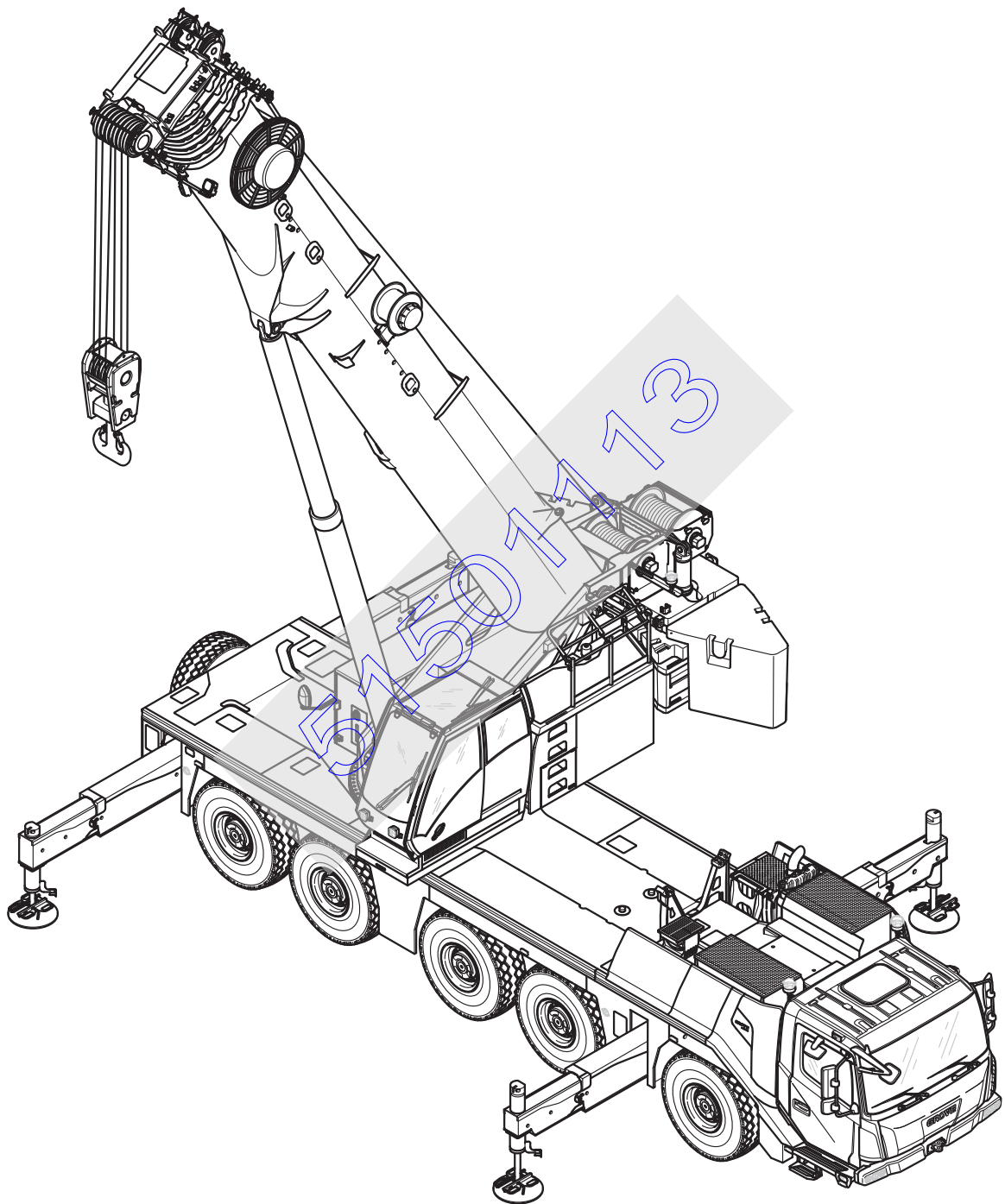


GROVE GMK5150L

Operating manual



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12.01.2018

Manitowoc[®]

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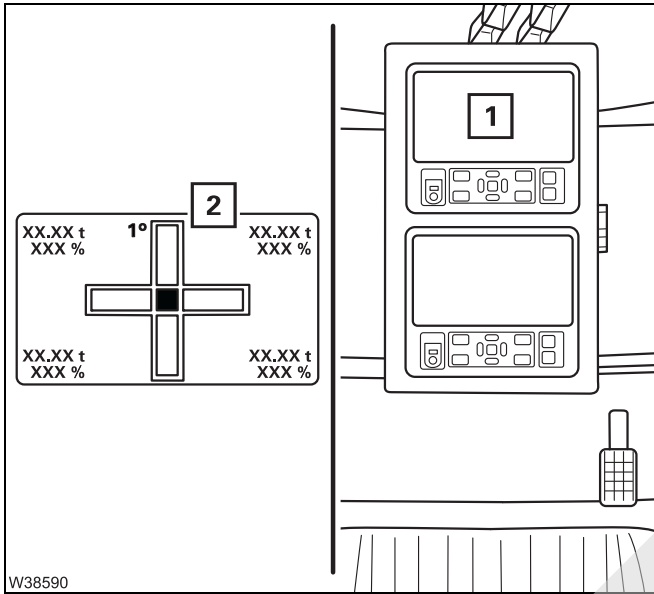
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12.01.2018

Outrigger spans

Overview metres (feet) / per cent



The display *RCL* (1) shows the outrigger spans in metres (feet).

The control units (2) indicate the outrigger spans in per cent.

The percentage values in the enclosed *lifting capacity table* and the enclosed *operating instructions* deviate from the percentage values actually displayed on the control units (2) as they are based on different principles.

These additional pages give an overview for different crane types of what per cent you have to move the outrigger beams on the control units in order to obtain the desired outrigger span.



Depending on the operating instructions supplied, the outrigger spans are given as the overall width or additionally as an individual width.

GMK5250L / GMK5200-1 / GMK5180-1			
Length specifications		Percentages	
Overall widths	Individual widths	Control unit	Lifting capacity table
7.800 m (25.6 ft)	3.900 m (12.8 ft)	100%	100%
6.854 m (22.4 ft)	3.427 m (11.2 ft)	81%	83%
5.910 m (19.4 ft)	2.955 m (9.7 ft)	63%	66%
4.310 m (14.2 ft)	2.155 m (7.1 ft)	31%	50%
2.710 m (8.8 ft)	1.355 m (4.4 ft)	0%	0%



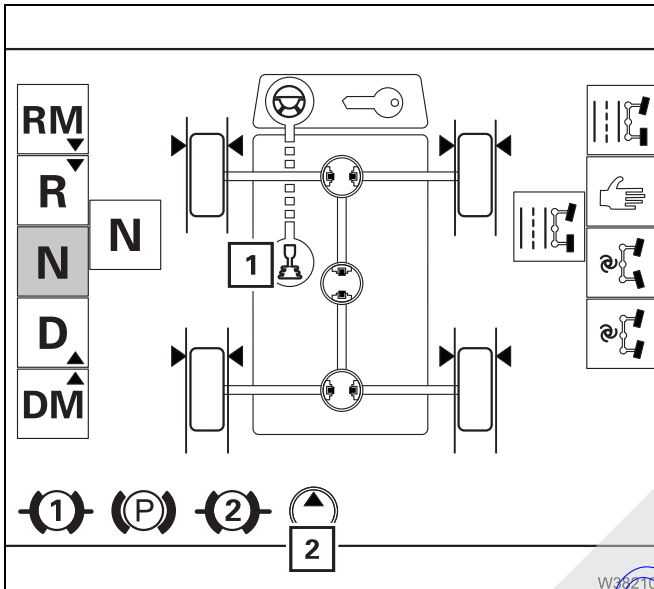
GMK5150/GMK5150L			
Length specifications		Percentages	
Overall widths	Individual widths	Control unit	Lifting capacity table
7.600 m (24.9 ft)	3.800 m (12.5 ft)	100%	100%
6.700 m (22.0 ft)	3.350 m (11.0 ft)	83%	83%
5.900 m (19.4 ft)	2.950 m (9.7 ft)	61%	66%
5.100 m (16.7 ft)	2.550 m (8.4 ft)	51%	50%
2.500 m (8.2 ft)	1.250 m (4.1 ft)	0%	0%

GMK4100L-1			
Length specifications		Percentages	
Overall widths	Individual widths	Control unit	Lifting capacity table
7.200 m (23.6 ft)	3.600 m (11.8 ft)	100%	100%
6.250 m (20.6 ft)	3.125 m (10.3 ft)	81%	80%
5.300 m (17.4 ft)	2.650 m (8.7 ft)	61%	60%
3.800 m (12.4 ft)	1.900 m (6.2 ft)	31%	40%
2.340 m (7.6 ft)	1.170 m (3.8 ft)	0%	0%

GMK3060			
Length specifications		Percentages	
Overall widths	Individual widths	Control unit	Lifting capacity table
6.20 m (20.3 ft)	3.10 (10.2 ft)	100%	None
4.40 m (14.4 ft)	2.20 (7.2 ft)	51%	
2.32 m (7.6 ft)	1.16 (3.8 ft)	0%	

Driving from the crane cab

Crane movement partially blocked



Notwithstanding the information in the *operating manual* supplied, crane movements are blocked during travel.

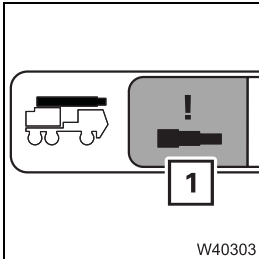
After switching over to *driving position* – symbol (1) **green** – the symbol (2) remains **grey** and the crane hydraulics *driving position* is switched off.

To carry out crane movements, you can stop and switch over to the *Crane operation* operating mode, as described in the supplied *operating manual*.



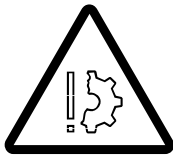
Telescoping emergency programme

Return run of the telescoping cylinder



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

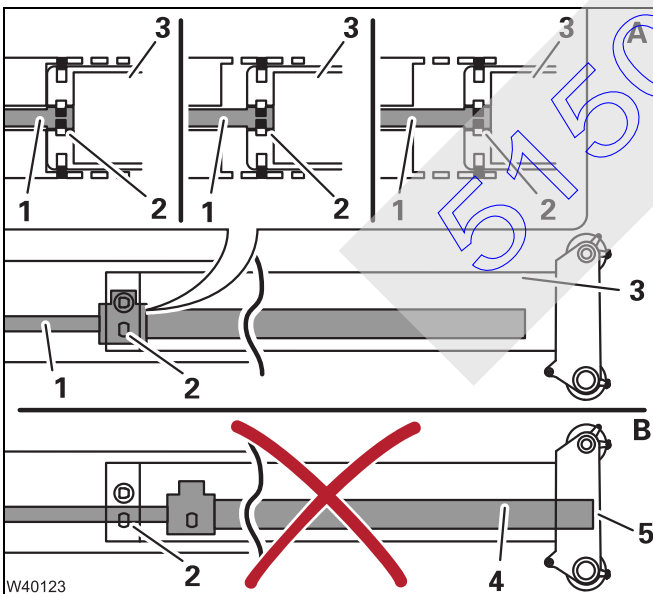
If you move the telescoping cylinder without a telescopic section (return run), please also note all the information in these additional pages.



Risk of damage during return run of the telescopic cylinder!

Always stop extending once the locking point on the foremost telescopic section has been reached.

This prevents damage to the boom system through a collision between the telescoping cylinder and the main boom head.



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

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

There is no automatic shutdown.

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

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



The operating manual consists of the following chapters:

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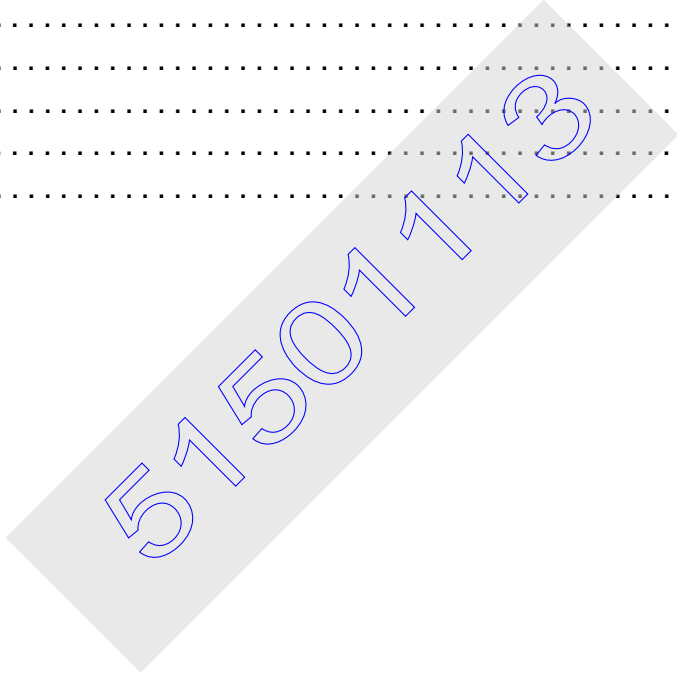
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1

Overview

1.1

Accidents

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

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

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1.2

Branch offices

1.2.1

Manitowoc Crane Care

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

<http://www.manitowoccranes.com>

1.2.2

Dealer list

Visit the following address for a global list of dealers:

<http://www.manitowoccranes.com>

1.3

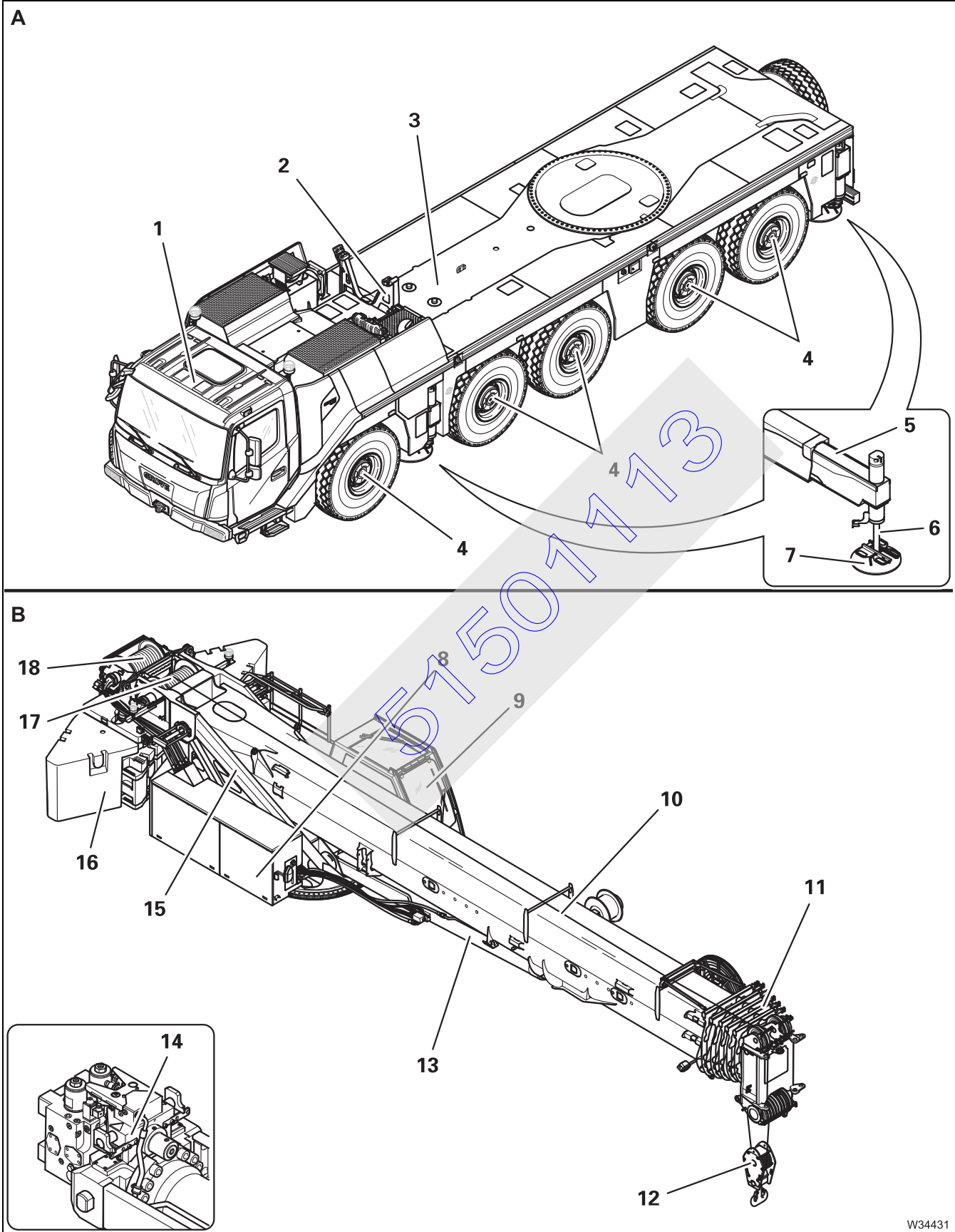
Warranty specifications

Please see the separately enclosed warranty certificate for information.

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1.4

Terms used



(A) – Carrier

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

(B) – Superstructure

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

¹⁾ Additional equipment

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1.5

Technical data

GROVE crane GMK5150L

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

Crane designation:	Truck crane as per DIN 15 001, Part 1
Crane application:	Service crane as per DIN 15 001, Part 2
Crane classification:	Hoist class H1 to DIN 15 018, Part 1 Crane class A1 to ISO 4301, Part 2

The crane is designed 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 in the sense of § 443 BGB (German Federal Law).

1.5.1

Maximum lifting capacity (ASME B 30.5)

Max. load bearing capacity

- Within 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

- Within the 360° slewing range: 440 tm (58 t x 7.6 m)
3,200 klbs x ft (128,000 lbs x 25 ft)

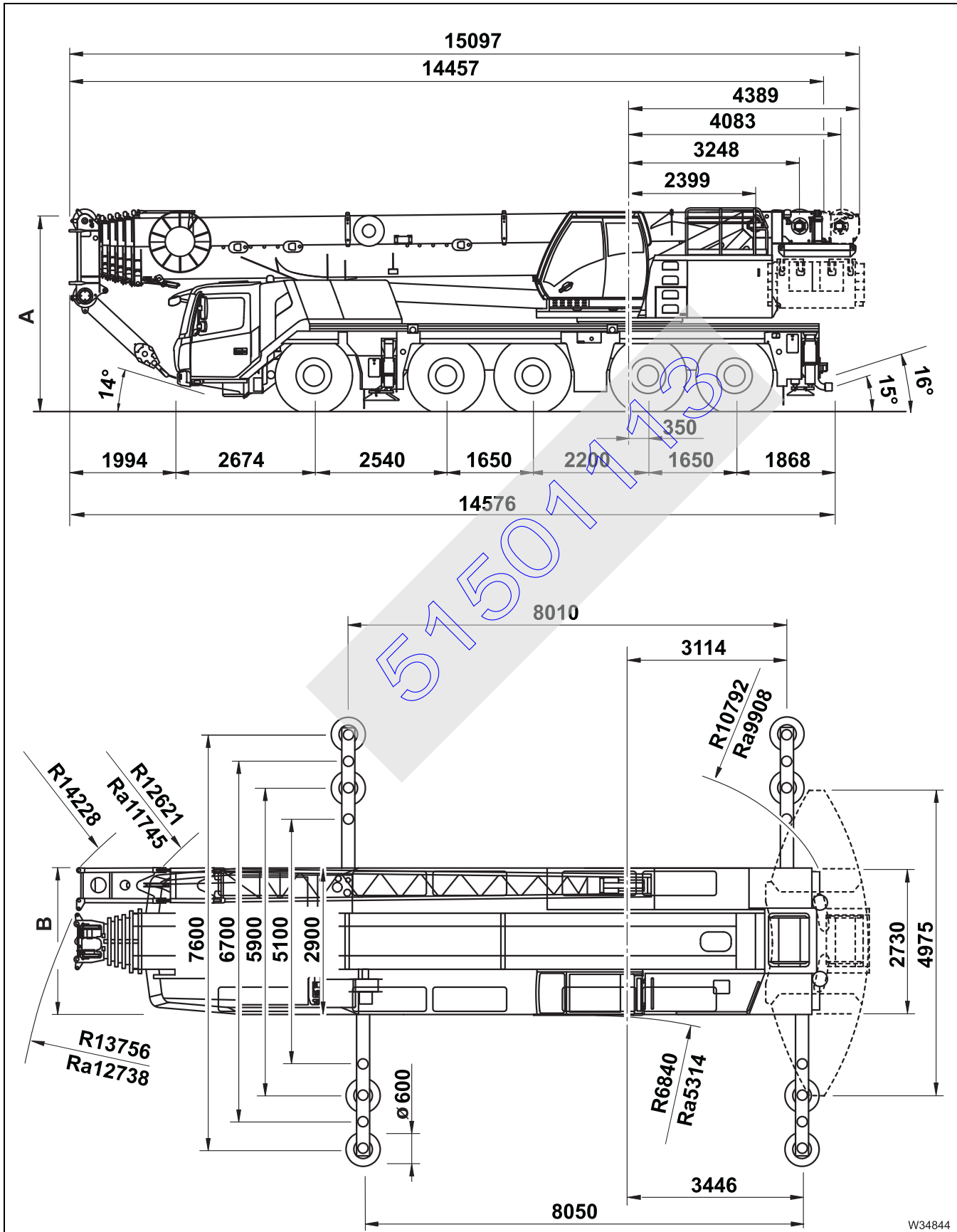
¹⁾ With additional equipment

²⁾ With special equipment (no currently available)


1.5.2

Dimensions and weights of the truck crane, axle loads

All dimensions in the illustration are in mm.





Dimensions

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

Length without auxiliary hoist:	14.46 m (47.4 ft)
A Height:	At on-road level:
– 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)
B Width:	
– 385/95 R25; 445/95 R25	2,75 m (9.0 ft)
– 525/80 R25	2.90 m (9.5 ft)
C Angle of negotiable banks:	At on-road level (385/95 R25)
Front:	about 12°
Rear:	about 12°

Weight and axle loads

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


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

Total weight:	depending on driving mode 60 t (132,277 lbs)
Axle loads:	depending on driving mode, 12 t (26,500 lbs)
Axle loads: ¹⁾	24 t (53,000 lbs) in working position free on wheels

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

1.5.3

Dimensions and weights of removable parts

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

Spare wheel

Description	Length x width x height in m (ft)	Weight in kg (lbs)
Spare wheel 385/95 R 25	1.36 x 1.36 x 0.40 (4.45 x 4.45 x 1.30)	245 (540)
Spare wheel 445/95 R 25	1.50 x 1.50 x 0.45 (4.95 x 4.95 x 1.50)	332 (732)
Spare wheel 525/80 R 25	1.50 x 1.50 x 0.53 (4.92 x 4.92 x 1.74)	362 (798)

Outrigger

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

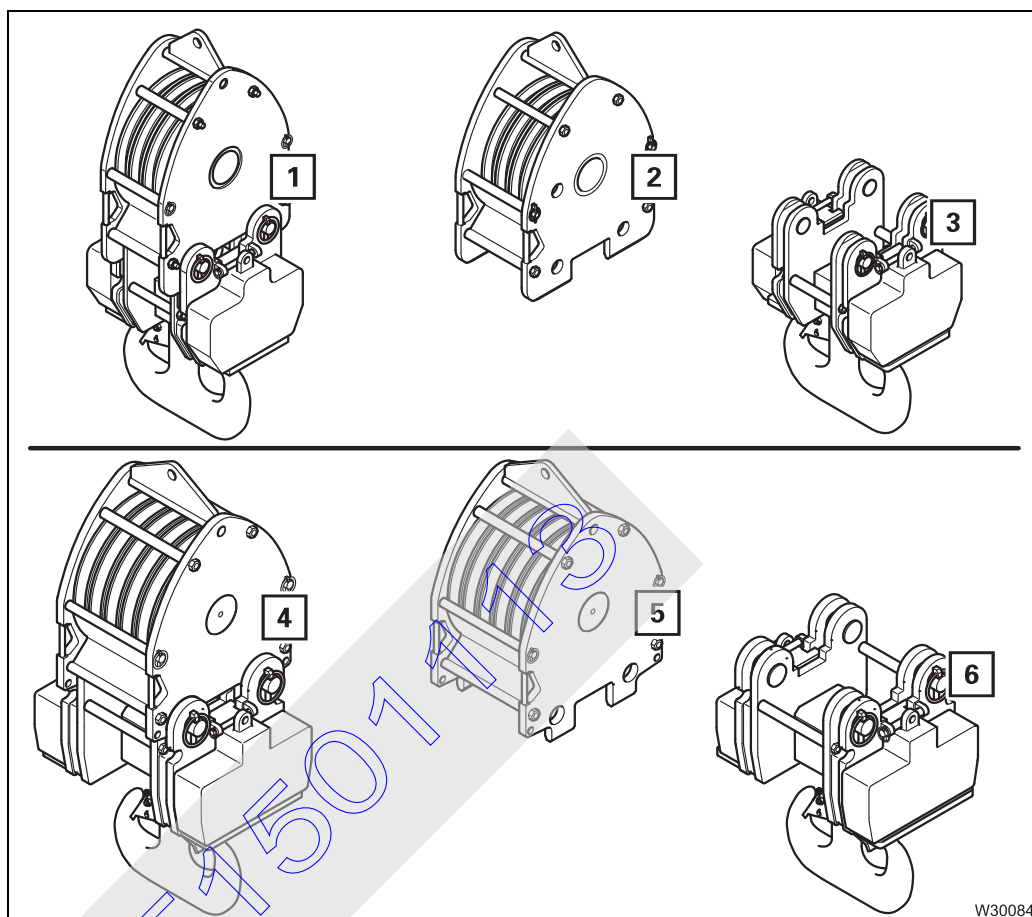
¹⁾ Consists of two sets

Main boom

Description	Length x width x height in m (ft)	Weight in kg (lbs)
Complete main boom	13.50 x 2.00 x 2.10 (44.30 x 6.60 x 6.90)	15 000 (33 070)
Complete main boom	13.50 x 2.00 x 2.10 (44.30 x 6.60 x 6.90)	13 750 (30 315)

Hook blocks and hook tackle

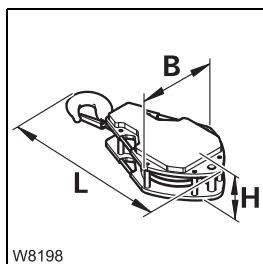
Versions as execution as separable hook block



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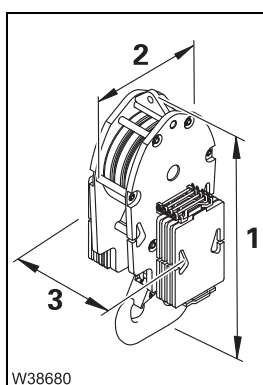
Dimensions (m) and weights (kg)	(1)	(2)	(3)	(4)	(5)	(6)
Length	1.98 (6.50)	0.90 (2.95)	1.20 (3.94)	1.98 (6.50)	0.90 (2.95)	1.30 (4.27)
Width	0.70 (2.30)	0.70 (2.30)	0.70 (2.30)	0.70 (2.30)	0.70 (2.30)	0.70 (2.30)
Height	0.76 (2.49)	0.32 (1.05)	0.76 (2.49)	0.76 (2.49)	0.45 (1.48)	0.76 (2.49)
Weight in kg	960 (2 116)	275 (606)	685 (1 510)	1600 (3 527)	465 (1 025)	1135 (2 502)





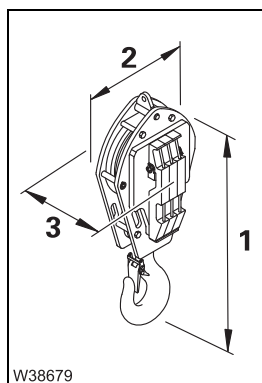
Standard versions

Description	Length x width x height (L) x (W) x (H) in m (ft)	Weight In kg (lbs)
Single or double hook, 8 sheaves	1.50 x 0.55 x 0.40 (4.90 x 1.80 x 1.30)	1,600 (1,325)
Single or double hook, 5 sheaves	1.40 x 0.55 x 0.30 (4.60 x 1.80 x 1.00)	1,300 (795)
Single or double hook, 3 sheaves	1.40 x 0.55 x 0.30 (4.60 x 1.80 x 1.00)	950 (795)
Single hook, 1 sheave	1.35 x 0.55 x 0.25 (4.45 x 1.80 x 0.82)	500 (465)
Hook tackle	0.90 x 0.35 x 0.35 (2.95 x 1.15 x 1.15)	200 (220)



Versions with ballast plate – Version A

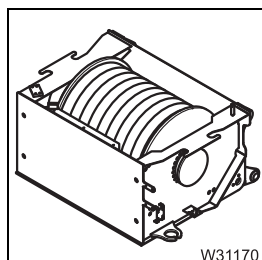
Description	(1) x (2) x (3) in m	Weight In kg
Hook block 1 sheave with ballast plates	1.33 x 0.56 x 0.47 (4.36 x 1.84 x 1.54)	500
Hook block 1 sheave without ballast plates	1.33 x 0.56 x 0.20 (4.36 x 1.84 x 0.65)	325
1 ballast plate		23
Hook block 3 sheave with ballast plates	0.82 x 0.50 x 0.59 (2.70 x 1.64 x 1.94)	450
Hook block 3 sheave without ballast plates	1.36 x 0.53 x 0.19 (4.46 x 1.74 x 0.62)	275
1 ballast plate		23



Versions with ballast plate – Version A

Description	(1) x (2) x (3) in m	Weight In kg
Hook block 1 sheave with ballast plates	1.41 x 0.56 x 0.44 (4.63 x 1.84 x 1.44)	450
Hook block 1 sheave without ballast plates	1.41 x 0.56 x 0.35 (4.63 x 1.84 x 1.15)	325
1 ballast plate		19
Hook block 3 sheave with ballast plates	1.47 x 0.56 x 0.51 (4.82 x 1.84 x 1.67)	950
Hook block 3 sheave without ballast plates	1.36 x 0.53 x 0.30 (4.46 x 1.74 x 0.98)	440
1 ballast plate		25

Auxiliary hoist

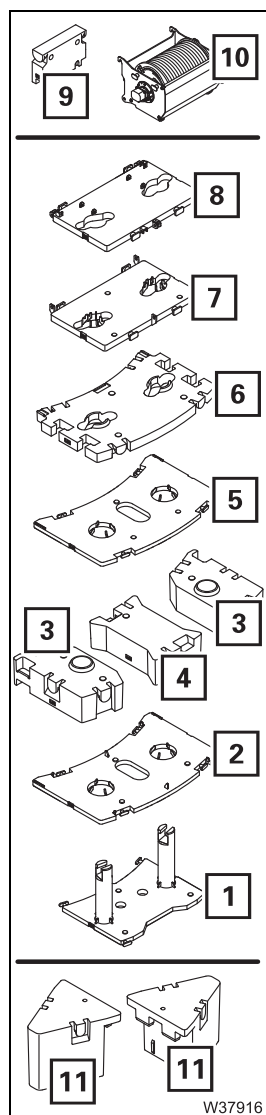


Description	Length x width x height in m (ft)	Weight in kg (lbs)
Complete auxiliary hoist	0.80 x 1.70 x 0.70 (2.62 x 5.58 x 2.29)	1,200 (2,646)




Counterweight parts

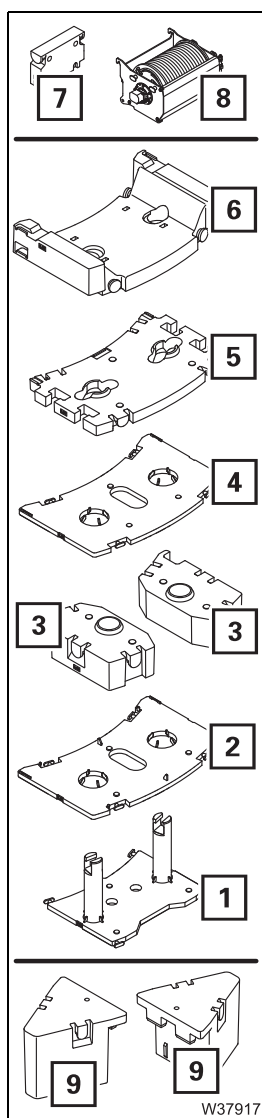
The stability of the crane rigged with the counterweight sections delivered has been tested.




Counterweight – Version 1

Item	Description	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	 Auxiliary hoist, p. 1 - 13		
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 procedure.

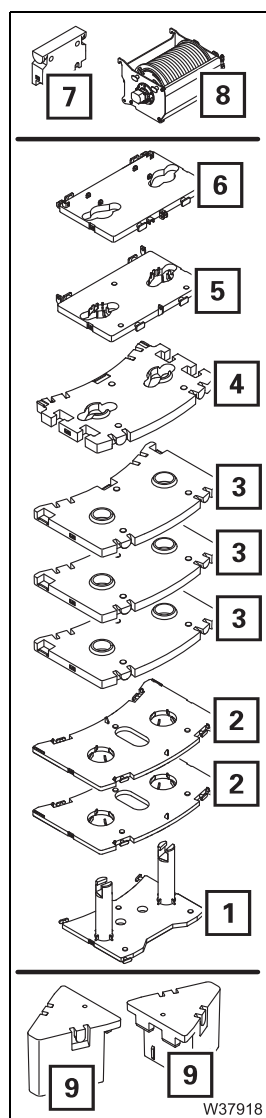


Counterweight – Version 2


Item	Description	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	 Auxiliary hoist, p. 1 - 13		
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 procedure.





Counterweight – Version 3

Item	Description	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	 Auxiliary hoist, p. 1 - 13		
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 procedure.

1.5.4

Carrier

Engine

Mercedes Benz

- Engine emissions: ▮▮▮▮▶ Engine data card
- Power: ▮▮▮▶ Engine data card
- Fuel – Tank¹⁾: 2 x 200 l (2 x 52.8 gal)
- AdBlue tank: 40 ltr (10.6 gal)

¹⁾ For additional equipment: 2 x 325 l (85.9 gal)

Transmission

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

Transfer case

Kessler VG 2639, 2-stage

Axle lines

Drive: **10 x 6 x 10**

- 1. axle line: Steered axle line
- 2. axle line: Steered and driven axle line
- 3. axle line: Steered axle line
- 4. axle line: Steered and driven axle line, steering can be switched on
- 5. axle line: Steered and driven axle line

Drive: **10 x 8 x 10¹⁾**

- 1. axle line: Steered axle line
- 2. axle line: Steered and driven axle line
- 3. axle line: Steered and driven axle line, drive can be activated
- 4. axle line: Steered and driven axle line (steering can be switched on)
- 5. 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 with cold tyres for axle loads up to max. 12 t

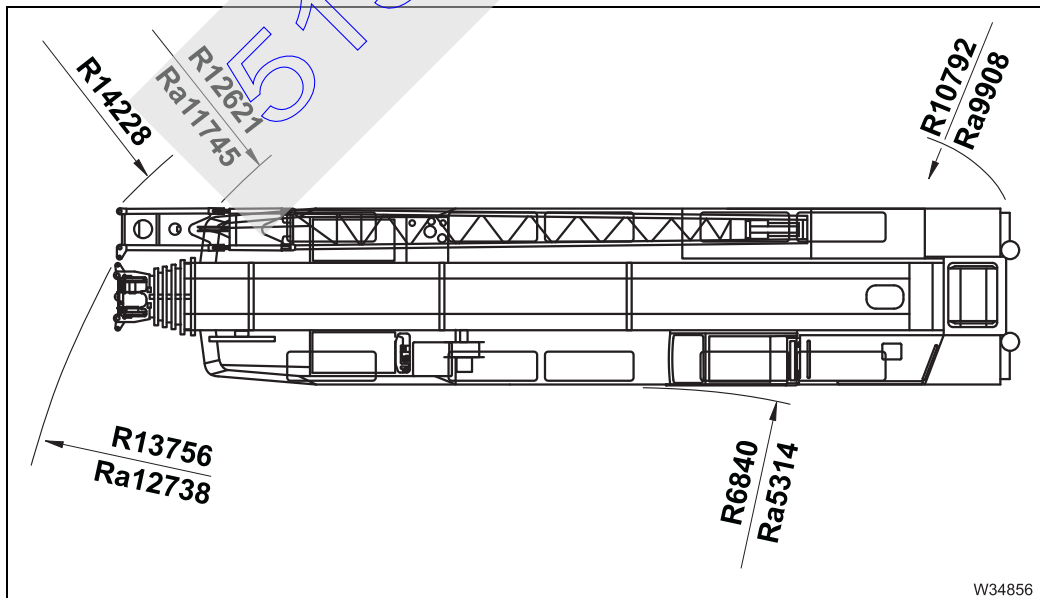
385/95 R25 ¹⁾ :	10 bar (145 psi)
445/95 R25:	9 bar (131 psi)
525/80 R25:	7 bar (102 psi)
¹⁾ Michelin X-Crane 9 bar (131 psi)	

Turning turning radii


All dimensions in the illustration are in mm.

R = values for normal steering mode

Ra = values for all-wheel steering



Outrigger

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)	Per cent
	8.030 x 7.600 m (26.3 x 24.9 ft)	100%
	8.030 x 6.700 m (26.3 x 22.0 ft)	83%
	8.030 x 5.900 m (26.3 x 19.4 ft)	66%
	8.030 x 5.100 m (26.3 x 16.7 ft)	50%
	8.030 x 2.500 m (26.3 x 8.2 ft)	0%
Outrigger span (MAXbase):	 Enabled outrigger spans, p. 12 - 36	
Outrigger pads:	Diameter: 600 mm (23.6 in) Surface: 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⁾ :	In the outriggers, integrated with a display in the crane cab and on the <i>outrigger</i> control units depending on design.	

¹⁾ Additional equipment



Electrical system

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

Tool

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

Towing couplings

Front towing coupling: 100 kN (22,480 lbf) permissible tension¹⁾
Rear tow lug: 75 kN (16,860 lbf) permissible tension¹⁾
¹⁾ Only permissible at certain tension angles; ■■■▶ p. 5 - 58

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%

1.5.5

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 (to 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 (to ISO 4301 - 2)
Load spectrum:	L 1
Load spectrum factor:	Km = 0.125
Theoretical service life:	D = 3,200 h

Slewing gears

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

Derricking gear

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



Main boom

Main boom lengths:	11.4 m to 60.0 m (37.4 ft to 196.9 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 (to 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 about 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:	extend from 0 - 0 - 0 - 0 - 0 to 100 - 100 - 100 - 100 - 100 about 400s In automatic mode during uninterrupted locking and telescoping processes
Derricking gear:	Derricking between - 1° and 83° High-speed mode: Raising: about 50 s

1.6

Documentation supplied

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

– **Operating manual**

Contains information on driving and crane operation.

– **Lattice extension operating manual**

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

– **Operating manual for additional equipment**

This is only supplied when the truck crane is supplied with additional equipment which 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.

– **Maintenance manual**

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

– **Safety manual**

Provides information on the safe operation of the truck crane.

– **Circuit diagrams**

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

– **Lifting capacity table**

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



– **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.

1.6.1

Questions on documentation

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

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

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1.7

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 driver, based on his prior knowledge, of the individual operating steps and procedures.

1.7.1

What do the symbols used mean?

The following designations and symbols are used in the operating 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.

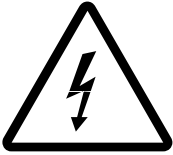


This symbol indicates hazards related to the described operation, which can endanger persons. The type of danger (for example, danger to life, risk of injury or risk of crushing) usually precedes the warning.






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



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



This symbol is to remind you that you are working with substances which pose a risk to the environment. Exercise special caution. For further information on handling substances that are harmful to the environment;  *Maintenance manual, chapter on Safety and environmental protection.*



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



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

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

1.7.2

How is the operating manual structured?

Division

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

The complete operating manual must always be carried in the truck crane. The basic safety instructions, also for crane operation, are included in **Chapter 2** only. Please read these safety instructions and observe them.

Structure of the chapters

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

Chapters **4** to **8** and **10** to **14** describe procedures, and are therefore structured relative 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 the rigging.

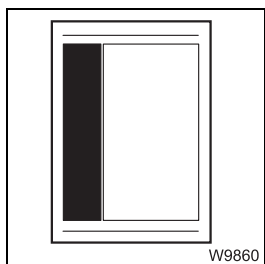
It is only safe to operate the truck crane by referring to the checklists when you are familiar with all the dangers which may occur, and are confident in completing the necessary steps as described in the relevant operating instructions.

If in doubt, always first read the section which is referred to in the checklist.



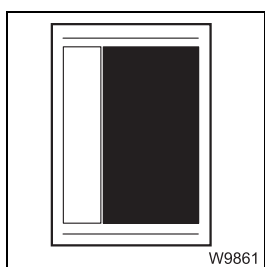
Structure of the pages

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 emphasis are used in the **text column**:

- When a section is preceded by a hyphen (as in this section, for example), you will find a list.
- When a section is preceded by a bullet, you will be required to take concrete action, for example,
 - Shift the transmission to neutral.
- The following text passages are highlighted in *italics*:
 - Designations of operating elements and switching states, for example, *Automatic* or *Manual*.
 - Headings of sections to which a reference is made.
 - The names of other documents to which a reference is made.

1.7.3

How do I find the information I need?

The operating manual contains the following guides for orientation.

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

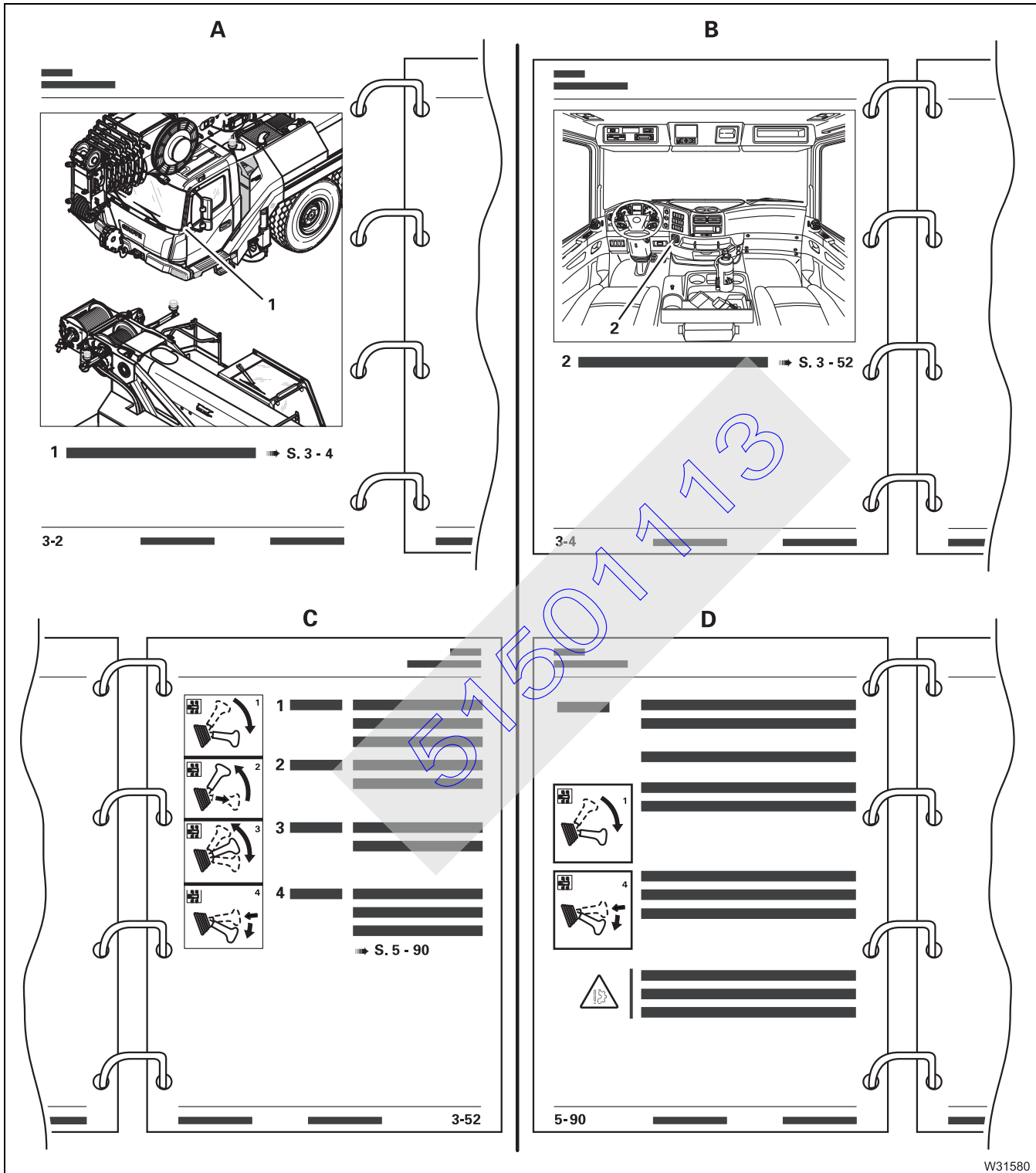
The following pages give an example of how to use the cross-references.



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Cross-references example

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



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

- A** In this example, the general overview is shown on page 3 - 2.
The driver's cab is labelled as number **1**. The related table contains a cross-reference in the form
- 1 Driver's cab** ▣▣▣▣▶ p. 3 - 4
- B** Page 3 - 4 shows an interior view of the driver's cab.
The parking brake is labelled as number **2**. The related table contains a cross-reference in the form
- 2 Parking brake** ▣▣▣▣▶ p. 3 - 52
- C** Page 3 - 52 gives a brief description of all the functions of the parking brake.
If further information is available, the brief description contains a cross-reference, for example,
- 4 Test position for towing a trailer:**
- Pull the lever down until it locks into place
 - Press in the lever and pull it further downwards
- The parking brake for the trailer is released;
▣▣▣▣▶ p. 5 - 90.
- D** Follow the cross-reference to page 5 - 90. Here, the test position of the parking brake when towing a trailer is described in detail, with all the preliminary requirements and safety instructions.
There may be additional cross-references here, such as to related pages in the chapter *Malfunctions*.
-

1.7.4

What information is available for operations planning?

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

The operating 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 - 10,
- Turning radii; ■■■▶ p. 1 - 18,
- The permissible outrigger spans for the *Standard* slewing range type; ■■■▶ p. 12 - 32,
- The permissible outrigger spans for the *MAXbase* slewing range type; ■■■▶ p. 12 - 36,
- The size of the outrigger pads; ■■■▶ p. 1 - 19.

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1.8

Conversion table for US measuring units

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

Converting from	into	Multiply by
mm	into	0,03937
into	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
ltr	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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1.9

Training - Information

For the EMEA area (Europe, Middle East, Africa), **Manitowoc Crane Group Germany GmbH** offers comprehensive training for crane types GMK and GTK.

Our training centre is located in a maritime environment, on Germany's North Sea coast 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 tailored to each target group and designed for safe, time-saving operation of your crane or else consolidates your specialist know-how of sales, marketing and service.

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

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

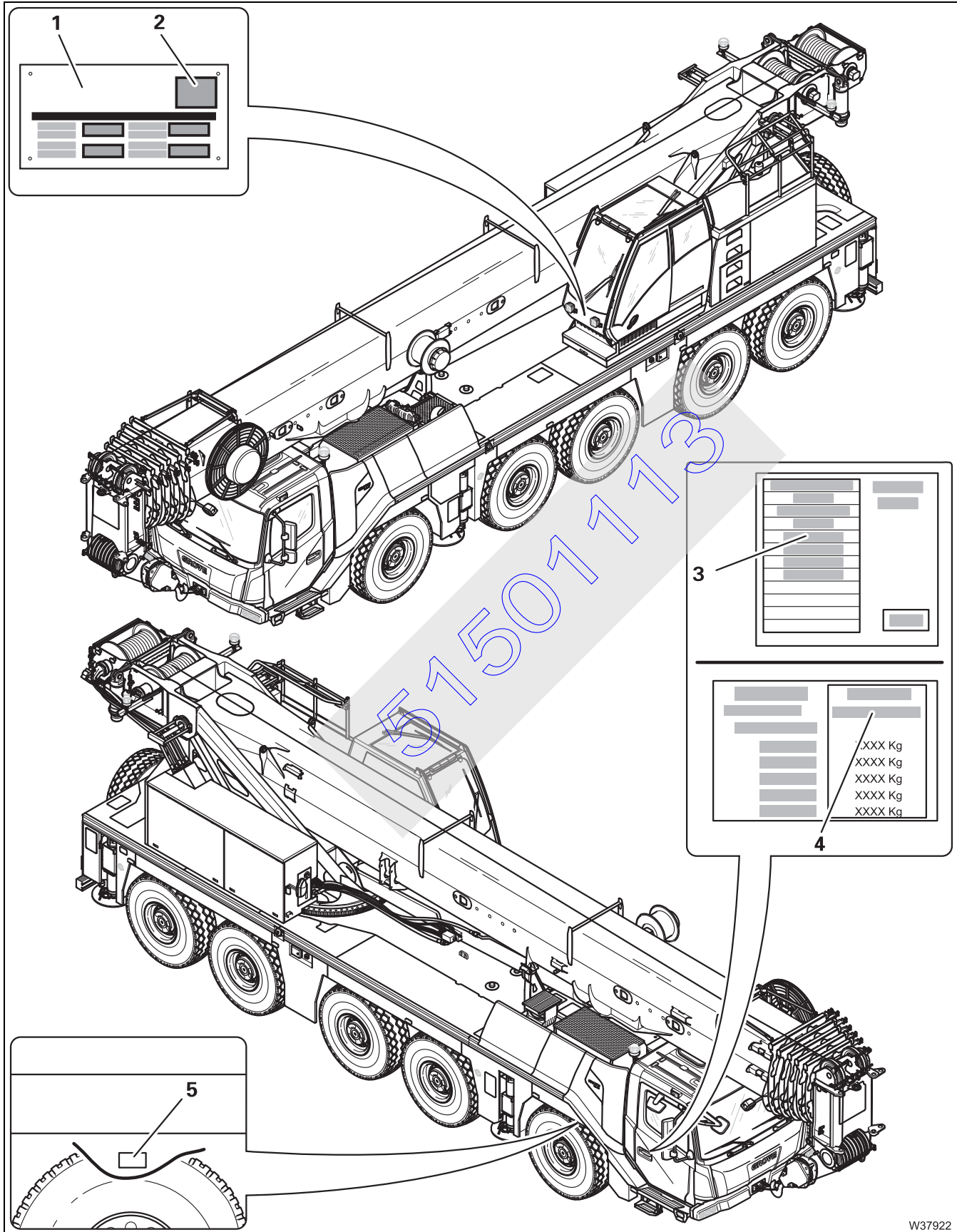
Have us design a suitable training programme for you today. We would be pleased to advise you! Your **Training Centre Wilhelmshaven**.

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

1.10

Identification



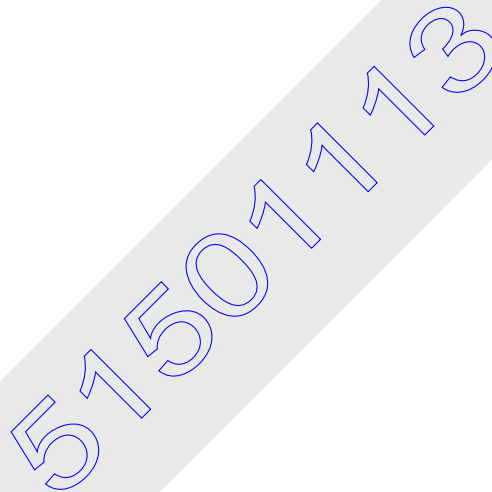
W37922

12.01.2018

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

- 1** Serial number and crane type
- 2** The CE mark, which is only applicable for truck cranes whose equipment and configuration complies 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 access)
- 4** Chassis number and crane type (at the passenger's seat)
- 5** Chassis number (front of the first axle line in the frame)

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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1.11 EC Declaration of Conformity



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

The enclosed Declaration of Conformity is valid only if the truck crane complies with all of the 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 does the truck crane receive a CE mark upon delivery.


The Declaration of Conformity shall become invalid and the CE mark 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



Notes on the warnings used;  *What do the symbols used mean?*, p. 1 - 25.


2.1

Intended use

The GMK5150L truck crane is constructed 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 be modified only with the consent of **Manitowoc Crane Group Germany GmbH**.

The GMK5150L 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 eliminated immediately.

The GMK5150L truck crane may only be operated without the corresponding special equipment within the permitted temperature range;
 *Technical data*, p. 1 - 7.

The GMK5150L truck crane is designed solely for lifting loads which are within the permitted GMK5150L lifting capacities. The load must be slung as prescribed to a hook block which is positioned vertically over the load prior to lifting.

Intended use also includes

- observing the entire crane documentation, consisting of the operating manual(s), the lifting capacity table, the outrigger pressure table and the safety manual
- adhering to the inspection and maintenance requirements specified in the maintenance manual.

The GMK5150L may only be operated with parts of equipment which have been approved by **Manitowoc Crane Group Germany GmbH** and which are labelled with the serial number of the GMK5150L.

The manufacturer is not liable for any damage caused by improper or unauthorized use of the GMK5150L truck crane. The user alone bears the risk.

2.1.1

Improper use

Manitowoc Crane Group Germany GmbH is not liable for damage resulting from improper or unauthorized use of the GMK5150L truck crane. The user alone bears the risk.

Improper use includes:

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

2.2

Organisational measures

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

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

They could include:

- How to deal with hazardous materials
- The wearing of personal protective equipment
- Road traffic regulations and
- All applicable regulations concerning the operation of a crane.

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

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

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

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

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

Use your personal protective gear whenever necessary or prescribed.

Observe all safety instructions and warnings on the truck crane.

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



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

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

Note the fire alarm and fire fighting facilities.

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

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

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

- Installation of safety devices
- Adjustment of safety devices and valves

All welding work (especially on load carrying members) may only be performed by qualified professional personnel with the prior written permission of **Manitowoc Crane Group Germany GmbH**.

To avoid damage, especially to electronic parts, there are certain measures you must take before doing any welding work. You should therefore always consult **Manitowoc Crane Care** before any welding work.

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

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

Be sure to follow the instructions in the maintenance manual relating to corrosion protection of the hydraulic cylinders.

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

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

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

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

2.3

Personnel qualifications

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.

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

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

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

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

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



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

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

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

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

2.4

Safety instructions for driving the truck crane

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

Check that all covers and safety devices are fitted properly and that they are in good condition before starting the vehicle.

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

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

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

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

After a lightning strike, always have the truck crane checked by **Manitowoc Crane Care** before you drive the truck crane – even if you do not notice any impairment to its function. Electronic components may be damaged by a lightning strike and may fail unexpectedly, either immediately or during later operation.

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

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

After driving, secure the truck crane against unauthorised use.

2.5

Safety instructions for crane operation

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

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

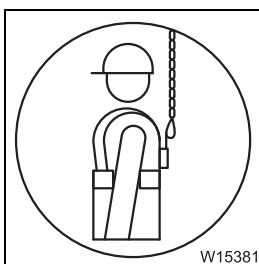
Check daily that all covers and safety devices are fitted properly and are in good condition before crane operation.

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

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

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

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



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

Always use a ladder for work above head height.



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

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

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

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

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

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

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

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

Always level the truck crane before operating the crane.

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

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

Always set the load down when there is a break in work, and never leave the truck crane whilst a load is raised.

Whenever you leave the truck crane, secure it against unauthorised use.

After a lightning strike, always have the truck crane checked by **Manitowoc Crane Care** before you operate the truck crane – even if you do not notice any impairment to its function. Electronic components may be damaged by a lightning strike and may fail unexpectedly, either immediately or during later operation.

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

Testing the truck crane by lifting an excessively heavy load (overload testing) is prohibited. This presents the danger of hidden damage that can lead to severe accidents during subsequent crane operation. If locally applicable national regulations require the truck crane to be tested by lifting an excessively heavy load (overload test), always first consult **Manitowoc Crane Care**.

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2.6

Instructions on transporting persons

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

It is prohibited to:

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

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

Further information on transporting persons can be found under the address: <http://fem-eur.com>.

Equipment for lifting persons

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

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

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

Personnel

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

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

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

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

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

Operation

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

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

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

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

The *operating manual* and the *lifting capacity table* must be in the crane cab and in easy reach of the crane operator.

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

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

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

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

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



The person being transported must be in radio contact with the crane operator.

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

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

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

Truck crane

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

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

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

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3

Operating elements for driving

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

3.1

Overview of the operating elements

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



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

51501113

1	Front flap	▣▣▣▣ p. 3 - 73
2	Driver's cab	▣▣▣▣ p. 3 - 6
3	Hose drum, installing/removing ^{1), 2)}	
4	Engine for driving	▣▣▣▣ p. 4 - 1
5	Rigging the main boom ¹⁾ ,	▣▣▣▣ p. 6 - 17
6	Auxiliary hoist Operation ¹⁾	▣▣▣▣ p. 9 - 116
	Rigging the auxiliary hoist ¹⁾	▣▣▣▣ p. 6 - 39
7	APS connection/interface (Auxiliary Power Supply) ^{1), 3)}	
8	– Spare wheel ¹⁾	▣▣▣▣ p. 8 - 33
	– Towbar coupling ¹⁾	▣▣▣▣ p. 5 - 81
	– Third brake light – At the rear of carrier/storage compartment ¹⁾	▣▣▣▣ p. 5 - 12
	– Third brake light – At the spare wheel clamp ¹⁾	▣▣▣▣ p. 8 - 35
9	BirdView system 270° – Camera ¹⁾	▣▣▣▣ p. 3 - 53
10	Chocks ¹⁾	▣▣▣▣ p. 5 - 46
11	Storage space for the folding ladder	▣▣▣▣ p. 3 - 77
12	Outriggers	
	– Operation	▣▣▣▣ p. 12 - 41
	– Lighting	▣▣▣▣ p. 12 - 45
	– Installing/removing the outrigger beams	▣▣▣▣ p. 6 - 51
13	Swing-out ladders	▣▣▣▣ p. 3 - 77
14	– Fuel tank	▣▣▣▣ p. 4 - 5
	– Dual tank ¹⁾	▣▣▣▣ p. 4 - 6
15	– Outrigger control units	▣▣▣▣ p. 3 - 38
	– Emergency stop switch	▣▣▣▣ p. 4 - 19
16	Step at the crane cab Switching on/off	▣▣▣▣ p. 12 - 157

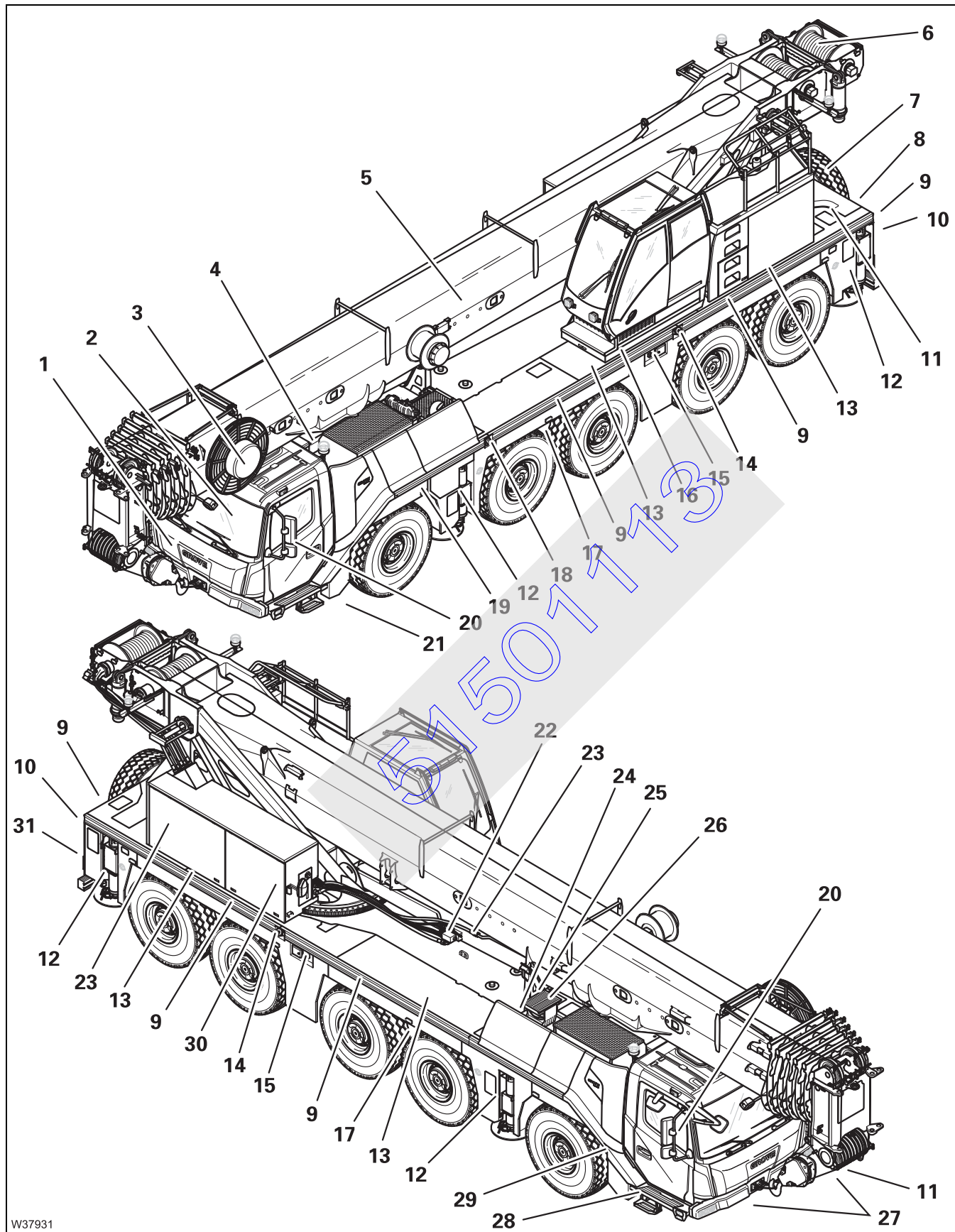
1) Additional equipment

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

3) ▣▣▣▣ *Separate operating manual*



Operating elements for driving
3.1 Overview of the operating elements



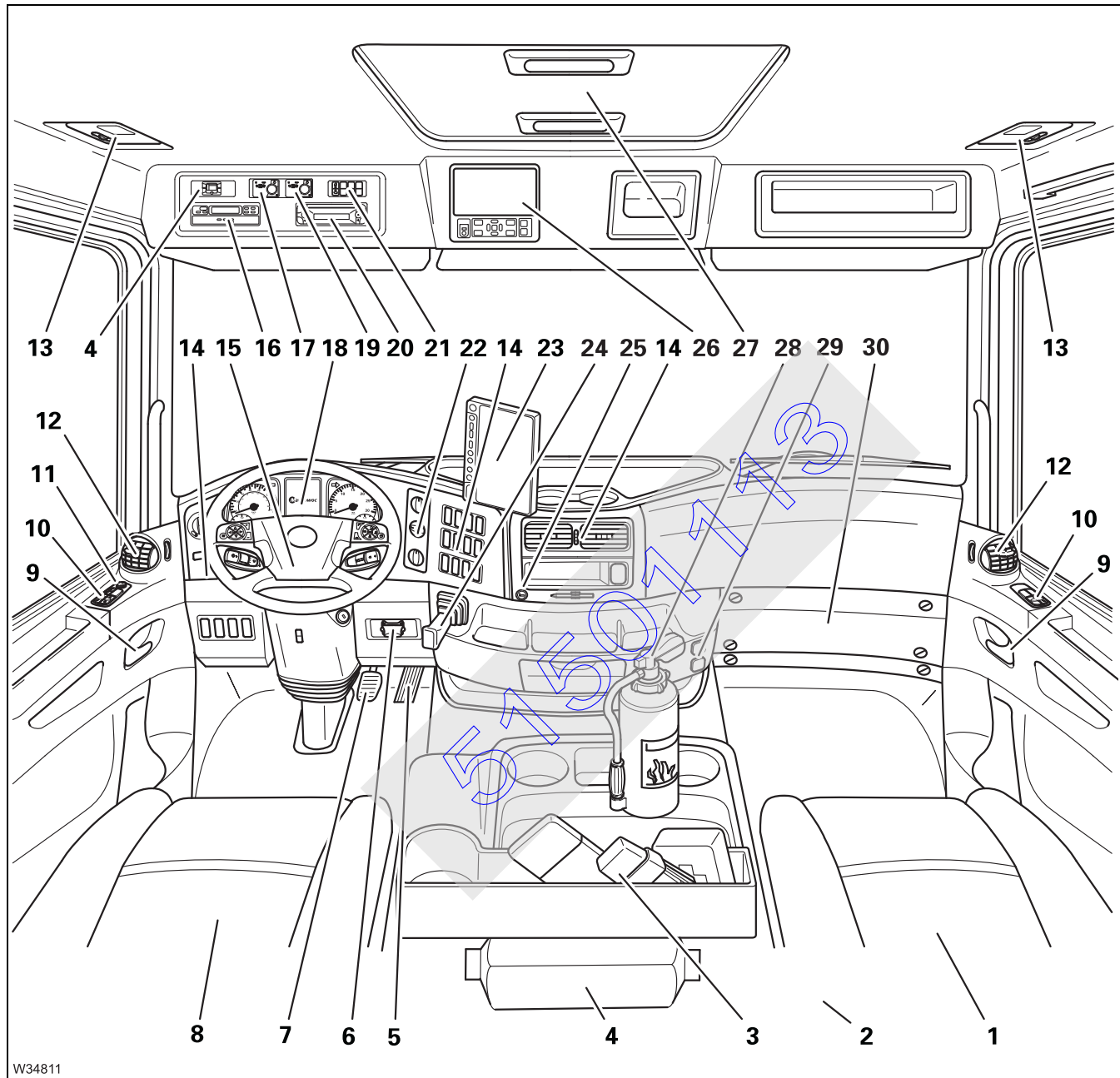
17 Raising/lowering the 3rd axle line for dolly operation ¹⁾	▣▣▣▣ p. 6 - 15
18 AdBlue tank ¹⁾	▣▣▣▣ p. 4 - 7
19 – Starting the truck crane externally ¹⁾ – Battery charger ¹⁾	▣▣▣▣ p. 8 - 27 ▣▣▣▣ p. 8 - 28
20 Adjusting the mirrors ¹⁾	▣▣▣▣ p. 5 - 7
21 Compressed-air supply Inflating the tyres yourself	▣▣▣▣ p. 8 - 29 ▣▣▣▣ p. 8 - 37
22 – Switching on the boom floating position ¹⁾ – Switching off the boom floating position ¹⁾	▣▣▣▣ p. 6 - 13 ▣▣▣▣ p. 12 - 19
23 – Switching on boom pre-tensioning ¹⁾ – Switching off boom pre-tensioning ¹⁾	▣▣▣▣ p. 6 - 14 ▣▣▣▣ p. 12 - 21
24 Shut-off valves at the hydraulic tank	▣▣▣▣ p. 4 - 8
25 – Hydraulic emergency operation with the hand pump – Hydraulic emergency operation acc. to BGR 159 ¹⁾	▣▣▣▣ p. 14 - 51 ▣▣▣▣ p. 14 - 59
26 Hydraulic oil cooler, second cooler ¹⁾	
27 Warning plates for vehicle width ¹⁾	▣▣▣▣ p. 5 - 9
28 Driver's cab tilt mechanism	▣▣▣▣ p. 8 - 44
29 Air intake inhibitor ¹⁾	▣▣▣▣ p. 4 - 20
30 – Switching on the slewing gear freewheel ¹⁾ – Switching off the slewing gear freewheel ¹⁾	▣▣▣▣ p. 6 - 13 ▣▣▣▣ p. 12 - 20
31 – Reverse camera ¹⁾ – Reversing lamp ¹⁾	▣▣▣▣ p. 3 - 52

¹⁾ Additional equipment

²⁾ Depending on the version, either **19** or **20** is present

3.1.2 Driver's cab

Front overview



1 Adjusting the passenger seat	▣▣▣▣ p. 5 - 14
2 Rear overview	▣▣▣▣ p. 3 - 8
3 Warning triangle, first-aid kit, warning lamp, high-vis vest ¹⁾	
4 Auxiliary air heater ¹⁾	▣▣▣▣ p. 3 - 19
5 Accelerator	▣▣▣▣ p. 5 - 44
6 Diagnostics	▣▣▣▣ p. 3 - 71
7 Service brake	▣▣▣▣ p. 3 - 58
8 Adjusting the driver's seat	▣▣▣▣ p. 5 - 13
9 To open/lock/unlock door	▣▣▣▣ p. 3 - 75
10 Window winder	▣▣▣▣ p. 3 - 74
11 – Adjusting the mirrors	▣▣▣▣ p. 5 - 7
– Mirror heating	▣▣▣▣ p. 5 - 8
12 Adjusting the air vents	▣▣▣▣ p. 5 - 66
13 Cab lighting	▣▣▣▣ p. 3 - 67
14 Instrument panel, Left/right	▣▣▣▣ p. 3 - 11
15 Steering column/steering wheel	▣▣▣▣ p. 3 - 10
16 Tachograph or cover	▣▣▣▣ p. 3 - 16
17 Battery heating ^{1), 2)}	
18 Instrument panel, Middle	▣▣▣▣ p. 3 - 12
19 Auxiliary water heating system ¹⁾	▣▣▣▣ p. 3 - 18
20 Radio/USB ^{1), 2)}	▣▣▣▣ p. 5 - 80
21 Auxiliary water heating system ¹⁾	▣▣▣▣ p. 3 - 18
22 Heating and air-conditioning system	▣▣▣▣ p. 3 - 17
23 BirdView system 270° – Monitor ¹⁾	▣▣▣▣ p. 3 - 53
24 Parking brake	▣▣▣▣ p. 3 - 59
25 Cigarette lighter	
26 CCS control unit	▣▣▣▣ p. 3 - 21
27 Push-up roof	▣▣▣▣ p. 3 - 71
28 Fire extinguisher ³⁾	
29 Sockets 12 V/24 V	▣▣▣▣ p. 3 - 46
30 Behind the cover	▣▣▣▣ p. 3 - 9

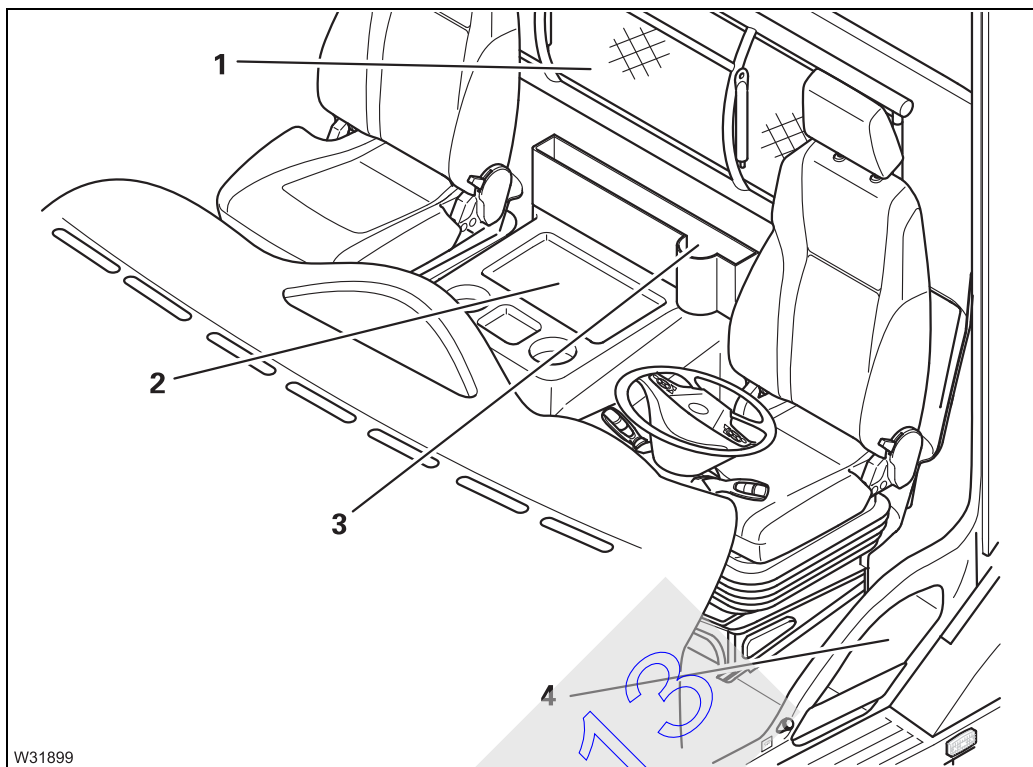
1) Additional equipment

2) ▣▣▣▣ *Separate operating manual*

3) ▣▣▣▣ *Maintenance manual*



Rear overview



1 Fold-up berth¹⁾

2 Rest

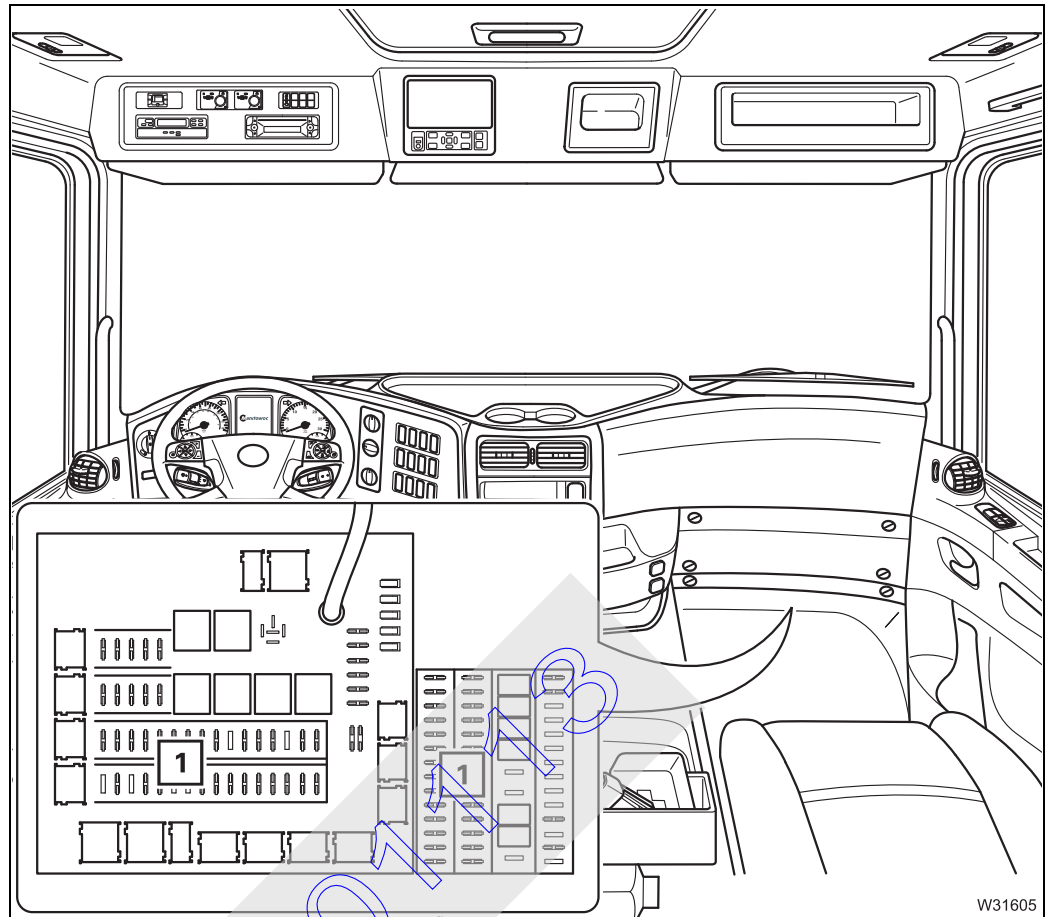
3 Storage (spare key etc. (on delivery))

4 Storage compartment (e.g. for battery charger)

▶ p. 5 - 48

¹⁾ Additional equipment

Behind the cover

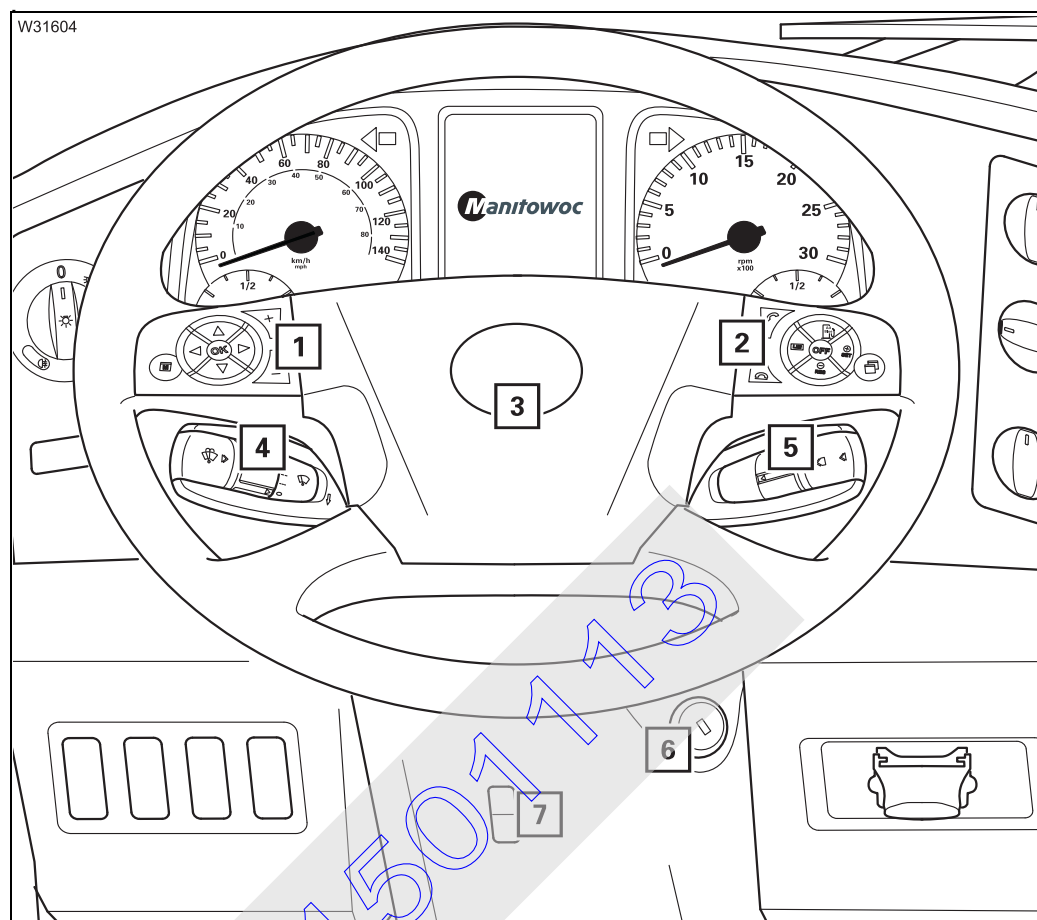


1 Fuses in the driver's cab

▶▶▶ p. 8 - 50

3.1.3

Steering column/steering wheel



- | | |
|---|----------------|
| 1 Operating the on-board computer | ▣▣▣▣ p. 3 - 72 |
| 2 Control: | |
| – Set idling speed | ▣▣▣▣ p. 3 - 42 |
| – Setting cruise control | ▣▣▣▣ p. 3 - 43 |
| – Setting the Temposet | ▣▣▣▣ p. 3 - 43 |
| – Engine retarder/transmission retarder ¹⁾ | ▣▣▣▣ p. 3 - 58 |
| – Hands-free unit ²⁾ | |
| 3 Horn | ▣▣▣▣ p. 3 - 65 |
| 4 Headlight flasher/headlight – full beam | ▣▣▣▣ p. 3 - 65 |
| Turn signal indicator/wiper-washing system | ▣▣▣▣ p. 3 - 65 |
| 5 Transmission operating elements | ▣▣▣▣ p. 3 - 14 |
| 6 Ignition lock | ▣▣▣▣ p. 3 - 42 |
| 7 Adjusting the steering column | ▣▣▣▣ p. 5 - 15 |

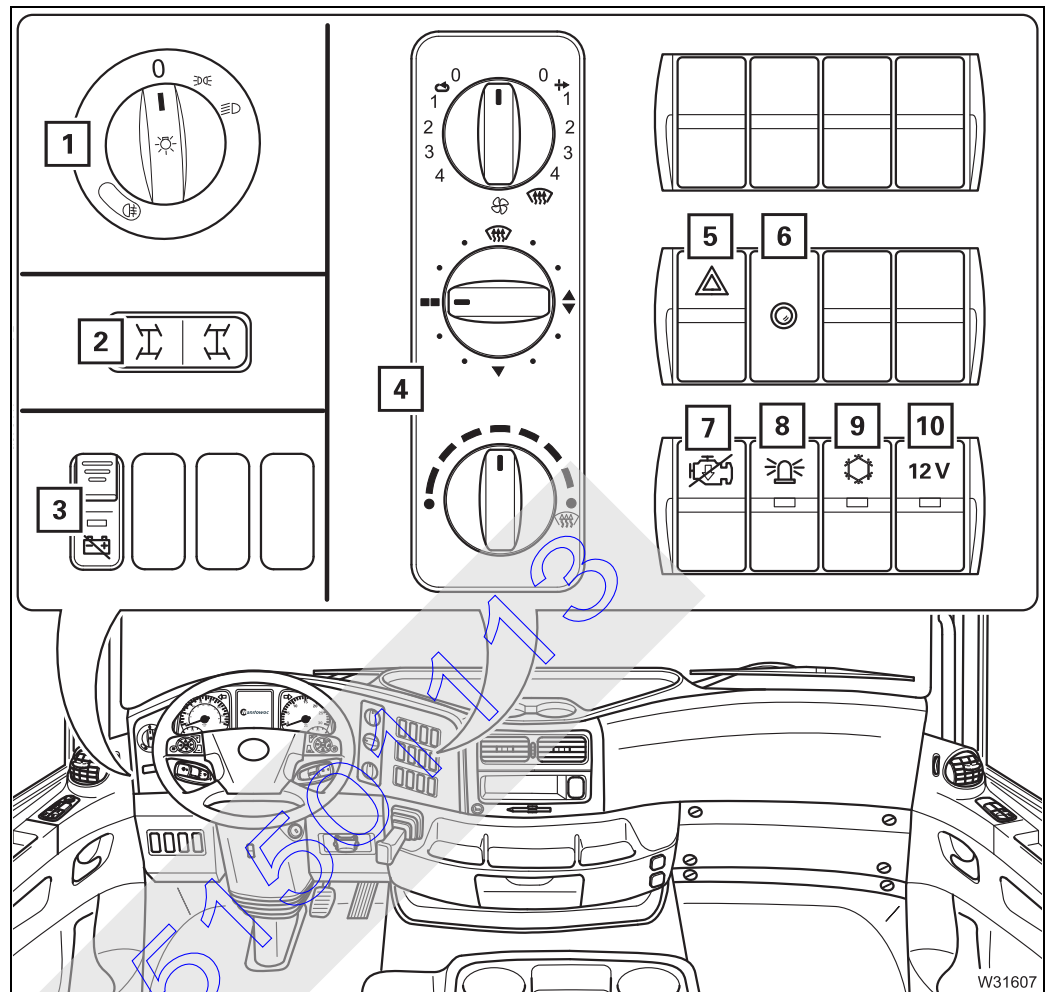
¹⁾ Additional equipment

²⁾ Suitable radio required

3.1.4

Instrument panel

Left/right

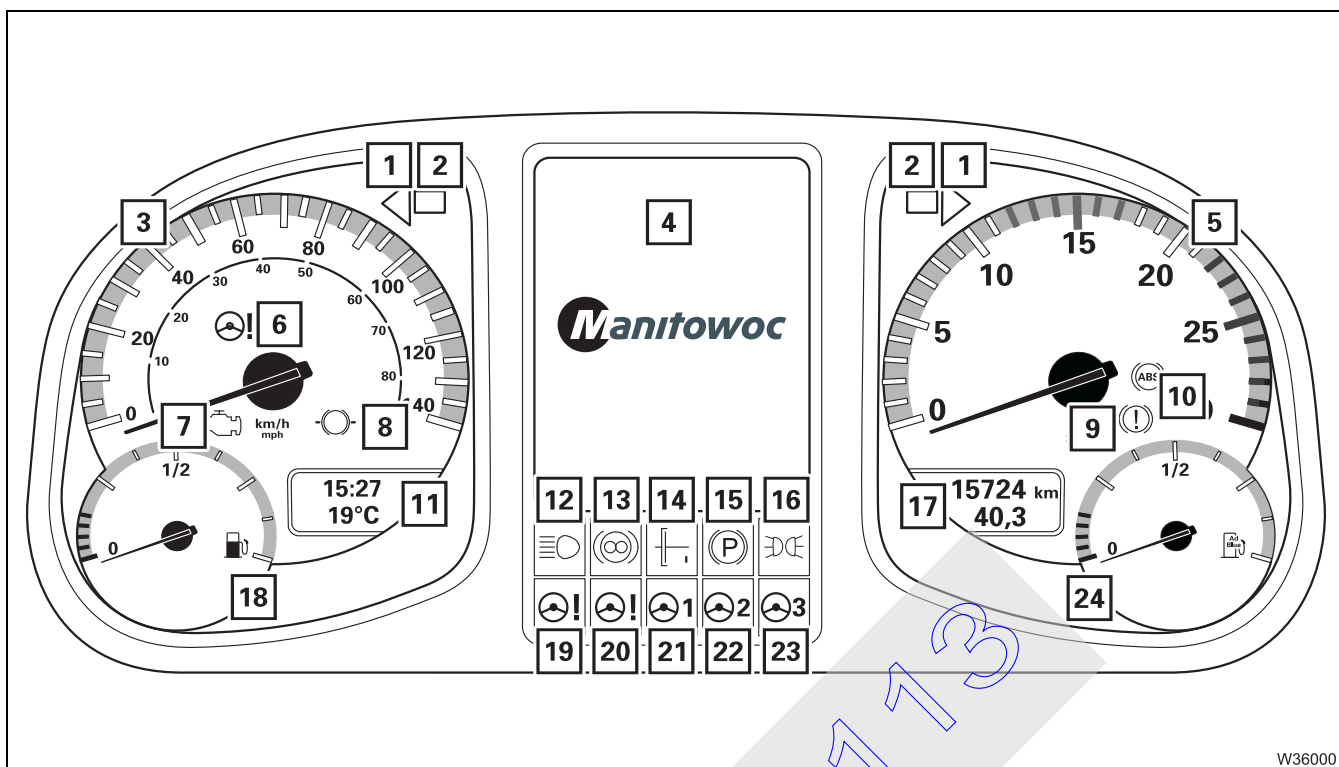


- | | |
|---|-------------|
| 1 Lighting on/off | ➡ p. 3 - 66 |
| 2 Separate manual steering | ➡ p. 3 - 61 |
| 3 Battery master switch | ➡ p. 3 - 45 |
| 4 Heating system | ➡ p. 3 - 17 |
| 5 Hazard warning system on/off | ➡ p. 3 - 66 |
| 6 Dual tank | ➡ p. 4 - 6 |
| 7 Override torque reduction | ➡ p. 3 - 44 |
| 8 Rotating beacon on/off | ➡ p. 3 - 67 |
| 9 Air-conditioning system ¹⁾ | ➡ p. 3 - 17 |
| 10 12 V power socket on/off | ➡ p. 3 - 46 |

¹⁾ Additional equipment



Middle



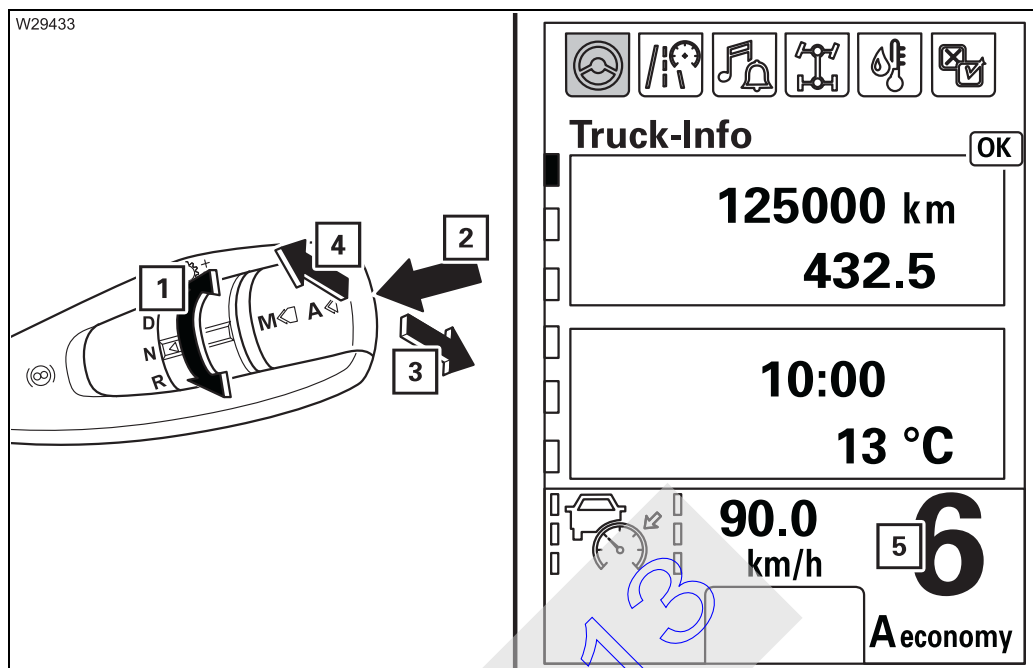
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1	Indicator lamp for turn signal indicator	➡ p. 3 - 66
2	Indicator lamp for trailer turn signal indicator ¹⁾	➡ p. 3 - 66
3	Speedometer	➡ p. 3 - 70
4	On-board computer	➡ p. 3 - 15
5	Tachometer	➡ p. 3 - 43
6	Power steering malfunction	➡ p. 8 - 6
7	Malfunctions on the engine	➡ p. 8 - 19
8	Engine speed too high warning	➡ p. 3 - 43
9	Brake malfunction	➡ p. 3 - 58
10	ABS warning	➡ p. 5 - 35
11	Display:	
	– Time	➡ p. 3 - 73
	– Outdoor air temperature	➡ p. 3 - 73
12	Checking headlight – full beam	➡ p. 3 - 65
13	Check the retarder	
14	Clutch indicator	➡ p. 3 - 51
15	Parking brake indicator lamp	➡ p. 3 - 60
16	Parking light indicator	➡ p. 3 - 66
17	Kilometre counter	➡ p. 3 - 70
18	Fuel level display	➡ p. 4 - 5
19	Steering system warning	➡ p. 3 - 61
20	Steering malfunction	➡ p. 3 - 60
21	Steering circuit 1 warning	➡ p. 3 - 60
22	Steering circuit 2 warning	➡ p. 3 - 60
23	Steering circuit 3 warning	➡ p. 3 - 60
24	AdBlue (DEF) level indicator	➡ p. 4 - 7

¹⁾ Additional equipment

3.1.5

Transmission operating elements

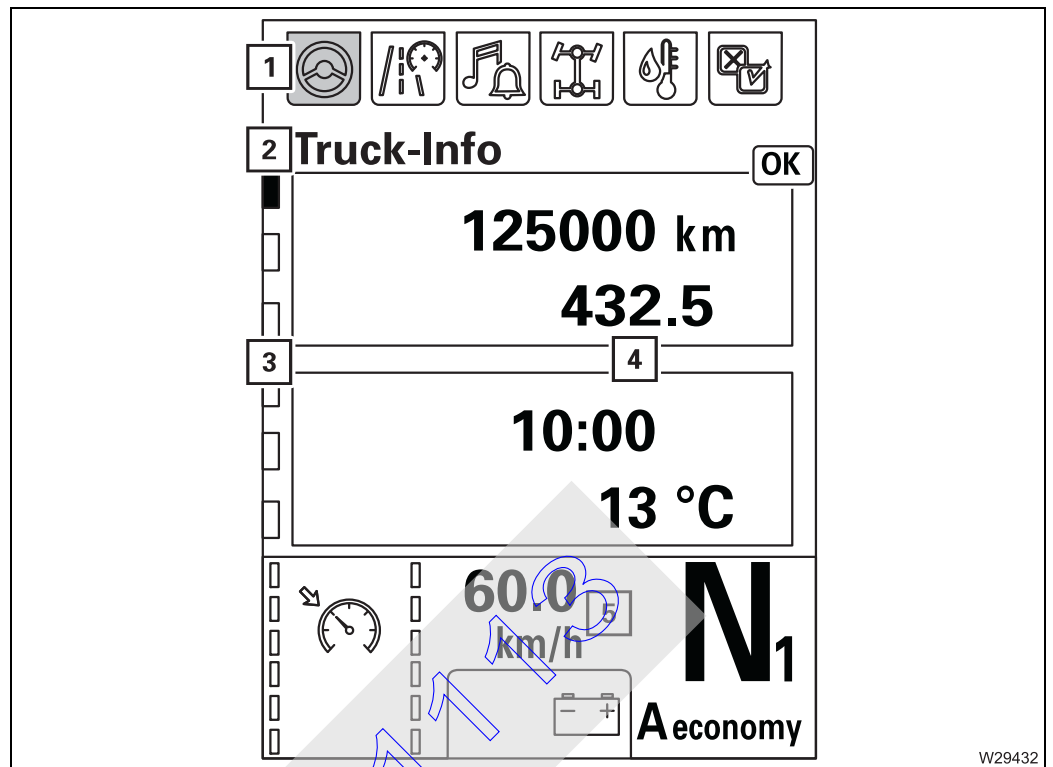


- 1 Selecting the driving direction
- 2 Changing the operating mode
- 3 Shift down, manual
- 4 Shift up, manual
- 5 Gear indicator

▶▶▶ p. 3 - 49

3.1.6

On-board computer

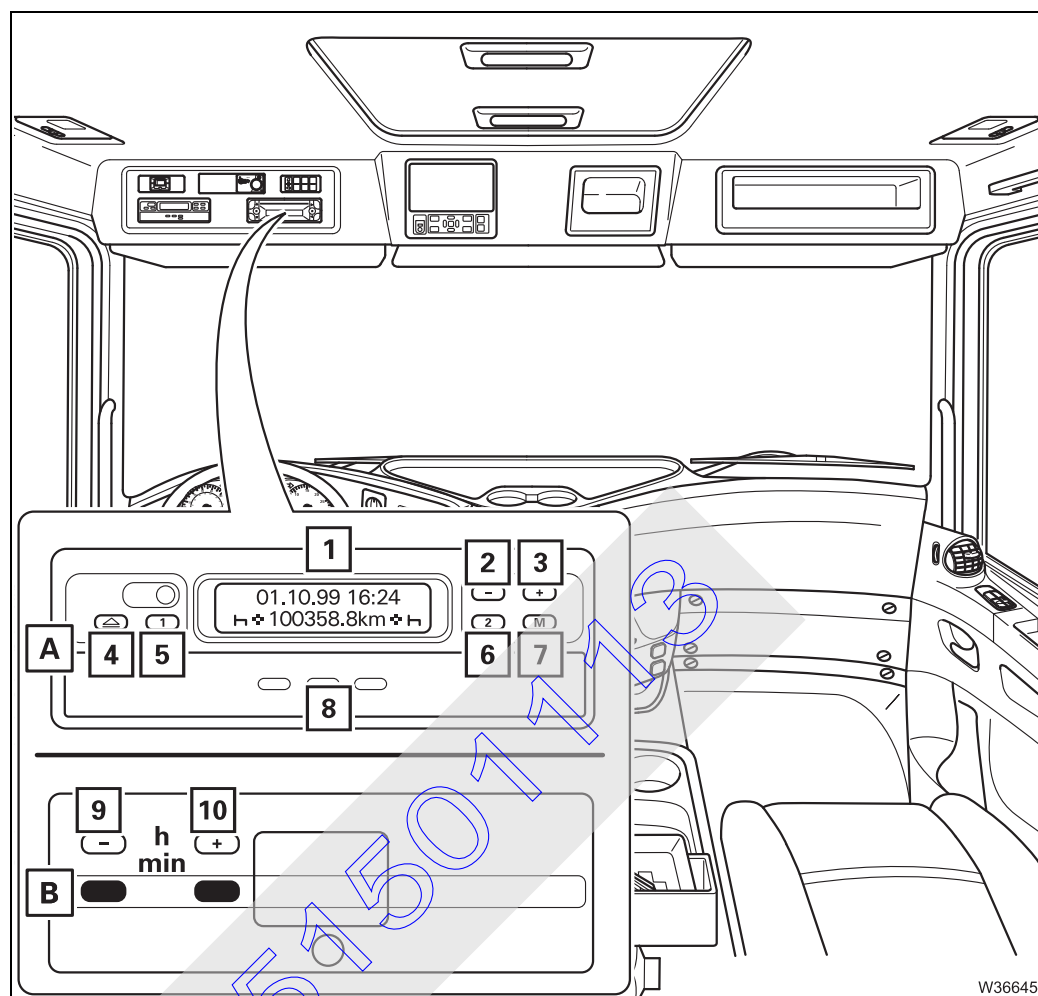


- 1 Main menu display
- 2 Display menu - Name
- 3 Submenu display
- 4 Display area
- 5 Display information

➡ p. 3 - 72

3.1.7

Tachograph



(A) – Tachograph¹⁾

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

➡ p. 5 - 18

➡ p. 5 - 21

➡ p. 3 - 70

➡ p. 3 - 70

➡ p. 5 - 19

➡ p. 5 - 20

➡ p. 5 - 20

➡ p. 3 - 70

➡ p. 5 - 19

(B) – Cover¹⁾

- 9 Time correction - :
- 10 Time correction + :

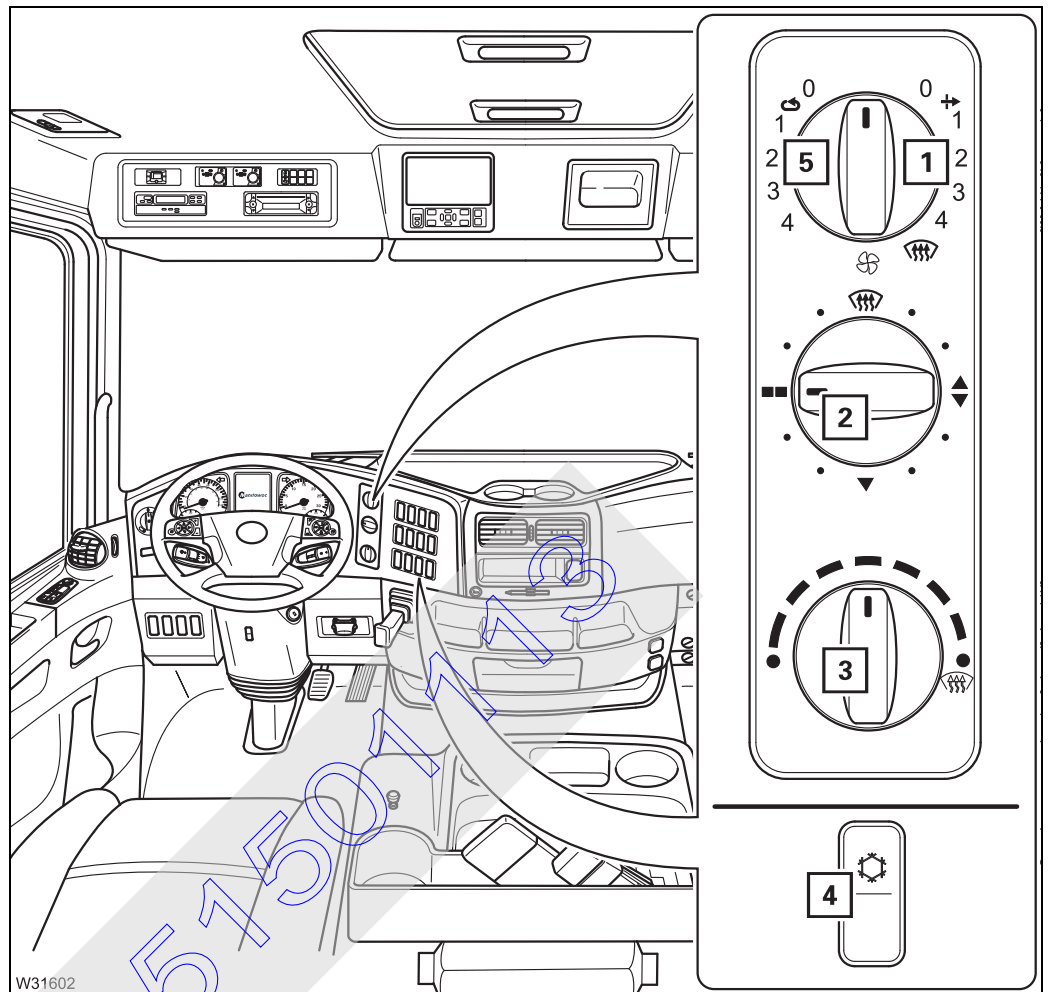
➡ p. 3 - 70

➡ p. 3 - 70

¹⁾ (A) or (B) present, depending on the version

3.1.8 Heating and air-conditioning system

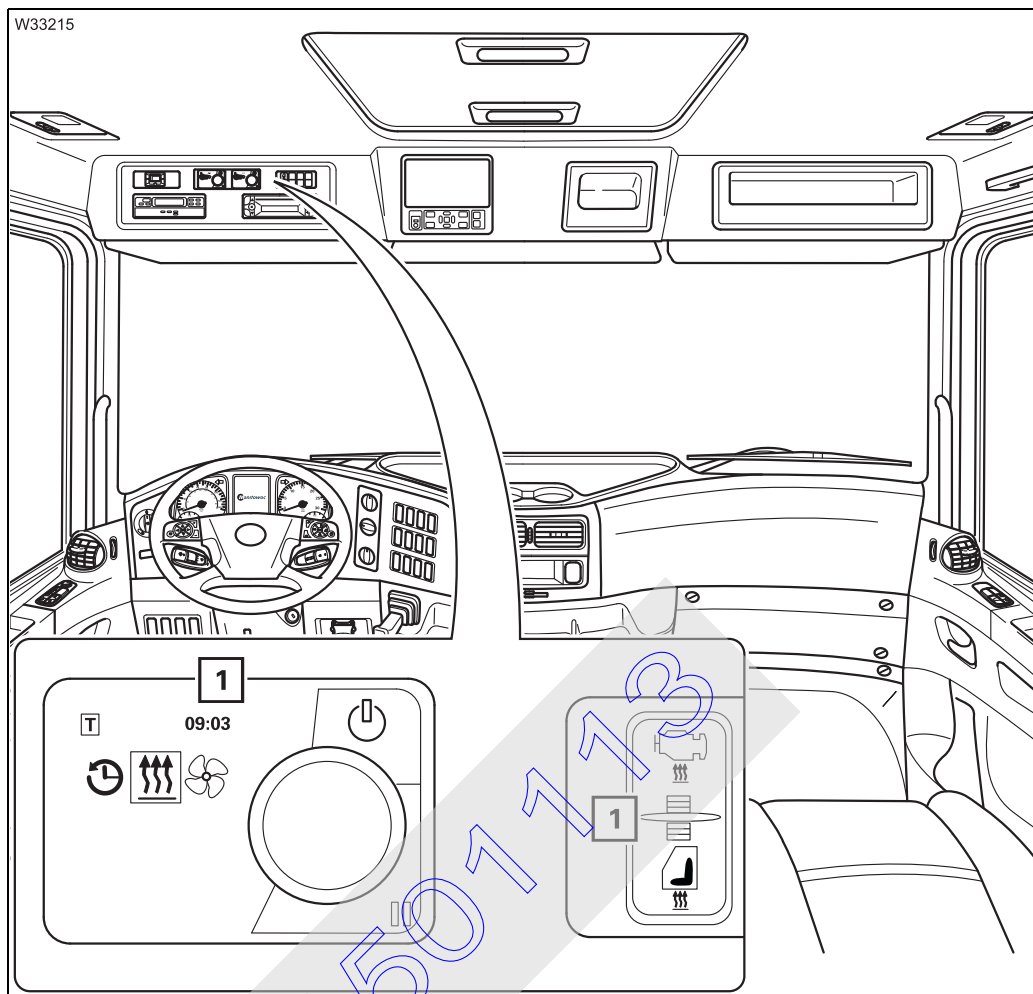
Standard



- | | |
|----------------------------------|-------------|
| 1 Setting the fan | ➡ p. 5 - 65 |
| 2 Air distribution | ➡ p. 5 - 66 |
| 3 Setting the temperature | ➡ p. 5 - 65 |
| 4 Air-conditioning system | ➡ p. 5 - 68 |
| 5 Setting the fan | ➡ p. 5 - 65 |



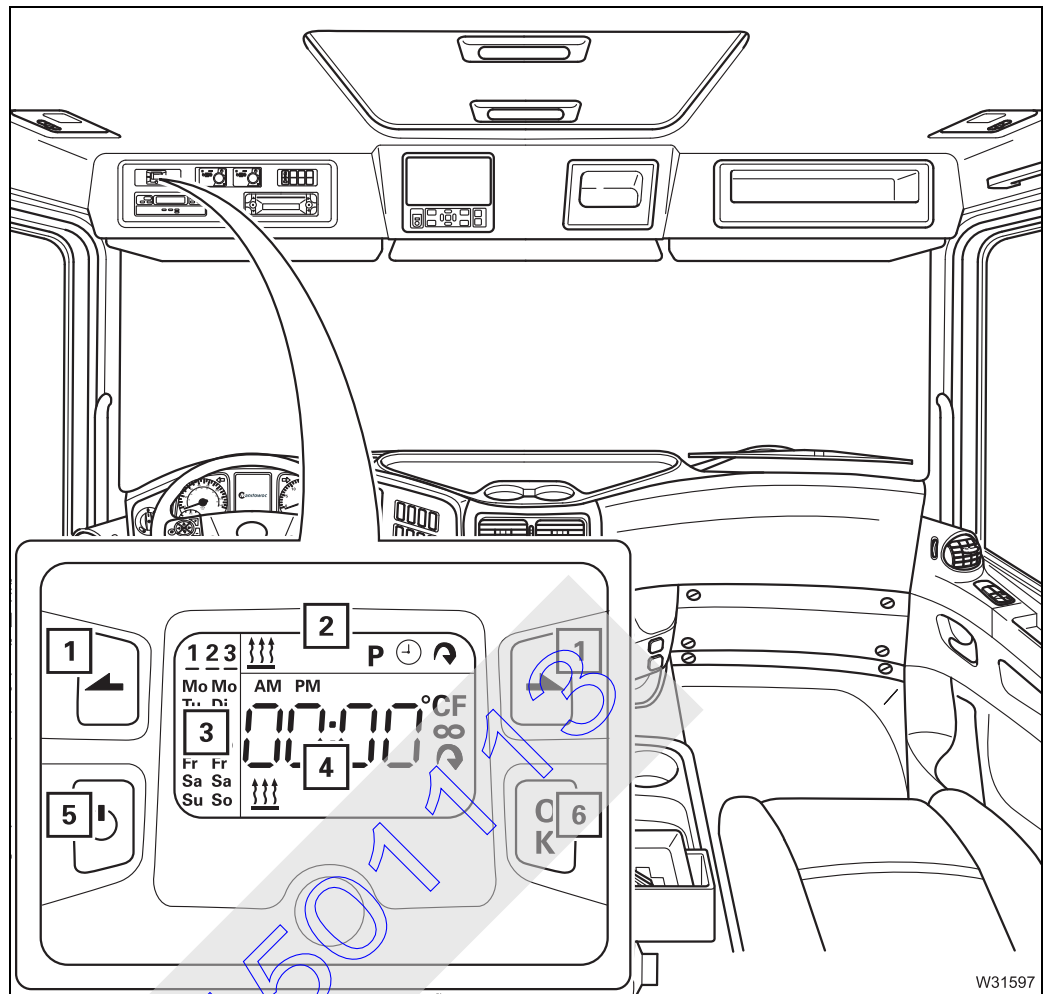
Auxiliary water heating system



- 1** Auxiliary water heating system
- Preheating the engine
 - Preheating the driver's cab

- ▶▶▶ p. 5 - 70
- ▶▶▶ p. 5 - 70
- ▶▶▶ p. 5 - 71

Auxiliary air heater



- 1 Selecting a function
- 2 Menu line
- 3 Program column
- 4 Display line
- 5 – Switching on
– Switching off
- 6 Confirm the entry

▣▣▣▣ p. 5 - 76

▣▣▣▣ p. 5 - 76

▣▣▣▣ p. 5 - 80

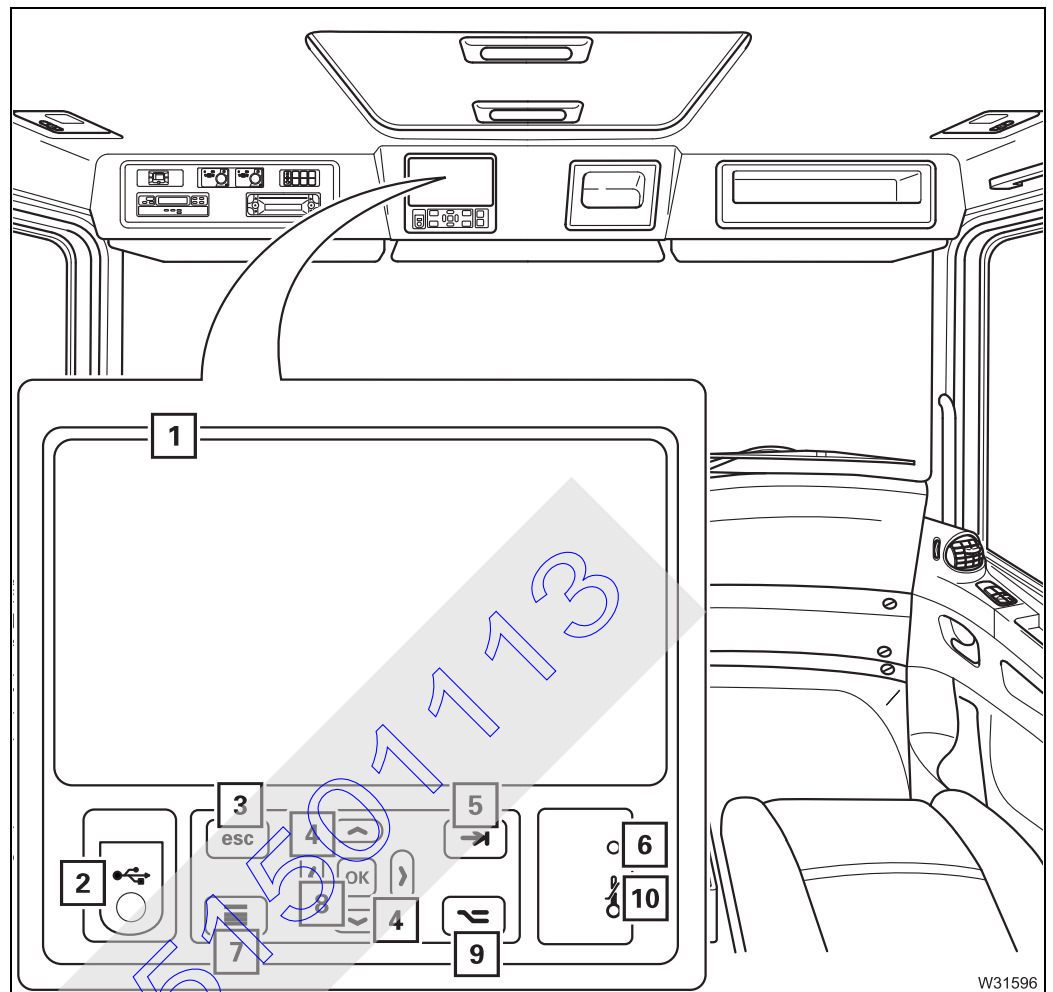
▣▣▣▣ p. 5 - 76

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3.1.9

CCS control unit

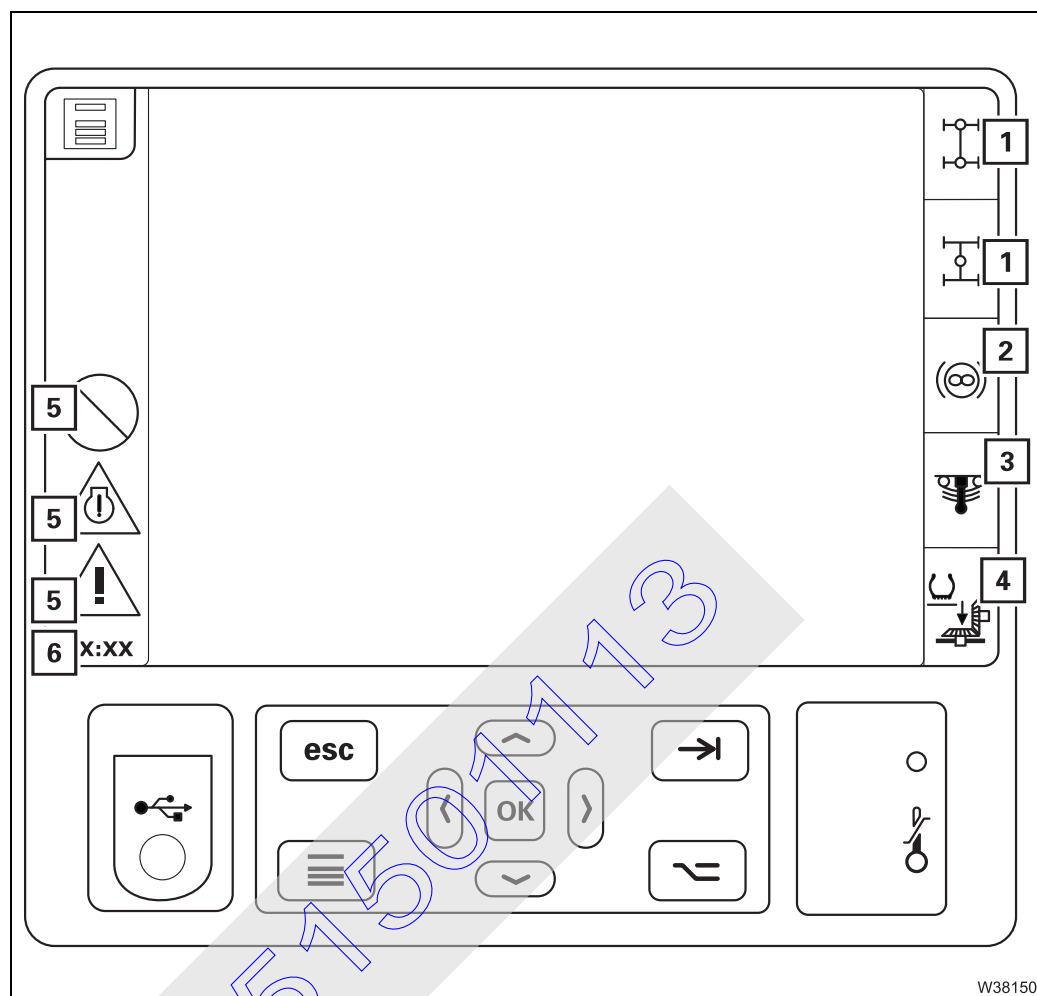


- | | |
|--|----------------------------|
| 1 CCS display
Overview start menu | ➡ p. 3 - 23 |
| 2 Service/diagnosis connection ¹⁾ | ➡ p. 3 - 71 |
| 3 Exiting the menu/input mode | ➡ p. 3 - 47 |
| 4 Selector buttons | ➡ p. 3 - 47 |
| 5 Selecting / deselecting favourites | ➡ p. 3 - 49 |
| 6 Sensor for brightness | ➡ p. 3 - 48 |
| 7 Overview menu groups – Operation
Overview menu groups – Overview | ➡ p. 3 - 48
➡ p. 3 - 24 |
| 8 Input confirmation | ➡ p. 3 - 47 |
| 9 no function | |
| 10 Display temperature warning display | ➡ p. 3 - 48 |

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

3.1.10

CCS – menu-dependent displays

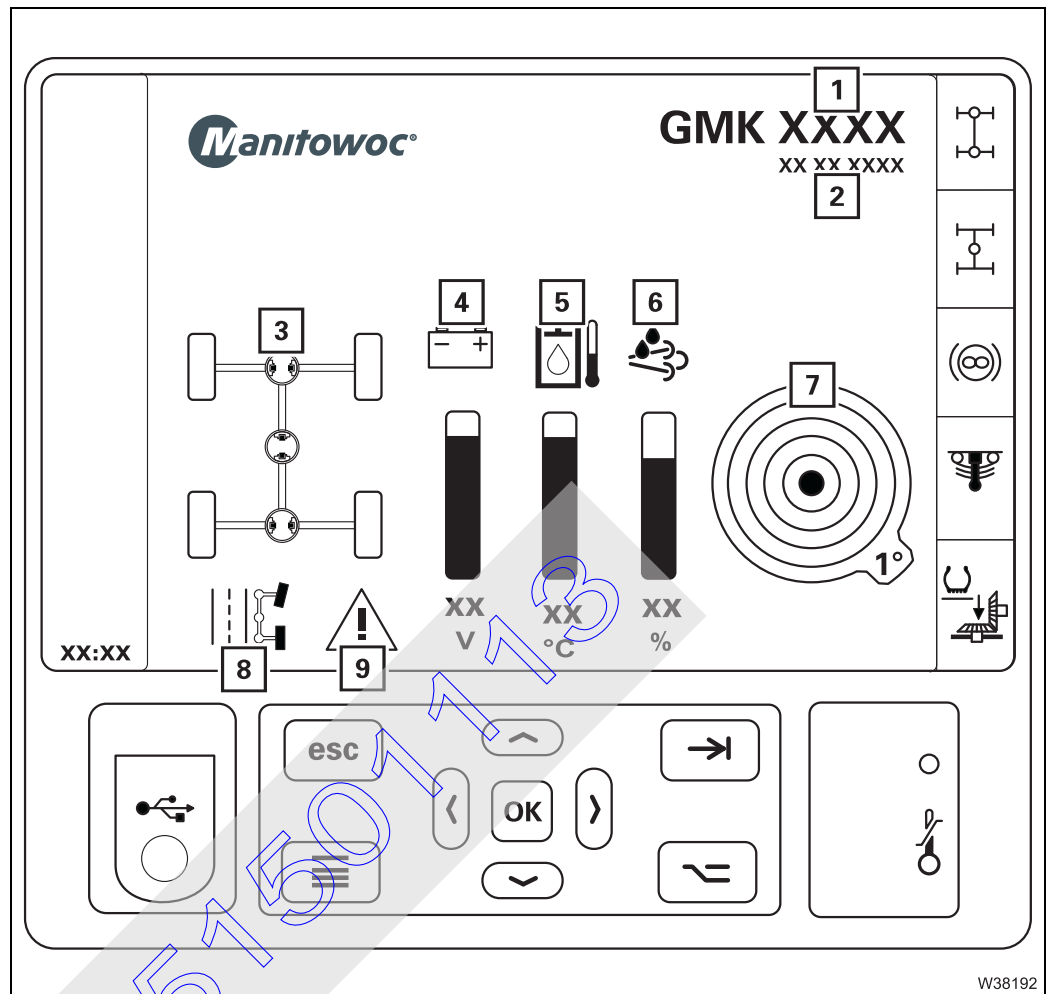


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- | | | |
|---|---|-------------|
| 1 | Transverse differential locks display | ▣ p. 3 - 57 |
| | Longitudinal differential lock display | ▣ p. 3 - 57 |
| 2 | Display of retarder function on/off | ▣ p. 5 - 43 |
| 3 | Suspension display | ▣ p. 3 - 64 |
| 4 | Transfer case display | ▣ p. 3 - 55 |
| 5 | Display area for error and warning messages | ▣ p. 8 - 13 |
| 6 | Display time | ▣ p. 3 - 30 |

3.1.11

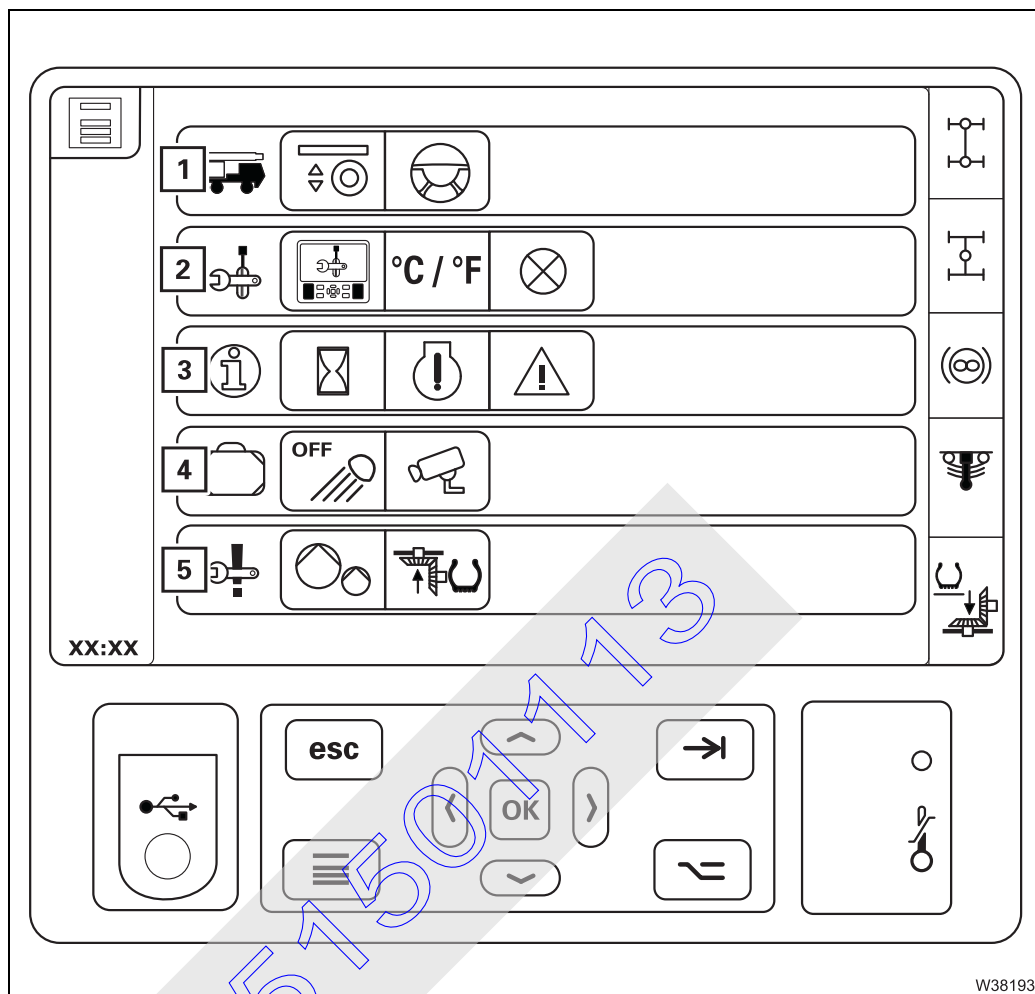
CCS – Start menu



- 1 Display of crane type
- 2 Serial number display
- 3 Display of transverse and longitudinal differential locks on/off ▶▶▶ p. 3 - 28
- 4 Voltage monitoring display ▶▶▶ p. 4 - 15
- 5 Hydraulic oil temperature display ▶▶▶ p. 4 - 15
- 6 AdBlue level display ▶▶▶ p. 4 - 15
- 7 Display of current inclination ▶▶▶ p. 3 - 69
- 8 Steering mode display ▶▶▶ p. 3 - 62
- 9 Steering system malfunction/warning ▶▶▶ p. 3 - 62

3.1.12

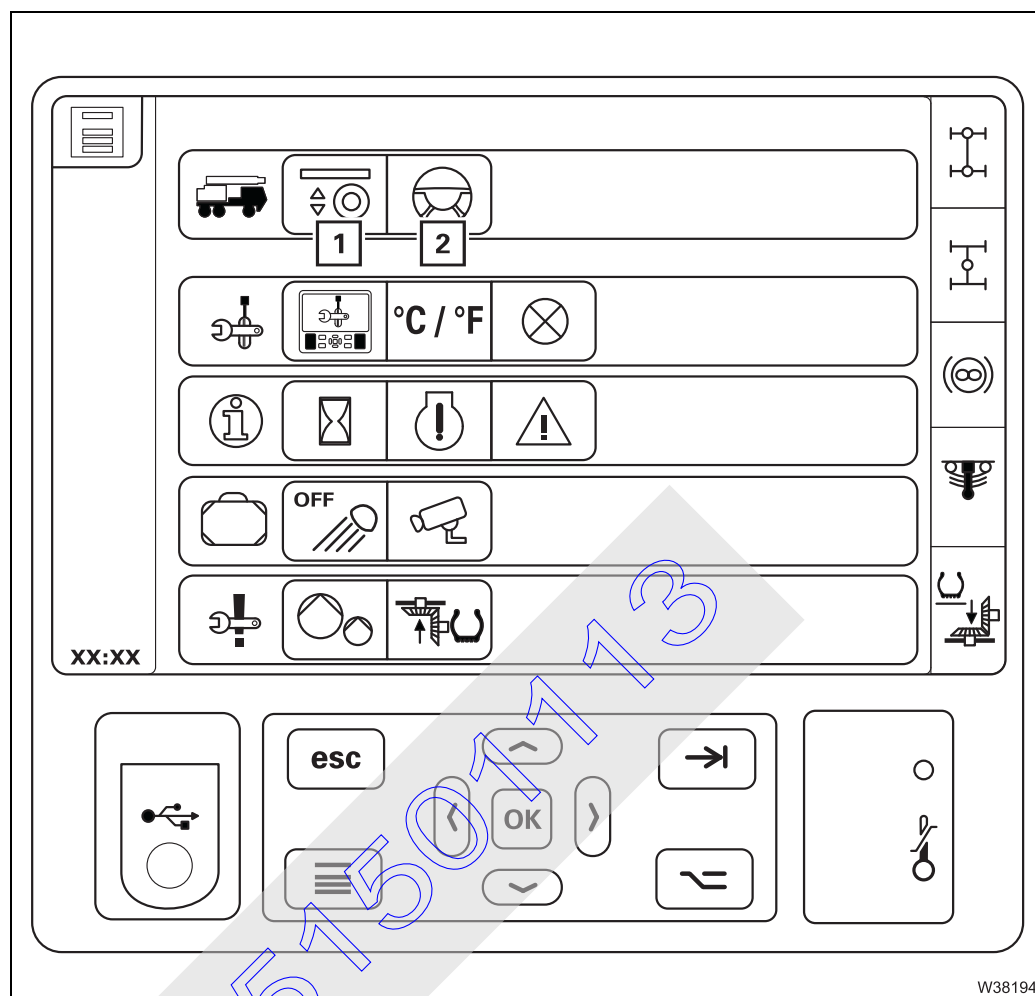
CCS – Overview menu groups



- 1 Carrier menu group** ▣▶ p. 3 - 26
 - Suspension/level adjustment menu
 - Driving menu
- 2 Settings menu group** ▣▶ p. 3 - 29
 - Set display brightness and date/time menu
 - Switch units menu
 - Lamp test
- 3 information menu group** ▣▶ p. 3 - 31
 - Operating hours menu
 - Engine/transmission error menu
 - Crane operation error menu
- 4 Various controls menu group** ▣▶ p. 3 - 36
 - Outrigger lighting on/off
 - Reverse camera on/off¹⁾
- 5 Emergency operations menu group** ▣▶ p. 3 - 37
 - Switching emergency operation on/off
 - Switching towing mode on/off

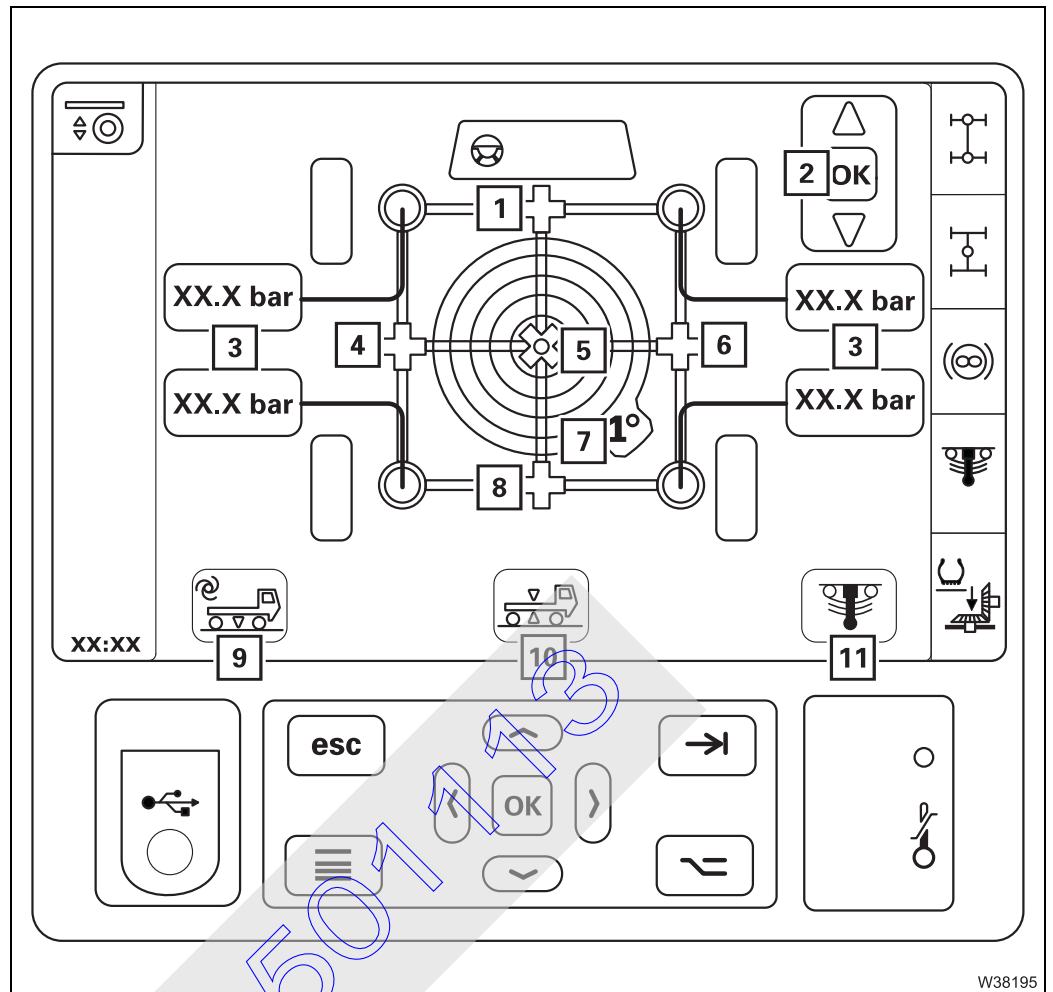
¹⁾ Additional equipment

3.1.13 Carrier menu group



- 1 Suspension/level adjustment menu ▶▶▶ p. 3 - 27
- 2 Driving menu ▶▶▶ p. 3 - 28

Suspension/level adjustment menu

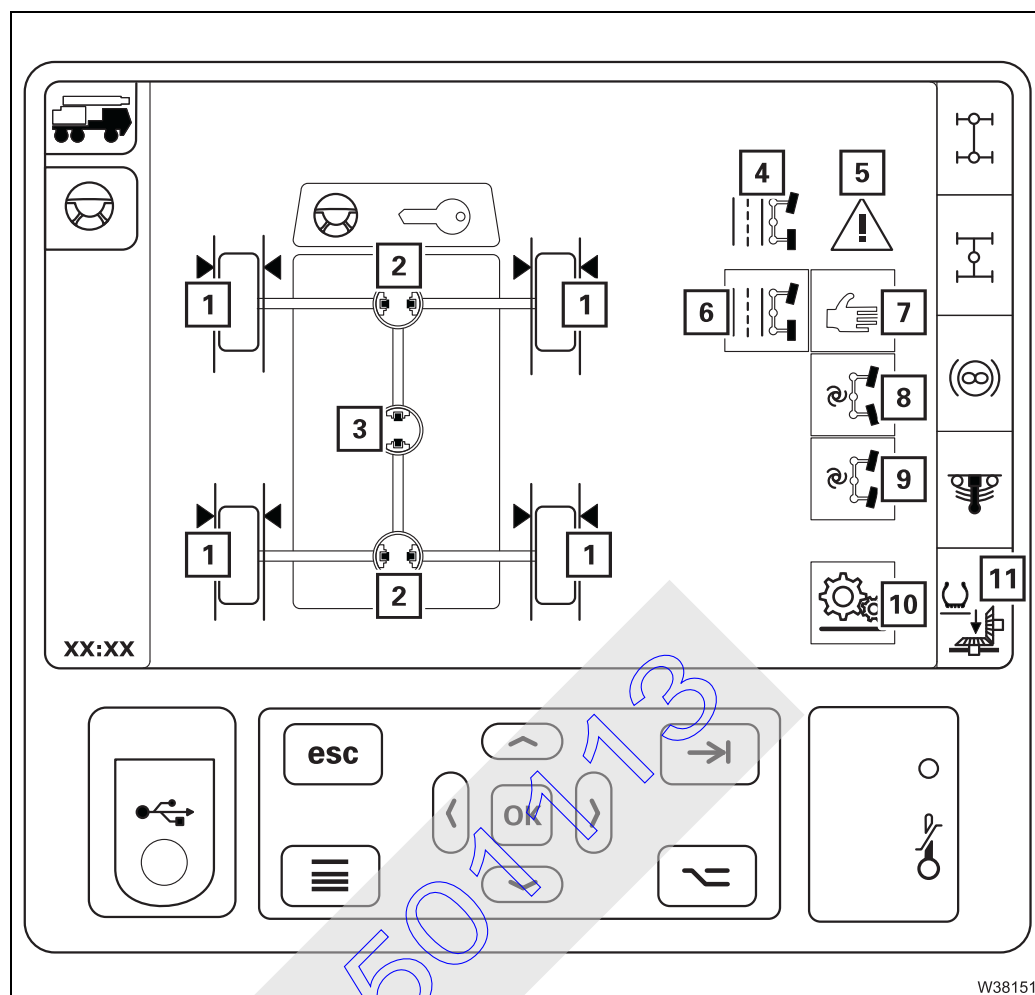


W38195

- | | |
|--|-------------|
| 1 Front level pre-selection | ➡ p. 3 - 68 |
| 2 Level adjustment system enabled display | ➡ p. 3 - 68 |
| 3 Suspension operation pressure gauge | ➡ p. 3 - 64 |
| 4 Left level pre-selection | ➡ p. 3 - 68 |
| 5 Overall level pre-selection | ➡ p. 3 - 68 |
| 6 Right level pre-selection | ➡ p. 3 - 68 |
| 7 Display of current inclination | ➡ p. 3 - 69 |
| 8 Rear level pre-selection | ➡ p. 3 - 68 |
| 9 Setting the on-road level | ➡ p. 3 - 69 |
| 10 Vehicle level display | ➡ p. 3 - 69 |
| 11 Suspension on/off | ➡ p. 3 - 64 |



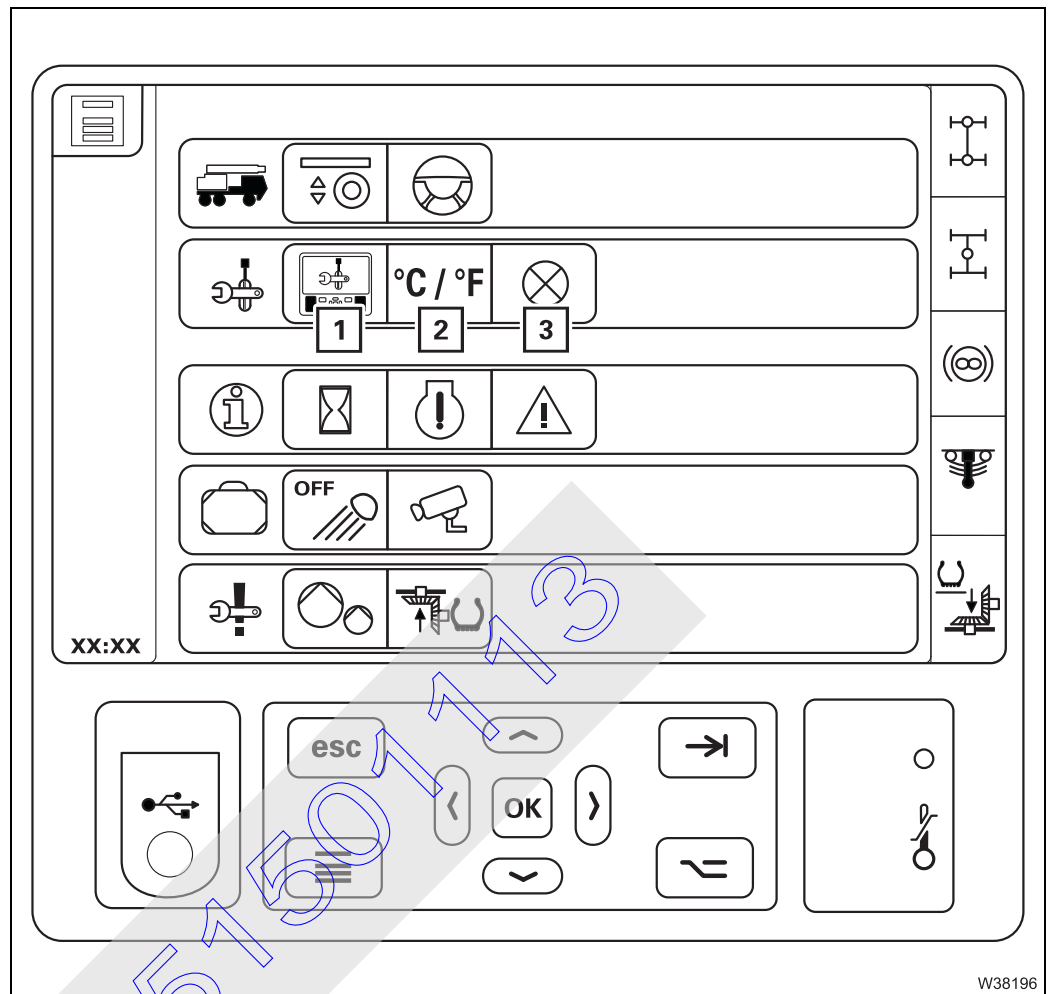
Driving menu



- | | |
|--|----------------|
| 1 Current wheel position display | ▣▣▣▣ p. 3 - 63 |
| 2 – Transverse differential locks display | ▣▣▣▣ p. 3 - 57 |
| – Transverse differential locks on/off | ▣▣▣▣ p. 3 - 57 |
| 3 – Longitudinal differential lock display | ▣▣▣▣ p. 3 - 57 |
| – Longitudinal differential lock on/off | ▣▣▣▣ p. 3 - 57 |
| 4 Steering mode display | ▣▣▣▣ p. 3 - 62 |
| 5 Steering system malfunction/warning | ▣▣▣▣ p. 3 - 62 |
| 6 Normal steering mode, on-road driving, on/off | ▣▣▣▣ p. 3 - 62 |
| 7 Manual separate steering on/off | ▣▣▣▣ p. 3 - 63 |
| 8 Separate steering for driving around corners on/off | ▣▣▣▣ p. 3 - 62 |
| 9 Separate steering crab travel mode on/off | ▣▣▣▣ p. 3 - 63 |
| 10 Transfer case for off-road gear on/off | ▣▣▣▣ p. 3 - 55 |
| 11 Transfer case display | ▣▣▣▣ p. 3 - 55 |

3.1.14

Settings menu group

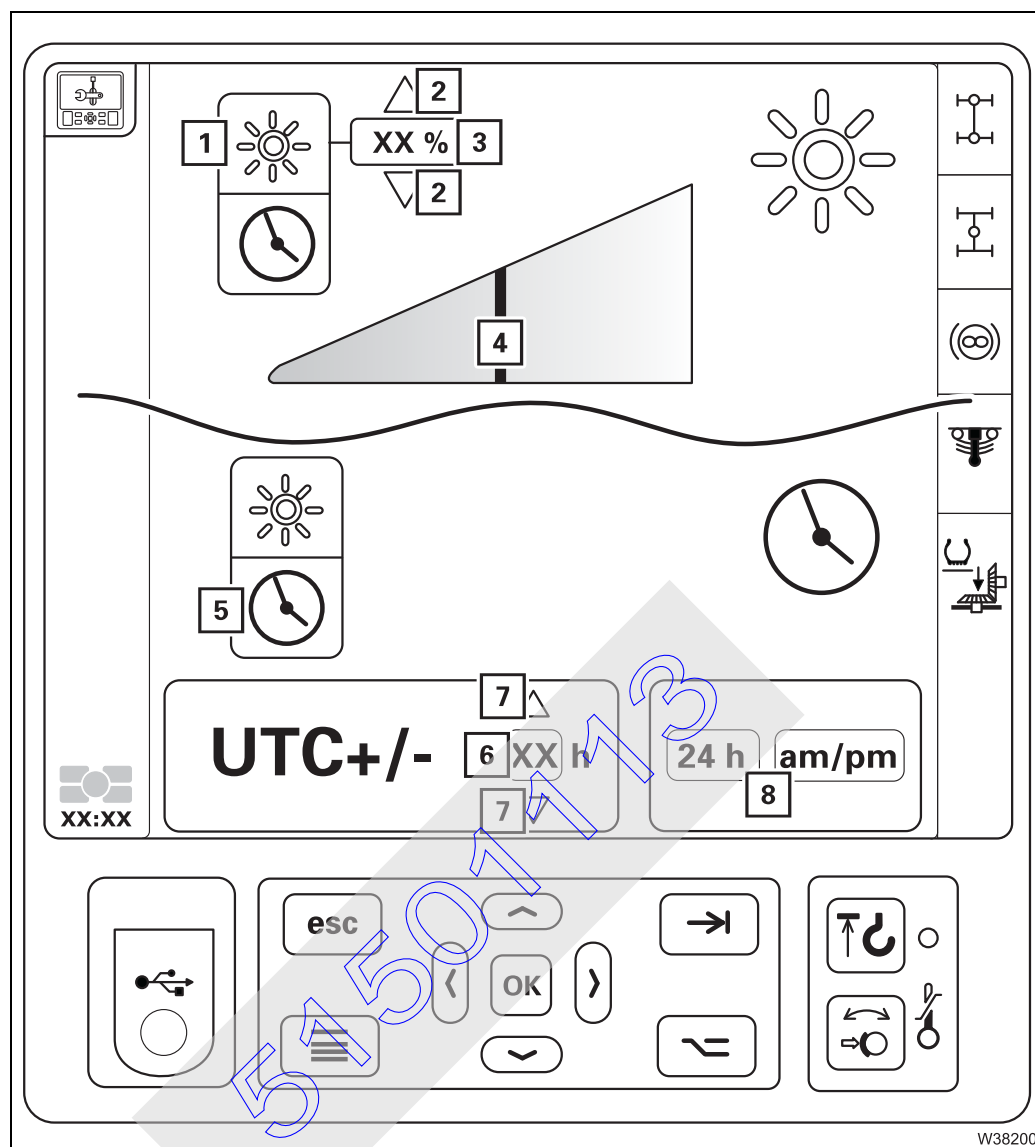


W38196

- 1 Set display brightness and date/time menu ▶▶▶ p. 3 - 30
- 2 Switch units menu ▶▶▶ p. 3 - 31
- 3 Lamp test ▶▶▶ p. 4 - 10

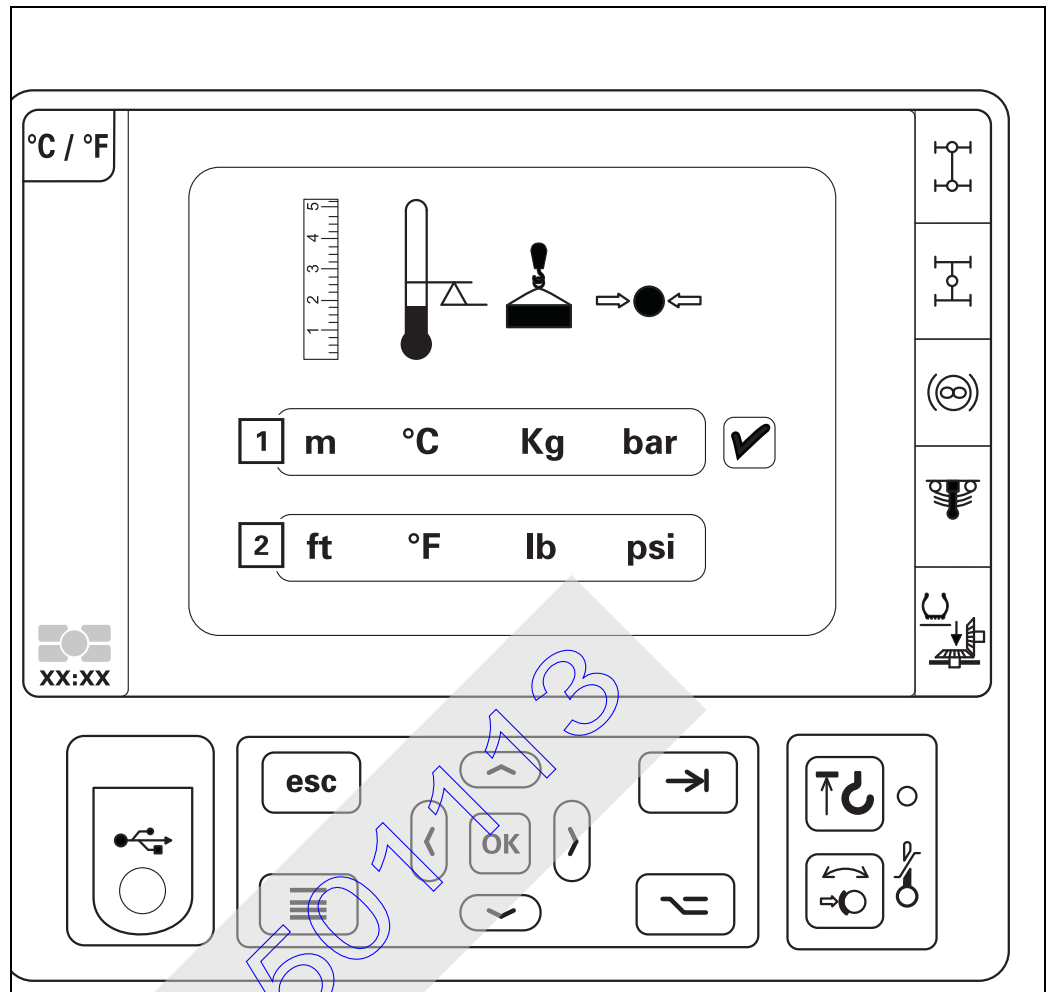


Set display brightness and date/time menu



- | | |
|--|----------------|
| 1 Selection setting the display brightness | ▣▣▣▣ p. 4 - 11 |
| 2 Increasing/reducing the value | ▣▣▣▣ p. 4 - 11 |
| 3 Display in percentage | ▣▣▣▣ p. 4 - 11 |
| 4 Display brightness | ▣▣▣▣ p. 4 - 11 |
| 5 Adjust time selection | ▣▣▣▣ p. 5 - 23 |
| 6 Setting the time | ▣▣▣▣ p. 5 - 23 |
| 7 Increasing/reducing the value | ▣▣▣▣ p. 5 - 23 |
| 8 Switching the display type | ▣▣▣▣ p. 5 - 23 |

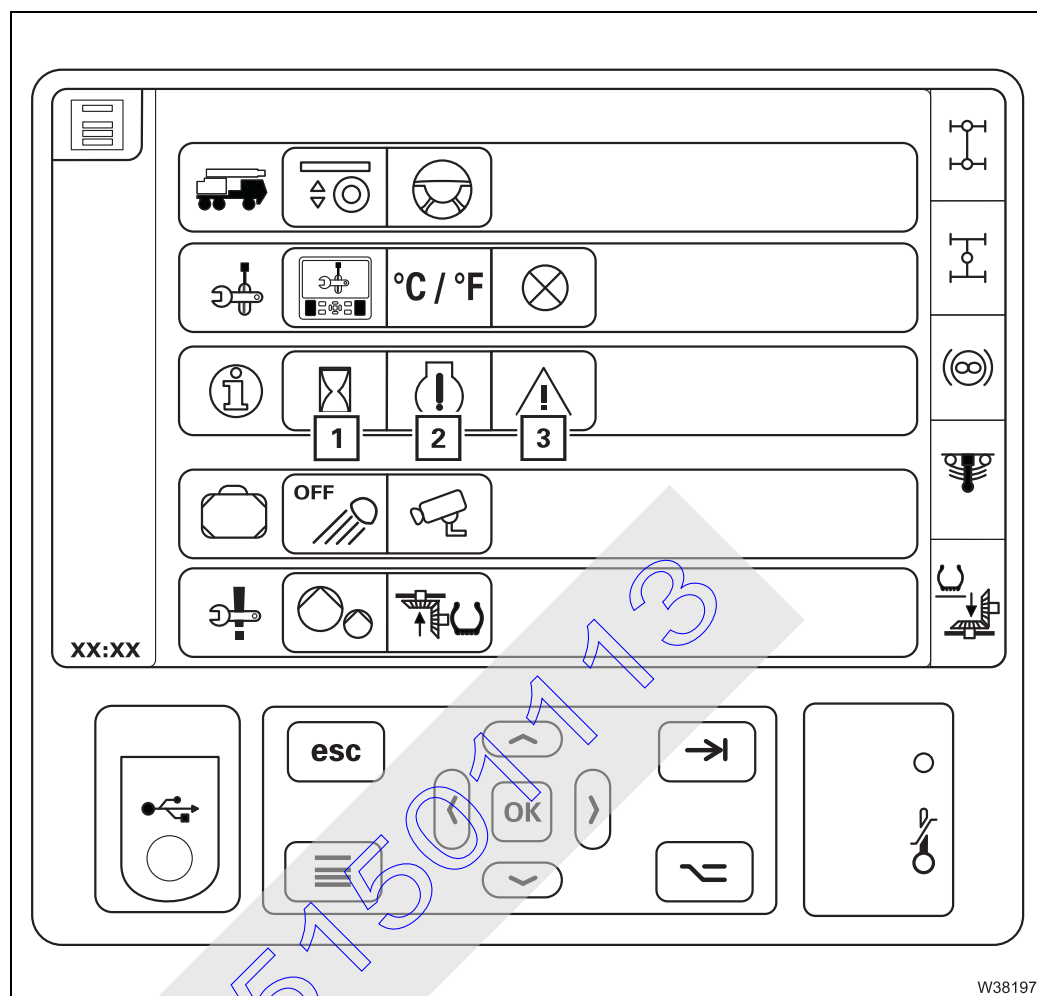
Switch units menu



- 1** Display units in: ▶▶▶▶▶ p. 5 - 64
- Metres
 - Degrees Celsius
 - Kilograms
 - Bar
- 2** Display units in: ▶▶▶▶▶ p. 5 - 64
- Feet
 - Degrees Fahrenheit
 - lbs
 - Psi

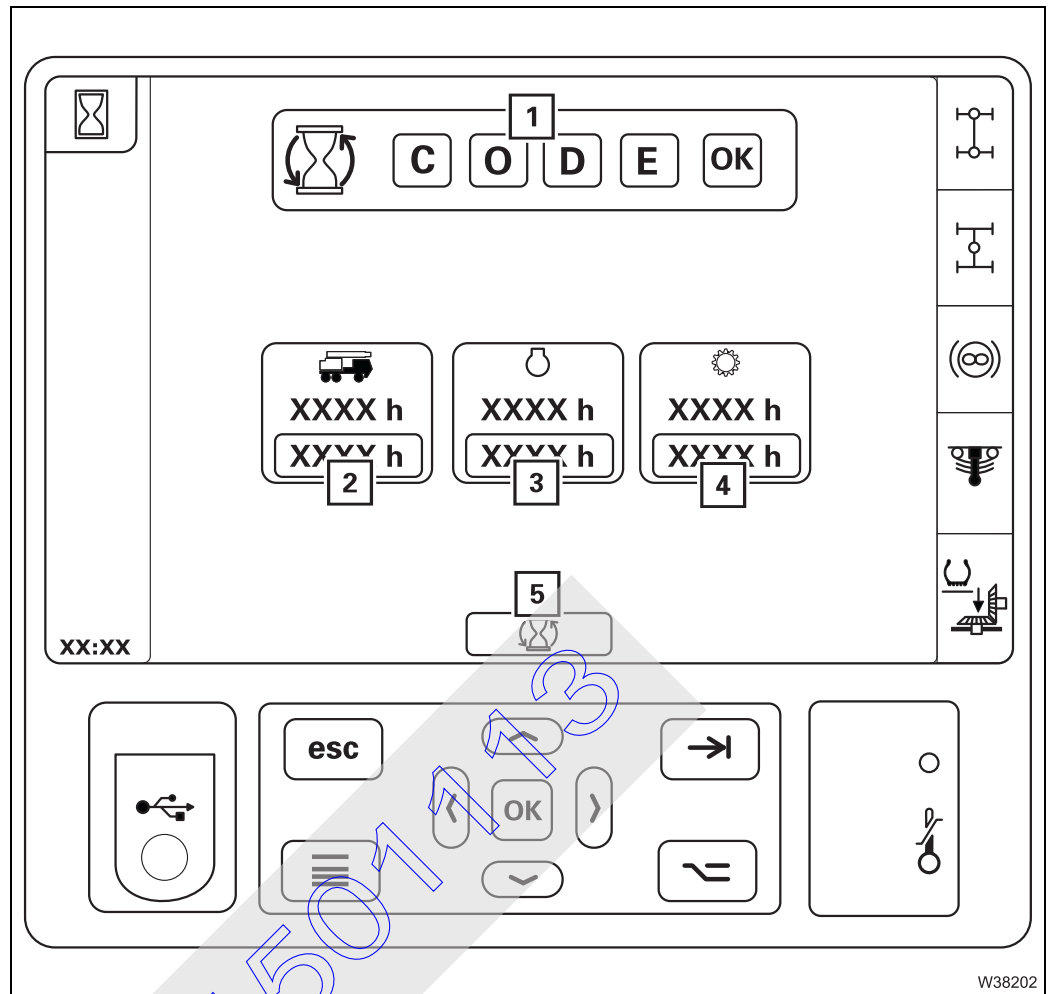
3.1.15

Menu group Information



- | | |
|------------------------------|----------------|
| 1 Operating hours menu | ▣▣▣▣ p. 3 - 33 |
| 2 Engine error menu | ▣▣▣▣ p. 3 - 34 |
| 3 Crane operation error menu | ▣▣▣▣ p. 3 - 35 |

Operating hours menu



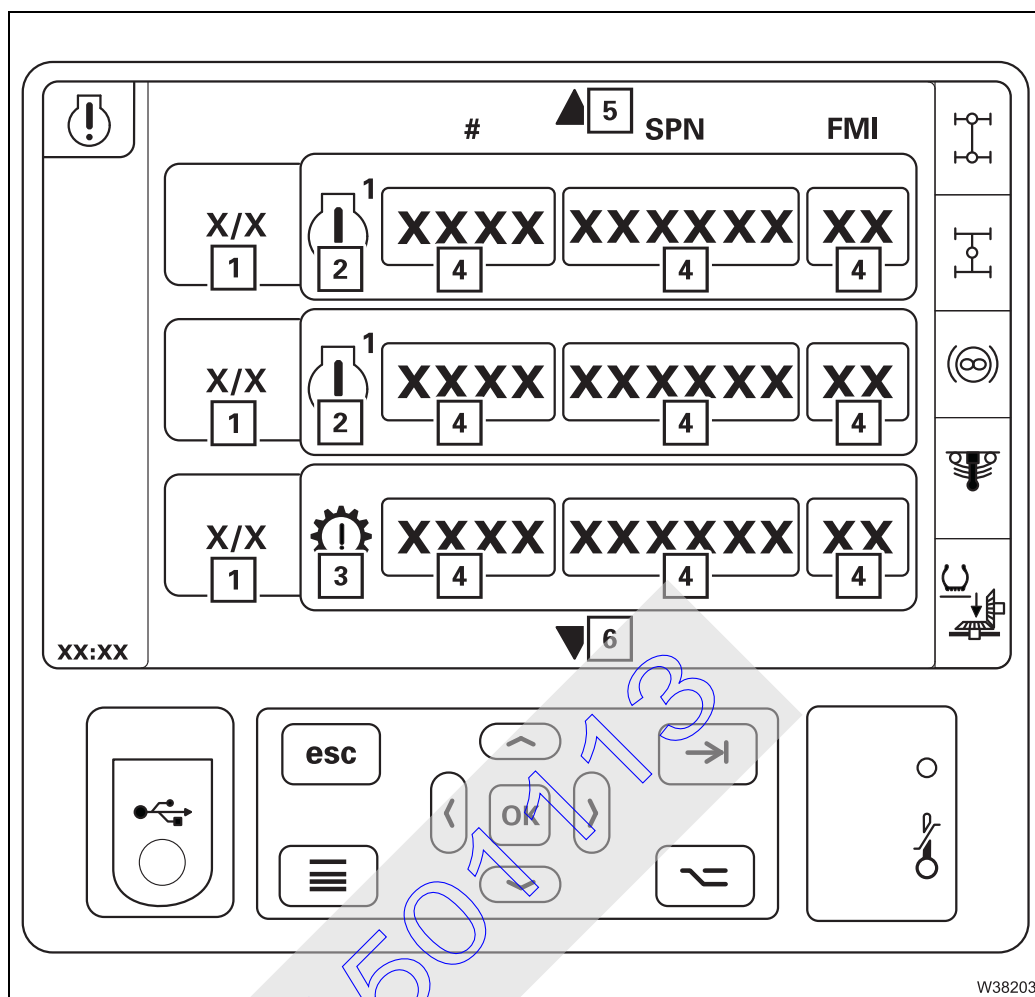
W38202

- 1 Keycode input
- 2 Carrier
- 3 Engine
- 4 Transmission
- 5 Selection all

- ▮ p. 5 - 24
- ▮ p. 5 - 24
- ▮ p. 5 - 24
- ▮ p. 5 - 24
- ▮ p. 5 - 24



Engine/transmission error menu

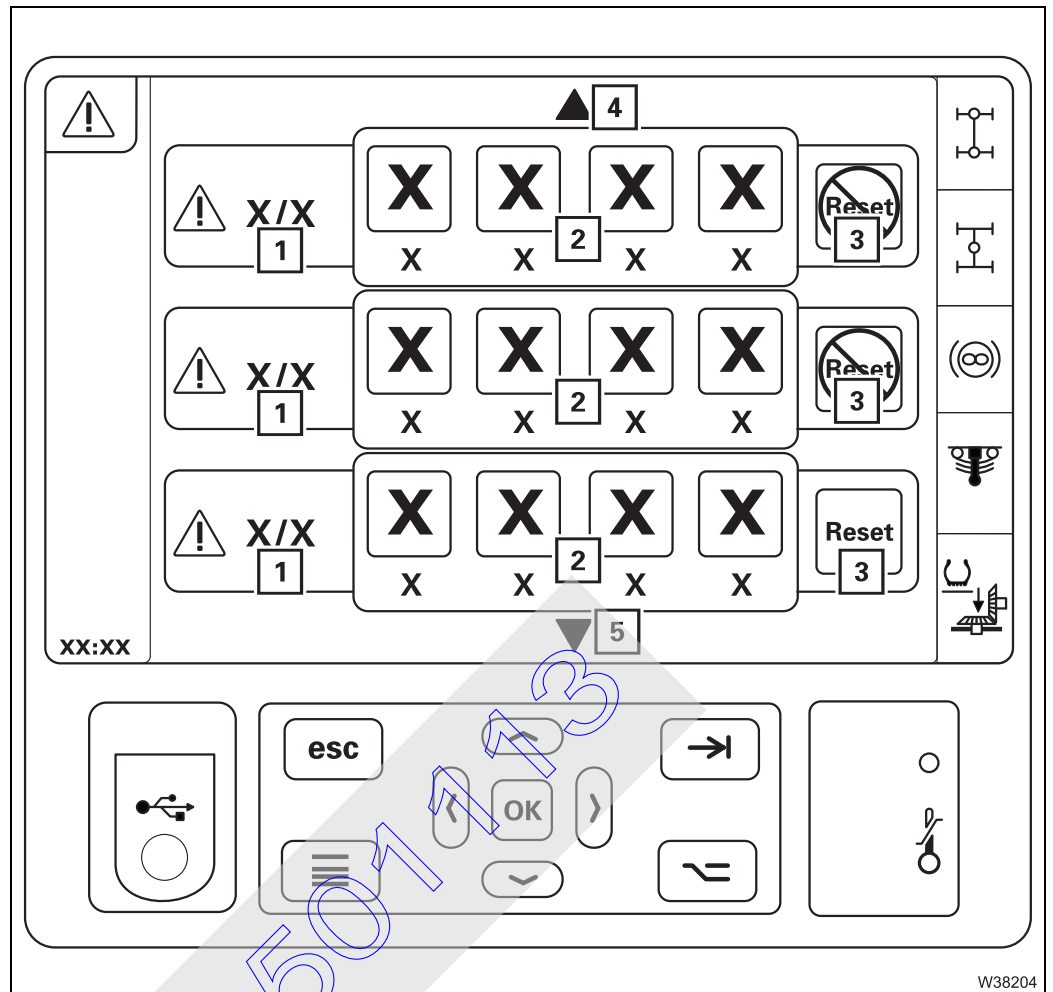


- 1 Display of error / total errors
- 2 Engine symbol display
- 3 Transmission symbol display
- 4 Error code display
- 5 Previous error
- 6 Next error

▮ p. 8 - 17

W38203

Crane operation error menu

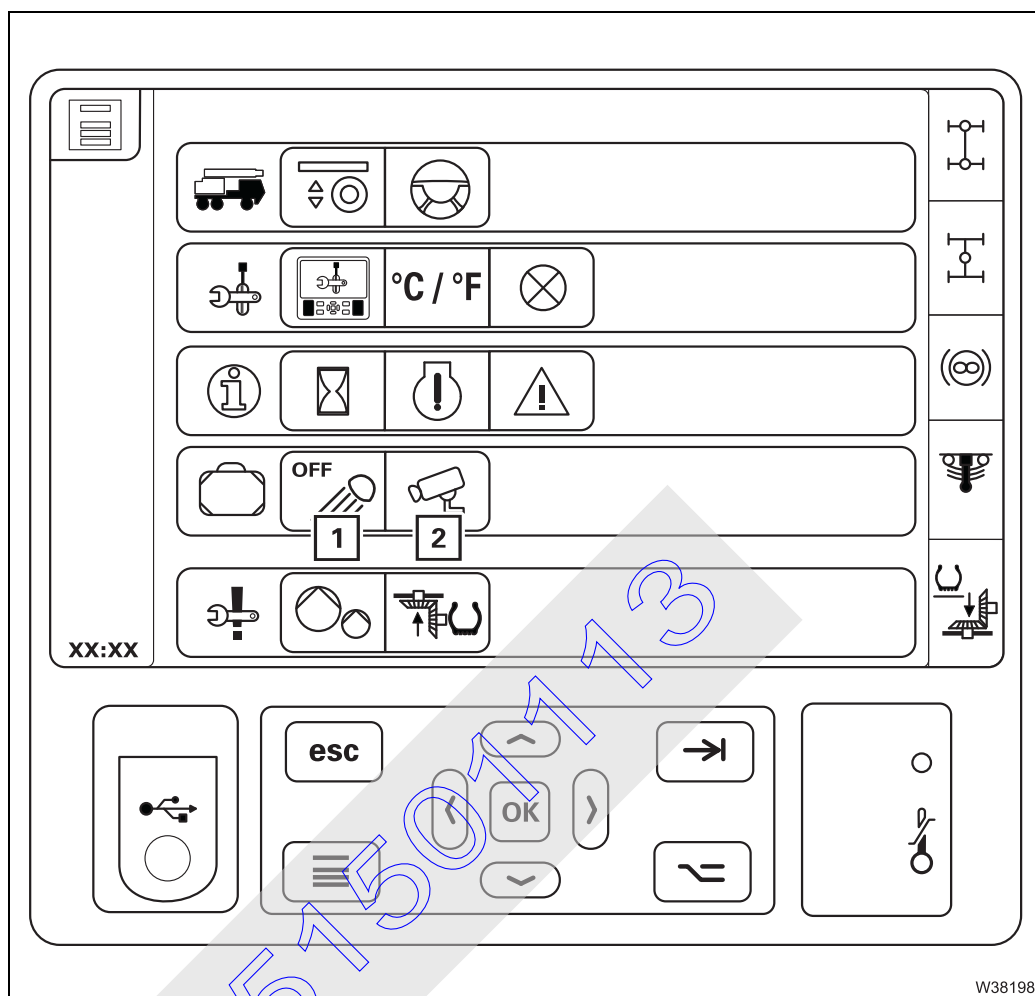


- 1 Current errors/total errors display
- 2 Error code
- 3 Deleting errors
- 4 Next error
- 5 Previous error

▶▶▶ p. 8 - 17

3.1.16

Various controls menu group



1 Outrigger lighting on/off

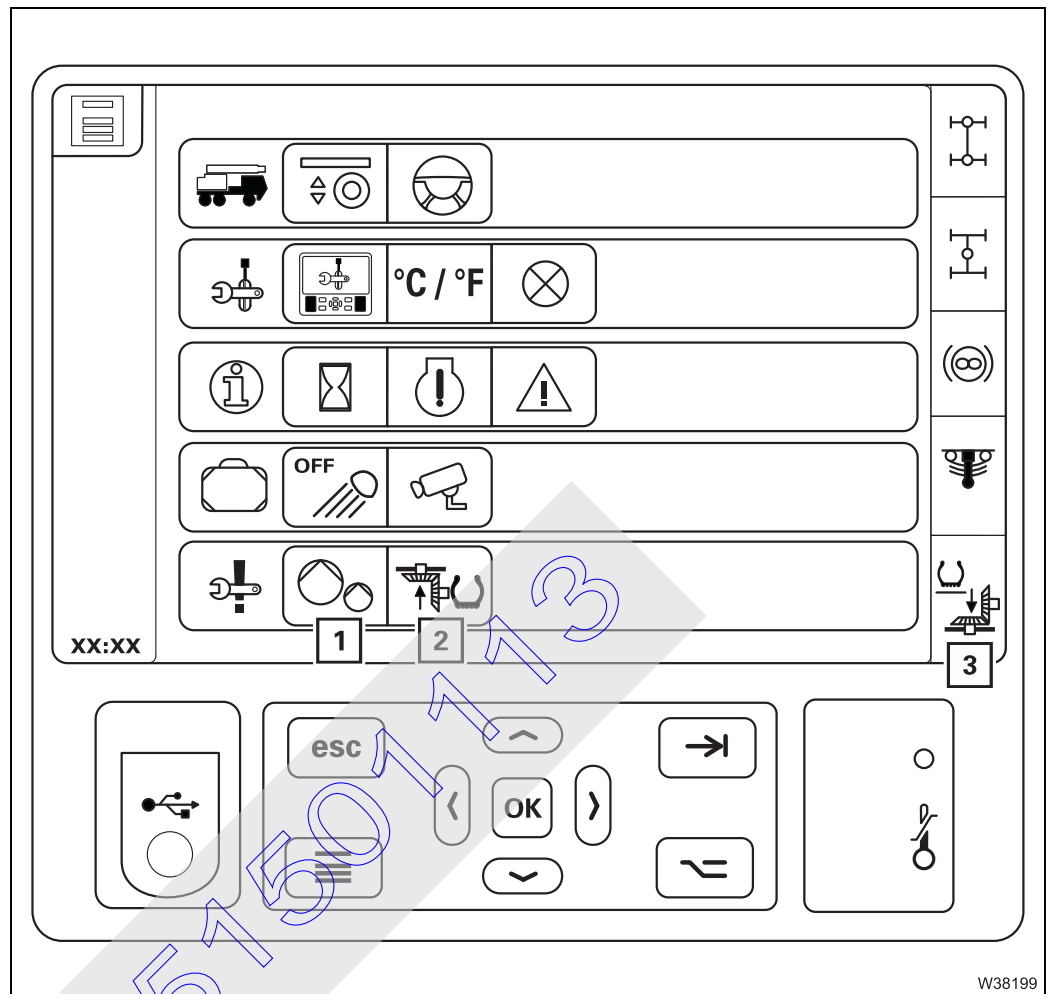
➡ p. 3 - 67

2 Reverse camera on/off

➡ p. 3 - 52

3.1.17

Emergency operations menu group



- 1 Switching emergency operation on/off
- 2 Switching towing mode on/off
(Transfer case for off-road gear on/off)
- 3 Transfer case display

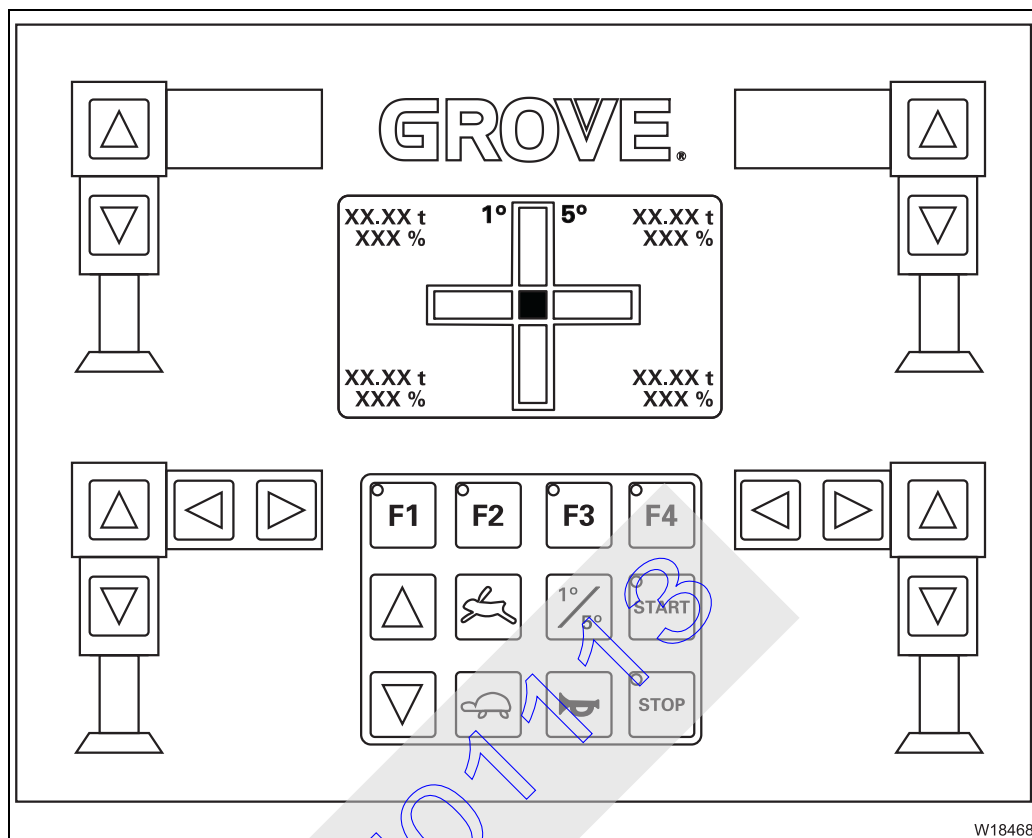
▣ p. 14 - 65

▣ p. 8 - 31

▣ p. 8 - 31

3.1.18

Outrigger control units



Contain operating elements for crane operation; ■■■► *Outriggers control units*, p. 9 - 85.

3.2

Short description of the operating elements



Risk of accident by operator error

This section is not a complete operating manual. It only provides a general overview of the functionality of the operating elements.

Before using the operating elements for the first time, read through the following chapters and the safety instructions listed there.



This section does not contain all the requirements that must be fulfilled for several operating elements to be active.

If some operating elements do not work, first read the following chapters which are referred to at the respective places before contacting

Manitowoc Crane Care.

51501113

3.2.1

Definition of information relating to directions of movement

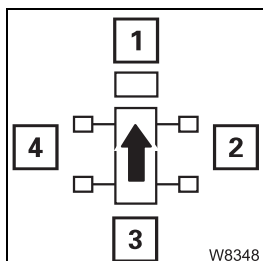
Basic rule

Directions always depend on whether the carrier or the superstructure is being operated.

On the carrier

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

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



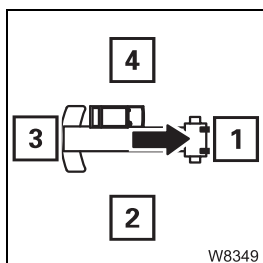
Forwards always means with driver's cab leading.

Backwards always means the rear lights on the carrier are to the front.

On the superstructure

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

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

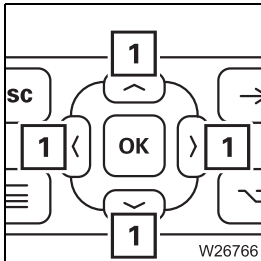


51501113

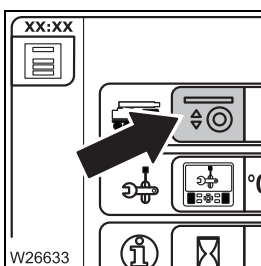
3.2.2

General rules for buttons and symbols on the display

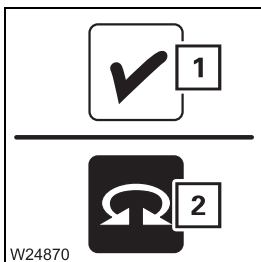
The symbols shown as an example are not present on all crane types.
The following rules apply in all menus:



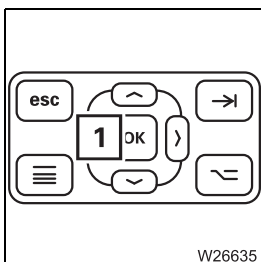
- A menu can only be opened when the corresponding symbol has been selected with the direction buttons (1).



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



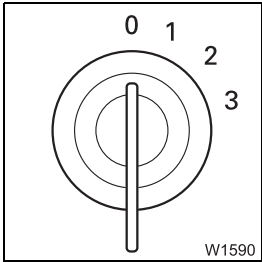
- In these operating instructions, we always refer to colours in terms of "The symbol is **red**" for instance, regardless of whether the background (1) of a symbol is **red** or whether only parts (2) of a symbol are **red**. This applies to all symbols and all colours.



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

3.2.3 Engine

Steering column



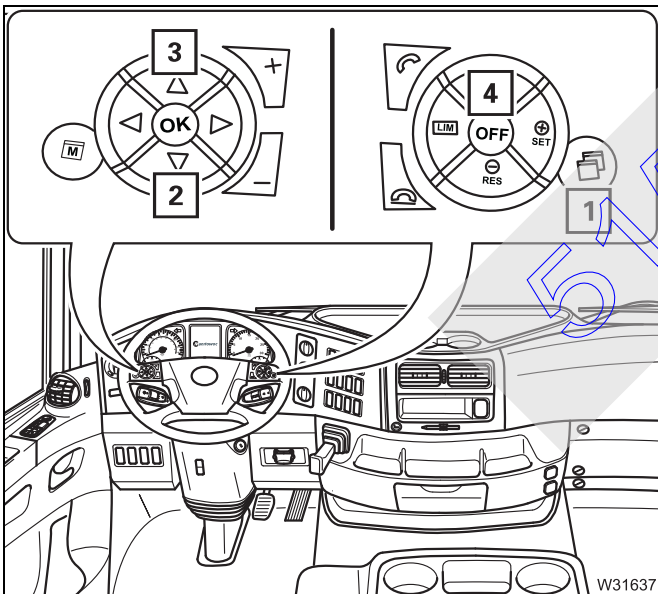
Ignition lock

- 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 - 9

Lock/unlock steering col- ▣▣▣▣ p. 5 - 15
umn

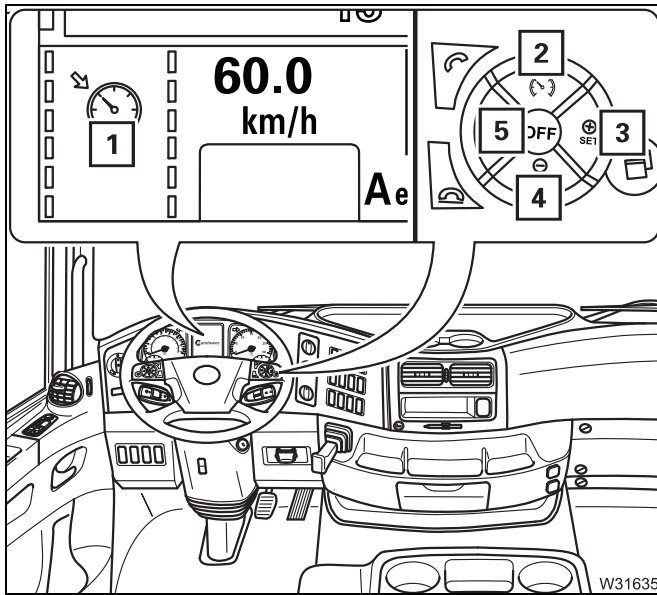
On the steering wheel



Set idling speed

The truck crane must be stationary.

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

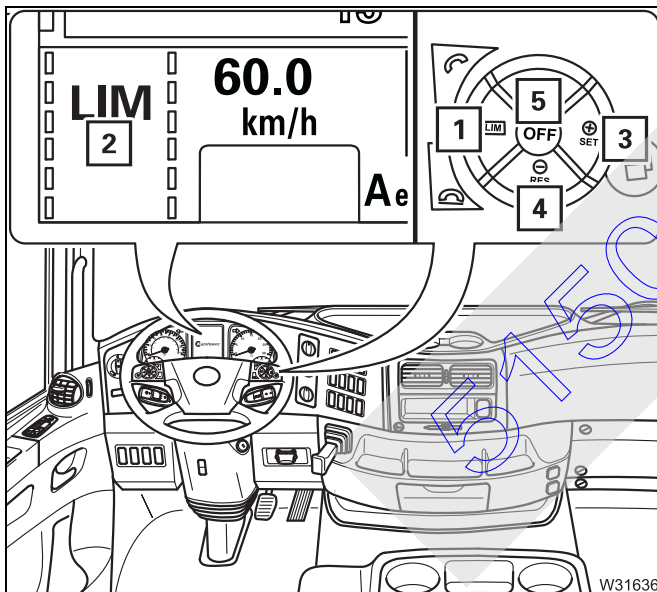


Setting cruise control

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

- 2 Select the *Cruise control* menu – symbol (1) is **grey**
- 3 Switches on or increases the speed – symbol (1) is **white**
- 4 Switches on or reduces the speed
- 5 switch off

➡ p. 5 - 38



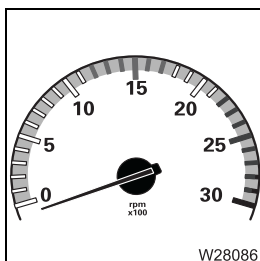
Setting the Tempomet

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

- 1 Select *Tempomet* – symbol (2) is **grey**
- 3 Switches on or increases the speed limit – symbol (2) is **white**
- 4 Switch off or reduce the speed limit
- 5 Switch *Tempomet* off

➡ p. 5 - 40

Instrument panel



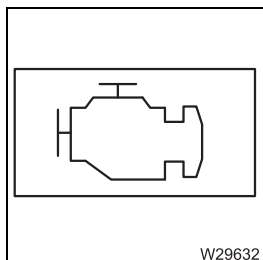
Tachometer

Display, engine speed in rpm; ➡ p. 5 - 37

3.2.4

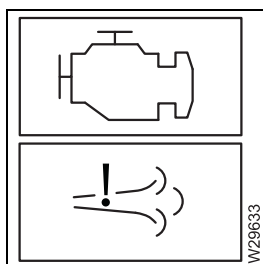
AdBlue system

Instrument panel



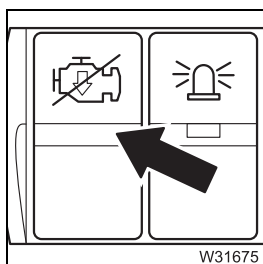
AdBlue warning

- **Out:** Filling level sufficient, no fault
 - **On:** AdBlue system malfunction
 - **Flashing:** Adblue tank empty or fault
- ➡ p. 5 - 45



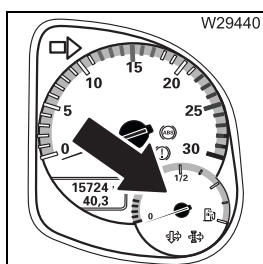
Torque reduction indicator lamp

- **Out:** Torque reduction off
 - **On:** Torque reduction on
 - **Flashing:** Reduction in torque on the next time the engine is started
- ➡ p. 5 - 45



Override torque reduction

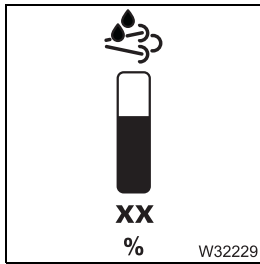
- **Press upwards once:** Torque reduction overridden for 30 minutes after 30 minutes
 - **Press up again:** Torque reduction overridden for 30 minutes after 30 minutes
 - **Press up again:** Torque reduction overridden for 30 minutes
- ➡ p. 5 - 45



AdBlue level display

- Shows the current Adblue filling level when the ignition is switched on
- ➡ p. 5 - 45

CCS display



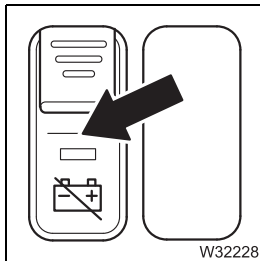
Adblue filling level indicator

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

➡ p. 4 - 7

3.2.5

Battery master switch



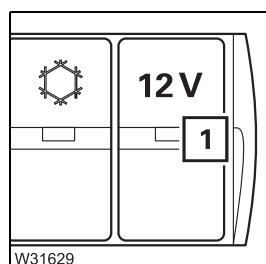
- **Switch on:** Push up
- **Switch off:** unlock and then press in downwards

➡ p. 4 - 9

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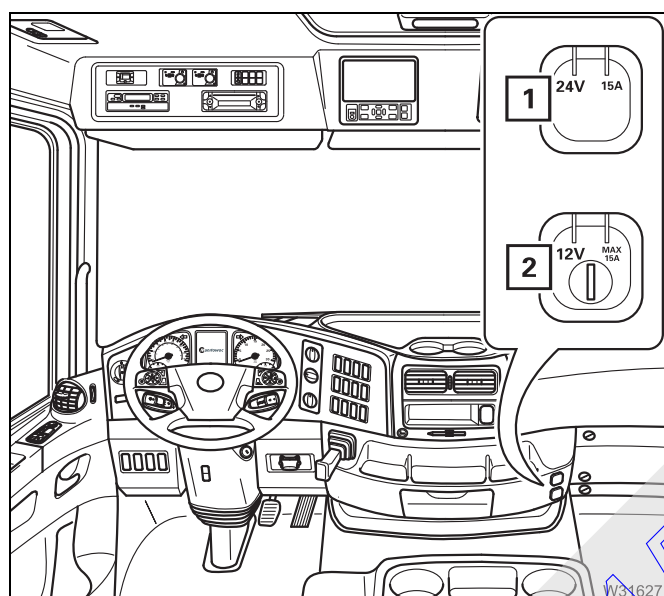
3.2.6

Electrical system



12 V power socket on/off

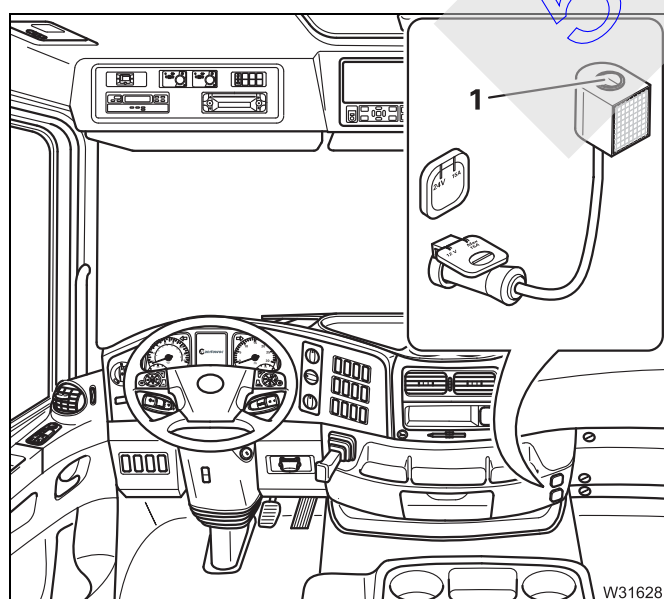
- **Switch on:** Press in switch (1) at the top
- **Switch off:** Press in switch (1) at the bottom



Sockets 12 V/24 V

- 1 Socket 24 V/max. 15 A
- 2 Socket 12 V/max. 15 A

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



Reading lamp 12 V

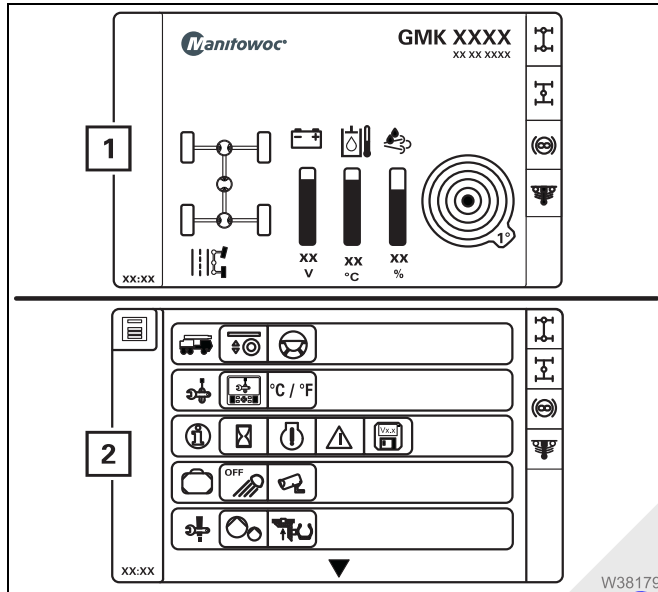
As additional equipment, the truck crane is equipped with a reading lamp.

- If necessary, plug the 12 V reading lamp into the 12 V socket.
- Press the button (1) – lamp on/off.

3.2.7

Crane control CCS

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



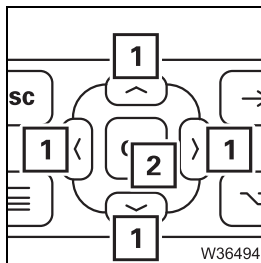
CCS display

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

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 a menu. The selected symbol is shown in red.

The OK button on the control panel is pressed in order to open a menu.



Menu control

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.

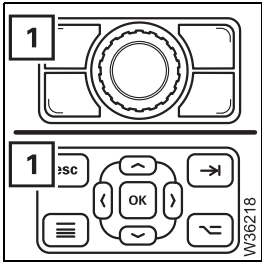
There are three areas, described in more detail in chapter *Operating elements for crane operation*.

▣ In the menu area, p. 9 - 96

▣ In the input area, p. 9 - 96

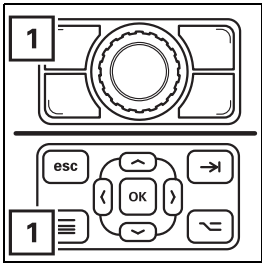
▣ In the operating area, p. 9 - 97





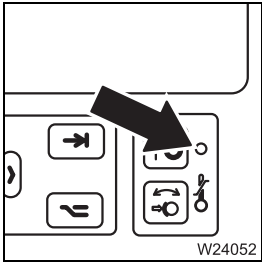
Exiting the menu/input mode

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



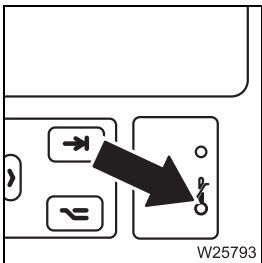
Overview menu groups

- 1 Press:**
- After the first press
Menu groups overview display
 - After a subsequent press
Next/previous group overview



Sensor for brightness


Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted;  *Display – setting the brightness,* p. 4 - 11.



Display temperature warning display

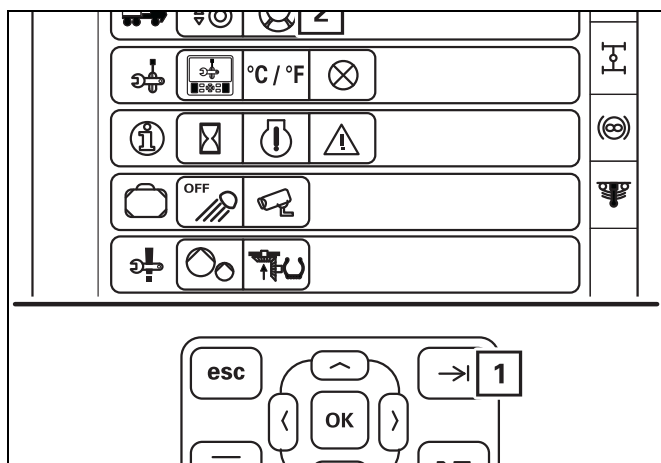
The temperature of the control unit is measured by an internal sensor.

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

 p. 4 - 11

Selecting / deselecting favourites

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



Select

A symbol is selected, such as symbol (2).

1 Press

The symbol is marked as a favourite.

Deselect

A favourites symbol is selected.

1 Press

The favourites selection is cancelled.

3.2.8

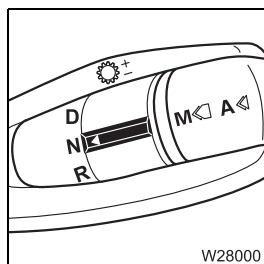
Transmission

Operating the transmission, p. 5 - 25.

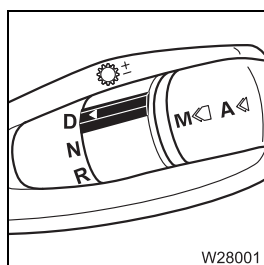
Transmission control unit

Selecting the transmission mode

The engine must be running.

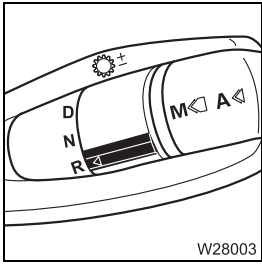


– **Position N:** Select neutral – No gear engaged

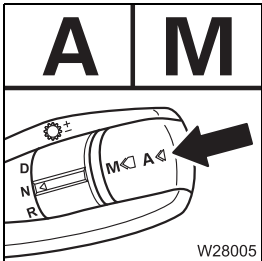


– **Position D:** When at a standstill – Select forwards starting gear
When driving forwards – Select a suitable gear, clutch engages
When driving in reverse – Select neutral





- **Position R:** When at a standstill – Select reverse starting gear
- When driving in reverse – No gear change
- When driving forwards – Select neutral

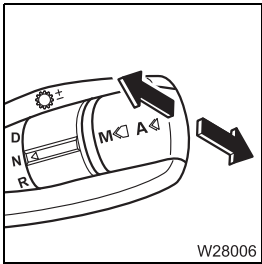


Gearshift lever

The truck crane may be stationary or driving.

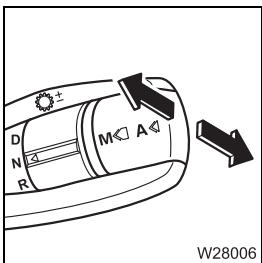
- **Press in once:** Change over between *automatic* and *manual* operating mode – without change of gear

➡ p. 5 - 29



The truck crane must be stationary.

- **Push forwards once:** Shift up starting gear – 1 gear
- **Push to the rear once:** Shift down starting gear – 1 gear

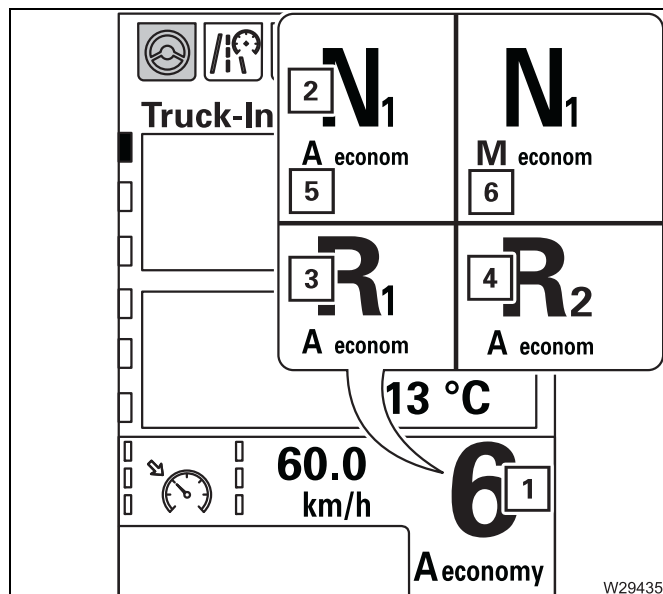


If the truck crane is in motion.

- **Push forwards once:** Upshift – 1 gear
Manual operating mode on
- **Push to the rear once:** Shift down – 1 gear
Manual operating mode on

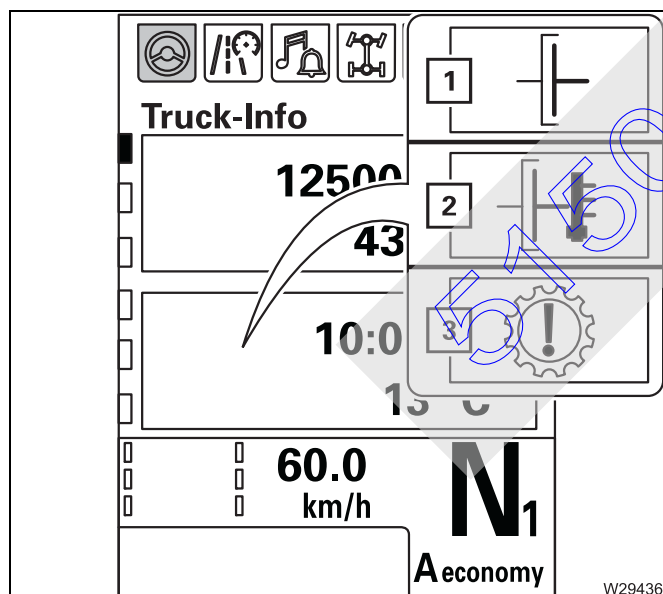
➡ p. 5 - 32

**Display,
driving mode**



Transmission display

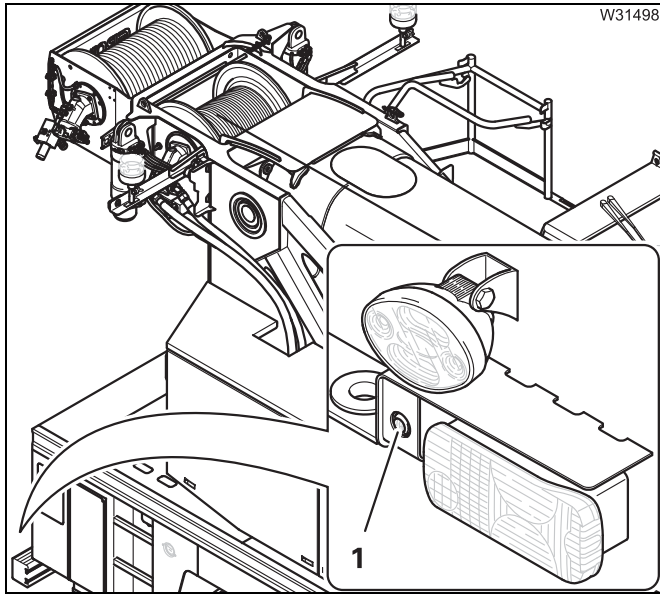
- 1 Currently engaged gear – forwards (1 to 16), for example 6
- 2 Neutral position switched on
- 3 Gear currently engaged – 1st reverse gear
- 4 Gear currently engaged – 2nd reverse gear
- 5 *Automatic* operating mode
- 6 *Manual* operating mode



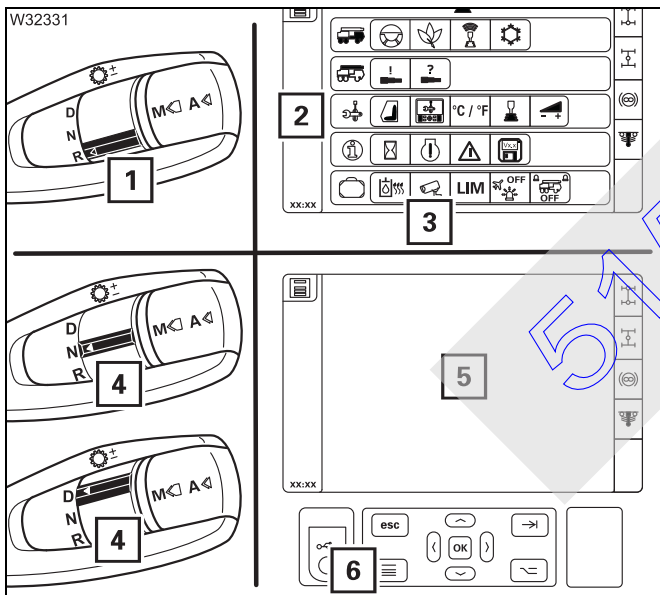
Error messages display

- 1 Clutch heavily loaded
- 2 Clutch malfunction
- 3 Gear shift malfunction

3.2.9 Reverse camera



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



Switching on

- Automatically, when reversing (1),
- Manual – 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),
- Manual – press button (6)

The display (2) shows the CCS menu

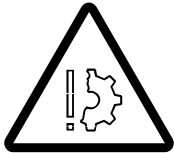
3.2.10

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 sufficient safe distance or braking in time! Drive with due care and attention! The sole responsibility lies with the crane operator.

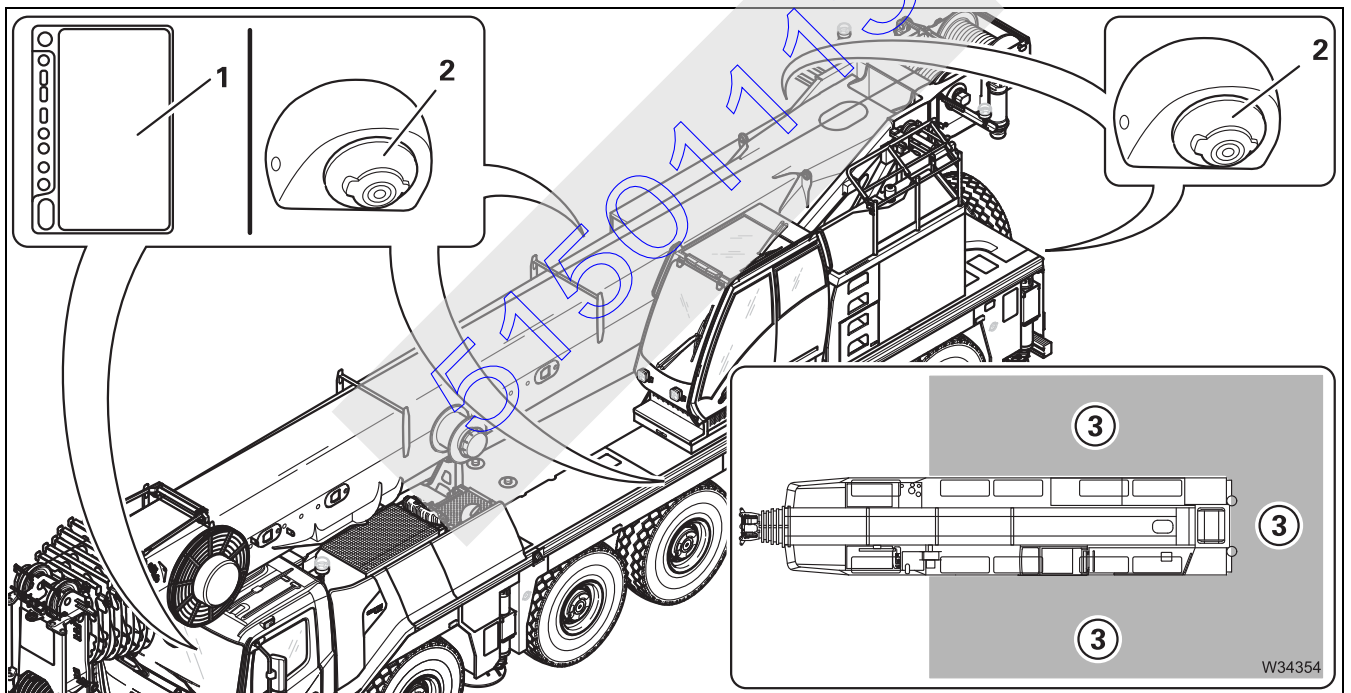
Manitowoc Crane Group Germany GmbH explicitly states that no liability is accepted for damage resulting from a failure to observe these instructions.



Risk of damage in driving mode

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

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



All cameras (2) simultaneous show images on the monitor (1).
The monitor (1) shows the area (3) to the rear and side of the carrier.





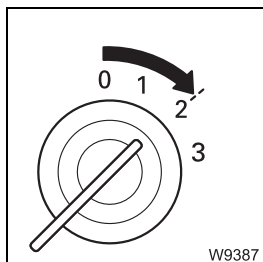
The cameras must not be removed or misadjusted. If a camera is mounted on the storage box then the storage box must not be removed.



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

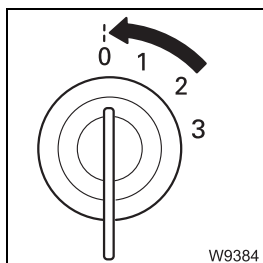
Switching on

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



Switching off

- Switch off the ignition – the monitor switches off

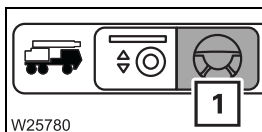


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3.2.11

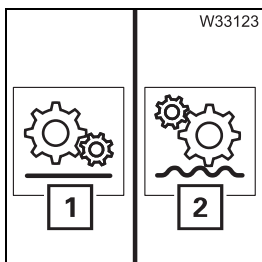
Transfer case

Transfer case – switching the off-road gear on/off, p. 5 - 50



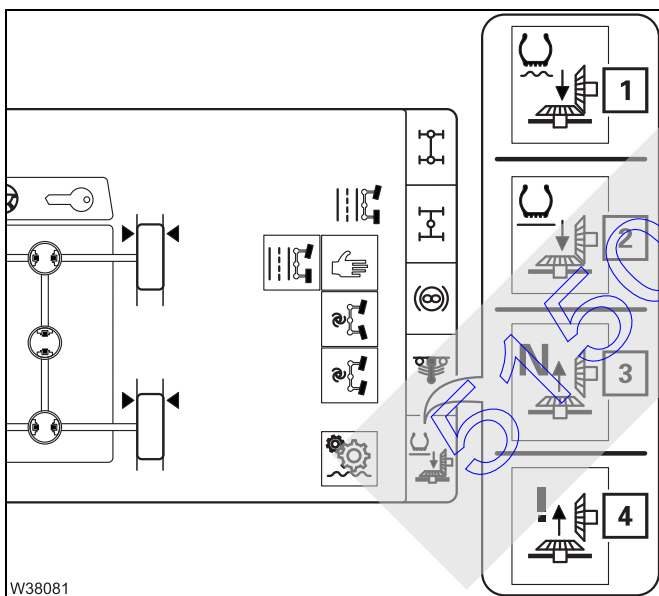
Driving menu

Opening: Select symbol (1) and confirm – menu is opened



Transfer case for off-road gear on/off

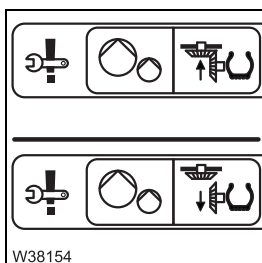
- **Switch on:** Select symbol (2) and confirm – off-road gear engaged
- **Switch off:** Select symbol (1) and confirm – off-road gear disengaged



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 Select neutral
- 4 Error – violet



Transfer case for off-road gear on/off

Switching towing mode on/off; p. 8 - 31.

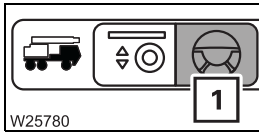
Blank page

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3.2.12

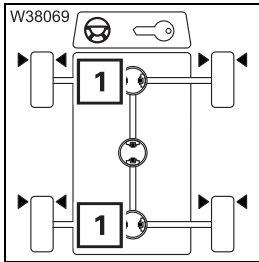
Final drive

▣▣▣▣ Longitudinal and transverse differential locks, p. 5 - 51



Driving menu

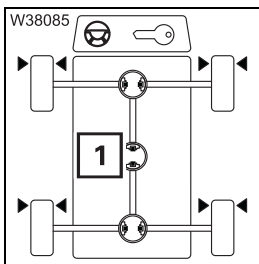
Opening: Select symbol (1) and confirm – menu is opened



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**

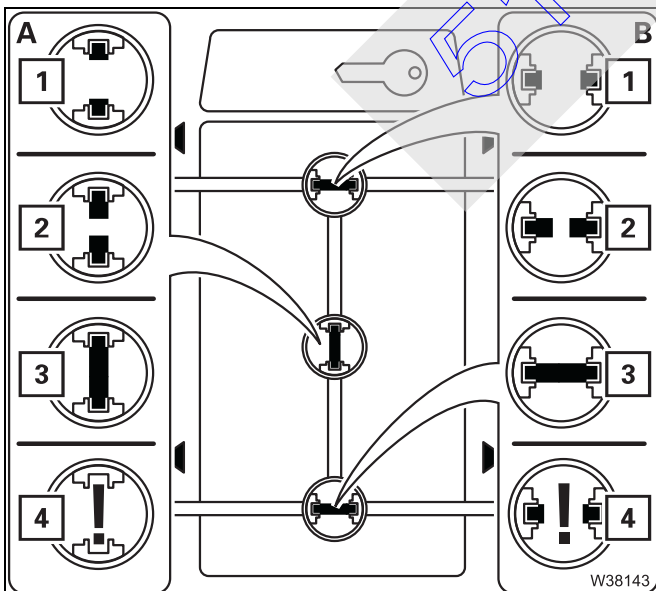
When a symbol (1) is selected **all** transverse differential locks are switched on or off.



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**

For drive 10 x 8 x 10 – simultaneously drive of first axle line on/out



(A) – longitudinal differential lock display

(B) – transverse differential lock display

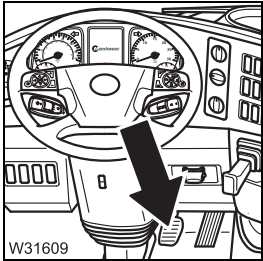
The current status is shown using different symbols.

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

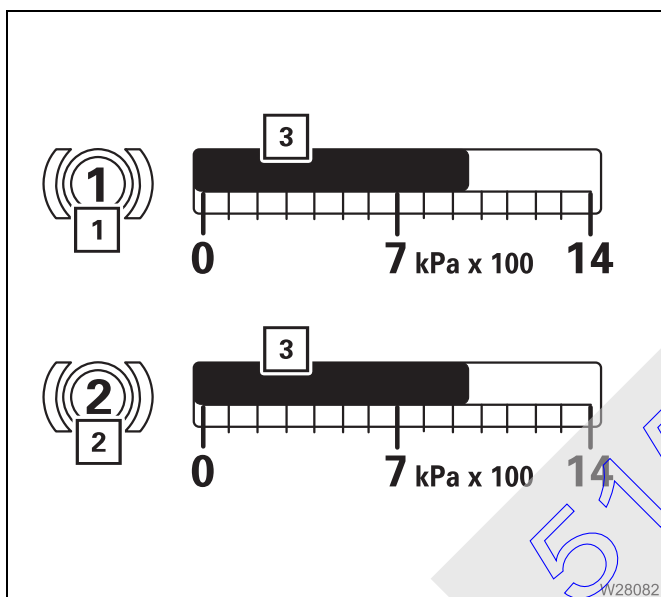
▣▣▣▣ p. 5 - 51

3.2.13 Brakes

Service brake



The braking force can be continuously adjusted with the parking brake lever.



Display of supply pressure in brake circuits

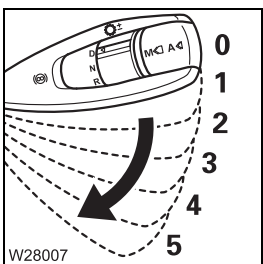
- 1 Current supply pressure in brake circuit 1
- 2 Current supply pressure in brake circuit 2
- 3 Red – supply pressure insufficient
 White – supply pressure sufficient

➔ p. 5 - 60

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

Multipurpose switch

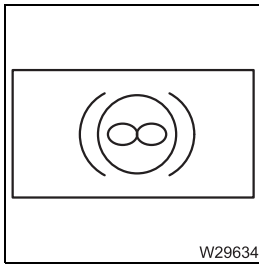
The braking effect is the least in position (1) and the greatest in position (5).



- 0 **Forward:** 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

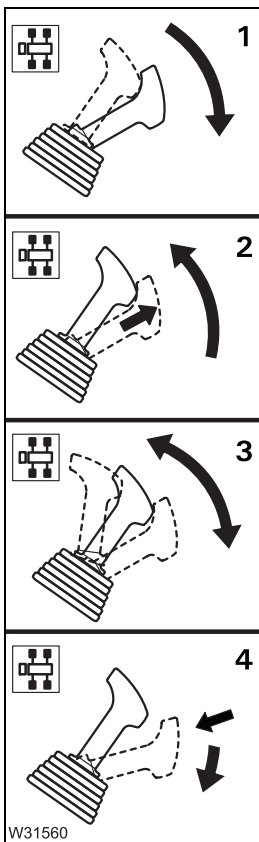
Instrument panel

Additional brake indicator lamp



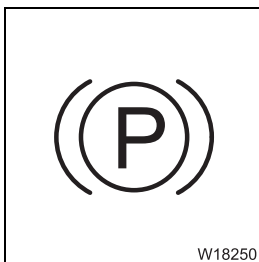
- **On:** Additional brake on
- **Out:** Additional brake off
- **Flashing:**
 - Ignition on – Multipurpose switch not in position 0
 - Engine is running – retarder power reduced

Parking brake



- 1 To engage the parking brake:** Pull the lever down until it locks into place
 - 2 To release the parking brake:** Lift the lever and push it up until it latches into place
 - 3 Operating as auxiliary brake:** Shift the lever to intermediate position
The braking force is increased continuously by moving the lever from top to bottom.
 - 4 Test position for towing a trailer:**
 - Push the lever backwards and downwards until it locks into place
 - Press in the lever and pull it further downwards
The parking brake for the trailer is released;
- ➡ p. 5 - 86.

Parking brake indicator lamp



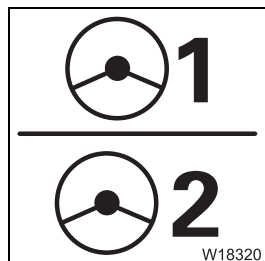
- **On:** Parking brake applied
- **Out:** Parking brake released

3.2.14

Steering/separate steering

▣▣▣▣▶ *Separate steering*, p. 5 - 59

Instrument panel

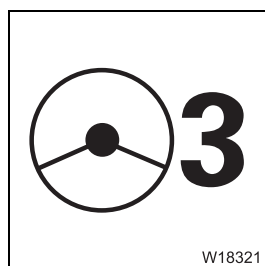


Steering circuit 1 warning

Steering circuit 2 warning

- **On:** Engine off – ignition on
or
Engine on – fault, stop – check oil loss
- **Out:** Engine on – no fault

▣▣▣▣▶ p. 8 - 6

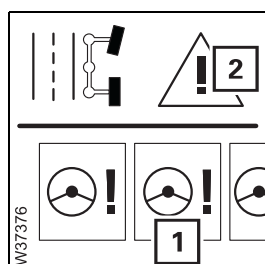


Steering circuit 3 warning

(emergency steering pump)

- **On:** approx. 10 km/h (6 mph) not reached
or
Steering malfunction – stop and check for oil loss
- **Out:** Emergency steering pump ready to function

▣▣▣▣▶ p. 8 - 6



Steering malfunction

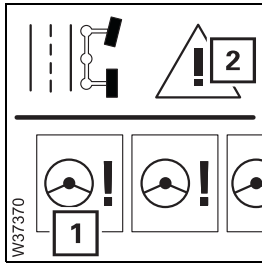
1 After switching on the ignition

- Lit – goes out after about three seconds if there is no error

Whilst driving

- Lit (1 x warning buzzer) and goes out again
continued driving possible, error was saved
- Lit – symbol (2) yellow
3. and/or 4th axle still in straight running position,
continued driving possible, error was saved

▣▣▣▣▶ p. 8 - 7



Steering system warning

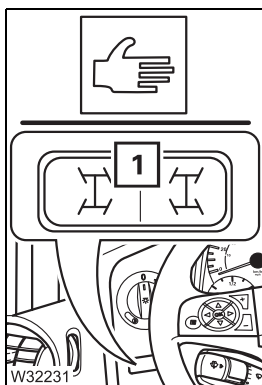
1 After switching on the ignition

- Lit - goes out after about three seconds if there is no error

Whilst driving

- Lit - symbol (2) red
Steering system faulty!
3. and/or 4th axle is no longer steerable
Stopping while taking the traffic situation into account
Repair required

➡ p. 8 - 7



Separate manual steering

The separate manual steering must be switched on.

1. and 2nd axle lines are steered with the steering wheel.

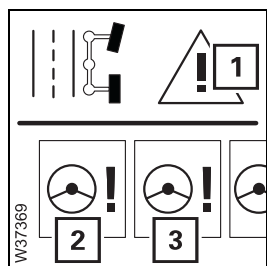
Press and hold button (1)

- **To the left:** 3. and 5th axle lines - turn to the left
- **To the right:** 3. and 5th axle lines - turn to the right

➡ p. 5 - 61



CCS display

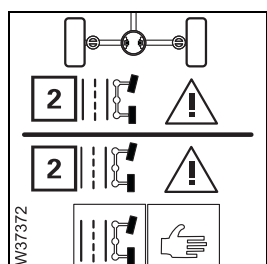


Steering system malfunction/warning

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

- 1 – Yellow:** Steering system malfunction – lamp (3) lit
- Red:** Steering system warning – lamp (2) lit
- No symbol:** No malfunction/warning

➡ p. 8 - 7



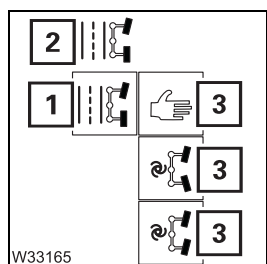
Steering mode display

The display (2) is shown in the *Start menu* and in the *Driving* menu.

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

The following applies to all steering modes:

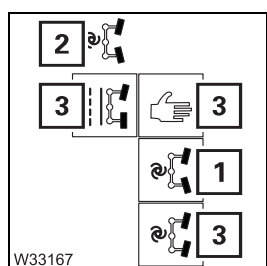
The selected symbol must be confirmed within 2 seconds, otherwise the steering mode remains unchanged.



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)

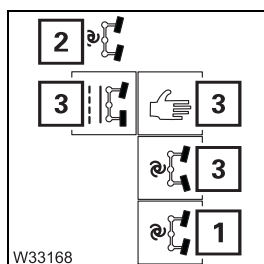
➡ p. 5 - 60



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)

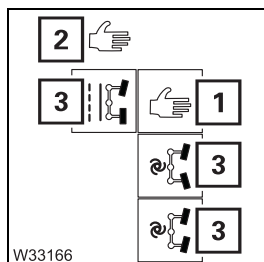
➡ p. 5 - 60



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 - 60

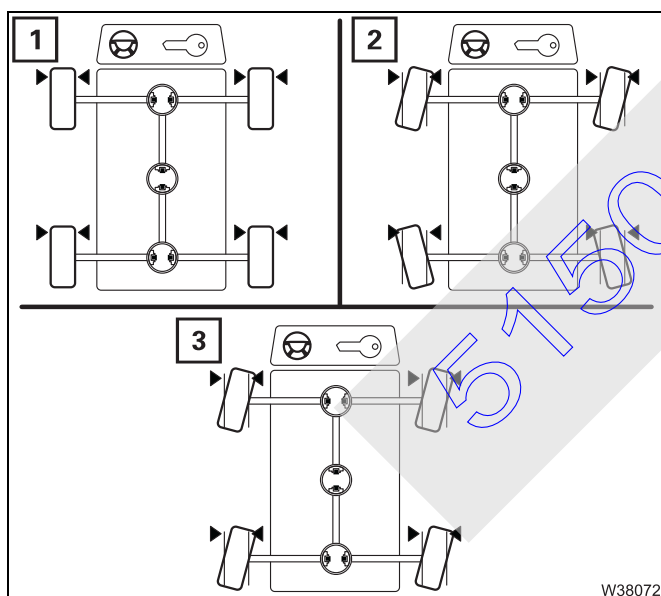


Manual separate steering on/off

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

➡ p. 5 - 60

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



Current wheel position display

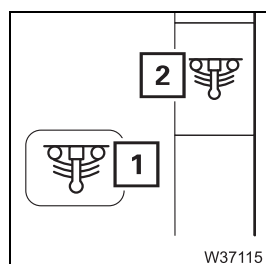
The current status is shown using different symbols:

- 1 Straight ahead
- 2 Driving around corners
- 3 Crab travel mode

3.2.15

Suspension

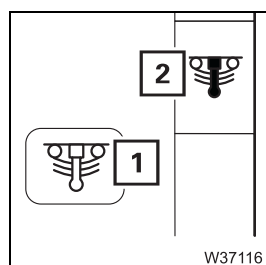
CCS display



Suspension display

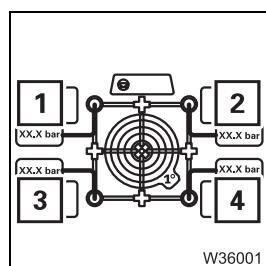
Suspension on/off

- **To switch on:** Select symbol (1) and confirm – Symbol (2) **green** (on-road driving)
Suspension on – enabled for on-road driving



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

▶▶▶ p. 5 - 16



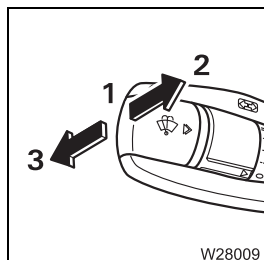
Suspension operation pressure gauge

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

3.2.16

Lighting/windscreen wipers/horn

Steering column



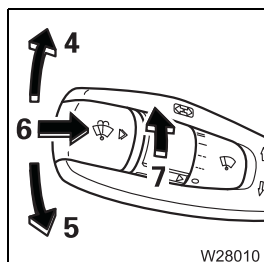
Multipurpose switch

Headlight flasher/headlight – full beam

- 1 **Parking light/headlight:** Middle position
- 2 **Flash the headlights:** Upwards

The parking light/headlight must be switched on:

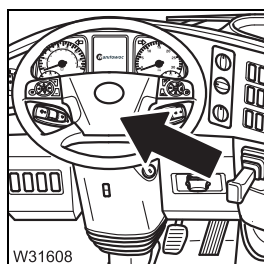
- 3 **Headlight – full-beam:** Down – latches into place



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

Steering wheel

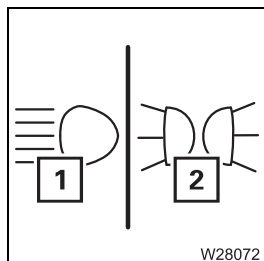


Horn

The ignition is switched on

- **Press:** Carrier horn on

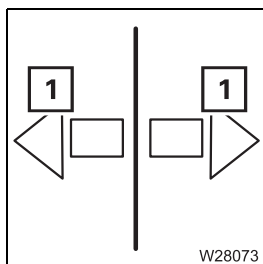
Instrument panel



Checking headlight – full beam

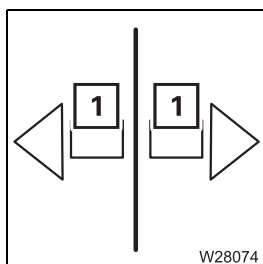
- 1 – **On:** Headlight – full beam on
- **Out:** Headlight – full beam off
- 2 – **Lights up** Headlight flash





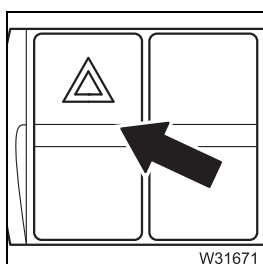
Indicator lamp for turn signal indicator

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



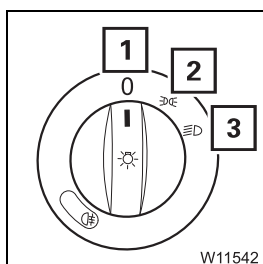
Indicator lamp for trailer turn signal indicator

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



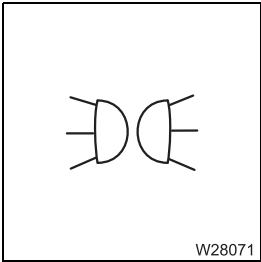
Hazard warning system on/off

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



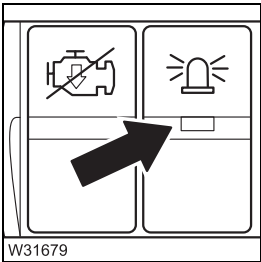
Lighting on/off

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



Checking headlight

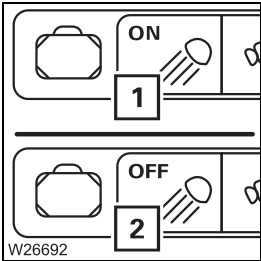
- **On:** Headlight on
- **Out:** Headlight off



Rotating beacon on/off

- **Switch on:** Push up
- **Switch off:** Push down

CCS display

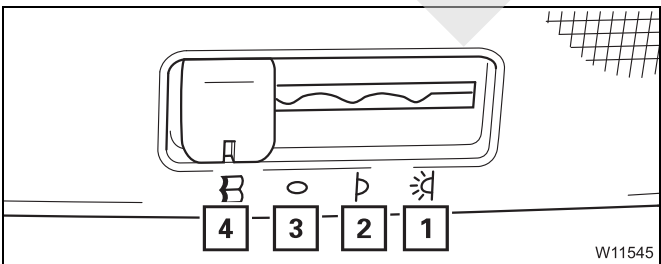


Outrigger lighting on/off

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

Roof

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

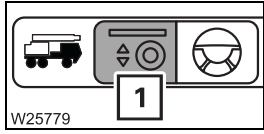


Cab lighting

- 1 On
- 2 On/off via door contact
- 3 Off
- 4 Reading lamp on

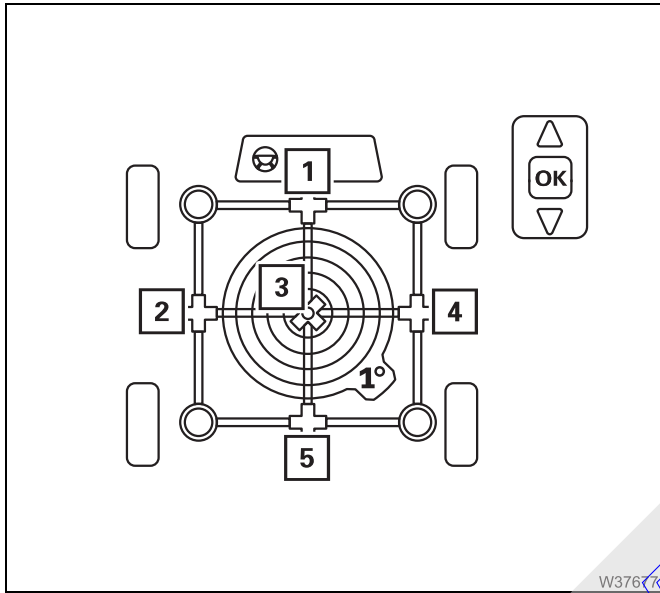
3.2.17 Level adjustment system

Operating the level adjustment system, p. 5 - 53.



Suspension/level adjustment menu

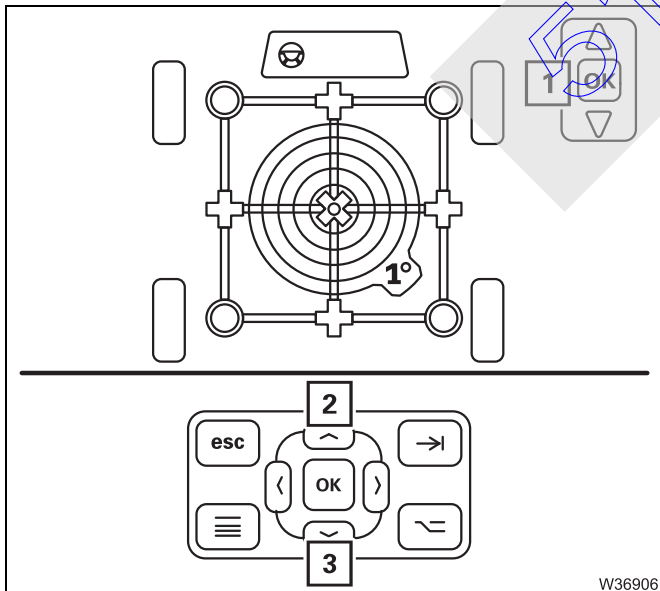
- **Opening:** Select symbol (1) and confirm – menu is opened



Lift/lower preselection level

The suspension must be 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

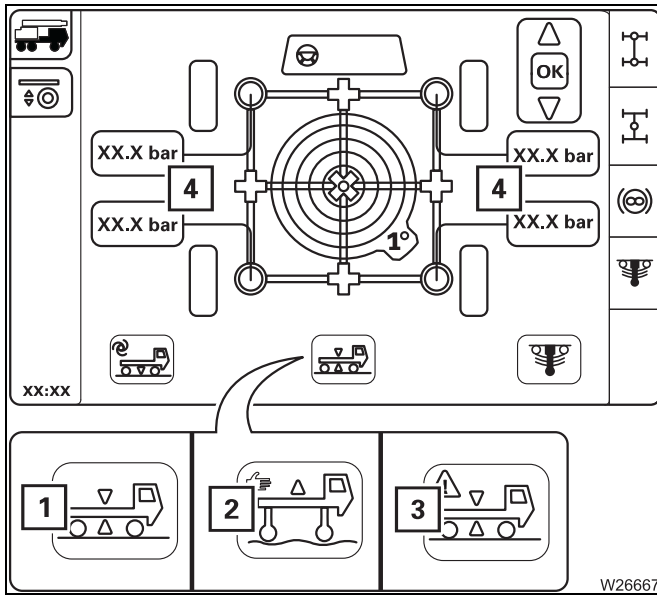
1 – Displayed
 Level pre-selection on,
 buttons (2) and (3) active.

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

Level change

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

- 2 Raise the level
- 3 Lower level

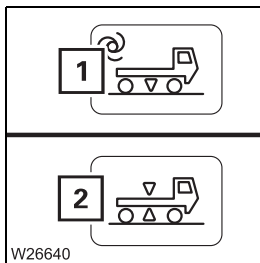


Vehicle level display

The current status is shown using different symbols.

- 1 On-road level
- 2 Off-road level
- 3 Error
- 4 Operation pressure in the suspension struts

▮▮▮▮▶ p. 5 - 53

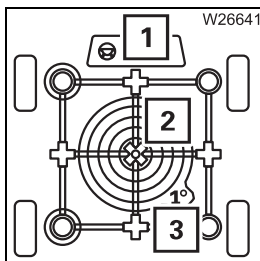


Setting the on-road level

The suspension is switched on.

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

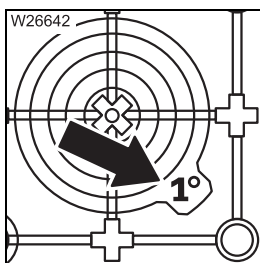
▮▮▮▮▶ p. 5 - 54



Display of current inclination

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

▮▮▮▮▶ p. 5 - 56



Switching between measuring ranges

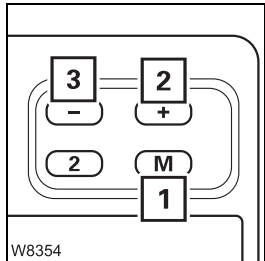
The current measuring range 1° or 5° is displayed – changeover automatic

▮▮▮▮▶ p. 5 - 56

3.2.18 Tachograph/speedometer

▣▣▣▣▣ *Setting the tachograph, p. 5 - 18.*

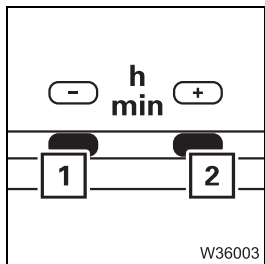
Tachograph



Time correction occurs 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

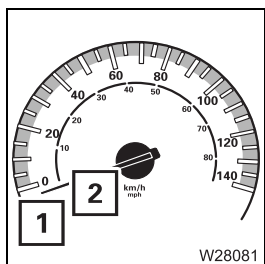
Cover



Time correction

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

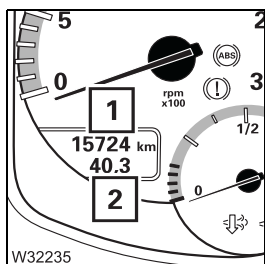
Speedometer



Displays the speed and the route:

Speed indicator

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



Kilometre counter

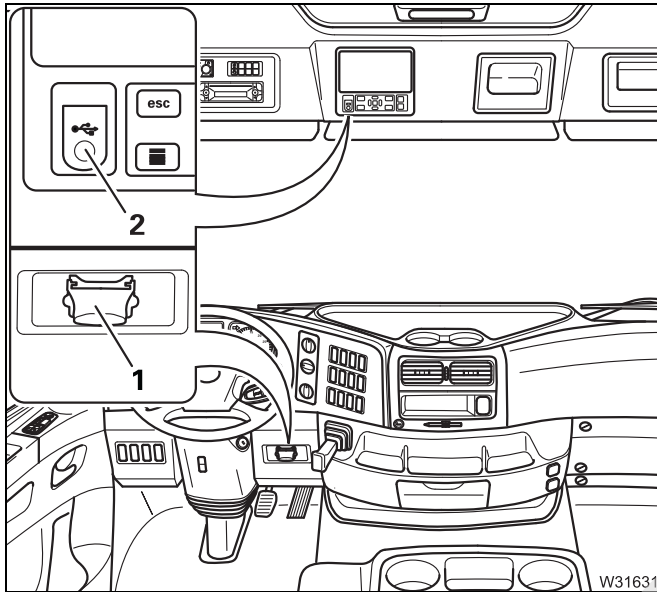
The ignition must be switched on.

- 1** Overall distance travelled in kilometres – value after the decimal point: 1 = 100 m
- 2** Daily distance travelled in kilometres – value after the decimal point: 1 = 100 m

3.2.19

Diagnostics

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

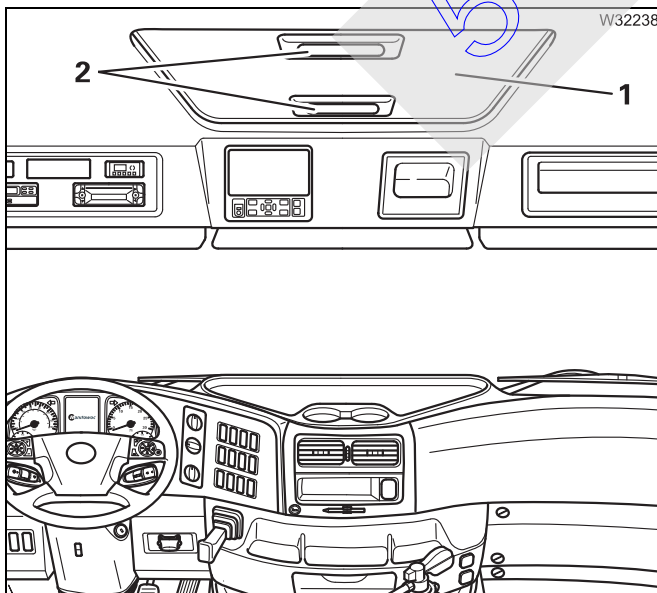


The following connections are below the cover (4).

- 1 Carrier electronics diagnostics
- 2 Transmission diagnostics
- 3 Engine diagnostics

3.2.20

Push-up roof



Opening

Hold the push-up roof (1) by the handles (2) and push up into the required position.

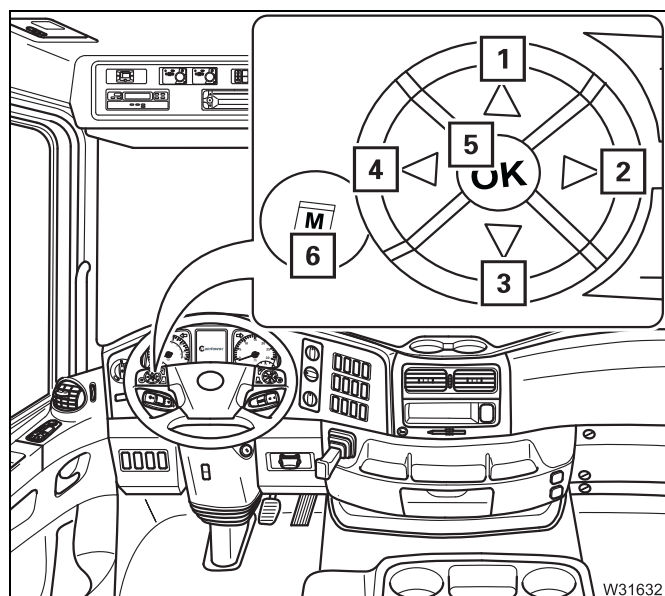
Closing

Hold the push-up roof by the handles (2) and pull down until it latches into place.

3.2.21

On-board computer

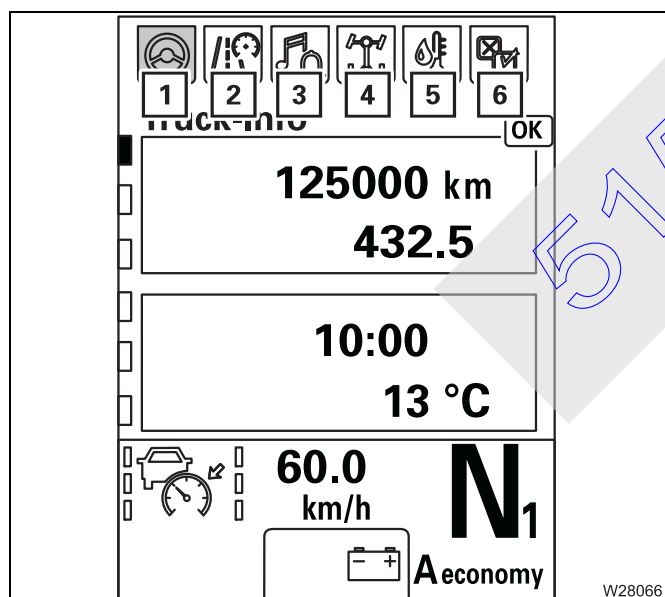
Click [here](#) for more information on the on-board computer menus.



Operating the on-board computer

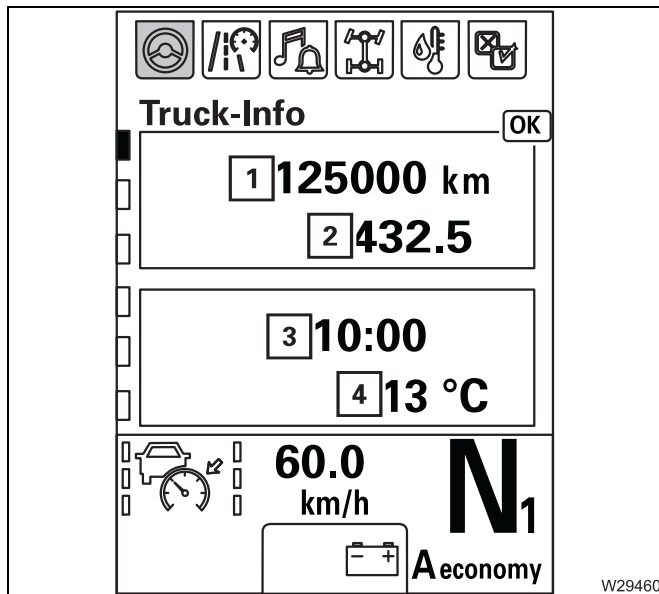
On the steering wheel:

- 1 Previous menu window, menu entry upwards
- 2 Next main menu, select next entry, increase or reset value
- 3 Next menu window, one menu entry downwards
- 4 Previous main menu, select previous entry, reduce value
- 5 Open and close data entry window, acknowledge messages
- 6 Save/display menu window



Main menu display

- 1 Tour data
- 2 Driving
- 3 Audio and communication
- 4 Operation and maintenance
- 5 Monitoring and information
- 6 Settings

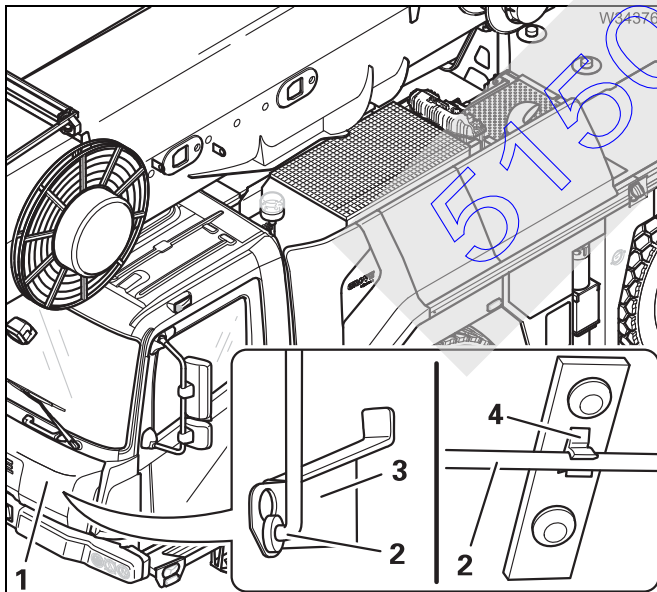


Tour data menu

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

3.2.22

Front flap



Opening

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

Closing

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

3.2.23

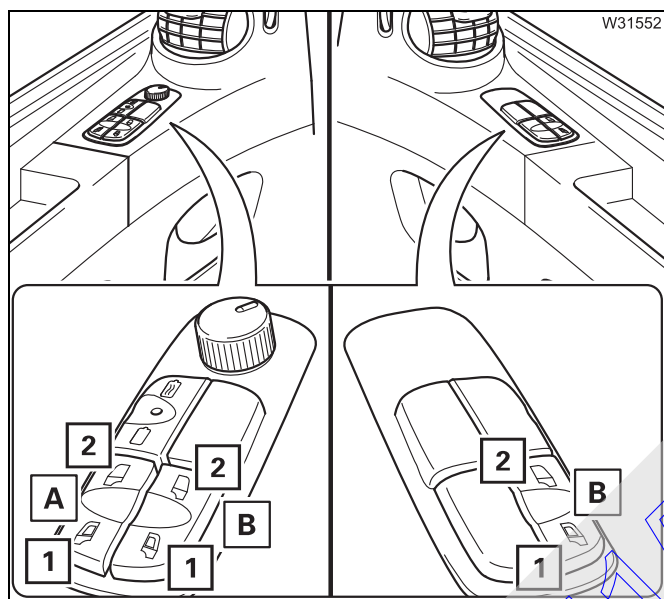
Windows and doors

Window winder



Risk of crushing when closing the windows

If the window winders encounter resistance, they do not stop but keep on moving at reduced power.



Button assignment

- A Window winder, driver's door
- B Window winder, passenger door
- 1 To open the window
- 2 To close the window

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.

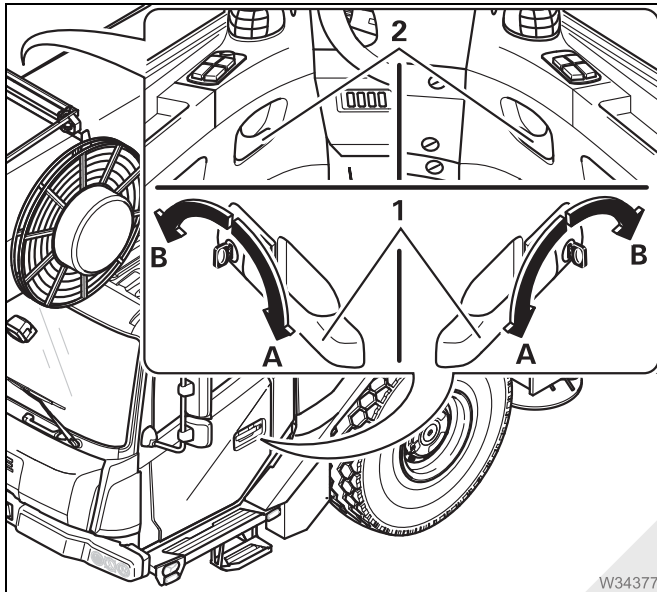
Press button (2) briefly – the window closes all the way to the end position.

Doors

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



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



Locking

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

Unlocking

- Turn the key towards **A**, or
- Pull the handle (2).

Opening

- Pull the handle (1) or
- Pull the handle (2)

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3.2.24

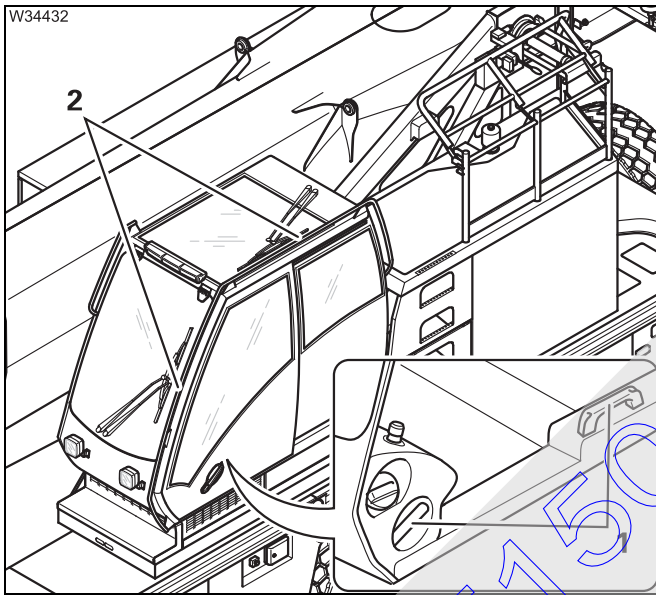
Access ladders and ladders

Different ladders and handles are on the truck crane depending on the version.



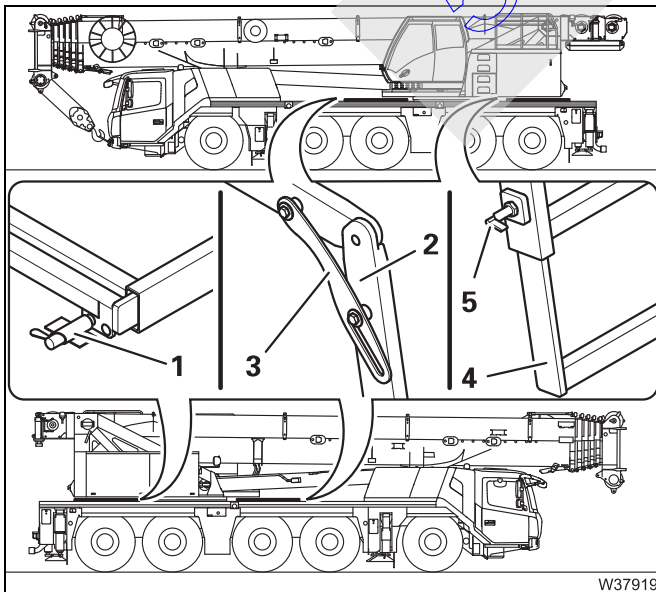
Hazard due to unsecured ladders

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



Handles

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

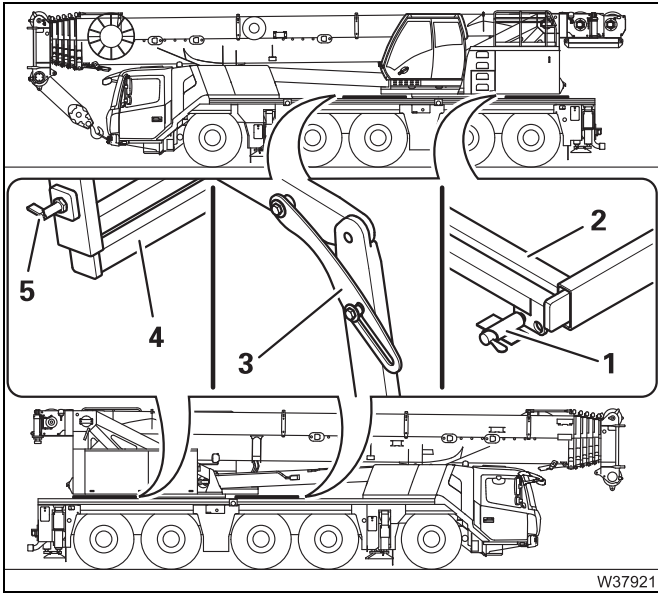


Swing-out ladders

– Folding out

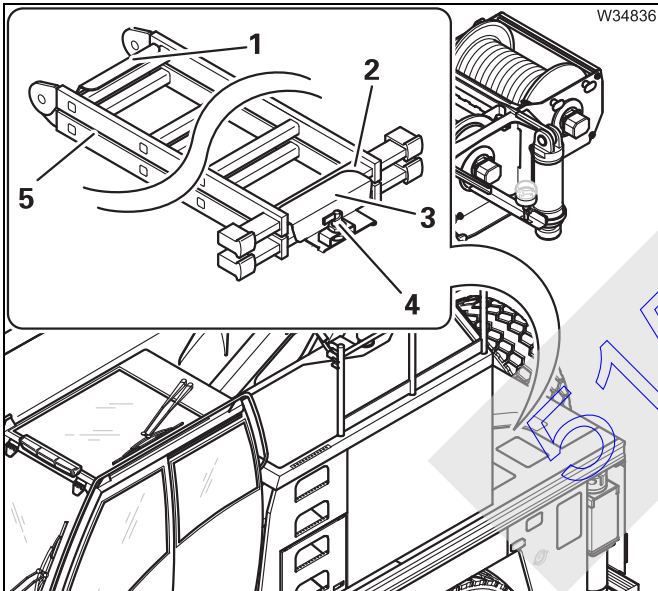
- Release the spring latch (1).
- Swing the ladder (2) outwards and fold downwards – locking bar (3) engages.
- If need be – engage the spring latch (5) and pull out another access ladder (4).





- Folding in

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



Folding ladder – shelf on the rear of carrier

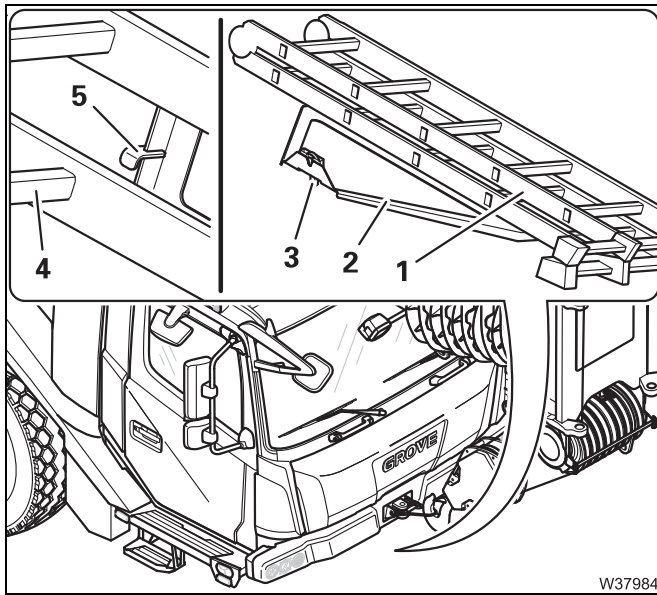
- For the use

Ladder (5) – to erect and fold out.


- Taking off the clamp (3) and taking out the ladder.
- Plug the clamp (3) into the mounting at the carrier.
- Push the clamp to the front and secure it with the locking bar (4).

- For driving/crane operation

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



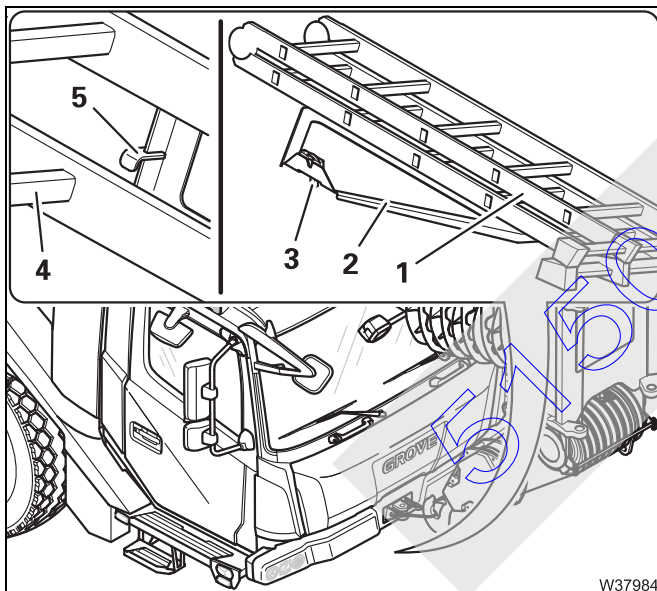
Folding ladder – shelf under the driver's cab

For the shelf on the rear of carrier;  p. 3 - 78.

– For the use

Ladder (1) – to erect 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) upwards until it engages.



– For driving/crane operation

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

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4

Starting the engine for driving / switching it off

4.1

Starting the engine from the driver's cab

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

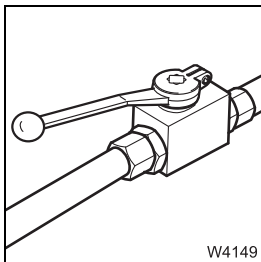
4.1.1

CHECKLIST: Starting the engine

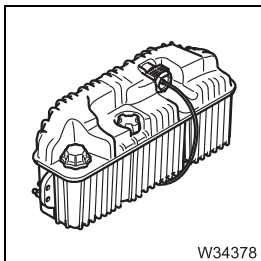



This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.

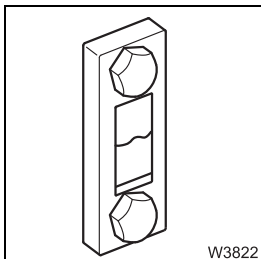
Observe the warnings and safety instructions specified here!



1. Check that the valves on the hydraulic tank are open;  p. 4 - 8.

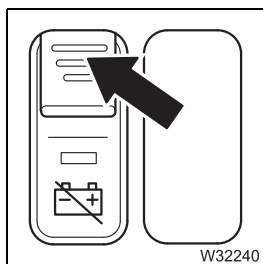


2. Check the coolant level in the engine;  *Maintenance manual*.

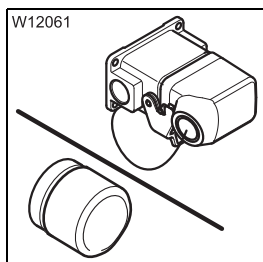


3. Check the oil level in the hydraulic system;  *Maintenance manual*.

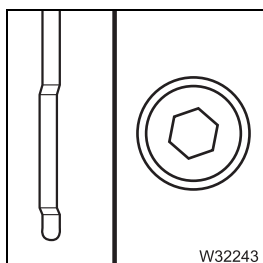




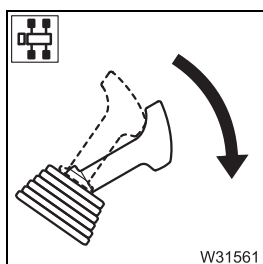
4. Switch on the battery master switch; p. 4 - 9.



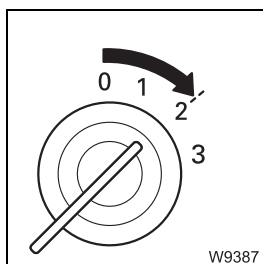
5. Check that all emergency stop switches have been reset; p. 4 - 19.



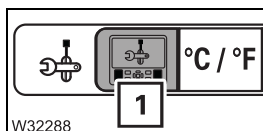
6. Check the oil level in the engine and gearbox; *Maintenance manual*.



7. Check that the parking brake is engaged.

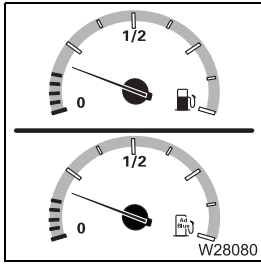


8. Switch on the ignition and check the instruments and displays; p. 4 - 9.






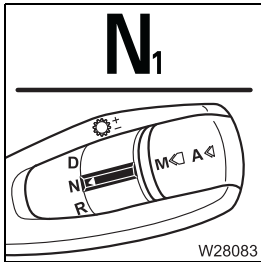
9. Adjust the brightness of the CCS display if necessary; p. 4 - 11.


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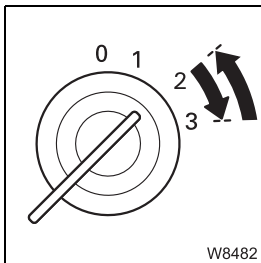



10. Check the fluid supply:

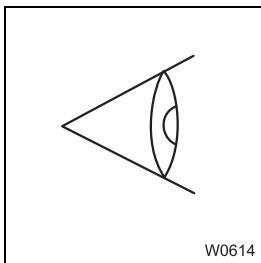
-  *Fuel tank*, p. 4 - 5,
-  *AdBlue tank*, p. 4 - 7
-  *Fuel tank auxiliary heater*, p. 11 - 5



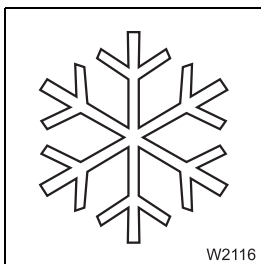
11. Shift the transmission to neutral;  p. 5 - 26.




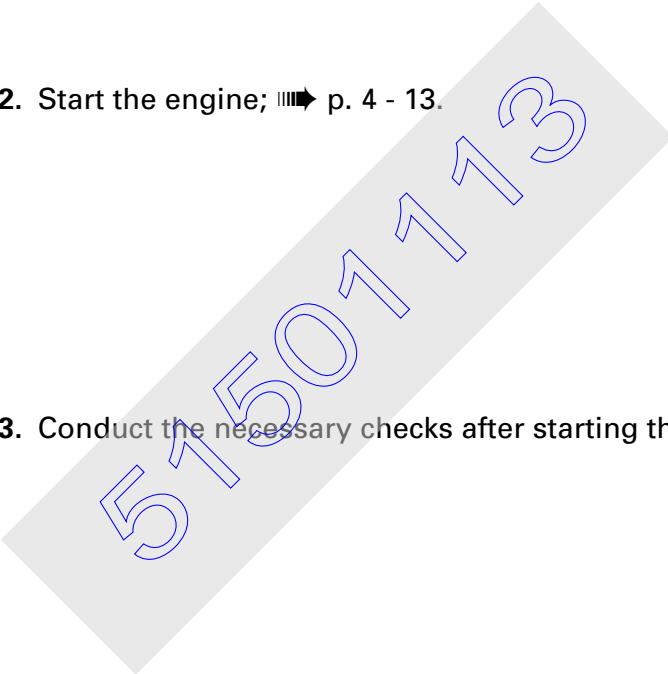
12. Start the engine;  p. 4 - 13.



13. Conduct the necessary checks after starting the engine;  p. 4 - 15.

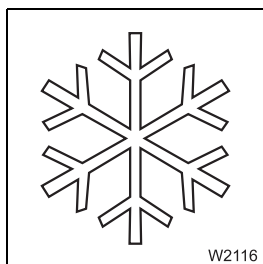


14. In the event of low outside temperatures;  *CHECKLIST: At low temperatures*, p. 4 - 4.



4.1.2

CHECKLIST: At low temperatures



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


1. The fuel and engine oil must be suitable for use at the respective outside temperature; ■■■▶ *Separate engine operating instructions, provided by the manufacturer.*
2. The engine coolant must contain sufficient antifreeze; ■■■▶ *Separate engine operating instructions, provided by the manufacturer.*
3. The windscreen washing system must contain sufficient antifreeze; ■■■▶ *Maintenance manual.*

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4.1.3

Filling up

Fuel tank

Only use permissible consumables;  *Separate engine operating instructions, provided by the manufacturer.*



Danger of fire due to flammable gases

Switch off the engine, the heater and all additional heaters before refuelling.



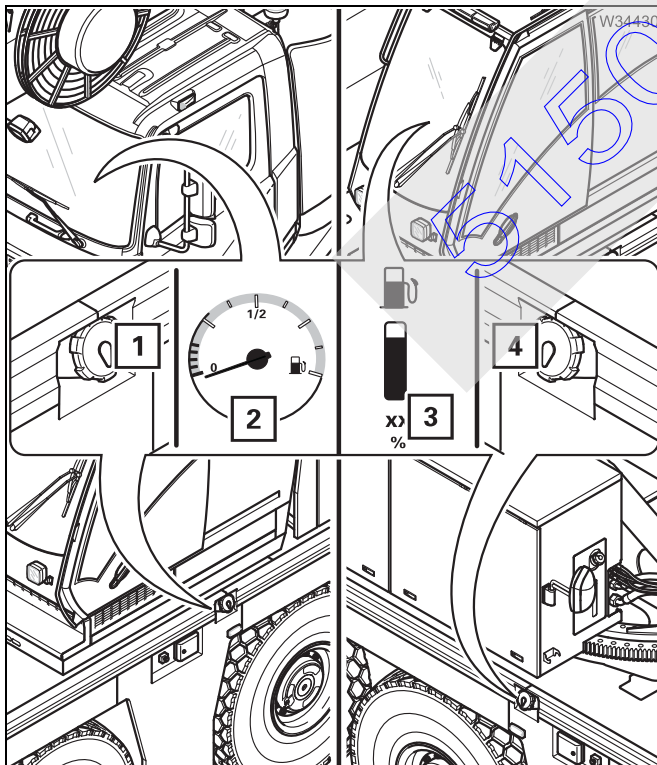
Risk of accidents if the tank is not closed.

Close the tank each time you have refilled it.
In this way you can prevent other vehicles from being endangered by the cap falling off or consumables escaping.



Risk of damage to the engine and catalytic converter

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




Standard tank

The displays (2) and (3) show the total fuel level in the tanks (1) and (4).

The tanks are filled together via the filler necks (1) or (4).

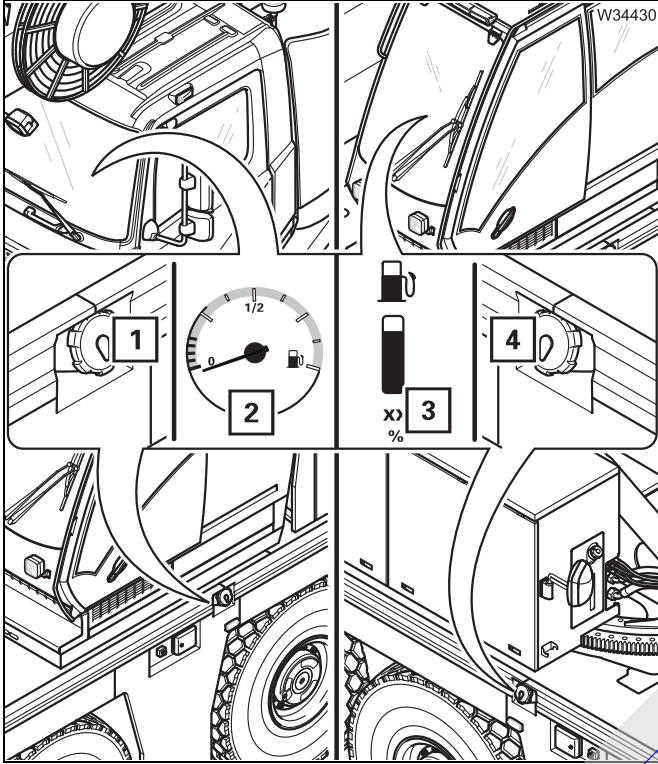
- Always open both filler necks (1) and (4) when refuelling.
- Refuel in good time – leave sufficient space for the fuel to expand.
- Close both tanks with the caps after refuelling.

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



Dual tank

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



The fuel tank (1) is filled with the fuel for driving operation – display (2).

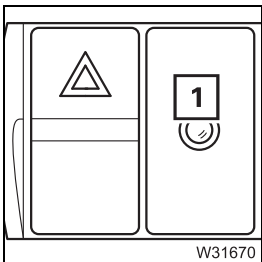
The fuel tank (4) is filled with the fuel for crane operation – display (3).

- When refuelling, open filler necks (1) or (4).
- Fill with the correct fuel in good time, and close the tank correctly. Leave sufficient space for the fuel to expand.
- Close both tanks with the caps.

Switching over the fuel supply


When fitted with dual tanks, the fuel supply is automatically switched over depending on whether you start the motor from the driver's cab or the crane cab.

- The indicator lamp (1) is off when the fuel tank is in use for driving.
- The indicator lamp (1) is lit when the fuel tank is in use for crane operation.



AdBlue tank

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

Only use permissible consumables;  *Separate engine operating instructions, provided by the manufacturer.*



Risk of accidents if the tank is not closed.

Close the tank each time you have refilled it.

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



Risk of damage to the engine and catalytic converter

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

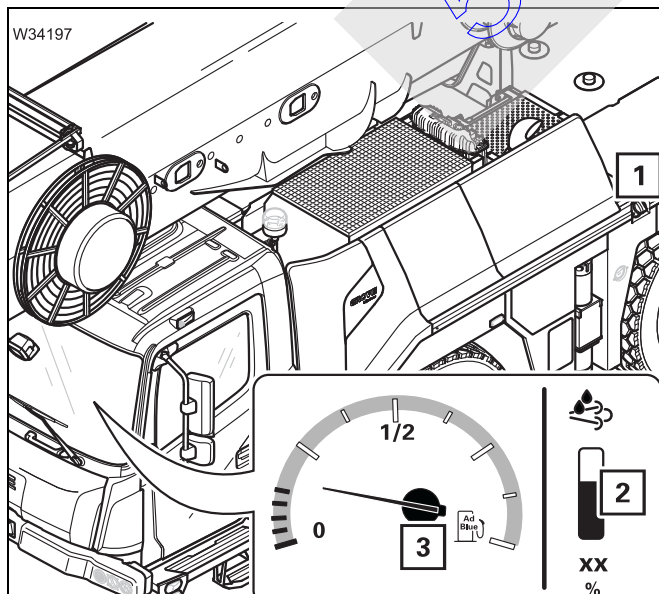
Ammonia vapours can escape if the *AdBlue* tank is opened at high outside temperatures. Ammonia vapours can irritate mucous membranes, skin and eyes.

Ensure that there is adequate fresh air supply and do not breathe in the escaping ammonia vapours.



Risk of damage to painted or aluminium surfaces

AdBlue can cause corrosion of these surfaces. Clean up spilled *AdBlue* with water immediately.




The displays (2) and (3) indicate the current filling level.

The level indicator (2) changes colour depending on the fill level:

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

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



If the *AdBlue* tank is empty, a warning will be output and the engine torque will be reduced;  *Overriding torque reduction*, p. 5 - 45.



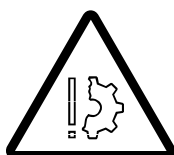
In order to comply with exhaust emission regulations, the truck crane may only be driven with *AdBlue*. Driving without *AdBlue* will invalidate the truck crane's licence for use on public roads and you are no longer permitted to drive on public roads.

4.1.4

Checks before starting the engine

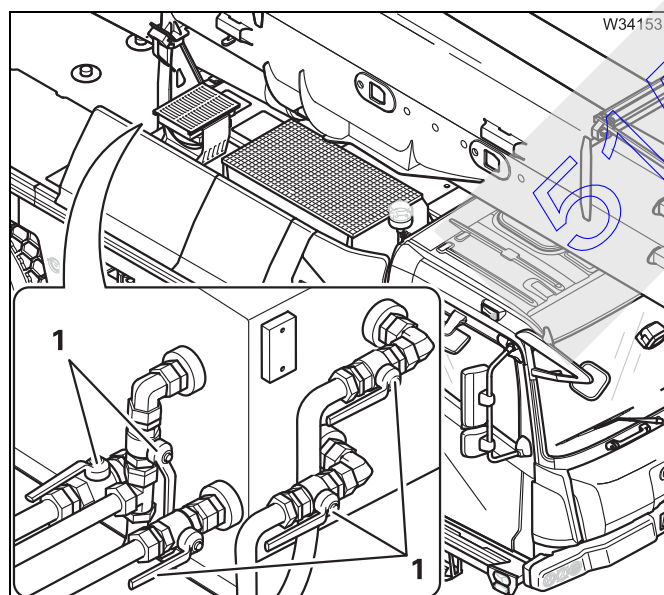
At the hydraulic tank

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



Risk of damage to hydraulic pumps

You may only start the engine when all the valves on the hydraulic tank are open!

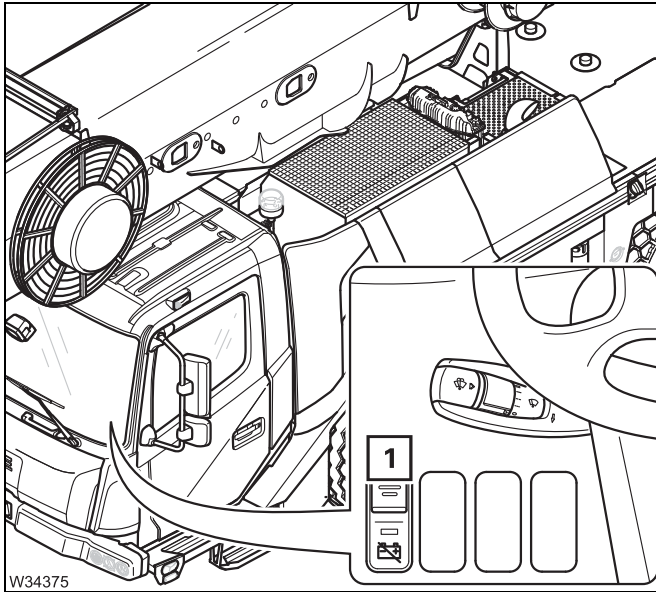


• Check that the valves are open – lever (1) parallel to the line.

• Open all the closed valves.


Battery master switch

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



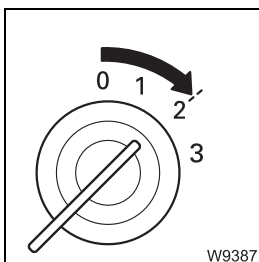
- Press switch (1) up – the battery master switch will be switched on.

Checking the hand-held control

Check that the hand-held control has been removed, and that the bridging plugs for the hand-held control are inserted into all sockets;  p. 9 - 83.

4.1.5

Switch the ignition on



- Insert the ignition key into the ignition lock and turn the key to position 2.
After switching on the ignition, a lamp test is performed and switching states are aligned.



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

4.1.6 Lamp test/equalisation of the switching states

Lamp test

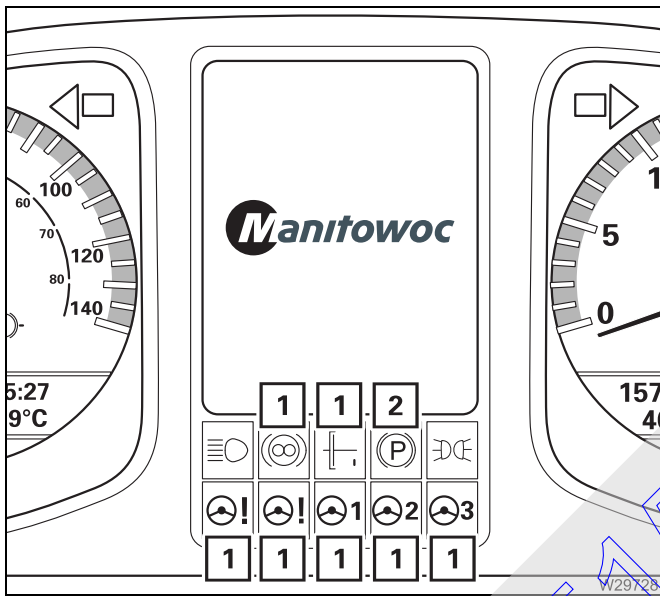
After the ignition has been switched on, a lamp test is performed.



Risk of accident from faulty lamps!

The lamps that are used to provide warnings and information during operation light up for control purposes whenever the ignition is switched on. Always perform the following lamp tests and immediately replace faulty lamps or have them replaced!

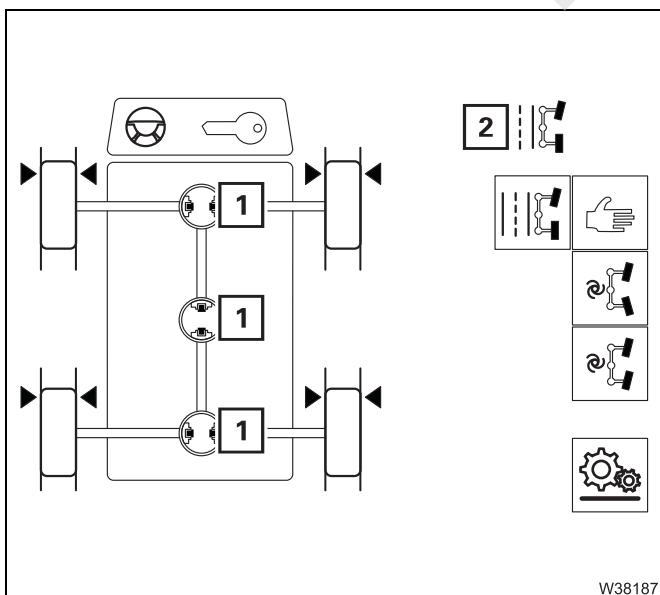
In this way, you will avoid accidents and damage that occur when malfunctions are not identified in time.



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

Switching state alignment

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



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

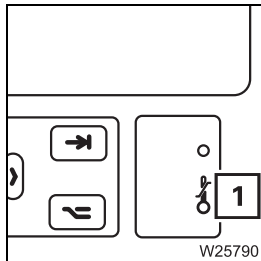
When you switch the ignition on, the steering is always set to *On-road driving* (2), irrespective of what setting was last saved.

4.1.7

Display – setting the brightness

Brightness of the displays

The brightness of the displays is regulated automatically by the CCS, depending on the ambient brightness. You can set a minimum brightness that may be reached.



Temperature on the display

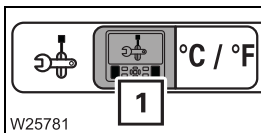
If the temperature on the display is too high, the brightness is reduced automatically.

Do not cover the sensors (1) and keep them clean to avoid contamination that can affect the brightness adjustment.

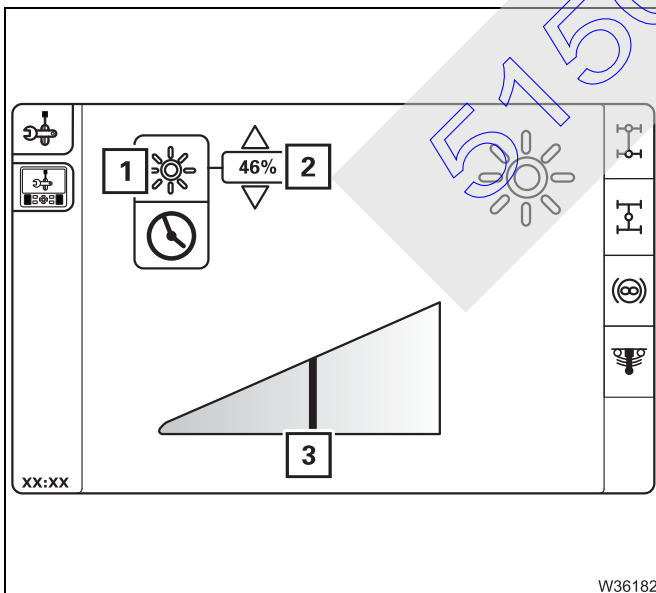


Setting the minimum brightness

The brightness of the headlight is reduced to 40% regardless of the minimum brightness setting, but can be increased again manually at any time.



- Open the *Set display brightness and date/time* menu (1).



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

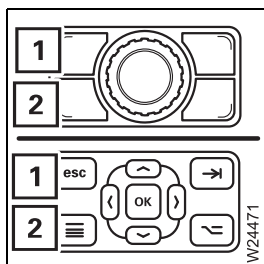
The brightness of the display changes while setting and you can view the set value (0 to 100%) on the display (2) or (3).

The brightness set here is the minimum value for automatic regulation.



There is no automatic regulation if you set the brightness to 100%. The displays then always show maximum brightness.





You can cancel the entry at any time using the (1) or (2) buttons. The settings are then reset.

51501113

4.1.8

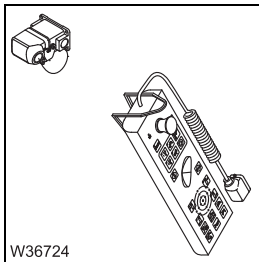
Starting the engine



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

Refer to the separate operating manual provided by the engine manufacturer for operating the engine. The engine can only be started if:

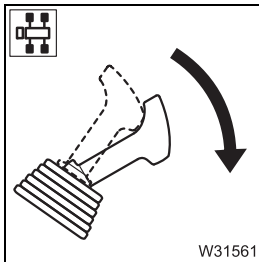
– The bridging plugs have been inserted in all sockets of the carrier and superstructure for the hand-held control; p. 9 - 83.



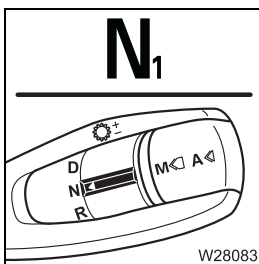
– The lamp (1) has gone out (superstructure ignition off).



– The parking brake must be applied.



– The transmission must be in position **N**; p. 5 - 26.



This section pertains to starting a warm and cold engine.



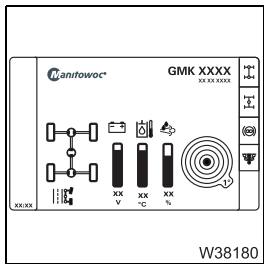
Danger of explosion when using starter fuel

The engine may never be started with the aid of starter fuel. The starter fuel sprayed into the intake manifold 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 in the subsequent driving operation.



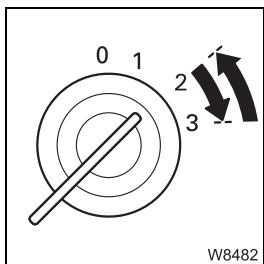
- Wait until the start menu is displayed before switching on the ignition.




Risk of crushing due to turning wheels

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

- Do not press the accelerator.
- Turn the ignition key to position **3** and hold it there until the engine starts.
- Let go of the ignition key after the engine starts.

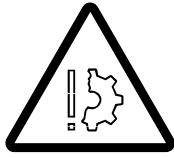


If the engine does not start, release the ignition key after about 15 seconds and wait one minute before trying again.

If the engine does not start after several attempts;  *Malfunctions on the engine*, p. 8 - 19.

4.1.9

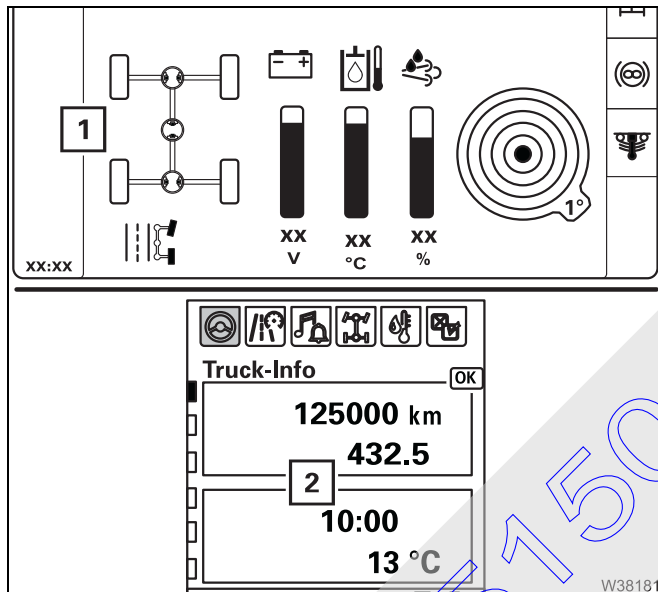
Checks after starting the engine



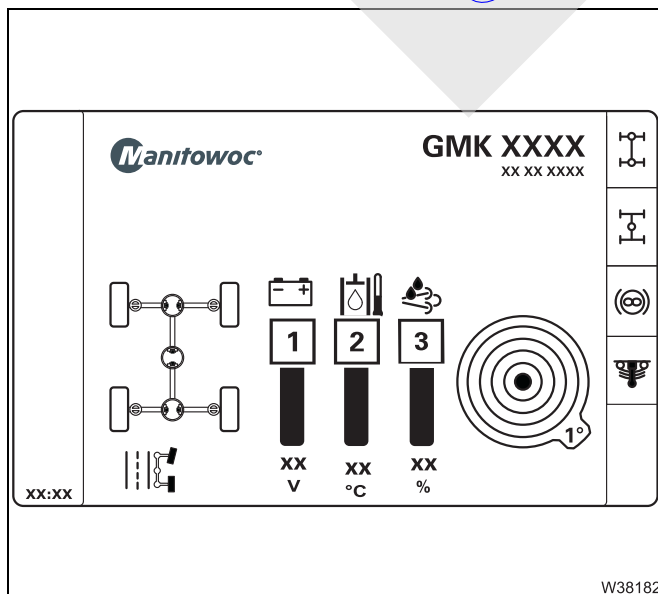
Risk of damage to the engine

Observe the symbols and messages in the display area of the main menu and in the on-board computer. By this means you avoid low oil pressure leading to engine damage.

Start menu and on-board computer



- Check if the display area of the main menu (1) or the on-board computer display (2) shows any **red** symbols
 - Display area (1) – when a symbol is **red**;
 - ▮▮▮▮▮ *Malfunctions on the engine*, p. 8 - 19.
 - On-board computer display (2) – when a warning message or symbol is shown;
 - ▮▮▮▮▮ *Warning and malfunction messages on the on-board computer display*, p. 8 - 9.
- If a **red** symbol lights up, or if a message demands it, switch the engine off immediately.



- Also check the following displays
 - 1 Voltage in volts
 - 2 The hydraulic oil temperature in °C (°F)
 - 3 AdBlue supply in percentage

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

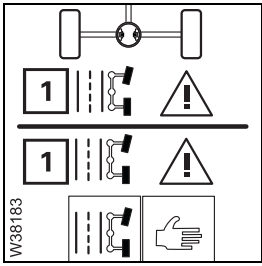
Green: Value OK

Yellow: Limit value almost reached

Red: Limit value exceeded (or not reached) – warning message;

▮▮▮▮▮ p. 8 - 13.





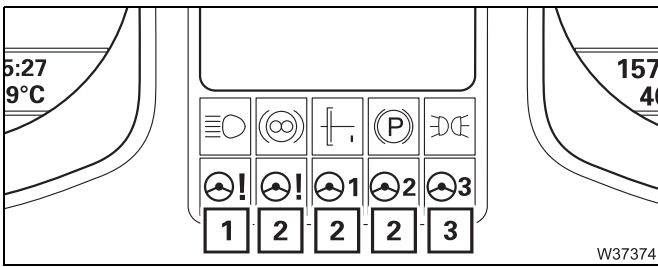
- Check the display (1) in the *Start* menu or in the *Driving* menu.

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 offset, and the lamp (1) goes out.

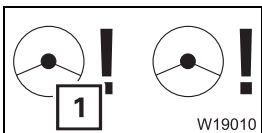
Instrument panel

After the engine start, several lamps must go out.



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

- Check that the lamps (1) and (2) go out. If one or more lamps light up; Warning or malfunction messages on the instrument panel, p. 8 - 5.



If the *Steering system warning* (1) red lamp does not go off, then you must perform the required checks before you start off; p. 8 - 5



Risk of accidents because the truck crane cannot be steered.

If the red *Warning, steering system* lamp lights up, then stop as soon as possible.

The affected axle lines can no longer be steered, which can lead to serious accidents even for reduced speeds.

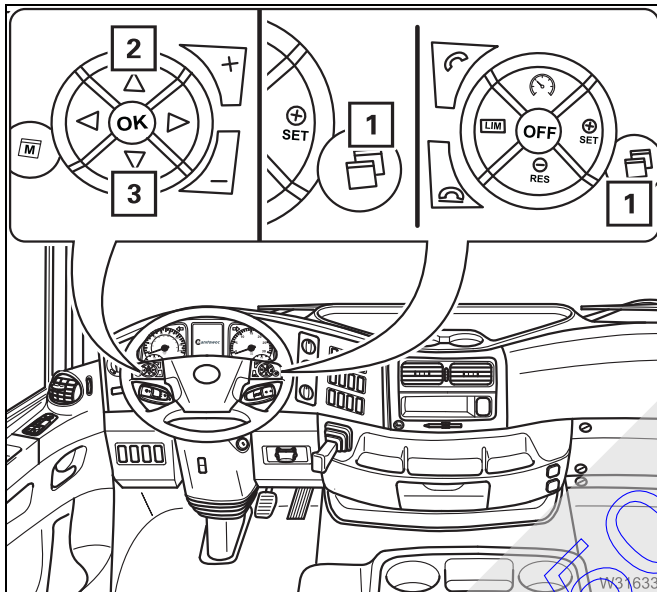
4.1.10

Setting the idling speed

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



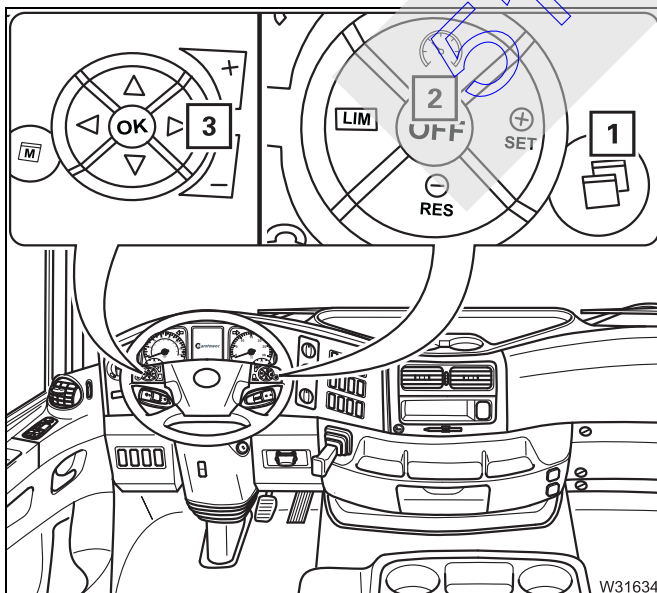
You can only set the idling speed when the truck crane is stationary.



Increasing/reducing the idling speed

- Press the button (1) repeatedly until *Engine speed* is shown in the on-board computer display.
- Increase or decrease the speed stepwise using the buttons (2) or (3). The engine speed is increased/reduced by 20 rpm.

After about 3 seconds the setting is automatically saved.



Switching off the idling speed change

- Press the button (1) repeatedly until *Engine speed* is shown in the on-board computer display.
- Press the button (3).
or
- Press the button (2).
or
- Accelerate to more than 20 km/h (12 mph).

4.2

Switch off the engine

4.2.1

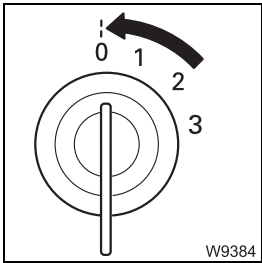
At the ignition lock and with the outrigger control units



Risk of accidents because the truck crane cannot be steered.

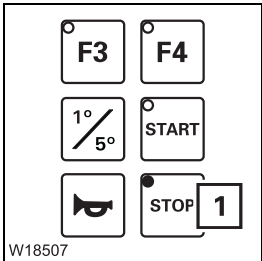
Switch the engine off only once the truck crane has come to a standstill. If you remove the ignition key, the steering will lock and you will lose control of the moving truck crane.

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



Ignition lock

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



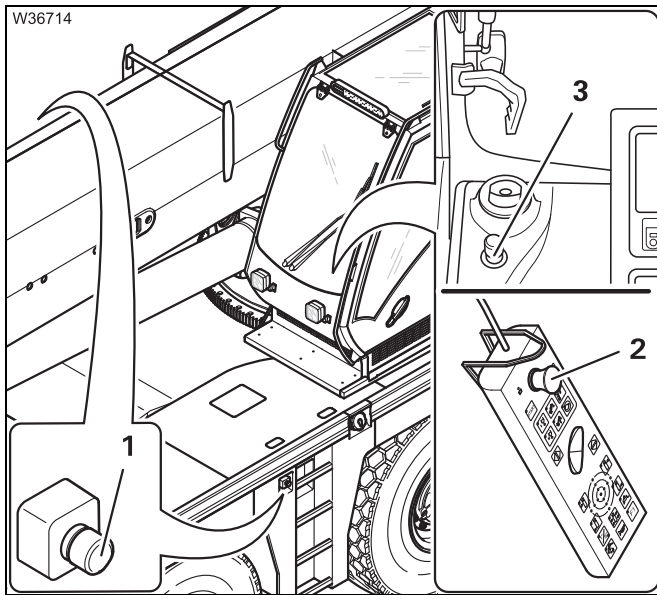
Outrigger control units:

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

After switching off If you want to park the truck crane; p. 5 - 46.

4.2.2

Using the emergency stop switches



Emergency stop switch

Three emergency stop switches are provided for emergency use:

- 1 On the carrier
- 2 On the hand-held control unit
- 3 In the crane cab

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

The engine shuts down.

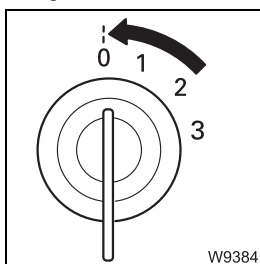


If an air intake inhibitor is present, this is then triggered.



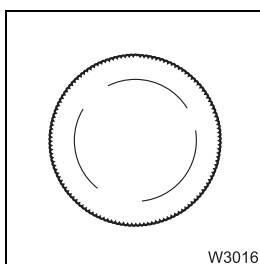
Do not operate the emergency stop switch to switch the engine off in normal operation. Only operate the emergency stop switch in an emergency situation.

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 air intake inhibitors are fitted, they must be released; *Opening the air intake inhibitor*, p. 4 - 20.


4.3

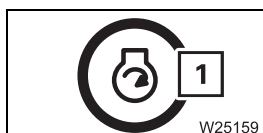
Air intake inhibitor



If the air intake inhibitor is triggered, a flap in the air intake line will close and the engine will stop running – symbol (1) **red** – in the start menu display area;  p. 8 - 13.

The air intake inhibitor is triggered,

- if an emergency stop switch is actuated or
- when the maximum permissible engine speed is exceeded. In this case, the symbol (1) will turn **red** – in the start menu display area;  p. 8 - 13.



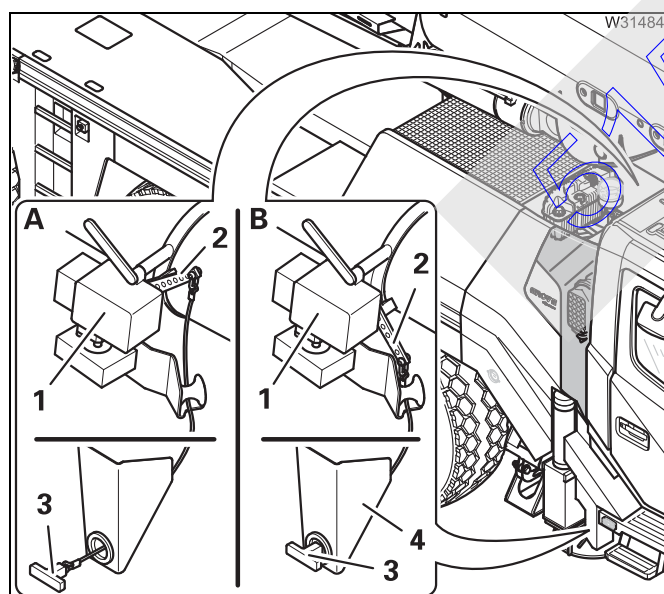
The symbol stays **red** until the ignition has been switched off.

The engine can be restarted only after the flap 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 indicator (2) shows the current state of the air intake inhibitor (1).

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

- Pull as far as possible on the handle (3).

(B) – Insert the pin (3) into the holder (4) – in the *opened* position.

5

Driving

5.1

Before driving

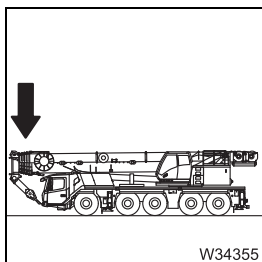
5.1.1

CHECKLIST: checks before on-road driving



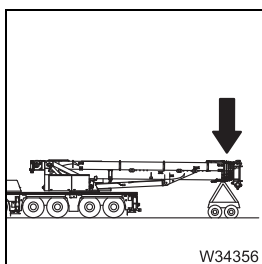
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.

Observe the warnings and safety instructions specified here!



1. For on-road driving without a dolly

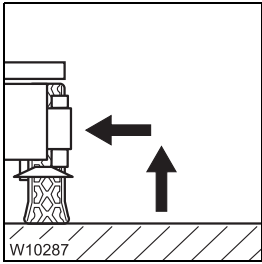
- Depending on the driving mode, the counterweight must be unrigged; ■■■▶ p. 6 - 1, ■■■▶ p. 12 - 71.
- The main boom must be telescoped for driving operation; ■■■▶ p. 11 - 110.
- All telescopic sections must be locked together.
- The slewing gear is switched off; ■■■▶ p. 11 - 120.
- The boom must be resting in the boom rest; ■■■▶ p. 5 - 9.



2. When the main boom is resting on a dolly

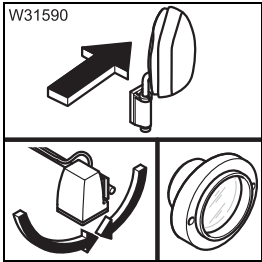
- All telescopic sections must be locked together.
- The slewing gear is switched off; ■■■▶ p. 11 - 120.
- The boom floating position must be switched on; ■■■▶ p. 6 - 13.
- The slewing gear freewheel must be switched on; ■■■▶ p. 6 - 12.
- The boom pre-tensioning might be switched on; ■■■▶ p. 6 - 14.
- If necessary, raise the 3rd axle line; ■■■▶ p. 6 - 15
- The houselock may be switched off; ■■■▶ p. 11 - 17.
- The superstructure must be unlocked; ■■■▶ p. 11 - 15.



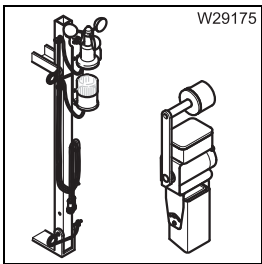


3. On the outriggers

- All outrigger beams must be fully retracted and secured to prevent extension; ■■■▶ p. 12 - 46.
- The outrigger pads are in the driving position ■■■▶ p. 12 - 53.

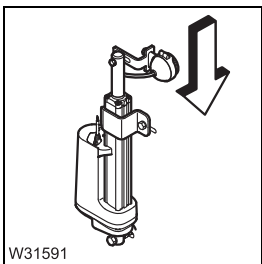


- 4.**
- All mirrors for crane operation are folded in/removed; ■■■▶ p. 12 - 150.
 - All spotlights are switched off and swivelled (if possible) in such a way that no other drivers will be blinded by reflection; ■■■▶ p. 11 - 130.
 - The lighting of the outrigger is switched off; ■■■▶ p. 3 - 36.

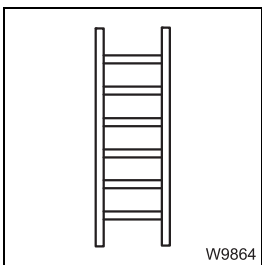


5. Anemometer, air traffic control light and camera system must be removed:

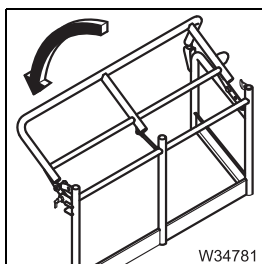
- ▶ *Anemometer and air traffic control light*, p. 12 - 145,
- ▶ *Camera on main boom*, p. 12 - 152.




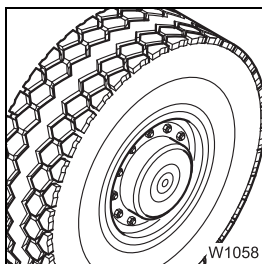
6. The camera on the turntable must be retracted; ■■■▶ p. 12 - 152.





7. All ladders are secured; ■■■▶ p. 3 - 77.

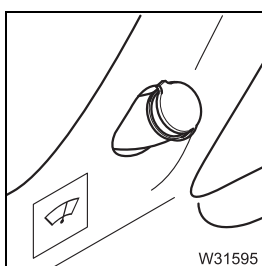


8. All railings must be folded in;  p. 12 - 149.

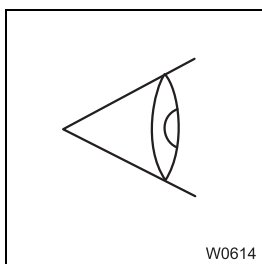


9. Check the tyres:

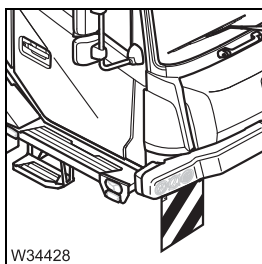
- Tyre pressure when tyres are cold in on-road mode;  p. 1 - 18.
- Other checks;  *Maintenance manual*.





10. Check the level and function of the windscreen washing system;  *Maintenance manual*.

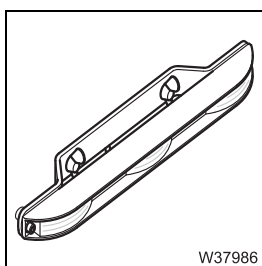



11. Carry out an inspection of the truck crane, looking out in particular for any leaks of fluids (oil, fuel or water).



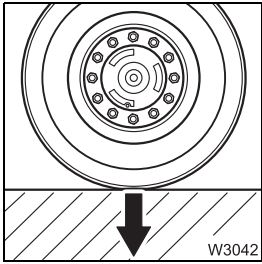
12. The warning signs for marking the vehicle width are folded down (only for vehicle widths of over 2.75 m (9.0 ft));

- Vehicle width;  p. 1 - 8,
- Warning signs;  p. 5 - 9.

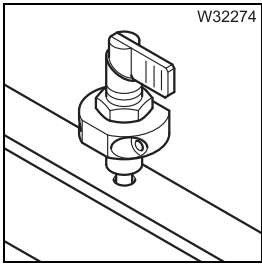


13. If necessary, check whether the third brake light is correctly connected;  p. 5 - 12.



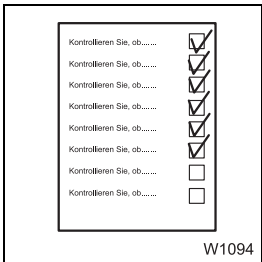


14. The detachable equipment parts must be stripped down so that they fulfil the regulations of the country in which you are working as regards permissible weights and axle loads, lengths, widths, height, etc. For a driving mode with a maximum axle load of 12 t (26,500 lbs);
|||▶ *Driving modes*, p.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

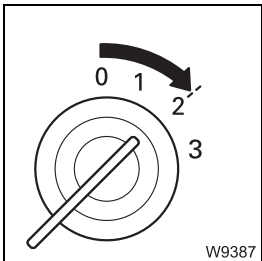


15. The fold-up berth must be folded up and secured; |||▶ p. 5 - 48.

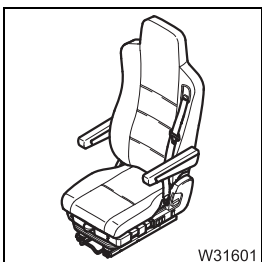
16. All additional parts which may be transported must be secured against falling down.



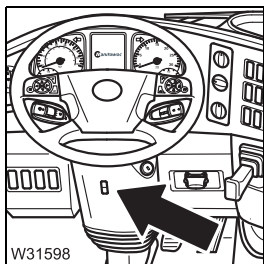
17. Carry out all activities and inspections required for starting the engine;
|||▶ *CHECKLIST: Starting the engine*, p. 4 - 1.



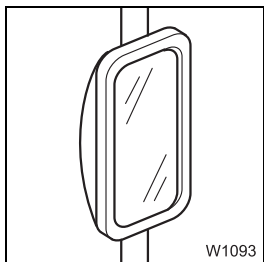
18. Switch on ignition; |||▶ p. 4 - 9.



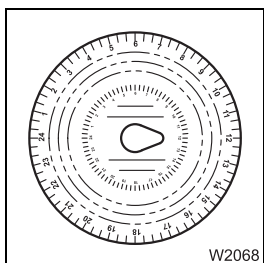
19. Adjust the driver's seat; |||▶ p. 5 - 13.



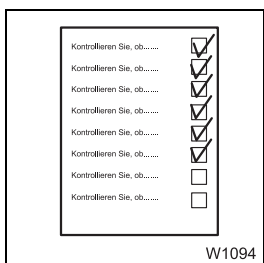
20. Adjust the steering column; p. 5 - 15.



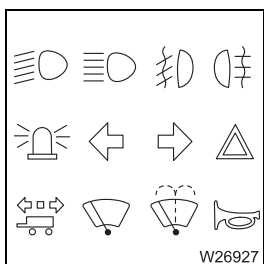
21. Adjust the mirrors; p. 5 - 7.



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

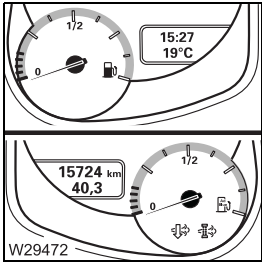


23. Start the engine and carry out all checks; *Checks after starting the engine*, p. 4 - 15.



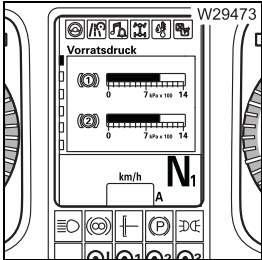
24. Check the electrical system; p. 5 - 7.





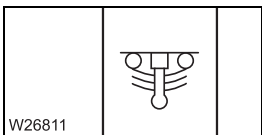
25. Check the fluid supply:

- Fuel tank, p. 4 - 5,
- AdBlue tank, p. 4 - 7.

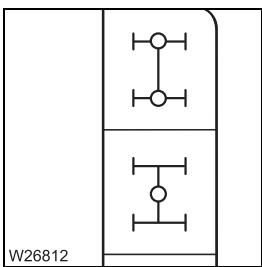


26. Check the compressed-air system and the brakes; p. 5 - 10.

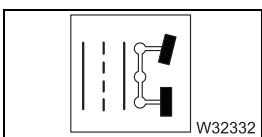
27. Check that all switching states for on-road driving are set, and that the corresponding symbols are shown:



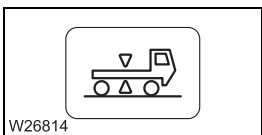
- Suspension switched on; p. 5 - 17,



- Longitudinal and transverse differential locks switched off;
 p. 5 - 51,



- Separate steering switched off – the symbol for on-road driving is displayed; p. 5 - 63,



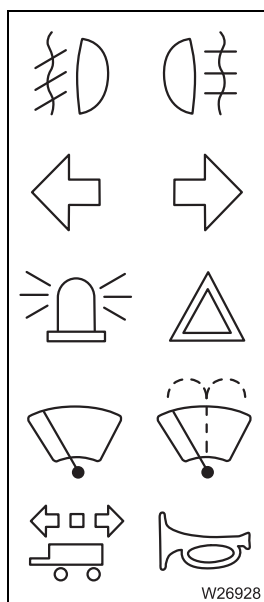
- On-road level is set; p. 5 - 54.

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

5.1.2

Check the condition of the truck crane

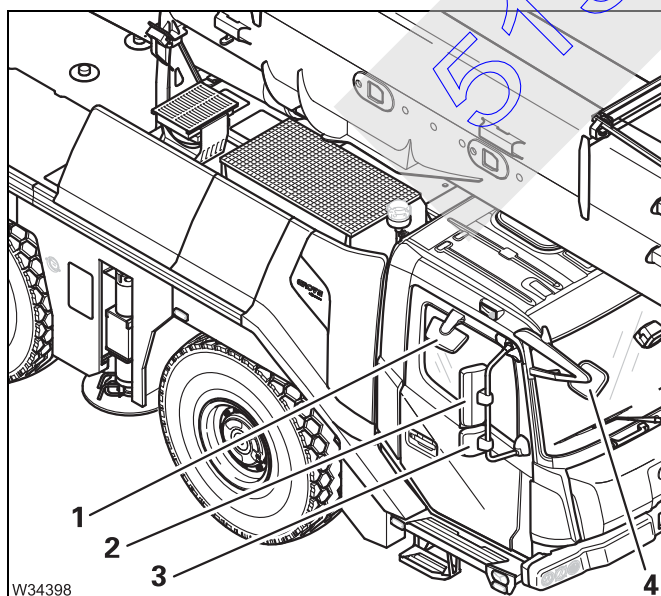
Electrical system



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

Adjusting the mirrors

Adjust all the mirrors to suit your sitting position.

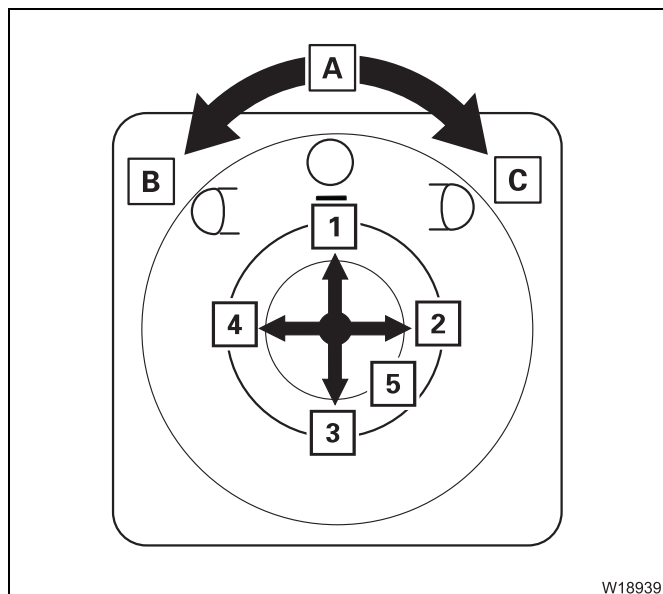


Manual adjustment

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

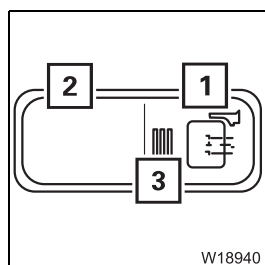
The mirrors (2) are adjusted electrically on both sides.





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** Up
 - 2** Right
 - 3** Down
 - 4** Left



Mirror heating

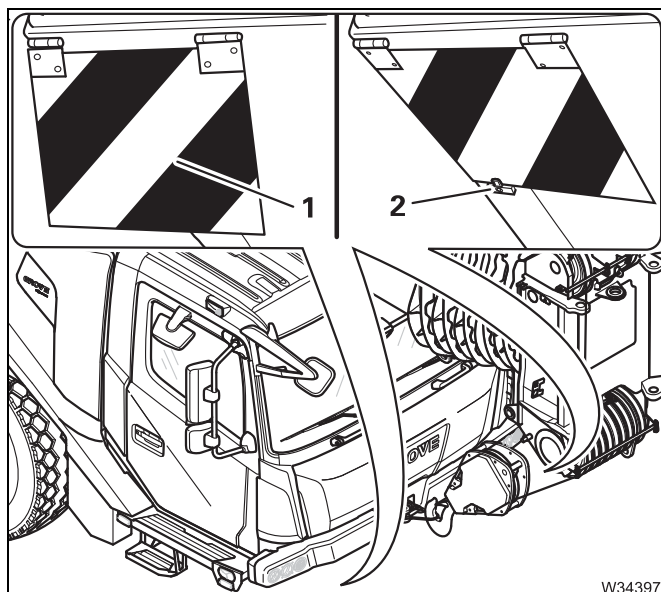
- 1 Switch on:**
- 2 Switch off:**

Press button once – lamp (3) turns on
Press button once – lamp (3) turns off

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Warning plates for vehicle width

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



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

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

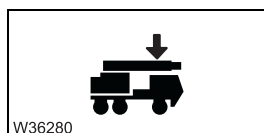
Checking the vehicle height

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



Risk of accidents by exceeding 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.

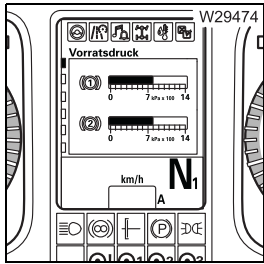


If the *Vehicle height check* function is present, the position of the main boom in the boom rest is monitored. In this case, a corresponding warning is shown on the CCS display if the main boom has not been correctly put down; ►► p. 8 - 16.



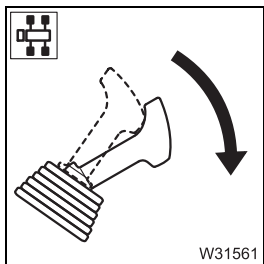
Supply pressure

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



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

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



Building up supply pressure

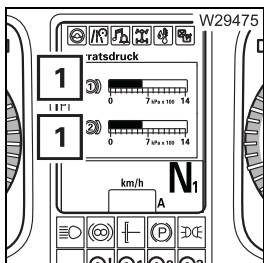
- Check that the parking brake is applied.



Risk of accidents by truck crane moving unintentionally

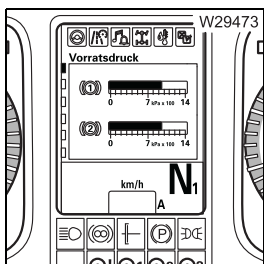
Make sure that the lever is pointing to the rear before building up the supply pressure.

This prevents the parking brake releasing 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.

The light (1) turns off once the supply pressure reaches about 5.5 bar (80 psi).

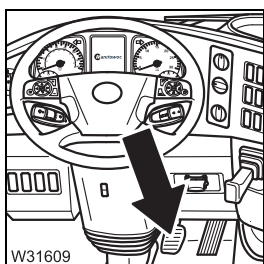


- Refill the supply pressure until
 - about 8 bar (116 psi) is reached **and**
 - a valve audibly discharges pressure.

There is now sufficient supply pressure.

Parking brake

Check the function of the parking brake.



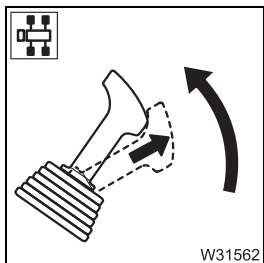
- Activate the service brake.



Risk of accidents by 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.



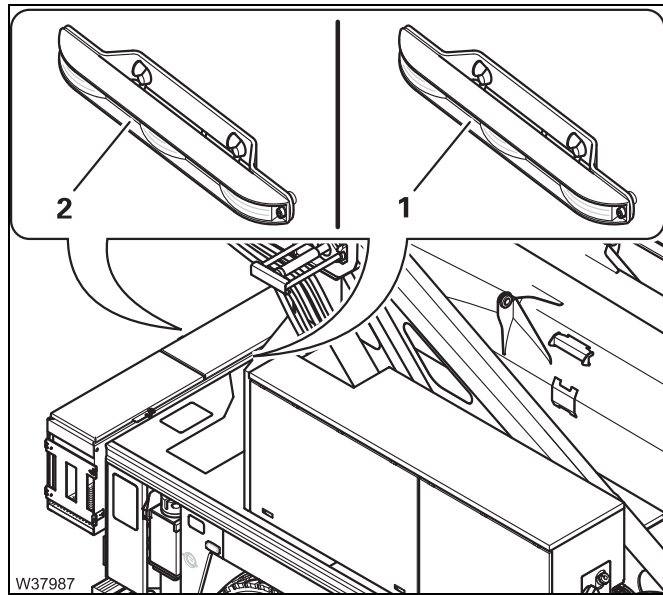
When the supply pressure is sufficient, the parking brake is released and the lamp (1) goes out.

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Third brake light

If a third brake light is present, then you must check to ensure it is correctly connected.



One brake light (1) is at the rear of carrier.

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

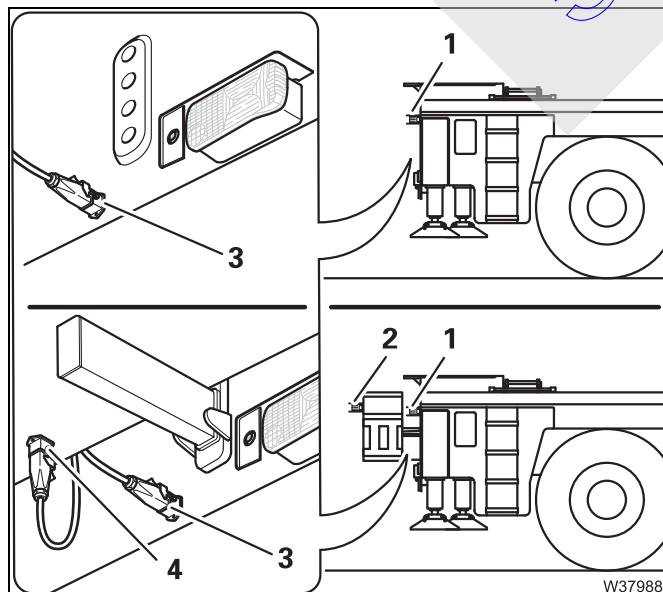


Risk of damage to the connecting cables!

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

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

Carry out a function check before driving.



For versions without storage box

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

For versions without storage box

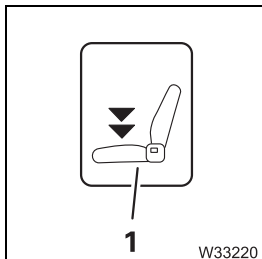
For on-road driving, the brake light (2) must be connected to the socket (3).

The plug of the brake 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

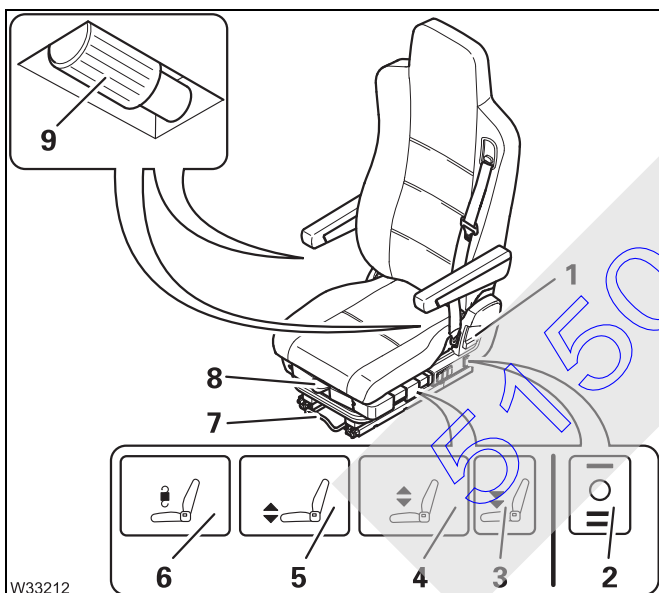


The seat height and lumbar support are adjusted pneumatically. You can only make these adjustments when:

- the switch (1) on the driver's seat is switched off (not pressed in),
- sufficient air pressure is available in the secondary consumer circuit. You may have to build up the supply pressure;  p. 5 - 10.

- 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.

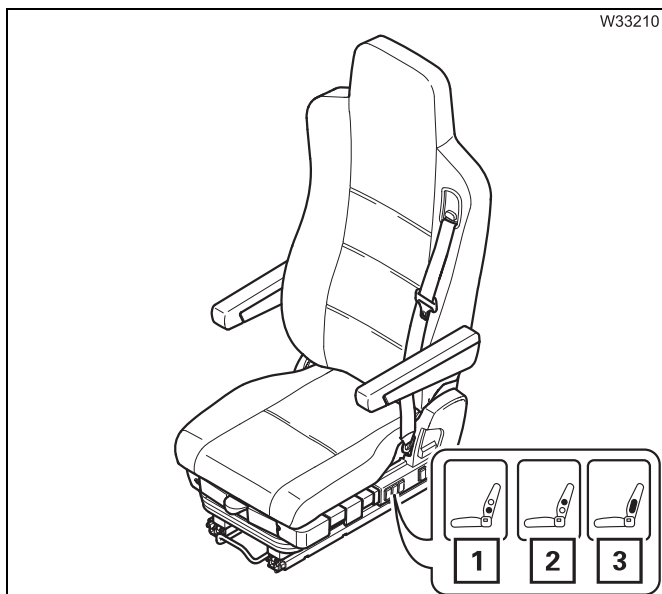


Settings for body size

- 1 Back rest – angle
- 2 Seat heating on/off¹⁾
- 3 Lower it to the lowest position
- 4 Seat – height
- 5 Seat – inclination
- 6 Spring hardness
- 7 Seat longitudinal adjustment
- 8 Seat cushion – longitudinal adjustment
- 9 Armrests – inclination¹⁾

1) Additional equipment





Settings for body shape

- 1 Lower lumbar area support
- 2 Upper lumbar area support
- 3 Lateral support

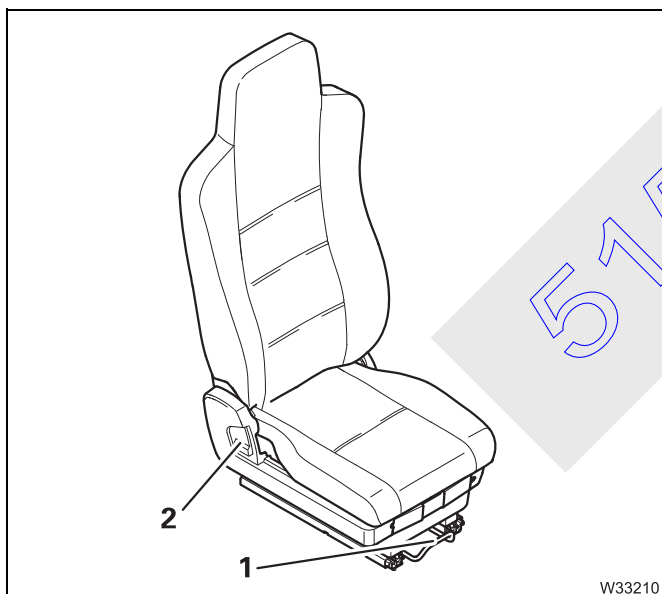
The settings are made pneumatically.
The following applies to all buttons:

Empty the air cushion: Press -

Fill the air cushion: Press +

Adjusting the passenger seat

The passenger's seat is adjusted mechanically.



- 1 Seat - inclination
- 2 Back rest - angle

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Adjusting the steering column


The steering column is unlocked pneumatically.

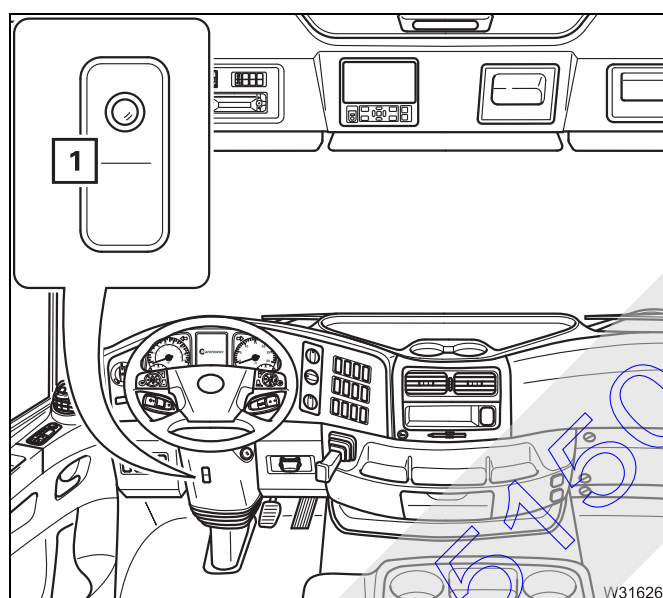


Risk of accidents by unlocked steering column

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 up supply pressure*, p. 5 - 10.

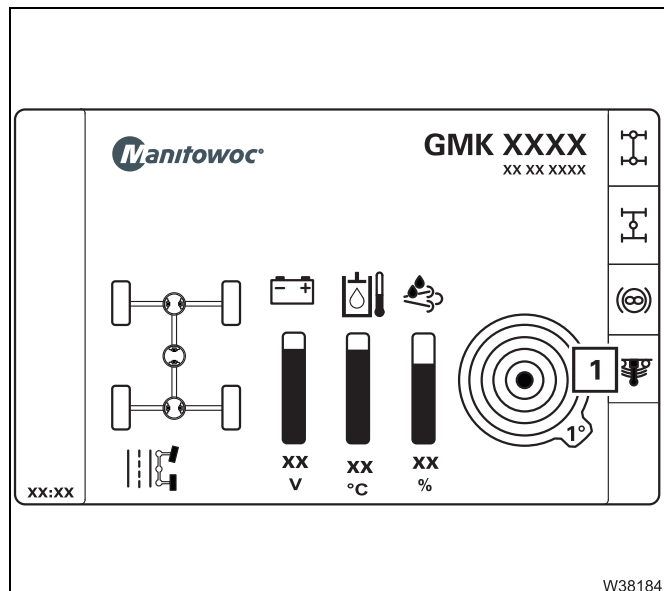


- Push the (1) button down once. The steering column is unlocked for about 6 seconds.
- Move the steering column into the desired position.
- Push the button (1) up once.
Or wait until the steering column locks automatically (after about 6 seconds).

5.1.4

Switching the suspension on/off

The suspension is switched off whenever the ignition is switched off.
The suspension must be switched on for on-road driving.



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

Symbol green: Suspension is switched on

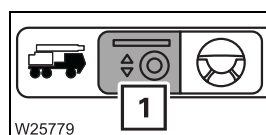
Symbol red: Suspension is switched off

When the symbol is violet: Error

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

Open menu

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



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

Switching the suspension on

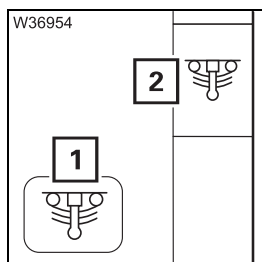
The suspension cylinders are enabled when the suspension is switched on. This state must be established for on-road driving.



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



- Select and confirm the symbol (1).

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

If the (2) symbol stays **red**, the supply pressure may be too low. In this case the suspension would only be switched on if sufficient supply pressure is built up; ► *Building up supply pressure*, p. 5 - 10.

Switching the suspension off

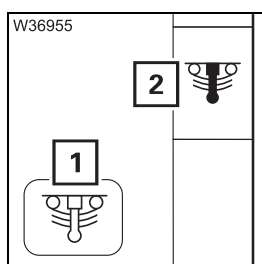
When the suspension is switched off, the suspension cylinders are locked. This state is intended only for crane operation.



Risk of damage to the axle lines

Always switch the suspension on for on-road driving.

The axle lines may become 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) is **red**.

5.1.5

Setting the tachograph

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

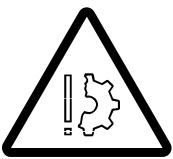
As a crane operator, you are obligated to set each activity on the tachograph.



This section only describes the basic operation of the tachograph (inserting diagram sheets, setting time groups, operating errors).

Before operation, also note the information in the tachograph manufacturer's separate operating manual.

There you will find detailed information (marking the diagram sheets, malfunctions, etc.).



Risk of damage to the tachograph drawer

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

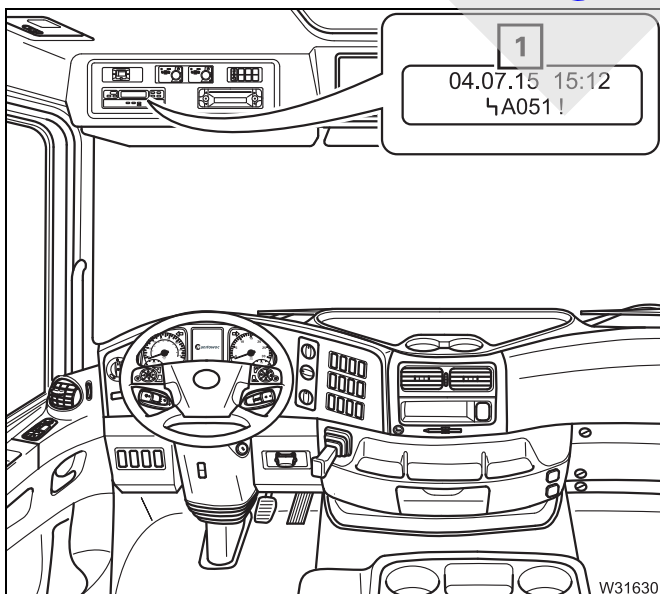
Prerequisites


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

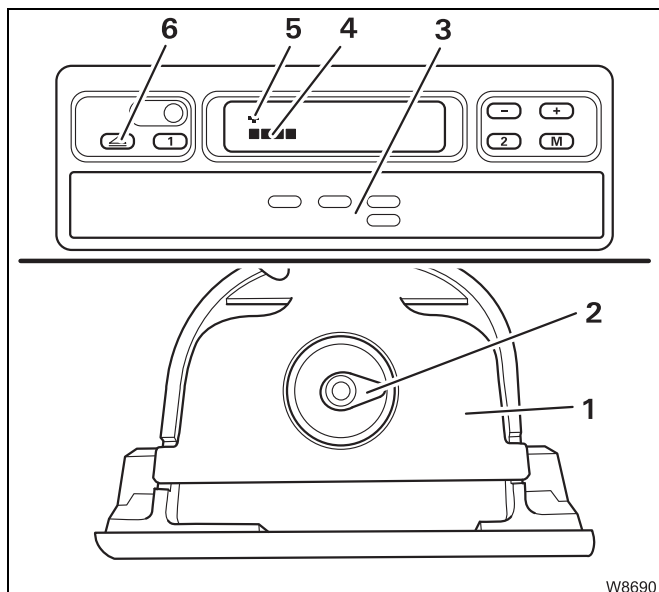
Check that a malfunction has occurred.



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



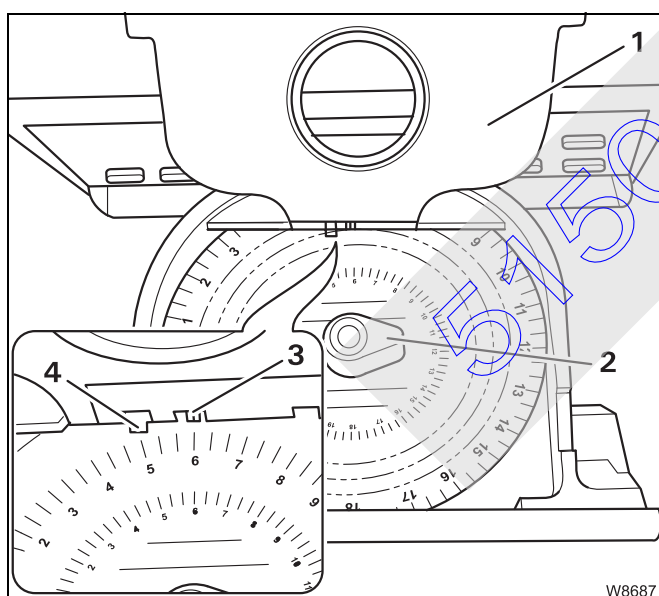
Opening the drawer

- Press the button (6) once.

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

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

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



Checking the time setting

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

Correcting the time

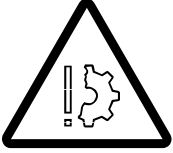
- Take all the diagram sheets out of the diagram sheet mounting.
- Close the drawer.
The time setting is corrected automatically.
- Open the drawer and insert the required diagram sheets.



Inserting diagram sheets

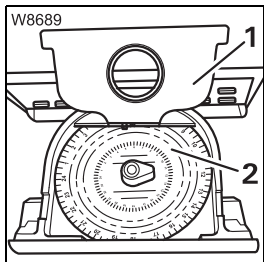


Only insert diagram sheets that are properly marked.
The diagram sheets are always inserted with the front facing upwards.



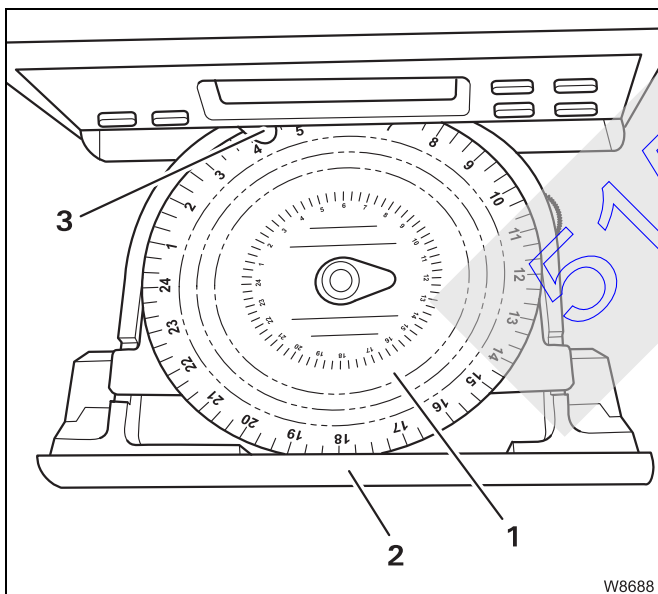
Risk of malfunctions in the electronics

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



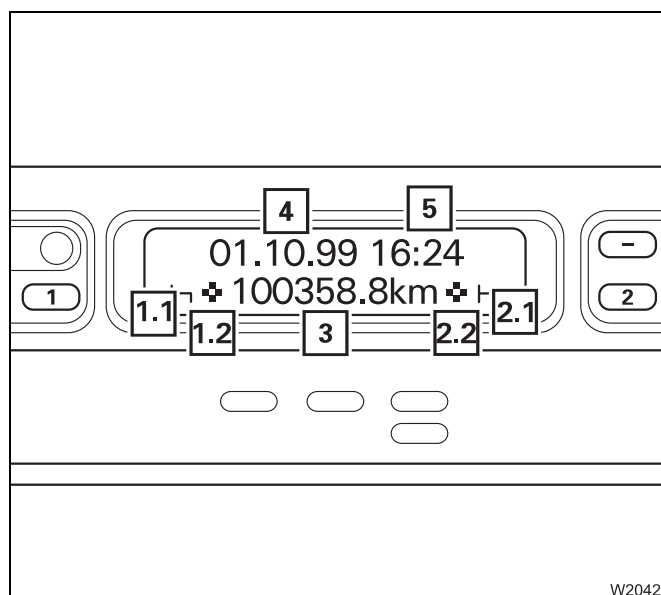
For **2-driver operation**, a diagram sheet (2) for driver 2 must be placed below the isolating plate (1):

- 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 downwards.
- Put 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.

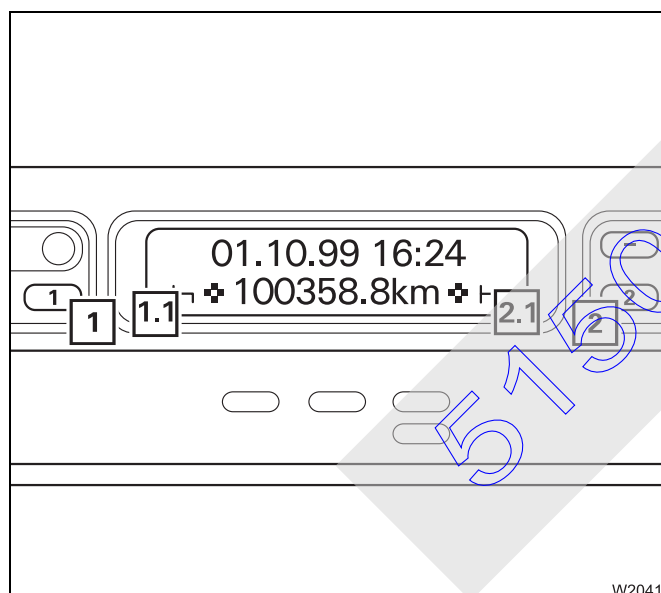
For single-driver operation the diagram sheet mounting under the isolating plate is empty and only the diagram sheet (1) for driver 1 is inserted.



Display

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

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



Setting the time groups

Set the time group for driver 1 using the button (1).

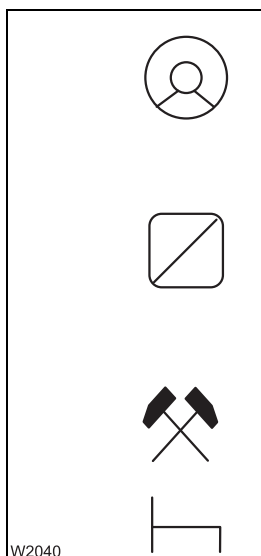
The set time group is shown with the symbol (1.1).

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

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



The different time groups are shown with the following symbols:



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

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

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

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



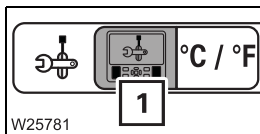
If the drivers swap during **two-driver operation**, the diagram sheets in the trip recorder also have to be changed. The driving time is always recorded on the diagram sheet which is on the isolating plate (driver 1).



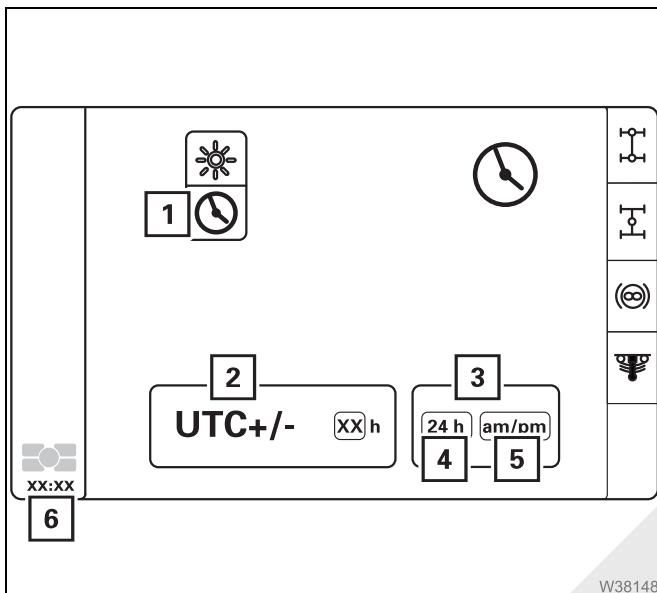
In **single-driver operation**, the symbol for resting must always be set for driver 2 otherwise an error message will appear.

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5.1.6 Setting the time



- Open the *Set display brightness and date/time menu* (1).



- Select and confirm the symbol (1).

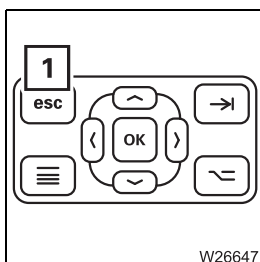
Setting the time

- Select and confirm the symbol (2).
- Select the current time – expressed as a deviation from UTC time.
- Confirm the selection. The newly set time is shown on the display (6).

Switching 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 becomes orange.

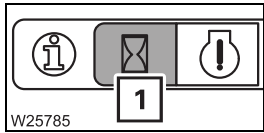


You can **cancel the input** at any time.

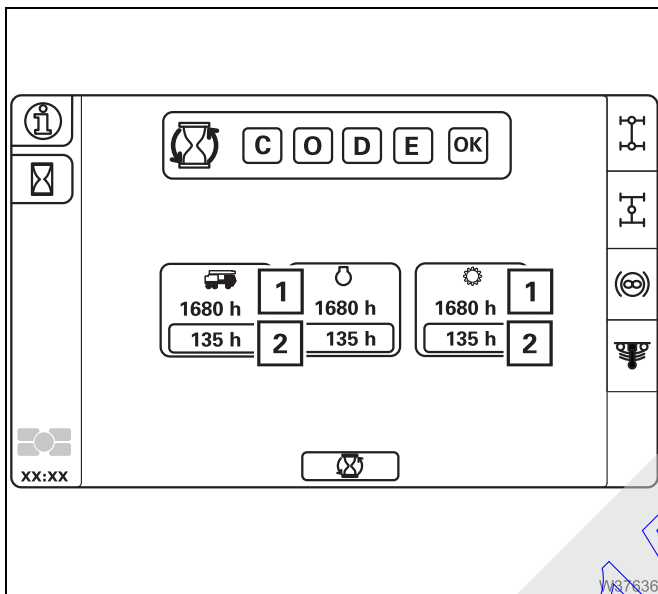
- Press button (1) – no values are changed.

5.1.7 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.



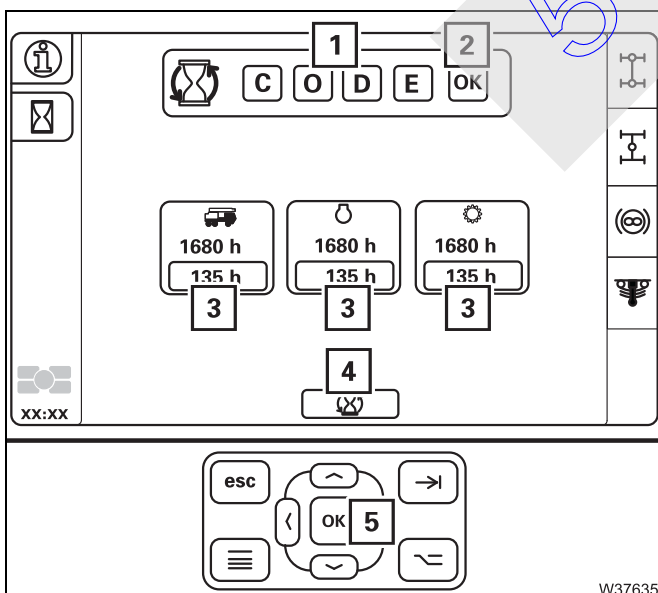
- Open the *Operating hours* (1) menu.



Displays

The operating hours are recorded as follows:

- The value (1) indicates 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 individually select power units

- display (3) or

- select all – symbol (4).

- Reset the selected operating hours with button (5).

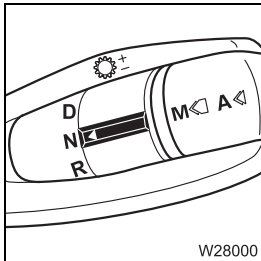
5.2

Operating the transmission

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

5.2.1

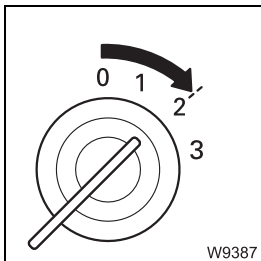
Switching on



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

- Shift to position **N**.

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



- Switch on the ignition.

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

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5.2.2

Switching the transmission to the neutral position

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



Risk of accidents when switching 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.



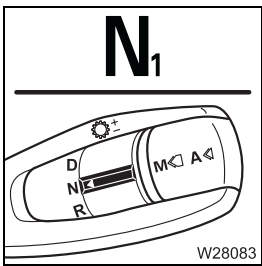
Risk of accidents due to the truck crane rolling away

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

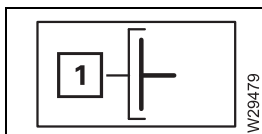
Selecting the driving direction

Before driving at temperatures below -20 °C (-4 °F); p. 5 - 34.

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

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

- Start the engine; p. 4 - 13.



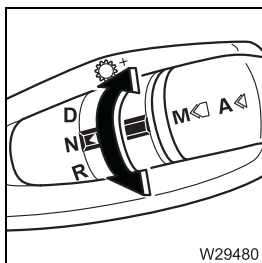
If the supply pressure is insufficient for shifting the transmission, the display will show the symbol (1). A corresponding message is also displayed. If necessary, wait until the supply pressure has built up, and the message disappears; *Building up supply pressure*, p. 5 - 10.

- Release the accelerator.

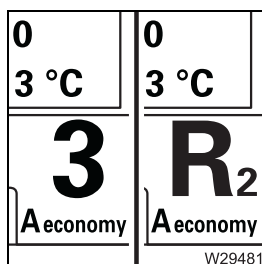


Risk of accidents from uncontrolled starting

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.



- In order to
 - drive **forwards**, shift to position **D**.
 - drive **backwards**, shift to position **R**. An acoustic signal is given with additional equipment.

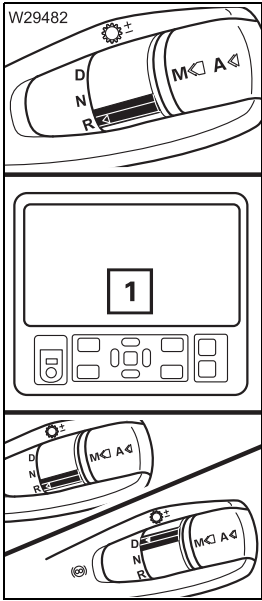


The operating mode *Automatic* is now selected. An appropriate starting gear is selected and displayed:

- for forward travel, e.g. 3rd gear,
- for reverse travel, e.g. 2nd gear.

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





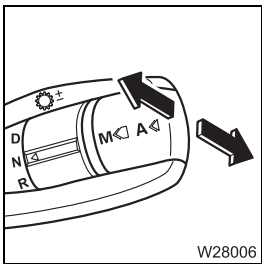
For reversing

The reversing camera and the reversing lamp are switched on.

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

When you exit the 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.

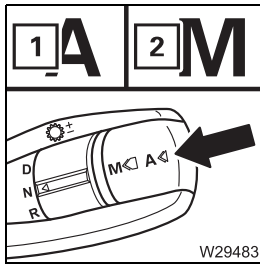
- Pull the gearshift lever upwards once.
The starting gear is shifted up by one gear.
- Press the gearshift lever downwards once.
The starting gear is shifted down by one gear.

The altered starting gear is shown on the display.

By changing the starting gear, you also change the transmission over to *Manual* 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



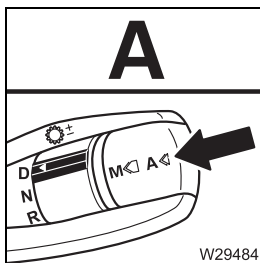
The display shows which operating mode is switched on.

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

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

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

Changing to automatic mode



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

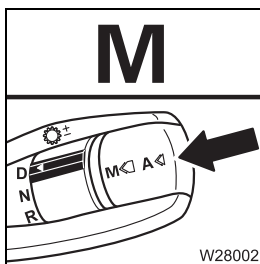
- Press the gearshift lever in once.

The transmission switches to the *Automatic* operating mode.

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

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

Change to manual mode



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

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

Changing over without gear change

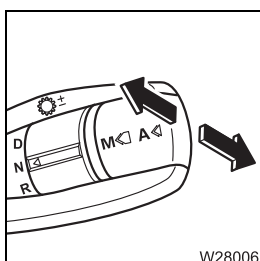
- Press the gearshift lever in once.

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 upshifts one gear (or downshifts one gear) and is now in *Manual* operating mode.



5.2.5

Starting

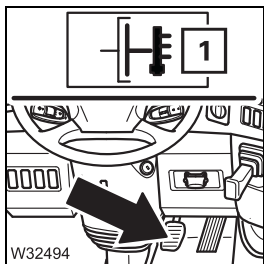


Risk posed by unexpected rolling!

Also apply the parking brake before starting on sloping ground. The gear will be engaged only once you depress the accelerator. This can lead to the truck crane starting to move (perhaps backwards) whilst you are moving your foot from the brake pedal to the accelerator.

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

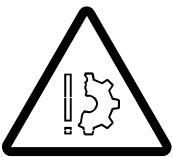
- Apply the parking brake.
- Depress the accelerator (now the clutch starts to be engaged)
- Release the parking brake after the clutch is engaged (tone of the engine changes)



Warning message when starting

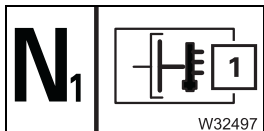
When the load on starting is so high that it would cause the clutch to overheat, a warning buzzer sounds. The symbol (1) is also displayed.

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



Risk of clutch damage

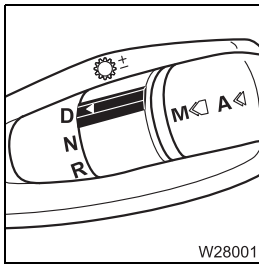
Always release the accelerator when the warning message is shown. The clutch will become overheated and damaged if you do not stop the starting procedure.



- 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



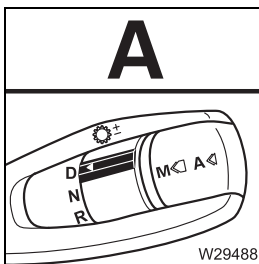
- When driving, always leave the switch in the position for the current driving direction, e.g. in position **D** for forward travel.



Risk of accidents due to changing transmission direction whilst driving

If whilst driving in one direction you select a gear for the opposite 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.

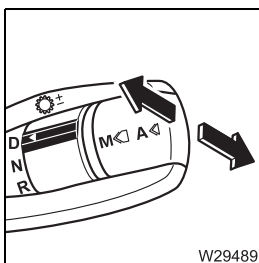
Automatic upshifting

You can influence upshifting by using the accelerator.

- Pressing the accelerator slightly: Upshifting at low engine speed
- Pressing the accelerator harder: Upshifting at high engine speed

Automatic downshifting

- When you slow down the truck crane by braking, the transmission shifts down when the appropriate engine speed is reached.
- If you fully depress the accelerator full (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, so as to achieve maximum acceleration.



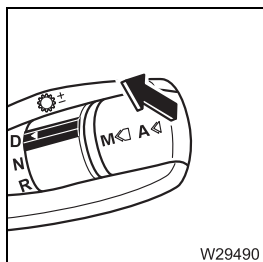
If you execute a manual gear change using the gearshift lever, you simultaneously switch to *Manual* operating mode.

The transmission will only perform an automatic shift after you have switched to *Automatic* operating mode (push in the gearshift lever once).



In manual operating mode

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

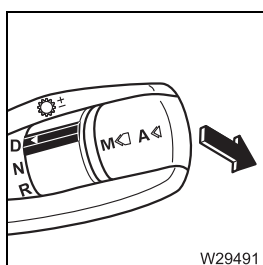


Manual upshifting

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

- Upshifting one gear: Push up once
- Upshifting two gears: Briefly push upwards twice
- Upshifting three gears: Briefly push upwards three times

The newly engaged gear will be shown in the display.



Manual downshifting

To downshift, you must press the gearshift lever downwards briefly:

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

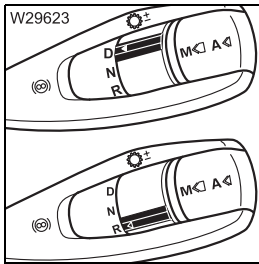
The newly engaged gear will be shown in the display.



If you initiate a gear change which would cause the maximum permitted engine speed to be exceeded, the transmission does not shift. In that case, slow the truck crane down until a permissible engine speed is reached, and downshift 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.

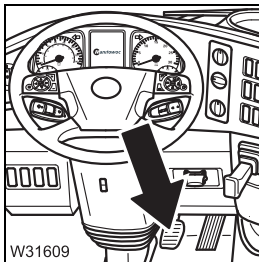
The newly engaged gear will be shown in the display.



Up to a speed of approx. 30 km/h, 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 actuate the brake pedal.

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

Stopping for longer periods

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.

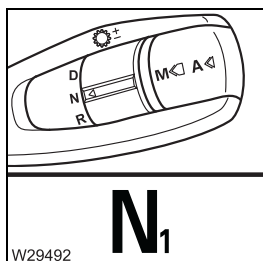
5.2.9

On the roller type dynamometer



Danger of unexpected moving off rollers

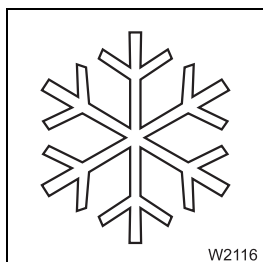
Always shift to the neutral position on the roller type dynamometer. In position **D** or **R**, a suitable gear is engaged for the speed. The engine braking power is applied against the rollers and the truck crane can drive out of them.



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

5.2.10

Preheating transmission



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 preheated before you start driving the truck crane.

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

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5.3

Driving the truck crane and switching it off



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 accident when the ignition is switched off

Never switch off the ignition while driving.

Once the ignition is switched off, the 4th axle line is brought into the straight-ahead position, and can no longer be steered.

This changes the turning radius of the truck crane.

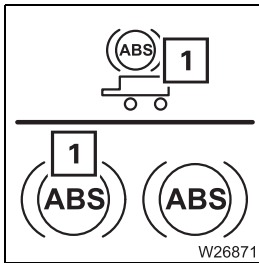
5.3.1

Checks whilst driving

Brakes


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

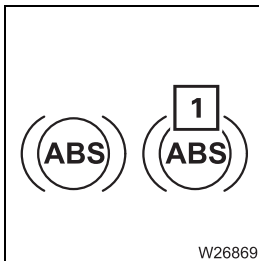
ABS system



- Check the lamps (1).

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

If a lamp does not go out, the corresponding ABS system is faulty, and the wheels will no longer be prevented from blocking. The full braking force remains intact;  *Malfunctions of the service brake*, p. 8 - 25.

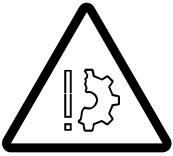


If the lamp (1) lights up, then the braking process is supported by the ABS system.



Steering

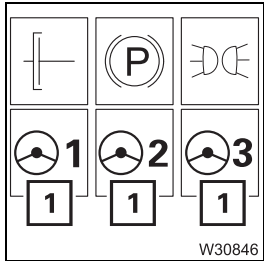
- Always pay attention to all the indicator lamps and all information in this and subsequent sections.



Risk of accident due to mobile crane that cannot be steered and leaking oil

If a warning message occurs, be 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.

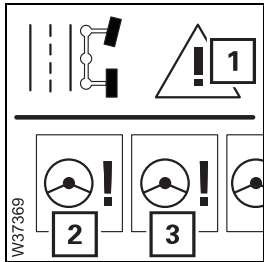


- Check the lamps (1) – at speeds over 10 km/h (6 mph), all the lamps must be out.

– If one or more lamps is lit (1)

One or more steering circuits have failed.

- Stop as quickly as possible, turn off the motor and perform the required checks; p. 8 - 6.



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

– If lamp (3) is lit – symbol (1) yellow

Steering system malfunction (with the without warning buzzer) – continued driving is not possible

- Pay attention to the subsequent information for the next stop; p. 8 - 7.

– If lamp (2) is lit – symbol (1) red

Steering system warning

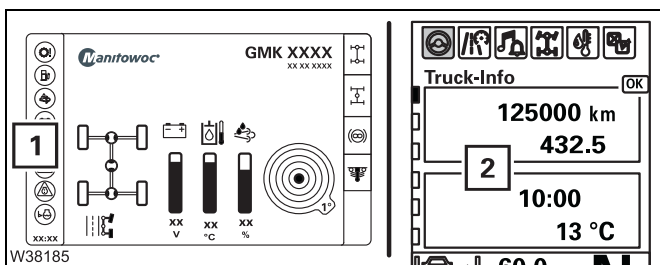
- Stop as quickly as possible and perform the required checks; p. 8 - 7.

Warning messages



Risk of damage if warning messages are disregarded!

After the occurrence of warning messages, 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.

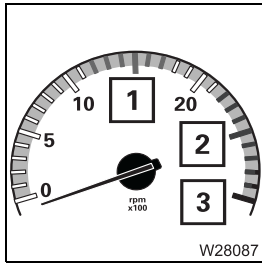


- Note the warning messages at the CCS display (1); p. 8 - 13.

- Note the warning messages at the On-board computer display (2); p. 8 - 13.

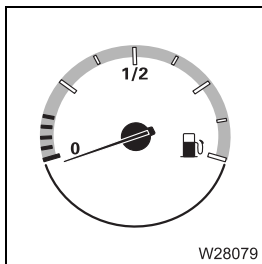
Monitoring elements

- Also pay attention to the monitoring elements.



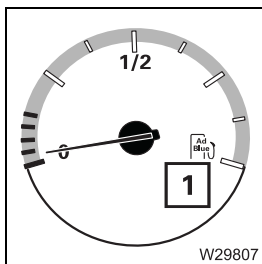
Tachometer

- 1 Green:** Economic consumption
- 2 Yellow:** Engine brake active
- 3 Red:** Engine speed too high – danger;
▣▣▣▣ Checks when driving downhill, p. 5 - 42



Fuel level display

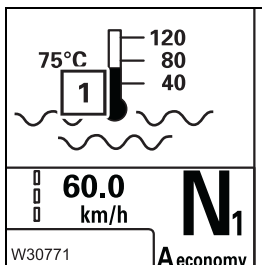
Never run the fuel tank completely dry; always refuel in time; ▣▣▣▣ p. 4 - 5.
If the fuel tank is almost empty, air can be sucked in and the fuel system must then be bled; ▣▣▣▣ *Maintenance manual*.



Adblue filling level indicator

If possible, never run the Adblue tank completely dry; refuel in due time; ▣▣▣▣ p. 4 - 7.

If the Adblue tank is empty, the lamp (1) lights and the slewing moment is reduced; ▣▣▣▣ p. 5 - 45.



Coolant temperature display

- 1** Coolant temperature display in degrees Celsius
In the event of malfunctions; ▣▣▣▣ p. 8 - 19

5.3.2

Cruise control

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

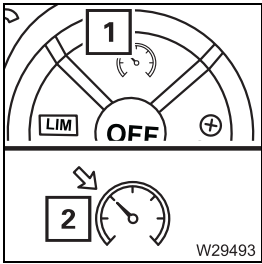


Risk of accidents due to carelessness

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.

Switching on

You can switch on cruise control only at speeds above 15 km/h (9 mph).



- Press the button (1) once.

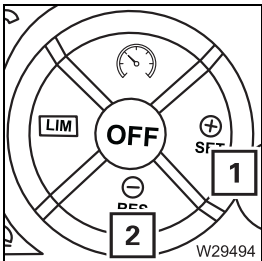
Cruise control is switched on. The symbol (2) is displayed in the Driving display.

The current speed is maintained.

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



On downhill slopes, the speed set may be exceeded since cruise control does not brake the truck crane. Switch the cruise control off on downhill slopes.



Increasing/reducing the speed

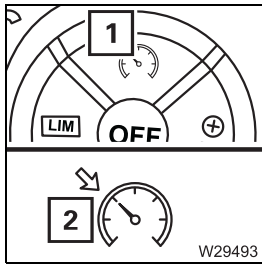
- Increase with (1)
- Reduce with (2)

- Press the corresponding button until the desired speed is reached
or

- Press the corresponding button once. The speed will increase/decrease by 0.5 km/h (0.3 mph)

The set speed is maintained.

Switching off



- Press the button (1) once. The cruise control is now switched off. The symbol (2) goes out in the Driving display.

Cruise control is also switched off,

- when the service brake or additional brake is applied
- when speed falls below 10 km/h (6 mph),
- when the Temposet function is switched on,
- when the ignition is switched off.

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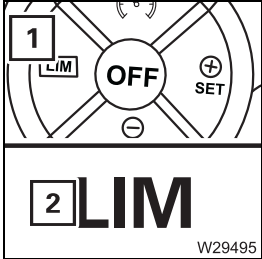
5.3.3

TempoSet

You can use TempoSet to limit the maximum speed.

Switching on

You can switch on TempoSet only at speeds greater than 15 km/h (9 mph).

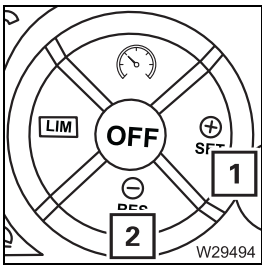


- Press the button (1) once.

TempoSet is now switched on. The symbol (2) is displayed in the Driving display.

The current 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). The TempoSet limits the speed again only once you release the accelerator and press it again.



Increasing/reducing the maximum speed

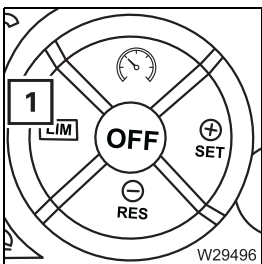
- Increase with (1)
- Reduce with (2)

- Press the corresponding button until the desired speed is reached

or

- Press the corresponding button once. The speed will increase/decrease by 1.0 km/h (0.6 mph)

Switching off



- Press the button (1) once.

The TempoSet is now switched off.

5.3.4

Driving downhill



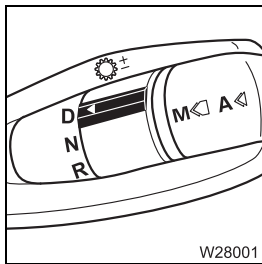
Risk of accidents when driving in neutral position

Never switch into neutral position whilst 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 and service brakes.
- Apply the accelerator if you wish to accelerate.
- Do not apply the accelerator if you wish to brake with the engine.

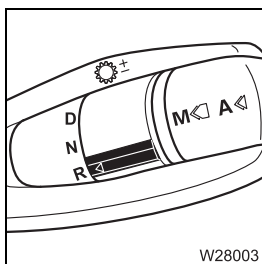


If the truck crane starts to move forwards in neutral position you can still switch to position **D**. A gear appropriate to the speed is engaged and the engine brake power is effective.



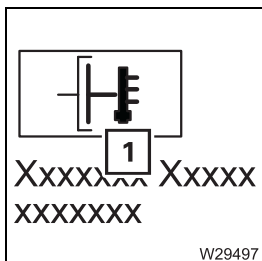
Danger when starting to reverse

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 roll away before this (when changing from brake pedal to accelerator), no gear will be engaged, and you can stop the truck crane only by braking.



To start **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.



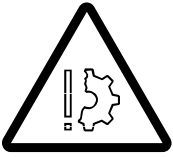
If the symbol (1) with a message is shown when starting:

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



Checks when driving downhill

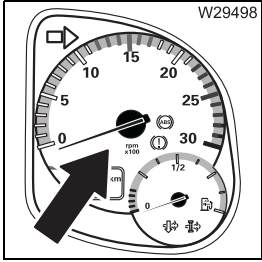
While driving, the engine speed may not exceed 2,300 rpm. The engine speed is not limited automatically.



Risk of damage due to excessive engine speed

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

This prevents damage to the engine or transmission.



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



Risk of damage from resonance vibrations

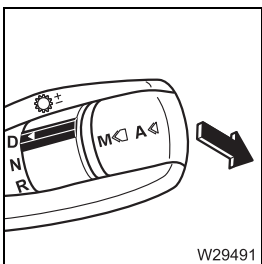
Always maintain a speed below 85 km/h (53 mph). Stop the truck crane promptly.

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

- By shifting down; ■■■▶ p. 5 - 42
- With the engine retarder; ■■■▶ p. 5 - 43
- With the eddy current retarder; ■■■▶ p. 5 - 43.

Downshifting

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



- Press the gearshift lever downwards once.

Manual operating mode is switched on, and if possible, one gear is shifted down.

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

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

Additional brakes

Engine retarder

The truck crane has an engine flap brake which it uses as an engine retarder. The engine retarder only becomes effective at an engine speed of 950 rpm and can be used up to a maximum speed of 2,300 rpm.



Risk of accidents from unexpected acceleration

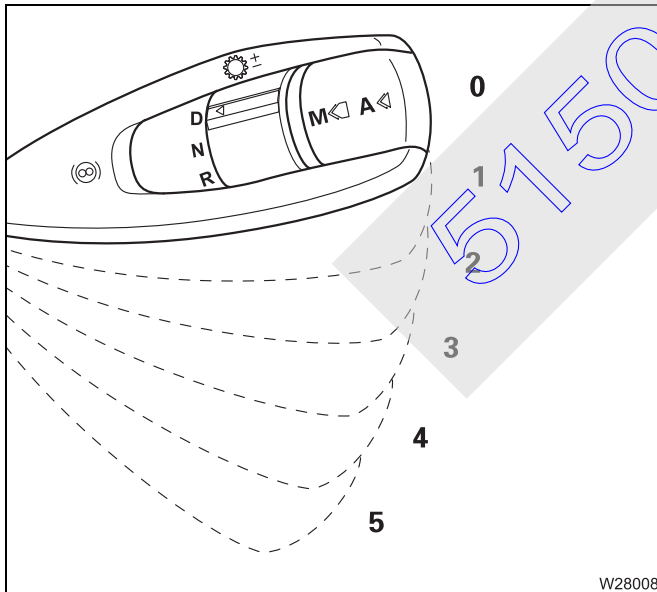
Maintain sufficient distance when the engine retarder is switched on. The effectiveness of the engine retarder is interrupted during gear shifting. This may cause the truck crane to accelerate briefly.

Transmission retarder

The truck crane can also be rigged with a transmission retarder. The braking force of the transmission retarder depends on the speed. The higher the speed, the higher the braking power.



For long downhill stretches, we recommend that you use level 2. When the transmission retarder is switched on, you cannot regulate the speed with the accelerator.



Switching on the additional brakes

- Pull the switch back to the required level (latch into place briefly at each level).
 - 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 upwards to level 0.



When the additional brake is switched on, the lamp (1) lights up.

5.3.5

Driving uphill

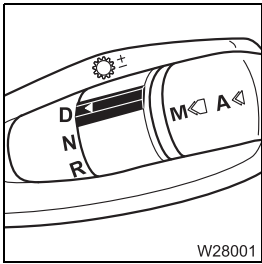
Starting

The engine must be running.



Danger of the truck crane starting to roll away unexpectedly


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



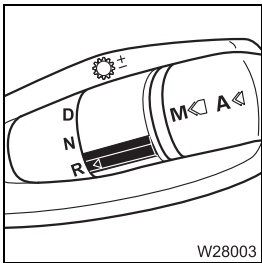
To start **moving forwards** you must do the following:

- shift into **D** position.
- apply the parking brake.
- press the accelerator.
- release the parking brake after the clutch has engaged.



Pay attention to any messages appearing on the on-board computer display when starting driving;  p. 8 - 9.

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



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

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

Driving

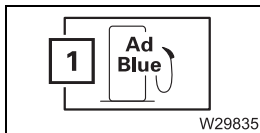
On certain gradients, the transmission may switch continuously back and forth between two gears. In this event, either release the accelerator slightly or downshift by one gear.

5.3.6


Overriding torque reduction

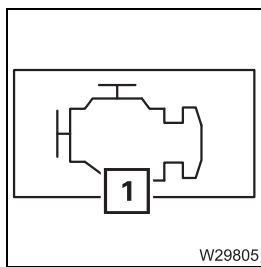
If the AdBlue tank is empty, torque reduction is activated via the engine control system.

You can override torque reduction up to 3 times.



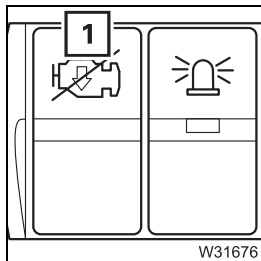
– If the level in the *AdBlue* tank falls to the reserve level, then the symbol (1) is displayed.

- Immediately fill up with *AdBlue*;  *AdBlue tank*, p. 4 - 7.



– If the *AdBlue* tank is empty, the light (1) will flash.

The engine torque is reduced the next time the engine is started.

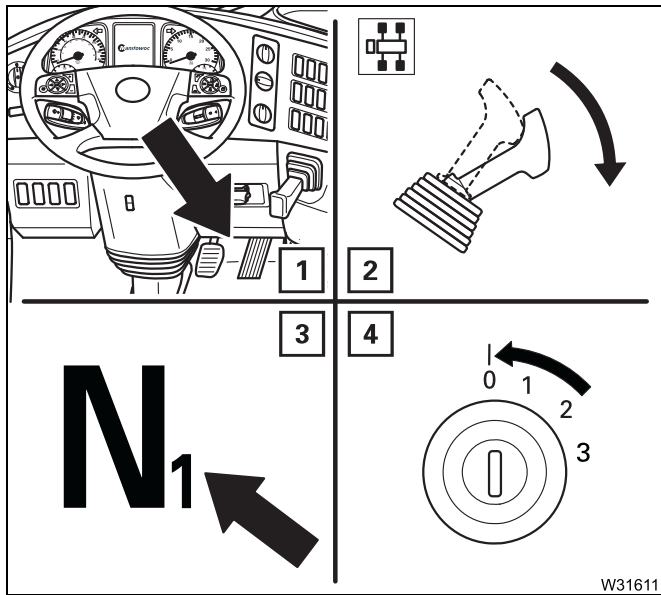


The engine torque is reduced.

- Push the button (1) upwards to override the torque reduction.

You can override torque reduction up to 3 times.

5.3.7 Switching the truck crane off



To switch the truck crane off, you must:

1. Stop the truck crane
2. Apply the parking brake
3. Switch to neutral position; p. 5 - 26
4. Turn off the engine; p. 4 - 18

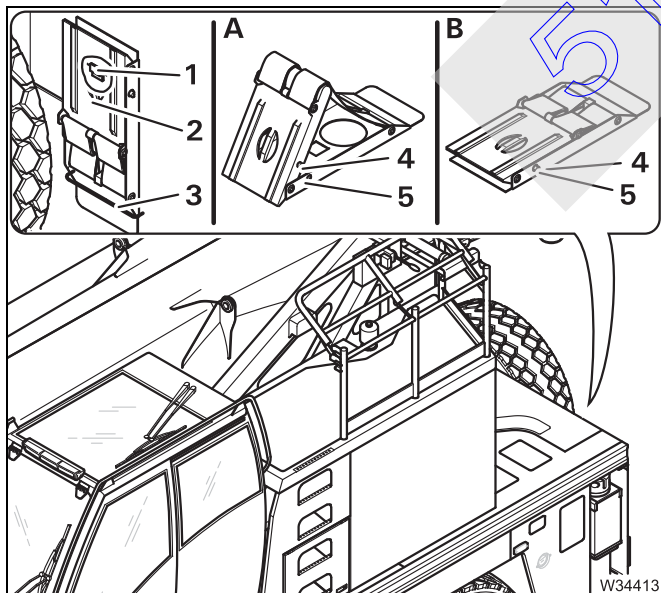
Secure it against rolling away



The number of wheel chocks supplied varies according to country.

Risk of accidents by 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 hang it on the holder (1).

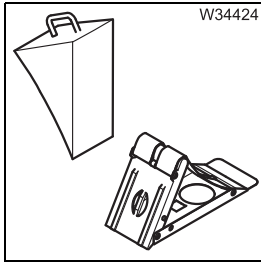
(A) – Folding out

- Push the latch (4) through the hole (5).

The chock unfolds by spring force.

(B) – Folding up

Push the chock together until the latch (4) engages in the hole (5).



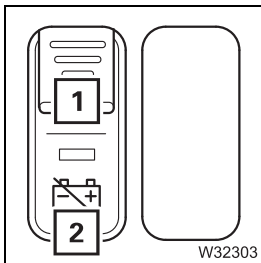
Additional chocks can be transported in the storage compartment on the turntable or at the rear of the truck crane.

**When stationary
for more than
8 hours**

- Switch off all current consumers, for example, auxiliary heaters.
- Switch the engine off.



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



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

Securing the truck crane against unauthorised use

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



Danger due to unauthorised use

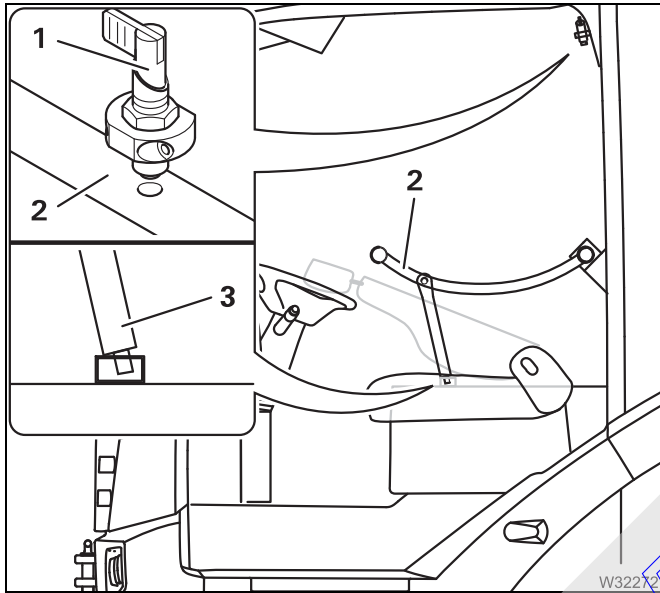
Always stow away the hand-held control in normally open contact the crane cab or in the driver's cab before leaving the truck crane and lock the doors. This way you can prevent unauthorised persons starting the engine using the hand-held control.

5.3.8**Fold-up berth**

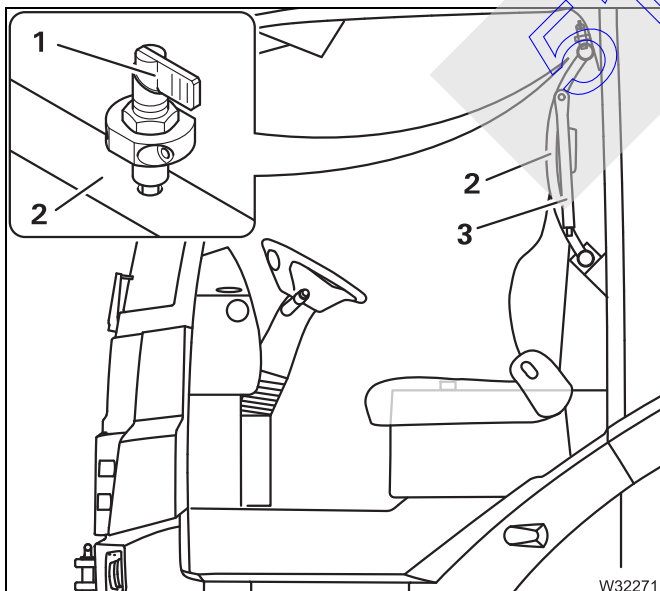
The berth must always be folded up and secured for driving.

**Risk of accidents due to the berth folding down**

Check that the locking bar has engaged and put up the back rest of the seats before driving. 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 - 15.
- Move the seats to their lowest position.
 - ■■■► *Adjusting the driver's seat*, p. 5 - 13;
 - ■■■► *Adjusting the passenger seat*, p. 5 - 14.
- Tilt the backrests of the seats forwards.
- Turn the locking bar (1) into the *Unlocked* position and fold the berth (2) down.
- Place the supports (3) into the socket.

**Folding up**

- Turn the locking bar (1) to position *Locked*.
- Fold out the berth (2) until the locking bar (1) engages in the berth.
- Fold up the supports (3).
- Put up the back rests of the seats.
- Bring the seats and the steering column into the desired position:
 - ■■■► *Adjusting the driver's seat*, p. 5 - 13;
 - ■■■► *Adjusting the passenger seat*, p. 5 - 14;
 - ■■■► *Adjusting the steering column*, p. 5 - 15.

5.4

Off-road driving

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

Adjustments to the transmission

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

- Shift to a lower starting gear; ■■■▶ p. 5 - 28.
- Step on the accelerator as far as it will go when starting – starting mode for load on.
- Select the “Manual” operating mode. This will allow you to drive carefully and promptly shift gears; ■■■▶ p. 5 - 29.

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 - 50.
- Then switch on the longitudinal differential locks; ■■■▶ p. 5 - 51.
- Then switch on the transverse differential locks; ■■■▶ p. 5 - 51.

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 - 53.

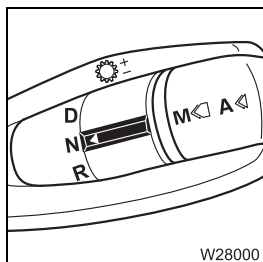
Rocking the vehicle free and towing

If the truck crane is stuck in terrain; ■■■▶ *Freeing truck crane stuck in terrain*, p. 5 - 57.

5.4.1

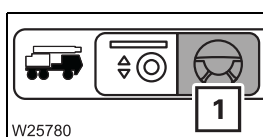
Transfer case – switching the off-road gear on/off

The off-road gear increases the thrust of the driven wheels.

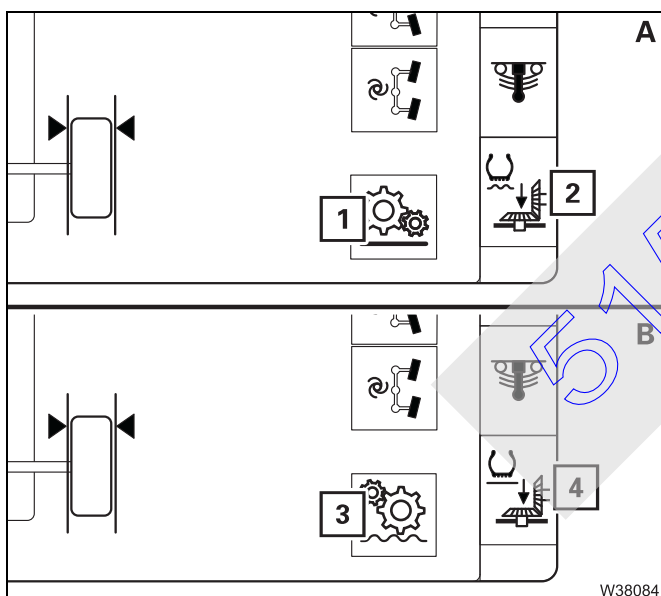


Prerequisites

- Stop the truck crane.
- Select neutral on the transmission.



- Open the *Driving* (1) menu.



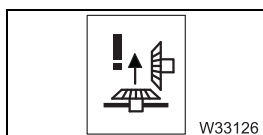
(A) – Switching on

- Select symbol (1) and confirm it – symbol (2) is displayed, off-road gear engaged. The speed is now 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 on the transmission and shift back into neutral, or start up slowly.



If the error symbol is displayed, contact **Manitowoc Crane Care**.



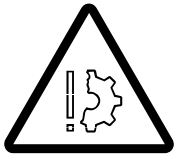
Neutral position

The transfer case is put into neutral position when the towing mode is switched on; p. 8 - 31

5.4.2

Longitudinal and transverse differential locks

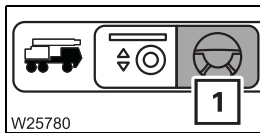
- The longitudinal differential locks prevent individual axle lines spinning when driving on a slippery surface. With the 10 x 8 x 10 drive, the 3rd axle line drive is switched on and off.
- The transverse differential locks prevent individual wheels spinning when driving on a slippery surface.



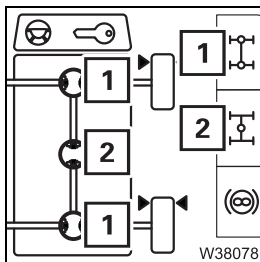
Risk of damage to the differential locks!

Leave the transverse differential locks switched on only for as long as necessary. Always switch off the transverse differential locks before driving on a firm surface

For switching on and off, the current speed needs to be under about 5 km/h (3 mph).

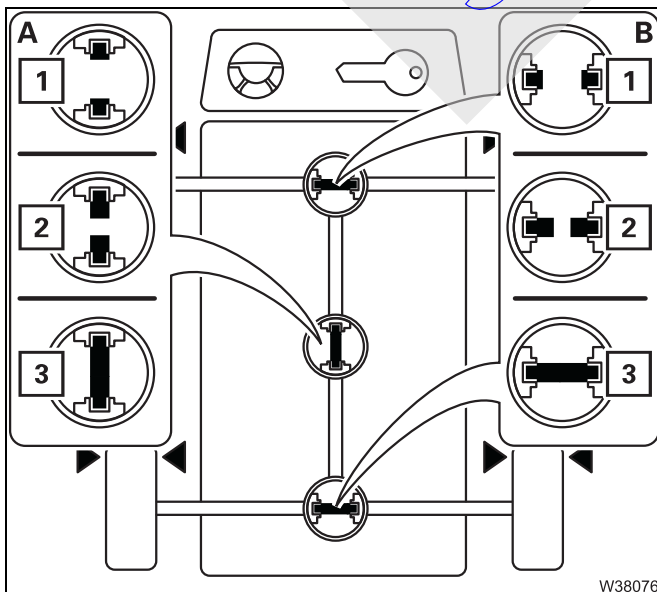


- Open the *Driving* (1) menu.



- Straighten the steering.
- Stop the truck crane.

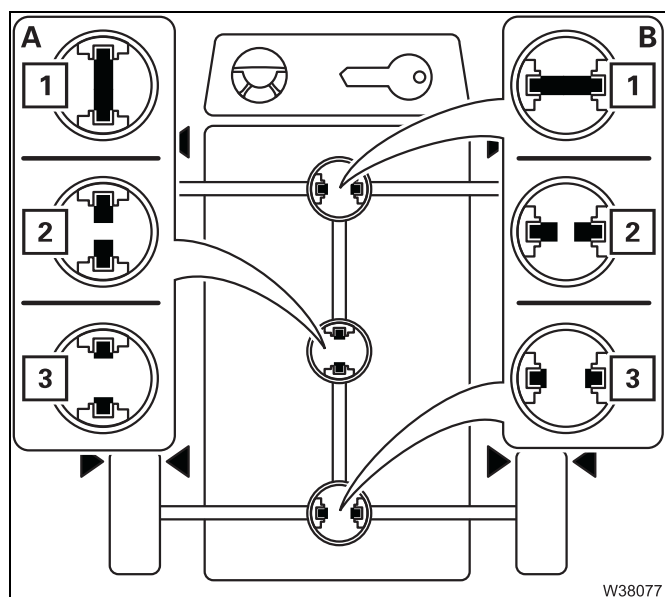
The symbols (1) and (2) indicate the current switching state and have the same colour.



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.





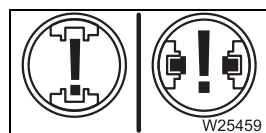
Switching off

- 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 **Manitowoc Crane Care**.

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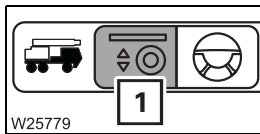
5.4.3

Operating the level adjustment system

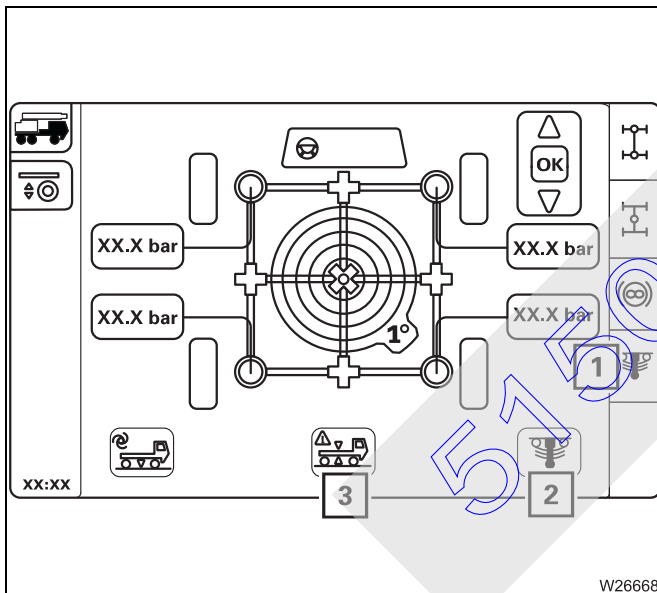
You can use the level adjustment system to set the on-road driving level, change the overall level and incline the truck crane.

Open menu

You can only open the *Level adjustment system* menu when the current speed is less than about 5 km/h (3 mph).



- Open the *Suspension/level adjustment (1)* 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 driving level
- Pre-select the suspension struts and change the vehicle level.

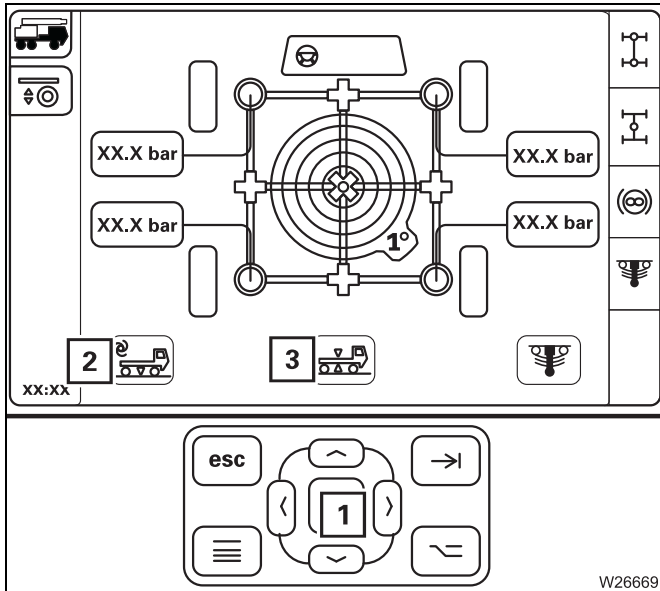
If the symbol (3) is shown for an error during a level adjustment, refer to **Manitowoc Crane Care**.



Setting the on-road level

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

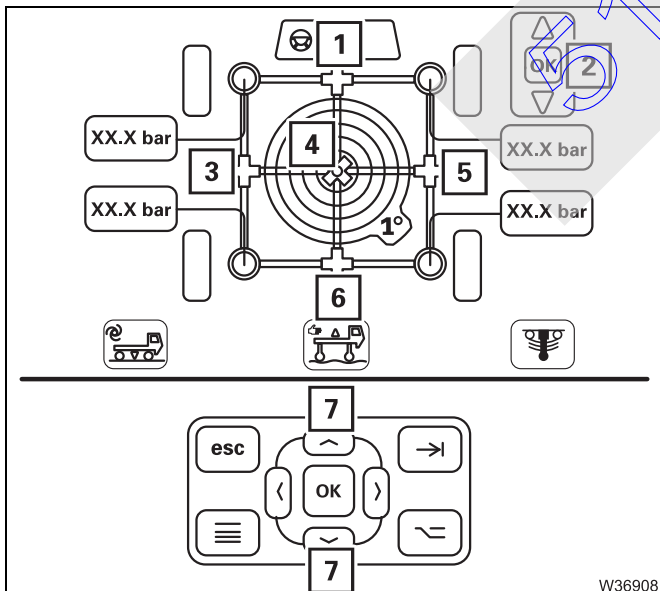
- Park the truck crane on a level surface.
- Straighten the steering.



- Select the symbol (2) – symbol is orange.
- Press the button (1) until the symbol (3) is displayed – on-road level has been reached.

Pre-selecting suspension struts

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



– For a uniform 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 3th to 5th axle line

- 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

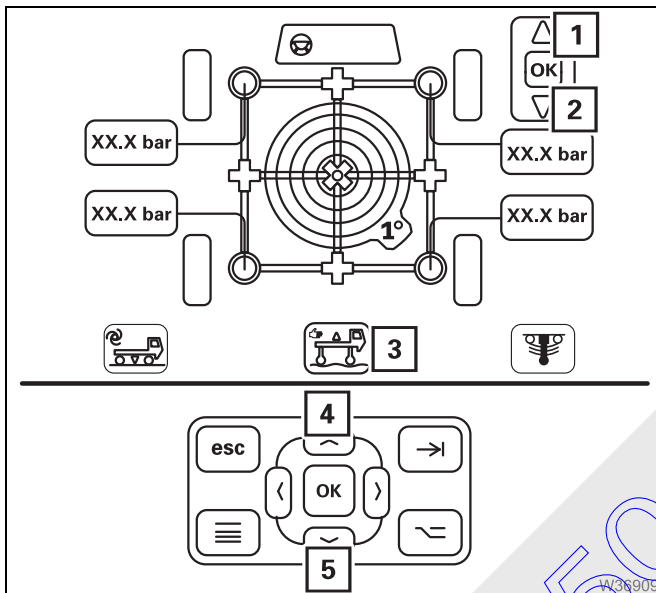
You can extend or retract the pre-selected suspension struts to change the vehicle level.



Risk of accidents by exceeding 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 symbol *No road level*.

The level is continuously changed until you release the button or the end position is reached.

Raise the level

- Press the button (4) – the symbol (1) becomes orange, the suspension struts extend.

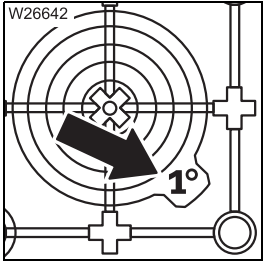
Lower level

- Press the button (5) – the symbol (2) becomes orange, the suspension struts retract.



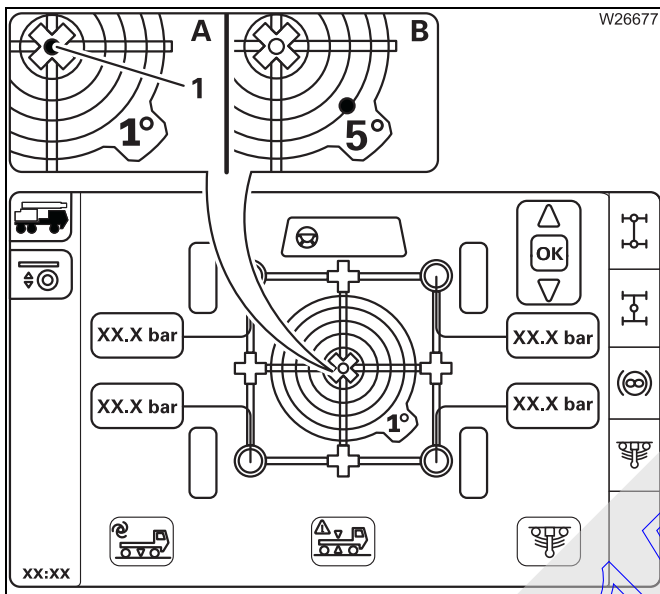
Viewing the current inclination

The inclination indicator shows the current alignment.



Switching over the measuring range

The measuring range is automatically switched between 1° and 5°.

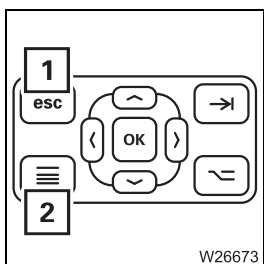


(A) – When the truck crane is level the marking (1) is in the middle.

(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 rises above approx. 5 km/h (3 mph).

5.4.4

Freeing truck crane stuck in terrain

Rocking the truck crane free

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

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

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

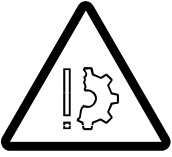


It does not make sense to switch between gear positions **D** and **R**, as switching to **R** is only performed when the truck crane is stationary and takes a few seconds. You would not be able to take advantage of the momentum generated by the change of direction.



Towing free forwards

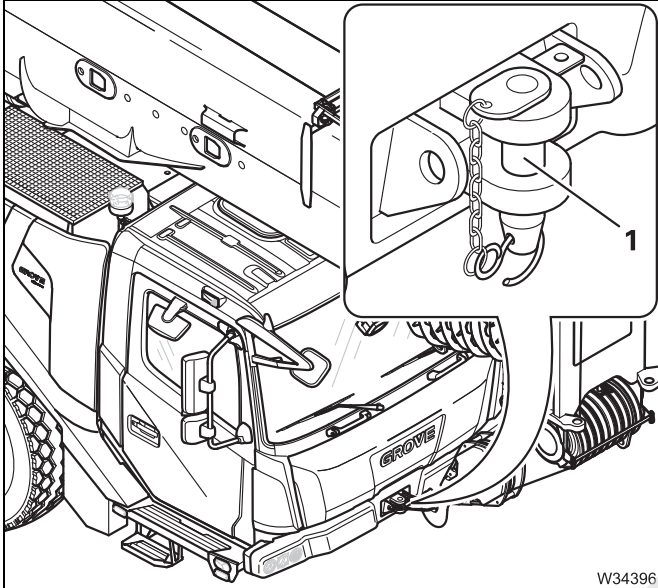
- Fasten a steel rope to the front towbar coupling.



Risk of damage to the chassis

Only tow the truck crane free while observing the procedure given for the pulling direction.

Jerking the truck crane or pulling it at an angle can cause damage to the chassis.



The front towbar coupling (1) is designed for a maximum tractive force of 100 kN (about 10 t) (22,480 lbs (about 22,050 lbs)), when:

- The direction of pull runs forward along the longitudinal axle or at an angle of 45° to the right or left of the longitudinal axle **and**
- The direction of pull runs along the longitudinal axle towards the rear without diverting up or down.

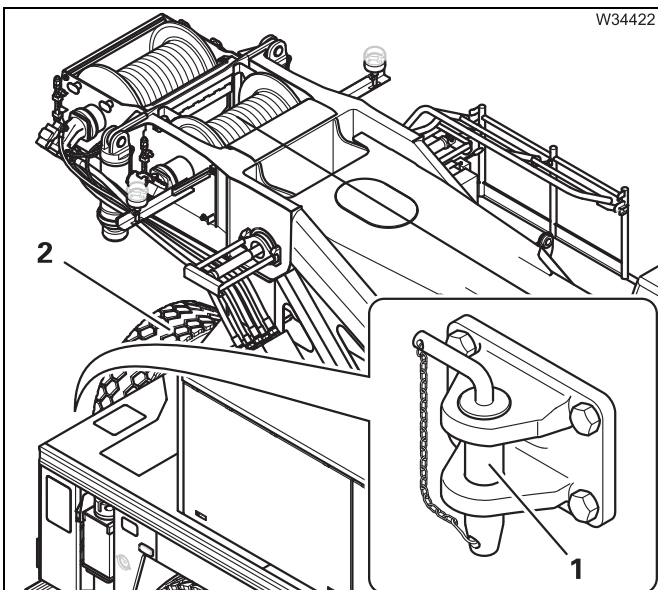
Towing free to the rear

- Fasten a steel rope to one of the towing eyes on the rear chassis wall using a shackle.



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 towing coupling (1) is designed for a maximum tensile force of 100 kN (about 10 t) (22,480 lbf (about 22,050 lbs)), if:

- The direction of pull runs along the level of the longitudinal axle **and**
- The direction of pull runs along the longitudinal axle towards the rear without diverting up or down.

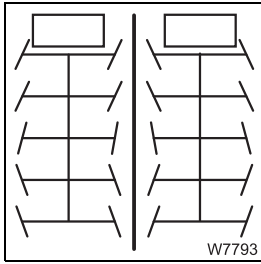
Remove the spare wheel (2) if necessary;

►► p. 8 - 33.

5.5

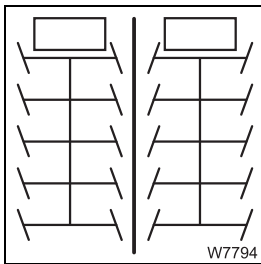
Separate steering

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

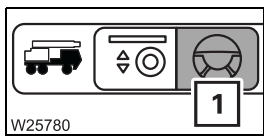
- Driving with the rigged truck crane
- Steering at low speed.



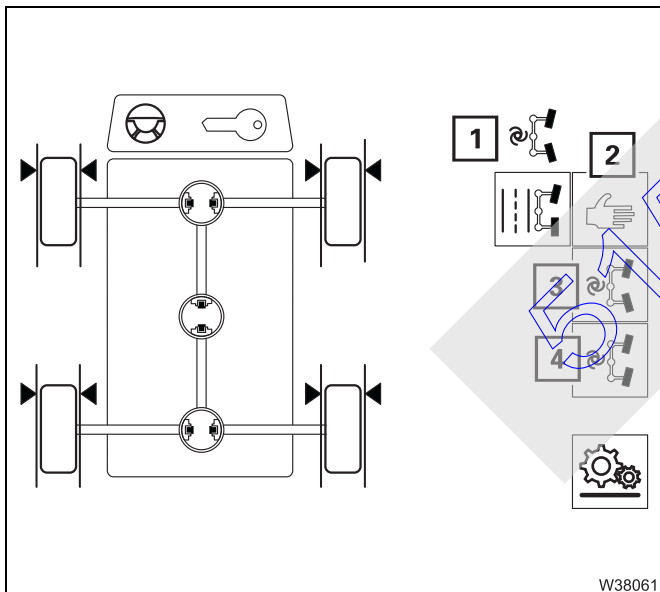
Risk of accidents when driving on-road with unlocked steering

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 switch to separate steering only at low speeds.



- Open the *Driving* (1) menu.



- Select and confirm the symbol for the desired steering mode.

- 2 Manual
- 3. to 5th axle line manually steered
- 3 Driving around corners
- 3. to 5th axle line automatically steered
- 4 Crab travel mode
- 3. to 5th axle line automatically steered

The symbol (1) indicates the selected steering mode, for example, *Driving around corners*.



If the error symbol is displayed, contact **Manitowoc Crane Care**; p. 8 - 24.

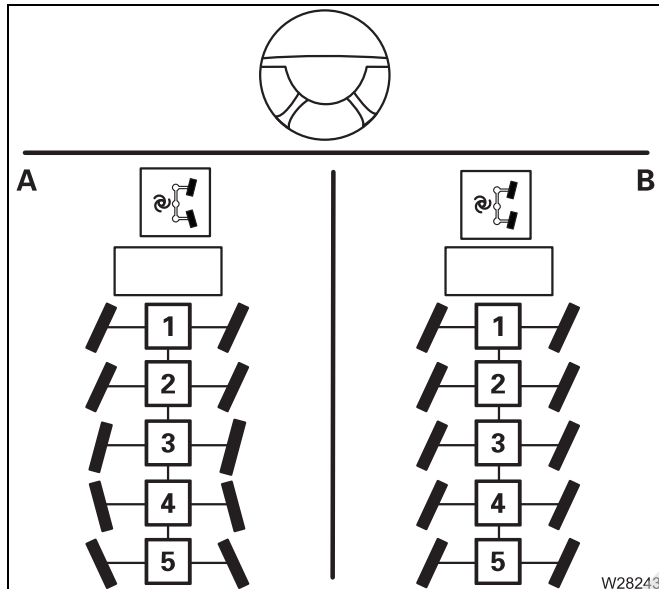


When separate steering is switched on, the speed is limited to about 20 m/h (12 mph).

Steering with separate steering – automatic

- Steer the 1st and 2nd axle line with the steering wheel.

The electronics will register the steering angle on the 1st and 2nd axle lines and automatically steer the wheels of the 3rd and 5th axle lines.



(A) – When driving around corners

The 3rd to 5th axle lines are always steered to suit the turning radius.

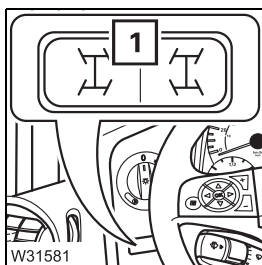
- The 3rd axle line is steered in the same direction as the 1st and 2nd axle lines.
- The 4th and 5th axle lines are steered in the opposite direction to the 1st and 2nd axle lines.

(B) – For crab travel mode

The 3rd and 5th axle lines are steered in the same direction as the 1st and 2nd axle lines.

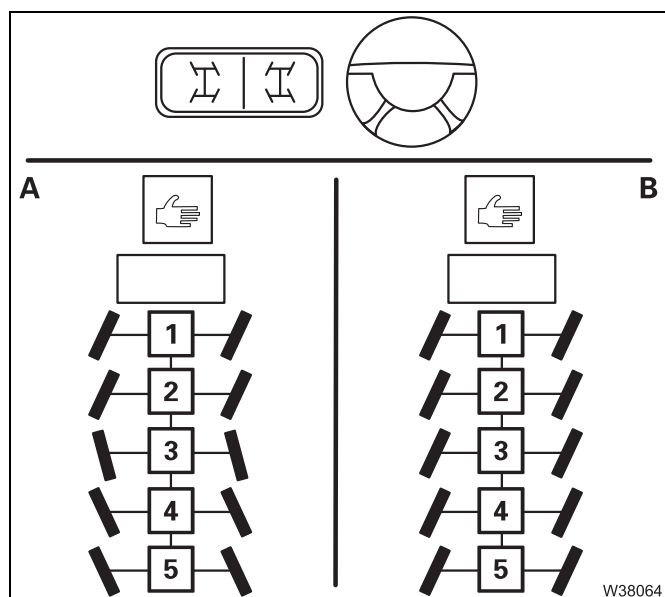
Steering with manual separate steering

- Steer the 1st and 2nd axle line with the steering wheel.
- Steer the 1st to 3rd axle line with the button (1).
 - To turn to the left: • Press button (1) to the left.
 - To turn to the right: • Press button to 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 and 5th axle lines in the opposite direction to the 1st and 2nd axle lines.

(B) – For crab travel mode

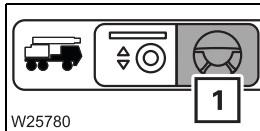
- Steer the 3rd and 5th axle line in the same direction as the 1st and 2nd axle line.

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5.5.2 Switching to normal steering mode

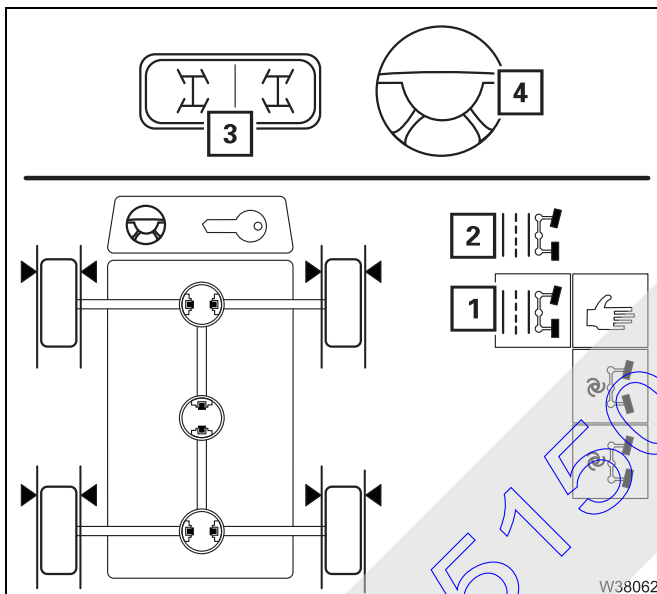
After driving with separate steering, change over immediately to normal steering mode.

Switching off the separate steering is possible during standstill and while travelling, up to a speed of about 5 km/h (3 mph).



- Select and confirm the symbol (1).

The *Driving* menu opens.



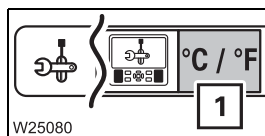
- Use the steering wheel (4) and the button (3) to turn the wheels to the *Straight ahead* position – the current wheel position is displayed.
- Select and confirm the symbol (1) – symbol (2) is displayed.



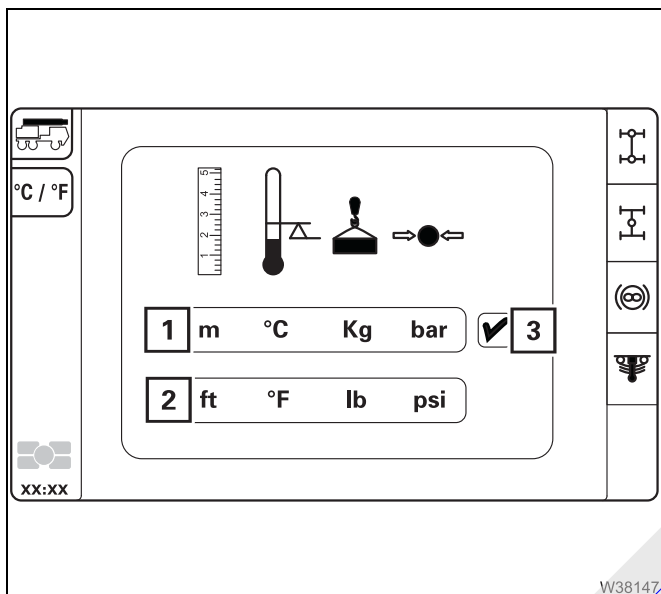
If the error symbol is displayed, contact **Manitowoc Crane Care**; p. 8 - 24.

5.5.3 Switching units of measure

You can display the crane control values in metric units or US units.



- Open the *Switch units* menu (1).



- Select and confirm the symbol:

- 1 To display metric units
- 2 To display US units

The symbol (3) shows the respective confirmed selection.

5.6

Heating and air-conditioning system

5.6.1

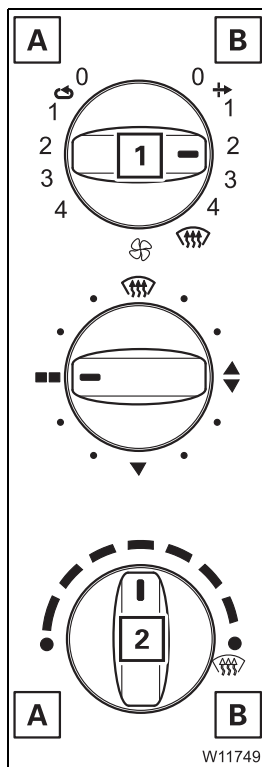
Standard heating system

Switching on

- Start the engine. The heating output is only provided when the engine is running.

Heating

You must set the blower and the temperature.



Setting the fan

Setting the fan

You can regulate the air volume with the switch (1) for:

- A** Recirculated air – air is sucked in from the driver's cab. Change to fresh air often to ensure that oxygen is supplied.
- B** Fresh air – outer air is sucked in.

- Turn the switch (1) to the desired level 1 to 4. Recommended – level 2.

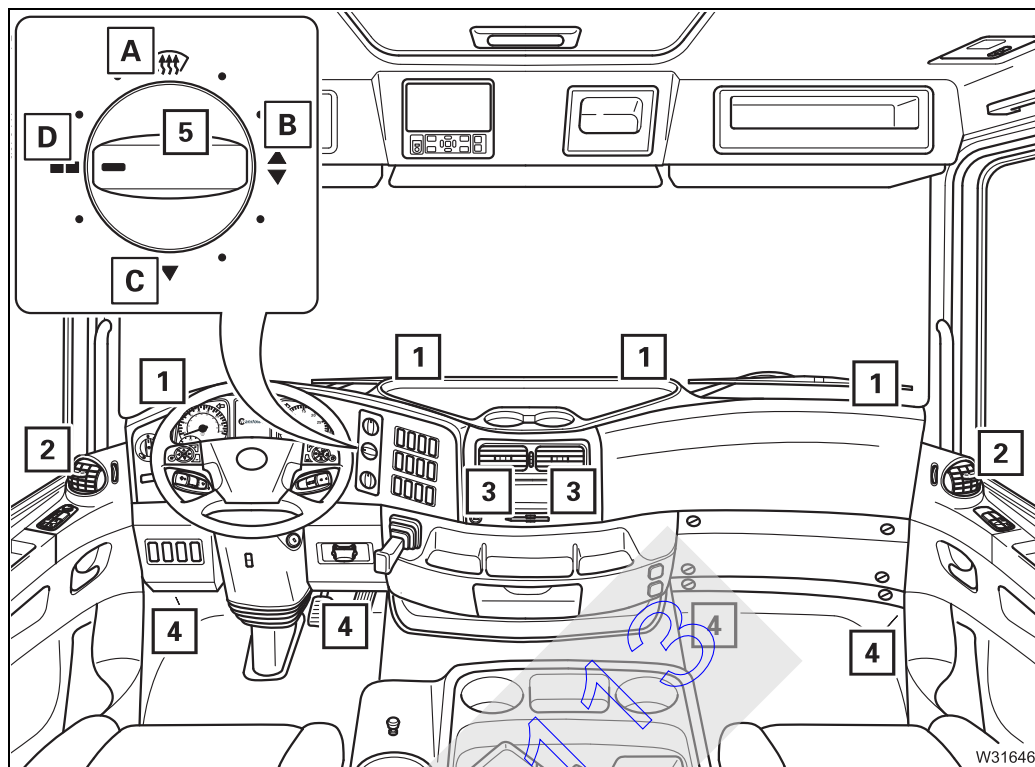
Setting the temperature

- Turn the switch (2) to the desired position
 - A** Colder
 - B** Warmer
- Press the switch (2) several times in succession at least once a month in order to prevent malfunctions.



Air distribution

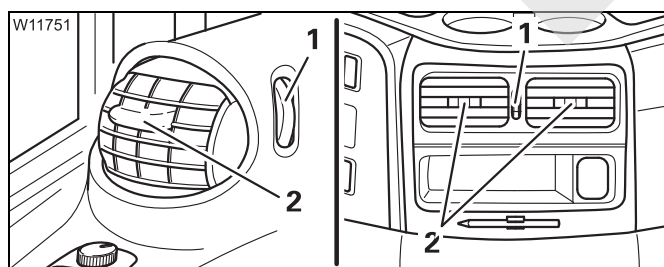
You can direct the air to flow out of various air vents.



- Turn the switch (5) to the position for the required air vents.

- A** Air vents (1), (2) – front windscreen, side
- B** Air vents (1) to (4)
- C** Air vents (2), (3), (4) – side, centre, below
- D** Air vents (2), (3) – side, centre

You can adjust air vents (2) and (3).

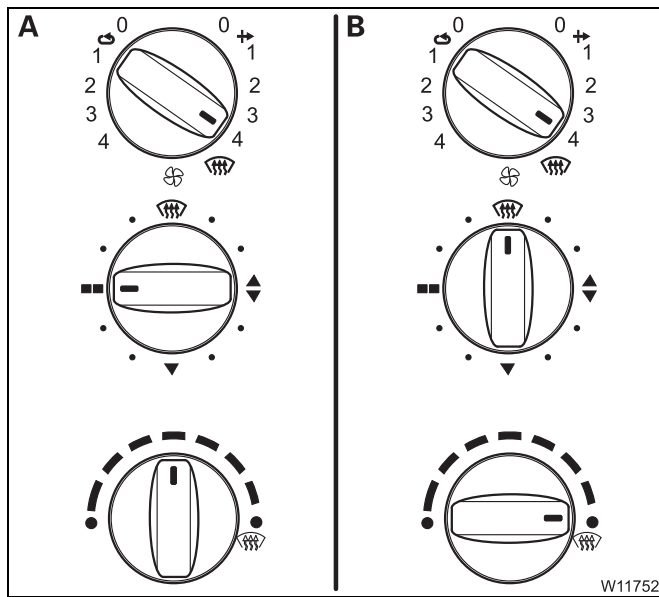


Adjusting the air vents


- 1** – To open: Upwards
– To close: Downwards
- 2** To direct the air flow

Examples

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



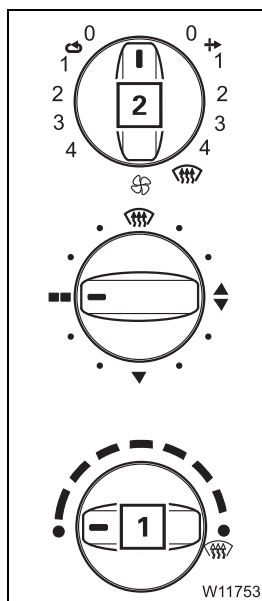
(A) – Ventilating

- Turn the switches to the positions shown.
- If necessary, open the air vents for the side and centre.
- **If necessary, open the push-up roof;**
 p. 3 - 71.

(B) – Defrosting the front windscreen

- Turn the switches to the positions shown.
- Close the air vents for the side and centre.

Switching off



Switching off the heating system

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

Switching off the ventilation

- Turn the switch (2) to the level 0.

5.6.2

Air-conditioning system

You can cool the driver's cab and dry the air using the air-conditioning system.

Notes

Do not cool the air too much.

The difference between the outside temperature and the inside temperature should be at the most 10 °C to 14 °C (18 °F to 25 °F).

If the cooling is too severe, you may frequently feel physically uncomfortable, albeit mostly only after you leave the cool environment.

Avoid having cold air blowing directly on to your body.

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



If the truck crane has been exposed to strong sunlight for a long period of time, for example, the air-conditioning system should initially be operated at the highest blower level with the engine running.

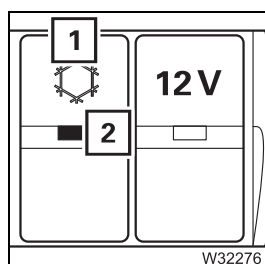
The door or at least the windows should be left open for a short while to thoroughly air the cab. The cooling-down procedure can be accelerated by increasing the engine speed.

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

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

Switching on/off

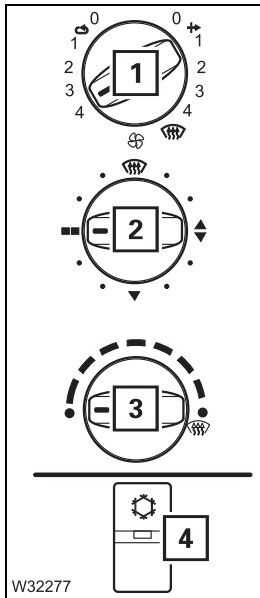
- Start the engine. The air-conditioning system operates only when the engine is running
- Switch off the auxiliary heater;  p. 5 - 70,  p. 5 - 76.





- **Switch on:**
 - Press the button (1) at the top – The lamp (2) lights up.
- **Switch off:**
 - Press the button (1) at the bottom – The lamp (2) goes out.

Cooling

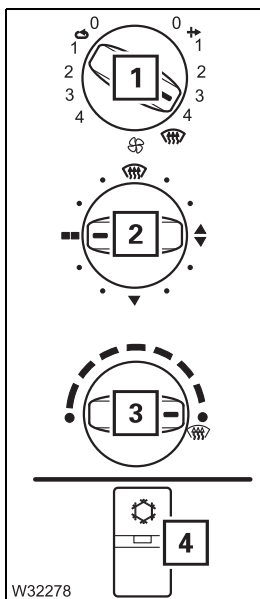
The illustration shows only a sample setting. Always adjust the setting to the current conditions.





- Switch the air-conditioning on – the lamp (4) lights up.
- Turn the switch (3) as far as it will go, to *Cold*.
- Turn the switch (1) to the desired level – with recalculated air, you will be able to cool more quickly, but no oxygen is fed in.
- Set the air distribution with switch (2) – open the air vents if necessary;  p. 5 - 66
- Close the push-up roof;  p. 3 - 71.

Drying

You can dry the air in the driver's cab.



- Switch the air-conditioning on – the lamp (4) lights up.
- Turn the switch (3) as far as it will go, to *Warm*.
- Turn the switch (1) to the desired level – adjust the fresh air/recalculated air setting to the current conditions (humidity and temperature of the outside air).
- Set the air distribution with switch (2) – open the air vents if necessary;  p. 5 - 66
- Close the push-up roof;  p. 3 - 71.

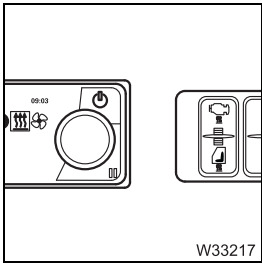
When drying, the air-conditioning system and the heating system work against each other. After drying, switch off the device that you do not require.

5.6.3 Auxiliary water heating system



The batteries will be drained if you operate the auxiliary heater with the engine switched off. You must recharge the batteries at shorter intervals if you use the auxiliary heater frequently.

Further information on the operation of the auxiliary water heating system is provided at the address Webasto.com.

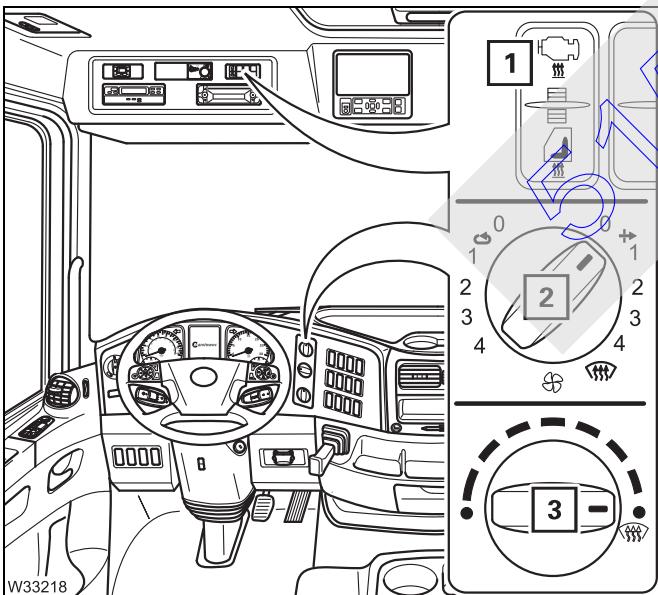


You can use the auxiliary water heater to:

- preheat the engine or
- pre-heat the engine and driver's cab.

Preheating the engine

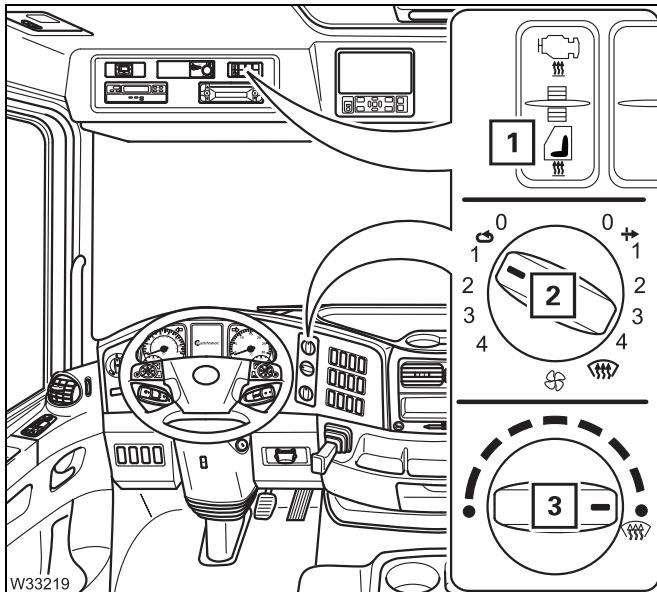
If only the engine is to be preheated, adjust the heating system as follows:




- Switch (1) pushed in at the bottom.
- Switch (2) to position *Fan off*
- Switch (3) to *Warm* setting

Preheating the driver's cab

Adjust the heating system as follows if the driver's cab is to be preheated in addition to the engine:



- Switch (1) pushed in at the top.
- Switch (2) to the required fan level *Recirculated air*.
- Switch (3) to *Warm* setting
- Air vents opened;  p. 5 - 66.



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

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



Risk of explosion when operating the auxiliary heater

The auxiliary heater is not allowed to be operated:

- At service stations and tank farms
- At places where flammable gases or vapours can be found or formed (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

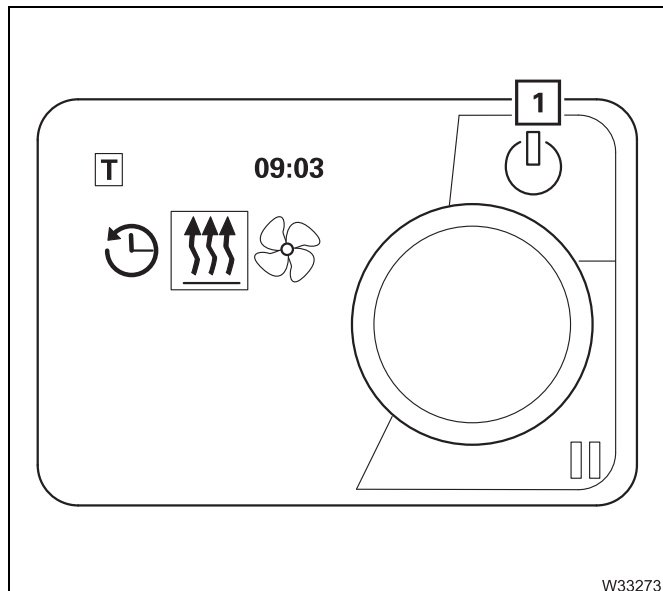
Do not use the auxiliary heater in closed spaces (for example, garage).





This section describes how to switch on manually. The auxiliary heater can also be switched on automatically; *Storing the heating start*, p. 5 - 74.

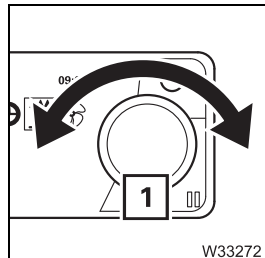
- Switch on the ignition; *Switch the ignition on*, p. 4 - 9.



- Press the button (1) once. The auxiliary heater is switched on and the control panel and buttons are illuminated.

The status of the auxiliary water heating system is indicated by the coloured light on the button (1):

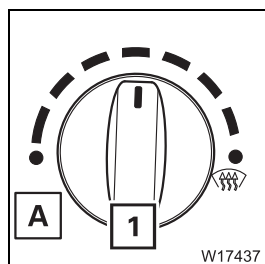
- Lights up green:** Heater operating
- Lights up blue:** Fan operating
- Lights up white:** Heater off – controls on
- Flashing red:** Error
- Flashing green:** Heater operation programmed
- Flashing blue:** Fan operation programmed



Menu control

The jog-dial (rotary push button) (1):

- turn to select,
- press to confirm.



Setting the temperature

- Turn switch (1) to the desired temperature.

If the switch (1) is turned as far as possible **A** (*Cold*), the auxiliary heater is not switched on.

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



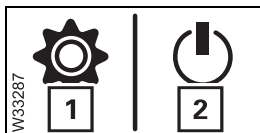
Always switch the auxiliary heater off if you switch off the truck crane whilst the battery master switch is switched on. In this way, you prevent the auxiliary heater from restarting and the batteries from running down after the engine has cooled down.

Setting the date and time



If the error code **TEB** is shown in the display, the power supply has been interrupted for more than 8 minutes. You must reset the date and time.

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

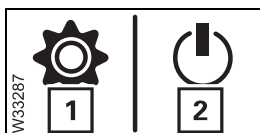


- Select and confirm the symbol *Settings* (1) – display symbol *Immediate start* (2).

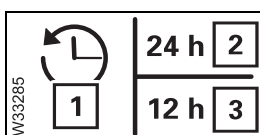


- Select and confirm the symbol *Day of the week* (1) – display symbol (2), for instance **MON** for Monday.

- Select and confirm the desired day of the week.



- Select and confirm the symbol *Settings* (1) – display symbol *Immediate start* (2).



- Select and confirm the symbol *Time* (1) – display symbol *Time format*.

- Select and confirm the desired time format (2) or (3).



The *Time* display flashes.

- At the flashing display, set the hours and confirm the selection.





- At the flashing display, set the minutes and confirm the selection.
- The time and day of the week have now been set.

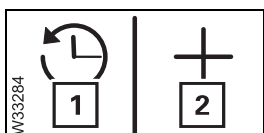
Storing the heating start

Heating is started automatically on schedule only if the time and the day of the week have been correctly set; *Setting the date and time*, p. 5 - 73.

You can set three different automatic heating starts – up to seven days in advance.



If you call up values in order to change them during the following setting process, they flash for 5 seconds. The entry must be made within this period. The value stops flashing after 5 seconds and is saved as the new value.



- Select and confirm the symbol *Timer* (1) – display symbol *Add timer* (2).
- Select and confirm the symbol *Add timer* (2).



- Select and confirm the desired day of the week, for instance **MON** for Monday.



The *Switch-on time* display flashes.

- At the flashing display, set the hours and confirm the selection.



- At the flashing display, set the minutes and confirm the selection.
- The switch-on time is now set.
Next you must set the switch-off time.

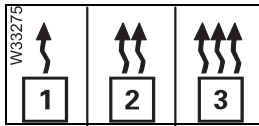


The *Switch-off time* display flashes.

- At the flashing display, set the hours and confirm the selection.



- At the flashing display, set the minutes and confirm the selection.

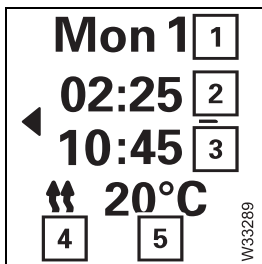


- Select and confirm the desired heating mode.
 - economical (1)
 - comfortable (2)
 - quick (3)



- Select and confirm the desired temperature.

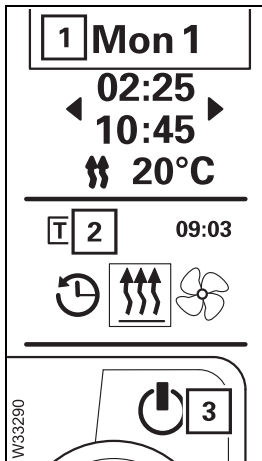
After the desired temperature has been input, the set values are saved and shown in the display:



- Day (1)
- Switch-on time (2)
- Switch-off time (3)
- Heating mode (4)
- Temperature (5)
- Confirm the set values.



- Confirm the *Activate* symbol.

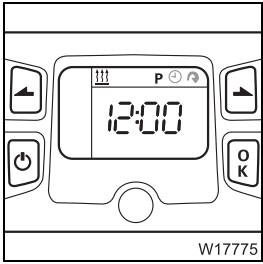


A heating start that is activated is shown by:

- A white marking (1)
- The symbol *T* (2) in the main menu
- If the display is switched off, the button (3) flashes **green**.

5.6.4

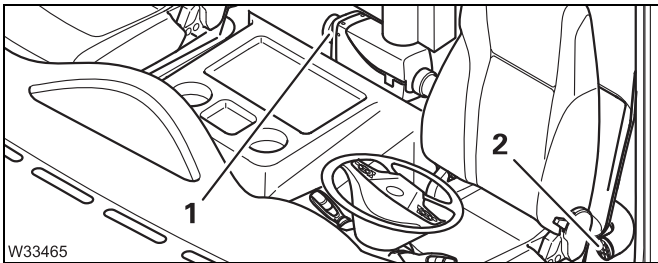
Auxiliary air heater



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



The batteries will be drained if you operate the auxiliary heater with the engine switched off. You must recharge the batteries at shorter intervals if you use the auxiliary heater frequently.



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

Switching on

- Before switching on the heating system, check whether it is allowed to be operated at the current location of the truck crane. Find out whether there are any possible sources of danger that could result in an explosion.



Risk of explosion when operating the heating system

The heating system may not be operated:

- At service stations and tank farms
- At places where flammable gases or vapours can be found or formed (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).



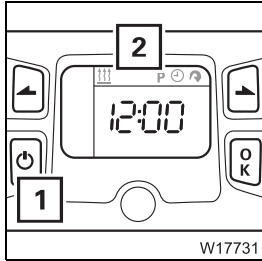
Risk of suffocation when operating the heating system

Do not operate the heater or the heater with the timer in enclosed rooms (e.g. garages).

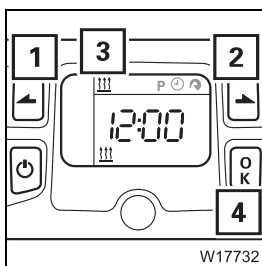


This section describes how to switch on manually. The auxiliary heater can also be switched on automatically; *Auxiliary water heating system*, p. 5 - 70.

- Switch on the ignition; *Switch the ignition on*, p. 4 - 9.
- Press the button (1) until the menu row (2) is displayed.

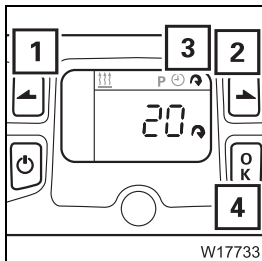


If you do not make settings within 10 seconds of switching on, the control unit switches to idle mode.



- Use button (1) or (2) to select the symbol (3) and confirm with button (4).
The auxiliary heater switches on.

Setting the heating level



You can preselect a heating level between 10 and 30.

- Use button (1) or (2) to select the symbol (3) and confirm with button (4).
- Change the heating level using button (1) or (2) and confirm with button (4).

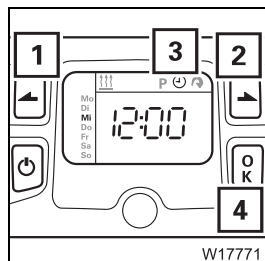
The higher the preselected heating level, the faster the auxiliary heater fan.



Setting the day and time

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

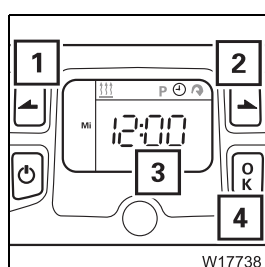
If the electric power supply is interrupted, you have to reset the time and day of the week.



- Use button (1) or (2) to select the symbol (3) and confirm with button (4).

The set day of the week is shown in the program column.

- Select the day of the week using button (1) or (2) and confirm with button (4).



The set time is shown in display row (3).

- Select the hour using button (1) or (2) and confirm with button (4).
- Select the minutes using button (1) or (2) and confirm with button (4).

Setting the preselection time

Heating is started automatically on schedule only if the time and the day of the week have been correctly set; ► *Setting the day and time*, p. 5 - 78.

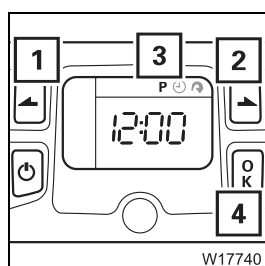
You can set three different preselection times – up to seven days in advance.

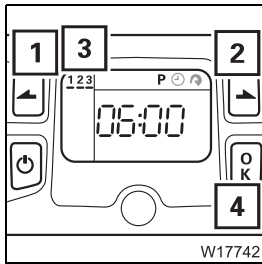


The set preselection times are departure times. Depending on the heating period set, the heating switches on accordingly beforehand.

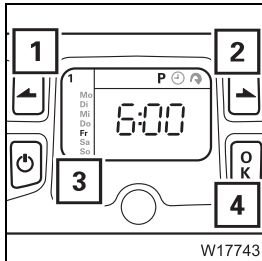
Setting the departure times

- Use button (1) or (2) to select the symbol (3) and confirm with button (4).

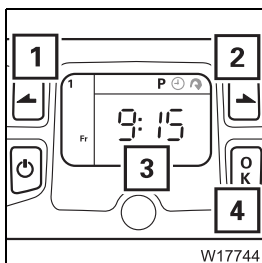




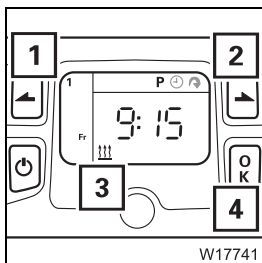
- Use button (1) or (2) in program column (3) to select storage location 1, 2 or 3 and confirm with button (4).



- Use button (1) or (2) in program column (3) to select a day of the week and confirm with button (4).



- Use button (1) or (2) in display row (3) to select the hour or minutes and confirm with button (4).



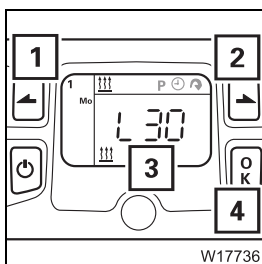
- Use button (1) or (2) to select the *Heating* function (3) and confirm with button (4).

You have now set the preselection time. After setting the preselection time, you can set the heating period.

Setting the heating period

After an automatic start, the auxiliary heater switches itself off as soon as the set heating period has elapsed.

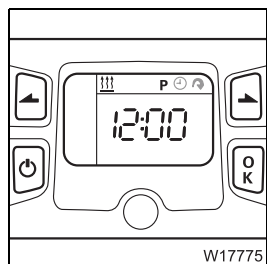
The heating period applies to all saved heating starts.



- Use button (1) or (2) to set the required period (3) and confirm with button (4).

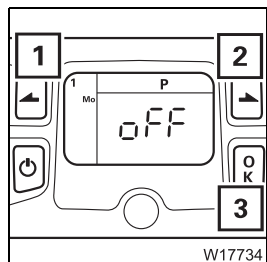
You have now set the heating period.





If you have set a preselection time (departure time) of e. g. 12.00 and a heating period of 30 minutes, the auxiliary heater starts at 11.30, for example.

Preselection times Delete

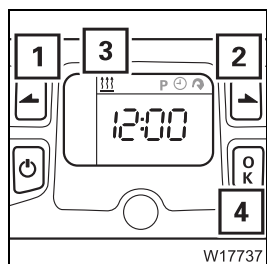


- To delete the preselection times, repeat the steps for setting preselection times; *Auxiliary water heating system*, p. 5 - 70.
- Press button (1) or (2) until the *Off* display appears and confirm with button (3).

The preselection time is deleted.

Switching off

This section only describes how to switch off the heater manually. If the auxiliary heater is switched on automatically, it switches off after the set heating period has elapsed; *Setting the heating period*, p. 5 - 79.



- Use button (1) or (2) to select the symbol (3) and confirm with button (4).
- The auxiliary heater switches off.



If you turn off the auxiliary heater before the set heating period has elapsed, the auxiliary heater continues to run for a certain period of time.

5.7

Radio

Click [here](#) for notes on the control of the radio.

5.8

Towing a trailer

When towing a trailer, a towbar coupling is fitted to the back of the carrier.

Please observe the permissible trailer load of your truck crane.



Risk of 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 swivel 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 be between the truck crane and trailer when coupling the two vehicles.



Risk of accidents from unexpected acceleration

When you move slowly to the trailer, the transmission automatically shifts into manoeuvring mode. If the warning buzzer sounds, release the accelerator **immediately**.

If you do not release the accelerator, the electronics will engage automatically within a few seconds. The truck crane could accelerate unexpectedly and people might be crushed between the trailer and the truck crane.



Please observe the relevant national regulations regarding coupling and uncoupling of the trailer.

Effects on the axle loads

Observe the effects on the axle loads when towing a trailer. The axle loads of your truck crane change in the following manner when operating with central axle trailers:

- For every 100 kg (220 lbs) of drawbar load, the axle loads on the 1st and 2nd axle lines are reduced by 40 kg (88 lbs).
- 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).



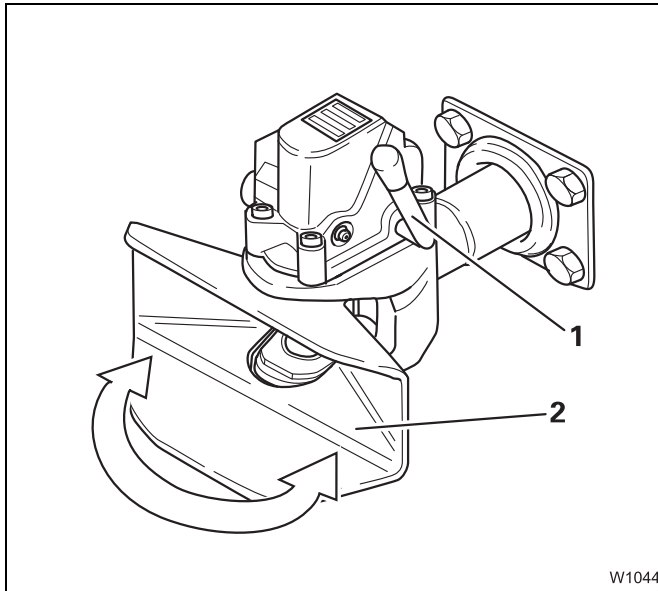
Coupling the trailer



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.

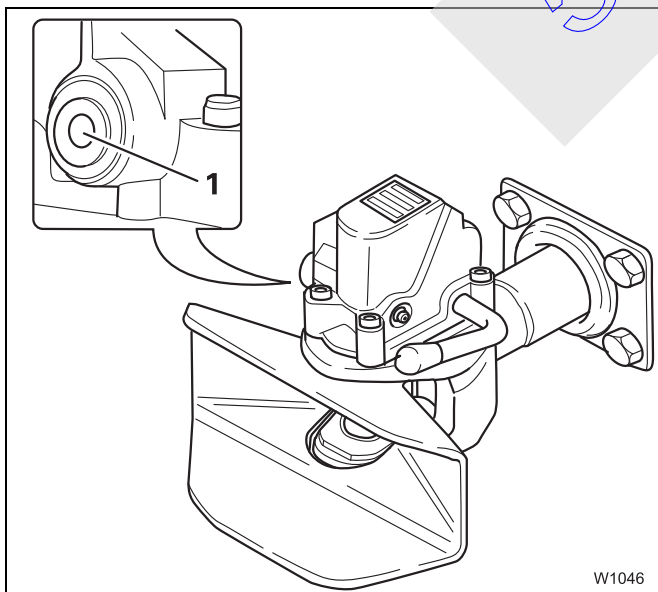


- Open the towbar coupling. Push the lever (1) up until it latches into place.
- Check whether the coupling jaw (2) is stable. It may not be allowed to move to the left or the right when the towbar coupling is open.
- Carefully drive the truck crane backwards so that the towbar of the trailer is pushed into the coupling jaw.

The towbar coupling closes automatically, and the lever (1) swings downwards.



Make sure you check the prescribed condition of the coupling after each coupling procedure.



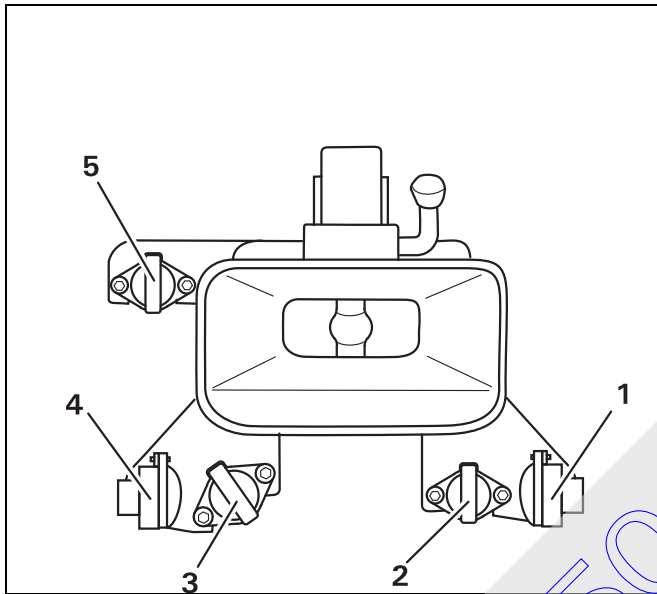
The pin (1) may no longer protrude from the guide bushing after the coupling procedure.



Risk of accidents if the trailer is coupled improperly

If the pin is protruding from the guide bushing, the trailer is not coupled properly and could become disengaged from the towbar coupling while driving.

Connecting the supply lines



- Insert the plug of the trailer's electrical system into the socket (5).
 - If necessary, insert the ABS connection cable into the socket (3).
 - First connect the hose of the brake pipe to the yellow coupling head (4).
 - Then connect the hose of the supply line to the red coupling head (1).
- Socket (2) is designed for special equipment.



Risk of accidents if the hoses are too short or installed improperly

The hose lines may not come off even when driving around corners. When connecting the hoses, make sure they are long enough and have enough clearance.

- Check the function of the trailer lighting.
- Test the service brake and parking brake immediately after setting off.

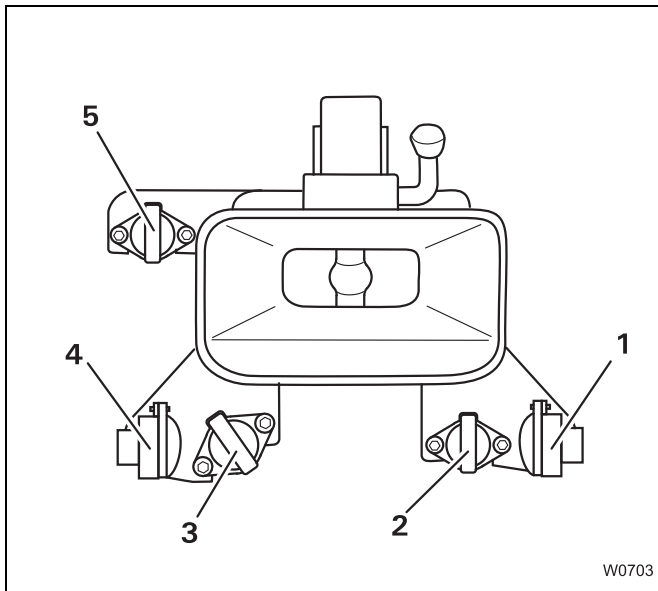


Removing supply lines



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 yellow coupling head (4) – yellow.
- Remove the plug (5) of the trailer electrical system from the socket.
- If necessary, remove the plugs (2) and (3) from the sockets (ABS and special fittings).

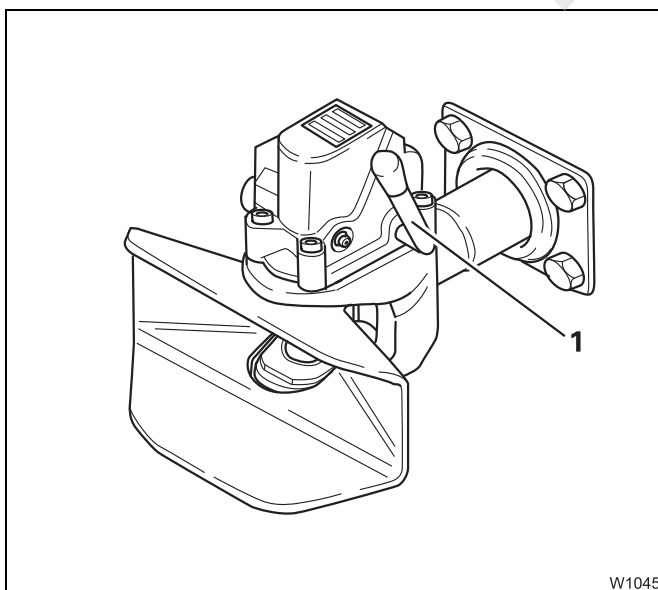
Uncoupling the trailer



Risk of injury when the automatic closing device is triggered

Never put your hand into the coupling jaw when the towbar coupling is open.

This prevents the coupling closing automatically, and the cotter pin causing serious injury to your hand.

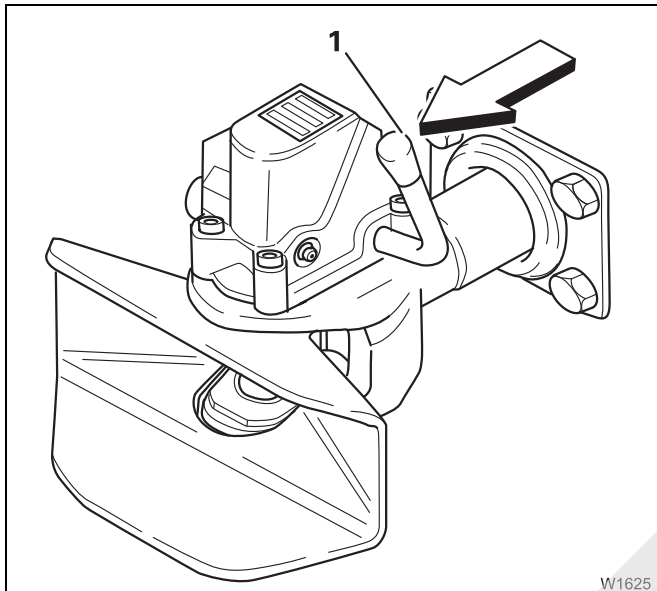


- Secure the trailer with the (trailer) parking brake and chocks as prescribed to prevent it from rolling away.
- Open the towbar coupling. Push the lever (1) up until it latches into place.
- Drive the truck crane carefully away from the trailer.



Risk of injury when closing the towbar coupling by hand

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



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

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

The lever swings downwards and the towbar coupling is closed.



Risk of injury when the automatic closing device is triggered

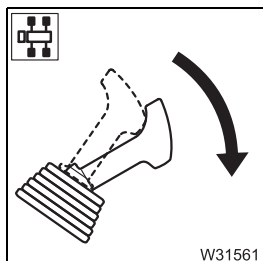
Always close the coupling if no trailer is connected. This prevents people being injured by the automatic closing device being activated unintentionally.



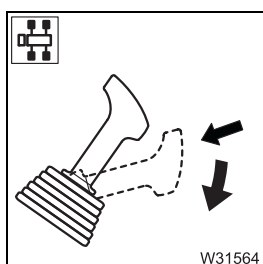
Checking the braking force

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 roads (e.g. when a brake hose has burst).

To check this, you can release the parking brake of the trailer on its own.



- Engage the parking brake.



- Press the lever in and pull it further 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 latches into position and the parking brake of the trailer is applied.



Risk of accident 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 the parking brake result was positive. Observe the corresponding regulations in your country when doing this.

6

Driving modes and rigging for on-road driving

This chapter contains tables with driving modes of the GMK5150L, for which the maximum axle load is 12 t (26,500 lbs).

6.1

Driving modes

Information about the axle loads

The GMK5150L truck crane is designed for driving with maximum axle loads of 12 t (26,500 lbs). **Manitowoc Crane Group Germany GmbH** points out that if the truck crane is driven with axle loads greater than 12 t (26,500 lbs), the brake system may overheat and the braking deceleration required by the EU partial type-approval cannot be met.

If country-specific regulations allow the truck crane to be driven with axle loads greater than 12 t (26,500 lbs), the crane driver/operator bears the sole responsibility for driving in this condition and for any subsequent damage. This also applies to damage due to premature wear.



Risk of accidents from increased braking distance

When driving with axle loads in excess of 12 t (26,500 lbs), the braking deceleration required by the EU partial type-approval cannot be met. Please bear in mind that the braking distance of the truck crane will be increased.



Risk of damage from premature wear

Premature wear of parts under particular strain (brake system, steering, tyres, wheels, suspension, drive shafts) cannot be ruled out even if the axle loads only briefly exceed 12 t (26,500 lbs).

6.1.1

How to use the tables



This section only shows some standard driving modes. For further information on additional or individual driving modes, please contact **Manitowoc Crane Care**.

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 section, 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 retarder and towbar for a trailer. 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 1-sheave hook block must be attached to the front bumper.
- the hose drum is installed on the main boom,
- the 1,8 m + 16 m swing-away lattice is folded to the side,
- a 2.3 t counterweight lies on the counterweight platform
- a 4.6 t counterweight may be installed on the turntable

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 are over 12 t.

6.1.2

Table for a maximum axle load of 12 t (26,500 lbs)

Tyres
385/95 R25

Also observe the effects on the axle loads when towing a trailer;
▣▣▣▣ p. 5 - 81.

		Driving mode		
		1	2	3
Equipment	Drive 10 x 6 x 10	✓		
	Drive 10 x 8 x 10		✓	✓
	Retarder	✓	✓	✓
	Rear bumper	✓	✓	✓
	Auxiliary hoist or 1.0 t counterweight installed	✓	✓	✓
Rigging mode	385/95 R25 spare wheel on rear			
	Storage box at the rear of the carrier			
	Hydraulic hose drum on the main boom	●	●	●
	1.8 m + 16 m swing-away lattice is 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⁾	●	●	
	Hook tackle hung on the bumper ¹⁾			●

1) The weight of the hook blocks is based on the information in these operating instructions; ▣▣▣▣ p. 1 - 11.



Tyres
445/95 R25

Also observe the effects on the axle loads when towing a trailer;
▣▣▣▣ p. 5 - 81.

		Driving mode		
		1	2	3
Equipment	Drive 10 x 6 x 10	✓		
	Drive 10 x 8 x 10		✓	✓
	Retarder	✓	✓	✓
	Rear bumper	✓	✓	✓
	Auxiliary hoist or 1.0 t counterweight installed	✓	✓	✓
Rigging mode	445/95 R25 spare wheel on rear			
	Storage box at the rear of the carrier, loaded with 150 kg	●		
	Hydraulic hose drum on the main boom	●	●	●
	1.8 m + 16 m swing-away lattice is 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⁾			
	3 -sheave hook block attached to the bumper ¹⁾			
	Hook tackle hung on the bumper ¹⁾	●	●	●

¹⁾ The weight of the hook blocks is based on the information in these operating instructions; ▣▣▣▣ p. 1 - 11.

Tyres
525/80 R25

Also observe the effects on the axle loads when towing a trailer;
▣▣▣▣▶ p. 5 - 81.

		Driving mode		
		1	2	3
Equipment	Drive 10 x 6 x 10		✓	
	Drive 10 x 8 x 10	✓		✓
	Retarder	✓	✓	✓
	Rear bumper	✓	✓	✓
	Auxiliary hoist or 1.0 t counterweight installed	✓	✓	✓
Rigging mode	525/80 R25 spare wheel on rear			
	Storage box at the rear of the carrier, loaded with 150 kg			
	Hydraulic hose drum on the main boom	●	●	
	1.8 m + 16 m swing-away lattice is 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⁾			
	3 -sheave hook block attached to the bumper ¹⁾			●
Hook tackle hung on the bumper ¹⁾				

¹⁾ The weight of the hook blocks is based on the information in these operating instructions; ▣▣▣▣▶ p. 1 - 11.

6.1.3

Maximum permitted speeds with an axle load of over 12 t (26,500 lbs)

Should your national regulations allow driving with axle loads over 12 t (26,500 lbs), you may under no circumstances exceed the maximum permitted speed given here.



Risk of accidents from overloading tyres

Never exceed the maximum permitted speed which is 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 given tyre pressure, and are maximum values. Also note the information provided by the tyre manufacturer regarding the maximum permitted load duration.

Tyre size/ Tyre pressure in bar (psi)	Current Axle load in t (lbs)	Maximum permissible speed In km/h (mph)
385/95 R 25¹⁾ / 10 (145.0)	Up to 13.5 (29,800)	58 (36)
	Up to 14.5 (32,000)	45 (28)
	Up to 15.5 (34,200)	32 (20)
	Up to 16.5 (36,400)	22 (14)
445/95 R 25 / 9 (130.5) 525/80 R 25 / 7 (101.5)	Up to 13.5 (29,800)	65 (40)
	Up to 14.5 (32,000)	65 (40)
	Up to 15.5 (34,200)	65 (40)
	Up to 16.5 (36,400)	58 (36)
¹⁾ Michelin X-Crane 9 bar (130.5 psi)		

6.2

Weighing the truck crane

Weighing error

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

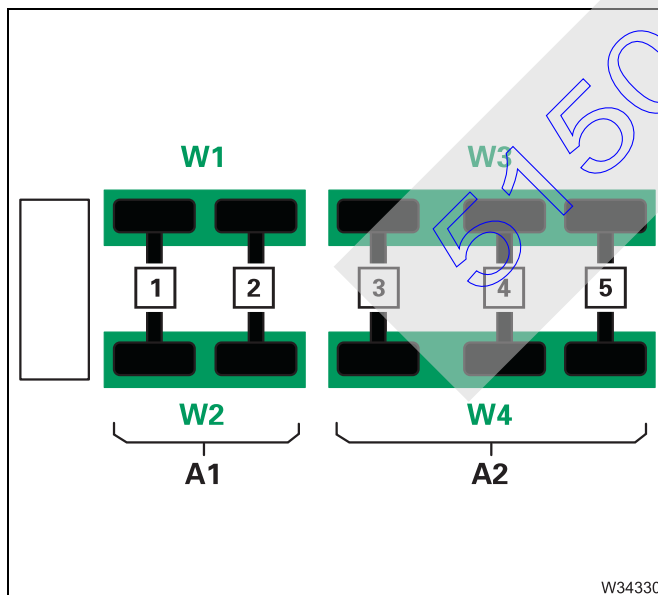
All other weighing procedures are subject to various factors which can lead to weighing errors. This Operating manual describes a procedure by which the greatest number of sources of weighing errors can be avoided. Also observe all the instructions provided by the manufacturer of the scales.



Defective measurement of the axle loads and total weight.

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

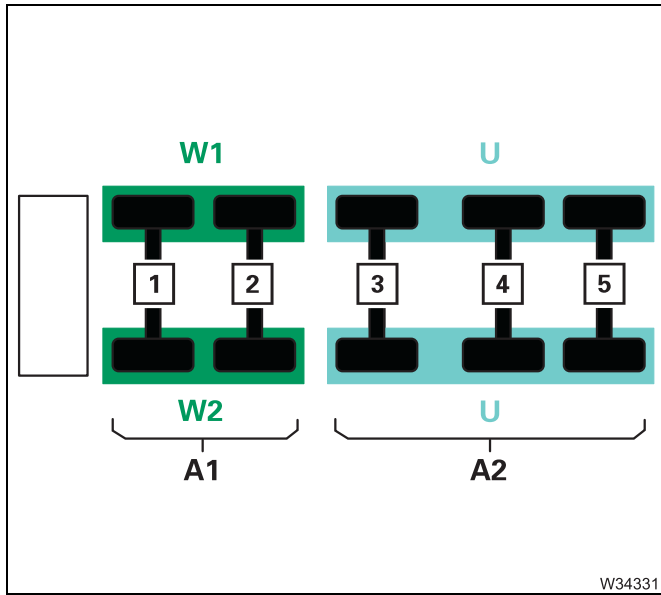
If multiple individual scales are used, allowance must be made for the fact that the axle groups are hydraulically coupled. For this purpose, you will need wheel load scales of sufficient capacity and size.



Determining the total weight

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

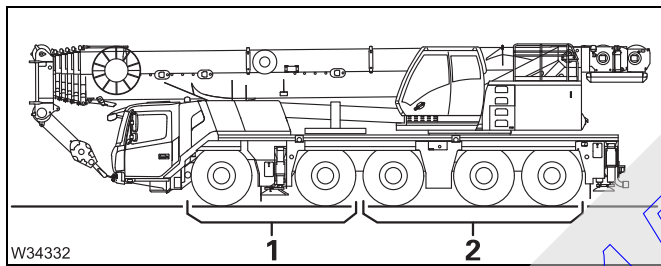




- Determining the axle loads

All the axle lines belonging to an axle group must always be weighed. In addition, all the wheels must be on the same level. If for instance only the axle group **A1** is to be weighed, then the axle groups **A2** must be equalised on a support plate **U** which has the same height as the scales **W1** and **W2**.

Axle groups

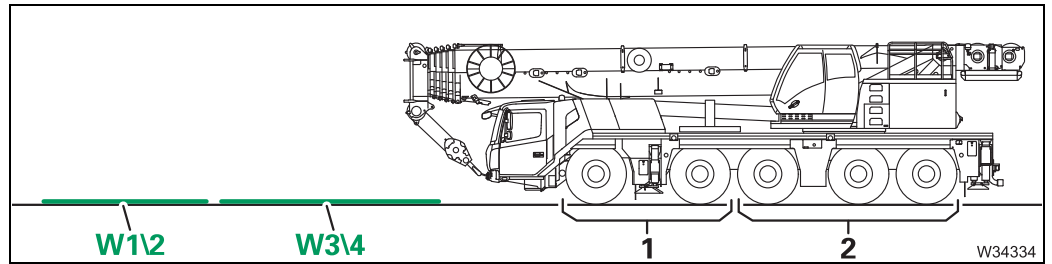


GMK5150L

- Axle group 1
- Axle group 2

- 1. + 2. axle lines
- 3. + 4. + 5. axle lines

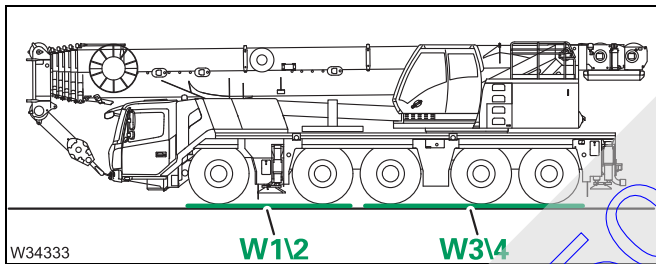
Weighing procedure



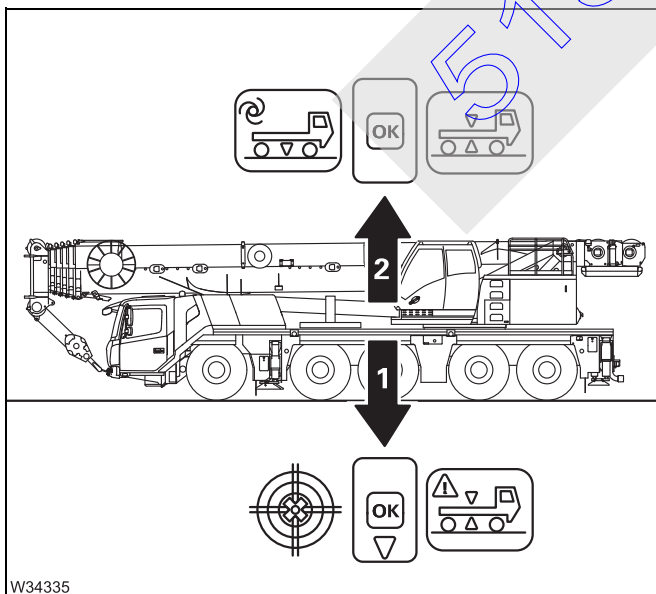
Perform the weighing procedure only with the crane truck standing on solid and horizontal ground. All scales must be at the same height.

- Position the scales **W1** to **W4** (or the necessary support plate) 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 support plates), 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 lower the truck crane to its lowest position; p. 5 - 16.
- (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 make a note of the results.



Evaluation

In the example shown you receive four weighing results. 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: $W1 + W3 = 10 \text{ t} + 12 \text{ t} = 22 \text{ t}$

Driver's side: $W2 + W4 = 10 \text{ t} + 12 \text{ t} = 22 \text{ t}$

Total weight = 44 t

For the axle loads of individual axle lines

- You must determine the weight of the associated axle group and divide it by the number of axle lines.

- Determine the weight of the axle group

The 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 = **24 t**

- Determining the axle load on the 2nd axle line

Axle group 2 has 3 axle lines.

- Divide the weight of the axle group by the number of axle lines.

$$\text{Axle load} = \frac{\text{Weight of axle group 2}}{\text{Number of axle lines}} = \frac{24 \text{ t}}{3} = 8 \text{ t}$$





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 onto 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.

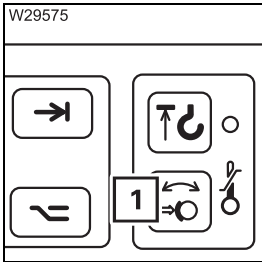
- If a houselock is fitted, switch it off;  *Switching off the houselock*, p. 11 - 19.




Risk of accidents from the houselock being switched on

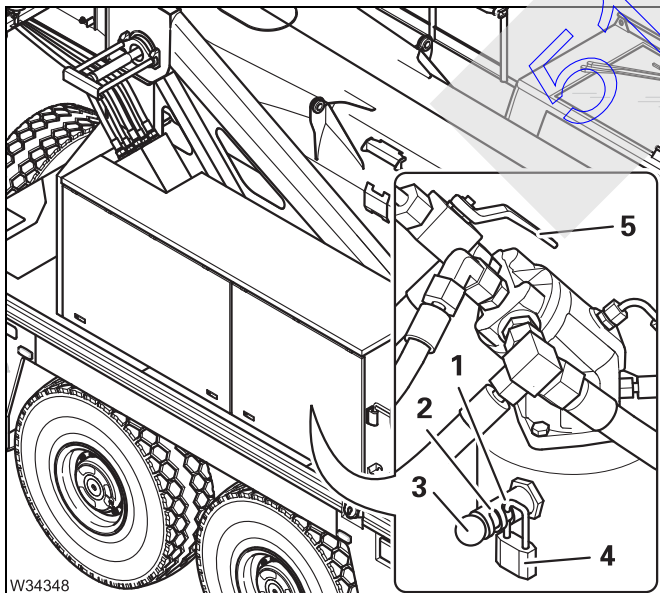
Always switch off the houselock before setting down the main boom on the dolly. Otherwise the superstructure will be unable to slew when driving around corners.

- Place the boom on the dolly as described in section *Switching on the boom floating position*, p. 6 - 13.



Prerequisites


- The engine must be running.
- The slewing gear brake must be released, the lamp (1) must have gone out;  *Releasing the slewing gear brake*, p. 11 - 116



Switching on

- Remove the lock (4) from the bore (2).
- Push the pin (3) inward as far as it will go.
- Secure the pin with the padlock 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.



Switching off the slewing gear freewheel;  p. 12 - 20.

6.3.2

Switching on the boom floating position

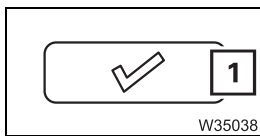
If the main boom has been placed on a dolly, the boom floating position must be switched on so that the main boom can move up and down.



Risk of accidents from the boom floating position being switched off

Always switch on the boom floating position when the main boom is on a dolly.

This prevents the full weight of the dolly briefly becoming suspended from the main boom on uneven ground, the axle loads from rising suddenly, or the truck crane from tipping when driving around corners.



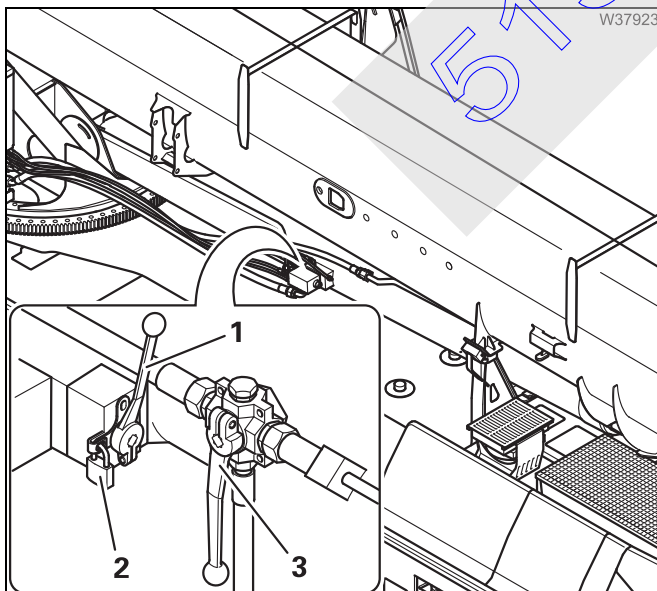
- Confirm the current rigging mode.
- Fully retract the main boom.
- Raise the main boom to a permitted angle within the working range.
- Turn the superstructure to the 0° to the rear working position and place the main boom on a dolly.



Risk of accidents from the main boom dropping 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 padlock (2).
- Switch over valve I – lever (1) upwards.
- Secure the lever (1) with the padlock (2).
- Switch the valve IV over – Lever (3) points downwards.

The boom floating position is now switched on.

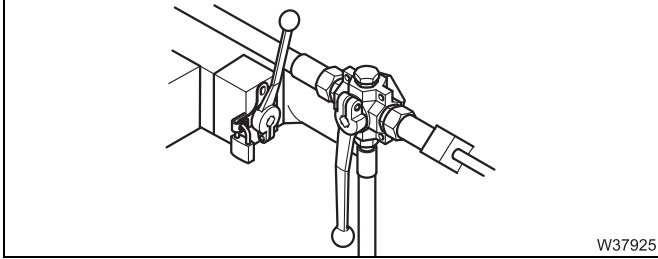


Switching off the boom floating position; p. 12 - 19.

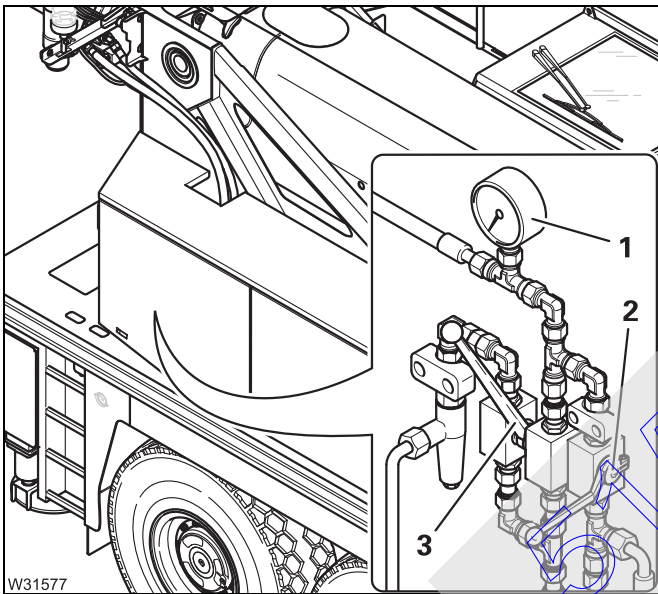
6.3.3

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 the boom pre-tensioning.



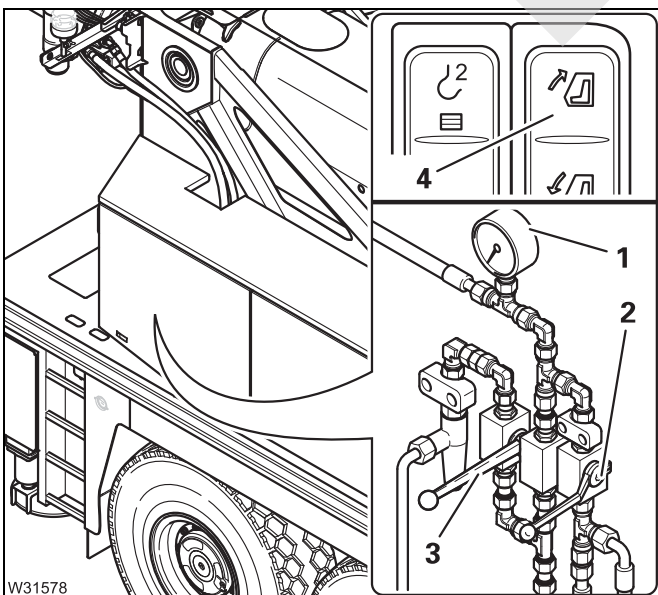
- Switch on the boom floating position;
▣▶ p. 6 - 13.



The valves II and III are under the pressure gauge (1).

- Close the valve II – the lever (2) is horizontal.
- Open the valve III – the lever (3) points upward.

You can now fill the pressure accumulator.



- Press button (4) in.
The pressure accumulator is now filled.

- Fill up the pressure accumulator until the pressure stops rising on the pressure gauge (1).

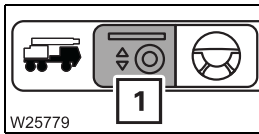
- Close the valve III – lever (3) points down.

The valve II stays closed – lever (2) is horizontal.

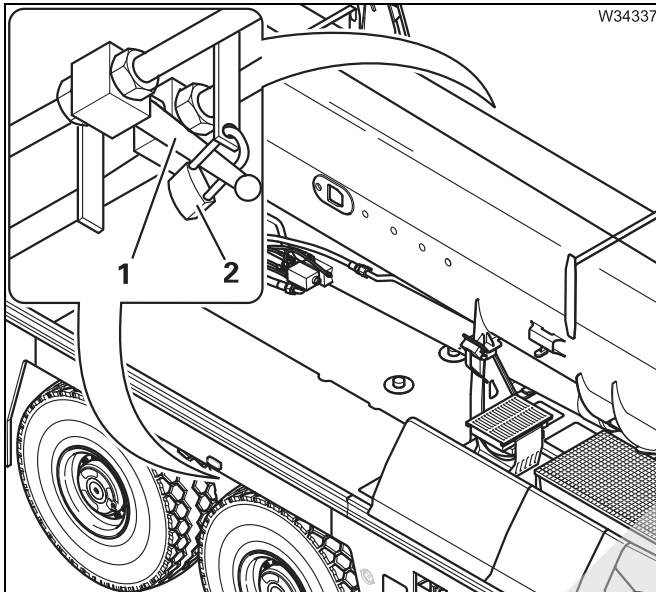
Now the boom pre-tensioning is switched on.

6.3.4

Raising/lowering the 3rd axle line for dolly operation

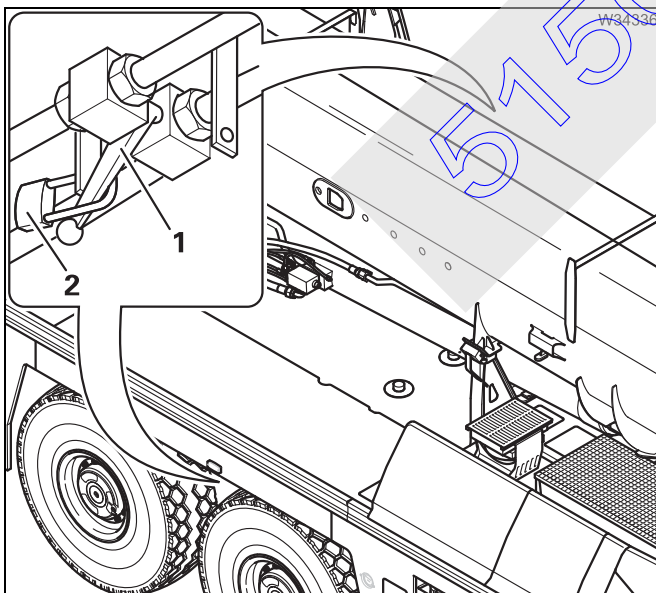


- Open the *Suspension/level adjustment* (1) menu.



Lifting

- Use the level adjustment system to lower the truck crane to its lowest position; p. 5 - 54.
- Remove the padlocks (2).
- Switch over valves I and II – levers (1) forwards.
- Secure the levers (1) with the padlocks (2).
- Establish the on-road level; p. 5 - 54.



Lowering

- Use the level adjustment system to lower the truck crane to its lowest position; p. 5 - 54.
- Remove the padlocks (2).
- Switch over valves I and II – levers (1) backwards.
- Secure the levers (1) with the padlocks (2).
- Establish the on-road level; p. 5 - 54.

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6.4

Rigging the main boom

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

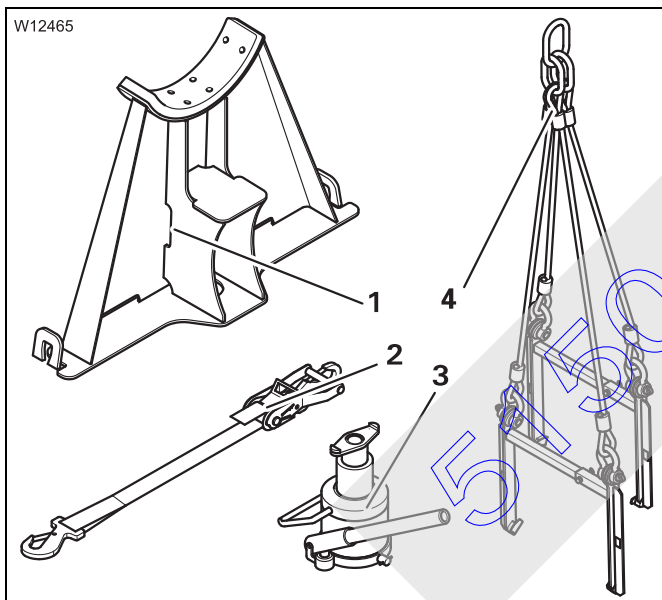


Risk of accident when removing/installing the main boom without pulling devices

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

Additional equipment required

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



- a derricking cylinder support (1)
 - a tightening belt (2)
 - a lifting device (3)
 - lifting gear (4)
- as well as
- an auxiliary crane with sufficient lifting capacity,
 - a separate vehicle with sufficient load bearing capacity and loading area.

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

6.4.1

CHECKLIST: Removing the main boom



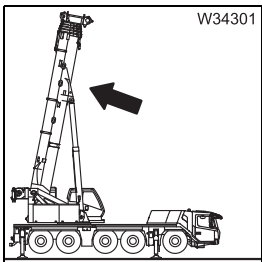
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.

Observe the warnings and safety instructions specified there!

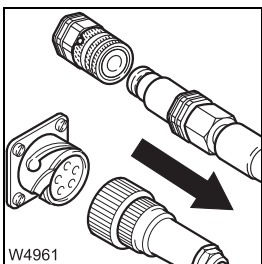
Prerequisites

- 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 with at least an outrigger span of 8.030 x 2.50 m (26.3 x 8.2 ft).
Or the parking brake is applied, the truck crane has been aligned horizontally with the level adjustment system and the suspension is locked.

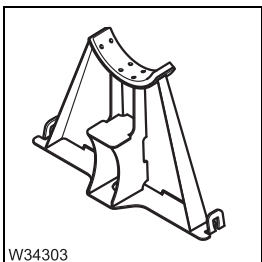
Checklist



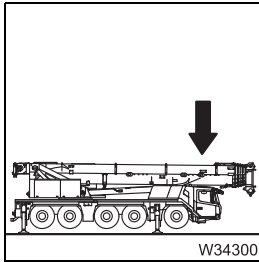
1. Raise the main boom.



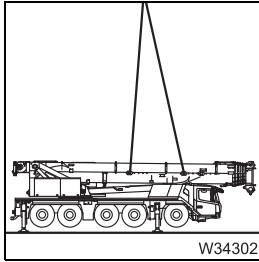
2. Disconnect the hydraulic/electrical connections; p. 6 - 24.



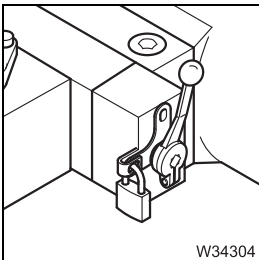
3. Place the derricking cylinder support on the counterweight platform;
 p. 6 - 26.



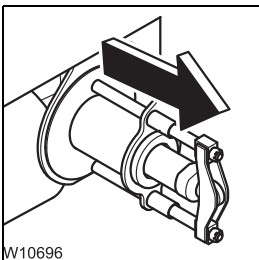
4. Place the main boom on the boom rest.



5. Sling the main boom to an auxiliary crane; p. 6 - 26.



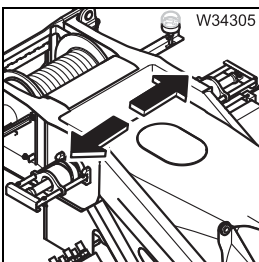
6. Switch on the derricking cylinder pressure relief; p. 6 - 29.



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.

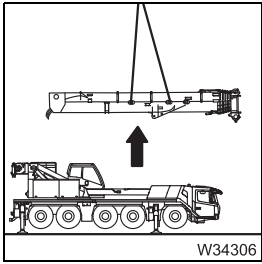


8. On the boom pivot pin

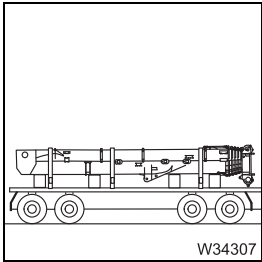
- Switch the hydraulic circuit over
- Release the pivot pin,
- Pull out the pivot pin;

p. 6 - 32.

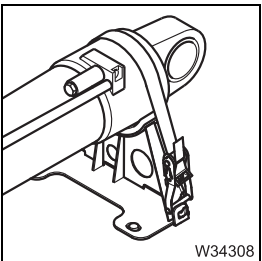




9. Raise the main boom from the turntable.



10. Put the main boom on the separate vehicle and secure for transport;
▣▣▣▣ p. 6 - 35.



11. Secure the derricking cylinder with a tightening belt; ▣▣▣▣ p. 6 - 35.

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6.4.2

CHECKLIST: Mounting the main boom



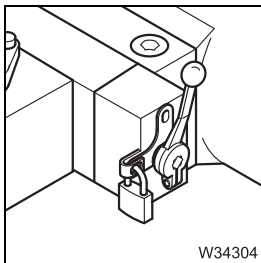
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references. **Observe the warnings and safety instructions specified there!**

Prerequisites

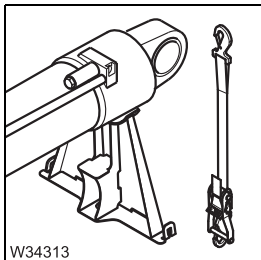
The truck crane is supported with at least an outrigger span of 8.030 x 2.50 m (26.3 x 8.2 ft).

Or the parking brake is applied, the truck crane has been aligned horizontally with the level adjustment system and the suspension is locked.

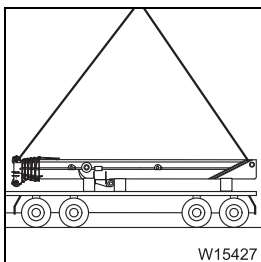
Checklist



1. Check whether the pressure relief for the derricking cylinder is switched on; p. 6 - 29.

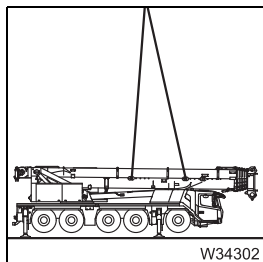


2. Remove the tightening belt from the derricking cylinder; p. 6 - 35.

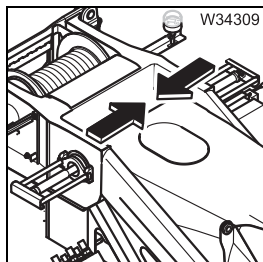


3. Sling the main boom to an auxiliary crane; p. 6 - 26.

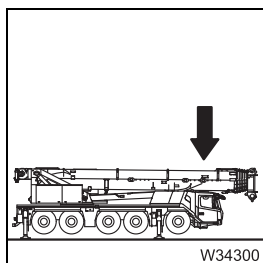




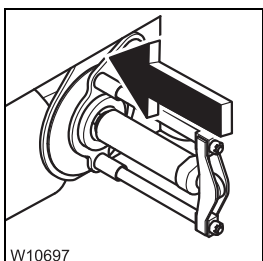
- 4.** Lift the main boom into the turntable and align the connecting points;
➡ p. 6 - 36.



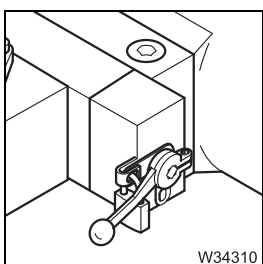
- 5.** On the boom pivot pin
- Push in the pivot pin
 - secure the pivot pin;
 - Switch the hydraulic circuit over
- ➡ p. 6 - 32.



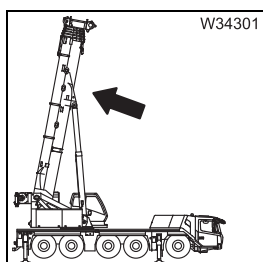
- 6.** Set down the main boom in the boom rest with the auxiliary crane and remove the lifting gear.



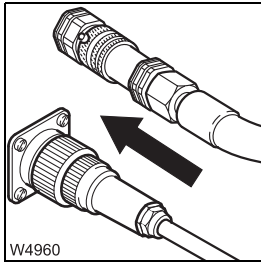
- 7.** On the derricking cylinder head axle
- Level the derricking cylinder,
 - Fit the head pin
 - Secure the head pin;
- ➡ p. 6 - 30.



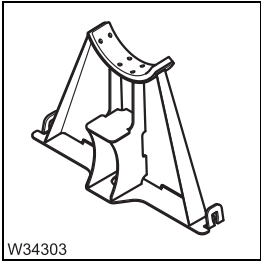
- 8.** Switch off the derricking cylinder pressure relief; ➡ p. 6 - 29.



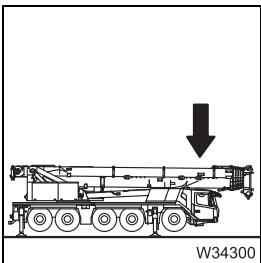
- 9.** Raise the main boom.



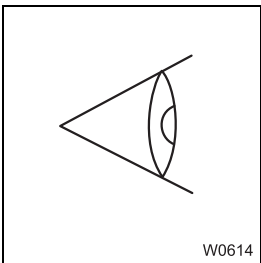
10. Establish the hydraulic/electric connection; |||▶ p. 6 - 24.



11. Remove the derricking cylinder support from the counterweight platform.



12. Place the main boom on the boom rest.

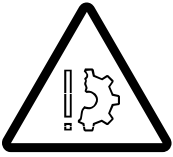


13. Perform inspections with the main boom set down; |||▶ p. 6 - 37.

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6.4.3

Disconnecting/connecting hydraulics/electrical



Risk of malfunction in the superstructure electronics!

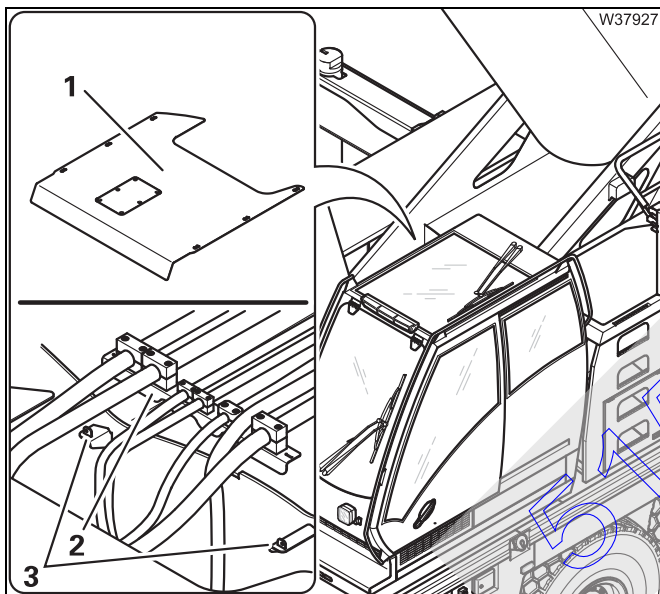
Always turn off the ignition in the crane cab before you establish or separate the electrical connection. This prevents malfunctions in the electronics and corresponding error messages in the subsequent crane operation.



Danger of hands and arms being crushed.

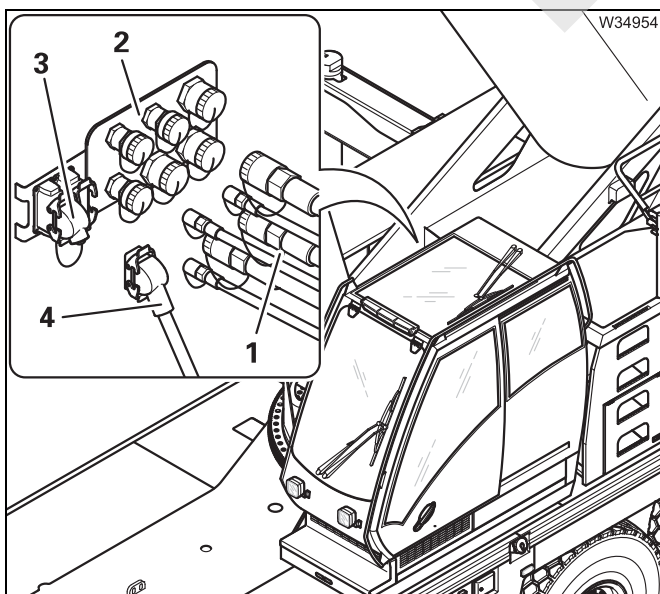
Make sure that the boom pivot pin is pushed in before making or breaking the connections.

By this means you avoid a swinging main boom crushing your arms or hands on the turntable.

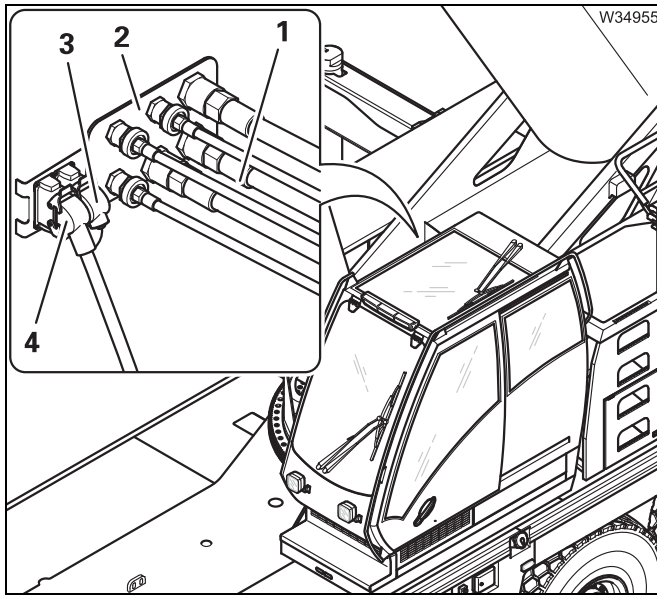


Breaking

- Remove the plate (1).
- Remove the clamp (2).
- Fasten the pin (3).

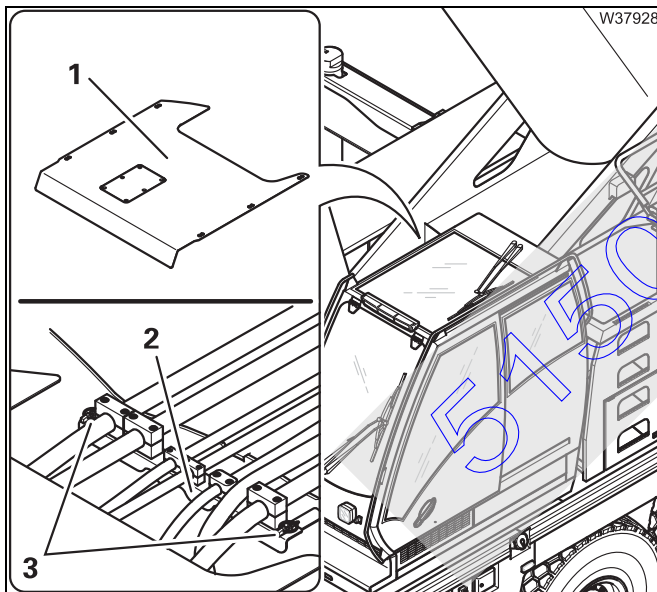


- Remove the hoses (1) from the connections (2).
- Withdraw the plug (4) from the socket.
- Insert the bridging plug (3).
- Close all hoses, connections, plugs and sockets.
- If necessary, secure all the hoses/cables so that they do not swing loose when the main boom is raised.



Establish

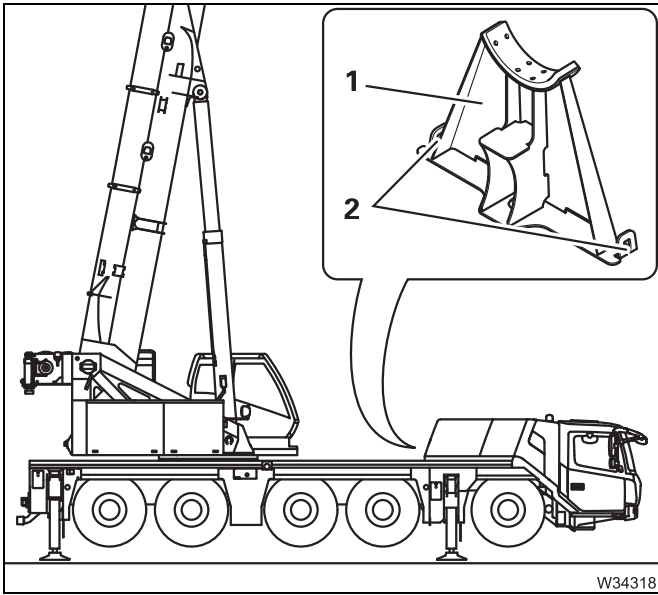
- Remove the bridging plug (3).
- Connect the plug (4) to the socket.
- Connect all hoses (1) to the connections (2). The assignment is given by the size and colour designations.
- Lay the hoses/cables so that they will not be damaged.



- Insert the clamp (2) onto the pins (3).
- Secure the clamp using the linch pins.
- Replace 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. Note the equipment necessary for this; ►► p. 6 - 17.

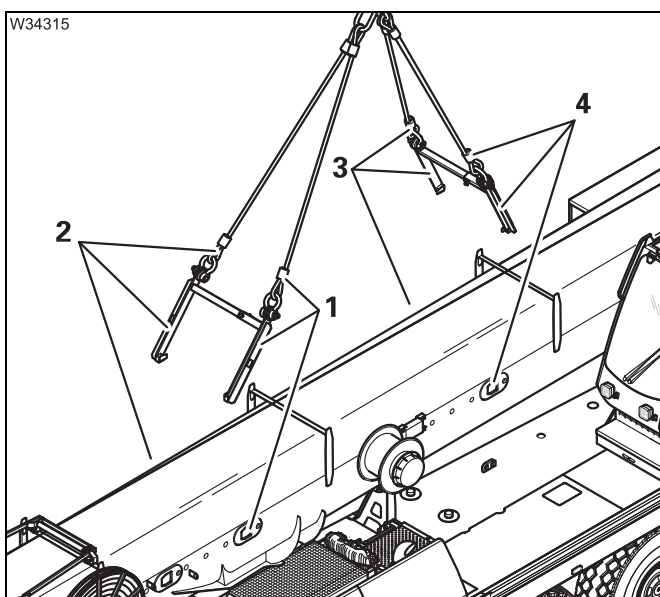


Risk of accidents due to incorrect procedure!

Only use the lifting gear included in the delivery and proceed as described in the following section.

Marking

The lifting gear is labelled.

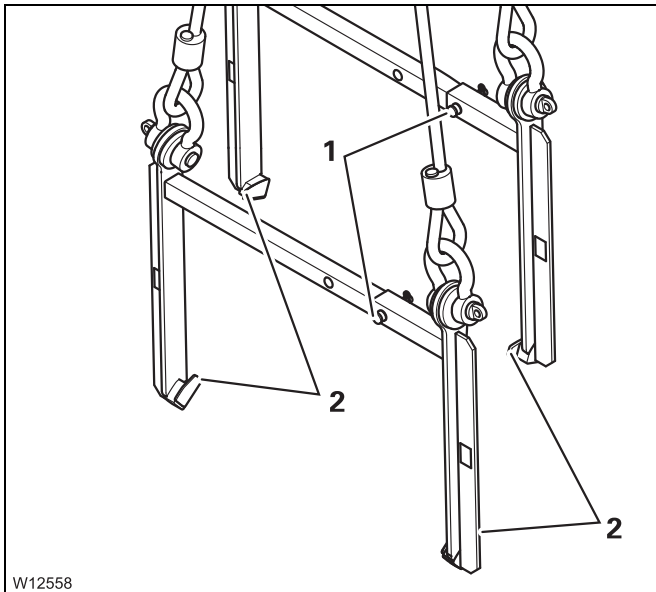


Only connect the parts of the lifting gear that have the same marking.

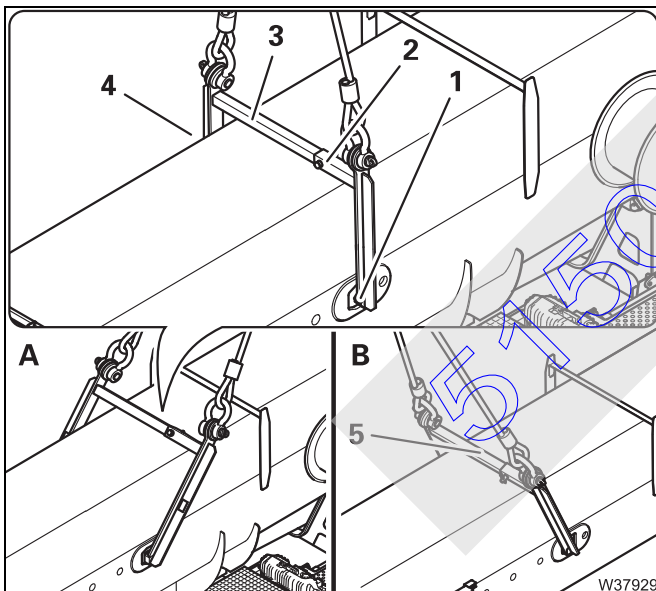
Only fasten the lifting gear to the slinging points intended for this purpose. The markings are of following significance:

- 1 FL – Front left
- 2 FR – Front right
- 3 BR – Rear right
- 4 BL – Rear left

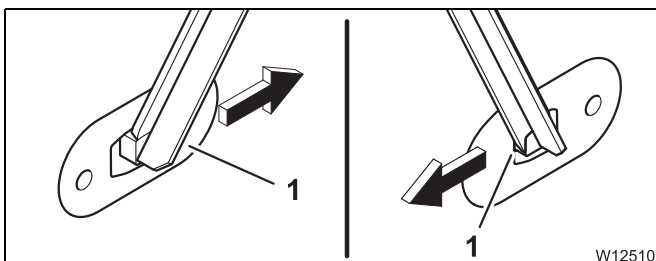
Attach lifting gear



- If the installation is correct, the load-bearing equipment (2) of both brackets point to each other.
- Lock both brackets in the wide position. Secure the pins (1) using the retaining pins.
- Install the front bracket first. It hangs on longer ropes, which makes installing the back bracket easier.



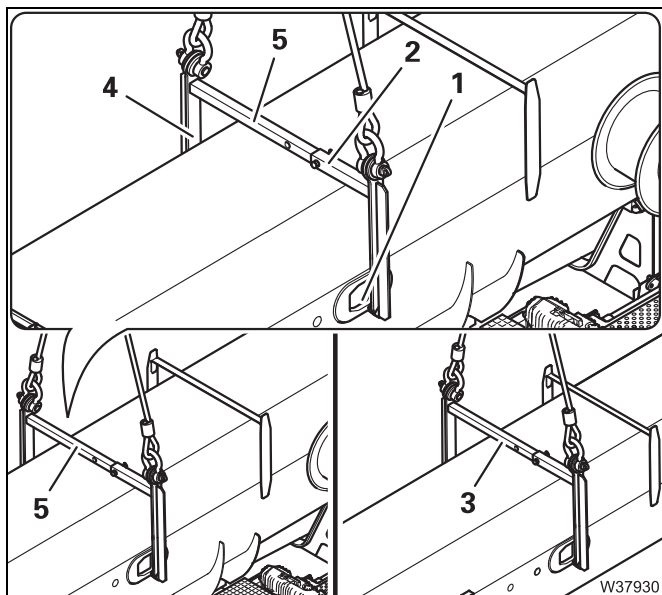
- Insert the bracket (3) into the slinging point (1). Pull the pin (2)
- Insert the bracket into the slinging point (4).
- Secure the bracket with the pin (2) and the retaining pin.
- (A) – Pull the bracket to the centre – the bracket must rest on the slinging point on both sides.
- (B) – Install the bracket (5) in the same manner



- (A) – Before lifting, make sure the brackets on both sides are resting on the slinging point (1)



Removing the sling gear



- Remove the pin (2) and pull the bracket (5) 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)
- Position the lifting gear such that the bracket (3) is relieved.
- Remove the bracket (3) in the same manner.
- Put down the lifting gear for transport.

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6.4.6

Switching the pressure relief on/off

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

When removing

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

When installing

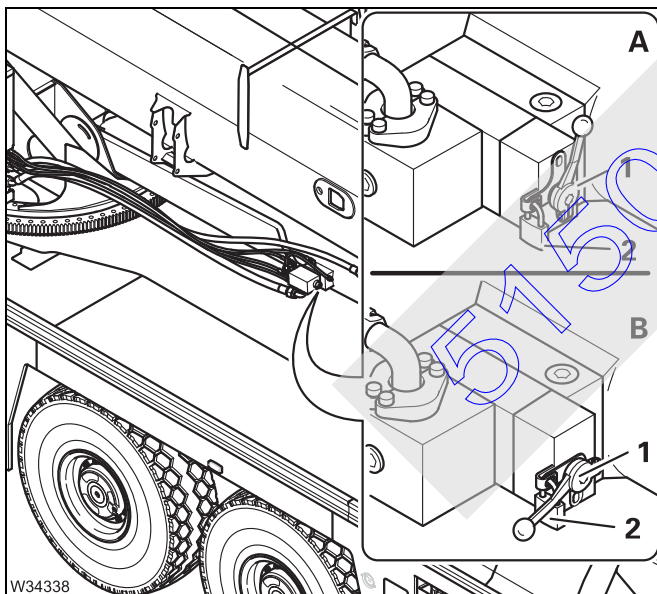
- Only switch off the pressure relief after fitting the derricking cylinder head axle.



Risk of accident 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) upwards.

– (B) – Switching off

- Switch over valve I – lever (1) horizontal and pointing outward.
- 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

Retracting/fitting the derricking cylinder head pin

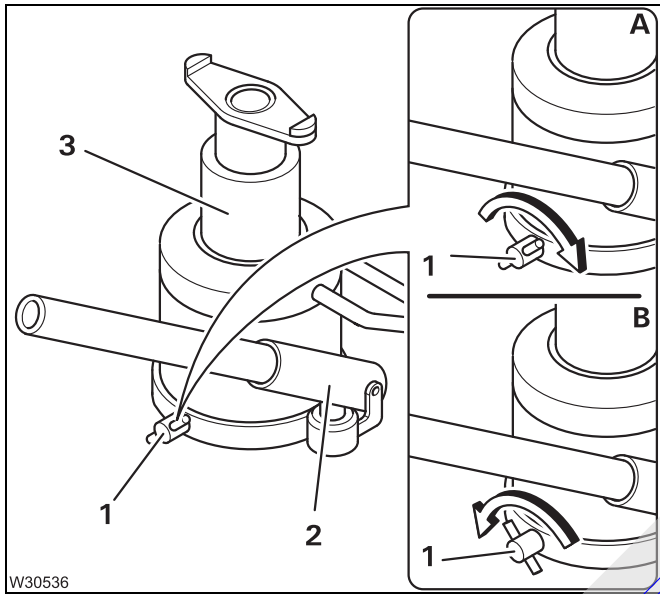
Operating the lifting device



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

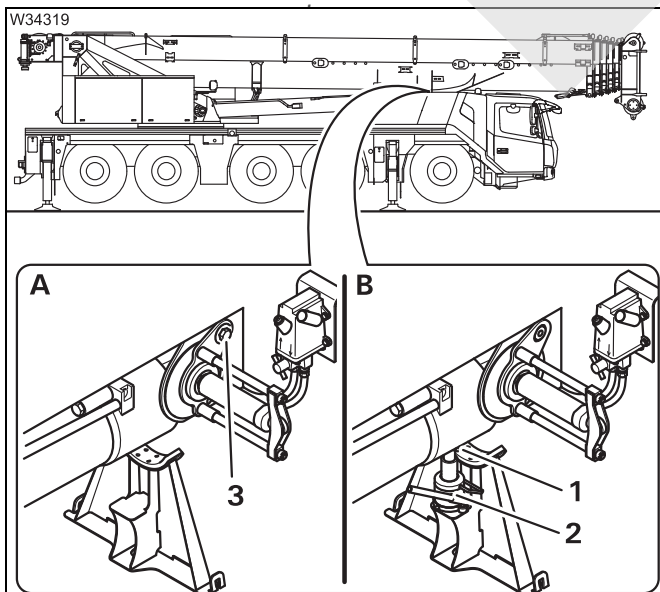
- Close the drain plug (1) and pump the lever. The piston rod (3) extends.

(B) – Lower

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

Pulling the derricking cylinder head axle

After you have pulled the head pin, you can not longer derrick the main boom.



(A) – Releasing the head pin

- Remove the disc (3).

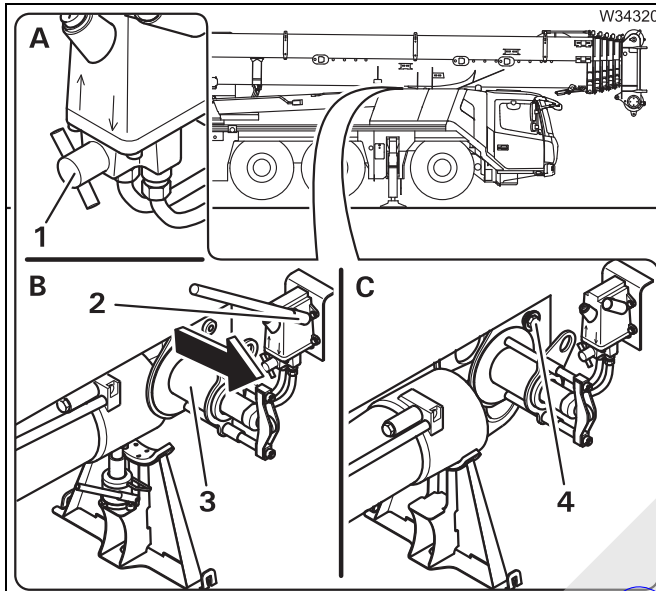
(B) – Taking the load off of the head pin

- Place the lifting device (2) underneath the middle of the derricking cylinder.
- Carry out the movement *Raise* until the shelf (1) is resting firmly on the derricking cylinder.




Risk of accident from falling derricking cylinder!

Always take the load off of the derricking cylinder using the lifting device before retracting the head pin. By doing this, you prevent the derricking cylinder from falling down, injuring people or being damaged while retracting the head pin.

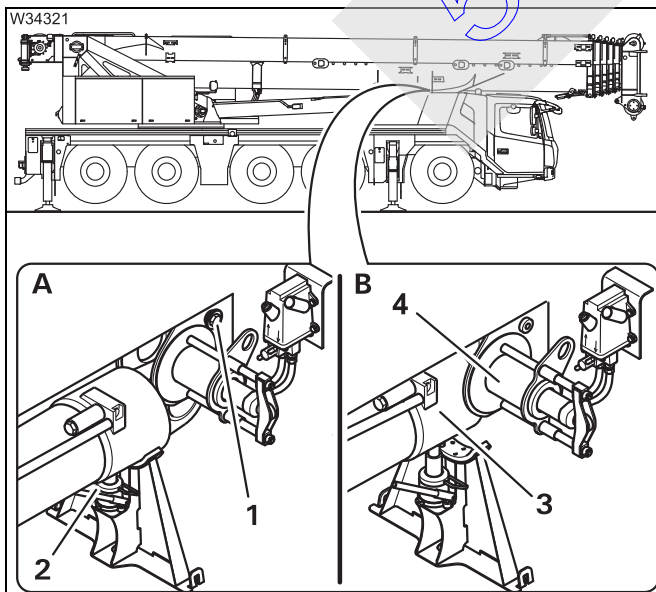


Pulling out the head pin

- (A) – Turn the switch (1) to the *Pull* position .
- (B) – Insert the lever into the clamp (2).
- Pump until the head pin (3) is completely drawn out.
- Carry out the movement *Lower* until the derricking cylinder is in the derricking cylinder support.
- (C) – Fasten the disc with the bolt (4).
- Stow away the lever and the lifting device.

Fitting the derricking cylinder head axle

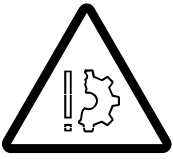
- Check to see if the tightening belt of the derricking cylinder is taken off.



Aligning the derricking cylinder

- (A) – Remove the disc (1).
- Place the lifting device (2) underneath the middle of the derricking cylinder.
- (B) – Carry out the movement *Raise* until the head pin (4) is aligned with the bearing in the derricking cylinder (3).

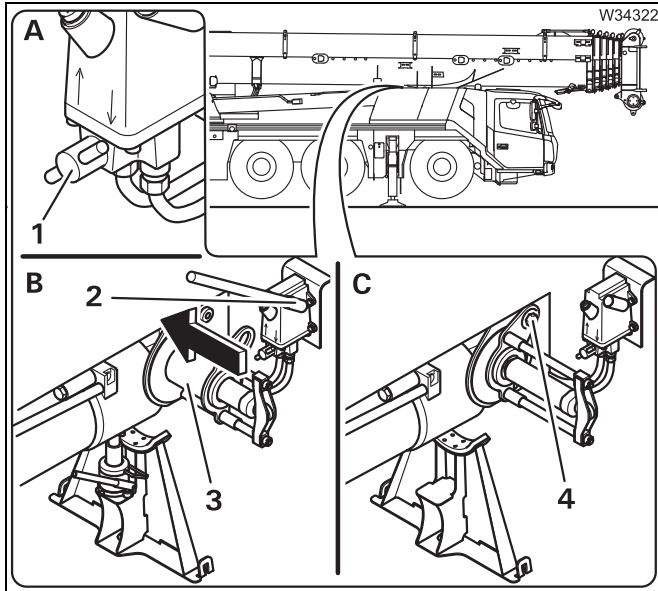





Risk of damage to the bearings in the derricking cylinder head

Make sure that the bearings in the derricking cylinder are aligned with the head pin before fitting the head pin.

This prevents the head pin from damaging the bearing.



Fitting the head pin

- (A) – Turn the switch (1) to the *Plug* position .
- (B) – Insert the lever into the clamp (2).
- Pump until the head pin (3) is inserted as far as possible.

Securing the head pin

- (C) – Fasten the disc with the bolt (4).
- Stow away the lever and the lifting device so that it is safe to drive on the road.

6.4.8

Extending/retracting the boom pivot pin



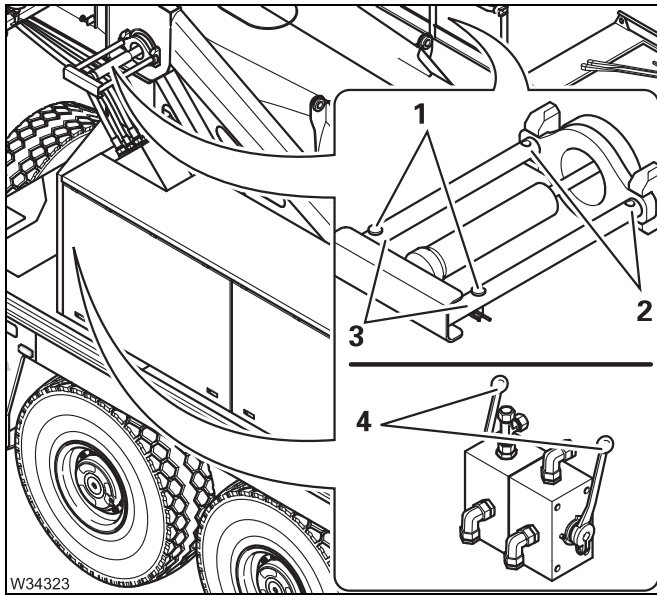
Risk of accidents due to the main boom falling down!

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 whilst the crane is in operation, whereupon the main boom would crash 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 valves – lever (4) vertical.

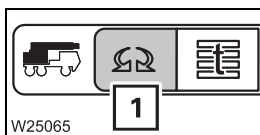
Releasing the pivot pin

- 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.

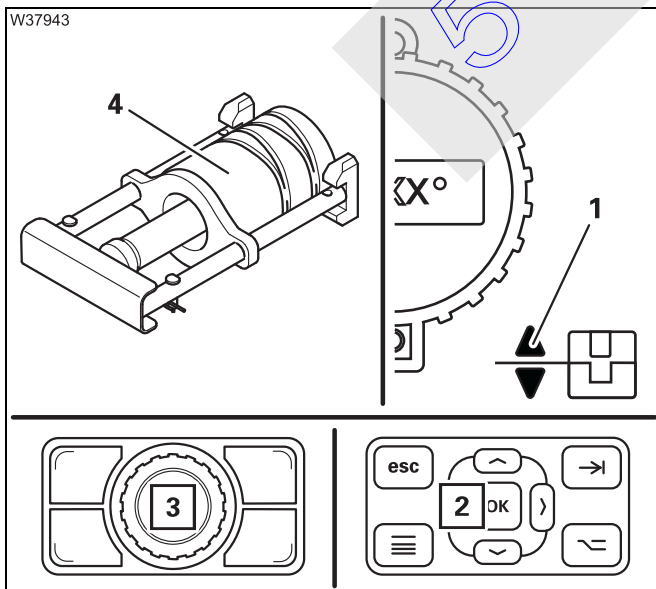


Risk of damage to the main boom

Before pulling out, the main boom must be slung and all other lifting gear must be tightened.



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



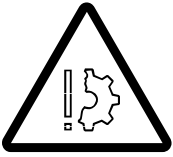
Pulling out the pivot pin

- Start the engine from the crane cab;
▮▮▮ p. 10 - 3.
- Select the symbol (1).
- Press and hold (2) or (3) button until the pivot pins (4) are completely pulled out on both sides.
- Switch the engine off.



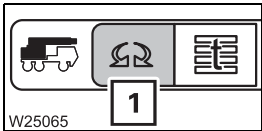
Pushing the pivot pin in

After pushing in, you must secure the pivot pins and switch the hydraulic circuit over.

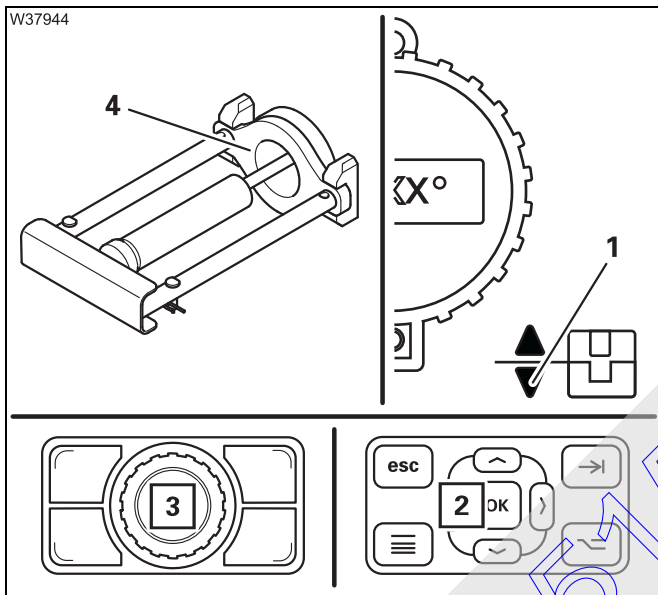


Risk of damage to the main boom

Before pushing in, the bearing points on the turntable must be aligned with the boom pivot pin.

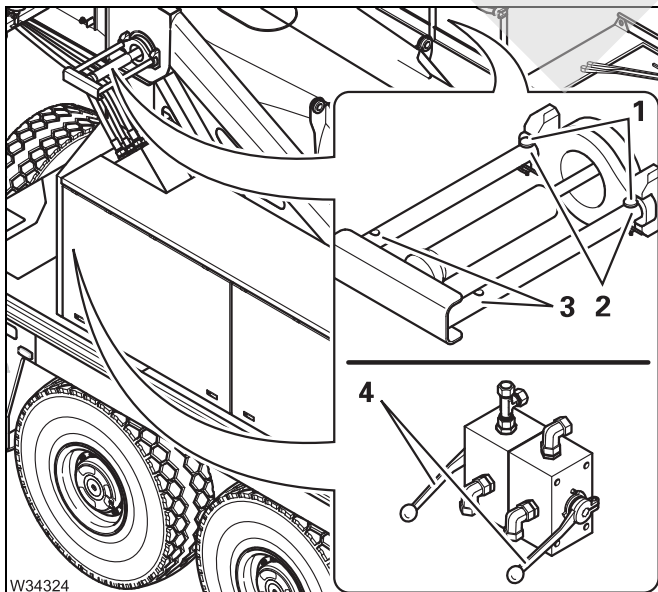


- Open the *Superstructure lock* menu (1) if necessary.



Pushing the pivot pin in

- Start the engine from the crane cab;
▮▶ p. 10 - 3.
- Select the symbol (1).
- Press and hold (2) or (3) button until the pivot pins (4) are completely pushed in on both sides.
- Switch the engine off.



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.

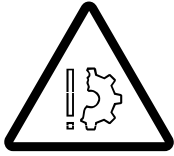
Switching over the hydraulic circuit

- Switch over valves – lever (4) horizontal.

6.4.9

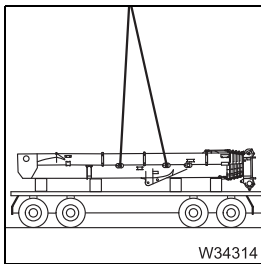
Transporting the main boom

Transport the main boom only on a separate vehicle which is of sufficient size and has sufficient lifting capacity;  p. 1 - 10.



Risk of damage to the main boom

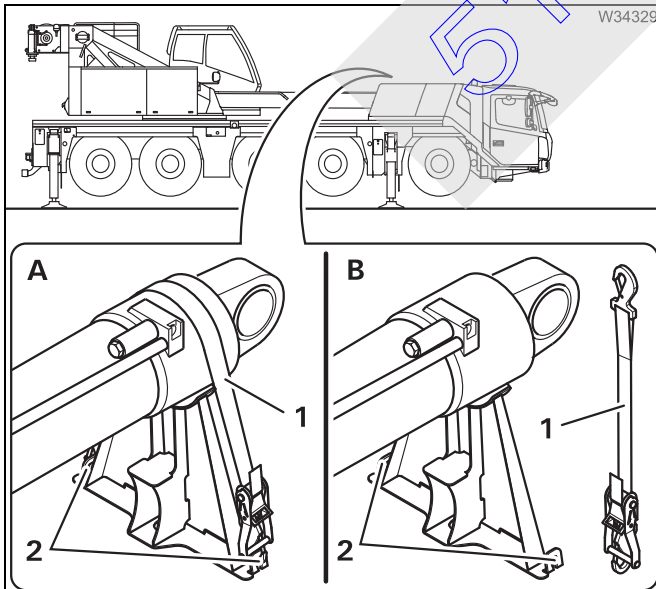
Always place the main boom onto a suitable packing. If you lay the main boom on its side, add-on parts will be damaged.



- Always place the main boom onto a suitable packing!
- Secure the main boom against slipping using the holding ropes.
- Load the main boom in such a way that other road users are not put at risk.
- Load the transport vehicle in such a way that the weight is evenly distributed.
- Secure the connection lines so that they will not slip and be damaged during transport.

6.4.10

Securing/releasing the derricking cylinder



(A) – Securing

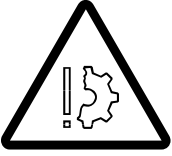
- Place the tightening belt (1) over the derricking cylinder and fasten it onto the holders (2).
- Tighten the tightening belt so that the derricking cylinder is secure within the support.

(B) – Releasing

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

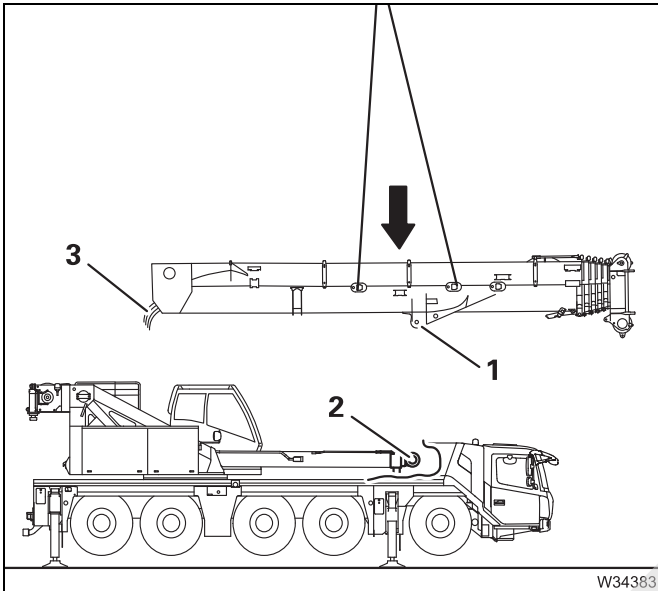
6.4.11

Aligning the connecting points

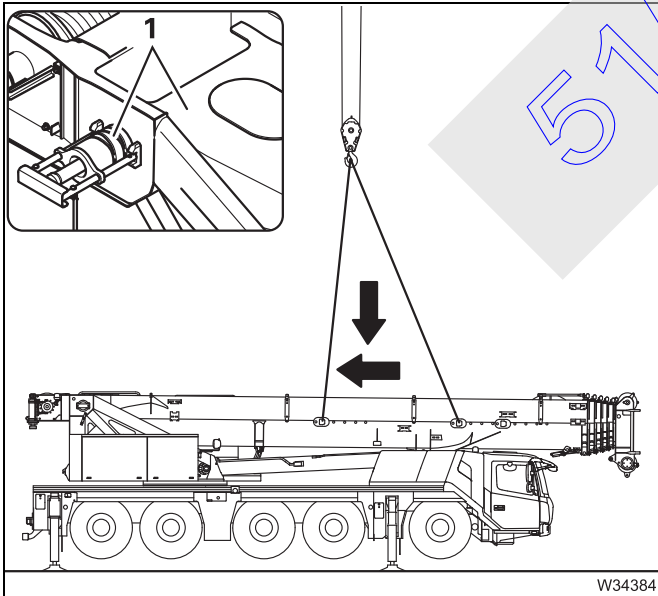


Risk of damage to the turntable and the connection lines

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.




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

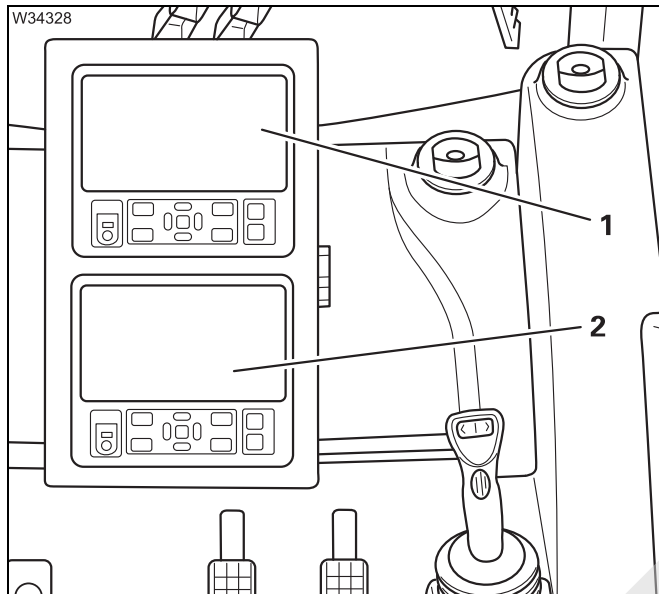



- Lay the hoses into the turntable in such a way that they are not damaged during alignment.
- Align the main boom so that the boom pivot pin is aligned with the bearing points (1) in the turntable.
- Hold the main boom in this position until the pivot pin is pushed in.

6.4.12

Inspections after main boom mounting

- 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* (1) or *CCS* (2) control unit shows 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 subsequent inspection:

- The truck crane is on outriggers.
- The main boom is resting in the boom rest.
- The current rigging mode must have been entered and confirmed on the *RCL* display.

- Telescope the telescopic section about 1 m out and back in.
- Retract the telescoping cylinder into another telescopic section and mechanically lock it there.
- Check to see if the hydraulic connections in the turntable are sealed.



Before operating for the first time, carry out the movement *Incline lattice extension* with the hydraulically derricking lattice extension and check if the corresponding connections in the turntable are sealed.

Installing/removing the hose drum requires using an auxiliary crane with sufficient load-bearing capacity. The weight of the hose drum is about 170 kg (375 lbs).

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6.5

Rigging the auxiliary hoist

You will require the following equipment with a sufficient load bearing capacity:

- An auxiliary crane
- Suitable lifting gear and guide ropes,
- A separate vehicle.

Transport dimensions and weight;  p. 1 - 13.

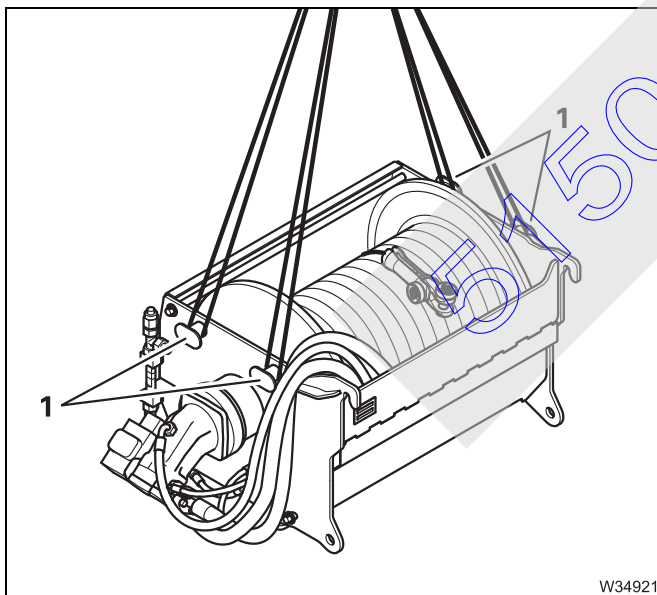
6.5.1

Slinging the auxiliary hoist



Risk of damage to the auxiliary hoist and truck crane

Only sling the auxiliary hoist onto the slinging points provided. Always use suitable lifting gear with sufficient lifting capacity.



- Sling the auxiliary hoist at the slinging points (1).

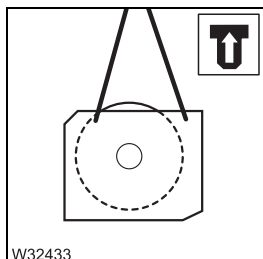
Use suitable lifting gear with the same length, so that the auxiliary hoist hangs at the centre of gravity.

- If necessary, remove the pins from the connecting points:

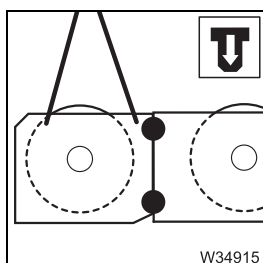
6.5.2

CHECKLIST: Installing the auxiliary hoist

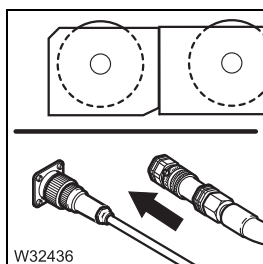
- The superstructure is slewed to the front.
- The main boom is resting in the boom rest.



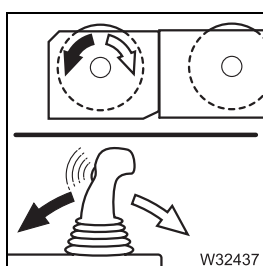
1. Attach the auxiliary hoist at the centre of gravity and remove the pins from the connection points; p. 6 - 39.



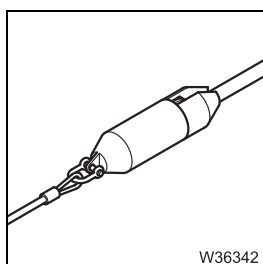
2. Lift the auxiliary hoist on to the turntable and make the connections; p. 6 - 42.



3. – Make the hydraulic connections; p. 6 - 43.
– Make the electrical connection; p. 6 - 44.
– Establish the connection to the central lubrication; p. 6 - 45



4. – Check that the auxiliary hoist is functioning properly; p. 6 - 47.

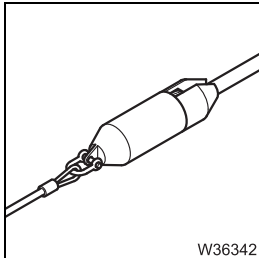


5. – Fit the hoist rope, using the rigging aid if necessary; p. 6 - 48.
– Reeve the hoist rope; p. 12 - 124.

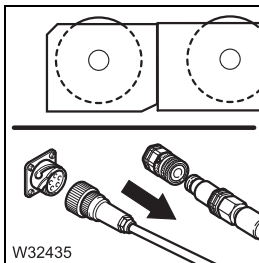
6.5.3

CHECKLIST: Removing the auxiliary hoist

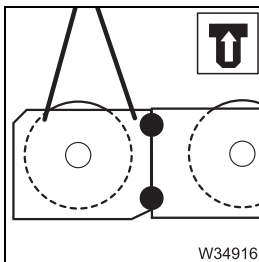
- The main boom must be resting in the boom rest.
- The hoist rope is unreeved.



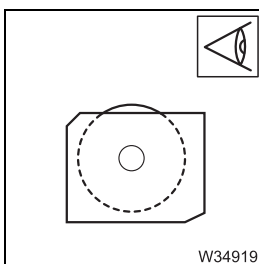
1. Wind on the auxiliary hoist rope, using the rigging aid if necessary; p. 6 - 48.



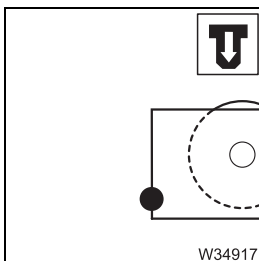
2. - Disconnecting hydraulic connections; p. 6 - 43.
- Disconnecting the electrical connection; p. 6 - 44.
- Disconnect the connection to the central lubrication; p. 6 - 45



3. - Attach the auxiliary hoist at the centre of gravity; p. 6 - 42.
- Disconnect the connection between the auxiliary hoist and turntable; p. 6 - 42.



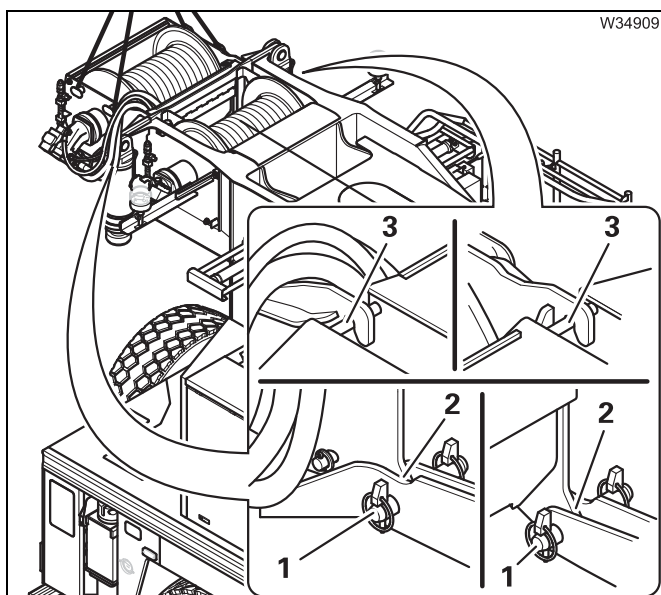
4. Lift the auxiliary hoist onto the separate vehicle and prepare it for transportation; p. 6 - 46.



5. Insert and secure the pin; p. 6 - 46.

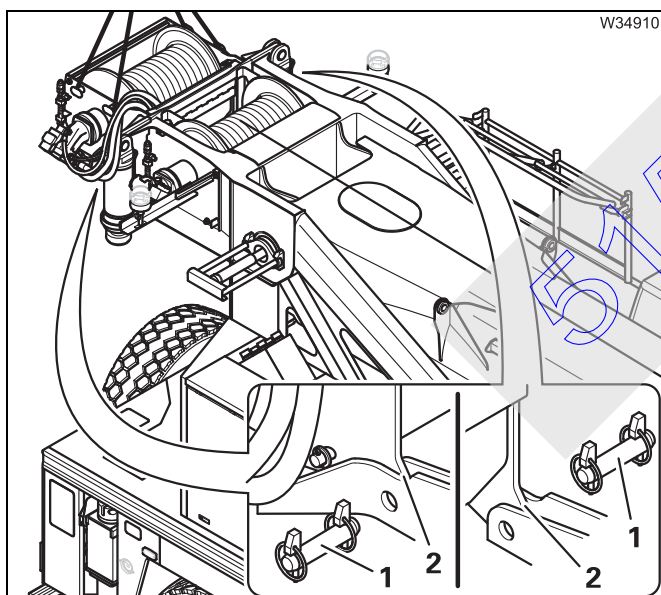
6.5.4

Making/breaking the connection between the auxiliary hoist and the turntable



Making the connection

- Suspend the auxiliary hoist in the connecting points (3) at the turntable.
- Lower the auxiliary hoist until the connecting points (2) align.
- Insert the pins (1) and secure them.

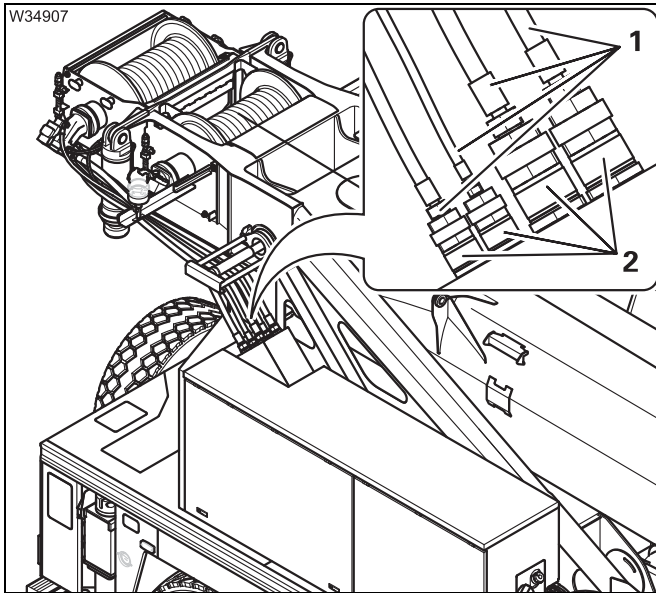


Undoing the connection

- Attach the auxiliary hoist on 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. 6 - 46.

6.5.5

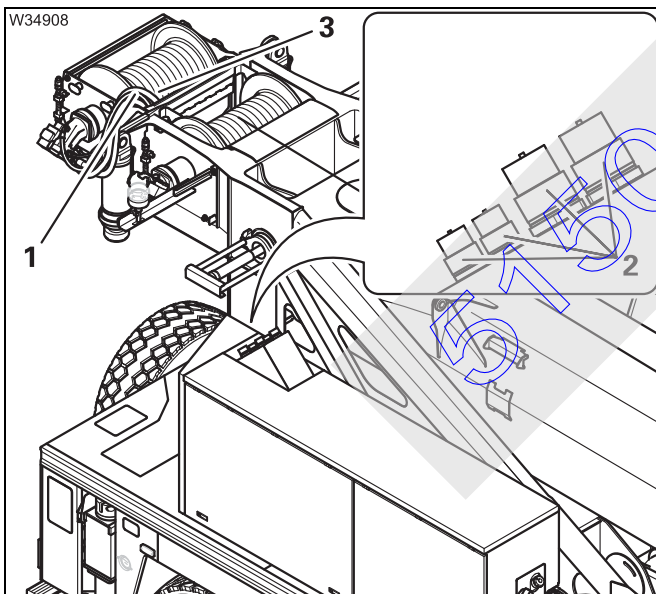
Establishing/disconnecting the hydraulic connections



Making the connection

The assignment is given by the size and colour designations.

- Connect the hoses (1) to the connections (2).

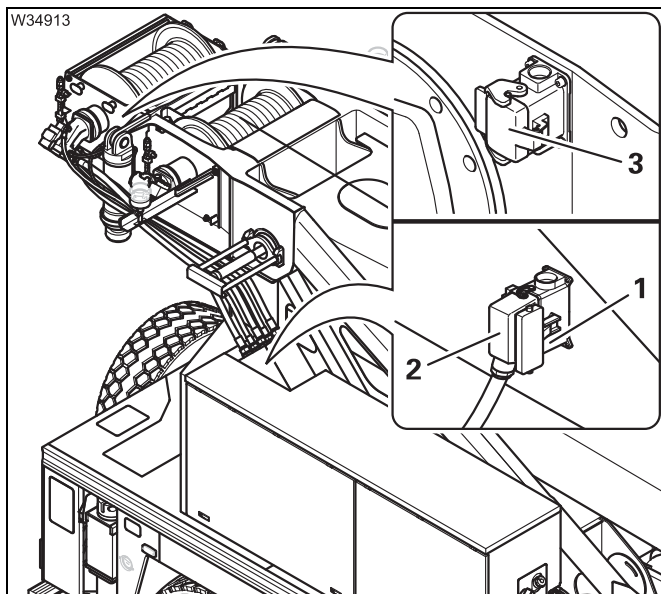


Undoing the connection

- Remove the hoses (1) from the connections (2).
- Close all hoses and connections.
- Insert the hoses into the hoist frame (3).

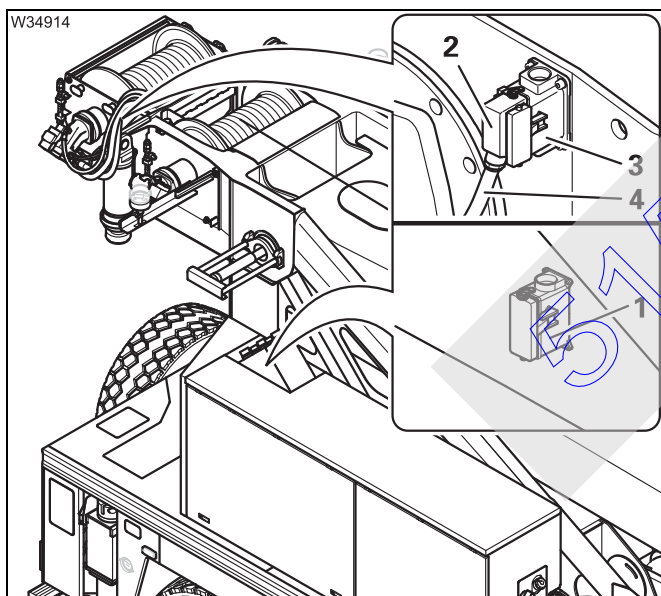
6.5.6

Disconnecting/establishing the electrical connection



Making the connection

- Remove the plug (2) from the dummy socket (3) and plug it into the socket (1).
- Close the dummy socket (3).

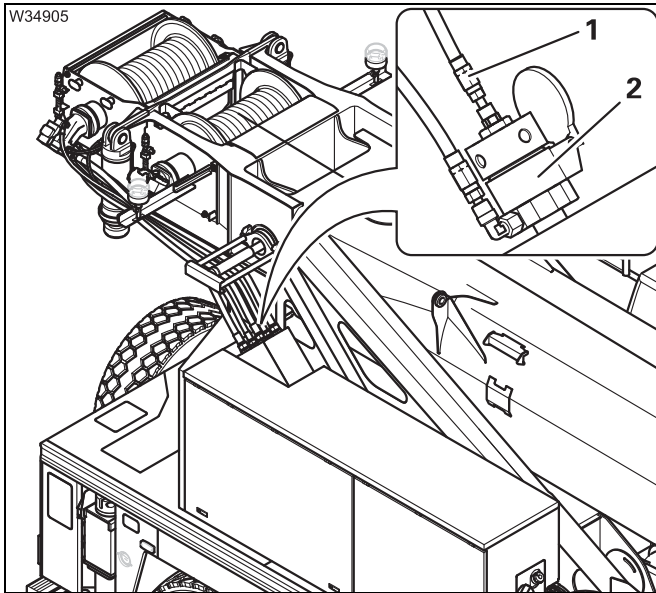


Undoing the connection

- Remove the plug (2) from the socket (1) and plug it into the dummy socket (3).
- Close the socket (1).
- Lay the cable (4) in such a way that it is not left hanging during removal.

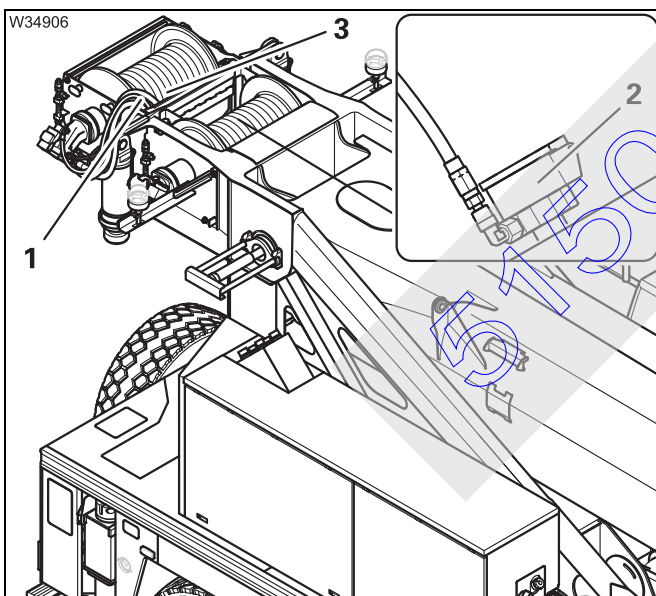
6.5.7

Making/breaking the connection to the central lubrication



Making the connection

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




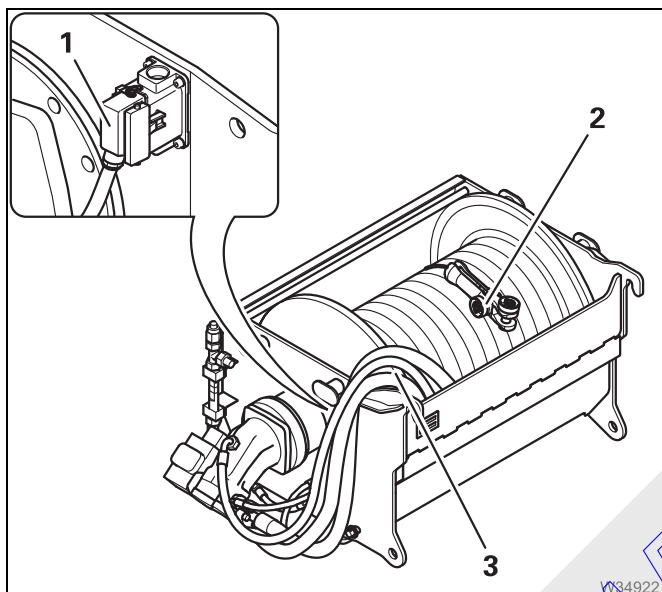
Undoing the connection

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

6.5.8

Transporting the auxiliary hoist

- For transportation, be sure to use a separate vehicle with sufficient load bearing capacity. Transport dimensions and weight;  p. 1 - 21.
- Load the separate vehicle in such a way that the weight is evenly distributed.
- Load the auxiliary hoist in such a way that no motorists and cyclists are put at risk.



- Lift the auxiliary hoist onto the separate vehicle and remove the lifting gear.
- Check that the plug (1) is inserted into the dummy socket.
- Lay the hoses and cables (3) aside so they will not become kinked.
- If necessary remove the rope end fitting (2).

6.5.9

Check that the auxiliary hoist is functioning properly

Slewing direction

Check the slewing direction before laying on the hoist rope.



Risk of accidents due to incorrect slewing direction

Check after each installation that the slewing direction is correct.

This prevents accidents caused by the hoist rope winding up unexpectedly when it is applied.

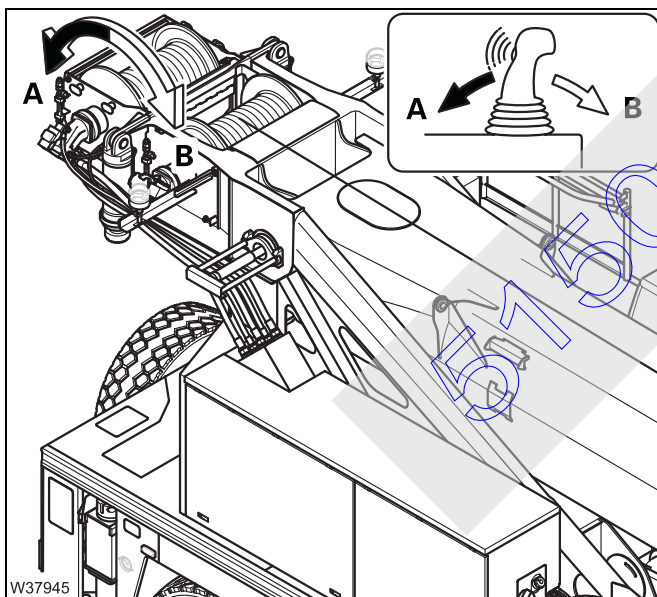


Danger due to slack rope!

Only drive the auxiliary hoist briefly and at the lowest speed.

This prevents slack rope from being created, or the rope end fitting being pulled into the hoisting gear frame.

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



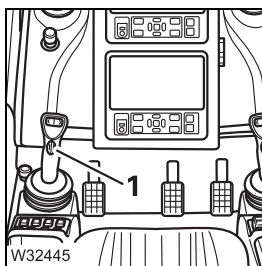
- Slowly perform the *Lift* and *Lower* movements → stop the movement as soon as the hoist drum turns.

- Check that the slewing direction is correct:

- A Lifting
- B Lowering

Slewing indicator

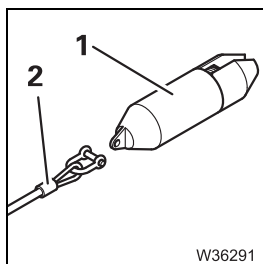
Check the function of the slewing indicator when applying the hoist rope.



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

6.5.10

Rigging aid for the hoist rope



Depending on the version, a rigging aid for the hoist rope is provided with the auxiliary hoist.

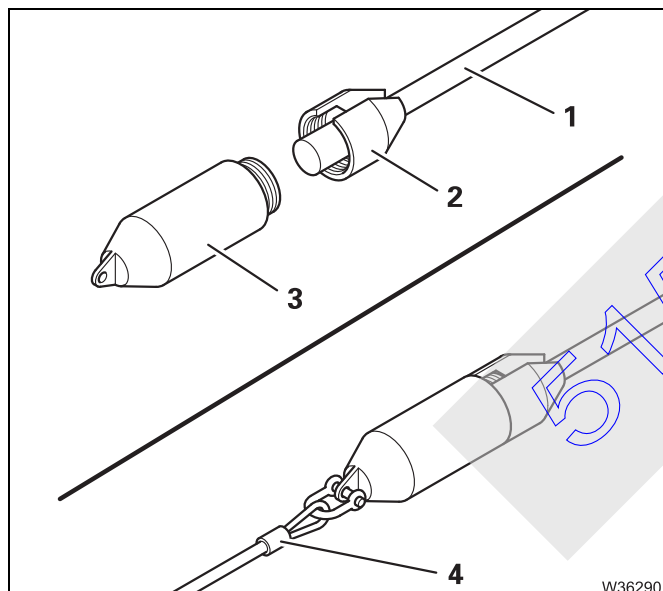
Scope of delivery

- 1 Connector, two parts
- 2 Rope



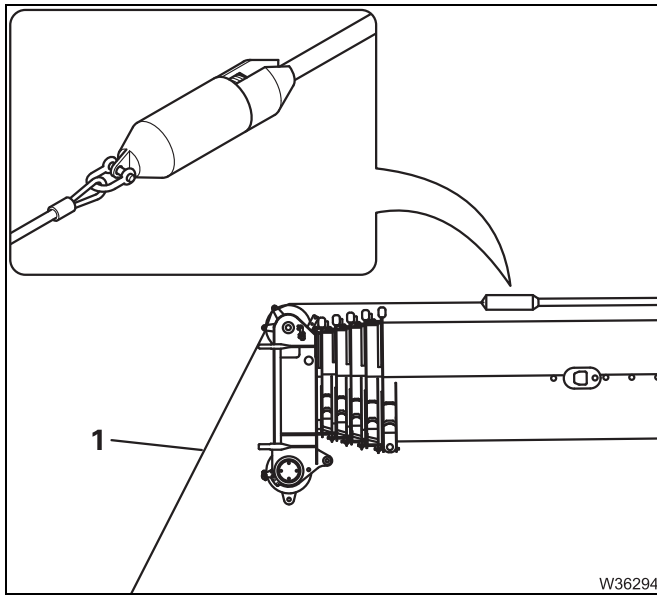
Risk of damage to the hoist rope!

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.



Making the connection

- Place the end of the hoist rope (1) in part (2) of the connector.
- Screw part (2) and (3) of the connector together.
- Attach the rope (4) to the connector.



Rigging the hoist rope

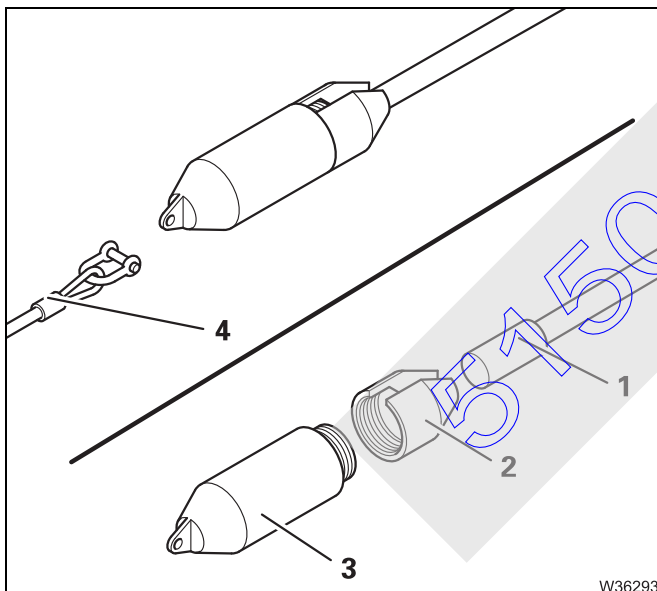
The rigging aid is connected to the hoist rope.

– When rigging

- Guide the rope (1) over the main boom and over the upper head sheave.
- 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.



Undoing the connection

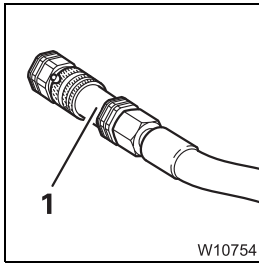
- Remove the rope (4).
- Disconnect part (2) and (3) of the connector and remove the hoist rope (1).
- Store the rigging aid so that it is safe for transport, under the passenger's seat if possible.

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6.6

Installing/removing the outrigger beams



To rig the outrigger beams, the outriggers must be fitted with hydraulic connections (1) which can be separated.

During rigging, each outrigger beam is removed and mounted as a complete "package", consisting of inner and outer outrigger beams, cylinders and add-on parts.



Risk of truck crane overturning if not properly supported!

Loads may only be lifted when the truck crane is supported 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 will require the following equipment with a sufficient load bearing capacity:

- An auxiliary crane
- Suitable lifting gear and guide ropes,
- A chain hoist,
- A separate vehicle.

Dimensions and weights of the outrigger beams; ■■■► p. 1 - 10.

6.6.1

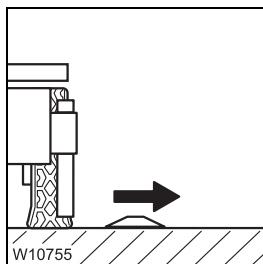
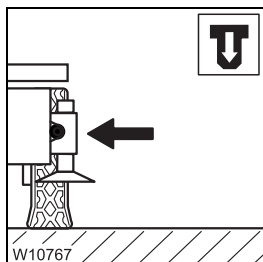
CHECKLIST: Removing the outrigger beams



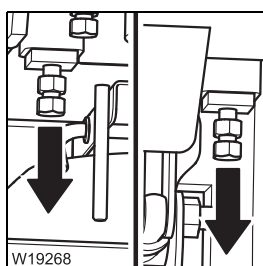
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.

Observe the warnings and safety instructions specified here!

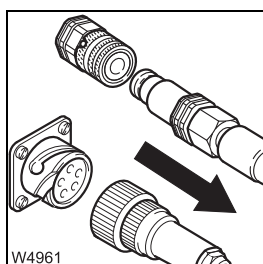
1. Preparing the truck crane; p. 6 - 57.
2. Label the outrigger beams, retract, release and bolt them to each other; p. 6 - 56.



3. If necessary, remove the outrigger pads; p. 6 - 58.

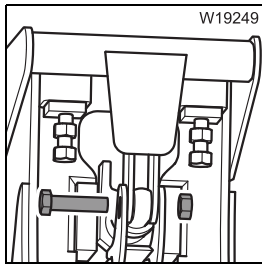


4. Unscrew the spacer; p. 6 - 62.

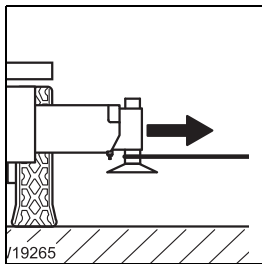


5. – Disconnecting hydraulic connections; p. 6 - 60.
– Disconnect the electrical connection if necessary; p. 6 - 61.

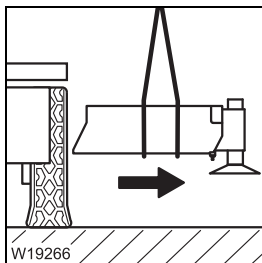
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6. Disconnect the connection to the support box; p. 6 - 64.



7. Sling the outrigger beam and pull it out of the outrigger box until it reaches the centre of gravity; p. 6 - 64.



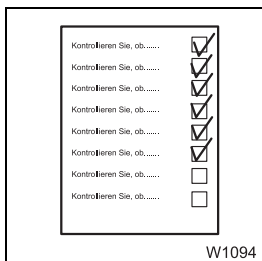
8. – Sling the outrigger beams in the centre of gravity and pull them out of the outrigger box.

– Lift the outrigger beams onto the separate vehicle.

– Attach the connecting elements on the outrigger box.

Extending the outrigger beam, p. 6 - 64

Transporting the outrigger beams, p. 6 - 68



9. Remove all necessary outrigger beams in the same way in accordance with this checklist.

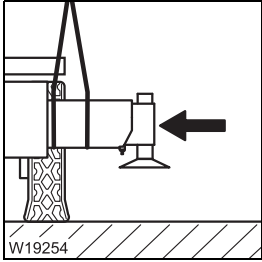
6.6.2

CHECKLIST: Installing the outrigger beams



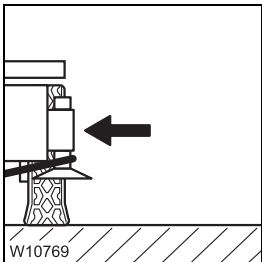
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified here!

1. Preparing the truck crane; p. 6 - 57.

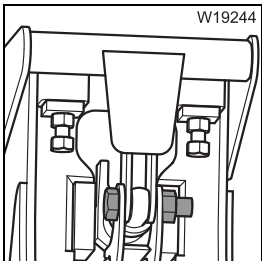


2. – Remove the connection elements from the outrigger box.
– Sling the outrigger beams at their centre of gravity.
– Lift the outrigger beams into the outrigger boxes and remove the lifting gear.

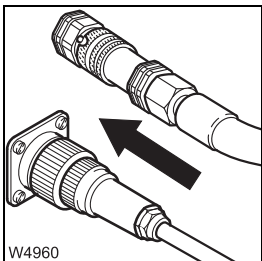
Inserting the outrigger beam, p. 6 - 66



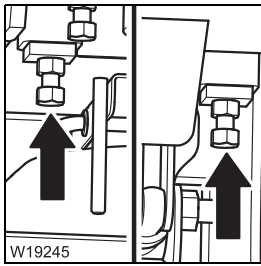
3. Sling the outrigger beams and pull into the outrigger boxes until the connection points align; p. 6 - 66.



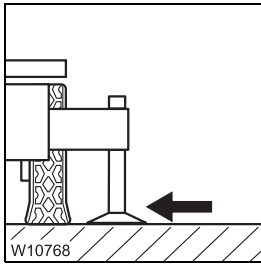
4. Establish the connection to the support box; p. 6 - 64.



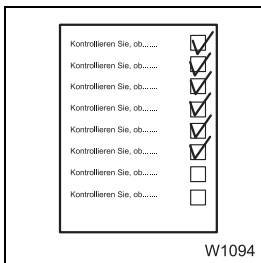
5. – Establishing hydraulic connections; p. 6 - 60.
– Establishing the electrical connection if necessary; p. 6 - 61.



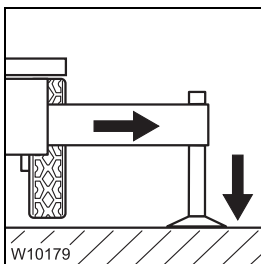
6. Screw in the spacers; p. 6 - 62.



7. If necessary, put supporting pads into position; p. 6 - 58.

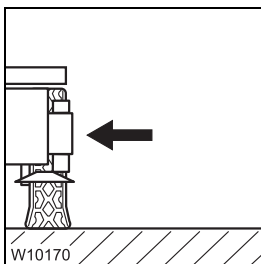


8. Mount all necessary outrigger beams in the same way in accordance with this checklist.



9. If the truck crane is at the site:

Extend the outrigger beams to the necessary outrigger span, secure them and stabilize the truck crane.

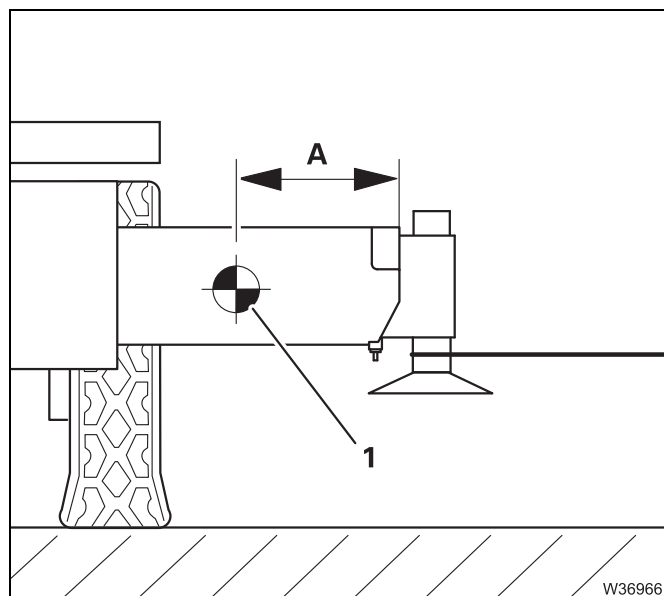


10. If the truck crane still has to be driven to the site:

Fully retract and secure the outrigger beams.

Extending/retracting outrigger beams, p. 12 - 49.

6.6.3 Centre of gravity data



The information in this section relates to a fully retracted outrigger beam package.

The centre of gravity is defined by the distance (A).

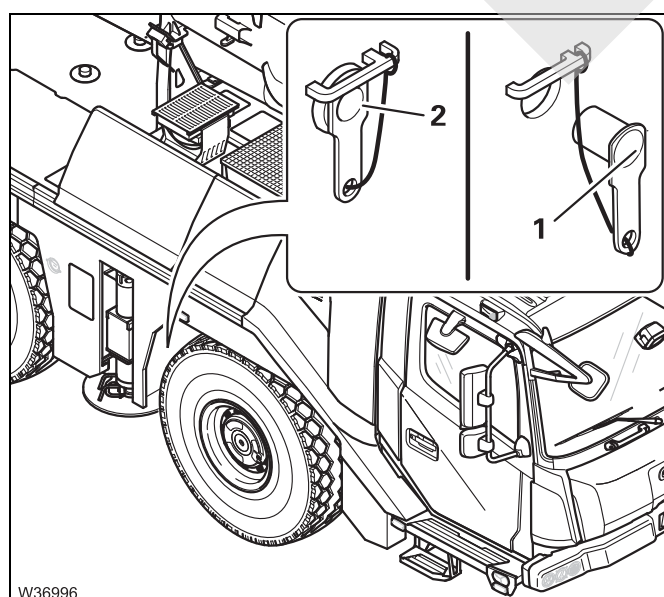
Outrigger pads	(A)
Without	840 mm (33.10 in)
Steel	780 mm (30.71 in)
Plastic	800 mm (31.50 in)

6.6.4 Preparations – for removal

Labelling 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 mount 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.



Release the outrigger beams

All outrigger beams are retracted.

- Pull out the pin (1).

Lock the outrigger beams together

- Insert the pins (2).

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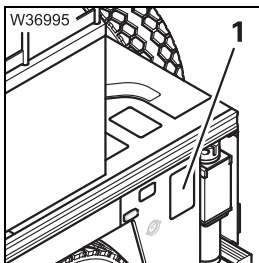
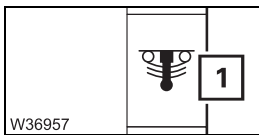
6.6.5

Preparations – on the truck crane

Prerequisites

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

- All rigging work which involves slewing the superstructure has been completed.
- The parking brake is engaged.
- The truck crane has been levelled with the level adjustment system;
▮▮▮▮▶ p. 5 - 53.
- The suspension is switched off (blocked), and the symbol **(1)** is **red**;
▮▮▮▮▶ p. 5 - 16.



- The corresponding covers have been removed **(1)**.

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6.6.6

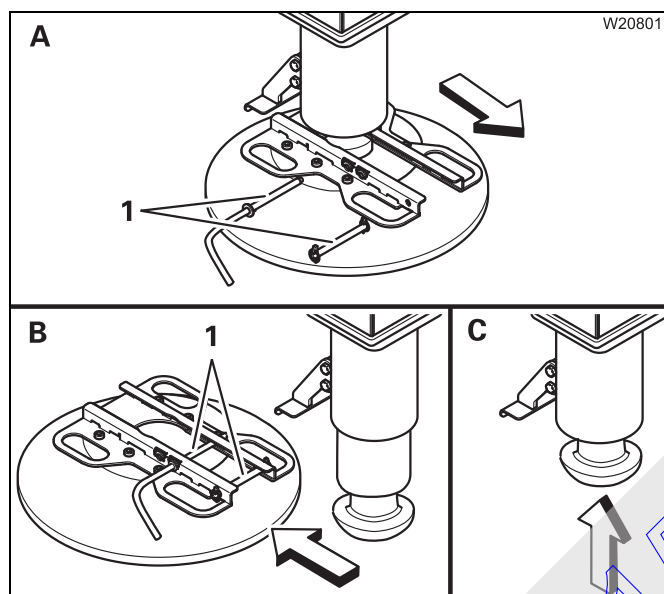
Removing/attaching outrigger pads

You only need remove the outrigger pads if the outrigger beams are to be transported lying on their side.

For transportation in a suitable holding frame, the outrigger beams can be set down on the outrigger pad.

Removing the outrigger pads

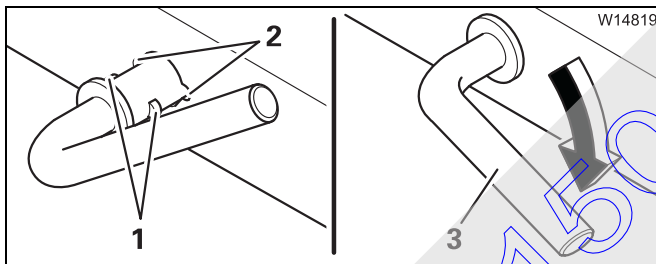
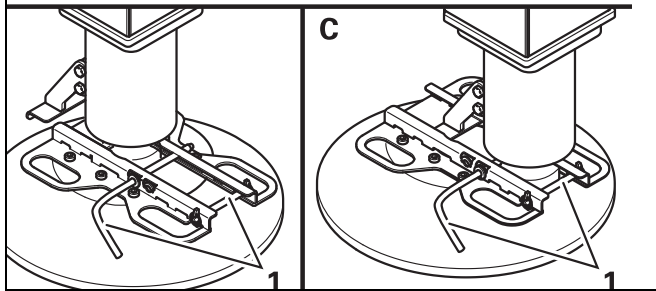
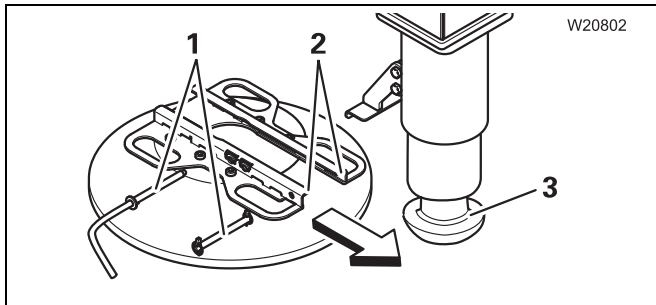
Handling is easier if you remove the outrigger pad before removing the outrigger beams.



- **(A)** – Move the outrigger pad into the operating position.
- Remove the pins (1).
- Extend the outrigger cylinder until the outrigger pad just touches the ground but is not yet under strain.
- **(B)** – Pull the outrigger pad off the outrigger cylinder.
- Insert the pins (1) and secure them.
- **(C)** – Fully retract the outrigger cylinder.
- Remove the other outrigger pads in the same way.

Attaching the outrigger pads

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



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

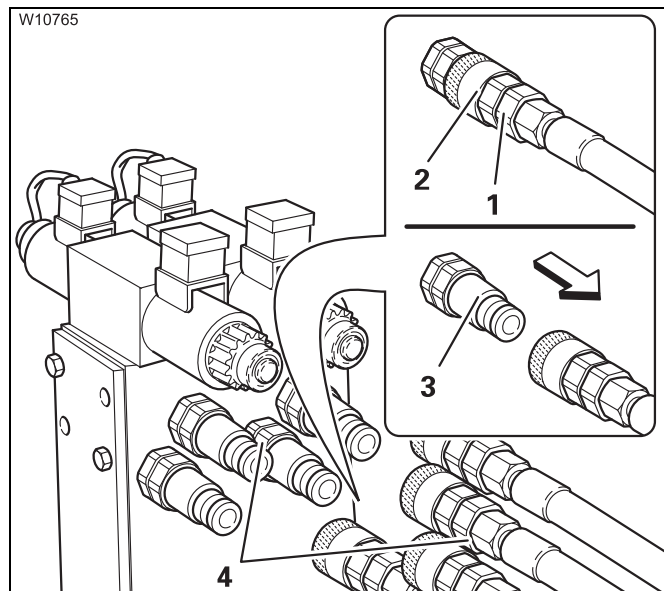
Securing pin

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

6.6.7

Disconnecting/establishing hydraulic connection

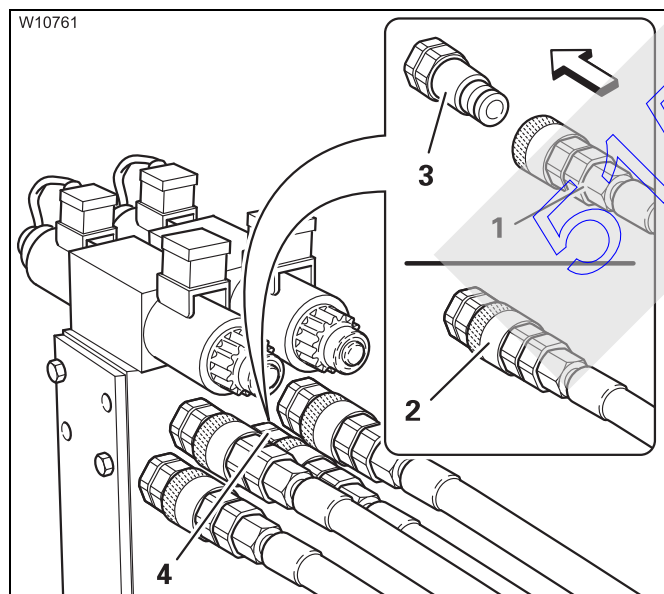
There is a valve block on each outrigger beam. The position of the valve block may differ from the drawings, depending on the outrigger beam.



Undoing the connection

Always disconnect 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.



Making the connection

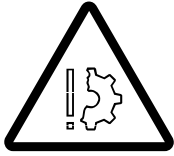
Always establish all connections (4).
The assignment is specified by colour designations.

- Insert the hose (1) into the connection (3).
- The lock (2) engages.

6.6.8

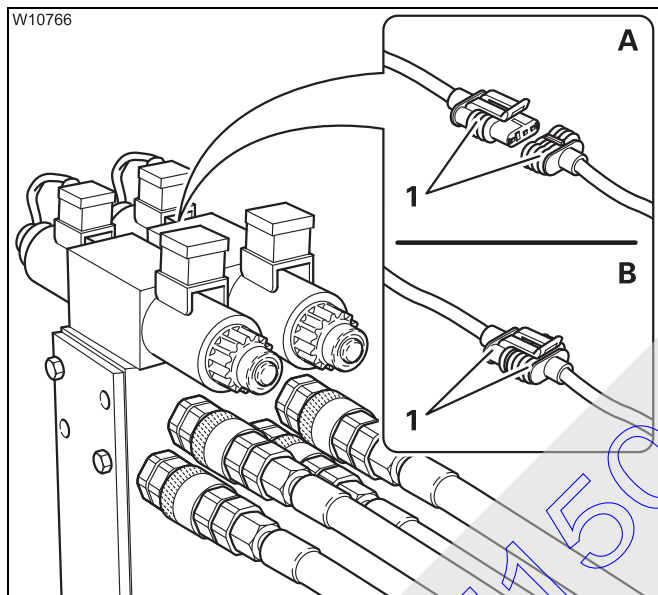
Disconnecting/establishing the electrical connection

The electrical connection is only present on truck cranes equipped with an outrigger pressure display or outrigger span monitoring system.



Risk of malfunctions in the electronic system!

Always turn off the ignition before you disconnect or establish the electrical connection. This prevents malfunctions and corresponding error messages in the subsequent crane operation.




(A) – Disconnecting 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 separating points against dirt and moisture.



Some error messages can occur after disconnecting the electrical connections;  *Note on error messages with removed outrigger beams, p. 6 - 68.*

6.6.9

Unscrewing/screwing in the spacers

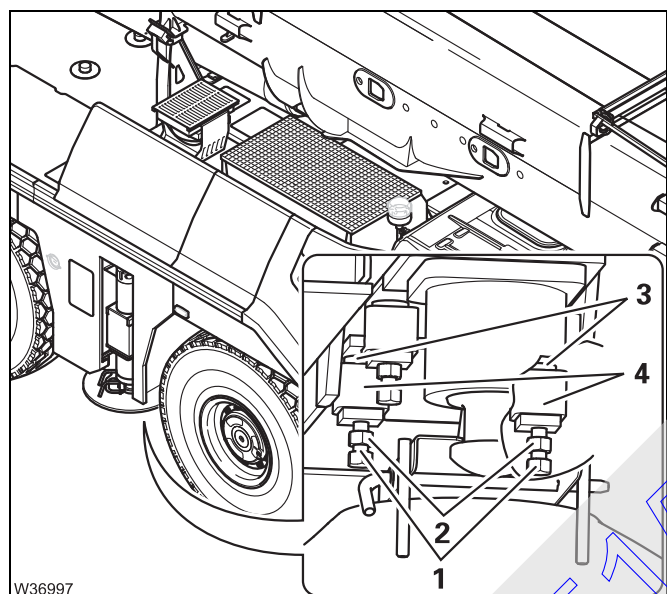
There are two spacers for each outrigger beam

- In the outrigger box
- In the outrigger beam on the opposite side.

The illustrations show as an example the spacers for the outrigger beam on the front right hand side.

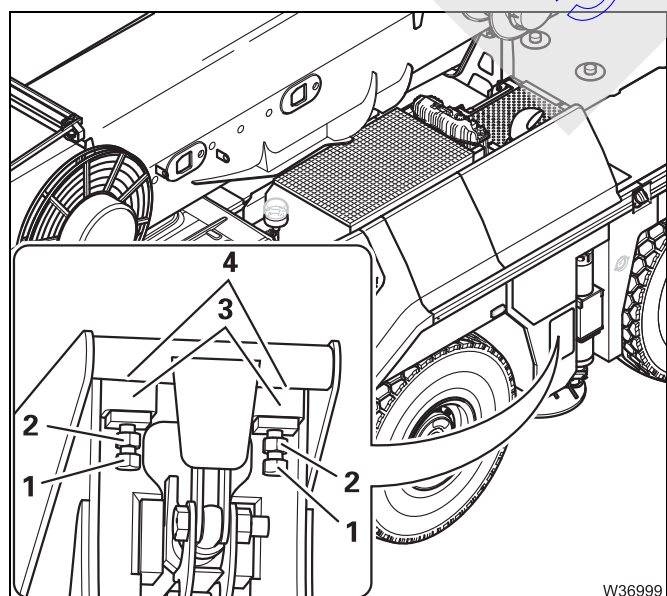
Unscrewing

Before you pull out the outrigger beams, you must unscrew the spacers.



At the outrigger box

- Undo the lug nuts (2).
- Unscrew the bolts (1) until the spacers (3) are screwed into the outrigger box (4) completely.

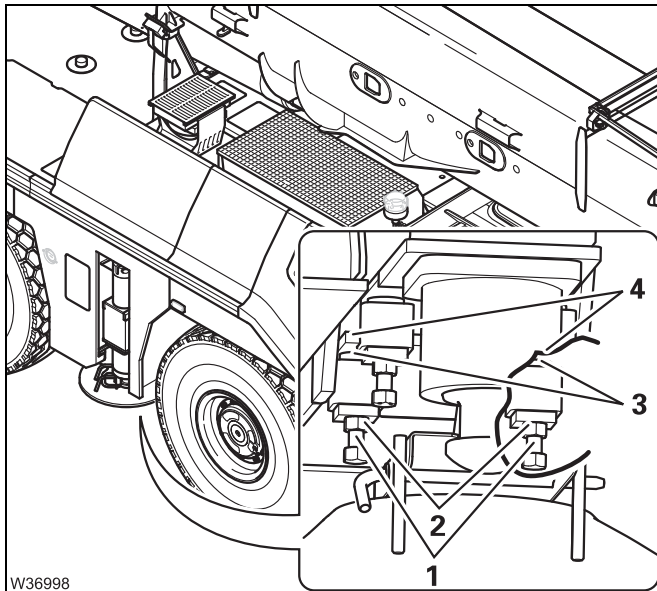


At the outrigger beam

- Undo the lug nuts (2).
- Unscrew the bolts (1) until the spacers (3) are screwed into the outrigger beam (4) completely.

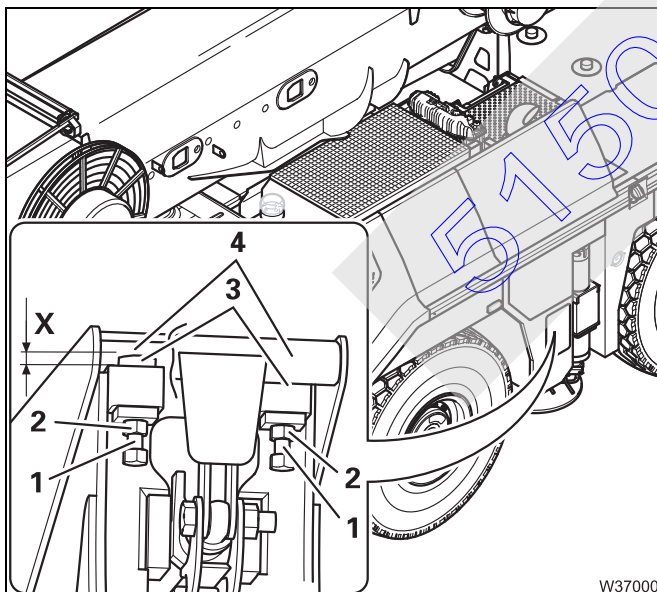
Screwing in

Before you retract/extend an outrigger beam after mounting, you must screw in the spacers.



At the outrigger box

- Screw in the screws (1) as far as possible until the spacers (3) are touching the outrigger beam (4) at the top.
- Ensure that the outrigger beam is aligned horizontally.
- Lock the screws in place with the nuts (2).



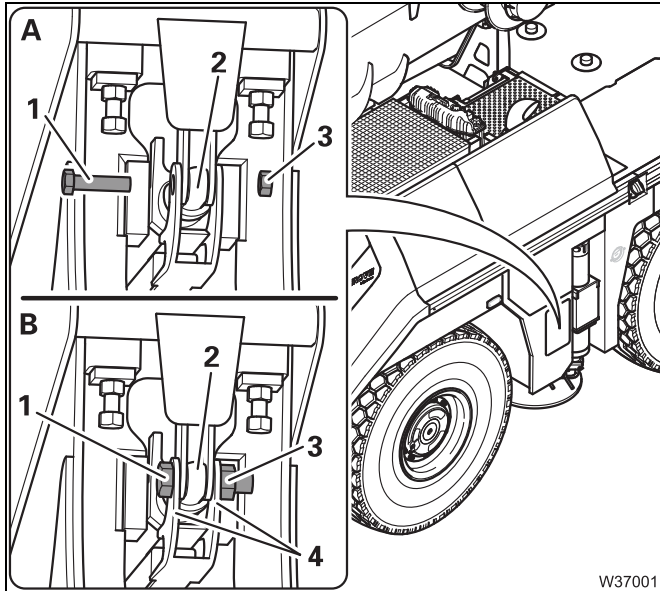
At the outrigger beam

- Screw in the bolts (1),
 - Until the spacers (3) lie on top on the outrigger box (4) and
 - Until the distance (X) to the supporting box (4) is an even 4 mm (0.16 in) over the entire width.
- Lock the screws in place with the nuts (2).

6.6.10

Disconnecting/establishing the connections to the supporting box

The illustrations show the connecting point for the front right outrigger beam as an example.



(A) – Disconnecting 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.

6.6.11

Pulling out/Inserting the outrigger beam

Extending the outrigger beam

- Check that the outrigger beams are released and are secured between each other; *Preparations – for removal*, p. 6 - 56.



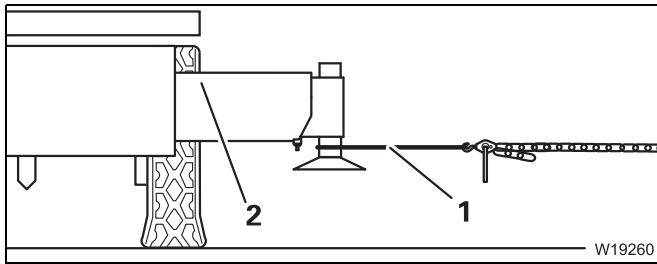
Risk of damage to hydraulic lines!

Ensure that the hydraulic lines on the outrigger beam do not remain hanging on the supporting box and become damaged.

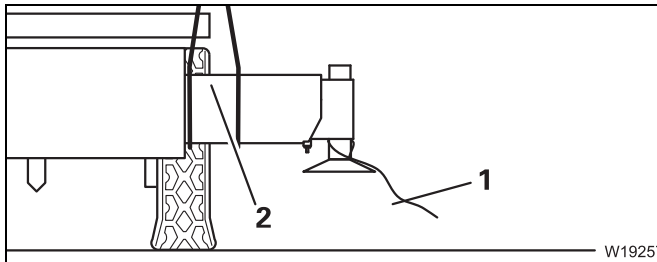


Danger of overloading due to diagonal pull!

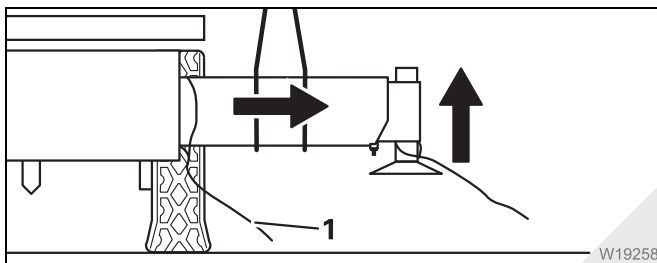
Always only pull the outrigger beams so far out of the supporting box (e.g. using a chain hoist) so that you can sling them at their centre of gravity, and then lift them out of the supporting box using the truck crane. This prevents the truck crane becoming overloaded due to impermissible diagonal pull.



- Fasten the 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 - 56.



- Using the auxiliary crane, sling the outrigger beam in the centre of gravity (2).
- Remove the chain hoist and lifting gear.
- Fasten a guide rope (1).

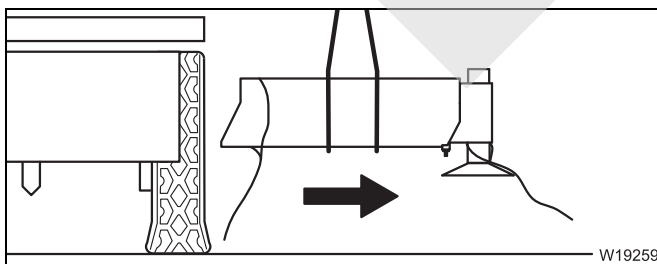


- Lift the outrigger beam slightly to ease the load.
- Lift the outrigger beam almost completely out of the outrigger box.
- Fasten another guide rope (1).

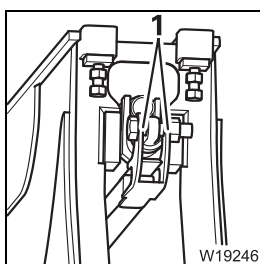


Risk of being crushed by the swinging outrigger beam!

Secure the outrigger beam with the guide ropes as it is lifted out of the outrigger box.
Keep a suitable distance to avoid injuring yourself or others on the swinging outrigger beam.



- Lift the outrigger beam out of the outrigger box.
- Lift the outrigger beam onto a separate vehicle; p. 6 - 68.



- Fasten the connecting elements to the connecting points (1) of the supports.



Inserting the outrigger beam

- Only insert the outrigger beam at the correct installation point. Note the information on the label.



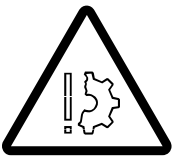
Risk of being crushed by the swinging outrigger beam!

Do not guide the outrigger beam with your hands when inserting it. Always use guide ropes and keep a suitable distance. This will prevent limbs from being crushed between the supporting box and the outrigger beam.



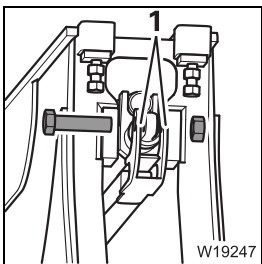
Risk of damage to hydraulic lines!

Ensure that the hydraulic lines on the outrigger beam do not remain hanging on the supporting box and become damaged.

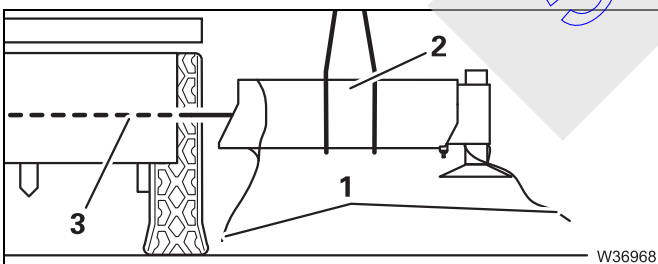



Risk of damage to the spacers!

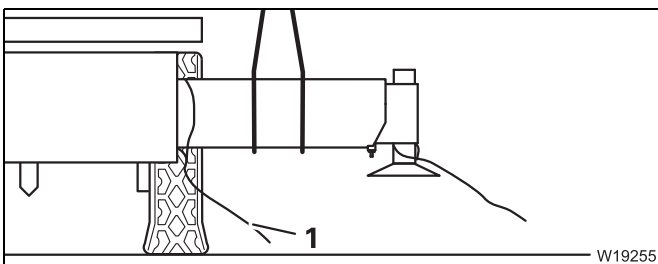
Check that all spacers have been screwed in completely. This prevents the spacers from remaining hanging in the supporting box and becoming damaged.



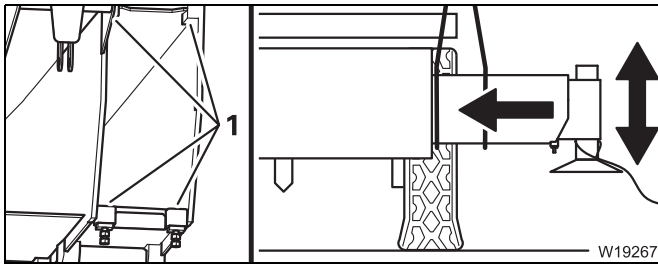
- Remove the connecting elements from the connecting points (1) of the supports.



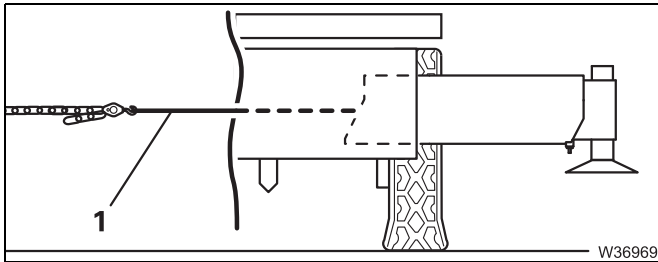
- Feed lifting gear (3) through the supporting box and fasten it to the outrigger beam.
- Sling the outrigger beam at the centre of gravity (2);  *Centre of gravity data*, p. 6 - 56.
- Fasten two guide ropes (1).



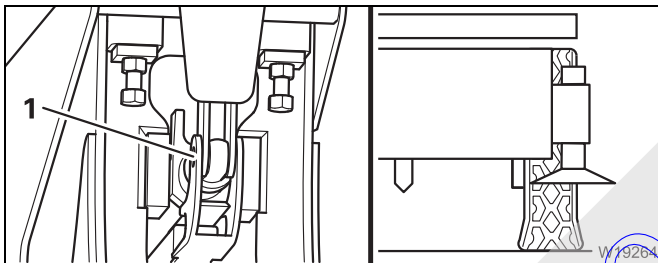
- Set the outrigger beam in the outrigger box.
- Remove the guide rope (1).



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



- Remove the lifting gear from the centre of gravity.
- Fasten a chain hoist to the lifting gear (1).




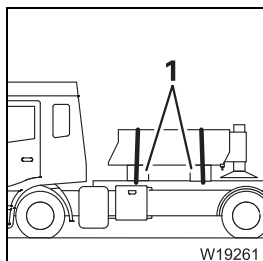
- Pull the outrigger beam in so far until the connecting points (1) align.
- Remove the chain hoist and lifting gear.

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6.6.12

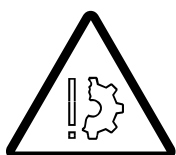
Transporting the outrigger beams

- For transportation, be sure to use a separate vehicle with sufficient load bearing capacity. Transport dimensions and weight;  p. 1 - 10.
- Load the separate vehicle in such a way that the weight is evenly distributed.
- Load the outrigger beam so that it that does not endanger other traffic.



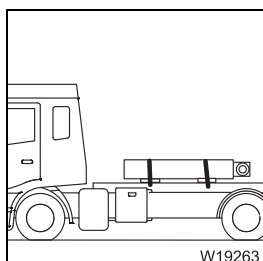
When the outrigger pads are mounted

- Place the outrigger beam onto a suitable fixture (1).
- Secure the outrigger beam from slipping.



Risk of damage to the outrigger beams and outrigger pads!

When outrigger pads are mounted, always use a device to set them down. If you lay the outrigger beams onto the side, connections may tilt and become damaged.




When the outrigger pads are dismantled

- Lay the outrigger beam onto the side.
- Secure the outrigger beam from slipping.
- Lay the outrigger pads onto the separate vehicle and secure them for transportation.

6.6.13

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 indicate only that the electrical connection between the outrigger beams and the crane control is disconnected.

Overview of the error messages;  *Special error messages*, p. 8 - 18.

7

Transport

Transport should be carried out only 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 transportation to only qualified companies and ensure that the regulations applicable in the country in which you are working are adhered to.



Risk of accidents due to improper means of transport!

Use only suitable lifting gear with sufficient lifting capacity for loading. Use only trailers and vehicles with sufficient loading surface and carrying capacity for transport.



Risk of accidents due to inadequate information

Observe the information in the following sections concerning transport. You can thus prevent unsecured parts from falling or components from 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 due to falling parts

Use only suitable lifting gear with sufficient load bearing capacity and use only the slinging points and lashing points provided.

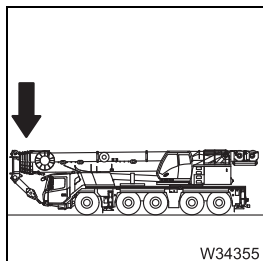
- Note the dimensions and weight of the truck crane for the transport;
 ▣► *Dimensions and weights of the truck crane, axle loads, p. 1 - 8.*

7.1.1

CHECKLIST: Checks before transport

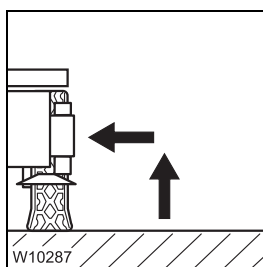


This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified here!



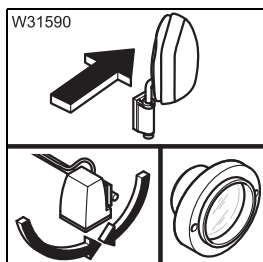
1. For on-road driving without a dolly

- All telescopic sections are interlocked; the telescoping cylinder is locked with telescopic section I.
- The boom must be resting in the boom rest.
- The slewing gear is switched off; ■■■▶ p. 11 - 120.
- The superstructure is locked; ■■■▶ p. 11 - 15.
- Depending on the driving mode, the counterweight must be unrigged; ■■■▶ p. 6 - 1, ■■■▶ p. 12 - 71.



2. On the outriggers

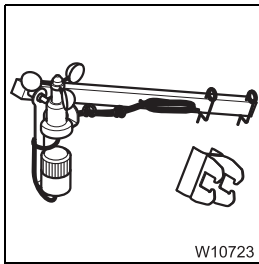
- All outrigger beams must be fully retracted and secured to prevent extension; ■■■▶ p. 12 - 46.
- The outrigger pads are in the driving position; ■■■▶ p. 12 - 53.



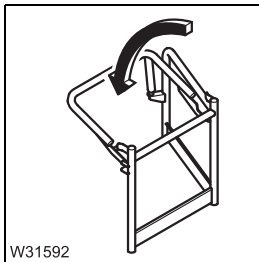
3. All mirrors for crane operation are folded in/removed; ■■■▶ p. 12 - 150.

All spotlights are switched off and swivelled (if possible) in such a way that no other drivers will be blinded by reflection; ■■■▶ p. 11 - 130.

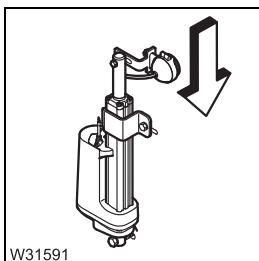
The lighting on the outrigger must be switched off; ■■■▶ p. 12 - 45.



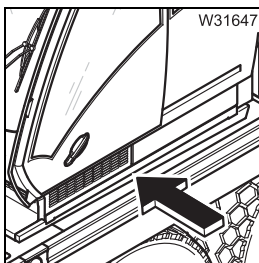
4. The anemometer and air traffic control light must be removed; *Anemometer and air traffic control light*, p. 12 - 145.



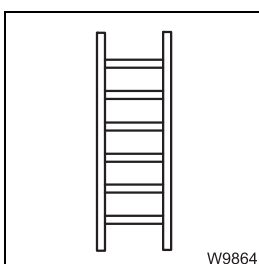
5. All railings must be folded in; p. 12 - 149.



6. The camera on the turntable must be retracted; p. 12 - 152.

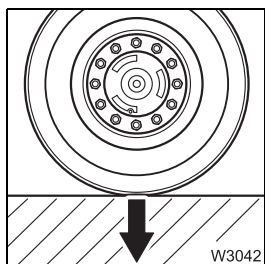


7. The step at the crane cab must be retracted; p. 12 - 157.

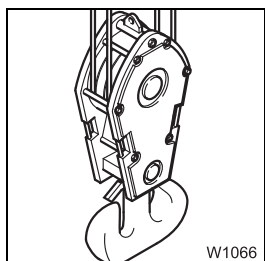


8. All ladders are secured; p. 3 - 77.

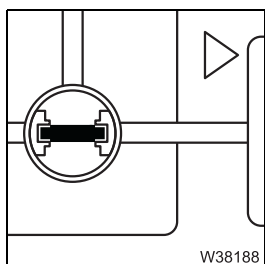




9. The detachable equipment parts must be stripped down so that they fulfil the regulations of the country in which you are working as regards permissible weights and axle loads, lengths, widths, height, etc. All additional parts which may be transported must be secured against falling down.



10. The hook block must be
- attached to the bumper; ■■■► p. 12 - 115 or
 - unreeved; ■■■► *Unreeving hoist rope*, p. 12 - 131.



11. The transverse differential locks must be switched on; ■■■► p. 5 - 51.

7.1.2

Drive the truck crane on to the transport vehicle

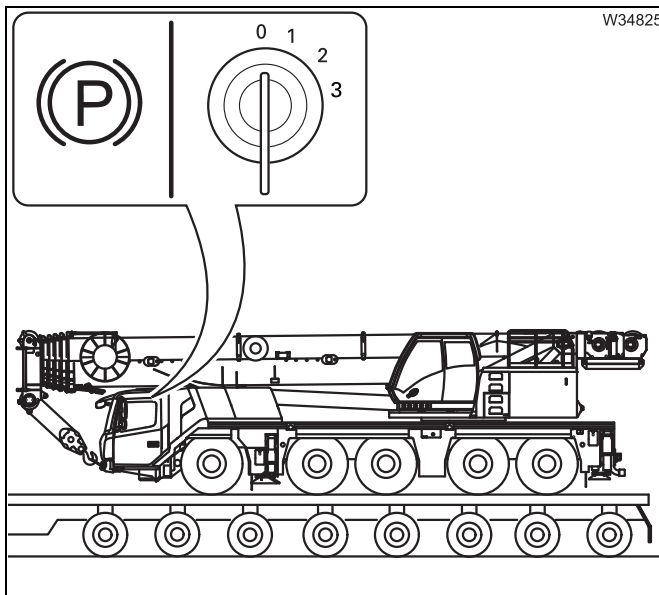


Risk of accidents due to inadequate field of vision!

Always have a banksman on hand to help when driving onto 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



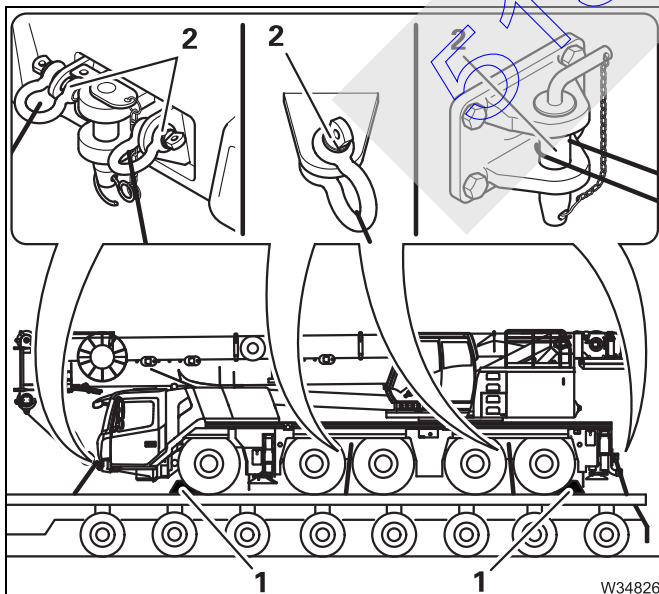
- Drive the truck crane onto the trailer. Apply the parking brake immediately, and switch the engine off.
- Close all the doors.

Lashing



Risk of accidents due to falling parts

Use only suitable lifting gear with sufficient load bearing capacity and use only the slinging points provided.



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

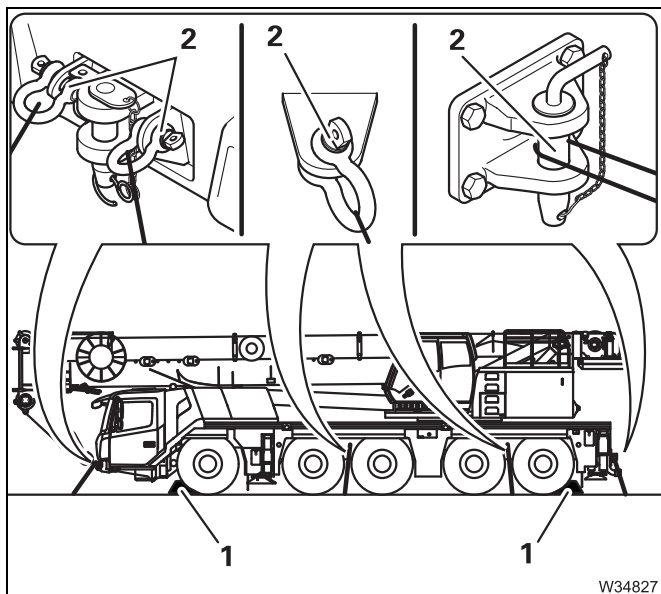
7.2

Transport by ship

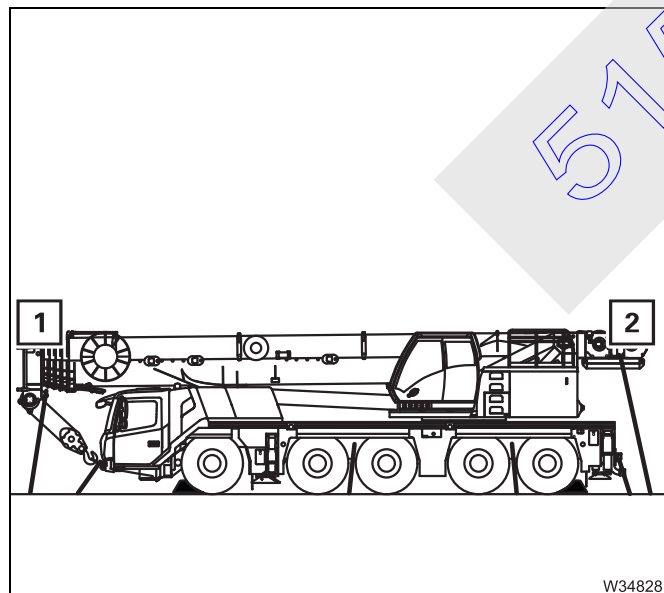


Risk of accidents due to falling parts

Use only suitable lifting gear with sufficient load bearing capacity and use only the slinging points provided.



- Secure the truck crane with the chocks (1).
- Fasten the lifting gear to the slinging points (2) on both sides. 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.

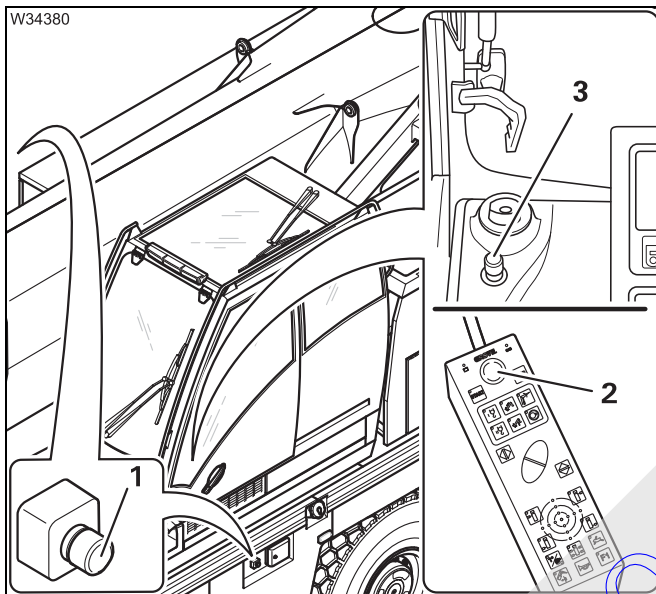
- 1 Main boom head
- 2 Main hoist

8

Malfunctions in driving mode

8.1

Emergency stop switch



Three emergency stop switches are provided for emergency use:

- 1 On the carrier
- 2 On the hand-held control unit
- 3 In the crane cab

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

The engine shuts down.

After activating an emergency stop switch;

- *Resetting the emergency stop switch, p. 4 - 19.*



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

8.2

Procedure during 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 hazard areas (e.g. tunnels, intersections, motorway bridges), even simple repairs can be dangerous.


When in a hazard area, carry out only the repair work required to leave the danger area.

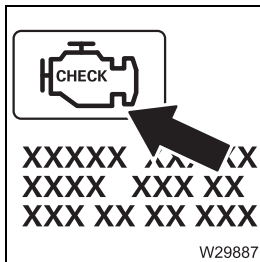
If you are unable to repair the damage yourself, notify **Manitowoc Crane Care** or have the truck crane towed; ► *Towing the truck crane*, p. 8 - 29.

8.2.2

Procedure during engine malfunctions

In the event of engine malfunctions, the electronic system will try to establish a secure operating condition with the remaining functions.

A text message is also displayed in addition to a symbol on the on-board computer display;  *Warning and malfunction messages on the on-board computer display, p. 8 - 9.*



Engine malfunction

One or more systems have a malfunction:

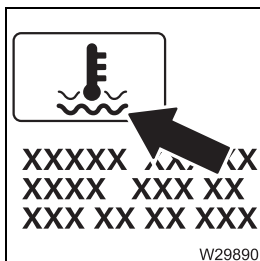
- Engine
- Engine cooling system
- Engine control
- Fuel system
- Drive on until you have a chance to stop.
- Stop immediately and switch the engine off.



Risk of damage to the engine

Switch off the engine immediately the truck crane has come to a stop. Do not by any means restart the engine. This will prevent serious damage to the engine.

- If necessary, note the error messages and contact **Manitowoc Crane Care** or a qualified specialist repair shop.



The coolant temperature is too high – the motor output is automatically reduced.

- Reduce speed.
- Drive on until you have a chance to stop.
- Stop immediately and switch the engine off.


8.2.3

Procedure during transmission malfunctions

If the transmission malfunctions, the electronic system will try to establish a secure operating condition with the remaining functions.



Even if the transmission still shifts, always notify **Manitowoc Crane Care**. This avoid situations where another small error could lead to transmission failure.

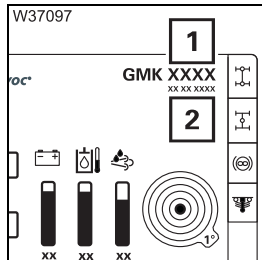
A text message is also displayed in addition to a symbol on the on-board computer display;  *Warning and malfunction messages on the on-board computer display, p. 8 - 9.*

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8.3

Warning and error messages

- Always note down the number of the program version and the serial number after a malfunction occurs before notifying **Manitowoc Crane Care**.



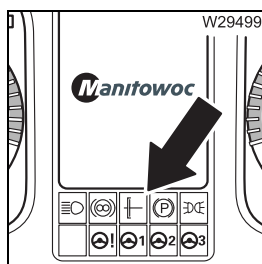
The crane type (1) and the serial number (2) are shown in the start menu.

The program version is displayed in the crane cab; p. 14 - 3.

8.3.1

Warning or malfunction messages on the instrument panel

Meaning of the lamps



The colour of the lamps indicates whether a warning or malfunction message is active in the corresponding area.

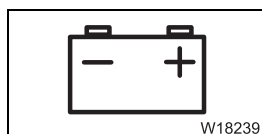
- Lamp goes out – no message.
- Lamp is **red** – warning message.
 - Stop the truck crane immediately, taking into account the traffic situation, and identify the cause
- Lamp is **orange** – malfunction message.
 - Identify the cause at the next opportunity.

If a symbol is displayed in **red** perform the following checks.



Risk of damage if warning or malfunction messages are disregarded

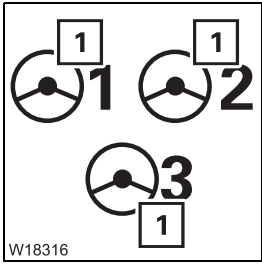
Observe the following information promptly and take the appropriate corrective measures if a warning or malfunction message appears. This prevents these malfunctions causing defects in the truck crane.



Battery charge indicator warning

The voltage in the carrier electrical system is too high or too low. Display of the current voltage; p. 4 - 15.





Steering circuit warning

Malfunction in the associated steering circuit 1, 2 or 3 (emergency steering pump).

- Stop as quickly as possible, taking account of the current traffic situation.
- Switch the engine off.



Risk of accidents if the steering circuits fail

If one or more lamps light up, stop the truck crane immediately and switch off the engine!

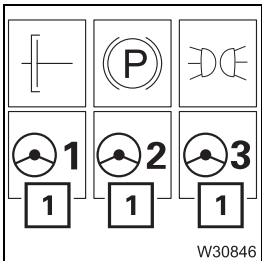
Check whether oil has been lost. Depending on the size of a leak, the oil supply in a steering circuit may be lost within a couple minutes.

If oil has leaked out

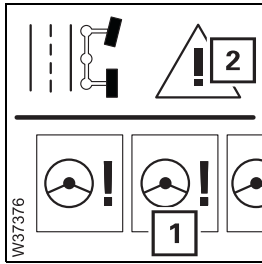
- Warn any vehicles on the road behind you.
- Do not continue driving. Contact **Manitowoc Crane Care**.

If no oil has leaked out

- Check the hydraulic oil level;  *Maintenance manual*.
- Start the engine.



- If all 3 lamps (1) light up:
 - Switch the engine off. Contact **Manitowoc Crane Care**.
- If **at least 2** lamps (1) light up:
 - Drive at a speed greater than about 10 km/h (6 mph).
 - If only one lamp is still lit, drive **slowly** to the next repair shop. The steering may be sluggish.
 - If two lamps are still lit, stop immediately. Contact **Manitowoc Crane Care**.



Steering malfunction

Lamp (1) lights up, symbol (2) yellow.

- The lamp (1) only lights up briefly and then goes out.

Error with low priority; continued driving possible.

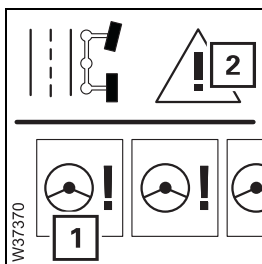
- Pay attention to steering behaviour and have the error read out and corrected at the next opportunity.

- 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 running 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.

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 stays on the current steering angle and can no longer steered.

- Stop as quickly as possible, taking account of the current traffic situation.




Risk of accidents because the truck crane cannot be steered.

Stop the vehicle as soon as possible.

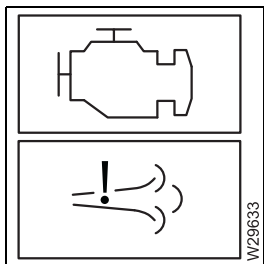
The affected axle lines can no longer be steered, which can lead to serious accidents even for reduced speeds.

- Briefly switch the ignition off and then on again. If the error is still present, then check the steering angle at the 3rd and 4th axle lines.

Whether it is possible to continue driving must be decided based on the current situation. Contact **Manitowoc Crane Care**.

If necessary, the 3rd and 4th axle lines can be steered into the straight running position with emergency operation to make it possible to drive to the repair shop;  *Emergency operation, steering 3rd and 4th axle lines*, p. 8 - 39.





AdBlue system

- Also check the control elements for the Adblue system;
 - ▮▮▮▮▮ *Faults on the Adblue system, p. 8 - 21.*

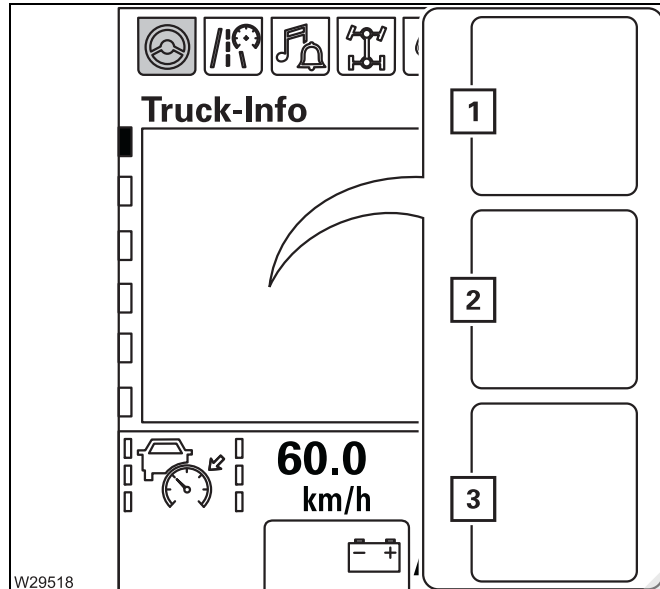
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8.3.2

Warning and malfunction messages on the on-board computer display

Messages

Messages are shown automatically. There are three types of message.



- Warning message

Display (1) **red**, additional text and symbols.

- Stop as quickly as possible, taking account of the traffic situation.

- Fault message

Display (1) **yellow**, additional text and symbols.

- Check the cause when you next stop, or stop if the text requests you to do so.

- Information

Display (1) **grey**, additional text and symbols.

- Pay attention to the messages. You can continue driving.

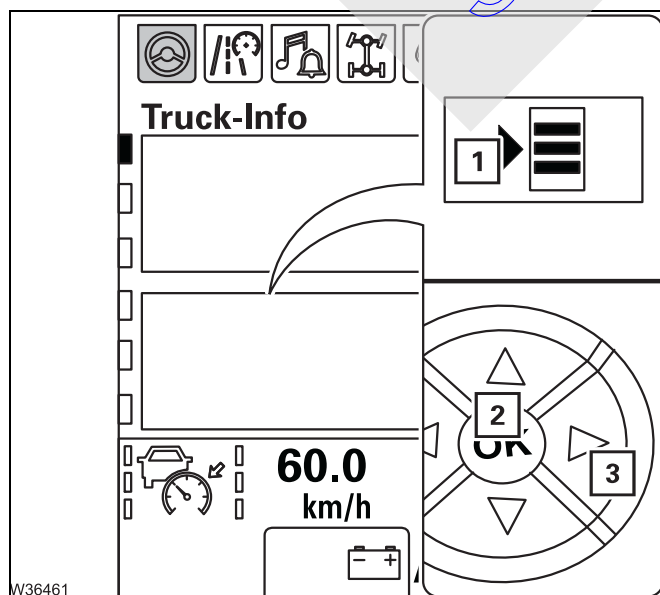


Risk of damage if messages are disregarded

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 consist of text and symbols/abbreviations.

When the symbol (1) is shown, you can display additional text by pressing the button (3).

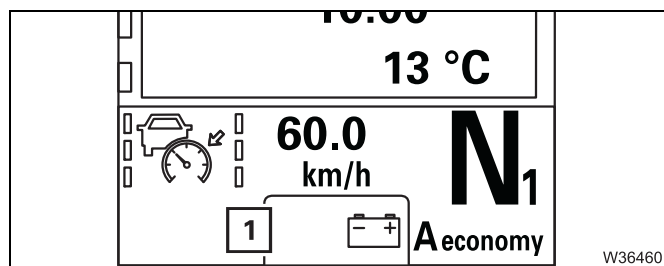
Follow the instructions that are displayed and perform the specified measures in good time.

Acknowledging a message

Press (2) once – the message disappears.

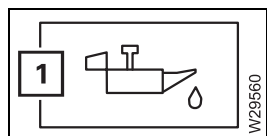


Symbols




In addition to the messages, symbols are shown on the display (1) of the on-board computer.

Symbols for engine/brake



– Oil pressure too low

A warning buzzer sounds and the lamp (1) lights up – the oil pressure is too low.

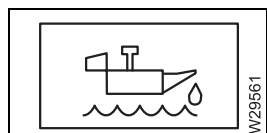
- Stop the truck crane as quickly as possible while observing the traffic situation and switch off the engine.
- Check the oil level;  *Maintenance manual*.
- Add oil if necessary. If the error message is still displayed, please contact **Manitowoc Crane Care**.



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.



– Oil level too low

The oil level is far too low.

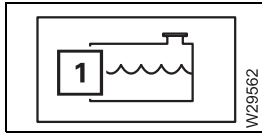
- Stop the truck crane as quickly as possible while observing the traffic situation and switch off the engine.

If oil has run out

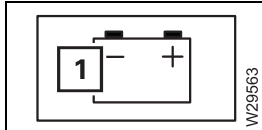
- Warn any vehicles on the road behind you.
- Do not continue driving. Contact **Manitowoc Crane Care**.

If no oil has run out

- Correct the oil level:  *Maintenance manual*.

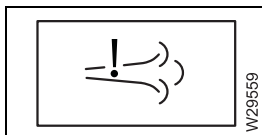


- Coolant level too low
- Immediately top up the coolant so that the engine does not overheat; *Maintenance manual*.

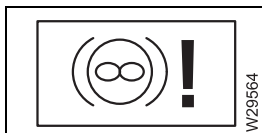


- Carrier voltage too low
- Stop the truck crane as quickly as possible while observing the traffic situation and switch off the engine.

Display of the current voltage; p. 4 - 15.

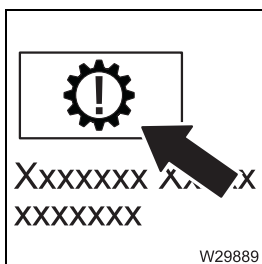


- AdBlue tank is empty
- or
- AdBlue system malfunction



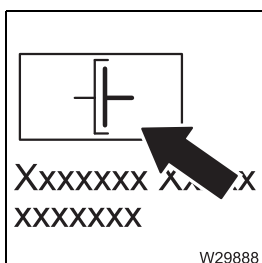
- Engine retarder fault
- The braking behaviour can change.
- Stop the truck crane as quickly as possible while observing the traffic situation and switch off the engine.
 - Have the engine retarder immediately checked and repaired by a specialist workshop.

Transmission symbols



The gear shifting has a malfunction – driving can continue with restrictions.

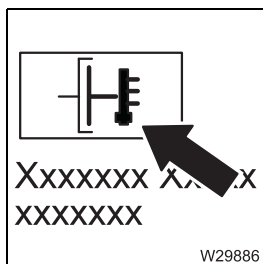
- If necessary, note the error messages and contact **Manitowoc Crane Care** or a qualified specialist repair shop.



The clutch has a malfunction – driving can continue with restrictions.

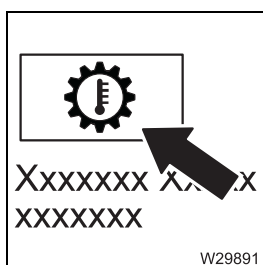
- If necessary, note the error messages and contact **Manitowoc Crane Care** or a qualified specialist repair shop.





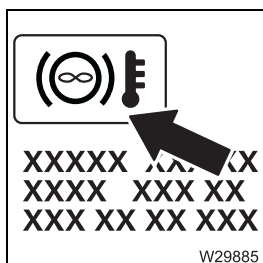
The maximum permissible operating temperature of the clutch has been reached.

- Shift to a lower gear for manoeuvring or starting.
- or
- Stop the manoeuvring or starting procedure.



The oil temperature of the fluid coupling is too high.

- Shift to a lower gear – the engine speed increases and the dry clutch closes.



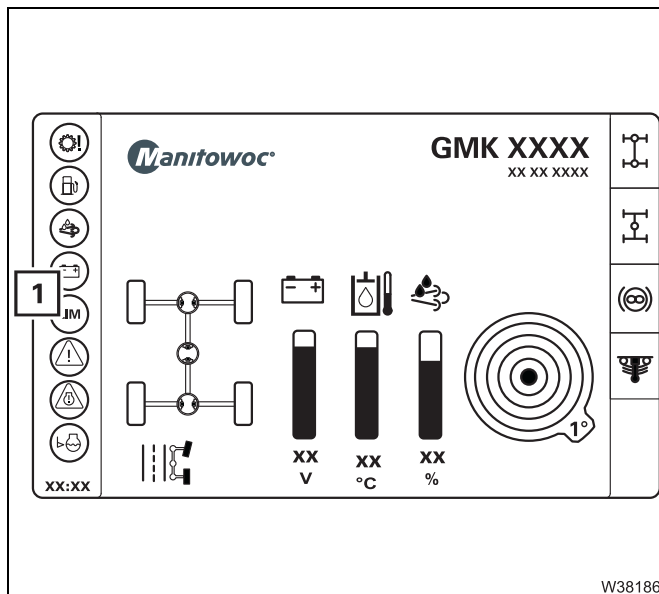
The oil temperature of the retarder is too high.

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

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8.3.3

Warning messages on the CCS display



A warning message indicates that certain values do not correspond to a target value. If CCS detects a warning or a fault then in the display area (1) a symbol is displayed.

Meaning of the symbols

The colour of the symbols indicates whether a warning or malfunction message is active in the corresponding area.

- Symbol **yellow** – malfunction.
- Symbol **red** – warning message.
- **No** symbol – no malfunction or warning message.

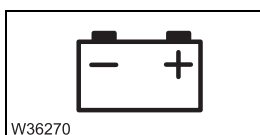
If a symbol is displayed in **red** or **yellow**, perform the following checks.




Risk of damage if warning messages are disregarded!

Observe the following information in good time and take the appropriate remedial measures if a warning message appears. This prevents these malfunctions causing defects in the truck crane.

Symbols in the display area



Voltage monitoring

The voltage in the electrical system is too high or too low. Display of the current voltage;  p. 4 - 17.





AdBlue tank level too low

Refill the AdBlue tank; p. 4 - 7.



Replace hydraulic oil filter

Replace the corresponding hydraulic oil filter as soon as possible;
 Maintenance manual.



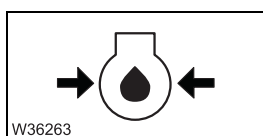
Hydraulic oil too hot

The hydraulic oil temperature is higher than 80 °C (176 °F).
Display of the current temperature; p. 4 - 17.
Possible cause and remedy; p. 8 - 26.



Danger of overheating

There is a fault if the hydraulic oil temperature exceeds 80 °C (176 °F).
Stop the truck crane at the next opportunity and try to find the cause.
Stop the truck crane immediately and switch off the engine if the temperature of the hydraulic oil rises to over 100 °C (212 °F).



Oil pressure too low

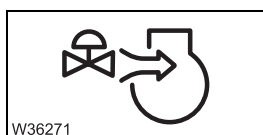
A warning buzzer sounds at the same time.

- Stop the truck crane as quickly as possible while observing the traffic situation and switch off the engine.
- Check the oil level; *Maintenance manual*.
- If the oil level is correct then start the engine and check the warning messages that are present.



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.



Air intake inhibitor triggered

The air intake inhibitor was triggered because the maximum permissible engine speed was exceeded. It is only possible to start the engine after the air intake inhibitor has been released manually; p. 4 - 20.

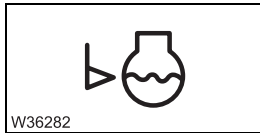


Refuelling

The fuel tank is filled only to a level of about 5%.

- Refuel before the fuel is used up; p. 4 - 5.

If the fuel tank is almost empty, air will be sucked in and you will have to bleed the fuel system; *Maintenance manual*.



Coolant level too low

Immediately top up the coolant so that the engine does not overheat;

- Maintenance manual*.



Coolant too hot

The engine coolant temperature is higher than about 95 °C.

Display of the current temperature; p. 10 - 8.

Possible cause and remedy; p. 8 - 19.



Transmission retarder too hot

The retarder in the transmission is not working. When the transmission retarder has cooled down, the symbol reverts to grey and the transmission retarder is ready to function again.



Transmission oil too hot

- Stop the truck crane as soon as possible and try to find the cause; *Malfunctions in the transmission*, p. 8 - 23.



Transmission error

- Stop the truck crane as soon as possible and try to find the cause; *Malfunctions in the transmission*, p. 8 - 23.



Permissible engine speed exceeded

- Brake the truck crane.




Change the engine oil filter

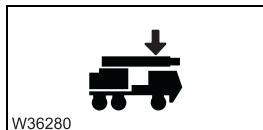
- Replace the engine oil filter as soon as possible; *Maintenance manual*.






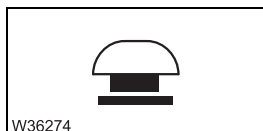
Changing the steering circuit oil filter

- Replace the steering circuit oil filter as soon as possible;  *Maintenance manual*.



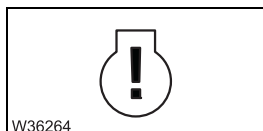
Main boom not set down

The main boom has not been set down in the boom rest; the specified vehicle height for the on-road level is exceeded;  *Checking the vehicle height*, p. 5 - 9.




Emergency stop switch actuated

 *Resetting the emergency stop switch*, p. 4 - 19



Engine malfunction

- Switch off the engine immediately and open the *Engine error* menu;  p. 8 - 17.
- If necessary, note the error messages and contact **Manitowoc Crane Care**.



CAN bus malfunction

- Switch off the ignition and wait about 15 seconds, then switch it on again.
If the malfunction is still present, contact **Manitowoc Crane Care**

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8.3.4

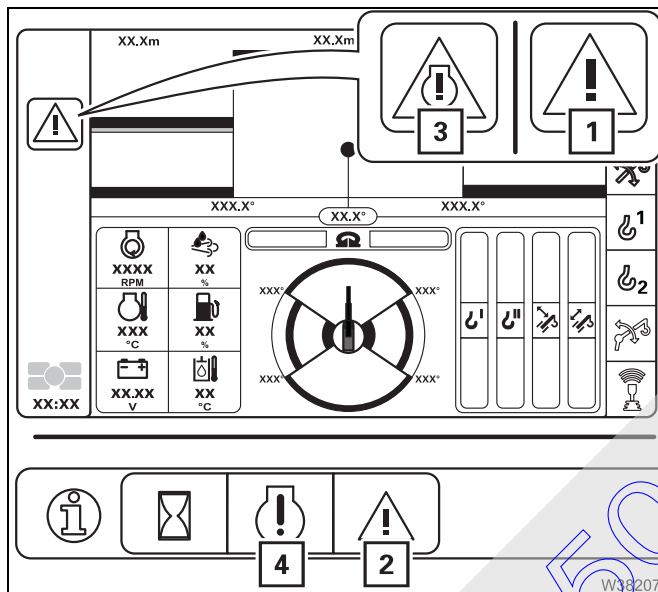
Error messages on the CCS display



Risk of accidents

The crane control may only be repaired by qualified personnel.

- If an error message occurs, stop while taking the traffic situation into consideration; *What to do when a malfunction occurs in road traffic*, p. 8 - 2.



The symbol (1) or (2) flashes when the CCS has detected an error. The symbols flash alternately when both error types are present.

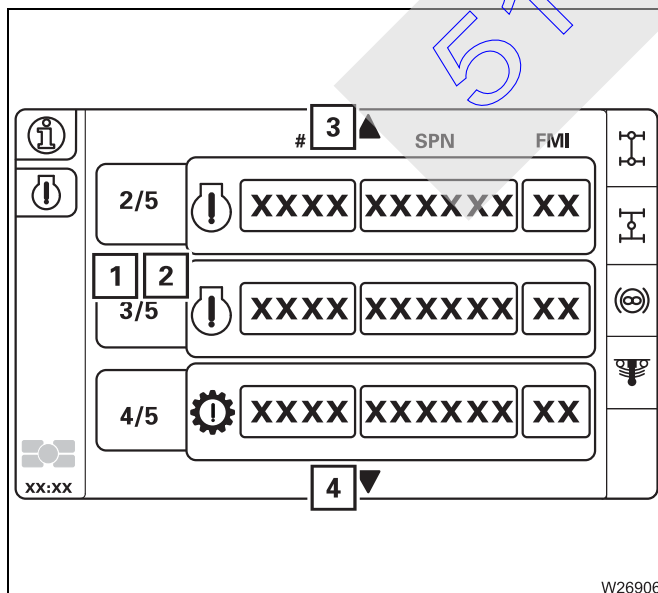
(1) – Crane operation error

The buzzer tone sounds once.

- Open the *Crane operation error* menu (2); *Special error messages*, p. 8 - 18.

(3) – Engine/transmission error

- Switch off the engine immediately.
- Open the *Engine/transmission error* menu (4).



Display of error / total errors

Display (2) shows the error total, and display (1) shows which error is displayed.

3/5, for example, means:

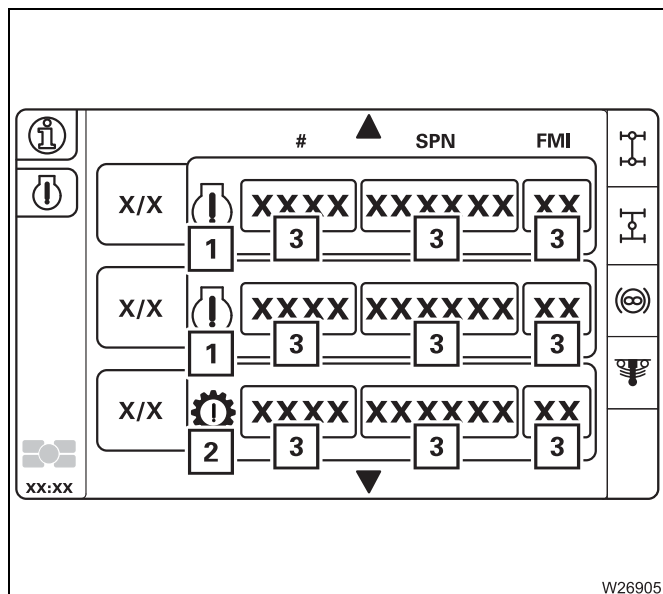
- Error 3 is shown
- there is a total of 5 errors.

Display errors

- Select and acknowledge the symbol (3) or (4) to show any additional errors.

- 3** Next error
- 4** Previous error



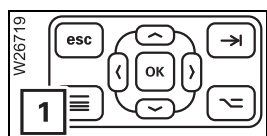


Error message display

For each error the display shows:

- The error code (3)
- The symbols for the faulty components:
 - 1 Engine
 - 2 Transmission
- Always note the error code before contacting **Manitowoc Crane Care**.

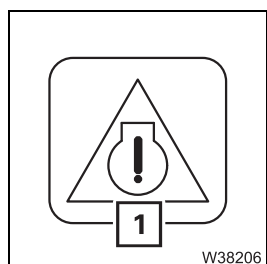
Exiting the menu



You can exit the *Engine errors* menu at any time.

- Press the button (1) once.

The next highest menu is opened.



If not all errors have been acknowledged then the symbol (1) will be 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 will no longer be shown after the correct installation of the outrigger beams.

If other error messages are shown; ► *Display of error / total errors*, p. 14 - 8.

8.4

Troubleshooting

8.4.1





Malfunctions on the engine



In addition to this information; *Separate engine operating instructions, provided by the manufacturer.*

Malfunction		Cause	Solution
Engine does not start – Starter does not turn		Battery master switch is switched off	Switch on the battery master switch; p. 4 - 9
		Switch the ignition off	<i>Switch the ignition on,</i> p. 4 - 9
		Transmission not in neutral position	<i>Switching the transmission to the neutral position,</i> p. 5 - 26
		Parking brake released	Lock the parking brake; p. 5 - 46
		Fuse F1/1, F1/2 blown	Replace blown fuses; p. 8 - 49
		Emergency stop switch pressed	Release the emergency stop switch; p. 4 - 19
Engine does not start – Starter turns		Batteries insufficiently charged	Charge the batteries; <i>Maintenance manual</i>
The symbol is displayed		Fuel tank empty	1. Refuel; p. 4 - 5
			2. Bleed the fuel system; <i>Maintenance manual</i> <i>Separate engine operating instructions, provided by the manufacturer</i>
The symbol is displayed		Air intake inhibitor closed	<i>Opening the air intake inhibitor,</i> p. 4 - 20
The lamp does not light after the ignition is switched on when the engine is cold		Fuse F6/8 blown	Replace blown fuses; p. 8 - 49
The symbol is displayed		Air filter clogged	Replace the dry air filter; <i>Maintenance manual</i>
The symbol is displayed		Coolant level too low	Top up coolant; <i>Maintenance manual</i>



Malfunction		Cause	Solution
The truck crane drives at a maximum of 20 km/h (12 mph)		A locking procedure is not yet completed	Lock the differential locks or steering
Coolant temperature too hot – the symbol is displayed.		Coolant level too low	Top up coolant; ▣▣▣▣▶ <i>Maintenance manual</i>
		Oil level in the transmission too low	Check the oil level; ▣▣▣▣▶ <i>Maintenance manual</i>
		Outer surface of heat exchanger dirty	Clean the heat exchanger
		V-belt of coolant pump at engine loose	Tighten V-belt; ▣▣▣▣▶ <i>Separate engine operating instructions, provided by the manufacturer</i>
Engine oil pressure is too low – the symbol is displayed		Engine oil level too low	Check oil level, top up if necessary; ▣▣▣▣▶ <i>Maintenance manual</i>
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 F1/5, F6/6 blown	Replace blown fuses; ▣▣▣▣▶ p. 8 - 49
The engine power is reduced and the engine coolant temperature is increased – the symbol is displayed.		The motor output is reduced due to an increase in the coolant temperature.	Wait until the coolant has cooled down and the motor output increases again
The symbol is displayed, the engine output falls continuously (coolant temperature is too high)		Due to a malfunction, the power is continuously reduced. The engine is not switched off however, in order to drive on to the next place where it is possible to stop.	Inform Manitowoc Crane Care






Further information; ▣▣▣▣▶ *Warning messages on the CCS display, p. 8 - 13.*

When operating with the dual tank The following specifications only apply when the dual tank is fitted as additional equipment.

Malfunction	Cause	Solution
Fuel supply cannot be switched over	Fuse F13 blown	Replace blown fuses; ▣▣▣▣ p. 8 - 49
Engine does not start – Starter turns	Dual tank empty	1. Refuel; ▣▣▣▣ p. 4 - 5
		2. Bleed the fuel system; ▣▣▣▣ <i>Maintenance manual</i> ▣▣▣▣ Operating manual of the engine manufacturer





8.4.2 Faults on the Adblue system

Malfunction		Cause	Solution
– Lights up – Flashing		AdBlue level in tank at reserve level AdBlue tank empty	Fill up with AdBlue; ▣▣▣▣ p. 4 - 7
– Light up	 	– AdBlue tank sensor faulty – Error on the AdBlue dosing unit – AdBlue lines blocked – Temperature sensor faulty – Open circuit on AdBlue system – Exhaust gas sensor faulty	Have the exhaust system checked by Manitowoc Crane Care , an authorised GROVE retailer or an authorised specialised repair shop.
AdBlue system not working		Fuse F6/8 blown	Replace blown fuses; ▣▣▣▣ p. 8 - 49






Further information; ▣▣▣▣ *Warning messages on the CCS display*, p. 8 - 13.

8.4.3 Differential lock malfunctions








Malfunction	Cause	Solution
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	Slowly drive truck crane back and forth,  p. 5 - 51
	Compressed air system insufficiently filled	 <i>Building up supply pressure</i> , p. 5 - 10
	Control unit fuse blown	Replace blown fuses;  p. 8 - 49
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	Slowly drive truck crane back and forth,  p. 5 - 51

8.4.4 Transfer case malfunctions

Malfunction	Cause	Solution
Switching operations are not conducted	Brake reservoir pressure insufficient	 <i>Building up supply pressure</i> , p. 5 - 10
	Fuse has blown	Replace blown fuses;  p. 8 - 50
Error symbol is displayed	CCS malfunction	Read out error messages ( p. 8 - 17) and notify Manitowoc Crane Care

8.4.5

Malfunctions in the transmission
















Malfunction		Cause	Solution
Transmission only shifts up to 2nd gear – the symbol is displayed		Transmission oil too hot	Switch to the neutral position and wait until the transmission oil has cooled down
		Transmission oil colder than about -7 °C (20 °F)	Wait until transmission oil temperature rises
Transmission is not upshifting at speeds over about 20 km/h (12 mph)		A locking procedure is not yet completed	Switch off differential locks;  p. 5 - 52
Transmission not shifting – the symbol is displayed		Retarder switched on	 <i>Switching off the additional brakes</i> , p. 5 - 43
The transmission does not respond to the controls		Fuse F1/6 blown	Replace blown fuses;  p. 8 - 49
		Transmission cannot shift down as otherwise the maximum permissible engine speed would be exceeded	Braking the truck crane
Driving display indicates a malfunction		The electronic gear system has detected a malfunction	 <i>Procedure during transmission malfunctions</i> , p. 8 - 4
Transmission diagnostics plug not working		Fuse F1/2, F6/5 blown	Replace blown fuses;  p. 8 - 49




Further information;  *Warning messages on the CCS display*, p. 8 - 13.

8.4.6






Malfunctions of the steering

Malfunction		Cause	Solution
Steering wheel hard to turn, grating noises when steering	  	Lamps can light up 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
One of the lamps lights up	  	Steering circuit has failed, e. g. pump faulty	Stop and perform required inspections;  p. 8 - 6.
Lights up (yellow)		Steering malfunction	Driving possible – observe the subsequent information for the next stop;  p. 8 - 7.
lights up (red)		Steering system warning	The steering is defective; stop as quickly as possible and observe the subsequent information;  p. 8 - 7
Symbol is displayed		Hydraulic oil filter dirty	Replace the hydraulic oil filter;  <i>Maintenance manual</i>
Separate steering cannot be activated		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)	
Separate steering not working		Control unit fuse blown	Replace blown fuses;  p. 8 - 49



Further information;  *Warning messages on the CCS display*, p. 8 - 13.





8.4.7 Malfunctions of the service brake

Malfunction		Cause	Solution
Lights up while driving or does not go out after the engine is started		The air pressure in one of the two circuits has fallen below 5.5 bar (80 psi)	The vehicle can be driven slowly to the next repair shop
		The air pressure in both circuits has fallen below 5.5 bar (80 psi)	1. Top up the compressed-air supply on the filler connection;  p. 8 - 29
			2. Tow the truck crane with the tow-rod;  p. 8 - 29
Parking brake unable to be released		Supply pressure too low	 <i>Building up supply pressure</i> , p. 5 - 10
The retarder cannot be engaged		Fuse F7/4 blown	Replace blown fuses;  p. 8 - 50



Further information;  *Warning messages on the CCS display*, p. 8 - 13.



8.4.8 Malfunctions on the suspension

Malfunction	Cause	Solution
Suspension cannot be activated	Current speed above about 5 km/h (3 mph)	Slow down or stop the truck crane
	Compressed air system insufficiently filled	 <i>Building up supply pressure</i> , p. 5 - 10
	Axle loads not evenly set	Use the "Raise axle" function to set the axle loads evenly;  p. 12 - 66
	Suspension is switched off	 <i>Switching the suspension on</i> , p. 5 - 17
Suspension cannot be switched on or off	Control unit fuse blown	Replace blown fuses;  p. 8 - 49

8.4.9 Malfunctions of the level adjustment system

Malfunction	Cause	Solution
Level adjustment system not working	Suspension is switched off	▣▣▣▣ Switching the suspension on, p. 5 - 17
	Control unit fuse blown	Replace blown fuses; ▣▣▣▣ p. 8 - 49

8.4.10 Malfunctions in the hydraulic system/hydraulic oil cooler

Malfunction		Cause	Solution
Hydraulic oil temperature above 80 °C (176 °F), fan in the hydraulic oil cooler running Symbol is displayed		Hydraulic system is heavily loaded	Stop the truck crane while taking the traffic situation into account and run the engine until the oil has cooled down
Hydraulic oil temperature above 80 °C (176 °F), fan in the hydraulic oil cooler not running Symbol is displayed		Faulty temperature sensor in the circuit of the hydraulic system, error message is displayed Corresponding hydraulic oil filter soiled	Have the temperature sensor replaced Change hydraulic oil filter; ▣▣▣▣ Maintenance manual



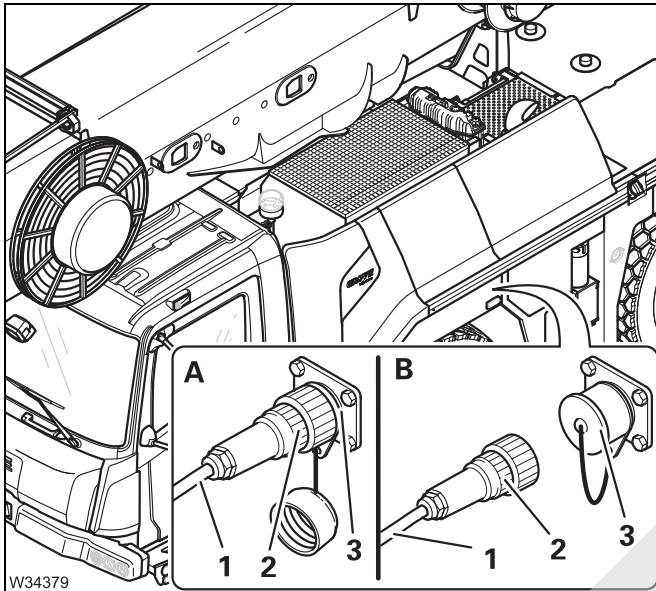
Further information; ▣▣▣▣ Warning messages on the CCS display, p. 8 - 13.

8.5

Emergency operation and breakdown assistance

8.5.1

Starting the truck crane externally



- Start the engine of the auxiliary vehicle.
- (A) – Connect the cable (1) to the power supply (24 V) of the auxiliary vehicle.
- Insert the plug (2) into socket (3).
- Start the truck crane engine.
- (B) – Take out 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 network).

8.5.2

Battery charger

Prerequisites

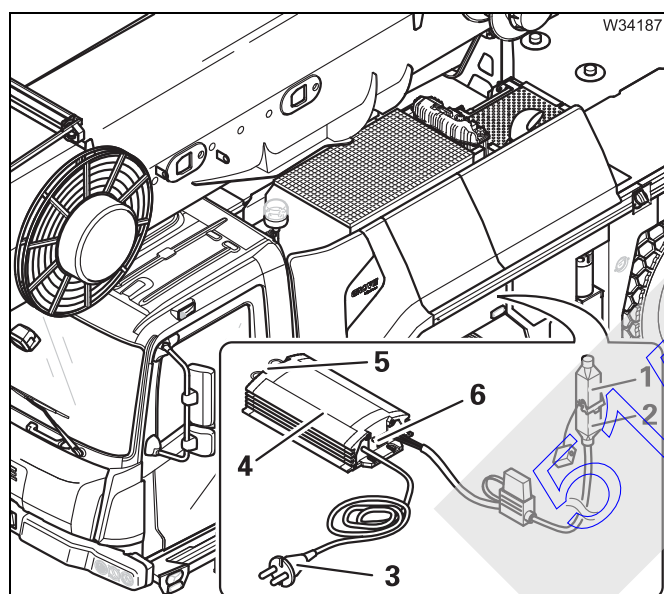
- The engine must not be running and must be secured against unauthorised use.
- An external 230 V mains power supply must be available at the location.
- The location must be well ventilated and protected against moisture.



Risk of explosion when operating the battery charger!

The battery charger 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).



Connecting

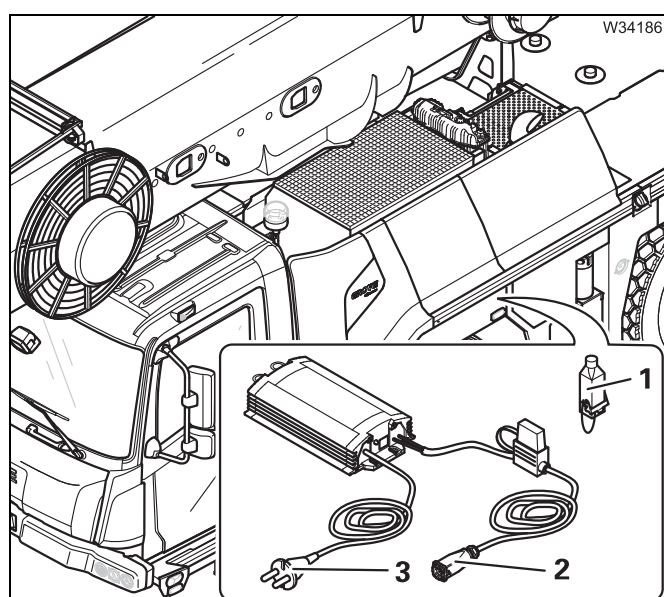
- Insert the plug (2) into socket (1).
- Place the battery charger (4) in a protected place where you can see the indicator lamp (6).

The battery charger can be suspended from the ring eyes (5).

- Insert the plug (3) into the socket on the mains supply 230 V at the location.

The battery charger switches on. The lamp (6) on the battery charger indicates the status:

- **Flashing:** The battery is being charged
- **On:** Charging complete



Breaking

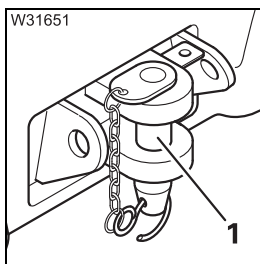
- Withdraw the plug (3) from the socket.
- Take out the plug (2) from the socket (1).
- Close the socket (1).
- Return the battery charger to the storage compartment in the driver's cab.

8.5.3

Towing 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.
- Be sure to observe the statutory regulations of the country in which you are working concerning the overall length of the towing and towed vehicle, including tow-rod.
- If the engine, steering and service brake still work, you can tow the truck crane with a lorry.
- If the engine, steering or service brake no longer function properly, the truck crane must be towed with a special breakdown truck.



The front towing coupling is designed for a maximum tractive force of 10 t (22,000 lbs). 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 hazard area in the event of damage to the engine or transmission.

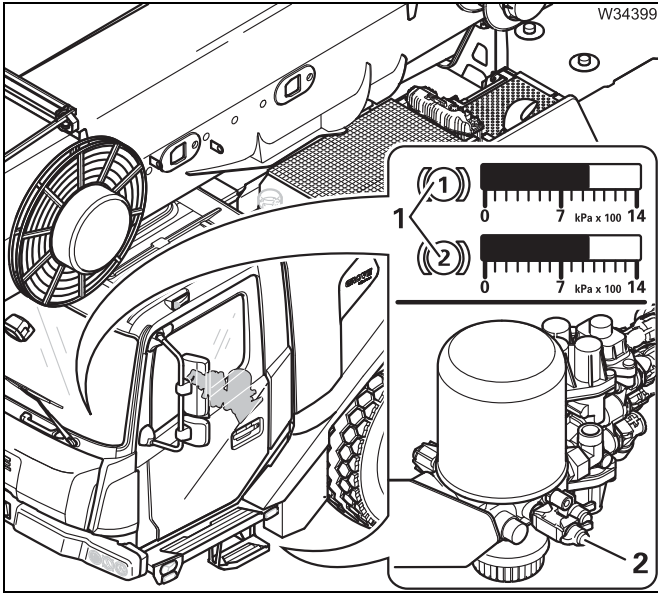
Risk of damage to the drive line

Always perform all the measures indicated 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, refer to **Manitowoc Crane Care**.

Compressed-air supply

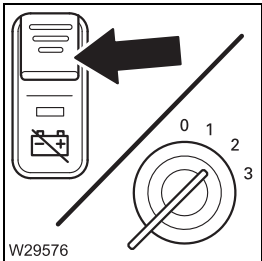
If the engine fails, the truck crane must be supplied with compressed air by the tractor-vehicle so that the brake system is still operable.





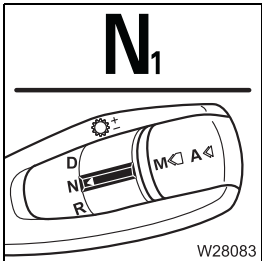
- Connect the filler connection (2) with the *Supply* coupling head of the towing vehicle.

A supply pressure of at least 6 bar (87 psi) must be displayed and the lamps (1) must not light up in the driver's cab when towing.



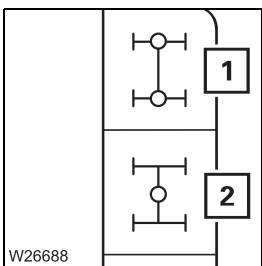
Electric power supply

- Switch on the battery master switch
- Switch on the ignition.



On the transmission

- Switch the transmission to neutral position **N**; p. 5 - 26.



Axle drives

- Switch off all differential locks.

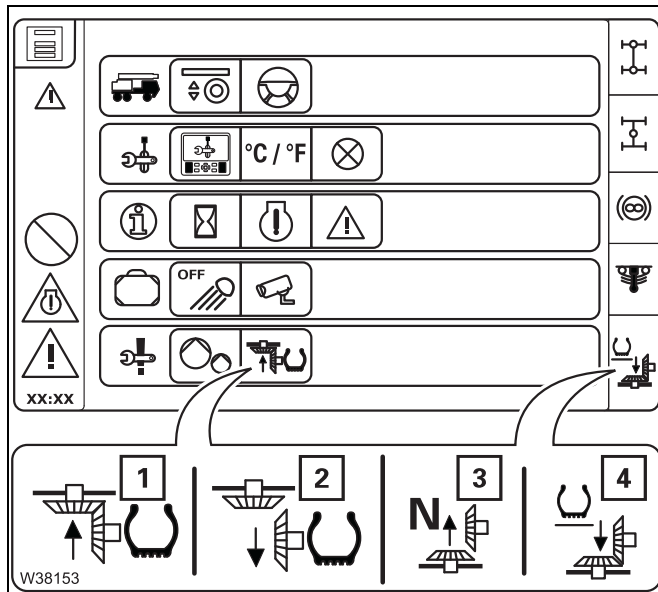
The symbols (1) and (2) must be **green**,

- Transverse differential locks p. 5 - 51.
- Longitudinal differential lock; p. 5 - 51.

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Transfer case

- Switch on the tow away mode.



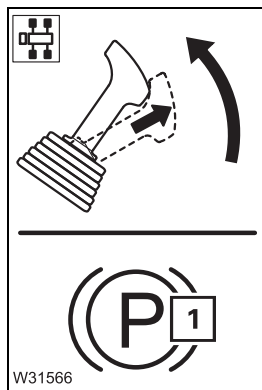
Switching towing mode on/off

Switching on

- Select and confirm the symbol (1).
 - Display symbol (2) – tow away mode on.
 - Display symbol (3) – transfer case in neutral position.

Switching off

- Select and confirm the symbol (2)
 - Display symbol (1) – tow away 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 continues to light up, the supply pressure may be too low. Let the engine of the truck crane or towing vehicle run on the compressed-air supply until the supply pressure has been built up; Building up supply pressure, p. 5 - 10.

If the lamp (1) does not go out, there is a malfunction on the parking brake system. Contact **Manitowoc Crane Care**.



Risk of accidents due to faulty brakes

If the service brake system has been damaged, you may only tow the truck crane from the immediate hazard area after consulting with **Manitowoc Crane Care**.



Towing the truck crane out of the danger area

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

- Ensure that the tractor-vehicle accelerates only slowly.



Risk of damage to the chassis

Starting jerkily or quickly can damage the chassis.

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



Risk of accidents due to sluggish steering

At speeds less than 2 km/h (1.2 mph) the truck crane is barely steerable.

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

Longer towing distances

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

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



Risk of accidents and damage when towing the truck crane long distances

Tow the truck crane at a maximum speed of 7 km/h (4 mph) and for a maximum distance of **100 m (330 ft)**. For longer distances, additional measures must be taken, refer to **Manitowoc Crane Care**.

Tow starting

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

8.5.4

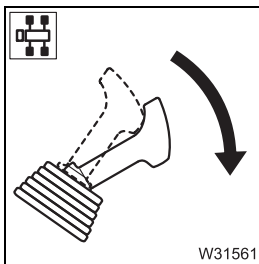
Wheel change

- 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 and 5th axle lines. These axle lines can be briefly steered during the start of the engine, sometimes with five seconds delay.



Removing a damaged wheel



- Switch off the suspension; p. 5 - 17.
- 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 lug nuts, the wheel can slip off the hub and fall toward you. Secure the wheel and step back quickly if the wheel begins to tip.

- Remove the lug nuts (1) to (12) and remove the damaged wheel
- Secure the wheel against falling over if you set it down temporarily.

On the spare wheel holder

When changing a wheel, you must remove the spare wheel from the spare wheel holder and mount the damaged wheel on to the spare wheel holder. You can use a chain hoist or the truck crane to lift the wheel.

- If you lift the wheel with the truck crane, then:
 - Support the truck crane.
 - Enter and confirm the current rigging mode.



Danger of overturning if the truck crane is free-standing

Always support the truck crane on outriggers before rotating the superstructure.

When the tyres are damaged, you may not operate the truck crane in the *Free on wheels* working position.



Risk of overturning while slewing

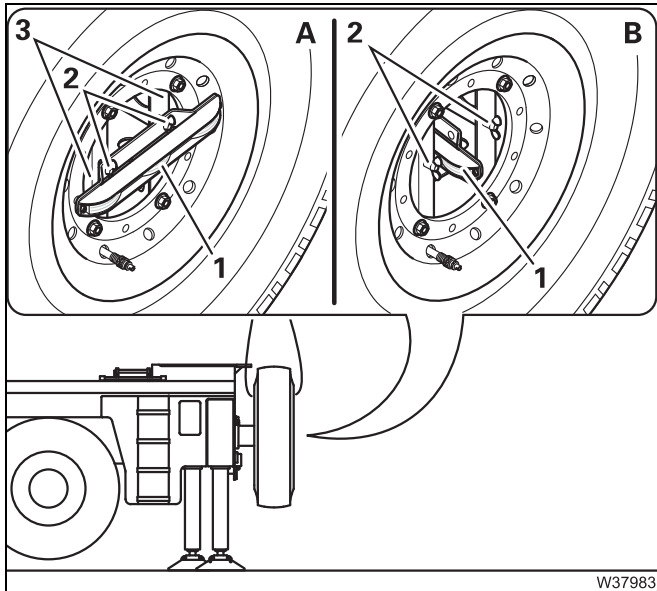
Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius).

Correct the rigging mode if necessary; *Slewing with rigged counterweight*, p. 12 - 113.

- Lift the spare wheel using only lifting gear with sufficient load bearing capacity; *Spare wheel*, p. 1 - 10.

Third brake light

If there is a third brake light, then you have to remove it before removing the wheel from the spare wheel holder. Before driving on the road, the brake light must be reattached.

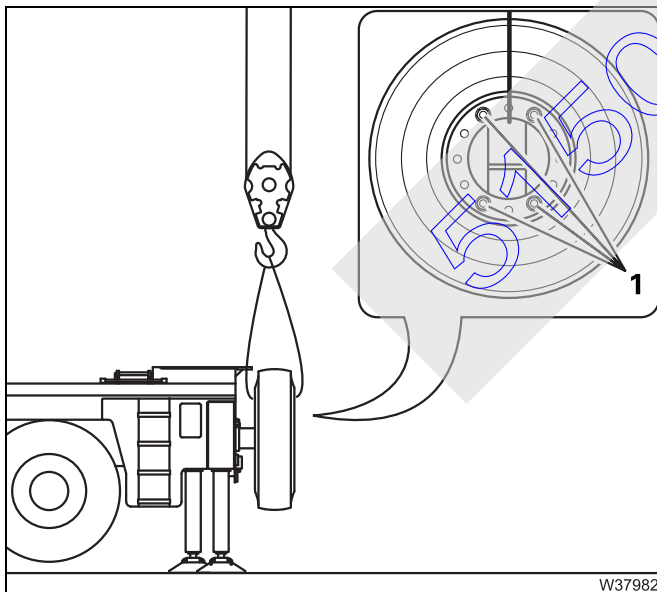


- Removing

- (A) – Remove the nuts (2).
- (B) – Put the brake light (1) into the holder.
- Undo the nuts (2).

- Installation

- (B) – Remove the nuts (2).
- (A) – Fit the brake light (1) onto the holder (3).
- Secure the brake 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).
- Lightly grease the wheel studs.



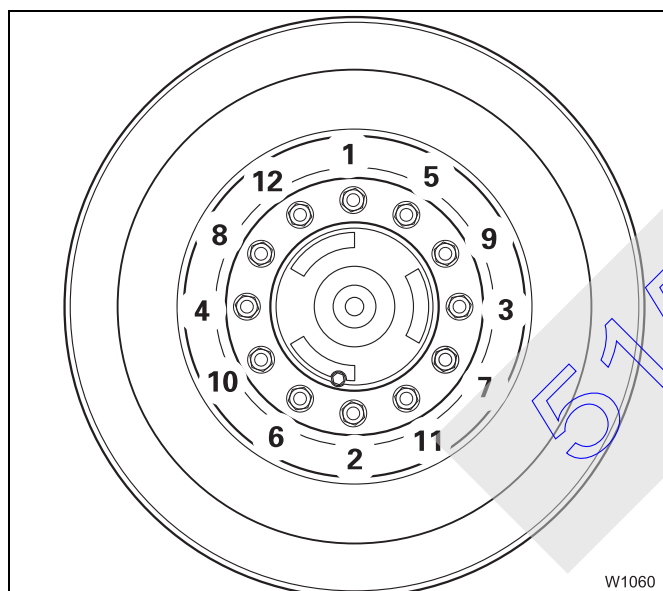
Risk of accidents

Check the wheel rim, tyres, lug nuts and wheel studs for damage before mounting the spare wheel.

Damaged parts may not be mounted

Mount only the original wheel 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 outrigger cylinders until the holes in the wheel rims are in line with the wheel studs.
- Push the wheel on to the wheel studs. Make sure the threads of the wheel studs are not damaged.



- Tighten the wheel nuts (1) and (2) finger-tight to secure the wheel.
- Tighten the remaining wheel nuts finger-tight.
- Always tighten the wheel nuts in the order (1) to (12).

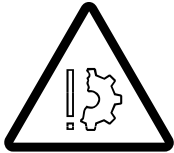
- Tighten all wheel nuts first to 200 Nm (150 lbf ft).
- Then all lug nuts to 400 Nm (300 lbf ft).
- Finally tighten all wheel nuts to 650 Nm (480 lbf ft).

After 50 km (30 mi) and 150 km (90 mi) retighten 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 filled above this maximum pressure.

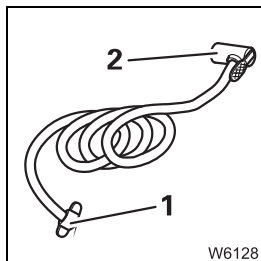


Risk of damage if the tyre pressure is too high!

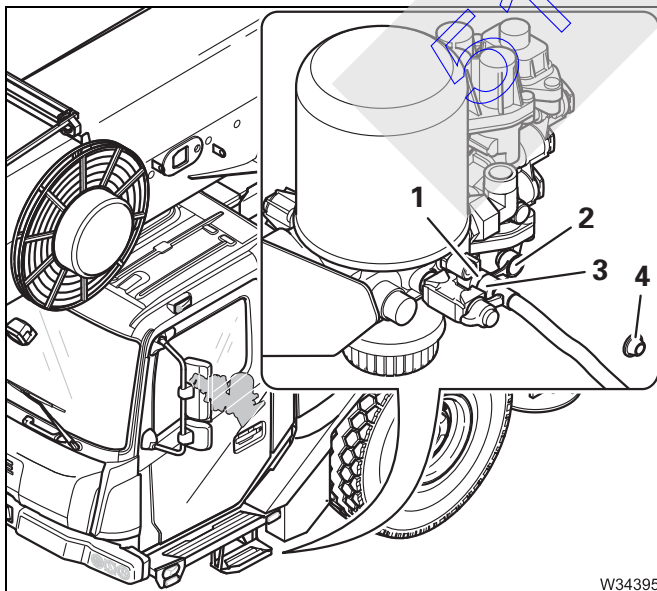
Depending on the size of the tyres, the prescribed pressure may be less than 10 bar (145 psi); *Tyres*, p. 1 - 18. Fill the tyres no more than the specified pressure. If necessary, break off the filling procedure. This prevents the tyres becoming damaged and bursting while driving.

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

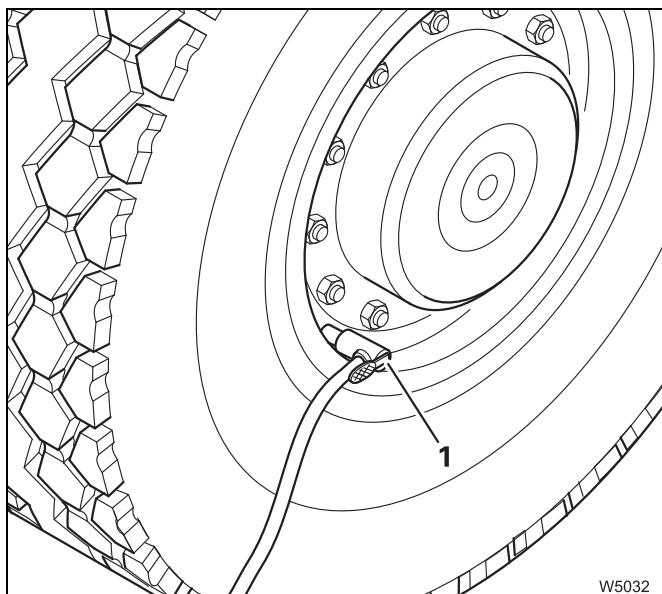



- Remove the caps (2) and (4).
- Fasten the connection (3) to the filler connection (1).

You can now inflate the tyres.

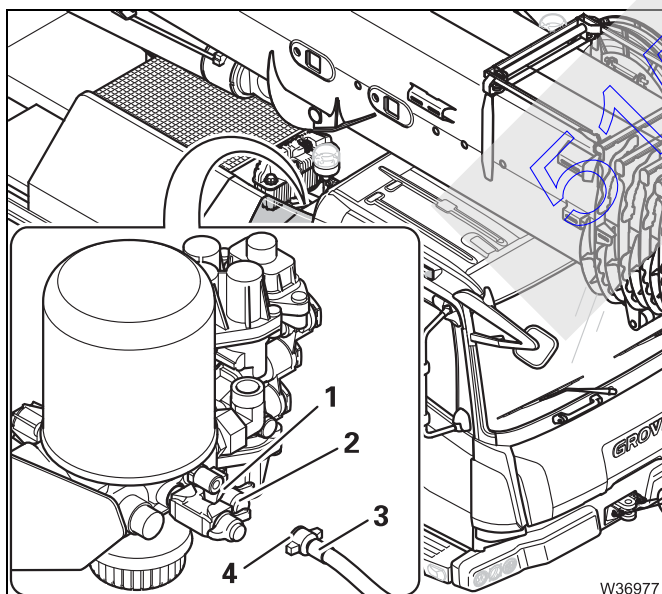


Inflating the tyres The maximum operation pressure of the compressed air system of 10 bar (145 psi) can only be reached with the engine running.



- Start the engine;  p. 4 - 13.
- Fasten the tyre connection (1) to the tyre valve.
- Press the button on the tyre connection and inflate the tyre.
- Disconnect the tyre connection (1) from the tyre valve.

Remove the filling hose Before driving, you must remove the tyre filling hose from the tyre inflator connection.



- Remove the connection (1) from the filler connection (2).
- 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.



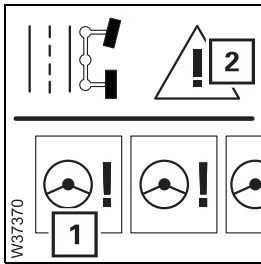
Risk of damage to the compressed air system

Always close the filler connection with the cap.

This prevents damage to the compressed air system and contamination of it.

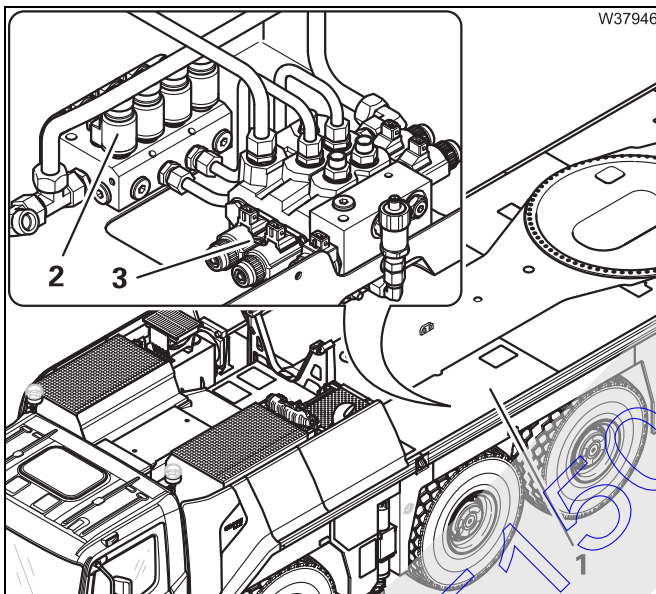
8.5.6

Emergency operation, steering 3rd and 4th axle lines



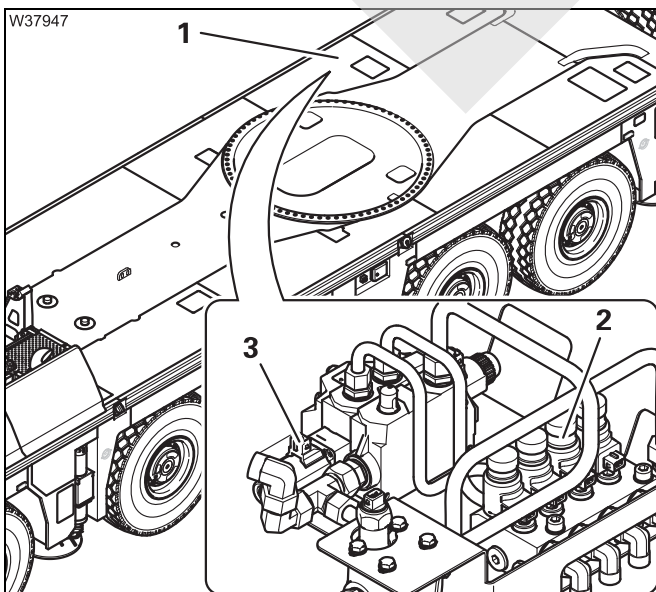
If there is a warning message in the steering system – lamp (1) lights and symbol (2) is red – the steering of the defective axle line will be locked. This axle line can then no longer be steered from the driver's cab or from the crane cab.

In this case, you can steer the wheels of the defective axle line with the emergency operation to the straight running position in order to enable a drive to the workshop.



3rd axle line operating element

- Remove the cover (1).
- 2 Check valve
- 3 Valve for the operation
- Fasten the covering (1) after the emergency operation.



4th axle line operating element

- Remove the cover (1).
- 2 Check valve
- 3 Valve for the operation
- Fasten the covering (1) after the emergency operation.



Performing emergency operation

If the current situation allows it, you can slightly lift the mobile crane with the support to relieve the axle line.

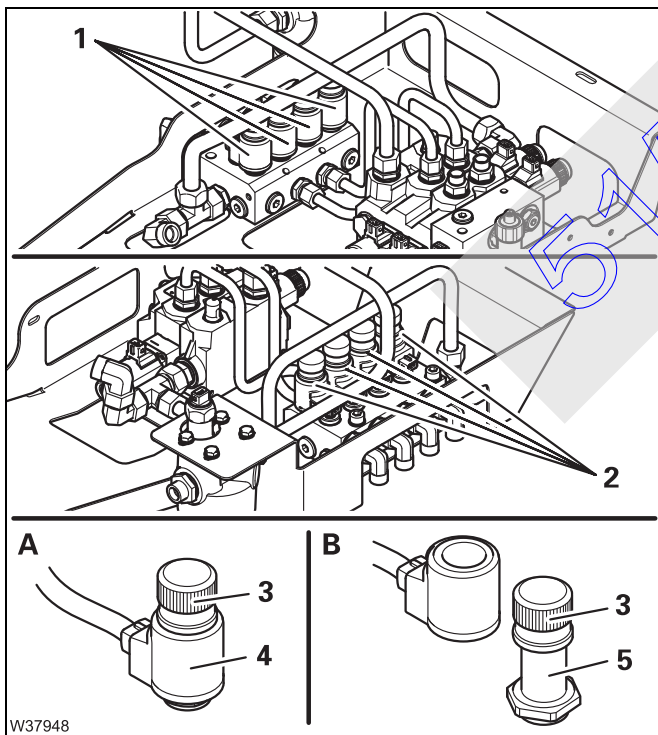
For the operation, you must

- Take out two fuses.
- Switch on the continuous operation at the check valves.
- Steer the 3rd axle line into the straight running position.
- Switch off the continuous operation at the check valves.
- Take out two fuses.

Take out fuses

You must take out two fuses before the emergency operation so that the steering system electronics is deactivated.

- Turn off the ignition.
- Take the fuses **F2/4** and **F2/5** out;  *Fuses in the driver's cab*, p. 8 - 50.
- Take the fuse **F10** out;  *Fuses in the battery box*, p. 8 - 56.



Check valves – switch on continuous operation

– For the 3rd axle line

- Always switch on the continuous operation for all valves (1).

– For the 4th axle line

- Always switch on the continuous operation for all valves (2).

- **(A)** – Remove the nut (3).

- Remove the magnets (4).

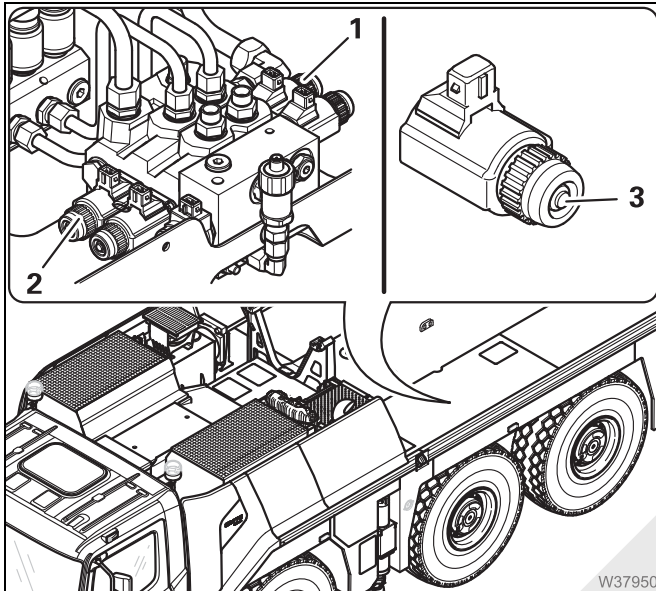
- Mark the magnet in such a way that you can put it back on the corresponding valve later.

- **(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

Ensure that there are no persons near the wheels being steered before steering an axle line with emergency operation.



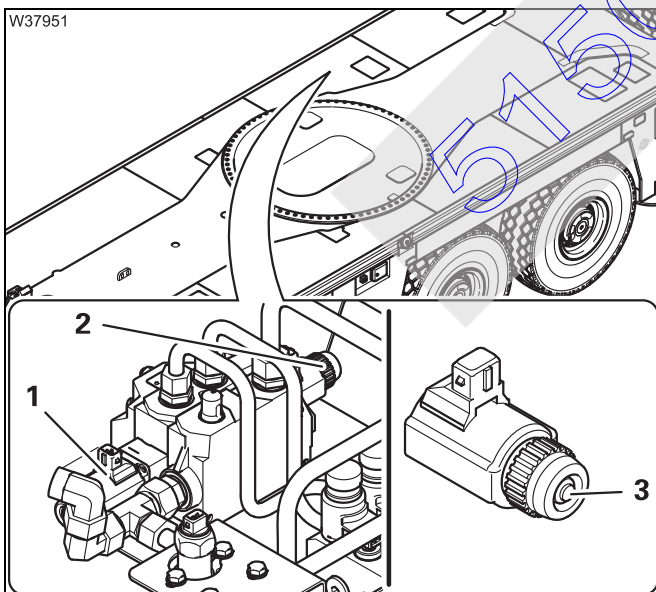
Steering of the 3rd axle line

The valves are labelled.

- 1 Y4903 – Steer to the left
- 2 Y4904 – Steer to the right

The valves are actuated 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 running position.



Steering of the 4th axle line

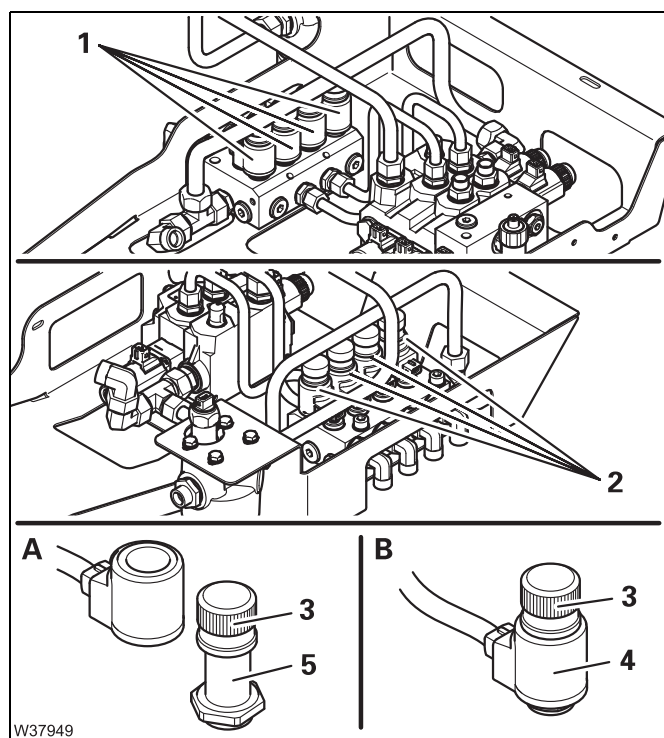
The valves are labelled.

- 1 Y4915 – Steer to the left
- 2 Y4916 – Steer to the right

The valves are actuated 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 running position.





Check valves – switch off continuous operation

- **For the 3rd axle line**
 - Always switch off the continuous operation for all valves (1).
- **For the 4th axle line**
 - Always switch off the continuous operation for all valves (2).
- (A) – Take the nut (3) off of the valve (5).
- (B) – Fit the magnets (4) – pay attention marking!
- Tighten the nut (3) hand-tight 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.

- Turn off the ignition.
- Insert the fuses F2/4 and F2/5; *Fuses in the driver's cab, p. 8 - 50.*
- Insert the fuse F10; *Fuses in the battery box, p. 8 - 56.*

After emergency operation

- Drive directly to the workshop and have the fault rectified.
- The speed may be reduced depending on the extent of the error.


8.6

Tilting/lowering the driver's cab

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

This assumes that the engine can be started.



If the engine cannot be started, you must use the hydraulic emergency operation to lift the main boom;  p. 14 - 51.

8.6.1

Prerequisites and information on tilting

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

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



Risk of damage to the steering's universal joint

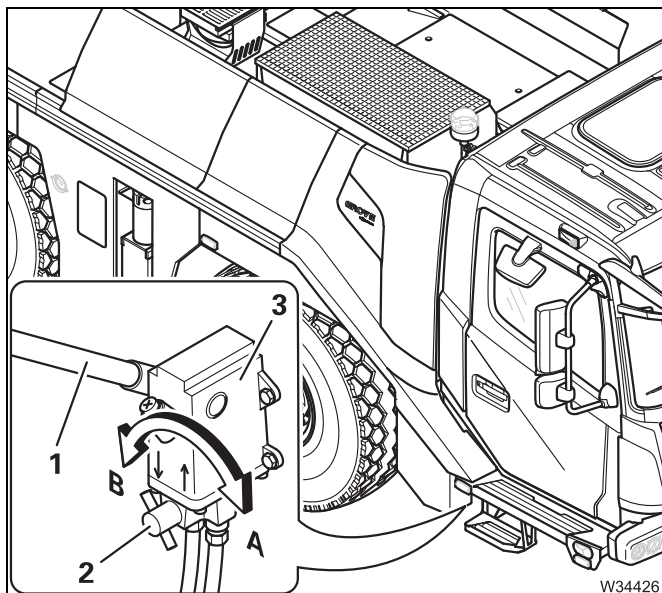
The steering wheel may only be moved when the driver's cab is lowered and locked. When moving the steering wheel into other driver's cab positions, the steering's universal joint can be damaged.

8.6.2


Tilting and 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) forward to position **A**.
- To **lower** the driver's cab, turn the lever (2) backwards, to the **B** position.

Before tilting the driver's cab, note the prerequisites specified at the beginning of the section;  *Prerequisites and information on tilting*, p. 8 - 43.

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 instrument panels and doors from swinging open during tilting, thereby injuring people.



Risk of accidents due to driver's cab tilting

When you are tilting the driver's cab forward and while it is actually tilted forward, no-one may be in front of the driver's cab.



Risk of damage when the main boom angle is too small

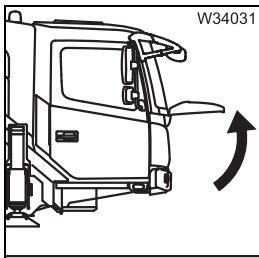
Only tilt the driver's cab when the main boom is sufficiently raised.

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.

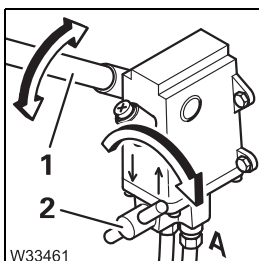


Risk of damage to front flap and the driver's cab!

The driver's cab may only be tilted if the front flap is open. This avoids damage to the front flap and the bumper.

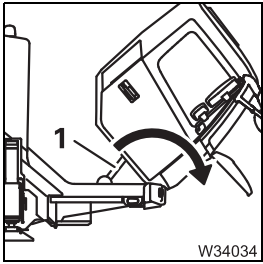


- Open the front flap, see **Front flap**, p. 3 - 73.



- Check that the lever is pointing forwards (2) (A).
- Use the lever to pump (1) – the driver's cab lock opens and the rear of the driver's cab is lifted up.





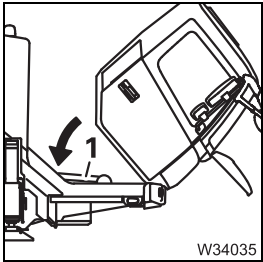
- Continue to pump until the driver's cab tilts no further.
- Secure the driver's cab – fold out the fall-back guard strut (1).



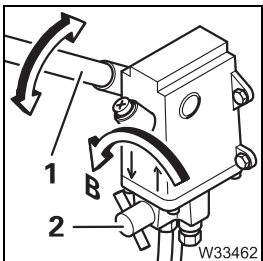
Risk of accidents due to the driver's cab tilting back.

You may only stand under the tilted driver's cab if the fall-back guard strut is folded out.

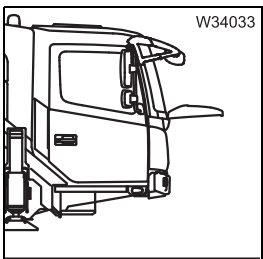
Lowering the driver's cab



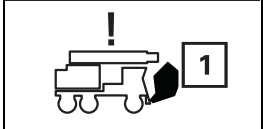
- Fold down the fall-back guard strut (1).



- Check that the lever is pointing (2) backwards (B).
- Use the lever to pump (1) – the driver's cab is lowered.

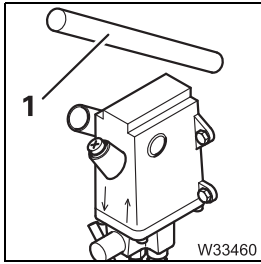


- Lower the driver's cab to its end position – the lock closes audibly.
- Switch on the ignition and check that the symbol (1) has gone out.
- If necessary, lower the driver's cab further until the symbol (1) goes out.

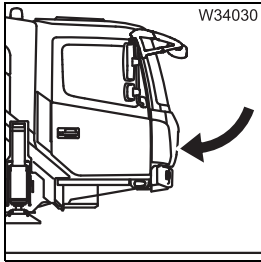



Risk of accidents if the driver's cab is not locked.

Ensure that the driver's cab is locked afterwards every time it is lowered. This prevents the driver's cab tilting forward when braking.



- Remove the lever (1) and stow it away safely.



- Close the front flap;  *Front flap*, p. 3 - 73.

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8.7

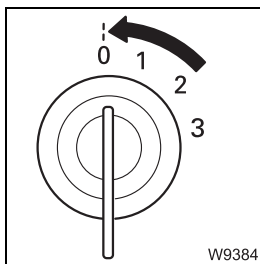
Fuses on the carrier

The fuses are divided into groups and are at various points on the carrier:

- In the driver's cab,
- In the battery box.

Information on 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 **Manitowoc Crane Care** if a fuse with the same amperage blows again when the ignition is switched on.

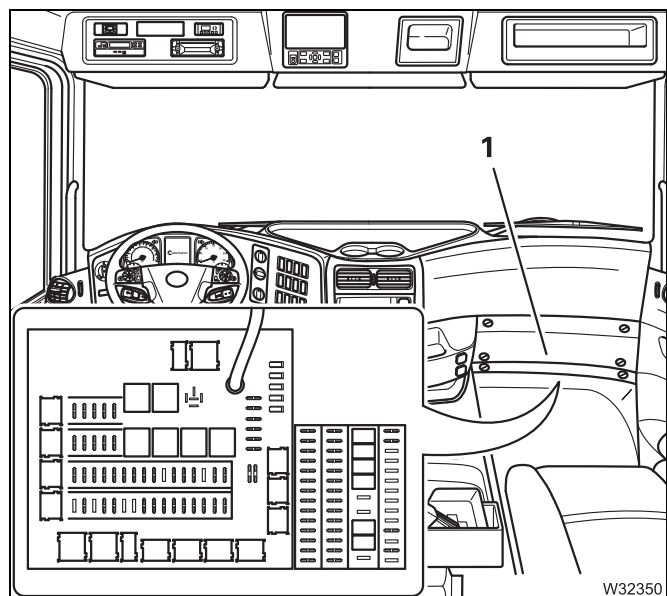


Risk of fire

Never repair a blown fuse with other electrically conductive materials.

8.7.1

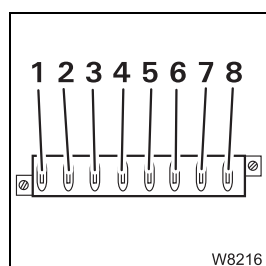
Fuses in the driver's cab



The driver's cab contains fuse groups **F1** to **F6**.

- Remove the cover (1).

The following tables show the designations of the individual fuses, including their amperage and functions.



The designations 1 to 8 in the tables correspond to their order from left to right (fuse 1 is always the left fuse).

- Observe the instructions for fuse changes; ► p. 8 - 49.

Designation	Amperage (A)	Function
F1/1	3	Ignition lock
F1/2	15	Control unit UB 2 CCM 11
F1/3	15	Control unit UB 2 CCM 11
F1/4	15	Permanent positive voltage (terminal 30)
F1/5	5	Engine/transmission diagnostics plug
F1/6	10	Electronic gear system control Transmission operating elements
F1/7	10	Engine electronic control system
F1/8	15	Engine electronic control system

Designation	Amperage (A)	Function
F2/1	15	Control unit UB 1 IOL 31
F2/2	15	Control unit UB 1 IOL 31
F2/3	15	Control unit UB 2 IOL 31
F2/4	15	Control unit UB 2 IOL 31
F2/5	15	Control unit UB 1 IOL 32 Electronic steering system
F2/6	15	Control unit UB 1 IOL 32
F2/7	15	Control unit UB 2 IOL 32
F2/8	15	Control unit UB 2 IOL 32

Designation	Amperage (A)	Function
F3/1	15	Control unit UB 1 IOL 33
F3/2	15	Control unit UB 1 IOL 33
F3/3	15	Control unit UB 2 IOL 33
F3/4	15	Control unit UB 2 IOL 33
F3/5	10	ABS control unit
F3/6	10	ABS control unit
F3/7	15	Cigarette lighter, voltage transformer
F3/8	-	Unassigned



Designation	Amperage (A)	Function
F4/1	3	Cab lighting
F4/2	20	Dual tank switchover
F4/3	5	CCS display
F4/4	-	Unassigned
F4/5	-	Unassigned
F4/6	-	Unassigned
F4/7	-	Unassigned
F4/8	-	Unassigned

Designation	Amperage (A)	Function
F5/1	20	Auxiliary heater
F5/2	3	Control unit UE CCM 11 Control unit UE 2 IOL 31/32/33
F5/3	10	Radio
F5/4	5	Tachograph, instrument panel
F5/5	10	Fan
F5/6	-	Unassigned
F5/7	-	Unassigned
F5/8	5	Power supply relay

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

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



Designation	Amperage (A)	Function
F8/1	5	Central lubrication
F8/2	15	Windscreen wiper
F8/3	5	Steering coupling
F8/4	3	ABS ABS trailer
F8/5	10	Horn
F8/6	15	Unassigned
F8/7	10	Operating the mirror adjustment Window winder
F8/8	-	Unassigned

Designation	Amperage (A)	Function
F9/1	2	Temperature gauge Fuel gauge
F9/2	-	Unassigned
F9/3	-	Unassigned
F9/4	-	Unassigned
F9/5	-	Unassigned
F9/6	-	Unassigned
F9/7	-	Unassigned
F9/8	-	Unassigned

Designation	Amperage (A)	Function
F10/1	5	Turn signal indicators Light switch
F10/2	10	Rotating beacon carrier/superstructure
F10/3	5	Parking light Side marker lights Side marker lights, front
F10/4	3	Instrument lighting
F10/5	5	Brake lights Trailer brake lights
F10/6	10	Light switch Warning blinkers
F10/7	-	Unassigned
F10/8	5	Reversing lamp

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8.7.2

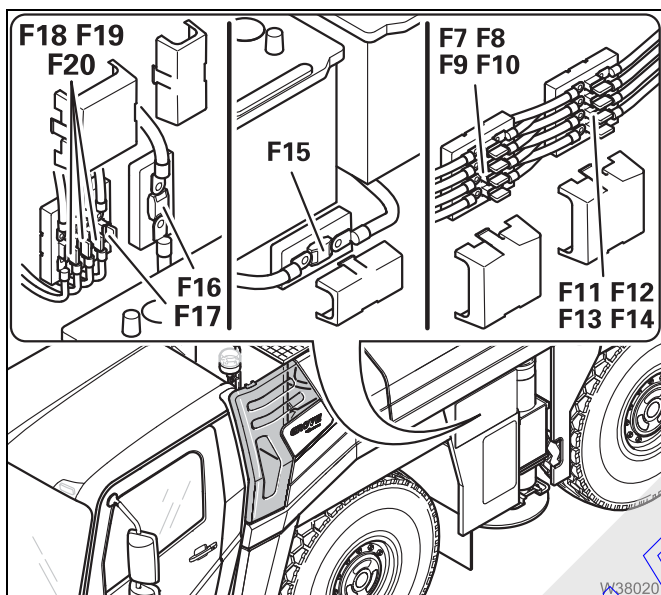
Fuses in the battery box

Fuses F7 to F16 are contained in the battery box.



Danger from lead and lead compounds on batteries

Battery poles, battery terminals and parts of the battery itself contain lead and lead compounds. Wash your hands after working on these parts or in these areas.



- Open the battery box.

The fuses are in a terminal box in front of the batteries.

- Remove the lids from the terminal boxes.
- Observe the instructions for fuse changes;
 ▶ p. 8 - 49.

Designation	Amperage (A)	Function
F7	50	Driver's cab central fuse
F8	25	Battery charger socket
F9	25	Superstructure central fuse
F10	10	Steer by wire
F11	20	Superstructure central fuse
F12	25	Driver's cab central fuse
F13	20	Dual tank system central fuse
F14	50	Superstructure central fuse
F15	150	Crane cab heating supply
F16	175	Back-up protection
F17	20	Crane cab heating supply
F18, F19, F20	Diverse	Reserve

9

Operating elements for crane operation

All operating elements for driving are described in Chapter 3.

9.1

Overview of the operating elements

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

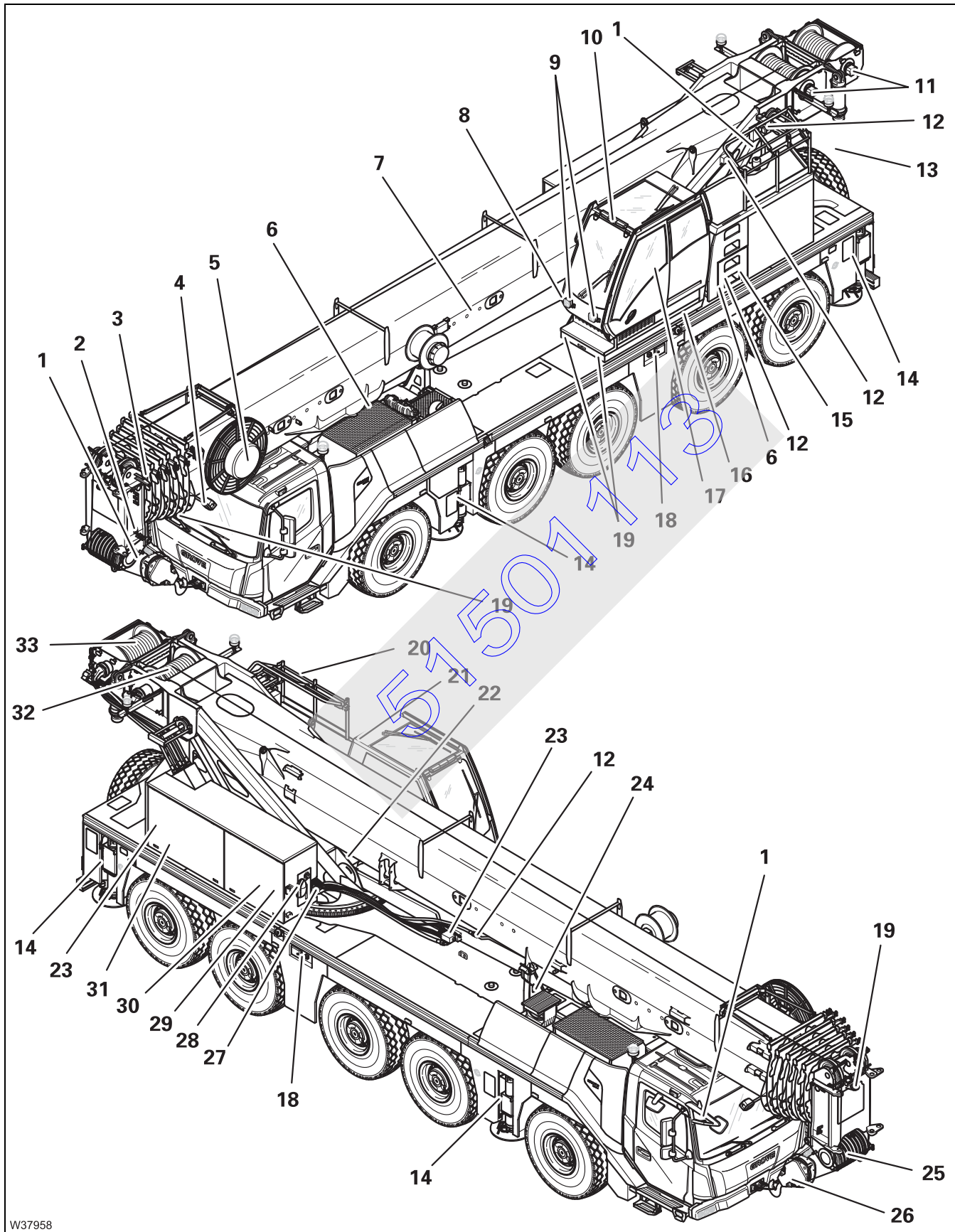


Operating elements available only with additional equipment are designated accordingly. These designations are made in this section only and are not repeated in the following sections.

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9.1.1

Exterior of the truck crane



W37958

1	– Camera on main boom ¹⁾	▣▣▣▣ p. 12 - 152
	– Camera on the hoists	▣▣▣▣ p. 12 - 155
	– Camera on the driver's cab ¹⁾	▣▣▣▣ p. 12 - 155
2	– Lifting limit switch – function	▣▣▣▣ p. 11 - 82
	– Installing/removing the lifting limit switch	▣▣▣▣ p. 12 - 139
3	Anemometer and air traffic control light ¹⁾	▣▣▣▣ p. 12 - 145
4	Using the slewable spotlights ¹⁾	▣▣▣▣ p. 11 - 130
5	Installing/removing the hose drum ^{1), 3)}	
6	Socket for hand-held control	▣▣▣▣ p. 9 - 83
7	Rigging the main boom ¹⁾	▣▣▣▣ p. 6 - 17
8	RCL override – Version A ⁴⁾	
	– Key-operated switch for overriding the RCL in an emergency	▣▣▣▣ p. 9 - 143
	RCL override – Version B ⁴⁾	
	– No function	▣▣▣▣ p. 9 - 144
9	Spotlights ¹⁾	▣▣▣▣ p. 9 - 8
10	RCL status display	▣▣▣▣ p. 11 - 63
11	Lowering limit switch	▣▣▣▣ p. 11 - 84
12	– Hydraulic emergency operation with the hand pump	▣▣▣▣ p. 14 - 51
	– Hydraulic emergency operation acc. to BGR 159 ¹⁾	▣▣▣▣ p. 14 - 59
13	Counterweight, removed	▣▣▣▣ p. 12 - 71
14	Outriggers	
	– operation	▣▣▣▣ p. 12 - 41
	– Lighting	▣▣▣▣ p. 12 - 45
	– Installing/removing the outrigger beams	▣▣▣▣ p. 6 - 51
15	Shut-off valves at the hydraulic tank	▣▣▣▣ p. 10 - 4
16	Step at the crane cab Switching on/off	▣▣▣▣ p. 12 - 157
17	Crane cab	▣▣▣▣ p. 9 - 6

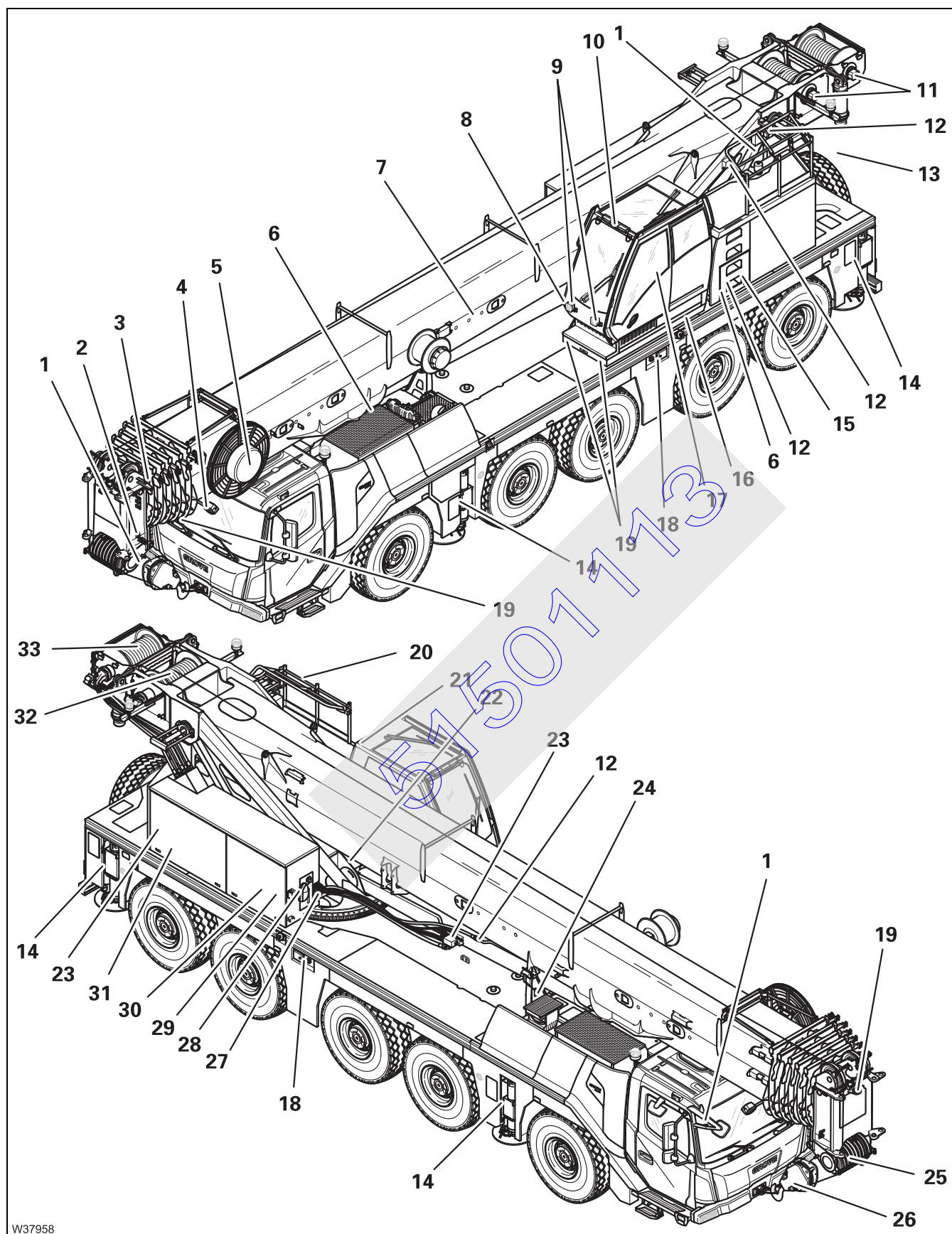
¹⁾ Additional equipment

²⁾ ▣▣▣▣ *Maintenance manual*

³⁾ ▣▣▣▣ *Lattice extension operating manual*

⁴⁾ Version A or version B active depending on RCL programming





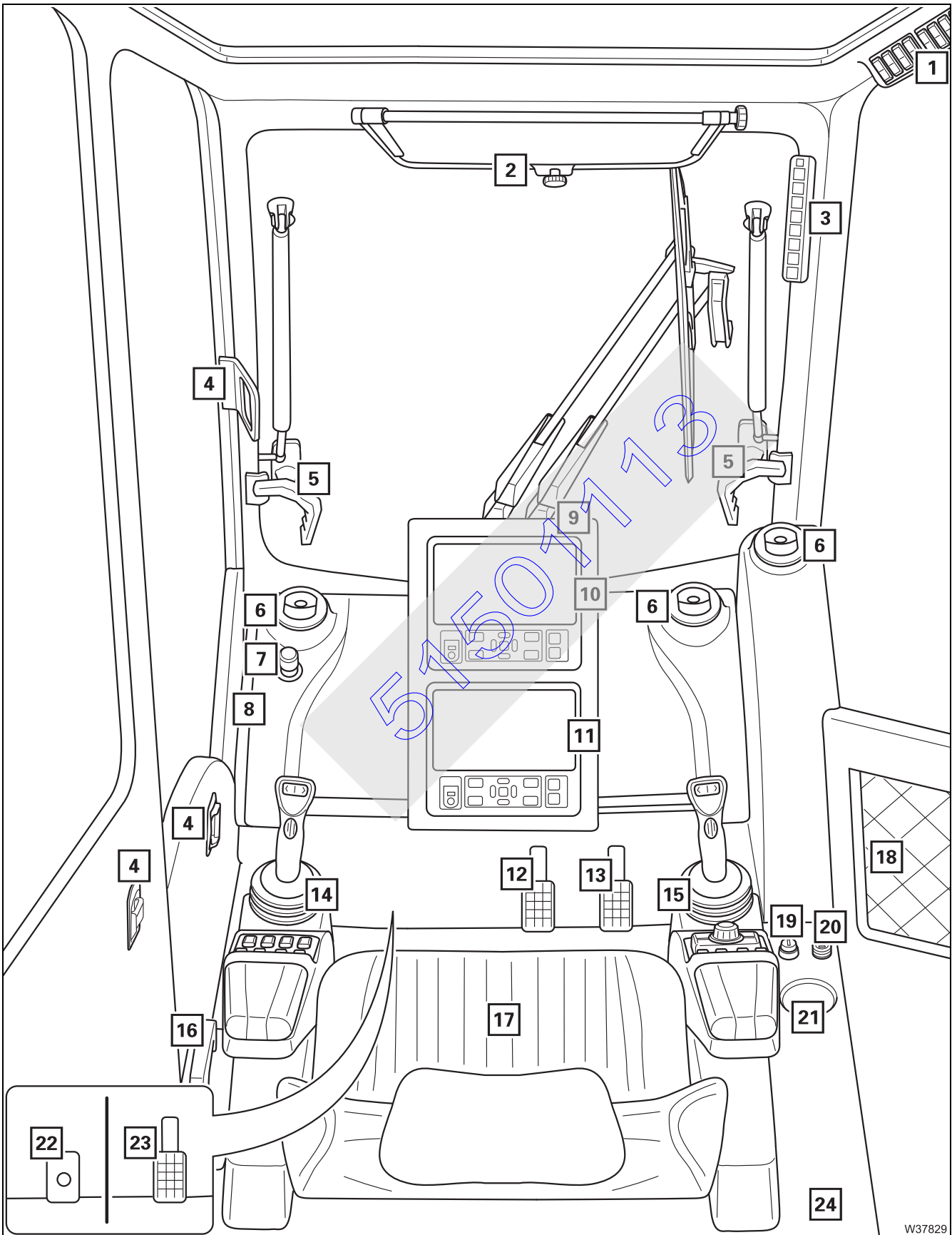
W37958

- 18** Outriggers:
- Control units¹⁾ ||||▶ p. 9 - 85
 - Control units for raising the axles ||||▶ p. 9 - 85
 - Emergency stop switch ||||▶ p. 14 - 1
- 19** Slinging points
- For personal protective clothing ||||▶ p. 12 - 151
 - For fall protection device¹⁾ ||||▶ p. 12 - 151
- 20** Railings on the turntable ||||▶ p. 12 - 149
- 21** CraneSTAR system ||||▶ p. 11 - 158
- 22** Drive unit²⁾
- 23** – Switching on the boom floating position¹⁾ ||||▶ p. 6 - 13
– Switching off the boom floating position¹⁾ ||||▶ p. 12 - 19
- 24** – Switching on boom pre-tensioning¹⁾ ||||▶ p. 6 - 14
– Switching off boom pre-tensioning¹⁾ ||||▶ p. 12 - 21
- 25** Reeving and unreeving the hoist rope ||||▶ p. 12 - 124
- 26** – Hook block ||||▶ p. 12 - 115
– Separable hook block¹⁾ ||||▶ p. 12 - 120
– Hook block with ballast plates¹⁾ ||||▶ p. 12 - 122
- 27** Fuel tank auxiliary heater¹⁾ ||||▶ p. 11 - 5
- 28** Mirror for crane operation ||||▶ p. 12 - 150
- 29** Storage compartment
- Anemometer ||||▶ p. 12 - 145
 - Hand-held control ||||▶ p. 12 - 23
- 30** Slewing gear:
- operation ||||▶ p. 11 - 115
 - Switching off the slewing gear freewheel¹⁾ ||||▶ p. 12 - 20
 - Switching on the slewing gear freewheel¹⁾ ||||▶ p. 6 - 13
 - Turntable lock¹⁾ ||||▶ p. 9 - 129
- 31** Hydraulic oil cooler, second cooler¹⁾
- 32** Main hoist ||||▶ p. 9 - 114
- 33** Auxiliary hoist Operation¹⁾ ||||▶ p. 9 - 116
Rigging the auxiliary hoist¹⁾ ||||▶ p. 6 - 39

¹⁾ Additional equipment

²⁾ ||||▶ *Maintenance manual*

9.1.2 Crane cab



W37829

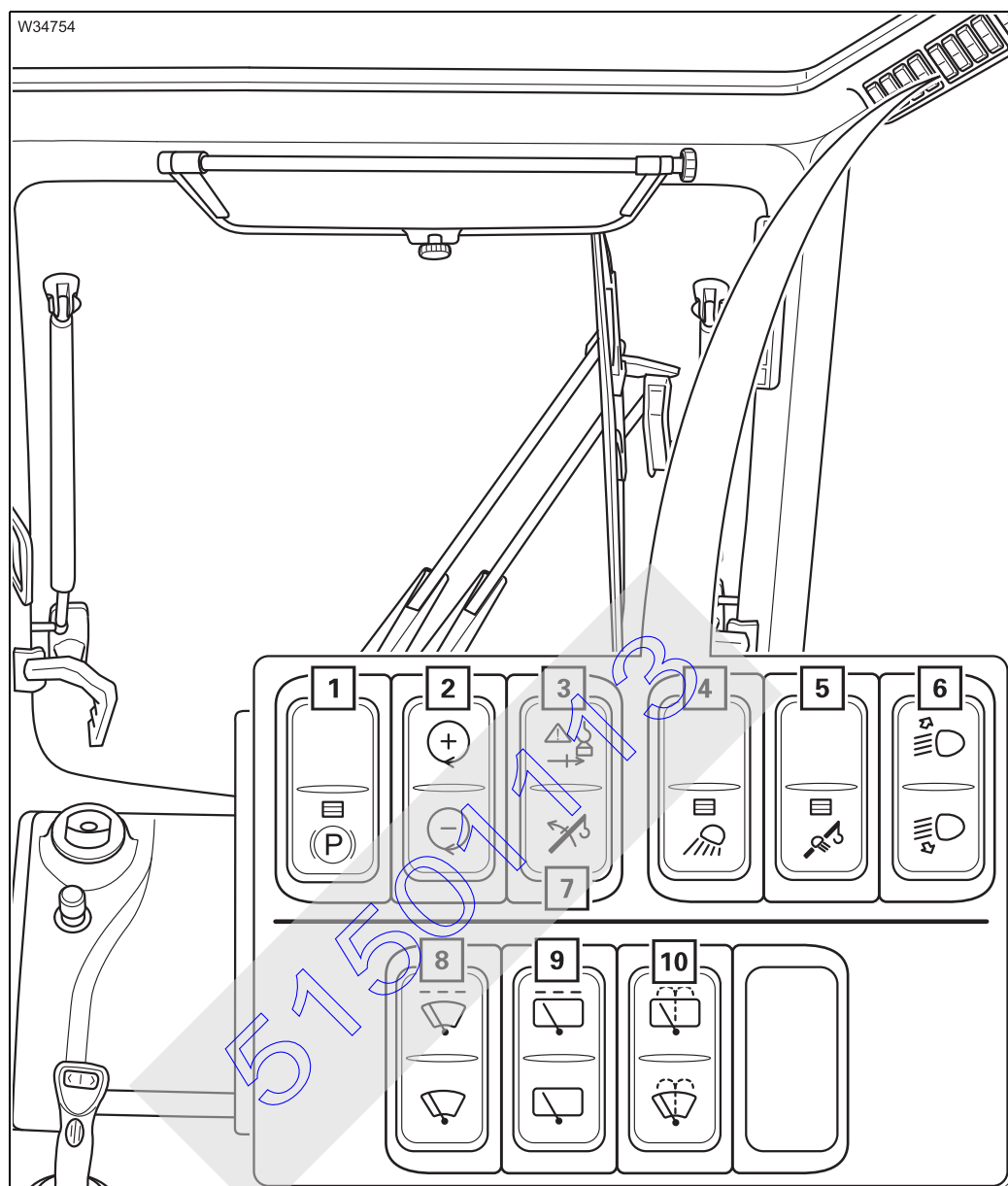
1 Side panel	▣▣▣▣▶ p. 9 - 8
2 Sun visor	
3 Current degree of utilisation display ¹⁾	▣▣▣▣▶ p. 11 - 51
4 Door unlocking mechanism	▣▣▣▣▶ p. 9 - 155
5 Lock/unlock windows	▣▣▣▣▶ p. 9 - 154
6 Air vents	▣▣▣▣▶ p. 11 - 152
7 Emergency stop switch	▣▣▣▣▶ p. 9 - 100
8 Windscreen washing system tank ²⁾	
9 Adjusting the front panel	▣▣▣▣▶ p. 11 - 9
10 RCL control unit (R ated- C apacity- L imiter)	▣▣▣▣▶ p. 9 - 76
11 CCS control unit	▣▣▣▣▶ p. 9 - 16
12 Service brake ¹⁾	▣▣▣▣▶ p. 9 - 162
13 Accelerator pedal	
14 Left-hand control panel	▣▣▣▣▶ p. 9 - 12
15 Right-hand control panel	▣▣▣▣▶ p. 9 - 13
16 Handle	
17 Crane cab seat	▣▣▣▣▶ p. 11 - 8
Seat contact switch	▣▣▣▣▶ p. 9 - 94
18 Rest	
19 Ignition lock	▣▣▣▣▶ p. 9 - 91
20 Cigarette lighter (24 volts)	
21 Ashtray	
22 Slewing gear freewheel ¹⁾	▣▣▣▣▶ p. 9 - 118
23 Slewing gear brake pedal – can be switched on/off ¹⁾	▣▣▣▣▶ p. 9 - 119
24 Crane cab, rear	▣▣▣▣▶ p. 9 - 10

¹⁾ Additional equipment

²⁾ ▣▣▣▣▶ *Maintenance manual*



Side panel



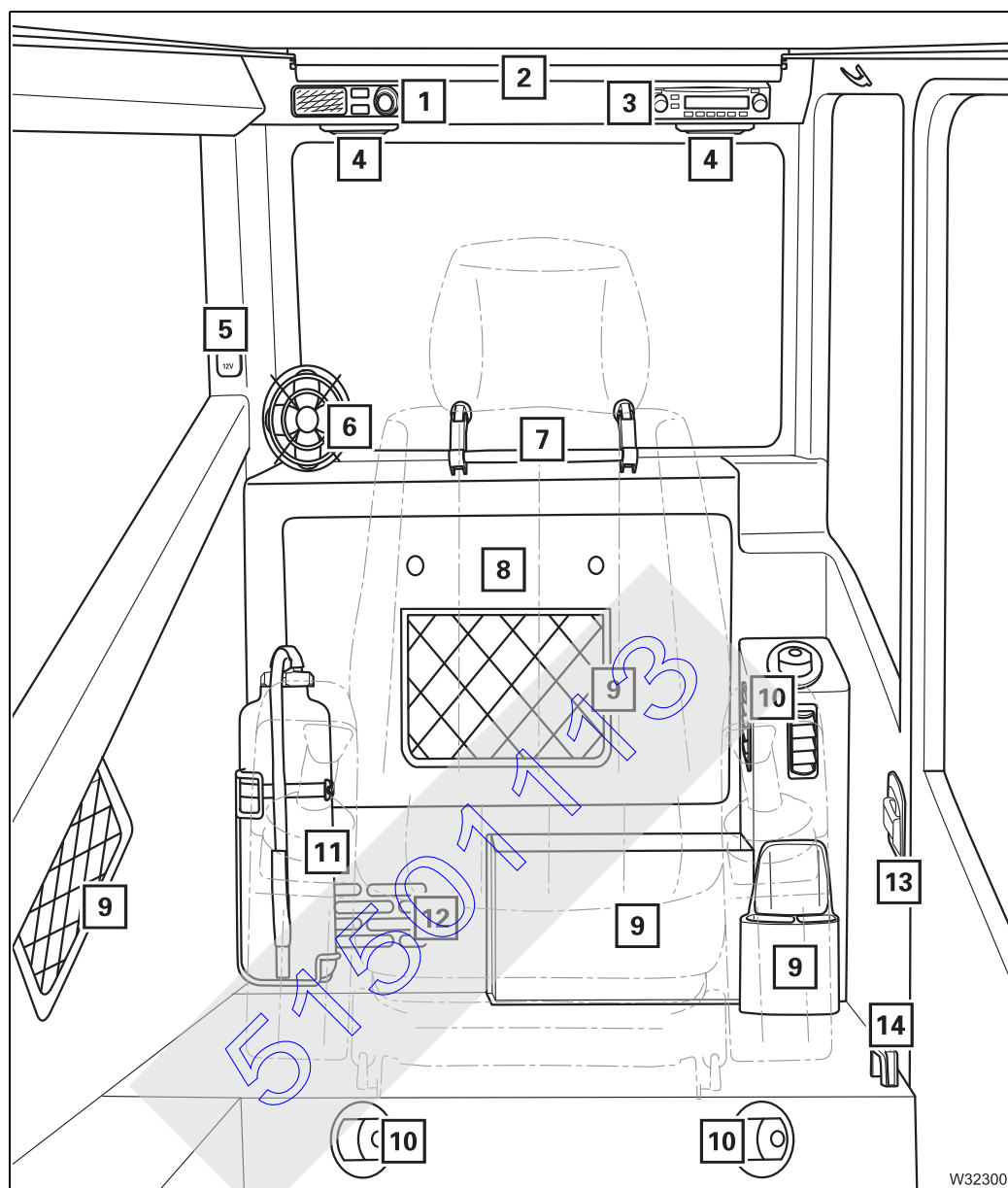
1 Applying/releasing the parking brake	▣▣▣▣ p. 9 - 163
2 – Starting the engine	▣▣▣▣ p. 9 - 91
– Set idling speed	▣▣▣▣ p. 9 - 91
3 RCL override – Version A ²⁾	
– Overriding the RCL	▣▣▣▣ p. 9 - 143
RCL override – Version B ²⁾	
– Overriding the RCL in an emergency	▣▣▣▣ p. 9 - 144
4 Headlight on/off	▣▣▣▣ p. 9 - 146
5 Slewable spotlights on/off ¹⁾	▣▣▣▣ p. 9 - 147
6 Slew slewable spotlight ¹⁾	▣▣▣▣ p. 9 - 147
7 RCL override – Version A ²⁾	
– Raise enable button after RCL shutdown	▣▣▣▣ p. 9 - 121
RCL override – Version B ²⁾	
– No function	▣▣▣▣ p. 9 - 144
8 Windscreen wiper on/off	▣▣▣▣ p. 9 - 148
9 Roof window wiper on/off	▣▣▣▣ p. 9 - 148
10 Windscreen washing system	▣▣▣▣ p. 9 - 148

1) Additional equipment

2) Version A or version B active depending on RCL programming



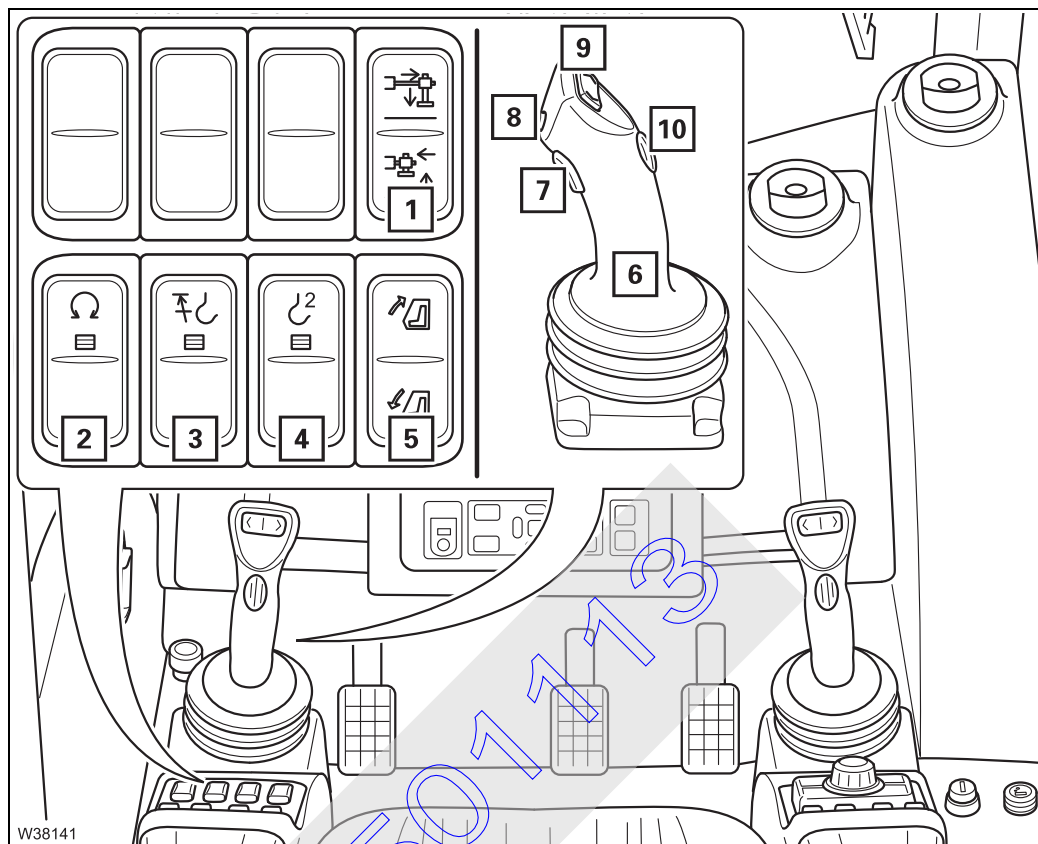
Crane cab, rear



- | | |
|---|------------------|
| 1 Cab lighting | ▣▣▣▣ p. 9 - 147 |
| 2 Sun roller blind | |
| 3 Radio-CD/USB^{1), 3)} | |
| 4 Loudspeaker¹⁾ | |
| 5 Sockets 12 V | ▣▣▣▣ p. 9 - 145 |
| 6 Fan with switch¹⁾ | |
| 7 Rear window | ▣▣▣▣ p. 9 - 154 |
| 8 Cover for: | |
| – Fuses | ▣▣▣▣ p. 14 - 75 |
| – Diagnostics | ▣▣▣▣ p. 9 - 156 |
| – CraneSTAR system ¹⁾ | ▣▣▣▣ p. 11 - 158 |
| 9 Rest | |
| 10 Air vents | ▣▣▣▣ p. 11 - 152 |
| 11 Fire extinguisher²⁾ | |
| 12 Air vents | ▣▣▣▣ p. 11 - 152 |
| 13 Door unlocking mechanism | ▣▣▣▣ p. 9 - 155 |
| 14 Handle | |
| 1) Additional equipment | |
| 2) ▣▣▣▣ <i>Maintenance manual</i> | |
| 3) ▣▣▣▣ <i>Separate operating manual</i> | |

9.1.3 Control panels

Left

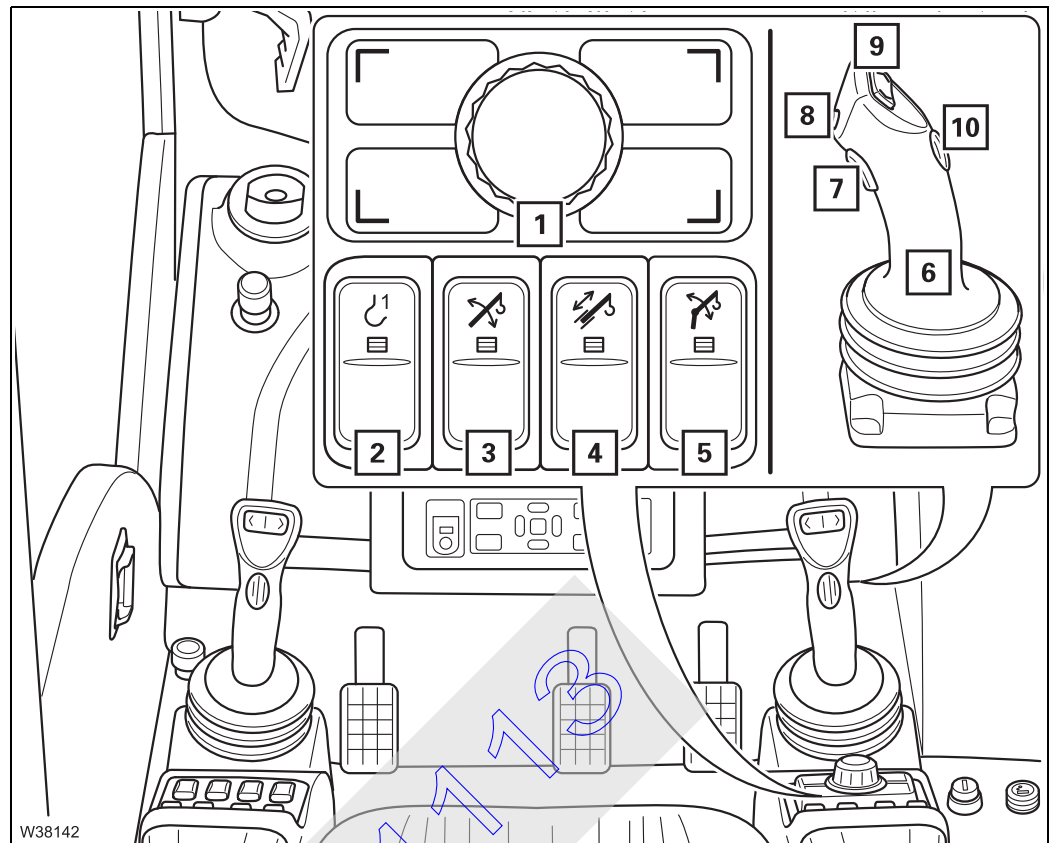


W38141

- 1** Moving the outrigger ➤ p. 9 - 102
- 2** Slewing gear on/off ➤ p. 9 - 118
- 3** – Lifting limit switch override ➤ p. 9 - 115
 – Override slewing gear shutdown ➤ p. 9 - 115
 – Correct the counterweight rigging mode ➤ p. 9 - 115
- 4** Auxiliary hoist¹⁾ on/off ➤ p. 11 - 79
- 5** Inclining the crane cab ➤ p. 9 - 128
- 6** Left-hand control lever (configuration varies depending on the version) ➤ p. 9 - 14
- 7** Dead man's switch ➤ p. 9 - 94
- 8** Slewing gear freewheel ➤ p. 9 - 118
- 9** Depending on which function is switched on, button for:
 - Derricking gear high-speed mode ➤ p. 9 - 121
 - Telescoping mechanism high-speed mode ➤ p. 9 - 123
 - Steering with separate steering ➤ p. 9 - 166
 - Economy Mode step 3 switch on¹⁾ ➤ p. 11 - 127
- 10** Auxiliary hoist slewing indicator ➤ p. 11 - 80

¹⁾ Additional equipment

Right



- | | |
|--|-----------------|
| 1 Jog dial (rotary push button) | ▣▣▣▣ p. 9 - 95 |
| 2 Main hoist on/off | ▣▣▣▣ p. 9 - 114 |
| 3 Derricking gear on/off | ▣▣▣▣ p. 9 - 120 |
| 4 Telescoping mechanism on/off | ▣▣▣▣ p. 9 - 122 |
| 5 Lattice extension derricking gear ^{1), 2)} | |
| 6 Right-hand control lever (configuration depends on version) | ▣▣▣▣ p. 9 - 14 |
| 7 Dead man's switch | ▣▣▣▣ p. 9 - 94 |
| 8 Horn | ▣▣▣▣ p. 9 - 149 |
| 9 Depending on which function is switched on, button for: | |
| – Hoist high-speed mode on/off | ▣▣▣▣ p. 9 - 114 |
| – Steering in normal steering mode | ▣▣▣▣ p. 9 - 166 |
| 10 Main hoist slewing indicator | ▣▣▣▣ p. 11 - 78 |

- 1) Additional equipment
2) ▣▣▣▣ *Lattice extension operating manual*

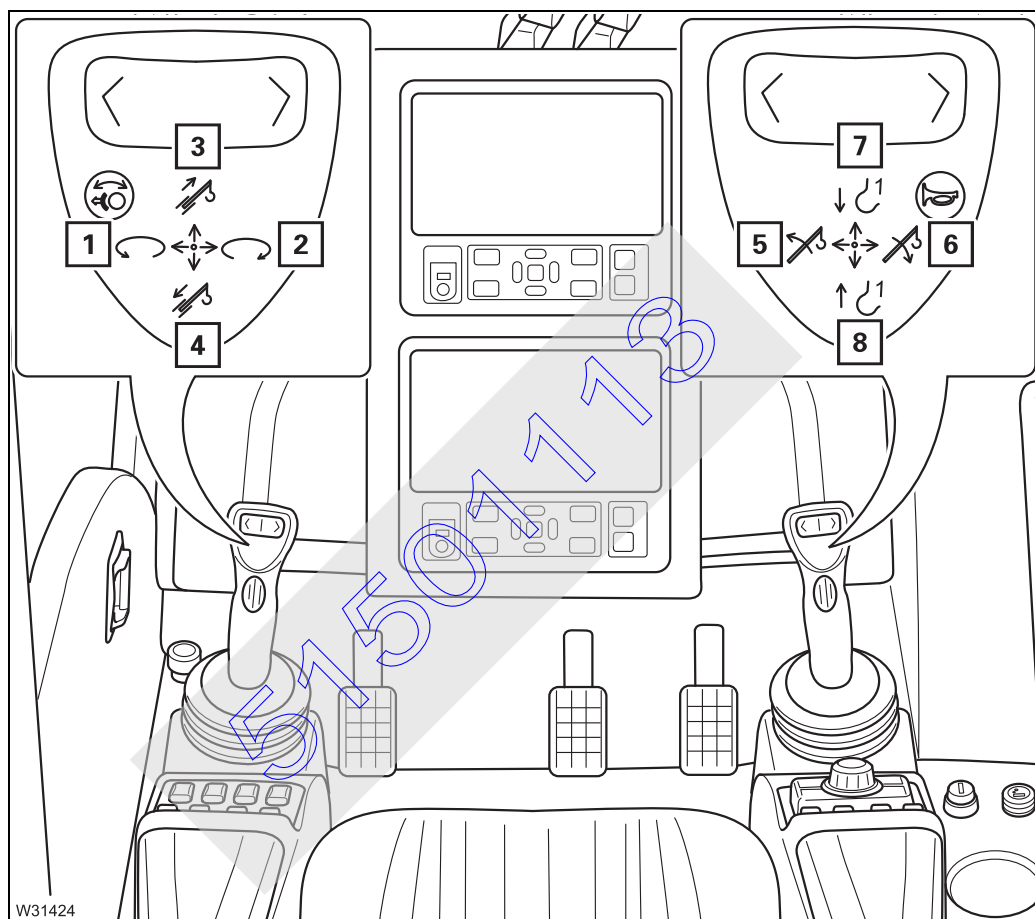
9.1.4

Control lever assignment

The truck crane can be equipped with two different control lever configurations. The current configuration of the control levers is indicated by symbols on the control levers.

Version 1

In version 1, the left control lever is configured with the *Telescope* function.



Left control lever

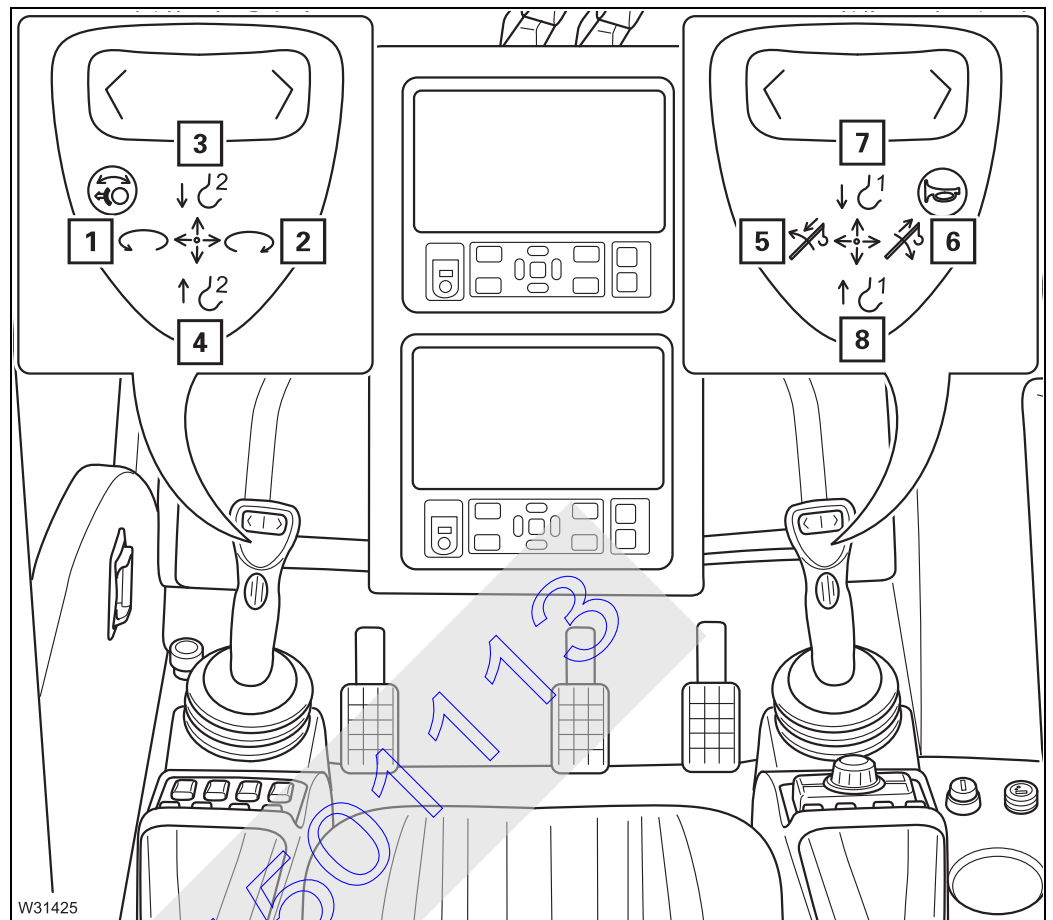
- 1 Slewing to the left
- 2 Slewing to the right
- 3 Extension
- 4 Retraction of the telescoping

Right control lever

- 5 Raising
- 6 Lowering the boom
- 7 Lower the main hoist
- 8 Lift the main hoist

Version 2

In version 2, the right control lever is configured with the *Telescope* function.



Left control lever

- 1 Slewing to the left
- 2 Slewing to the right
- 3 Lower auxiliary hoist¹⁾
- 4 Raise auxiliary hoist¹⁾

Right control lever

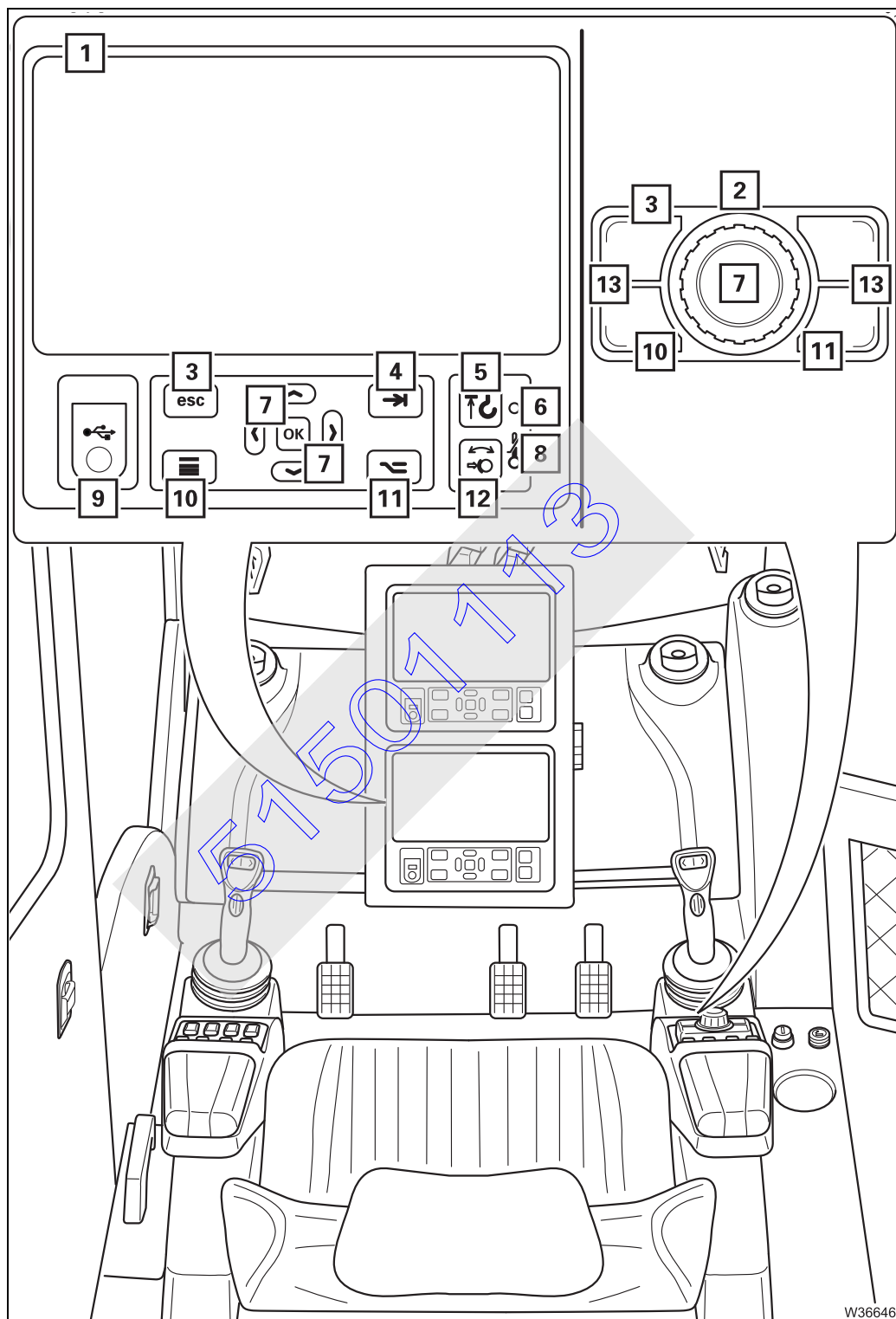
- 5 Raise/retract²⁾
- 6 Lower/extend²⁾
- 7 Lower the main hoist
- 8 Lift the main hoist

¹⁾ Additional equipment

²⁾ Derricking the lattice extension;  *Lattice extension operating manual*

9.1.5

CCS control unit

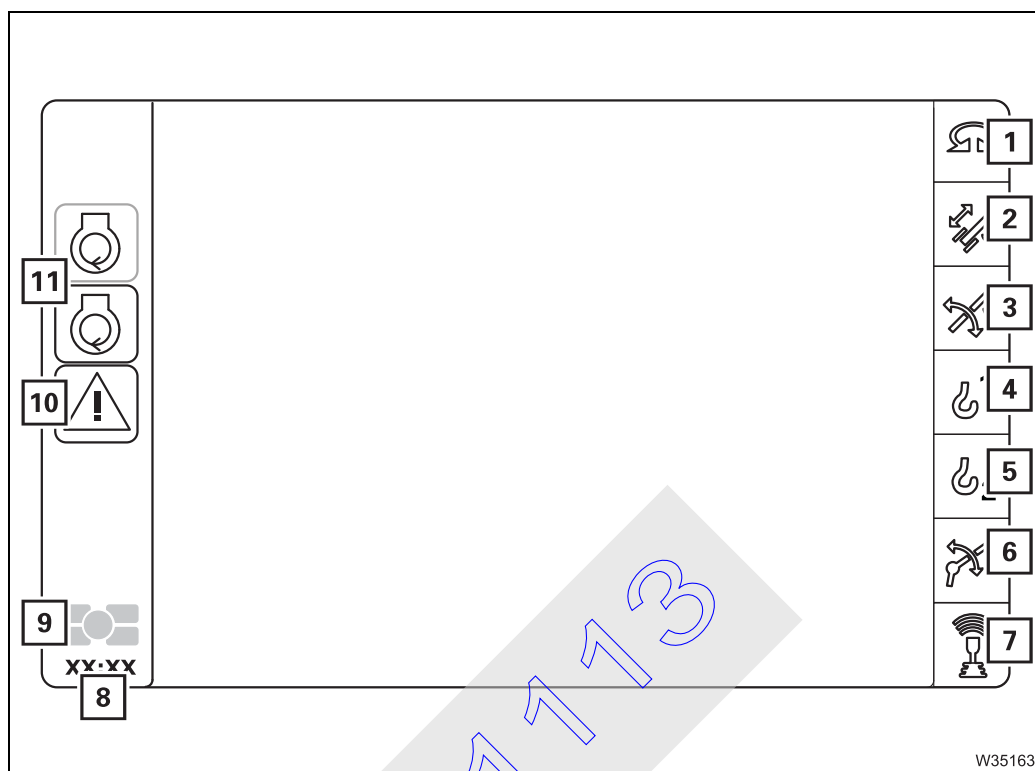


1	Display CCS	➡ p. 9 - 95
	Overview start menu	➡ p. 9 - 19
2	Jog dial	
3	Exiting the menu/input mode	➡ p. 9 - 98
4	Selecting / deselecting favourites	➡ p. 9 - 99
5	Warning for lifting limit switch shutdown	➡ p. 9 - 116
6	Sensor for brightness	➡ p. 9 - 98
7	Menu control	➡ p. 9 - 95
	Select / activate / confirm	
8	Display temperature warning display	➡ p. 9 - 99
9	Service/diagnosis connection ¹⁾	➡ p. 9 - 156
10	Overview menu groups – Operation	➡ p. 9 - 98
	Overview menu groups – Overview	➡ p. 9 - 22
11	Switch off the RCL buzzer	➡ p. 9 - 98
12	Slewing gear brake engaged/released	➡ p. 9 - 119
13	Function only in the menu Outtrigger	➡ p. 9 - 29
1		

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

9.1.6

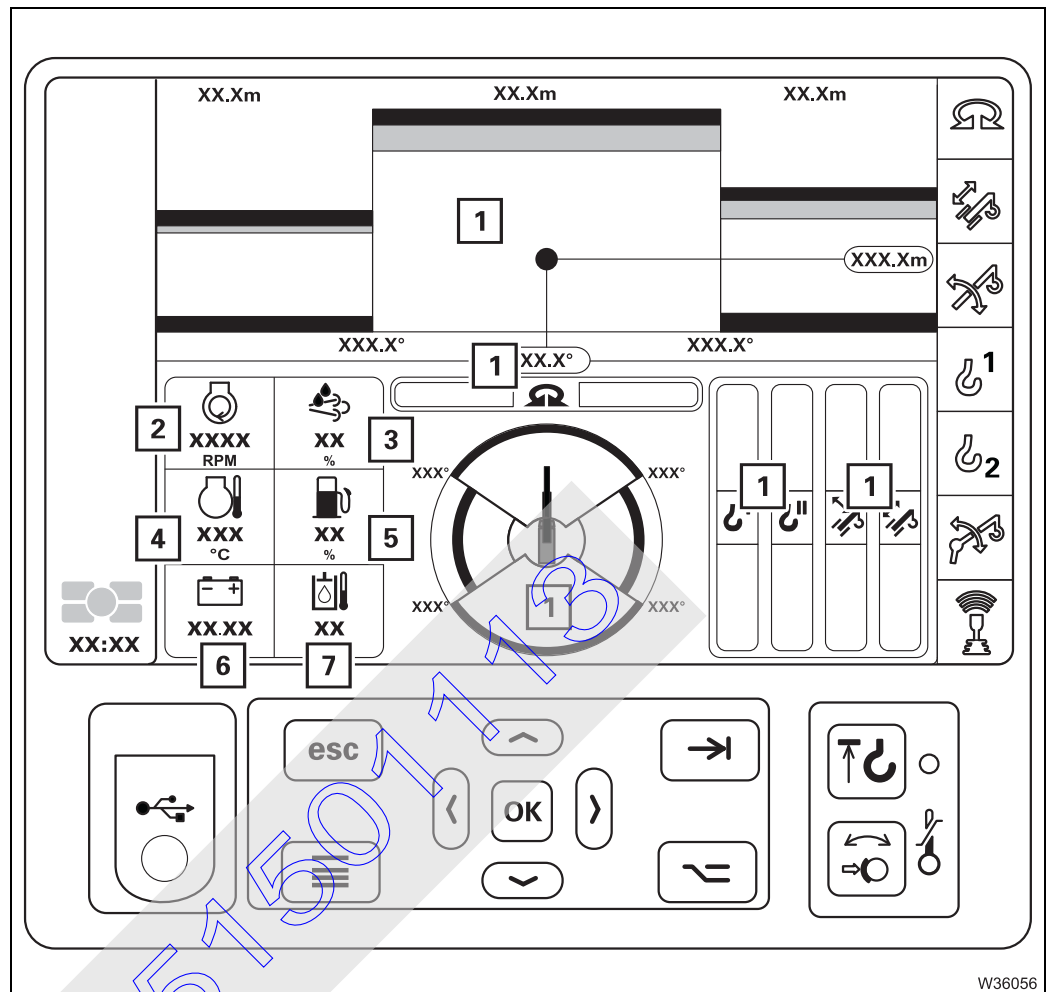
Menu-independent displays



- | | |
|---|--------------|
| 1 Slewing gear | ➡ p. 9 - 118 |
| 2 Telescoping mechanism | ➡ p. 9 - 122 |
| 3 Derricking gear | ➡ p. 9 - 120 |
| 4 Main hoist | ➡ p. 9 - 114 |
| 5 Auxiliary hoist ¹⁾ | ➡ p. 9 - 116 |
| 6 Lattice extension derricking gear ^{1), 2)} | |
| 7 Remote control display ³⁾ | |
| 8 Display time | |
| 9 Jog dial display | ➡ p. 9 - 98 |
| 10 Error display | ➡ p. 14 - 8 |
| 11 Warning messages display | ➡ p. 14 - 3 |

9.1.7

CCS – Start menu

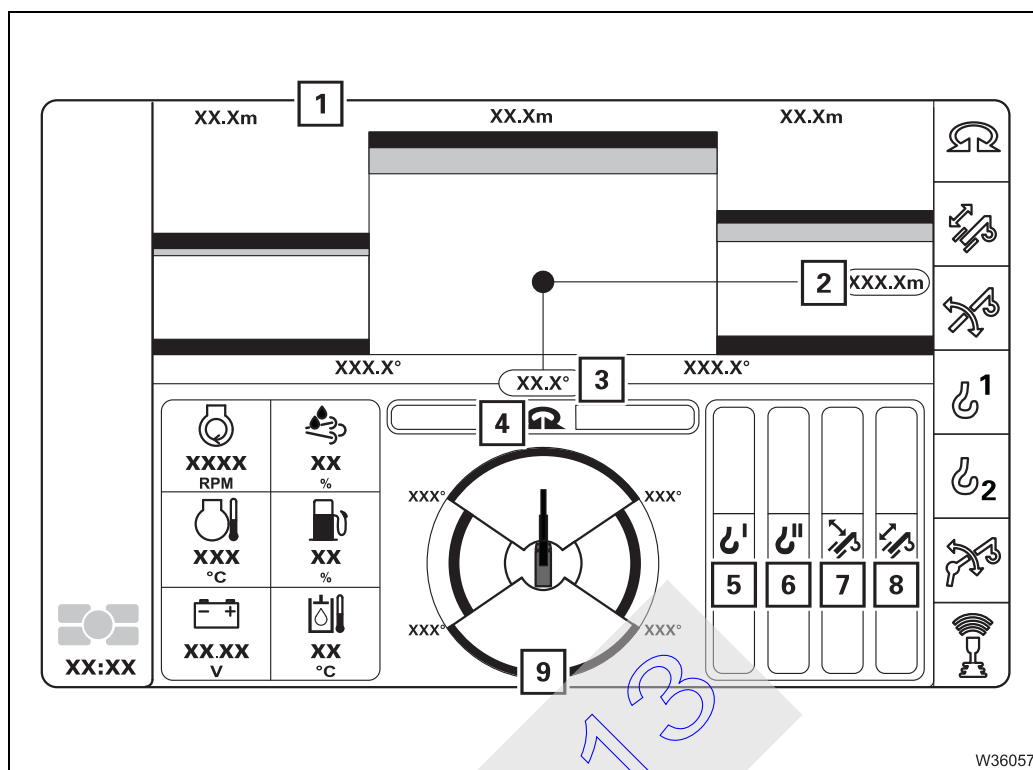


W36056

- | | |
|---|----------------|
| 1 RCL display | ▮▮▮▮ p. 9 - 20 |
| 2 Engine speed display | ▮▮▮▮ p. 10 - 8 |
| 3 AdBlue (DEF) filling level indicator | ▮▮▮▮ p. 10 - 8 |
| 4 Coolant temperature display | ▮▮▮▮ p. 10 - 8 |
| 5 Fuel level display | ▮▮▮▮ p. 10 - 8 |
| 6 Voltage monitoring display | ▮▮▮▮ p. 10 - 8 |
| 7 Hydraulic oil temperature display | ▮▮▮▮ p. 10 - 8 |



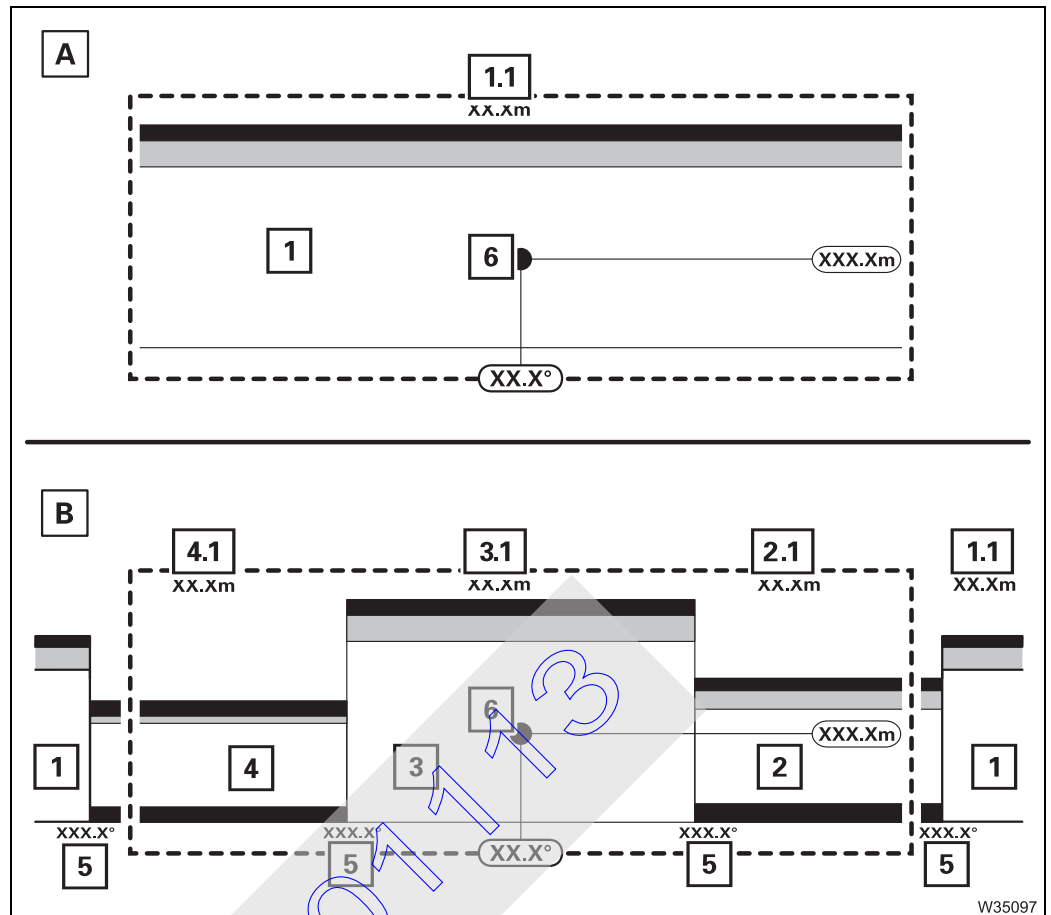
RCL display



- | | |
|--|----------------|
| 1 Display Slewing ranges/working radii | ▮▮▮ p. 9 - 21 |
| 2 Current working radius display | ▮▮▮ p. 9 - 134 |
| 3 Current slewing angle display | ▮▮▮ p. 9 - 134 |
| 4 Maximum permissible speed display – Slewing gear | ▮▮▮ p. 9 - 135 |
| 5 Maximum permissible speed display – Main hoist | ▮▮▮ p. 9 - 135 |
| 6 Maximum permissible speed display – Auxiliary hoist ¹⁾ | ▮▮▮ p. 9 - 135 |
| 7 Maximum permissible speed display – Derricking gear | ▮▮▮ p. 9 - 135 |
| 8 Maximum permissible speed display – Telescoping mechanism | ▮▮▮ p. 9 - 135 |
| 9 Slewing range display | ▮▮▮ p. 9 - 135 |

¹⁾ Additional equipment

Display Slewing ranges/working radii



A For the *Standard* slewing range type

B For the *MAXbase* slewing range type

Display of current slewing range divisions

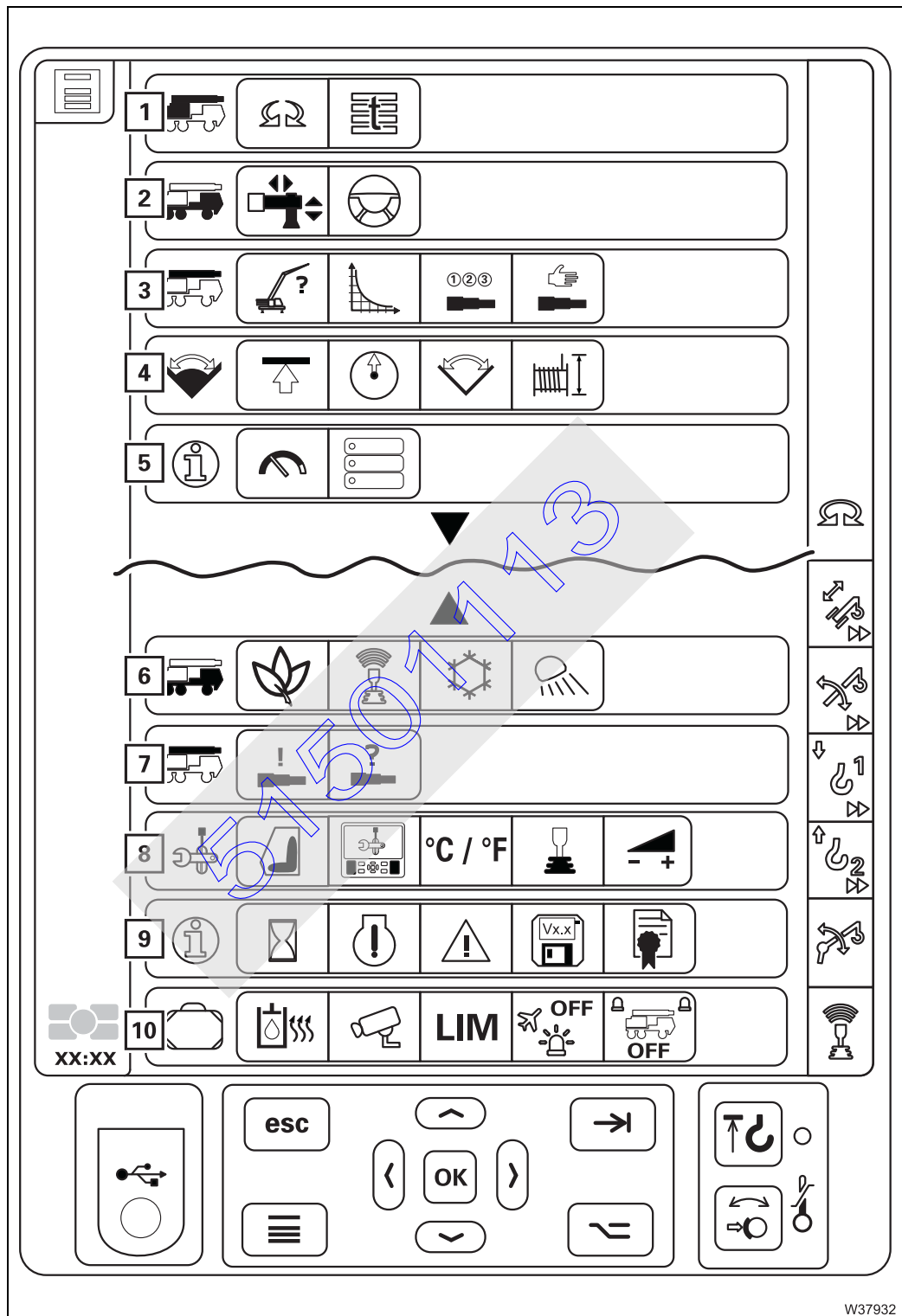
- 1 Slewing range 1 ▣▣▣▣ p. 9 - 133
- 2 Slewing range 2 ▣▣▣▣ p. 9 - 133
- 3 Slewing range 3 ▣▣▣▣ p. 9 - 133
- 4 Slewing range 4 ▣▣▣▣ p. 9 - 133
- 5 Display of current slewing range limits ▣▣▣▣ p. 9 - 133
- 6 Current position display ▣▣▣▣ p. 9 - 134

Maximum permissible working radius display

- 1.1 In slewing range 1 ▣▣▣▣ p. 9 - 134
- 2.1 In slewing range 2 ▣▣▣▣ p. 9 - 134
- 3.1 In slewing range 3 ▣▣▣▣ p. 9 - 134
- 4.1 In slewing range 4 ▣▣▣▣ p. 9 - 134

9.1.8

CCS – Overview menu groups

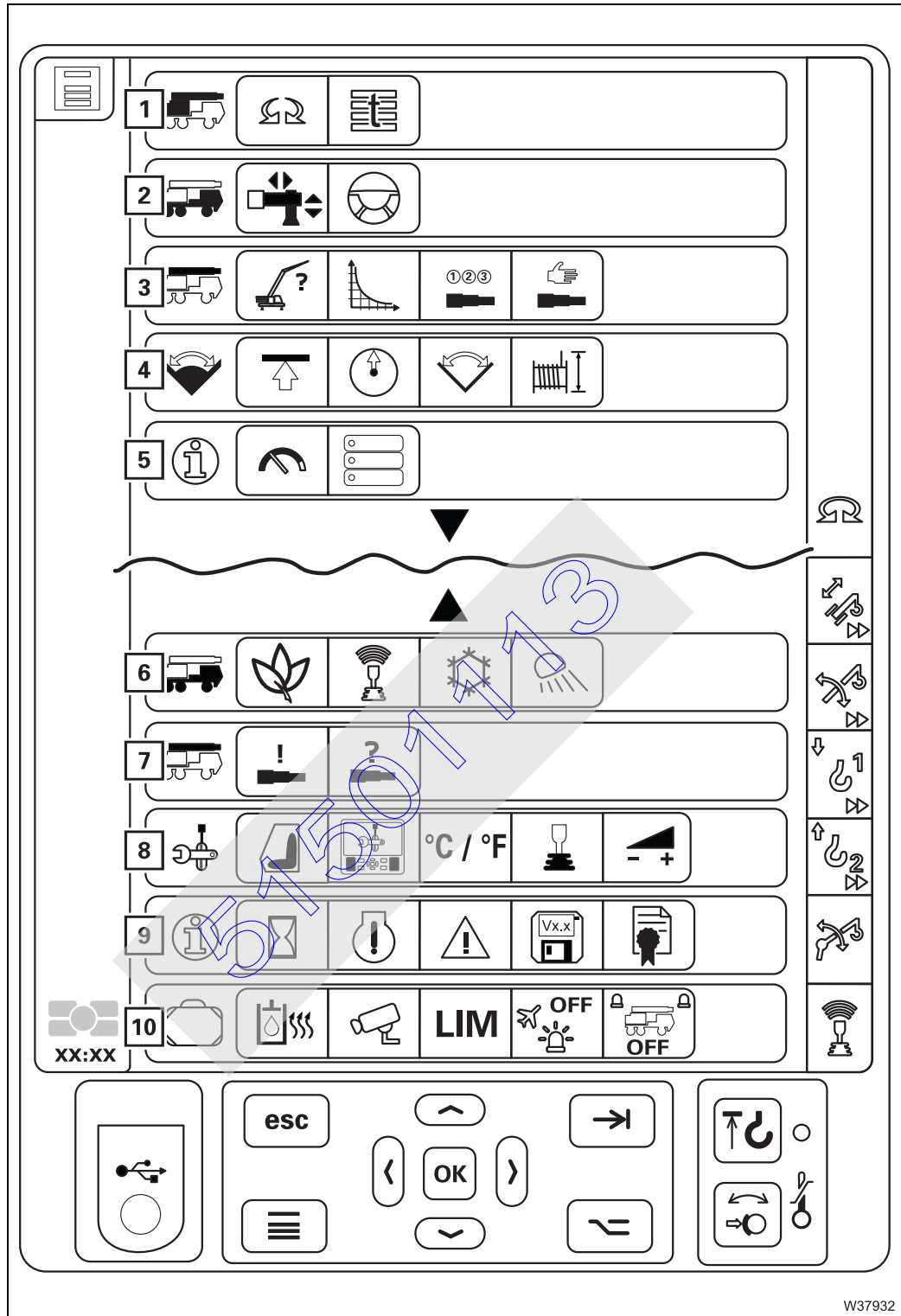


W37932

- 1 Superstructure menu group** ▣▣▣▣▶ p. 9 - 26
 - Superstructure lock sub-menu¹⁾
 - Counterweight menu
- 2 Menu group outrigger/driving** ▣▣▣▣▶ p. 9 - 29
 - Outrigger menu
 - Outrigger cylinders menu
 - Driving menu¹⁾
- 3 RCL/Telescoping menu group** ▣▣▣▣▶ p. 9 - 37
 - Menu enter rigging mode/telescope
 - Lifting capacity tables menu
 - Telescoping semi-automation menu
 - Manual telescoping menu
- 4 Working range limiter menu group** ▣▣▣▣▶ p. 9 - 47
 - Overall height menu
 - Working radius menu
 - Slewing angle menu
 - Hoist rope travel limitation menu
- 5 Information 1 menu group** ▣▣▣▣▶ p. 9 - 52
 - Hydraulic pressure and fuel consumption menu
 - Datalogger menu (Menu opens on the display RCL)
- 6 Heating/Engine/Additional equipment menu group** ▣▣▣▣▶ p. 9 - 54
 - Economy menu
 - Remote control menu¹⁾
 - Heating/air-conditioning menu
 - Spotlights menu¹⁾
- 7 Telescoping emergency program menu group** ▣▣▣▣▶ p. 9 - 59
 - Telescoping emergency program menu
 - Unknown telescoping menu

¹⁾ Additional equipment





W37932

8 Menu group, settings

▣▣▣▣▶ p. 9 - 63

- Crane cab menu
- Set display brightness and date/time menu
- Switch units menu
- Set control lever characteristic curve menu
- Power unit speeds menu

9 Information 2 menu group

▣▣▣▣▶ p. 9 - 69

- Operating hours menu
- Engine/transmission error menu
- Crane operation error menu
- Program version menu
- Disclaimer menu

10 Various controls

▣▣▣▣▶ p. 9 - 75

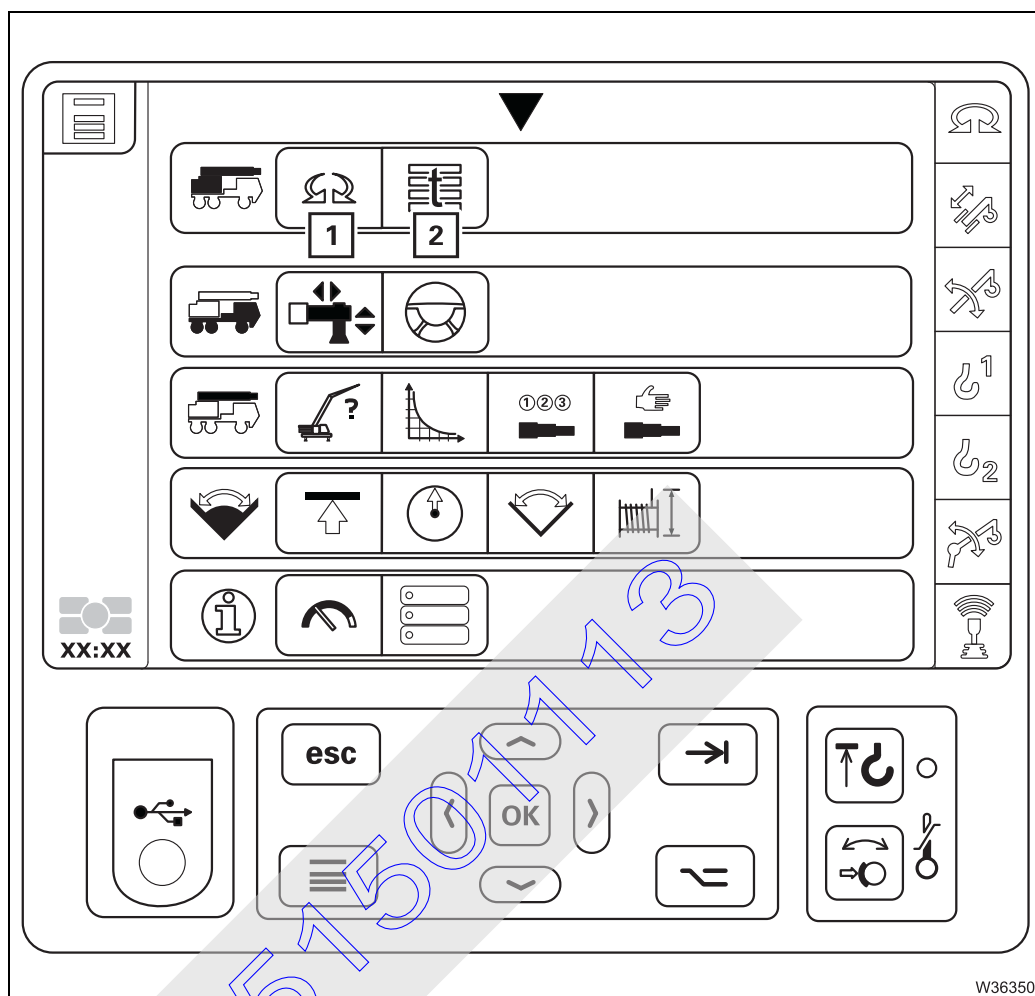
- Preheating the hydraulic oil
- Camera on/off
- Override torque reduction
- Switching the air traffic control light on and off
- Switching the rotating beacon on/off

1) Additional equipment

5150113

9.1.9

Superstructure menu group



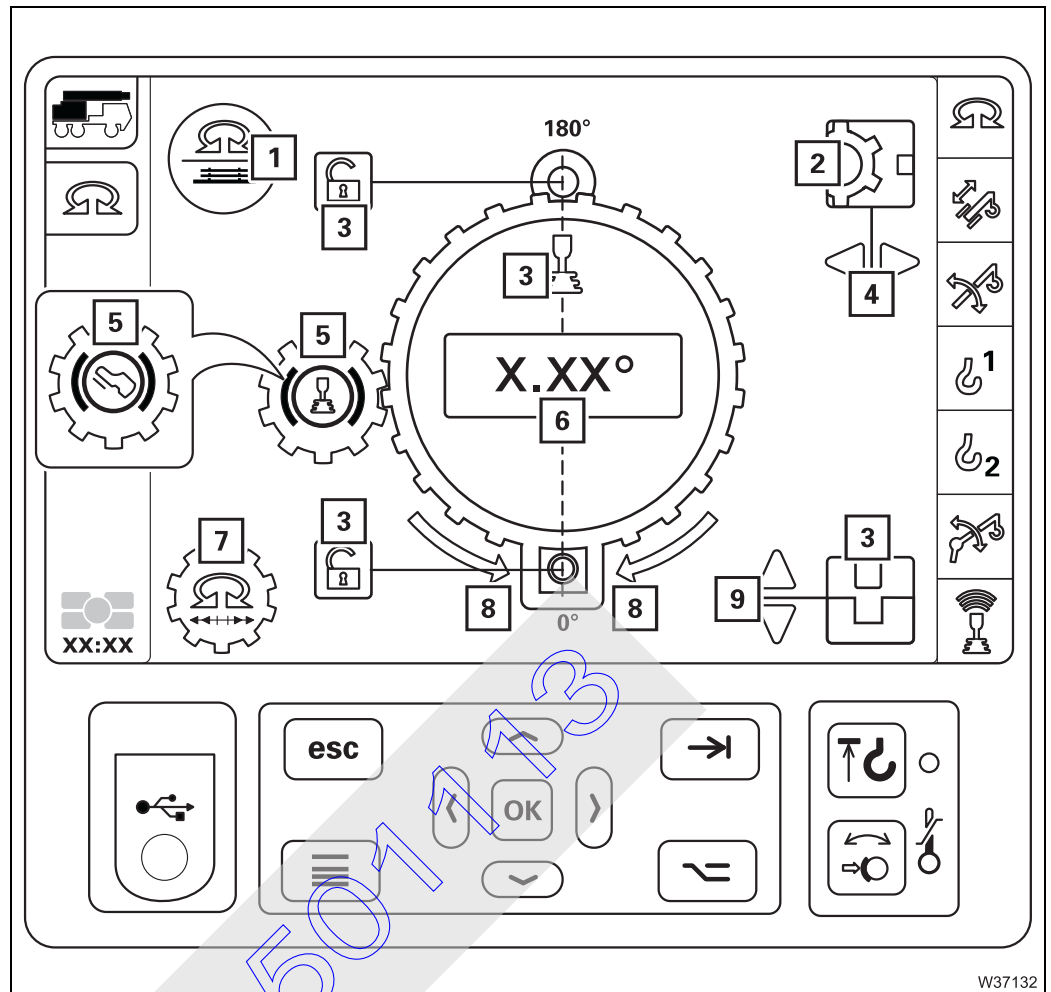
1 Superstructure lock sub-menu

▶▶▶▶ p. 9 - 27

2 Counterweight menu

▶▶▶▶ p. 9 - 28

Superstructure lock sub-menu



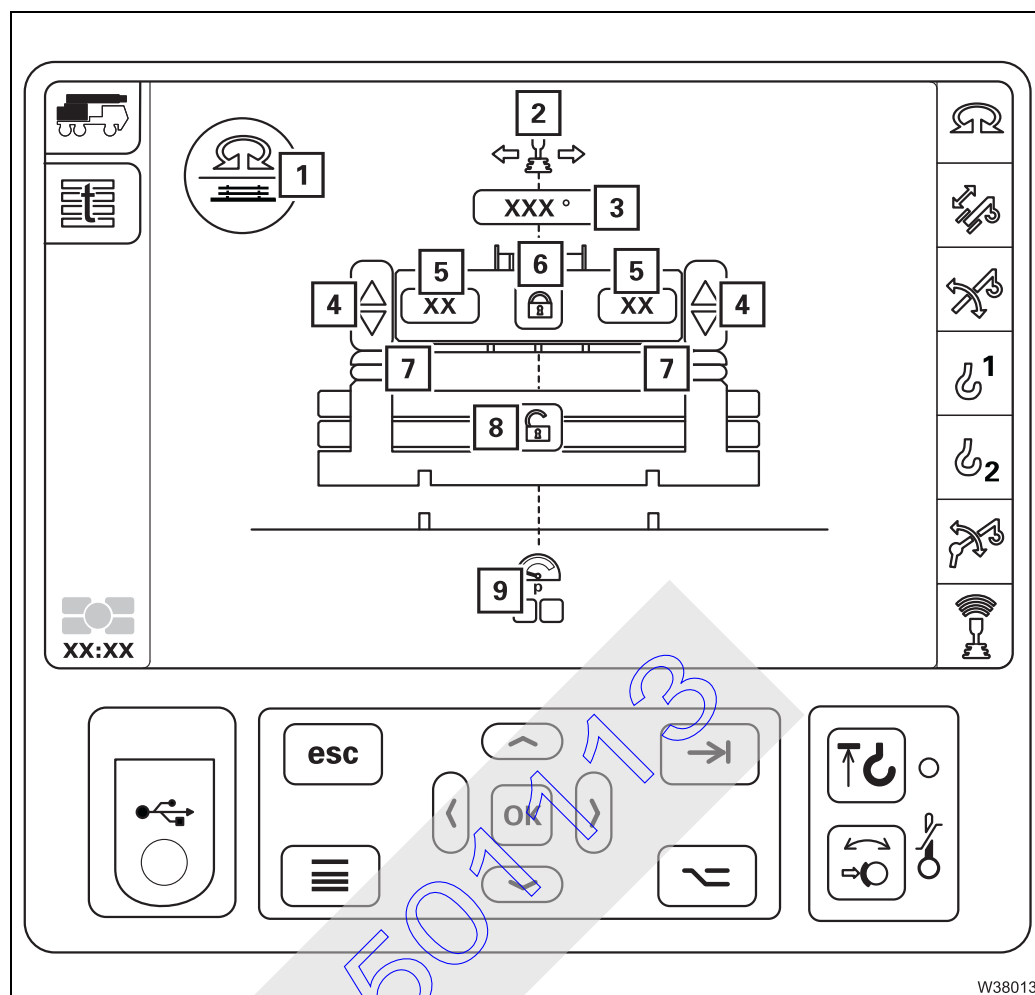
W37132

- | | |
|---|--------------|
| 1 Slewing release display – identical to the display in the <i>Counterweight</i> menu | ➤ p. 9 - 28 |
| 2 House lock locking status displays ¹⁾ | ➤ p. 9 - 131 |
| 3 Locking status displays | ➤ p. 9 - 129 |
| 4 House lock on/off ¹⁾ | ➤ p. 9 - 131 |
| 5 Display/switch function for the slewing gear brake | ➤ p. 9 - 119 |
| 6 Current slewing angle display ¹⁾ | ➤ p. 9 - 130 |
| 7 Slewing speed reduction on/off | ➤ p. 9 - 119 |
| 8 Display slewing direction to 0°/180° | ➤ p. 9 - 130 |
| 9 Locking/unlocking the turntable ¹⁾ | ➤ p. 9 - 129 |

¹⁾ Additional equipment



Counterweight menu

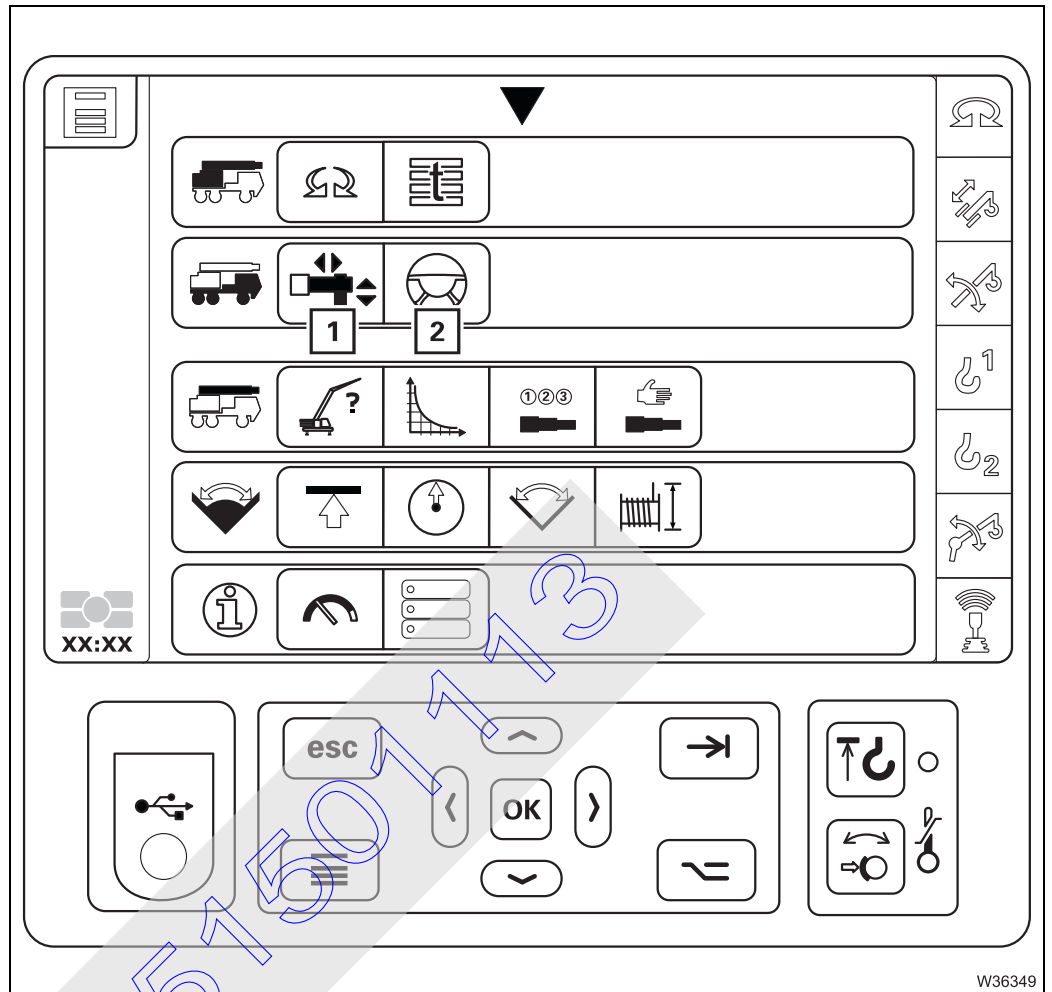


W38013

- | | |
|---|-----------------|
| 1 Slewing release display | ▣▣▣▣ p. 9 - 113 |
| 2 Display of slewing direction for automatic mode | ▣▣▣▣ p. 9 - 110 |
| 3 Current slewing angle display | ▣▣▣▣ p. 9 - 113 |
| 4 Extending/Retracting the lifting cylinders | ▣▣▣▣ p. 9 - 112 |
| 5 Lifting cylinder position display | ▣▣▣▣ p. 9 - 112 |
| 6 Automatic mode, rigging | ▣▣▣▣ p. 9 - 111 |
| 7 Lifting cylinder position display | ▣▣▣▣ p. 9 - 112 |
| 8 Automatic mode, unrigging | ▣▣▣▣ p. 9 - 111 |
| 9 Pre-tensioning pressure display | ▣▣▣▣ p. 9 - 112 |

9.1.10

Menu group outrigger/driving

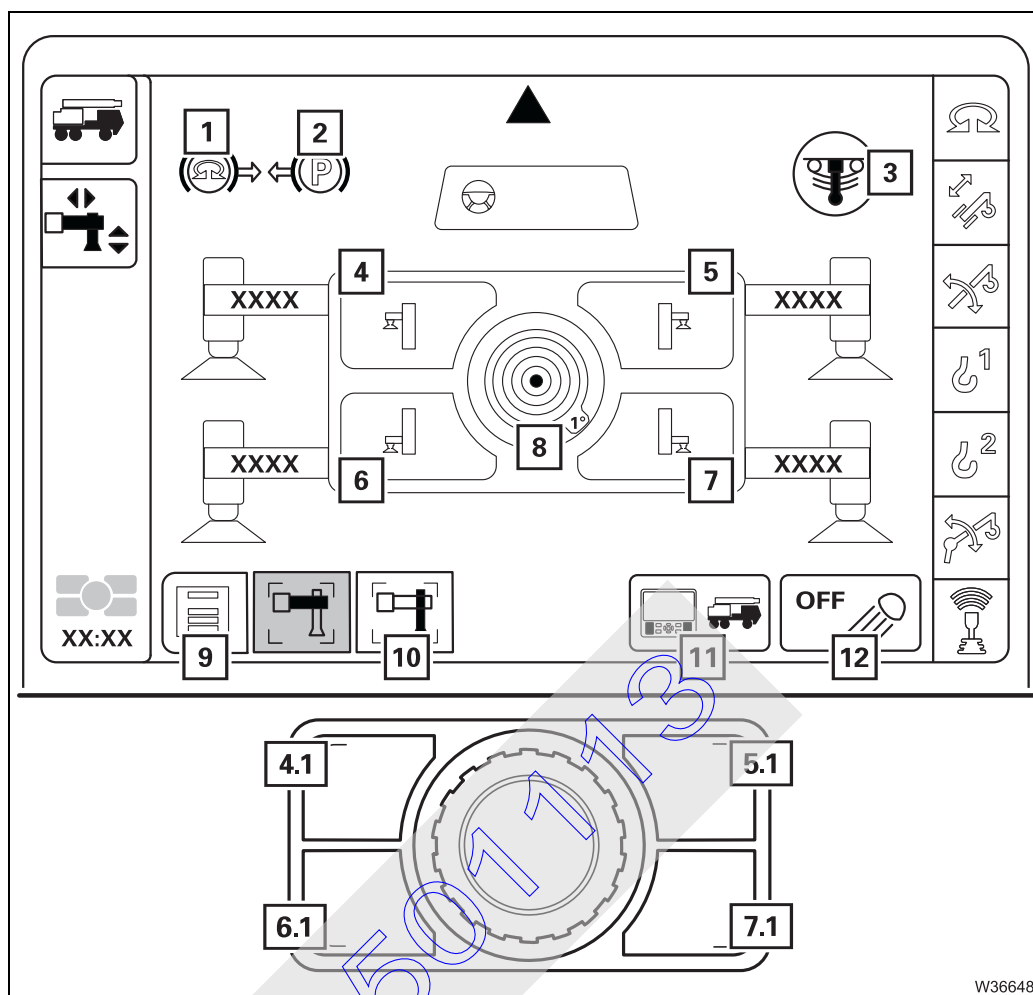


- 1** – Outrigger menu
 - Outrigger cylinders menu
- 2** Driving menu

- ▮▮▮ p. 9 - 30
- ▮▮▮ p. 9 - 32
- ▮▮▮ p. 9 - 34



Outrigger menu

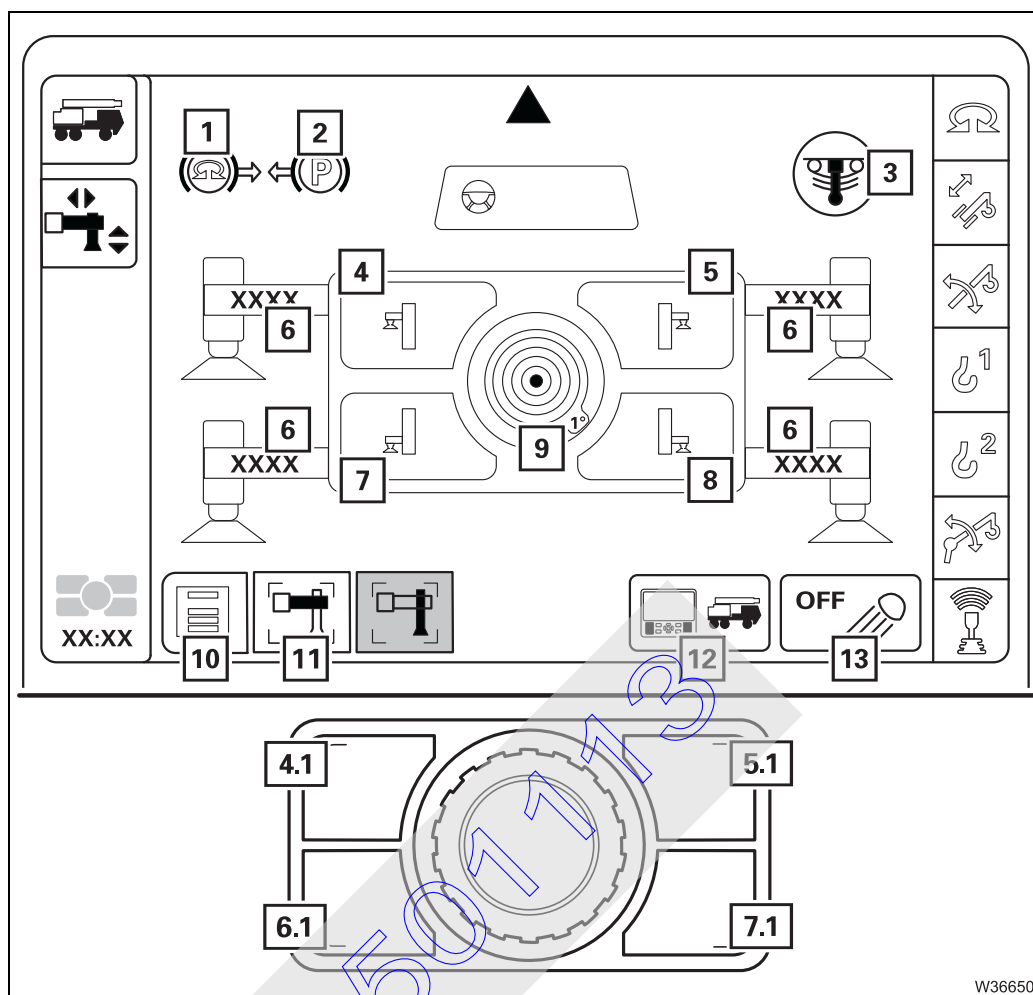


1	Slewing gear/movements locked display	▣▣▣▣ p. 9 - 101
2	Parking brake/movements locked display/warning	▣▣▣▣ p. 9 - 101
3	Suspension on/off display/warning	▣▣▣▣ p. 9 - 101
4	Pre-select front left outrigger display	▣▣▣▣ p. 9 - 102
4.1	Pre-select front left outrigger	▣▣▣▣ p. 9 - 102
5	Pre-select front right outrigger display	▣▣▣▣ p. 9 - 102
5.1	Pre-select front right outrigger	▣▣▣▣ p. 9 - 102
6	Pre-select rear left outrigger display	▣▣▣▣ p. 9 - 102
6.1	Pre-select rear left outrigger	▣▣▣▣ p. 9 - 102
7	Pre-select rear right outrigger display	▣▣▣▣ p. 9 - 102
7.1	Pre-select rear right outrigger	▣▣▣▣ p. 9 - 102
8	Current inclination display	▣▣▣▣ p. 9 - 108
9	exiting the menu	▣▣▣▣ p. 9 - 102
10	Switching to the Outrigger cylinders menu	▣▣▣▣ p. 9 - 102
11	Outrigger control units on/off	▣▣▣▣ p. 9 - 102
12	Outrigger lighting on/off	▣▣▣▣ p. 9 - 101



51501113

Outrigger cylinders menu

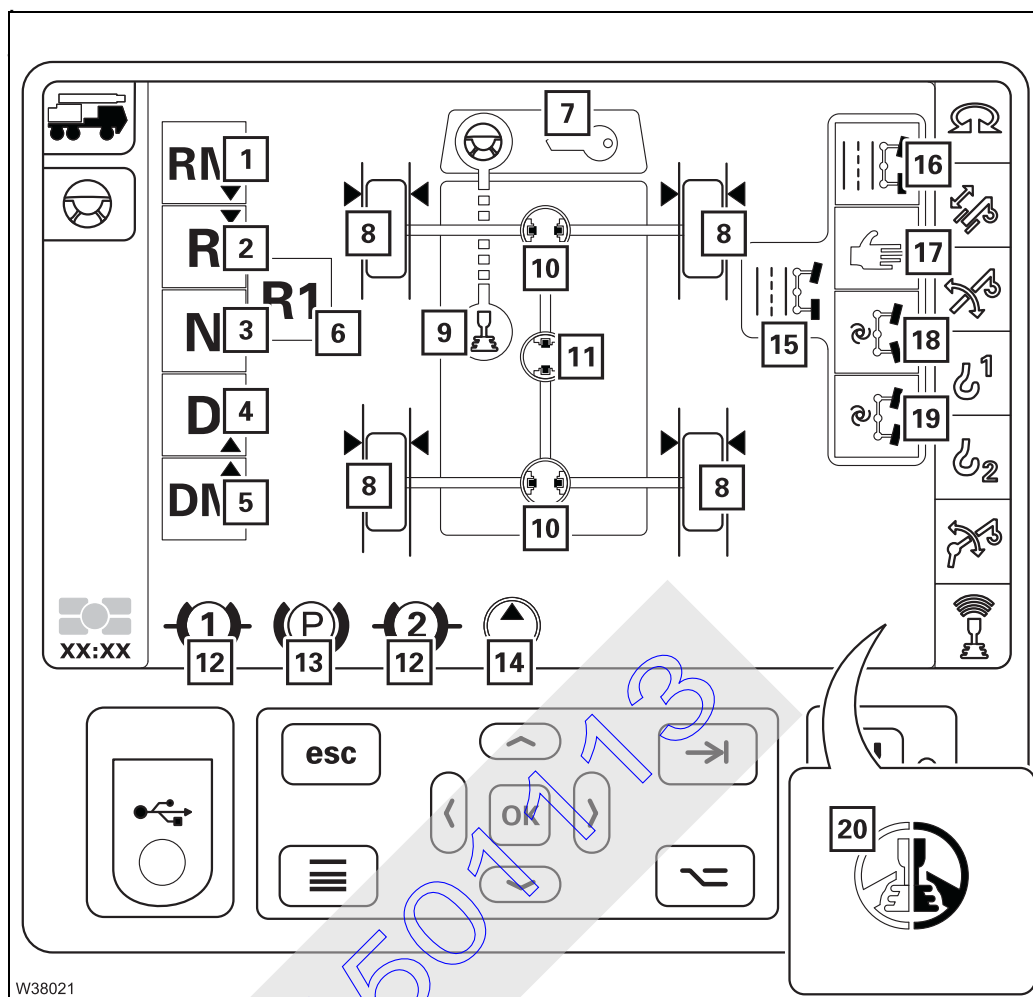


1 Slewing gear/movements locked display	➡ p. 9 - 101
2 Parking brake/movements locked display/warning	➡ p. 9 - 101
3 Suspension on/off display/warning	➡ p. 9 - 101
4 Pre-select front left outrigger cylinder display	➡ p. 9 - 102
4.1 Pre-select front left outrigger cylinder	➡ p. 9 - 102
5 Pre-select front right outrigger cylinder display	➡ p. 9 - 102
5.1 Pre-select front right outrigger cylinder	➡ p. 9 - 102
6 Outrigger pressure display ¹⁾	➡ p. 12 - 68
7 Pre-select rear left outrigger cylinder display	➡ p. 9 - 102
7.1 Pre-select rear left outrigger cylinder	➡ p. 9 - 102
8 Pre-select rear right outrigger display	➡ p. 9 - 102
8.1 Pre-select rear right outrigger	➡ p. 9 - 102
9 Current inclination display	➡ p. 9 - 108
10 Exiting the menu	➡ p. 9 - 102
11 Switching to the Outrigger menu	➡ p. 9 - 102
12 Outrigger control units on/off	➡ p. 9 - 102
13 Outrigger lighting on/off	➡ p. 9 - 101

1) Additional equipment



Driving menu



W38021

1	Transmission mode RM	▣▣▣▣ p. 9 - 160
2	Transmission mode R	▣▣▣▣ p. 9 - 159
3	Neutral position N	▣▣▣▣ p. 9 - 159
4	Transmission mode D	▣▣▣▣ p. 9 - 159
5	Transmission mode DM	▣▣▣▣ p. 9 - 160
6	Current transmission mode display	
7	Steering lock display	▣▣▣▣ p. 9 - 158
8	Current wheel position display	▣▣▣▣ p. 9 - 163
9	Change-over between crane operation and driving modes	▣▣▣▣ p. 9 - 158
10	– Transverse differential locks display	▣▣▣▣ p. 9 - 161
	– Transverse differential locks on/off	▣▣▣▣ p. 9 - 161
11	– Longitudinal differential lock display	▣▣▣▣ p. 9 - 161
	– Longitudinal differential lock on/off	▣▣▣▣ p. 9 - 161
12	Supply pressure brake circuits 1 and 2 display	▣▣▣▣ p. 9 - 162
13	Parking brake indicator lamp	▣▣▣▣ p. 9 - 162
14	Display of crane's hydraulic system driving mode on/off	▣▣▣▣ p. 9 - 158
15	Steering mode switched on indicator	
16	Normal steering mode/on-road driving on	▣▣▣▣ p. 9 - 165
17	Separate steering, manual on	▣▣▣▣ p. 9 - 165
18	Automatic separate steering driving around corners on	▣▣▣▣ p. 9 - 165
19	Automatic separate steering for crab travel mode on	▣▣▣▣ p. 9 - 165
20	Changing the steering direction¹⁾	▣▣▣▣ p. 9 - 164

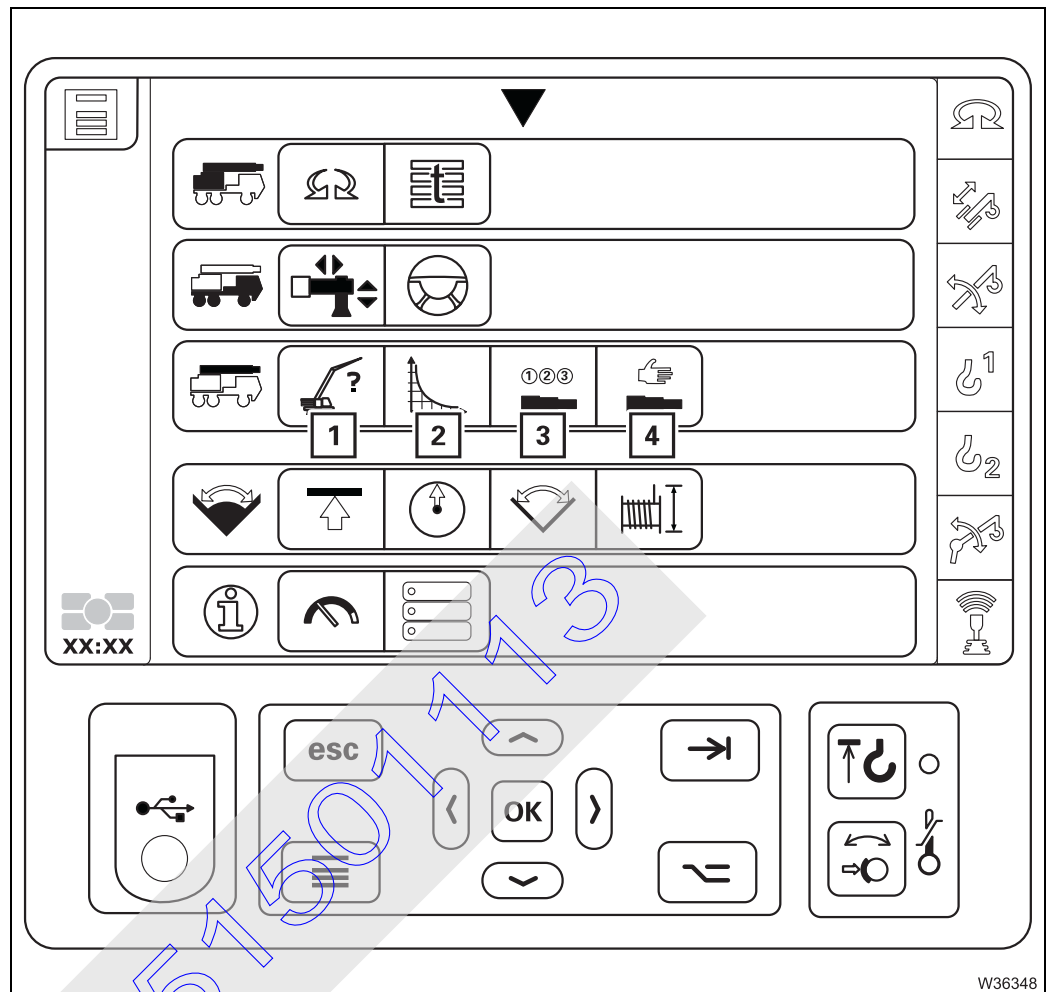
¹⁾ Display depends on carrier display; ▣▣▣▣ p. 9 - 157

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51501113

9.1.11

RCL/Telescoping menu group



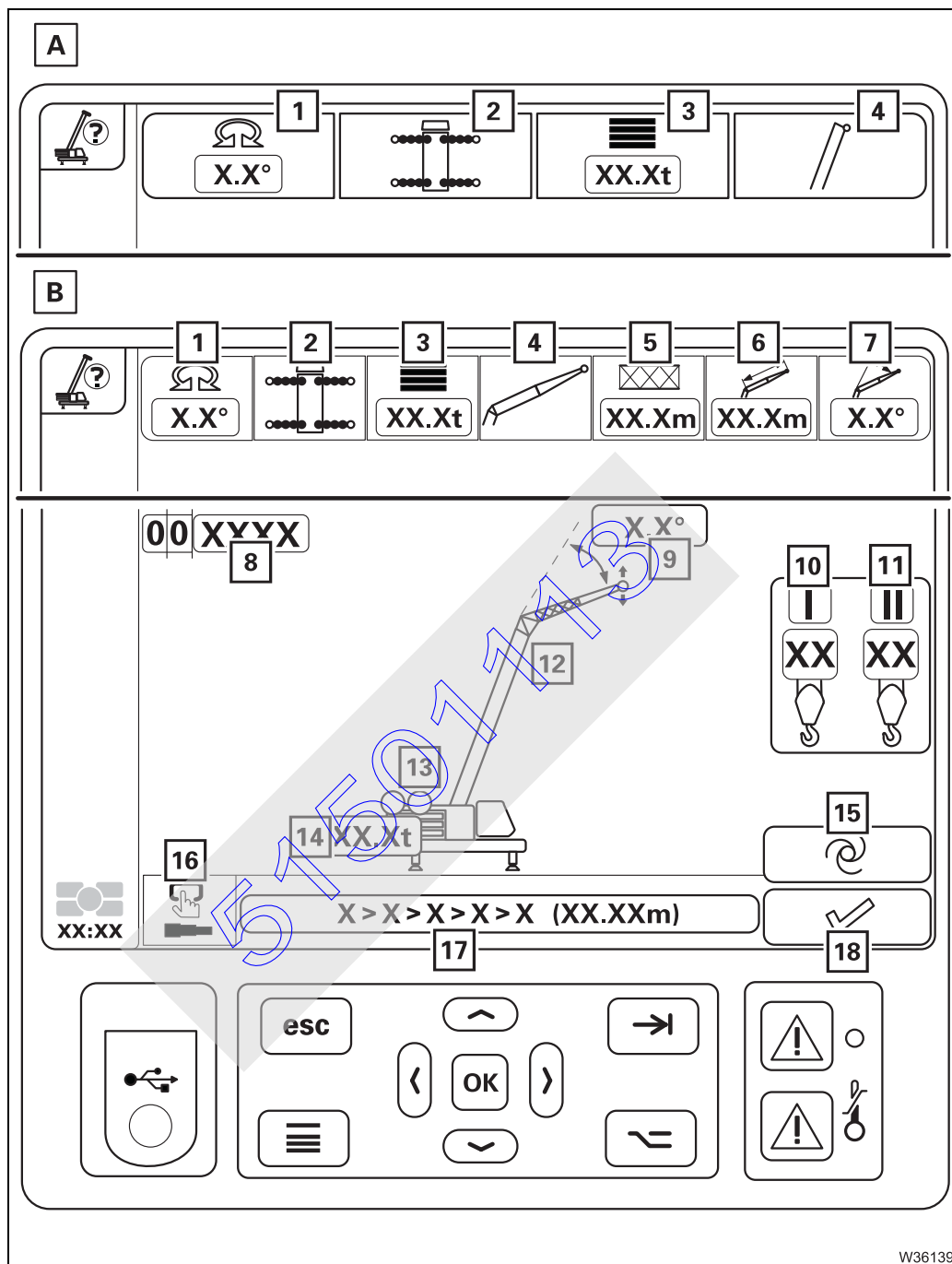
W36348

- 1** Menu enter rigging mode/telescope ▣▣▣▣ p. 9 - 38
- 2** Lifting capacity tables menu ▣▣▣▣ p. 9 - 44
- 3** Telescoping semi-automation menu ▣▣▣▣ p. 9 - 45
- 4** Manual telescoping menu ▣▣▣▣ p. 9 - 46



**Menu enter
 rigging mode/
 telescope**

– For the *Standard* slewing range type



A For the *Main boom* boom system

B For the *Lattice extension* boom system

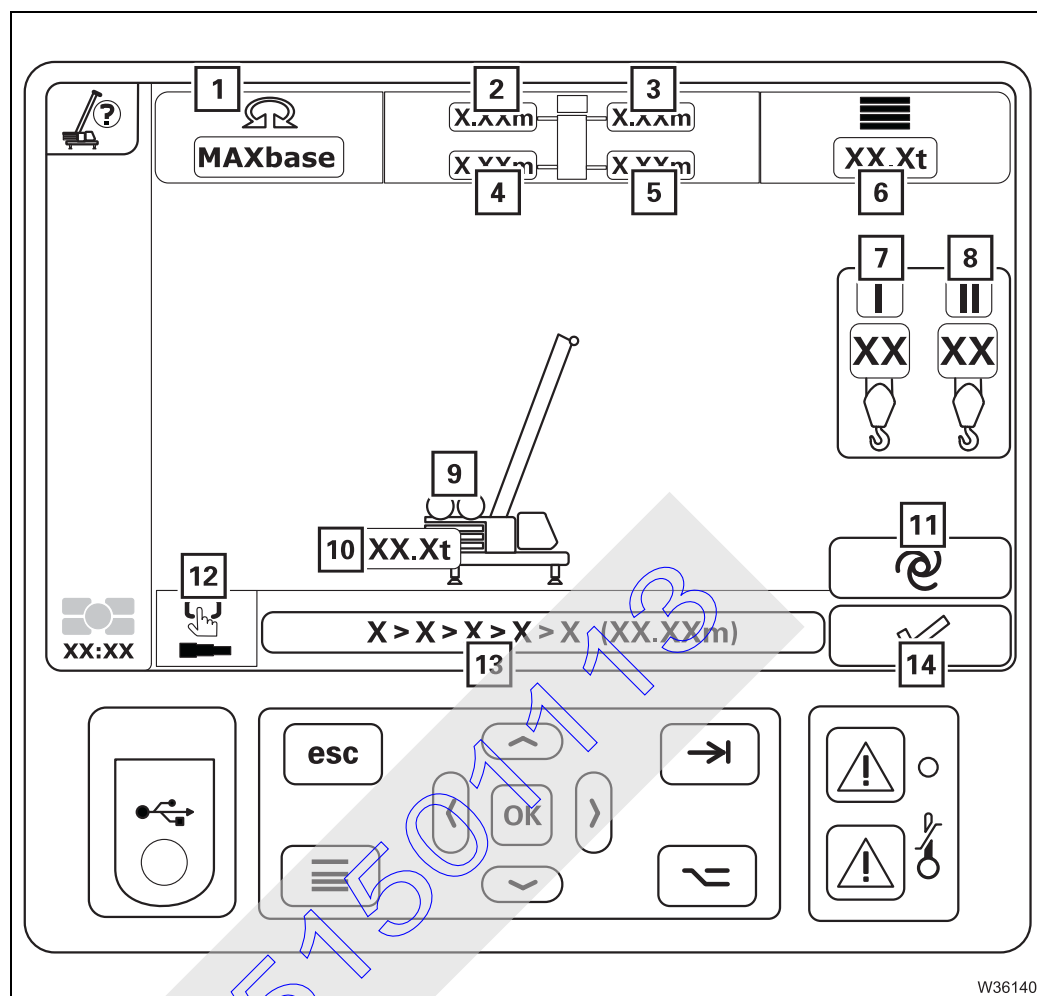


Depending on the version, the top view (2) is shown rotated by 180°. The representation occurs in the same manner as in the RCL *Monitoring* menu; ■■■▶ p. 9 - 78.

1	Enter slewing range	▶▶▶▶ p. 9 - 136
2	Enter outrigger span	▶▶▶▶ p. 9 - 139
	Outrigger span monitoring display	▶▶▶▶ p. 9 - 140
3	Enter counterweight	▶▶▶▶ p. 9 - 136
4	Boom system entry	▶▶▶▶ p. 9 - 138
5	Input lattice extension – the length before the angle ¹⁾	▶▶▶▶ p. 9 - 138
6	Input lattice extension – the length after the angle ¹⁾	▶▶▶▶ p. 9 - 138
7	Lattice extension input – angle ^{1),2)}	▶▶▶▶ p. 9 - 138
8	Enter RCL code	▶▶▶▶ p. 9 - 140
9	Angle of the lattice extension display ^{1),2)}	▶▶▶▶ p. 9 - 138
10	Enter reeving – Main hoist	▶▶▶▶ p. 9 - 137
11	Enter reeving – Auxiliary hoist	▶▶▶▶ p. 9 - 137
12	Boom system display	▶▶▶▶ p. 9 - 138
13	Reeving input mode display	▶▶▶▶ p. 9 - 137
14	Counterweight display	▶▶▶▶ p. 9 - 136
15	Accept the measured outrigger span	▶▶▶▶ p. 9 - 139
16	Pre-selection telescoping menu	▶▶▶▶ p. 9 - 42
17		▶▶▶▶ p. 9 - 137
18	Confirming the rigging mode	▶▶▶▶ p. 9 - 137
1)	Additional equipment	
2)	Display only with an inclinable lattice extension	



– For the *MAXbase* slewing range type ¹⁾



¹⁾ Additional equipment



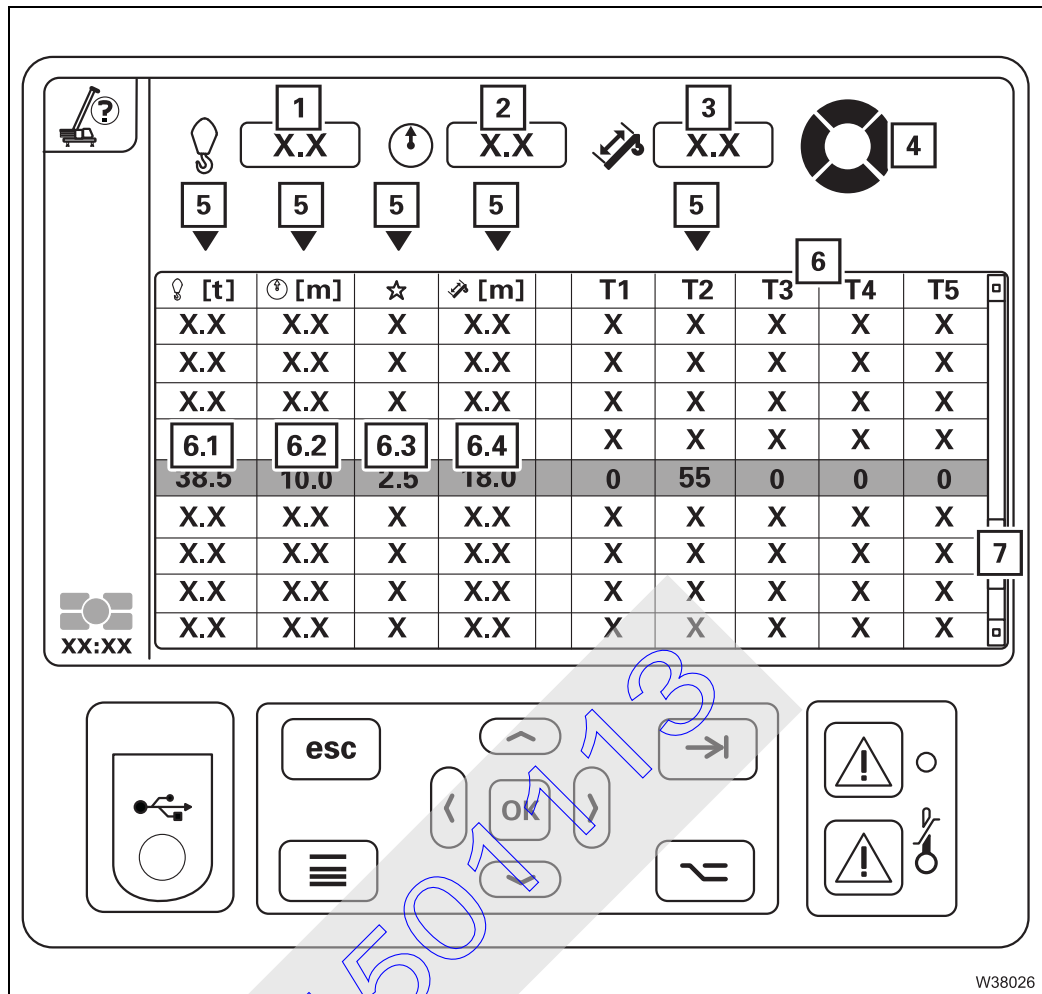
Depending on the version, the top view (2) to (5) is shown rotated by 180°. The representation occurs in the same manner as in the RCL *Monitoring* menu; p. 9 - 78.

1	Enter slewing range	➡ p. 9 - 136
2	Input front left outrigger span	➡ p. 9 - 139
3	Input front right outrigger span	➡ p. 9 - 139
4	Input rear left outrigger width	➡ p. 9 - 139
5	Input rear right outrigger width	➡ p. 9 - 139
2 to 5	Outrigger span monitoring display	➡ p. 9 - 139
6	Enter counterweight	➡ p. 9 - 136
7	Enter reeving – Main hoist	➡ p. 9 - 137
8	Enter reeving – Auxiliary hoist	➡ p. 9 - 137
9	Reeving input mode display	➡ p. 9 - 137
10	Counterweight display	➡ p. 9 - 136
11	Accept the measured outrigger span	➡ p. 9 - 139
12	Pre-selection telescoping menu	➡ p. 9 - 42
13	Preselected telescoping display	➡ p. 9 - 137
14	Confirming the rigging mode	➡ p. 9 - 137



51501113

**Pre-selection
 telescoping menu**



W38026

Enter desired parameter

- 1 Input load ▶▶▶▶▶ p. 9 - 141
- 2 Input working radius ▶▶▶▶▶ p. 9 - 141
- 3 Input main boom length ▶▶▶▶▶ p. 9 - 141
- 4 Input slewing range¹⁾ ▶▶▶▶▶ p. 9 - 141

Pre-selection telescoping

- 5 Sort values ▶▶▶▶▶ p. 9 - 141
- 6 Selectable telescoping display ▶▶▶▶▶ p. 9 - 141
 - 6.1 Associated maximum load ▶▶▶▶▶ p. 9 - 141
 - 6.2 Associated maximum working radius ▶▶▶▶▶ p. 9 - 141
 - 6.3 Associated telescoping duration ▶▶▶▶▶ p. 9 - 141
 - 6.4 Associated main boom length ▶▶▶▶▶ p. 9 - 141
- 7 Overview of the table lengths

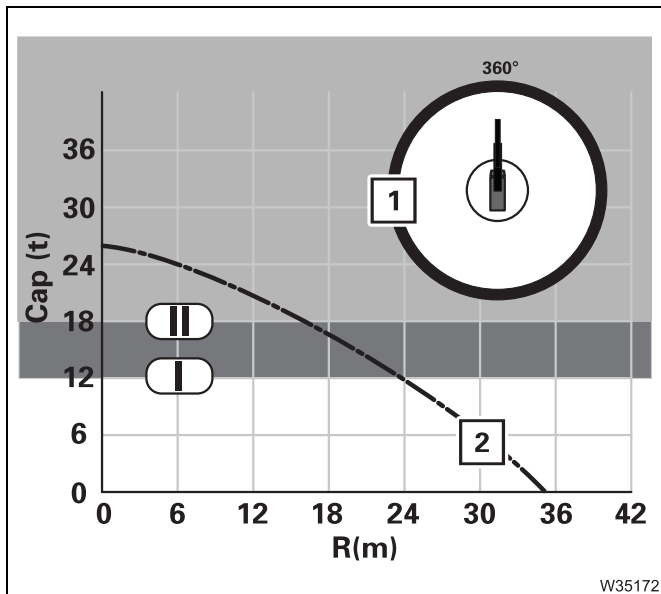
1) Display only with the *MAXbase* slewing range type



51501113

Lifting capacity tables menu

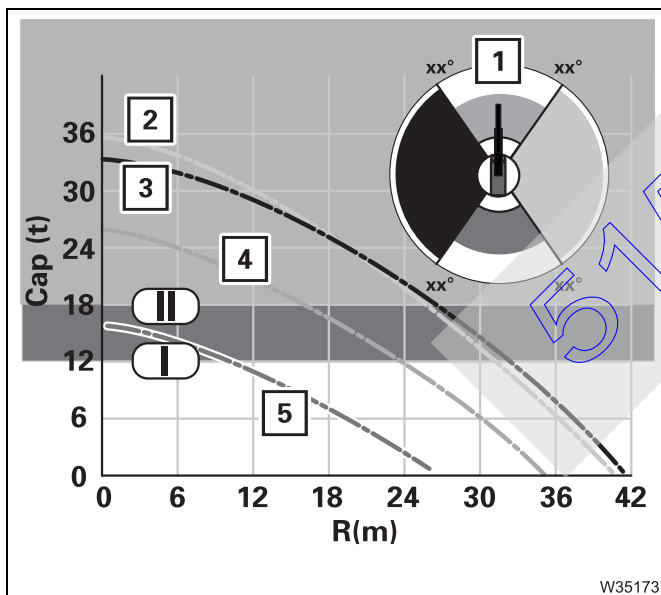
▣▣▣▣ ▸ *Displaying the lifting capacity tables, p. 11 - 59*



- 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

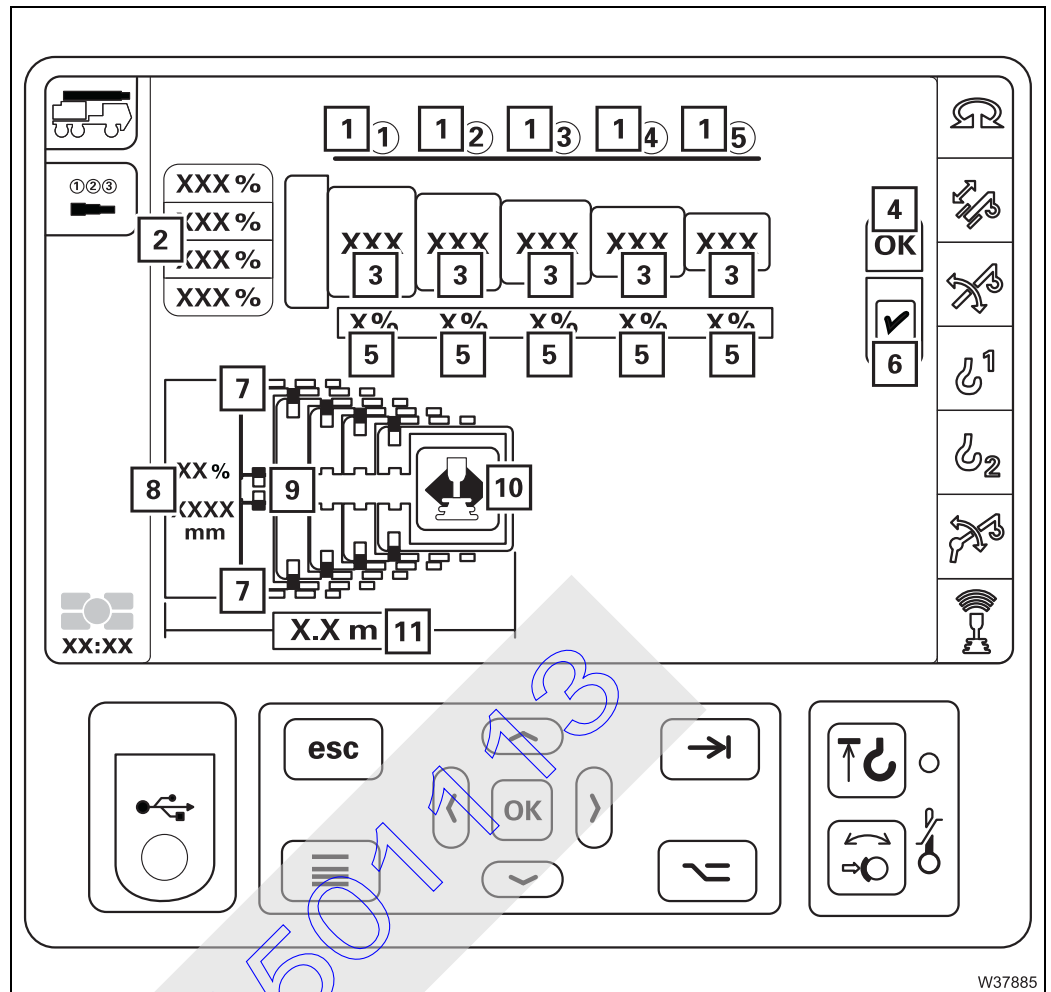


- For the *MAXbase* slewing range type

- 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

Telescoping semi-automation menu

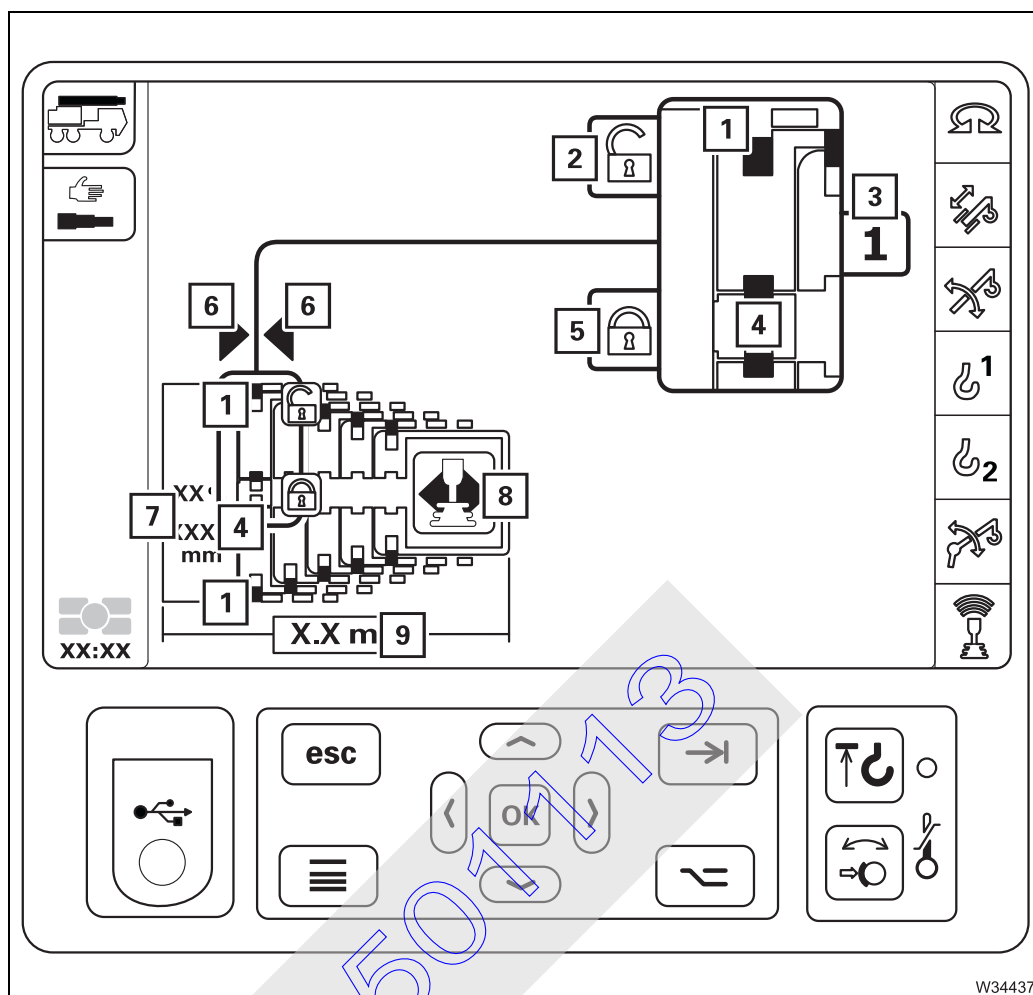


W37885

- | | |
|---|-----------------|
| 1 Telescopic sections display | ▮▮▮▮ p. 9 - 124 |
| 2 Pre-selection for all telescopic sections | ▮▮▮▮ p. 9 - 124 |
| 3 Pre-selection individual telescopic sections | ▮▮▮▮ p. 9 - 125 |
| 4 Confirm pre-selection | ▮▮▮▮ p. 9 - 125 |
| 5 Current telescope status display | ▮▮▮▮ p. 9 - 124 |
| 6 Telescoping permitted display
Telescoping not permitted display | ▮▮▮▮ p. 9 - 125 |
| 7 Locking status telescopic section display | ▮▮▮▮ p. 9 - 123 |
| 8 Telescoping cylinder length display | ▮▮▮▮ p. 9 - 124 |
| 9 Locking status telescoping cylinder display | ▮▮▮▮ p. 9 - 123 |
| 10 Teleautomation direction display | ▮▮▮▮ p. 9 - 125 |
| 11 Main boom length display | ▮▮▮▮ p. 9 - 124 |



**Manual
 telescoping menu**

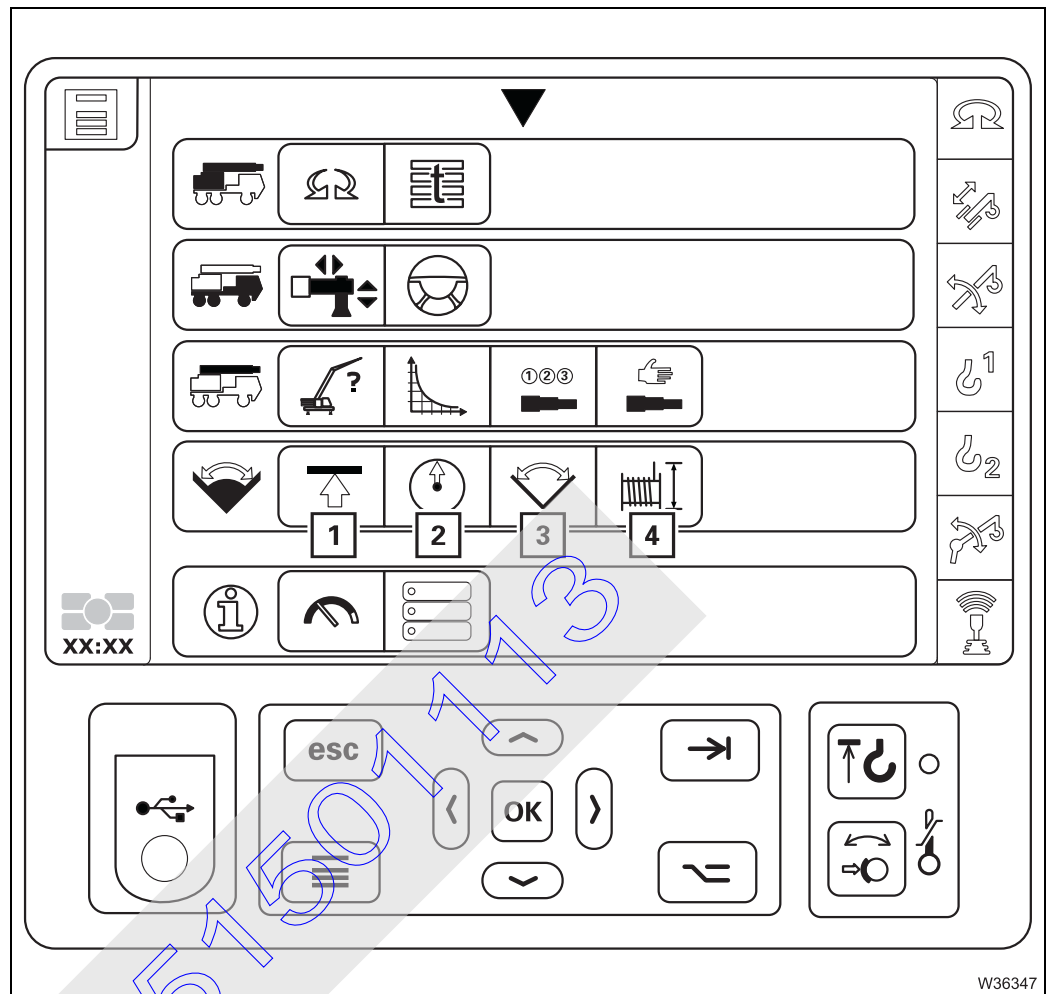


W34437

- | | | |
|---|-------|------------|
| 1 Locking status telescopic section display | ▮▮▮▮▶ | p. 9 - 126 |
| 2 Symbol lock/release telescopic section | ▮▮▮▮▶ | p. 9 - 126 |
| 3 Telescoping cylinder in the telescopic section display | ▮▮▮▮▶ | p. 9 - 127 |
| 4 Locking status telescoping cylinder display | ▮▮▮▮▶ | p. 9 - 125 |
| 5 Locking/releasing the telescoping cylinder | ▮▮▮▮▶ | p. 9 - 126 |
| 6 Locking point display | ▮▮▮▮▶ | p. 9 - 126 |
| 7 Telescoping cylinder length display | ▮▮▮▮▶ | p. 9 - 126 |
| 8 Telescoping direction display | ▮▮▮▮▶ | p. 9 - 127 |
| 9 Main boom length display | ▮▮▮▮▶ | p. 9 - 127 |

9.1.12

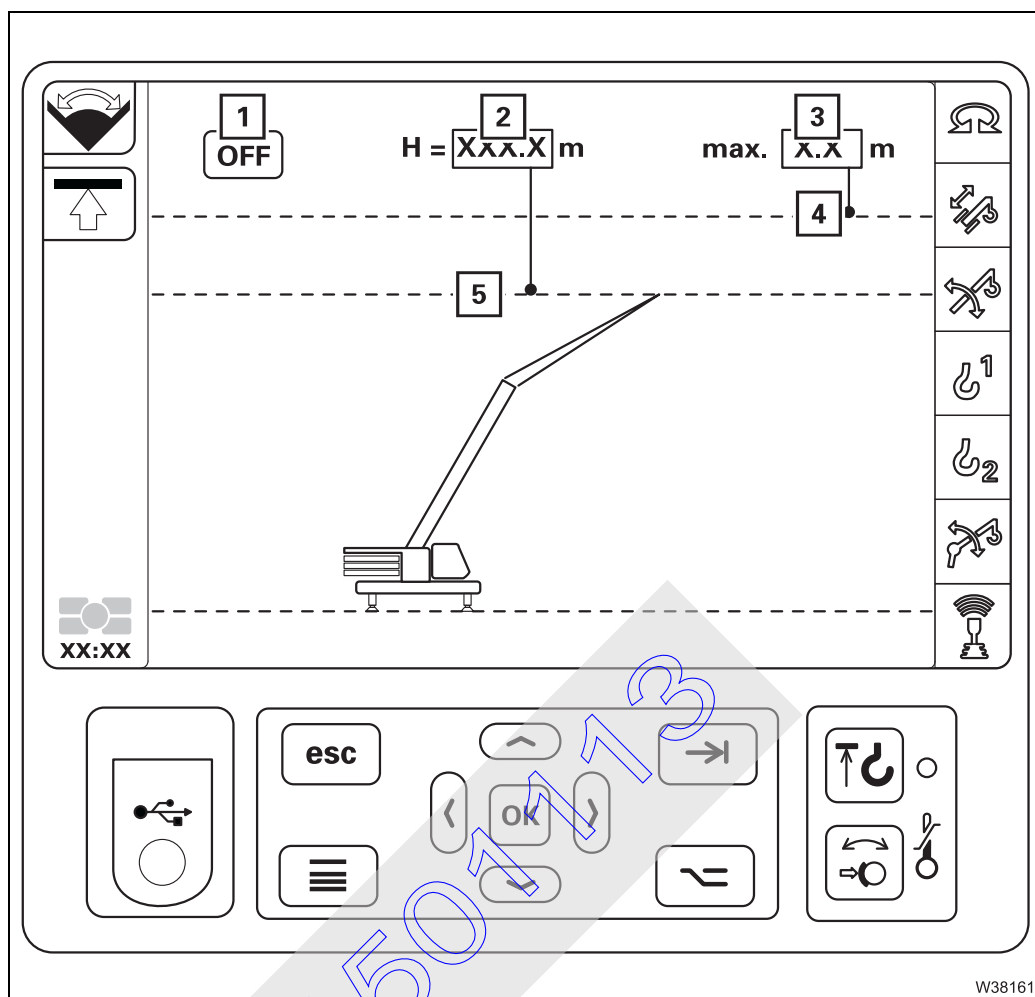
Working range limiter menu group



- | | |
|--|-----------------|
| 1 Overall height menu | ▮▮▮▮▶ p. 9 - 48 |
| 2 Working radius menu | ▮▮▮▮▶ p. 9 - 49 |
| 3 Slewing angle menu | ▮▮▮▮▶ p. 9 - 50 |
| 4 Hoist rope travel limitation menu | ▮▮▮▮▶ p. 9 - 51 |



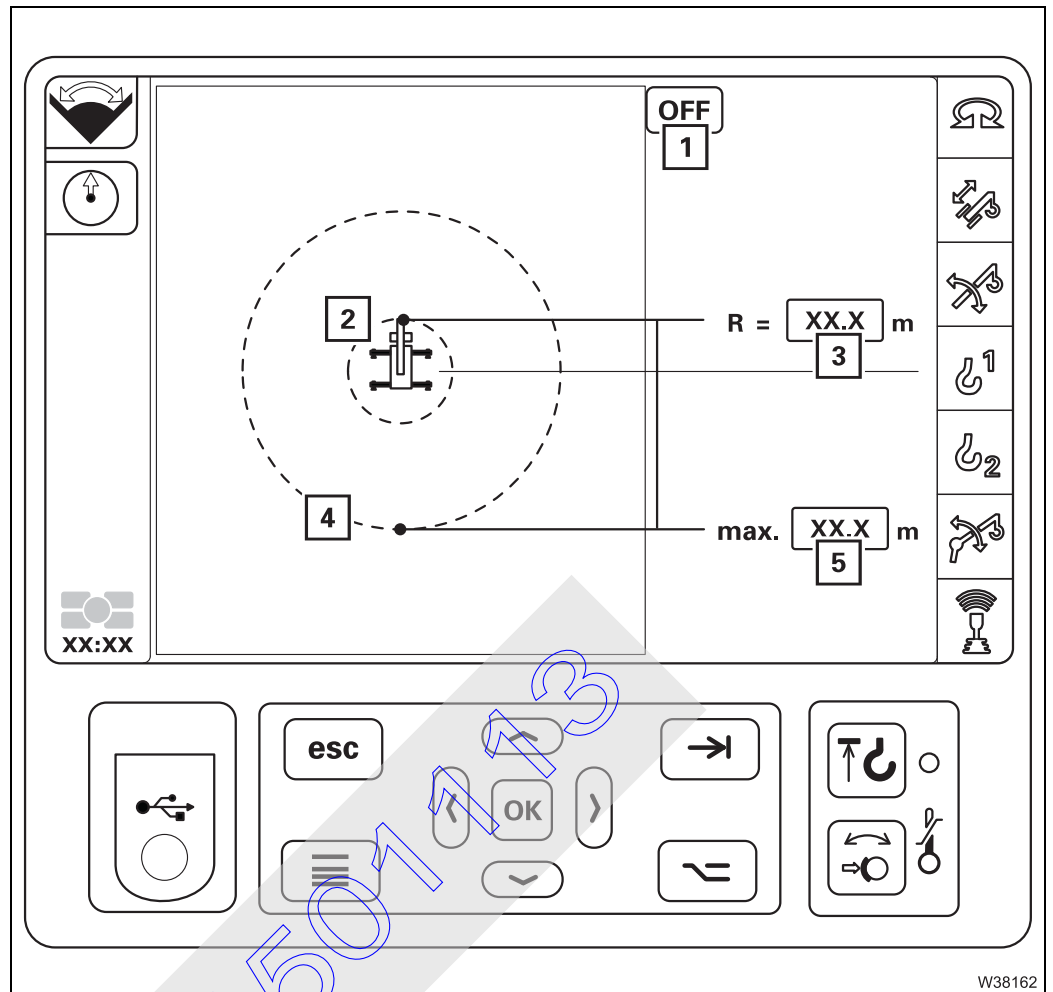
Overall height menu



- 1 Switching monitoring function on/off
- 2 – Current overall height display
– Accepting limit value
- 3 – Overall height limit value display
– Entering limit values manually
- 4 Overall height limit value display
- 5 Current overall height display

➡ p. 11 - 138

Working radius menu

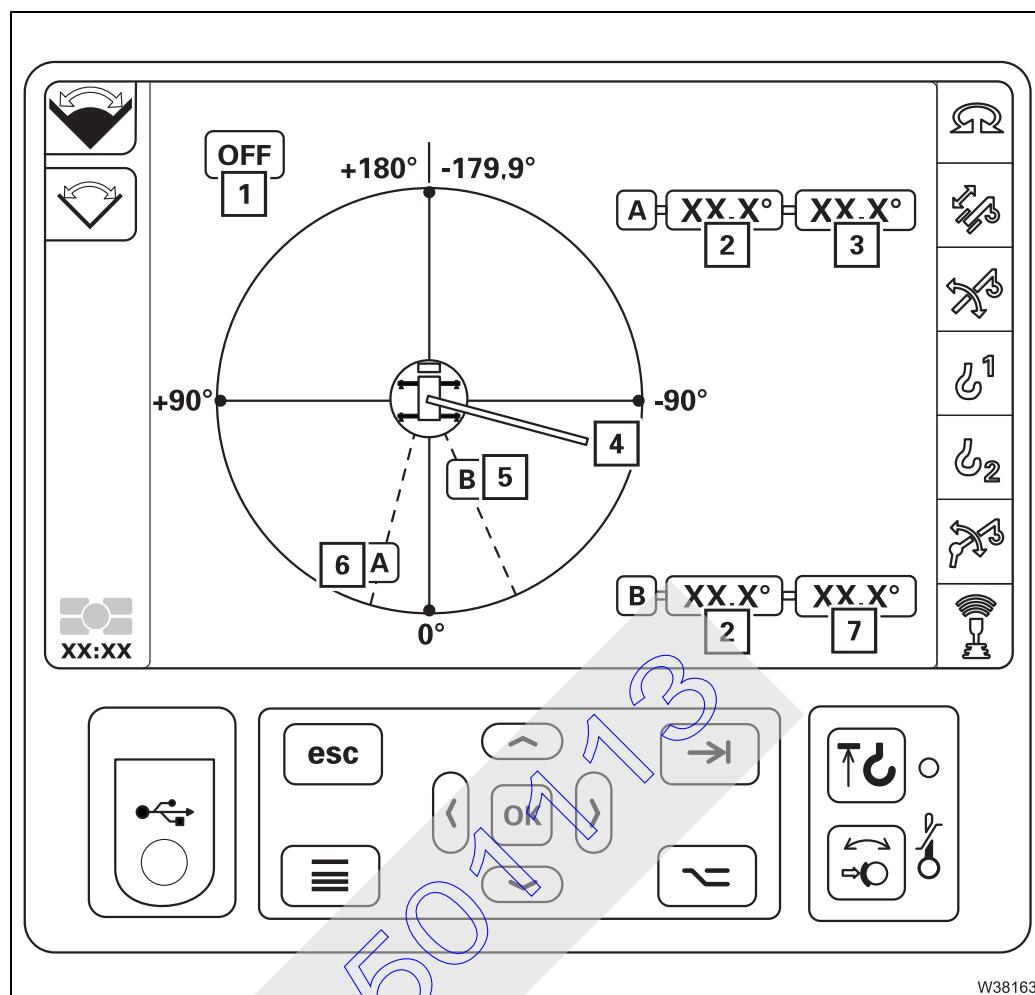


- 1 Switching monitoring function on/off
- 2 Current working radius display
- 3 – Current working radius display
– Accepting limit value
- 4 Working radius limit value display
- 5 – Working radius limit value display
– Entering limit values manually

▮ p. 11 - 140



Slewing angle menu

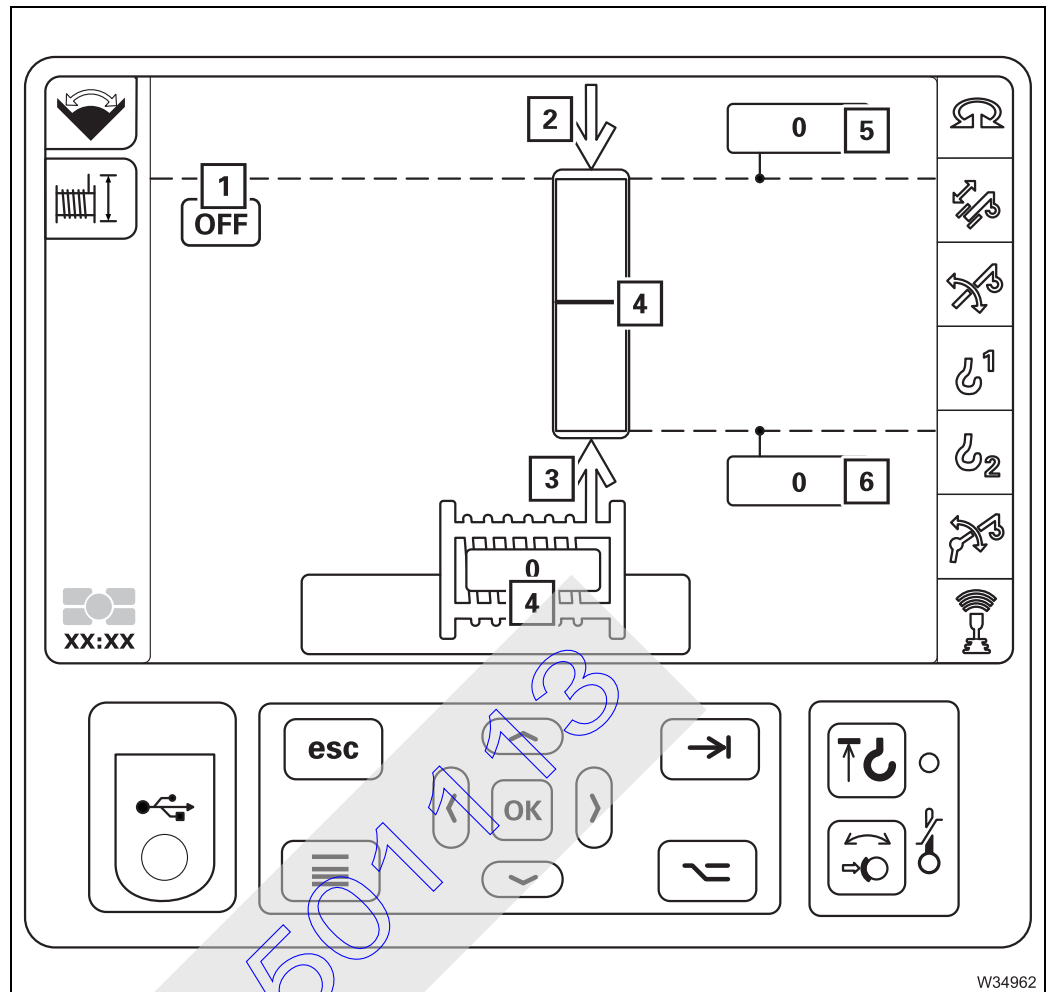


W38163

- 1 Switching monitoring function on/off
- 2 – Current slewing angle display
– Accepting limit value
- 3 – Slewing angle A limit value display
– Manually entering 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 entering limit value

▶▶▶ p. 11 - 142

Hoist rope travel limitation menu

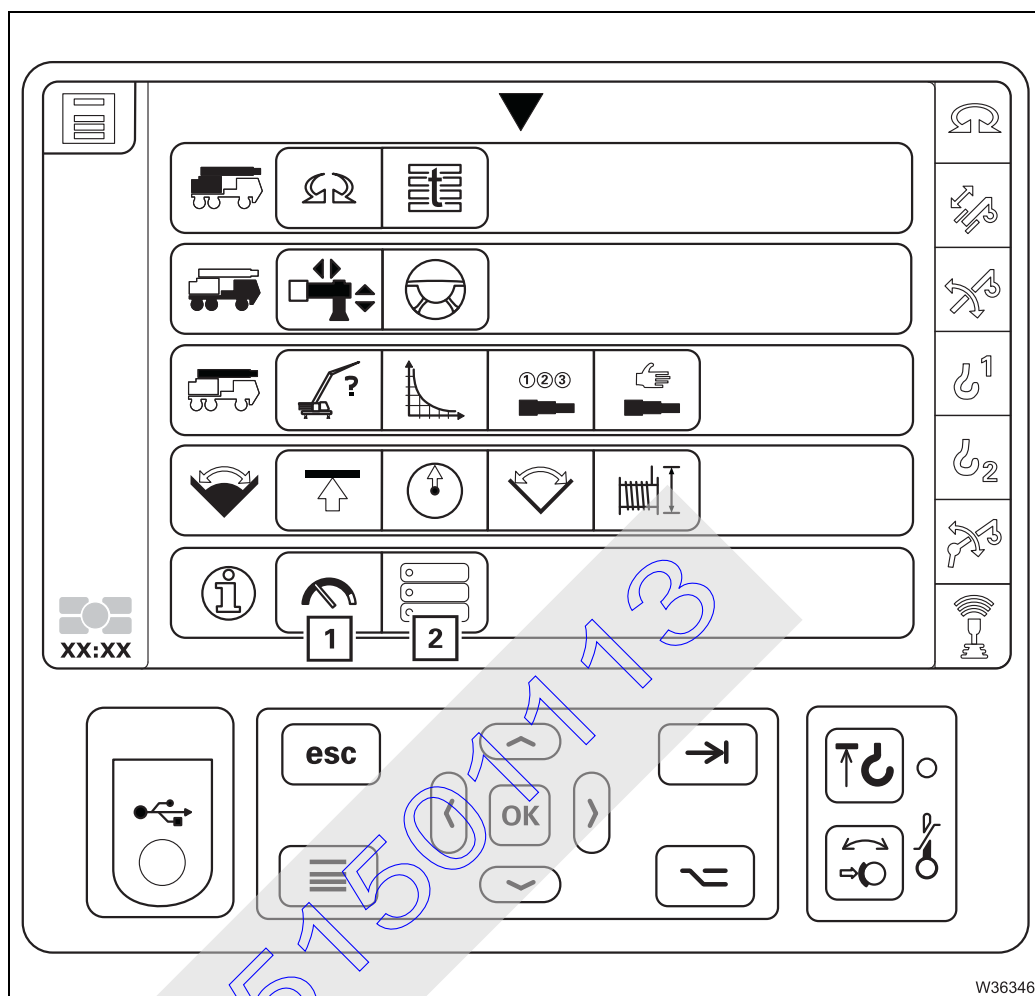


- 1 Switching monitoring function on/off
- 2 *Raise* input confirmation
- 3 *Lower* input confirmation
- 4 Current hoist rope position display
- 5 – *Raise* limit value display
– Accepting limit value
- 6 – *Lower* limit value display
– Accepting limit value

▣▣▣▣ p. 11 - 145

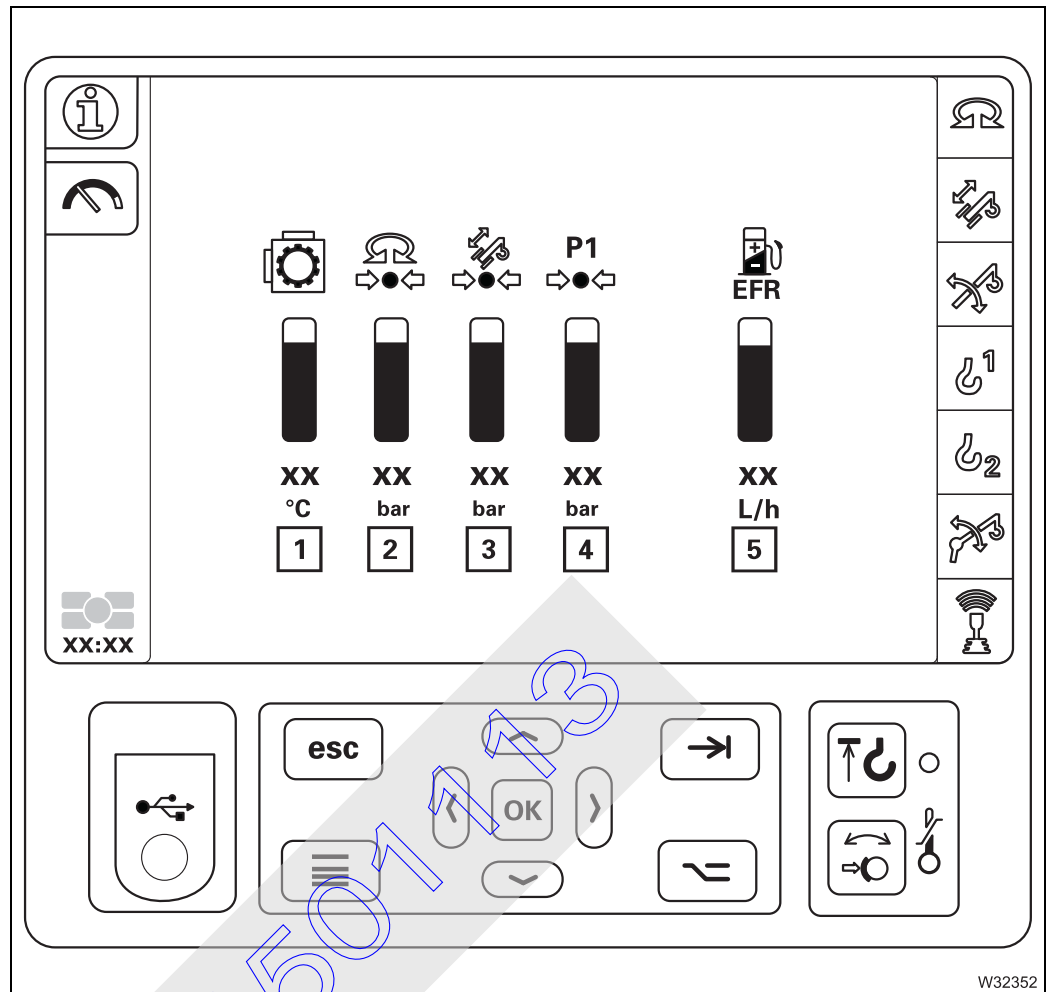
9.1.13

Information 1 menu group



- 1 Hydraulic pressure and fuel consumption menu ▮▮▮ p. 9 - 53
- 2 Datalogger menu (Menu opens on the display *RCL*) ▮▮▮ p. 9 - 81

Hydraulic pressure and fuel consumption menu

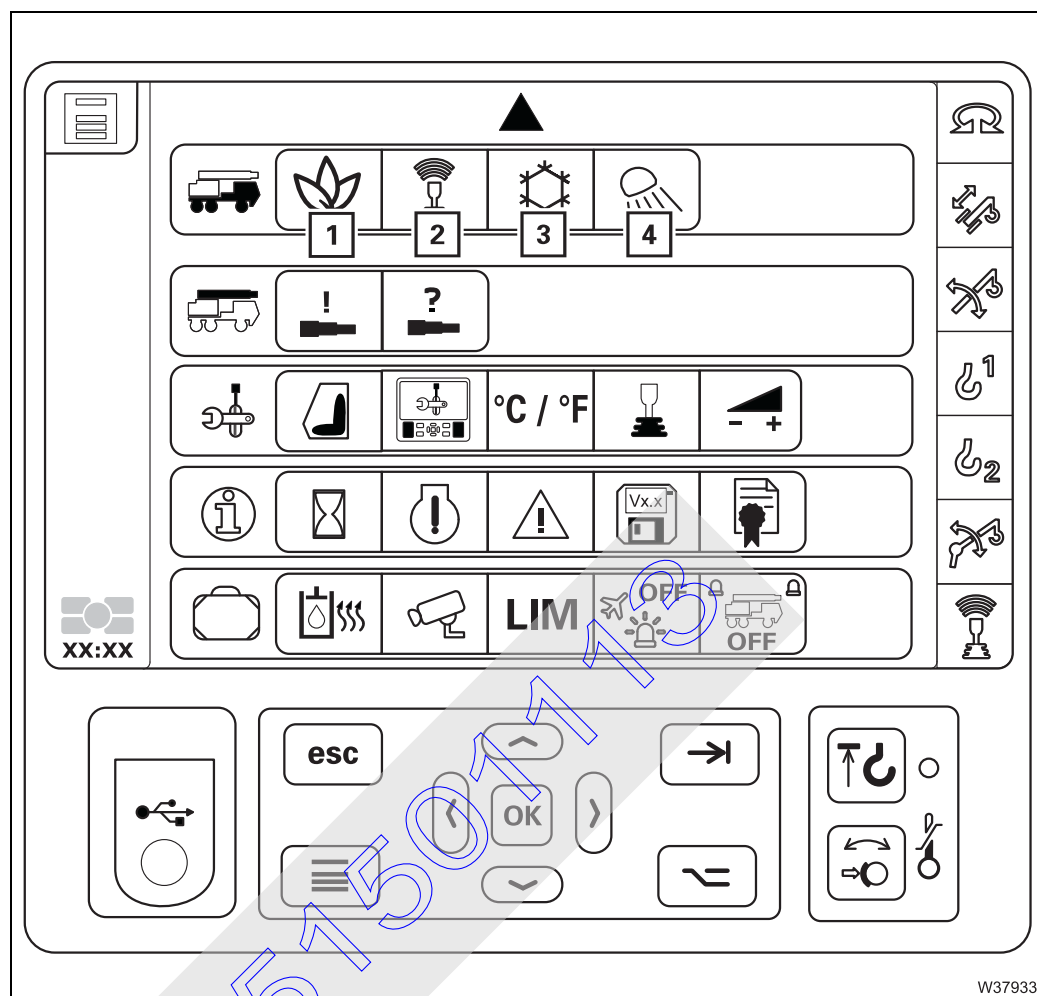


- | | | |
|---|---|-----------------|
| 1 | Angle gear temperature display | ▣▣▣▣ p. 9 - 128 |
| 2 | Hydraulic system pressure display
Slewing gear circuit | ▣▣▣▣ p. 9 - 128 |
| 3 | Telescoping cylinder pressure display | ▣▣▣▣ p. 9 - 128 |
| 4 | Hydraulic circuit pressure display | ▣▣▣▣ p. 9 - 128 |
| 5 | Display of consumption in litres per hour ¹⁾ | |

¹⁾ Additional equipment

9.1.14

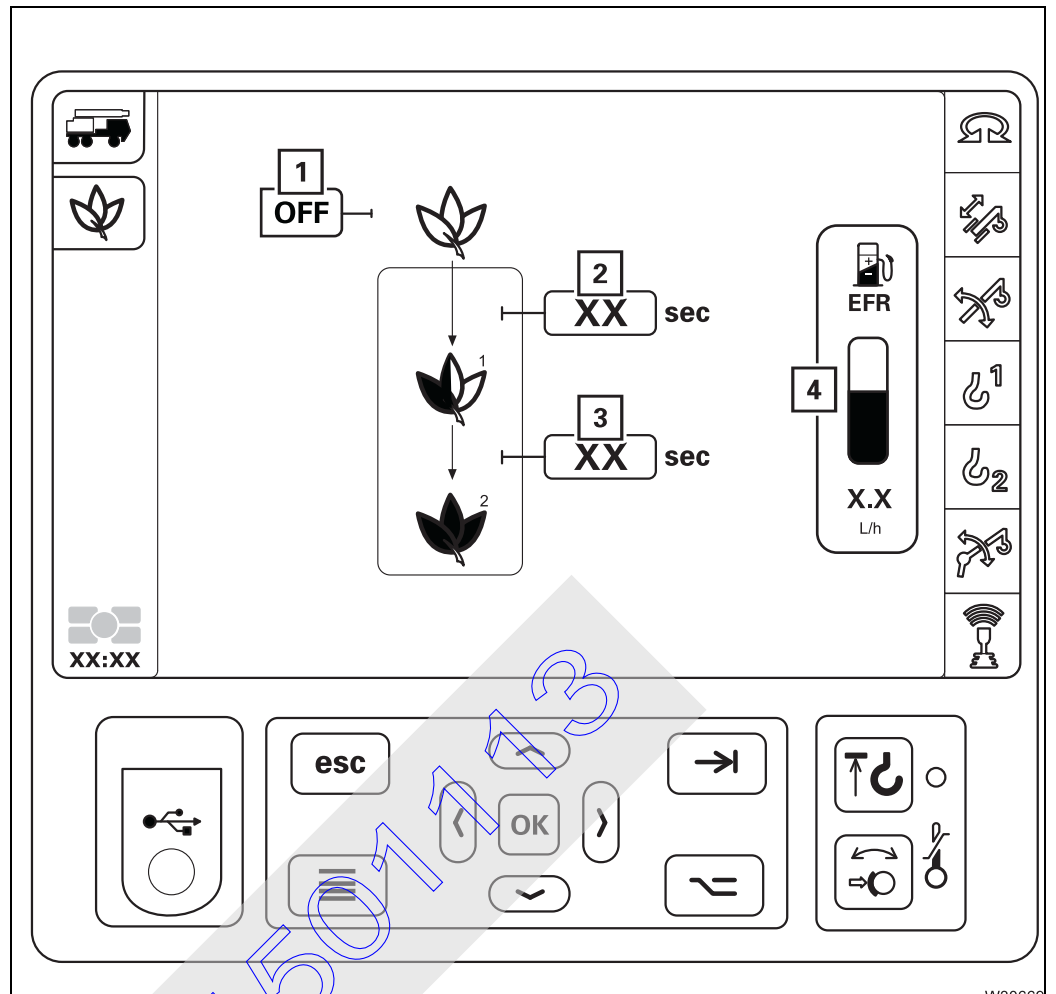
Heating/Engine/Additional equipment menu group



W37933

- | | |
|--|----------------|
| 1 Economy menu | ▣▣▣▣ p. 9 - 55 |
| 2 Remote control menu | ▣▣▣▣ p. 9 - 56 |
| 3 Heating/air-conditioning menu | ▣▣▣▣ p. 9 - 57 |
| 4 Spotlights menu | ▣▣▣▣ p. 9 - 58 |

Economy menu

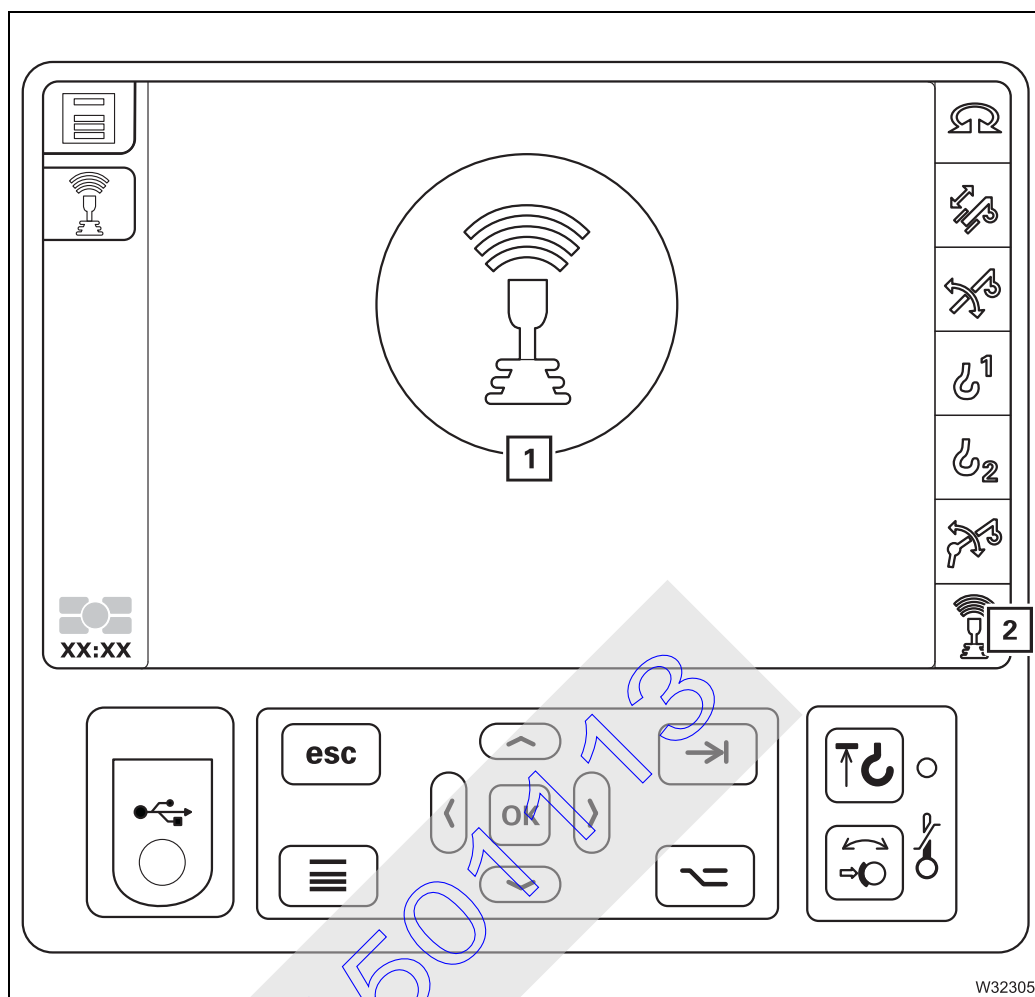


- 1 Switching off Economy mode on/off
- 2 Set interval 1
- 3 Set interval 2
- 4 Average consumption

- ➡ p. 9 - 92
- ➡ p. 9 - 92
- ➡ p. 9 - 92
- ➡ p. 9 - 92



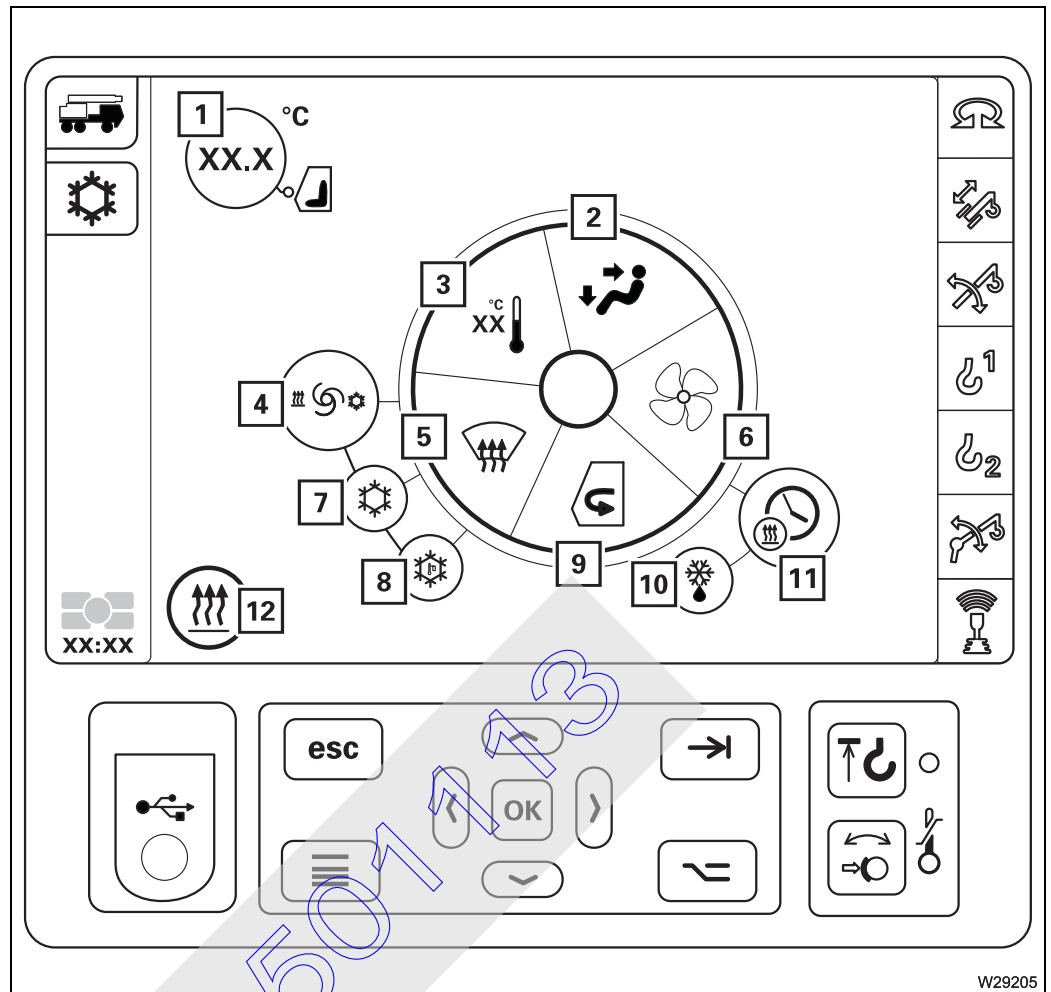
Remote control menu



- 1 Remote control menu
- 2 Remote control display

- ▣▣▣▣ p. 9 - 132
- ▣▣▣▣ p. 9 - 132

Heating/air-conditioning menu



W29205

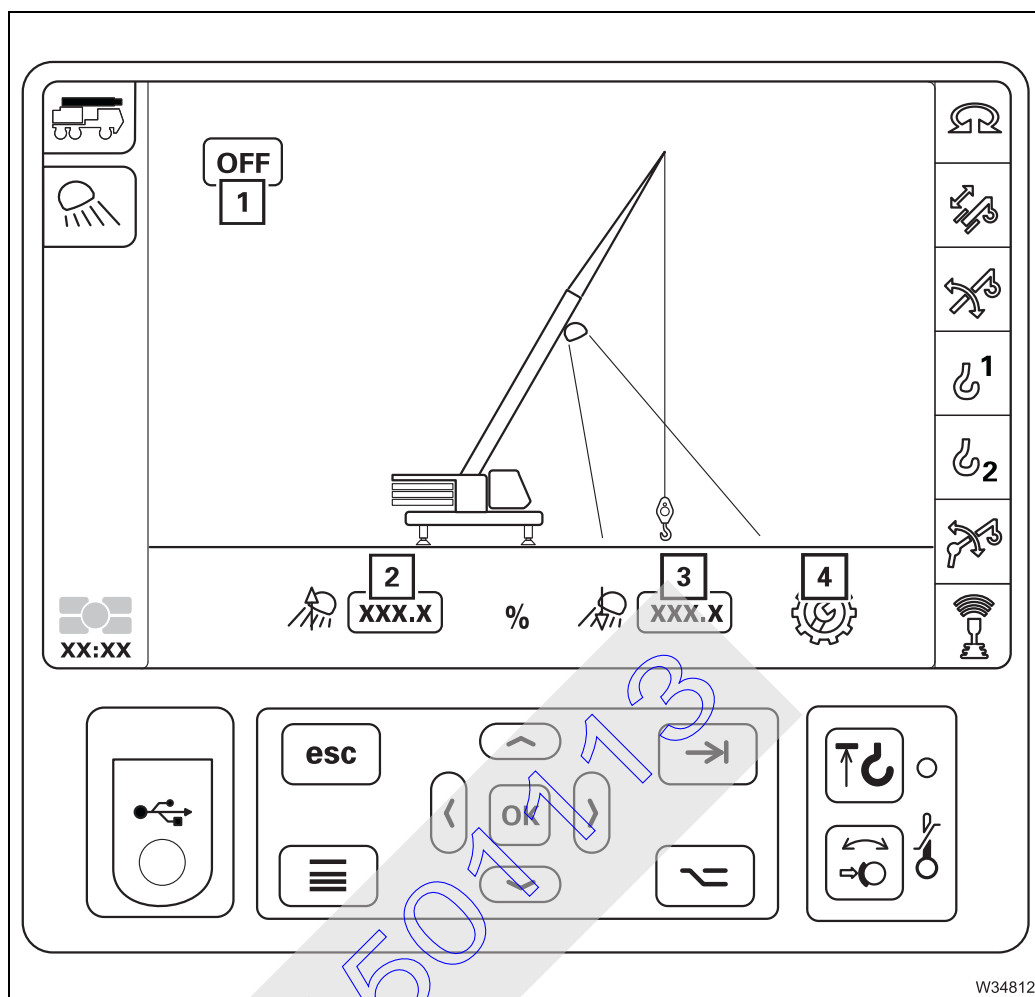
- | | |
|-------------------------------------|-----------------|
| 1 Outdoor temperature display | ▮▮▮ p. 11 - 151 |
| 2 Air distribution | ▮▮▮ p. 11 - 152 |
| 3 Setting the temperature | ▮▮▮ p. 11 - 151 |
| 4 Automatic air-conditioning system | ▮▮▮ p. 11 - 154 |
| 5 Defrosting the windscreen | ▮▮▮ p. 11 - 151 |
| 6 Setting the fan | ▮▮▮ p. 11 - 151 |
| 7 Air-conditioning system on/off | ▮▮▮ p. 11 - 153 |
| 8 Cooling, maximum | ▮▮▮ p. 11 - 154 |
| 9 Recirculated air | ▮▮▮ p. 11 - 151 |
| 10 Frost Guard ^{1) 2)} | |
| 11 Setting the auxiliary heating | ▮▮▮ p. 11 - 155 |
| 12 Heating on display | ▮▮▮ p. 11 - 151 |

1) Additional equipment

2) ▮▮▮ *Separate operating manual*



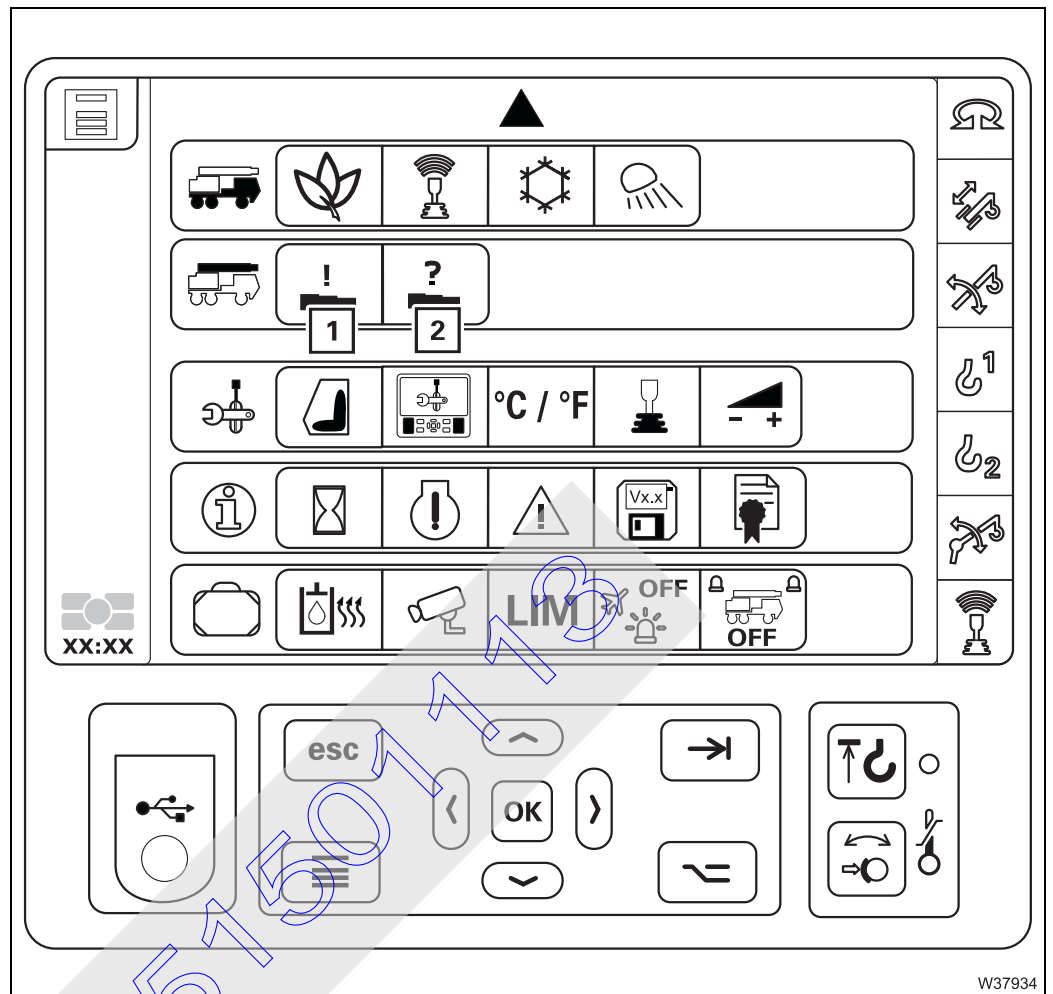
Spotlights menu



- | | |
|---|----------------|
| 1 Switching automatic spotlights on/off | ▣▣▣ p. 9 - 147 |
| 2 Increase the slewing speed | ▣▣▣ p. 9 - 147 |
| 3 Reduce the slewing speed | ▣▣▣ p. 9 - 147 |
| 4 Opening/closing the Settings submenu | ▣▣▣ p. 9 - 147 |

9.1.15

Telescoping emergency program menu group



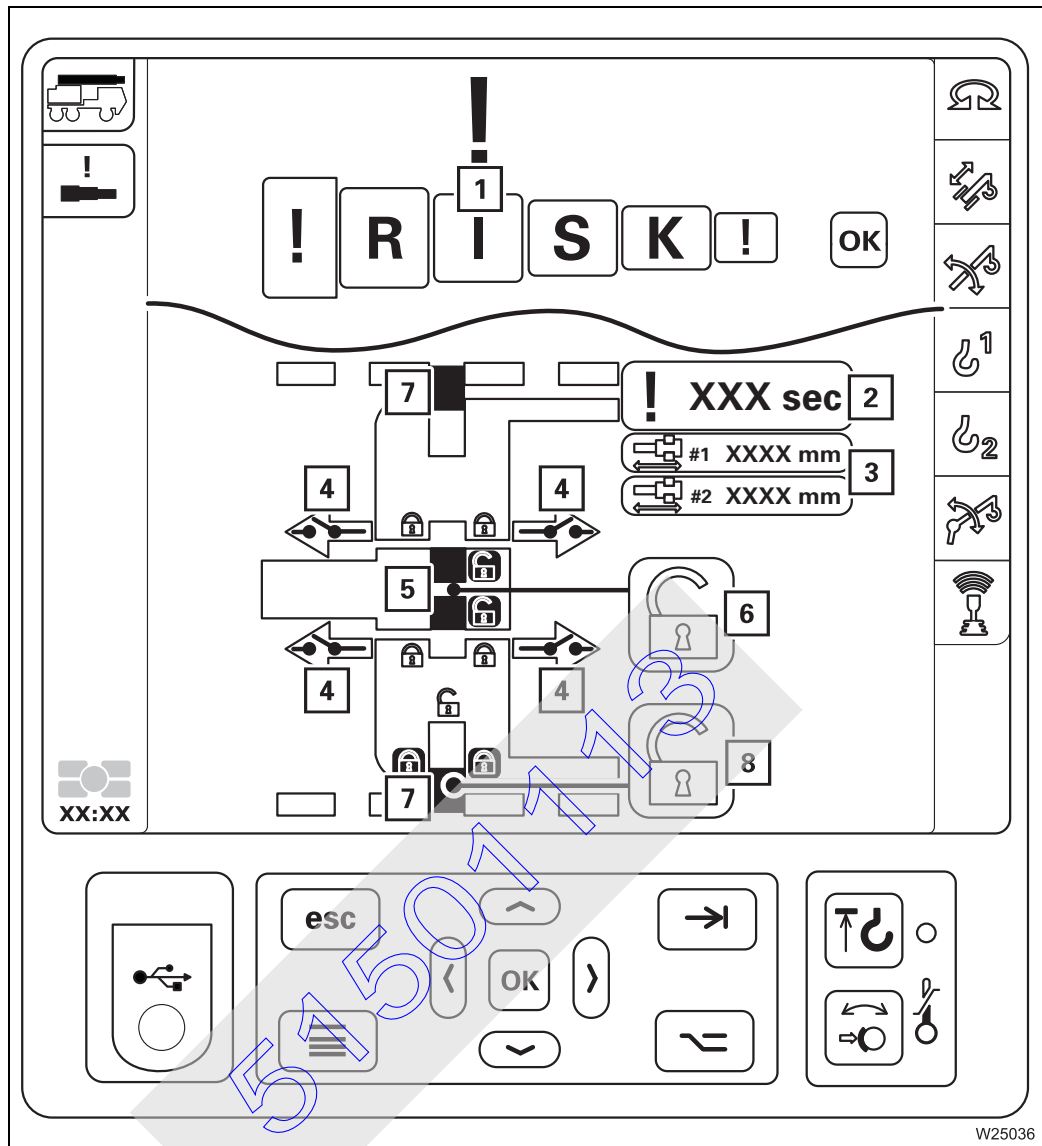
- 1 Telescoping emergency program menu
- 2 Unknown telescoping menu

- ▣▣▣▣ p. 9 - 60
- ▣▣▣▣ p. 9 - 62

1) Additional equipment



**Telescoping
emergency
program menu**



- | | |
|--|------------------|
| 1 Input access code emergency program | ▣▣▣▣▶ p. 14 - 33 |
| 2 Remaining time emergency program display | ▣▣▣▣▶ p. 14 - 33 |
| 3 Telescoping cylinder length displays | ▣▣▣▣▶ p. 14 - 33 |
| 4 – Locking status telescoping cylinder display
– Locking/unlocking the telescoping cylinder | ▣▣▣▣▶ p. 14 - 33 |
| 5 – Locking status telescopic section display
– Locking/unlocking a telescopic section | ▣▣▣▣▶ p. 14 - 33 |
| 6 Display, position of the telescoping cylinder in the foot section | ▣▣▣▣▶ p. 14 - 33 |

Displays for the extended emergency operation



These displays are primarily intended for service personnel and are therefore only mentioned in this operating manual and are not described in more detail.

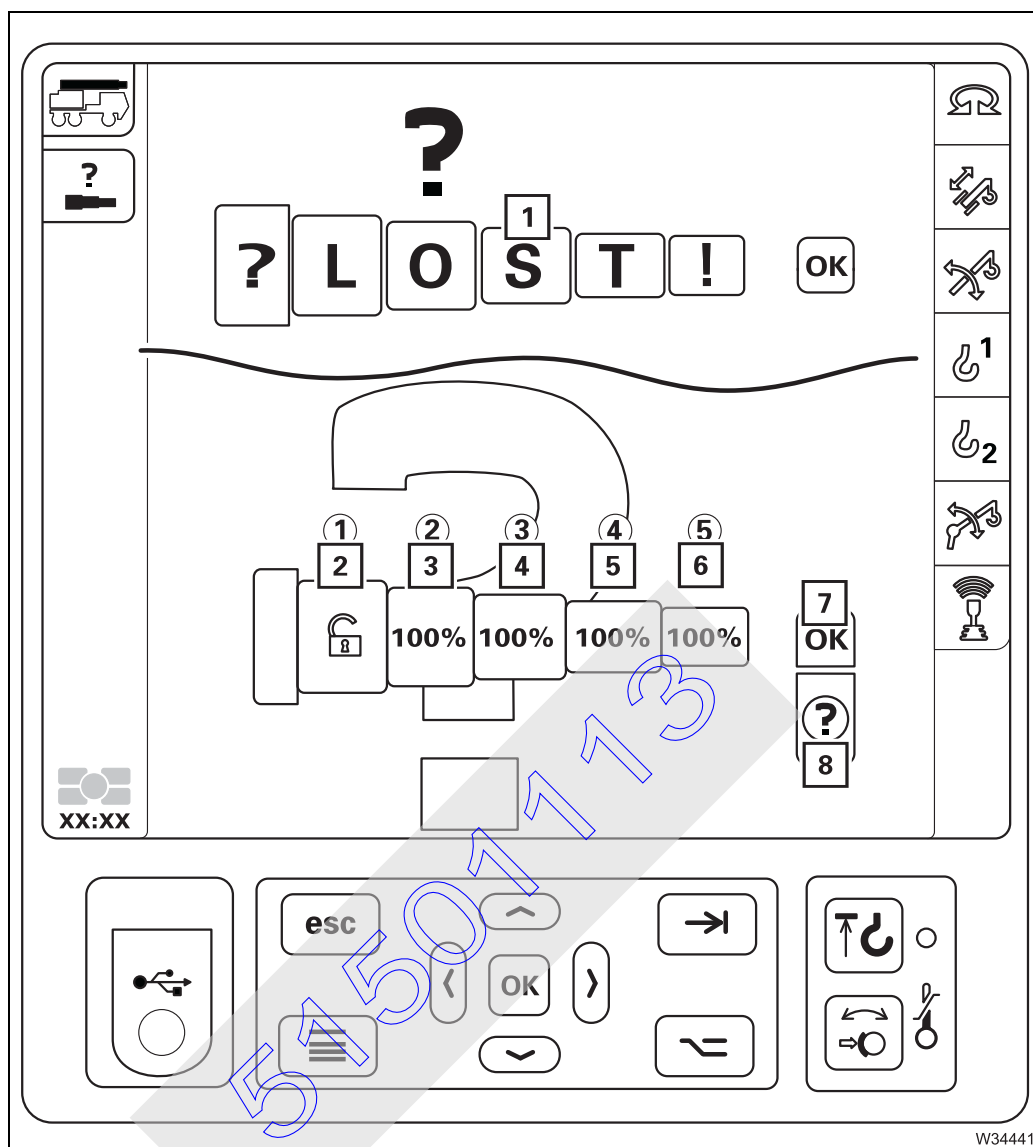
- 7** – Telescoping cylinder locked
– Telescopic section unlocked
- 8** – Telescoping cylinder locked
– Telescopic section locked
- 9** – Telescoping cylinder unlocked
– Telescopic section locked
- 10** Telescoping cylinder in the foot section
- 11** Left telescoping cylinder unlocked
- 12** Right telescoping cylinder unlocked
- 13** Telescoping cylinder just before the locking point
- 14** Telescoping cylinder just behind the locking point

The following applies to all displays

- **Grey:** Described position not reached
- **Coloured:** Described position reached



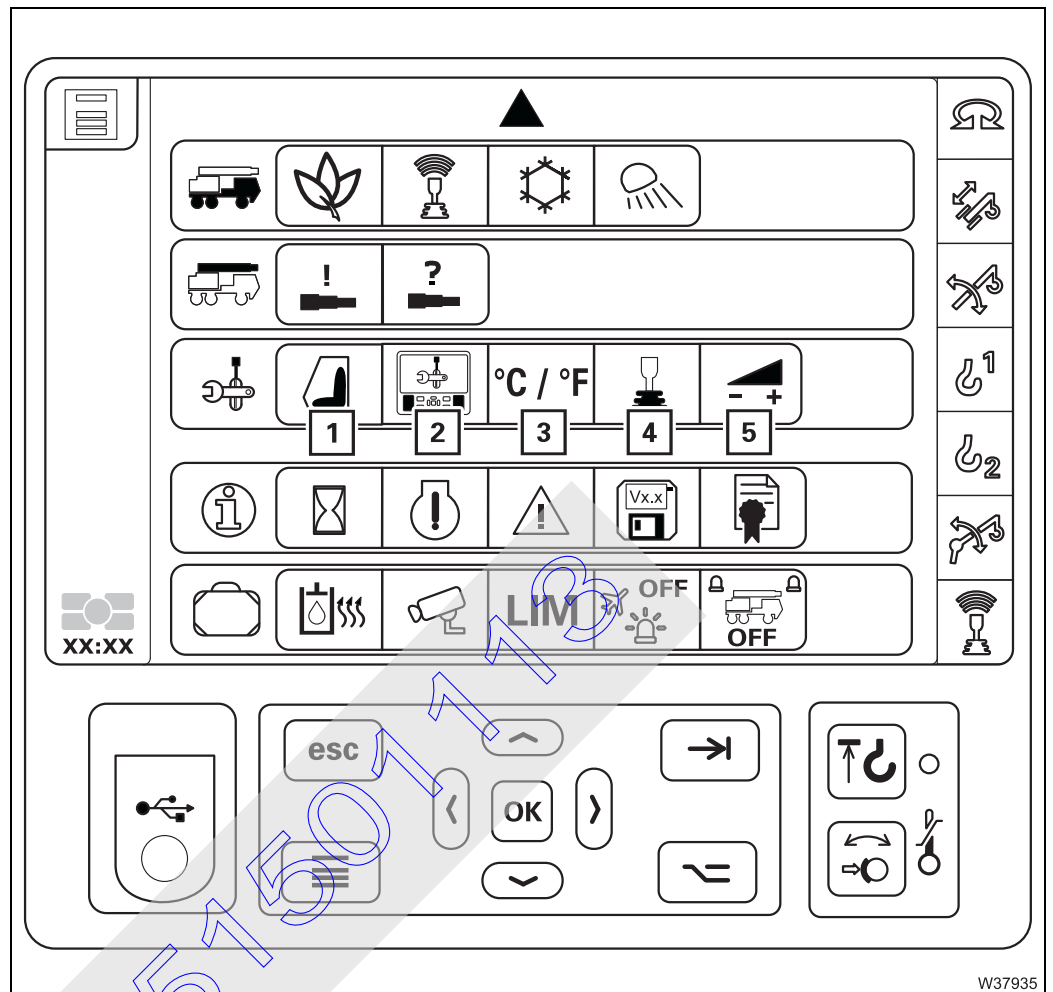
Unknown telescoping menu



- | | | |
|---|---|-----------------|
| 1 | Input access code unknown telescoping | ▣▣▣▣ p. 14 - 41 |
| 2 | Input for telescopic section 1 | ▣▣▣▣ p. 14 - 41 |
| 3 | Input for telescopic section 2 | ▣▣▣▣ p. 14 - 41 |
| 4 | Input for telescopic section 3 | ▣▣▣▣ p. 14 - 41 |
| 5 | Input for telescopic section 4 | ▣▣▣▣ p. 14 - 41 |
| 6 | Input for telescopic section 5 | ▣▣▣▣ p. 14 - 41 |
| 7 | Input confirmation | ▣▣▣▣ p. 14 - 41 |
| 8 | Telescoping permitted/not permitted display | ▣▣▣▣ p. 14 - 41 |

9.1.16

Menu group, settings

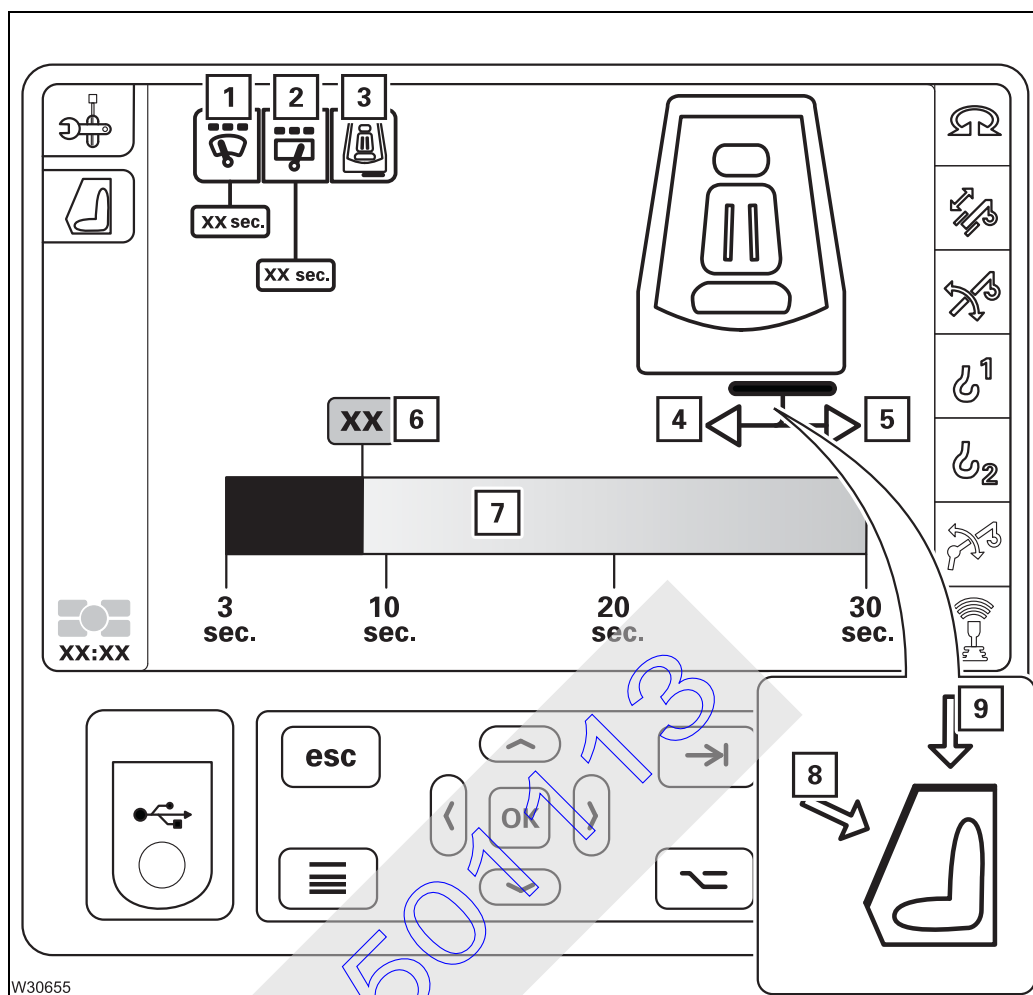


- | | |
|---|-------------|
| 1 Crane cab menu | ➡ p. 9 - 64 |
| 2 Set display brightness and date/time menu | ➡ p. 9 - 65 |
| 3 Switch units menu | ➡ p. 9 - 66 |
| 4 Set control lever characteristic curve menu | ➡ p. 9 - 67 |
| 5 Power unit speeds menu | ➡ p. 9 - 68 |

1) Additional equipment



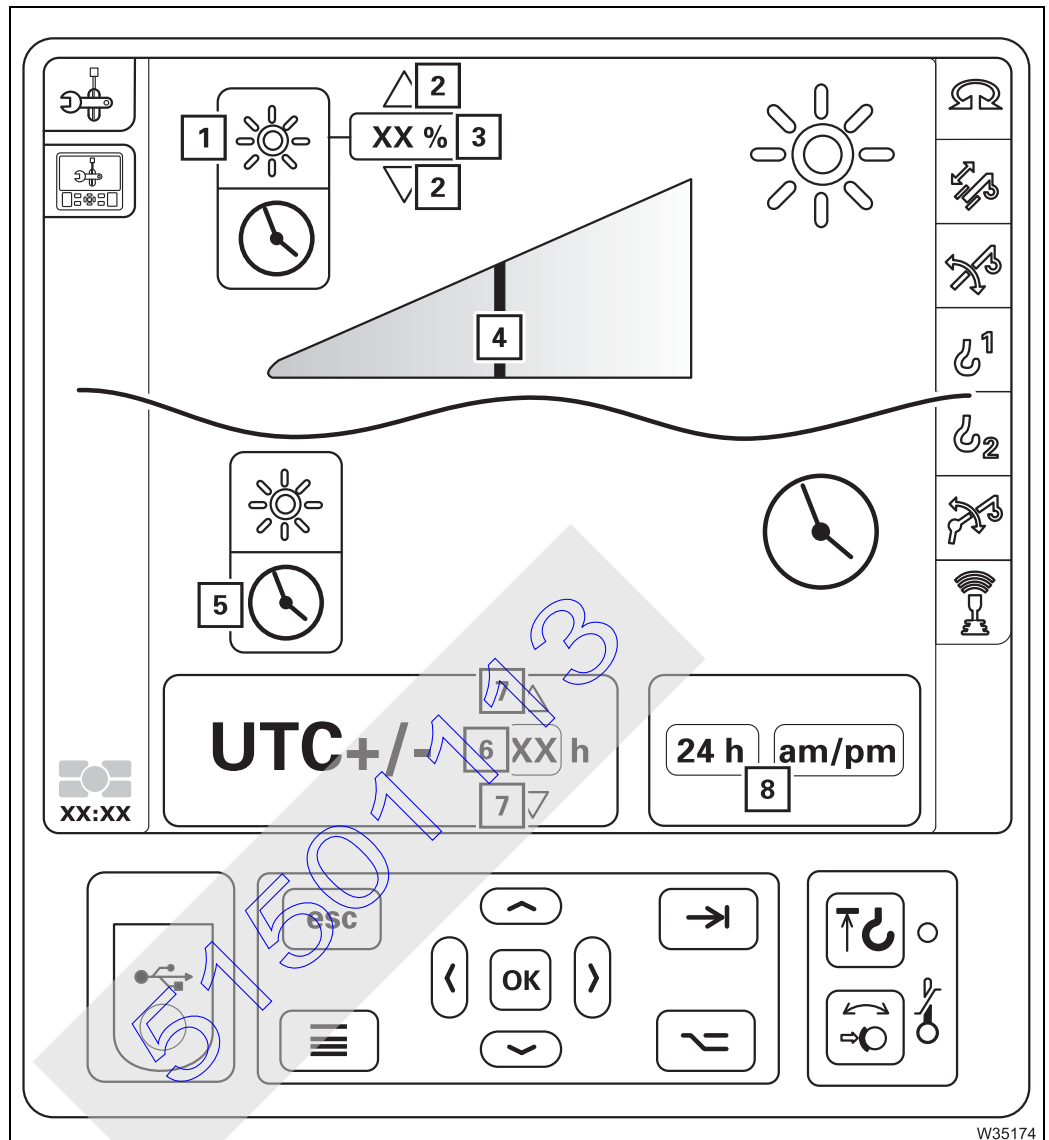
Crane cab menu



- | | |
|--|-----------------|
| 1 Windscreen interval duration selection/display | ▣▣▣ p. 9 - 149 |
| 2 Selection/display of skylight interval duration | ▣▣▣ p. 9 - 149 |
| 3 Retract/extend step selection | ▣▣▣ p. 12 - 157 |
| 4 Retract step | ▣▣▣ p. 12 - 157 |
| 5 Extend step | ▣▣▣ p. 12 - 157 |
| 6 Adjust interval selection | ▣▣▣ p. 9 - 149 |
| 7 Adjust interval display | ▣▣▣ p. 9 - 149 |
| 8 Windscreen selected display | ▣▣▣ p. 9 - 149 |
| 9 Skylight selected display | ▣▣▣ p. 9 - 149 |

**Set display
brightness and
date/time menu**

This is operated in the same way as in the driver's cab.

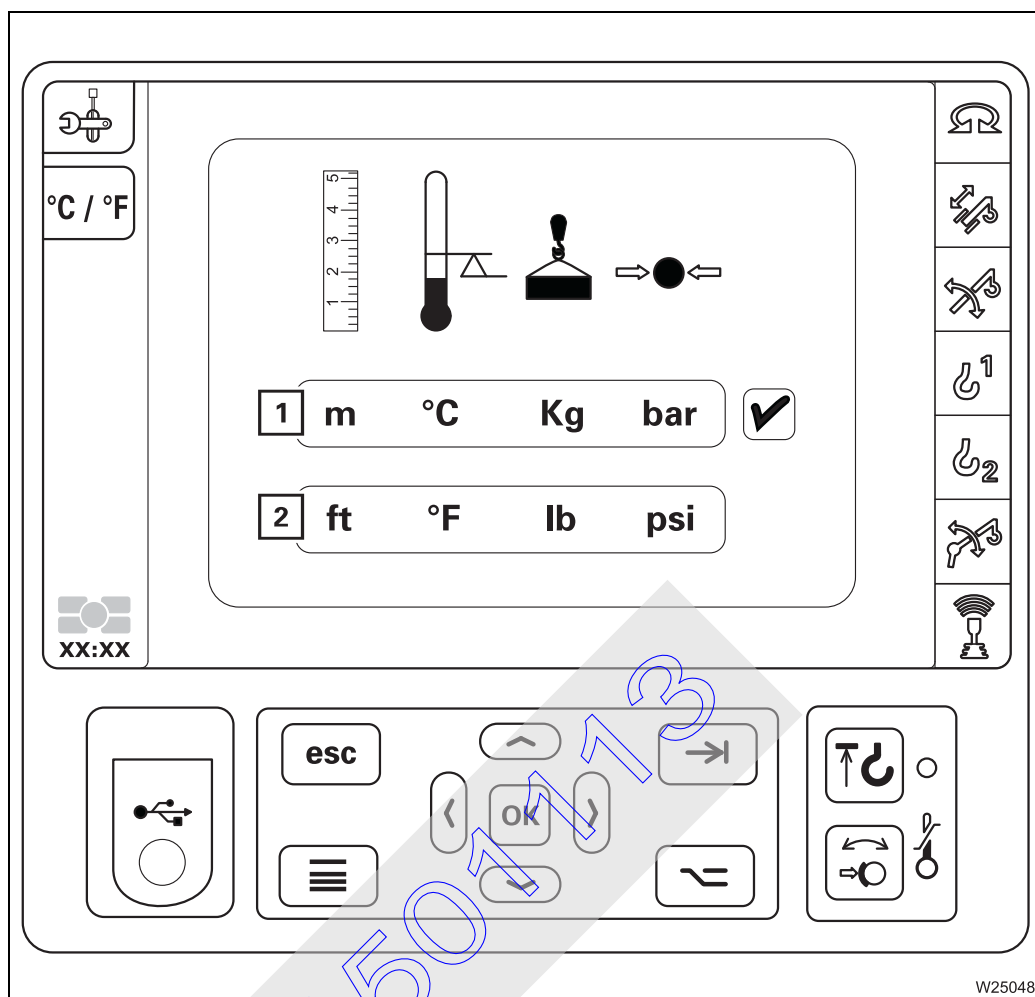


W35174

- | | | |
|----------|--|----------------|
| 1 | Selection setting the display brightness | ▣▣▣▣ p. 4 - 11 |
| 2 | Increasing/reducing the value | ▣▣▣▣ p. 4 - 11 |
| 3 | Display in percentage | ▣▣▣▣ p. 4 - 11 |
| 4 | Brightness display | ▣▣▣▣ p. 4 - 11 |
| 5 | Adjust time selection | ▣▣▣▣ p. 5 - 24 |
| 6 | Setting the time | ▣▣▣▣ p. 5 - 23 |
| 7 | Increasing/reducing the value | ▣▣▣▣ p. 5 - 24 |
| 8 | Switching the display type | ▣▣▣▣ p. 5 - 23 |



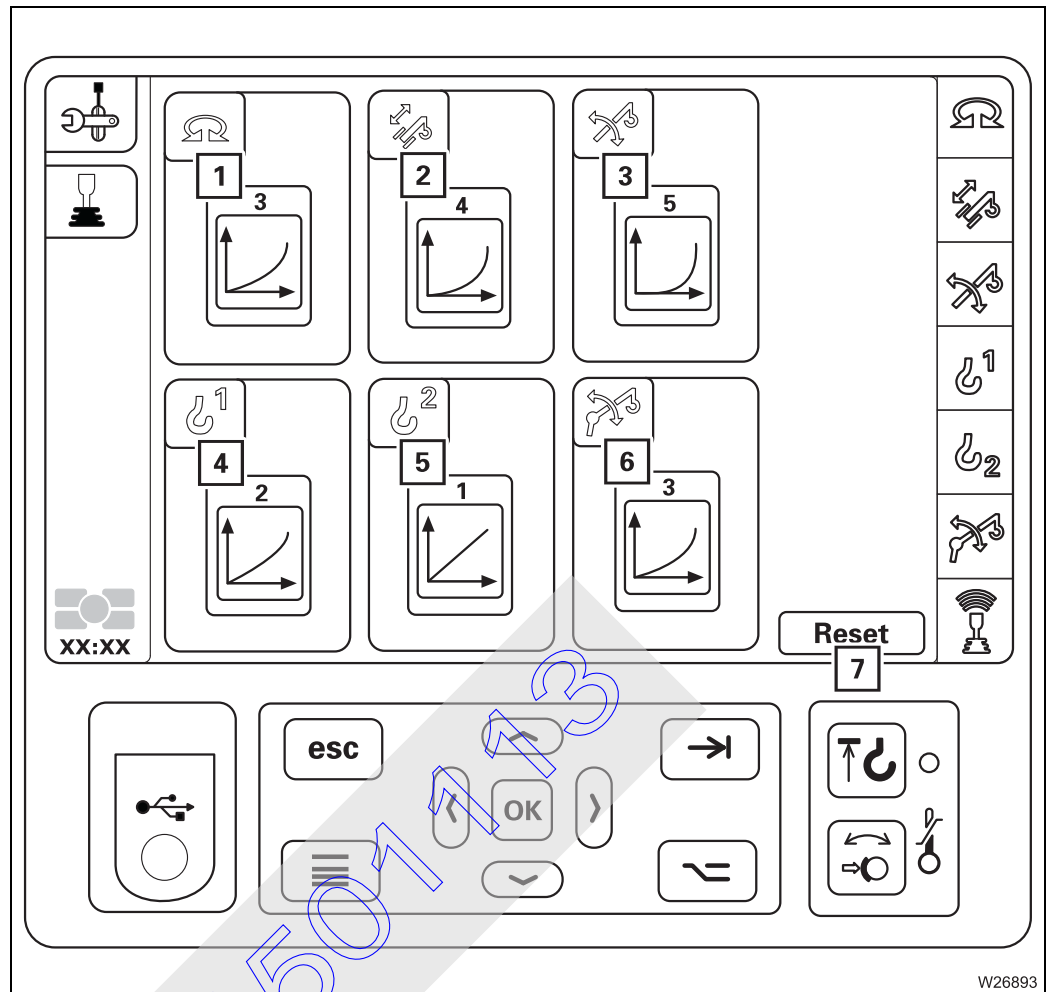
Switch units menu



- 1 Display units in:
 - Metres
 - Degrees Celsius
 - Kilograms
 - Bar
- 2 Display units in:
 - Feet
 - Degrees Fahrenheit
 - lbs
 - Psi

➡ p. 11 - 128

**Set control lever
characteristic
curve menu**



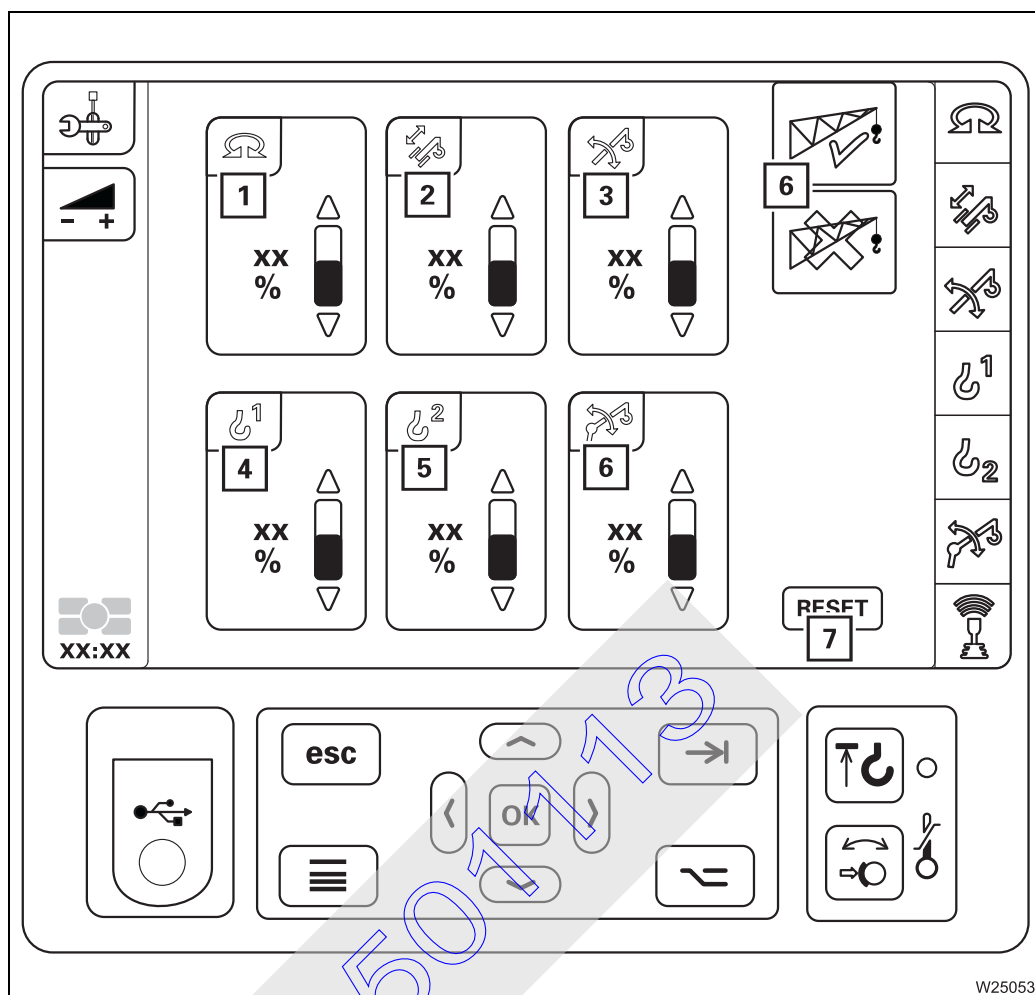
- 1 Characteristic curve slewing gear
- 2 Characteristic curve telescoping mechanism
- 3 Characteristic curve derricking gear
- 4 Characteristic curve main hoist
- 5 Auxiliary hoist¹⁾ characteristic curve
- 6 Lattice extension¹⁾ characteristic curve
- 7 Setting Reset characteristic curve

▶▶ p. 11 - 129

¹⁾ Additional equipment



Power unit speeds menu



W25053

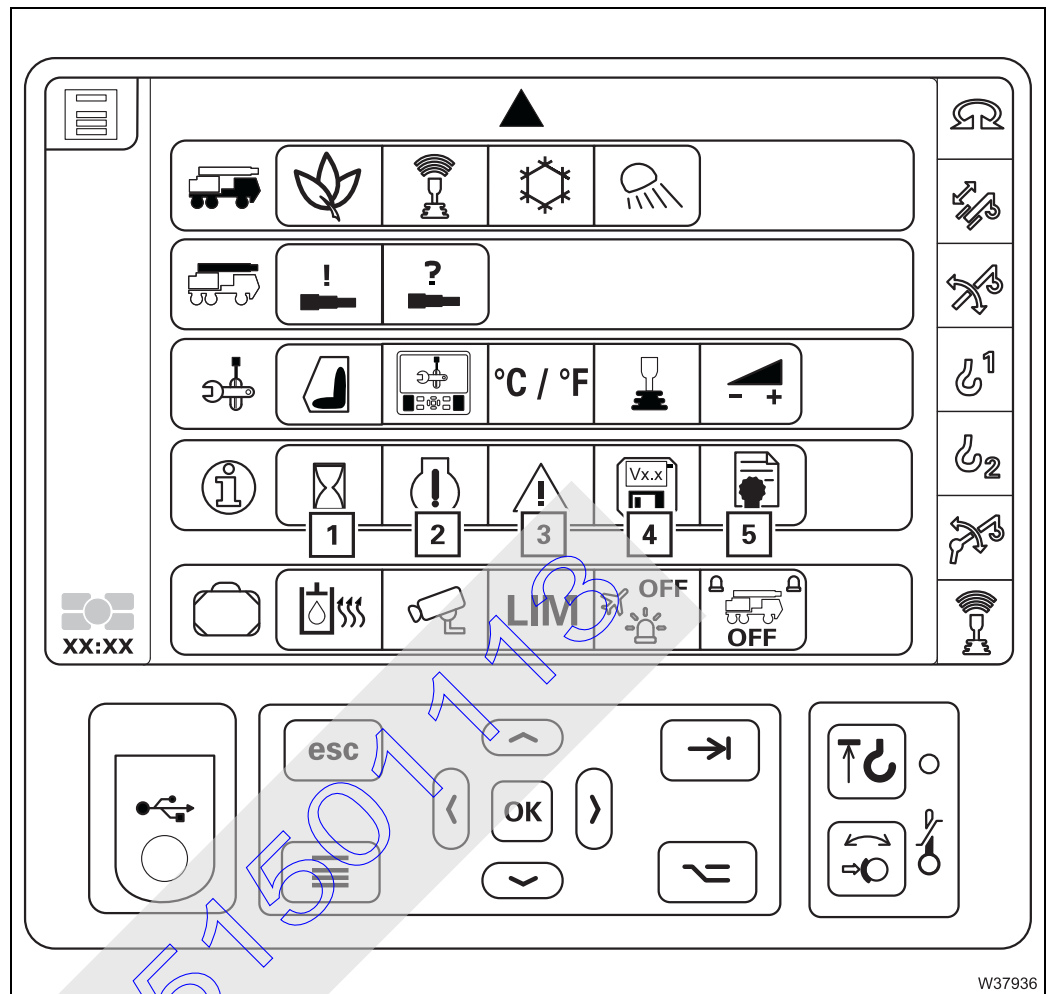
- 1 Enter slewing gear speed
- 2 Enter telescoping mechanism speed
- 3 Enter derricking gear speed
- 4 Enter speed – main hoist
- 5 Enter speed – auxiliary hoist¹⁾
- 6 Enter speed – derricking gear of lattice extension¹⁾
- 7 Reset power unit speed settings

▣► p. 11 - 125

¹⁾ Additional equipment

9.1.17

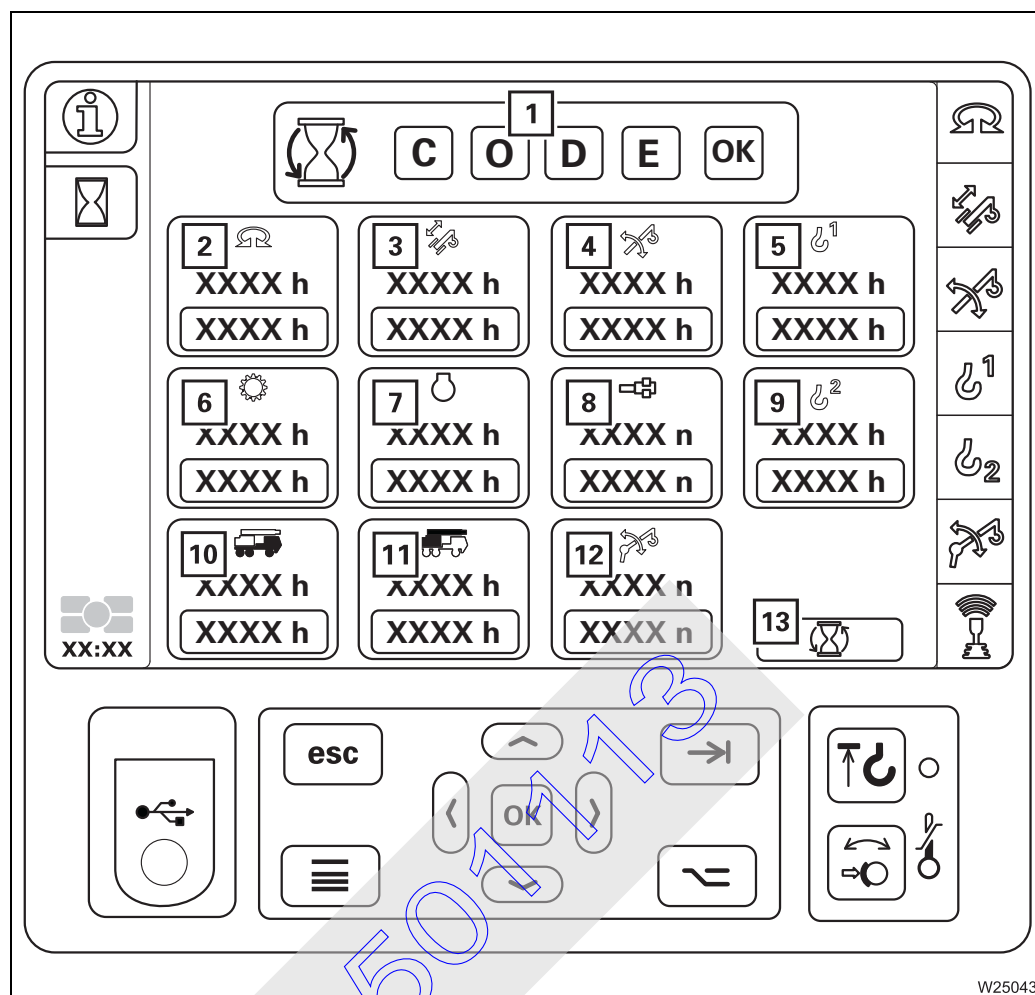
Information 2 menu group



- | | |
|---|-----------------|
| 1 Operating hours menu | ▣▣▣▣ p. 9 - 70 |
| 2 Engine/transmission error menu | ▣▣▣▣ p. 9 - 71 |
| 3 Crane operation error menu | ▣▣▣▣ p. 9 - 72 |
| 4 Program version menu | ▣▣▣▣ p. 9 - 73 |
| 5 Disclaimer menu | ▣▣▣▣ p. 9 - 156 |



Operating hours menu



W25043

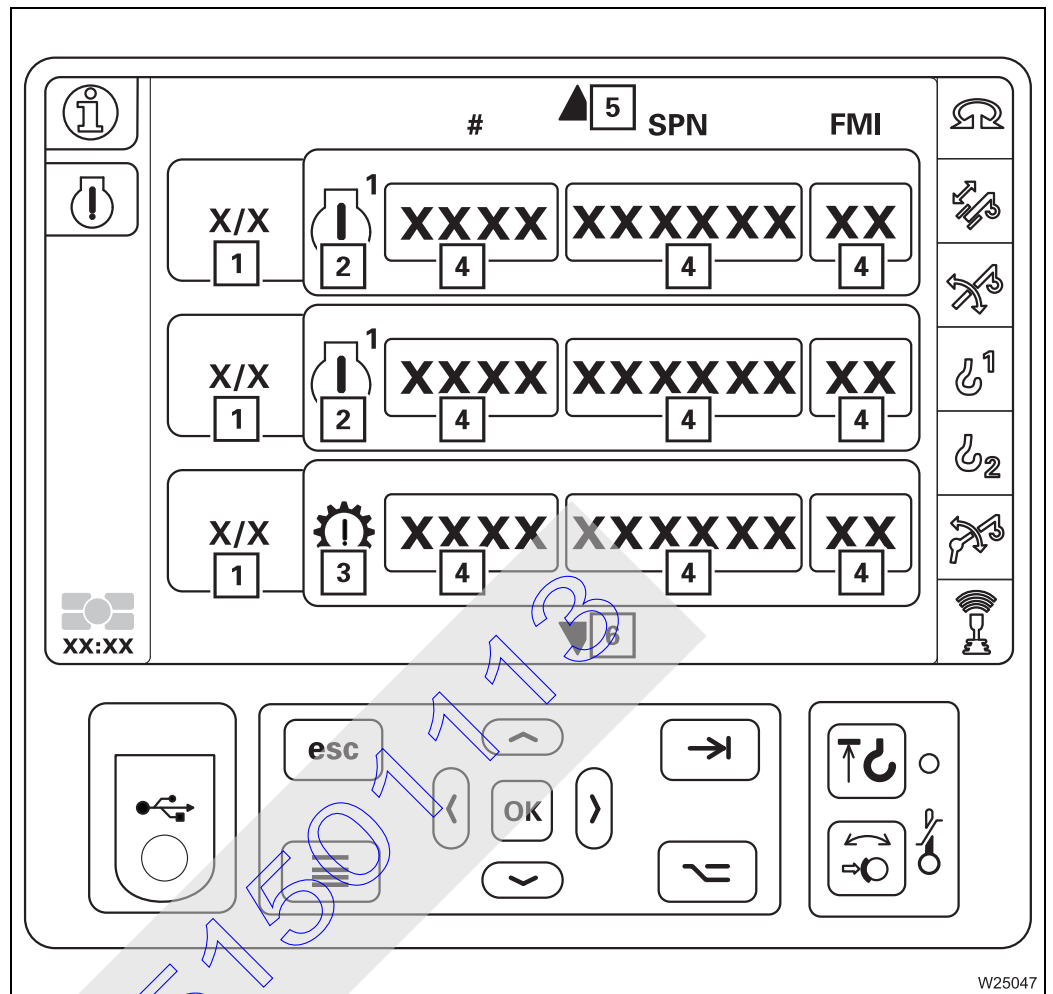
- 1 Keycode entry and confirmation
- 2 Slewing gear
- 3 Telescoping mechanism
- 4 Derricking gear
- 5 Main hoist
- 6 Transmission
- 7 Engine
- 8 Locking system
- 9 Auxiliary hoist
- 10 Carrier
- 11 Superstructure
- 12 Lattice extension – luffing jib¹⁾
- 13 Selection all

▶▶▶ p. 11 - 133

¹⁾ Additional equipment

**Engine/
transmission error
menu**

This is operated in the same way as in the driver's cab.

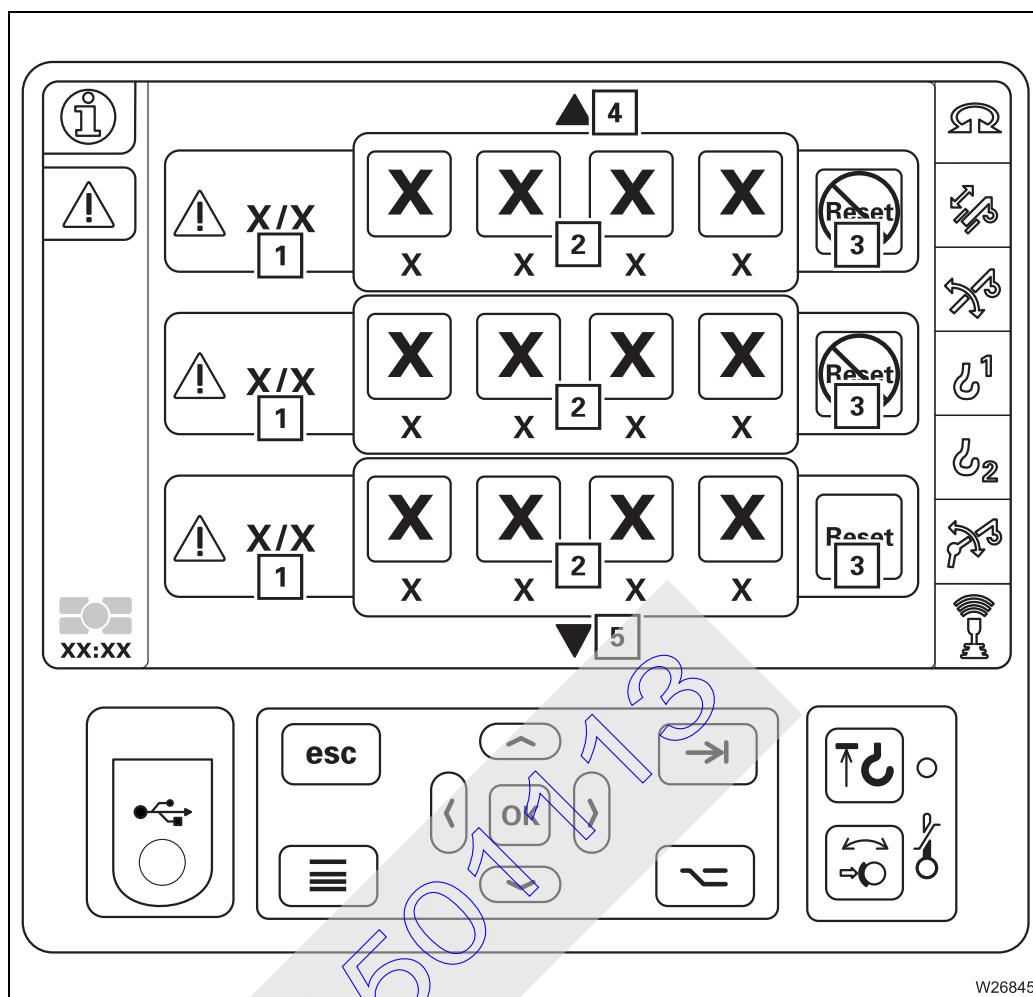


- 1 Display of error / total errors
- 2 Engine symbol display
- 3 Transmission symbol display
- 4 Error code display
- 5 Previous error
- 6 Next error

➡ p. 14 - 8



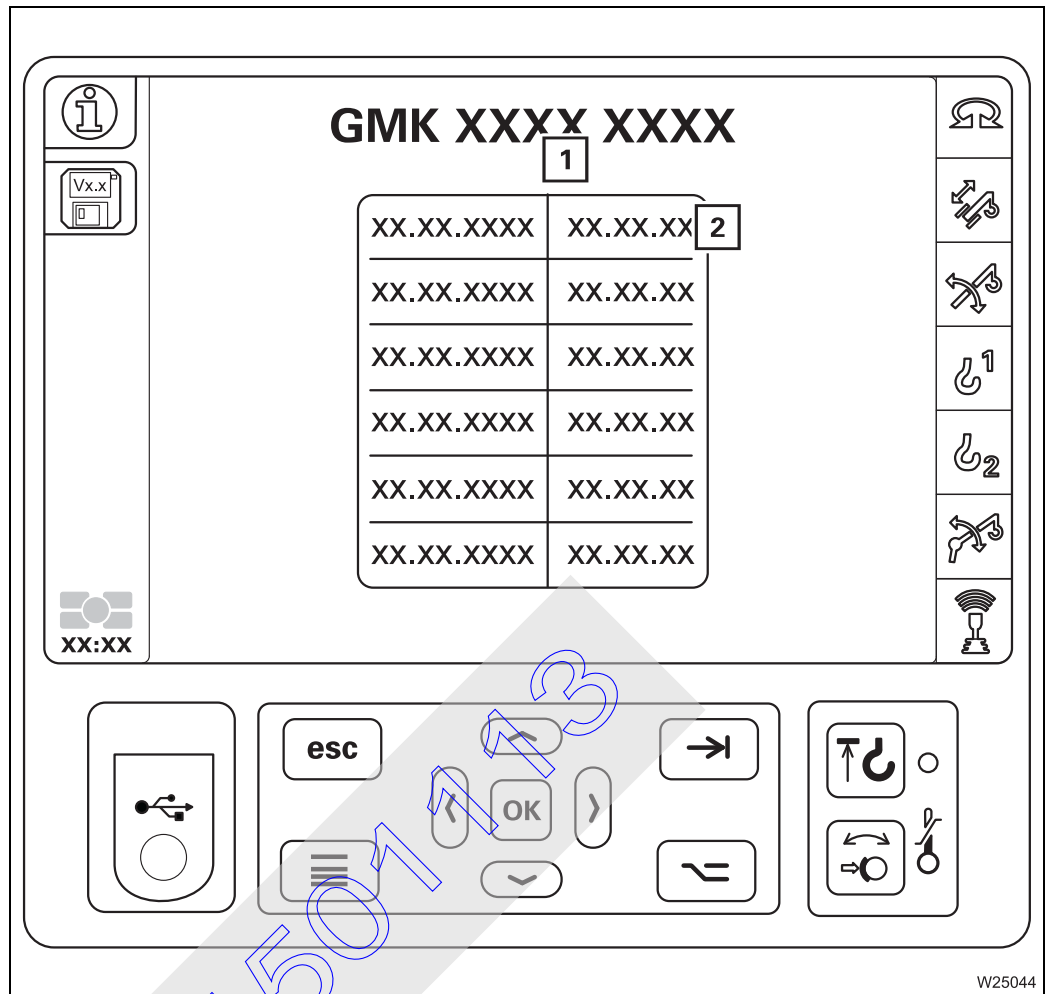
Crane operation error menu



- 1 Display of error / total errors
- 2 Error message display
- 3 To acknowledge the error
- 4 Previous error
- 5 Next error

▮▮▮ p. 14 - 8

Program version menu



W25044

- 1 Serial number display
- 2 Program version display

▣▣▣▣ p. 14 - 3

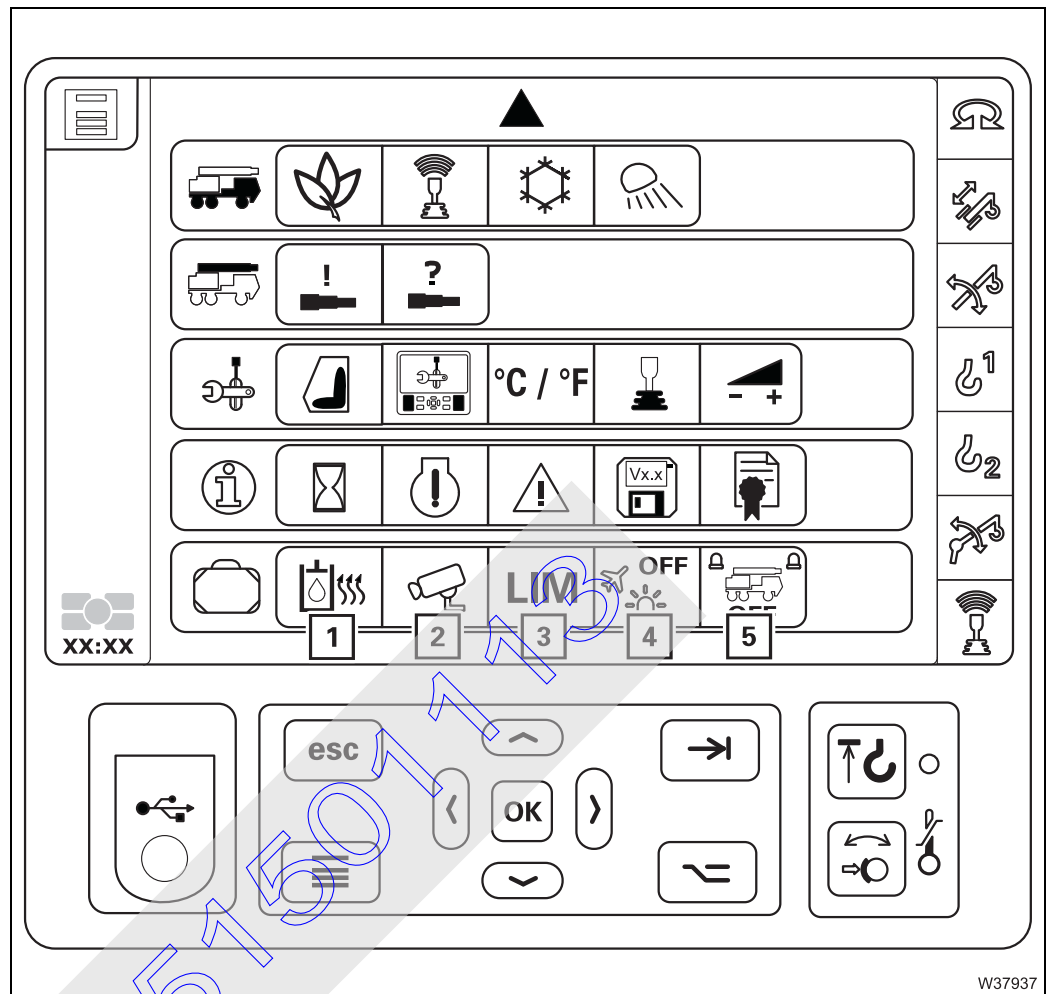
▣▣▣▣ p. 14 - 3

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9.1.18

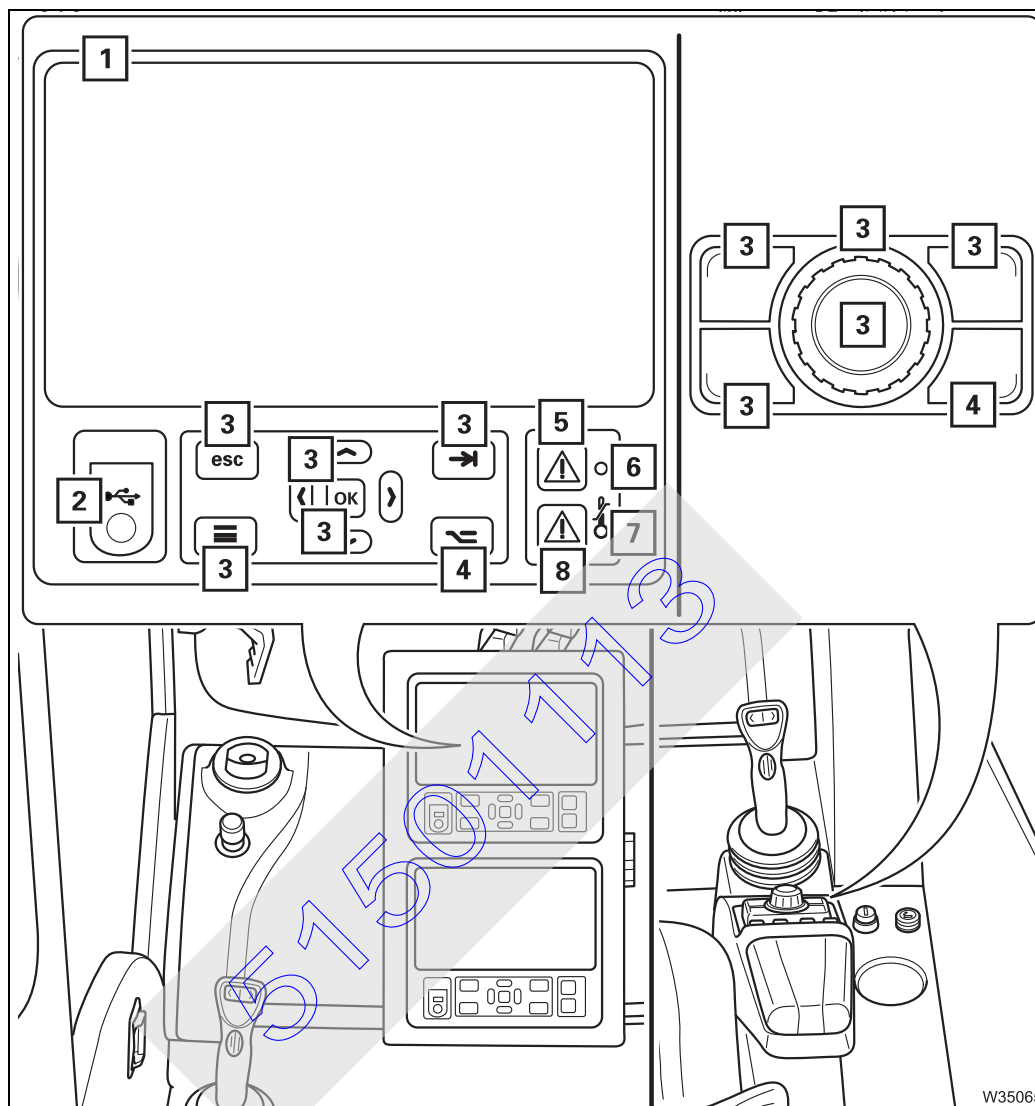
Various controls



- | | |
|--|---------------|
| 1 Preheating the hydraulic oil | ➡ p. 9 - 128 |
| 2 Camera on/off | ➡ p. 12 - 156 |
| 3 Override torque reduction | ➡ p. 11 - 132 |
| 4 Switching the air traffic control light on and off | ➡ p. 12 - 146 |
| 5 Switching the rotating beacon on/off | ➡ p. 9 - 146 |

9.1.19

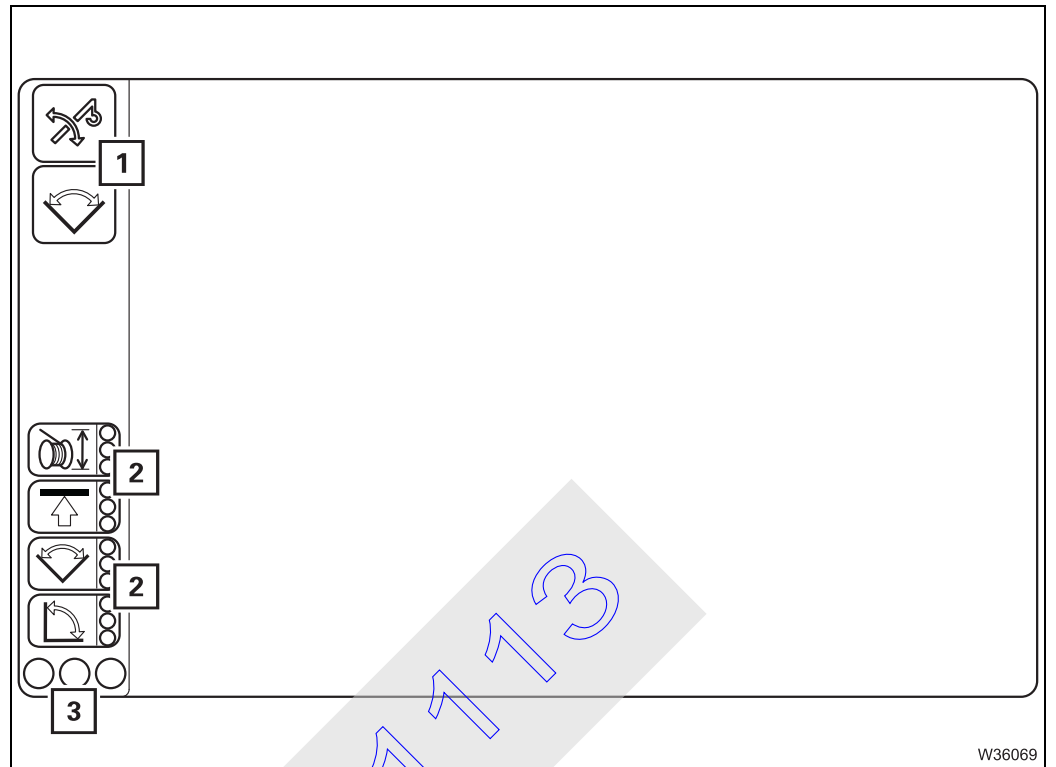
RCL control unit



- 1** RCL display
- 2** USB connection for data export ▣▣▣▣ p. 9 - 142
- 3** No function
- 4** Switch off RCL buzzer ▣▣▣▣ p. 9 - 98
- 5** RCL early warning ▣▣▣▣ p. 11 - 57
- 6** Sensor for brightness ▣▣▣▣ p. 9 - 98
- 7** RCL shutdown ▣▣▣▣ p. 11 - 57
- 8** Display temperature warning display ▣▣▣▣ p. 9 - 100

9.1.20

Menu-independent displays



1 Warning messages display

▣ p. 14 - 10

2 Working range limiter displays

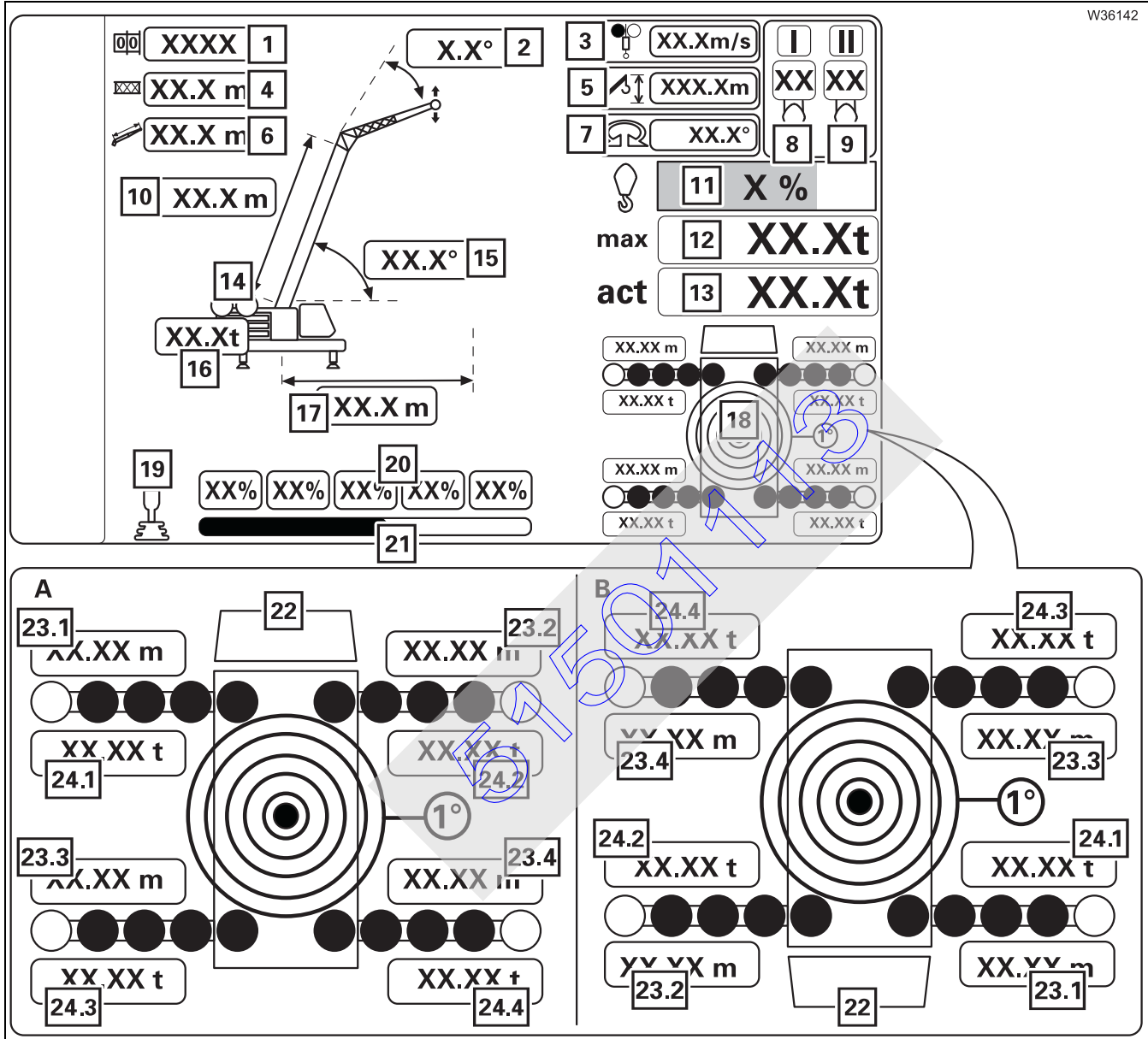
▣ p. 11 - 136

3 RCL status display

▣ p. 11 - 51

9.1.21 RCL – menus

Monitoring menu



Depending on the version, the top view in view **A** is shown, or is shown rotated by 180° in view **B**. This operating manual shows view **A** in the subsequent illustrations.

1 Display RCL code ²⁾	▣▣▣▣ p. 11 - 45
2 Current lattice extension inclination display ^{1),2)}	▣▣▣▣ p. 11 - 50
Angle of the 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 Display of current main boom length	▣▣▣▣ p. 11 - 49
11 Current degree of utilisation display	▣▣▣▣ p. 11 - 51
12 Maximum load display	▣▣▣▣ p. 11 - 51
13 Display of the currently raised load	▣▣▣▣ p. 11 - 50
14 Display of reeving used	▣▣▣▣ p. 11 - 46
15 Status display for current main boom angle	▣▣▣▣ p. 11 - 50
16 Counterweight display	▣▣▣▣ p. 11 - 45
17 Current working radius display	▣▣▣▣ p. 11 - 49
18 Current inclination display	▣▣▣▣ p. 9 - 108
19 Telescoping direction display	▣▣▣▣ p. 11 - 52
20 Current telescope status 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 - 109
24.2 Front right outrigger pressure	▣▣▣▣ p. 9 - 109
24.3 Rear left outrigger pressure	▣▣▣▣ p. 9 - 109
24.4 Rear right outrigger pressure	▣▣▣▣ p. 9 - 109

1) Additional equipment

2) Display only with the *Standard slewing range type*



**Lifting capacity
tables menu**

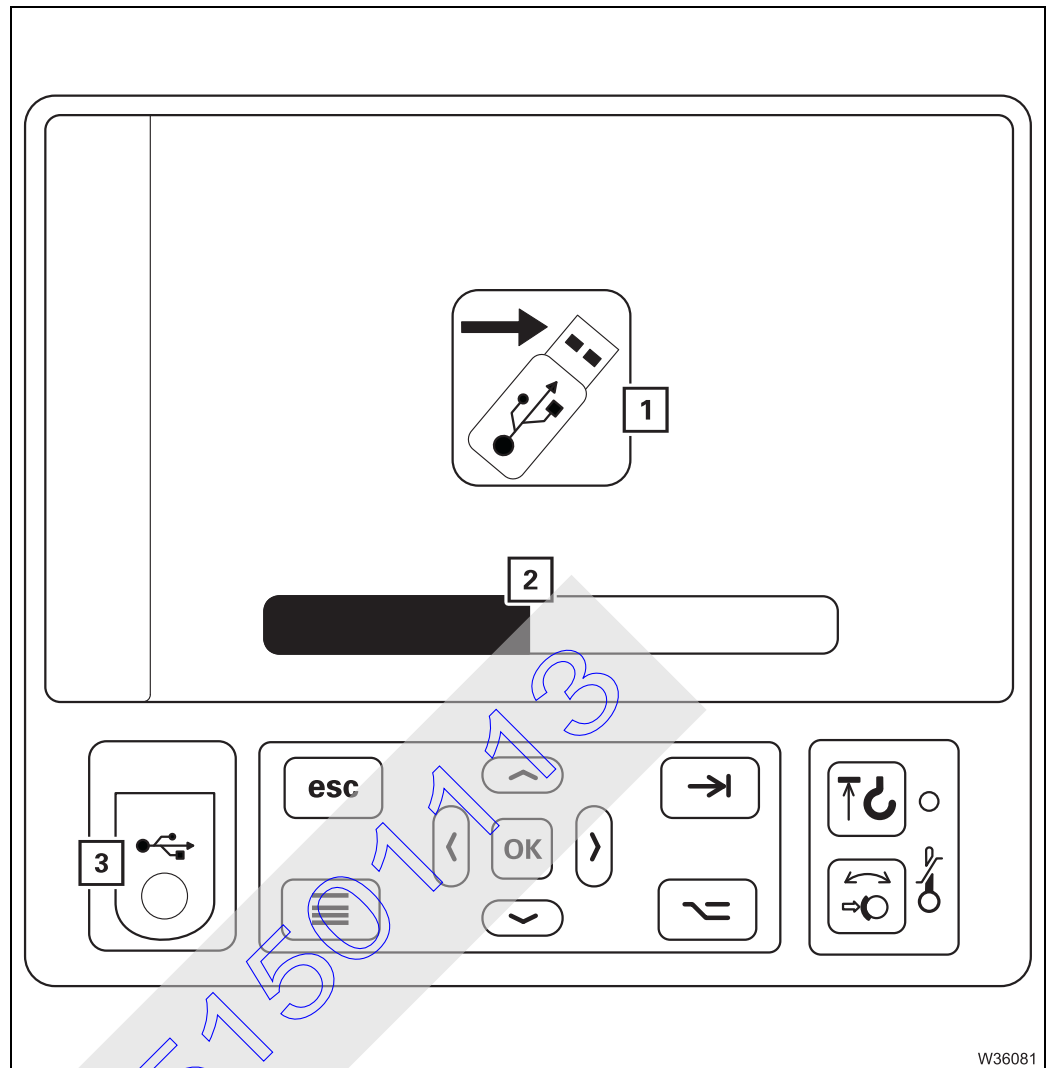
The same menu is displayed as shown on the *CCS* display;  p. 9 - 44.



Either the *Monitoring* menu or the *Lifting capacity table* menu is displayed. Additionally, the *Datalogger* menu can be manually opened (from the *CCS* display).

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Datalogger menu



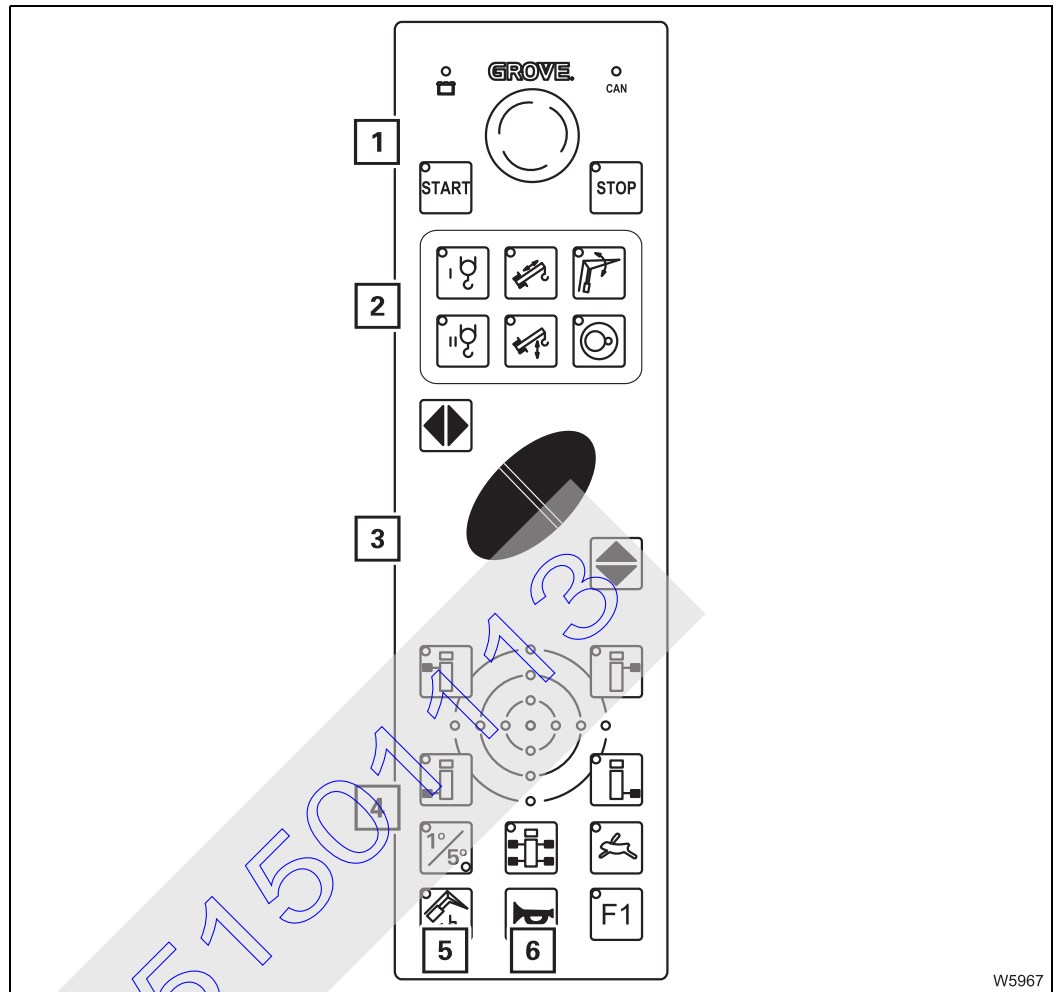
- | | | |
|----------------------------------|-------|------------|
| 1 Export data | ▣▣▣▣▶ | p. 9 - 142 |
| 2 Display of export progress | ▣▣▣▣▶ | p. 9 - 142 |
| 3 USB connection for data export | ▣▣▣▣▶ | p. 9 - 142 |

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9.1.22

Hand-held control



W5967

- 1 Engine control panel ▣▣▣ p. 9 - 151
- 2 Pre-select emergency operation¹⁾ ▣▣▣ p. 9 - 152
- 3 Function buttons ▣▣▣ p. 9 - 152
- 4 no function
- 5 no function
- 6 Horn ▣▣▣ p. 9 - 151

1) Additional equipment



Required connections for the various movements; ▣▣▣ p. 9 - 150.

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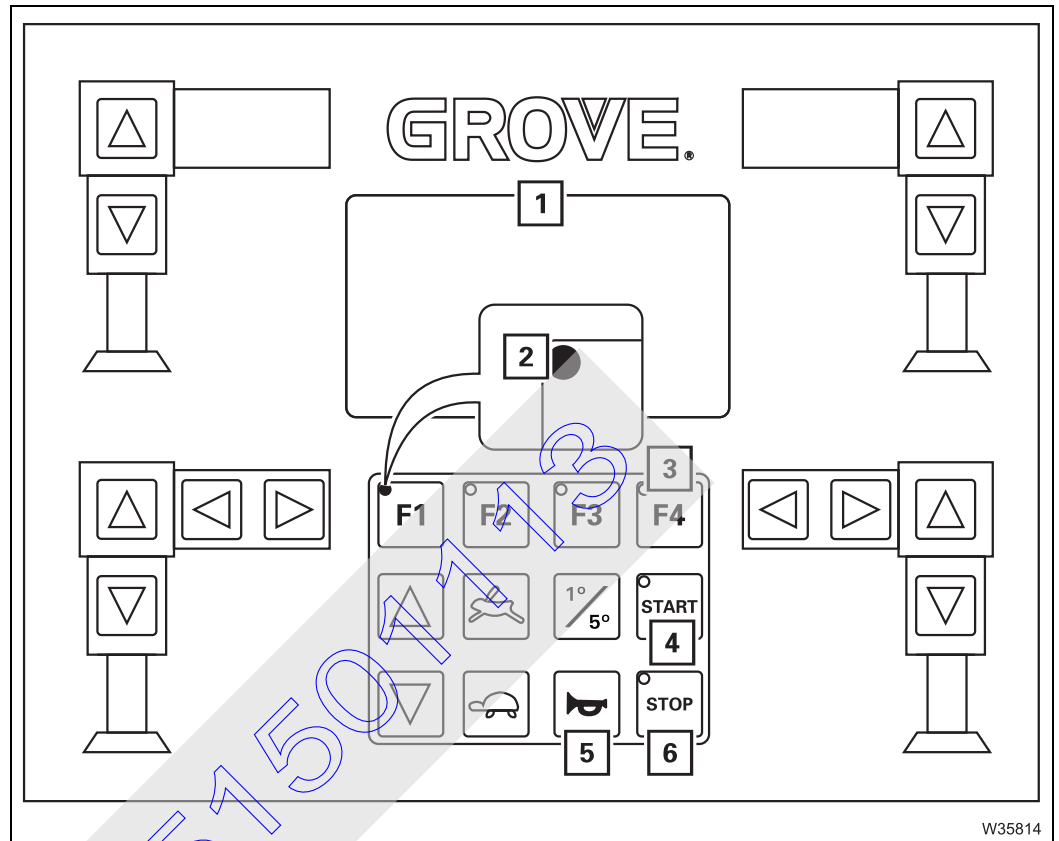
51501113

9.1.23

Outriggers control units

Menu-independent buttons

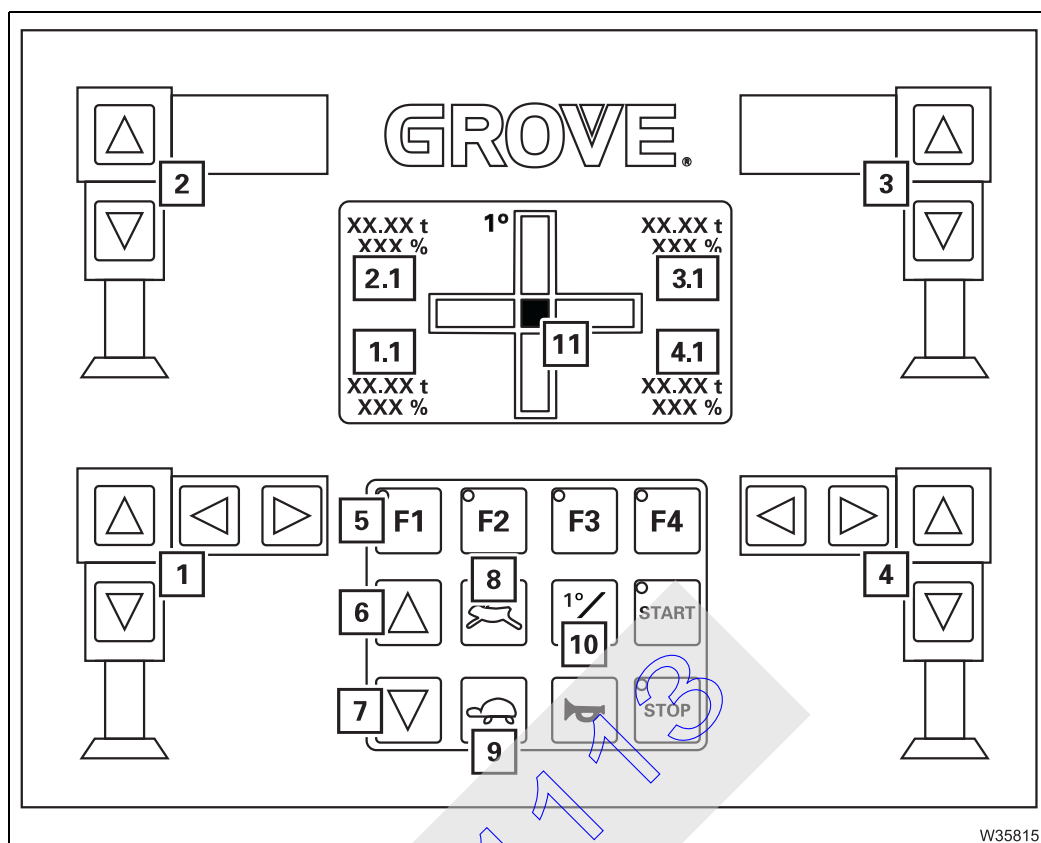
This function of the illustrated buttons is the same in all the menus.
This function of the other buttons depends on the opened menu.



- | | |
|--|------------------|
| 1 Outrigger display | ▣▣▣▣▶ p. 9 - 103 |
| 2 Position lights for indicator lamps | ▣▣▣▣▶ p. 9 - 103 |
| 3 Menu selection | ▣▣▣▣▶ p. 9 - 103 |
| – Outrigger menu | ▣▣▣▣▶ p. 9 - 86 |
| – Raise axle menu | ▣▣▣▣▶ p. 9 - 88 |
| 4 START engine | ▣▣▣▣▶ p. 12 - 29 |
| 5 Horn | ▣▣▣▣▶ p. 9 - 104 |
| 6 STOP engine | ▣▣▣▣▶ p. 12 - 29 |



Outrigger menu



W35815



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

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

Outriggers

- | | | |
|---|---|-----------------|
| 1 | Operating the left outriggers | ▶▶▶▶ p. 9 - 104 |
| 2 | Operating the left outriggers, opposite side | ▶▶▶▶ p. 9 - 104 |
| 3 | Operating the right outriggers, opposite side | ▶▶▶▶ p. 9 - 105 |
| 4 | Operating the right outriggers | ▶▶▶▶ p. 9 - 105 |
| 5 | Additional function F1 | |
| 6 | Retracting all supporting cylinders | ▶▶▶▶ p. 9 - 105 |
| 7 | Extending all supporting cylinders | ▶▶▶▶ p. 9 - 105 |
| 8 | Pre-select high-speed mode | ▶▶▶▶ p. 9 - 103 |
| 9 | – Pre-select normal speed | ▶▶▶▶ p. 9 - 103 |
| | – Automatic alignment – as additional function F1 | ▶▶▶▶ p. 9 - 105 |

Outrigger pressure display

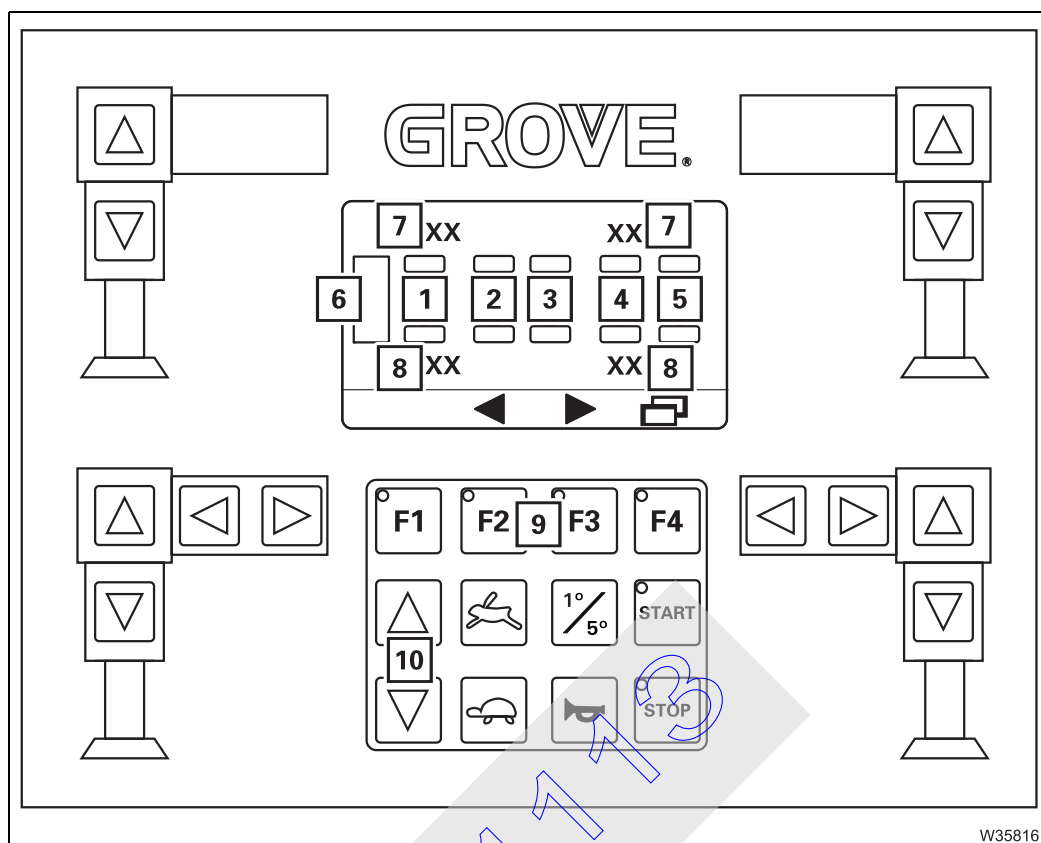
- | | | |
|-----|---|-----------------|
| 1.1 | Left-hand outrigger pressure display | ▶▶▶▶ p. 9 - 109 |
| 2.1 | Left-hand outrigger pressure display, opposite | ▶▶▶▶ p. 9 - 109 |
| 3.1 | Right-hand outrigger pressure display, opposite | ▶▶▶▶ p. 9 - 109 |
| 4.1 | Right-hand outrigger pressure display | ▶▶▶▶ p. 9 - 109 |

Inclination indicator

- | | | |
|----|------------------------------------|-----------------|
| 10 | Switching over the measuring range | ▶▶▶▶ p. 9 - 108 |
| 11 | Display of current inclination | ▶▶▶▶ p. 9 - 108 |



Raise axle menu



- | | | |
|---------------|-------------------------------------|------------------|
| 1 to 5 | Pre-selection display | ▣▣▣▣▶ p. 9 - 106 |
| 6 | Directional indicator | |
| 7 | Wheel load display, opposite | ▣▣▣▣▶ p. 9 - 107 |
| 8 | Wheel load display, operator's side | ▣▣▣▣▶ p. 9 - 107 |
| 9 | Pre-selecting wheels | ▣▣▣▣▶ p. 9 - 106 |
| 10 | Lifting/lowering wheels | ▣▣▣▣▶ p. 9 - 107 |

9.2

Short description of the operating elements



Risk of accident by operator error

This section is not a complete operating manual. It only provides a general overview of the functionality of the operating elements.

Before using the operating elements for the first time, read through the following chapters and the safety instructions listed there.



This section does not contain all the requirements that must be fulfilled for several operating elements to be active.

If some operating elements do not work, first read the following chapters which are referred to at the respective places before contacting

Manitowoc Crane Care.

9.2.1

Definition of information relating to directions of movement

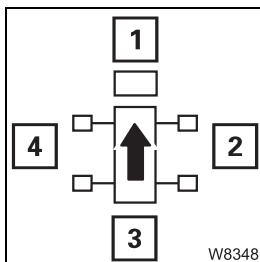
Basic rule

Directions always depend on whether the carrier or the superstructure is being operated.

On the carrier

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

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



W8348

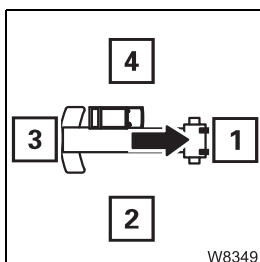
Forwards always means the driver's cab is to the front.

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 that:

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



W8349

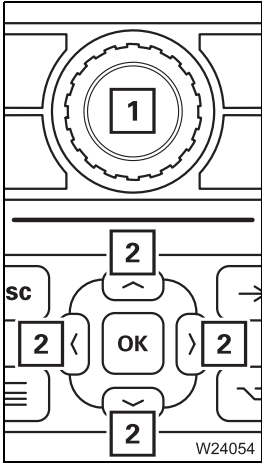


9.2.2

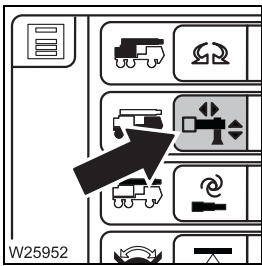
General rules for buttons and symbols on the display

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

- A menu can only be opened if the relevant symbol has been selected with the jog dial (1) or direction buttons (2).

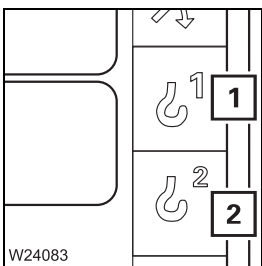


- A selected menu is marked in colour and can be opened.

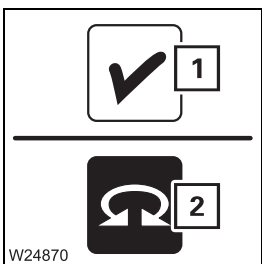


- Symbols can be shown in different colours. The colour of the symbol indicates the current switching state of the relevant power unit.

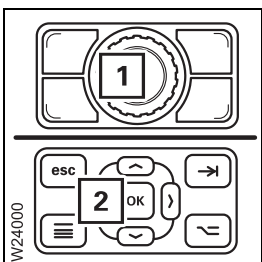
- 1 Grey:** e.g. main hoist – switched off
- 2 Green:** e.g. auxiliary hoist – switched on



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



If the instruction given in this section is to "Press the button once...", for instance, this always refers to the button (1) or (2). This is the case if a menu is opened or a function is to be carried out.



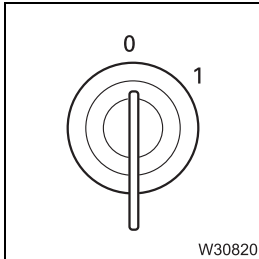
9.2.3

Engine

Side panel

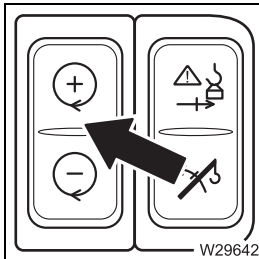
▣▣▣▣ *Starting the engine – from the crane cab, p. 10 - 3.*

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 - 7



Starting the engine

- The engine must be off:

- **Press upwards once:** Engine starts,
idling speed = standard

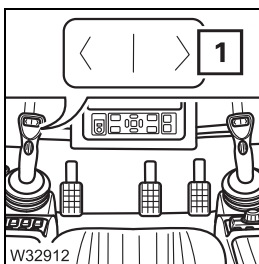
Set idling speed

- The engine is running:

- **Press up:** Increase idling speed
- **Press down:** Decrease idling speed,
engine cutout after about 6 seconds.

▣▣▣▣ p. 10 - 9

Left control lever

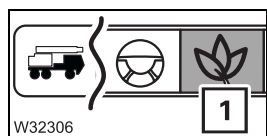


- The engine must be off:

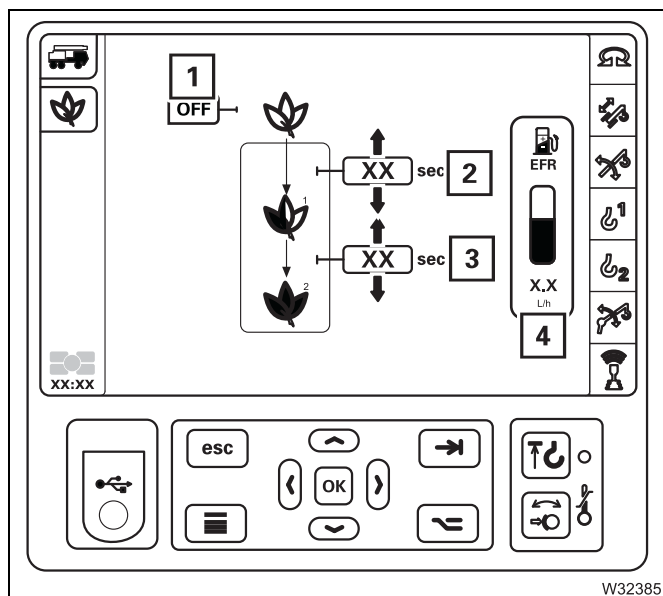
- **Press and keep depressed:** Engine starts,
Idling speed = standard



Economy mode menu



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



Select symbol and confirm for:

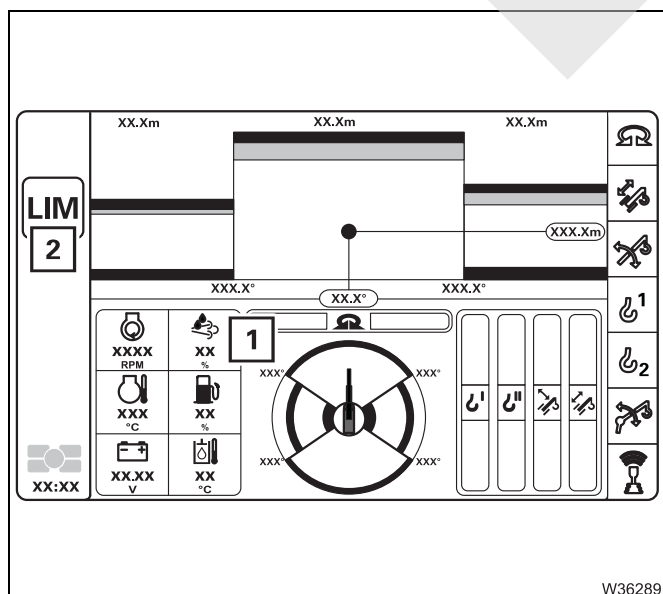
- 1 Switching off Economy mode on/off
- 2 Set interval 1
- 3 Set interval 2
- 4 Average consumption

▮ p. 11 - 126

9.2.4

AdBlue system

CCS display



AdBlue warning

- 1 - **Green:** - AdBlue tank level sufficient
- **Yellow:** - Adblue (DEF) tank almost empty; ▮ AdBlue tank, p. 4 - 7
- **Red:** - Adblue (DEF) tank empty - symbol (2) displayed



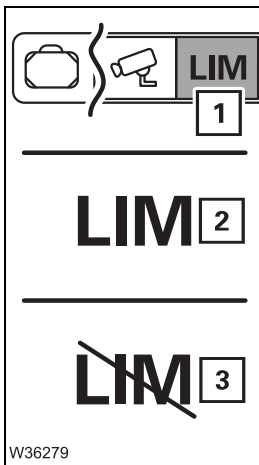
AdBlue system fault

- 1 – On: *Faults on the Adblue system, p. 8 - 21*



Torque reduction indicator lamp

- 1 – On: Reduction in torque the next time the engine is started
1 – Out: Torque reduction off or overridden
2 – On: Torque reduction on



Override torque reduction

Symbol (2) is displayed

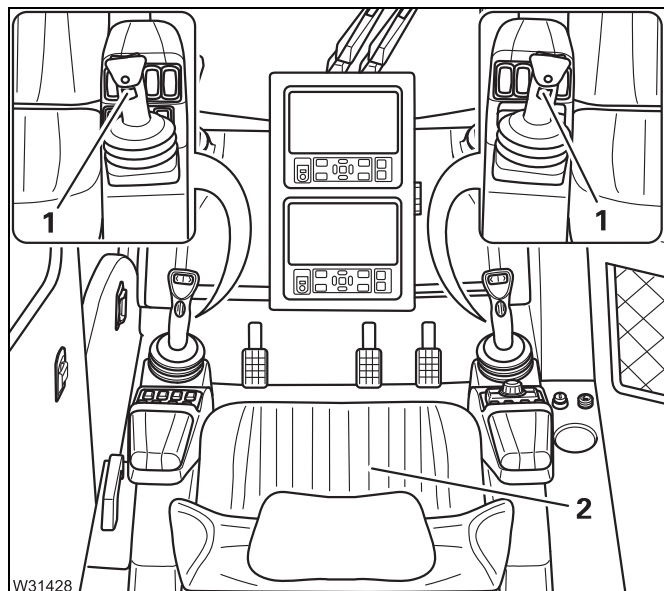
- 1 – **Select and confirm:** Torque reduction overridden for 30 minutes – symbol (3) displayed
after 30 minutes
- 1 – **Select and confirm:** Torque reduction overridden for 30 minutes – symbol (3) displayed
after 30 minutes
- 1 – **Select and confirm:** Torque reduction overridden for 30 minutes – symbol (3) displayed – after this, symbol (1) without function until the next engine restart

Overriding torque reduction, p. 11 - 132

9.2.5

Seat contact switch and dead man's switch

The seat contact switch and the dead man's switch are safety devices for releasing crane functions.



Releasing crane functions

- Sit down – seat contact switch (2) on
- or
- Press at least one dead man's switch (1)

Safety function on

- Get off seat – seat contact switch off
- and
- Both dead man's switches (1) not pressed

All operating elements for crane functions in the crane cab are locked.

Any crane movements are slowed down to standstill within 3 seconds and then locked.

Crane cab seat – version 2

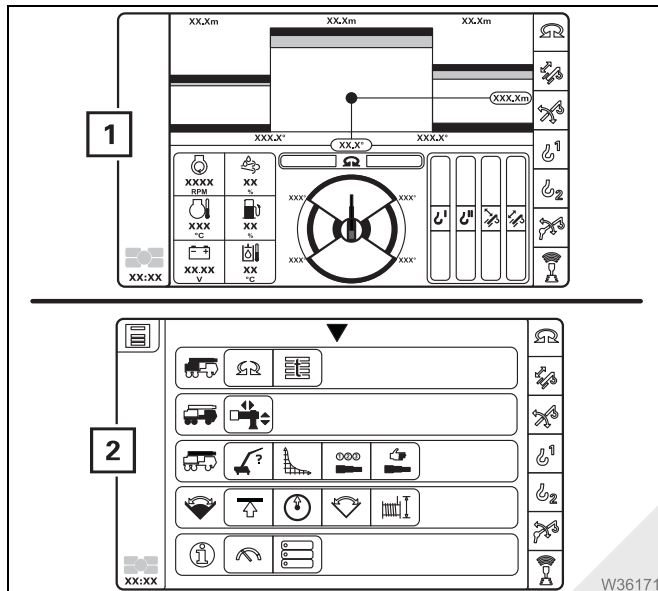
The seat contact switch is very sensitive. It is recommended that you also press the dead man's switch in order to avoid unintentional shutdown.

▣▣▣▣ ▶ *Seat contact switch*, p. 11 - 12

9.2.6

Crane control CCS

The GMK5150L 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.



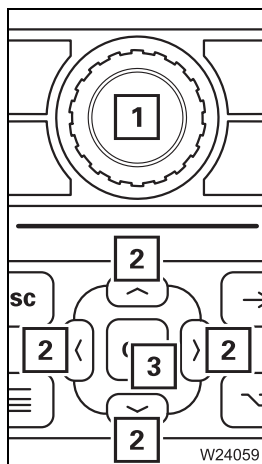
Display CCS

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

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 red.

A menu is opened by pressing the jog dial or the OK button on the control panel.



Menu control

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

- Select

1 Slewing or 2 Press

- The selected range is marked.

- Activate / confirm

1 Press or 3 Press

- The marked range is activated.

- The entry is confirmed.

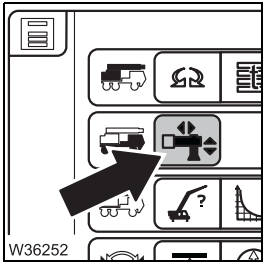
The function of the buttons is different depending on the area. There are three areas.

▣ In the menu area, p. 9 - 96

▣ In the input area, p. 9 - 96

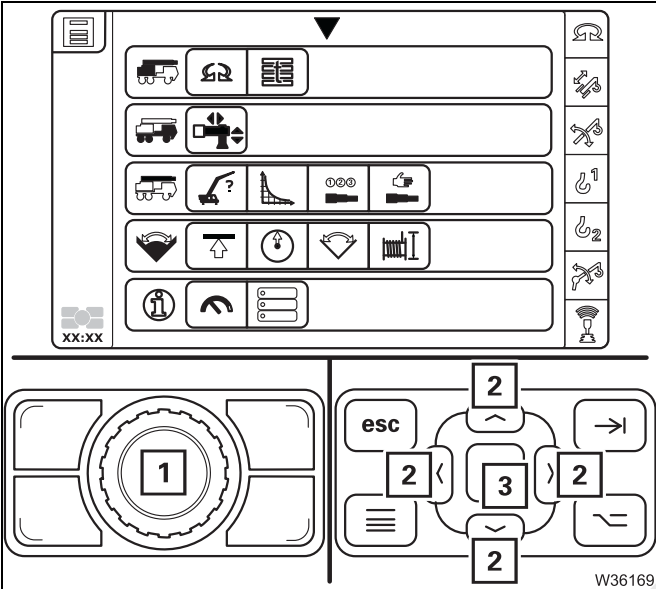
▣ In the operating area, p. 9 - 97





In the menu area

- For selecting and opening menus.
 One symbol is always selected.



Select a menu

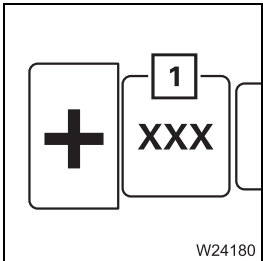
- 1 Slewing** or **2 Press**

- The next symbol is marked.

Menu, open

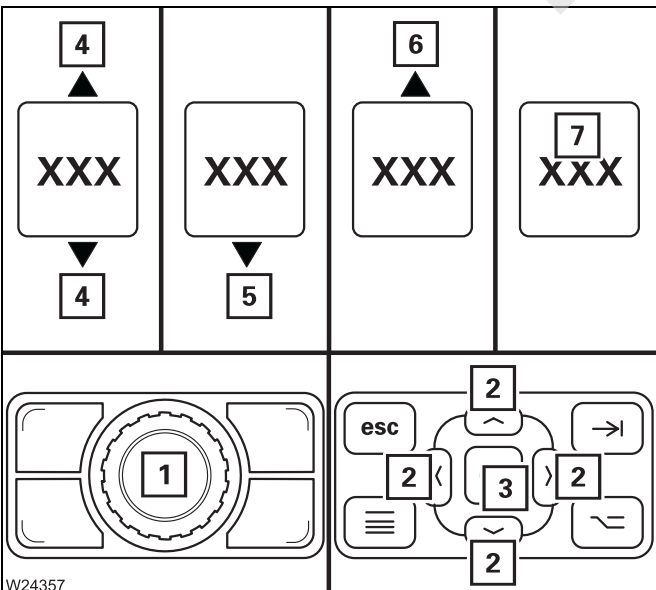
- 1 Press** or **3 Press**

- The corresponding menu is opened.



In the input area

- For selecting and confirming values.
 A field (1) with numbers or letters is marked.



Select a value

- 1 Slewing¹⁾** or **2 Press**

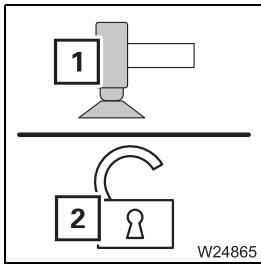
- 4** Value can be reduced/increased
- 5** Highest value achieved
- 6** Lowest value achieved

- ¹⁾ Holding pressed and turning results in a quick value change.

Confirm value

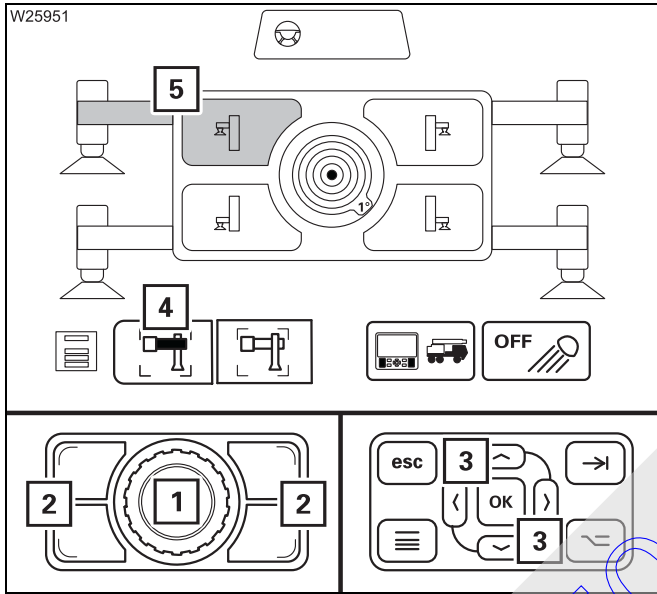
- 1 Press** or **3 Press**

- Displayed value (7) is adopted – input mode off.



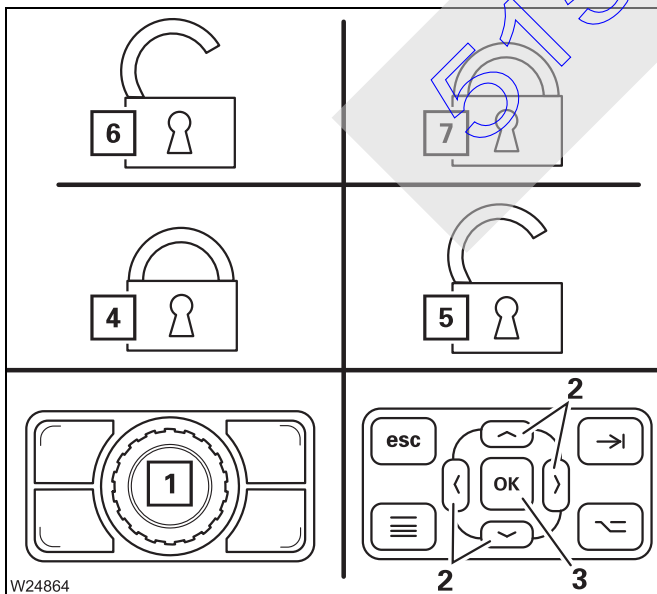
In the operating area

- For carrying out movements during rigging.
The required element is marked, e.g. outrigger cylinder (1).
- For turning on/off and switching
A symbol for a status is marked, e.g. symbol (2).



Executing a movement

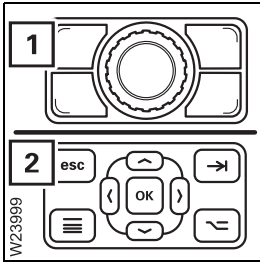
- Select function
3 Press or **1 Slewing**
- The marked function (4) or (5) is selected.
- Move function
2 Press
- The selected function is carried out.



Turning on/off and switching

- Selecting status
2 Press or **1 Slewing**
- The marked state (4) or (6) is selected.
- Switch on state
1 Press or **3 Press**
- The selected state (5) or (7) is established.

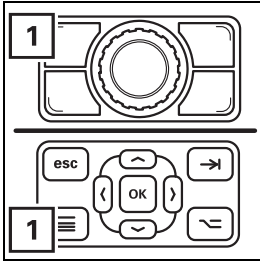




Exiting the menu/input mode

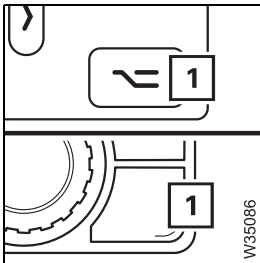
Press button (1) or (2) to exit the menu or input mode.

- **Press the button once:**
 - The opened menu closes – the menu from the next higher level is opened
 - Input mode is deactivated



Overview menu groups

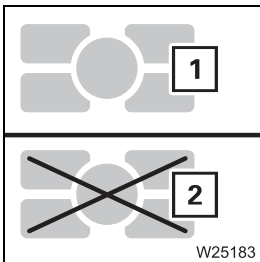
- 1 Press:**
 - After the first press
Menu groups overview display
 - After a subsequent press
Next/previous group overview



Switch off the RCL buzzer

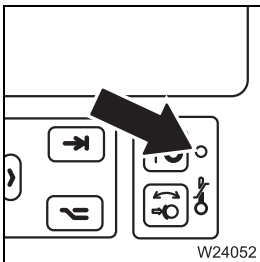
In some cases not active until after 5 seconds

- **Press once:** Buzzer is switched off



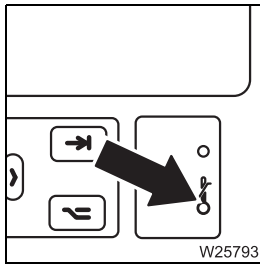
Jog dial display

- 1 Jog Dial OK
- 2 Jog Dial not working
Communication fault or error (error display)



Sensor for brightness

Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted; Display – setting the brightness, p. 10 - 6.



Display temperature warning display

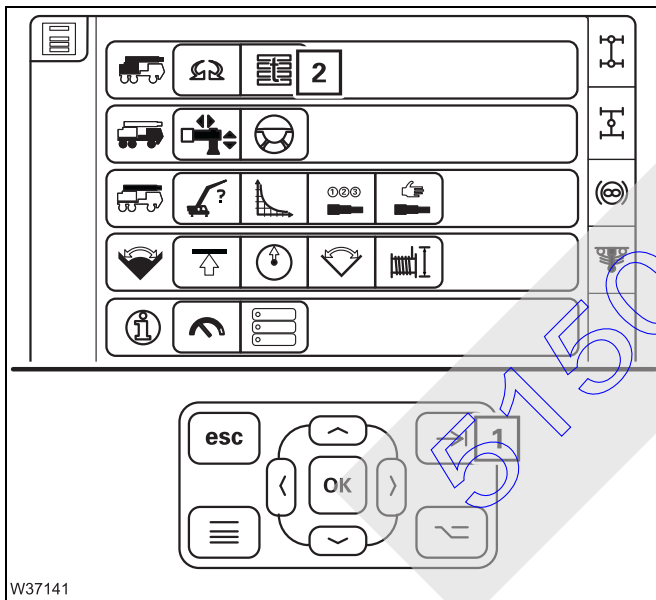
The temperature of the control unit is measured by an internal sensor.

- **Blue, flashing:** Temperature too low – display will not be 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 symbols can be selected as favourites. The cursor jumps directly from favourite to favourite when scrolling through the menu groups.



Select

A symbol is selected, such as symbol (2).

1 Press

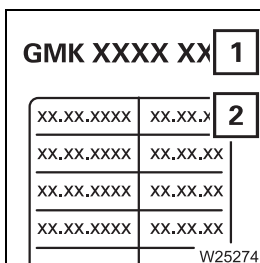
The symbol is marked as a favourite.

Deselect

A favourites symbol is selected.

1 Press

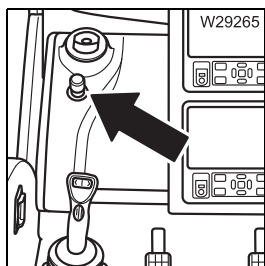
The favourites selection is cancelled.



Serial number and program version display

- 1 Truck crane serial number
- 2 Current program version of the crane control – always include in the event of a malfunction; ▣▣▣▣ p. 14 - 3



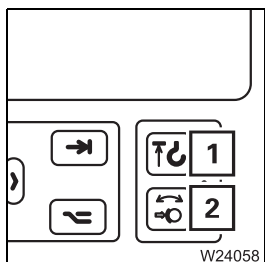


Emergency stop switch

May only be used in an emergency.

- **Press:** Engine off – crane functions stop immediately. Switch latches
- **Turn the latched switch:** Switch returns to initial position – crane functions released

▣▣▣▣ p. 10 - 12



Other

- 1 Lifting limit switch warning; ▣▣▣▣ p. 9 - 118
- 2 Slewing gear brake indicator lamp; ▣▣▣▣ p. 9 - 118

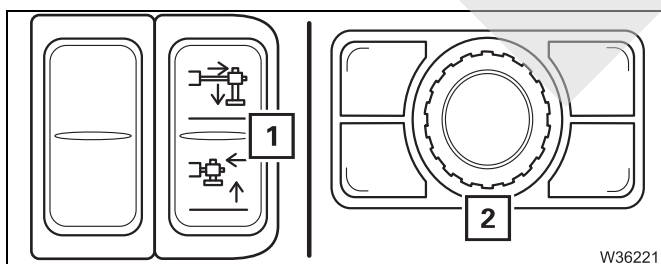
9.2.7

Outrigger – crane cab

- ▣▣▣▣ *Extending/retracting outrigger beams*, p. 12 - 49
- ▣▣▣▣ *Extending/retracting supporting cylinders*, p. 12 - 56

The display fields must be switched on for crane operation – in the driver's cab, in the *Settings* menu on the CCS display.

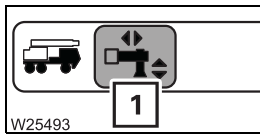
Control panels



Short description on the CCS display

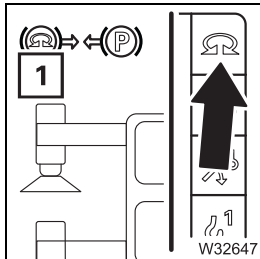
- 1 Left – Moving the outrigger; ▣▣▣▣ p. 9 - 102
- 2 Right – Outrigger pre-selection; ▣▣▣▣ p. 9 - 102

CCS display



Outrigger menu

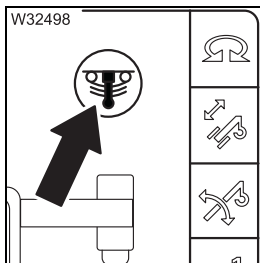
- **Opening:** Select and confirm symbol (1)



Slewing gear/movements locked display

- **Red:** Slewing gear switched off – symbol (1) out
- **Green:** Slewing gear switched on – outrigger movement disabled – symbol (1) is displayed

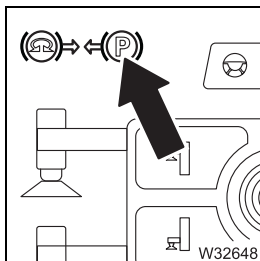
➡ p. 12 - 45



Suspension on/off display/warning

- **Red:** Suspension is switched off
- **Green:** Suspension switched on – outrigger movement disabled – symbol is displayed

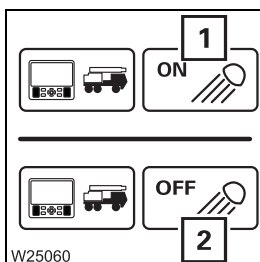
➡ p. 12 - 45



Parking brake/movements locked display/warning

- **Red:** Parking brake released – outrigger movements locked
- **Out:** Parking brake applied – outrigger movements enabled

➡ p. 12 - 45

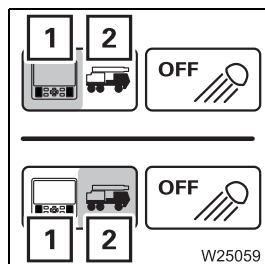


Outrigger lighting on/off

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

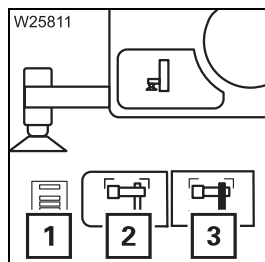
➡ p. 12 - 45





Outrigger control units on/off

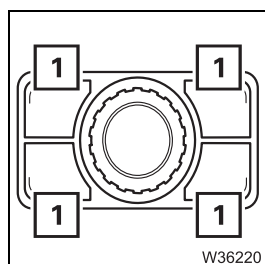
- **Switch on:** Select symbol (2) and confirm – symbol (1) is **grey**
 - **Switch off:** Select symbol (1) and confirm – symbol (2) is **grey**
- ☞ p. 12 - 45



Switch over/exit the menu

Select symbol and confirm – symbol is green

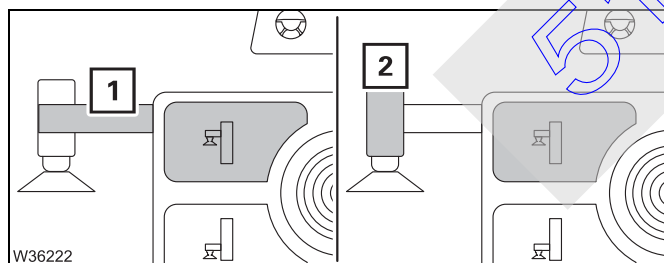
- 1 **Exiting the menu:**
- 2 **Outrigger menu**
- 3 **Outrigger cylinders menu**



Outrigger pre-selection

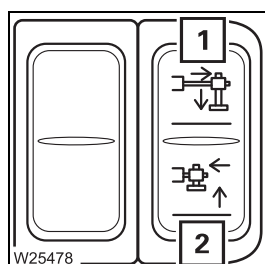
The associated outrigger cylinder or outrigger beam is pre-selected, depending on the menu that is open.

- **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

An outrigger cylinder or outrigger beam is pre-selected.

- 1 **Extend:** Press up the button
- 2 **Retract:** Press down the button

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

9.2.8

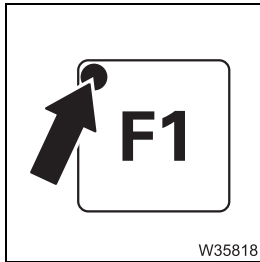
Outrigger control units

- ▣▣▣▣▶ *Extending/retracting outrigger beams*, p. 12 - 49
- ▣▣▣▣▶ *Extending/retracting supporting cylinders*, p. 12 - 56

All directional information relates to the carrier; ▣▣▣▣▶ p. 9 - 89.

General information

The function of the general elements is independent of the menu shown on the *Outrigger* display.

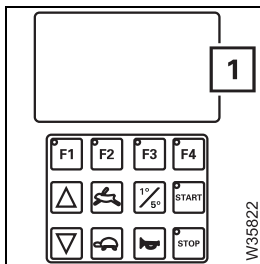


Position lights for indicator lamps

Light up when the ignition is on.

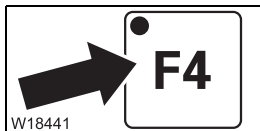
- **Display field lighting off:** Ignition on and no button activated yet or no button activated within the last 10 seconds
- **Display field lighting on:** Press any button

▣▣▣▣▶ p. 12 - 51



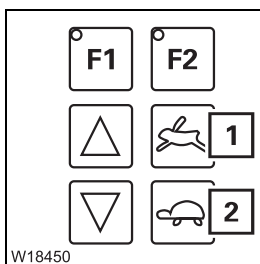
Outrigger display

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

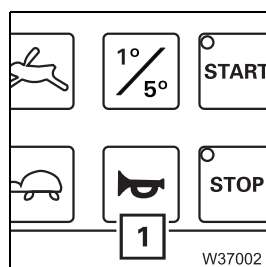
Selection: Press the button – the next menu is shown on the *Outrigger* display



Pre-select high-speed/normal speed mode

- 1 Pre-select:** Press button – high-speed mode pre-selection on
- 2 Pre-select:** Press button – normal speed pre-selection on





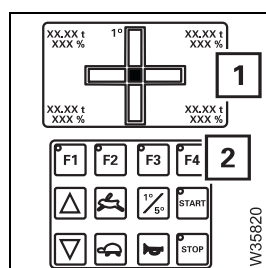
Horn

The ignition must be switched on.

- 1 - Press:** Carrier horn on

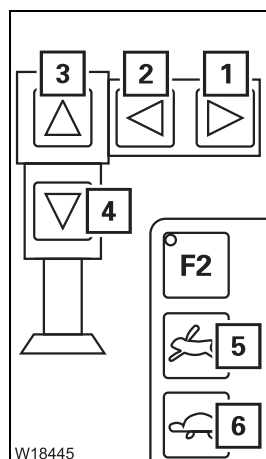
Outrigger menu

The operating elements for the outriggers are only active when the *Outrigger* menu is open.



Outrigger menu

- Opening:** Press button (2) repeatedly until display (1) appears.



Operating the left outriggers (next to control unit)

Button (5) or (6) is pressed.

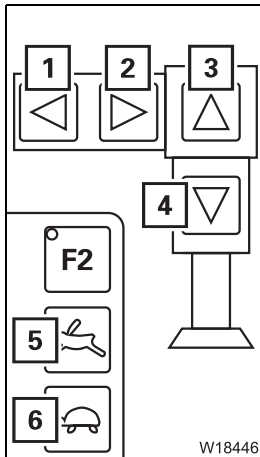
- 1 Retract:** Press button – outrigger beam retracts¹⁾
- 2 Extend:** Press button – outrigger beam extends¹⁾
- 3 Retract:** Press button – outrigger cylinder retracts
- 4 Extend:** Press button – outrigger cylinder extends

¹⁾ only on operator's side

Outrigger beams; ▮▮▮▮ p. 12 - 51

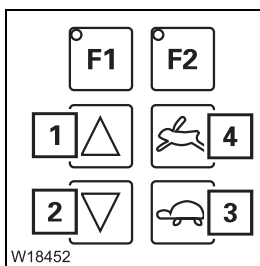
Outrigger cylinders; ▮▮▮▮ p. 12 - 57

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



Operating the right outriggers (next to control unit)

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

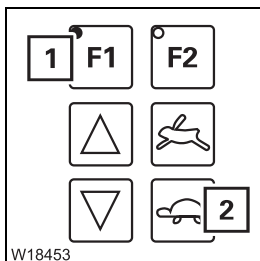


Extending/retracting all outrigger cylinders

Button (3) or (4) is pressed.

- 1 Retract:** Press button – all outrigger cylinders retract
- 2 Extend:** Press button – all outrigger cylinders extend

Movement stops after the button is released, and when an end position is reached; ||||▶ p. 12 - 57.



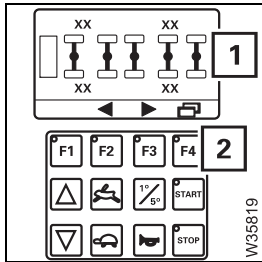
- Automatic alignment

Press button (1) and button (2) together –
 Truck crane is levelled horizontally
 The process stops as soon as the truck crane is levelled horizontally or
 the button is released

||||▶ p. 12 - 62

9.2.9 Raise axle

Operating the axle raising system, p. 12 - 66

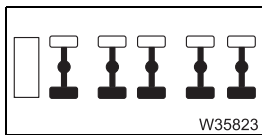


Raise axle menu

The suspension is switched off (locked).

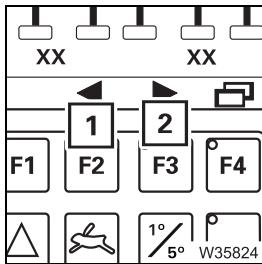
– **Opening:** Press button (2) repeatedly until display (1) appears.

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.

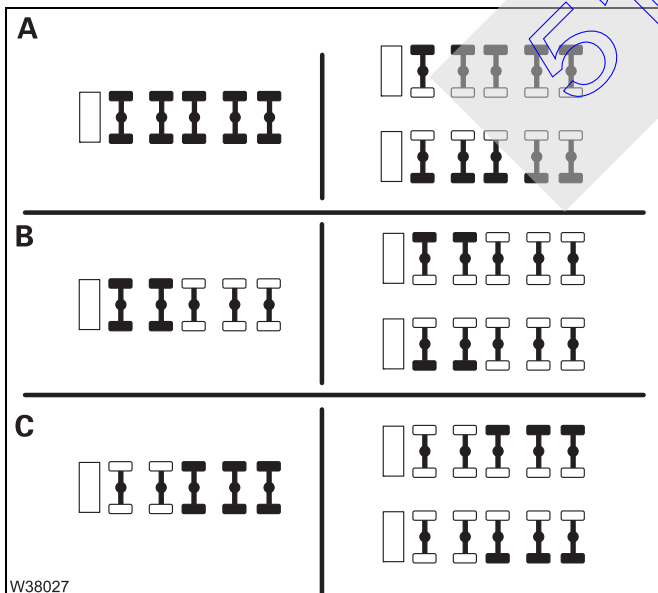


Pre-selecting wheels

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

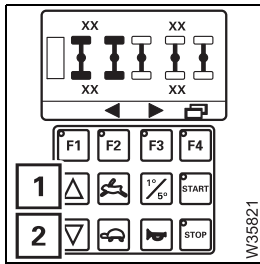
A All wheel groups

- All wheels
- Opposing wheels
- Operator side wheels

B Front wheel group

C Rear wheel group

- All wheels
- Opposing wheels
- Operator side wheels

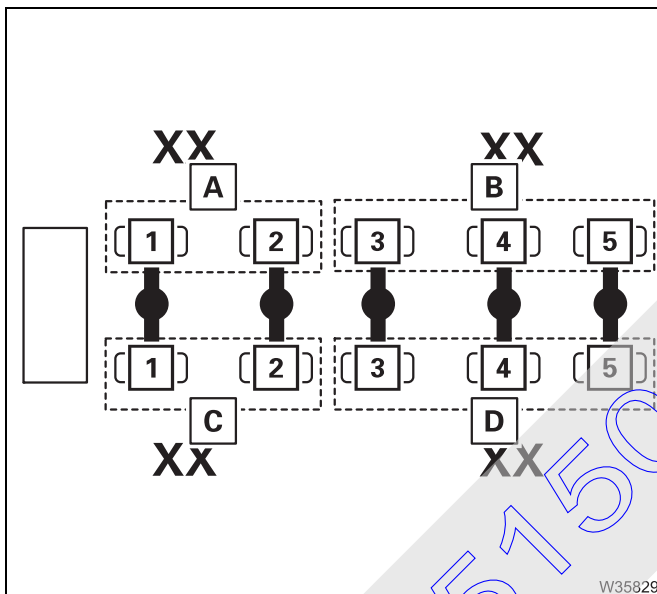


Lifting/lowering wheels

The axle load on the pre-selected wheels lies 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

The displays (A) to (D) show the sum of the wheel loads for the associated wheels.

– Opposite the operator side

- A** Wheel load of the wheels A1 + A2
- B** Wheel load of the wheels B3 + B4 + B5

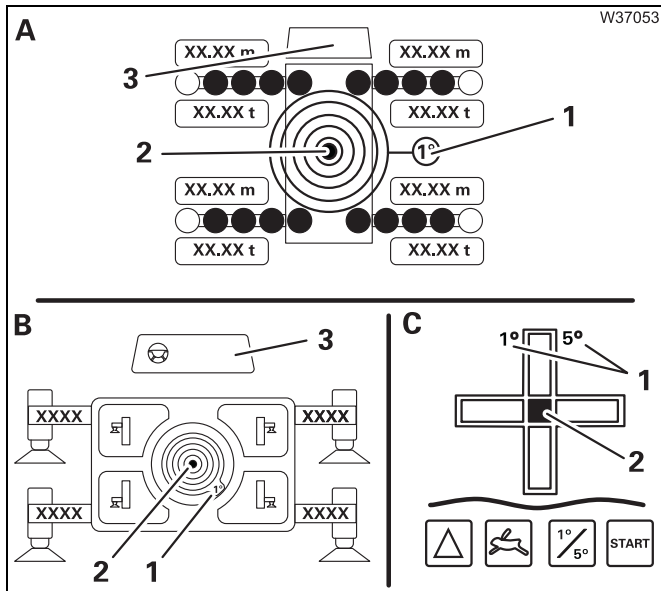
– Operator's side

- C** Wheel load of the wheels C1 + C2
- D** Wheel load of the wheels D3 + D4 + D5

The display is in tons or kilopounds, depending on the setting – (1 Kilopound = 1,000 lbs).

9.2.10 Inclination indicators

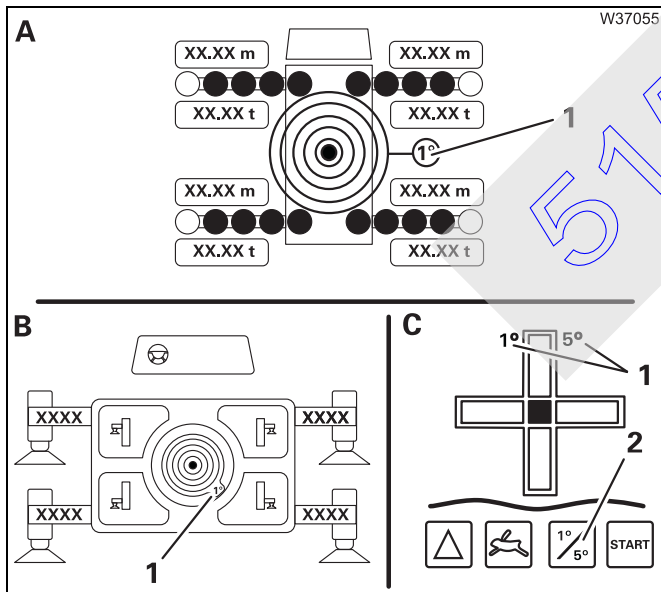
▣▣▣▣► *Inclination indicators*, p. 12 - 60



Display of current inclination

- A In the *Monitoring* menu
- B In the *Outrigger* menu
- C On the *Outrigger* control units

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



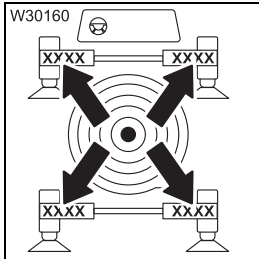
Switching over the measuring range

- A In the *Monitoring* menu
 - B In the *Outrigger* menu
- Changeover is automatic – the current measurement range (1) is displayed, 1° or 5°
- C On the *Outrigger* control units
- Press button (2) once – the current measurement range (1) is displayed, 1° or 5°

9.2.11

Outrigger pressure displays

Outrigger menu

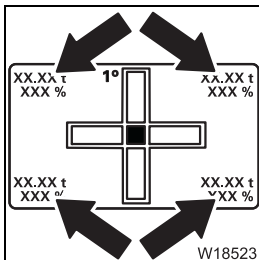


Outrigger pressure display

- **Unit of measurement:** Displayed depending on setting
 - **t** – tons or
 - **klbs** – kilopounds – (1 kilopound = 1,000 lbs)
- **Precision:** One decimal place

▶▶▶ p. 12 - 68

Outriggers control units



Outrigger pressure display

- **Unit of measurement:** Lights up depending on setting
 - **t** – tons or
 - **klbs** – kilopounds – (1 kilopound = 1,000 lbs)
- **Precision:**
 - When in **t**, one place of decimals
 - When in **klbs**, no places of decimals

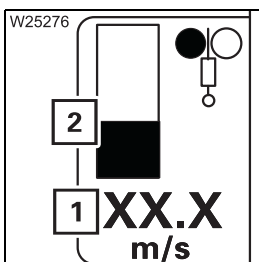
▶▶▶ p. 12 - 69

9.2.12

Anemometer displays

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

v_{max} = maximum permissible/reduced wind speed as shown in the *Lifting capacity table*

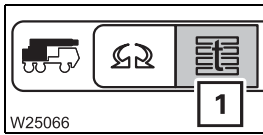


- 1 Display in metres per second (m/sec) or Beaufort scale (B)
- 2 Variable measurement range – 100% = v_{max}
 - **Green:** Display (1) \leq 90% of v_{max}
 - **Red:** Display (1) $>$ 90% of v_{max}

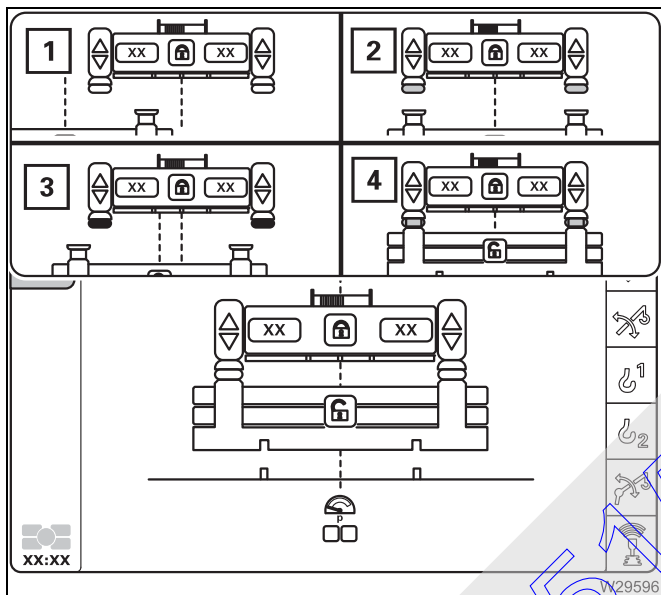
▶▶▶ p. 11 - 74

9.2.13 Counterweight menu

- ▮▮▮▮ *Rigging/unrigging the counterweight*, p. 12 - 71,
- ▮▮▮▮ *Counterweight hoist unit*, p. 12 - 102.



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



Rigging position display

1 White – not in the rigging range

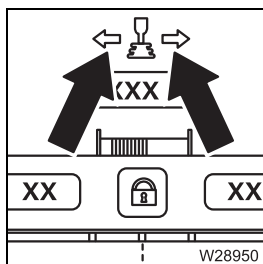
In the rigging range, the following rigging positions are displayed.

2 Green – move the lifting cylinder position

3 Red – intermediate position, lifting cylinder movements blocked

4 Green – lift/lower the counterweight position (0° position)

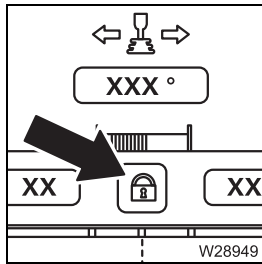
▮▮▮▮ p. 12 - 104



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 executed



Automatic mode, rigging

- **Display** **Yellow:** Recognition that the counterweight is rigged
- Flashing:** Automatic mode on
- Grey:** Automatic mode cancelled or
No recognition that counterweight is rigged

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

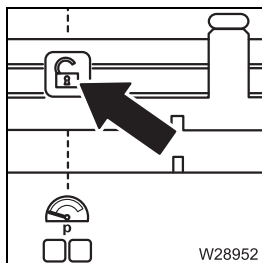
- **To switch on:** Select symbol and confirm – symbol flashes yellow
- **To execute:** Move control lever for slewing gear, automatically:
 - Slewing in *Move lifting cylinders* position
 - Extend lifting cylinders,

Move the control lever for slewing gear in indicated direction, automatically:

 - Slewing in *Lift/lower counterweight* position,
 - Lift counterweight,
 - Pre-tension counterweight.

Automatic mode ends – symbol yellow

➡ p. 12 - 105



Automatic mode, unrigging

- **Display** **Yellow:** Recognition that the counterweight is unrigged
- Flashing:** Automatic mode on
- Grey:** Automatic mode cancelled or no recognition that the counterweight is unrigged

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

- **To switch on:** Select symbol and confirm – symbol flashes yellow
- **To execute:** Move control lever for slewing gear, automatically:
 - Slewing in *Lift/lower counterweight* position,
 - Lower the counterweight,

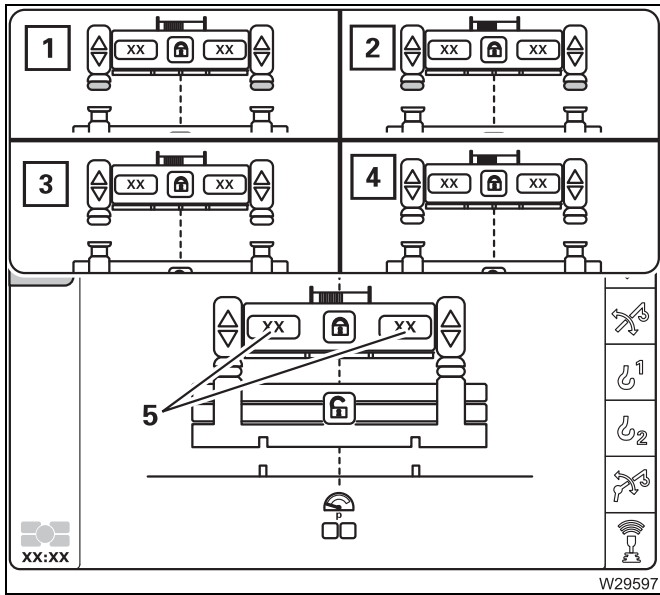
move the control lever for slewing gear in indicated direction, automatically:

 - Slewing in *Move lifting cylinders* position,
 - Retract the lifting cylinders,

Automatic mode ends – symbol yellow

➡ p. 12 - 107



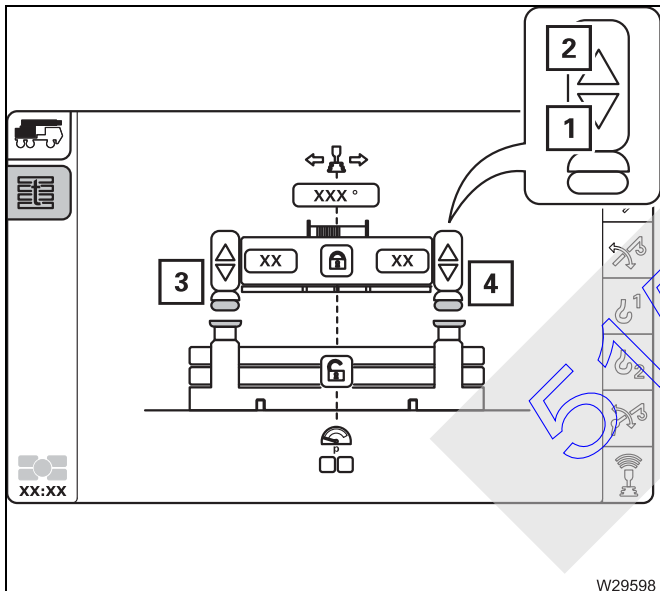


Lifting cylinder position display

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 per cent (%)

➡ p. 12 - 103



Extending/Retracting the lifting cylinders

1 Extend:

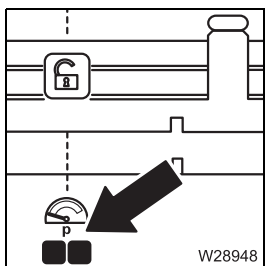
- Display (5) and symbol (3) yellow or
- Display (6) and symbol (4) yellow

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

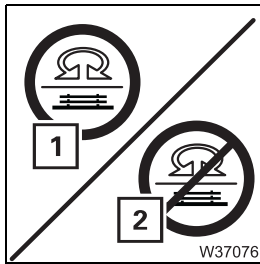
The movement stops after the button is released, and when an end position is reached; ➡ p. 12 - 103.



Pre-tensioning pressure display

- Green: Pre-tensioning pressure reached
- Red: Pre-tensioning pressure too low – pre-tension the counterweight

➡ p. 12 - 105

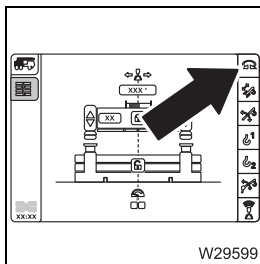


Slewing release display

- 1 Green:** Slewing enabled (if no other shutdown has occurred).
- 2 Red:** Slewing disabled by counterweight – the corresponding warning is displayed.

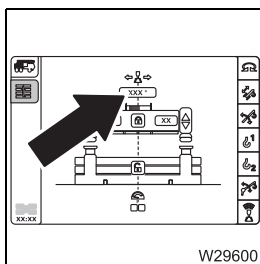
The pre-tensioning pressure is too low or the counterweight is not completely lifted.

▣▣▣▣▶ *Extending/retracting the lifting cylinders*, p. 12 - 103



Slewing gear display

Identical to the display in the *Slewing gear/House lock* menu; ▣▣▣▣▶ p. 9 - 118.



Current slewing angle display

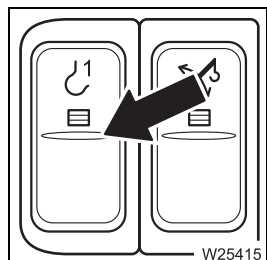
Identical to the display in the *Slewing gear/House lock* menu; ▣▣▣▣▶ p. 9 - 129.

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9.2.14

Main hoist

Control panels



Main hoist on/off

There is a lamp in the button.

- **Press once:** - Lamp bright – main hoist on
- Lamp dim – main hoist off

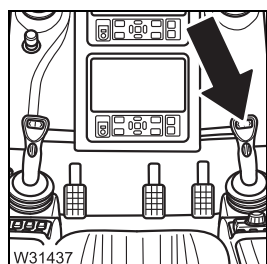
➡ p. 11 - 76



Right control lever

- **Back:** Lifting
- **Forward:** Lowering

➡ p. 11 - 77



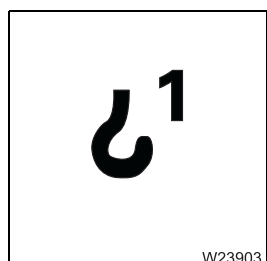
Hoist high-speed mode on/off

The parking brake is engaged.

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

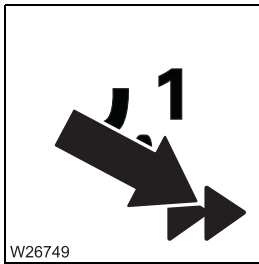
➡ p. 11 - 113

CCS display



Power units display

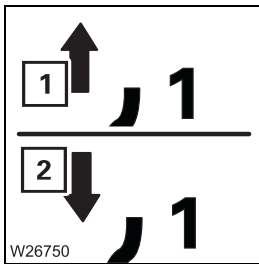
- **Green:** Main hoist on
- **Red:** Main hoist off



High speed monitoring for the hoist

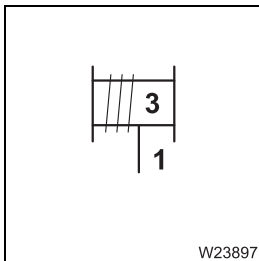
- **On:** High-speed mode on
- **Out:** High-speed mode off

▣▣▣▣ p. 11 - 113



Lift/lower the hoist display

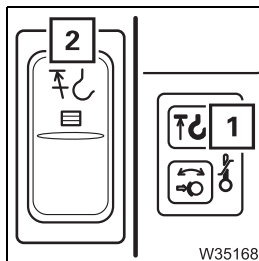
- **Symbol (1):** Lifting
- **Symbol (2):** Lowering



Warning for lowering limit switch shutdown

- **Red:** Lowering limit switch triggered – main hoist stop
- **Grey:** Lowering limit switch not triggered

▣▣▣▣ p. 11 - 82



Lifting limit switch override

Override slewing gear shutdown

Correct the counterweight rigging mode

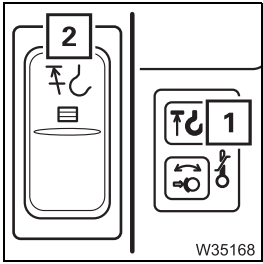
- 2 – Press:** Shutdown functions of the lifting limit switch bridged
 - Lamp (1) flashes
 - Buzzer tone sounds
 - Enable crane movements (move the control lever to the initial position if necessary)
 - Slewing gear shutdown bypassed
- 2 – Release:** Shutdown of the lifting limit switch and shutdown of the slewing gear not bypassed

▣▣▣▣ *Lifting limit switch and lowering limit switch, p. 11 - 82*

▣▣▣▣ *Rotate for overridden slewing gear shutdown, p. 14 - 49*

▣▣▣▣ *Extending/retracting the lifting cylinders, p. 12 - 103*





Warning for lifting limit switch shutdown

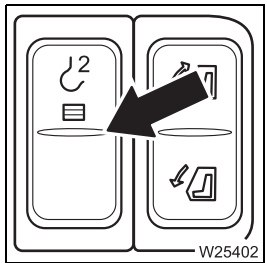
- 1 - On:** Lifting limit switch triggered – movements which increase the load moment stops
- 1 - Flashing:** Button (2) pressed
- 1 - Out:** Lifting limit switch not triggered and not bridged

▣▣▣▣▶ p. 11 - 82

9.2.15

Auxiliary hoist

Control panels

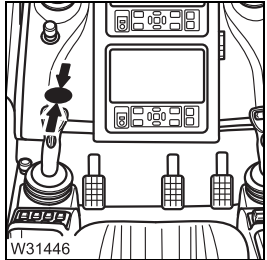


Auxiliary hoist on/off

There is a lamp in the button.

- **Press once:**
 - Lamp bright – auxiliary hoist on
 - Lamp dim – auxiliary hoist off

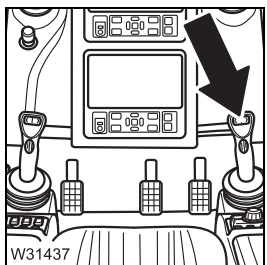
▣▣▣▣▶ p. 11 - 79



Left control lever

- **Back:** Lifting
- **Forward:** Lowering

▣▣▣▣▶ p. 11 - 80



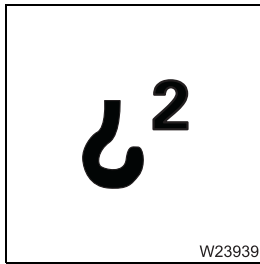
Hoist high-speed mode on/off

The parking brake is engaged.

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

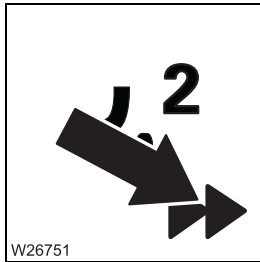
▣▣▣▣▶ p. 11 - 113

CCS display



Power units display

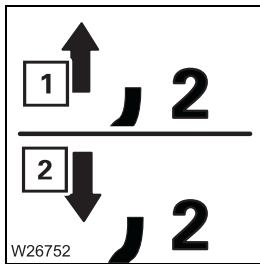
- **Green:** Auxiliary hoist on
- **Red:** Auxiliary hoist off



High speed monitoring for the hoists

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

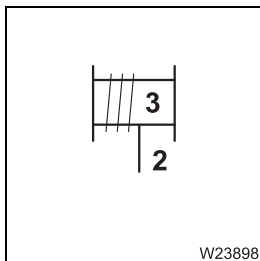
▣▣▣▣ p. 11 - 113



Lift/lower the hoist display

- **Symbol (1):** Lifting
- **Symbol (2):** Lowering

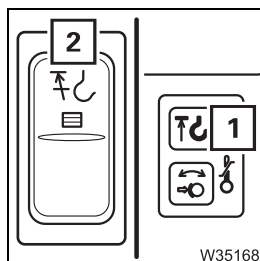
▣▣▣▣ p. 11 - 113



Warning for lowering limit switch shutdown

- **Red:** Lowering limit switch triggered – auxiliary hoist stop
- **Grey:** Lowering limit switch not triggered

▣▣▣▣ p. 11 - 82



Warning for lifting limit switch shutdown

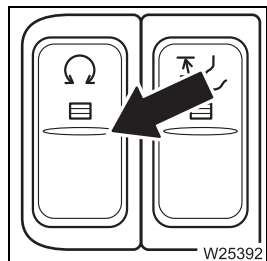
Overriding the lifting limit switch

- 1 Short description with main hoist; ▣▣▣▣ p. 9 - 116
- 2 Short description with main hoist; ▣▣▣▣ p. 9 - 115

9.2.16 Slewing gear

➡ *Slewing gear*, p. 11 - 115.

Control panels

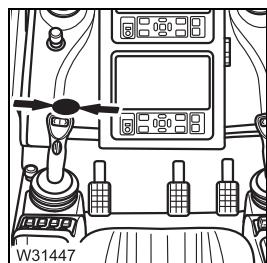


Slewing gear on/off

There is a lamp in the button.

- **Press once:**
 - Lamp bright – slewing gear on,
Slewing gear brake released
 - Lamp dim – slewing gear off
Slewing gear brake applied

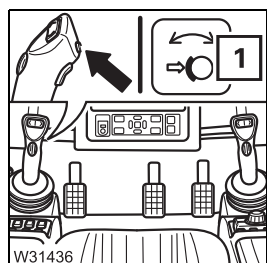
➡ p. 11 - 116



Left control lever

- **To the left:** Slewing to the left
- **To the right:** Slewing to the right

➡ p. 11 - 117

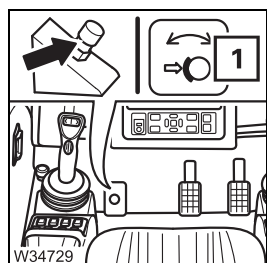


Slewing gear freewheel

- **To switch on:** Move control lever to zero position and press button – slewing gear brake released, lamp (1) goes out
- **Switch off:** Release switch – slewing gear brake applied, lamp (1) lights up

➡ p. 11 - 119

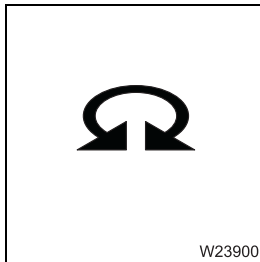
or:



- **To switch on:** Move control lever to zero position and press button – slewing gear brake released, lamp (1) goes out
- **Switch off:** Release switch – slewing gear brake applied, lamp (1) lights up

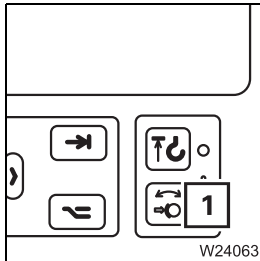
➡ p. 11 - 119

CCS display



Power units display

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



Slewing gear brake engaged/released

- 1 On:** Slewing gear brake applied
- 1 Out:** Slewing gear brake released

➡ p. 11 - 116



Switch slewing gear brake function

Slewing gear is switched on

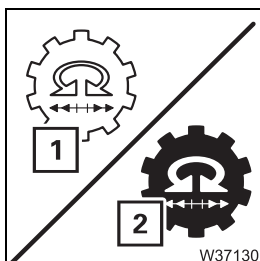
- **To switch:** Select symbol and confirm – the function is displayed



Slewing gear brake function display

- 1 Brake pedal function**
Brake slewing movement – actuate *Slewing gear* brake pedal
- 2 Control lever function**
Brake slewing movement – control lever in the zero position
Slewing gear brake pedal without function

➡ p. 11 - 115



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

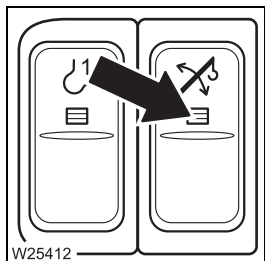
➡ *Switching the reduction of slewing speed on and off*, p. 11 - 121

9.2.17

Derricking gear

▣▣▣▣ ▸ *Derricking gear*, p. 11 - 85.

Control panels

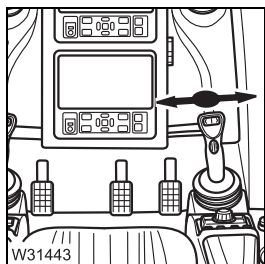


Derricking gear on/off

There is a lamp in the button.

- **Press once:**
 - Lamp bright – derricking gear on, power units with the same control lever configuration off
 - Lamp dim – derricking gear off

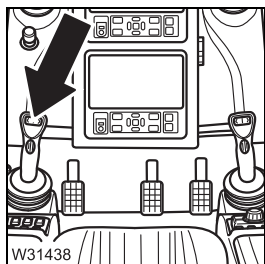
▣▣▣▣ ▸ p. 11 - 85



Right control lever

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

▣▣▣▣ ▸ p. 11 - 86



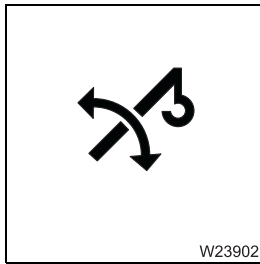
Derricking gear/telescoping mechanism high-speed mode on/off

The parking brake is engaged.

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

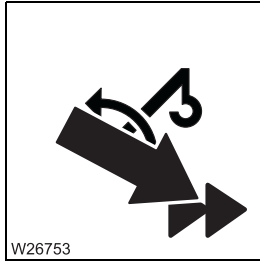
▣▣▣▣ ▸ p. 11 - 113

CCS display



Power units display

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

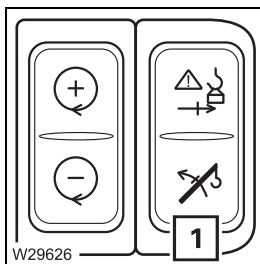


High-speed mode inspection derricking gear

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

▣▣▣▣ p. 11 - 113

Side panel



1 Raise enable button after RCL shutdown

RCL override – version A; ▣▣▣▣ p. 9 - 143.

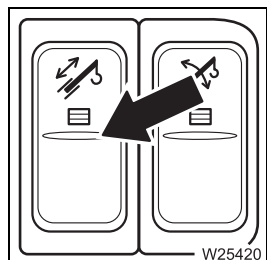
RCL override – version B; ▣▣▣▣ p. 9 - 144.

9.2.18

Telescoping mechanism

Control panels

▣▣▣▣ ➔ *Telescoping mechanism*, p. 11 - 89.



Telescoping mechanism on/off

There is a lamp in the button.

- **Press once:**
 - Lamp bright – telescoping mechanism on, power units with the same control lever configuration off
 - Lamp dim – telescoping mechanism off

▣▣▣▣ ➔ p. 11 - 98

Control lever

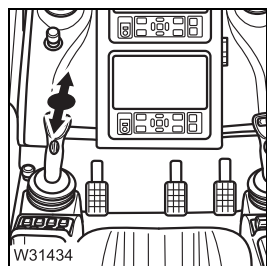
The control lever configuration is depends on the version.

- Version 1

Left control lever

- **Back:** Retraction of the telescoping
- **Forward:** Extension

▣▣▣▣ ➔ p. 11 - 98

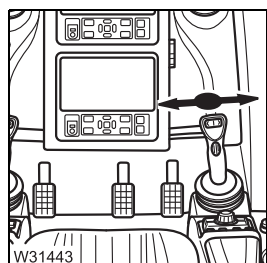


- Version 2

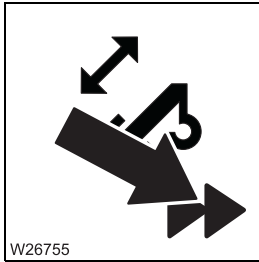
Right control lever

- **To the left:** Retraction of the telescoping
- **To the right:** Extension

▣▣▣▣ ➔ p. 11 - 98



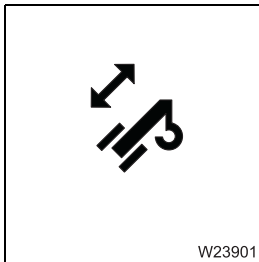
CCS display



Telescoping mechanism high-speed mode inspection

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

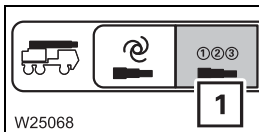
▮▮▮ p. 11 - 113



Power units display

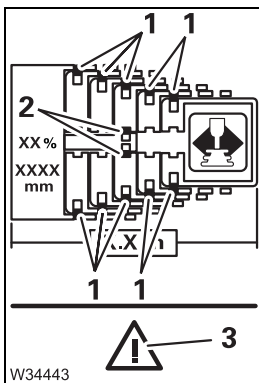
- **Green:** Telescoping mechanism on
- **Red:** Telescoping mechanism off

Telescoping semi-automation menu



Open menu

Opening: Select symbol (1) and confirm – menu is opened



Telescope diagram display

Current relation of the telescopic sections to each other – section of top view.

Locking pin

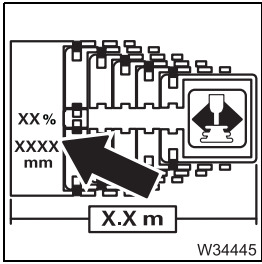
- 1 On the telescopic section
- 2 On the telescoping cylinder
- 3 Error

▮▮▮ p. 11 - 102

Display 1 and 2

- **Green:** Locked
- **Yellow:** Intermediate position
- **Red:** Unlocked

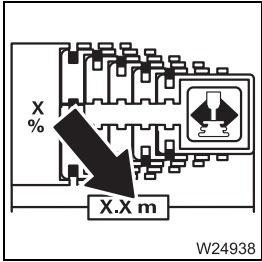




Telescoping cylinder length display

- **Display:** Current extended length of the telescoping cylinder
- **Unit of measurement** Displayed in % (per cent) and, depending on setting, mm (millimetres) or ft (feet)

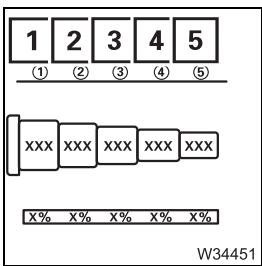
:
 ■■■▶ p. 11 - 110



Main boom length display

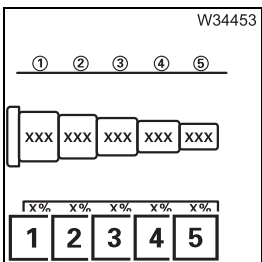
- **Display:** Current extended length of the main boom
- **Unit of measurement** Displayed depending on setting, mm (millimetres) or ft (feet)

:
 ■■■▶ p. 11 - 110



Telescopic sections display

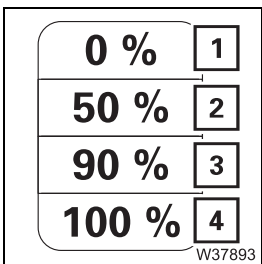
- 1 - 5 Display of telescopic sections 1 to 5



Current telescope status display

Extended length of the telescopic sections in percentage

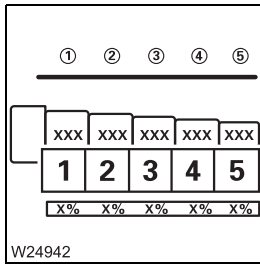
- 1 - 5 Display of telescopic sections 1 to 5



Pre-selection for all telescopic sections

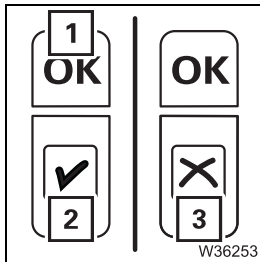
- 1 Pre-selection telescoping 0%
- 2 Telescope status 50% pre-selection – 47% to 56% depending on telescopic section
- 3 Telescope status 90% pre-selection – 89% to 92% depending on telescopic section
- 4 Pre-selection telescoping 100%

Overview of the fixed lengths; ■■■▶ p. 14 - 39



Pre-selection individual telescopic sections

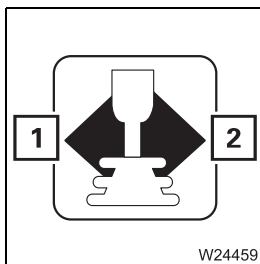
1 - 5 Display of telescopic sections 1 to 5



Confirm pre-selection

- 1 Confirm pre-selected telescoping
- 2 Telescoping permitted display
- 3 Telescoping not permitted display

▮▮▮ p. 11 - 110

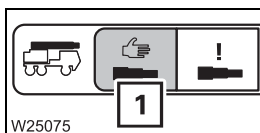


Teleautomation direction display

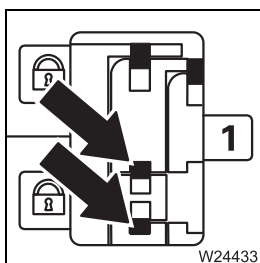
- 1 Start telescoping full automation with *Retract*
- 2 Start telescoping full automation with *Extend*

▮▮▮ p. 11 - 110

Manual telescoping menu



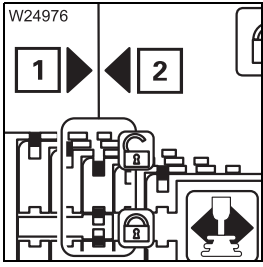
Opening: Select symbol (1) and confirm – menu is opened



Telescoping cylinder locked/released

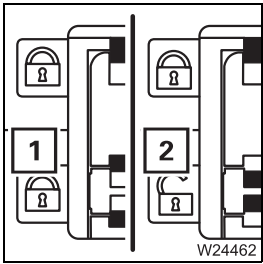
- **Display** **Yellow:** Locking pins intermediate position
- Green:** Telescoping cylinder locked
- Red:** Telescoping cylinder unlocked





Locking point display

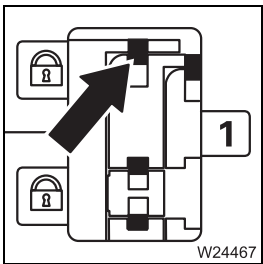
- 1 Extend telescoping cylinder
- 2 Retract telescoping cylinder



Locking/releasing the telescoping cylinder

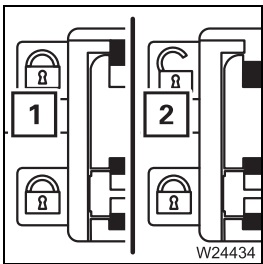
- **To lock:**
 - Telescopic section locked:
Select symbol (2) and confirm – telescoping cylinder is locked
- **To unlock:**
 - Telescopic section locked:
Select symbol (1) and confirm – telescoping cylinder is unlocked

➡ p. 11 - 103



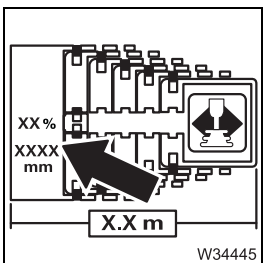
Lock/release telescopic section

- **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 locked
- **To unlock:**
 - The telescoping cylinder is locked:
Select symbol (1) and confirm – telescopic section is unlocked

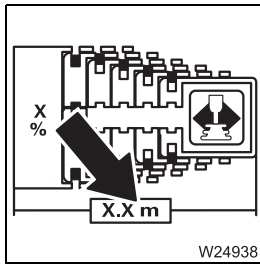
➡ p. 11 - 107



Telescoping cylinder length display

- **Display:** Current extended length of the telescoping cylinder
- **Unit of measurement** Displayed in % (per cent) and, depending on setting, mm (millimetres) or ft (feet)

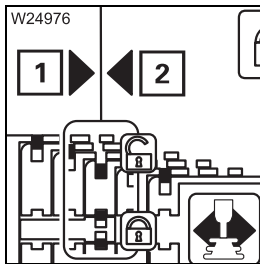
➡ p. 11 - 101



Main boom length display

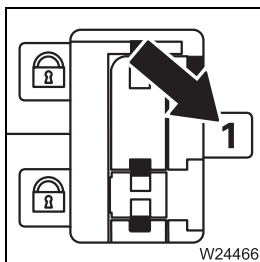
- **Display:** Current extended length of the main boom
- **Unit of measurement** Displayed depending on setting, mm (millimetres) or ft (feet)

:
 p. 11 - 101



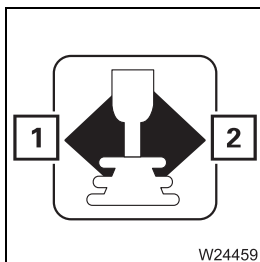
Locking point display

- 1 Extend telescoping cylinder
- 2 Retract telescoping cylinder



Telescoping cylinder in the telescopic section display

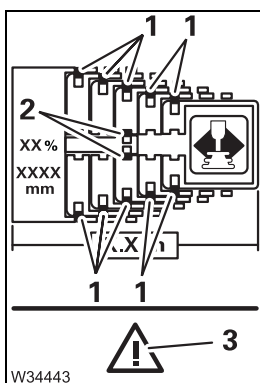
Displayed telescopic section, e.g. telescopic section 1



Telescoping direction display

- 1 Start with *Retract*
- 2 Start with *Extend*

p. 11 - 110



Telescope diagram display

Current relation of the telescopic sections to each other – section of top view.

Locking pin

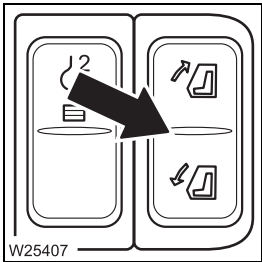
- 1 On the telescopic section
- 2 On the telescoping cylinder
- 3 Error

p. 11 - 102

Display 1 and 2

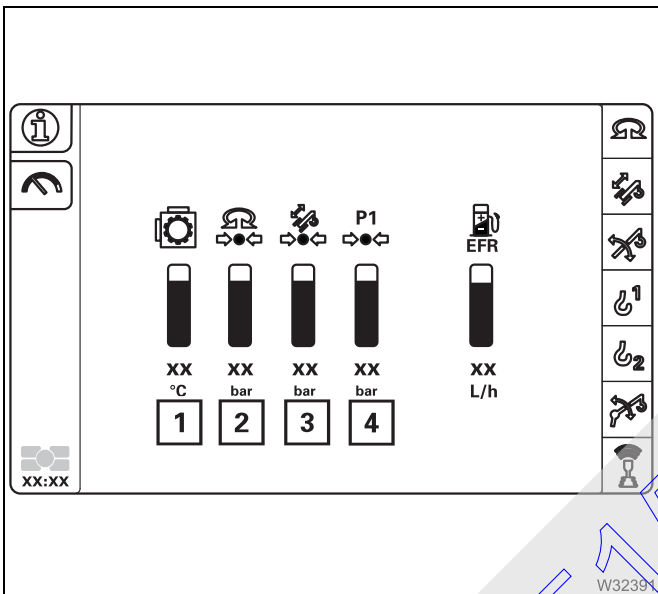
- **Green:** Locked
- **Yellow:** Intermediate position
- **Red:** Unlocked

9.2.19 Hydraulic system



Inclining the crane cab

- **Press down:** Incline forward
 - **Press up:** Incline back
- ▮▮▮▮ p. 11 - 123

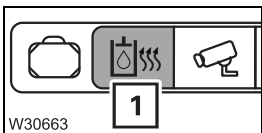


In Information menu

- 1 Angle gear oil temperature

Current pressure in bar for movements of:

- 2 Slewing gear
- 3 Telescoping mechanism
- 4 - Hoist
 - Derricking gear
 - Counterweight hoist unit
 - inclining the crane cab
 - Locking units

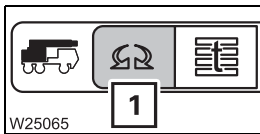


Preheating the hydraulic oil

- **Switch on:** Select symbol (1) and confirm – symbol is **red**
 - **Switch off:** Select symbol (1) and confirm – symbol is **grey**
- ▮▮▮▮ p. 11 - 14

9.2.20

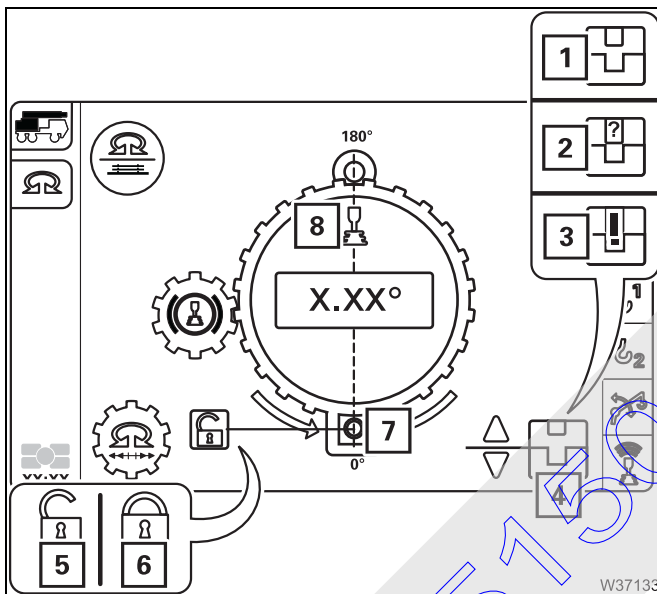
Superstructure lock/house lock menu



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

Superstructure lock

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



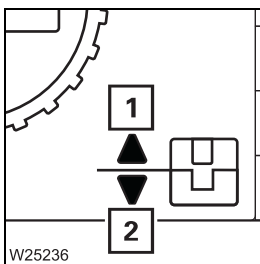
Locking status displays

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

- 1 and 7** Red – unlocked – symbol (8) green
- 2 and 7** Yellow – intermediate position
- 3 and 7** Violet – error
- 4 and 7** Green – locked – symbol (8) hidden

- 5** Unlocked
- 6** Locked

▣▣▣▣ p. 11 - 16



Locking/unlocking the turntable

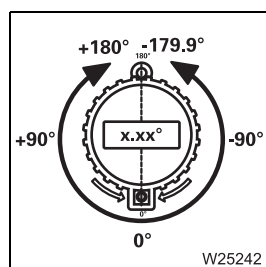
The superstructure must be in the 0° or 180° position.

To unlock: Symbol (1) – locking pins retract

To lock: Symbol (2) – locking pins extend

▣▣▣▣ p. 11 - 16

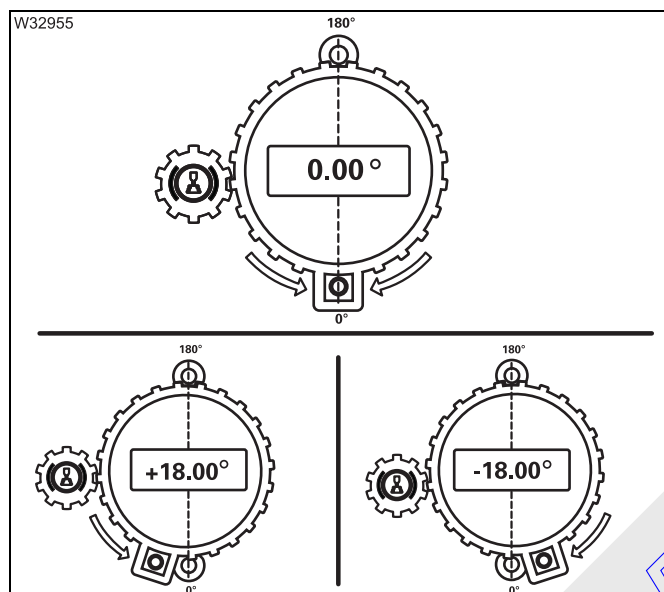




Current slewing angle display

- 0°:** *0° to the rear position – locking point*
- 180°:** *180° to the front position – locking point*
- +0.1 to +180.0°:** Turned to the right from 0°
- 0.1 to -179.9°:** Turned to the left from 0°

▣▣▣▣▶ p. 11 - 115



Directional indicator

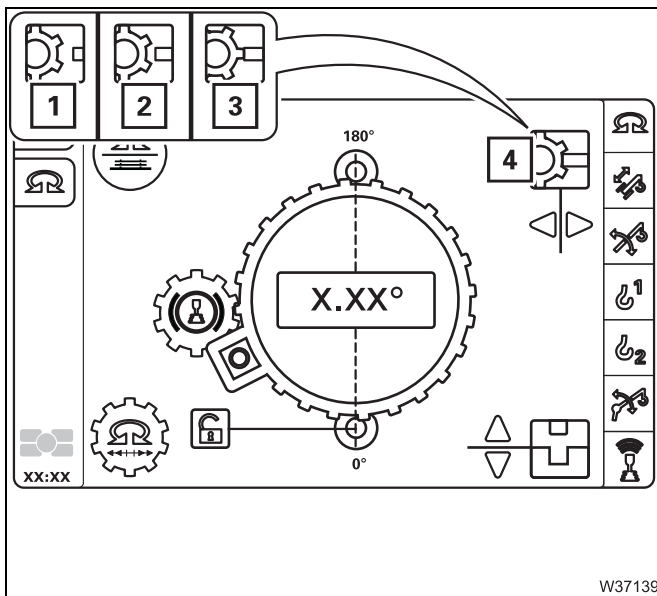
Current position $\pm 20^\circ$ in front of the locking point.

- **Both arrows:** locking point reached
- **One arrow:** direction of arrow = turning direction towards the locking point

▣▣▣▣▶ p. 11 - 15

Houselock

Switching the houselock on/off, p. 11 - 17.

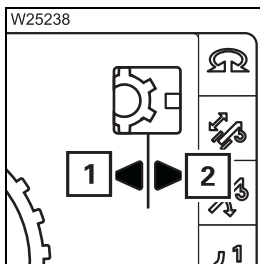


Locking status displays

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

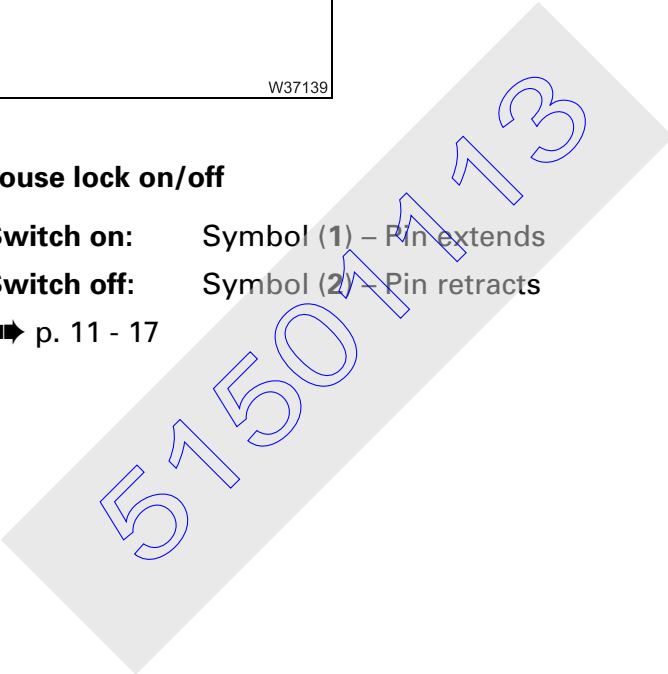


House lock on/off

Switch on: Symbol (1) – Pin extends

Switch off: Symbol (2) – Pin retracts

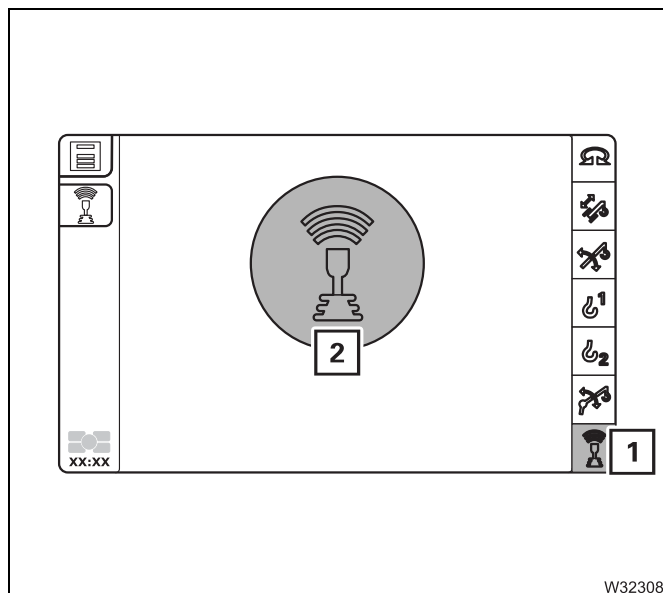
Switching the houselock on/off, p. 11 - 17



9.2.21 Remote control



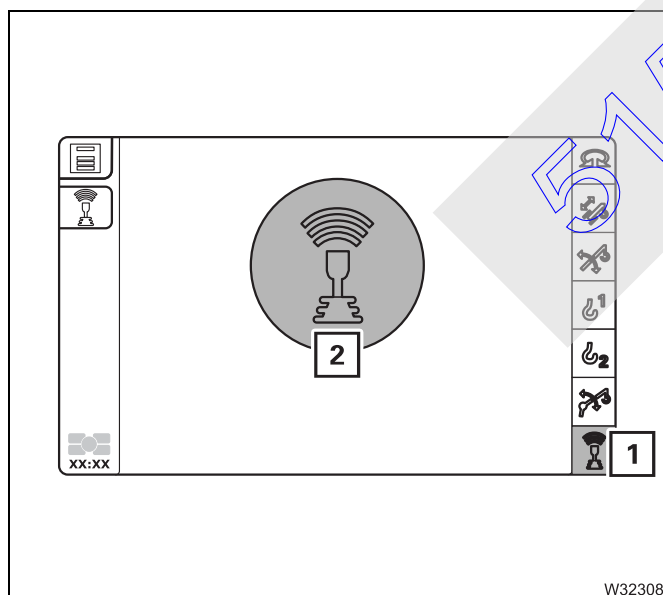
Operating with the remote control is only enabled for the *Standard* slewing range type.



Remote control menu

- 1 – Orange:**
Remote control connected
- 1 – Green:**
Remote control switched on.
CCS operation from the cab is blocked.
Symbol (2) is shown green on all menus.
- 1 – Off:**
Remote control deactivated

Other information; *Separate operating manual*



Remote control display

- 1 – Green:**
Remote control switched on.
CCS operation from the cab is blocked.
Symbol (2) is shown on all menus.
- 1 – Off:**
Remote control deactivated

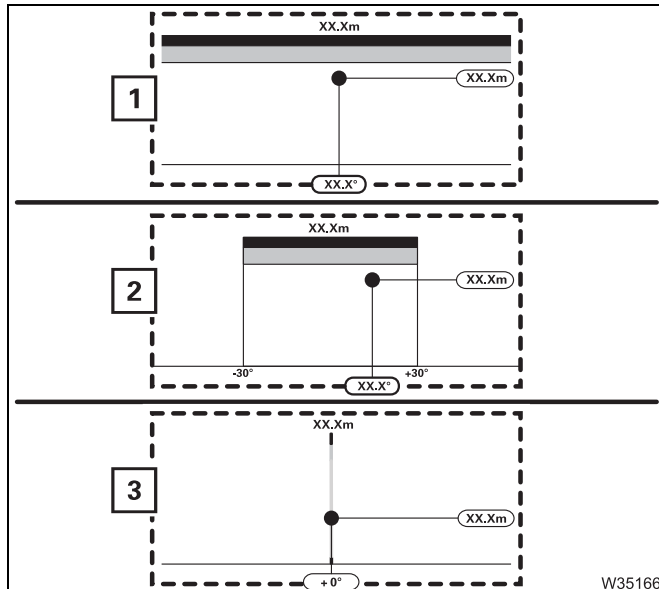
Other information; *Separate operating manual*

9.2.22

Rated capacity limiter (RCL)

CCS display

In the Start menu

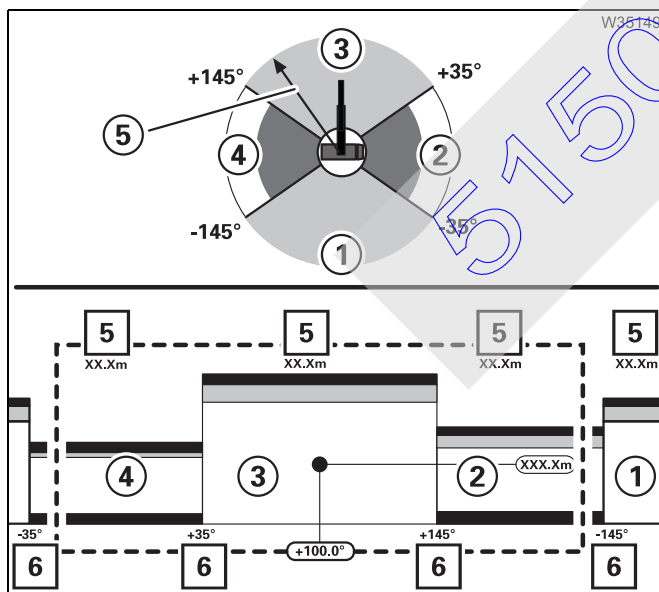


For the *Standard* slewing range type

Only one slewing range is displayed

- 1 360° slewing range
- 2 Restricted slewing range, e.g. $\pm 30^\circ$
- 3 Working position, e.g. 0° to the rear

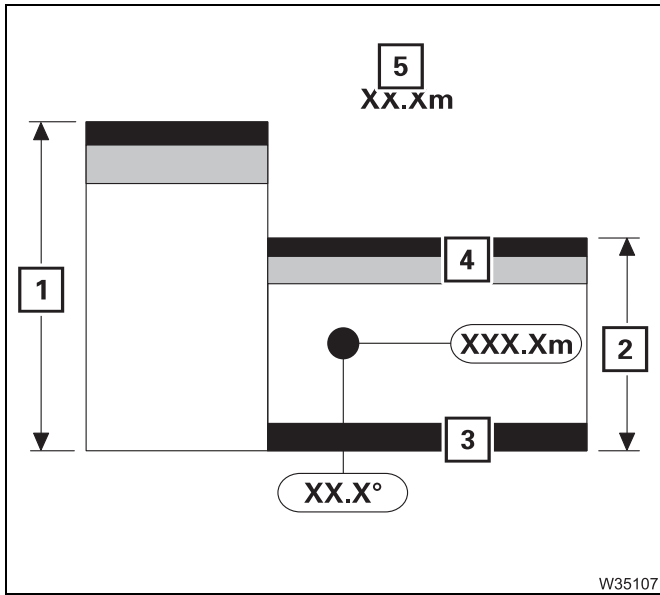
The displays for working radius, current slewing angle and current position are identical to the displays for the *MAXbase* slewing range type.



For the *MAXbase* slewing range type

- **Display Slewing ranges/working radii**
Represents the defined slewing ranges and corresponding respective maximum permissible operating radii ⑤ for the confirmed rigging mode as a diagram.
- **Display of current slewing range divisions**
Shows the currently defined slewing ranges ① to ④ as pillars ① to ④. The pillar width represents the angular range.
- **Display of current slewing range limits**
Shows the currently defined slewing range limits (6) in degrees.
For example $-35^\circ / +35^\circ / +145^\circ / -145^\circ$.

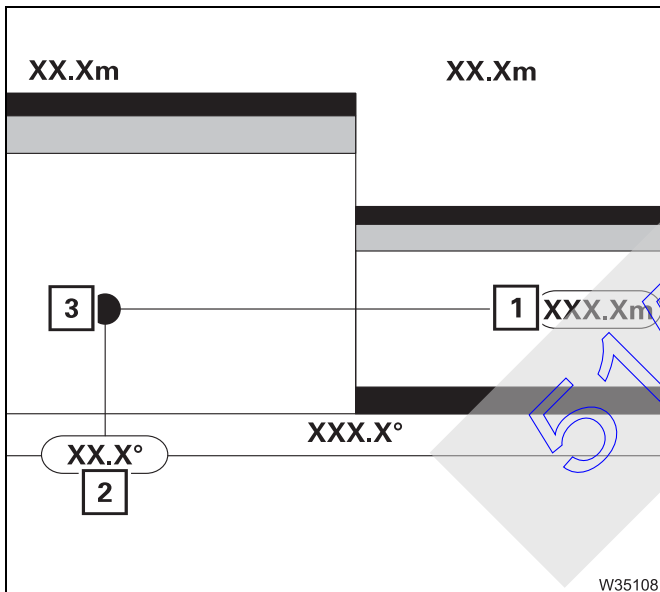




Maximum permissible working radius display

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 region for minimum permissible working radius (display only with active limitation)
- 4 Red/yellow – limit region for maximum permissible working radius



Current working radius display

- 1 Display occurs in the same manner as in the *Monitoring* menu; p. 11 - 49.

Current slewing angle display

- 2 Display occurs in the same manner as in the *Monitoring*; menu; p. 11 - 50.

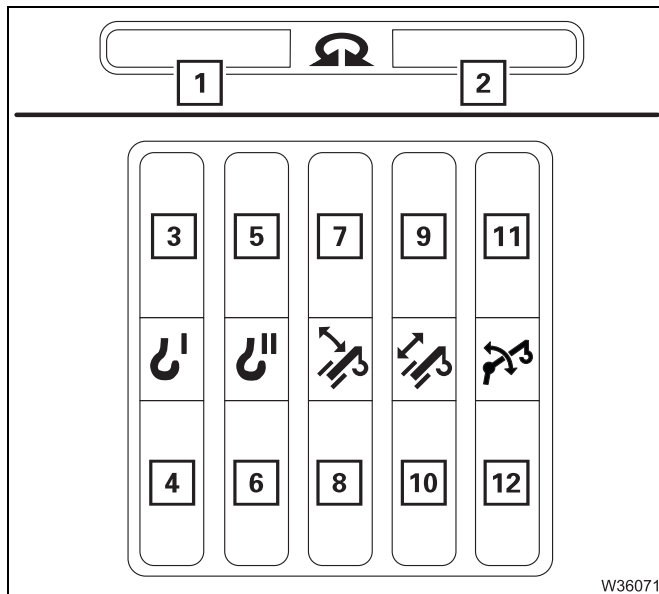
Current position display

- 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 chart 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.

Slewing range type Standard, p. 11 - 53

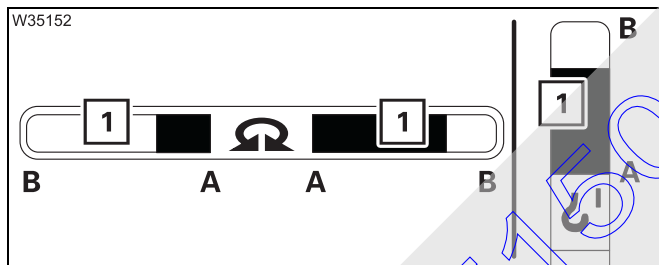
Slewing range type MAXbase, p. 11 - 55



Maximum permissible speed display

Separate displays are provided for each direction of movement.

- 1 Slewing to the left
- 2 Slewing to the right
- 3 Lower the main hoist
- 4 Lift the main hoist
- 5 Lower the auxiliary hoist
- 6 Lifting the auxiliary hoist
- 7 Lowering the boom
- 8 Raising
- 9 Extension
- 10 Retraction of the telescoping
- 11 Lower the lattice extension
- 12 Raise the lattice extension

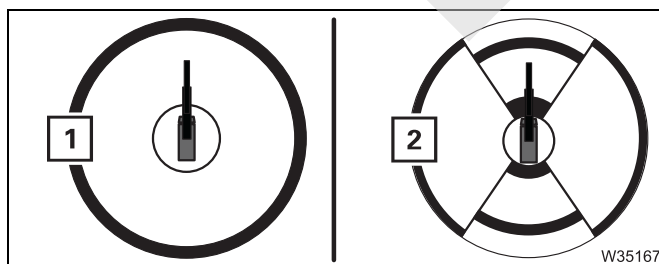


A bar (1) shows the maximum permissible speed – scale from 0% (A) to 100% (B).

The colour of the bar (1) changes.

- Red:** 0% to 10%
- Yellow:** 11% to 25%
- Green:** 26% to 100%

On the CCSdisplay, p. 11 - 53



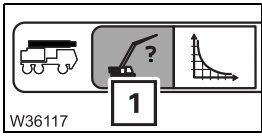
Slewing range display

The function is identical to the display in the *Lifting capacity table* menu.

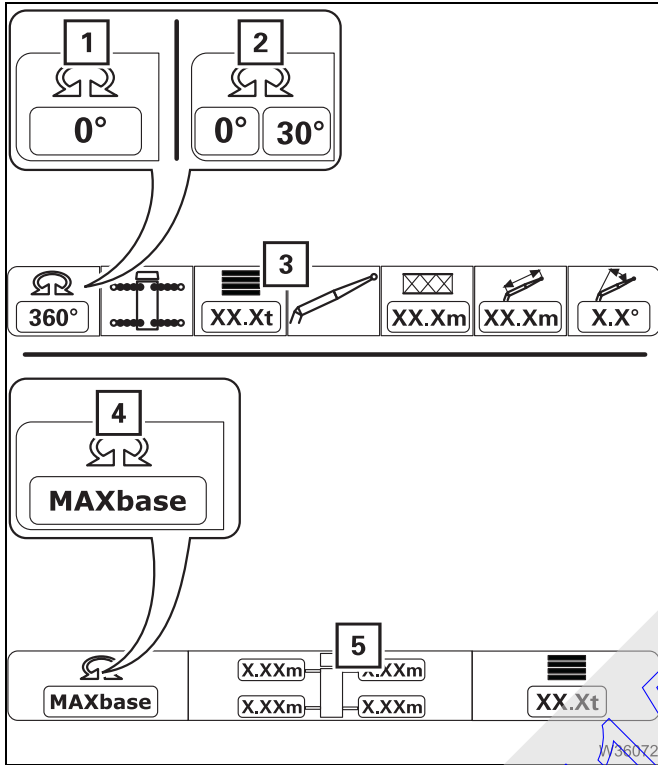
- 1 For the *Standard slewing range type*;
p. 11 - 60
- 2 For the *MAXbase slewing range type*;
p. 11 - 62



In the *Enter rigging mode/telescope status menu*



Select and confirm the symbol (1) – the menu opens, and 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 working position¹⁾, e.g. 0° to the front
- 2 Display for restricted slewing range, e.g. 0° ± 30°

– After confirmation: Menu display (3)

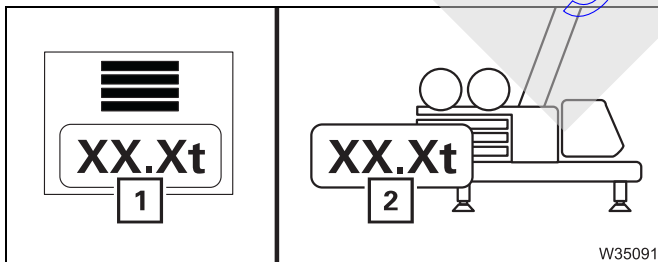
1) To accept, switch off the slewing gear

– For the *MAXbase* slewing range type

4 MAXbase

– After confirmation: Menu display (5)

Enter rigging mode, p. 11 - 32



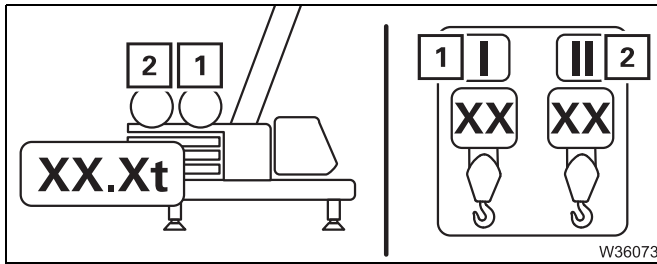
Enter counterweight

Counterweight display

1 In input mode – select and confirm counterweight

2 Shows the current entry

Enter rigging mode, p. 11 - 32



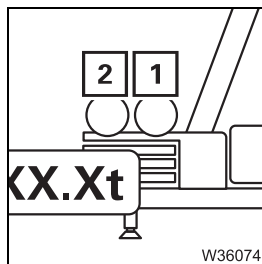
Reeving input mode display

- 1 Main hoist
- 2 Auxiliary hoist

Orange: on

Grey: off

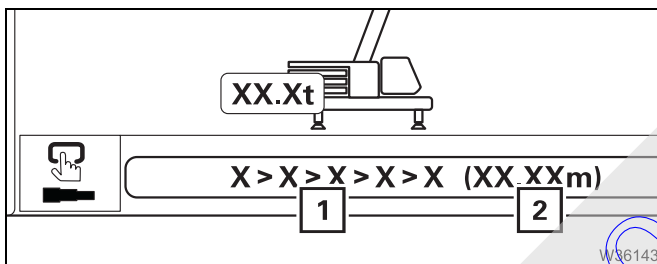
Enter rigging mode, p. 11 - 32



Enter reeving

- 1 Main hoist
In input mode – select and confirm current reeving
- 2 Auxiliary hoist – functions as with (1)

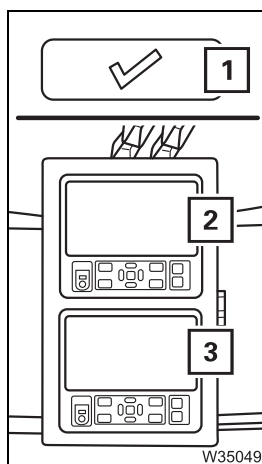
Enter rigging mode, p. 11 - 32



Preselected telescoping display

- 1 Telescope status display in percentage (%)
- 2 Preselected main boom length (1) in metres (m) or in feet (ft)

Enter rigging mode, p. 11 - 32

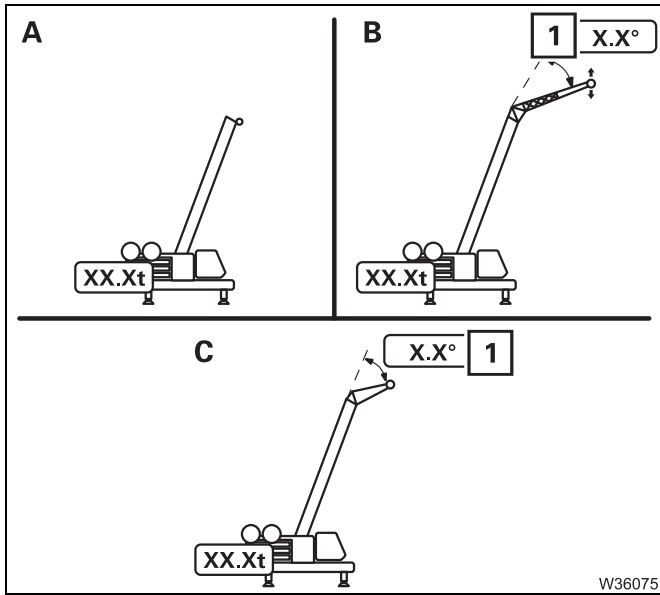


Confirming the rigging mode

- 1 – **Orange:** Select and confirm
 - Rigging mode and preselected telescope status are adopted – lifting capacity table is confirmed
 - Display (2) – *Monitoring* menu on
 - Display (3) – *Start menu* on
- **Grey:** MAXbase only – no selection possible
Measured outrigger width ≠ of required width

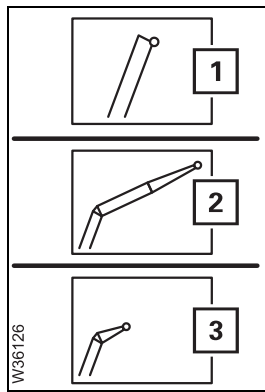
Enter rigging mode, p. 11 - 32





Boom system display

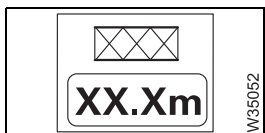
- A Main boom display
- B Lattice extension display
- C Heavy load lattice extension display
- 1 Angle of the lattice extension display (for inclinable lattice extension)



Boom system entry

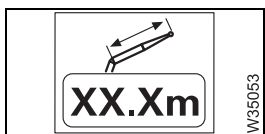
For the *Standard* slewing range type only.
 In input mode – select and confirm the boom system

- 1 main boom
- 2 Lattice extension/boom extension
- 3 Heavy load lattice extension



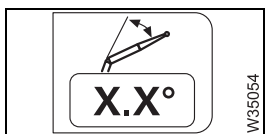
Input lattice extension – the length before the angle

In input mode – select and confirm length.



Input lattice extension – the length after the angle

In input mode – select and confirm length.



Lattice extension input – angle

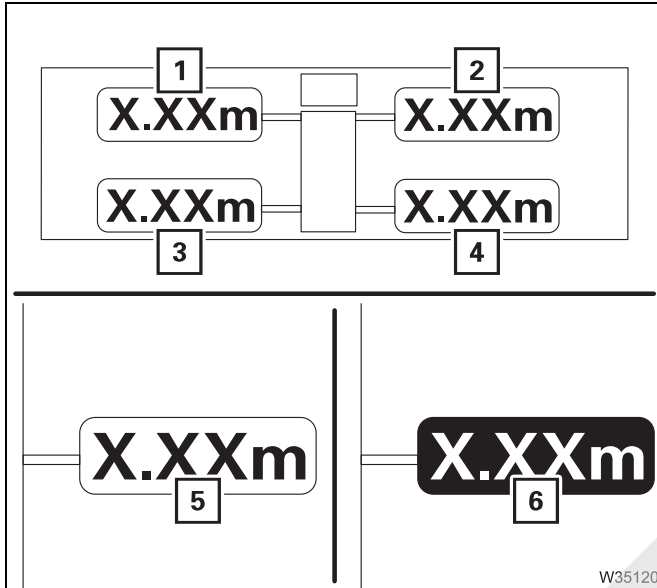
Only for manually inclinable lattice extensions
 In input mode – select and confirm the angle.

Enter rigging mode, p. 11 - 32



Accept the measured outrigger span

Select and confirm – the outrigger span provided by the outrigger width monitoring is adopted and shown on the *Enter outrigger span* display;
 ■■■► *Confirm the rigging mode and lifting capacity table, p. 11 - 41.*



Enter outrigger span (MAXbase)

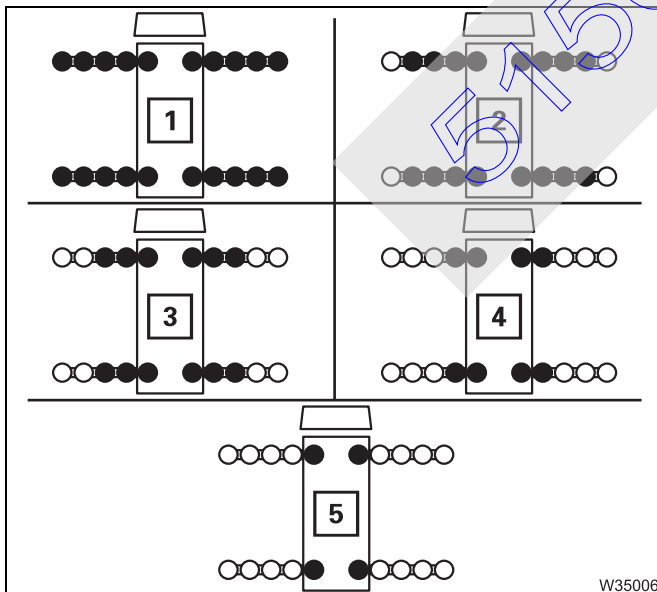
The values are entered individually for outrigger beams (1) to (4).

In input mode – select and confirm the individual widths.

Outrigger span monitoring display (MAXbase)

- 5 Measured outrigger width = required width
- 6 Measured outrigger width ≠ of required width

■■■► *Enter rigging mode, p. 11 - 32*



Enter outrigger span (Standard)

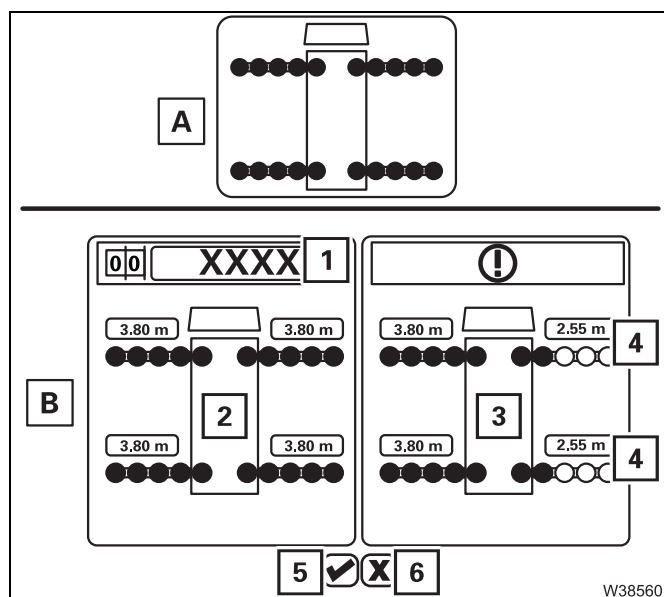
The selection occurs simultaneously for all outrigger beams – selected outrigger widths are orange.

In input mode – select and confirm the outrigger span

- 1 8.030 x 7.600 m (26.3 x 24.9 ft)
- 2 8.030 x 6.700 m (26.3 x 22.0 ft)
- 3 8.030 x 5.900 m (26.3 x 19.4 ft)
- 4 8.030 x 5.100 m (26.3 x 16.7 ft)
- 5 8.030 x 2.500 m (26.3 x 8.2 ft)

■■■► *Enter rigging mode, p. 11 - 32*



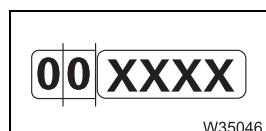


Outrigger span monitoring display (standard)

Query after confirming the rigging mode.

- A** Measured outrigger width = required width
- B** Measured outrigger span \neq of required span (query menu)
 - 2** Required outrigger width – for RCL code (1)
 - 3** Measured outrigger width
 - 4** Outrigger width not OK for RCL Code (1) – **red**
 - 5** Confirmation
 Rigged outrigger span = outrigger span (2),
 Crane operation enabled
 - 6** Confirmation
 Rigged outrigger span \neq outrigger span (2)
 Crane operation not enabled

Enter rigging mode, p. 11 - 32

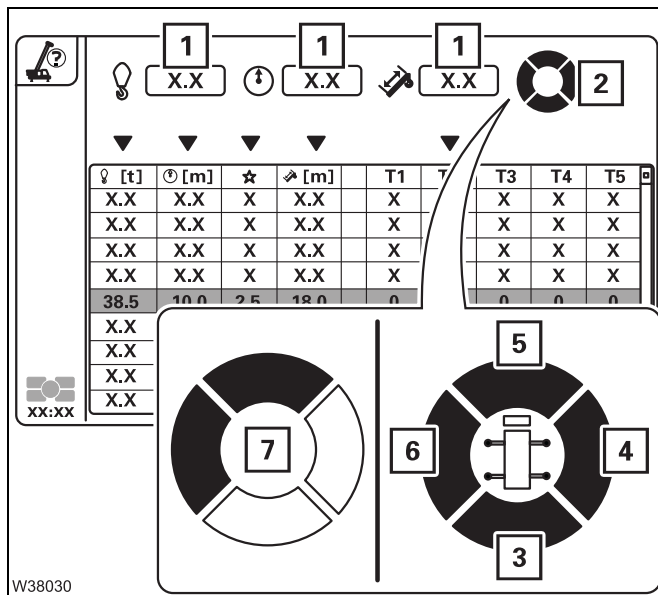


Enter RCL code

In input mode – select and confirm the RCL code.
 The corresponding rigging mode is displayed; Enter rigging mode, p. 11 - 40.

In the *Pre-selection telescoping* menu

▣▣▣▣ *Pre-selecting telescoping*, p. 11 - 40

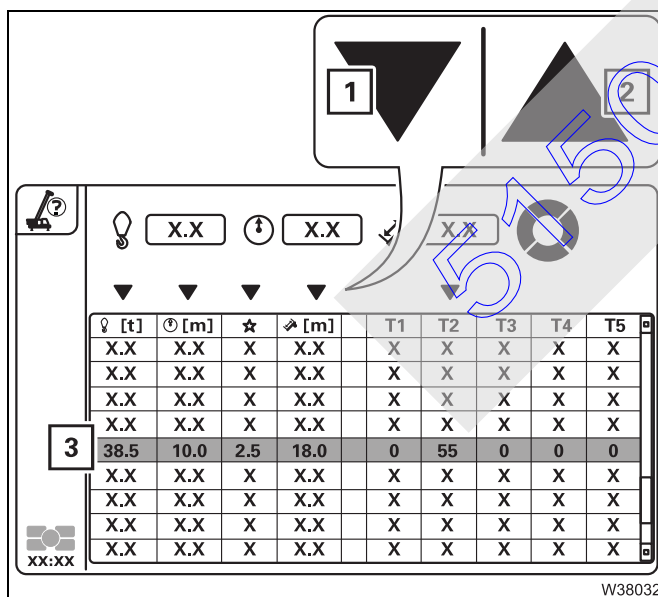


Enter desired parameter

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 Backwards
- 4 To the right
- 5 Forwards
- 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

Table sorted 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).

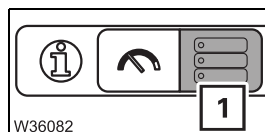
- The *Pre-selection telescoping* menu closes
- The *Enter rigging mode/telescope status* menu opens

▣▣▣▣ *Pre-selecting telescoping*, p. 11 - 40



In the *Datalogger menu*

▣▣▣▣▶ *Datalogger*, p. 11 - 68

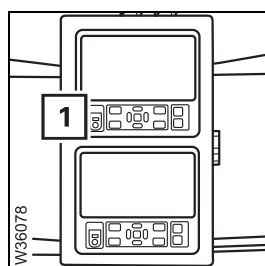


– **Opening:** Select and confirm symbol (1)

RCL display

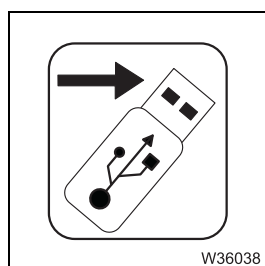
In the *Datalogger menu*

▣▣▣▣▶ *Datalogger*, p. 11 - 68



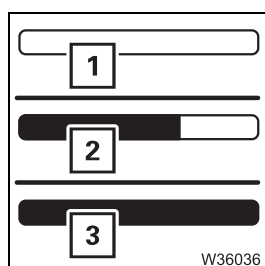
USB connection for data export

1 Connect the USB stick – the symbol for the export is activated



Export data

Can only be selected when a USB stick is connected to the *RCL* control unit.
Starts the data export to the USB stick.



Display of export progress

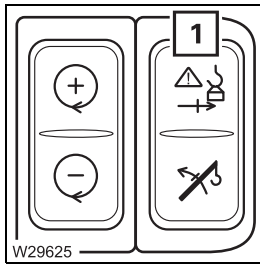
- 1 0% exported
- 2 75% exported
- 3 100% exported

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 operating the crane*, p. 11 - 45,
▣▣▣▣▶ *Display during the crane operation*, p. 11 - 49.


RCL override – version A

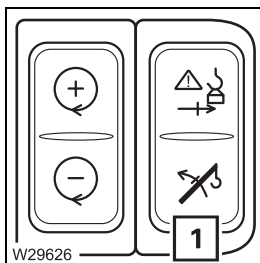
This version only applies to RCL programming as per EN 13000.
For other RCL programming;  p. 9 - 144.



Overriding the RCL

- 1 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 max. 15%

 RCL override – version A, p. 11 - 63



Raise enable button after RCL shutdown


– Switch on function

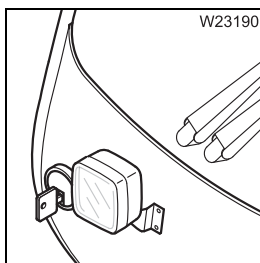
Only active if the current degree of utilisation is greater than 100% – crane movements blocked.

- 1 Press once:** Release the raise function to the permitted working range.
If the degree of utilisation is less than 100% – release of the blocked crane movements.


– Switch off function

- Degree of utilisation less than 100% Function switched off automatically.
- Degree of utilisation greater than 100% Press button in at the bottom once.

 RCL override – version A, p. 11 - 63




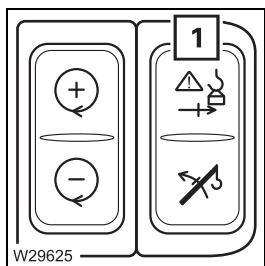
Key-operated switch for overriding the RCL in an emergency

- **Once to the right or to the left:** RCL shutdown overridden for 30 minutes – crane functions released;  p. 11 - 66




**RCL override –
version B**

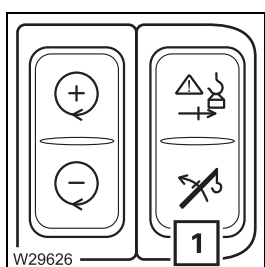
This point only applies to RCL programming deviating from EN 13000.
For RCL programming in accordance with EN 13000;  p. 9 - 143.



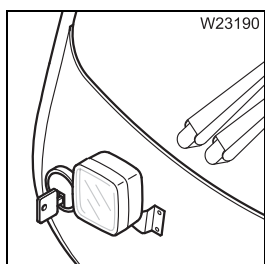
Overriding the RCL in an emergency

- 1 – Press once:** RCL shutdown overridden – crane functions enabled
- Crane functions can be started within the next 10 seconds.
 - Speed of movements increasing load moment max. 15%.

 RCL override – version B, p. 11 - 67



No function

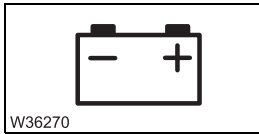


No function

51501113

9.2.23

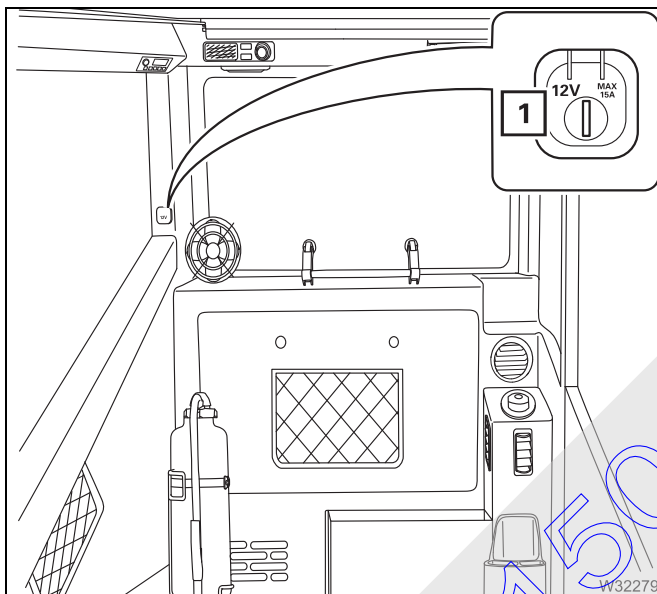
Electrical system



Voltage monitoring warning

- **Display symbol:** Engine on – power failure – switch off engine
- **Out:** Engine on – no fault

▣▣▣▣▶ p. 10 - 8



Sockets 12 V

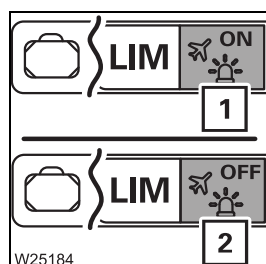
1 Socket 12 V/max. 15 A

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

9.2.24

Lighting, windscreen wiper/washing system

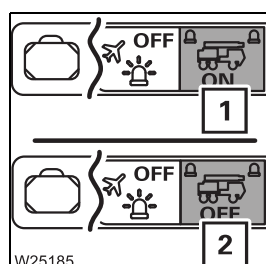
Lighting



Air traffic control light on/off

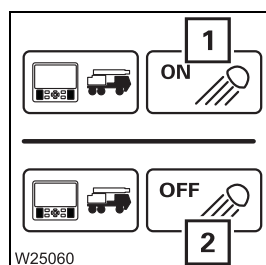
- **Switch on:** Select symbol (1) and confirm – symbol *ON* is displayed
- **Switch off:** Select symbol (2) and confirm – symbol *OFF* is displayed

▮▮▮▮▶ p. 12 - 146



Rotating beacon on/off

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



Outrigger lighting on/off

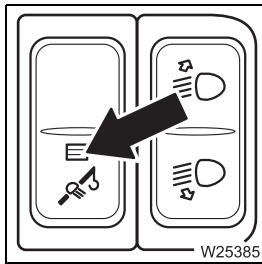
- **Switch on:** Select symbol (1) and confirm – symbol *ON* is displayed
- **Switch off:** Select symbol (2) and confirm – symbol *OFF* is displayed

▮▮▮▮▶ p. 12 - 45



Headlight on/off

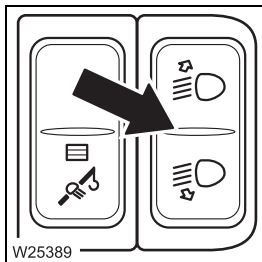
- **Switch on:** Push down – lamp in the button on
- **Switch off:** Push up – lamp in the button off



Slewable spotlights on/off

- **Switch on:** Push down – lamp in the button on
- **Switch off:** Push up – lamp in the button off

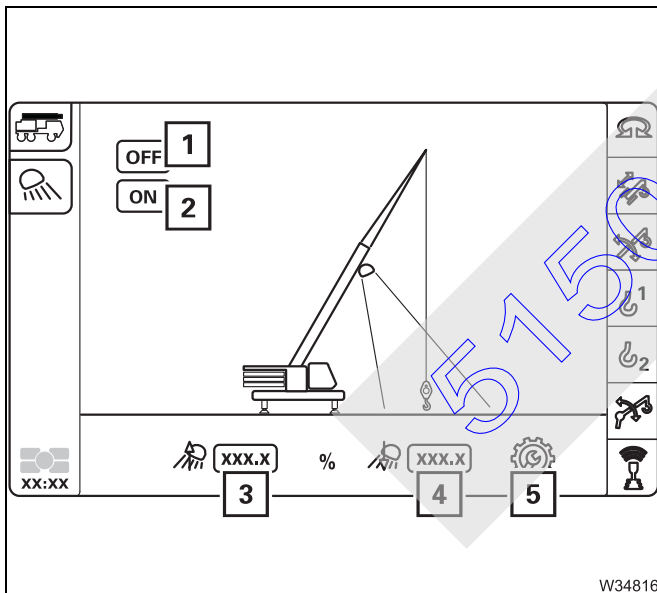
▮▮▮▮ p. 11 - 130



Slew slewable spotlight

- **Down:** Push down
- **Up:** Push up

▮▮▮▮ p. 11 - 130

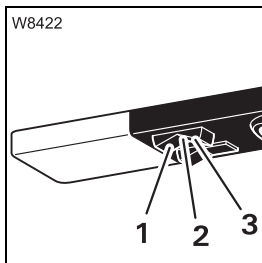


Automatic spotlights

The spotlights are switched on.

- 1 Switch on – symbol (2) display
- 2 Switch off – symbol (1) display
- 3 Increase the slewing speed
- 4 Reduce the slewing speed
- 5 Submenu speed, opening/closing

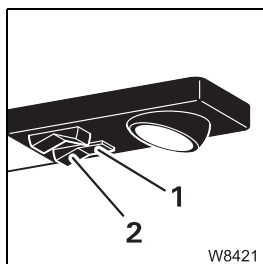
▮▮▮▮ p. 11 - 130



Cab lighting

- 1 Always on
- 2 Always off
- 3 On/off via door contact

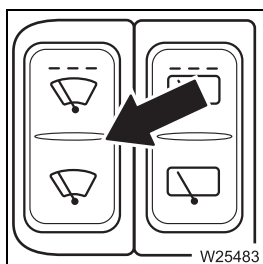




Reading lamp

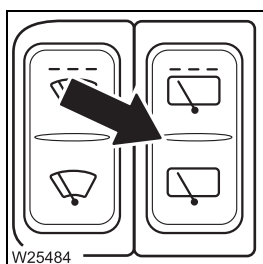
- 1 On
- 2 Off

Windscreen wiper/washing system



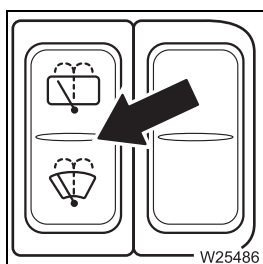
Windscreen wiper on/off

- **Off:** Middle position
- **Interval:** Push up – wiper goes to end position
- **Continuous operation:** Push down



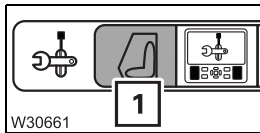
Roof window wiper on/off

- **Off:** Middle position
- **Interval:** Push up – wiper goes to end position
- **Continuous operation:** Push down



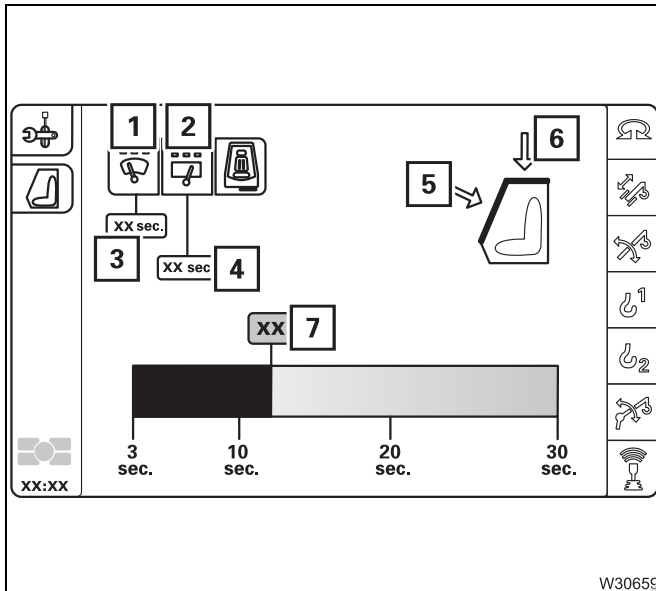
Windscreen washing system

- **Windscreen:** Push down
 - **Skylight:** Push up
- No additional wiping function is performed



Crane cab menu

Opening: Select symbol (1) and confirm – menu is opened



Adjusting the wiper stroke interval

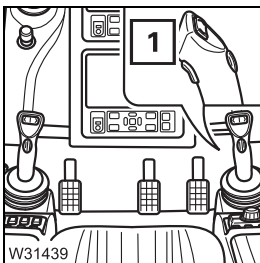
- 1 Wipers selection, display (5)
- 2 Skylight wiper selection, display (6)
- 7 Changing the interval duration

Wiper interval in seconds for

- 3 Wipers wiper
- 4 Roof window wiper

▶▶▶ p. 11 - 124

Horn



The ignition must be switched on.

- 1 – Press: superstructure horn on

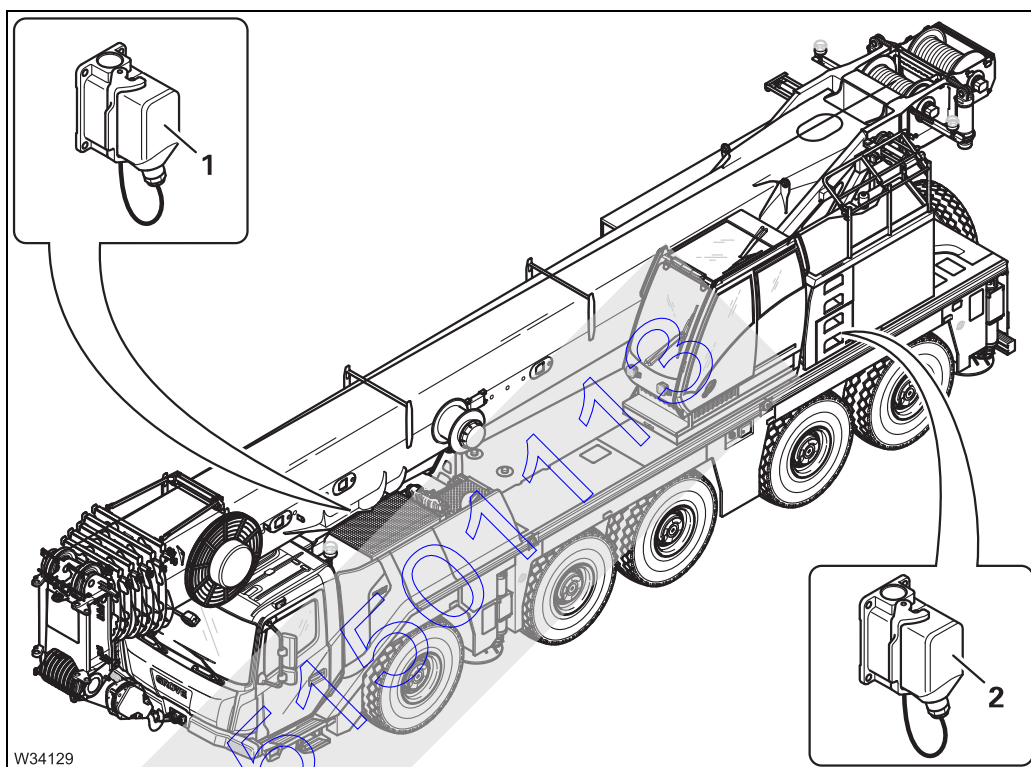
9.2.25

Hand-held control

Sockets for hand-held control

The following applies to all sockets:

- Pull plug: Engine off – ignition off
 - Insert plug: Switch the ignition on
- ▣▣▣▣ p. 12 - 23



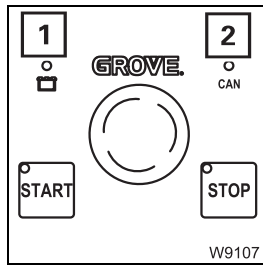
The hand-held control is only active when it is connected to the sockets (1) or (2).

Enabled operations	
1	<ul style="list-style-type: none">– Emergency operation for crane movements (except for telescoping mechanism)– Derrick lattice extension¹⁾
2	<ul style="list-style-type: none">– Emergency mode for crane operations

¹⁾ Additional equipment

Engine control panel

▶▶▶ Starting the engine – with the hand-held control, p. 10 - 10

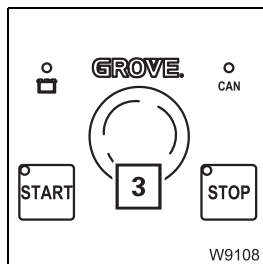


1 Voltage monitoring

- On: Switch the ignition on
- Out: Switch the ignition off

2 CAN monitoring

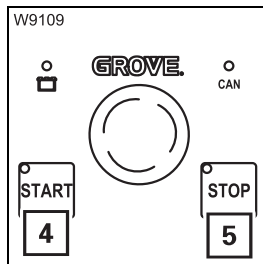
- On: Hand-held control connected – no malfunction – goes out after 20 seconds
- Flashing: Hand-held control connected – malfunction



3 Emergency stop switch

May only be used in an emergency

- Press: Engine off – crane functions stop immediately, Switch latches
- Turn the latched switch: Switch returns to initial position – crane functions released



4 START engine

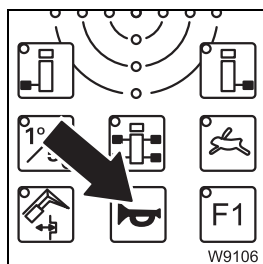
- Press once: Engine on

5 STOP engine

- Press once: Engine off

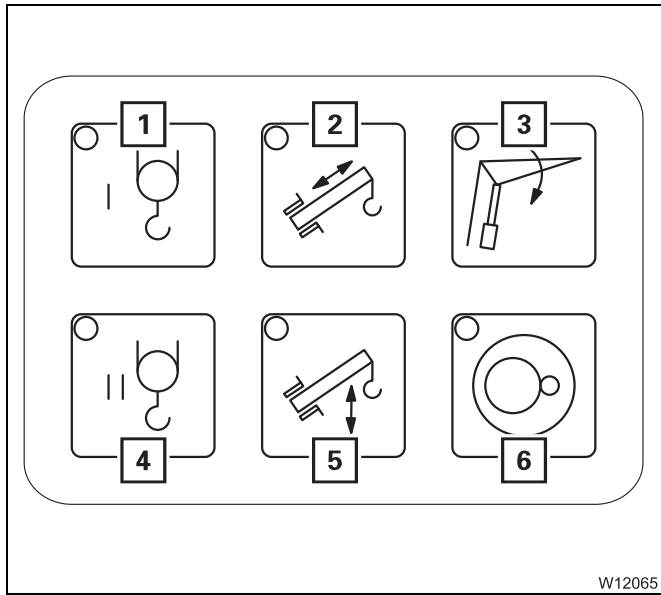
Horn

The ignition must be switched on.



- Press: Hand-held control on the superstructure socket – superstructure horn on

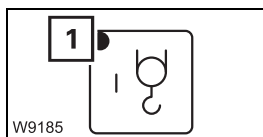




Pre-select emergency operation

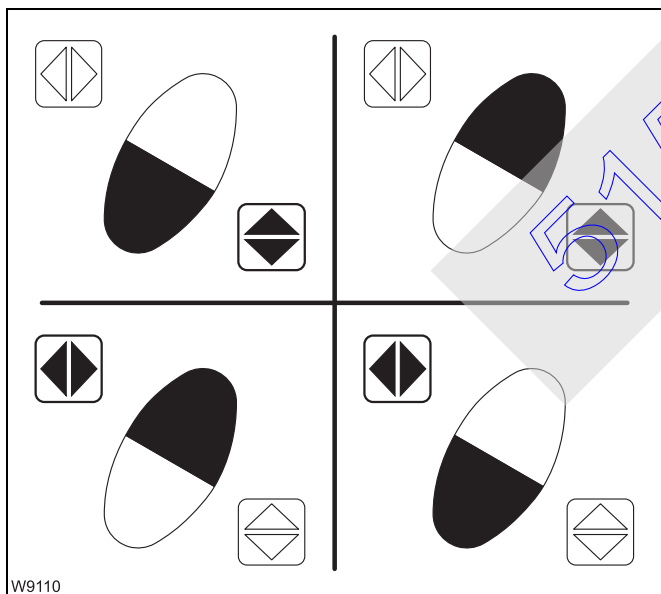
- 1 Main hoist
- 2 Telescoping mechanism
- 3 Derrick lattice extension¹⁾
- 4 Auxiliary hoist
- 5 Derricking gear
- 6 Slewing gear

¹⁾ Lattice extension derricking gear



Actuation is the same for all buttons

- **Pre-select:** Press button once – lamp (1) lights up – pre-selection on until another pre-selection is made

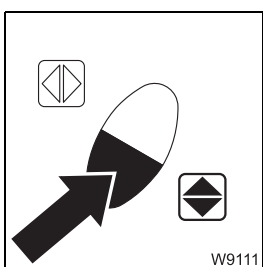


Function buttons

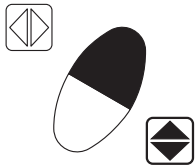
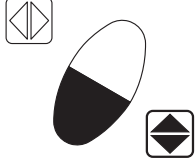
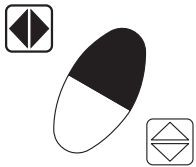
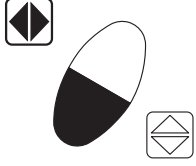
The operations are not monitored by the RCL. There are four button combinations; activated buttons are shown in black:

- **Pre-selected function on**
Press the required button combination.
- **Pre-selected function off**
Release one or both the buttons.

Press a non-assigned button combination – pre-selection off.



- **Faster movement:** Increase pressure on button
- **Slower movement:** Decrease pressure on button

Button combination	Pre-selected power unit				
	Telescoping mechanism	Derricking gear	Slewing gear	Hoists	Lattice extension
 W3851	No	Lower	No	Lowering	Lower
 W3850	Retract	Raise	No	Lifting	Raise
 W3849	No	No	Slew to right	No	No
 W3848	No	No	Slew to left	No	No

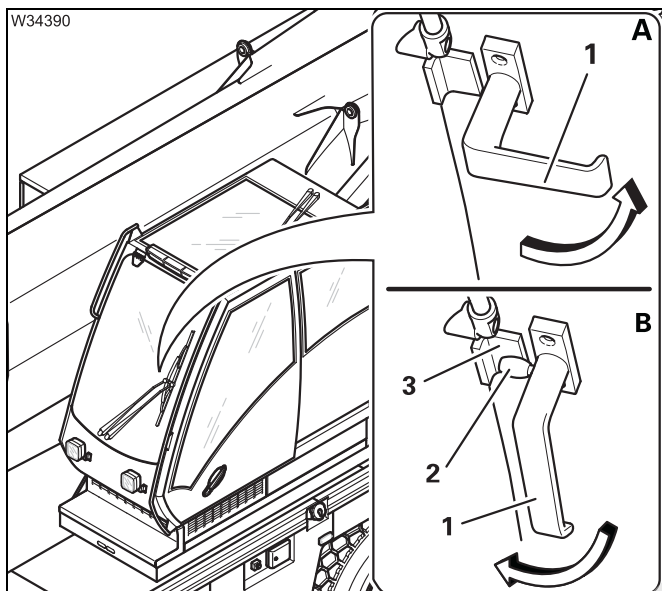
Emergency operation with the hand-held control, p. 14 - 43

9.2.26

Windows and doors

window

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



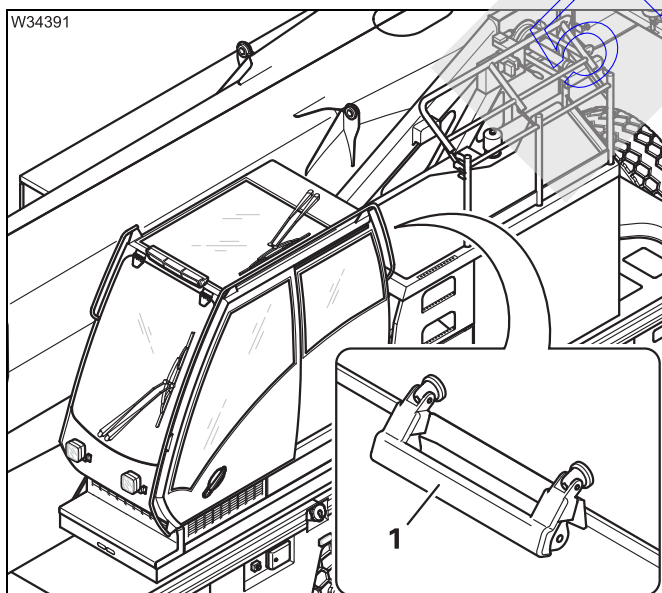
Open window (A)

- Turn both handles (1) inward.
- Push the window forward.

Close window (B)

- Pull the window closed.
- Turn both handles down – pegs (2) located behind the clamp (3).

rear window



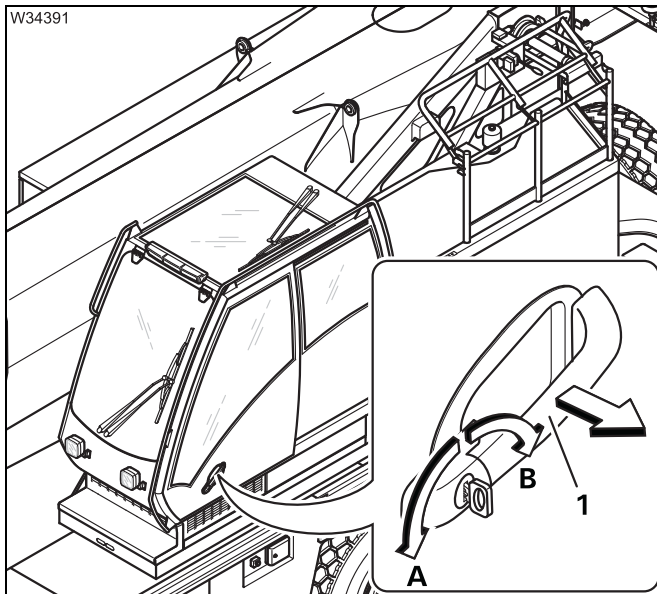
Opening

- Raise the handle (1).
- Push window outwards.

Closing

- Pull in window.
- Push down the handle (1).

Crane cab door



From outside

Unlocking

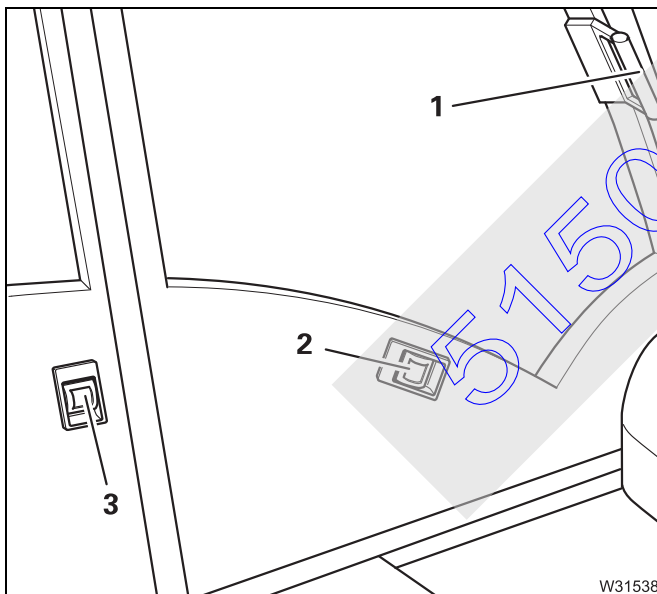
- Turn the key in direction **A**.

Locking

- Turn the key in direction **B**.

Open/close

- Pull the handle **(1)**.
- Slide the door.



From inside

- Closing

Pull unlocking lever **(3)**, push door forwards by handle **(1)** – engages.

Locking from inside not possible.

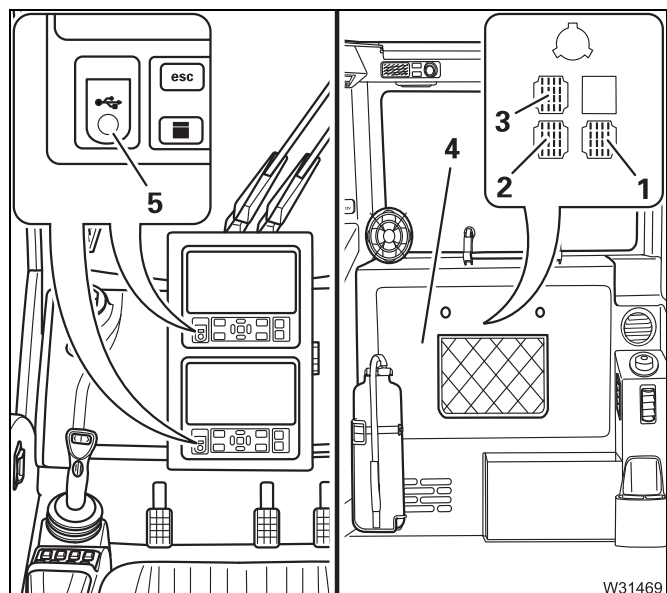
- Opening

Pull unlocking lever **(2)**, push door back by handle **(1)** – latches.

9.2.27

Diagnostics

The diagnostics connections may only be operated by the service personnel.



The following connections are below the cover (4).

- 1 CCS diagnostics – (serial interface)
- 2 CCS diagnostics – CAN bus
- 3 RCL diagnostics

Additional diagnostic and service connections are present on the CCS and RCL control units (5).

- Do not connect external devices, e.g. a mobile phone, to these connections!

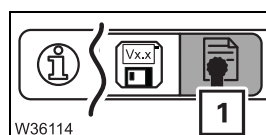


Risk of damage to the crane control system!

Do not connect external devices to the diagnostic connections. This prevents severe malfunctions in the crane control system.

9.2.28

Other



Disclaimer menu

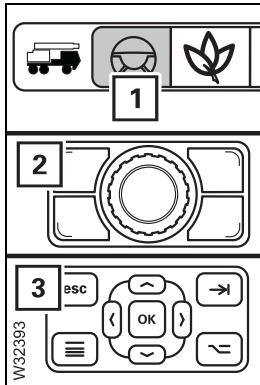
- **Opening:** Select and confirm symbol (1). The warranty waiver text is shown on the display.

9.3

Short description of the operating elements – driving from the crane cab

9.3.1

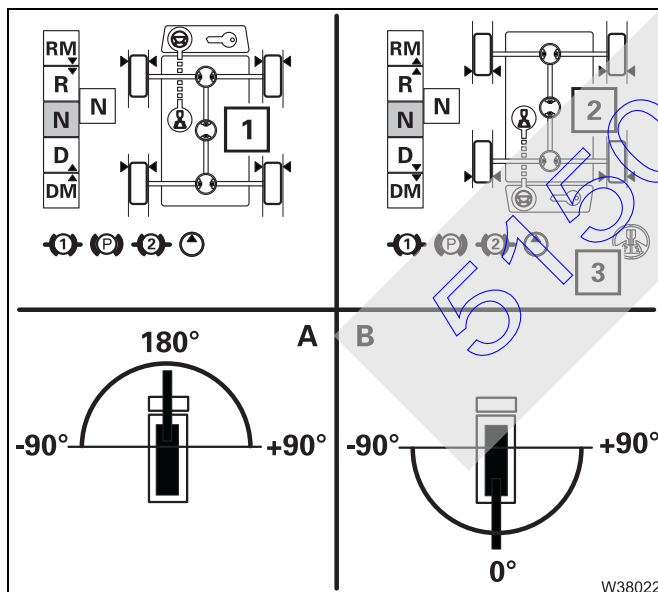
Driving menu



Driving menu

- **Opening:** Select symbol (1) and confirm – menu is opened
 The menu is also opened the first time the parking brake is released; \Rightarrow p. 9 - 163
 - **Applying:**
 - The parking brake must be engaged
 - Crane operation mode must be switched on
- Press button (2) or (3) once – menu is closed

\Rightarrow p. 13 - 19

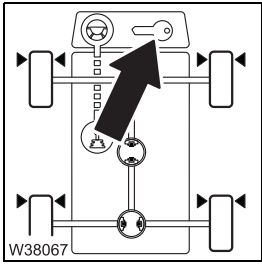


Carrier display

- 1 Display in the front semi-circle (A)
- 2 Display in the rear semi-circle (B) – display of symbol (3)

\Rightarrow p. 13 - 22

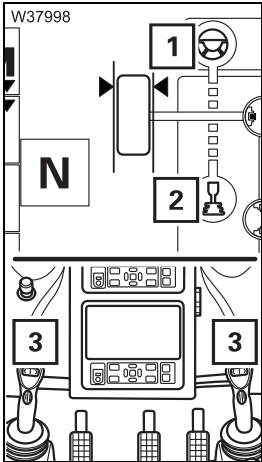




Steering lock display

- 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 - 19



Change-over between crane operation and driving modes

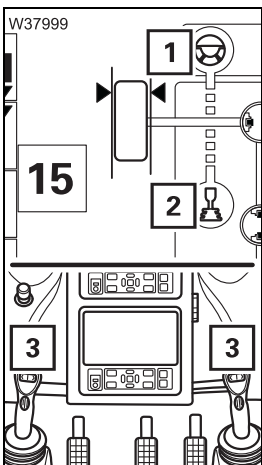
- Switching on driving mode

Crane operation mode must be switched on

Select and confirm symbol (2)

- Symbol (2) green
- Symbol (1) black
- Buttons (3) have *Driving* function
- Transmission in neutral position
- Crane's hydraulic system *Driving mode* on

▶▶▶ *Selecting the operating mode*, p. 13 - 19



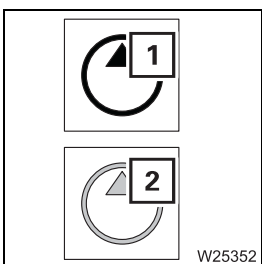
- Switching on crane operation mode

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
- Crane's hydraulic system *Driving mode* off

▶▶▶ *Selecting the operating mode*, p. 13 - 19



Display of crane's hydraulic system driving mode on/off

- 1** Arrow **orange** – crane's hydraulic system *Driving mode* on (N, DM or RM active)
- 2** Arrow **grey** – crane's hydraulic system *Driving mode* off (D or R active)

▶▶▶ *Crane's hydraulic system Driving mode*, p. 13 - 21

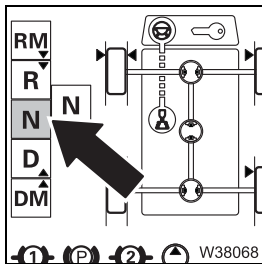
9.3.2

Transmission

Operating the transmission when driving with rigged truck crane,
 ■■■► *Operating the transmission*, p. 13 - 28.

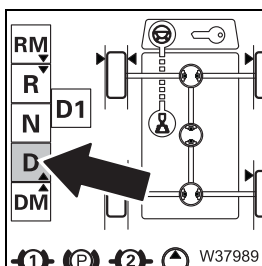
The following applies to all operating elements:

- Driving mode must be switched on
- The *Service brake* pedal must be applied
- The truck crane must be stationary.



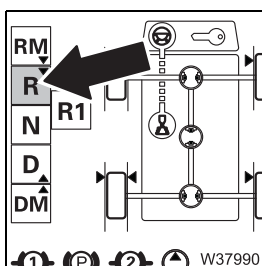
Neutral position N

- **Switch on:** Select and confirm symbol – letter is **white** – no gear engaged
- **Switch off:** Shift to a different gear – letter is **blue**



Transmission mode D

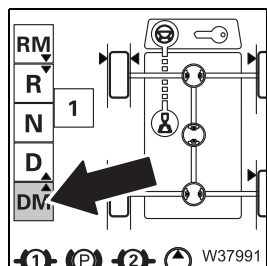
- **Switch on:** Select and confirm symbol – letter is **white**
 - Select forwards starting gear
 - Crane's hydraulic system *Driving mode off*
 - Crane movements disabled
- **Switch off:** Shift to a different gear – letter is **blue**



Transmission mode R

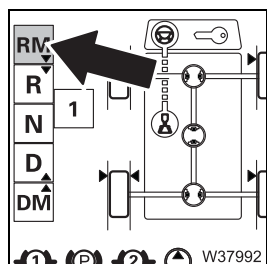
- **Switch on:** Select and confirm symbol – letter is **white**
 - Select reverse starting gear
 - Crane's hydraulic system *Driving mode off*
 - Crane movements disabled
- **Switch off:** Shift to a different gear – letter is **blue**





Transmission mode DM

- **Switch on:** Select and confirm symbol – letter is **white**
 - Gear 1 forwards on – transmission will not shift
 - Crane's hydraulic system *Driving mode* on
 - Crane movements released
- **Switch off:** Shift to a different gear – letter is **blue**



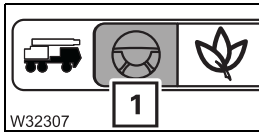
Transmission mode RM

- **Switch on:** Select and confirm symbol – letter is **white**
 - Gear 1 reverse on – transmission will not shift
 - Crane's hydraulic system *Driving mode* on
 - Crane movements released
- **Switch off:** Shift to a different gear – letter is **blue**

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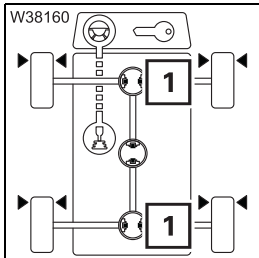
9.3.3

Final drive



Driving menu

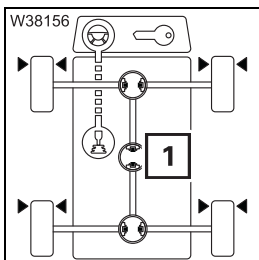
Opening: Select symbol (1) and confirm – menu is opened



Transverse differential locks on/off

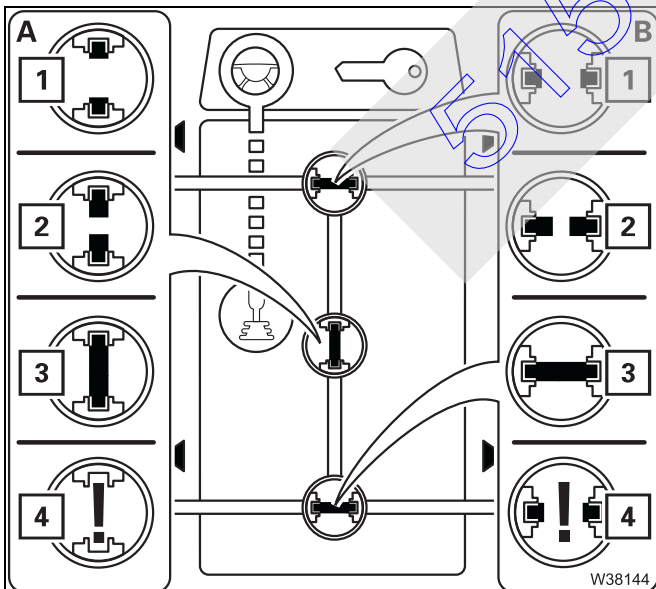
- **Switch on:** Select symbol (1) and confirm – symbol is **red**
- **Switch off:** Select symbol (1) and confirm – symbol is **green**

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

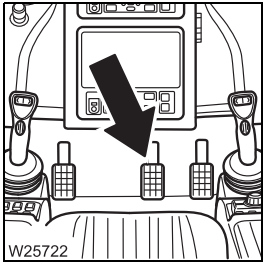
The current status is shown using different symbols:

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

➡ p. 13 - 30

9.3.4

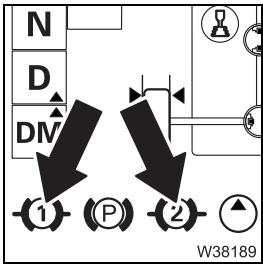
Brakes



Service brake

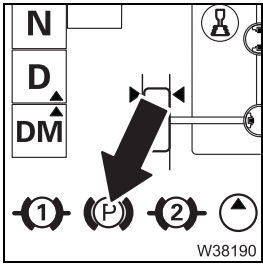
The pedal acts on the carrier brakes – for continuously variable adjustment of the braking force.

CCS display



Supply pressure brake circuits 1 and 2 display

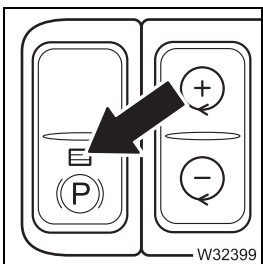
- Red: Supply pressure less than about 5 bar
- Green: Supply pressure greater than 5.5 bar



Parking brake indicator lamp

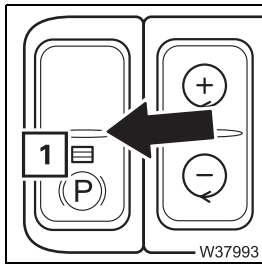
- Red: Parking brake applied
- Grey: Parking brake released

Side panel from above



Parking brake indicator lamp

- On: Parking brake applied
- Out: Parking brake released



Applying/releasing the parking brake

- **Applying:**
 - Press down once – lamp (1) lights up, Parking brake applied
- **Releasing:**
 - Press up once – *Driving* menu opens
 - Apply the service brake
 - Wait for about 5 seconds
 - Press up once – lamp (1) goes out, Parking brake released

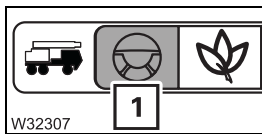
After the first release

- Apply the service brake
- Press up once – lamp (1) goes out, Parking brake released

➡ After driving, p. 13 - 32

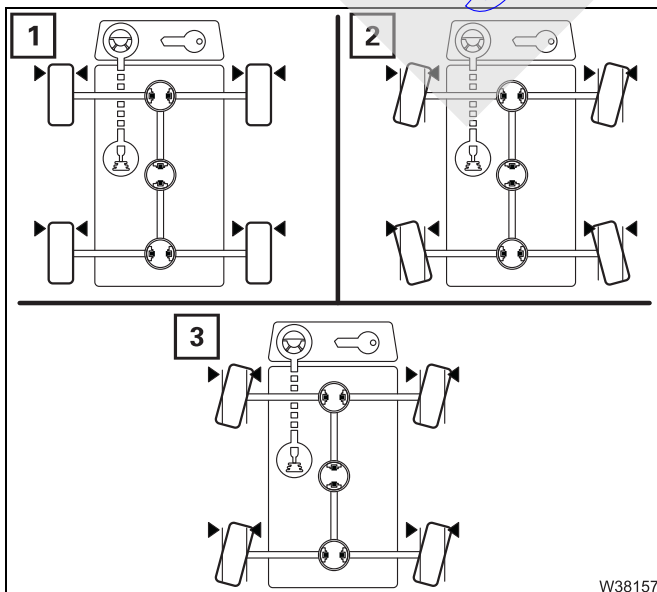
9.3.5

Steering



Driving menu

Opening: Select symbol (1) and confirm – menu is opened



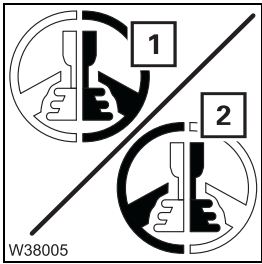
Current wheel position display

- 1 Straight ahead
- 2 Driving around corners
- 3 Crab travel mode

➡ p. 13 - 23



CCS display

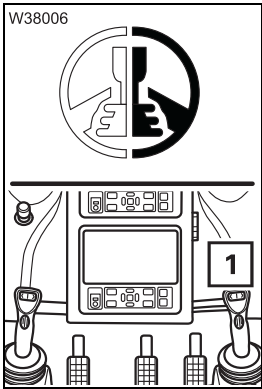


Changing the steering direction

Display

- 1 Steering direction *Steering wheel*
- 2 Steering direction *Reversed* (compared to steering wheel)

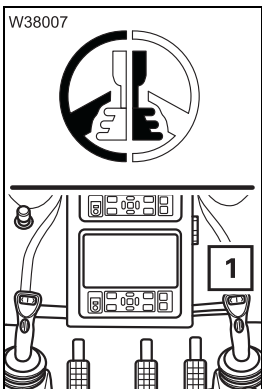
To switch over: Select desired symbol and confirm
The setting will be secured



– Steering direction *Steering wheel*

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



– Steering direction *Reversed*

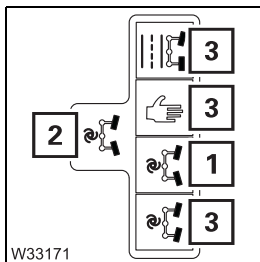
Function

- Press button (1) to the right = turn wheels 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

➡ *Switching the steering direction, p. 13 - 23*

Switching steering modes on and off

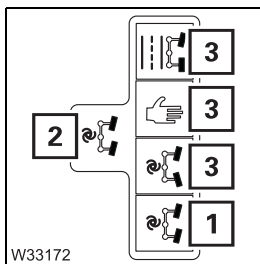
The selected symbol must be confirmed within 2 seconds, otherwise the steering mode remains unchanged.



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)

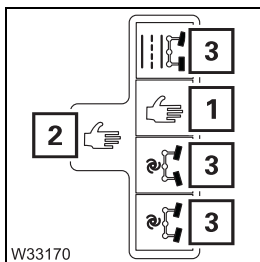
▶▶▶ p. 13 - 24



Automatic separate steering for 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)

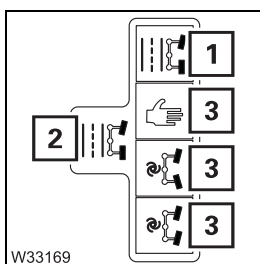
▶▶▶ p. 13 - 24



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 - 24



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)

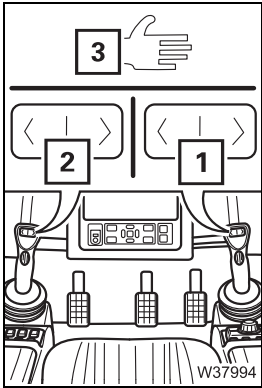
▶▶▶ p. 13 - 27



Control panels



The information in this section is based on the steering direction setting *Steering wheel*.



Steering with separate steering – manual

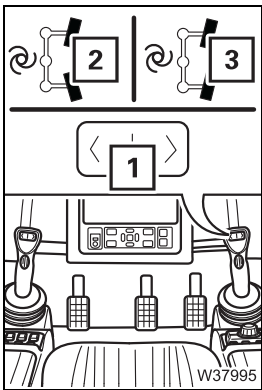
The (3) symbol is displayed

1. Steer 1st and 2nd axle lines with the button (1).

Press and hold button (2)

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

▣▣▣▣▶ p. 13 - 26



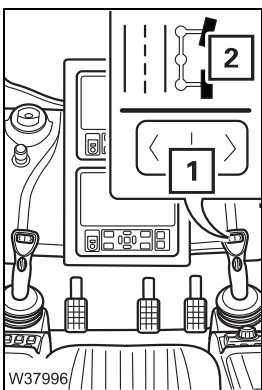
Steering with separate steering – automatic driving around corners/crab travel mode

The symbol (2) or (3) is displayed.

Press and hold button (1)

- **To the left:**
 - 1. and 3rd axle lines – turn to the left
 - 3. up to 5th axle lines – the matching steering angle for steering mode
- **To the right:**
 - 1. and 3rd axle lines – turn to the right
 - 3. up to 5th axle lines – the matching steering angle for steering mode

▣▣▣▣▶ p. 13 - 25



Steering in normal steering mode

The (2) symbol is displayed

1. Steer 1st and 2nd axle lines with the button (1).

- **To the left:**
 - 1. and 3rd axle lines – turn to the left
 - 3. up to 5th axle lines – the matching steering angle for steering mode
- **To the right:**
 - 1. and 3rd axle lines – turn to the right
 - 3. up to 5th axle lines – the matching steering angle for steering mode

▣▣▣▣▶ p. 13 - 27

10

Starting/switching off the engine – for crane operation

You must start the engine from the crane cab for crane operation. If the engine has been started from the carrier, then you must shut it down in the carrier and switch off the ignition before crane operation.

All the power units required for crane operation are only released when you start the engine from the crane cab.

The procedure depends on whether you:

- Start the (cold) engine for the first time in the day
- Start the engine from the crane cab; ■■■▶ p. 10 - 3,
- Start the engine with the hand-held control; ■■■▶ p. 10 - 10.

10.1

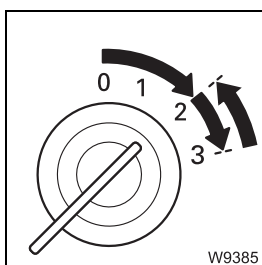
When starting the engine for the first time in the day



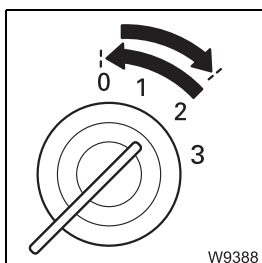
Risk of crushing due to turning wheels

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

The first start of the day should always be made from the **driver's cab**, as all the displays for monitoring the engine can only be accessed there.

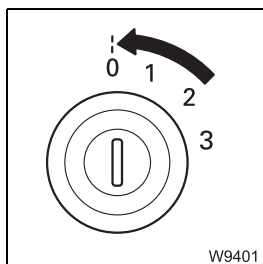


- Carry out all the required tasks and checks for starting the engine; ■■■▶ *CHECKLIST: Starting the engine*, p. 4 - 1.
- Start the engine from the driver's cab and perform all the necessary checks; ■■■▶ *Checks after starting the engine*, p. 4 - 15.



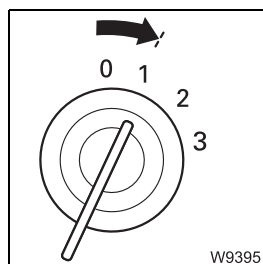
- Switch the engine off and switch off the ignition.






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 - 18.



Lock the driver's cab for protection against unauthorised use.

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10.2

Starting the engine – from the crane cab

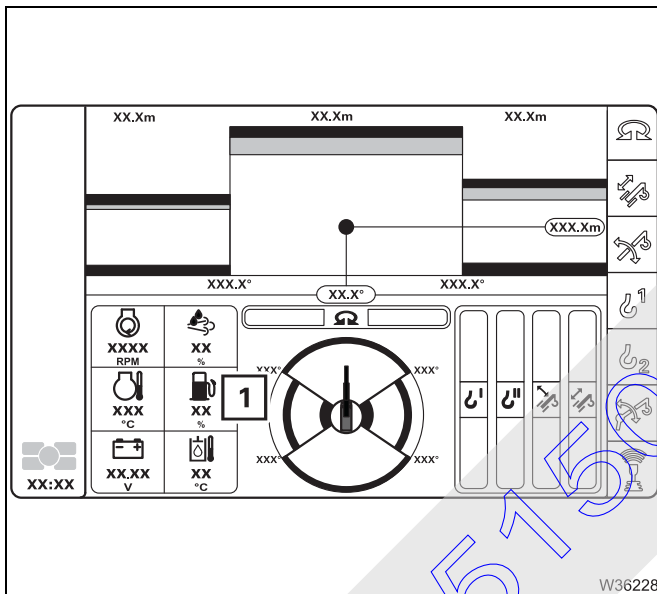
10.2.1

Check the fuel level and AdBlue level

- Check the fuel level and the AdBlue 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 filling level in per cent.

100% corresponds to about 400 ltr (105.6 gal)¹⁾.

The display changes colour depending on the filling level:

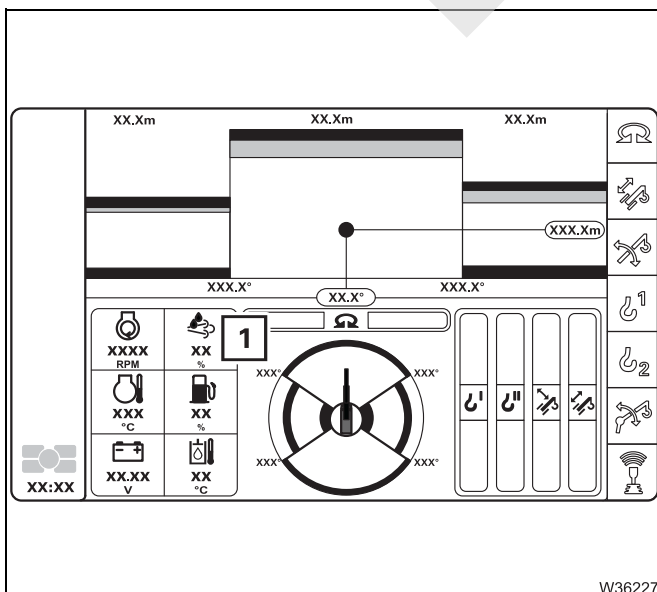
Green: Over 10% (over 40 ltr) (10.6 gal)

Yellow: 5 to 10% (20 to 40 ltr) (5.3 to 10.6 gal)

Red: below 5% (less than 20 ltr) (5.3 gal)

¹⁾ With additional equipment approx. 650 ltr (85.9 gal); see p. 4 - 7.

AdBlue



The display (1) indicates the current filling level in per cent.

100% corresponds to about 40 ltr (10.6 gal).

The display changes colour depending on the filling level:

Green: Over 10% (over 4 ltr) (1.1 gal)

Yellow: 5 to 10% (2 to 4 ltr) (0.53 to 1.1 gal)

Red: below 5% (less than 2 ltr) (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 - 1.

Checking the hand-held control

Hand-held control removed

- Check that the bridging plugs are inserted into all sockets for the hand-held control; ■■■► p. 9 - 150.

Hand-held control connected to the superstructure

After starting the engine, you can use the hand-held control to execute all functions which are provided from this socket.

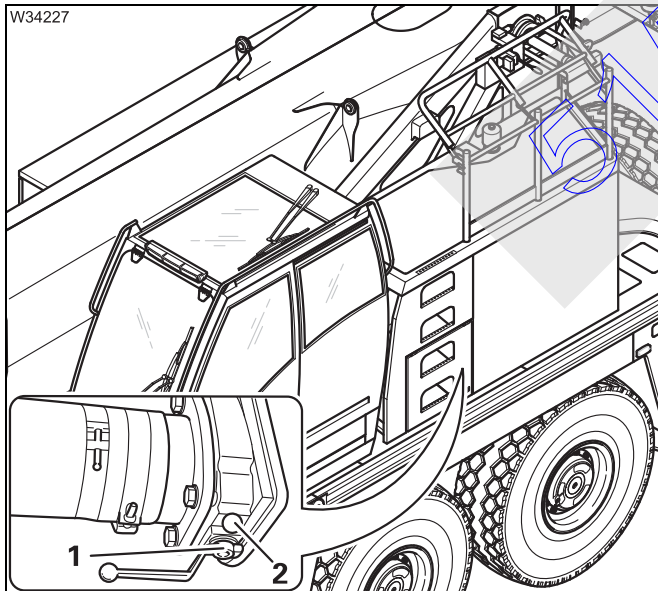
At the hydraulic tank

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



Risk of damage to hydraulic pumps

You may only start the engine when all the valves on the hydraulic tank are open!



The flap is located behind the valve (1).

- Check that the valve is open – lever (1) parallel to the pipe.

If the valve is closed

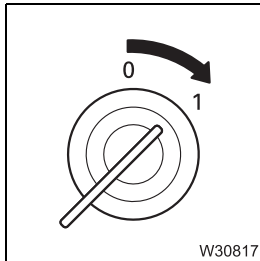
- Pull the knob (2) and open the valve.

10.2.3

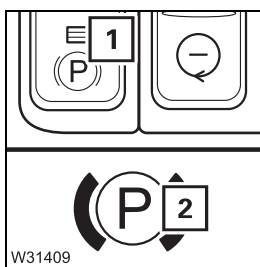
Switching the ignition on



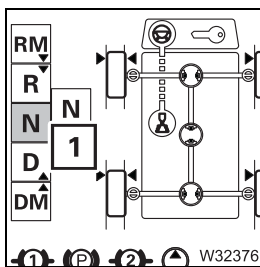
Do not start the engine until the CCS display shows a menu (usually the *Enter rigging mode* menu).



- Turn the ignition key to position **1**.
The ignition is switched on:



- The vehicle parking brake must be engaged. The lamp (1) lights up – symbol (2) – **red**.

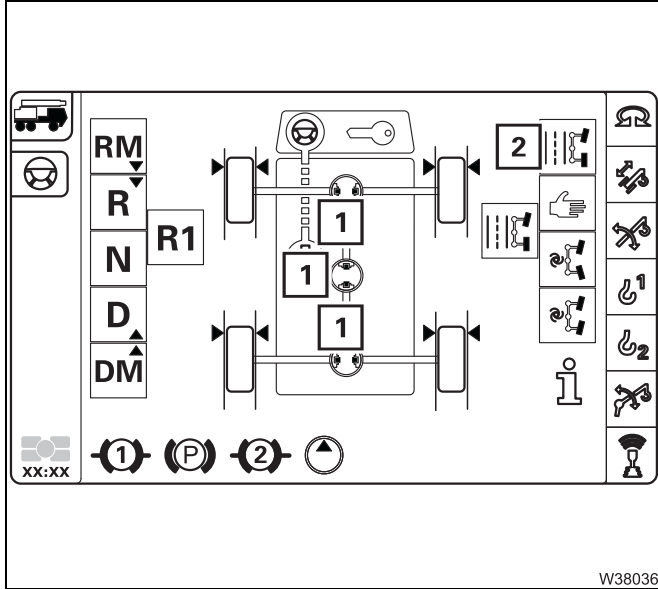


- The transmission must be switched to neutral position – symbol (1).
If the symbol (1) is grey then switch the ignition off and on again.

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

10.2.4 Comparison of switching states

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



Differential locks

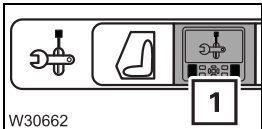
The state last saved is retrieved.

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), irrespective of what setting was last saved.

10.2.5 Display – setting the brightness



- Open the *Settings* (1) menu.

This is operated in the same way as in the driver's cab; p. 4 - 11.

10.2.6

Starting the engine

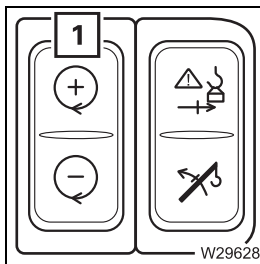
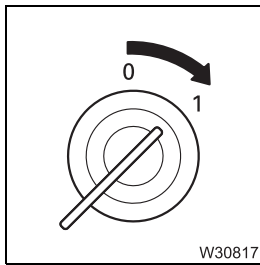
This section pertains to starting a warm and cold engine.



Danger of explosion when using starter fuel

The engine may never be started with the aid of starter fuel. The starter fuel sprayed into the intake manifold can ignite.


- Do not press the accelerator.
- Turn the ignition key to position **1**.



- Press button **(1)** upwards.
- Let go of the button after the engine starts.

After starting, the idling speed corresponds to the standard value.

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

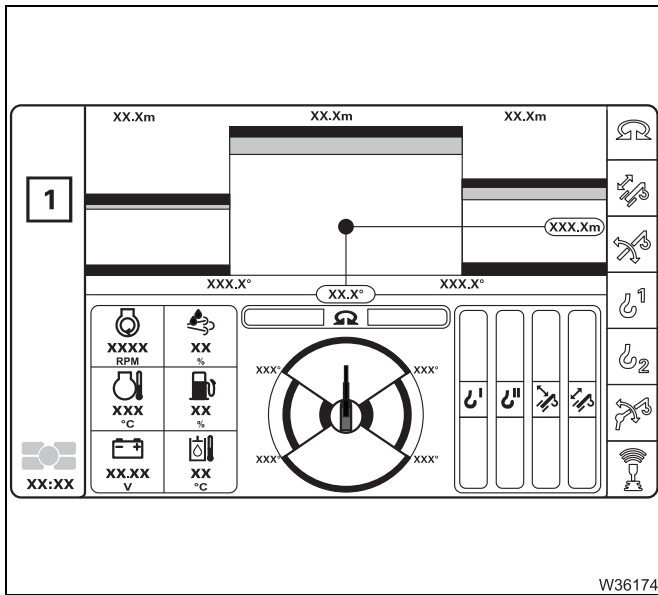
If the engine does not start after several attempts;  *Malfunctions on the engine*, p. 8 - 19.



To set the idling speed;  p. 10 - 9.

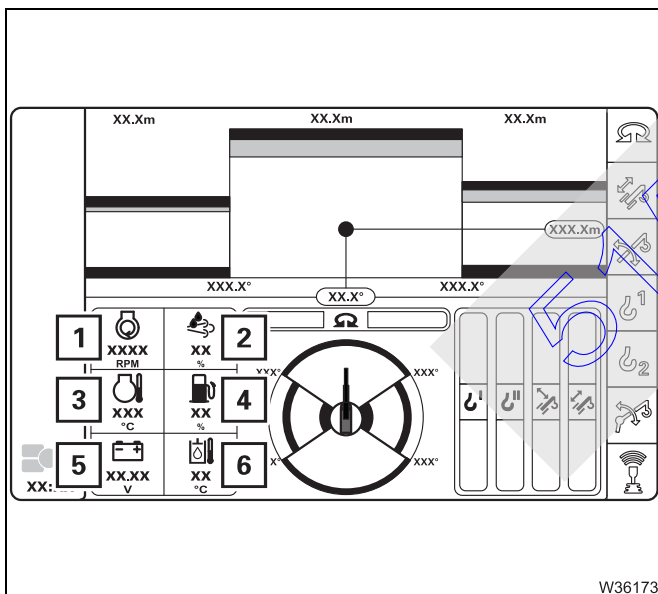
10.2.7

Checks after starting the engine



- Check the display (1) on the CCS control unit immediately after starting the engine.

When a symbol is displayed in the display area (1); Malfunctions on the engine, p. 8 - 19.



- Also check the displays
 - 1 Engine speed display in rpm
 - 2 AdBlue (DEF) filling level indicator in per cent
 - 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 can be found.

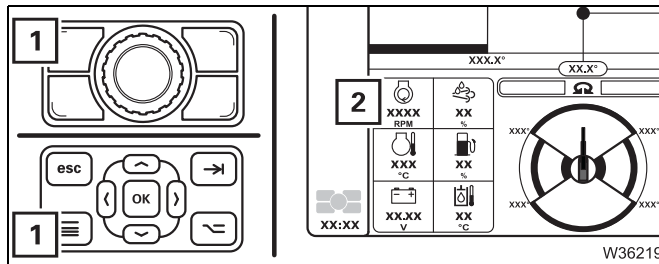
Green: Value OK

Yellow: Limit value almost reached

Red: Limit value exceeded (or not reached) – warning message;
 p. 14 - 3.

10.2.8

Setting the idling speed



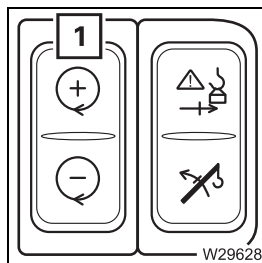
- Start the engine; p. 10 - 7.
- Open the start menu – button (1).

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

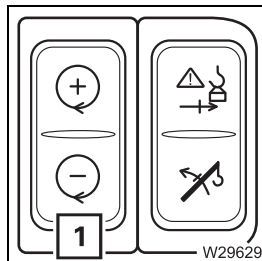


- Push the button (1) **up**.
The idling speed increases continuously until you release the button or the maximum value is reached.

or

- Press the button in **at the top** once.
The idling speed is increased by one step.

Reduces the idling speed

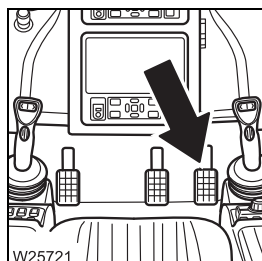


- Push the button (1) **down** once.
The idling speed is reduced by one step.

or

- Press the button (1) in **at the bottom** and hold it pressed.
 - After about 3 seconds the idling speed will be at the standard value.
 - After a further approx. 3 seconds, the engine will switch off.
The engine cannot be restarted until about 7 seconds have elapsed.

Exceeding the idling speed



You can exceed the idling speed at any time using the accelerator.

Once you release the accelerator the engine speed reduces to the pre-set idling speed.

10.3

Starting the engine – with the hand-held control



You can only start the engine when bridging plugs are inserted in all sockets that are not required; p. 9 - 150.

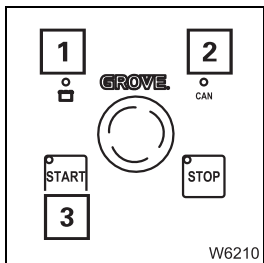


Risk of crushing due to turning wheels

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

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

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



- Wait until the lamps (1) and (2) light up.
- If the lamp (2) does not light up or flash after about 20 seconds, there is a malfunction; p. 8 - 19.
- Press the (3) button once – the engine starts.



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

10.4

Switch off the engine

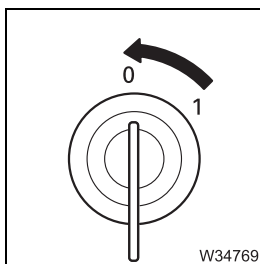
10.4.1

At the ignition lock and with hand-held control



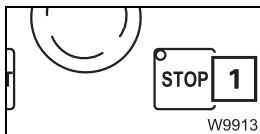
Risk of accident by suspended loads

Never switch off the engine whilst a load is suspended. You must have the control levers at hand in order to intervene at any time. Always set down the load before you leave the crane cab.



If the hand-held control is not connected:

- Turn the ignition key to position **0** – the engine will stop.
The crane control is switched off.



If the hand-held control is connected:

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

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

After switching off

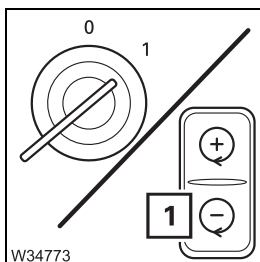
Refer to the instructions in the respective sections for each type of stopping work;

▣▣▣▣ *In case of short work breaks, p. 11 - 149,*

▣▣▣▣ *In case of work breaks of more than 8 hours, p. 11 - 150.*

10.4.2

With the idling button



- Push the button **(1)** **down** and hold it there.
 - After about 3 seconds the idling speed will be at the standard value.
 - After a further about 3 seconds, the engine will switch off – the crane control remains switched on.
The engine cannot be restarted until about 7 seconds have elapsed.

10.4.3

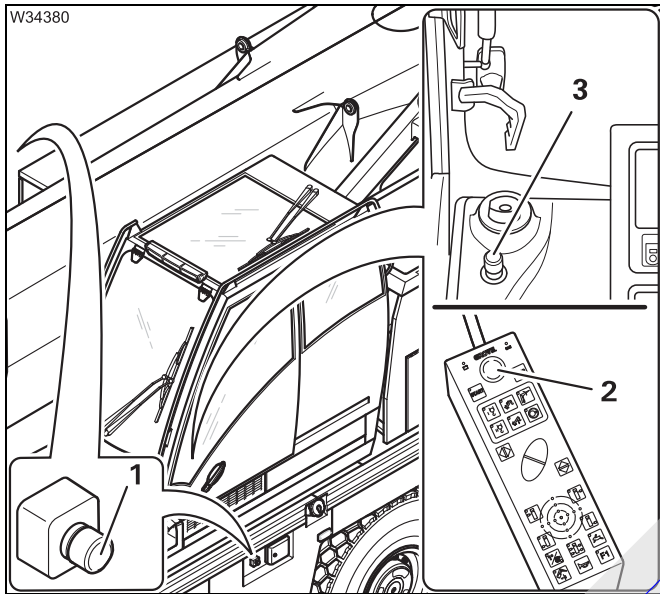
Using the emergency stop switches



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
- 2 On the hand-held control unit
- 3 In the crane cab

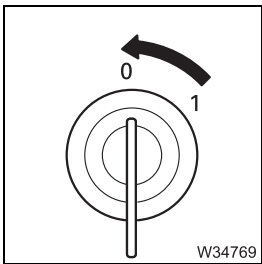
- Press an emergency stop switch (1), (2) or (3). The switch latches.

The engine shuts down.

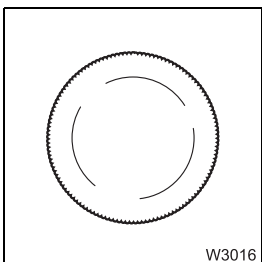
If an air intake inhibitor is fitted, it is closed.

Emergency stop switch, resetting


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 unlatches again.

If an air intake inhibitor is fitted, it must be loosened;  *Opening the air intake inhibitor, p. 4 - 20.*

11 Crane operation

11.1 Before operating the crane

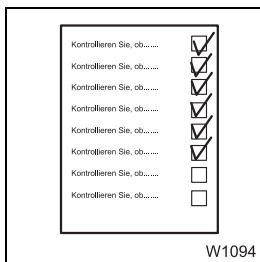
11.1.1 CHECKLIST: Checks before operating the crane



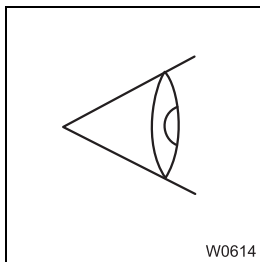
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references. **Observe the warnings and safety instructions there.**



This checklist only applies to working with a rigged truck crane (supported and rigged with counterweight). If the truck crane is not yet rigged; **▶▶▶ CHECKLIST: Rigging, p. 12 - 1.**

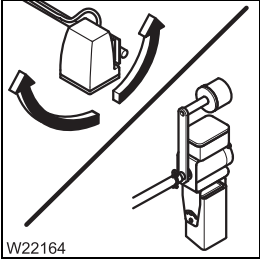




1. The truck crane has been rigged for the operation to be carried out as described in the *CHECKLIST: Rigging*; ▶▶▶ p. 12 - 1.

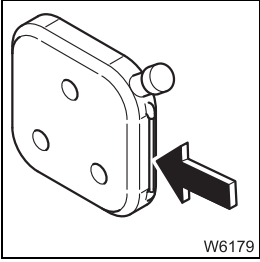



2. Inspect the truck crane, looking out in particular for any leaking fluids (oil, fuel or water).

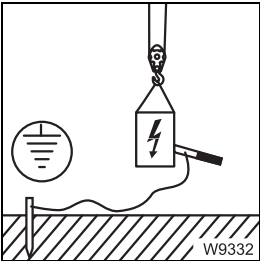





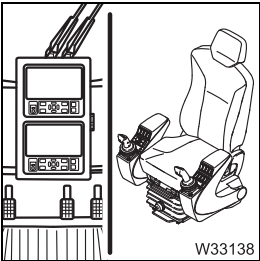
3. – Switch on the cameras for crane operation;  p. 12 - 150.
– Adjust the slewable spotlights if necessary;  p. 11 - 130.





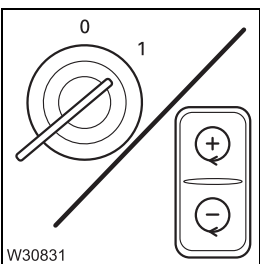
4. Crane cab heater – check the fuel level;  p. 11 - 5.



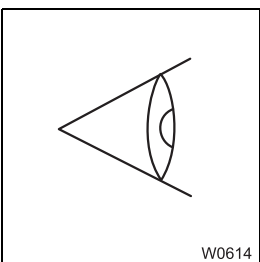
5. Earth the load, if necessary;  p. 11 - 13.




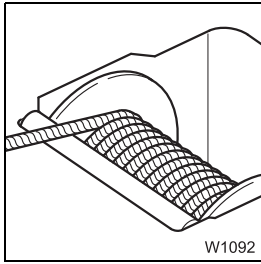
6. Adjust crane cab seat and front panel;
 *Crane cab seat*, p. 11 - 8,
 *Front control panel*, p. 11 - 9.



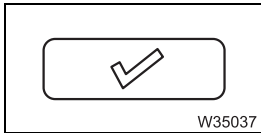
7. Start the engine for crane operation;  p. 10 - 7.



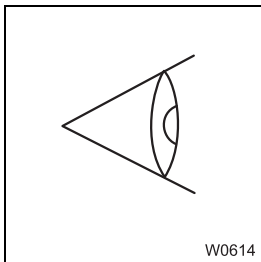
8. Check
 - RCL,
 - lifting limit switch,
 - seat contact switch and dead man's switch,
 - emergency stop switch,for correct operation. Have faulty units repaired;  p. 11 - 10.



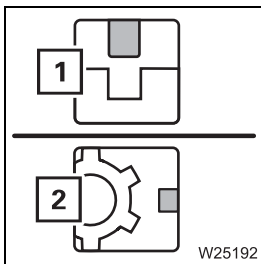
9. Check the position of the hoist ropes; ■■■▶ p. 11 - 6.



10. Compare current rigging mode with the *RCL* display – enter and confirm current rigging mode, if necessary; ■■■▶ p. 11 - 32.

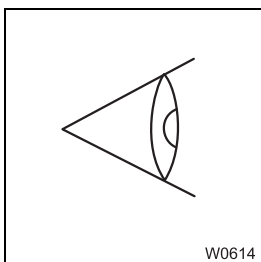


11. Check telescoping; ■■■▶ *Inspections prior to starting operations*, p. 11 - 97.



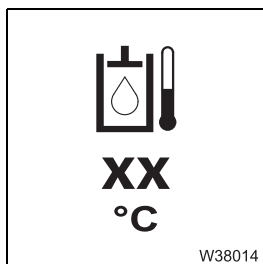
12. – Switch off the slewing gear for 0° and 180° working positions – symbol (1) red; ■■■▶ p. 11 - 120.


– Switch off houselock (if fitted) for other working positions – symbol (2) red; ■■■▶ p. 11 - 19.

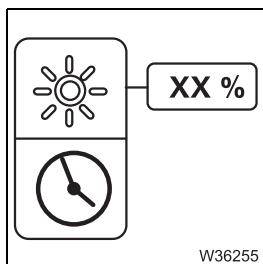


13. Check the electrical system for correct operation; ■■■▶ p. 11 - 7.






14. Check hydraulic oil temperature, preheat if necessary;  p. 11 - 14.



15. Adjust the brightness of the CCS display if necessary;  p. 10 - 6.



Additional information on inspections during crane operation, on permissible working positions and on how to operate the individual power units;  *Crane operation with main boom*, p. 11 - 73.

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11.1.2

Check the condition of the truck crane

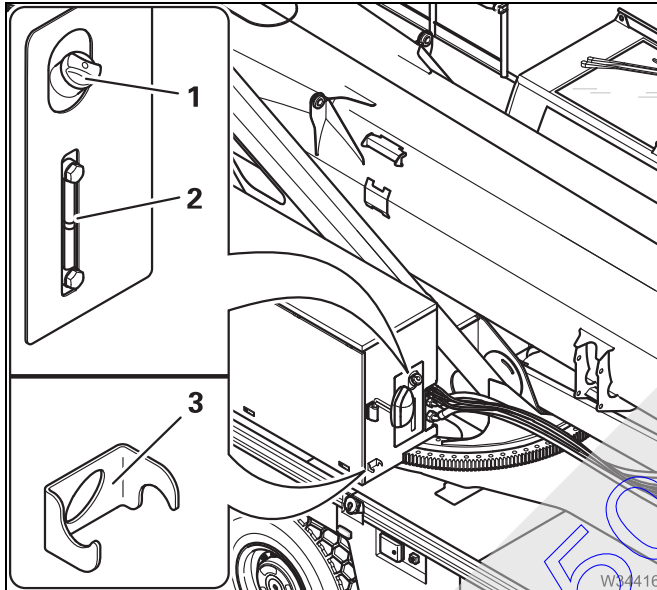
Fuel tank auxiliary heater

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



Danger of fire due to flammable gases

Turn off the engine and heating systems before refuelling.



Insert the fuel nozzle in the clamp (3).

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

Visual inspection

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



Danger if the crane cannot be unrigged

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



Risk of environmental damage due to leaking consumables.

Immediately repair or have repaired oil, fuel and coolant leakages. This prevents oil or fuel seeping into the ground or polluting waters.

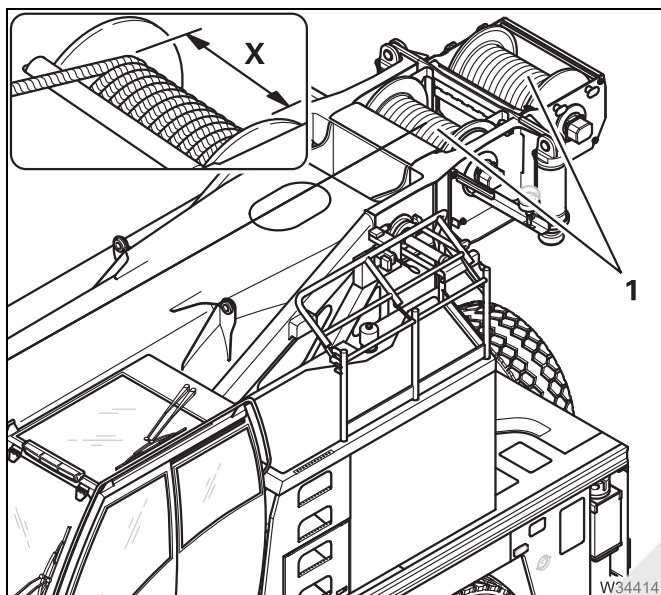


Checking the position of the hoist ropes



Risk of crushing due to turning rope drum

Keep away from the rope drum while it is turning.
This will prevent your limbs being drawn in or crushed.

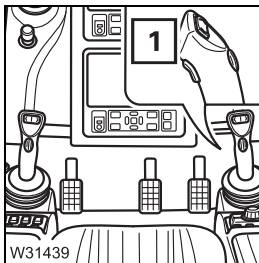
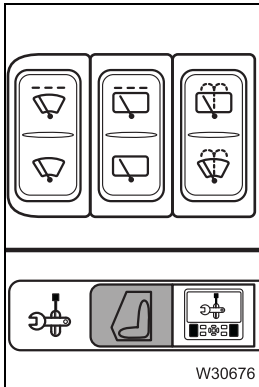
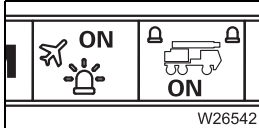
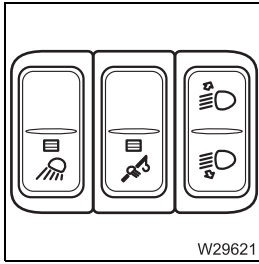


- Always check the entire length of the winding of the ropes (1).
- Slowly perform the *Lower* movement until the rope has moved over a complete width (X) of the rope drum.
 - The rope must be evenly wound.
 - The rope turns on the drum must be evenly spaced, 0 to 2 mm (0 to 0.08 in) apart.
 - The cross-over 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



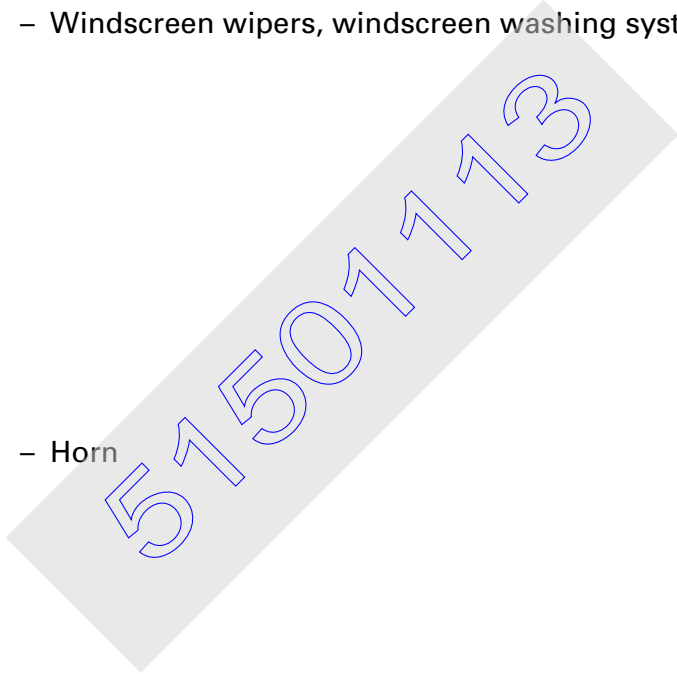
- Check the following functions and have faulty parts repaired.

– Working area spotlight

– Air traffic control light, rotating beacons

– Windscreen wipers, windscreen washing system

– Horn

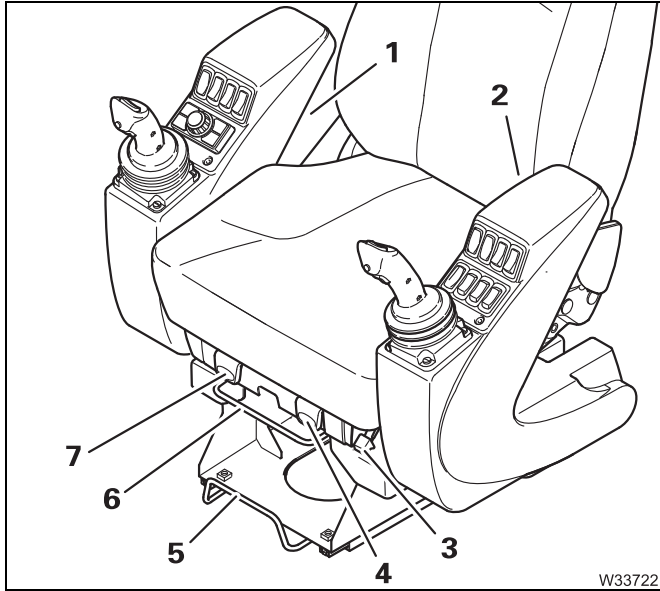


11.1.3

Adjusting the crane cab seat and front control panel

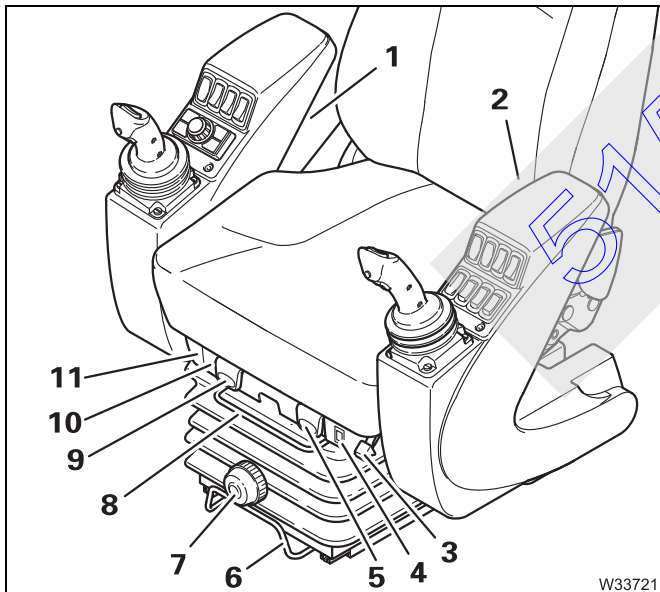
Crane cab seat

You can adjust the crane cab seat to your height.



Version 1

- 1 Control panel right – height
- 2 Control panel left – height
- 3 Back rest – angle
- 4 Seat – height
- 5 Seat – longitudinal adjustment with control panels
- 6 Seat – longitudinal adjustment without control panels
- 7 Seat cushion – angle



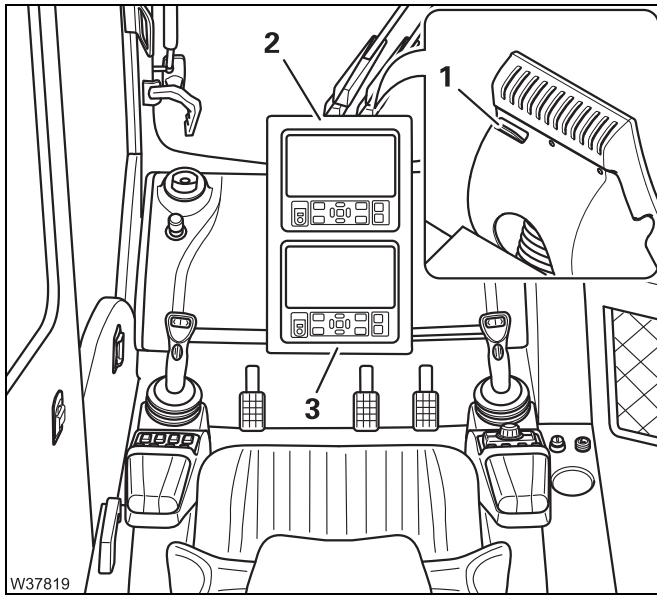
Version 2

- 1 Control panel right – height
- 2 Control panel left – height
- 3 Back rest – angle
- 4 Seat heating¹⁾ on/off
- 5 Seat – height¹⁾
- 6 Seat – longitudinal adjustment with control panels
- 7 Adjust suspension stiffness to body weight
- 8 Seat – longitudinal adjustment without control panels
- 9 Seat cushion – angle
- 10 Upper lumbar area support
- 11 Lower lumbar area support

¹⁾ Requirement – ignition is on

Front control 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).

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11.1.4

Checking the safety equipment




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.

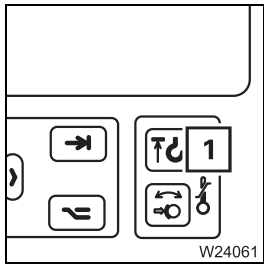
Have faulty safety devices repaired immediately by **Manitowoc Crane Care**.

Rated capacity limiter

- Switch on the rated capacity limiter (RCL), do all of the checks and enter and confirm the current rigging mode;  *Enter rigging mode*, p. 11 - 32.
- The RCL is working correctly at this point in time if no error message is pending and if crane movements have been enabled.

If the RCL is not working correctly, do not start crane operation but rather notify **Manitowoc Crane Care**.

Lifting limit switch



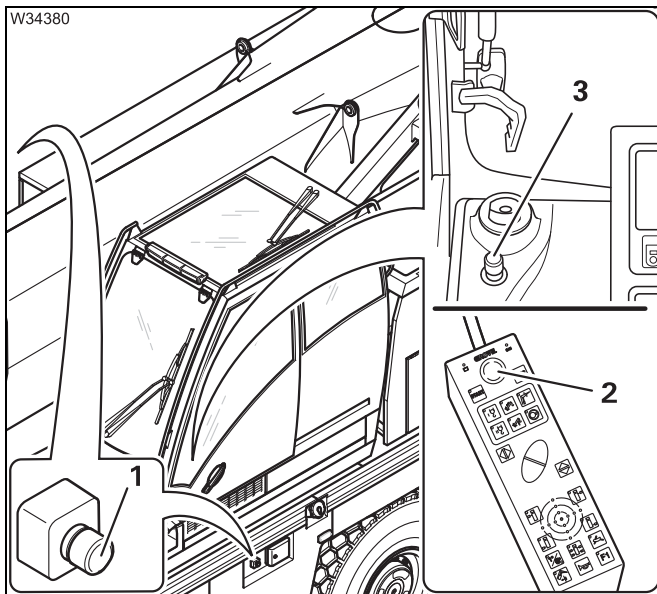
- Raise the main boom until the hook block is lifted off the ground.
- Slowly perform the *Raise* movement until the hook block lifts the lifting limit switch weight.
- Now check whether the *Raise* movement is switched off and lamp (1) lights up
- Check whether the *Lower* and *Extend* movements are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

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

If the lift limit switch is not working correctly, do not start work with the crane but notify **Manitowoc Crane Care**.

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 - 20.
- Repeat the checks with the emergency stop switches (1) and (2)

If the emergency off switch is not working correctly, do not start work with the crane but notify **Manitowoc Crane Care**.



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Seat contact switch

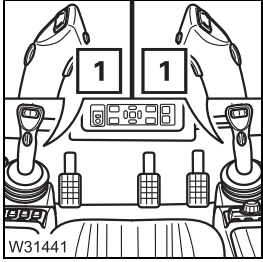


This check is carried out together with the dead man's switch.

Danger of accident if the seat contact switch is faulty

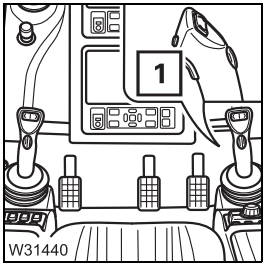
Always stand inside the crane cab when you do this check.

If you stand next to the crane cab, you may be pushed off the carrier if the superstructure slews as a result of a faulty dead man's switch.



Checks during standstill

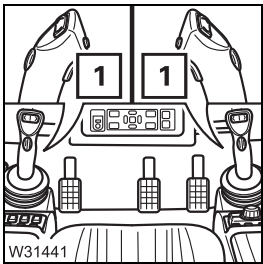
- Do not sit down on the crane cab seat.
- Do not press any dead man's switch (1).
- Move the control levers one after the other for all the crane movements and check whether all the crane movements are switched off.



Checks during operation

– Dead man's switch

- Do not sit down on the crane cab seat.
- Press the right dead man's switch (1) and slowly lift the hook block.
- With the control lever actuated, let go of the right dead man's switch and check whether the crane movement comes to a standstill within about 3 seconds.
- Repeat the check with the dead man's switch on the left control lever.



– Seat contact switch

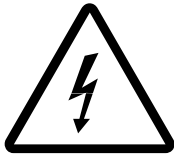
- Do not press any dead man's switch (1).
- Sit down on the crane cab seat and slowly lift the hook block.
- With the control lever actuated, stand up and check whether the crane movement comes to a standstill within about 3 seconds.

If the dead man's switch system is not working correctly, do not start work with the crane but notify **Manitowoc Crane Care**.

11.1.5

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 synthetic sheaves or non-conducting sling gear is used.

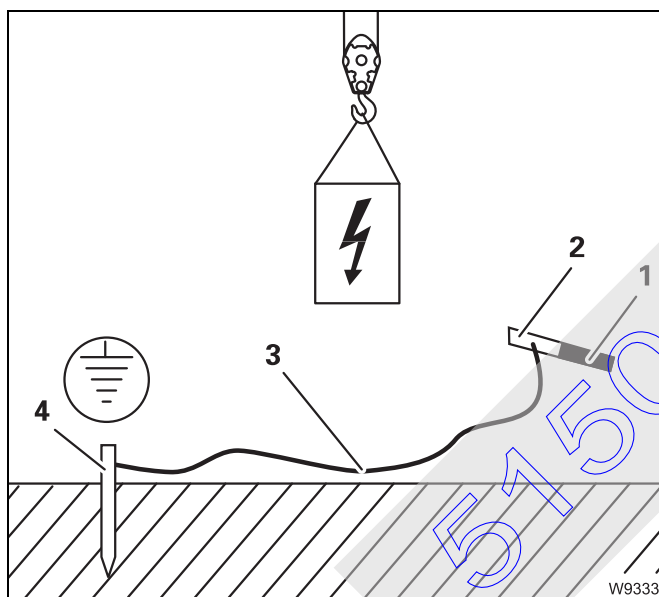


Risk of accident due to electric shock

Always earth the load before operating the crane

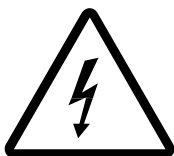
- Near strong transmitters (radio transmitters, radio stations, etc.)
- Near high-frequency switchgears
- If a thunder storm is forecast.

If the load is charged with static electricity, you must always earth the load before touching it.



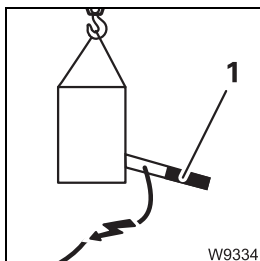
Use electrically conducting material for earthing.

- Hammer a metal rod (4) (length approx. 2.0 m (6.6 ft)) at least 1.5 m (5 ft) deep into the ground.
- 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 accident due to electric shock

Ensure that the connections between the cable and the metal rods are electrically conductive. When earthing, hold the metal rod only by the insulated handle and keep a sufficient distance to the metal rod in the ground.



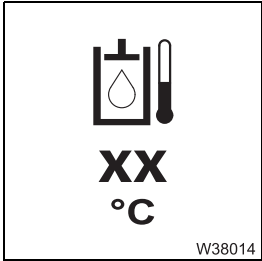
- Hold the metal rod firmly by its insulated handle (1).
- To earth, touch the load with the metal rod.

11.1.6

Preheating 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)**

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

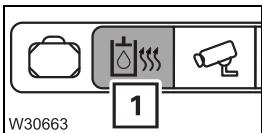
– **Below -15 °C (5 °F)**

You must preheat 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 no greater than 30 °C (86 °F)

Preheating



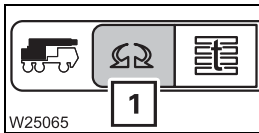
- Select and confirm the symbol (1) – symbol is **red**.

The engine speed is increased, the hydraulic fluid is preheated until reaching a temperature of 30 °C (86 °F).

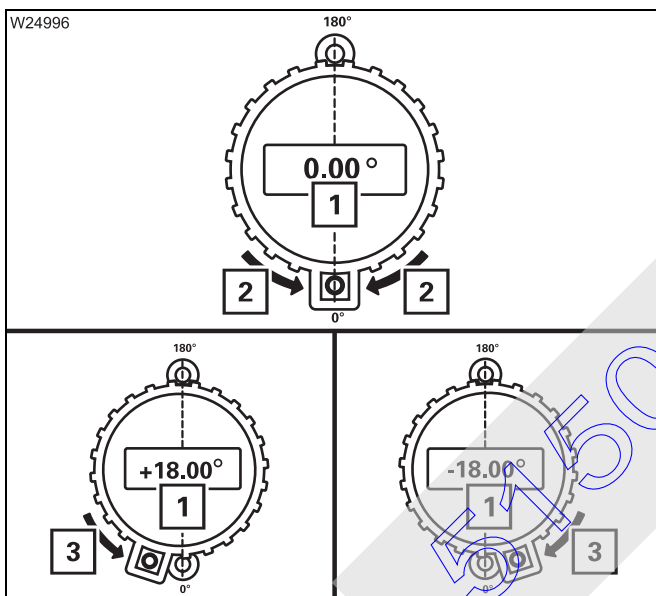
11.1.7 Locking/unlocking the superstructure

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

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



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



The display (1) will show the current superstructure position.

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

The display (1) shows positive and negative values. For an overview;  p. 11 - 118.

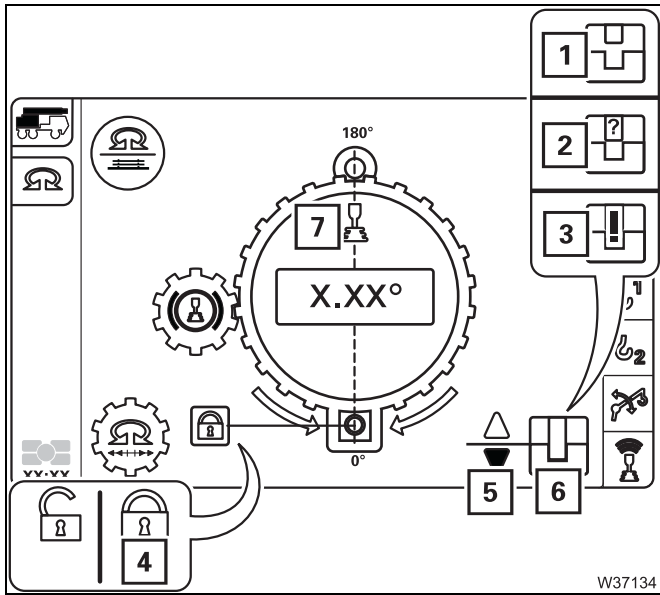
At the locking point, both arrows (2) are shown.

In the range of $\pm 20^\circ$ around the locking point, an arrow (3) indicates the slewing direction that leads to the locking point.



Lock the superstructure

The superstructure needs to be at one of the locking points (0° or 180°).



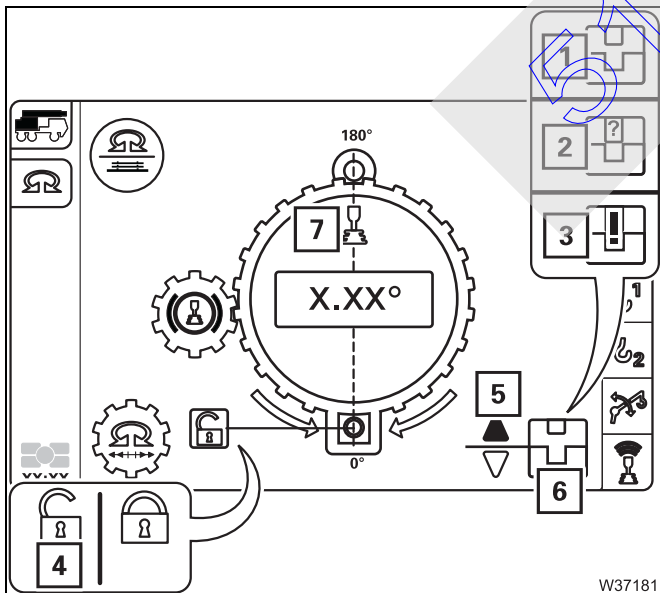
- Select the symbol (5).
- Press the button until the symbol (4) is displayed – *Superstructure locked*.

The display changes from symbol (1) to symbol (2) and shows symbol (6) when the superstructure is locked. The symbol (7) disappears.

If the error symbol (3) is displayed, contact **Manitowoc Crane Care**.

Unlocking the superstructure

The RCL shutdown procedure will be triggered and slewing disabled if you unlock the superstructure during a rigging mode for 0° to the rear has been entered. To acknowledge the shutdown procedure, you must either lock the superstructure or set down the load and enter a rigging mode for a working range of 360°.



- Select the symbol (5).
- Press the button until the symbol (4) is displayed – *Superstructure unlocked*.

The display changes from symbol (1) to symbol (2) and shows symbol (6) when the superstructure is unlocked. The (7) symbol is displayed.

If the error symbol (3) is displayed, contact **Manitowoc Crane Care**.

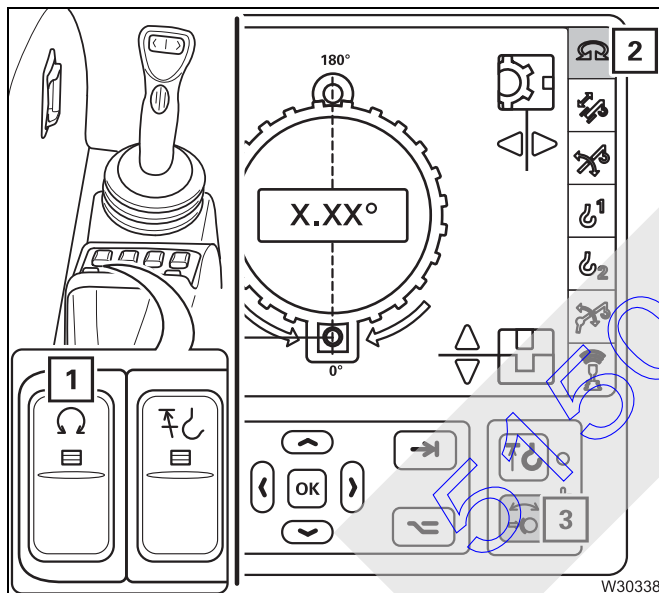
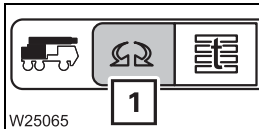
11.1.8

Switching the houselock on/off

If the truck crane is equipped with a houselock, the turntable can be locked in the entire slewing range. For locking, a pin extends and blocks the slewing gear.

Switching on the houselock

- Slew the superstructure to the position in which it is to be locked and then stop the slewing movement.
- Open the *Superstructure lock* menu (1) if necessary.



Switching off the slewing gear

The slewing gear brake must be engaged when operating the houselock.

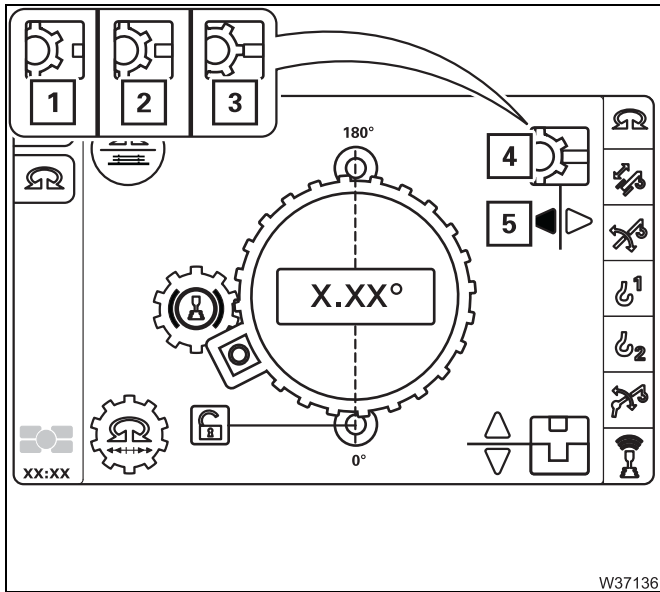
- Press the button (1) once.
The slewing gear will be switched off and the slewing gear brake applied.
 - Symbol (2) is red.
 - The lamp (3) lights up.



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

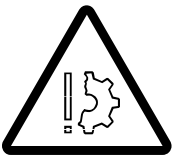
- Select the symbol (5).
- Press the button until the symbol (4) is displayed – *Houselock switched on.*

The display first shows the symbol (1), then (2) and then shows the symbol (4) when the houselock is switched on.

If the symbol (3) is displayed:

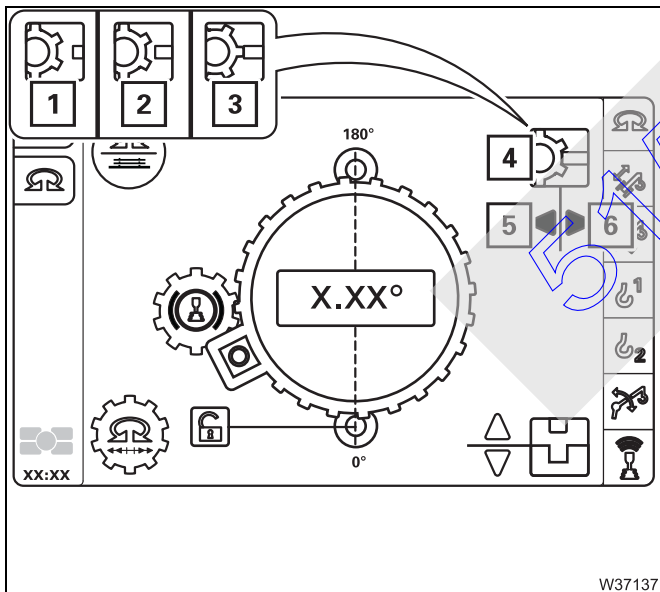
- Let go of the button.

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

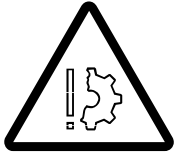
Before slewing ensure that the houselock is switched off. Otherwise the system will be damaged during slewing.



- Select the symbol (6).
- Press the button until the symbol (1) is displayed – *Houselock switched off.*
- Apply the slewing gear brake.
- 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 again correct the position of the superstructure.

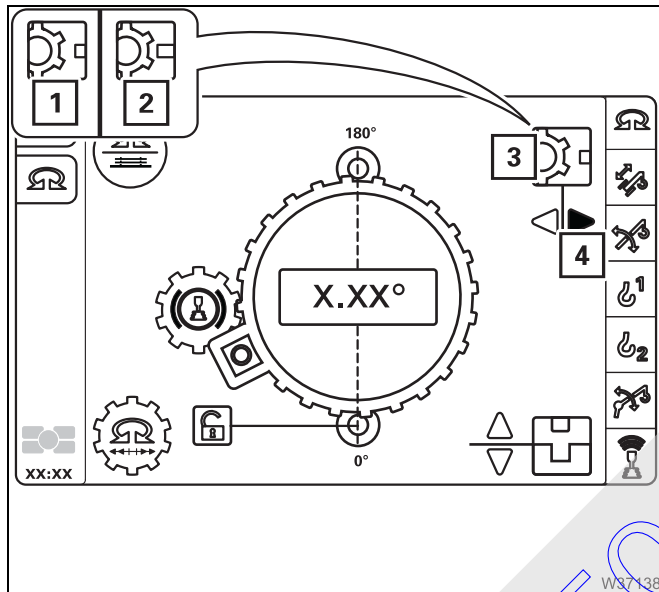
Switching off the houselock

- Check that the slewing gear is switched off, and switch it off if it is not;
 ▶ *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.

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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 supplied 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 working 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*;  *Enter rigging mode*, p. 11 - 32.
- Rig a counterweight combination that is no larger than that permitted for the rigged outrigger span. Slewing with a rigged counterweight is not permitted with all outrigger spans;  *Slewing with rigged counterweight*, p. 12 - 113.

Working 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.
- Lock the turntable;  p. 11 - 15.
- Enter an RCL code for the 0° to the rear working position according to *Lifting capacity table*;  *Enter rigging mode*, p. 11 - 32.
The RCL will accept this code only if the turntable is locked and the superstructure is in the 0° position.



All slewing operations are disabled if an RCL code is entered for the 0° to the rear working position. An RCL shutdown is triggered by unlocking the turntable. To acknowledge this shutdown, if slewing is permissible with the rigged counterweight ( p. 12 - 113), 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.

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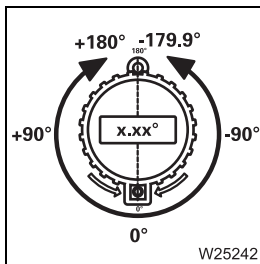
51501113

11.3

MAXbase slewing range type

This slewing range type is available in addition to the *Standard* slewing range type;  *Permissible slewing ranges and working 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.

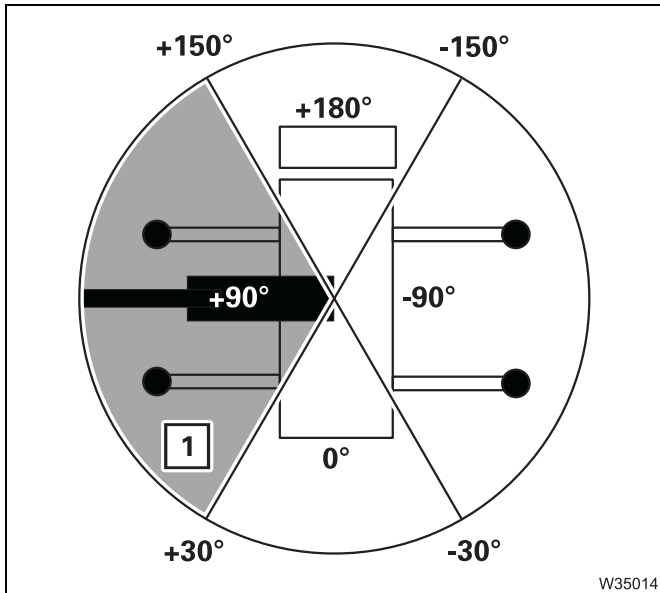


The designation of the slewing angle always relates to the starting point 0° to the rear. A full turn from this working position is divided into two semi-circles.

- 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°).

11.3.1 Specifications in the lifting capacity tables

The specified lifting capacities are only enabled for specific slewing ranges.



The *Lifting capacity table* contains a direction specification for the enabled slewing range, which is assigned to a superstructure position.

Positional reference	Superstructure position
Backwards	0°
To the right	-90°
Forwards	+180°
To the left	+90°

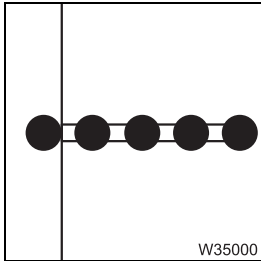
This superstructure position is the starting point for the enabled slewing range. A complete turn is always divided in four slewing ranges. The size of the slewing range is defined via an angular region around the starting point, e.g. $\pm 60^\circ$ for the slewing range (1). This results in the enabled 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

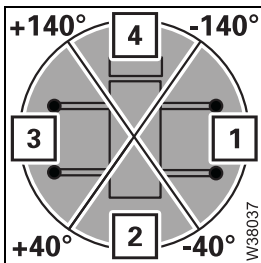
Enabled slewing ranges

The enabled angular ranges around the starting point are specified in the *Lifting capacity table*. This section provides an overview of where the enabled slewing ranges begin and end for each slewing angle.

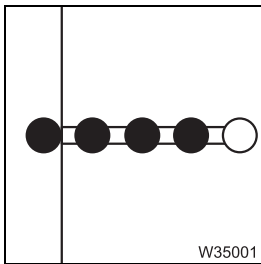


Smallest individual width 3.800 m (12.5 ft)

This case applies only to a symmetrical outrigger span with a span of 7.600 m (24.9 ft).

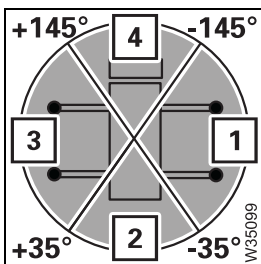


	Positional reference	Angular range	Enabled slewing range
1	To the right	$\pm 50^\circ$	-140° to -40°
2	Backwards	$\pm 40^\circ$	-40° to $+40^\circ$
3	To the left	$\pm 50^\circ$	$+40^\circ$ to $+145^\circ$
4	Forwards	$\pm 40^\circ$	$+140^\circ$ to -140°



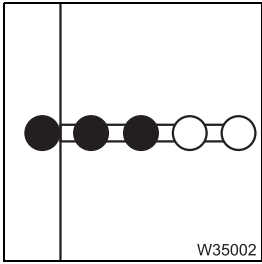
Smallest individual width 3.350 m (11.0 ft)

This case applies when one or more outrigger beams is extended to a span of 3.350 m (11.0 ft) and all other outrigger beams are extended to larger spans.



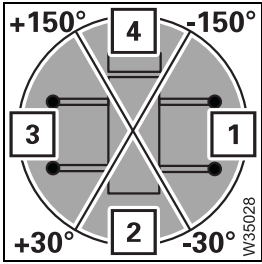
	Positional reference	Angular range	Enabled slewing range
1	To the right	$\pm 55^\circ$	-145° to -35°
2	Backwards	$\pm 35^\circ$	-35° to $+35^\circ$
3	To the left	$\pm 55^\circ$	$+35^\circ$ to $+145^\circ$
4	Forwards	$\pm 35^\circ$	$+145^\circ$ to -145°



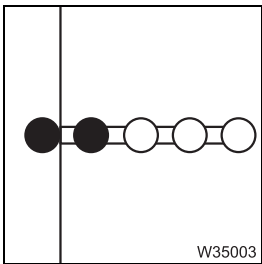


Smallest individual width 2.950 m (9.7 ft)

This case applies when one or more outrigger beams is extended to a span of 2.950 m (9.7 ft) and all other outrigger beams are extended to larger spans.

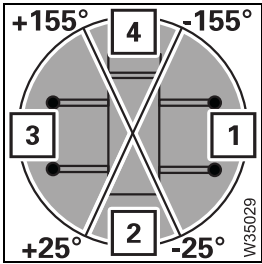


	Positional reference	Angular range	Enabled slewing range
1	To the right	$\pm 60^\circ$	-150° to -30°
2	Backwards	$\pm 30^\circ$	-30° to $+30^\circ$
3	To the left	$\pm 60^\circ$	$+30^\circ$ to $+150^\circ$
4	Forwards	$\pm 30^\circ$	$+150^\circ$ to -150°

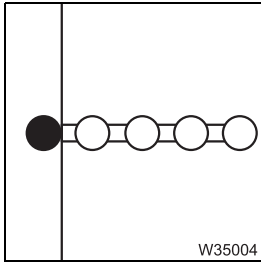


Smallest individual width 2.550 m (8.4 ft)

This case applies when one or more outrigger beams is extended to a span of 2.550 m (8.4 ft) and all other outrigger beams are extended to larger spans.

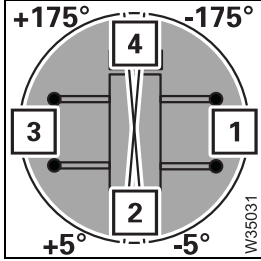


	Positional reference	Angular range	Enabled slewing range
1	To the right	$\pm 65^\circ$	-155° to -25°
2	Backwards	$\pm 25^\circ$	-25° to $+25^\circ$
3	To the left	$\pm 65^\circ$	$+25^\circ$ to $+155^\circ$
4	Forwards	$\pm 25^\circ$	$+155^\circ$ to -155°



Smallest individual width 1.250 m (4.1 ft)

This case applies when one outrigger beam is extended to a span of 1.250 m (4.1 ft) and all other outrigger beams are extended to larger spans.



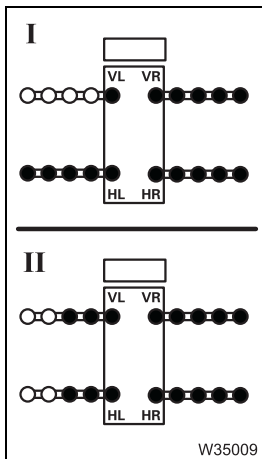
	Positional reference	Angular range	Enabled slewing range
1	To the right	$\pm 85^\circ$	-175° to -5°
2	Backwards	$\pm 5^\circ$	-5° to $+5^\circ$
3	To the left	$\pm 85^\circ$	$+5^\circ$ to $+175^\circ$
4	Forwards	$\pm 5^\circ$	$+175^\circ$ to -175°



11.3.3

Lifting capacities and slewing ranges for outrigger spans without separate lifting capacity tables

In the case of outrigger spans where the opposing 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*

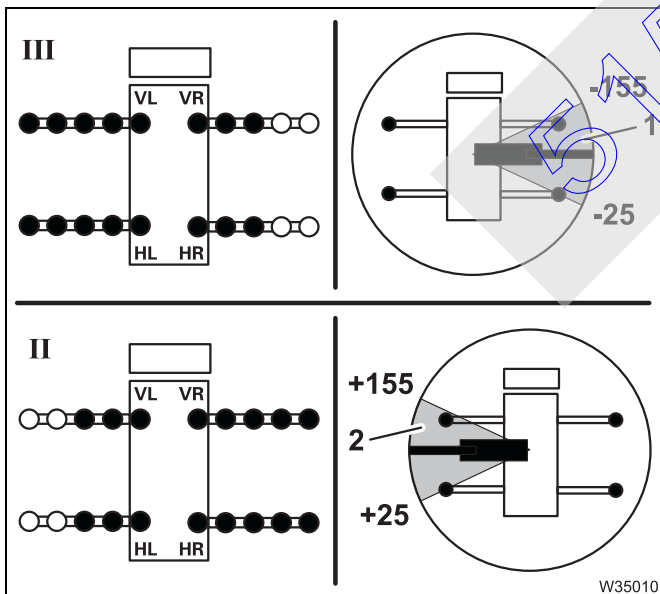
Lifting capacity tables are only provided for the combination *One outrigger beam retracted – left*, e.g. for the outrigger span (I).

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 on outrigger beams with a mirrored outrigger span then the same lifting capacities are enabled in the correspondingly mirrored 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 mirrored outrigger span (II) with the mirrored 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

Operation of the rated capacity limiter

The rated capacity limiter is abbreviated to RCL (**R**ated-**C**apacity-**L**imiter) in these operating instructions.

If the truck crane's current rigging mode is registered properly, the RCL will prevent the permissible lifting capacity from being exceeded and the truck crane from being overloaded.



Risk of accidents due to an incorrectly set RCL

Ensure that the current rigging mode is correctly entered Before starting crane operation. An incorrect entry will give you a false sense of security. This may result in the truck crane overloading and causing an accident.

The current rigging mode is registered via

- Measurements,
- Acquired via manual entry.

Acquired via measurements	Acquired via manual entry
<ul style="list-style-type: none"> – Main boom length – Main boom angle – Current load – Lattice extension inclination¹⁾ – Outrigger span 	<ul style="list-style-type: none"> – Counterweight – Length of lattice extension – Angle of the lattice extension²⁾ – Reeving

¹⁾ Lattice extension – luffable

²⁾ Lattice extension – inclinable

During the operation of the crane, a visual and acoustic early warning is issued before the load limit is reached and then the functions are shut down that would lead into the overload range.



Risk of 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.



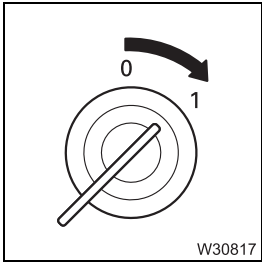
Danger of overturning in two-hook operation

The rated capacity limiter only ensures safety for single hook operation. Two-hook operation is not permitted.

11.4.1

Switch on the RCL

Switching on



The RCL is switched on together with the ignition.

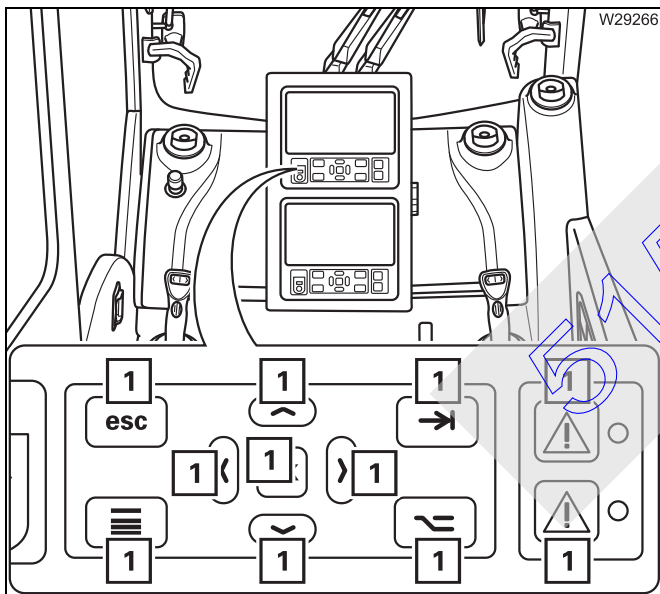
- Switch on the ignition.
- A test program runs after switching on the ignition.
- Check whether you can hear a buzzer tone.



Risk of accidents in the event of faulty safety devices!

If the lamps or buzzer fail, notify **Manitowoc Crane Care** and have the error corrected.

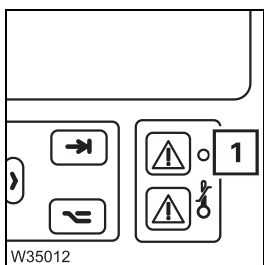
In the meantime, pay particular attention to the lamps in the event of a failure of the buzzer tone and vice versa.



Lamp test

- Check that the lamps (1) light up after turning on the ignition.

If one or more lamps do not light up, refer to **Manitowoc Crane Care**.



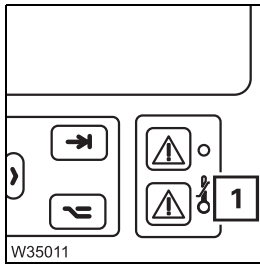
Brightness of the displays

The brightness of the *CCS* and *RCL* is adjusted automatically.

Do not cover the sensors (1) and keep them clean to avoid contamination that can affect the brightness adjustment.

You can set a common minimum brightness for both displays at the *CCS* control unit. This is operated in the same way as in the driver's cab;

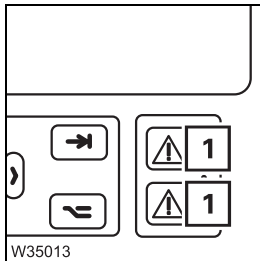
▮▮▮ p. 4 - 11.



Temperature on the display

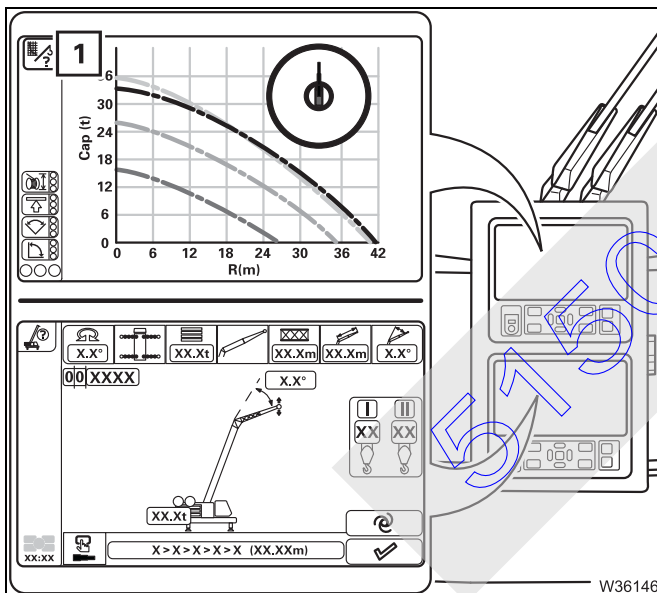
The brightness is reduced automatically if the temperature at the display is too high.

Do not cover the sensors (1) and keep them clean to avoid contamination that can 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 a rigging mode has not 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 Enter rigging mode

Notes on Input

You can enter the rigging mode for various different purposes.

– Entry for crane operation

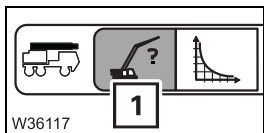
You enter the current rigging mode, select a telescope status according to the lifting capacity table and confirm the rigging mode to enable the crane functions.

– Entry for operations planning

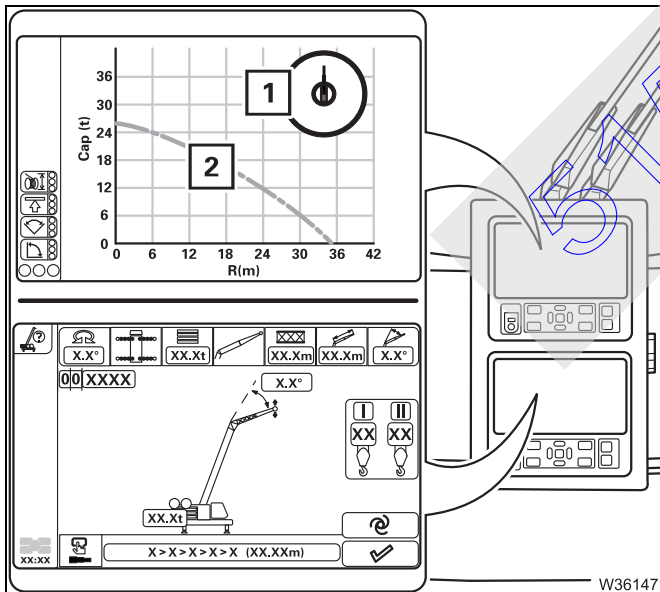
You enter a possible rigging mode to check the lifting capacities, slewing ranges and telescoping that are enabled with this rigging mode.



You can only change the rigging mode when all crane movements have stopped – control lever in the initial position.



- If necessary, open the *Enter rigging mode/telescope status* menu (1) on the CCS display.



The RCL display shows the *Lifting capacity table* menu.

The CCS shows the *Enter rigging mode/telescope status* 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).

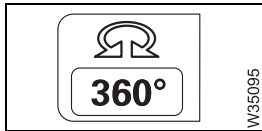
The input options and the displays are based on the confirmed slewing range type.

First enter the slewing range type;

▮▮▮ p. 11 - 33.

Enter 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 influence further input of the rigging mode.



- Slewing range type *Standard*

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 via entry of 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 enabled Standard outrigger spans is provided in the section *Outriggers*;  *Supplied operating manual*.




- Slewing range type *MAXbase*

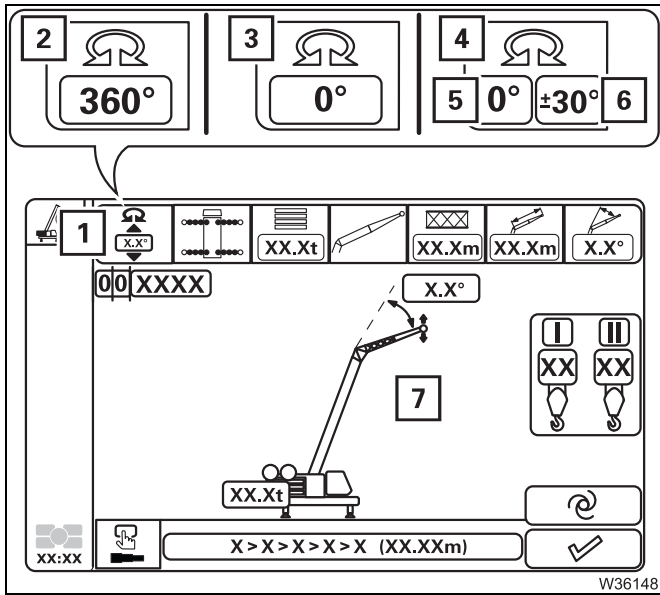
The MAXbase tables apply, which are only provided in digital form due to the wide diversity of configurations. All rigging modes listed there can be entered.

- The rigging mode is entered via the individual components.
- The outriggers are entered as individual widths for each outrigger beam.
- The enabled slewing range is displayed, divided into four areas with different lifting capacities.



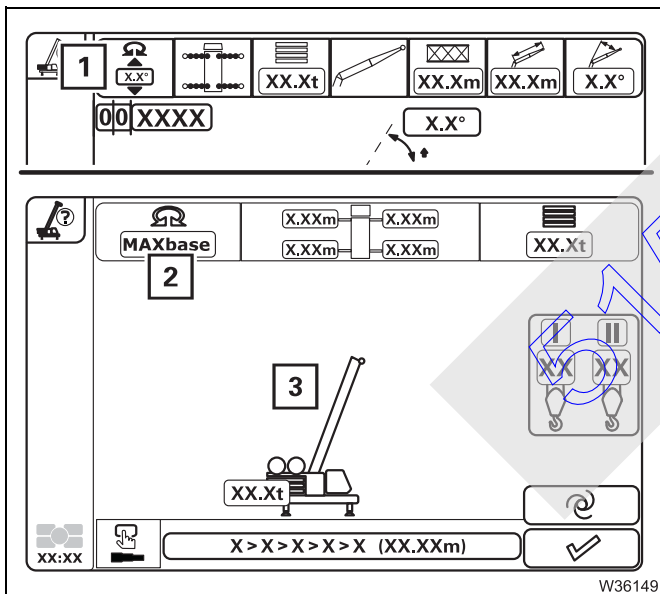
An overview of all enabled MAXbase outrigger spans is provided in the section *Outriggers*;  *Supplied operating manual*.





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 Working position 0° to the rear
 - 4 Limited slewing range
 - 5 Working position – e.g. 0° to the rear
 - 6 Slewing range – e.g. ±30°
- After confirming, the menu (7) is displayed for further rigging mode entry.
 - Entry via RCL code; ■■■▶ p. 11 - 40.
 - Entry via individual components; ■■■▶ p. 11 - 34.

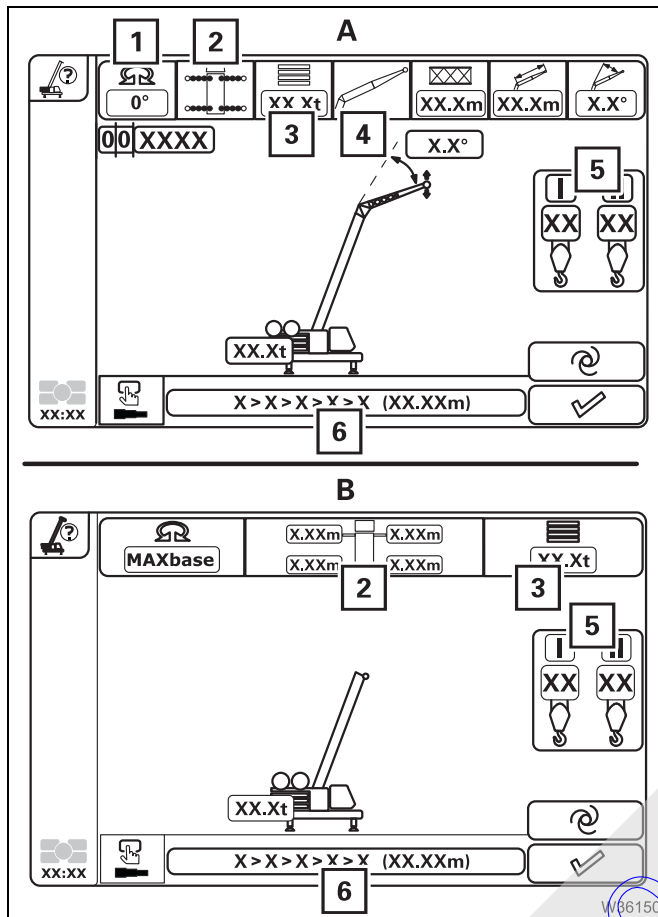


For the *MAXbase* slewing range type

- Select and confirm the display (1).
- Select and confirm the symbol (2).
- After confirming, the menu (3) is displayed for further rigging mode entry.
 - Enter the rigging mode; ■■■▶ p. 11 - 34.

Entering individual components

Only enabled rigging modes can be selected. For this reason, the selection possibilities for the individual components are based on the already entered and confirmed components.



The displayed menu depends on the slewing range type.

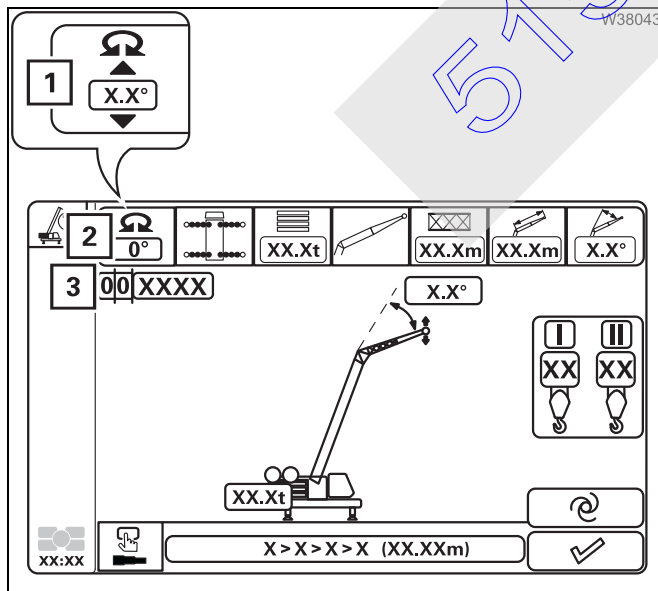
A Menu for *Standard*

B Menu for *MAXbase*

The selection is not restricted when 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 adopted from the outrigger width 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 conform the rigging mode together with the display lifting capacity table.



Slewing range

- Select and confirm the display (1).
- Select the required slewing range (2), for example, working 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° :

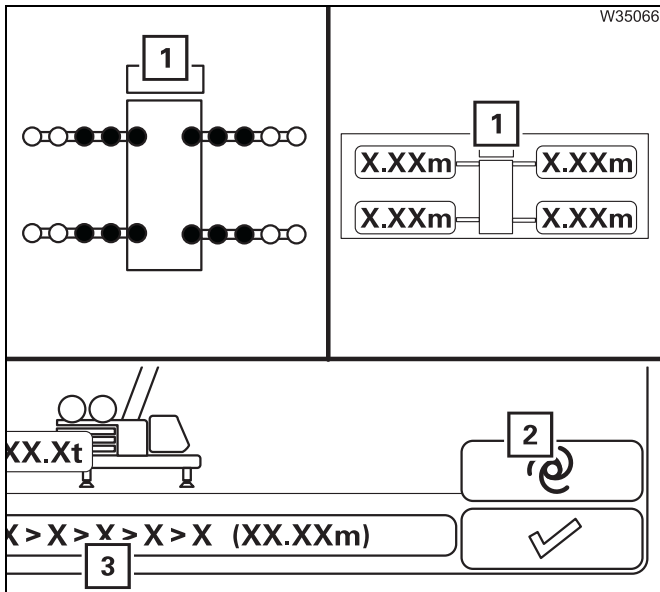
- When the selected working position is reached and the slewing gear is switched off.
- When the superstructure is in the selected slewing range.

If necessary, first enter the 360° slewing range and slew the superstructure into the required position.



Outrigger span

You can adopt the outrigger span provided by the outrigger width monitoring or manually enter the outrigger span.



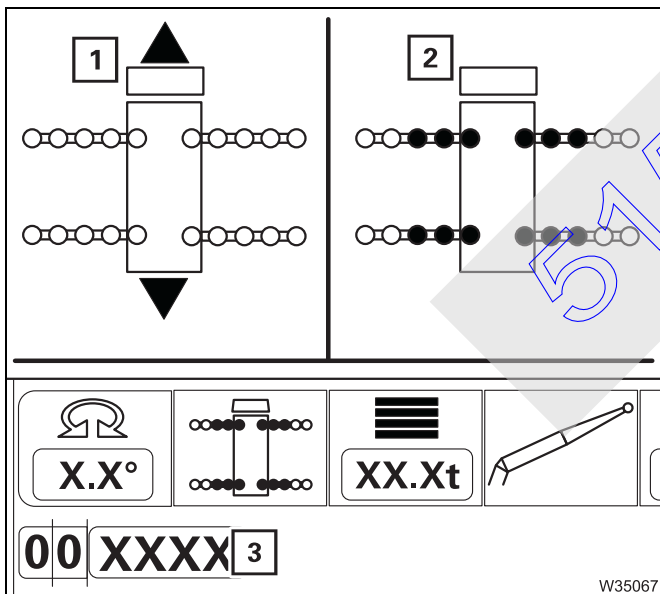
Adopt the outrigger span

- Select and confirm the symbol (2).

The outrigger span provided by the outrigger width monitoring is adopted and shown on the current display (1).

At the same time, the current telescoping is adopted and shown on the display (3).

- Always check that the currently rigged outrigger span is displayed before confirming the rigging mode.



Enter outrigger span (Standard)

- Select and confirm the display (1).
- Select the rigged outrigger span, for example, symbol (2) for 8.030 x 5.900 m (26.3 x 22.0 ft).

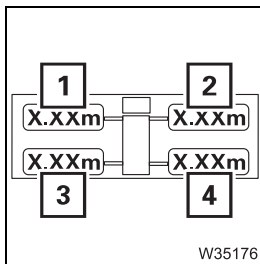
- Confirm the selection. The selection and the corresponding RCL code (3) are displayed.

If the outrigger span provided by the outrigger width monitoring deviates from the entered value then a query is displayed after confirming the rigging mode; see p. 11 - 42.

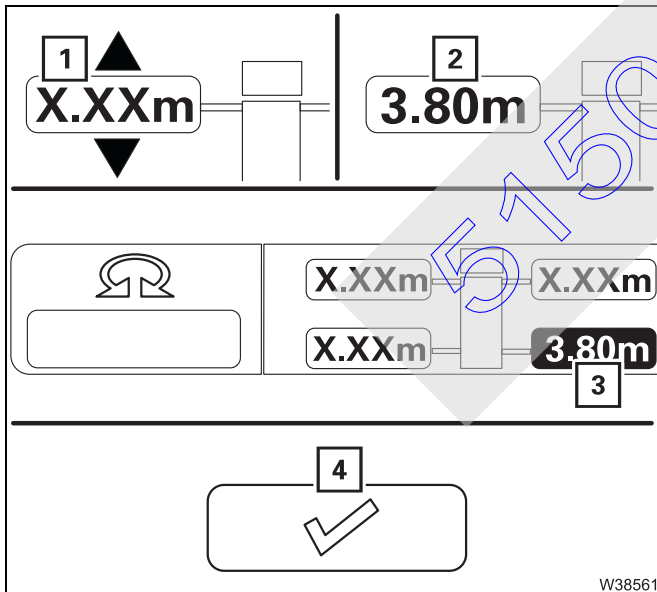
Enter outrigger span (MAXbase)

The outrigger spans are entered as individual widths. If the *Lifting capacity table* specifies an overall width then select the associated individual width.

Overall width	Individual width
7.600 m (24.9 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 (16.7 ft)	2.550 m (8.4 ft)
2.500 m (8.2 ft)	1.250 m (4.1 ft)



If changing an outrigger width would result in an impermissible outrigger span, then the selection is disabled for this outrigger beam. If necessary, you must re-enter the outrigger widths in the sequence (1) to (4).



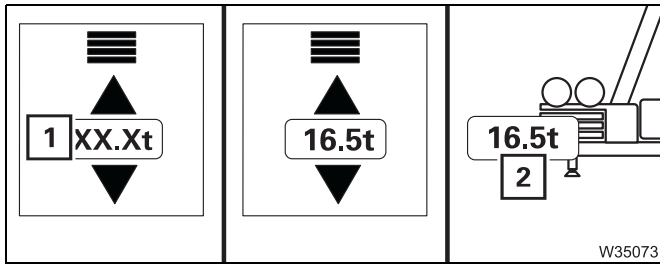
- Select and confirm the display (1) for the desired outrigger beam.
- Select the rigged individual width (2), e. g. 5.100 m (12.5 ft).
- Confirm the selection.

If the outrigger span measured by the outrigger width monitoring differs from the entered value then the value (3) is displayed in red.

The symbol (4) becomes grey – the rigging mode cannot be adopted.

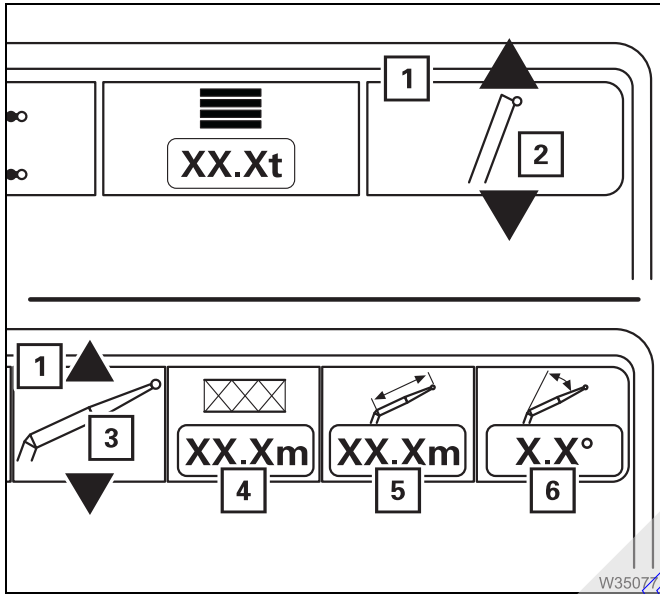
- In this case, rig the necessary outrigger span.





Counterweight

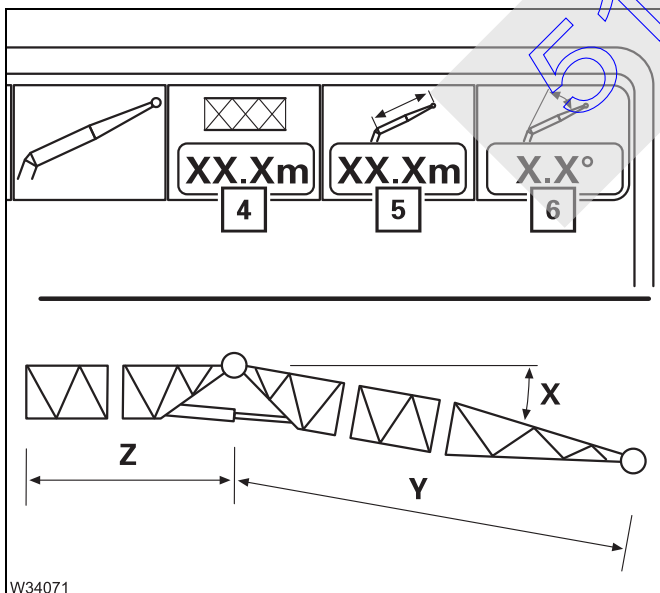
- Select and confirm the display (1).
- Select the rigged counterweight combination, for example, 16.5 t.
- Confirm the selection.
The display (2) shows the entered counterweight combination.



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.

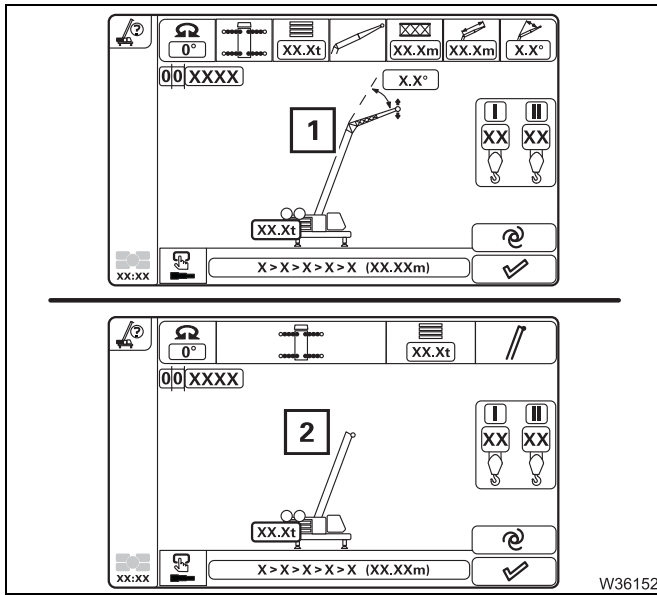
– Display (5)

- Select and confirm the current length (Y) after the angle.

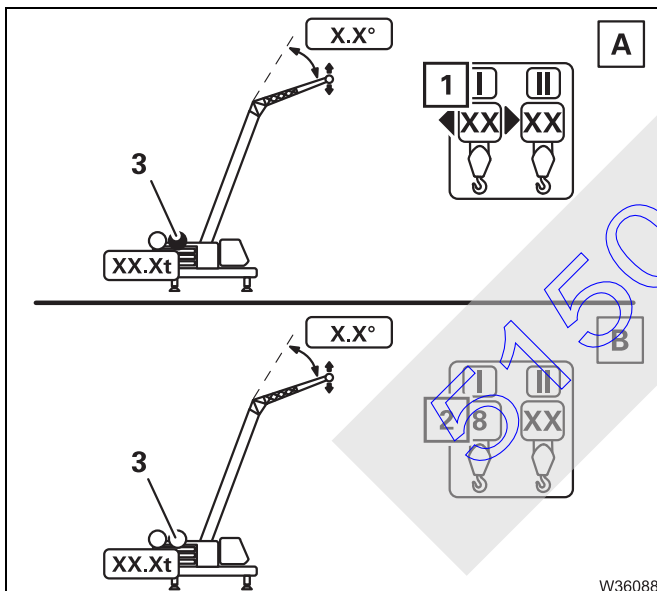
– Display (6)

Only for inclinable lattice extensions.

- Select and confirm the currently rigged angle (X).



The confirmed boom system (1) or (2) is displayed.



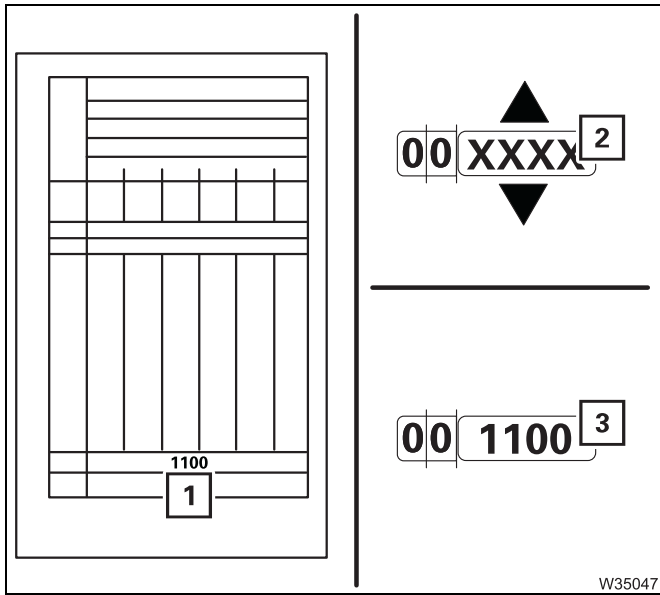
Reeving

- (A) Select and confirm the display for the hoist to be used for lifting the load, for example, 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 (1) – symbol (3) grey.



Entering the RCL code

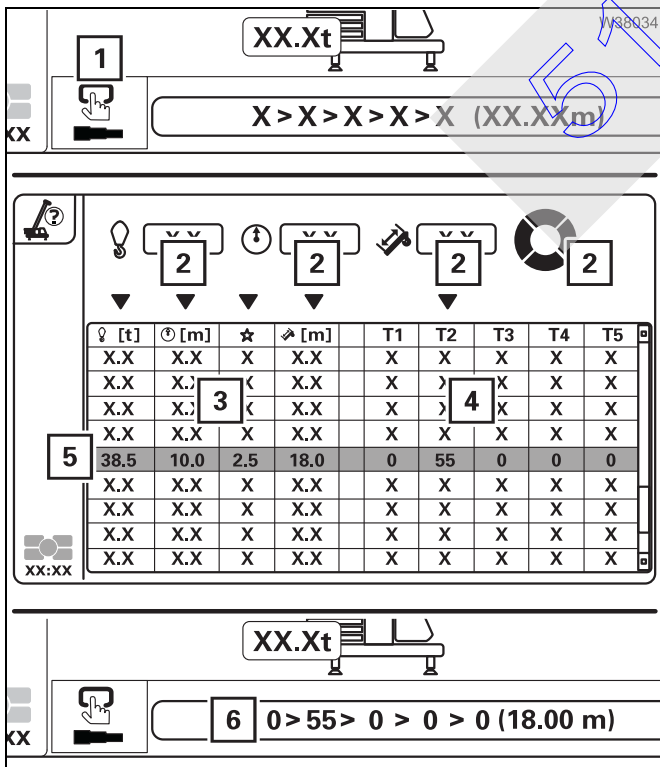
You must enter the RCL code for the rigging mode according to the *Lifting capacity table*.



- Refer to the *Lifting capacity table* for the current rigging mode. The corresponding RCL code (1) is specified 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 will 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-selection telescoping* menu opens.
- Enter the desired parameter (2); see p. 9 - 42. The table shows all permissible telescoping (4) and the associated parameter (3) for the entered rigging mode and entered parameter.
- 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

Confirm the rigging mode and lifting capacity table

You must confirm the rigging mode together with the display lifting capacity table before commencing crane operation. Some parts of the procedure are different, depending on the entered slewing range type.

Slewing range type *Standard*

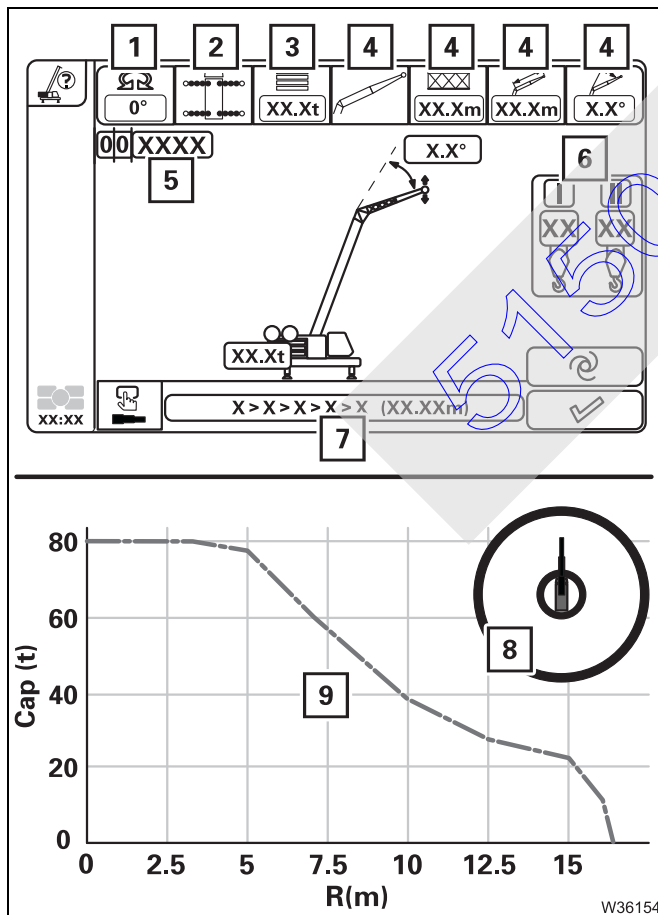
If the *MAXbase* slewing range type has been entered;  p. 11 - 43.

- Check whether 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 varies from the displayed rigging mode, the maximum load displayed by the *RCL* will not correspond to the actually permissible lifting capacity according to the *Lifting capacity table*. Overloading and accidents will certainly be the result.



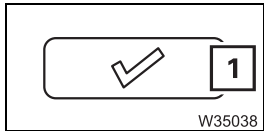
• Check:

- 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.

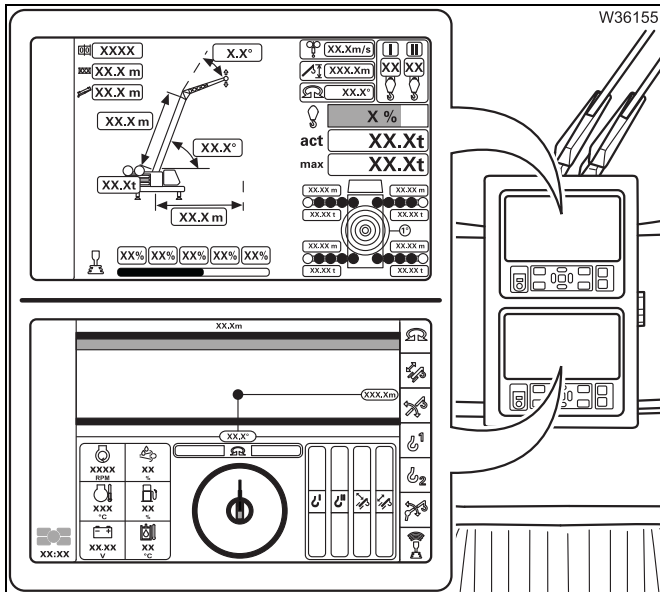
The displayed lifting capacity table (9) applies to the RCL code (5) in the corresponding slewing range (8) and for the preselected telescope status (7).

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).



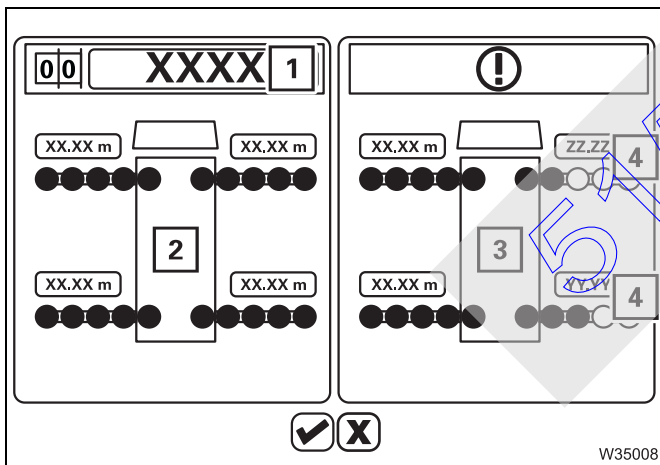
If the rigging mode is permissible

The rigging mode is accepted together with the display lifting capacity table.

The RCL display shows the *Monitoring* menu.

The CCS display shows the *Start* menu.

The crane movements are released if there is no error; Checks before operating the crane, p. 11 - 45.



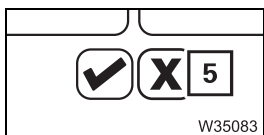
If a deviation in the outrigger span is detected

A query menu opens.

The display (2) shows the outrigger span corresponding to the RCL code (1).

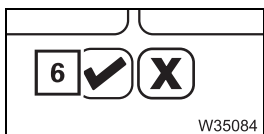
The display (3) shows the acquired outrigger span – deviating outrigger widths (4) are red.

- Check the currently rigged outrigger span.



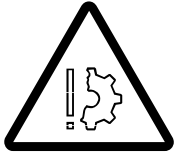
– If an incorrect outrigger span is rigged

- Select and confirm the symbol (5) – the menu closes and the rigging mode is not adopted.
- Rig the required outrigger span.



– If the necessary outrigger span is rigged

- Select and confirm the symbol (6).
The rigging mode is accepted.
- Have the outrigger width monitoring checked after finishing operations.



Risk of accident due to incorrectly supported truck crane!

A shutdown is not initiated as standard when an outrigger span monitoring error message is issued. When an error message is displayed, compare the rigged outrigger span with the required outrigger span and rig the required outrigger span.

This prevents the truck crane from tilting due to an inadequate outrigger span.

Slewing range type MAXbase

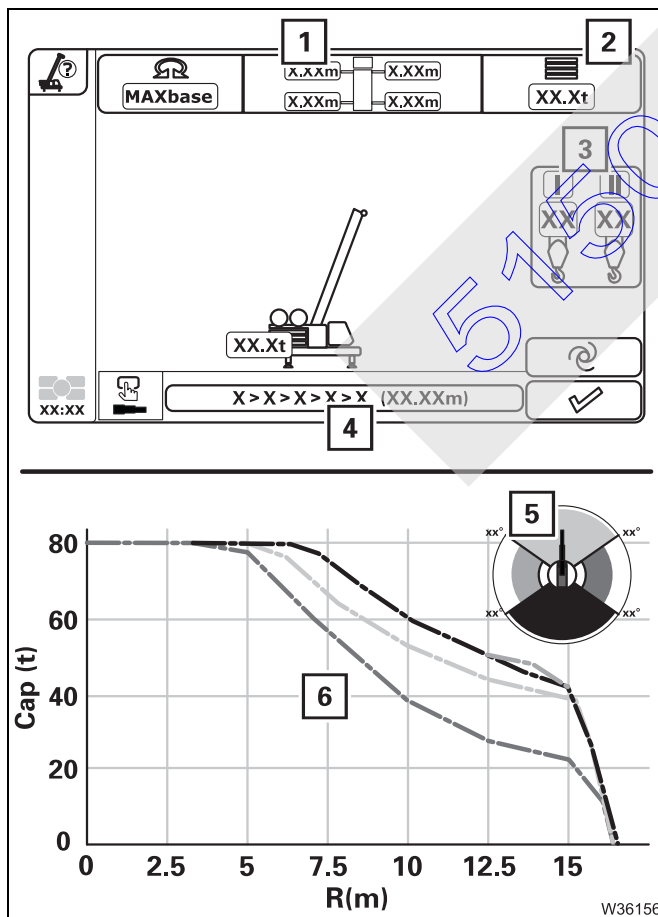
If the *Standard* slewing range type has been entered; p. 11 - 41.

- Check whether 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 varies from the displayed rigging mode, the maximum load displayed by the RCL will not correspond to the actually permissible lifting capacity according to the *Lifting capacity table*. Overloading and accidents will certainly be the result.



- Check:

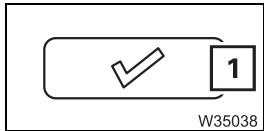
- **1** The rigged outrigger span
- **2** The rigged counterweight
- **3** The number of reeved hoist rope lines

- Correct any incorrectly entered rigging modes if necessary.

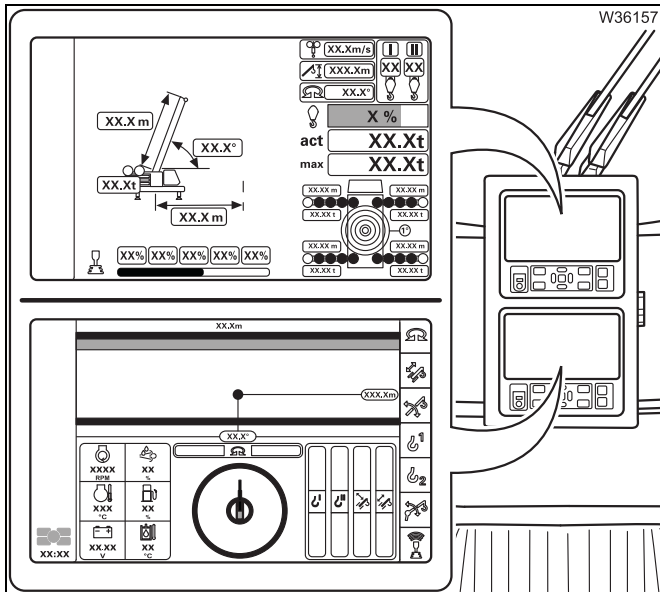
The displayed lifting capacity tables apply to the preselected telescope status (**4**) in the respectively corresponding slewing ranges (**5**).

If the current rigging mode is displayed and the planned operations lie within the displayed operating ranges (**6**), then you can confirm the rigging mode.





- Select and confirm the symbol (1).



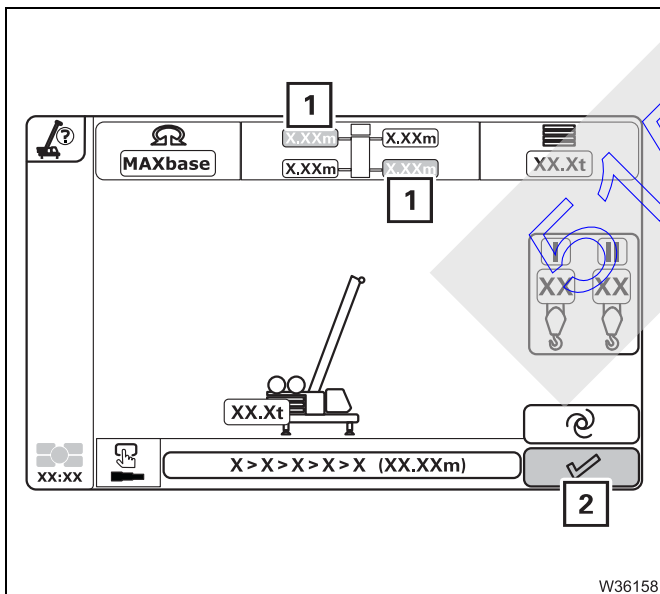
If the rigging mode is permissible

The rigging mode is accepted together with the display lifting capacity table.

The RCL display shows the *Monitoring* menu.

The CCS display shows the *Start* menu.

The crane movements are released if there is no error; Checks before operating the crane, p. 11 - 45.



If a deviation in the outrigger span is detected

The symbol (2) is grey.

The rigging mode cannot be conformed, crane operation is not enabled.

If the value for an outrigger width 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 operating the crane

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 commands on the *CCS* display.

- After confirming a permissible rigging mode, the *Monitoring* menu opens;  p. 11 - 41.
- After opening the *Enter rigging mode/telescope status* menu, the *Monitoring* menu is exited and the *RCL* display opens the *Lifting capacity table*;  p. 11 - 32.

Checking the rigging mode

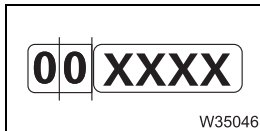


- Check that the *Monitoring* menu displays the current rigging mode of the truck crane.

Risk of accidents due to an incorrectly set RCL

If the current rigging mode varies from the displayed rigging mode, the maximum load displayed by the *RCL* will not correspond to the actually permissible lifting capacity according to the *Lifting capacity table*. Overloading and accidents will certainly be the result.

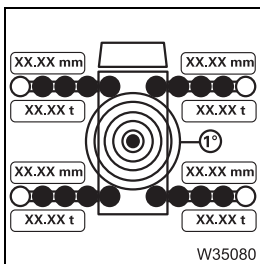
- Check that the displays listed here show the current rigging mode and correct the rigging mode if necessary.



Display RCL code

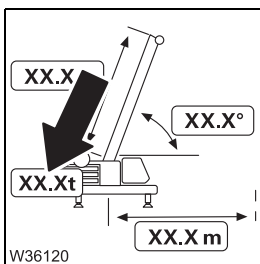
For the *Standard* slewing range type only.

Shows the RCL code corresponding to the confirmed rigging mode according to the *Lifting capacity table*.



Outrigger span display

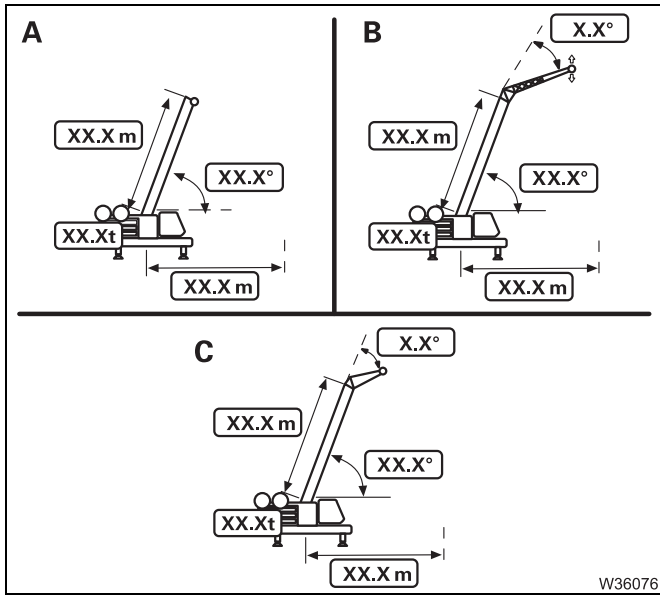
- Numerical values – show the individual widths of the outrigger beams for the confirmed rigging mode, in metres (m) or feet (ft).
- Visual display – shows the required outrigger span in **orange**. For the *Standard* slewing range type only – the display is **red** when the outrigger span provided by the outrigger width 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⁾

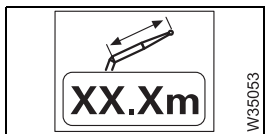
C Heavy load lattice extension¹⁾

¹⁾ For the *Standard* slewing range type only. The lattice extension must be electrically connected.



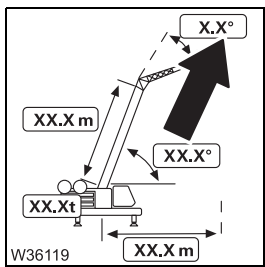
Lattice extension display – length before the angle

Shows the required length of lattice extension before the angle according to the confirmed rigging mode – in metres (m) or feet (ft).



Lattice extension display – length after the angle

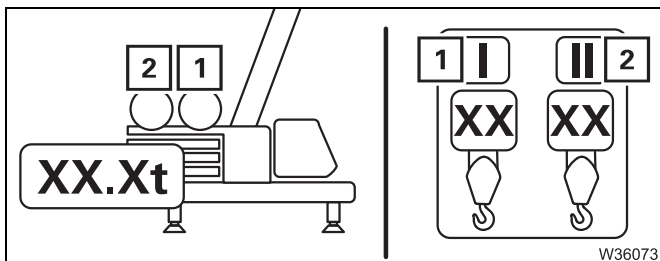
Shows the required length of lattice extension after the angle according to the confirmed rigging mode – in metres (m) or feet (ft).



Angle of the lattice extension display

Only for manually 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

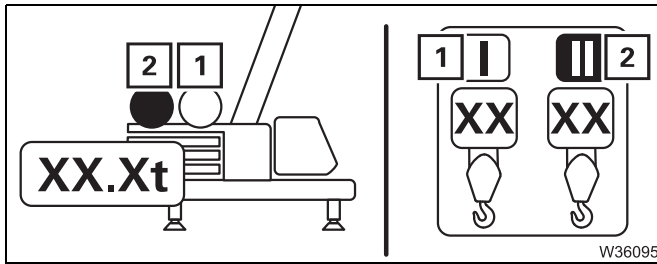
Orange: Used¹⁾

Grey: Not used

¹⁾ The value on the *Maximum load* display applies to this reeving. You may need to switch over the display if necessary; see p. 11 - 47.

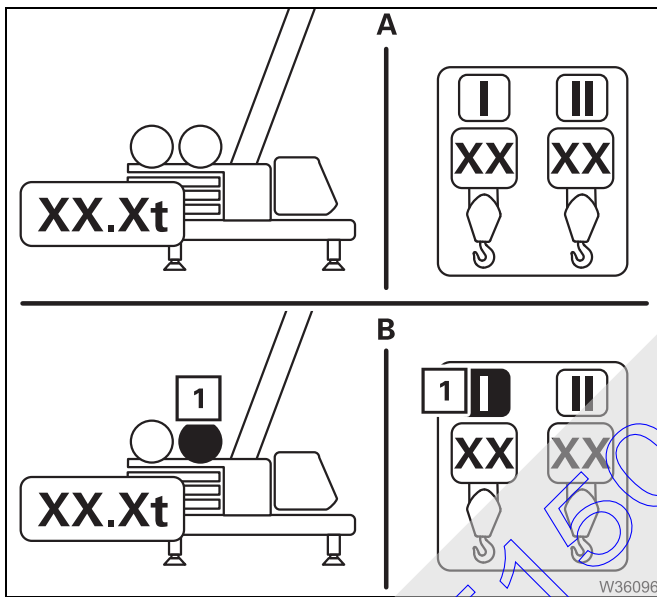
Hoist checking

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 wish 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 become grey.
- (B) – Switch on the hoist with which you wish to lift the load. The corresponding symbol becomes **orange**, for example, the symbol (1) for the main hoist.



Risk of accidents due to incorrectly entered reeving!

Check the displayed reeving after each switch over and enter the current reeving if necessary.
In this way, you prevent the RCL from making calculations based on an incorrect reeving value and the truck crane from becoming overloaded or from overturning.

If you wish to also lift a load with the other hoist during subsequent crane operation then you must first switch over the display appropriately.

Blank page

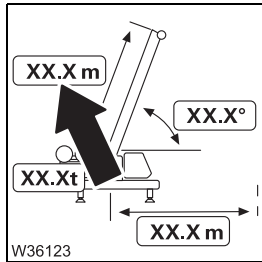
51501113

11.4.6

Display during the crane operation

Various different information is shown on the *RCL* display and *CCS* display. This section describes only the displays that change during crane operation.

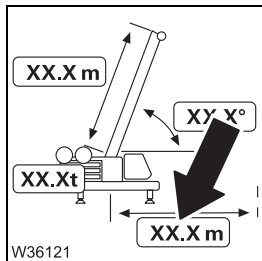
On the *RCL* display



All displays are shown in the *Monitoring* menu.

Display of current main boom length

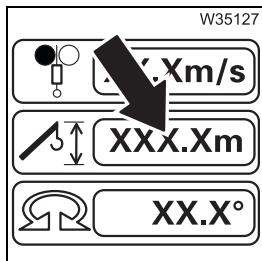
Shows the current main boom length in metres (m) or feet (ft).



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.



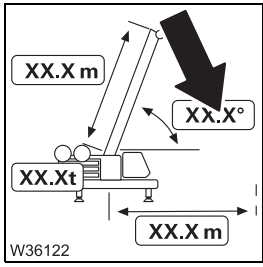
Current overall height display

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 outrigger cylinders on the largest outrigger span.

The value is displayed either in metres (m) or in feet (ft), depending on the setting.

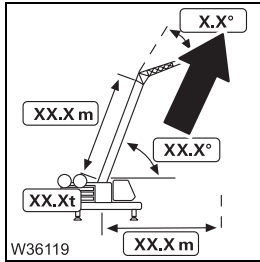




Status display for current main boom angle

Shows the current main boom angle in relation to the horizontal. Angles below the horizontal are displayed with a minus sign, for example, -3° . A luffing jib is connected.

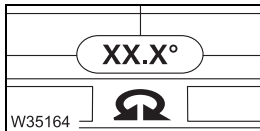
Shows the current angle between the lattice extension and main boom in degrees ($^\circ$).



Current lattice extension inclination display

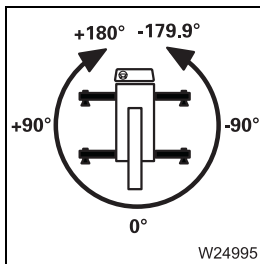
A luffing jib is connected.

Shows the current angle between the lattice extension and main boom in degrees ($^\circ$).

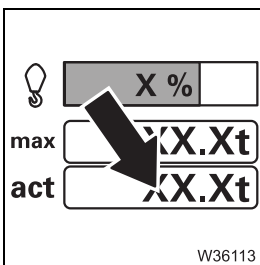


Current slewing angle display

Shows the angle of the current superstructure position.



- 180° means that the superstructure is slewed to the front.
- 0° means that the superstructure is slewed to the rear.
A full turn from this working 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°).



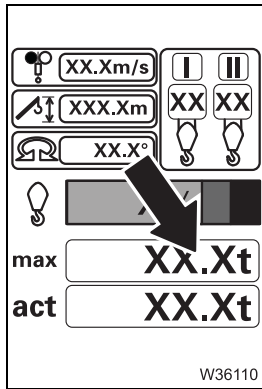
Display of the currently raised load

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 is equal to 55,200 lbs.

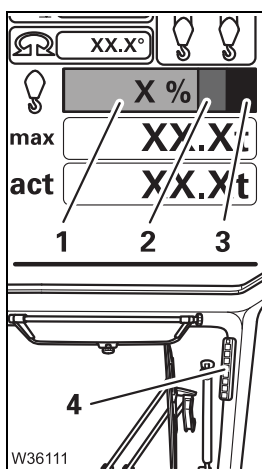


Maximum load display

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.



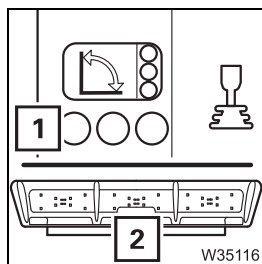
Current degree of utilisation display

The degree of utilisation shows the weight of the current load as a percentage of the maximum possible load. (degree of utilisation = 100 x current load / maximum load).

The display has three coloured regions.

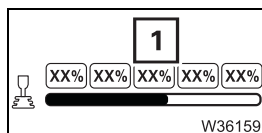
- 1 Green:** 0-90%
- 2 Yellow:** about 90-100% – early warning
- 3 Red:** greater than 100% – shutdown

Depending on the equipment, the degree of utilisation is shown on a display (4) with coloured lamps.



RCL status display

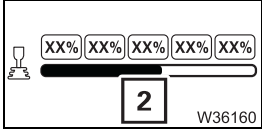
The green, yellow and red displays (1) are identical to the status displays (2) on the outside of the truck crane.



Current telescope status display

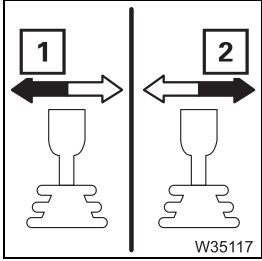
The display (1) shows the current telescoping – from left to right for telescopic sections I to VI. When the display is **orange** then the telescoping cylinder head is in this telescopic section.





Telescoping cylinder position display

The bar (2) shows the telescoping length of the telescoping cylinder – the total bar length corresponds to 100%.



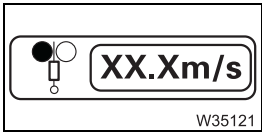
Telescoping direction display

The display is only active when telescoping with teleautomation and shows the direction in which you must move the control lever for each respective telescoping direction.

1 Start with *Retract*

2 Start with *Extend*

▣▣▣▣ *Telescoping with semi-automaton, p. 11 - 110*



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: approx. 90 – 100% of v_{max} reached

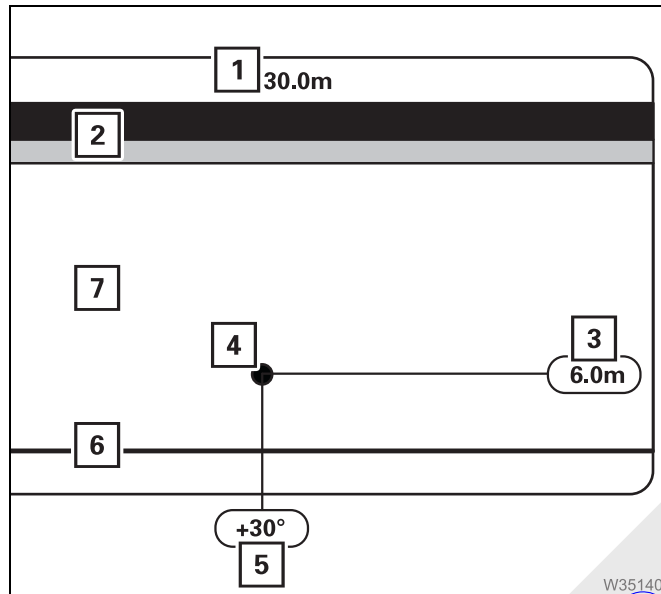
Red: v_{max} exceeded

On the CCSdisplay After confirming a permissible rigging mode, the *Start menu* opens automatically.

Slewing range type *Standard*

If the *MAXbase* slewing range type has been entered;  p. 11 - 55.

The RCL display differs according to the confirmed slewing range.



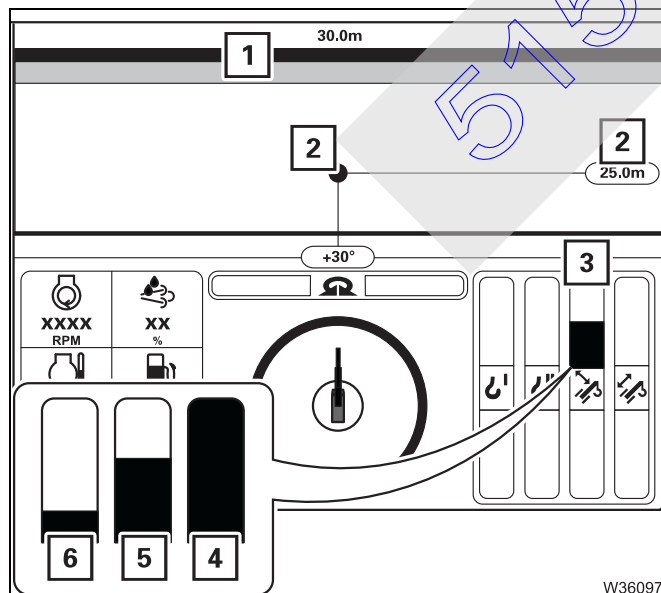
360° slewing range

The diagram (7) covers the entire width. The height of the diagram corresponds to the maximum permissible working radius (1), for example, 30 m (100 ft).

The current position of the boom head is shown using the symbol (4) and defined by two displays.

- 3 Current working radius, e.g. 6 m (20 ft)
- 5 Current slewing angle, for example +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

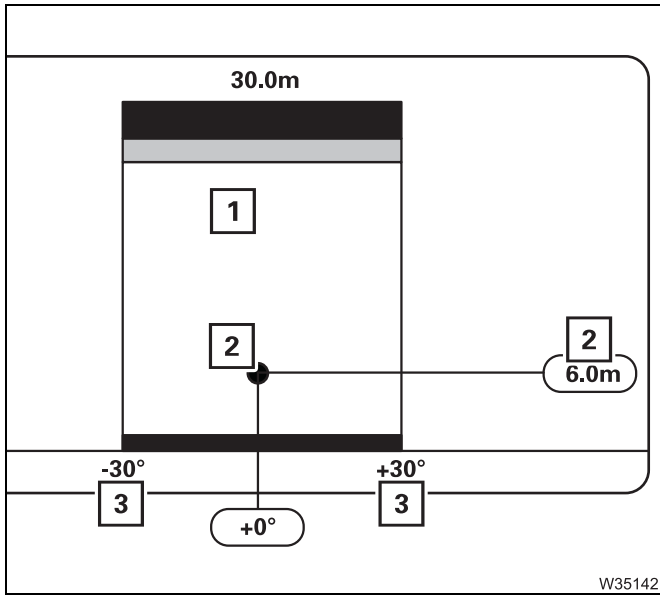
The displays (2) move up and down to show the current working radius, e.g. 25 m (20 ft).

In a shutdown range (1) the movement towards the shutdown limit is continually reduced until reaching a standstill.

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%





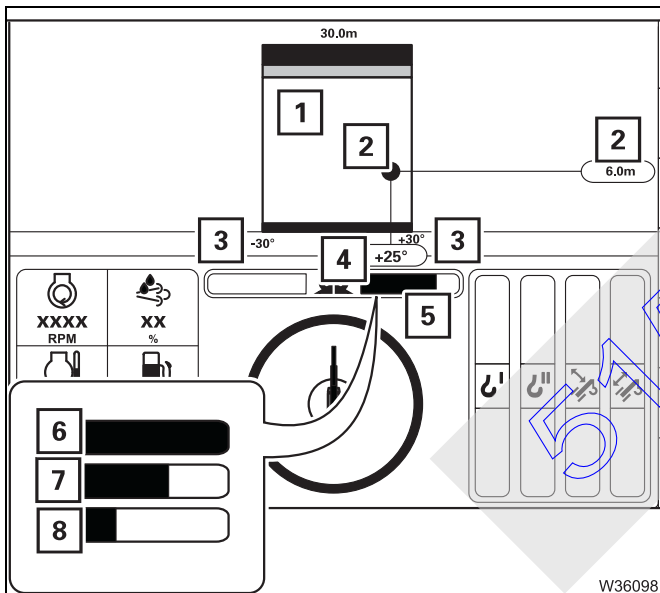
Limited slewing range

The diagram (1) shows the enabled 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 towards a shutdown limit are reduced in the same manner as with the 360° slewing range; p. 11 - 53.



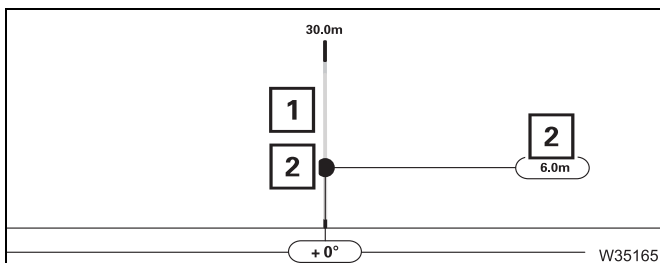
- When slewing

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 towards a shutdown limit is continuously reduced until reaching a standstill.

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%



Working position

The diagram (1) shows the working range, e.g. 0° to the rear.

- When telescoping or derricking

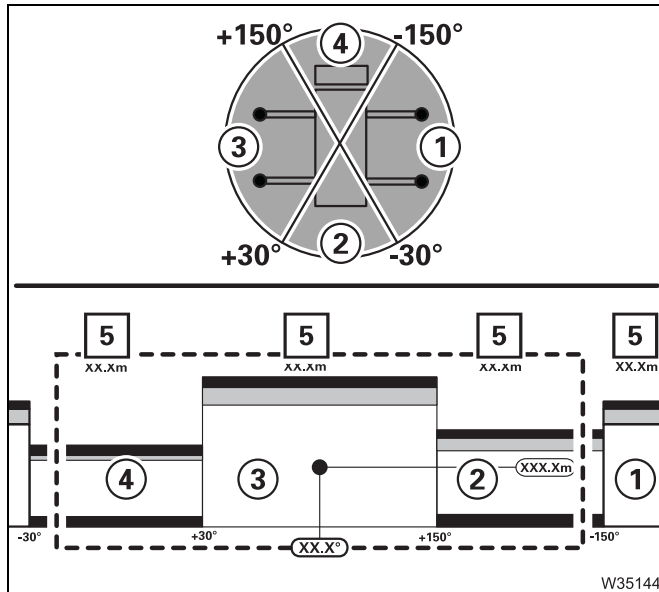
The diagram (1) remains at the current position. The displays (2) move up or down.

Movements leading towards a shutdown limit are reduced in the same manner as with the slewing ranges.

- Slewing is disabled.

Slewing range type *MAXbase*

If the *Standard* slewing range type has been entered; p. 11 - 53.



Display of the slewing ranges

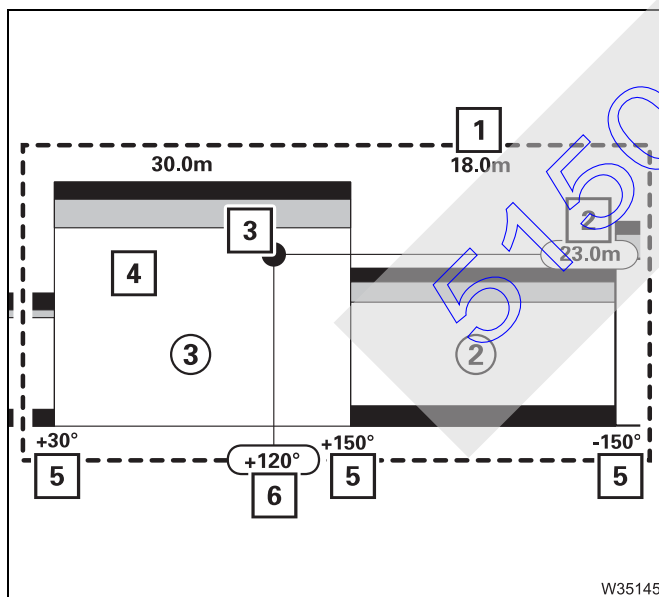
The RCL display represents the four enabled slewing ranges ① to ④ in a diagram with four regions.

The maximum permissible working radius (5) is shown for each region.

Assume that 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° .



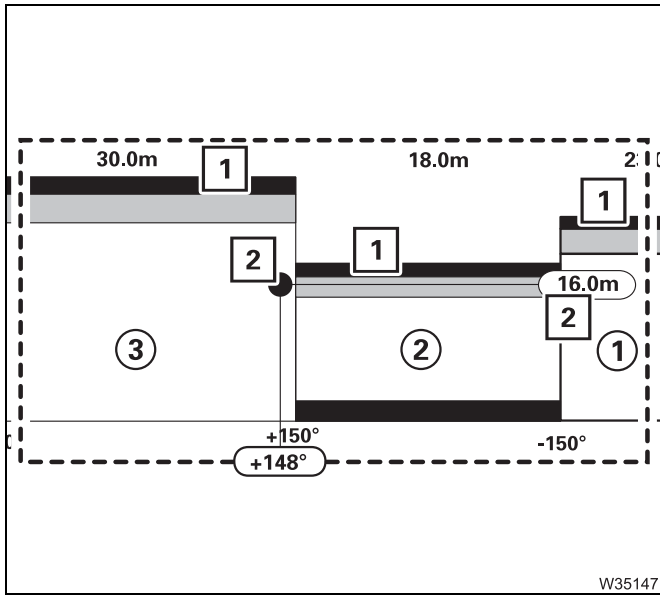
The RCL display shows an angular range of approx. 200° . The range of the diagram is always in the middle corresponding to the current slewing angle (6), for example, the range ③ for 120° .

- 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 reaching a standstill.

The speed reduction occurs in the same manner as with the *Standard* slewing range type; p. 11 - 54.





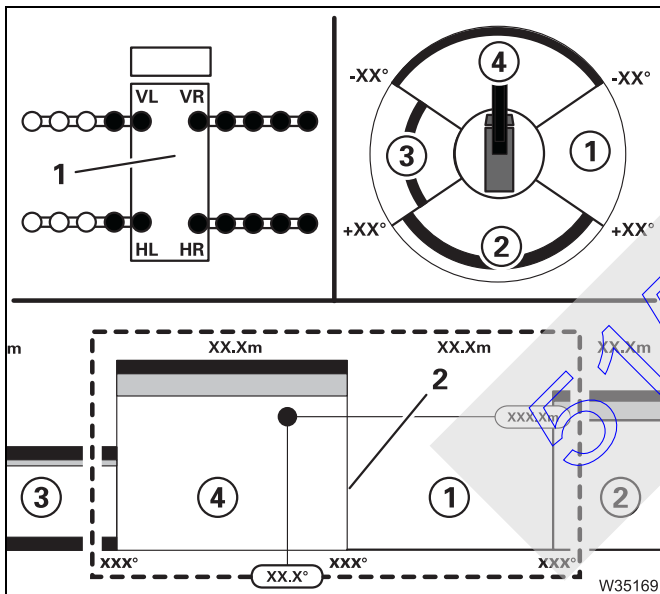
To enable the slewing movement, you must reduce the working radius correspondingly, e.g. to 16 m (52.5 ft) for slewing into slewing range ②.

– 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 continually reduced until reaching a standstill.

The speed reduction occurs in the same manner as with the Standard slewing range type; see p. 11 - 54.



Special case – disabled range

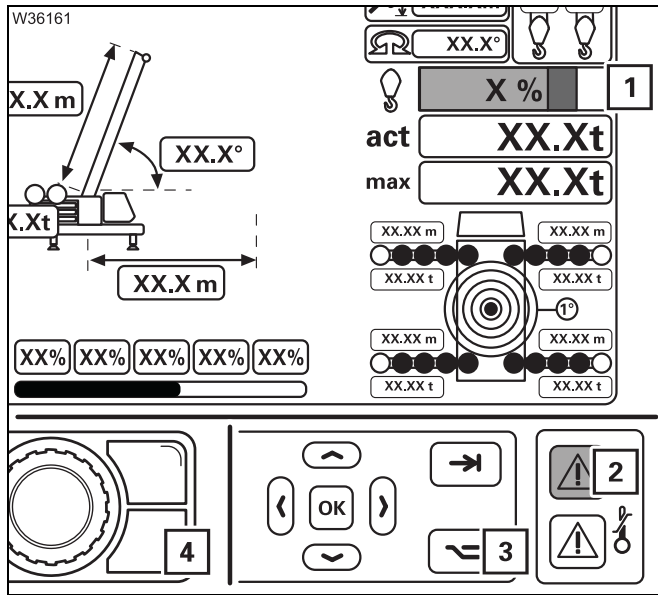
A slewing range can be disabled in certain cases.

If for example, an outrigger span (1) is rigged and operations are to be performed at the right side, with large counterweight combinations, a small working radius and a small load it is possible for the stability towards the rear to become endangered within the slewing range ①.

The range ① in the diagram would then be empty and slewing out of range ④ would be stopped at the range limit (2).

In this case you can increase the working radius – assuming this is permitted by the enabled working range and the external conditions. If the required stability is then present, 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 will sound. 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

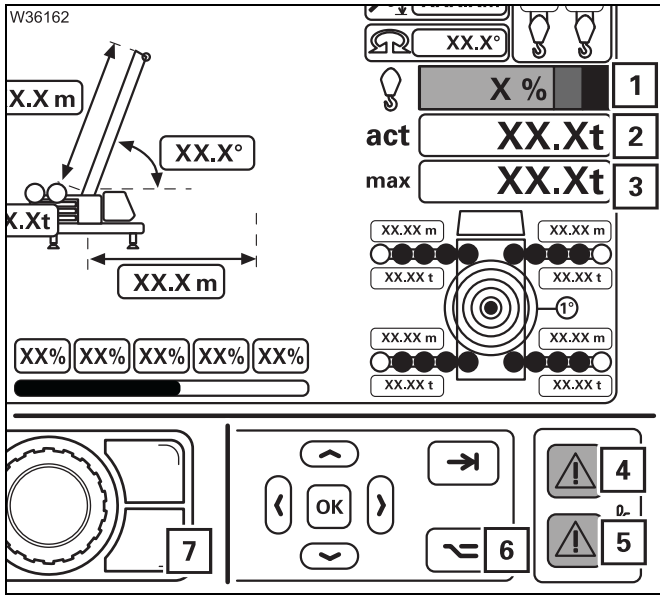
There are different types of RCL shutdowns

- shutdown due to overload,
- Shutdown due to an error; |||► p. 14 - 8.
- Shutdown due to working range limiter; |||► p. 11 - 147.

Shutdown due to overload

If approx. 100% of the maximum permissible load is exceeded, shutdown will occur due to overload.





- All crane movements which increase the load moment will be switched off.
- A continuous buzzer tone will sound. After five seconds, you can switch off the buzzer tone using button (6) or (7).
- Lamps (4) and (5) light up.
- The display (1) is in the red range.
- The value on display (3) is greater than or equal to the value on display (2).

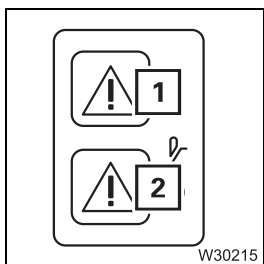
labelling="Section-Header">Cancelling a shutdown

- Turn off the buzzer tone if necessary.
- Leave the shutdown range by moving the crane according to the following table.

Switched off crane movements	Permitted crane movements
Lift loads	Lower loads
Lower the main boom	Raising the main boom ¹⁾
Extend the main boom	Retracting the main boom ¹⁾
Slewing to the left	Slewing to the right
Slewing to the right	Slewing to the left
Lower the lattice extension	Raise the lattice extension



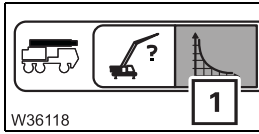
- ¹⁾ In some cases, the RCL will also switch off these movements. In this case, leave the shutdown range through other enabled movements. If this is not possible, set down the load.



The crane movements are released when you have left the shutdown area – lamps (1) and (2) go out.

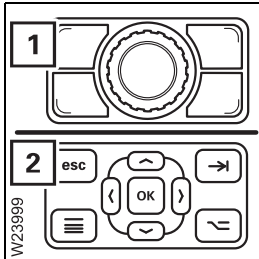
11.4.9

Displaying the lifting capacity tables



Open menu

- Open the *Lifting capacity table* menu (1) on the CCS control unit.

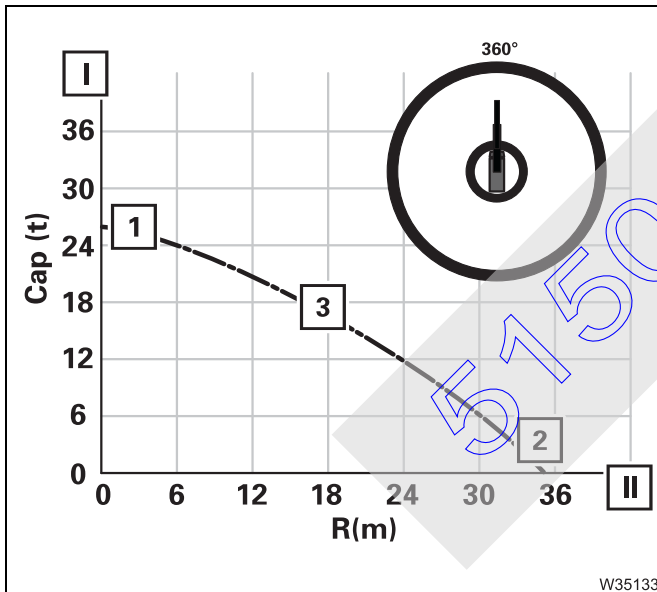


Exiting the menu

- Press the button (1) or press the button (2) on the CCS control unit once – the Start menu opens.

Slewing range type *Standard*

If the *MAXbase* slewing range type has been entered; see p. 11 - 61.



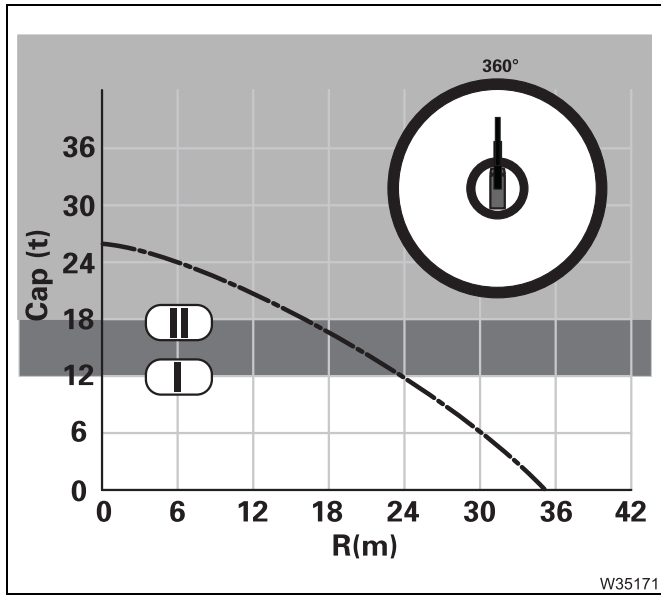
Permissible working range display

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).

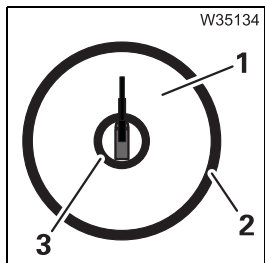




Limitation due to reeving

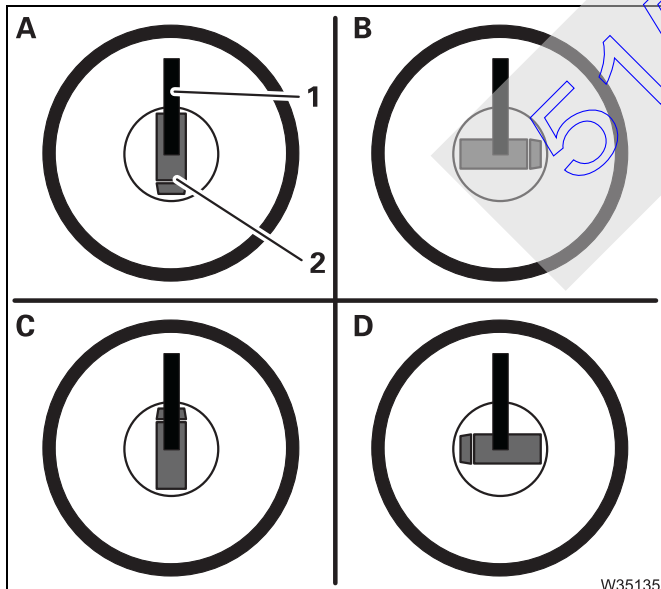
If the maximum load is limited due to the confirmed reeving then the disabled range is marked.

- I Display for main hoist, for example, maximum load 12 t
- II Display for main 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 upwards and does not move.

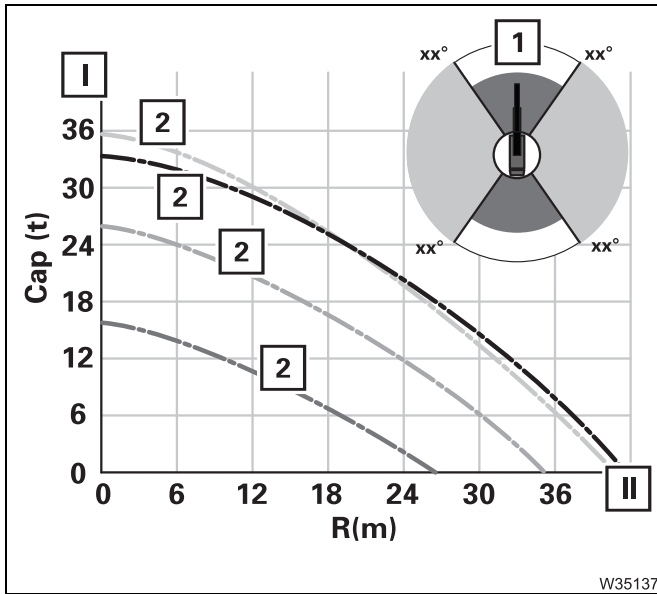
The symbol (2) for the carrier rotates to the position corresponding to the slewing angle.

Examples

- A Current slewing angle 0°
- B Current slewing angle +90°
- C Current slewing angle 180°
- D Current slewing angle -90°

Slewing range type MAXbase

If the *Standard* slewing range type has been entered; p. 11 - 59.



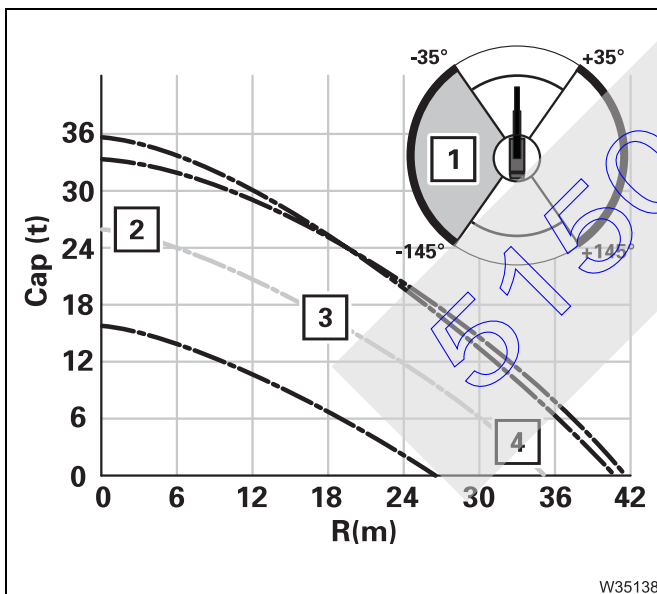
Permissible working range display

The displays apply to the confirmed rigging mode.

- 1 Slewing range display – four slewing ranges, marked in colour
- 2 Display of permissible working ranges – 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

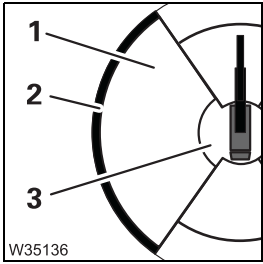
Assume that the slewing range (1) lies between -35° and -145° .

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).

There has to be enough reeving for this load. The speed reduction due to reeving occurs in the same manner as with the *Standard* slewing range type; p. 11 - 60.

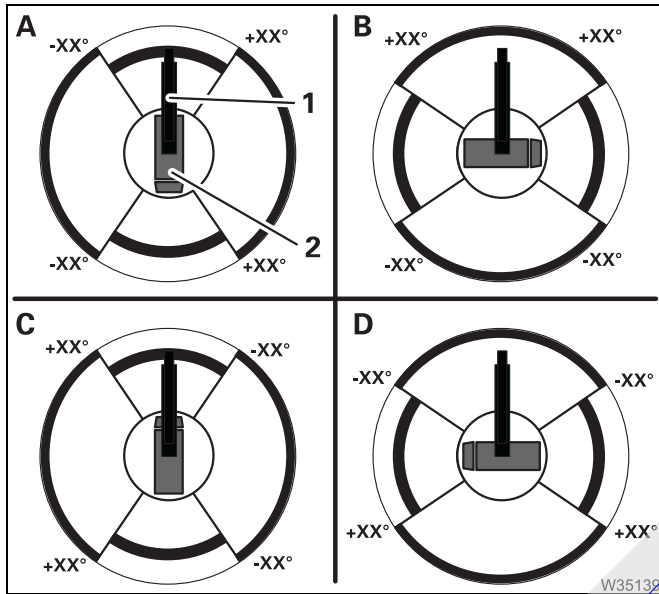




Slewing range display

The display is same in all four slewing ranges.

- 1 Coloured:** Enabled 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 upwards and does not move.

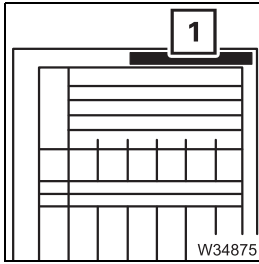
The symbol (2) for the carrier rotates together with the display of the slewing range division to the position corresponding to the slewing angle.

Examples

- A** Current slewing angle 0°
- B** Current slewing angle +90°
- C** Current slewing angle +180°
- D** Current slewing angle -90°

11.4.10

RCL override – version A



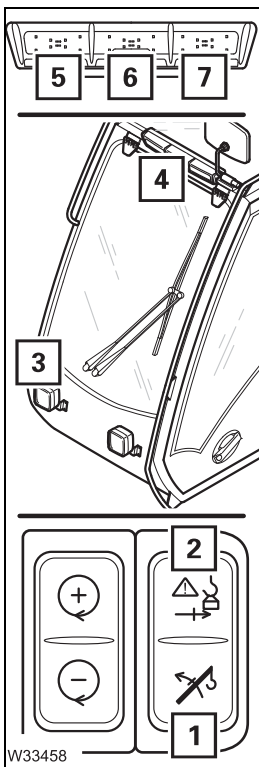
This section applies only when the supplied *Lifting capacity table* contains the entry *EN 13000* in the header (1).

In the case of other entries; *RCL override – version B*, p. 11 - 67.

If the RCL is overridden, the 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.
- **You can release the raise boom function to leave** the shutdown area; *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



The lamps (5) to (7) of the status display (4) light up or flash depending on the RCL degree of utilisation and button confirmations.

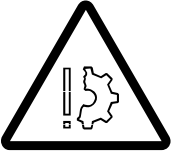
Switch pressed	Degree of utilisation		
	0-90%	about 90-100%	greater than 100%
No switch (normal operation)	Display (5) green	Display (6) Yellow	Display (7) Red
Button (2) Overriding for rigging	Display (5) green	Display (6) Yellow	Display (6) yellow, flashing
Button (1) Raising	Display (5) green	Display (6) Yellow	Display (5) green, flashing
Key-operated switch (3) RCL override in case of emergency	Display (7) red, flashing	Display (7) red, flashing	Display (7) red, flashing



When rigging

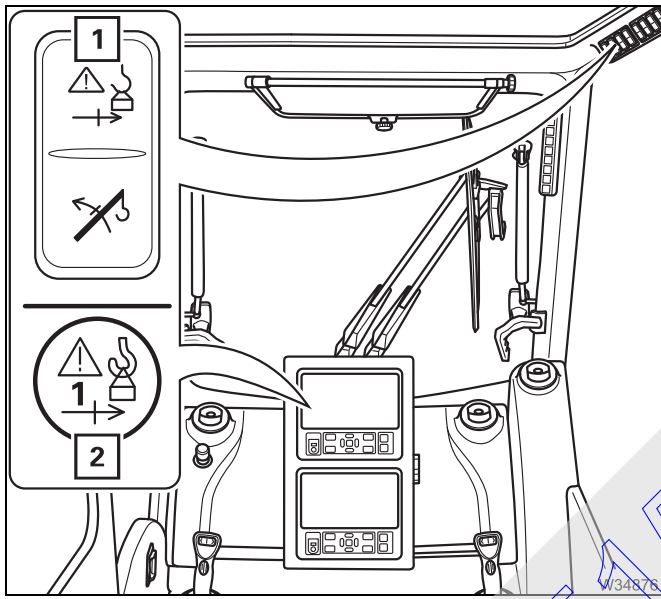
For rigging work, you can:

- override the lifting limit switch; ►► p. 11 - 83
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 speed of the movements which increase the load moment is reduced to 15%.

Cancelling the override

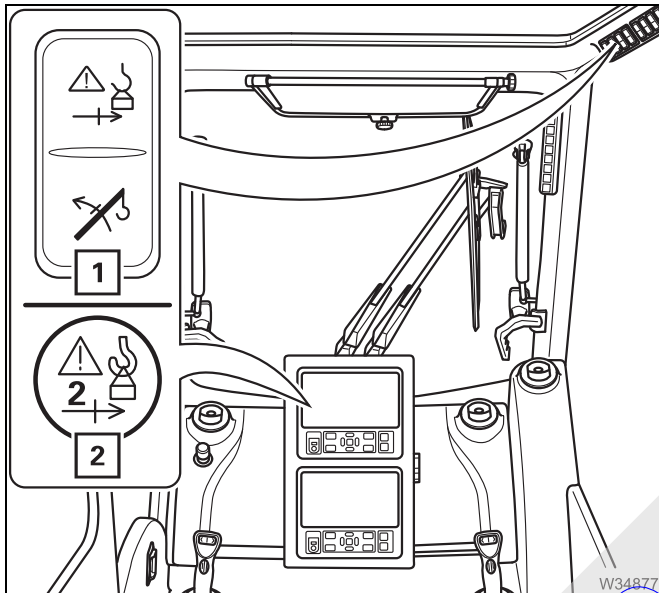
The override will be cancelled when you:

- 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 lies 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 will then be enabled again.The button (1) has no function.



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

Switch off function

- For degree of utilisation above 100%

The function will be switched off if you:

 - press button (1) again, or
 - switch off the ignition.
- For degree of utilisation below 100%

The function is switched off automatically.



In emergencies

During 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.

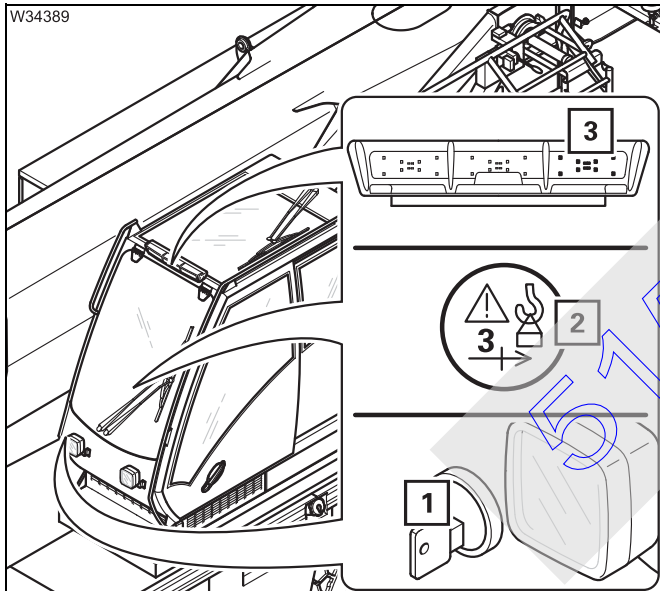
You may only override the RCL if it becomes absolutely necessary in the event of an emergency. This is to put the truck crane into a safe state in the event of a malfunction. In this case, do not perform any movements that would increase the load moment.



Risk of accidents due to unintentional override

The key must not remain in the key-operated switch while the crane is operating.

This prevents the RCL being overridden unintentionally.



Cancelling a shutdown

- Insert the key into the key-operated switch (1).
- Turn the key to the left or right once. The status display (3) will flash 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.

Cancelling the override

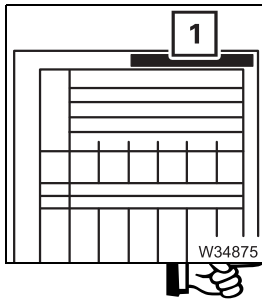
The override will be cancelled when you:

- Switch off the ignition
- Press the key-operated switch again.

The override will automatically be cancelled 30 minutes after the key-operated switch has been pressed.

11.4.11

RCL override – version B



This section applies only 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.

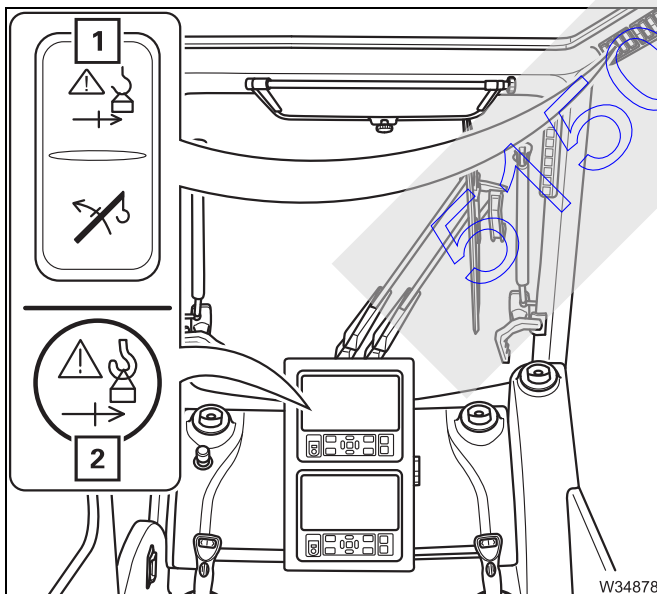


Risk of accidents due to overridden or faulty RCL

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 the event of an emergency. This is to put the truck crane into a safe state in the event of a malfunction. In this case, do not perform any movements that would increase the load moment.



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 which increase the load moment is reduced to 15%.

Cancelling the override

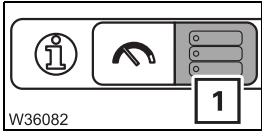
The override will be cancelled when you:

- press button (1) again, or
 - do not activate the control lever for 10 seconds, or
- switch off the ignition.

11.4.12

Datalogger

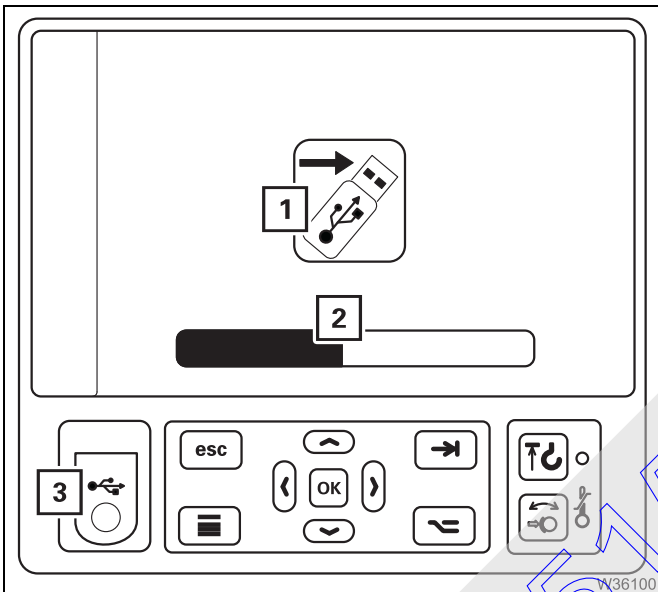
You can export data from the CCS crane control system to a USB stick and display this on a PC using the *CraneEvaluation* program supplied.



- Open the *Datalogger* (1) menu.

Export data

You require a USB Stick (USB 2.0 / FAT32 file system / approx. 500 MB free capacity is recommended).



Export 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

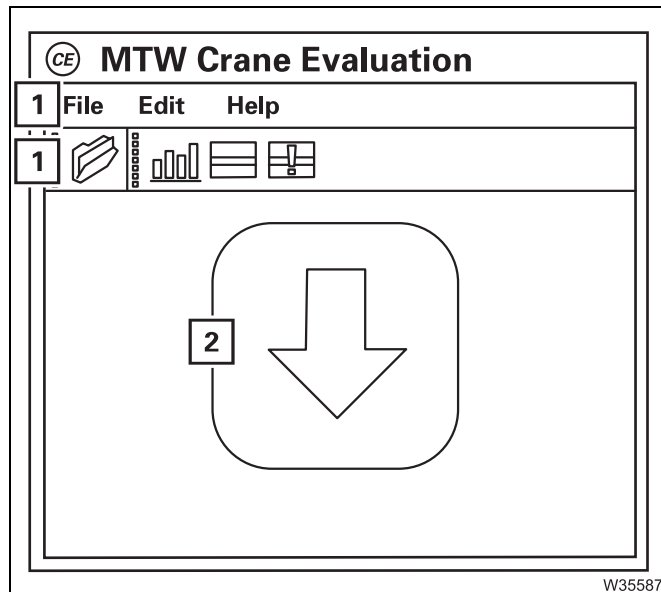
Contains all exported data – can only be opened with the *CraneEvaluation* program.

xxxCraneFault.csv

Contains all exported error messages – can be opened for example, with Excel.

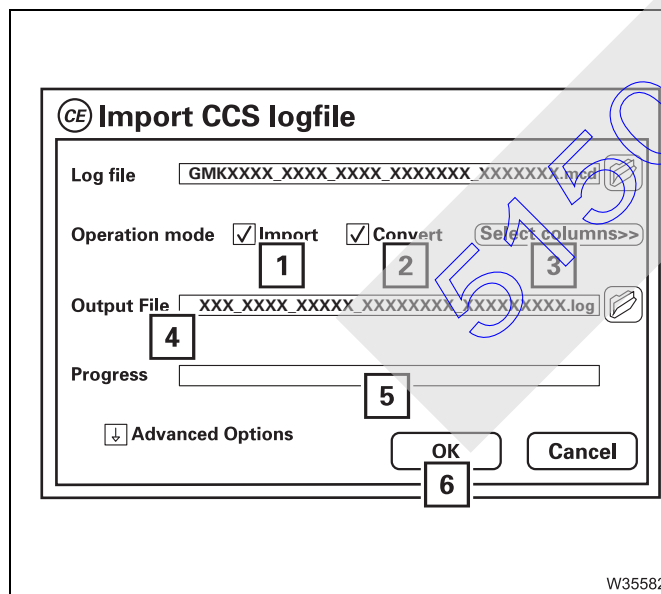
Display the data

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.



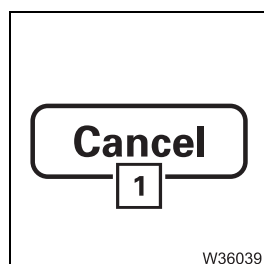
Import data

- Start the *CraneEvaluation* program.
- Drag the file *xxx.mcd* onto the symbol (2) or open the file via a command (1).




An Import window with various settings is displayed.

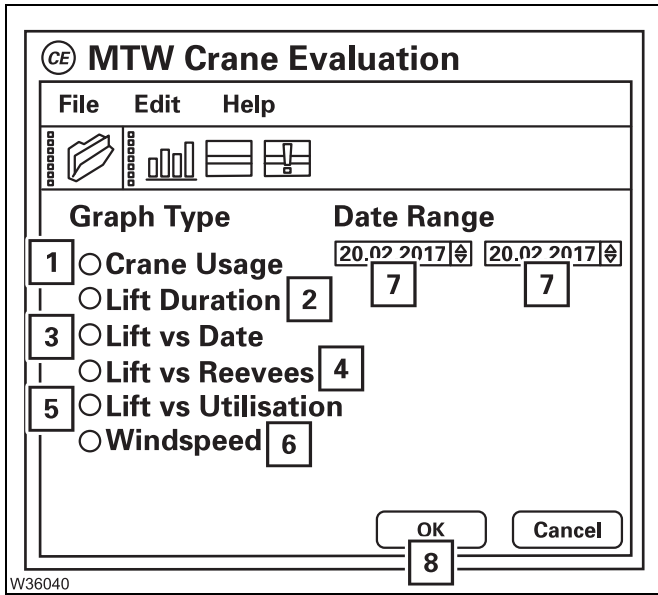
- 1 *Import* – the data is imported for display in the program.
 - 2 *Convert* – the data is saved in a log file that can be opened for example, with Excel.
 - 3 *Select columns* – with the default setting, all available data is imported. The menu allows individual selection.
 - 4 *Output File* – Storage location for the log file
- Confirm the selection via the symbol (6) – the display (5) shows the import progress.



A graphical selection window opens.

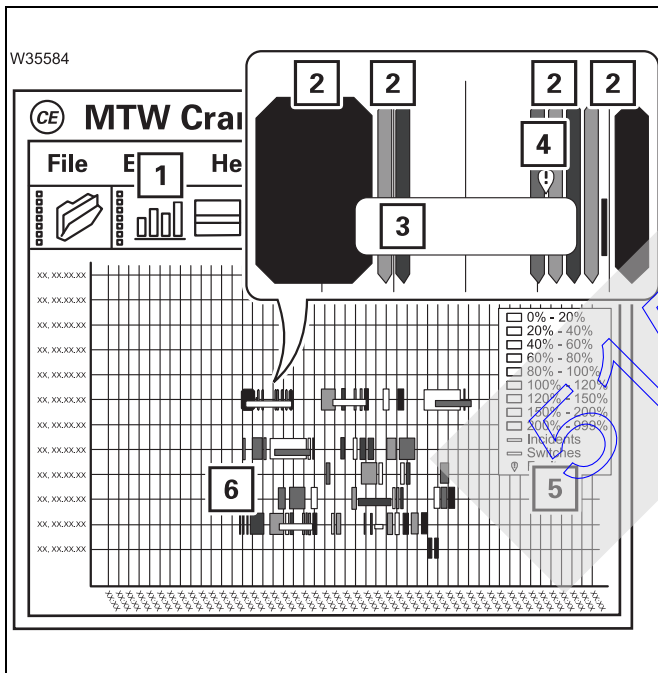
If you do not wish to select a graph, you can simply close the window – symbol (1);  *Displaying tables*, p. 11 - 71.





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 lifts per day
 - 4 Number of lifts per reeving
 - 5 Number of lifts per utilisation area
 - 6 Wind speed for each day
- Confirm the selection via the symbol (8).



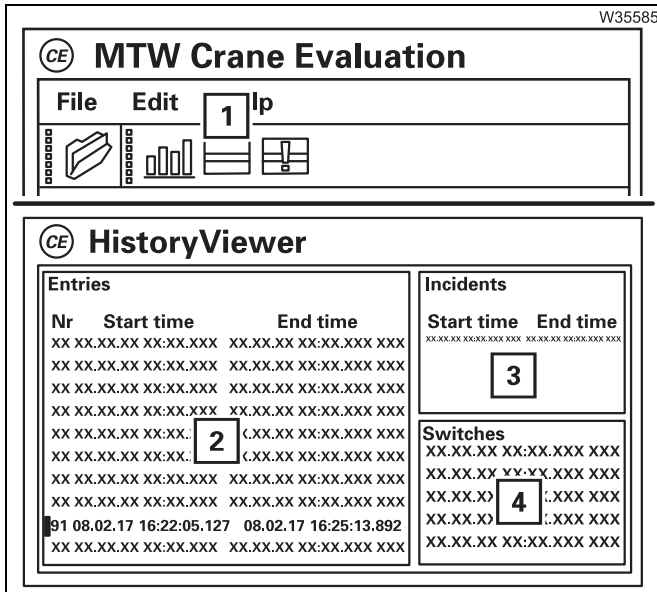
The selected graphic is displayed, for example, the *Crane use* graphic.

All lifts 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.

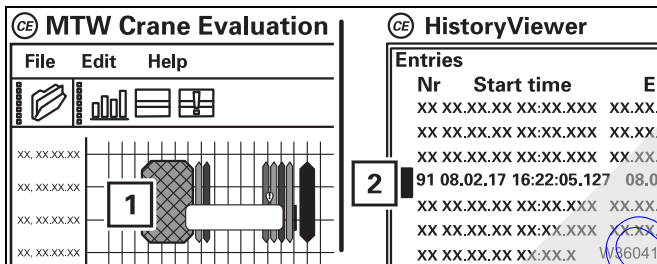
Clicking with the left mouse button provides more details (6) on an element.

Use the symbol (1) to open the graphic selection window.



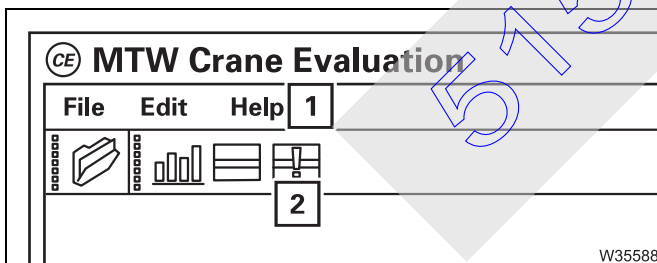
Displaying tables

- Select the symbol (1) – a table is displayed.
- 2 List with all lifts
- 3 List with all events
- 4 List with all actuated switches



When the *Crane use* graphic is also open, an element is displayed and marked in the respective other window when clicked.

- 1 Graphical marking
- 2 Tabular marking



Display the error list

- Select the symbol (2) – a table showing all imported errors is displayed.

Other

Select the command (1) for further information.

Blank page

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11.5

Crane operation with main boom

11.5.1

Checks during crane operation

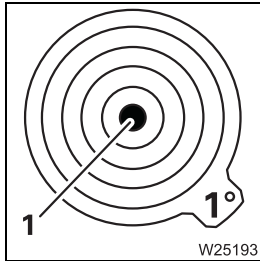
Horizontal alignment

During crane operation, the truck crane may tilt if the ground gives way due to varying 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 - 60.

Due to deformation of the frame, the horizontal alignment can change by up to 2° when the superstructure is turned from the 0° or 180° position. If the truck crane does not return to the horizontal position after being turned back to the 0° or 180° position, you must immediately determine the cause and eliminate it and, if necessary, realign the crane. Observe the position of the superstructure when doing so; *Levelling the truck crane on outriggers horizontally*, p. 12 - 60.

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).

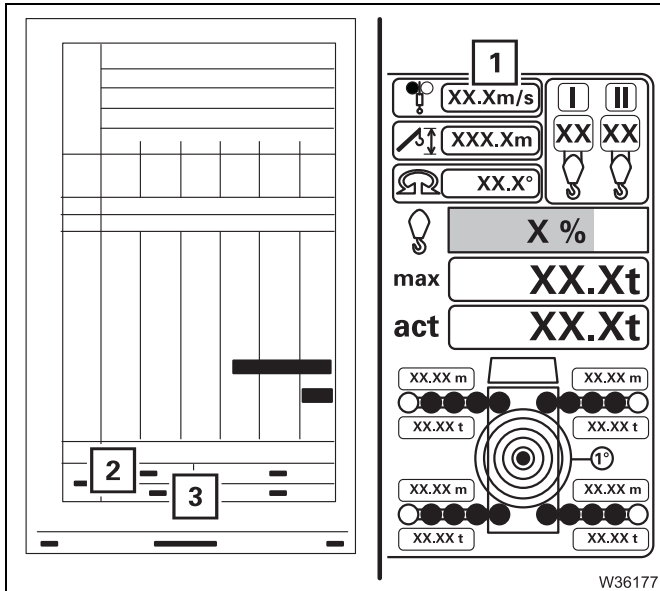
Keep a safe distance to electrical cables; *Safe distance from overhead power lines*, p. 12 - 16.



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

No automatic shutdown occurs if the maximum permissible wind speed is exceeded.

- Immediately stop crane operation.
- Put the truck crane into 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 set up an appropriate rigging mode.

This will prevent the truck crane from overturning due to overload.

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 onto the drum.

- The rope will slacken in the course of the *Lower* movement. Rope loops will form, which can cause the load to slip and damage the hoist rope.
- The switch-off point of the lowering limit switch shifts in the course of the *Raise* movement. The lowering limit switch will lose its function as a safety device.



Risk of accidents when raising loads at an angle

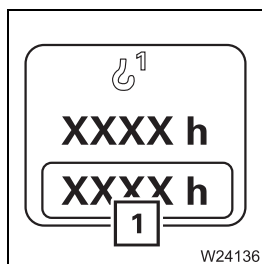
Loads can cause the main boom to bend, resulting in the hoist rope no longer being aligned in a vertical position. Compensate for the bend by lowering the boom so that the load will be lifted vertically. In this way, you can prevent the load dragging and helpers being injured.

Inform all helpers about this issue.



Danger due to slack rope!

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

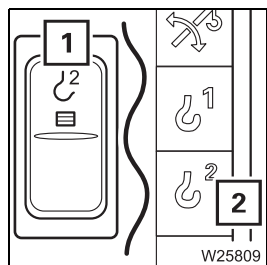


You can have the operating hours (1) of the hoist displayed; p. 11 - 133.

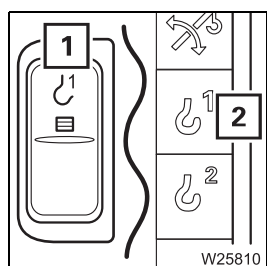


Switching on the main hoist

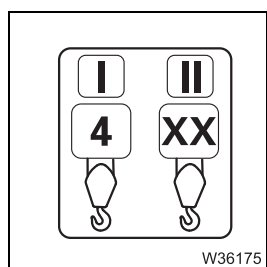
After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will light up only dimly.



- Check whether the auxiliary hoist is switched off and therefore secured against unintentional operation.
 - The lamp in button (1) should light up only dimly.
 - Symbol (2) must be **red**.




- Press the button (1) once.
 - The lamp in button (1) will light 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;  p. 11 - 39.

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


Lifting and lowering

You can adjust the sensitivity of the control levers to suit the operating conditions;  *Setting the characteristic curves for the control levers*, p. 11 - 129.



Risk of accidents due to gaps in monitoring

Operation of the hoist will only be monitored fully if:

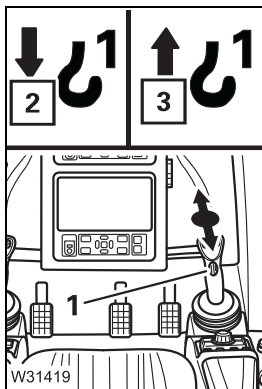
- The lifting limit switch is correctly installed;  p. 12 - 139
- The lifting limit switch is not overridden;  p. 11 - 82
- The lowering limit switch is correctly set;  p. 11 - 82



Risk of accident by suspended loads

Never switch off the engine whilst a load is suspended. You must have the control levers at hand in order to intervene at any time.

Always set down the load before you leave the crane cab.

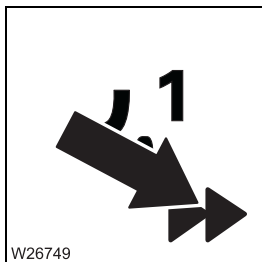



Raising: Pull the control lever to the rear – symbol (3) is displayed.

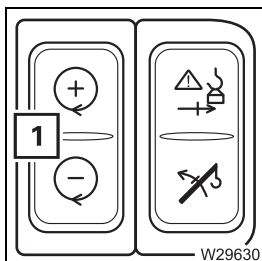
Lowering: Pull the control lever to the front – symbol (2) is displayed.


When the hoist drum is turning, you will notice a pulse on the slewing indicator (1).

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




You can switch on high-speed mode for a higher speed;  p. 11 - 113.

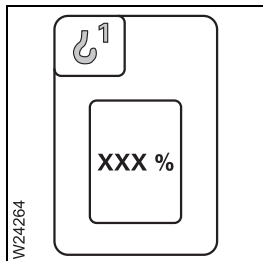



You can set the desired engine speed (idling speed) with button (1);  p. 10 - 9.



Maximum permissible hoist rope speed

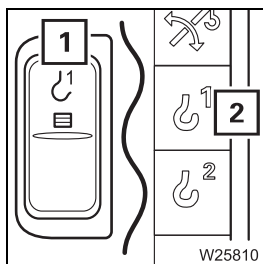
The maximum permissible hoist rope speed is limited automatically depending on the degree of utilisation of the lifting capacity and reeving. The scale of the limitation is specified in the supplied lifting capacity table. The current speed reduction is displayed in the start menu;  p. 9 - 19.



You can limit the maximum telescoping speed in the *Power unit speed* menu;  p. 11 - 125.

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 in the button (1) will light up dimly.
 - Symbol (2) is **red** when the main hoist is switched off.

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11.5.3

Auxiliary hoist



Risk of accidents when operating the auxiliary hoist

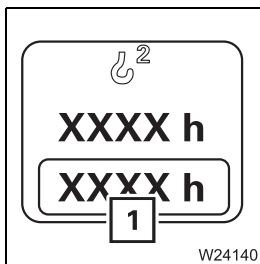
Read and observe all of the safety instructions in the section titled *Main hoist*, p. 11 - 75 before operating the auxiliary hoist.

All safety instructions for the operation of the main hoist also apply to the auxiliary hoist, along with the information in this section.



Risk of accidents due to a damaged hoist rope

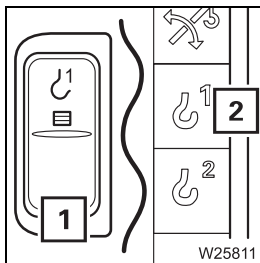
If you reeve the auxiliary hoist rope in addition to the main hoist rope, make sure the hoist ropes do not rub against each other and that the auxiliary hoist rope does not touch the rotating flanged wheel of the main hoist during subsequent operation.



You can have the operating hours (1) of the hoist displayed; see p. 11 - 133.

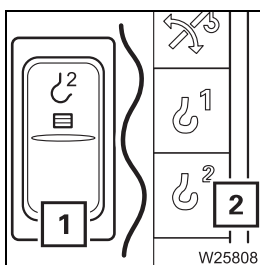
Switching on the auxiliary hoist

After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will light up only dimly.



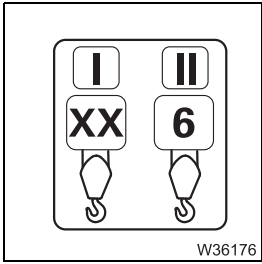
- Check whether the main hoist is switched off and therefore secured against unintentional operation.

- The lamp in button (1) should light up only dimly.
- Symbol (2) must be **red**.



- Press the button (1) once.
 - The lamp in button (1) will light up brightly.
 - Symbol (2) is **green** when the auxiliary hoist is switched on.





- Check whether the current reeving of the auxiliary hoist is displayed, for example, **6**. Correct the reeving if necessary; p. 11 - 39.

Lifting and lowering

You can adjust the sensitivity of the control levers to suit the operating conditions; *Setting the characteristic curves for the control levers*, p. 11 - 129.



Risk of accidents due to gaps in monitoring

Operation of the hoist will only be monitored fully if:

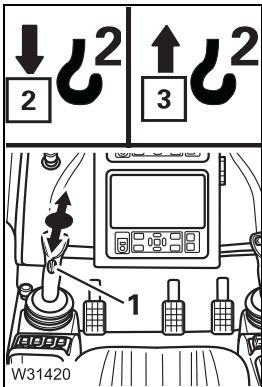
- The lifting limit switch is correctly rigged; p. 12 - 139
- The lifting limit switch is not overridden; p. 11 - 82
- The lowering limit switch is correctly set; p. 11 - 82



Risk of accident by suspended loads

Never switch off the engine whilst a load is suspended. You must have the control levers at hand in order to intervene at any time.

Always set down the load before you leave the crane cab.

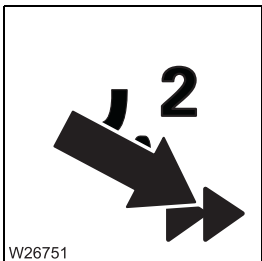


Raising: Pull the control lever to the rear – symbol **(3)** is displayed.

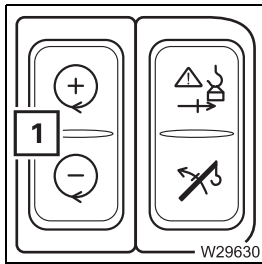
Lowering: Pull the control lever to the front – symbol **(2)** is displayed.

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

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



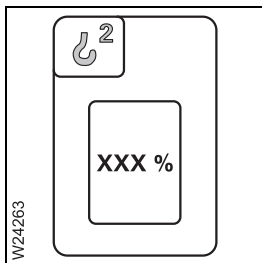
You can switch on high-speed mode for a higher speed; p. 11 - 113.



You can set the desired engine speed (idling speed) with button (1);
 ■■■► p. 10 - 9.

Maximum permissible hoist rope speed

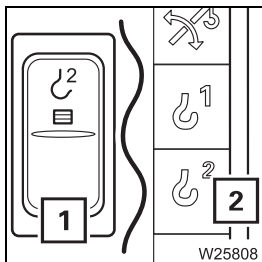
The maximum permissible hoist rope speed is limited automatically depending on the degree of utilisation of the lifting capacity and reeving. The scale of the limitation is specified in the supplied *Lifting capacity table*. The current speed reduction is displayed in the start menu; ■■■► p. 9 - 19.



You can limit the maximum telescoping speed in the *Power unit speed* menu; ■■■► p. 11 - 125.

Switching off the auxiliary hoist

If the auxiliary hoist is not required, it should be switched off to avoid unintentional use.




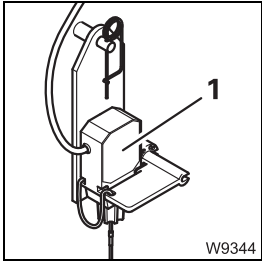
- Press the button (1) once.
 - The lamp in the button (1) will light up dimly.
 - Symbol (2) is **red** when the auxiliary hoist is switched off.

11.5.4

Lifting limit switch and lowering limit switch

Lifting limit switch

To install/remove the lifting limit switch;  p. 12 - 139.



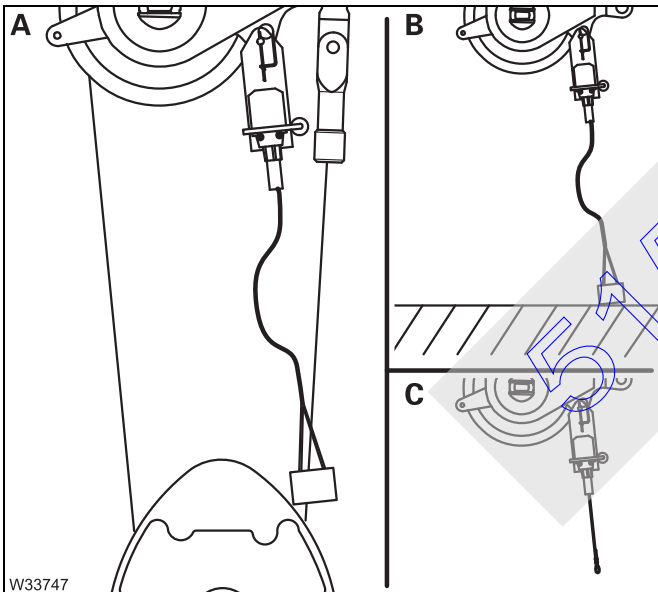
The lifting limit switch (1) prevents the hook block being lifted up to the main boom head and damaging it.

The lifting limit switch only works if it has been unlocked;  p. 12 - 144.



Risk of accidents due to intentionally triggering the lifting limit switch

Always complete the hoisting operation (and extending) before raising the lifting limit switch weight. If the lifting limit switch is lifted at too great a speed, the hook block may swing into the main boom head and damage the head sheaves and the hoist rope.



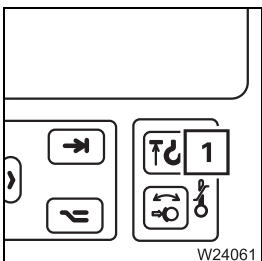
The lifting limit switch will be triggered if:

(A) – the hook block raises the lifting limit switch weight or

(B) – the lifting limit switch weight touches the ground upon lowering or

(C) – the lifting limit switch weight is not attached.

The lifting limit switch will not trigger if it is locked.



The lamp (1) will light up if the lifting limit switch has been triggered. At the same time, all movements which would increase the load moment will be switched off – *Lifting, Lowering, Extending and Derricking the lattice extension* if necessary.

To cancel the shutdown, leave the shutdown range by performing a different crane movement or by setting down the load.

Lifting limit switch override

When overriding, the shutdown of the lifting limit switch is cancelled and the crane operation is no longer completely monitored.



Risk of accidents if the lifting limit switch is overridden

You may override the lifting limit switch only if this is specified in the operating instructions for carrying out maintenance or rigging work. With the lifting limit switch overridden, you may drive only at the minimum speed and without a load.



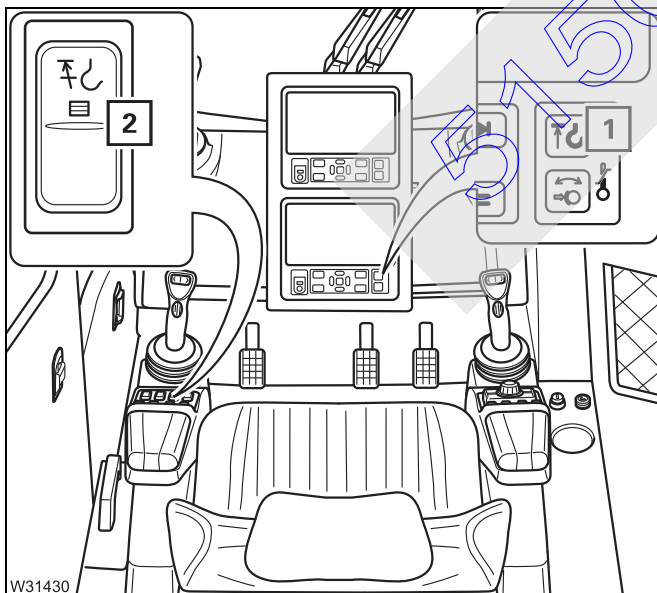
Risk of accidents due to gaps in monitoring

If the lifting limit switch is overridden, crane operation is no longer completely monitored. When hoisting the lifting limit switch weight, the crane movement will be stopped once. After moving the control lever again, the crane movement will again be enabled and will not be switched off again.



Risk of damage due to overridden slewing gear shutdown.

If the lifting limit switch has been overridden, then the load torque related shutdowns of the slewing gear will not be released (for example, if the pretensioning 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)
 - The 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 zero position and then move it again.

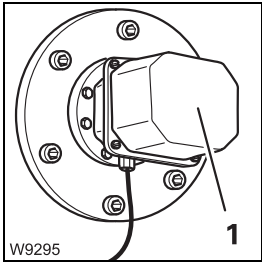
This crane movement will now not be stopped again.

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 due to adjustments made to the lowering limit switch

Always re-adjust the lowering limit switch if you unreel hoist rope from the stationary rope drum. The lowering limit switch does not record the number of these winds.

This prevents the lowering limit switch 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.

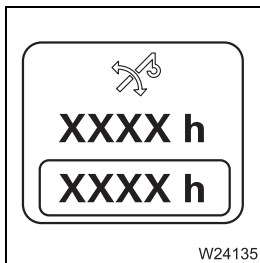
Depending on the size of the load and the rigging mode, the RCL will switch off the lowering process of the boom as soon as leaving the working area specified in the *Lifting capacity table*.



Danger of overturning when lifting loads!

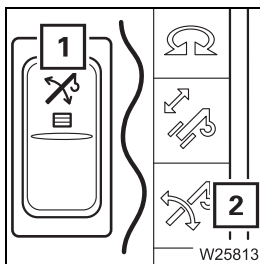
It is prohibited to lift loads by raising the boom, since the RCL does not monitor this procedure!

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 which can cause the truck crane to overturn if the load lifted is too heavy.



You can have the operating hours of the derricking gear displayed; p. 11 - 133.

Switching on the derricking gear




After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will light up only dimly.

- Press the button **(1)** once.
 - The lamp in button **(1)** will light up brightly.
 - Symbol **(2)** will be **green** if the derricking gear is switched on.

If the control lever is assigned more than one function, all other power units which are assigned to the same control lever movement will be switched off; *Control lever assignment*, p. 9 - 14.



Raising and lowering

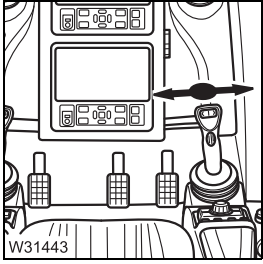
You can adjust the sensitivity of the control levers to suit the operating conditions;  *Setting the characteristic curves for the control levers*, p. 11 - 129.



Risk of accident due to unexpected crane movements!

If assigned more than one function, check whether the *Derricking* control lever function is switched on before you move the control lever for derricking.

This prevents accidents due to unexpected crane movements.



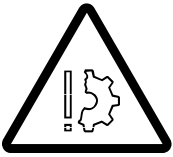
Lowering: Push the control lever to the right – the main boom is lowered.

Raising: Push the control lever to the left – the main boom is raised.

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



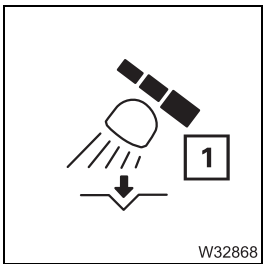
The maximum derricking speed will automatically be reduced as the system length is increased. If you now reduce the working radius (for example, by retracting the telescoping), the derricking speed will automatically be increased again.




Risk of damage to the slewable spotlights!

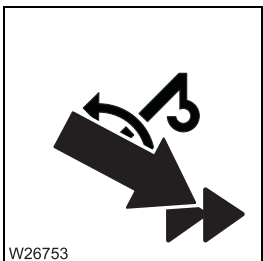
Make allowances for the position of the slewable spotlights before setting down the main boom.

This is prevent a collision between the working spotlights and the engine cover.

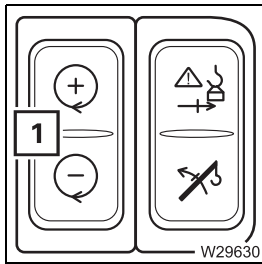


If when the main boom is being set down a symbol (1) is displayed:

- Correct the position of the slewable spotlights until the symbol (1) goes out;  p. 11 - 130



You can switch on high-speed mode for a higher speed;  p. 11 - 113.

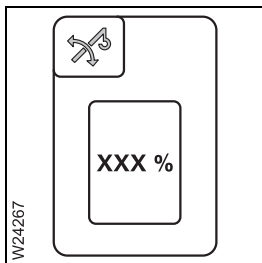


You can set the desired engine speed (idling speed) with button (1);
 ■■■▶ p. 10 - 9.

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 - 19.

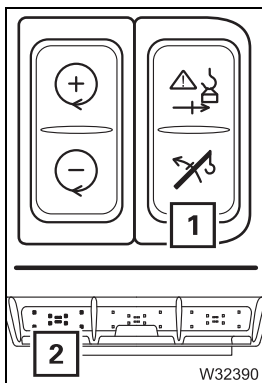


You can limit the maximum derricking speed in the *Power unit speed* menu;
 ■■■▶ p. 11 - 125.

Re-enable raising function

For RCL override (version A)

If the RCL has switched off the raising function due to an overload, you can re-enable the raising function with button (1). The speed will then be reduced to 50%.



- Press the (1) button down once.
- Use the control lever to raise the main boom.

The status display (2) will flash **green**.

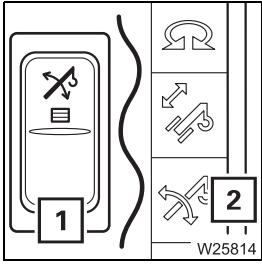


The raising of the main boom will be shut down if the main boom angle is too great. Then all you can do is set the load down.



Switching off the derricking gear

If the derricking gear is not required, it should be switched off to avoid unintentional use.

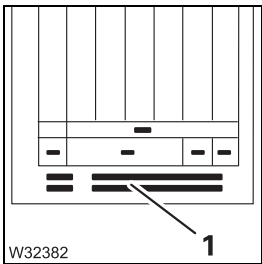


- Press the button (1) once.
 - The lamp in the button (1) will light up dimly.
 - Symbol (2) will be red if the derricking gear is switched off.

If the control lever is assigned more than one function, the derricking gear will also be switched off if you switch on another power unit which is assigned to the same control lever movement; Control lever assignment, p. 9 - 14.

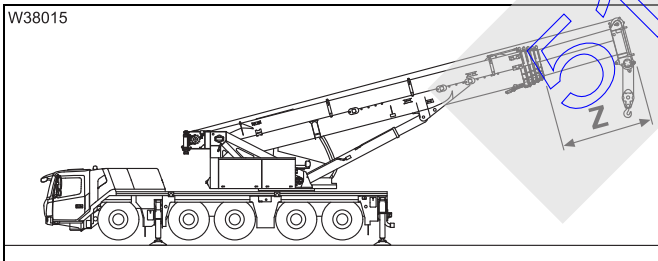
Lowering the main boom to a horizontal position

The main boom can be set down by referring to the working curves within the working range specified in the *Lifting capacity tables*.

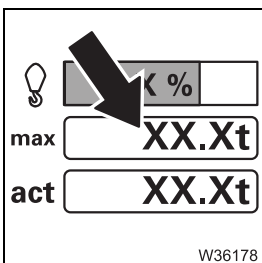


This section supplements the information (1) in the *Lifting capacity tables* supplied for the main boom intermediate lengths.

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 bearing 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, the RCL shuts down; 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-automaton**

When telescoping with semi-automation, 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 telescoping values that you can use as the starting point for semi-automatic teleautomation. 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.

This is operated using the control lever. The control unit *CCS* still forms part of the 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.

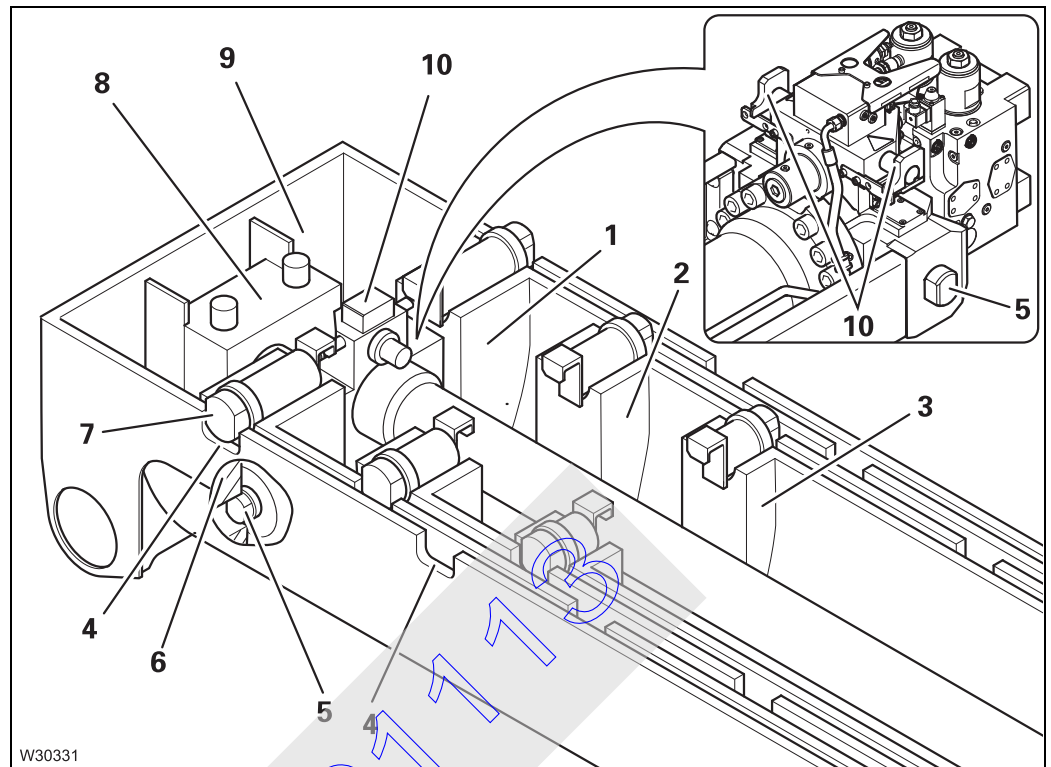


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Overview

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) which are extended by spring force.

The locking pins (7) are pushed into the cutouts (4) of the telescopic section above at the locking points – the telescopic section is locked.

The telescoping cylinder is attached to the basic section (9) with the piston rod (8). The telescoping cylinder has two locking pins (5) at the bottom and a mechanism at the top (10).

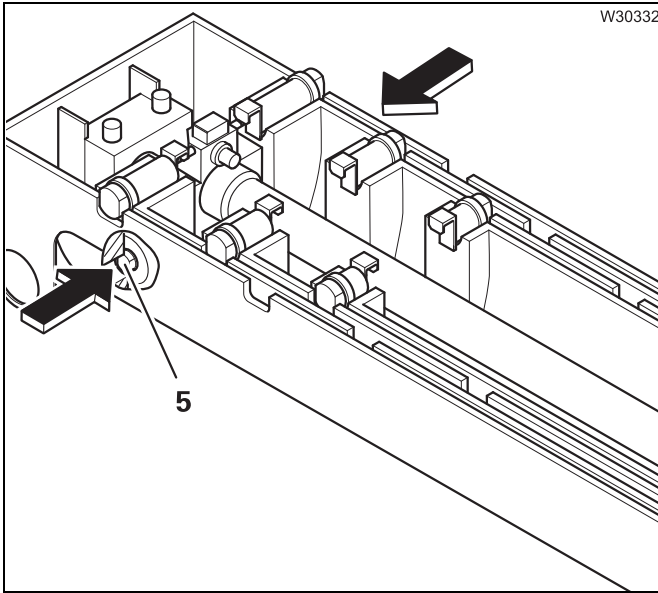
When the telescoping cylinder is positioned at a locking point:

- The locking pins (5) can be extended into the cutouts (6) – the telescoping cylinder is locked.
- The mechanism (10) engages into the locking pins (7) and can retract them – the telescopic section is unlocked.



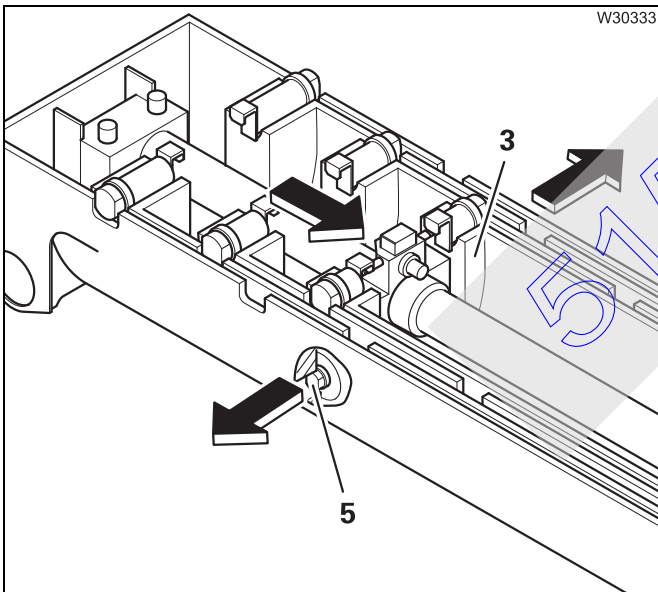
Telescoping process

This state should be the starting point for a telescoping process.
Telescoping processes consist of 4 steps.



1. unlocking the telescoping cylinder

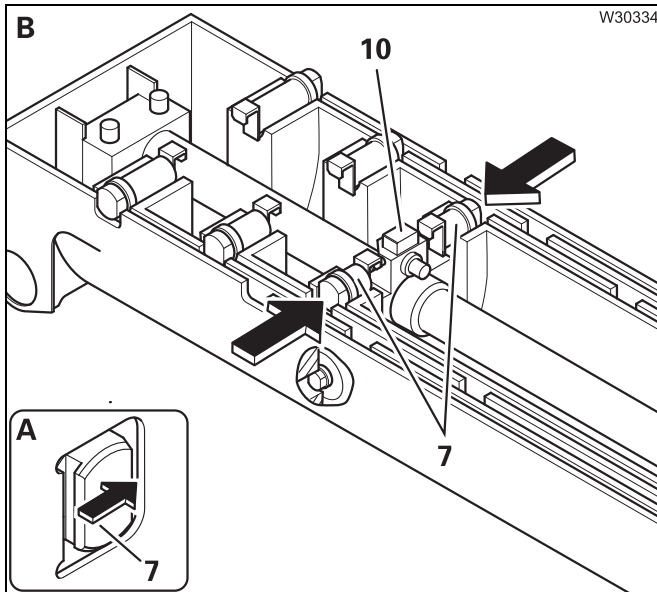
The locking pins (5) retract – the telescoping cylinder is unlocked.



2. Moving and locking the telescoping cylinder

The telescoping cylinder moves into the section to be telescoped, for example, telescopic section III (3).

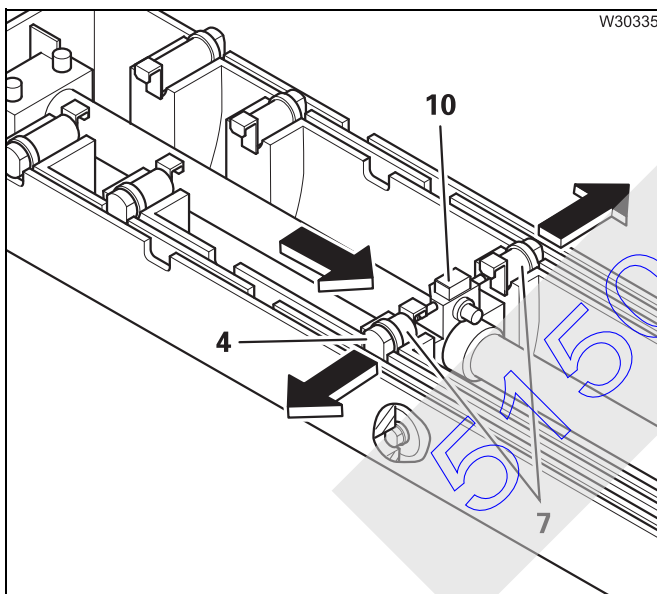
The locking pins (5) extend – the telescoping cylinder is locked.



3. Unlocking the telescopic section

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

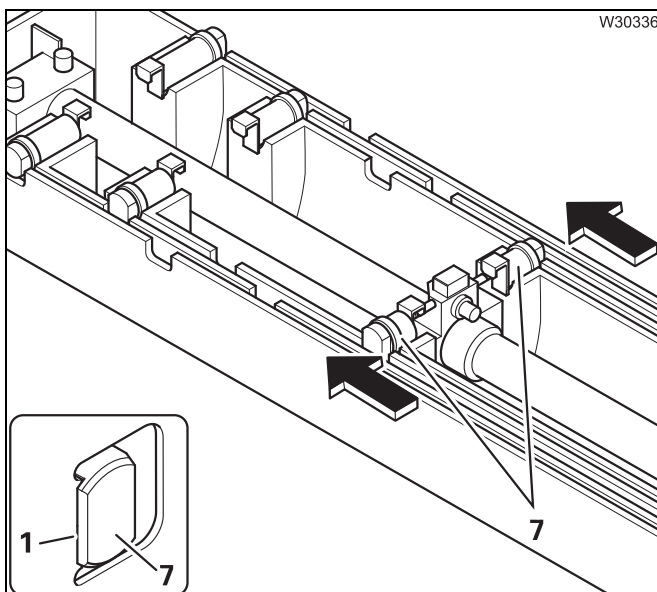
(B) – The mechanism (10) retracts the locking pins (7) – the telescopic section is unlocked.



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 retracts until the locking pins (7) are positioned on the above telescopic section (1).

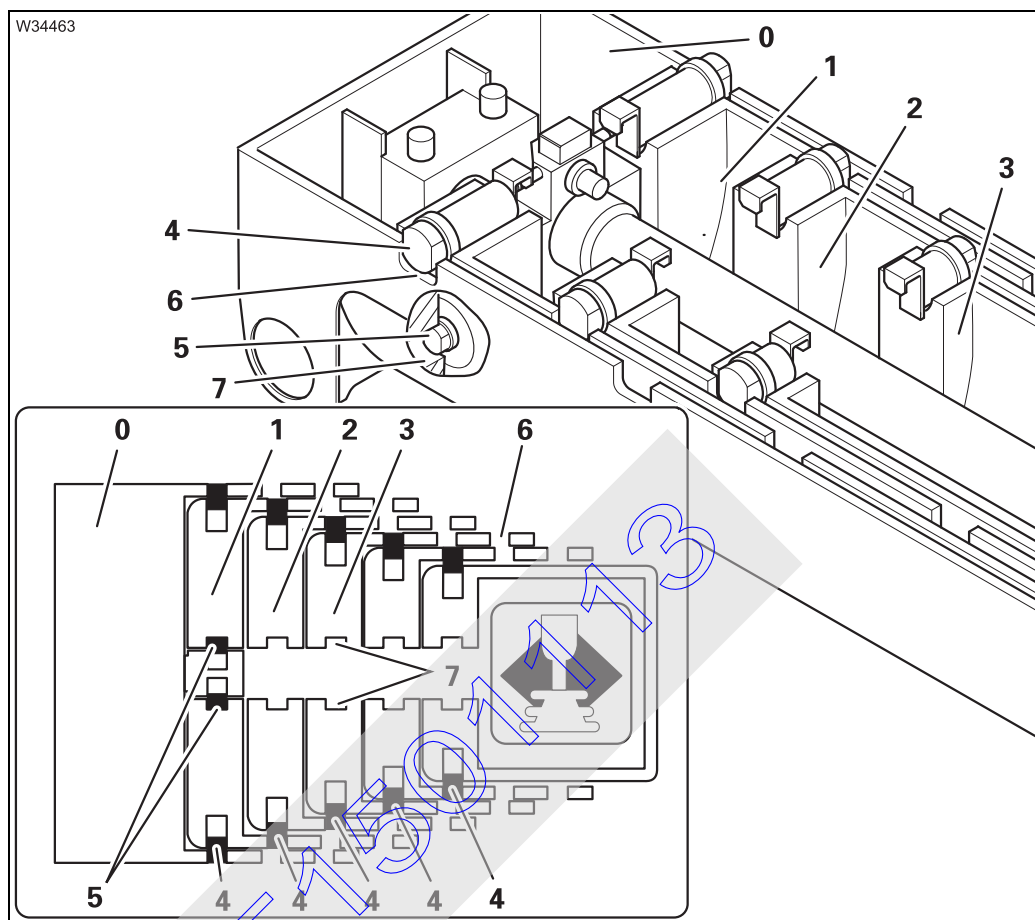
The weight of the load is now on the telescopic sections and not on the telescoping cylinder.



**Assignment
for display**

The 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 detected by the RCL, and the corresponding lifting capacities according to the *Lifting capacity table* are enabled and displayed automatically.

Main boom fixed length

Main boom fixed lengths have the greatest lifting capacities. A main boom fixed length is reached if:

- All telescopic sections are locked to a fixed length
- All telescopic sections are set down.

Main boom intermediate length

A main boom intermediate length is reached if not all telescopic sections are locked to fixed lengths.

Extend the main boom to the required length before hoisting the load.

You cannot telescope the boom with the specified lifting capacities for main boom intermediate lengths.

Main boom telescoping length

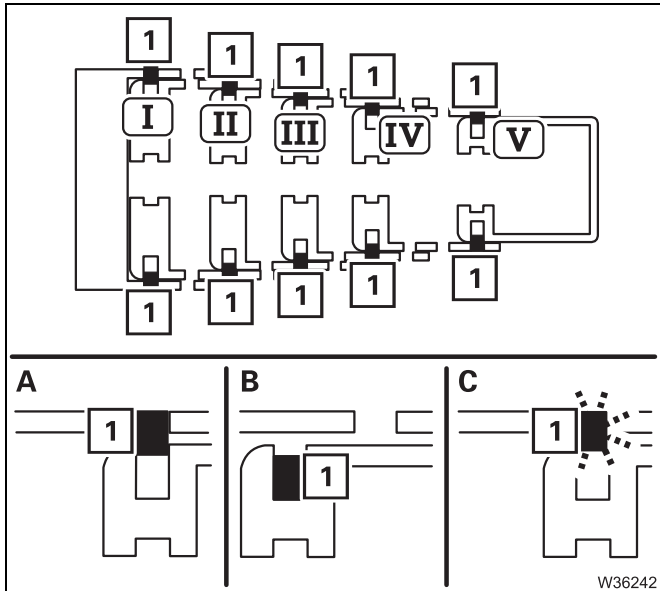
The main boom is at a telescoping length if it is extended to an intermediate length and may be telescoped with the current load. The size of the load that can be telescoped depends on the angle of inclination and on the degree of lubrication of the main boom.



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 V has four fixed lengths – Fixed lengths overview;

▣▣▣▣ p. 14 - 39.

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).

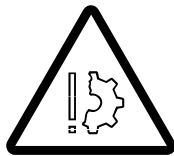
The telescopic sections are always **retracted** in the reverse order of extending.

Inspections prior to starting operations

When the ignition is turned on, CCS registers the displayed telescoping status from the current status of the telescoping mechanism and the previously saved locking and unlocking procedures.

Normally, CCS detects differences between the current and the displayed telescoping and displays the corresponding error message;  *Malfunctions in the telescoping mechanism*, p. 14 - 19.

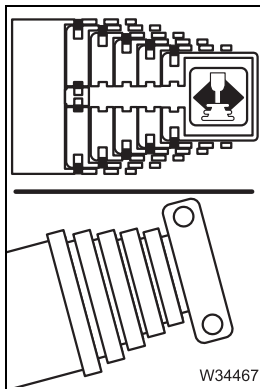
If a **malfunction** results in values being deleted, CCS can no longer calculate the current telescoping and will not issue an error message.



Risk of damage to the telescoping mechanism

Before the first telescoping, always check whether the CCS display is showing the current telescoping.

This prevents the telescoping mechanism being damaged when telescoping.

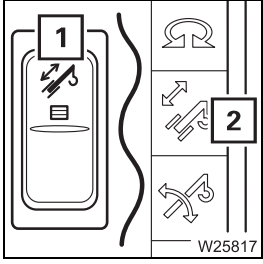


- Before the first telescoping, compare the telescoping indicated on the CCS display with the current telescoping.

You must enter the current telescoping if the current telescoping is not displayed correctly;  *Current telescoping*, p. 11 - 102.



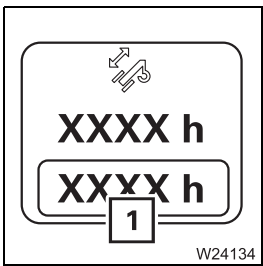
Switching on the telescoping mechanism



After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will light up only dimly.

- Press the button (1) once.
 - The lamp in button (1) will light up brightly.
 - The symbol (2) will be **green** if the telescoping mechanism is switched on.

If the control lever is assigned more than one function, all other power units which are assigned to the same control lever movement will be switched off; *Control lever assignment*, p. 9 - 14.



You can have the operating hours (1) of the telescoping mechanism displayed; p. 11 - 133.

Function of the control lever

This section only describes the function of the control lever. Before telescoping, a number of prerequisites need to be fulfilled as well.

- Before manual telescoping; p. 11 - 101.
- Before telescoping with teleautomation; p. 11 - 110.

You can adjust the sensitivity of the control levers to suit the operating conditions; *Setting the characteristic curves for the control levers*, p. 11 - 129.



Risk of accident due to unexpected crane movements!

In the case of multiple configuration, check whether the control lever *Telescoping* function is switched on before you move the control lever for telescoping.

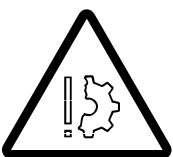
This prevents accidents caused by unexpected derricking.



Risk of accidents due to gaps in monitoring

Boom extension will only be monitored completely if

- The lifting limit switch is correctly rigged; p. 12 - 139
- The lifting limit switch is not overridden; p. 11 - 82.



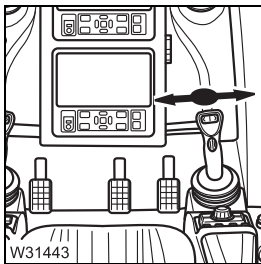
Risk of damage to the hoist rope!

The rope can become slack if the hook block touches the ground during retraction operations. Rope loops will form, which can cause the load to slip and damage the hoist rope.

The distance between the hook block and the boom head changes during telescoping. Ensure that the hook block does not trigger the lifting limit switch or touch the ground.

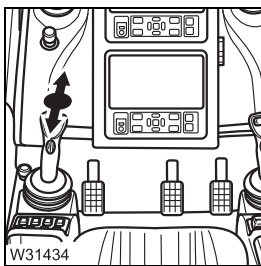
- Additionally carry out the following movements
 - Lower hoist when extending and
 - the Raise hoist movement when retracting.

The control lever movements for telescoping vary depending on the configuration.



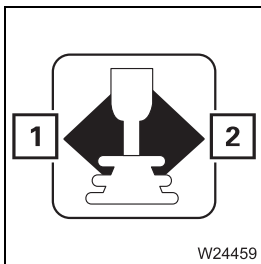
– With telescoping assigned to the right-hand lever

- 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 backwards.



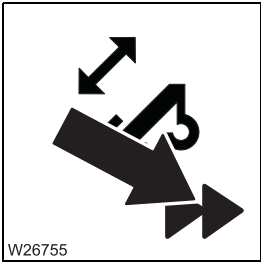
Telescoping will only start if arrow (1) or (2) for the selected telescoping direction is green.

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

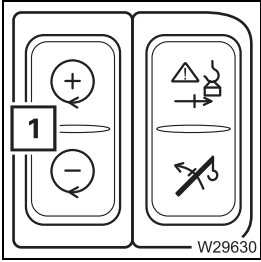


With certain telescoping states, the RCL will switch telescoping off, for example, when you leave the telescoping lengths or when the working range limit has been reached;  RCL shutdown, p. 11 - 57.

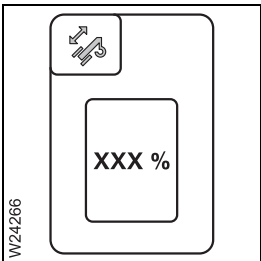




You can switch on high-speed mode for a higher speed; p. 11 - 113.

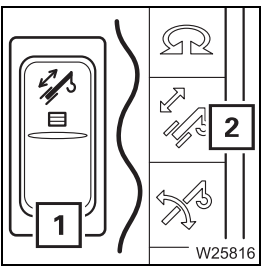


You can set the desired engine speed (idling speed) with button (1);
 p. 4 - 17.



You can limit the maximum telescoping speed in the *Power unit speeds* menu;
 p. 11 - 125.

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 in the button (1) will light up dimly.
 - The symbol (2) **red** if the telescoping mechanism is switched off.

If the control lever is assigned more than one function, the derricking gear will also be switched off if you switch on another power unit which is assigned to the same control lever movement; *Control lever assignment*, p. 9 - 14.

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 - 103
- Moving the telescoping cylinder (without telescopic section);  p. 11 - 105
- Lock the telescoping cylinder;  p. 11 - 106
- Unlocking the telescopic section;  p. 11 - 107
- Telescoping the telescopic section;  p. 11 - 108
- Locking the telescopic section;  p. 11 - 109



The operating order depends on the current initial position. For an overview of a telescoping process (example);  p. 11 - 92.

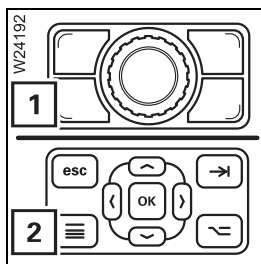


The lengths given in the following illustrations are purely sample values, and may differ from the current display.

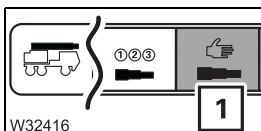
Checking the initial position,

Before telescoping, you must check the following statuses:

- **Current telescope status**
- **Position of the telescoping cylinder**
- **Position of the locking pins**

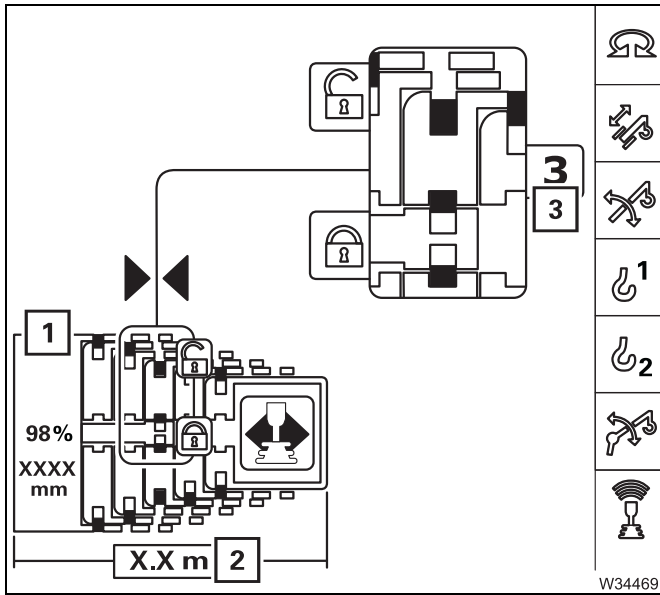


- If necessary, open the overview of the menu groups – press button **(1)** or **(2)** once.



- Open the *Manual telescoping* menu **(1)**.



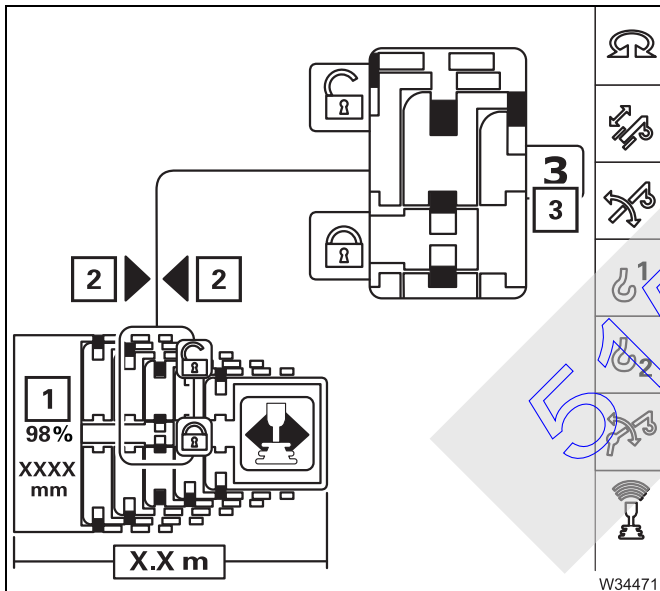


Current telescoping

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.



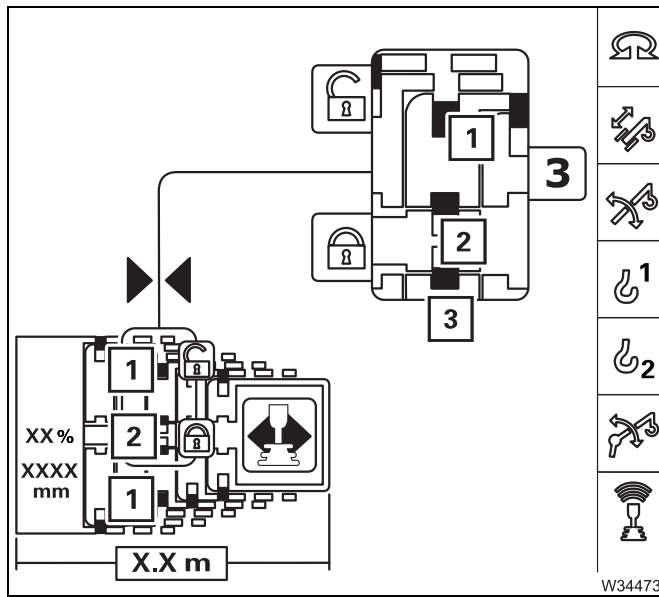
Position of the telescoping cylinder

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.

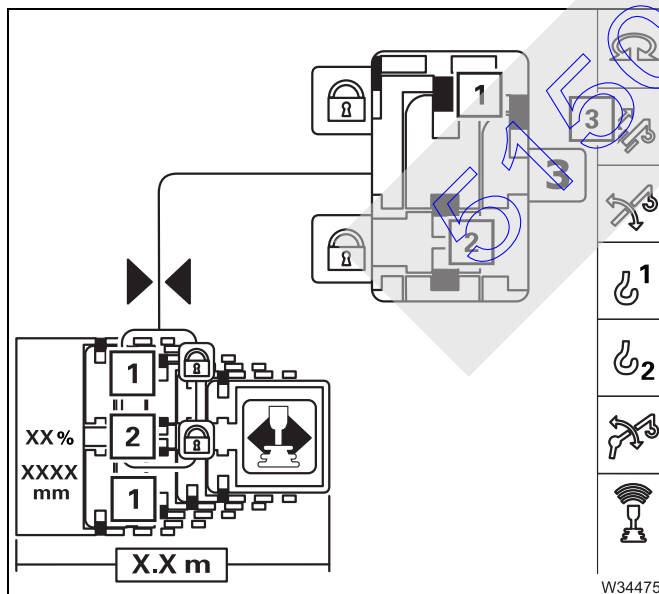
The current settings are shown in different colours.

- **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).

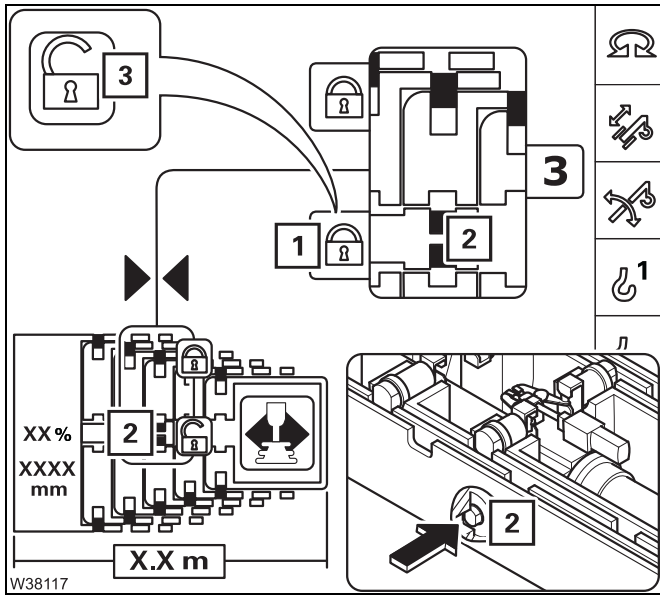
The telescoping cylinder and the telescopic section cannot be unlocked simultaneously.



Prerequisites

- Telescoping mechanism on – symbol (3) **green**
- Telescoping cylinder locked – symbol (2) **green**
- Telescopic section locked – symbol (1) **green**



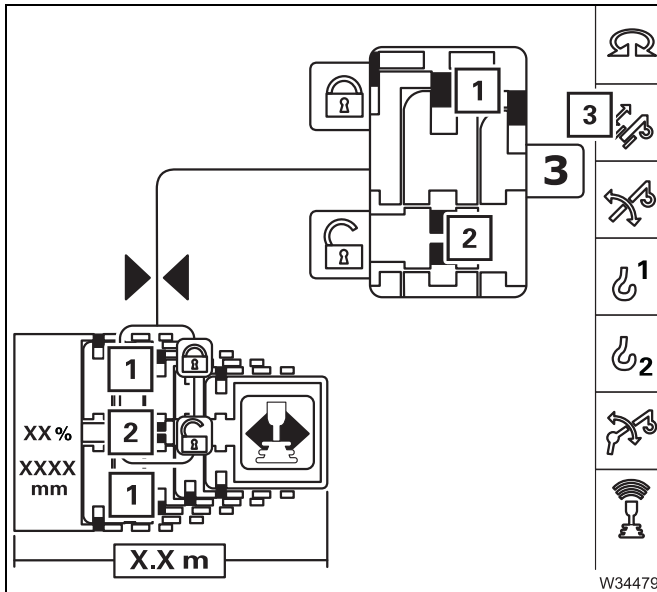


Unlocking

- Select and confirm the symbol (1).
The locking pins (2) retract.
- **Yellow:** Intermediate position
- **Red:** Unlocked – symbol (3) displayed

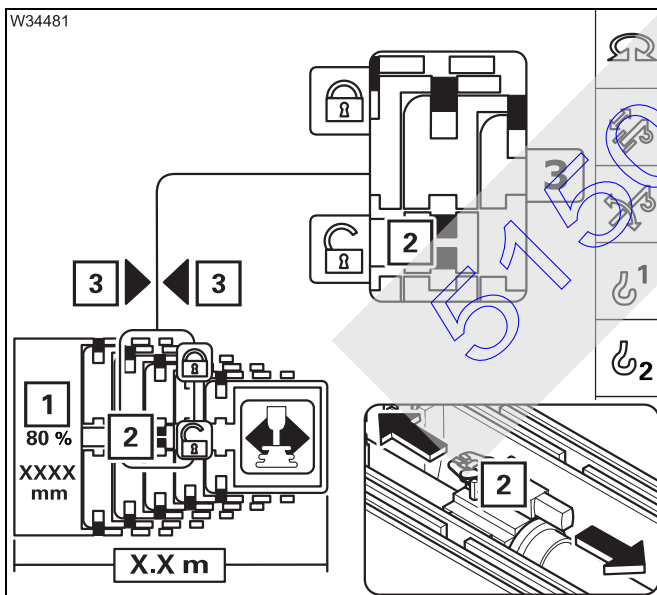
51501113

Extending/retracting the telescoping cylinder



Prerequisites

- Telescoping mechanism on – symbol (3) **green**
- Telescopic section locked – symbol (1) **green**
- Telescoping cylinder unlocked – symbol (2) **red**



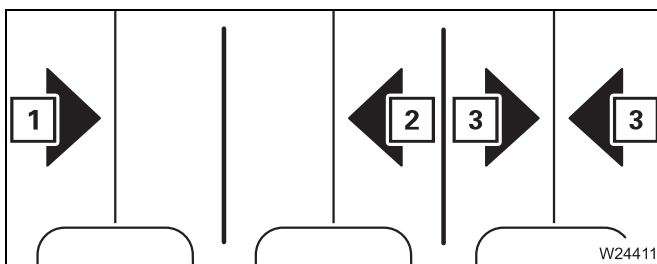
Extending/retracting

- Move the control lever in the corresponding telescoping direction:
 - **Extend:** Extension
 - **Retract:** Retraction of the telescoping

The telescoping cylinder (2) extends/retracts.

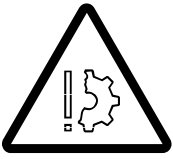
The display (1) shows the currently extended length, for example, 80%.

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



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





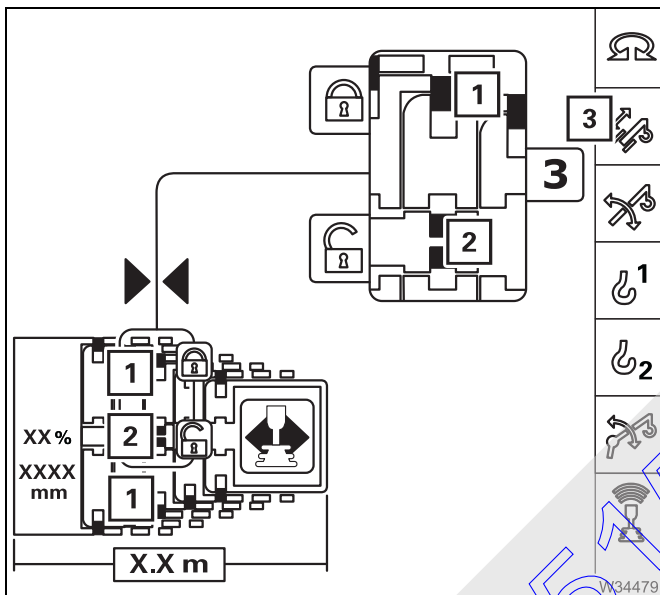
Risk of damage to the boom system

If extending and retracting several times does not lead to the lock being released, you must not telescope any further against the stop.

If removing the load does not cause the lock to be released, you must lock the telescoping cylinder (→ p. 11 - 106) and then restart unlocking.

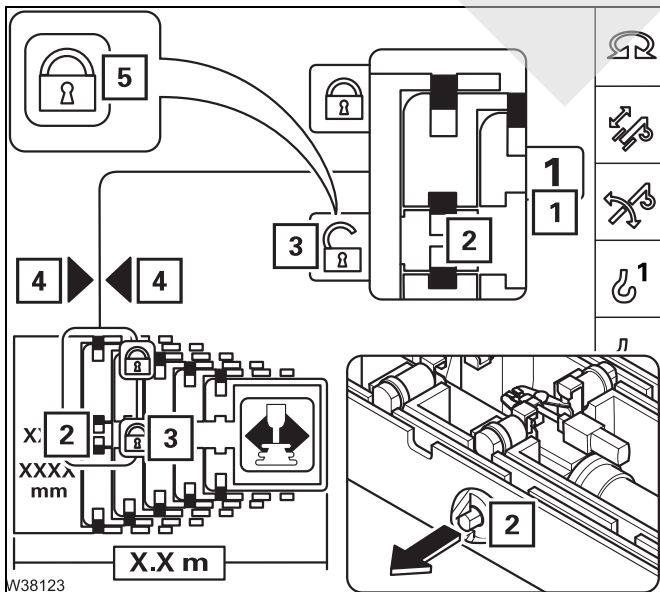
Lock telescoping cylinder

The telescoping cylinder must be locked to a telescopic section so that the telescopic section can be telescoped.



Prerequisites

- Telescoping mechanism on – symbol (3) **green**
- Telescopic section locked – symbol (1) **green**
- Telescoping cylinder unlocked – symbol (2) **red**



Locking

- Move the telescoping cylinder to the desired locking point, e. g. to telescopic section 1.

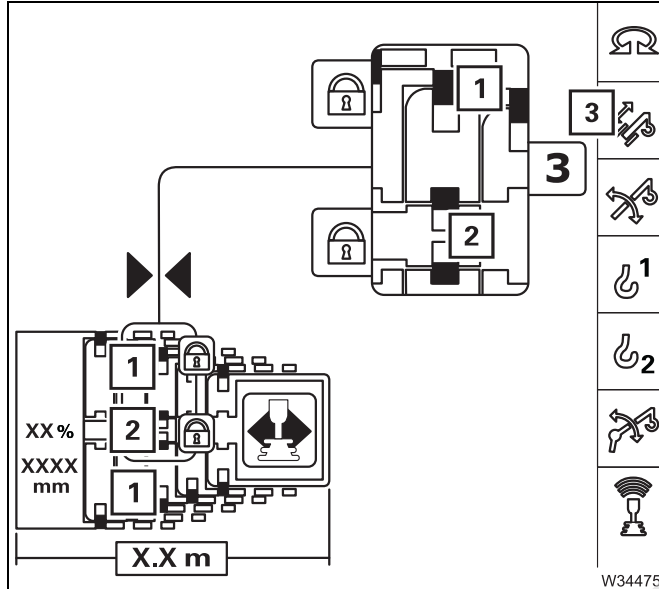
Wait until the display:

- shows the desired telescopic section (1) and
- the symbols (4) are shown.
- Select and confirm the symbol (3). The locking pins (2) extend.
 - **Yellow:** Intermediate position
 - **Green:** Locked – symbol (5) displayed

Unlocking the telescopic section

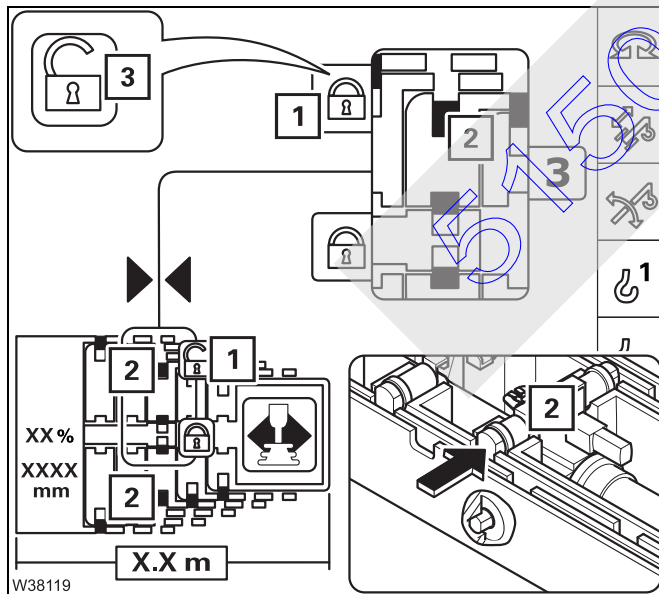
Unlocking a telescopic section is required for the telescopic section to be telescoped.

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) retract.
 - **Yellow:** Intermediate position
 - **Red:** Unlocked – symbol (3) displayed

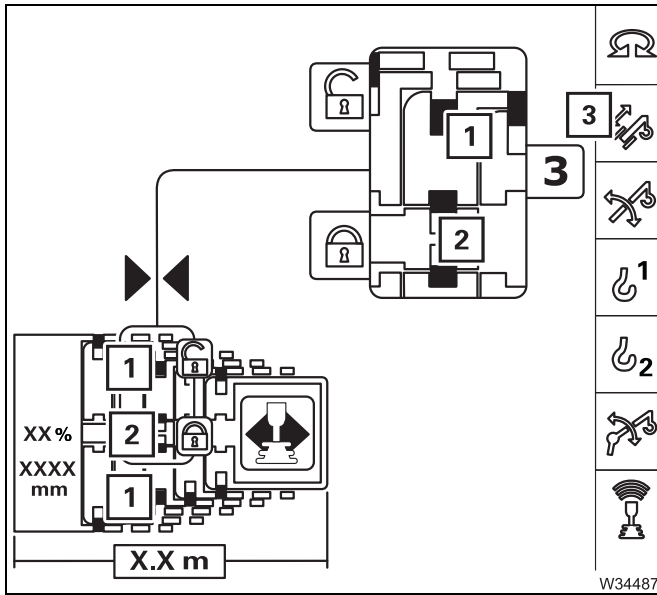
If symbol (2) is not **red** after about 10 seconds, this means that the locking pins are under load.

To relieve the load, carefully retract and extend a little.



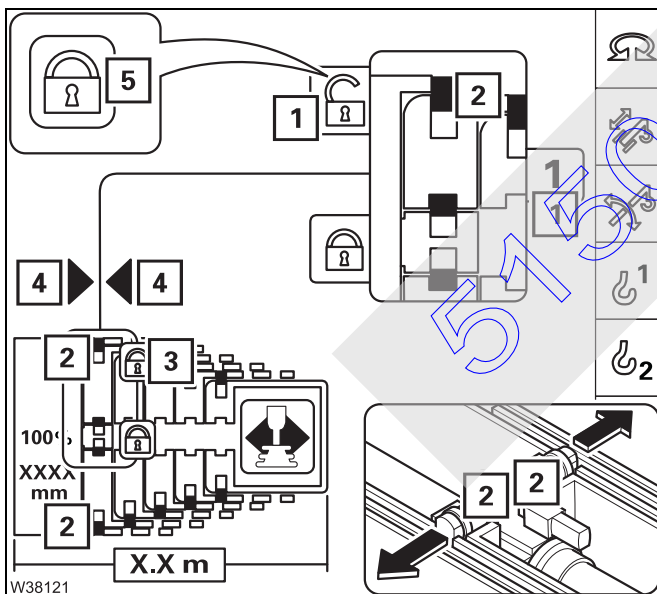
Locking the telescopic section

Every telescopic section can be locked at the fixed lengths – fixed lengths; p. 11 - 95.



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, e. g. telescopic section (1) 1 to 100%.
- If the symbol (4) is displayed, the telescopic section must be locked.
- Select and confirm the symbol (3). The locking pins (2) extend.
 - **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 by all means lock the telescoping cylinder in telescopic section I so that the axle loads are in accordance with the values in the *Driving mode* table; *Driving modes*, p. 6 - 1.

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

If another telescopic section was retracted last, you must do the following before selecting locking:

- Unlock the telescoping cylinder; p. 11 - 103,
- move the telescoping cylinder into telescopic section I; p. 11 - 105 and
- lock the telescoping cylinder; p. 11 - 106.

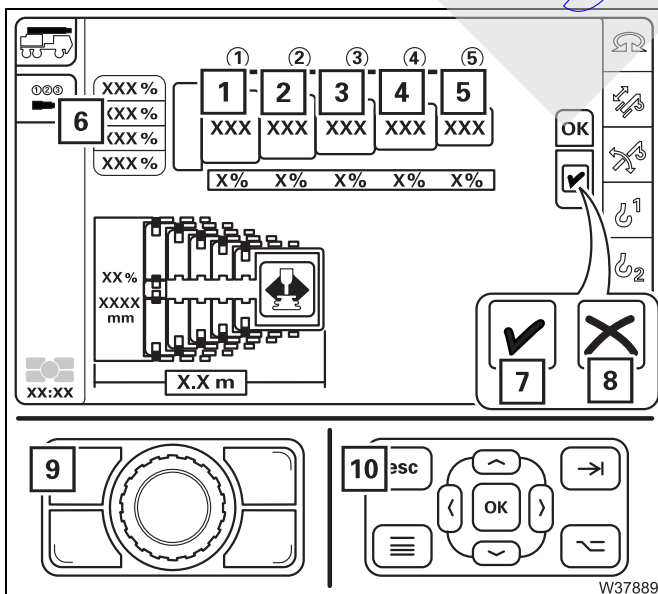
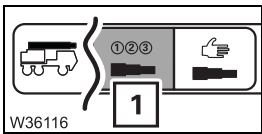
Telescoping with semi-automaton

When telescoping with semi-automation, 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 telescoping status is not a fixed length, you can first telescope to the next closest fixed length with the semi-automation and then telescope further to the desired length manually.

- Switch on the telescoping mechanism; p. 11 - 89.
- Open the *Telescoping semi-automation* menu (1).



Entering telescope status

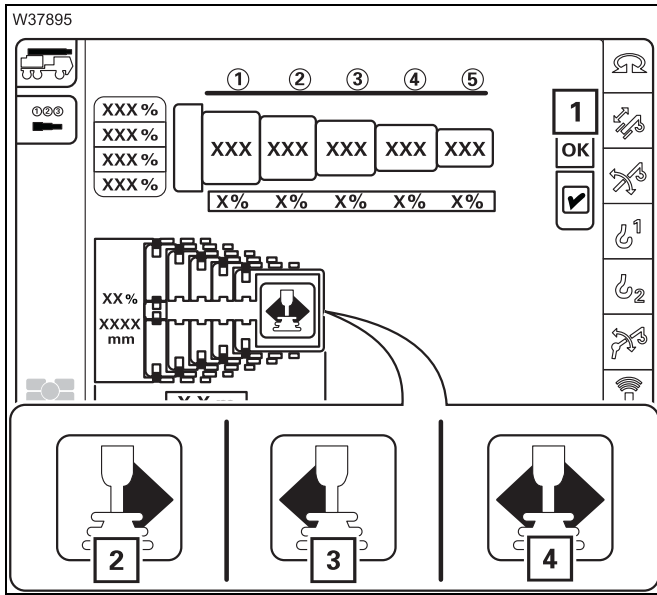
You can cancel the input at any time – press button (9) or (10) once.

Entry for all telescopic sections

- Select and confirm the desired value (6).

Entry for individual telescopic sections

- Select and confirm the desired value (1) to (5).
- Display symbol (8) – Telescoping **not permitted** – enter a new value.
- Display symbol (7) – telescoping permitted – the entry can be confirmed.

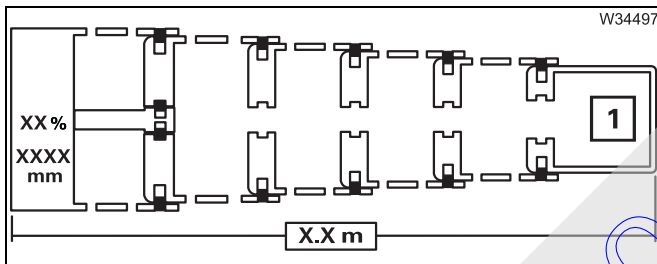


Confirming the entry

- Select and confirm the symbol (1).

Telescoping

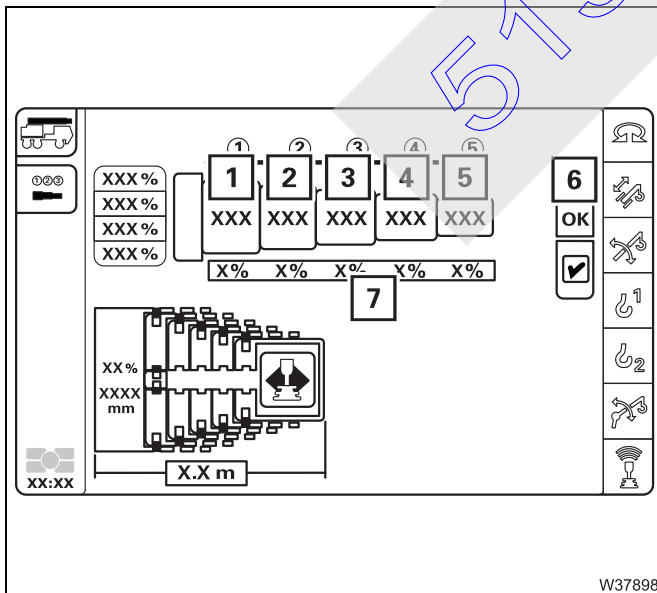
- Move the control lever for the displayed telescoping direction.
- 2 Extension
 - 3 Retraction of the telescoping
 - 4 Display in the case of return runs (without a telescopic section)



End telescoping semi-automation

The teleautomation will stop when the entered telescoping status is reached – symbol (1) go out.

- Move the control lever to its initial position – teleautomation off.



Cancel telescoping semi-automation

- Release the control lever.

If the telescopic sections are at a fixed length, the current telescoping can be entered as the telescoping destination.

The display (7) shows the current telescoping:

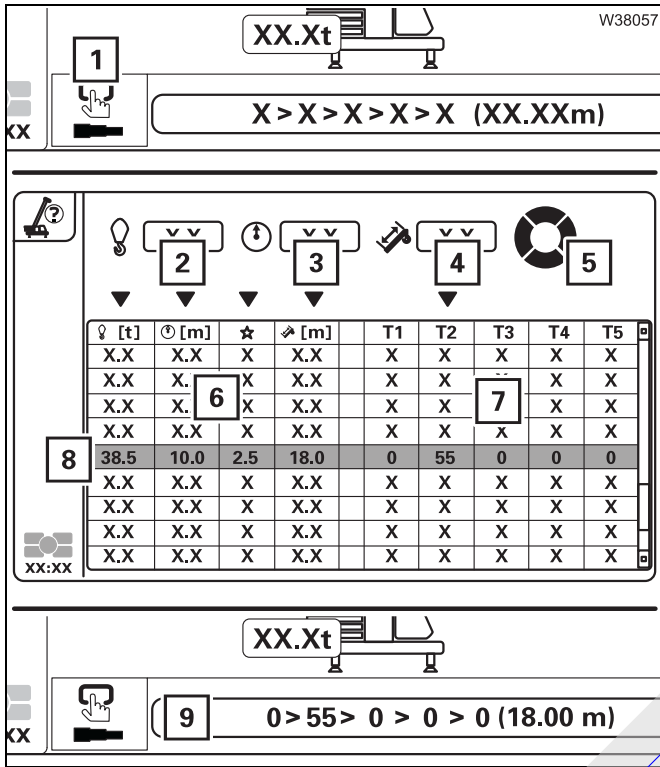
- **Red:** Unlocked
- **Green:** Fixed length and locked

- Enter the current telescoping (1) to (5) and confirm the selection with (6).



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 has already been performed when entering the rigging mode at the RCL; *Pre-selecting telescoping*, p. 11 - 40.



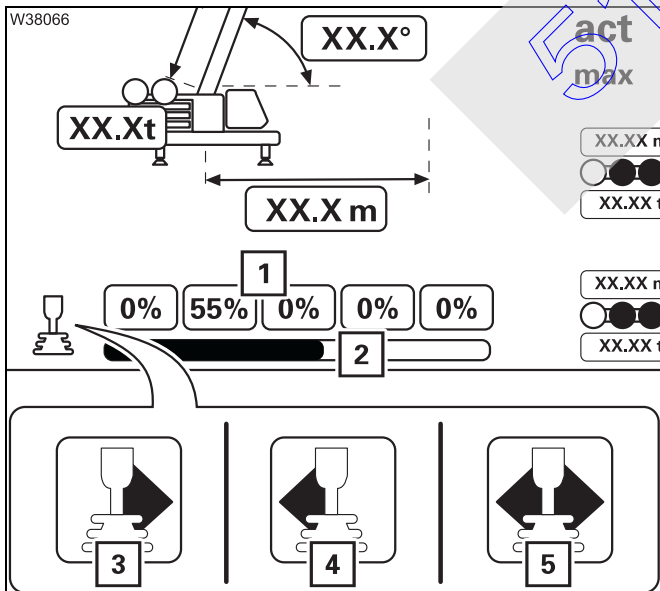
Pre-selection – Overview

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 – MAXbase only

The table shows all permissible telescoping (6) and the associated parameter (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 Extension
 - 4 Retraction of the telescoping
 - 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.



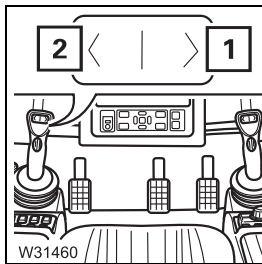
You can switch on the high-speed mode for a higher speed.

Risk of accidents due to the suddenly accelerating movements

Reduce the engine speed before starting high-speed mode.

This will prevent movements becoming excessively accelerated, which may result in the truck crane starting to sway and overturning.

Derricking gear Telescoping mechanism



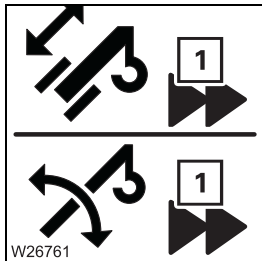
High-speed mode is always switched on and off for the derricking gear and the telescoping mechanism at the same time.

To switch on briefly

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

Continuous operation

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



The symbol (1) indicates the current status:

- **On:** High-speed mode switched on
- **Out:** High-speed mode switched off



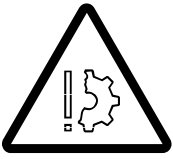
When lowering the boom, high-speed mode only supports the start of the derricking procedure from steep boom positions. It does not increase the derricking speed.

High-speed mode is disabled for raising when performing operations with the lattice extension.

Hoists

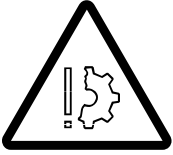
High-speed mode is always switched on and off simultaneously for the main hoist and the auxiliary hoist.





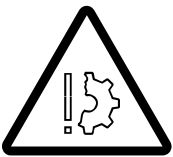
Risk of accidents due to overloading!

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.



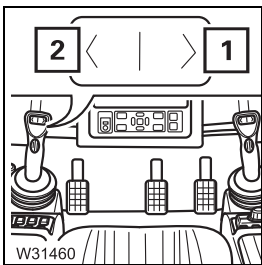
Danger of slack rope with a lightweight hook block

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 large boom length.



Danger of slack rope with large number of reevings

If you switch on high-speed mode with a large number of reevings and without a load, slack rope may form because the hook block is lowered too slowly due to the high degree of friction.

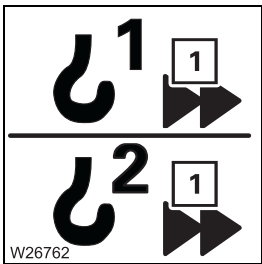


To switch on briefly

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

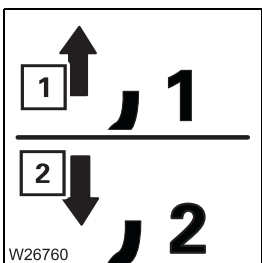
Continuous operation

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



The symbol (1) indicates the current status:

- **On:** High-speed mode switched on
- **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 will only be significantly increased by switching to high-speed mode if you have deflected the control lever by more than 70%.

11.5.8

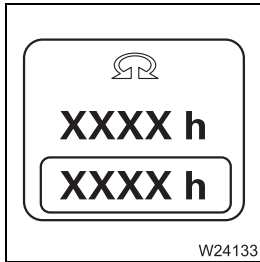
Slewing gear



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 - 113.



You can have the operating hours of the slewing gear displayed; p. 11 - 133.

Slewing gear brake

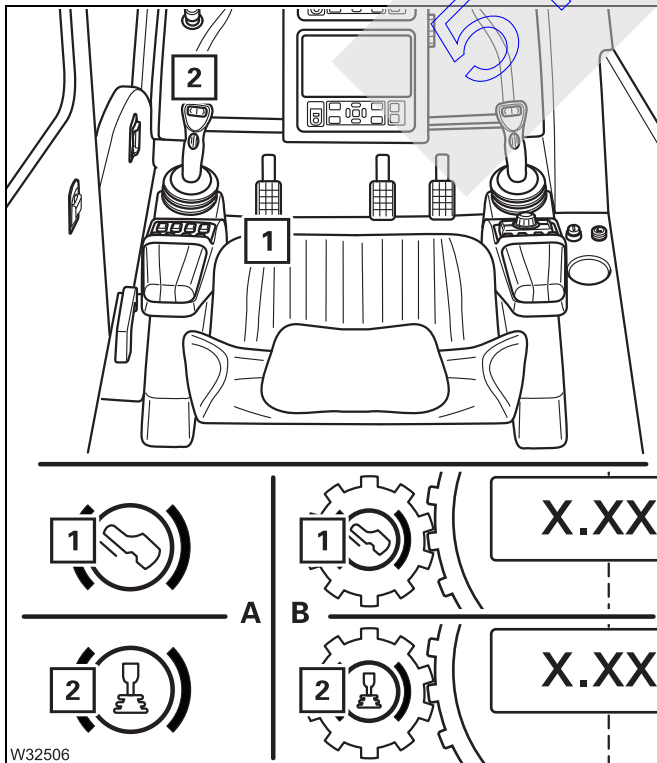
Depending on the function that is switched on, the slewing gear is braked with the brake pedal or with the control lever.



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 use of the brake pedal (1).

2 Control lever function

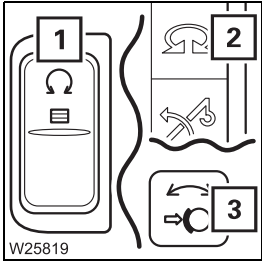
The only means of braking the slewing movement is by use of the control lever (2).

Switching over the function

- Select and confirm the symbol (3) or (4) until the function is displayed.



Switching on the slewing gear



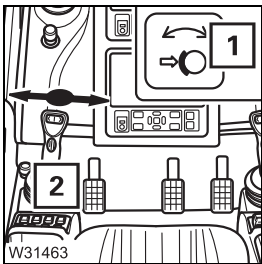
After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will light up only dimly.

- Press the button (1) once.
 - The lamp in button (1) will light up brightly.
 - Symbol (2) is **green** if the slewing gear is switched on.



If an rigging mode has been entered for the working position 0° to the rear or *Free-on-wheels*, an RCL shutdown will occur after switching on the slewing gear, and slewing will be disabled. To acknowledge the shutdown, you must either switch off the slewing gear or set down the load and enter an rigging mode for the 360° working range.

Releasing the slewing gear brake



- With the *Brake pedal* function

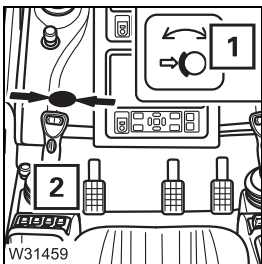
The slewing gear brake is released when you switch on the slewing gear.

- With the *Control lever* function

The slewing gear brake is released as soon as you move the control lever (2).

Lamp (1) will extinguish if the slewing gear brake has been released.

Applying the slewing gear brake



- With the *Brake pedal* and the *Control lever* functions

The slewing gear brake will engage when you switch off the slewing gear;
▶ p. 11 - 120.





- With the *Control lever* function

The slewing gear brake will also be applied if the control lever (2) is in its initial position.

The lamp (1) will light up if the slewing gear brake has been applied.

Slewing

The following requirements must be fulfilled before slewing:

- Houselock is switched off;  p. 11 - 17.
- The superstructure must be unlocked;  p. 11 - 15.
- Slewing is permissible with the current rigging mode;  p. 12 - 113.
- The current rigging mode is shown on the *RCL* display.
- The counterweight is pre-tensioned;  p. 12 - 105

If slewing is not permissible with the current rigging mode, the slewing gear will be 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 parts.




Risk of the main boom buckling.

Do not accelerate the slewing speed to such a degree that the load starts swinging.



Risk of damage due to overridden slewing gear shutdown.

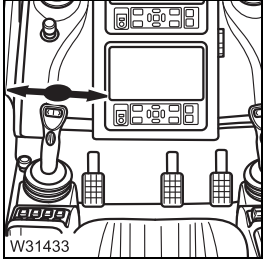
If the lifting limit switch has been overridden, then the load torque related shutdowns of the slewing gear will not be released (for example, if the pre-tensioning pressure of the counterweights is too low). For this reason, do not start slewing as long as the lifting limit switch is overridden.

You can adjust the sensitivity of the control levers to suit the operating conditions;  *Setting the characteristic curves for the control levers*, p. 11 - 129.





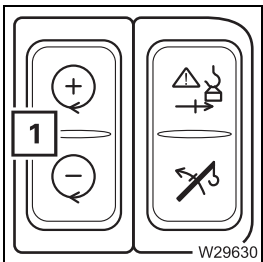
With the *Brake pedal* function switched on, slewing movements are not braked automatically. If you let go of the control lever or move it to initial position, the slewing movement will slowly run down; *Braking the slewing movement*, p. 11 - 119.



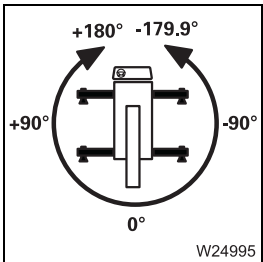
Slewing to the left: • Push the control lever to the left.

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 button (1); p. 10 - 9.



The current slewing angle is shown in the *Start menu* and in the *Superstructure lock* menu.

0° means that 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°).

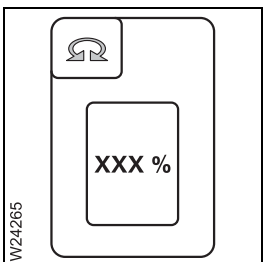
Permissible slewing speed

The current speed reduction is displayed in the *Start menu*; p. 9 - 19.

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 - 121.



You can limit the maximum derricking speed in the *Power unit speed* menu; p. 11 - 125.

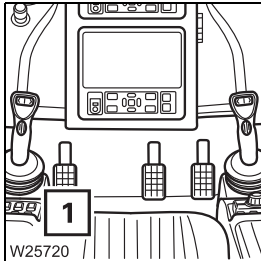
Braking the slewing movement



You may only brake the slewing movement with the slewing gear brake.

Risk of the main boom buckling.

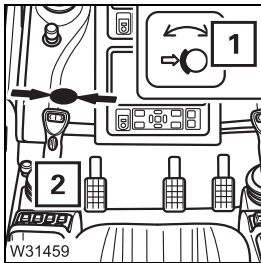
On no account switch the slewing gear off to brake it; only switch the slewing gear off when the superstructure has stopped rotating.



With the *Brake pedal* function switched on

- Depress the brake pedal (1) Do not brake to such a degree that the load starts swinging.

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



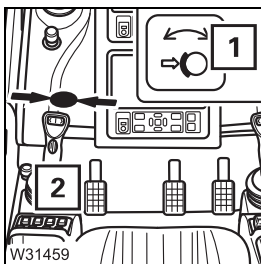
With the *Control lever* function switched on

- Move the control lever (2) towards its initial position – the slewing movement will be stopped.

At the initial position, the slewing movement will be stopped. At the same time the slewing gear brake will be applied, and lamp (1) will light up.

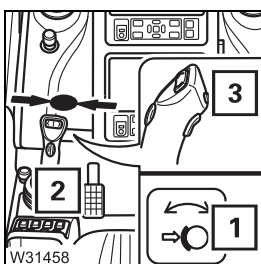
Slewing gear freewheel

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



With the *Brake pedal* function switched on

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



With the *Control lever* function switched on

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



Switching off the slewing gear

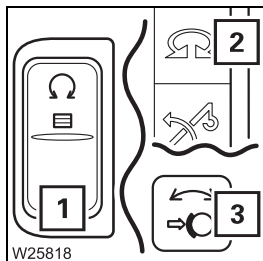
If the slewing gear is not required, it should be switched off to avoid unintentional use.



Risk of damage to the main boom

Brake the slewing movement down 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 heavy deceleration or swinging loads.



- Press the button (1) once.
 - The lamp in the button (1) will light up dimly.
 - Symbol (2) will be **red** if the slewing gear is switched off.
 - The slewing gear brake is applied – lamp (3) lights up.

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11.5.9

Switching the reduction of slewing speed on and off

When the ignition is switched on the reduction of slewing speed 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 reduction off

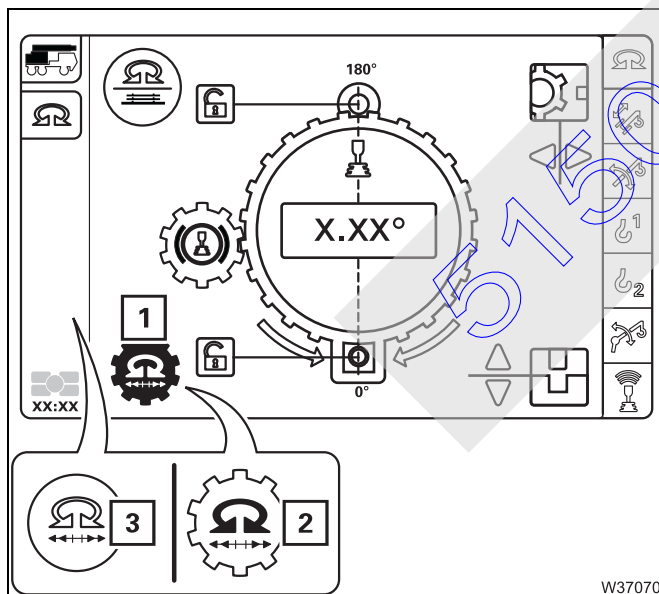
You can only switch off the reduction if the slewing range type *Standard* has been entered.



Risk of accidents due to excessive slewing speed!

Observe the specified maximum permissible slewing speeds. This prevents the truck crane being subjected 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 reduction is switched off, you as crane operator are responsible for a slewing speed that is suitable the current loading case.



- Select and confirm the symbol (2).

- Display symbol (1) – **green**.
- Warning message display (3) – **blue**.

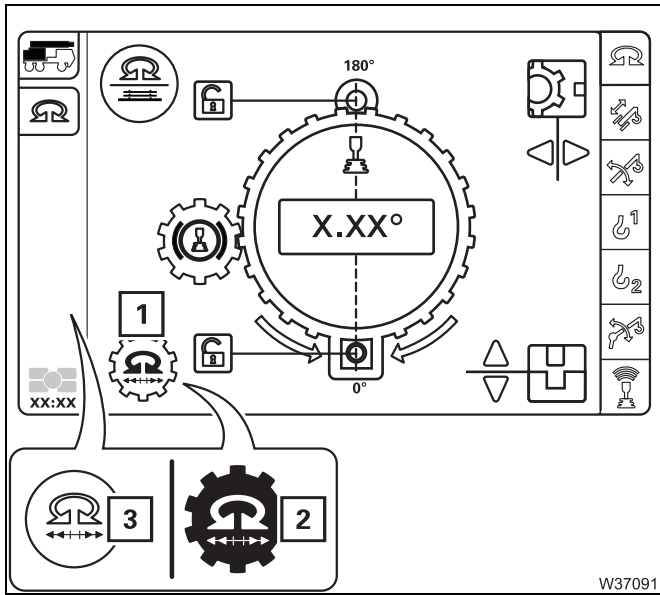
The slewing speed is not reduced automatically.

If the maximum permissible slewing speed is exceeded, the buzzer tone sounds once and the warning message (3) is displayed – **red**.



The entered limitations 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 reduction on

- Select and confirm the symbol (2).
 - Symbol (1) – **grey** displayed.
 - The warning message (3) disappears.
- The slewing speed is reduced automatically.

The reduction is automatically switched on when you enter the slewing range type *MAXbase*.

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 units.
- The auxiliary power units – Superstructure lock, tilt crane cab, counterweight lifting unit – cannot be operated with the *Telescoping out* movement. Moving the auxiliary power units in combination with other power units can result in reductions of speed.
- Lattice extension derricking gear
The lattice extension derricking gear cannot be operated in combination with the *Extending* movement.



Certain movement combinations can reduce the speed in high-speed mode.

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

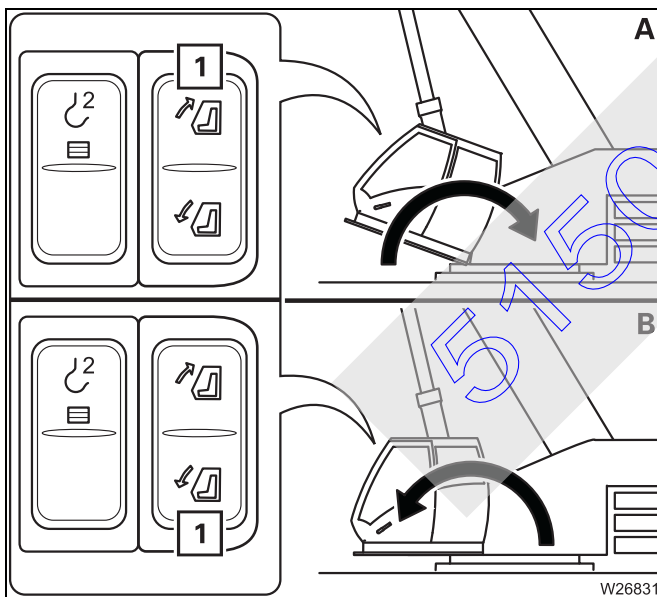
With the appropriate equipment, you can incline the crane cab to the rear in order to attain a better sitting position when working at great heights.



Risk of accidents due to objects overturning 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 tipping over, the crane cab door opening by itself, and unintended operational accidents caused by fright.



(A) – Incline to the rear

- Close the crane cab door.
- Press the button (1) in at the top.

(B) – Incline to the front

- Close the crane cab door.

The crane cab will tilt as long as you hold the button down or until its end position is reached.

11.6.2

Idling speed, setting

▮▮▮▮▶ *Setting the idling speed*, p. 10 - 9

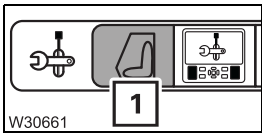
11.6.3

Adjusting the wiper stroke interval of the windscreen wiper

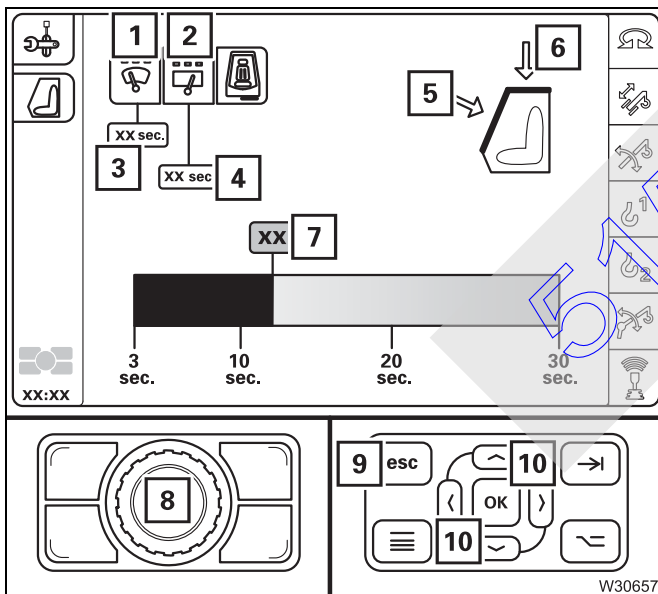
You can set a value between 3 and 30 seconds for the front and roof window wiper stroke interval.



The higher the selected value is, the longer the pauses between the strokes of the wiper are.



- Open the *Datalogger* (1) menu.



- The displays (1) and (2) 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
- 2 For the roof window wiper – symbol (6) displayed

- Select and confirm the symbol (7).

Symbol is **orange** – input on.

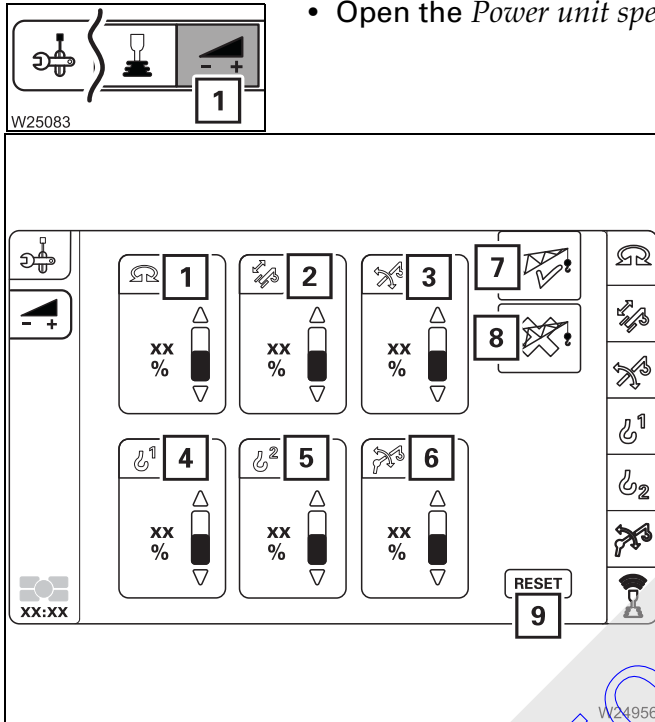
To cancel the input – press button (9) once.

- Change the value using buttons (8) or (10).
- 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 *Power unit speeds* (1).



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

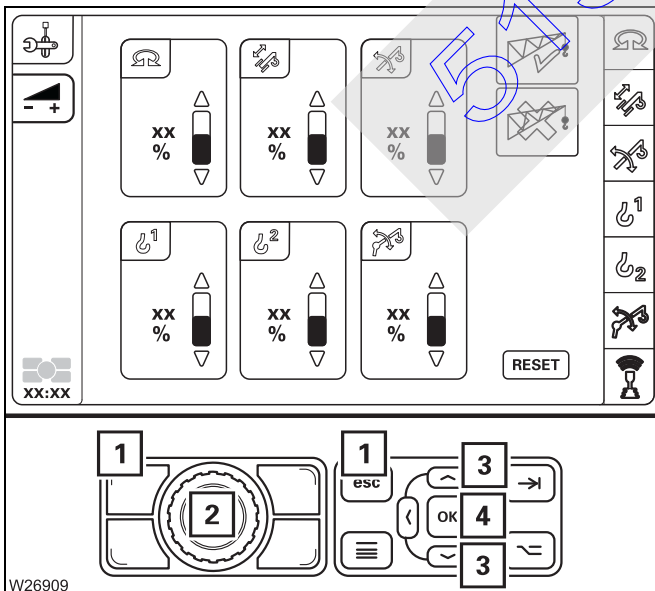
The values for the slewing gear (1) and derricking gear (3) only apply if they are lower than the automatically limited values. The automatically limited values are not displayed.

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

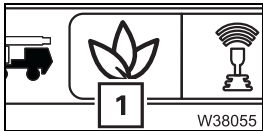
- Select and confirm the symbol for the relevant power unit – symbol **red**.
- Change the value using switch (2) or the buttons (3).

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.

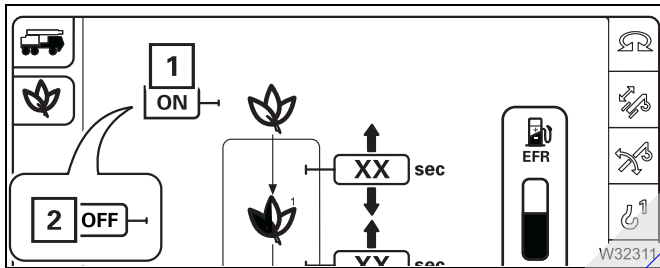
11.6.5 Economy mode

You can also switch economy mode on/off. If you do not move the control lever when *Economy mode* is switched on, then the engine speed is automatically reduced in two steps. If the crane truck is also equipped with APS (**A**uxiliary **P**ower **S**upply), there is a further third step in which the engine is shut down and an external generator started. You can adjust the time interval between the steps.

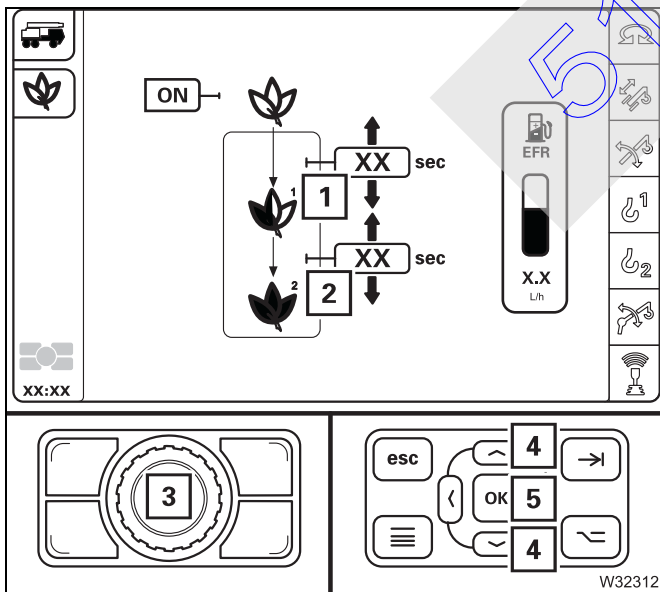


- Open the *Economy* menu (1).

Switching on

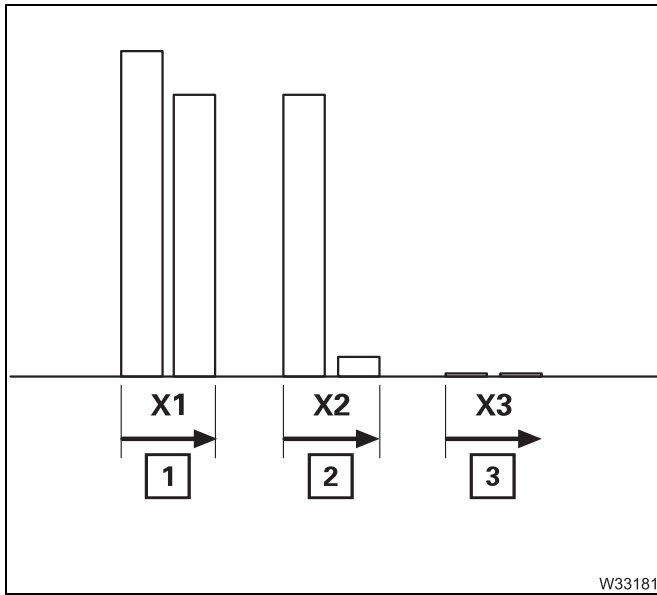


- Select and confirm the symbol (2) – Symbol (1) is displayed.



Adjusting the time interval

- Select and confirm the symbol (1) or (2). Change the value of the time intervals using switch (3) or the buttons (4).
- You can set a time interval from 10 seconds to 10 minutes.
- Confirm the changed values – press switch (3) or button (5) once.



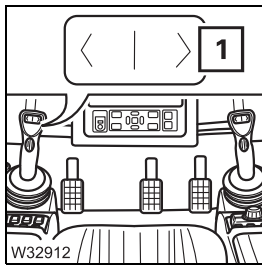
Economy steps

The economy steps **1** to **3**:

- Step 1:** The engine speed is reduced
- Step 2:** The superstructure drive is shut down
- Step 3:** The engine is switched off – APS¹⁾ is started automatically

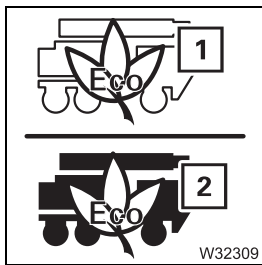
¹⁾ Additional equipment

The time interval between step **2** and step **3** is 60 seconds and cannot be adjusted.



Activate step 3 manually

- Press and hold the button (1) – for 3 seconds.
The engine for crane operation is switched off – APS is started.



Economy Mode display

If the *Economy Mode* is active, a background image will be shown on the CCS display.

- 1** for step 1
- 2** for steps 2 and 3

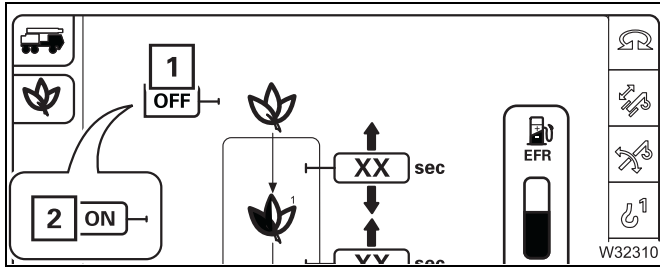


**Ending/
 switching off**

Ending

To end *Economy Mode* you can either:

- press the accelerator pedal,
- move a control lever,
- switch on a power unit.

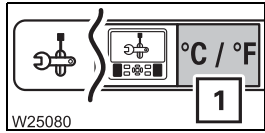


Switching off

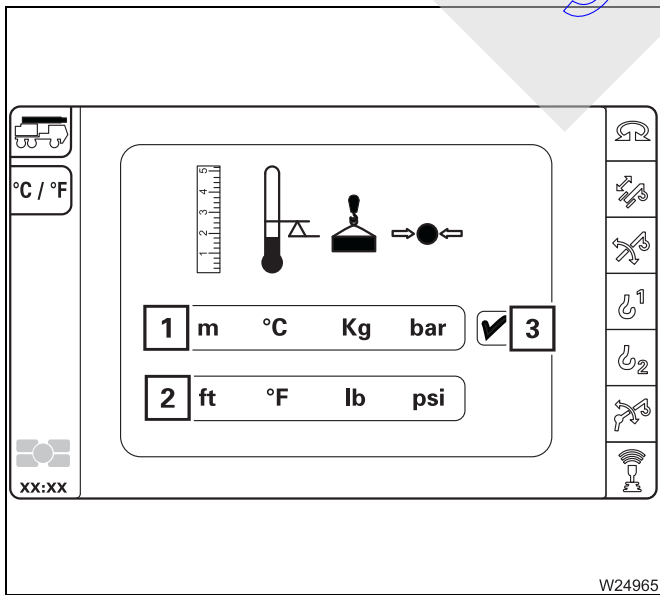
- Select and confirm the symbol (2) – Symbol (1) is displayed.

11.6.6 Switching units of measure

You can display the crane control values in metric units or US units.



- Open the *Switch units* menu (1).



- Select and confirm the symbol:

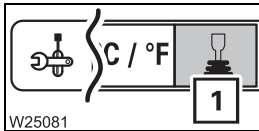
- 1** To display metric units
- 2** To display US units

The symbol (3) shows the respective confirmed selection.

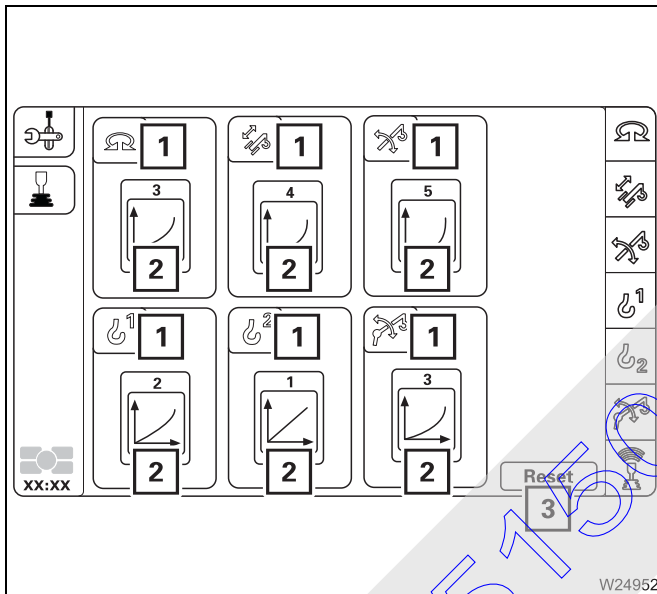
11.6.7 Setting the characteristic curves for the control levers

The control lever characteristic curve determines how high the power unit speed should be for a particular control lever movement.

You can assign different control lever characteristic curves to the power units.



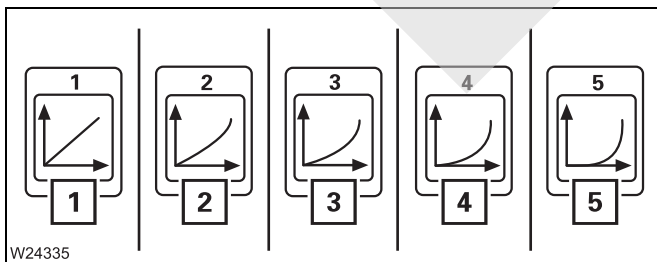
- Open the *Settings (1)* menu.



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.



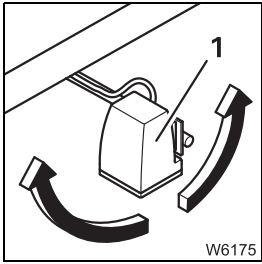
There are five characteristic curves:

The higher the number of the characteristic curve (1) to (5), the further the control lever must be moved to get a clear increase in speed.

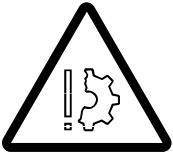
With characteristic curve (5), you can work particularly sensitively with the control lever.

11.6.8

Using the slewable spotlights

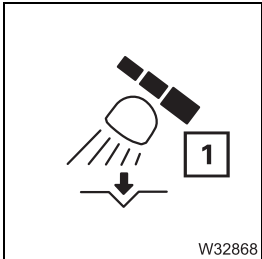


With the relevant equipment, the slewable spotlights (1) are located on the main boom. They are controlled from the crane cab.



Risk of damage to the slewable spotlights!

Make allowances for the position of the slewable spotlights before setting down the main boom. This is prevent a collision between the working spotlights and the engine cover.



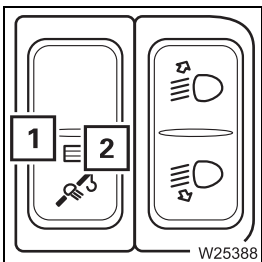
If when the main boom is being set down a symbol (1) is displayed:

- Slew the working 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.



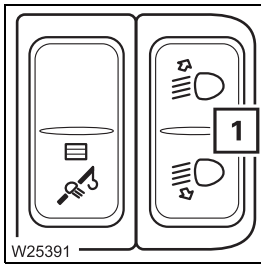
Switching on

- Push the switch (1) in at the bottom – the lamp (2) lights up.

Switching off

- Push the switch (1) in at the top – the lamp (2) goes out.

Manually swinging



Turn upwards

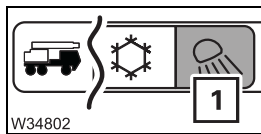
- Press the button (1) in at the top.

Turn downwards

- Push the button (1) down.

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

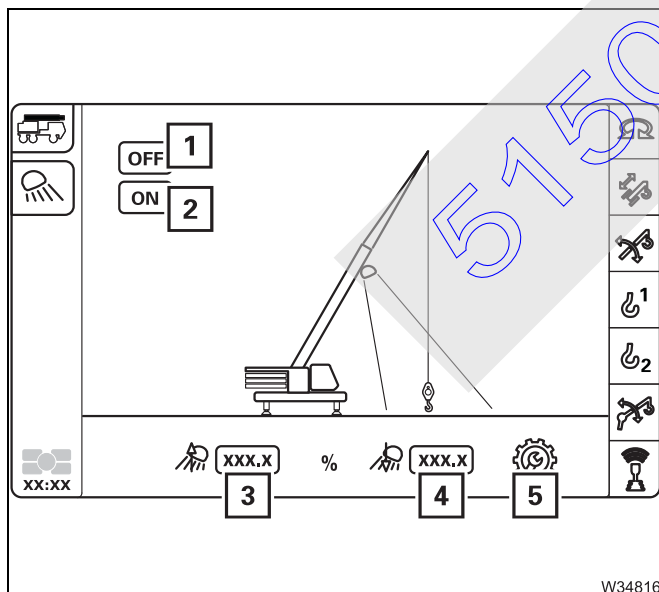
The automatic load tracking can be switched on via the *Spotlights* menu.



- Open the *Spotlight* (1) menu.

Automatic load tracking

The pivoting spotlights must be manually aligned onto the load. You can then switch on the automatic load tracking. The spotlights automatically follow the load. You can adjusting the pivoting speed of the spotlights.



- Switch on the automatic load tracking – symbol (2).

You can adjust the pivoting speed:

- Open the submenu (5).

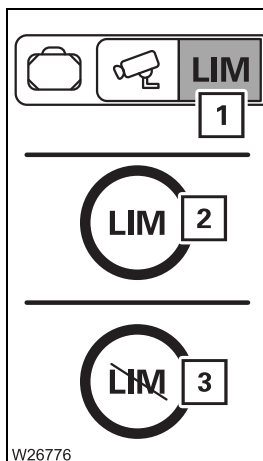
Speed

- increased with (3),
- decreased with (4).

Switch off the automatic load tracking – symbol (1).

11.6.9

Overriding torque reduction



If the engine torque has been reduced then the symbol (2) is shown in the start menu.

You can override the torque reduction function for a limited time while working with the crane.

- Select and confirm the symbol (1) – symbol (3) appears.

The torque reduction function is overridden for 30 minutes.

After 30 minutes the torque is automatically reduced again.

You can override this reduction three times. The torque is reduced continuously with each override – starting at 80% down to 20%.

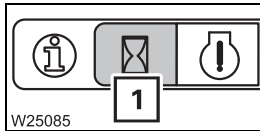
After the third override the symbol (1) will become inactive until the engine is restarted.

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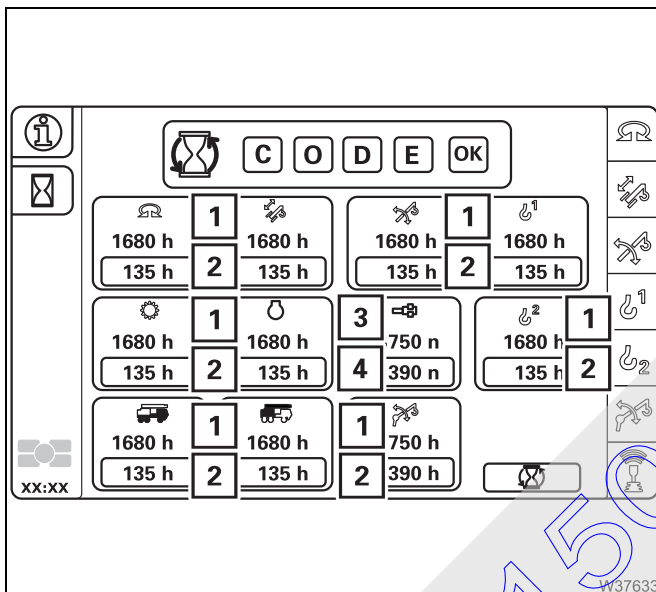
11.6.10

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 *Operating hours* (1) menu.

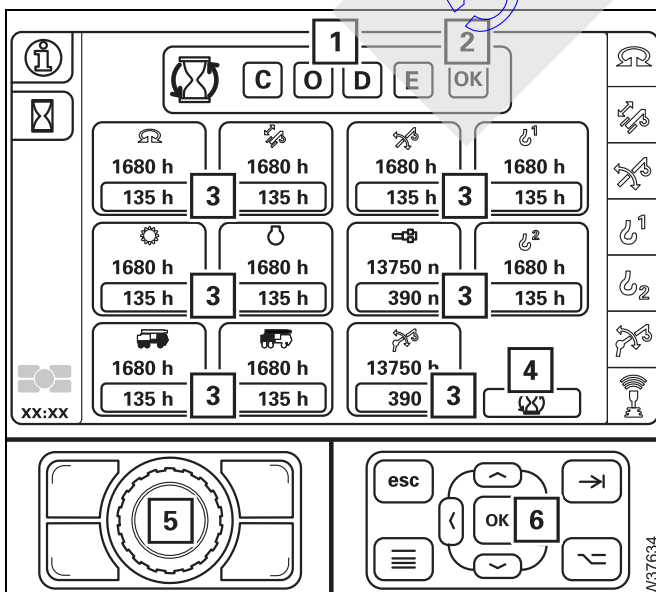


Displays

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

Exception: The value below the symbol (3) indicates how often the cycle *Unlock telescopic section* has been performed, for example, 13,750 times.

The value (4) shows the cycles; this 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 individually select power units

- display (3) or
- select all – symbol (4).

- Reset the selected operating hours with button (5) or (6).

Blank page

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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

The monitoring of the programmed limits can be switched on and off separately. After turning on the ignition, all monitoring functions are switched on that were on before the ignition was turned off.



Risk of accidents due to situations which cannot be monitored

The working range limiter only serves as an additional safety device. Brake the crane movement before contact with the obstacle becomes imminent. Do not deliberately move into the shutdown range. You, the crane operator, are still responsible for monitoring the working range, so that you can react appropriately if situations arise which cannot be monitored electronically.



Risk of accidents due to limits set too low

When entering the limits, bear in mind that, even after switching off the engine, movements can still occur that would bring the load into the shutdown range, for example, due to the load swinging or the boom bending. For this reason, always enter the limit values with sufficient safety margin from the object.

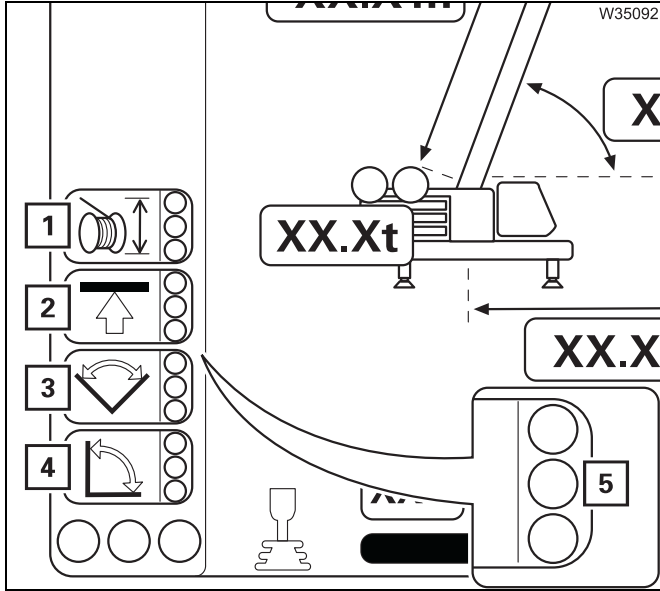


Risk of accidents due to insufficient safe distances!

Always observe all safety 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 limitations that are switched on.

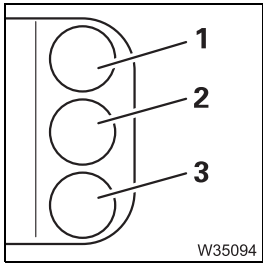


Working range limiter displays

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.



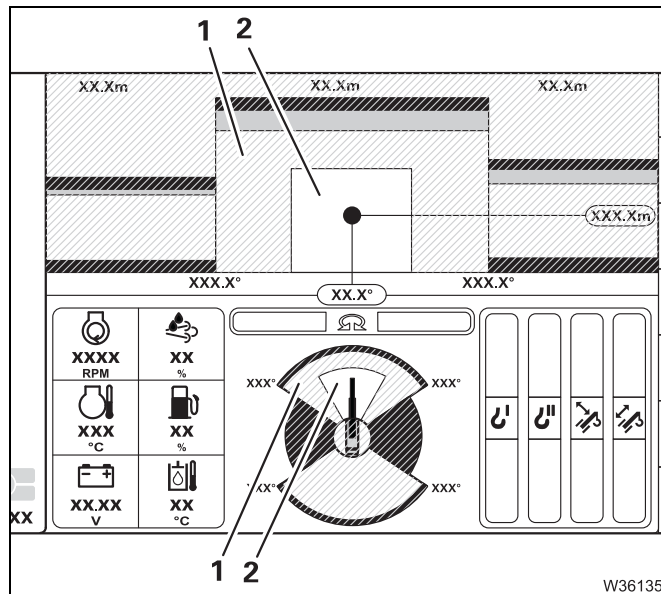
There are three displays.

- 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.

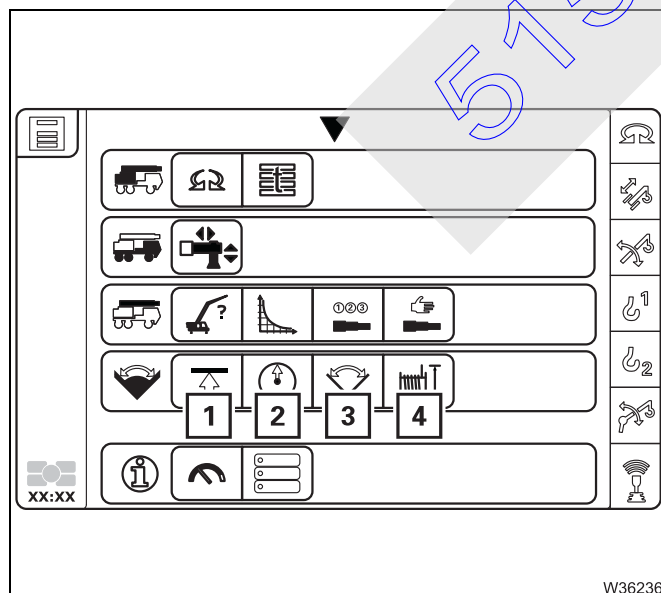


Display examples for switched-on *Slewing angle* and *Working radius* monitoring systems.

- 1 Permissible working range according to the *Lifting capacity table* – shown darkened
- 2 Limited working range – shown lightened

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 will open, and you can enter limit values and switch the monitoring on and off.

- 1 For the overall height; p. 11 - 138
- 2 For the working radius; p. 11 - 140
- 3 For the slewing range; p. 11 - 142.
- 4 For the hoist rope monitoring; p. 11 - 145



11.7.3

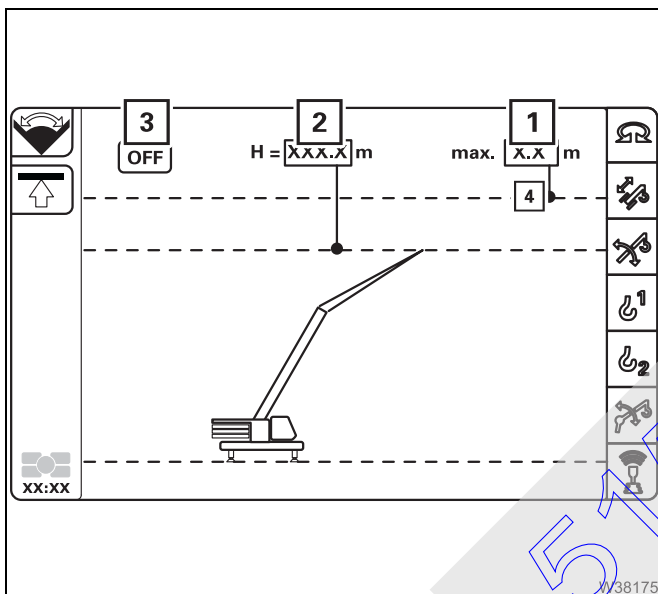
Enter limit values – for the overall height

- For unknown limit values, you can approach a shut-off point and accept the current overall height as **Accept limit value**.
- If the limit values are known, you can **Manually enter limit value**.



Danger of accident due to incorrectly set limit values!

When entering the limit values, please note that movements can still take place even after switching off, which lead further into the shutdown range. Before crane operation, slowly approach all limit values, check that they are shutdown in good time and, if necessary, enter new limit values with larger safe distances.



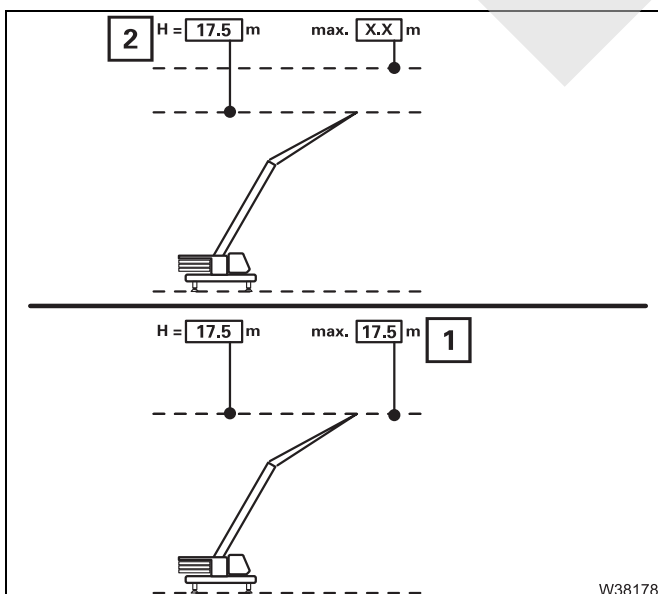
Switch off monitoring

Before you enter a limit value, you must switch off the monitoring.

- Select and confirm the symbol (3).
The *Overall height* monitoring is switched off.

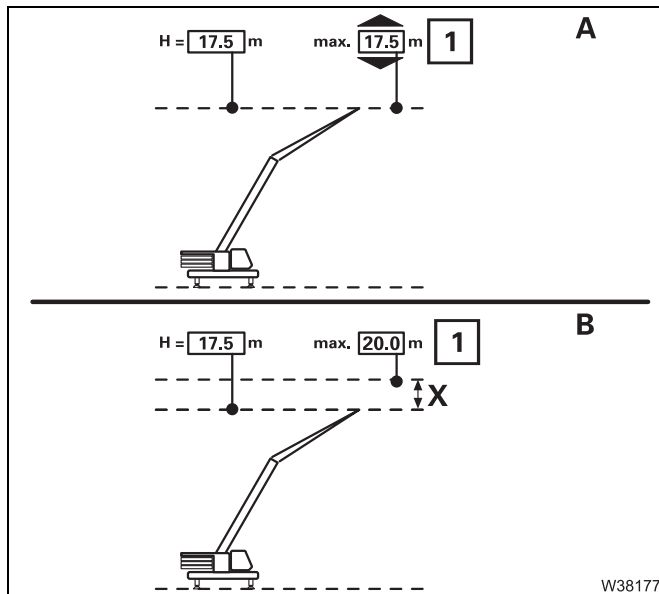
Displays

- 1 Overall height limit value
- 2 Current overall height



Accepting limit value

- Move the main boom head to just before the shutdown point without a load, for example, up to 17.5 m – display (2).
- Select and confirm the display (2).
The current value (2) will be accepted as the limit value (1).

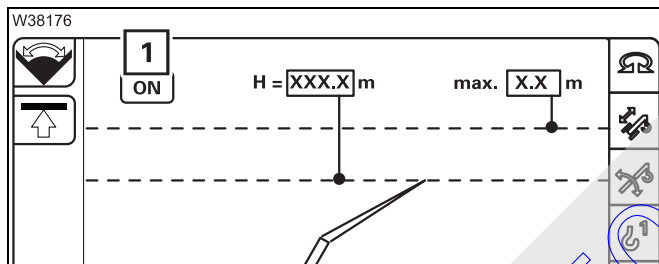


Entering limit values manually

- (A) – Select and confirm the display (1).
- (B) – Enter the limit value, for example, 20.0 m and confirm the input.

Display (1) shows the newly inputted limit value.

The distance (X) shows the current distance to the shutdown range.



Switch on monitoring

- Select and confirm the symbol (1).
The *Overall height* monitoring is switched on.



The movement towards the shutdown limit is continually reduced until reaching a standstill. The current limitation is displayed;

- ▮▮▮▮ On the RCL display, p. 11 - 136,
- ▮▮▮▮ On the CCS display, p. 11 - 53.

11.7.4

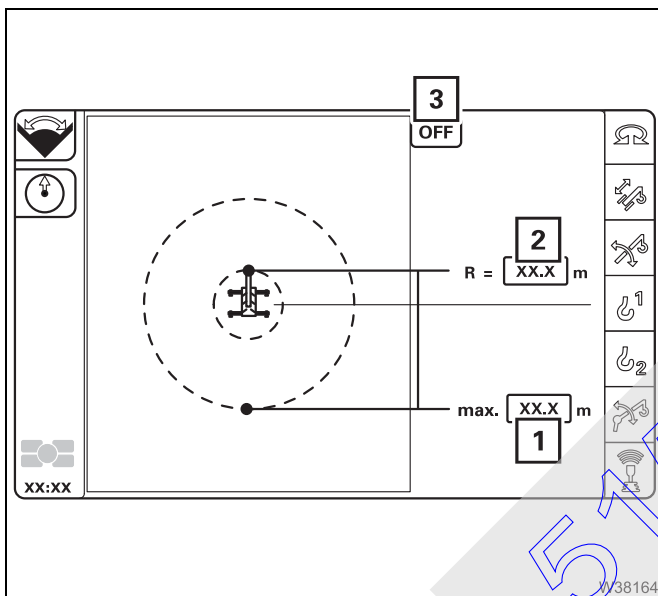
Enter limit values – for the working radius

- For unknown limit values, you can approach a shut-off point and accept the current working radius as **Accept limit value**.
- If the limit values are known, you can **Manually enter limit value**.



Danger of accident due to incorrectly set limit values!

When entering the limit values, please note that movements can still take place even after switching off, which lead further into the shutdown range. Before crane operation, slowly approach all limit values, check that they are shutdown in good time and, if necessary, enter new limit values with larger safe distances.



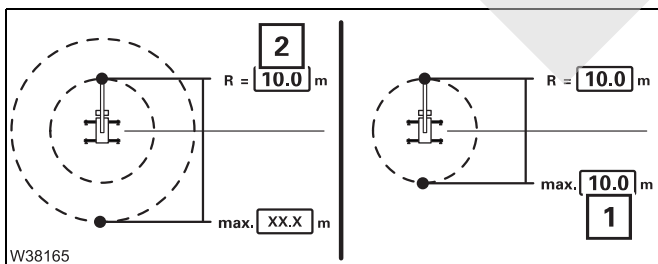
Switch off monitoring

Before you enter a limit value, you must switch off the monitoring.

- Select and confirm the symbol (3). The *Working radius* monitoring is switched off.

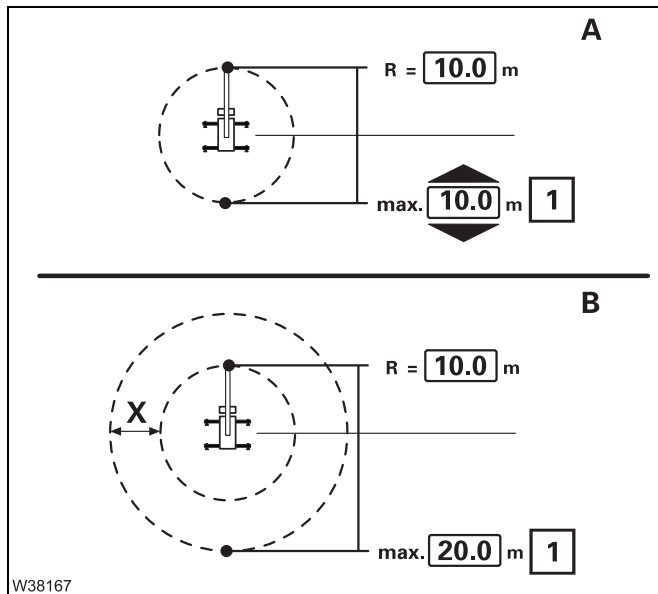
Displays

- 1 Working radius limit value
- 2 Current working radius



Accepting limit value

- Move the main boom head to just before the shutdown point without a load, for example, up to 10.0 m – display (2).
- Select and confirm the display (2). The current value (2) will be accepted as the limit value (1).

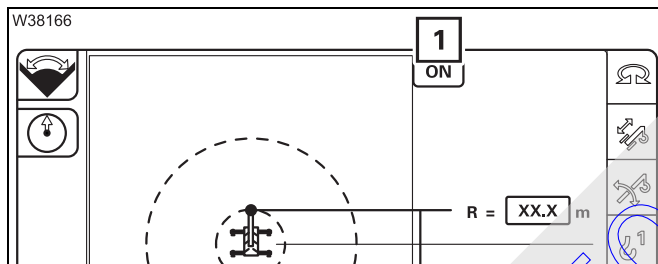


Entering limit values manually

- (A) – Select and confirm the display (1).
- (B) – Enter the limit value, for example, 20.0 m and confirm the input.

Display (1) shows the newly inputted limit value.

The distance (X) shows the current distance to the shutdown range.



Switch on monitoring

- Select and confirm the symbol (1).
The Working radius monitoring is switched on.



The movement towards the shutdown limit is continually reduced until reaching a standstill. The current limitation is displayed;

- ▮▮▮▮ On the RCL display, p. 11 - 136,
- ▮▮▮▮ On the CCS display, p. 11 - 53.

11.7.5

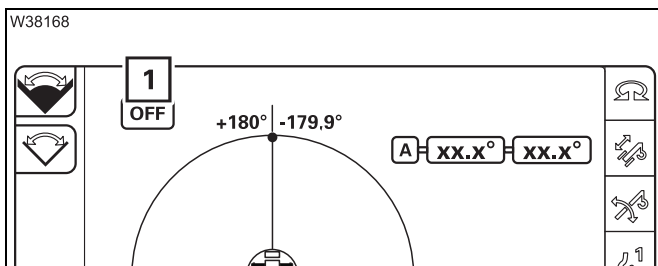
Enter limit values – for the slewing range

- For unknown limit values, you can approach a shut-off point and accept the current slewing angle as **Accept limit value**.
- If the limit values are known, you can **Manually enter limit value**.



Danger of accident due to incorrectly set limit values!

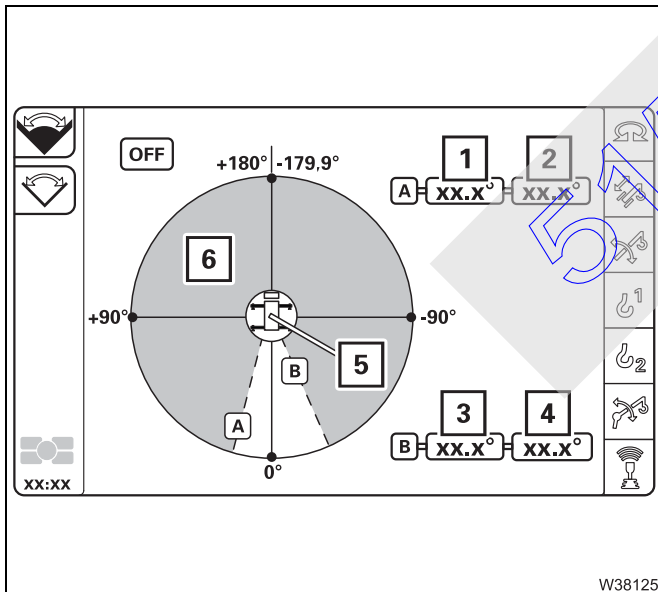
When entering the limit values, please note that movements can still take place even after switching off, which lead further into the shutdown range. Before crane operation, slowly approach all limit values, check that they are shutdown in good time and, if necessary, enter new limit values with larger safe distances.



Switch off monitoring

Before you enter a limit value, you must switch off the monitoring.

- Select and confirm the symbol (1).
The *Slewing range* monitoring is switched off.



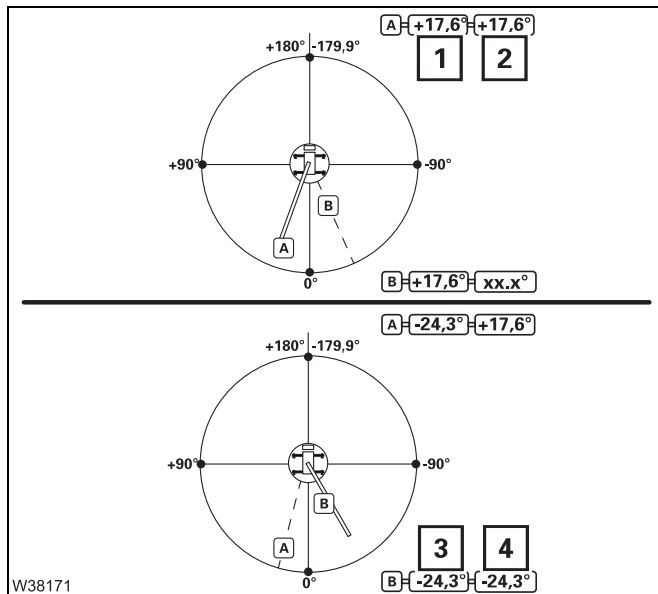
Displays

- 1, 3, 5 Current slewing angle
- 2 Limit value for the slewing angle A
- 4 Limit value for the slewing angle B

Permissible slewing range

- The slewing angle **A** limits slewing to the left.
- The slewing angle **B** limits slewing to the right.

The permissible slewing range (6) – **green** – is the angle from **A** clockwise to **B**.



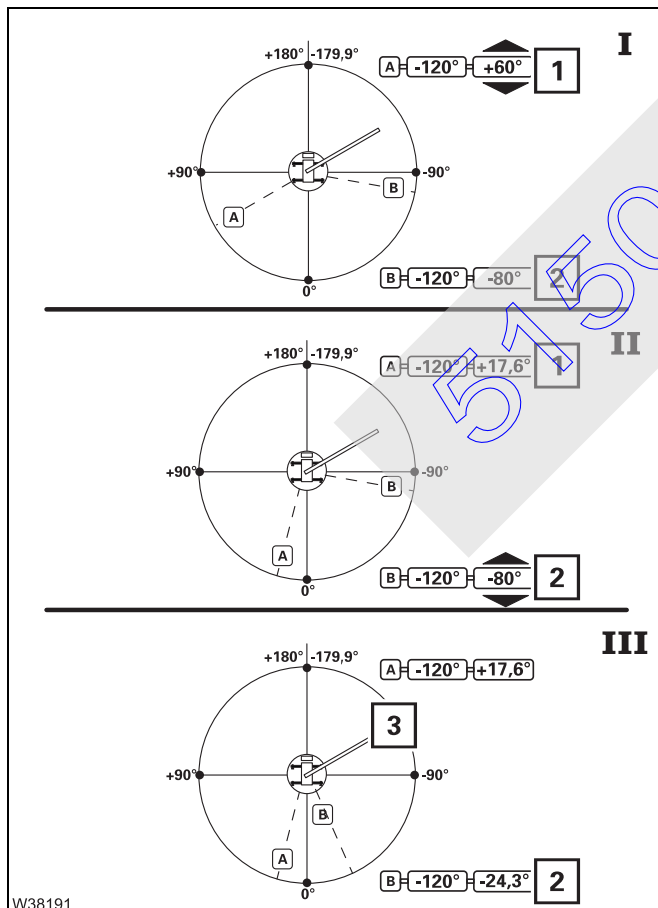
Accepting limit value

- 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) will be 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) will be accepted as the limit value (4), for example, -24.3°.



Entering limit values manually

- Slewing angle A

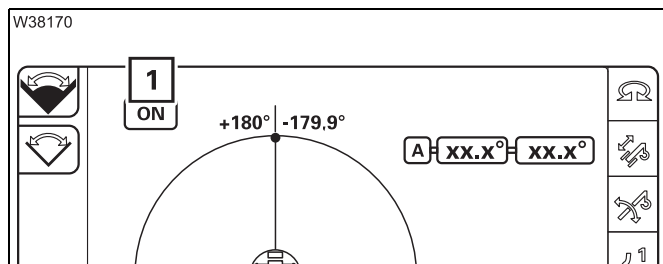
- (I) – Select and confirm the display (1).
- (II) – Enter the limit value, for example, +17.6° and confirm the input. Display (1) shows the newly inputted limit value.

- Slewing angle B

- (II) – Select and confirm the display (2).
- (III) – Enter the limit value, for example -24.3° and confirm the input. Display (2) shows the newly inputted limit value.

The current slewing angle (3) shows the current position to the shutdown range.





Switch on monitoring

- Select and confirm the symbol (1).
The *Slewing range* monitoring is switched on.



The movement towards the shutdown limit is continually reduced until reaching a standstill. The current limitation is displayed;

▣▣▣▣ ➔ *On the RCL display*, p. 11 - 136,

▣▣▣▣ ➔ *On the CCS display*, p. 11 - 53.

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11.7.6

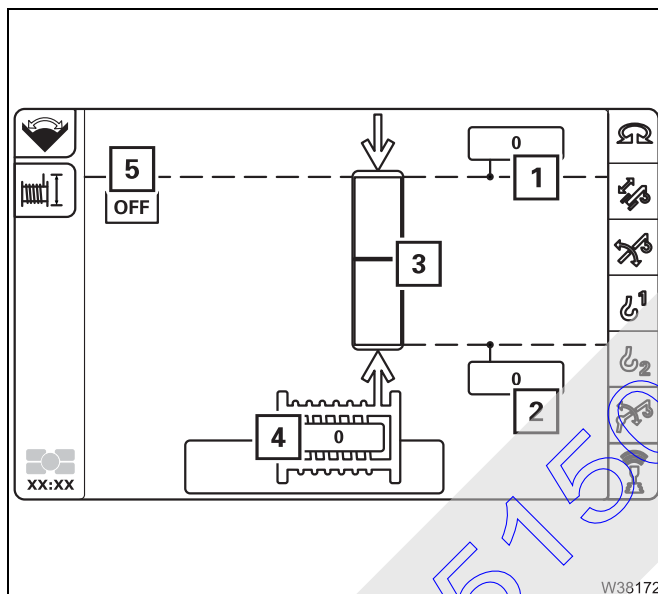
Enter limit values – for the hoist rope travel

The limit values for the hoist rope travel can only be input by approaching the shutdown points. Manually inputting is not possible.



Danger of accident due to incorrectly set limit values!

When entering the limit values, please note that movements can still take place even after switching off, which lead further into the shutdown range. Before crane operation, slowly approach all limit values, check that they are shutdown in good time and, if necessary, enter new limit values with larger safe distances.



Switch off monitoring

Before you enter a limit value, you must switch off the monitoring.

- Select and confirm the symbol (5).
The *Hoist rope travel* monitoring is switched off.

Displays

- 1 Limit value for the *Raise* movement
- 2 Limit value for the *Lower* movement
- 3 Current position – optical
- 4 Current position – count value



The displayed values are purely numeric values from the rotary encoder 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 lift.

Entering limit values

The values for the 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 will show an error message;

▮▮▮ Error messages on the *CCS* display, p. 14 - 8.

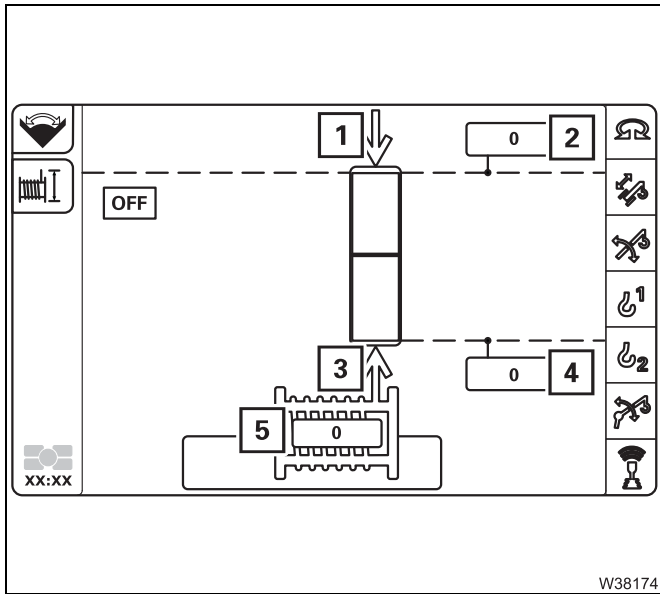




Risk of accidents due to the hoist rope travel limitation being switched off!

Always set the telescope status and the boom position for crane operation first before setting limit values.

In this way you prevent an interruption of crane operation due to shutdown.

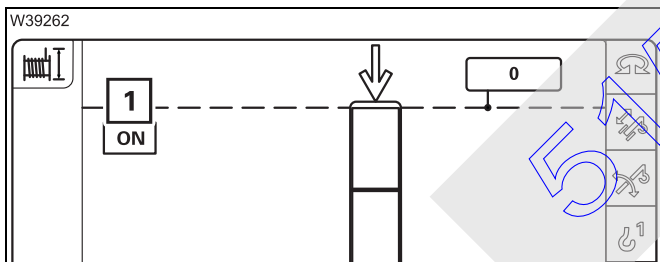


Entering the limit value for *Raise*

- Lift the load to the necessary height.
- Select and confirm the display (2).
The number value (5) is set as limit value (2) for *Raise*. 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 number value (5) is set as limit value (4) for *Lower*. The symbol (3) confirms the entry.



Switch on monitoring

- Select and confirm the symbol (1).
The *Hoist rope travel* monitoring is switched on.



The movement towards the shutdown limit is continually reduced until reaching a standstill. The current limitation is displayed;





- ▣► On the RCL display, p. 11 - 136,
- ▣► On the CCS display, p. 11 - 53.

11.7.7

Shutdown by working range limiter

If a limit value is reached, RCL shutdown will occur. All movements that would go closer to the limit value will be disabled. Shutdown will remain active even if you switch off the monitoring function.

The RCL display also shows an information symbol. You must leave the shutdown area in order to enable the movement.

RCL display	Shutdown point reached for	Disabled movements
	Overall height	<ul style="list-style-type: none"> - Raising - Extension - Lowering the hoist - Derricking the lattice extension
	Working radius	<ul style="list-style-type: none"> - Lowering the boom - Extension - Lifting the hoist - Derricking the lattice extension
	Slewing angle A	- Slewing to the left
	Slewing angle B	- Slewing to the right
	Rope travel limitation Lifting	- Lifting
	Rope travel limitation Lowering	- Lowering



Risk of accidents due to overriding shutdown procedures

Override RCL only if it is absolutely necessary and you have a clear view of the hazard area. Bear in mind that, due to the boom bending for example, the overall height is increased if you set down the load.

If you override the RCL, the shutdown will be overridden and all movements enabled.

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11.8

Work break

11.8.1

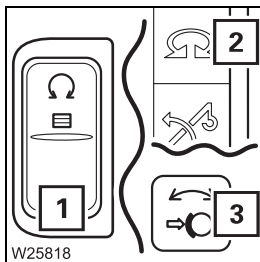
In case of short work breaks



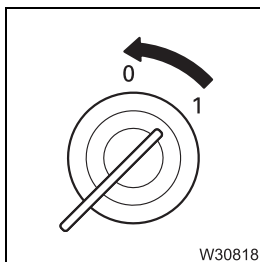
Risk of accident by suspended loads

Never switch off the engine whilst a load is suspended. You must have the control levers at hand in order to intervene at any time.

Always set down the load before you leave the crane cab.



- Switch off the slewing gear.
 - The lamp in the button (1) must be dimly lit.
 - Then symbol (2) turns **red** – slewing gear switched off.
 - Lamp (3) must light up – slewing gear brake applied.



Switch the engine off, turn the ignition key to position **0** and remove it.

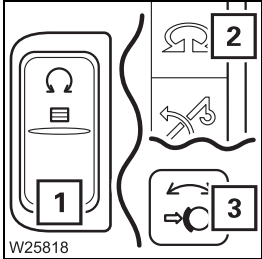
Ensure that no unauthorised persons can operate the truck crane;

▮▮▮▮▮ To secure the truck crane, p. 11 - 150.

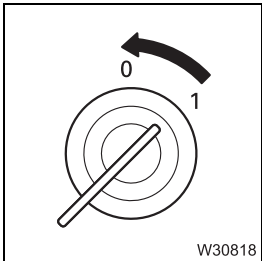
11.8.2

In case of work breaks of more than 8 hours

- Retract all telescopic sections.
- Lower the main boom.

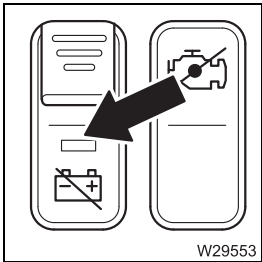


- Switch off the slewing gear.
 - The lamp in the button (1) must be dimly lit.
 - Then symbol (2) turns **red** – slewing gear switched off.
 - Lamp (3) must light up – slewing gear brake applied.



- Switch the engine off, turn the ignition key to position **0** and remove it.

- Switch off all current consumers.



- Switch off the battery master switch. This will not interrupt the run-down period of the heater.

To secure the truck crane

- Secure the truck crane against unauthorised use by:
 - Stowing away the hand-held control in the crane cab
 - Removing the ignition key
 - Locking the crane cab

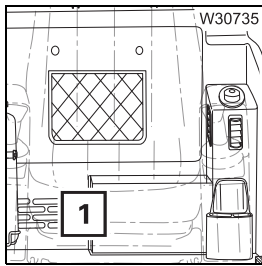


Danger due to unauthorised use

Always lock the hand-held controller before you leave the truck crane. This way you can prevent unauthorised persons starting the engine using the hand-held control.

11.9

Heating and air-conditioning system



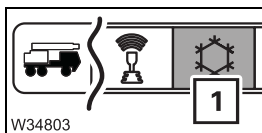
- Do not cover the grille (1).
Air is sucked in through the grille.

11.9.1

Standard heating system

Switching on

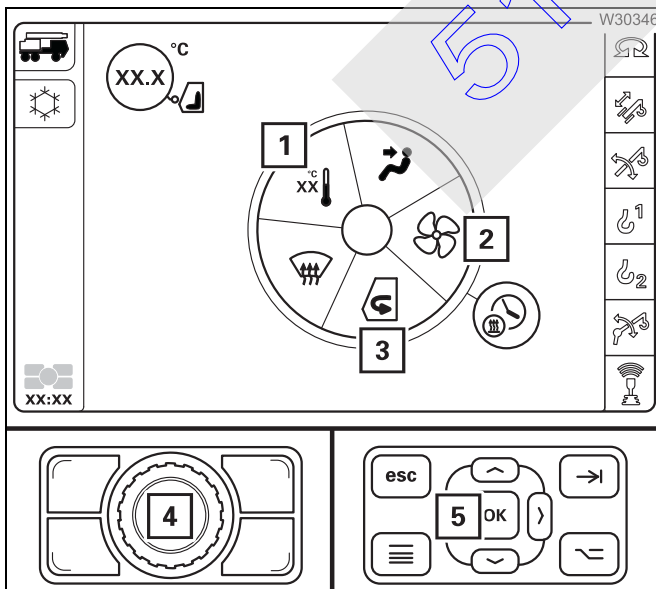
- Start the engine. The heating output is only provided when the engine is running.



- Open the *Heating* (1) menu.

Heating

You must set the fan, fresh air/recirculated air and the temperature.



Setting the temperature

- Select and confirm the symbol (1) – symbol is red.

Setting the fan

- Select and confirm the symbol (2) – symbol is red.

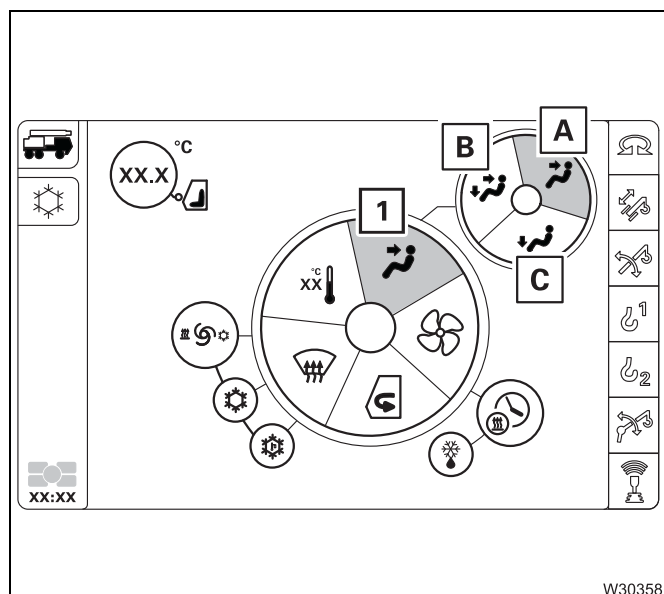
Fresh air/recirculated air/mixed air

- Select and confirm the symbol (3) – symbol is red.
- Change and confirm the respective values using the control units (4) or (5).



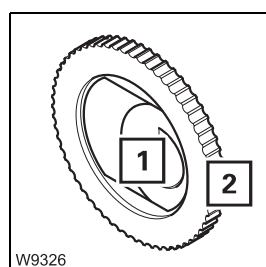
Air distribution

You can direct the air to flow out of various air vents.



- Select the corresponding symbol (1) for the desired air vents.

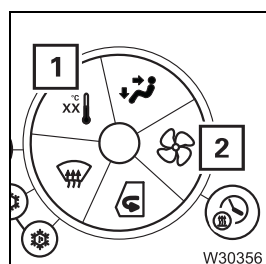
- A Top only
- B Top and bottom
- C Bottom only



Adjusting the air vents

- 1 – To open: Press in/and position lengthwise
- To close: Position crosswise
- To direct the air flow: In intermediate position
- 2 – To direct the air flow: Slewing

Switching off



Switching off the heating system

- Reduce the temperature – symbol (1).

Switching off the ventilation

- Switch off the ventilation – symbol (2).

11.9.2 Air-conditioning system

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 be at the most 10 °C to 14 °C (50 °F to 57.2 °F). If the cooling is too severe, you may frequently feel physically uncomfortable, albeit mostly only after you leave the cool environment.

Avoid having cold air blowing directly on to your body.

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

If the truck crane has been exposed to strong sunlight for a long period of time, for example, the air-conditioning system should initially be operated at the highest blower level with the engine running.

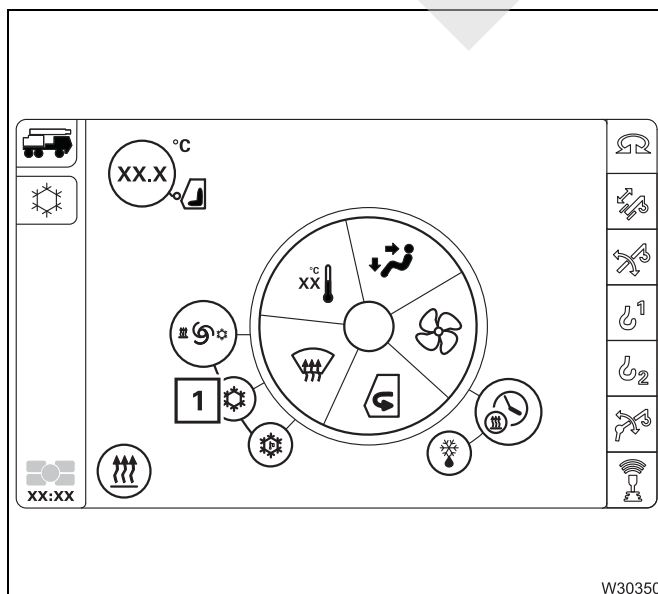
The door or at least the windows should be left open for a short while to thoroughly air the cab.

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

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

Switching on/off

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



Switching on

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

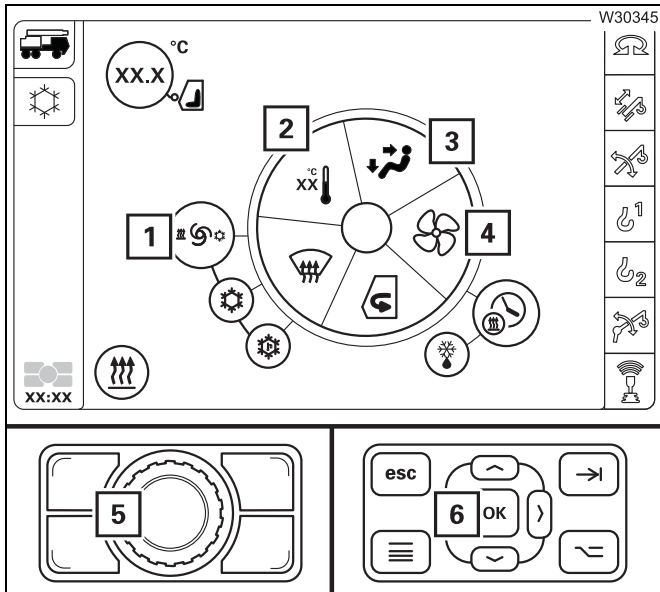
Switching off

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



Cooling, automatic

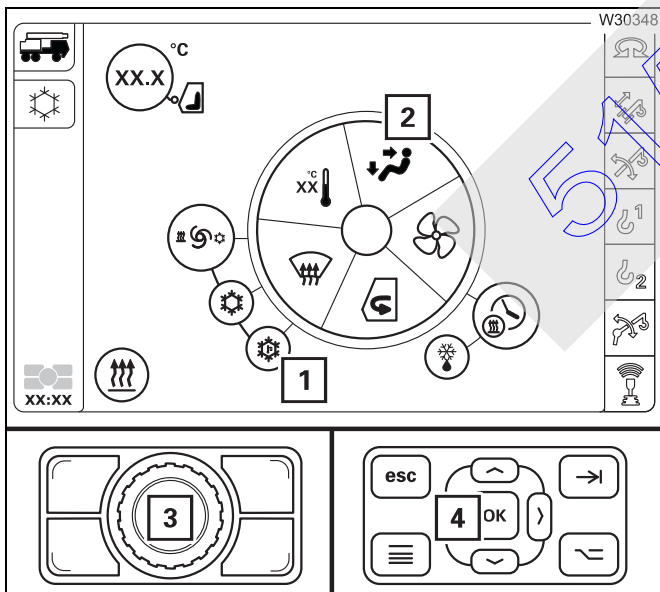
The illustration shows only a sample setting. Always adjust the setting to the current conditions.



- Select and confirm the symbol (1) – symbol is red.
- Set the desired temperature – symbol (2).
- Set the desired air distribution – symbol (3). Open the air vents if necessary.
- Set the desired fan setting – Symbol (4).
- Change and confirm the respective values using the controls (5) or (6).

Cooling, maximum

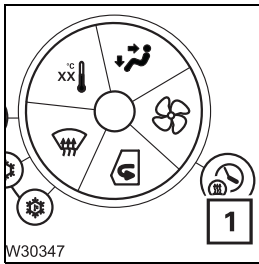
You can also manually cool the crane cab without regulation. The air-conditioning operates at maximum power and at the highest fan level.



- Select and confirm the symbol (1) – symbol is red.
- Set the desired air distribution – symbol (2). Open the air vents if necessary.
- Change and confirm the respective values using the controls (3) or (4).

11.9.3

Auxiliary heater



You can use the auxiliary air heater to preheat the crane cab.



The batteries will be drained if you operate the auxiliary heater with the engine switched off. You must recharge the batteries at shorter intervals if you use the auxiliary heater frequently.

Switching on

You can set an automatic start time and duration for the heating, over several days; *Setting the heating start/heating duration*, p. 11 - 156.

- Before switching on the heating system, check whether it is allowed to be operated at the current location of the truck crane. Find out whether there are any possible sources of danger that could result in an explosion.



Risk of explosion when operating the heating system

The heating system may not be operated:

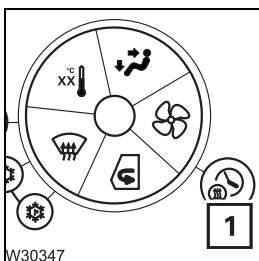
- At service stations and tank farms
- At places where flammable gases or vapours can be found or formed (for example, at places where fuel is stored and in chemical factories)
- At places where explosive dust can be found or formed (e.g. carbon dust, wood dust and grain dust).



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).

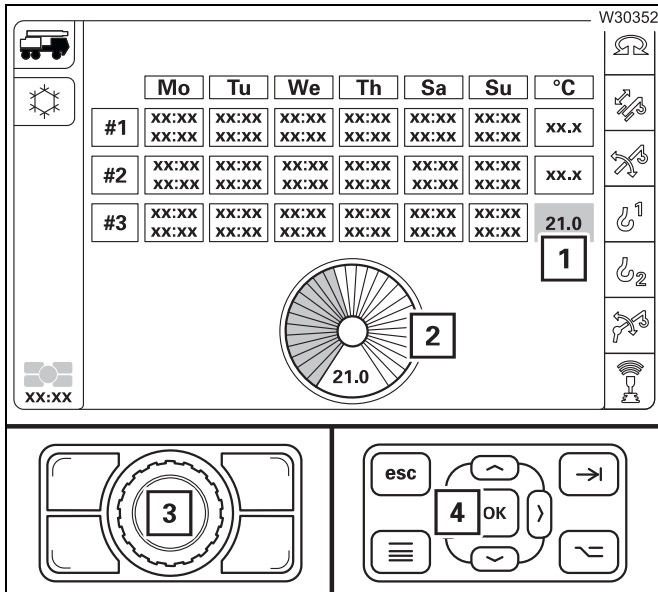
The engine in the carrier is switched off and the ignition in the driver's cab is switched off; *Switch off the engine*, p. 4 - 18.



- Switch on the ignition in the crane cab; *Switching the ignition on*, p. 10 - 5.
- Select and confirm the symbol (1) – the submenu opens.

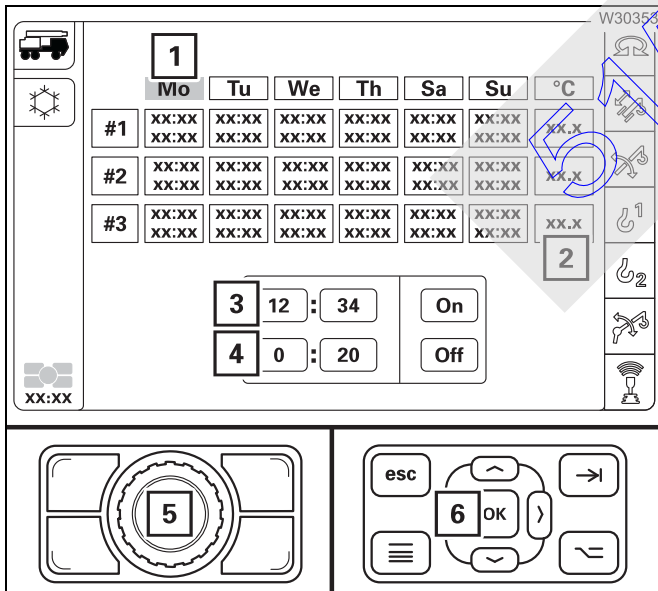


Setting the temperature



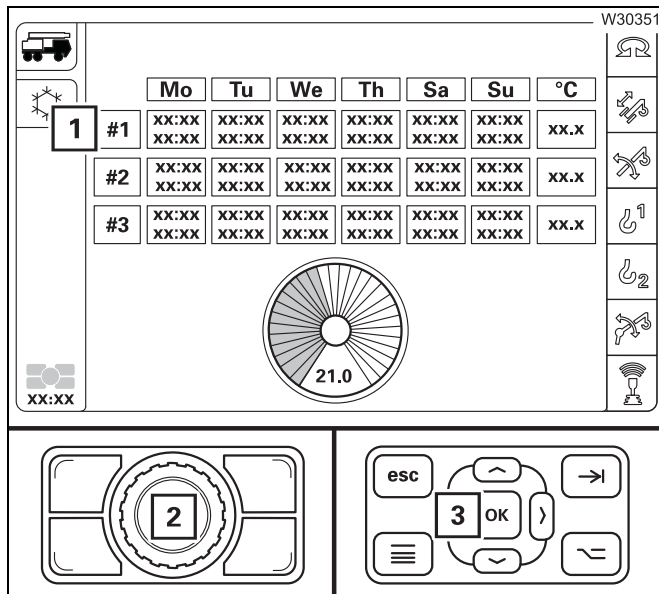
- Select the symbol (1).
- Set the desired temperature – symbol (2).
- Change and confirm the respective values using the controls (3) or (4).

Setting the heating start/ heating duration



- Select a weekday – symbol (1).
- Set the starting time for the heating – symbol (3). You can set up to three starting times.
- Set the desired heating duration – symbol (4). You can set a maximum heating duration of 2 hours.
- Set the desired temperature – symbol (2).
- Change and confirm the respective values using the controls (5) or (6).

Switching heating start on/off



Switching on

- Select a storage location (for example, #1) – symbol (1) **red**. You can also selected other storage locations.

The auxiliary heating now starts at the times stored in the corresponding column.

Switching off

- Select a storage location (e.g. #1) – symbol (1) **grey**. You can also selected other storage locations.
- Change and confirm the respective values using the controls (2) or (3).

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11.10

CraneSTAR system

11.10.1

Overview

Your truck crane is equipped with the CraneSTAR system.

The CraneSTAR system is used to transmit crane data via mobile phone, thus allowing remote diagnostics and localisation of the truck crane.

The CraneSTAR system works automatically, no controls must be operated. This section shows only the location of the associated components.

The CraneSTAR system will be activated only at the request of the crane operator.

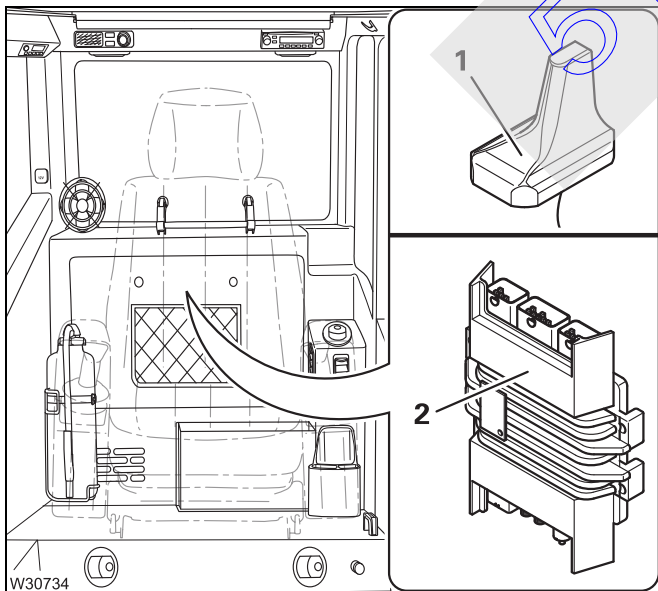
Information on viewing the transmitted data in the Internet can be found in the separate *CraneSTAR Operating instructions* and at:

www.cranestar.net – here, you will find all the information about activating the CraneSTAR system.

11.10.2


Position of the components

The CraneSTAR system includes an antenna and a *TCU* control unit (Telematic Control Unit = data transfer control unit).



The antenna (1) is a combined GSM/GPS antenna for transmission via mobile phone (GSM) and for receiving positioning data (GPS).

The antenna is connected to the *TCU* (2) control unit.

In the case of a malfunction;  p. 14 - 26.

12

Rigging work

If the truck crane on the site has already been rigged, proceed according to the *CHECKLIST: Checks before operating the crane*, p. 11 - 1.

12.1

Rigging work checklists for crane operation with the main boom

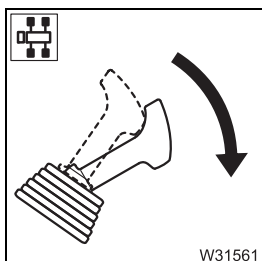


This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.

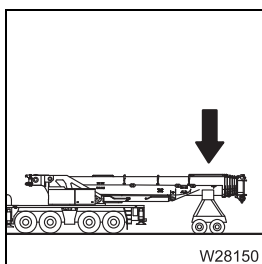
Observe the warnings and safety instructions there.

12.1.1

CHECKLIST: Rigging



W31561



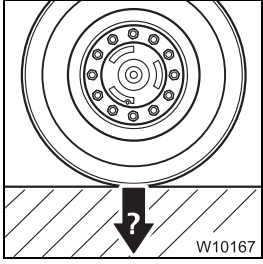
W28150

1. Choose a suitable site; *Choice of a suitable positioning site*, p. 12 - 11.
2. Check that the parking brake is engaged – if necessary, engage the parking brake.
3. **If the main boom is resting 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.



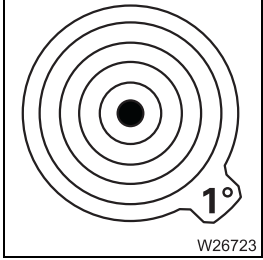
The following points only apply to rigging in *Free on wheels* working position. Continue the checklist at **point 8.** when rigging the truck crane on outriggers.



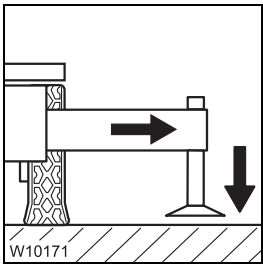


4. For the free on wheels working position

- Check that the tyre pressure is correctly set; ||||▶ p. 1 - 18.
- Check that the ground can support the maximum axle loads
 - ||||▶ *Weight and axle loads*, p. 1 - 9,
 - ||||▶ *Determining the required load-bearing area*, p. 12 - 11.

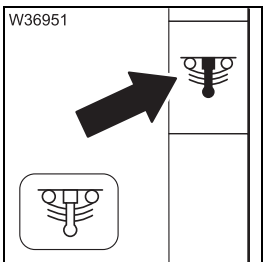


5. Align the truck crane horizontally with the level adjustment system;
||||▶ *Operating the level adjustment system*, p. 5 - 53.



6. On the outriggers:

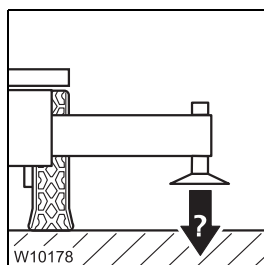
- Extend all outrigger beams as far as possible; ||||▶ p. 12 - 49.
- Move all outrigger pads into the working position; ||||▶ p. 12 - 53.
- Extend all outrigger cylinders far enough so that the outrigger pads are just above the ground; ||||▶ p. 12 - 56.



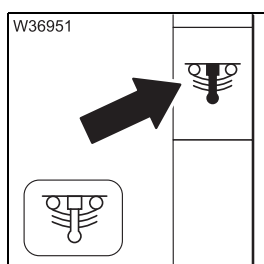
7. Deactivate (Lock) the suspension – symbol red (suspension off);
||||▶ p. 5 - 17.



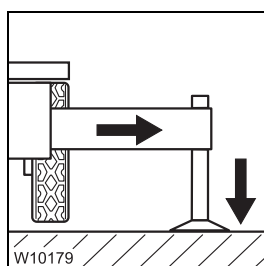
The following points only apply when rigging the truck crane on outriggers. To continue rigging in the *Free on wheels* working position, continue the checklist at **point 12**.



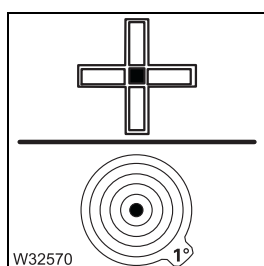
8. Check whether the ground will support the maximum occurring outrigger pressures; *Determining the required load-bearing area*, p. 12 - 11.



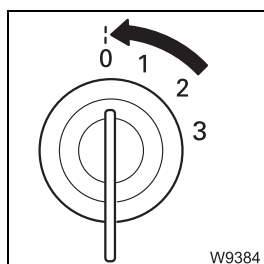
9. Deactivate (Lock) the suspension – symbol **red** (suspension off); p. 5 - 17.



10. Support the truck crane with the outrigger span required for the job according to the *Lifting capacity table* and raise until none of the wheels is touching the ground; *Outrigger operation*, p. 12 - 41.

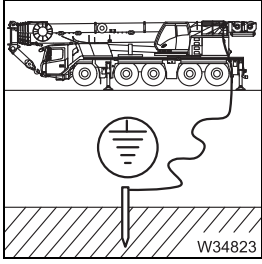


11. Align the truck crane horizontally; p. 12 - 60.

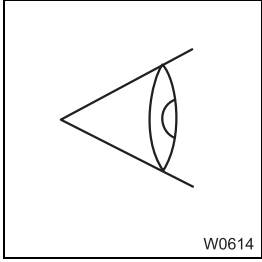


12. Switch off the engine

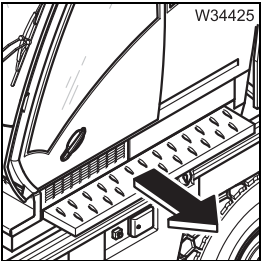




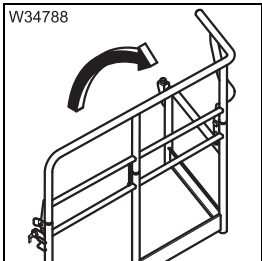
13. Earth the truck crane, if necessary; *Earthing the truck crane*, p. 12 - 15.



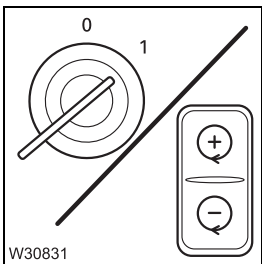
14. Inspect the truck crane, while looking out in particular for any leaking fluids (oil, fuel or water).



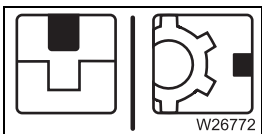
15. Extend the step if necessary; p. 12 - 157.



16. Fold out the railing on the turntable; p. 12 - 149.

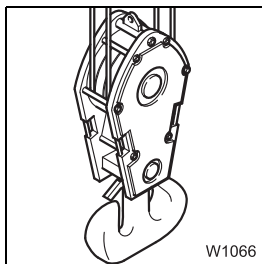


17. Start the engine for crane operation; p. 10 - 3.

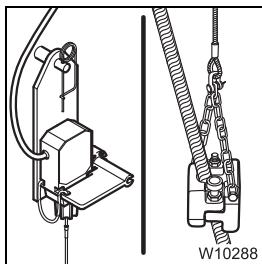


18. Unlock the turntable and if necessary switch off the houselock;
 Unlocking the superstructure, p. 11 - 16,
 Switching off the houselock, p. 11 - 19.

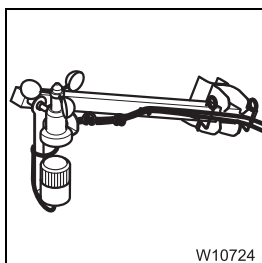
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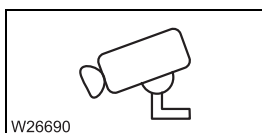
- 19. Pick up the hook block and re-reeve the hoist rope, if necessary;**
- ▣▣▣▣▶ *Hook block on a separate vehicle, p. 12 - 117,*
 - ▣▣▣▣▶ *Hook block on the bumper, p. 12 - 115,*
 - ▣▣▣▣▶ *Reeving and unreeving the hoist rope, p. 12 - 124.*



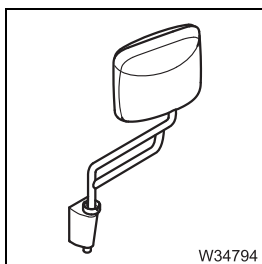
- 20. Install lifting limit switch; ▣▣▣▣▶ p. 12 - 139.**



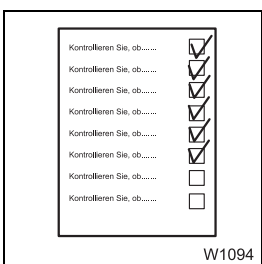
- 21. Install the anemometer and if necessary the air traffic control light;**
- ▣▣▣▣▶ *Anemometer and air traffic control light, p. 12 - 145.*



- 22. Install the camera on main boom if required; ▣▣▣▣▶ *Cameras for crane operation, p. 12 - 152.***

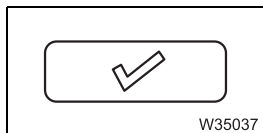



- 23. Fold out and adjust all mirrors for crane operation; ▣▣▣▣▶ p. 12 - 150.**

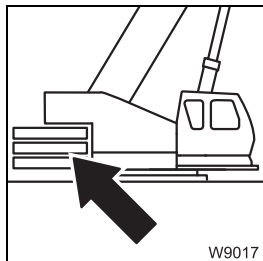



- 24. Perform all the required checks prior to crane operation;**
- ▣▣▣▣▶ *CHECKLIST: Checks before operating the crane, p. 11 - 1.*

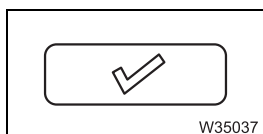





- 25.** Enter and confirm the current rigging mode;  *Enter rigging mode*, p. 11 - 32.



- 26.** With the rigging mode adjusted accordingly, rig the counterweight combination required for the operation according to *Lifting capacity table*;  *CHECKLIST: Rigging the counterweight*, p. 12 - 77.



- 27.** Enter the current rigging mode with the new rigged counterweight combination at the RCL display;  *Enter rigging mode*, p. 11 - 32.

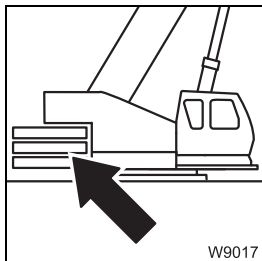
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12.1.2

CHECKLIST: Unrigging

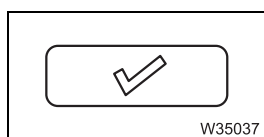


This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references. **Observe the warnings and safety instructions specified here!**



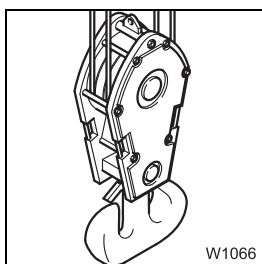
W9017

1. With the RCL set correspondingly, unrig the counterweight;
 - ▣▣▣▣ *CHECKLIST: Unrigging the counterweight, p. 12 - 79.*



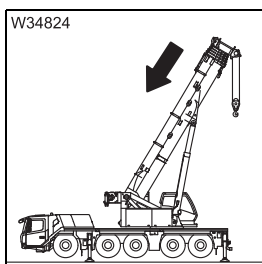
W35037

2. Enter the current rigging mode with the new rigged counterweight combination at the RCL display;
 - ▣▣▣▣ *Enter rigging mode, p. 11 - 32.*



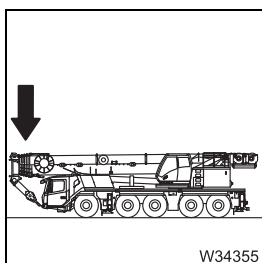
W1066

3. Depending on transport:
 - Attach the hook block to the bumper; ▣▣▣▣ p. 12 - 116 or
 - Set down the hook block and unreeve the hoist rope;
 - ▣▣▣▣ *Setting down the hook block, p. 12 - 118*
 - ▣▣▣▣ *Unreeving hoist rope, p. 12 - 131*



W34824

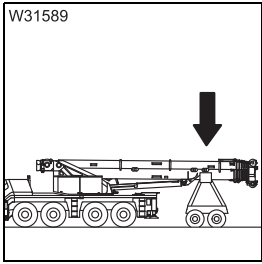
4. Retract the main boom; ▣▣▣▣ p. 11 - 89.



W34355

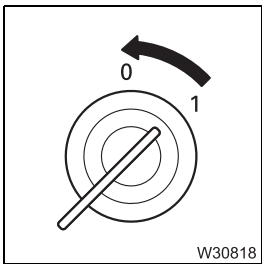
5. **For on-road driving without dolly:**
 - Turn the superstructure to the 180° position to the front with the RCL adjusted accordingly,
 - Place the main boom on the boom rest.



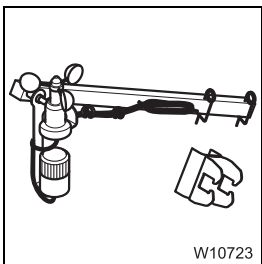


6. For on-road driving with a dolly:

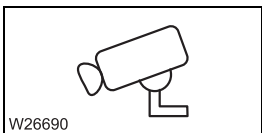
- Set down the superstructure on a dolly with the RCL adjusted accordingly and switch on the boom floating position; ||||▶ p. 6 - 13,
- Switch on slewing gear freewheel; ||||▶ p. 6 - 12
- Switch on boom pre-tensioning if necessary; ||||▶ p. 6 - 14,
- If necessary, raise the 3rd axle line; ||||▶ p. 6 - 15,
- switch off the houselock; ||||▶ p. 11 - 17,
- unrig the counterweight on the *Rear* counterweight platform; ||||▶ p. 12 - 76.



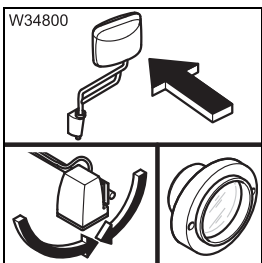
7. Turn off the engine for crane operation; ||||▶ p. 10 - 11.



8. If necessary, remove the anemometer and air traffic control light; ||||▶ *Anemometer and air traffic control light*, p. 12 - 145.



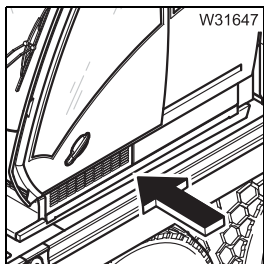
9. If necessary, remove the camera from the main boom; ||||▶ *Cameras for crane operation*, p. 12 - 152.



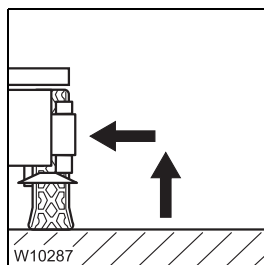
10. Fold in all mirrors for crane operation; ||||▶ *Folding the mirrors in and out, and adjusting them*, p. 12 - 150.

Slew the slewable spotlights to point downwards; ||||▶ p. 11 - 130.

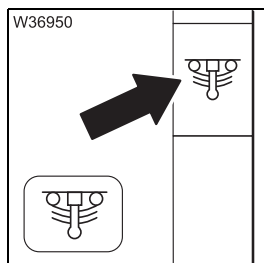
The lighting on the outrigger must be switched off; ||||▶ p. 12 - 45.



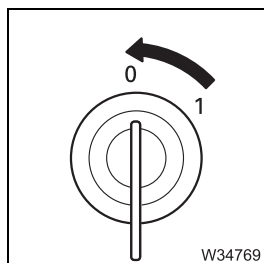
11. Retract the step; p. 12 - 157.



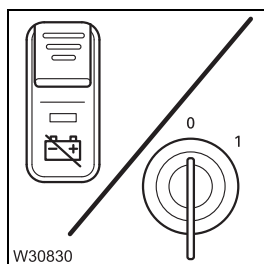
12. Retracting the outriggers; *CHECKLIST: Retracting the outriggers*, p. 12 - 43.



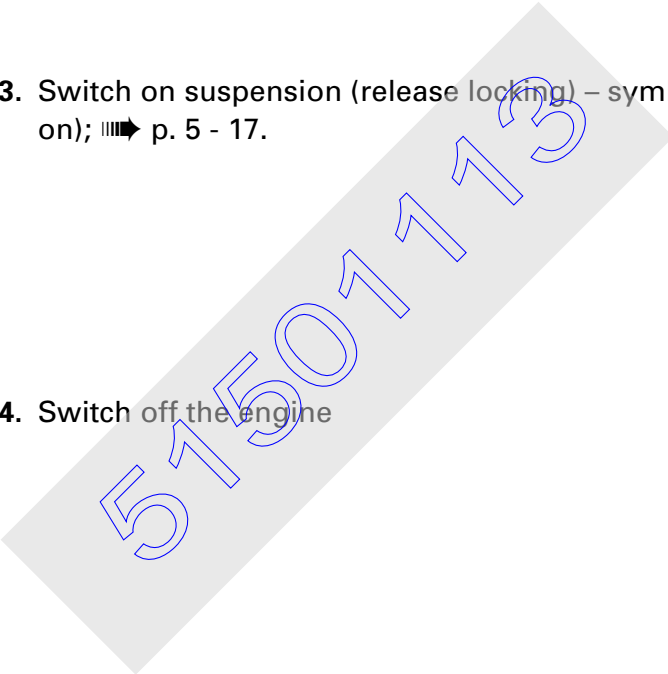
13. Switch on suspension (release locking) – symbol **green** (suspension on); p. 5 - 17.



14. Switch off the engine



15. When the truck crane is no longer being used; *In case of work breaks of more than 8 hours*, p. 11 - 150.








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12.2

Choice of a suitable positioning 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.
- Observe the required safe distances to 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.
- Keep a safe distance to electrical cables;  p. 12 - 15.
- Choose the site such that the unevenness of the ground can be compensated for by adjusting the outrigger cylinders. Maximum hoist of the outrigger cylinders;  p. 1 - 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 in the first instance on the load bearing capacity of the ground. The load bearing capacity of the ground and the occurring outrigger pressure determine the load-bearing area required for the operation.

$$\text{Load-bearing area (m}^2\text{)} = \frac{\text{Outrigger pressure (t)}}{\text{Load bearing capacity of the ground } \left(\frac{\text{t}}{\text{m}^2}\right)}$$

Outrigger pressure

- Determine the outrigger pressure for the operation planned 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, apparently undisturbed ground:		
Mud, peat, marsh		0
Non-cohesive ground which is sufficiently firm:	Fine to medium sand	15 (3,070)
	Coarse sand to gravel	20 (4,100)
Cohesive ground:	Mushy	0
	Soft	4 (820)
	Stiff	10 (2,050)
	Semi-solid	20 (4,100)
	Hard	40 (8,200)
Rock with minimal fissures in sound, unweathered condition and with favourable strata:	In 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 surface of the outrigger pad (▮▮▮▮ p. 1 - 19) is larger than the calculated load-bearing area. If the surface of the outrigger pad is smaller, you will need to enlarge the load-bearing area.



Danger of overturning if the load-bearing area is too small!

Ensure that the actual load-bearing area is at least as large as specified in the table.

This prevents the ground giving way and the truck crane overturning.

Example for calculating the required load-bearing area:

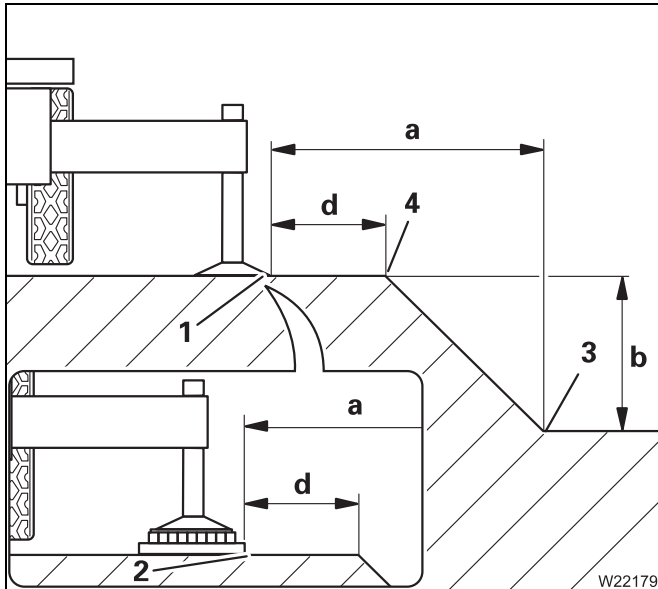
If the outrigger pressure is 25 t and the ground has a load bearing capacity of 40 t/m². Then the required ground bearing area for this supporting cylinder is 0.625 m² (= 6,250 cm²).

If the outrigger pad has a surface of 2,000 cm², you would need to enlarge the ground bearing area by packing the outrigger pads; ▮▮▮▮ p. 12 - 55.

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12.2.2**Safe distance from slopes and pits**

Erect the crane at a safe distance from slopes and pits. The distance also depends on the type of ground if the slopes and pits are not supported.

**As a rule of thumb**

If you are working on *non-cohesive or filled-in* ground, the safety distance (**a**) must be twice as large as the pit depth (**b**).

$$a = 2 \times b$$

If you are working on *cohesive, undisturbed* ground, the safe distance (**a**) must be as great as the depth of the pit (**b**).

$$a = 1 \times b$$

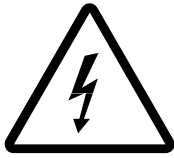
The safe distance is measured from the base of the pit (**3**).

In addition to this the safe distance (**d**) 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

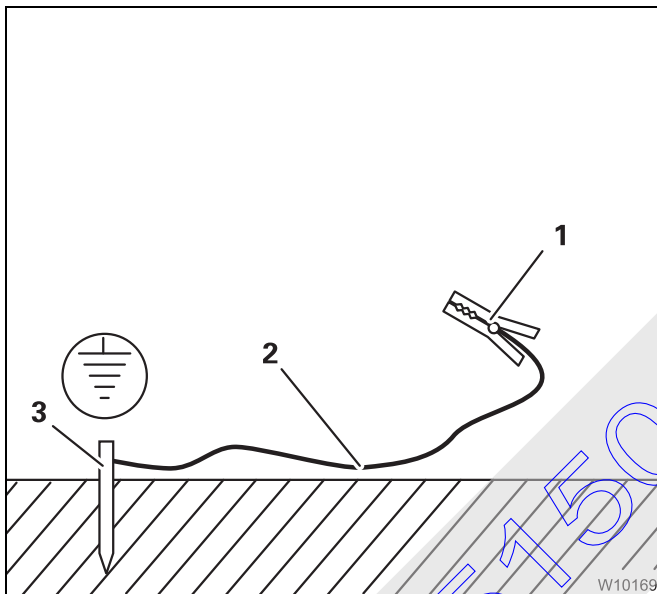
The truck crane may become charged with static electricity. This may occur especially when using outrigger pads made of plastic or when the outrigger pads are packed with insulating material (e.g. wooden planks).



Risk of accident due to electric shock

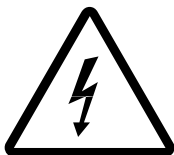
Earth the truck crane before you start to work with it

- Near strong transmitters (radio transmitters, radio stations, etc.)
- Near high-frequency switchgears
- If a thunder storm is forecast



Use electrically conducting material for earthing.

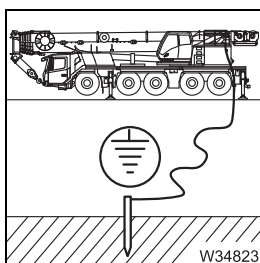
- Hammer a metal rod (3) (length about 2.0 m (6.6 ft)) at least 1.5 m (5 ft) into the ground.
- For better conductivity, dampen the soil around the metal rod (3).
- Clamp an insulated cable (2) to the metal rod (2) (cross-section of at least 16 mm² (0.025 in²))
- Connect the free end of the cable using a clamp (1).



Risk of accident due to electric shock

Ensure that the connections between the cable and the clamp are electrically conductive.

Do not attach the clamp to parts that are bolted on, such as valves, cover plates or similar parts.



- Attach the clamp 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.

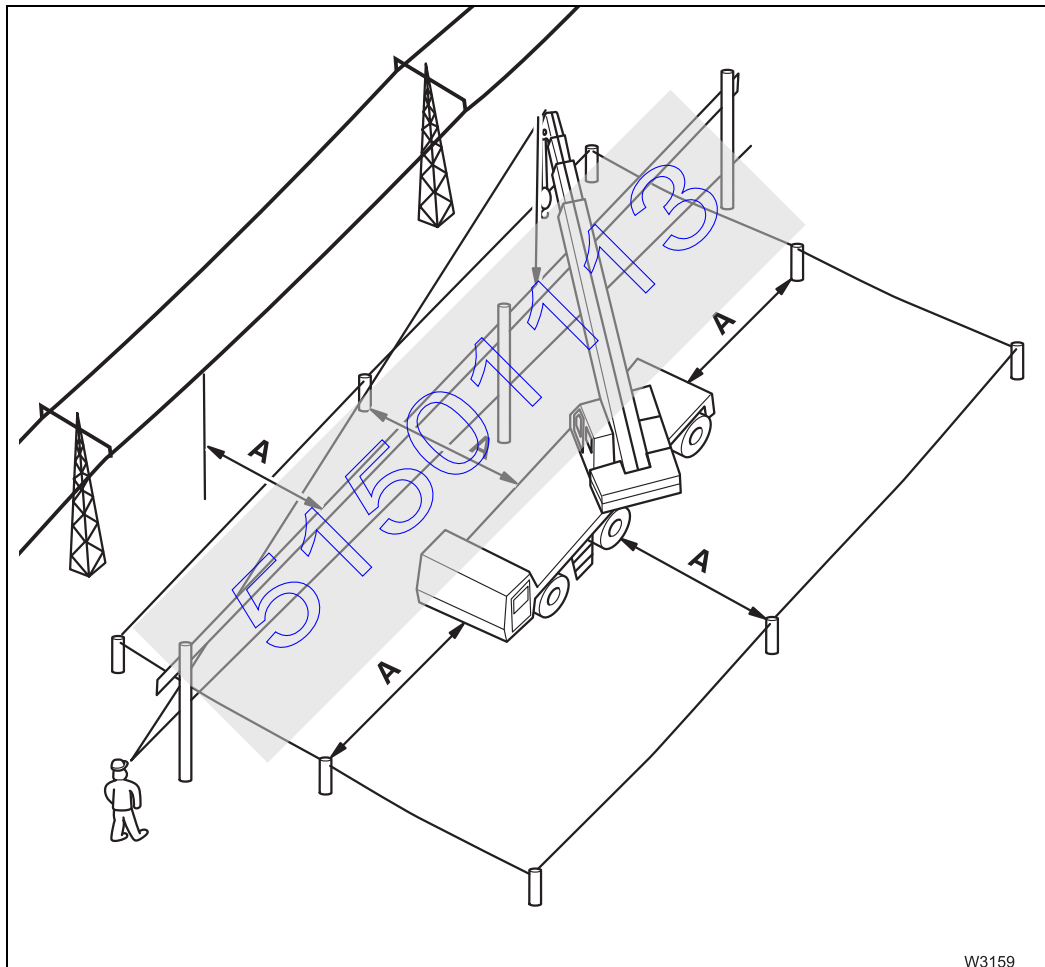


Risk of accident due to electric shock

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 de-energised if possible.



If this is not possible, you must at least observe the prescribed safe distance (**A**).

Different safe distances are recommended by the respective national regulations:

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 up to 110,000 V	3 m (9.8 ft)
over 110,000 V up to 220,000 V	4 m (13.1 ft)
over 220,000 V up 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 up to 200,000 V	4.60 m (15 ft)
over 200,000 V up to 350,000 V	6.10 m (20 ft)
over 350,000 V up to 500,000 V	7.62 m (25 ft)
over 500,000 V up to 750,000 V	10.67 m (35 ft)
over 750,000 V up to 1,000,000 V	13.72 m (45 ft)

- Erect 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 observing the safe distance (**A**).
-
- If the load has to be guided, use only 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 hazard area.

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12.3

Rigging work after driving with a dolly

If the main boom is resting on a dolly whilst 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
- Switch off boom pre-tensioning, if necessary; ▮▮▮▮ p. 12 - 21

12.3.1

Switching off the boom floating position

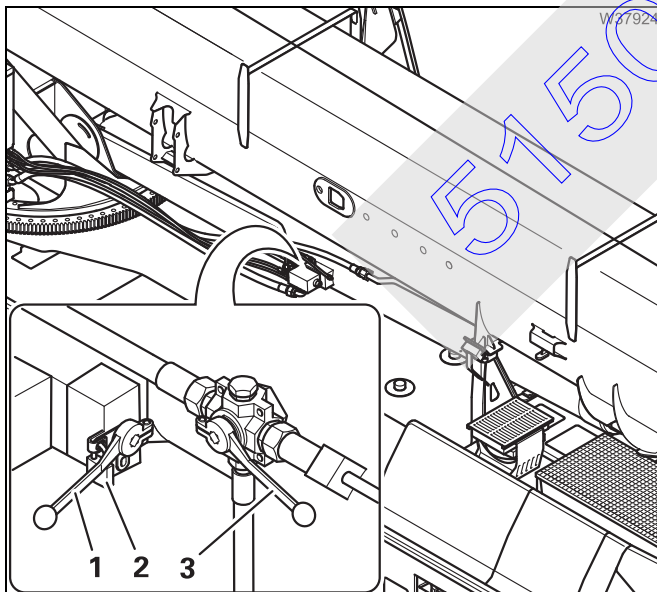
You must switch off the boom floating position before you raise the main boom off the dolly.



Risk of accidents from the main boom dropping down

Always secure the lever with the padlock after switching off the boom floating position.

This prevents the raised main boom falling down when the lever is actuated.



- Remove the padlock (2).
- Switch over valve I – lever (1) horizontal and pointing outward.
- Secure the lever (1) with the padlock (2).
- Switch the valve IV over – lever (3) points forwards.

The boom floating position is now switched off.

12.3.2

Switching off the slewing gear freewheel

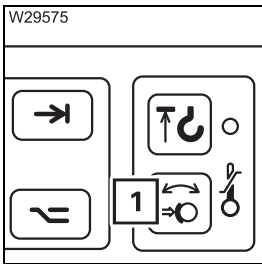
If the slewing gear freewheel is switched on, switch it off prior to working with the crane.



Risk of accidents with the slewing gear freewheel switched on

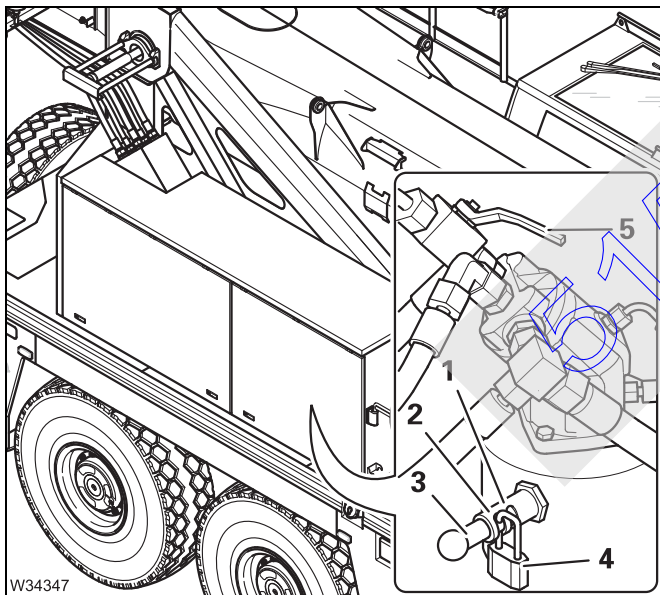
Switch off the slewing gear freewheel before working with the crane.

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 must be running.
- The slewing gear brake must be released, the lamp (1) must have gone out; *Releasing the slewing gear brake*, p. 11 - 116



Switching off

- Remove the lock (4) from the bore (1).
- Pull the pin (3) out as far as possible.
- Secure the pin with the padlock 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

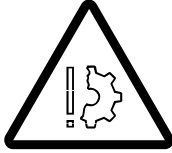
Support the truck crane with the necessary outrigger span, enter the corresponding rigging mode and derrick the main boom to an angle permissible within the working range.

12.3.3

Switching off boom pre-tensioning

You must switch off the boom pre-tensioning before you raise the main boom off the dolly.

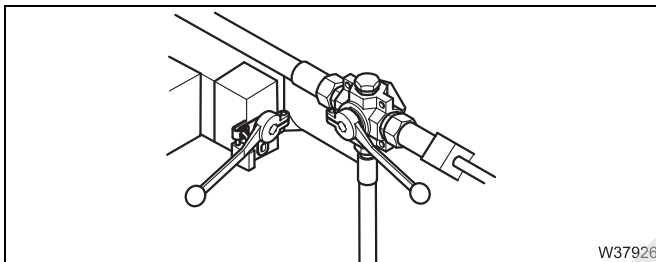
To switch off boom pre-tensioning, you must bring the valves I to IV into the required positions, which will empty the pressure accumulator.



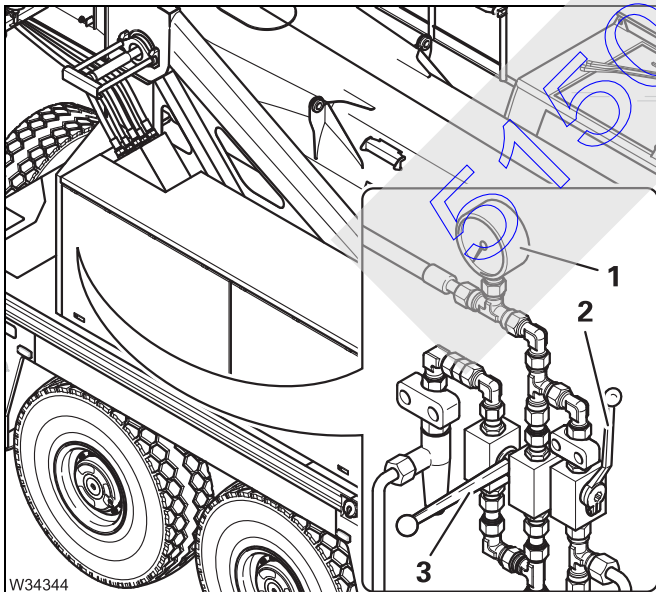
Danger of the hydraulic oil overheating

Always switch the valve IV (III ➔ p. 12 - 19) over (lever in horizontal position) before operating the crane.

This prevents the pressure in the hydraulic circuit rising and the hydraulic oil exceeding the permissible temperature of 80 °C (176 °F).



- Switch off the boom floating position; III ➔ p. 12 - 19.



The valves II and III are under the pressure gauge (1).

- Open valve II – the lever (2) is vertical.

The pressure accumulator is emptied. The pressure on the pressure gauge (1) must drop to 0 bar (0 psi).

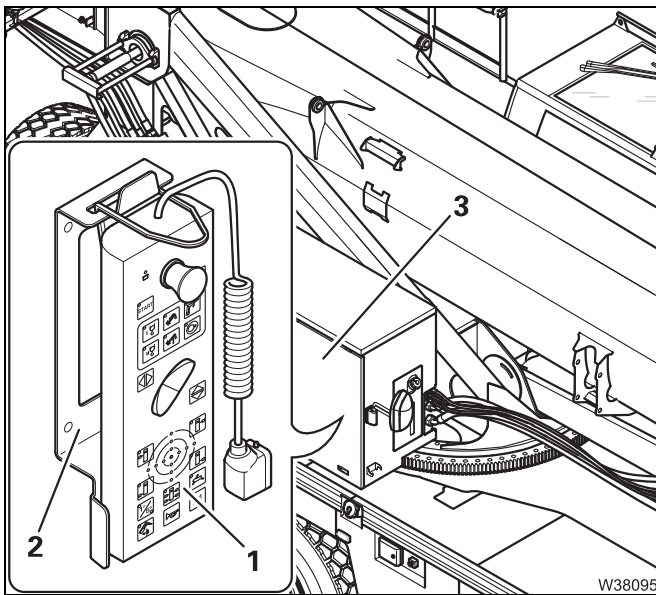
The valve III stays closed – lever (3) is horizontal.

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12.4

Connecting/disconnecting the hand-held control



For operation

- Remove the hand-held control (1) from the clamp (2).

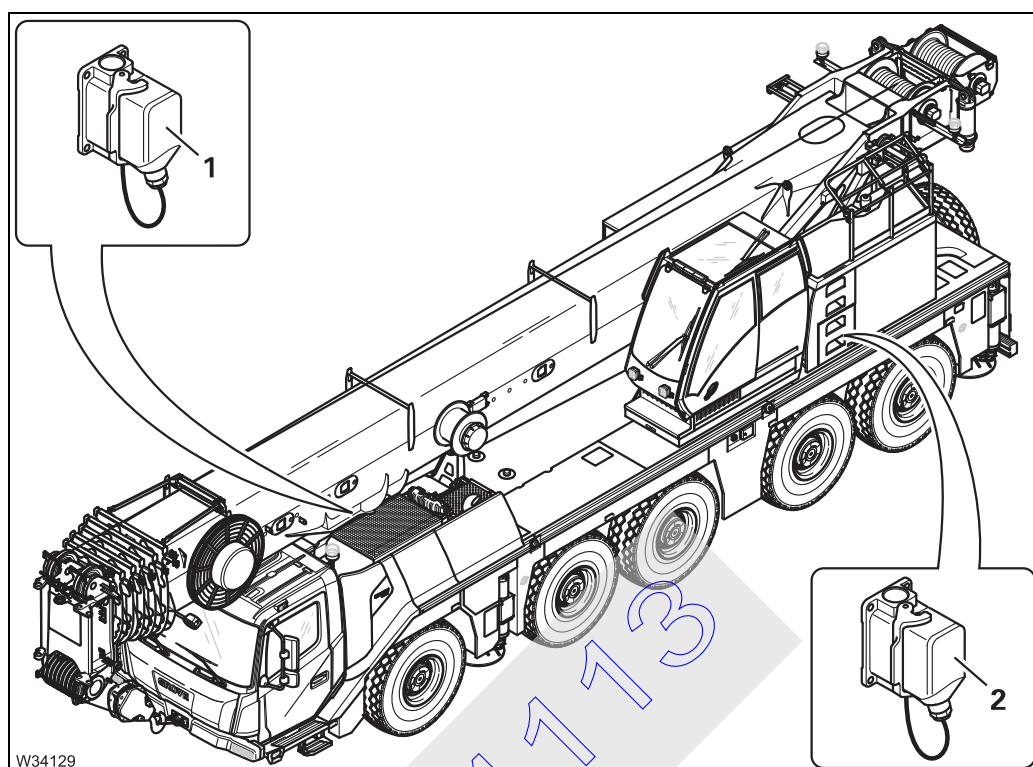
For transport

- Hang the hand-held control (1) in the clamp (2).
- Close the covering (3).



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Functionality of the sockets



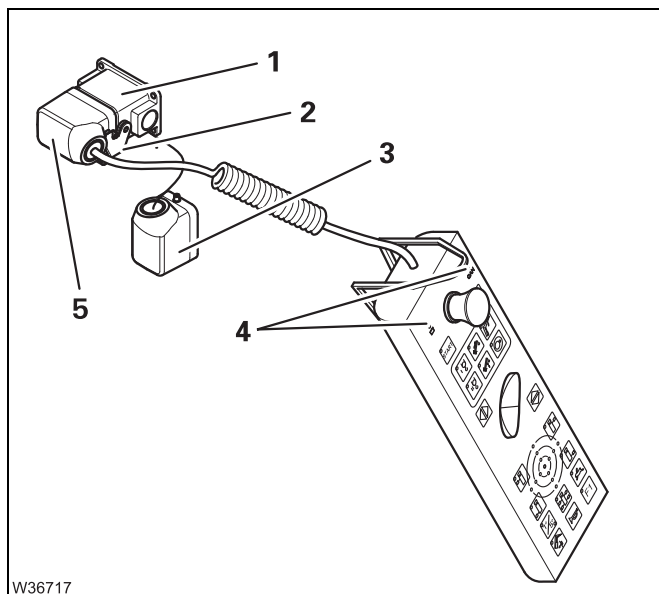
The hand-held control is only active when it is connected to the sockets (1) or (2).

Socket	Enabled operations
1	<ul style="list-style-type: none"> - Emergency operation for crane movements (except for telescoping mechanism) - Derrick lattice extension¹⁾
2	<ul style="list-style-type: none"> - Emergency mode for crane operations

¹⁾ Additional equipment



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



Connect the hand-held control

- Open the cap (2) and remove the bridging plug (3) from the socket (1).
- Insert the plug (5) into the socket (1) and secure it with the cap (2).
- After approx. 20 seconds, the lamps (4) light up – the ignition is now switched on.

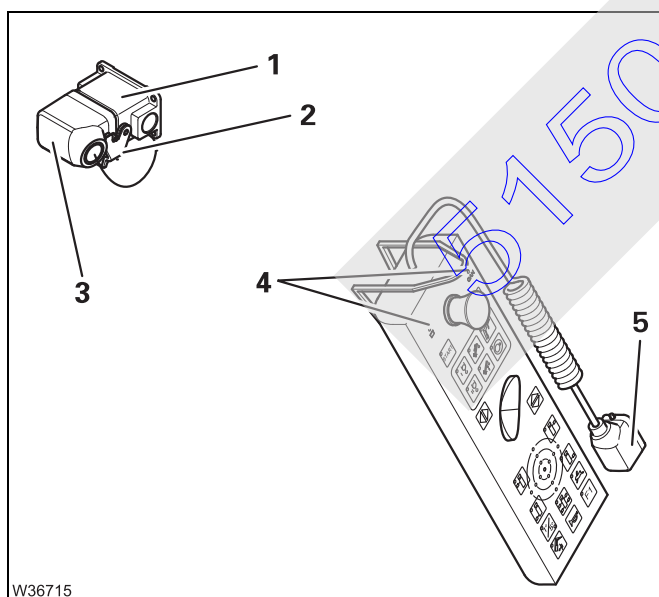
If the lamp (4) does not light up or if it flashes, there is a malfunction; ■■■► p. 14 - 23.



Danger due to unauthorised use

Always stow the hand-held control in the driver's cab or in the crane cab before you leave the crane, and lock the doors.

This way you can prevent unauthorised persons starting the engine.



Disconnecting the hand-held control

- Open the cap (2).
- Remove the plug (5) from the socket (1) – the lamps (4) will go out.
- Insert the bridging plug (3) into the socket (1) and secure it with the cap (2).

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

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12.5

Starting the engine for rigging

For rigging work, you can start the engine:

- With the hand-held control
- From the control units of the outriggers.



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



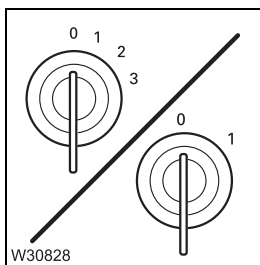
Risk of crushing due to turning wheels

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

12.5.1

Starting/shutoff the engine – with the hand-held control

Prerequisites




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

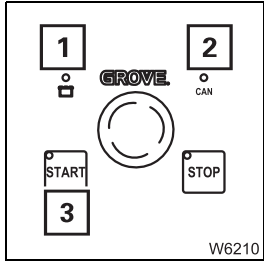
- The ignition is switched off in the crane cab.
- The ignition is switched off in the driver's cab.

- Connect the hand-held control to a socket; p. 12 - 25.




Starting the engine

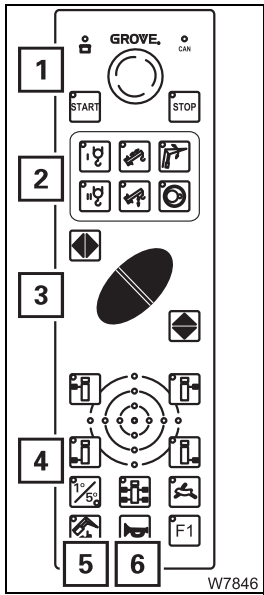
All activities and inspections required to start the engine must be carried out before starting the engine;  p. 4 - 1.



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

If the lamp (2) does not illuminate or flash after approx. 20 seconds, there is a malfunction;  p. 14 - 23.

- Press the (3) button once – the engine starts.



The following buttons are now active on the hand-held control:

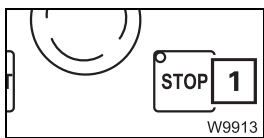
- All buttons on the control panel (1).
- The function buttons (3).
- All buttons on the control panel (4).
- The button (6) for the horn on the carrier.

The button (2) and button (5) are inactive.

The *Outriggers* control units are locked after connection of the hand-held control.

Turning off the engine

If the engine was started with the hand-held control, you cannot switch off it off at the ignition lock in the driver's cab,



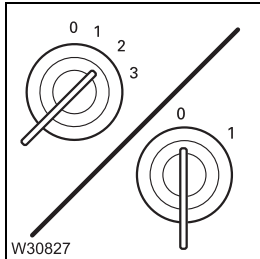
- Press the button (1) once – the engine will switch off.

12.5.2

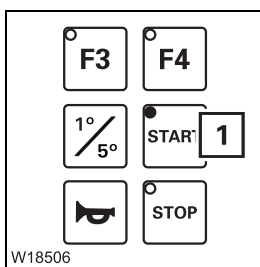
Starting/shutoff the engine – from the outrigger control units

Prerequisites

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



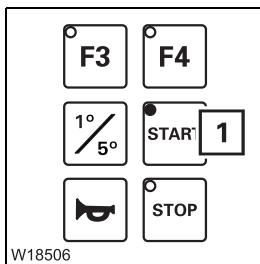
- The ignition in the driver's cab must be switched on.
- The ignition in the crane cab must be switched off.



- The lamp (1) lights up.

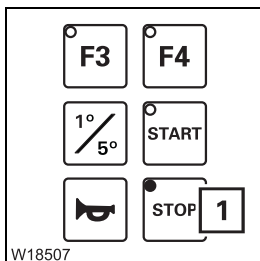
Starting the engine

All activities and inspections required to start the engine must be carried out before starting the engine. p. 4 - 1.



- Press the button (1) once – the engine will start.

Switch off the engine




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


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12.6

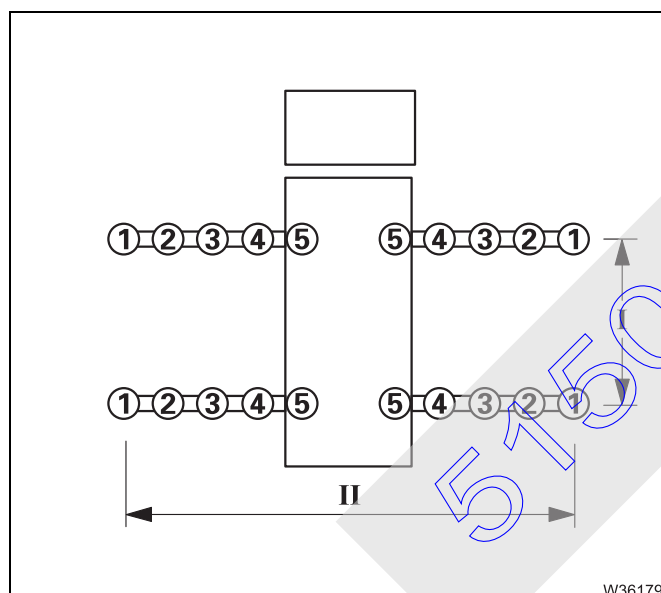
Slewing range – only with the Standard slewing range type

The information in this section applies only to the *Standard* slewing range type. If you wish to operate the truck crane using the *MAXbase* slewing range type;  p. 12 - 33.

All permissible outrigger spans are symmetrical. All outrigger beams are extended and all outrigger beams are extended to the same outrigger span;  *Enabled outrigger spans*, p. 12 - 32.

12.6.1

Representation in the lifting capacity tables



The outrigger span is always specified in this form in the *Lifting capacity table*.

Outrigger length xxxx – outrigger width yyyyy

– Outrigger length

The outrigger length (I) has a fixed value of 8.030 m (26.3 ft) and never changes for a fully supported truck crane.

– Outrigger width

The outrigger span relates to the overall width (II). There are five outrigger spans (1) to (5).

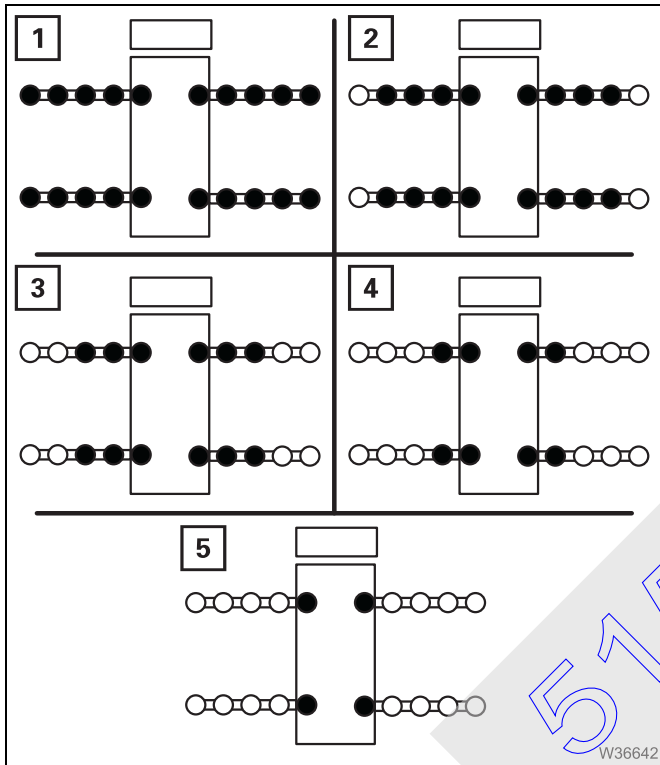
12.6.2

Enabled 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 - 113.



The tables show the values for permissible outrigger spans with overall widths (1) to (5).

1	7.600 m (24.9 ft)
2	6.700 m (22.0 ft)
3	5.900 m (19.4 ft)
4	5.100 m (16.7 ft)
5	2.500 m (8.2 ft)


In addition, there is a lifting capacity table for the *Free on wheels* working position.

The cover pages of the individual lifting capacity tables provide a brief overview in per cent.

Outrigger width	Per cent
1	100%
2	83%
3	66%
4	50%
5	0%

12.7

Outriggers – Overview – MAXbase slewing range type

The information in this section applies to the *MAXbase* slewing range type. If you wish to operate the truck crane using the *Standard* slewing range type;  p. 12 - 31.

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 commencing operation.

12.7.1

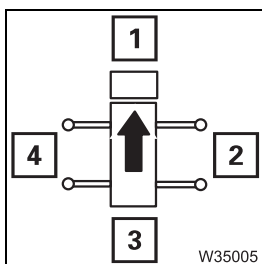
Definitions

Specific terms and graphical illustrations are used in the description.

Directional information

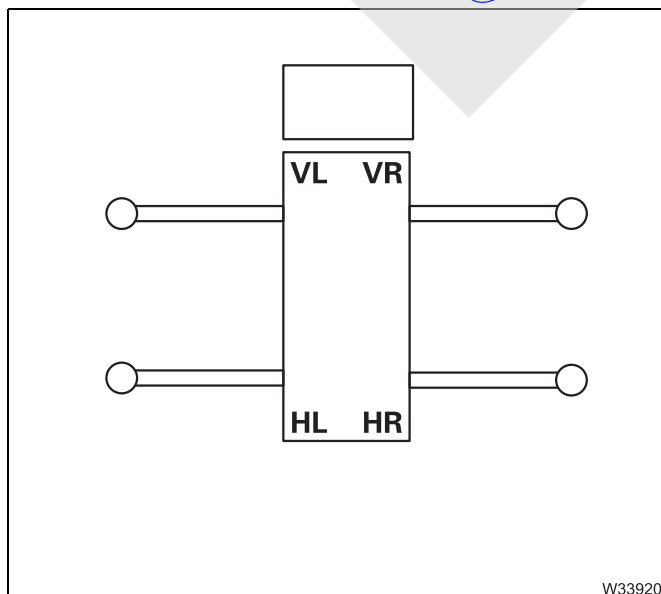
The directional information is always based on the carrier regardless of the position of the superstructure.

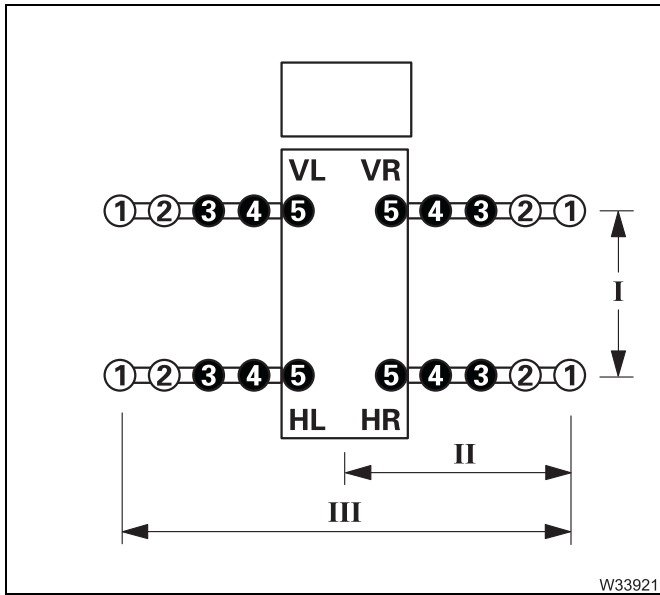
- 1: Front 2: Right
3: Rear 4: Left



Designation of the outrigger beams

VL	Front left
VR	Front right
HL	Rear left
HR	Rear right





Representation of the outrigger spans

– Outrigger length

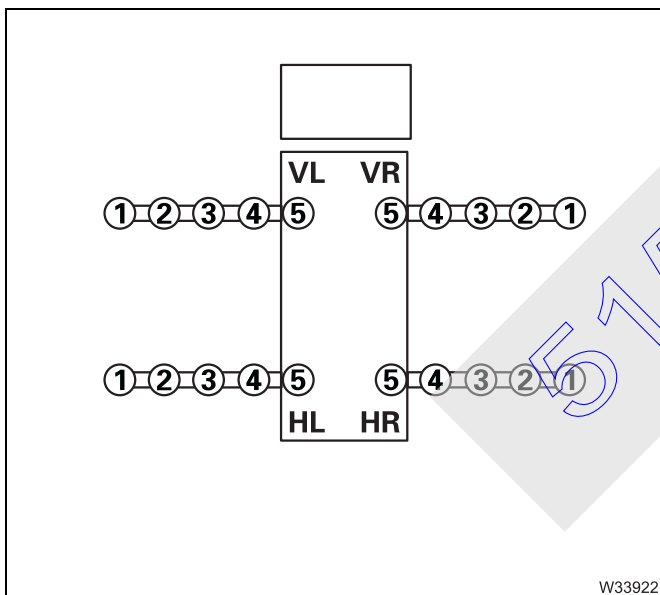
The outrigger length (I) has a fixed value of 8.030 m (26.3 ft) and never changes.

– Outrigger width

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 widths (3).

The outrigger width is specified as an individual width (II) or overall width (III) depending on the type of the outrigger span.



Individual widths / Overall widths

The tables show the values for the outrigger widths (1) to (5).

	Individual widths	Overall widths
1	3.800 m (12.5 ft)	7.600 m (24.9 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 (16.7 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.

Outrigger width	Per cent
1	100%
2	83%
3	66%
4	50%
5	0%

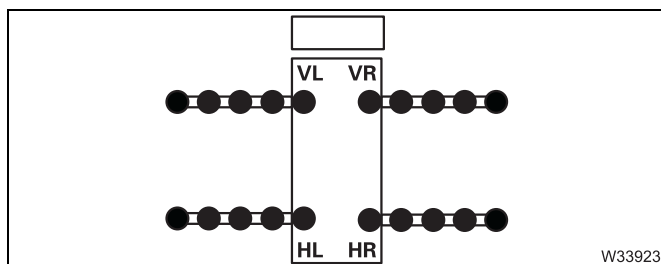
12.7.2

Representation in the lifting capacity tables

The outrigger span is always specified in this form

Outrigger length xxxx – outrigger width yyyyy

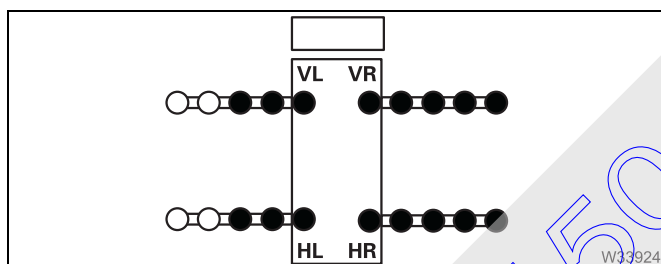
- The value **xxxx** is always 8.030 m (26.3 ft).
- The value **yyyyy** depends on the type of outrigger span. A distinction is made between four types.



Symmetrical

The outrigger width is the same for all outrigger beams. The overall width is entered once. For example

Outrigger width 7.600 m (24.9 ft)



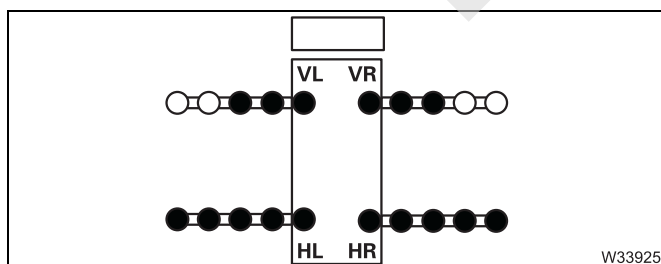
Right / Left

The outrigger span is the same at the left side and the same at the right side – but different between the right and left sides.

The individual widths for the front and for the rear are entered. For example

Front outrigger span 3,800 + 2,950 m (12.5 + 9.7 ft)

Rear outrigger span 3,800 + 2,950 m (12.5 + 9.7 ft)



Front / rear

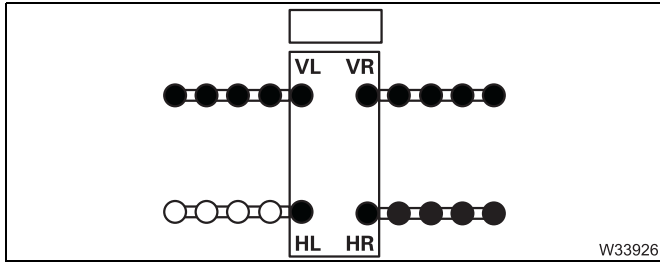
The outrigger width is the same at the front and the same at the rear – but different between the front and rear.

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 (24.9 ft)





Three / One

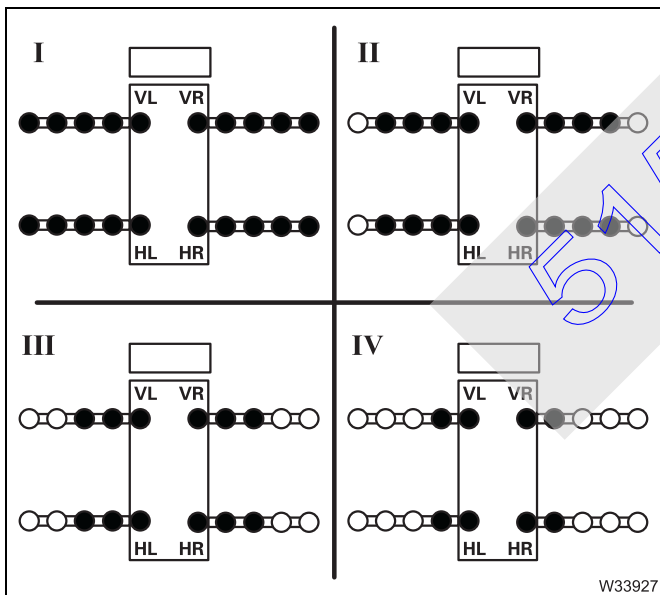
The outrigger width is the same for three outrigger beams and one outrigger beam is fully retracted.

The overall width is entered once and an individual width is entered once. For example

- Front outrigger span** 7.600 m (24.9 ft)
- Rear outrigger span** 3.800 + 1.250 m
(12.5 + 4.1 ft)

12.7.3 Enabled outrigger spans

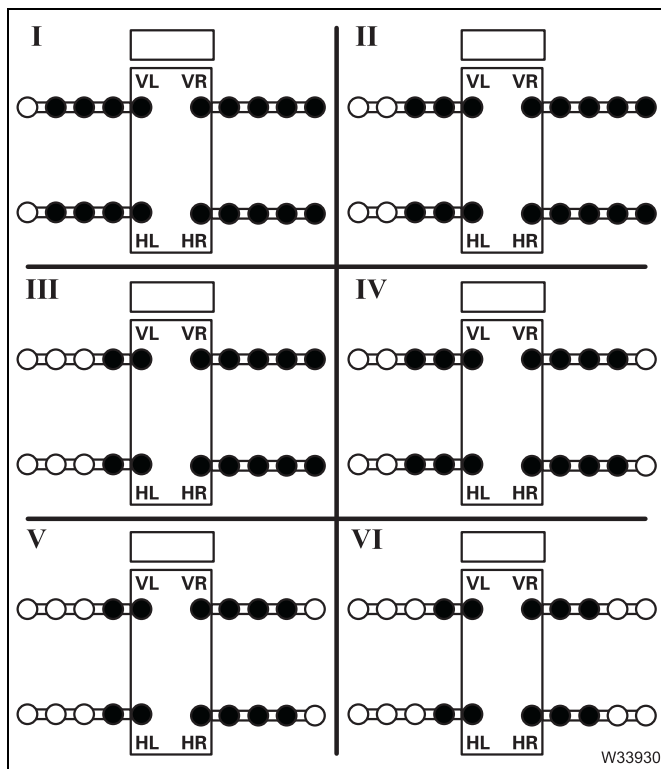
Particular combinations are enabled for each type of outrigger span. This section shows all released combinations with the associated individual widths of the outrigger beams.



Symmetrical

The outrigger width is the same for all outrigger beams. The table shows the released combinations.

	FL / FR / RL / RR (front left / front right / rear left / rear right)
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)

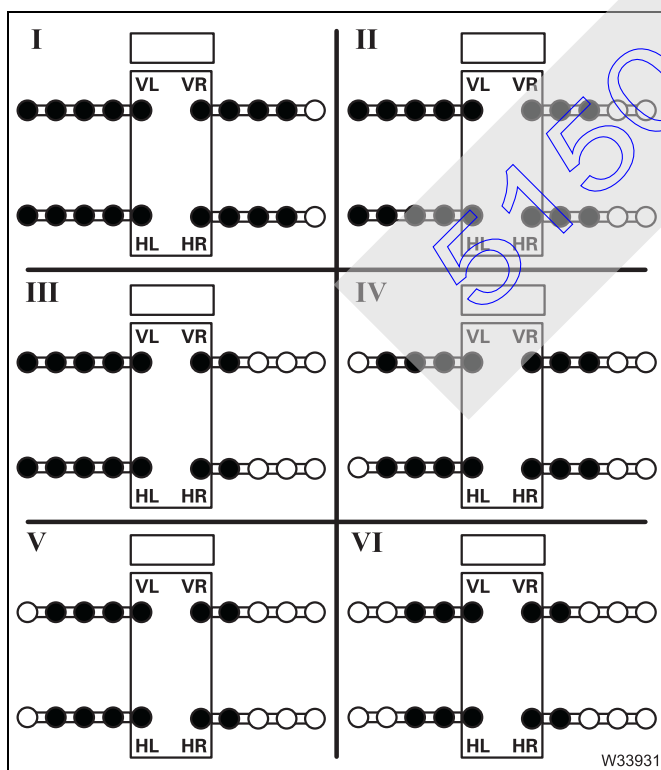


Right / Left

– Right greater than left

The outrigger width is the same at the left and the same at the right. The table shows the permissible combinations.

	FR / RR	FL / RL
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)



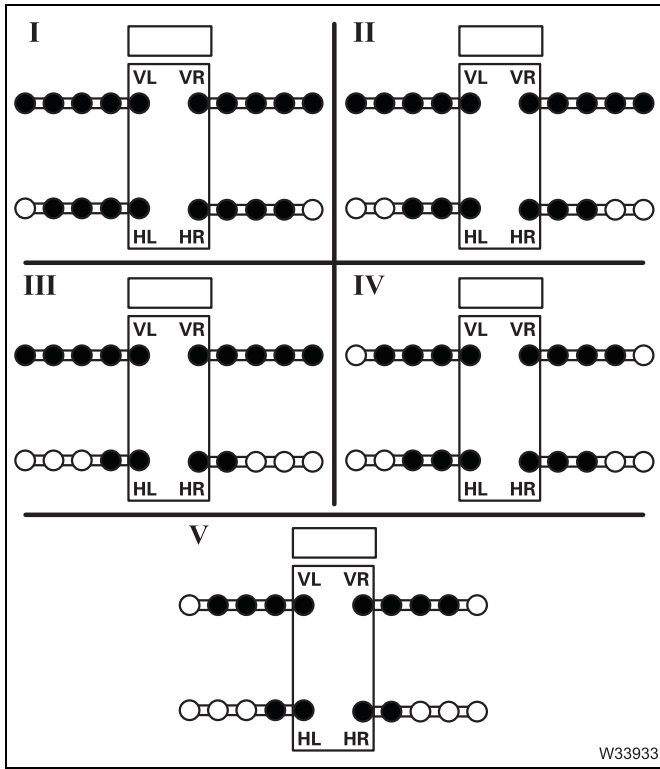
– Left greater than right

The outrigger width is the same at the left and the same at the right. The table shows the permissible combinations.

	FR / RR	FL / RL
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 enabled in a correspondingly mirrored slewing range; **||||** *Lifting capacities and slewing ranges for outrigger spans without separate lifting capacity tables, p. 11 - 28.*



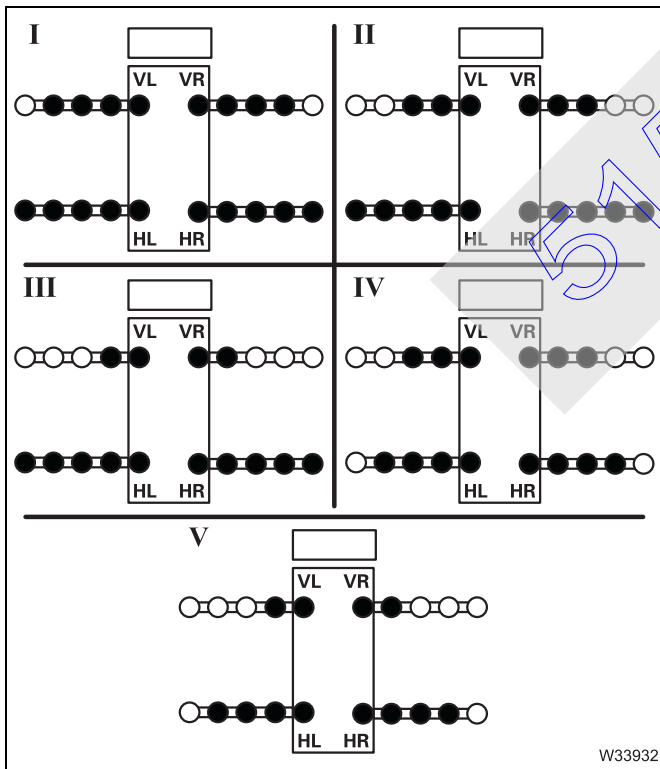


Front / rear

– Front greater than rear

The front outrigger beams are extended further than the rear outrigger beams. The table shows the permissible combinations.

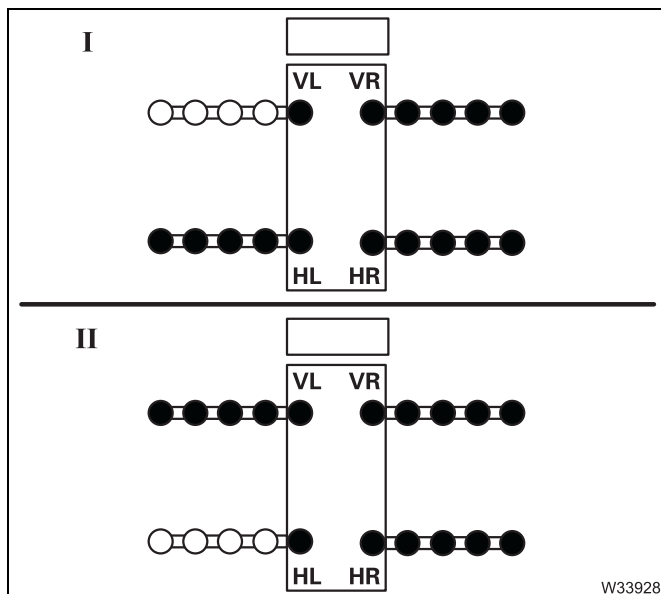
	FR / FL	RR / RL
I	3.800 m (12.5 ft)	3.350 m (11.0 ft)
II	3.800 m (12.5 ft)	2.950 m (9.7 ft)
III	3.800 m (12.5 ft)	2.550 m (8.4 ft)
IV	3.350 m (11.0 ft)	2.950 m (9.7 ft)
V	3.350 m (11.0 ft)	2.550 m (8.4 ft)



– Rear greater than front

The rear outrigger beams are extended further than the front outrigger beams. The table shows the permissible combinations.

	FR / FL	RR / RL
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)

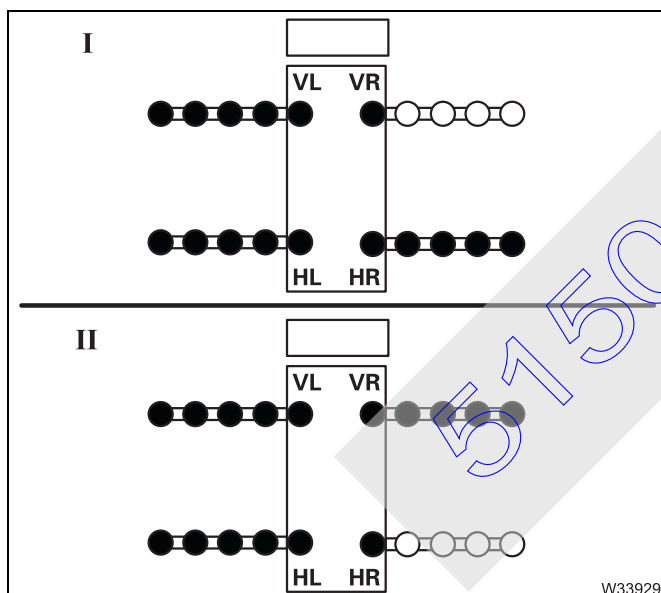


Three / One

– One outrigger beam retracted – left

Three outrigger beams are extended the same distance and one outrigger beam at the left side is retracted. 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)



– One outrigger beam retracted – right

Three outrigger beams are extended the same distance and one outrigger beam at the right side is retracted. 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)

There are no separate lifting capacity tables for this type. The lifting capacities for the *One outrigger beam retracted – left* type are enabled in a correspondingly mirrored slewing range; **III** ➔ *Lifting capacities and slewing ranges for outrigger spans without separate lifting capacity tables, p. 11 - 28.*

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12.8

Outrigger operation



Danger of crushing by extending outrigger beams.

You may only activate the outriggers if you yourself or a banksman with whom you are in visual contact have an unobstructed view of their movements.

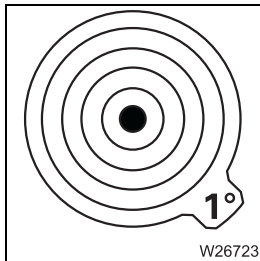
12.8.1

CHECKLIST: Extending the outriggers

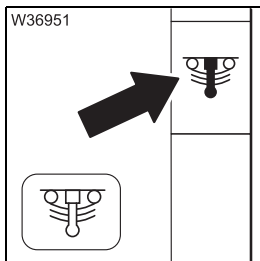


This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.

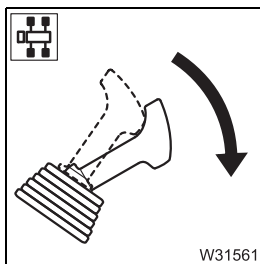
Observe the warnings and safety instructions specified here!



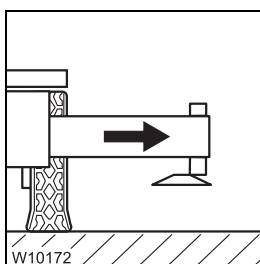
1. Level the truck crane with the level adjustment system and lower it as far as possible; p. 5 - 53.



2. Deactivate (Lock) the suspension – symbol **red** (suspension off); p. 5 - 17.

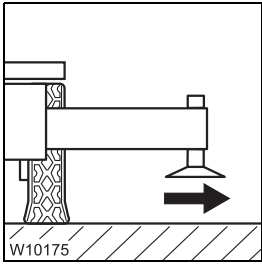


3. Engage parking brake; p. 5 - 46.

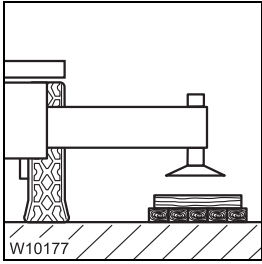


4. Extend all outrigger beams to the required span;
 - For the *Standard* slewing range type; p. 12 - 32
 - For the *MAXbase* slewing range type; p. 12 - 36
 - Setting the outrigger spans*, p. 12 - 46
 - Extending/retracting outrigger beams*, p. 12 - 49.

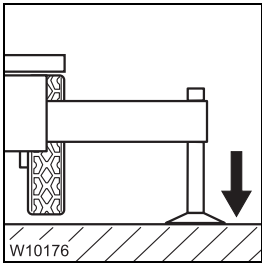




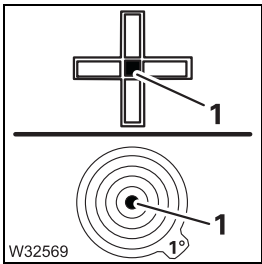
5. Move the outrigger pads into the operating position and secure them;
▣▣▣▣ p. 12 - 53.



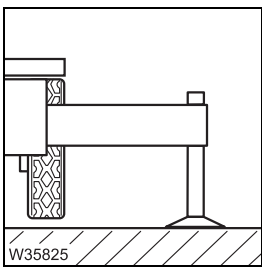
6. Enlarge the load-bearing area if necessary;
▣▣▣▣ *Determining the required load-bearing area*, p. 12 - 11,
▣▣▣▣ *Enlarging the load-bearing area*, p. 12 - 55.



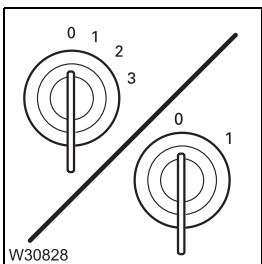
7. Extend the supporting cylinders until none of the wheels are touching the ground;
▣▣▣▣ p. 12 - 56.



8. Level the truck crane horizontally with the outriggers.
The lamp (1) lights up in the measuring range 1°; ▣▣▣▣ p. 12 - 60.



9. Check that none of the wheels are touching the ground.
Raise the wheels if necessary; ▣▣▣▣ *Operating the axle raising system*,
p. 12 - 66.



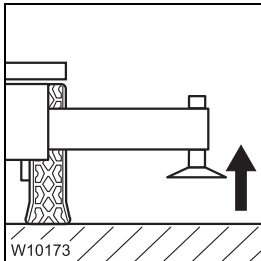
10. Switch off the engine:
– After operating it from the control units; ▣▣▣▣ p. 12 - 29.
– After operating it from the crane cab; ▣▣▣▣ p. 10 - 11.

12.8.2

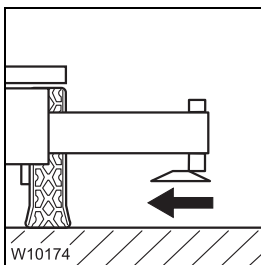
CHECKLIST: Retracting the outriggers



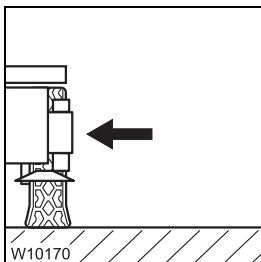
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references. **Observe the warnings and safety instructions specified here!**



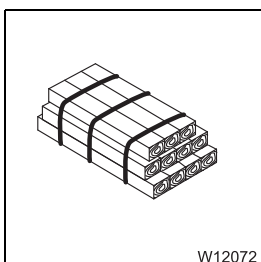
1. Retract the outrigger cylinders as far as possible; p. 12 - 56.



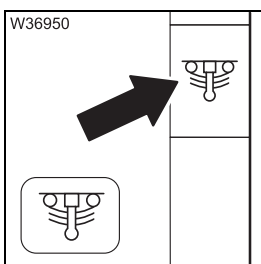
2. Move the outrigger pads into the driving position and secure them; *Moving into driving position*, p. 12 - 53.



3. Fully retract and secure all supports; *For on-road driving*, p. 12 - 49, *Extending/retracting outrigger beams*, p. 12 - 49.

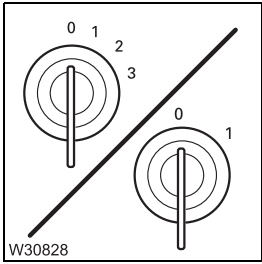


4. Stow away packing material safely, if applicable.



5. Switch on suspension (release locking) – symbol **green** (suspension on); p. 5 - 17.





6. Switch off the engine;

- After operating it from the control units; ■■■▶ p. 4 - 18.
- After operating it from the crane cab or using the hand-held control; ■■■▶ p. 10 - 11.

12.8.3

Preparing the truck crane

Driver's cab

Leveling the truck crane

- Level the truck crane with the level adjustment system; ■■■▶ *Operating the level adjustment system*, p. 5 - 53.

Locking the suspension

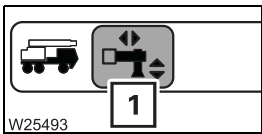
- Switch off the suspension; ■■■▶ *Switching the suspension on/off*, p. 5 - 16.

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

Crane cab

The outriggers can be moved from the crane only when:

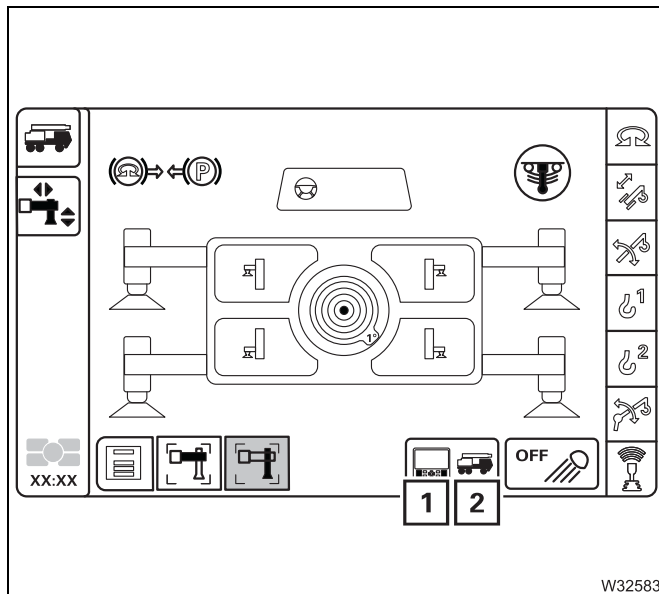
- The suspension is switched off.
- The parking brake is applied.
- The slewing gear is switched off.



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

Switching the outrigger control units on/off

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



The current status is displayed, either the symbol (1) or (2) grey.

Switch the control units on:

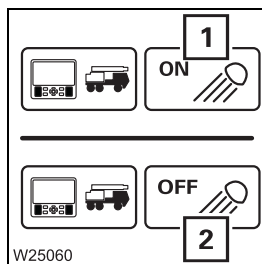
- Select and confirm the symbol (1) – symbol (1) red symbol (2) grey.
 - The outriggers cannot now be operated via the CCS display.

Switch the control units off:

- Select and confirm the symbol (2) – symbol (2) red symbol (1) grey.
 - The outriggers can now be operated via the CCS display.

Outrigger lighting on/off

You can switch the *outrigger lighting* on and off from the crane cab.



Switching on

Select symbol (1) and confirm – *Input mode on*

Switching off

Select symbol (2) and confirm – *Input mode off*.

12.8.4

Setting the outrigger spans

Extend the outrigger beams only as far as the permissible spans.



Danger of overturning if the outrigger beams are not correctly extended

Extend the outrigger beams only as far as the permissible spans.

Always extend all outriggers to the outrigger spans specified 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 guaranteed.




Risk of accidents from incorrect or missing markings

Replace missing and illegible markings. First query **Manitowoc Crane Care** for the correct position.

This way you prevent the truck crane overturning due to an incorrect outrigger span.

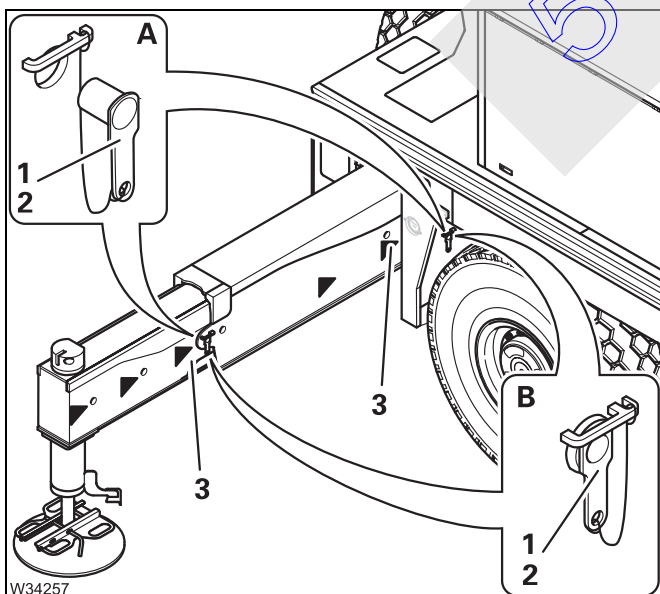


This section describes how to release and secure the outrigger beams, as well as the markings for the outrigger spans.

There are various ways to move the supports,  *Extending/retracting outrigger beams*, p. 12 - 49.

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 associated individual width.



Outrigger span (100%)

Overall width 8.030 x 7.600 m (26.3 x 24.9 ft)

Individual width 8.030 x 3.800 m (26.3 x 12.5 ft)

(A) – Prerequisite

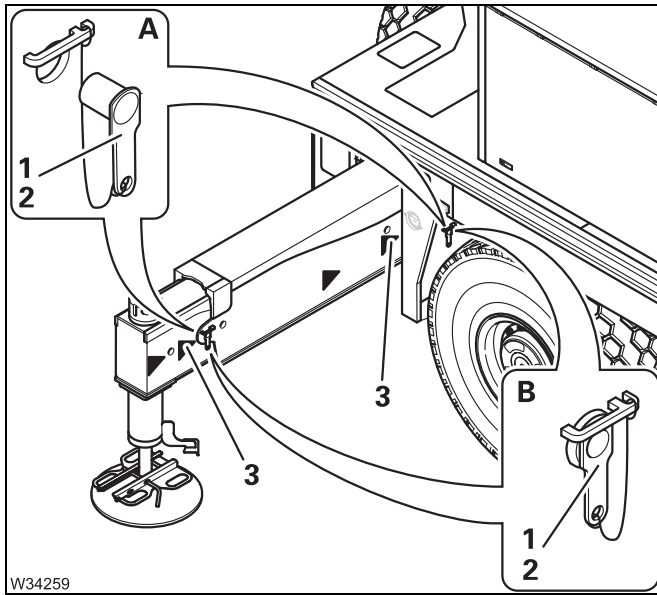
Pins (1) and (2) must be pulled out

(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 same outrigger span in the same way at the opposite outrigger beam.



Outrigger span (83%)

Overall width 8.030 x 6.700 m (26.3 x 22.0 ft)
Individual width 8.030 x 3.350 m (26.3 x 11.0 ft)

(A) – Prerequisites

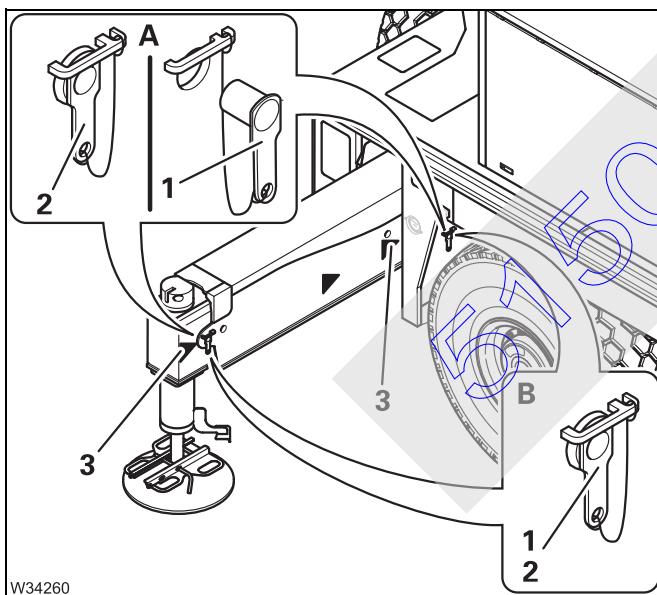
Pins (1) and (2) must be pulled out

(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 same outrigger span in the same way at the opposite outrigger beam.



Outrigger span (66%)

Overall width 8.030 x 5.900 m (26.3 x 19.4 ft)
Individual width 8.030 x 2.950 m (26.3 x 9.7 ft)

(A) – Prerequisites

- Pin (1) must be removed
- Pin (2) must be inserted

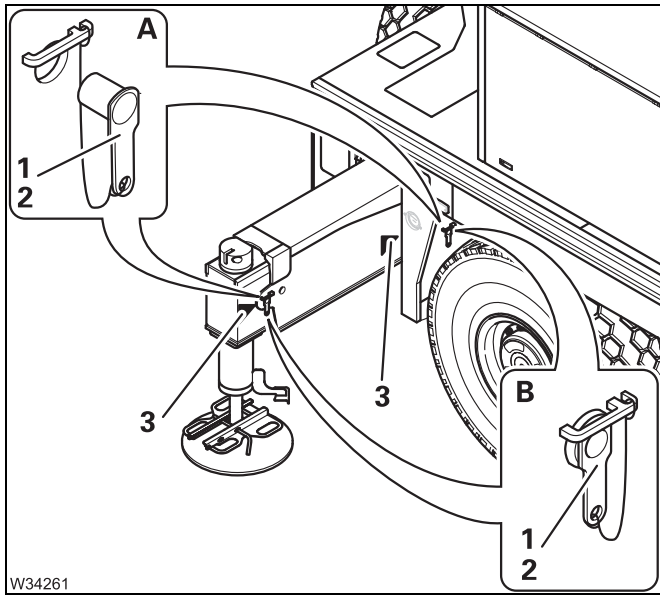
(B) – Setting and securing

- 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 same outrigger span in the same way at the opposite outrigger beam.





Outrigger span (50%)

Overall width 8.030 x 5.100 m (26.3 x 16.7 ft)

Individual width 8.030 x 2.550 m (26.3 x 8.4 ft)

(A) – Prerequisites

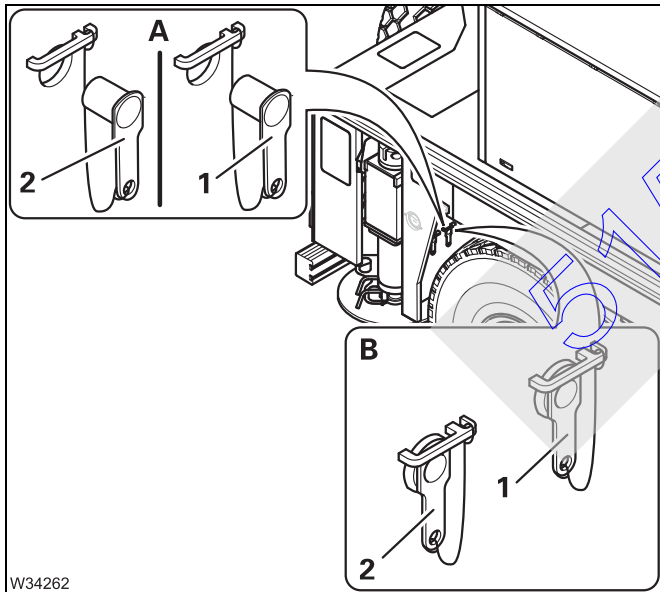
- Pin (1) must be removed
- Pin (2) must be inserted

(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 same outrigger span in the same way at the opposite outrigger beam.



Outrigger span (0%)

Overall width 8.030 x 2.500 m (26.3 x 8.2 ft)

Individual width 8.030 x 1.250 m (26.3 x 4.1 ft)

(A) – Prerequisites

- Pins (1) and (2) must be 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 same outrigger span in the same way at the opposite outrigger beam.

For on-road driving

- Create the outrigger span 8.030 x 2.500 m (26.3 x 8.2 ft) for all outrigger beams and secure all the outrigger beams.
- Bring all the outrigger pads into driving position;  p. 12 - 53.



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.

12.8.5

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 the rear stability for the rigging mode according to the displayed rigging mode is no longer guaranteed.



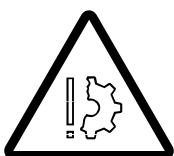
Risk of damage to the outriggers

Before extending the outrigger beams, always check whether they have been released. This prevents damage to the locking bars.



Risk of damage to driver's cab

Always bring the outrigger pads to the driving position before retracting the outrigger beams. This prevents the outrigger pads damaging the driver's cab when the outrigger beams are retracted.



Risk of damage to the outrigger beams and rear bumper!

Always check the clearance of the outrigger pad before extending the rear left outrigger. This prevents a collision between the outrigger pads and rear bumper.



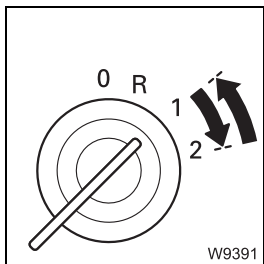
- Check that the pins are inserted/removed as specified in the prerequisites for the desired outrigger span; ||||► p. 12 - 46.

Depending on the rigging, control elements are provided for moving the outrigger beams

- On the *Outriggers* control units; ||||► p. 12 - 50,
- In the crane cab; ||||► p. 12 - 50.

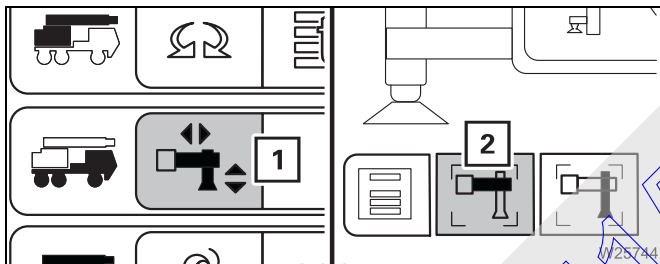
From the crane cab

The following operating elements are found in the *Outrigger* menu.
The parking brake is engaged.



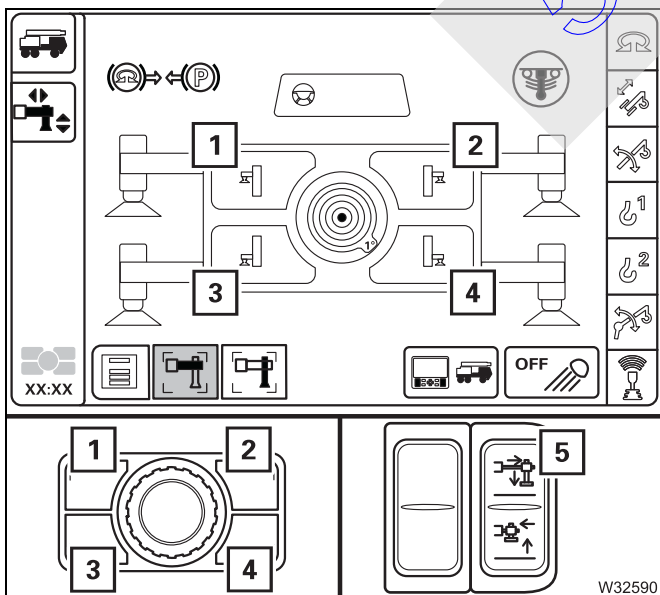
Starting the engine

- Start the engine from the crane cab; ||||► p. 10 - 3.
- Switch off the slewing gear; ||||► p. 11 - 120.



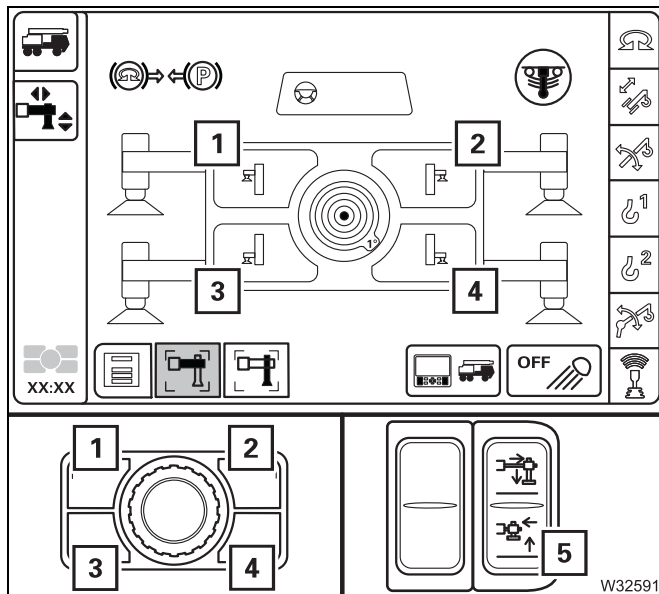
Menu, open

- Open the *Outrigger* menu (1).
- Select and confirm the symbol (2) – *Move outrigger beams*.



Extending

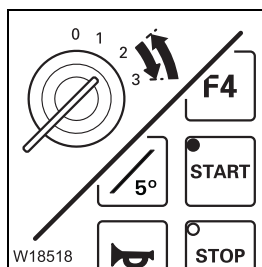
- Press the button for the desired outrigger beam.
 - 1 Front left
 - 2 Front right
 - 3 Rear left
 - 4 Rear right
- Press the button (5) in at the top – the selected outrigger beam extends.



Retracting

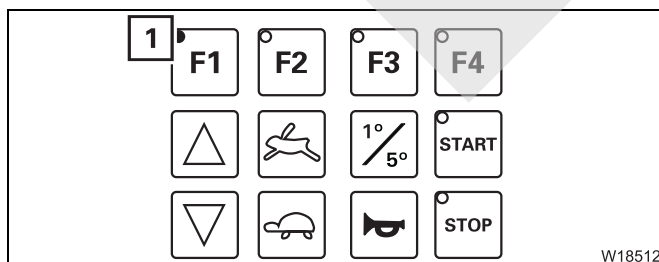
- Press the button for the desired outrigger beam.
 - 1 Front left
 - 2 Front right
 - 3 Rear left
 - 4 Rear right
- Press the button (5) in at the bottom – the selected outrigger beam retracts.

From the control units



Starting the engine

- Start the engine from the driver's cab; see p. 4 - 13.
- You can also start the engine from the control units; see p. 12 - 27.



Switching on the lighting

Only the lamp (1) lights up after opening the door.

- Press any button.
The lights are switched on.

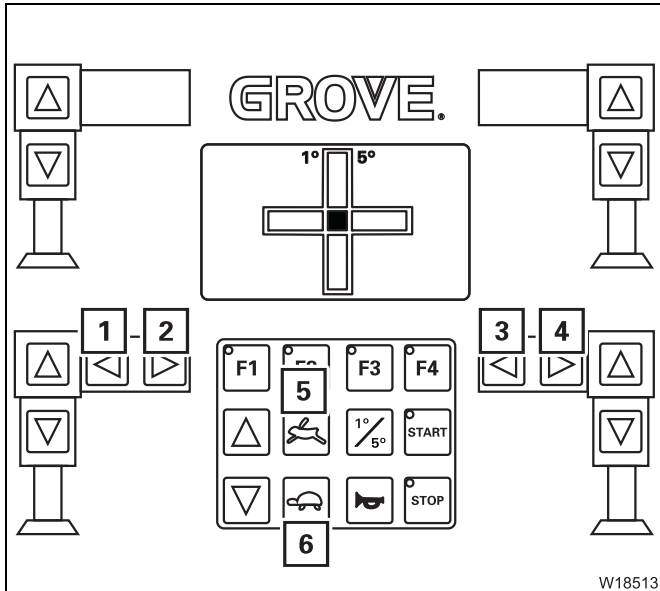


Moving the outrigger beams



You can only operate the outrigger beams to the left and right of the control unit on the operator's side.

- Observe the safety instructions for operating the outriggers;
 ▶▶▶▶▶ p. 12 - 49.

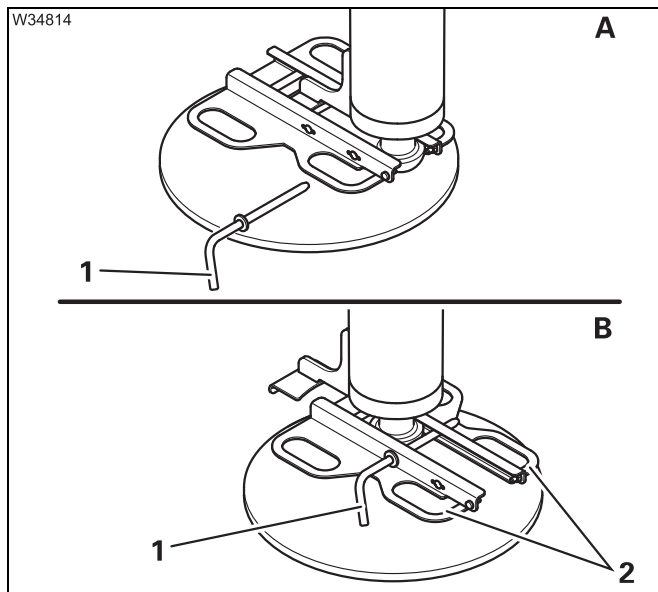


- Press the button
 - 5** For high-speed mode
 - 6** For normal speed.
- Additionally press the button for the desired outrigger beam.
 - 1** Extend left
 - 2** Retract left
 - 3** Retract right
 - 4** Extend right
 - 1 + 4** Extend both
 - 2 + 3** Retract both

The outrigger beams move until you let go of the respective button or until the respective end position has been reached.

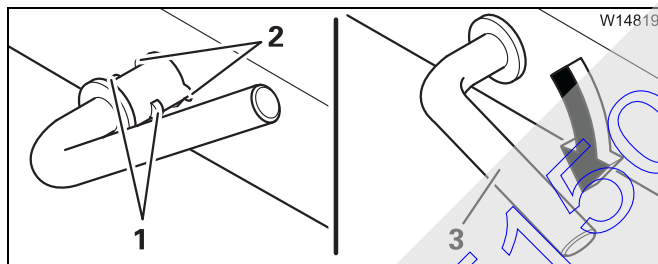
12.8.6

Moving the outrigger pads into operating/driving position



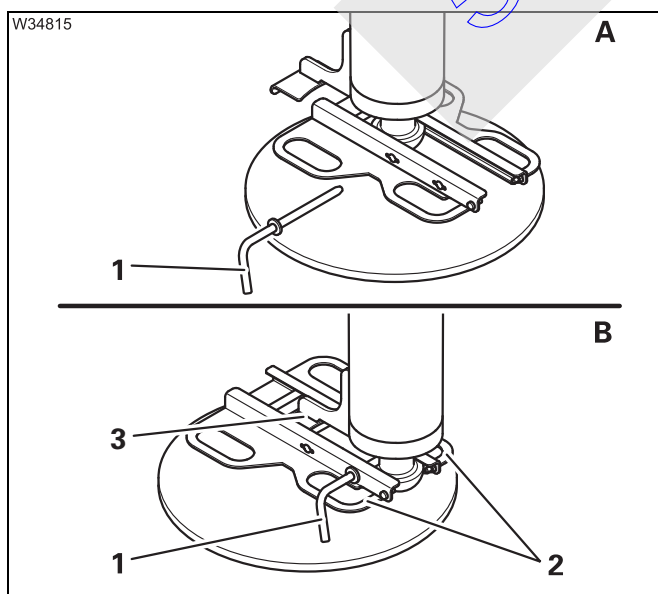
Moving them into working position

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



Securing pin

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



Moving into driving position


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

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12.8.7

Enlarging the load-bearing area

If the surface 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, use only suitable materials that will withstand the outrigger pressure, e.g. straight hardwood of similar cross-sections or steel plates with welded-on strips that will keep the outrigger pads in position.



Risk of accidents if the packing is insufficient

Only use materials of sufficient strength.

This will prevent the packing giving way and causing the truck crane to tilt and overturn.



Danger of overturning if the packing or truck crane is at an angle!

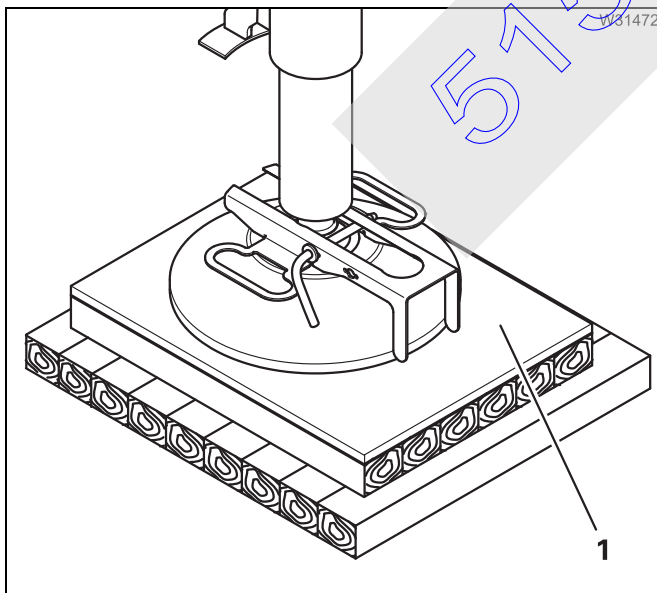
Level the packing and the truck crane.

This prevents the outrigger pads slipping off the inclined packing and causing the truck crane to overturn.



Risk of damage to the outrigger pads!

Always place a steel plate of sufficient strength as the uppermost 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.



Level the packing; the outrigger pad must not be at an angle.

Ensure that the outrigger pressure is evenly distributed over the packing:

- The outrigger pad must be positioned in the centre of the packing.
- The outrigger pad must cover all the wooden planks.
- If the packing has several layers, each layer must be placed below the other offset by 90°.
- The packing must lie flat on the ground.

Consult your supervisor if you are in doubt.



If the truck crane is equipped with plastic outrigger pads then the uppermost layer of the packing must be a steel plate (1) of sufficient strength.

12.8.8

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 withstand the resulting outrigger pressure.

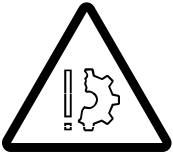
This prevents the ground under the outrigger pad giving way and causing the truck crane to tilt and overturn.



Risk of accidents if the supporting cylinders are out of sight

No one is allowed to be in the area of the supporting cylinders.

Observe the moving supporting cylinders or have them observed by a banksman who is in visual contact with you.



Risk of damage to the supporting cylinders

Move the outriggers as uniformly as possible on all four points under the boom. 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.

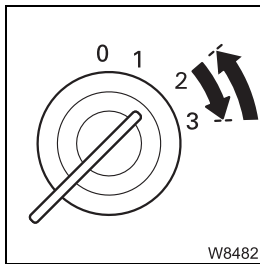


Do not extend the supporting cylinders to their absolute limit. The supporting cylinders must have a remaining stroke of at least 25 mm (1 in) in order to carry out alignment corrections.

There are various operating elements for moving the outrigger beams

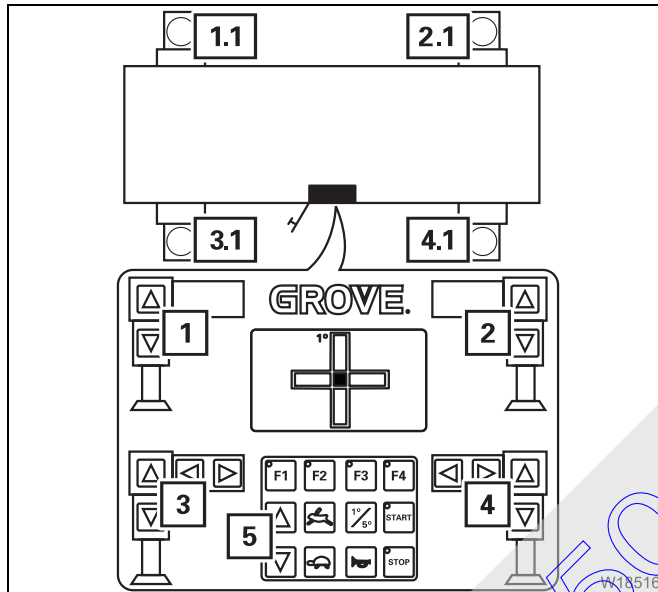
- On the *Outriggers* control units;  p. 12 - 57,
- In the crane cab;  p. 12 - 58.

From the control units



Starting the engine

- Start the engine, either
 - from the driver's cab; p. 4 - 13
 - or
 - from the control units; p. 12 - 27.

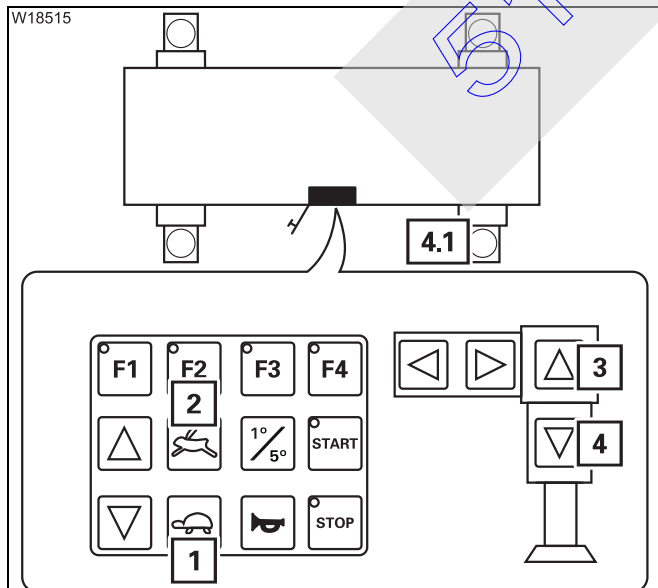


Moving the supporting cylinders

Assignment of buttons:

- 1 Supporting cylinder 1.1
- 2 Supporting cylinder 2.1
- 3 Supporting cylinder 3.1
- 4 Supporting cylinder 4.1
- 5 All supporting cylinders (1.1) to (4.1)

- Observe the safety instructions for operating the supporting cylinders; p. 12 - 56.



The operation is the same for all supporting cylinders.

- Press the button
 - 1 For normal speed
 - 2 For high-speed mode.
- Also press the button for the desired supporting cylinder, e.g. for 4.1.
 - 3 For retracting
 - 4 For extending

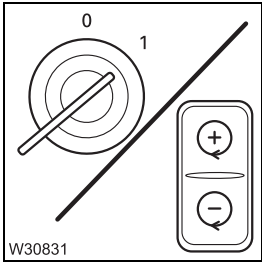
You can also operate several supporting cylinders at the same time.

The supporting cylinders move until you let go of the respective button or until the respective end position has been reached.



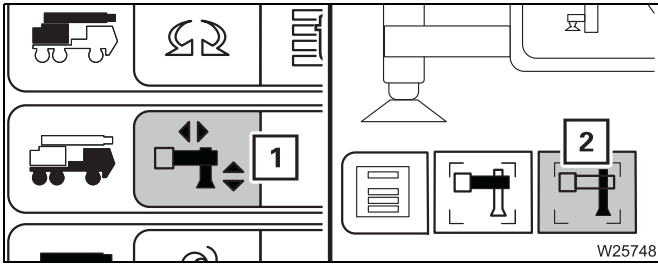
From the crane cab

The following operating elements are found in the *Outrigger* menu.



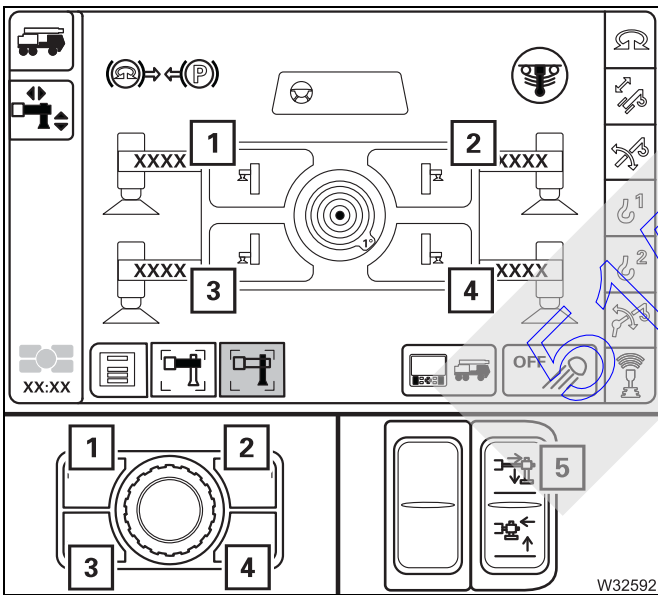
Starting the engine

- Start the engine from the crane cab; see p. 10 - 3.
- Switch off the slewing gear.



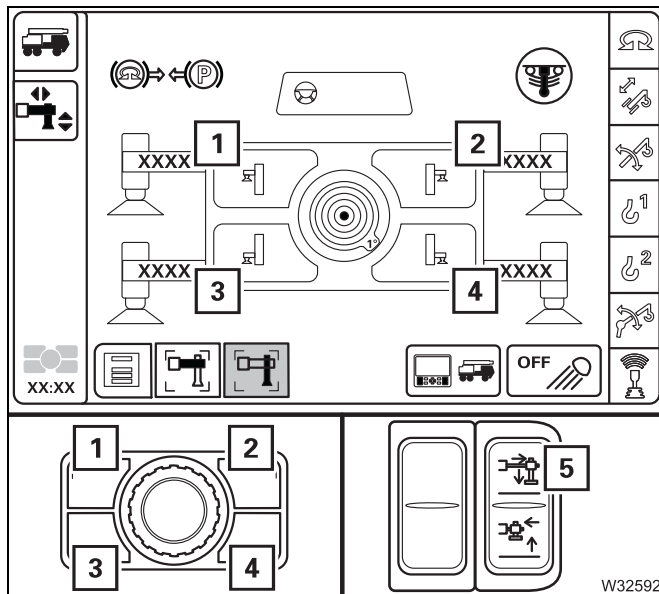
Menu, open

- Open the *Outrigger* menu (1).
- Select and confirm the symbol (2) – *Move outrigger cylinders*.



Extend

- Press the button for the desired outrigger cylinder.
 - 1 Front left
 - 2 Front right
 - 3 Rear left
 - 4 Rear right
- Press the button (5) in at the top – the selected supporting cylinder extends.



Retracting

- Press the button for the desired outrigger cylinder.
 - 1 Front left
 - 2 Front right
 - 3 Rear left
 - 4 Rear right
- Press the button (5) in at the bottom – the selected supporting cylinder retracts.

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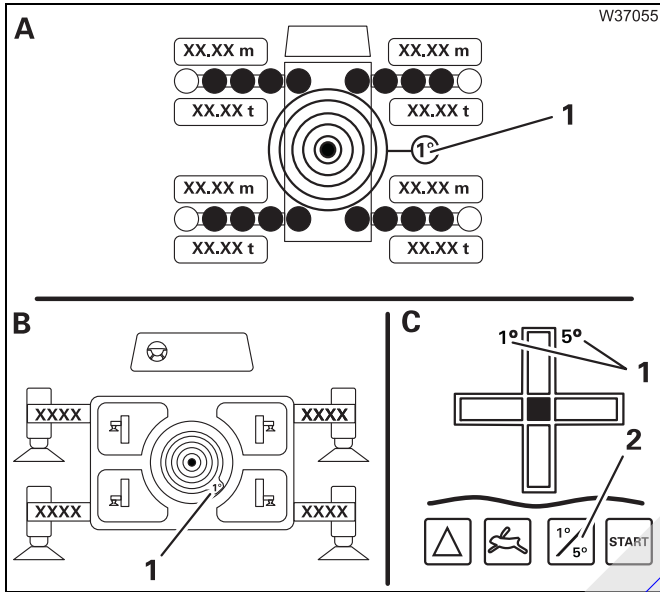
12.8.9

Levelling the truck crane on outriggers horizontally

You must level the truck crane before crane operation horizontally and possibly correct its horizontal alignment during crane operation.

Inclination indicators

After switching on the ignition, various inclination indicators display the current alignment.



A In the *Monitoring* menu

B In the *Outrigger* menu

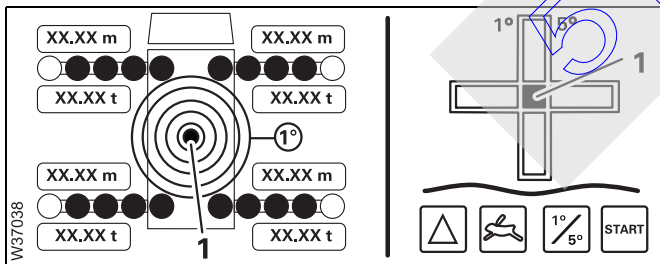
C On the *Outrigger* control units

Switching between measuring ranges

You can change the measuring range between 1° and 5°.

- Press the button (2) once.
The current measuring range (1) is displayed.

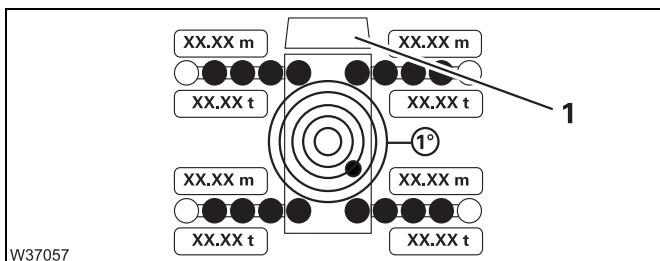
The measuring range is automatically switched in the *Outrigger* menu and the *Monitoring* menu.



Read the display

Only the lamp (1) at the centre is on if the truck crane is level.

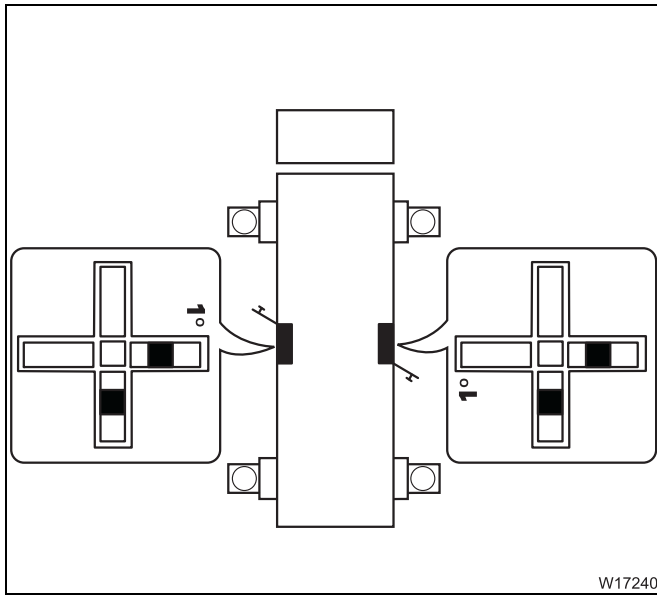
The other lamps show the sides of the truck crane which are higher.



- RCL / CCS display

The assignment to the carrier is given by the directional indicator (1).

In this example, the carrier would be standing higher to the rear on the right hand side.



– *Outrigger control units*

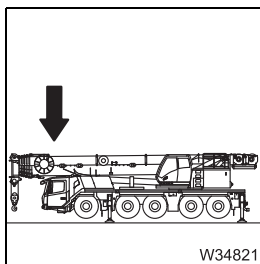
The assignment to the carrier corresponds to the top view.

Due to the position of the control units, the displays on both sides differ.

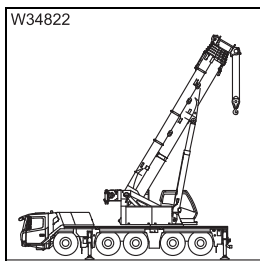
In this example, the carrier would be standing higher to the rear on the right hand side.

Prerequisites

The following prerequisites apply to manual and automatic alignment.



The main boom must be resting in the boom rest.



Or

- The main boom must be raised **and**
- the load must have been set down **and**
- the superstructure must be in the 0° or 180° position.



Risk of overloading the main boom

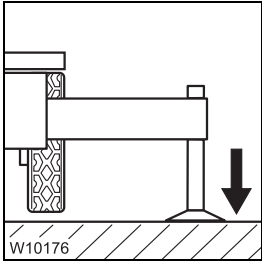
Always slew the superstructure to the 0° or 180° position and set down the load before levelling the truck crane.

In other positions, the deformation of the carrier will create incorrect results for the inclination and the truck crane will be at an angle. This could cause the boom to become overloaded during crane operation.

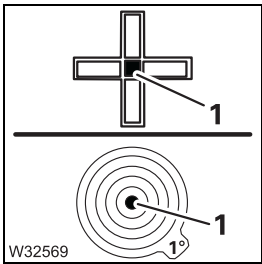



Manual alignment

- Check that the prerequisites are met;  p. 12 - 61.



- Extend all supporting cylinders until none of the wheels is touching the ground.



- Level the truck crane with the supporting cylinders until the lamp (1) is the only one lighting up in the measuring range 1°;  p. 12 - 56.
- 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 allowed by the RCL.

- After you have levelled the truck crane, check:
 - that all the 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.

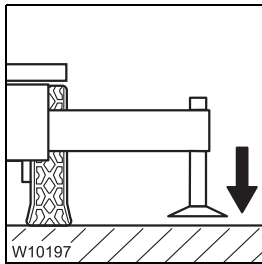
If slewing is permissible in the current rigging mode:

- Slew the superstructure within the permissible slewing range.
- Perform the specified checks again.
- Check the horizontal alignment on the inclination indicator.

Automatic alignment

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

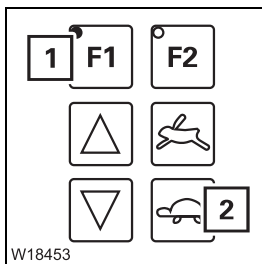
- Check that the prerequisites are met;  p. 12 - 61.



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

Starting procedure

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

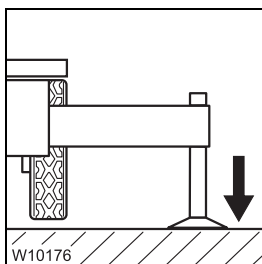


On the control units

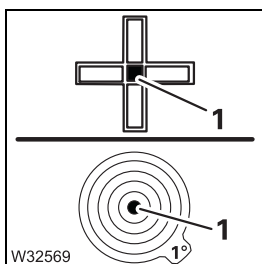
- Press the button (1) once.
- Additionally, press the button (2).

The procedure begins.

Automatic procedure



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



3. The truck crane is automatically leveled horizontally.

This procedure is performed:

- until horizontal alignment is reached, the lamp (1) in the centre is the only one lighting up in measuring range 1° **or**
- until you let go of a button **or**
- until horizontal alignment is no longer possible, e.g. when a supporting cylinder is extended as far as possible.



Danger of overturning if the truck crane is not level

When CCS ends the automatic alignment procedure, the truck crane is not necessarily level.

Always check the horizontal alignment on the inclination indicator after automatic levelling.

12.8.10

Levelling the free-standing truck crane



This section describes the levelling with the outrigger. You can level the truck crane using the axle raising; p. 12 - 66.

The suspension is deactivated (locked) if the truck crane is in the *Free on wheels* working position.

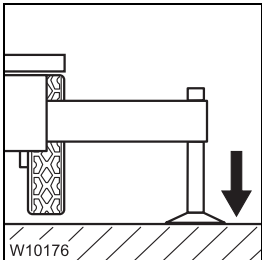
The suspension must remain switched off until the truck crane is on outriggers.



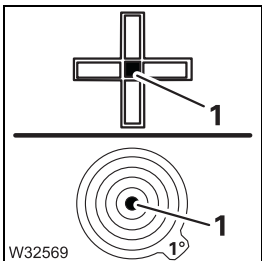
Danger of overturning if the supporting cylinders are operated unevenly

Extend or retract the supporting cylinders as evenly as possible.

This prevents the truck crane overturning while retracting individual outrigger cylinders.



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



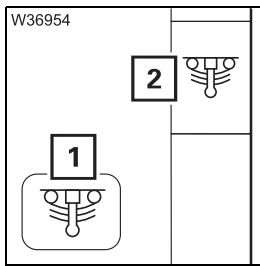
Levelling the truck crane

- Level the truck crane with the outriggers until only lamp (1) is illuminated in the measuring range 1°.



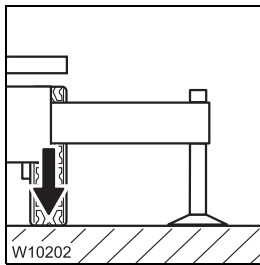
Danger of overturning when switching on the suspension

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 be suddenly collapsed and damaged, and the truck crane could overturn.

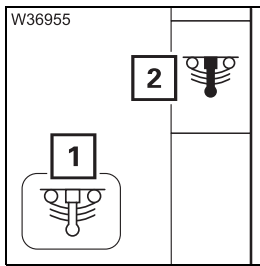


Switching on the suspension

- Select and confirm the symbol (1) once.
The symbol (2) is **green** if the suspension is switched on.

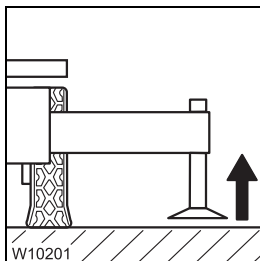


Now all wheels are lowered to the ground and are in the right position for the horizontal alignment.



Switching off the suspension

- Select and confirm the symbol (1) once.
The symbol (2) is **red** if the suspension is switched off.



To secure the truck crane

- Retract the supporting cylinders until the outrigger pads are about 5 to 10 cm (2 to 4 in) above the ground. Leave the outrigger beams extended.

12.8.11 Operating the axle raising system

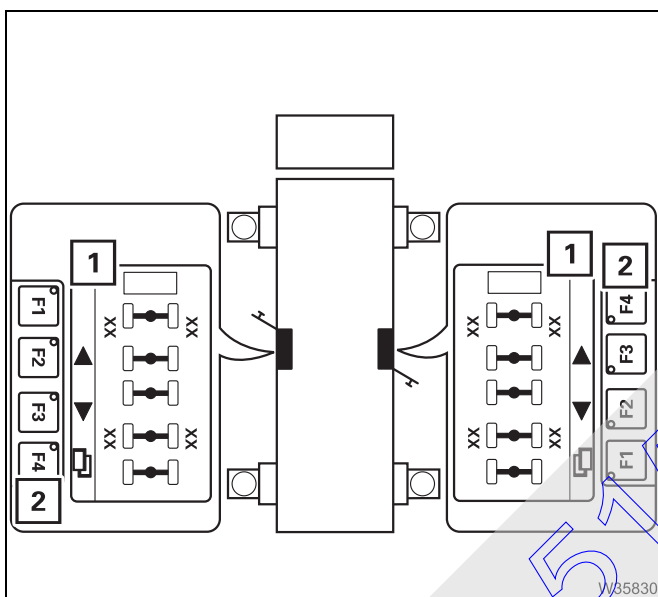
The axle raising system has two functions.

– Lifting/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.



Menu, open

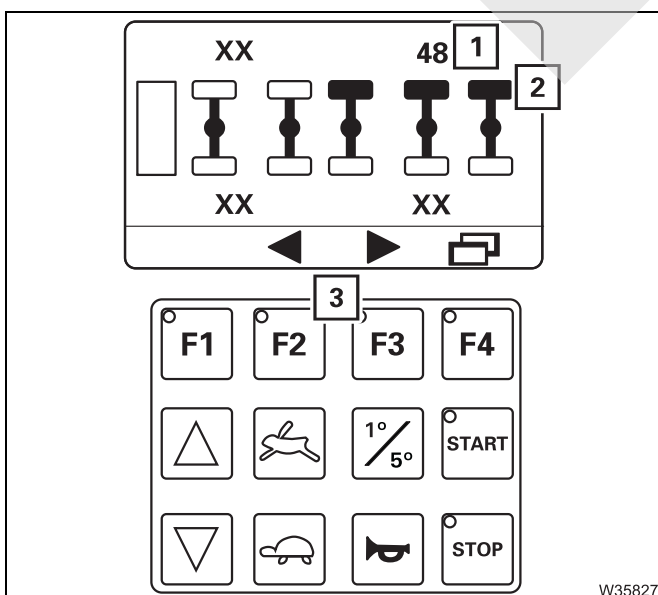
The *Raise axle* menu can only be opened when the suspension is switched off (locked);

▣▣▣▣ *Switching the suspension on/off*, p. 5 - 16.

- Press button (2) repeatedly until the *Raise Axle* menu (1) is displayed.

The assignment to the carrier corresponds to the top view.

The operation is same on both sides.

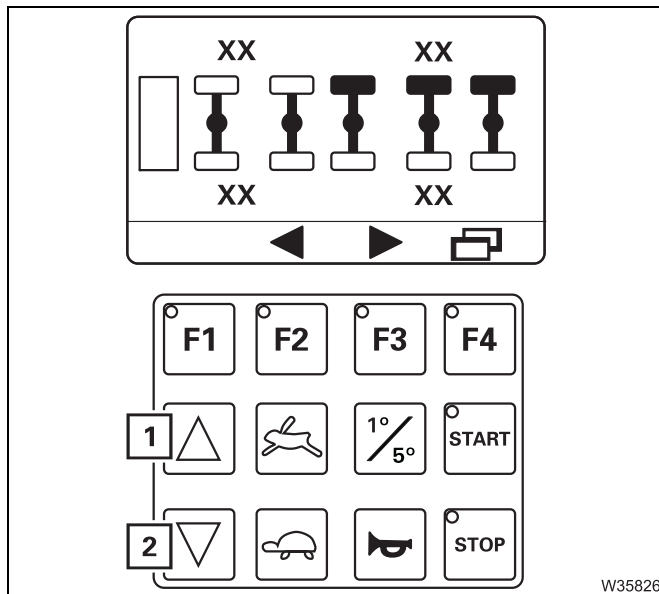


Only certain wheel groups can be selected;

▣▣▣▣ *Selectable wheel groups*, p. 9 - 106.

- 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 is a maximum of 16 t (35 klbs) – e.g. 48 t (105 klbs) on the display (1) with 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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12.8.12

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 - 60.

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.



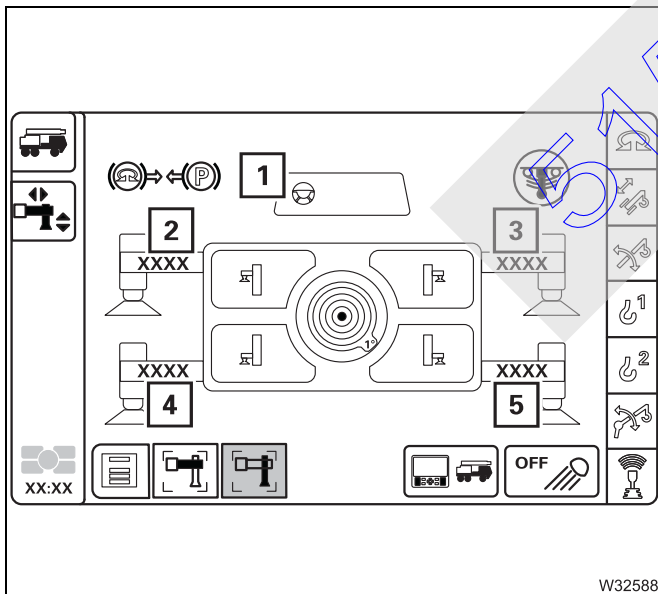
Outrigger cylinders retracted or extended as far as possible will lead to an incorrect outrigger pressure display.

The display will show the most accurate reading if the movement performed last was *Extend outrigger cylinders*.



Risk of accidents when misused

A displayed outrigger pressure over 0 t does not guarantee protection against overturning or overloading. For this reason, never override the RCL.

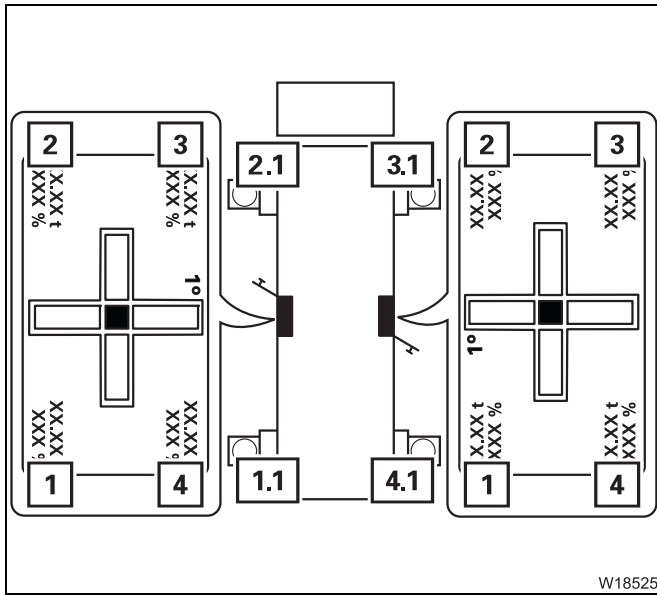


In the Outrigger menu

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

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On the outrigger control units

The assignment of the displays to the carrier corresponds to the top view.

- 1 Display for the supporting cylinder 1.1
- 2 Display for the supporting cylinder 2.1
- 3 Display for the supporting cylinder 3.1
- 4 Display for the supporting cylinder 4.1


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12.9

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

12.9.1

Information on rigging

Rigging the counterweight is a challenging task. Only experienced 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 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 other counterweight sections or blocks.

When rigging

As the crane operator

- Lift the counterweight section onto the counterweight platform as described in the section *Assembling counterweight combination*.
- 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 permitted by the crane operator.
- Position the counterweight if necessary.



As the crane operator

- Use only the *Raise/lower hoist* or *Raise/lower derricking gear* movements for setting down the counterweight. Execute the movement as slowly as possible.

Notify the rigging personnel if the superstructure need 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 free.

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 permitted by the crane operator.
- Sling 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.

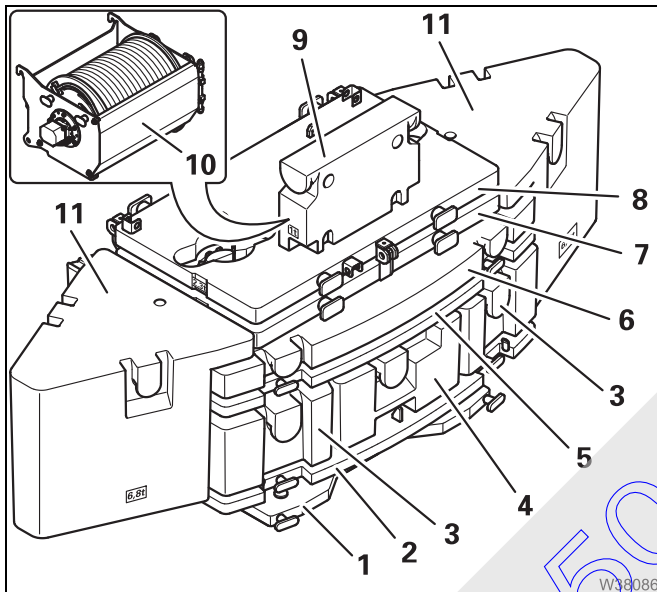
12.9.2

Counterweight sections

Depending on the version, the GMK5150L can be equipped with a counterweight mass of 1.0 t (2,205 lbs) or 44.5 t (98,106 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.

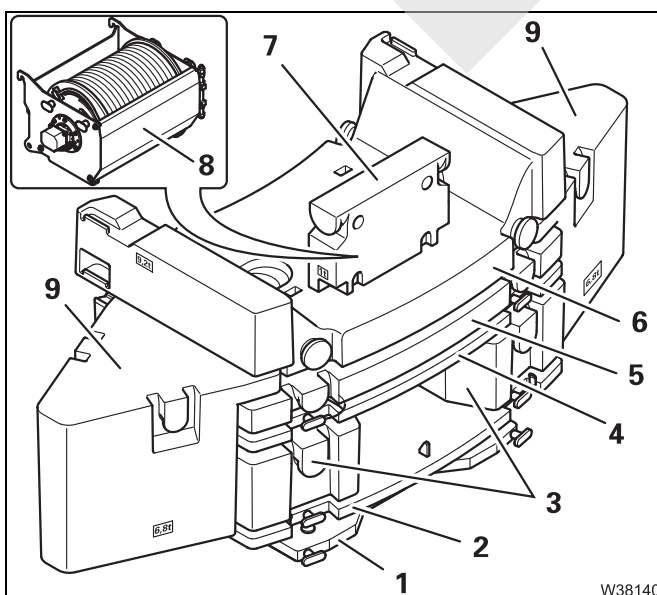


Counterweight

- one 2.3 t base plate (1),
- one 2.3 t section (2),
- two 4.6 t blocks (3),
- one 4.6 t block (4),
- one 2.3 t section (5),
- one 4.6 t section (6),
- one 2.3 t section (7),
- one 2.3 t section (8),
- one 1.0 t plate (9) or the auxiliary hoist (10),
- two 6.8 t blocks (11).

Version 2

With this version, 24 t maximum counterweight can be transported with the truck crane. The axle loads are over 12 t.



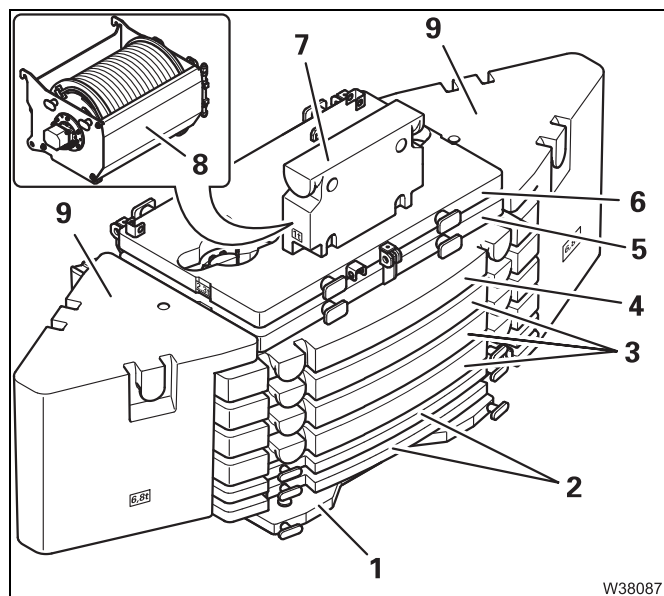
Counterweight

- one 1.0 t plate (7) or the auxiliary hoist (8),
- one 2.3 t base plate (1),
- one 2.3 t section (2),
- two 4.6 t blocks (3),
- one 2.3 t section (4),
- one 4.6 t section (5),
- one 9.2 t section (6),
- one 1.0 t plate (9) or the auxiliary hoist (10),
- two 6.8 t blocks (7).



Version 3

This version enables you to drive with maximum axle loads of 12 t.



Counterweight

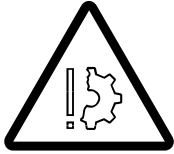
- one 1.0 t plate (1) or the auxiliary hoist (8),
- one 2.3 t base plate (1),
- two 2.3 t sections (2),
- three 4.6 t sections (3),
- one 4.6 t section (4),
- one 2.3 t section (5),
- one 2.3 t section (6),
- one 1.0 t plate (7) or the auxiliary hoist (8),
- two 6.8 t blocks (9).

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12.9.3

Identification

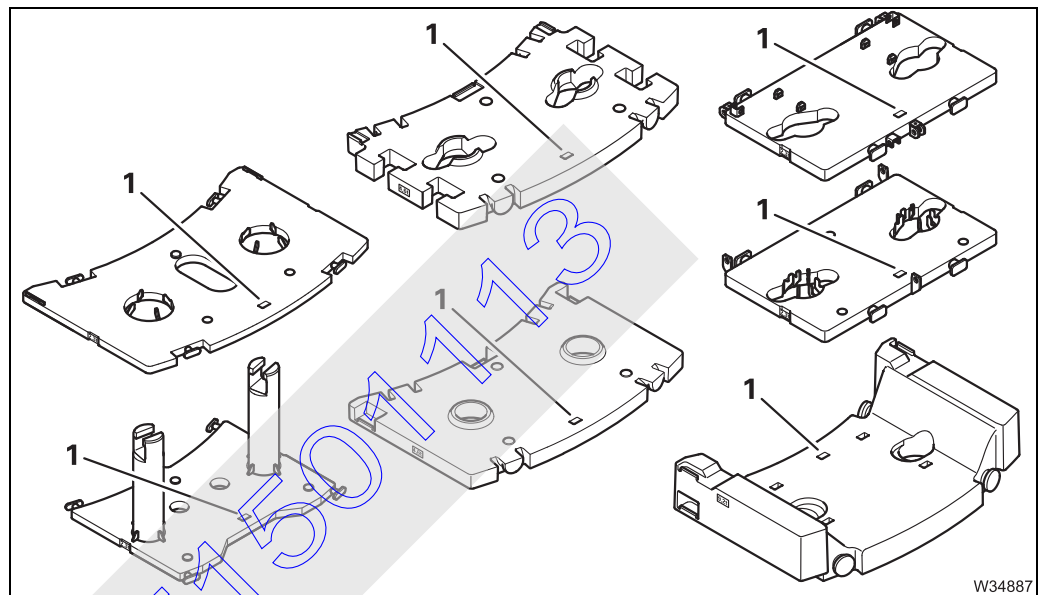
The truck crane and its corresponding counterweight sections are labelled with the same serial number.



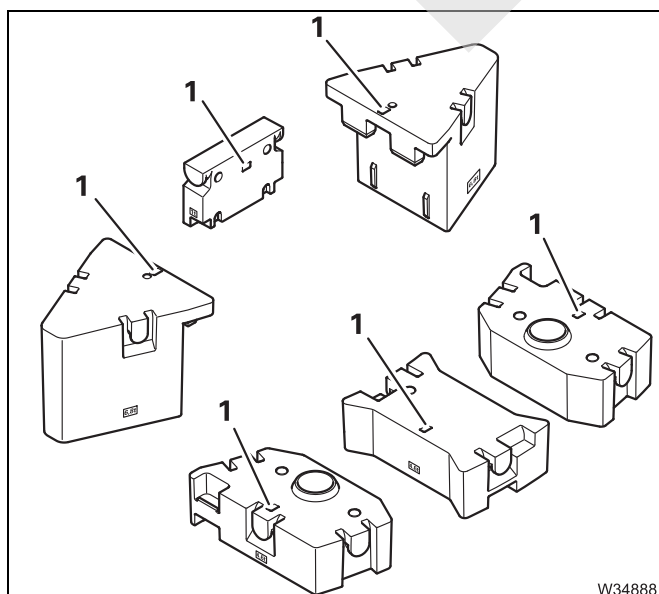
Danger if counterweight sections are interchanged

Operate the truck crane only with the counterweight sections that belong to it. The truck crane and counterweight sections are labelled with the same serial number.

Other or additional counterweight sections may not be rigged.



The base plate and the counterweight sections are labelled with the serial number (1).



Depending on the version, other counterweight sections, e.g. blocks, are labelled with a serial number (1).

12.9.4


Slings points on the counterweight sections



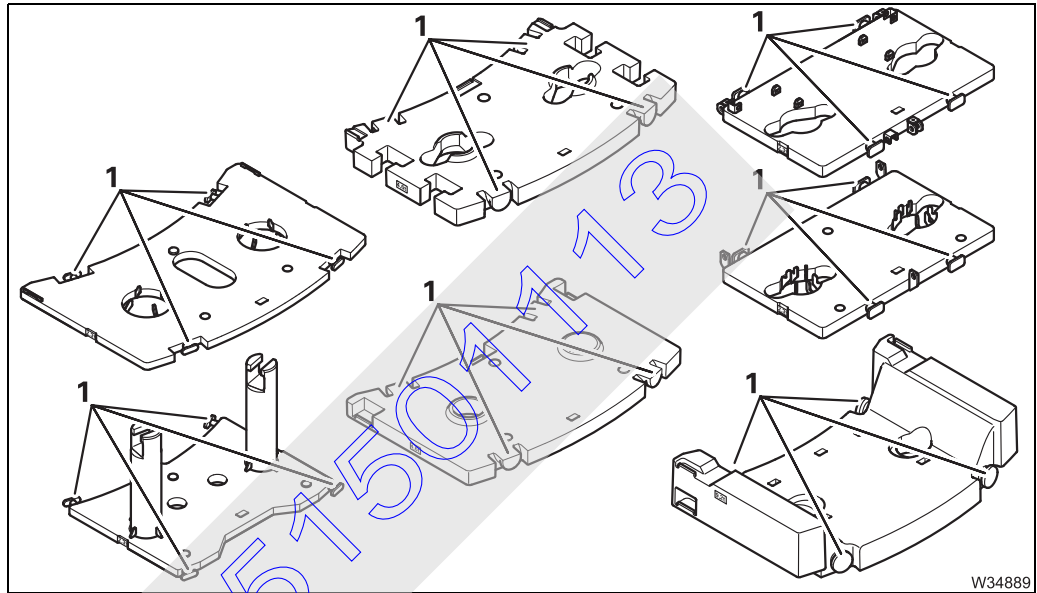
Risk of accident if used improperly

Attach the lifting gear to various counterweight section only at the appropriate slinging points. Ensure the lifting gear has sufficient load bearing capacity.

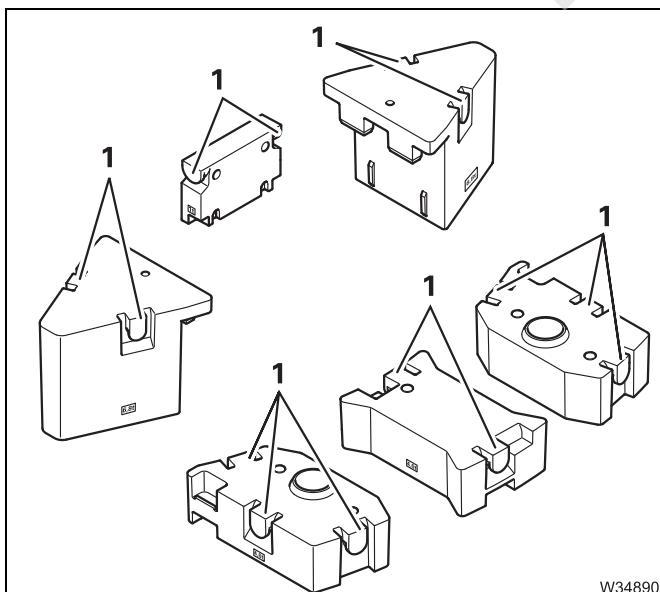
Lift a maximum of two stacked 4.6 t plates. The slinging points of the other plates are not designed for lifting stacked plates.

- Only use lifting gear of sufficient load bearing capacity.
Weights;  *Counterweight parts*, p. 1 - 14.

Sections



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



Blocks

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

12.9.5

CHECKLIST: Rigging the counterweight



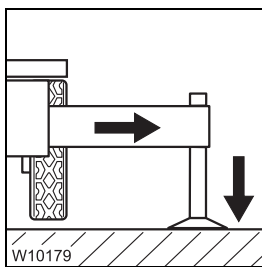
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified here!



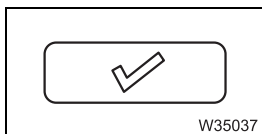
Danger of overturning when slewing with a rigged counterweight

Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius).

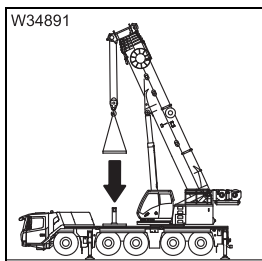
Correct the rigging mode if necessary; *Slewing with rigged counterweight*, p. 12 - 113.



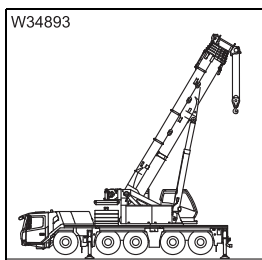
1. The truck crane is stabilised with the outrigger span required for crane work according to the *load capacity chart*. Enabled outrigger spans
 - For the *Standard* slewing range type; p. 12 - 32
 - For the *MAXbase* slewing range type; p. 12 - 36



2. Enter and confirm the current rigging mode; p. 11 - 32.

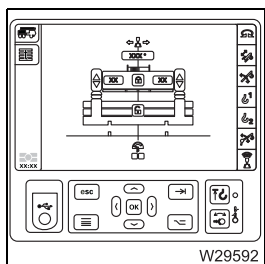




3. Assemble the required combination of counterweights:
 - Slings points on the counterweight sections*, p. 12 - 76
 - Assembling counterweight combination*, p. 12 - 80

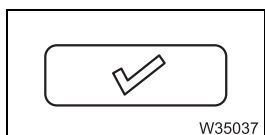




4. Slew the superstructure to the 0° to the rear position;
 - Braking the slewing movement*, p. 11 - 119.





5. – Open *Counterweight* menu
 - Correct the rigging mode, if necessary;  p. 12 - 104,
 - Slew the superstructure into the rigging range and lift counterweight to the turntable (automatic) and pre-charge;  p. 12 - 106.



6. Enter the current rigging mode with the new rigged counterweight combination at the RCL display;  p. 11 - 32.
7. Only switch on the slewing gear if slewing is permissible for the current outrigger span;  *Slewing with rigged counterweight*, p. 12 - 113

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12.9.6

CHECKLIST: Unrigging the counterweight



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

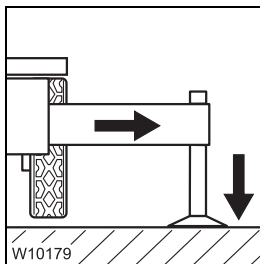
Observe the warnings and safety instructions specified here!



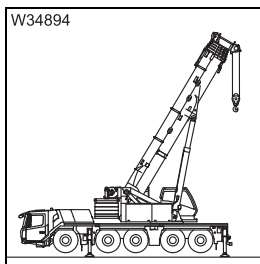
Danger of overturning when slewing with a rigged counterweight

Before slewing with the rigged counterweight, check whether slewing is permissible with the rigged outrigger span or with the truck free on wheels;

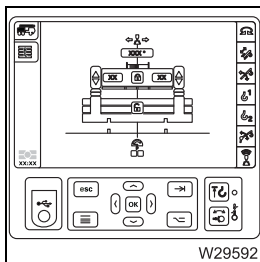
▣▣▣▣ *Slewing with rigged counterweight*, p. 12 - 113.



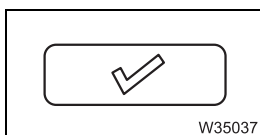
1. The truck crane is stabilised with the outrigger span required for crane work according to the *Load capacity chart*. Enabled outrigger spans
 - For the *Standard* slewing range type; ▣▣▣▣ p. 12 - 32
 - For the *MAXbase* slewing range type; ▣▣▣▣ p. 12 - 36



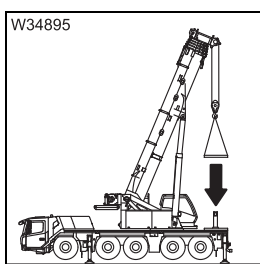
2. Slew the superstructure to the 0° to the rear position;
 - ▣▣▣▣ *Braking the slewing movement*, p. 11 - 119,



3. - Open *Counterweight* menu;
 - Correct the rigging mode, if necessary; ▣▣▣▣ p. 12 - 104,
 - Use the automatic system to lower the counterweight on to the counterweight platform; ▣▣▣▣ p. 12 - 106.



4. Enter the current rigging mode with the currently rigged counterweight combination; ▣▣▣▣ p. 11 - 32.



5. Lift the counterweight sections off the counterweight platform, as required by the respective driving mode;
 - ▣▣▣▣ *Slings points on the counterweight sections*, p. 12 - 76,
 - ▣▣▣▣ *Driving modes*, p. 6 - 1.

12.9.7

Assembling counterweight combination



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 titled *Slewing with rigged counterweight*, p. 12 - 113 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 versions 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 from the counterweight platform that could become jammed or crushed!



Risk of crushing when slewing the superstructure

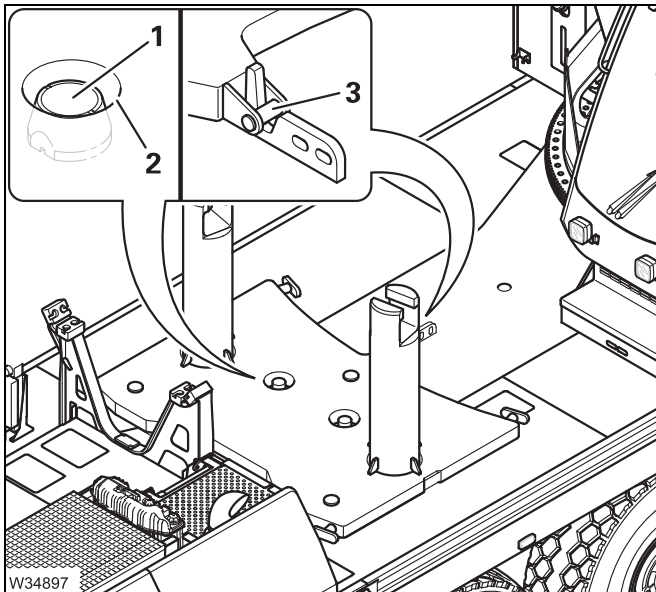
The access ladders are located in the slewing range of the superstructure. Make sure nobody uses the access ladders (helpers for example) whilst you are lifting a section on to the counterweight platform.



Risk of accidents due to falling counterweight sections

Only attach the counterweight sections to the appropriate slinging points and use lifting gear of sufficient load bearing capacity.

Setting down the 2.3 t base plate



With versions 1, 2 and 3

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 centrally on the carrier.

- Position the 2.3 t base plate in such a way that the holders (1) grip into the recesses (2).

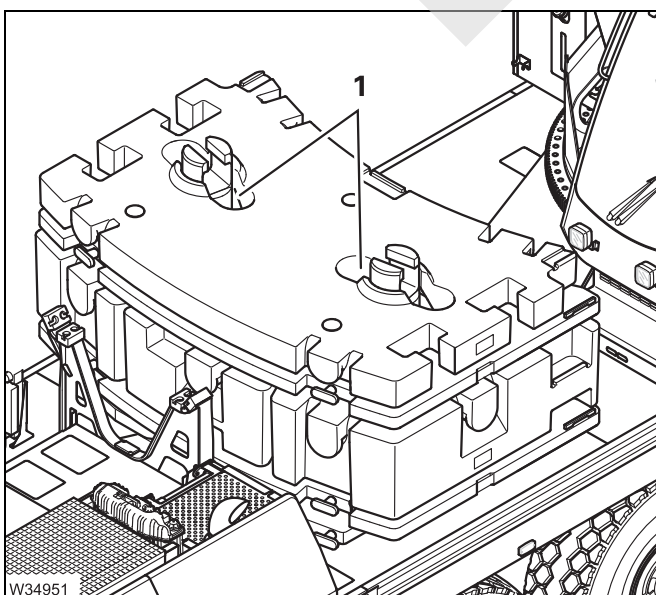
For larger counterweight combinations, now set additional counterweight sections onto the 2.3 t base plate.



Risk of damage to the counterweight

Always position the 4.6 t section at the top. This prevents the lifting cylinders and counterweight being damaged while rigging.

Setting down the top counterweight section



With versions 1, 2 and 3

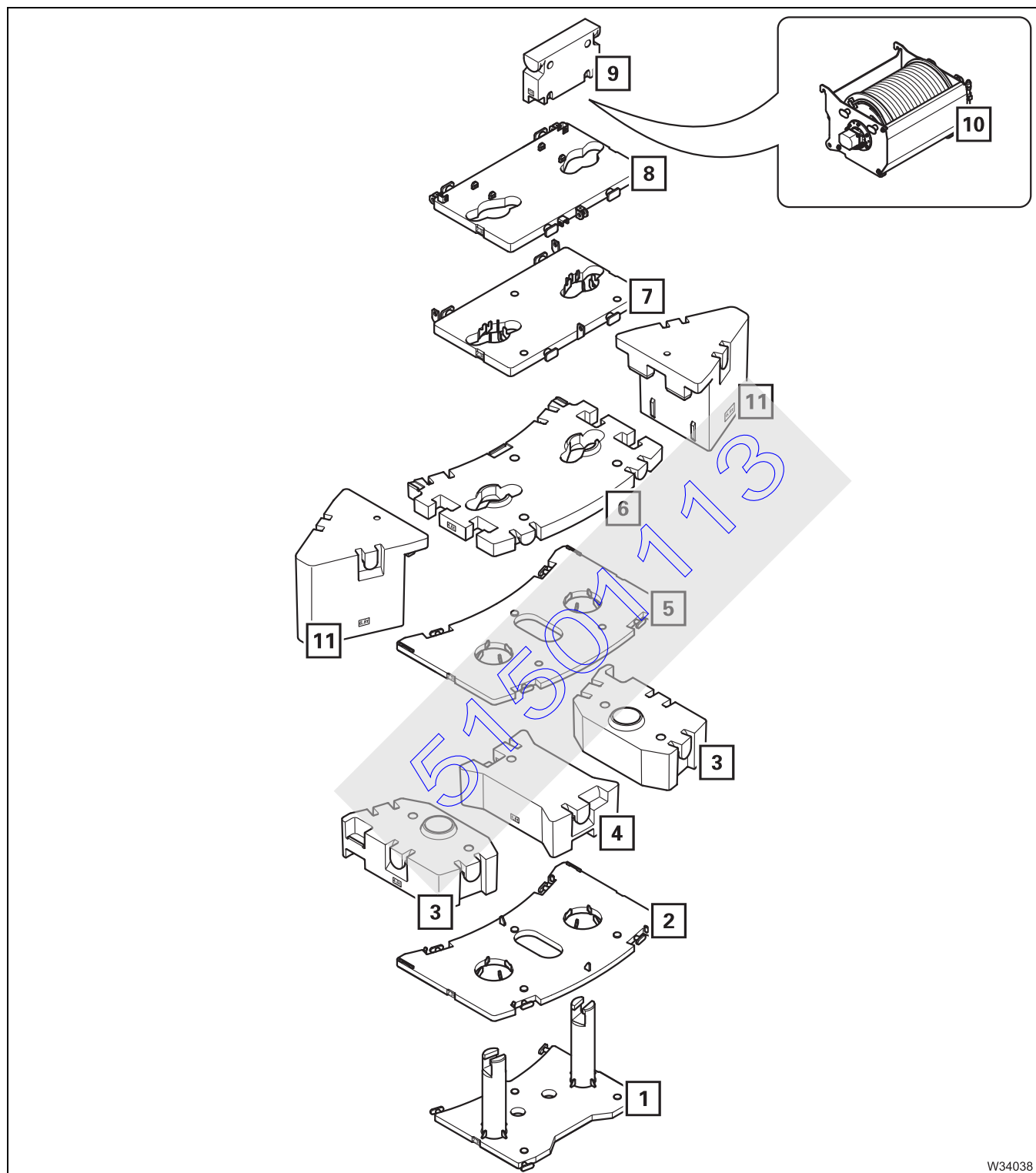
Always place a plate with cutouts (1) as the uppermost counterweight section.

Only then can the lifting cylinder be rotated into the 2.3 t base plate.




Version 1

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



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- Lift the counterweight sections onto the base plate;  *Slings points on the counterweight sections, p. 12 - 76.*

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 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) 11
1.0 (2,205)	-	-	-	-	-	-	-	-	●	-
3.3 (7,275)	●	-	-	-	-	-	-	-	●	-
	-	-	-	-	-	-	-	● ⁴⁾	●	-
5.6 (12,346)	●	●	-	-	-	-	-	-	●	-
	●	-	-	-	-	-	●	-	●	-
	●	-	-	-	-	-	●	●	●	-
	-	-	-	-	-	-	● ⁵⁾	● ⁴⁾	●	-
7.9 (17,417)	●	● ³⁾	-	-	●	-	-	-	●	-
	●	-	-	-	-	●	-	-	●	-
	●	● 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

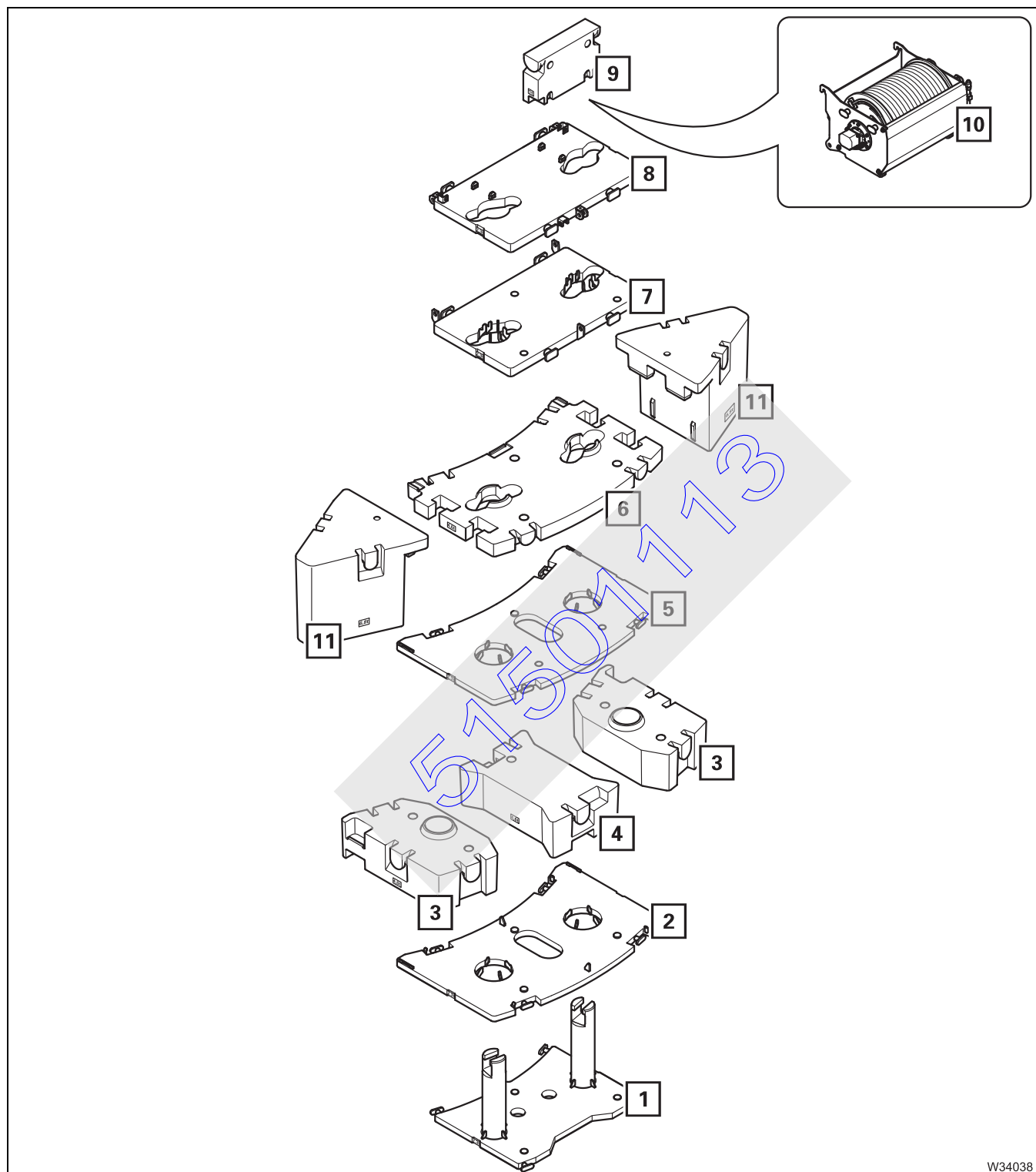
5) 7 Must be installed under 8

6) 7 Must lie on top, or lie under 8 or 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 which can be rigged.



W34038

- Lift the counterweight sections onto the base plate;  *Slingsing points on the counterweight sections, p. 12 - 76.*

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)	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⁾	11
10.2 (22,487)	●	● ³⁾	-	-	-	●	-	-	●	-
	●	-	-	-	●	●	-	-	●	-
	●	● ³⁾	-	-	●	-	-	● ⁴⁾	●	-
	●	-	-	-	●	-	● ⁶⁾	● ⁷⁾	●	-
	●	● ³⁾	-	-	-	-	● ⁵⁾	● ⁴⁾	●	-
12.5 (27,558)	●	● ³⁾	-	-	●	●	-	-	●	-
	●	● ³⁾	-	-	-	●	-	● ⁴⁾	●	-
	●	● ³⁾	-	-	●	-	● ⁵⁾	● ⁴⁾	●	-
14.8 (32,628)	●	●	2 x	-	-	-	-	-	●	-
	●	● ³⁾	-	-	●	●	-	● ⁴⁾	●	-
	●	● ³⁾	-	-	-	●	● ⁵⁾	● ⁴⁾	●	-
17.1 (37,699)	●	●	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

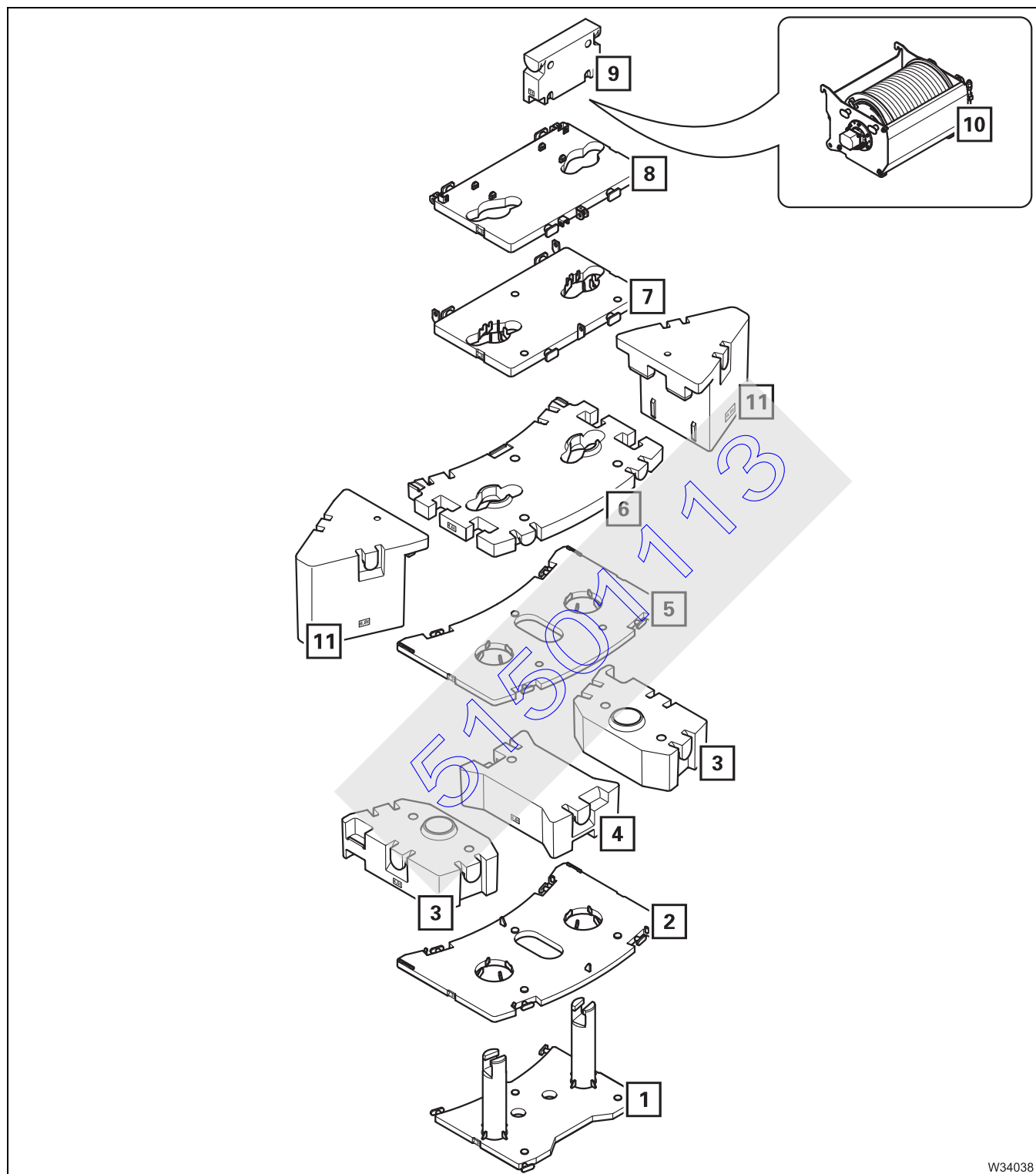
5) 7 Must be installed under 8

6) 7 Must lie on top, or lie under 8 or 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 which can be rigged.



W34038

- Lift the counterweight sections onto the base plate;  *Slingsing points on the counterweight sections, p. 12 - 76.*

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)	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⁾	11
19.4 (42,770)	●	●	2 x	●	-	-	-	-	●	-
	●	●	2 x	-	-	●	-	-	●	-
	●	●	2 x	-	●	-	● ³⁾	-	●	-
	●	●	2 x	-	●	-	-	● ⁷⁾	●	-
	●	●	2 x	-	-	-	● ⁶⁾	● ⁷⁾	●	-
21.7 (47,840)	●	●	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

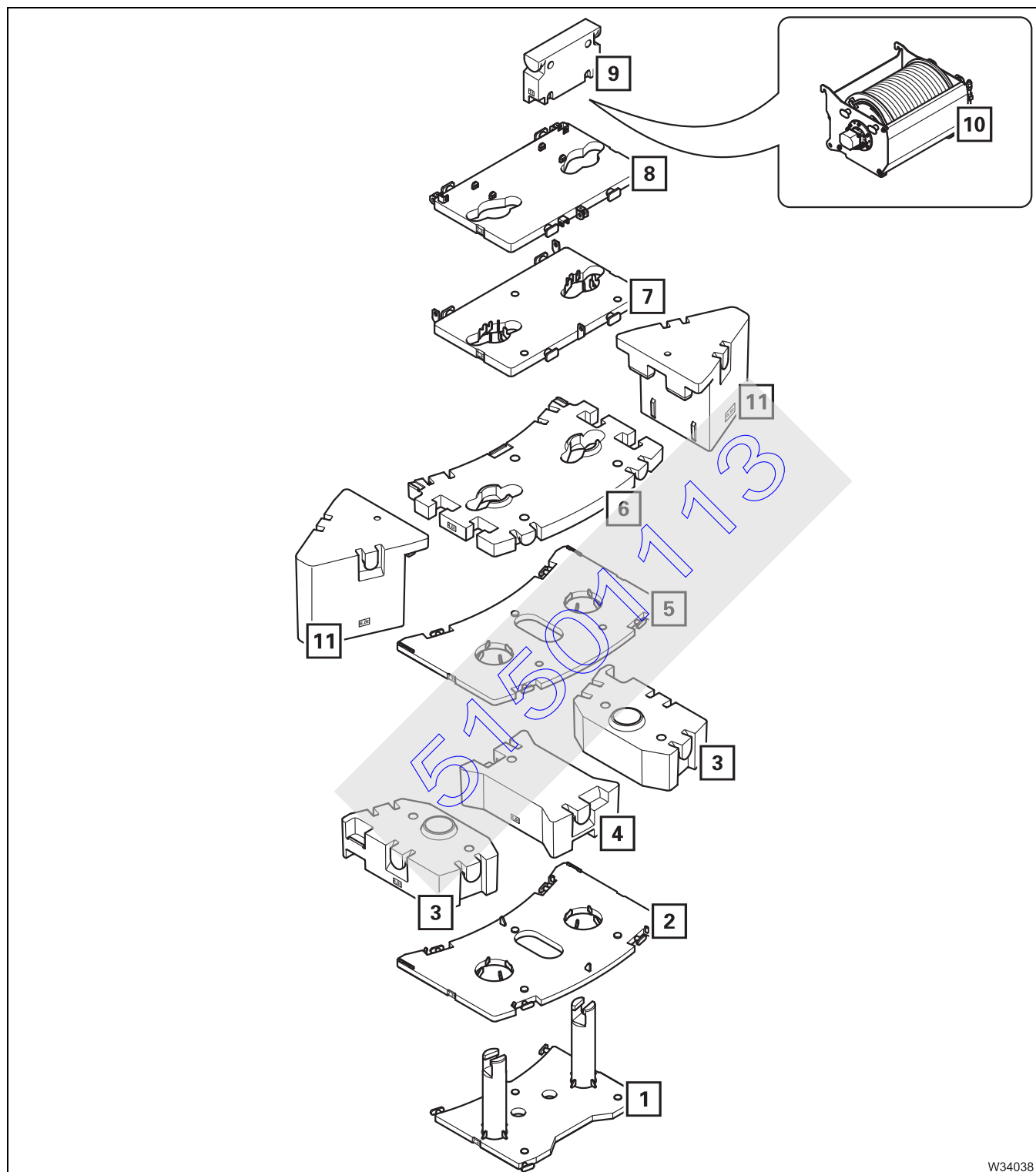
5) 7 Must be installed under 8

6) 7 Must lie on top, or lie under 8 or 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 which can be rigged.



W34038

- Lift the counterweight sections onto the base plate;  *Slings points on the counterweight sections, p. 12 - 76.*

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)	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⁾	11
24.0 (52,911)	●	●	2 x	●	-	●	-	-	●	-
	●	●	2 x	●	●	-	● ³⁾	-	●	-
	●	●	2 x	-	●	●	● ³⁾	-	●	-
	●	●	2 x	●	●	-	-	● ⁷⁾	●	-
	●	●	2 x	-	●	●	-	● ⁷⁾	●	-
	●	●	2 x	-	-	●	● ⁶⁾	● ⁷⁾	●	-
	●	●	2 x	●	-	-	● ⁶⁾	● ⁷⁾	●	-
26.3 (57,982)	●	●	2 x	●	●	●	-	-	●	-
	●	●	2 x	●	-	●	● ³⁾	-	●	-
	●	●	2 x	●	-	●	-	● ⁷⁾	●	-
	●	●	2 x	●	●	●	● ⁶⁾	● ⁷⁾	●	-
	●	●	2 x	●	●	-	● ⁶⁾	● ⁷⁾	●	-
30.9 (68,123)	●	●	2 x	●	●	● ⁸⁾	● ⁶⁾	● ⁷⁾	●	-
44.5 (98,106)	●	●	2 x	●	●	● ⁸⁾	● ⁶⁾	● ⁷⁾	●	2 x

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 installed under 8

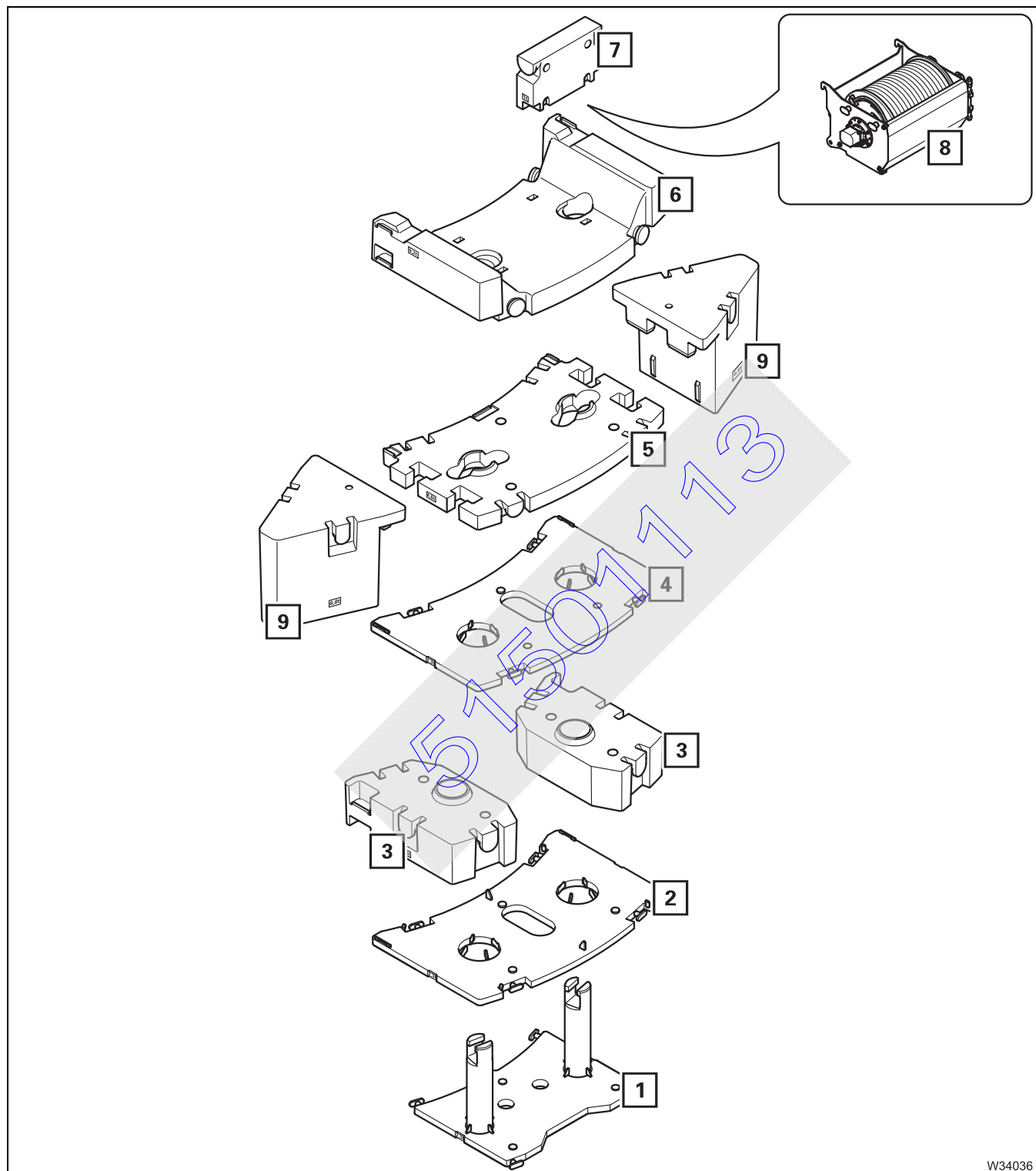
7) 8 Must lie on top or be installed on the turntable


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 which can be rigged.



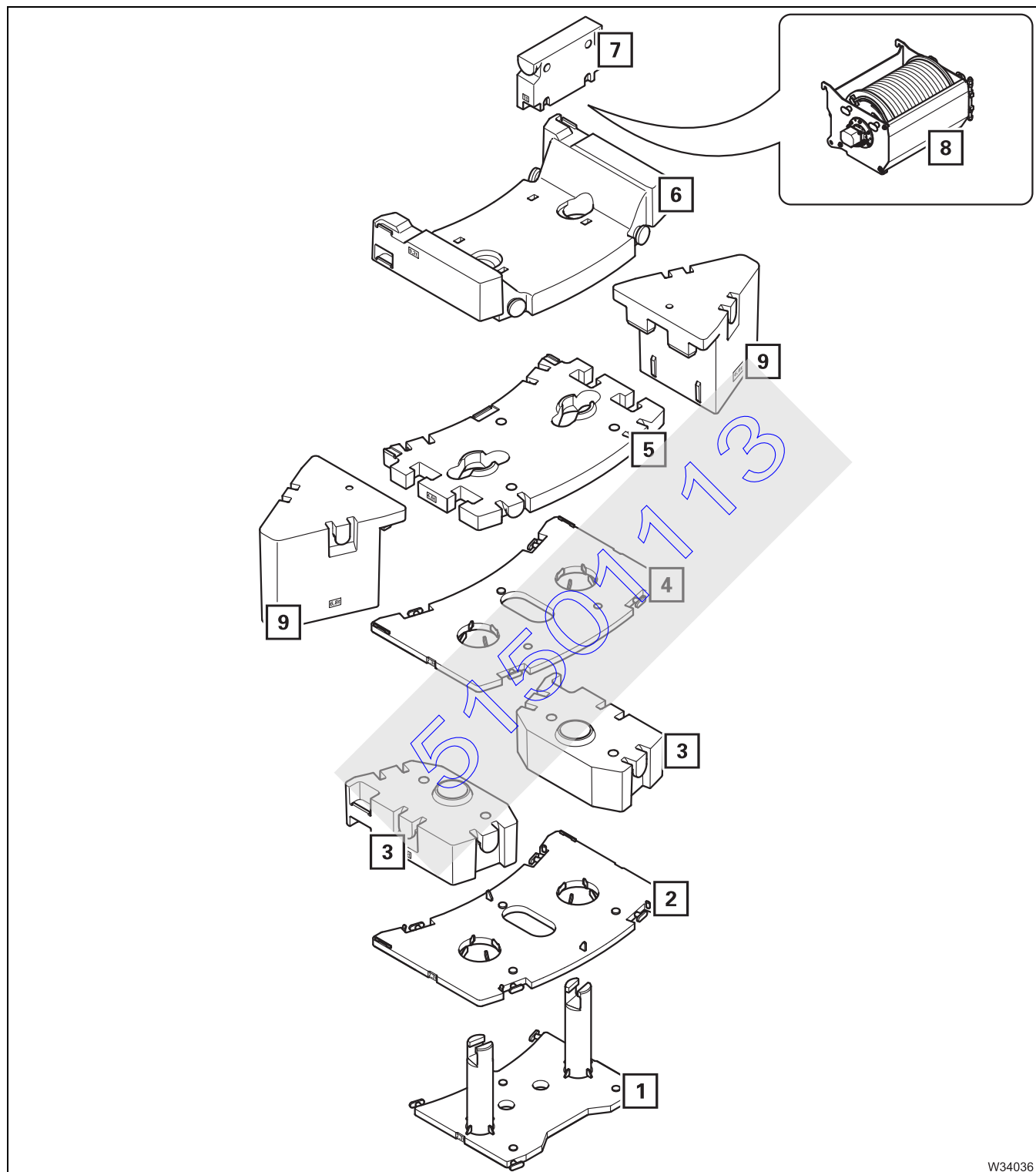
- Lift the counterweight sections onto the base plate;  *Slings points on the counterweight sections, p. 12 - 76.*


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 ¹⁾	2.3 (5,071) 4	4.6 (10,142) 5	9.2 (20,283) 6 ²⁾	1.0 (2,205) 7 ³⁾	6.8 (14,991) 9
1.0 (2,205)	-	-	-	-	-	-	●	-
3.3 (7,275)	●	-	-	-	-	-	●	-
5.6 (12,346)	●	●	-	-	-	-	●	-
7.9 (17,417)	●	● ⁴⁾	-	●	-	-	●	-
	●	-	-	-	●	-	●	-
10.2 (22,487)	●	● ⁴⁾	-	-	●	-	●	-
	-	-	-	-	-	●	●	-
12.5 (27,558)	●	● ⁴⁾	-	●	●	-	●	-
	●	-	-	-	-	●	●	-
14.8 (32,628)	●	●	●	-	-	-	●	-
	●	●	-	-	-	●	●	-
17.1 (37,699)	●	●	●	●	-	-	●	-
	●	● ⁴⁾	-	●	-	●	●	-
19.4 (42,770)	●	●	●	-	●	-	●	-
	●	● ⁴⁾	-	-	●	●	●	-

- 1) Must always lie on 2.
- 2) Must be installed on the turntable.
- 3) Or use 8.
- 4) Must always lie on top.



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



- Lift the counterweight sections onto the base plate;  *Slings points on the counterweight sections, p. 12 - 76.*

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] ¹⁾	2.3 (5,071) [4]	4.6 (10,142) [5]	9.2 (20,283) [6] ²⁾	1.0 (2,205) [7] ³⁾	6.8 (14,991) [9]
19.4 (42,770)	●	●	●	-	●	-	●	-
	●	● ⁴⁾	-	-	●	●	●	-
21.7 (47,840)	●	●	●	●	●	-	●	-
	●	● ⁴⁾	-	●	●	●	●	-
24.0 (52,911)	●	●	●	-	-	●	●	-
26.3 (57,982)	●	●	●	●	●	●	●	-
30.9 (68,123)	●	●	●	●	● ⁴⁾	●	●	-
44.5 (98,106)	●	●	●	●	● ⁴⁾	●	●	2 x

1) Must always lie on [2].

2) Must be installed on the turntable.

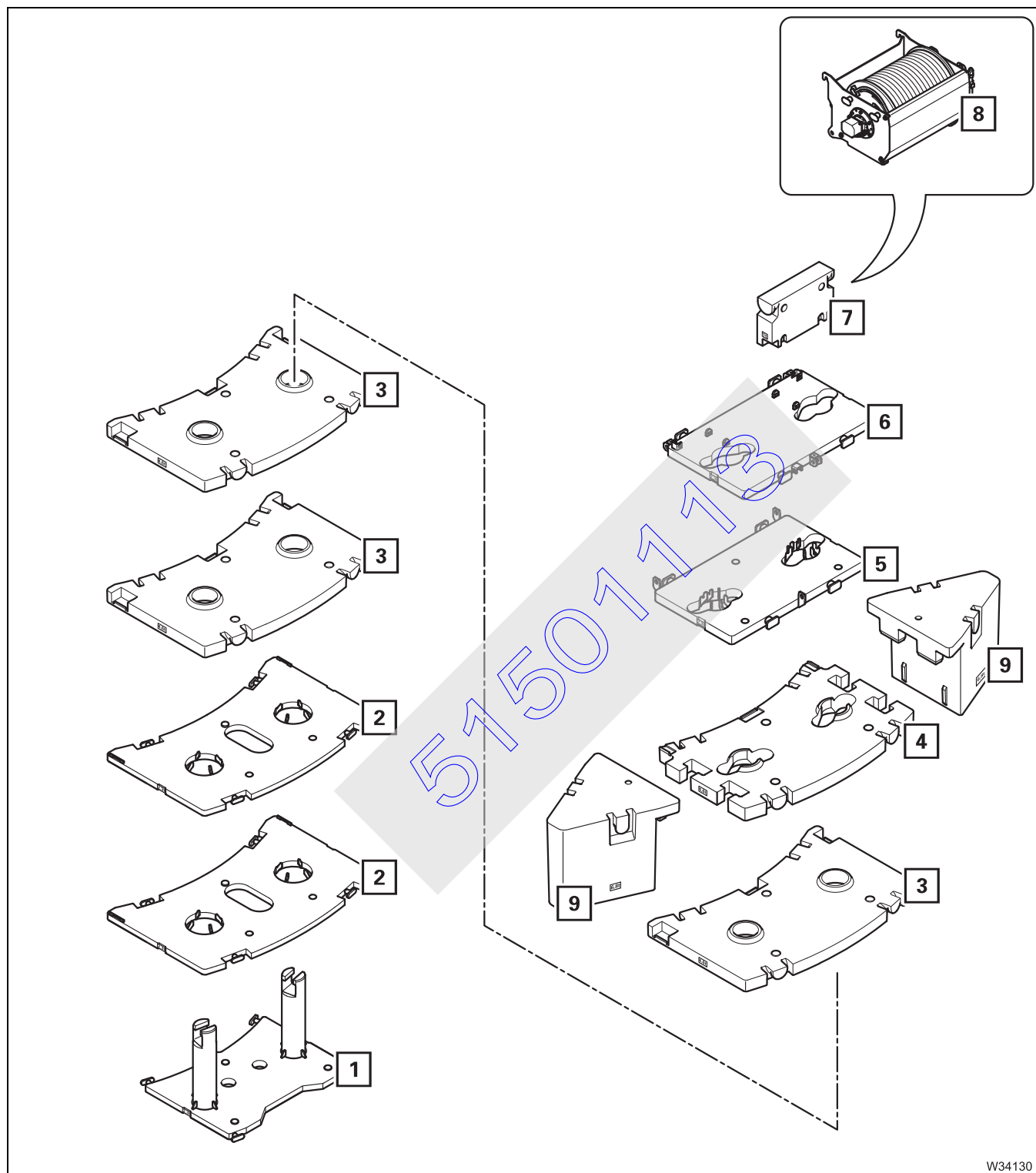
3) Or use [8].


4) Must always lie on top.



Version 3

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



- Lift the counterweight sections onto the base plate;  Sliding points on the counterweight sections, p. 12 - 76.

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) [9]
1.0 (2,205)	-	-	-	-	-	-	●	-
3.3 (7,275)	●	-	-	-	-	-	●	-
	-	-	-	-	-	● ³⁾	●	-
5.6 (12,346)	●	1 x	-	-	-	-	●	-
	●	-	-	-	-	●	●	-
	●	-	-	-	● ⁵⁾	-	●	-
	-	-	-	-	● ⁵⁾	● ⁴⁾	●	-
7.9 (17,417)	●	2 x	-	-	-	-	●	-
	●	-	1 x ²⁾	-	-	-	●	-
	●	1 x	-	-	● ⁵⁾	-	●	-
	●	1 x	-	-	-	● ⁷⁾	●	-
	●	-	-	-	● ⁶⁾	● ⁷⁾	●	-
10.2 (22,487)	●	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]

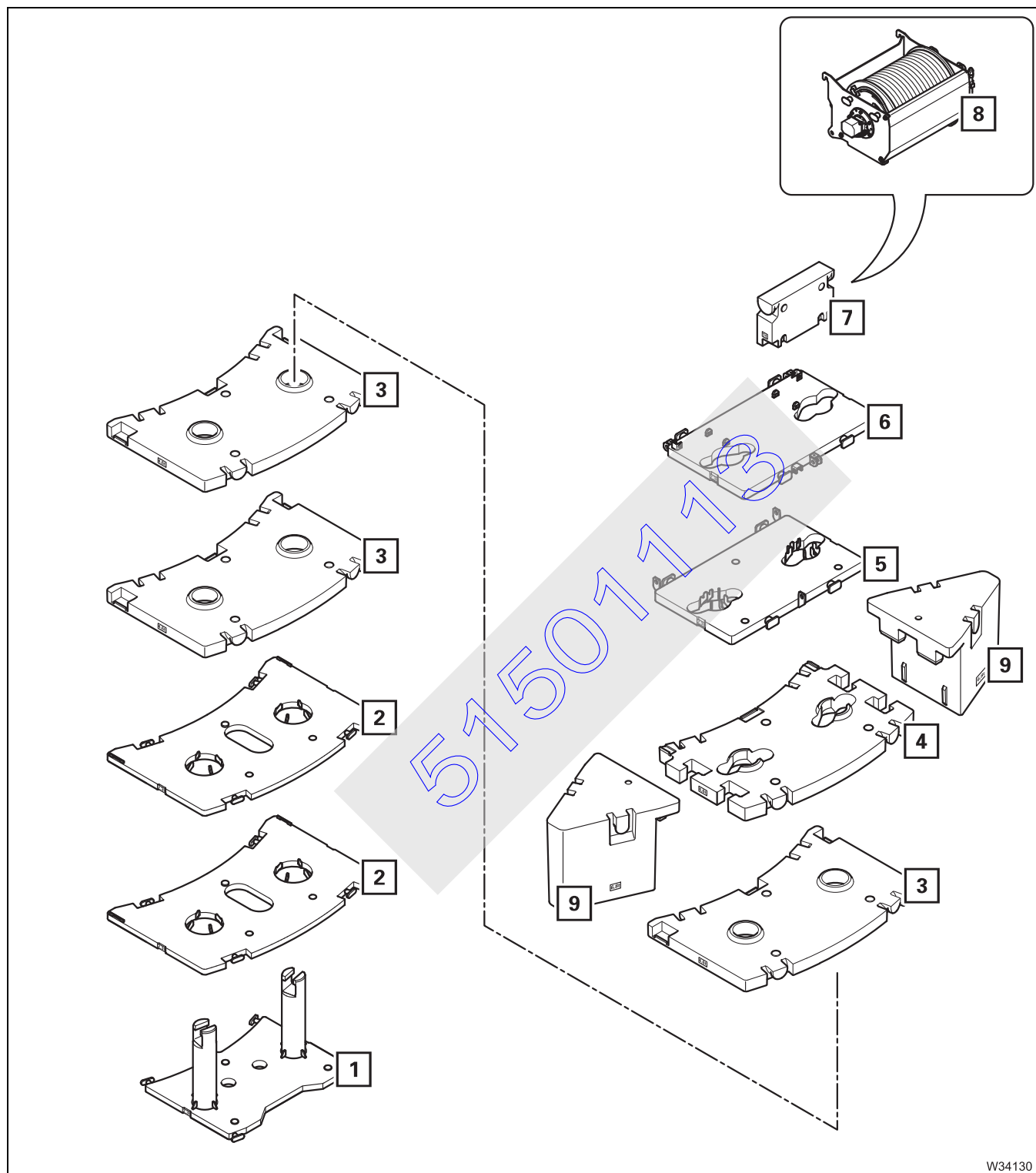
5) Must always lie on top

6) [5] Must lie on top, or lie under [6] or 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 which can be rigged.



W34130

- Lift the counterweight sections onto the base plate;  Sliding points on the counterweight sections, p. 12 - 76.

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) [9]
12.5 (27,558)	●	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 (32,628)	●	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]

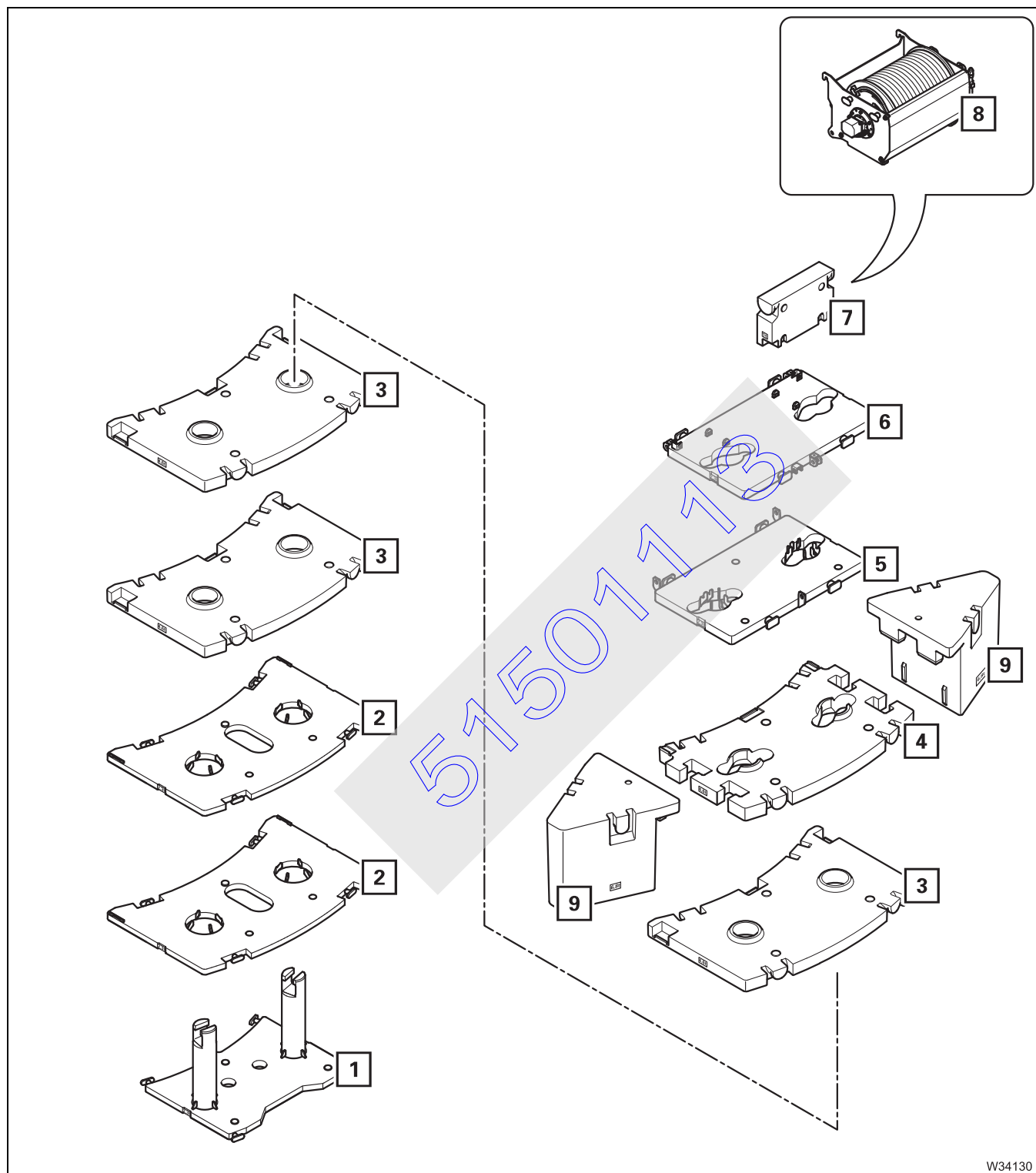
5) Must always lie on top

6) [5] Must lie on top, or lie under [6] or 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 which can be rigged.



W34130

- Lift the counterweight sections onto the base plate;  Sliding points on the counterweight sections, p. 12 - 76.

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⁾	9
17.1 (37,699)	●	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 (42,770)	●	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 (47,840)	●	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

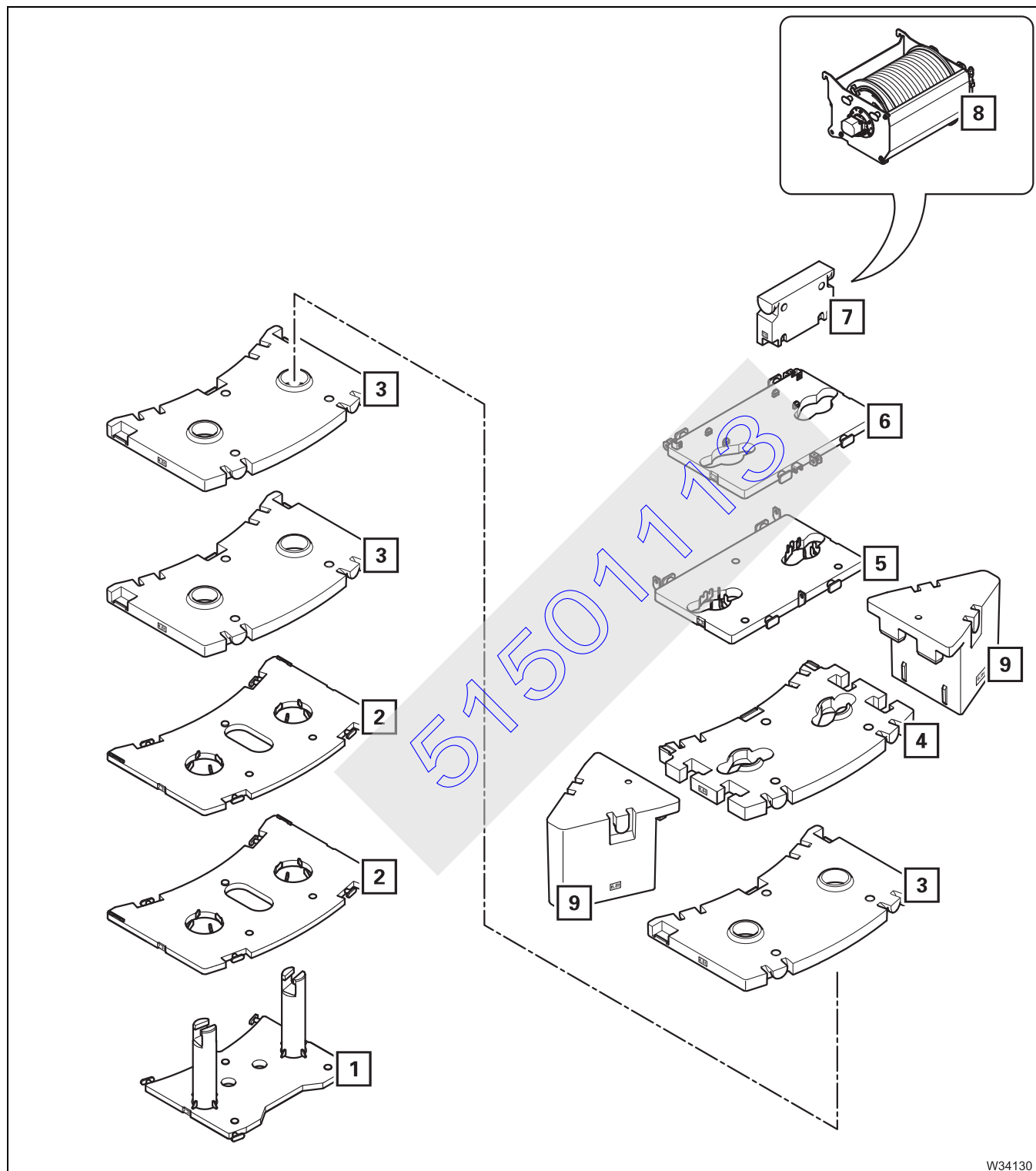
5) Must always lie on top

6) 5 Must lie on top, or lie under 6 or 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 which can be rigged.



W34130

- Lift the counterweight sections onto the base plate;  *Slings points on the counterweight sections, p. 12 - 76.*

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⁾	9
24.0 (52,911)	●	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 (57,981)	●	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 (68,123)	●	2 x	3 x	● ⁸⁾	● ⁶⁾	● ⁷⁾	●	-
44.5 (98,106)	●	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

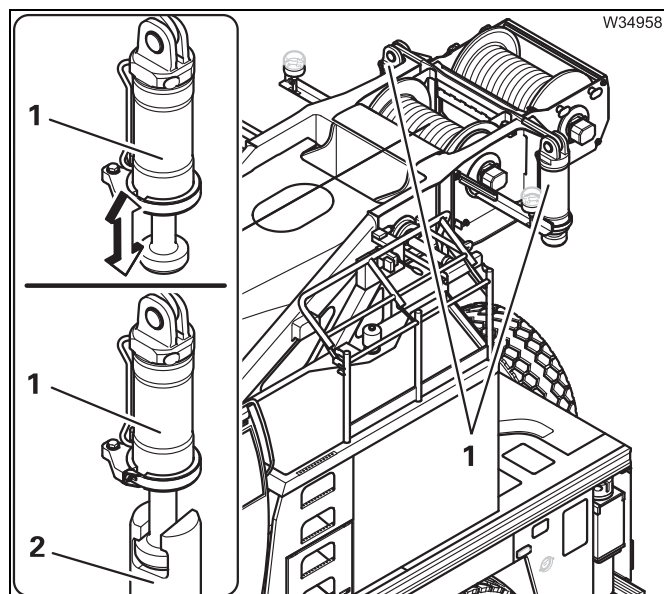
6) 5 Must lie on top, or lie under 6 or installed under 6

7) 6 Must lie on top or be installed on the turntable

8) 4 Must lie on top, or lie under 5

12.9.8

Counterweight hoist unit



The lifting cylinders (1) can be extended and retracted.

To lift and lower the counterweight, the lifting cylinders are screwed 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.

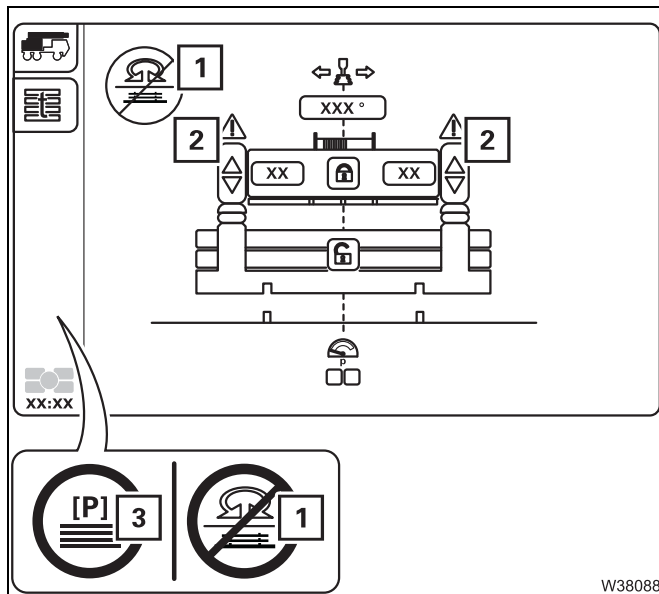
Counterweight menu



To operate the counterweight hoist unit, you must open the *Counterweight* menu.

Open menu

- Open the *Counterweight* menu (1).



The *Counterweight* menu opens.

Errors and warning messages can be shown for operation.

- 1 Slewing blocked – pre-clamp the counterweight; p. 12 - 105.
- 2 Contact **Manitowoc Crane Care**.
- 3 If the pre-tensioning pressure continues to drop, the message (1).

Extending/retracting the lifting cylinders

This section describes how to operate the lifting cylinders manually,
– for correcting the displayed rigging mode and
– for pre-charging the counterweight afterwards.

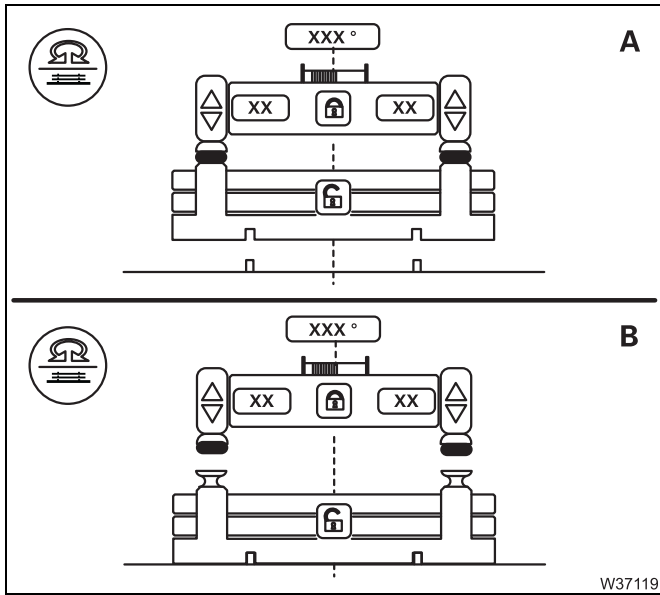


Risk of damage to the counterweight

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 blocked; *Automatic mode rigging*, p. 12 - 105, *Automatic mode unrigging*, p. 12 - 107.





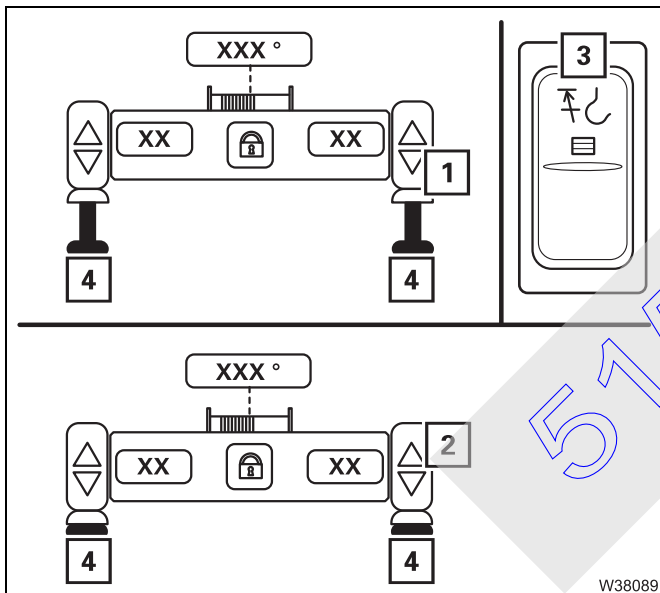
Correct the rigging mode

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

- A** Counterweight rigged
- B** Counterweight unrigged

If necessary, correct the displayed rigging mode as follows:

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

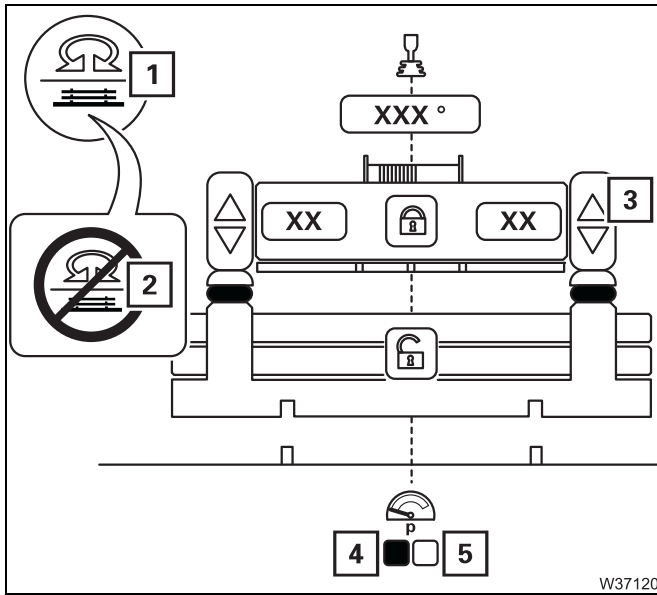


Assuming the symbol (4) is yellow with the counterweight unrigged.

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

The symbols (4) become green.

You can now use the automatic mode.



Pre-tensioning

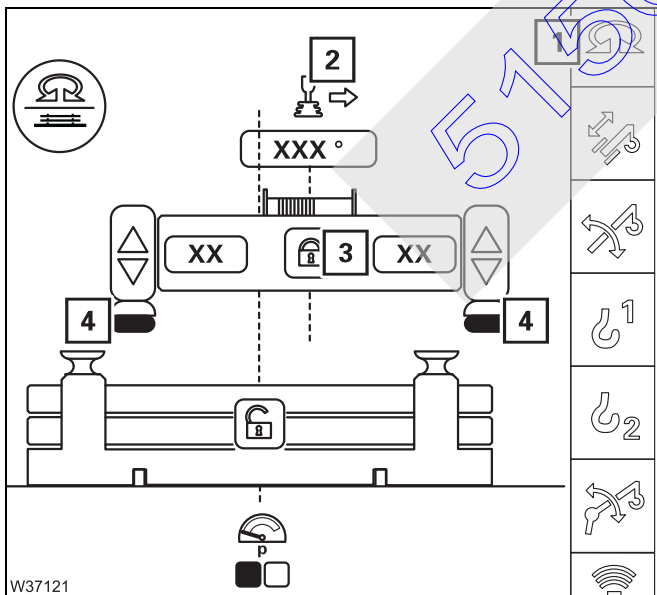
When the symbol (5) is **red**, you must pre-tension the counterweight. Slewing is blocked – symbol display (2).

- Select and confirm the symbol (3) until the symbol (4) becomes **green**. The slewing is released – display symbol (1).

Automatic mode rigging

While the automatic mode is being executed, you can always

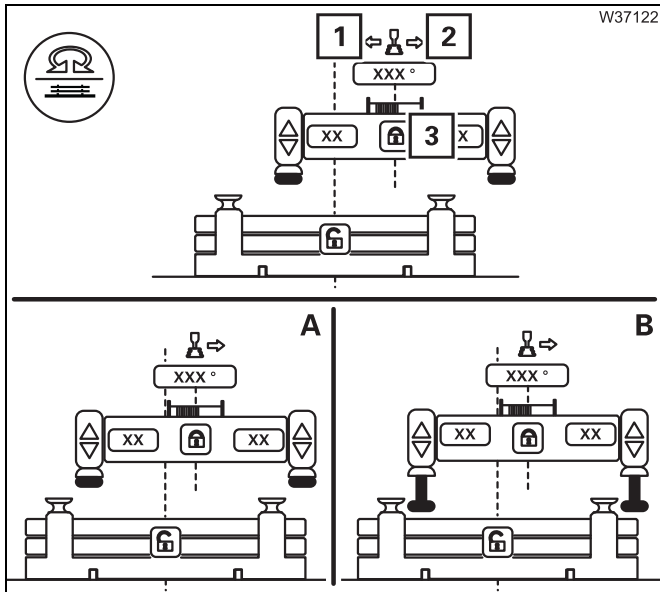
- **Cancel** the automatic mode; *Cancel automatic mode*, p. 12 - 108.
- **Interrupt** the automatic mode by letting go of the control lever. After moving the lever in the displayed direction once more, the automatic mode is continued.



Prerequisites

- The counterweight combination must be assembled.
- The lifting cylinders must be fully retracted – symbol (4) **green**.
- The slewing gear is switched – symbol (1) **green**.
- The superstructure must be in the rigging range:
 - Symbol (3) active,
 - Symbol (2) displayed.



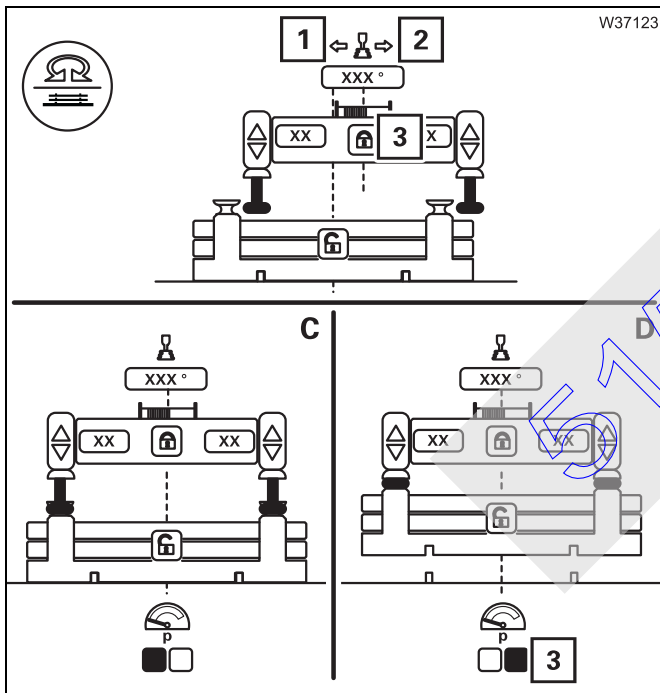


Switch on automatic mode

- Select and confirm the symbol (3).

Execute the automatic mode.


- Move the slewing control lever in the displayed direction (1) or (2) – the automatic mode starts.
 - The superstructure turns into position (A).
 - The lifting cylinders are extended (B).
- Release the control lever.

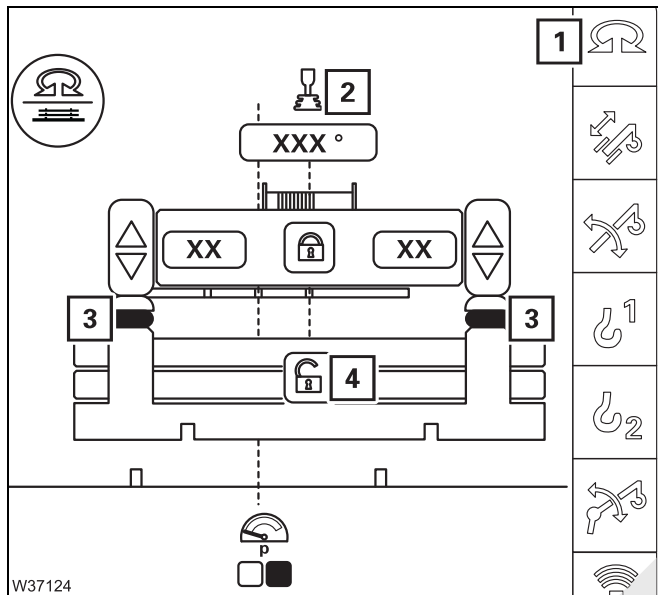


- Move the slewing control lever in the displayed direction (1) or (2) – the automatic mode continues.
 - The superstructure turns into position (C).
 - The lifting cylinders are retracted (D).
 - The counterweight is pre-charged – symbol (3) **green**.
- Release the control lever.

Automatic mode unrigging

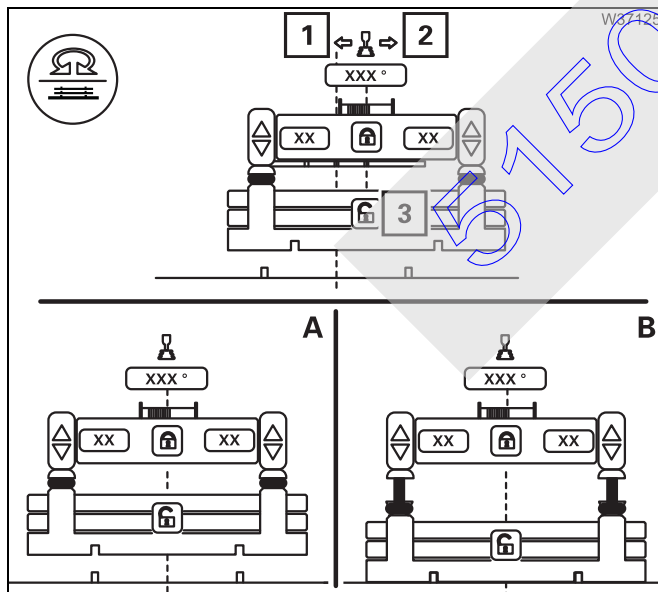
While the automatic mode is being executed, you can always

- **Cancel** the automatic mode;  *Cancel automatic mode*, p. 12 - 108.
- **Interrupt** the automatic mode by letting go of the control lever. After moving the lever in the displayed direction once more, the automatic mode is continued.



Prerequisites

- The lifting cylinders must be fully retracted – symbol (3) **green**.
- The slewing gear is switched – symbol (1) **green**.
- The superstructure must be in the rigging range:
 - Symbol (4) active,
 - Symbol (2) displayed.



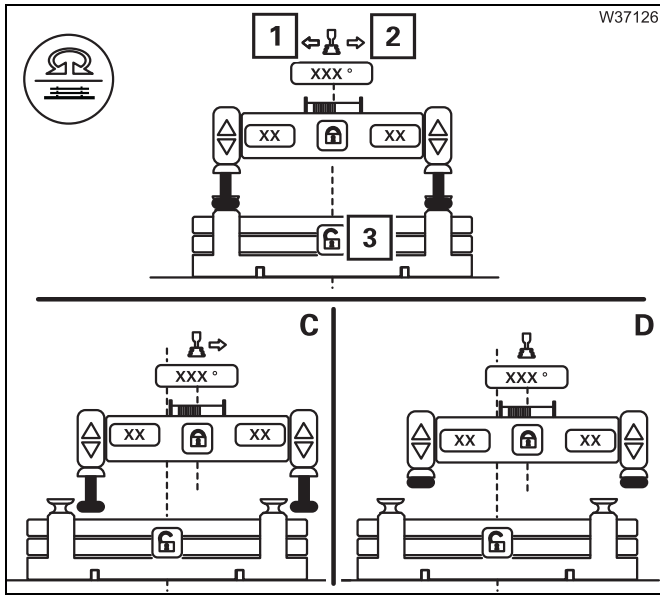
Switch on automatic mode

- Select and confirm the symbol (3).

Execute automatic mode

- Move the slewing control lever in the displayed direction (1) or (2) – the automatic mode starts.
 - The superstructure turns into position (A).
 - The lifting cylinders are extended (B).
- Release the control lever.

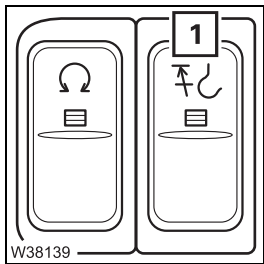




- Move the slewing control lever in the displayed direction (1) or (2) – the automatic mode continues.
 - The superstructure turns into position (C).
 - The lifting cylinders are retracted (D).
- Release the control lever.

Cancel automatic mode

You can cancel the automatic mode any time.

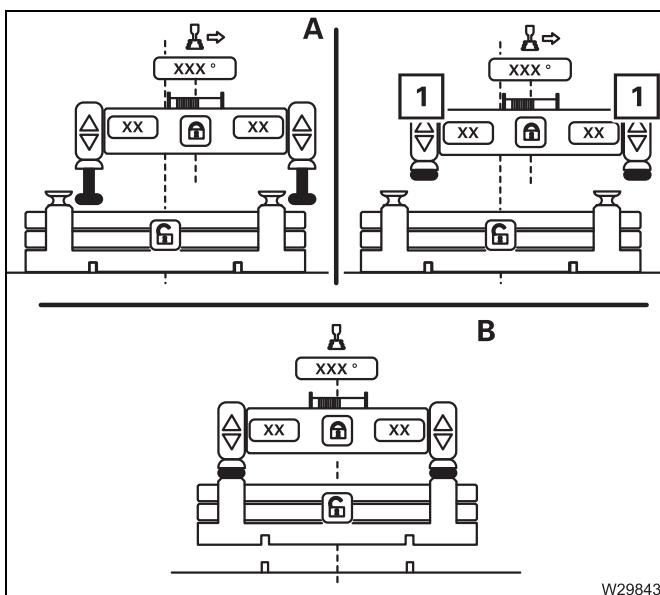


- Press in the override button (1) upwards – the automatic mode is cancelled.



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 the automatic operation, then you must:

In position (A)

- Fully retract the lifting cylinders – symbol (1).

In position (B)

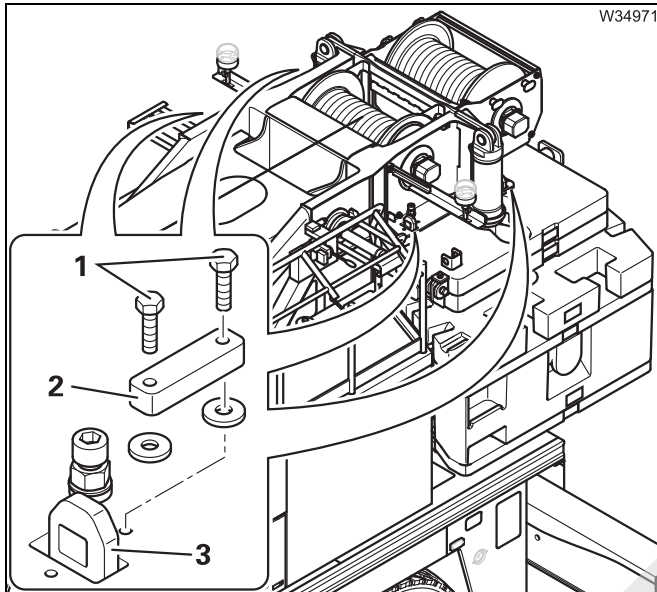
- Turn the superstructure into position (A).
- Fully retract the lifting cylinders – symbol (1).

12.9.9


Removing/installing the counterweight on the turntable

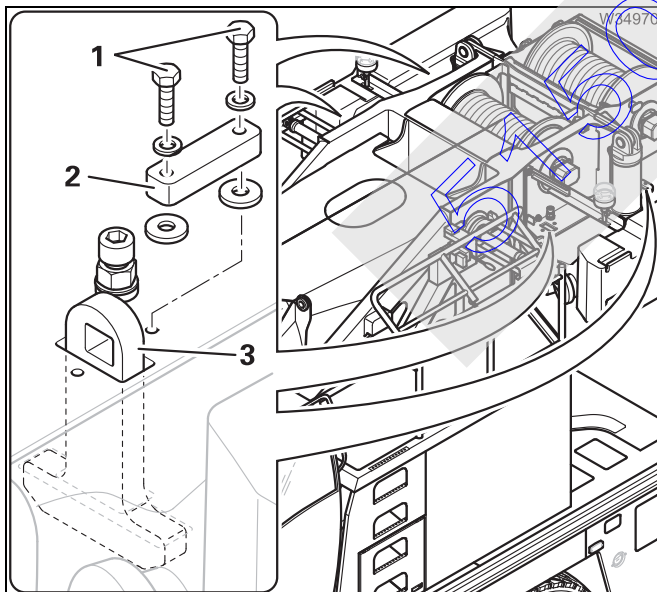
Removing

With version 1 and 3 two 2.3 t plates, with version 2 one 9.2 t plates can be removed/installed on the turntable.



Version 1 and 3

- Use automatic mode to lift the counterweight combination onto the turntable;  *Automatic mode rigging*, p. 12 - 105.
- Unscrew the bolts (1) and remove the clamp (2) from the bracket (3).
- Use automatic mode to lower the counterweight combination onto the turntable.

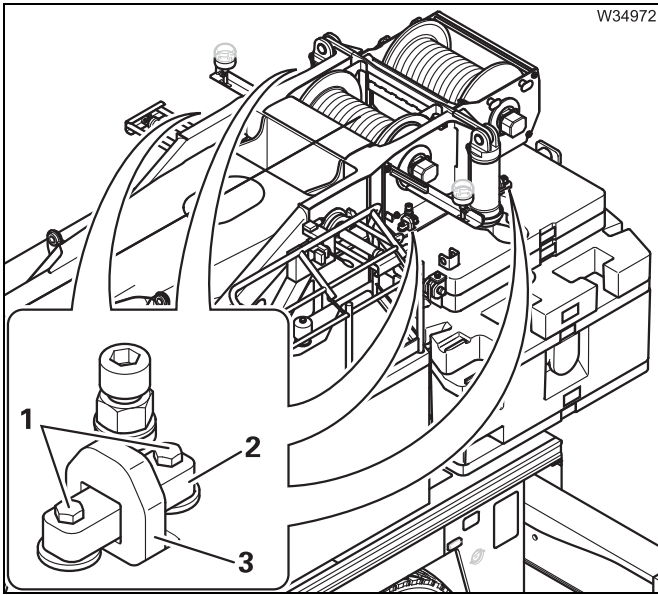


Version 2

- Secure the mounted 9.2 t plate using suitable lifting gear 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

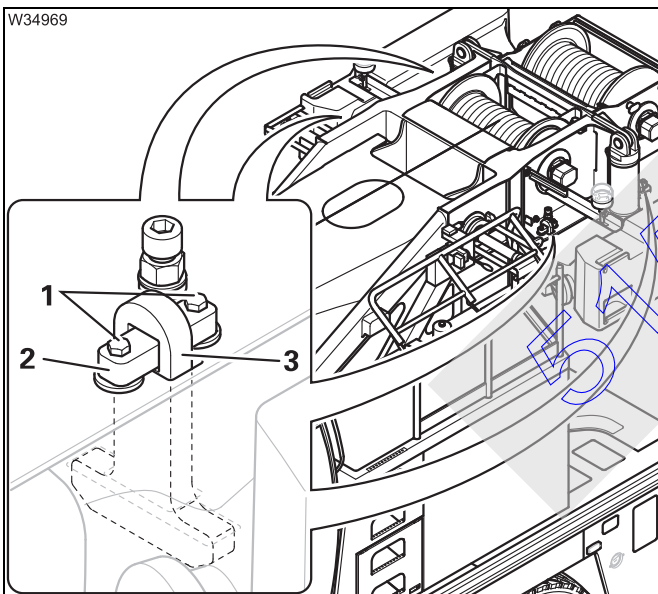


Version 1 and 3

- Use automatic mode to lift the counterweight combination onto the turntable;
 ▶ *Automatic mode rigging*, p. 12 - 105.
- Push the clamp (2) through the bracket (3).
- Fasten the clamp (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 onto the turntable.




Version 2

- Use suitable auxiliary equipment (e.g. fork-lift) to lift the 9.2 t plate onto the turntable until the connecting points line up.
- Insert the bracket (3) through the counterweight section from below.
- Push the clamp (2) through the bracket (3). Fasten the clamp (2) using the bolts (1) – tightening torque 75 Nm (55.3 lbf ft).

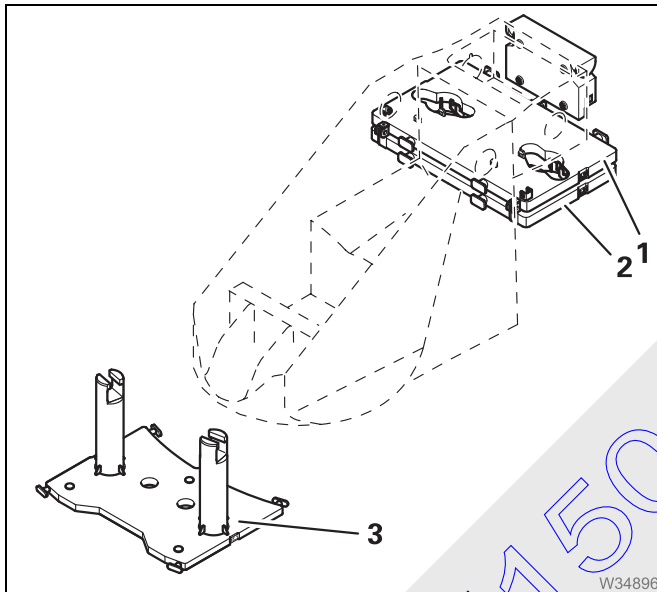
12.9.10

Setting down 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.

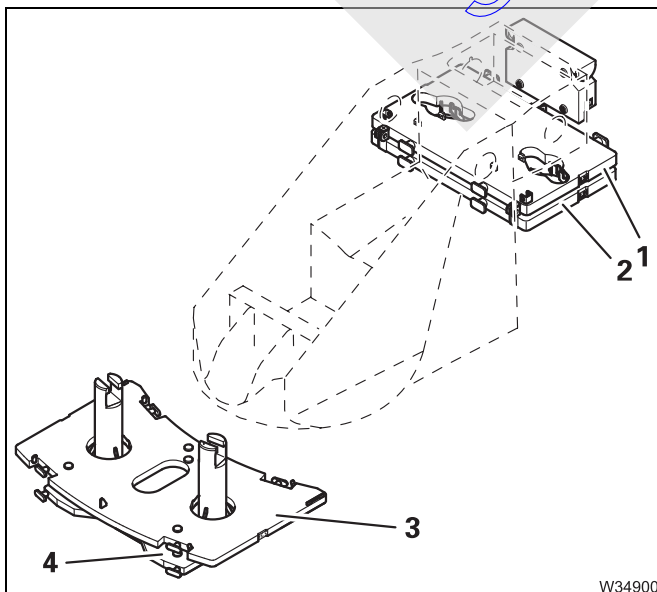
Versions 1 and 3



For driving with axle loads up to 12 t

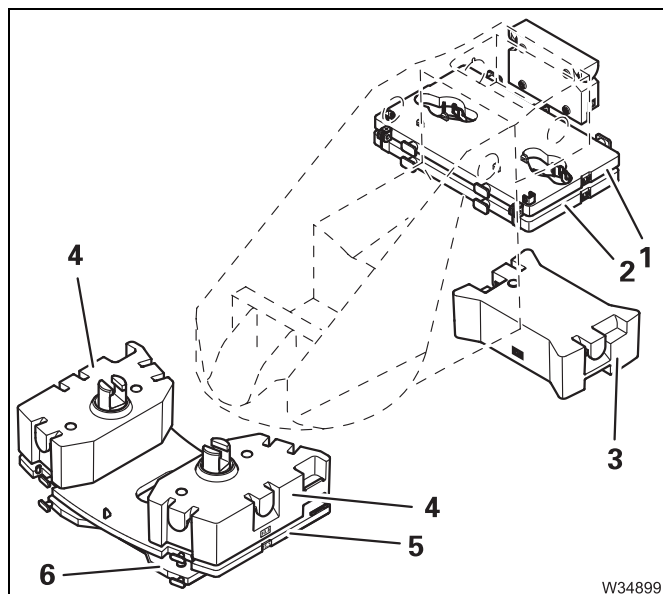
- The 2.3 t plates (1) and (2) are mounted on the turntable,
- The 2.3 t base plate (3) is on the counterweight platform,

or, for the respective driving mode



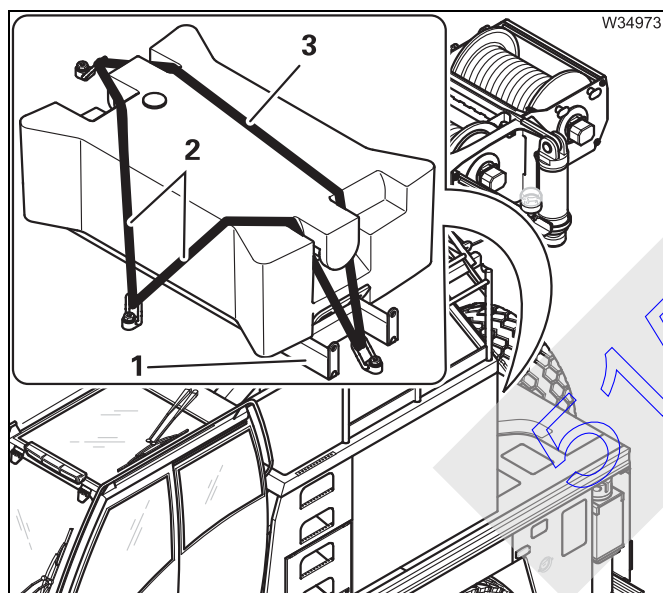
- The 2.3 t plates (1) and (2) are mounted on the turntable,
- The 2.3 t base plate (4) and the 2.3 t plate (3) lie on the counterweight platform.





For driving with axle loads greater than 12 t

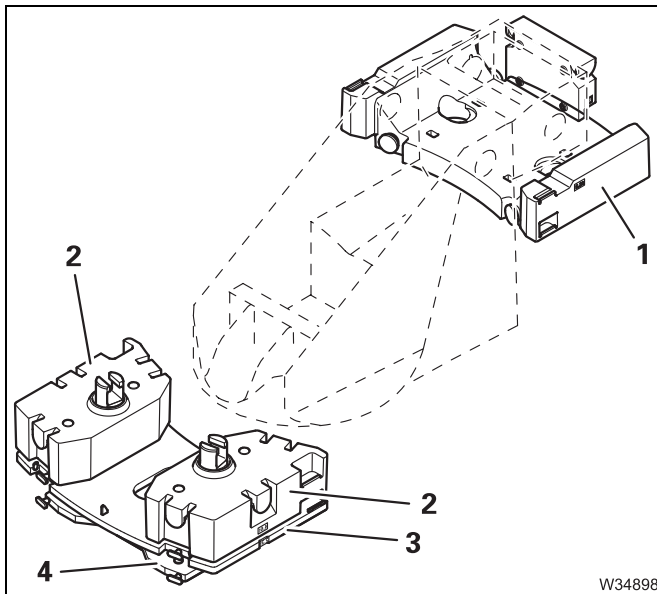
- The 2.3 t plates (1) and (2) are mounted on the turntable,
- The 2.3 t base plate (6) and the 2.3 t plate (5) lie on the counterweight platform,
- the 4,6 t counterweight blocks (4) lie on the 2.3 t counterweight section (5),
- the 4.6 t counterweight section (3) is attached to the rear storage area.



Fasten the counterweight on the rear storage area

- Fasten the holder (1) to the carrier.
- Place the 4.6 t counterweight block on the holder (1).
- Secure the pins 4.6 t counterweight block using the lashing straps (2) and (3).

Version 2



For driving with axle loads greater than 12 t

- The 9.2 t plate (1) is mounted on the turntable,
- The 2.3 t base plate (3) and the 2.3 t plate (4) lie on the counterweight platform.
- The 4.6 t counterweight blocks (2) lie on the 2.3 t counterweight section (3).

12.9.11

Slewing with rigged counterweight

Slewing with a rigged counterweight is only permissible when:

- The necessary outrigger span is rigged
- The current rigging mode is shown on the *RCL* display
- 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 the slewing operation if you have entered the RCL code 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 operations from being enabled within the impermissible ranges, which would cause the truck crane to overturn.



Risk of overturning when slewing in emergency operation!

Crane operations are not monitored by the RCL whilst 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 - 46.

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51501113

12.10 Rigging work on the main boom

12.10.1 Hook block on the bumper

When the hook block is transported on a separate vehicle;  p. 12 - 117.

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.

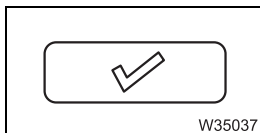


Risk of accidents if the view is obstructed

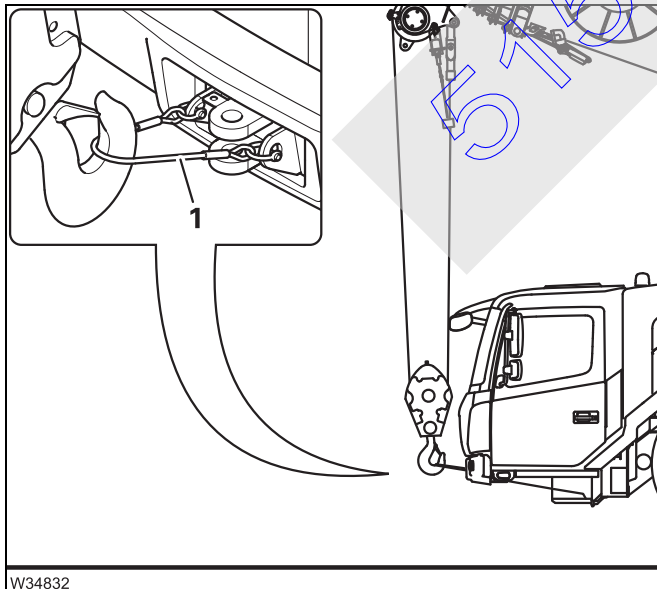
Have someone instruct you when raising the main boom, since the view of the hook block is obstructed. That way you will not raise the boom too far, which would cause the retaining rope to tear.

The main boom must be fully retracted.

- Enter and confirm the current rigging mode.



W35037



W34832

- Slacken the hoist rope and raise the main boom simultaneously.
- Raise the main boom until the boom head is in a vertical position above the hook block.
- Detach the hook block from the retaining rope (1).



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

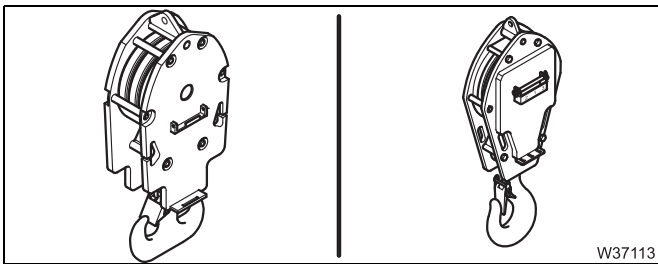
The reeved rope lines obstruct the view of the runway. The number of legally permissible rope lines can vary depending on the country in which you are working. According to EU regulations, the hook block may be reeved no more than 4 times when driving on the road.



Risk of accidents from the hook block swinging unexpectedly

The hook block will suddenly swing **forward** if the retaining rope for the hook block tears when tightening the hoist rope.

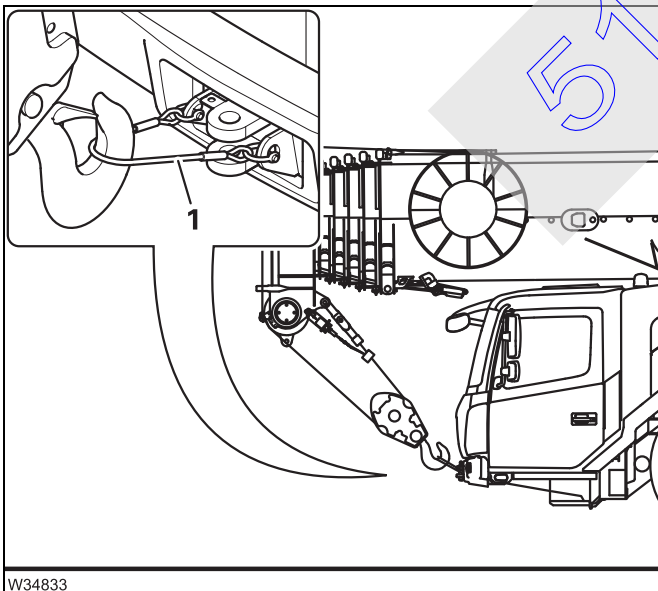
Therefore ensure that the banksman or other persons always stand at a safe distance **to the side** of the hook block.



Before attaching a hook block with ballast plates to the bumper, you can dismantle the ballast plates; p. 12 - 122.



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 - 83.

12.10.2

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 - 113.



Danger of overturning when slewing with an overridden RCL

Do not override the RCL before slewing the superstructure.
If slewing is not enabled then, 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

Raise the hook block from the separate vehicle only when the main boom head is directly above the hook block.
This prevents the hook block swinging and damaging the separate vehicle.




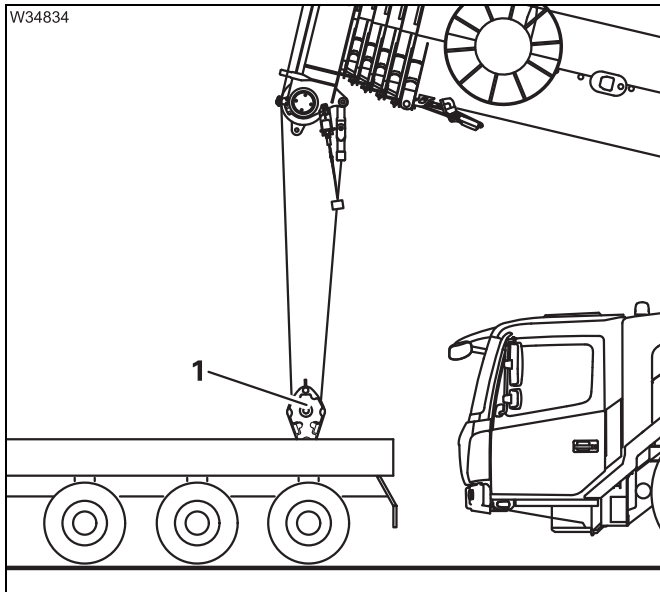
Risk of damage to the hoist rope!


To prevent slack rope, do not ease down too much hoist rope when picking up and reeving the hook block!
Slack rope causes rope loops on the hoist drum, which can result in the load slipping and the hoist rope being damaged.




Picking up the hook block

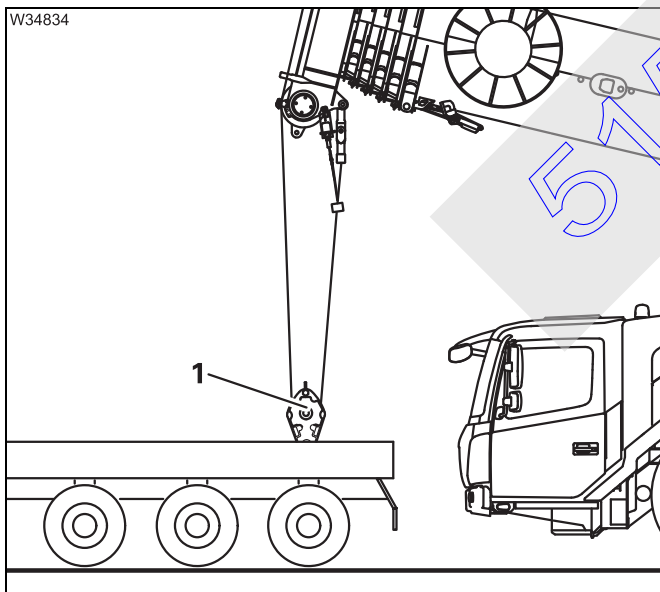
Depending on the driving mode, the hook block can be placed on a separate vehicle;  *Driving modes*, p. 6 - 1.



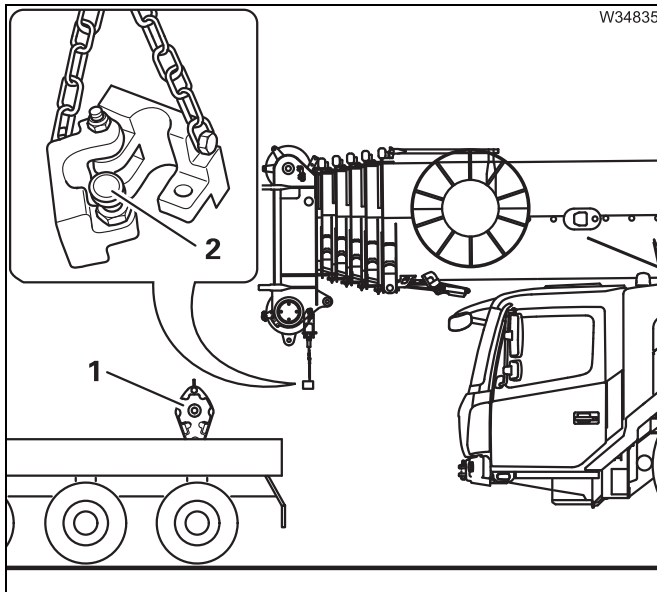
- If the respective setting has been made in the RCL, slew the superstructure and lower the main boom until the boom head is directly above the hook block (1).
- Unreel the hoist rope.
- Reeve the hoist rope into the hook block (1);  *Reeving and unreaving the hoist rope*, p. 12 - 124.
- Raise the hook block off the separate vehicle.

Setting down the hook block

Depending on the driving mode, the hook block must be set down on a separate vehicle;  *Driving modes*, p. 6 - 1.



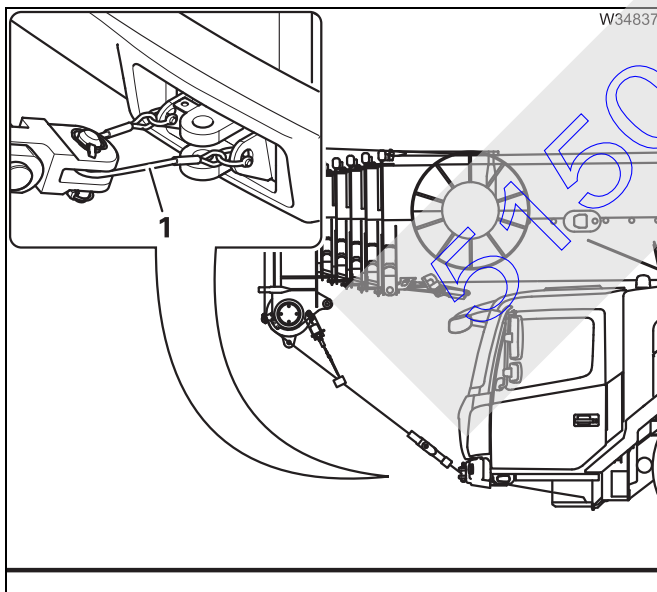
- With the RCL set accordingly, fully retract the main boom.
- Raise the hook block until it is about 1 m (3.3 ft) below the main boom.
- Lower the main boom and set the hook block (1) down on the separate vehicle.



- Detach the lifting limit switch weight (2) from the hoist rope; ▮▮▮ p. 12 - 142.
- Unreeve the hoist rope; ▮▮▮ p. 12 - 131.
- 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 slightly taut.
- Fasten the lifting limit switch weight to the hoist rope.

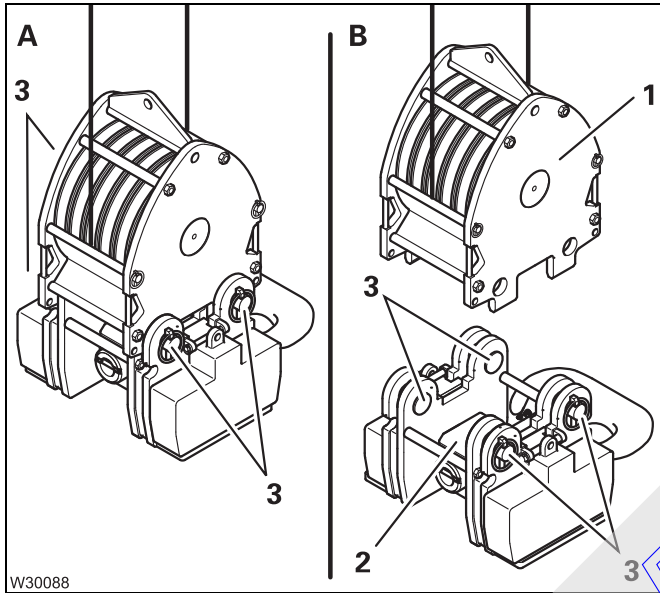
The hoist rope and lifting limit switch weight are now secured for driving.

12.10.3

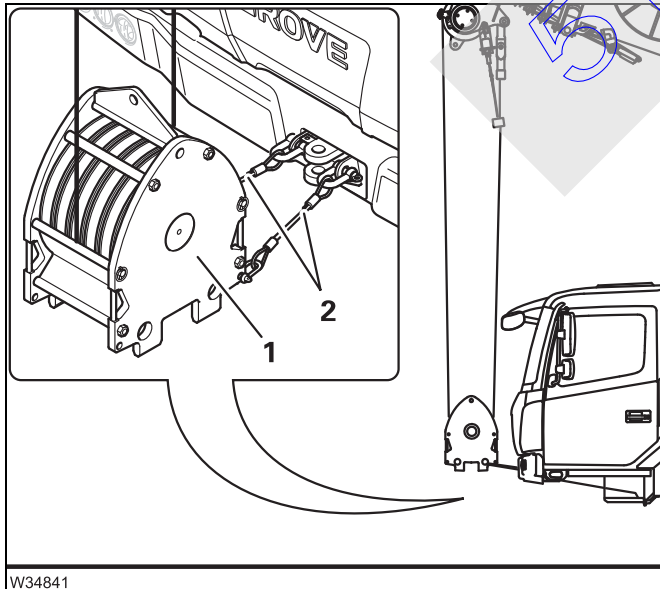
Hook block, separable

The hook block can be separated for on-road driving. The block hook remains reeved and can be attached to the bumper. The hook can be transported separately, e.g. on a separate vehicle.

Rigging for on-road driving



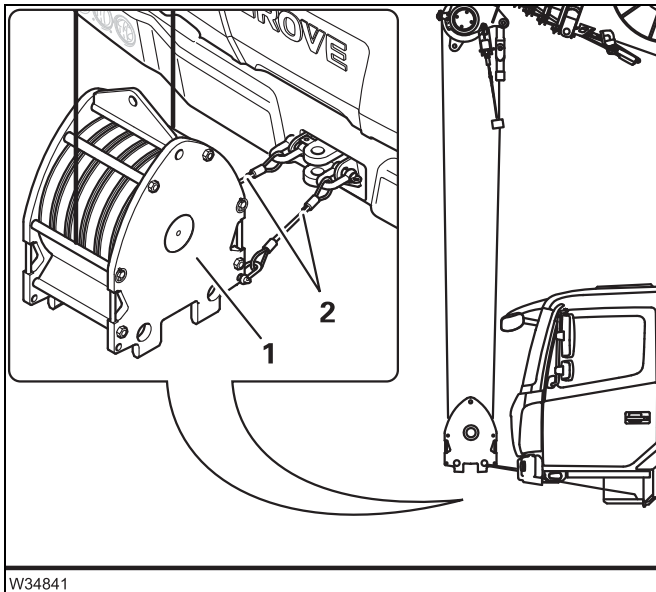
- **(A)** – Remove the retaining pin and pull out the pins (3).
- **(B)** – Raise the block hook (1) up. Insert the pins (3) and secure them in the hook. Stow away the hook (2) so that it is safe for transportation.



- Raise the block hook (1) vertically above the holding ropes (2).
- Lower the block hook (1) and fasten it using the holding ropes (2).

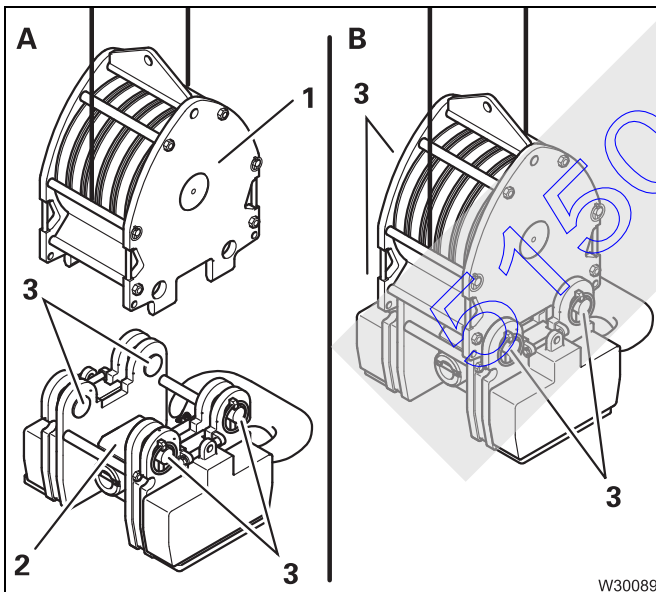
Set down the main boom onto the boom rest and pull the hoist rope tight only to the extent that the block hook is stabilised in its position.

Rigging for crane operation



W34841

- Slacken the hoist rope and raise the main boom simultaneously.
- Raise the main boom until the boom head is in a vertical position above the block hook (1).
- Detach the block hook from the retaining ropes (2).

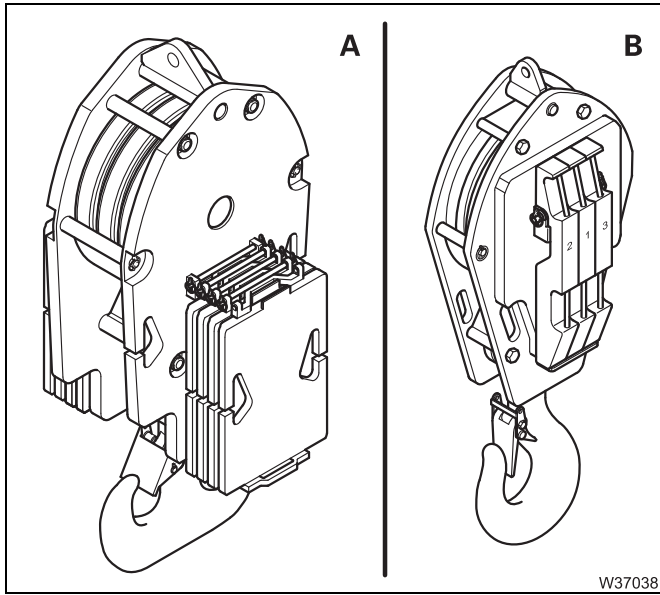


W30089

- (A) – Pull the pin (3) out.
- (B) – Raise the hook block (1) above the hook (2) until the connecting points are aligned.
- Insert the pins (3) and secure them with the retaining pins.

12.10.4

Hook block with ballast plates



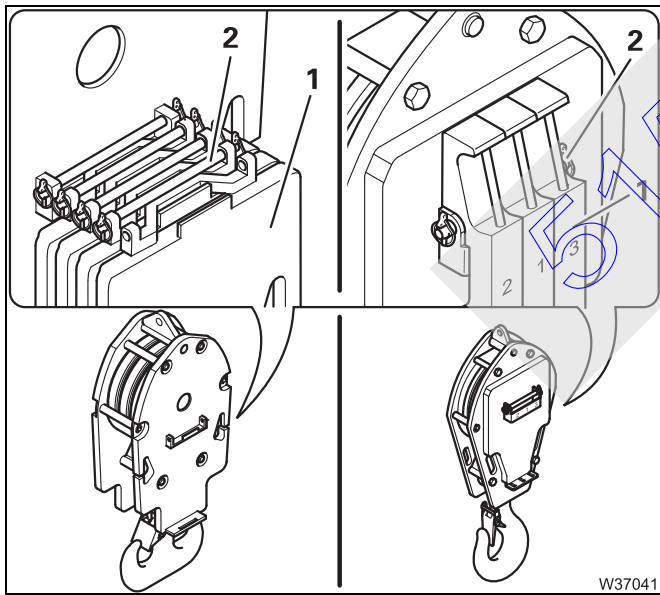
There are 1 and 3-sheave hook blocks for both versions A and B.

By removing and installing ballast plates, you can adapt the hook block weight to the weight required according to the *Lifting capacity table*.

Weight version A;  p. 1 - 12

Weight version A;  p. 1 - 13

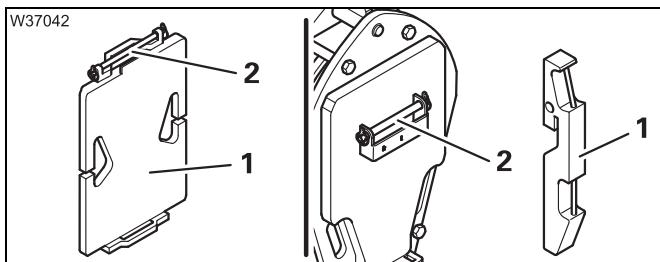
Removing



- Remove the securing plugs and pull out the pins (2).
- Remove the ballast plates (1).

In this way, remove the ballast plates alternately from both sides.

If all ballast plates have not been removed, make sure that the number of remaining ballast plates are equal on both sides.



- Stow away the ballast plates (1) and the fastening elements (2) safely.

Installing

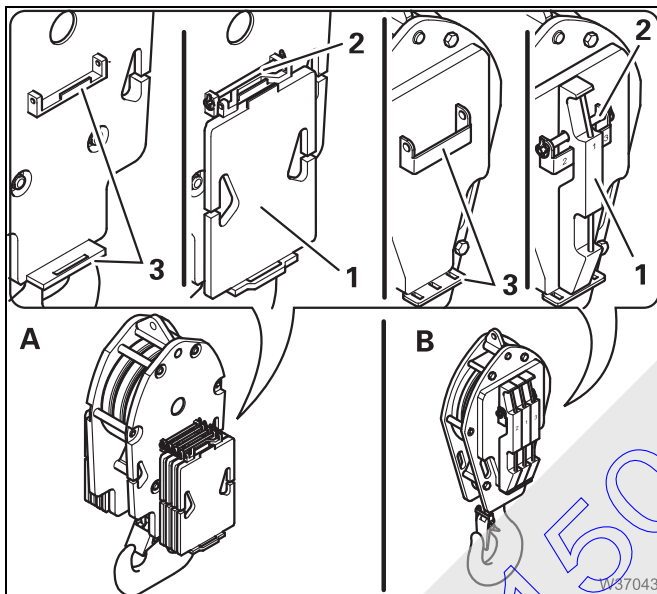


Risk of accident due to falling ballast plates.

Always secure the ballast plates with the pins and the securing plugs.
Always check the completeness and condition of the securing plugs before operating the crane. This prevents ballast plates from falling down during crane operation.



Always observe and follow the assembly and safety instructions attached to the hook block.



Version (A) and (B)

- Put or hang the ballast plates (1) on the mountings (3) and attach them with the pins (2).
- Secure the pins (2) using the securing plugs.

For version (B):

The ballast plates and the mountings are marked with numbers. The numbers determine the rigging sequence.

Information on crane operation

Exercise particular care when operating the crane. Check that the hook blocks have room to move freely, especially for two-hook operation.



Risk of damage to the hook blocks.


Check the retainers for the ballast plates regularly for corrosion and conditions. This applies in particular if

- work is frequently carried out in a corrosive environment
- the hook blocks are transported ballasted
- the hook blocks collide during crane operation.

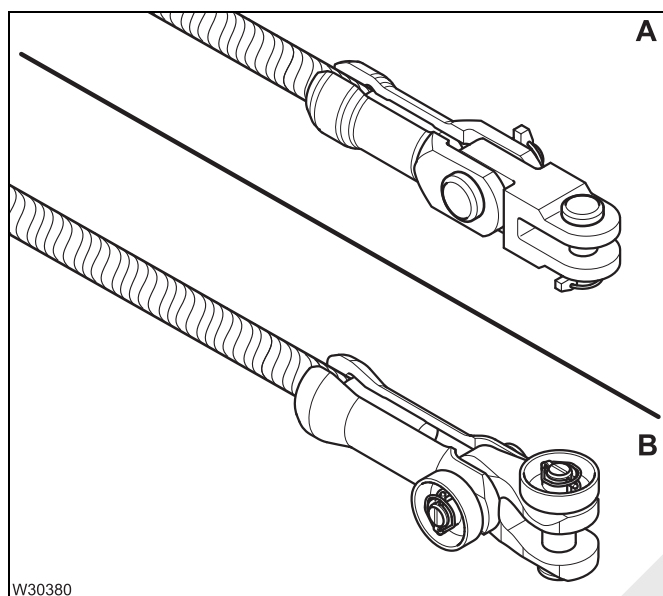
In this way, you avoid damaging the retainers, which can lead to the hook blocks falling over.

12.10.5

Reeving and unreeving the hoist rope

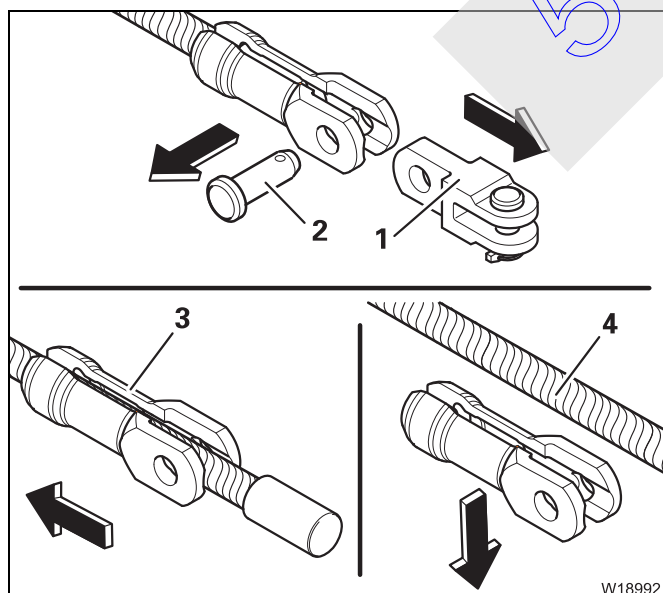
You must reeve a certain number of rope lines, depending on the required load bearing capacity. Four reeved rope lines correspond, for example, to 4-fall reeving;  Possible reevings on the main boom, p. 12 - 132.

To reeve and unreeve the hoisting rope, you must remove the pocket lock. After reeving you must reattach the pocket lock.



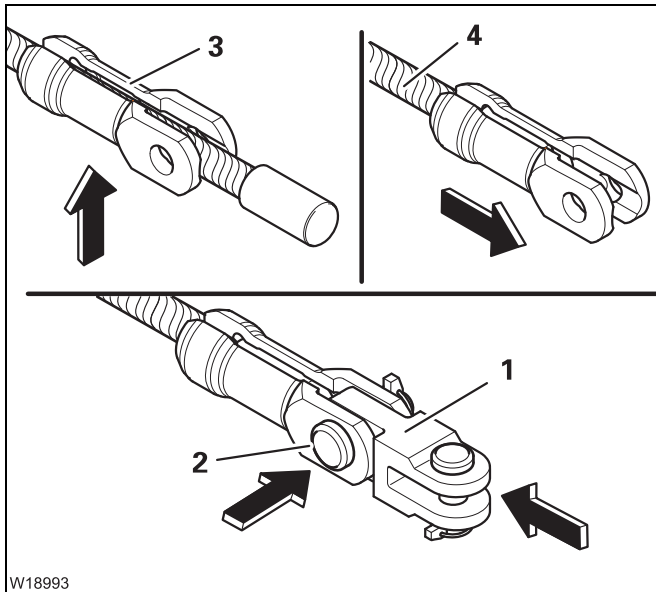
There are **A** or **B** versions.

Version A



Removing

- Pull the pin (2) out and remove the fork element (1).
- Slide the holder (3) back and remove it from the hoist rope (4).

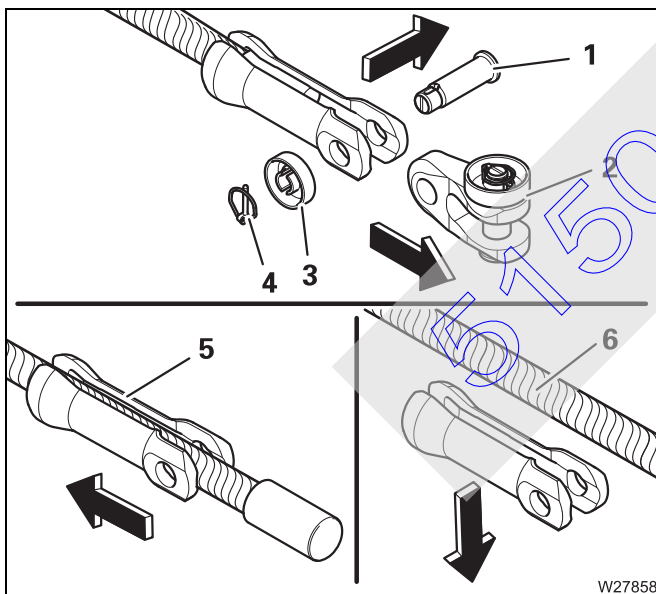


W18993

Positioning

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

Version B

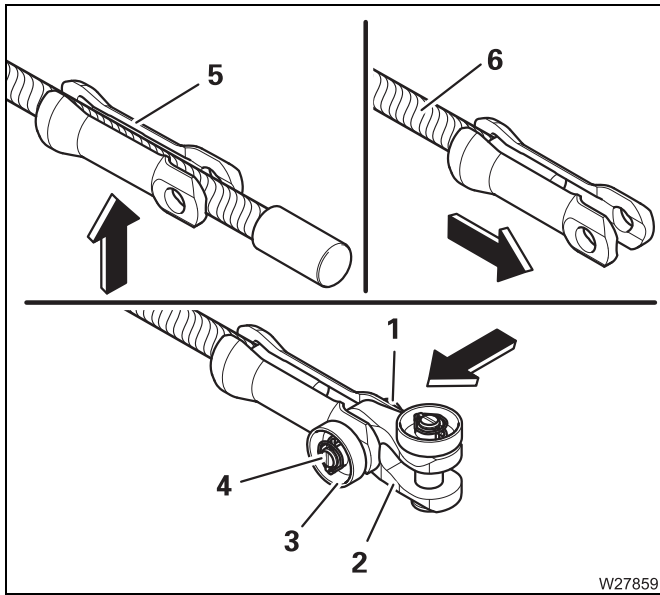


W27858

Removing

- Remove the linchpin (4).
- Release the locknuts (3) and pull out the pins (1). Remove the bracket (2).
- Slide the padlock (5) back and remove it from the hoist rope (6).





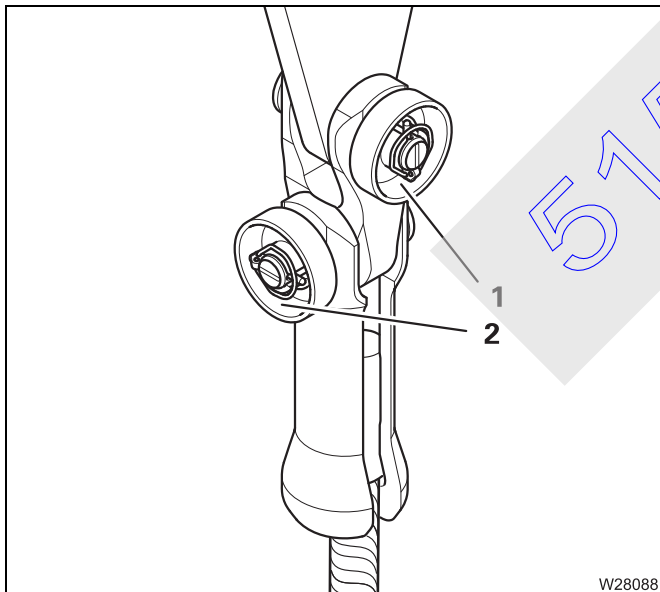
Positioning

- Insert the padlock (5) and slide it onto the hoist rope as far as it will go (6).
- Fasten the bracket (2) to the padlock (5) using the pin (1).
- Turn the locknut (3) on the pin (1) as far as it will go and then turn by one half turn.
- Insert the linchpin (4).



Risk of damage to the hoist rope!

Always install the pocket lock as it is described in the following paragraph. This will prevent the hoist rope rubbing against the locknut and being damaged.



Fastening the pocket lock on the main boom

- Fasten the pocket lock to the fixed point of the main boom in such away that
 - the locknut (1) faces outward
 - and
 - The locknut (2) faces forward in the driving direction.

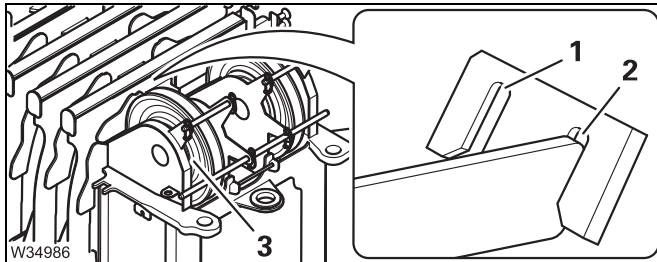
Reeving the hoist rope

Depending on the version, you can use the rigging aid for fitting the hoist rope if necessary; ▮▮▮▮ p. 6 - 48.



Danger due to slack rope!

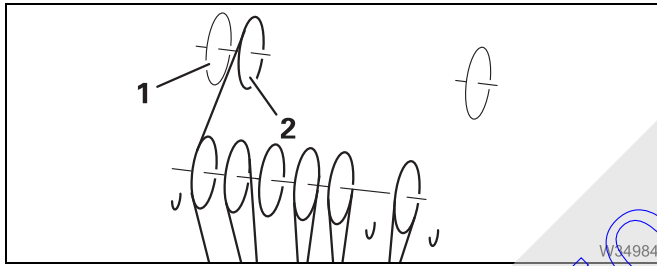
Only use hook blocks and lifting gear of the minimum weight prescribed in the *Lifting capacity table*, depending on the reeving and boom length. This prevents slack rope forming at large heights when lifting without a load. This can result in the load slipping.



Adjusting the head sheave

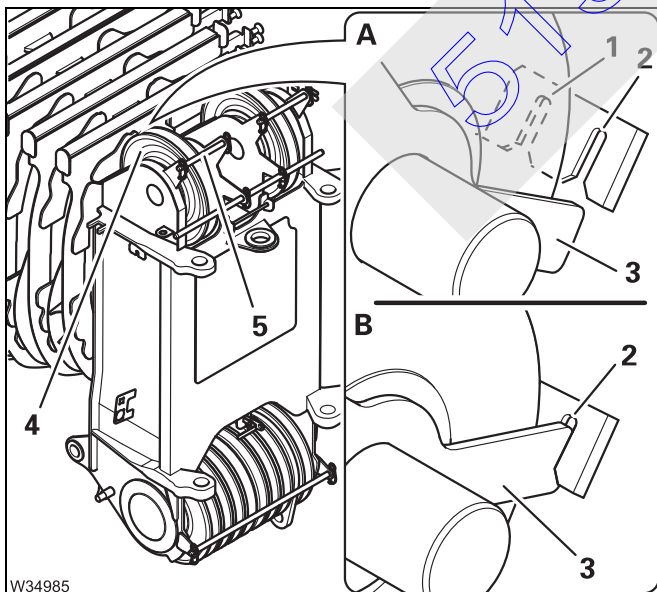
The head sheave can be shifted into two different positions (1) and (2).

The required position depends on the reeving.



Reeving images show the head sheaves in the positions (1) and (2).

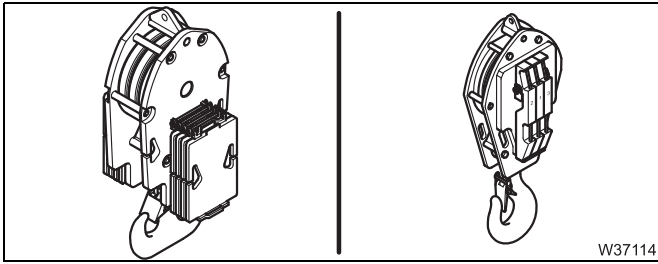
The head sheave must always be shifted into the position via which the hoist rope will run – for example, into position (2).



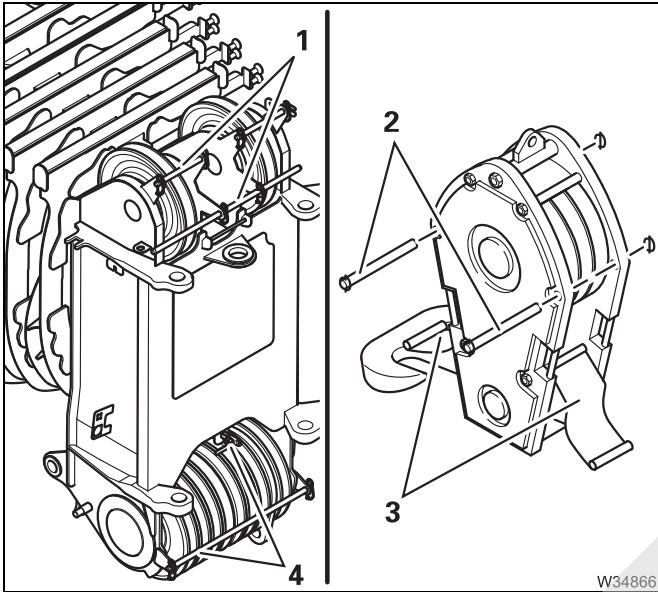
Shifting the head sheave

- (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 appropriate cutout – e.g. into cutout (2).
- Insert the rod (5) and secure it with the retaining pins.





For hook blocks with ballast plates, you can achieve the required weight by installing or removing ballast plates; see p. 12 - 122.

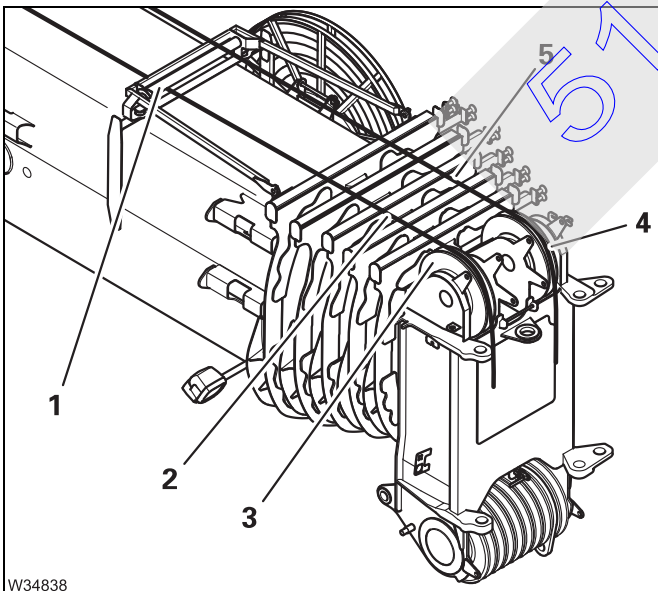


Opening the hook block

- Pull out the rods (2).
- Fold down the plates (3).

Positioning the hoist rope

- Pull out the rods (1) and (4).

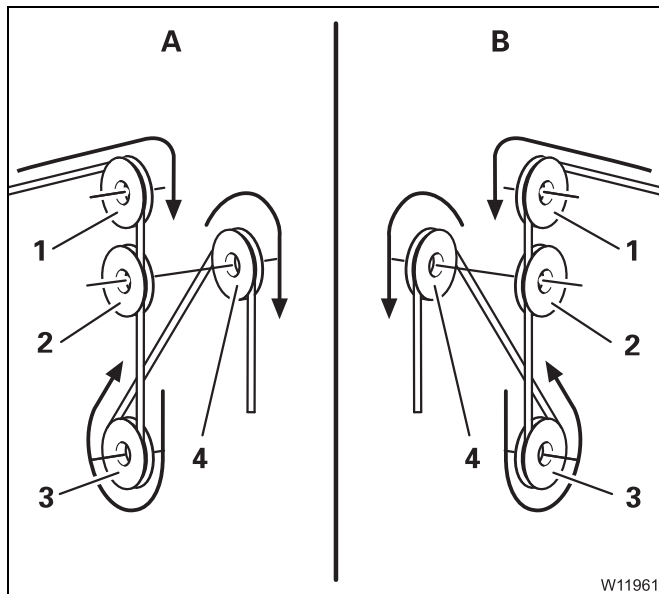


- Feed the main hoist rope (2) **under** the rope grab (1).

If two hoist ropes are reeved, you must feed the auxiliary hoist rope (5) **over** the rope grab.

- Feed the main hoist rope to the head sheave (3).
- Feed the auxiliary hoist rope to the head sheave (4).

Use the rope grab also when working with the lattice extension.

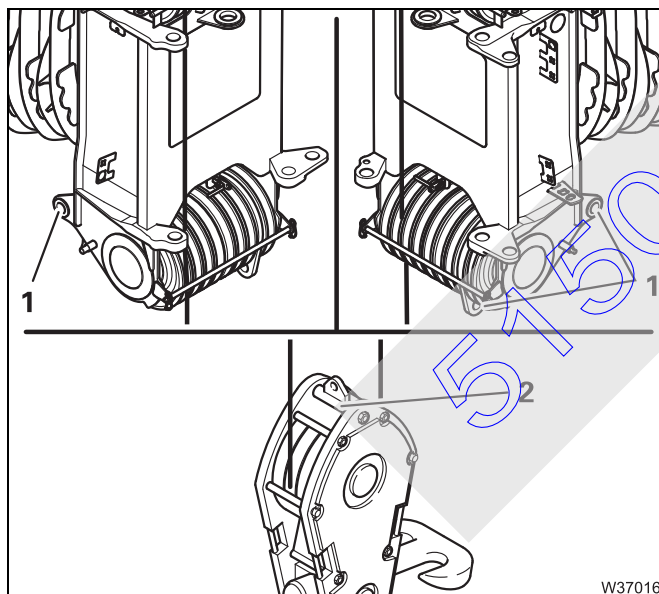


Reeving the hoist rope

- 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 pulley (3) of the hook block, upwards to the main boom head.
- Guide the hoist rope from the rear over the next required head sheave (4), etc.
- Reeve the hoist rope with the required number of lines.

Possible reevings; p. 12 - 132.



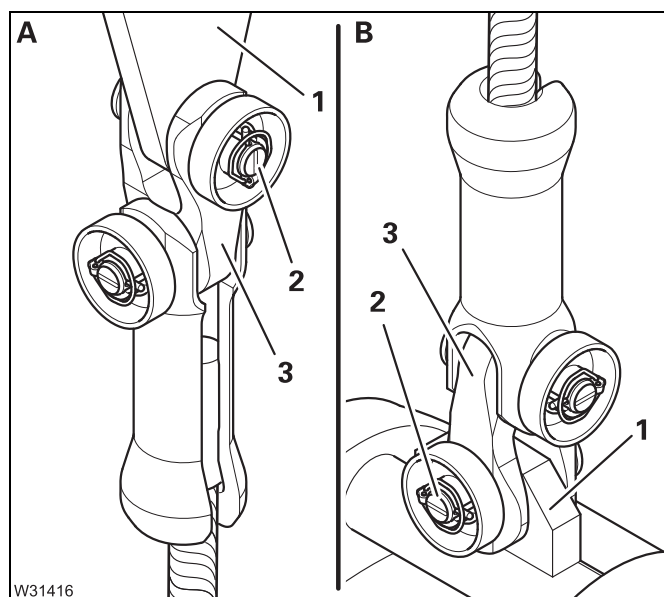
Fastening the hoist rope

The fixed point used depends on the number of reeved rope lines.

Depending on the version, the centre fixed point (2) may be present on main booms with 5 head sheaves.

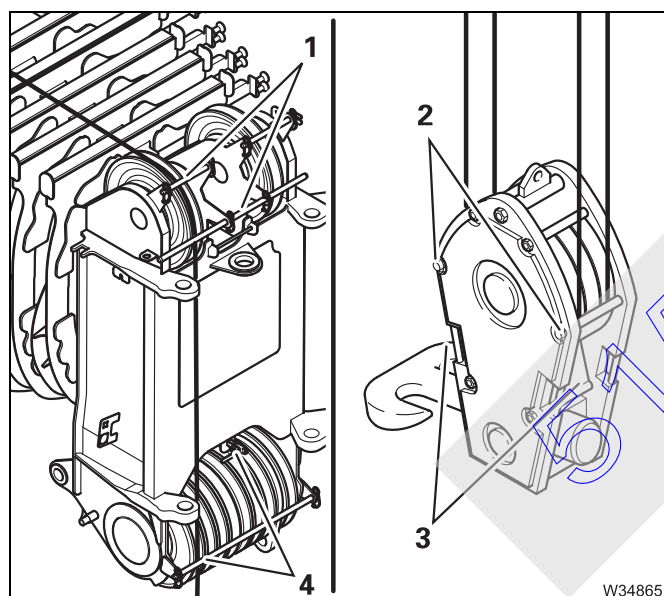
- **Fixed points for an even number of lines**
The rope end clamp is fastened to a fixed point (1) or (2) for 2-fall, 4-fall, 6-fall reevings, etc.
- **Fixed point for an odd number of lines**
The rope end clamp is fastened to the fixed point (3) for 1-fall, 3-fall, 5-fall reevings etc.





– Rope end fitting

- Fasten the rope end fitting (3) using the pin (2).
(A) – If there is an even number of lines to a fixed point (1) of the main boom head.
(B) – If there is an uneven number of lines to a fixed point (1) of the hook block.
- Secure the pin (2) with the safety hinged pin.



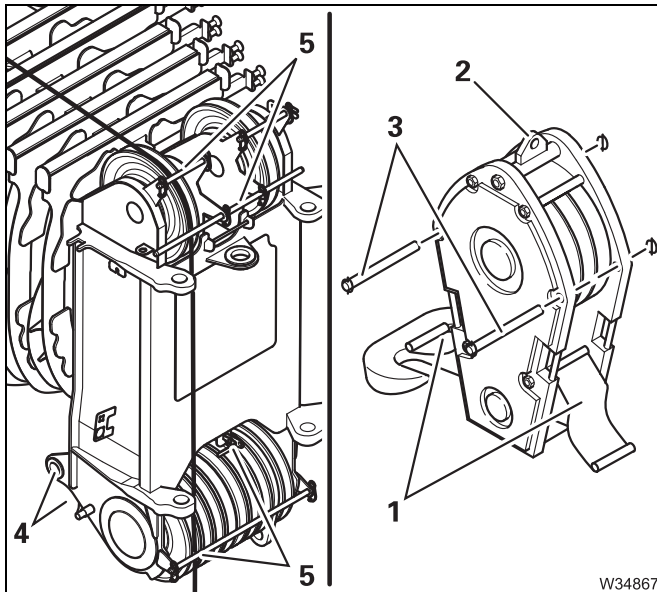
Securing the hoist rope

- Insert the rods (1) and (4).
- Secure all the rods.

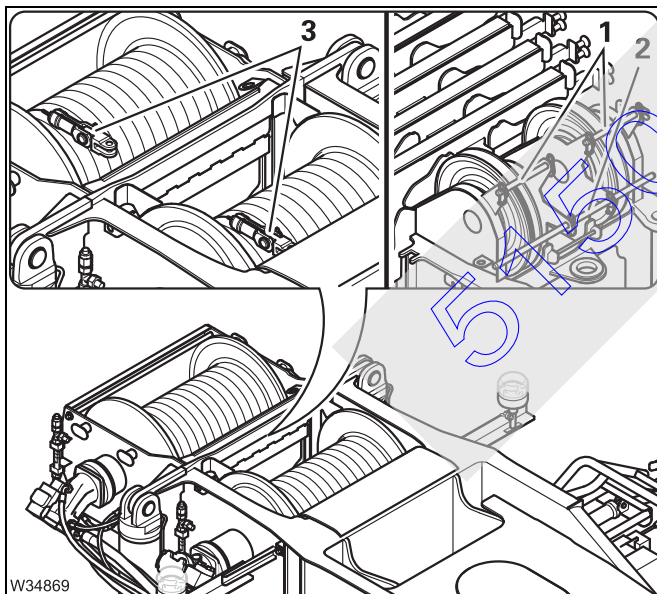
Closing the hook block

- Fold up the plates (3) on both sides.
- Insert the rods (2) and secure them.

Unreeving hoist rope



- Pull out the rods (5) and (3).
- Fold down the plates (1).
- Remove the rope end fitting from the fixed point (2) or (4).
- Unreeve the hoist rope.
- Insert the rods (5) and (3) and secure them.




Depending on the driving mode, you can:

- Fasten the hoist rope to the bumper;
→ p. 12 - 119 or
- Pull out the rods (1), (2) and roll the hoist rope (3) on to the drum.
- Insert the rods (1), (2) and secure them.
- Secure the hoist rope (3).

12.10.6


Possible reevings on the main boom


Possible reevings on lattice extensions and the auxiliary single-sheave boom top;  *Lattice extension operating manual*.

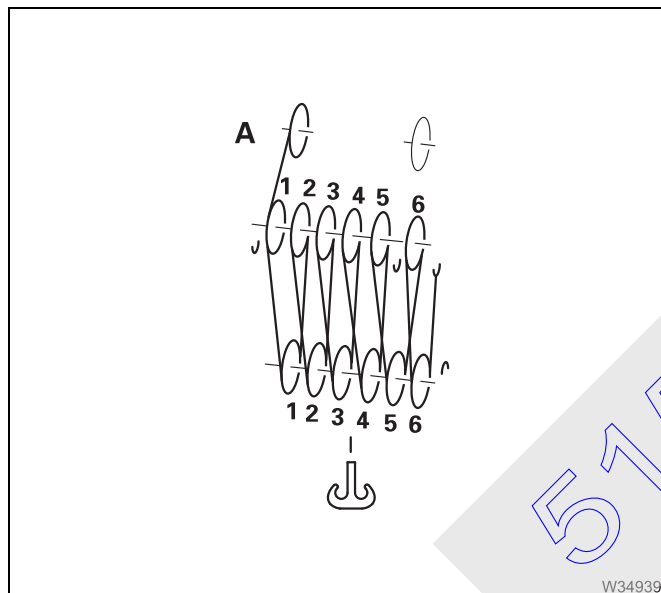


The maximum lifting capacity is specified in the supplied *lifting capacity table*.

With 6 head sheaves

If 8 head sheaves are provided;  p. 12 - 135.

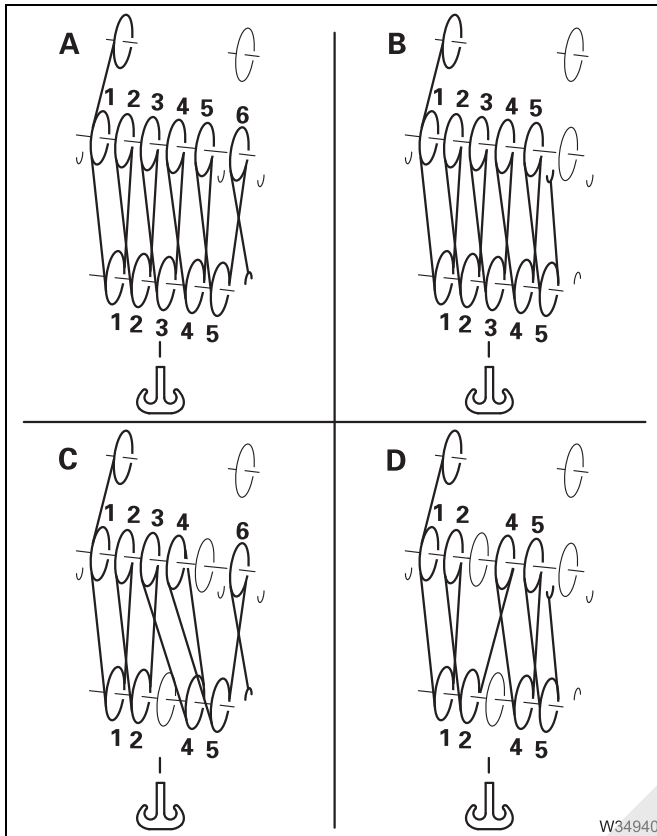
If 9 head sheaves are provided;  p. 12 - 138.



6-sheave hook block

Reeving

A 12-fall

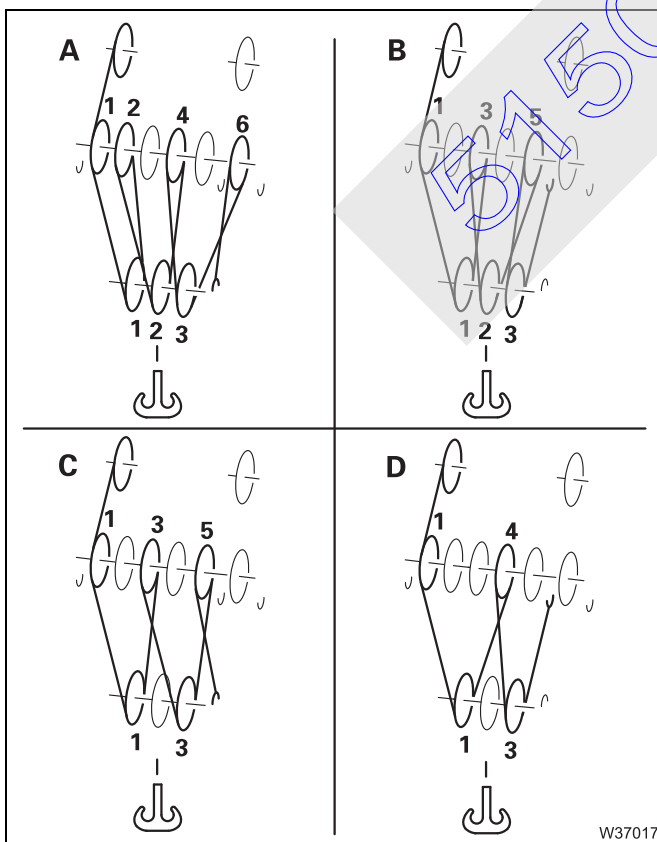


5-sheave hook block

Reeving

- A** 11-fall
- B** 10-fall
- C** 9-fall
- D** 8-fall

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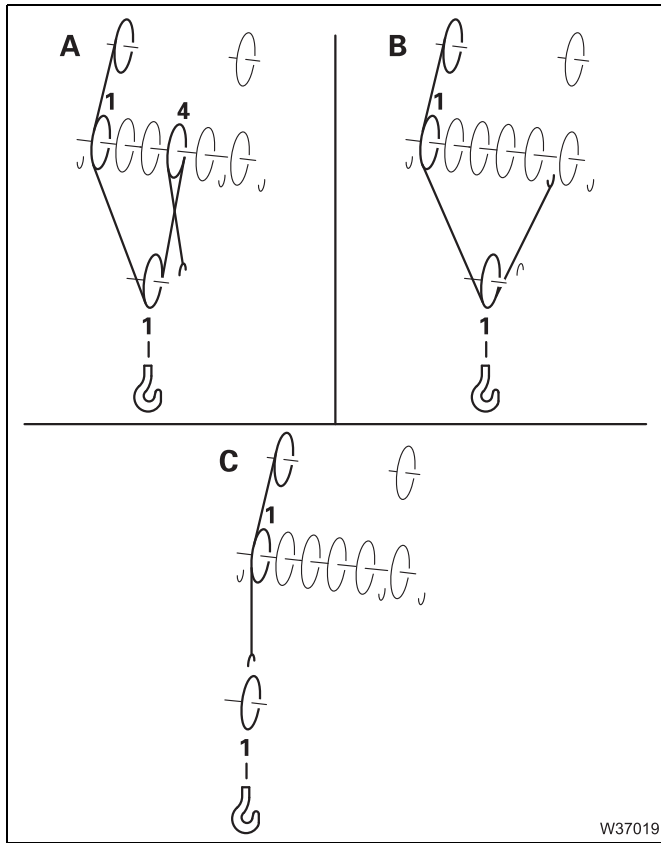
3-sheave hook block

Reeving

- A** 7-fall
- B** 6-fall
- C** 5-fall
- D** 4-fall

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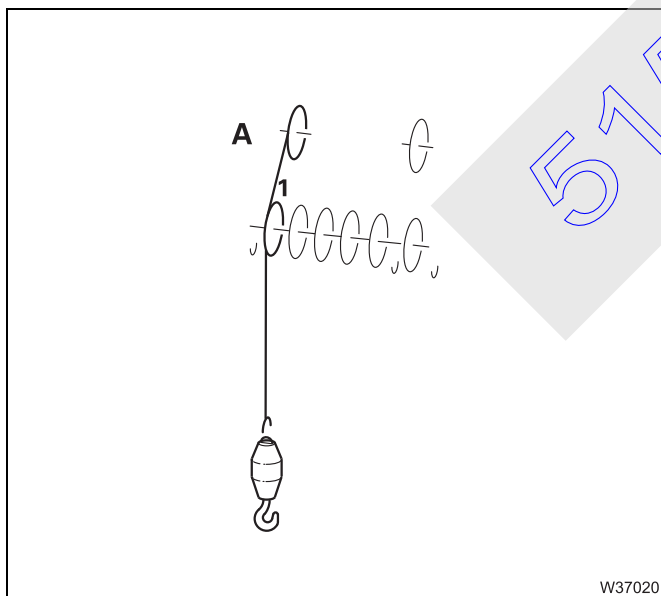




1-sheave hook block

Reeving

- A** 3-fall
- B** 2-fall
- C** 1-fall




Hook tackle

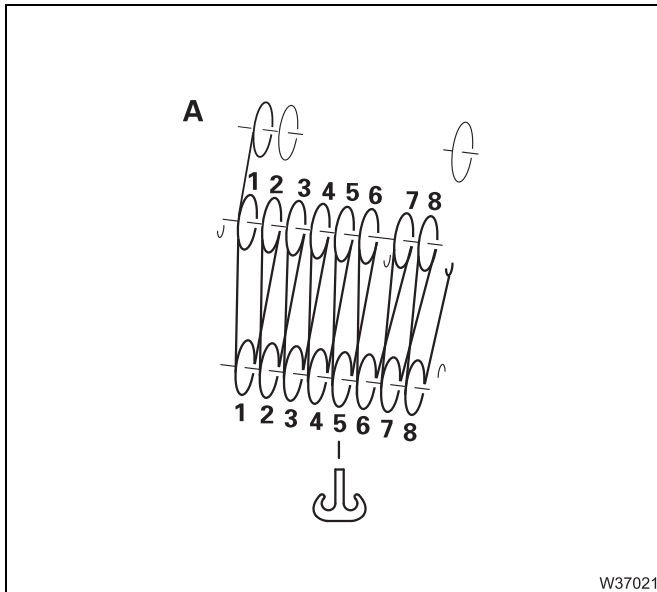
Reeving

- A** 1-fall

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With 8 head sheaves

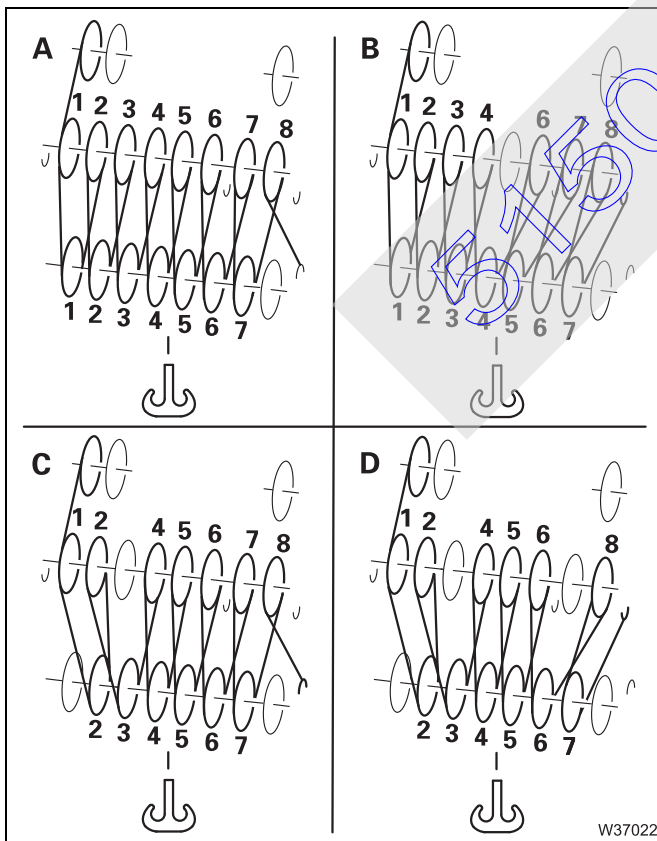
With additional equipment, 8 head sheaves may be present.
If 6 head sheaves are provided;  p. 12 - 132.



8-sheave hook block

Reeving

A 16-fall



7-sheave hook block

Reeving

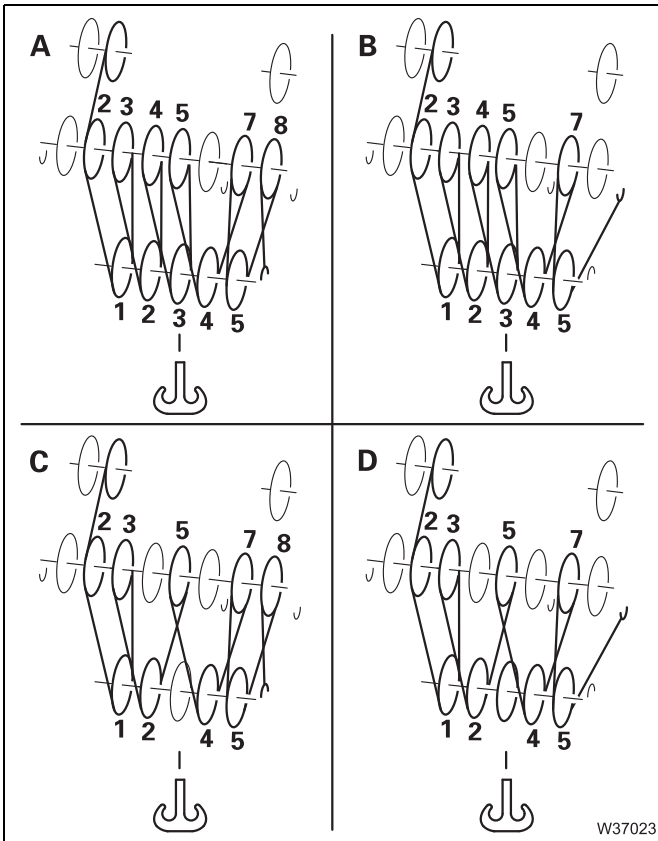
- A** 15-fall
- B** 14-fall
- C** 13-fall
- D** 12-fall



5-sheave hook block

Reeving

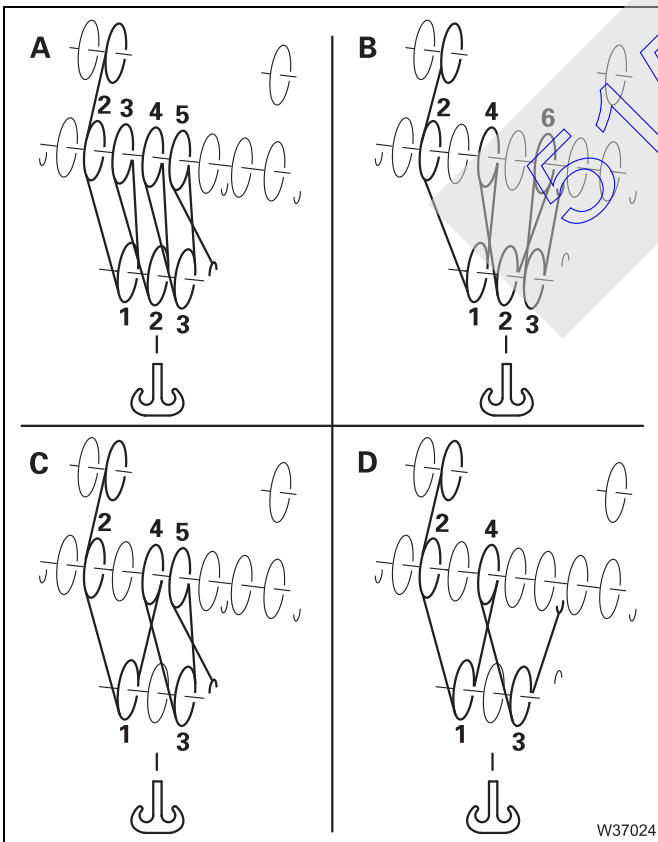
- A** 11-fall
- B** 10-fall
- C** 9-fall
- D** 8-fall

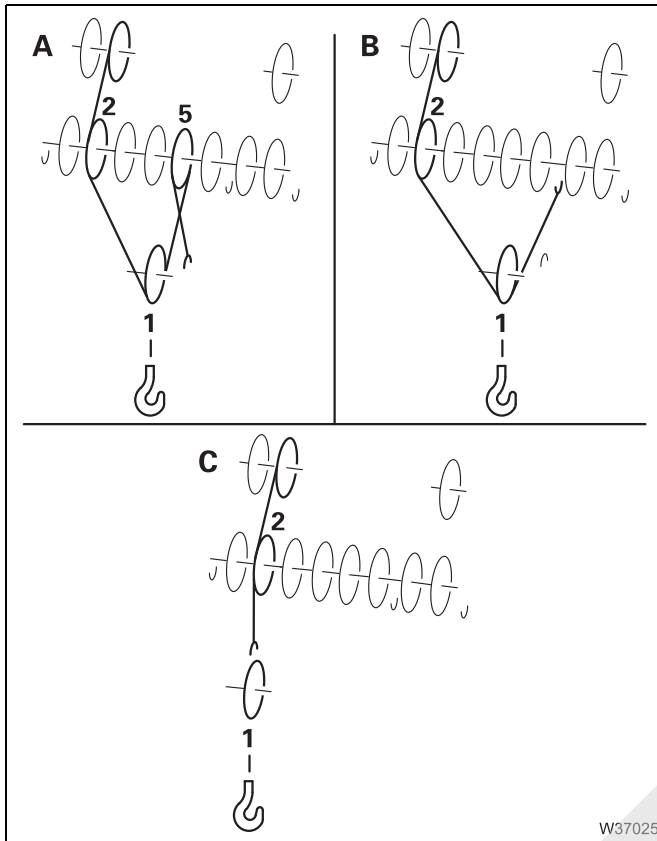


3-sheave hook block

Reeving

- A** 7-fall
- B** 6-fall
- C** 5-fall
- D** 4-fall

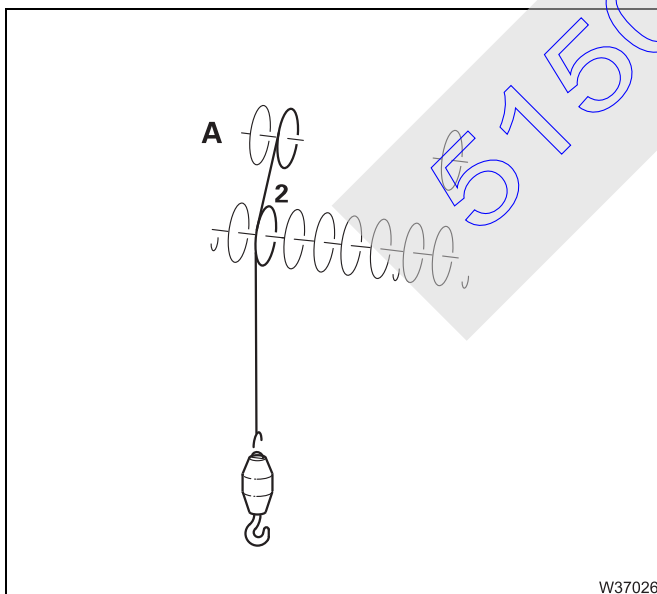




1-sheave hook block

Reeving

- A** 3-fall
- B** 2-fall
- C** 1-fall



Hook tackle

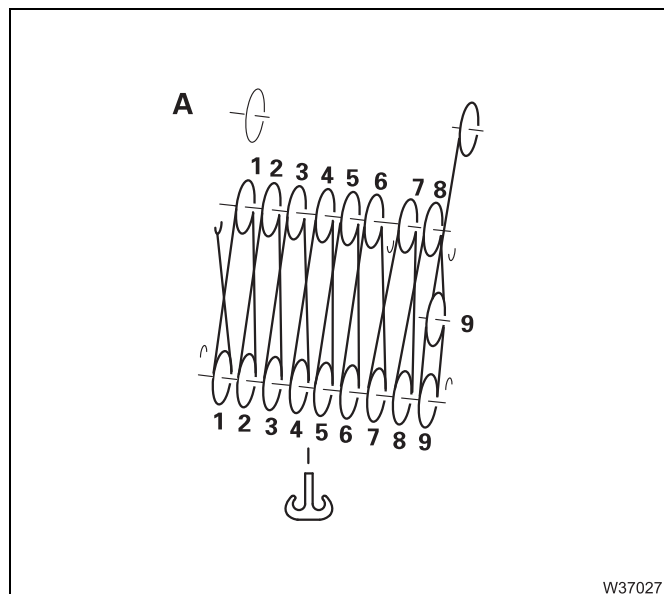
Reeving

- A** 1-fall



With 9 head sheaves

The 7th head sheave of the auxiliary single-sheave boom top ¹⁾ is used for this version.



9-pulley hook block¹⁾

Reeving

A 18-falls²⁾

¹⁾ Additional equipment;


▣▣▣▣ *Lattice extension operating manual*

²⁾ Only with special equipment; ▣▣▣▣ p. 1 - 7

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12.10.7

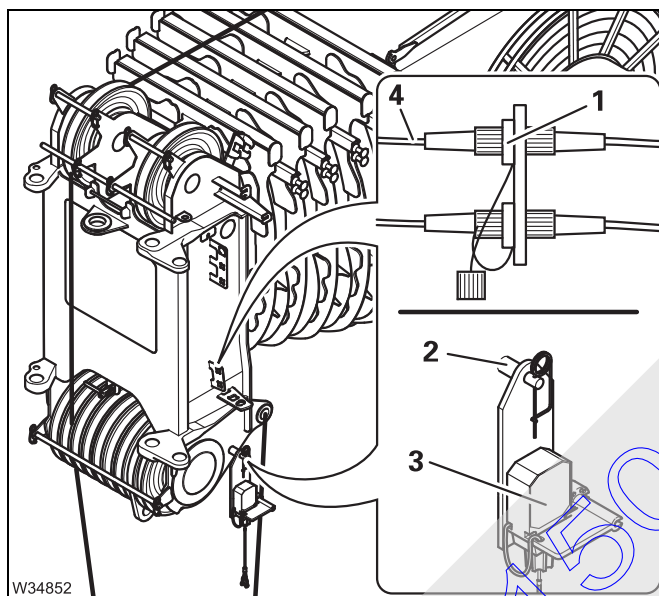
Installing/removing the lifting limit switch

Function of the lifting limit switch;  p. 11 - 82.

For every reeved hoist rope, you must install a lifting limit switch, attach a lifting limit switch weight and place it around the hoist rope.

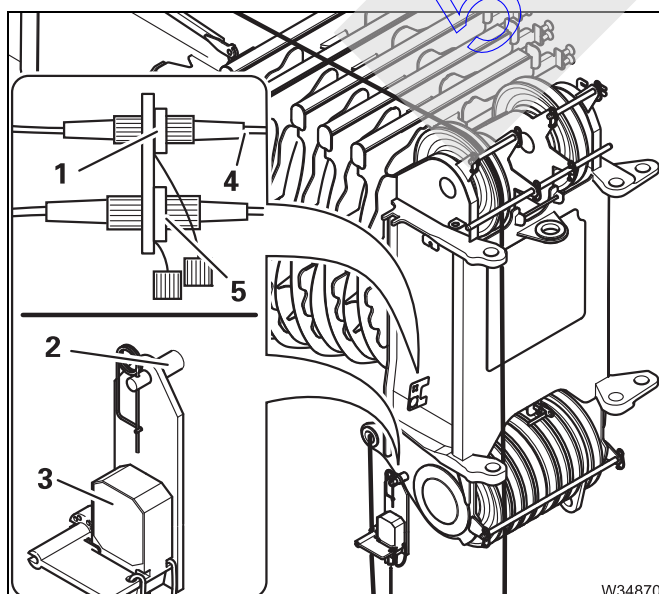
Installing the lifting limit switch

You can attach the lifting limit switch on the right or left side of main boom head. Install the switch on the side that is closer to the last rope line leading upwards. There can also be one lifting limit switch installed on each side.




On the left side

- Fit the lifting limit switch (3) onto the clamp (2) and secure it with the retaining pin
- Lay the cable (4) so that it will not be damaged during crane operation, and insert the lifting limit switch into the socket (1).

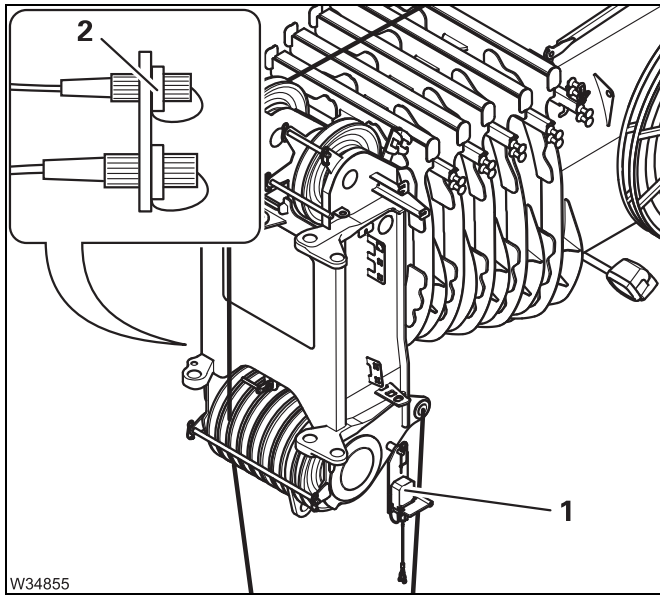


On the right side

- Plug the lifting limit switch (3) onto the clamp (2) and secure it with the retaining pin.
- Lay the cable (4) so that it will not be damaged during crane operation, and insert the lifting limit switch into the socket (1).

Connections (5),  *Lattice extension operating manual.*





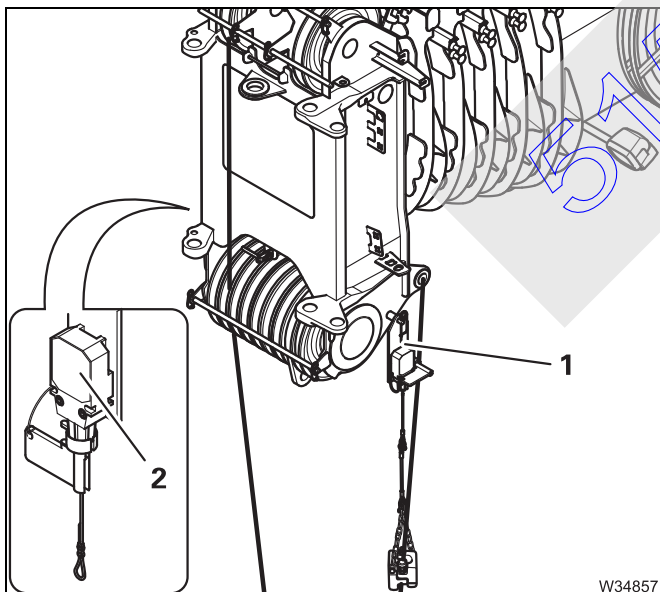
If only one lifting limit switch has been installed

- Cover the unused socket with the protective cap (2).
- Check whether the lock on the used lifting limit switch, e.g. (1), is released;
 ▣▣▣▣► *Removing the lock*, p. 12 - 144.



Risk of damage if the lifting limit switch is locked

The lifting limit switch must not be locked. Remove the lock, if necessary. If the lifting limit switch is locked, the hook block could hit the bottom of the main boom head during the lifting procedure, resulting in damage to the hook block, main boom head and hoist rope.

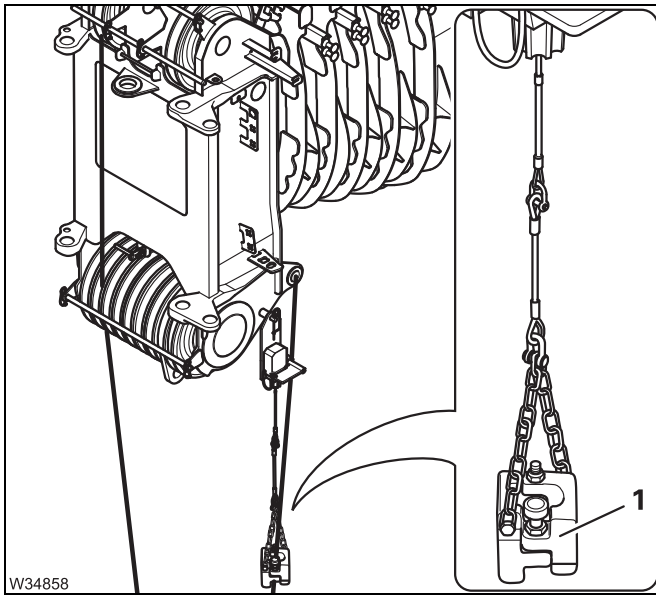


If two lifting limit switches have been installed

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


If the lifting limit switch weight has, for example, been attached to the left lifting limit switch (1), you must lock the right lifting limit switch (2); ▣▣▣▣► *Locking*, p. 12 - 144.

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

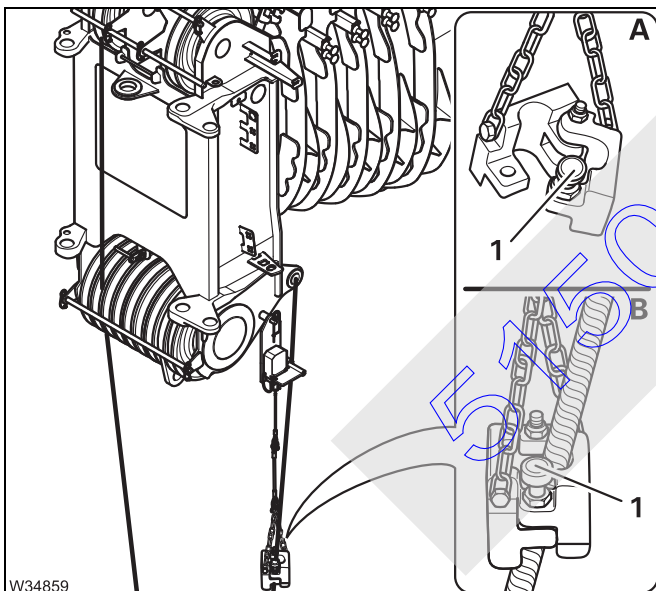


Attaching the lifting limit switch weight

- Attach the lifting limit switch weight (1).

These lifting limit switches must not be blocked;  *Removing the lock*, p. 12 - 144.

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 and the two halves of the weight are securely attached to each other.

If two hoist ropes are reeved, you must also place a lifting limit switch weight around the second hoist rope.



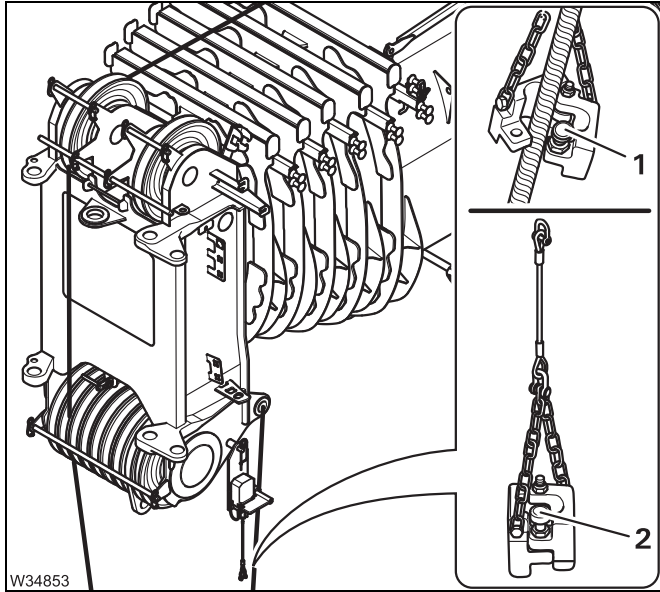
If you place the lifting limit switch weight around the last rope line leading upwards, less rope will run through the lifting limit switch weight, especially if there is a high number of reevings per lifting operation. This rope line will even be at a standstill if the number of rope lines is even.

This allows you to reduce the wear of the hoist rope and lifting limit switch weight and prevent unintentional deactivation procedures that may be caused by the running hoist rope lifting the lifting limit switch weight.



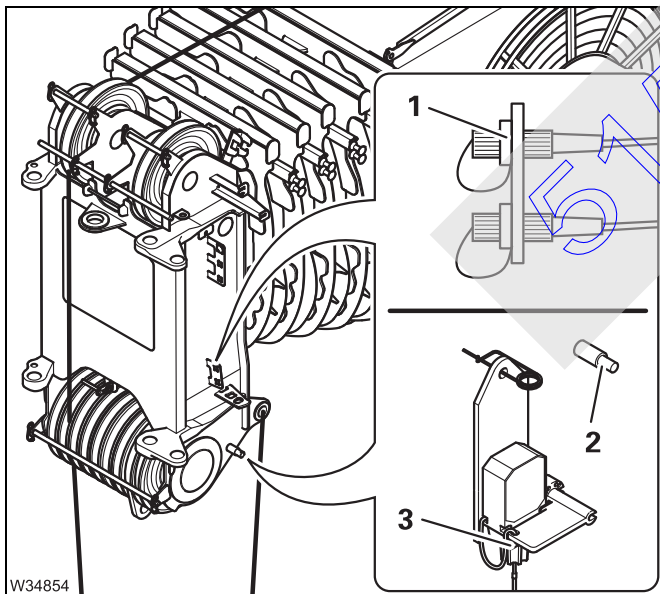
Removing the lifting limit switch

This section describes complete removal.
If the hook block is to be attached to the bumper at a later point, you will need to detach the lifting limit switch weight from the hoist rope, so that you can unreeve or reeve when unrigging the hoist rope. You can place the lifting limit switch weight around the hoist rope again before driving.



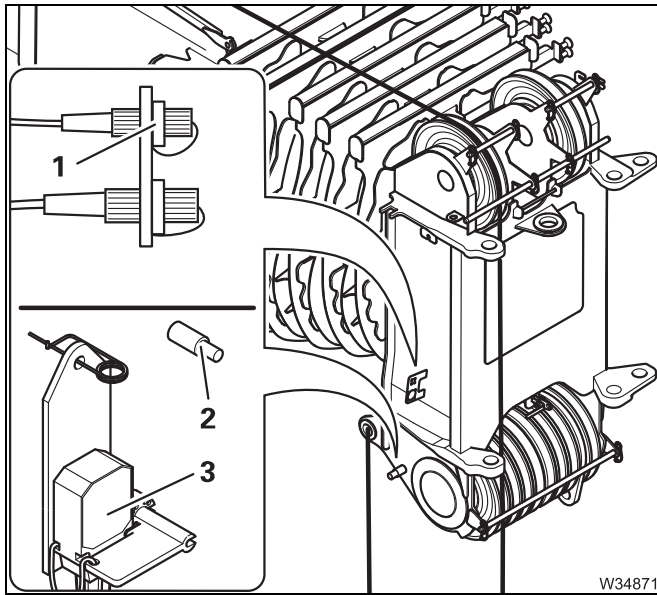
Removing the lifting limit switch weight

- Pull the safety pin (1) out and fold the two halves of the weight apart.
- Remove the halves of the weight from the rope line.
- Pull the safety pin (1) out, fold the two halves of the weight back together and let the safety pin engage.
- Remove the lifting limit switch weight (2).
- Remove the lifting limit switch weight on the other side too, if necessary.



Removing the left lifting limit switch

- Pull out the plug and close the socket with the protective cap (1).
- Remove the lifting limit switch (3) from the bracket (2)
- Fasten the retaining pin on the lifting limit switch.



Removing the right lifting limit switch

- Pull out the plug and close the socket with the protective cap (1).
- Remove the lifting limit switch (4) from the bracket (2)
- Attach the retaining pin (3) to the lifting limit switch.

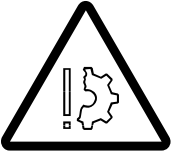
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12.10.8

Locking/unlocking the lifting limit switch

Locking

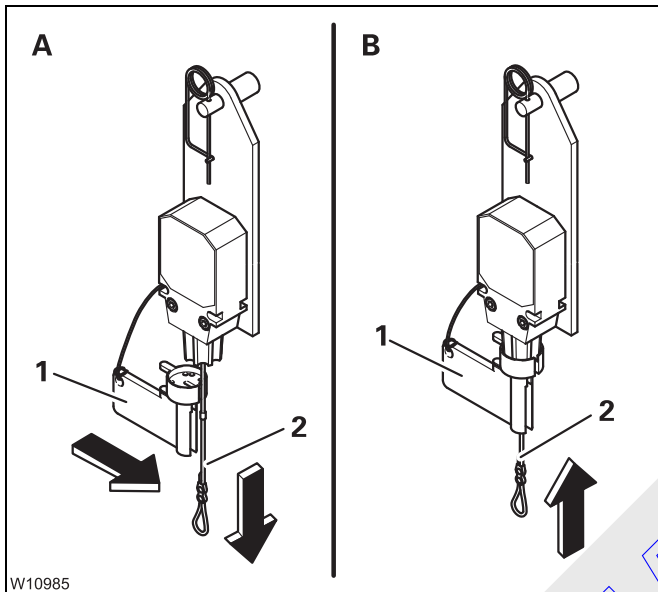
If two lifting limit switches are installed, you must lock the lifting limit switch not used in order to enable all crane operations.



Risk of damage if the lifting limit switch is locked

If the lifting limit switch on which the lifting limit switch weight hangs is locked, release the lock.

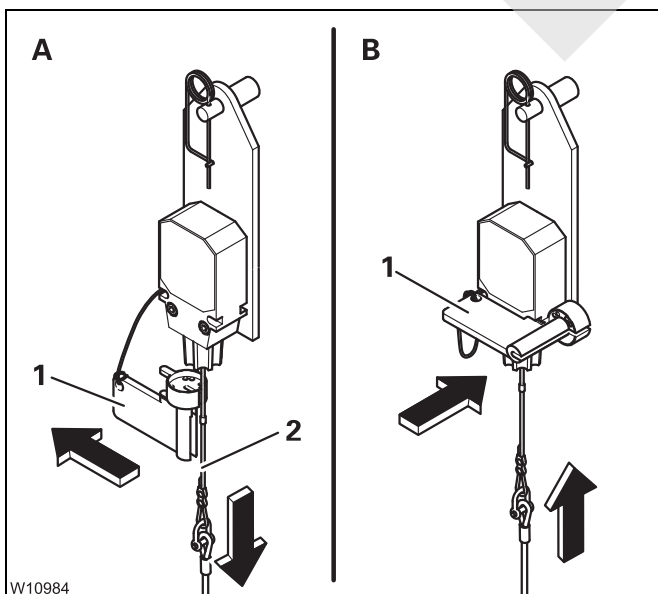
This prevents the hook block hitting the main boom head, causing damage to the hook block, main boom head and hoist rope.



- 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.

Removing the lock

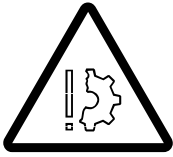
You must always release the locking before you place a lifting limit switch weight around the hoist rope.



- **(A)** – Pull the rope **(2)** down and take off the cap **(1)** – the locking is released.
- **(B)** – Fit the cap **(1)** onto the lifting limit switch.

12.10.9

Anemometer and air traffic control light



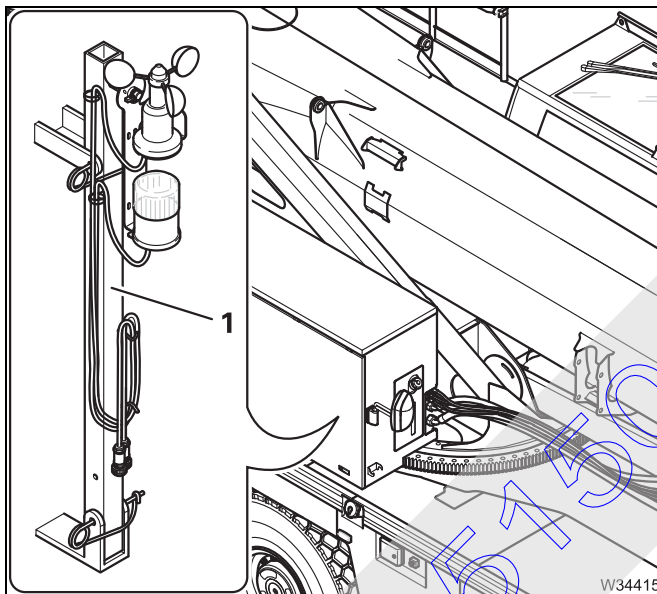
Risk of damage during on-road driving

Always remove the anemometer and air traffic control light before on-road driving.

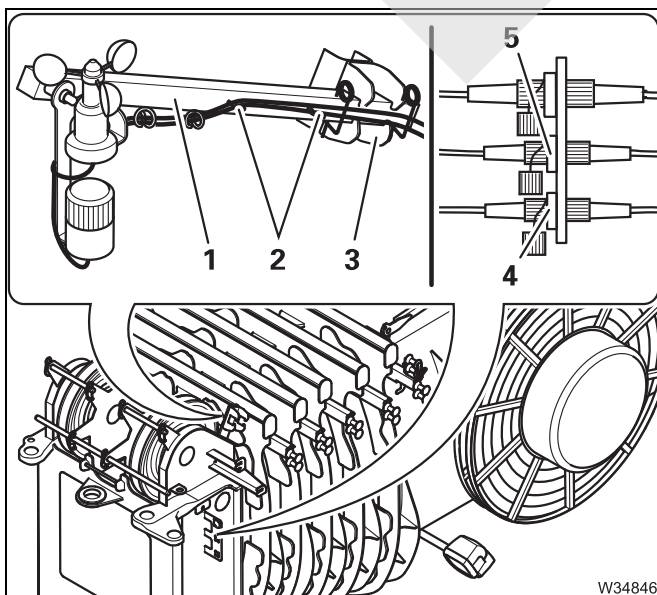
This prevents the specified overall height from being exceeded at on-road level, and the anemometer from being damaged due to unfavourable air currents.

Installing

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

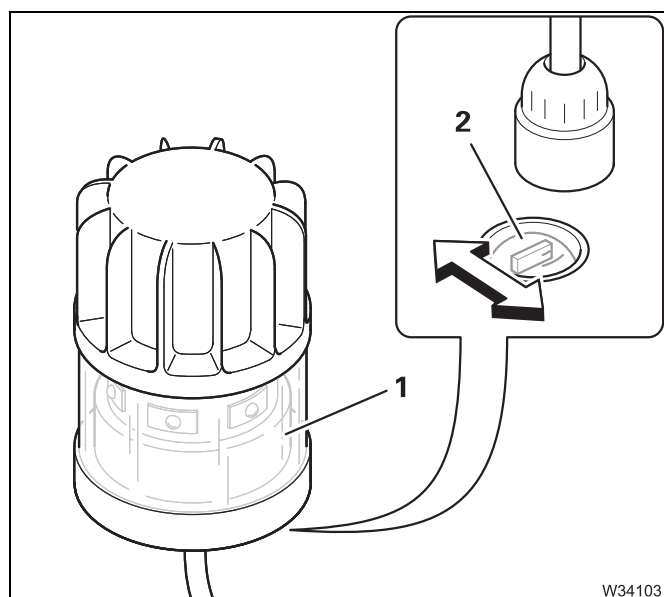


- If necessary, remove the rod from the storage compartment (1).



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



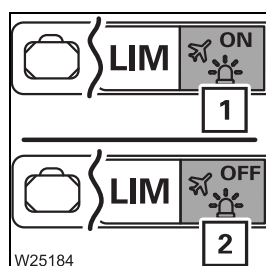


Depending on the additional equipment, the truck crane can be equipped with a switchable air traffic control light.

This air traffic control light (1) has *flashing light* and *constant light* lighting modes.

- Select the desired lighting mode using the switch (2).

Switching on/off

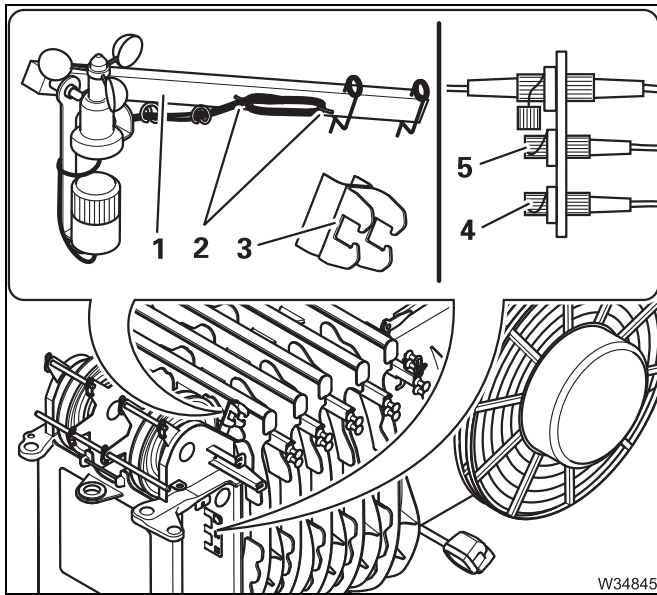


- Switch on:** Select symbol (1) and confirm – symbol *ON* is displayed
- Switch off:** Select symbol (2) and confirm – symbol *OFF* is displayed

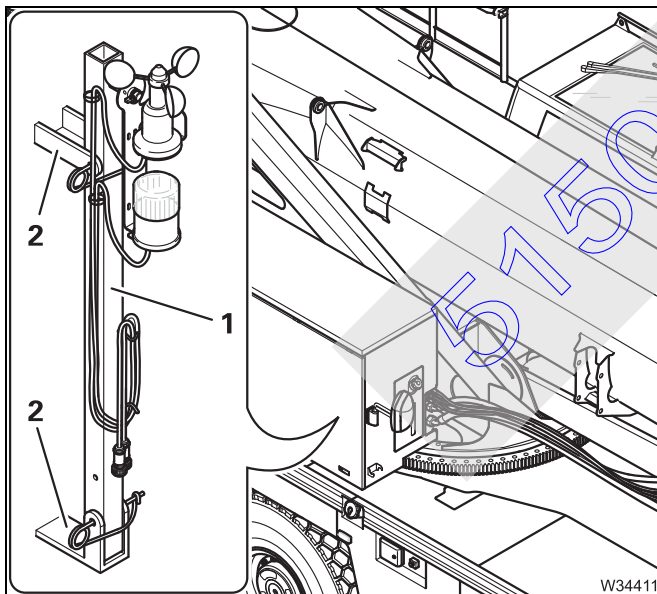
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Removing

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 protective caps.
- Wind the cables on to the clamps (2).
- Take the rod (1) out of clamp (3).



For transport

- Place the rod (1) in the holder (2).
- Secure the rod (1) using the retaining pins.

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12.11 Other rigging work

12.11.1 Railings on the turntable

The turntable is equipped with fixed handrails or extendable/retractable handrails, depending on the version.



Risk of accidents if railings are not pushed out!

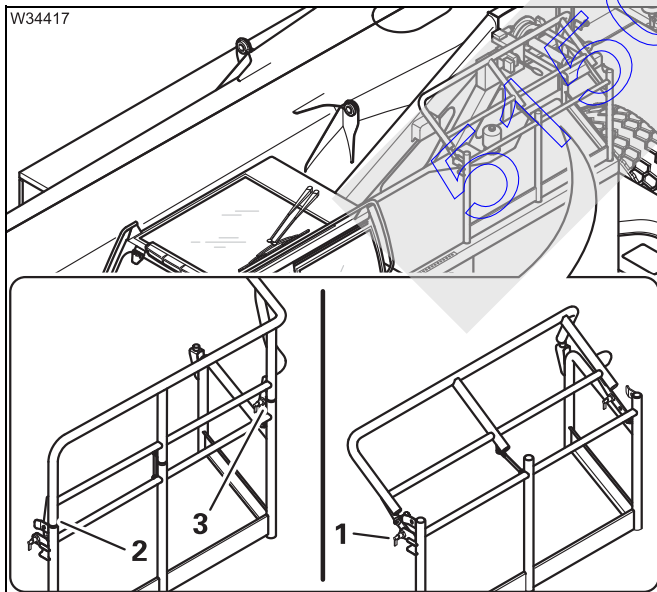
The railings provide protection from falling. Always fold out the railings before stepping on to the turntable.



Risk of accidents due to exceeding the permissible dimensions!

Fold in the railings before driving. When the railings are unfolded, the overall height specified for on-road driving is exceeded.

Always fold out the railings when you are working above on the turntable.
Always fold in the railings before driving.



Folding out

- Release the bolt (1). Fold the railings out until the latches (2) and (3) engage.

Folding in

- Release the bolt (3).
- Pull the locking bar (2) and fold in the railing until the locking bar (1) engages.

12.11.2

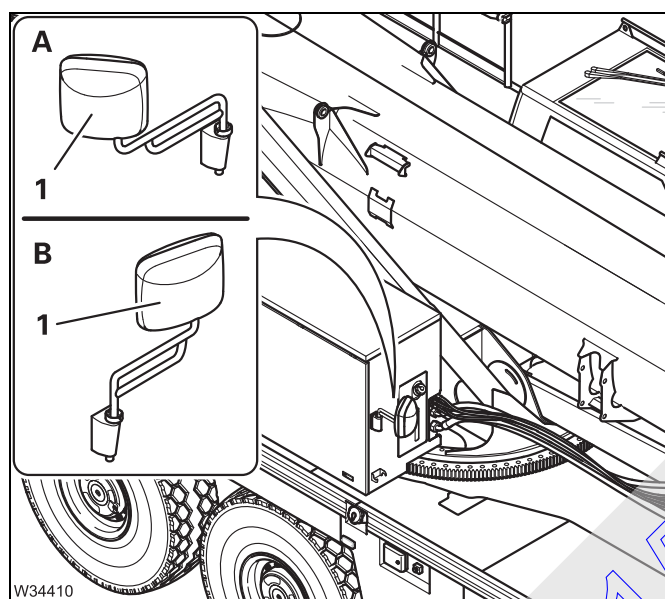
Folding the mirrors in and out, and adjusting them

The mirror must be folded in for driving. You must fold the mirror out and adjust it for crane operation or driving from the superstructure.



Risk of accidents due to exceeding the permissible dimensions!

Fold the mirror in for driving. The overall width specified for on-road driving is exceeded if the mirror is folded out.



(A) – Folding out and adjusting the mirror

- 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).

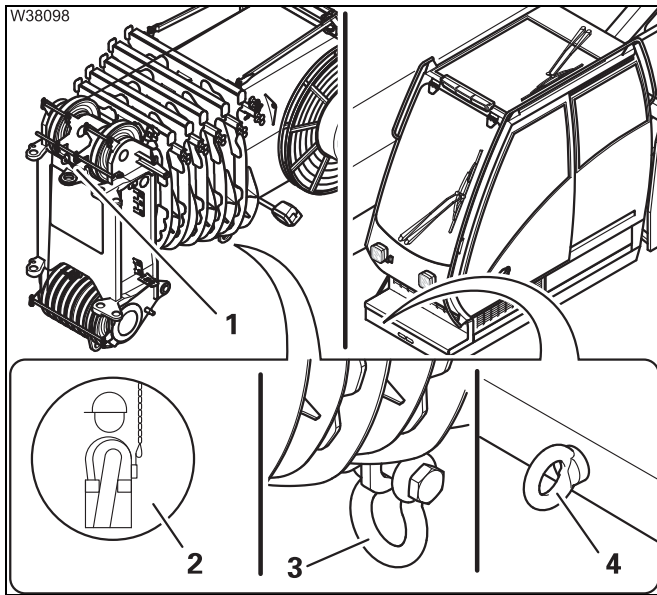
Folding in the mirror

- Fold in the mirror (1) until it does not protrude over the side of the carrier.

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12.11.3

Slings points for personal protective equipment



The labels (2) mark the approved slinging points for personal safety equipment, for example, slinging point (1).

The slinging options (3) and (4) are provided for the attachment of a fall protection device.

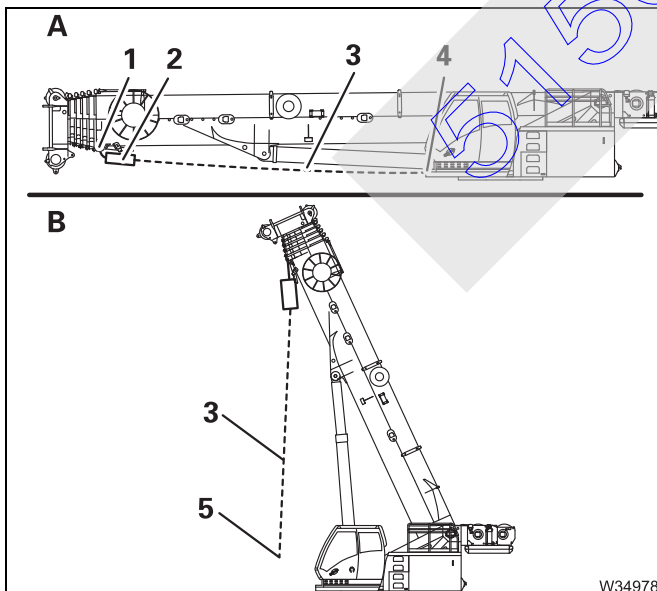
- Always use a slinging point (1) for securing yourself and your personal safety equipment or use an authorised fall protection device.



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.



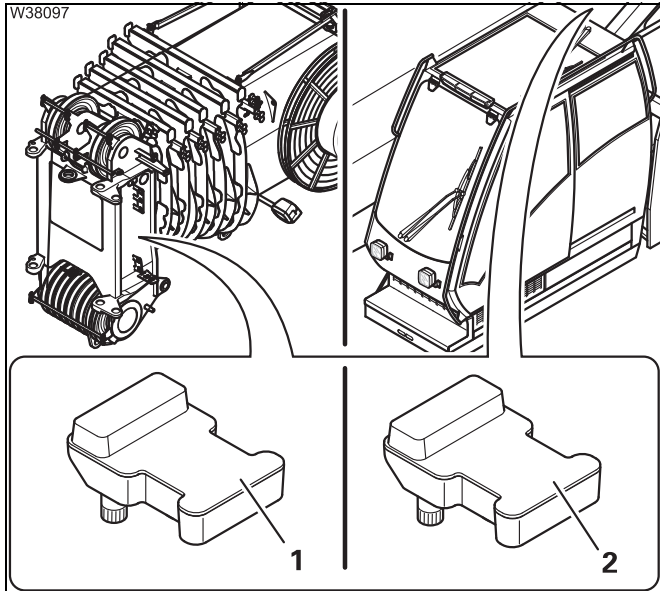
Fall protection device

- (A) – Lower the main boom.
- Sling the fall protection device (2) at the point (1).
- Guide the safety cable (3) to point (4) and fasten it.
- Make sure that the abseiling function on the fall arrester 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).

12.11.4 Cameras for crane operation

Camera on main boom

For crane operation you have to install the camera and switch it on.
For on-road driving, you have to switch the camera off again and remove it.



The transmitter (1) and the associated receiver (2) are matched 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.

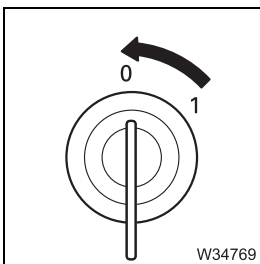


Risk of accidents if an incorrect transmitter or receiver is used!

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.



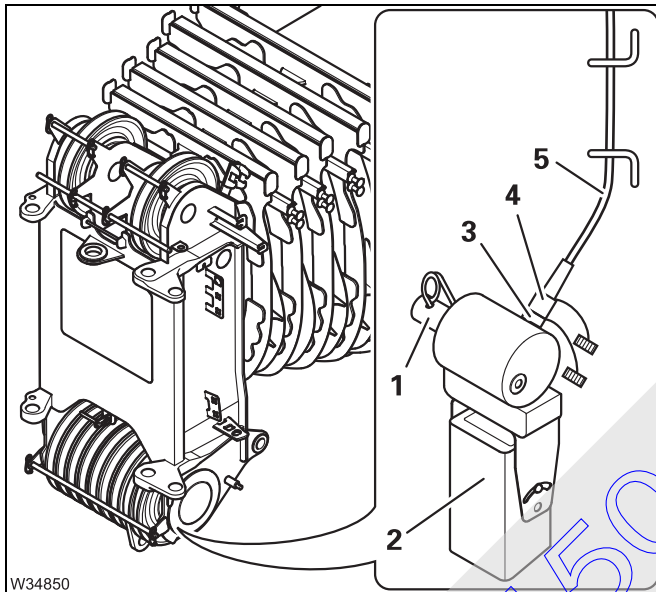


You will need the respective connecting cable to connect the camera to a lattice extension. This means certain pre-conditions are applicable to installation and removal.



Risk of accidents due to falling camera

Always use a retaining pin to hold the camera in the clamp.
This prevents the camera falling down and injuring someone.

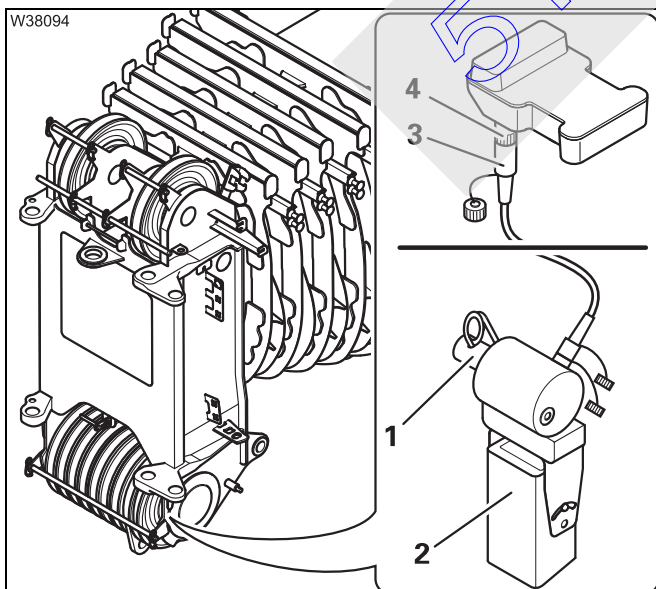


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Installing

- Only the camera

- Insert the camera (2) into the clamp (1) and secure it with the retaining pin.
- Insert the plug (4) into socket (3).
- Lay the cable (5) so that it will not be damaged.

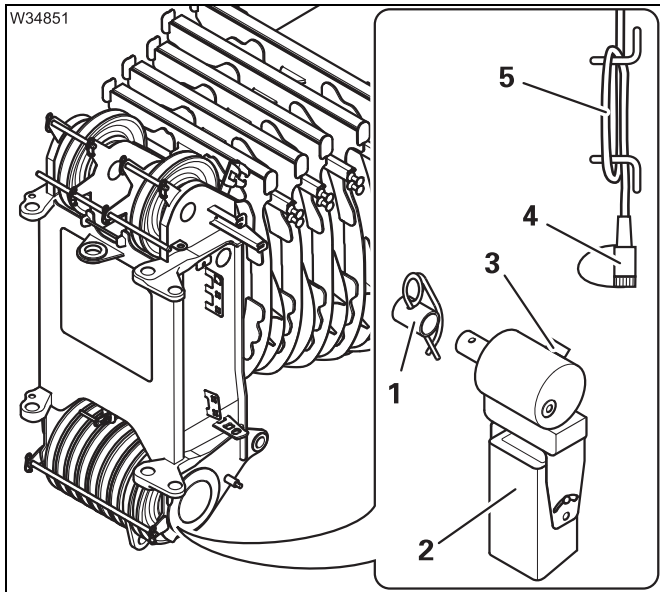


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- The camera and the connecting cable

- Insert the camera (2) into the clamp (1) and secure it with the retaining pin.
- Insert plug (3) in socket (4).
- Lay the cable (5) so that it will not be damaged.

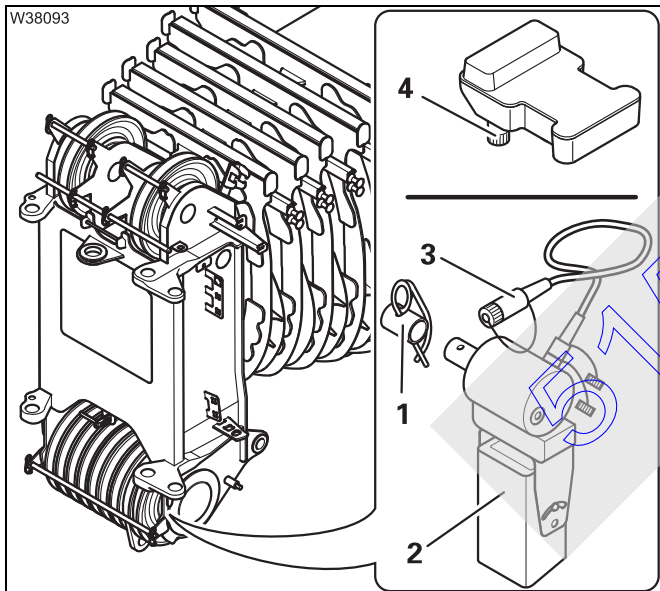




Removing

– Only the camera

- Withdraw the plug (4) from the socket (3) and close it with the cap.
- Remove the camera (2) from the clamp (1) and put the retaining pin in the holder (1).
- Wind the cable (5) on to the clamp.



– The camera and the connecting cable

- Withdraw the plug (3) from the socket (4) and close it with the cap.
- Remove the camera (2) from the clamp (1) and put the retaining pin in the holder (1).
- Wind the cable (5) on to the clamp.

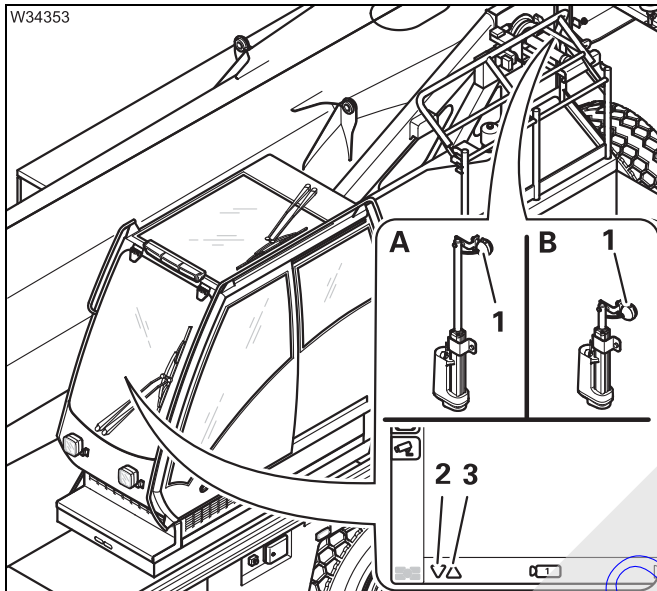
Camera on the hoists

This section describes the CCS display as the monitor. Depending on the version, a separate monitor may also be present.



Risk of accidents due to exceeding the permissible dimensions!

Always retract the camera before driving. When the camera is extended, the overall height specified for on-road driving is exceeded.

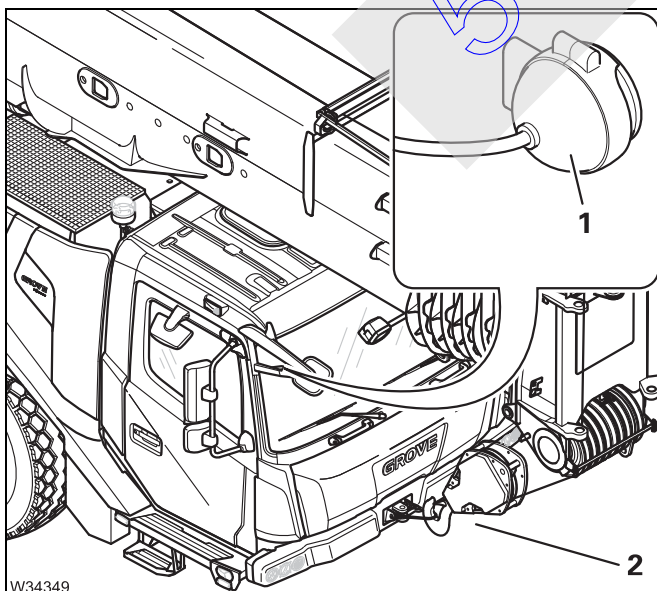


A camera (1) transmits an image of the main and auxiliary hoists to the display in the crane cab.

(A) – For crane operation you must extend the camera – symbol (3).

(B) – For crane operation you must retract the camera – symbol (2).

Camera on the driver's cab



A camera (1) allows viewing of the non-visible area in front of the driver's cab.

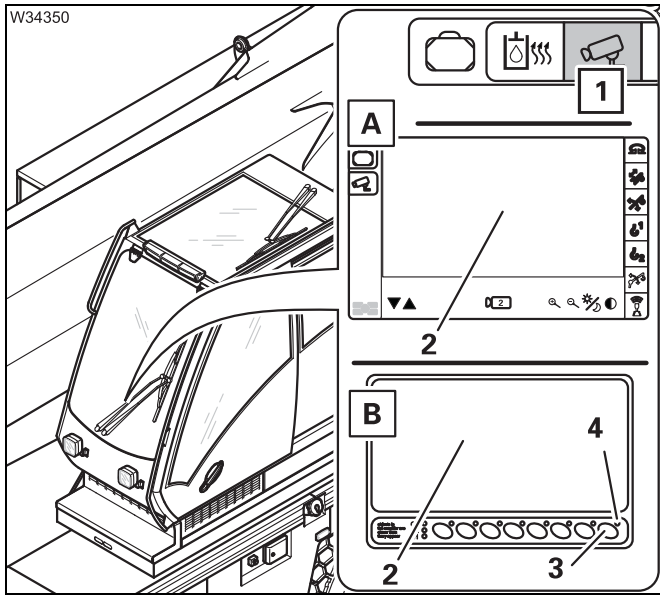
Depending on the version, the camera image is shown on the CCS display or on a separate monitor.

- Adjust the camera (1) to show the area (2) in front of the bumper on the display or monitor.



Operating the camera

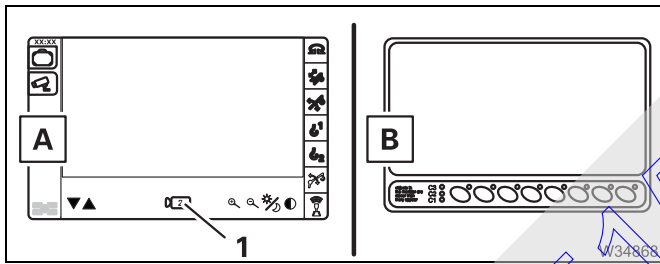
Depending on the version, the image is shown on the CCS display or on a separate monitor.



Switching on

- Switch on the ignition.
- (A) – Select and confirm the symbol (1)
- or
- (B) – Press the button (3) once. The lamp (4) lights up.

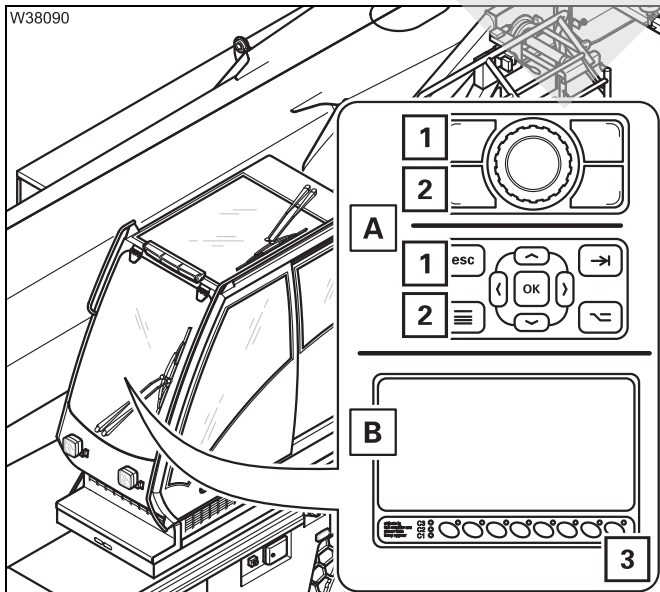
The image appears on the display after a few seconds.



Switching the representation

- (A) – with symbol (1),
- or
- (B) – with the buttons + or -.

If no image appears; see p. 14 - 17.



Switching off

- (A) – Press the button (1) or (2) once
- or
- (B) – Press the button (3) once.

The image will disappear.

12.11.5

Step at the crane cab

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



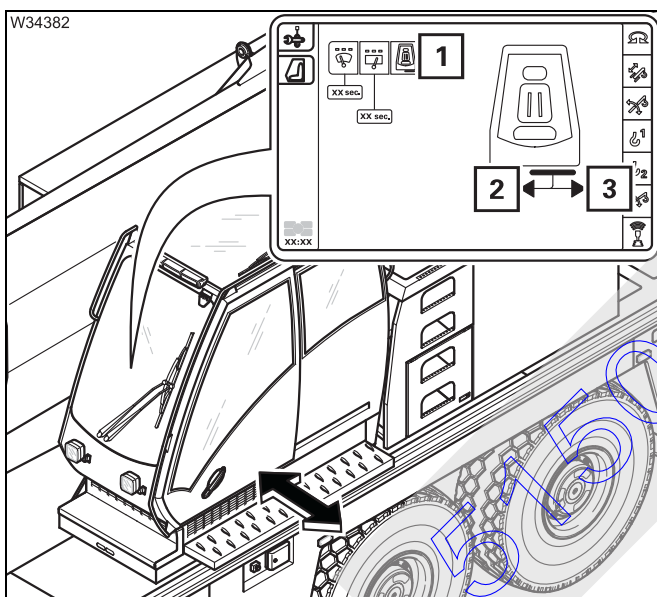
Risk of accidents by exceeding the permissible overall width!

Always retract the step for on-road driving.

When the step is extended, the overall width specified for on-road driving is exceeded.



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



In the *Crane cab* menu

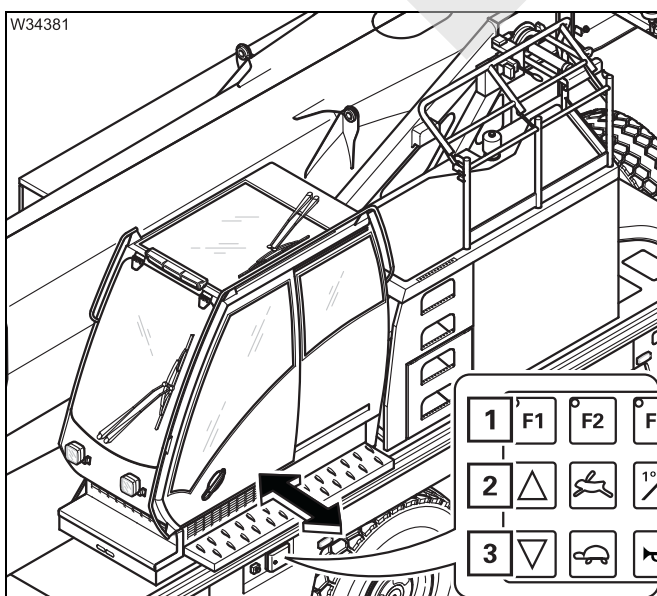
Select *extend/retract access ladder* as necessary (1).

Extending

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

Retracting

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



On the outrigger control unit

Extend

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

Retract


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

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13

Driving with a rigged truck crane

This section describes driving 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 raised main boom in the 0° to the rear position.



Risk of overturning by slewing superstructure

When driving the rigged truck crane, the slewing gear must be switched off – slewing gear brake engaged. The turntable must be locked.




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 permissible *Free on wheels* working 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 permissible only 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 permissible on public roads.

13.1

Route

The path to be driven must be level. The level adjustment system cannot compensate for uneven surfaces.

The entire driving distance must be level. The rigging modes and axle loads specified in this chapter only for routes which are free of inclines in longitudinal and lateral direction.

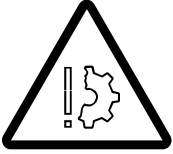
The ground of the path to be driven must be stable enough to bear the axle loads.

If the surface pressure of the tyres exceeds the permissible load on the ground, the surface area of the tyres must be increased by laying stable material (e.g. wooden planks) on it.

13.2

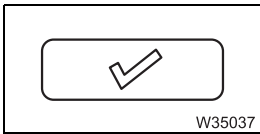
Permissible rigging modes and axle loads

Depending on the counterweight rigged, you must bring the superstructure and the main boom into certain positions so that the permissible axle loads are not exceeded.



Risk of damage to the axle lines!

Only bring the superstructure and the main boom into the specified positions. This prevents excessive strain on the axle lines.



- Enter and confirm the current rigging mode of the truck crane.



Risk of accidents if the RCL is overridden!

Always confirm the current rigging mode. The specified positions are within the monitored operating ranges.

If the RCL is overridden, the truck crane may overturn even if you move it into the positions specified.

- Bring the superstructure and the main boom into a position that is indicated in the following table for the specified counterweight rigged.
- Tie down the hook block so that it cannot swing around.

Axle load table

The axle loads apply

- to all permissible tyres; ■■■► p. 1 - 18
- a reeved 3-sheave hook block; ■■■► p. 1 - 12

Counter weight in t (lbs)	Telescope status I - II - III - IV - V in %	Main boom Angle in °	Superstruc- ture position ¹⁾	Axle load ²⁾ in t (x 1,000 lbs)	
				front	rear
1.0 (2,205)	0 - 0 - 0 - 0 - 0	30 - 50	front	12.0 (26.5)	11.5 (25.4)
	0 - 0 - 0 - 0 - 0	80	rear	9.0 (19.8)	12.0 (26.5)
3.3 (7,275)	0 - 0 - 0 - 0 - 0	30	front	11.5 (25.4)	11.0 (24.3)
	0 - 0 - 0 - 0 - 0	80	rear	10.0 (22.1)	12.0 (26.5)
5.6 (12,356)	0 - 0 - 0 - 0 - 0	20	front	11.5 (25.4)	12.0 (26.5)
	0 - 0 - 0 - 0 - 0	80	rear	11.0 (24.3)	12.0 (26.5)
7.9 (17,417)	0 - 0 - 0 - 0 - 0	20 - 40	front	10.5 (23.1)	14.5 (31.9)
	0 - 0 - 0 - 0 - 0	80	rear	12.0 (26.5)	12.5 (27.6)

Counter weight in t (lbs)	Telescope status I - II - III - IV - V in %	Main boom Angle in °	Superstruc- ture position ¹⁾	Axle load ²⁾ in t (x 1,000 lbs)	
				front	rear
10.2 (22,487)	50 - 0 - 0 - 0 - 0	20 - 40	front	15.5 (34.2)	12.5 (27.6)
	0 - 0 - 0 - 0 - 0	80	rear	12.5 (27.6)	12.5 (27.6)
12.5 (27,558)	50 - 0 - 0 - 0 - 0	20	front	15.0 (33.1)	12.0 (26.5)
	0 - 0 - 0 - 0 - 0	65 - 80	rear	13.5 (29.8)	14.5 (31.9)
14.8 (32,628)	50 - 0 - 0 - 0 - 0	20	front	14.0 (30.9)	13.0 (28.7)
	0 - 0 - 0 - 0 - 0	60 - 80	rear	14.5 (31.9)	15.5 (34.2)
17.1 (37,699)	50 - 0 - 0 - 0 - 0	20	front	13.5 (29.8)	14.5 (31.9)
	0 - 0 - 0 - 0 - 0	70 - 80	rear	15.0 (33.1)	14.5 (31.9)
19.4 (42,770)	50 - 0 - 0 - 0 - 0	20	front	12.5 (27.6)	15.5 (34.2)
	0 - 0 - 0 - 0 - 0	80	rear	16.0 (35.3)	13.0 (28.7)
21.7 (47,840)	50 - 50 - 0 - 0 - 0	20	front	16.0 (34.2)	14.0 (30.9)
	0 - 0 - 0 - 0 - 0	70	rear	15.0 (33.1)	15.5 (34.2)
24.0 (52,911)	50 - 50 - 0 - 0 - 0	20	front	15.0 (33.1)	15.5 (34.2)
	0 - 0 - 0 - 0 - 0	70	rear	15.0 (33.1)	16.0 (35.3)
26.3 (57,982)	50 - 50 - 0 - 0 - 0	20	front	14.5 (31.9)	16.5 (36.4)
	0 - 0 - 0 - 0 - 0	65	rear	15.5 (34.2)	15.5 (34.2)
30.9 (68,123)	50 - 50 - 50 - 0 - 0	20	front	15.5 (34.2)	17.5 (38.6)
	0 - 0 - 0 - 0 - 0	65	rear	17.5 (38.6)	16.0 (35.3)
44.5 (98,106)	50 - 50 - 50 - 50 - 50	20	front	14.0 (30.9)	23.0 (50.7)
	0 - 0 - 0 - 0 - 0	50	rear	20.0 (44.1)	19.0 (41.9)

- 1) Rear: Display, slewing angle 0°
Front: Display, slewing angle 180°
- 2) Front: on the first and second axle lines respectively
Rear: on the 3rd, 4th and 5th axle line

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13.2.1

To drive without a load

- Bring 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


To drive with a load

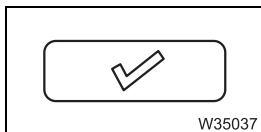
When the truck crane is being driven with a lifted load, it may be driven only from the crane cab.



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.
- Bring the main boom to an inclination permitted within the working range.
- Lock the turntable in the 0° to the rear position;  p. 13 - 7.
- Enter and confirm the rigging mode according to *Lifting capacity table* for the current *Free on wheels, 0° to the rear* working position.



Risk of accidents when driving with a lifted load

Secure the load when driving so that it cannot swing and use the transmission mode **DM** or **RM** so that the transmission does not shift.

In 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 - 17

13.2.3

Axle loads

The axle loads do not exceed 25.0 t (55,116 lbs) if the main boom is within the permissible working range in a permissible *Lifting capacity table Free-on-wheels* working position.

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13.3

Before driving the rigged truck crane

13.3.1

Check the tyre pressures and wind speed

- Ensure that all the tyres are at the prescribed pressure levels;
 ▣▣▣▣ *Tyres*, p. 1 - 18.



Risk of damage to the tyres

Only drive the rigged truck crane if the tyres are at the prescribed pressure level.

Never reduce the tyre pressure in order to increase the bearing surface of the tyres!

The wind speeds stated in *Lifting capacity table* for the entered rigging mode apply for 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 secure state.

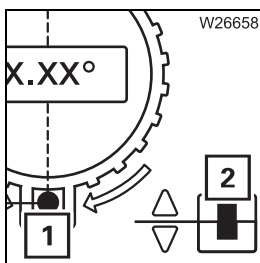
13.3.2

Secure the superstructure against slewing



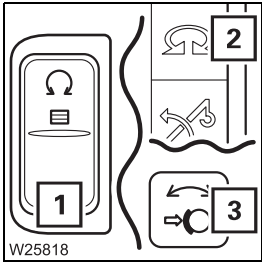
Danger of overturning by the superstructure slewing whilst driving the truck crane

Always secure the superstructure before driving the rigged truck crane to prevent it slewing. Slewing the superstructure whilst driving the truck crane increases the risk of overturning.



- Lock the turntable – the symbols (1) and (2) must be **green**





- Switch off the slewing gear
 - The lamp in the button (1) must be dimly lit.
 - Then symbol (2) turns **red** – slewing gear switched off.
 - Lamp (3) must light up – the slewing gear brake is applied;
 ▣▣▣▣ *Switching off the slewing gear*, p. 11 - 120.

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 - 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 outrigger cylinders.



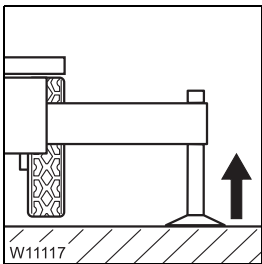
Risk of damage to the axle lines!

Retract the outrigger cylinders evenly. This prevents excessive strain on the axle lines.

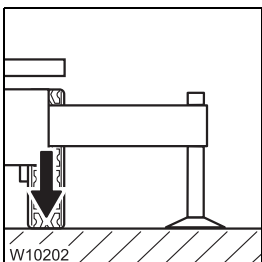


Danger of overturning when switching on the suspension

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 be suddenly collapsed and damaged, and the truck crane could overturn.



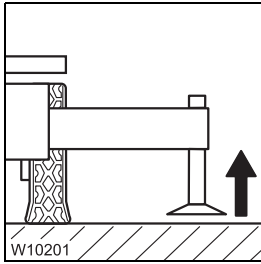
- If necessary, retract the outrigger cylinders until all wheels are just above the ground.



Lowering wheels

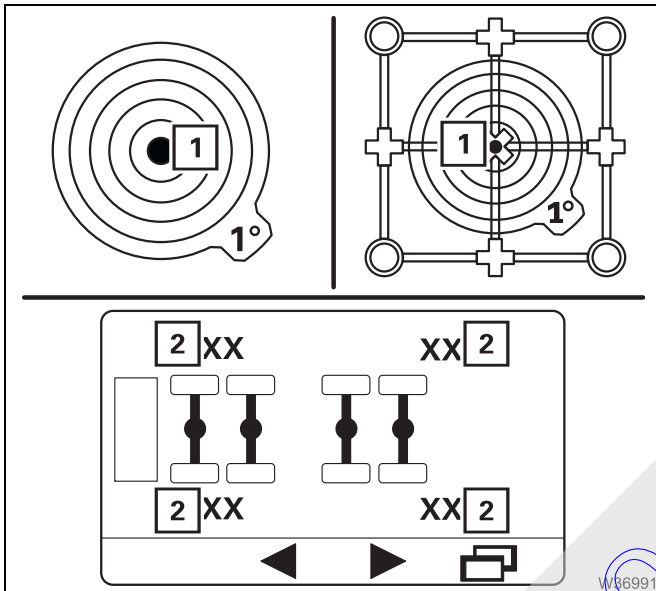
Use the Raise axle function to lower all wheels to the ground;

▣▣▣▣ *Operating the axle raising system*, p. 12 - 66.



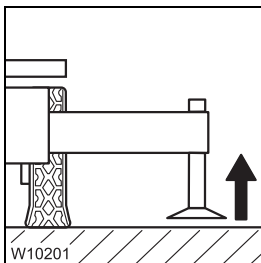
Aligning the truck crane

- 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 - 66.



To secure the truck crane

- Retract the supporting cylinders until the outrigger pads are about 5 to 10 cm (2 to 4 in) above the ground. 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

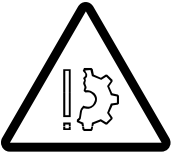


You can also use the raise axle function to put the truck crane on the wheels; p. 13 - 8.



Danger of overturning by unevenly retracting the outrigger cylinders

Retract the outrigger cylinders evenly. This prevents the truck crane from overturning while retracting individual outrigger cylinders.



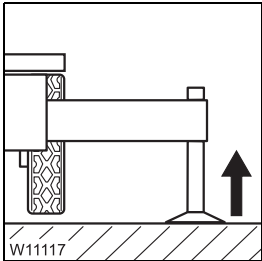
Risk of damage to the axle lines!

Retract the outrigger cylinders evenly. This prevents excessive strain on the axle lines.



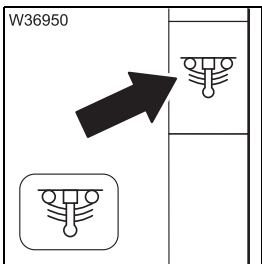
Danger of overturning when switching on the suspension

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

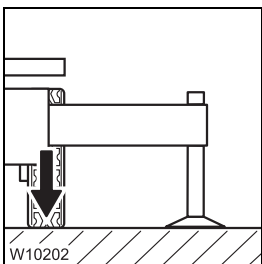


Lowering wheels

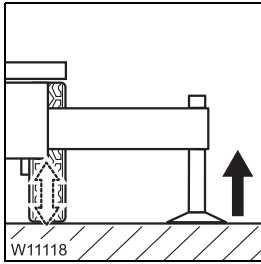
- Retract the supporting cylinders until all wheels are just above the ground.



- Switch on the suspension – the symbol must be **green**; *Switching the suspension on/off*, p. 5 - 16.

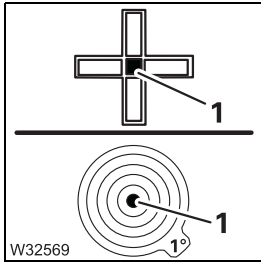


Now lower all wheels to the ground.

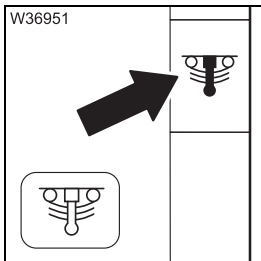


Levelling the truck crane


- Retract the supporting cylinders evenly. Lower the truck crane only to the extent that the suspension struts still have enough play for alignment.

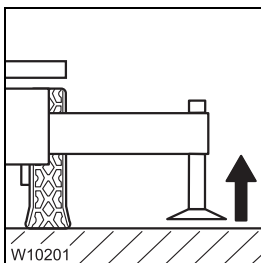


- Level the truck crane with the outriggers until the lamp (1) is the only one illuminated in the measuring range 1°.



Switching off the suspension

- Switch off the suspension – the symbol must be red;  Switching the suspension on/off, p. 5 - 16.



To secure the truck crane

- Retract the supporting cylinders until the outrigger pads are about 5 to 10 cm (2 to 4 in) above the ground. 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



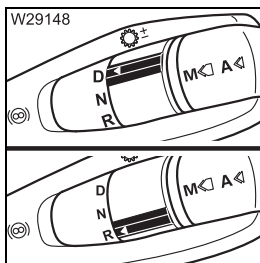
Risk of accidents when driving the truck crane from the driver's cab with a lifted load!

With a lifted load, drive the truck crane only from the crane cab. You must be able to carry out crane movements in an emergency at all times.

13.4.1

Preparing to drive

Transmission



- In order to
 - for **forward travel** in position **D**,
 - drive **backwards**, shift to position **R**. An acoustic signal is given with additional equipment.

Switching on separate steering

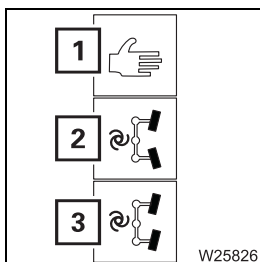


When driving the rigged truck crane, the separate steering must be switched on.

Risk of damage to the steering linkage

Always switch on separate steering before driving the rigged truck crane and steer the truck crane only when it is rolling.

The steering linkage can be damaged if separate steering is switched off or if you steer the vehicle while it is stationary.



- Select and confirm the symbol
 - 1 – for Manual separate steering or
 - 2 – Separate steering automatic for driving around corners or
 - 3 – separate steering automatic for crab travel.

Connections

If required, you can

- switch on the longitudinal differential locks; p. 5 - 51.
- switch on the transverse differential locks; p. 5 - 51.

13.4.2

Whilst driving

- Only drive slowly, do not change up.
- The turning radius should be as great as possible when driving around corners.
- Steer the truck crane when it is moving, and avoid sudden changes to the steering.



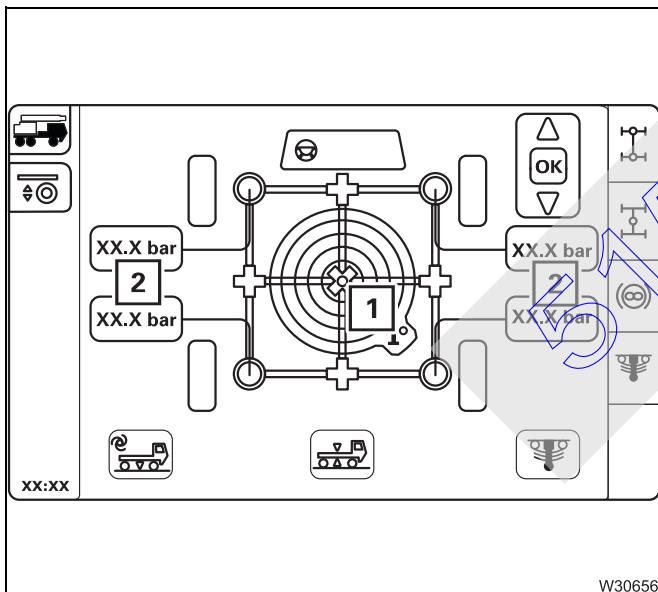
Risk of damage to the steering linkage

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 whilst 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
- or
- The suspension operation pressure (2) of 210 bar (3,045 psi) has been exceeded.

In this case, you must realign the truck crane using Raise axle as described in the section *Putting the truck crane on the wheels – with Raise axle function*; p. 13 - 8.




Danger of overturning by switching on the suspension

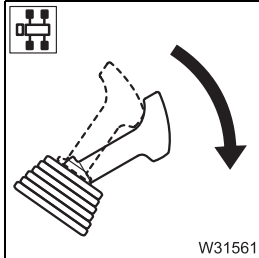
The suspension must be deactivated (locked) while the rigged truck crane is on wheels.

Switching on the suspension would cause the suspension cylinders to be suddenly pressed together and damaged, and the truck crane could overturn.

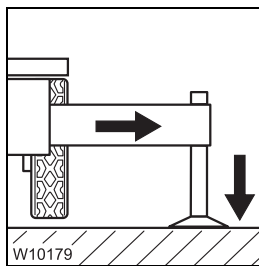
13.4.3

After driving

- Switch separate steering off after driving;  p. 5 - 63.





- Engage the parking brake.



Support the truck crane with the outrigger span required for the job according to the *Lifting capacity table* and raise until none of the wheels touches the ground.

Enabled outrigger spans

- For the *Standard* slewing range type;  p. 12 - 32
- For the *MAXbase* slewing range type;  p. 12 - 36

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13.5

Driving from the crane cab



Risk of accidents when driving with a lifted load

The truck crane may be driven with a lifted load only when it is in the *Free on wheels* working 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 away slowly 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 which you cannot see, such as the erected main boom.



Risk of overturning by slewing superstructure

When driving the rigged truck crane, the slewing gear must be switched off – slewing gear brake engaged. The turntable must be locked.




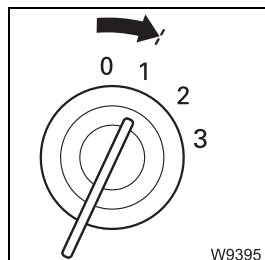
Risk of accidents when an increased idling speed is used

If necessary, reset the idling speed to the default value. Do not drive with increased idling speed. You may drive the truck crane from the crane cab only at the lowest speed possible.

13.5.1

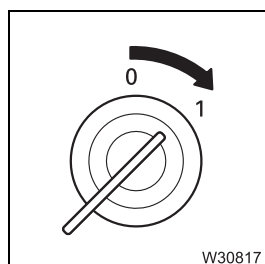
Preparing to drive

- 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 must be in position **1** so that the steering cannot block.
- The driver's cab must be locked with the second ignition key in order to secure it against unauthorised use – e.g. braking.
- The parking brake is engaged.



In the crane cab

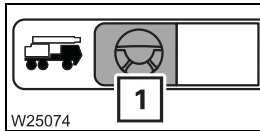
- The ignition must be switched on.
- The hand-held control must be disconnected and bridging plugs plugged into all the sockets.
- The superstructure must be locked.
- The parking brake is engaged.

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13.5.2

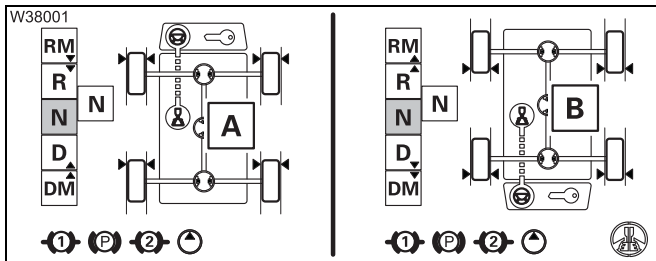
Opening/closing the driving menu

Opening the menu

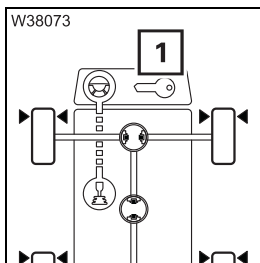


- Select and confirm the symbol (1).

The menu opens automatically the first time you release the parking brake after switching on the ignition.



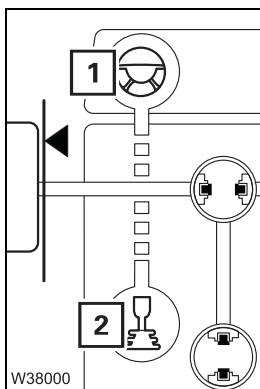
The display will show (A) or (B) depending on the current slewing angle; *Carrier display*, p. 9 - 157.



If the symbol (1) is **red**, you must turn the ignition key in the driver's cab to position 1 – the symbol then 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

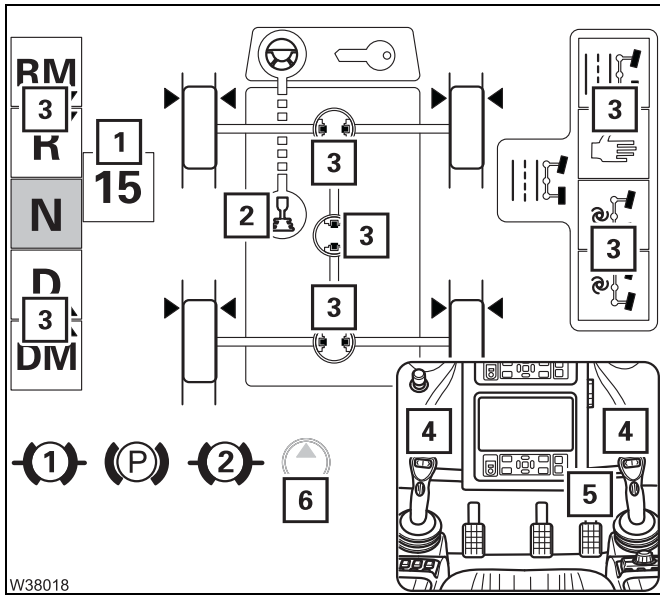
Symbol (1) **white** – symbol (2) **green**

In this operating mode, the operating elements for driving are activated and you can choose to drive with the crane's hydraulic system switched on. When the crane's hydraulic system is switched on, the crane movements are released with reduced power (no high-speed mode).

Selecting the operating mode

- Select and confirm the symbol (2) – the active operating mode is displayed.





In crane operation

The symbol (2) is **white**.

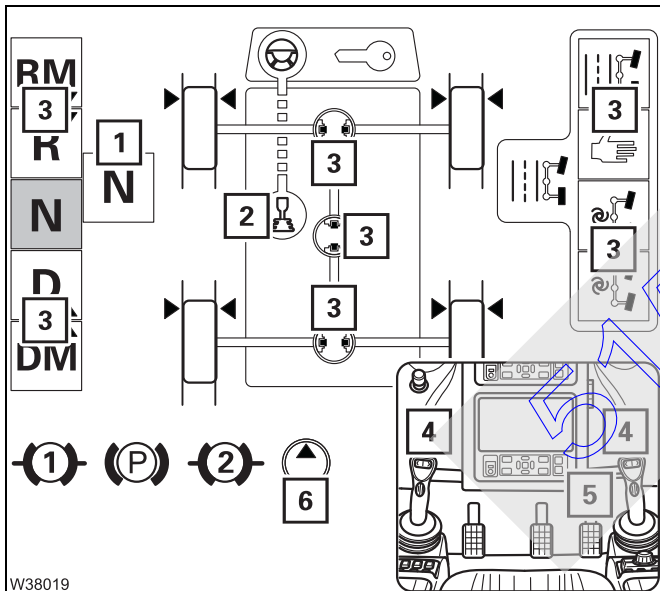
The gear indicator (1) indicates gear 15 (shift position for supplying the crane's hydraulic system).

The operating elements (3) are disabled.

The buttons (4) are assigned the *High-speed* function.

The crane's hydraulic system *Driving mode* is switched off – symbol (6) **grey**.

The engine speed for crane operation is regulated using the pedal (5).



In driving operation

The symbol (2) is **green**.

The transmission is in neutral position – display (1).

The operating elements (3) are released.

The buttons (4) are assigned the *Steering* function.

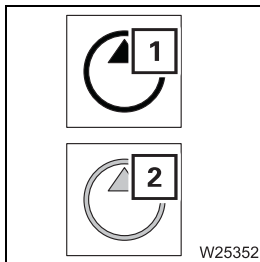
The crane's hydraulic system *Driving mode* is switched on – symbol (6) **orange**.

The engine speed for driving is regulated using the pedal (5).

Crane's hydraulic system *Driving mode*

In driving mode, the crane's hydraulic system is driven by a different energy source from the one used in crane operation.

The switchover is automatic, and the current status is displayed.




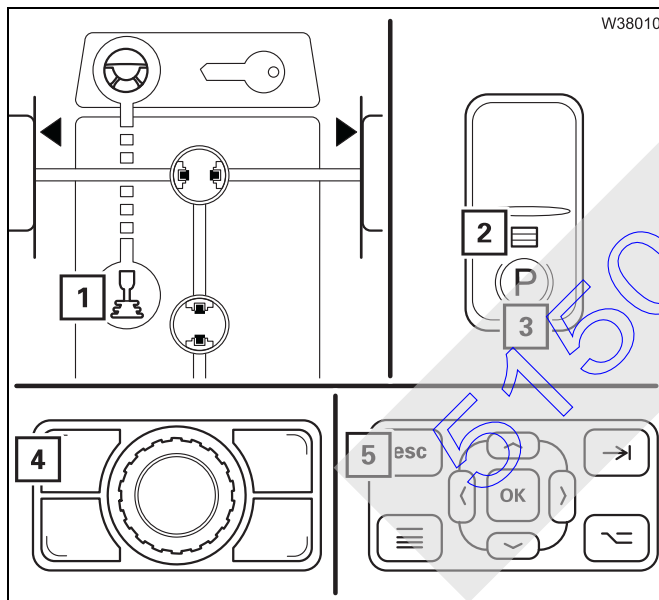
1 Arrow orange – crane's hydraulic system *Driving mode* on
The transmission mode **RM**, **DM** or neutral position **N** is selected – you can carry out crane movements.

2 Arrow grey – crane's hydraulic system *Driving mode* off
The transmission mode **D** or **R** is selected – the crane movements are disabled.

Closing menu

This section describes only how to close the *Driving* menu.

If you want to stop driving,  *After driving*, p. 13 - 32.

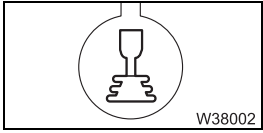


- Apply the parking brake.
Press button (3) down once – lamp (2) lights up.
- Switch to crane operation mode.
Select symbol (1) and confirm – symbol is white.
- Close the *Driving* menu.
Press button (4) or (5) once.

13.5.3

Steering

Switching on



Switching over to *Driving* mode switches on the normal steering mode.

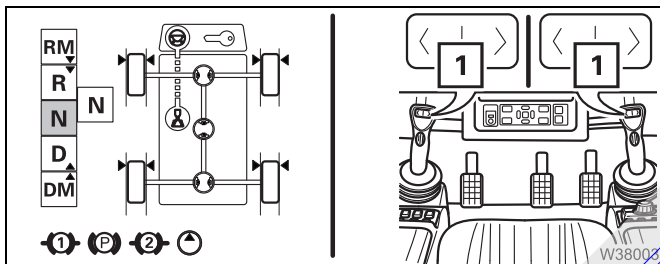
Display and steering direction

The display of the carrier depends on the current slewing angle;
Carrier display, p. 9 - 157.

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

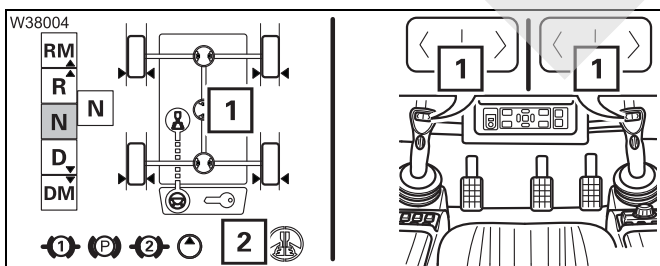
The steering direction is *Steering wheel*.



- **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.

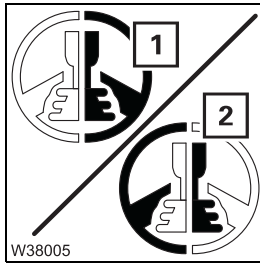


With steering direction *Reversed* – symbol (2) displayed – the following applies:

- **Turn to the right**
Press button (1) to the left – steering wheel turns to the right (with right control lever).
- **Turn to the left**
Press button (1) to the right – steering wheel turns to the left (with right control lever).

Switching the steering direction

The steering direction switched on is saved and is retained even after a restart.



The display shows the currently set steering direction.

- 1 Steering direction *Steering wheel*
- 2 Steering direction *Reversed* (compared to steering wheel)

Switching over

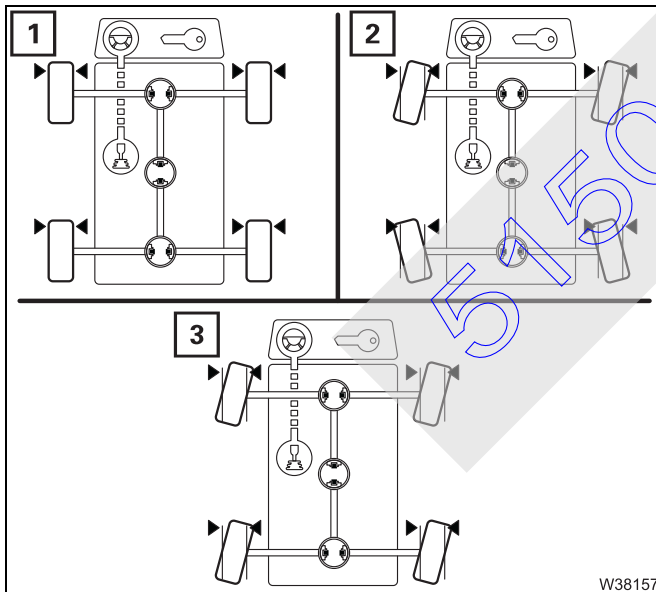
- Select and confirm the desired symbol



All illustrations and descriptions in the following sections refer to the steering direction *Steering wheel*. 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.



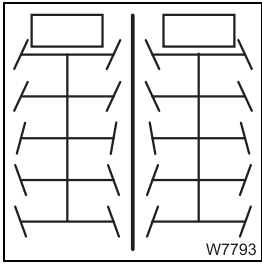
The symbols show the current steering angle:

- 1 Straight ahead position
- 2 Driving around corners
- 3 Crab travel mode



Separate steering

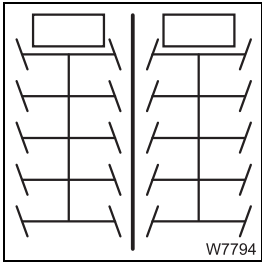
Always switch off the separate steering when driving a rigged truck crane.



There are two steering modes with separate steering.

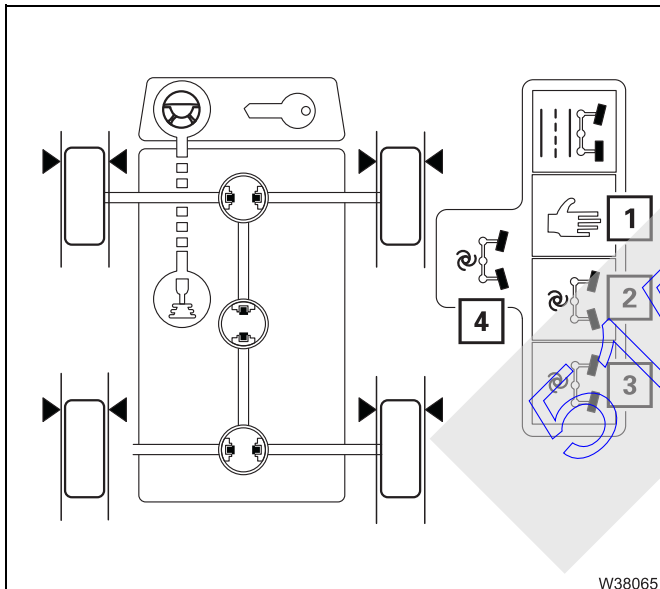
- Driving around corners

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

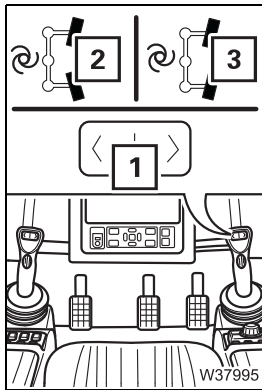
- Select and confirm the symbol for the desired steering mode.

- 1 Manual
3. to 5th axle line manually steered
- 2 Automatic – driving around corners
3. to 5th axle line automatically steered
- 3 Automatic – crab travel mode
3. to 5th axle line automatically steered

The symbol (4) indicates the selected steering mode, for example, *Driving around corners*.



If the error symbol is displayed, contact **Manitowoc Crane Care**; p. 8 - 24.



Steering with separate steering – automatic

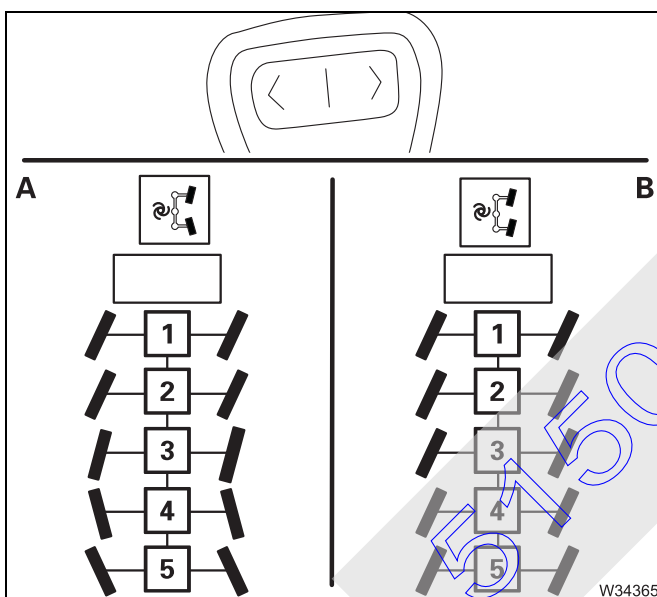
The symbol (2) or (3) is displayed for the desired steering mode.

- Steer the 1st and 2nd axle lines with the button (1).

- To turn to the left: • Press button (1) to the left.
- To turn to the right: • Press button (1) to the right.

The axle lines are steered as long as you keep the button pressed or until an end position is reached.

The electronics will register the steering angle on the 1st and 2nd axle lines and automatically steer the wheels of the 3rd and 5th axle lines.



(A) – When driving around corners

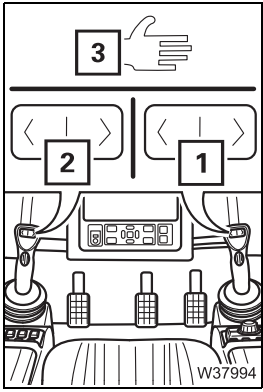
The 3rd to 5th axle lines are always steered to suit the turning radius.

- 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) – For crab travel mode

The 3rd and 5th axle lines are steered in the same direction as the 1st and 2nd axle lines.





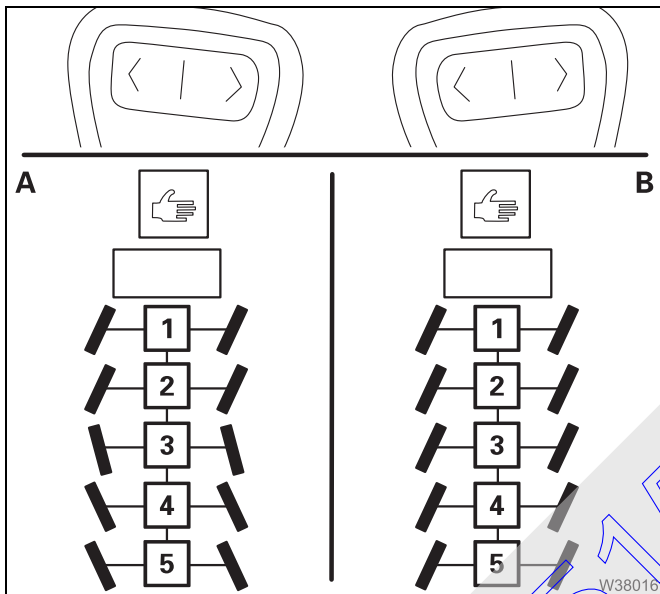
Steering with separate steering – manual

The (3) symbol 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) to the left.
- **To turn to the right:** • Press buttons (1), (2) to 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

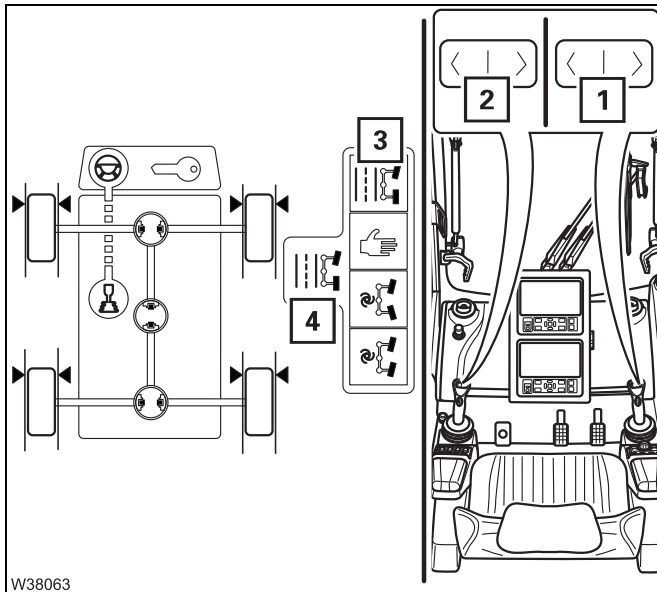
- Steer the 3rd and 5th axle lines in the opposite direction to the 1st and 2nd axle lines.

(B) – For crab travel mode

- Steer the 3rd and 5th axle line in the same direction as the 1st and 2nd axle line.

Normal steering mode

When driving a **rigged** truck crane, always use the separate steering;
▮▮▮▮ p. 13 - 24.

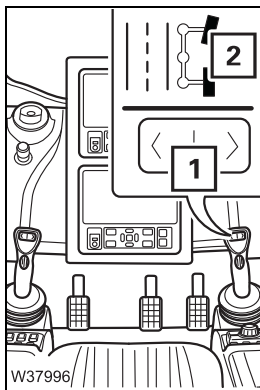


Switching to normal steering mode

- 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) – display symbol (4).



If the error symbol is displayed, contact **Manitowoc Crane Care**; ▮▮▮▮ p. 8 - 24.



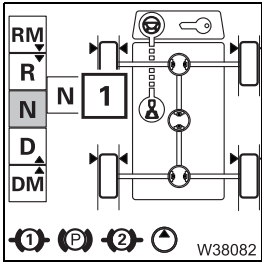
Steering in normal steering mode

The (2) symbol 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) to the left.
- **To turn to the right:** • Press button (1) to the right.

13.5.4

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

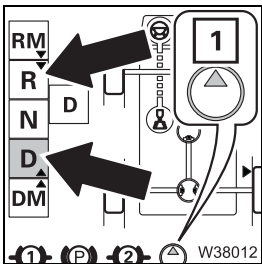


You can select transmission modes with crane functions and transmission modes without crane functions.

Risk of accidents when driving with a lifted load

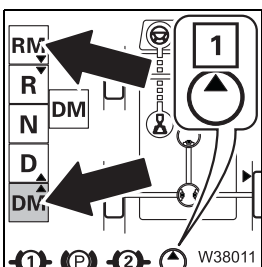
Secure the load when driving so that it cannot swing and use the transmission mode **DM** or **RM** so that the transmission does not shift.

In this way you can prevent the swinging load leaving the permissible working range and the truck crane overturning.



Transmission modes without crane functions

- Switch to transmission mode **D** or **R**.
- The crane's hydraulic system *Driving mode* is switched off – symbol (1) is **grey**.
- The transmission shifts.
- The speed is limited to about 20 km/h (12 mph).



Transmission modes with crane functions

- Switch to transmission mode **DM** or **RM**.
- The crane's hydraulic system *Driving mode* is switched on – symbol (1) **orange**.
- The transmission shifts only into the 1st gear (reverse or forwards).
- The speed is limited to about 5 km/h (3 mph).

In these transmission modes you can start moving more slowly than in the transmission modes **D** or **R**. These transmission modes are intended for manoeuvring mode and for driving with a load.



The crane functions are also available in the neutral position **N**.

13.5.5

Whilst driving

DM and RM transmission mode



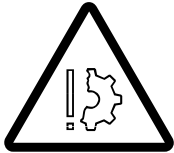
The truck crane drives in 1st gear only, and the transmission does not shift.

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, at the most 1.5 km/h (1 mph). The speed is not automatically limited to this value.

- Use the greatest possible turning radius when you are driving 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. You can level the truck crane using the outrigger or the axle raising; *Levelling the free-standing truck crane*, p. 12 - 64.

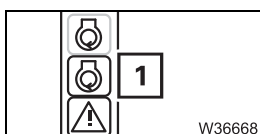
Transmission mode D

The speed is limited to a maximum of about 20 km/h (12 mph) (5th gear maximum).

Use this transmission mode only when:

- The main boom is completely retracted
- The main boom is resting in the boom rest
- The outrigger beams/cylinders are fully retracted

Warning messages

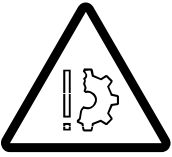


If a symbol is shown in area (1);

- Warning messages on the CCS display*, p. 14 - 3,
- Error messages on the CCS display*, p. 14 - 8.

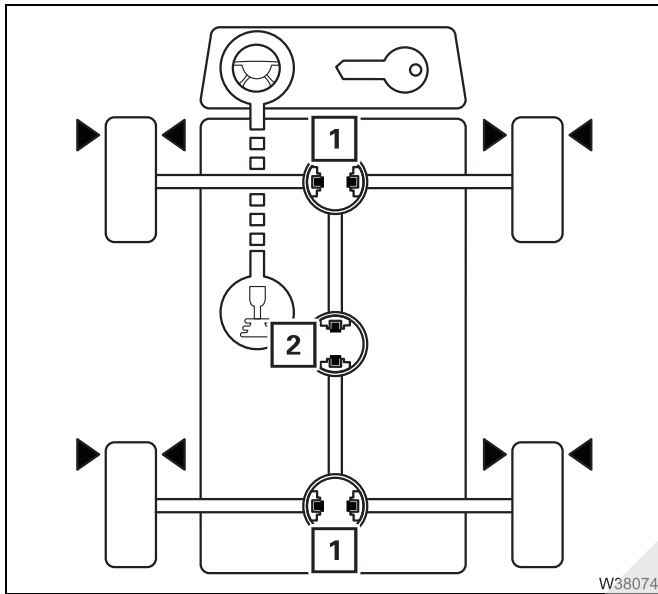
13.5.6

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 a firm surface

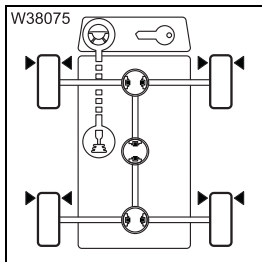


You can make the following connections, one after the other:

- Longitudinal differential locks (2)
- Transverse differential locks (1)

The symbols indicate the current switching state.

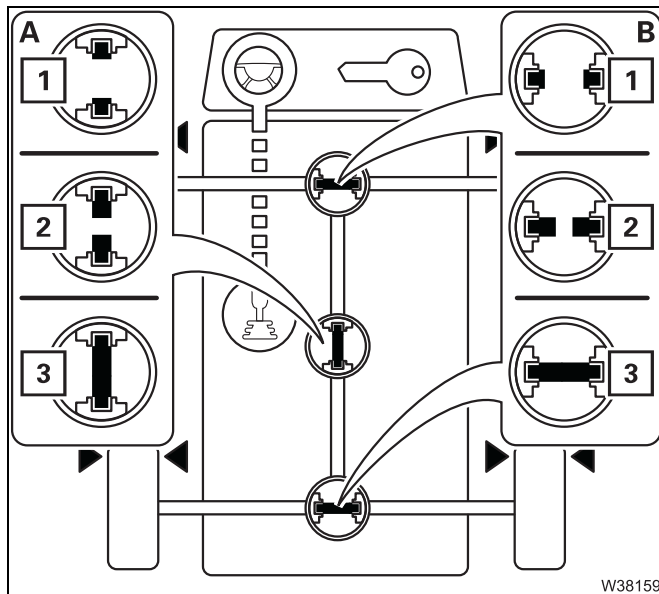
Longitudinal/ transverse differential locks



With a 10 x 8 x 10 drive, the drive of the 3rd axle line is switched on and off together with the longitudinal differential locks.

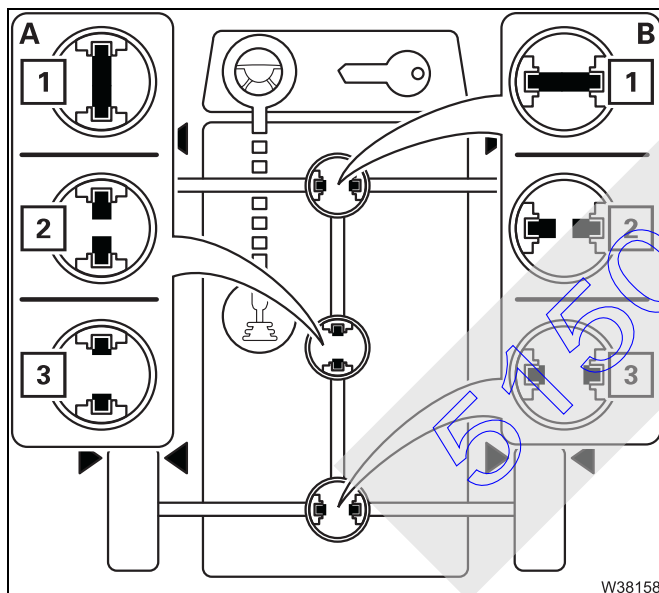
- Straighten the steering.
- Stop the truck crane.

For switching on and off, the current speed needs to be under 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.



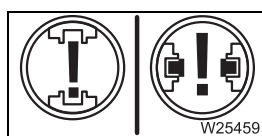
Switching off

- 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.

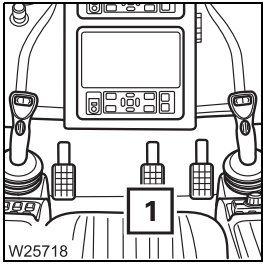
If symbol (3) is not **green** then drive back and forth slowly.



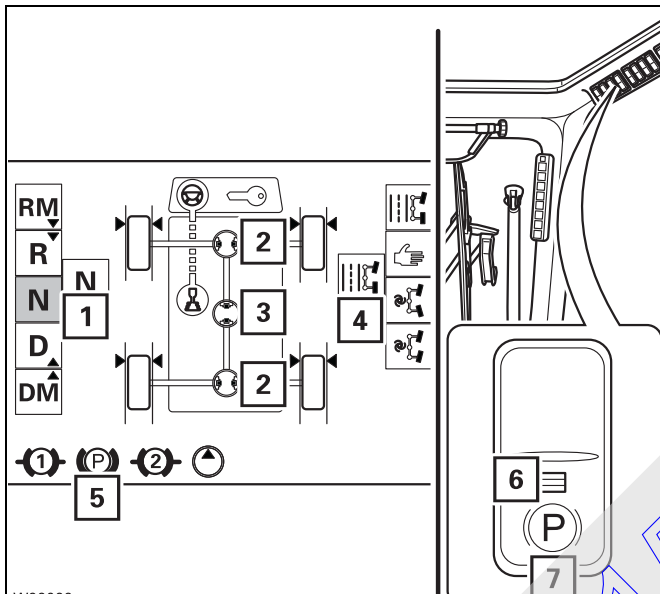
If the error symbol is displayed, contact **Manitowoc Crane Care**.

13.5.7


After driving



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



- Restore the original condition:
 - Switch the transmission to neutral position (1)
 - Switch off longitudinal differential lock (3)
 - Switch off transverse differential locks (2)
 - Switch on normal steering mode (4)
- Press button (7) down once. The lamp (6) lights up, symbol (5) is red – the parking brake is applied.

- If necessary, switch the engine off;  Switch off the engine, p. 10 - 11.
- Remove the ignition key from the ignition lock in the driver's cab and lock the driver's cab to prevent unauthorised access.

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

14

Malfunctions during crane operation

14.1

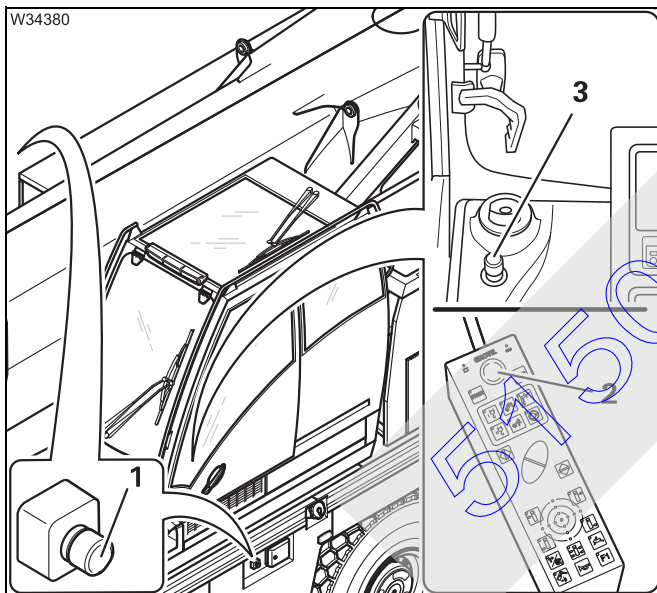
Emergency stop switch



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 suddenly. This may overload the truck crane, e.g. in the event of high working speeds and large working radii.



- Stop all crane movements.

Four emergency stop switches are provided for emergencies:

- 1 On the carrier
- 2 On the hand-held control unit
- 3 In the crane cab

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

The engine shuts down.

After activating an emergency stop switch;

- ▣▶ *Resetting the emergency stop switch, p. 4 - 19.*



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

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 properly 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 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 the event of an emergency. This is to put the truck crane into a safe state in the event of a malfunction. In this case, do not perform any movements that would increase the load moment.

If it is no longer possible to operate the crane from the crane cab, you can use the emergency activation, if necessary;

▣▣▣▣▶ *Emergency operation with the hand-held control*, p. 14 - 43,

▣▣▣▣▶ *Hydraulic emergency operation with the hand pump*, p. 14 - 51.

- Lock the truck crane to prevent unauthorised use. Remove the ignition key and lock away the hand-held control.
- Inform your supervisor.
- Try to eliminate the malfunction. Inform **Manitowoc Crane Care** if you cannot correct the malfunction.

Load cannot be set down

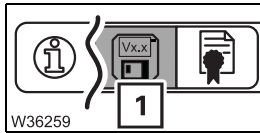
- Secure the danger area using cordons and warning signs.
- Notify **Manitowoc Crane Care**.

14.3

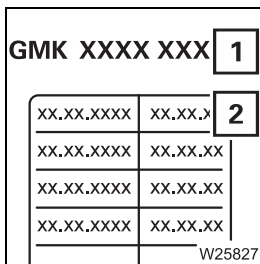
Warning and error messages

Program version

- Always note down the number of the program version and the serial number after a malfunction occurs before notifying **Manitowoc Crane Care**.



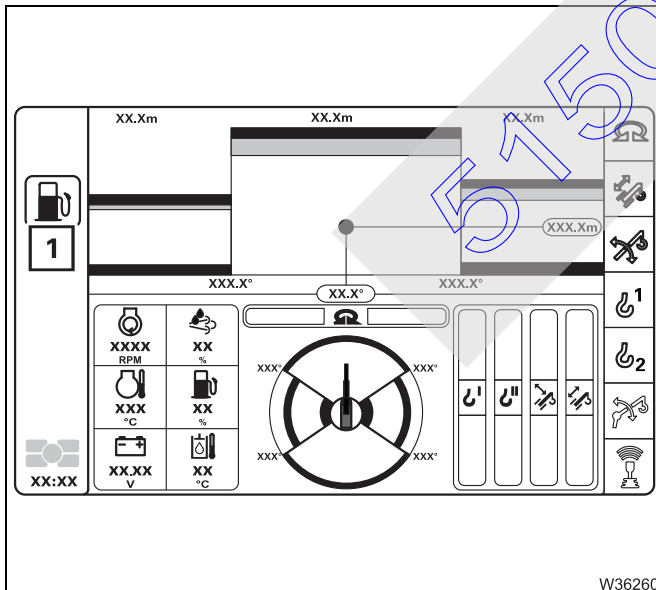
- Open the *Program version* menu (1).



- Serial number display
- Program version display

14.3.1

Warning messages on the CCS display



If the CCS detects a malfunction then a symbol is shown in the display area, for example, the symbol (1).

If several warning messages exist, all of the corresponding symbols are displayed one after the other in consecutive order.



Meaning of the symbols

The colour of the symbols indicates whether a warning or malfunction message is active in the corresponding area.

- Symbol **yellow** – malfunction.
- Symbol **red** – warning message.
- **no** symbol – no malfunction or warning message.

If a symbol is displayed in **red** or **yellow**, perform the following checks.

Perform the following checks if a symbol is displayed.



Risk of damage if warning messages are disregarded!

Observe the following information in good time and take the appropriate remedial measures if a warning message appears. This prevents these malfunctions causing defects in the truck crane.



Collective warning

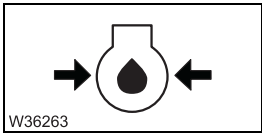
- Set down the load as soon as possible and turn off the engine.



CAN bus malfunction

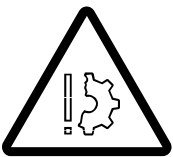
- Switch off the ignition and wait about 15 seconds, then switch it on again.

If the malfunction is still present, contact **Manitowoc Crane Care**.



Engine oil pressure

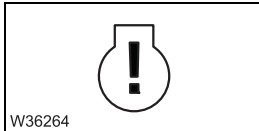
- Switch off the engine as quickly as possible.
- Check the engine oil level and top up with oil if necessary;
 ▶ *Maintenance manual*.



Risk of damage to the engine

Switch off the engine as quickly as possible and check the oil level.
Restart the engine only when the oil level is correct.

- If the oil level is correct then start the engine from the driver's cab and check the warning messages that are present.



Engine malfunction

- Switch off the engine immediately and open the *Engine error* menu; ■■■► p. 8 - 17.
- If necessary, note the error messages and contact **Manitowoc Crane Care**.



Refuelling

The fuel tank is filled only to a level of about 5%.

- Refuel before the fuel is used up; ■■■► p. 4 - 5.

If the fuel tank is almost empty, air will be sucked in and you will have to bleed the fuel system; ■■■► *Maintenance manual*.

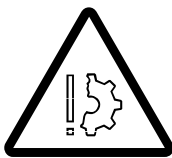


Hydraulic oil too hot

The hydraulic oil temperature is higher than 80 °C (176 °F).

Display of the current temperature; ■■■► p. 10 - 8.

Possible cause and remedy; ■■■► p. 14 - 22.

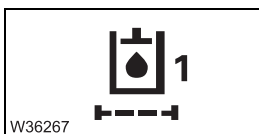


Danger of overheating

There is a fault if the hydraulic oil temperature exceeds 80 °C (176 °F).

Set down the load as soon as possible and try to find the cause.

Set down the load as soon as possible and turn off the engine if the temperature of the hydraulic oil exceeds 100 °C (176 °F).



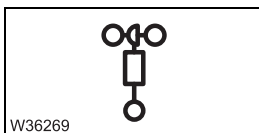
Replace hydraulic oil filter

- Replace the corresponding hydraulic oil filter as soon as possible; ■■■► *Maintenance manual*.



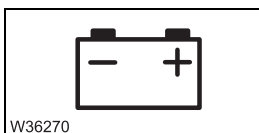
Slewing gear brake too hot

- Stop crane operation as soon as possible and let the slewing gear brake cool down.



Anemometer not connected

- Connect the anemometer to the electrical power supply; ■■■► p. 12 - 145.

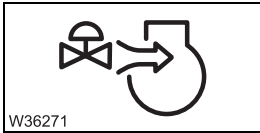


Voltage monitoring

The voltage in the electrical system is too high or too low.

Display of the current voltage; ■■■► p. 10 - 8.





Air intake inhibitor triggered

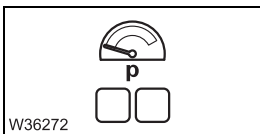
It is only possible to start the engine after the air intake inhibitor has been released manually; *Opening the air intake inhibitor*, p. 4 - 20.



Pre-tension counterweight (early warning)

The pre-tensioning pressure is at the lower limit – if the pre-tensioning pressure continues to drop, the slewing is disabled.

- Pre-tension the counterweight; p. 12 - 105.



Pre-tension the counterweight

The pre-tensioning pressure is too low.

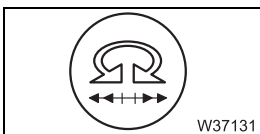
- Pre-tension the counterweight; p. 12 - 105.



Slewing disabled by counterweight

The pre-tensioning pressure is too low or the counterweight is not completely lifted.

- Pre-tension the counterweight; p. 12 - 105.



Reduction of slewing speed switched off

– Blue – information

The slewing speed is not reduced automatically.

– Red – warning

The maximum permissible slewing speed stated in the *Lifting capacity table* for the current loading case has been exceeded.

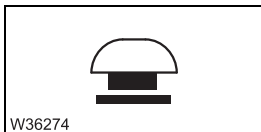
There is a risk of accidents – slowly reduce the slewing speed to a permissible value and where possible engage the reduction of slewing speed, to prevent further cases where the speed is exceeded; p. 11 - 121.



Transfer case not in crane operation

The change-over of the transfer case to crane operation has not yet been completed or is blocked. There are no crane functions available.

- If the message is not hidden after starting the engine from the crane cab, switch the ignition off and on again after a few seconds. Repeat the procedure if necessary.
- If the symbol is still displayed, then start the engine from the cab and carry out a few gear changes in the transmission.
- If the symbol continues to be displayed, please contact **Manitowoc Crane Care**.



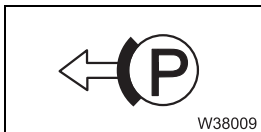
Emergency stop switch actuated

▣▣▣▣ ➔ *Resetting the emergency stop switch*, p. 4 - 19



Vehicle brake

- Stop the truck crane immediately and check the pressure in the brake circuits; ▣▣▣▣ ➔ p. 5 - 10.



Parking brake released

Information – the parking brake was released from the crane cab.



This section does not include all messages. Symbols described for driving may also be displayed; ▣▣▣▣ ➔ *Warning messages on the CCS display*, p. 8 - 13.

14.3.2

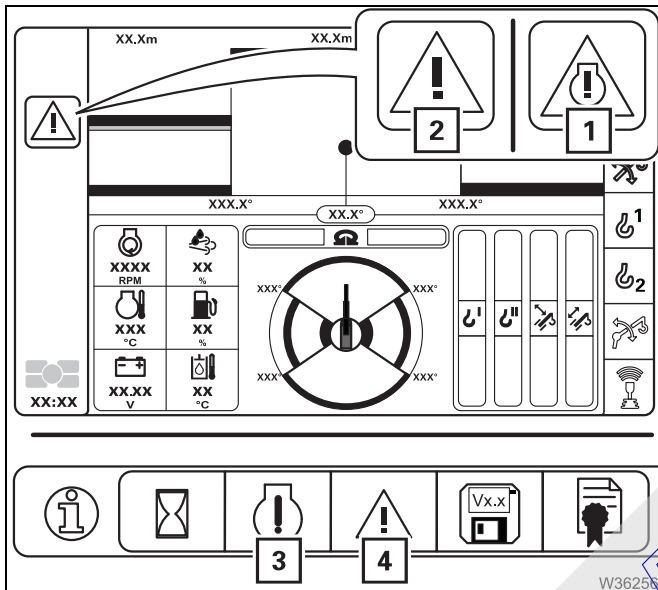
Error messages on the CCS display



Risk of accidents

Immediately stop operating the crane if an error message is displayed. The crane control may only be repaired by qualified personnel.

- Stop all crane movements and bring both control levers into the initial position.



The symbol (1) or (2) flashes when the CCS has detected an error. The symbols flash alternately when both error types are present.

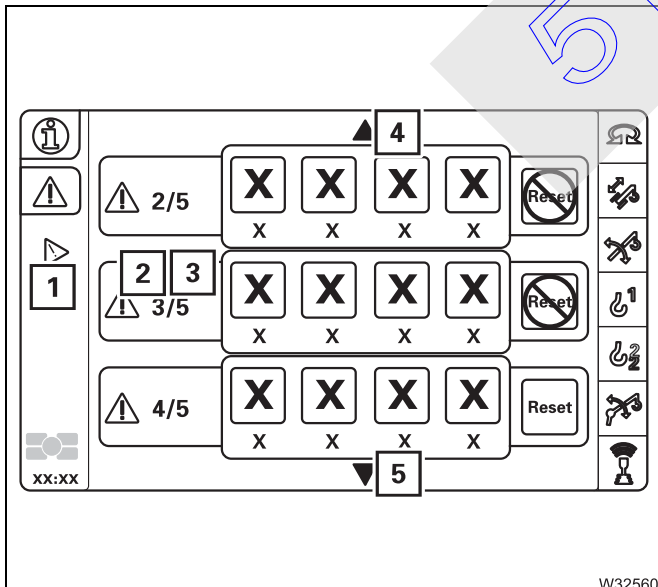
(1) – Engine/transmission error

- Switch off the engine immediately.
- Open the *Engine/transmission error* menu (3). For the subsequent procedure; see p. 8 - 17.

(2) – Crane operation error

The buzzer tone sounds once.

- Open the *Crane operation error* menu (4).



Display of error / total errors

Display (3) shows the error total, and display (2) shows which error is displayed.

3/5, for example, means:

- Error 3 is shown
- A total of 5 errors are pending.

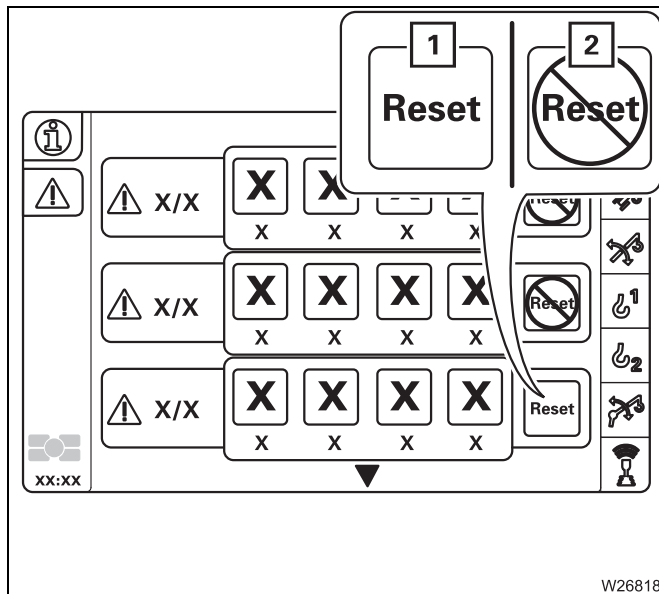
Displaying errors

The rotating symbol (1) indicates that further unacknowledged errors are present.

- Select and acknowledge the symbol (4) or (5) to show any additional errors.

4 Previous error

5 Next error



To acknowledge the error

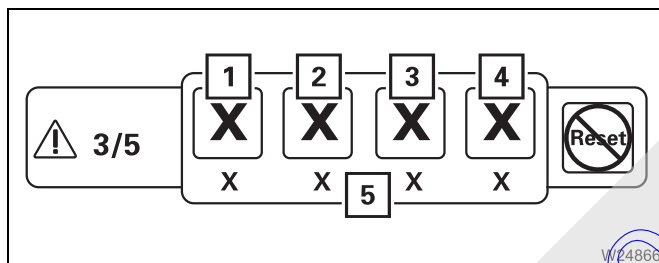
There are error messages that cannot be acknowledged; see *Special error messages*, p. 8 - 18.

Display symbol (1) – error can be acknowledged

Display symbol (2) – error cannot be acknowledged

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

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

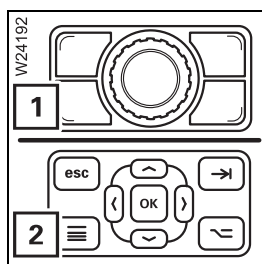


Error message display

For each error the display shows:

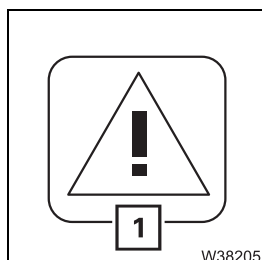
- The error code (5)
- The symbols for

- 1 the faulty component
- 2 the error type
- 3 the control unit which detected the error
- 4 the index in the error group



Exiting the menu

You can exit the error menu at any time via button (1) or (2).



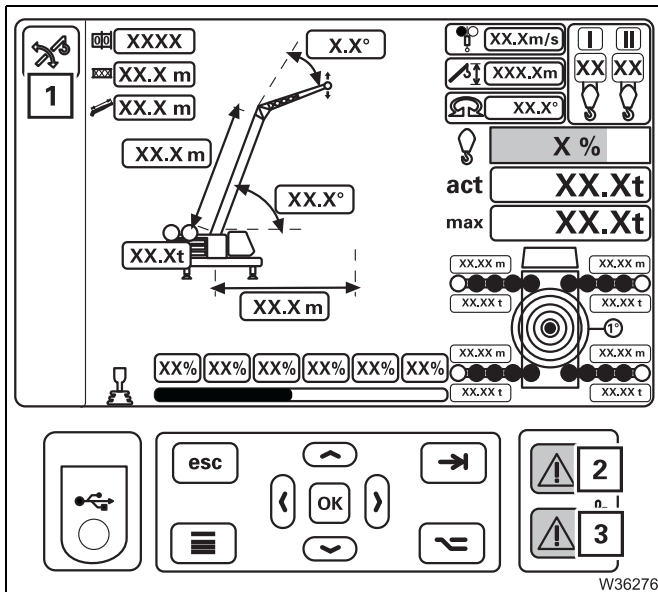
If not all errors have been acknowledged then the symbol (1) will be displayed continuously.

When all errors are acknowledged, the symbol (1) goes out.

The buzzer tone sounds once and the symbol (1) flashes when an error occurs.

14.3.3

Warning messages on the RCL display



The buzzer tone sounds once when the RCL detects a malfunction.

Lamps (2) and (3) light up.

A symbol is displayed, e.g. the symbol (1). If several warning messages are pending, all of the corresponding symbols are displayed one after the other in consecutive order.

- Perform the following checks if a symbol is displayed.



Risk of damage if warning messages are disregarded!

Observe the following information in good time and take the appropriate remedial measures if a warning message appears. This prevents these malfunctions causing defects in the truck crane.

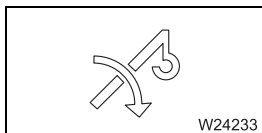


Risk of accidents due to overridden or faulty RCL

Only override the RCL if it becomes absolutely necessary in order to lower the load in the event of an emergency.

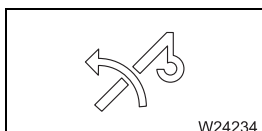
Do not carry out any movements which increase the load moment in the event of a faulty or overridden RCL.

If the RCL is overridden, the crane operations are not monitored and no shutdown procedures are initiated when leaving the working range.



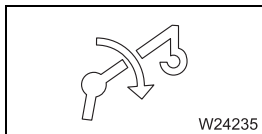
– Main boom angle too small

Raise the main boom; *Derricking gear*, p. 9 - 120.



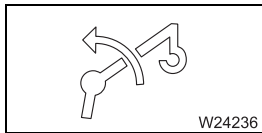
– Main boom angle too large

Lower the main boom; *Derricking gear*, p. 9 - 120.



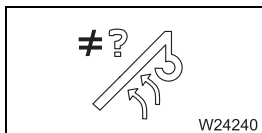
- **Lattice extension angle too small**

Raise the lattice extension;  *Lattice extension operating manual.*

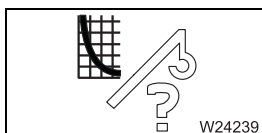


- **Lattice extension angle too large**

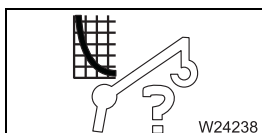
Lower the lattice extension;  *Lattice extension operating manual.*



- **Boom extension angle not measured (different sensor values)**



- **Main boom, lifting capacity table not present**



- **Lattice extension, lifting capacity table not present**



- **RCL override (switch 1) not actuated**



- **RCL override (switch 1) actuated**



- **RCL override (switch 2) not actuated**



- **RCL override (switch 2) actuated**





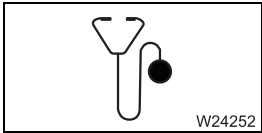
– RCL override (switch 3) not actuated



– RCL override (switch 3) actuated

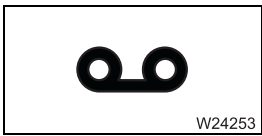


– RCL override, all switches actuated



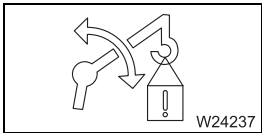
– Learn-in phase

Displayed only during maintenance by service personnel

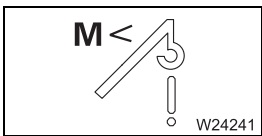


– Data acquisition

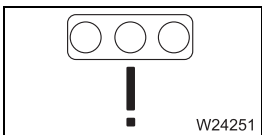
Displayed only during maintenance by service personnel



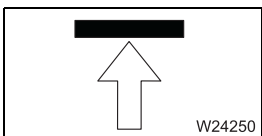
– Lattice extension, maximum permissible load exceeded



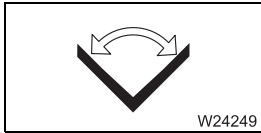
– Load too low



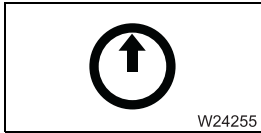
– RCL error status display



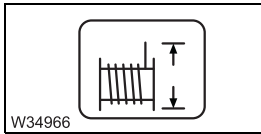
– Active working range limiter, maximum permissible overall height reached



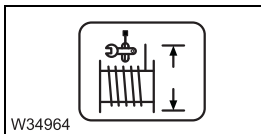
– **Active working range limiter, maximum permissible slewing angle reached**



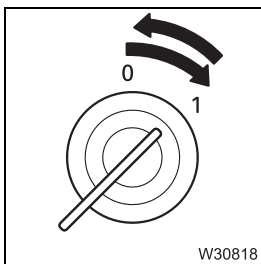
– **Active working range limiter, maximum permissible working radius reached**



– **Hoist rope travel limitation, upper or lower limit reached**



– **Hoist rope travel limitation, working radius or telescope status changed**



If the described measures do not solve the problem, try to remedy the error by switching off the ignition and switching it on again after about 15 seconds.

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14.4 Troubleshooting

14.4.1 Malfunctions on the engine











Observe all specifications in the section *Malfunctions on the engine*; p. 8 - 19.

Malfunction		Cause	Solution
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 - 1
Symbol red		Engine malfunction	<i>Malfunctions on the engine</i> , p. 8 - 19

14.4.2 Malfunctions on the main hoist/auxiliary hoist

Malfunction		Cause	Solution
Main hoist not working or malfunctioning		Main hoist off, lamp in button lights up dimly	<i>Switching on the main hoist</i> , p. 11 - 76, <i>Switching on the auxiliary hoist</i> , p. 11 - 79
		Dead man's switch not actuated	Press dead man's switch
		Emergency stop switch on	<i>Resetting the emergency stop switch</i> , p. 4 - 19
		Control unit fuse blown	Replace the blown fuse; p. 14 - 75
		Control unit faulty, error message is displayed	Acknowledge error message once; p. 14 - 8 – if error persists, notify Manitowoc Crane Care
Only the lifting function works		Lowering limit switch approached	Leave the shutdown range and raise the hoist.





Malfunction		Cause	Solution
Only the lowering function works		Lifting limit switch approached, lamp lights up	Leave the shutdown range and lower the hoist.
		RCL shutdown, lamp lights up	Leave the shutdown range;  p. 11 - 58
		Control unit fuse blown	Replace the blown fuse;  p. 14 - 75
Lifting, lowering or high-speed mode function not working		Function disabled by CCS	If required, acknowledge error message once and briefly turn off the ignition – it if occurs again, notify Manitowoc Crane Care
No lift function		Control unit fuse blown	Replace the blown fuse;  p. 14 - 75
Lifting or lowering is either not possible at all or only at a low speed		Speed limited	Increase limit;  p. 11 - 125
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 - 43

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14.4.5

Malfunctions on the derricking gear



Malfunction		Cause	Solution
Derricking gear not working or malfunctions		Derricking gear off, lamp in button lights up dimly	Switching on the derricking gear; ■■■▶ p. 11 - 85
		Dead man's switch not actuated	Press the dead man's switch.
		Emergency stop switch on	■■■▶ <i>Resetting the emergency stop switch</i> , p. 4 - 19
		Control unit fuse blown	Replace the blown fuse; ■■■▶ p. 14 - 75
		Control unit faulty, error message is displayed	Acknowledge error message once; ■■■▶ p. 14 - 8 – if error persists, notify Manitowoc Crane Care
Lowering function not working		Lifting limit switch approached, lamp lights up	Leave the shutdown range and lower the auxiliary hoist
		RCL shutdown, lamp lights up	Leave the shutdown range; ■■■▶ p. 11 - 58
		Control unit fuse blown	Replace the blown fuse; ■■■▶ p. 14 - 75
Derricking function not working		Function disabled by CCS	If required, acknowledge error message once and briefly turn off the ignition – it if occurs again, notify Manitowoc Crane Care
		Control unit fuse blown	Replace the blown fuse; ■■■▶ p. 14 - 75
Derricking not possible, or only at low speed		Speed limited	Increase limit; ■■■▶ p. 11 - 125
Derricking 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 - 43

14.4.6

Malfunctions in the telescoping mechanism







Malfunction		Cause	Solution
Telescoping mechanism not working or malfunctioning		Telescoping mechanism off, lamp in button lights up dimly	Switch on the telescoping mechanism; p. 11 - 89
		Dead man's switch system not actuated	Press dead man's switch
		Emergency stop switch on	<i>Resetting the emergency stop switch</i> , p. 4 - 19
		Control unit fuse blown	Replace the blown fuse; p. 14 - 75
		Control unit faulty, error message is displayed	Acknowledge error message once; p. 14 - 8 – if error persists, notify Manitowoc Crane Care
Extending function not working		Control unit fuse blown	Replace the blown fuse; p. 14 - 75
		RCL shutdown, lamp lights up	Leave the shutdown range; p. 11 - 58
		Lifting limit switch approached, lamp lights up	Leave the shutdown range, retract boom
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 function not working		Function disabled by CCS, error message is displayed	Acknowledge error message once; p. 14 - 8 – if error persists, notify Manitowoc Crane Care
		Control unit fuse blown	Replace the blown fuse; p. 14 - 75
Telescoping not possible or only possible at very low speed		Speed limited	Increase limit; p. 11 - 125
Telescoping cannot be switched off		Malfunction in crane control	Emergency stop switch; p. 10 - 12






Malfunction	Cause	Solution
Operation with the teleautomation menus is blocked	Diverse errors, e.g. length indicator failed	Retract main boom with the emergency program;  p. 14 - 33
The main boom can no longer be telescoped; the telescoping cylinder can no longer be moved	The hydraulic supply is interrupted	Inform Manitowoc Crane Care
No response to control lever movements	CCS malfunction for operating elements in the crane cab	Unrig using hand-held control;  p. 14 - 43

14.4.7

Malfunctions on the slewing gear

Malfunction	Cause	Solution
Slewing gear not functioning	Slewing gear off, lamp in button lights up dimly	Switch on the slewing gear;  p. 11 - 116
	Superstructure locked	Unlock superstructure;  p. 11 - 15
	Dead man's switch system not engaged.	Press dead man's switch
	Emergency stop switch on	 <i>Resetting the emergency stop switch</i> , p. 4 - 19
	Control unit fuse blown	Replace the blown fuse;  p. 14 - 75
	Control unit faulty, error message is displayed	Acknowledge error message once;  p. 14 - 8 – if error persists, notify Manitowoc Crane Care
	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 - 105. In case of emergency – shutdown bypassed; p. 14 - 49
Slewing function not working	Function disabled by CCS	If required, acknowledge error message once and briefly turn off the ignition – if it occurs again, notify Manitowoc Crane Care

Malfunction		Cause	Solution
Slewing only possible in one direction		Shutdown angle of a limited slewing range reached (additional equipment).	Enter the RCL code for a slewing range of 360° (<i>Standard</i>) or reduce the working radius (<i>MAXbase</i>) or slew in the opposite direction to leave the shutdown angle
Slewing not possible or only at low speed		Speed limited	Increase limit;  p. 11 - 125
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 - 43

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14.4.8

Malfunctions on the counterweight hoist unit

Malfunction		Cause	Solution
Counterweight hoist unit not working		Emergency stop switch on	▣▣▣▣ ➔ <i>Resetting the emergency stop switch</i> , p. 4 - 19
		Control unit fuse blown	Replace the blown fuse; ▣▣▣▣ ➔ p. 14 - 75
Error symbol (!) is displayed		Function disabled by CCS	If required, acknowledge error message once and briefly turn off the ignition – if it occurs again, notify Manitowoc Crane Care
		Electronic system has detected an electrical or logical error	
Extend lifting cylinder not working		Superstructure unlocked	▣▣▣▣ ➔ <i>Lock the superstructure</i> , p. 11 - 16

14.4.9

Malfunctions in the hydraulic system/hydraulic oil cooler

Malfunction		Cause	Solution
Hydraulic oil temperature above 80 °C (176 °F), fan in the hydraulic oil cooler running		Hydraulic system is heavily loaded	Stop the crane operation and keep the engine running until the oil has cooled down
Hydraulic oil temperature above 80 °C (176 °F), fan in the hydraulic oil cooler not running		Control unit fuse blown	Stop crane operation and replace blown fuse; ▣▣▣▣ ➔ p. 14 - 75
		Faulty temperature sensor in the circuit of the hydraulic system, error message is displayed	Have the temperature sensor replaced
Symbol is displayed		Corresponding hydraulic oil filter soiled	Change hydraulic oil filter; ▣▣▣▣ ➔ <i>Maintenance manual</i>

14.4.10 Malfunctions when operating with the hand-held control

Malfunction		Cause	Solution
After connection: The CAN lamp does not light up or blinks		Some other socket is lacking a bridging plug	Insert bridging plug; ▣▣▣▣ p. 12 - 25
		Crane cab: Fuse F3/6 blown	Replace the blown fuse; ▣▣▣▣ p. 14 - 75
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	Inform Manitowoc Crane Care

14.4.11 Malfunctions when inclining the crane cab

Malfunction	Cause	Solution
Crane cab inclination function not working	Control unit fuse blown	Replace the blown fuse; ▣▣▣▣ p. 14 - 75

14.4.12 Malfunctions when raising the axles

Malfunction	Cause	Solution
The menu cannot be opened	Suspension is switched on	Switching off the suspension; ▣▣▣▣ p. 5 - 16
Operating elements not working	<i>Outrigger</i> menu open	Open the <i>Raise axle</i> menu; ▣▣▣▣ p. 12 - 66
Operating elements not working	Maximum permissible pressure exceeded	Re-align the truck crane to relieve the load; ▣▣▣▣ p. 12 - 60

14.4.13 Malfunctions of the outriggers

Malfunction	Cause	Solution
Outrigger cylinders and beams can neither be extended nor retracted and the inclination indicator does not work	Control unit fuse blown	Replace blown fuses; ■■■► <i>Fuses in the driver's cab,</i> p. 8 - 50
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 	Disconnect hand-held control or insert bridging plug; ■■■► p. 12 - 25 Lock the parking brake; ■■■► p. 5 - 46 Switching the slewing gear off; ■■■► p. 11 - 120
When operating from the control units	Display fields switched off	Switch on display fields; ■■■► p. 12 - 45
	Hand-held control connected to the superstructure or a bridging plug not inserted	Disconnect hand-held control or insert bridging plug; ■■■► p. 12 - 25
None of the specified causes apply	Solenoid valves are not switching electrically	Inform Manitowoc Crane Care

14.4.14 Malfunctions on the turntable lock

Malfunction	Cause	Solution
Turntable locking or unlocking function not working	Control unit fuse blown	Replace the blown fuse; ■■■► p. 14 - 75


14.4.15

Malfunctions on the CCS/RCL control units

Malfunction	Cause	Solution
Control unit not working	Power supply not switched on	switching the ignition on
	Fuse F1/4 blown	Replace blown fuses; ▮▮▮▮ p. 14 - 75
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 weak	Ambient temperature too high – brightness is reduced automatically	The set brightness is restored after cooling

14.4.16

Malfunctions when driving from the crane cab

Malfunction		Cause	Solution
The transmission, the differential locks and the separate steering do not respond to the operating elements – symbols grey		Parking brake applied	Releasing the parking brake; ▮▮▮▮ p. 13 - 18
		Ignition key in driver's cab not in position 1	Turn the ignition key in the driver's cab to position 1; ▮▮▮▮ p. 13 - 18
Button for separate steering has no function		Separate steering switched off	▮▮▮▮ <i>Switching on separate steering</i> , p. 13 - 13
Symbol for error appears during differential locking		An illogical switching state was recorded	If required, acknowledge error message once and briefly turn off the ignition – if it occurs again, notify Manitowoc Crane Care

If this table does not help to remedy the malfunction;

▮▮▮▮ *Malfunctions in the transmission*, p. 8 - 23,

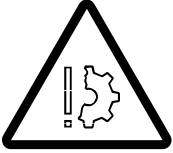
▮▮▮▮ *Differential lock malfunctions*, p. 8 - 22,

▮▮▮▮ *Malfunctions of the steering*, p. 8 - 24.

14.4.17

Malfunctions on the CraneSTAR system

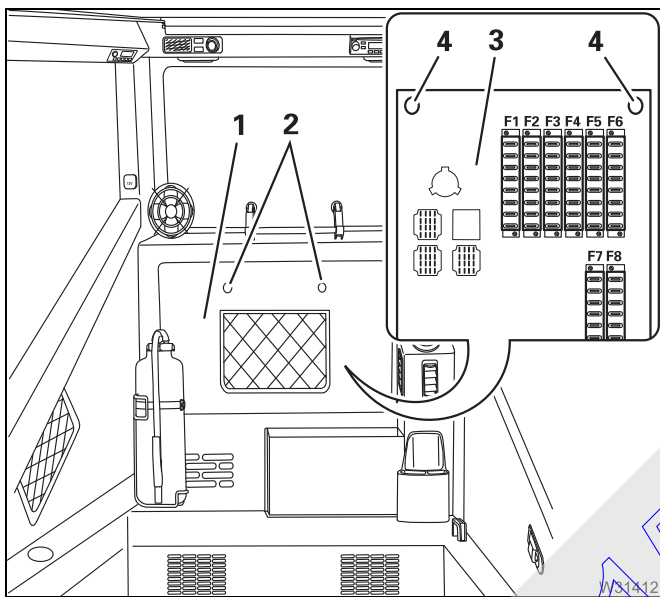
If an error is present, then check the fuses and the electronic connections.




Risk of damage if procedure is incorrect

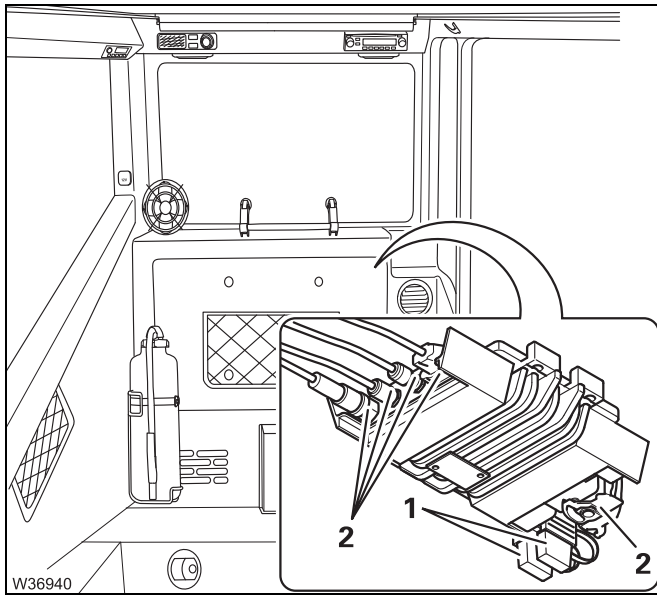
Observe the following notes to avoid malfunctions and damage.

- Always switch the ignition off before changing a fuse and before checking the antenna plugs.
- Replace blown fuses only with new fuses of the same amperage.



Checking

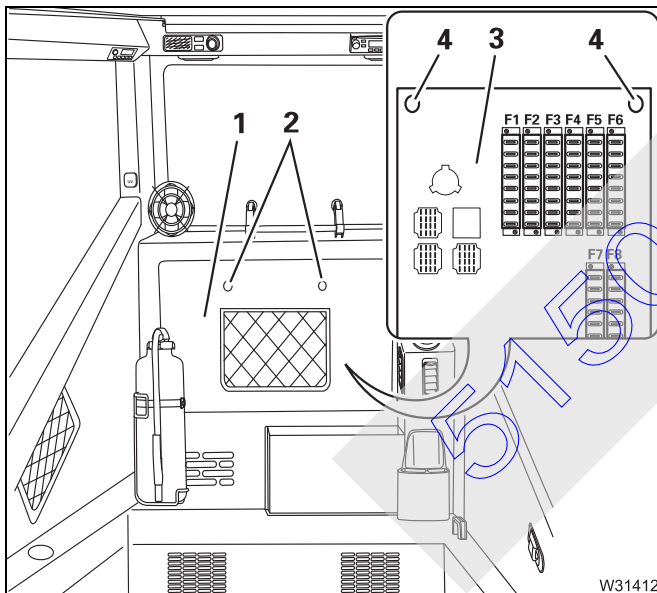
- Loosen the bolts (2) and remove the cover (1).
- Check the associated fuse on the plate (3) and replace it if necessary:  *Fuses in the crane cab, p. 14 - 75.*
- Loosen the screws (4) and fold down the plate (3) to the front.



- Check the fuses (1) and replace them if necessary.

Designation	Amperage
F3401	5 A
F3402	5 A

- Check whether the plugs (2) are plugged in:



After checking

- Fold the plate (3) up and secure it with the screws (4).
- Fasten the cover (1) using the bolts (2).

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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 telescoping after an emergency operation
- Operation of the power units with the hand-held control

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14.5.1

Mechanical emergency activation for retracting

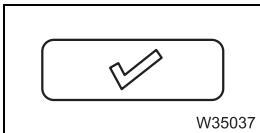
If you can no longer lock and unlock the telescopic sections from within the crane cab because of a malfunction, you can do so manually by performing mechanical emergency activation.

In this case, you need one or two auxiliary cranes.

In the worst case, emergency operation must be performed by properly qualified personnel, because incorrect operation poses the risk of injury and damage to the main boom.

- Always check the following option first.

Prior to the emergency operation, check




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 with licensed passenger transportation and a second auxiliary crane to secure and telescope the unlocked telescopic sections.



If it is possible to lower the main boom but there is not sufficient space, you can check whether it is permissible to drive the truck crane 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 **Manitowoc Crane Care**.

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.

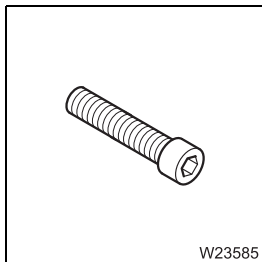


Risk of accidents due to sudden retraction of a telescopic section

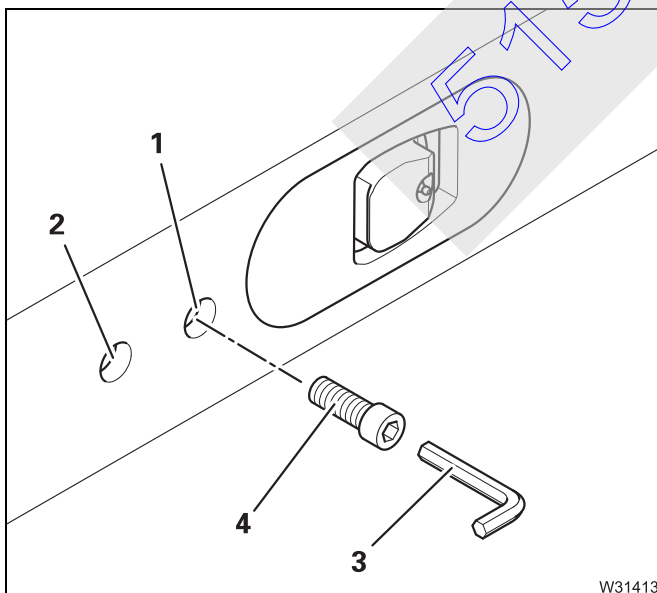
Before unlocking the telescopic section, secure it against automatic retraction. This prevents the retracting telescopic section severing one of your limbs or the truck crane being damaged or overturned by the telescopic section suddenly retracting.



If the telescoping cylinder is positioned at a locking point, the corresponding telescopic section cannot be locked or unlocked manually.



There are two **M8 x 110** bolts for every telescopic section. These bolts are in the toolbox supplied with the crane.

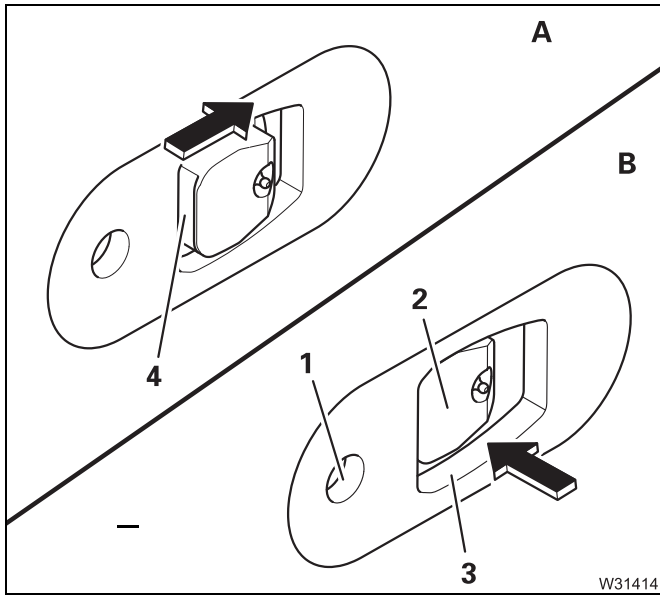


You will need a suitable tool (3), at least 250 mm (9.8 in) long.

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 lock

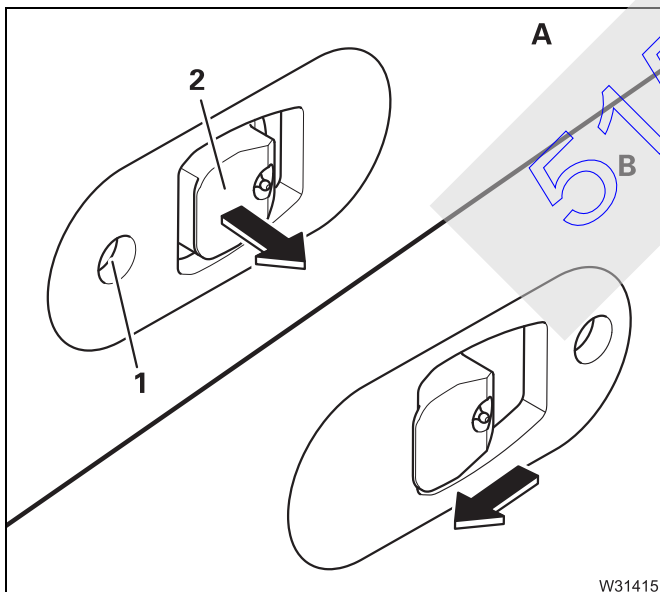
- **(A)** – Extend about 35 mm (0.11 ft), so that the cutout **(4)** is accessible.
- **(B)** – Screw a bolt into the bore **(1)**. The locking pins **(2)** must retract behind the telescopic section **(3)**. If necessary, give the locking pin **(3)** a slight knock to help this procedure.
- Unlock the 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 whilst 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 the telescoping 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 fully extended.
- Remove the bolt from the bore **(1)**.
- **(B)** – Retract the telescoping further until the telescopic section is set down.

14.5.2

Telescoping emergency program

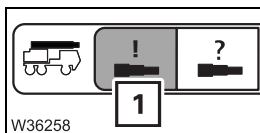
The emergency program is intended only for retracting the telescoping when operation with the teleautomation menus is no longer possible due to a malfunction.

The emergency program is enabled only when the current locking status can still be detected by the crane control.

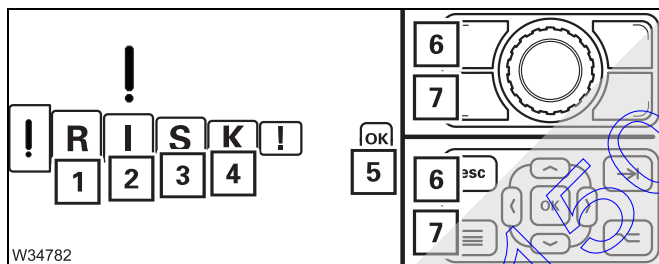
The emergency program is not intended for crane operation and is therefore restricted to a certain amount of time.

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.*

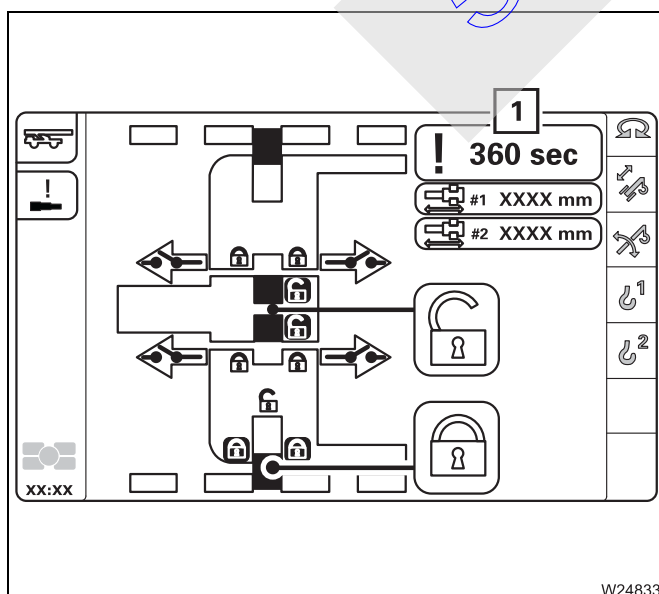


- Select and confirm the symbol (1) – the *Telescoping* emergency program is opened.



- Select and confirm the symbols (1) to (4).
- Confirm the entry with the symbol (5).

You can cancel the entry at any time using the (6) or (7) buttons.



Once the correct entry has been made, the *Telescoping* emergency programme is started.

The emergency program has a time limit.

The display (1) counts down a time span 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.



Determining the type of error

- Check which emergency program procedure is suitable for the current error:



Risk of damage to the telescoping mechanism

Ensure that you always have an overview of the current status of the telescoping mechanism before you initiate locking or unlocking.

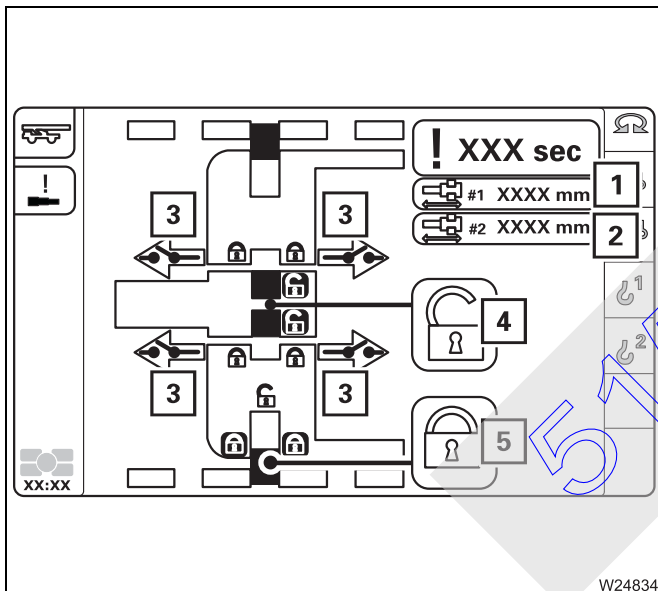
In emergency mode, there is no monitoring of prerequisites – the function is performed **immediately** after pressing the button.



Risk of damage to the telescoping mechanism

Never telescope the main boom if errors exist simultaneously in the length indicators of the crane control system CCS and the rated capacity limiter RCL.

It would then not be possible for you to monitor operations, and components in the main boom could be damaged, or a situation could arise in which the main boom can no longer be extended or retracted.



– If the display (1) shows no value, there is an error on the length indicator of the CCS crane control system.

– If the display (2) shows no value, there is an error on the length indicator of the RCL rated capacity limiter.

• If no values are shown on displays (1) and (2) you must not start the telescoping process. Contact **Manitowoc Crane Care**.

– If a symbol (3) is **violet**, there is an error at the proximity switch.

The symbols (4) and (5) are active. After selection and confirmation, locking or unlocking is performed **immediately**.



Risk of damage to the main boom

Never telescope the main boom if at the same time there is an error at both the length indicator and the proximity switch.

It would then not be possible for you to monitor operations, and components in the main boom could be damaged, or a situation could arise in which the main boom can no longer be extended or retracted.

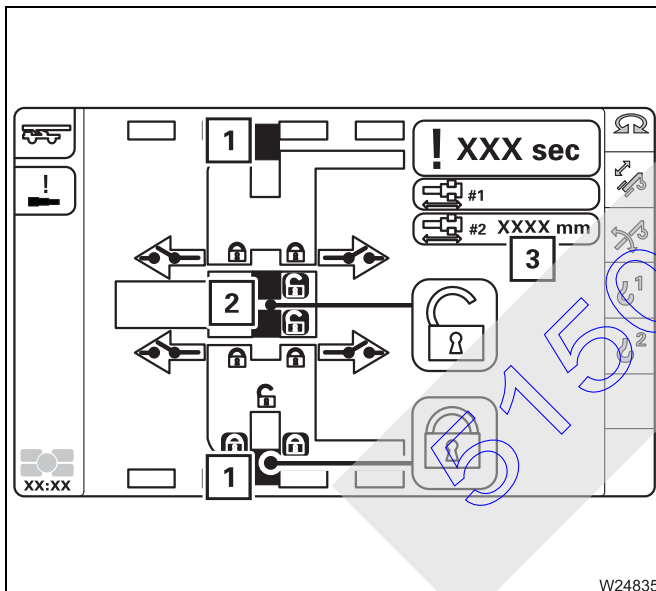


In the *Telescoping* emergency programme, all functions for retracting the main boom remain enabled as long as there are no other errors (hydraulic or mechanical).

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

Error at the length indicator

First register the current status of the telescoping mechanism.



- Check the positions of the locking pins as usual, (i.e. at the symbols (1) and (2)).
- Check that the display (3) shows the RCL measured value for the extended length of the telescoping cylinder.



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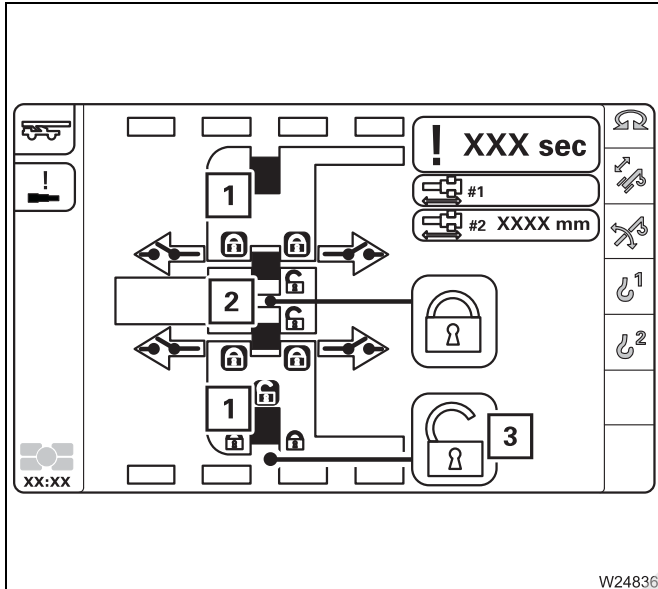
Checks before telescoping

- Before telescoping, check that the following conditions are met.

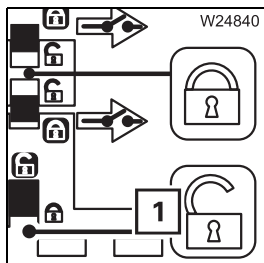


Risk of accidents from sudden retraction of a telescopic section

You can select and confirm the symbol for unlocking the telescopic section **only a maximum of 2 times**. If this does not start the unlocking procedure, contact **Manitowoc Crane Care**.



- The telescoping cylinder is at the locking point and is locked, symbols (2) are **green**.
- The telescopic section is unlocked, symbol (3) (**select no more than 2 x**), symbols (1) are **red**.



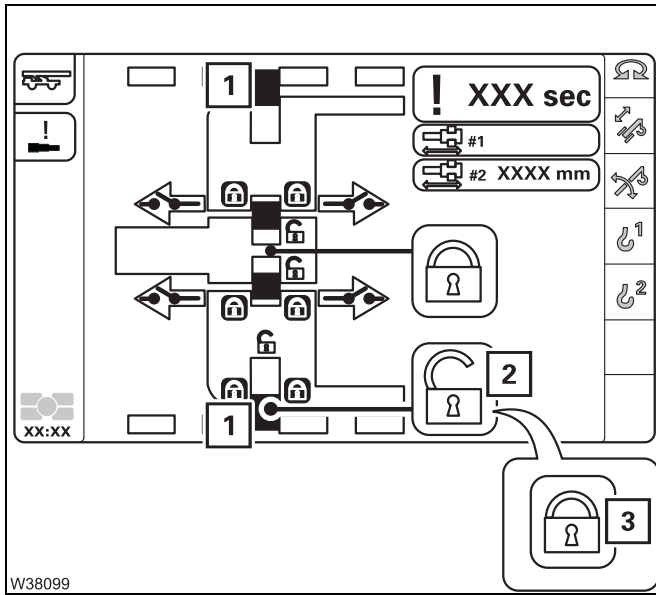
Retracting and locking a telescopic section

During telescoping you may **not** select Lock. Under **no** circumstances should you select and press the symbol (1).

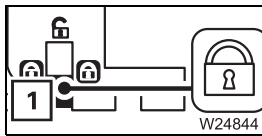


Risk of damage to the main boom

If you select Lock during telescoping, the locking pins on the telescopic section are slid out immediately and they can damage or tear the electrical or hydraulic components in the main boom.



- Retract the telescopic section slowly and as far as possible; Locking points for the telescopic sections, p. 14 - 40.
- Extend to about 25 mm (1 in).
- Select and confirm the symbol (2). The telescopic section is locked – display symbol (3), locking pin (1) **green**.
- Set down the telescopic section, retracting it as far as it will go.



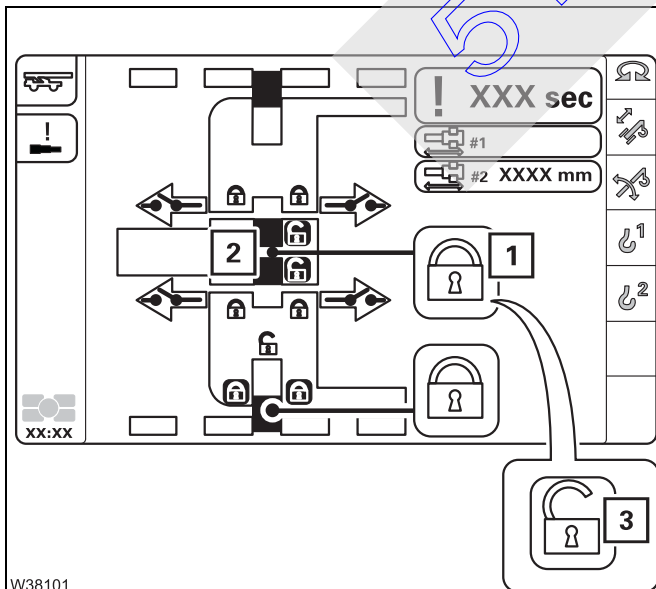
Unlocking the telescoping cylinder

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



Risk of accidents from sudden retraction of a telescopic section

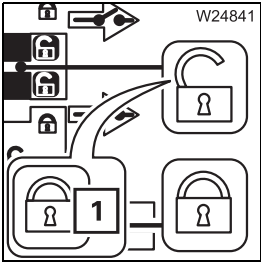
You can select and confirm the symbol for unlocking the telescoping cylinder **only a maximum of 2 times**. If this does not start the unlocking procedure, contact **Manitowoc Crane Care**.



- Select and confirm the symbol (1). The telescoping cylinder is unlocked – display symbol (3), locking pin (2) **red**.

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





Extending and locking the telescoping cylinder

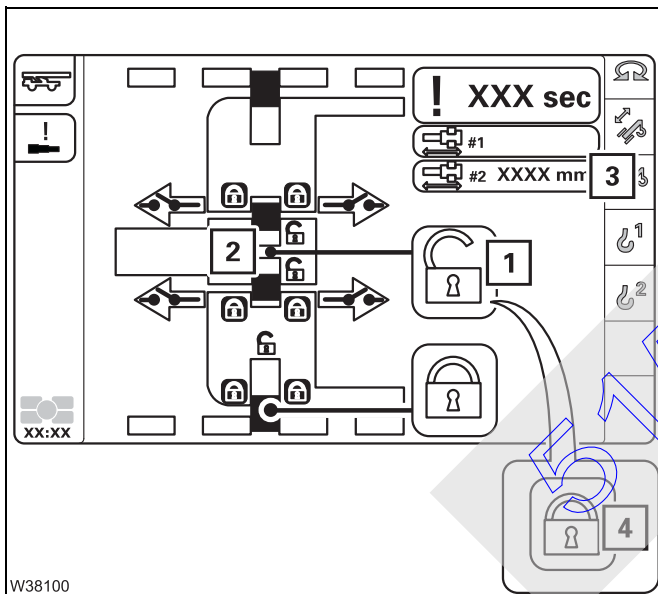
You may **not** select Lock while the telescoping cylinder is retracting or extending. **Under no circumstances** select and confirm the symbol (1).



Risk of damage to the main boom

If you select Lock while the telescoping cylinder is moving, the locking pins on the telescopic section are slid out immediately and they can damage or tear the electrical or hydraulic components in the main boom.

- Slowly move the telescoping cylinder into the next extended telescopic section.



At the locking point

– the display (3) shows the length for the current locking point; p. 14 - 39.

- Select and confirm the symbol (1). The telescoping cylinder is locked – display symbol (4), locking pin (2) **green**.
- You can now retract this telescopic section; p. 14 - 36.

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:

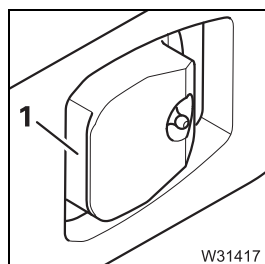
- the telescoping cylinder or
- a telescopic section.

Locking points for the telescoping cylinder

The following table shows the extended length for locking the telescoping cylinder.

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)
	56	5,226	(17.15)
	89	8,453	(27.73)
	100	9,497	(31.16)
Telescopic section II	0	285	(0.94)
	53	5,543	(18.19)
	89	8,793	(28.85)
	100	9,845	(32.30)
Telescopic section III	0	543	(1.78)
	52	5,214	(15.33)
	89	9,026	(26.74)
	100	10,074	(33.05)
Telescopic section IV	0	803	(2.63)
	52	5,407	(17.74)
	92	9,166	(30.07)
	100	10,199	(33.46)
Telescopic section V	0	1,038	(3.41)
	47	5,550	(18.21)
	92	9,233	(30.29)
	100	10,246	(33.62)





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. That is why you have to extend the telescoping cylinder about 25 mm 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	Extended length of telescoping cylinder	
		in %	in mm (in ft)
Telescopic section I	0	30	(0.10)
	56	5,251	(13.11)
	89	8,478	(27.81)
	100	9,522	(31.24)
Telescopic section II	0	310	(1.02)
	53	5,568	(18.27)
	89	8,818	(28.93)
	100	9,870	(32.38)
Telescopic section III	0	568	(1.86)
	52	5,239	(17.19)
	89	9,051	(29.69)
	100	10,099	(33.13)
Telescopic section IV	0	828	(2.72)
	52	5,432	(17.82)
	92	9,191	(30.15)
	100	10,224	(33.54)
Telescopic section V	0	1,063	(3.49)
	47	5,575	(18.29)
	92	9,258	(30.37)
	100	10,271	(33.70)

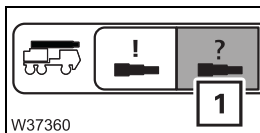
14.5.3

Entering the current telescoping

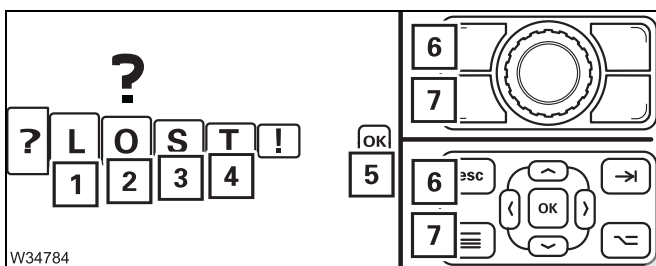
CCS no longer displays the current telescoping

- if you telescoped in emergency mode, or
- if the power supply was interrupted in the course of saving data.

In these cases, you must enter the current telescoping, e.g. the values from the RCL display.



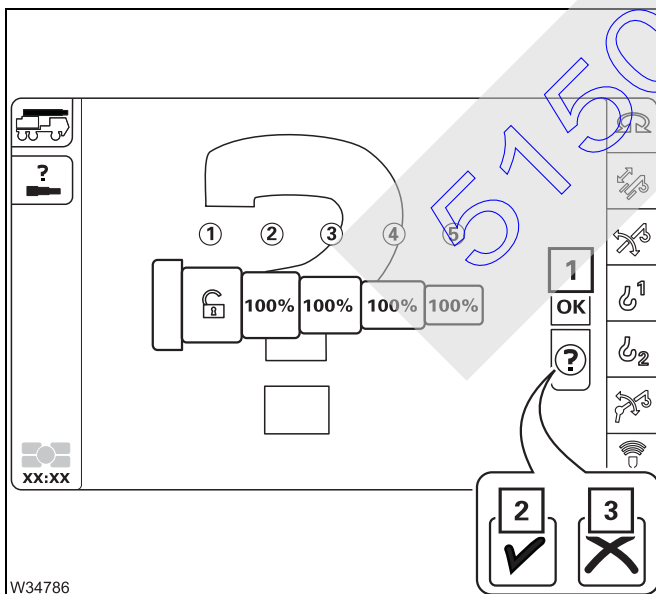
- Select and confirm the symbol (1) – the *Unknown telescoping* menu is opened.



- Select and confirm the symbols (1) to (4).
- Confirm the entry with the symbol (5).

You can cancel the entry at any time using the (6) or (7) buttons.

After the correct input, the area for the set value input will be opened.



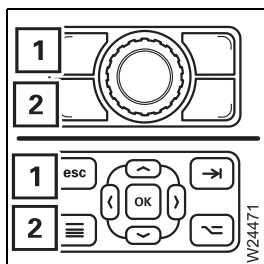
Entering target values

- Select and confirm the symbols 1 to 5.
- Enter the desired target values for all telescopic sections, for example, *Unlocked, 100%, 100%, 100%, 100%*.
- Confirm the entry with the symbol (1).

Display symbol:

- 2 Permissible value
- 3 Impermissible value





You can cancel the entry at any time using the (1) or (2) buttons.



Risk of damage due to incorrect input

Before working with the crane, check whether CCS indicates the current telescoping and correct if this is not the case.

Entering incorrect values causes malfunctions and may result in damage to the telescoping mechanism.

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14.5.4

Emergency operation with the hand-held control

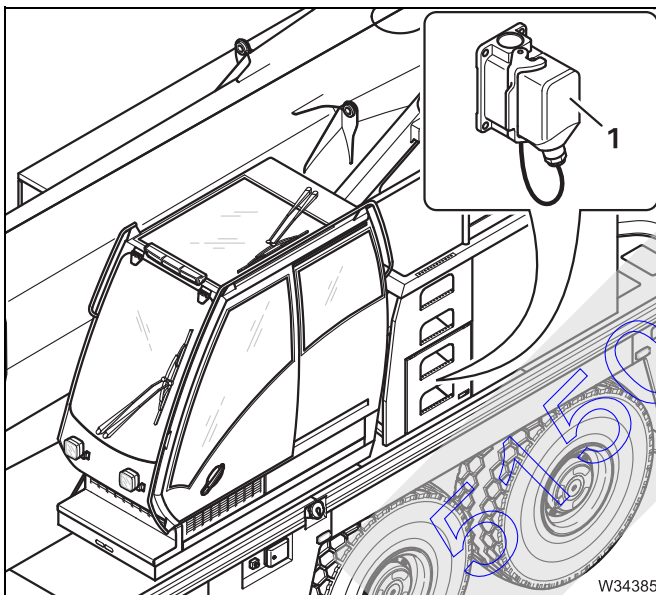
If the power units no longer respond to the operating elements in the crane cab, you can operate the power units with the hand-held control.

Operating them with the hand-held control is intended for emergencies only and for bringing the truck crane into a safe state or to shut it down.



Danger of overturning due to deactivated monitoring function

The **RCL is switched off** and the crane operations are not monitored when operating with the hand-held control. If you move into a critical range, the truck crane will overturn.

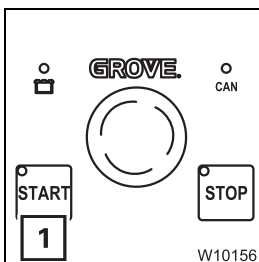


Connect the hand-held control

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

All power units can be operated from this connection.

Information on connecting; p. 12 - 25.



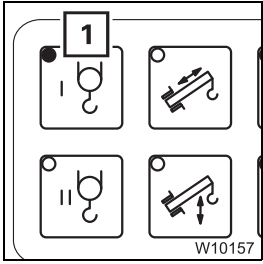
Starting the engine

- Press the button (1) once – the engine will start; p. 10 - 10.



To pre-select a power unit

The preselection is the same for all power units except the telescoping mechanism.



- Press the corresponding button once, e.g. button (1) for the main hoist. The lamp in the button illuminates – preselection on.

With the telescoping mechanism, teleautomation with the target 0/0/0/0/0 is always selected at the same time – fully retract.


The extension function is disabled in emergency mode.

Operating a power unit

All the safety instructions contained in the sections on the individual power units also apply to operation with the hand-held control.



Danger of overturning when moving into the shutdown ranges

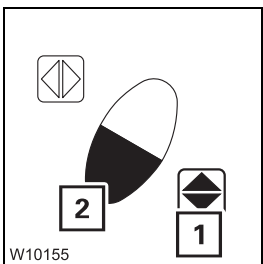
Avoid lowering the boom. If you cannot avoid lowering, try to set down the load beforehand and ensure that the maximum permissible working radius is not exceeded for the rigging mode as specified in the *Lifting capacity table*. Before slewing, always check whether this is permissible in the current rigging mode;  *Notes on slewing in emergency operation*, p. 14 - 46.



Risk of accidents when operating the slewing gear

Set 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.

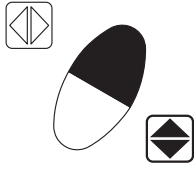
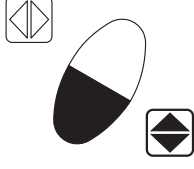
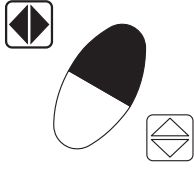
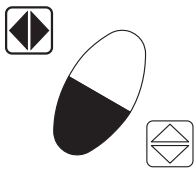
Lay the connecting cable of the hand-held control so that it will not catch on anything.



- Press the required function buttons one after the other, e.g. for *Lift main hoist*, press button (1) first, and then also button (2).

The further you press button (2), the quicker the movement. The maximum speed is limited to about 50% for all power units.

The table shows all the button combinations. Engaged buttons are shown in **black**.

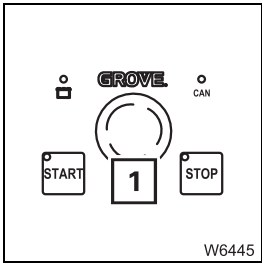
Button combination	Pre-selected power unit				
	Telescoping mechanism	Derricking gear	Slewing gear	Hoist	Lattice extension
 W3851	No	Lower	Lock turntable	Lowering	Lower
 W3850	Retract	Raise	Unlock turntable	Lifting	Raise
 W3849	No	No	Slew to right	No	No
 W3848	No	No	Slew to left	No	No

Stopping movements

The movement continues until you release the button or the end position is reached.




Stopping movements in emergencies



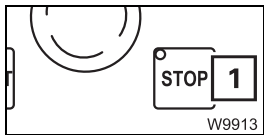
This section applies only to the situation where a motion does not stop after releasing the Function button.

- Press the emergency stop switch (1) – the engine switches off.

The switch (1) latches.

After activating an emergency stop switch;  *Resetting the emergency stop switch*, p. 4 - 19.

Switch off the engine



You can switch off the engine only by using the hand-held control.

- Stop all crane movements.
- Press the button (1) – the engine will switch off.

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 - 48.

Slewing is not monitored by the RCL in emergency operation.



Risk of overturning when slewing in emergency operation!

Check the table to see if slewing is permitted. Adhere to the enabled working range specified in the *Lifting capacity table* and observe the restrictions described.

If you have any doubts, contact **Manitowoc Crane Care**.

	Rigged outrigger span 8.030 x (26.3 x)					Free on wheels					
	0%	50%	66%	83%	100%						
	2.500 m (8.2 ft)	5.100 m (16.7 ft)	5.900 m (19.4 ft)	6.700 m (22.0 ft)	7.600 m (24.9 ft)						
Rigged counterweight	1.0 t (2,205 lbs)	<div style="position: relative; width: 100%; height: 100%;"> <div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); opacity: 0.3; font-size: 4em; pointer-events: none;">51501113</div> <div style="position: absolute; top: 30%; left: 60%;">Slewing permissible¹⁾</div> <div style="position: absolute; top: 45%; left: 35%;">Slewing not permissible³⁾</div> <div style="position: absolute; top: 60%; left: 80%;">Slewing not permissible²⁾</div> </div>									
	3.3 t (7,300 lbs)										
	5.6 t (12,346 lbs)										
	7.9 t (17,417 lbs)										
	10.2 t (22,487 lbs)										
	12.5 t (27,558 lbs)										
	14.8 t (32,628 lbs)										
	17.1 t (37,699 lbs)										
	19.4 t (42,770 lbs)										
	21.7 t (47,840 lbs)										
	24.0 t (52,911 lbs)										
	26.3 t (57,981 lbs)										
	30.9 t (68,123 lbs)										
44.5 t (98,106 lbs)											

- 1) Slewing permissible only if the working radius permissible in the working range is observed; *Lifting capacity table*
- 2) Only 0° working position 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 - 46.

Slewing is not monitored by the RCL in emergency operation.

Due to the wide variety of possible outrigger spans and the asymmetry, the permissible slewing ranges cannot be representing as simple tables.



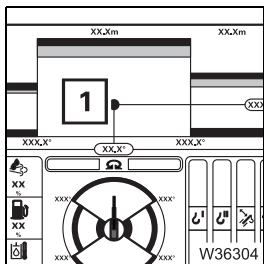
Risk of overturning when slewing in emergency operation!

Execute the measures described in this section before slewing and during slewing. Special caution must be exercised with the *MAXbase* slewing range type because several parameters must be monitored simultaneously.

If you have any doubts, contact **Manitowoc Crane Care**.

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 for each.



Checking the RCL display

Check that the enabled 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 that the current position (1) changes accordingly.
- Derrick slowly towards a safe range and check that 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 via measurements, depending on the availability of the displays (slewing angle/working radius).

14.5.6

Rotate for overridden slewing gear shutdown

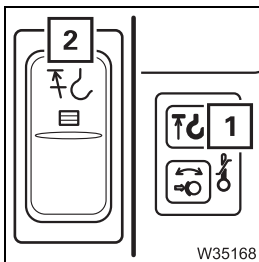
If the slewing gear is not switched off due to the load torque, turning can be released within the permissible operating range. For example, for emergency unrigging when the counterweight cannot be fully pre-stressed.



Risk of damage due to overridden slewing gear shutdown.

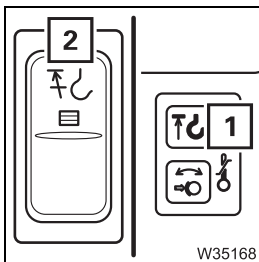
The slewing is not monitored if the shutdown is overridden.

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) in at the top.
 - The lamp (1) lights up.
 - The lifting limit switch is overridden.
 - Slewing in permissible working range will be released.
 - The slewing speed is limited to about 6%.



Cancelling the override

- Release button (2).
 - The lamp (1) goes out.
 - The lifting limit switch override is cancelled.
 - The slewing will be blocked (if the shutdown is still pending).

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14.6

Hydraulic emergency operation with the hand pump



This section only applies to the standard hydraulic emergency operation. With the appropriate equipment you can also use the hydraulic emergency operation according to BGR 159; ■■■► p. 14 - 59.



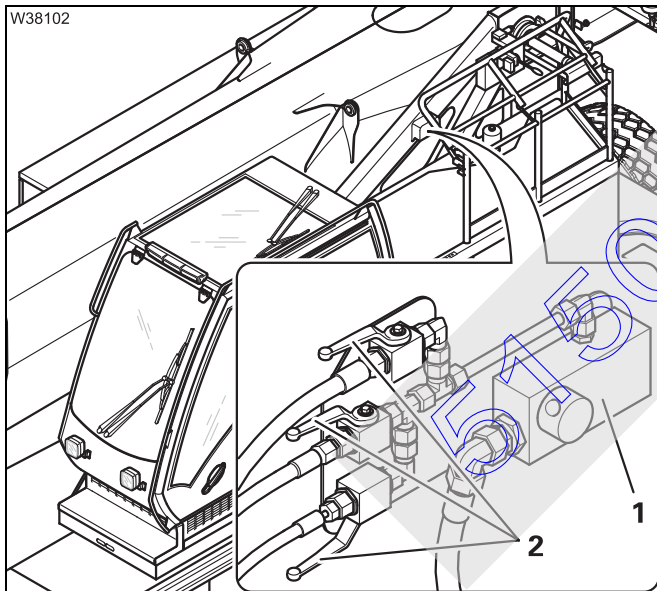
Danger from mutual interference of the power units

Check the positions of the valves **1** to **5** for the hydraulic emergency operation in accordance with BGR (in case available) and, if necessary, switch to *Crane operation*; ■■■► p. 14 - 67.

This prevents the power units suddenly starting to move.

14.6.1

Operating principle



In hydraulic emergency operation, you can operate the derricking gear and perform the *Lower main hoist* movement, for example, 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**).

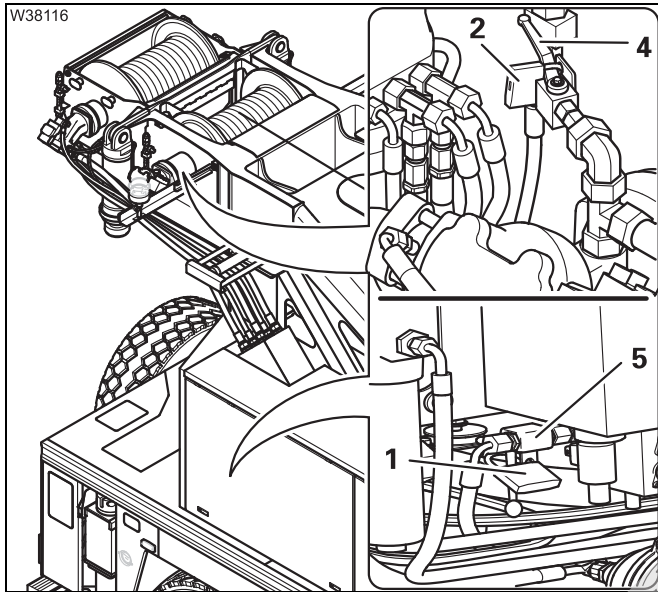
The crane movements are performed by operating the hand pump.

14.6.2

Switching over the crane's hydraulic system

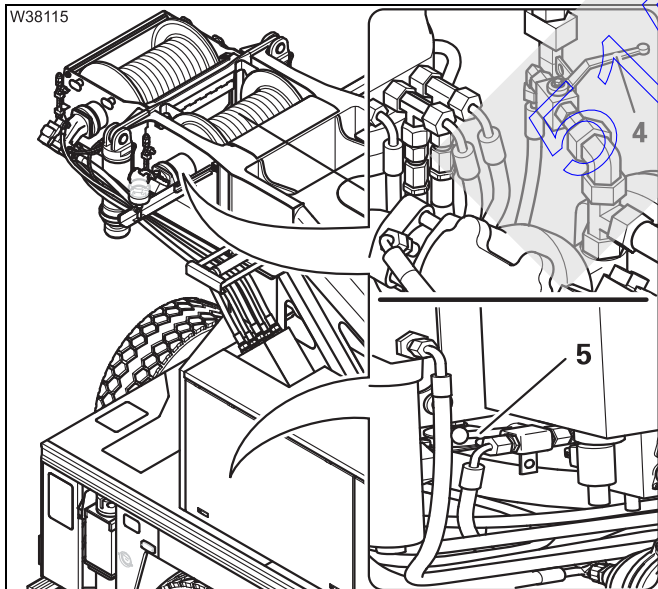


If you wish to move the hoist during emergency operation, you can open tap **4** at the beginning of the operation – as described in this section – this leads to the elimination of this step later during emergency operation. This does not affect the emergency operation of the other power units.



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)**.

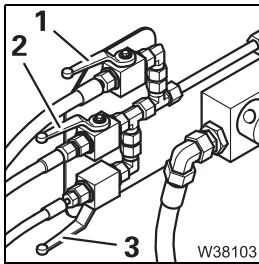


For emergency operation

- Take off the lock and close the valve **(4)**.
- Take off the lock and open the valve **(5)**.

14.6.3

Establishing the hydraulic circuits required



You must switch over the necessary valves to establish a hydraulic circuit. The valves **1** to **3** are secured against unintentional switching over.

Releasing/ securing valves

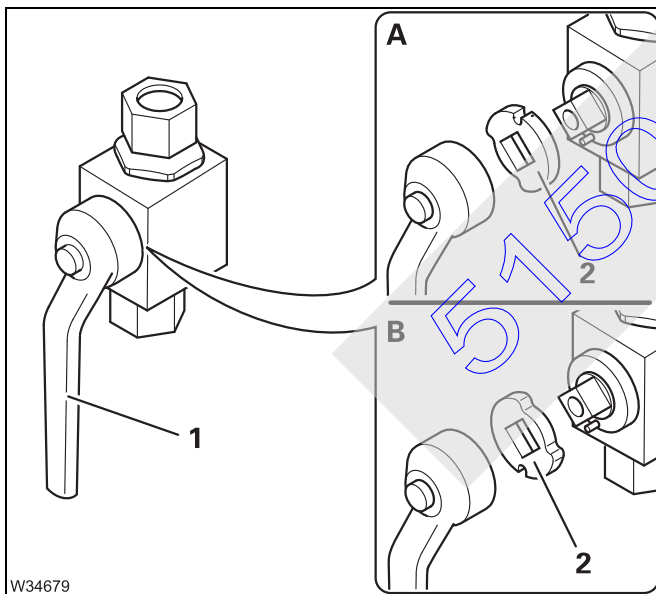
Releasing/securing is described for a valve. The procedure is identical for valves **1** to **3**.



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 the emergency operation

- Unscrew the handle (**1**).
- Move the disc (**2**) to position **A**.
- Fasten the handle (**1**).

Rigging – for crane operation

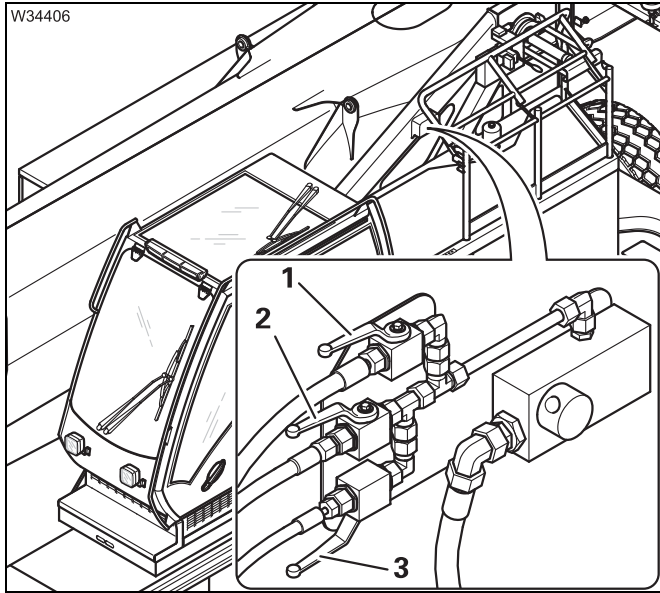
The valve must be closed.

- Unscrew the handle (**1**).
- Move the disc (**2**) to position **B**.
- Fasten the handle (**1**).



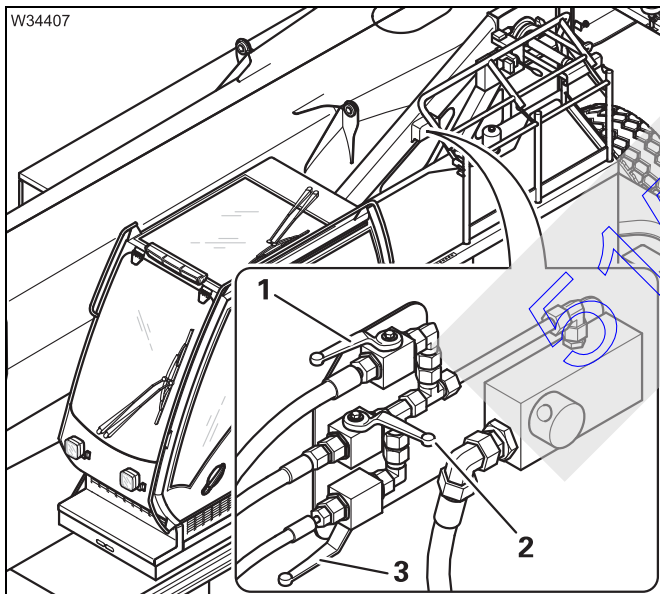
Switching over valves

The 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 - 53.



For emergency operation

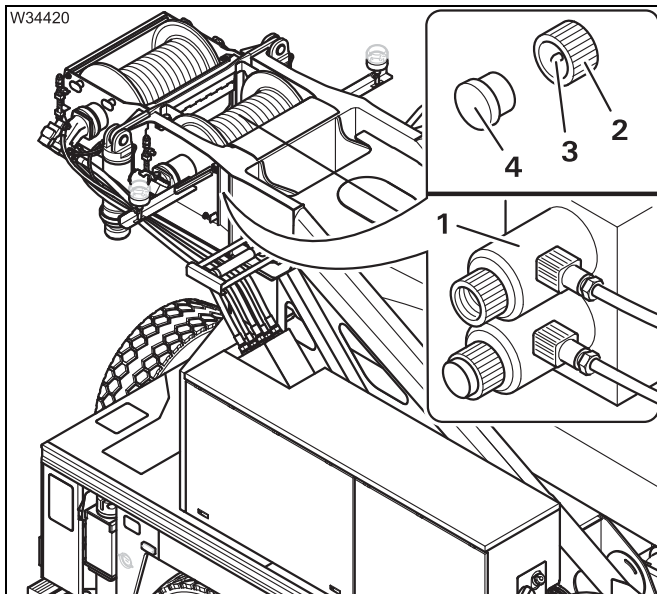
- Unlock the valves **(1)**, **(2)** and **(3)**;
 ■▶ p. 14 - 53.
- Switch the valves **1** to **3** to the positions for the desired crane movement – as shown in the following table.

For lowering, for example, switch the valve **2 outward** – valve open. Valves **1** and **3** must be switched **forwards**.

Emergency operation for crane movement	Valves outward	Valves to the front	Additional switching operations
Lowering	3	1, 2	Valve Y1104 on continuous operation; ■▶ p. 14 - 55 Valve 5 open, valve 4 closed; ■▶ p. 14 - 52
Lowering	2	1, 3	Valve 5 open, valve 4 closed; ■▶ p. 14 - 52
Raising	1	2, 3	

For lowering

You must additionally switch a valve to continuous operation for lowering.



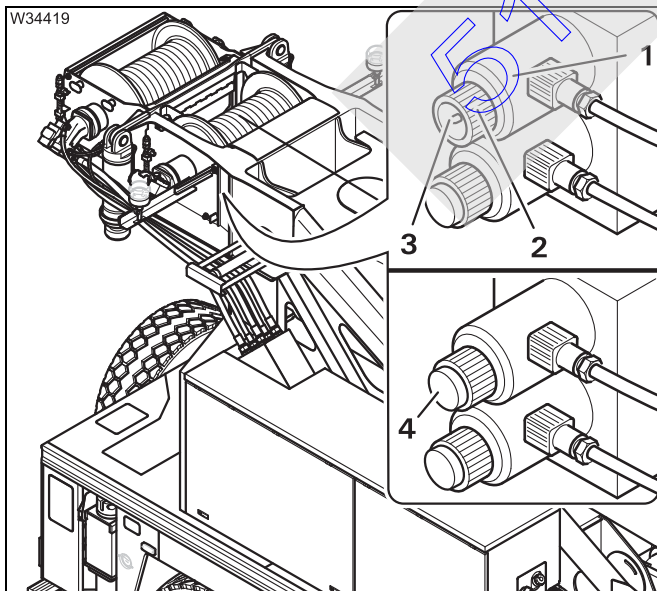
Switching on continuous operation

- Unscrew the cap (2) from valve Y1104 – Lowering (1).
- Remove the plug (4).
- Screw the cap with pin (3) on to the valve – continuous operation is now 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. Thus you prevent loads falling down immediately after lifting in subsequent crane operation.

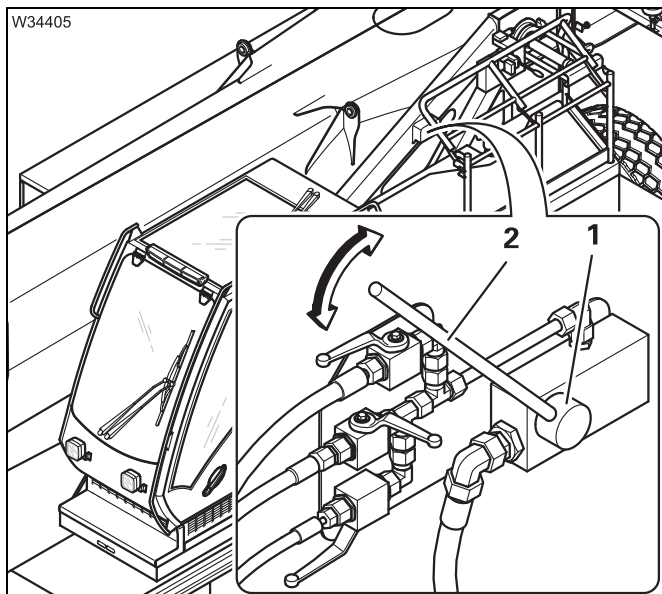


Switching off continuous operation

- 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



If the required hydraulic circuit has been established, you can make the corresponding crane movement using the hand pump (1).

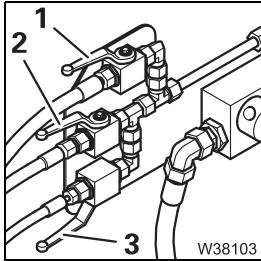
- Insert the pump lever (2) provided into the holder at the hand pump lever.
- Pump with the lever – the corresponding crane movement is performed.

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14.6.5

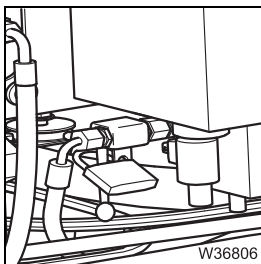
After emergency activation

You must restore the truck crane to its original state after finishing emergency activation.

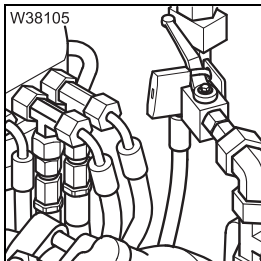


After each emergency activation

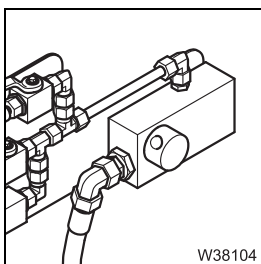
- Switch valves 1 to 3 to crane operation; p. 14 - 54.



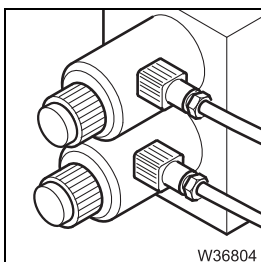
- Switch the valve 5 to crane operation; p. 14 - 52.



- Switch the valve 4 to crane operation; p. 14 - 52.



- Remove the lever from the hand pump.



Additionally after the lowering

- Switch off continuous operation on the valve Y1104; p. 14 - 55.

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14.7

Hydraulic emergency operation acc. to BGR 159



This section only applies to hydraulic emergency operation in acc. with BGR 159. Optionally you can also use the emergency operation with the hand pump; ►► p. 14 - 51.

This emergency operation corresponds to a hydraulic emergency release according to BGR 159 (4.2.8) and enable a transport of small loads.



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

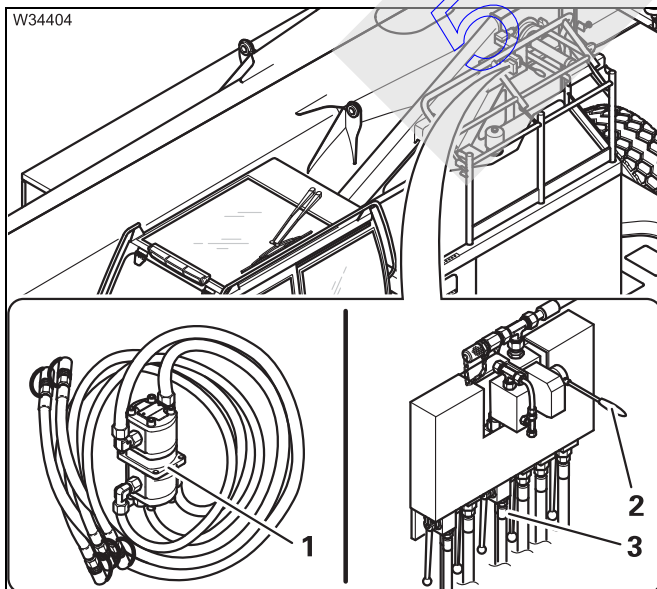
Check the positions of the valves **1** to **5** for the hydraulic emergency operation with the hand pump and, if necessary, switch to *Crane operation*; ►► p. 14 - 54, ►► p. 14 - 52.

This prevents the power units suddenly starting to move.

14.7.1

Applications and function

The hydraulic emergency operation according to BGR 159 enables the **Emergency operation** of the GMK5150L and the **Emergency supply** of another truck crane.



Emergency operation

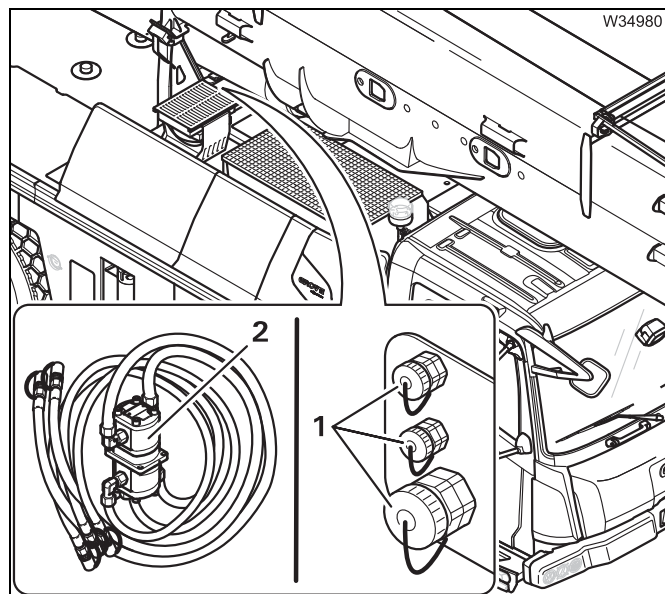
In emergency operation, you can drive the main hoist, derricking gear and slewing gear.

The energy source for the crane hydraulics 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 an hydraulic emergency operation according to BGR 159.

In the event of emergency supply, the connections (1) feed a transformer (2) which is connected to the hydraulic system of the other crane.

▣▣▣▣ *Emergency supply of another crane, p. 14 - 73.*

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14.7.2

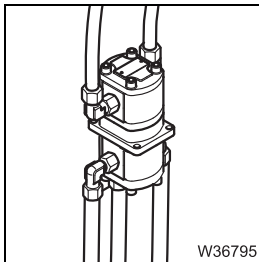
CHECKLIST: Emergency operation



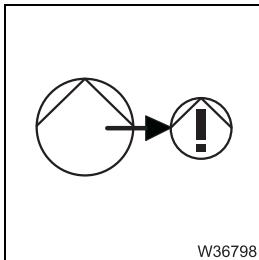
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references. **Observe the warnings and safety instructions specified here!**

1. For emergency operation with self-sufficiency

- Attach and connect the transformer to the superstructure; p. 14 - 63.

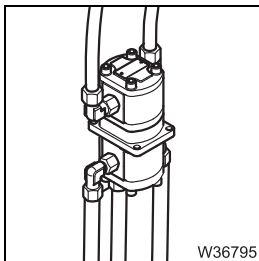


- Switching on emergency operation; p. 14 - 65.



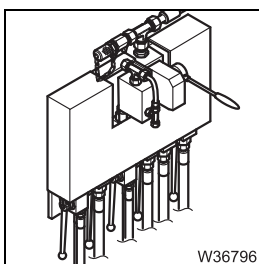
2. For emergency operation with external energy source

- Attach and connect the transformer to the superstructure; p. 14 - 66.



- 3. – Establishing the required hydraulic circuits; p. 14 - 67.

- Carrying out emergency operation; p. 14 - 71.



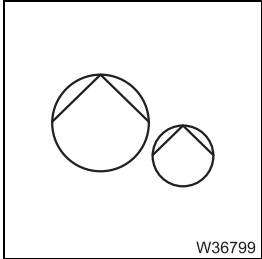
- 4. Put the truck crane into the original state; *CHECKLIST: After emergency operation*, p. 14 - 62.

14.7.3

CHECKLIST: After emergency operation



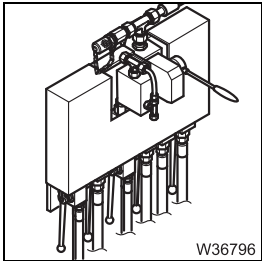
This checklist is not a complete operating manual. There are accompanying operating instructions which are indicated by cross-references.
Observe the warnings and safety instructions specified here!



W36799

1. Switching off emergency operation.

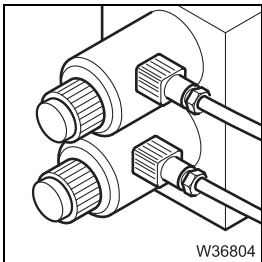
- After emergency operation with self-sufficiency; ■■■▶ p. 14 - 65
- After emergency operation with external energy source; ■■■▶ *Operating manual of energy source.*



W36796

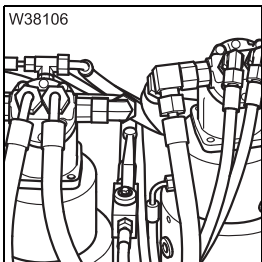
2. Establish hydraulic energy circuit for the crane operation.

- Switch valves **1** to **5** into position for crane operation; ■■■▶ p. 14 - 67.



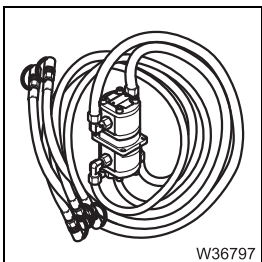
W36804

- Switching off continuous operation; ■■■▶ p. 14 - 69.



W38106

- Open valve **6**; ■■■▶ p. 14 - 70.



W36797

3. Take off transformer.

- After emergency operation with self-sufficiency; ■■■▶ p. 14 - 63
- After emergency operation with external energy source; ■■■▶ p. 14 - 66.

14.7.4

Connecting/removing transformer – for self-sufficiency

- Switch the engine off.

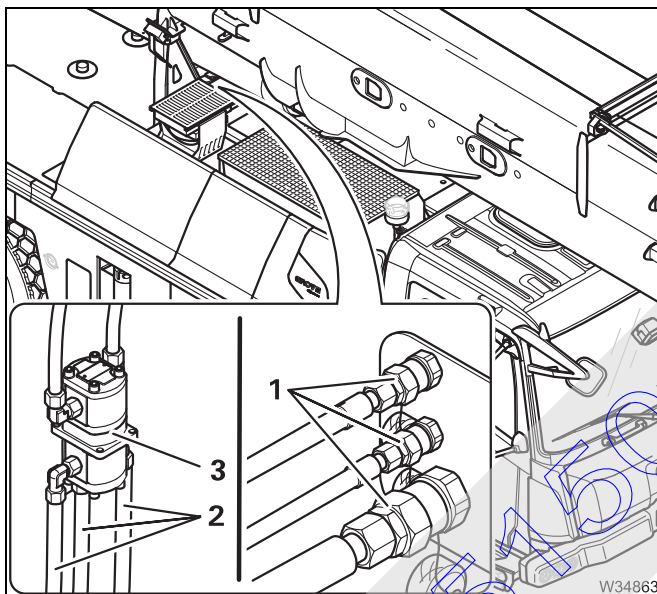


Risk of damage to the hoses

Lay 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.

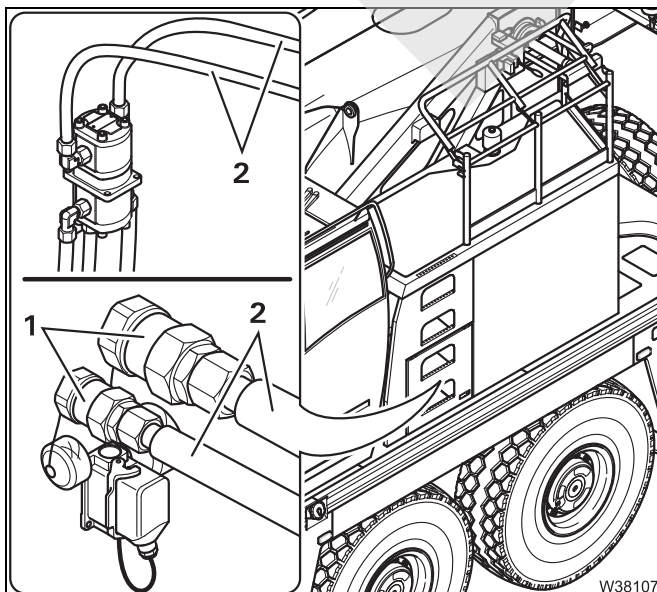
Connecting

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).



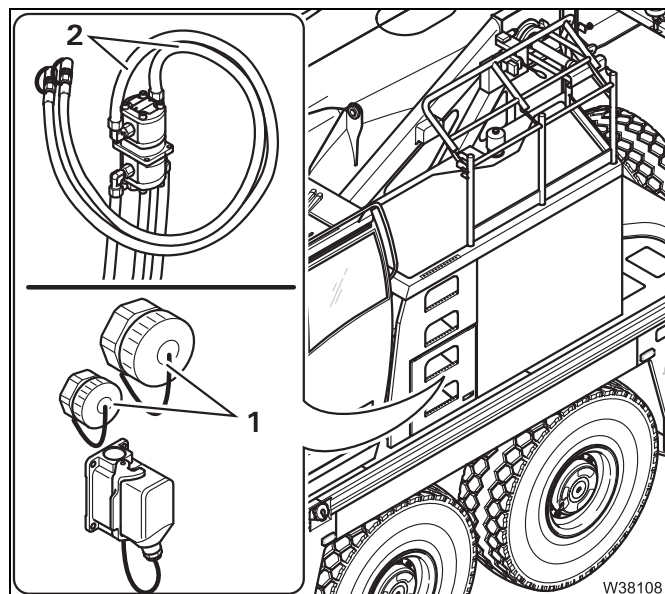
superstructure

- Connect the hoses (2) to the ports (1).



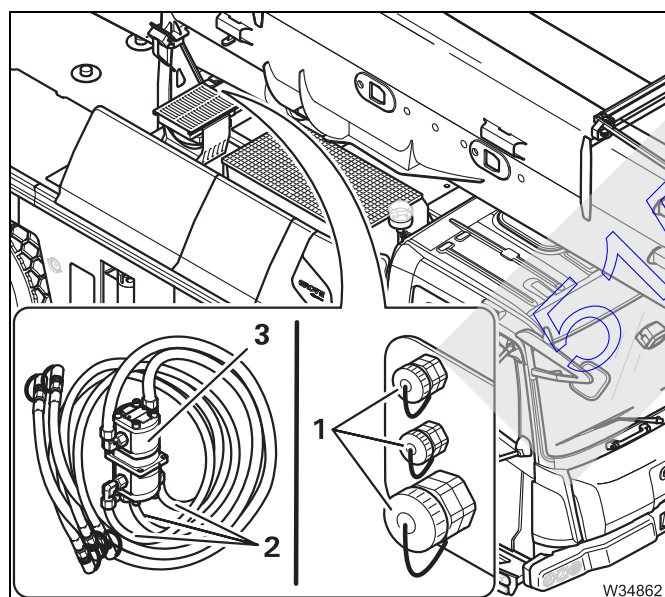
Removing

After the emergency operation, you must disconnect the hoses and the transformer.



On the superstructure

- Remove the hoses (2) from the ports (1).
- Close off the hoses and connections with the caps.

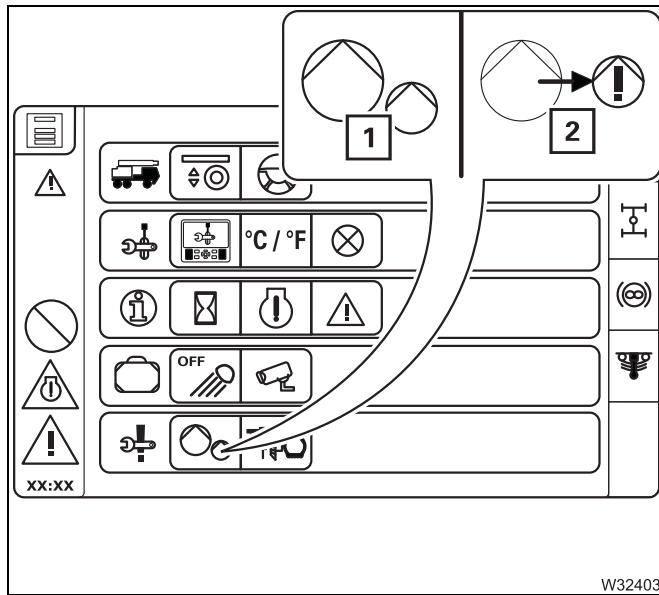


On the carrier

- Remove the hoses (2) from the ports (1).
- Close off 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).
Display symbol (2) – emergency operation switched on.

Switching off

- Select and confirm the symbol (2).
Display symbol (1) – emergency operation switched off.
- Switch the engine off.

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14.7.6

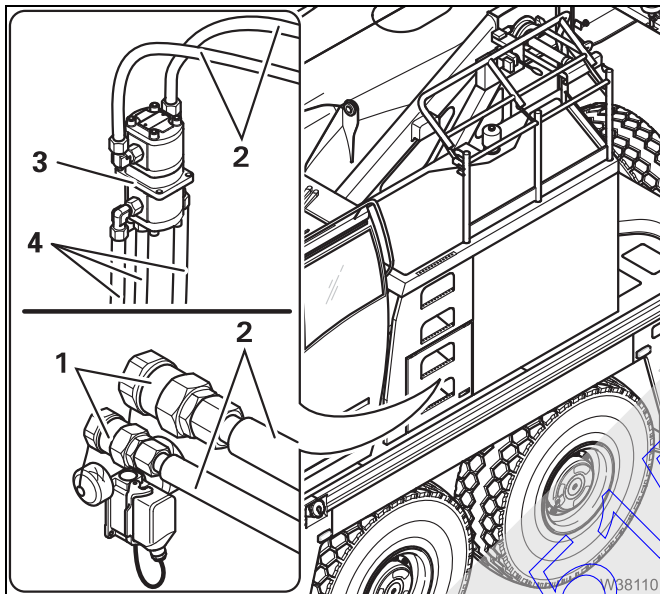
Connecting/removing transformer – for external energy source

The external energy source can be provided by a vehicle with hydraulic emergency operation according to BGR 159 or by an external, hydraulic energy source that meets the requirements of hydraulic emergency operation according to BGR 159.



Risk of damage to the hoses

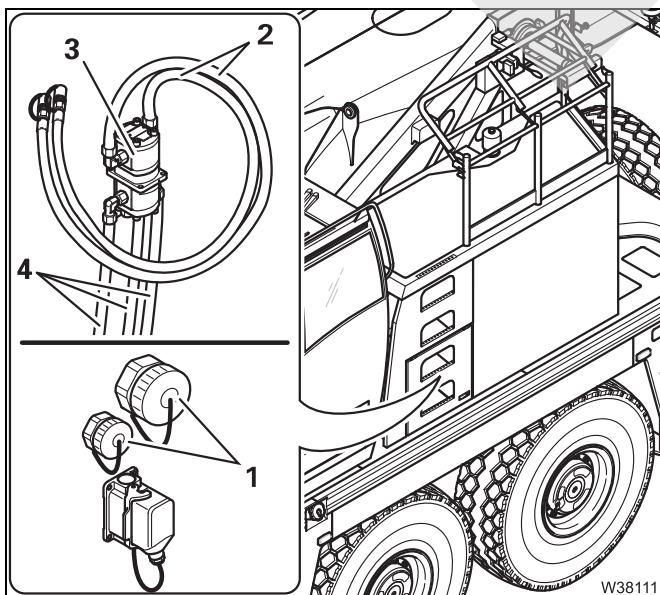
Lay the hoses in such a manner that they can be moved freely, so as to prevent them being crushed or torn or becoming caught during subsequent crane movements.



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).
- Close off the hoses and connections with the caps.

14.7.7

Establishing the required hydraulic circuits

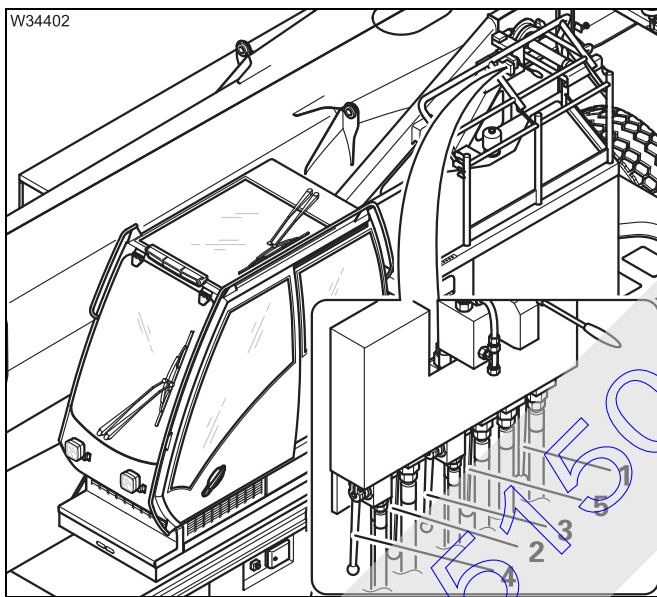
You must switch over the necessary valves to establish a hydraulic circuit.



The 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 - 54, ■■■► *Switching over the crane's hydraulic system*, p. 14 - 52.

Valves at the control panel

The valves **1 to 5** are labelled with their respective numbers.



For crane operation

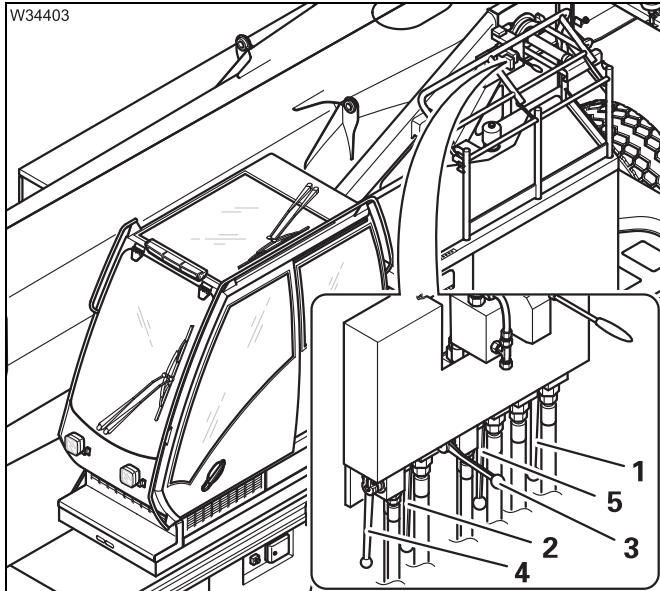
- Switch the valves **1 to 5** downward.





Danger from mutual interference of the power units

For crane operation, always switch **all** the 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 desired crane movement – as shown in the following table.

To raise the boom, for example, you must switch valve **3 upwards**. Valves **1, 2, 4** and **5** must point down.



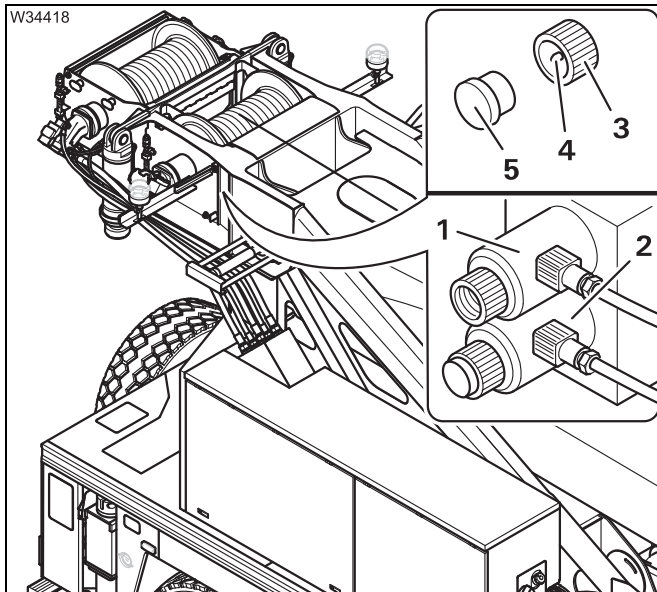
Danger from mutual interference of the power units

For **one crane movement**, always switch valves upward. This prevents wrong crane movements being performed and several movements being performed unintentionally at the same time.

Emergency operation for crane movement	Valves upwards	Valves downward	Additional switching operations
Lifting	1	2, 3, 4, 5	Valve Y1105 on continuous operation; p. 14 - 69
Lowering	1	2, 3, 4, 5	Valve Y1104 on continuous operation; p. 14 - 69
Raising	3	1, 2, 4, 5	No
Lowering the boom	5	1, 2, 3, 4	
Slewing to the left or right	2, 4	1, 3, 5	Valve 6 closed; p. 14 - 70

**For lifting/
lowering**

After establishing hydraulic circuits, switch one additional valve to continuous operation.



Switching on continuous operation

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

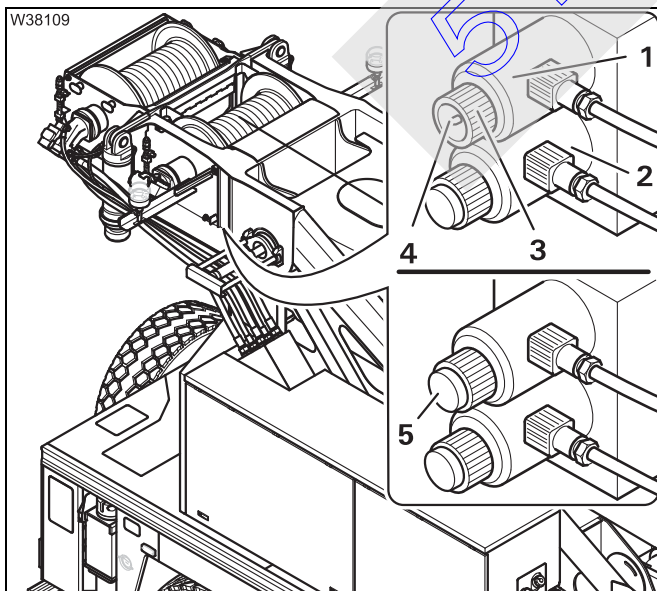
- 1 Valve Y1104 – Lowering or
- 2 Valve Y1105 – Lifting

- Screw off the cap (3), e.g. off valve (1).
- Remove the plug (5).
- Screw the cap with pin (4) on to the valve – continuous operation is now switched on.



Danger due to falling loads

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



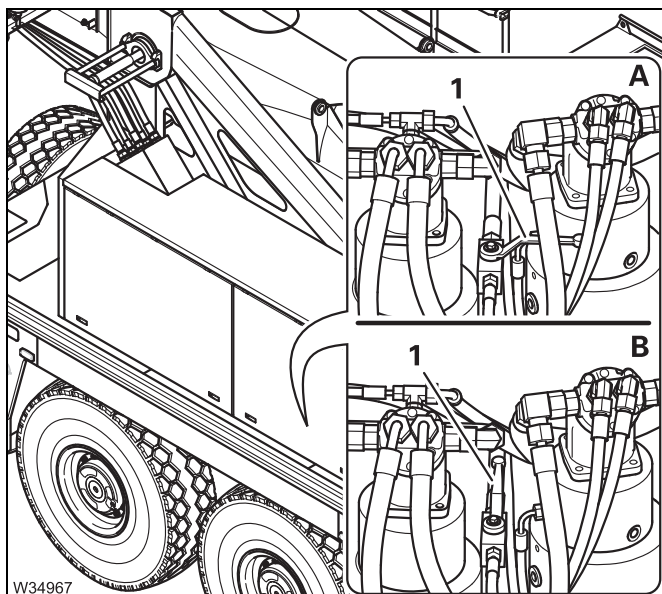
Switching off continuous operation

- Remove 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 pipe.

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14.7.8

Performing emergency operation

If the required hydraulic circuit has been established, you can make the corresponding crane movement.



You can control the speed of all power units with the control lever.

Slewing

It is not possible to control the slewing movements with the control lever for emergency operation with the same degree of sensitivity as with the control lever in the crane cab.



Risk of overturning when slewing in emergency operation!

Crane operations are not monitored by the RCL whilst the hand-held control is connected!

Various checks are therefore necessary, depending on the active slewing range type, before slewing in emergency operation; p. 14 - 46.



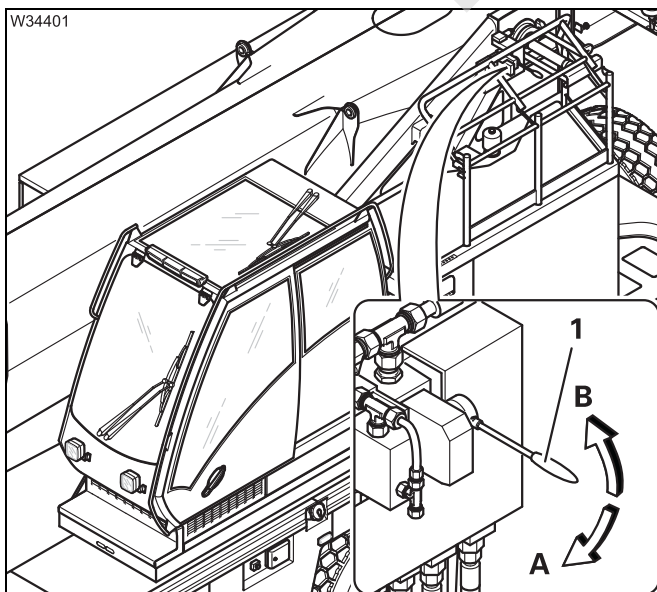
Risk of accidents during slewing

Do not stand on the carrier. This prevents you 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: Slewing to the right

B: Slewing to the left



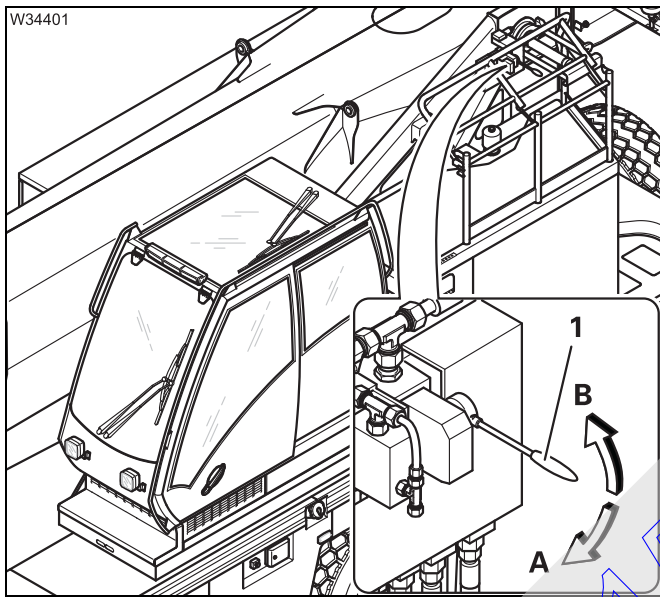
Derricking

- 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

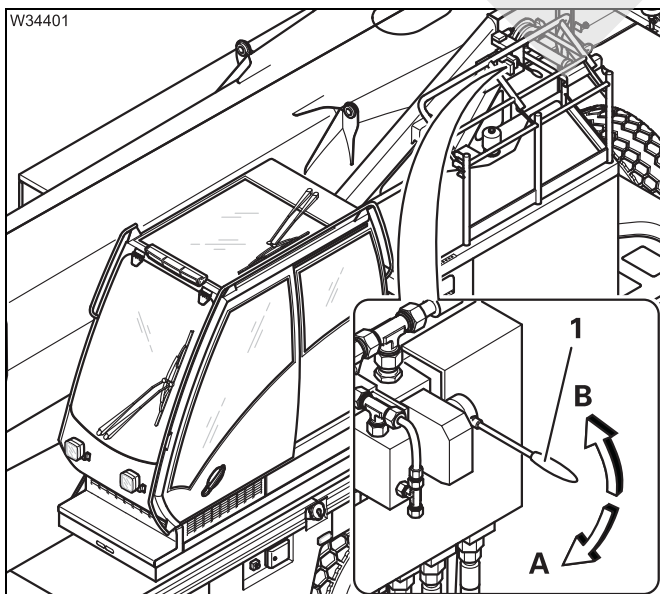
In emergency operation, operations are not shut down by RCL. This also applies if the RCL displays are still active after switching on the ignition. The truck crane will overturn if you exceed the maximum permissible working radius for the current rigging mode as specified in the *Lifting capacity table* 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: Lowering
B: Raising

Lifting/lowering



- Move the control lever (1) in the required direction.

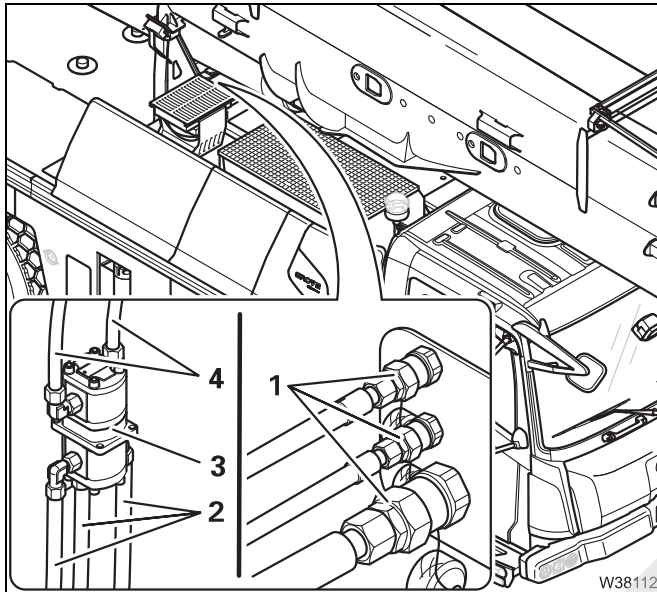
A: Lowering
B: Lifting

14.7.9

Emergency supply of another crane

For emergency supply

The hoses are assigned according to the various diameters.



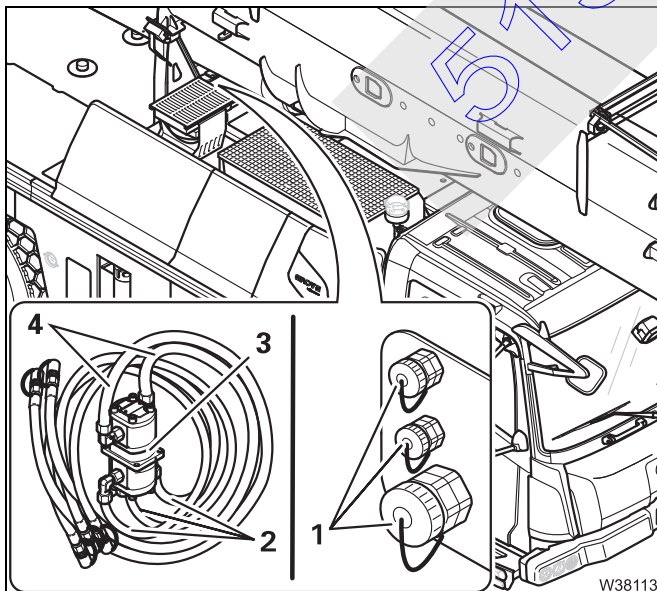
- On the crane to be supplied

- Attach the transformer (3).
- Attach the hoses (4); *Operating manual of the other crane.*

- On the GMK5150L

- Switch the engine off.
- Connect the hoses (2) to the connections (1).
- Switch on the hydraulic emergency operation; p. 14 - 65.

After emergency supply



- On the GMK5150L

- Switch off the hydraulic emergency operation; p. 14 - 65.
- Remove the hoses (2) from the connections (1).

- On the crane that was supplied

- Disconnect the hoses (4).
 - Remove the transformer (3).
-
- Close all the hoses and connections with the caps.

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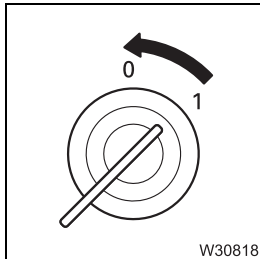
14.8

Fuses in the crane cab

The fuses are located in the crane cab behind the crane cab seat.

Information 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.

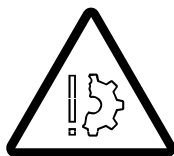


- Switch off the ignition whenever a fuse has to be replaced.



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.

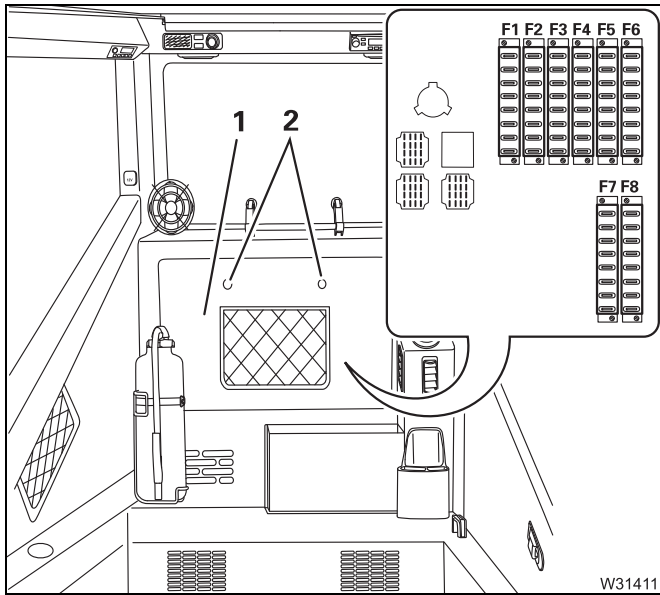
Notify **Manitowoc Crane Care** if a fuse with the same amperage blows again when the ignition is switched on.



Risk of fire

Never repair a blown fuse with other electrically conductive materials.



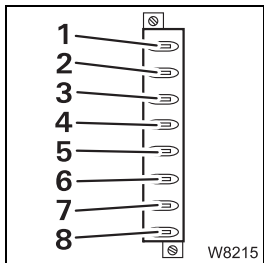


- Loosen the bolts (2) and remove the cover (1).

The fuse groups **F1** to **F8** consist of eight fuses each.

The following tables show the designations of the individual fuses, including their amperage and functions.

- Observe the instructions for fuse changes;
 p. 14 - 75.



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 for cab lighting
F3/5	5	CCS display
F3/6	5	Hand-held control
F3/7	7,5	Comfort seat ¹⁾
F3/8	5	Cigarette lighter

¹⁾ Additional equipment



Designation	Amperage (A)	Function
F4/1	5	Control unit UE IOL 30, CCM 10, UE SCM
F4/2	5	Reserve
F4/3	3	CraneSTAR system
F4/4	10	Radio ¹⁾
F4/5	–	Unassigned
F4/6	3	Central locking system (reserve)
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	3	Reserve
F5/7	5	Reserve
F5/8	5	Switch lighting

¹⁾ Additional equipment

Designation	Amperage (A)	Function
F6/1	10	Windscreen washing system
F6/2	15	Sockets 12 V
F6/3	10	Crane cab spotlight
F6/4	15	Main boom spotlight
F6/5	5	House Lock
F6/6	3	CraneSTAR 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	3	Heating system
F7/4	3	Extendable step for crane cab
F7/5	5	Hoist camera tripod
F7/6	–	Unassigned
F7/7	–	Unassigned
F7/8	–	Unassigned

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	–	Unassigned
F8/7	–	Unassigned
F8/8	3	Crane control power supply

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Index



To avoid making the index unnecessarily long and unclear, we have not included every single element from the instrument panel. Those elements, such as switches and buttons, lamps and displays are described and named in detail in the overviews of Chapter 3 and Chapter 9 *Truck Crane Description*. From there, you are referred, as usual, to more detailed descriptions of these elements.

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