with a rigged counterweight!

You may only slew the superstructure with a rigged counterweight if an outrigger span of sufficient size is rigged. You can find the required outrigger span in the table in the section entitled *Slewing with rigged counterweight*, p. 12 - 119 and support the truck crane accordingly before slewing the superstructure. This prevents the truck crane overturning when slewing.



Risk of accidents!

Combine the counterweights with each other only in the way prescribed in this chapter and in the *Lifting capacity table*. Other combinations are not permitted. If other combinations are assembled, the truck crane is no longer protected against overloading by the RCL.



Risk 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 that could be caught or crushed by the counterweight platform!



Risk of crushing when slewing the superstructure!

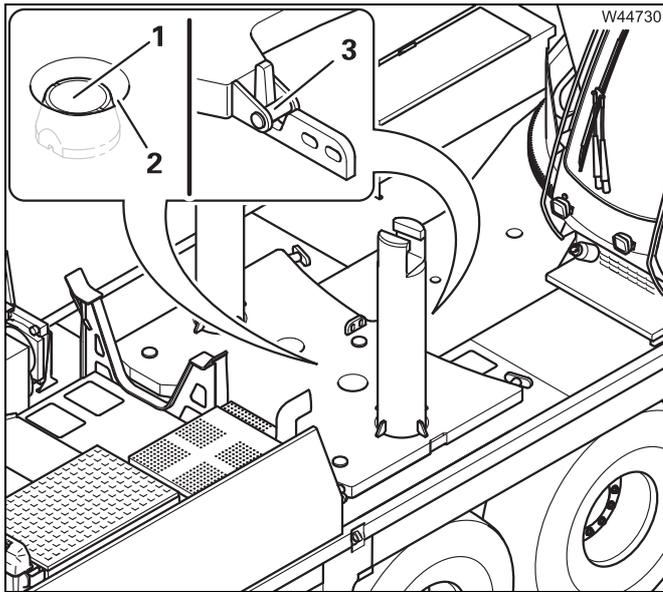
The ladders for climbing on the carrier are in the slewing range of the superstructure.
Make sure nobody uses the ladders (helpers for example) while you are lifting a plate on to the counterweight platform.



Risk of accidents due to falling counterweight sections!

Only attach the counterweight sections to the appropriate slinging points and only use lifting gear of sufficient lifting capacity.





Setting down the 2.3 t base plate

Only the 2.3 t base plate may be set down directly on the counterweight platform.

You can use the holder (3) to position the 2.3 t base plate in a central position on the carrier.

- Position the 2.3 t base plate in such a way that the holders (1) engage in the cutouts (2).

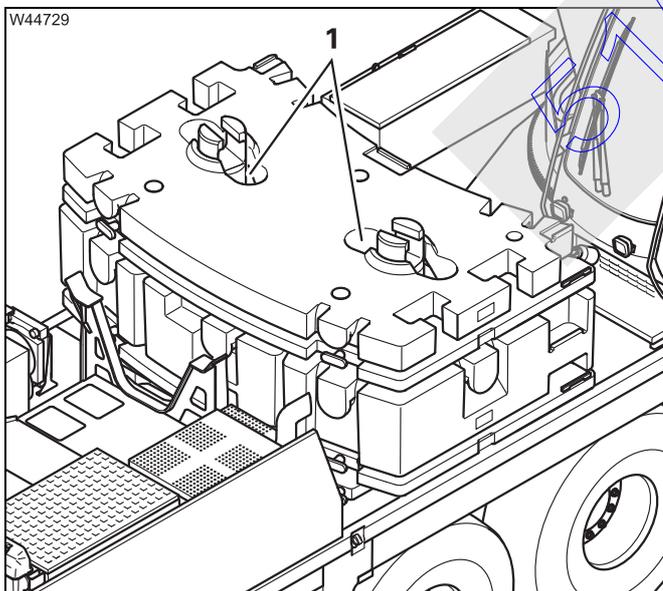
For larger counterweight combinations, now place further counterweight sections on the 2.3 t base plate.

Setting down the topmost counterweight section – for versions 1, 2 and 3



Risk of damage to the counterweight!

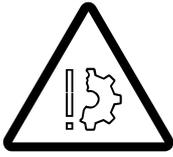
Always position the 4.6 t plate at the top. This prevents the lifting cylinders and counterweight being damaged while rigging.



Always place a plate with cutouts (1) as the uppermost counterweight section.

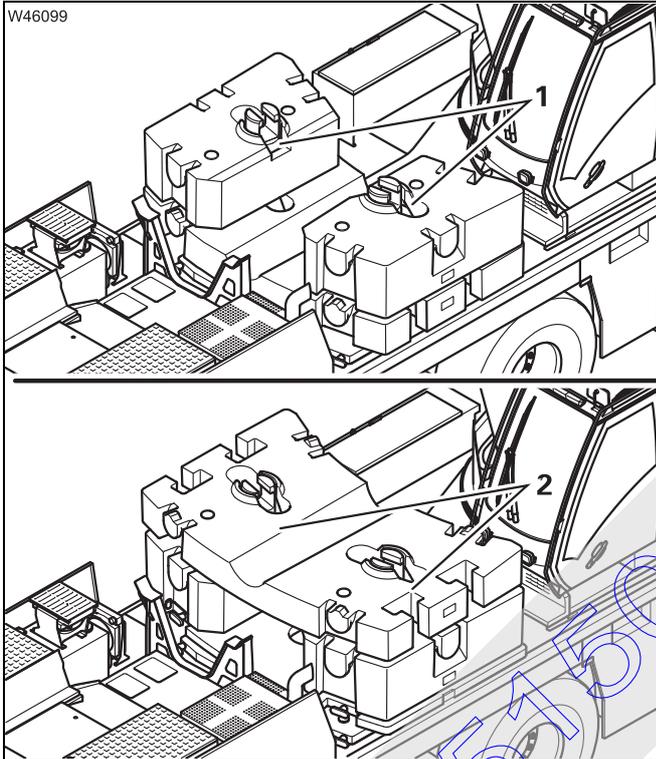
Only then can the lifting cylinder be rotated into the 2.3 t base plate.

Setting down the topmost counterweight section – for version 4



Risk of damage to the counterweight!

Depending on the counterweight combination, position the 6.8 t blocks or the 6.9 t plate at the top. This prevents the lifting cylinders and counterweight being damaged while rigging.



For version 4

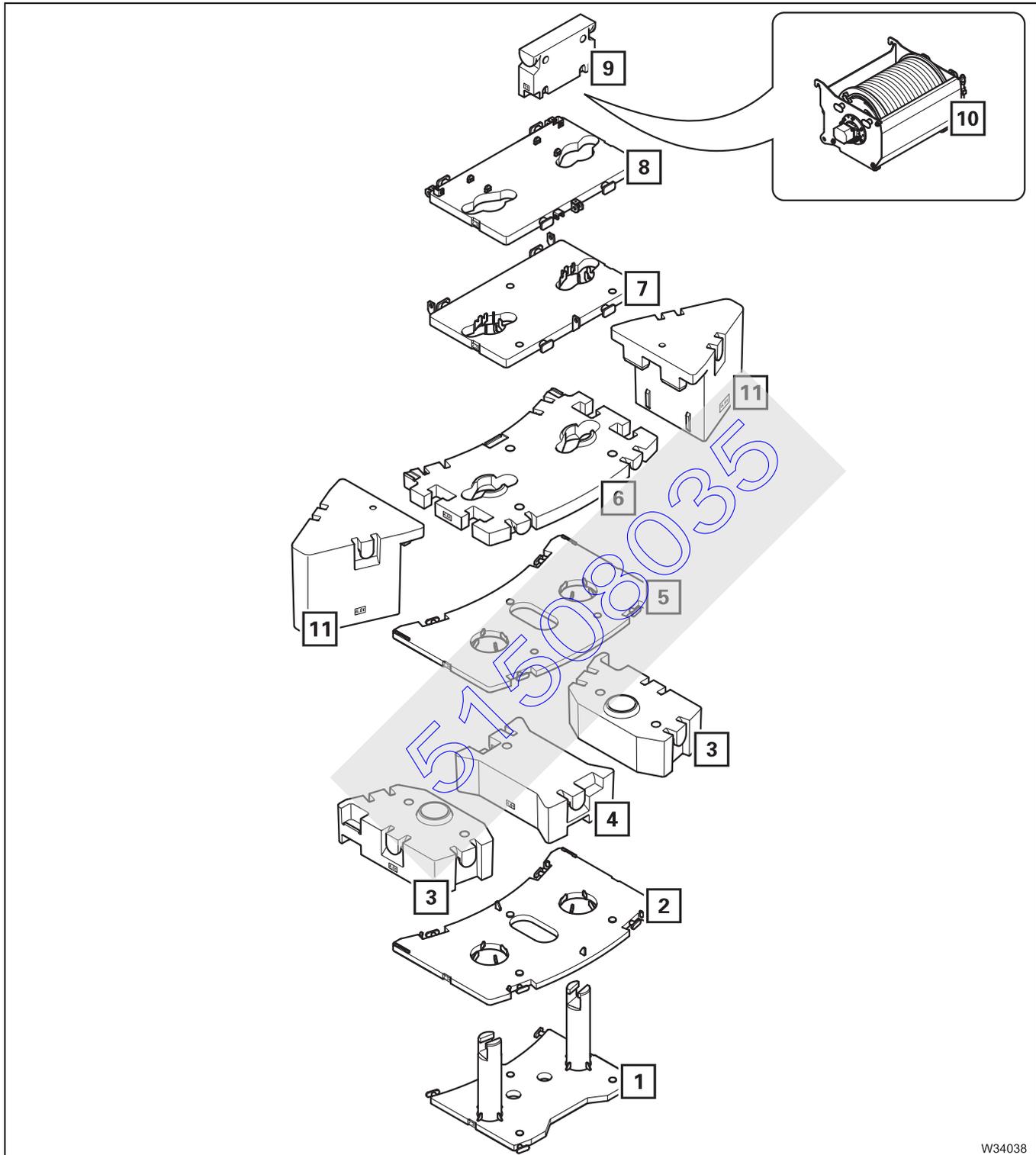
For counterweight combination **28.6 t (63,000 lbs)** position the 4.6 t blocks with the cutouts (1) at the top.

For counterweight combinations **30.9 t (68,100 lbs)** and **44.5 (98,100 lbs)** position the 6.9 t plate with the cutouts (2) at the top.



Version 1

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



- Lift the counterweight sections on to the base plate;
 ▣▣▣▣ *Slinging points*, p. 12 - 71.

Counterweight combination in t (lbs)	Counterweight sections in t (lbs)									
	2.3 (5,071)	2.3 (5,071)	4.6 (5,071)	4.6 (10,142)	2.3 (5,071)	4.6 (10,142)	2.3 (5,071)	2.3 (5,071)	1.0 (2,205)	6.8 (14,991)
	1	2	3 1)	4 1)	5	6	7	8	9 2)	2 x 11
1.0 (2.200)	-	-	-	-	-	-	-	-	●	-
3.3 (7.200)	●	-	-	-	-	-	-	-	●	-
	-	-	-	-	-	-	-	● ⁴⁾	●	-
5.6 (12.300)	●	●	-	-	-	-	-	-	●	-
	●	-	-	-	-	-	●	-	●	-
	●	-	-	-	-	-	-	●	●	-
	-	-	-	-	-	-	● ⁵⁾	● ⁴⁾	●	-
7.9 (17.400)	●	● ³⁾	-	-	●	-	-	-	●	-
	●	-	-	-	-	●	-	-	●	-
	●	●	-	-	-	-	-	● ⁴⁾	●	-
	●	-	-	-	●	-	● ³⁾	-	●	-
	●	-	-	-	●	-	-	● ⁷⁾	●	-
	●	-	-	-	-	-	● ⁶⁾	● ⁷⁾	●	-

1) Must always lie on 2

2) Or use 10

3) Must always lie on top

4) Must be installed on the turntable

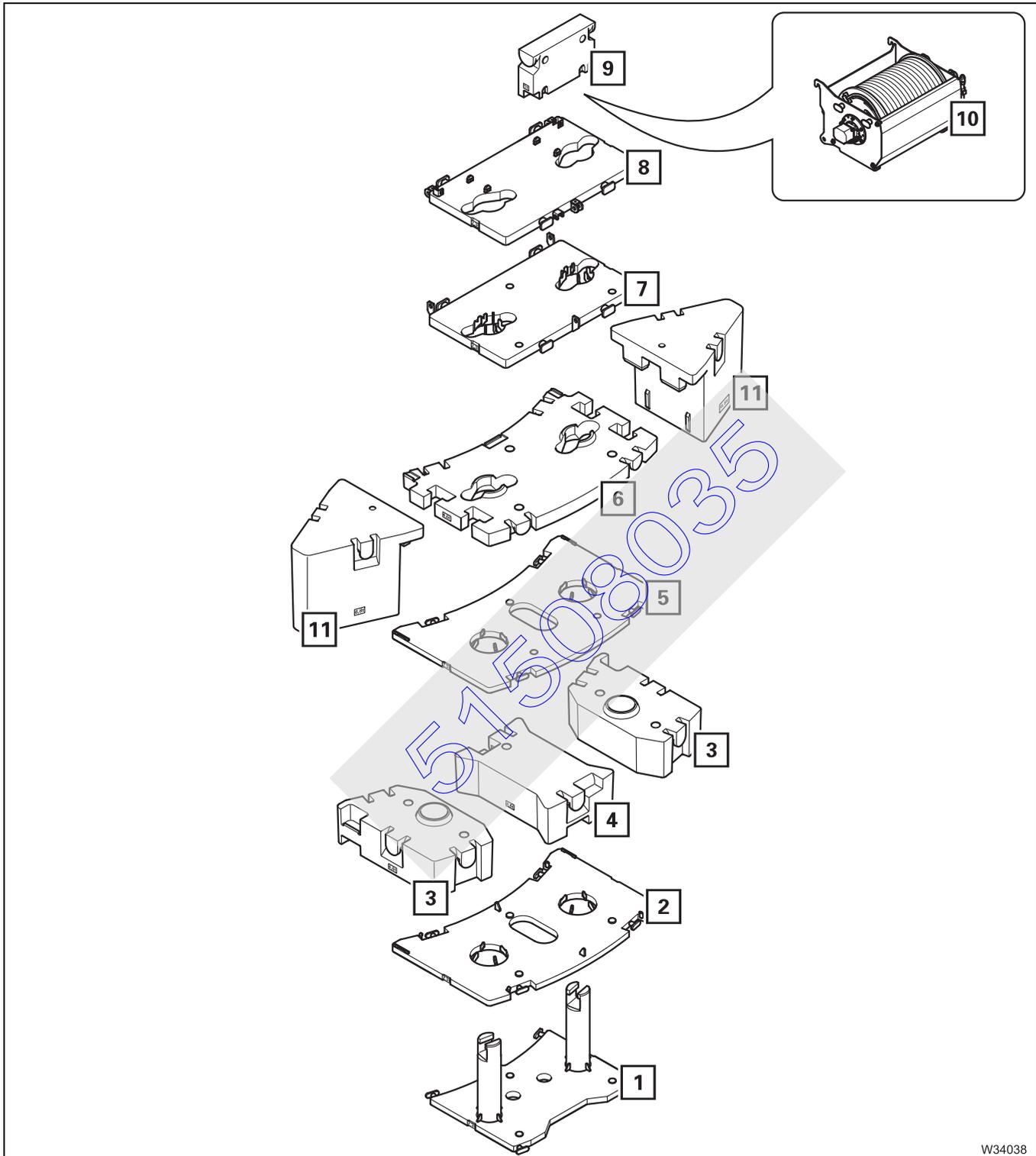
5) 7 Must be installed under 8

6) 7 Must lie on top, or lie under 8 or be installed under 8

7) 8 Must lie on top or be installed on the turntable



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



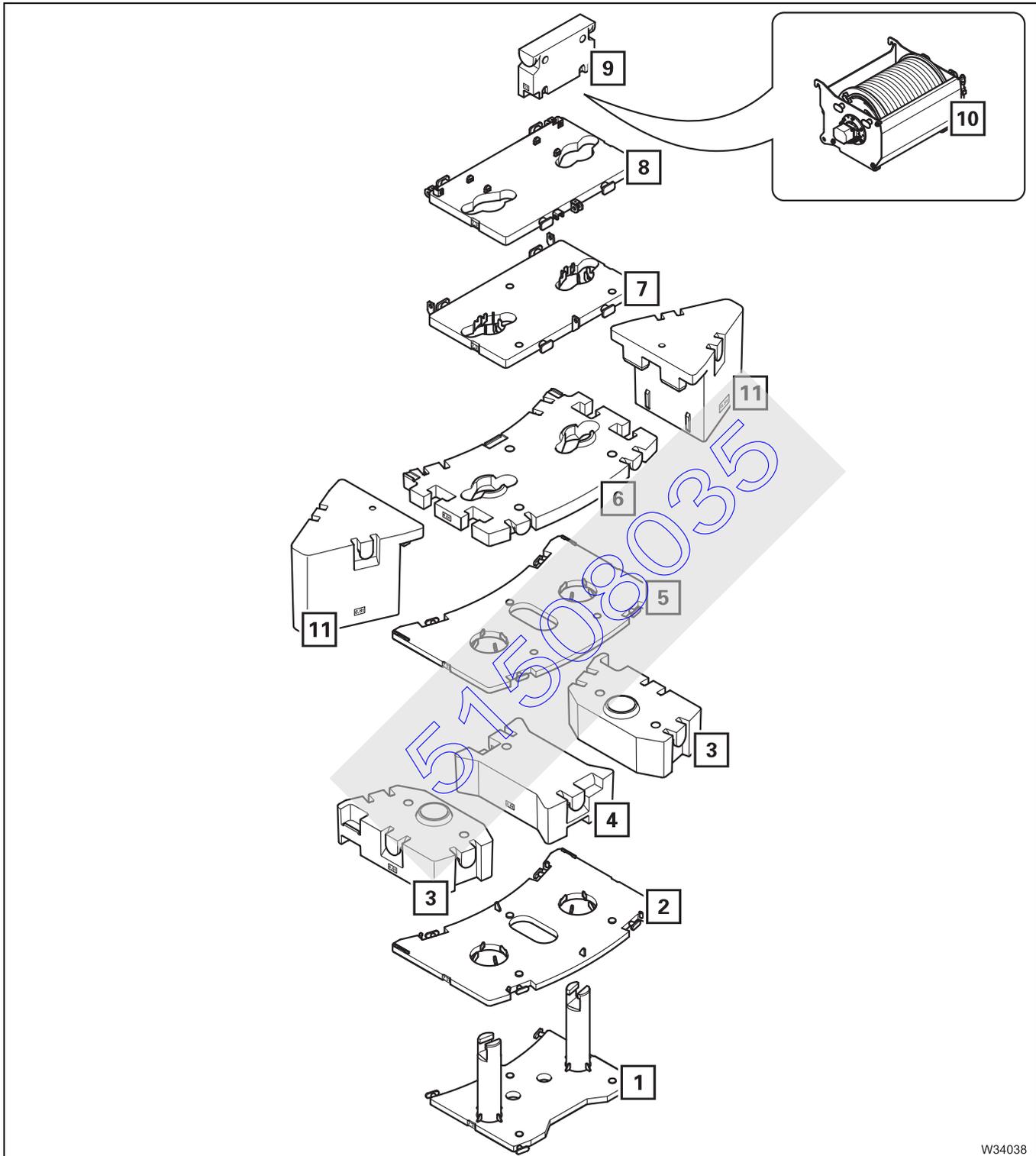
- Lift the counterweight sections on to the base plate;
 ▣▣▣▣▣ *Slings points*, p. 12 - 71.

Counterweight combination in t (lbs)	Counterweight sections in t (lbs)									
	2.3 (5,071) 1	2.3 (5,071) 2	4.6 (5,071) 3 1)	4.6 (10,142) 4 1)	2.3 (5,071) 5	4.6 (10,142) 6	2.3 (5,071) 7	2.3 (5,071) 8	1.0 (2,205) 9 2)	6.8 (14,991) 2 x 11
10.2 (22.400)	●	● ³⁾	-	-	-	●	-	-	●	-
	●	-	-	-	●	●	-	-	●	-
	●	● ³⁾	-	-	●	-	-	● ⁴⁾	●	-
	●	-	-	-	●	-	● ⁶⁾	● ⁷⁾	●	-
	●	●	-	-	-	-	● ⁵⁾	● ⁴⁾	●	-
12.5 (27.500)	●	● ³⁾	-	-	●	●	-	-	●	-
	●	● ³⁾	-	-	-	●	-	● ⁴⁾	●	-
	●	● ³⁾	-	-	●	●	● ⁵⁾	● ⁴⁾	●	-
14.8 (32.600)	●	●	2 x	-	-	-	-	-	●	-
	●	● ³⁾	-	-	●	●	-	● ⁴⁾	●	-
	●	● ³⁾	-	-	-	●	● ⁵⁾	● ⁴⁾	●	-
17.1 (37.600)	●	●	2 x	-	●	-	-	-	●	-
	●	●	2 x	-	-	-	● ³⁾	-	●	-
	●	●	2 x	-	-	-	-	● ⁷⁾	●	-
	●	● ³⁾	-	-	●	●	● ⁵⁾	● ⁴⁾	●	-

- 1) Must always lie on 2
- 2) Or use 10
- 3) Must always lie on top
- 4) Must be installed on the turntable
- 5) 7 Must be installed under 8
- 6) 7 Must lie on top, or lie under 8 or be installed under 8
- 7) 8 Must lie on top or be installed on the turntable



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



W34038

- Lift the counterweight sections on to the base plate;
 ▣▣▣▣▣ *Slings points*, p. 12 - 71.

Counterweight combination in t (lbs)	Counterweight sections in t (lbs)									
	2.3 (5,071)	2.3 (5,071)	4.6 (5,071)	4.6 (10,142)	2.3 (5,071)	4.6 (10,142)	2.3 (5,071)	2.3 (5,071)	1.0 (2,205)	6.8 (14,991)
	1	2	3 1)	4 1)	5	6	7	8	9 2)	2 x 11
19.4 (42,700)	●	●	2 x	●	-	-	-	-	●	-
	●	●	2 x	-	-	●	-	-	●	-
	●	●	2 x	-	●	-	● ³⁾	-	●	-
	●	●	2 x	-	●	-	-	● ⁷⁾	●	-
	●	●	2 x	-	-	-	● ⁶⁾	● ⁷⁾	●	-
21.7 t (47,800 lbs)	●	●	2 x	●	●	-	-	-	●	-
	●	●	2 x	-	●	●	-	-	●	-
	●	●	2 x	●	-	-	● ³⁾	-	●	-
	●	●	2 x	-	-	●	● ³⁾	-	●	-
	●	●	2 x	●	-	-	-	● ⁷⁾	●	-
	●	●	2 x	-	-	●	-	● ⁷⁾	●	-
	●	●	2 x	-	●	-	● ⁶⁾	● ⁷⁾	●	-

1) Must always lie on 2

2) Or use 10

3) Must always lie on top

4) Must be installed on the turntable

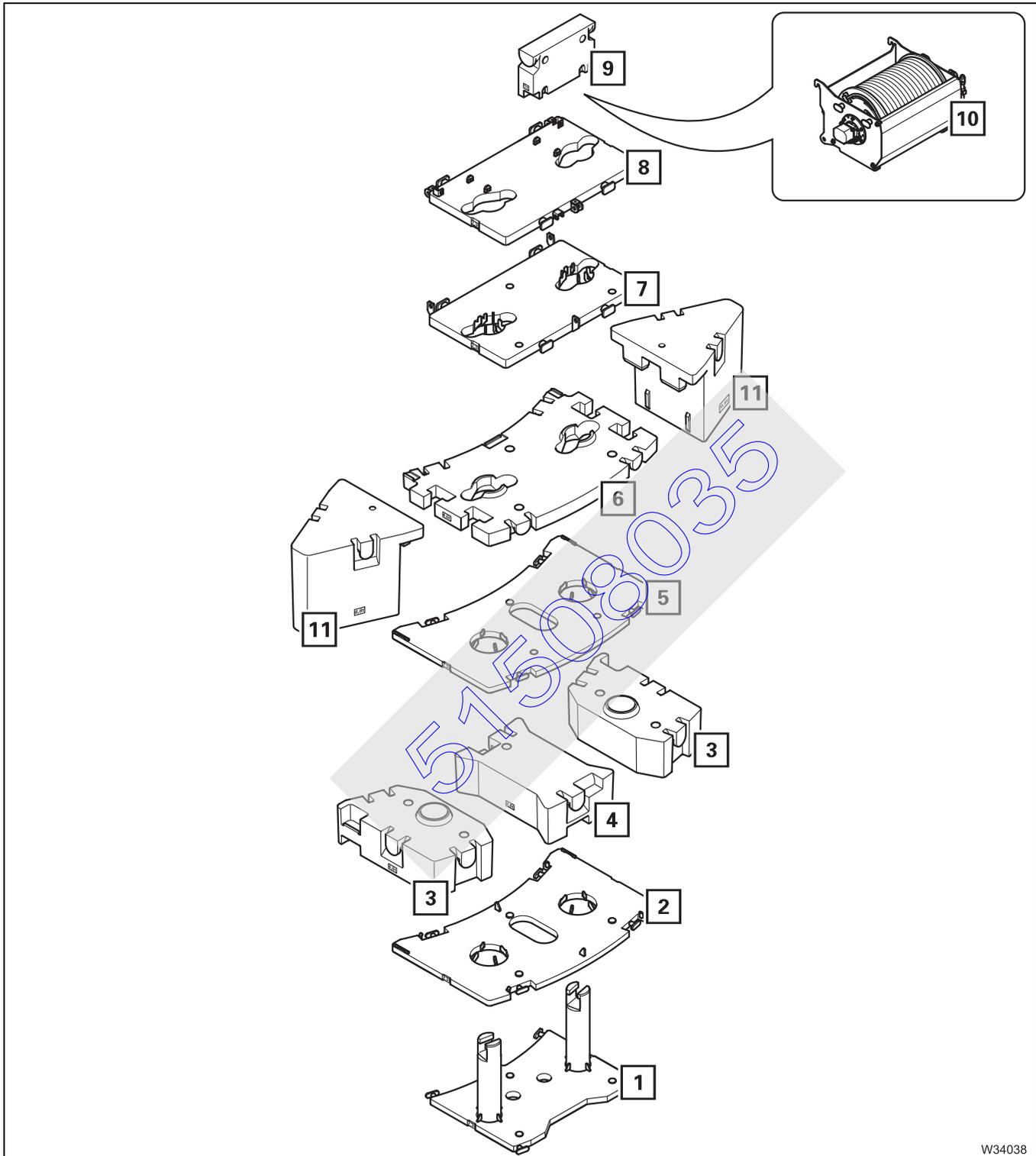
5) 7 Must be installed under 8

6) 7 Must lie on top, or lie under 8 or be installed under 8

7) 8 Must lie on top or be installed on the turntable



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



W34038

- Lift the counterweight sections on to the base plate;
 ▣▣▣▣▣ *Slings points*, p. 12 - 71.

Counterweight combination in t (lbs)	Counterweight sections in t (lbs)									
	2.3 (5,071)	2.3 (5,071)	4.6 (5,071)	4.6 (10,142)	2.3 (5,071)	4.6 (10,142)	2.3 (5,071)	2.3 (5,071)	1.0 (2,205)	6.8 (14,991)
	1	2	3 1)	4 1)	5	6	7	8	9 2)	2 x 11
24.0 t (52,900 lbs)	●	●	2 x	●	-	●	-	-	●	-
	●	●	2 x	●	●	-	● ³⁾	-	●	-
	●	●	2 x	-	●	●	● ³⁾	-	●	-
	●	●	2 x	●	●	-	-	● ⁷⁾	●	-
	●	●	2 x	-	●	●	-	● ⁷⁾	●	-
	●	●	2 x	-	-	●	● ⁶⁾	● ⁷⁾	●	-
	●	●	2 x	●	-	-	● ⁶⁾	● ⁷⁾	●	-
26.3 t (57,900 lbs)	●	●	2 x	●	●	●	-	-	●	-
	●	●	2 x	●	-	●	● ³⁾	-	●	-
	●	●	2 x	●	-	●	-	● ⁷⁾	●	-
	●	●	2 x	-	●	●	● ⁶⁾	● ⁷⁾	●	-
	●	●	2 x	●	●	-	● ⁶⁾	● ⁷⁾	●	-
30.9 t (68,100 lbs)	●	●	2 x	●	●	● ⁸⁾	● ⁶⁾	● ⁷⁾	●	-
44.5 (98,100 lbs)	●	●	2 x	●	●	● ⁸⁾	● ⁶⁾	● ⁷⁾	●	●

1) Must always lie on 2

2) Or use 10

3) Must always lie on top

4) Must be installed on the turntable

5) 7 Must be installed under 8

6) 7 Must lie on top, or lie under 8 or be installed under 8

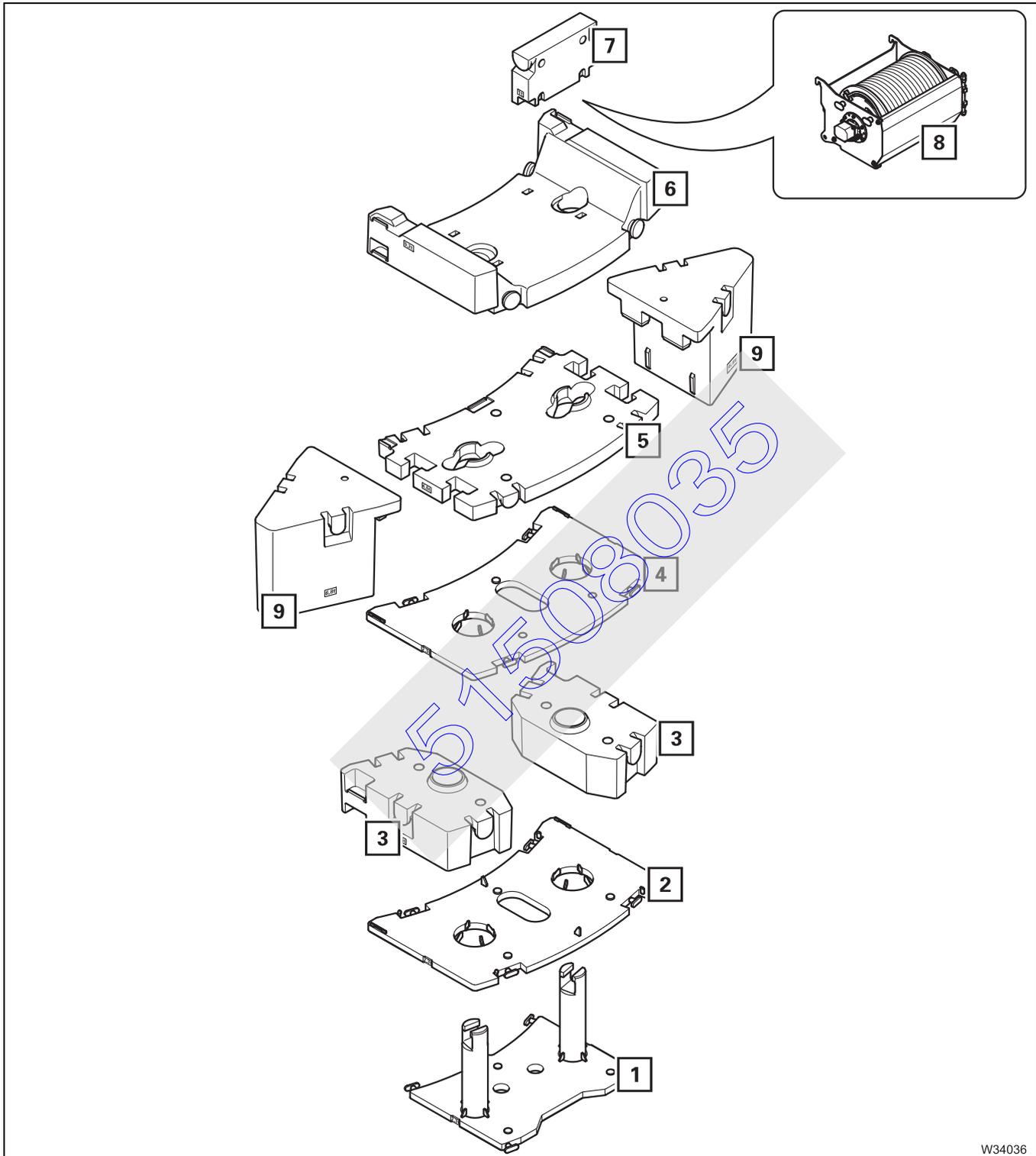
7) 8 Must lie on top or be installed on the turntable

8) 6 Must lie on top, or lie under 7



Version 2

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



- Lift the counterweight sections on to the base plate;
 ▣▣▣▣ *Slinging points*, p. 12 - 71.

Counterweight combination in t (lbs)	Counterweight sections in t (lbs)							
	2.3 (5,071)	2.3 (5,071)	4.6 (10,142)	2.3 (5,071)	4.6 (10,142)	9.2 (20,283)	1.0 (2,205)	6.8 (14,991)
	1	2	2 x 3 ³⁾	4	5	6 ¹⁾	7 ²⁾	2 x 9
1.0 (2.200)	-	-	-	-	-	-	●	-
3.3 (7.200)	●	-	-	-	-	-	●	-
5.6 (12.300)	●	●	-	-	-	-	●	-
7.9 (17.400)	●	● ⁴⁾	-	●	-	-	●	-
	●	-	-	-	●	-	●	-
10.2 (22.400)	●	● ⁴⁾	-	-	●	-	●	-
	-	-	-	-	-	●	●	-
12.5 (27.500)	●	● ⁴⁾	-	●	●	-	●	-
	●	-	-	-	-	●	●	-
14.8 (32.600)	●	●	●	-	-	-	●	-
	●	●	-	-	-	●	●	-
17.1 (37.600)	●	●	●	●	-	-	●	-
	●	● ⁴⁾	-	●	-	●	●	-
19.4 (42.700)	●	●	●	-	●	-	●	-
	●	● ⁴⁾	-	-	●	●	●	-

1) Must be installed on the turntable.

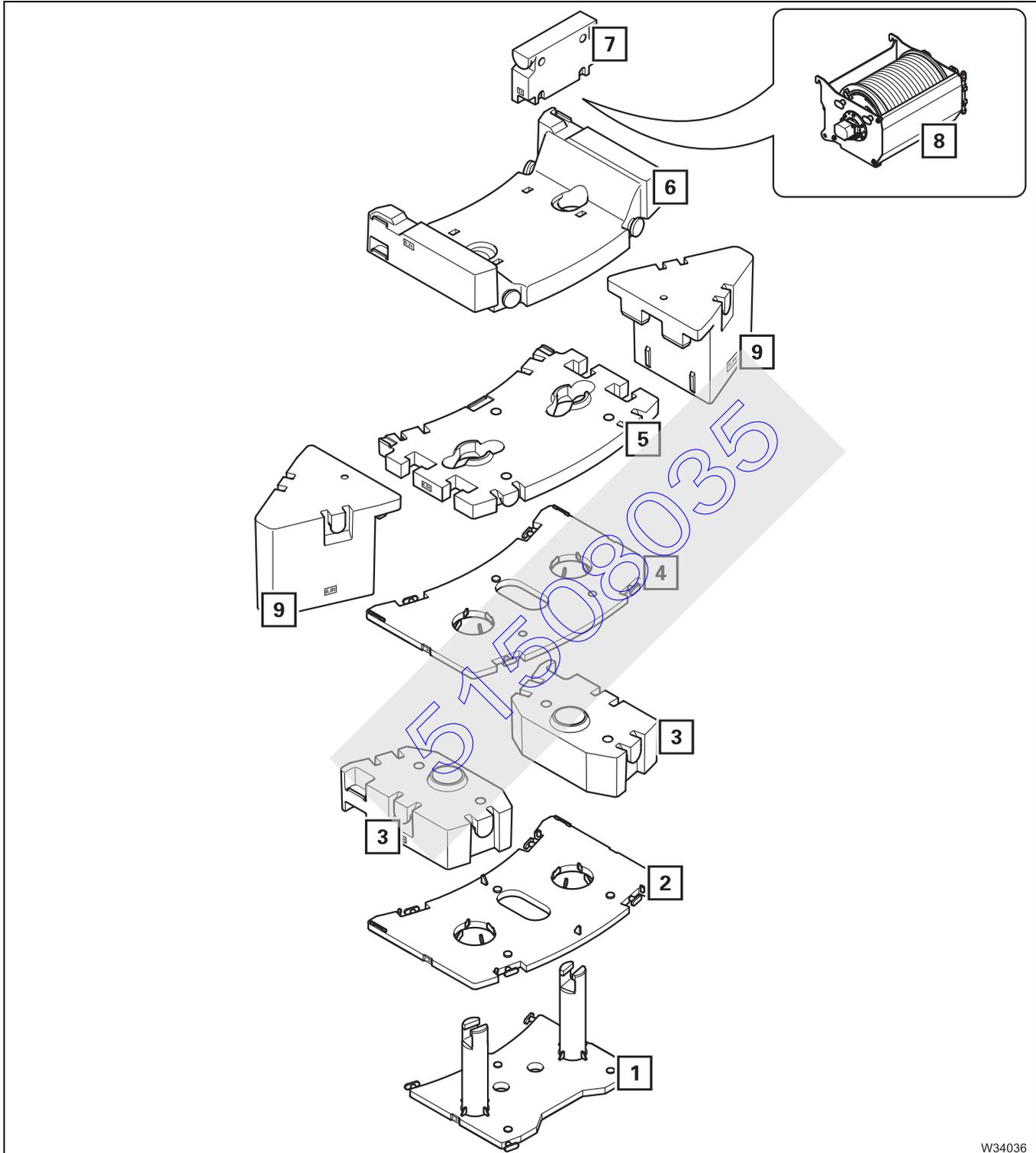
2) Or use 8.

3) Must lie on 2.

4) Must lie on top



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



W34036

- Lift the counterweight sections on to the base plate;
 ▣▣▣▣ *Slinging points*, p. 12 - 71.

Counterweight combination in t (lbs)	Counterweight sections in t (lbs)							
	2.3 (5,071)	2.3 (5,071)	4.6 (10,142)	2.3 (5,071)	4.6 (10,142)	9.2 (20,283)	1.0 (2,205)	6.8 (14,991)
	1	2	2 x 3 ³⁾	4	5	6 ¹⁾	7 ²⁾	2 x 9
19.4 (42,700)	●	●	●	–	●	–	●	–
	●	● ⁴⁾	–	–	●	●	●	–
21.7 t (47,800 lbs)	●	●	●	●	●	–	●	–
	●	● ⁴⁾	–	●	●	●	●	–
24.0 t (52,900 lbs)	●	●	●	–	–	●	●	–
26.3 t (57,900 lbs)	●	●	●	●	–	●	●	–
30.9 t (68,100 lbs)	●	●	●	●	● ⁴⁾	●	●	–
44.5 (98,100 lbs)	●	●	●	●	● ⁴⁾	●	●	●

1) Must be installed on the turntable.

2) Or use 8.

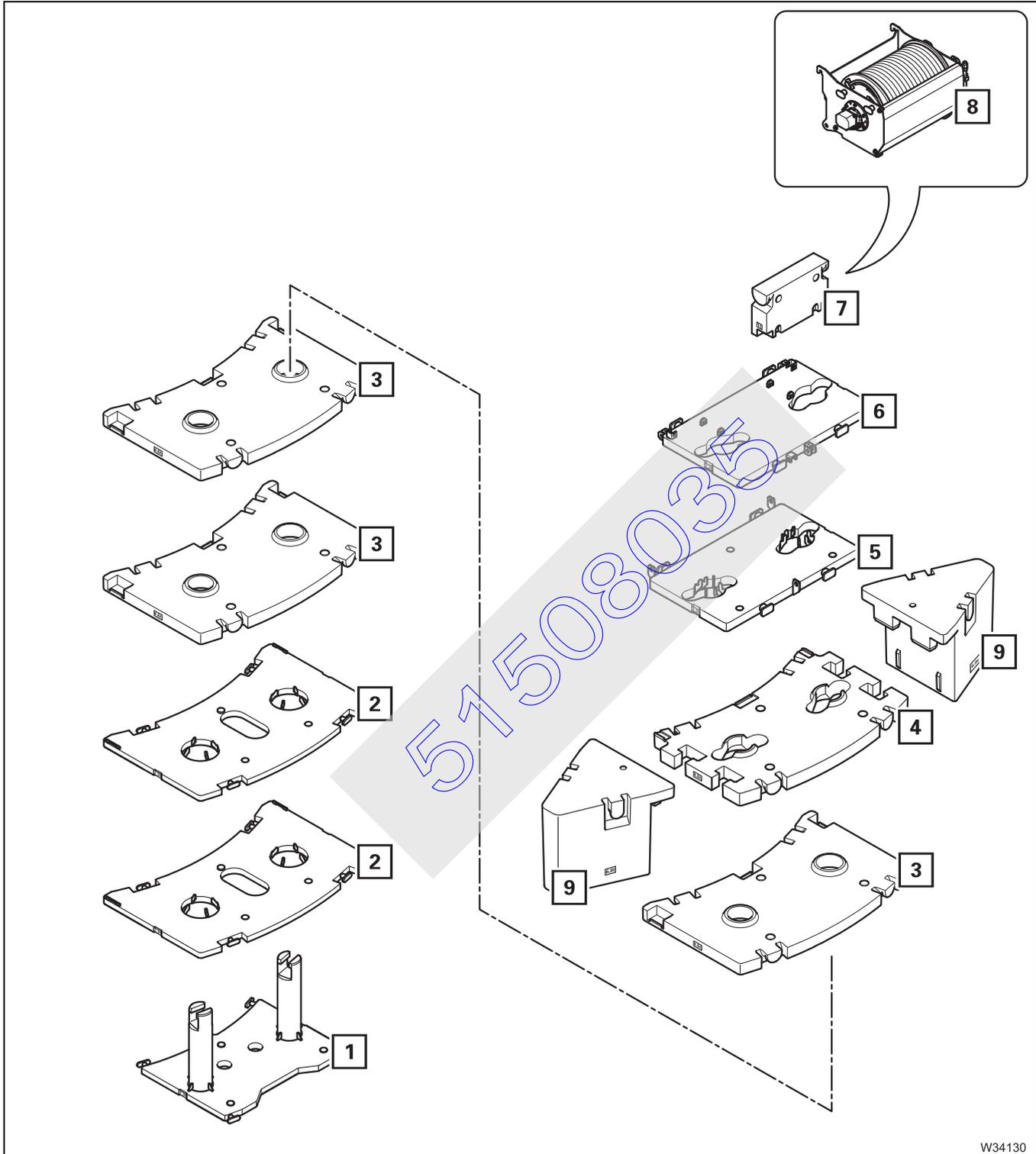
3) Must lie on 2.

4) Must lie on top



Version 3

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



W34130

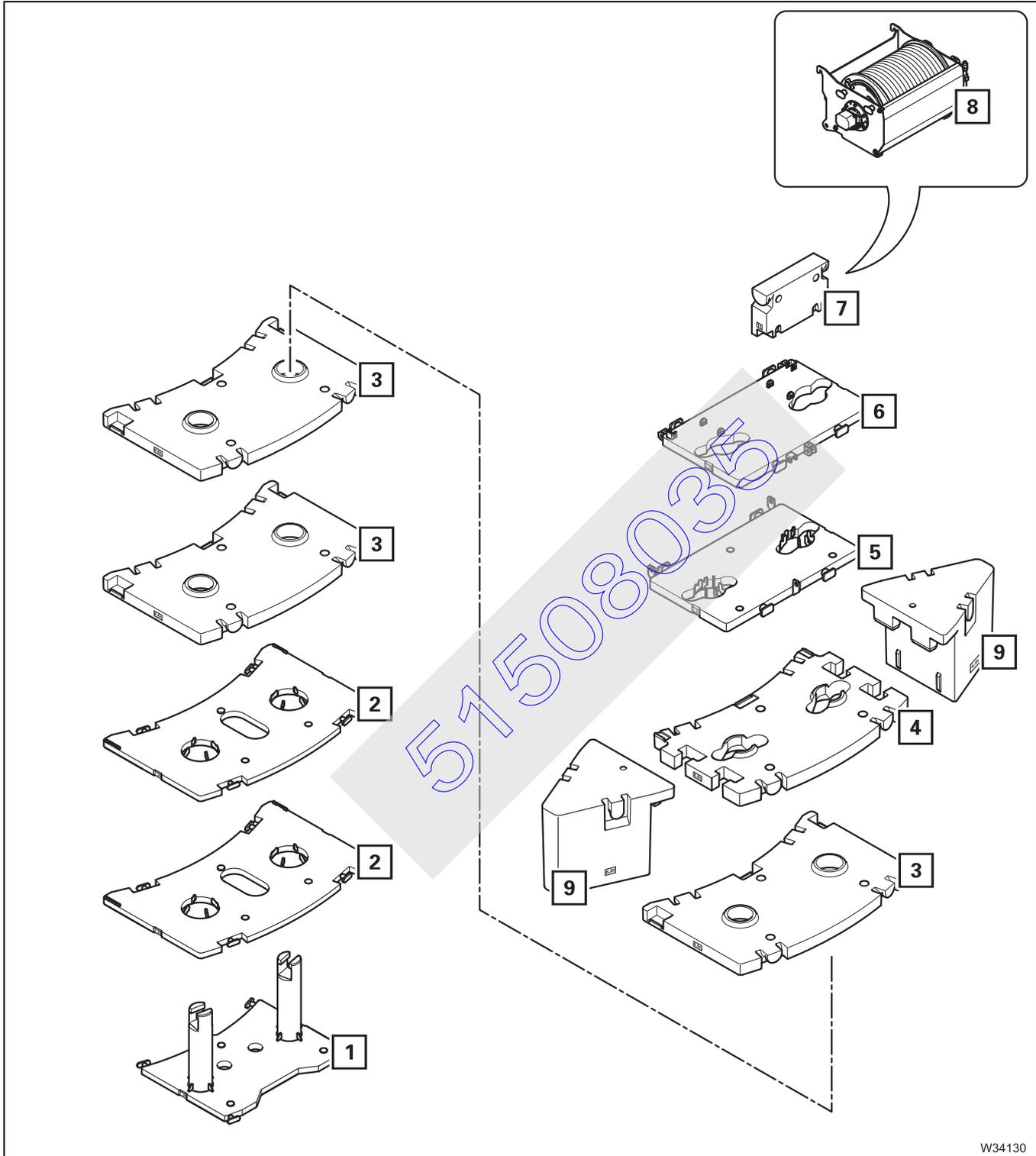
- Lift the counterweight sections on to the base plate;
 ▣▣▣▣ *Slinging points*, p. 12 - 71.

Counterweight combination in t (lbs)	Counterweight sections in t (lbs)							
	2.3 (5,071) 1	2.3 (5,071) 2	4.6 (10,142) 3	4.6 (10,142) 4	2.3 (5,071) 5	2.3 (5,071) 6	1.0 (2,205) 7 1)	6.8 (14,991) 2 x 9
1.0 (2.200)	-	-	-	-	-	-	●	-
3.3 (7.200)	●	-	-	-	-	-	●	-
	-	-	-	-	-	● ³⁾	●	-
5.6 (12.300)	●	1 x	-	-	-	-	●	-
	●	-	-	-	-	●	●	-
	●	-	-	-	● ⁵⁾	-	●	-
	-	-	-	-	● ⁵⁾	● ⁴⁾	●	-
7.9 (17.400)	●	2 x	-	-	-	-	●	-
	●	-	1 x ²⁾	-	-	-	●	-
	●	1 x	-	-	● ⁵⁾	-	●	-
	●	1 x	-	-	-	● ⁷⁾	●	-
	●	-	-	-	● ⁶⁾	● ⁷⁾	●	-
10.2 (22.400)	●	1 x	1 x ²⁾	-	-	-	●	-
	●	-	1 x ²⁾	-	●	-	●	-
	●	-	1 x ²⁾	-	-	● ⁷⁾	●	-
	●	-	1 x ²⁾	-	● ⁶⁾	● ⁷⁾	●	-

- 1) Or use 8
- 2) 1 x 3 can be replaced with 4
- 3) Must be installed on the turntable
- 4) 5 Must be installed under 6
- 5) Must always lie on top
- 6) 5 Must lie on top, or lie under 6 or be installed under 6
- 7) 6 Must lie on top or be installed on the turntable



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



W34130

- Lift the counterweight sections on to the base plate;
 ▣▣▣▣ *Slings points*, p. 12 - 71.

Counterweight combination in t (lbs)	Counterweight sections in t (lbs)							
	2.3 (5,071)	2.3 (5,071)	4.6 (10,142)	4.6 (10,142)	2.3 (5,071)	2.3 (5,071)	1.0 (2,205)	6.8 (14,991)
	1	2	3	4	5	6	7 1)	2 x 9
12.5 (27.500)	●	2 x	1 x 2)	–	–	–	●	–
	●	–	2 x 2)	–	–	–	●	–
	●	–	1 x 2)	–	● 5)	–	●	–
	●	–	1 x 2)	–	–	● 7)	●	–
	●	2 x	–	–	● 6)	● 7)	●	–
	●	–	1 x 2)	–	● 6)	● 7)	●	–
14.8 (32.600)	●	1 x	2 x 2)	–	–	–	●	–
	●	2 x	1 x 2)	–	● 5)	–	●	–
	●	1 x	1 x 2)	–	● 5)	–	●	–
	●	2 x	1 x 2)	–	–	● 7)	●	–
	●	1 x	1 x 2)	–	–	● 7)	●	–
	●	2 x	–	–	● 6)	● 7)	●	–

1) Or use 8

2) 1 x 3 can be replaced with 4

3) Must be installed on the turntable

4) 5 Must be installed under 6

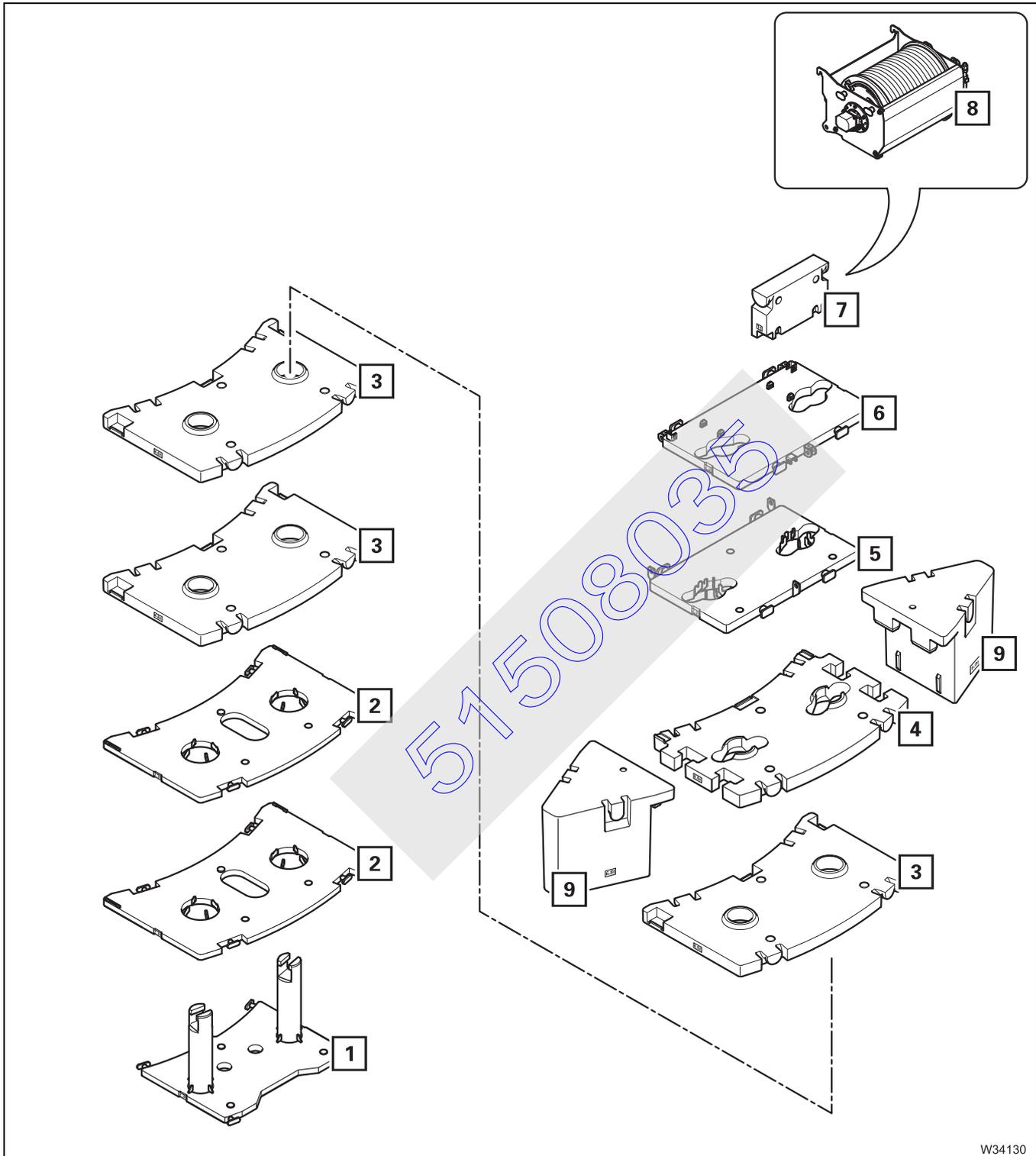
5) Must always lie on top

6) 5 Must lie on top, or lie under 6 or be installed under 6

7) 6 Must lie on top or be installed on the turntable



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



W34130

- Lift the counterweight sections on to the base plate;
 ▣▣▣▣ *Slings points*, p. 12 - 71.

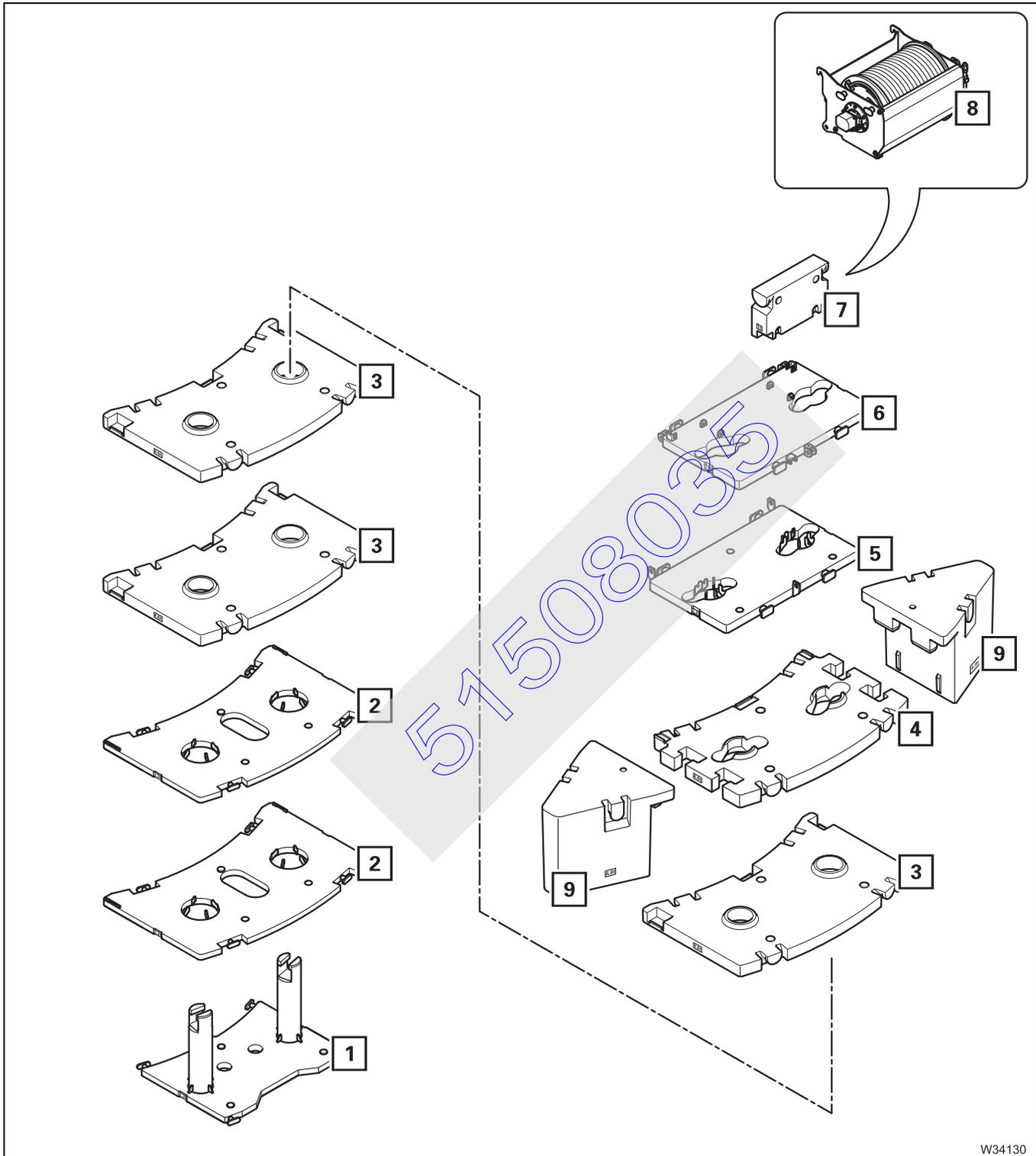
Counterweight combination in t (lbs)	Counterweight sections in t (lbs)							
	2.3 (5,071)	2.3 (5,071)	4.6 (10,142)	4.6 (10,142)	2.3 (5,071)	2.3 (5,071)	1.0 (2,205)	6.8 (14,991)
	1	2	3	4	5	6	7 1)	2 x 9
17.1 (37.600)	●	2 x	2 x ²⁾	–	–	–	●	–
	●	–	2 x ²⁾	–	–	–	●	–
	●	1 x	3 x ²⁾	–	● ⁵⁾	–	●	–
	●	1 x	3 x ²⁾	–	–	● ⁷⁾	●	–
	●	2 x	1 x ²⁾	–	● ⁶⁾	● ⁷⁾	●	–
	●	–	2 x ²⁾	–	● ⁶⁾	● ⁷⁾	●	–
19.4 (42.700)	●	1 x	3 x ²⁾	–	–	–	●	–
	●	–	2 x ²⁾	–	● ⁵⁾	–	●	–
	●	–	3 x ²⁾	–	● ⁵⁾	–	●	–
	●	–	2 x ²⁾	–	–	● ⁷⁾	●	–
	●	–	3 x ²⁾	–	–	● ⁷⁾	●	–
	●	1 x	2 x ²⁾	–	–	–	●	–
21.7 (47.800)	●	2 x	3 x ²⁾	–	–	–	●	–
	●	–	3 x ²⁾	–	–	–	●	–
	●	1 x	3 x ²⁾	–	● ⁵⁾	–	●	–
	●	1 x	3 x ²⁾	–	–	● ⁷⁾	●	–
	●	2 x	2 x ²⁾	–	● ⁶⁾	● ⁷⁾	●	–
	●	–	3 x ²⁾	–	● ⁶⁾	● ⁷⁾	●	–

- 1) Or use 8
- 2) 1 x 3 can be replaced with 4
- 3) Must be installed on the turntable
- 4) 5 Must be installed under 6
- 5) Must always lie on top
- 6) 5 Must lie on top, or lie under 6 or be installed under 6
- 7) 6 Must lie on top or be installed on the turntable

23.03.2022



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



W34130

- Lift the counterweight sections on to the base plate;
 ▣▣▣ *Slinging points*, p. 12 - 71.

23.03.2022

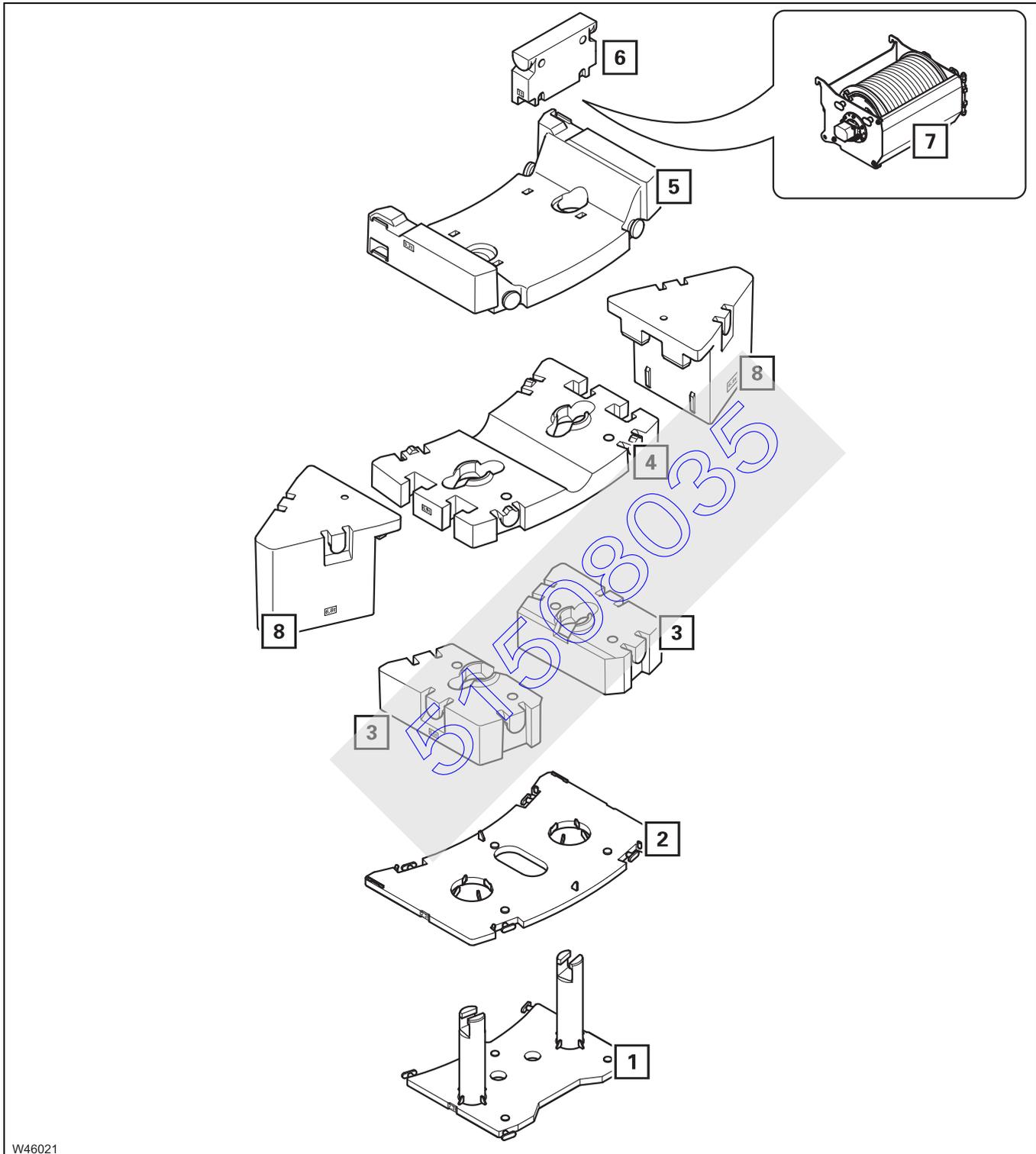
Counterweight combination in t (lbs)	Counterweight sections in t (lbs)							
	2.3 (5,071)	2.3 (5,071)	4.6 (10,142)	4.6 (10,142)	2.3 (5,071)	2.3 (5,071)	1.0 (2,205)	6.8 (14,991)
	1	2	3	4	5	6	7 1)	2 x 9
24.0 (52.900)	●	1 x	3 x	●	–	–	●	–
	●	2 x	3 x ²⁾	–	● ⁵⁾	–	●	–
	●	–	3 x	●	● ⁵⁾	–	●	–
	●	2 x	3 x ²⁾	–	–	● ⁷⁾	●	–
	●	–	3 x	●	–	● ⁷⁾	●	–
	●	1 x	3 x ²⁾	–	● ⁶⁾	● ⁷⁾	●	–
26.3 (57.900)	●	2 x	3 x	●	–	–	●	–
	●	1 x	3 x	●	● ⁵⁾	–	●	–
	●	1 x	3 x	●	–	● ⁷⁾	●	–
	●	2 x	3 x ²⁾	–	● ⁶⁾	● ⁷⁾	●	–
	●	–	3 x	●	● ⁶⁾	● ⁷⁾	●	–
30.9 (68.100)	●	2 x	3 x	● ⁸⁾	● ⁶⁾	● ⁷⁾	●	–
44.5 (98.100)	●	2 x	3 x	● ⁸⁾	● ⁶⁾	● ⁷⁾	●	●

- 1) Or use 8
- 2) 1 x 3 can be replaced with 4
- 3) Must be installed on the turntable
- 4) 5 Must be installed under 6
- 5) Must always lie on top
- 6) 5 Must lie on top, or lie under 6 or be installed under 6
- 7) 6 Must lie on top or be installed on the turntable
- 8) 4 Must lie on top, or lie under 5



Version 4

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



W46021

- Lift the counterweight sections on to the base plate;
 ▣▣▣▣ *Slinging points*, p. 12 - 71.

Counterweight combination in t (lbs)	Counterweight sections in t (lbs)						
	2.3 (5,071) [1]	2.3 (5,071) [2]	4.6 (10,142) 2 x [3]	6.9 (15,212) [4]	9.2 (20,283) [5] 1)	1.0 (2,205) [6] 2)	6.8 (14,991) 2 x [8]
1.0 (2.200)	-	-	-	-	-	●	-
3.3 t (7.200)	●	-	-	-	-	●	-
5.6 t (12.300)	●	●	-	-	-	●	-
10.2 t (22.400)	-	-	-	-	●	●	-
	●	-	-	●	-	●	-
12.5 t (27.500)	●	-	-	-	●	●	-
	●	●	-	●	-	●	-
14.8 t (32.600)	●	●	-	-	●	●	-
	●	●	● 3)	-	-	●	-
19.4 t (42.700)	●	-	-	●	●	●	-

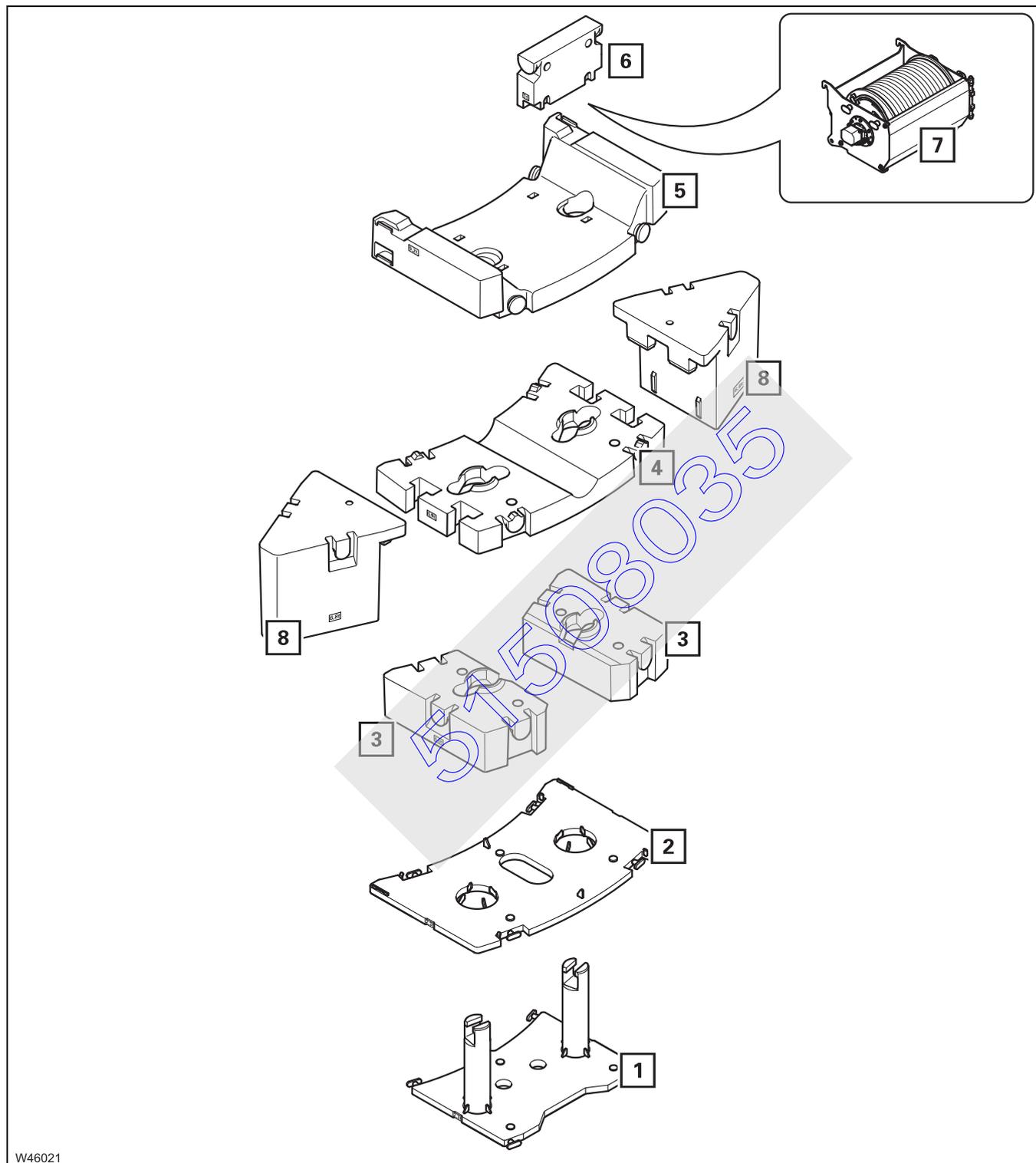
1) Must be installed on the turntable.

2) Or use [7].

3) Must lie on [2].



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



W46021

- Lift the counterweight sections on to the base plate;
 ▣▣▣▣ *Slinging points*, p. 12 - 71.

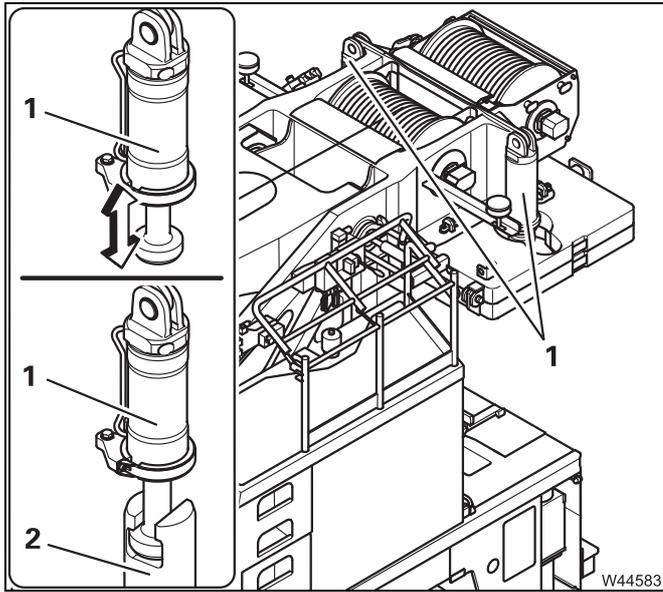
23.03.2022

Counterweight combination in t (lbs)	Counterweight sections in t (lbs)						
	2.3 (5,071)	2.3 (5,071)	4.6 (10,142)	6.9 (15,212)	9.2 (20,283)	1.0 (2,205)	6.8 (14,991)
	1	2	2 x 3	4	5 ¹⁾	6 ²⁾	2 x 8
21.7 t (47.800)	●	●	–	●	●	●	–
	●	●	●	●	–	●	–
24.0 t (52.900)	●	●	● ³⁾	–	●	●	–
28.6 t (63.000)	●	–	● ⁴⁾	●	●	●	–
30.9 t (68.100)	●	●	● ⁵⁾	● ⁶⁾	●	●	–
44.5 (98.100)	●	●	●	● ⁶⁾	●	●	●

- 1) Must be installed on the turntable.
- 2) Or use 7.
- 3) Must lie on 2.
- 4) Must lie on 4.
- 5) Must lie on 2.
- 6) Must lie on top

51508035

12.7.8 Counterweight hoist unit



The lifting cylinders (1) can be extended and retracted.

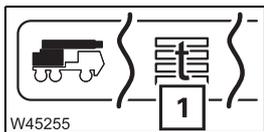
To lift and lower the counterweight, the lifting cylinders are slewed into the 2.3 t base plate (2).



Risk of crushing when lifting and lowering the counterweight!

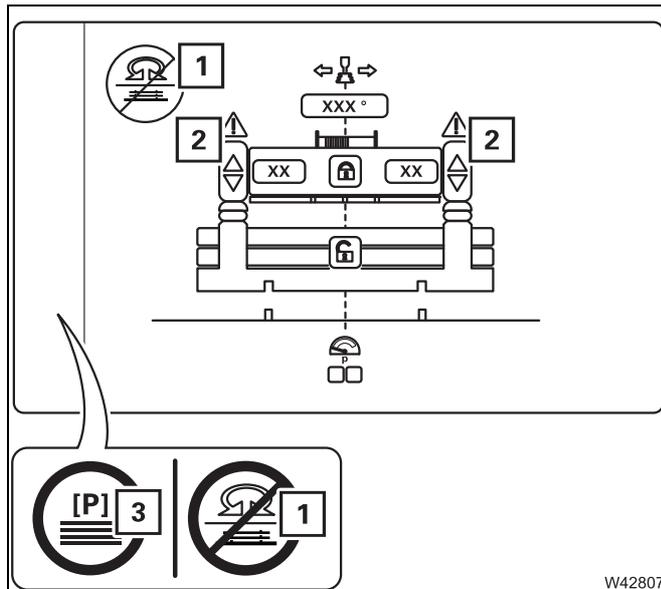
Make sure nobody is on the counterweight platform while the counterweight is being lifted or lowered.

Counterweight menu



To operate the counterweight hoist unit, you must open the *Counterweight* menu.

- Open the menu (1) – Counterweight menu.



The *Counterweight* menu opens.

Errors and warning messages can be shown during operation.

- 1 Slewing disabled – pre-tension the counterweight; p. 12 - 107.
- 2 Contact **Grove Product Support**
- 3 If the pre-tensioning pressure continues to drop, the message (1) appears.

Extending/ retracting the lifting cylinders



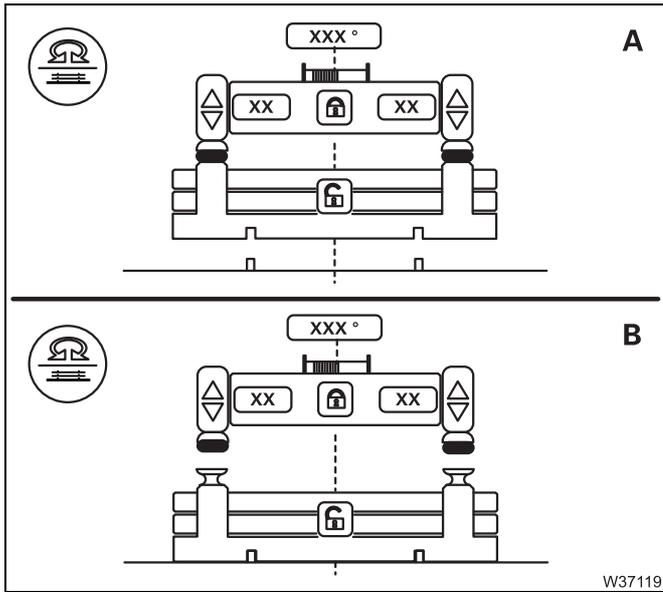
This section describes how to operate the lifting cylinders manually,
– for correcting the displayed rigging mode and
– for pre-tensioning the counterweight afterwards.

Risk of damage to the counterweight!

With the override switch actuated, the functions are always enabled.
Slew the superstructure only when the lifting cylinders are fully retracted.

Always lift and lower the counterweight in automatic mode, otherwise slewing with extended lifting cylinders will be disabled; *Automatic rigging*, p. 12 - 107, *Automatic unrigging*, p. 12 - 109.





Correcting the rigging mode

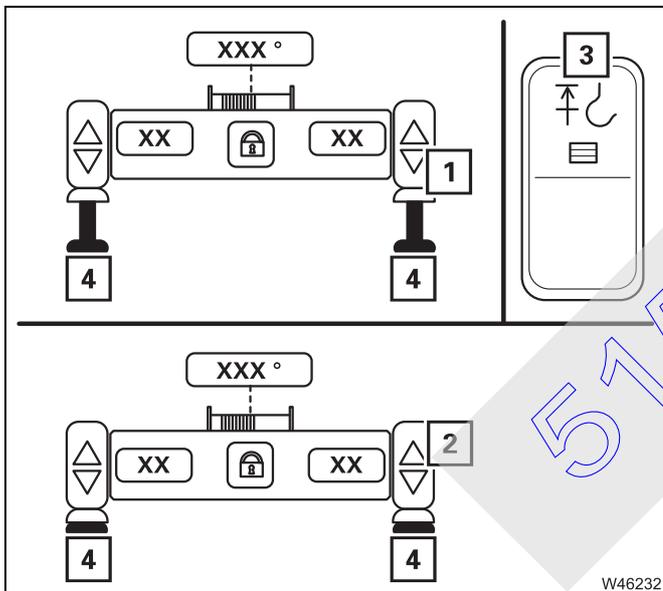
- You can only use automatic mode if the current rigging mode is displayed.

A Counterweight rigged

B Counterweight unrigged

If necessary, correct the displayed rigging mode as follows:

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

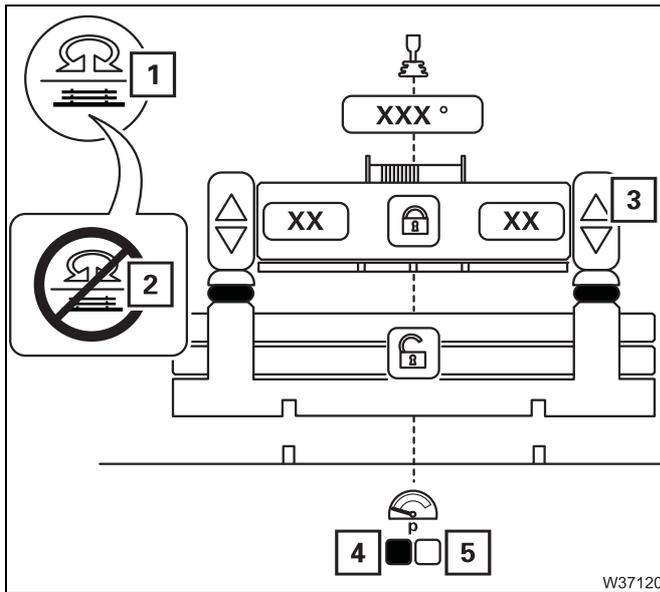


Assuming the symbols (4) are yellow with the counterweight unrigged.

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

The symbols (4) turn green.

You can now use automatic mode.



Pre-tensioning

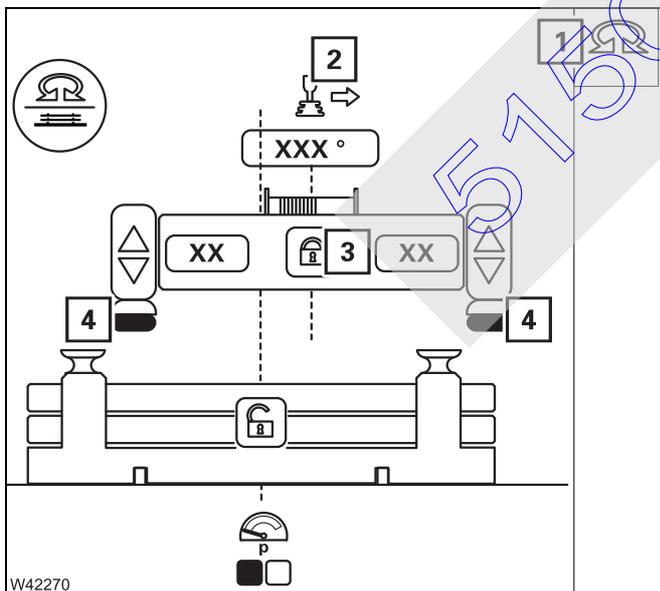
When the symbol (5) is **red**, you must pre-tension the counterweight. Slewing is disabled – symbol (2) is displayed.

- Select and confirm the symbol (3) until the symbol (4) turns **green**. Slewing is enabled – symbol (1) is displayed.

Automatic rigging

In automatic mode, you can always

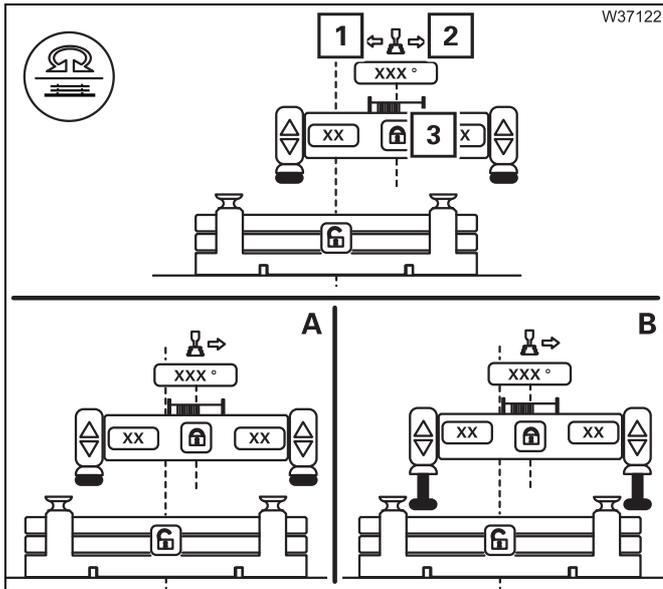
- **Cancel** automatic mode;  *Cancel automatic mode*, p. 12 - 110.
- **Interrupt** automatic mode by letting go of the control lever. After moving the lever in the displayed direction once more, automatic mode is resumed.



Prerequisites

- The counterweight combination is assembled.
- The lifting cylinders are fully retracted – symbols (4) **green**.
- The slewing gear is switched on – symbol (1) **green**.
- The superstructure must be in the rigging range:
 - Symbol (3) active,
 - Symbol (2) displayed.



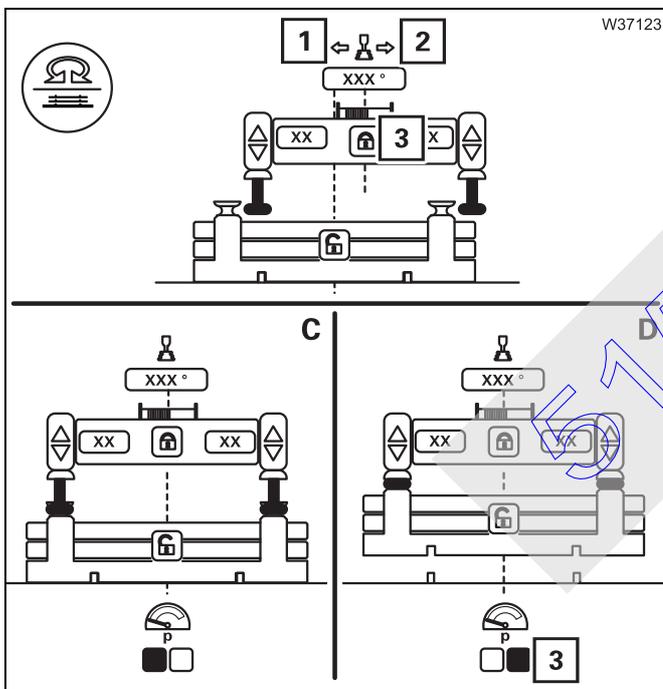


Switching on automatic mode

- Select and confirm the symbol (3).

Run automatic mode.

- Move the slewing control lever in the displayed direction (1) or (2) – automatic mode starts.
 - The superstructure turns into position (A).
 - The lifting cylinders are extended (B).
- Release the control lever.

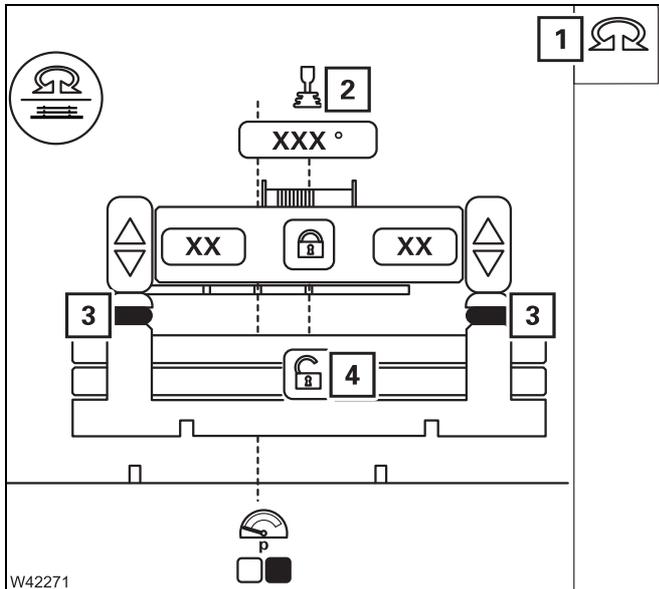


- Move the slewing control lever in the displayed direction (1) or (2) – automatic mode is resumed.
 - The superstructure turns into position (C).
 - The lifting cylinders are retracted (D).
 - The counterweight is pre-tensioned – symbol (3) **green**.
- Release the control lever.

Automatic unrigging

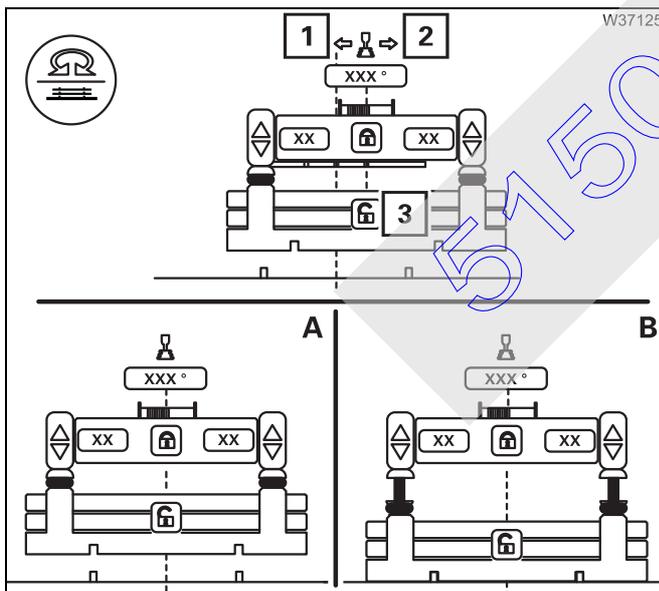
In automatic mode, you can always

- **Cancel** automatic mode;  *Canceling automatic mode*, p. 12 - 110.
- **Interrupt** automatic mode by letting go of the control lever. After moving the lever in the displayed direction once more, automatic mode is resumed.



Prerequisites

- The lifting cylinders are fully retracted – symbols (3) **green**.
- The slewing gear is switched on – symbol (1) **green**.
- The superstructure must be in the rigging range:
 - Symbol (4) active,
 - Symbol (2) displayed.



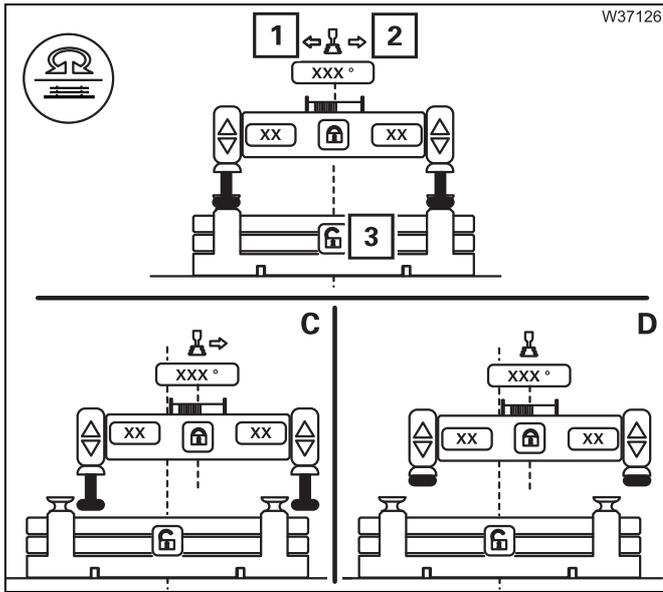
Switching on automatic mode

- Select and confirm the symbol (3).

Running automatic mode

- Move the slewing control lever in the displayed direction (1) or (2) – automatic mode starts.
 - The superstructure turns into position (A).
 - The lifting cylinders are extended (B).
- Release the control lever.

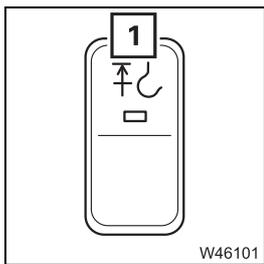




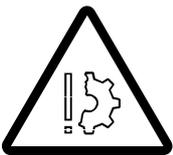
- Move the slewing control lever in the displayed direction (1) or (2) – automatic mode is resumed.
 - The superstructure turns into position (C).
 - The lifting cylinders are retracted (D).
- Release the control lever.

Cancelling automatic mode

You can cancel automatic mode at any time.

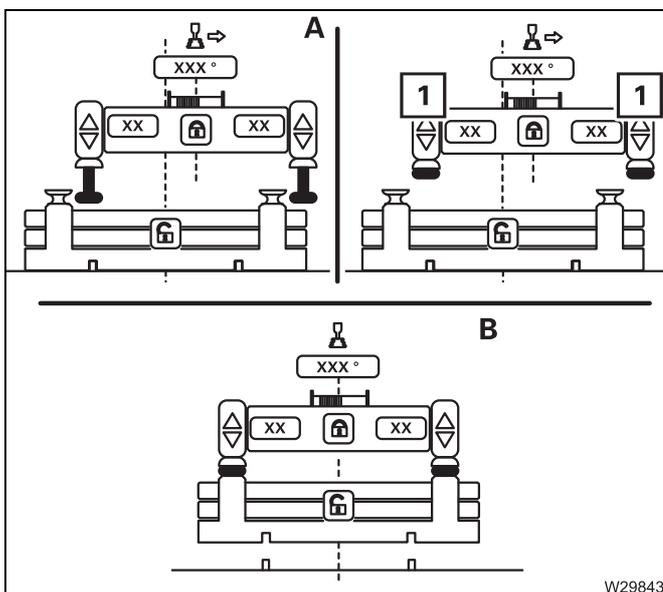


- Press the override button (1) at the top – automatic mode is cancelled.



Risk of damage to the counterweight!

With the override switch actuated, the functions are always enabled. Slew the superstructure only when the lifting cylinders are fully retracted.



If you have cancelled automatic mode, then you must:

In position (A)

- Fully retract the lifting cylinders – symbol (1).

In position (B)

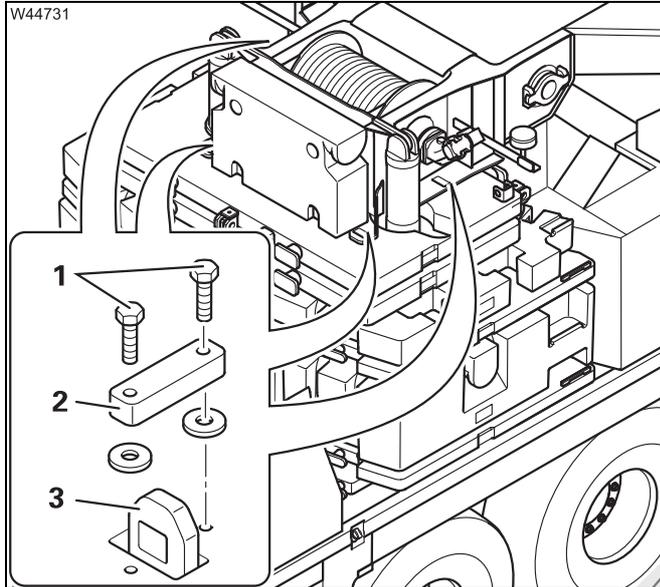
- Slew the superstructure into position (A).
- Fully retract the lifting cylinders – symbol (1).

12.7.9

Removing/installing the counterweight on the turntable

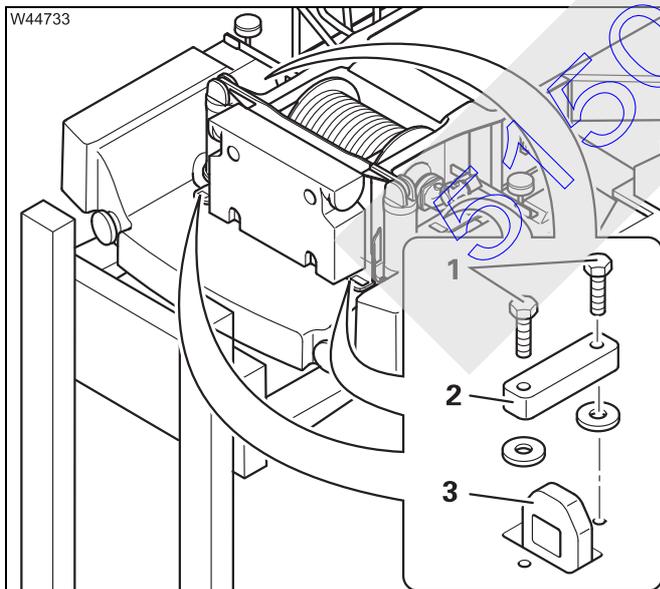
Removal

With version 1 and 3 two 2.3 t plates, and with version 2 and 4 one 9.2 t plate can be removed/installed on the turntable.



Versions 1 and 3

- Use automatic mode to lift the counterweight combination on to the turntable;
 ▶ *Automatic rigging*, p. 12 - 107.
- Unscrew the bolts (1) and remove the clamp (2) from the bracket (3).
- Use automatic mode to lower the counterweight combination on to the counterweight platform.

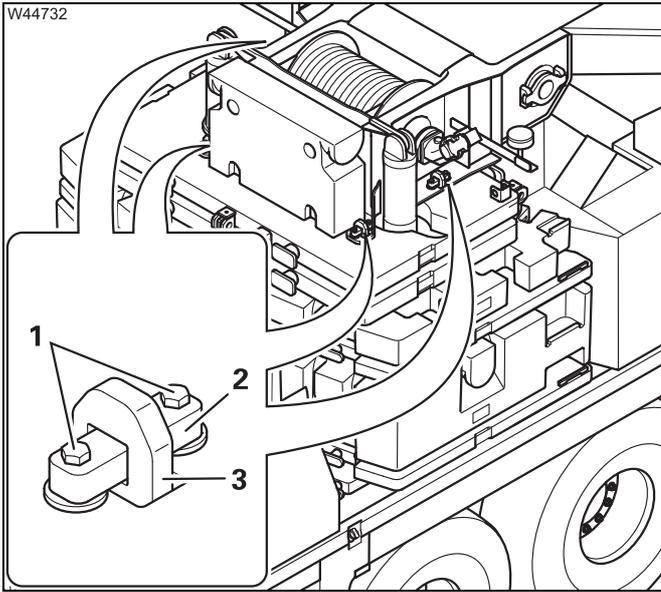


Versions 2 and 4

- Secure the installed 9.2 t plate using suitable lifting gear (e.g. forklift truck) so that the plate cannot fall down during removal.
- Unscrew the bolts (1) and take off the clamps (2).
- Remove the bracket (3) from the 9.2 t plate.
- Lift the 9.2 t plate off the turntable.



Installing

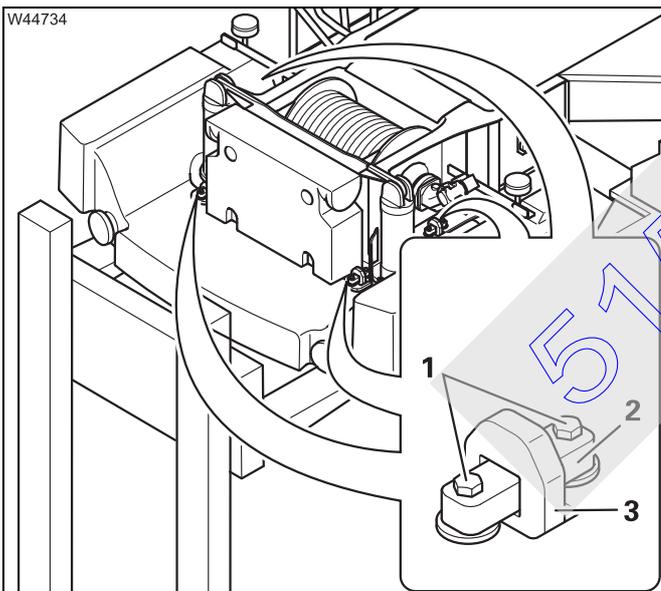


Versions 1 and 3

- Use automatic mode to lift the counterweight combination on to the turntable;
 ▶ *Automatic rigging*, p. 12 - 107.
- Push the clamps (2) through the bracket (3).
- Fasten the clamps (2) using the bolts (1) – tightening torque 75 Nm (55.3 lbf ft).

If no further work is to be performed using the truck crane:

- Use automatic mode to lower the counterweight combination on to the turntable.



Versions 2 and 4

- Use suitable auxiliary equipment (e.g. forklift truck) to lift the 9.2 t plate on to the turntable until the connecting points are aligned.
- Insert the bracket (3) through the counterweight section from below.
- Push the clamps (2) through the bracket (3). Fasten the clamps (2) using the bolts (1) – tightening torque 75 Nm (55.3 lbf ft).

12.7.10

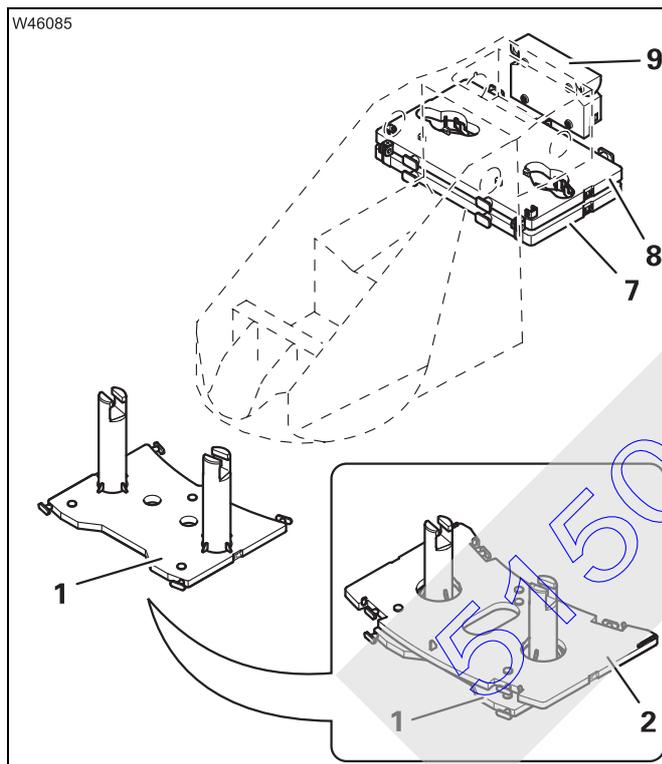
Setting down the counterweight for driving

Which parts of the counterweight sections can be transported on the turntable and counterweight platform when driving the truck crane depends on the driving mode of the truck crane;  *Driving modes*, p. 6 - 1.

With all versions, the 1 t compensation weight or the auxiliary hoist is mounted on the turntable.

Version 1

For driving with axle loads up to 12 t (26,500 lbs)



Installed on the turntable

- 1.0 t plate (9) – or auxiliary hoist
- 2.3 t plates (7) and (8)

On the counterweight platform

- 2.3 t base plate (1).

Or, for the respective driving mode

- 2.3 t base plate (1)
- 2.3 t plate (2)

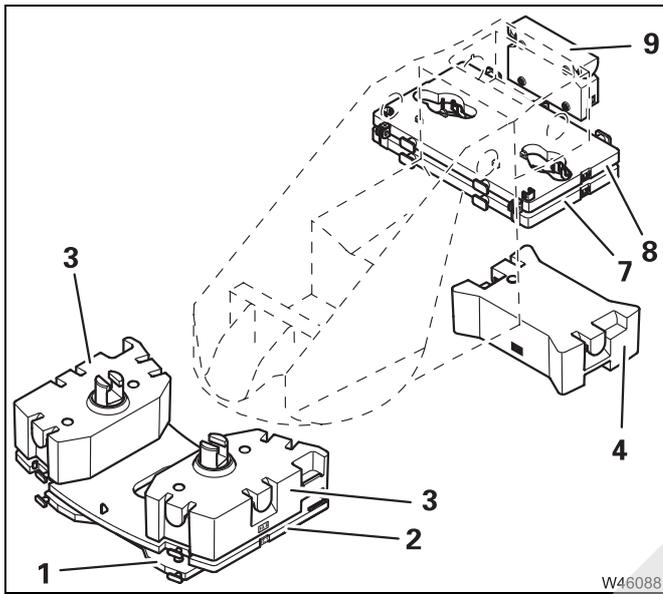


For driving with axle loads above 12 t (26,500 lbs)



Risk of damage to the derricking cylinder!

Set down the counterweight sections displayed here at the most and make sure that the 4.6 t blocks are always lying on the top on the 2.3 t plate. You thus prevent the derricking cylinder pressing against the 2.3 t plate and being damaged when the main boom is set down.



Installed on the turntable

- 1.0 t plate (9) – or auxiliary hoist
- 2.3 t plates (7) and (8)

On the counterweight platform

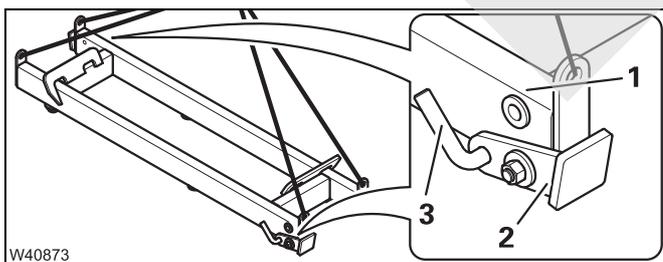
- 2.3 t base plate (1)
- 2.3 t plate (2)
- 4.6 t blocks (3)

On the rear storage area

- 4.6 t block (4)

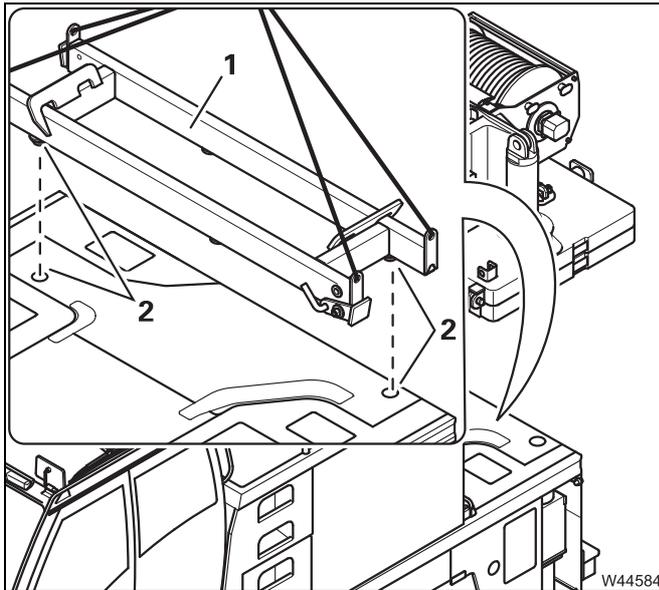
Placing the counterweight on the rear storage area

For transport on the rear storage area, you require the supplied holder.

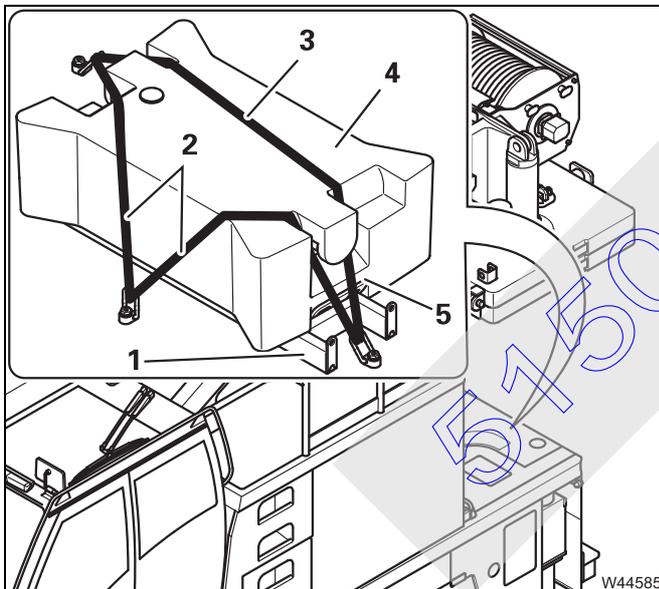


Setting down the holder

- Raise the holder (1).
- Remove the pins and fold in the feet (2).
- Insert the pins (3) and secure them.



- Place the holder (1) on the rear of carrier so that the retainers (2) mutually engage.



Setting down the 4.6 t block

- Place the 4.6 t block (4) on the holder (1) so that the retainers (5) mutually engage.
- Secure the 4.6 t block with lashing straps (2) and (3).

Before the next crane operation, you must lift the 4.6 t block and the holder off the rear storage area.



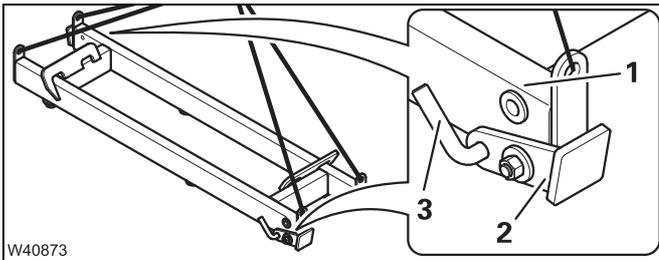
Lifting the counterweight off the rear storage area

- Lift the 4.6 t block off the holder.



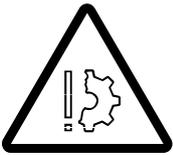
Risk of damage if the holder is set down

Always lift the holder off the rear storage area before operating the crane. This prevents the counterweight from hitting the holder when turning and damaging the holder or causing it to fall off the rear storage area.



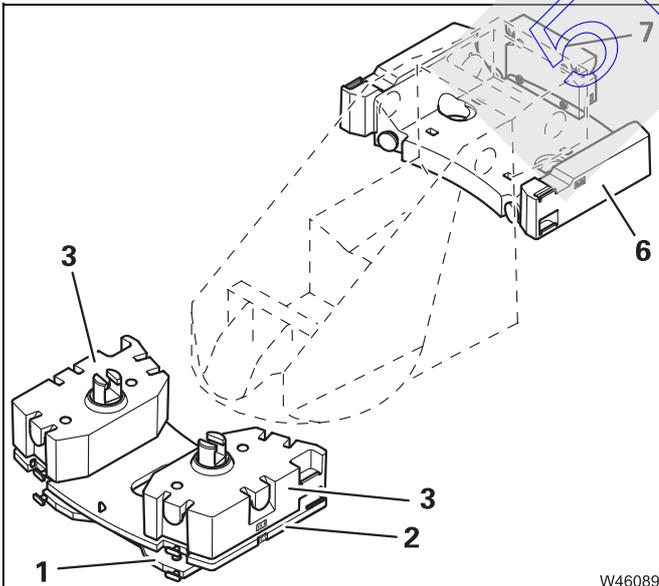
- Lift the holder (1) off the rear storage area.
- Remove the pins and fold out the feet (2).
- Insert the pins (3) and secure them.
- Set down the holder.

Version 2



Risk of damage to the derricking cylinder

Set down the counterweight sections displayed here at the most and make sure that the 4.6 t blocks are always lying on the top on the 2.3 t plate. You thus prevent the derricking cylinder pressing against the 2.3 t plate and being damaged when the main boom is set down.



For driving with 24.0 t (52.900 lbs) counterweight

The axle loads are over 12 t (26,500 lbs).

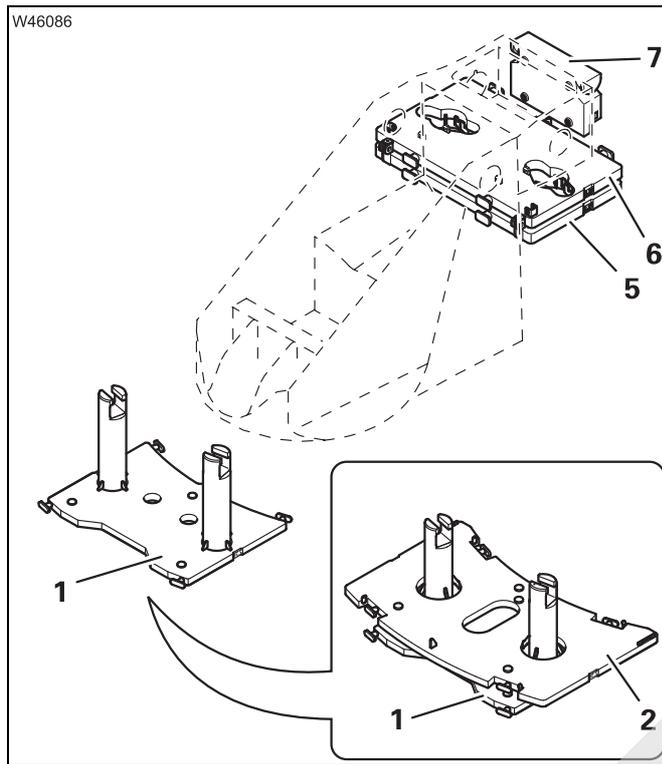
Installed on the turntable

- 1.0 t plate (7) – or auxiliary hoist
- 9.2 t plate (6)

On the counterweight platform

- 2.3 t base plate (1)
- 2.3 t plate (2)
- 4.6 t blocks (3)

Version 3



For driving with axle loads up to 12 t

- Installed on the turntable
- 1.0 t plate (7) – or auxiliary hoist
 - 2.3 t plates (5) and (6)

- On the counterweight platform
- 2.3 t base plate (1)

Or, for the respective driving mode

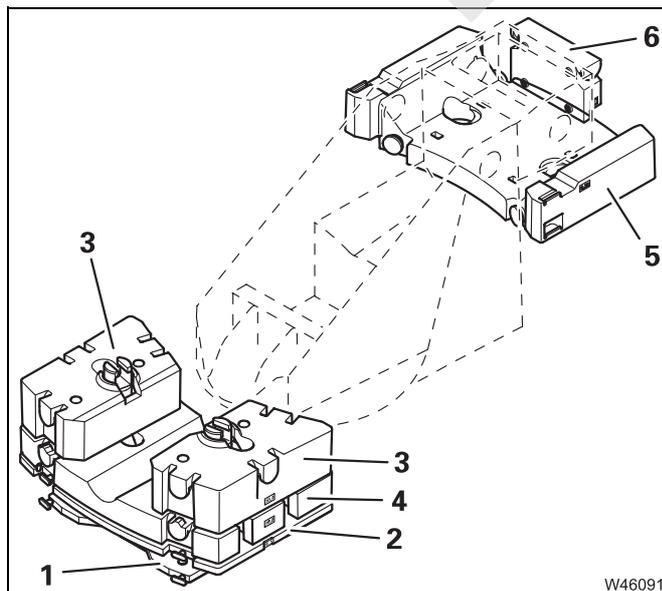
- 2.3 t base plate (1)
- 2.3 t plate (2)

Version 4



Risk of damage to the derricking cylinder!

Set down the counterweight sections displayed here at the most and make sure that the 4.6 t blocks are always lying on the very top on the 6.9 t plate. You thus prevent the derricking cylinder pressing against the counterweight section and being damaged when the main boom is set down.



For driving with 30.9 t (68,100 lbs) counterweight

The axle loads are over 12 t (26,500 lbs).

- Installed on the turntable
- 1.0 t plate (6) – or auxiliary hoist
 - 9.2 t plate (5)

- On the counterweight platform
- 2.3 t base plate (1)
 - 2.3 t plate (2)
 - 6.9 t plate (4)
 - 4.6 t blocks (3)

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12.7.11

Slewing with rigged counterweight

Slewing with a rigged counterweight is only permitted when:

- The necessary outrigger span is rigged,
- The current rigging mode is shown on the *RCL* display and
- The permissible working radius according to *Lifting capacity table* is maintained.



Danger of overturning when slewing with an incorrectly set RCL!

The RCL only disables slewing if you have entered the current rigging mode correctly and if the RCL is not overridden.

Before slewing, always check that the current rigging mode is shown on the *RCL* display.

This prevents slewing being enabled within impermissible ranges, which would cause the truck crane to overturn.



Risk of overturning when slewing during emergency operation!

Crane operations are not monitored by the RCL while the hand-held control is connected during emergency operation!

Various checks are therefore necessary, depending on the active slewing range type, before slewing in emergency operation; ■■■► p. 14 - 48.

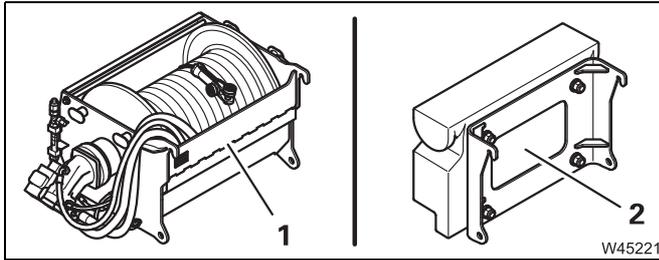
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12.8

Modifying the auxiliary hoist/1 t plate



The auxiliary hoist (1) or the 1 t plate (2) must always be installed on the turntable.



Risk of overturning while slewing!

The weight of the auxiliary hoist or the 1 t plate is always added automatically by the RCL. Therefore the 1 t plate or the auxiliary hoist must always be rigged for crane operation.

This prevents crane operation being enabled with an insufficiently heavy counterweight and prevents the truck crane overturning.

12.8.1

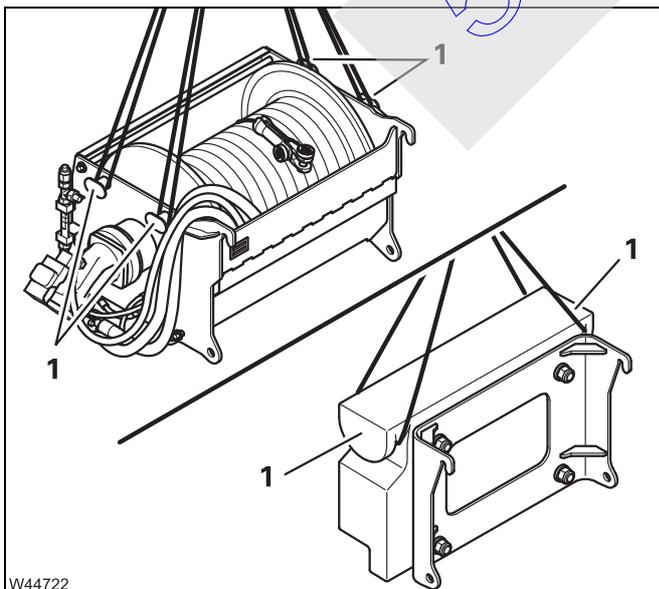
Slinging points



Risk of accidents if used improperly!

Attach parts only at the designated slinging points.

Always use suitable lifting gear with sufficient lifting capacity.



- Attach the parts at the slinging points (1).

Use suitable lifting gear with the same length, so that the parts hang at its centre of gravity.

12.8.2

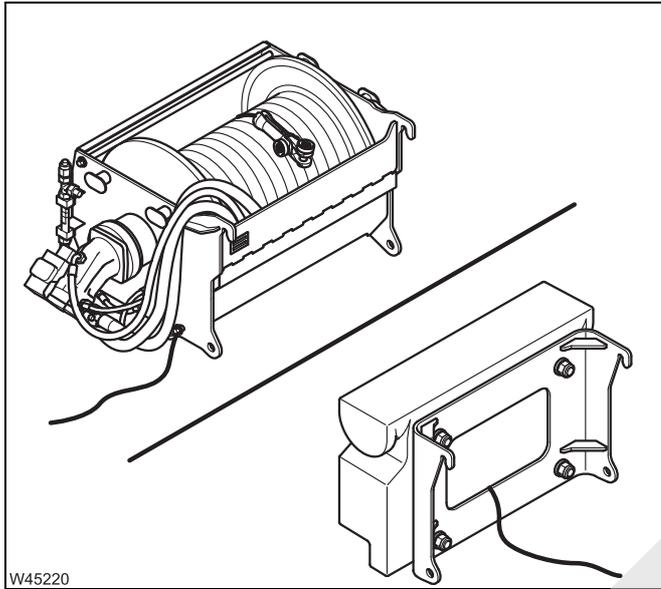
Securing with a guide rope



Risk of accidents due to swinging parts!

Always secure the parts with a guide rope before lifting parts or separating any connections.

This prevents you being caught or crushed by sections.



Auxiliary hoist

- Fasten the guide rope, e.g. to the rod at the bottom.

1 t plate

- Fasten the guide rope, e.g. to the frame.

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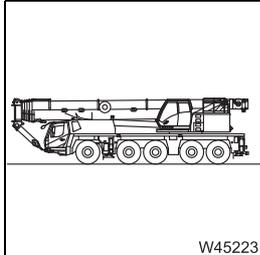
12.8.3

CHECKLIST: Conversion to the auxiliary hoist

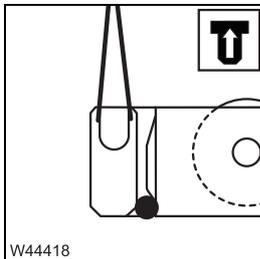


This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.

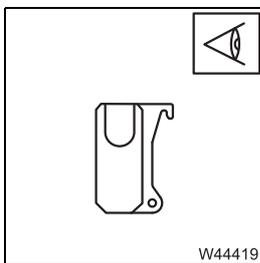
Observe the warnings and safety instructions given there!



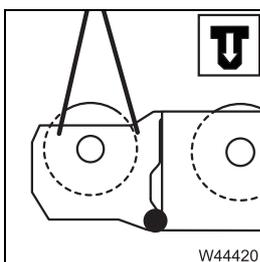
1. – The superstructure is slewed to the front.
– The main boom is resting in the boom rest.



2. – Sling 1 t plate and secure it with a guide rope.
Weight; ■■■▶ p. 1 - 13
■■■▶ *Slinging points*, p. 12 - 121
■■■▶ *Securing with a guide rope*, p. 12 - 122
– Separate the connection between 1 t plate and rotary table;
■■■▶ p. 12 - 131.

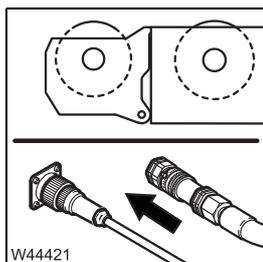


3. – Lift 1 t plate off and set it down.
– Remove the guide rope.
– Establish transport condition; ■■■▶ p. 12 - 132.

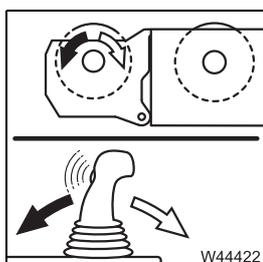


4. – Sling auxiliary hoist and secure it with a guide rope.
Weight; ■■■▶ p. 1 - 12
■■■▶ *Slinging points*, p. 12 - 121
■■■▶ *Securing with a guide rope*, p. 12 - 122
– Establish connection between auxiliary hoist and turntable;
■■■▶ p. 12 - 127.

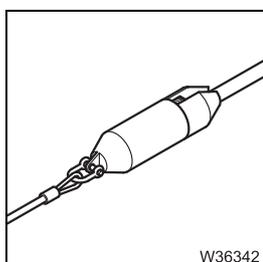




5. – Establish the hydraulic connections; ■■■▶ p. 12 - 128.
– Establish the electrical connections; ■■■▶ p. 12 - 129.
– Establish the connection to the central lubrication; ■■■▶ p. 12 - 130.



6. Check the auxiliary hoist for correct operation; ■■■▶ p. 12 - 133.

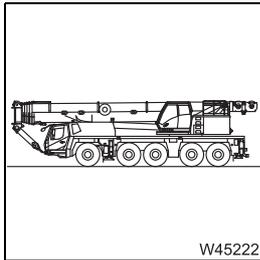


7. – Fit the hoist rope, using the rigging aid if necessary; ■■■▶ p. 12 - 134.
– Reeve the hoist rope; ■■■▶ p. 12 - 142.

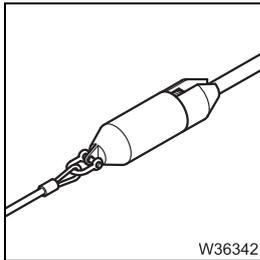
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12.8.4

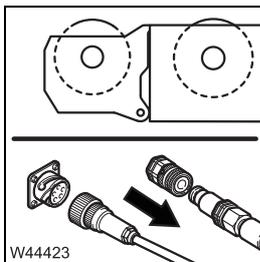
CHECKLIST: Switch over to installation on 1 t plate



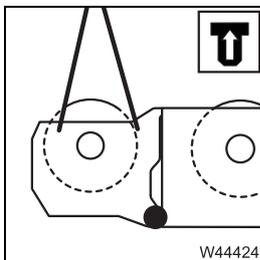
1. – The superstructure is slewed to the front.
– The main boom is resting in the boom rest.



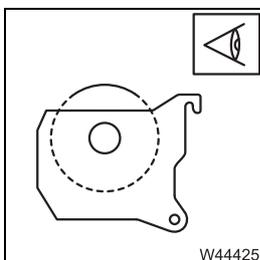
2. Wind on the auxiliary hoist rope, using the rigging aid if necessary;
 ▮▮▮▮ p. 12 - 134.



3. – Separate the hydraulic connections; ▮▮▮▮ p. 12 - 128.
– Separate the electrical connection; ▮▮▮▮ p. 12 - 129.
– Separate the connection to the central lubrication; ▮▮▮▮ p. 12 - 130

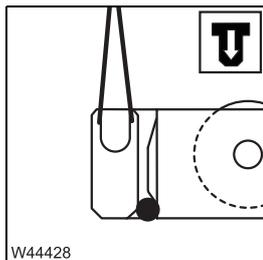


4. – Sling auxiliary hoist and secure it with a guide rope.
Weight; ▮▮▮▮ p. 1 - 12
 ▮▮▮▮ *Slinging points*, p. 12 - 121
 ▮▮▮▮ *Securing with a guide rope*, p. 12 - 122
– Disconnect connection between auxiliary hoist and turntable;
 ▮▮▮▮ p. 12 - 127.



5. – Lift the auxiliary hoist and set it down.
– Remove the guide rope.
– Establish transport condition; ▮▮▮▮ p. 12 - 132.





6. – Sling 1 t plate and secure it with a guide rope.

Weight; ■■■▶ p. 1 - 13

■■■▶ *Slinging points*, p. 12 - 121

■■■▶ *Securing with a guide rope*, p. 12 - 122

– Establish the connection between 1 t plate and rotary table;

■■■▶ p. 12 - 131.

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12.8.5

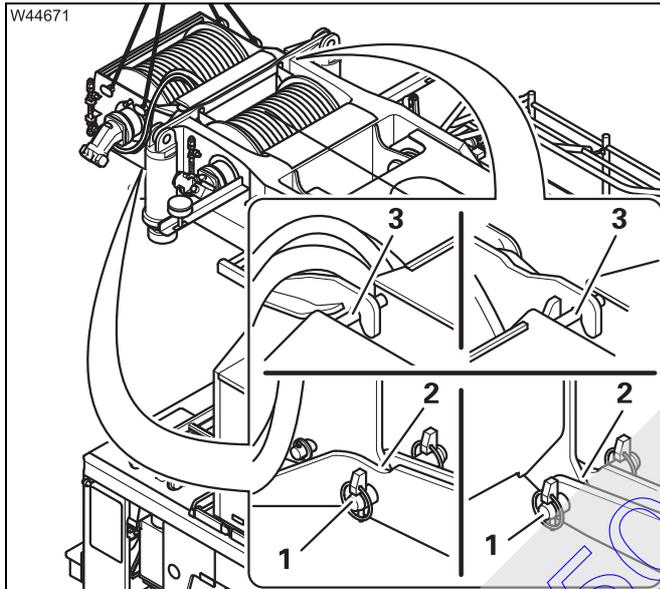
Establishing/separating the connection between auxiliary hoist and turntable



Risk of accidents due to swinging sections!

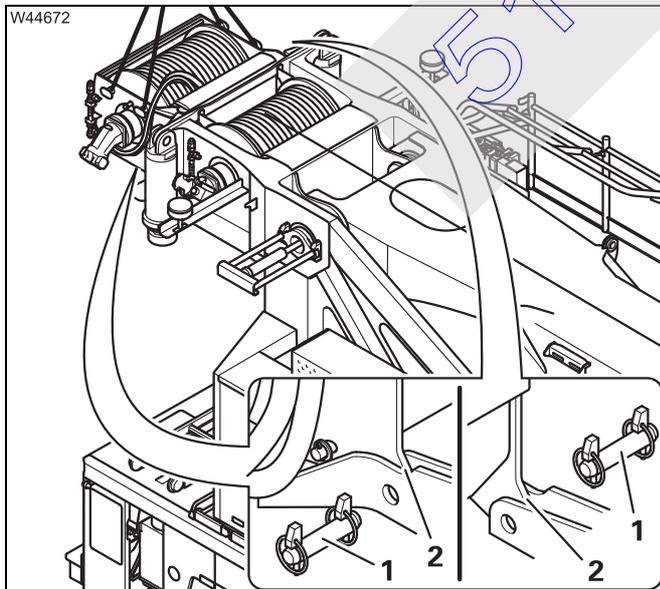
Always secure the sections with a guide rope from the ground before establishing or separating connections.

This prevents you being caught or crushed by sections.



Establishing the connection

- Suspend the auxiliary hoist in the connecting points (3) at the turntable.
- Lower the auxiliary hoist until the connecting points (2) are aligned.
- Insert the pins (1) and secure them.



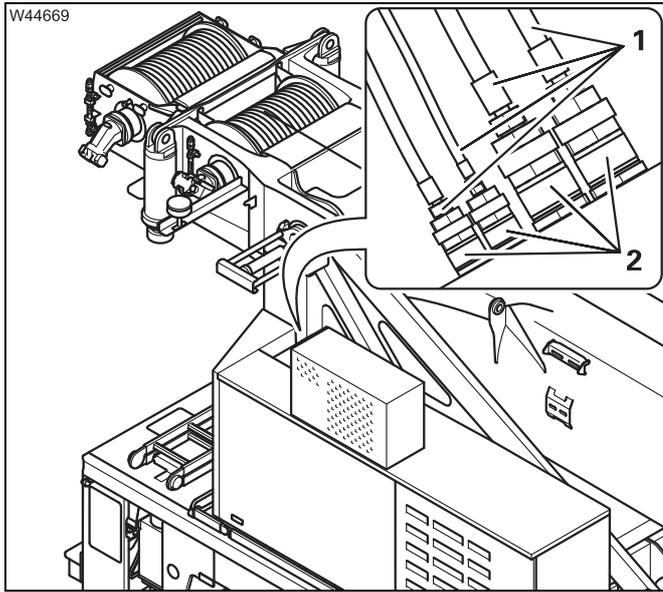
Removing the connection

- Attach the auxiliary hoist to an auxiliary crane.
- Remove the pins (1) from the connecting points (2).
- Lift the auxiliary hoist off the turntable.
- Lift the auxiliary hoist on to a separate vehicle;
▶▶▶ p. 12 - 132.

You will need the pins (1) to install the 1 t plate.

12.8.6

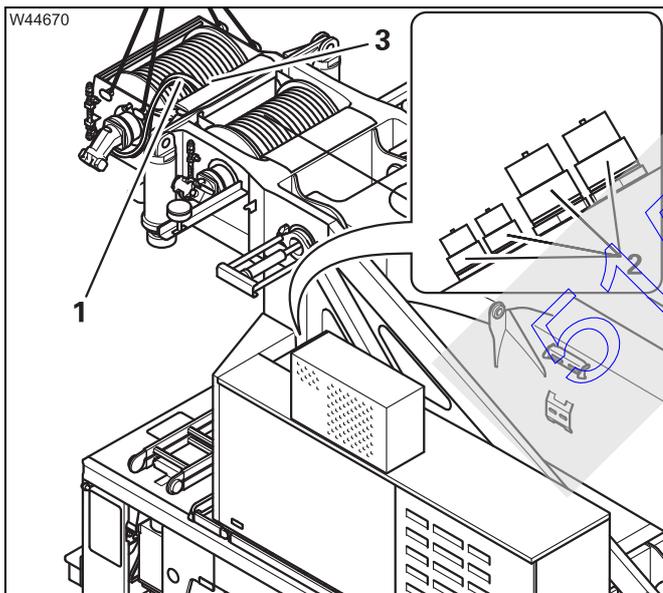
Establishing/separating the hydraulic connection



Establishing the connection

The assignment is given by the size and colour designations.

- Connect the hoses (1) to the connections (2).

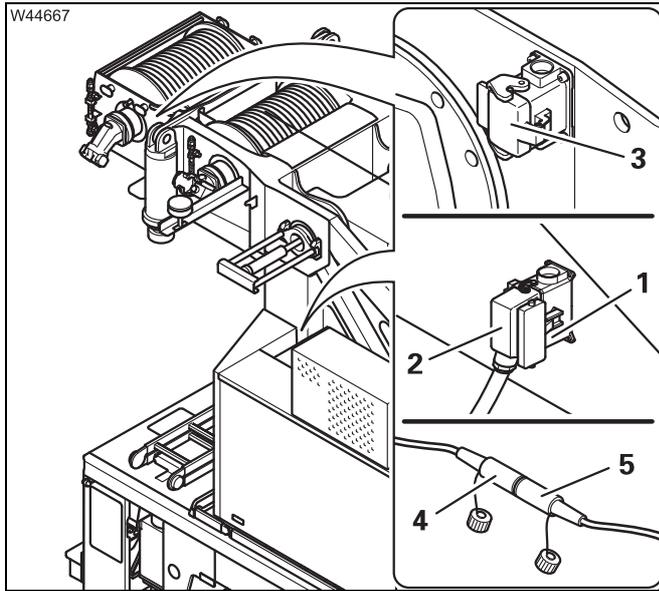


Removing the connection

- Remove the hoses (1) from the connections (2).
- Close all hoses and connections.
- Insert the hoses into the hoist frame (3).

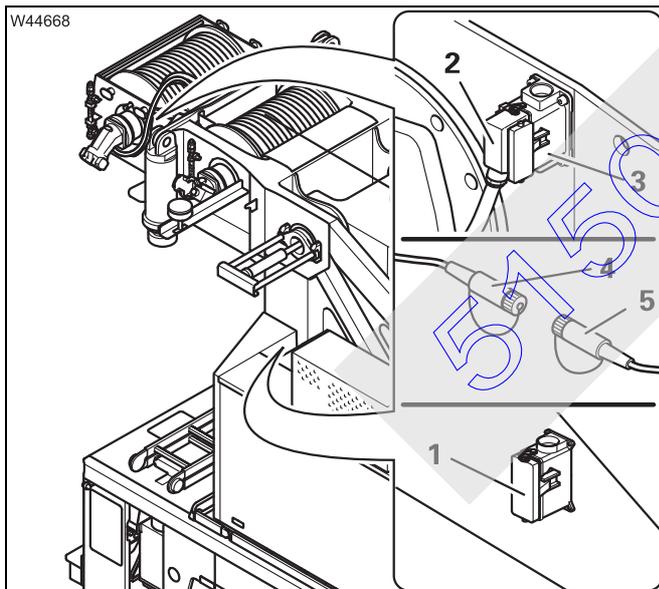
12.8.7

Establishing/separating electrical connections



Establishing connections

- Remove the plug (2) from the dummy socket (3) and plug it into the socket (1).
- Close the dummy socket (3).
- Insert the cable (4) for the hoist camera into the socket (5).

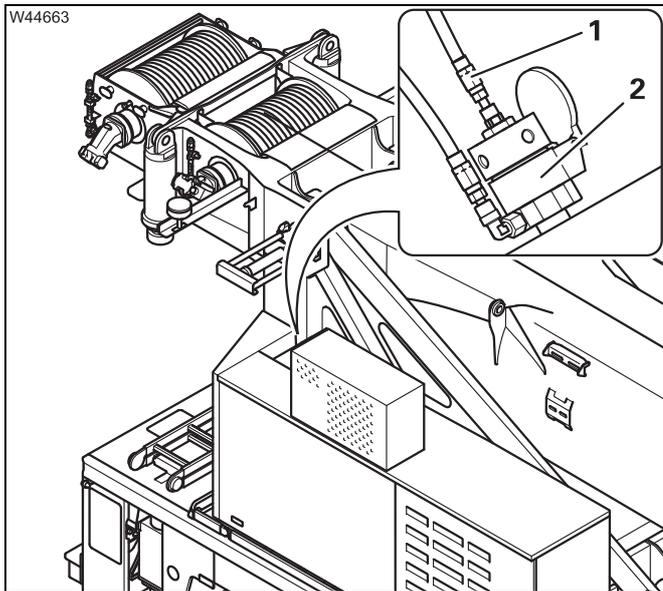


Separating the connections

- Remove the cable (4) for the hoist camera from the socket (5).
- Remove the plug (2) from the socket (1) and plug it into the dummy socket (3).
- Close the socket (1).
- Seal the cable (4) and the sockets (5) with the caps.
- Route the cables so that they are not caught during removal.

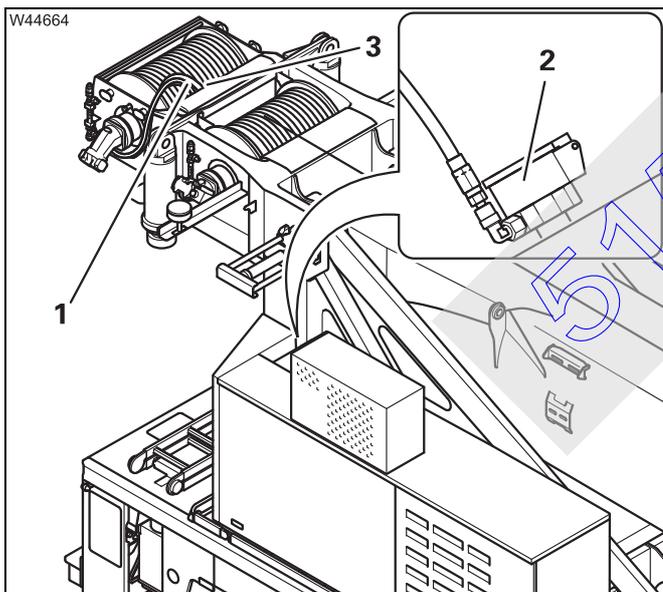
12.8.8

Establishing/separating the connection to the central lubrication



Establishing the connection

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



Removing the connection

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

12.8.9

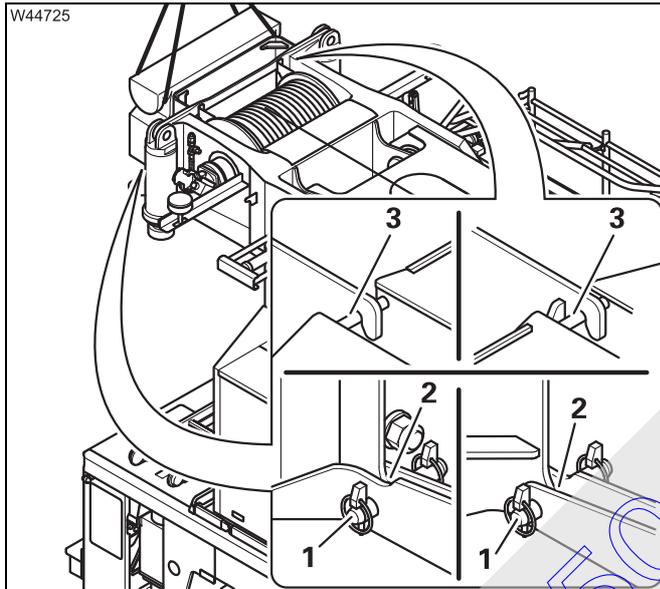
Establishing/separating the connection between 1 t plate and rotary table



Risk of accidents due to swinging sections!

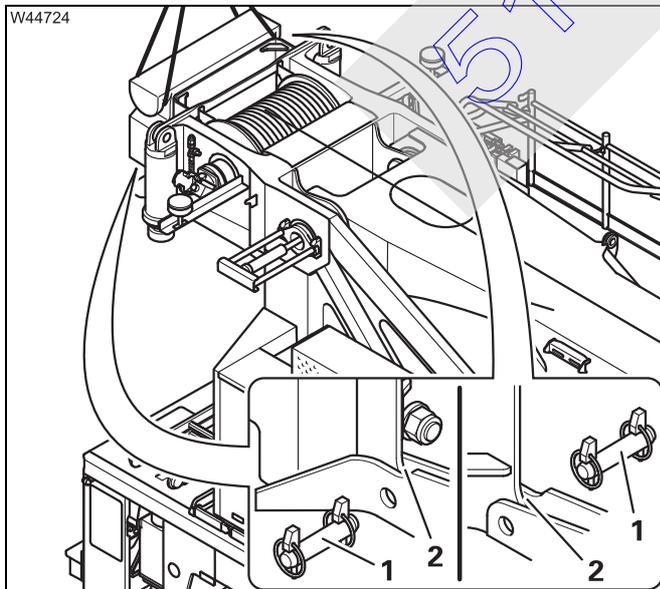
Always secure the sections with a guide rope from the ground before establishing or separating connections.

This prevents you being caught or crushed by sections.



Establishing the connection

- Attach the 1 t plate to the connecting points (4).
- Lower the 1 t plate until the connecting points (2) are aligned.
- Insert the pins (1) and secure them.



Removing the connection

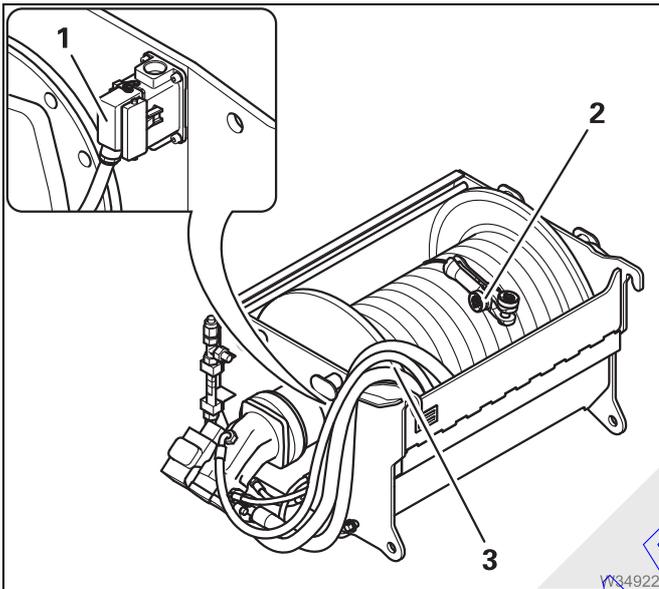
- Sling the 1 t plate to an auxiliary crane.
- Remove the pins (1) from the connecting points (2).
- Lift the 1 t plate off the turntable.
- Lift the 1 t plate on to a separate vehicle;
▶▶▶ p. 12 - 132.

You need the pins (1) to install the auxiliary hoist.

12.8.10

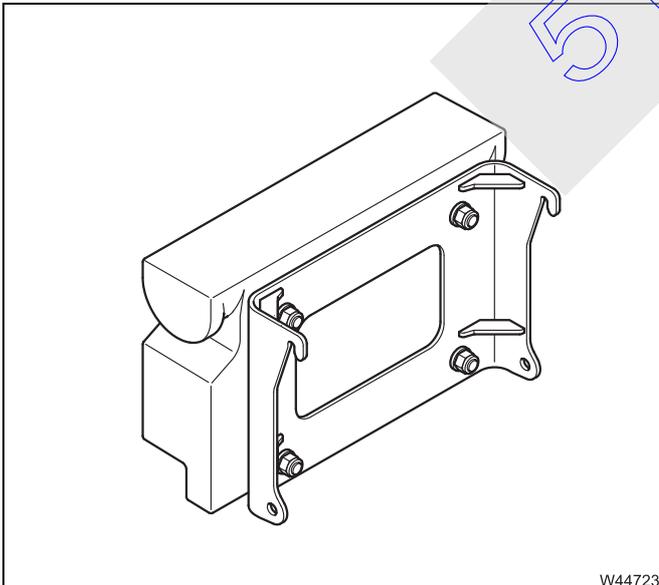
Transporting the auxiliary hoist/1 t plate

- For transport, only use a separate vehicle with sufficient load bearing capacity. Transport dimensions and weight;
 ▶ , p. 1 - 12.
 ▶ *Counterweight sections*, p. 1 - 13
- Load the separate vehicle in such a way that the weight is evenly distributed.
- Load the auxiliary hoist and the 1 t plate so that other traffic is not put at risk.



Auxiliary hoist

- Lift the auxiliary hoist on to the separate vehicle and remove the lifting gear.
- Check that the plug (1) is inserted into the dummy socket.
- Place the hoses and cables (3) to the side in such a way that they cannot be kinked.
- If necessary remove the rope end fitting (2).



1 t plate

- Lift the 1 t plate on to the separate vehicle and remove the lifting gear.

12.8.11 Checking the auxiliary hoist for correct operation

Slewing direction Check the slewing direction before attaching the hoist rope.



Risk of accidents due to incorrect slewing direction

Check after each installation that the slewing direction is correct.

This prevents accidents caused by the hoist rope being wound up unexpectedly when it is applied.

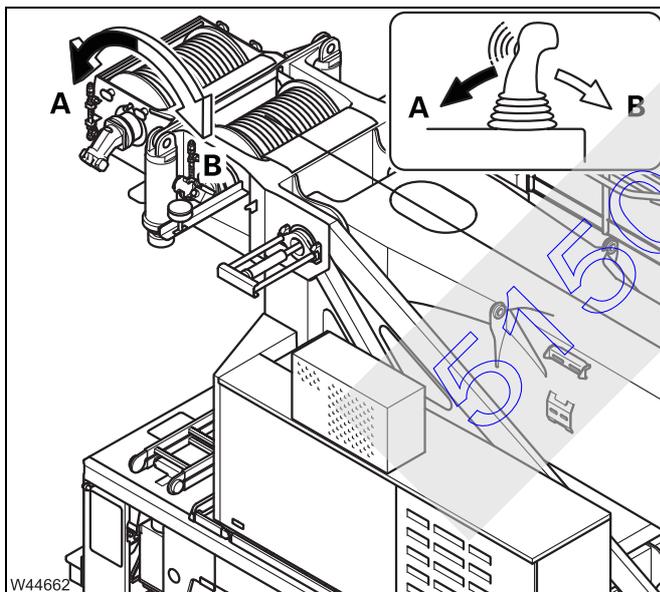


Danger due to slack rope!

Only run the auxiliary hoist briefly and at the lowest speed.

This prevents slack rope developing or the rope end clamp being pulled into the hoist frame.

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



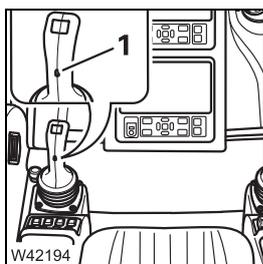
- Slowly perform the *Lift* and *Lower* movements – stop the movement as soon as the hoist drum turns.

• Check that the slewing direction is correct:

A Lifting

B Lowering

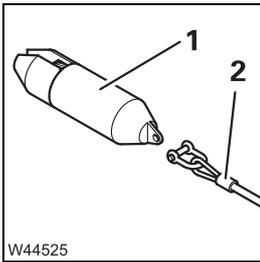
Slewing indicator Check the function of the slewing indicator when applying the hoist rope.



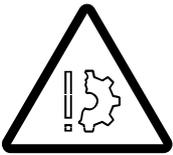
- You must feel a pulse on the slewing indicator (1) when the auxiliary hoist is rotating.
- If there is no pulse, contact **Grove Product Support**.

12.8.12

Rigging aid for the hoist rope

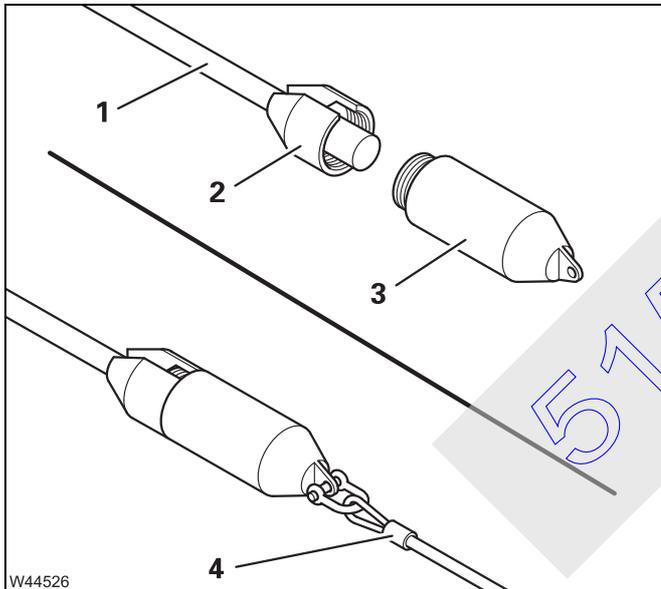


Depending on the equipment, the auxiliary hoist is provided with a rigging aid for the hoist rope. A connector (1) and a rope (2) belong to the rigging aid.



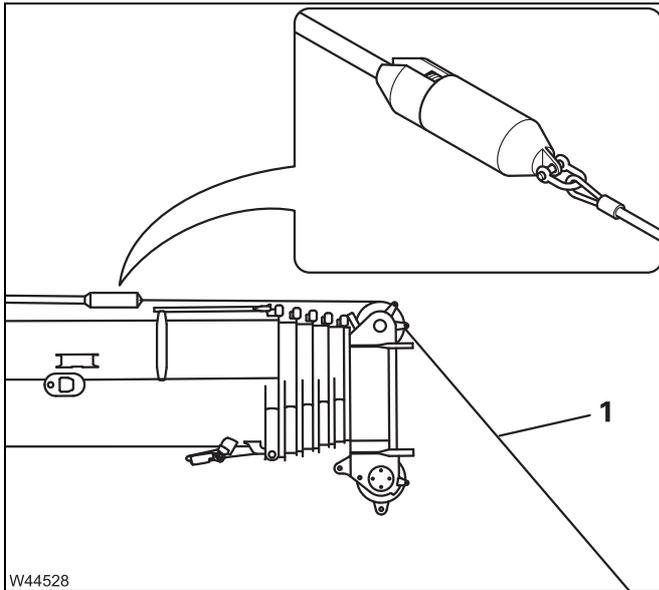
Risk of damage to the hoist rope!

Always rig the hoist rope with the rigging aid. This prevents slack rope. Rope loops will form, which can cause the load to slip and damage the hoist rope.



Establishing the connection

- Unscrew the part 3 out of part 2.
- Place the end of the hoist rope (1) in part 2.
- Screw the part 3 into part (2).
- Attach the rope (4) to the part 3.



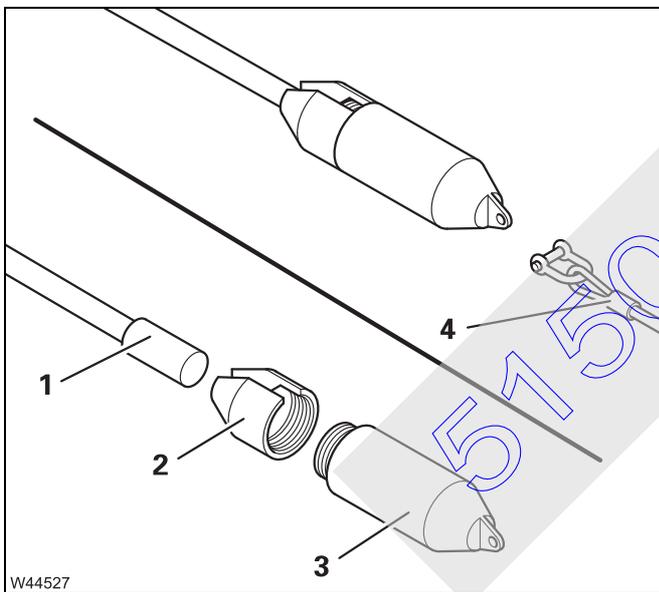
Rigging the hoist rope

– When rigging

- Guide the rope (1) over the main boom and over the upper head sheaves.
- Slowly unreel the hoist rope.
- Use the rope (1) to keep the hoist rope tensioned so that no slack rope occurs.

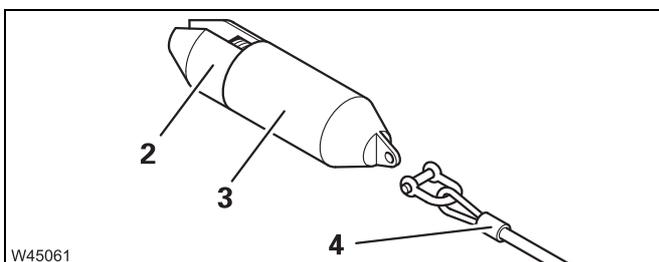
– When unrigging

- Slowly reel in the hoist rope.
- Use the rope (1) to keep the hoist rope tensioned so that no slack rope occurs.



Removing the connection

- Remove the rope (4).
- Unscrew the part 3 out of part 2.
- Remove the hoist rope (1) from the part 2.
- Screw the part 3 into part (2).



- Screw the part 3 into part (2).
- Stow away the parts (2) to (4) so that safe driving is ensured.

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12.9

Rigging work on the main boom

12.9.1

Hook block on the bumper

When the hook block is transported on a separate vehicle;  p. 12 - 139.

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.

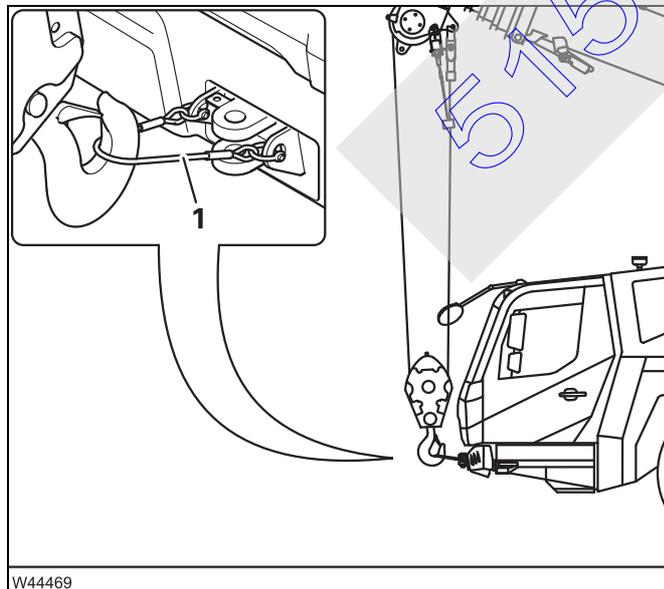
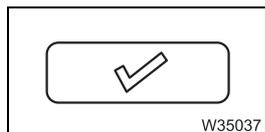


Risk of accidents if the view is obstructed!

Have someone instruct you when raising the main boom, since the view of the hook block is obstructed. This way you will not raise the boom too far, which would cause the retaining rope to tear.

The main boom is fully retracted.

- Enter and confirm the current rigging mode.



- 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.
- Disconnect the hook block from the retaining rope (1).



Attaching the hook block

Depending on the driving mode, you can attach the hook block to the front bumper;  *Driving modes*, p. 6 - 1.



Risk of accidents 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 be reeved no more than 4-fall when driving on the road.

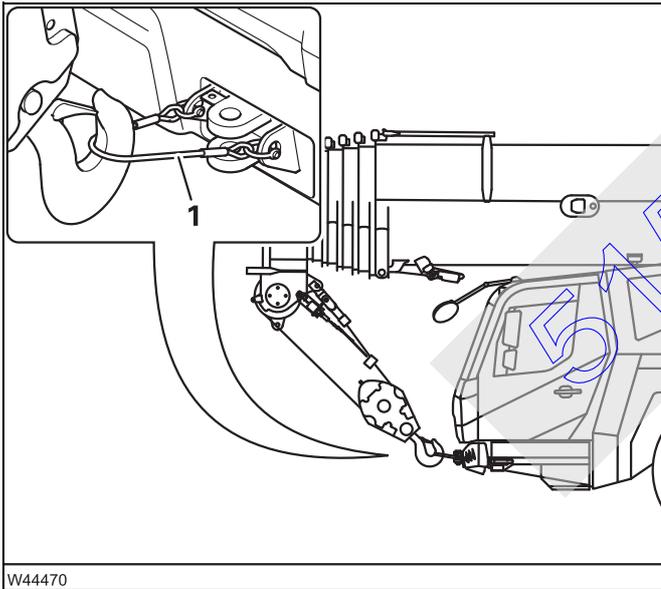


Risk of accidents from the hook block swinging unexpectedly!

The hook block will suddenly swing **forwards** 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 clamp 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 on to 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 - 85.

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 - 119.



Danger of overturning when slewing with an overridden RCL!

Do not override the RCL before slewing the superstructure.

If slewing is not enabled, for the *Standard* slewing range type enter a rigging mode for the 360° working range or for the *MAXbase* slewing range type enter a working radius for which slewing is enabled.

This prevents slewing into impermissible areas and the truck crane tipping over as a result.



Risk of damage to the separate vehicle!

Only lift the hook block off the separate vehicle when the main boom head is vertically above the hook block!

This prevents the hook block swinging and damaging the separate vehicle.



Risk of damage to the hoist rope!

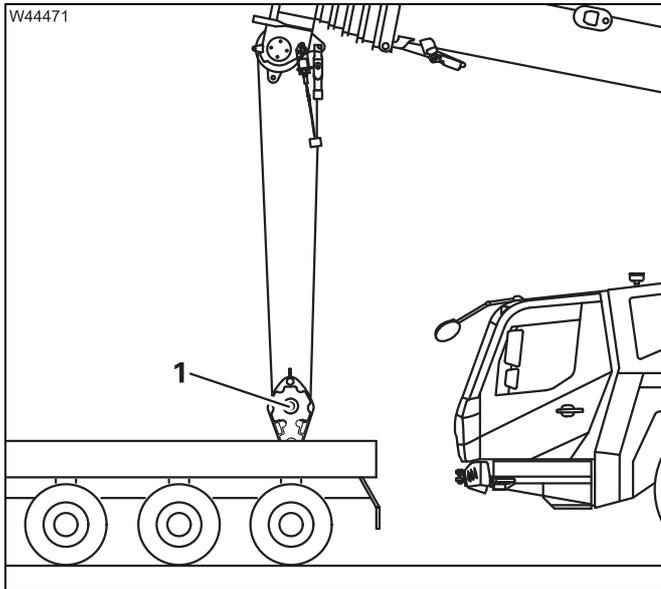
To prevent slack rope, do not slacken too much hoist rope when picking up and reeving the hook block!

Slack rope causes rope loops on the hoist drum, which can result in the load slipping and the hoist rope being damaged!



Picking up the hook block

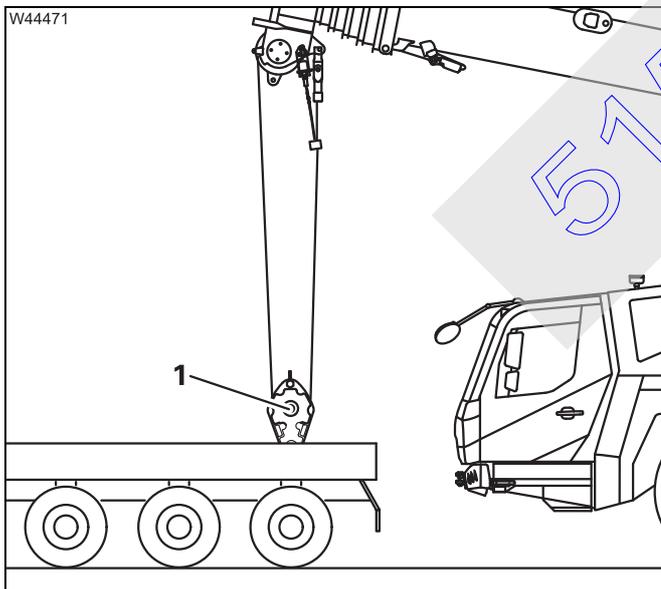
Depending on the driving mode, the hook block can be placed on a separate vehicle;  *Driving modes*, p. 6 - 1.



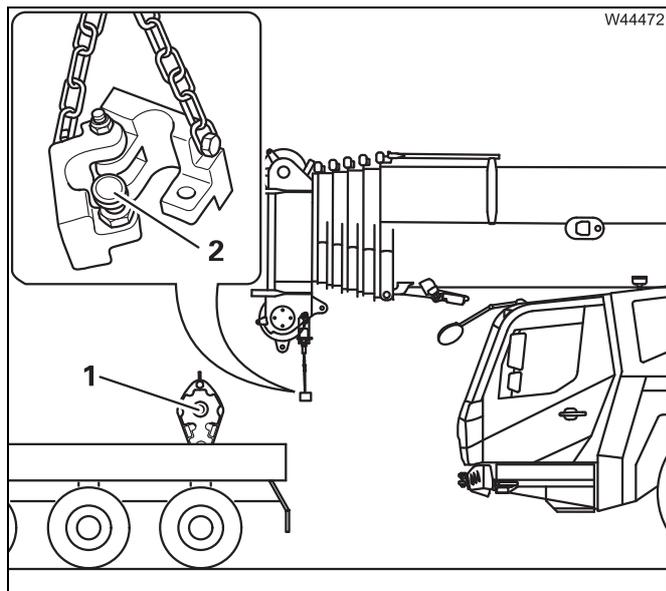
- If the respective setting has been made at the RCL, slew the superstructure and lower the main boom until the boom head is vertically above the hook block (1).
- Unreel the hoist rope.
- Reeve the hoist rope into the hook block (1);  *Reeving and unreeving the hoist rope*, p. 12 - 142.
- Raise the 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.



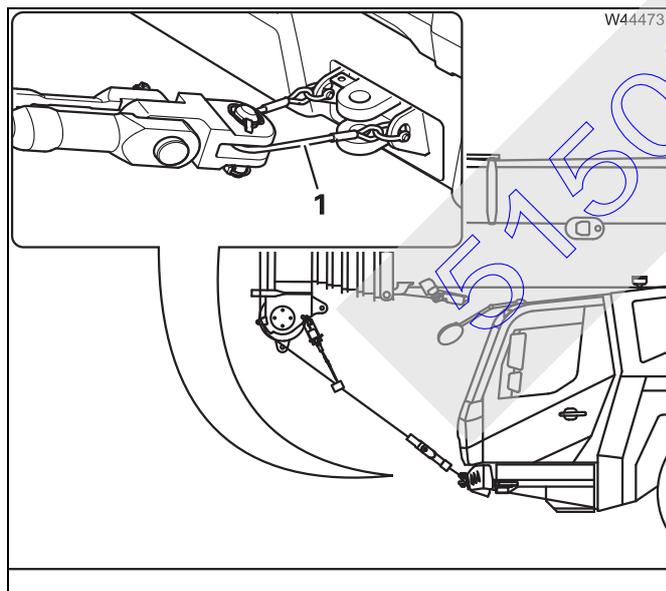
- With the RCL set accordingly, fully retract the main boom.
- Raise the hook block until it is about 1 m (3.3 ft) below the main boom.
- Lower the main boom and set the hook block (1) down on the separate vehicle.



- Remove the lifting limit switch weight (2) from the hoist rope; ▮▮▮▮ p. 12 - 161.
- Unreeve the hoist rope; ▮▮▮▮ p. 12 - 149.
- 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 clamp to the front towing coupling! The towing coupling must be free for a tow-rod in emergencies.



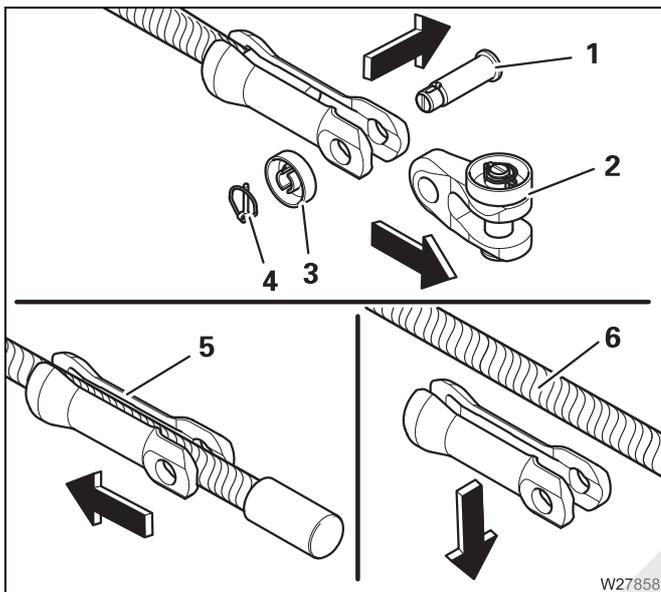
- Attach the rope end clamp to the retaining rope (1).
- Pull the hoist rope taut slightly.
- Fasten the lifting limit switch weight to the hoist rope.

The hoist rope and lifting limit switch weight are now secured for driving.

12.9.3 Reeving and unreeving the hoist rope

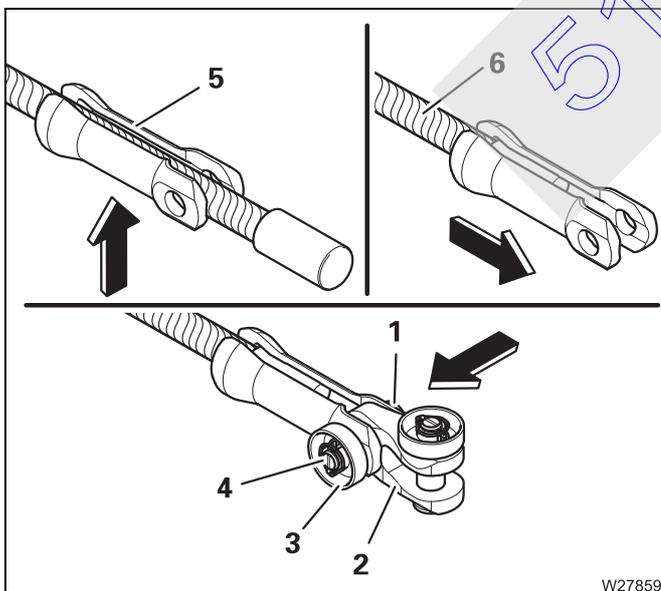
You must reeve a certain number of rope lines, depending on the required load bearing capacity. Four reeved rope lines correspond, for example, to 4-fall reeving;  Possible reevings on the main boom, p. 12 - 150.

To reeve and unreeve the hoisting rope, you must remove the pocket lock. After reeving you must reattach the pocket lock.



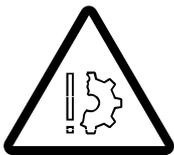
Removing

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



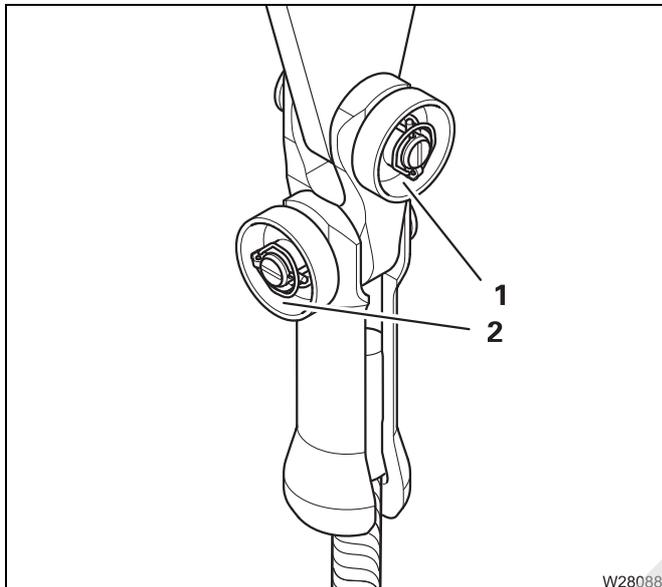
Positioning

- Insert the pocket lock (5) and push it on to the hoist rope as far as it will go (6).
- Fasten the bracket (2) to the pocket lock (5) using the pin (1).
- Turn the locknut (3) on the pin (1) as far as it will go and then turn it back half a turn.
- Insert the linchpin (4).



Risk of damage to the hoist rope!

Always install the pocket lock as described in the following paragraph. This will prevent the hoist rope rubbing against the locknut and being damaged.



Fastening the pocket lock to the main boom

- Fasten the pocket lock to the fixed point of the main boom in such a way that
 - the locknut (1) faces outwardsand
 - the locknut (2) faces forwards in the driving direction.



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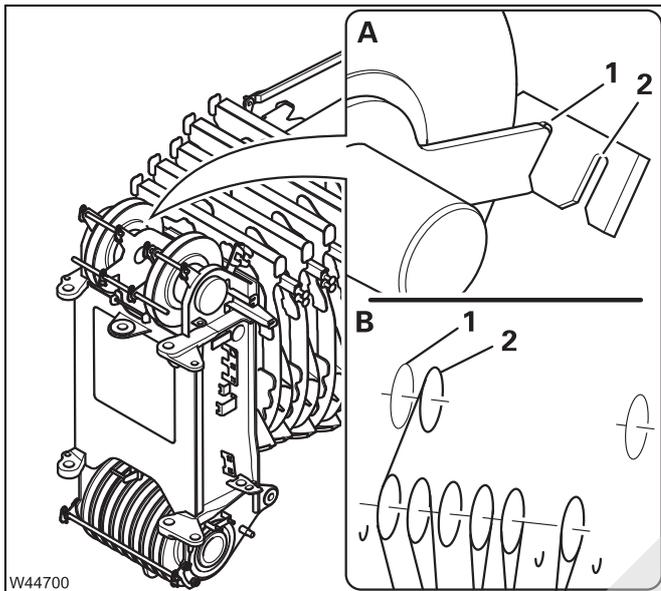
Reeving the hoist rope

Depending on the equipment, you can use the rigging aid for fitting the hoist rope if necessary; ▶▶▶▶ p. 12 - 134.



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.



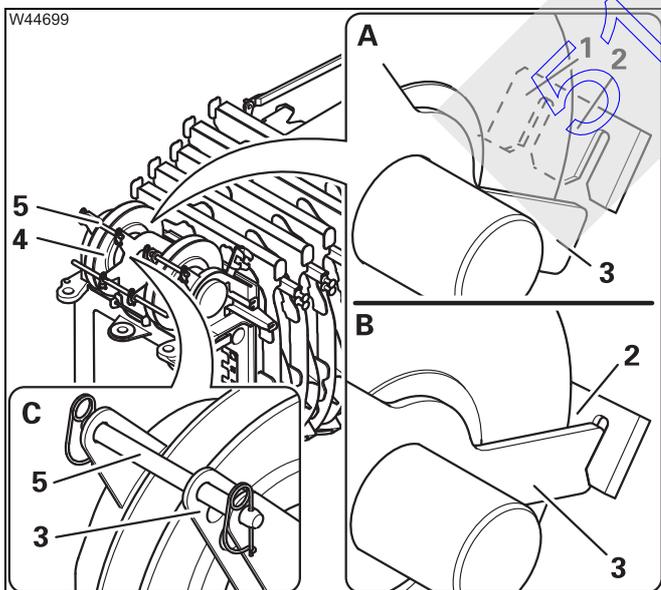
Adjusting the head sheave

(A) – The head sheave can be adjusted into two different positions (1) and (2).

The required position depends on the reeving.

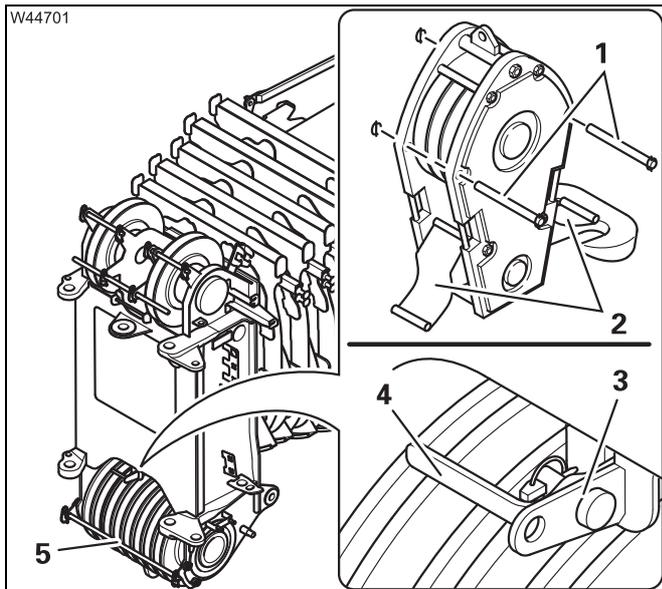
(B) – The reeving images show the head sheaves in the positions (1) and (2); ▶▶▶▶ *With 8 head sheaves*, p. 12 - 153.

The head sheave must always be adjusted into the position via which the hoist rope will run – e.g. into position (2).



Adjusting the head sheave

- (A) – Pull the rod (5) out.
- Turn the lever (3) so that it is located below the cutouts (1) or (2).
- (B) – Push the head sheave (4) into the required position – e.g. into position (2).
- Turn the lever (3) into the corresponding cutout – e.g. into cutout (2).
- (C) – Plug in the rod (5) and secure it – make sure that the rod is inserted through the lever (3).

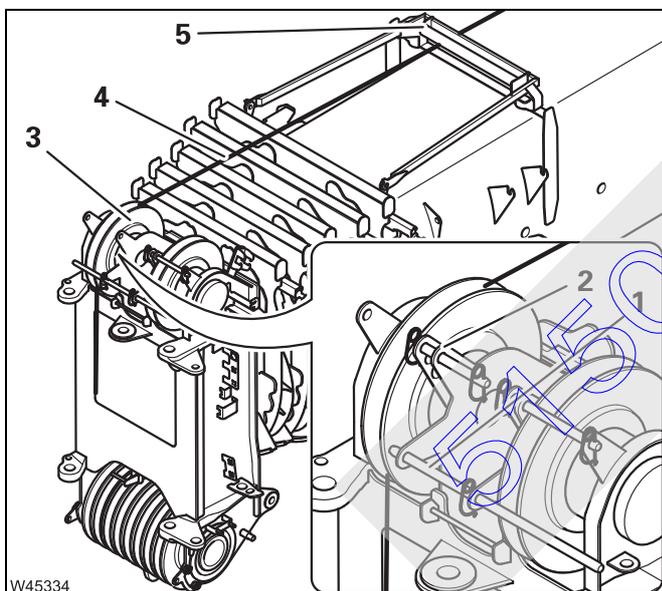


Opening the hook block

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

Rods for the rope guide

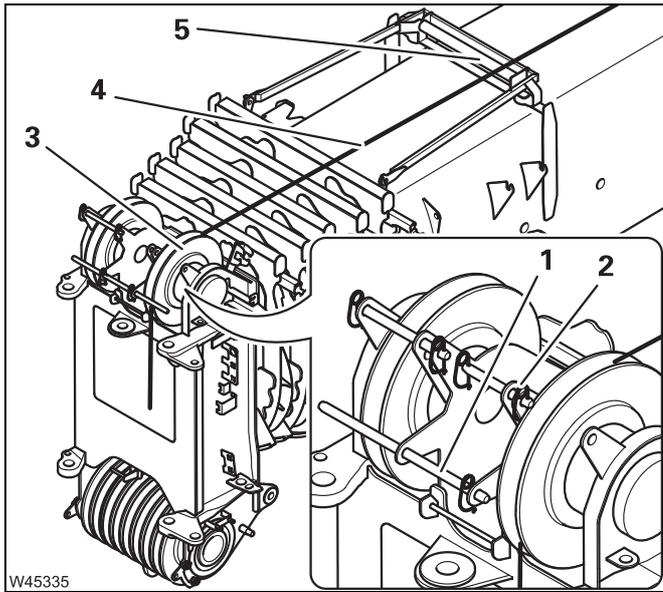
- Remove the rod (5).
- Remove the pin (3) and push the locking bar (4) to the rear.
- Insert the pin (3) and secure it.



- For the main hoist rope

- Push the rod (1) to the side and secure it.
- Push the rod (2) to the side and secure it.
- Guide the main hoist rope (4) **under** the rope grab (5).
- Guide the hoist rope over the head sheave (3).





– For the auxiliary hoist rope

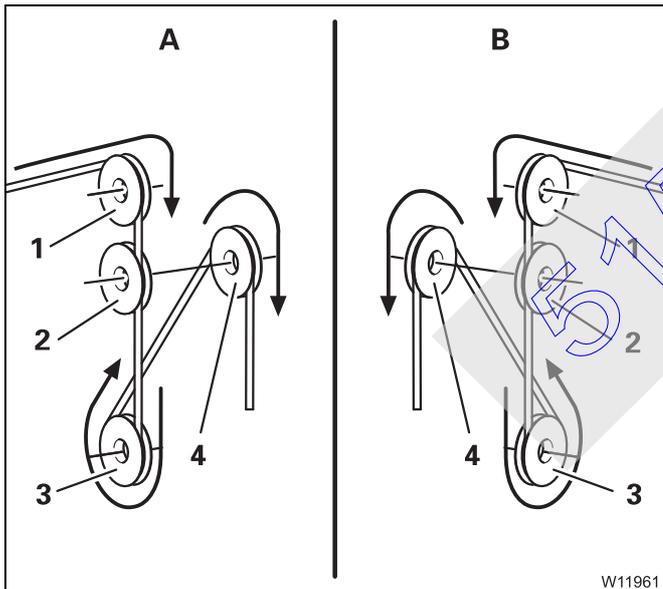
- Push the rod (1) to the side and secure it.
- Push the rod (2) to the side and secure it.
- Guide the auxiliary hoist rope (4) **under** the rope grab (5).

If two hoist ropes are reeved, you must feed the auxiliary hoist rope (4) **over** the rope grab.

- Guide the auxiliary hoist rope over the head sheave (3).



Also use the rope grab when working with the lattice extension.



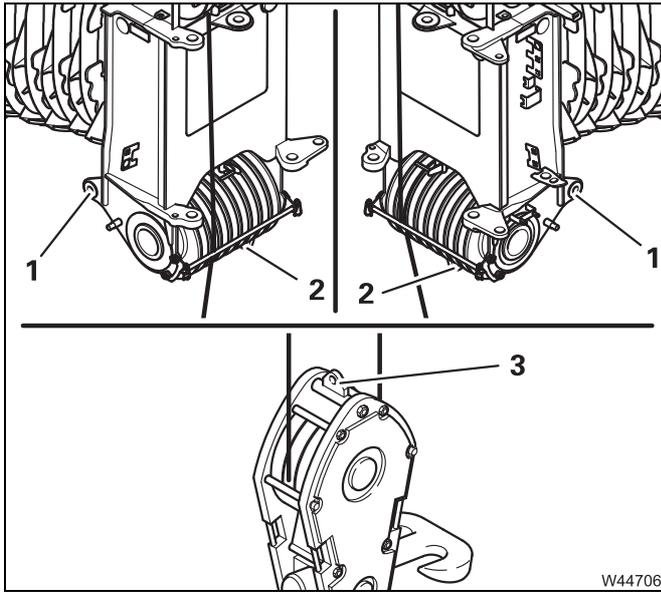
Reeving the hoist rope

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 sheave (3) of the hook block, up to the main boom head.
- Guide the hoist rope from the rear over the next required lower head sheave (4), etc.
- Reeve the hoist rope with the required number of lines.

Possible reevings; ||||► p. 12 - 150.



Fastening the hoist rope

The fixed point used depends on the number of reeved rope lines.

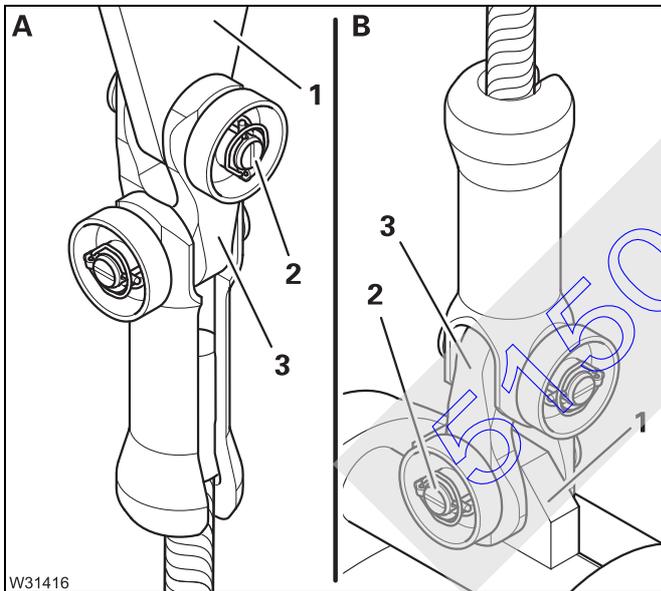
The fixed point (2) in the centre for the equipment with 6 head sheaves.

– Fixed point for an even number of lines

The rope end clamp is fastened to a fixed point (1) or to a fixed point (2) for 2-fall, 4-fall, 6-fall reevings, etc.

– Fixed point for an odd number of lines

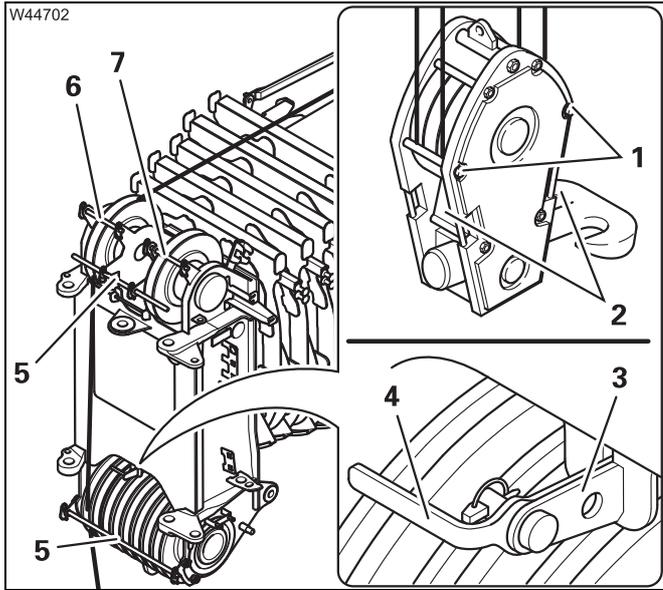
The rope end clamp is fastened to the fixed point (3) for 1-fall, 3-fall, 5-fall reevings etc.



– Rope end fitting

- Fasten the rope end fitting (3) using the pin (2).
(A) – If there are an even number of lines at a fixed point (1) of the main boom head.
(B) – If there are an odd number of lines at a fixed point (1) of the hook block.
- Secure the pin (2) with the safety hinged pin.



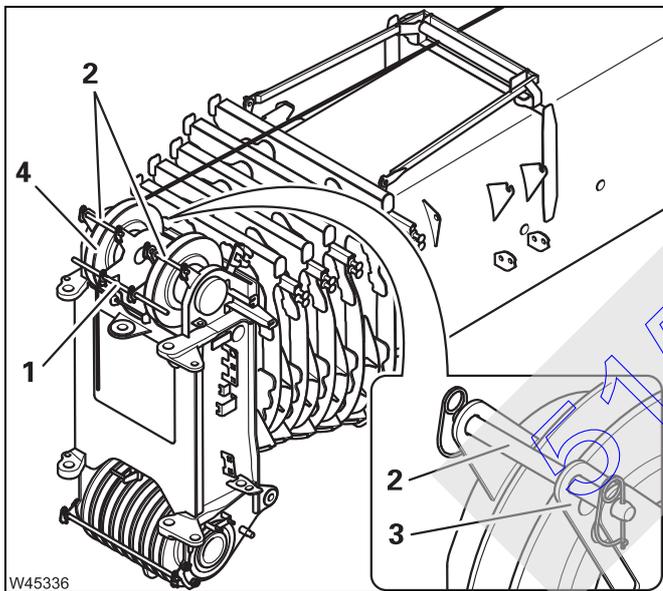


Closing the hook block

- Fold up the plates (2) on both sides.
- Insert the rods (1) and secure them.

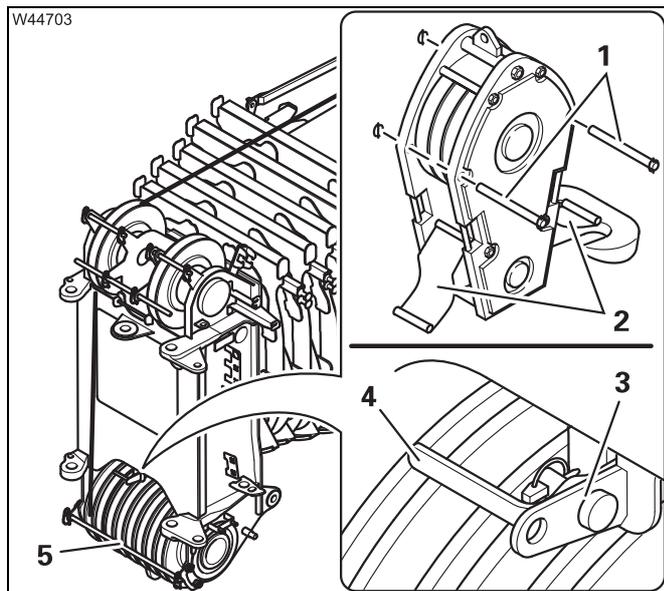
Securing the hoist rope

- Insert the rod (5) and secure it.
- Remove the pin (3) and pull the locking bar (4) to the front.
- Insert the pin (3) and secure it.



- Push the rod (1) to the centre and secure it.
- Insert the rods (2) and secure them.
- Make sure that the rod (2) is inserted through the lever (3) to prevent the head sheave (4) being misaligned.

Unreeving the hoist rope

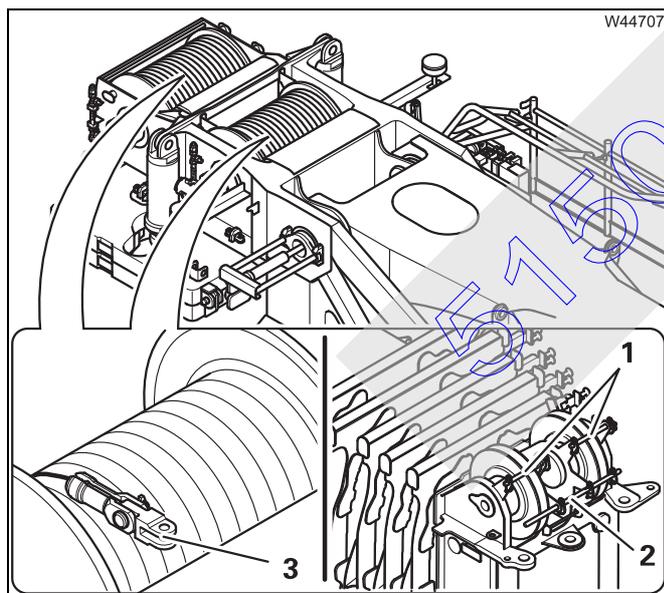


Opening the hook block

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

Unreeving the hoist rope

- Remove the rod (5).
- Remove the pin (3) and push the locking bar (4) to the rear.
- Insert the pin (3) and secure it.
- Unreeve the hoist rope.



Depending on driving mode

– Fastening the hoist rope to the bumper

► p. 12 - 141

or

– Wind on the hoist rope

- Remove the required rod (1).
- Push the rod (2) to the side and secure it.
- Wind on the hoist rope (3) and secure it.

12.9.4 Possible reevings on the main boom

Possible reevings on lattice extensions and the auxiliary single-sheave boom top;
▣▣▣▣ ▣▣▣▣ *Lattice extension operating manual.*



The maximum lifting capacity is specified in the supplied *Lifting capacity table*.

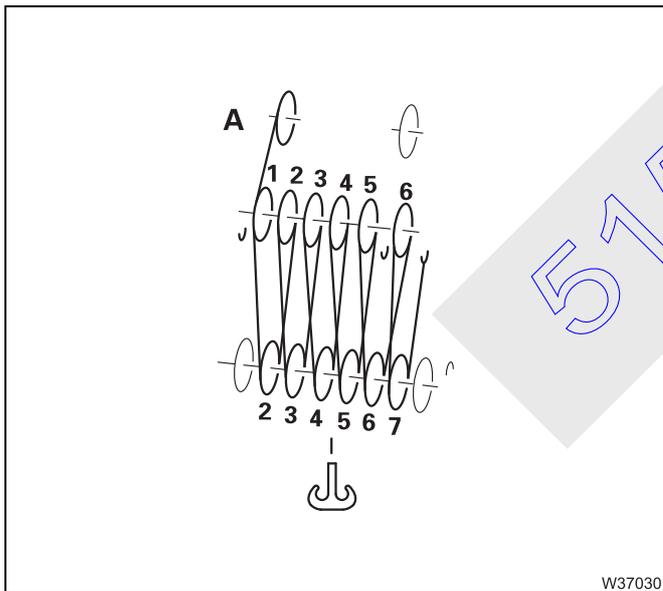


If the purpose and the rigging mode permit this, you should then select a 4-fall reeving compared to a 3-fall reeving. This reduces the rope twist and extends the period of operation of the hoist rope until it reaches discard condition.

With 6 head sheaves

If there are 8 head sheaves; ▣▣▣▣ ▣▣▣▣ p. 12 - 153.

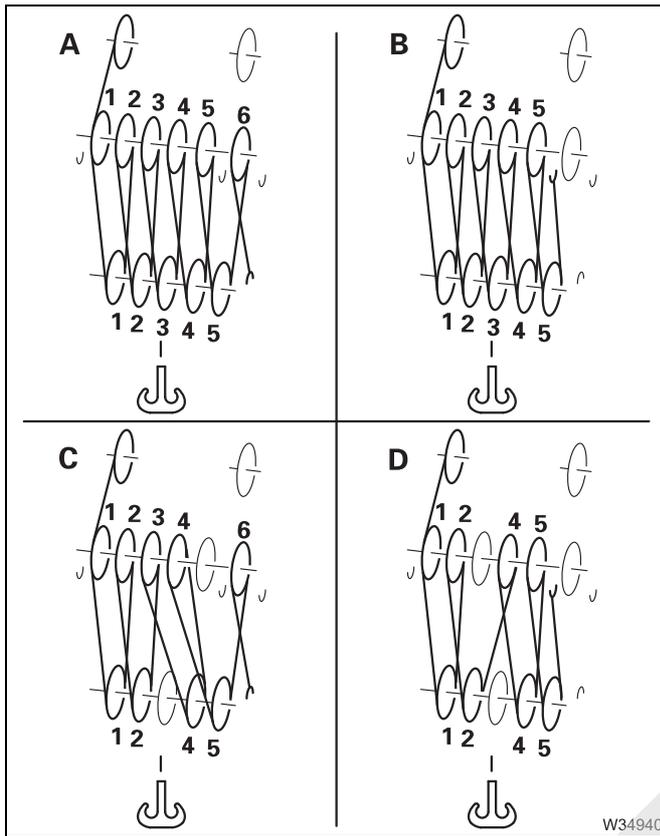
If there are 9 head sheaves; ▣▣▣▣ ▣▣▣▣ p. 12 - 157.



8-sheave hook block

Reeving

A 12-fall

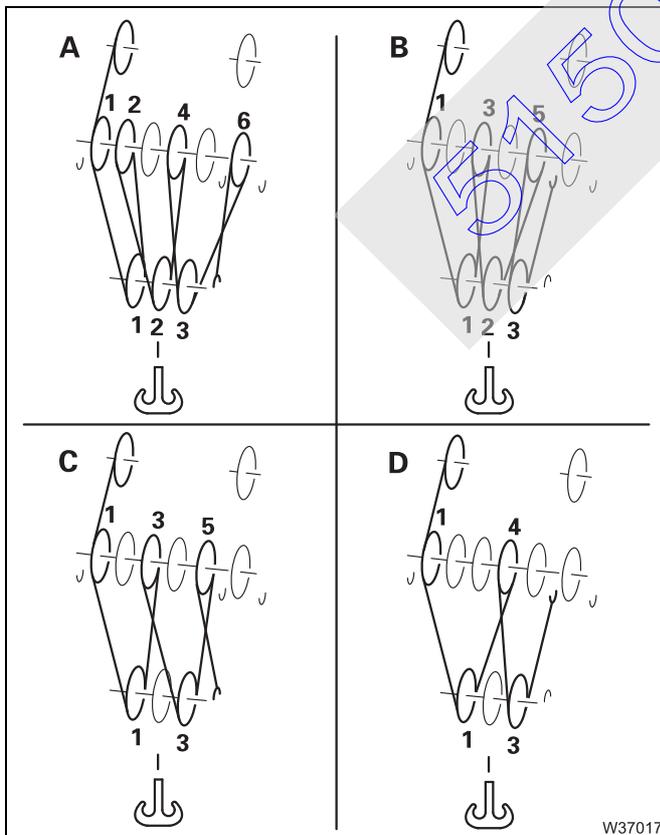


5-sheave hook block

Reeving

- A** 11-fall
- B** 10-fall
- C** 9-fall
- D** 8-fall

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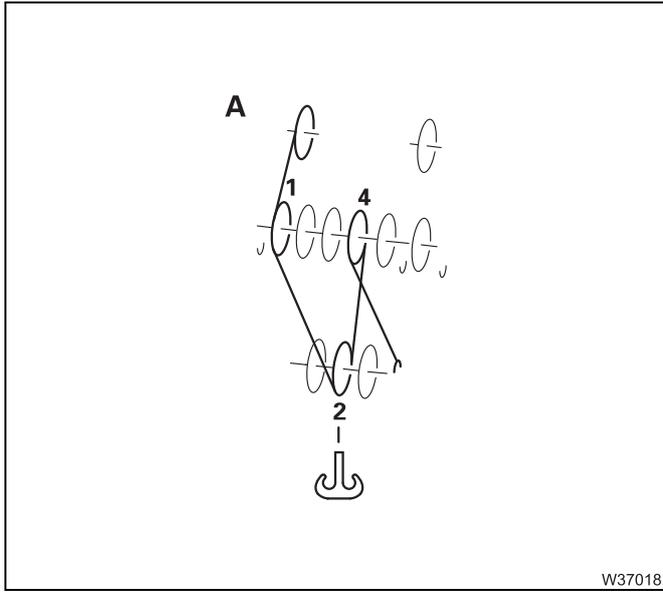
3-sheave hook block

Reeving

- A** 7-fall
- B** 6-fall
- C** 5-fall
- D** 4-fall

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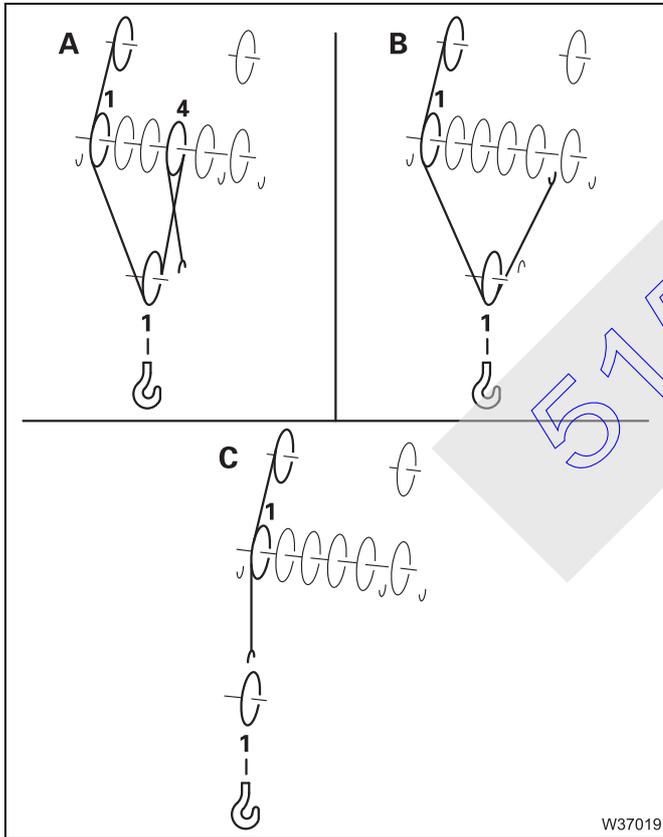




3-sheave hook block

Reeving

A 3-fall



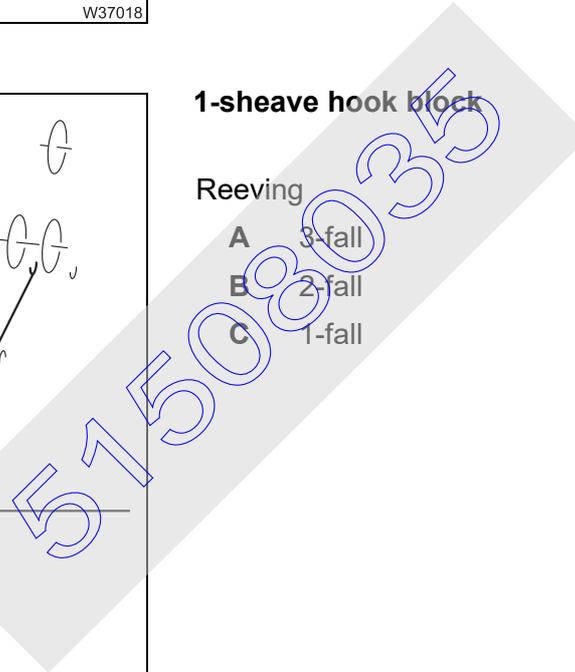
1-sheave hook block

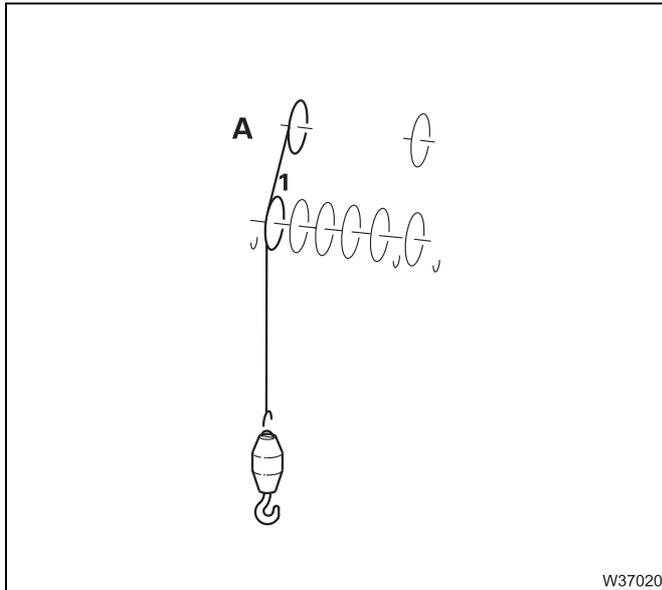
Reeving

A 3-fall

B 2-fall

C 1-fall





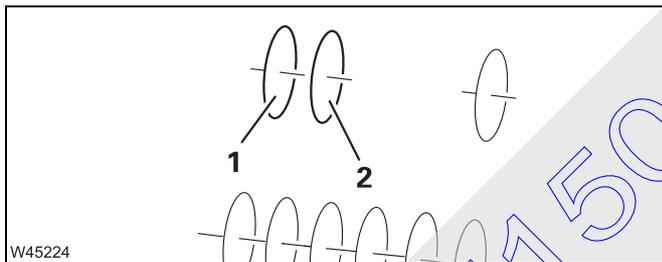
Hook tackle

Reeving

A 1-fall

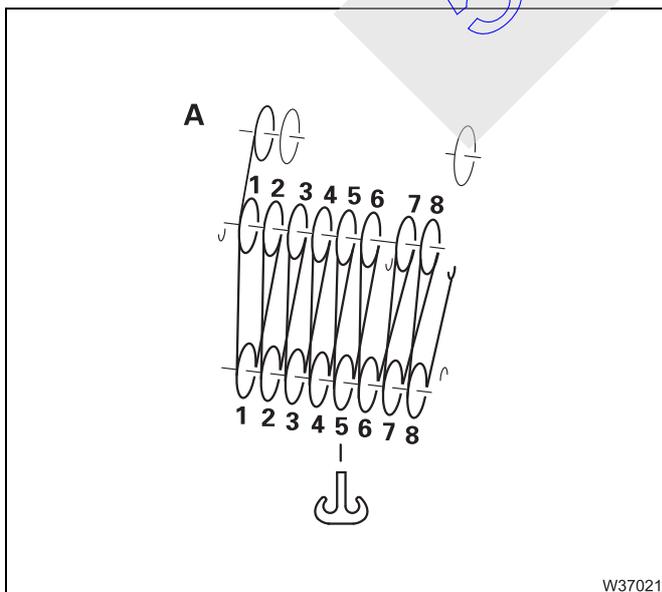
With 8 head sheaves

With additional equipment, there may be 8 head sheaves.
 ■■■► *With 6 head sheaves, p. 12 - 150.*



Depending on the reeving, you must place the head sheave in position (1) or (2) as shown in the reeving images in this section;

■■■► *Adjusting the head sheave, p. 12 - 144.*



8-sheave hook block

Reeving

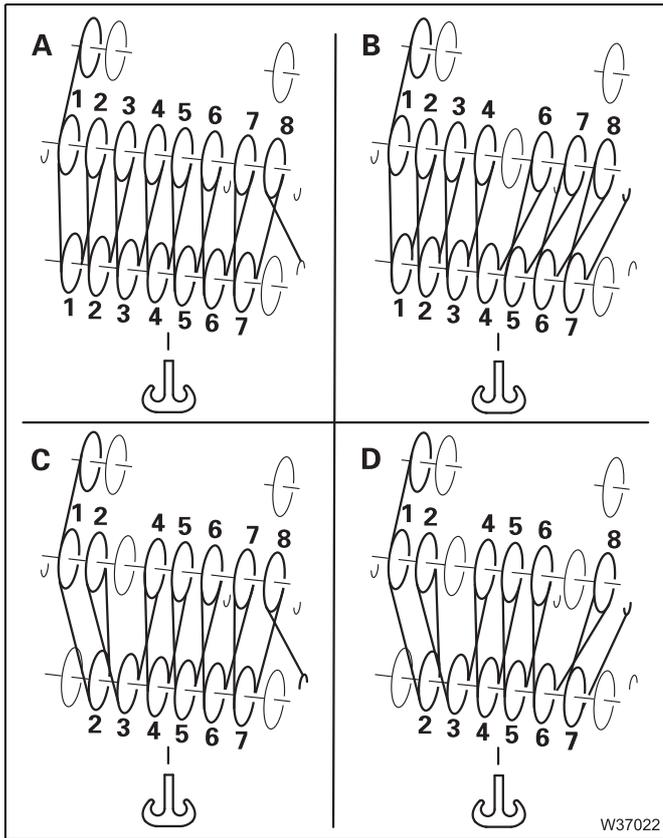
A 16-fall



8-sheave hook block

Reeving

- A** 15-fall
- B** 14-fall
- C** 13-fall
- D** 12-fall

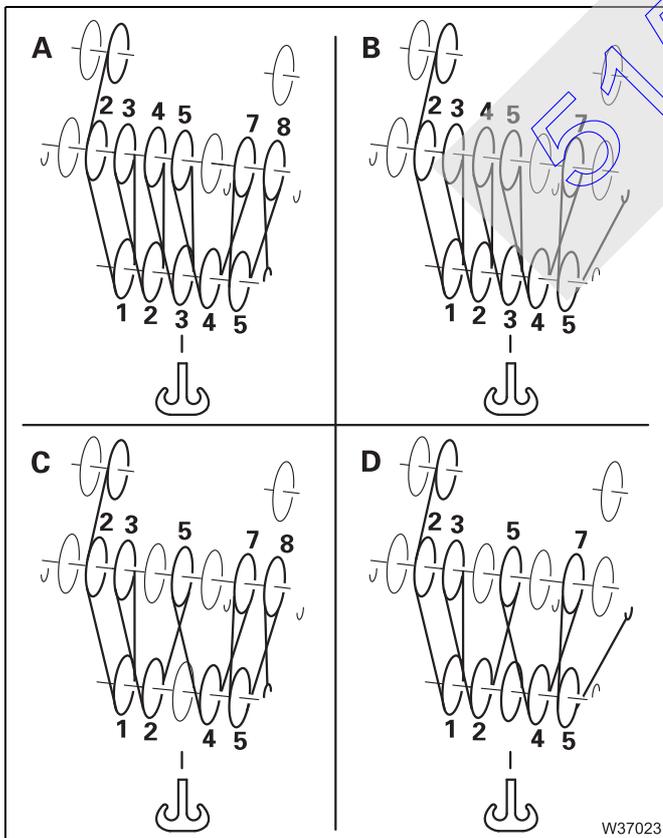


W37022

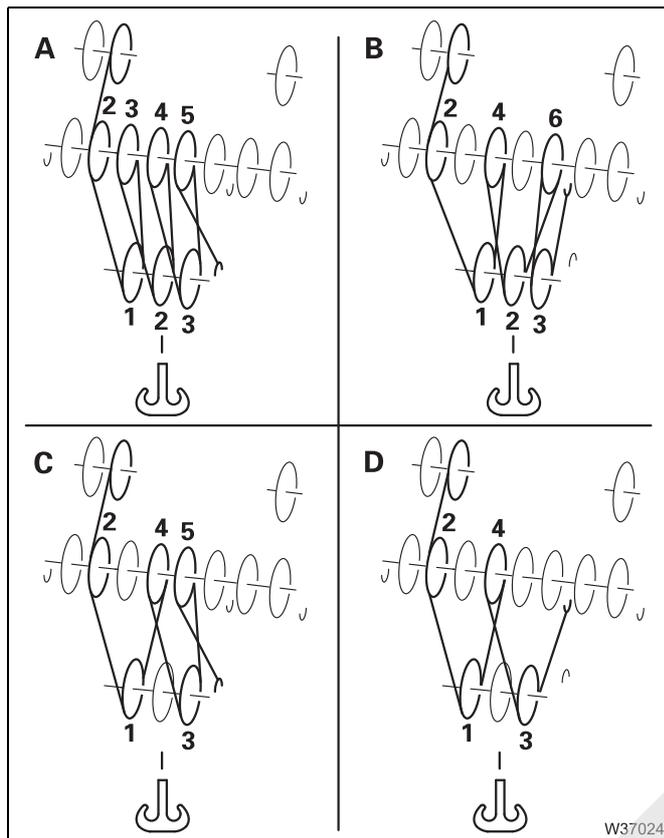
5-sheave hook block

Reeving

- A** 11-fall
- B** 10-fall
- C** 9-fall
- D** 8-fall



W37023

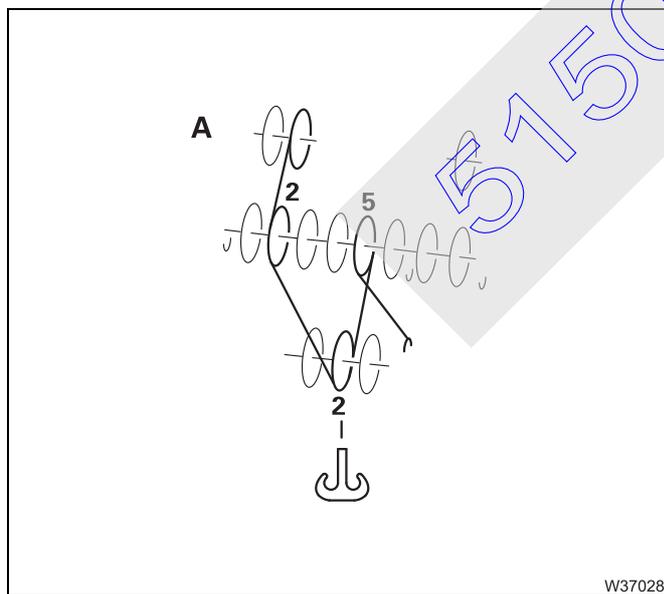


3-sheave hook block

Reeving

- A** 7-fall
- B** 6-fall
- C** 5-fall
- D** 4-fall

W37024



3-sheave hook block

Reeving

- A** 3-fall

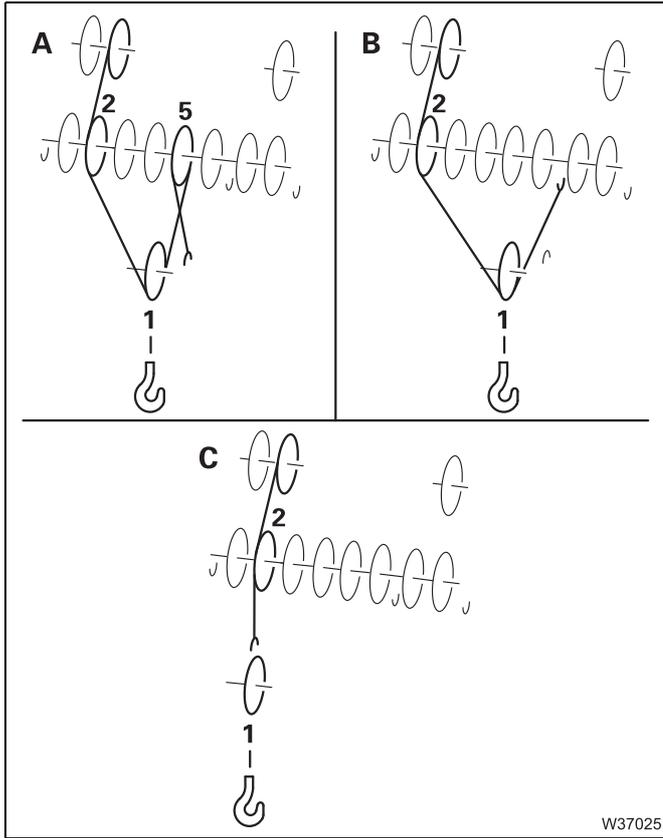
W37028



1-sheave hook block

Reeving

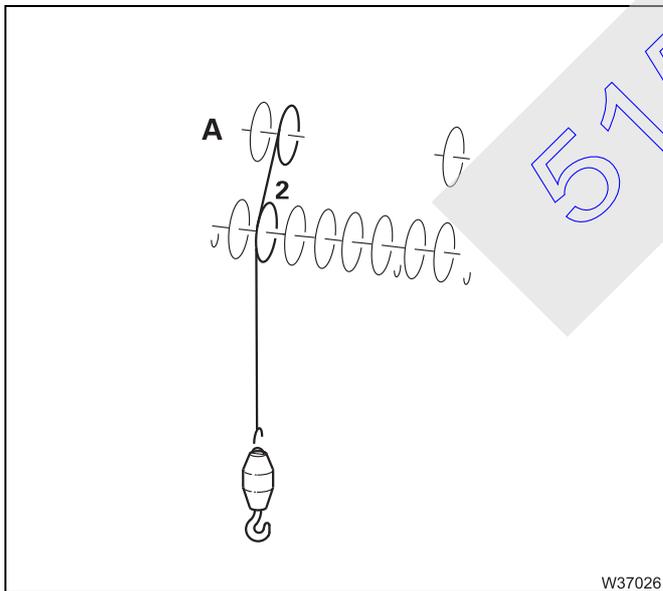
- A** 3-fall
- B** 2-fall
- C** 1-fall



Hook tackle

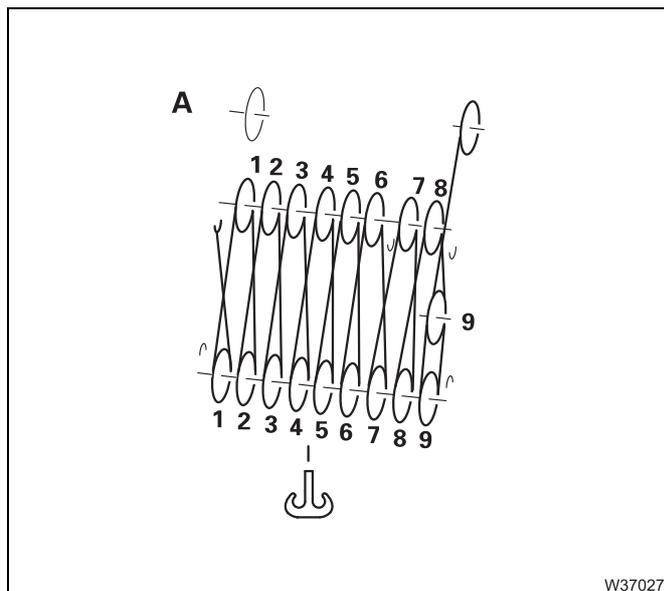
Reeving

- A** 1-fall



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With 9 head sheaves



9-sheave hook block¹⁾

Reeving

A 18-fall ²⁾

- 1) Additional equipment
- 2) only with special equipment

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12.9.5

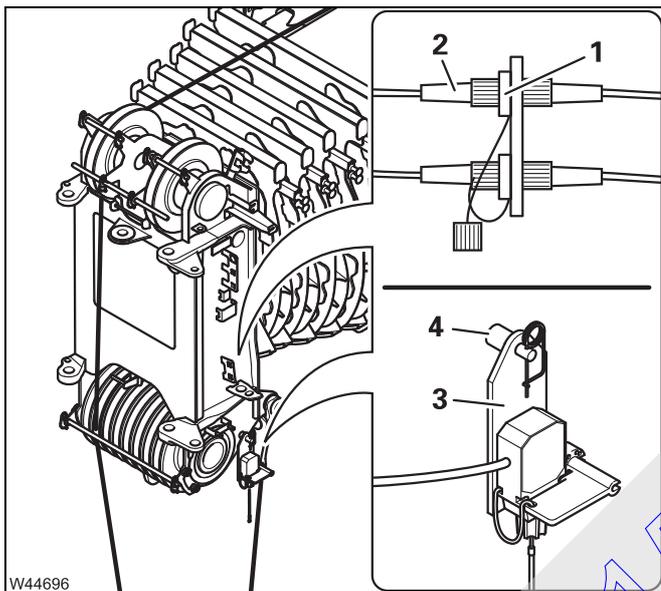
Installing/removing the lifting limit switch

For the function of the lifting limit switch;  p. 11 - 84.

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.

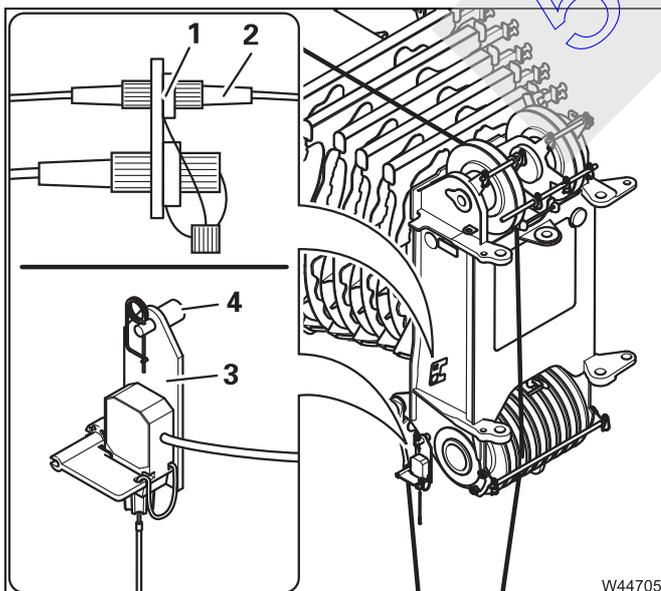
Installing the lifting limit switch

You can attach the lifting limit switch on the right or left side of the 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.



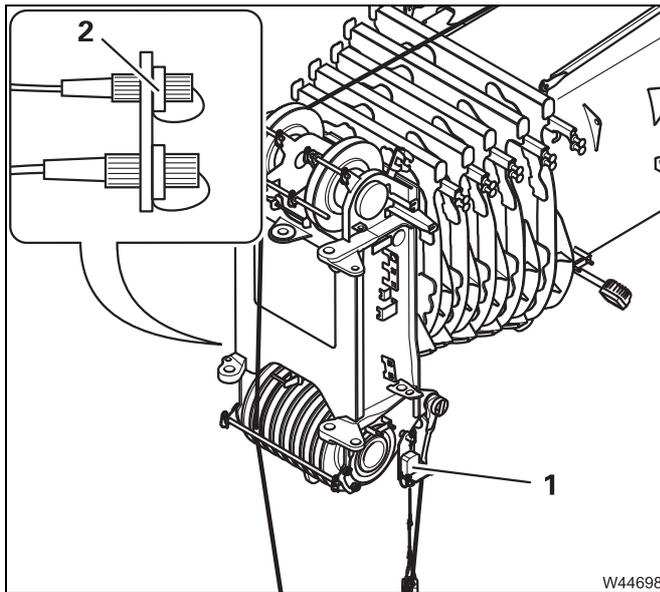
On the left side

- Plug the lifting limit switch (3) on to the clamp (4).
- Secure the lifting limit switch.
- Route the cable so that it is not damaged during crane operation.
- Insert the plug (2) into the socket (1).



On the right side

- Plug the lifting limit switch (3) on to the clamp (4).
- Secure the lifting limit switch.
- Route the cable so that it is not damaged during crane operation.
- Insert the plug (2) into the socket (1).



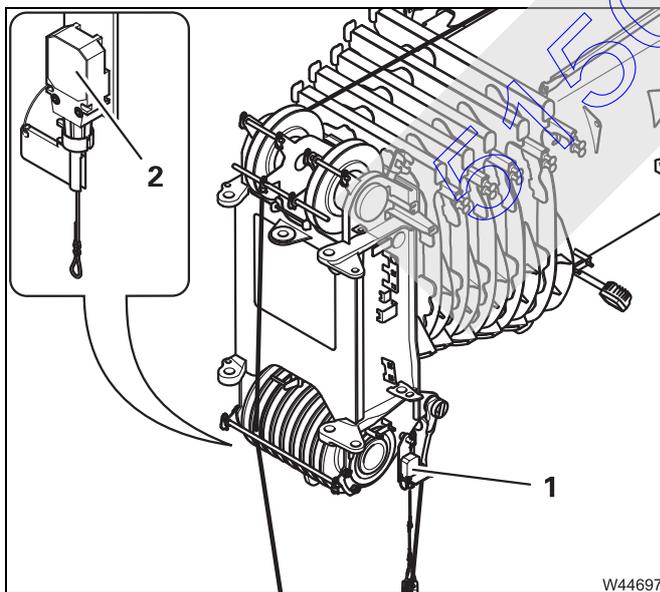
If only one lifting limit switch is installed

- Cover the unused socket with the protective cap (2).
- Check whether the lock on the used lifting limit switch, e.g. (1), is released;  *Releasing the lock*, p. 12 - 163.



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.



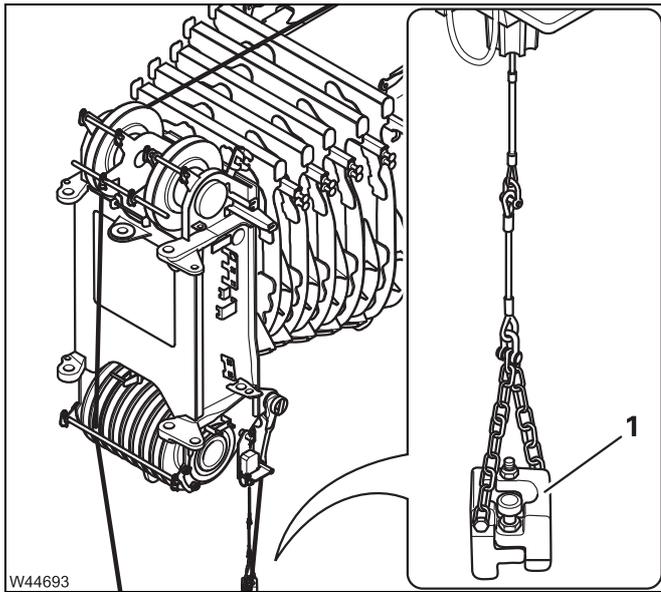
If two lifting limit switches are installed

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

If the lifting limit switch weight is, for example, attached to the left lifting limit switch (1), you must lock the right lifting limit switch (2);  *Locking*, p. 12 - 163.

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



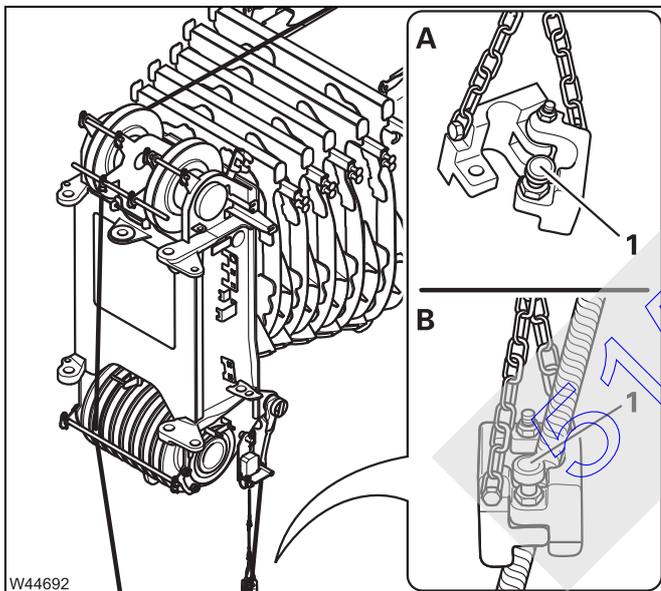


Attaching the lifting limit switch weight

- Attach the lifting limit switch weight (1).

This lifting limit switch must not be locked;
▣▣▣▣ *Releasing the lock*, p. 12 - 163.

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



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 correctly and the two halves of the weight are firmly attached to each other.

If two hoist ropes are reeved, you must also place a lifting limit switch weight around the second hoist rope.



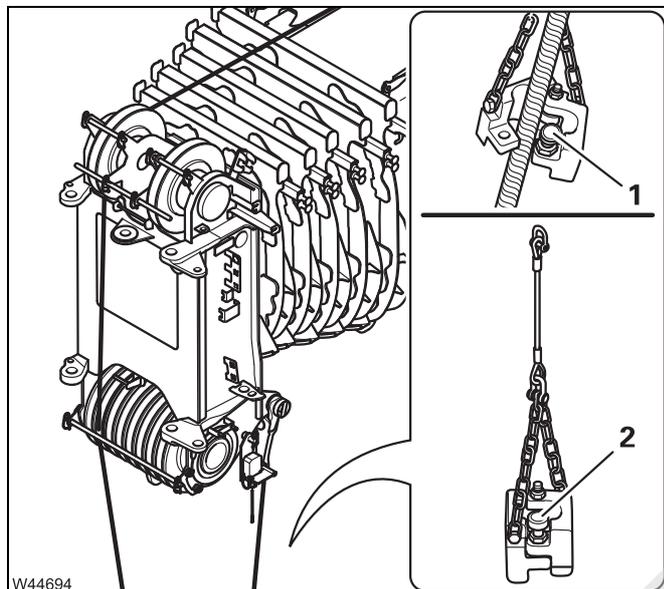
If you place the lifting limit switch weight around the last rope line leading upwards, less rope will run through the lifting limit switch weight, especially if there is a high number of reevings for each lifting operation. This rope line will even be stationary if the number of rope lines is even.

This allows you to reduce the wear of the hoist rope and lifting limit switch weight and prevent unintentional shutdowns that may be caused by the running hoist rope lifting the lifting limit switch weight.

Removing the lifting limit switch

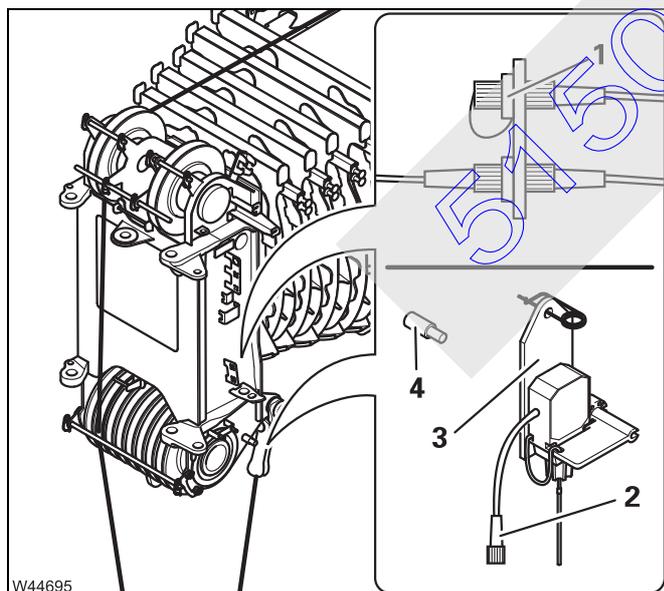
This section describes the complete removal.

If the hook block is to be subsequently attached to the bumper, you only need to detach the lifting limit switch weight from the hoist rope in order to be able to unreeve or re-reeve the hoist rope when unrigging. You can place the lifting limit switch weight around the hoist rope again before driving.



Removing the lifting limit switch weight

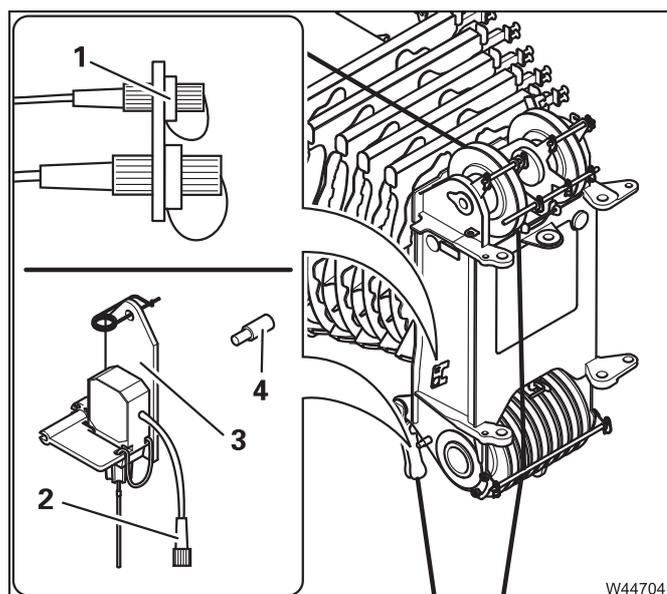
- Pull the safety pin (1) out and fold the two halves of the weight apart.
- Remove the halves of the weight from the rope line.
- Pull the safety pin (1) out, fold the two halves of the weight back together and let the safety pin engage.
- Remove the lifting limit switch weight (2).
- Remove the lifting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



Removing the left lifting limit switch

- Remove the plug (2) from the socket (1).
- Seal the socket (1) with the cap.
- Remove the lifting limit switch (3) from the clamp (4).
- Fasten the retaining pin on the lifting limit switch.
- Stow away the lifting limit switch safely.





Removing the right lifting limit switch

- Remove the plug (2) from the socket (1).
- Seal the socket (1) with the cap.
- Remove the lifting limit switch (3) from the clamp (4).
- Fasten the retaining pin on the lifting limit switch.
- Stow away the lifting limit switch safely.

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12.9.6

Locking/unlocking the lifting limit switch

Locking

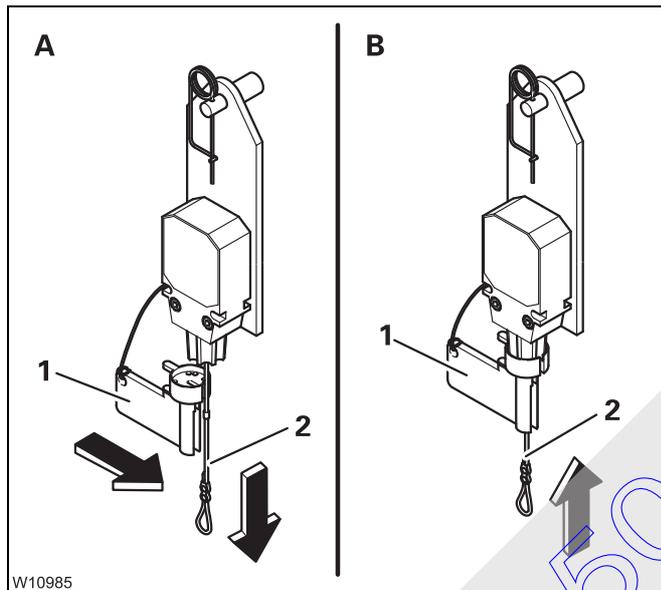
If two lifting limit switches are installed, you must lock the lifting limit switch not used in order to enable all crane operations.



Risk of damage if the lifting limit switch is locked!

If the lifting limit switch from which the lifting limit switch weight is hanging is locked, release the lock.

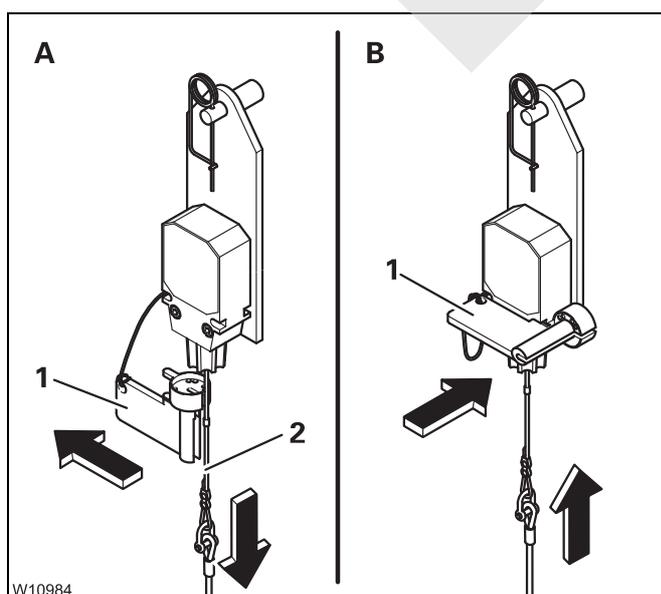
This prevents the hook block hitting the main boom head, causing damage to the hook block, main boom head and hoist rope.



- Remove the lifting limit switch weight.
- (A) – Remove the cap (1).
- Pull the rope (2) down, the lifting limit switch is triggered.
- (B) – Secure the rope (2) in this position using the cap (1) – the lifting limit switch is locked.

Releasing the lock

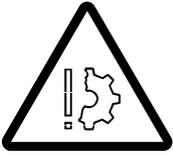
You must always release the lock before you place a lifting limit switch weight around the hoist rope.



- (A) – Pull the rope (2) down and take off the cap (1) – the lock is released
- (B) – Fit the cap (1) on the lifting limit switch.

12.9.7

Anemometer and air traffic control light



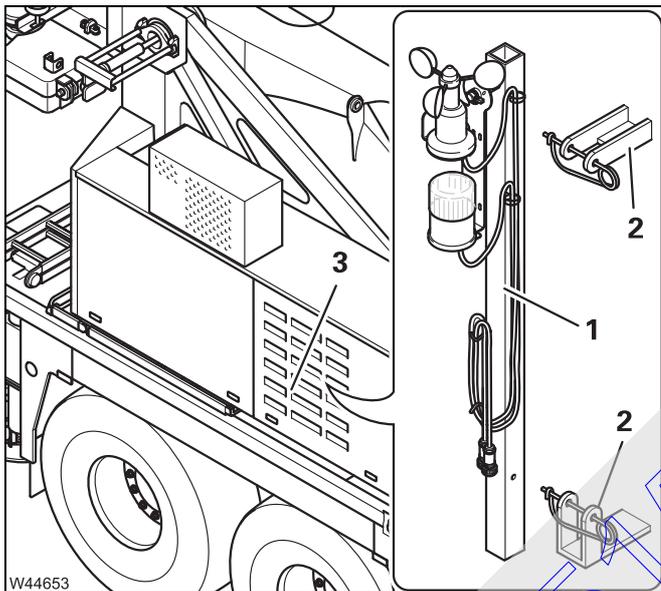
Risk of damage during on-road driving

Always remove the anemometer and air traffic control light before on-road driving.

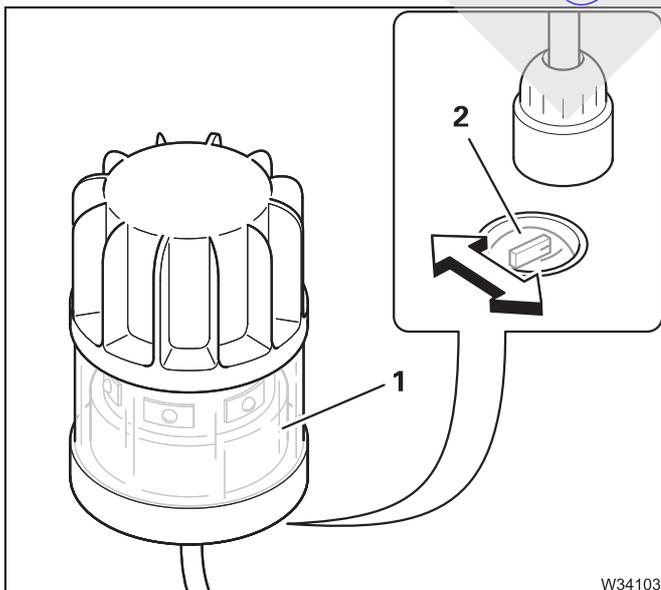
This prevents the specified overall height being exceeded at on-road level, and the anemometer being damaged due to unfavourable air currents.

Installing

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



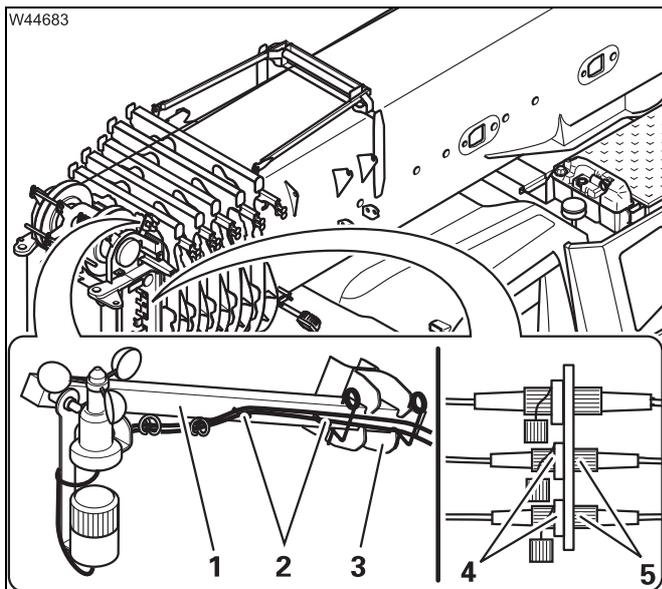
- Remove the rod (1) from the clamp (2).
- Fasten the retaining pins at the clamp (2).
- Lock the storage compartment (3).



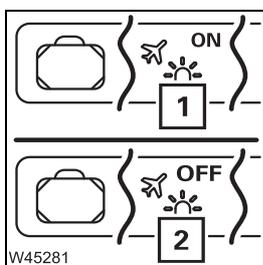
Depending on the additional equipment, the truck crane can be equipped with a switchable air traffic control light.

This air traffic control light (1) has *Flashing light* and *Constant light* lighting modes.

- Select the desired lighting mode using the switch (2).



- Insert the rod (1) into the clamp (3) and secure it with the retaining pins
- Remove the cable from the clamps (2).
- Connect the plugs (4) to the sockets (5) – the assignment is defined by the version of the plugs.
- Lay the cables in such a way that they are not damaged during crane operation.
- Check that the anemometer is able to swing so that it is suspended vertically even when the main boom is raised.



Switching the air traffic control light on/off

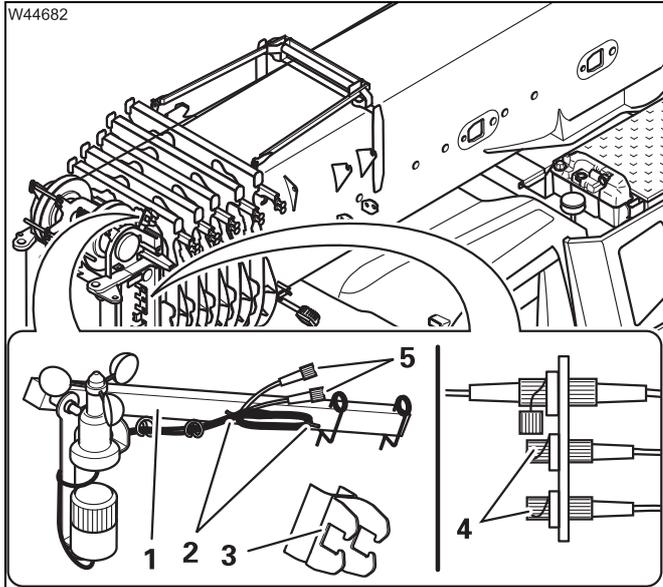
Switch on: Select symbol (2) and confirm – symbol (1) is displayed

Switch off: Select symbol (1) and confirm – symbol (2) is displayed

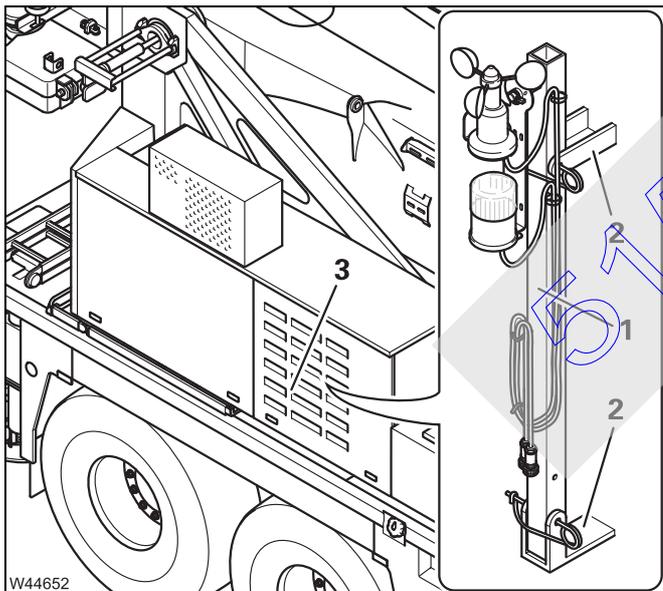


Removal

You must remove the rod with the anemometer/air traffic control light before driving on the road.



- Switch off the air traffic control light.
- Remove the plug and close the sockets (5) and (4) with the caps.
- Wind the cables on to the clamps (2).
- Take the rod (1) out of the clamp (3).



For transport

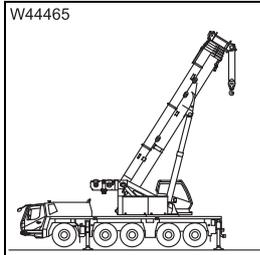
- Place the rod (1) in the clamp (2).
- Secure the rod (1) using the retaining pins.
- Lock the storage compartment (3).

12.10

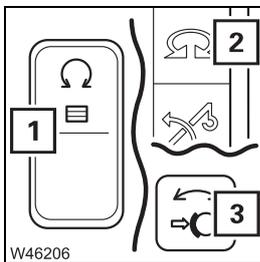
Other rigging work

12.10.1

Rigging in free on wheels working position



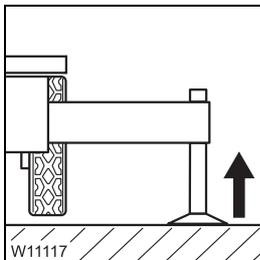
- The truck crane is supported on outriggers.
- The counterweight combination required for using the truck crane free on wheels is rigged.
- Slew the superstructure into the *working position 0° to the rear*.



- Press the button (1) once – the lamp lights up dimly.
Symbol (2) is **orange** when the slewing gear is switched off.
The slewing gear brake is applied – lamp (3) lights up.



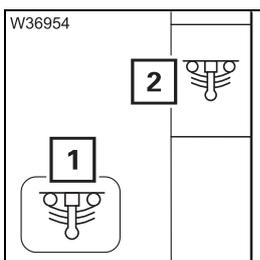
Danger of overturning if the supporting cylinders are retracted unevenly!
Retract all of the supporting cylinders as evenly as possible! In this way you can prevent the truck crane from overturning when retracting individual supporting cylinders.



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

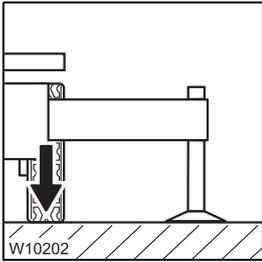


Danger of overturning when switching on the suspension!
You may under no circumstances switch on the suspension as long as the rigged truck crane is on wheels. The suspension struts would be suddenly pressed together and damaged and the truck crane could overturn when switching on the suspension.

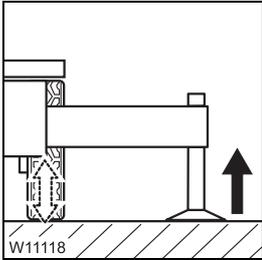


- Select and confirm the symbol (1).
When the suspension is switched on, the symbol (2) turns **green**.
The symbol (1) is **green** if the suspension is switched on.



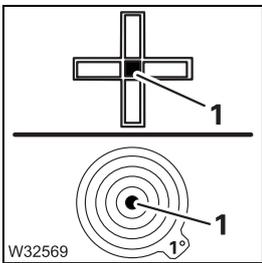


Now lower all wheels to the ground.

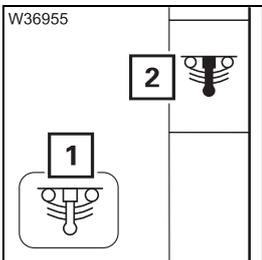


Horizontally aligning the truck crane

Move the supporting cylinders evenly while leveling. Lower the truck crane only to the extent that the suspension struts still have enough play.

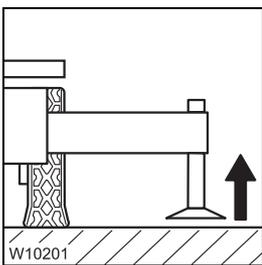


- Level the truck crane on outriggers with the outriggers until the lamp (1) is the only one lighting up in the measuring range 1°.



Switching off the suspension

- Select and confirm the symbol (1) once.
Symbol (2) is red when the suspension is switched off.



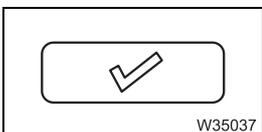
To secure the truck crane

- 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.



Setting the RCL

- Enter the current rigging mode on the RCL.

12.10.2

Railing on the turntable



Risk of accidents if the railing is not pushed out!

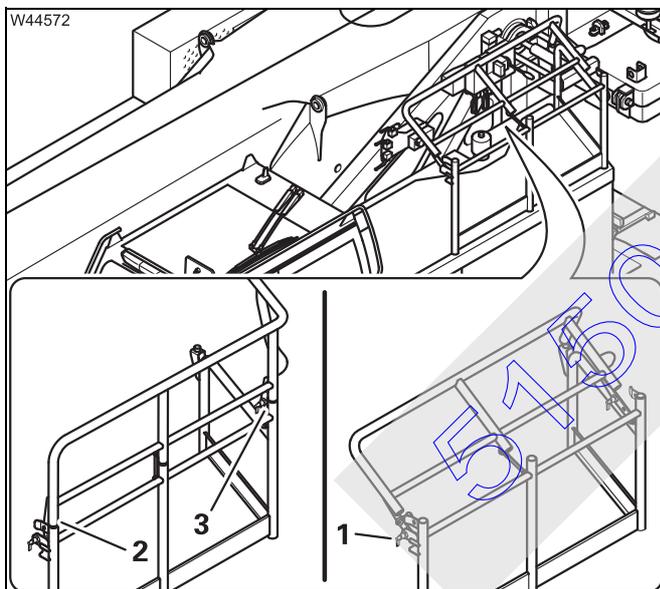
The railing provides protection against falling. Always fold out the railing before stepping on to the turntable.



Risk of accidents due to exceeding the permissible dimensions

Fold in the railing before driving. When the railing is unfolded, the overall height specified for on-road driving is exceeded.

Always fold out the railing when you are working on top of the turntable. Always fold in the railing before driving.



Folding out

- Release the locking bar (1). Fold the railing out until the locking bars (2) and (3) engage.

Folding in

- Release the locking bar (3).
- Pull the locking bar (2) and fold in the railing until the locking bar (1) engages.

12.10.3

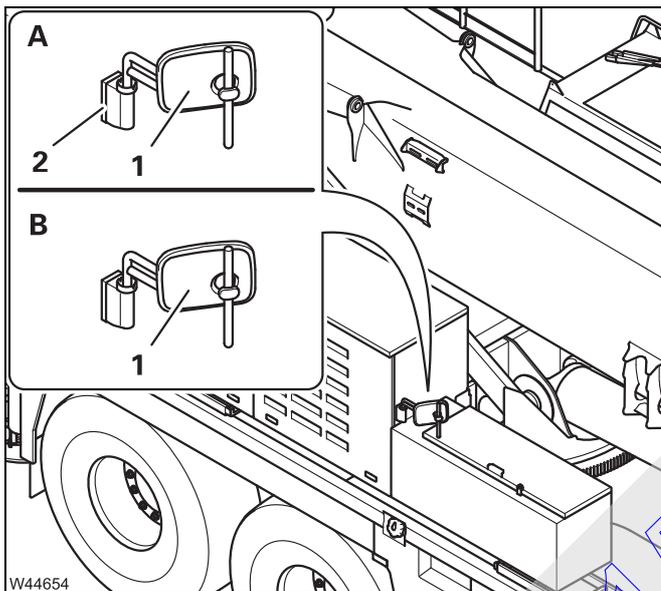
Mirror for crane operation

The mirror must be folded in or removed for driving. For crane operation or driving from the superstructure, the mirror must be installed and folded out.



Risk of accidents due to exceeding the permissible dimensions

Fold the mirror in or remove it for driving. The overall width specified for on-road driving is exceeded if the mirror is folded out.



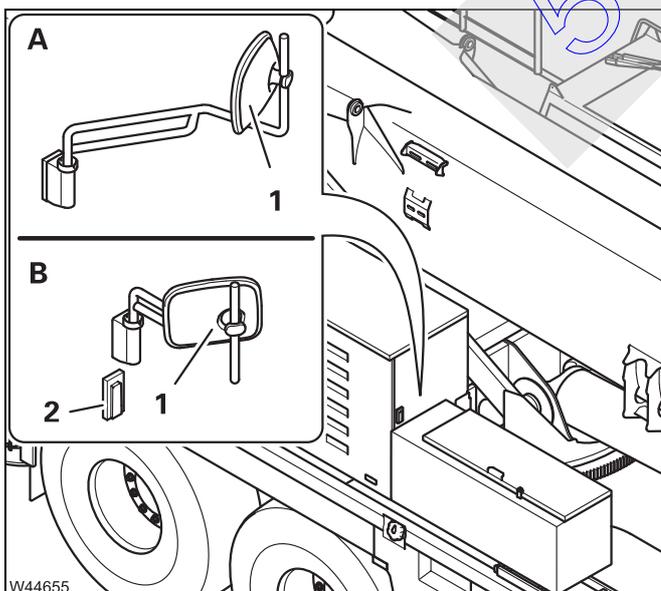
For crane operation

(A) – Installation

- Plug the mirror (1) on to the clamp (2).
- Adjust the mirror.

(B) – Folding out and adjusting

- Fold out the mirror (1).
- Adjust the mirror (1) so that the rear right outrigger beam can be observed clearly from the crane cab (when the main boom is raised).



For driving

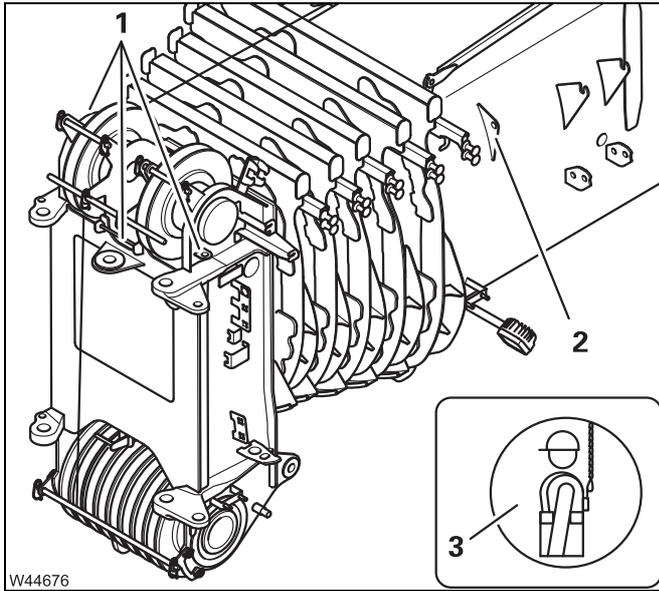
(A) – Folding in

- Fold in the mirror (1) until it does not protrude over the side of the carrier.
- Remove the mirror if required.

(B) – Removal

- Remove the mirror (1) from the clamp (2) and stow it away so that it is safe for driving.

12.10.4 Slings points for personal protective equipment



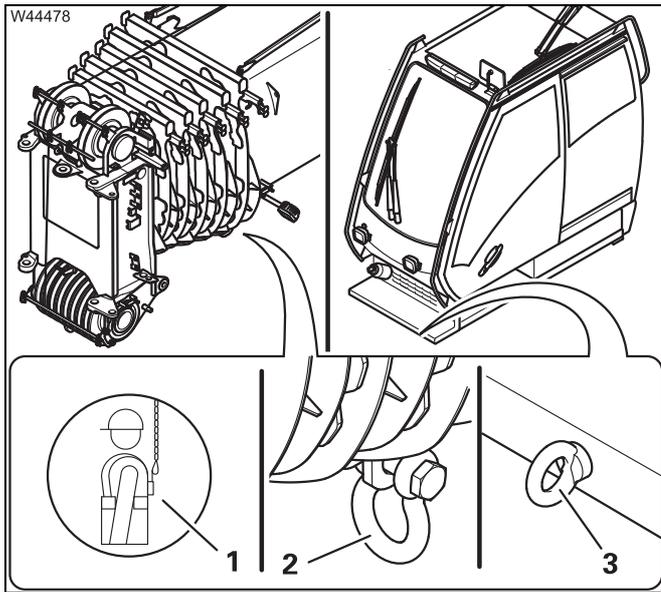
The approved slinging points for the personal safety equipment are marked with special labels (3).

- Always secure your personal safety equipment to the slinging points (1) and (2) when performing rigging work.
- Or use an approved fall protection device;  p. 12 - 172.

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12.10.5

Attachment options for fall protection device



The attachment options (2) and (3) are provided for the attachment of a fall protection device and are marked with a label (1).

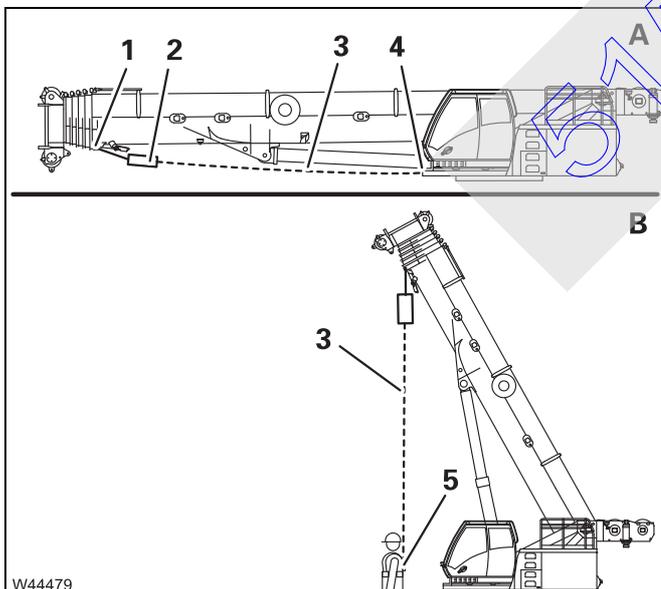
- Always secure yourself with an approved fall protection device.
- Or secure yourself at the attachment points intended for your personal protective equipment; see p. 12 - 171.



Risk of damage to the crane cab!

Always use a fall protection device with activated abseiling function for the slinging point on the main boom.

This will prevent damage to the crane cab when raising.



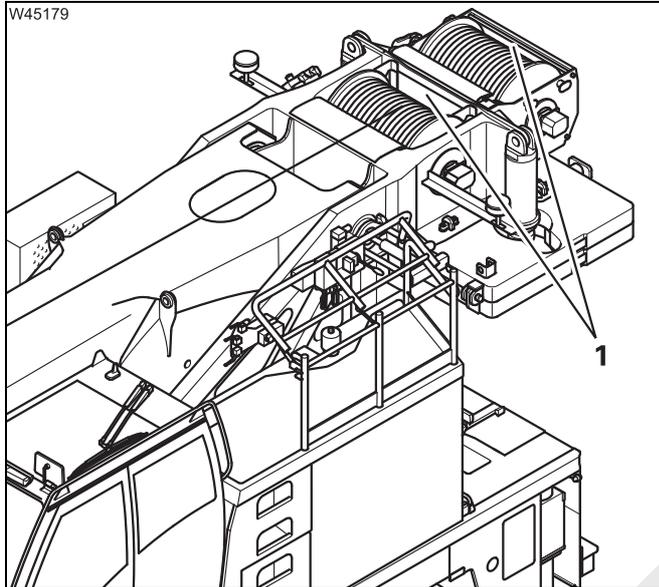
Fall protection device

- (A) – Lower the main boom.
- Sling the fall protection device (2) at the point (1).
- Guide the safety cable (3) to the point (4) and fasten it.
- Ensure that the abseiling function of the fall protection device is activated.
- (B) – Raise the main boom and switch all power units off.
- Now connect the safety cable (3) to your personal safety equipment – at the point (5).

12.10.6 Cameras for crane operation

Cameras on the hoists

Depending on the equipment, the camera image is shown on the *CCS* display or on a separate monitor.



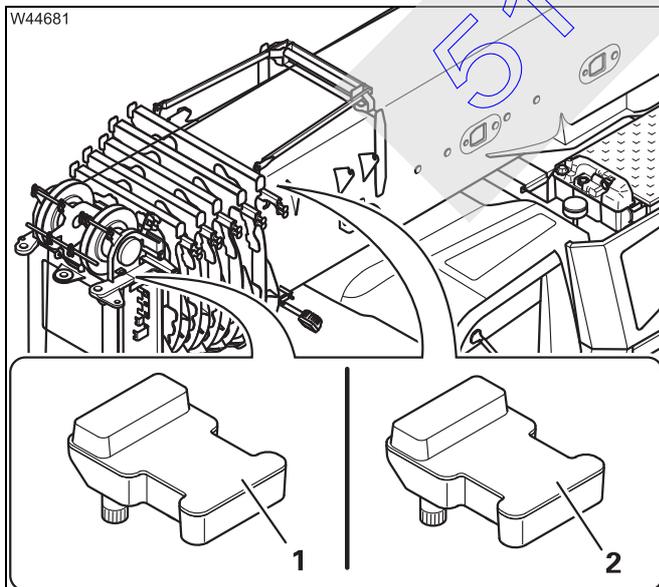
A camera can be found on both the main and auxiliary hoist (1).

- Clean the camera lens if necessary.

Operating the camera;  p. 12 - 176.

Camera on the main boom

The camera can be installed for crane operation and must be removed for driving.



The transmitter (1) and the corresponding receiver (2) are adapted to each other and are identified by the same number on the model plates.

Neither the transmitter nor the receiver should be removed or installed; they remain together on the truck crane at all times.

In the event of a defect, both transmitter and receiver must always be replaced, even if only one part is defective. When spare parts are ordered both transmitter and receiver are always delivered together.

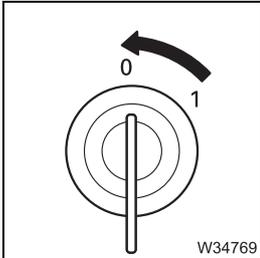




Risk of accidents if an incorrect transmitter or receiver is used!

In the event of a defect, do not under any circumstances use a transmitter or receiver from another truck crane.

This is to avoid the wrong image appearing on the monitor of your crane or the monitor of a neighbouring crane.



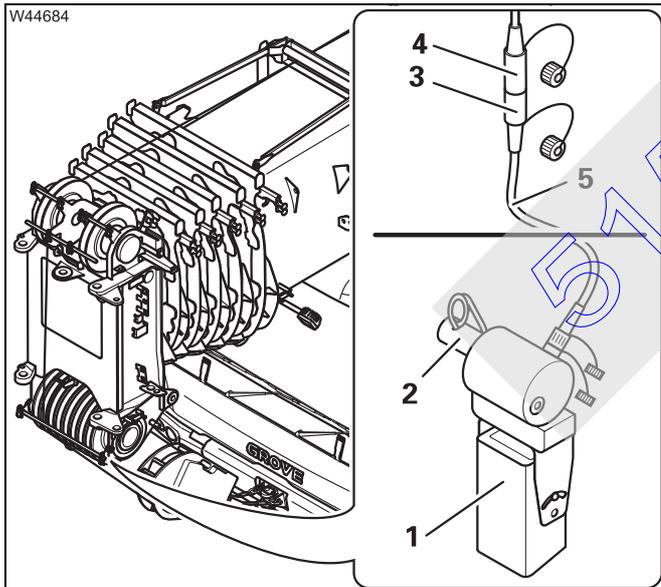
- Switch off the ignition in the crane cab.



Risk of accidents due to a falling camera!

Always use a retaining pin to hold the camera in the clamp.

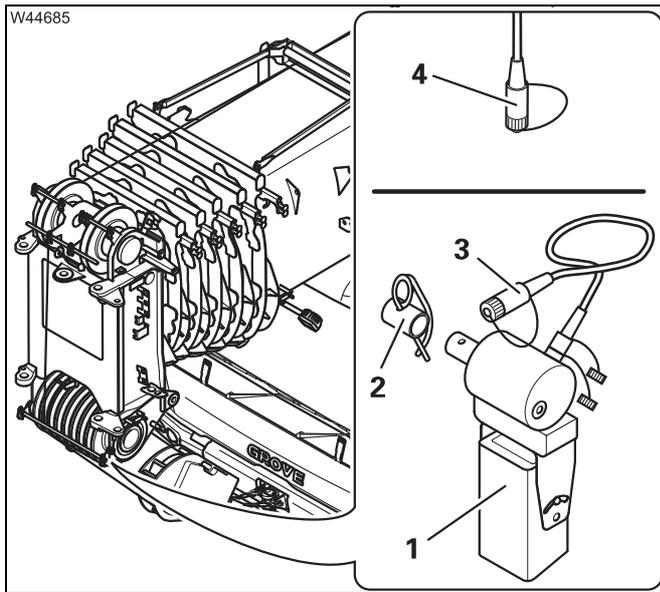
This prevents the camera falling down and injuring someone.



Installing

- Insert the camera (1) into the clamp (2) and secure it with the retaining pin.
- Insert the plug (3) into the socket (4).
- Route the cable (5) so that it will not be damaged.

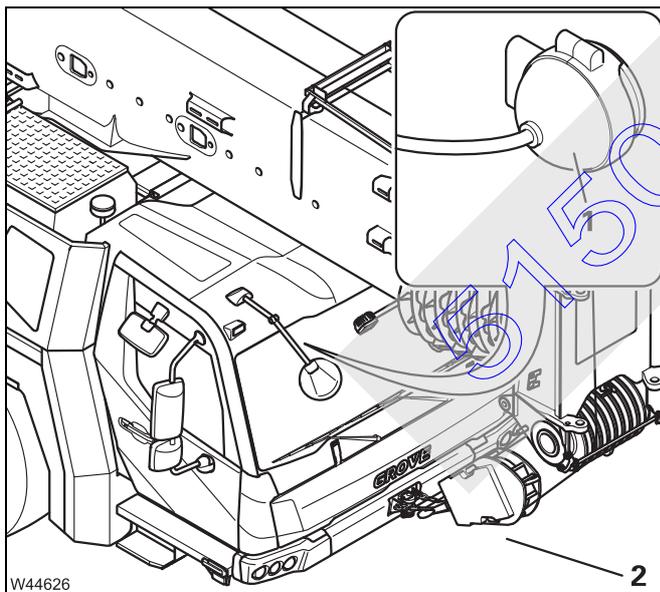
Operating the camera; ► p. 12 - 176.



Removal

- Remove the plug (3) from the socket (4) and close it with the cap.
- Remove the camera (1) from the clamp (2) and insert the retaining pin in the clamp (1).

Camera on the driver's cab



A camera (1) allows viewing of the non-visible area in front of the driver's cab.

Depending on the equipment, the camera image is shown on the CCS display or on a separate monitor.

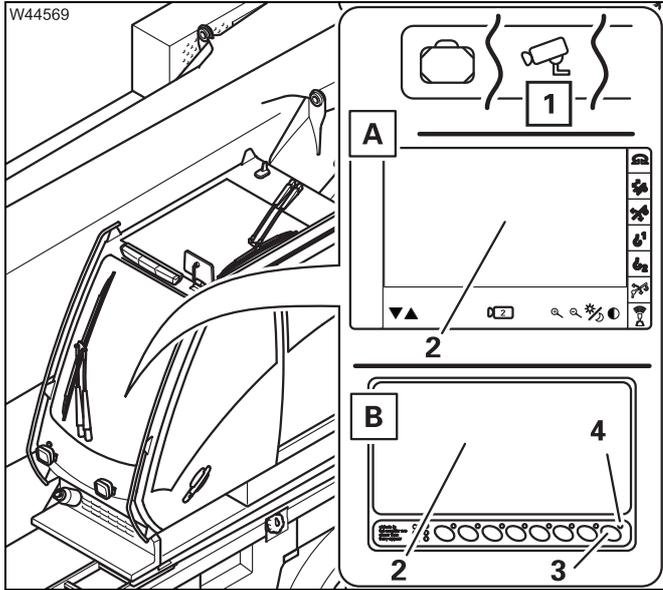
- Adjust the camera (1) to show the area (2) in front of the bumper on the display or monitor.

Operating the camera;  p. 12 - 176.



Operating the camera

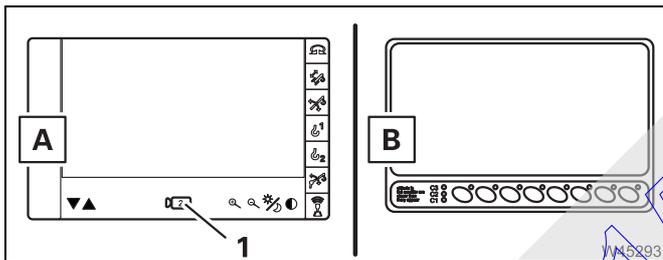
Depending on the equipment, the image is shown on the *CCS* display or on a separate monitor.



Switching on

- Switch on the ignition.
- **(A)** – Select and confirm the symbol **(1)**
or
- **(B)** – Press button **(3)** once. The lamp **(4)** lights up.

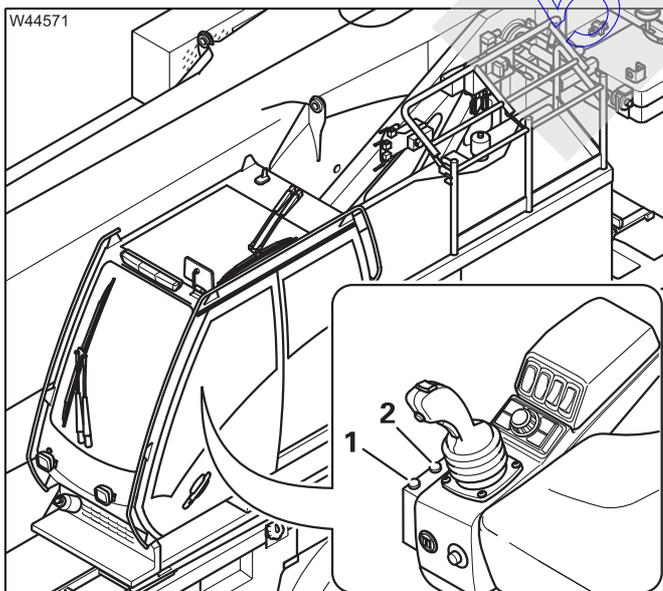
The image appears on the display after a few seconds.



Switching over the representation

- **(A)** – with symbol **(1)**,
- or
- **(B)** – with buttons + or -.

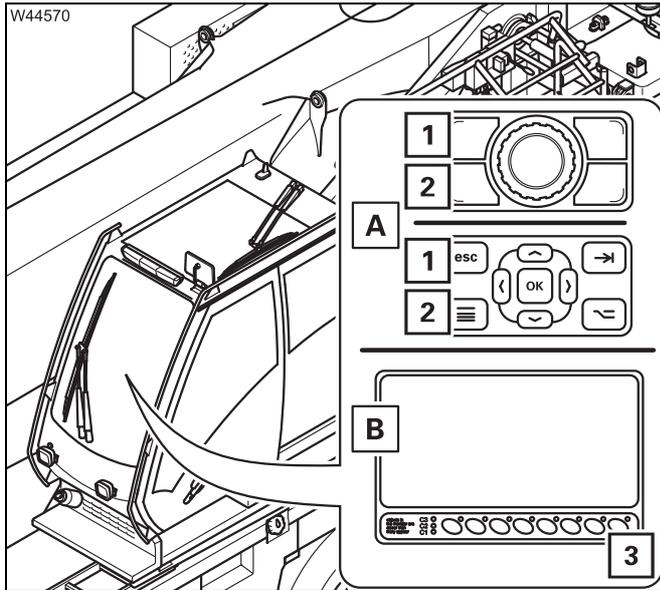
If no image appears; p. 14 - 17.



Changing views

For the main boom camera with zoom lens

- 1 Enlarge the view
- 2 Reduce the view



Switching off

- (A) – Press button (1) or (2) once.
or
- (B) – Press button (3) once.

The image disappears.

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12.10.7 Step on the crane cab

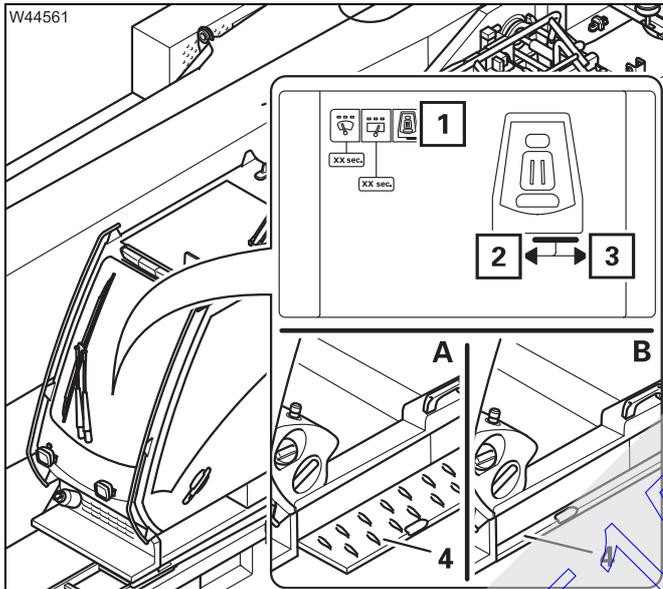


Risk of accidents by exceeding the permissible overall width!

Always retract the step for on-road driving.

When the step is extended, the overall width specified for on-road driving is exceeded.

Automatic operation



In the *Crane cab* menu

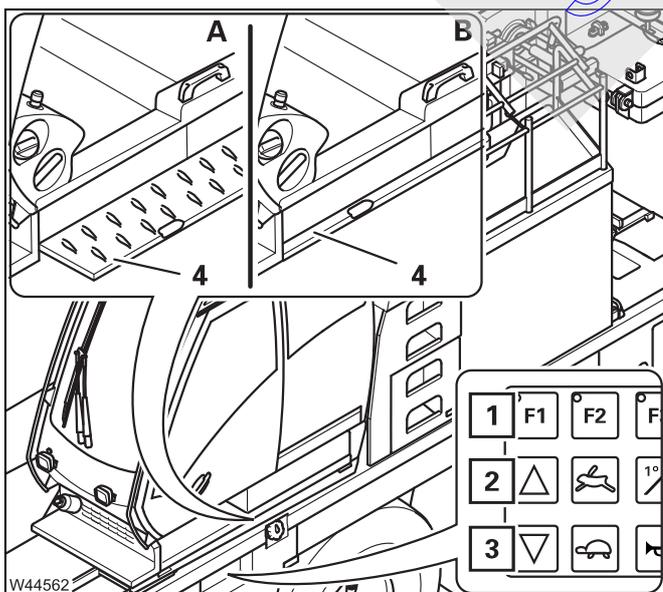
Select and confirm the symbol (1).

Extend step

- Select and confirm the symbol (3) – the step is extended.

Retract step

- Select and confirm the symbol (2) – the step is retracted.



At the *Outrigger* control unit

The function is always only active at the control unit that is on the same side as the step.

Extend step

- (A) – Press buttons (1) and (3) – the step is extended.

Retract step

- (B) – Press buttons (1) and (2) – the step is retracted.

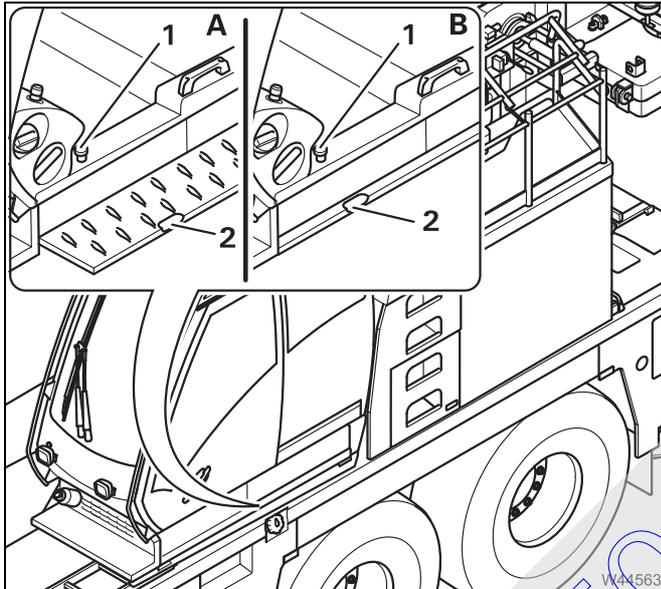
Manual operation



Risk of accidents during on-road driving due to the step moving out

Always secure the retracted step using the spring latch.

This prevents the step sliding out by itself during cornering.



Pulling out the step

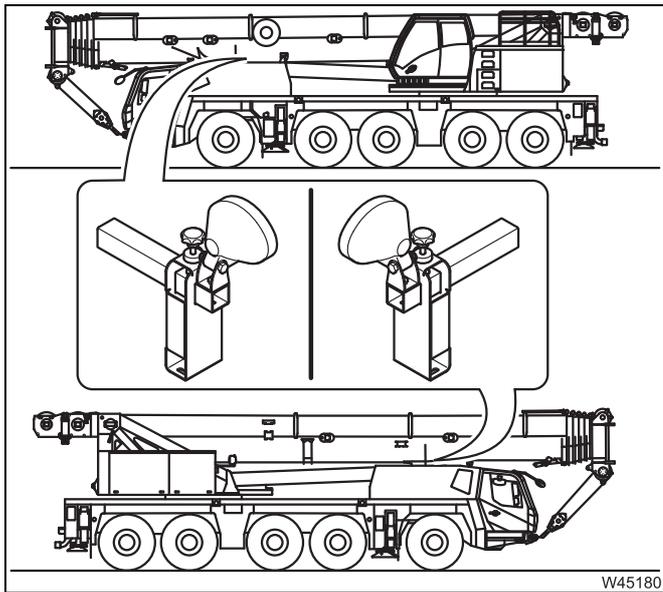
- (B) – Release the spring latch (1) – pull.
- (A) – Pull the step out by the handle (2) and allow the spring latch (1) to engage.

Pushing in the step

- (A) – Release the spring latch (1) – pull.
- (B) – Push the step in by the handle (2) and allow the spring latch (1) to engage.

12.10.8

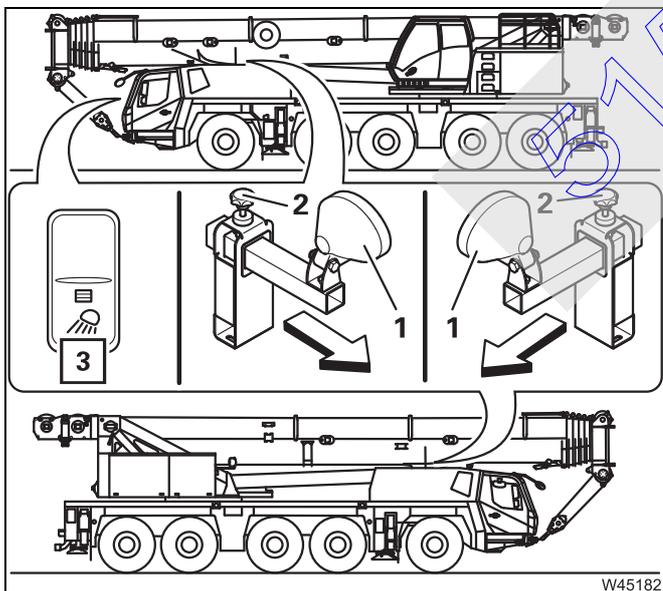
Spotlights III



Spotlights III (1) are located on the carrier.
The spotlights III can be pushed in and out.

For crane operation

You can push out the spotlight for crane operation and rigging mode.



Pushing out

- Undo the bolt (2).
- Push out the spotlight (1) and tighten the bolt (2).
- Swing the spotlight into the desired position.

Switching on

The ignition is switched on.

- Press in switch (3) at the bottom.

For driving

For driving mode you must push in the spotlight.



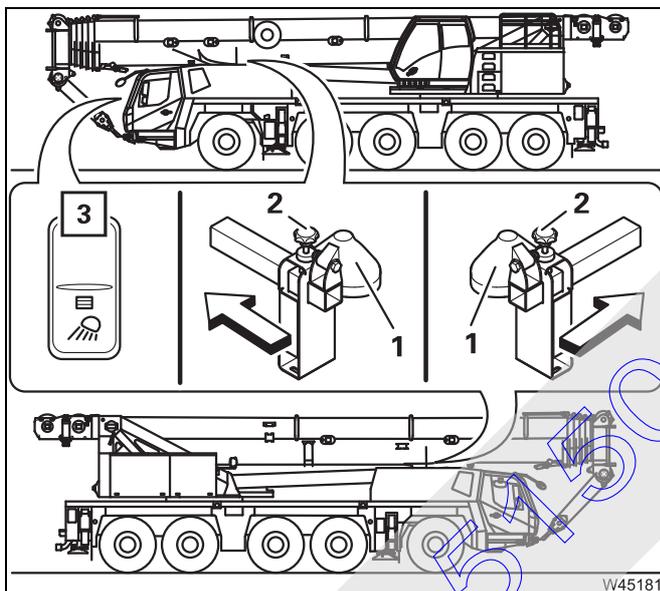
Risk of accidents due to exceeding the permissible dimensions

Push in the spotlight for driving mode. When the spotlight is pushed out, the overall width specified for on-road driving is exceeded.



Risk of accidents due to dazzling during on-road driving!

When driving on the road, always direct the spotlight in such a way that the reflector points downwards, even when the spotlight is pivoted down. This prevents yourself and other drivers being dazzled and causing accidents.



Switching off

- Press the switch (3) at the top.

Pushing in

- Undo the bolt (2).
- Push in the spotlight (1) and tighten the screw (2).
- Swing the spotlight down.

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13

Driving with a rigged truck crane

This section describes how to drive the truck crane with the counterweight rigged. If a lattice extension is also rigged;  *Lattice extension operating manual*.



Risk of accidents due to 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, for example, the erected main boom in the 0° to the rear position.



Risk of overturning by slewing superstructure!

When driving with the truck crane rigged, the slewing gear must be switched off – the slewing gear brake must be applied. The turntable can be locked if there is a corresponding system.



Risk of accidents when driving with a lifted load!

The truck crane may only be driven with a lifted load if it is in a permitted *Free on wheels, 0° to the rear* operating position in accordance with *Lifting capacity table*. The truck crane must not be driven from the driver's cab with a raised load.



Risk of accidents when driving on public roads

Driving on public roads is only permitted if all requirements listed in the *CHECKLIST: Checks before on-road driving* are met;  p. 5 - 1.

Driving from the crane cab and driving with the truck crane rigged is not permitted on public roads.

13.1

Driving distance

The driving distance must be level. Uneven surfaces cannot be compensated for with the level adjustment system.

The entire driving distance must be level. The rigging modes and axle loads specified in this chapter are only valid for driving distances that are without sloping ground in longitudinal and lateral directions.

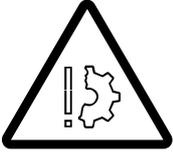
The ground of the driving distance to be driven must be stable enough to bear the axle loads.

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).

13.2

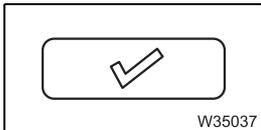
Permissible rigging modes and axle loads

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.



W35037

- Enter and confirm the current rigging mode of the truck crane.



Risk of accidents if the RCL is overridden

Always confirm the current rigging mode. All specified positions are within the monitored working 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.

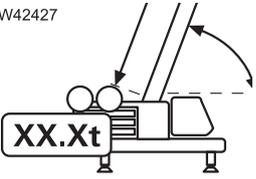
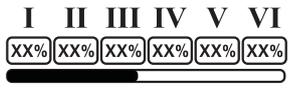
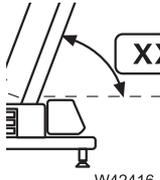
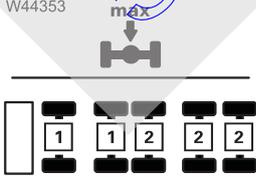
Axle load table

The axle loads apply:

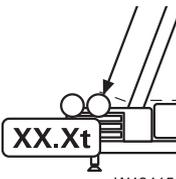
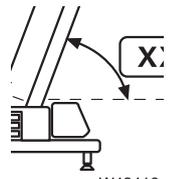
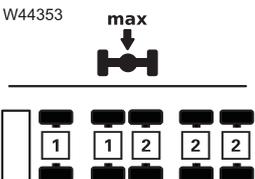
- to all permissible tyres; ■■■▶ p. 1 - 18
- to a reeved 3-sheave hook block (heavy); ■■■▶ p. 1 - 12.

Symbols in the table headers

The symbols in the headers of the tables are used in this chapter. The RCL displays are shown for the truck crane's rigging mode. The table gives an overview of the meaning.

Symbol	Meaning
<p>W42427</p> 	Rigged counterweight
<p>I II III IV V VI</p>  <p>W42411</p>	Required telescope status – for telescopic sections I to VI
 <p>W42416</p>	Angle range for the main boom in which the specified maximum axle loads are not exceeded
<p>W42429</p> 	Required slewing angle 0° – Superstructure rotated to the rear 180° – Superstructure rotated to the front
<p>W44353</p> 	Maximum axle load – for the specified rigging mode 1 – on the 1st and 2nd axle lines 2 – on each of the 3rd, 4th and 5th axle lines



 W42415	W42431 I II III IV V VI XX% XX% XX% XX% XX% XX%	 W42416	 W42414	W44353 max 	
in t (lbs)	in %	in °	in °	Max. in t (x 1000 lbs)	
				1	2
1.0 (2.200)	0 - 0 - 0 - 0 - 0 - 0	5 - 65	180°	14.5 (31.9)	14.0 (30.9)
	0 - 0 - 0 - 0 - 0 - 0	70 - 82	0°	10.0 (22.1)	14.0 (30.9)
3.3 (7.200)	0 - 0 - 0 - 0 - 0 - 0	5 - 60	180°	13.5 (29.8)	14.5 (31.9)
	0 - 0 - 0 - 0 - 0 - 0	70 - 82	0°	10.5 (23.1)	14.0 (30.9)
5.6 (12.300)	0 - 0 - 0 - 0 - 0 - 0	5 - 55	180°	13.0 (28.7)	15.0 (33.1)
	0 - 0 - 0 - 0 - 0 - 0	65 - 82	0°	11.5 (25.4)	15.0 (33.1)
7.9 (17.400)	0 - 0 - 0 - 0 - 0 - 0	5 - 50	180°	12.0 (26.5)	15.5 (34.2)
	0 - 0 - 0 - 0 - 0 - 0	60 - 82	0°	12.5 (27.6)	15.5 (34.2)
10.2 (22.400)	0 - 0 - 0 - 0 - 0 - 0	5 - 40	180°	11.5 (25.4)	16.0 (35.3)
	0 - 0 - 0 - 0 - 0 - 0	60 - 82	0°	13.5 (29.8)	16.0 (35.3)
12.5 (27.500)	0 - 0 - 50 - 0 - 0 - 0	5 - 50	180°	15.0 (33.1)	16.5 (36.4)
	0 - 0 - 0 - 0 - 0 - 0	55 - 82	0°	14.0 (30.9)	16.5 (36.4)
14.8 (32.600)	0 - 0 - 50 - 0 - 0 - 0	5 - 45	180°	14.0 (30.9)	17.0 (37.5)
	0 - 0 - 0 - 0 - 0 - 0	55 - 82	0°	15.0 (33.1)	17.0 (37.5)
17.1 t (37.600)	0 - 0 - 5 - 0 - 0 - 0	5 - 40	180°	13.0 (28.7)	17.5 (38.6)
	0 - 0 - 0 - 0 - 0 - 0	50 - 82	0°	16.0 (35.3)	17.5 (38.6)

in t (lbs)	in %	in °	in °	Max. in t (x 1000 lbs)	
				1	2
19.4 (42.700)	0 - 50 - 50 - 0 - 0 - 0	5 - 50	180°	17.0 (37.5)	18.0 (39.7)
	0 - 0 - 0 - 0 - 0 - 0	45 - 82	0°	16.5 (36.4)	18.5 (40.8)
21.7 (47.800)	0 - 50 - 50 - 0 - 0 - 0	5 - 45	180°	16.5 (36.4)	18.5 (40.8)
	0 - 0 - 0 - 0 - 0 - 0	40 - 82	0°	17.5 (38.6)	19.0 (41.9)
24.0 (52.900)	0 - 50 - 50 - 0 - 0 - 0	5 - 40	180°	15.5 (34.2)	19.0 (41.9)
	0 - 0 - 0 - 0 - 0 - 0	35 - 82	0°	18.5 (40.8)	19.5 (43.0)
26.3 (57.900)	50 - 50 - 50 - 0 - 0 - 0	5 - 50	180°	21.0 (46.3)	19.5 (43.0)
	0 - 0 - 0 - 0 - 0 - 0	30 - 82	0°	19.5 (43.0)	20.5 (45.2)
28.6 (63.000)	50 - 50 - 50 - 0 - 0 - 0	5 - 50	180°	20.0 (44.1)	21.0 (46.3)
	0 - 0 - 0 - 0 - 0 - 0	25 - 82	0°	20.0 (44.1)	21.0 (46.3)
30.9 (68.100)	50 - 50 - 50 - 0 - 0 - 0	5 - 45	180°	19.5 (43.0)	21.0 (46.3)
	0 - 0 - 0 - 0 - 0 - 0	15 - 82	0°	21.0 (46.3)	21.5 (47.4)
44.5 (98.100)	50 - 50 - 50 - 0 - 0 - 0	5 - 20	180°	14.5 (31.9)	24.0 (52.9)
	0 - 0 - 0 - 0 - 0 - 0	5 - 82	0°	26.0 (57.3)	23.0 (50.7)

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13.2.1

For driving without a load

- Slew the superstructure to the 0° to the rear position – if slewing is not permitted in the current *Free on wheels* operating position then you must support the truck crane on outriggers before slewing.
- Lock the turntable if possible.
- Switch off the slewing gear.
- Move the main boom to an inclination permitted within the working range.
- Tie down the hook block so that it cannot swing around.

13.2.2

For driving with a load

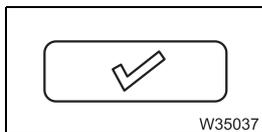
When the truck crane is with a lifted load, it may be driven only from the crane cab.



Risk of accidents when driving with a lifted load!

When driving with a lifted load, you must be able to operate the crane at any time in the event of an emergency. That is why the truck crane may not be driven from the driver's cab with a lifted load.

- Lift the load.
- Move the main boom to an inclination permitted within the working range.
- Slew the superstructure to the 0° to the rear position – if slewing is not permitted in the current *Free on wheels* operating position then you must support the truck crane on outriggers before slewing.
- Lock the turntable if possible.
- Switch off the slewing gear.
- Enter and confirm the rigging mode according to *Lifting capacity table* for the current *Free on wheels*, 0° to the rear operating position.



- Switch to **DM** or **RM** transmission mode depending on the driving direction.



Risk of accidents when driving with a lifted load!

Secure the load when driving so that it cannot swing and use the **DM** or **RM** transmission mode so that the transmission does not shift.

This way you can prevent the swinging load leaving the permissible working range and the truck crane overturning.

- Tie down the load so that it cannot swing back and forth.
- Before driving with a load, observe the specifications in the relevant section;
 ▶ *Driving from the crane cab*, p. 13 - 19.

13.2.3

Axle loads

The maximum axle loads are 25.0 t (55,116 lbs) when the main boom is in the permissible operating range for a *Free on wheels* operating position according to the *Lifting capacity table*.

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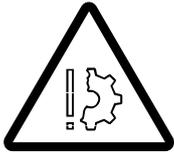
13.3

Before driving the rigged truck crane

13.3.1

Check the tyre pressures and wind speed

- Make sure that all tyres have the prescribed inflation pressure;
 ▮▮▮▮ *Maintenance manual.*



Danger of damage to the tyres!

Only drive the rigged truck crane if the tyres have the prescribed inflation pressure.

Never reduce the tyre pressure in order to increase the bearing area of the tyres!

The wind speeds given in *Lifting capacity table* for the entered rigging mode apply to driving the truck crane.

- Check the wind speed; ▮▮▮▮ p. 11 - 74.



Risk of accidents due to excessively high wind speeds!

You may not drive the rigged truck crane if the wind speed exceeds the maximum permissible values specified in *Lifting capacity table*. In this case, you must bring the truck crane into a safe state.

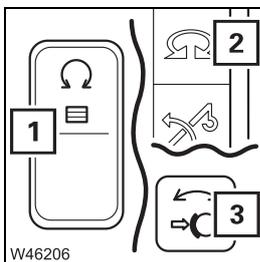
13.3.2

Secure the superstructure against slewing

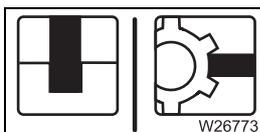


Danger of overturning by the superstructure slewing while driving the truck crane!

Always secure the superstructure before driving the rigged truck crane to prevent it slewing. Slewing the superstructure while driving the truck crane increases the risk of overturning!



- Switch off the slewing gear.
 - The lamp (1) must light up dimly.
 - The symbol (2) is **orange** – slewing gear switched off.
 - Lamp (3) must light up – slewing gear brake applied;▮▮▮▮ *Switching off the slewing gear*, p. 11 - 122



- Lock the turntable – provided the systems are available.
 - ▮▮▮▮ *Locking the superstructure*, p. 11 - 16
 - ▮▮▮▮ *Switching on the houselock*, p. 11 - 17

13.3.3

Putting the truck crane on the wheels – with raise axle function

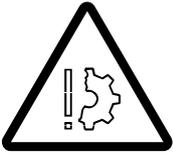


You can also use the outriggers to put the truck crane on the wheels;
▮▮▮▶ p. 13 - 12.



Danger of overturning if the supporting cylinders are retracted unevenly

Retract the supporting cylinders evenly! This prevents the truck crane overturning while retracting individual supporting cylinders.



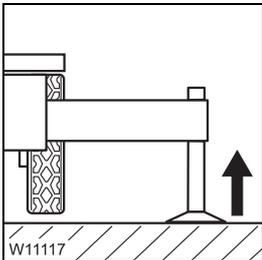
Risk of damage to the axle lines!

Retract the supporting cylinders evenly! This prevents excessive strain on the axle lines.

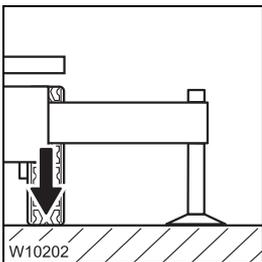


Danger of overturning when switching on the suspension!

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 suddenly collapse, be damaged and the truck crane could overturn.



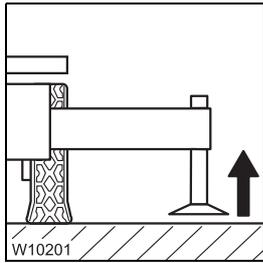
- If necessary, retract the supporting cylinders until all wheels are just above the ground.



Lowering wheels

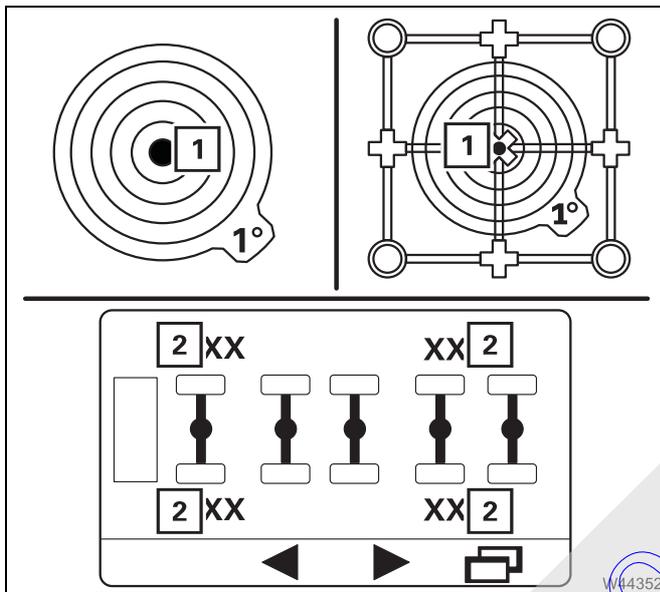
Use the raise axle function to lower all wheels to the ground;

▮▮▮▶ *Operating the axle raising system*, p. 12 - 60.



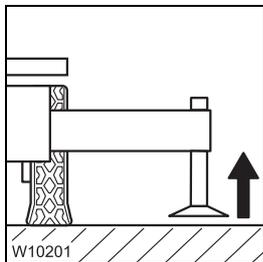
Levelling the truck crane

- Retract the support cylinders until they do not make contact with the ground during alignment.



- Level the truck crane with the raise axle function.
 - On the *Current inclination* display, the marking (1) must be in the middle of the 1° measuring range.
 - The displays (2) must show an even axle load.

Operating the axle raising system, p. 12 - 60.



Securing the truck crane

- Retract the supporting cylinders until the outrigger pads are about 5 to 10 cm (2 to 4 in) above the ground. Allow the outrigger beams to extend as far as possible.



Danger of overturning if outriggers are retracted!

Always leave the outrigger beams extended as far as possible and the outrigger pads just above the ground to secure the truck crane against overturning.

13.3.4

Putting the truck crane on the wheels – with the outriggers



You can also use the raise axle function to put the truck crane on the wheels;
▣▣▣▣ p. 13 - 10.



Danger of overturning if the supporting cylinders are retracted unevenly

Retract the supporting cylinders evenly! This prevents the truck crane overturning while retracting individual supporting cylinders.



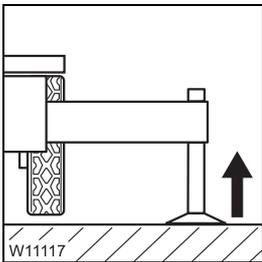
Risk of damage to the axle lines!

Retract the supporting cylinders evenly! This prevents excessive strain on the axle lines.



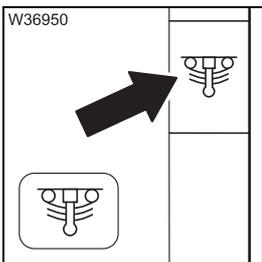
Danger of overturning when switching on the suspension!

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 suddenly collapse, be damaged and the truck crane could overturn.



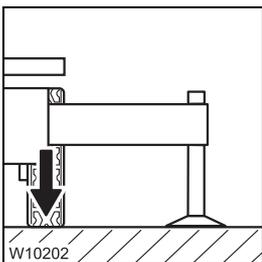
Lowering wheels

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

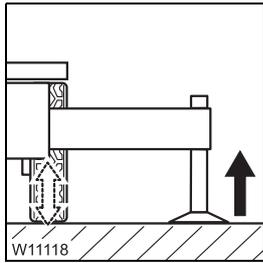


- Switch on the suspension – the symbol must be **green**;

▣▣▣▣ *Switching the suspension on/off*, p. 5 - 18.

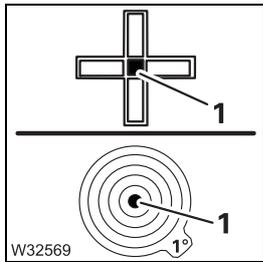


Now lower all wheels to the ground.

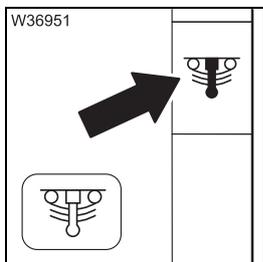


Levelling the truck crane

- Retract the supporting cylinders evenly. Lower the truck crane only to the extent that the suspension struts still have enough play for alignment.

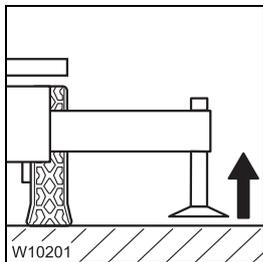


- Level the truck crane with the outriggers until only lamp (1) lights up in the measuring range 1°.



Switching off the suspension

- Switch off the suspension – the symbol must be red;
 ▶ Switching the suspension on/off, p. 5-18.



Securing the truck crane

- Retract the supporting cylinders until the outrigger pads are about 5 to 10 cm (2 to 4 in) above the ground. Allow the outrigger beams to extend as far as possible.



Danger of overturning if outriggers are retracted!

Always leave the outrigger beams extended as far as possible and the outrigger pads just above the ground to secure the truck crane against overturning.

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13.4

Driving from the driver's cab



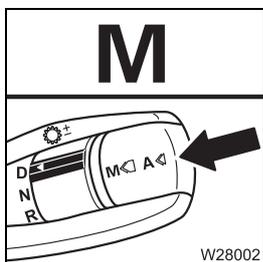
Risk of accidents when driving the truck crane from the driver's cab with a lifted load

With a lifted load, drive the truck crane from the crane cab only. You must be able to carry out crane movements in an emergency at all times.

13.4.1

Preparing to drive

Transmission



- Shift into the lowest starting gear; p. 5 - 44.
- Remain in *Manual* operating mode without changing gears; p. 5 - 45.

In this way you prevent shifting up gears and ensure that the speed is kept to a minimum.

Switching on separate steering

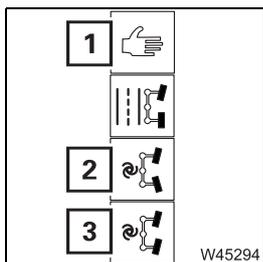


When driving the rigged truck crane, the separate steering must be switched on.

Risk of damage to the steering linkage

Always switch on separate steering before driving the rigged truck crane and steer the truck crane only when it is moving.

The steering linkage can be damaged if separate steering is switched off or if you steer the vehicle while it is stationary.



- Select and confirm the symbol
 - 1 – for manual separate steering or
 - 2 – for automatic separate steering for driving around corners or
 - 3 – for automatic separate steering for crab travel mode.

Connections

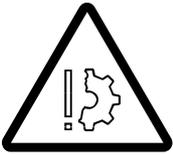
If required, you can

- Switch on the longitudinal differential locks; p. 5 - 71,
- Switch on the transverse differential locks; p. 5 - 71.

13.4.2

While driving

- Only drive slowly, do not shift up gears.
- Use the greatest possible turning radius when you drive around corners.
- Steer the truck crane when it is moving, and avoid sudden changes to the steering!



Risk of damage to the steering linkage

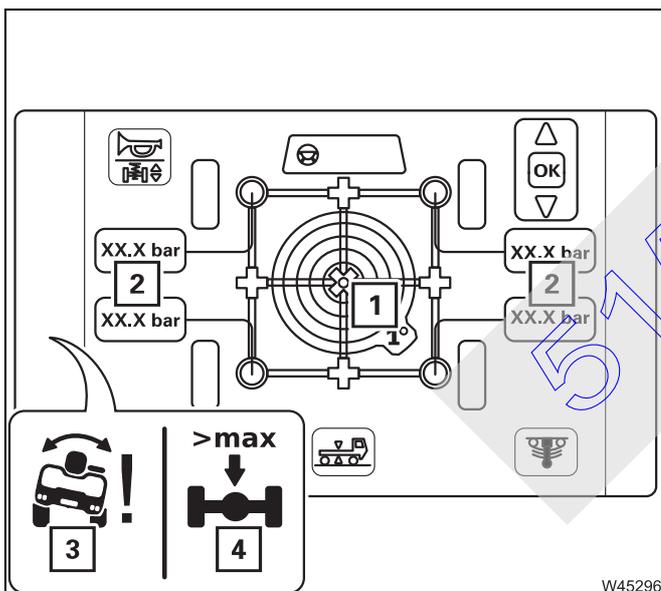
The steering linkage can be damaged if the steering wheel is moved while the vehicle is stationary.



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.



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° was exceeded – symbol (3) displayed
- or
- The suspension operation pressure (2) of 210 bar (3,045 psi) was exceeded – (4) symbol is displayed.

In this case, you must realign the truck crane using the raise axle function as described in the section *Putting the truck crane on the wheels – with raise axle function*; p. 13 - 10.



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.

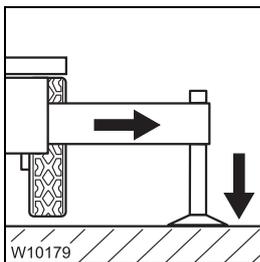
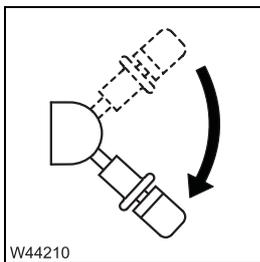
Never level the truck crane with the level adjustment system if the ground is uneven. In this case, you can lift the truck crane

- with the supporting cylinders, align it and lower it again;
 ▣▣▣▣► *Levelling the free-on-wheels truck crane*, p. 12 - 58.
- or level it with the raise axle function; ▣▣▣▣► *Levelling the truck crane*, p. 13 - 11.

13.4.3

After driving

- Switch separate steering off after driving; ▣▣▣▣► p. 5 - 83.
- Apply 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.

Released outrigger spans

- For the *Standard* slewing range type; ▣▣▣▣► p. 12 - 24
- For the *MAXbase* slewing range type; ▣▣▣▣► p. 12 - 29

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13.5

Driving from the crane cab



Risk of accidents when driving with a lifted load!

The truck crane may only be driven with a lifted load when it is in the *Free on wheels* operating position and the current rigging mode has been entered and confirmed on the RCL.



Risk of accidents due to the hook block/load swinging!

Secure the hook block/load when driving so that it cannot swing. Start slowly only so that the hook block/load does not swing.



Risk of accidents due to partially obstructed view of the truck crane!

While driving, always stay in visual or radio contact with a banksman who can observe the parts that you cannot see, such as the erected main boom.



Risk of overturning by slewing superstructure!

When driving with the truck crane rigged, the slewing gear must be switched off – the slewing gear brake must be applied. The turntable can be locked if there is a corresponding system.



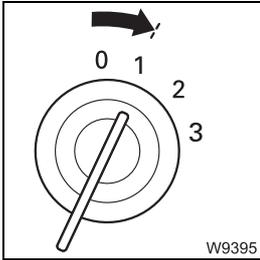
Risk of accidents when an increased idling speed is used!

If necessary, reset the idling speed to the default value. Do not drive at increased idling speed. You may drive the truck crane from the crane cab only at the lowest speed possible.

13.5.1

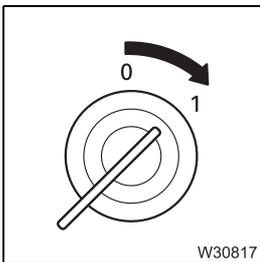
Preparing to drive

- Make sure that the rigging mode for driving with a load or without a load is set correctly;  p. 13 - 2.



In the driver's cab

- The ignition key is in position **1** so that the steering cannot lock.
- The driver's cab must be locked with the second ignition key in order to secure it against unauthorised use – for example, braking.
- The parking brake is applied.



In the crane cab

- The ignition is switched on.
- The hand-held control must be disconnected and the bridging plugs plugged into all the sockets.
- The superstructure is locked.
- The parking brake is applied.

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13.5.2

Releasing/applying the parking brake

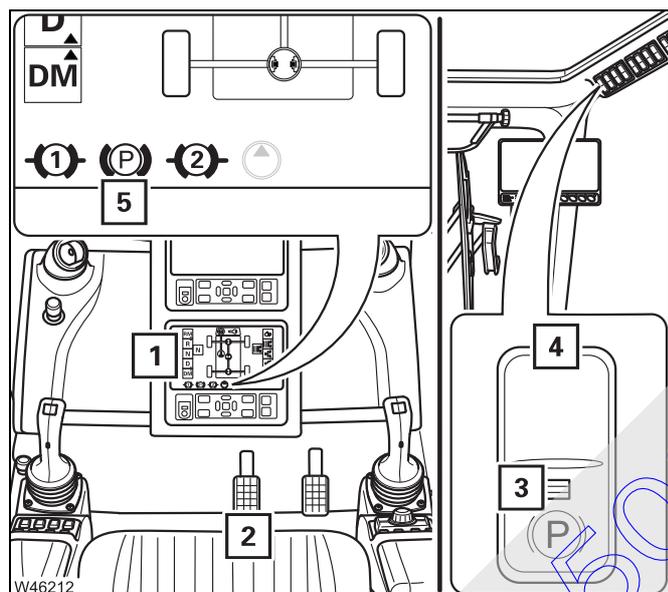
Releasing



Risk of accidents due to the truck crane moving unintentionally!

Always apply the service brake before releasing the parking brake.

This prevents the truck crane rolling in an uncontrolled manner when the parking brake is released.



Releasing for the first time after ignition on

- Push the button (4) at the top once – the display (1) opens the *Driving* menu.
- Wait approx. 5 seconds and continue as described after the first enable.

After the first enable

- Operate the service brake (2).
- Push the button (4) at the top once.
 - The lamp (3) goes out.
 - The parking brake is released.
 - In the *Driving* menu – the symbol (5) turns grey.



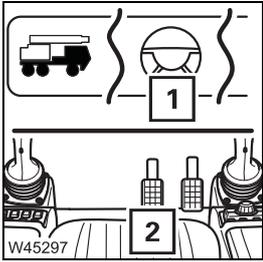
If the supply pressure is not sufficient to release the parking brake, a corresponding message is displayed on the CCS display.

Closing

➡ *After driving*, p. 13 - 35.

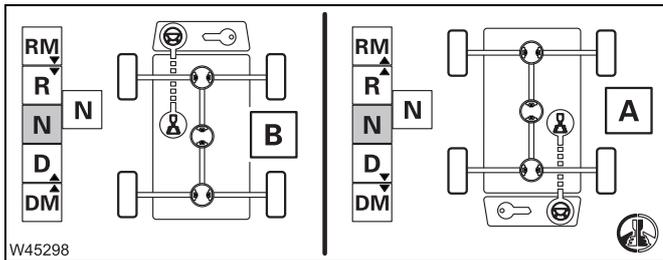
13.5.3 Opening/closing the Driving menu

Opening the menu

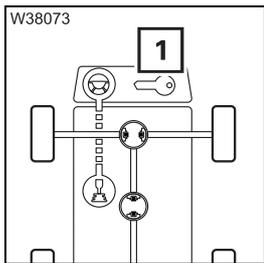


- Open the menu (1) – Driving menu.

The menu opens automatically the first time you release the parking brake after switching on the ignition. Always apply the service brake (2) before releasing the parking brake; ■■■► p. 13 - 21.



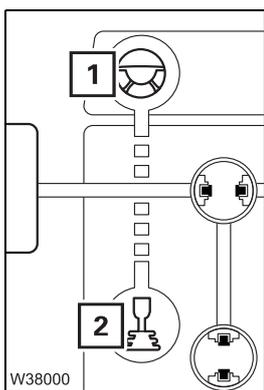
The display shows (A) or (B) depending on the current slewing angle; *Carrier display*, p. 9 - 165.



If the symbol (1) is **red**, you must turn the ignition key in the driver's cab to position 1 – the symbol turns **grey**.

Selecting the operating mode

The available operating modes are *Crane operation* and *Driving*.



Crane operation

Symbol (1) **green** – symbol (2) **white**

In this operating mode, you can perform crane operation in exactly the same way as when the *Driving* menu is closed. This operating mode is selected when the menu is opened.

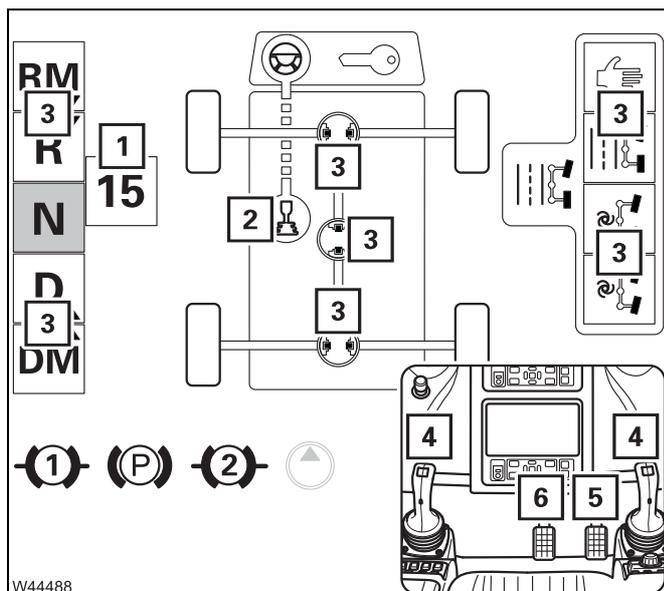
Driving

Symbol (1) **white** – symbol (2) **green**

In this operating mode, the operating elements for driving are enabled. The crane's hydraulic system remains switched off – no crane movements can be carried out.

Selecting the operating mode

- Select and confirm the symbol (2) – the active operating mode is displayed.



During crane operation

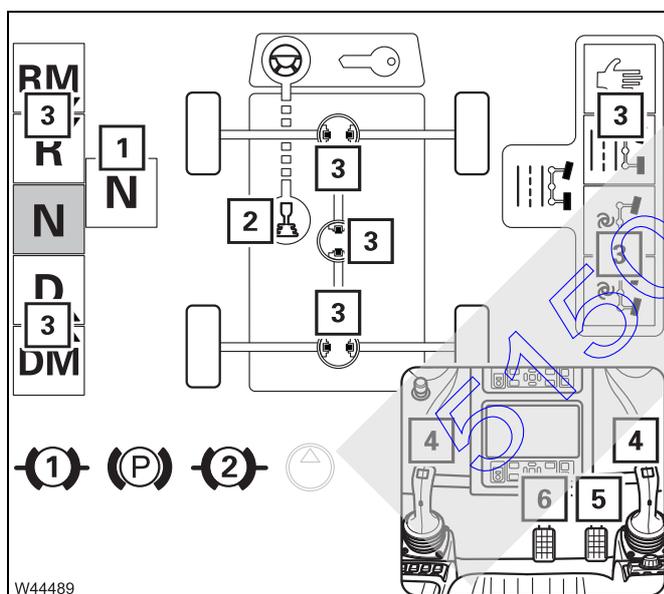
The symbol (2) is **white**.

The gear indicator (1) shows gear 15 (shift position for supplying the crane's hydraulic system).

The operating elements (3) and (6) are disabled.

The buttons (4) are assigned the *High-speed* function.

The engine speed for crane operation is controlled using the pedal (5).



When driving

The symbol (2) is **green**.

The transmission is in neutral position – (1) displayed.

The operating elements (3) are enabled.

The buttons (4) are assigned the *Steering* function.

The engine speed for driving is controlled using the pedal (5).

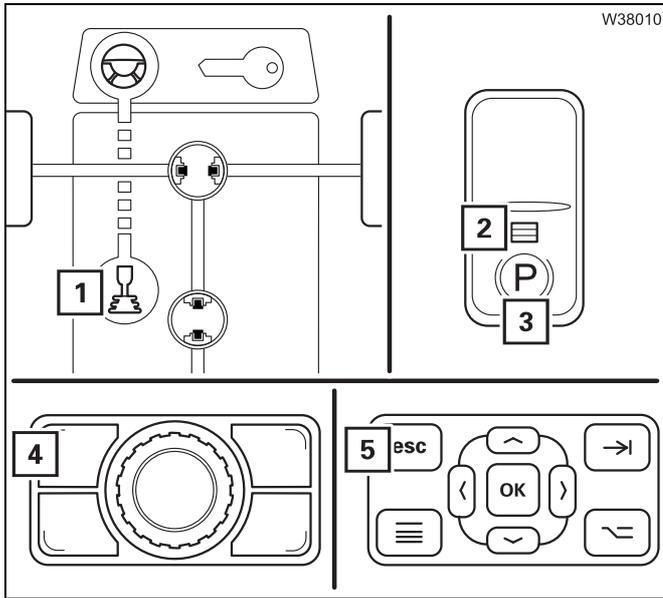
The pedal (6) for the service brake is active.

To carry out crane movements, you can stop and switch over to *Crane operation* operating mode.



Closing the menu This section describes only how to close the *Driving* menu.

If you want to stop driving,  *After driving*, p. 13 - 35.



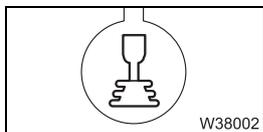
- Apply the parking brake.
Press button (3) at the bottom once – lamp (2) lights up.
- Switch to crane operation.
Select symbol (1) and confirm – symbol is **white**.
- Close the *Driving* menu.
Press button (4) or (5) once.

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13.5.4

Steering

Switching on



Switching over to *Driving* operating mode switches on normal steering mode.

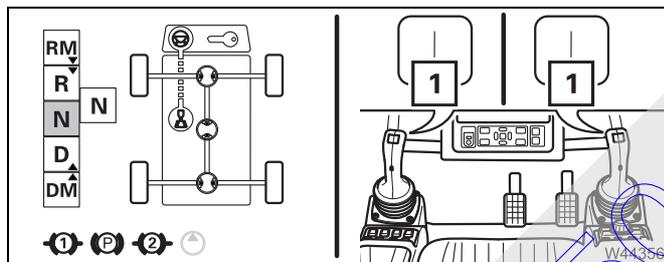
Display and steering direction

The display of the carrier depends on the current slewing angle; *Carrier display*, p. 9 - 165.

The steering direction depends on whether the superstructure is in the front semi-circle or in the rear semi-circle.

In the front semi-circle

The *Steering wheel* steering direction applies.



- Turn to the right

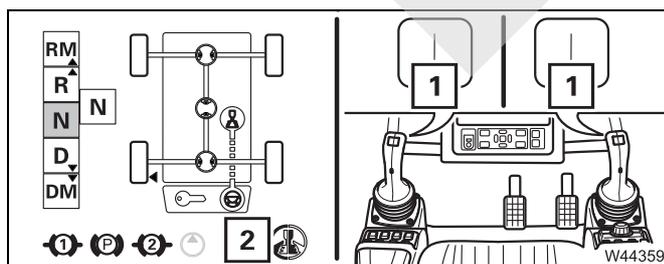
Press button (1) to the right – steering wheel turns to the right (with right control lever).

- Turn to the left

Press button (1) to the left – steering wheel turns to the left (with right control lever).

In the rear semi-circle

The steering direction can be switched between *Steering wheel* and *Reversed*. The current steering direction is displayed.



With the *Reversed* steering direction – symbol (2) displayed – the following applies:

- Turn to the right

Press button (1) on the left – steering wheel turns to the right (with right control lever).

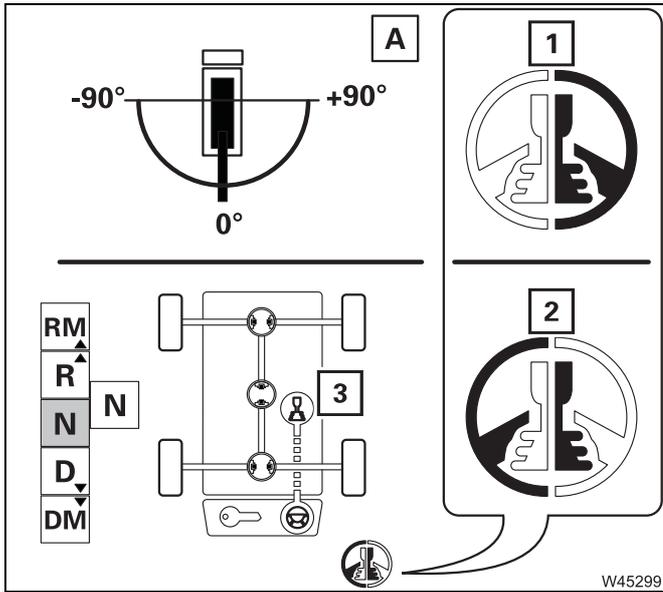
- Turn to the left

Press button (1) on the right – steering wheel turns to the left (with right control lever).



Changing the steering direction

The steering direction switched on is saved and is retained even after a restart.



The superstructure is in the rear semi-circle (A) – (3) is displayed. The currently set steering direction is displayed.

- 1 *Steering wheel* steering direction
- 2 *Reverse* steering direction (compared to steering wheel)

Switching over to *Steering wheel*

- Select and confirm the symbol (2) – symbol (1) is displayed.

Switching over to *Reversed*

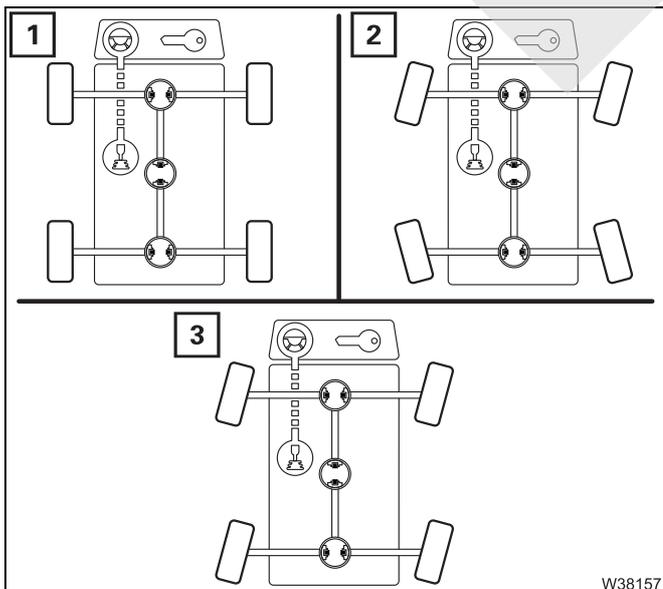
- Select and confirm the symbol (1) – symbol (2) is displayed.



All illustrations and descriptions in the following sections refer to the *Steering wheel* steering direction. When you switch to the *Reversed* steering direction, remember that the wheels will turn in the opposite direction.

Displays when steering

The current steering angle of the wheels is displayed.

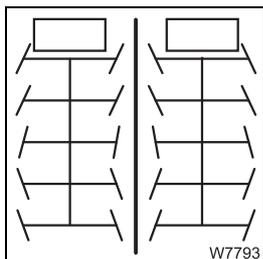


The symbols show the current steering angle:

- 1 Straight ahead position
- 2 Driving around corners
- 3 Crab travel mode

Separate steering

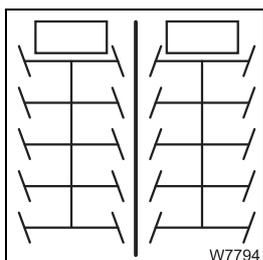
Always switch off the separate steering when driving a rigged truck crane.



There are two steering modes with separate steering.

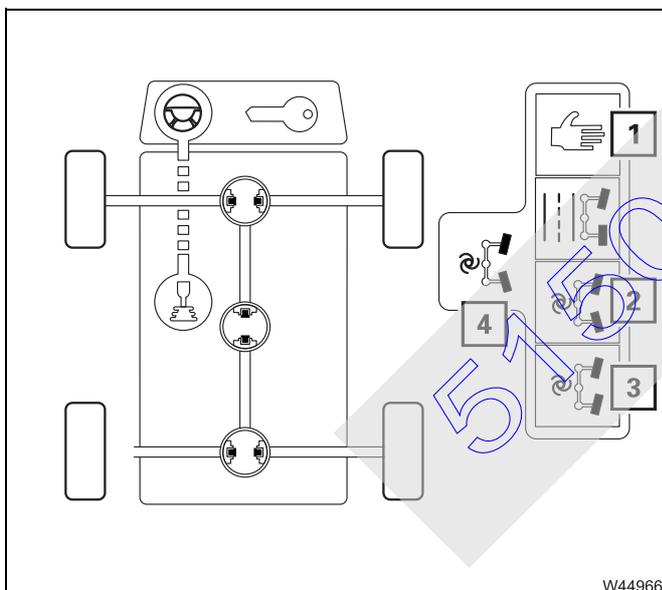
– Driving around corners

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



– Crab travel mode

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



Switching to separate steering

- Select and confirm the symbol for the desired steering mode.

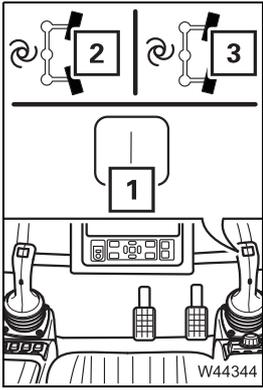
- 1 Manually
3rd to 5th axle lines steered manually
- 2 Automatic – driving around corners
3rd to 5th axle lines steered automatically
- 3 Automatic – crab travel mode
3rd to 5th axle lines steered automatically

The symbol (4) indicates the selected steering mode, e.g. *Driving around corners*.



If the error symbol is displayed, contact **Grove Product Support**; p. 8 - 42.





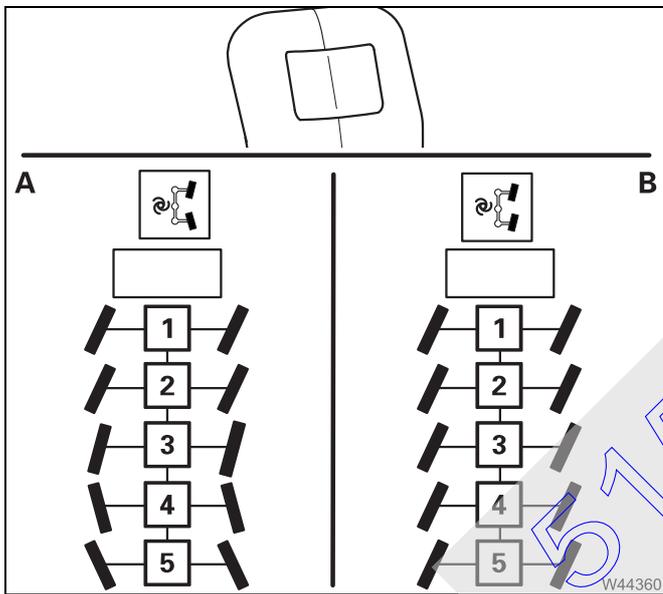
Steering with separate steering – automatic

Symbol (2) or (3) is displayed for the desired steering mode.

- Steer the 1st and 2nd axle lines with the button (1).
- To turn to the left: • Press button (1) on the left.
- To turn to the right: • Press button (1) on the right.

The axle lines are steered as long as you keep the button pressed or until an end position is reached.

The electronics system measures the steering angle of the 1st and 2nd axle lines and automatically steers the wheels of the 3rd to 5th axle lines correspondingly.



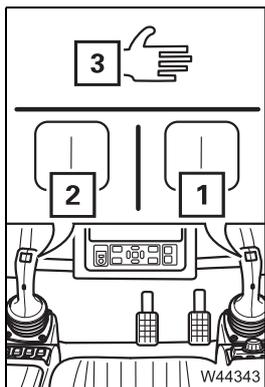
(A) – When driving around corners

The 3rd to 5th axle lines are moved out of position to suit the turning circle.

- The 3rd axle line is steered in the same direction as the 1st and 2nd axle lines.
- The 4th and 5th axle lines are steered in the opposite direction to the 1st and 2nd axle lines.

(B) – With crab travel mode

The 3rd to 5th axle lines are steered in the same direction as the 1st and 2nd axle lines.

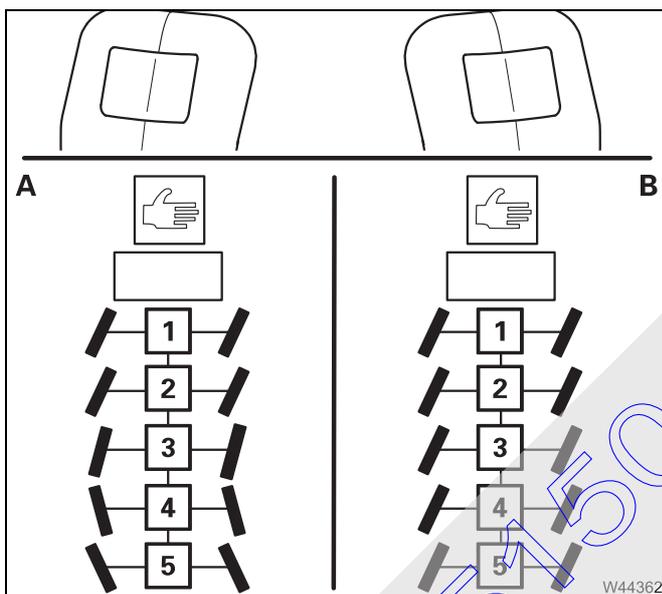


Steering with separate steering – manual

The symbol (3) is displayed.

- Steer the 1st and 2nd axle lines with the button (1).
 - Steer the 3rd to 5th axle lines with the button (2).
- **To turn to the left:** • Press buttons (1), (2) on the left.
- **To turn to the right:** • Press buttons (1), (2) on the right.

The axle lines are steered as long as you keep the button pressed or until an end position is reached.



(A) – For driving around corners

- Steer the 3rd to 5th axle lines in the opposite direction to the 1st and 2nd axle lines.

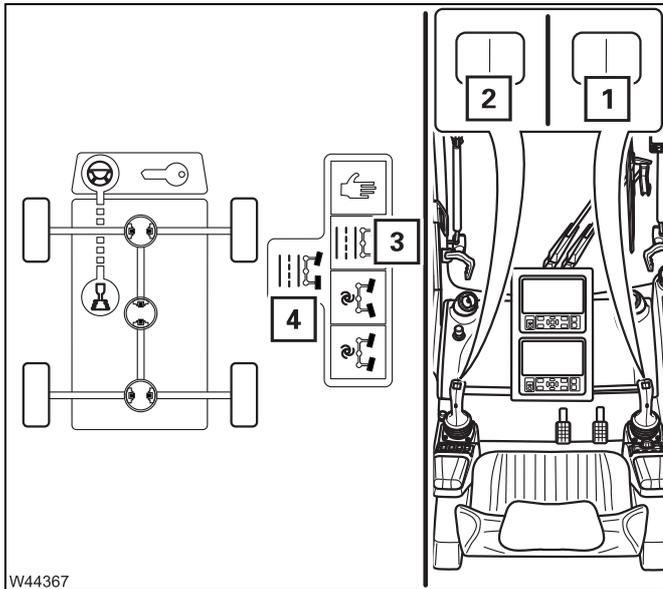
(B) – For crab travel mode

- Steer the 3rd to 5th axle lines in the same direction as the 1st and 2nd axle lines.



Normal steering mode

When driving a **rigged** truck crane, always use the separate steering;
▣▣▣▣ p. 13 - 27.

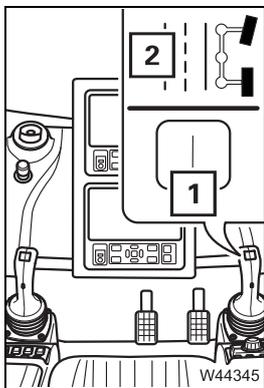


Switching to normal steering mode

- Use buttons (1) and (2) to turn the wheels to the *Straight ahead* position – the current wheel position is displayed.
- Select and confirm the symbol (3) – symbol (4) is displayed.



If the error symbol is displayed, contact **Grove Product Support**; ▣▣▣▣ p. 8 - 42.



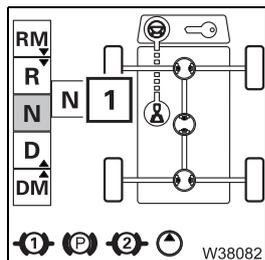
Steering in normal steering mode

The symbol (2) is displayed.

- Steer the 1st and 2nd axle lines with the button (1).
The wheels of the 3rd to 5th axle lines are turned correspondingly for driving around the corner.
- **To turn to the left:**
 - Press button (1) on the left.
- **To turn to the right:**
 - Press button (1) on the right.

13.5.5

Operating the transmission



When the *Driving* operating mode is switched on, the transmission is in neutral position – letter **N (1) white**.

Selecting the transmission mode

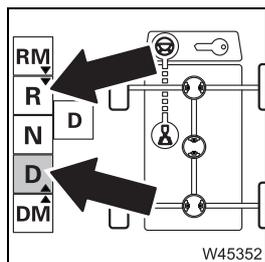


You can select transmission modes with change of gear and transmission modes without change of gear.

Risk of accidents when driving with a lifted load!

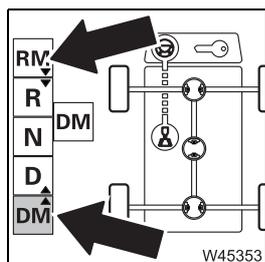
Secure the load when driving so that it cannot swing and use the **DM** or **RM** transmission mode so that the transmission does not shift.

This way you can prevent the swinging load leaving the permissible working range and the truck crane overturning.



Transmission modes with gear change

- Switch to transmission mode **D** or **R**.
 - The transmission shifts.
 - The speed is limited to approx. 20 km/h (12 mph).



Transmission modes without gear change

- Switch to transmission mode **DM** or **RM**.
 - The transmission only shifts up to 1st gear (reverse or forwards).
 - The speed is limited to approx. 5 km/h (3 mph).

In these transmission modes, you can start more gently than in transmission mode **D** or **R**. These transmission modes are intended for manoeuvring mode and for driving with a load.

13.5.6

While driving

DM and RM transmission modes

The truck crane is only driving in 1st gear, the transmission does not shift.



Risk of accidents when driving with a lifted load!

The maximum permissible speed for driving with a lifted load is 1.5 km/h (1 mph).

With a load lifted, drive at the lowest possible speed, not more than 1.5 km/h (1 mph). The speed is not automatically limited to this value.

- Use the greatest possible turning radius when you drive around corners.
- Do not steer the truck crane when it is stationary.



Risk of damage to the steering linkage

The steering linkage can be damaged if the steering wheel is moved while the vehicle is stationary.



Danger of overturning by switching on the suspension

The suspension must be deactivated (locked) while the rigged truck crane is on wheels.

When switching on the suspension, the suspension cylinders would suddenly be pressed together and damaged, and the truck crane could overturn.

Never level the truck crane with the level adjustment system if the ground is uneven. In this case, you can lift the truck crane

- with the supporting cylinders, align it and lower it again;
 ▣▣▣▣► *Levelling the free-on-wheels truck crane*, p. 12 - 58.
- or level it with the raise axle function; ▣▣▣▣► *Levelling the truck crane*, p. 13 - 11.

Transmission mode D

The speed is limited to approx. 20 km/h (12 mph) (maximum of 5th gear).

Use this transmission mode only when:

- The main boom is completely retracted
- The main boom is resting in the boom rest
- The outrigger beams/supporting cylinders are fully retracted

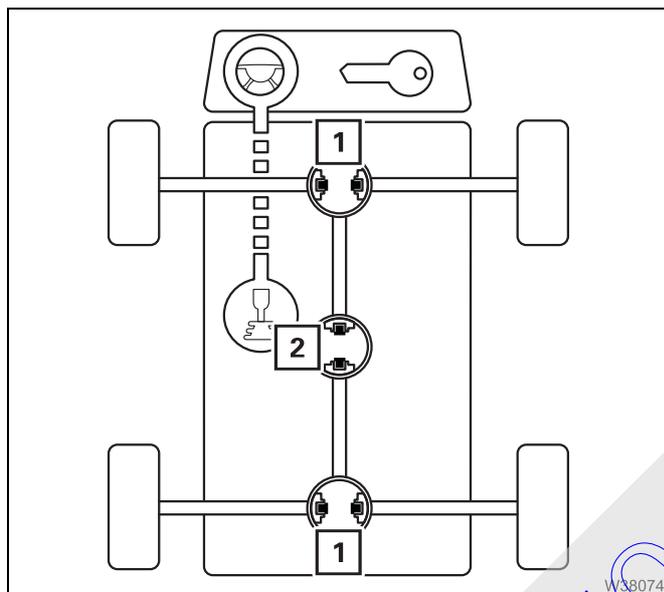
13.5.7

Possible connections



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 hard surfaces.



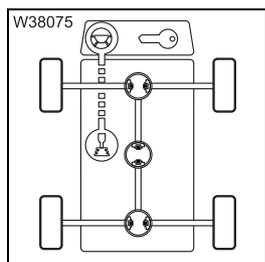
You can make the following connections, one after the other:

- Longitudinal differential locks (2),
- Transverse differential locks (1).

The symbols indicate the current switching state.

Longitudinal/ transverse differential locks

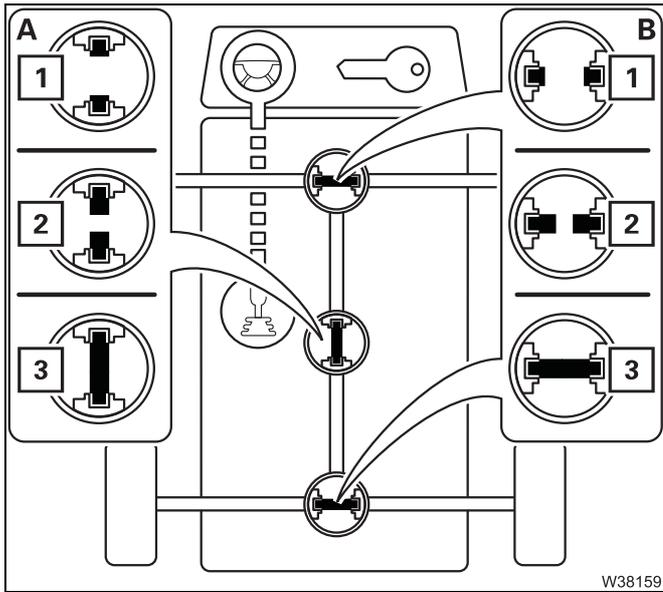
With a 10 x 8 x 10 drive, together with the longitudinal differential locks the drive of the 3rd axle line drive is also switched on / off.



- Set the steering to straight ahead.
- Stop the truck crane.

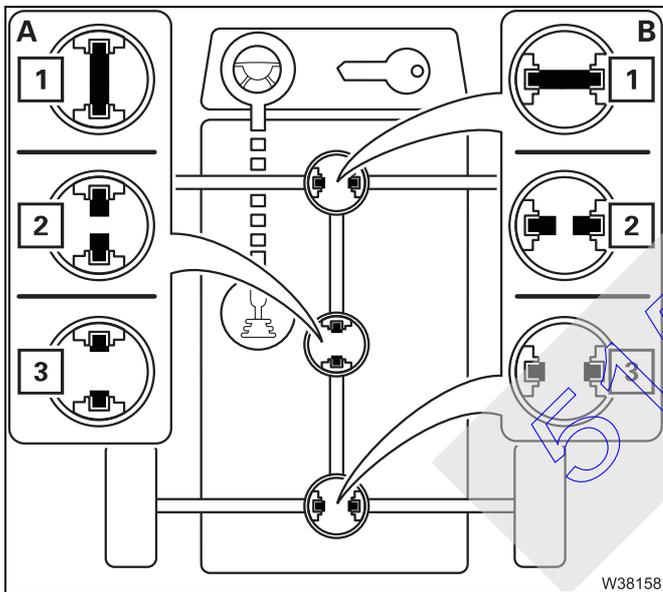
Operation in the menu is only enabled if the truck crane is stationary or if the current speed is below about 5 km/h (3 mph).





Switching on

- Select and confirm the symbol (1) for the
 - Longitudinal differential locks (A) or
 - Transverse differential locks (B).
- Start moving slowly – display:
 - first symbol (2) – **yellow**, then symbol (3) – **red**, differential locks on.



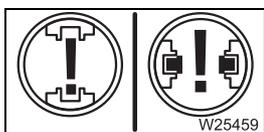
Switching off

- Select and confirm the symbol (1) for the
 - Longitudinal differential locks (A) or
 - Transverse differential locks (B).

Display:

first symbol (2) – **yellow**, then symbol (3) – **green**, differential locks off.

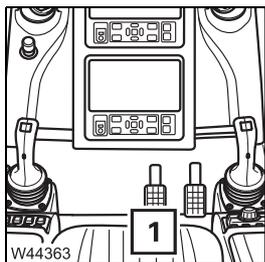
If symbol (3) is not **green** then drive back and forth slowly.



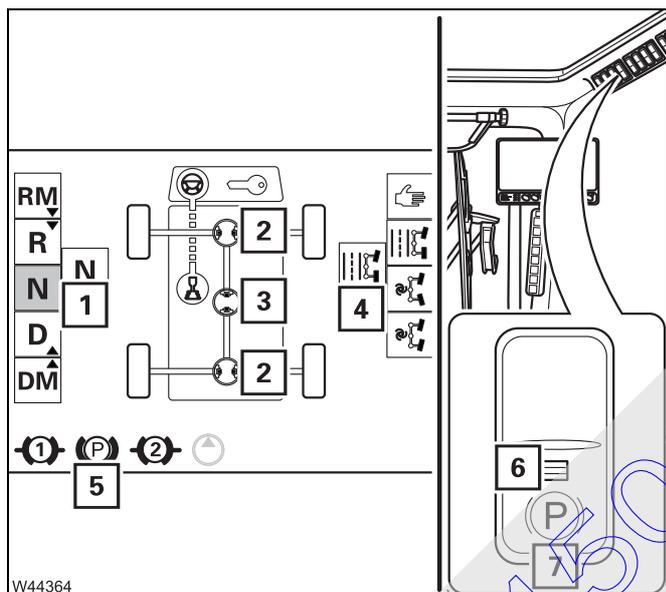
If the error symbol is displayed, contact **Grove Product Support**.

13.5.8

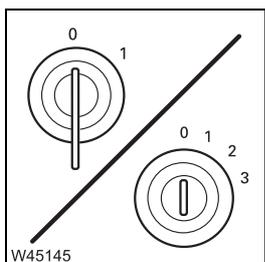
After driving



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



- Restore the original condition:
 - Switch the transmission to neutral position (1)
 - Switch off longitudinal differential lock (3),
 - Switch off transverse differential locks (2),
 - Switch on normal steering mode (4).
- Press the button (7) at the bottom once. The lamp (6) lights up, symbol (5) is red – the parking brake is applied.



- If necessary, switch the engine off; Switching off the engine, p. 10 - 12.
- Remove the ignition key from the ignition lock in the driver's cab and lock the driver's cab to prevent unauthorised access.

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

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14

Malfunctions during crane operation

14.1

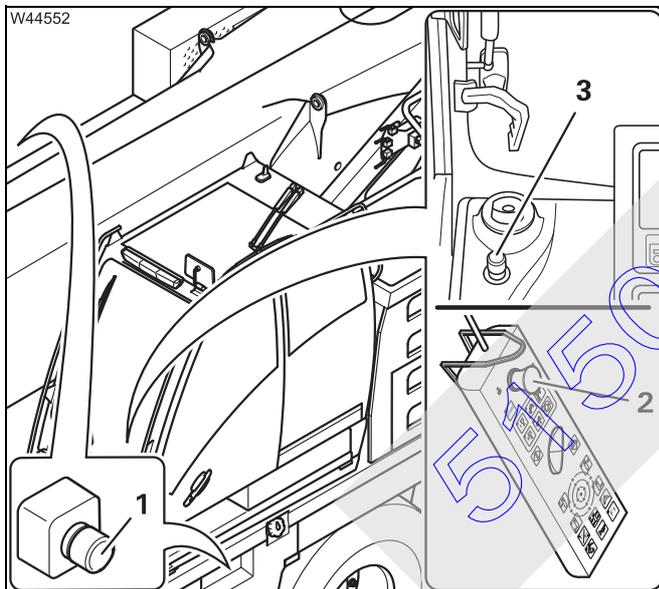
Emergency stop switch



Risk of overloading if used improperly!

Press the emergency stop switch only if it is no longer possible to stop the crane movements with the normal operating elements.

The emergency stop switch stops the crane movements abruptly. 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 emergencies:

- 1 On the carrier – always active (on both sides)
- 2 Only active with connected hand-held control – in addition to (1) and (3)
- 3 In the crane cab – always active

- Press an active emergency stop switch.
 - The switch engages.
 - The engine is switched off.

If there is an air intake inhibitor, then it is triggered.

After activating an emergency stop switch;
▣▣▣▣ ➔ *Resetting the emergency stop switch*, p. 10 - 14.



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 is switched off.

14.2

What to do when malfunctions occur during crane operation

Pay attention to the following points if a malfunction occurs:

- Keep calm!



Risk of accidents 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 trained and qualified personnel may perform crane movements with the solenoid valves.

The load can be set down

- 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 first in the section titled *RCL override*;

▣▣▣▣ *RCL override – version A*, p. 11 - 63.

▣▣▣▣ *RCL override – version B*, p. 11 - 67



Risk of accidents due to overridden or faulty RCL!

You may override the RCL only if it becomes absolutely necessary to do so in 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 emergency activation, if necessary;

▣▣▣▣ *Emergency operation with the hand-held control*, p. 14 - 42,

▣▣▣▣ *Hydraulic emergency operation with the hand pump*, p. 14 - 53.

▣▣▣▣ *Hydraulic emergency operation according to DGUV*, p. 14 - 61

- Lock the truck crane to prevent unauthorised use. Remove the ignition key and lock away the hand-held control.
- Inform your supervisor.
- Try to rectify the malfunction. If you cannot rectify the malfunction, contact **Grove Product Support**.

Load cannot be set down

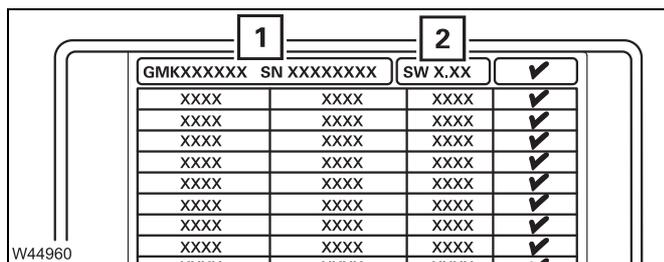
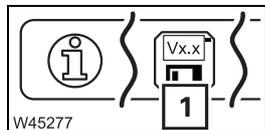
- Secure the danger area using cordons and warning signs.
- Notify **Grove Product Support**.

14.3

Warning and error messages

Program version

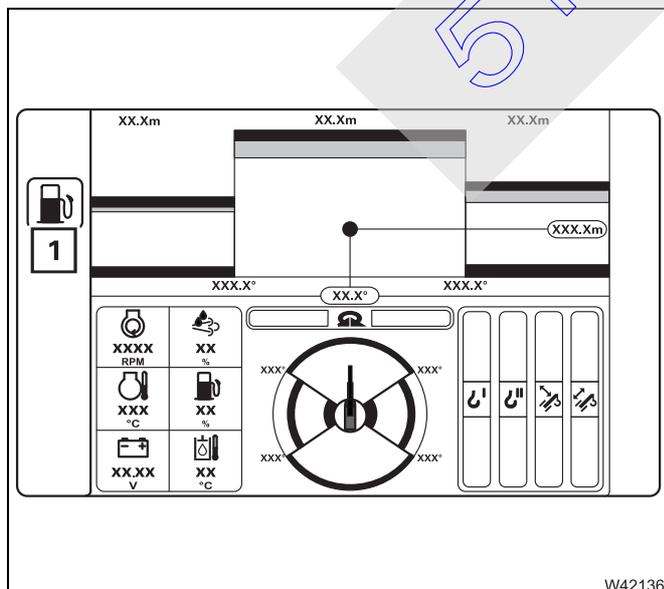
- Always note down the number of the program version and the serial number after a malfunction occurs before contacting **Grove Product Support**.
- Open the menu (1) – Program version menu.



- 1 Serial number display
- 2 Program version display (software package)

14.3.1

Warning messages on the CCS display



Warning messages are indicated by symbols in area (1). Overview of the symbols;

▣▣▣▣ *Warning messages on the CCS display, p. 8 - 23*

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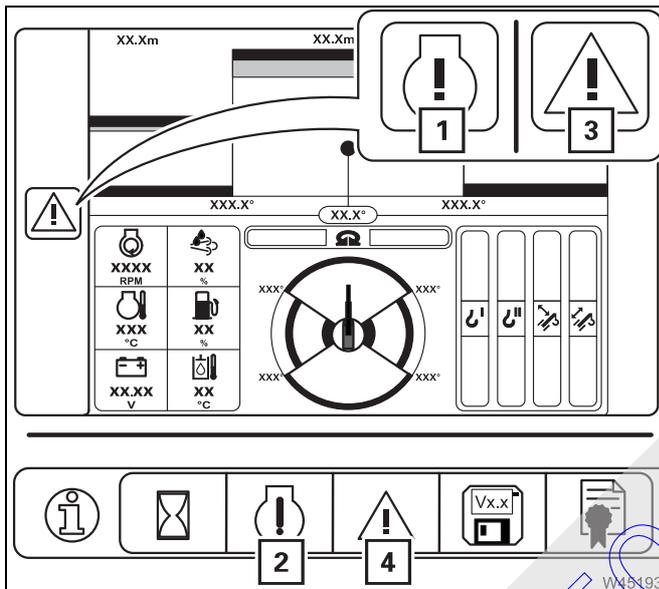
14.3.2 Error messages on the CCS display



Risk of accidents!

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

- Stop all crane movements and move both control levers into the initial position.



Symbol (1) or (3) flashes when the CCS detects an error. The symbols flash alternately if both error types apply.

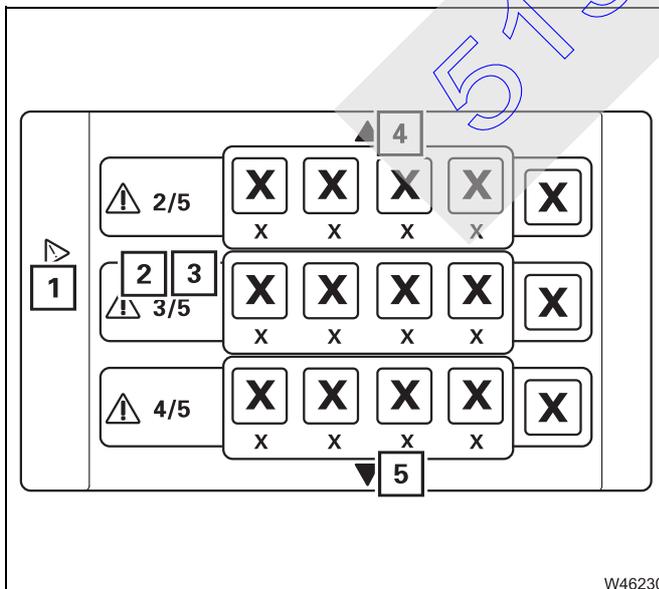
(1) – Engine/transmission error

- Switch off the engine immediately.
- Open the *Engine/transmission error* menu (2).
For the subsequent procedure; see p. 8 - 37.

(2) – Crane operation error

The buzzer tone sounds once.

- Open the *Crane operation error* menu (4).



Displaying errors / total errors

The display (3) shows the error total and the display (2) shows which error is displayed.

3/5 for example, means:

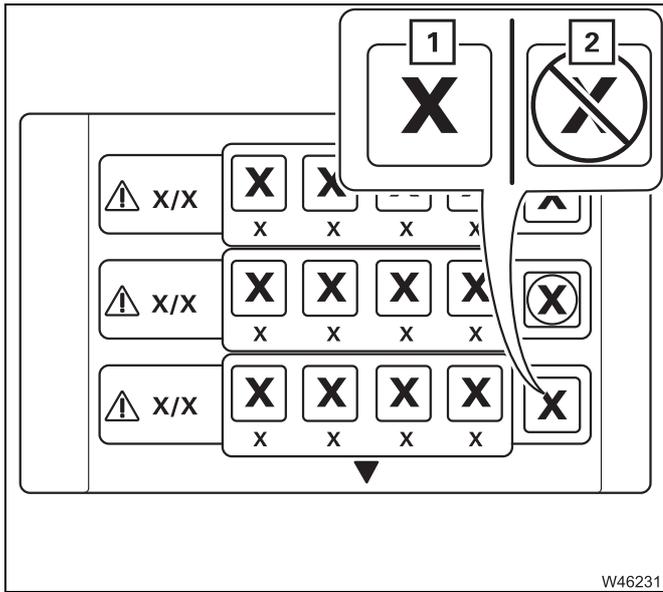
- Error 3 is shown,
- there are a total of 5 errors.

Displaying errors

The rotating symbol (1) indicates there are further unacknowledged errors.

- Select and confirm the symbol (4) or (5) to show any additional errors.

- 4** Previous error
- 5** Next error



Acknowledging errors

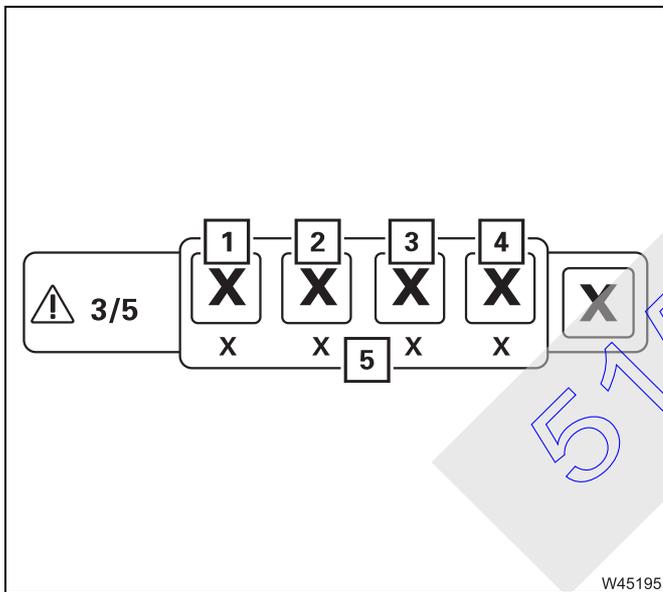
There are error messages that cannot be acknowledged;  *Special error messages*, p. 14 - 7.

Symbol (1) is displayed – error can be acknowledged

Symbol (2) is displayed – error cannot be acknowledged

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

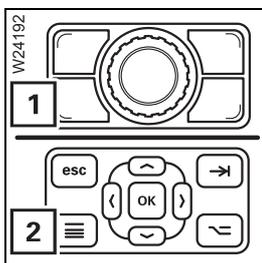
If an error cannot be acknowledged, consult **Grove Product Support**.



Error message display

For each error there is

- The error code (5),
- The symbols for
 - 1 The faulty component
 - 2 The error type
 - 3 The control unit that detected the error
 - 4 The index in the error group



Exit menu

You can exit the error menu at any time via button (1) or (2).



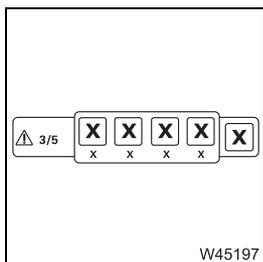
If not all errors have been acknowledged then the symbol (1) is displayed continuously.

When all errors are acknowledged, the symbol (1) goes out.

The buzzer tone sounds once and the symbol (1) flashes when an error occurs.

Special error messages

The error messages listed here are shown after the removal of the outrigger beams and cannot be acknowledged.



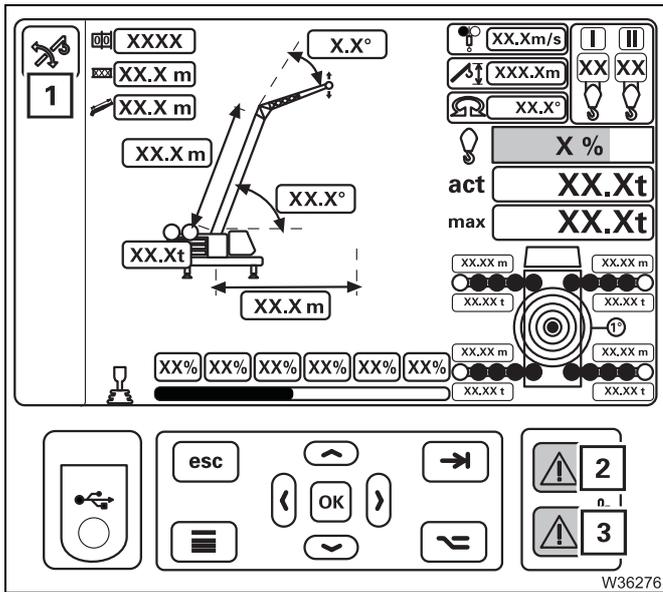
5801.7.33.2	5809.7.32.96	5801.7.33.98
5803.7.32.2	5807.7.32.96	5803.7.32.98

The error messages have no effect on driving and are no longer shown after the correct installation of the outrigger beams.

If other error messages are shown; *Displaying errors / total errors*, p. 14 - 5.



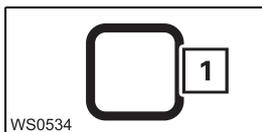
14.3.3 Warning messages on the RCL display



If RCL detects a warning or a fault then a symbol is displayed in the display area (1).

If the warning results in a shutdown, lamps (2) and (3) also light up.

If only lamps (2) or (3) light up;
 ■■■► RCL early warning, p. 11 - 57
 ■■■► RCL shutdown, p. 11 - 57



All symbols are shown within a frame (1). The colour of the frame indicates the message type.

– Red: Warning message

In addition, corresponding shutdowns take place to prevent overloading of the truck crane or shutdowns due to undefined conditions.

– Yellow: Fault message

Some shutdowns occur because adjustable limit values are reached or information is displayed



Colours are not used in this overview. The table provides an overview. Also observe the overview provided separately, it may contain additional symbols.

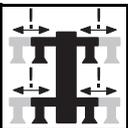


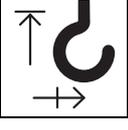
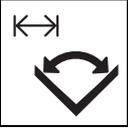
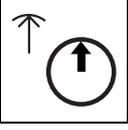
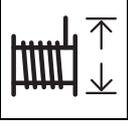
Risk of accidents due to overridden or faulty RCL!

Only override the RCL if it is unavoidable to reduce 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, crane operations are not monitored and no shutdown procedures are initiated when leaving the working range.

Symbol	Cause Details / effect	Remedy
	Main boom angle too small	
	RCL shutdown Lower boom is disabled	Raising the main boom
	Main boom angle too large	
	RCL shutdown Raise boom is disabled	Lower main boom
	Rigging mode not permitted	
	There is no lifting capacity table for main boom operation with the currently entered rigging mode or current operating state RCL shutdown	<ul style="list-style-type: none"> – If the rigging mode is not accepted – enter the rigging mode correctly or establish a permissible rigging mode and enter this – On shutdown – leave the shutdown range
	Rated capacity calculation illogical	
	Main boom is set down or pressure sensor in the derricking cylinder is defective RCL shutdown Only raising the boom is enabled	<p>Raise the main boom if necessary</p> <p>If the message remains, notify Grove Product Support and have the pressure sensor checked</p>
	Lattice extension angle too small	
	RCL shutdown Lower boom is disabled	Raise lattice extension
	Lattice extension angle too large	
	RCL shutdown Raise boom is disabled	Lower lattice extension



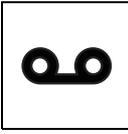
Symbol	Cause Details / effect	Remedy
	<p>Rigging mode not permitted</p> <p>There is no lifting capacity table for working with the lattice extension with the currently entered rigging mode or current operating state.</p> <p>RCL shutdown</p>	<ul style="list-style-type: none"> – If the rigging mode is not accepted – enter the rigging mode correctly or establish a permissible rigging mode and enter this – On shutdown – leave the shutdown range
	<p>Lattice extension cannot be derricked</p> <p>The maximum permissible pressure in the derricking cylinder has been reached.</p> <p>RCL shutdown</p> <p>Derricking the lattice extension is disabled.</p>	<p>Raise the main boom (reduce the load moment at the lattice extension) or set the load down</p>
	<p>RCL error status display</p> <p>No device input signal available</p>	<p>Connect the status display</p> <p>At the next opportunity notify Grove Product Support and have the fault rectified</p>
	<p>Outrigger span deviation</p> <p>The measured outrigger span deviates from the entered outrigger span.</p> <p>A deviating outrigger span has been entered or outrigger span monitoring is faulty</p>	<p>Check the rigged outrigger span and enter the rigged span or rig the required outrigger span</p> <p>For the standard slewing range type – if necessary, enable crane operation if the outrigger span is correct;  p. 11 - 42</p>
	<p>Counterweight deviation</p> <p>The measured counterweight weight deviates from the entered counterweight weight.</p> <p>A deviating counterweight has been entered or counterweight monitoring is faulty</p>	<p>Check the rigged counterweight and enter the rigged counterweight or rig the required counterweight</p>

Symbol	Cause Details / effect	Remedy
	Lifting limit switch – shutdown	
	Lifting limit switch weight is lifted Raising, extending and lowering are disabled	Lower the hoist until the lifting limit switch weight hangs freely – the disabled movements are enabled again
	Lifting limit switch – overridden	
	Only 1x shutdown after lifting the lifting limit switch weight, then no further monitoring after this Risk of damage to the hoist rope and boom head sheaves due to the hook block being lifted too far!	Cancel overriding;  p. 11 - 85
	Slewing speed – reduction switched off	
	The reduction required according to the lifting capacity table is no longer monitored Risk of overturning and risk of damage due to excessively high slewing speed!	Switch on slewing speed reduction
	Active working range limiter – maximum permissible overall height reached	
	Crane movements into the shutdown range are disabled	Leave the shutdown range
	Active working range limiter – maximum permissible slewing angle reached	
	Crane movements into the shutdown range are disabled	Leave the shutdown range
	Active working range limiter – maximum permissible working radius reached	
	Crane movements into the shutdown range are disabled	Leave the shutdown range
	Rope travel limitation – limit reached	
	Raising or lowering disabled, depending on the type of shutdown	Leave the shutdown range by raising or lowering, depending on the type of shutdown

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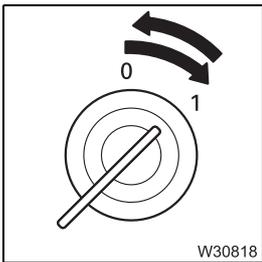


Symbol	Cause Details / effect	Remedy
	Hoist rope travel limitation – working radius or telescope status changed	
	Hoist disabled Configured limit value is no longer correct	Re-enter the hoist rope travel limitation
	RCL override activated for rigging (EN 13000)	
	 Button was pressed – Degree of utilisation up to 110% enabled – Speed reduction active	
	Raise enable activated after RCL shutdown (EN13000)	
	 Button was pressed With a degree of utilisation above 100%, raising the boom into a permissible working range is enabled	With a degree of utilisation below 100%, the disabled movements are enabled
	RCL override activated for emergency (EN 13000)	
	 Button was pressed – Crane movements are enabled for 30 minutes – Speed reduction active Risk of accident – no automatic monitoring!	
	RCL override activated (not EN 13000)	
	 Button was pressed – Crane functions enabled – Speed reduction active Risk of accident – no automatic monitoring!	

Symbol	Cause Details / effect	Remedy
	RCL override disabled for rigging	
	 <p>Button is pressed but override is not activated</p> <p>Override is not permitted for the current rigging mode/ operating condition</p>	Establish a permissible rigging mode/operating mode
	Raise enable disabled after RCL shutdown	
	 <p>Button is pressed but override is not activated</p> <p>Override is not permitted for the current rigging mode/ operating condition</p>	Establish a permissible rigging mode/operating mode
	RCL override disabled for emergency	
	 <p>Button is pressed but override is not activated</p> <p>Override is not permitted for the current rigging mode/ operating condition</p>	Establish a permissible rigging mode/operating mode
	Teach-in phase, test mode	
	Activation can only be performed by service personnel	
	Data acquisition	
	Activation can only be performed by service personnel	



Symbol	Cause Details / effect	Remedy
	<p>Outrigger pressure too low</p> <p>A warning buzzer sounds</p> <ul style="list-style-type: none"> - Truck crane not supported correctly - Outrigger pad with ground contact <p>If necessary RCL shutdown, depending on country-specific setting</p>	<p>Support truck crane correctly</p>



If the described measures do not solve the problem, try to correct the error by switching off the ignition and switching it on again after about 15 seconds.



14.4

Troubleshooting

This section only deals with malfunctions not displayed by the control. If a warning message or error message is displayed, then observe the information in the corresponding section.

▮▮▮▮ *Warning messages on the CCS display*, p. 14 - 3

▮▮▮▮ *Error messages on the CCS display*, p. 14 - 5

▮▮▮▮ *Warning messages on the RCL display*, p. 14 - 8



In addition to the information in this section, check whether a corresponding fuse is faulty; ▮▮▮▮ p. 14 - 77.

14.4.1

Malfunctions at the engine



Observe the instructions in the section entitled *Malfunctions at the engine*; ▮▮▮▮ p. 8 - 39.

Malfunction	Cause	Remedy
Engine does not start – Starter does not turn	Ignition switched on in the driver's cab	Switch off the ignition in the driver's cab; ▮▮▮▮ p. 10 - 3
	Battery master switch switched off	Switch on the battery master switch; ▮▮▮▮ p. 4 - 11
Engine does not start – Starter turns	Batteries insufficiently charged	Charge the batteries; ▮▮▮▮ <i>Maintenance manual</i>

14.4.2

Malfunctions on the main hoist/auxiliary hoist

Malfunction	Cause	Remedy
Main hoist not working or malfunctioning	Main hoist off, lamp in button lights up dimly	▮▮▮▮ <i>Switching on the main hoist</i> , p. 11 - 78, ▮▮▮▮ <i>Switching on the auxiliary hoist</i> , p. 11 - 81
	Dead man's switch not actuated	Press dead man's switch
	Emergency stop switch on	▮▮▮▮ <i>Resetting the emergency stop switch</i> , p. 4 - 20



Malfunction	Cause	Remedy
No hoist function	Emergency stop switch on	▣▣▣▣▶ <i>Resetting the emergency stop switch</i> , p. 10 - 14
Only the lifting function works	Lowering limit switch approached	Leave the shutdown range and raise the hoist.
Lifting only possible at low speed	Speed limited	Increase limit; ▣▣▣▣▶ p. 11 - 127
Lifting or lowering function cannot be switched off	CCS malfunction	Emergency stop switch; ▣▣▣▣▶ p. 14 - 1
No response to control lever movements	CCS malfunction for operating elements in the crane cab	Unrig using hand-held control; ▣▣▣▣▶ p. 14 - 42

14.4.3

Malfunctions at the main boom camera

Malfunction	Cause	Remedy
No image appears on the monitor after it is switched on.	Fuse blown – in camera or monitor.	Check fuses and replace as necessary; ▣▣▣▣▶ <i>Manufacturer operating instructions</i> .
	Radio communication between camera and receiver is interrupted.	Adjust the receiver on the crane cab.
	Connection between receiver and monitor is broken.	Check cable connection and notify Grove Product Support if necessary.
	Cable between camera and transmitter not connected or disconnected.	Check cable connection and notify Grove Product Support if necessary; ▣▣▣▣▶ p. 12 - 173.

14.4.4 Malfunctions at the hoist cameras

Malfunction	Cause	Remedy
No image appears on the monitor after it is switched on.	Fuse blown in monitor.	Check fuses and replace as necessary; ■■■► <i>Manufacturer operating instructions.</i>
	Connection between camera and monitor is broken.	Check cable connection and notify Grove Product Support if necessary.

14.4.5 Malfunctions at the derricking gear

Malfunction	Cause	Remedy
Derricking gear not working or malfunctioning	Derricking gear off, lamp in button lights up dimly	Switch on derricking gear; ■■■► p. 11 - 87
	Dead man's switch not actuated	Press the dead man's switch.
	Emergency stop switch on	■■■► <i>Resetting the emergency stop switch, p. 4 - 20</i>
	Control unit fuse blown	Replace blown fuse; ■■■► p. 14 - 77
Derricking gear not working	Emergency stop switch on	■■■► <i>Resetting the emergency stop switch, p. 10 - 14</i>
Derricking function or high-speed mode not working	Function disabled by CCS	If necessary, acknowledge error message once and briefly switch off the ignition – if it occurs again, notify Grove Product Support
Derricking only possible at low speed	Speed limited	Increase limit; ■■■► p. 11 - 127
Derricking function cannot be switched off	CCS malfunction	Emergency stop switch; ■■■► p. 14 - 1
No response to control lever movements	CCS malfunction for operating elements in the crane cab	Unrig using hand-held control; ■■■► p. 14 - 42

14.4.6 Malfunctions at the telescoping mechanism

Malfunction	Cause	Remedy
Telescoping mechanism not working or malfunctioning	Telescoping mechanism off, lamp in button lights up dimly	Switch on telescoping mechanism; ■■■▶ p. 11 - 91
	Dead man's switch not actuated	Press dead man's switch
	Emergency stop switch on	■■■▶ <i>Resetting the emergency stop switch</i> , p. 4 - 20
Telescoping mechanism not working	Emergency stop switch on	■■■▶ <i>Resetting the emergency stop switch</i> , p. 10 - 14
Retracting function not working	Insufficient lubrication	Lubricate main boom; ■■■▶ <i>Maintenance manual</i>
	Main boom is not steep enough	Leave the shutdown range and raise the boom
Telescoping not possible or only possible at very low speed	Speed limited	Increase limit; ■■■▶ p. 11 - 127
Telescoping cannot be switched off	Malfunction at crane control	Emergency stop switch; ■■■▶ p. 10 - 14
Operation with the Teleautomation menus is disabled	Various errors	Retract main boom with the emergency program; ■■■▶ p. 14 - 27
The main boom can no longer be telescoped, the telescoping cylinder can no longer be moved	The hydraulic supply is interrupted	Notify Grove Product Support
No response to control lever movements	CCS malfunction for operating elements in the crane cab	Unrig using hand-held control; ■■■▶ p. 14 - 42

14.4.7

Malfunctions at the slewing gear

Malfunction	Cause	Remedy
Slewing gear not functioning	Slewing gear off, lamp in button lights up dimly	Switch on slewing gear;  p. 11 - 118
	Dead man's switch not actuated.	Press dead man's switch
	Emergency stop switch on	 <i>Resetting the emergency stop switch</i> , p. 4 - 20
	Rigging mode for position 0° to the rear or 180° to the front confirmed.	Confirm rigging mode for a slewing range
	Counterweight not pre-tensioned.	Pre-tension counterweight;  p. 12 - 107. In case of emergency – override shutdown; p. 14 - 51
	Superstructure locked	 <i>Locking the superstructure</i> , p. 11 - 16  <i>Switching on the houselock</i> , p. 11 - 17
Slewing gear not functioning	Emergency stop switch on	 <i>Resetting the emergency stop switch</i> , p. 10 - 14
Slewing not possible or only at low speed	Speed limited	Increase limit;  p. 11 - 127
Slewing gear no longer responds to the control lever movement	CCS malfunction	Emergency stop switch;  p. 14 - 1
No response to control lever movements	CCS malfunction for operating elements in the crane cab	Unrig using hand-held control;  p. 14 - 42

14.4.8 Malfunctions at counterweight hoist unit

Malfunction	Cause	Remedy
Counterweight hoist unit is not working	Emergency stop switch on	▣▣▣▣➤ <i>Resetting the emergency stop switch</i> , p. 10 - 14

14.4.9 Malfunctions when operating with the hand-held control

Malfunction	Cause	Remedy
After connecting: The CAN lamp does not light up or flashes	A bridging plug is not plugged into another socket	Plug in bridging plug; ▣▣▣▣➤ p. 14 - 43
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	Notify Grove Product Support

14.4.10 Malfunctions when raising the axles

Malfunction	Cause	Remedy
The menu cannot be opened	Suspension is switched on	Switch off suspension; ▣▣▣▣➤ p. 5 - 18
Operating elements not working	<i>Outrigger</i> menu open	Open the <i>Raise axle</i> menu; ▣▣▣▣➤ p. 12 - 60
Operating elements not working	Maximum permissible pressure exceeded	Re-align the truck crane to relieve it; ▣▣▣▣➤ p. 12 - 54

14.4.11 Malfunctions at the outriggers

Malfunction	Cause	Remedy
When operating from the crane cab	<ul style="list-style-type: none"> – Hand-held control connected to the superstructure or a bridging plug not inserted – Parking brake not applied – Slewing gear switched on – Operation switched over to control units 	Remove hand-held control or insert bridging plug; ■■■► p. 14 - 42 Apply parking brake; ■■■► p. 5 - 85 Switch off slewing gear; ■■■► p. 11 - 122 ■■■► <i>Switching over outrigger operation</i> , p. 12 - 37
When operating from the control units	– Operation switched over to crane cab	■■■► <i>Switching over outrigger operation</i> , p. 12 - 37
	Hand-held control connected to the superstructure or a bridging plug not inserted	Remove hand-held control or insert bridging plug; ■■■► p. 14 - 42
None of the specified causes apply	Solenoid valves are not switching electrically	Notify Grove Product Support

14.4.12 Malfunctions at the hydraulic system/hydraulic oil cooler

Malfunction	Cause	Remedy
Hydraulic oil temperature above 80 °C (176 °F), fan in the hydraulic oil cooler not running	Faulty temperature sensor in the circuit of the hydraulic system, error message is displayed	Have the temperature sensor replaced

14.4.13 Malfunctions at the CCS/RCL control units

Malfunction	Cause	Remedy
Control unit not working	Power supply not switched on	Switch the ignition on
Display is dark – LED flashes blue	Ambient temperature too low	Heat the crane cab
Display is dark – LED flashes yellow	Ambient temperature too high	Cool the crane cab
Display off – LED flashes red	Temperature on the display exceeds around 60 °C (140 °F)	Cool the crane cab; also protect the display from sunlight
Display dim	Ambient temperature too high – brightness is reduced automatically	The set brightness is restored after cooling

14.4.14 Malfunctions when driving from the crane cab

Malfunction	Cause	Remedy
The transmission, the differential locks and the separate steering do not respond to the operating elements – symbols grey	Parking brake applied	Release parking brake;  p. 13 - 21
	Ignition key in driver's cab not in position 1	Turn the ignition key in the driver's cab to position 1;  p. 13 - 20
Button for separate steering has no function	Separate steering switched off	 <i>Switching on separate steering</i> , p. 13 - 15

If this table does not help to rectify the fault, then start the engine from the driver's cab and check whether there are any warning messages.

14.5

Emergency operations and programs

This section contains all the information about possible emergency operations and emergency programs. The following are available:

- Mechanical emergency activation for retracting
- The *Telescoping emergency program* menu
- Entering the telescope status after emergency operation and
- Operation of the power units with the hand-held control

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14.5.1

Mechanical emergency activation for retracting

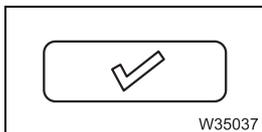
If you can no longer lock and unlock the telescopic sections from within the crane cab because of a malfunction, you can do so manually by performing mechanical emergency activation.

In this case, you need one or two auxiliary cranes.

In the worst case, emergency operation must be performed by trained and qualified personnel, because incorrect operation poses the risk of injury and damage to the main boom.

- Always check the following option first.

Checks before emergency activation



First check whether it is permitted to lower the main boom to a horizontal position with the current telescope status. Proceed as follows:

Enter and confirm the current rigging mode of the truck crane. The current rigging mode must be shown on the *RCL* display.

- 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 approved to lift persons and a second auxiliary crane to secure and telescope the unlocked telescopic sections.



If lowering is possible but there is not sufficient space, you can check whether the truck crane may be driven in the current rigging mode;  p. 13 - 1.

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 **Grove Product Support**.

Mechanical emergency activation

The following requirements must be met before manually unlocking a lock:

- 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.

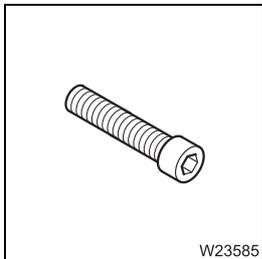


Risk of accidents due to abrupt retraction of a telescopic section!

Before unlocking the telescopic section, secure it against automatic retraction. This prevents the retracting telescopic section severing your limbs or the truck crane being damaged or overturned by the telescopic section suddenly retracting.



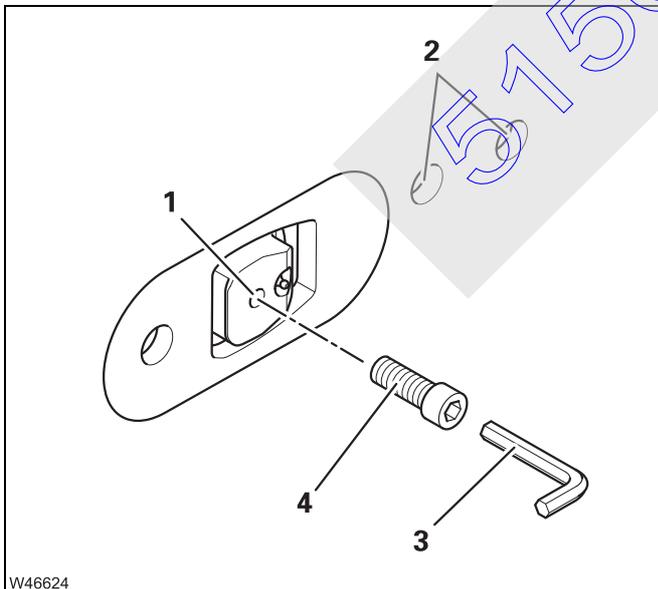
If the telescoping cylinder is positioned at a locking point, the corresponding telescopic section cannot be locked or unlocked manually.



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There are two **M8 x 110** bolts for every telescopic section.

These bolts are in the tool box supplied with the crane.



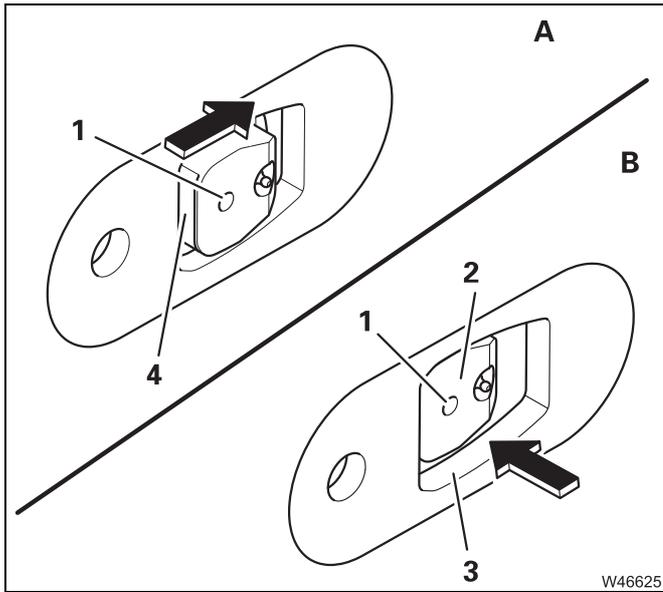
W46624

You will need a suitable tool (3), at least 250 mm (9.8 in) long.

In order to unlock the telescopic section, screw the bolts (4) into the bores (1) in the locking pins.

Pins located further inside are reached through the bores (2).





Unlocking the lock

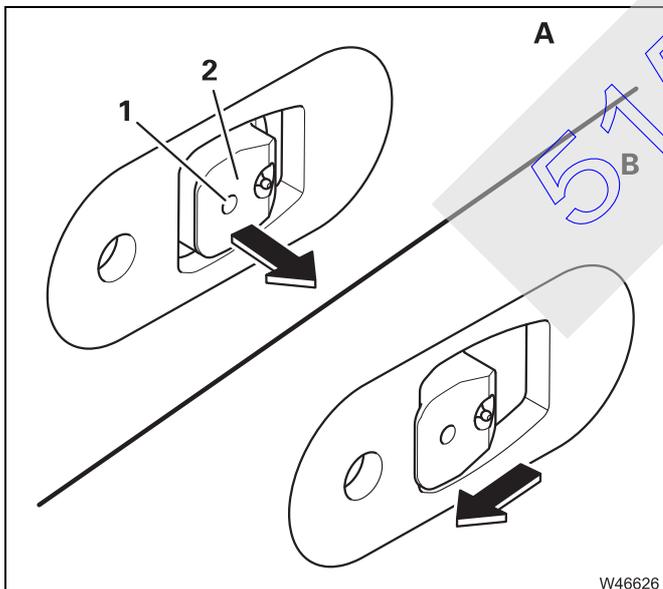
- **(A)** – Extend about 35 mm (0.11 ft), so that the cutout (4) is accessible.
- **(B)** – Screw a bolt into the bore (1). The locking pins (2) must retract behind the telescopic section (3).
If necessary, give the locking pin (3) a slight knock to help this procedure.
- Unlock the lock on other side of the telescopic section as well.



Risk of damage due to a mechanically released lock!

Under no circumstances may you operate the telescoping cylinder (alone) while the lock is mechanically released. Unscrew all bolts out of the bores 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
- Unscrew the bolt from the bore (1) until the locking pin (2) is extended completely.
- Remove the bolt from the bore (1).
- **(B)** – Continue to retract until the telescopic section is set down

14.5.2

Telescoping emergency program

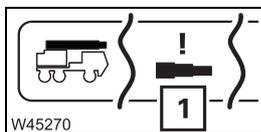
The emergency program is intended only for retracting the telescoping when operation with the Teleautomation menus is no longer possible due to a malfunction.

The emergency program is enabled only when the current locking status can still be detected by the crane control.

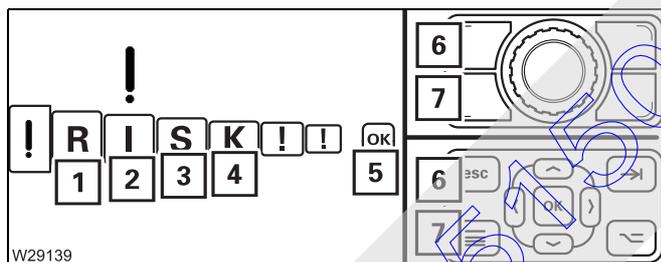
The emergency program is not intended for crane operation and is therefore limited to a certain amount of time.

Opening telescoping emergency program menu

- If possible, set down the load before starting the emergency program;
 - ▮▮▮▮ *What to do when malfunctions occur during crane operation, p. 14 - 2.*

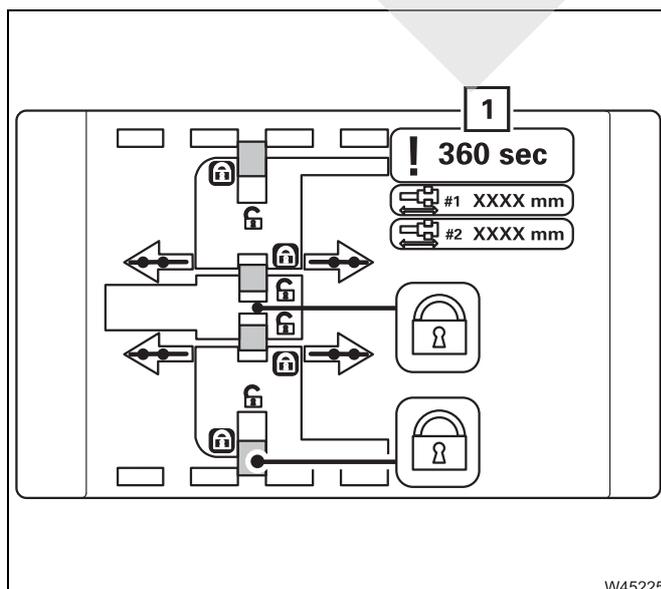


- Open the menu (1) – Telescoping emergency program menu.



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

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



Once the correct entry has been made, the *Telescoping* emergency program is started.

The emergency program has a time limit.

The display (1) counts down a time of about 360 seconds.

Within this time, you can operate the telescoping mechanism using the emergency program.

If the time is not sufficient you must restart the emergency program.





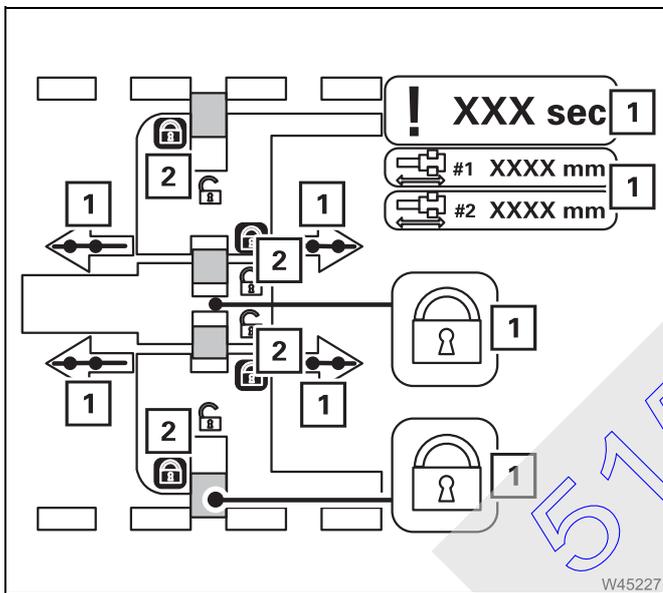
In the emergency program, all functions for retracting the main boom are enabled as long as there are no other faults (hydraulic or mechanical). The speed is limited to about 30% of the maximum speed.



If the emergency program was opened, you must re-enter the telescope status before the next operation without emergency program;
 ■■■▶ *Entering the current telescoping*, p. 14 - 40.

Description of the displays

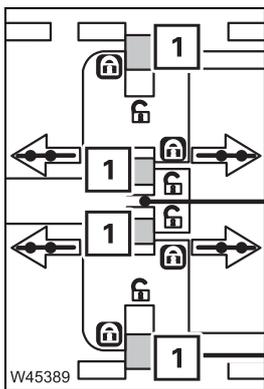
This section describes only those displays required for operation of the emergency program.



The displays shown in (2) are required for advanced emergency operation and are mainly intended for service personnel. For an overview; ■■■▶ p. 9 - 75.

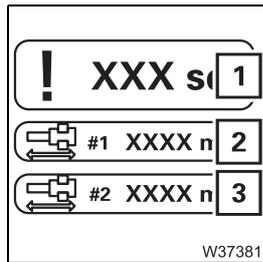
Operation of the emergency program is described here using the displays shown in (1) only.

This section provides an overview of the displays (1), with brief explanations.



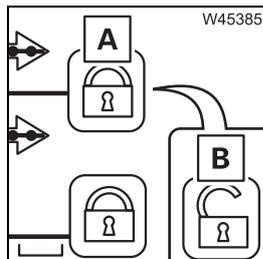
Display of the locking pins

Unlike the other telescoping menus, the locking pins (1) do not change their colour or their position.



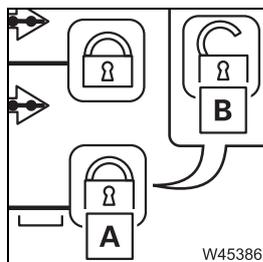
Displays for time and length

- 1 Time remaining until the emergency program closes automatically
- 2 Extended length of the telescoping cylinder – value from the length indicator of the *CCS* crane control
- 3 Extended length of the telescoping cylinder – value from the length indicator of the *RCL*



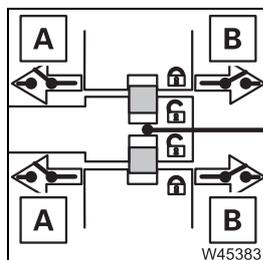
Locking status of telescopic section function display

- (A) – Display: Locked
– Function: Unlock
- (B) – Display: Unlocked
– Function: Lock



Locking status of telescopic section function display

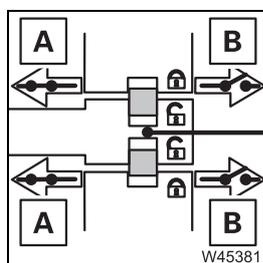
- (A) – Display: Locked
– Function: Unlock
- (B) – Display: Unlocked
– Function: Lock



Position of telescoping cylinder in foot section display

The display is shown by the arrows (A) and (B).

There are four different displays.



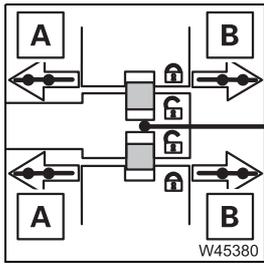
– Just before the locking point

Arrows (A) – Green

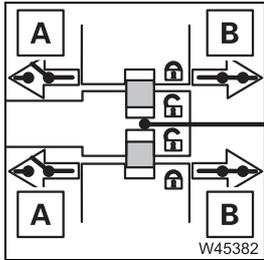
Arrows (B) – Grey

The locking point is reached by extending.

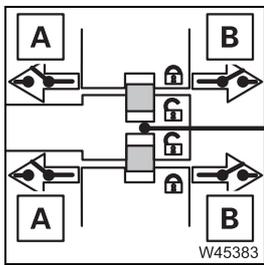




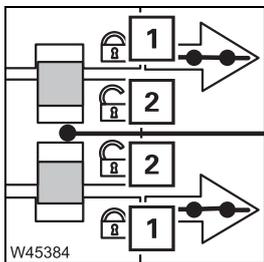
- At the locking point
- Arrows (A) – Green
- Arrows (B) – Green



- Just after the locking point
- Arrows (A) – Grey
- Arrows (B) – Green
- The locking point is reached by extending

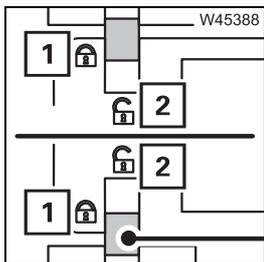


- Telescopic cylinder not in a foot section
- Arrows (A) – Grey
- Arrows (B) – Grey



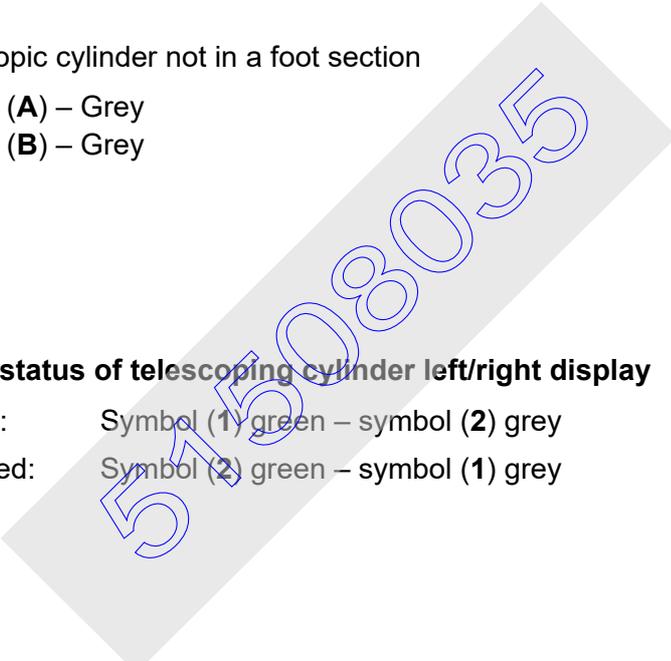
Locking status of telescopic cylinder left/right display

- Locked: Symbol (1) green – symbol (2) grey
- Unlocked: Symbol (2) green – symbol (1) grey



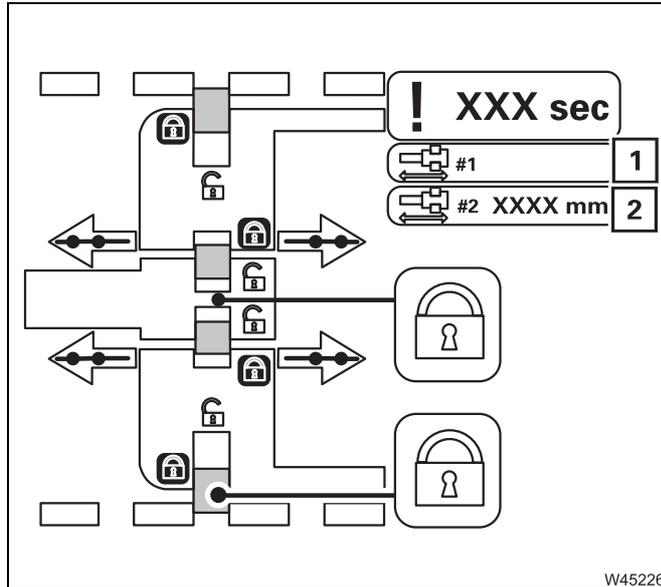
Locking status of telescopic section left/right display

- Locked: Symbol (1) green – symbol (2) grey
- Unlocked: Symbol (2) green – symbol (1) grey



Checks in the emergency program

Before operation, you must check the **length indicator displays** and the **functioning of the emergency program**.



Checking the length indicator display

- Check the displays (1) and (2).

Only telescope the main boom if at least one of the two displays shows a value.

If neither of the displays shows a value, you may not start the telescoping process. You have no way of determining the locking point of a telescopic section. In this case, consult **Grove Product Support**.



Risk of damage to the telescoping mechanism!

Never telescope the main boom without any length indicator display. It would then no longer 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.

Checking functioning of emergency program

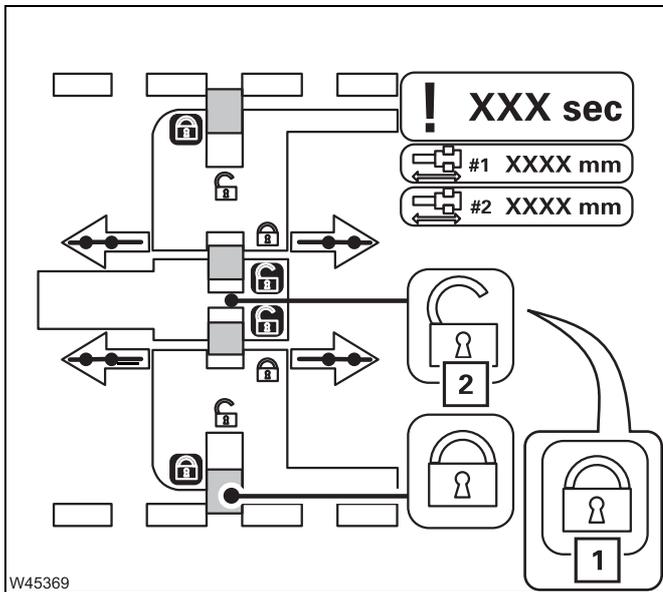
The procedure to follow depends on the current status of the telescoping mechanism.

- Check the current status of the telescoping mechanism and follow the cross reference that corresponds to the current status.
 - Status 1 – Telescoping cylinder at locking point; ■■■► p. 14 - 32.
 - Status 2 – Telescoping cylinder moving with telescopic section; ■■■► p. 14 - 33.
 - Status 3 – Telescoping cylinder on return run (without telescopic section); ■■■► p. 14 - 33.



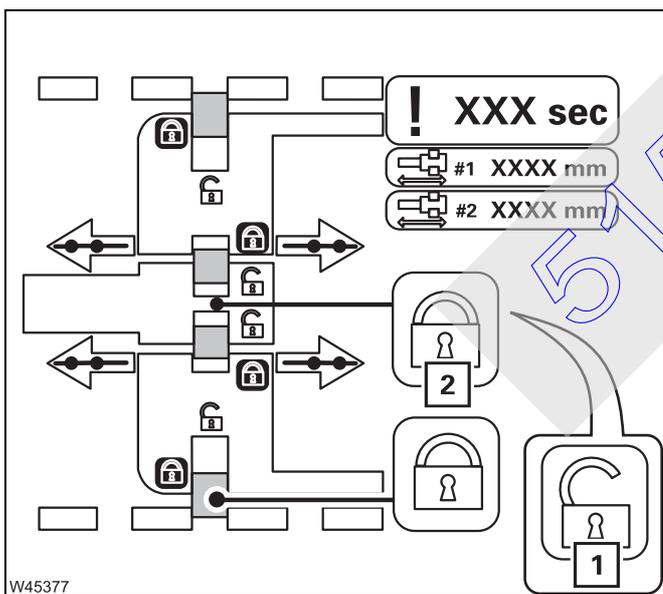
Status 1 – Telescoping cylinder at locking point

- Carry out the check for the current locking status and observe the result.



– Telescoping cylinder and telescopic section locked

- Select and confirm the symbol (1) to unlock the telescoping cylinder.
- Check that the symbol (2) is displayed.



– Telescoping cylinder or telescopic section unlocked

- Select and confirm one of the symbols for locking, e.g. the symbol (1) for the telescopic cylinder.
- Check that the symbol (2) is displayed.

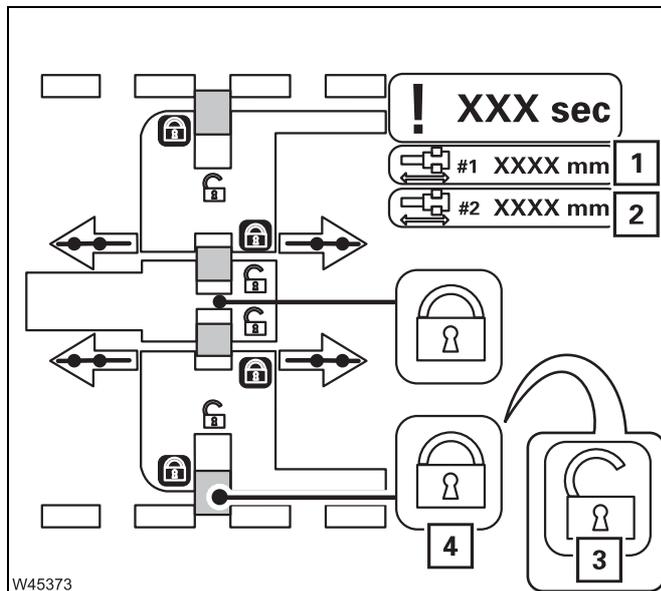
– Result

If the required symbol (2) is displayed, you can operate the emergency program;  *Retracting with emergency program*, p. 14 - 35.

If the symbol (1) is still displayed, the emergency program is disabled. Contact **Grove Product Support**.

Status 2 – Telescoping cylinder moving with telescopic section

- For the current telescopic section, note down the value for the locking point at 0%;  p. 14 - 38.



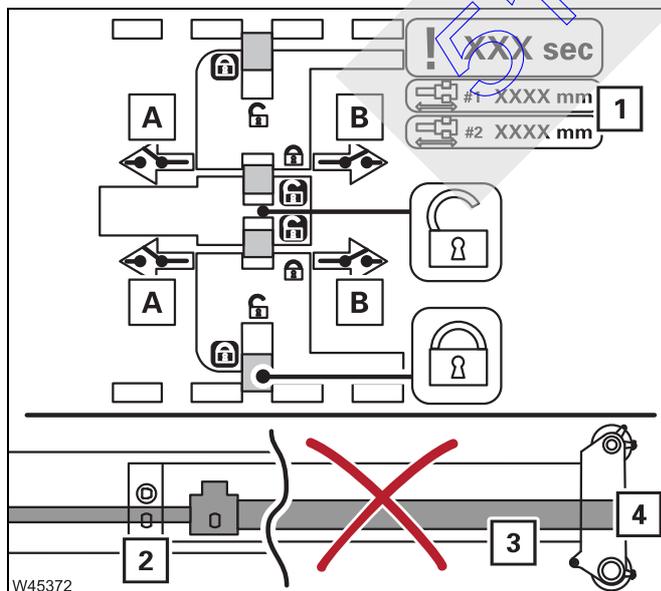
- Telescope the telescopic section to the locking point at 0% – check at the length indicator (1) or (2).
- Select and confirm the symbol (3) for locking.
- Check that the symbol (4) is displayed.

If the symbol (4) is displayed, you can operate the emergency program;  p. 14 - 35.

If the symbol (3) is still displayed, the emergency program is disabled. Contact **Grove Product Support**.

Status 3 – Telescoping cylinder on return run (without telescopic section)

In this state, you must always first check the function of the *Position of the telescoping cylinder in the foot section display*.



Displays (A) and (B) provide support in addition to the values of the length indicator when approaching the locking points (1).

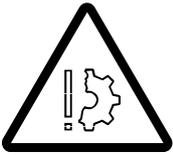
This is particularly important for extending the telescoping cylinder into telescopic section V – at all fixed lengths.

If you move too far past the locking point (2), the cylinder tube (3) will hit the main boom head (4) at the front.

This can lead to damage which would make telescoping the main boom no longer possible.

If displays (A) and (B) are in full working order, an automatic shutdown is carried out if the telescoping cylinder is moved too far.



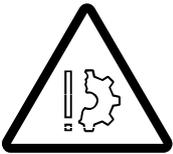


Risk of damage during return run of the telescopic cylinder!

Always stop extending in due time when the locking point on telescopic section V is reached. Do not deliberately move into the shutdown range. In the emergency program, conditions that cannot be monitored electronically may occur at any time that prevent an automatic shutdown.

– Check display *Position of the telescopic cylinder in the foot section*

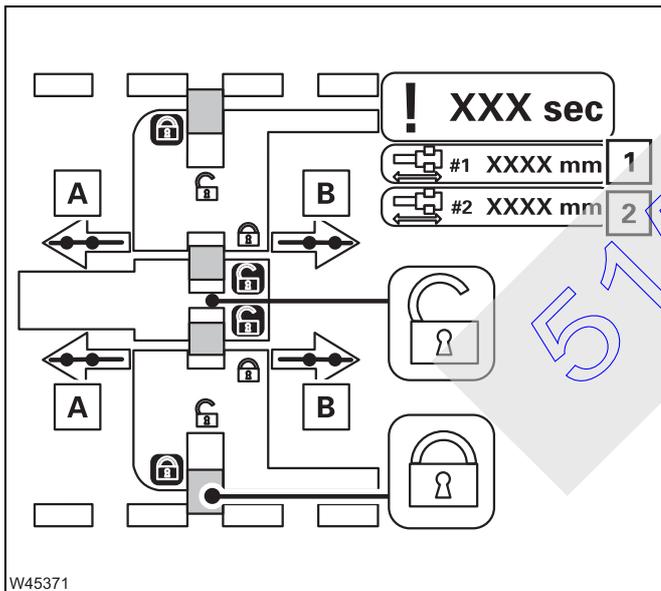
In the next step, start by extending the telescopic cylinder no further than the locking point.



Risk of damage from faulty proximity switches!

If only telescopic section V needs to be retracted, then always retract the telescopic cylinder and perform the check at the locking point of telescopic section .

That prevents moving past the locking point when extending the telescopic cylinder and it colliding with the main boom head.

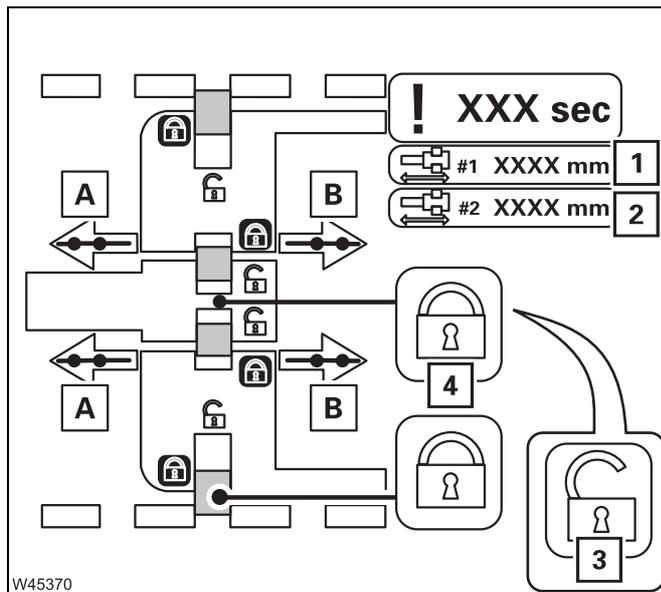


- Move the telescopic cylinder slowly to the locking point – check at the length indicator (1) or (2).
- Check the function of arrows (A) and (B).
 - During retraction, arrows (B) must turn green first.
 - During extension, arrows (A) must turn green first.
 - All arrows must turn at the locking point.

If at least one arrow (A) each and one arrow (B) is green, then you can operate the emergency program; see p. 14 - 35.

If the arrows are grey or if only one arrow is green, the emergency program is disabled. Contact **Grove Product Support**.

– Checking functioning of emergency program



- Extend the telescoping cylinder to the locking point – check at the length indicator (1) or (2) and at the arrows (A), (B).
- Select and confirm the symbol (3) for locking.
- Check that the symbol (4) is displayed.

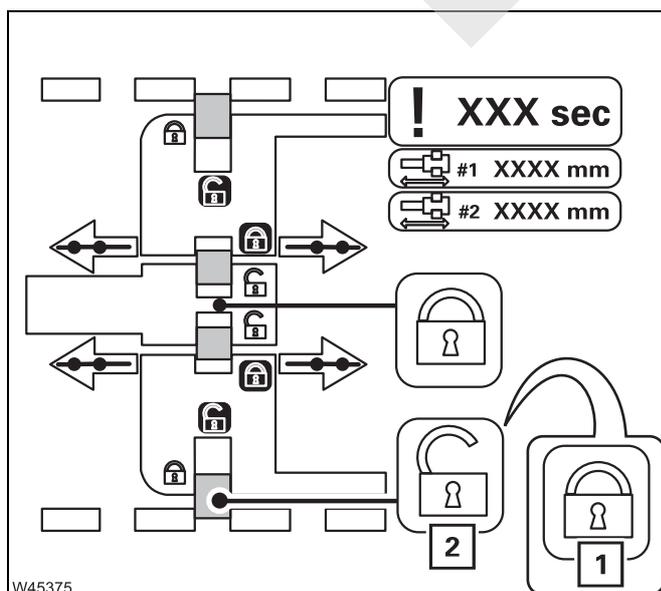
If the symbol (4) is displayed, you can operate the emergency program; p. 14 - 35.

If the symbol (3) is still displayed, the emergency program is disabled. Contact **Grove Product Support**.

Retracting with emergency program

Before operation, check whether the emergency program can be run in the current state; p. 14 - 31. This section describes a telescoping process for retracting in four steps. The starting position is *Telescopic section locked at a fixed length and the telescoping cylinder locked in the telescopic section*, which results in the sequence of steps given here. If the current starting position is different, start with the corresponding step.

1. Unlocking the telescopic section; p. 14 - 35.
2. Retracting and locking a telescopic section; p. 14 - 36.
3. Unlocking the telescoping cylinder; p. 14 - 36.
4. Extending and locking the telescoping cylinder; p. 14 - 37.



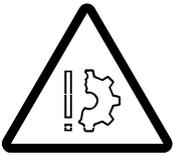
1. Unlocking the telescopic section

- Extend to about 25 mm (1.0 in).
- Select and confirm the symbol (1). The telescopic section is unlocked – symbol (2) is displayed.



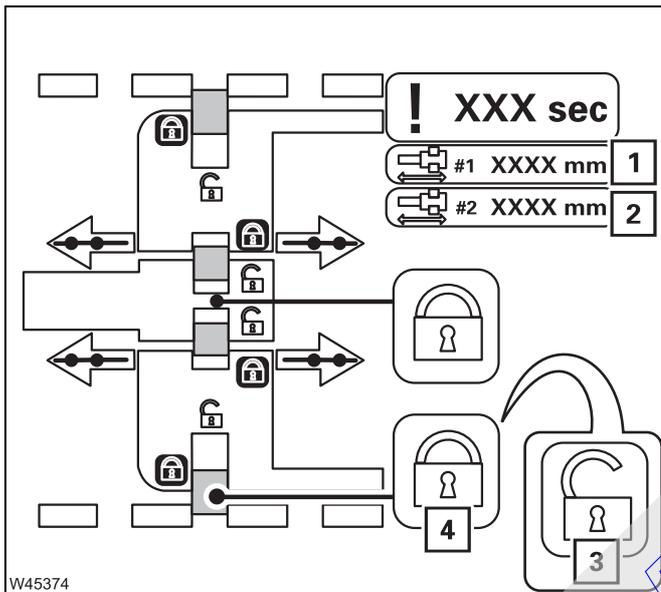
2. Retracting and locking a telescopic section

- For the current telescopic section, note down the value for the locking point at 0%;  p. 14 - 38.



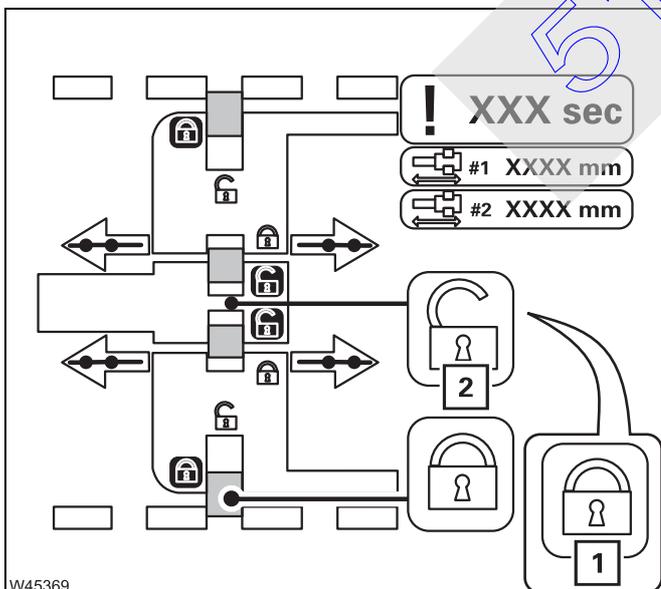
Risk of damage to the main boom!

If you select locking during telescoping, the locking pins on the telescopic section are pushed out and they can damage or tear off the electrical or hydraulic components in the main boom.



While telescoping, **never** select and confirm the symbol (3) for locking.

- Slowly retract the telescopic section to the locking point at 0% – check at the length indicator (1) or (2).
- Select and confirm the symbol (3). The telescopic section is locked – symbol (4) is displayed.
- Set down the telescopic section, retracting it as far as it will go.

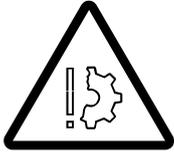


3. Unlocking the telescoping cylinder

- Select and confirm the symbol (1). The telescoping cylinder is unlocked – symbol (2) is displayed.

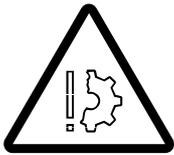
4. Extending and locking the telescoping cylinder

- During the first return run, check the *Shortly after the locking point* display and observe the specifications in the corresponding section;  p. 14 - 34.
- For the next telescopic section to be retracted, note down the value for the locking point of the telescoping cylinder;  p. 14 - 38.



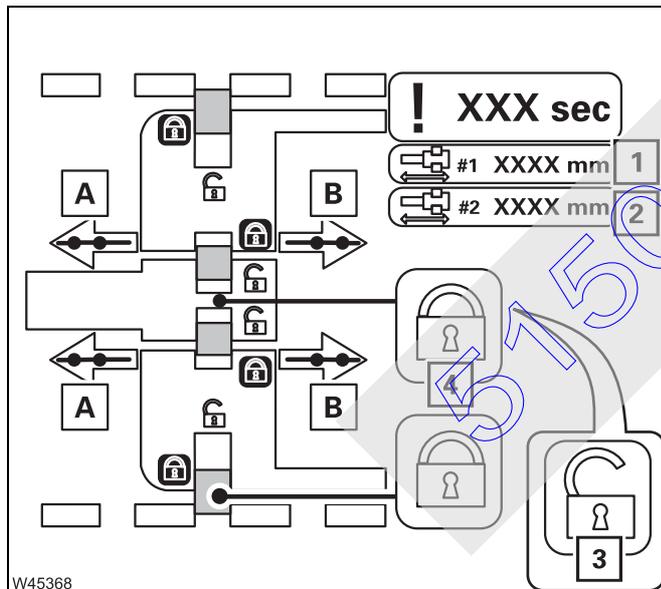
Risk of damage to the main boom!

If you select locking during the movement of the telescoping cylinder, the locking pins on the telescoping cylinder are pushed out and they can damage or tear off the electrical or hydraulic components in the main boom.



Risk of damage during return run to the telescopic section V!

Always stop extending in due time when the locking point on telescopic section V is reached. Do not deliberately move into the shutdown range. In the emergency program, conditions that cannot be monitored electronically may occur at any time that prevent an automatic shutdown.



- While telescoping, **never** select and confirm the symbol (3) for locking.
- Slowly extend the telescoping cylinder to the value noted down for locking point – check at the length indicator (1) or (2) and at the arrows (A), (B).
- Select and confirm the symbol (3). The telescoping cylinder is locked – display symbol (4).
- You can now unlock this telescopic section;  p. 14 - 35.



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:

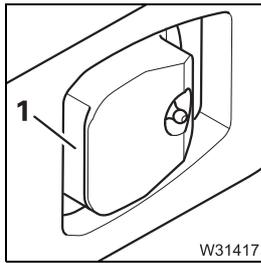
- the telescoping cylinder or
- a telescopic section.

Locking points for the telescoping cylinder

The following table shows the extended length for locking the telescoping cylinder during a return run.

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	5	(0.02)
	50	4,751	(17.15)
	89	8,453	(27.75)
	100	9,495	(31.17)
Telescopic section II	0	315	(0.94)
	50	5,080	(18.19)
	90	8,892	(28.85)
	100	9,842	(32.30)
Telescopic section III	0	604	(1.98)
	50	5,339	(17.53)
	90	9,127	(29.96)
	100	10,071	(33.06)
Telescopic section IV	0	883	(2.89)
	50	5,541	(18.19)
	90	9,267	(30.42)
	100	10,199	(33.48)
Telescopic section V	0	1,162	(3.81)
	50	5,709	(18.74)
	90	9,347	(30.68)
	100	10,258	(33.67)
Telescopic section VI	0	1,416	(4.65)
	50	5,834	(19.15)
	90	9,368	(30.75)
	100	10,254	(33.66)

Locking points for the telescopic sections



The telescopic section must not be set down for locking or unlocking it.

The cutout (1) must be clear. You must therefore extend the telescoping cylinder about 25 mm (1.0 in) further than for a return run.

The following table shows the extended length for locking and unlocking the telescopic sections.

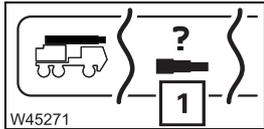
Table for locking/unlocking the telescopic sections			
Telescopic section	Locking point at fixed length in %	Extended length of telescoping cylinder	
		in mm	(in ft)
Telescopic section I	0	30	(0.10)
	50	4,776	(15.68)
	89	8,478	(27.83)
	100	9,520	(31.25)
Telescopic section II	0	340	(1.12)
	50	5,105	(16.76)
	90	8,917	(29.27)
	100	9,867	(32.39)
Telescopic section III	0	629	(2.06)
	50	5,364	(17.61)
	90	9,152	(30.04)
	100	10,096	(33.14)
Telescopic section IV	0	908	(2.98)
	50	5,566	(18.27)
	90	9,292	(30.50)
	100	10,224	(33.56)
Telescopic section V	0	1,187	(3.89)
	50	5,734	(18.82)
	90	9,372	(30.77)
	100	10,283	(33.75)
Telescopic section VI	0	1,441	(4.73)
	50	5,859	(19.23)
	90	9,393	(30.83)
	100	10,279	(33.74)

14.5.3 Entering the current telescoping

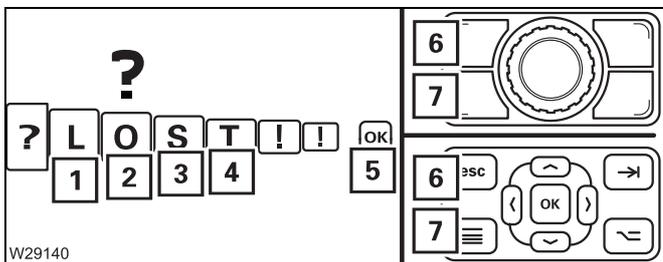
CCS no longer displays the current telescoping,

- if the emergency program was open or
- if the power supply was disconnected in the course of saving data.

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



- Open the menu (1) – Unknown telescoping menu.



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

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

After making the correct entry, the area for the set value input is opened.

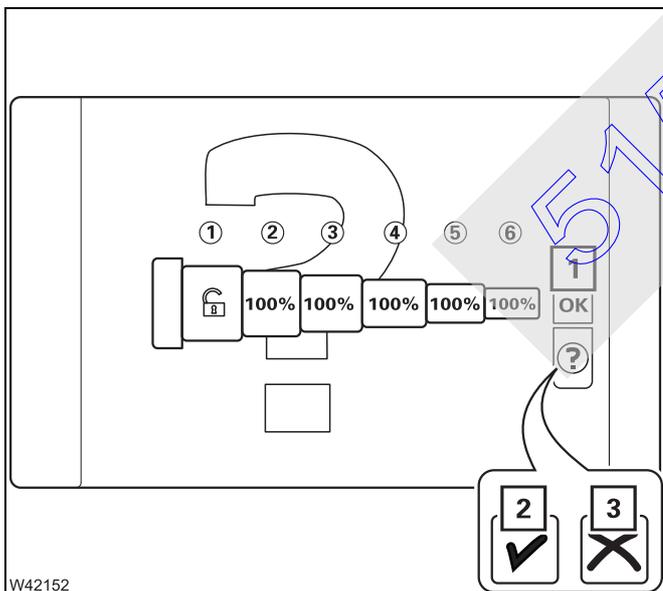
Entering target values

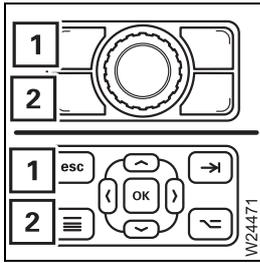
- Select and confirm the symbols 1 to 6 one after the other.
- Enter the desired target values for all telescopic sections, for example, *Unlocked*, 100%, 100%, 100%, 100%, 100%, 100%.

- Confirm the entry with the symbol (1).

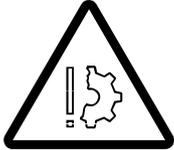
- Display symbol:

- 2 Permissible values
- 3 Impermissible values





You can cancel the entry at any time using buttons (1) or (2).

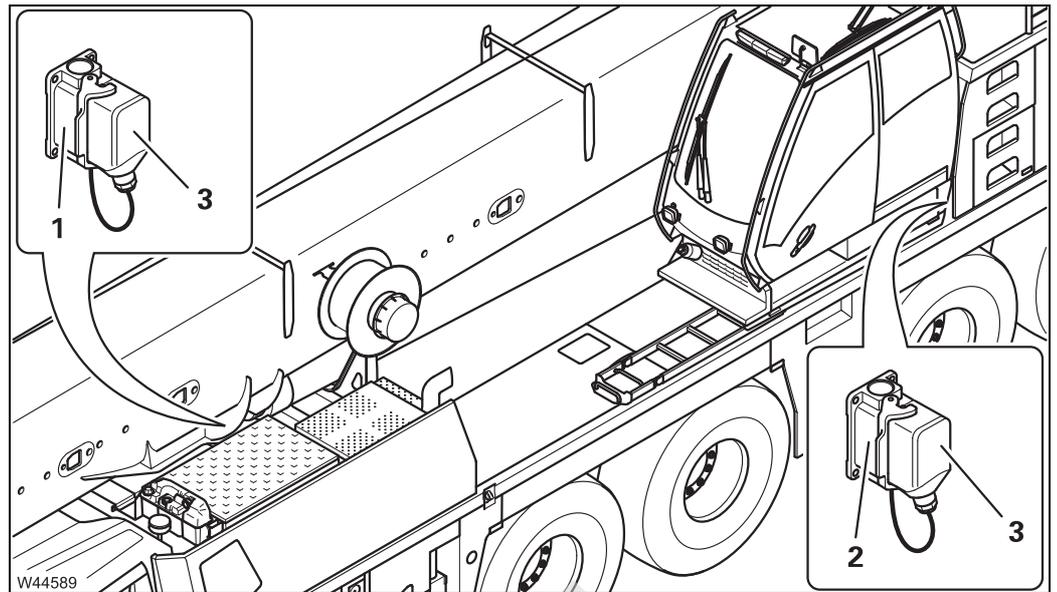


Risk of damage due to incorrect input!

Before working with the crane, check whether CCS indicates the current telescoping and correct it if this is not the case. Entering incorrect values causes malfunctions and may result in damage to the telescoping mechanism.



Sockets



Enabled operations	
1	<ul style="list-style-type: none"> – Emergency operation for crane movements (except for telescoping mechanism) – Derricking the lattice extension
2	<ul style="list-style-type: none"> – Emergency operation for crane movements

The bridging plug (3) must be plugged in if the hand-held control is not connected.

The following applies to all sockets:

- Pull bridging plug: Engine off – ignition off
- Connect the hand-held control: Ignition on

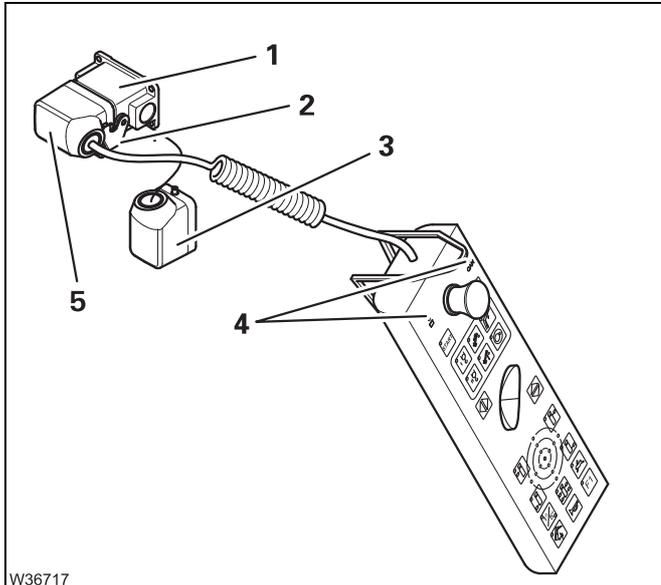


Connection

- Switch off the engine



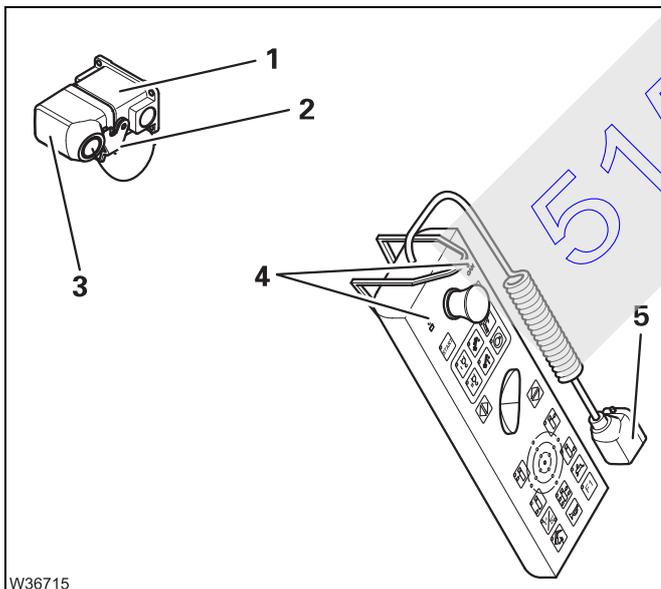
Pulling a bridging plug will switch the engine off, but this shutdown is only designed for emergencies.



Connecting the hand-held control

- Open the lock (2) and remove the bridging plug (3) from the socket (1).
- Insert the plug (5) into the socket (1) and secure it with the lock (2).
- After about 20 seconds, the lamps (4) light up – the ignition is now switched on.

If the lamps (4) do not light up or if they flash, there is a malfunction; see p. 14 - 20.



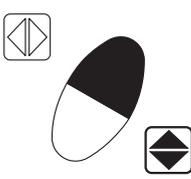
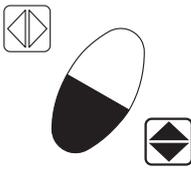
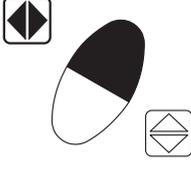
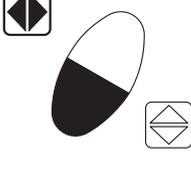
Removing the hand-held control

- Open the cap (2).
- Remove the plug (5) from the socket (1) – the lamps (4) go out.
- Insert the bridging plug (3) into the socket (1) and secure it with the lock (2).

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

Button combinations

The table shows all the button combinations. Pressed buttons are shown in black.

Button combination	Pre-selected power unit				
	Telescoping mechanism	Derricking gear	Slewing gear	Hoist	Lattice extension
 <p>W3851</p>	None	Lower boom	Lock turntable	Lower	Lower
 <p>W3850</p>	Retract	Raise boom	Unlock turntable	Lift	Raise boom
 <p>W3849</p>	None	None	Turn to the right	None	None
 <p>W3848</p>	None	None	Turn to the left	None	None



Emergency operation



Danger of overturning due to lack of monitoring!

The **RCL is switched off** and crane operations are not monitored when operating with the hand-held control. If you move into a critical range, the truck crane will overturn.



Risk of crushing due to turning wheels!

When you start the engine, no persons may be within the steering range of the 3rd to 5th axle lines. These axle lines can be briefly steered during the start of the engine; sometimes with a delay of five seconds.

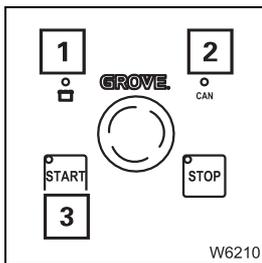
Starting the engine

All checks required before starting the engine must be carried out; p. 4 - 3.

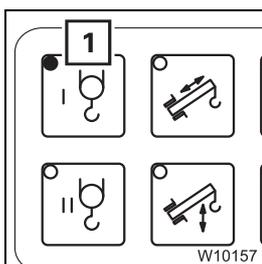
You can also start the engine if the ignition in the driver's cab or crane cab is switched on.



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



- Wait until the lamps (1) and (2) light up.
- If the lamp (2) does not light up or flash after about 20 seconds, there is a malfunction; p. 8 - 39.
- Press the button (3) once – the engine starts.



Pre-selecting a power unit

- Press the corresponding button once, e.g. button (1) for the main hoist. The lamp in the button lights up – pre-selection on.

With the telescoping mechanism, teleautomation with the target 0/0/0/0 is always selected at the same time – fully retract.

Telescoping out is disabled in emergency mode.

Operating a power unit

All the safety instructions included 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*.

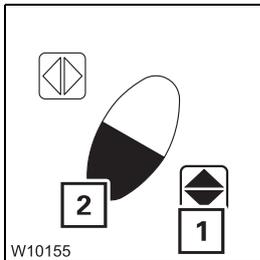
Before slewing, always check whether this is permissible in the current rigging mode;  *Notes on slewing in emergency operation*, p. 14 - 48.



Risk of accidents when operating the slewing gear!

Sit down in the crane cab to operate the slewing gear. This prevents you being pushed off the carrier or being crushed by the carrier as a result of slewing.

Route the connecting cable of the hand-held control so that it does not get caught anywhere.



- 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. The maximum speed is limited to about 50% for all power units.

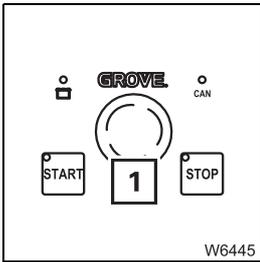
Stopping movements

The movement continues until you release the button or the end position is reached.



Stopping movements in emergencies

This section applies only to the situation where a movement does not stop after releasing the function button.



- Press the emergency stop switch (1) – the engine switches off.

The switch (1) engages.

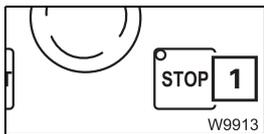
After activating an emergency stop switch;  *Resetting the emergency stop switch*, p. 4 - 20.



You can also use the emergency stop switch on the carrier or in the crane cab;  p. 14 - 1.

Switching off the engine

You can only switch off the engine using the hand-held control.



- Stop all crane movements.
- Press the button (1) – the engine goes off.
- Stow the hand-held control in such a way that it is secured against unauthorised use;  *Transporting the hand-held control*, p. 14 - 42.

14.5.5

Notes on slewing in emergency operation

For the Standard slewing range type

If the *MAXbase* slewing range type is activated;  p. 14 - 49.

Slewing is not monitored by the RCL during emergency operation.



Risk of overturning when slewing during emergency operation!

Check the table to see if slewing is permitted. Adhere to the released working range specified in the *Lifting capacity table* when slewing and observe the restrictions described.

If you have any doubts contact **Grove Product Support**.

		Rigged outrigger span 8.030 m (26.3 ft) x					Free on wheels	
		2.500 m (8.2 ft)	5.100 m (16.8 ft)	5.900 m (19.4 ft)	6.700 m (22.0 ft)	7.600 m (25.0 ft)		
Rigged counterweight	1.0 t (2,200 lbs)	Slewing not permitted ³⁾	Slewing permitted ¹⁾					Slewing not permitted ²⁾
	3.3 t (7,2700 lbs)							
	5.6 t (12,300 lbs)							
	7.9 t (14,400 lbs)							
	10.2 t (22,400 lbs)							
	12.5 t (27,500 lbs)							
	14.8 t (32,600 lbs)							
	17.1 t (37,600 lbs)							
	19.4 t (42,700 lbs)							
	21.7 t (47,800 lbs)							
	24.0 t (52,900 lbs)							
	26.3 t (57,900 lbs)							
	28.6 t (63,000 lbs)							
	30.9 t (68,100 lbs)							
44.5 (98,100 lbs)								

- 1) Slewing only permitted if the working radius permitted in the working range is complied with;  *Lifting capacity table*
- 2) Only operating position 0° to the rear permitted
- 3) Rigging modes not permitted

For the MAXbase slewing range type

If the *Standard* slewing range type is activated;  p. 14 - 48.

Slewing is not monitored by the RCL during emergency operation.

Due to the wide range of possible outrigger spans and the their asymmetry, the permissible slewing ranges cannot be represented as simple tables.



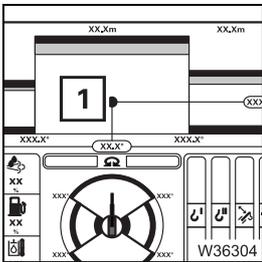
Risk of overturning when slewing during emergency operation!

Take the measures described in this section before slewing and during slewing. Special care must be taken with the *MAXbase* slewing range type because several parameters must be monitored simultaneously.

If you have any doubts contact **Grove Product Support**.

When slewing with the hand-held control is unavoidable

- Refer to the *Lifting capacity table* (provided in digital form only) for the slewing ranges applicable to the current rigging mode.
- Note the slewing range divisions and the permissible (maximum and minimum) working radii and lifting capacities.



Checking the RCL display

Check that the released slewing ranges and working radii specified in the *Lifting capacity table* are correctly shown on the RCL display.

- Slew slowly towards a safe range and check whether the current position (1) changes accordingly.
- Derrick slowly towards a safe range and check whether the current position (1) changes accordingly.

– If the RCL display still displays correctly

You can use the RCL display for orientation while slewing and correct the working radius before reaching the slewing range limits.

– If the RCL does not display correctly

Slew slowly only and monitor the slewing range limits and working radius based on the values specified in the *Lifting capacity table*. You may need to determine the current position by measurements, depending on the availability of the displays (slewing angle/working radius).

14.5.6

Slewing with overridden slewing gear shutdown

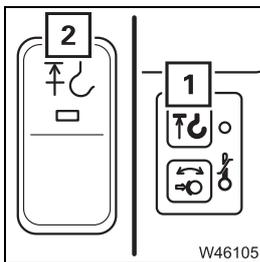
If the slewing gear is not switched off due to the load moment, slewing can be enabled within the permissible working range. For example, for emergency unrigging when the counterweight cannot be fully pre-tensioned.



Risk of damage due to overridden slewing gear shutdown.

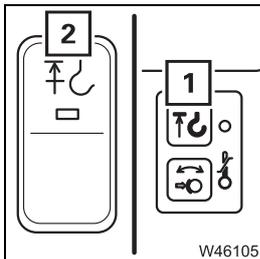
Slewing is not monitored if the shutdown is overridden.

Before slewing, always make sure that the superstructure and the counterweight (partially lowered if necessary) cannot damage any parts in the slewing range.



Overriding shutdown procedures

- Press the button (2) at the top.
 - The lamp (1) lights up.
 - The lifting limit switch is overridden.
 - Slewing in permissible working range is enabled.
 - The slewing speed is limited to about 6%.



Cancelling the override

- Release the button (2).
 - The lamp (1) goes out.
 - The lifting limit switch override is cancelled.
 - Slewing is disabled (if the shutdown is still pending).

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14.6

Hydraulic emergency operation with the hand pump



This section only applies to standard hydraulic emergency operation. With the appropriate equipment you can also use hydraulic emergency operation according to DGUV; p. 14 - 61.



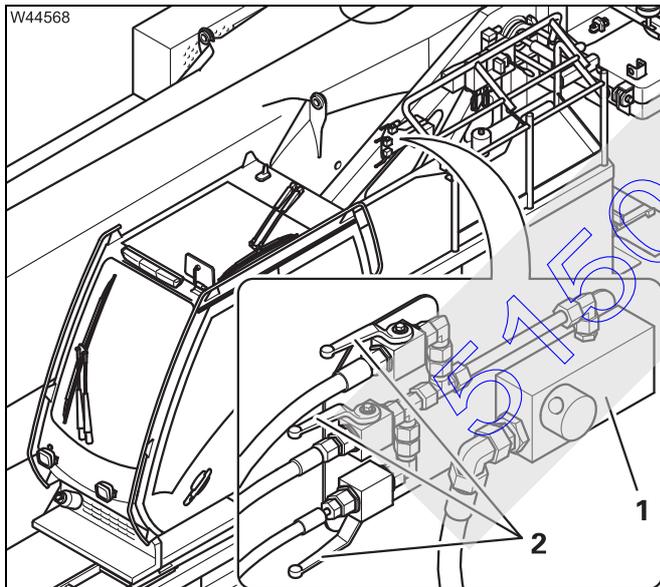
Danger from mutual interference of the power units!

Check the positions of the valves **1** to **5** for hydraulic emergency operation according to DGUV (in case available) and, if necessary, switch to *Crane operation*; p. 14 - 69.

This prevents the power units suddenly starting to move.

14.6.1

Functionality



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

The hand pump (**1**), which is activated by switching over a valve, is used as the energy source for the crane's hydraulic system.

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

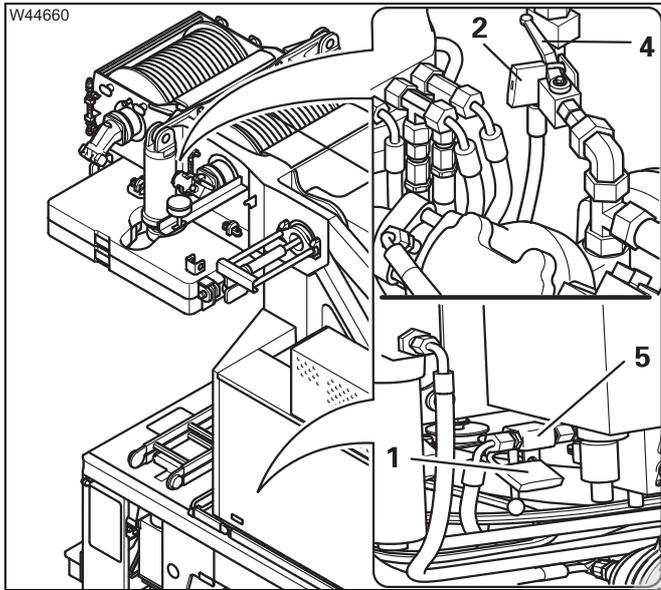
The crane movements are performed by operating the hand pump.

14.6.2

Switching over the crane's hydraulic system

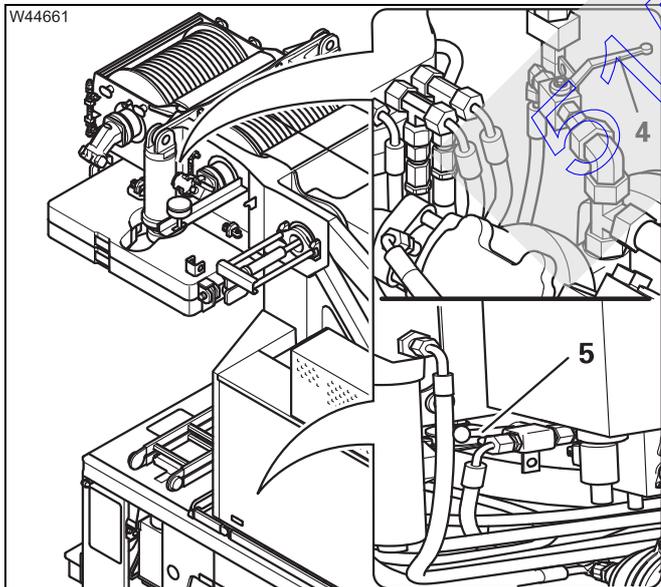


If you wish to move the hoist during emergency operation, you can open valve **4** at the beginning of the operation – as described in this section – this leads to the omission of this step later during emergency operation. This does not affect emergency operation of the other power units.



For crane operation

- Open the valve **(4)** and secure it using the lock **(2)**.
- Close the valve **(5)** and secure it using the lock **(1)**.

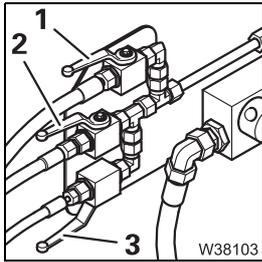


For emergency operation

- Take off the lock and close the valve **(4)**.
- Take off the lock and open the valve **(5)**.

14.6.3

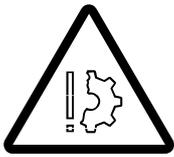
Establishing the required hydraulic circuits



You must switch over the necessary valves to establish a hydraulic circuit. Valves 1 to 3 are secured against unintentional switching over.

Releasing/ securing valves

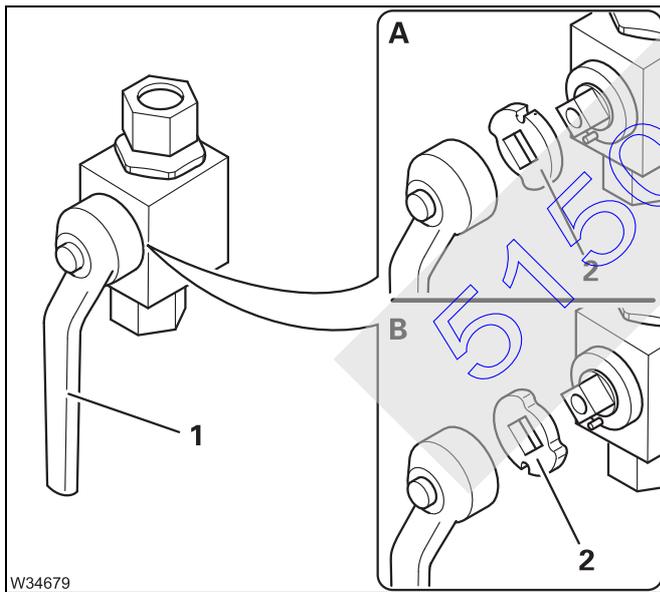
Releasing/securing is described for a valve. The procedure is identical for valves 1 to 3.



Danger due to operating error!

Following emergency operation, secure the valves 1 to 3 in position B again for crane operation.

This prevents uncontrolled crane movements when switching the crane's hydraulic system on.



Release – for emergency operation

- Unscrew the handle (1).
- Move the disc (2) to position A.
- Fasten the handle (1).

Securing – for crane operation

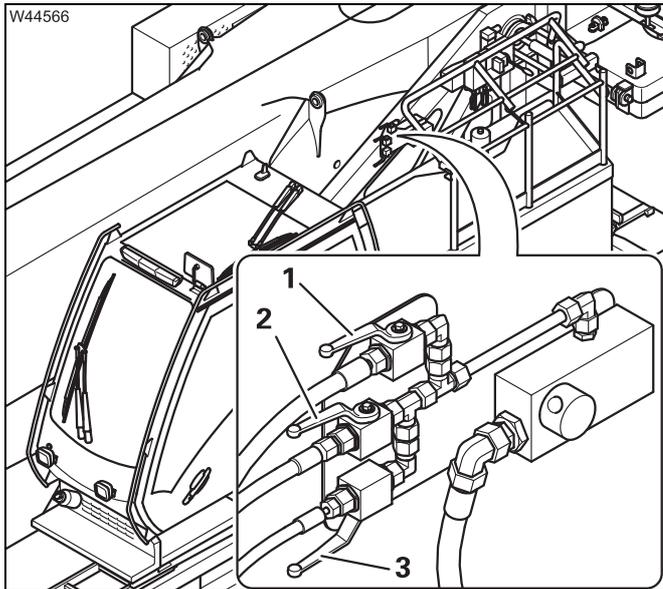
The valve must be closed.

- Unscrew the handle (1).
- Move the disc (2) to position B.
- Fasten the handle (1).



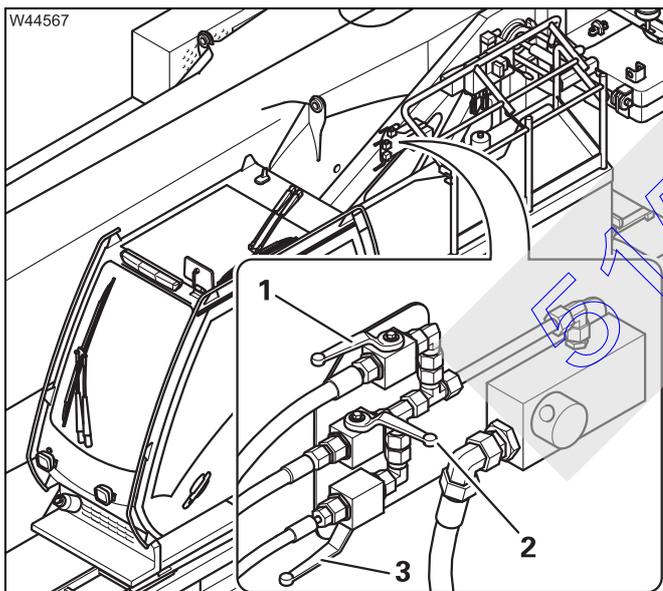
Switching over valves

Valves **1** to **3** are labelled with their respective numbers.



For crane operation

- Switch the valves **(1)**, **(2)** and **(3)** forwards – valves closed.
- Secure the valves in this position;
 ■■■▶ p. 14 - 55.



For emergency operation

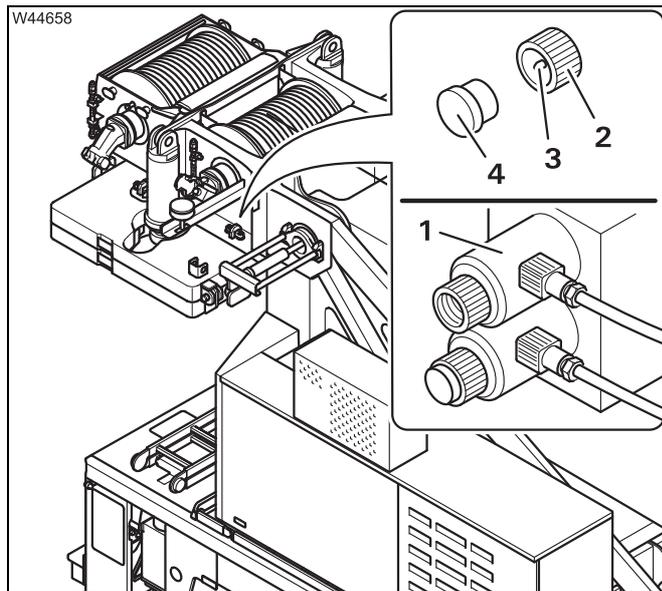
- Unlock the valves **(1)**, **(2)** and **(3)**;
 ■■■▶ p. 14 - 55.
- Switch the valves **1** to **3** to the positions for the required crane movement – as shown in the following table.

For lowering, for example, switch the valve **2 outwards** – valve open. Valves **1** and **3** must be switched **forwards**.

Emergency operation for crane movements	Valves outwards	Valves forwards	Additional switching operations
Lower	3	1, 2	Valve Y1104 to continuous operation; ■■■▶ p. 14 - 57 Valve 5 open, valve 4 closed; ■■■▶ p. 14 - 54
Lower boom	2	1, 3	Valve 5 open, valve 4 closed; ■■■▶ p. 14 - 54
Raise boom	1	2, 3	

For lowering

You must additionally switch a valve to continuous operation for lowering.



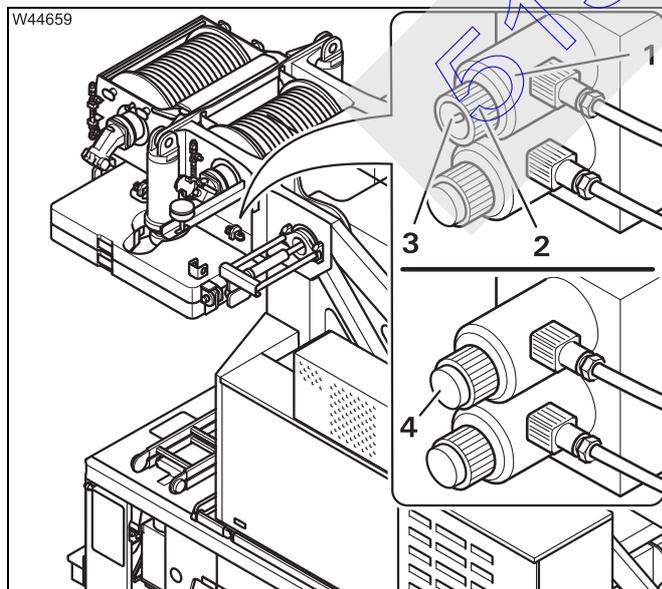
Switching on continuous operation

- Unscrew the cap (2) from valve Y1104 – Lower (1).
- Remove the plug (4).
- Screw the cap and pin (3) on to the valve – continuous operation is switched on.



Danger due to falling loads!

Switch off continuous operation immediately after emergency activation. Check that the pin can be seen on the cap. You thus prevent loads falling down immediately after lifting in subsequent crane operation.

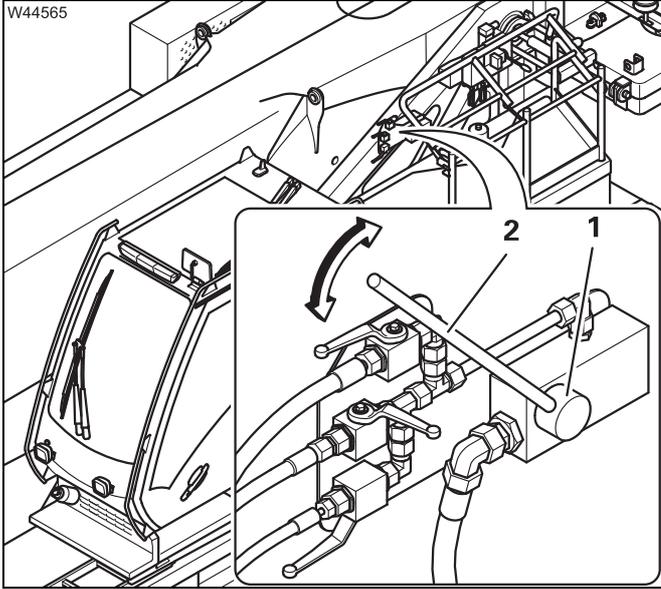


Switching off continuous operation

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

14.6.4

Performing emergency activation



When the required hydraulic circuit is established, you can perform the corresponding crane movement using the hand pump (1).

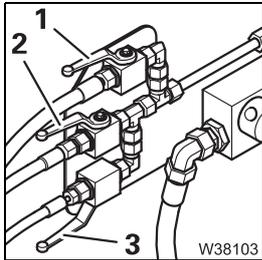
- Insert the lever (2) provided into the holder at the hand pump lever.
- Pump with the lever – the corresponding crane movement is performed.

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14.6.5

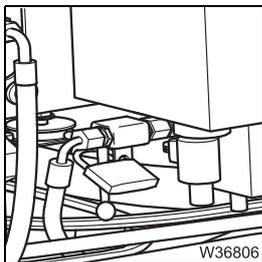
After emergency activation

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

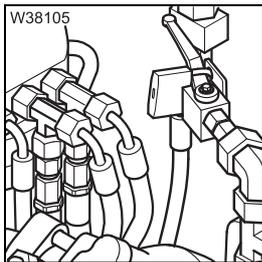


After each emergency activation

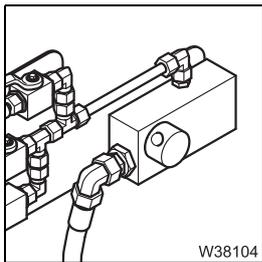
- Switch valves **1** to **3** to crane operation; p. 14 - 56.



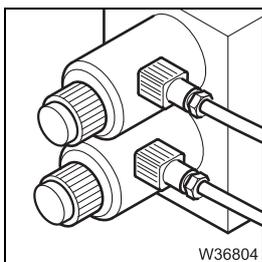
- Switch valve **5** to crane operation; p. 14 - 54.



- Switch valve **4** to crane operation; p. 14 - 54.



- Remove the lever from the hand pump.



Additionally after lowering

- Switch off continuous operation at the valve Y1104; p. 14 - 57.

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14.7

Hydraulic emergency operation according to DGUV



This section only applies to the hydraulic emergency operation according to DGUV. You can optionally also use emergency operation with the hand pump; p. 14 - 53.

With this additional equipment, the truck crane is equipped with a hydraulic emergency bleed valve in accordance with DGUV. This allows small loads to be transported in case of an emergency, e.g. in the event of an engine failure.



Risk of accidents due to improper use!

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



Danger from mutual interference of the power units!

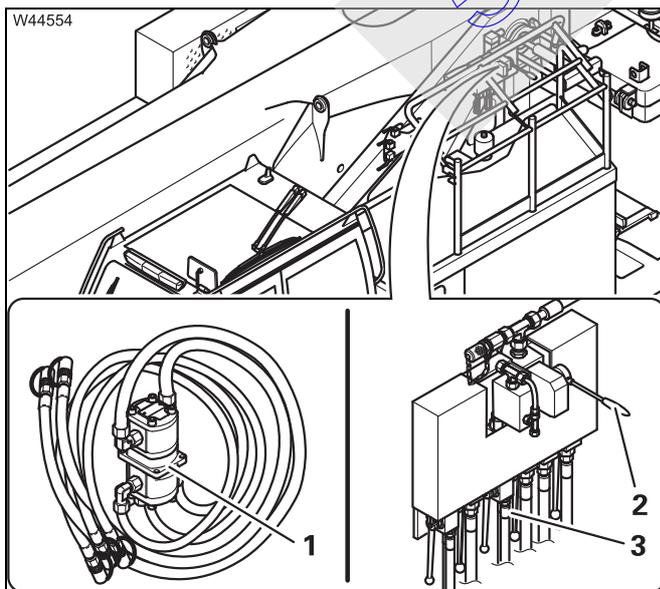
Check the positions of valves **1** to **5** for hydraulic emergency operation with the hand pump and, if necessary, switch to *Crane operation*; p. 14 - 56, p. 14 - 54.

This prevents the power units suddenly starting to move.

14.7.1

Applications and functionality

Hydraulic emergency operation according to DGUV enables **emergency operation** of the GMK5150XL and the **emergency supply** of another truck crane.



Emergency operation

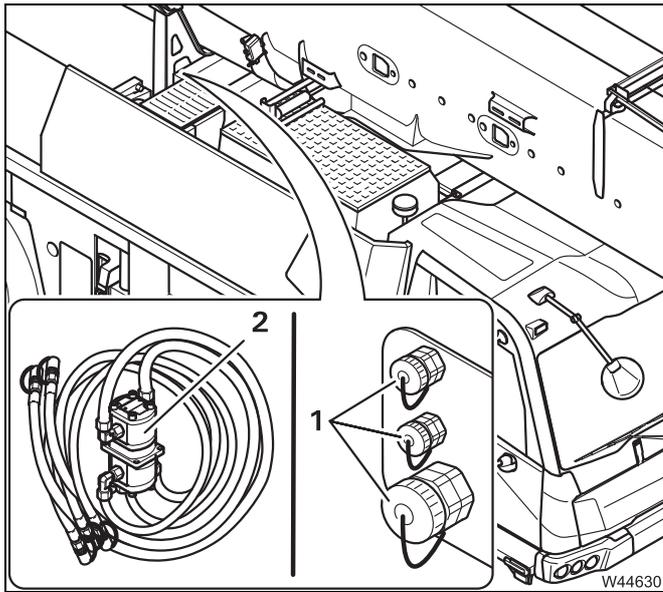
In emergency operation, you can drive the main hoist, derricking gear and slewing gear.

The energy source for the crane's hydraulic system is a transformer (**1**), which is driven by the carrier's hydraulic system in case of **self-sufficiency** or is driven by a hydraulic **external energy source** in case of an external power supply.

The hydraulic circuits are switched via the valves (**3**).

The control lever (**2**) is used to control the direction of movement and the speed.





Emergency supply

You can supply another crane that also has hydraulic emergency operation according to DGUV.

In the event of emergency supply, the connections (1) supply a transformer (2) that is connected to the hydraulic system of the other crane.

▣▣▣▣ *Emergency supply for another crane, p. 14 - 75.*

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14.7.2

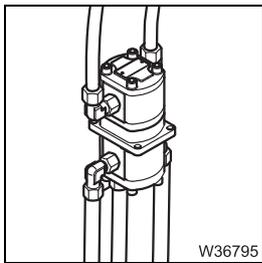
CHECKLIST: Emergency operation



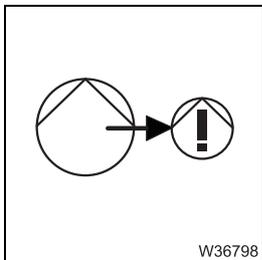
This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.
Observe the warnings and safety instructions given there!

1. For emergency operation with self-sufficiency

– Attach and connect the transformer to the superstructure; |||||▶ p. 14 - 65.

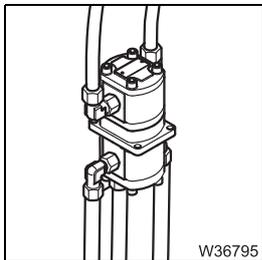


– Switch on emergency operation; |||||▶ p. 14 - 67.



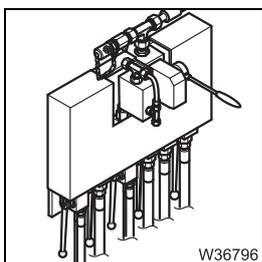
2. For emergency operation with external energy source

– Attach and connect the transformer to the superstructure; |||||▶ p. 14 - 68.



3. – Establish the required hydraulic circuit; |||||▶ p. 14 - 69.

– Run emergency operation; |||||▶ p. 14 - 73.



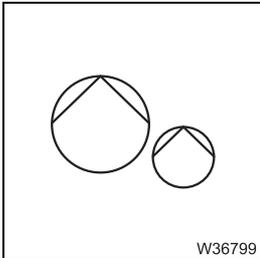
4. Bring the truck crane to its original state; |||||▶ *CHECKLIST: After emergency operation*, p. 14 - 64.

14.7.3

CHECKLIST: After emergency operation

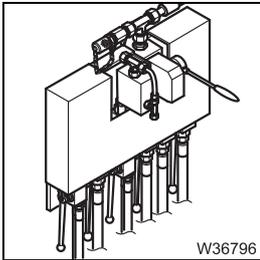


This checklist is not a complete operating manual. There are accompanying operating instructions, which are indicated by cross-references.
Observe the warnings and safety instructions given there!



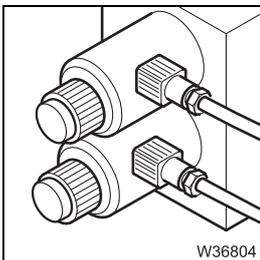
1. Switch off emergency operation.

- After emergency operation with self-sufficiency; ■■■▶ p. 14 - 67
- After emergency operation with external energy source;
■■■▶ *Operating manual of energy source.*

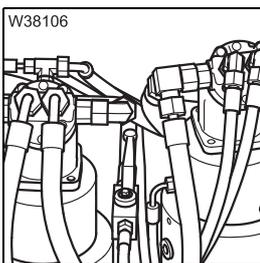


2. Establish hydraulic circuit for crane operation.

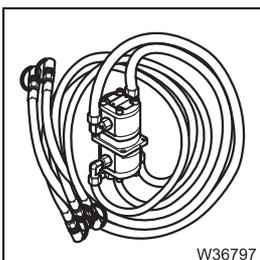
- Switch valves **1** to **5** into position for crane operation; ■■■▶ p. 14 - 69.



- Switch off continuous operation; ■■■▶ p. 14 - 71.



- Open valve **6**; ■■■▶ p. 14 - 72.



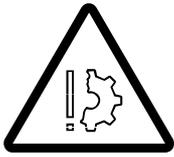
3. Take off transformer.

- After emergency operation with self-sufficiency; ■■■▶ p. 14 - 65
- After emergency operation with external energy source; ■■■▶ p. 14 - 68.

14.7.4

Connecting/removing the transformer – for self-sufficiency

- Switch off the engine.

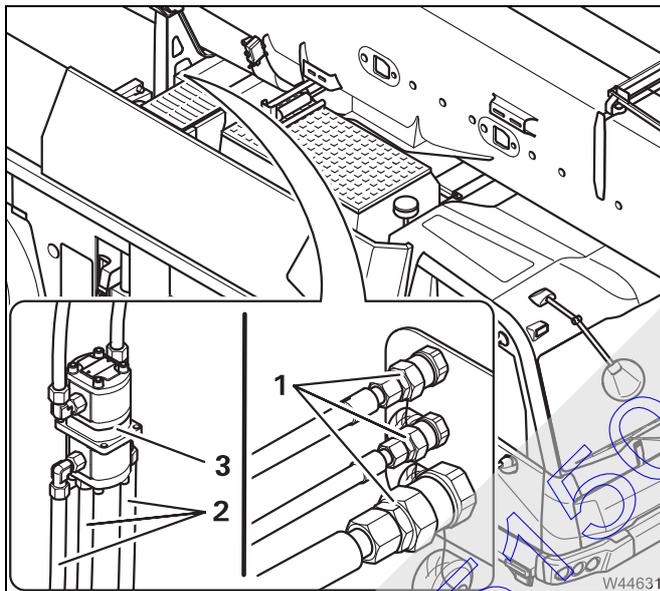


Risk of damage to the hoses!

Route the hoses in such a manner that they can be moved freely, so as to prevent them being crushed or torn or becoming caught during subsequent crane movements.

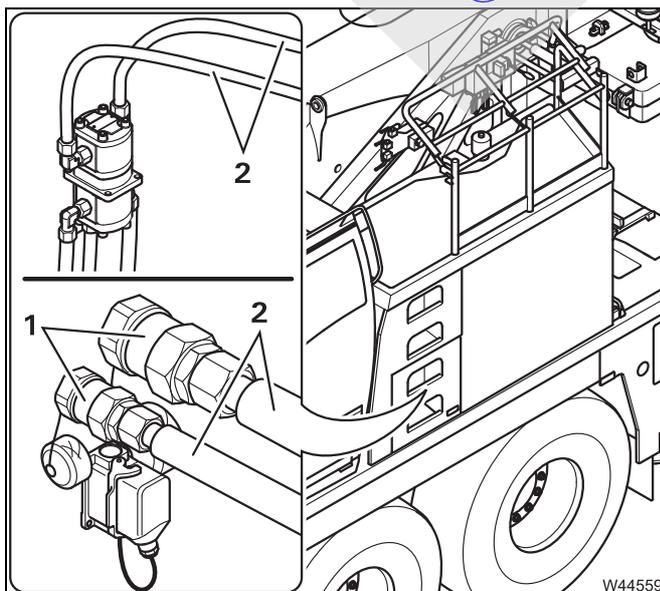
Connecting

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).



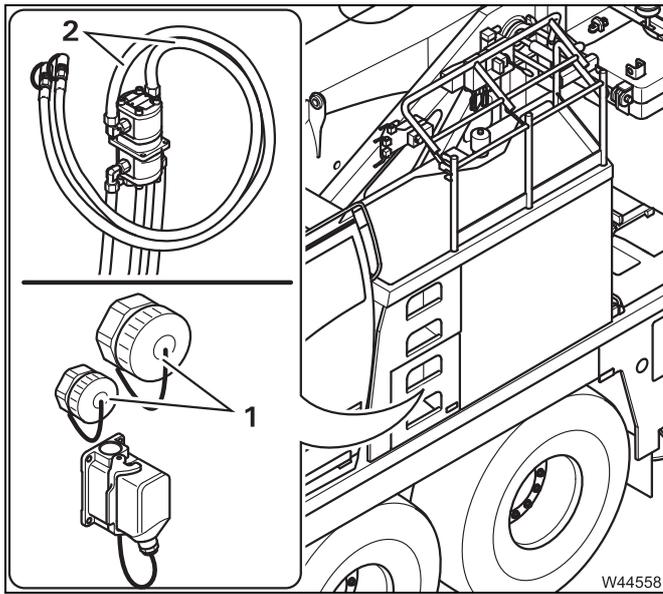
Superstructure

- Connect the hoses (2) to the connections (1).



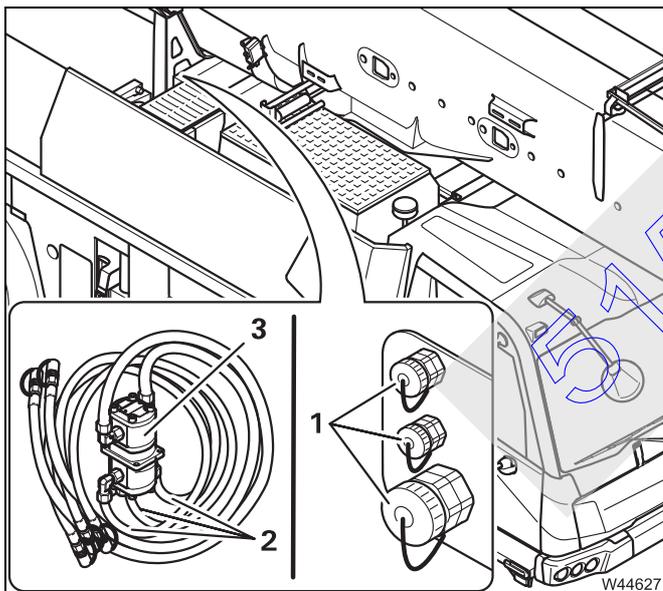
Removing

After emergency operation, you must disconnect the hoses and the transformer.



On the superstructure

- Remove the hoses (2) from the connections (1).
- Seal the hoses and connections with the caps.

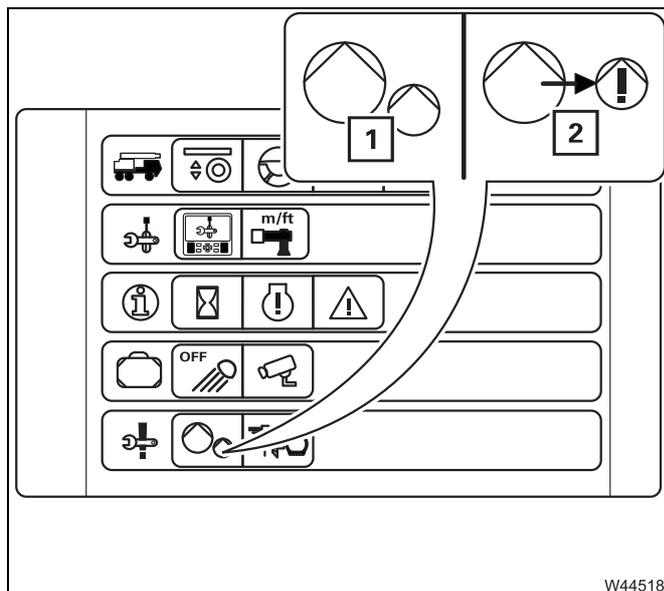


On the carrier

- Remove the hoses (2) from the connections (1).
- Seal the hoses and connections with the caps.
- Remove the transformer (3).

14.7.5

Switching emergency operation on/off



Switching on

- Start the engine.
- Select and confirm the symbol (1).
Symbol (2) is displayed – emergency operation switched on.

Switching off

- Select and confirm the symbol (2).
Symbol (1) is displayed – emergency operation switched off.
- Switch off the engine.

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14.7.6

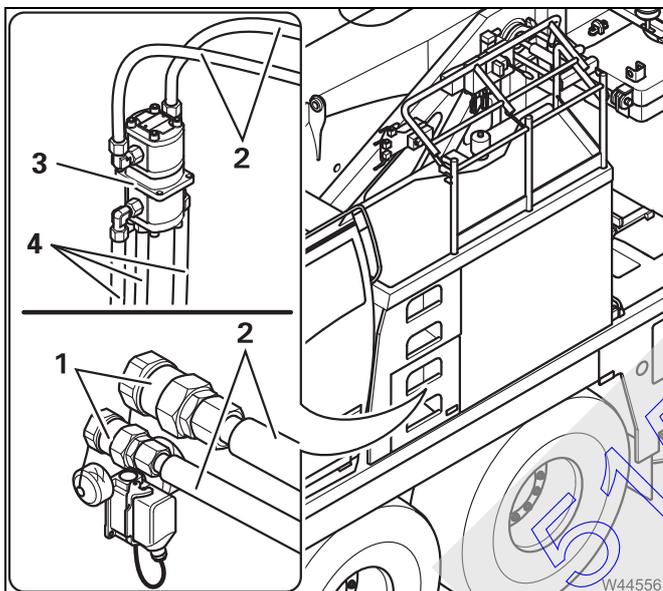
Connecting/removing the transformer – for external energy source

The external energy source can be provided by a vehicle with hydraulic emergency operation according to DGUV or by an external, hydraulic energy source that meets the requirements of hydraulic emergency operation according to DGUV.



Risk of damage to the hoses!

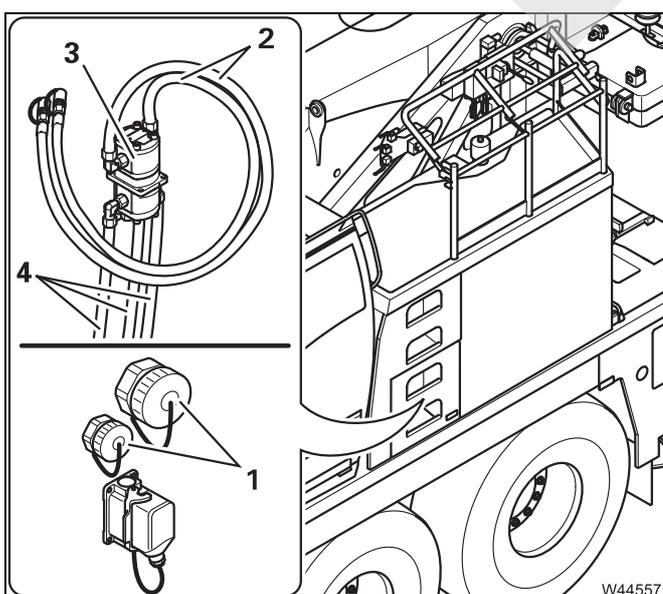
Route the hoses in such a manner that they can be moved freely, so as to prevent them being crushed or torn or becoming caught during subsequent crane movements.



Connecting

The hoses are assigned according to the various diameters.

- Switch off the hydraulic energy source.
- Attach the transformer (3) to the superstructure.
- Connect the hoses (2) to the connections (1).
- Connect the hoses (4) to the supplying energy source.
- Switch on the hydraulic energy source.



Removing

- Switch off the hydraulic energy source.
- Remove the hoses (2) from the connections (1).
- Remove the hoses (4) from the supplying energy source.
- Remove the transformer (3).
- Seal the hoses and connections with the caps.

14.7.7

Establishing the required hydraulic circuits

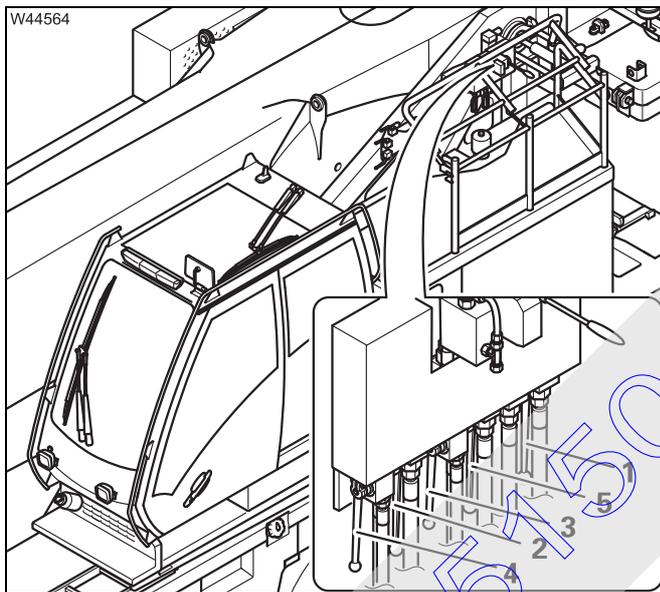
You must switch over the necessary valves to establish a hydraulic circuit.



Valves **1** to **5** for hydraulic emergency operation with the hand pump must be switched to *Crane operation*. Check the positions of the valves and, if necessary, switch to *Crane operation*; *Switching over valves*, p. 14 - 56, *Switching over the crane's hydraulic system*, p. 14 - 54.

Valves at the control panel

Valves **1** to **5** are labelled with their respective numbers.



For crane operation

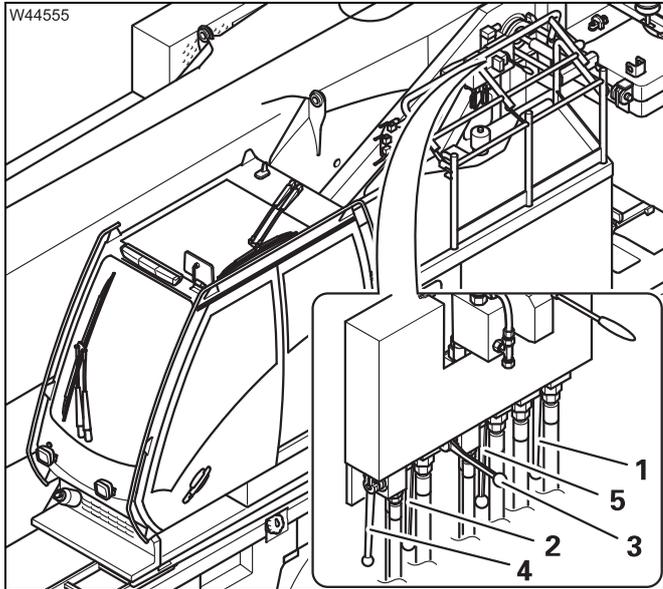
- Switch valves **1** to **5** down.





Danger from mutual interference of the power units!

For crane operation, always switch **all valves 1 to 5** down. This prevents the power units suddenly starting to move.



For emergency operation

- If necessary, remove the cover over the valves **1 to 5**.
- Switch the valves **1 to 5** to the positions for the required crane movement – as shown in the following table.

To raise the boom, for example, you must switch valve **3 up**. Valves **1, 2, 4** and **5** must point down.



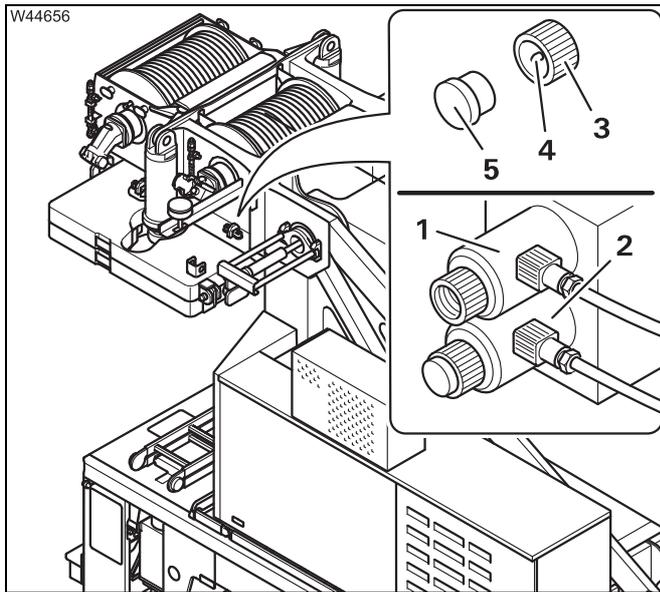
Danger from mutual interference of the power units!

For **one crane movement**, always switch valves up. This prevents incorrect crane movements being performed and several movements being performed unintentionally at the same time.

Emergency operation for crane movements	Valves up	Valves down	Additional switching operations
Lift	1	2, 3, 4, 5	Valve Y1105 to continuous operation; p. 14 - 71
Lower	1	2, 3, 4, 5	Valve Y1104 to continuous operation; p. 14 - 71
Raise boom	3	1, 2, 4, 5	None
Lower boom	5	1, 2, 3, 4	
Slew to the left or right	2, 4	1, 3, 5	Valve 6 closed; p. 14 - 72

For lifting/ lowering

After establishing hydraulic circuits, you must switch one additional valve to continuous operation.

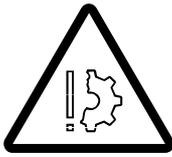


Switching on continuous operation

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

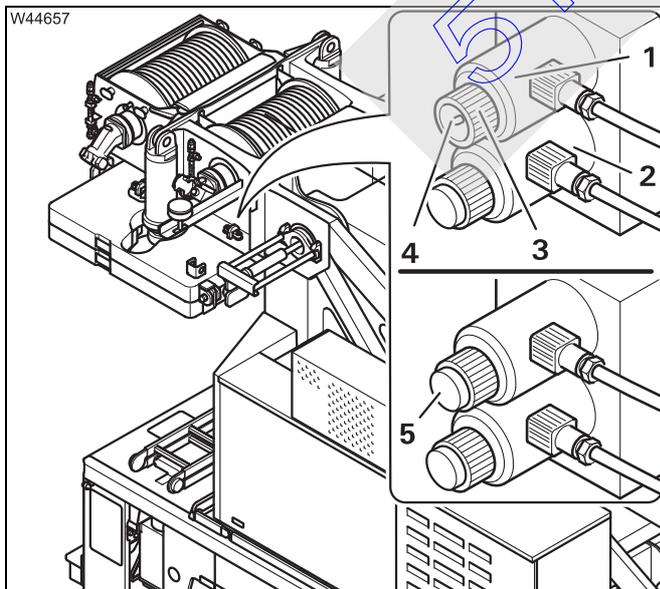
- 1 Valve Y1104 – *Lower* or
- 2 Valve Y1105 – *Lift*

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



Danger due to falling loads!

Switch off continuous operation immediately after emergency activation. Check whether the pins can be seen on both caps. You thus prevent loads falling down immediately after lifting in subsequent crane operation.



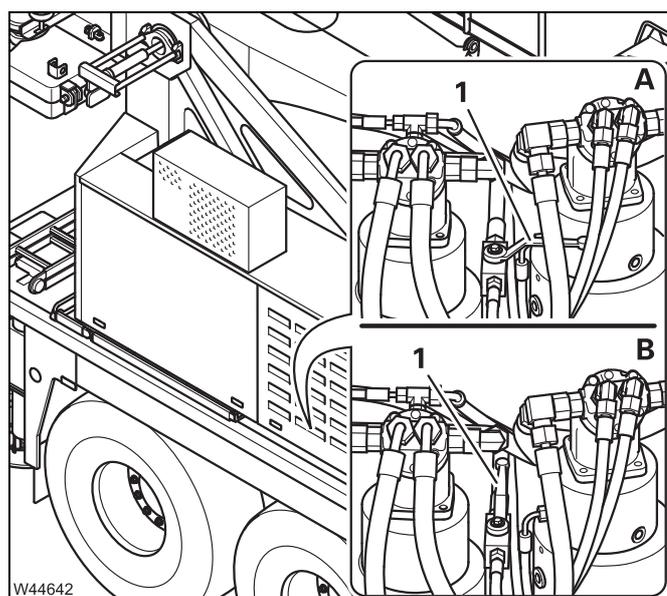
Switching off continuous operation

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



For slewing

After switching over the valves behind the crane cab, you must also close a valve.



(A) – Emergency operation position

- Close the valve **6** – lever **(1)** at right angles to the line.

(B) – Crane operation position

- Open the valve **6** – lever **(1)** parallel to the line.

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14.7.8

Performing emergency operation

If the required hydraulic circuit has been established, you can perform 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 overturning when slewing during emergency operation!

Crane operations are not monitored by the RCL while the hand-held control is connected!

Various checks are therefore necessary, depending on the active slewing range type, before slewing in emergency operation, see p. 14 - 48.



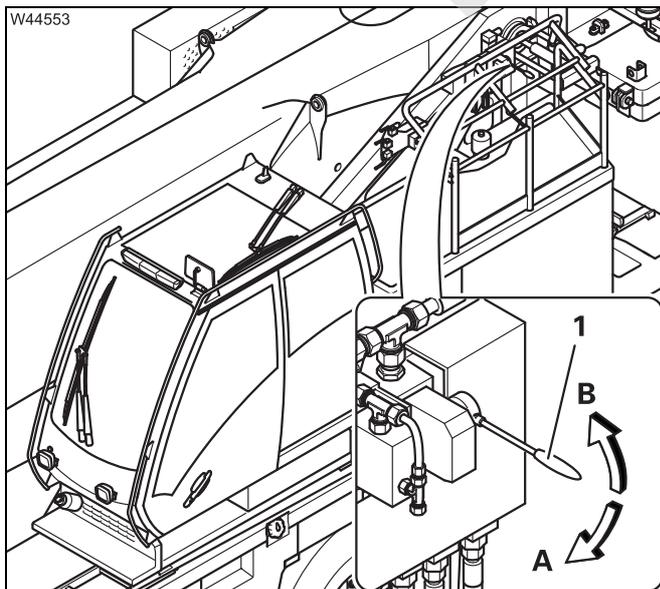
Risk of accidents during slewing!

Do not stand on the carrier. You thus avoid 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 clockwise

B: Slew anti-clockwise



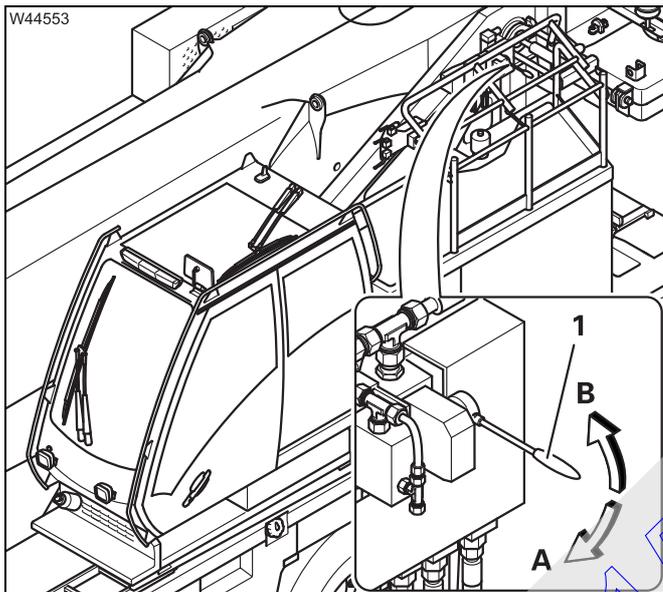
Derricking

- Before lowering the boom, determine the maximum permissible working radius for the current rigging mode according to the *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 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* when lowering the boom.

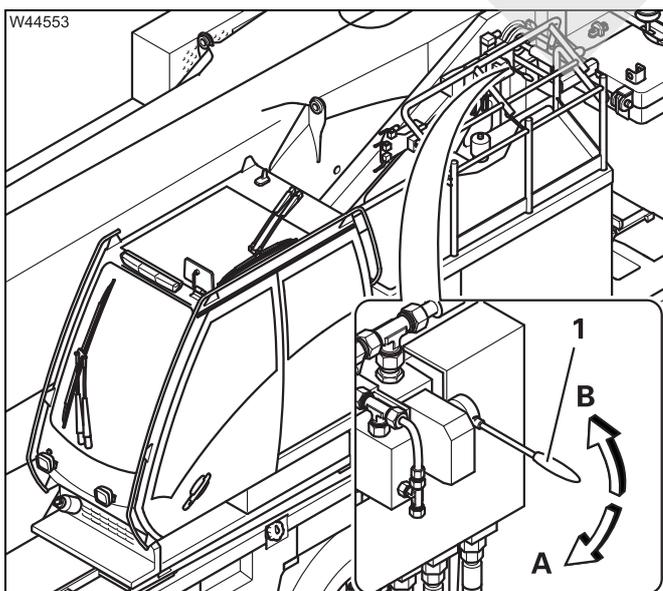


- Observe the maximum permissible working radius specified in the *Lifting capacity table* – by measuring, if necessary.
- Move the control lever (1) in the required direction.

A: Lower boom

B: Raise boom

Lifting/lowering



- Move the control lever (1) in the required direction.

A: Lower

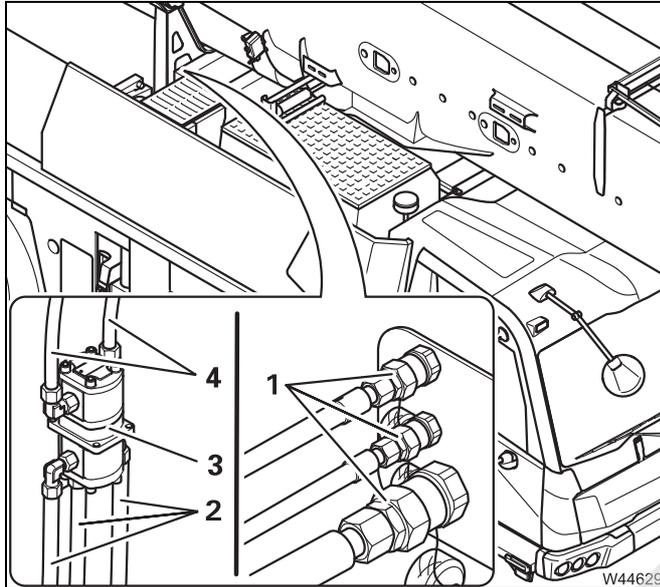
B: Lift

14.7.9

Emergency supply for another crane

For emergency supply

The hoses are assigned according to the various diameters.



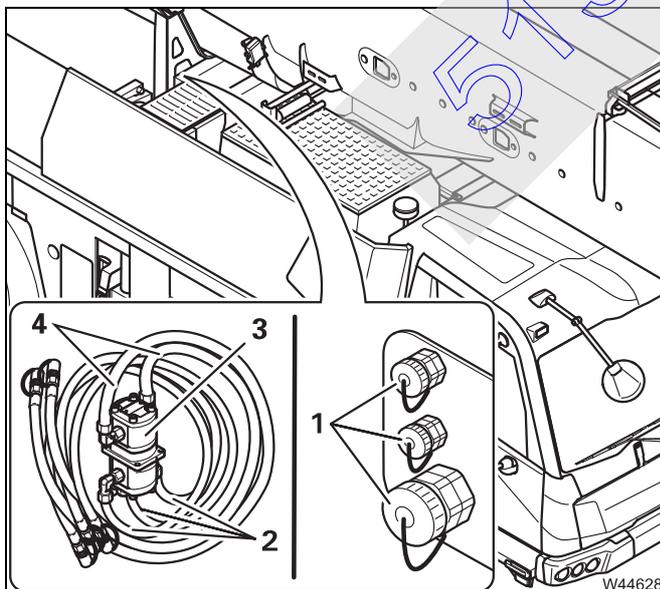
– On the crane to be supplied

- Attach the transformer (3).
- Connect the hoses (4);
 ▣▣▣▣ *Operating manual of the other crane.*

– On the GMK5150XL

- Switch off the engine.
- Connect the hoses (2) to the connections (1).
- Switch on hydraulic emergency operation;
 ▣▣▣▣ p. 14 - 67

After emergency supply



– On the GMK5150XL

- Switch off hydraulic emergency operation;
 ▣▣▣▣ p. 14 - 67
- Remove the hoses (2) from the connections (1).

– On the crane that was supplied

- Remove the hoses (4).
- Remove the transformer (3).
- Close all the hoses and connections with the caps.

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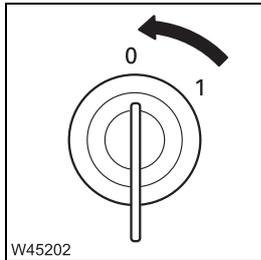
14.8

Fuses in the crane cab

The fuses are located in the crane cab behind the crane cab seat.

Notes on changing fuses

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



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



Risk of damage if the ignition is switched on!

Switch off the ignition whenever a fuse has to be replaced. This prevents the new fuse being blown immediately by the increased starting current after being installed.



Risk of damage by overloading!

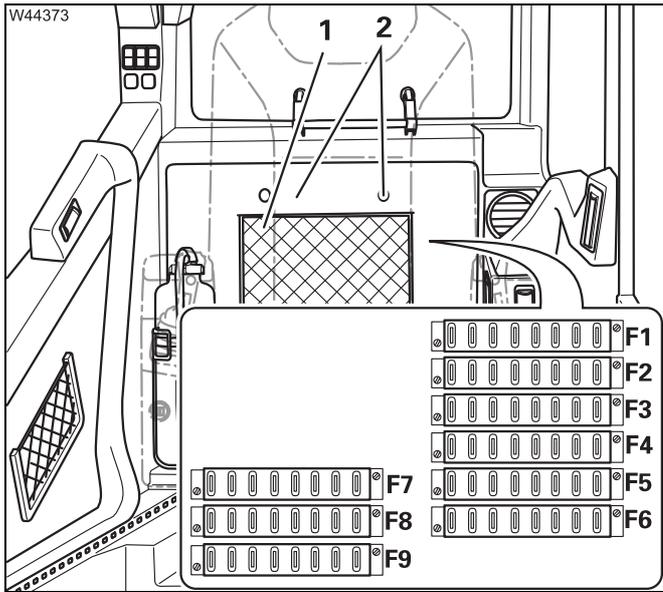
Replace blown fuses only with new fuses of the same amperage. This prevents parts being overloaded and damaged or the fuse being immediately blown again. Notify **Grove Product Support** if a fuse with the same amperage blows again when the ignition is switched on.



Risk of fire!

Never repair a blown fuse with other electrically conductive materials.



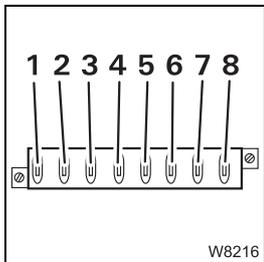


- Loosen the bolts (2) and remove the cover (1).

Fuse groups **F1** to **F9** consist of eight fuses each.

The following tables show the designations of the individual fuses, including their amperage and functions.

- Observe the instructions for changing fuses;
 p. 14 - 77.



The designations 1 to 8 in the tables correspond to their order from left to right (fuse 1 is always the left fuse).

Designation	Amperage (A)	Function
F1/1	15	Control unit UB 1 CCM 10
F1/2	15	Control unit UB 2 CCM 10
F1/3	15	Control unit UB SCM
F1/4	15	Control unit UB IOS 20
F1/5	5	Control unit UB UE IOS 21
F1/6	15	Control unit UB 1 IOS 22
F1/7	15	Control unit UB 2 IOS 22
F1/8	15	Control unit UB 1 IOL 30

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

Designation	Amperage (A)	Function
F3/1	–	Unassigned
F3/2	–	Unassigned
F3/3	–	Unassigned
F3/4	3	Contact switch, cab lighting
F3/5	5	CCS display
F3/6	5	Hand-held control
F3/7	7.5	Comfort seat ¹⁾
F3/8	15	Cigarette lighter

¹⁾ Additional equipment



Designation	Amperage (A)	Function
F4/1	5	Control unit UE IOL 30, CCM 10, UE SCM
F4/2	5	Reserve
F4/3	5	TELEMATIC system
F4/4	10	Audio device ¹⁾
F4/5	3	Clock, heating
F4/6	3	Unassigned
F4/7	–	Unassigned
F4/8	3	Rotating beacon

Designation	Amperage (A)	Function
F5/1	5	Control unit 15 SCM, CCM 10 Control unit UE IOL 30, IOS 22
F5/2	5	Control unit 15 UE IOS 20 and 21
F5/3	3	CCS display
F5/4	3	Control lever
F5/5	5	Control lever supply
F5/6	5	USB socket
F5/7	5	Reserve
F5/8	5	Switch lighting Audio device lighting

¹⁾ Additional equipment

Designation	Amperage (A)	Function
F6/1	10	Windscreen washing system
F6/2	15	12 V socket
F6/3	10	Crane cab spotlight
F6/4	15	Main boom spotlight
F6/5	5	Houselock
F6/6	3	TELEMATIC system
F6/7	3	Radio control
F6/8	5	Camera system

Designation	Amperage (A)	Function
F7/1	3	Rotating beacons
F7/2	5	Diagnostic connection
F7/3	5	Heating system
F7/4	3	Extendable step for crane cab
F7/5	5	Unassigned
F7/6	5	Monitor for camera ¹⁾
F7/7	–	Unassigned
F7/8	–	Unassigned

¹⁾ Additional equipment

Designation	Amperage (A)	Function
F8/1	5	Crane control power supply
F8/2	3	Crane control power supply
F8/3	3	Crane control power supply
F8/4	3	Crane control power supply
F8/5	–	Unassigned
F8/6	2	CCM 10 (8.5 V)
F8/7	2	AGND CCM10 (8.5 V)
F8/8	3	Crane control power supply



Designation	Amperage (A)	Function
F9/1	10	Heating tank level
F9/2	20	Heating control unit
F9/3	20	Unassigned
F9/4		Unassigned
F9/5		Unassigned
F9/6	30	Ignition
F9/7	10	Fan
F9/8	10	Heating system

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