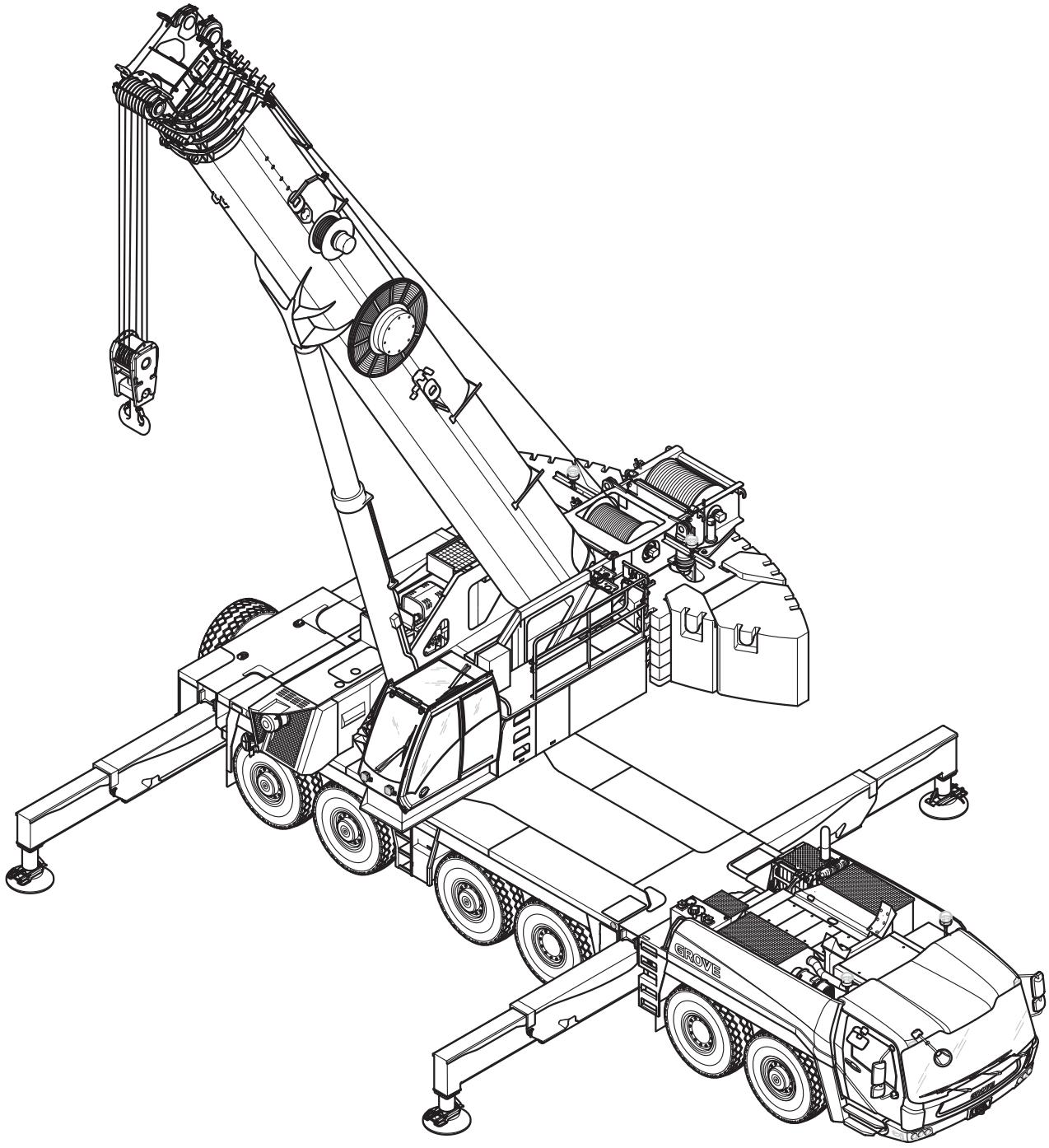
GROVE GMK6300L-1

Operating Manual
Part 1 – Driving



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Important note

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14.03.2018

Correction sheet

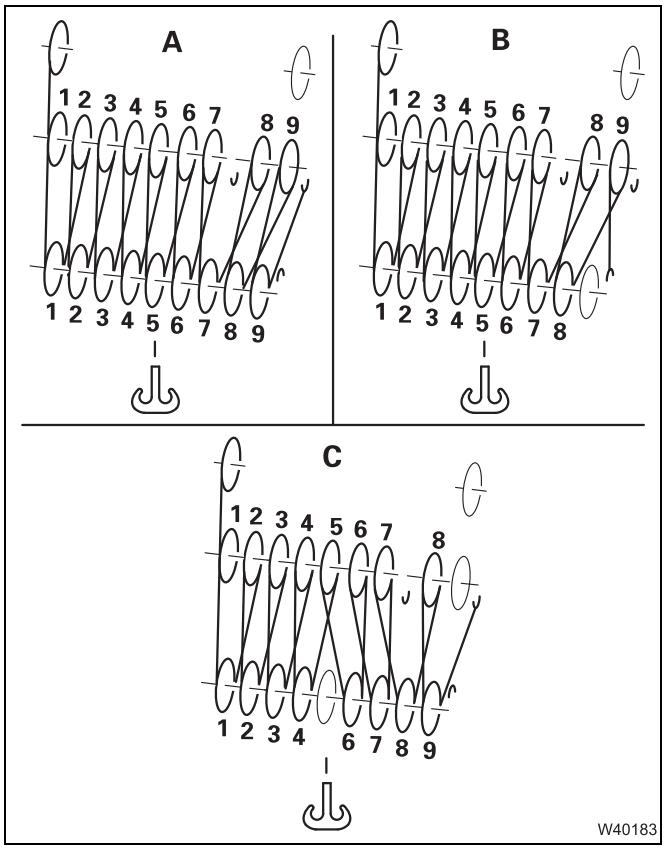
Possible reeving methods on the main boom

Contrary to the information specified in the operating manual, there are corrected hoist rope reevings on the main boom for the GMK6300L/GMK6300L-1 truck crane.

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

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

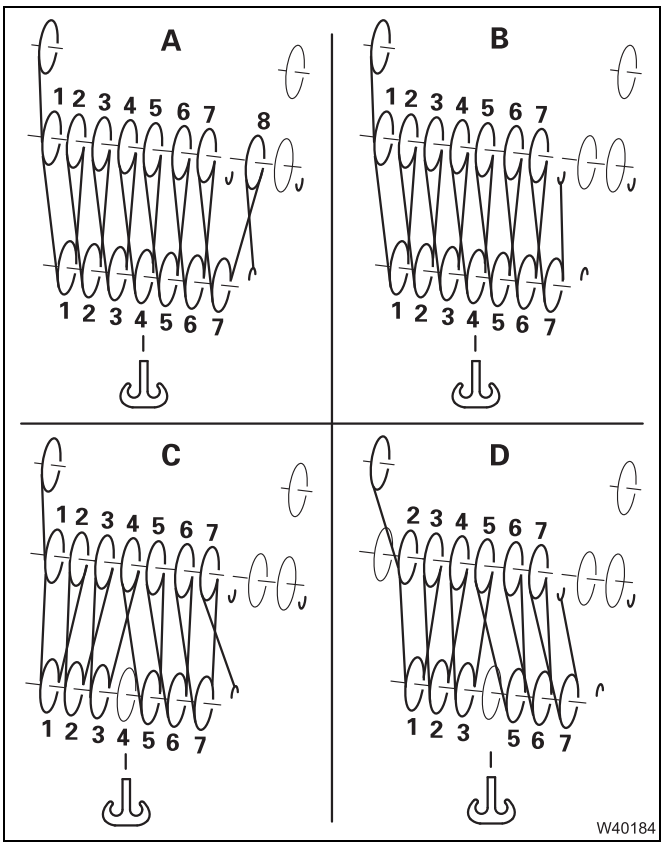
With 9 head sheaves



9 sheave hook block

	Reeving
A	18x
B	17x
C	16x

27.08.2018



7 sheave hook block

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

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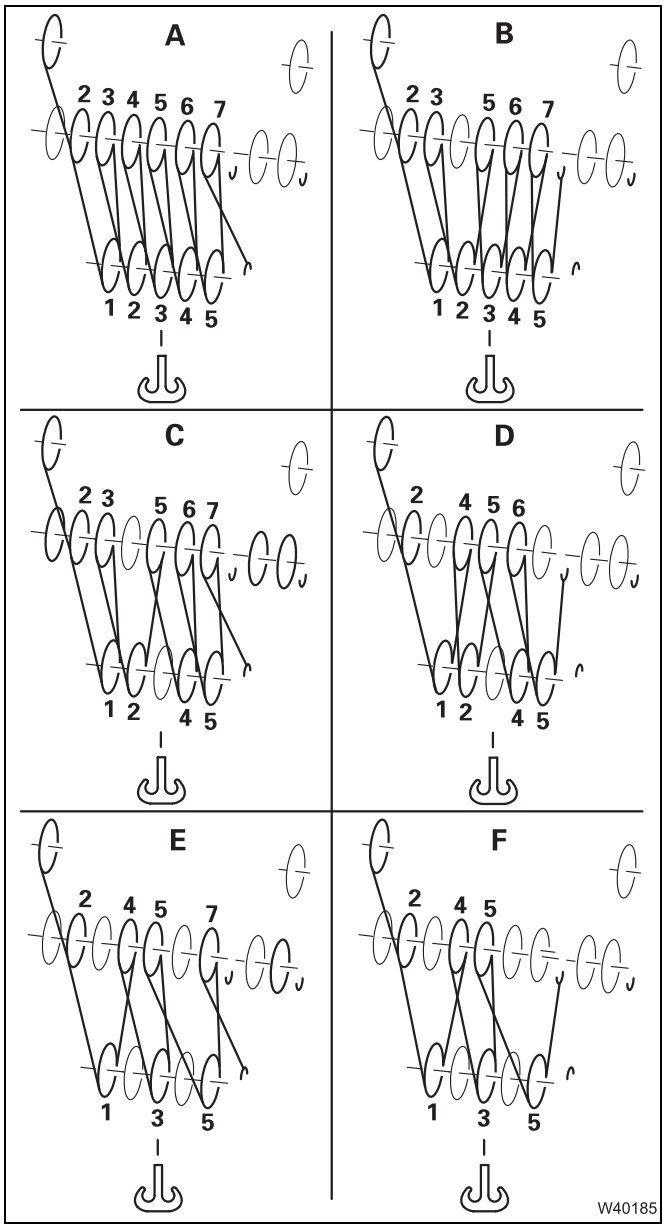

5 sheave hook block

	Reeving
A	11x
B	10x
C	9x
D	8x
E	7x
F	6x

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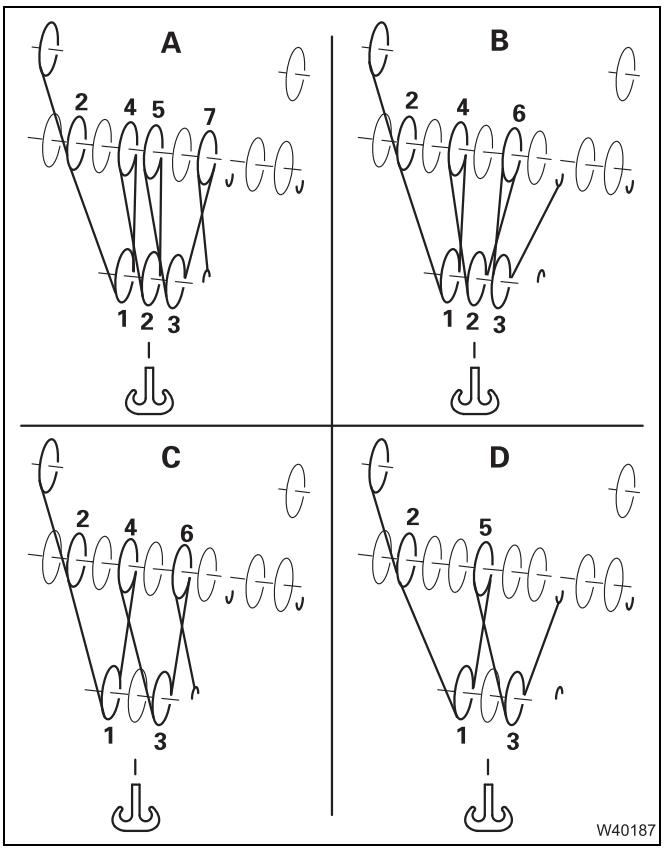
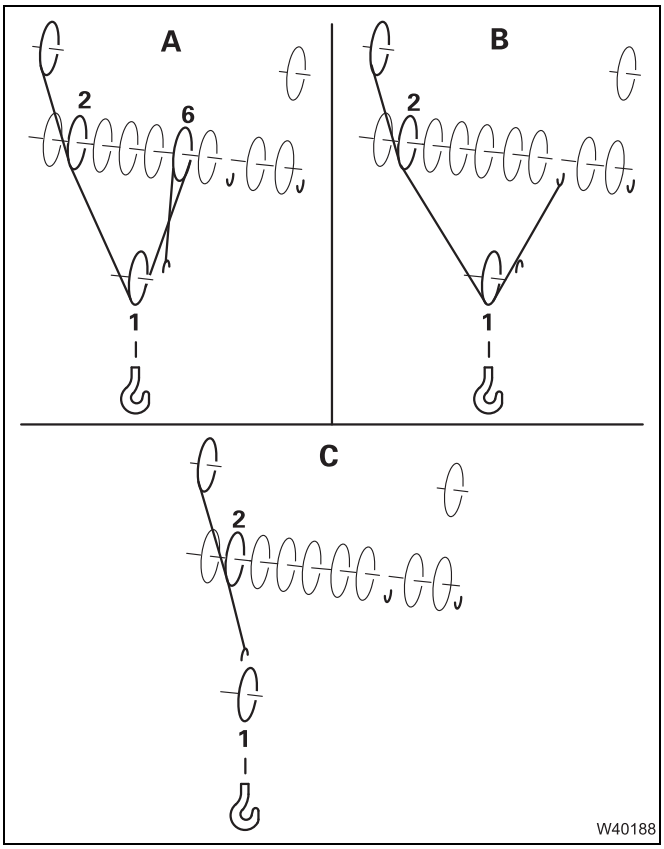


3 sheave hook block

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



1 sheave hook block

	Reeving
A	3x
B	2x
C	1x

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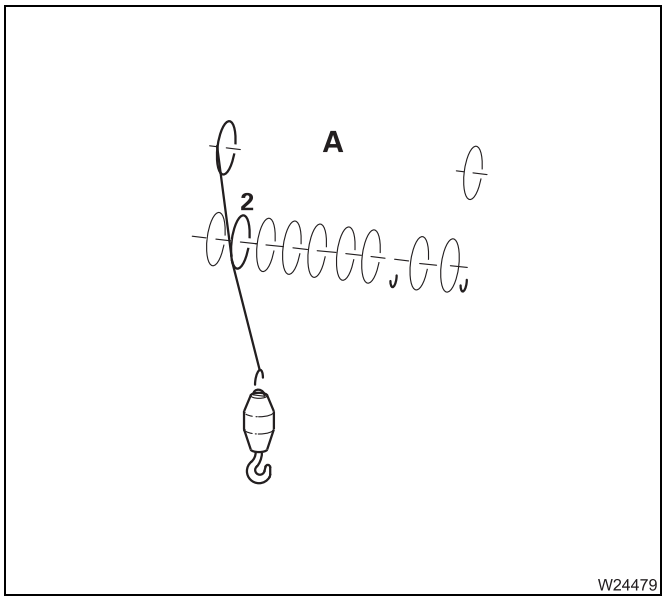
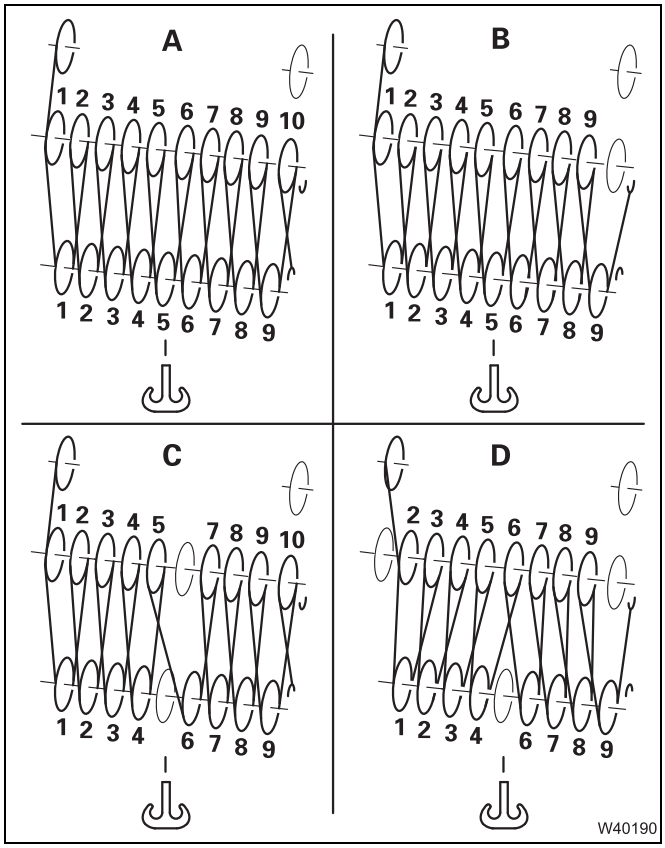


Hook tackle

	Reeving
A	1x

With 10 head sheaves



9 sheave hook block

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

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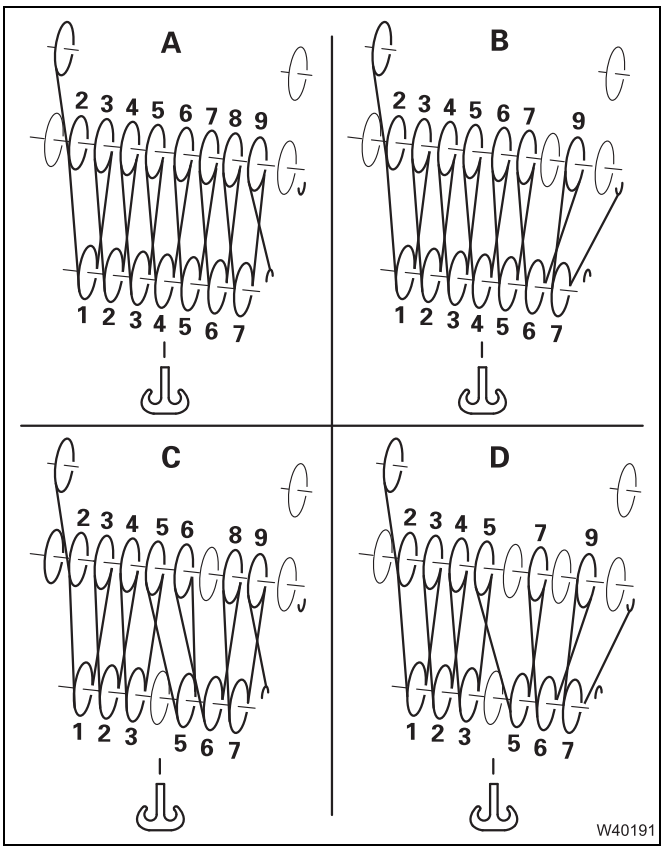

7 sheave hook block

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

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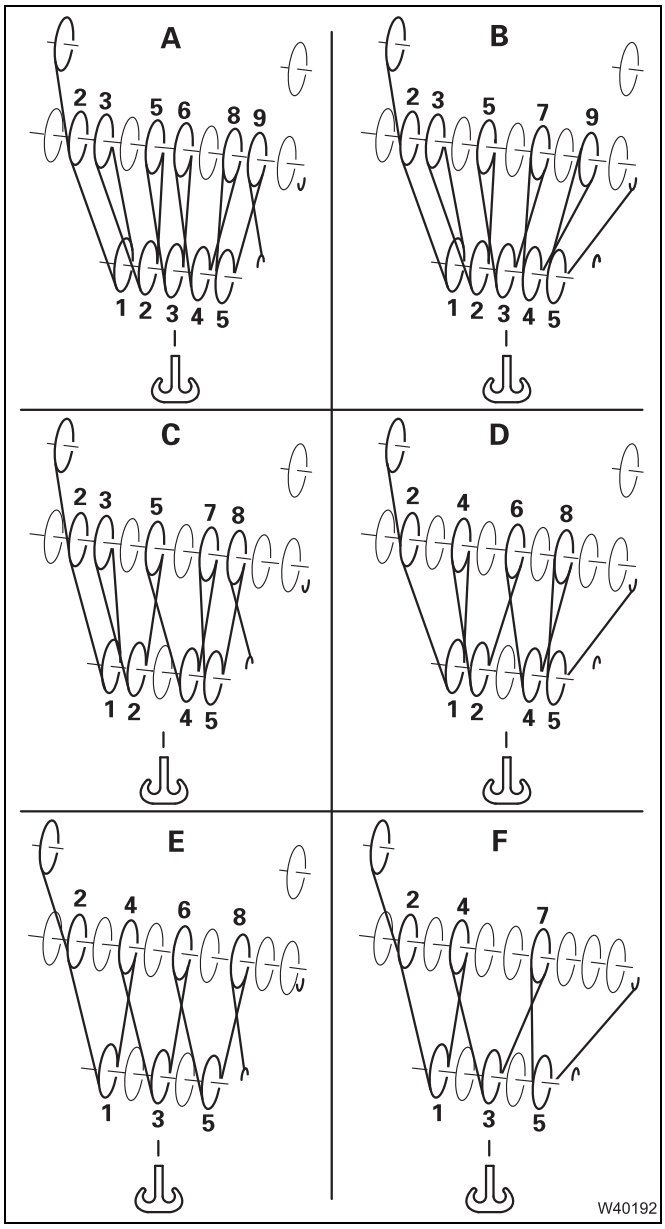

5 sheave hook block

	Reeving
A	11x
B	10x
C	9x
D	8x
E	7x
F	6x

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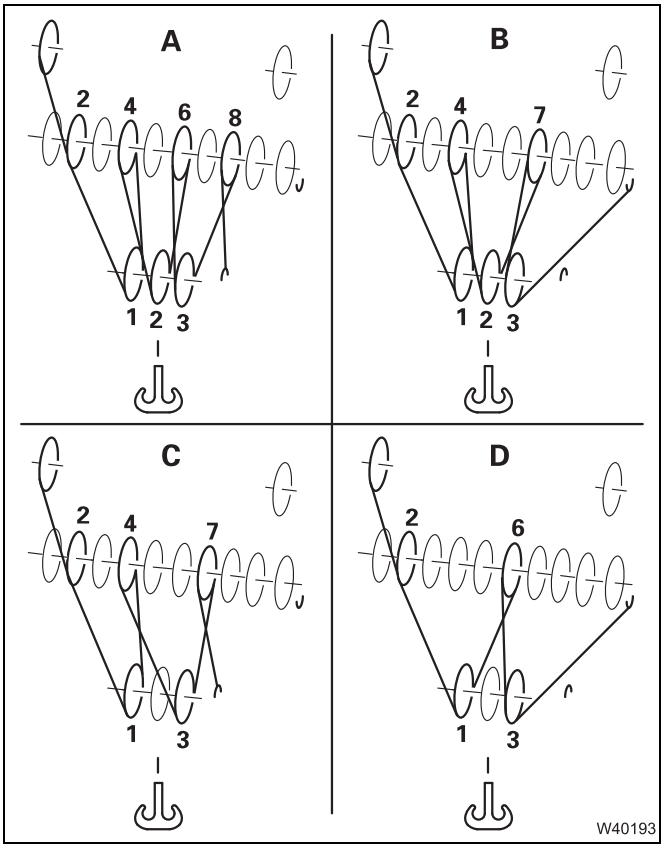
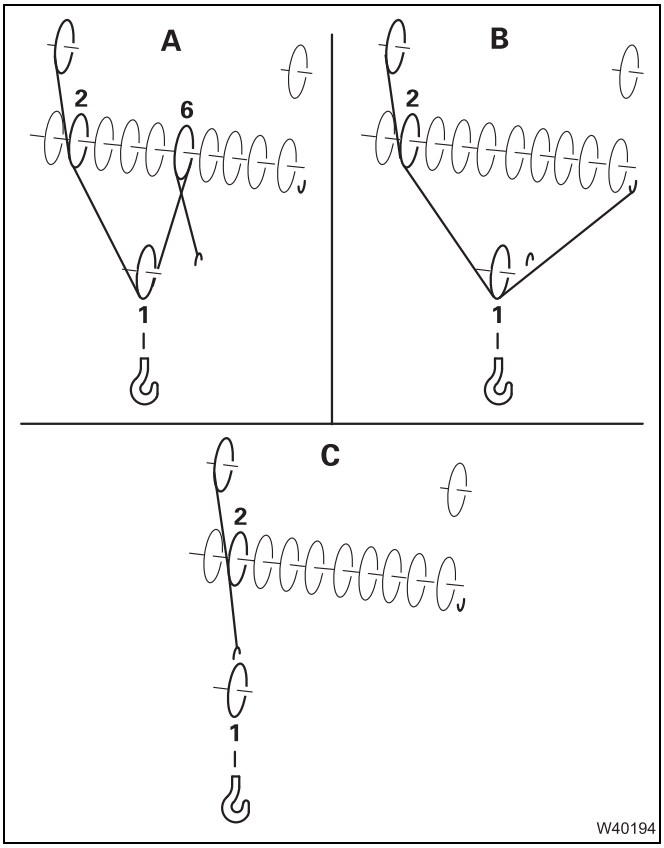


3 sheave hook block

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



1 sheave hook block

	Reeving
A	3x

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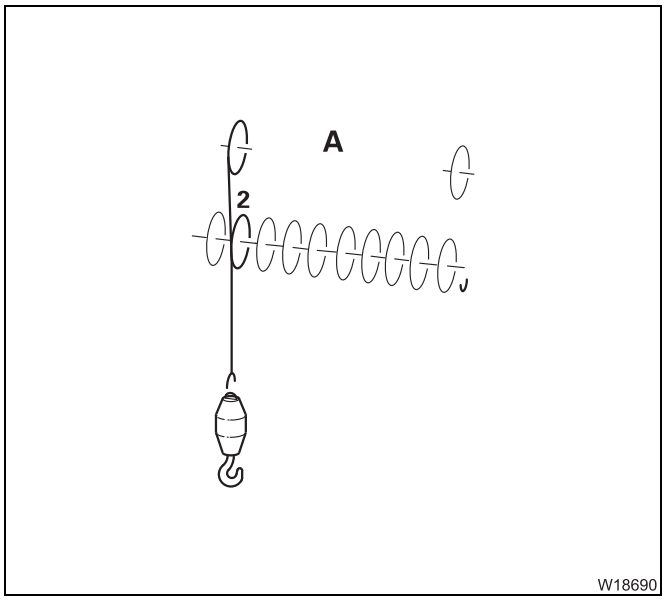

Hook tackle

	Reeving
A	1x

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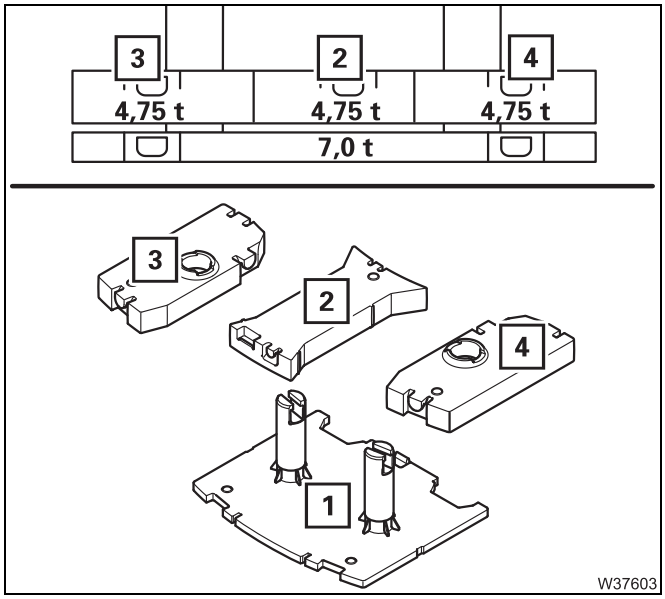
27.08.2018

Counterweight version B

Information on weight specifications



In the supplied documentation, for plates [2], [3] and [4] a weight of 4.75 t is presumed and in illustrations the plates are labelled as 4.75 t.

– The originally supplied plate [2] may also be labelled as 4.5 t or 4.7 t depending on the version.

– The originally supplied plates [3] and [4] are labelled as 4.7 t.

Regardless of the label on the supplied plates [2] , [3] and [4] the weight of 4.75 t is always valid for the composition of the counter-weight combination.

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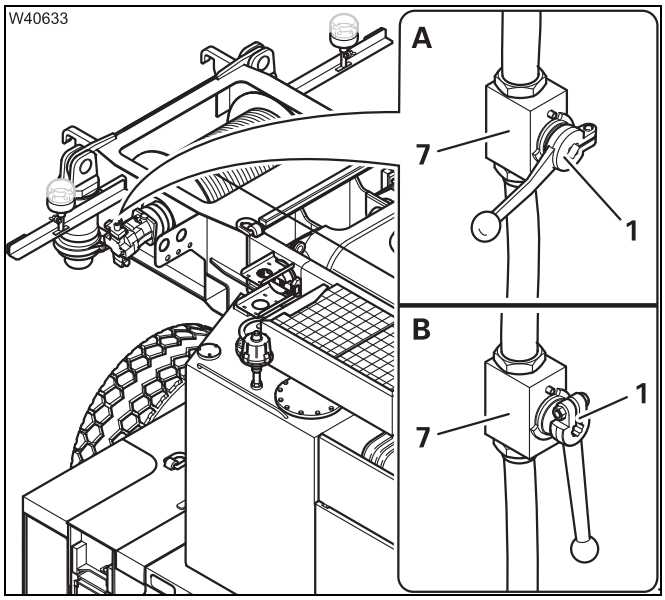
02.11.2017

Hydraulic emergency operation

Additional switches required

Contrary to the specifications in the *operating manual* supplied, the valve **7**, if present, can also be closed for the crane movements *Lifting* and *Lowering*. This increases the hoist speed.

Always close the valve **7 in addition** to all other switches that are specified in the *operating manual* supplied for the movements *Lifting* and *Lowering*.



(A) – For lifting and lowering in emergency operation

- Close the valve **7** – lever (**1**) at right angles to the line.

(B) – For crane operation

- Open the valve **7** – lever (**1**) parallel to the line.

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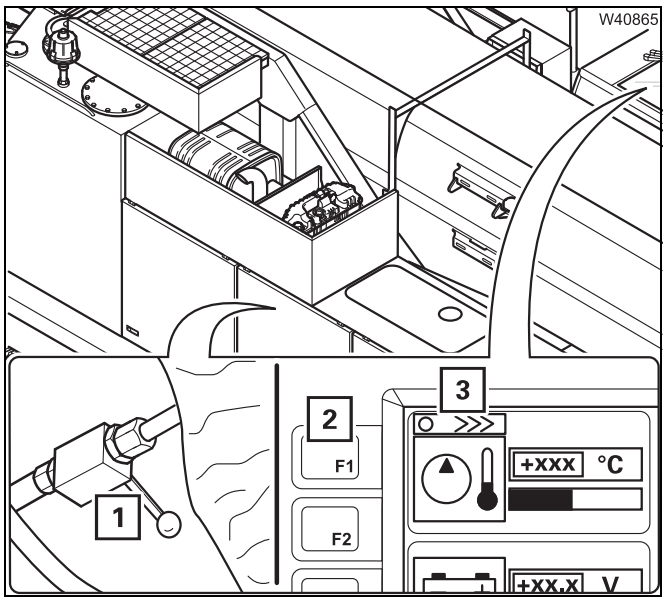
23.11.2018

Preheating hydraulic fluid



Contrary to the specifications in the *operating manual* provided, the shut-off valve is not required (**1**).

Preheating

- Press the button (**2**) - the symbol (**3**) appears.

  The engine speed is increased, the hydraulic fluid is preheated until reaching a temperature of 40 °C (104 °F).

Observe all instructions for preheating the hydraulic fluid in the *operating manual* provided.

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This operating manual is divided into two parts:

Part 1 – Driving

Part 2 – Crane operation

Content overview of Part 1:

You will find chapters Chapter 9 to Chapter 15 in part 2 – Crane operation.

14.03.2018

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14.03.2018

1 Overview

14.03.2018

14.03.2018

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.

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

14.03.2018

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14.03.2018

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:

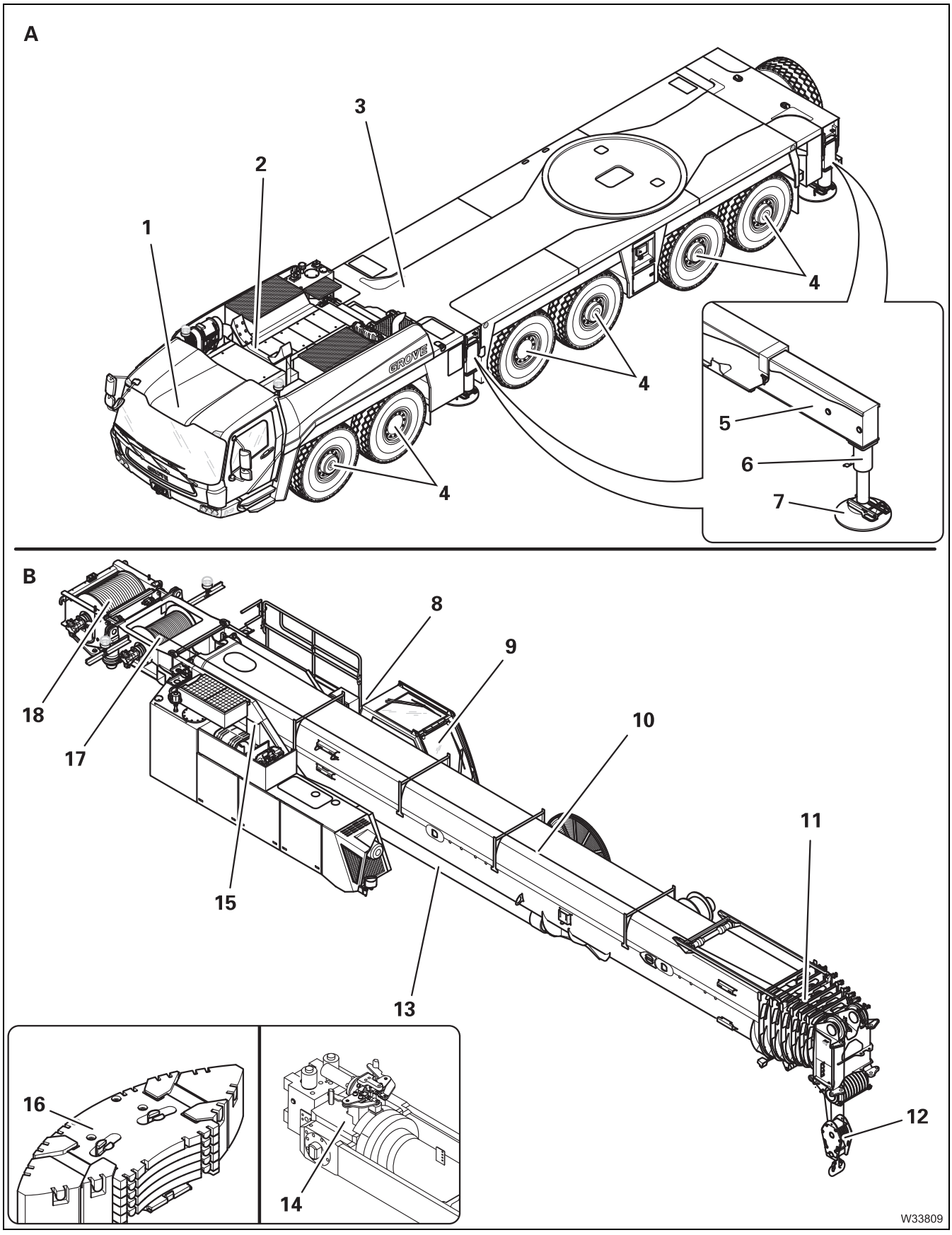
http://www.manitowoccranes.com

1.3 Warranty specifications

Please see the separately enclosed warranty certificate for information.

14.03.2018

1.4 Terms used



14.03.2018

(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 hoist[1)]

[1)] Additional equipment

14.03.2018

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14.03.2018

1.5 Technical data

GROVE crane GMK6300L-1

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 (DIN/ISO/EN)

Max. load bearing capacity:	190 t (418,900 lbs)
Max. load moment	
– Within the 360° slewing range:	825 tm (82.5 t x 10 m)

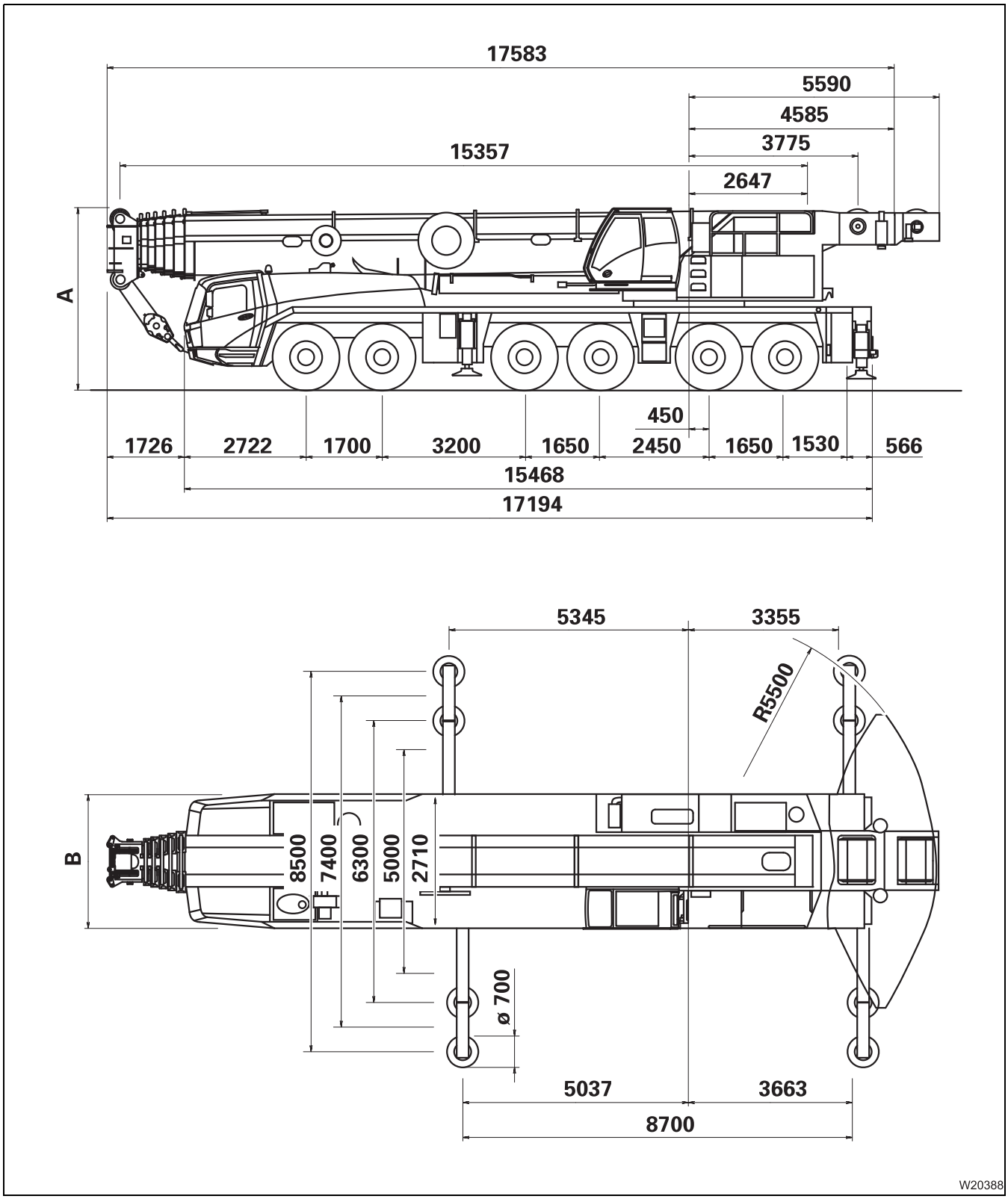
1.5.2 Maximum lifting capacity (ASME B 30.5)

Max. load bearing capacity:	190 t (418,900 lbs)
Max. load moment	
– Within the 360° slewing range:	865 tm (86.5 t x 10 m)

14.03.2018

1.5.3 Dimensions and weights of the truck crane, axle loads

All dimensions in the illustration are in mm.



14.03.2018

Dimensions

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

Length without auxiliary hoist:		17.58 m (57.7 ft)
A	Height:	At on-road level:
	– 385/95 R25	3.95 m (13 ft)
	– 445/95 R25/525/80 R25	4.00 m (13.1 ft)
	Max. level change	-130/+170 mm (-5.1/+6.7 in)
B	Width:	
	– 385/95 R25	3.00 m (9.8 ft)
	– 445/95 R25	3.00 m (9.8 ft)
	– 525/80 R25	3.10 m (10.2 ft)
Angle of negotiable banks:		At on-road level (385/95 R25)
Front:		approx. 14°
Rear:		approx. 8° (without outrigger box (ROB)) approx. 7° (with outrigger box (ROB))

Weight and axle loads

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

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

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

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

14.03.2018

1.5.4 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

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

Outriggers

Name	Length x width x height in m (ft)	Weight in kg (lbs)
Plastic outrigger pad diameter	0.70 x 0.14 (2.30 x 0.46)13	43 (95)
Steel outrigger pad diameter	0.70 x 0.14 (2.30 x 0.46)	80 (176)
Front outrigger[1)], complete per packet	2.98 x 0.37 x 1.20 (9.78 x 1.21 x 3.94)	1,252 (2,760)
Rear outriggers[1)], complete, per packet	2.98 x 0.37 x 1.10 (9.78 x 1.21 x 3.60)	1,365 (3,009)
Rear outrigger, complete, with outrigger beams, outrigger cylinders and outrigger pads (ROB)[2)]	3.41 x 1.26 x 1.53 (11.19 x 4.13 x 5.02)	5,125 (11,300)

1) Consists of two complete packets

2) Additional equipment

14.03.2018

Driver's safety guard

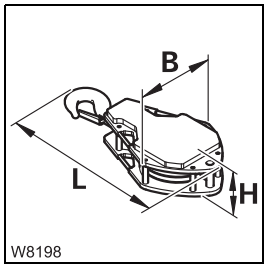
Name	Length x width x height in m (ft)	Weight in kg (lbs)
Rear bumper for versions with ROB[1)]	3.0 x 0.4 x 1.2 (9.8 x 1.31 x 3.9)	120 (265)

1) Additional equipment

Hose drum

Name	Diameter x width in m (ft)	Weight in kg (lbs)
Hose drum, complete with hose	1.55 x 0.4 (5.1 x 1.31)	275 (606)

Hook blocks and hook tackle



Name	Length x width x height (L) x (W) x (H) in m (ft)	Weight In kg (lbs)
Double hook, 9 sheaves	2.30 x 0.95 x 0.85 (7.55 x 3.12 x 2.79)	3,000 (6,615)
Double hook, 7 sheaves	2.00 x 0.80 x 0.70 (6.56 x 2.62 x 2.30)	1,750 (3,858)
Double hook, 5 sheaves	1.85 x 0.70 x 0.60 (6.07 x 2.30 x 1.97)	1,650 (3,650)
Single hook, 3 sheaves	1.95 x 0.65 x 0.40 (6.40 x 2.13 x 1.31)	1,125 (2,480)
Double hook, 3 sheaves	1.75 x 0.65 x 0.40 (5.74 x 2.13 x 1.31)	1,125 (2,480)
Single hook, 1 sheave	1.50 x 0.65 x 0.35 (4.92 x 2.13 x 1.15)	620 (1,370)
Hook tackle	0.91 x 0.35 x 0.35 (2.99 x 1.15 x 1.15)	300 (660)

Lifting capacity of the hook blocks; ➠ *Lifting capacity table*

14.03.2018

Auxiliary hoist

Name	Length x width x height in m (ft)	Weight in kg (lbs)
Complete auxiliary hoist	1.15 x 1.90 x 0.80 (3.77 x 6.23 x 2.62)	2,000 (4,410)
Rigging frame	1.43 x 2.17 x 0.55 (4.69 x 7.12 x 1.80)	352 (776)

Main boom

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

Counterweight parts

Name	Length x width x height in m (ft)	Weight in kg[1)] (lbs)
7 t base plate	2.99 x 2.42 x 1.25 (9.81 x 7.94 x 4.10)	7,000 (15,440)
each 9.5 t plate	2.99 x 2.40 x 0.29 (9.81 x 7.87 x 0.95)	9,500 (20,950)
9.5 t section with cutouts	2.99 x 2.40 x 0.24 (9.81 x 7.87 x 0.79)	9,500 (20,950)
each 9 t block	1.39 x 1.44 x 1.24 (4.56 x 4.72 x 4.07	9,000 (19,850)
each 10 t block	0.97 x 1.97 x 1.30 (3.18 x 6.46 x 4.27	10,000 (22,050)

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

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

14.03.2018

1.5.5 Carrier

Engine

Mercedes-Benz:	OM 473 LA
Engine emission:[1)]:	97/68/EG Level 4 (TIER 4 Final/Euromot 4)
Power[1)]:	430 kW (585 PS) at 1,700 rpm (ECE R 120)
DEF tank:	approx. 40 l (10.6 gal)
Fuel tank:	approx. 480 l (105.6 gal)

[1)] See also engine data card

Transmission

Allison 4500 SP automatic transmission with integrated retarder[1)] with two driving programs, six forward gears and one reverse gear.

[1)] Additional equipment

Transfer case

Kessler VG 2600, 2-stage

Axle lines

Drive:	**12 x 6 x 12**
1. axle line:	Steered and driven axle line
2. axle line:	Steered axle line
3. axle line:	Steered axle line, steering can be switched on
4. axle line:	Steered and driven axle line, steering can be switched on
5. axle line:	Steered and driven axle line
6. axle line:	Steered axle line

Drive:	**12 x 8 x 12**
1. axle line:	Steered and driven axle line
2. axle line:	Steered axle line
3. axle line:	Steered axle line, steering can be switched on
4. axle line:	Steered and driven axle line, steering can be switched on
5. axle line:	Steered and driven axle line, drive can be activated
6. axle line:	Steered and driven axle line

14.03.2018

Steering

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

Tyres

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

[1)] Additional equipment

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

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

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

Outriggers

Design:	4-point telescoping outrigger system
Control system:	Can be controlled from both sides on the carrier and individually from the crane cab
Outrigger spans:	8.70 x 8.50 m (28.5 x 27.9 ft) 8.70 x 7.40 m (28.5 x 24.3 ft) 8.70 x 6.30 m (28.5 x 20.4 ft) 8.70 x 5.00 m (28.5 x 16.4 ft) 8.70 x 2.71 m (28.5 x 8.9 ft) 7.98 x 8.50/1.00 m[1)] (26.1 x 27.9/3.3 ft)
Outrigger pads	Diameter: 700 mm (27.6 in) Surface: 3,848 cm^2 (596 in^2)
Stroke of support cylinders	550 mm (21.7 in)
Inclination indicator:	On the hand-held control, in the crane cab, on the *outrigger* control units.
Outrigger pressure display:	In the outriggers, integrated with a display in the crane cab and on the *outrigger* control units depending on design.

[1)] Additional equipment

14.03.2018

Auxiliary supports

Control system:	Right rear as viewed from the carrier
Outrigger pads	Diameter: 400 mm (15.8 in)
	Surface: 1,257 cm^2 (195 in^2)
Stroke of support cylinders	500 mm (19.7 in)

Electrical system

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

Tool

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

Towing coupling

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

[1)] Only permissible at certain tension angles; ➠ p. 5 - 68

Driving speeds

At an engine speed of 1,700 rpm

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

Climbing ability

Transport weight 72 t (158,760 lbs)

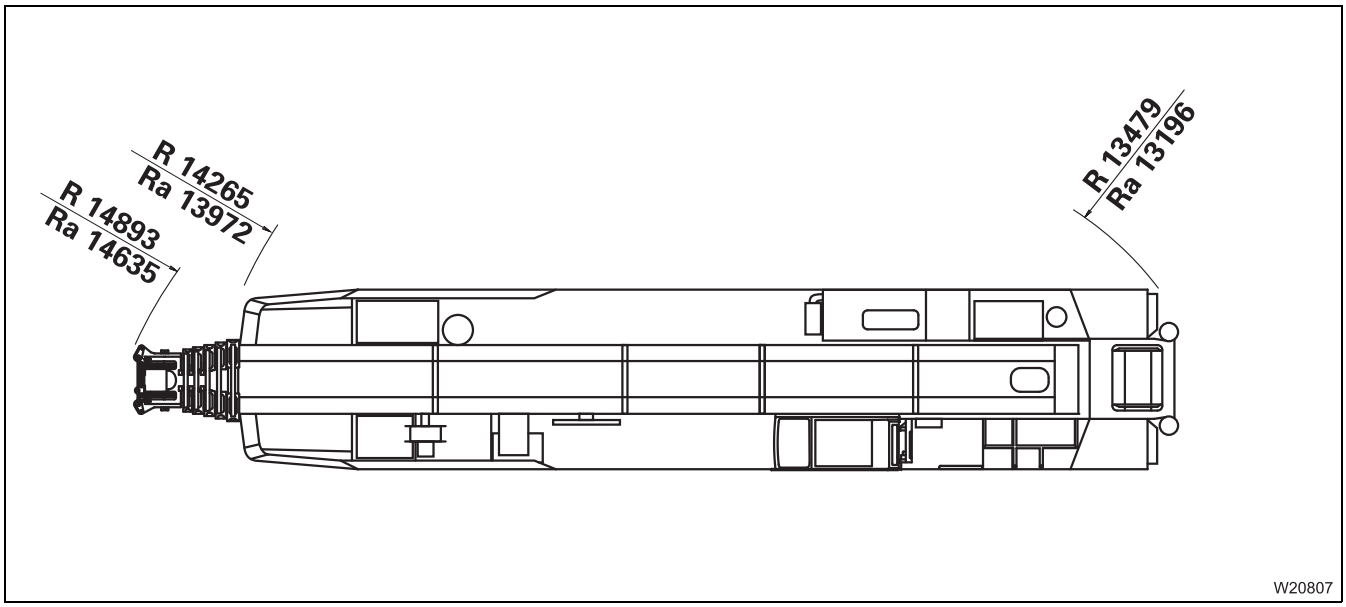
Shift position transfer case	**Climbing ability in %**	
	385/95 R25 tyres	525/80 R25 tyres 445/95 R25 tyres
On-road gear	31	28
Off-road gear	49	43

14.03.2018

Turning radii All dimensions in the illustration are in mm.

R = values for normal steering mode

Ra = values for all-wheel steering



14.03.2018

1.5.6 Superstructure

Engine

Mercedes-Benz:	OM 936 LA
Engine emission:[1)]:	97/68/EG Level 4 (TIER 4 Final/Euromot 4)
Power[1)]:	210 kW (282 PS) at 2,200 rpm (ECE R120)
DEF tank:	approx. 40 l (10.6 gal)
Fuel tank:	220 l (58 gal)

[1)] See also engine data card

Main hoist

Drum diameter:	458 mm (18.03 in) (rope centre to rope centre)
Rope diameter:	22 mm (0.87 in)
Rope length:	350 m (1,148 ft)
Rope pull:	94.4 to 97.7 kN/line (21,220 to 21,960 lbf)
Power unit group:	M 3 (to ISO 4301 - 2)
Load spectrum:	L1
Factor of the load spectrum	Km = 0.125
Theoretical service life:	D = 3,200 h

Auxiliary hoist

Drum diameter:	458 mm (18.03 in) (rope centre to rope centre)
Rope diameter:	22 mm (0.87 in)
Rope length:	350 m (1,148 ft)
Rope pull:	94.4 to 97.7 kN/line (21,220 to 21,960 lbf)
Power unit group:	M 3 (to ISO 4301 - 2)
Load spectrum:	L1
Factor of the load spectrum	Km = 0.125
Theoretical service life:	D = 3,200 h

14.03.2018

Slewing gears

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

Derricking gear

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

Main boom

Main boom lengths:	15.4 m to 80.0 m (50.5 ft to 262.5 ft)
Main boom head:	9 sheaves 10 sheaves[1)]
Cylinder:	One single-level telescoping cylinder with locking/unlocking mechanism
Power unit group	M 1 (to ISO 4301 - 2)
Telescoping mechanism:	

[1)] Additional equipment

Lattice extension As additional equipment; ➠ *Operating Instructions Lattice Extension*.

14.03.2018

Operating speeds

The specified operating speeds only apply to an engine speed of about 2,000 rpm without load.

Main hoist:	Rope speed when lifting and lowering		
	Normal speed:	maximum	63 m/min (207 ft/min)
	High-speed mode:	maximum	126 m/min (413 ft/min)
Auxiliary hoist:	Rope speed when lifting and lowering		
	Normal speed:	maximum	63 m/min (207 ft/min)
	High-speed mode:	maximum	126 m/min (413 ft/min)
Slewing gear:	0 to 1.3 revolutions per minute		
Telescoping mechanism:	Extending from 15.4 to 80.0 m (50.5 ft to 262.5 ft)		
	approx. 740 s	In automatic mode during uninterrupted locking and telescoping processes	
Derricking gear:	Derricking between - 1.5° and 83°		
	Normal speed:	Raising:	approx. 130 s
	High-speed mode:	Raising:	approx. 95 s

14.03.2018

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14.03.2018

1.6 Documentation supplied

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

– **Operating Manual**

  Contains information on driving and crane operation.

– **Lattice extension operating manual**

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

– **Operating 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.

14.03.2018

– **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:

e-mail: whv-techpublications@manitowoc.com

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

14.03.2018

1.7 Notes on the operating manual

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

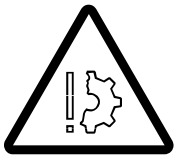
1.7.1 What do the symbols used mean?

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 (e.g. danger to life, risk of injury or risk of crushing) usually precedes the warning.

14.03.2018



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

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

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

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

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

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

14.03.2018

1.7.2 How is the operating manual structured?

Division

The operating manual is divided into two parts.

– **Part 1** with chapters **1** to **8** contains a description of how to drive the truck crane.

– **Part 2** with chapters **9** to **15** contains a description of the crane operation.

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

Structure of the chapters

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

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

– The checklists show the procedure in the required sequence, e.g. for rigging work. From there, cross-references take you to the corresponding operation descriptions.

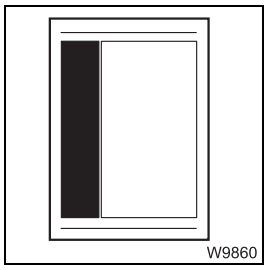
– The operation descriptions describe the work in detail, including the required **warnings and safety instructions**.
You are obliged to read these sections before using the truck crane for the first time **and** if you are still unsure about how to operate the truck crane.

Risk of accidents when only referring to the checklists during operation!
The checklists and operating instructions should always be regarded as a single unit for the 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.

14.03.2018

Structure of the pages

Each page in the operating manual is divided into a wide text column and a narrow column.



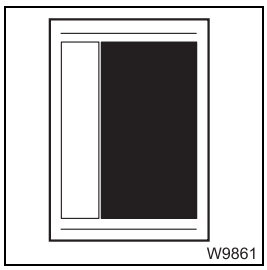
The **narrow column** contains various pieces of information:

– 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, e.g.

  • Shift the transmission to neutral.

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

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

  – Headings of sections to which a reference is made.

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

14.03.2018

1.7.3 How do I find the information I need?

The operating manual contains the following guides for orientation.

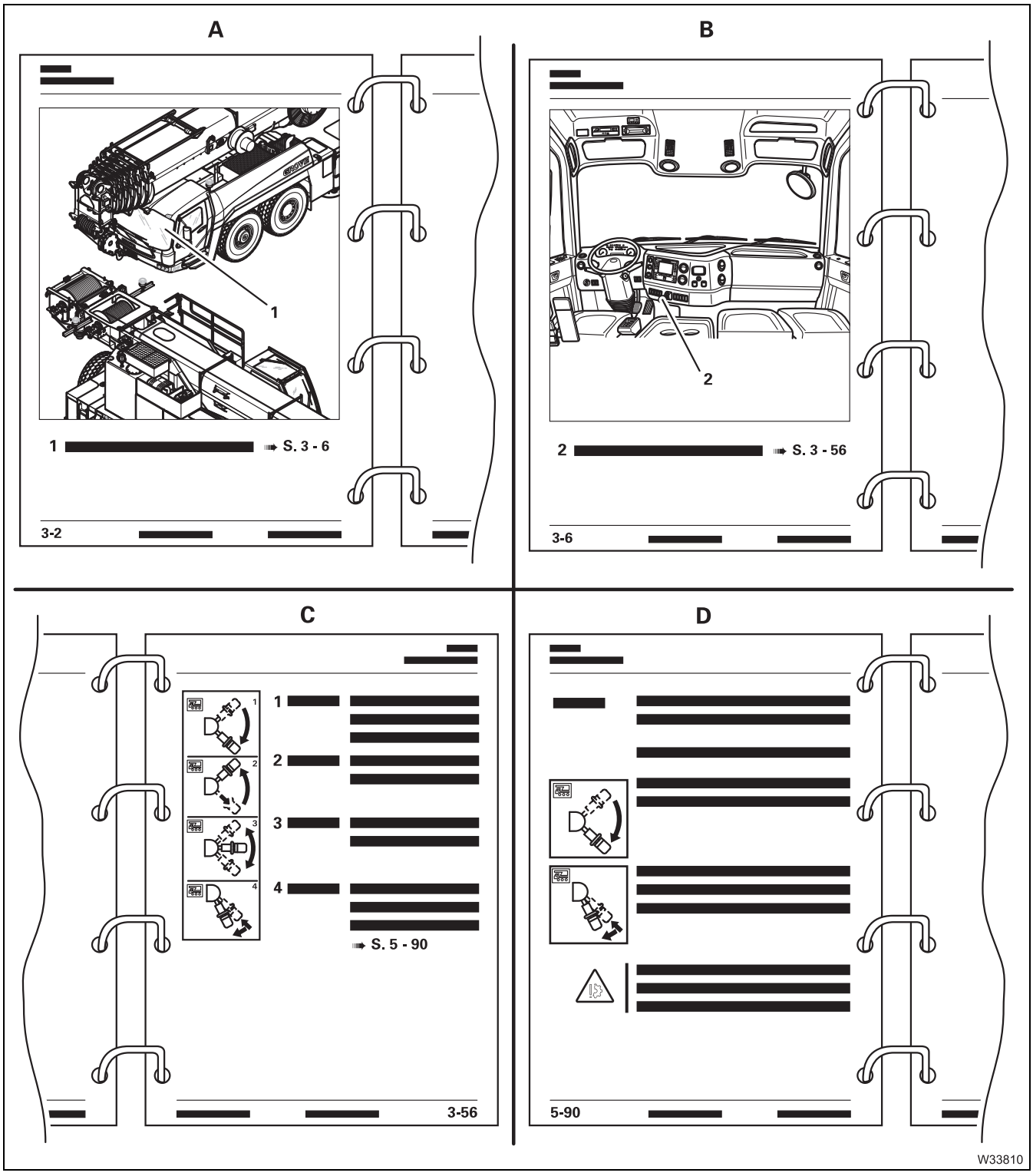
- The **Contents** at the front in sections 1 and 2 list all the chapters in the section.
- The **Table of contents** ahead of each chapter provides an overview of the topics it contains.
- The **Index** in chapters **8** and **15** gives an alphabetic list of keywords and search terms with a reference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

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

14.03.2018

Cross-references example

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



14.03.2018

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 - 6

B Page 3 - 6 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 - 56

C Page 3 - 56 gives a brief description of all the functions of the parking brake.
If further information is available, the brief description contains a cross-reference, e.g.

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

14.03.2018

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 - 16,

– the permitted outrigger spans; ➠ p. 12 - 30,

– the size of the outrigger pads; ➠ p. 1 - 14.

14.03.2018

1.8 Conversion table for US measuring units

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

Converting from	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
l	gal (US)	0.264178
kg	lbs	2.204622
lbs	kg	0.45359
t	lbs	2,204.622
lbs	t	0.0004536
kN	lbf	224.809
daN/cm^2	lbf/in^2	14.50378
lbf/in^2	daN/cm^2	0.06895
bar	psi	14.50378
psi	bar	0.06895
m/s	ft/s	3.28084
km/h or km	mph or mi	0.62137
mph or mi	km/h or km	1.60935
Nm	lbf ft	0.7375
°C	°F	1.8 x °C+32
°F	°C	(°F-32)/1.8
t/m^2	lbs/ft^2	204.8
m^2/t	ft^2/lbs	0.04882

14.03.2018

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14.03.2018

1.9 Training – Information

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

Our training centre is located in a maritime environment, on Germany's North Sea coast in Wilhelmshaven. It is there where we train our qualified service 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.

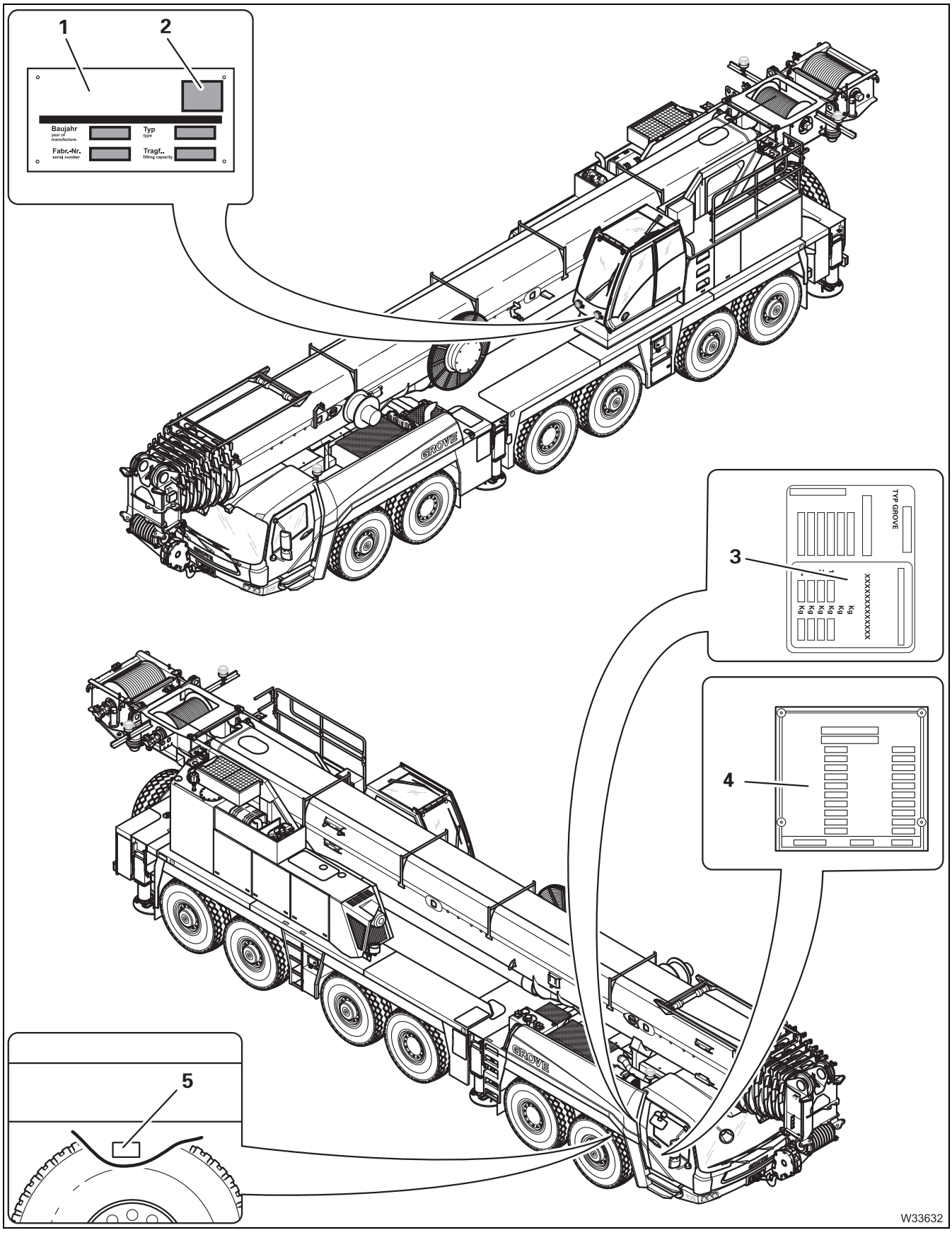
Have us design a suitable training programme for you today.
We would be pleased to advise you! Your **Training Centre Wilhelmshaven**.

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

14.03.2018

1.10 Identification



14.03.2018

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

1 Serial number and crane type

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

3 The serial number of the driver's cab

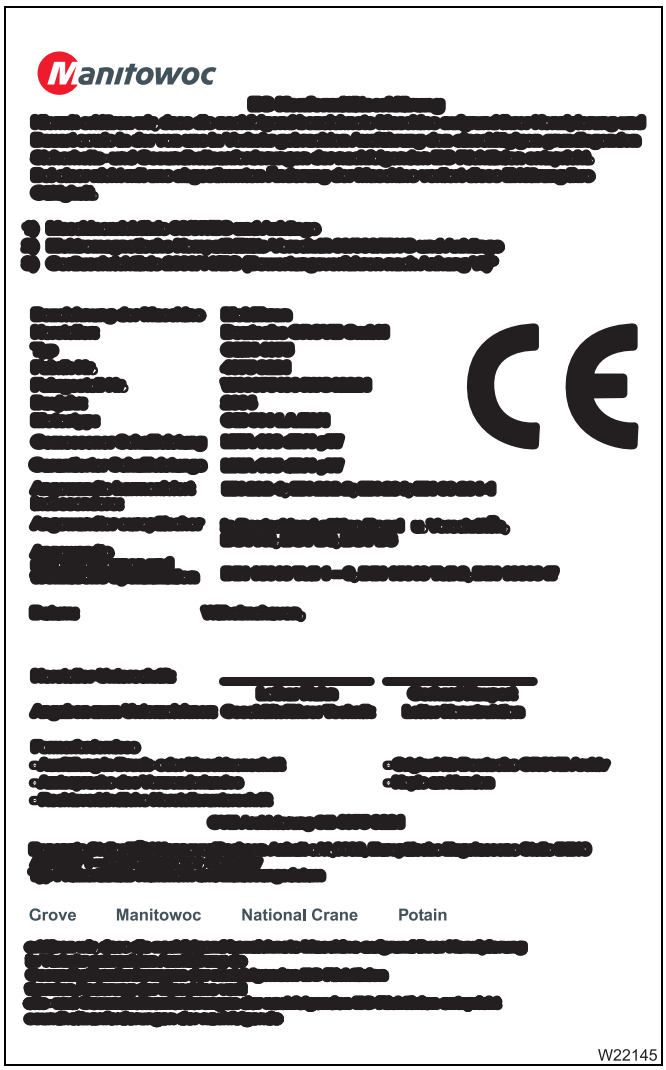
4 The chassis number and crane type

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

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

14.03.2018

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.

14.03.2018

2 Basic safety instructions

14.03.2018

14.03.2018

2 Basic safety instructions

Notes on the warnings used; ➠ *What do the symbols used mean?*, p. 1 - 23.

2.1 Intended use

The GMK6300L-1 is a state-of-the-art truck crane, designed in accordance with approved safety regulations. Nevertheless, the operator or third parties can still be endangered and the crane or other property put at risk while using it.

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

The GMK6300L-1 truck crane may only be used when it is in perfect technical condition and for its intended purpose and with due attention paid to safe operation and possible hazards.
Any malfunctions that could impair safety must be eliminated immediately.

The GMK6300L-1 truck crane may only be operated without the corresponding special equipment within the permitted temperature range;
➠ *Technical data*, p. 1 - 7.

The GMK6300L-1 truck crane is designed solely for lifting loads that are within the permitted GMK6300L-1 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 GMK6300L-1 may only be operated with parts of equipment which are permitted by **Manitowoc Crane Group Germany GmbH** and which are labelled with the serial number of the GMK6300L-1.

The manufacturer is not liable for any damage caused by improper or unauthorized use of the GMK6300L-1 truck crane. The user alone bears the risk.

14.03.2018

2.1.1 Improper use

Manitowoc Crane Group Germany GmbH is not liable for damage resulting from improper or unauthorized use of the GMK6300L-1 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.

14.03.2018

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 requirements concerning the operation of a crane.

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

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

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

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

14.03.2018

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 the truck crane without the consent of the manufacturer if such changes would affect the safety. This also applies to:

– the installation of safety devices,

– the adjustment of safety devices and valves.

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

14.03.2018

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

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

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

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

Observe national regulations that apply to transport when loading the truck crane. Also observe the prescribed safety measures of the carrying agent or railway 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.

14.03.2018

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.

14.03.2018

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.

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 **Manitowoc Crane Care** check the truck crane 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.

14.03.2018

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14.03.2018

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.

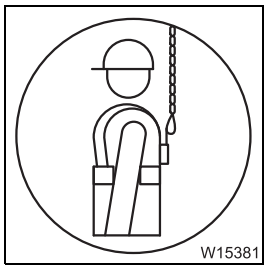
Check daily that all covers and safety devices are fitted properly and are in good condition before crane operation.

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.

14.03.2018

Always use a ladder for work above head height.

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.

14.03.2018

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

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 **Manitowoc Crane Care** check the truck crane 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**.

Ramming or pulling sheet-pile walls, sheet piles, beams etc. can damage the mobile crane or cause it to tip over.

14.03.2018

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14.03.2018

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.).

14.03.2018

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 equipped as prescribed and be level.

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

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

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

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

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

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

14.03.2018

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

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

14.03.2018

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14.03.2018

3 Operating elements for driving

14.03.2018

14.03.2018

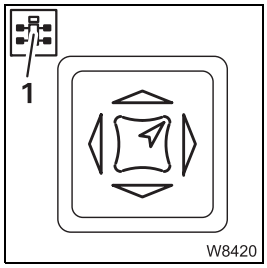
3 Operating elements for driving

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.

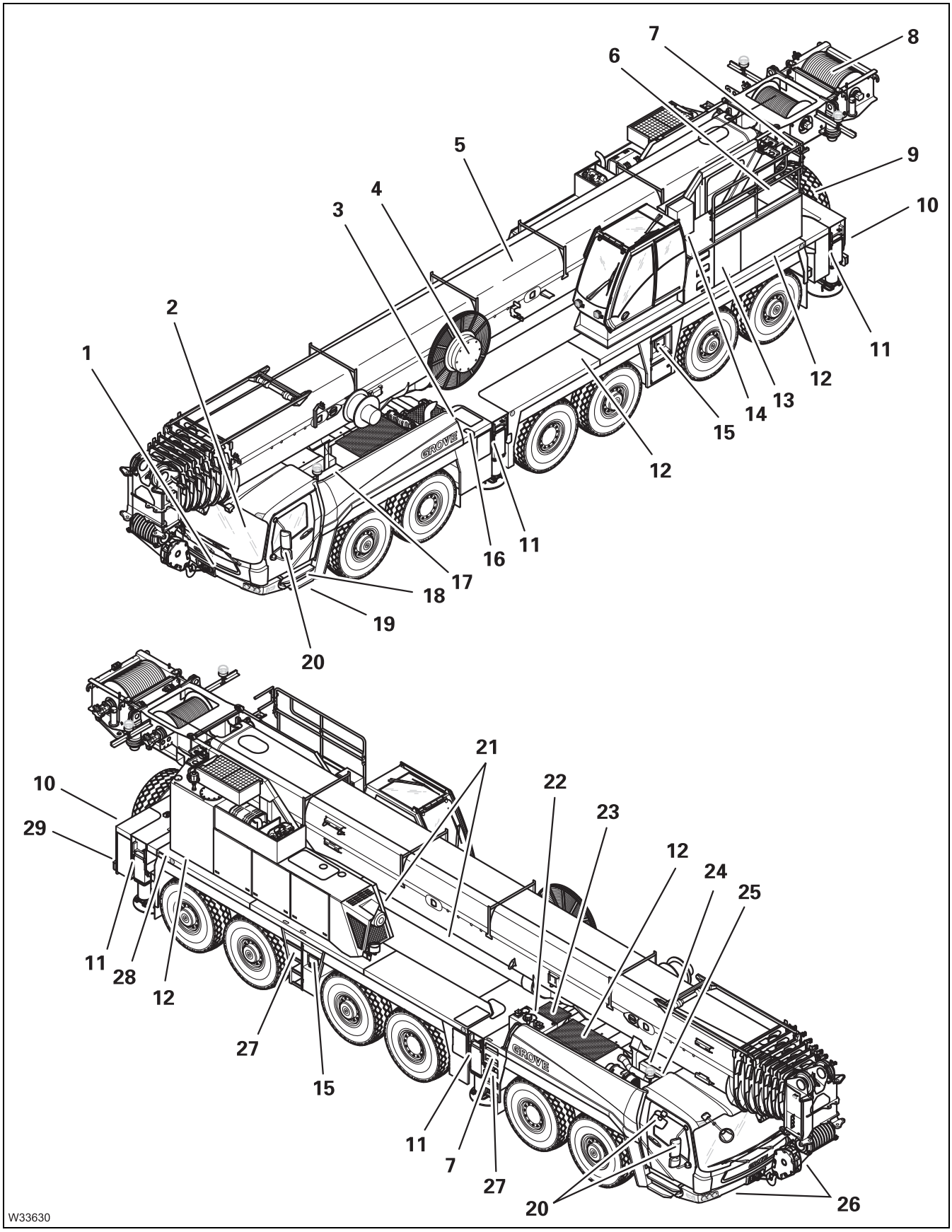
Operating elements available only with additional equipment are designated accordingly. These designations are made in this section only and are not repeated in the following sections.



Some figures show details from a different perspective than the general overview. The perspective is indicated in these figures by the symbol (**1**).

14.03.2018

3.1.1 On the outside of the truck crane

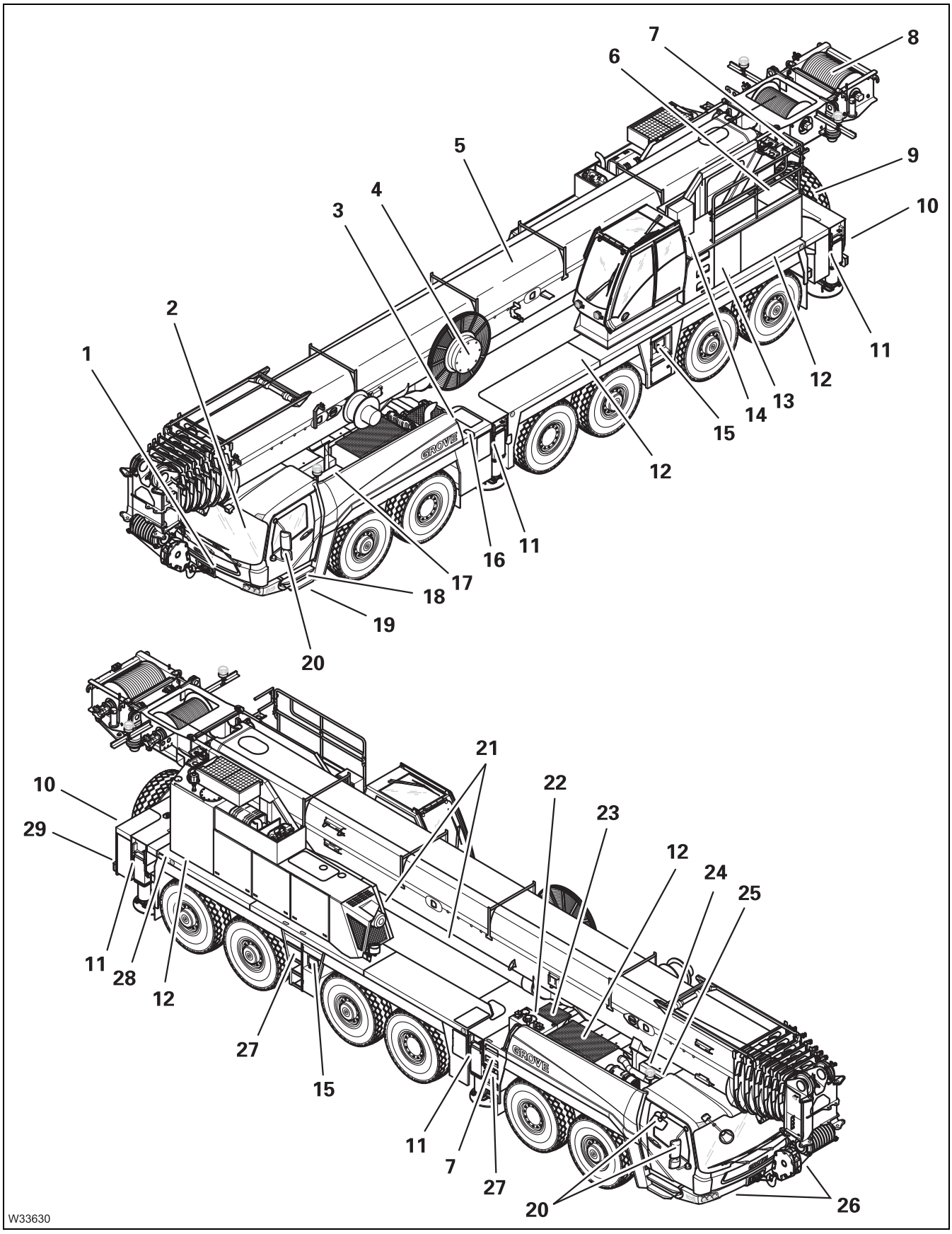


14.03.2018

1	Front flap	p. 3 - 72
2	Driver's cab	p. 3 - 6
3	External starting socket[1)]	p. 7 - 10
4	Installing/removing the hose drum[1)]	p. 6 - 43
5	Main boom, removing/installing[1)]	p. 6 - 19
6	Fuel tank	p. 4 - 7
7	– Hydraulic emergency operation[1)]	p. 14 - 65
	– Control panel for hydraulic emergency operation[1)]	p. 14 - 65
	– Connections for emergency supply[1)]	p. 14 - 76
8	Auxiliary hoist[1)]	
	– Installation/Removal	p. 6 - 89
	– Rigging frame	p. 6 - 94
	– Operation	p. 9 - 80
9	Spare wheel[1)]	p. 1 - 10
10	Chocks[1)]	p. 5 - 54
11	– Outriggers, operation	p. 12 - 27
	– Outrigger lighting[1)]	p. 3 - 62
	– Installing/removing supports[1)]	p. 6 - 47
	– Installing/removing rear supporting box[1)]	p. 6 - 65
12	Ladders	p. 4 - 6
13	– Switching on the slewing gear freewheel[1)]	p. 6 - 12
	– Switching off the slewing gear freewheel[1)]	p. 12 - 18
14	Switching the superstructure driving lights on/off[1)]	p. 6 - 17

[1)] Additional equipment

14.03.2018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14.03.2018

15 Outriggers:
- – Outrigger control units ➠ p. 9 - 52
- – Control units for raising the axles ➠ p. 9 - 52
- – Emergency stop switch ➠ p. 4 - 24

16 Urea tank[1)] ➠ p. 4 - 8

17 Connection for battery charger[1)] ➠ p. 7 - 11

18 Battery master switch ➠ p. 4 - 10

19
- – Filler connection for the compressed air system ➠ p. 7 - 6
- – Tyre inflater connection ➠ p. 7 - 17

20 Adjusting the mirrors ➠ p. 5 - 8

21
- – Switching off the boom floating position[1)] ➠ p. 12 - 17
- – Switching on the boom floating position[1)] ➠ p. 6 - 13
- – Switching off boom pre-tensioning[1)] ➠ p. 12 - 19
- – Switching on boom pre-tensioning[1)] ➠ p. 6 - 14

22 Valves on carrier hydraulic tank ➠ p. 4 - 10

23 Hydraulic oil cooler, second cooler[1)]

24 Engine for driving ➠ p. 4 - 1

25 Air intake inhibitor[1)] ➠ p. 4 - 25

26 Warning plates for vehicle width[1)] ➠ p. 5 - 9

27 Fixed ladders ➠ p. 4 - 4

28 Control unit[1)] ➠ p. 3 - 33
- – Rear supporting box lock
- – Auxiliary supports

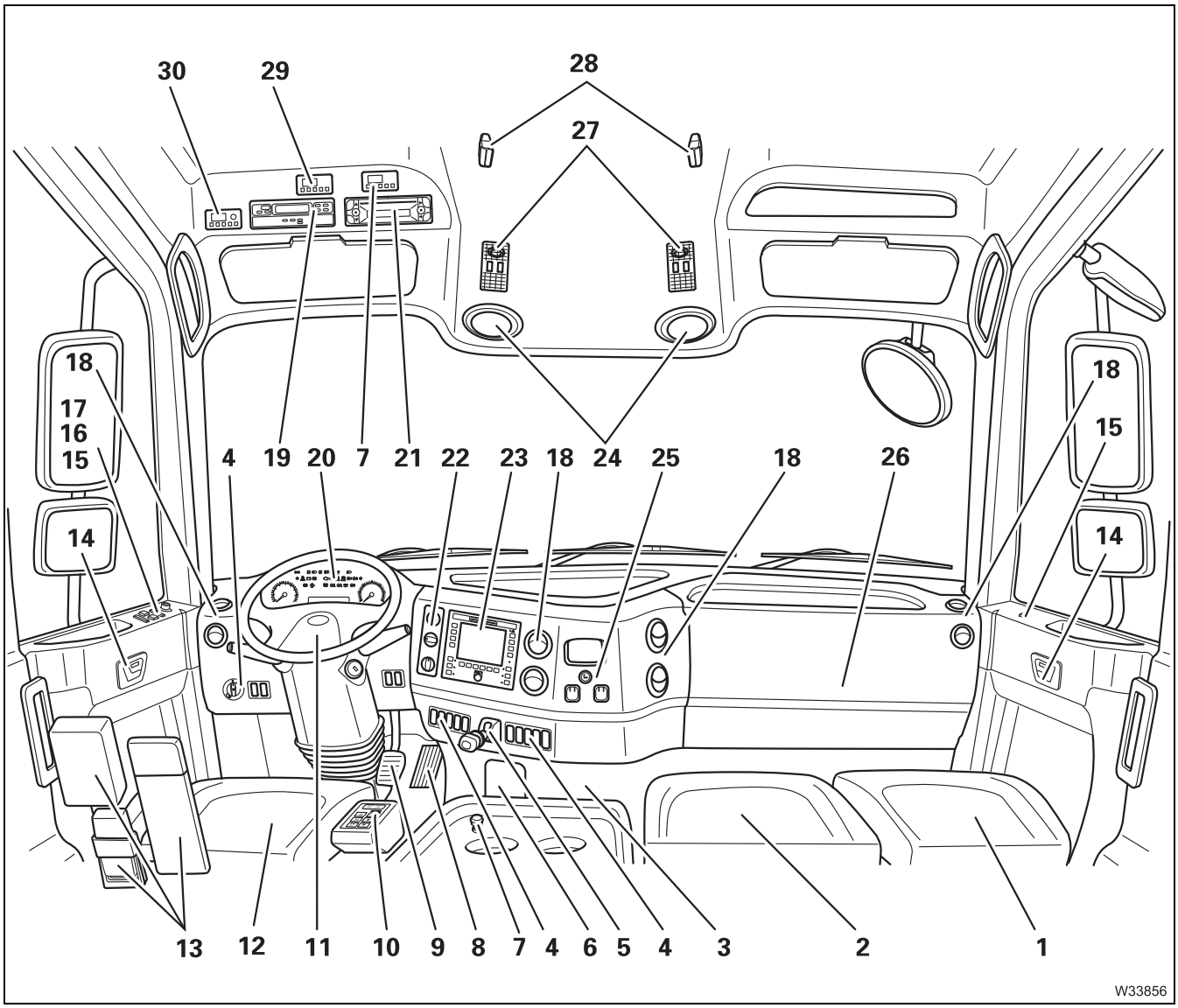
29 Reverse camera[1)] ➠ p. 3 - 51
Spotlights on rear of carrier on/off[1)] ➠ p. 3 - 63

[1)] Additional equipment

14.03.2018

3.1.2 Driver's cab

Front overview



14.03.2018

1 Passenger's seat ➠ p. 5 - 14

2 Storage space or 2nd passenger seat[1)]

3 Fire extinguisher[1), 3)]

4 Instrument panel, left/right ➠ p. 3 - 12

5 Parking brake ➠ p. 3 - 55

6 Diagnostics ➠ p. 3 - 69
Hydraulic emergency operation on/off[1)] ➠ p. 14 - 65

7 Auxiliary water heater[1)] ➠ p. 5 - 80

8 Accelerator ➠ p. 5 - 47

9 Service brake ➠ p. 5 - 35

10 Transmission operating elements ➠ p. 3 - 18

11 Steering column/steering wheel ➠ p. 3 - 17

12 Driver's seat ➠ p. 5 - 13

13 Behind driver's seat
- Warning triangle[1)]
- First-aid kit[1)]
- Warning lamp[1)]

14 To open/lock door ➠ p. 3 - 71

15 Separate steering ➠ p. 3 - 58

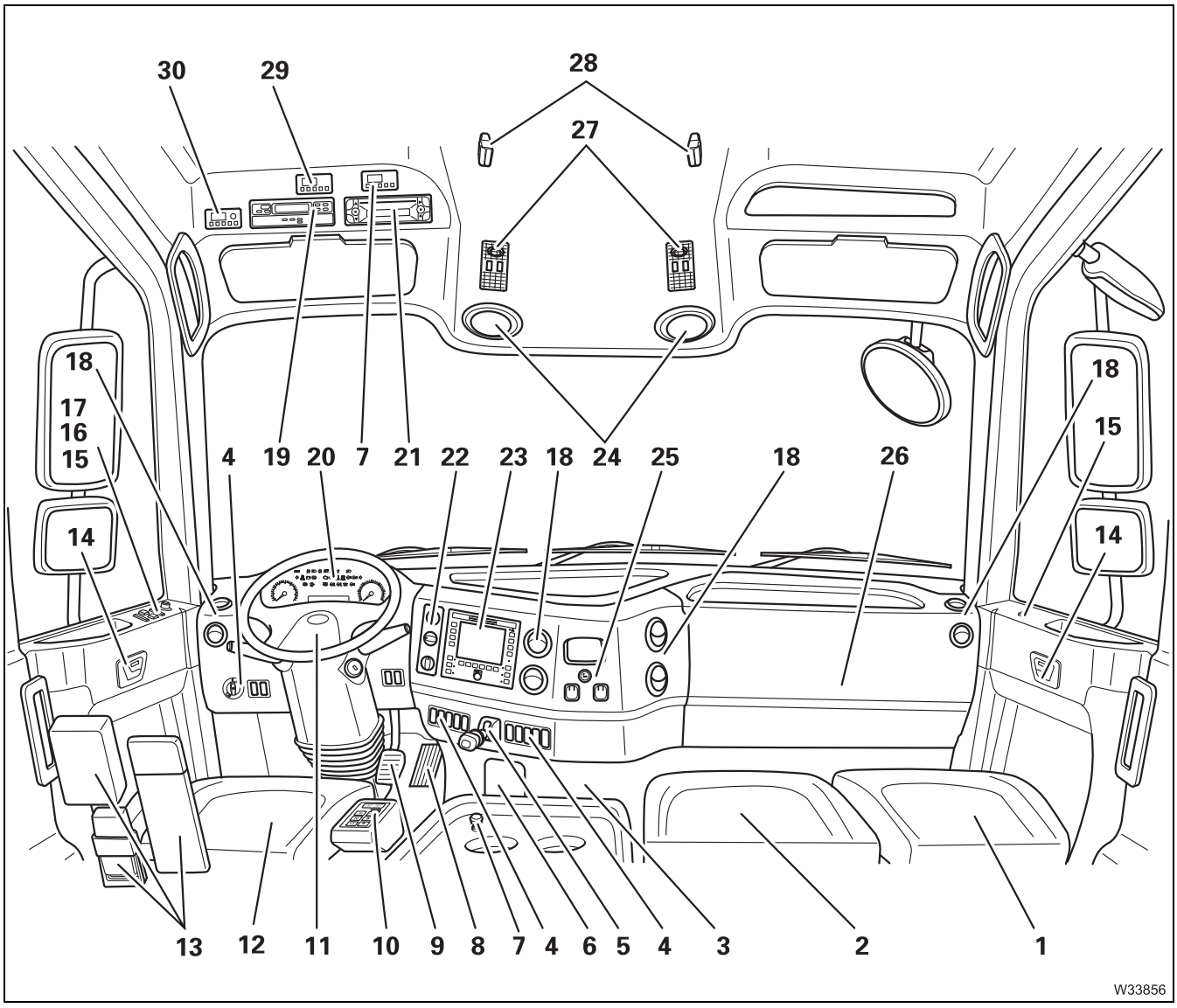
16 Window winder ➠ p. 3 - 70

[1)] Additional equipment

[2)] ➠ *Separate operating instructions*

[3)] ➠ *Maintenance Manual*

14.03.2018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14.03.2018

17 – Adjusting the mirrors ➠ p. 5 - 8
– Mirror heating ➠ p. 5 - 8

18 Adjusting the air vents ➠ p. 5 - 76

19 Tachograph, time correction ➠ p. 3 - 19

20 Instrument panel, centre ➠ p. 3 - 12

21 Radio/USB/CD[1), 2)]

22 Heating/Air-conditioning system[1)] ➠ p. 3 - 30

23 ECOS control unit ➠ p. 3 - 20
Monitor, reverse camera ➠ p. 3 - 51

24 Loudspeakers

25 Sockets 12 V/24 V ➠ p. 3 - 43
Cigarette lighter
Ashtray

26 Behind the cover ➠ p. 3 - 10

27 Cab lighting ➠ p. 3 - 63

28 Fastening the folding berth[1)] ➠ p. 5 - 57

29 Battery heater[1), 2)]

30 Auxiliary air heater[1), 3)]

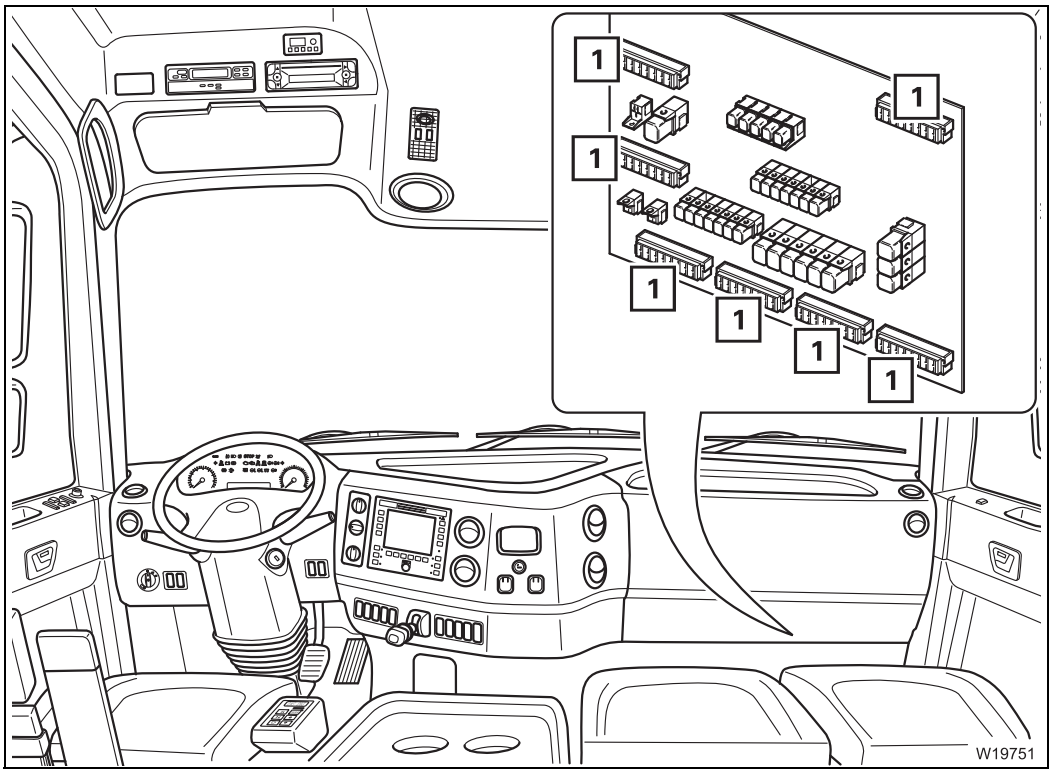
[1)] Additional equipment

[2)] ➠ *Separate operating instructions*

[3)] Not currently available

14.03.2018

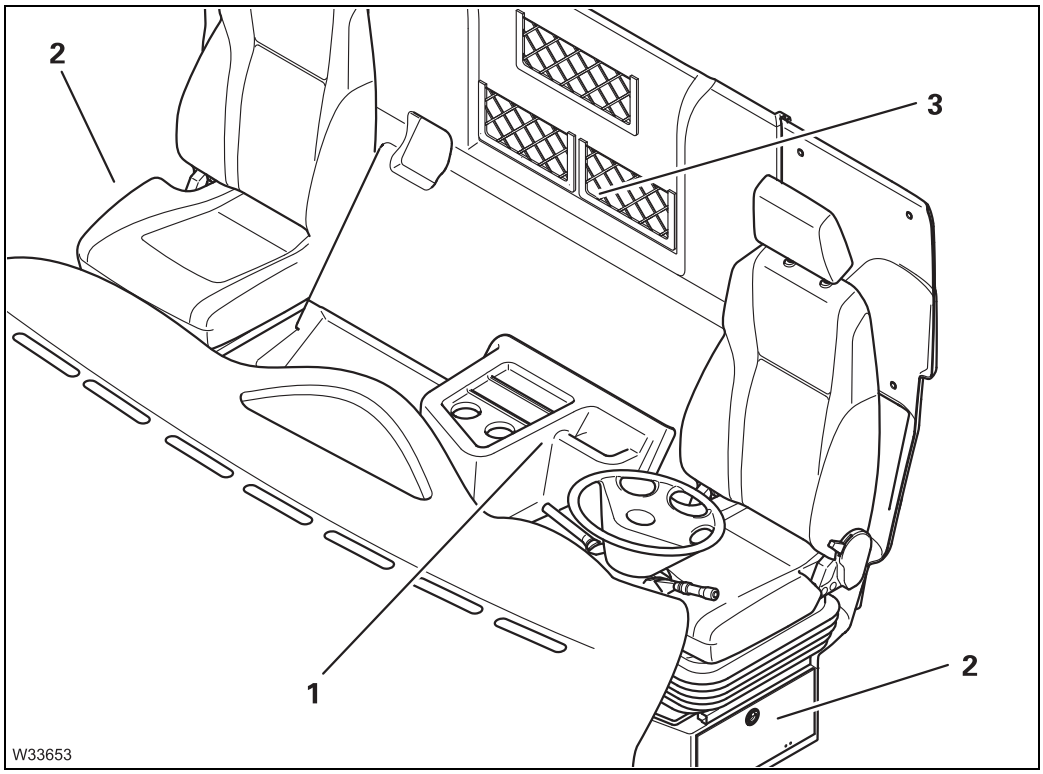
Behind the cover



1 Fuses ➠ p. 7 - 19

14.03.2018

Rear overview



1 Rest

2 Storage compartment (e.g. for hand-held control, battery charger)

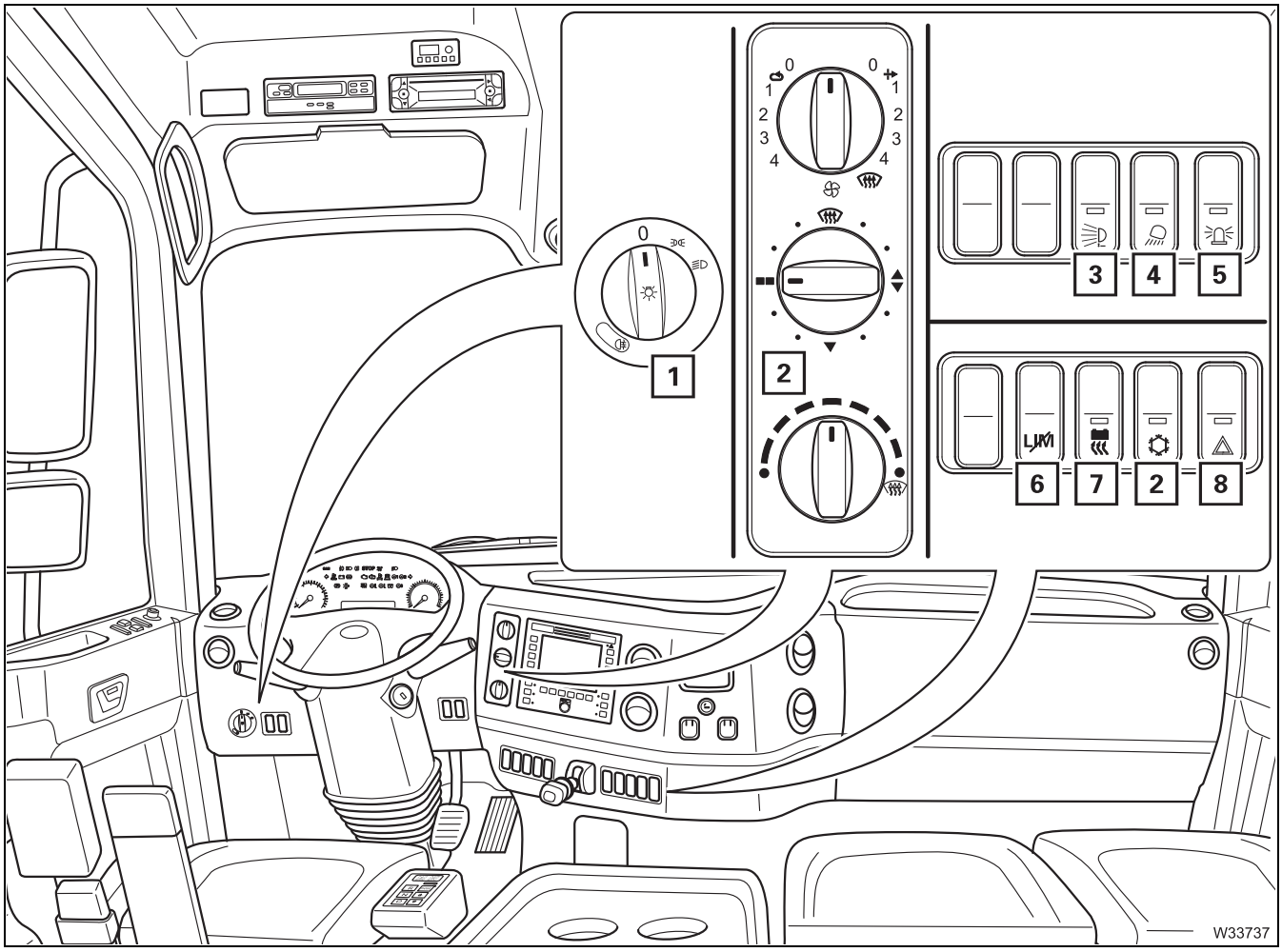
3 – Folding berth[1)] p. 5 - 57
– Storage (spare key etc. (on delivery))

[1)] Additional equipment

14.03.2018

3.1.3 Instrument panel

Left/right

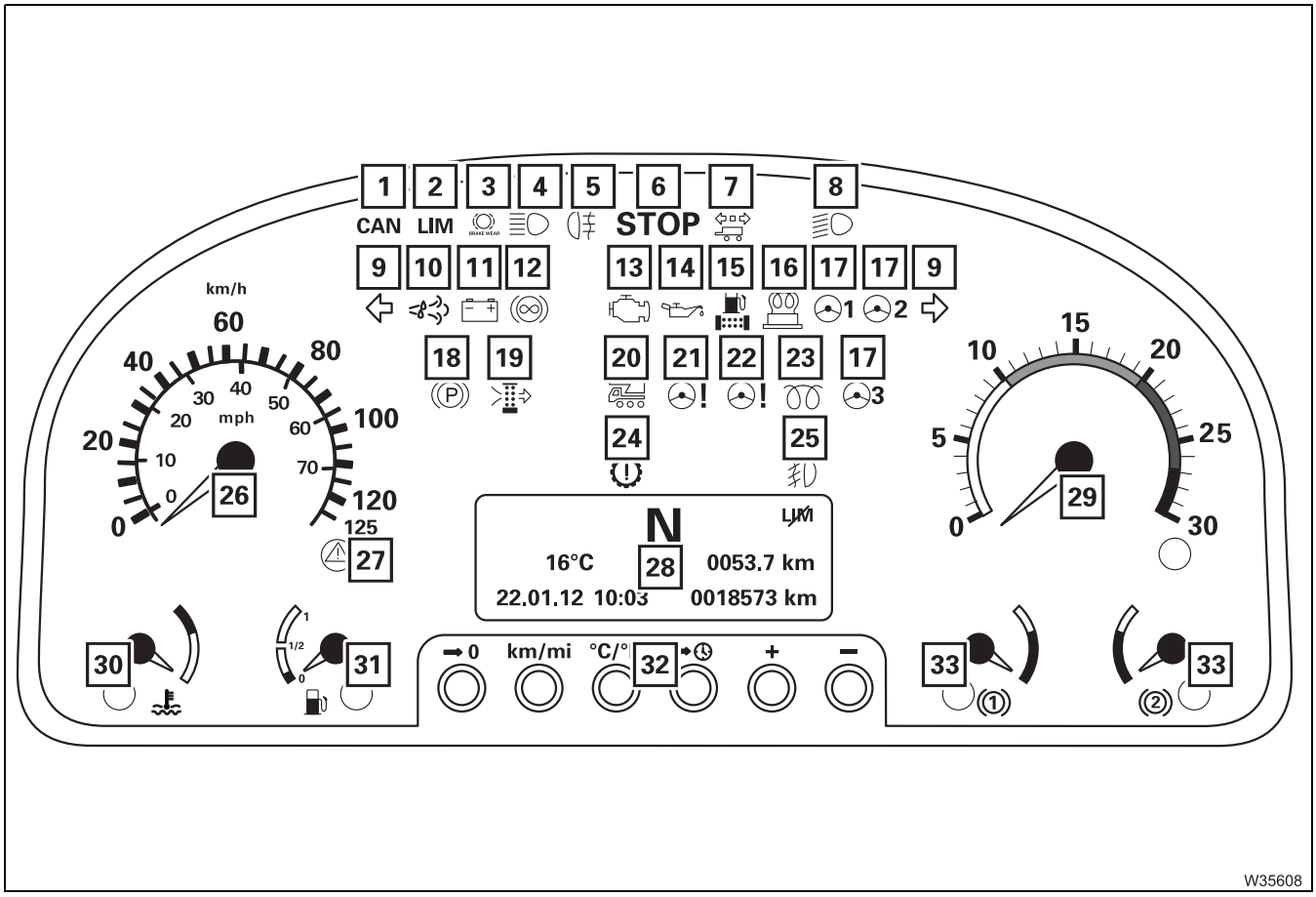


1 Lighting on/off ➠ p. 3 - 61
2 Heating/Air-conditioning system[1)] ➠ p. 3 - 30
3 Spotlights on the rear of the carrier[1)] ➠ p. 3 - 63
4 Outrigger lighting on/off ➠ p. 3 - 62
5 Rotating beacon on/off ➠ p. 3 - 62
6 Torque reduction override button[1)] ➠ p. 5 - 53
7 Battery heater on/off[1), 2)]
8 Hazard warning system on/off ➠ p. 3 - 61

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

14.03.2018

Middle



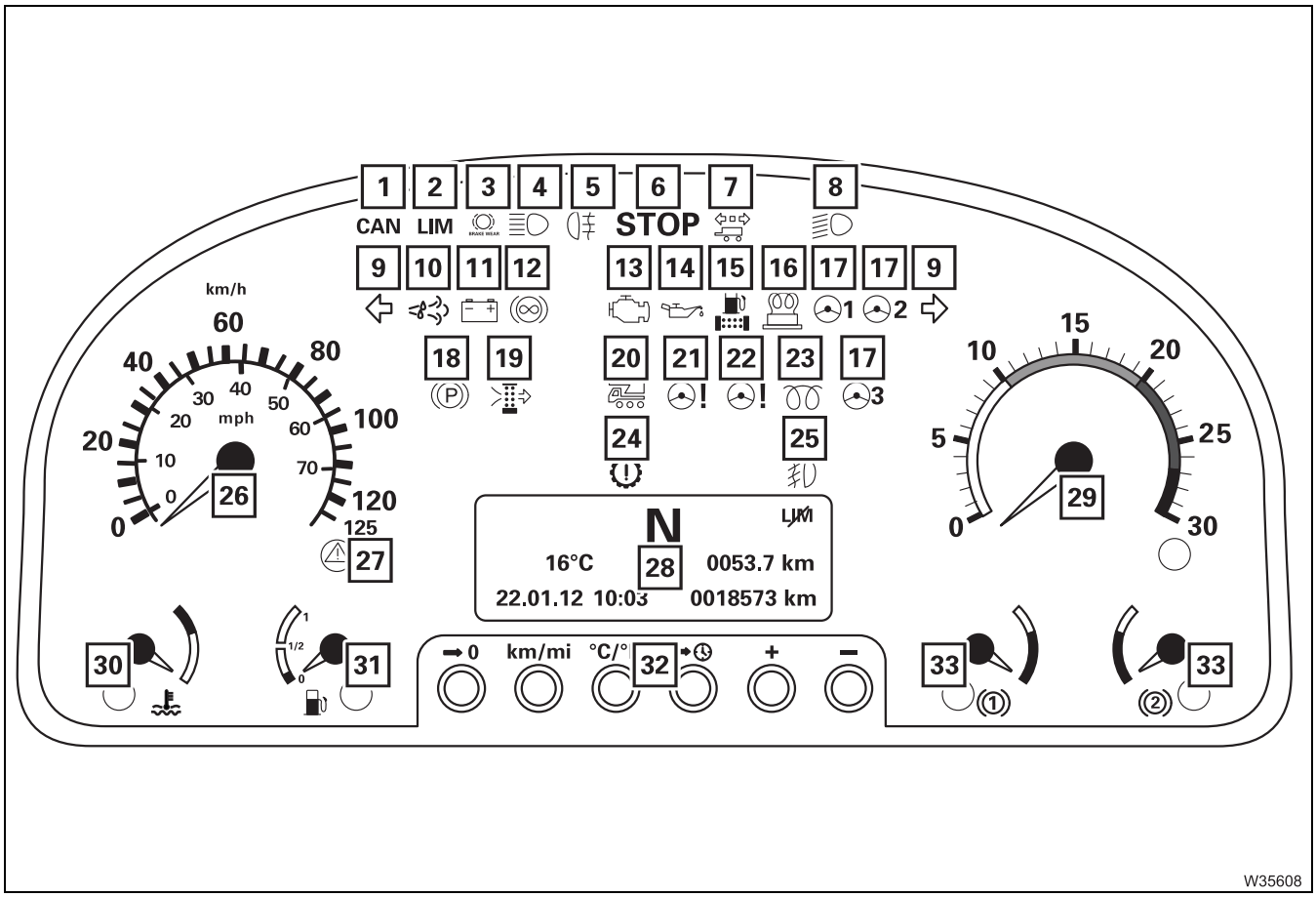
1	CAN BUS system malfunction	➠ p. 5 - 51
2	Torque reduction indicator lamp[1)]	➠ p. 5 - 53
3	Brake wear indicator[3)]	
4	Headlight – full beam indicator lamp	➠ p. 3 - 60
5	Fog tail light indicator lamp	➠ p. 3 - 61
6	STOP warning	➠ p. 3 - 39
7	Indicator lamp for trailer turn signal indicator[1)]	➠ p. 3 - 61
8	Parking light/headlight indicator lamp	➠ p. 3 - 62
9	Indicator lamp for turn signal indicator	➠ p. 3 - 61
10	Carbamide level indicator lamp[1)]	➠ p. 3 - 41
11	Voltage monitoring warning	➠ p. 3 - 27

[1)] Additional equipment

[2)] ➠ *Maintenance Manual*

[3)] Additional equipment, currently not available

14.03.2018



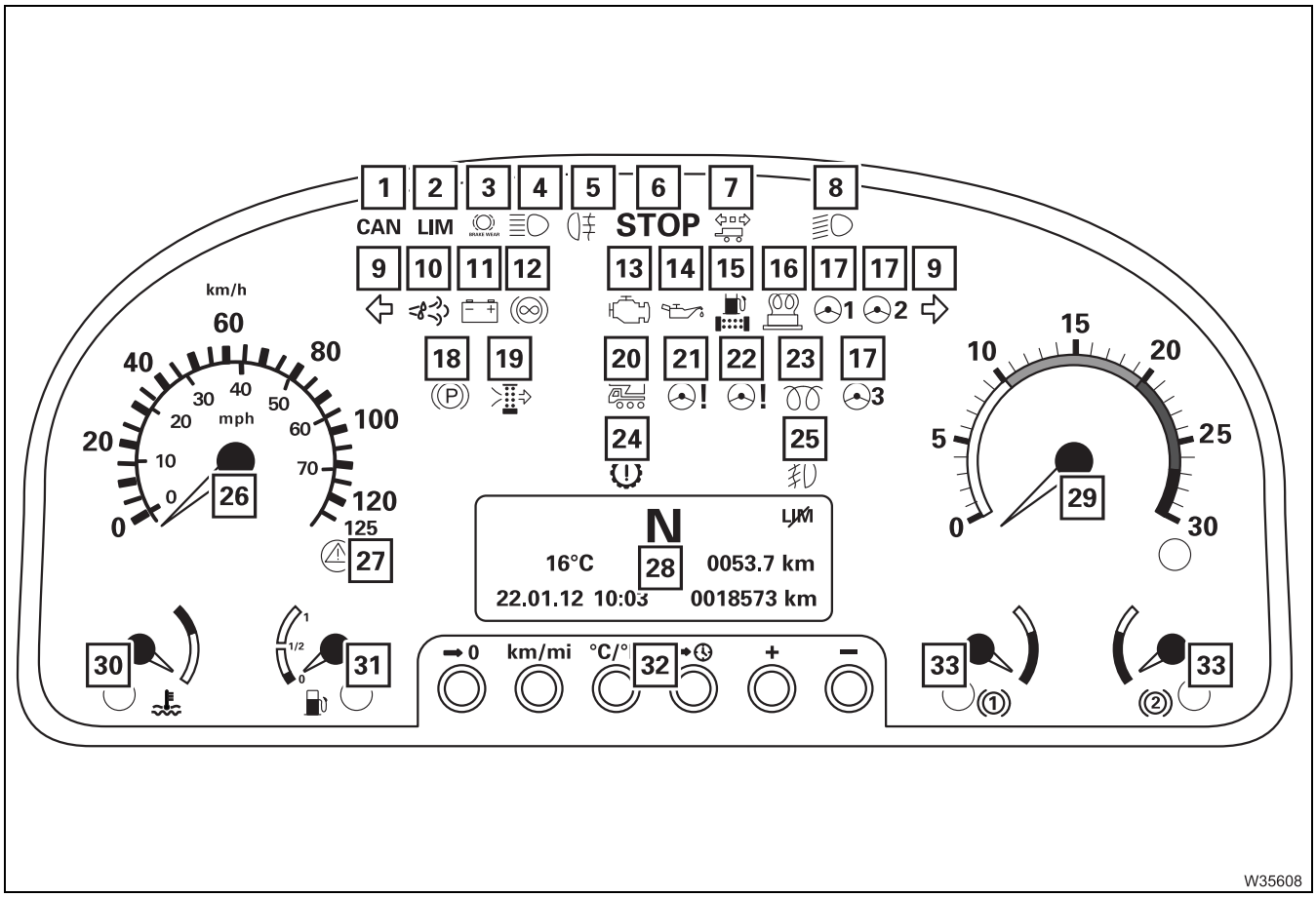
12	Additional brake indicator lamp	➠ p. 3 - 55
13	Engine warning lamp	➠ p. 3 - 39
14	Engine oil pressure	➠ p. 3 - 39
15	Fuel filter inspection lamp[3)]	
16	Flame start system warning lamp	➠ p. 3 - 39
17	Steering circuit warning lamp	➠ p. 3 - 56
18	Parking brake indicator lamp	➠ p. 3 - 55
19	Air filter indicator lamp[2)]	
20	Superstructure ignition indicator lamp	➠ p. 3 - 40
21	Steering malfunction	➠ p. 3 - 56
22	Steering warning lamp	➠ p. 3 - 57
23	Flame start system monitoring[1)]	➠ p. 3 - 39

[1)] Additional equipment

[2)] ➠ *Maintenance Manual*

[3)] Additional equipment, currently not available

14.03.2018



24 Transmission malfunction

25 Fog light indicator lamp[1)] ➠ p. 3 - 60

26 Speedometer ➠ p. 3 - 67

27 Tachograph malfunction warning[1)] ➠ p. 5 - 19

28 Display, driving mode ➠ p. 3 - 16

29 Tachometer ➠ p. 3 - 39

30 Coolant temperature display ➠ p. 4 - 20

31 Fuel level display ➠ p. 4 - 20

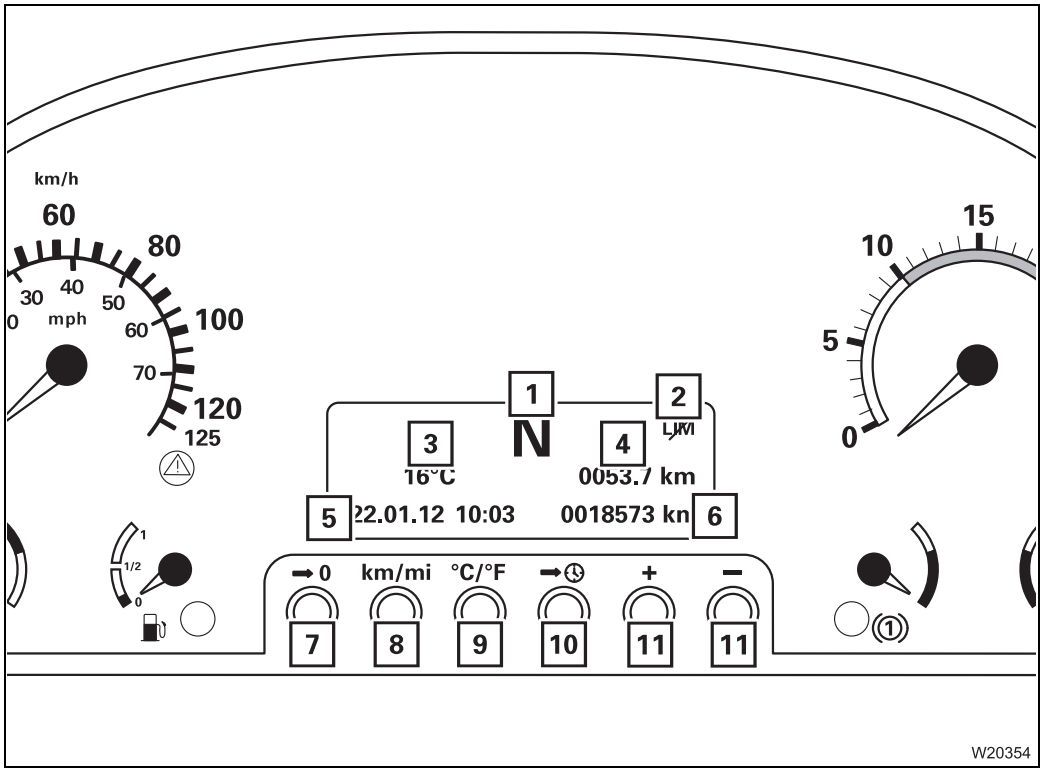
32 Keypad for driving display ➠ p. 3 - 16

33 Display – supply pressure in brake circuits ➠ p. 3 - 54

[1)] Additional equipment

14.03.2018

3.1.4 Display, driving mode

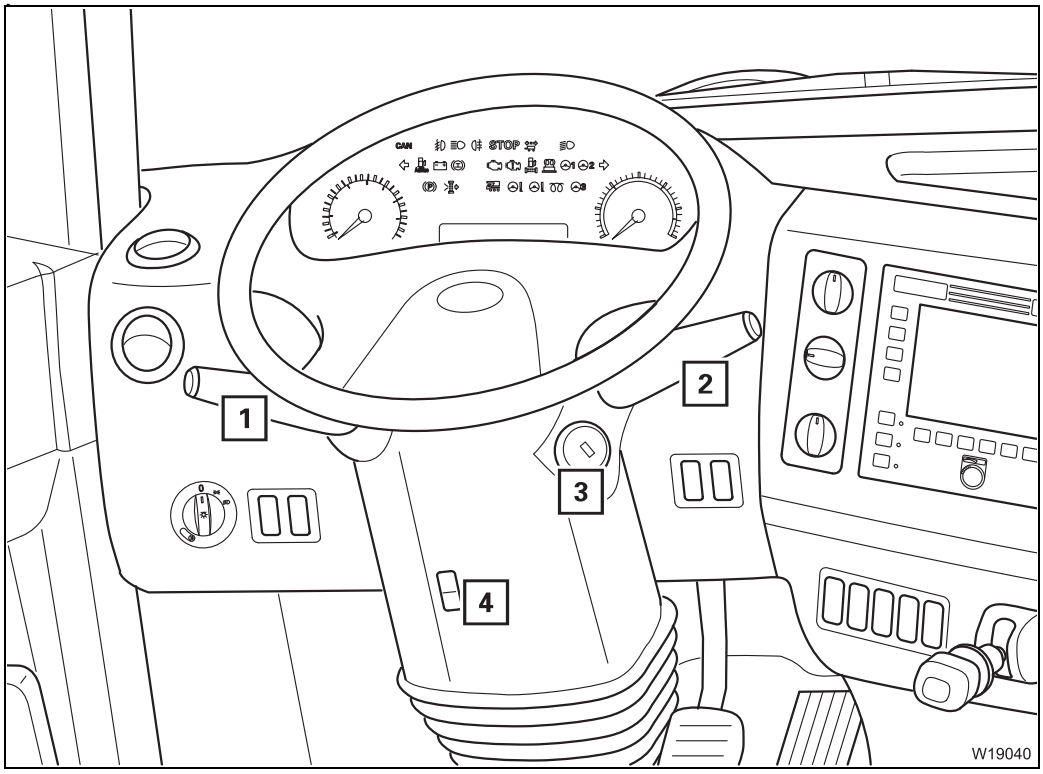


1	Transmission display	➠ p. 3 - 47
2	Torque reduction display override[1)]	➠ p. 5 - 53
3	Outside air temperature display	➠ p. 5 - 26
4	Day's kilometre counter	➠ p. 5 - 26
5	Date/time display	➠ p. 5 - 26
6	Kilometre counter	➠ p. 5 - 26
7	Reset daily kilometre counter	➠ p. 5 - 26
8	Switch between km/mi	➠ p. 5 - 26
9	Switching between degrees Celsius and Fahrenheit	➠ p. 5 - 26
10	Setting the date/time	➠ p. 5 - 26
11	Setting the instrument lighting/date/time	➠ p. 5 - 26

[1)] Additional equipment

14.03.2018

3.1.5 Steering column/steering wheel



1 Horn/headlight flasher/headlight – full beam p. 3 - 60
Turn signal indicator/wiper-washing system p. 3 - 60

2 – Set idling speed p. 3 - 38
– Setting the Tempomat p. 3 - 38
– Setting the Temposet p. 3 - 38
– Engine retarder/transmission retarder[1)] p. 3 - 54

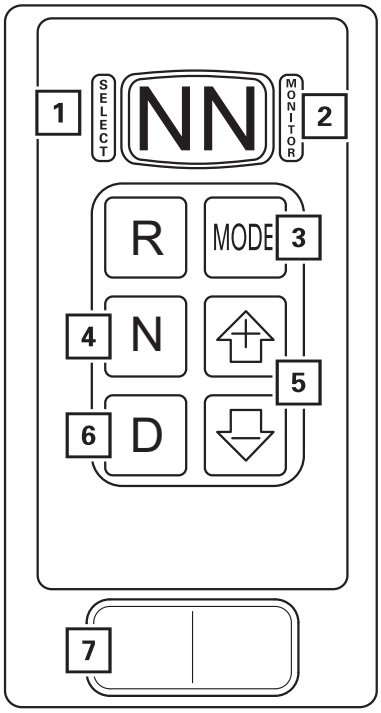
3 Ignition lock p. 3 - 38

4 Adjusting the steering column p. 5 - 16

[1)] Additional equipment

14.03.2018

3.1.6 Transmission operating elements



1 Transmission display p. 3 - 47

2 Transmission mode R p. 3 - 49
Reverse camera on p. 3 - 51

3 Changing the driving mode p. 3 - 49

4 Neutral position N p. 3 - 48

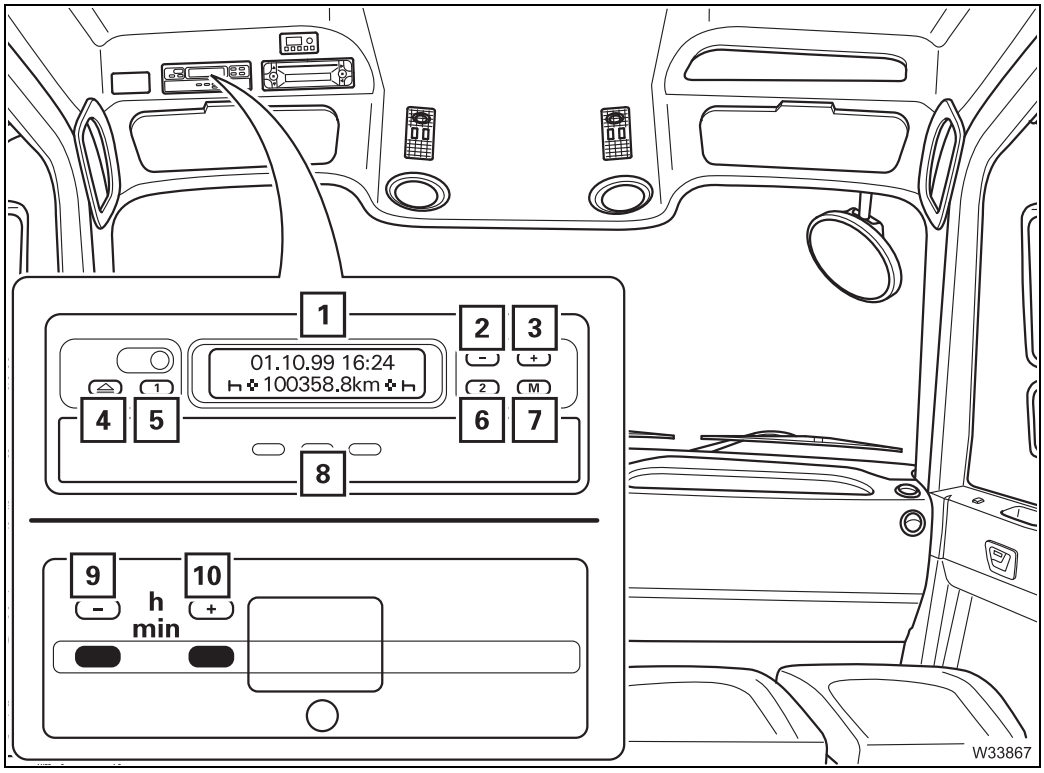
5 Selecting a gear p. 3 - 50

6 Transmission mode D p. 3 - 48

7 No function

14.03.2018

3.1.7 Tachograph, time correction



Tachograph[1] p. 5 - 19

1 Display p. 5 - 22

2 Time correction -: p. 3 - 67

3 Time correction +: p. 3 - 67

4 Opening the drawer p. 5 - 20

5 Setting the time group – driver 1 p. 5 - 21

6 Setting the time group – driver 2 p. 5 - 21

7 Correction of time p. 3 - 67

8 Drawer p. 5 - 20

Driving mode time correction display

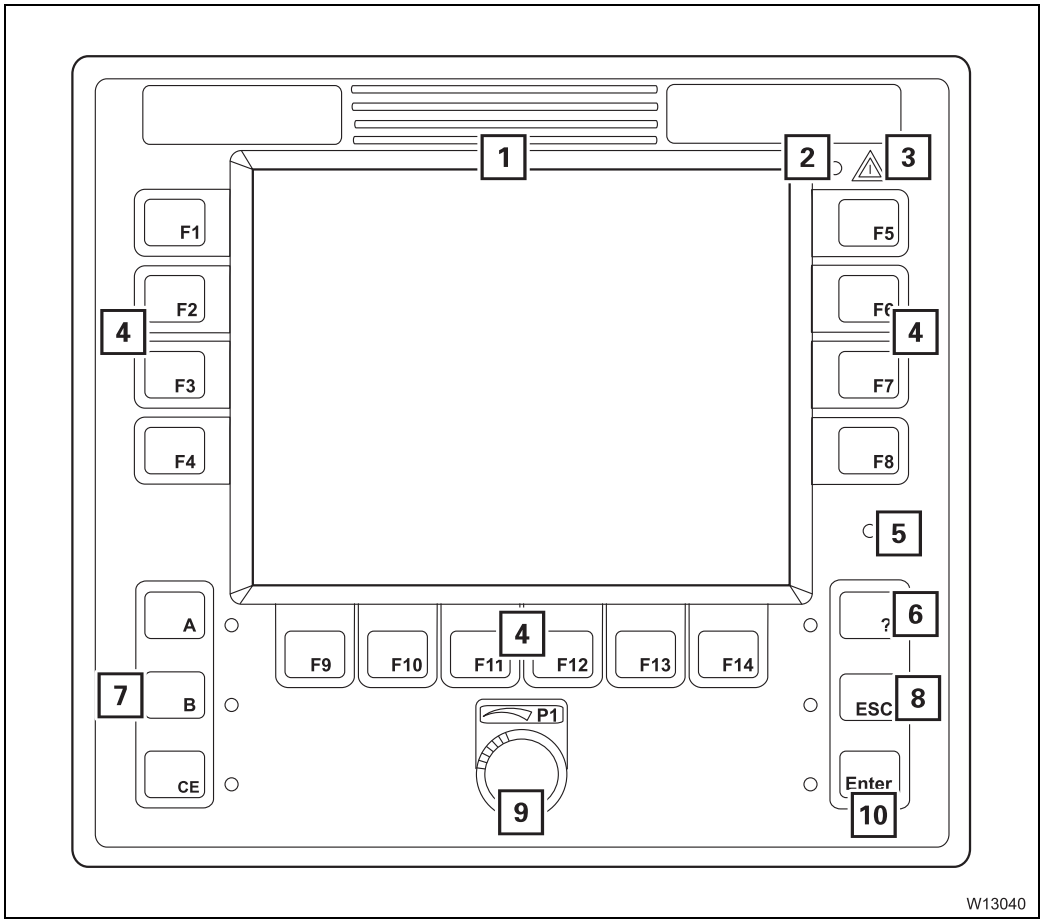
9 Time correction -: p. 3 - 67

10 Time correction +: p. 3 - 67

[1] Additional equipment

14.03.2018

3.1.8 ECOS control unit



14.03.2018

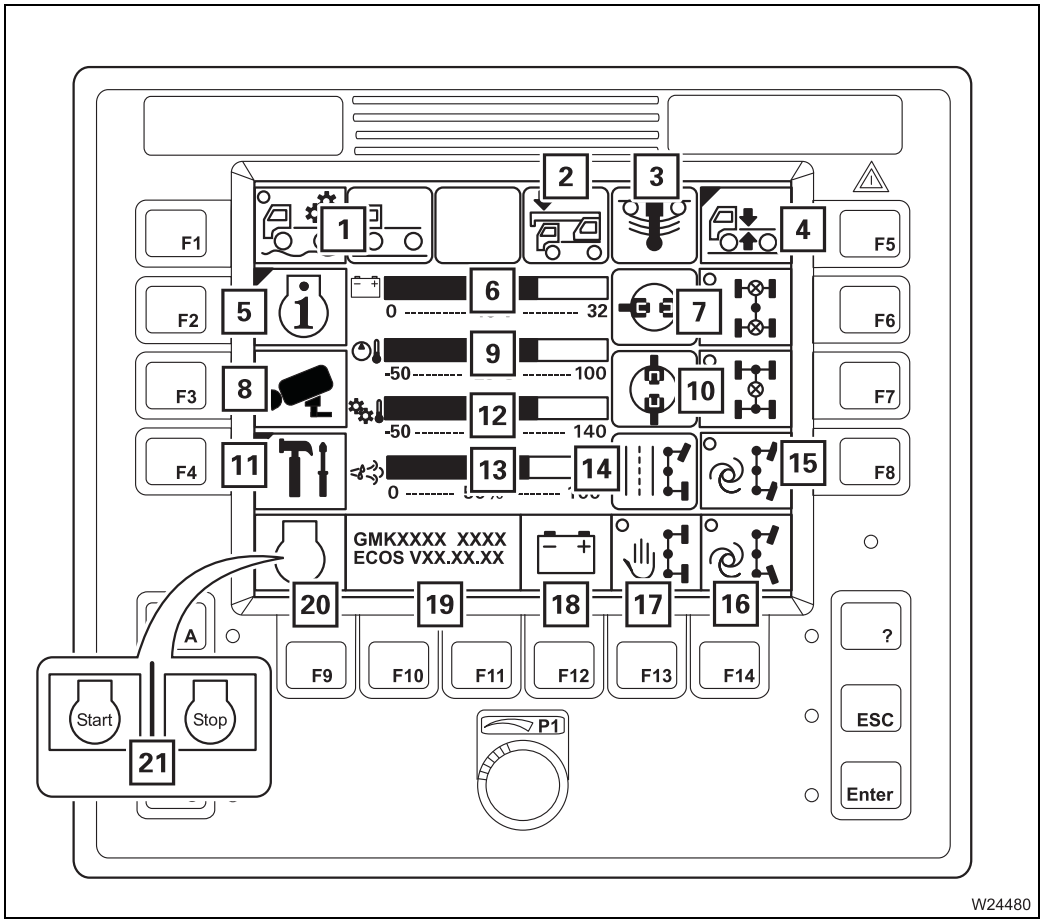
1	ECOS display	p. 3 - 46
	Main menu overview	p. 3 - 22
	Reverse camera display	p. 3 - 51
2	Sensor for brightness[1)]	p. 3 - 46
3	Error/warning message	p. 3 - 45
4	Buttons F1 to F14	p. 3 - 44
5	Sensor for brightness[1)]	p. 3 - 46
6	Error submenu	p. 5 - 54
	Submenu overview	p. 3 - 29
7	Warning submenu	p. 5 - 48
	Submenu overview	p. 3 - 28
8	Exiting the submenu/input mode	p. 3 - 45
9	Entering values	p. 3 - 45
10	Input confirmation	p. 3 - 45

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

Various menus are shown on the ECOS display.
The menus are operated using buttons F1 to F14. The individual buttons have a different function in each menu. The functions of the buttons in the displayed menu correspond to the symbols next to or above the buttons; p. 3 - 44.

14.03.2018

3.1.9 ECOS display – main menu



14.03.2018

1 Transfer case for off-road gear on/off ➠ p. 3 - 52
Transfer case display ➠ p. 3 - 52

2 Displaying vehicle height[1)] ➠ p. 5 - 9

3 Suspension display ➠ p. 3 - 59

4 Level adjustment system submenu ➠ p. 3 - 24

5 Monitoring submenu ➠ p. 3 - 27

6 Voltage monitoring display ➠ p. 3 - 27

7 Transverse differential locks display ➠ p. 3 - 53
Transverse differential locks on/off ➠ p. 3 - 53

8 Reverse camera on/off ➠ p. 3 - 51

9 Hydraulic oil temperature display ➠ p. 3 - 27

10 Longitudinal differential locks display ➠ p. 3 - 53
Longitudinal differential locks on/off ➠ p. 3 - 53

11 Transmission oil temperature display ➠ p. 3 - 27

12 Settings submenu ➠ p. 3 - 26

13 Carbamide filling level display[1)] ➠ p. 3 - 27

14 Steering mode display ➠ p. 3 - 58

15 Separate steering crab travel mode on/off ➠ p. 3 - 57

16 Separate steering driving on a curved path on/off ➠ p. 3 - 57

17 Separate steering, manual on/off ➠ p. 3 - 58

18 Warning display ➠ p. 3 - 46

19 Serial number/program version display ➠ p. 3 - 46

20 Combined operation display off[1)] ➠ p. 3 - 40

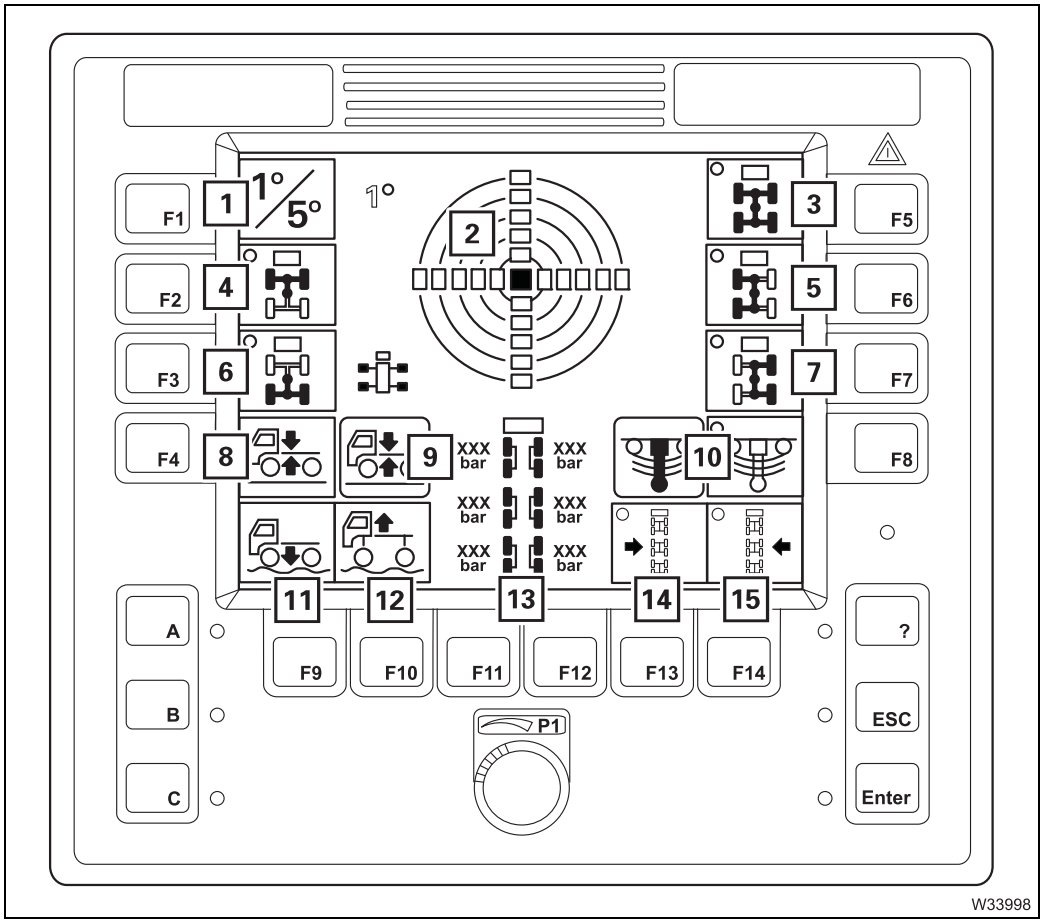
21 Combined operation display on[1)] ➠ p. 3 - 40
Starting/turning off the engine

[1)] Additional equipment

14.03.2018

3.1.10 ECOS display – submenus

Level adjustment system submenu



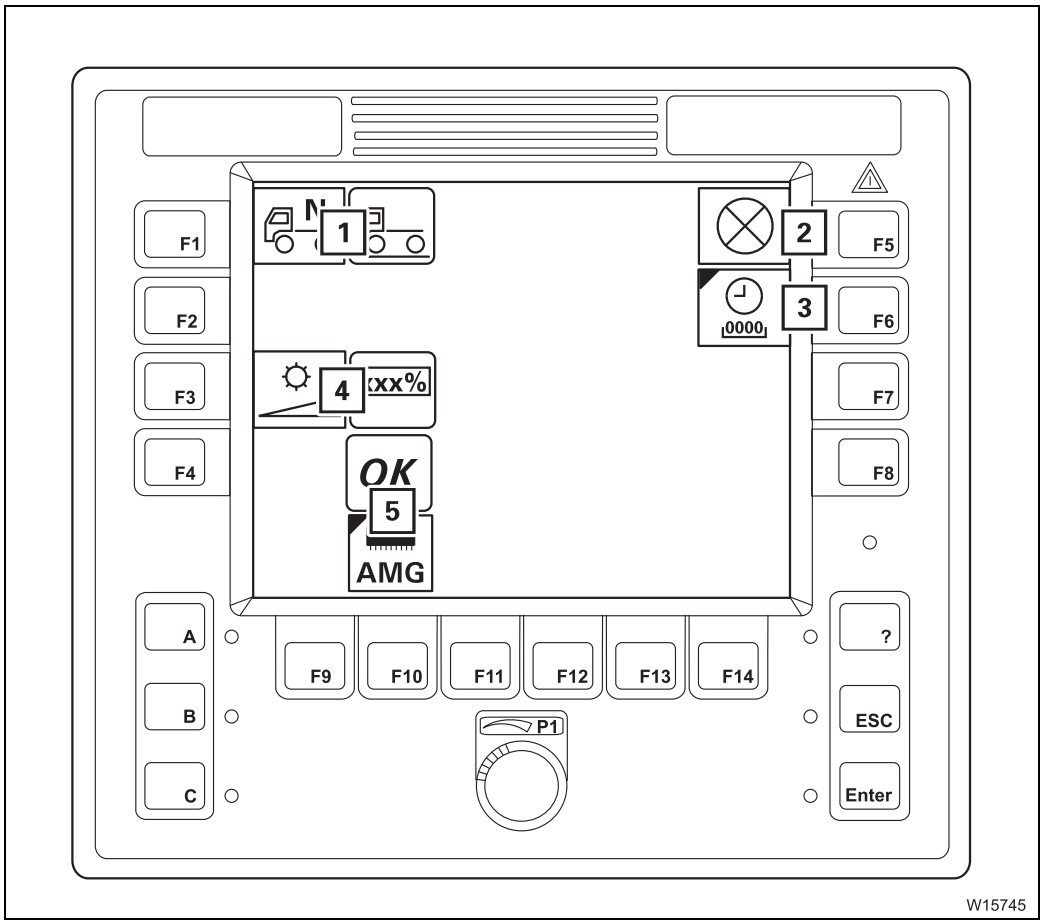
14.03.2018

1 Switch measuring range ➠ p. 3 - 65
2 Current inclination display ➠ p. 3 - 65
3 Overall level pre-selection ➠ p. 3 - 64
4 Front level pre-selection ➠ p. 3 - 64
5 Right level pre-selection ➠ p. 3 - 64
6 Rear level pre-selection ➠ p. 3 - 64
7 Left level pre-selection ➠ p. 3 - 64
8 Setting the on-road level ➠ p. 3 - 65
9 Vehicle level display ➠ p. 3 - 65
10 Suspension display ➠ p. 3 - 59
Suspension on/off ➠ p. 3 - 59
11 Lowering/raising the level ➠ p. 3 - 64
12 Lowering/raising the level ➠ p. 3 - 64
13 Suspension operation pressure gauge ➠ p. 3 - 59
14 Left axle pressure preselection[1)] ➠ p. 3 - 66
15 Right axle pressure preselection[1)] ➠ p. 3 - 66

[1)] Additional equipment

14.03.2018

Settings submenu



1 Neutral position transfer case on ➠ p. 3 - 52
Transfer case display ➠ p. 3 - 52

2 Lamp test ➠ p. 4 - 12

3 Operating hours submenu ➠ p. 3 - 28

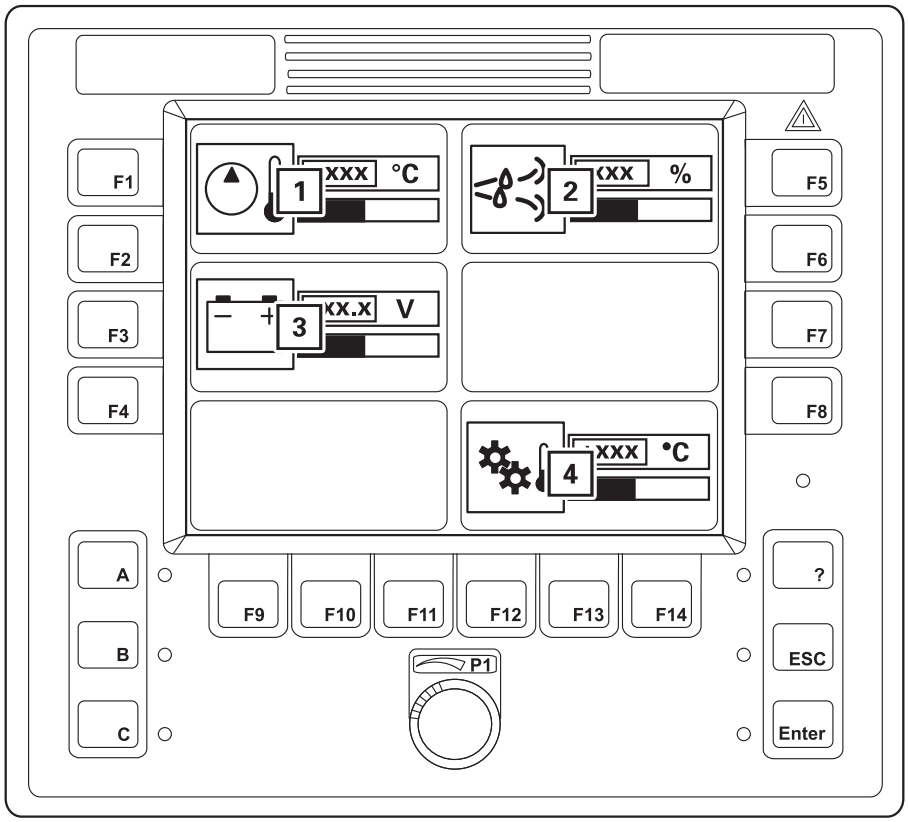
4 Display – setting the brightness ➠ p. 4 - 14

5 AMG diagnostics[1)] ➠ p. 3 - 69

[1)] For service personnel only

14.03.2018

Monitoring submenu



1 Hydraulic oil temperature display ➠ p. 4 - 21

2 Carbamide supply display[1), 2)] ➠ p. 4 - 21

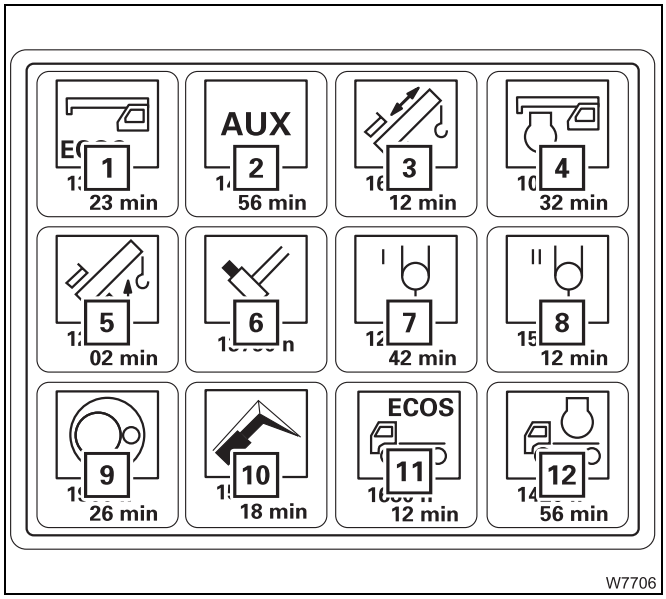
3 Voltage monitoring display ➠ p. 4 - 21

4 Transmission oil temperature display ➠ p. 4 - 21

[1)] Additional equipment

14.03.2018

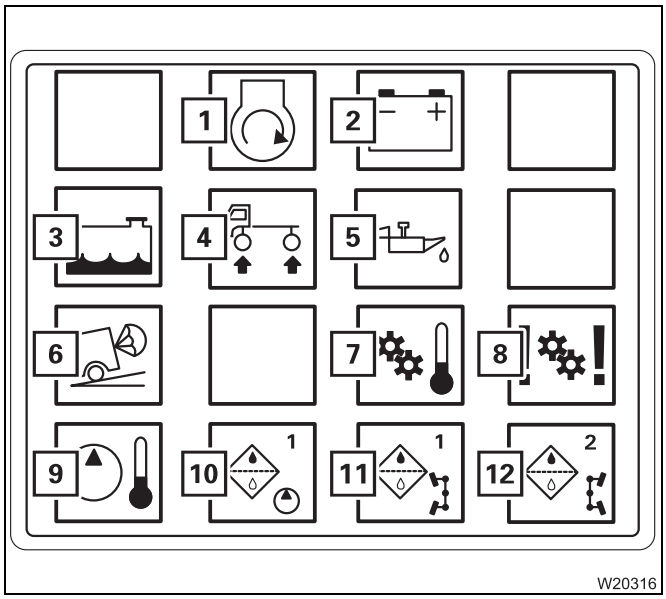
Operating hours submenu Description of the displays; ➠ *Displaying the operating hours*, p. 5 - 25.



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

[1)] Additional equipment

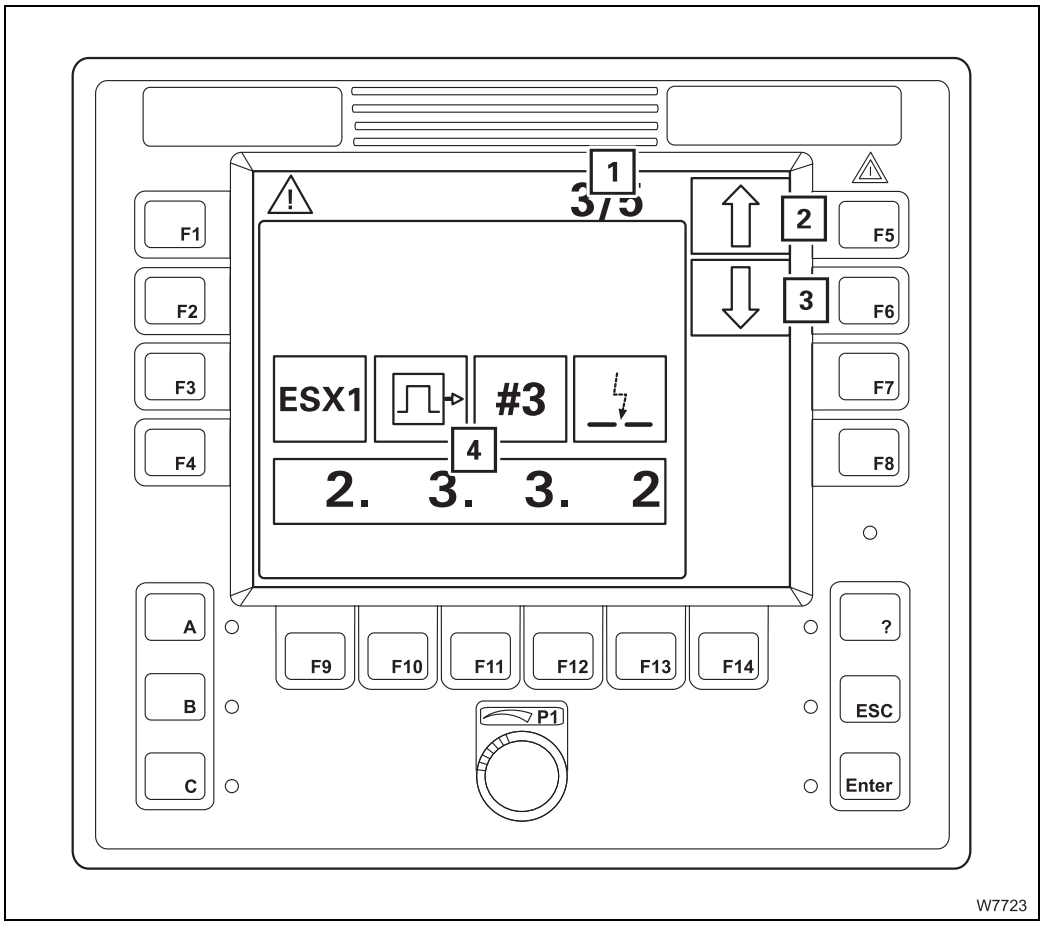
Warning submenu Description of the displays; ➠ *Warning submenu*, p. 5 - 48.



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

14.03.2018

Error submenu



1 Display of error/total errors p. 7 - 36

2 Next error p. 7 - 36

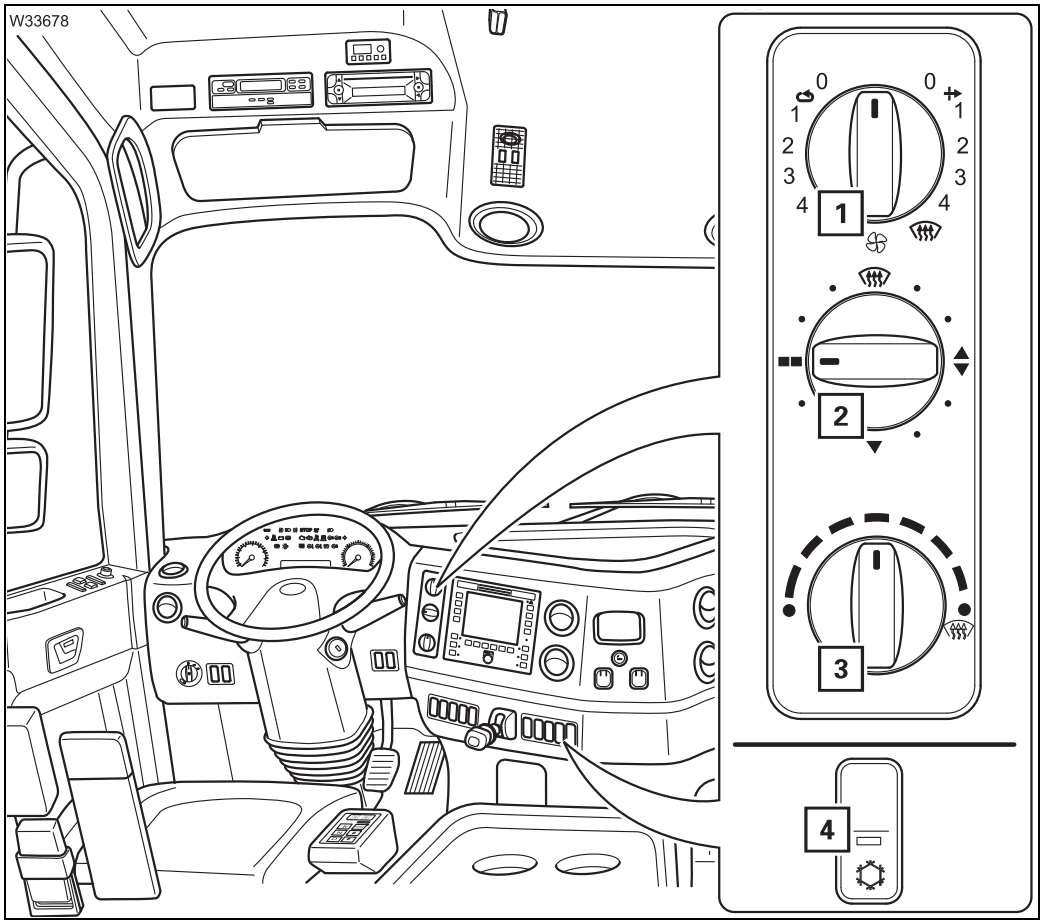
3 Previous error p. 7 - 36

4 Error display p. 7 - 37

14.03.2018

3.1.11 Heating/Air-conditioning system

Standard heating system



1 Setting the blower/fresh air/recirculated air ➠ p. 5 - 75

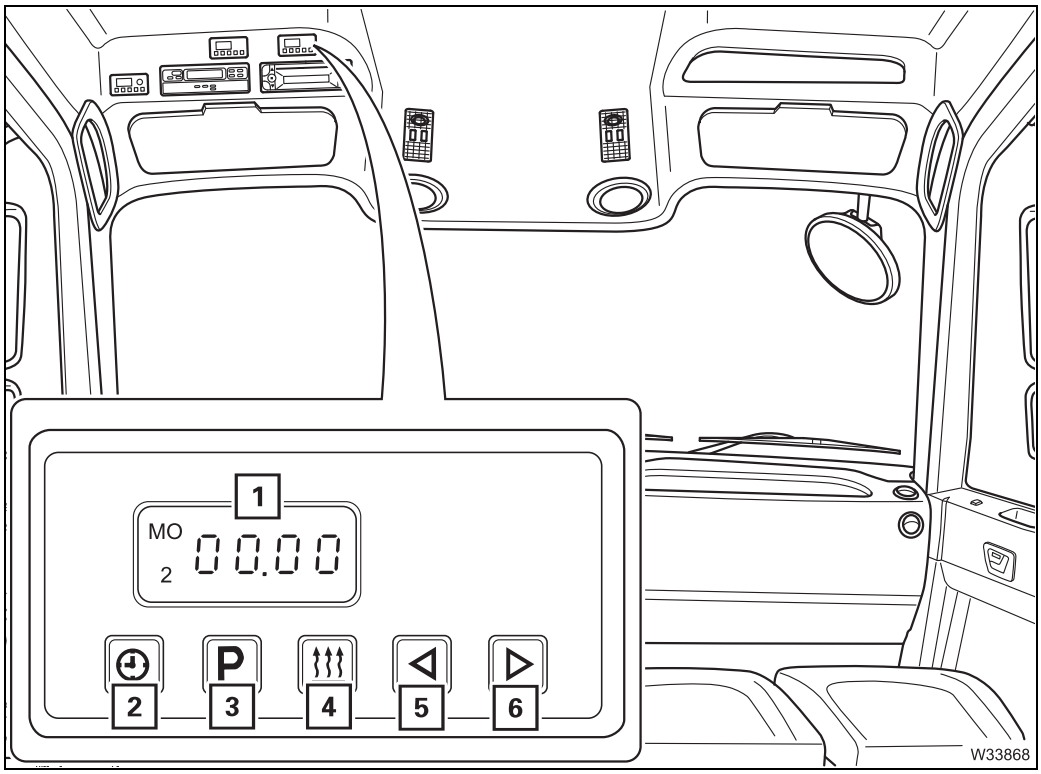
2 Air distribution ➠ p. 5 - 76

3 Setting the temperature ➠ p. 5 - 75

4 Air-conditioning system ➠ p. 5 - 78

14.03.2018

Auxiliary water heating system



1 Heating display ➠ p. 5 - 82

2 Setting time and weekday ➠ p. 5 - 82

3 – Saving automatic heating start ➠ p. 5 - 83
– Switching the automatic heating start on and off ➠ p. 5 - 85

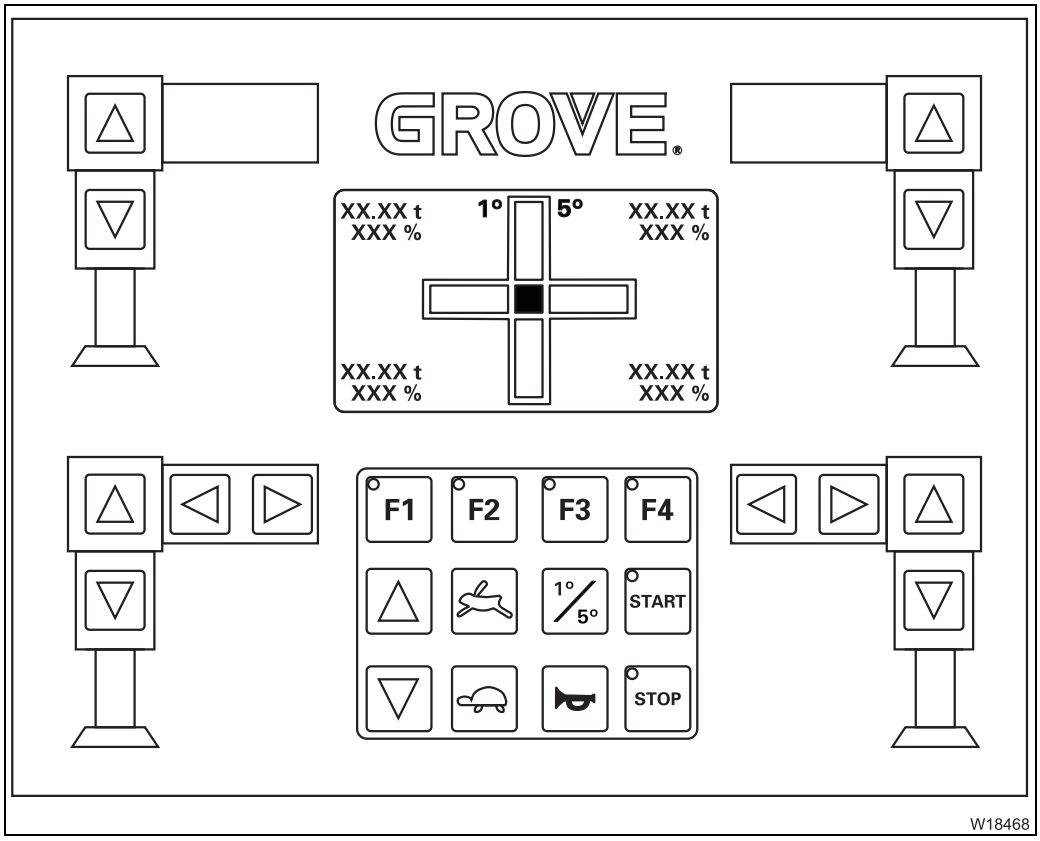
4 – Switching on the auxiliary heater ➠ p. 5 - 81
– Switching off the auxiliary heater ➠ p. 5 - 82

5 Input – ➠ p. 5 - 82

6 Input + ➠ p. 5 - 82

14.03.2018

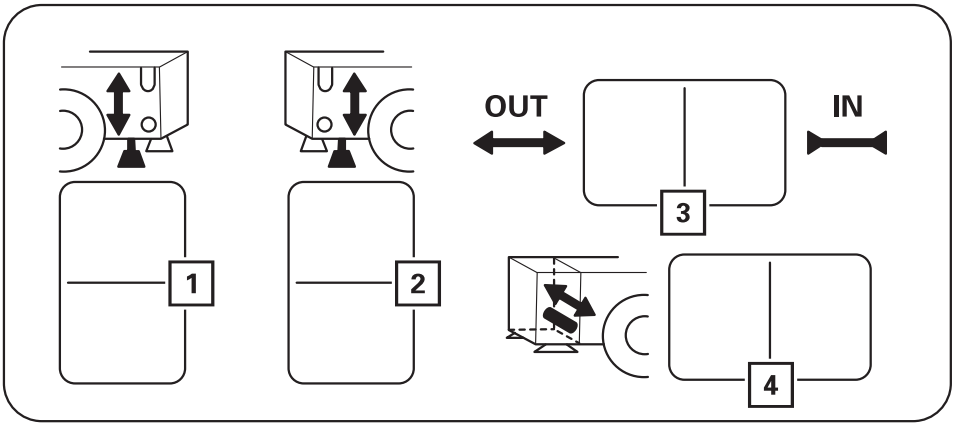
3.1.12 Outrigger control units



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

14.03.2018

3.1.13 Rear supporting box control unit



1 Left auxiliary support control p. 3 - 68
2 Right auxiliary support control p. 3 - 68
3 Extending/Retracting the pre-selection p. 3 - 68
4 Locking pin control p. 3 - 68

14.03.2018

Blank page

14.03.2018

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.

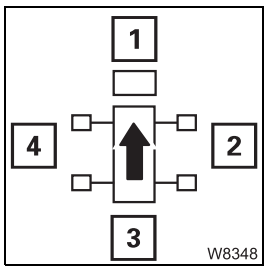
This section does not contain all the requirements that must be fulfilled for several operating elements to be active.
If some operating elements do not work, first read the following chapters which are referred to at the respective places before contacting **Manitowoc Crane Care**.

3.2.1 Definition of direction information

Basic rule

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

On the carrier

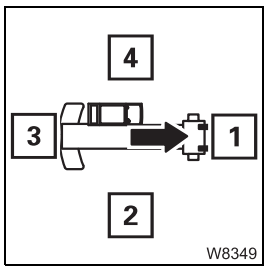


The driver's cab is always at the front, which means that:

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

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

On the superstructure

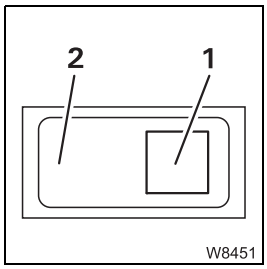


The main boom head is always at the front, which means that:

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

14.03.2018

Switches and buttons

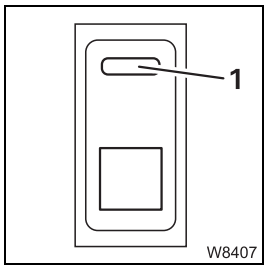


For switches and buttons, the terms **down** and **up** are used.

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

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

3.2.2 General notes on the operating elements



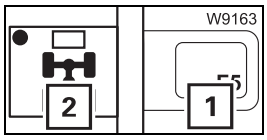
Some switches have a lock button (**1**). The lock button is not mentioned again during operation. The following applies to all switches with a lock button:

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

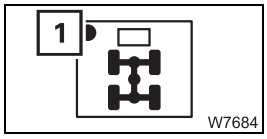
14.03.2018

3.2.3 General rules for buttons and symbols on the display

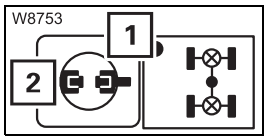
The symbols shown as an example are not present on all crane types.
The following rules apply in all menus:



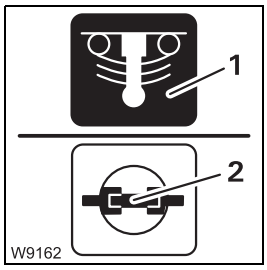
– A button (**1**) is only active when the corresponding symbol (**2**) is black. Buttons next to a grey symbol always have no function.



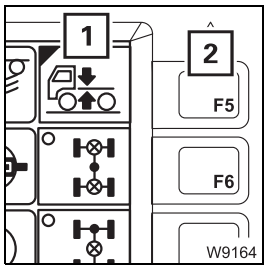
– Some symbols have a dot (**1**). The colour of the dot indicates the current switching state of the button.
  – **Green:** button on – the corresponding gear change is being carried out
  – **Black:** button off – the corresponding gear change is not being carried out



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



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

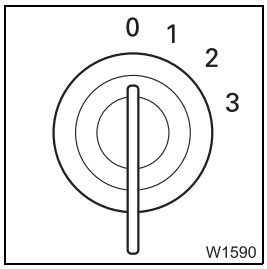


– If the instruction given in this section is to "Press the button once...", for instance, this always refers to the button (**2**) next to or below the symbol shown (**1**). This applies even when the button itself is not visible in the illustration.

14.03.2018

3.2.4 Engine

Steering column



Ignition lock

0 Ignition off, engine off, key can be removed

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

2 Ignition on, driving position

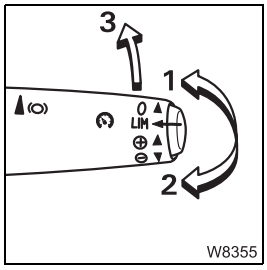
3 Starting position

➠ p. 4 - 11

Lock/unlock steering column ➠ p. 5 - 16

Multipurpose switch

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



– Set idling speed

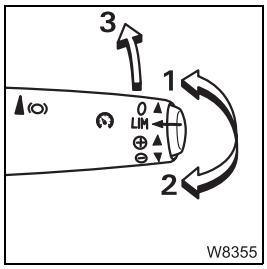
The truck crane must be stationary.

1 Up: Increasing the idling speed

2 Down: Reduces the idling speed

3 Forward: Idling speed setting off

➠ p. 4 - 22



– Setting the Tempomat

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

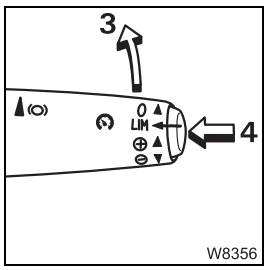
1 Up: Switches on or increases the speed

2 Down: Switches on or reduces the speed

3 Forward: Switching off

Tempomat on = current speed is maintained

➠ p. 5 - 42



– Setting the Temposet

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

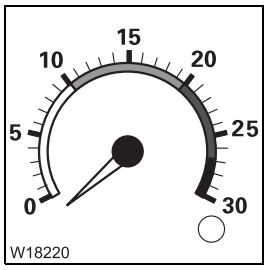
4 Press once: Current speed = maximum

3 Forwards 2 x: Temposet off

➠ p. 5 - 43

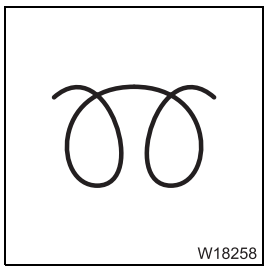
14.03.2018

Instrument panel



Tachometer

Display, engine speed in rpm; ➠ p. 4 - 20



Flame start system monitoring

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

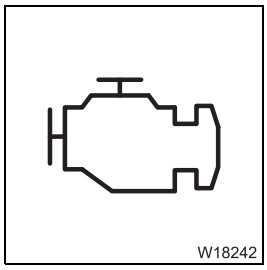
– **Off:** Engine is ready to start

➠ p. 4 - 16

STOP warning

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

➠ p. 5 - 51

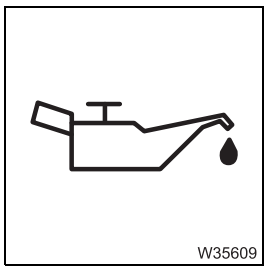


Engine warning

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

– **Off:** Engine on – no malfunction

➠ p. 5 - 51



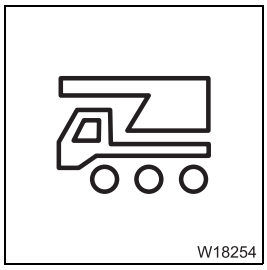
Engine oil pressure too low

– **On:** Engine off – ignition on
or
Engine on – oil pressure too low

– **Off:** Engine on – no malfunction

➠ p. 5 - 51

14.03.2018



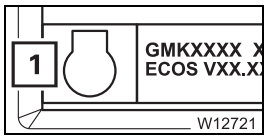
Superstructure ignition indicator lamp

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

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

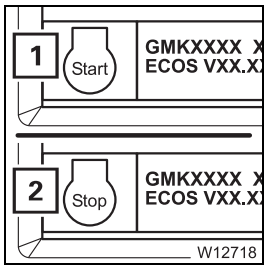
➠ p. 4 - 15

Main menu



Combined operation display off

1 Grey: Combined operation switched off –
Starting/turning off the engine only via ignition lock



Combined operation display on

Combined operation switched on – starting/turning off the engine only via button (**1**) and (**2**)

1 Green: Press button once – Engine for driving starts,
Symbol (**2**) displayed

2 Red: Press button once – Engine for driving is turned off,
Symbol (**1**) displayed

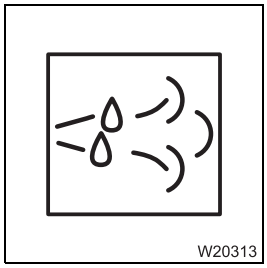
➠ *Driving in combined operation*, p. 13 - 10

14.03.2018

3.2.5 Carbamide system

If the GMK6300L-1 truck crane complies with TIER 4i and Euromot 3B exhaust gas emissions, there are additional display and operating elements in the driver's cab.

Instrument panel



Carbamide warning

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

p. 5 - 53

Torque reduction indicator lamp

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

p. 5 - 53

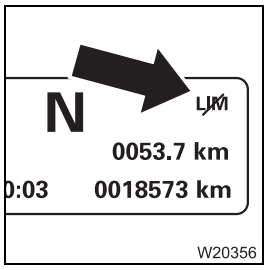
Torque reduction override button

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

p. 5 - 53

14.03.2018

Display, driving mode



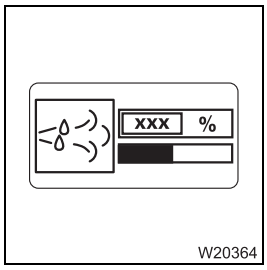
Torque reduction display override

The ignition is switched on or the engine is running.

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

p. 5 - 53

ECOS display

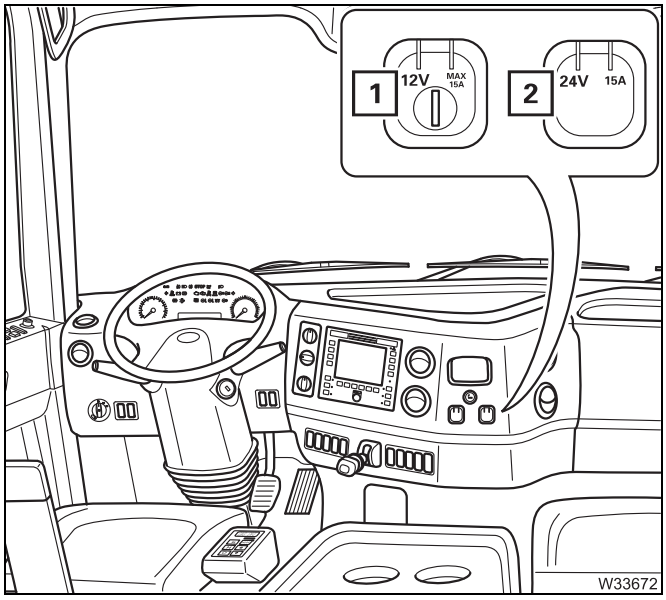


Carbamide level monitoring submenu

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

14.03.2018

3.2.6 Electrical system

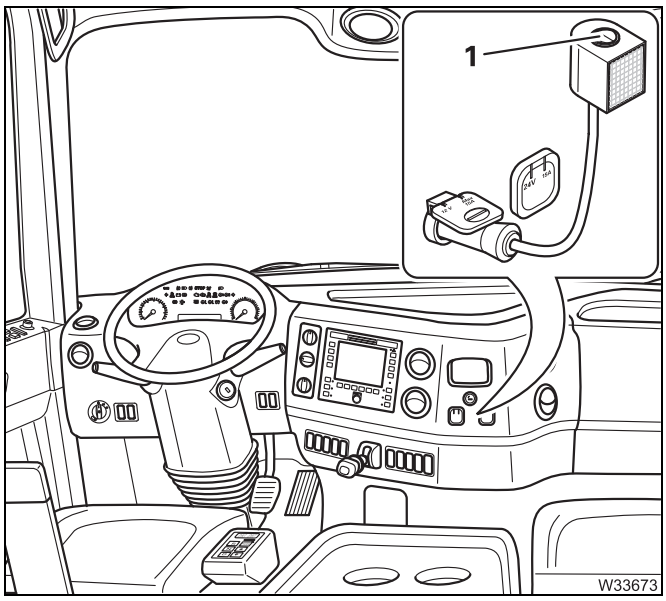


Sockets 12 V/24 V

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.

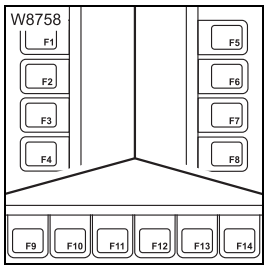
14.03.2018

3.2.7 ECOS crane control

The truck crane GMK6300L-1 is equipped with the **ECOS** electronic crane control (**E**lectronic **C**rane **O**perating **S**ystem). ECOS includes a control unit in the crane cab, a control unit in the driver's cab and several control units (ESX0, ESX1, ESX2 etc.) and I/O circuit boards (I/O 0, I/O 1 etc.), which are distributed on the superstructure and carrier.

Control unit

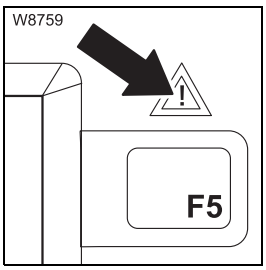
This section contains the operating elements that are the same for all menus opened.



Buttons F1 to F14

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

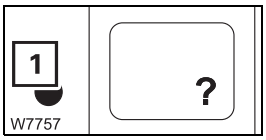
14.03.2018



Error/warning message

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

➠ p. 11 - 114

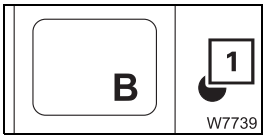


Opening the Error submenu

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

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

➠ p. 11 - 114



Opening the Warning submenu

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

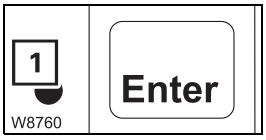
– **To open:** Press button once – submenu opens

➠ p. 5 - 48

Exiting the submenu/input mode

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

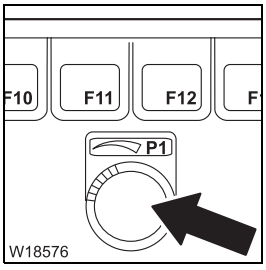
– **Press the button once:**
  – The opened submenu closes – the menu from the next higher level is opened
  – Input mode is deactivated



Input confirmation

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

– **Press the button once:** A newly entered value is saved



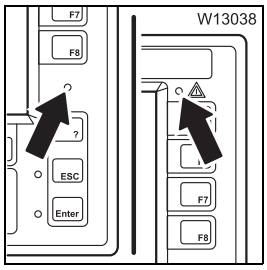
Entering values

Input mode is switched on.

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

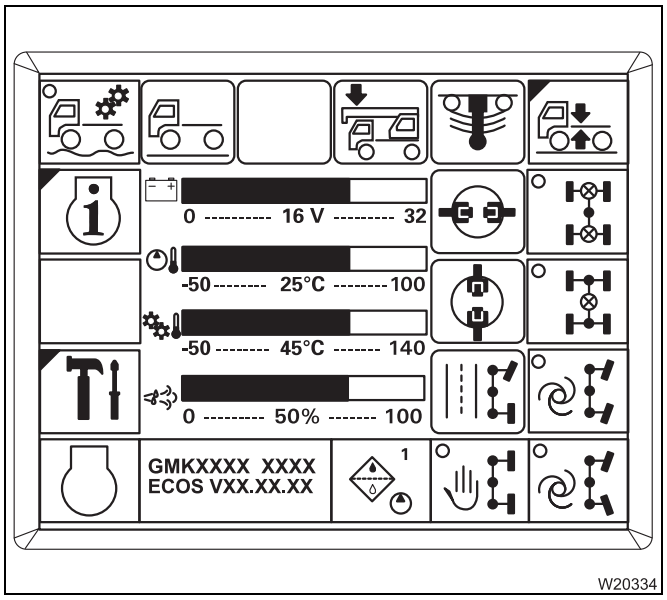
Slow turning changes the value slowly
Fast turning changes the value fast

14.03.2018



Sensor for brightness

Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted.
Manual input; p. 4 - 14.

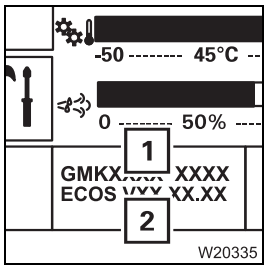


ECOS display

The main menu appears after switching on the ignition.

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

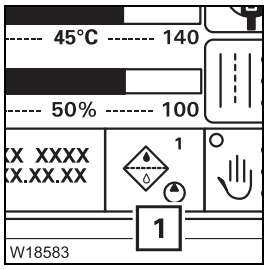
Submenus are opened by pressing the button next to or under the respective symbol.



Serial number/program version display

1 Serial number

2 Current ECOS programme version – always include in the event of a malfunction; p. 7 - 35.



Warning display

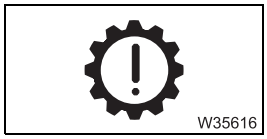
1 Shows the symbol of a current warning message – for several warning messages, the displays are shown one after the other in continuous sequence; p. 5 - 48.

14.03.2018

3.2.8 Transmission

➠ *Operating the transmission*, p. 5 - 27.

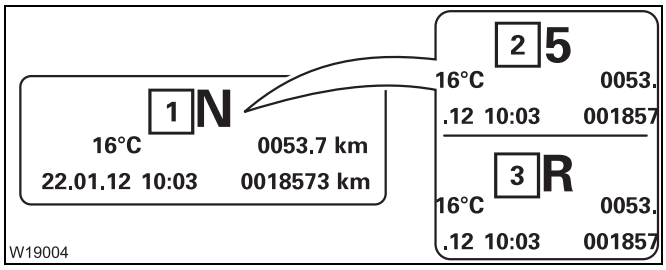
Instrument panel, middle



Transmission malfunction

Switching on diagnostics/oil-level gauge; ➠ p. 3 - 50

Display, driving mode



Transmission display

1 Neutral position switched on

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

3 Currently selected gear – reverse

Transmission control unit

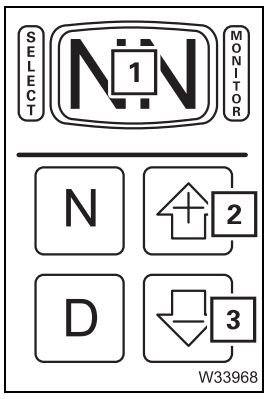
Transmission display

– Neutral position **N** switched on

– Gear position **R** switched on

14.03.2018

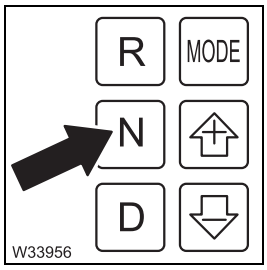
– Gear position **D** switched on
  1 Currently selected gear
  2 Highest possible gear, 1 to 6 possible
  – Number flashing – motor off



– For diagnostics and oil-level gauge
  1 Continuous character string for error/oil level

– For diagnostics
  1 Displayed error is active
  2 Press button once – display of next error
  3 Press button once – display of previous error

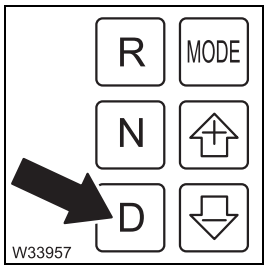
Switching on diagnostics/oil-level gauge; ➠ p. 3 - 50



Neutral position N

– **Press once:** Neutral position on – no gear engaged

➠ p. 5 - 28



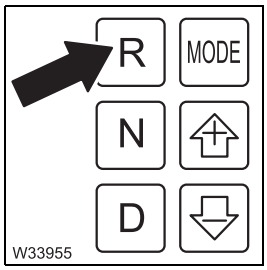
Transmission mode D

Press once

– **At a standstill:** Select forwards starting gear
– **For driving forwards:** Suitable gear on – clutch engages
– **For driving in reverse:** at first no gear change, just before standstill – forward gear on

➠ p. 5 - 30

14.03.2018

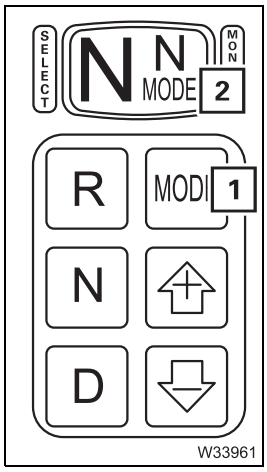


Transmission mode R

Press once

– At a standstill:	Select reverse starting gear
– For driving in reverse:	Suitable gear selected – clutch engages, reverse camera on
– For driving forwards:	at first no gear change, just before standstill – reverse gear on

➠ p. 5 - 30

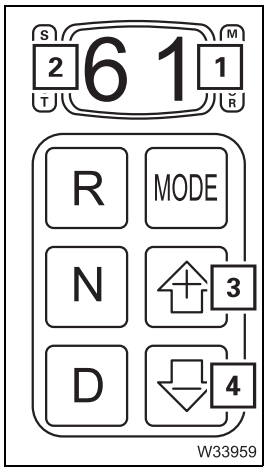


Changing the driving mode

1	**Press the button once:**	Driving mode switches to other driving mode
2	**– On:**	Driving mode **P** on (Power) Gear change at high engine speed
	– Off:	Driving mode **E** on (Economy) Gear change at low engine speed

➠ *Changing the driving mode*, p. 5 - 29
Additional function; ➠ *For diagnostics*, p. 3 - 48

14.03.2018



Selecting a gear

– The truck crane is stationary – starting gear engaged

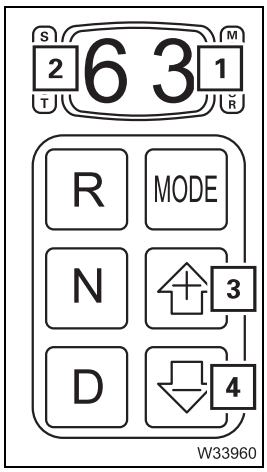
1 Starting gear

2 Highest possible gear

3 Press the button once: Highest possible gear +1
If starting gear = highest possible gear, depending on driving mode – starting gear +1

4 Press the button once: Highest possible gear -1
If highest possible gear = starting gear, starting gear -1

➠ p. 5 - 30



– The truck crane moves

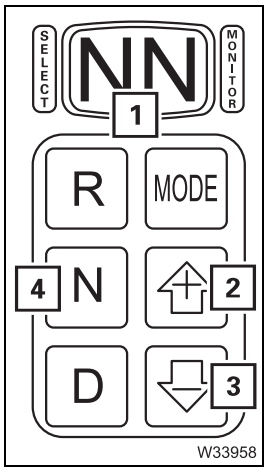
1 Current gear

2 Highest possible gear

3 Press the button once: Highest possible gear +1,
Depending on driving mode – current gear +1

4 Press the button once: Highest possible gear -1,
Depending on driving mode – current gear -1

➠ p. 5 - 33



– Additional function, oil-level gauge – the truck crane is stationary

– To switch on: Press buttons (**2**) + (**3**) once –
Display (**1**) switched to oil-level gauge

– To switch off: Press button (**4**) once

➠ p. 5 - 36

– Additional function, diagnostics – the truck crane is stationary

– To switch on: Press buttons (**2**) + (**3**) twice –
Display (**1**) switched to error display

– To switch off: Press button (**4**) once or
Press buttons (**2**) + (**3**) once

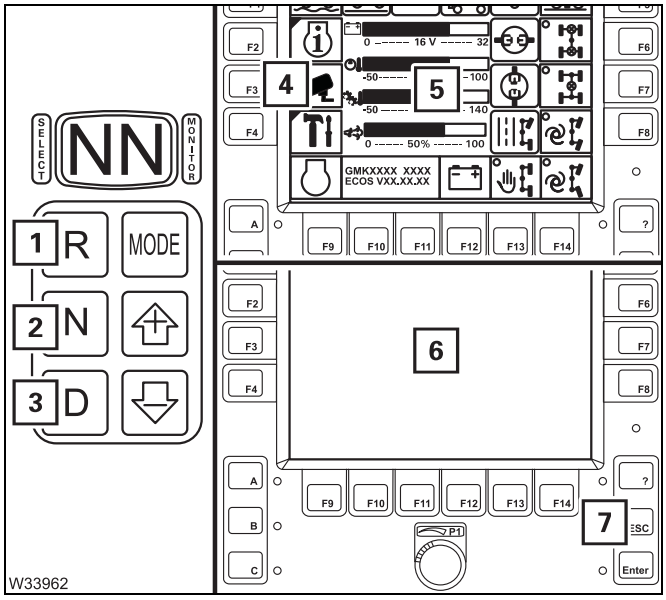
➠ p. 7 - 42

14.03.2018

3.2.9 Reverse camera

The truck crane GMK6300L-1 is equipped with a reverse camera. The reverse camera is on the rear of the carrier of the truck crane. The reverse camera displays the area behind the truck crane on the ECOS display in the driver's cab when the reverse gear is engaged.

Reverse camera on/off



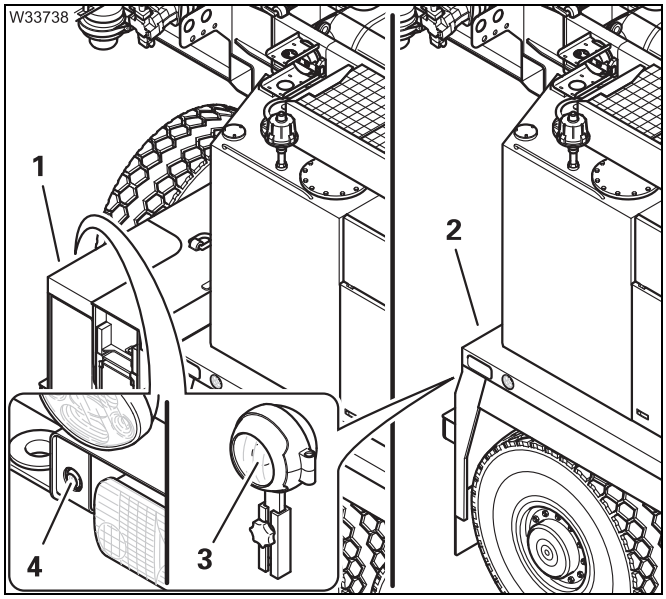
– **To switch on:** Press button (**1**) or Press button (**4**)

– Display (**6**) reverse camera on

– **To switch off:** Press button (**2**) or (**3**) or Press button (**7**)

– Reverse camera off, display (**5**) shows ECOS menu

➠ p. 5 - 31

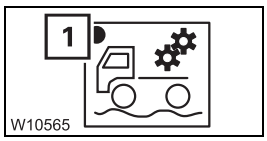


Reversing camera (**3**) or (**4**) is present depending on the equipment.

- Install the Reversing camera (**3**) according to the driving mode:
  - on the supporting box (**1**) or
  - on the carrier (**2**); ➠ *Installing the reverse camera*, p. 6 - 80.
- Align the reversing camera (**3**) so that the monitor provides a good overview of the area behind the truck crane.

14.03.2018

3.2.10 Transfer case



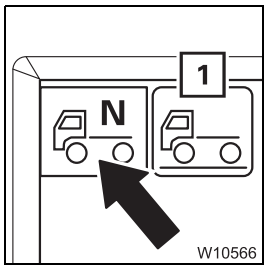
In the main menu

Transfer case for off-road gear on/off

- **To switch on:** Press button once – dot (**1**) green
- **To switch off:** Press button once – dot (**1**) black, or switching to neutral position

p. 5 - 60

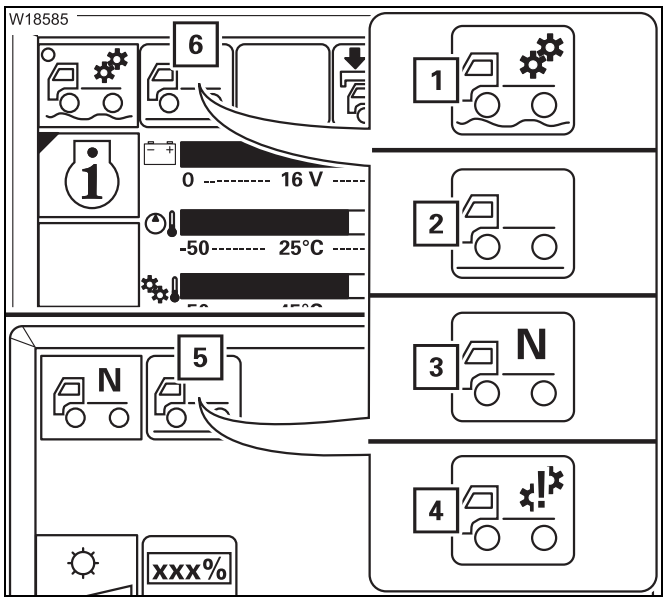
In the *Settings* submenu



Neutral position transfer case on

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

p. 7 - 8



Transfer case display

The current status is shown using different symbols:

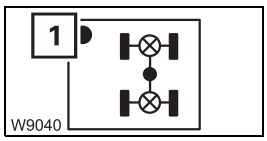
1 Off-road gear on
2 Off-road gear off – on-road driving
3 Select neutral
4 Error – violet

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

14.03.2018

3.2.11 Final drive

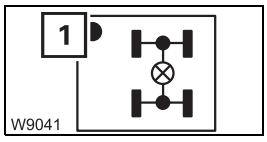
➠ *Longitudinal and transverse differential locks*, p. 5 - 62



Transverse differential locks on/off

– **To switch on:** Press button once – dot (**1**) green, maximum 20 km/h (12 mph)

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

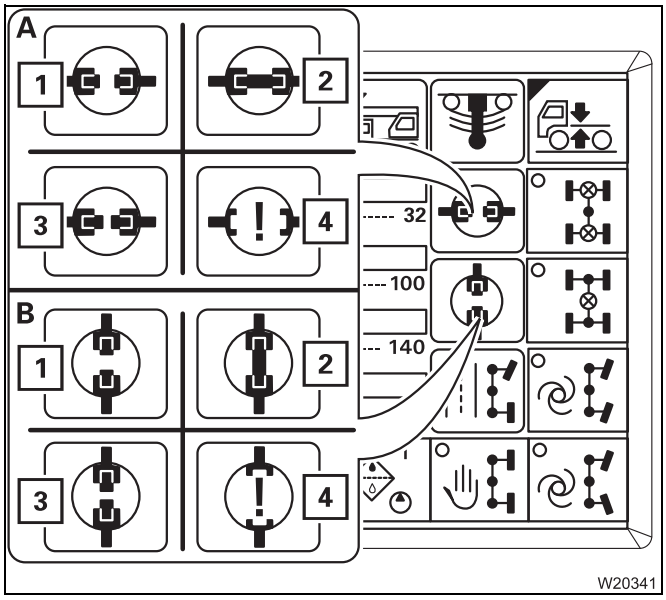


Longitudinal differential locks on/off

– **To switch on:** Press button once – dot (**1**) green, maximum 20 km/h (12 mph)

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

With additional equipment, the drive of the 2nd axle line is switched on and off simultaneously.



A Transverse differential locks display

B Longitudinal differential locks display

The current status is shown using different symbols:

1 Green – locks off

2 Red – locks on

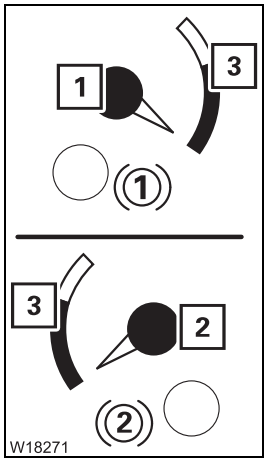
3 Yellow – intermediate position

4 Violet – error

14.03.2018

3.2.12 Brakes

Service brake



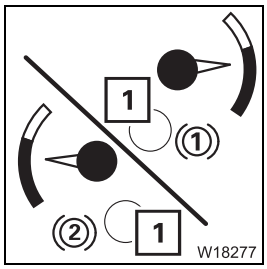
Display – supply pressure in brake circuits

1 Current supply pressure in brake circuit 1

2 Current supply pressure in brake circuit 2

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

➠ p. 5 - 54



Warning – supply pressure in the displayed brake circuit too low

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

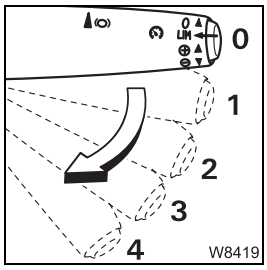
– Off: Supply pressure above 5.5 bar (80 psi)

➠ p. 5 - 54

Additional brakes

Engine retarder/transmission retarder
➠ *Additional brakes*, p. 5 - 46

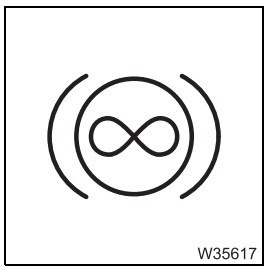
Multipurpose switch



0	**Forward:**	Engine retarder and transmission retarder off
1	**Back:**	Engine retarder
2	**Back:**	Engine retarder, transmission retarder 50%
3	**Back:**	Engine retarder, transmission retarder 75%
4	**Back:**	Engine retarder, transmission retarder 100%

14.03.2018

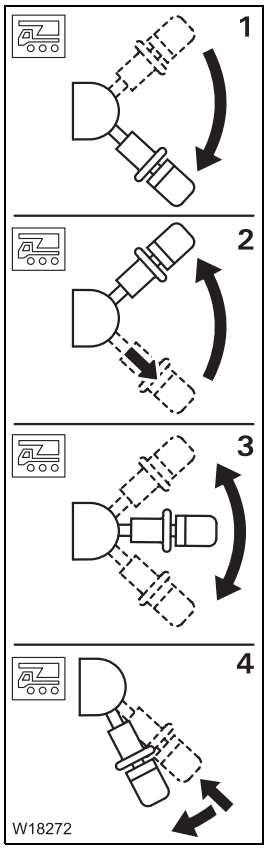
Instrument panel



Additional brake indicator lamp

– **On:** Engine retarder/transmission retarder on
– **Off:** Engine retarder/transmission retarder off

Parking brake

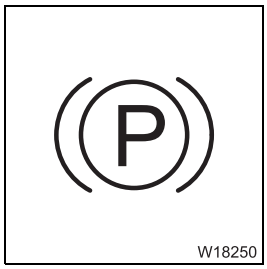


1 To engage the parking brake: Pull the lever down until it locks into place

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

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

4 Test position for towing a trailer:
– Pull the lever down until it locks into place
– Press in the lever and pull it further downwards
The parking brake for the trailer is released;
➠ p. 5 - 92.



Parking brake indicator lamp

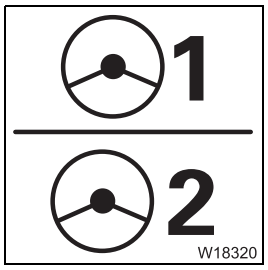
– **On:** Parking brake applied
– **Off:** Parking brake released

14.03.2018

3.2.13 Steering/separate steering

➠ *Separate steering*, p. 5 - 71

Instrument panel

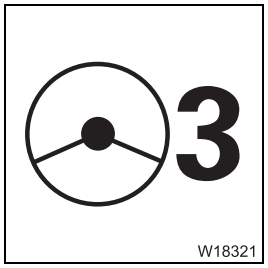


Steering circuit 1 and 2 warning lamp

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

– **Off:** Engine on – no malfunction

➠ p. 5 - 39

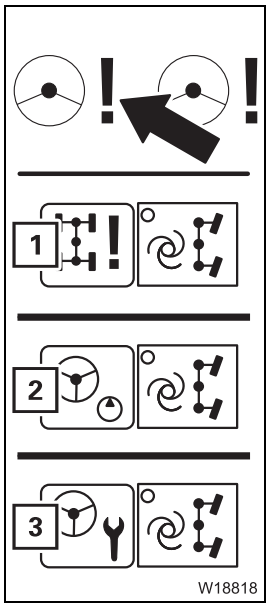


Emergency steering pump warning lamp

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

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

➠ p. 5 - 39



Error in steering system

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

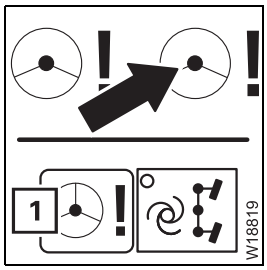
  While driving:
  – Display symbol (**1**) – 5th and 6th axle still in straight running position, forward drive possible

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

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

After engine start; ➠ p. 4 - 18
While driving; ➠ p. 5 - 28

14.03.2018



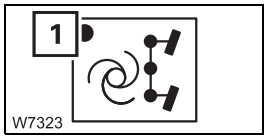
Steering system warning

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

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

After engine start; ➠ p. 4 - 18
While driving; ➠ p. 5 - 28

ECOS display Main menu

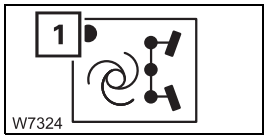


Separate steering crab travel mode on/off

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

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

➠ p. 5 - 71



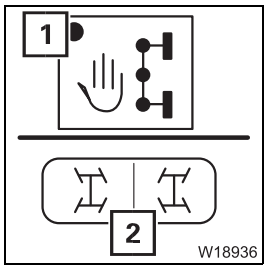
Separate steering for driving around corners on/off

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

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

➠ p. 5 - 71

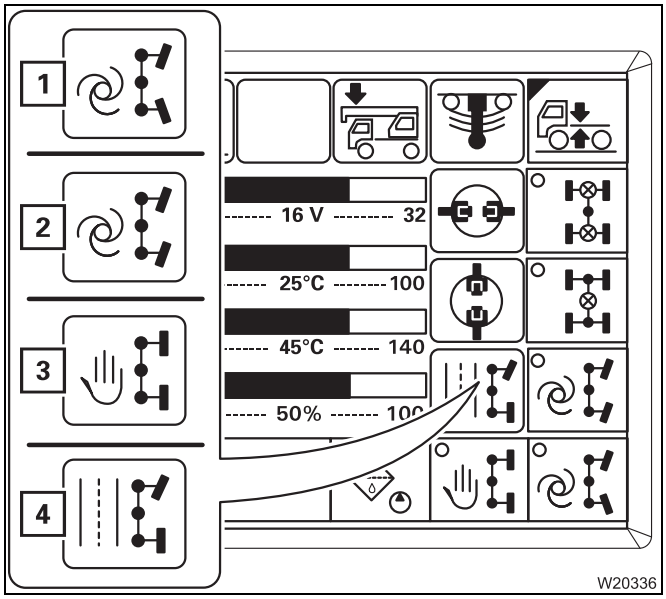
14.03.2018



Manual separate steering on/off

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

p. 5 - 71



Steering mode display

The steering mode switched on is shown using different symbols:

1 Separate steering – driving around corners

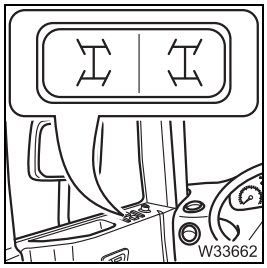
2 Separate steering – crab travel mode

3 Separate steering – manual

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

p. 5 - 71

Driver's door



Separate steering

The separate steering is switched on.

Press button and hold

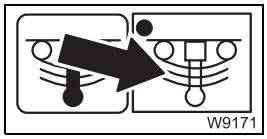
– **To the left:** 5. and 6th axle lines – turn to the left
– **To the right:** 5. and 6th axle lines – turn to the right

p. 5 - 72

14.03.2018

3.2.14 Suspension

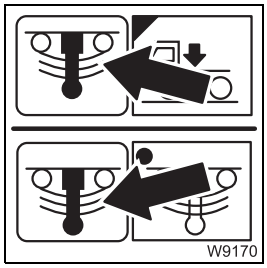
➠ *Switching the suspension on/off*, p. 5 - 17.



Suspension on/off

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

➠ p. 5 - 18

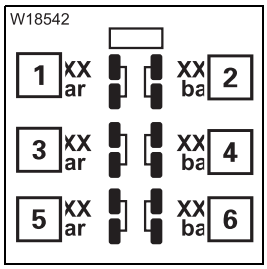


Suspension display

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

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

➠ p. 5 - 18



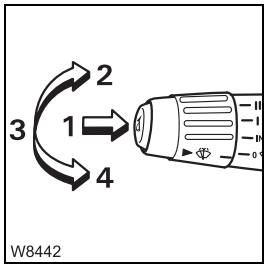
Suspension operation pressure gauge

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

14.03.2018

3.2.15 Lighting/windscreen wipers/horn

Steering column Multipurpose switch

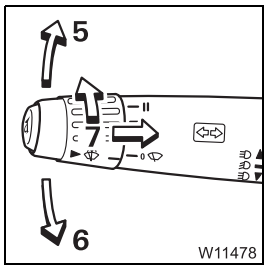


Horn/headlight flasher/headlight – full beam

1	**Horn:**	Press the button
2	**Flash the headlights:**	Upwards

The parking light/headlight must be switched on:

3	**Parking light/headlight:**	Middle position
4	**Headlight – full-beam:**	Down – latches into place

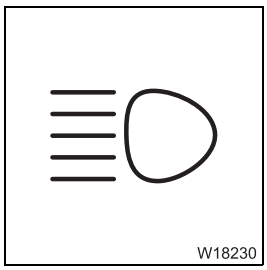


Turn signal indicator/wiper-washing system

5	**Right turn signal indicator:**	Forwards
6	**Left turn signal indicator:**	Backwards
7	**Windscreen wiper/washing system:**	Press
7	**Windscreen wiper:**	Turn – off (0), intermittent, slow, fast

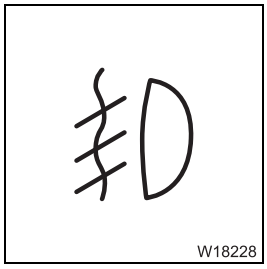
7 Adjusting the wiper stroke interval:
- Switch on intermittent
- Switch off after the first wipe (0)
- Wait for the required time (maximum 20 seconds)
- Switch on the interval – required time = pause between wipes

Instrument panel



Headlight – full beam indicator lamp

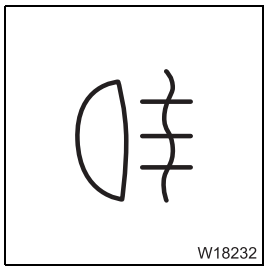
–	**On:**	Headlight – full beam on
–	**Off:**	Headlight – full beam off



Fog light indicator lamp

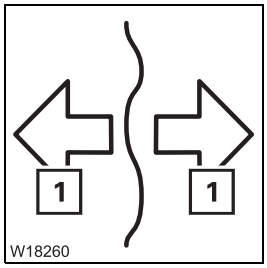
–	**On:**	Fog light on
–	**Off:**	Fog light off

14.03.2018



Fog tail light indicator lamp

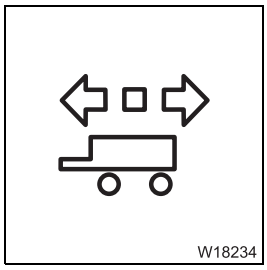
- **On:** Fog tail light on
- **Off:** Fog tail light off



Indicator lamp for turn signal indicator

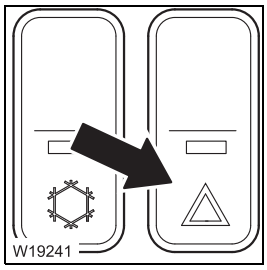
1 – **Flashing:** Turn signal indicator on

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



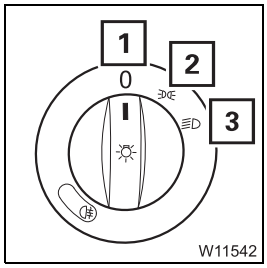
Indicator lamp for trailer turn signal indicator

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



Hazard warning system on/off

- **To switch on:** Press downwards – light in the switch flashes
- **To switch off:** Push up



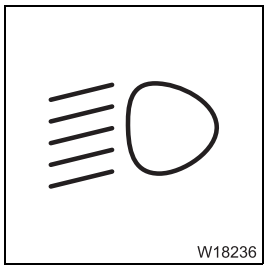
Lighting on/off

1 **Light off**

2 **Parking light on** Instrument lighting on

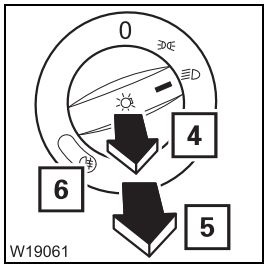
3 **Headlight on** Full beam can be switched on using the multipurpose switch

14.03.2018



Headlight indicator lamp

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

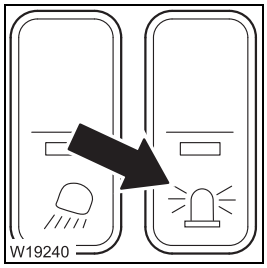


The headlight or parking light is switched on.

4 Fog light on

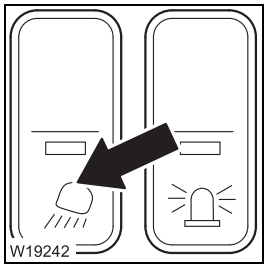
5 Fog tail light on

6 – on



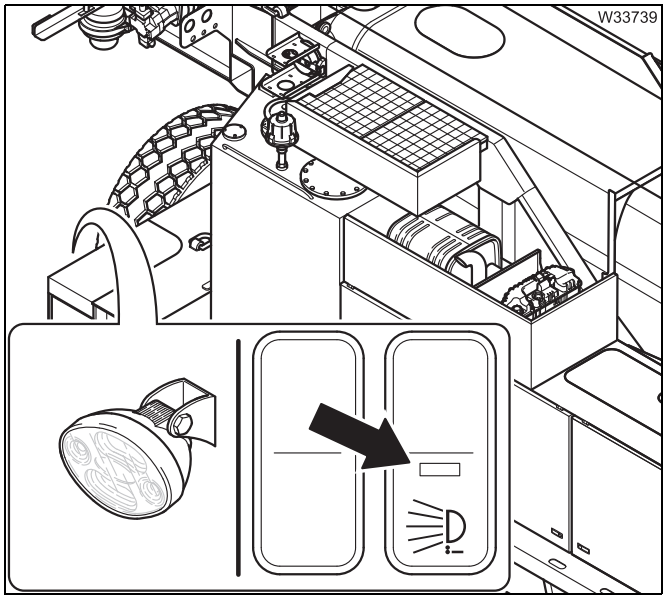
Rotating beacon on/off

- **To switch on:** Push down
- **To switch off:** Push up



Outrigger lighting on/off

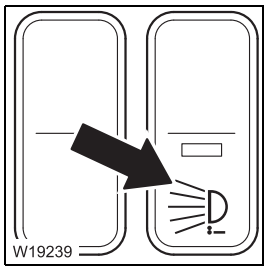
- **To switch on:** Push down
- **To switch off:** Press in at top – position for driving on road



Spotlights on rear of carrier on/off

- **To switch on:** Push down
- **To switch off:** Press in at top – position for driving on road

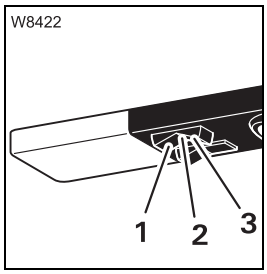
14.03.2018



Spotlights on rear of carrier on/off

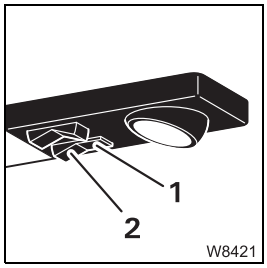
- **To switch on:** Push down
- **To switch off:** Press in at top – position for driving on road

The lamps on the driver and passenger sides are identical.



Cab lighting

1 Always on
2 Always off
3 On/off via door contact



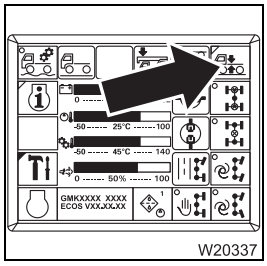
Reading lamp

1 On
2 Off

14.03.2018

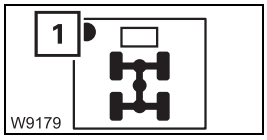
3.2.16 Level adjustment system

➠ *Operating the level adjustment system*, p. 5 - 64.



Level adjustment system submenu

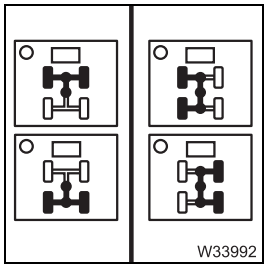
– **To open:** Press button once – submenu opens



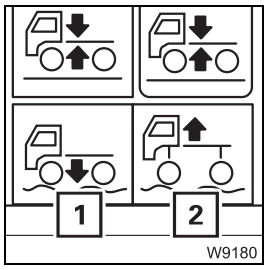
Overall level pre-selection

– **Pre-selecting suspension struts:** Press button once – dot (**1**) turns green – pre-selection on
After 5 seconds – dot (**1**) turns black – pre-selection off

➠ p. 5 - 65



The following functions are operated in the same manner:
– **Front level pre-selection**
– **Rear level pre-selection**
– **Left level pre-selection**
– **Right level pre-selection**



Lowering/raising the level

Suspension struts are pre-selected.

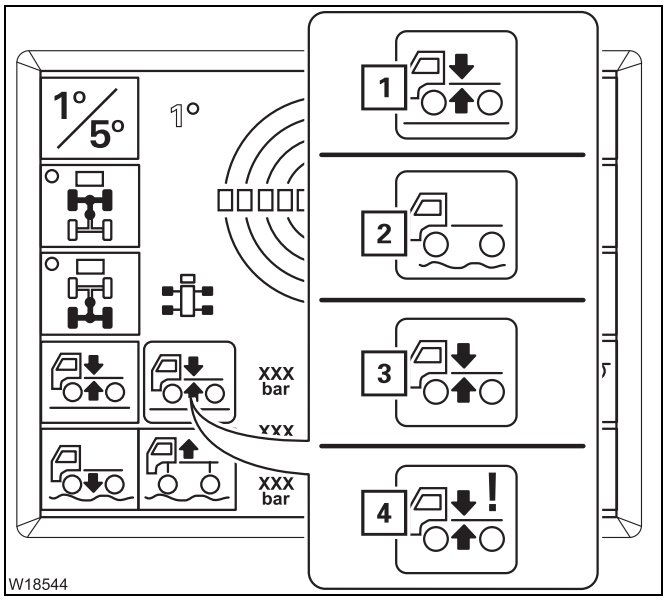
1 Lowering: Press button – suspension struts retract

2 Raise: Press button – suspension struts extend

➠ p. 5 - 66

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

14.03.2018

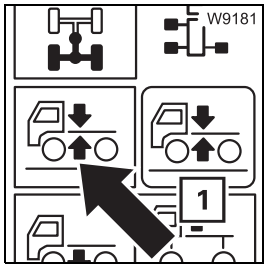


Vehicle level display

The current status is shown using different symbols:

1 Green – on-road level
2 White – no on-road driving level
3 Yellow – level change
4 Violet – error

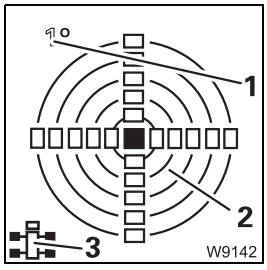
➠ p. 5 - 64



Setting the on-road level

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

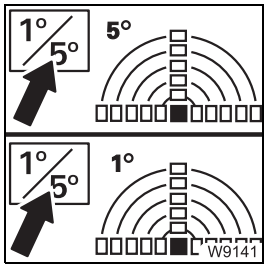
➠ p. 5 - 65



Current inclination display

1 Measuring range display
2 Inclination indicator
3 Directional indicator

➠ p. 5 - 66



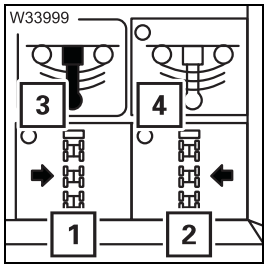
Switch measuring range

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

➠ p. 5 - 66

14.03.2018

This function is only available with additional equipment.

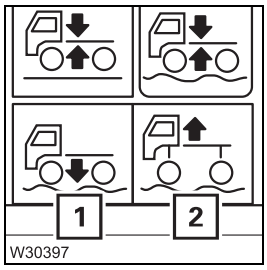


Adjusting axle pressure for trailer (dolly) operation

1 Press button once – point (**3**) green – pre-selection on for left axle pair

2 Press button once – point (**4**) green – pre-selection on for right axle pair

After 30 seconds – dot (**1**) turns black – pre-selection off



For pre-selected axle pair:

1 Tap the button – increase axle pressure

2 Tap the button – reduce axle pressure

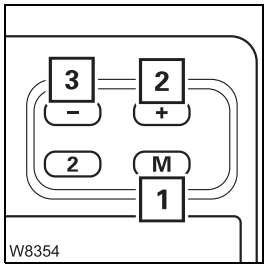
p. 6 - 15

14.03.2018

3.2.17 Tachograph/speedometer

➠ *Setting the tachograph*, p. 5 - 19.

Tachograph Correction of time

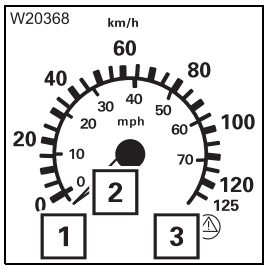


1 Open the time menu: Press the button – the time correction menu opens

2 Time correction +: Press the button – the time is increased

3 Time correction –: Press the button – the time is decreased

Speedometer Display speed:

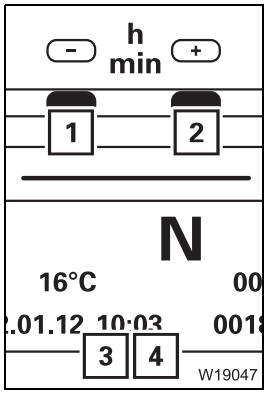


Speed indicator

1 Indicates the speed in km/h

2 Indicates the speed in mph

3 Tachograph malfunction warning



Setting the driving display time

1 Press the button – the time is increased

2 Press the button – the time is decreased

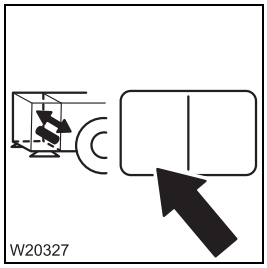
Setting the hours (**3**): Press buttons (**1**) + (**2**) once – press the button for setting within 10 seconds

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

14.03.2018

3.2.18 Rear supporting box control unit

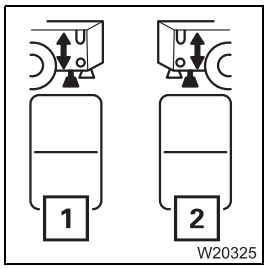
Installing/removing the supporting box, p. 6 - 65



Locking pin pre-selection

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

p. 6 - 83

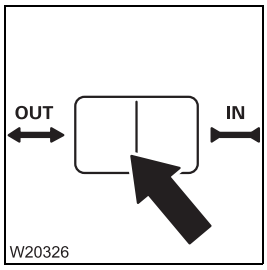


Left/right auxiliary supports pre-selection

1 – **Press down:** Pre-selection, left auxiliary support

2 – **Press down:** Pre-selection, right auxiliary support

p. 6 - 71



Extending/retracting

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

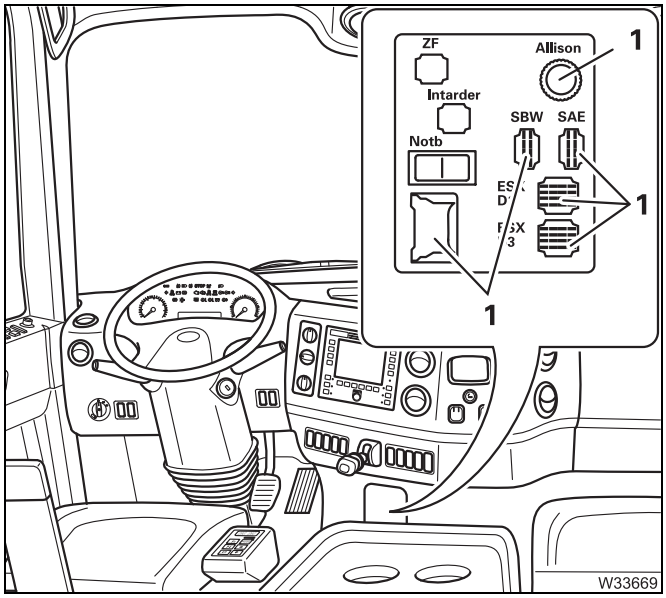
– **Press in to the right:** Retracting the auxiliary support or locking pin

p. 6 - 71

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

14.03.2018

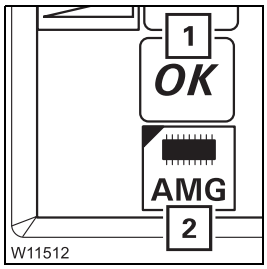
3.2.19 Diagnostics



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

Displays/ submenu

Settings submenu



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

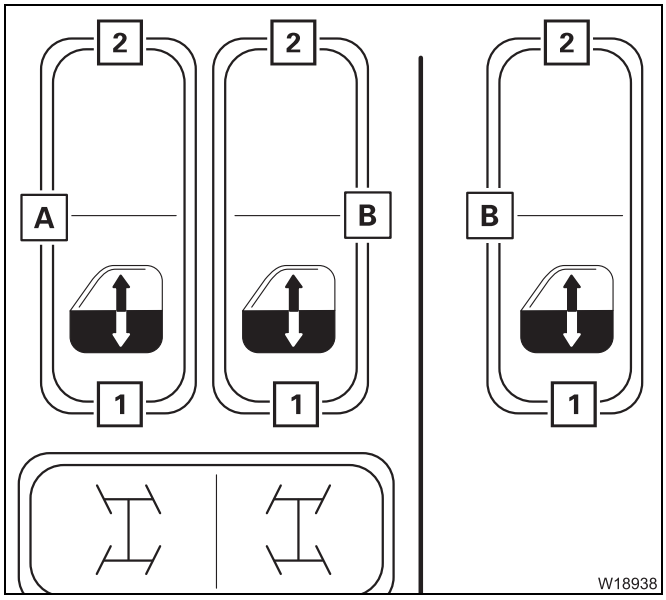
2 Diagnostics submenu
If there is a malfunction, press button (**2**) once, read the values in the submenu and report to **Manitowoc Crane Care**.

14.03.2018

3.2.20 Windows, doors, keys

Window winder

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



Button assignment

A Window winder, driver's door

B Window winder, passenger door

1 To open the window

2 To close the window

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

Jog function

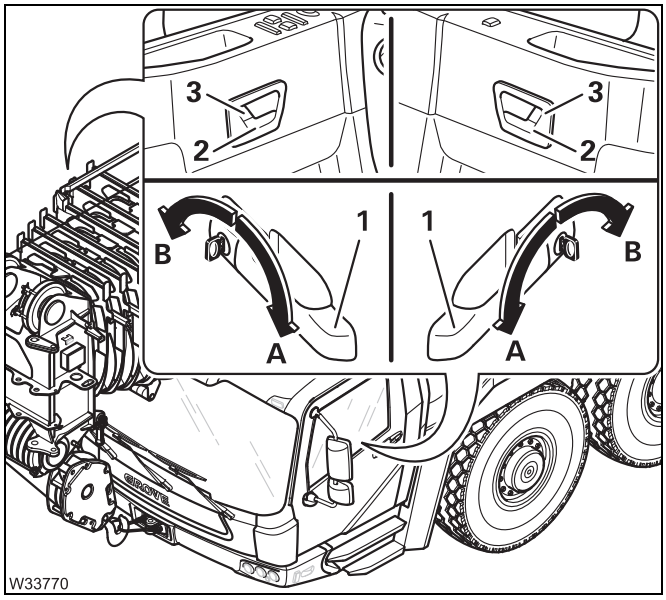
Press button (**1**) briefly – the window opens all the way to the end position.

14.03.2018

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.



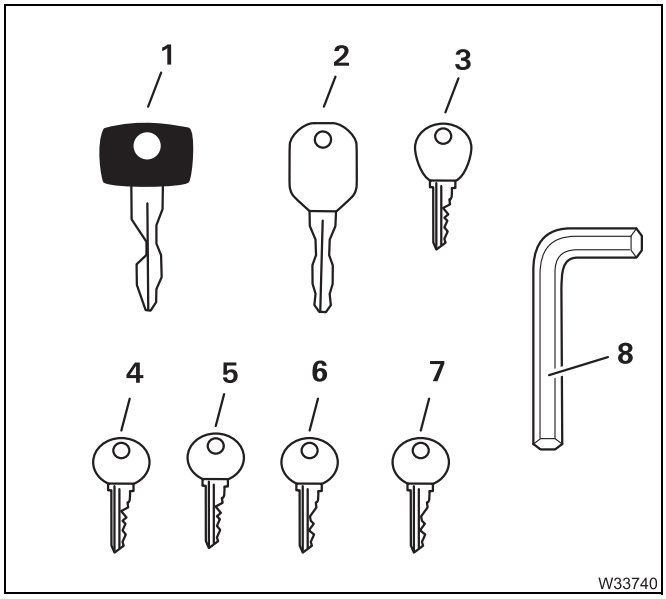
Lock
- Turn the key towards **B**, or
- Press in the handle (**3**)

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

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

Keys

Different keys are supplied.

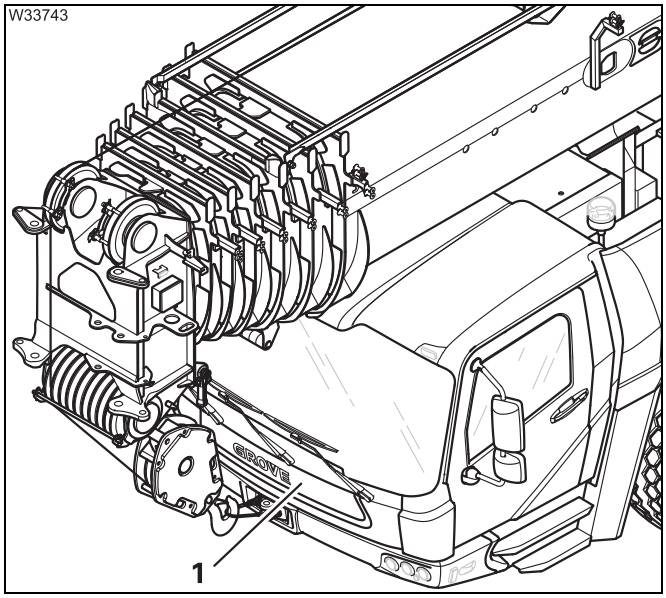


1 Door locks/ignition lock of driver's cab
2 Carbamide tank[1)]
3 Control units for outriggers
4 Boom floating position lock[1)]
5 Slewing gear freewheel lock[1)]
6 Carrier storage box
7 Fuel tank[1)]
8 Covers

[1)] Additional equipment

14.03.2018

3.2.21 Front flap



Opening

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

The front flap is held in the open position.

Closing

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

14.03.2018

4 Starting the engine for driving / switching it off

14.03.2018

14.03.2018

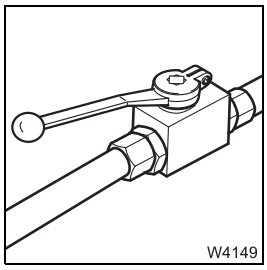
4 Starting the engine for driving / switching it off

4.1 Starting the engine from the driver's cab

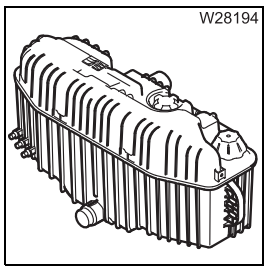
This section describes how to start the engine from within the driver's cab. You can also start the engine from the crane cab; ➠ *Starting the engine for driving for rigging work*, p. 12 - 23.

4.1.1 CHECKLIST: Starting the engine

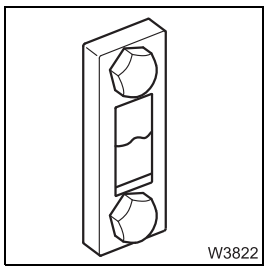
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions there!



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

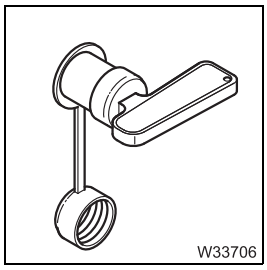


2. Check the coolant level of the engine; ➠ *Maintenance Manual*.

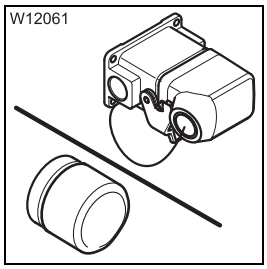


3. Check the oil level in the hydraulic system; ➠ *Maintenance Manual*.

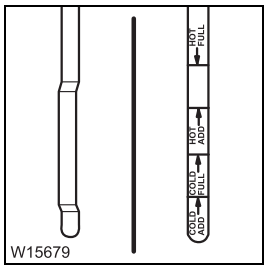
14.03.2018



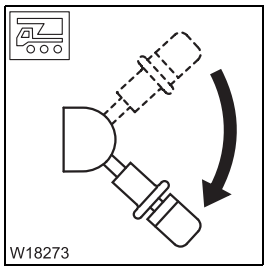
4. Switch on the battery master switch; ➠ p. 4 - 10.



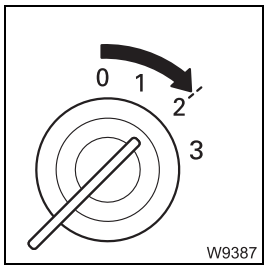
5. Check that
– The bridging plugs are inserted in the sockets for hand-held control; ➠ p. 10 - 8.
– All emergency stop switches have been reset; ➠ p. 4 - 24.



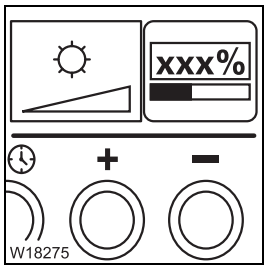
6. Check the oil level in the engine and gearbox; ➠ *Maintenance Manual*.



7. Check that the parking brake is engaged.

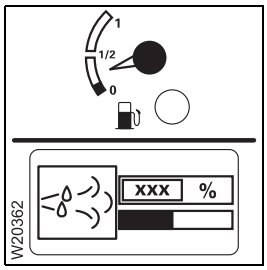


8. Switch on the ignition and check the instruments and displays; ➠ p. 4 - 11.

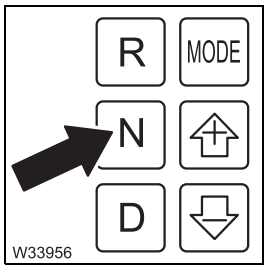


9. If necessary, set the brightness,
– on the *ECOS* display; ➠ p. 4 - 14,
– of the instrument lighting; ➠ p. 5 - 26.

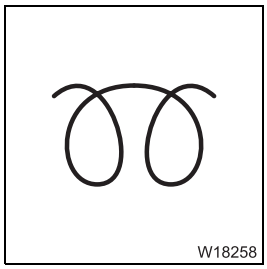
14.03.2018



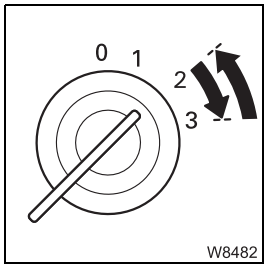
10. Check the fuel level and carbamide level if necessary; ➠ p. 4 - 7.



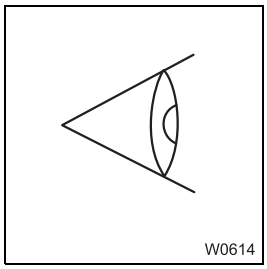
11. Shift the transmission to the neutral position; ➠ p. 5 - 28.



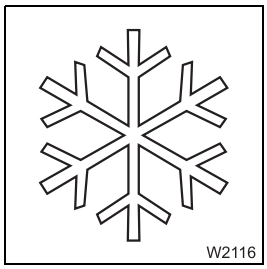
12. If the truck crane has a flame start system, wait until the lamp goes out; ➠ p. 4 - 16.



13. Start the engine; ➠ p. 4 - 15.



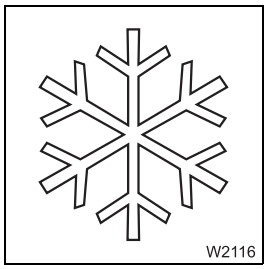
14. Conduct the necessary checks after starting the engine; ➠ p. 4 - 18.



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

14.03.2018

4.1.2 CHECKLIST: At low temperatures



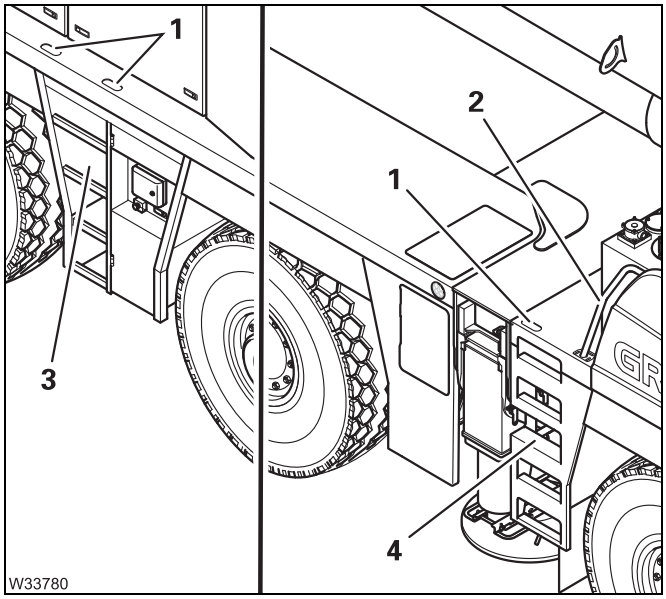
You must also observe the following points when operating the truck crane at low outside temperatures:

1. The fuel and engine oil must be suited for use in the outside temperature in question; ➠ *Separate engine 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; ➠ *Windscreen washing system*, p. 5 - 7.

4.1.3 Ladders and access ladders

Fixed ladders

The access ladders are fixed in position.

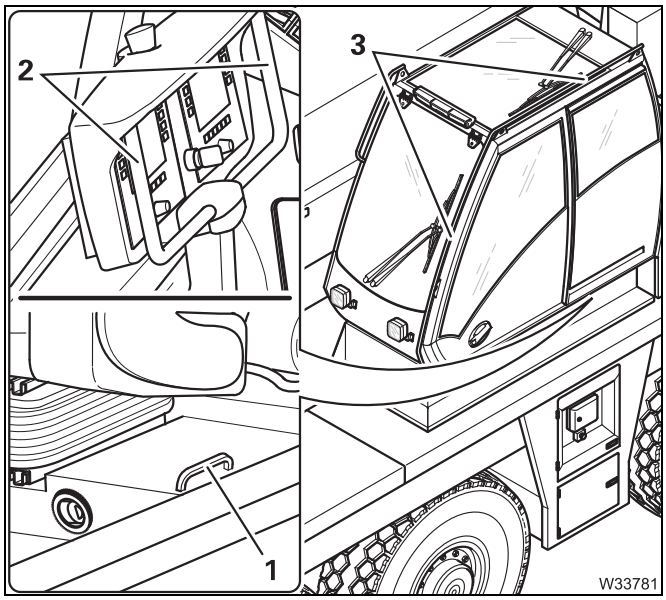


Right side

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

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

14.03.2018



Left side

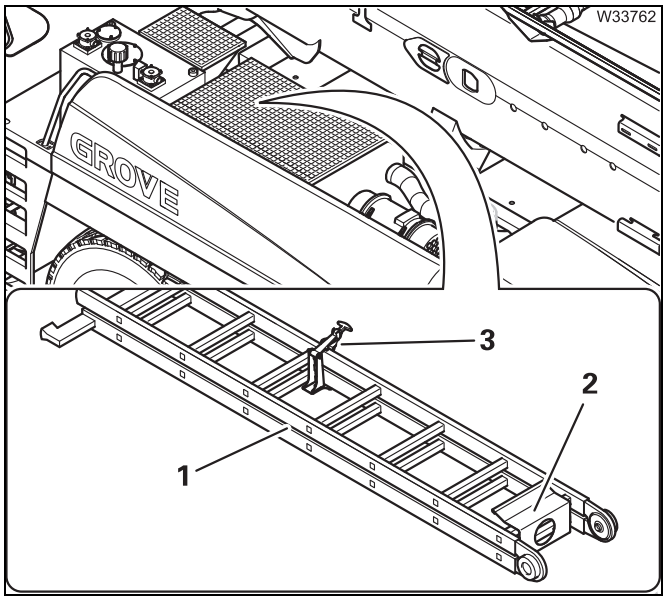
– When the crane cab door is open, you can reach the handle (**1**).

– The handle (**3**) is located on the outside of the crane cab.

The handle (**2**) may only be used for adjusting the front panel. Do not use the handle as a climbing aid.

Risk of damage to the front control panel!
Do not use the front panel handle as a climbing aid. This way, you avoid damage due to overloading. Use the handle on the floor of the crane cab or the exterior handrail.

Ladders



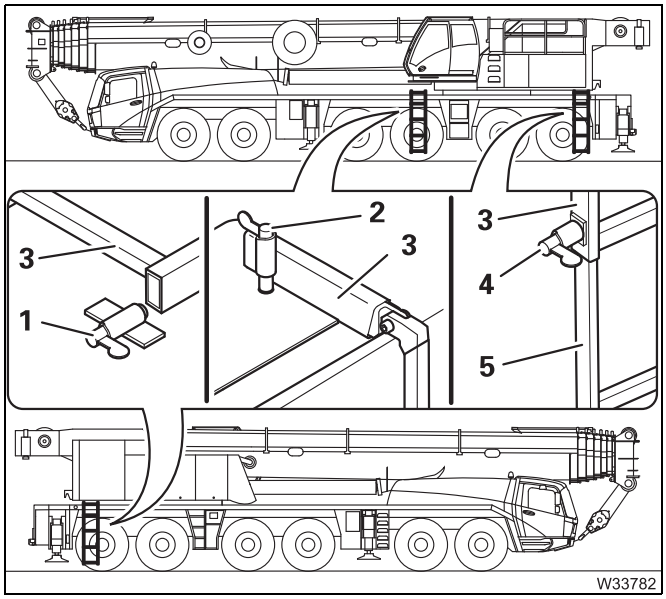
You can fold out the ladder (**1**).

While driving

• Place the ladder (**1**) in the bracket (**2**) and secure it with the spring latch (**3**).

14.03.2018

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

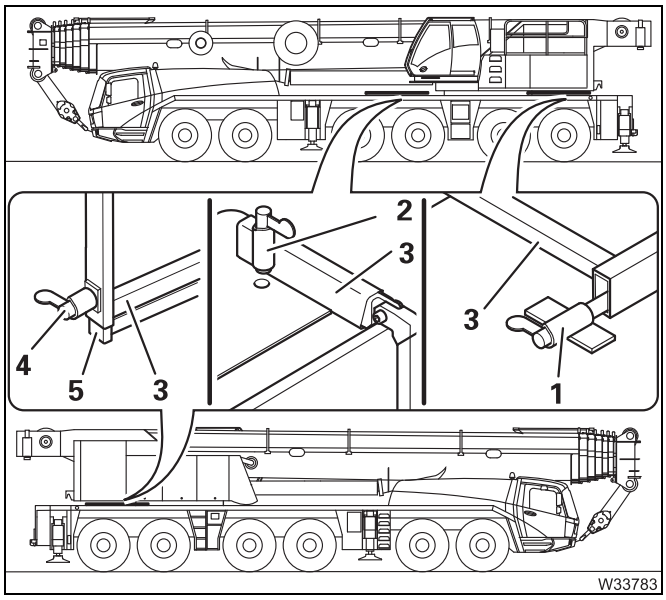


Folding out

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

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

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



Folding in

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

14.03.2018

4.1.4 Refuel

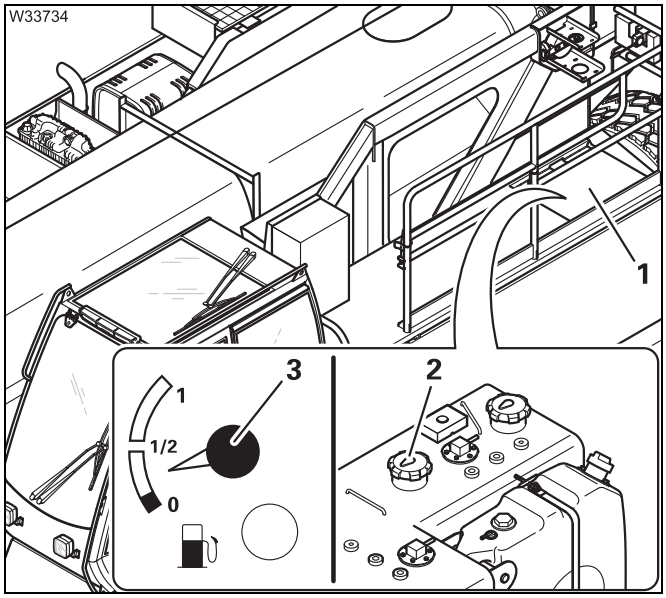
Only use permissible consumables; ➠ *Separate engine operating instructions, provided by the manufacturer*.

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

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

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

Fuel

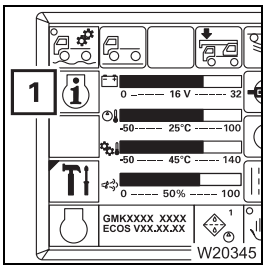


The display (**3**) shows the fuel level in the tank.

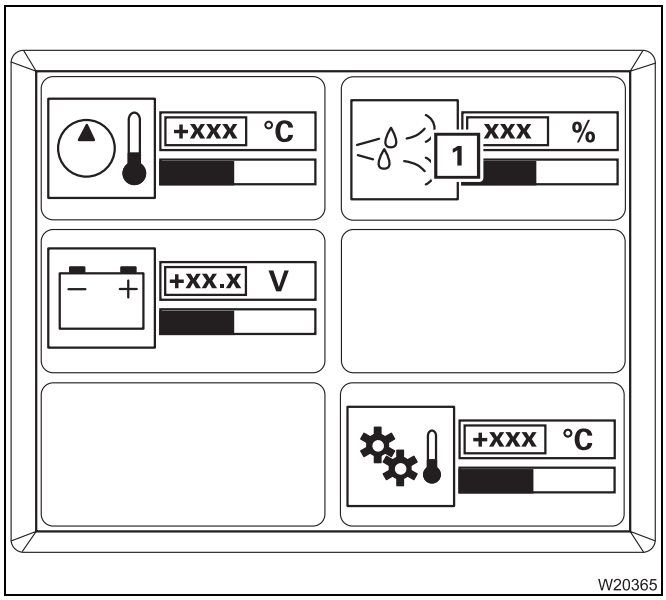
- Open the cover (**1**).
- Fill in the fuel through the filler neck (**2**) in time. Leave sufficient space for the fuel to expand.
- Close the filler neck each time you have refuelled (**2**).
- Close the cover (**1**).

14.03.2018

Carbamide



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



The display (**1**) indicates the current level in percent. 100% corresponds to about 40 l (0.9 gal).

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

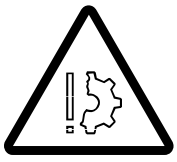
Green: Over 10% – over 4 l (0.9 gal)

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

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

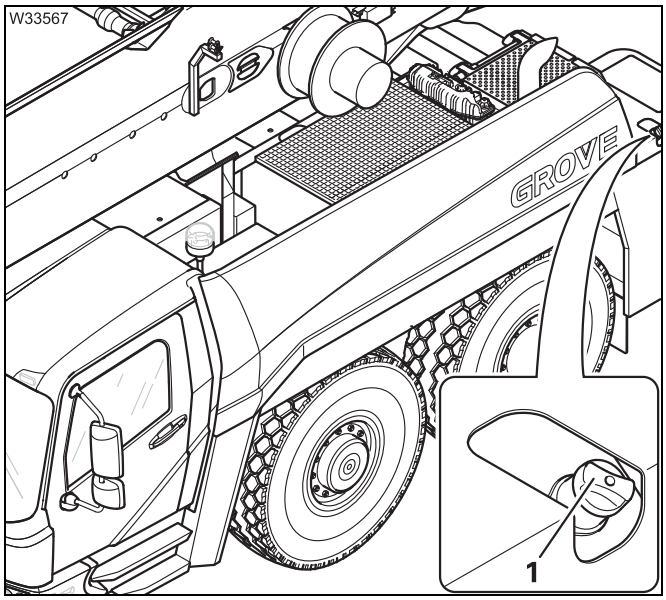
When the carbamide tank is empty the engine control system will reduce the motor torque. You can override this torque reduction;
➠ *Override torque reduction*, p. 5 - 53.

Risk of injury from ammonia vapours!
Ammonia vapours can escape if the carbamide 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!
Carbamide can damage these surfaces. Clean up spilled carbamide with water immediately.

14.03.2018



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

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

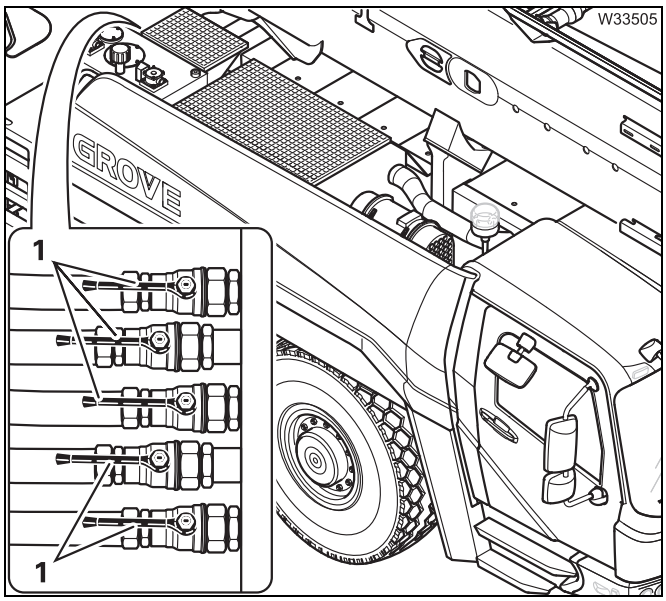
14.03.2018

4.1.5 Checks before starting the engine

At the hydraulic tank

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

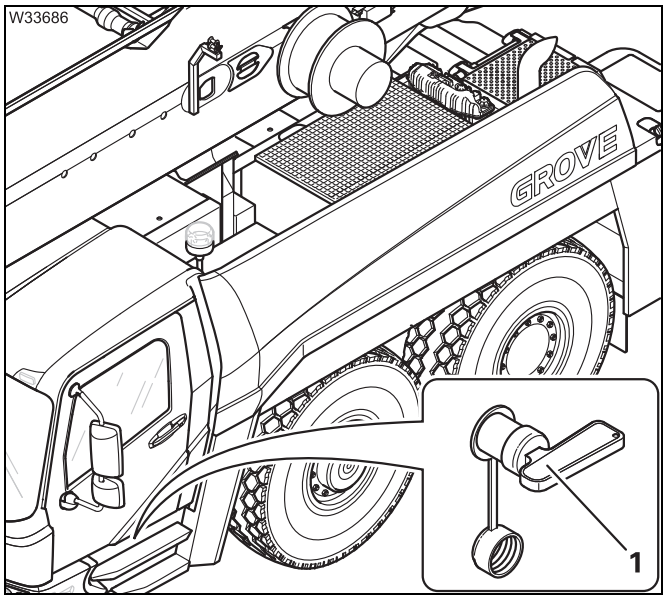
Risk of damage to the hydraulic pumps!
You may only start the engine when all the valves on the hydraulic tank are open!



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

Battery master switch

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



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

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

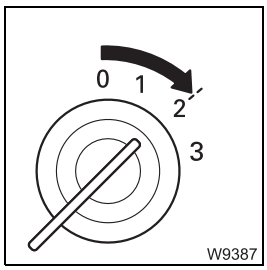
14.03.2018

Checking the hand-held control

Check that the hand-held control has been removed, and that bridging plugs for the hand-held control are inserted into all sockets; ➠ p. 10 - 8.

4.1.6 Switch on the ignition

The ignition can only be switched on if the bridging plugs have been inserted in all sockets for the hand-held control; ➠ *Hand-held control*, p. 9 - 114.



- 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.

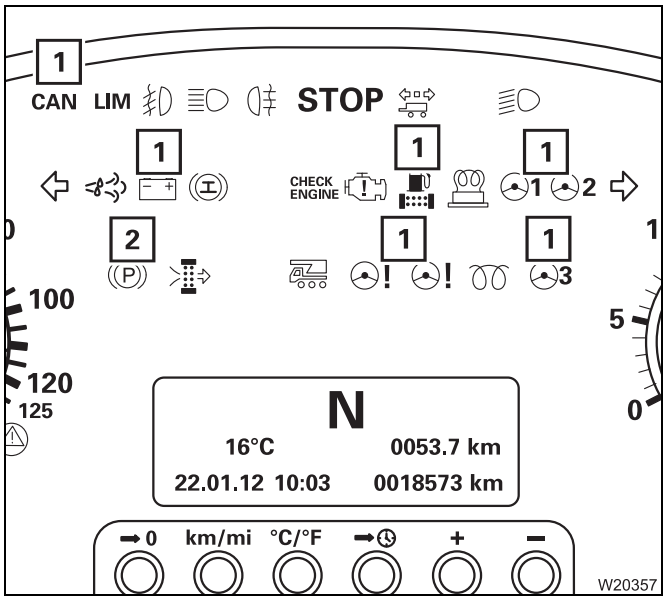
14.03.2018

4.1.7 Lamp test/equalisation of the switching states

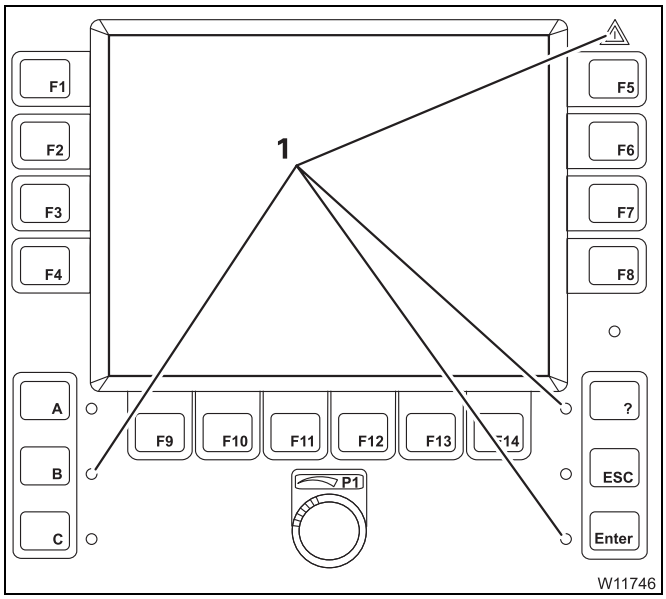
Lamp test

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

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



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

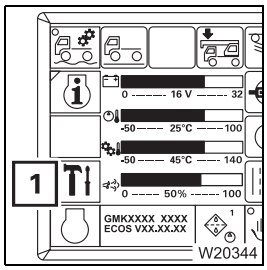


- Check that the lamps (**1**) go on for approx. 2 seconds after switching on the ignition:

If one or more lamps do not light up, refer to **Manitowoc Crane Care**.

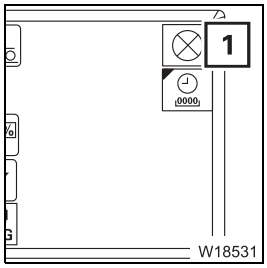
If you could not check all the lamps in the specified time, you can conduct the lamp test again as follows.

14.03.2018



Conducting the lamp test

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

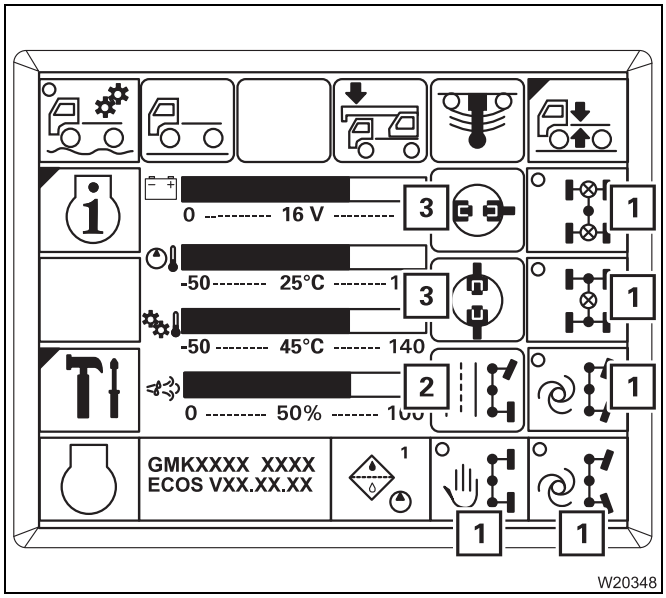


- Press the button (**1**).
  The lamps on the ECOS control unit remain lit until you let go of the button again.

You can adjust the minimum brightness of the display if necessary;
➠ p. 4 - 14.

Switching state alignment

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



The state last saved is retrieved.

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

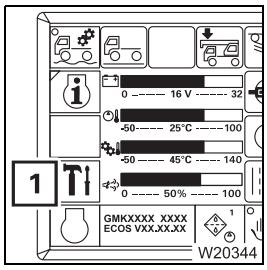
The displays (**2**) and (**3**) show the current switching states.

If the display (**2**) does not show the symbol that corresponds to the switching process, you must actuate the steering so that the locking processes are performed mechanically;
➠ *switching to normal steering mode*, p. 5 - 74.

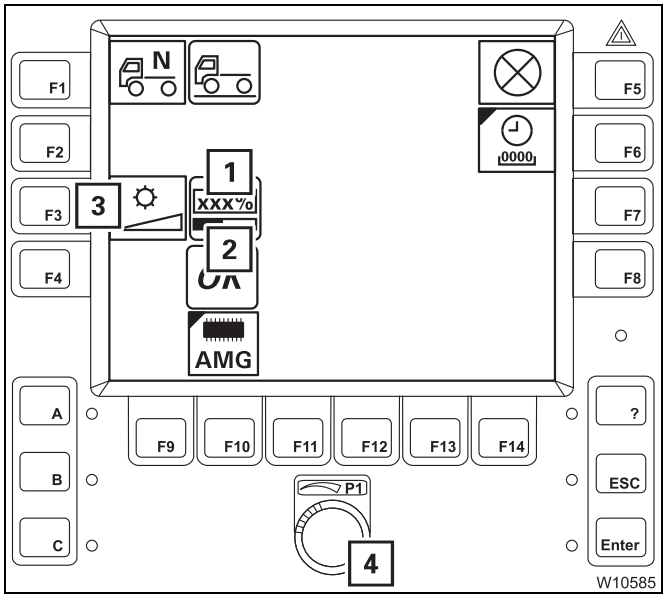
14.03.2018

4.1.8 Display – setting the brightness

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



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



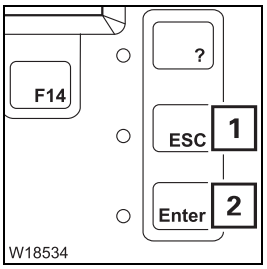
- Press the button (**3**) once.

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

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

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

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



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

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

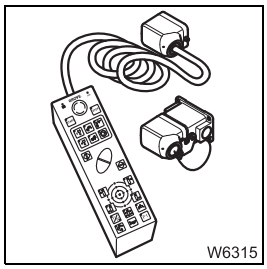
14.03.2018

4.1.9 Starting the engine

This section describes only how to start the engine from the driver's cab.

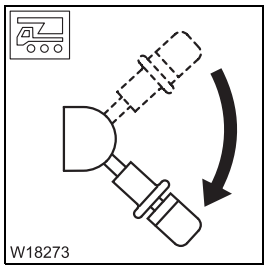
You can also start the engine from the outrigger control units; ➠ p. 12 - 23.

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



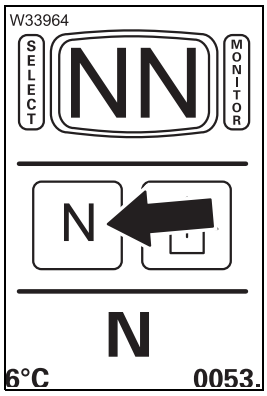
– The bridging plugs have been inserted in all sockets of the carrier and superstructure for the hand-held control; ➠ *Hand-held control*, p. 9 - 114.

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



- Check that the vehicle parking brake is locked.

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



- Switch the transmission to neutral position **N**; ➠ p. 5 - 28.
  Only in this shift position can the engine be started.

14.03.2018

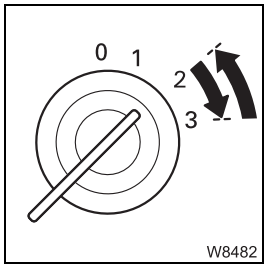
If the engine is equipped with a flame start system; ➠ *With flame start system*, p. 4 - 16.

Without flame start system

This section pertains to starting a warm and cold engine.

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

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



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

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

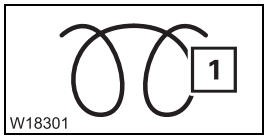
With flame start system

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

This section pertains to starting a warm and cold engine.

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

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

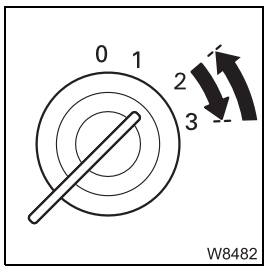


– **When the engine is warm**, the lamp (**1**) will light up only briefly (2 to 3 seconds).
– **When the engine is cold**, the lamp (**1**) goes out as soon as the engine is preheated (duration of up to 20 seconds).
Start the engine within the next 30 seconds; otherwise, you must switch on the ignition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

14.03.2018

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

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



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

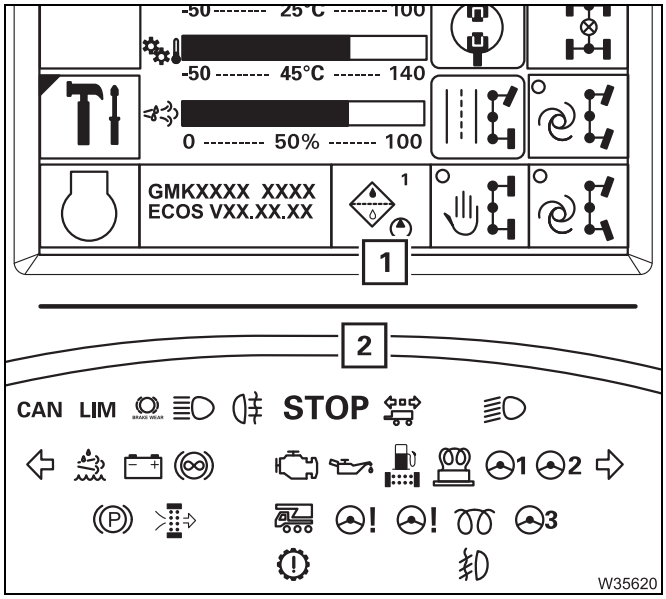
If the engine does not start after multiple attempts; ➠ *Malfunctions on the engine*, p. 7 - 27.

14.03.2018

4.1.10 Checks after starting the engine

Checking in the main menu

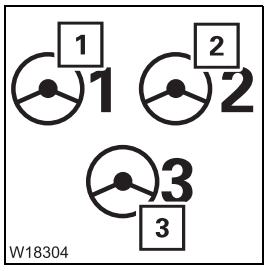
Risk of damage to the engine!
If symbol (**1**) lights up or the **STOP** lamp comes on and the warning buzzer sounds, switch the engine off immediately. Running the engine when the oil pressure is too low can damage it.



- In the main menu, check the displays (**1**) and (**2**):
  - Display (**1**) – when the symbol is red; ➠ *Immediately after you start to move*, p. 5 - 39.
  - Display (**2**) – when a warning message is shown; ➠ *Warning or malfunction messages on the instrument panel*, p. 5 - 51.

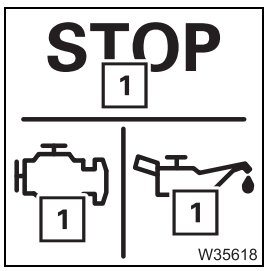
Indicator lamps on the instrument panel

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



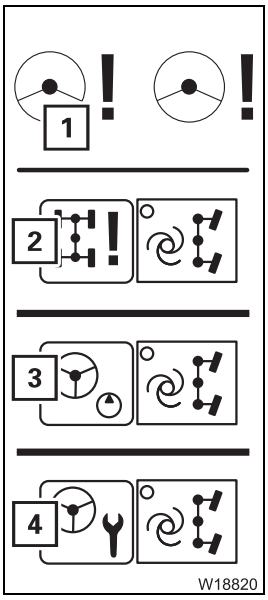
- Check that the lamps (**1**) and (**2**) go out.
  If one or both lamps are lit, refer to the information in section *Immediately after you start to move*; ➠ p. 5 - 39.

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



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

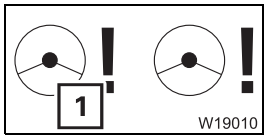
14.03.2018



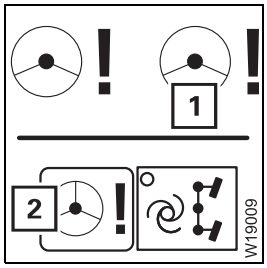
- Check that the lamp (**1**) goes out.

– If the lamp (**1**) **is lit**:
The main menu shows a symbol.

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



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



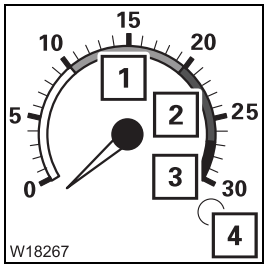
- Check that the lamp (**1**) goes out.
If the lamp (**1**) **is lit**, the symbol (**2**) is shown. The steering system has failed. You must not under any circumstances drive the truck crane.
Contact **Manitowoc Crane Care** and arrange for the error to be rectified.

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

14.03.2018

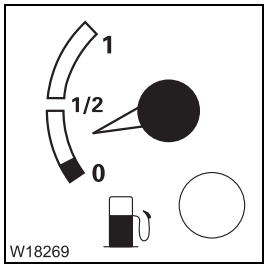
4.1.11 Monitoring elements

Instrument panel



Tachometer

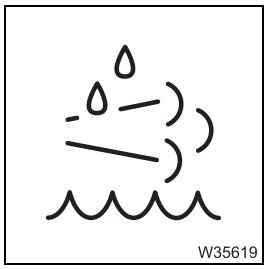
1	**Green:**	Economic consumption
2	**Yellow:**	Engine brake active
3	**Red:**	Engine speed too high – danger; ➠ *Checks when driving downhill*, p. 5 - 44
4	**Lights up**	Engine speed is too high



Fuel level display

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

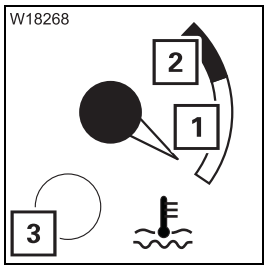
If the fuel tank is almost empty, air can be sucked in; the fuel system must then be bled; ➠ *Maintenance Manual*.



Carbamide supply display

On:	Carbamide supply almost empty
Flashing:	Carbamide tank is empty

➠ p. 4 - 8



Coolant temperature display

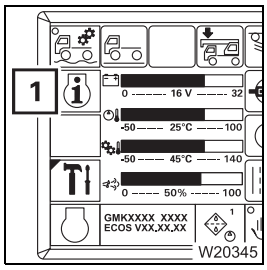
1	**White:**	Coolant temperature normal
2	**Red:**	Coolant temperature too high
3	**Red, flashing**	

Cause and remedy; ➠ p. 7 - 38

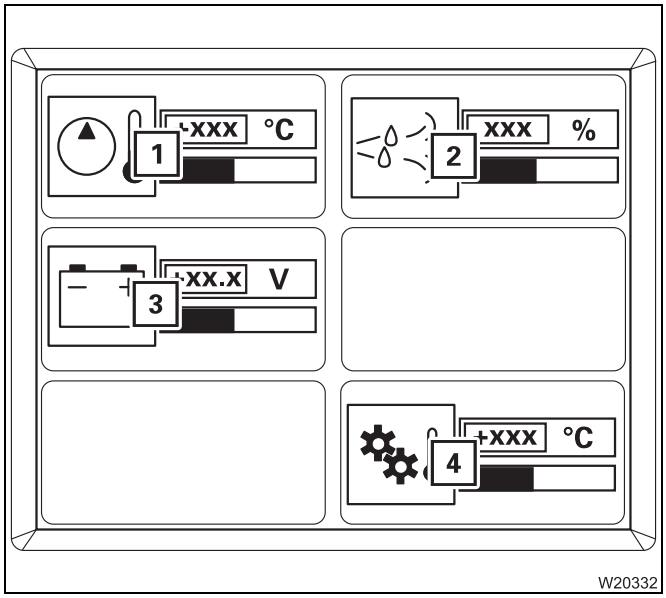
14.03.2018

4.1.12 Monitoring submenu

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



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



This opens the *Monitoring* submenu.

The following values are displayed:

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

2 Carbamide supply in percent

3 Voltage in volts

4 The transmission oil temperature in °C (°F)

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

Green: Value OK.

Yellow: Limit value almost reached

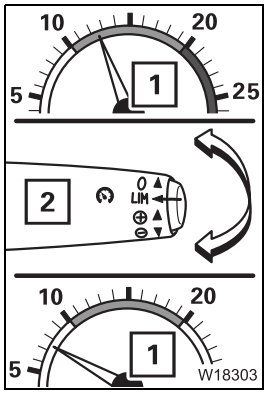
Red: Limit value exceeded (or not reached) – warning message; p. 5 - 48.

14.03.2018

4.1.13 Setting idling speed

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

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

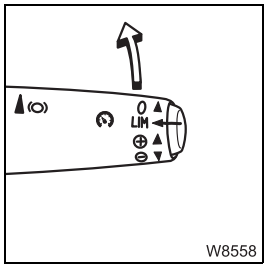


Increasing/reducing the idling speed

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

  or

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



Switching off the idling speed change:

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

  or

- Accelerate to more than 20 km/h (12 mph).

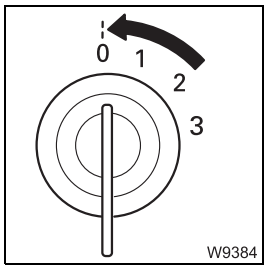
14.03.2018

4.2 Switch the engine off

4.2.1 At the ignition lock and with the outrigger control units

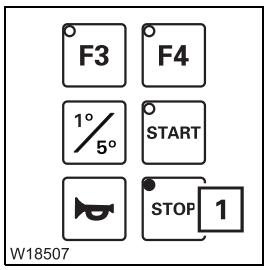
Risk of accidents because the truck crane cannot be steered!
Switch the engine off only once the truck crane has come to a standstill. If you remove the ignition key, the steering will lock and you will lose control of the moving truck crane.

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.



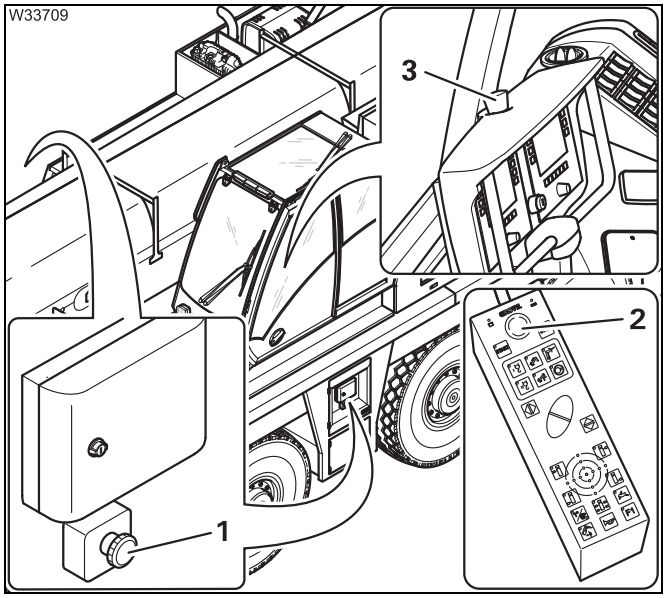
Outrigger control units

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

After switching off If you want to park the truck crane; ➠ p. 5 - 54.

14.03.2018

4.2.2 Using the emergency stop switches



Emergency stop switch

Four emergency stop switches are provided for emergencies:

1 On the carrier

2 On the hand-held control

3 In the crane cab

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

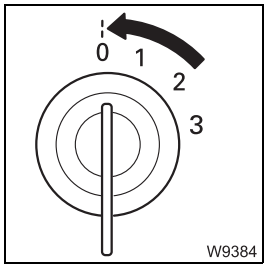
The engine shuts down.

If an air intake inhibitor is present, it will be triggered – this also applies to the engine for crane operation.

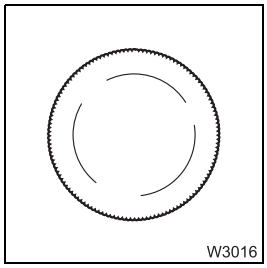
Do not operate the emergency stop switch to switch the engine off in normal operation. Only operate the emergency stop switch in an emergency situation.

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.

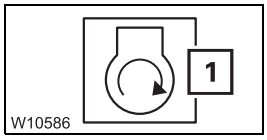
If air intake inhibitors are fitted, they must be released; ➠ *Releasing the air intake inhibitor*, p. 4 - 25,
➠ *Releasing the air intake inhibitor*, p. 10 - 23.

14.03.2018

4.3 Air intake inhibitor

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

– if an emergency stop switch is actuated or



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

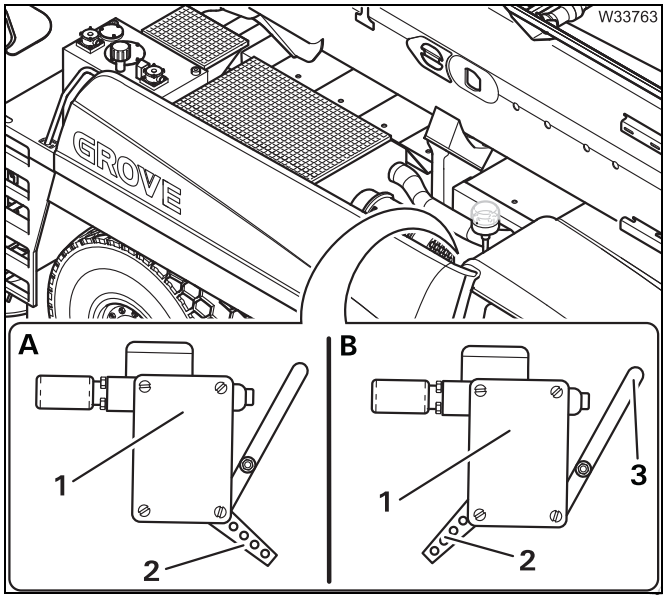
The engine can be restarted only after the air intake inhibitor has been released.

Releasing the air intake inhibitor

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

– The ignition 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.

(**B**) – Turn the indicator (**2**) clockwise until it engages in the *released* position.

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

14.03.2018

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14.03.2018

5 Driving

14.03.2018

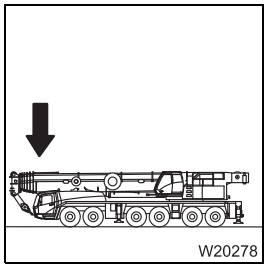
14.03.2018

5 Driving

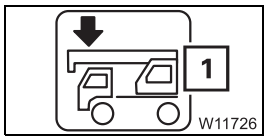
5.1 Before driving

5.1.1 CHECKLIST: Checks before on-road driving

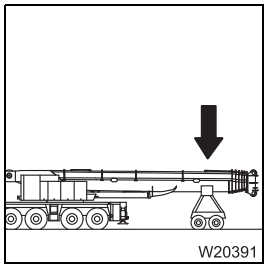
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions there!



1. **If the boom is on the boom rest**
   - All telescopic sections are interlocked; the telescoping cylinder is locked with telescopic section I.
   - The slewing gear must be switched off; ➠ p. 11 - 100.
   - The turntable is also locked; ➠ p. 11 - 14.
   - The swing-away lattice must be in the rigging position; ➠ *Operating Instructions Lattice Extension*

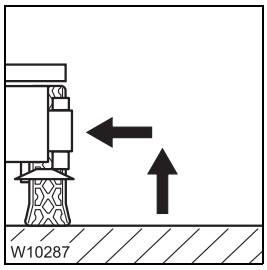


   - The symbol (**1**) is displayed (if present); ➠ p. 5 - 9.



2. **When the main boom is resting on a trailer**
   - All telescopic sections must be locked together.
   - The slewing gear must be switched off; ➠ p. 11 - 100.
   - The boom floating position is switched on; ➠ p. 6 - 13.
   - The slewing gear freewheel is switched on; ➠ p. 6 - 12.
   - The boom pre-tensioning may be switched on; ➠ p. 6 - 14.
   - The houselock may be switched off; ➠ p. 11 - 15.
   - The turntable has been unlocked; ➠ p. 11 - 14.

14.03.2018



3. On the outriggers

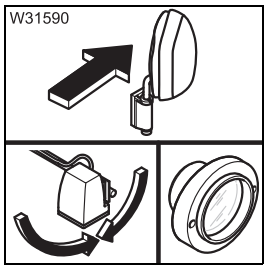
– All outrigger beams must be fully retracted and secured to prevent extension; ➠ p. 12 - 32.

– The outrigger pads must be in the driving position; ➠ p. 12 - 39.

In the case of additional equipment with removable support box:

– The auxiliary supports are retracted; ➠ p. 6 - 72.

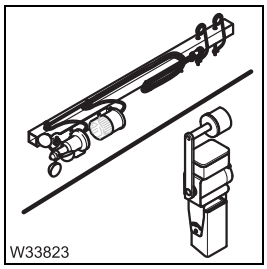
– The electrical and pneumatic connections for driving on the road have been established; ➠ p. 6 - 75; ➠ p. 6 - 74.



4. – The mirrors for crane operation are folded in; ➠ p. 12 - 123.

– The spotlight must be turned downwards (if present); ➠ p. 11 - 108.

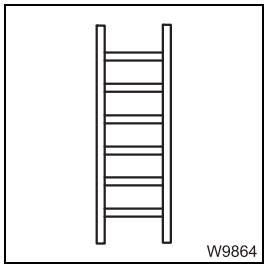
– The lighting on the outrigger must be switched off; ➠ p. 3 - 62.



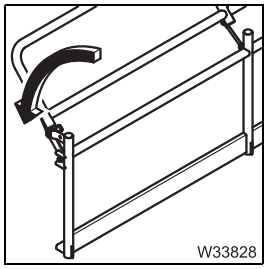
5. Anemometer, air traffic control light and camera system are removed;

➠ *Anemometer and air traffic control light*, p. 12 - 112.

➠ *Cameras for crane operation*, p. 12 - 117

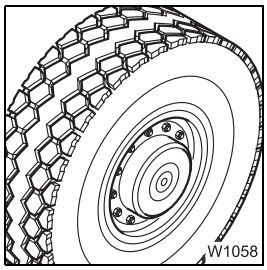


6. All ladders are secured; ➠ *Folding in*, p. 4 - 6.



7. The railings are folded in; ➠ *Railings on the turntable*, p. 12 - 115.

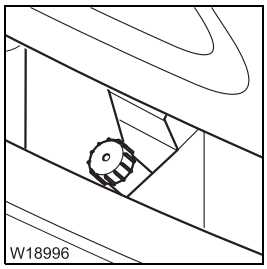
14.03.2018



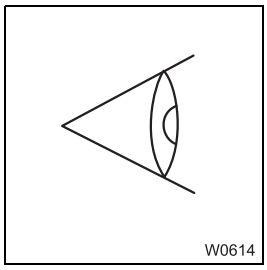
8. Check the tyres:

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

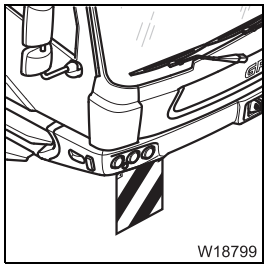
– Other checks; ➠ *Maintenance Manual*.



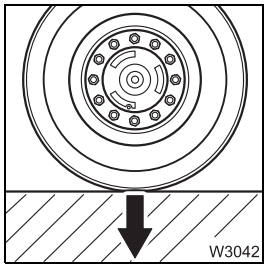
9. Windscreen washing system – check level; ➠ p. 5 - 7.



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

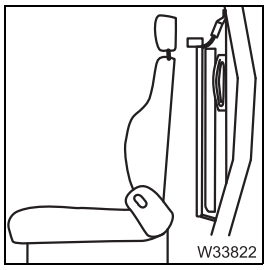


11. The warning signs for marking the vehicle width are folded down (only for vehicle widths over 2.75 m (9.0 ft));
Vehicle width; ➠ p. 1 - 8,
Warning signs; ➠ p. 5 - 7.



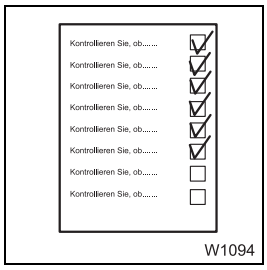
12. The detachable equipment parts must be stripped down so that they fulfil the regulations of the country in which you are working as regards permissible weights and axle loads, lengths, widths, height, etc.
For a driving mode with a maximum axle load of 12 t (26,500 lbs);
➠ *Driving modes*, p. 6 -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

14.03.2018

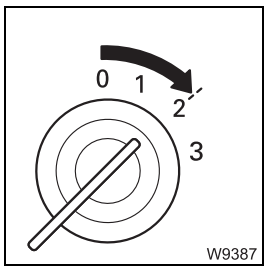


13. The fold-up berth must be folded up and secured; ➠ p. 5 - 57.

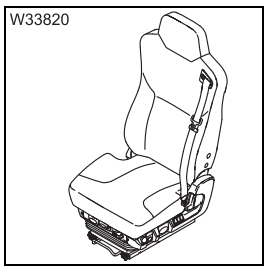
14. All additional parts which may be transported must be secured against falling down.



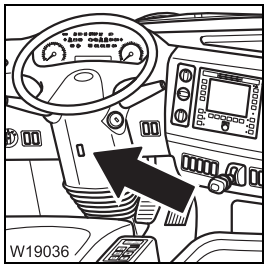
15. Carry out all activities and inspections required for starting the engine; ➠ *CHECKLIST: Starting the engine*, p. 4 - 1.



16. Switch on the ignition; ➠ p. 4 - 11.

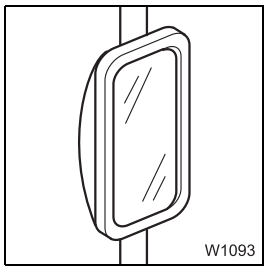


17. Adjust the driver's seat; ➠ p. 5 - 13.

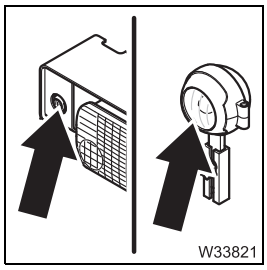


18. Adjust the steering column; ➠ p. 5 - 16.

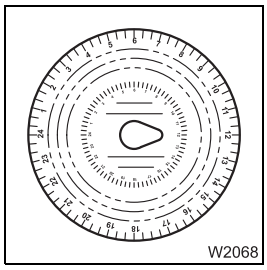
14.03.2018



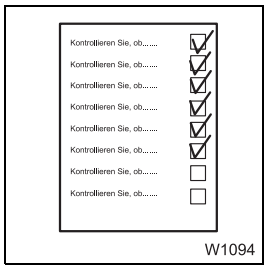
19. Adjust the mirrors; ➠ p. 5 - 8.



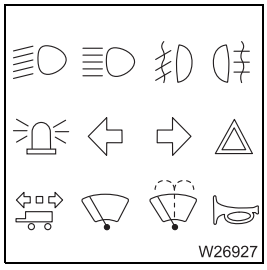
20. Adjust the reverse camera if necessary; ➠ p. 5 - 8.



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

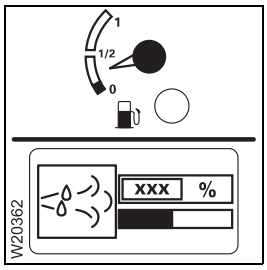


22. Start the engine and carry out all checks; ➠ *Checks after starting the engine*, p. 4 - 18.

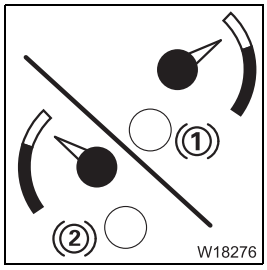


23. Check the electrical system; ➠ p. 5 - 7.

14.03.2018

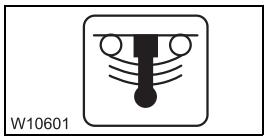


24. Check the fuel level and carbamide level if necessary; ➠ p. 4 - 7.

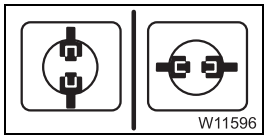


25. Check the compressed-air system and the brakes; ➠ p. 5 - 10.

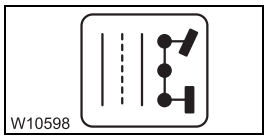
26. Check that all switching states for on-road driving are set, and that the corresponding symbols are shown:



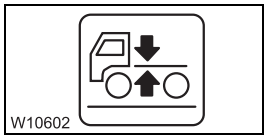
– Suspension switched on; ➠ p. 5 - 18,



– Longitudinal and transverse differential locks switched off; ➠ p. 5 - 62,



– Separate steering switched off – the symbol for on-road driving is displayed; ➠ p. 5 - 74,



– On-road level is set; ➠ p. 5 - 65.

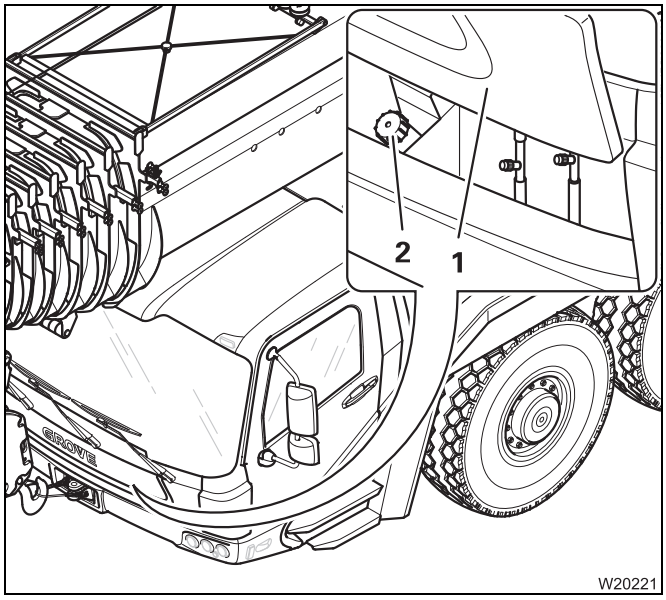
Establish the switching states for on-road driving if necessary.

14.03.2018

5.1.2 Checking the condition of the truck crane

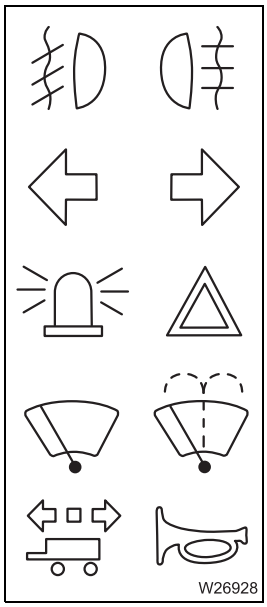
Windscreen washing system

Use a windscreen washing agent and, at low temperatures, an appropriate antifreeze.



- Open the front flap (**1**); ➠ p. 3 - 72.
- Check the level in the tank (**2**).
- Top up water in due time, and close the tank (**2**) with the cap.
- Close the front flap (**1**).

Electrical system

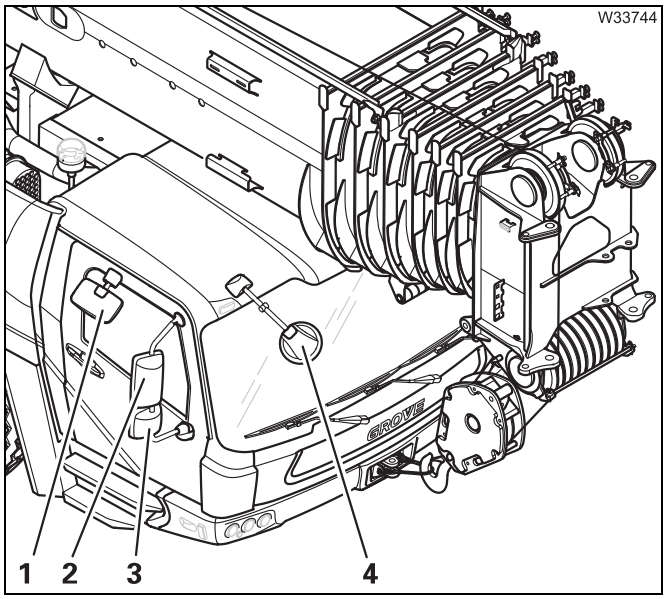


- Check the following functions and arrange for faulty parts to be repaired:
  - Parking light/headlight, rotating beacons, fog tail light, side marker lights,
  - Hazard warning system,
  - Brake lights,
  - Reversing lamp/buzzer,
  - Headlight – full beam,
  - Turn signal indicators,
  - Windscreen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

14.03.2018

Adjusting the mirrors

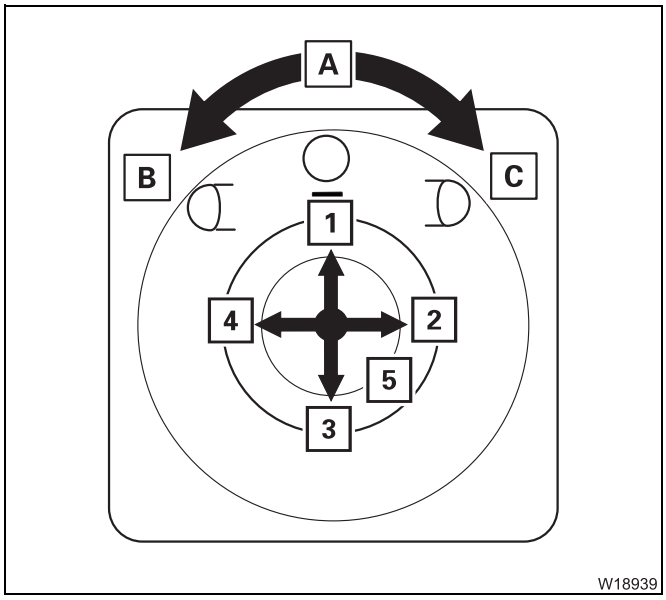
Adjust all the mirrors to suit your sitting position.



Manual adjustment

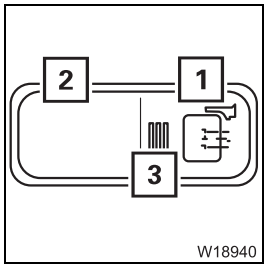
- Manually adjust the mirrors (**1**), (**3**) and (**4**).

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

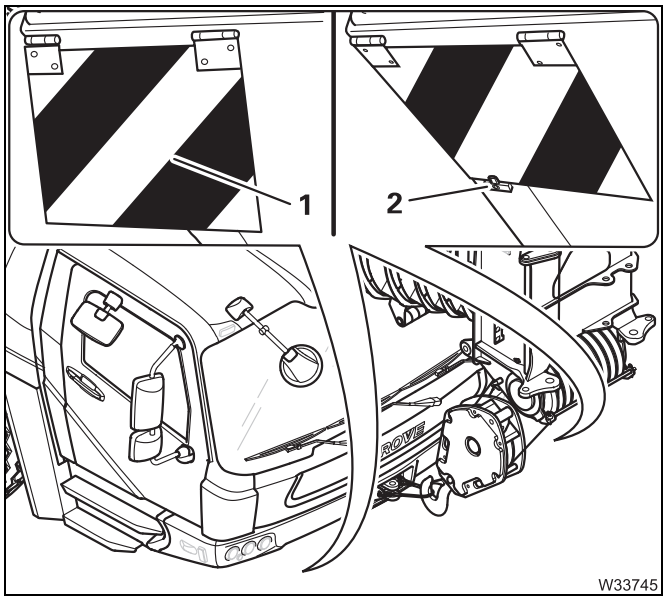
1 To switch on: Press button once – lamp (**3**) turns on

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

14.03.2018

Warning plates for vehicle width

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



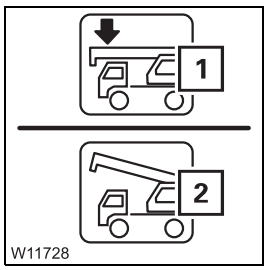
The warning plates (**1**) must be folded down to indicate the vehicle width during on-road driving.

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

Displaying vehicle height

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

- Open the main menu.



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

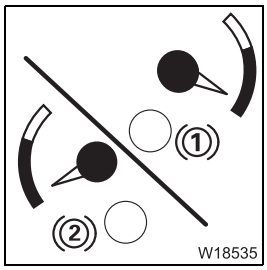
- Check that the symbol (**1**) is shown.
- When the symbol (**2**) is shown, derrick the main boom out until the symbol (**1**) appears.

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

14.03.2018

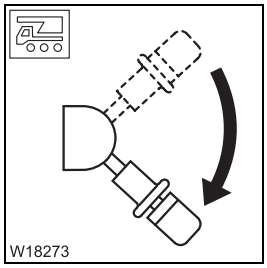
Supply pressure

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



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

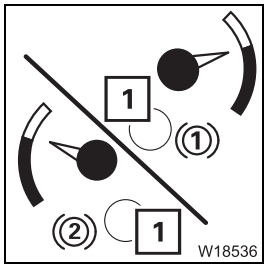
If the supply pressure is too low, such as after repairs, you can build it up as follows.



Building up supply pressure

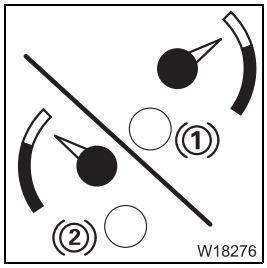
- Check that the parking brake is applied.

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



- Allow the engine to 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 approx. 5.5 bar (80 psi).



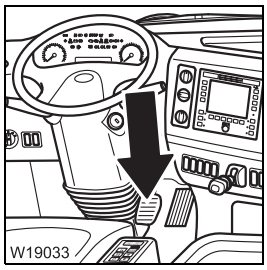
- Refill the supply pressure until
  - approx. 8 bar (116 psi) is reached **and**
  - a valve audibly discharges pressure.

There is now sufficient supply pressure.

14.03.2018

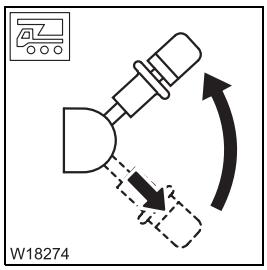
Parking brake

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 from 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.

14.03.2018

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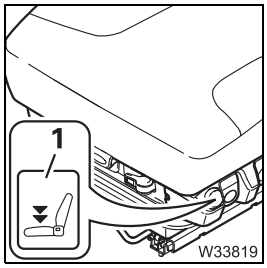
14.03.2018

5.1.3 Adjusting the seats and steering column

Driver's seat



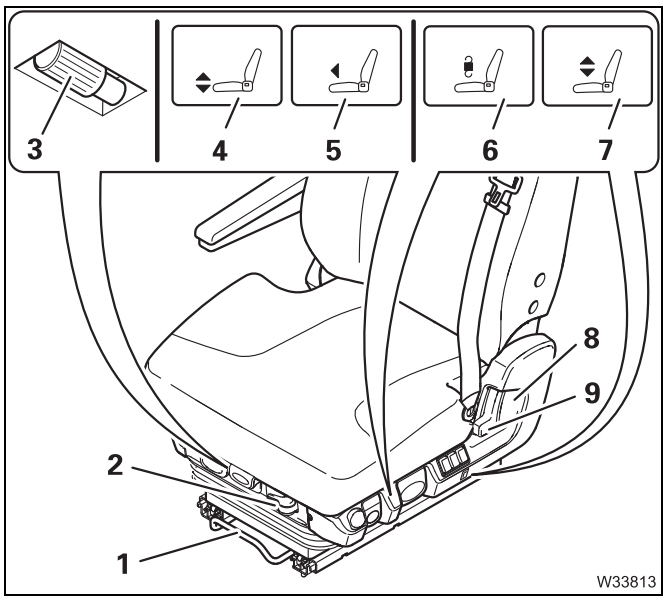
The seat height and lumbar support (version 1) are adjusted pneumatically. You can only make these adjustments when:

– Sufficient air pressure is available in the secondary consumer circuit. You may have to build supply pressure; ➠ p. 5 - 10.

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

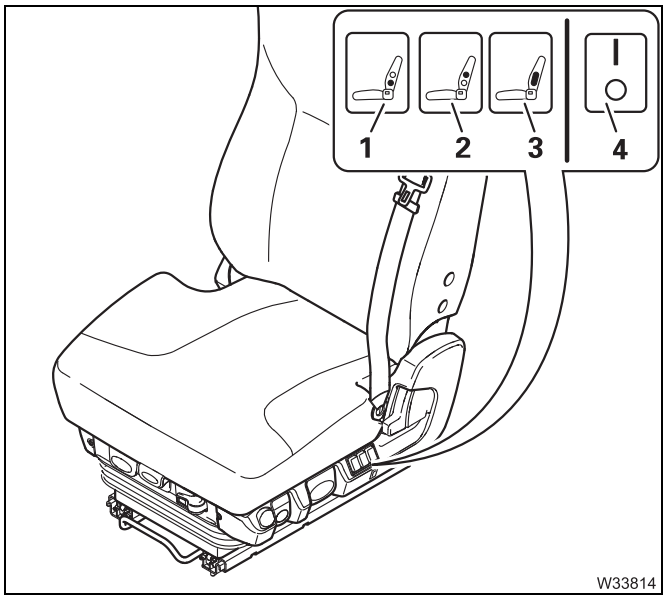
• Sit on the driver's seat; the seat will rise to the last position set.

You can make various settings as required.



Version 1

1 Seat – longitudinal adjustment
2 Vertical cushioning on/off
3 Armrests – inclination[1)]
4 Seat cushion – angle
5 Seat cushion – longitudinal adjustment
6 Adjust suspension stiffness to body weight
7 Seat – height
8 Back rest – angle
9 Shoulder supports



1 Lower lumbar support area
2 Upper lumbar support area
3 Lateral support
4 Seat heating on/off[1)]

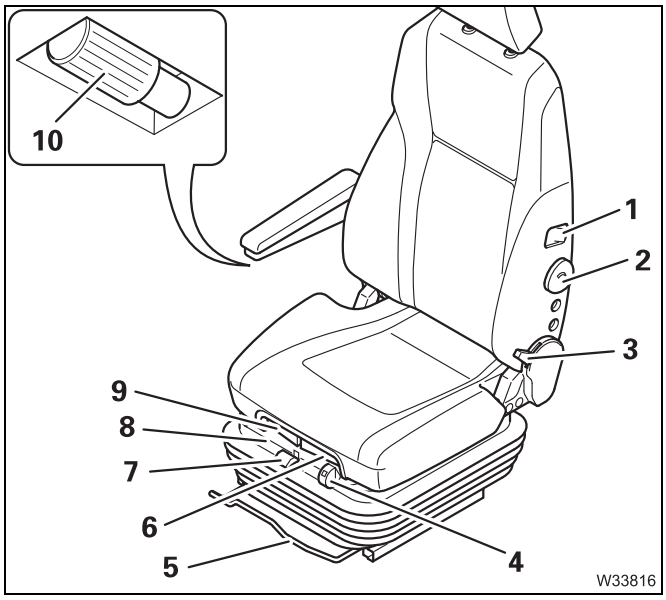
[1)] Additional equipment

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

Empty the air cushion: Push down

Fill the air cushion: Push up

14.03.2018



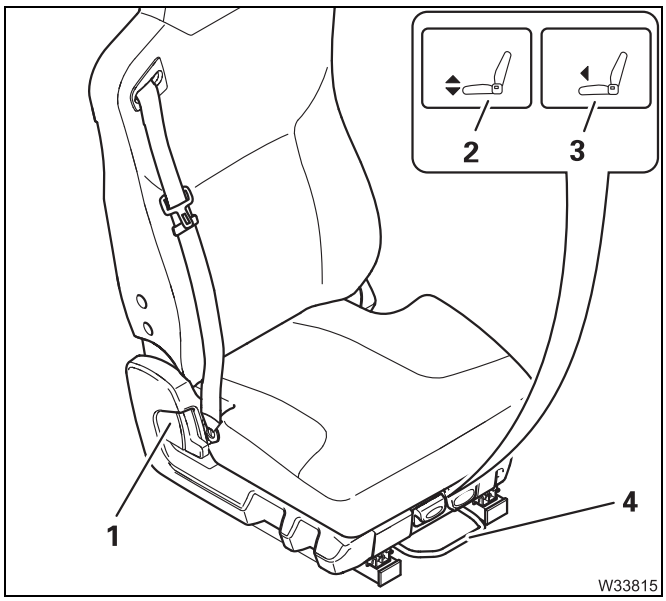
Version 2

1 Seat heating on/off[1)]
2 Back rest
3 Back rest – angle
4 Seat display – height
5 Seat – longitudinal adjustment
6 Seat cushion – longitudinal adjustment
7 Seat – height
8 Adjust suspension stiffness to body weight[1)]
9 Seat cushion – angle
10 Armrests – inclination[1)]

[1)] Additional equipment

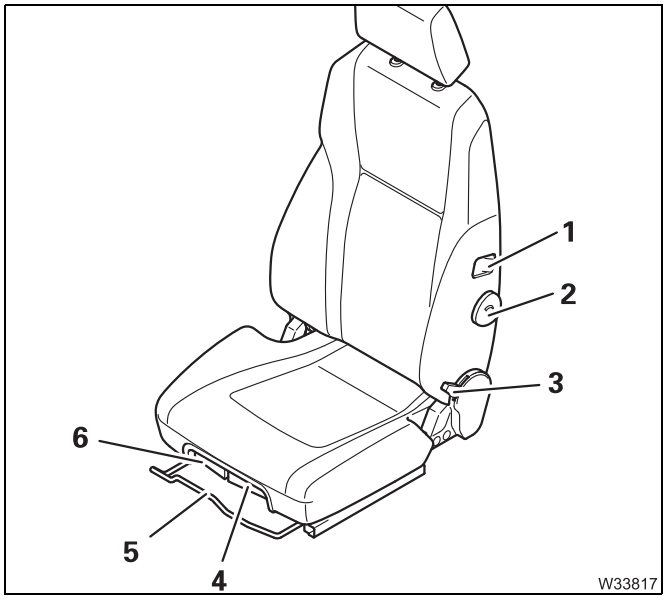
14.03.2018

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



Version 1

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



Version 2

1 Seat heating on/off[1)]
2 Lumbar area support[1)]
3 Back rest – angle
4 Seat cushion – longitudinal adjustment
5 Seat – longitudinal adjustment
6 Seat cushion – angle

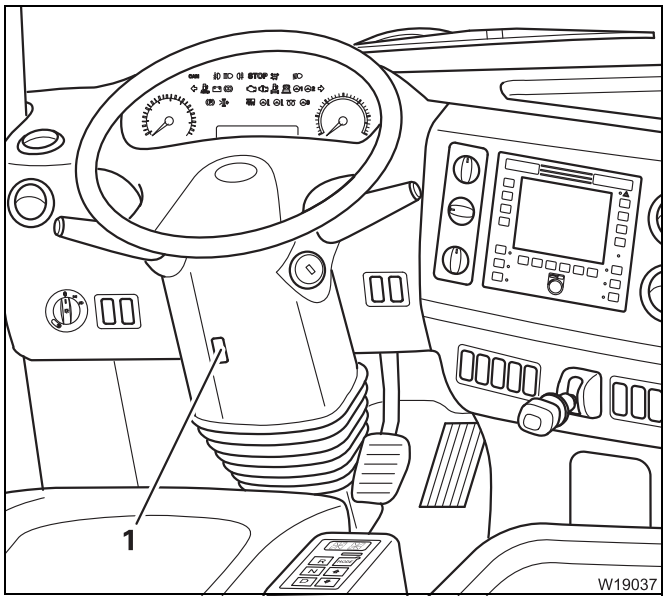
[1)] Additional equipment

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 is only unlocked when sufficient supply pressure is available; ➠ *Building up supply pressure*, p. 5 - 10.

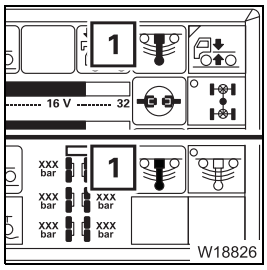


- Push the (**1**) button down once. The steering column is unlocked for approx. 6 seconds.
- Move the steering column into the desired position.
- Push the button (**1**) up once.
  Or wait until the steering column locks automatically (after approx. 6 seconds).

14.03.2018

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.



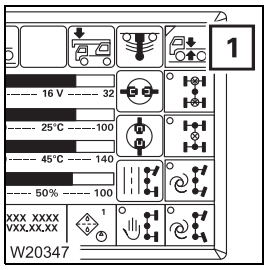
The current switching state of the suspension is shown in the displays (**1**) in the main menu and in the *Suspension* submenu.

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

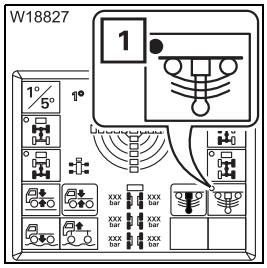
To switch the suspension on and off, you must open the *Level adjustment system* submenu.

Opening the submenu

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



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



The *Level adjustment system* submenu opens.

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

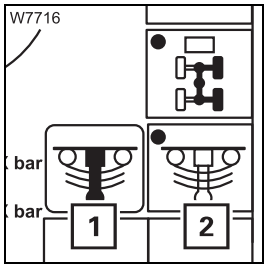
Dot is green:	Switch on suspension has been selected.
Dot is black:	Switch off suspension has been selected.

14.03.2018

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 would be suddenly pushed together when the suspension was switched on, causing them to be damaged and possibly causing the truck crane to overturn.



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

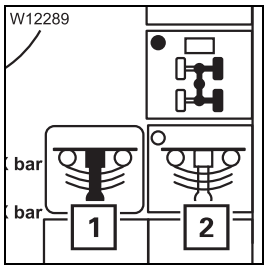
When the suspension is switched on, the symbol (**1**) is **green**.

If the (**1**) symbol stays **red**, the supply pressure may be too low. In this case the suspension would not be switched on until sufficient supply pressure has been built up; ➠ *Building 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.



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

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

14.03.2018

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.).

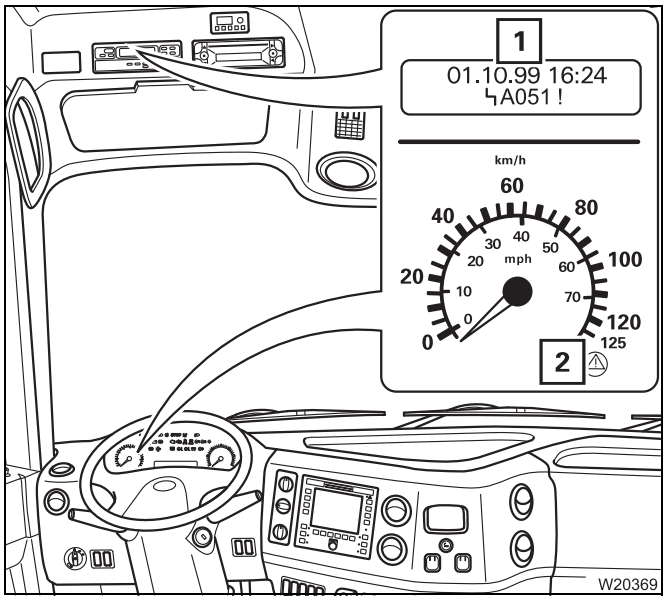
Risk of damage to the tachograph drawer!
Open the tachograph drawer only to insert or remove diagram sheets and do not use the opened drawer as a shelf or surface (e.g. to mark the diagram sheets). This prevents contamination and damage.

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.



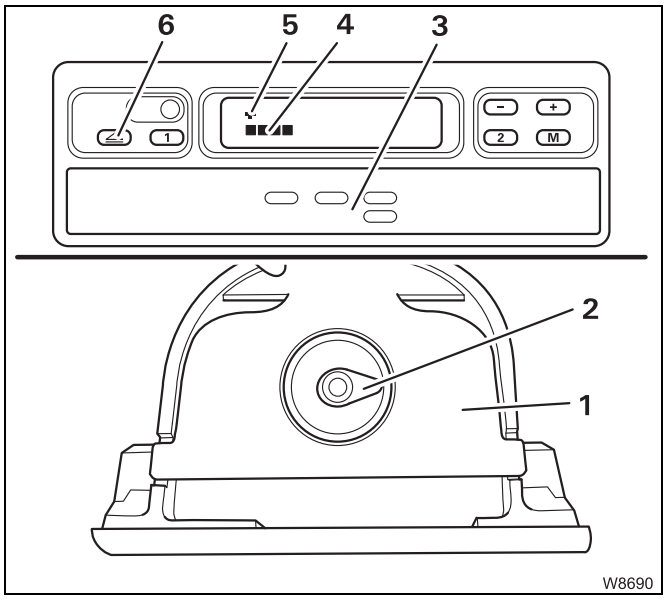
If there is a malfunction in the tachograph (**1**), the lamp (**2**) on the tachometer lights up.

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

14.03.2018

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.



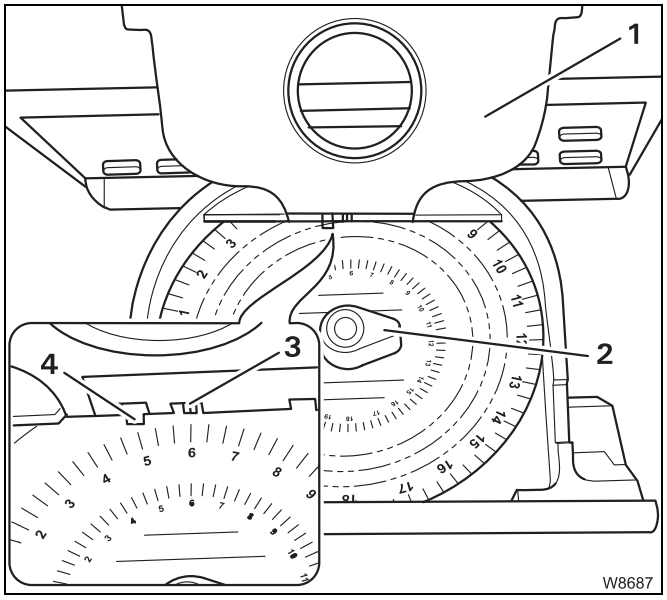
Opening the drawer

- 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

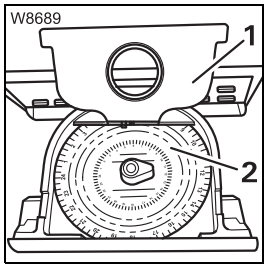
- Take all the diagram sheets out of the diagram sheet mounting.
- Close the drawer.
  The time setting is corrected automatically.
- Open the drawer and insert the required diagram sheets.

14.03.2018

Inserting diagram sheets

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

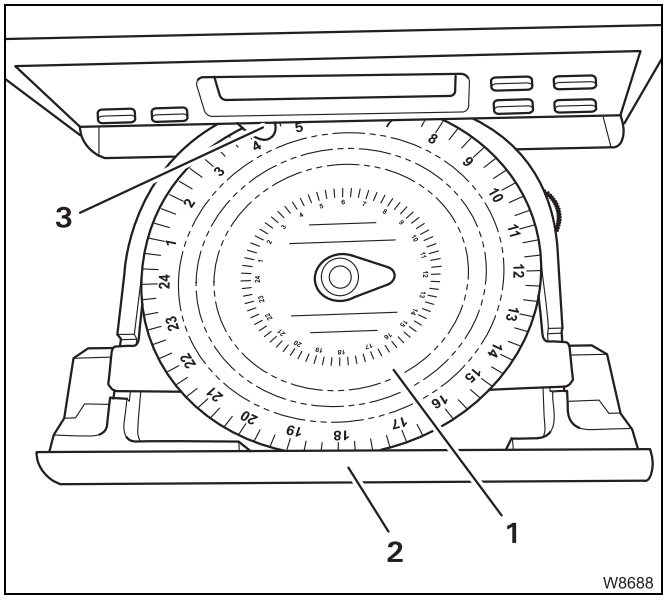
Risk of malfunctions in the electronics!
If a diagram sheet has been damaged by being marked several times, this might cause malfunctions in the electronics. Always insert the plastic diagram sheet supplied should you not need to use the tachograph.



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

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

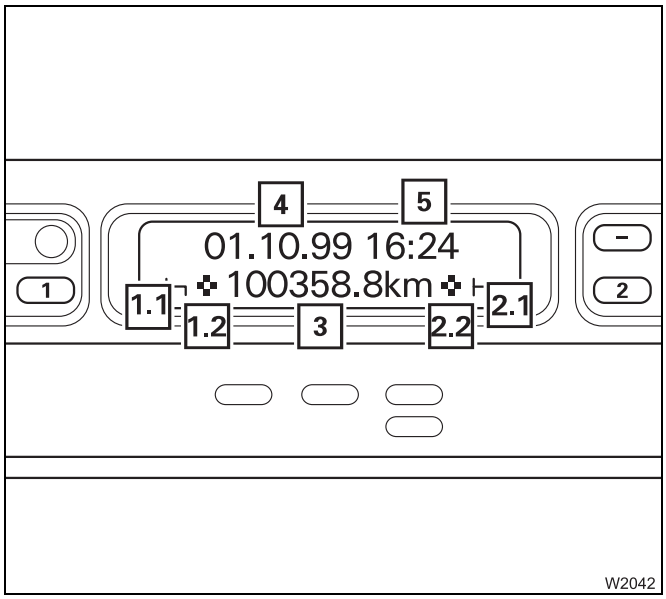
– After checking the time, insert the diagram sheet (**2**).



- Fold the isolating plate downwards.
- Put the diagram sheet (**1**) for driver 1 on the isolating plate.
- Take care that the diagram sheet is under the 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.

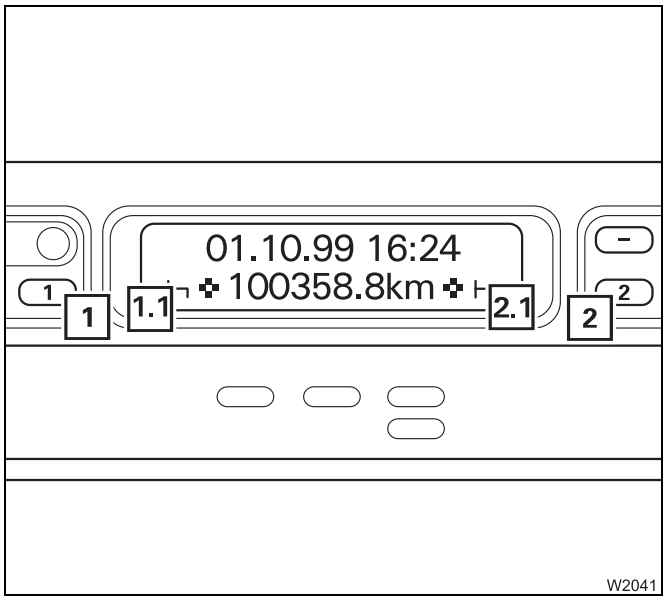
14.03.2018



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**)



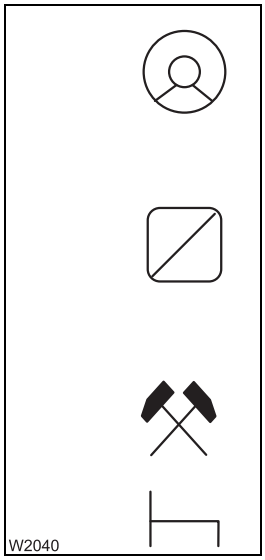
Setting the time groups

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**).

14.03.2018

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).

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

14.03.2018

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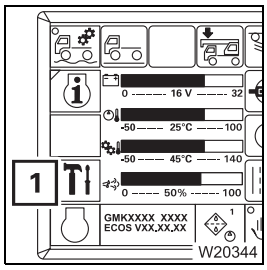
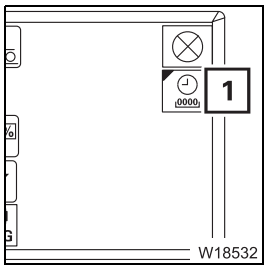
14.03.2018

5.1.6 Displaying the operating hours

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

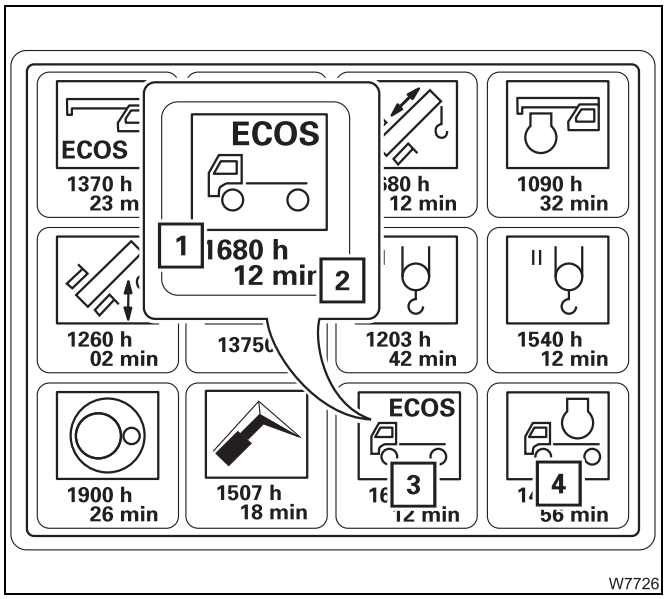


- If necessary, open the main menu and press the button (**1**) once.



The *Settings* submenu opens.

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



The *Operating hours* submenu opens.

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

– The value (**1**) indicates the hours, e.g. 1,680 hours,

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

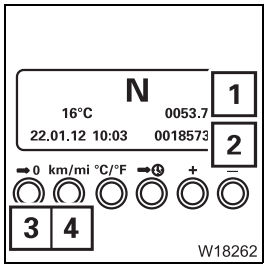
The other displays relate to crane operation;
➠ *Displaying the operating hours*, p. 11 - 109.

14.03.2018

5.1.7 Settings/indications on the driving display

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

The ignition must be switched on.



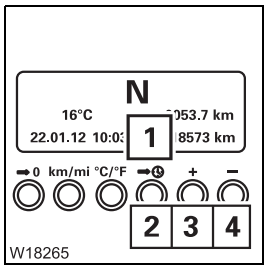
Kilometre counter

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

2 Overall route in kilometres

3 Reset daily kilometre counter

4 Switch between km/mi



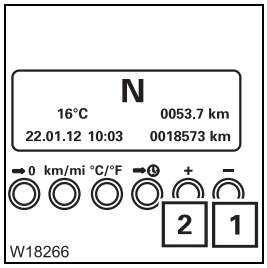
Time/date

1 Time/date

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

3 Increase the selected unit

4 Reduce the selected unit

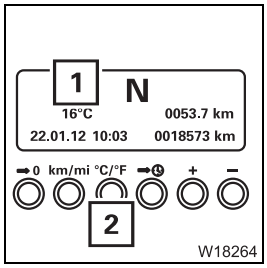


Instrument lighting

The headlight or parking light is switched on.

1 Instrument lighting dimmer

2 Instrument lighting brighter



Outside air temperature display

1 Outside air

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

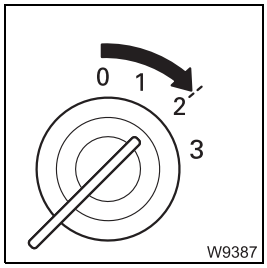
14.03.2018

5.2 Operating the transmission

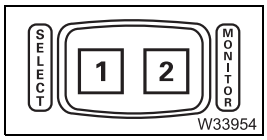
The transmission automatically controls all gear changes. However, gears can be changed manually at any time.

5.2.1 Switching on

Risk posed by unexpected rolling!
When the ignition is switched on, the transmission switches to the neutral position **N**.
Therefore always apply the parking brake or the service brake before you switch on the ignition.
This prevents the truck crane from suddenly rolling away.

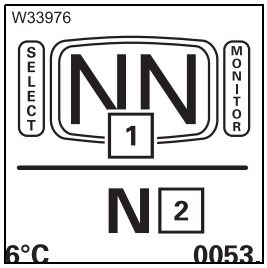


- Switch on the ignition.

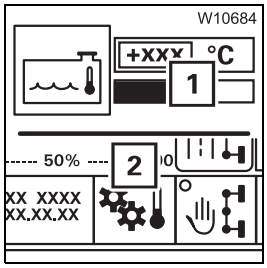


– The electronic transmission system is switched on and a test program runs. At the same time, the displays (**1**) and (**2**) light up in the *Transmission* display.

– If a gear is engaged when the ignition is switched off, the transmission switches into the neutral position. The entry **NN** appears in the *Transmission* display.



– The *Transmission* display shows the current state, e.g. neutral position
  1 on the *Transmission* display
  2 on the *Driving* display



If an error occurs, which may be of importance for continued driving, the corresponding symbols appear on the displays (**1**), (**2**); ➠ p. 7 - 39.

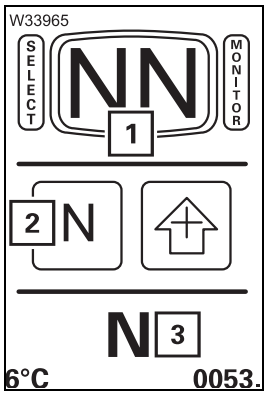
14.03.2018

5.2.2 Switching the transmission to the neutral position

The neutral position can be switched on at any time. You should only switch to neutral position at standstill.

You can only start the motor when the transmission is in the neutral position.

Risk of accidents when driving in neutral position!
Never switch into neutral position whilst driving.
In the neutral position, you cannot accelerate the truck crane, and the engine retarder does not work.

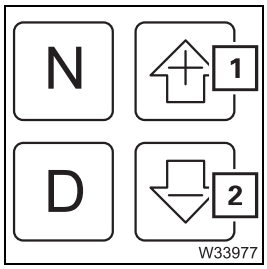


- Press the button (**2**) once.

As soon as the neutral position is switched on, it is shown on the displays (**1**) and (**3**).

While driving

If you have shifted into neutral while driving, then proceed as follows to shift down in order to return to a safe driving mode.



- Release the accelerator.
- Press button (**2**) once **while driving forward**.
- Press button (**1**) once **while driving in reverse**.

An appropriate gear will be engaged.

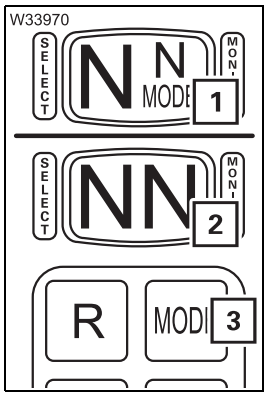
14.03.2018

5.2.3 Changing the driving mode

You may switch between two driving modes:

– The **E** (Economy) driving mode is designed mostly for level driving conditions. A higher gear is selected at a low engine speed to save on fuel consumption.

– The **P** (Power) driving mode is designed mostly for driving uphill and off-road. A high gear is selected only when a high engine speed has been reached for more power.



- Press button (**3**) once – the driving mode switches to the other driving mode.
  – The display shows the current state.
    1 Driving mode **P** on
    2 Driving mode **E** on

14.03.2018

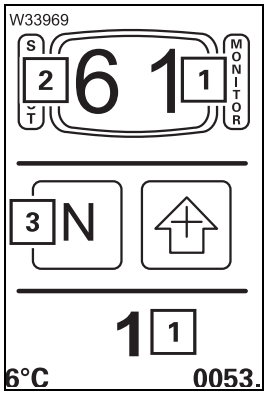
5.2.4 Selecting the driving direction

The following conditions must be met:

– The vehicle engine is running at idling speed,
– The accelerator is not being operated
– The parking brake or holding brake is applied to secure the truck crane.

Risk of accidents from unexpected movement!
If the engine speed is too high when selecting the driving direction, then no gear will be engaged. However, if the engine speed briefly drops low enough, then the gear will be engaged and the truck crane will begin to move, e.g. when you release the accelerator.

Risk of accidents if brakes not applied!
If the brakes are not applied, the truck crane moves immediately once the driving direction has been selected. Therefore, always apply the parking brake or the holding brake to secure the truck crane before selecting the driving direction.



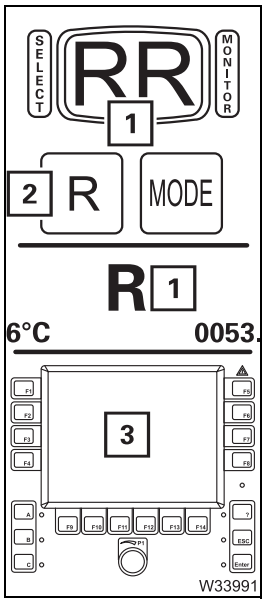
For forward travel

• Press the button (**3**) once.

A suitable starting gear (**1**) is selected and displayed, e.g. gear **1**.

Additionally, the highest gear (**2**) which is selected during driving is displayed. You can change this gear; ➠ p. 5 - 32.

14.03.2018



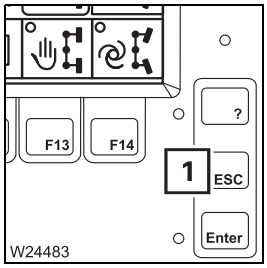
For reverse travel

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

The reverse gear (**1**) is selected and displayed.

The reverse camera is switched on.

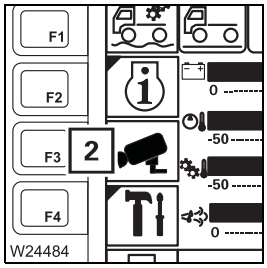
The display (**3**) shows the area behind the truck crane.



Switching off the reverse camera

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

The display shows the main menu.



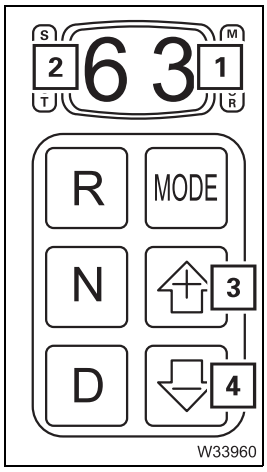
Switching the reverse camera on again

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

The display shows the area behind the truck crane.

14.03.2018

5.2.5 Changing highest gear/starting gear



The highest gear (**2**), which is selected during driving, and the engaged starting gear (**1**) are displayed.

Changing the highest gear

- Press button (**3**) or (**4**) until the required highest gear (**2**) is displayed.

Selecting a lower starting gear

- Select a gear which is lower than the engaged starting gear (**1**) to be the highest gear (**2**), e.g. gear 1.

The starting gear is switched down to the highest gear.

5.2.6 Starting

To start moving, you have to:

– Apply the service brake,

– Release the parking brake,

– Release the service brake – the truck crane starts to move,

– Actuate the accelerator.

If the load is too high that the truck crane cannot move:

- Release the accelerator after 30 seconds at the latest.

Risk of damage to the transmission!
Release the accelerator after 30 seconds at the latest when the load is too high.
This prevents the transmission from being damaged due to overheating.
The starting gear is not automatically disengaged.

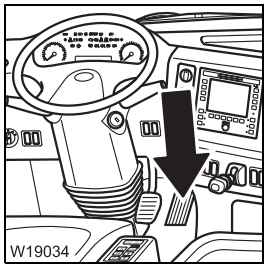
- Switch into the neutral position and let the motor run until the gear oil temperature drops below approx. 93 °C (199 °F); ➠ *Monitoring elements*, p. 4 - 20.
- Select a lower starting gear or driving mode **P** and start driving again.

14.03.2018

5.2.7 Driving and changing gears

While driving, the transmission changes to the gear suitable for the current load, engine speed and position of the accelerator.

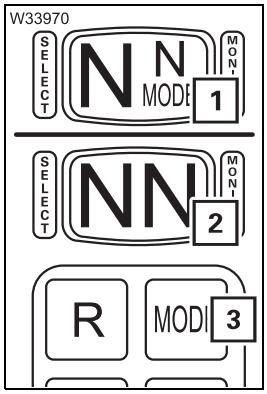
When the gear oil temperature falls below approx. -7 °C (20 °F), only gears 1 and 2 are used in gear position **D**.



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



You can influence upshifting by using the driving mode – button (**3**).

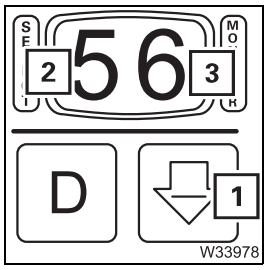
1 Driving mode **P** on: Upshifting at high engine speed

2 Driving mode **E** on: Upshifting at low 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.

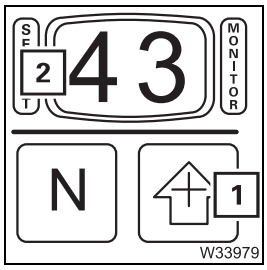
14.03.2018



Manual downshifting

- Select a gear that is smaller than the current gear (**3**) as the highest gear (**2**) by using the button (**1**).

If it is permissible for the current driving mode, then transmission shifts down. It may be necessary for you to slow down by braking until an engine speed is reached that is permissible for downshifting.



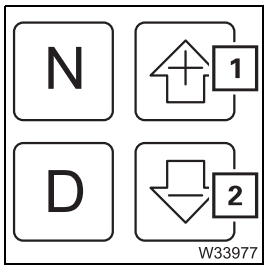
Manual upshifting

The truck crane is being driven in the highest gear that is smaller than gear 6.

- Select a higher gear (**2**) by using the button (**1**).

If it is permissible for the current driving mode, then transmission shifts up.

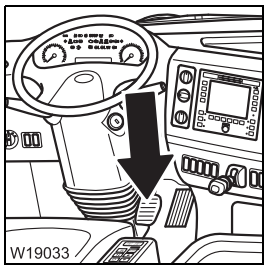
5.2.8 Changing the driving direction



- Stop the truck crane and leave the vehicle engine running at idling speed.
- Select the opposite driving direction by using button (**1**) or (**2**).
- Start moving.

14.03.2018

5.2.9 Stopping



- In order to stop, take your foot off the accelerator and depress the brake pedal.

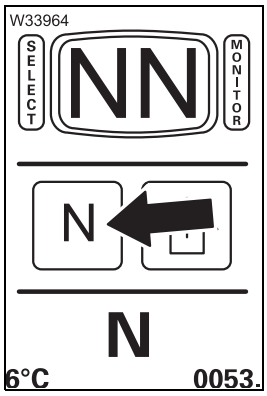
Stopping for longer periods

In order to stop for a longer time with the engine running, you must:

– Apply the parking brake and

– Shift the transmission to the neutral position **N**.

5.2.10 On the roller type dynamometer



- Always switch to neutral position **N** after driving onto a roller type dynamometer.
- Allow the engine to keep running.

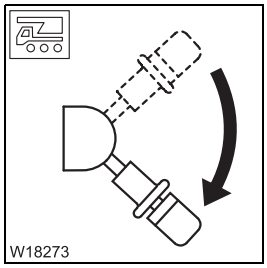
14.03.2018

5.2.11 Oil level gauge

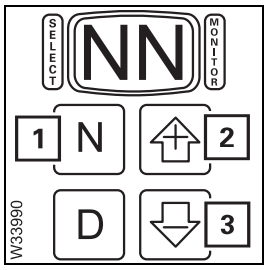
You can call up information on the current oil level in the transmission.

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

- Park the truck crane on a level surface.



- Apply the parking brake.
- Let the motor run at idling speed.
- Wait approx. 3 minutes – required resting time.



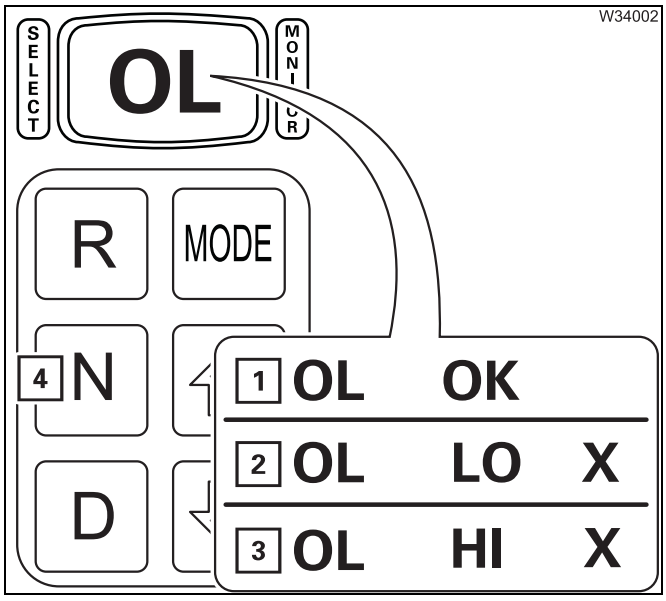
- Switch to the neutral position – button (**1**).
- Press buttons (**2**) and (**3**) together once.

The *Transmission* display shows a code

– for the oil level or

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

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



Displays for the oil level

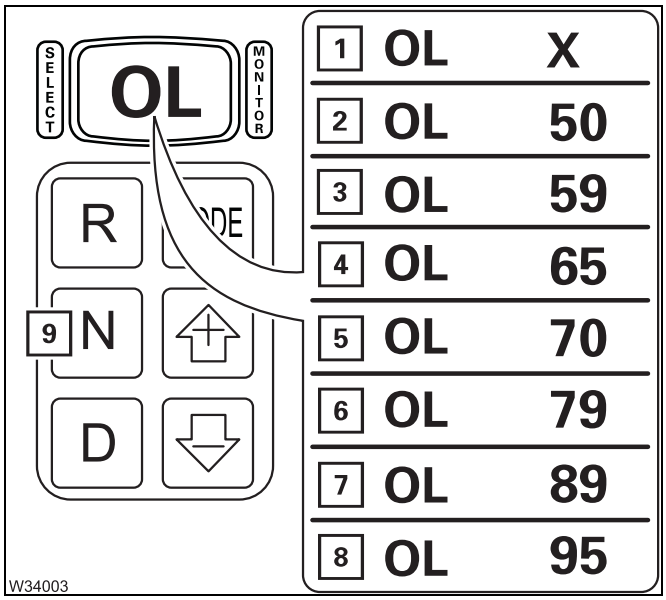
1 Oil level correct

2 Oil level **x** litres too low

3 Oil level **x** litres too high

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

14.03.2018



Displays for errors

1 Resting time is elapsing,
X = counters 8 to 1

2 Engine speed too low

3 Engine speed too high

4 No neutral position

5 Transmission oil too cold

6 Transmission oil too hot

7 No standstill

8 Error on the sensor

- Press button (**9**) once to exit the oil-level gauge.
- Rectify the error and call up the oil level gauge again.

14.03.2018

Blank page

14.03.2018

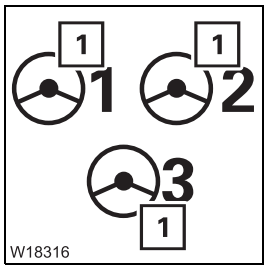
5.3 Driving the truck crane and switching it off

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!
In this way you prevent the steering from locking and do not lose control of the moving truck crane.

Risk of accident when the ignition is switched off!
Never switch off the ignition while driving.
After the ignition is switched off, the 5th and 6th axle lines are brought into the straight-ahead position, and can no longer be steered.
This changes the turning radius of the truck crane.

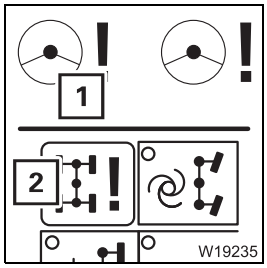
5.3.1 Checks whilst driving

Immediately after you start to move



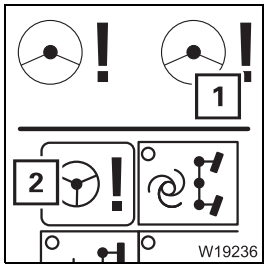
- Check the service and parking brakes for correct functioning immediately after starting out.
- Check the lamps (**1**).

At speeds above 10 km/h (6 mph), **all** the lamps (**1**) must go out. If a lamp does not go out, this indicates a malfunction in the steering.



– The lamp (**1**) lights up when an error is detected in the steering system – the symbol (**2**) is shown. The 5th and 6th axles are brought into the straight running position and can no longer be steered. It is possible to continue driving. Only the 1st and 2nd axle lines are still available for steering – the turning circle increases in size accordingly.

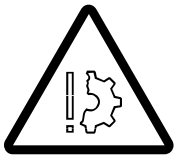
- Have the error rectified as soon as possible.



– The lamp (**1**) lights up when a serious fault is detected in the steering system – the symbol (**2**) is shown. The 5th and 6th axle lines can no longer be steered in a controlled manner.

- Stop the vehicle as soon as possible. Briefly switch the ignition off then on again. If the lamp is still lit, contact **Manitowoc Crane Care**.

14.03.2018



Risk of accidents because the truck crane cannot be steered!
Stop as quickly as possible if the red lamp lights up.
The 5th and 6th axle can steer in an uncontrolled manner, which may lead to serious accidents, even when driving at reduced speed.

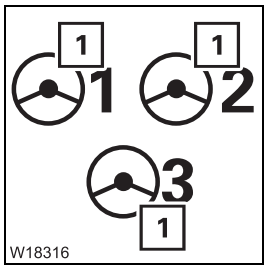
Risk of accidents if the steering circuits fail!
If one or all of the symbols is red, stop the truck crane immediately and switch off the engine!
Check whether oil has been lost. Depending on the size of a leak, the oil supply in a steering circuit may be lost within 2 minutes.

If oil has escaped

- Warn any vehicles on the road behind you.
- Do not continue driving. Contact **Manitowoc Crane Care**.

If no oil has escaped

- Start the engine.



– If all 3 lamps (**1**) light up:
  - Switch off the engine. Contact **Manitowoc Crane Care**.

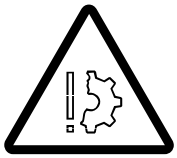
– If **at most** 2 lamps (**1**) light up:
  - Drive at a speed greater than approx. 10 km/h (6 mph).
    – If only one lamp is still lit, drive **slowly** to the next repair shop. The steering may be sluggish.
    – If two lamps are still lit, stop immediately. Contact **Manitowoc Crane Care**.

➠ *Malfunctions of the steering*, p. 7 - 32

14.03.2018

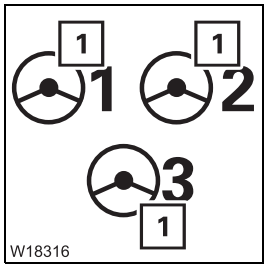
While driving

- Observe all warning messages.

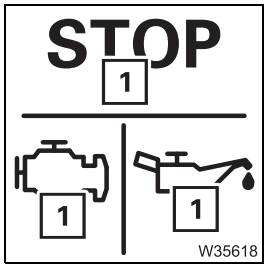


Risk of damage if warning messages are disregarded!
After a warning message appears (on the *ECOS* display or *combination instrument* display), always promptly observe all information in the section titled *Warning submenu*, and take the appropriate corrective measures. This prevents these malfunctions causing defects in the truck crane.

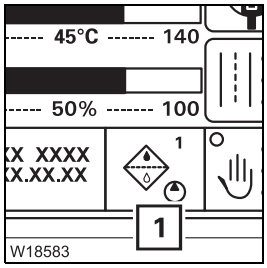
On the instrument panel



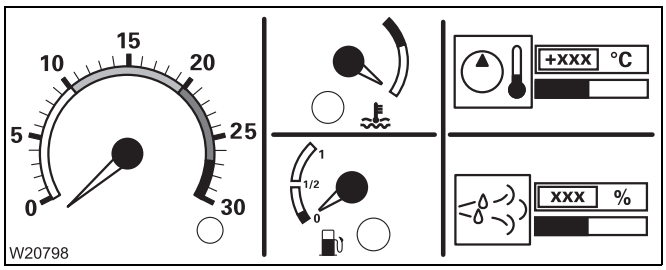
– If one of the lamps (**1**) which has already been checked lights up again, refer to the information in the previous section.



– When one of the lamps (**1**) lights up, stop the truck crane immediately and check the message; ➠ p. 5 - 54.



– When the *ECOS* display shows a warning message (**1**);
➠ *Warning submenu*, p. 5 - 48.



- Also note the control elements for fuel level and carbamide level where applicable, engine speed, coolant temperature, transmission and hydraulic oil temperature; ➠ p. 4 - 20.

1) Additional equipment

14.03.2018

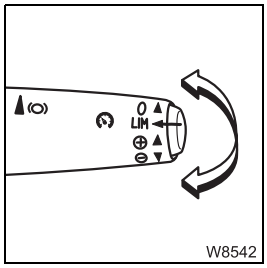
5.3.2 Cruise control

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 of over 15 km/h (9 mph).

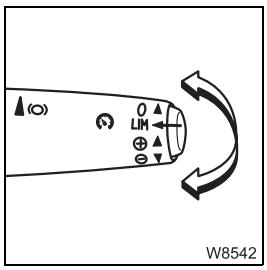


- Press the switch upwards or downwards once

Cruise control is switched on. 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

- Press the switch up/down until the required speed has been reached

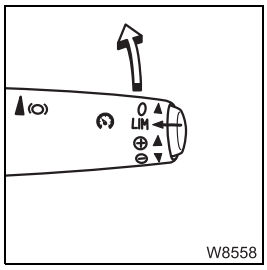
  or

- Push the switch upwards/downwards once. The speed will increase/ decrease by 0.5 km/h (0.3 mph).

The set speed is maintained.

14.03.2018

Switching off



- Push the switch forwards once. The cruise control is now switched off.

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,

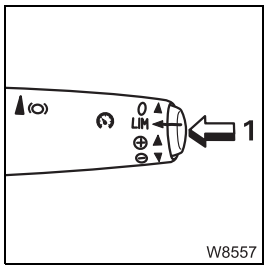
– when the ignition is switched off.

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).

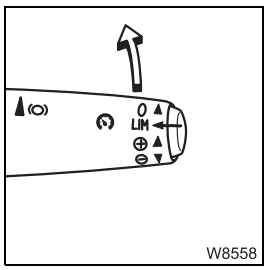


- Press the button (**1**) once.

Temposet is now switched on. The 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.

Switching off



- Press the switch forwards twice.

The Temposet is now switched off.

14.03.2018

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, you have to:
– Select the driving direction and wait until the starting gear is shown,
– Release the parking and service brakes,
– Actuate the accelerator.

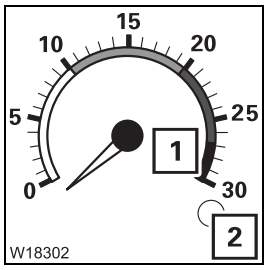
If the truck crane starts to move forwards in neutral position, you can still select the *forwards* driving direction. A gear appropriate to the speed is engaged and the engine braking power is effective.

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 the engine or transmission from being damaged or the air intake inhibitor from being triggered.

If an air intake inhibitor is present, it will be triggered if the maximum permissible engine speed is exceeded and the motor will stop running;
➠ p. 4 - 25.



- Whilst driving, monitor the current engine speed on the tachometer.
- Brake the truck crane before the engine speed increases into the red range (**1**) – over 2,300 min^{-1}(rpm).

When the maximum permissible engine speed is reached, a warning buzzer sounds.

14.03.2018

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 from the highest gear; p. 5 - 45,

– with the additional brake; p. 5 - 46,

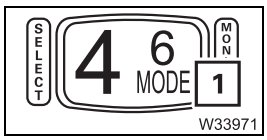
– with the transmission retarder; p. 5 - 47.

Shifting down from the highest gear

If you shift down from the highest gear, the braking force of the engine is increased.

• Shift down from the highest gear, e.g. to 4th gear.

• Brake the truck crane.
When a permissible speed has been reached, the transmission will shift down.



You can also increase the braking force of the engine by switching to the **P** (**1**) driving mode.

If the maximum permissible speed is also reached in a lower gear, the transmission will automatically engage the highest gear and shift up.

14.03.2018

Additional brakes

Engine retarder

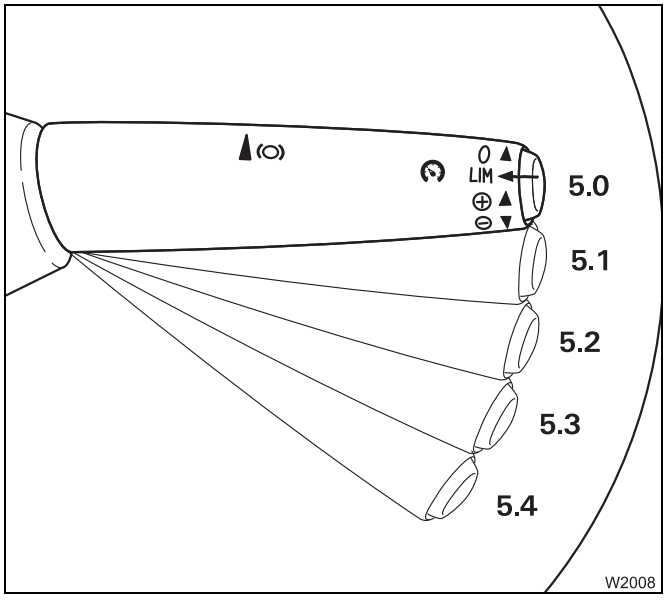
The truck crane has an engine flap brake which it uses as an engine retarder. The engine retarder only becomes effective at an engine speed of 900 rpm and can be used up to a maximum speed of 2,300 rpm.

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.

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).

  5.1 Only engine retarder

  Connection to the retarder power:

  5.2 50% power, engine retarder

  5.3 75% power, engine retarder

  5.4 100% power, engine retarder

Switching off the additional brakes

- Press the switch forwards to level **5.0**.

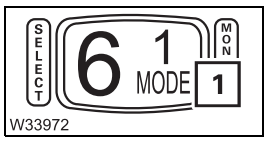
When the additional brake is switched on, the lamp (**1**) lights up.

14.03.2018

5.3.5 Driving uphill

Starting

The engine must be running.



- To start moving and to drive on steep uphill roads, switch to the **P** (**1**) driving mode.

To start moving, you have to:
– Apply the parking brake,
– Select the driving direction and wait until the starting gear is shown,
– Actuate the accelerator gently,
– Release the parking brake and press the accelerator.

Driving

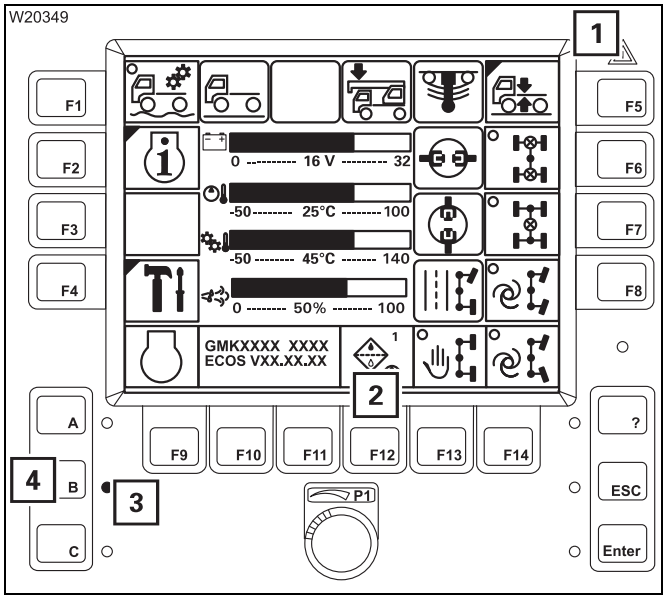
On certain gradients, the transmission may switch continuously back and forth between two gears. Then remove the pressure from the accelerator slightly, or shift the highest gear down.

14.03.2018

5.3.6 Warning submenu

ECOS differentiates between warning messages and error messages (error messages; ➠ *Error submenu*, p. 5 - 54). A warning message indicates that certain values do not correspond to a target value.

Further warning messages can be displayed on the instrument panel; ➠ p. 5 - 51.



When a warning message occurs:

– The lamps (**1**) and (**3**) flash,

– The display (**2**) shows the red symbol for the pending warning message.

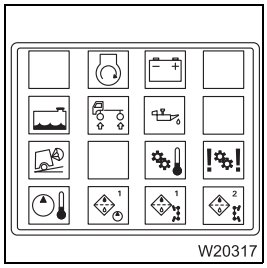
For more information

- Press button (**4**) once – the *Warning* submenu opens.

The warning message has been acknowledged – the lamp (**3**) lights up (no longer flashes).

Meaning of the symbols

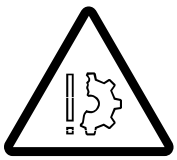
The colour of the symbols indicates whether a warning message is active in the corresponding area.



– Symbol **grey** – no warning message.

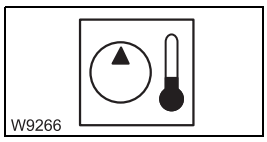
– Symbol **red** – warning message.

If a symbol is displayed in **red**, perform the following checks.



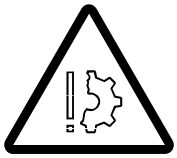
Risk of damage if warning messages are disregarded!
Observe the following information in good time and take the appropriate remedial measures if a warning message appears. This prevents these malfunctions causing defects in the truck crane.

14.03.2018



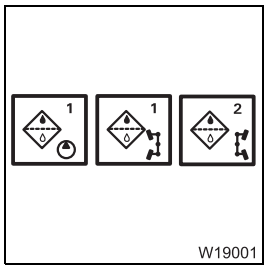
Hydraulic oil too hot

The hydraulic oil temperature is higher than 80 °C (176 °F).
Current temperature display; ➠ p. 4 - 20.
Possible cause and solution; ➠ p. 7 - 33.



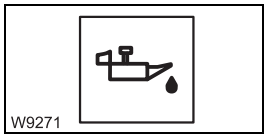
Danger of overheating!

There is a fault if the hydraulic oil temperature exceeds 80 °C (176 °F). Stop the truck crane at the next opportunity and try to find the cause.
Stop the truck crane immediately and switch off the engine if the temperature of the hydraulic oil rises to over 100 °C (212 °F)!



Replace hydraulic oil filter

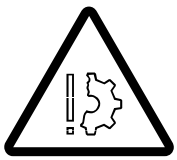
Replace the appropriate hydraulic oil filter as quickly as possible;
➠ *Maintenance Manual*.



Oil pressure too low

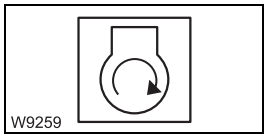
A warning buzzer sounds at the same time.

- Stop the truck crane as quickly as possible while observing the traffic situation and switch off the engine.
- Check the oil level; ➠ *Maintenance Manual*.



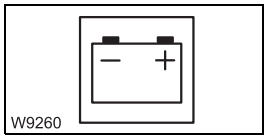
Risk of damage to the engine if the oil pressure drops!

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! ➠ p. 7 - 27.



Air intake inhibitor triggered

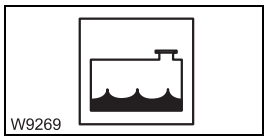
The air intake inhibitor was triggered because the maximum permissible engine speed was exceeded. It is only possible to start the engine after the air intake inhibitor has been released manually; ➠ p. 4 - 25.



Voltage monitoring

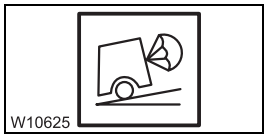
The voltage in the carrier electrical system is too high or too low.
Current voltage display; ➠ p. 4 - 20.

14.03.2018



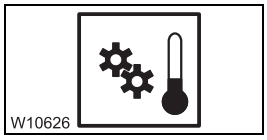
Coolant level too low

Immediately top up the coolant so that the engine does not overheat; ➠ *Maintenance Manual*.



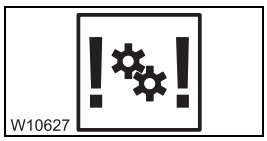
Transmission retarder too hot

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.



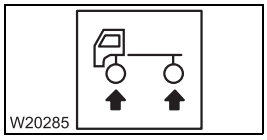
Transmission oil too hot

- Stop the truck crane at the next opportunity and try to find the cause; ➠ *Malfunctions in the transmission*, p. 7 - 30.



Shift lock transmission

The transmission no longer switches.
Drive to the next safe place to stop and stay there – you can no longer drive further; ➠ *Malfunctions in the transmission*, p. 7 - 30.

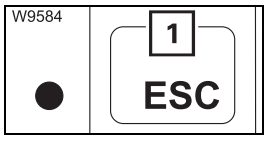


Pressure in the suspension struts or permissible sideways tilt exceeded

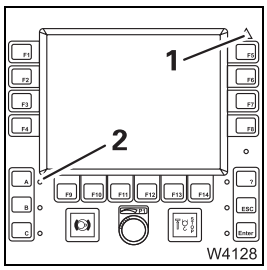
- Immediately bring the truck crane to a halt and check the pressure in the suspension struts and the lateral tilt; ➠ *Warnings whilst driving*, p. 13 - 8.

Exiting the submenu

You can exit the submenu at any time.



- Press the button (**1**) once.
  The same menu opens which was open before the *Warning* submenu opened.



If the same warning messages are still present, the lamps (**1**) and (**2**) light up.

If no warning message is present, both lamps will go out.

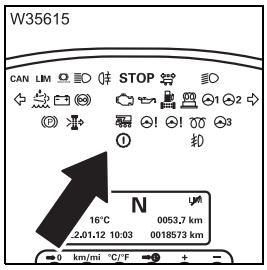
Both lamps start flashing again as soon as a new warning message occurs.

14.03.2018

5.3.7 Warning or malfunction messages on the instrument panel

Meaning of the lamps

The colour of the lamps indicates whether a warning or malfunction message is active in the corresponding area.



– Lamp goes out – no message.

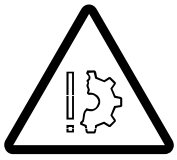
– Lamp is **red** – warning message.

  • 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.



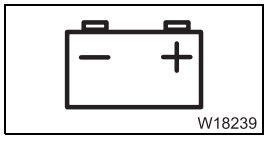
Risk of damage if warning or malfunction messages are disregarded!
Observe the following information promptly and take the appropriate corrective measures if a warning or malfunction message appears. This prevents these malfunctions causing defects in the truck crane.

STOP warning

When the STOP lamp lights up, further messages are displayed on the instrument panel.
Switch off the engine as soon as possible; ➠ *Malfunctions on the engine*, p. 7 - 27.

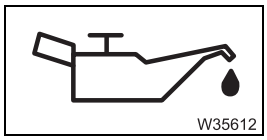
CAN BUS system interrupted

If the lamp continues to light up, switch off the ignition and switch it back on after 15 seconds; notify **Manitowoc Crane Care**.



Battery charge indicator warning

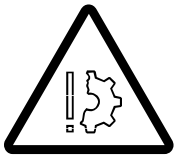
The voltage in the carrier electrical system is too high or too low.
Current voltage display; ➠ *Monitoring elements*, p. 4 - 20.



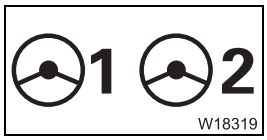
Oil pressure too low

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*.

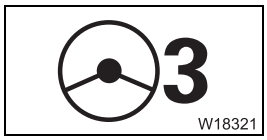


Risk of damage to the engine if the oil pressure drops!
Switch off the engine as soon as possible and look for the cause if the lamp lights up or the warning buzzer sounds!
Never restart the engine before you have found the cause and eliminated the problem! ➠ p. 7 - 27.



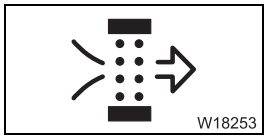
Steering circuit 1 or 2 warning

Malfunction in steering circuit 1 or 2 – check for loss of oil; ➠ *Malfunctions of the steering*, p. 7 - 32.



Steering circuit 3 warning (emergency steering pump)

Malfunction in steering circuit 3 – check for loss of oil; ➠ *Malfunctions of the steering*, p. 7 - 32.



Replace air filter

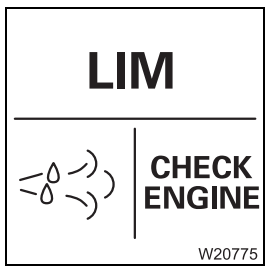
The air filter is soiled, ➠ *Maintenance Manual*.

Malfunction in steering circuit 1 or 2

The 5th and 6th axle lines have been centred and can no longer be steered, ➠ *Malfunctions of the steering*, p. 7 - 32.

Steering circuit 1 or 2 warning

The 5th and 6th axle lines have not been centred and can no longer be steered, ➠ *Malfunctions of the steering*, p. 7 - 32.



Exhaust system

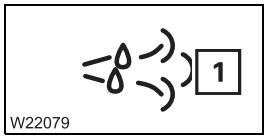
- Also check the control elements for the exhaust system; ➠ *Malfunctions in the exhaust system*, p. 7 - 29.

14.03.2018

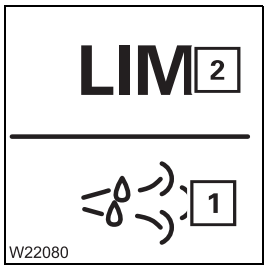
5.3.8 Override torque reduction

When the carbamide supply is empty, the torque reduction is activated via the engine control system.

You can override torque reduction up to 3 times.

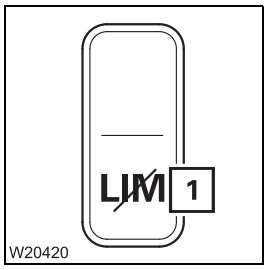


– If the carbamide level drops to the reserve level, the lamp (**1**) lights up.



– If the carbamide supply is used up, the lights (**1**) and (**2**) will light up.

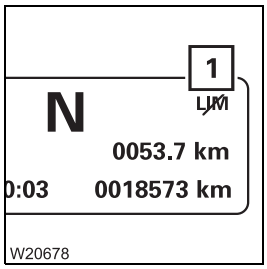
– If lamp (**1**) flashes, the engine torque is reduced the next time the engine is started.



The engine torque is reduced.

- Press button (**1**) down to override torque reduction.

  You can override torque reduction up to 3 times.



The symbol (**1**) is displayed.

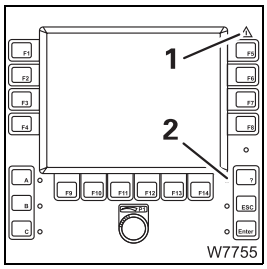
- Refill with carbamide immediately; ➠ *Carbamide*, p. 4 - 8.

  After the next engine start the torque reduction is deactivated.
  The symbol (**1**) disappears.

14.03.2018

5.3.9 Error submenu

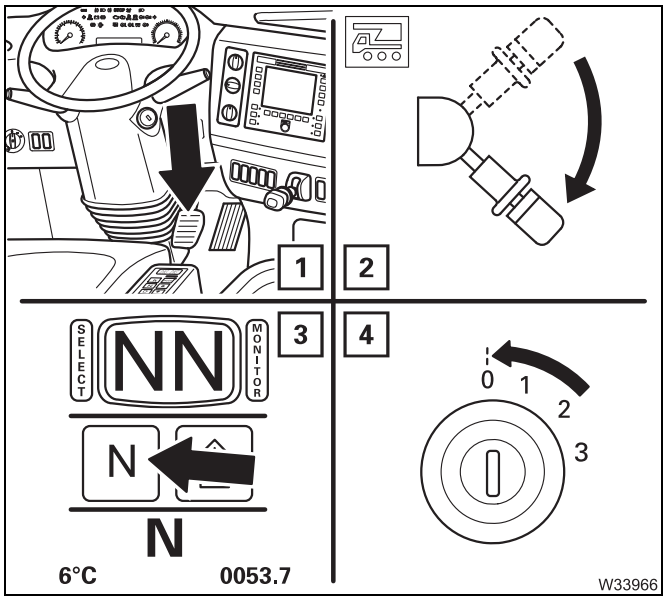
ECOS differentiates between error messages and warning messages (warning messages ➠ *Warning submenu*, p. 5 - 48).



In the event of an error message, the lamps (**1**) and (**2**) flash.

Further information can be found on the *Error* submenu; ➠ *Malfunctions on the ECOS carrier*, p. 7 - 35.

5.3.10 Switching the truck crane off



To switch the truck crane off, you must:

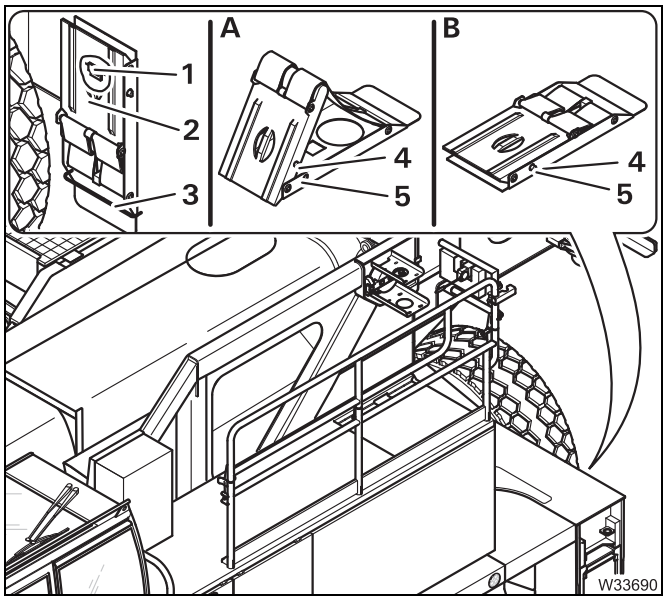
1. Stop the truck crane
2. Apply the parking brake
3. Switch to neutral position; ➠ p. 5 - 28
4. switch off the engine; ➠ p. 4 - 23

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.

14.03.2018



Transport at the rear of the carrier

- Push the chock (**2**) behind the bracket (**3**) and hang it on the holder (**1**).

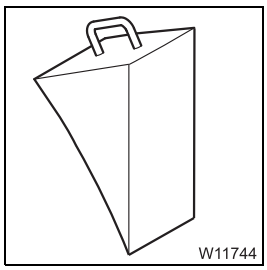
(A) – Folding out

- 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**).

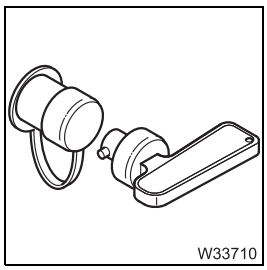


Additional chocks can be transported in the storage compartment on the turntable or at the rear of the truck crane.

When stationary for more than 8 hours

- Switch off all current consumers, e.g. auxiliary heaters.
- Switch off the engine.

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



- Switch off the battery master switch.

14.03.2018

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 and
  - Locking the driver's cab and the crane cab.

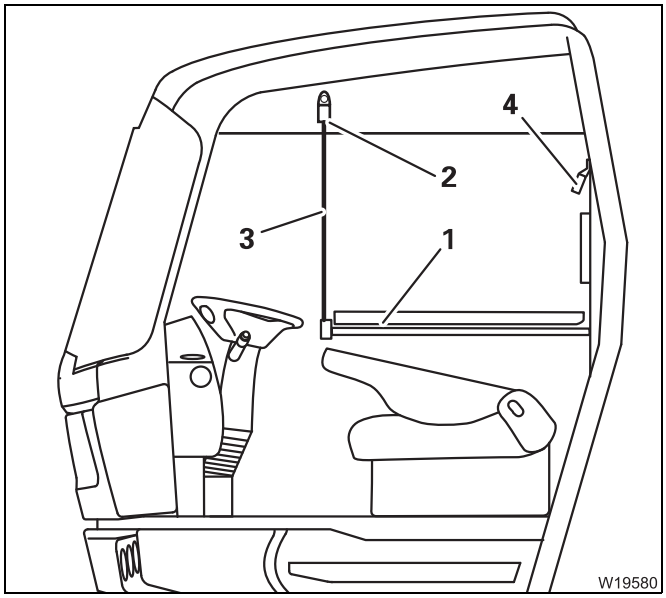
Danger due to unauthorised use!
Always stow away the hand-held control in the crane cab or in the driver's cab before leaving the truck crane and lock the doors.
This way you can prevent unauthorised persons from starting the engine with the hand-held control.

14.03.2018

5.3.11 Folding berth

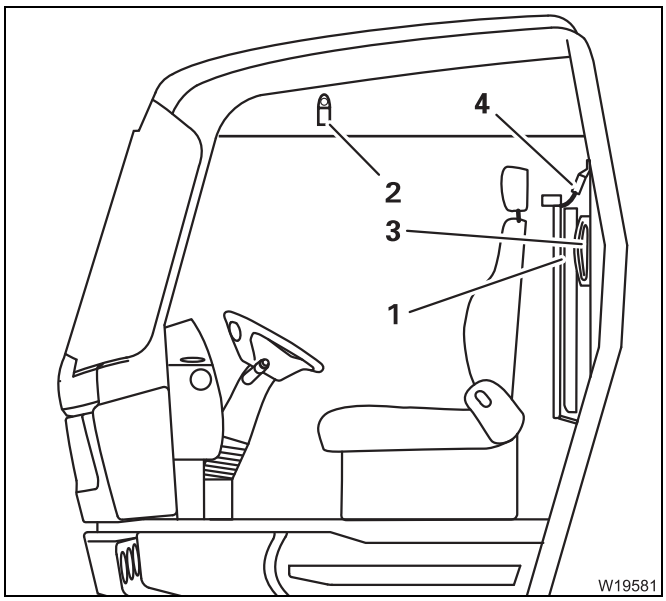
The berth must always be folded up for driving.

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 from folding down when braking, resulting in uncontrolled manoeuvres due to fright.



Folding down

- Place the steering column forwards, upright; ➠ *Adjusting the steering column*, p. 5 - 16.
- Move the seats to their lowest position:
  – ➠ *Driver's seat*, p. 5 - 13;
  – ➠ *Version 2*, p. 5 - 14.
- Remove the neck-rests from the seats and tilt the back rests of the seats forwards.
- Release the berth (**1**) from the retainer (**4**) and fold it downwards.
- Fasten both belts (**3**) in the retainers (**2**).



Folding up

- Release the belts (**3**) from the retainers (**2**) and place them on the berth.
- Fold up the berth (**1**) and fasten it in the retainer (**4**).
- Put up the back rests of the seats and fasten the neck-rests.
- Bring the seats and the steering column into the desired position:
  – ➠ *Driver's seat*, p. 5 - 13;
  – ➠ *Version 2*, p. 5 - 14;
  – ➠ *Adjusting the steering column*, p. 5 - 16.

14.03.2018

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14.03.2018

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 - 33.

– Select the **P** driving mode for more power; ➠ p. 5 - 33.

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 - 60.

– Then switch on the **central differential locks**; ➠ p. 5 - 62.

– Then switch on the **transverse differential locks**; ➠ p. 5 - 62.

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 - 64.

Rocking the vehicle free and towing

If the truck crane is stuck in terrain; ➠ *Freeing truck crane stuck in terrain*, p. 5 - 68.

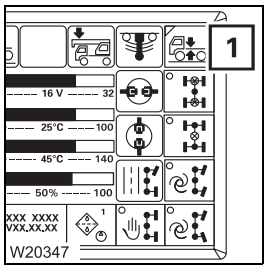
14.03.2018

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

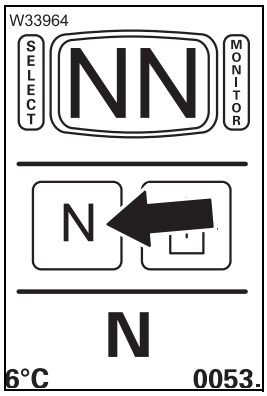
The off-road gear increases the thrust of the driven wheels.

Prerequisites

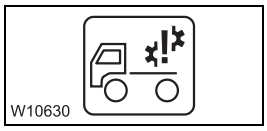
- Stop the truck crane.



- Open the main menu, if necessary (**1**).



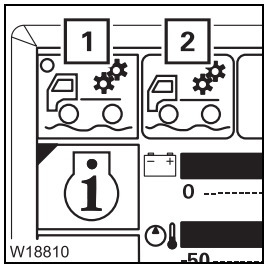
- Select neutral position on the transmission.



If the error symbol is shown during the following gear changes, contact **Manitowoc Crane Care**.

14.03.2018

Switching on



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

The off-road gear is switched on when the symbol (**2**) is shown.

If another symbol is shown:

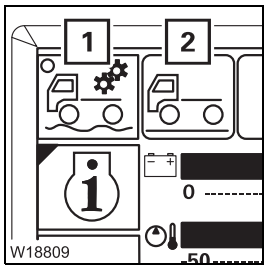
- Briefly shift up the transmission to D and back to N.

  or

- Start moving slowly.

When the off-road gear is switched on, the speed is limited to approx. 20 km/h (12 mph).

Switching off



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

The off-road gear is switched off when the symbol (**2**) is shown.

If another symbol is shown:

- Briefly shift up the automatic transmission to D and back to N.

  or

- Start moving slowly.

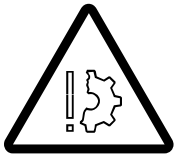
Neutral position For towing away, you will have to switch the transfer case to the neutral position; p. 7 - 8.

14.03.2018

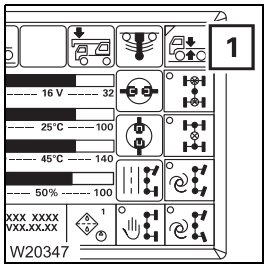
5.4.2 Longitudinal and transverse differential locks

– The longitudinal differential locks prevent individual axle lines from spinning when driving on a slippery surface. With the 12 x 8 x 12 drive, the 5th axle line drive is switched on and off at the same time.

– The transverse differential locks prevent individual wheels from spinning when driving on a slippery surface.

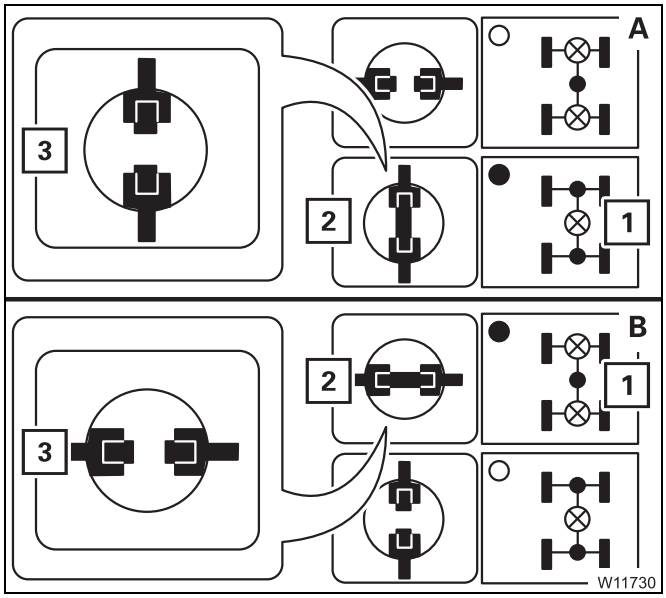


Risk of damage to the differential locks!
Leave the transverse differential locks switched on only for as long as necessary. Always switch off the transverse differential locks before driving on a firm surface!



- Stop the truck crane.
- Straighten the steering.
- Open the main menu, if necessary (**1**).

For switching on and off, the current speed must be less than about 5 km/h (3 mph).

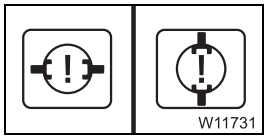


Switching on

- Press button (**1**) once for:
  – Central differential locks (**A**) or
  – Transverse differential locks (**B**),

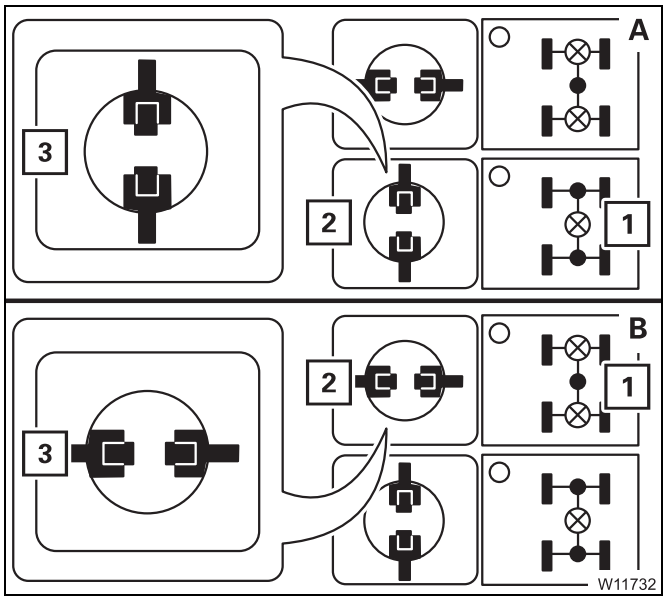
  The dot turns **green**.

- Start moving slowly – display:
  – The symbol (**3**) first turns yellow,
  – Then symbol (**2**) turns **red**, differential locks on.



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

14.03.2018



Switching off

- Press button (**1**) once for:
  - Central differential locks (**A**) or
  - Transverse differential locks (**B**),

  The dot turns **black**.

Display:

- The symbol (**3**) first turns yellow,
- Then symbol (**2**) turns **green**, differential locks off.

If symbol (**2**) is not displayed, then drive back and forth slowly.

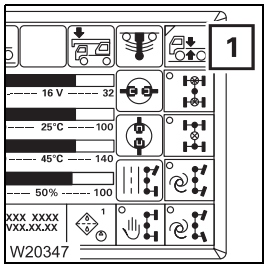
14.03.2018

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.

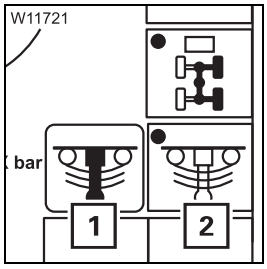
Opening the submenu

You can only open the *Level adjustment system* submenu when the current speed is below approx. 5 km/h (3 mph).



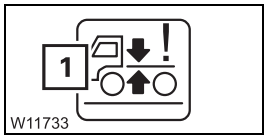
- If necessary, open the main menu Esc and press the button (**1**) once.

This opens the *Level adjustment system* submenu.



- Check that the symbol (**1**) is **green** (suspension on).
- If the symbol (**1**) is red, press the button (**2**) once to switch on the suspension.

When the suspension has been switched on, you can:
– Set the on-road driving level,
– Pre-select the suspension struts and change the vehicle level.



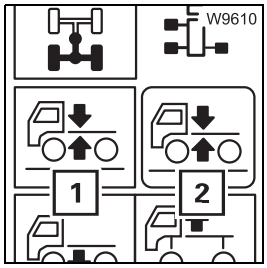
If the error symbol (**1**) is shown during level adjustment, contact **Manitowoc Crane Care**.

14.03.2018

Setting the on-road level

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

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

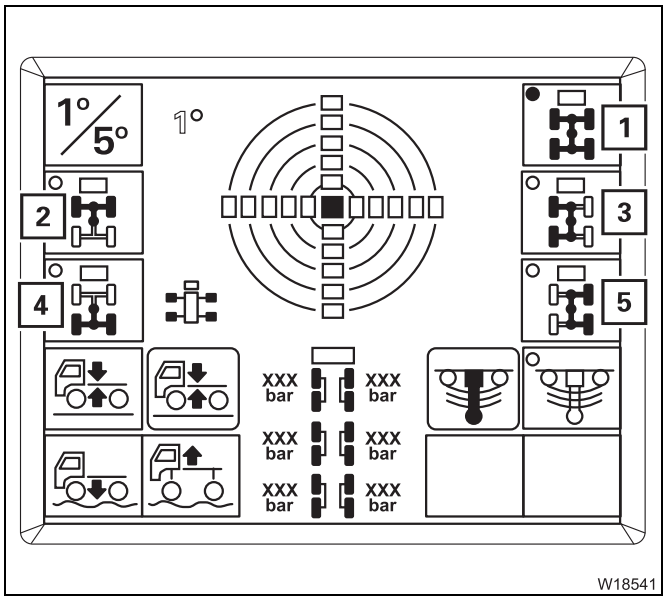


- Press the button (**1**) until the symbol (**2**) turns **green**.

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

Pre-selecting suspension struts

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



– For a uniform level change

1 Overall level – all suspension struts

– For inclination

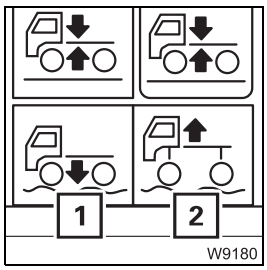
2 Front level – suspension strut for the 1st to the 3rd axle line

3 Left level – all suspension struts on the left

4 Rear level – suspension struts for the 4th to 6th axle line

5 Right level – all suspension struts on the right

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



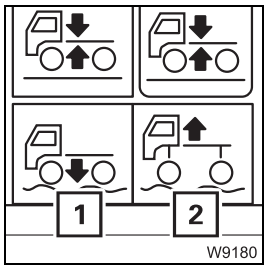
The corresponding suspension struts remain pre-selected for approx. 5 seconds.
During this time, the symbols (**1**) and (**2**) are **black** and the corresponding buttons are active.

14.03.2018

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.



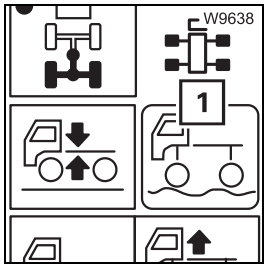
Lowering the level

- Press the button (**1**).
  The pre-selected suspension struts retract.

Raise the level

- Press the button (**2**).
  The pre-selected suspension struts extend.

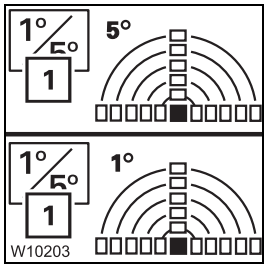
The level is continuously changed until you release the button or the end position is reached.



During the entire procedure, the symbol for the current state is shown, e.g. after the truck crane is inclined, the symbol (**1**) – *No on-road level* is shown.

Viewing the current inclination

The inclination indicator shows the current alignment.

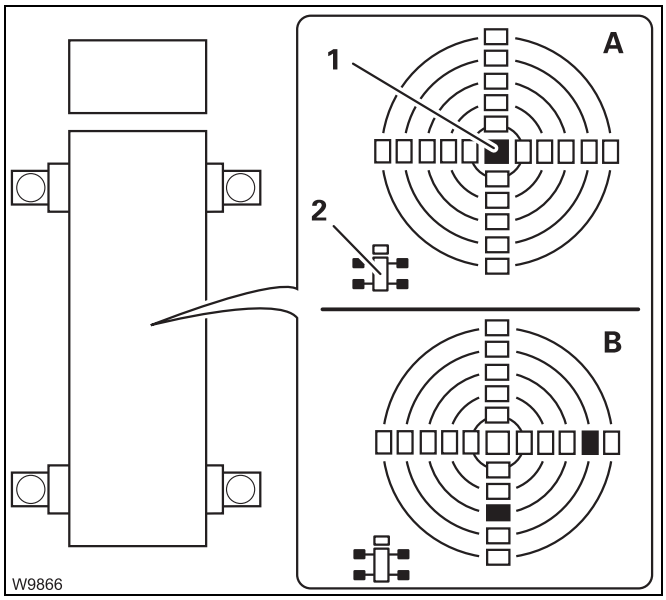


Switching over the measuring range

You can change the measuring range between 1° and 5°.

- Press the button (**1**) once.
  The current measuring range is displayed.

14.03.2018



(**A**) – When the truck crane is level, only the lamp (**1**) in the middle lights up.

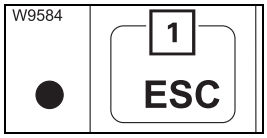
The other lamps show the sides of the truck crane which are higher.

The assignment to the carrier is given by the directional indicator (**2**).

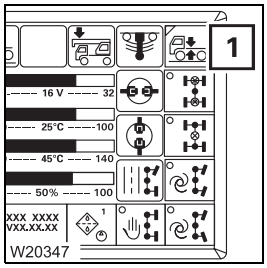
(**B**) – In this example, the carrier would be standing higher to the rear on the right hand side.

Exiting the submenu

You can exit the *Level adjustment system* submenu at any time.



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



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

The main menu opens.

The *Level adjustment system* submenu automatically closes as soon as the current speed rises above approx. 5 km/h (3 mph).

14.03.2018

5.4.4 Freeing truck crane stuck in terrain

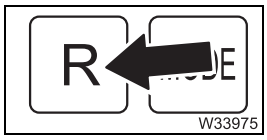
Rocking the truck crane free

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

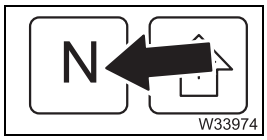
When rocking free, you should
– switch on the transverse differential locks,
– switch on the longitudinal differential locks,
– switch to the **P** driving mode and
– switch on the off-road gear in the transfer case.

Risk of damage to the transmission!
Release the accelerator after 30 seconds at the latest when the load is too high.
This prevents the transmission from being damaged due to overheating.
The starting gear is not automatically disengaged.

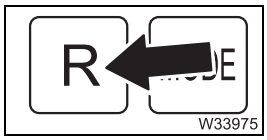
- Let the motor run at idling speed.



- Select a gear position, e.g. gear position **R**.
- Drive as far as you can as high as possible.



- Remove your foot from the accelerator and switch to the neutral position.
- Let the truck crane roll in the opposite direction.



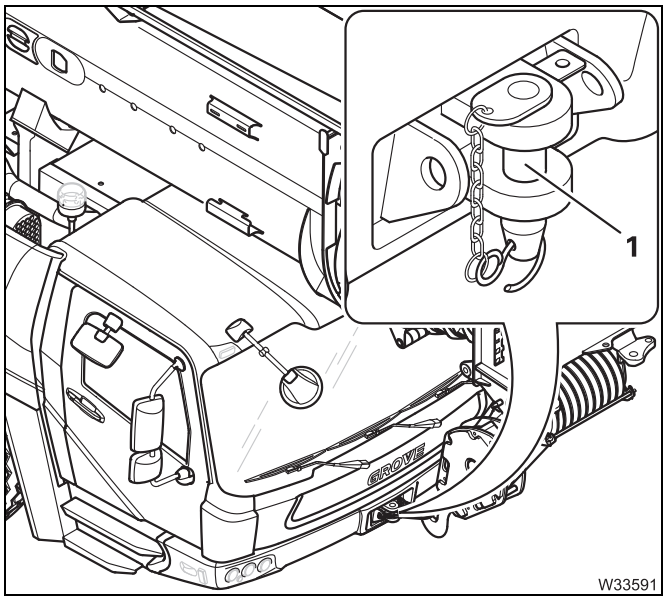
- Before you reach the highest point, select the gear position again, e.g. gear position **R**.
- Drive as far as possible until you reach the highest point, and repeat the procedure.

14.03.2018

Towing free to the front

- 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 tensile force of 100 kN (approx. 10 t) (22,480 lbf (approx. 22,050 lbs)), when:

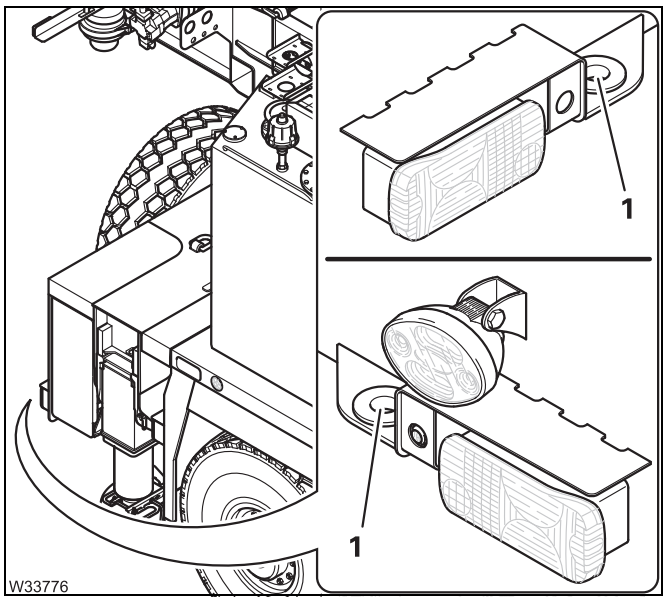
– The direction of pull runs forward along the longitudinal axle or at an angle of 45° to the right or left of the longitudinal axle **and**

– 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 towing eyes (**1**) on the vehicle tail are designed for a maximum tensile force of 75 kN (approx. 7.5 t) (16,860 lbf (approx. 16,530 lbs)) when:

– The direction of pull runs along the level of the longitudinal axle **and**

– The direction of pull runs along the longitudinal axle towards the rear without diverting up or down.

14.03.2018

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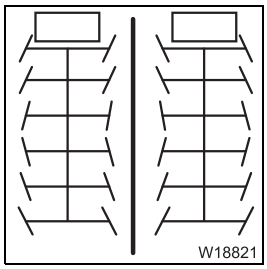
14.03.2018

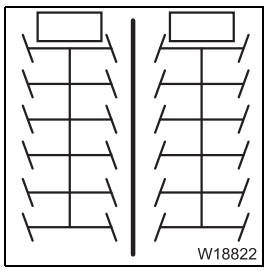
5.5 Separate steering

There are two steering modes with separate steering.



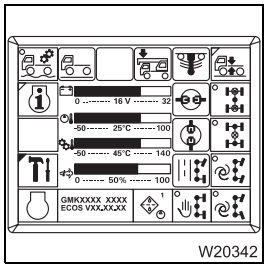
– **Driving around corners:**

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



– **Crab travel mode:**

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



• Open the main menu, if necessary.

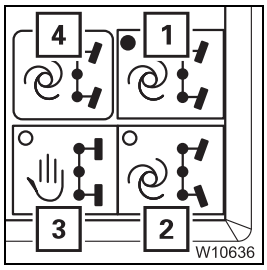
5.5.1 Switching to separate steering

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

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

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

14.03.2018



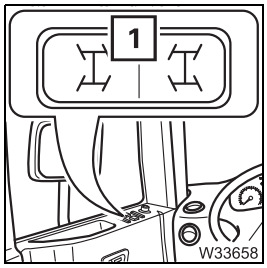
- Press the button for the required steering mode once.
  - **1** Crab travel mode, the 6th axle line is steered automatically
  - **2** Driving around corners, the 6th axle line is steered automatically
  - **3** Manual mode, the 6th axle line is manually steered for driving around corners/crab travel mode

The dot in the symbol turns **green**. The display (**4**) automatically shows the related symbol, e.g. for crab travel mode.

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

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

Manual

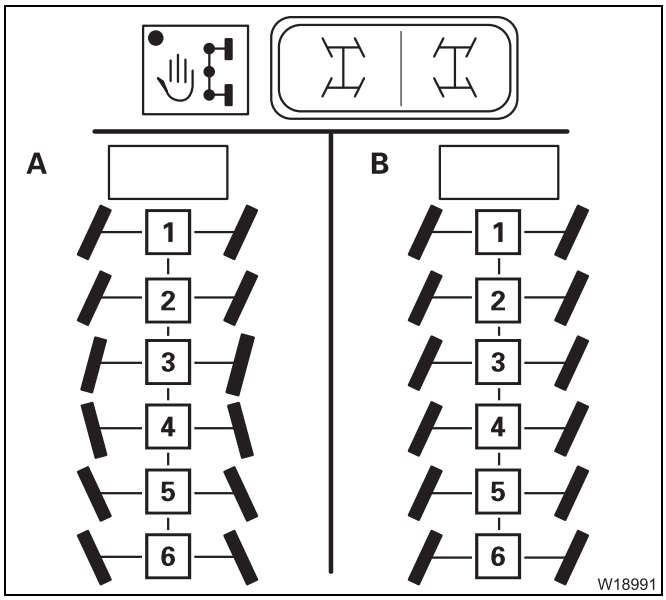


- Steer the 1st to 2nd axle line with the steering wheel.
- Steer the 6th axle line with the button (**1**).
  - **– To turn to the left:** • Push the button to the left.
  - **– To turn to the right:** • Push the button to the right.

The axle lines 3, 4 and 5 are automatically steered, depending on the 1st and 6th axle line and on the steering mode selected.

The axle lines are steered as long as you keep the button pressed or until an end position is reached.

14.03.2018



(A) – For driving around corners

- Steer the 6th axle line in the opposite direction to the 1st to 2nd axle line.

The other axle lines are steered to suit the turning radius.

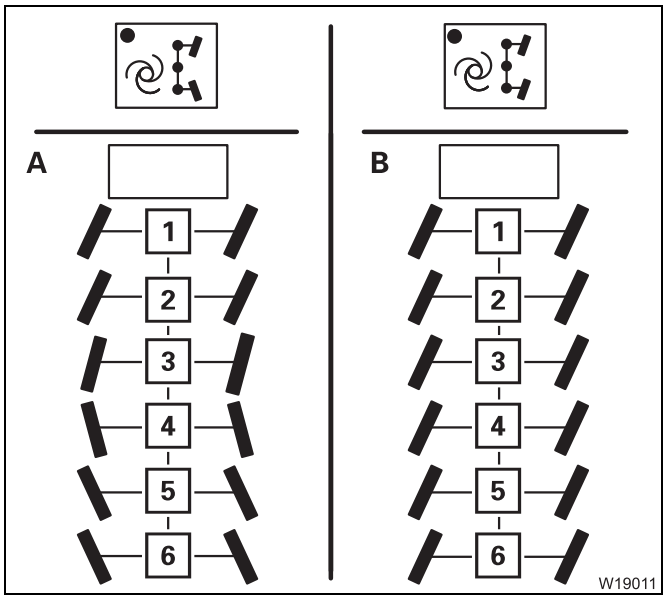
(B) – For crab travel mode

- Steer the 6th axle line in the same direction as the 1st to 2nd axle line.

The other axle lines are always steered in the same direction.

Automatic

- Steer the 1st to 2nd axle line with the steering wheel.



(A) – when driving around corners

The further axle lines are steered out in line with the turning radius, and with or against the steering angle on the 1st to 2nd axle line.

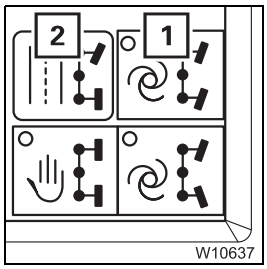
(B) – for crab travel mode

The further axle lines are steered in the same direction as the 1st to 2nd axle lines.

14.03.2018

switching to normal steering mode

Switching off the separate steering is possible during standstill and while travelling, up to a speed of approx. 5 km/h (3 mph).



- Press the button for the steering mode which is switched on, e.g. the button (**1**) for crab travel mode. The dot in the symbol turns **black**.

  When no steering mode is switched on, the separate steering will be switched off. The display (**2**) shows the symbol for on-road driving. Now:

  – steer the 1st to 2nd axle line with the steering wheel,

  – the 3rd and 4th axle lines always remain in the straight running position,

  – the 5th and 6th axle lines always steer to suit the turning radius.

If the error symbol is displayed, contact **Manitowoc Crane Care**;
➠ p. 7 - 32.

14.03.2018

5.6 Heating and air-conditioning system

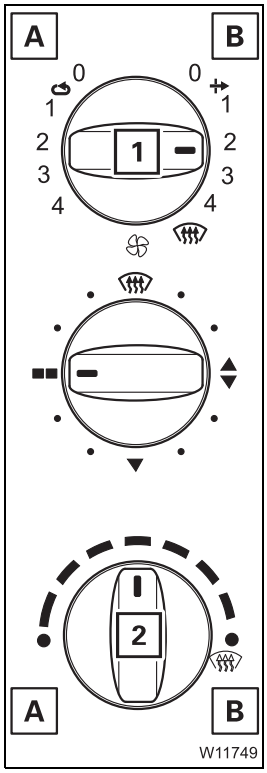
5.6.1 Standard heating system

Switching on

- Start the engine. The heating output is only provided when the engine is running.

Heating

You must set the blower and the temperature.



Setting the blower/fresh air/recirculated air

You can regulate the air volume with the switch (**1**) for:

A Recirculated air – air is sucked in from the driver's cab.
Change to fresh air often to ensure that oxygen is supplied.

B Fresh air – outer air is sucked in.

- Turn the switch (**1**) to the desired level **1** to **4**,
Recommended – level 2.

Setting the temperature

- Turn the switch (**2**) to the desired position

A Colder

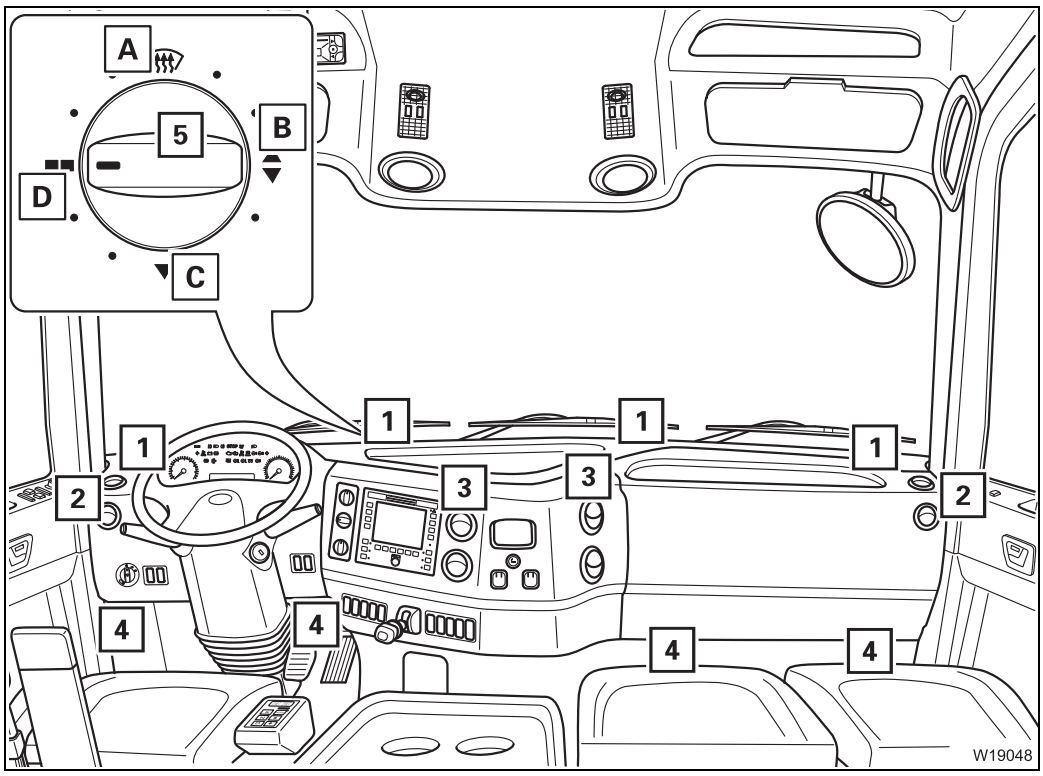
B Warmer

- Press the switch (**2**) several times in succession at least once a month in order to prevent malfunctions.

14.03.2018

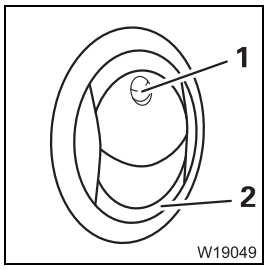
Air distribution

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**).



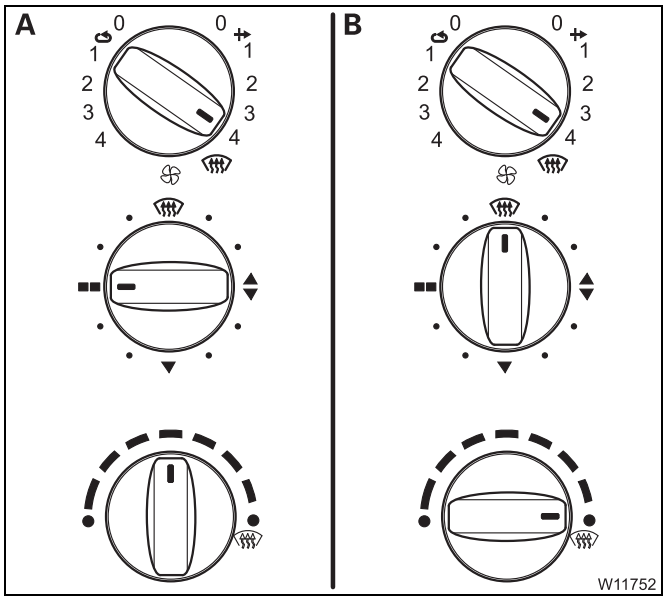
Adjusting the air vents

1	– To open:	Press in and position lengthwise
	– To close:	Position crosswise
	– To direct the air flow:	In intermediate position
2	– To direct the air flow:	Slewing

14.03.2018

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.

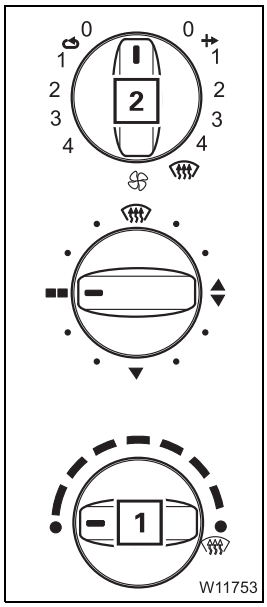
– If necessary, open the air vents for the side and centre.

(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.

14.03.2018

5.6.2 Air-conditioning system

You can cool the driver's cab and dry the air using the air-conditioning system.

Information

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:

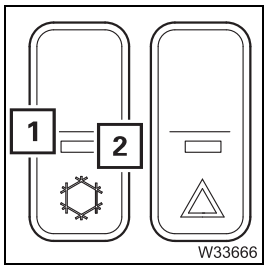
If the truck crane has been exposed to strong sunlight for a long period of time, for example, the air-conditioning system should initially be operated at the highest blower level with the engine running.
The door or at least the windows should be left open for a short while to thoroughly air the cab. 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 - 82.



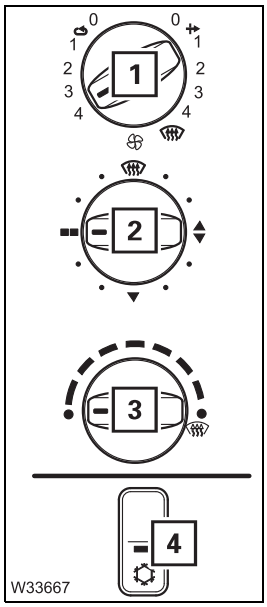
– **To switch on:**
  - Press the button (**1**) at the bottom – The lamp (**2**) lights up.

– **To switch off:**
  - Press the button (**1**) at the top – The lamp (**2**) goes out.

14.03.2018

Cooling

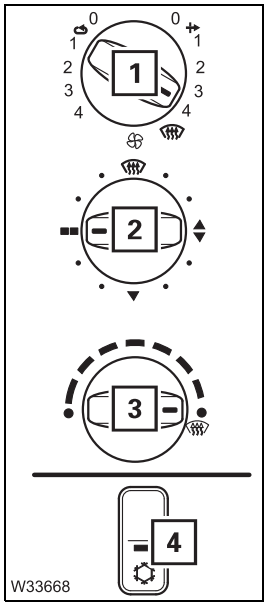
The illustration shows only a sample setting. Always adjust the setting to the current conditions.



- 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 - 76.

Drying

You can dry the air in the driver's cab.



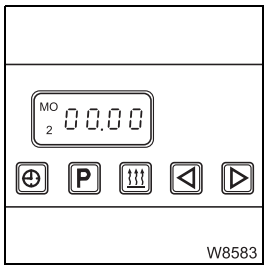
- Switch the air conditioning on – the lamp (**4**) lights up.
- Turn the switch (**3**) as far as it will go, to *Warm*.
- Turn the switch (**1**) to the desired level – adjust the fresh air/recalculated air setting to the current conditions (humidity and temperature of the outside air).
- Set the air distribution with switch (**2**) – open the air vents if necessary; ➠ p. 5 - 76.

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.

14.03.2018

5.6.3 Auxiliary water heater

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!



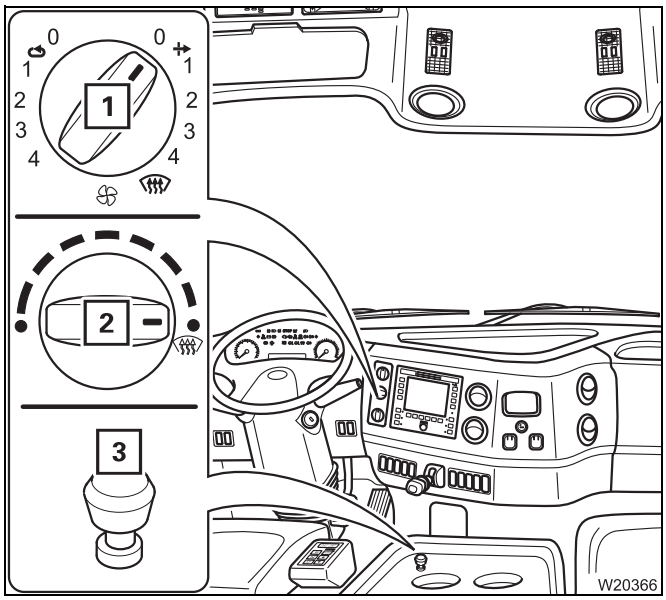
You can use the auxiliary water heater to:

– Preheat just the engine or

– Preheat the engine and driver's cab simultaneously.

Preheating the engine

If only the engine is to be preheated, adjust the heating system as follows:

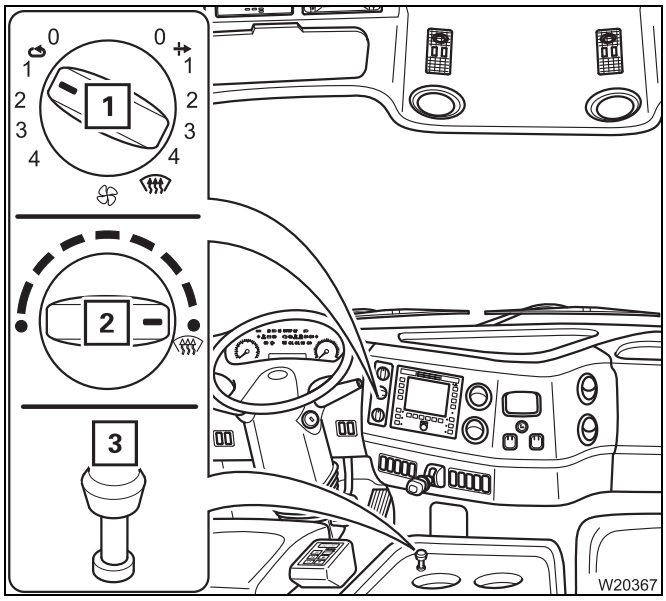


- Switch (**2**) to position *Warm*.
- Switch (**1**) to *Fan off* setting.
- Knob (**3**) pressed.

14.03.2018

Preheating the driver's cab

Adjust the heating system as follows if the driver's cab is to be preheated in addition to the engine:



- Switch (**2**) to position *Warm*.
- Switch (**1**) on the *recirculated air* symbol, level **1**.
- Open the air vents; ➠ p. 5 - 76.
- Knob (**3**) pulled.

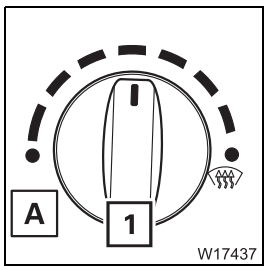
If you heat the driver's cab at the same time, the amount of time required to preheat the engine will increase significantly.

Switching on the auxiliary heater

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

Risk of explosion when operating the auxiliary heater!
The auxiliary heater is not allowed to be operated:
– at service stations and tank farms,
– at places where flammable gases or vapours can be found or formed (e.g. at places where fuel is stored and in chemical factories),
– at places where explosive dust can be found or formed (e.g. carbon dust, wood dust and grain dust).

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



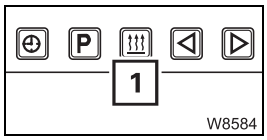
- Turn the switch (**1**) to the required temperature.

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

14.03.2018

This section describes how to switch on the heater manually. The auxiliary heater can also be switched on automatically; *Saving automatic heating start*, p. 5 - 83.

- Switch on the ignition; *Switch on the ignition*, p. 4 - 11.



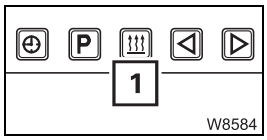
- Press the button (**1**) once.
  The auxiliary heater switches itself on and the insert lights up.

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

Always switch 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.

Switching off the auxiliary heater

This section only describes how to switch off the heater manually. The auxiliary heater is switched off again after a certain heating period if it was switched on automatically. You can set this heating period; *Setting the heating period*, p. 5 - 84.



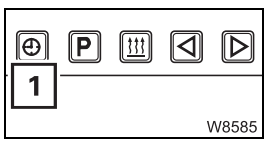
- To **switch off**, press the button (**1**) once. The auxiliary heater is switched off immediately.

If you turn off the ignition while the auxiliary heater is in operation, the auxiliary heater continues to run for a certain period of time. You can set this remaining time; *Air-conditioning system*, p. 5 - 78.

Setting time and weekday

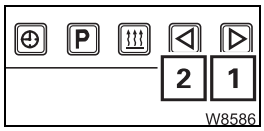
Always set the current time and current day of the week. These settings are required for the correct activation point of the automatic heating start.

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



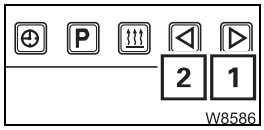
- Press the button (**1**) for longer than 2 seconds.
  The displayed time flashes, e.g. 10.00.

14.03.2018



- Set the current time on the flashing display – button (**1**) or (**2**), e.g. 14:00.

- Wait for 5 seconds. The new time is saved and then the weekday flashes, e.g. **MO** for Monday.



- Set the current day of the week on the flashing display.

After 5 seconds, the display stops flashing and the current time is displayed. The weekday goes out.

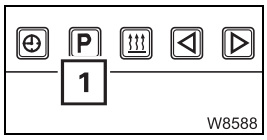
The time and weekday have now been set.

Saving automatic heating start

Heating is started automatically on schedule only if the time and the day of the week have been correctly set; ➠ p. 5 - 82.

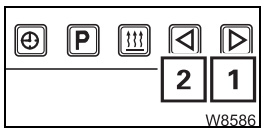
You can set three different automatic heating starts – up to seven days in advance.

If you call up values in order to change them during the following setting process, they flash for 5 seconds. The entry must be made within this period. The value stops flashing after 5 seconds and is saved as the new value.



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

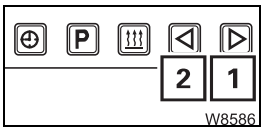
The following flash:
– The retrieved storage location, e. g. 2
– The last saved heating start, e.g. 06:00.



- Set the time for the desired heating start – button (**1**) or (**2**), e.g. 08:00.

14.03.2018

Wait for approx. 5 seconds until the weekday for the heating start flashes, e.g. **MO** for Monday.



- Set the weekday for the desired heating start – button (**1**) or (**2**).

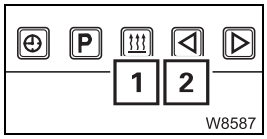
Wait for approx. 5 seconds until the current time is displayed, e. g. 14.00. Now, the new heating start has been saved and switched on.

If you wish to store one or two more heating starts, retrieve a new storage location using the P button and repeat the procedure.

After you have saved the heating start, you can also set the heating period;
➠ *Setting the heating period*, p. 5 - 84.

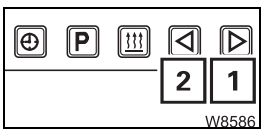
Setting the heating period

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



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

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



- Set the desired heating period on the flashing display – button (**1**) or (**2**). You can set a heating period of 10 to 120 minutes.

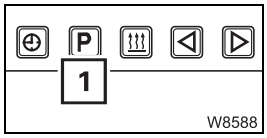
Wait for approx. 5 seconds until the current time is displayed, e. g. 14.00.

A new heating period has now been set.

14.03.2018

Switching the automatic heating start on and off

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



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

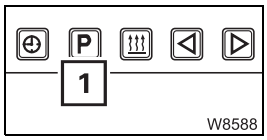
The display field flashes for 5 seconds and a storage location is shown (e.g. **2**). The heating start at this storage location is now switched on.

To switch on a different heating start, press the P button repeatedly until the desired storage location is displayed. This heating start is switched on as soon as the display stops flashing.

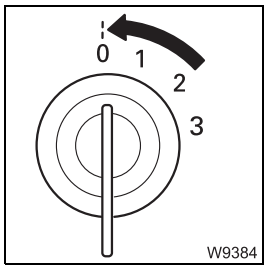
To switch off the automatic heating start, press the P button repeatedly until no storage location is displayed any longer.

Setting the remaining run time

If the ignition is turned off while the auxiliary heater is running, the auxiliary heater continues to run for the remaining time.

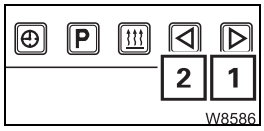


- Switch on the auxiliary heater using the button (**1**).



- Switch off the ignition.

The auxiliary heater continues to run and the residual run time set last flashes, e.g. 48 minutes.



- Set the desired remaining time on the flashing display – button (**1**) or (**2**). You can set a remaining time of 1 to 120 minutes.

- Wait for 5 seconds until the current time is displayed.
  The remaining time is now set.

14.03.2018

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14.03.2018

5.7 Towing a trailer

When towing a trailer, a towbar coupling is fitted to the back of the carrier.

Please observe the permissible trailer load of your truck crane.

Risk of 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 from rolling away. Ensure that it is still possible to swivel the front axle of the trailer.

Before coupling the trailer, adjust the towbar to the height of the towbar coupling.

Risk of 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:

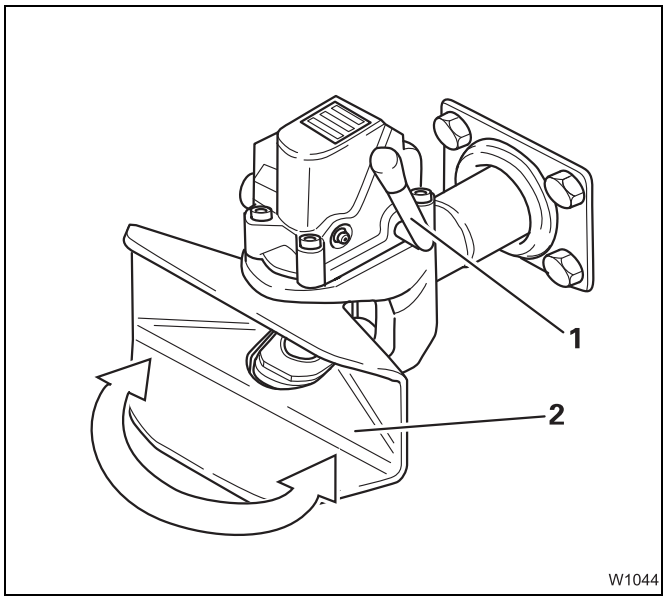
– For every 100 kg (220 lbs) of drawbar load, the axle loads on the 1st and 2nd axle lines are reduced by 36 kg (80 lbs).

– For every 100 kg (220 lbs) of drawbar load, the axle loads on the 3rd and 6th axle lines are reduced by 43 kg (95 lbs).

14.03.2018

Coupling the trailer

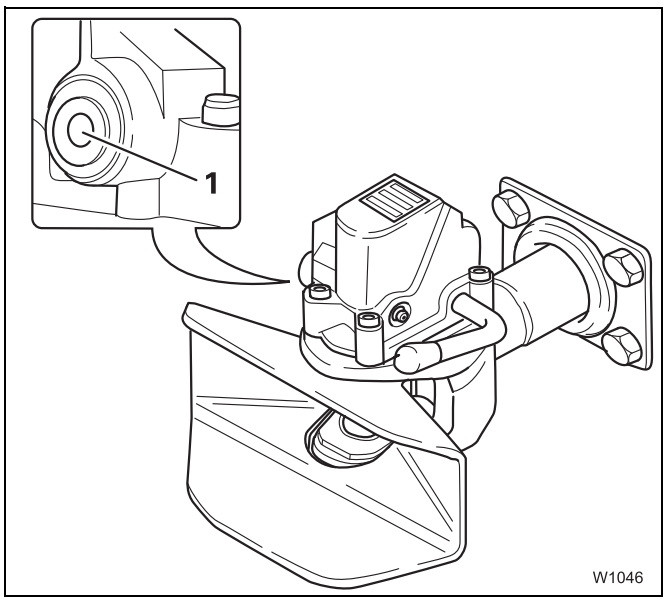
Risk of injury when the automatic closing device is triggered!
Do not put your hand into the coupling jaw when the towbar coupling is open.
This may activate the automatic closing device, causing the cotter pin to move down with great force, seriously injuring your hand.



- 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.

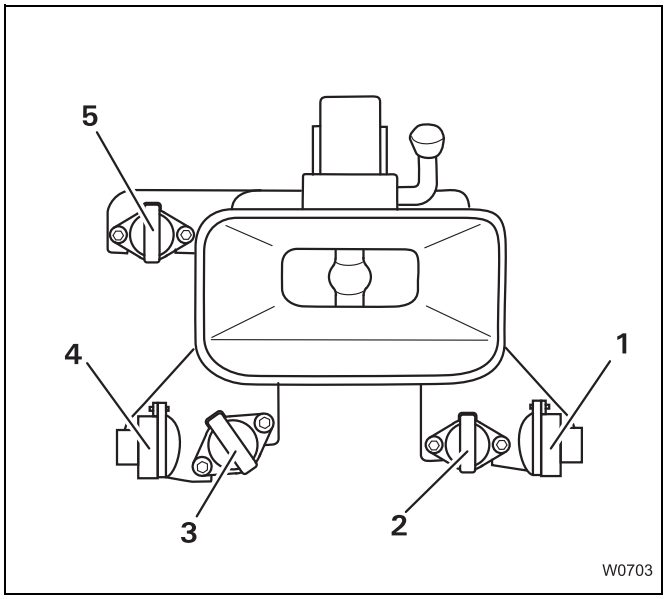


The pin (**1**) may no longer protrude from the guide bushing after the coupling procedure.

14.03.2018

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 cable 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.

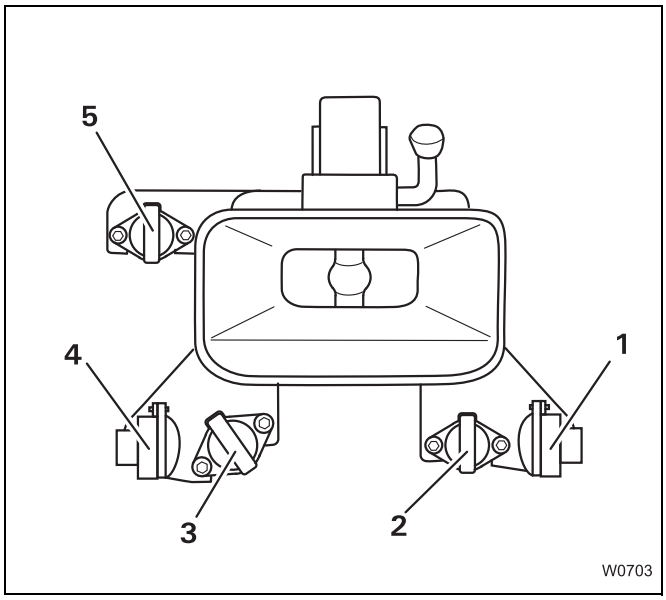
Risk of accidents if the hoses are too short or installed improperly!
The hose lines may not come off even when driving around corners. When connecting the hoses, make sure they are long enough and have enough clearance.

- Check the function of the trailer lighting.
- Test the service brake and parking brake immediately after setting off.

14.03.2018

Removing supply lines

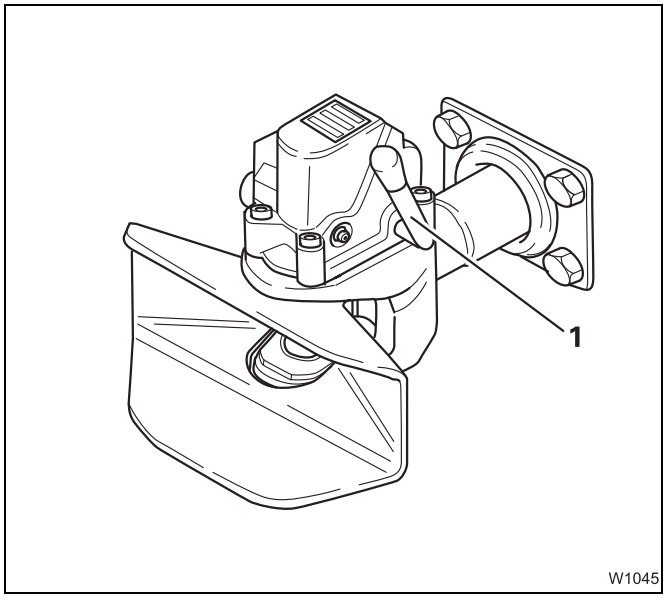
Risk of accidents due to trailer moving unintentionally!
Always first remove the hose from the supply line so that the trailer is braked. This prevents the trailer from moving when you remove the brake hose.



- Proceed as follows:
  - First disconnect the hose of the supply line from the red coupling head (**1**). Now the trailer is braked.
  - Then disconnect the hose of the brake line from the yellow coupling head (**4**).
- Remove the plug (**5**) of the trailer electrical system from the socket.
- If necessary, remove the plugs (**2**) and (**3**) from the sockets (ABS and special fittings).

Uncoupling the trailer

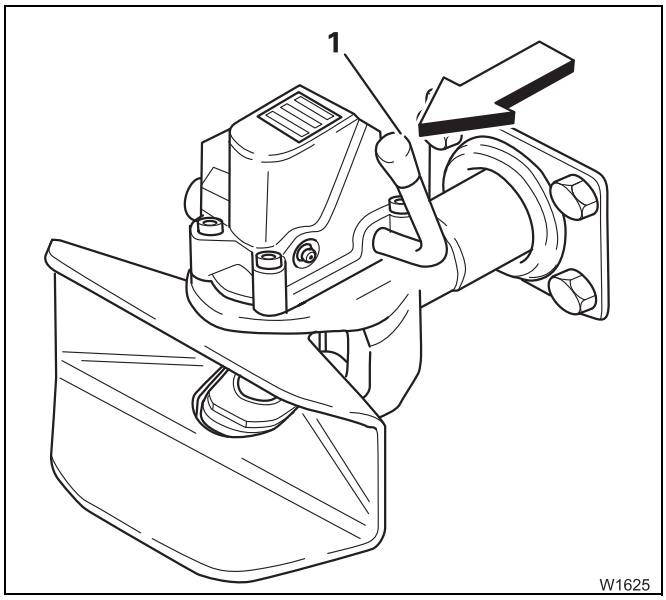
Risk of injury when the automatic closing device is triggered!
Never put your hand into the coupling jaw when the towbar coupling is open.
This prevents the coupling from closing automatically, and the cotter pin causing serious injury to your hand.



- 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.

14.03.2018

Risk of injury when manually closing the towbar coupling!
When closing, the lever moves down with great force in the direction of the coupling jaw. Start the closing process only by moving the lever briefly in the direction of the coupling jaw with the ball of your hand.
If you hold the lever and move it down, it may carry your hand with it and crush it.



If no trailer is connected, you must close the towbar coupling by hand. Proceed as follows:

- Move the lever (**1**) briefly in the direction of the coupling jaw (observe the arrow).

The lever swings downwards and the towbar coupling is closed.

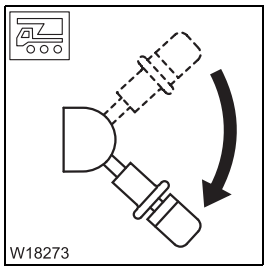
Risk of injury when the automatic closing device is triggered!
Always close the coupling if no trailer is connected. This prevents people from being injured by the automatic closing device being activated unintentionally.

14.03.2018

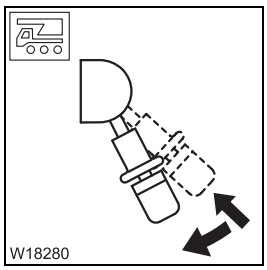
Checking the braking force

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.



- Apply the parking brake.



- Press the lever in and pull it further down.
  As long as you hold the lever in this position, the parking brake on the trailer is released – the parking brake on the truck crane remains 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.

14.03.2018

6 Driving modes

14.03.2018

14.03.2018

6 Driving modes

This chapter contains:

– Tables with driving modes of the GMK6300L-1, in which the maximum axle load is 12 t (26,500 lbs).

– Rigging work required in order to set down the main boom on a trailer.

– Installation/removal of the main boom.

6.1 Driving modes

Information about the axle loads

The GMK6300L-1 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 that 12 t (26,500 lbs), the crane driver/crane operator bears the sole responsibility for driving in this condition and for any subsequent damage. This also applies to damage due to premature wear.

Risk of accidents from increased braking distance!
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).

14.03.2018

6.1.1 Information on how to use the tables

The tables consist of two parts:

– The driving mode of your truck crane is specified in the top part, next to **Equipment**. Find out which driving mode applies to your truck crane. Each truck crane has one driving mode only.
– The required rigging mode for this driving mode and the accessories you are allowed to transport are specified in the middle section, next to **Rigging mode**.

If you remove indicated parts from the truck crane in driving mode, then the total weight decreases but can be distributed in such a way that the front or rear axle loads are over 12 t (26,500 lbs).

Example of how to use the table:

Assuming your truck crane is equipped with 445/95 tyres, 12 x 8 x 12 drive and a retarder.

In this case, the driving mode in the upper part, in addition to the equipment, is **1**.

According to the specifications in the middle part, in addition to rigging mode:

– The triple-sheave hook block may be attached to the bumper.

Counterweight, lattice extension/hose drum and auxiliary hoist may not be transported.

14.03.2018

6.1.2 Tables for a maximum axle load of 12 t (26,500 lbs)

The following applies to all driving modes:
– The counterweight is completely unrigged.
– The lattice extensions/hose drums have been removed.
– The auxiliary hoist must be removed.

For tyres 385/95 R25

Also be aware of the effects on the axle loads when towing a trailer; ➠ p. 5 - 87.

		Driving mode 1
Equipment	Aluminium rims	✔
	Drive 12 x 8 x 12	✔
	Retarder	✔
	Outrigger pad, synthetic material	✔
Rigging mode	3 -sheave hook block attached to the bumper [1)]	●

		Driving mode 2
Equipment	Steel rims	✔
	Drive 12 x 6 x 12	✔
	Retarder	✔
	Outrigger pad, synthetic material	✔
Rigging mode	1 -sheave hook block attached to the bumper [1)]	●

[1)] The weight of the hook blocks is based on the information in these operating instructions; ➠ p. 1 - 10.

14.03.2018

For tyres 445/95 R25

Also be aware of the effects on the axle loads when towing a trailer; ➠ p. 5 - 87.

		Driving mode 1
Equipment	Aluminium rims	✔
	Drive 12 x 6 x 12	✔
	Retarder	
	Outrigger pads	
Rigging mode	1 -sheave hook block attached to the bumper [1)]	●

[1)] The weight of the hook blocks is based on the information in these operating instructions; ➠ p. 1 - 10.

		Driving mode 2
Equipment	Steel rims	✔
	Drive 12 x 6 x 12	✔
	Retarder	
	Outrigger pads	
Rigging mode	No hook block	●

14.03.2018

For tyres 525/80 R25

Also be aware of the effects on the axle loads when towing a trailer; ➠ p. 5 - 87.

		Driving mode 1
Equipment	Aluminium rim	✔
	Drive 12 x 6 x 12	✔
	Retarder	
	Outrigger pads	
Rigging mode	1 -sheave hook block attached to the bumper [1)]	

[1)] The weight of the hook blocks is based on the information in these operating instructions; ➠ p. 1 - 10.

14.03.2018

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 rupturing.

The maximum permissible speed depends on the size of the tyres and the axle load. The following values only apply to the given tyre pressure, and are maximum values. Also note the information provided by the tyre manufacturer regarding the maximum permitted load duration.

Tyre size/ Tyre pressure in bar (psi)	Current axle load in t (lbs)	Maximum permissible speed in km/h (mph)
385/95 R 25[1] / 10 (145.0)	up to 13.5 (29,800)	58 (36)
	up to 14,5 (32,000)	45 (28)
	up to 15,5 (34,200)	32 (20)
	up to 16,5 (36,400)	22 (14)
445/95 R 25 / 9 (130,5) **525/80 R 25 / 7 (101.5)**	up to 13.5 (29,800)	65 (40)
	up to 14,5 (32,000)	65 (40)
	up to 15,5 (34,200)	65 (40)
	up to 16,5 (36,400)	58 (36)
[1] Michelin X-Crane **9 bar (130.5 psi)**		

14.03.2018

6.2 Weighing the truck crane

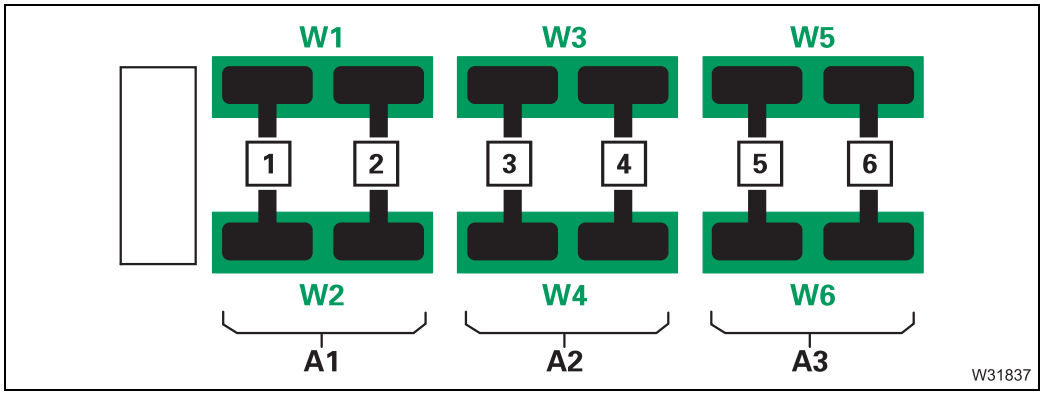
Weighing error

The most precise method for determining the total weight of the GMK6300L-1 is too 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.

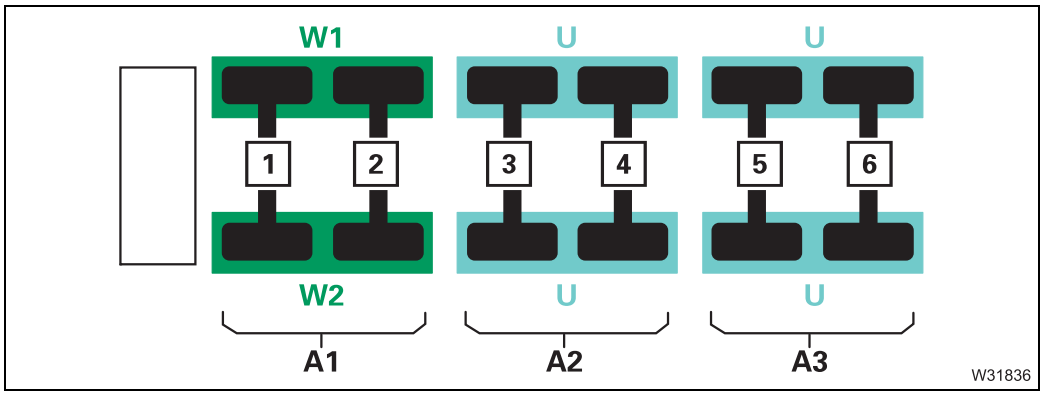
If multiple individual scales are used, allowance must be made for the fact that the axle groups are hydraulically coupled. For this purpose, you will need wheel load scales of sufficient capacity and size.



Determining

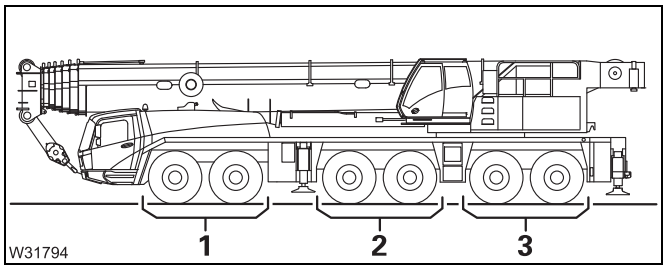
– **Determining the total weight**
The weights of all the axle groups belonging to the crane must be recorded at the same time in a single weighing procedure. In addition, only one set of scales may be used per axle group on each side of the vehicle. If, for instance, there are three coupled axle groups (**A1** to **A3**) on the truck crane, then you need six wheel load scales (**W1** to **W6**).

14.03.2018



– **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** and **A3** must be equalised on a support plate **U** which has the same height as the scales **W1** and **W2**.

Axle groups

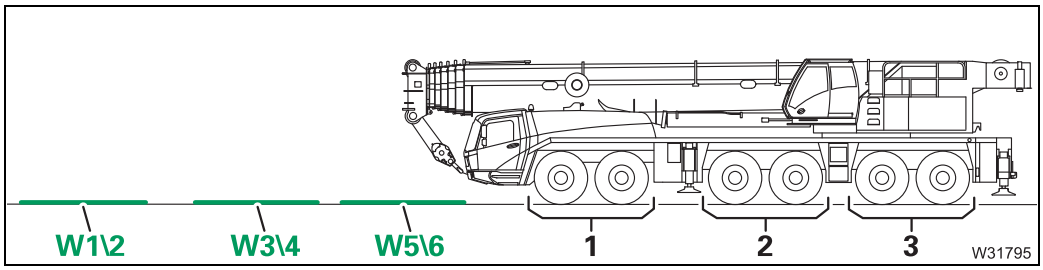


GMK6300L-1

– Axle group **1**	1. + 2. axle lines
– Axle group **2**	3. + 4. axle lines
– Axle group **3**	5. + 6. axle lines

14.03.2018

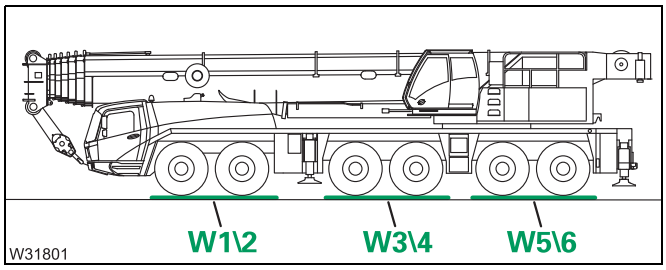
Weighing procedure



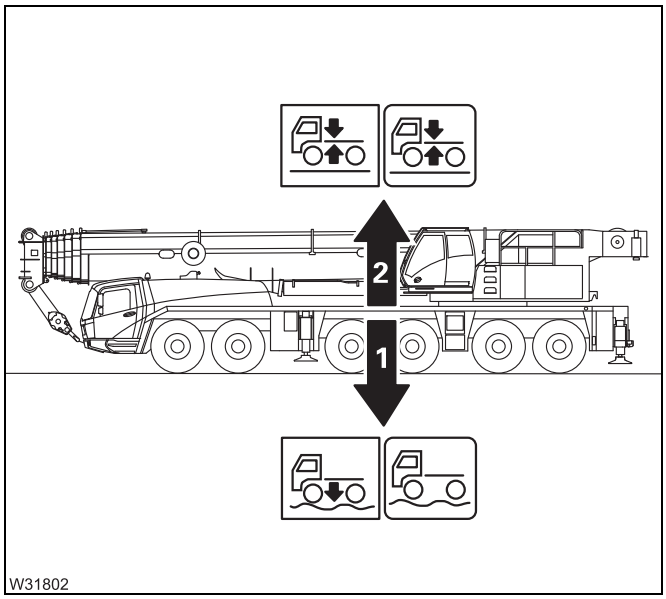
Perform the weighing procedure only with the crane truck standing on solid and horizontal ground! All scales must be at the same height!

- Position the scales **W1** to **W6** (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** to **3**.

In the next step, drive steadily at a very low speed without any steering movements, and brake only very gently.



- Drive the truck crane on to the scales **W1** to **W6** (or on to the necessary support plate), 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 - 64.
- **(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.

14.03.2018

Evaluation

In the example shown you receive six weighing results. Assume you had made a note of the values listed here.

Passenger side: W1 = 10 t, W3 = 10 t, W5 = 12 t

Driver's side: W2 = 10 t, W4 = 10 t, W6 = 12 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 six results.

Passenger side: W1 + W3 + W5 = 10 t + 10 t + 12 t = **32 t**

Driver's side: W2 + W4 + W6 = 10 t + 10 t + 12 t = **32 t**

Total weight = 64 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.

Example of 3rd axle line

– 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 = 10 t

Driver's side: W4 = 10 t

Weight of axle group 2 = **20 t**

– Determining the axle load on the 3rd axle line

Axle group 2 has 2 axle lines.

- Divide the weight of the axle group by the number of axles.

$$\textbf{Axle load} = \frac{\text{Weight of axle group 2}}{\text{Number of axle lines}} = \frac{20\ \text{t}}{2} = \textbf{10 t}$$

14.03.2018

6.3 Rigging work for driving with a trailer

To reduce the axle loads to the specifications applicable in the country in which you are working, you can set the main boom on to a trailer (dolly) when driving.
For this purpose, the truck crane must be fitted with a slewing gear freewheel, boom floating position and if necessary, with a boom pre-tensioning device.

Before driving with the trailer, you must:

- Switch on the slewing gear freewheel; ➠ p. 6 - 12,
- Switch on the boom floating position; ➠ p. 6 - 13,
- Switch on boom pre-tensioning, if necessary; ➠ p. 6 - 14,
- If necessary, mechanically unlock the turntable; ➠ p. 11 - 14.

14.03.2018

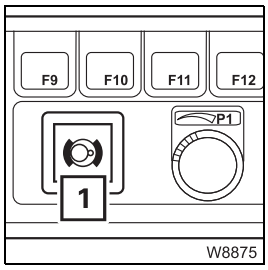
6.3.1 Switching on the slewing gear freewheel

When the main boom is set down on a trailer, the superstructure must be able to slew when driving around corners. You must switch on the slewing gear freewheel for this purpose.

- If a houselock is fitted, switch it off; ➠ *Switching off the houselock*, p. 11 - 17.

Risk of accidents from the houselock being switched on!
Always switch off the houselock before setting down the main boom on the trailer. Otherwise the superstructure will be unable to slew when driving around corners.

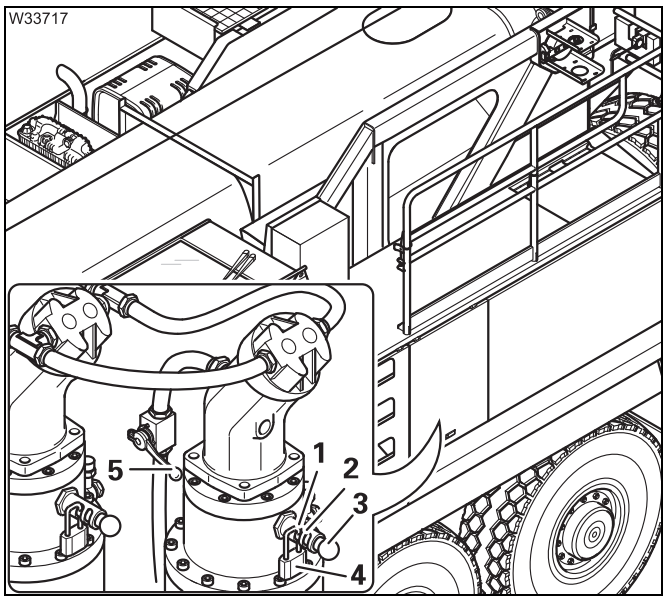
- Place the boom on the trailer as described in section *Switching on the boom floating position*, p. 6 - 13.



Prerequisites

– The engine for crane operation is running.

– The slewing gear brake is released, the lamp (**1**) has gone out; ➠ *Releasing the slewing gear brake*, p. 11 - 97.



Switching on

- Remove the padlock (**4**) from the bore (**2**).
- Push the pin (**3**) inward as far as it will go.
- Secure the pin with the lock in the bore (**1**) and remove the key.
- Fit and secure the pin (**3**) on the other slewing gear in the same way.
- Open the valve (**5**) – the slewing gear freewheel is switched on.

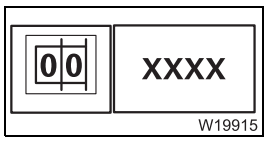
Switching off the slewing gear freewheel; ➠ p. 12 - 18.

14.03.2018

6.3.2 Switching on the boom floating position

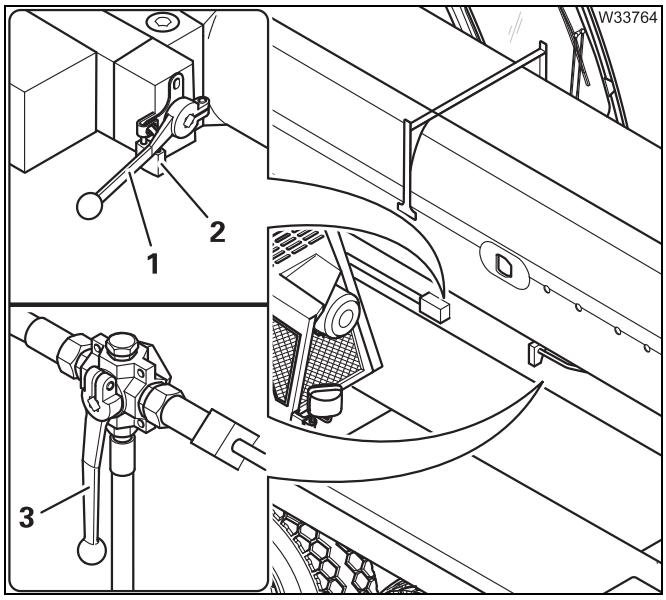
If the main boom has been placed on a trailer, the boom floating position must be switched on so that the main boom can move up and down.

Risk of accidents from the boom floating position being switched off!
Always switch on the boom floating position when the main boom is on a trailer.
This prevents the full weight of the trailer 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.



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

Risk of accidents 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 trailer.
This prevents the raised main boom from dropping down.



- 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 – lever (**3**) points downwards.

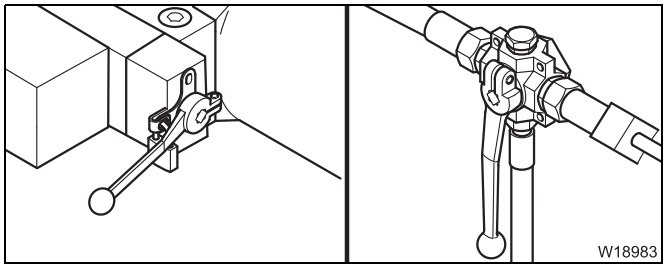
The boom floating position is now switched on.

Switching off the boom floating position; ➠ p. 12 - 17.

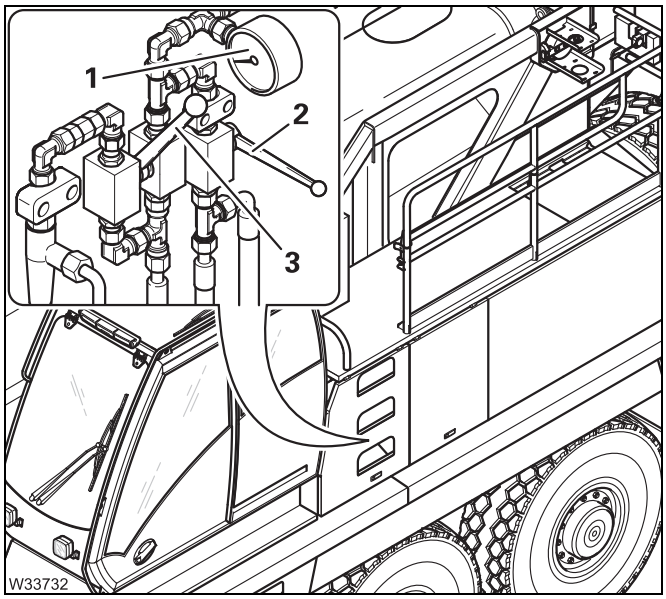
14.03.2018

6.3.3 Switching on boom pre-tensioning

If the main boom has been set down on a trailer, you can change the axle loads on the rear axle lines by switching on the boom pre-tensioning.



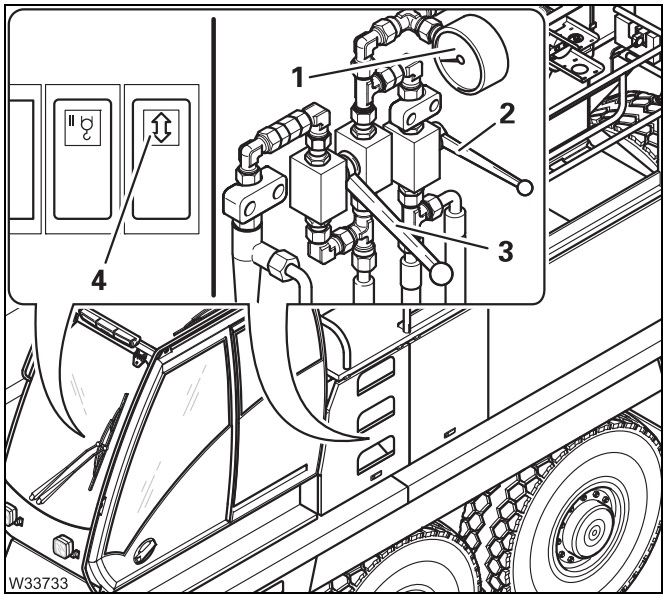
- Switch on the boom floating position; ➠ p. 6 - 13.



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**) up.
  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.

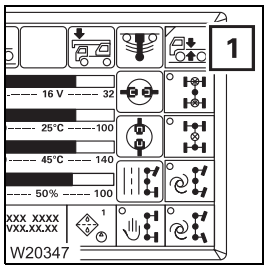
Now the boom pre-tensioning is switched on.

14.03.2018

6.3.4 Adjusting axle pressure

With additional equipment you can adjust the axle pressure of the 3rd and 4th axle lines for trailer operation.

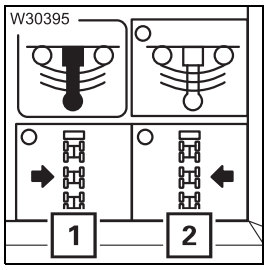
You can only open the submenu when the truck crane is stationary.



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

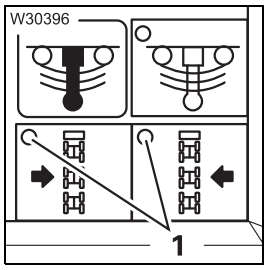
  This opens the *Level adjustment system* submenu.

Preselecting the axle pair



- Press the button once.
  - (**1**) for the left axle pair,
  - (**2**) for the right axle pair.

  The pre-selection remains active for 30 seconds.



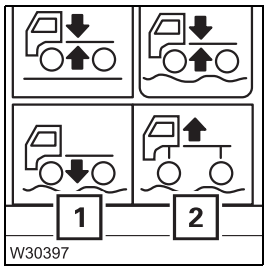
The dots (**1**) indicate the selected switching state:

Green dots:	Axle pressure adjustment is selected.
Black dots:	Axle pressure adjustment is deselected.

Only one axle pair can be preselected at a time.

14.03.2018

Adjusting axle pressure



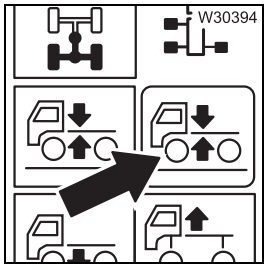
- Tap the button
  - (**1**) to increase the axle pressure,
  - (**2**) to reduce the axle pressure.

  The set axle pressure may not exceed 80 bar (1,160 psi).

Driving with changed axle pressures

The truck crane may only be driven with changed axle pressures if the main boom is set down on a trailer (dolly).

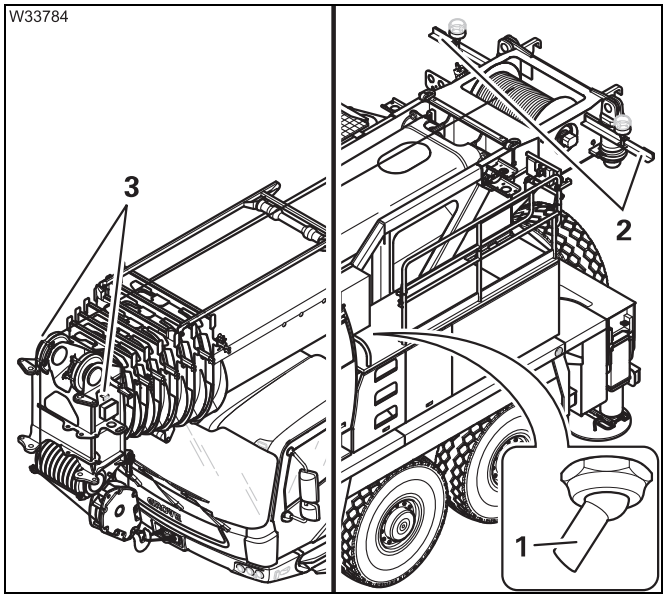
Adjusting axle pressure for on-road driving



If you would like to drive the truck crane without a trailer (dolly), then you must adjust the on-road level; p. 5 - 17.

14.03.2018

6.3.5 Switching the superstructure driving lights on/off



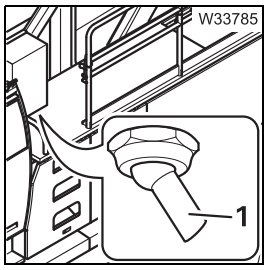
The lighting for the *superstructure* includes lamps (**2**) and (**3**).

With standard equipment, lamps (**2**) and (**3**) are always switched on and off together with the parking light and the headlights.

With additional equipment consisting of the switch (**1**), lamps (**2**) and (**3**) can be switched on or off separately when the parking light or headlights are switched on.

Switching off

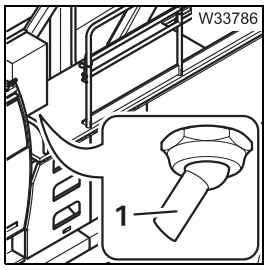
When the boom is set down on a trailer, you can switch off the *Superstructure* driving lights when necessary, e.g. in order to conform to country-specific regulations for the colour of front and rear lights.



- Push the switch (**1**) to the right – outwards.

Switching on

When the main boom is on the boom rest, the *Superstructure* driving lights must be switched on.



- Push the switch (**1**) to the left – towards the turntable.

14.03.2018

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14.03.2018

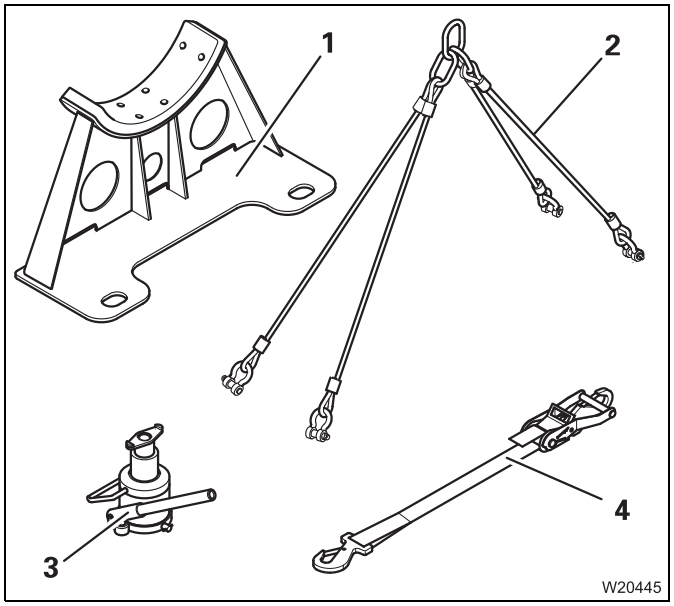
6.4 Main boom, removing/installing

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

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

Additional equipment required

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



- A derricking cylinder support (**1**),
- A tightening belt (**4**),
- A lifting device (**3**),
- Lifting gear (**2**),

as well as

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

Transport dimensions and weight;
➠ p. 1 - 10.

14.03.2018

6.4.1 CHECKLIST: Removing the main boom

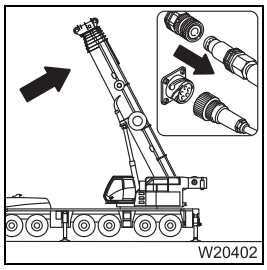
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.

Observe the warnings and safety instructions specified there!

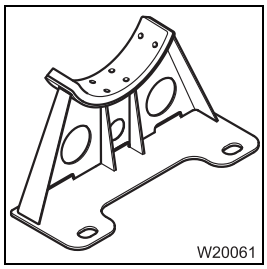
Prerequisites

- The auxiliary hoist has been unrigged.
- The hose drum is removed.
- The counterweight is unrigged.
- All lattice extensions have been removed.
- All telescopic sections are fully retracted and locked.
- The hook block has been unreeved and the hoist rope has been reeled on the drum up to the main hoist.
- The superstructure is slewed to the front.
- The truck crane is supported by an outrigger span of at least 8,70 x 2,71 m (28.5 x 8.9 ft).

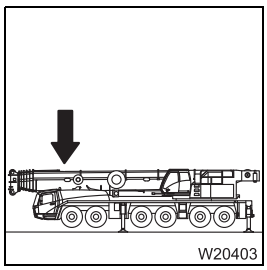
Checklist



1. Raise main boom and
- disconnect the hydraulic/electrical connections; p. 6 - 36,
- remove the clamps for the hoses; p. 6 - 28.

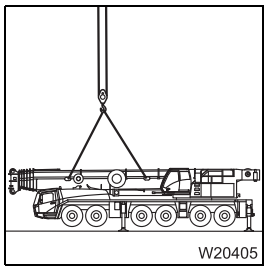


2. Place the derricking cylinder support on the counterweight platform; p. 6 - 30.

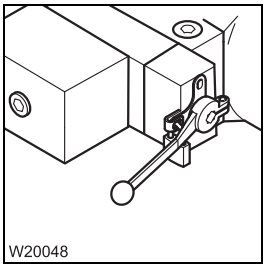


3. Place the main boom on the boom rest.

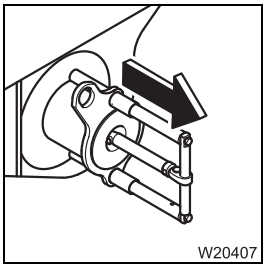
14.03.2018



4. Sling the main boom to an auxiliary crane; p. 6 - 26.



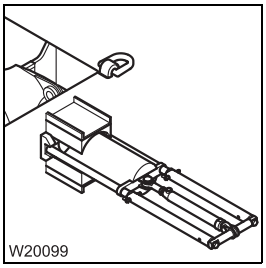
5. Switch on the derricking cylinder pressure relief; p. 6 - 29.



6. On the derricking cylinder head:

- Take the load off of the head pin,
- Release the head pin,
- Pull the head pins out;

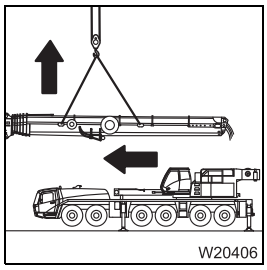
p. 6 - 30.



7. On the boom pivot pin:

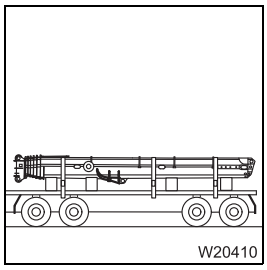
- Switch the hydraulic circuit over,
- prepare the pulling device,
- Pull out the pivot pin;

p. 6 - 33.

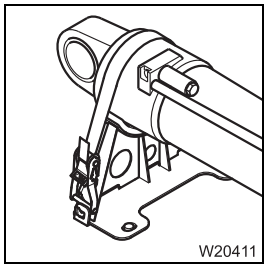


8. Raise the main boom from the turntable; p. 6 - 38.

14.03.2018



9. Put the main boom on the separate vehicle and secure for transport; ➠ p. 6 - 41.



10. Secure the derricking cylinder with a tightening belt; ➠ p. 6 - 40.

14.03.2018

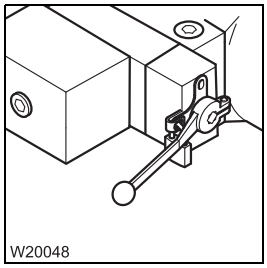
6.4.2 CHECKLIST: Mounting the main boom

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

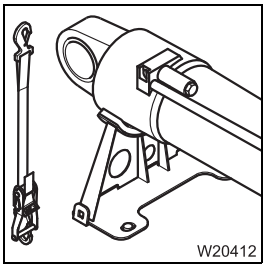
Prerequisites

The truck crane is supported by an outrigger span of at least 8,70 x 2,71 m (28.5 x 8.9 ft).

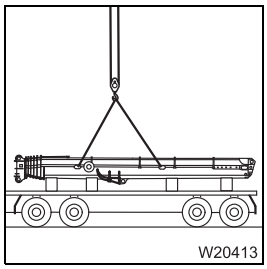
Checklist



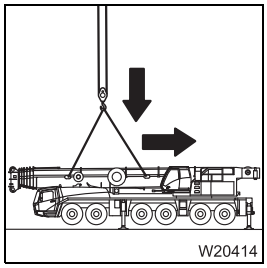
1. Check whether the pressure relief for the derricking cylinder is switched on; ➠ p. 6 - 29.



2. Remove the tightening belt from the derricking cylinder; ➠ p. 6 - 40.

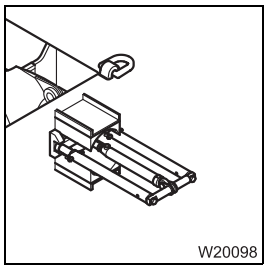


3. Sling the main boom to an auxiliary crane; ➠ p. 6 - 26.



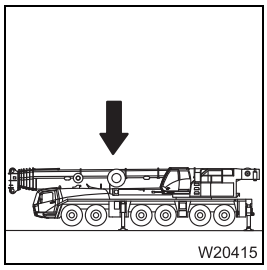
4. Lift the main boom into the turntable and align the connecting points; ➠ p. 6 - 40.

14.03.2018

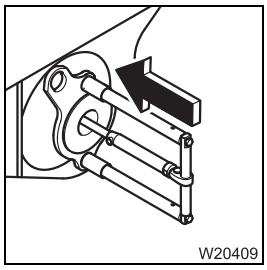


5. On the boom pivot pin:
- Switch the hydraulic circuit over,
- Push in the pivot pin,

➠ p. 6 - 33.

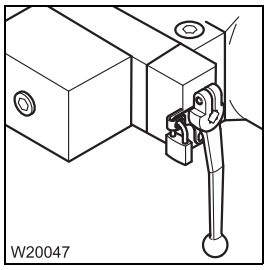


6. Set down the main boom in the boom rest with the auxiliary crane and remove the lifting gear.

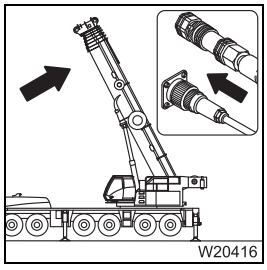


7. On the derricking cylinder head:
- Level the derricking cylinder,
- Fit the head pin,
- Secure the head pin;

➠ p. 6 - 30.

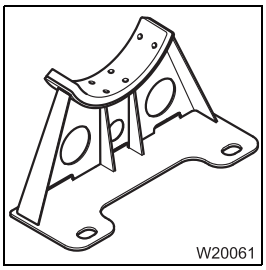


8. Switch off the derricking cylinder pressure relief; ➠ p. 6 - 29.

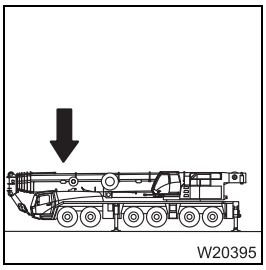


9. Raise main boom and
- attach the clamps for the hoses; ➠ p. 6 - 28,
- make the hydraulic and electrical connections; ➠ p. 6 - 36.

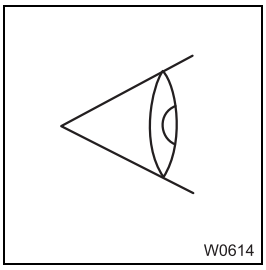
14.03.2018



10. Remove the derricking cylinder support from the counterweight platform.



11. Place the main boom on the boom rest.



12. Perform inspections with the main boom set down; ➠ p. 6 - 42.

14.03.2018

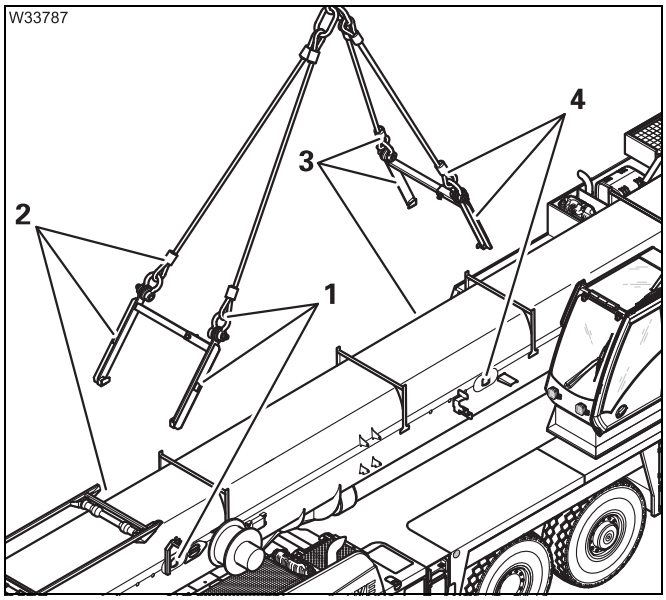
6.4.3 Slinging the main boom

Slings are fitted to the main boom when rigging and it is lifted with an auxiliary crane. Note the equipment necessary for this; ➠ p. 6 - 19.

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.

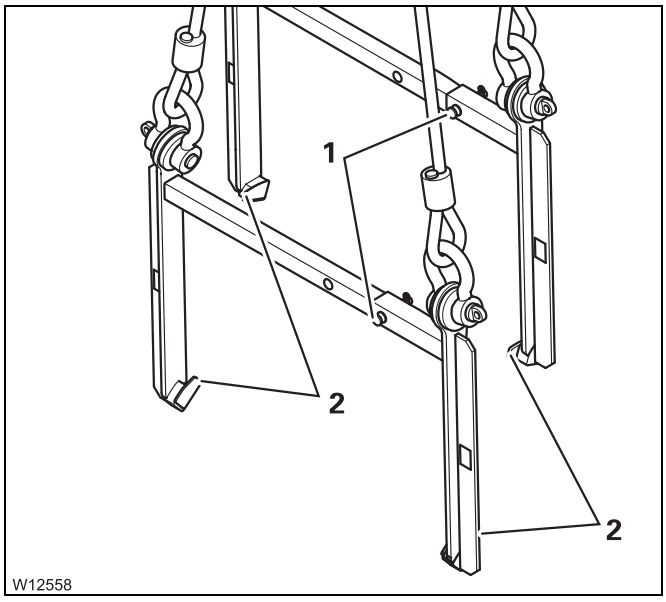


Only connect the parts of the lifting gear that have the same marking.

Only fasten the lifting gear to the slinging points intended for this purpose. The markings are of following significance:

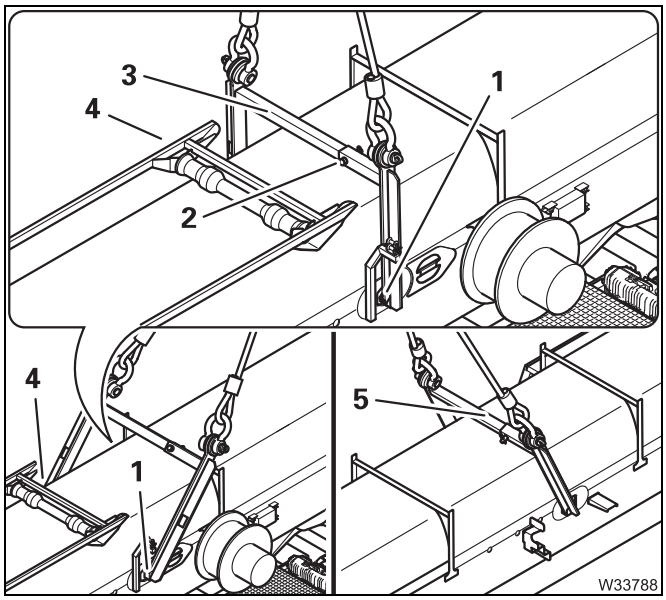
1 VL – Front left
2 VR – Front right
3 HR – Rear right
4 HL – Rear left

Installing the lifting gear

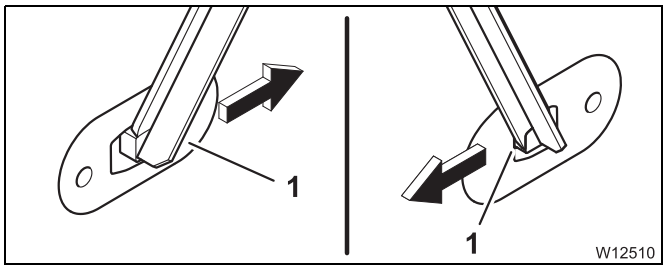


- If the installation is correct, the load-bearing equipment (**2**) of both brackets point to each other.
- Lock both brackets in the wide position. Secure the pins (**1**) using the retaining pins.
- Install the front bracket first. It hangs on longer ropes, which makes installing the back bracket easier.

14.03.2018

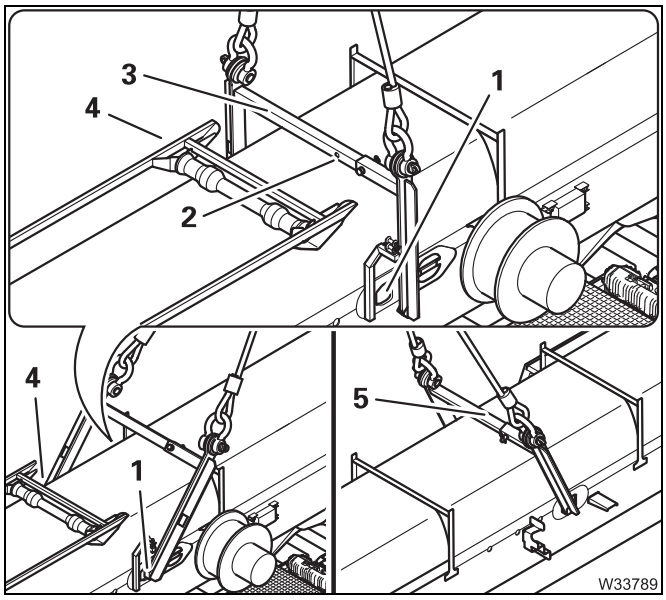


- Insert the bracket (**3**) into the slinging point (**1**). Pull the pin (**2**).
- Insert the bracket into the lifting gear (**4**).
- Secure the bracket with the pin (**2**) and the retaining pin.
- Pull the bracket to the centre – the bracket must rest on the slinging point on both sides.
- Install the bracket (**5**) in the same manner.



- Before lifting, make sure the brackets on both sides are resting on the slinging point (**1**).

Removing the lifting gear



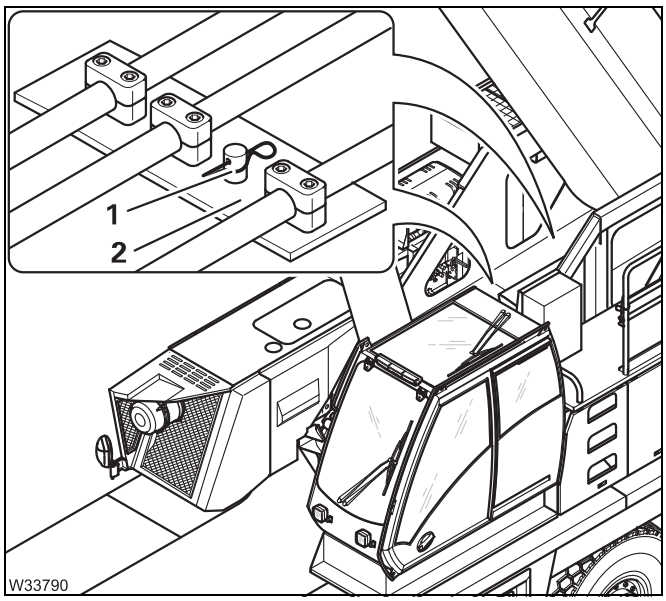
- Remove the pin (**2**) and pull the bracket (**3**) out of the slinging point (**4**).
- Secure the bracket with the pin (**2**) and the retaining pin.
- Pull the bracket out of the slinging point (**1**).
- Install the bracket (**5**) in the same manner.
- Remove the brackets.

14.03.2018

6.4.4 Removing/attaching the clamps

Danger of hands and arms being crushed!
Make sure that the boom pivot pin is bolted before making or removing or attaching the clamp.
By this means you avoid a swinging main boom crushing your arms or hands on the turntable.

The hoses for the hydraulic connection and the cables for the electrical connection are attached in the turntable on two clamps (**2**).



Removing the clamp

- Loosen the retaining pins from the pins (**1**).
- Remove the clamp (**2**).

Attaching the clamp

- Insert the clamp (**2**) onto the pins (**1**).
- Secure the clamp using the retaining pins.

14.03.2018

6.4.5 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.

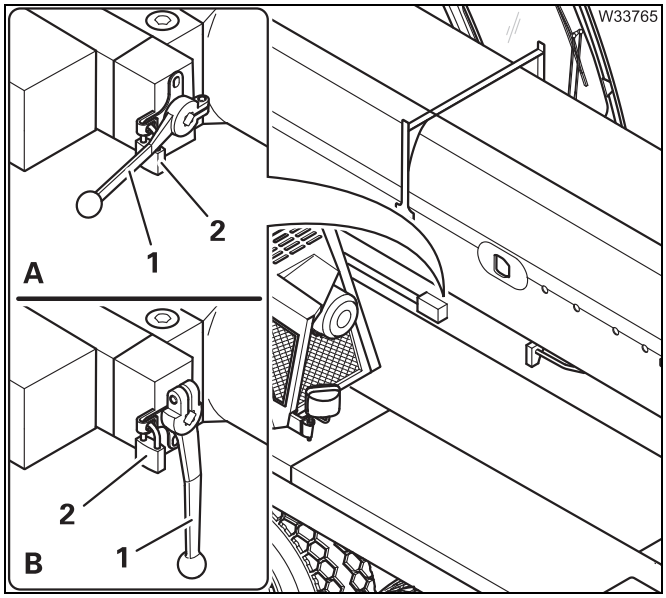
When removing

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

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

Risk of accident from falling boom!
Never switch on the pressure relief during crane operation.
This prevents the raised main boom from dropping down.

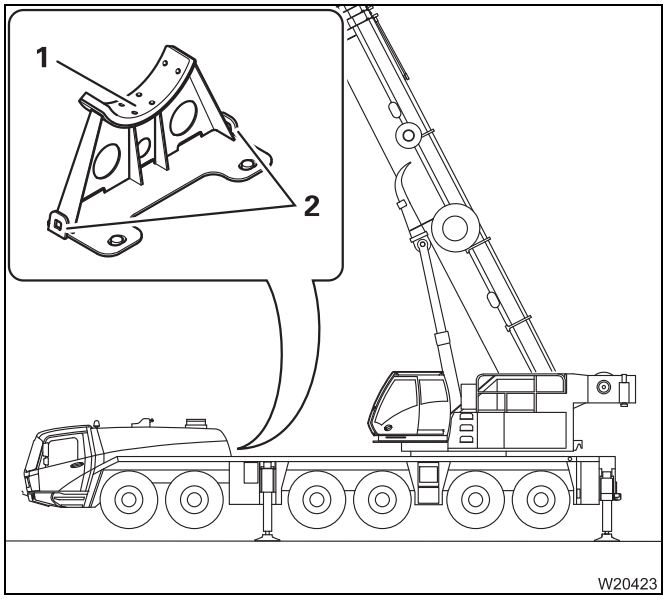
14.03.2018

6.4.6 Connecting/disconnecting the derricking cylinder from the boom

The derricking cylinder head axle is retracted and fitted with a pulling device.

Derricking cylinder support

Before retracting the head pin, the derricking cylinder support must be erected.



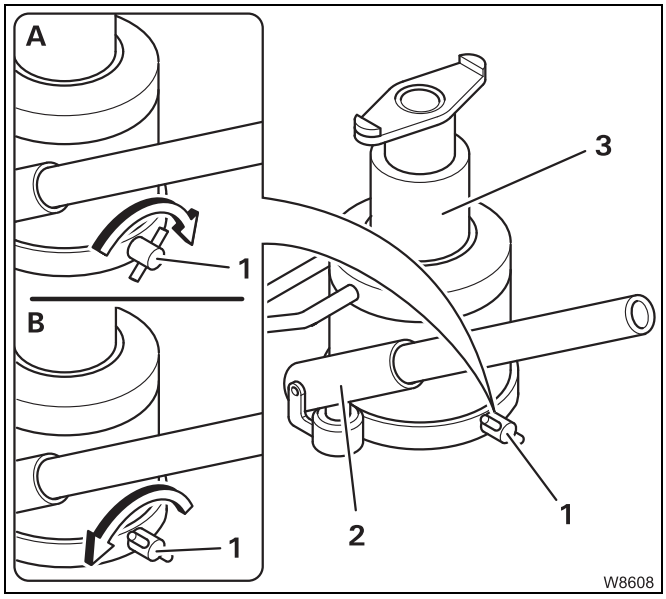
- Place the derricking cylinder support (**1**) between the holders (**2**).
- Set down the main boom on the boom rest.

Operating the lifting device

A lifting device is needed in order to relieve and level the derricking cylinder.

Danger from using unsuitable lifting device!

Have the lifting device serviced in time before the maintenance interval specified on the label expires.



- Attach the lever in the holder (**2**).

(**A**) – Raise

- Close the drain plug (**1**) and pump the lever. The piston rod (**3**) extends.

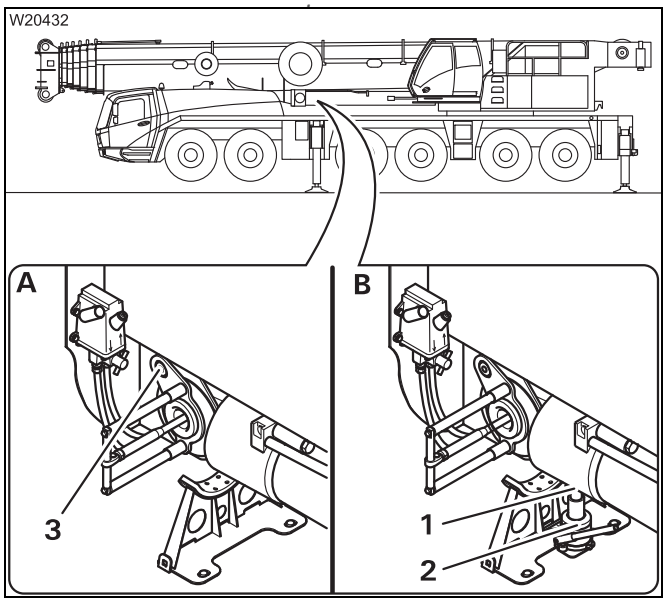
(**B**) – Lower

- Slowly open the drain plug (**1**). The piston rod (**3**) retracts.

14.03.2018

Retracting the derricking cylinder head axle

After you have pulled the head pin, you can no longer derrick the main boom.



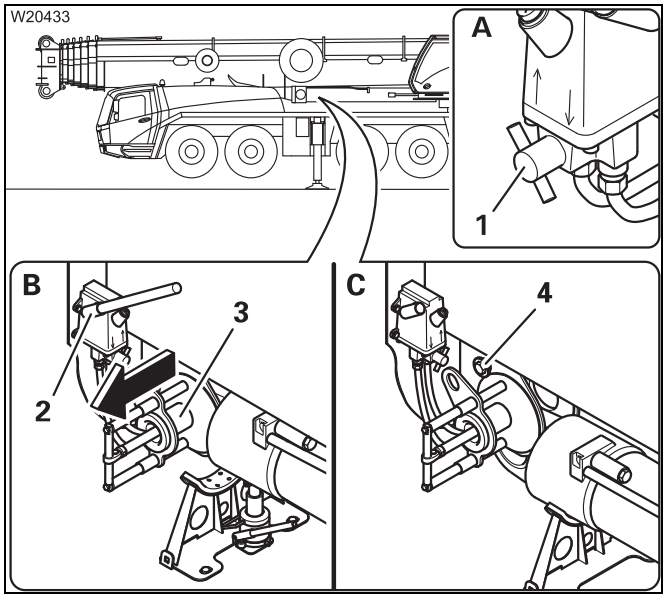
(A) – Releasing the head pin

- Loosen the bolt (**3**) and remove the disc.

(B) – 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 bracket (**1**) is resting firmly on the derricking cylinder.

Risk of accident from falling derricking cylinder!
Always take the load off of the derricking cylinder using the lifting device before retracting the head pin. This prevents the derricking cylinder from falling down, injuring people or being damaged when the bolts are undone.



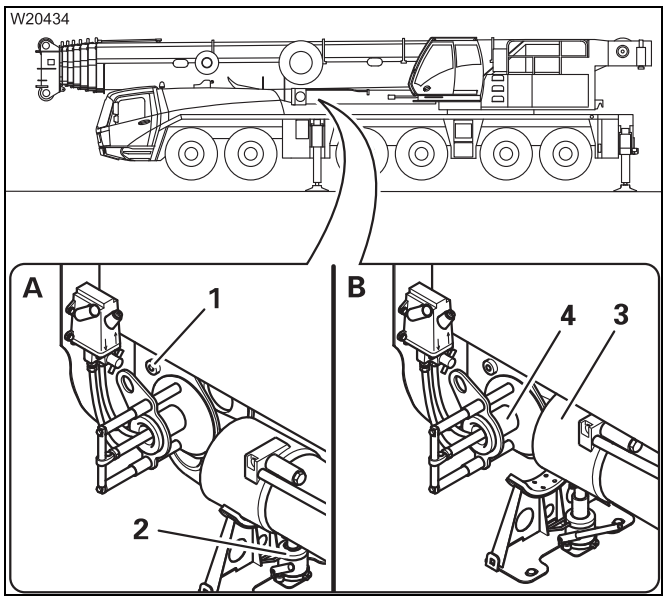
Pulling out the head pin

- (**A**) – Turn the switch (**1**) to the *pull* position ⍐.
- (**B**) – Insert the lever into the clamp (**2**).
- Pump until the head pin (**3**) is completely drawn out.
- Carry out the movement *Lower* until the derricking cylinder is in the derricking cylinder support.
- (**C**) – Fasten the disc with the bolt (**4**).
- Stow away the lever and the lifting device.

14.03.2018

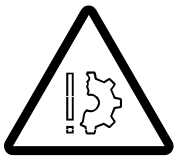
Fitting the derricking cylinder head axle

- Check to see if the tightening belt of the derricking cylinder is taken off.

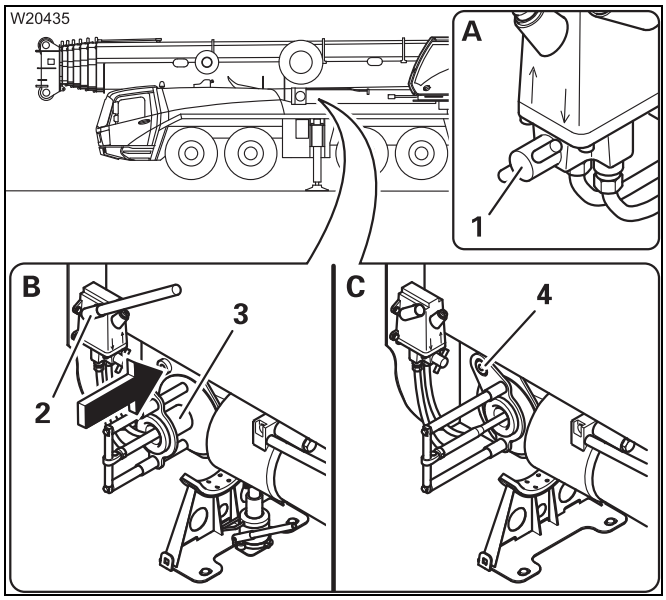


Aligning the derricking cylinder

- (**A**) – Undo the bolt (**1**) and remove the disc.
- Place the lifting device (**2**) underneath the middle of the derricking cylinder.
- (**B**) – Carry out the movement *Raise* until the head pin (**4**) is aligned with the bearing in the derricking cylinder (**3**).



Risk of damage to the bearings in the derricking cylinder head!
Make sure that the bearings in the derricking cylinder are aligned with the head pin before fitting the head pin.
This prevents the head pin from damaging the bearing.



Fitting the head pin

- (**A**) – Turn the switch (**1**) to the *fitting* 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.

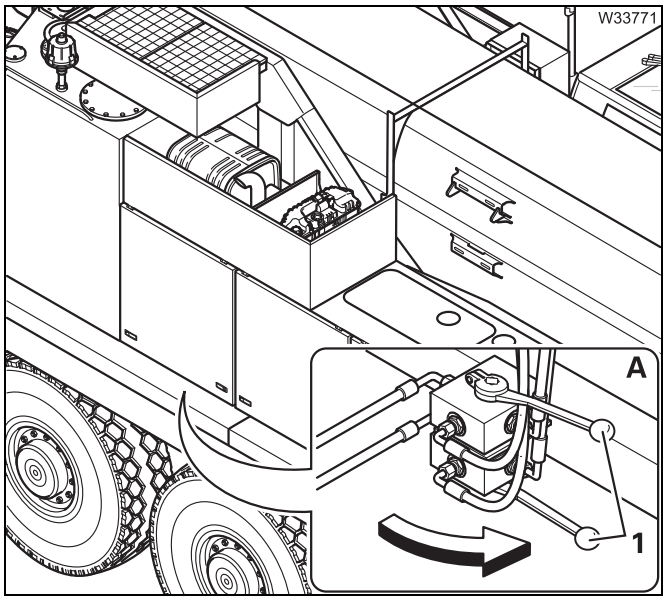
14.03.2018

6.4.7 Extending/retracting the boom pivot pin

The boom pivot pin is pulled out and pushed in using a hydraulic pulling device.

Before pulling it out

Before pulling the boom pivot pin out, you must switch the hydraulic circuit over.



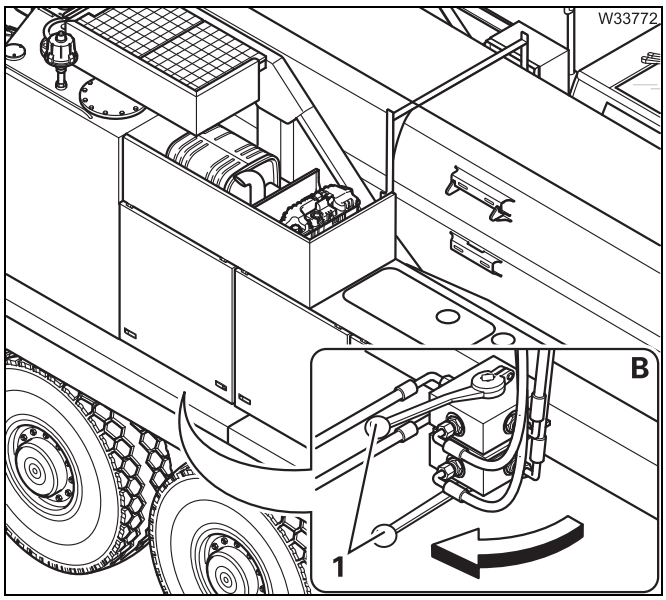
Switching over the hydraulic circuit

The valves (**1**) can be reached from underneath.

- Switch the valves (**1**) to position **A**.

After pushing it in

After pushing the boom pivot pin in, you must switch the hydraulic circuit over again.



Switching over the hydraulic circuit

- Switch the valves (**1**) to position **B**.

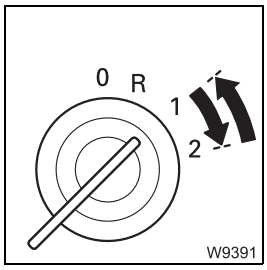
14.03.2018

Pulling out the pivot pin

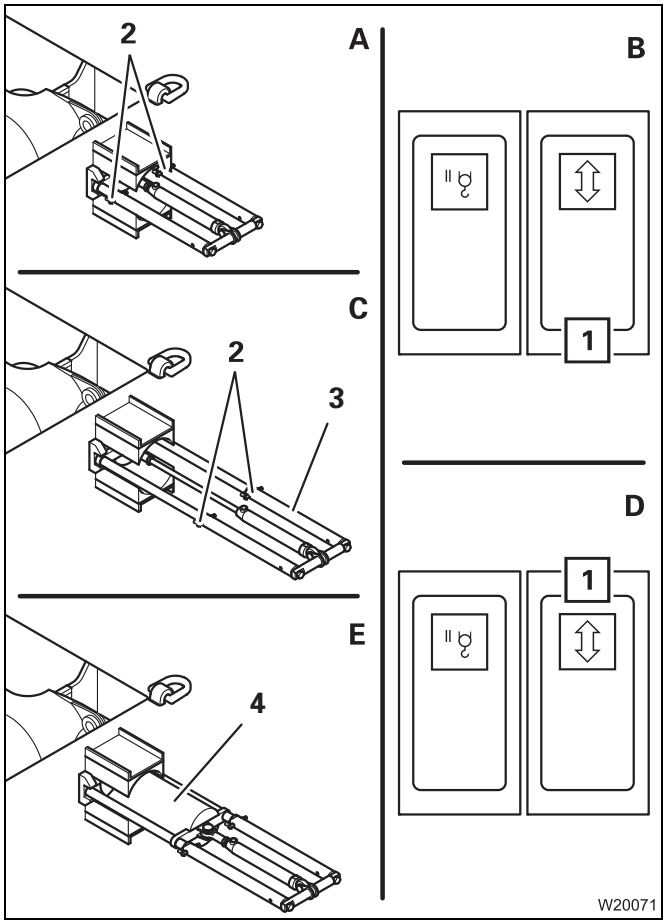
You must pull out / push in the pivot pin on both sides of the main boom.

You can operate the pulling device from the crane cab.

Risk of damage to the main boom!
Before **pulling it out**, the main boom must be slung and all other lifting gear must be tightened.
Before **pushing it in**, the bearing points on the turntable must be aligned with the boom pivot pin.



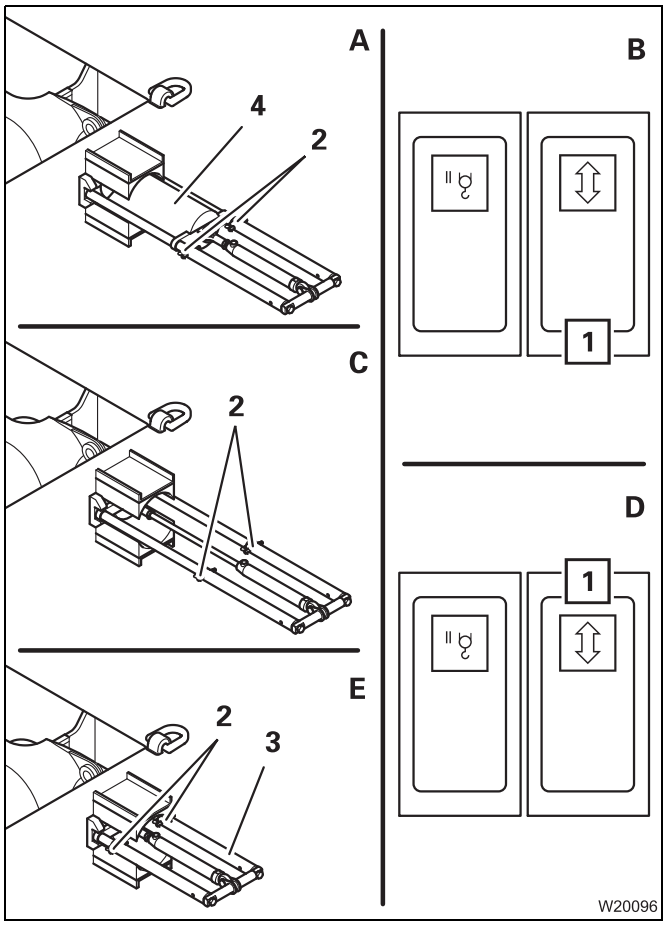
- Start the engine for crane operation.



- (**A**) – Pull the pin (**2**) out.
- (**B**) – Press the button (**1**) down.
  The pulling device is extended.
- (**C**) – Insert the pins (**2**).
  The pulling device is now in the position to pull out the pivot pin.
- (**D**) – Press the button (**1**) up.
- (**E**) – The pivot pin (**4**) is pulled out.

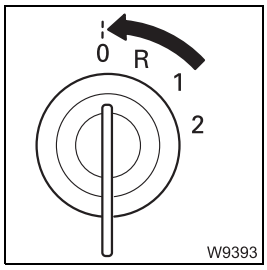
14.03.2018

Pushing the pivot pin in



- (**A**) – The pivot pin (**4**) is pulled out and the pins (**2**) are inserted.
- (**B**) – Press the button (**1**) down.
  The pivot pin (**4**) is pushed in.
- (**C**) – Remove the pins (**2**).
- (**D**) – Press the button (**1**) up. The pulling device retracts
- (**E**) – Insert the pins (**2**).
  The pulling device (**3**) is now secured in position for driving on the road.
  The pivot pin is secured for crane operation.

Risk of accidents by exceeding the permissible vehicle width!
Before driving on public roads, always move the pulling devices to the on-road driving position. In this way you can prevent putting other road users at risk and causing accidents.



- Turn off the crane engine.

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.

14.03.2018

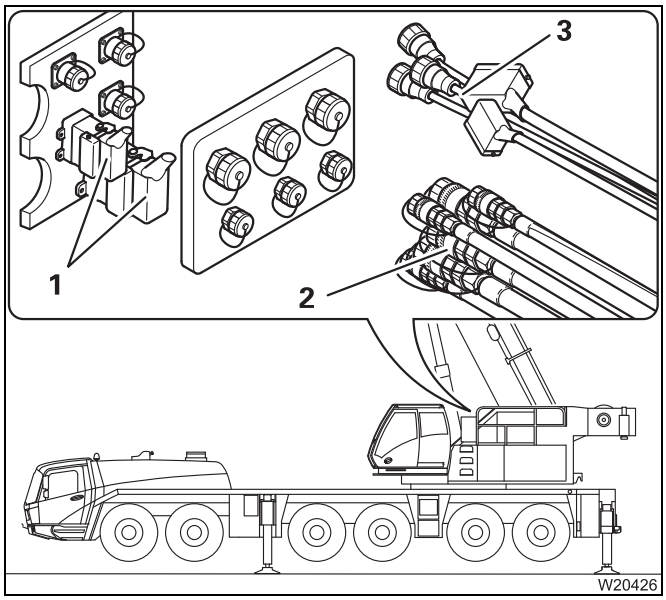
6.4.8 Disconnecting/connecting hydraulics/electrical

Disconnecting

The number of hoses/cables depends on how the truck crane is equipped.

– The main boom must be raised.

Risk of malfunction in the superstructure electronics!
Always turn off the ignition in the crane cab before you establish or separate the electrical connection. This prevents malfunctions in the electronics and corresponding error messages in the subsequent crane operation.



- Remove the hoses (**2**) from the ports.
- Remove the plugs (**3**) from the sockets.
- Insert the bridging plugs (**1**).
- Close all hoses, connections, plugs and sockets.
- Remove the clamps for the hoses; ➠ p. 6 - 28.
- If necessary, secure all the hoses/cables so that they do not swing loose when the main boom is raised.

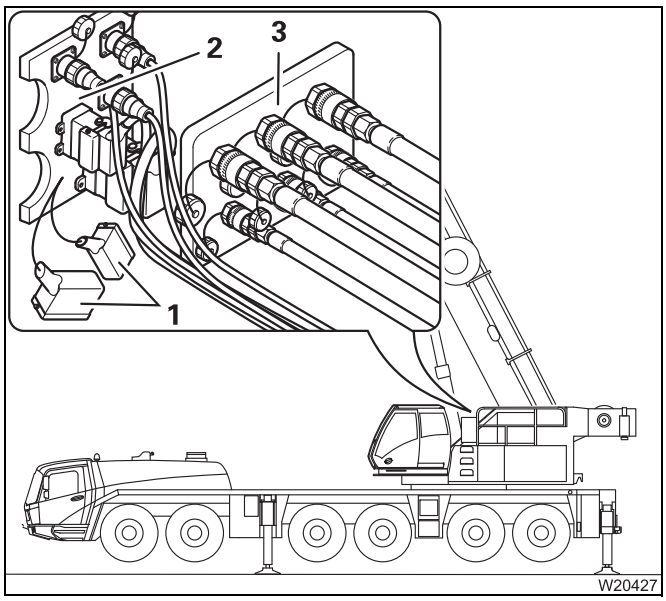
14.03.2018

Connecting

The number of hoses/cables depends on how the truck crane is equipped.

– The main boom must be raised.

Risk of malfunction in the superstructure electronics!
Always turn off the ignition in the crane cab before you establish or separate the electrical connection. This prevents malfunctions in the electronics and corresponding error messages in the subsequent crane operation.



- Remove the bridging plugs (**1**).
- Connect the plugs (**2**) to the sockets.
  The assignment is given by the number of poles and the shape of the plug.
- Connect all hoses (**3**).
  The assignment is given by the size and colour designations.
- Lay the hoses/cables so that they will not be damaged.
- Secure the clamps for the hoses;
  ➠ p. 6 - 28.

14.03.2018

6.4.9 Lifting the main boom off/on the turntable

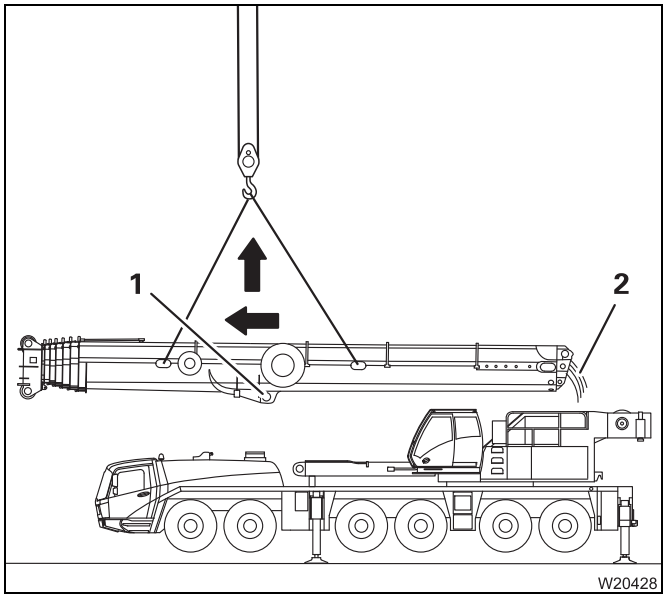
– The main boom is slung; ➠ p. 6 - 26.
– The hydraulic/electrical connections are disconnected; ➠ p. 6 - 36.
– The boom pivot pin is pulled out; ➠ p. 6 - 33.
– The derricking cylinder is separated from the main boom; ➠ p. 6 - 30.

Lifting from the turntable

- Align the auxiliary crane in such a way that the main boom can be raised vertically without swinging.

Risk of damage to driver's cab!
Lift the main boom far enough to ensure that the pivot point of the derricking cylinder does not damage the driver's cab.

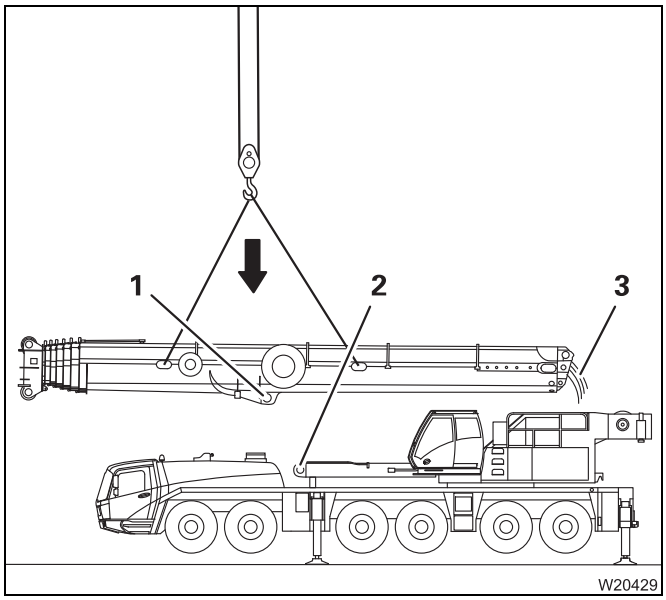
Danger of hands and arms being crushed!
Whilst rigging the crane, maintain sufficient distance from the main boom and do not reach in between the connecting points. This will prevent you from being crushed between the turntable and the main boom.



- Lift the main boom forwards and upwards from the turntable. Make sure that:
  – The connection lines (**2**) do not hang loose,
  – The pivot point (**1**) is higher than the driver's cab.

14.03.2018

Lifting on to the turntable

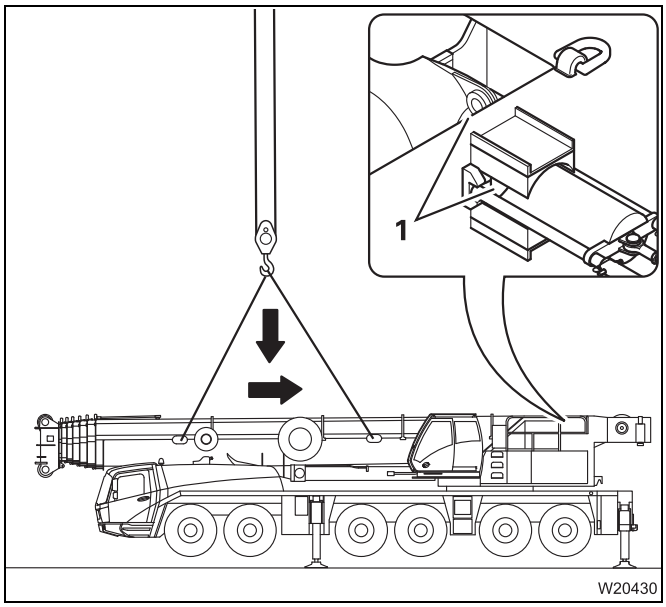


- Lift the main boom backwards and downwards on to the turntable. Make sure that:
  - The connection lines (**3**) do not hang loose,
  - The pivot point (**1**) is higher than the driver's cab,
  - The pivot point (**1**) is located forwards of the derricking cylinder (**2**),
  - The connecting points are not tilted.

14.03.2018

6.4.10 Aligning the connecting points

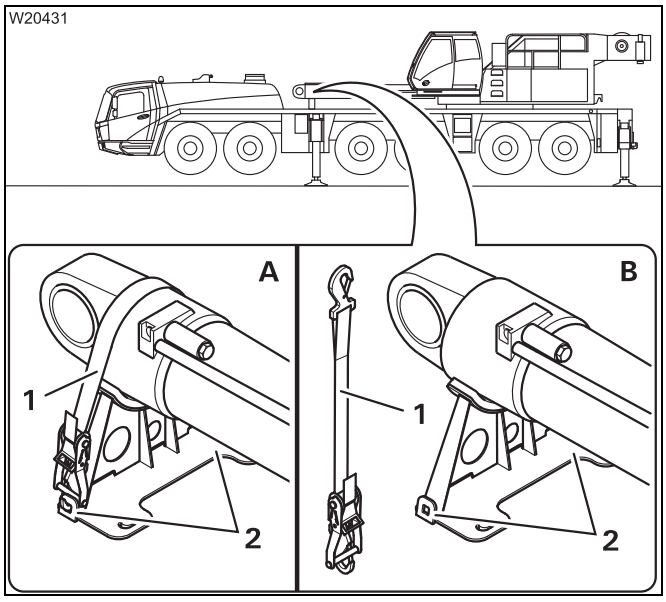
Risk of damage to the turntable and the connection lines!
Make sure that the connection lines are located within the turntable and that the main boom does not swing when you raise it for insertion into the turntable.



Aligning the connecting points

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

6.4.11 Securing/releasing the derricking cylinder



(A) – Securing

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

(B) – Releasing

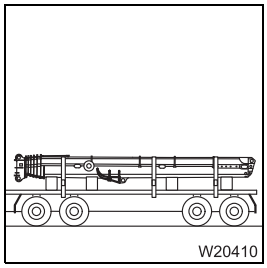
- Loosen the tightening belt (**1**) and remove it from the holders (**2**).
- Stow the tightening belt away.

14.03.2018

6.4.12 Transporting the main boom

Transport the main boom only on a separate vehicle which is of sufficient size and has sufficient lifting capacity.
Transport dimensions and weight; ➠ *Operating Manual*.

Risk of damage to the main boom!
Always place the main boom onto a suitable packing. If you lay the main boom on its side, add-on parts will be damaged.

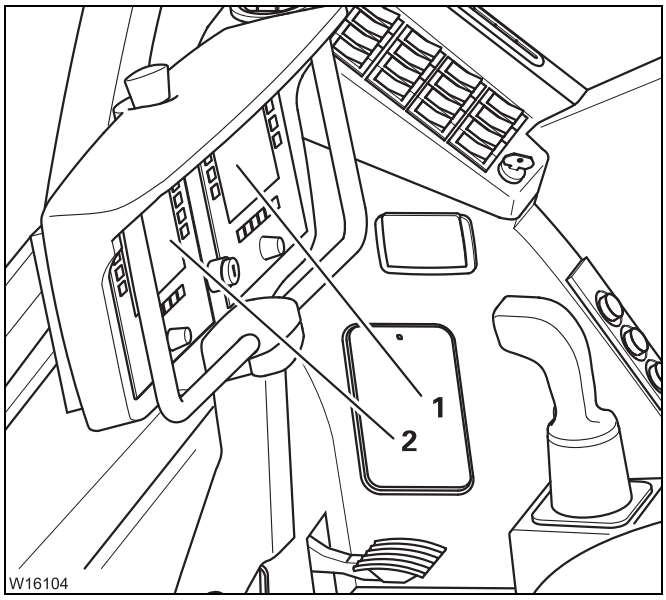


- Always place the main boom onto a suitable packing!
- Secure the main boom against slipping using the holding ropes.
- Load the main boom in such a way that other road users are not put at risk.
- Load the transport vehicle in such a way that the weight is evenly distributed.
- Secure the connection lines so that they will not slip and be damaged during transport.
- Keep the connecting points free of contamination.

14.03.2018

6.4.13 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* control unit (**1**) or *ECOS* (**2**) show an error message.
- If an error message is displayed, check that all electrical connections are established; ➠ p. 6 - 36.

The following requirements must be met for the subsequent inspection:

– The truck crane is supported on outriggers.

– The main boom is resting in the boom rest.

– The current rigging mode is entered on the RCL.

- Telescope the telescopic section approx. 1 m out and back in.
- Retract the telescoping cylinder into another telescopic section and mechanically lock it there.
- Check to see if the hydraulic connections in the turntable are sealed.

Before operating for the first time, carry out the movement *Incline lattice extension* with the hydraulically derricking lattice extension and check if the corresponding connections in the turntable are sealed.

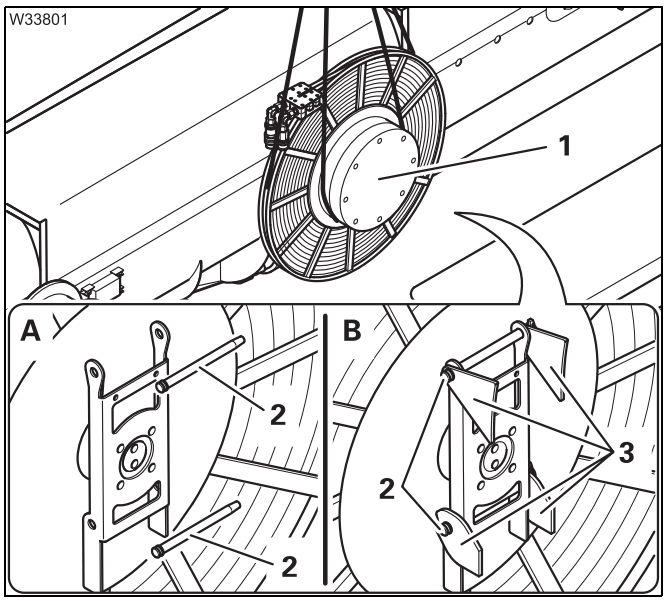
14.03.2018

6.4.14 Installing/removing the hose drum

Installing/Removing the hose drum requires using an auxiliary crane with sufficient bearing capacity; ➠ *Dimensions and weights of removable parts*, p. 1 - 10.

Installing

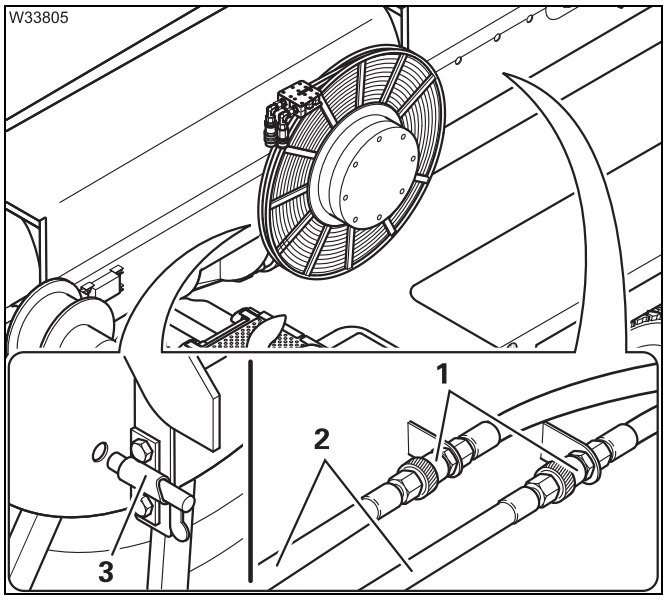
For crane operation you must install the hose drum, if it is not already installed.



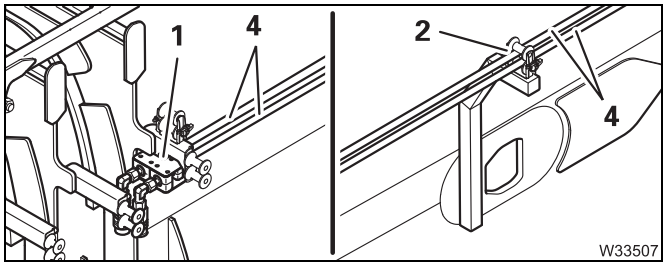
- Attach the hose drum (**1**) using a strap sling of sufficient load bearing capacity.
- (**A**) – Remove the pins (**2**) from the holder.
- (**B**) – Hoist the hose reel (**1**) into the holder (**3**).
- Secure the hose drum (**1**) to the holder (**3**) using the pins (**2**).
- Secure the pin.

Risk of accidents from hoses springing back!
Hold the hoses tightly before releasing the locking device. You must take special care not to release the hoses before you have hung them on the main boom. Otherwise the hoses will retract uncontrollably and can injure people or damage parts of the truck crane.

14.03.2018



- Connect the hoses (**2**) to the connections (**1**) (match the markings).
- Hold the hoses.
- Release the locking device (**3**).

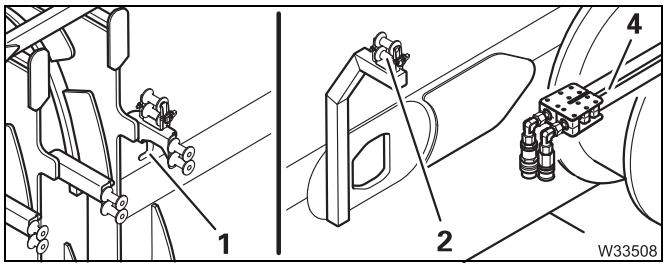


- Hang the hoses (**4**) at the slinging points (**1**) and (**2**) on the main boom.
- Check the connections for leaks.

Removing

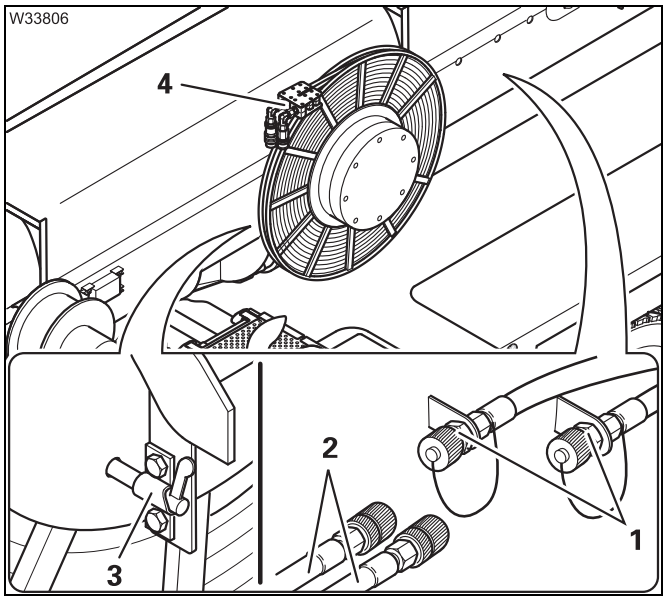
Depending on the driving mode, the hose drum must be removed before driving on the road.

Risk of accidents from hoses springing back!
If you detach the hoses after the locking device has been released, do not under any circumstances let go of the hoses before the locking device has been engaged. Otherwise the hoses will retract uncontrollably and can injure people or damage parts of the truck crane.

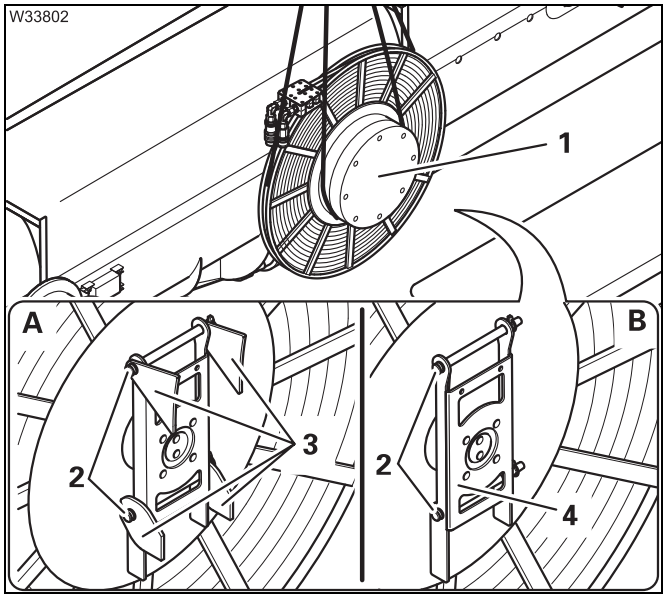


- Remove the hoses (**4**) from the holders (**1**) and (**2**) on the main boom.
- Hold the hoses tightly and guide them to the hose drum.

14.03.2018



- Engage the locking device (**3**).
- Place the hoses (**4**) on the hose drum.
- Remove the hoses (**2**) from the connections (**1**).
- Close the hoses and the connections (**1**) with the caps.



- Attach the hose drum (**1**) using a strap sling of sufficient load bearing capacity.
- (**A**) – Remove the pins (**2**) from the holder (**3**).
- Hoist the hose drum (**1**) out of the holder (**3**).
- (**B**) – Insert the pin (**2**) into the holder (**4**).
- Secure the pin.
- Stow the hose drum (**1**) safely for transportation.

Risk of damaging the hose drum!
When the hose drum is transported on a separate vehicle, always secure it by strapping it down with suitable belts or by placing it in a transport cradle. This prevents the hose drum from tipping over and becoming damaged during transportation.

14.03.2018

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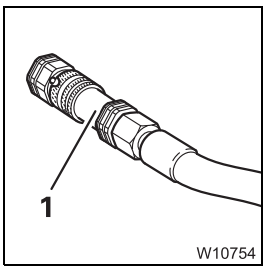
14.03.2018

6.5 Installing/removing outrigger beams

If the truck crane is fitted with a removable supporting box (ROB), you can only assemble/disassemble the front outrigger beams.

➠ *Installing/removing the supporting box*, p. 6 - 65.



To rig the outrigger beams, the outriggers must be fitted with hydraulic connections (**1**) which can be separated.

During rigging, each outrigger beam is removed and mounted as a complete "package", consisting of inner and outer outrigger beams, cylinders and add-on parts.

Risk of truck crane overturning if not properly supported!
Loads may only be lifted when the truck crane is supported by all the outriggers.
For this reason, always use an auxiliary crane to lift the outrigger beams.

You will require the following equipment with a sufficient load bearing capacity:

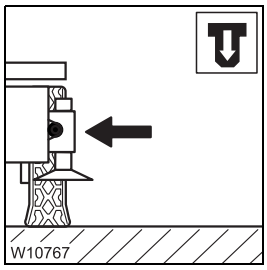
- An auxiliary crane,
- Suitable lifting gear and guide ropes,
- A chain hoist,
- A separate vehicle.

Dimensions and weights of the outrigger beams; ➠ p. 1 - 10.

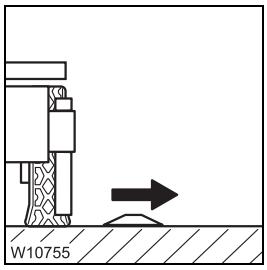
14.03.2018

6.5.1 CHECKLIST: Removing the outrigger beams

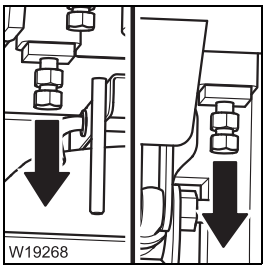
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions there!



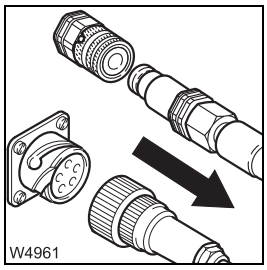
1. Prepare the truck crane – label the outrigger beams, retract, release and bolt them to each other; ➠ p. 6 - 52.



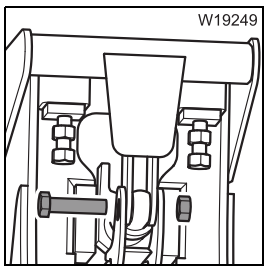
2. If necessary remove outrigger pad; ➠ p. 6 - 53.



3. Unscrew the spacer; ➠ p. 6 - 57.

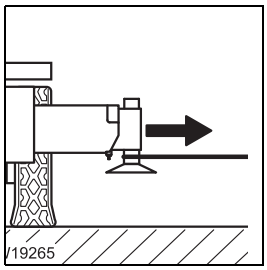


4. – Disconnect hydraulic connections; ➠ p. 6 - 55.
– Separate the electrical connection if necessary; ➠ p. 6 - 56.

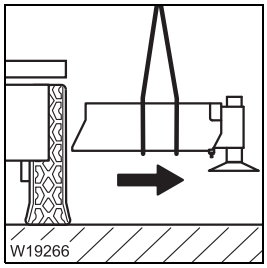


5. Release the connection to the support box; ➠ p. 6 - 59.

14.03.2018



6. Sling the outrigger beam and pull it out of the supporting box until it reaches the centre of gravity; ➠ p. 6 - 59.

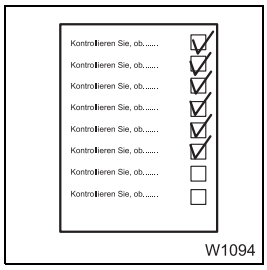


7. – Sling the outrigger beams in the centre of gravity and pull them out of the supporting box.

– Lift the outrigger beams onto the separate vehicle.

– Attach the connecting elements on the supporting box.

➠ *Extending the outrigger beam*, p. 6 - 59
➠ *Transporting the outrigger beams*, p. 6 - 63



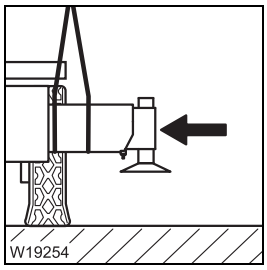
8. Remove all necessary outrigger beams in the same way in accordance with this checklist.

14.03.2018

6.5.2 CHECKLIST: Installing the outrigger beams

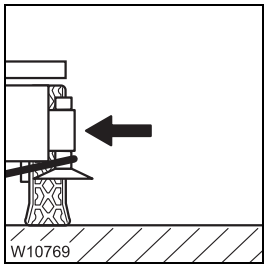
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions there!

1. Prepare the truck crane for the installation of the outrigger beams; ➠ p. 6 - 52.

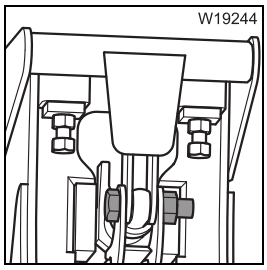


2. – Remove the connection elements from the supporting box.
– Sling the outrigger beams at their centre of gravity.
– Lift the outrigger beams into the outrigger boxes and remove the lifting gear.

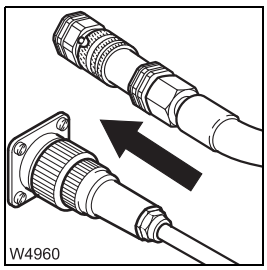
➠ *Inserting the outrigger beam*, p. 6 - 61



3. Sling the outrigger beams and pull into the outrigger boxes until the connection points align; ➠ p. 6 - 61.

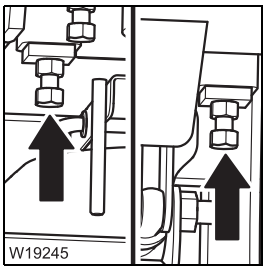


4. Establish the connection to the support box; ➠ p. 6 - 59.

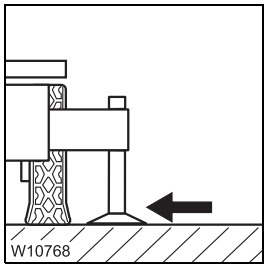


5. – Establishing hydraulic connections; ➠ p. 6 - 55.
– Establish the electrical connection if necessary; ➠ p. 6 - 56.

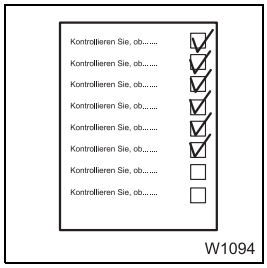
14.03.2018



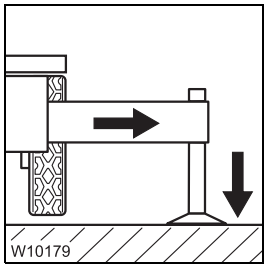
6. Screw in the spacers; ➠ p. 6 - 57.



7. If necessary put outrigger pads into position; ➠ p. 6 - 53.

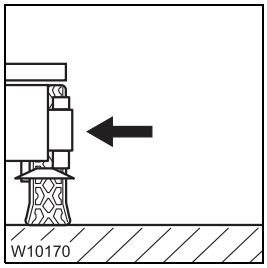


8. Mount all necessary outrigger beams in the same way in accordance with this checklist.



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 - 35.

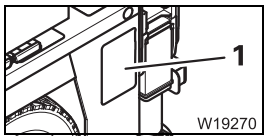
14.03.2018

6.5.3 Preparing the truck crane

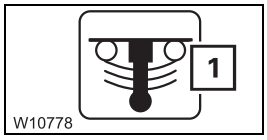
Prerequisites

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

- All rigging work which involves slewing the superstructure was completed.
- The parking brake is engaged.
- The truck crane has been levelled with the level adjustment system; ➠ p. 5 - 64.



- The corresponding covers have been removed (**1**).



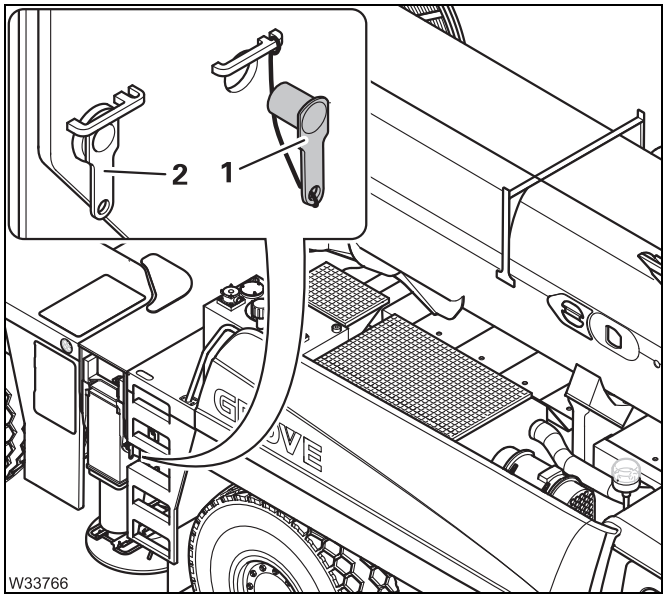
- The suspension is switched off (blocked), and the symbol (**1**) is red; ➠ p. 5 - 17.

For removal

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

Labelling the outrigger beams

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



Releasing the outriggers

All outrigger beams are retracted.

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

Lock the outrigger beams together

- Insert the pins (**2**).

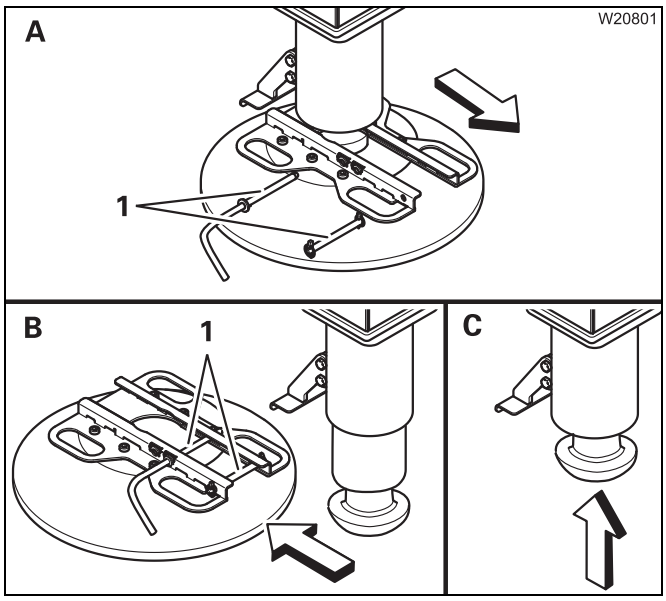
14.03.2018

6.5.4 Removing/attaching outrigger pads

You only need remove the outrigger pads if the outrigger beams are to be transported lying on their side.
For transportation in a suitable holding frame, the outrigger beams can be set down on the outrigger pad.

Removing outrigger pads

Handling is easier if you remove the outrigger pad before removing the outrigger beams.

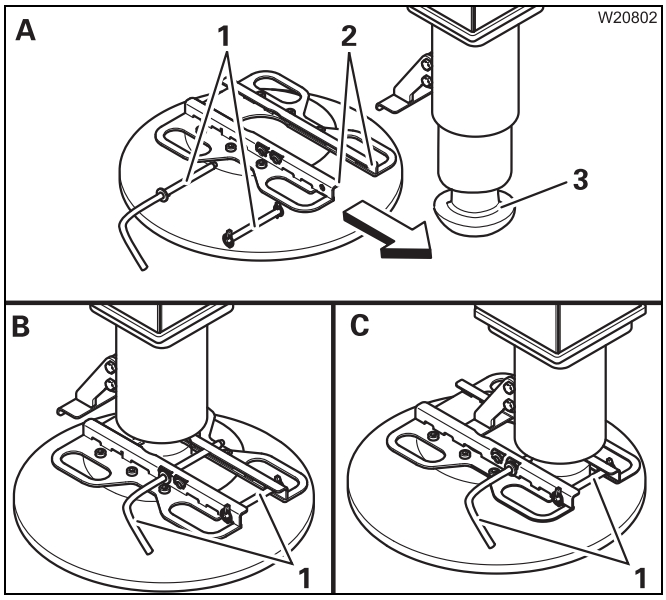


- (**A**) – Move the outrigger pad into the operating position.
- Remove the pins (**1**).
- Extend the outrigger cylinder until the outrigger pad just touches the ground but is not yet under strain.
- (**B**) – Pull the outrigger pad off the outrigger cylinder.
- Insert the pins (**1**) and secure them.
- (**C**) – Fully retract the outrigger cylinder.
- Remove the other outrigger pads in the same way.

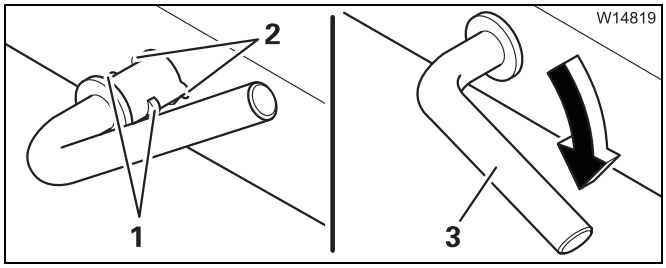
14.03.2018

Attaching outrigger pads

After mounting the outrigger beam, you must attach the outrigger pad.



- (**A**) – Remove the pin (**1**).
- Extend the outrigger cylinder far enough so that the bearing surface (**3**) is below the guide (**2**).
- Push the outrigger pad onto the outrigger cylinder.
- Move the outrigger pad into required position.
  - On site, move it to the working position (**B**).
  - If you need to drive to the site, in driving position (**C**).
- Insert the pins (**1**) and secure them.



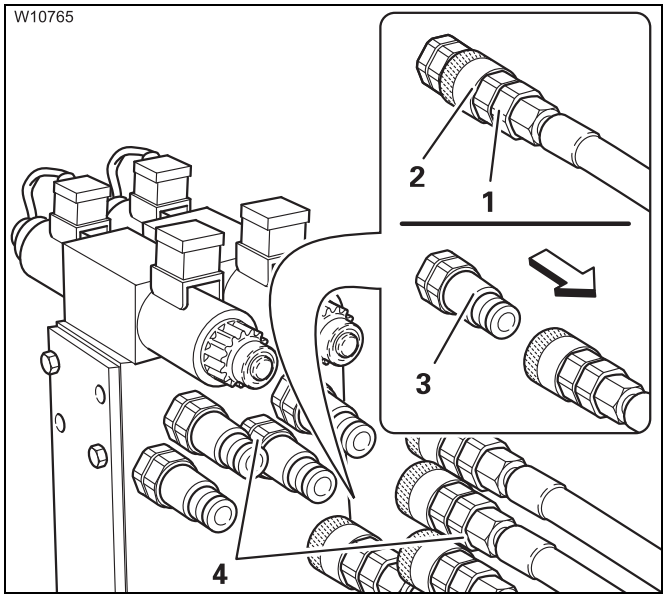
Securing pin

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

14.03.2018

6.5.5 Disconnecting/establishing the hydraulic connection

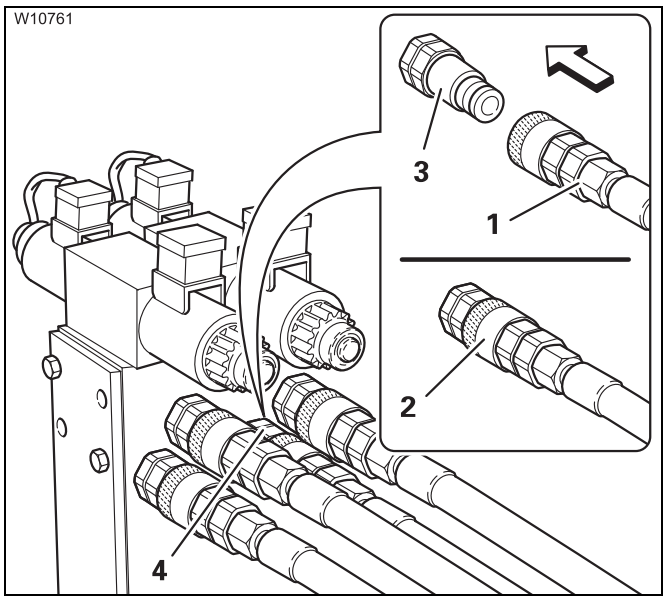
There is a valve block on each outrigger beam. The position of the valve block may differ from the drawings, depending on the outrigger beam.



Separating 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.



Establishing the connection

Always establish all connections (**4**). The assignment is differentiated by colour designations.

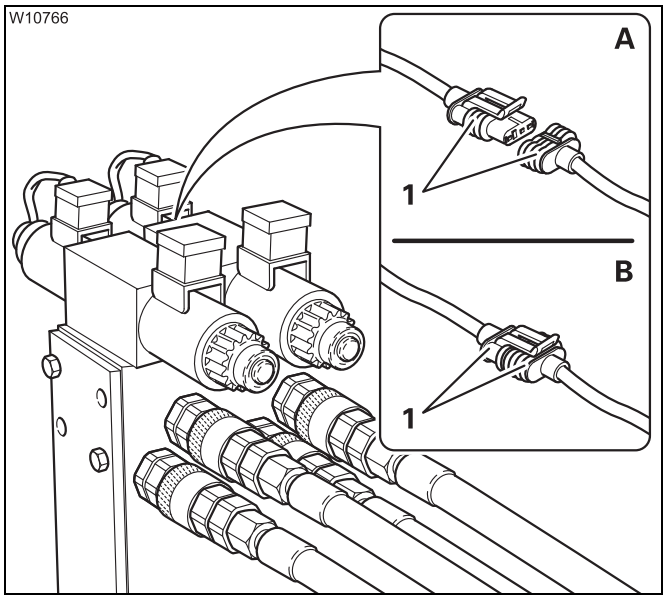
- Insert the hose (**1**) into the connection (**3**).
- The lock (**2**) engages.

14.03.2018

6.5.6 Disconnecting/establishing the electrical connection

The electrical connection is only present on truck cranes with an outrigger pressure indicator.

Risk of malfunctions in the electronic system!
Always turn off the ignition before you disconnect or establish the electrical connection. This prevents malfunctions and corresponding error messages in the subsequent crane operation.



(A) – Disconnecting the connection

- Pull the plugs (**1**) apart. Protect the plugs against dirt and moisture.

(B) – Establishing the connection

- Put the plugs (**1**) together.
- Protect the separating points against dirt and moisture.

14.03.2018

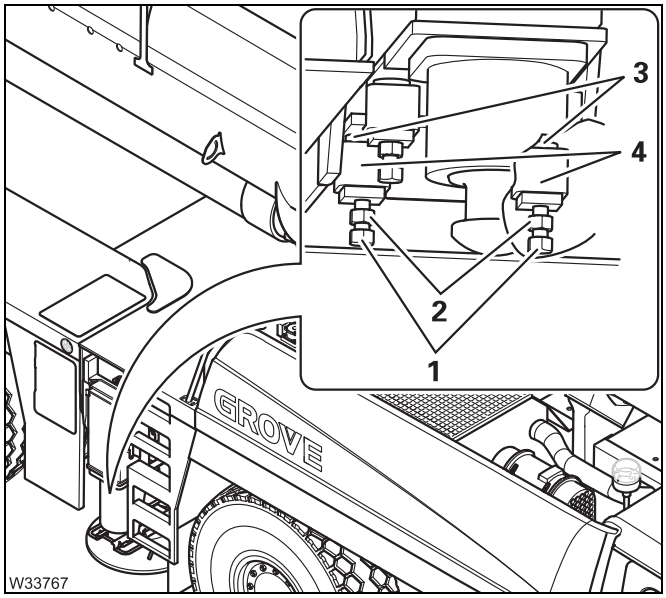
6.5.7 Unscrewing/screwing in the spacers

There are two spacers for each outrigger beam

– In the supporting box
– In the outrigger beam on the opposite side.

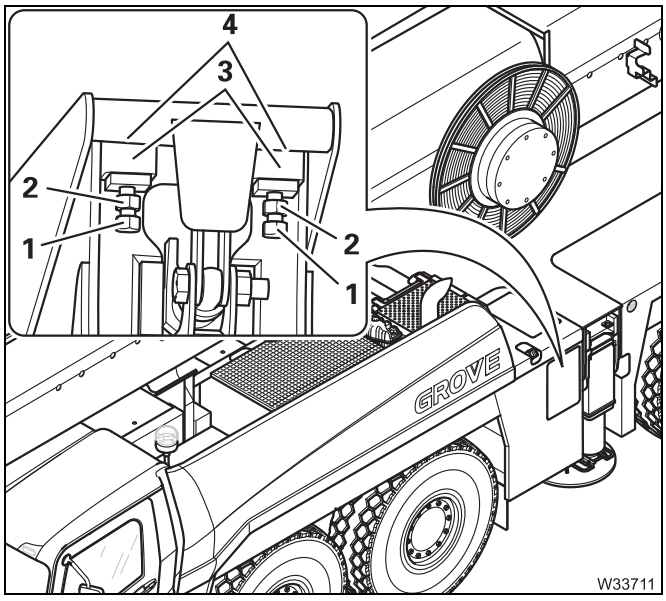
The illustrations show as an example the spacers for the outrigger beams on the front right hand side.

Unscrewing Before you pull out the outrigger beams, you must unscrew the spacers.



At the supporting box

- Undo the wheel nuts (**2**).
- Unscrew the bolts (**1**) until the spacers (**3**) are screwed into the supporting box (**4**) completely.

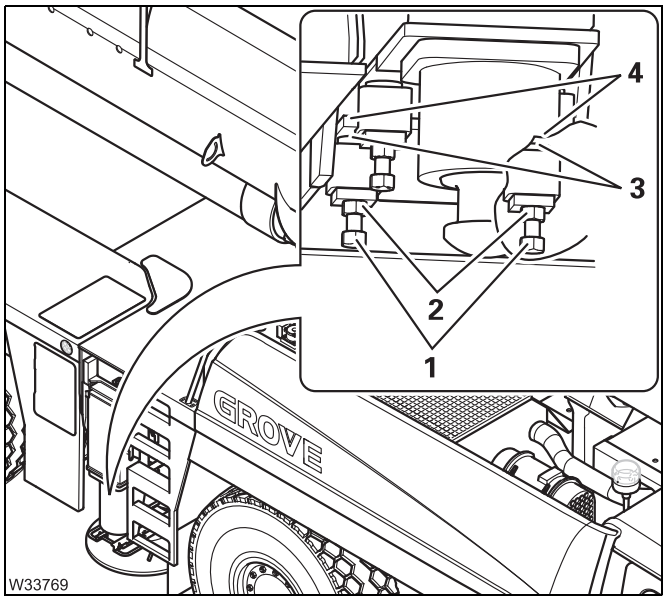


At the outrigger beam

- Undo the wheel nuts (**2**).
- Unscrew the bolts (**1**) until the spacers (**3**) are screwed into the outrigger beam (**4**) completely.

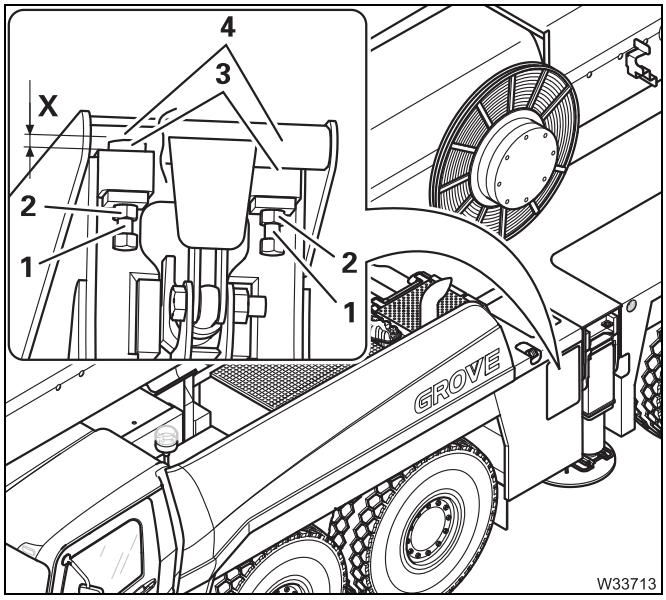
Screwing in

Before you retract/extend an outrigger beam after mounting, you must screw in the spacers.



At the supporting 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**).



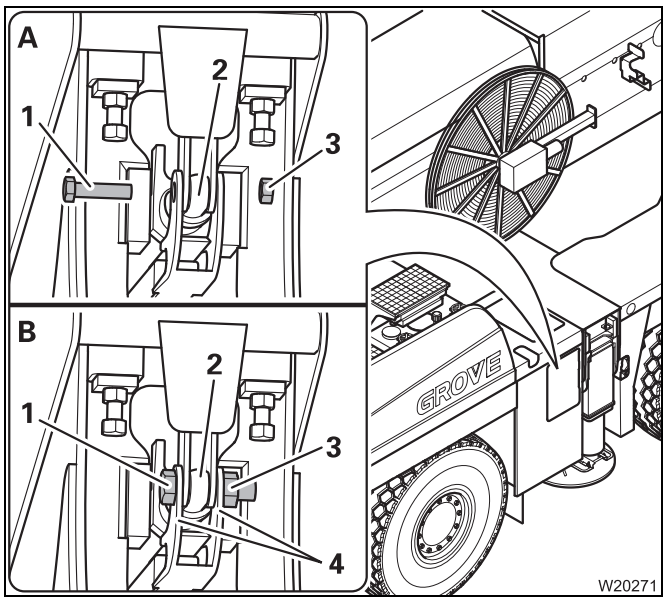
At the outrigger beam

- Screw in the bolts (**1**),
  - Until the spacers (**3**) lie on top on the supporting box (**4**) **and**
  - Until the distance (**X**) to the supporting box (**4**) is an even 4 mm over the entire width.
- Lock the screws in place with the nuts (**2**).

14.03.2018

6.5.8 Disconnecting/establishing the connections to the supporting box

The illustrations show as an example the connecting points for the outrigger beam on the front left hand side.



(A) – To disconnect

- Undo the wheel nuts (**3**).
- Remove the bolts (**1**) from the connecting points (**2**).

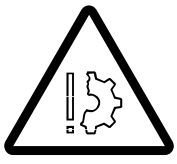
(B) – Establishing the connection

- Fasten the bolts (**1**) with the nuts (**3**) in the connecting points (**2**) just tight enough that the attachment plates (**4**) still have lateral play.

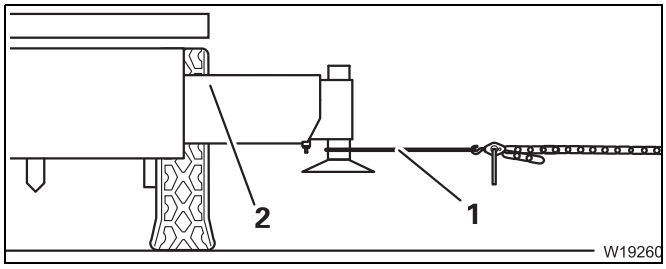
6.5.9 Extending/retracting the outrigger beam

Extending the outrigger beam

- Check that the outrigger beams are released and are secured between each other; ➠ *Preparing the truck crane*, p. 6 - 52.

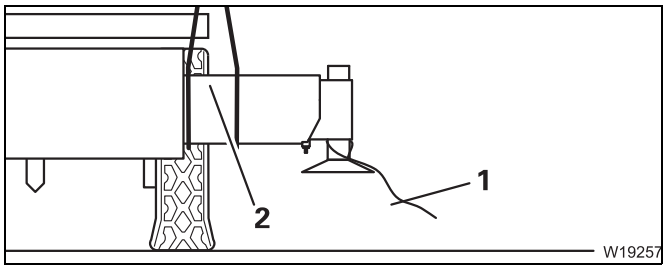


Risk of damage to hydraulic lines!
Ensure that the hydraulic lines on the outrigger beam do not remain hanging on the supporting box and become damaged.



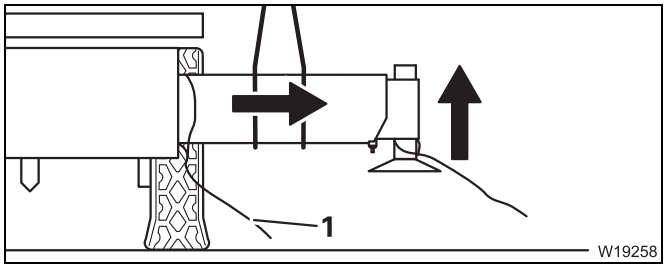
- Fasten the lifting gear (**1**) and a chain hoist.
- Pull the outrigger beam out so far that the centre of gravity (**2**) is accessible.

14.03.2018



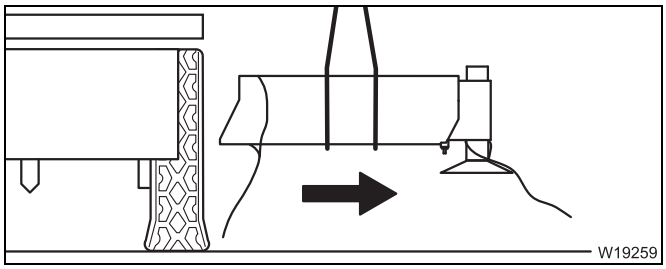
- Using the auxiliary crane, sling the outrigger beam in the centre of gravity (**2**).
- Remove the chain hoist and lifting gear.

Fasten a guide rope (**1**).

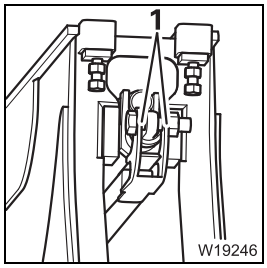


- Lift the outrigger beam slightly to ease the load.
- Lift the outrigger beam almost completely out of the supporting box.
- Fasten another guide rope (**1**).

Risk of being crushed by the swinging outrigger beam!
Secure the outrigger beam with the guide ropes as it is lifted out of the supporting box.
Keep a suitable distance to avoid injuring yourself or others on the swinging outrigger beam.



- Lift the outrigger beam out of the supporting box.
- Lift the outrigger beam onto a separate vehicle; ➠ p. 6 - 63.



- Fasten the connecting elements to the connecting points (**1**) of the supports.

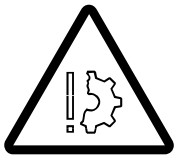
14.03.2018

Inserting the outrigger beam

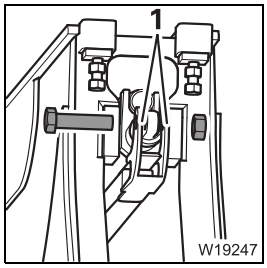
- Only insert the outrigger beam at the correct installation point. Note the information on the label.

Risk of being crushed by the swinging outrigger beam!
Do not guide the outrigger beam with your hands when inserting it. Always used guide ropes and keep a suitable distance. This will prevent limbs from being crushed between the supporting box and the outrigger beam.

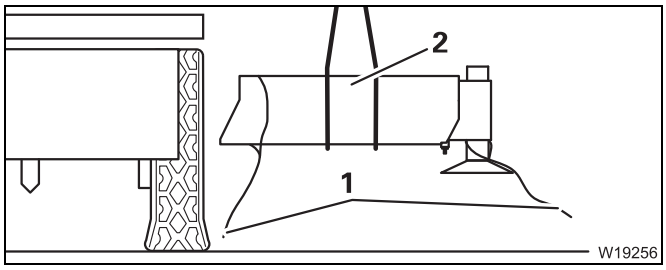
Risk of damage to hydraulic lines!
Ensure that the hydraulic lines on the outrigger beam do not remain hanging on the supporting box and become damaged.



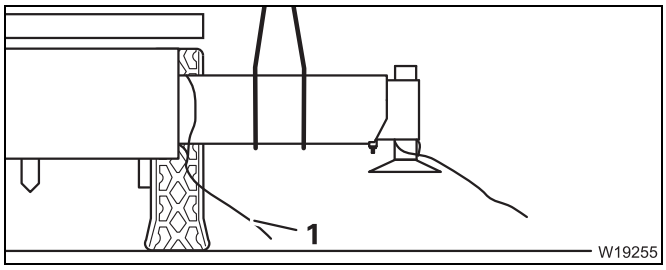
Risk of damage to the spacers!
Check that all spacers have been screwed in completely.
The prevents the spacers from remaining hanging in the supporting box and becoming damaged.



- Remove the connecting elements from the connecting points (**1**) of the supports.

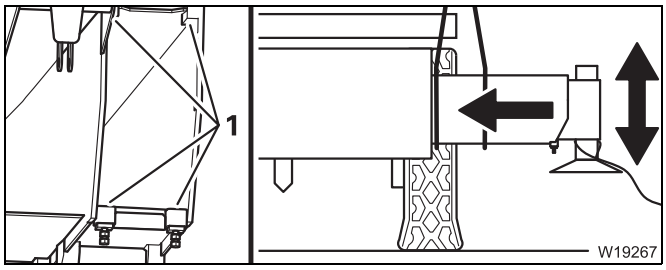


- Sling the outrigger beam at the centre of gravity (**2**).
- Fasten two guide ropes (**1**).

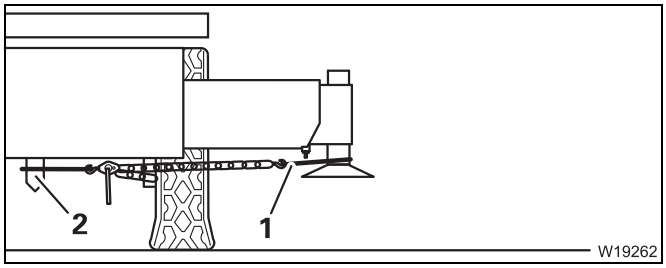


- Set the outrigger beam in the supporting box.
- Remove the guide rope (**1**).

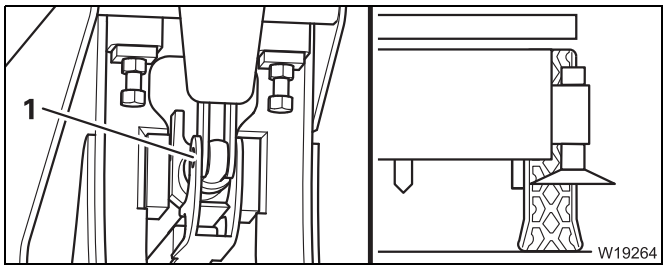
14.03.2018



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



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

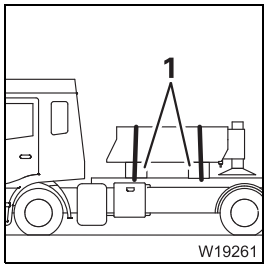


- Pull the outrigger beam in so far until the connecting points (**1**) align.
- Remove the chain hoist and lifting gear.

14.03.2018

6.5.10 Transporting the outrigger beams

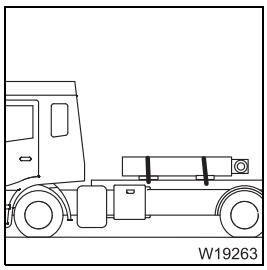
- For transportation, be sure to use a separate vehicle with sufficient load bearing capacity. Transport dimensions and weight; ➠ p. 1 - 10.
- Load the separate vehicle in such a way that the weight is evenly distributed.
- Load the outrigger beam so that it that does not endanger other traffic.



When the outrigger pads are mounted

- Place the outrigger beam onto a suitable device (**1**).
- Secure the outrigger beam from slipping.

Risk of damage to the outrigger beams and outrigger pads!
When outrigger pads are mounted, always use a device to set them down. If you lay the outrigger beams onto the side, connections may tilt and become damaged.



When the outrigger pads are dismounted

- Lay the outrigger beam onto the side.
- Secure the outrigger beam from slipping.
- Lay the outrigger pads onto the separate vehicle and secure them for transportation.

14.03.2018

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14.03.2018

6.6 Installing/removing the supporting box

The rear support mechanism comes from the rear supporting box. When using additional equipment, this can be completely removed with supporting cylinders and outrigger beams for driving on roads.

Risk of overturning when slewing the superstructure!
Support the truck crane with an outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) and set the corresponding RCL code before slewing the superstructure.
Never override the RCL when slewing is switched off; ➠ *Crane movements during installation and removal*, p. 6 - 81.

Auxiliary equipment required

– Appropriate lifting gear (chain or rope suspension gear) of sufficient lifting capacity and guide ropes,
– A separate vehicle of sufficient load bearing capacity with a sufficient loading area.

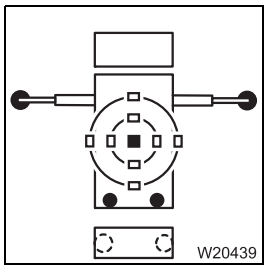
Dimensions and weights of removable parts;

➠ *Dimensions and weights of removable parts*, p. 1 - 10.

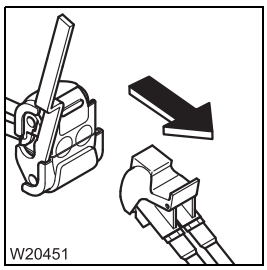
14.03.2018

6.6.1 CHECKLIST: Removing the supporting box

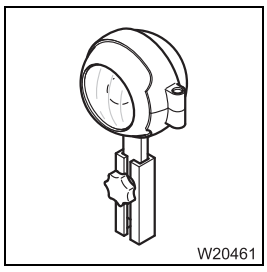
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions specified there!



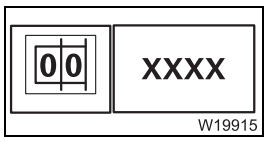
1. Rig the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) and align the truck crane horizontally; ➠ p. 6 - 71.



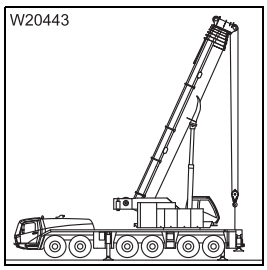
2. Disconnect the pneumatic connections between the carrier and supporting box; ➠ p. 6 - 74.



3. Install the reverse camera to the carrier; ➠ p. 6 - 80.

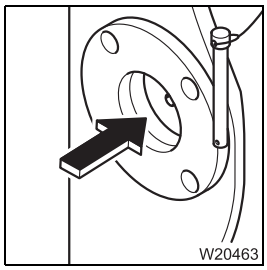


4. With the RCL set accordingly, raise the main boom and slew the superstructure to the rear;
➠ *Crane movements during installation and removal*, p. 6 - 81.

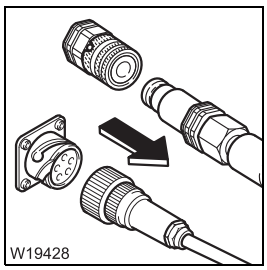


5. Sling the supporting box to the truck crane; ➠ *Slinging points on the supporting box*, p. 6 - 82.

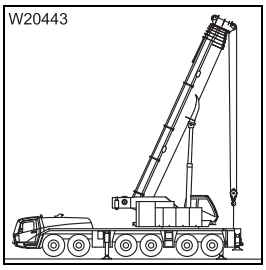
14.03.2018



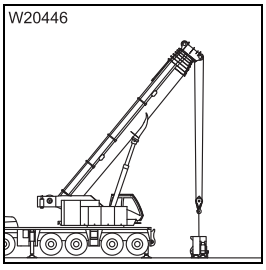
6. Release the locking pin between the supporting box and carrier;
➠ p. 6 - 83.



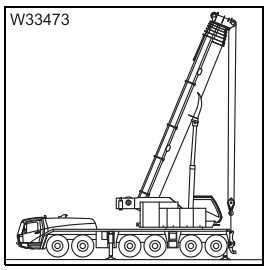
7. – Disconnect hydraulic connections; ➠ p. 6 - 76.
– Disconnect the electrical connection; ➠ p. 6 - 75.



8. **If the supporting box is to be transported:**
Turn off and secure the supporting box with truck crane on the separate vehicle;
➠ *Attaching/raising the supporting box with the truck crane*, p. 6 - 77,
➠ *Transporting the supporting box on the separate vehicle*, p. 6 - 85.

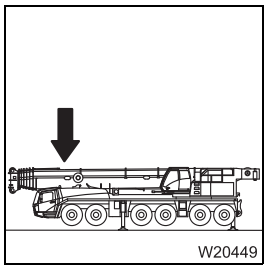


9. **If the supporting box is to be set down:**
Turn off the supporting box with truck crane on the supports;
➠ p. 6 - 78.



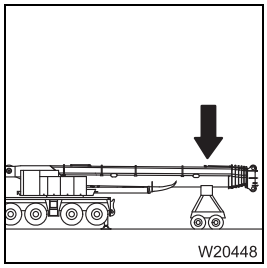
10. Install rear bumper if necessary; ➠ p. 6 - 86.

14.03.2018



11. If the main boom is to be set down on the boom rest:

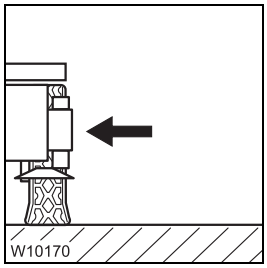
– With the RCL set accordingly, slew the superstructure to the front and set down the main boom; ➠ *After the removal*, p. 6 - 81.



12. If the main boom is to be set down on a trailer:

With the RCL set accordingly, slew the superstructure to the rear and lower the main boom

➠ *Crane movements during installation and removal*, p. 6 - 81.



13. On the outrigger:

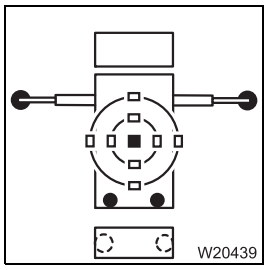
– Retract the front outrigger cylinders and outrigger beams and secure; ➠ *CHECKLIST: Retracting the outriggers*, p. 12 - 29,

– Retract auxiliary support; ➠ *Auxiliary supports*, p. 6 - 72.

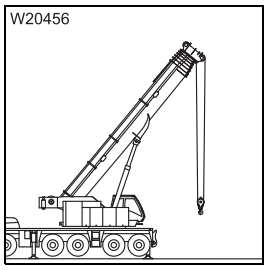
14.03.2018

6.6.2 CHECKLIST: Installing the supporting box

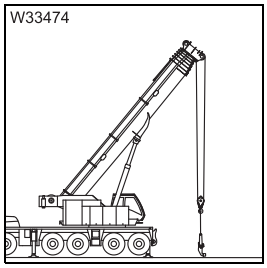
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions specified there!



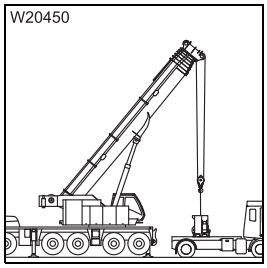
1. Rig the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) and align the truck crane horizontally; ➠ p. 6 - 71.



2. With the RCL set accordingly, raise the main boom and slew the superstructure into the position for raising the supporting box;
➠ *Crane movements during installation and removal*, p. 6 - 81.

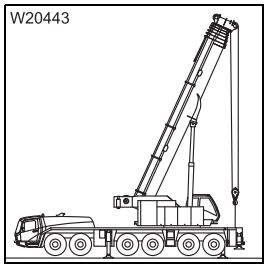


3. Install rear bumper if necessary; ➠ p. 6 - 86.



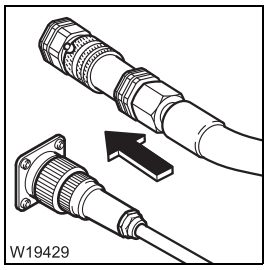
4. Sling the supporting box to the truck crane and remove from the separate vehicle; ➠ *Slinging points on the supporting box*, p. 6 - 82.

If the supporting box was placed on the supports:
Retract the supports; ➠ p. 6 - 79.

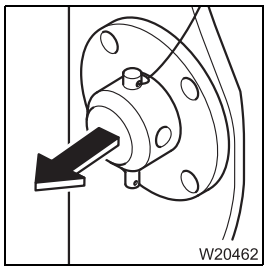


5. Suspend the rear supporting box in the holders on the carrier; ➠ p. 6 - 77.

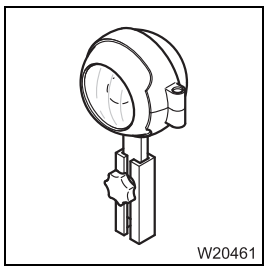
14.03.2018



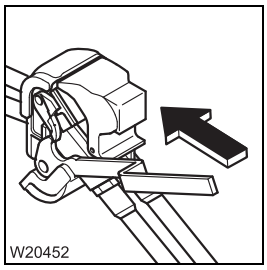
6. – Establish the hydraulic connection; ➠ p. 6 - 76.
– Establish electrical connection; ➠ p. 6 - 75.



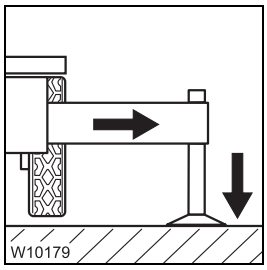
7. Pin the supporting box to the carrier; ➠ p. 6 - 83.



8. Install the reverse camera on the carrier; ➠ p. 6 - 80.



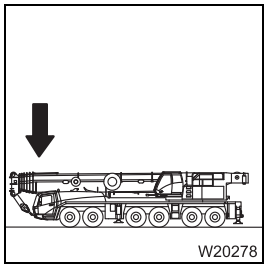
9. Where necessary, disconnect the pneumatic connections between the carrier and supporting box; ➠ p. 6 - 74.



10. If the truck crane is at the site:

– Retract the auxiliary supporsts; ➠ p. 6 - 72,

– Extend all outrigger beams to the necessary outrigger span, secure them and stabilize the truck crane; ➠ *CHECKLIST: Extending the outriggers*, p. 12 - 27.



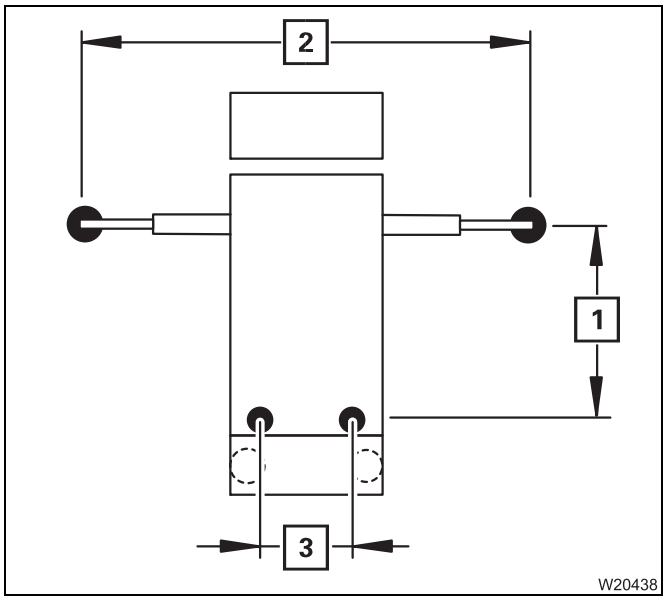
11. If the truck crane has to be driven to the site:

With the RCL set accordingly, slew the superstructure to the front and set down the main boom; ➠ *Crane movements during installation and removal*, p. 6 - 81.

– Retract the front outrigger cylinders and outrigger beams and secure; ➠ *CHECKLIST: Retracting the outriggers*, p. 12 - 29,
– Place the outrigger pads in the driving position; ➠ p. 12 - 39,
– Retract auxiliary support; ➠ p. 6 - 72.

14.03.2018

6.6.3 Rig the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft)



With this outrigger span, the truck crane is stabilised at the front to an outrigger width (**2**) 8.50 m (26.1 ft). The auxiliary supports must be extended at the rear. This produces the outrigger span (**3**) of 1.00 m (3.3 ft) and the outrigger length (**1**) of 7.98 m (26.1 ft).

You must rig this outrigger span before:

- Slewing the superstructure with the rear supporting box removed,
- Removing/installing the supporting box,
- Installing / removing the rear bumper,
- Setting down the main boom on a separate trailer, or raising the main boom from a trailer.

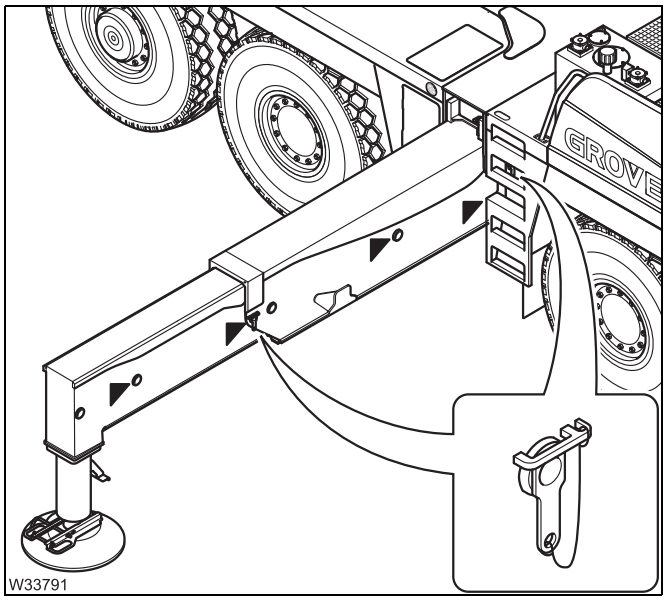
Risk of damage to the suspension struts and tyres!
Always extend the auxiliary supports before you perform one of the list processes.
This prevents the suspension struts and tyres from becoming overloaded and damaged.

Loads of up to 55.7 t (122,789 lbs) can arise on the outrigger pads of the auxiliary supports when the truck crane only stands on the supports. If the ground cannot support these loads, you must determine the required support area and install the supports.

➠ *Determining the required load-bearing area*, p. 12 - 9
➠ *Enlarging the load-bearing area*, p. 12 - 40

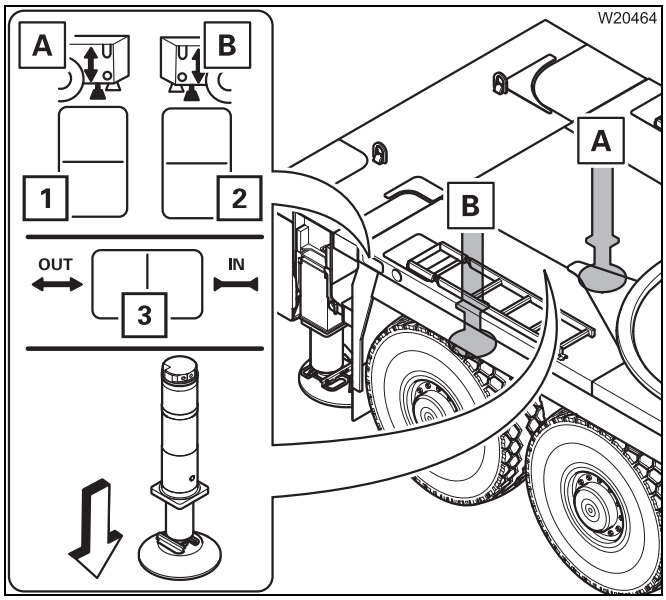
14.03.2018

Front outrigger



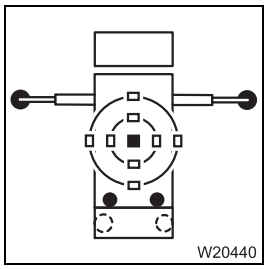
- At the front outrigger, set the span to 8.50 m (26.1 ft); ➠ *Setting the outrigger spans*, p. 12 - 32.
- Extend the support cylinders until they make contact with the ground.

Auxiliary supports



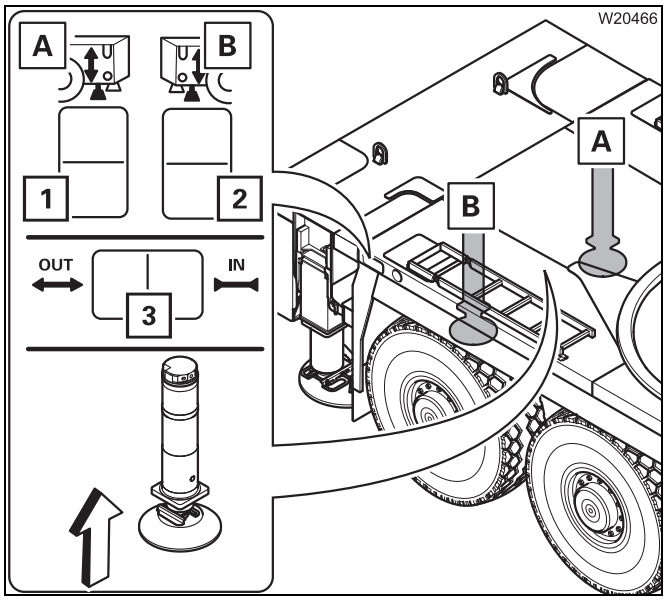
Extend

- (**A**) – Left auxiliary support – Press and hold down the button (**1**) below.
- Press in the button (**3**) at the left.
- (**B**) – Right auxiliary support – Press and hold down the button (**2**) below.
- Press in the button (**3**) at the left.
- Extend the auxiliary supports until the outrigger pads make contact with the ground.



- Extend the auxiliary supports on both sides until the truck crane is aligned horizontally and no wheel is touching the ground.

14.03.2018



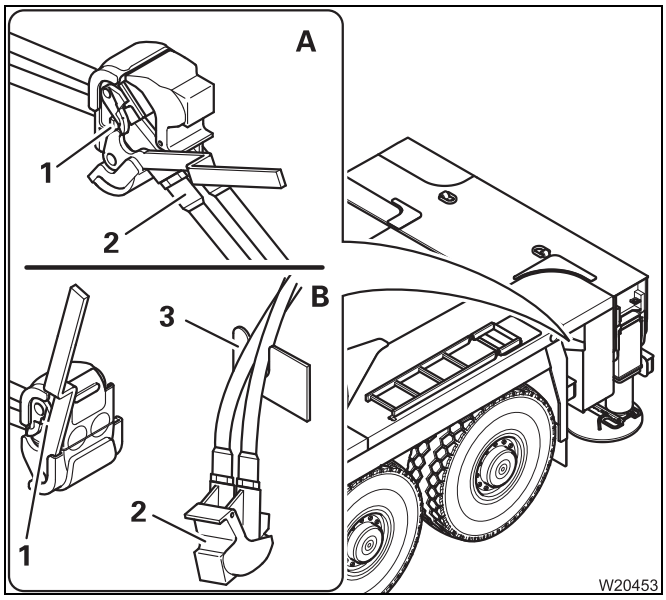
Retract

- (**A**) – Left auxiliary support – Press and hold down the button (**1**) below.
- Press in the button (**3**) at the right.
- (**B**) – Right auxiliary support – Press and hold down the button (**2**) below.
- Press in the button (**3**) at the right.
- Retract the auxiliary supports until they reach the stop.

14.03.2018

6.6.4 Establishing/disconnecting the pneumatic connection

When additional equipment is in use, there is a pneumatic connection between the carrier and the supporting box.



(A) – Establishing the connection

- Open the connection (**1**).
- Connect the hoses (**2**) to the connection (**1**).

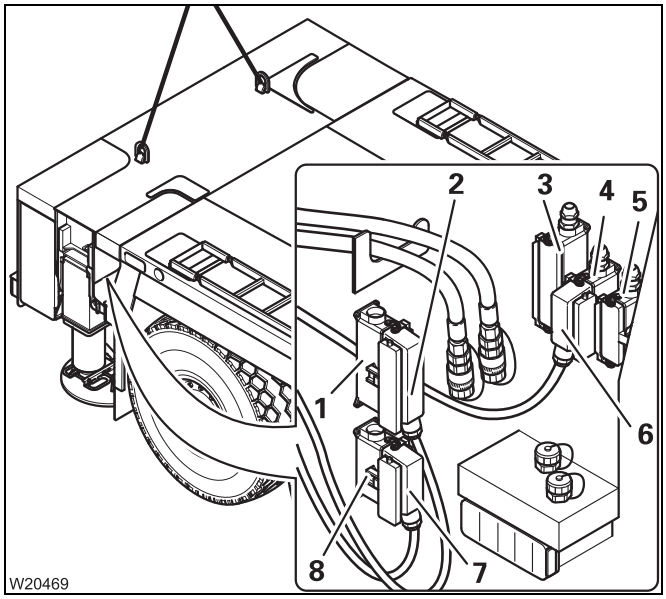
(B) – Disconnecting the connection

- Open the connection (**1**) and remove the hose (**2**).
- Suspend the hoses in the clamp (**3**).

14.03.2018

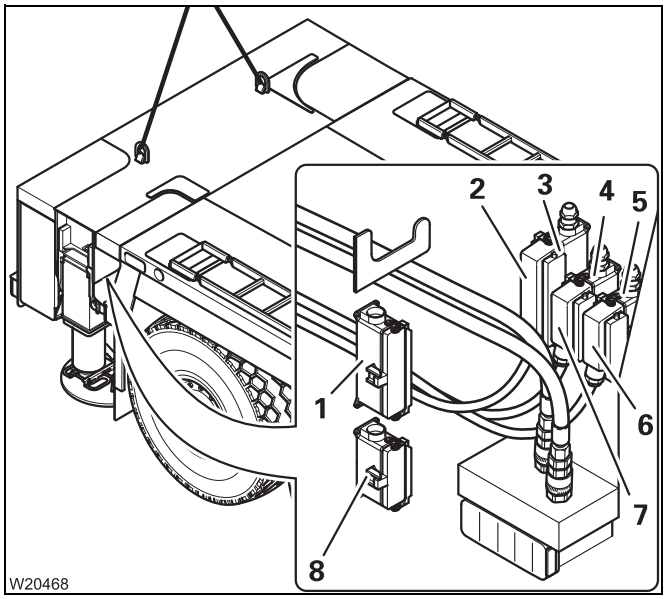
6.6.5 Disconnecting/establishing the electrical connection

Risk of malfunctions in the carrier electronics!
Always turn off the ignition before you establish or break the electrical connection. This prevents malfunctions and error messages in the carrier electronics.



Separating the connection

- Pull connecting cable (**2**) and (**7**) from sockets (**3**) and (**5**).
  Insert them into the dummy sockets (**1**) and (**8**).
- Remove the plug (**6**) from the socket (**5**) and plug it into the socket (**4**).
- Seal sockets (**3**) and (**5**) with the protective caps.



Establishing the connection

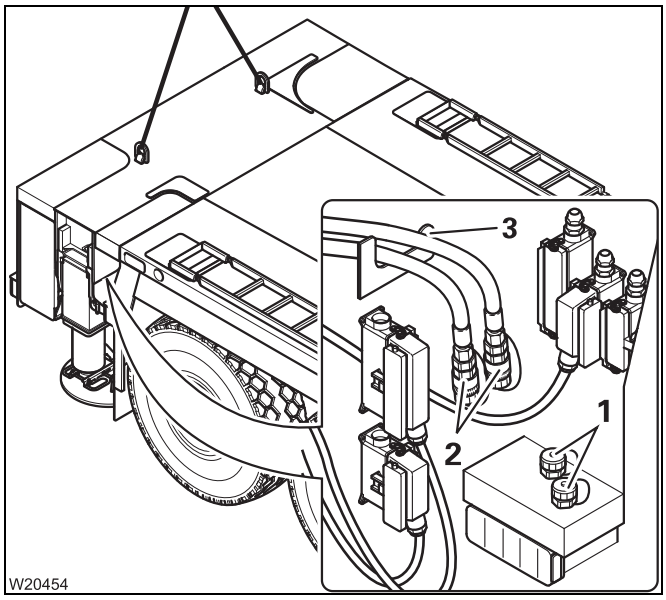
- Remove the plug (**6**) from the socket (**4**) and plug it into the socket (**5**).
- Pull connecting cable (**2**) and (**7**) from dummy sockets (**1**) and (**8**).
  Insert them into the sockets (**3**) and (**4**).
- Seal dummy sockets (**1**) and (**8**) with the protective caps.

14.03.2018

6.6.6 Disconnecting/establishing the hydraulic connection

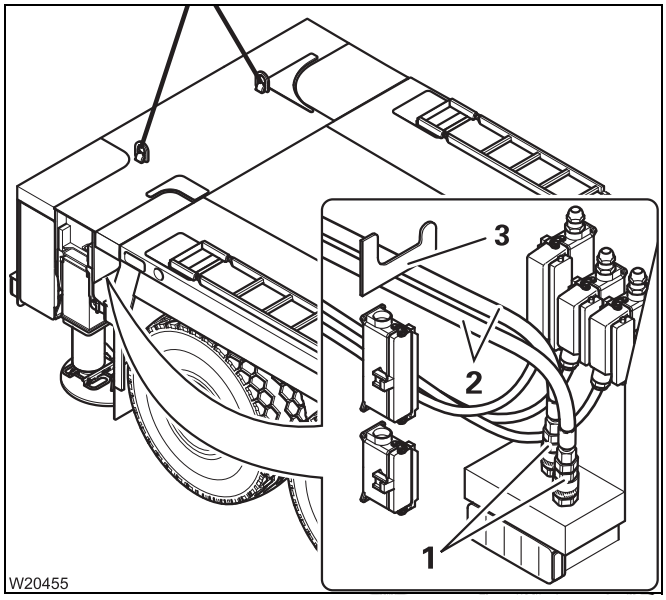
The hydraulic connection between the supporting box and carrier consists of two hoses with couplings.

Always close off hoses or connections you do not need with appropriate caps.



Separating the connection

- Remove the hoses (**2**) from the connections (**1**).
- Place the hoses in the clamp (**3**).



Establishing the connection

- Remove the hoses (**2**) from the holder (**3**).
- Connect the hoses to the connections (**1**).

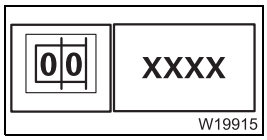
The assignment is defined by the size.

14.03.2018

6.6.7 Attaching/raising the supporting box with the truck crane

Prerequisites:

- The outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) has been established and the truck crane is horizontally aligned; ➠ p. 12 - 46.



- The RCL code for the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) as stated in the *Lifting capacity table*, has been entered.
- The locking pin on the supporting box has been released; ➠ p. 6 - 83.
- The electrical, hydraulic, and pneumatic connections are disconnected before removing the supporting box.

Risk of damage to the suspension struts and tyres!
Always extend the auxiliary support before you raise the supporting box with the truck crane.
This prevents the suspension struts and tyres from becoming overloaded and damaged.

Risk of overturning with the raised supporting box!
Always enter an RCL code for the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) with the working position required before lifting the supporting box with the truck crane and slewing the truck crane. You may not override the RCL even if the RCL goes off at a small working radius!
When the working radius increases after RCL shutdown, the stability is no longer guaranteed.

Risk of being crushed when attaching and raising the supporting box!
Always guide the supporting box from the rear with guide ropes when attaching and raising it. This will help prevent you being crushed between the supporting box and the carrier.

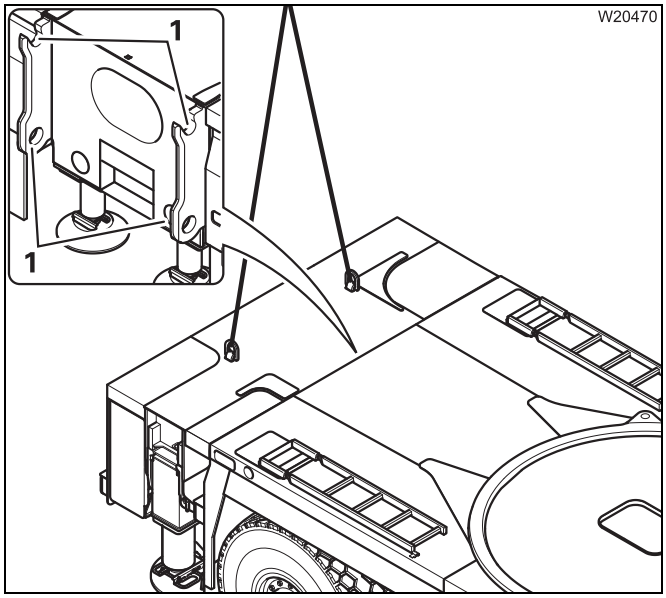
14.03.2018

Lifting

- Raise the main boom until you are able lift the supporting box upwards in an upright position.

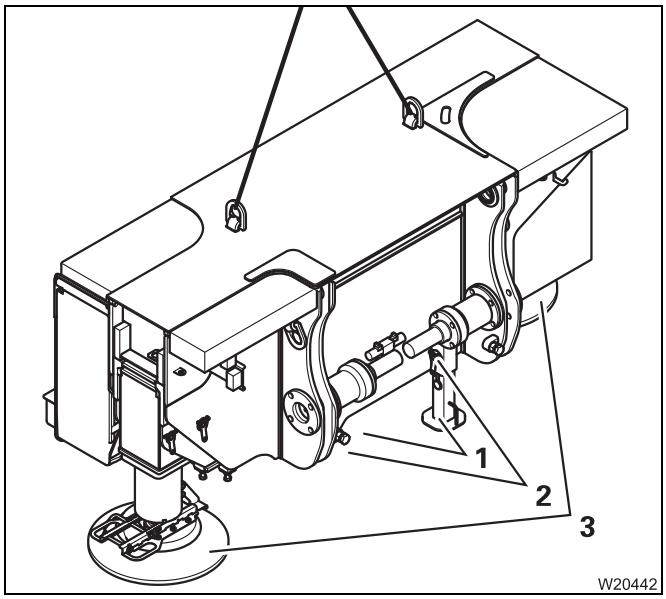
If the supporting box is to be placed on a separate vehicle:

- Move the separate vehicle up to the truck crane so that you can set down the supporting box without overriding the RCL; ➠ p. 6 - 85.



Do not override the RCL!

- Lift the supporting box vertically out of the carrier retainers (**1**) with the truck crane.



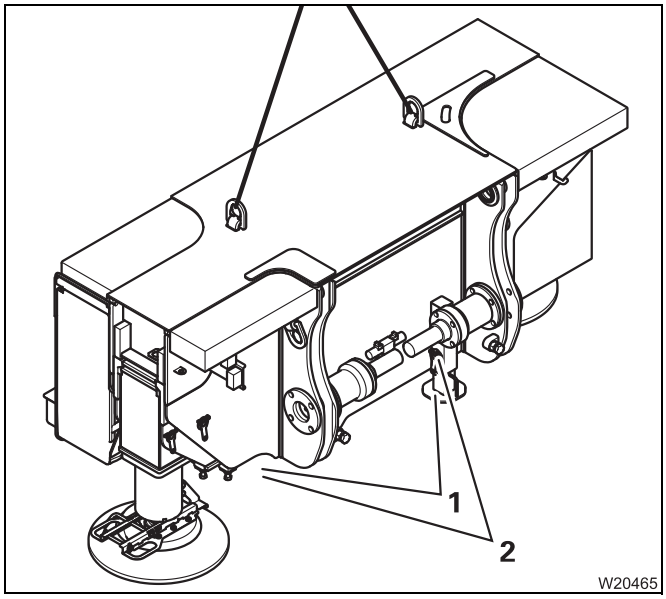
- Hold the supports (**1**) and remove the retaining pins (**2**).
- Extend the supports (**1**).
- Secure the supports (**1**) by inserting the locking bolts (**2**) into the upper hole.
- Bring the outrigger pad (**2**) to the working-position; ➠ p. 12 - 39.

14.03.2018

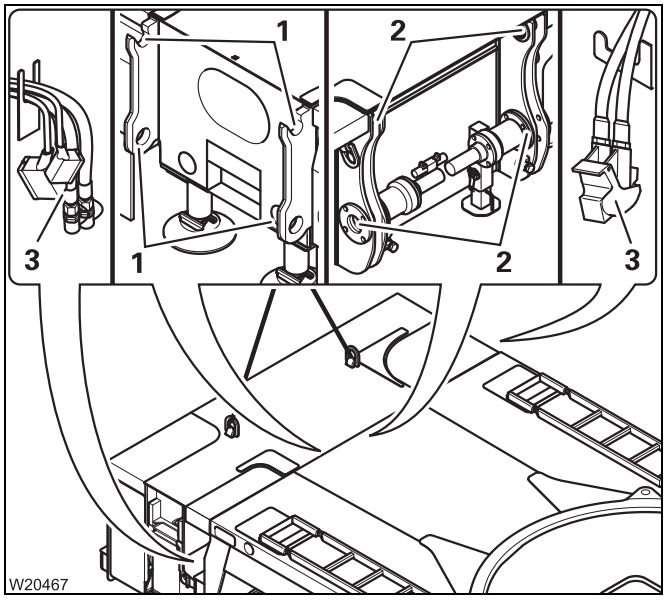
Hanging

The supporting box is within one of the radii permitted by the RCL.

The supports must be retracted before hanging the box.



- Sling the supporting box.
- Pull the locking pins (**2**).
- Retract the supports (**1**).
- Secure the supports; by inserting the locking pins into the lower hole.
- Where necessary to do so, bring all the outrigger pads into driving position; ➠ p. 12 - 39.



Do not override the RCL!

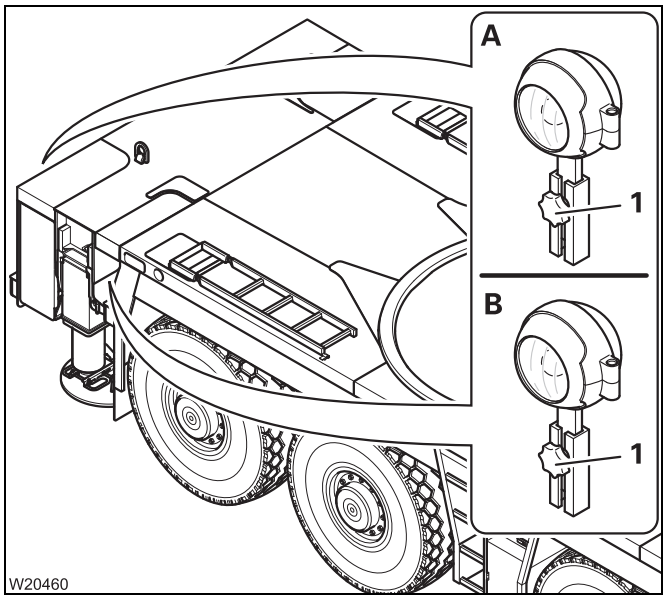
- Hoist the supporting box onto the carrier in such a way that the pins (**2**) on the supporting box are vertically above the mountings (**1**) on the rear of the vehicle.
- Hang the supporting box in the mountings (**1**).

  Take care that the cables and hoses (**3**) are not trapped and damaged.

14.03.2018

6.6.8 Installing the reverse camera

Depending on the driving mode, you can install the reverse camera on the carrier or the supporting box.



(A) – On the supporting box

(B) – On the carrier

- Fasten the reverse camera with the bolt (**1**).
- Install and secure the connecting camera so that it safe for use on roads.

14.03.2018

6.6.9 Crane movements during installation and removal

When the rear supporting box is removed, the setting down and raising of the main boom and the slewing of the superstructure is monitored by RCL. There are RCL codes for different working positions for an outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft).

Risk of overturning when slewing the superstructure!
Always support the truck crane with an span of 7.98 x 8.50/1,00 m (26.1 x 27.9/3.3 ft) (with auxiliary supports at the rear) and set the corresponding RCL code before slewing the superstructure.
Do not override the RCL if slewing is switched off.

Prerequisites

The following prerequisites must be met:

– The auxiliary hoist must be removed.
– The counterweight is completely unrigged.
– The truck crane is rigged with an outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft); ➠ p. 6 - 71.
– The truck crane must be level.
– All telescopic sections are retracted and locked.

Before installation

- Enter the RCL code for an outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) for the current main boom position (code for 0° position to the rear or 180° position to the front).
- Raise the main boom.
- Enter the RCL code for the outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) for the 360° slewing range.
- Rotate the superstructure into the position for mounting the rear support.
- Enter the RCL code for the outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) for the limited slewing range of ±20° to the rear.

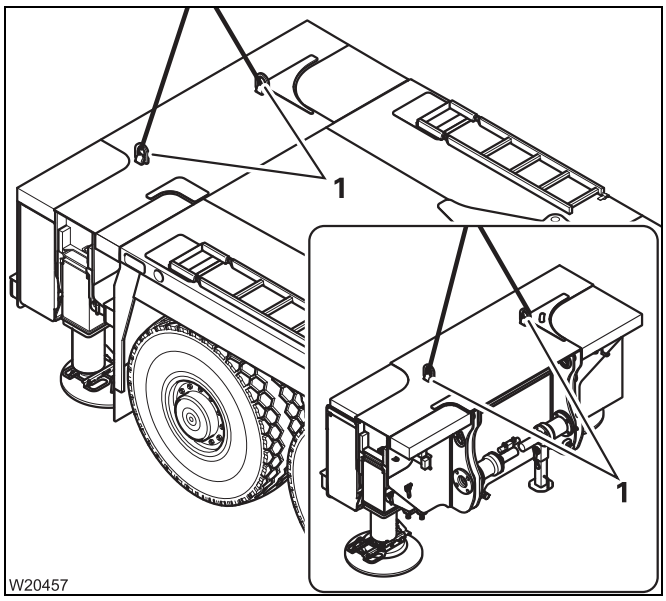
After the removal

- Enter the RCL code for the outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) for the 360° slewing range.
- Slew the superstructure into the position for setting down the main boom (0° to the rear, 180° to the front or ±15° to the rear).
- Enter the RCL code for the outrigger span of 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) for the current main boom position.
- Set down the main boom on the boom rest or on a trailer.

14.03.2018

6.6.10 Slinging points on the supporting box

Risk of accidents if used improperly!
Attach the supporting box only to the designated points and only use lifting gear of sufficient lifting capacity. Weight of the supporting box
➠ *Dimensions and weights of removable parts*, p. 1 - 10.



At the top of the supporting box there are two slinging points (**1**).

Use only these slinging points for fastening the lifting gear.

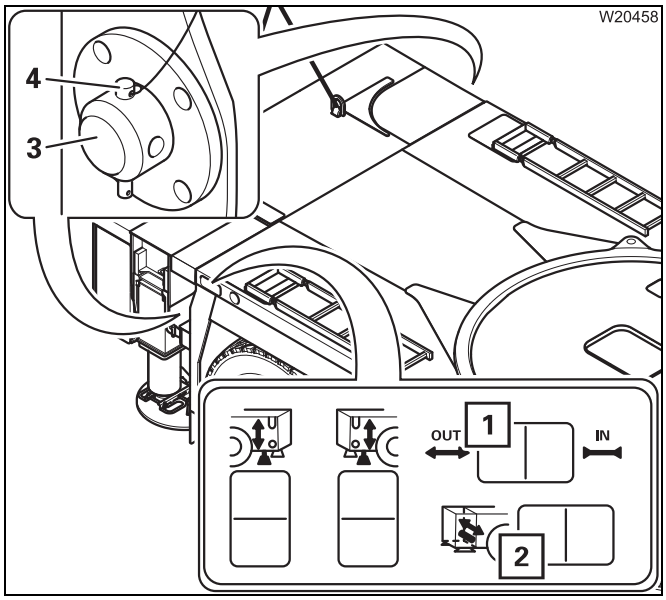
14.03.2018

6.6.11 Locking/unlocking the supporting box

Risk of crushing when extending/retracting the pins!
The pins on both sides are always moved at the same time from the *Supporting box* control unit. Make sure that no-one is in the vicinity of the carrier retainers on the other side of the vehicle when you extend or retract the pins.

Risk of damage to the securing plugs!
Make sure that the securing plugs with the chains are not pushed inwards through the retainers on the carriage. This prevents the chains or the securing plugs being severed when the pins are extended or retracted.

Locking



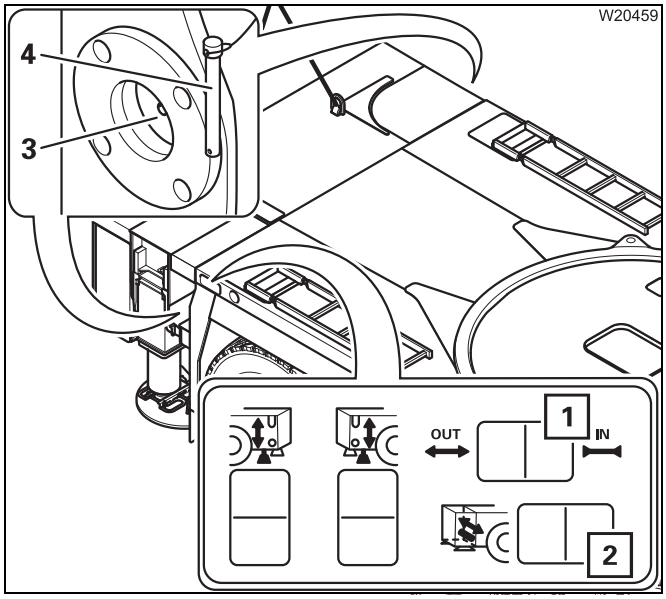
- Press the button (**2**) and button (**1**) on the left.
- Extend the pins (**3**) completely through the mountings.

The movement continues till you release the button or the end position is reached.

- Secure all pins (**3**) using the retaining pins (**4**).
- Push the retaining plugs in until the balls at the bottom of the plugs are pushed out.

14.03.2018

Unlocking



- Sling the supporting box before releasing the pins.
- Pull the securing plugs (**4**) out of the two pins (**3**).
- Press the button (**2**) on the left and the button (**1**) on the right.
- Fully insert the pins (**3**).

The movement continues till you release the button or the end position is reached.

14.03.2018

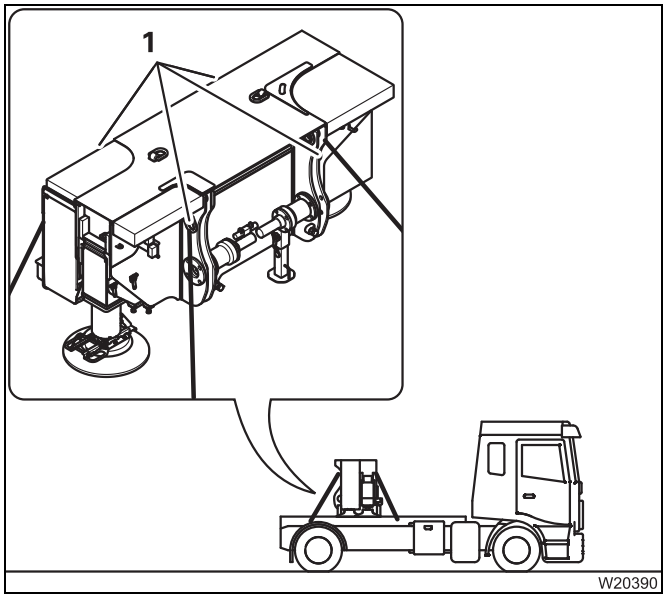
6.6.12 Transporting the supporting box on the separate vehicle

Risk of damage to add-on parts on the supporting box and outrigger pads!
Always secure the supporting box against slipping and overturning.
This will prevent damage.

Risk of accidents if used improperly!
For transport, attach the supporting box to the provided lashing eyelets only and only use lifting gear of sufficient lifting capacity.

- Check that the outrigger beams are secured against extension during transportation with the locking pin; ➠ p. 12 - 32.
- Move the outrigger pads into operating position; ➠ p. 12 - 39.
- Load the supporting box in such a way that other traffic is not endangered.
- Secure the supporting box and mounting equipment with holding ropes to prevent them from falling from the transport vehicle, slipping or damaging other parts.
- Load the transport vehicle in such a way that the weight is evenly distributed.
- Transport the supporting box only on a separate vehicle of sufficient lifting capacity; ➠ *Dimensions and weights of removable parts*, p. 1 - 10.

Lashing eyelets



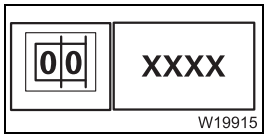
- Fasten the supporting box for the transport to the lashing eyelets (**1**) with holding ropes.

14.03.2018

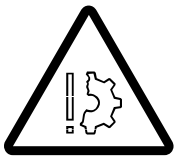
6.6.13 Installing / removing the rear bumper

Prerequisites:

– The outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) has been established and the truck crane is horizontally aligned; ➠ p. 12 - 46.



– The RCL code for the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) as stated in the *Lifting capacity table*, has been entered.



Risk of damage to the suspension struts and tyres!
Always extend the auxiliary support before you raise the rear bumper with the truck crane.
This prevents the suspension struts and tyres from becoming overloaded and damaged.

Risk of overturning with the raised rear bumper!
Always enter an RCL code for the outrigger span 7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) with the working position required before lifting the rear bumper with the truck crane and slewing the truck crane. You may not override the RCL even if the RCL goes off at a small working radius!
When the working radius increases after RCL shutdown, the stability is no longer guaranteed.

Danger of crushing when installing/removing the rear bumper!
Always guide the rear bumper from the rear with guide ropes when attaching and raising it. This will help prevent you being crushed between the rear bumper and the carrier.

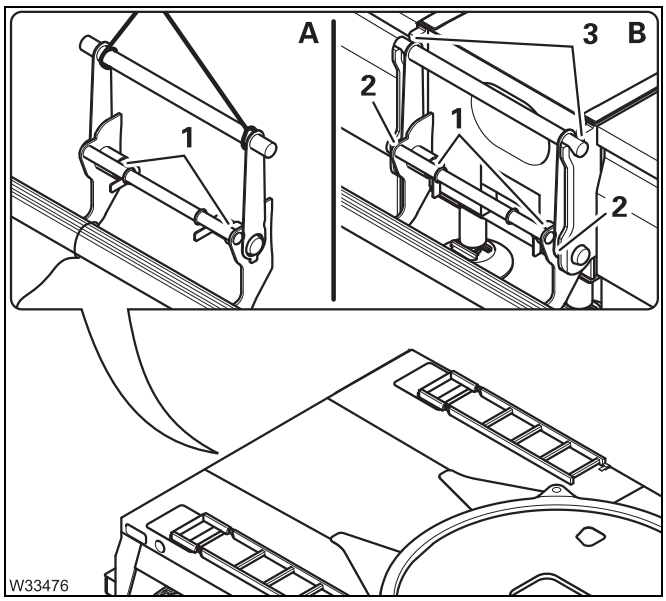
Risk of accidents if used improperly!
Use only lifting gear and joining elements of sufficient load bearing capacity.

Observe: ➠ *Dimensions and weights of removable parts*, p. 1 - 10

14.03.2018

Installing

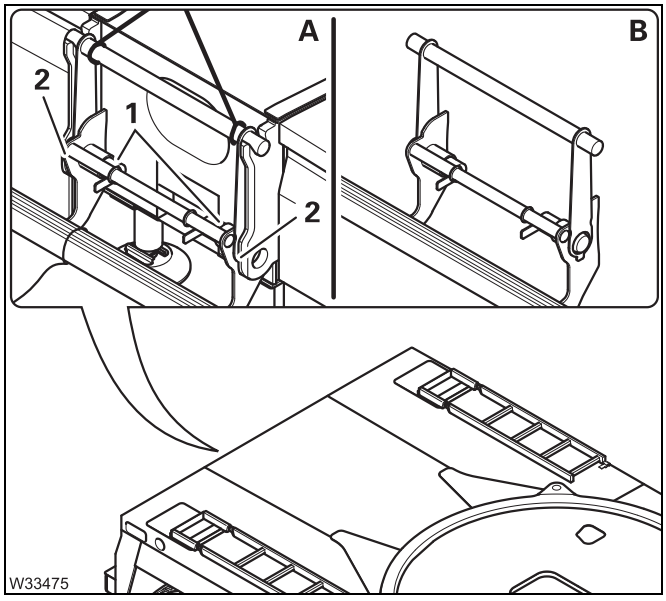
Therear bumper is within one of the radii permitted by the RCL.



- (**A**) – Sling the rear bumper.
- (**B**) – Lift the rear bumper vertically over the bracket (**3**).
- Hang and align the rear bumber in the brackets (**3**) until the connecting points (**2**) line up.
- Release the pins (**1**) insert them into the connecting points (**2**).
- Secure the pins – lever vertical.
- Remove the lifting gear.

Removing

- Raise the main boom until you are able lift the rear bumper vertically upwards.



- (**A**) – Sling the rear bumper.
- Remove the pins (**1**) from the connecting points (**2**) and secure them – lever horizontal.
- (**B**) – Lift the rear bumper vertically off the carrier.
- Remove the lifting gear.

14.03.2018

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14.03.2018

6.7 Rigging the auxiliary hoist

You need the following equipment:

– suitable lifting gear and guide ropes with sufficient load bearing capacity; ➠ *Dimensions and weights of removable parts*, p. 1 - 10,

– a separate vehicle,

– if necessary, a rigging frame for rigging counterweight combinations up to max. 26 t.

6.7.1 CHECKLIST: Auxiliary hoist, installing

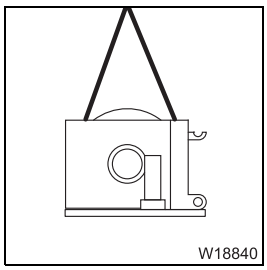
Prerequisites

– The truck crane is supported with the required outrigger span as specified in the *Lifting capacity table*; ➠ p. 12 - 30,

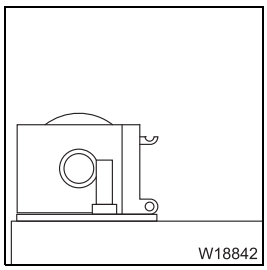
– The 54.5 t counterweight combination is resting on the counterweight platform; ➠ p. 12 - 62,

or

– Install the rigging frame for counterweight combinations of up to a maximum of 26 t (57,320 lbs); ➠ p. 6 - 94.

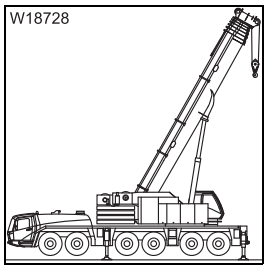


1. Attach the auxiliary hoist at the centre of gravity; ➠ p. 6 - 93.

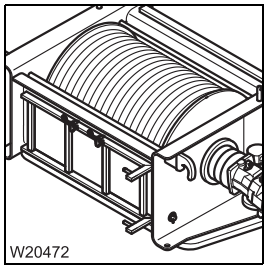


2. – Place the auxiliary hoist on the counterweight combination or the rigging frame; ➠ p. 6 - 98.

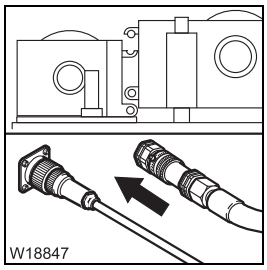
14.03.2018



3. Slew the superstructure into the *0° to the rear* position;
➠ *Slewing with rigged counterweight*, p. 12 - 83,
➠ *The current slewing angle*, p. 11 - 35.

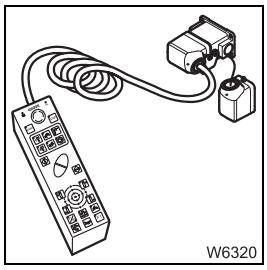


4. Hang the ladder for rigging work on the counterweight;
➠ *Ladder on the counterweight*, p. 12 - 121.

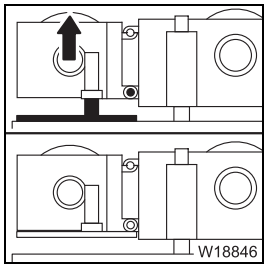


5. – Establish the hydraulic connections; ➠ p. 6 - 96.

– Establish the electrical connection; ➠ p. 6 - 97.

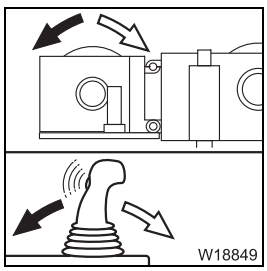


6. Connect the hand-held control at the right rear of the turntable;
➠ *Connecting/disconnecting the hand-held control*, p. 12 - 21.



7. Creating the connection to the turntable:

– Lift the auxiliary hoist; ➠ p. 6 - 95.
– Create the connection to the turntable; ➠ p. 6 - 98.
– Lift the lifting frame; ➠ p. 6 - 98.



8. – Check that the auxiliary hoist is functioning properly; ➠ p. 6 - 103.

– Place the hoist rope on and reeve it.

14.03.2018

6.7.2 CHECKLIST: Auxiliary hoist, removing

Prerequisites

– The truck crane is supported with the required outrigger span as specified in the *Lifting capacity table*; ➠ p. 12 - 30.

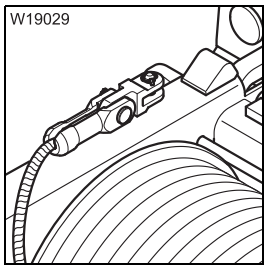
– The hoist rope on the auxiliary hoist must be unreeved and wound up.

– The superstructure is slewed to the rear.

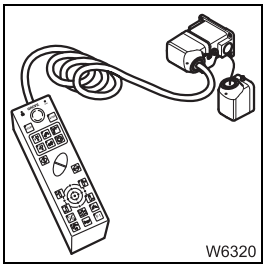
– The 54.5 t counterweight combination is resting on the counterweight platform; ➠ p. 12 - 62,

or

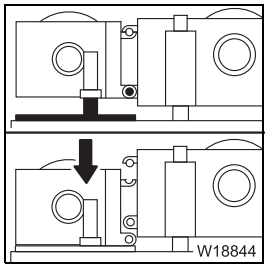
– Install the rigging frame for counterweight combinations of up to a maximum of 26 t (57,320 lbs).



1. – Secure the hoist rope; ➠ p. 6 - 101.

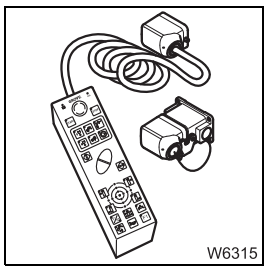


2. Connect the hand-held control at the right rear of the turntable; ➠ *Connecting/disconnecting the hand-held control*, p. 12 - 21.



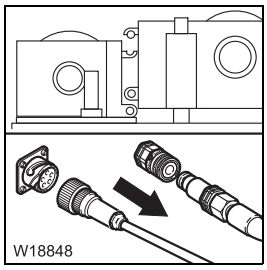
3. Removing the connection to the turntable:

– Lower the lifting frame; ➠ p. 6 - 100.
– Remove the connection to the turntable; ➠ p. 6 - 98.
– Lower the auxiliary hoist; ➠ p. 6 - 100.



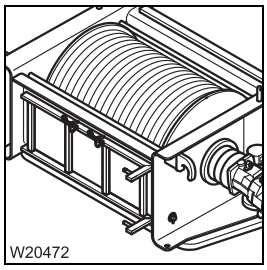
4. If necessary, disconnect and stow the hand-held control; ➠ *Connecting/disconnecting the hand-held control*, p. 12 - 21.

14.03.2018



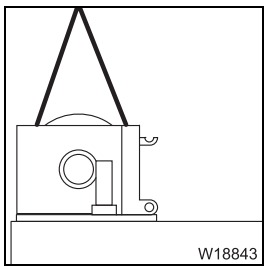
5. – Disconnect the hydraulic connections; ➠ p. 6 - 96.

– Disconnect the electrical connections; ➠ p. 6 - 97.

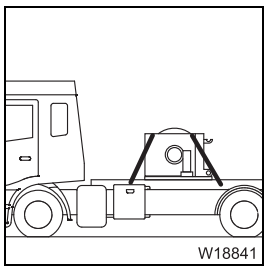


6. Remove the ladder from the counterweight;

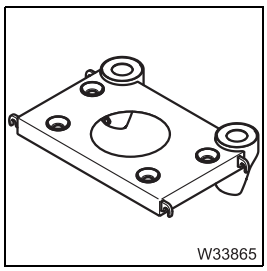
➠ *Ladder on the counterweight*, p. 12 - 121.



7. – Attach the auxiliary hoist at the centre of gravity; ➠ p. 6 - 98.



8. – Lift the auxiliary hoist onto the separate vehicle and make it ready for transportation; ➠ p. 6 - 102.

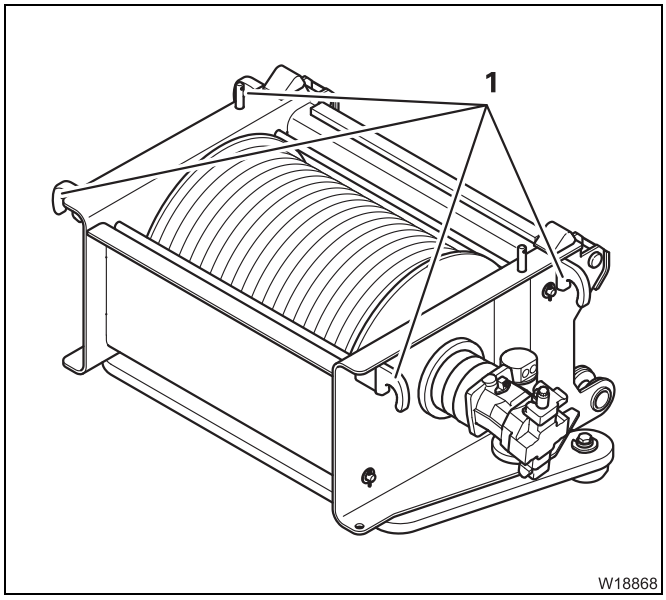


9. If necessary, remove the rigging frame; ➠ p. 6 - 94.

14.03.2018

6.7.3 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 lifting gear with a sufficient lifting capacity.



- Sling the auxiliary hoist only at the slinging points (**1**).

Use lifting gear with the same length, so that the auxiliary hoist hangs at the centre of gravity; ➠ *Dimensions and weights of removable parts*, p. 1 - 10.

14.03.2018

6.7.4 Installing/removing the rigging frame

You need the rigging frame for the auxiliary hoist only when the counterweight combination is a maximum of 26 t (57,320 lbs).

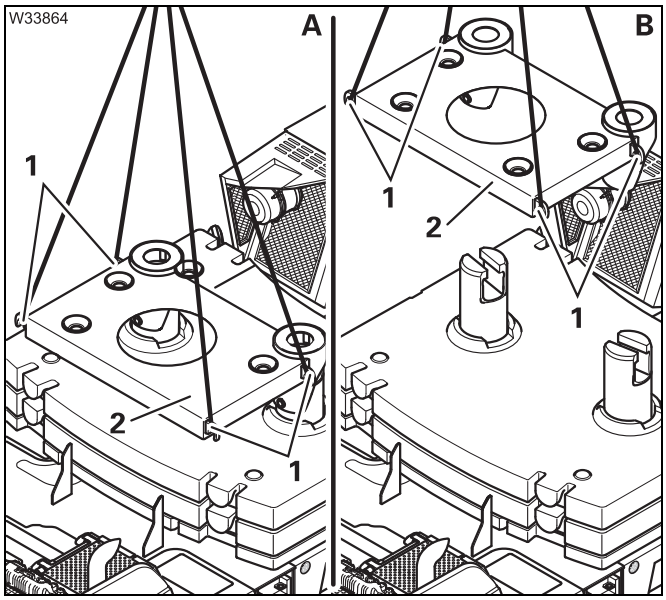
Prerequisite

– At least the 7 t (15,432 lbs) base plate lies on the counterweight platform.

– A base plate with a maximum weight of 26 t (57,320 lbs) lies on the counterweight platform.

– Use lifting gear of the same lengths, so that the rigging frame hangs in the centre of gravity; ➠ *Dimensions and weights of removable parts*, p. 1 - 10.

Risk of damage to the rigging frame and truck crane!
Only sling the rigging frame at the slinging points provided. Always use lifting gear with a sufficient lifting capacity and the same lengths.



Installing

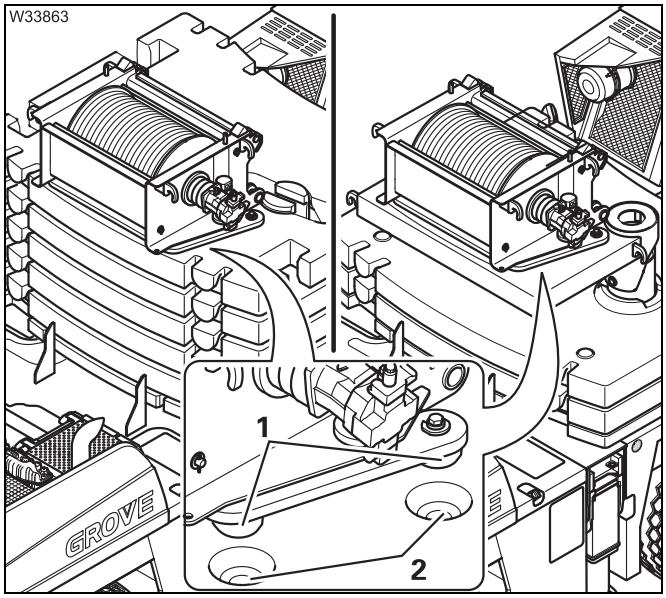
- (**A**) – Sling the rigging frame (**2**) at the slinging points (**1**).
- (**B**) – Lift the rigging frame (**2**) onto the counterweight combination.

Removing

- (**A**) – Sling the rigging frame at the slinging points (**1**).
- (**B**) – Lift the rigging frame (**2**) off the counterweight combination.
- Safely stow the rigging frame.
- Remove the lifting gear.

14.03.2018

6.7.5 Setting down the auxiliary hoist

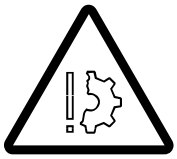


- Hoist the auxiliary hoist onto the counterweight combination or the rigging frame.

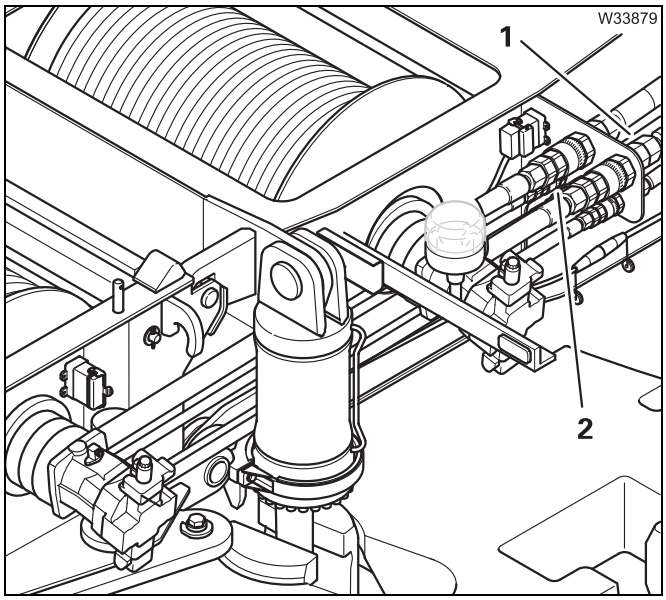
The pins (**1**) must engage into the mountings (**2**).

- Remove the lifting gear.

6.7.6 Making/breaking the hydraulic connection



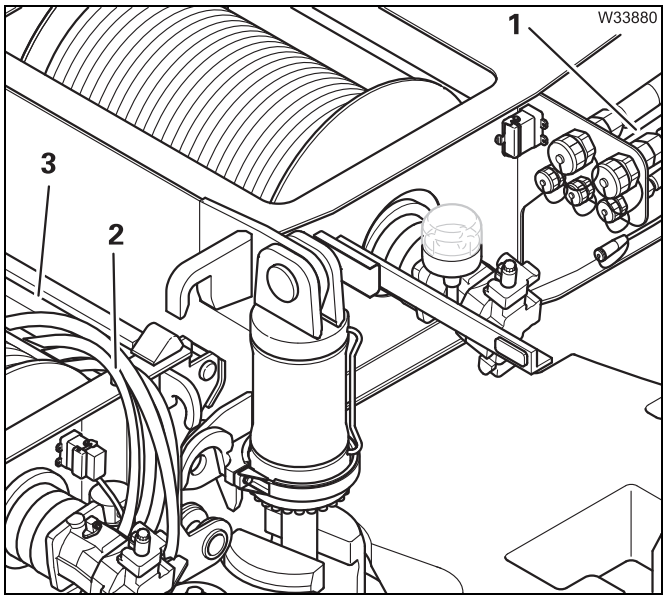
Risk of damage to hydraulic lines!
Lay the hydraulic hoses so that they will not be damaged during rigging and crane operation.



Establishing the connection

The assignment is given by the size and colour designations.

- Connect the hoses (**2**) to the connections (**1**).

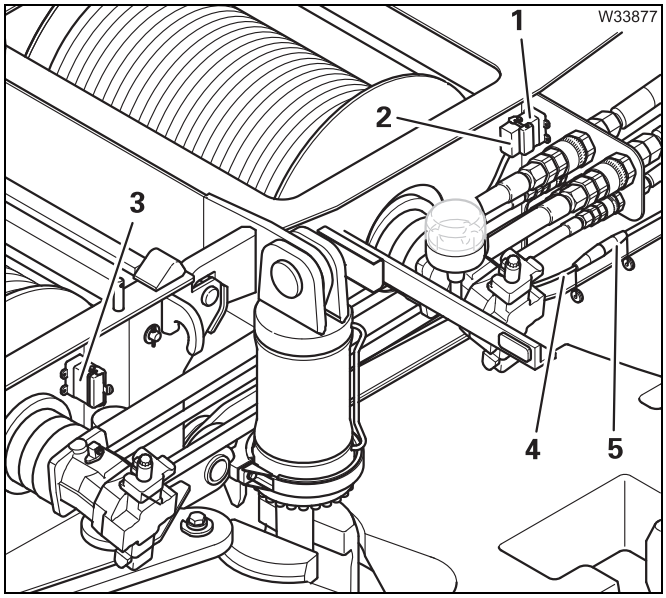


Separating the connection

- Remove the hoses (**2**) from the connections (**1**).
- Close all the hoses and connections with the protective caps.
- Insert the hoses into the hoist frame (**3**).

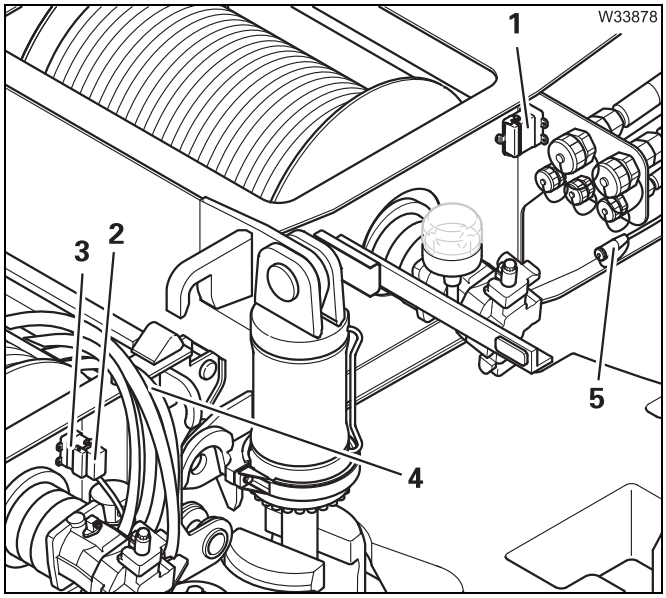
14.03.2018

6.7.7 Establishing/disconnecting the electrical connection



Establishing the connection

- Remove the plug (**2**) from the dummy socket (**3**) and insert it in the socket (**1**).
- Close the dummy socket (**3**).
- Insert the cable (**4**) for the hoist camera into the socket (**5**).



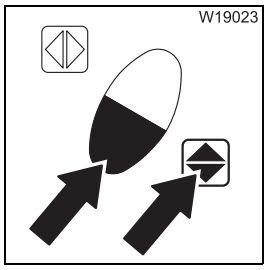
Separating the connection

- Remove the plug (**2**) from the socket (**1**) and plug it into the dummy socket (**3**).
- Close the socket (**1**).
- Remove the cable (**4**) for the hoist camera from the socket (**5**).
- Cover the plug and socket with caps.
- Lay the cable (**4**) so that it is not damaged during transport.

14.03.2018

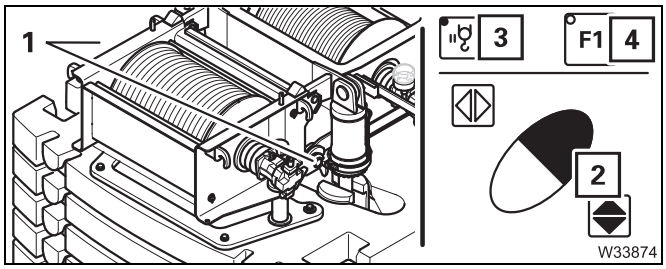
6.7.8 Creating the connection to the turntable

Risk of being crushed when rigging the auxiliary hoist!
Make sure that you or any helpers keep all parts of the body a sufficient distance away from the auxiliary hoist when rigging the auxiliary hoist. Remove all objects in the rigging range that could become jammed or crushed!



The respective button combination required is shown in black.

Establishing the connection



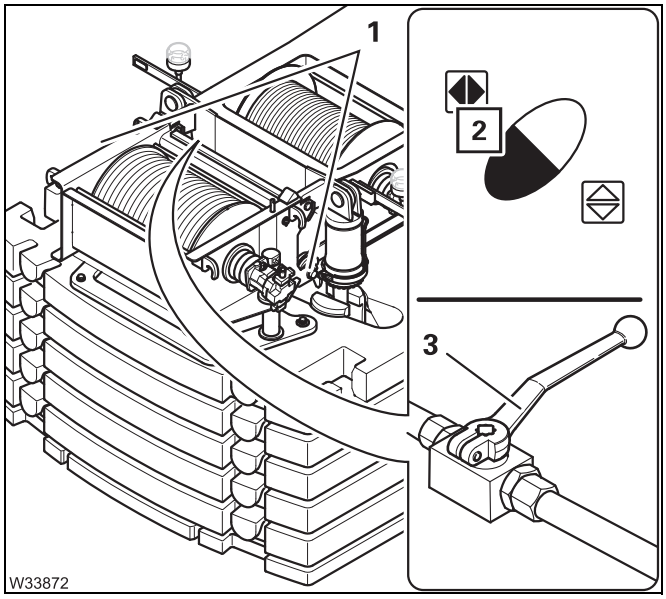
Lifting the auxiliary hoist

- Press the buttons (**3**) and (**4**).

Press the buttons (**2**) until the locking points (**1**) are aligned.

14.03.2018

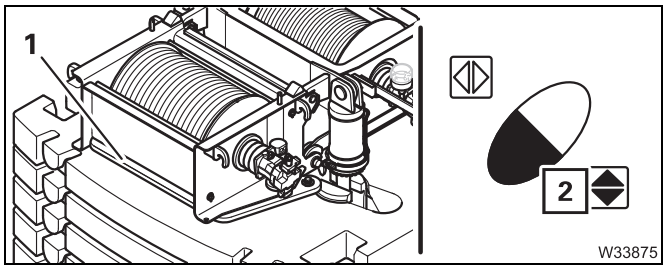
Risk of accident when the safety valve is open!
Always close the safety valve when the auxiliary hoist is locked to the turntable!
This prevents the auxiliary hoist from falling down due to unintentional actuation of the locking cylinders.



Extending the locking cylinders

- Press the buttons (**2**) until the locking cylinders (**1**) are fully extended.

- Close the safety valve (**3**) – lever at right angles to the line.

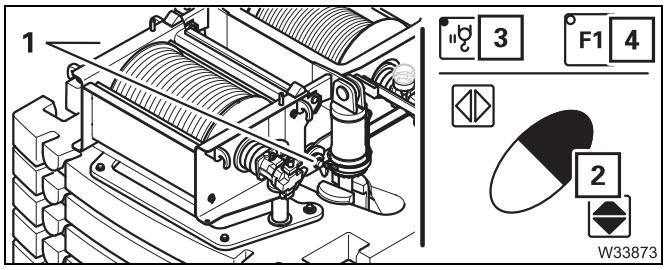


Lifting the lifting frame

- Press the buttons (**2**) until the lifting frame (**1**) is fully retracted.

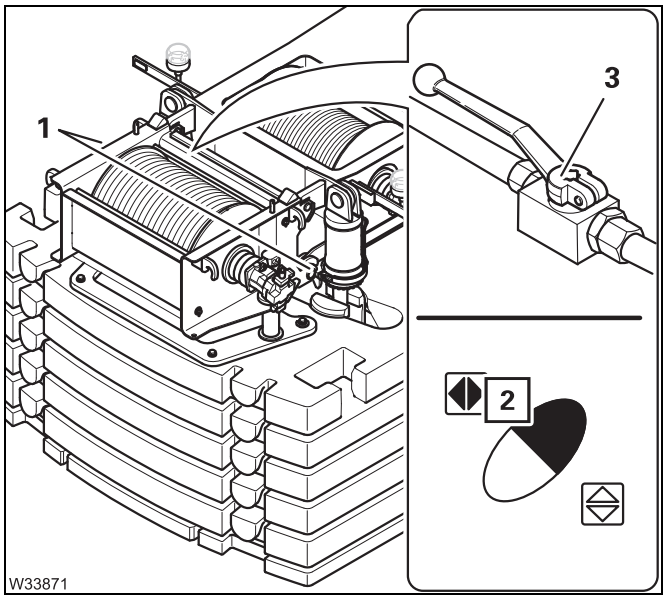
14.03.2018

Separating the connection



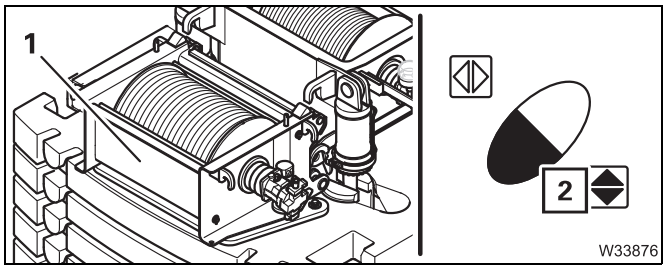
Lowering the lifting frame

- Press the buttons (**3**) and (**4**).
- Press the buttons (**2**) until the locking points (**1**) are relieved.



Retracting the locking cylinders

- Open the safety valve (**3**) – lever parallel with the line.
- Press the buttons (**2**) until the locking cylinders (**1**) are fully retracted.



Lowering the auxiliary hoist

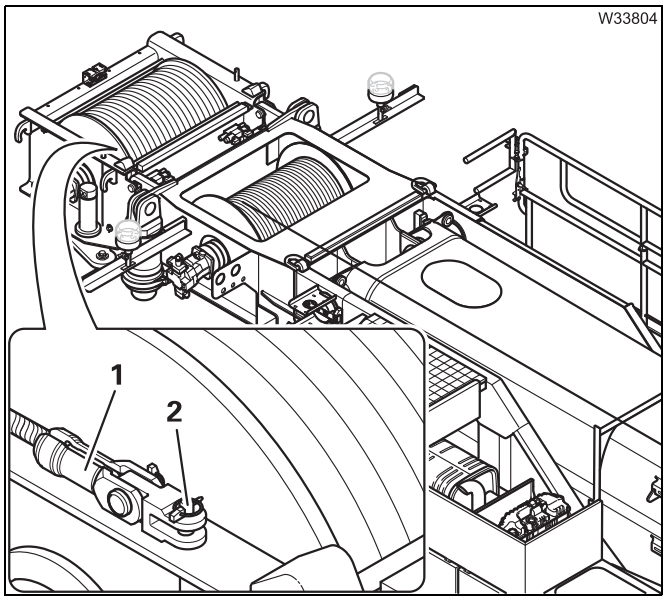
- Press the buttons (**2**) until the auxiliary hoist (**1**) is completely lowered.

14.03.2018

6.7.9 Securing the hoist rope

If you have wound up the hoist rope, you must secure it prior to removal.

Risk of accident from damaged auxiliary hoist rope!
Always secure the hoist rope prior to removal.
This prevents the hoist rope from being damaged and being overloaded during crane operation.

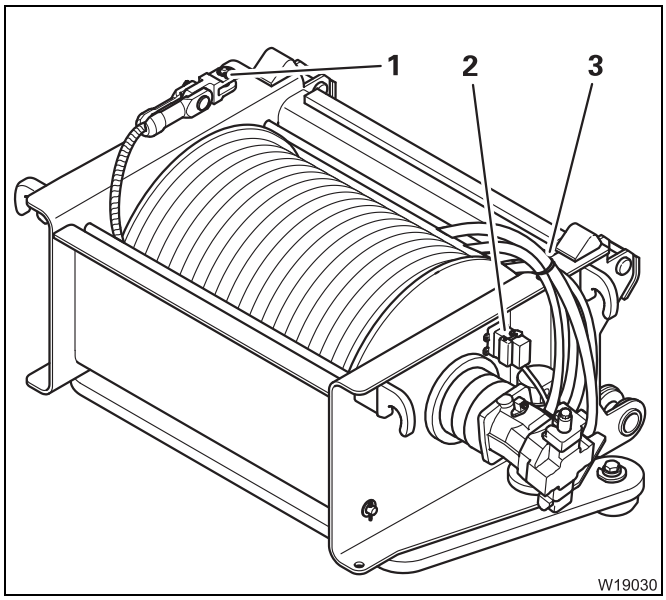


- Attach the rope end fitting (**1**) to the holder (**2**).
- Always secure the rope end fitting with a linchpin.

14.03.2018

6.7.10 Transporting the auxiliary hoist

- For transportation, be sure to use a separate vehicle with sufficient load bearing capacity; ➠ *Dimensions and weights of removable parts*, p. 1 - 10.
- Load the separate vehicle in such a way that the weight is evenly distributed.
- Transport and secure 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.
- Secure the hoses, e.g. on the slinging point (**3**).
- The plug (**2**) must be inserted in the dummy socket.
- The hoist rope is secured on the holder (**1**).

14.03.2018

6.7.11 Check that the auxiliary hoist is functioning properly

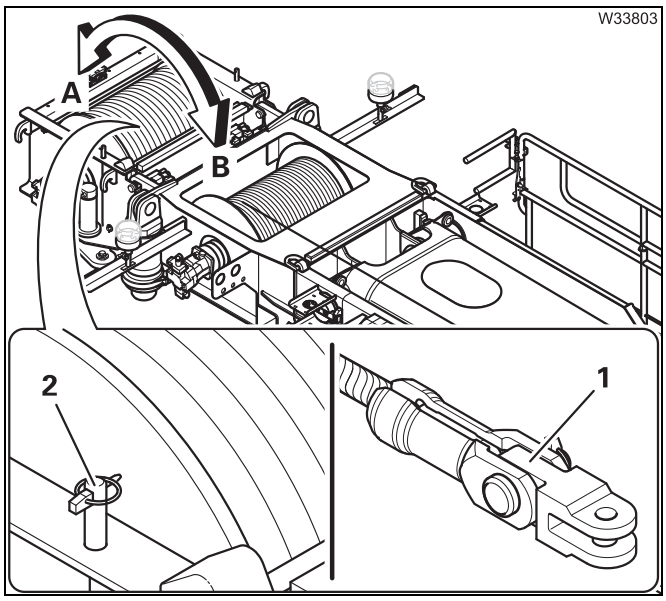
Slewing direction

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.



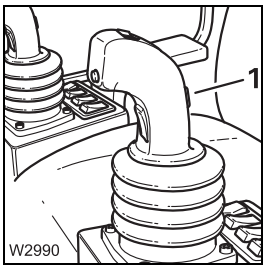
- Remove the rope end fitting (**1**) from the clamp (**2**).
- Drive slowly, and complete the *lifting* and *lowering* movements – stop the movement as soon as the hoist drum turns.
- Check that the slewing direction is correct:
  - **A** Lifting
  - **B** Lowering

If the slewing direction is incorrect

- Check if the hydraulic hoses have been mixed up; ➠ p. 6 - 96.

Slewing indicator

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



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

14.03.2018

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14.03.2018

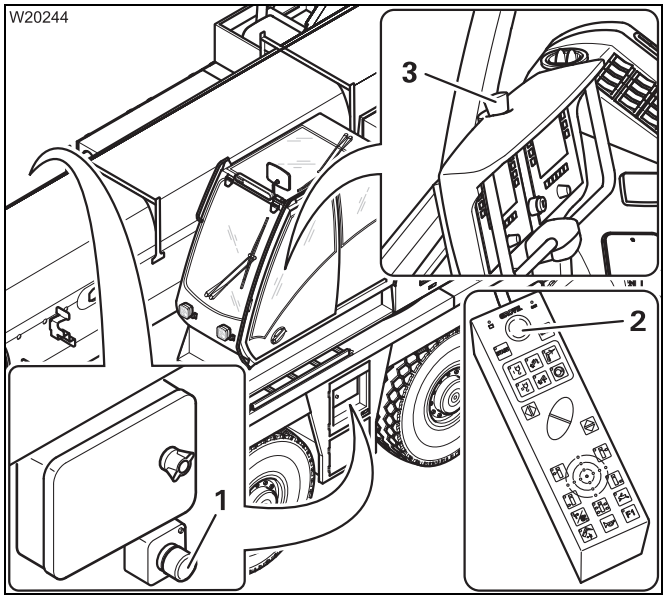
7 Malfunctions in driving mode

14.03.2018

14.03.2018

7 Malfunctions in driving mode

7.1 Emergency stop switch



Four emergency stop switches are provided for emergencies:

1 On the carrier

2 On the hand-held control

3 In the crane cab

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

The engine shuts down. If the engine for crane operation ha5

s previously been started, it is also shut down.

After activating an emergency stop switch;
➠ *Resetting the emergency stop switch*, p. 4 - 24.

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.

14.03.2018

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14.03.2018

7.2 What to do when a malfunction occurs in road traffic

If the truck crane can no longer be driven due to an accident or another malfunction, observe the following.

- Keep calm!
- Stop the truck crane! Observe the traffic behind you!
- Stop at a place safe for you and for the traffic behind you!

Risk of 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. 7 - 5.

14.03.2018

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14.03.2018

7.3 Towing the truck crane

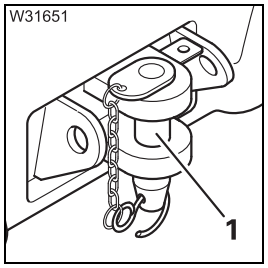
Observe the following when towing the truck crane:

– The truck crane may only be towed away with a tow-rod. Attach the tow-rod to the tow-rod coupling on the front bumper.

– Be sure to observe the statutory regulations of the country in which you are working concerning the overall length of the towing and towed vehicle, including tow-rod.

– If the engine, steering and service brake still work, you can tow the truck crane with a lorry.

– If the engine, steering or service brake no longer function properly, the truck crane must be towed with a special breakdown truck.

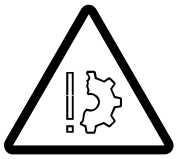


The front towing coupling is designed for a maximum tractive force of 10 t (22,000 lbs). Tensile force may be applied only forwards or at an angle of 45° to both sides of the longitudinal axis of the truck crane.

14.03.2018

7.3.1 Towing after engine/transmission damage

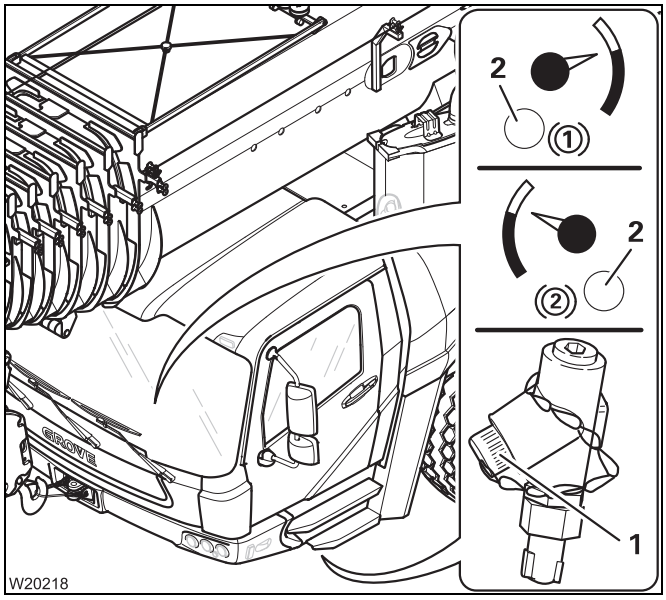
The following information only applies to towing the truck crane out of the immediate hazard area in the event of damage to the engine or transmission.



Risk of accidents and damage when towing the truck crane long distances!
Tow the truck crane at a maximum speed of 10 km/h (6 mph) and over a distance of max. 1 km (0,62 mi). Additional measures must be taken for longer distances, 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.

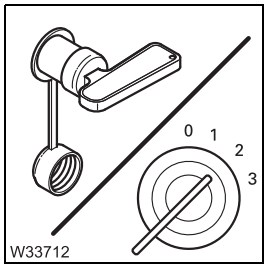


- Connect the filler connection (**1**) with the *supply* coupling head of the towing vehicle.

A supply pressure of at least 6 bar (87 psi) must be displayed and the lamps (**2**) must not light up in the driver's cab when towing.

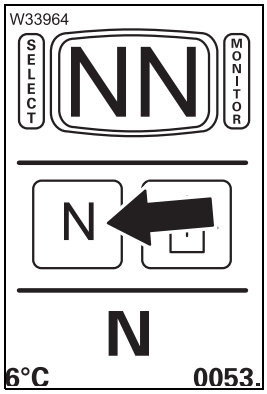
14.03.2018

Electric power supply



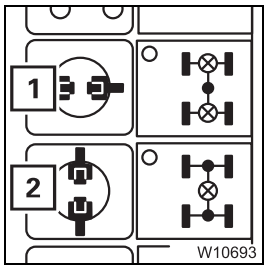
- Switch on the battery master switch.
- Switch on the ignition.

On the transmission



- Switch the transmission to neutral position **N**.

Axle drives



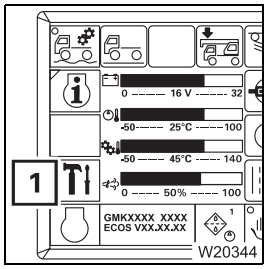
- Switch off all differential locks.

The **green** symbols (**1**) and (**2**) must be shown; ➠ *Switching off*, p. 5 - 63,

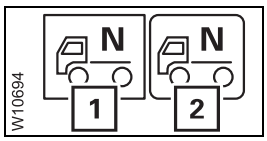
14.03.2018

Transfer case

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



- If required, open the main menu Esc.
- Press the button (**1**) once.
  This opens the *Settings* submenu.

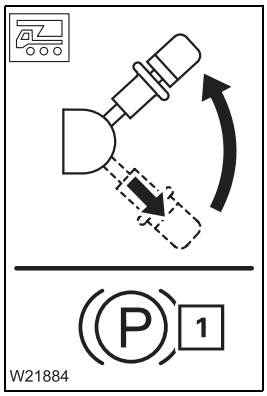


- Press the button (**1**) once.

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

To switch off the neutral position, you must switch the off-road gear on or off in the main menu; ➠ p. 5 - 60.

Parking brake



- Release the parking brake.
  The lamp (**1**) must go out.

If the lamp (**1**) continues to light up, the supply pressure may be too low. Let the engine of the truck crane or towing vehicle run on the compressed-air supply until the supply pressure has been built up; ➠ *Building up supply pressure*, p. 5 - 10.

If the lamp (**1**) fails to go out, the parking brake has been damaged, contact **Manitowoc Crane Care**.

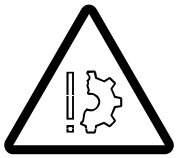
Risk of accidents due to faulty brakes!
If the service brake system has been damaged, you may only tow the truck crane from the immediate danger area after consulting with **Manitowoc Crane Care**.

14.03.2018

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.

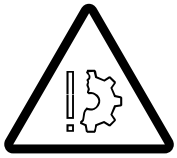


Risk of damage to the chassis!
Starting jerkily or quickly can damage the chassis!

- 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 10 km/h** (6 mph).
- Ensure that the towing distance is a maximum of **1 km** (0,62 mi).



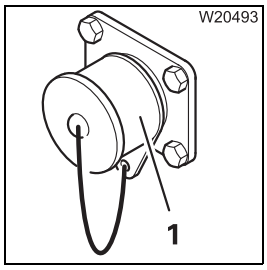
Risk of accidents and damage when towing the truck crane long distances!
Tow the truck crane at a maximum speed of 10 km/h (6 mph) and over a distance of max. 1 km (0,62 mi). Additional measures must be taken for longer distances, refer to **Manitowoc Crane Care**.

7.3.2 Tow starting

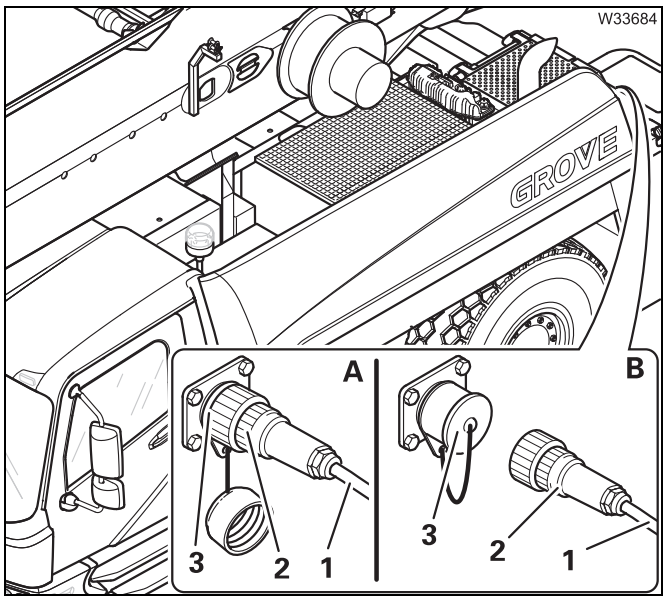
It is **not** possible for the truck crane to start towing for transmission reasons.

14.03.2018

7.3.3 External starting socket



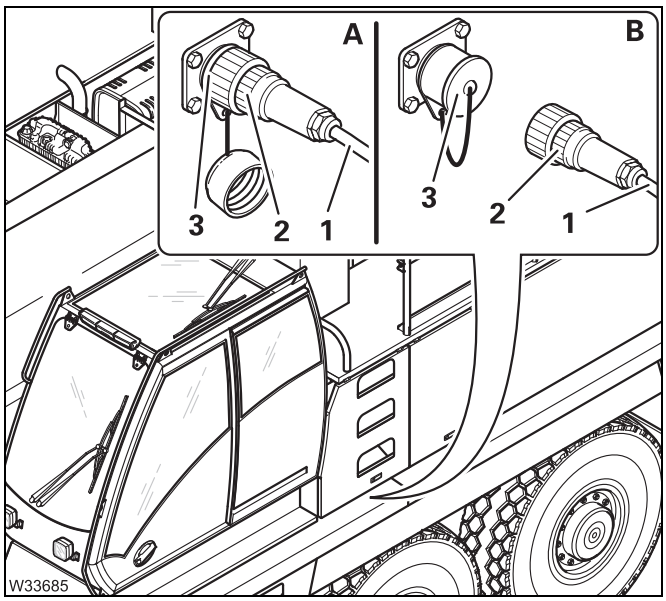
The truck crane is equipped with a socket for external starting (**1**) on the carrier and on the superstructure (➠ p. 14 - 79).
If the batteries are discharged, the power supply (24 V) of an auxiliary vehicle or the socket (**1**) on the superstructure can be used for charging.



- Start the engine of the power source (24 V).
- (**A**) – Connect the cable (**1**) to the power supply.
- Insert the plug (**2**) into the socket (**3**).
- Start the engine for driving.
- (**B**) – Withdraw the plug (**2**).
- Close the socket (**3**).
- Remove the cable (**1**) from the power supply.

Performing a jump start

The socket (**1**) can also be used to supply power to another vehicle (with a 24 V on-board network).



- Start the engine for driving.
- (**A**) – Insert the plug (**2**) into the socket (**3**) on the carrier.
- Connect the cable (**1**) to the vehicle requiring the power (24 V).
- Start the engine of the vehicle that requires the power.
- (**B**) – Withdraw the plug (**2**).
- Close the socket (**3**).
- Remove the cable (**1**) from the vehicle.

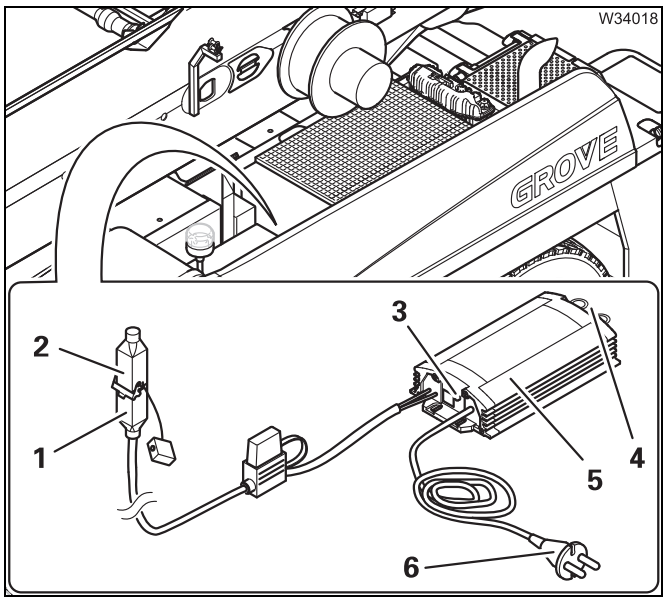
14.03.2018

7.3.4 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 (e.g. 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).



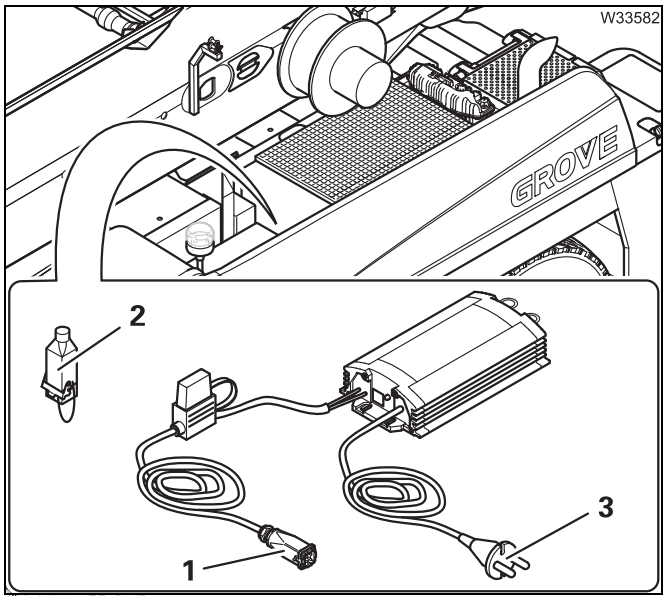
Connecting

- Insert the plug (**1**) into the socket (**2**).
- Place the battery charger (**5**) in a protected place where you can see the indicator lamp (**3**).

  The battery charger can be suspended from the ring eyes (**4**).
- Insert the plug (**6**) into the socket on the mains supply 230 V at the location.

The battery charger switches on. The lamp (**3**) on the battery charger indicates the status:

- **Flashing:** The battery is being charged
- **On:** Charging complete



Disconnecting

- Withdraw the plug (**3**) from the socket.
- Withdraw the plug (**1**) from the socket (**2**).
- Close the socket (**2**).
- Return the battery charger to the storage compartment in the driver's cab.

14.03.2018

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14.03.2018

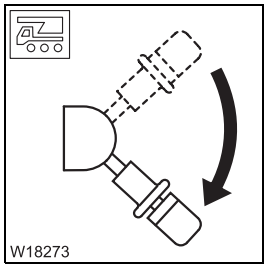
7.4 Wheels and tyres

This section contains all the information about changing a wheel and about using the tyre inflater connection.

7.4.1 Wheel change

- If a puncture occurs while driving, stop the truck crane, taking the following traffic into account, and secure the truck crane as outlined in the applicable legal stipulations of the country in which you are working.
- Select 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.



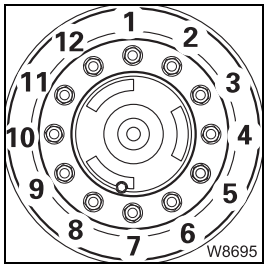
- Apply the parking brake.

14.03.2018

Removing a damaged wheel

- Switch off the suspension; ➠ p. 5 - 18.
- 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 wheel nuts (**1**) to (**12**) and remove the damaged wheel.
- Secure the wheel against falling over if you set it down temporarily.

On the spare wheel holder

When changing a wheel, you must remove the spare wheel from the spare wheel holder and mount the damaged wheel on to the spare wheel holder.

You can use a chain hoist or the truck crane to lift the wheel.

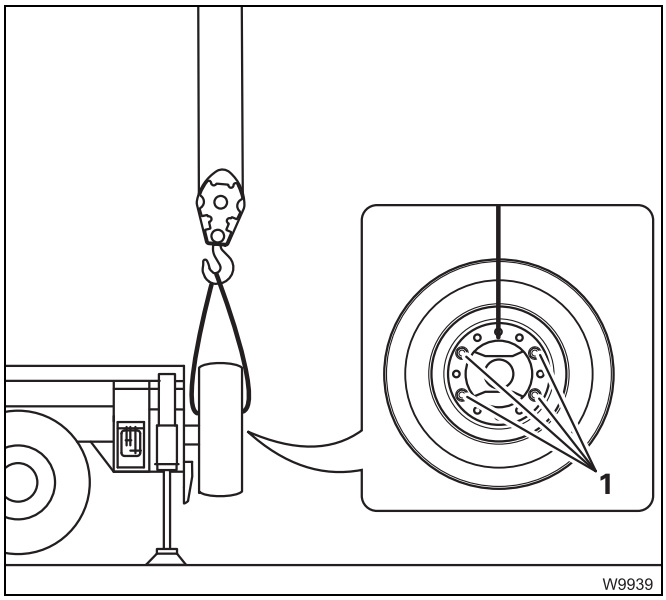
- If you lift the wheel with the truck crane, then:
  - Support the truck crane and
  - Enter the current rigging mode on the RCL.

Danger of overturning if the truck crane is free-standing!
Always support the truck crane on outriggers before rotating the superstructure.
If 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 - 83.

- Lift the spare wheel using only lifting gear with sufficient load bearing capacity; ➠ *Spare wheel*, p. 1 - 10.

14.03.2018



Removing a wheel

- Undo the wheel nuts (**1**).
- Lift the spare wheel off the spare wheel holder.
- Secure the spare wheel against falling over if you put it down temporarily.

Mounting a wheel

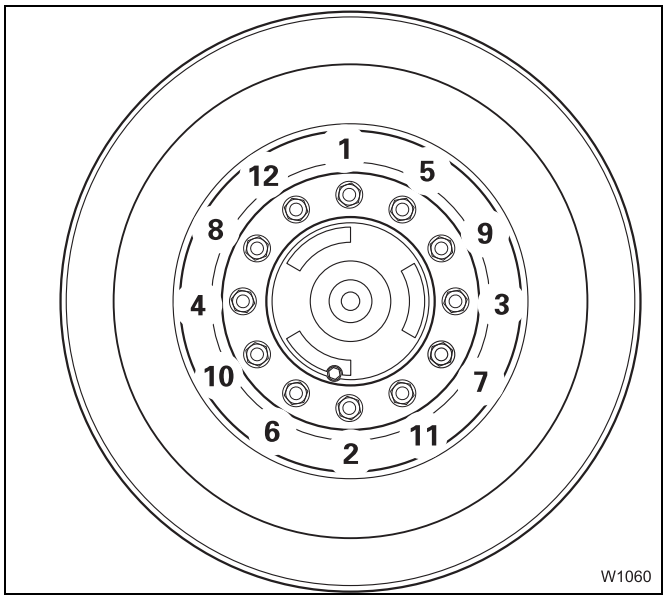
- Lift the wheel on to the spare wheel holder.
- Secure the wheel with the nuts (**1**) and tighten them to 500 Nm (370 lbf ft).

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 as listed in the spare parts list or a permitted 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).

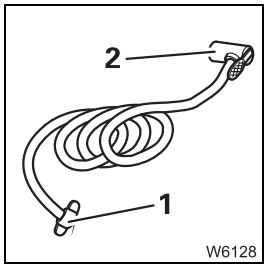
14.03.2018

7.4.2 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.
The tyres can be inflated up to a maximum pressure of about 8 bar (116 psi).
This pressure might not correspond to the prescribed tyre pressure, depending on the tyres; ➠ *Tyres*, p. 1 - 14.

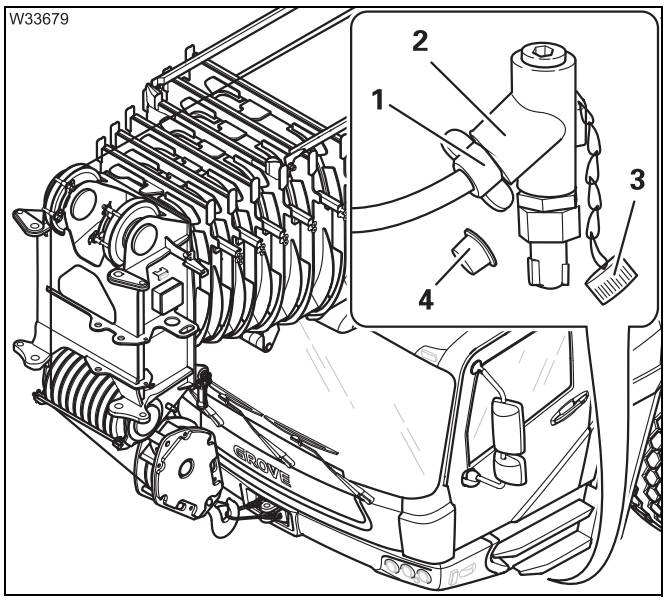
Risk of accidents due to excessive tyre pressure!
If the maximum pressure is above the specified tyre pressure, then do not inflate the tyres to more than the specified pressure.
This prevents the tyres becoming damaged and bursting while driving.

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 inflater connection (**2**) and a connection (**1**).

Connecting the filling hose



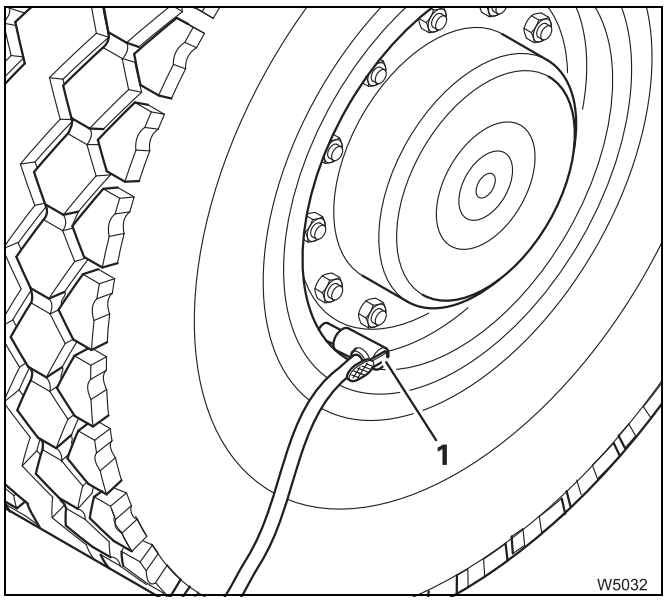
- Remove the caps (**3**) and (**4**).
- Fasten the connection (**1**) to the filler connection (**2**).

You can now inflate the tyres.

14.03.2018

Inflating the tyres

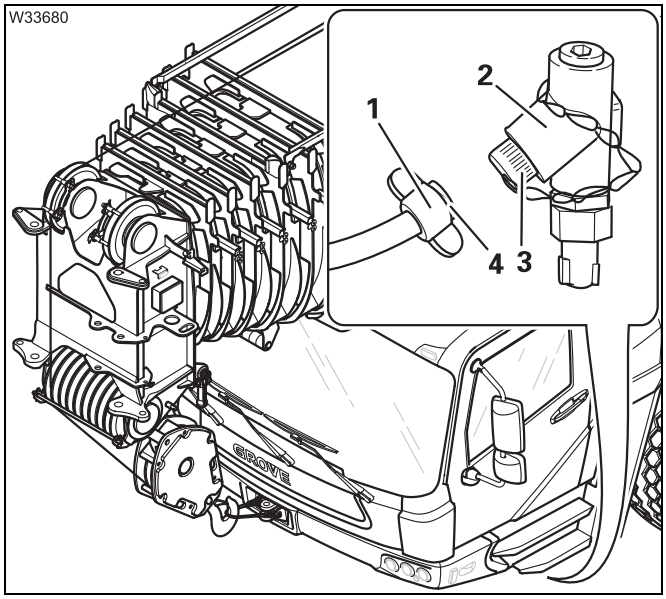
The compressed air system's maximum operation pressure of 8 bar (116 psi) can only be reached with the engine running.



- Start the engine; ➠ p. 4 - 15.
- Fasten the tyre connection (**1**) to the tyre valve.
- Press the button on the tyre connection and inflate the tyre.
- Disconnect the tyre connection (**1**) from the tyre valve.

Removing the filling hose

Before driving, you must remove the filling hose from the filler connection.



- Remove the connection (**1**) from the filler connection (**2**).
- Close the filler connection and the connection with the caps (**3**) and (**4**).
- Stow the filling hose away.
- Drive to a service station or 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.

14.03.2018

7.5 Fuses

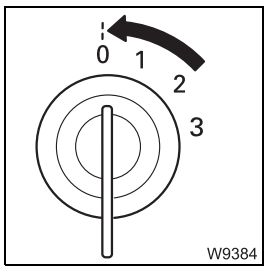
The fuses are divided into groups and are at various points on the carrier:

– In the driver's cab,

– In the battery box.

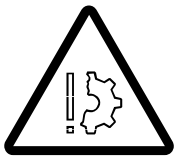
Information on replacing fuses

The positions of the fuses, their designations and which functions are protected by 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.

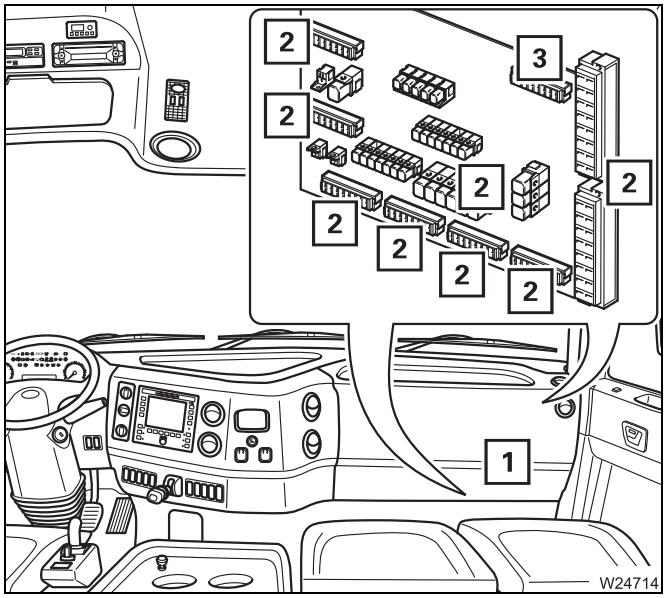


Risk of damage by overloading!
Replace blown fuses only with new fuses of the same amperage. This prevent parts being overloaded and damaged or the fuse being immediately blown again.
Notify **Manitowoc Crane Care** if a fuse with the same amperage fails again once the ignition is switched on.

Risk of fire!
Never repair a blown fuse with other electrically conductive materials.

14.03.2018

7.5.1 Fuses in the driver's cab



- Remove the covers (**1**).

2 Fuse groups F1 to F10

3 Reserve fuses

The following sections show the designations of the individual fuses, including their amperage and functions.

Group F1

The fuses are labelled with the numbers.

- Observe the instructions on changing fuses; ➠ p. 7 - 19.

Designation	Amperage (A)	Function
F1/1	20	Automatic parking light[1)]
F1/2	10	Diagnostics plug, cab lighting Cigarette lighter
F1/3	20	Oil cooler, 24 V/12 V voltage transformer
F1/4	10	Hazard warning system, light switch, power supply[1)]
F1/5	5	Engine electronic system, ECOS control unit
F1/6	10	Electronic gear system
F1/7	15	ABS trailer
F1/8	–	Unassigned

[1)] Additional equipment

14.03.2018

Group F2

Designation	Amperage (A)	Function
F2/1	10	Tachograph, radio, control unit ESX 3
F2/2	15	Warm water auxiliary heating[1)]
F2/3	3	Ignition lock
F2/4	15	Heater fan
F2/5	10	Automatic parking light[1)] Power supply[1)]
F2/6	10	Retarder[1)], air-conditioning system[1)]
F2/7	15	ABS trailer
F2/8	3	Low-beam headlight[1)]

Group F3

Designation	Amperage (A)	Function
F3/1	15	Rotating beacon
F3/2	10	Flame start system[1)], Vehicle height monitoring[1)]
F3/3	15	Warm water auxiliary heater[1)], Ignition lock
F3/4	20	Air drier, mirror adjustment, Window winder
F3/5	15	Outrigger lighting, spotlights on the rear of the carrier[1)]
F3/6	10	Turn signal indicators
F3/7	10	Windscreen wiper/washing system, horn
F3/8	10	Reversing lamps, trailer socket

[1)] Additional equipment

14.03.2018

Group F4

Designation	Amperage (A)	Function
F4/1	15	Instrument lighting, trailer socket, engine brake
F4/2	10	Battery heating[1)], Particulate filter[1)]
F4/3	10	Central lubrication
F4/4	10	Power supply
F4/5	10	Tachograph
F4/6	10	Engine electronic system, ECOS control unit
F4/7	10	diagnostics plug
F4/8	10	TCM supply

Group F5

Designation	Amperage (A)	Function
F5/1	5	Generator
F5/2	5	Emergency stop system, air intake inhibitor[1)]
F5/3	5	Power supply CAN BUS
F5/4	20	Power supply ESX3 control unit
F5/5	5	Air intake inhibitor[1)]
F5/6	10	Engine electronic system (ADM, SCR)
F5/7	2	Emergency operation, ESX 3 control unit
F5/8	5	Fog tail light

[1)] Additional equipment

14.03.2018

Group F6

Designation	Amperage (A)	Function
F6/1	5	Left-hand side marker lights and parking light
F6/2	10	Right-hand side marker lights[1)] and parking light
F6/3	10	marker light and tail lamps, left-hand instrument lighting
F6/4	5	Right-hand marker light and tail lamps
F6/5	5	Left full-beam headlight
F6/6	5	Right-hand full beam headlight, indicator lamp for full beam headlight
F6/7	5	Headlight, left
F6/8	5	Headlight, right

Group F7

Designation	Amperage (A)	Function
F7/1	2	Control unit ESX 4
F7/2	5	ESX 4 sensors, Fuse monitoring
F7/3	20	Control unit ESX 4
F7/4	2	Control unit ESX 5
F7/5	5	ESX 5 sensors, Fuse monitoring
F7/6	20	Control unit ESX 5
F7/7	7.5	Fog light[1)]
F7/8	7.5	Rocker

[1)] Additional equipment

Group F8

Designation	Amperage (A)	Function
F8/1	5	Fixed voltage controller 5 V

14.03.2018

Group F9

Designation	Amperage (A)	Function
F9/1	3	Radio
F9/2	5	Radio
F9/3	15	Outrigger lighting
F9/4	10	Cigarette lighter, ceiling light
F9/5	15	Battery preheater[1)]
F9/6	5	Battery preheater timer[1)]
F9/7	Unassigned	
F9/8	5	Auxiliary heater timer[1)]

Group F10

Designation	Amperage (A)	Function
F10/1	2	Daytime driving light, left
F10/2	2	Daytime driving light, right
F10/3	7.5	Reserve
F10/4	7.5	Reserve
F10/5	Unassigned	
F10/6	Unassigned	
F10/7	Unassigned	
F10/8	Unassigned	

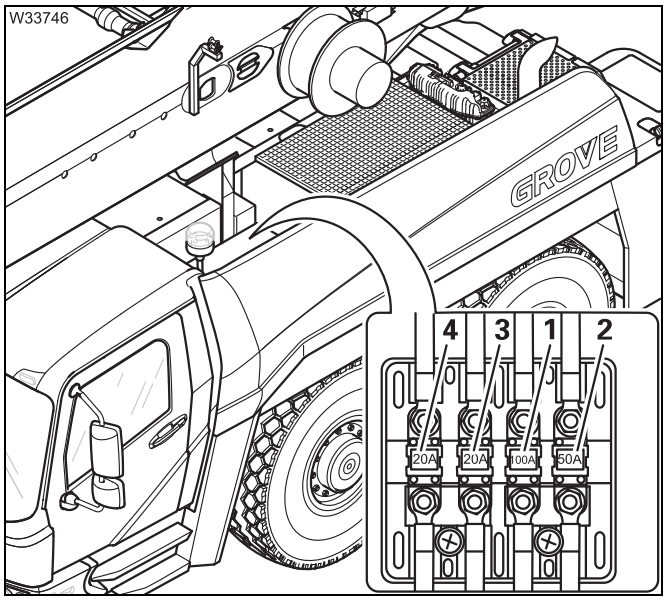
[1)] Additional equipment

14.03.2018

7.5.2 Fuses in the battery box

Fuses F7 to F10 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 next to the batteries.

- Remove the lid from the terminal box:
  - **1** Fuse F7
  - **2** Fuse F8
  - **3** Fuse F9
  - **4** Fuse F10

Designation	Amperage (A)	Function
F7	100	Carrier central fuse
F8	50	Flame start system
F9	20	Preliminary fuse for auxiliary heater switch timer, tachograph and radio
F10	20	Unassigned

- Observe the instructions on changing fuses; ➠ p. 7 - 19.

14.03.2018

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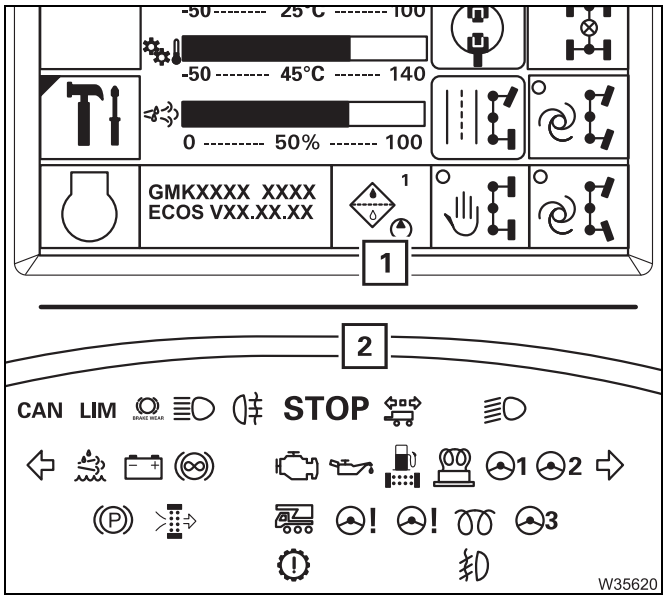
14.03.2018

7.6 Troubleshooting



This section does not include all malfunctions.

– If a warning is shown in the display (**1**); ➠ p. 5 - 48.
– If the lamp on the instrument panel (**2**) lights up; ➠ p. 5 - 51.

7.6.1 Malfunctions on the engine

In addition to this information; ➠ *Separate engine operating instructions, provided by the manufacturer*.

Malfunction	Cause	Remedy
Engine does not start – Starter does not turn	Battery master switch is switched off	Switch on the battery master switch; ➠ p. 4 - 10
	Switch the ignition off	➠ *Switch on the ignition*, p. 4 - 11
	Transmission not in neutral position	➠ *Switching the transmission to the neutral position*, p. 5 - 28
	Parking brake released	Lock the parking brake; ➠ p. 3 - 55
	Fuse F1/5 blown	Replace blown fuses; ➠ p. 7 - 20
	Bridging plug for the hand-held control not inserted	Insert bridging plug; ➠ p. 12 - 21
	Emergency stop switch pressed	Release the emergency stop switch; ➠ p. 4 - 24

14.03.2018

Malfunction	Cause	Remedy
Engine does not start – Starter turns	Batteries insufficiently charged	Charge the batteries; ➠ *Maintenance Manual*
	Fuel tank empty	1. Refuel; ➠ p. 4 - 7
		2. Bleed the fuel system; ➠ *Maintenance Manual* ➠ *Separate engine operating instructions, provided by the manufacturer*
	Air intake inhibitor closed	➠ *Releasing the air intake inhibitor*, p. 4 - 25
	Fuse F4/6 blown	Replace blown fuses; ➠ p. 7 - 20
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 high	Coolant level too low	Top up coolant; ➠ *Maintenance Manual*
	Oil level in the transmission too low	Check the oil level; ➠ *Maintenance Manual*
	Outer surface of heat exchanger dirty	Clean the heat exchanger
	V-belt of coolant pump at engine loose	Tighten V-belt; ➠ *Separate engine operating instructions, provided by the manufacturer*
	The fan wheel on the engine does not turn	Switch the fan wheel to emergency operation; ➠ p. 7 - 38
Engine cannot be switched off using the ignition key	Malfunction in the electronics	Switch off the engine with the emergency stop device; ➠ p. 7 - 1
Motor brake (engine retarder) cannot be switched on	Fuse F4/1 blown	Replace blown fuses; ➠ p. 7 - 20
Engine/transmission diagnostics plug not working	Fuse F1/2, F4/7 blown	Replace blown fuses; ➠ p. 7 - 20
The engine performance is reduced	The coolant is too hot or another malfunction. The engine is not switched off in order to drive on to the next place where it is possible to stop.	Coolant too hot: Wait until the coolant has cooled down – the performance will increase again Other malfunctions: **Manitowoc Crane Care** Report it

14.03.2018

Malfunction		Cause	Remedy
	– **Flashes** and – **Lights up**	Urea tank empty The engine control system reduces the engine torque	Refill carbamide; ⇛ p. 4 - 8

7.6.2 Malfunctions in the exhaust system

Malfunction		Cause	Remedy
	– **Lights up** – **Flashes**	Carbamide level in tank at reserve level Urea tank empty	Refill carbamide; ⇛ p. 4 - 8
	– **Light up**	– Carbamide tank sensor faulty – Error on the carbamide dosing unit – Carbamide lines blocked – Temperature sensor faulty – Cable breakage in the carbamide system – Exhaust gas sensor faulty	Have the exhaust system checked by **Manitowoc Crane Care**, an authorised GROVE retailer or an authorised specialised repair shop.

14.03.2018

7.6.3 Malfunctions in the transmission

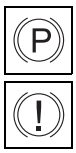
Malfunction	Cause	Remedy
Transmission only shifts up to second gear	Transmission oil too hot	➠ *On the transmission*, p. 7 - 7
	Transmission oil colder than approx. -7 °C (20 °F)	Wait until transmission oil temperature rises
Transmission is not upshifting at speeds over approx. 20 km/h (12 mph)	A locking procedure is not yet completed	Lock the differential locks
Transmission not shifting	Retarder switched on	➠ *Switching off the additional brakes*, p. 5 - 46
The transmission does not respond to the controls	Fuse F1/6 blown	Replace blown fuses; ➠ p. 7 - 19
Symbol ⊙ is red	Transmission cannot shift down as otherwise the maximum permissible engine speed would be exceeded.	Slow down the truck crane until the symbol goes out
The *transmission* display shows a malfunction	The electronic gear system has detected a malfunction	➠ *Malfunctions in the transmission*, p. 7 - 40
Transmission diagnostics plug not working	Fuse F1/2, F4/7 blown	Replace blown fuses; ➠ p. 7 - 19

14.03.2018

7.6.4 Transfer case malfunctions

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

7.6.5 Malfunctions of the service brake

Malfunction		Cause	Remedy
	**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. 7 - 6
			2. Tow the truck crane with the towing bar; ➠ p. 7 - 6
	**Parking brake unable to be released** **– Does not go out** **– Off**	Supply pressure too low	➠ *Building up supply pressure*, p. 5 - 10
	**Also lights up at over 6 km/h (4 mph)**	The trailer ABS has failed	Drive vehicle to next garage; braking without ABS support is still possible
The retarder cannot be engaged		Fuse F2/6 blown	Replace blown fuses; ➠ p. 7 - 20

14.03.2018

7.6.6 Malfunctions of the steering

Malfunction	Cause	Remedy
Steering wheel hard to turn, grating noises when steering	Oil level in the hydraulic oil tank too low	Check hydraulic oil level; ➠ *Maintenance Manual*.
Symbol or is red	Oil level in the hydraulic oil tank too low	Stop and check whether oil has run out ➠ *If oil has escaped*, p. 5 - 40 ➠ *If no oil has escaped*, p. 5 - 40
	Steering circuit has failed, e. g. pump faulty	
Symbol and are red	Both steering circuits have failed	The truck crane cannot be driven any further, since it can no longer be steered!
Separate steering cannot be activated	Current speed above approx. 5 km/h (3 mph)	Slow down or stop the truck crane
Separate steering cannot be switched off	Current speed above approx. 5 km/h (3 mph)	
Separate steering not working	Fuse F7/1, F7/2 or F7/3 blown	Replace blown fuses; ➠ p. 7 - 20
Separate steering not working and the *ECOS* display shows an error message	ECOS malfunction	Read out error messages (➠ p. 7 - 35) and notify **Manitowoc Crane Care**

14.03.2018

7.6.7 Differential lock malfunctions

Malfunction	Cause	Remedy
Differential locks cannot be switched on	Current speed above approx. 5 km/h (3 mph)	Slow down or stop the truck crane
	Drive train under tension	Slowly drive the truck crane back and forth, ➠ p. 5 - 62
	Compressed air system insufficiently filled	➠ *Building up supply pressure*, p. 5 - 10
	Fuses F2/1, F4/6, F5/4, F5/7 blown	Replace blown fuses; ➠ p. 7 - 20
Differential locks cannot be switched off	Current speed above approx. 5 km/h (3 mph)	Slow down or stop the truck crane
	Drive train under tension	Slowly drive the truck crane back and forth, ➠ p. 5 - 62
Error symbol is displayed	ECOS malfunction	Read out error messages (➠ p. 7 - 35) and notify **Manitowoc Crane Care**

7.6.8 Malfunctions in the hydraulic system/hydraulic oil cooler

Malfunction	Cause	Remedy
Hydraulic oil temperature above 80 °C , fan in the hydraulic oil cooler is running	Hydraulic system under extreme strain and ambient temperature very high	Stop the truck crane while taking the traffic situation into account and run the engine until the oil has cooled down
Hydraulic oil temperature above 80 °C, fan in the hydraulic oil cooler is not running	Fuse F1/3 blown	Stop the truck crane while taking the traffic situation into account, and replace the defective fuse; ➠ p. 7 - 20.
	Defective temperature sensor in the hydraulic system (error message is displayed)	Have the temperature sensor replaced

14.03.2018

7.6.9 Malfunctions on the suspension

Malfunction	Cause	Remedy
Suspension cannot be activated	Current speed above approx. 5 km/h (3 mph)	Slow down or stop the truck crane
	Compressed air system insufficiently filled	➠ *Building up supply pressure*, p. 5 - 10
Suspension cannot be switched on or off	Fuses F1/5, F2/1, F4/6, F5/4 blown	Replace blown fuses; ➠ p. 7 - 20
Error symbol is displayed	ECOS malfunction	Read out error messages (➠ p. 7 - 35) and notify **Manitowoc Crane Care**

7.6.10 Malfunctions of the level adjustment system

Malfunction	Cause	Remedy
Level adjustment system not working	Suspension is switched off	➠ *Switching the suspension on*, p. 5 - 18
	Fuses F1/5, F2/1, F4/6, F5/4 blown	Replace blown fuses; ➠ p. 7 - 20
Error symbol is displayed	ECOS malfunction	Read out error messages (➠ p. 7 - 35) and notify **Manitowoc Crane Care**

14.03.2018

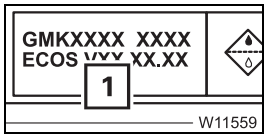
7.6.11 Malfunctions on the ECOS carrier

This section contains general malfunctions and malfunctions that generate an “error” display.

ECOS programme version

Always note down the number of the program version after a malfunction occurs before notifying **Manitowoc Crane Care**.

- If required, open the main menu Esc.



The display (**1**) shows the number of the current program version.

General malfunctions

The following table contains information on troubleshooting and possible solutions.

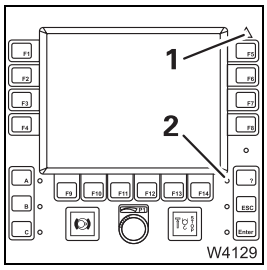
Malfunction	Cause	Remedy
Ignition on – *ECOS* display does activate	Fuse F1/5, F4/6 blown.	Replace the blown fuse; p. 7 - 20.

If further malfunctions occur, the appropriate error messages are shown in the *ECOS* display.

14.03.2018

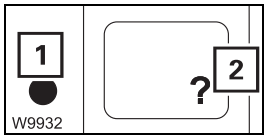
Error messages

If ECOS detects an error, an error message is shown:



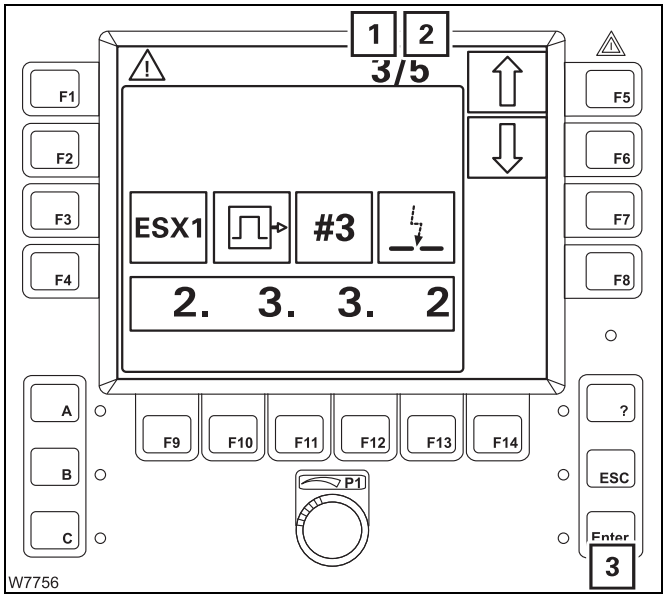
– lamp (**1**) flashes and
– lamp (**2**) flashes.

Open the *Errors* submenu for more information.



- Press the button (**2**) once. The button is only active when the lamp (**1**) flashes or lights up.

  This opens the *Errors* submenu.



Display of error/total errors

Display (**2**) shows the error total and display (**1**) shows which error is displayed.

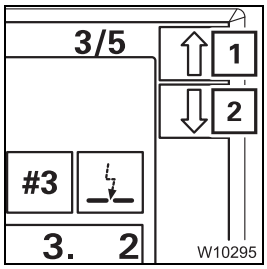
3/5, for example, means:
– Error **3** is shown
– There is a total of **5** errors.

If the error shown is not acknowledged, the lamp next to the button (**3**) lights up.

To acknowledge the error

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

If there are further errors, the next error is displayed and can be acknowledged.



- When all errors have been acknowledged, you can retrieve any pending errors using the buttons next to the symbols (**1**) and (**2**).

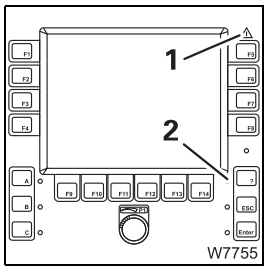
  1 Next error

  2 Previous error

Every time you press the button, the next error will be displayed.
When you keep the button pressed, all errors are shown one after the other continuously.

If not all errors have been acknowledged, the buttons ⇧ and ⇩ have no function – the symbols are grey.

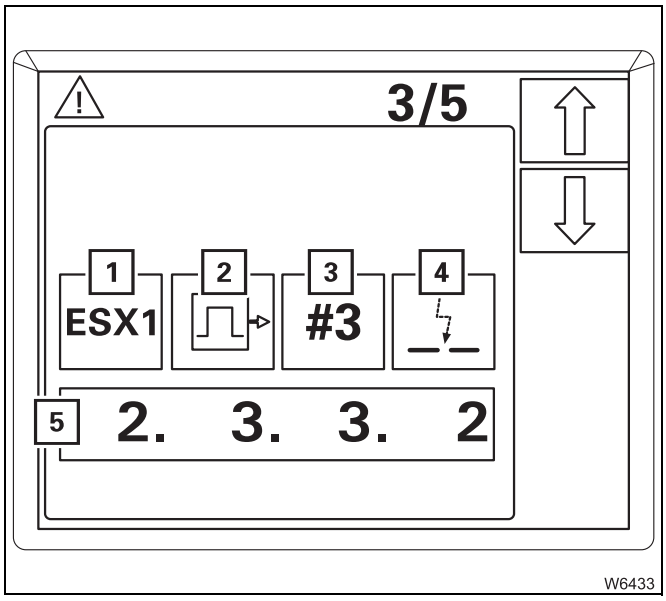
14.03.2018



When all error messages have been acknowledged, the displays change:

– lamp (**1**) lights up and
– lamp (**2**) lights up.

Both displays start to flash again as soon as a new error occurs.



Error display

Each error is defined by an error code (**5**) and the symbols (**1**) to (**4**).

The symbols stand for:

1 the faulty device

2 the error group

3 The index within the group

4 the error type

The error code (**5**) consists of 4 digits, e. g. **2332**.

- Always note the error code before contacting **Manitowoc Crane Care**.

Exiting the submenu

You can exit the *Errors* submenu at any time

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

The same menu opens that was open before the *Errors* submenu opened.

All errors remain saved until you switch off the ignition, even errors that have since been resolved. All existing errors are treated as new errors and displayed again after turning on the ignition.

14.03.2018

7.7 Procedure in the event of malfunctions

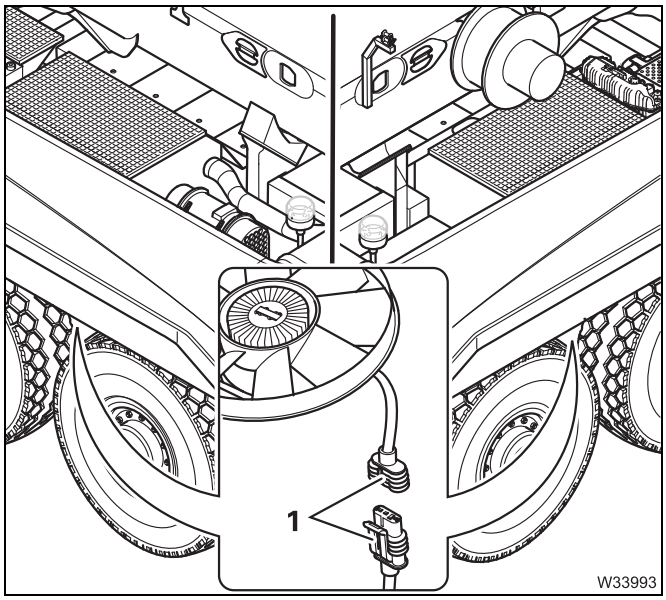
7.7.1 Switching on emergency operation in coolant circuit

The speed of the fan wheel for the engine is automatically controlled. You can switch on the emergency mode if this automatic system fails. The fan wheel then runs at maximum speed when the engine is switched on.

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

Risk of accidents by turning fan wheel!
Always switch off the engine and secure it against unauthorised start before switching on emergency operation.
This prevents the fan wheel from turning suddenly and injuring you.

Risk of burns when the engine is hot!
During operation, the engine and the add-on parts heat up greatly.
Wear appropriate protective gloves and be careful not to touch hot parts.



- Disconnect the plug connection (**1**).
- Fasten the plug connection (**1**) so that it will not be damaged when the engine is running.

Emergency operation is switched on and the fan wheel runs at maximum speed when the engine is switched on.

- Have the cooling system immediately checked and repaired by a specialist workshop.

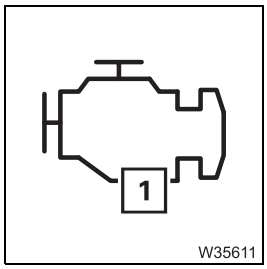
14.03.2018

7.7.2 Procedure during engine malfunctions

The displays when an engine malfunction occurs depend on:

– Whether an engine malfunction has occurred

– Whether a severe engine malfunction has occurred.

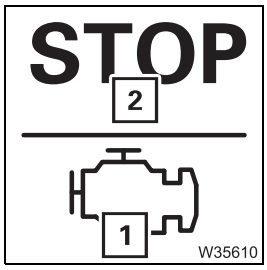


Engine malfunction

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

Engine performance falls continuously.

- Drive on until you have a chance to stop.
- Stop immediately and switch the engine off.
- If necessary, note the error messages (➠ p. 7 - 36) and contact **Manitowoc Crane Care**.



Severe engine malfunction

The **STOP** warning lamp (**2**) lights up.

In addition the lamp (**1**) lights up.

- Stop the truck crane immediately while taking into account the traffic situation.
- Switch off the engine.

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 (➠ p. 7 - 36) and contact **Manitowoc Crane Care**.

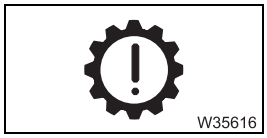
In the event of engine malfunctions, the electronic system will try to establish a secure operating condition with the remaining functions.

14.03.2018

7.7.3 Malfunctions in the transmission

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

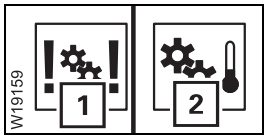
General malfunctions



When a general transmission malfunction occurs, only error codes are stored.
Switching on diagnostics/oil-level gauge; ➠ p. 3 - 50

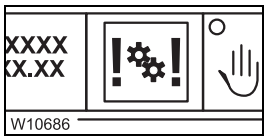
Check regularly whether error codes have been stored, e.g. during maintenance work; ➠ p. 7 - 42. If necessary, inform **Manitowoc Crane Care**. This avoid situations where another small error could lead to transmission failure.

Transmission malfunction



If a transmission malfunction is present, the *Warning* display shows the (**1**) or (**2**) symbol while the engine is running.

If a transmission malfunction occurs, proceed as follows:



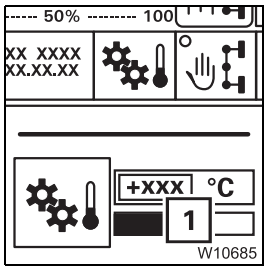
Shift lock transmission

The transmission no longer switches.

- Drive in the current gear until you reach the next safe place to stop, and stop the crane.

Switch to neutral position only once you have reached a safe place to stop. You can then no longer select the gear positions **D** or **R**.

14.03.2018

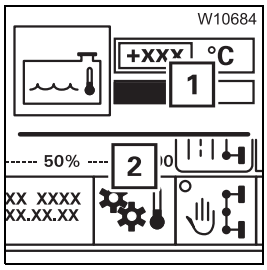


Transmission oil too hot

The transmission may only shift up to the 2nd gear.

The display (**1**) shows the current oil temperature.

- Stop at the next opportunity.



– If the coolant temperature (**1**) is normal (➠ p. 4 - 20), then check the oil level in the transmission and top up if necessary; ➠ *Oil level gauge*, p. 5 - 36.

– If the coolant temperature (**1**) has increased, shift into the neutral position **N** and let the engine run at an increased speed. If the symbol (**2**) is still shown after approx. 3 minutes, shut down the engine. Read the error codes (➠ p. 7 - 42) and contact **Manitowoc Crane Care**.

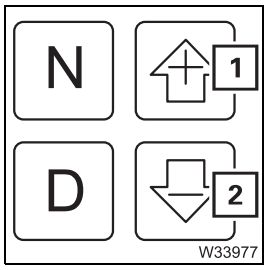
Risk of overheating damage to the transmission!
If the transmission oil temperature is still too high after 2 to 3 minutes, shut down the engine. Under no circumstances should you continue driving. This prevents the transmission from being damaged due to overheating.

- Apply the parking brake.
- Switch to neutral position **N**. You can now not select any gear position.
- Read the error codes (➠ p. 7 - 42) and contact **Manitowoc Crane Care**.

14.03.2018

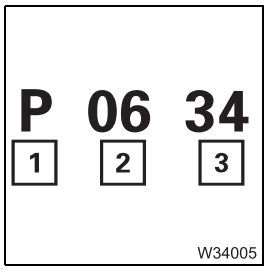
Reading out error codes

You can display all the stored error codes one after the other.



- Press buttons (**1**) and (**2**) simultaneously twice.

The *Transmission* display shows the first stored error code.

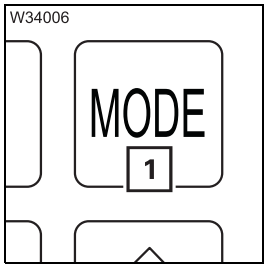


Each error code consists of four displays that are shown continuously in succession.

1 Error type

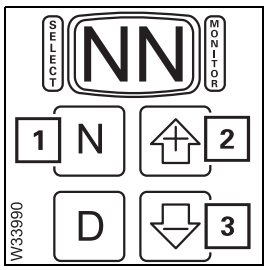
2 Error number, 1st part

3 Error number, 2nd part



- To read further error codes, press button (**1**).
  Each time you press the button, the next error code will be displayed.

As long as error codes are shown, the driving mode switched on has no influence on the lamp (**2**).



- Press button (**1**) once to exit the error display.

or

- Press buttons (**2**) and (**3**) together once.

14.03.2018

8 Index

14.03.2018

14.03.2018

8 Index

To avoid making the index unnecessarily long and unclear, we have not included every single element from the instrument panel.
Those elements, such as switches and buttons, lamps and displays are described and named in detail in the overviews of Chapter 3 and Chapter 9 *Truck Crane Description*.
From there you will as usual be referred to more detailed descriptions of these elements.

14.03.2018

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14.03.2018

14.03.2018

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14.03.2018

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14.03.2018

14.03.2018

14.03.2018

14.03.2018

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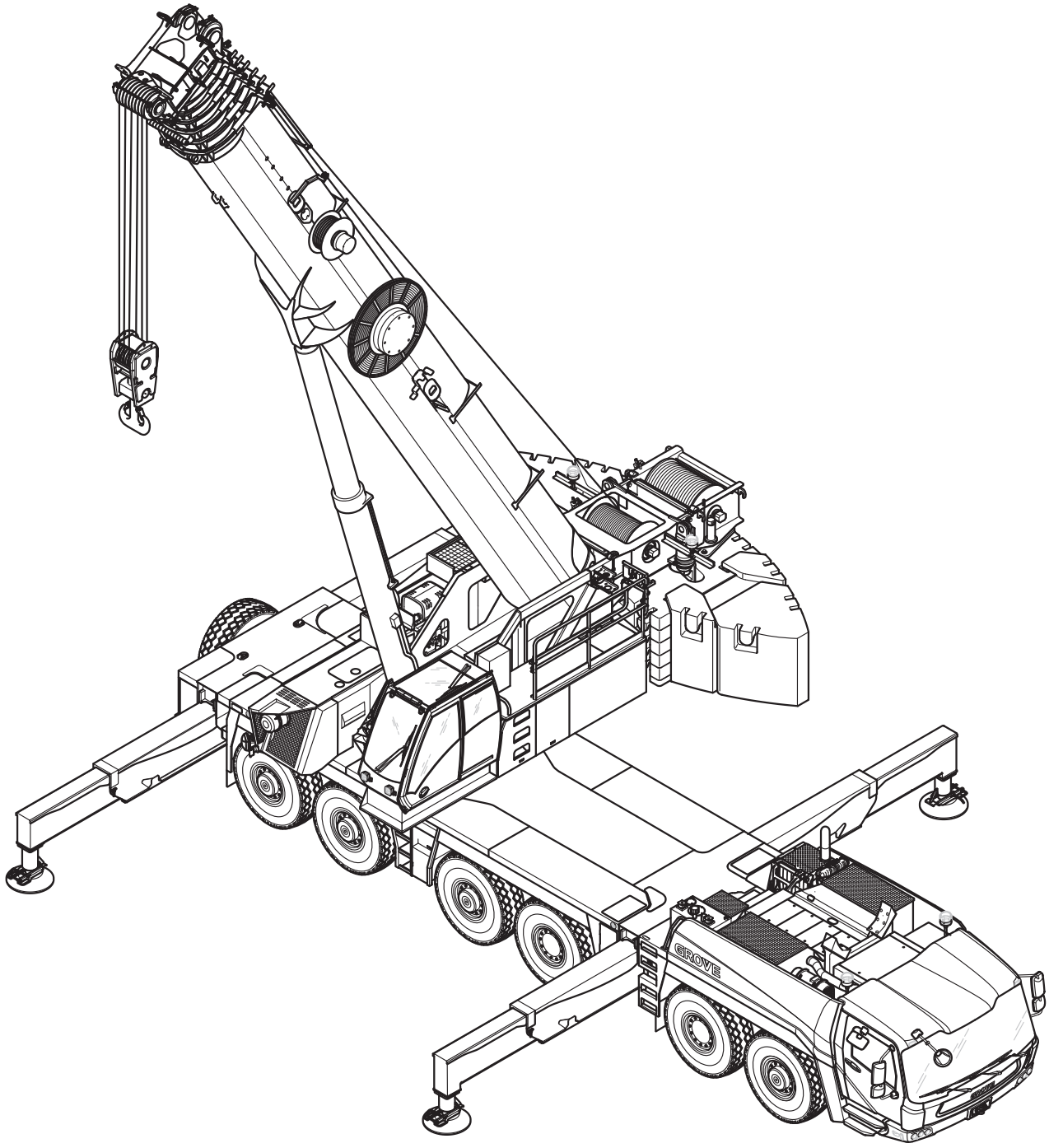
14.03.2018

Grove Manitowoc National Crane Potain

GROVE GMK6300L-1

Operating Manual
Part 2 – Crane operation



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14.03.2018

Manitowoc®

Important note

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14.03.2018

Correction sheet

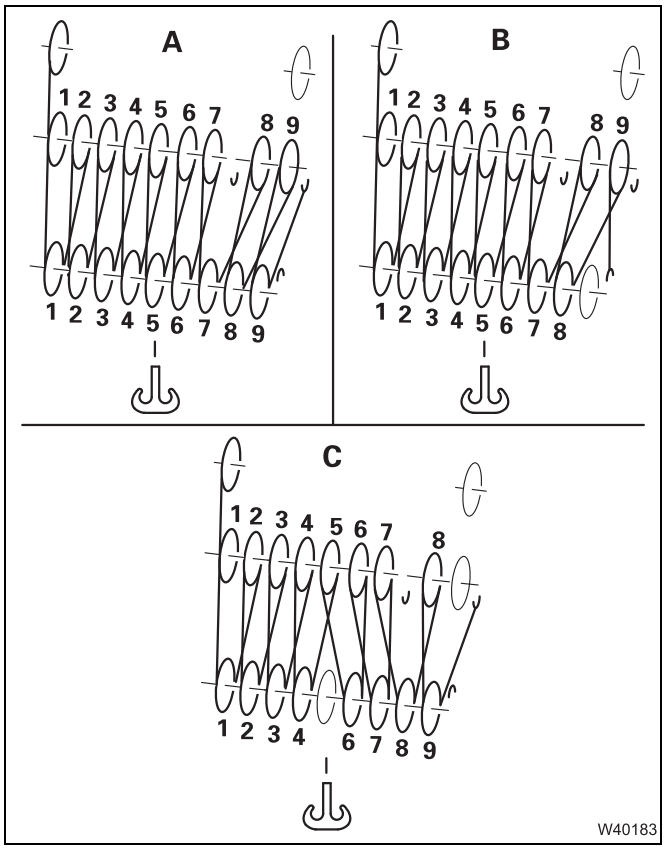
Possible reeving methods on the main boom

Contrary to the information specified in the operating manual, there are corrected hoist rope reevings on the main boom for the GMK6300L/GMK6300L-1 truck crane.

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

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

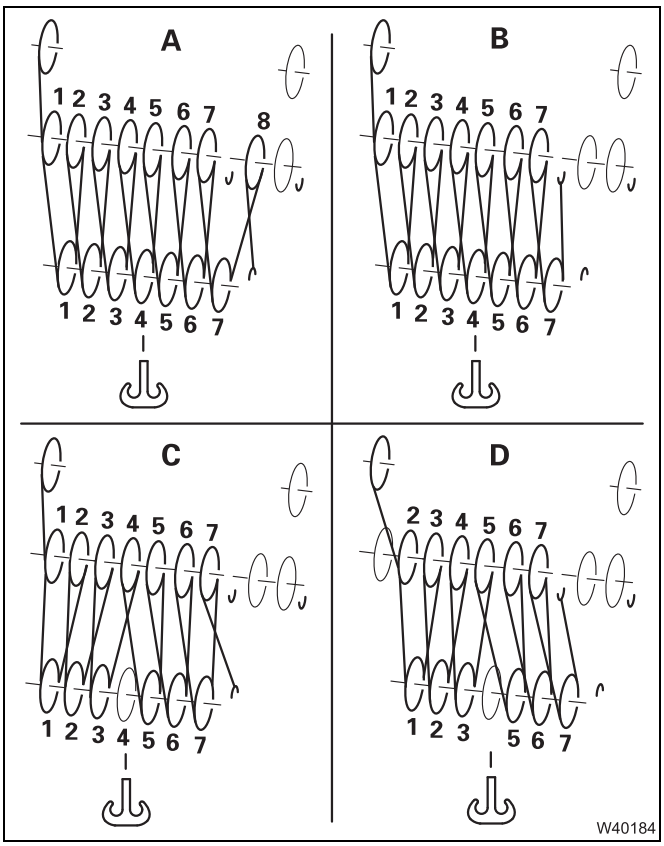
With 9 head sheaves



9 sheave hook block

	Reeving
A	18x
B	17x
C	16x

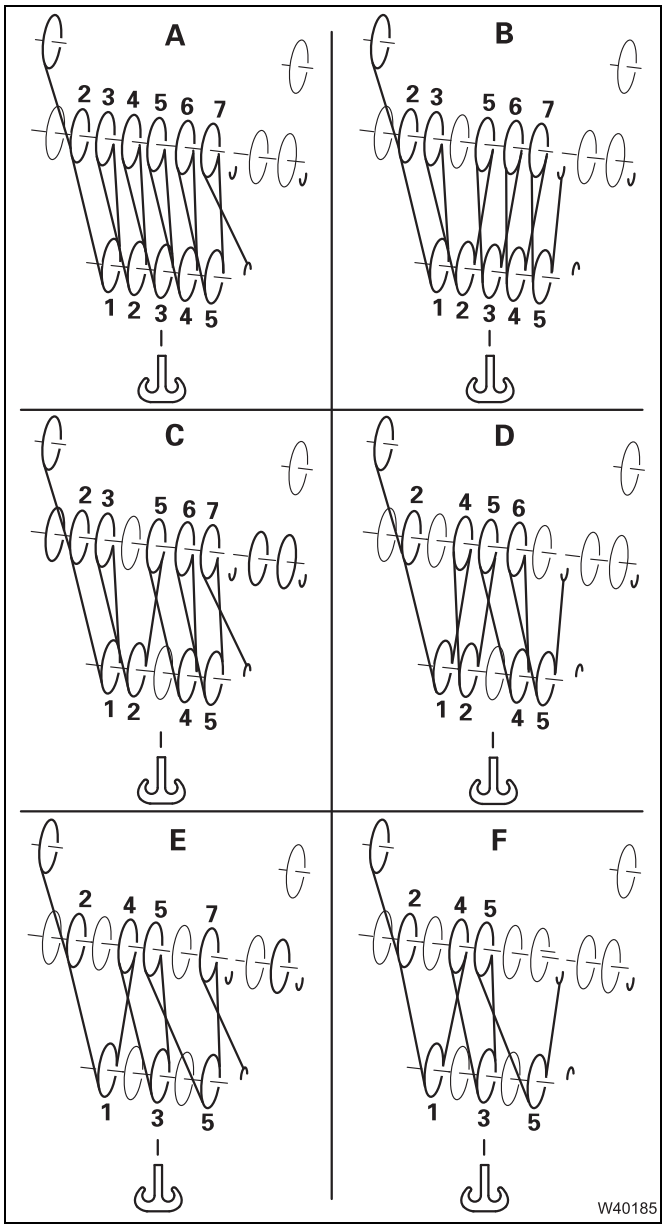
27.08.2018



7 sheave hook block

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

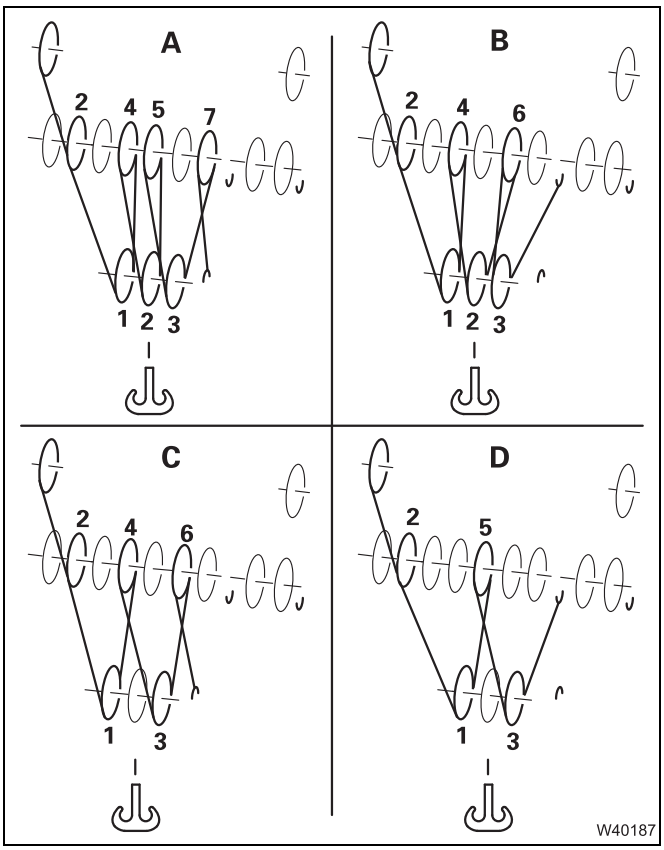
27.08.2018



5 sheave hook block

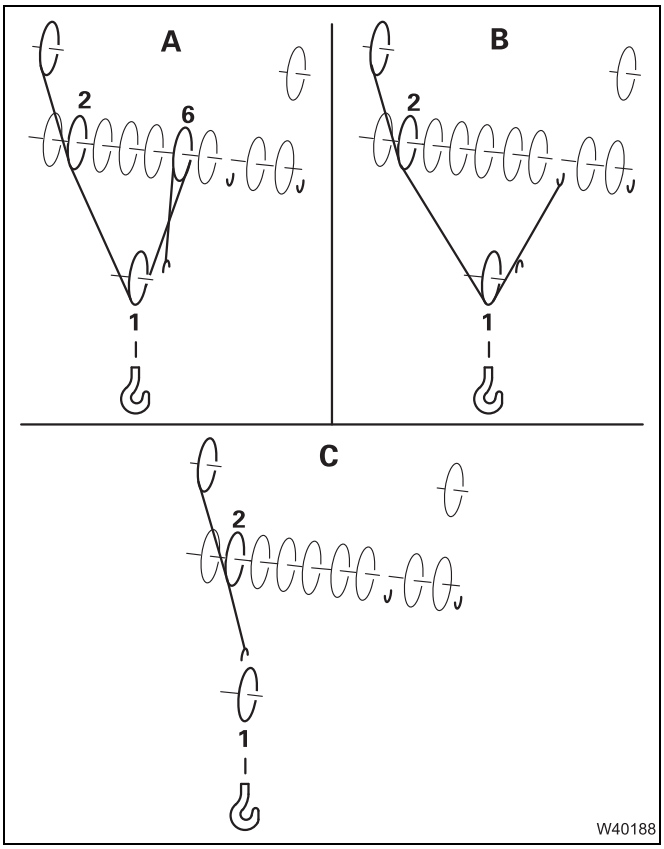
	Reeving
A	11x
B	10x
C	9x
D	8x
E	7x
F	6x

27.08.2018



3 sheave hook block

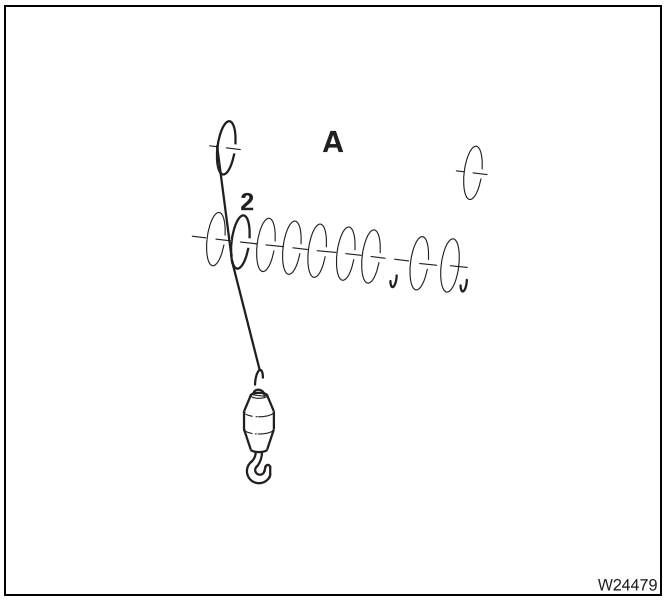
	Reeving
A	7x
B	6x
C	5x
D	4x



1 sheave hook block

	Reeving
A	3x
B	2x
C	1x

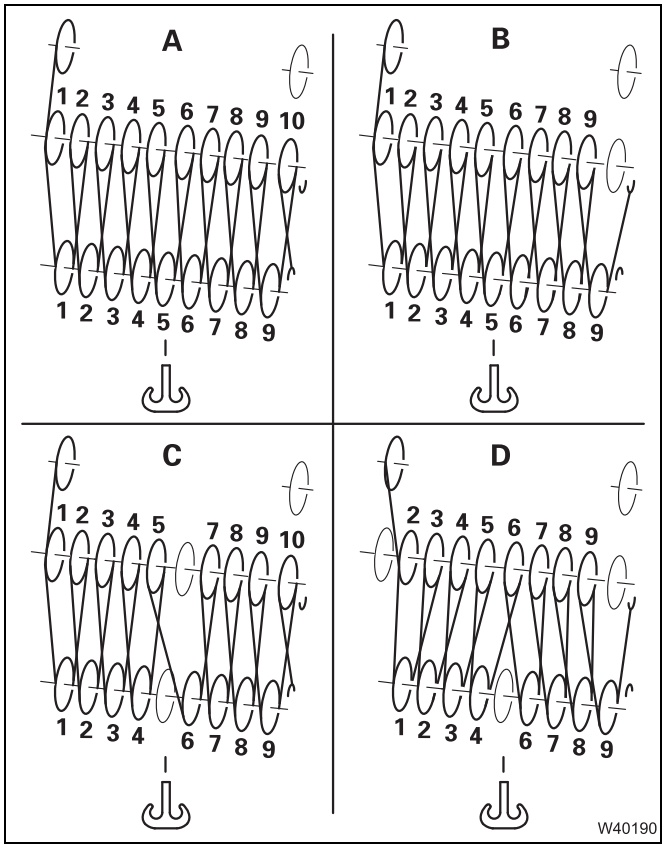
27.08.2018



Hook tackle

	Reeving
A	1x

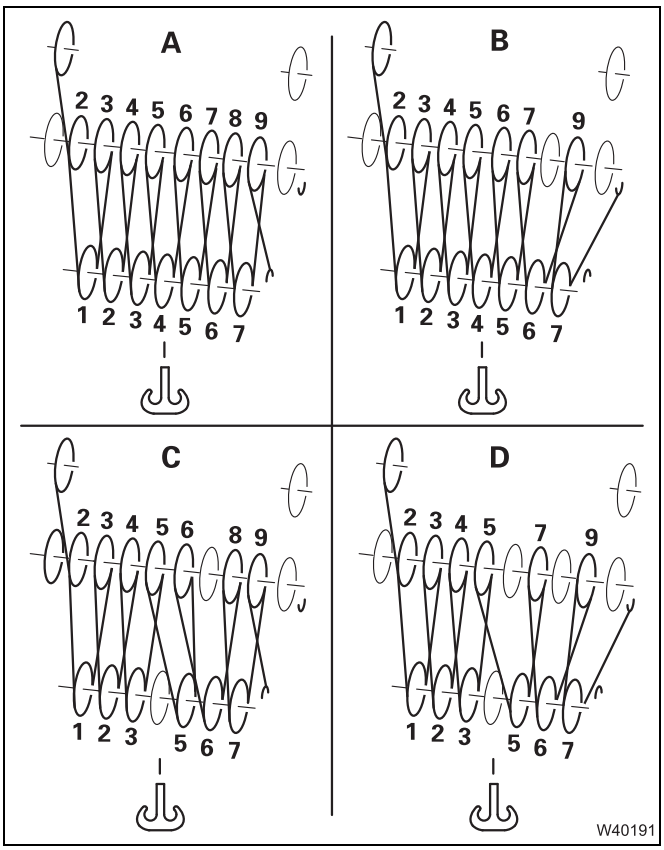
With 10 head sheaves



9 sheave hook block

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

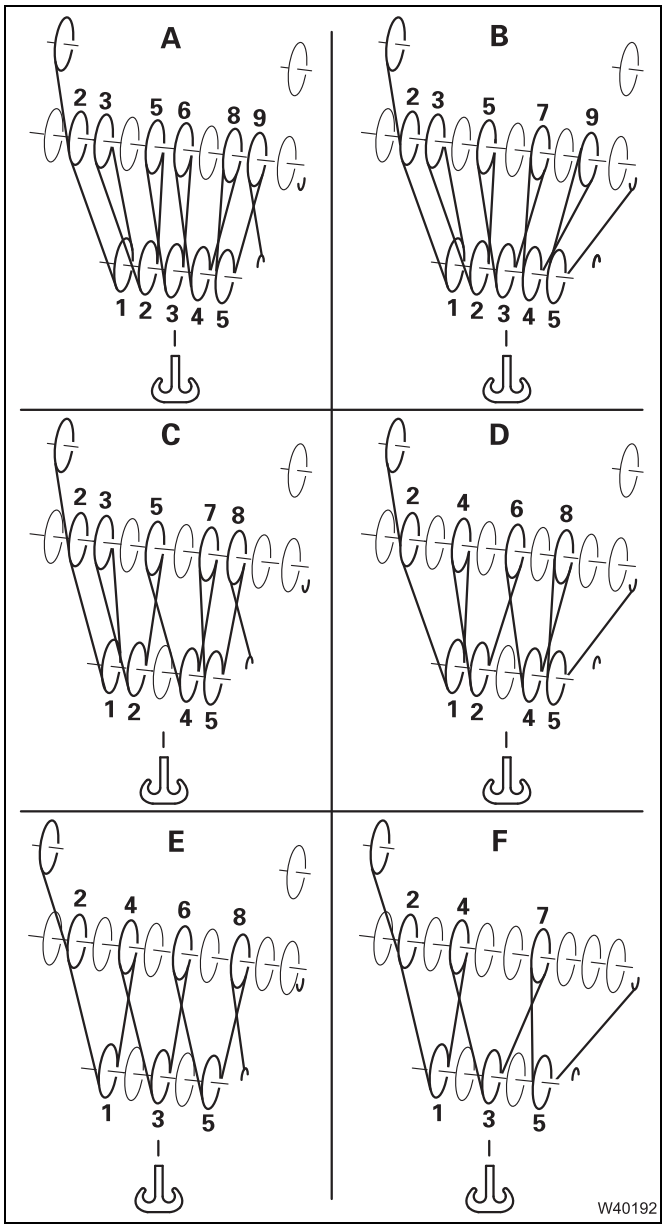
27.08.2018



7 sheave hook block

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

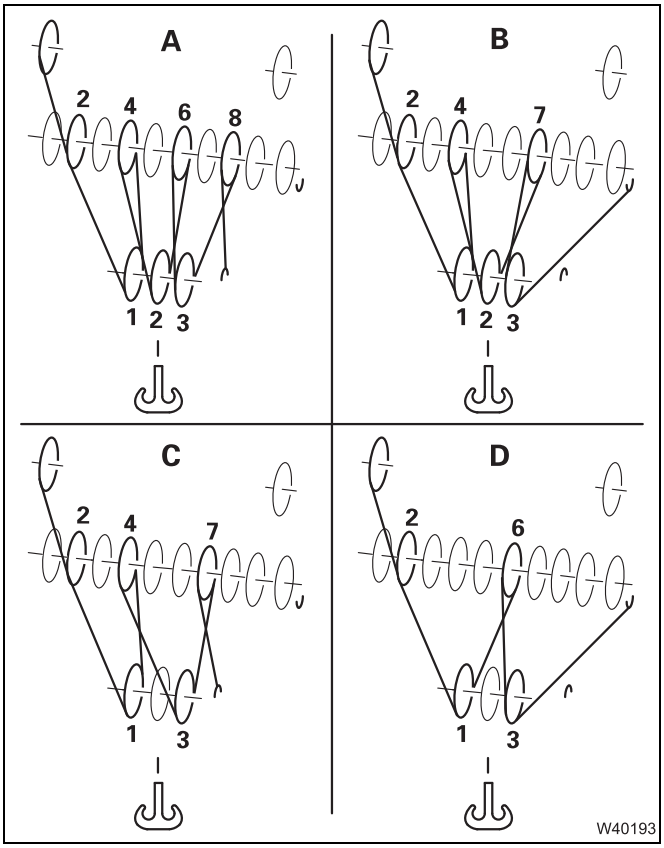
27.08.2018



5 sheave hook block

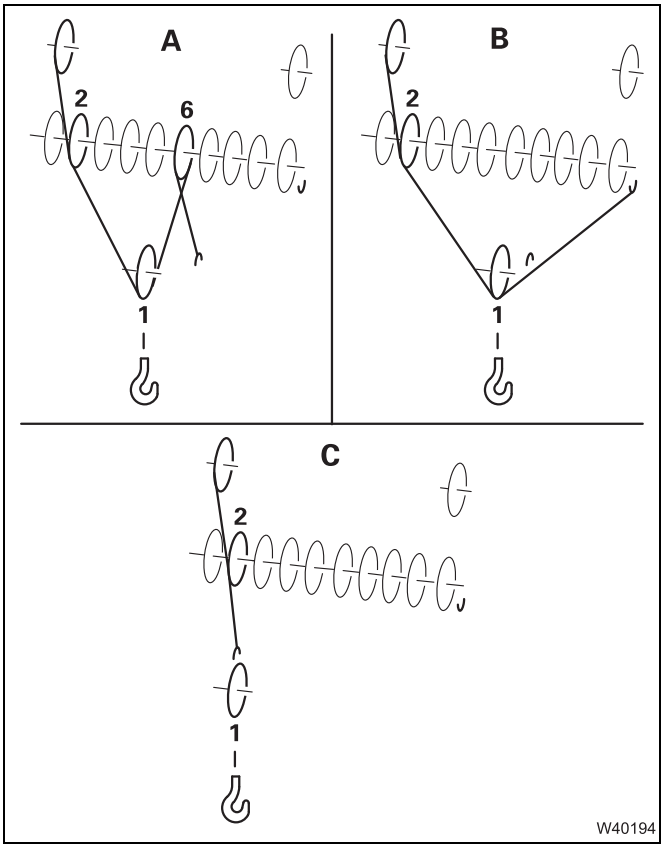
	Reeving
A	11x
B	10x
C	9x
D	8x
E	7x
F	6x

27.08.2018



3 sheave hook block

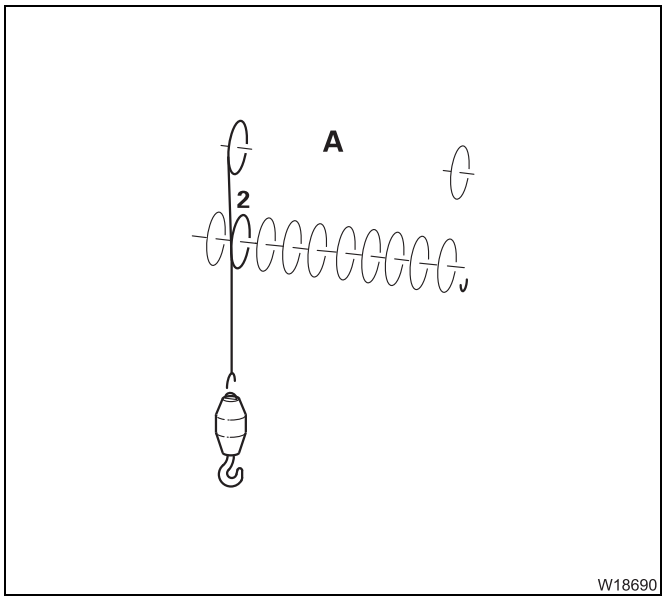
	Reeving
A	7x
B	6x
C	5x
D	4x



1 sheave hook block

	Reeving
A	3x

27.08.2018



Hook tackle

	Reeving
A	1x

27.08.2018

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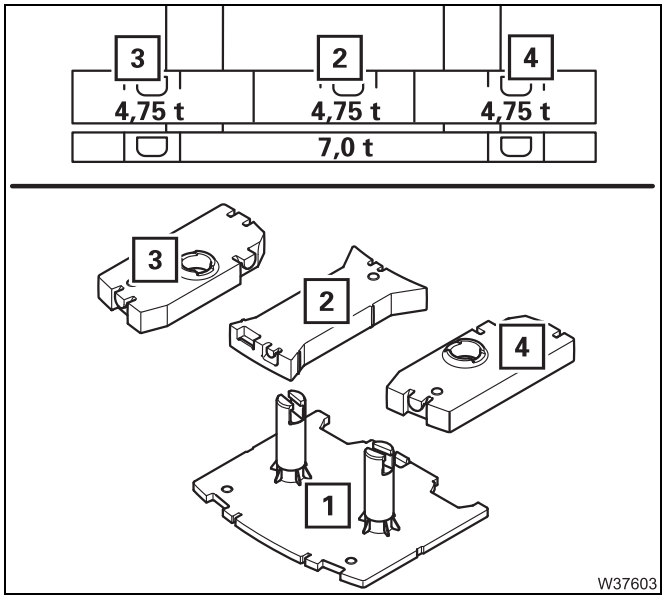
27.08.2018

Counterweight version B

Information on weight specifications



In the supplied documentation, for plates [2], [3] and [4] a weight of 4.75 t is presumed and in illustrations the plates are labelled as 4.75 t.

– The originally supplied plate [2] may also be labelled as 4.5 t or 4.7 t depending on the version.

– The originally supplied plates [3] and [4] are labelled as 4.7 t.

Regardless of the label on the supplied plates [2] , [3] and [4] the weight of 4.75 t is always valid for the composition of the counter-weight combination.

02.11.2017

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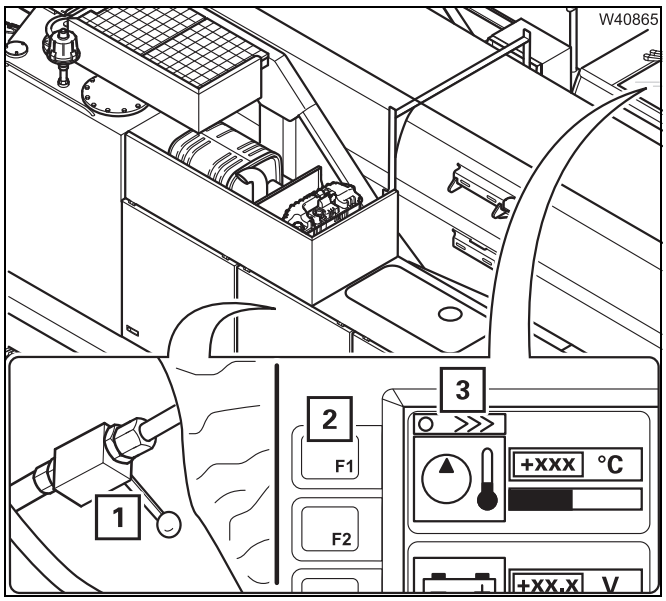
02.11.2017

Preheating hydraulic fluid



Contrary to the specifications in the *operating manual* provided, the shut-off valve is not required (**1**).

Preheating

- Press the button (**2**) - the symbol (**3**) appears.

  The engine speed is increased, the hydraulic fluid is preheated until reaching a temperature of 40 °C (104 °F).

Observe all instructions for preheating the hydraulic fluid in the *operating manual* provided.

14.02.2019

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This operating manual is divided into two parts:

Part 1 – Driving

Part 2 – Crane operation

Content overview of Part 2:

Chapters 1 to 8 are in Part 1 – Driving

This section alone is not equivalent to complete operating instructions.
The basic safety instructions for crane operation are located in Section 1, Chapter 2.

14.03.2018

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14.03.2018

9 Operating elements for crane operation

14.03.2018

14.03.2018

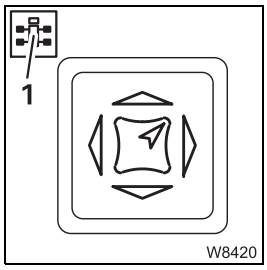
9 Operating elements for crane operation

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.

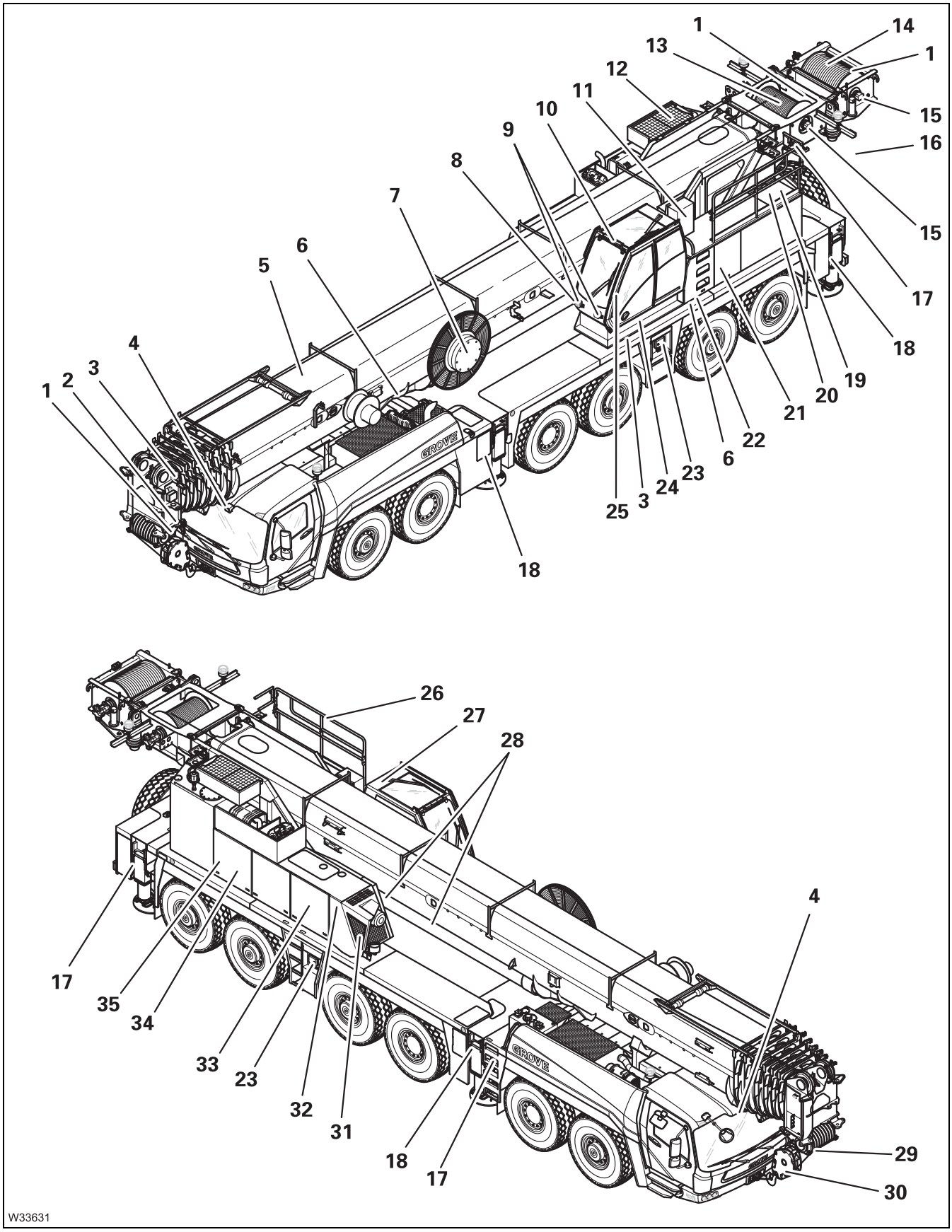
Operating elements available only with additional equipment are designated accordingly. These designations are made in this section only and are not repeated in the following sections.



Some figures show details from a different perspective than the general overview. The perspective is indicated in these figures by the symbol (**1**).

14.03.2018

9.1.1 Exterior of the truck crane

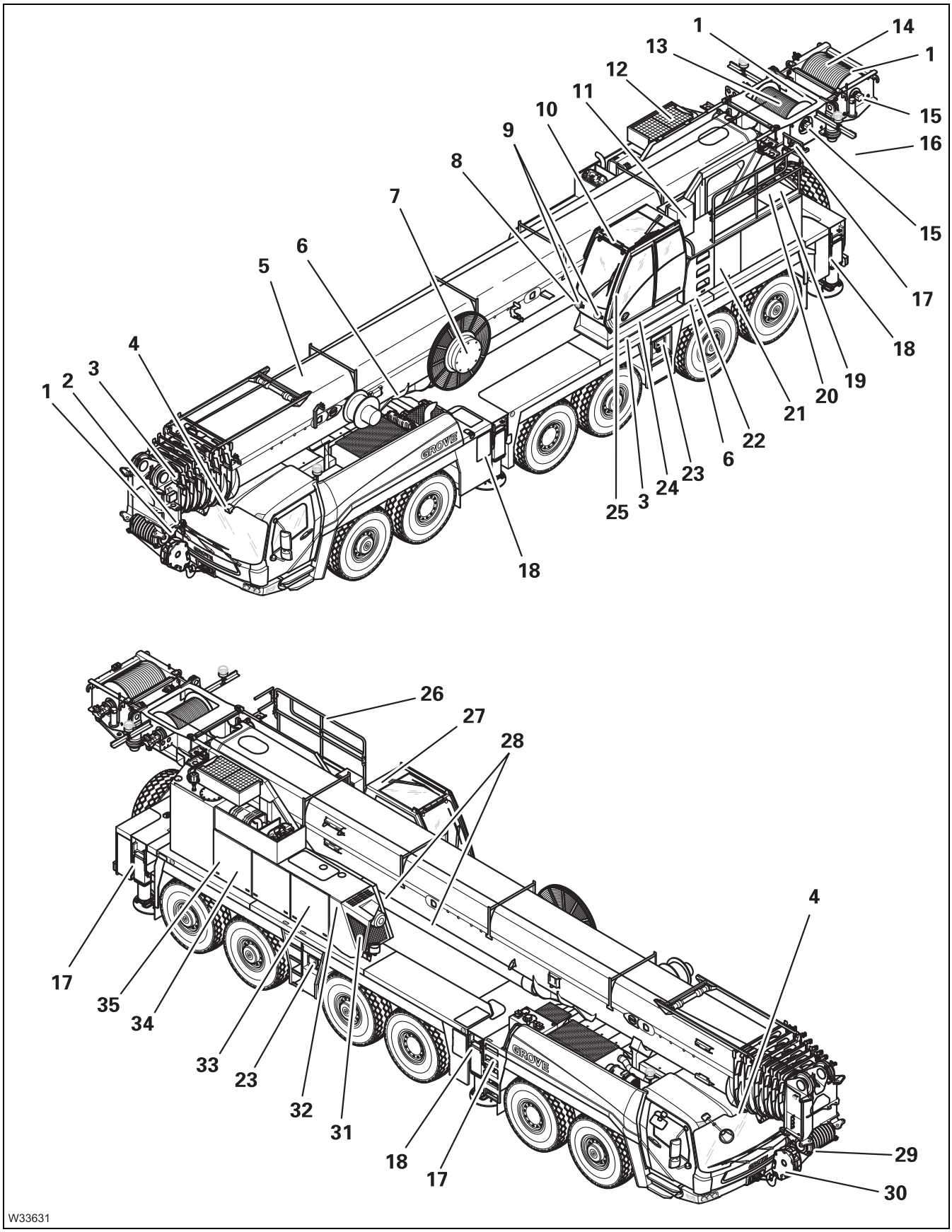


14.03.2018

1	– Camera on main boom1)	p. 12 - 117
	– Camera, hoist	p. 12 - 117
2	Lifting limit switch – function	p. 11 - 60
	Installing/removing the lifting limit switch	p. 12 - 106
3	Anemometer and air traffic control light[1)]	p. 12 - 112
4	Slewable spotlight[1)]	p. 11 - 108
5	Main boom, removing/installing[1)]	p. 6 - 19
6	Connections for hand-held control	p. 9 - 51
7	Installing/removing the hose drum[1)]	p. 6 - 43
8	Key-operated RCL override switch	p. 11 - 40
9	Spotlights[1)]	p. 9 - 111
10	Status display RCL	p. 11 - 41
11	Distribution box, with fuses behind it	p. 14 - 6
12	Hydraulic oil cooler, second cooler[1)]	p. 11 - 101
13	Main hoist	p. 9 - 78
14	Auxiliary hoist[1)]	
	– Operation	p. 9 - 80
	– Installation/Removal	p. 6 - 89
	– Rigging frame	p. 6 - 94
15	Lowering limit switch	p. 11 - 61
16	– Counterweight, removed	p. 12 - 53
	– Counterweight rear storage area[1)]	p. 12 - 81
17	– Hydraulic emergency operation[1)]	p. 14 - 65
	– Control panel for hydraulic emergency operation[1)]	p. 14 - 65
	– Connections for emergency supply[1)]	p. 14 - 76
18	– Outriggers, operation	p. 12 - 27
	– Outrigger lighting[1)]	p. 3 - 62
	– Installing/removing supports[1)]	p. 6 - 47
	– Installing/removing rear supporting box [1)]	p. 6 - 65

[1)] Additional equipment

14.03.2018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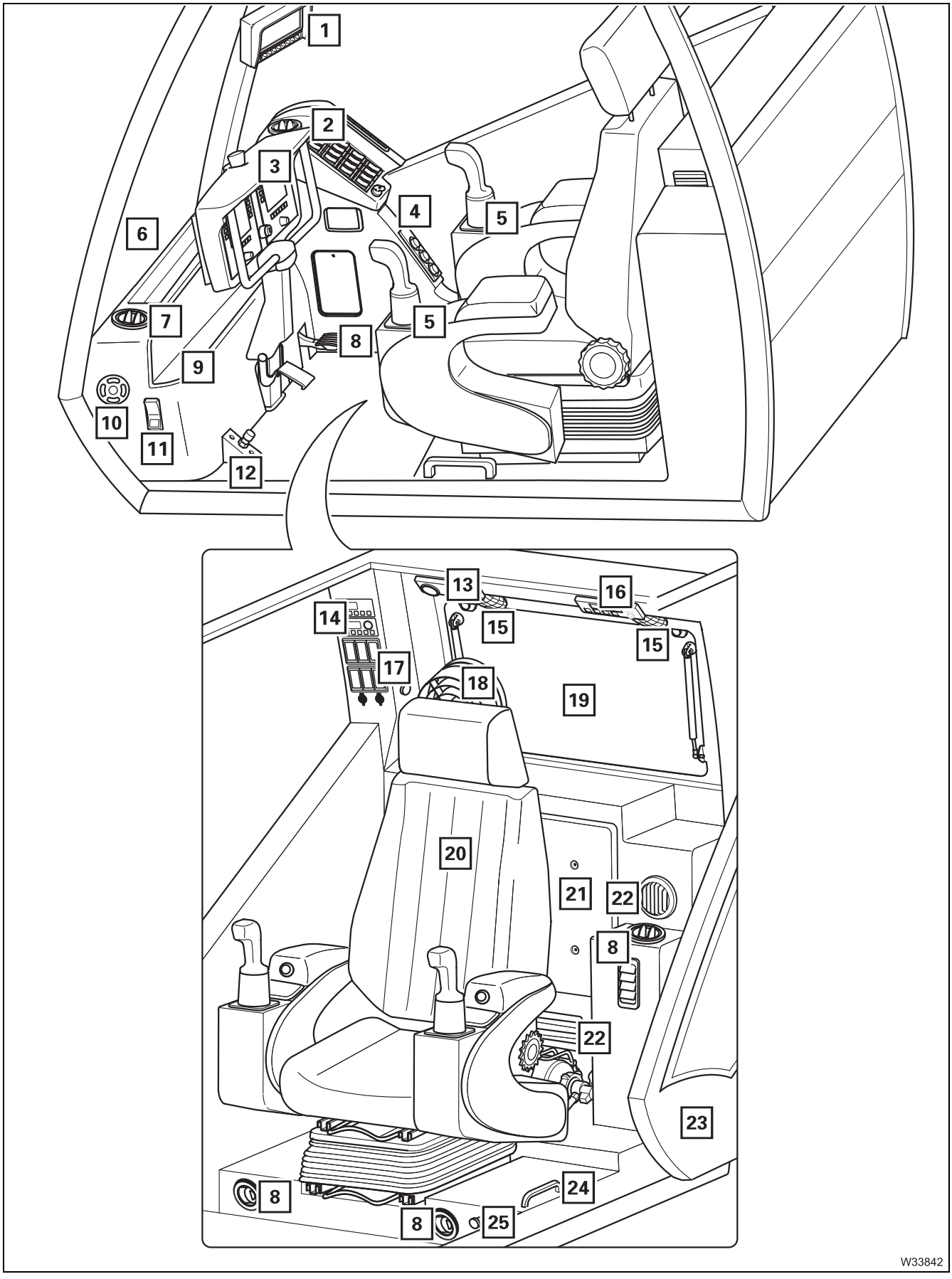
14.03.2018

19	Carbamide tank filler neck[1)]	p. 10 - 6
20	Filler neck on fuel tank	p. 10 - 4
21	Slewing gear	
	– Operation	p. 11 - 96
	– Switching off the slewing gear freewheel[1)]	p. 12 - 18
	– Switching on the slewing gear freewheel[1)]	p. 6 - 12
	– Turntable lock[1)]	p. 9 - 82
22	– Battery master switch	p. 10 - 7
	– External starting socket[1)]	p. 14 - 77
	– Battery charger[1)]	p. 14 - 79
23	Outriggers:	
	– Outrigger control units	p. 9 - 52
	– Control units for raising the axles	p. 9 - 52
	– Emergency stop switch	p. 14 - 1
24	Extendable step[1)]	p. 12 - 122
25	Crane cab	p. 9 - 6
26	Railings on the turntable	p. 12 - 115
27	CraneSTAR system[1)]	p. 11 - 144
28	– Switching off the boom floating position[1)]	p. 12 - 17
	– Switching on the boom floating position[1)]	p. 6 - 13
	– Switching off boom pre-tensioning[1)]	p. 12 - 19
	– Switching on boom pre-tensioning[1)]	p. 6 - 14
29	Reeving and unreeving the hoist rope	p. 12 - 92
30	– Hook block	p. 12 - 85
	– Hook block, separable[1)]	p. 12 - 90
31	Mirror for crane operation	p. 12 - 123
32	Air intake inhibitor[1)]	p. 10 - 23
33	Engine for crane operation	p. 10 - 1
34	Preheating the hydraulic oil[1)]	p. 11 - 13
35	Valves on superstructure hydraulic tank	p. 10 - 7

[1)] Additional equipment

14.03.2018

9.1.2 Crane cab



14.03.2018

1	Camera monitor[1)]	➠ p. 12 - 117
2	Side panel	➠ p. 9 - 9
3	Front panel	➠ p. 9 - 8
4	Standard heating system	➠ p. 9 - 13
5	Control panels	➠ p. 9 - 16
6	Windscreen	➠ p. 9 - 118
7	Accelerator pedal	
8	Air vent	➠ p. 11 - 132
9	Storage compartment	
10	Windscreen washing system – Tank[3)]	➠ p. 11 - 5
11	Extendable step	➠ p. 12 - 122
12	Slewing gear freewheel[1)]	➠ p. 9 - 82
13	Cab lighting	➠ p. 9 - 112
14	Auxiliary water heating system Auxiliary air heater	➠ p. 9 - 14 ➠ p. 9 - 15
15	Loudspeakers	
16	Radio/CD/USB[1), 2)]	
17	Console, rear	➠ p. 9 - 12
18	Fan with switch[1)]	
19	Rear window	➠ p. 9 - 118
20	Crane cab seat – Version 1 Crane cab seat – Version 2 Seat contact switch	➠ p. 11 - 7 ➠ p. 11 - 7 ➠ p. 9 - 62
21	Cover for – Fuses – CraneSTAR system[1)]	 ➠ p. 14 - 5 ➠ p. 11 - 144
22	Intake/air vents	➠ p. 11 - 131
23	Door lock	➠ p. 9 - 118
24	Handle	➠ p. 4 - 5
25	Door unlocking mechanism	➠ p. 9 - 118

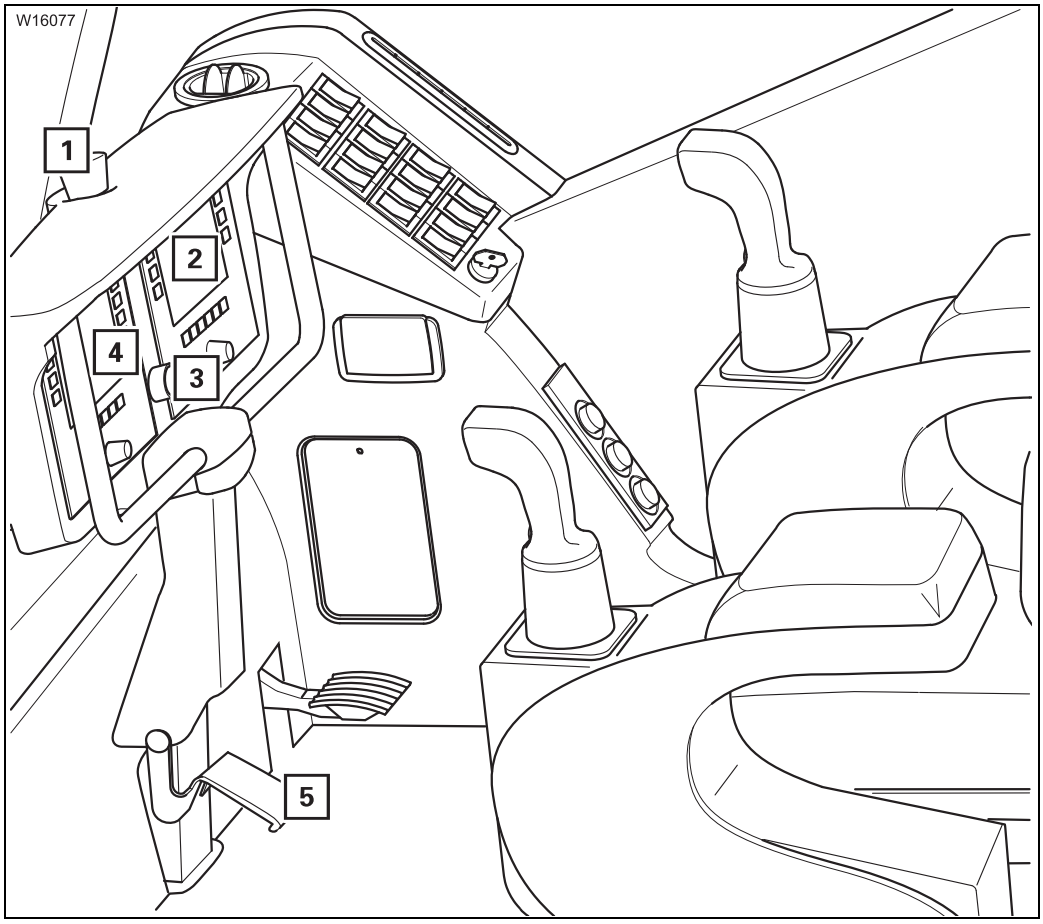
[1)] Additional equipment

[2)] ➠ *Separate operating instructions*

[3)] ➠ *Maintenance Manual*

14.03.2018

9.1.3 Front panel



1 Emergency stop switch ➠ p. 9 - 65

2 Control unit RCL (**R**ated-**C**apacity-**L**imiter) ➠ p. 9 - 40

Depending on the version:

3 – RCL override – symbol (A) ➠ p. 11 - 44
or
– RCL override – symbol (A) ➠ p. 11 - 45
– for RCL
– Lifting limit switch

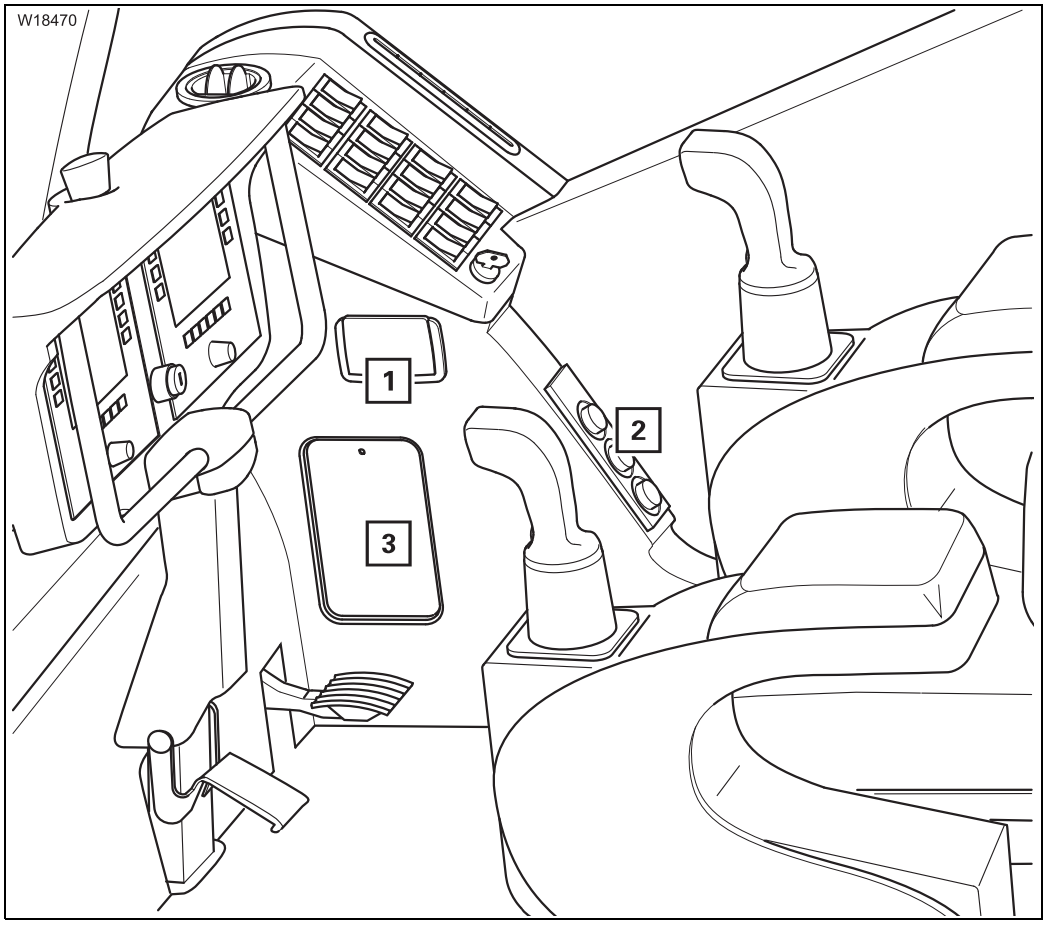
4 ECOS control unit ➠ p. 9 - 20

5 Front control panel ➠ p. 11 - 8

14.03.2018

9.1.4 Side panel

Bottom



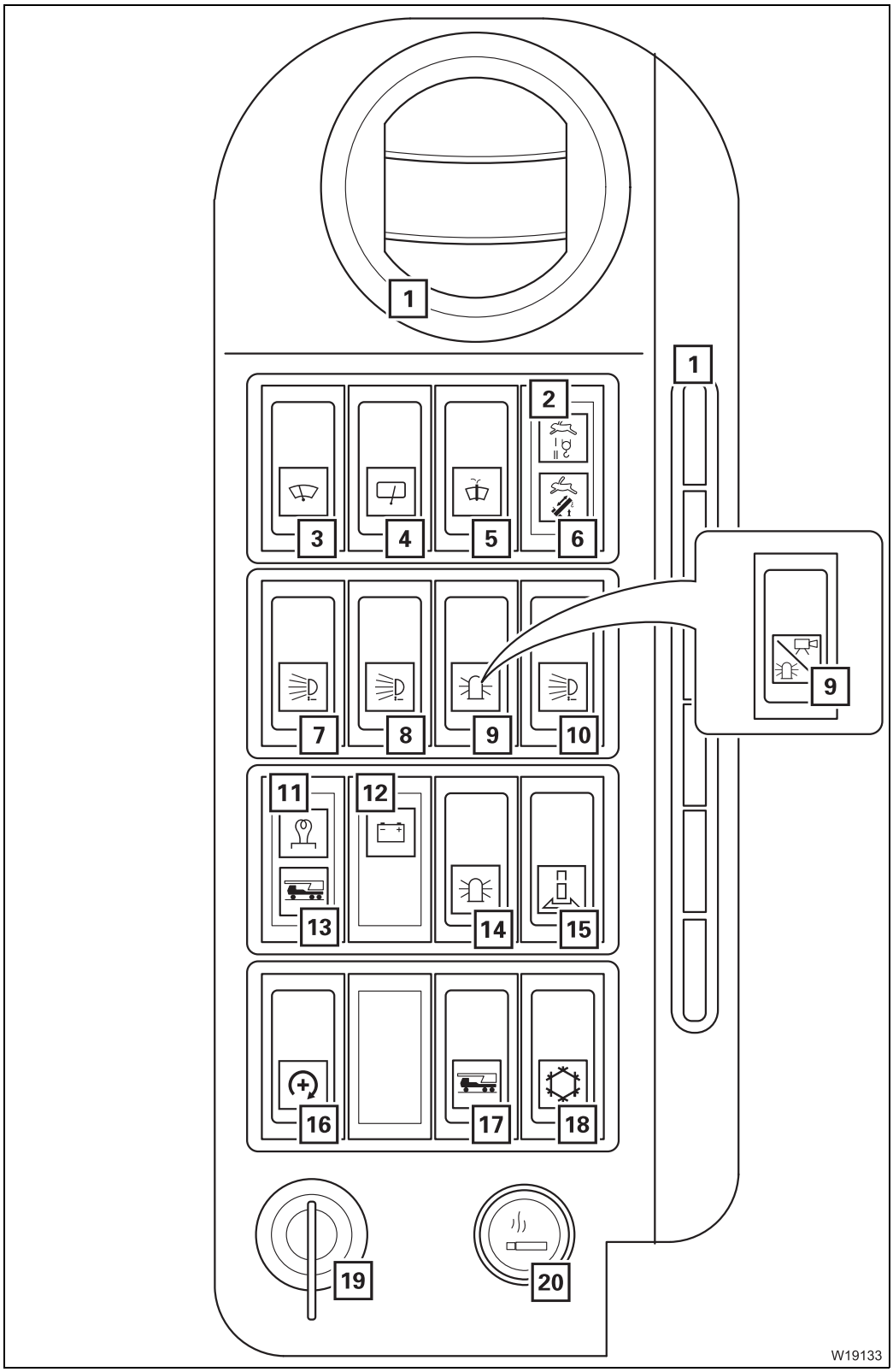
1 Ashtray

2 Standard heating system p. 9 - 13

3 Diagnostics (behind cover) p. 9 - 120

14.03.2018

Top



14.03.2018

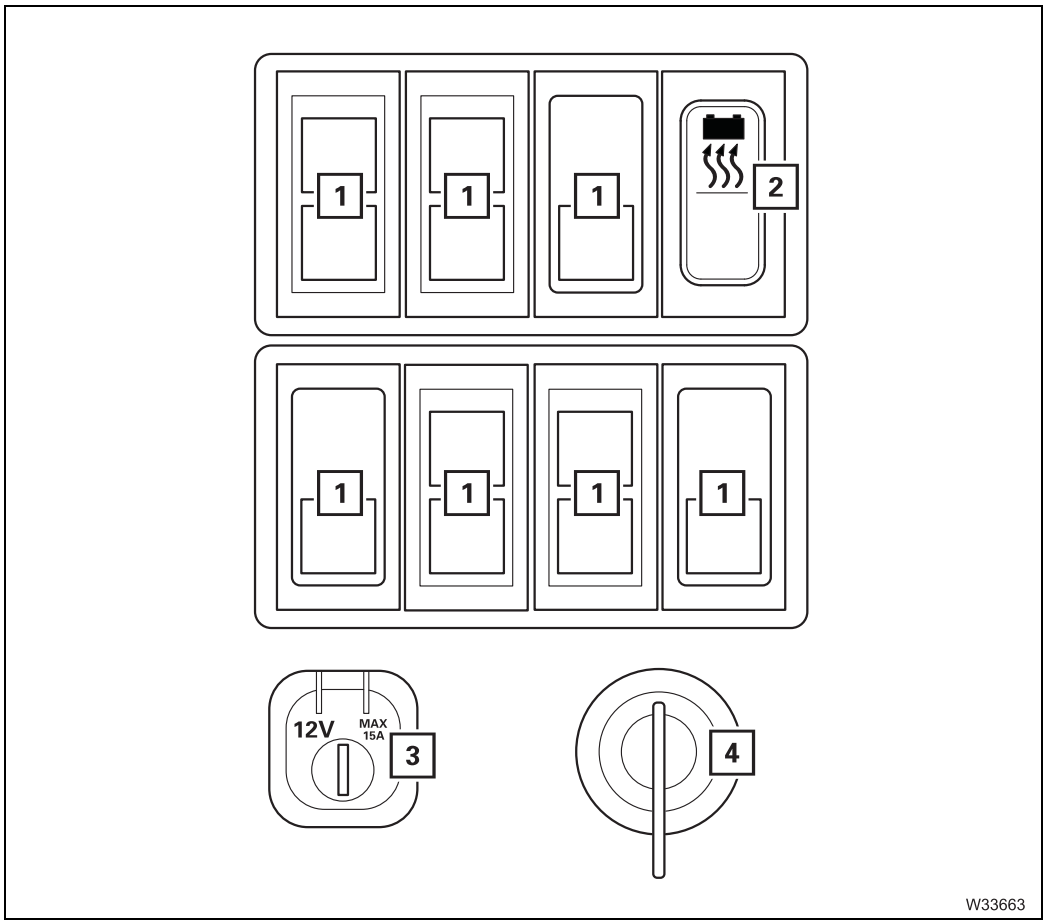
1	Air vents	p. 11 - 132
2	High speed monitoring for the hoists	p. 9 - 79
3	Windscreen wiper on/off	p. 9 - 113
4	Roof window wiper on/off	p. 9 - 113
5	Windscreen washing system	p. 9 - 113
6	High-speed monitoring for derricking gear / telescoping mechanism	p. 9 - 85
7	Spotlight sockets on/off	p. 9 - 111
8	Slewable spotlight on/off[1)]	p. 9 - 112
9	Air traffic control light/camera on/off/Camera[1) 2)]	p. 9 - 111
10	Swing the spotlight[1)]	p. 9 - 112
11	Flame start system monitoring[1)]	p. 9 - 59
12	Voltage monitoring warning	p. 9 - 110
13	Carrier ignition monitoring	p. 9 - 59
14	Rotating beacons on/off[1)]	p. 9 - 111
15	Houselock on/off[1)]	p. 9 - 94
16	Set idling speed	p. 9 - 59
17	Carrier ignition on/off	p. 9 - 60
18	Air-conditioning system[1)]	p. 11 - 133
19	Ignition lock	p. 9 - 59
20	Cigarette lighter (24 volts)	

[1)] Additional equipment

[2)] Symbol according to execution

14.03.2018

Console, rear



1 Configuration according to execution[1)]

2 Battery heater[1) 2)] ➠ p. 9 - 60

3 Socket (12 V)[1)]

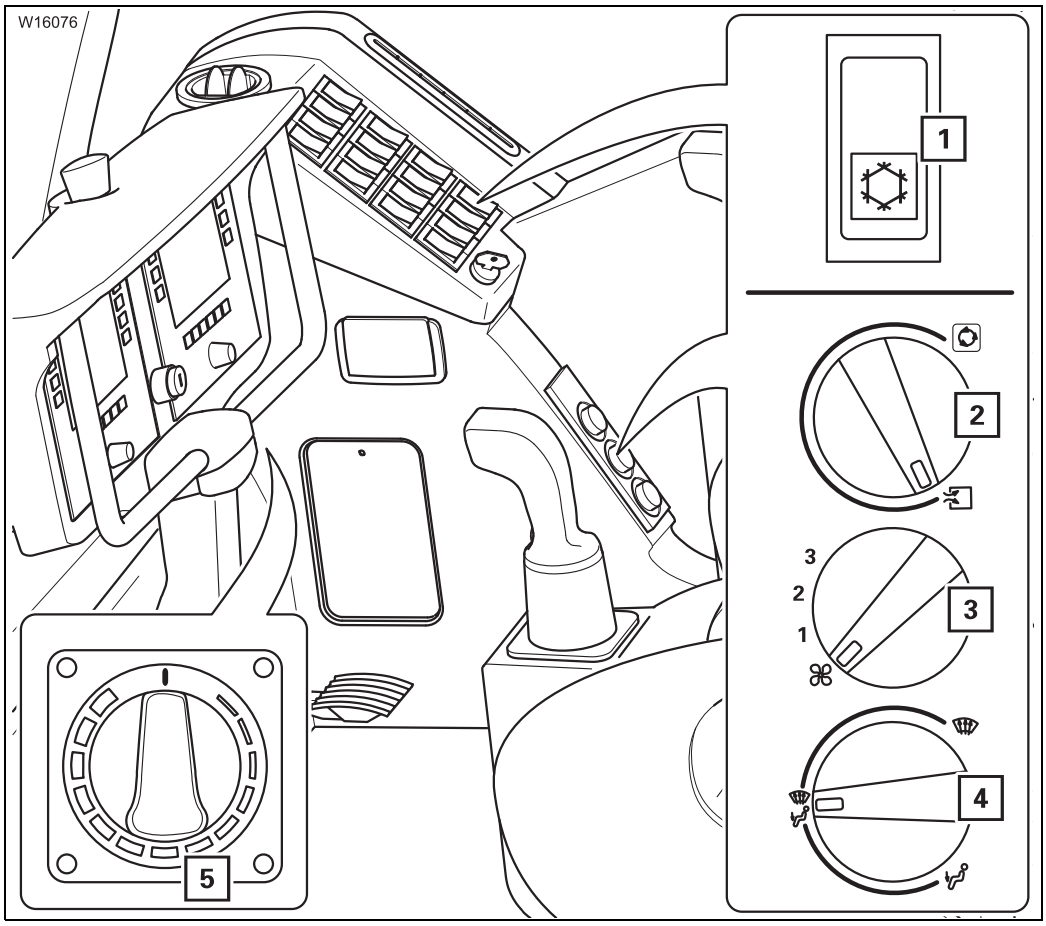
4 Key-operated switch[1) 2)]

[1)] Additional equipment

[2)] ➠ *Separate operating instructions*

14.03.2018

Standard heating system

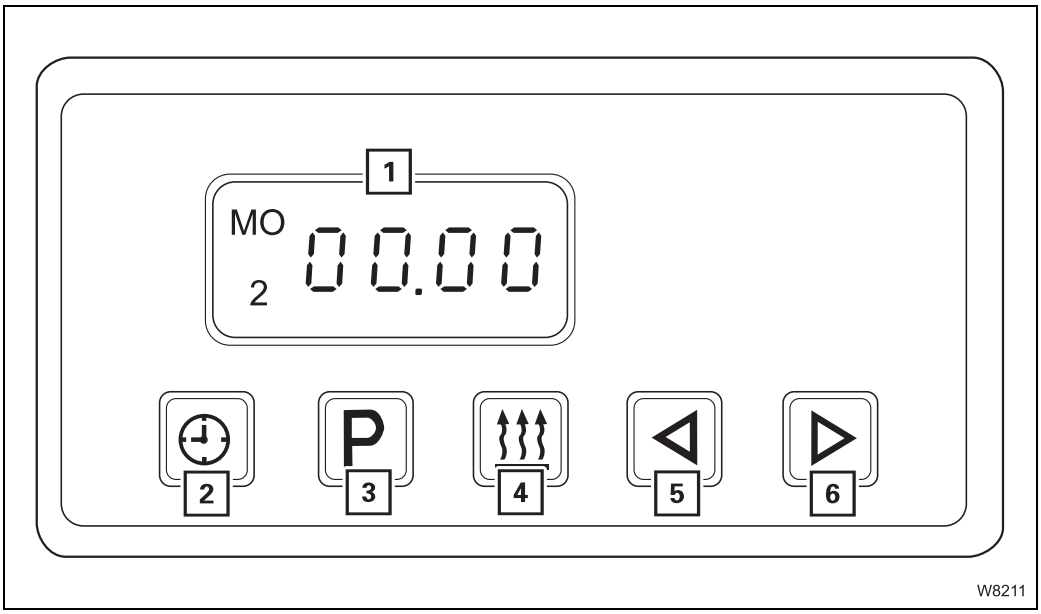


1 Air-conditioning system[1)] ➠ p. 11 - 133
2 Setting fresh air/recirculated air/mixed air ➠ p. 11 - 131
3 Setting the fan ➠ p. 11 - 131
4 Air distribution ➠ p. 11 - 132
5 Setting the temperature ➠ p. 11 - 131

[1)] Additional equipment

14.03.2018

Auxiliary water heating system



1 Heating display ➠ p. 11 - 137

2 Setting the day and time ➠ p. 11 - 138

3 – Storing the heating start ➠ p. 11 - 138
– Switching heating start on/off ➠ p. 11 - 140

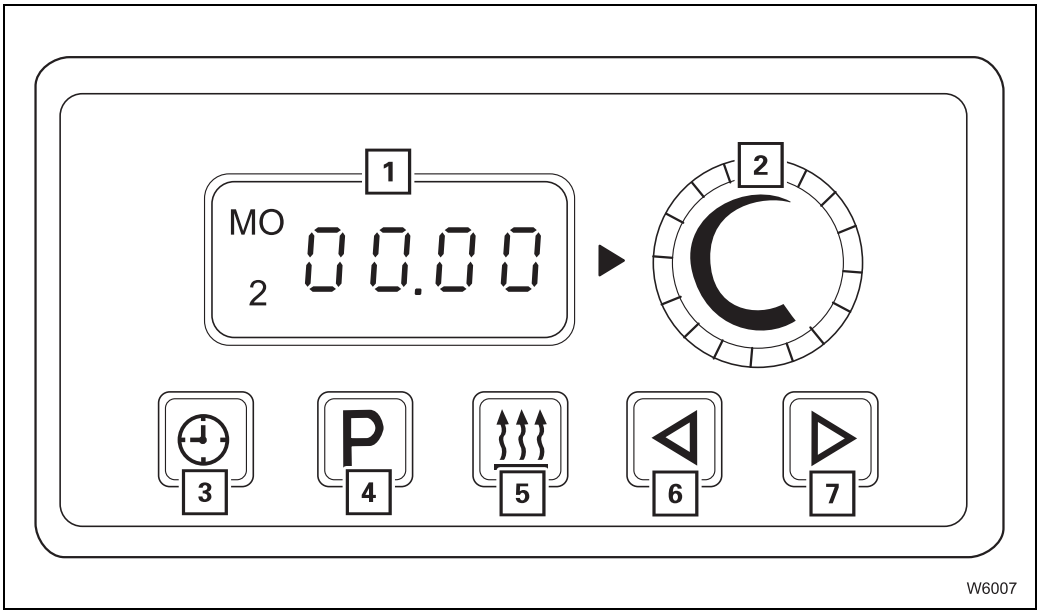
4 – Switching on ➠ p. 11 - 137
– Switching off ➠ p. 11 - 141

5 Input – ➠ p. 11 - 138

6 Input + ➠ p. 11 - 138

14.03.2018

Auxiliary air heater



1 Heating display p. 11 - 142

2 Temperature p. 11 - 143

3 Setting the time/day p. 11 - 143

4 – Storing the heating start p. 11 - 143
– Switching heating start on/off p. 11 - 143

5 – Switching on p. 11 - 142
– Switching off p. 11 - 143

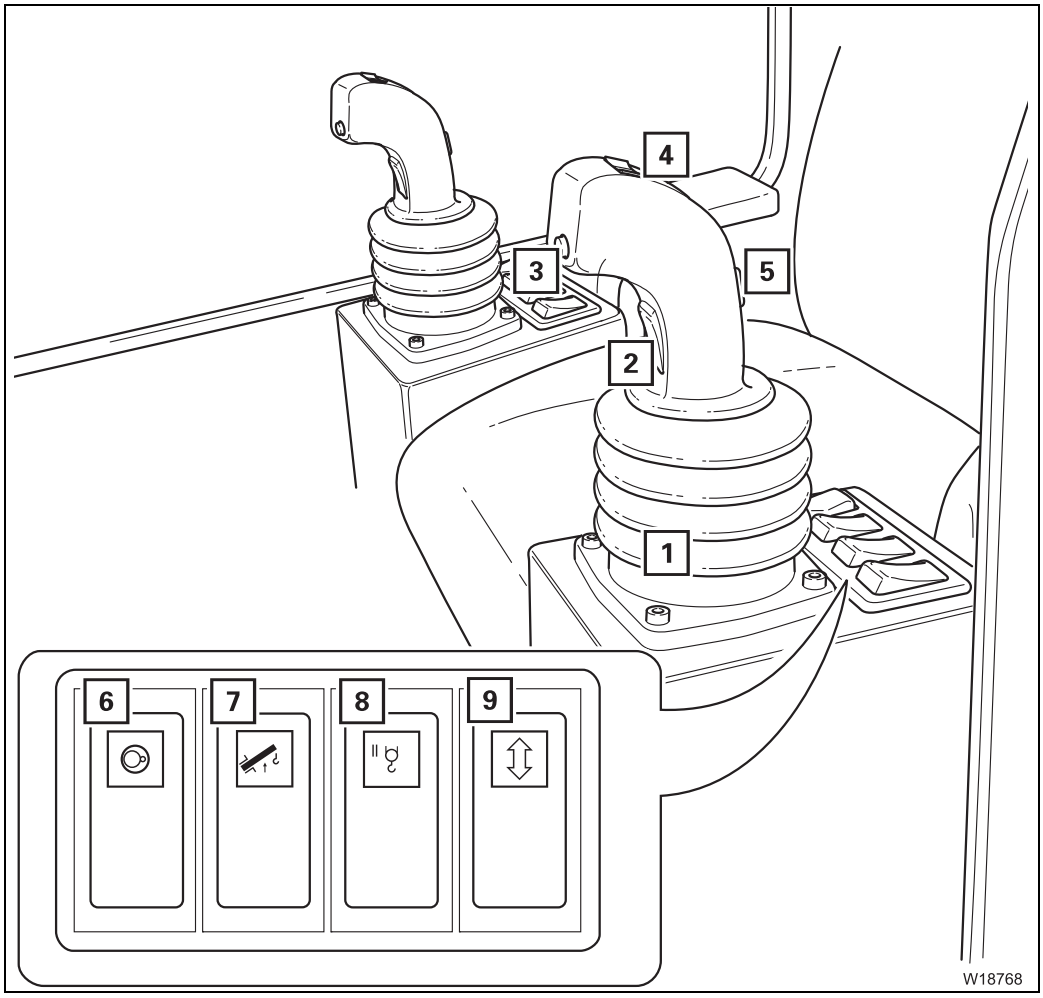
6 Input – p. 11 - 143

7 Input + p. 11 - 143

14.03.2018

9.1.5 Control panels

Left



1 Left control lever (configuration according to execution) ➠ p. 9 - 18

2 Dead man's switch ➠ p. 9 - 62

3 Horn button
or
Slewing gear freewheel[1)] ➠ p. 9 - 82

4 Depending on which function is activated, button for:
– Derricking gear/telescoping mechanism high-speed mode on/off ➠ p. 9 - 85

5 Auxiliary hoist slewing indicator ➠ p. 11 - 59

6 Slewing gear on/off ➠ p. 9 - 81

7 Raise button – shutdown bypass ➠ p. 9 - 85

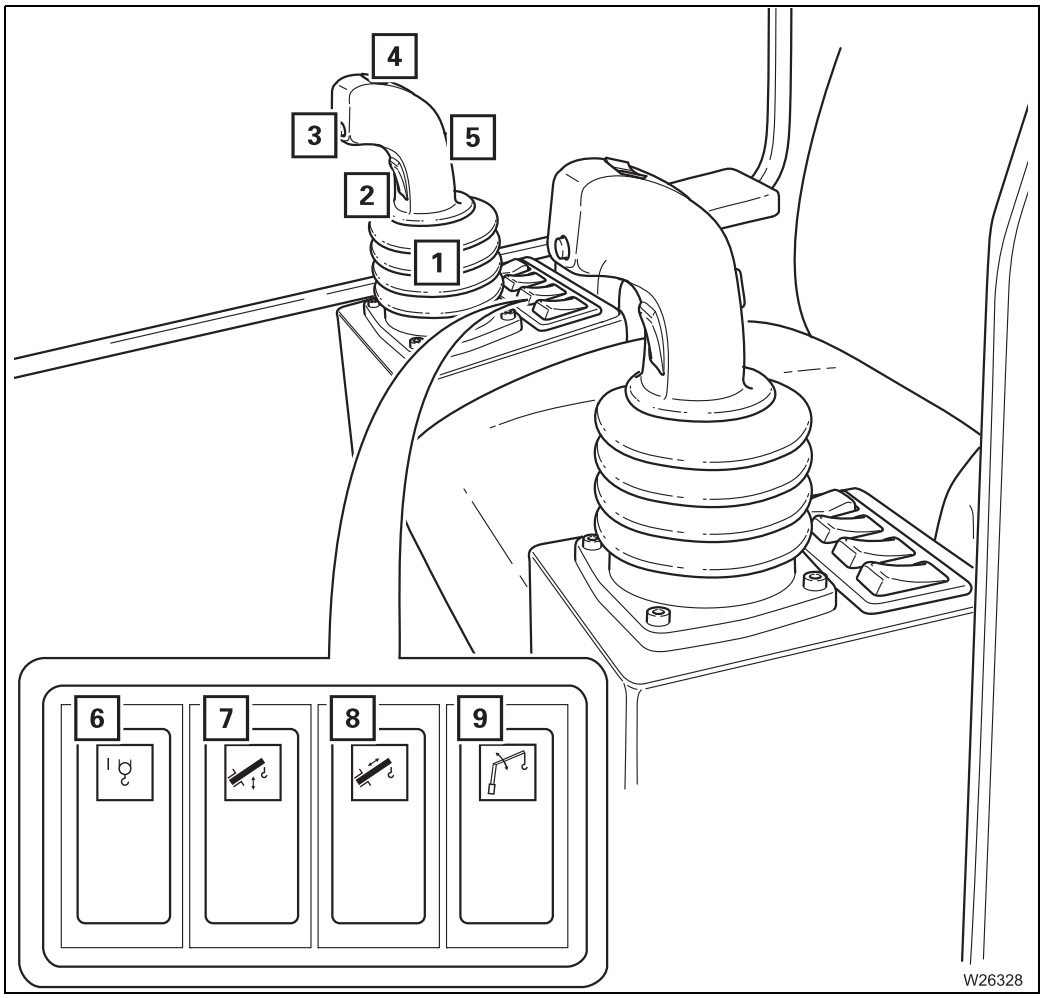
8 Auxiliary hoist on/off[1)] ➠ p. 9 - 80

9 Inclining the crane cab[1)] ➠ p. 9 - 93

[1)] Additional equipment

14.03.2018

Right



1 Right control lever (configuration according to execution) ➠ p. 9 - 18

2 Dead man's switch ➠ p. 9 - 62

3 Horn button

4 Hoist high-speed mode on/off ➠ p. 9 - 79

5 Main hoist slewing indicator ➠ p. 11 - 55

6 Main hoist on/off ➠ p. 9 - 78

7 Derricking gear on/off ➠ p. 9 - 84

8 Telescoping mechanism on/off ➠ p. 9 - 86

9 Derrick lattice extension on/off[1), 2)]

[1)] Additional equipment

[2)] ➠ *Operating Instructions Lattice Extension*

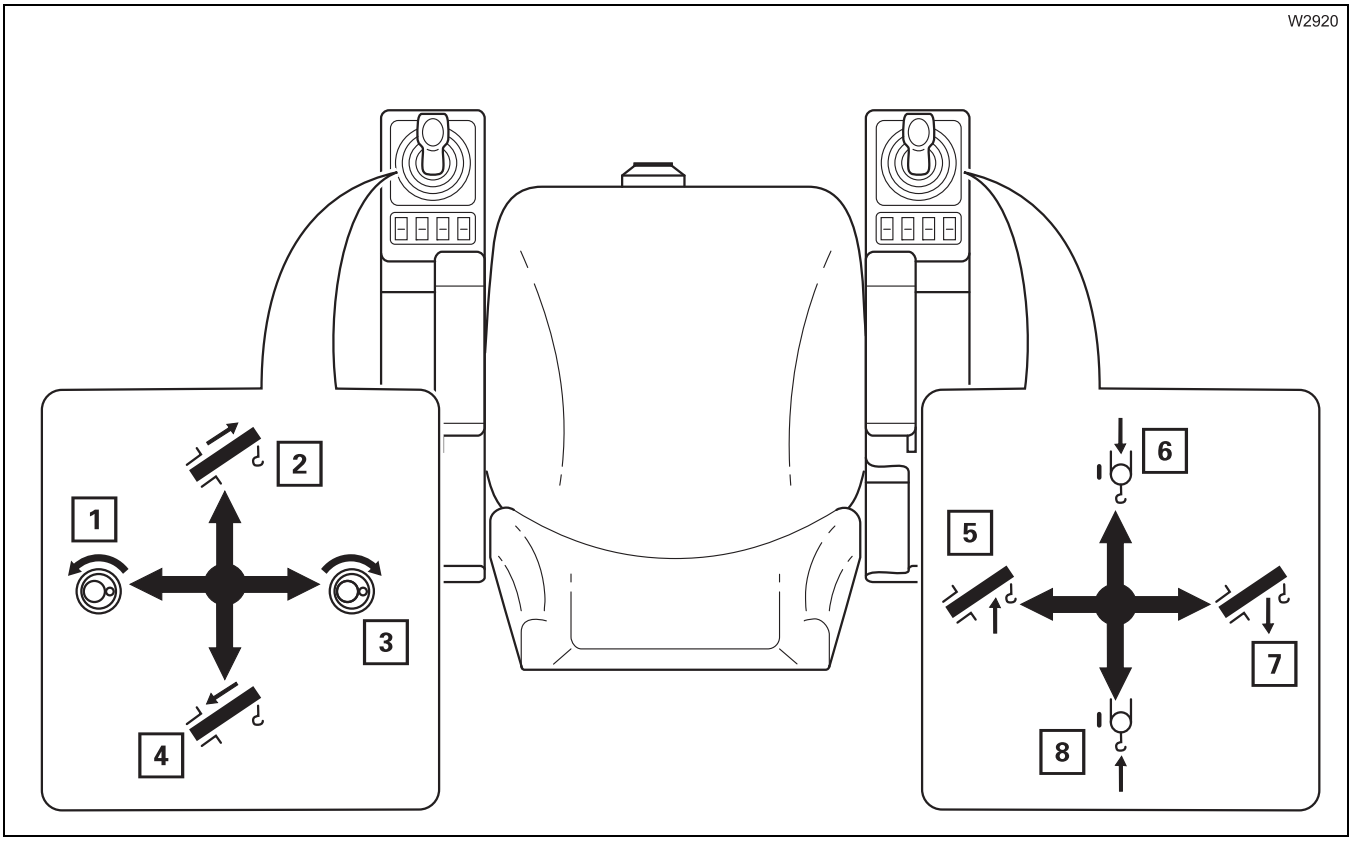
14.03.2018

9.1.6 Control lever configuration

The truck crane can be equipped with two different control lever configurations. The current configuration of the control levers is indicated by symbols on the control levers.

Version 1

In version 1, the left control lever is configured with the *Telescope* function.



Left control lever

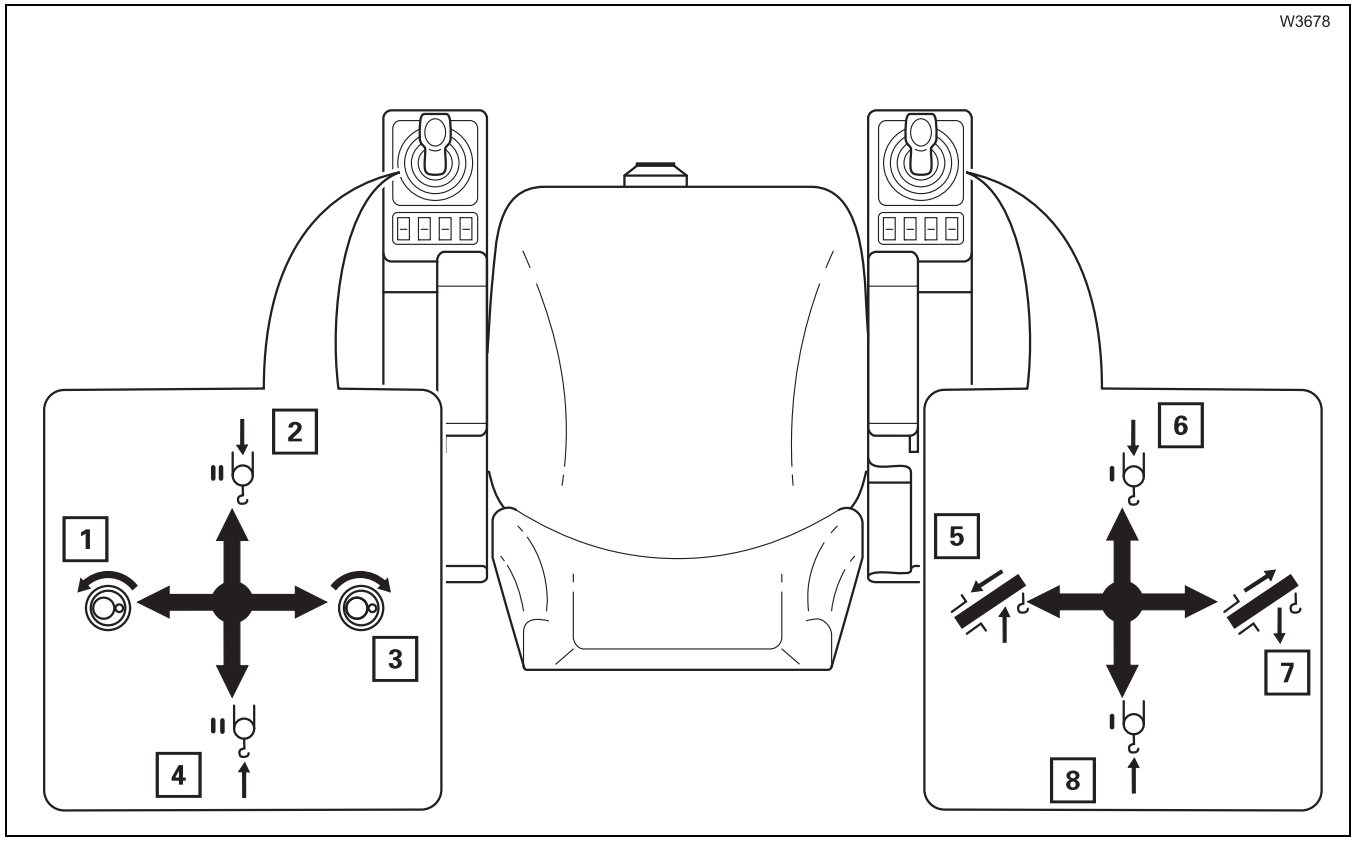
1 Slew to the left
3 Slew to the right
2 Extending
4 Retracting

Right control lever

5 Raise
7 Lower
6 Lower the main hoist
8 Lift the main hoist

14.03.2018

Version 2 In version 2, the right control lever is assigned the *Telescope* function.



Left control lever

1 Slew to the left

3 Slew to the right

2 Lower auxiliary hoist[1)]

4 Raise auxiliary hoist[1)]

Right control lever

5 Raise/retract[2)]

7 Lower/extend[2)]

6 Lower the main hoist

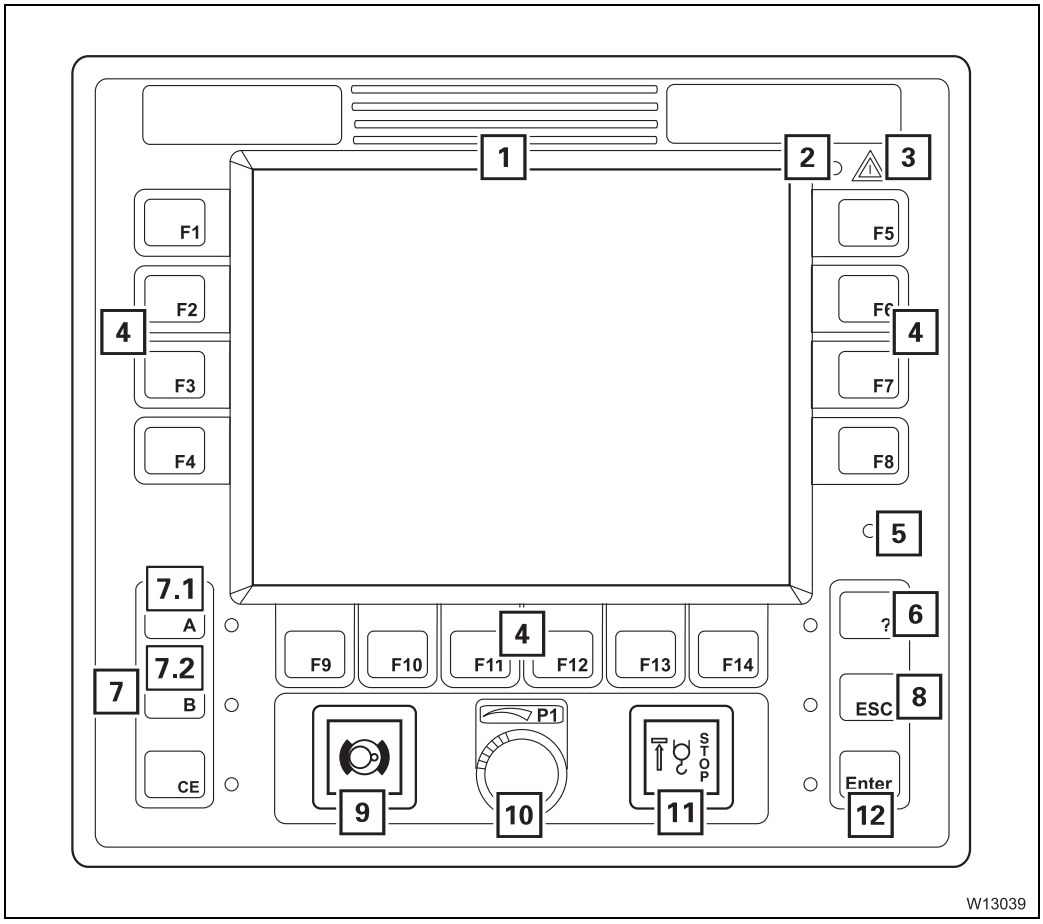
8 Lift the main hoist

[1)] Additional equipment

[2)] Derricking the lattice extension; ➠ *Operating Instructions Lattice Extension*

14.03.2018

9.1.7 ECOS control unit



14.03.2018

1	ECOS display Main menu overview	p. 9 - 65 p. 9 - 22
2	Sensor for brightness[1)]	p. 9 - 65
3	Error/warning message	p. 9 - 63
4	Buttons F1 to F14	p. 9 - 63
5	Sensor for brightness[1)]	p. 9 - 65
6	Opening the Error submenu Submenu overview	p. 9 - 63 p. 9 - 38
7	Entering the keycode	p. 9 - 64
7.1	Opening the Warning submenu Submenu overview (superstructure)	p. 9 - 63 p. 9 - 24
7.2	Open Warning submenu Submenu overview (carrier)	p. 9 - 64 p. 9 - 36
8	Exiting the submenu/input mode	p. 9 - 64
9	Slewing gear brake applied/released	p. 9 - 81
10	Entering values	p. 9 - 64
11	Warning for lifting limit switch shutdown	p. 9 - 79
12	Input confirmation	p. 9 - 64

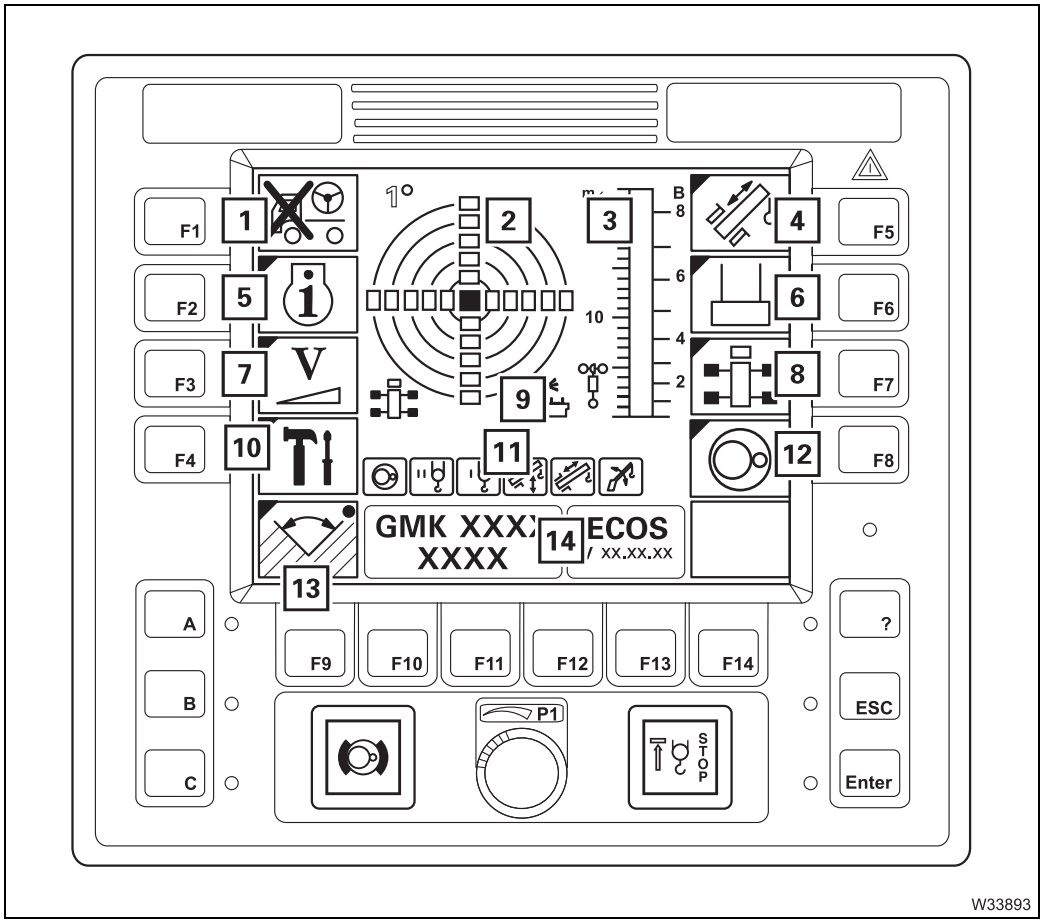
[1)] Either **2** or **5**

Various menus are shown on the *ECOS* display.
The menus are operated using buttons F1 to F14. The individual buttons have a different function in each menu. The functions of the buttons in the displayed menu correspond to the symbols next to or above the buttons; p. 9 - 63.

14.03.2018

9.1.8 ECOS display – main menu

The main menu displays symbols for further submenus and symbols for current displays.



14.03.2018

1	Combined operation display Combined operation on	➠ p. 9 - 60
2	Current inclination display	➠ p. 9 - 70
3	Anemometer display[1)]	➠ p. 9 - 73
4	Telescoping submenu	➠ p. 9 - 28
5	Monitoring submenu	➠ p. 9 - 31
6	Counterweight submenu	➠ p. 9 - 24
7	Power unit speeds submenu	➠ p. 9 - 30
8	Outriggers submenu	➠ p. 9 - 26
9	Remote control display[1), 3)]	
10	Settings submenu	➠ p. 9 - 32
11	Power units display Slewing gear Main hoist Auxiliary hoist Derricking gear Telescoping mechanism Derricking the lattice extension[1), 2)]	 ➠ p. 9 - 81 ➠ p. 9 - 78 ➠ p. 9 - 80 ➠ p. 9 - 84 ➠ p. 9 - 86
12	Slewing gear/houselock submenu[1)]	➠ p. 9 - 25
13	Working range limiter submenu[1)]	➠ p. 9 - 38
14	Serial number and program version displays	➠ p. 9 - 65

[1)] Additional equipment

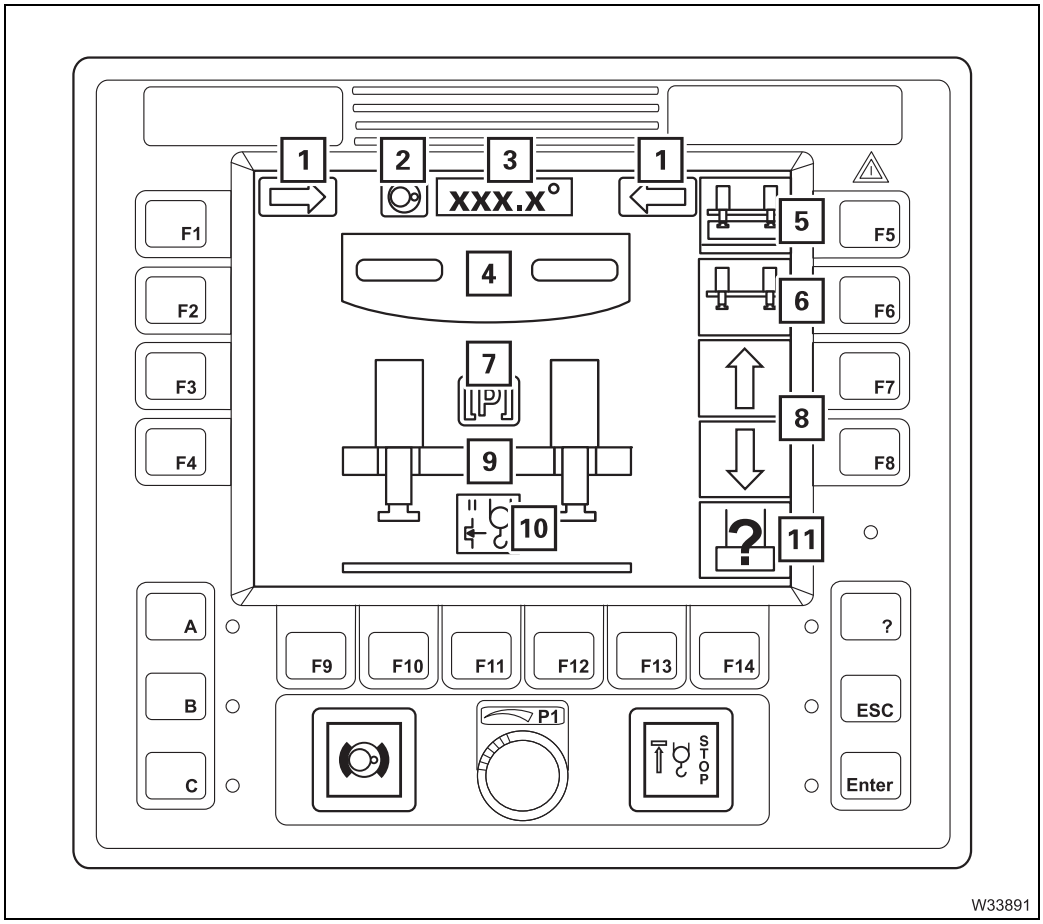
[2)] ➠ *Operating Instructions Lattice Extension*

[3)] ➠ *Separate operating instructions*

14.03.2018

9.1.9 ECOS display – submenus

Counterweight submenu

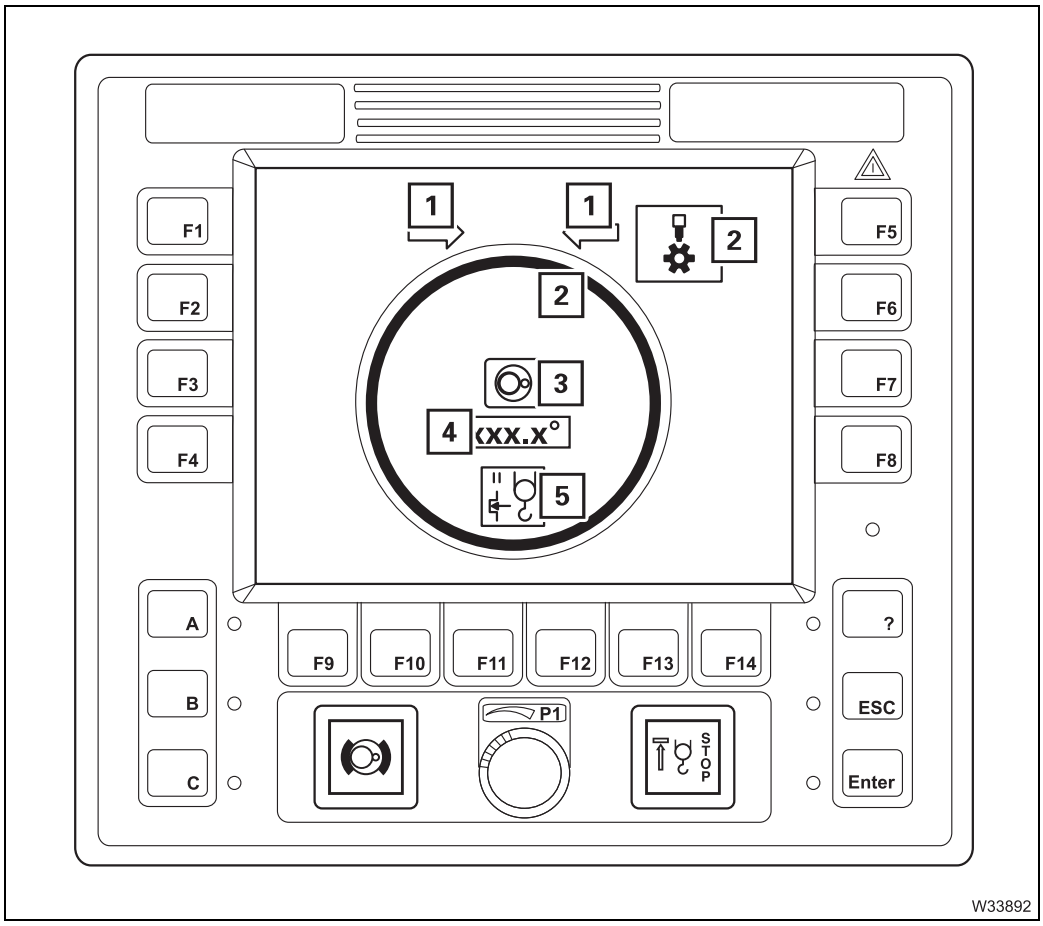


1	Display of slewing direction for automatic mode	p. 9 - 74
2	Slewing gear display	p. 9 - 77
3	Current slewing angle display	p. 9 - 77
4	Rigging position display	p. 9 - 74
5	Automatic mode, rigging	p. 9 - 75
6	Automatic mode, unrigging	p. 9 - 75
7	Pre-tensioning pressure display	p. 9 - 77
8	Extending/retracting the lifting cylinders	p. 9 - 76
9	Lifting cylinder position display	p. 9 - 76
10	Auxiliary hoist lock display[1)]	p. 9 - 77
11	Counterweight detection display[1)]	p. 9 - 77

[1)] Additional equipment

14.03.2018

Slewing gear/ houselock submenu



1 Display of slewing direction to 0°/180° ➠ p. 9 - 83

2 Locking status displays[1)] ➠ p. 9 - 94

3 Slewing gear display ➠ p. 9 - 83

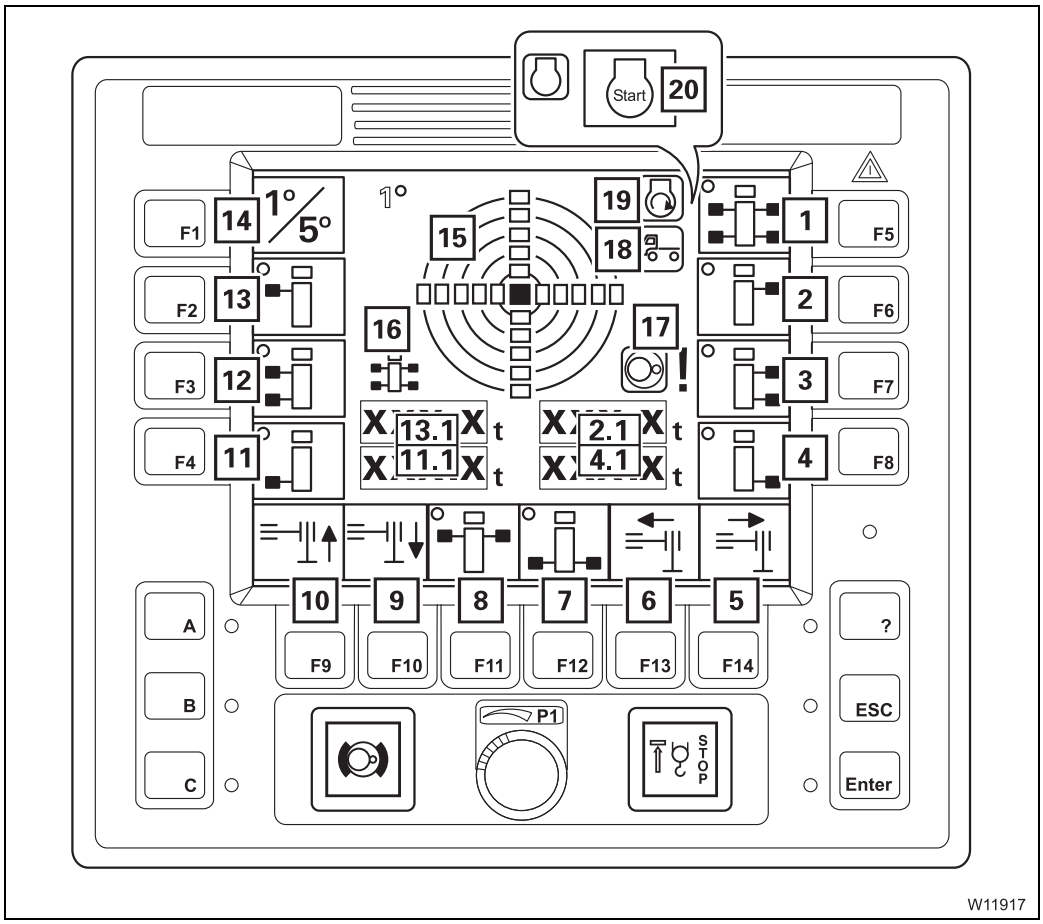
4 Current slewing angle display ➠ p. 9 - 83

5 Auxiliary hoist lock display ➠ p. 9 - 83

[1)] Additional equipment

14.03.2018

Outriggers submenu



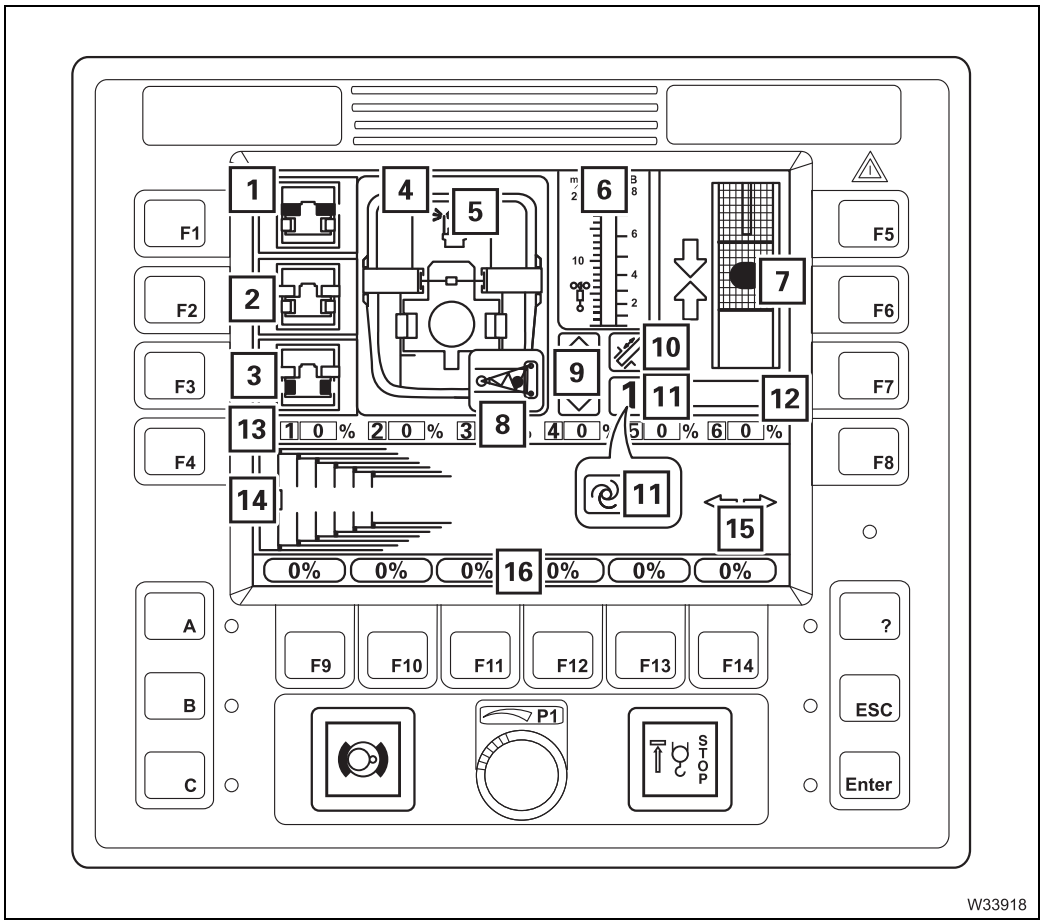
14.03.2018

1	All supporting cylinders	p. 9 - 66
2	Front right-hand outrigger	p. 9 - 66
2.1	Front right-hand outrigger pressure display[1)]	p. 9 - 73
3	Right-hand supporting cylinder	p. 9 - 66
4	Rear right-hand outrigger	p. 9 - 66
4.1	Rear right-hand outrigger pressure display[1)]	p. 9 - 73
5	Extending the outrigger beam	p. 9 - 67
6	Retracting the outrigger beam	p. 9 - 67
7	Rear supporting cylinder	p. 9 - 66
8	Front supporting cylinder	p. 9 - 66
9	Extend supporting cylinders	p. 9 - 67
10	Retract supporting cylinders	p. 9 - 67
11	Rear left-hand outrigger	p. 9 - 66
11.1	Rear left-hand outrigger pressure display[1)]	p. 9 - 73
12	Left-hand supporting cylinder	p. 9 - 66
13	Front left-hand outrigger	p. 9 - 66
13.1	Front left-hand outrigger pressure display[1)]	p. 9 - 73
14	Switching over the measuring range	p. 9 - 70
15	Current inclination display	p. 9 - 70
16	Angle direction display	p. 9 - 70
17	Slewing gear/movements locked display	p. 9 - 66
18	Carrier ignition display	p. 9 - 61
19	Display for engine for driving on/off	p. 9 - 61
20	Start engine for driving	p. 9 - 61

[1)] Additional equipment

14.03.2018

Telescoping submenu



1 Unlock telescopic section selection ➠ p. 9 - 89

2 Lock selection ➠ p. 9 - 89

3 Unlock telescoping cylinder selection ➠ p. 9 - 88

4 Locking status display ➠ p. 9 - 88

5 Remote control display[1)]

6 Anemometer display ➠ p. 9 - 73

7 Locking point display ➠ p. 9 - 90

8 Lattice extension pivoting cylinder position[2)] ➠ p. 9 - 91

9 Telescoping release display ➠ p. 9 - 90

10 Display for telescoping mechanism on/off ➠ p. 9 - 87

11 – Telescoping cylinder in the telescopic section display ➠ p. 9 - 87
– Teleautomation on/manual telescoping on ➠ p. 9 - 91

12 Telescoping cylinder length display ➠ p. 9 - 89

13 Current telescope status display ➠ p. 9 - 87

14 Telescope diagram display ➠ p. 9 - 88

15 Teleautomation direction display ➠ p. 9 - 91

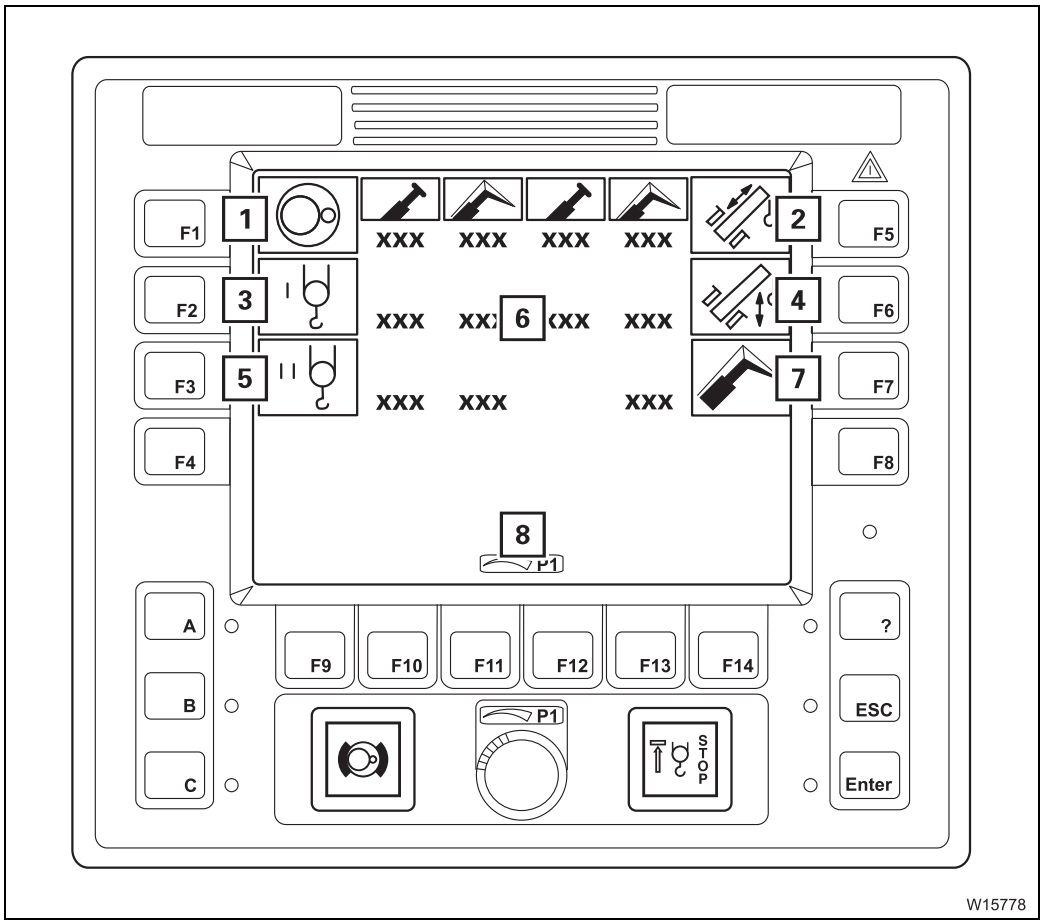
16 Entering the set value for teleautomation ➠ p. 9 - 90

1) ➠ *Separate operating instructions*

2) Additional equipment

14.03.2018

Power unit speeds submenu

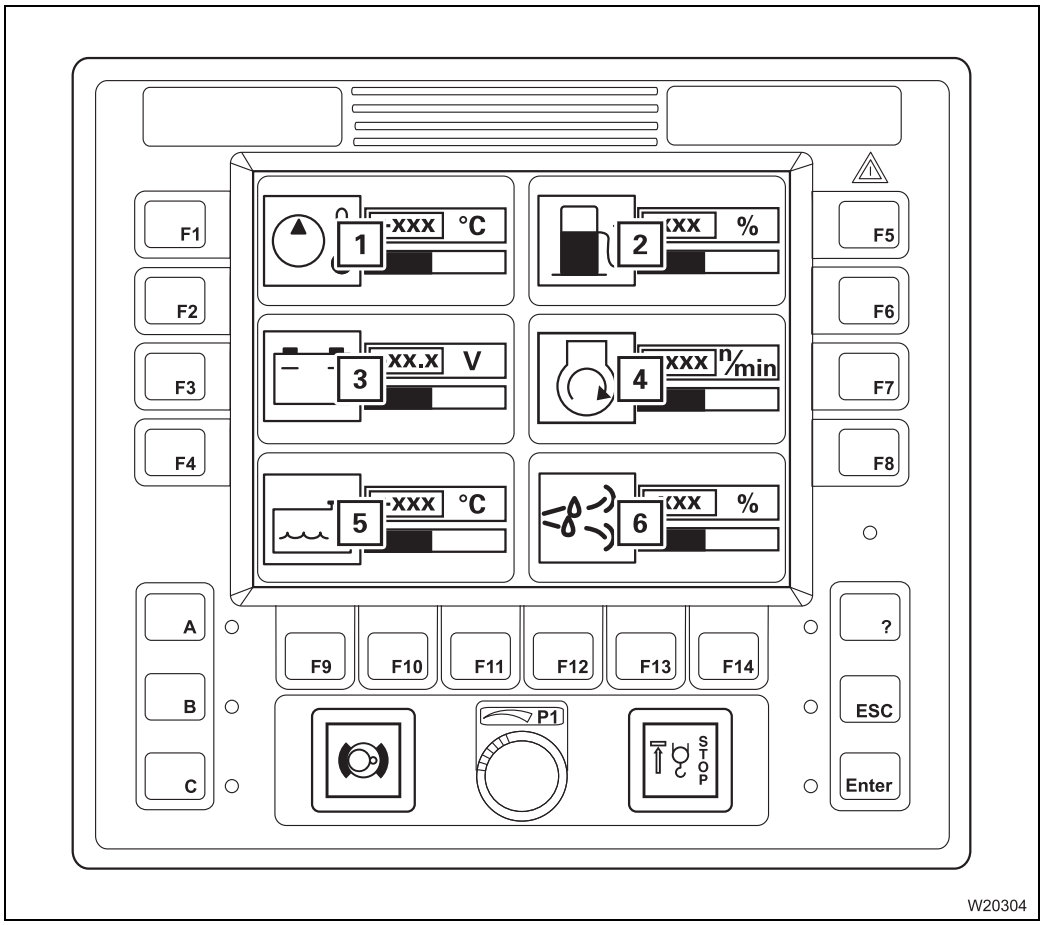


1 Enter slewing gear speed ➠ p. 11 - 105
2 Enter telescoping mechanism speed ➠ p. 11 - 105
3 Enter speed – main hoist ➠ p. 11 - 105
4 Enter derricking gear speed ➠ p. 11 - 105
5 Enter auxiliary hoist speed ➠ p. 11 - 105
6 Entered speed displays ➠ p. 11 - 105
7 Enter speed – derricking gear of lattice extension[1)]
8 Display input mode on

[1)] Additional equipment

14.03.2018

Monitoring submenu



1 Hydraulic oil temperature display ➠ p. 10 - 15

2 Fuel level display ➠ p. 10 - 15

3 Voltage monitoring display ➠ p. 10 - 15

4 Engine speed display ➠ p. 10 - 15

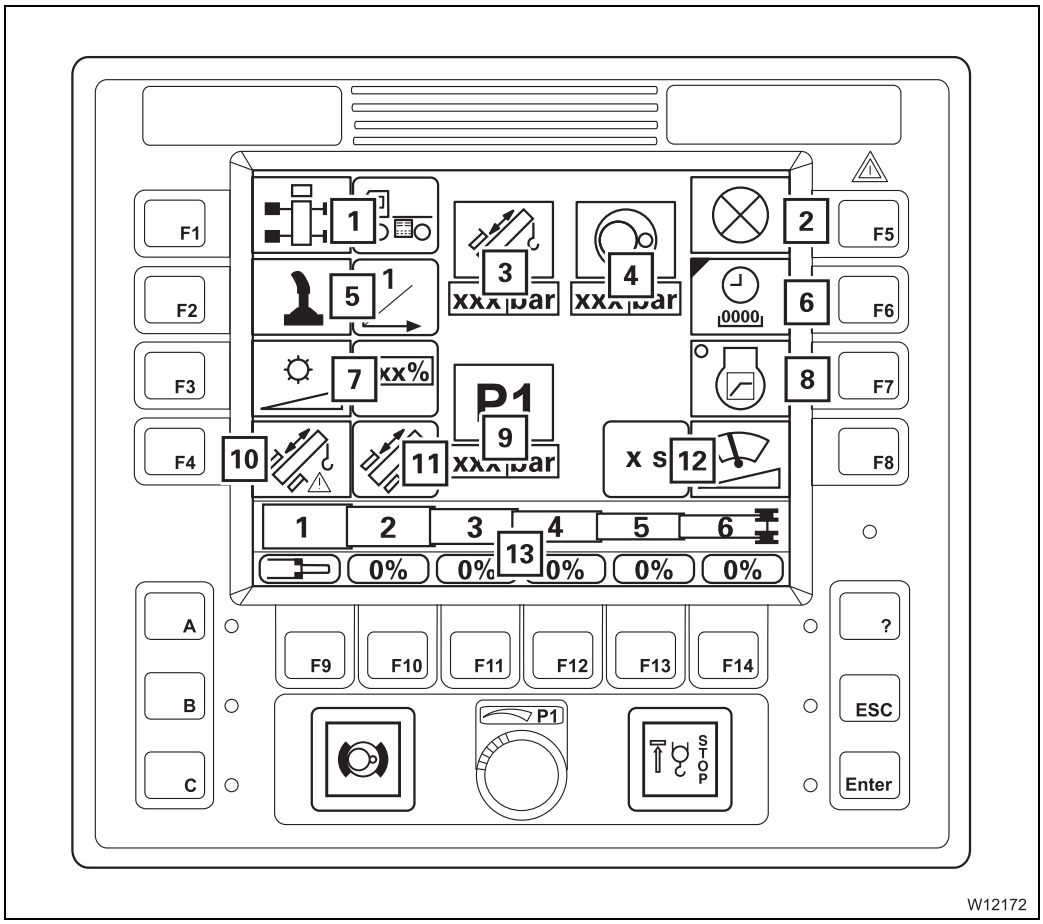
5 Coolant temperature display ➠ p. 10 - 15

6 Carbamide supply display[1), 2)] ➠ p. 10 - 15

[1)] Additional equipment

14.03.2018

Settings submenu

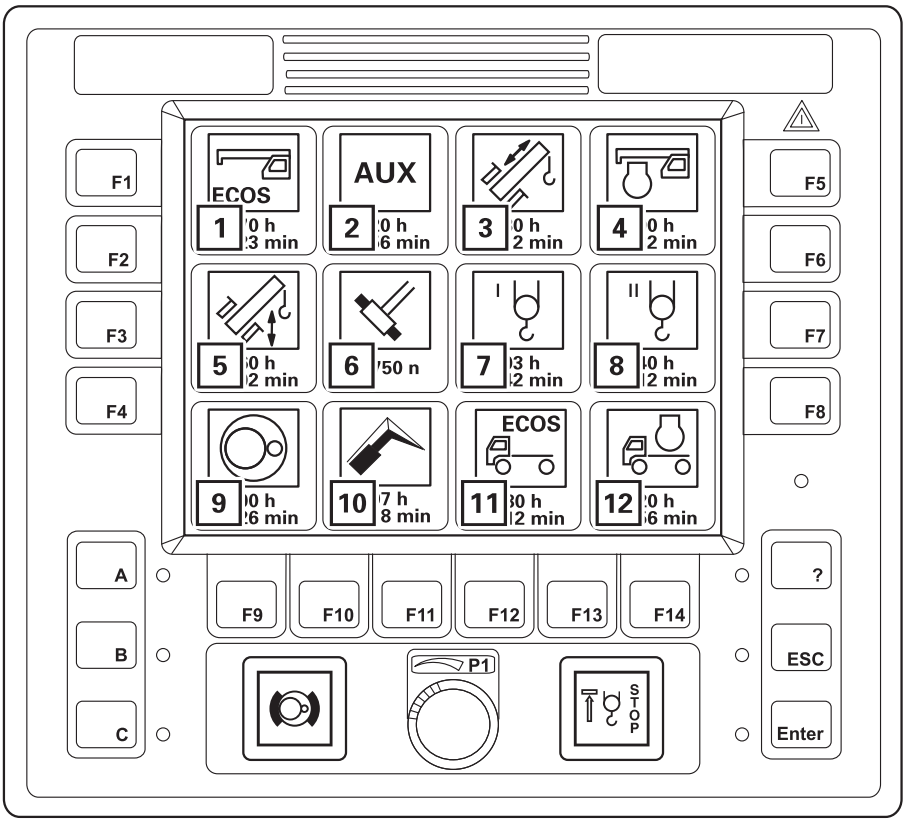


1	Outrigger control units on/off[1)]	➠ p. 9 - 67
2	Lamp test	➠ p. 10 - 9
3	Telescoping cylinder pressure display	➠ p. 9 - 93
4	Slewing gear hydraulic circuit pressure display	➠ p. 9 - 93
5	Setting the characteristic curves for the control levers	➠ p. 11 - 106
6	Operating hours submenu	➠ p. 9 - 33
7	Adjusting display brightness	➠ p. 10 - 11
8	Critical load control on/off	➠ p. 9 - 93
9	Hydraulic circuit pressure display	➠ p. 9 - 93
10	Telescoping emergency program access	➠ p. 9 - 92
11	Current telescoping mechanism status display	➠ p. 9 - 92
12	Adjusting the wiper stroke interval	➠ p. 9 - 113
13	Entering the current telescoping	➠ p. 14 - 57

[1)] Additional equipment

14.03.2018

Operating hours submenu



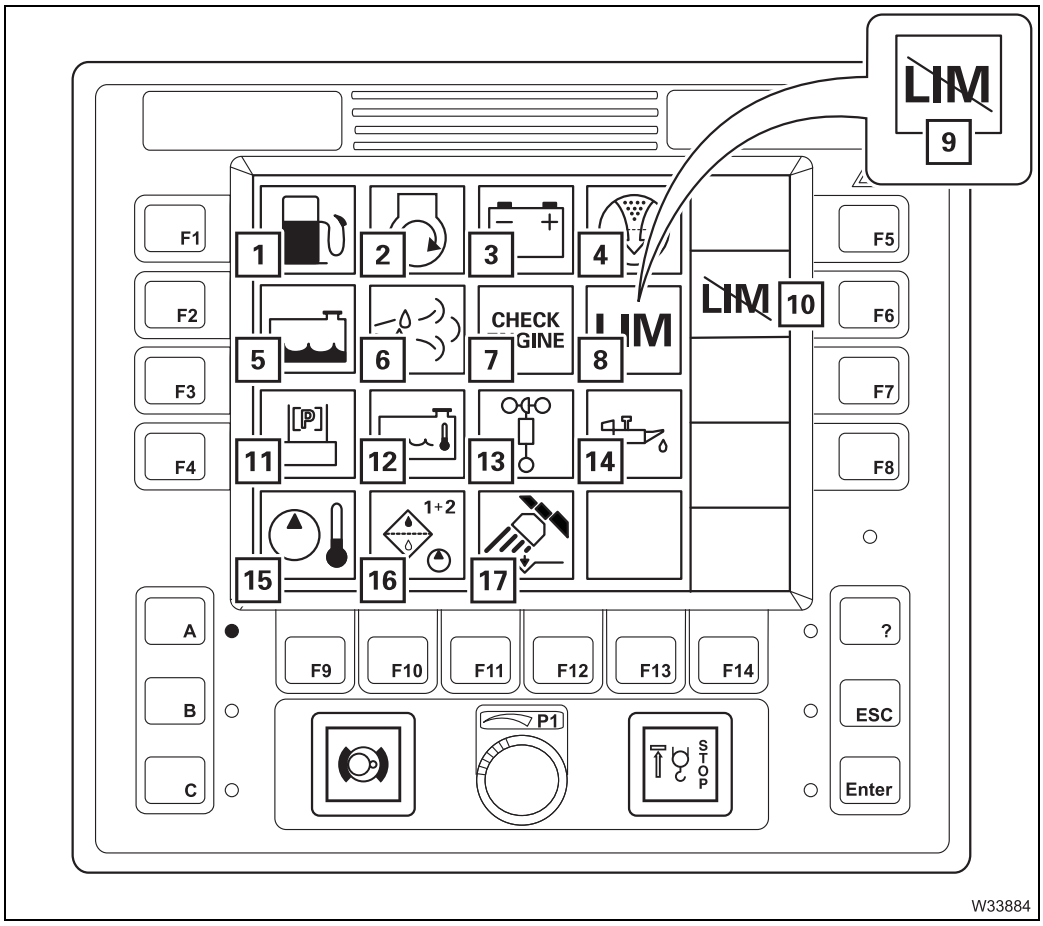
1 ECOS superstructure p. 11 - 109
2 Auxiliary drive gears p. 11 - 109
3 Telescoping mechanism p. 11 - 109
4 Engine for crane operation p. 11 - 109
5 Derricking gear p. 11 - 109
6 Locking system p. 11 - 109
7 Main hoist p. 11 - 109
8 Auxiliary hoist[1)] p. 11 - 109
9 Slewing gear p. 11 - 109
10 Lattice extension[1)] p. 11 - 109
11 ECOS – carrier p. 11 - 109
12 Engine for driving p. 11 - 109

[1)] Additional equipment

14.03.2018

Submenu **Superstructure**

Warning Engine-related displays apply to the engine for crane operation.



14.03.2018

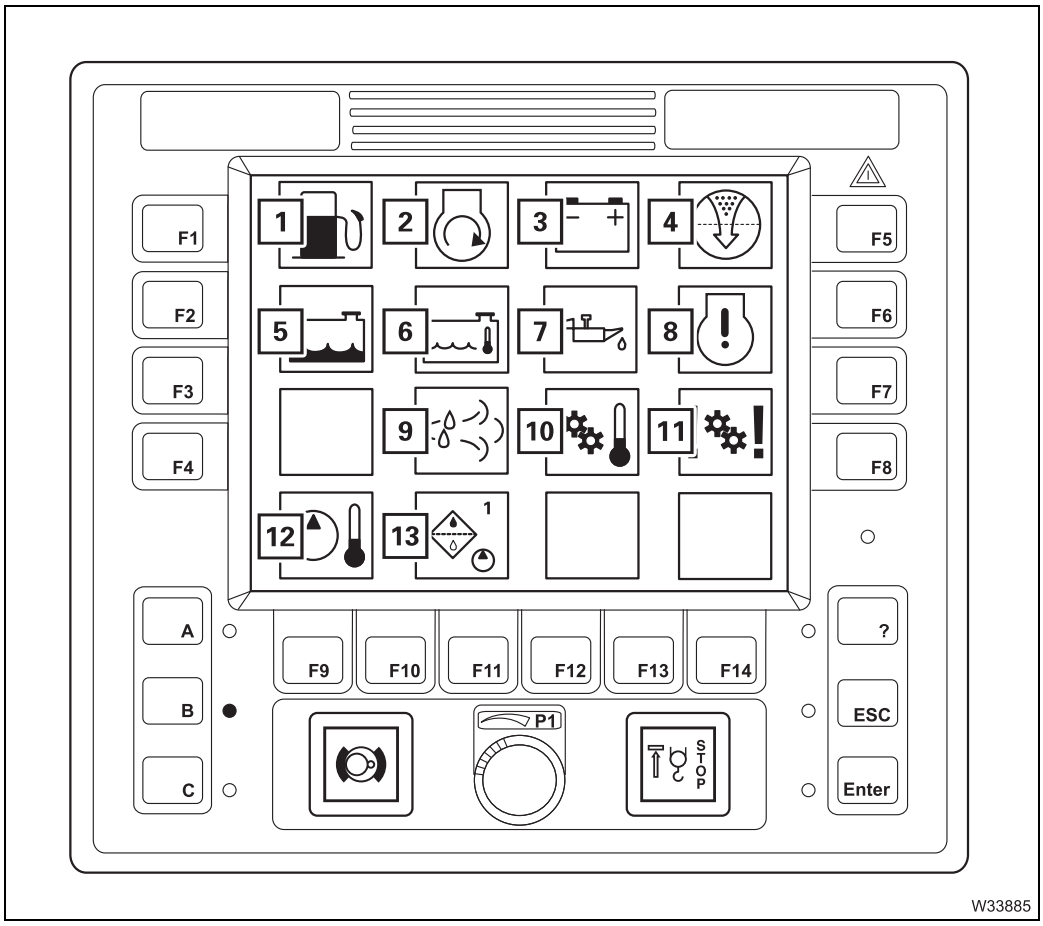
1	Filling up	p. 11 - 112
2	Air intake inhibitor triggered[1)]	p. 11 - 113
3	Voltage monitoring	p. 11 - 113
4	Replace air filter	p. 11 - 112
5	Coolant level too low	p. 11 - 111
6	Refilling carbamide[1)]	p. 11 - 113
7	Engine electronic system	p. 11 - 112
8	Torque reduction	p. 11 - 113
9	Override torque reduction	p. 11 - 113
10	Torque reduction override button	p. 10 - 17
11	Pre-tension counterweight	p. 11 - 113
12	Coolant too hot	p. 11 - 111
13	Anemometer not connected	p. 11 - 113
14	Oil pressure too low	p. 11 - 111
15	Hydraulic oil too hot	p. 11 - 112
16	Replace hydraulic oil filter	p. 11 - 112
17	Spotlights swing[1)]	p. 11 - 113

[1)] Additional equipment

14.03.2018

Carrier

Engine-related displays apply to the engine for driving.



1 Filling up p. 11 - 112

2 Air intake inhibitor triggered[1)] p. 11 - 113

3 Voltage monitoring p. 11 - 113

4 Replace air filter p. 11 - 112

5 Coolant level too low p. 11 - 111

6 Coolant too hot p. 11 - 111

7 Oil pressure too low p. 11 - 111

8 Engine electronic system p. 11 - 112

9 Refilling carbamide[1)] p. 11 - 113

10 Transmission oil too hot p. 5 - 50

11 Shift lock transmission p. 5 - 50

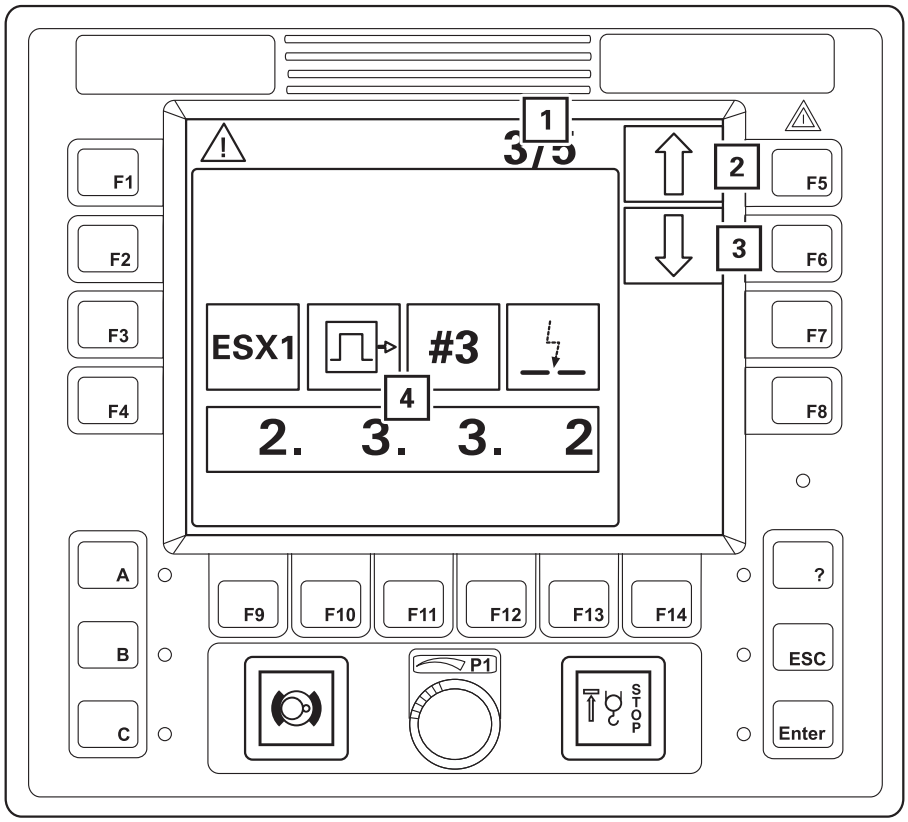
12 Hydraulic oil too hot p. 11 - 112

13 Replace hydraulic oil filter p. 11 - 112

[1)] Additional equipment

14.03.2018

Error submenu



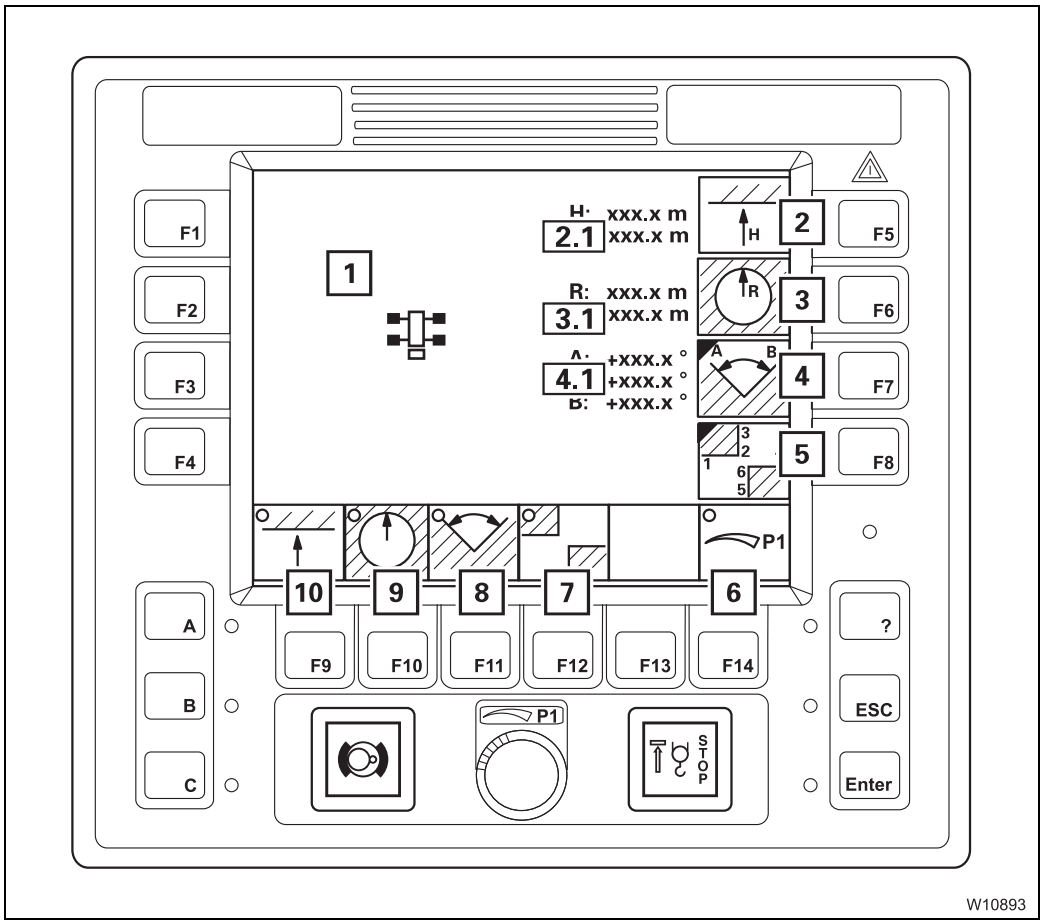
1 Current errors/total errors display p. 14 - 36

2 Next error p. 14 - 36

3 Previous error p. 14 - 36

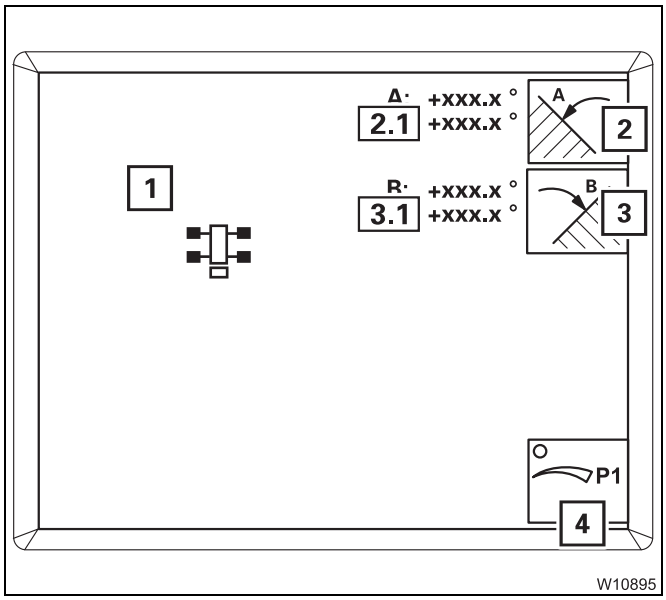
4 Error display p. 14 - 36

Working range limiter submenu



1	Working range limiter display	p. 11 - 126
2	Input maximum overall height	p. 11 - 118
2.1	Maximum overall height display	p. 11 - 118
3	Input maximum working radius	p. 11 - 118
3.1	Maximum/current working radius display	p. 11 - 118
4	Enter slewing angle submenu	p. 11 - 119
4.1	Maximum/current slewing angle display	p. 11 - 119
5	Enter objects submenu	p. 11 - 121
6	Manual input on/off	p. 11 - 124
7	Object monitoring on/off	p. 11 - 126
8	Slewing angle monitoring on/off	p. 11 - 126
9	Working radius monitoring on/off	p. 11 - 126
10	Overall height monitoring on/off	p. 11 - 126

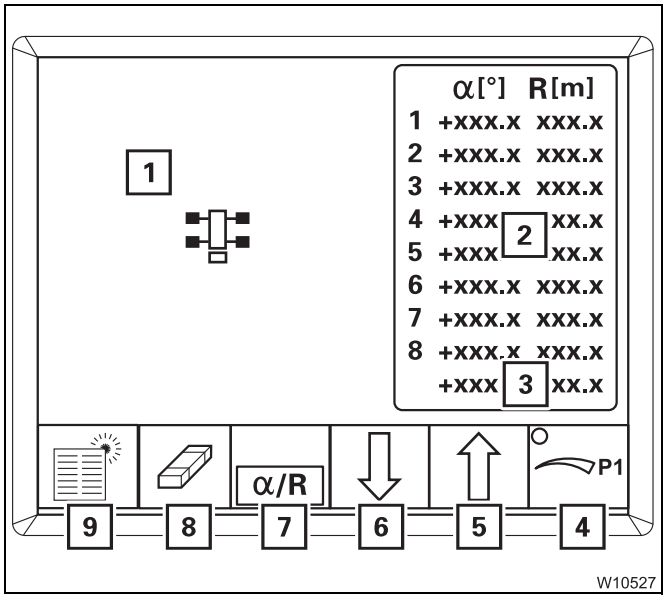
14.03.2018



Enter slewing angle submenu

1 Limited slewing angle display
2 Select slewing angle A
2.1 Maximum/current slewing angle A display
3 Select slewing angle B
3.1 Maximum/current slewing angle B display
4 Manual input on/off

Slewing angle, p. 11 - 119.

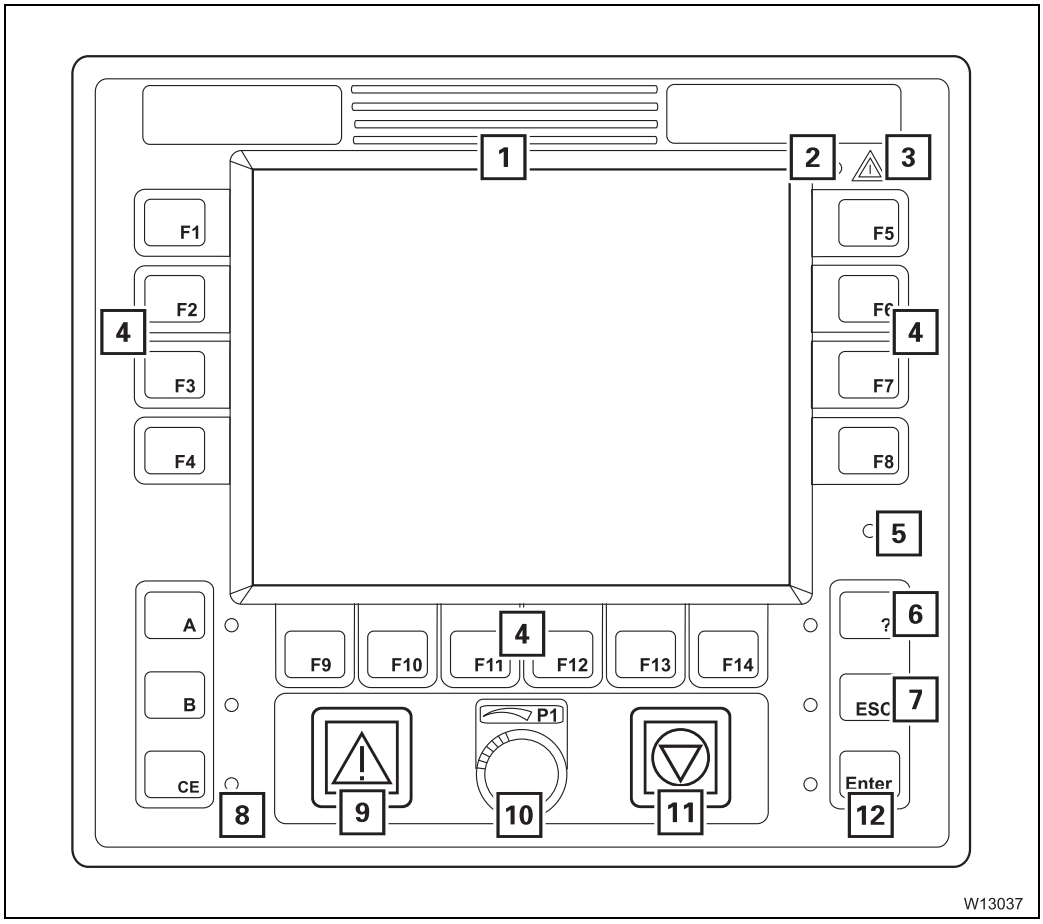


Enter objects submenu

1 Limitation by object display
2 Point data display
3 Current point data display
4 Manual input on/off
5 Select previous point
6 Select next point
7 Select angle/working radius
8 Delete selected point data
9 Delete all point data

Entering objects, p. 11 - 121.

9.1.10 RCL control unit

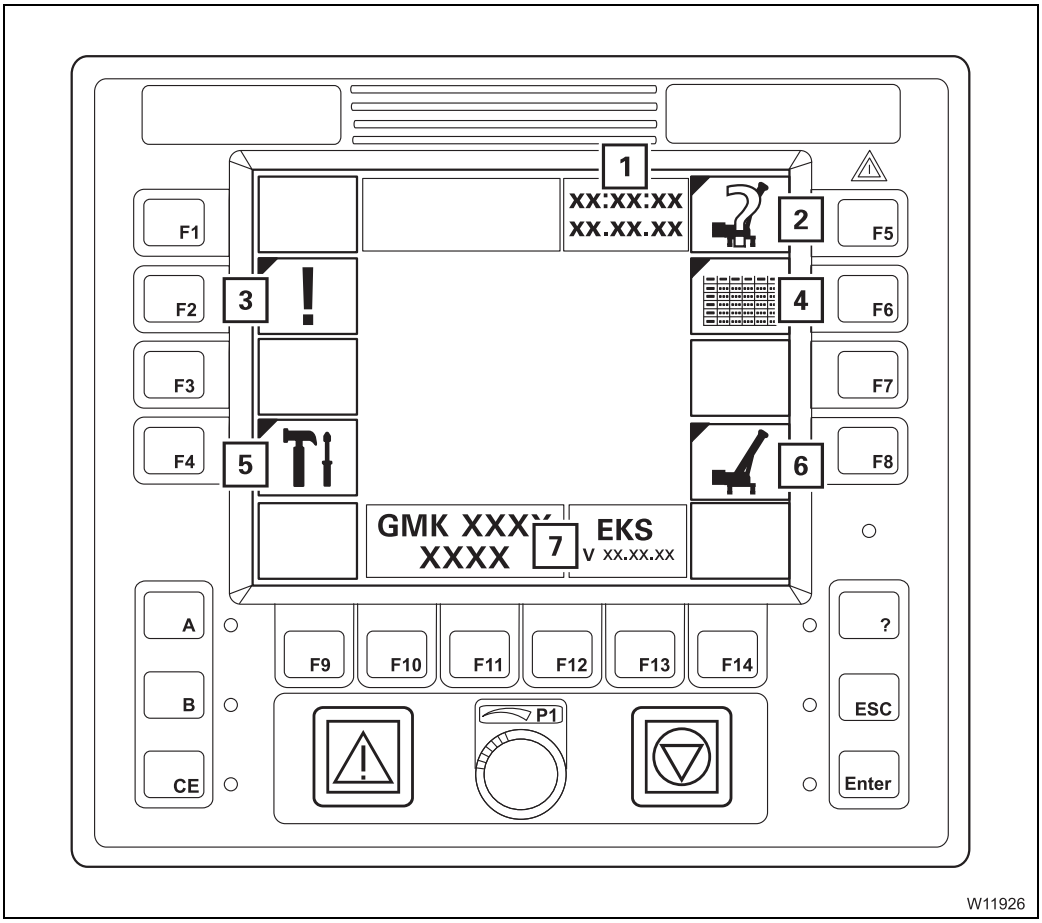


1	Display RCL	➠ p. 9 - 97
	Main menu overview	➠ p. 9 - 6
2	Sensor for brightness[1)]	➠ p. 9 - 96
3	Error/warning message	➠ p. 9 - 63
4	Buttons F1 to F14	➠ p. 9 - 63
5	Sensor for brightness[1)]	➠ p. 9 - 96
6	Opening the Error submenu	➠ p. 9 - 63
	Submenu overview	➠ p. 9 - 49
7	Exiting the submenu/input mode	➠ p. 9 - 64
8	Acknowledgement	➠ p. 9 - 96
9	RCL early warning	➠ p. 9 - 96
10	Entering values	➠ p. 9 - 64
11	RCL switch-off	➠ p. 9 - 96
12	Input confirmation	➠ p. 9 - 96

14.03.2018

9.1.11 RCL display – main menu

The main menu shows symbols for further submenus and symbols for current displays.



1 Date/time display p. 9 - 97
2 Enter rigging mode submenu p. 9 - 43
3 Error submenu p. 9 - 49
4 Lifting capacity table submenu p. 9 - 47
5 Settings submenu p. 9 - 50
6 Monitoring submenu p. 9 - 44
7 Serial number and program version displays p. 9 - 65

14.03.2018

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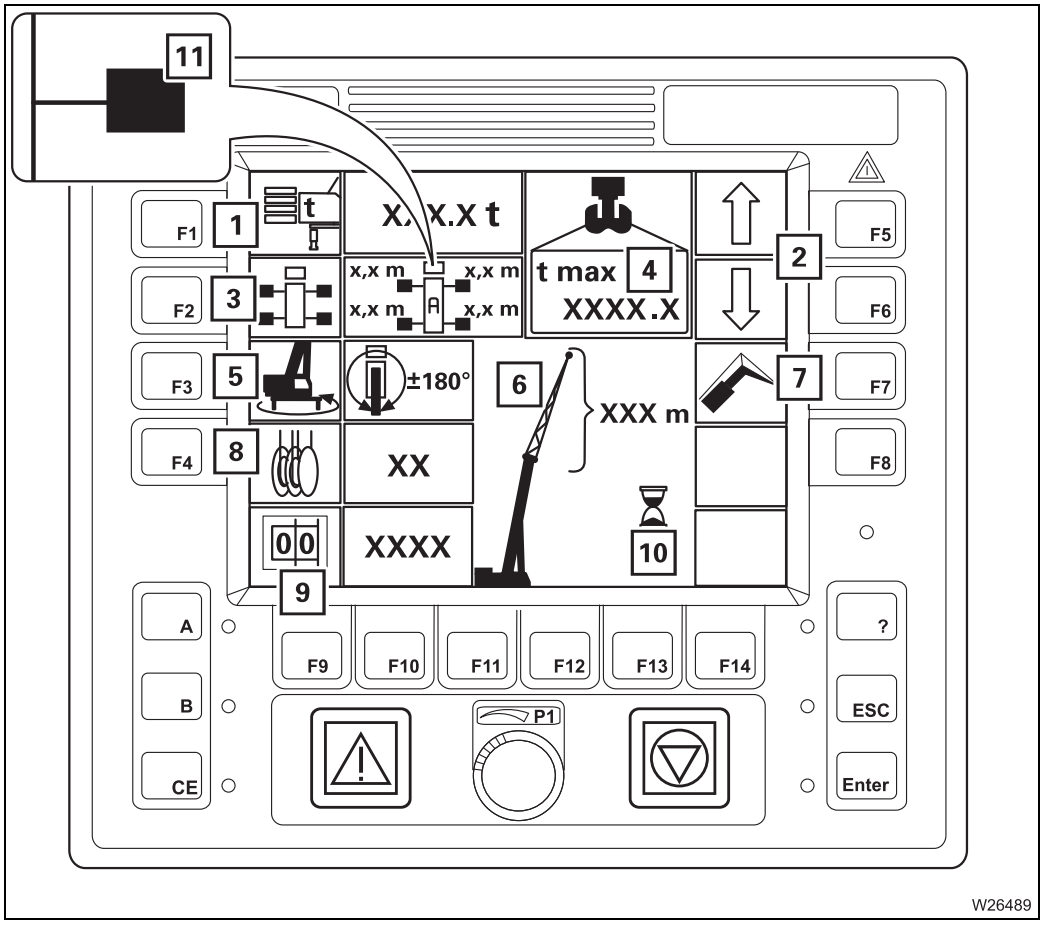
14.03.2018

9.1.12 Display RCL – submenus

Enter rigging mode submenu

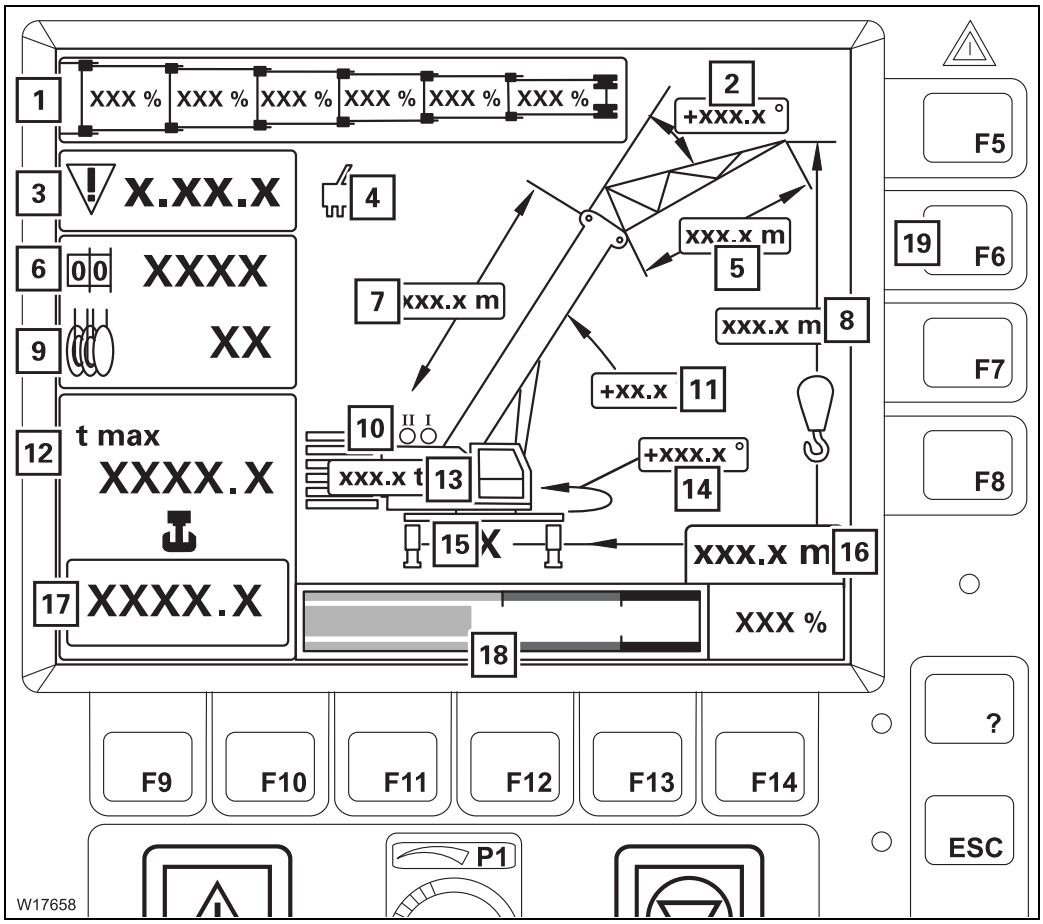


1	Enter counterweight	p. 9 - 99
2	Selection	p. 9 - 98
3	Enter outrigger span	p. 9 - 100
4	Maximum load display	p. 9 - 101
5	Enter slewing range	p. 9 - 100
6	Boom system display	p. 9 - 101
7	Boom system entry[1)]	p. 9 - 101
8	Enter reeving	p. 9 - 99
9	Enter RCL code	p. 9 - 98
10	Determine the displayed RCL code	p. 9 - 98
11	Outrigger span monitoring display[1)]	p. 9 - 100

[1)] Additional equipment

14.03.2018

Monitoring submenu



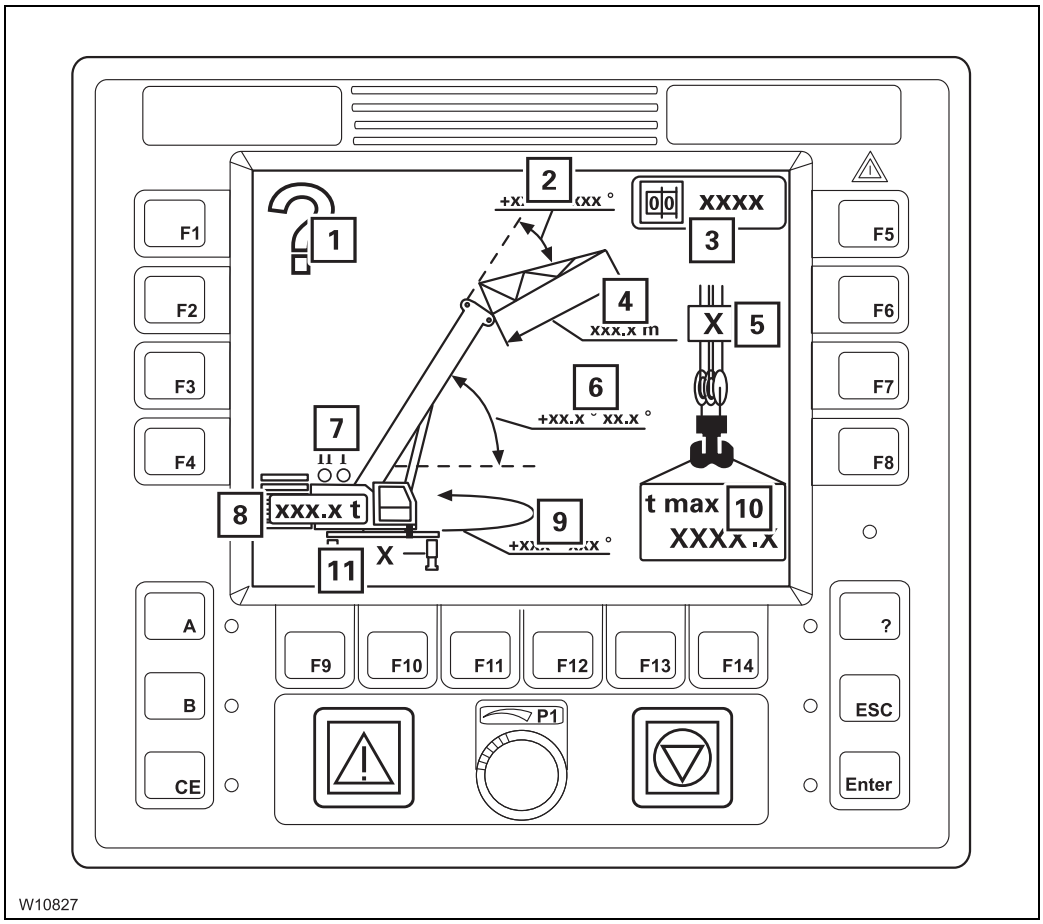
14.03.2018

1 Current telescope status display ➠ p. 9 - 103
2 Lattice extension inclination display[1)] ➠ p. 9 - 104
Angle of the lattice extension display[1)] ➠ p. 9 - 103
3 Error display ➠ p. 9 - 105
4 Service symbol display ➠ p. 9 - 105
5 Current length of lattice extension[1)] ➠ p. 9 - 105
6 Display RCL code ➠ p. 9 - 102
7 Current main boom length ➠ p. 9 - 105
8 Current overall height ➠ p. 9 - 105
9 Reeving display ➠ p. 9 - 102
10 Hoists display ➠ p. 9 - 102
11 Current main boom angle display ➠ p. 9 - 104
12 Maximum load display ➠ p. 9 - 104
13 Counterweight display ➠ p. 9 - 102
14 Current slewing angle display ➠ p. 9 - 105
15 Outrigger span display ➠ p. 9 - 102
16 Current working radius ➠ p. 9 - 105
17 Current load display ➠ p. 9 - 103
18 Current degree of utilisation display ➠ p. 9 - 104
19 Lifting capacity table submenu ➠ p. 9 - 103
Submenu overview ➠ p. 9 - 47

[1)] Additional equipment

14.03.2018

Rigging mode monitoring submenu



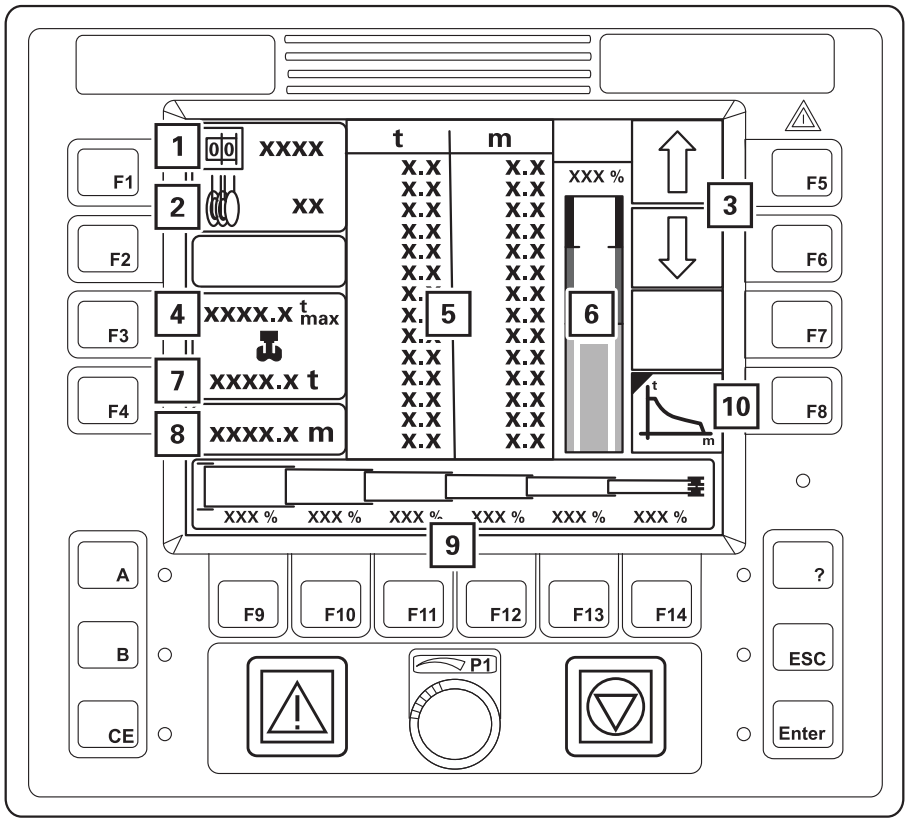
1 Query – accept rigging mode?
2 Permissible lattice extension working range[1)]
3 RCL code
4 Length of lattice extension
5 Reeving
6 Permissible main boom working range
7 Hoists display
8 Counterweight
9 Permissible slewing range
10 Maximum load
11 Outrigger span

➠ *Accepting the rigging mode*, p. 11 - 29

[1)] Additional equipment

14.03.2018

Lifting capacity table submenu



1 Display RCL code ➠ p. 9 - 106

2 Reeving display ➠ p. 9 - 106

3 Selection

4 Maximum load display ➠ p. 9 - 106

5 Lifting capacity table display ➠ p. 9 - 106

6 Current degree of utilisation display ➠ p. 9 - 106

7 Current load display ➠ p. 9 - 106

8 Current working radius display ➠ p. 9 - 106

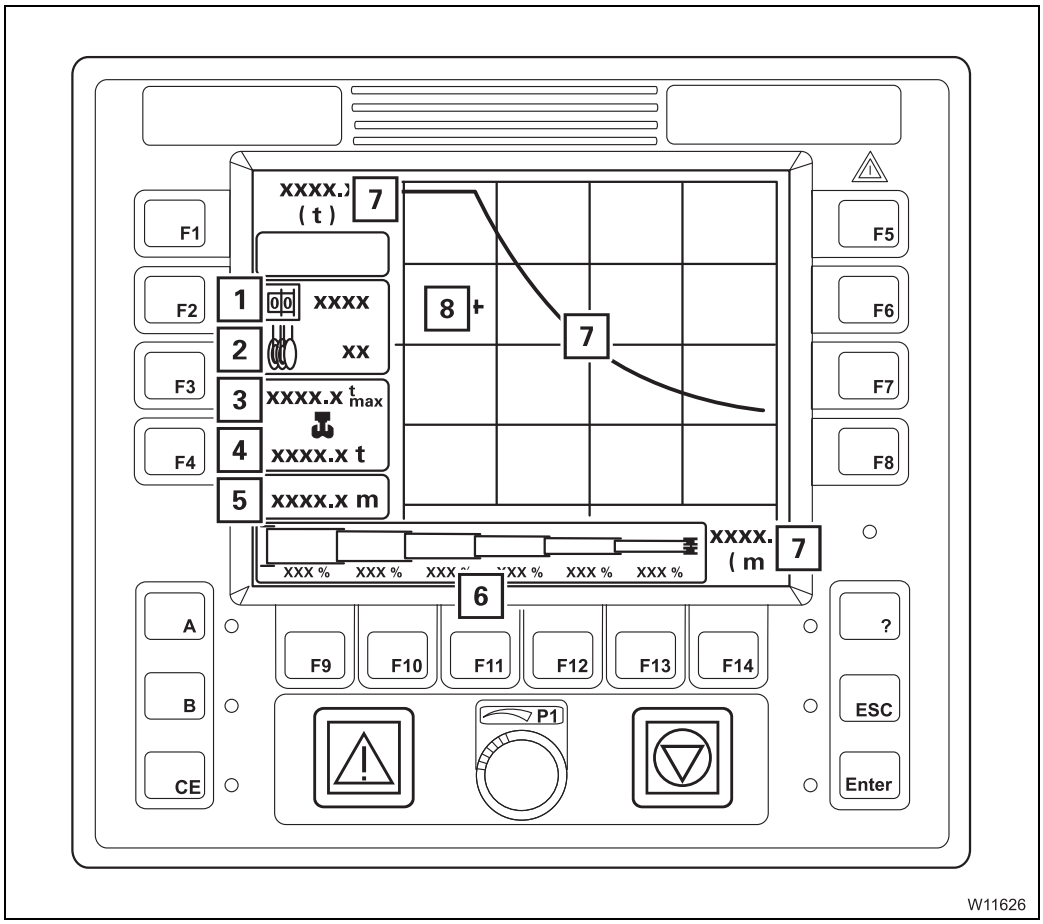
9 Telescope status display/input ➠ p. 9 - 106

10 Working range submenu[1)] ➠ p. 9 - 48

[1)] Additional equipment

14.03.2018

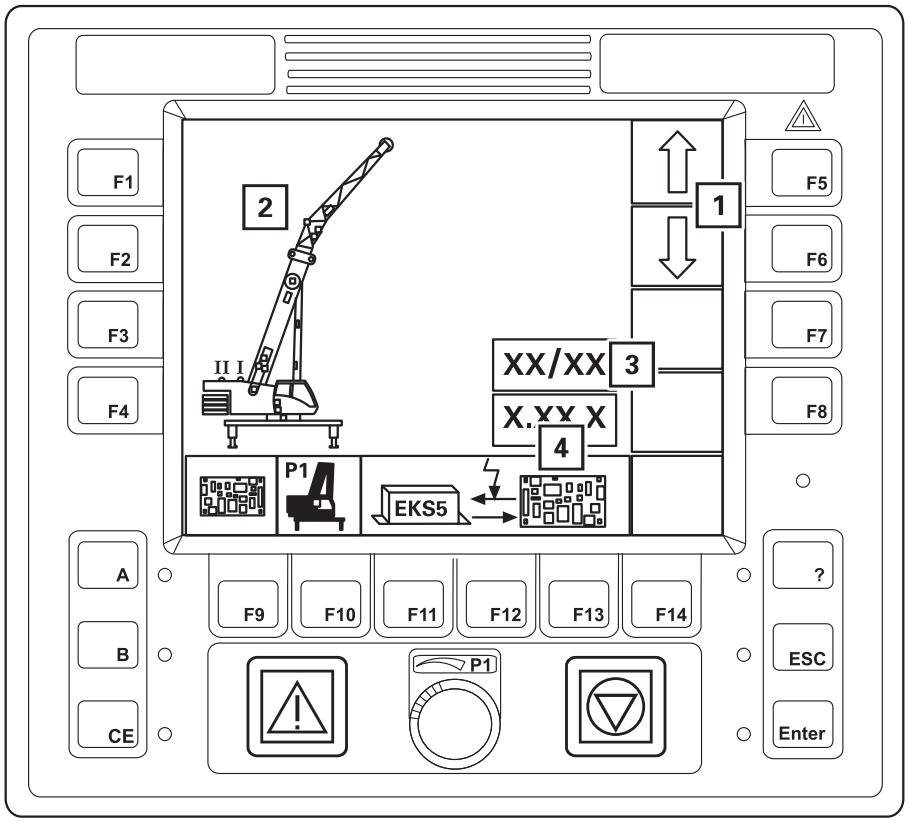
Working range submenu



1 Display RCL code ➠ p. 9 - 107
2 Reeving display ➠ p. 9 - 107
3 Maximum load display ➠ p. 9 - 107
4 Current load display ➠ p. 9 - 107
5 Current working radius display ➠ p. 9 - 107
6 Telescope status display/input ➠ p. 9 - 107
7 Permissible working range display ➠ p. 9 - 106
8 Current position display ➠ p. 9 - 107

14.03.2018

Error submenu



1 Selection p. 14 - 29

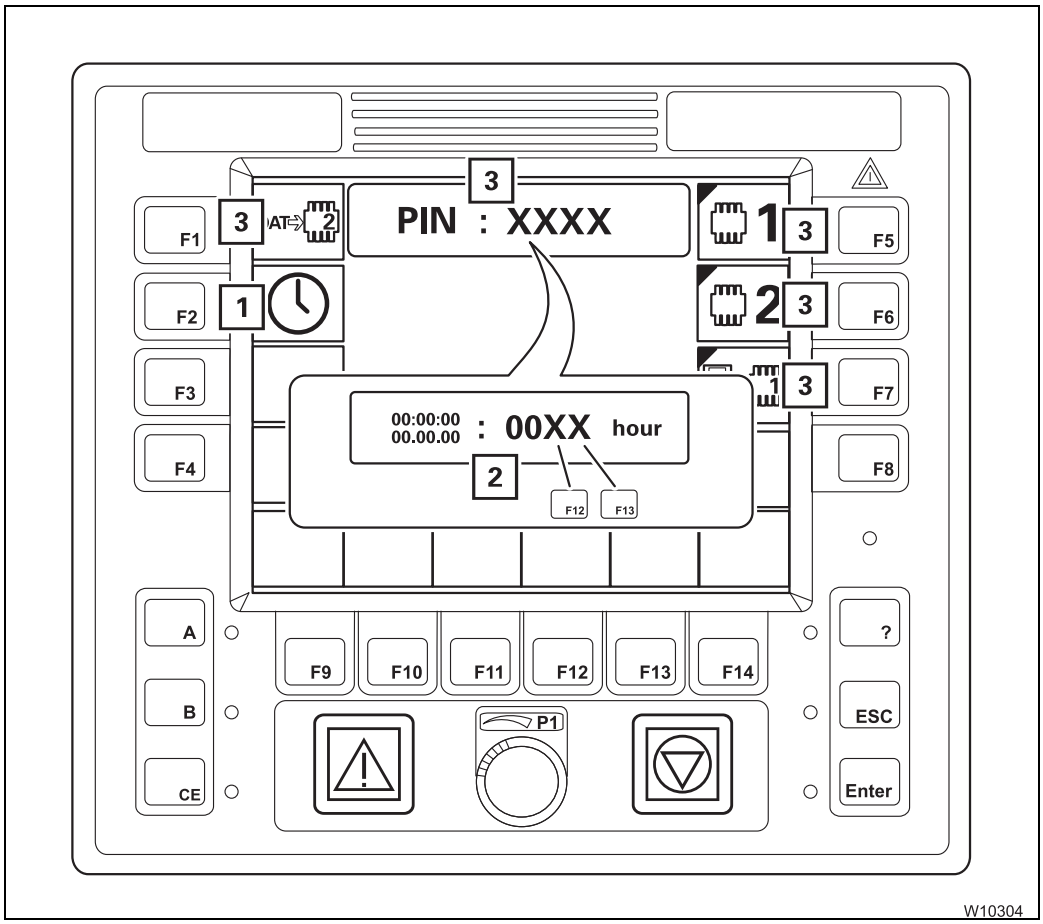
2 Display error location p. 14 - 29

3 Current errors/total errors display p. 14 - 29

4 Error display p. 14 - 29

14.03.2018

Settings submenu



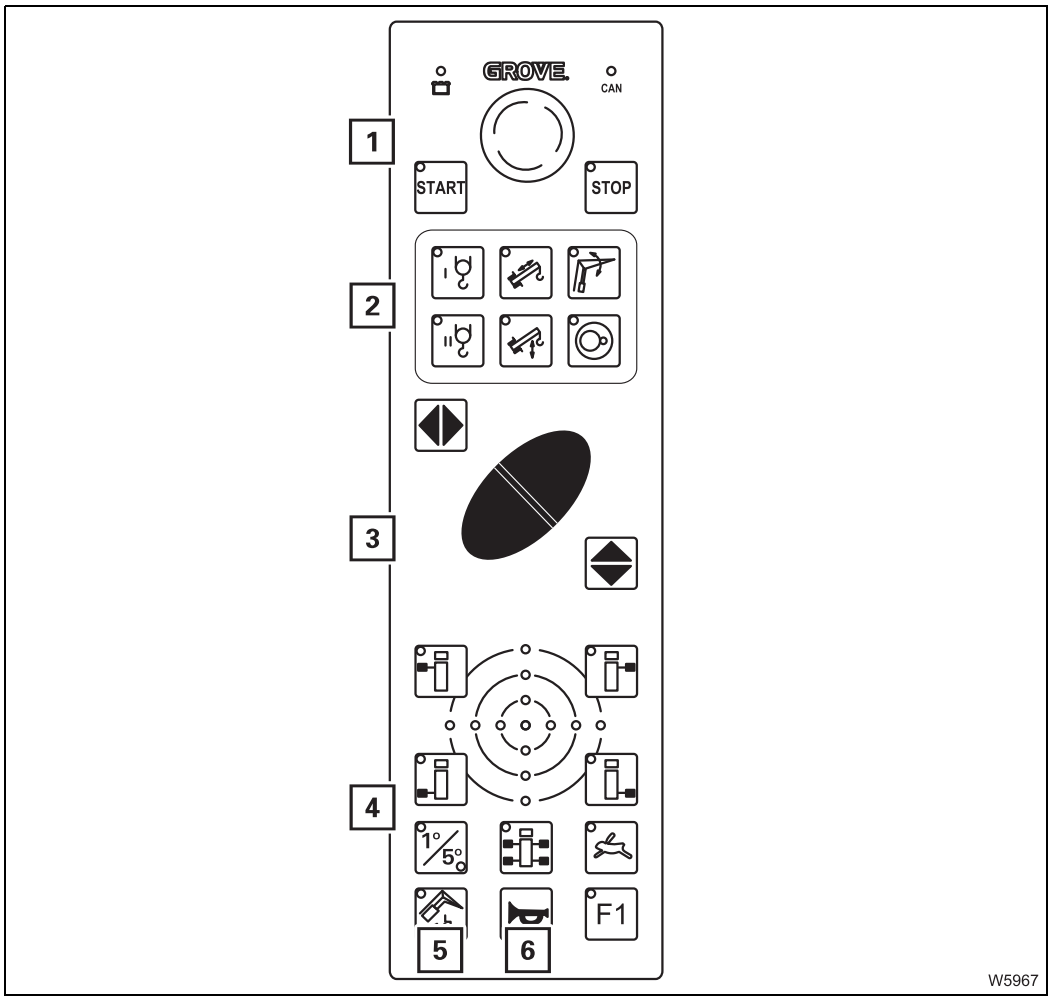
1 Entering the time/date p. 11 - 49

2 Enter time/date display p. 11 - 49

Buttons/displays (**3**) are only shown if a service device is connected. For this reason, these functions are not described in these operating instructions.

14.03.2018

9.1.13 Hand-held control



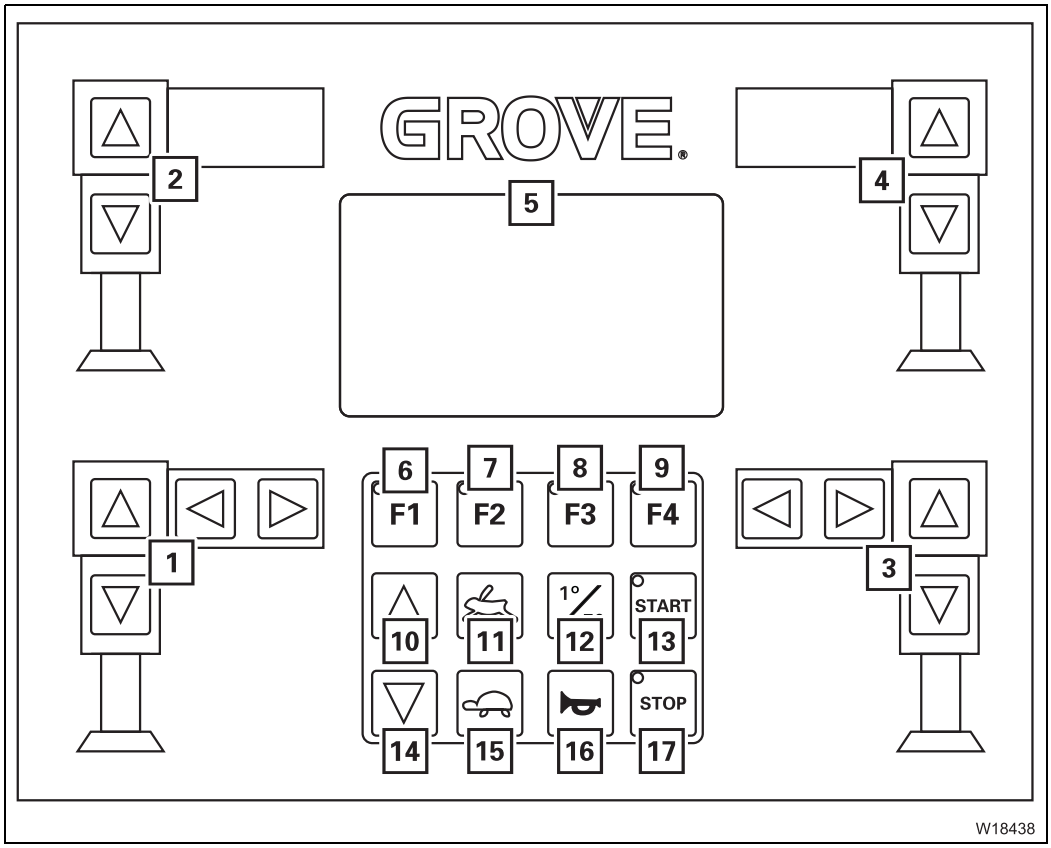
1 Engine control panel ➠ p. 9 - 115
2 Pre-select emergency operation ➠ p. 9 - 116
3 Function buttons ➠ p. 9 - 116
4 No function
5 No function
6 Horn ➠ p. 9 - 115

Required connections for the various movements; ➠ p. 9 - 114.

14.03.2018

9.1.14 Outrigger control units

Button



14.03.2018

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.

Outrigger button

1 Operate left outrigger p. 9 - 68

2 Operate left outrigger, opposite p. 9 - 68

3 Operate right outrigger p. 9 - 68

4 Operate right outrigger, opposite p. 9 - 68

5 Inclination indicator p. 9 - 70
Raise axle display p. 9 - 71

6 Additional function F1 on/Position lights for indicator lamps p. 9 - 69

7 Additional function F2 Select axle pairs p. 9 - 71

8 Additional function F3 Select axle pairs p. 9 - 71

9 Additional function F4 Menu selection p. 9 - 71
– Outriggers
or
– Raise axle

10 In the Outrigger menu p. 9 - 69
– Retract all outrigger cylinders
In the Raise axle menu
– Raise the axles p. 9 - 71

11 Pre-select high-speed mode p. 9 - 68

12 Switching over the measuring range p. 9 - 70

13 START engine

14 In the Outrigger menu p. 9 - 69
– Extend all outrigger cylinders
In the Raise axle menu
– Lower the axles p. 9 - 71

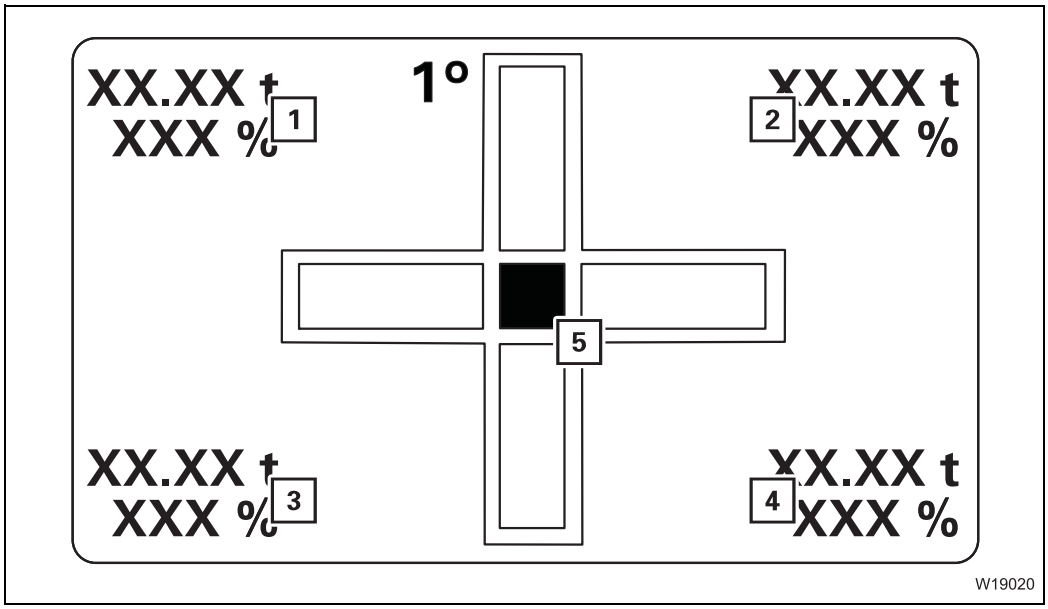
15 – Pre-select normal speed p. 9 - 68
– Automatic alignment p. 9 - 69
(as additional function F1)

16 Horn

17 STOP engine

14.03.2018

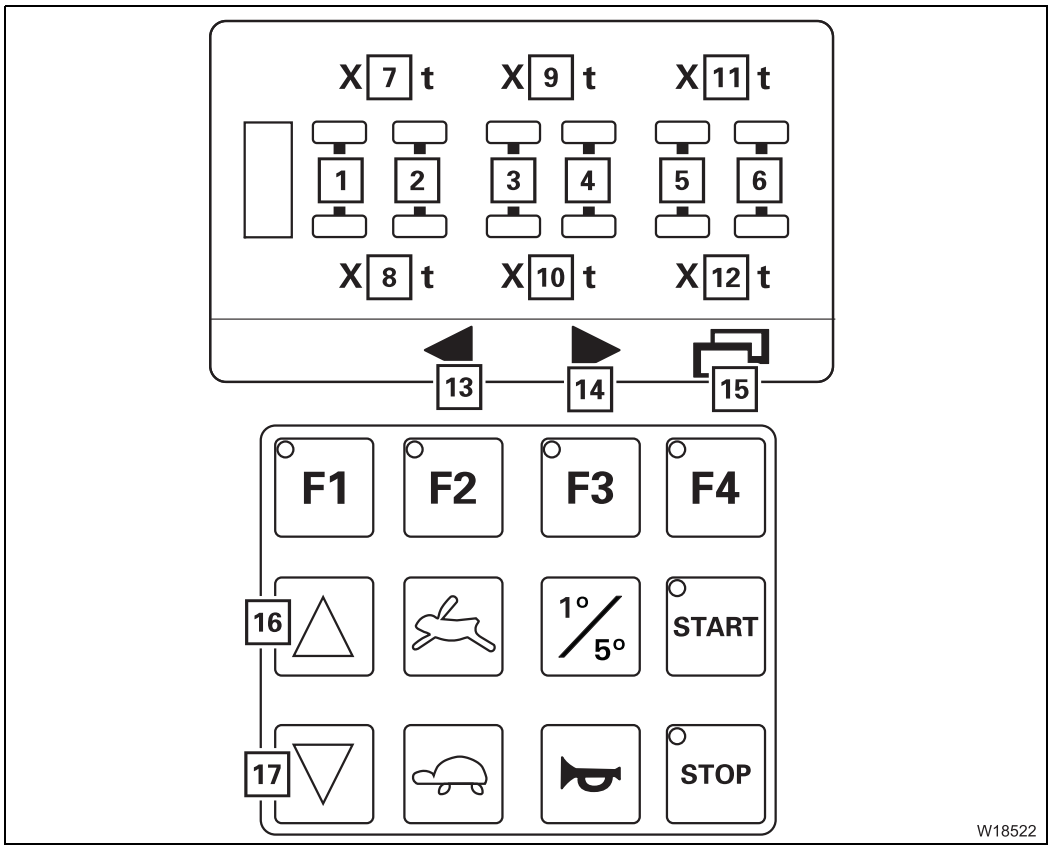
Inclination and outrigger pressure display



1 Left-hand outrigger pressure display, opposite ➠ p. 9 - 73
2 Right-hand outrigger pressure display, opposite ➠ p. 9 - 73
3 Left-hand outrigger pressure display ➠ p. 9 - 73
4 Right-hand outrigger pressure display ➠ p. 9 - 73
5 Current inclination display ➠ p. 9 - 70

14.03.2018

Raise axle display



1 Axle line 1 p. 9 - 71
2 Axle line 2 p. 9 - 71
3 Axle line 3 p. 9 - 71
4 Axle line 4 p. 9 - 71
5 Axle line 5 p. 9 - 71
6 Axle line 6 p. 9 - 71
7 Axle load display, axle lines 1 and 2, opposite p. 9 - 72
8 Axle load display for axle lines 1 and 2 p. 9 - 72
9 Axle load display, axle lines 3 and 4, opposite p. 9 - 72
10 Axle load display for axle lines 3 and 4 p. 9 - 72
11 Axle load display, axle lines 5 and 6, opposite p. 9 - 72
12 Axle load display for axle lines 5 and 6 p. 9 - 72
13 Axle selection p. 9 - 71
14 Axle selection p. 9 - 72
15 Switch menu p. 9 - 71
16 Raise the axles p. 9 - 72
17 Lower the axles p. 9 - 72

14.03.2018

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14.03.2018

9.2 Short description of the operating elements

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

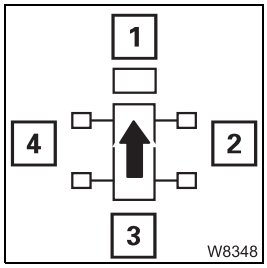
This section does not contain all the requirements that must be fulfilled for several operating elements to be active.
If some operating elements do not work, first read the following chapters which are referred to at the respective places before contacting **Manitowoc Crane Care**.

9.2.1 Definition of direction information

Basic rule

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

On the carrier

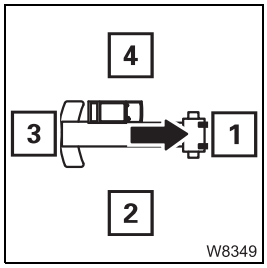


The driver's cab is always at the front, which means that:

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

Forwards always means with the driver's cab leading,
Backwards always means with the rear lights on the carrier leading.

On the superstructure

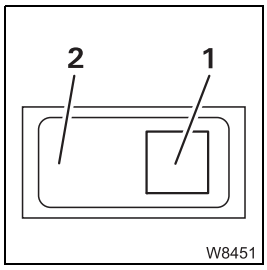


The main boom head is always at the front, which means that:

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

14.03.2018

Switches



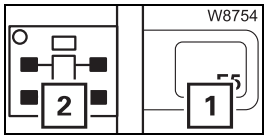
For switches and buttons, the terms **down** and **up** are used.

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

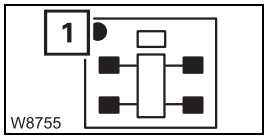
- **Down:** If (**1**) press – next to the symbol
- **Up:** If (**2**) press – opposite the symbol

9.2.2 General rules for buttons and symbols on the display

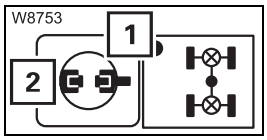
The symbols shown as an example are not present on all crane types.
The following rules apply in all menus:



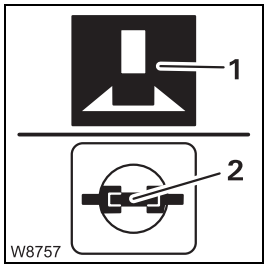
– A button (**1**) is only active when the corresponding symbol (**2**) is black. Buttons next to a grey symbol always have no function.



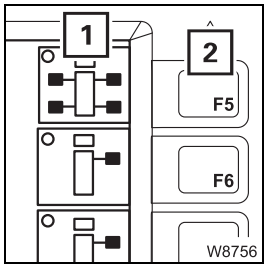
– Some symbols have a dot (**1**). The colour of the dot indicates the current switching state of the button.
  - **Green:** button on – the corresponding gear change is being carried out
  - **Black:** button off – the corresponding gear change is not being carried out



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



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



– If the section contains, e.g., "Press button (**1**)...", this always refers to the button (**2**) next to or below the symbol shown (**1**). This applies even when the button itself is not visible in the illustration.

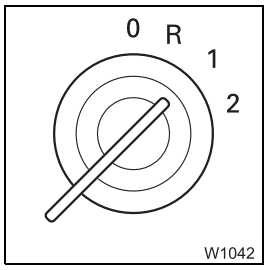
14.03.2018

9.2.3 Engine for crane operation

Side panel

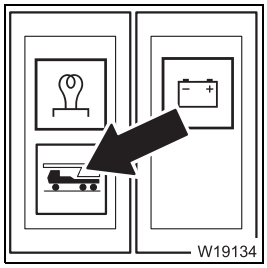
➠ *Starting the engine*, p. 10 - 12.

Ignition lock



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

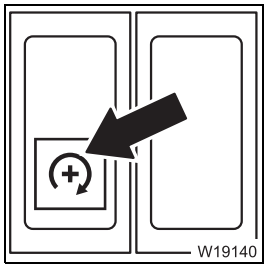
➠ p. 10 - 9



Carrier ignition monitoring

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

➠ p. 10 - 12



Set idling speed

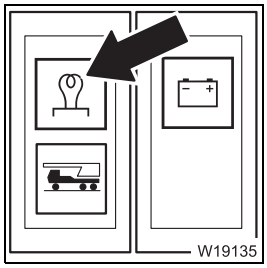
– The engine must be off:

- **Press down once:** Engine starts,
  Idling speed = standard

– The engine is running:

- **Press down:** Increasing the idling speed
- **Press up:** Decrease idling speed,
  after about 6 seconds: engine stop.

➠ p. 10 - 16



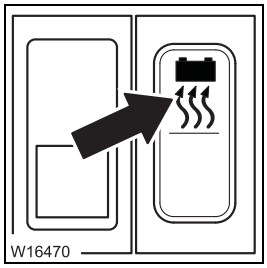
Flame start system monitoring

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

➠ p. 10 - 13

14.03.2018

Console, rear



Battery heater on/off

- **Up:** Heating system on
- **Down:** Heating system off

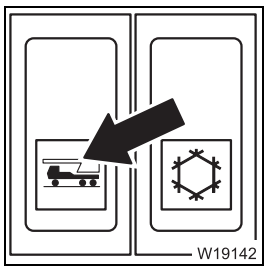
Further information on operation; ➠ *Separate operating instructions*.

ECOS display

There is no short description of the displays in the submenus;
➠ *Monitoring submenu*, p. 10 - 15,
➠ *Warning submenu*, p. 11 - 110.

9.2.4 Engine for driving

Side panel



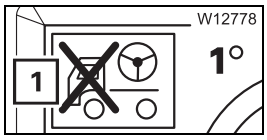
Carrier ignition on/off

There is a lamp in the button.
The superstructure ignition has been switched on for approx. 30 seconds.

- **Press down once:** Ignition on – lamp flashes
  After engine start: lamp lights up
- **Press up once:** Ignition off – lamp is off while engine is running, engine cutout

➠ p. 12 - 23

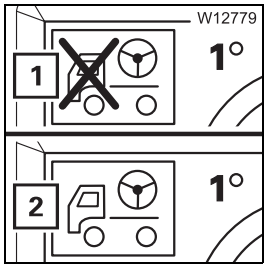
Main menu



Combined operation display

The prerequisites for combined operation have not been met:

1 Grey: Combined operation switched off – button disabled



Combined operation on

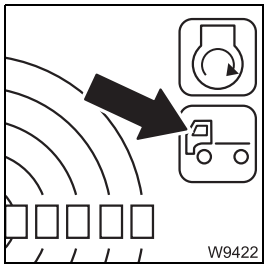
The prerequisites for combined operation have been met:

- **1 Red:** Combined operation switched off – press button once, combined operation on, symbol (**2**) displayed
- **2 Green:** Combined operation switched on – button disabled, to switch off – carrier ignition off

➠ *Driving in combined operation*, p. 13 - 10

14.03.2018

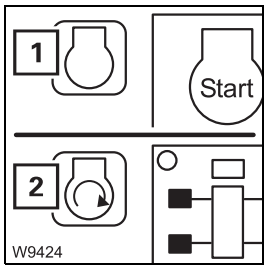
Outriggers submenu



Carrier ignition display

- **Red:** Ignition off – engine start not possible
- **Green:** Ignition on – engine start possible

p. 12 - 23

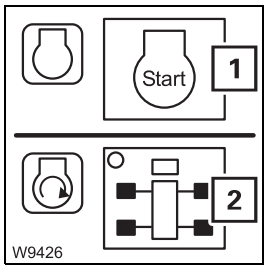


Display for engine for driving on/off

1 Red: Engine off

2 Green: Engine on

p. 12 - 23



Start engine for driving

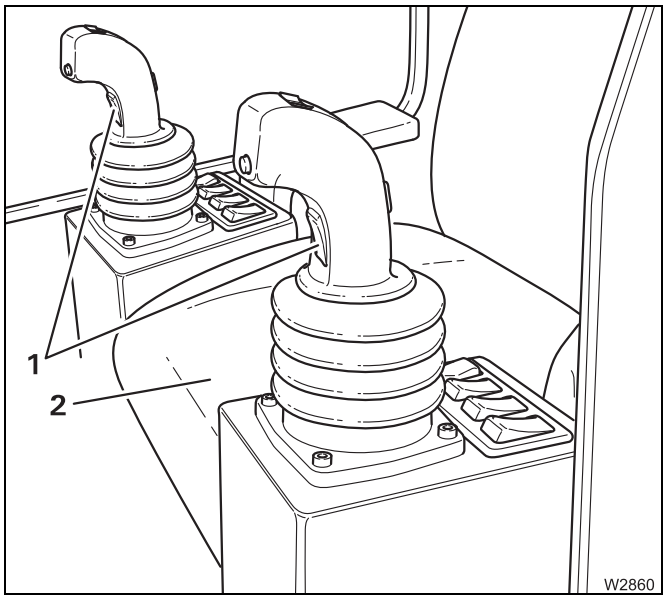
1	**Starting the engine:**	Press button once
2	**Engine running:**	Button has function *Pre-select all supporting cylinders*
	Switch off the engine:	Switch off the carrier ignition

p. 12 - 23

14.03.2018

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 - 11

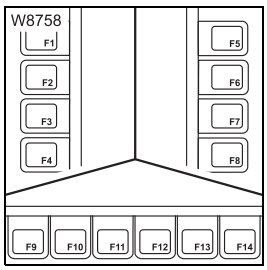
14.03.2018

9.2.6 ECOS crane control

The truck crane GMK6300L-1 is equipped with the **ECOS** electronic crane control (**E**lectronic **C**rane **O**perating **S**ystem). The ECOS includes a control unit in the crane cab, an operating unit in the driver's cab and several control units (ESX0, ESX1, ESX2 etc.) and I/O circuit boards (I/O 0, I/O 1 etc.) distributed on the superstructure and carrier.

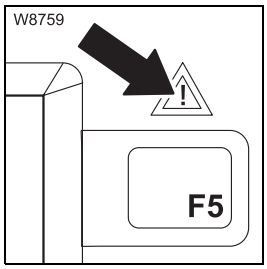
Control unit

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



Buttons F1 to F14

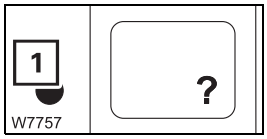
The function of buttons F1 to F14 is shown on the symbol next to or above the button. After the button is pressed, the function displayed is executed provided it has been released.



Error/warning message

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

➠ p. 11 - 114

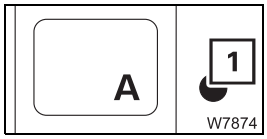


Opening the Error submenu

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

- **Press the button once:** This opens the *Errors* submenu

➠ p. 11 - 114



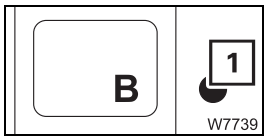
Opening the Warning submenu

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

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

➠ p. 11 - 110

14.03.2018

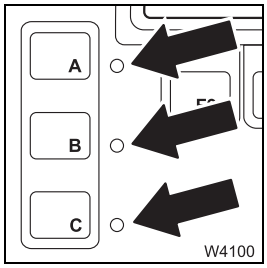


Opening the Warning submenu

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

– **Press the button once:** This opens the *Warning* submenu for the carrier

p. 11 - 110

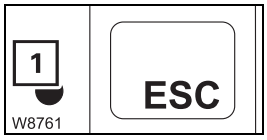


Entering the keycode

The lamps next to all three buttons are lit.

– **Enter keycode:** Press buttons in the required sequence and confirm keycode.

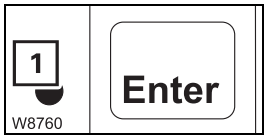
Telescoping emergency program, p. 14 - 45



Exiting the submenu/input mode

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

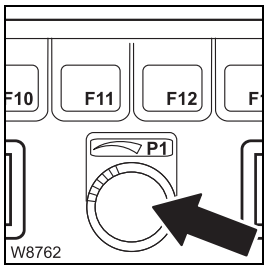
– **Press the button once:**
  – The opened submenu closes – the menu from the next higher level is opened
  – Input mode is deactivated



Input confirmation

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

– **Press the button once:** A newly entered value is saved

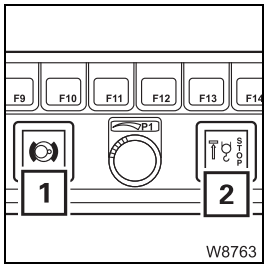


Entering values

Input mode is switched on.

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

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

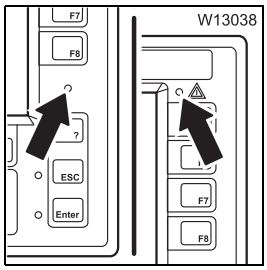


Other

1 Slewing gear brake monitoring; p. 9 - 81

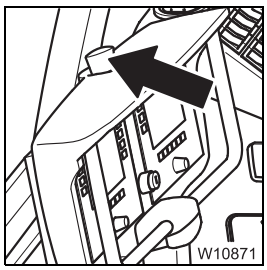
2 Lifting limit switch warning; p. 9 - 81

14.03.2018



Sensor for brightness

Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted.
Manual input; p. 10 - 9.

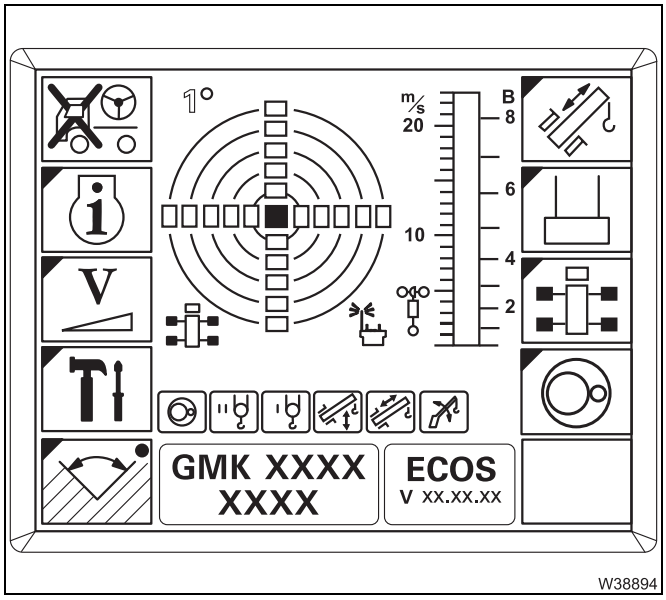


Emergency stop switch

May only be used in an emergency.

– **Press:** Engine off – crane functions stop immediately. Switch latches
– **Turn switch while pressing:** Switch returns to initial position – crane functions released

p. 10 - 22

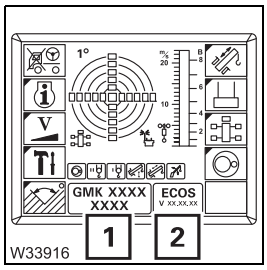


ECOS display

Ignition on – Main menu display

Symbols with blue corner = submenu

Open submenu – Press the button next to the symbol once



Serial number and program version displays

1 Serial number

2 Current ECOS programme version – always include in the event of a malfunction; p. 14 - 35.

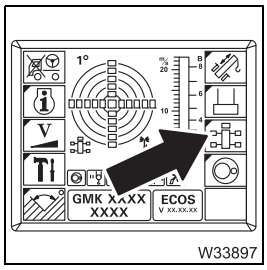
14.03.2018

9.2.7 Outriggers

➠ *Extending/retracting outrigger beams*, p. 12 - 35
➠ *Extending/retracting supporting cylinders*, p. 12 - 41

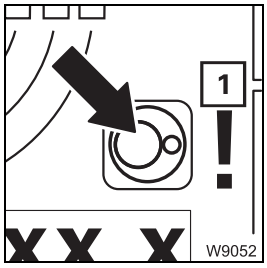
In the Outriggers submenu

All directional information refers to the carrier; ➠ p. 9 - 57.



Outrigger submenu

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

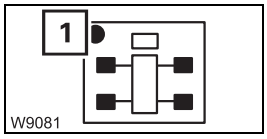


Slewing gear/movements locked display

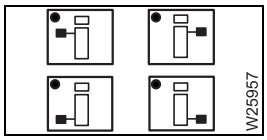
– **Red** Slewing gear switched off
– **Green:** Slewing gear switched on – outrigger movement disabled, symbol (**1**) appears after pre-selection of the outrigger

Pre-selecting the outrigger

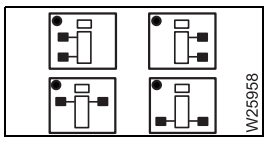
All supporting cylinders



– **Pre-select:** Press button once – dot (**1**) turns green – pre-selection on
After 10 seconds – dot (**1**) turns black – pre-selection off



The following functions are pre-selected in the same way:
– **Front left-hand outrigger**
– **Front right-hand outrigger**
– **Rear left-hand outrigger**
– **Rear right-hand outrigger**

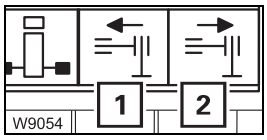


– **Left-hand supporting cylinder**
– **Right-hand supporting cylinder**
– **Front supporting cylinder**
– **Rear supporting cylinder**

14.03.2018

Retract/extend outrigger beam/supporting cylinder

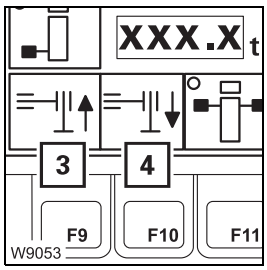
Slewing gear is switched off – outrigger pre-selection on.



1 Retract: Press button – outrigger beam retracts

2 Extend: Press button – outrigger beam extends

p. 12 - 37



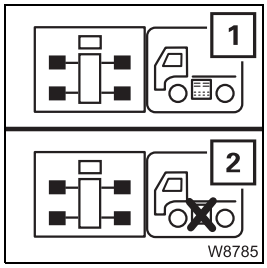
3 Retract: Press button – outrigger cylinder retracts

4 Extend: Press button – outrigger cylinder extends

p. 12 - 43

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

In the Settings submenu



Outrigger control units on/off

– **To switch on:** Press button until symbol (**1**) appears

– **To switch off:** Press button until symbol (**2**) appears

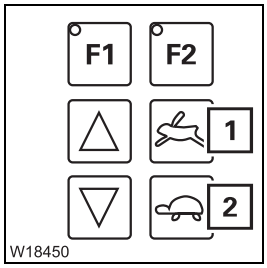
p. 12 - 31

14.03.2018

On the outrigger control units

All directional information refers to the carrier; ➠ p. 9 - 57.

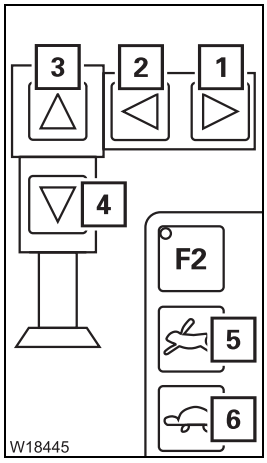
The display fields in the *Settings* submenu need to be switched on to operate in crane mode.



Pre-select high-speed/normal speed mode

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

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



Operating the left outriggers (next to control unit)

Button (**5**) or (**6**) is pressed.

1 Retract: Press button – outrigger beam retracts[1)]

2 Extend: Press button – outrigger beam extends[1)]

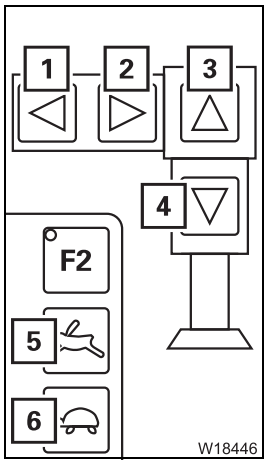
3 Retract: Press button – outrigger cylinder retracts

4 Extend: Press button – outrigger cylinder extends

[1)] only on operator's side

Outrigger beams; ➠ p. 12 - 36
Supporting cylinders; ➠ p. 12 - 42

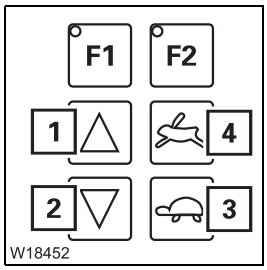
Movement stops after the button is released, and when an end position is reached.



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*.

14.03.2018



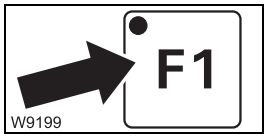
Extending/retracting all supporting cylinders

Button (**3**) or (**4**) is pressed.

1 Retract: Press button – all outrigger cylinders retract

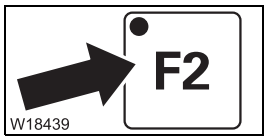
2 Extend: Press button – all outrigger cylinders extend

Movement stops after the button is released, and when an end position is reached; ➠ p. 12 - 42.



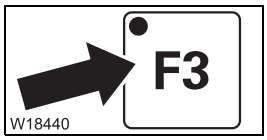
Additional function F1 on

Always use in combination with other buttons.



Additional function F2 Raise axle is on

Select the axle pairs

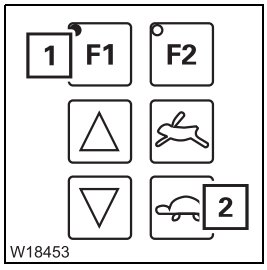


Additional function F3 Raise axle is on

Select the axle pairs

Additional function F4

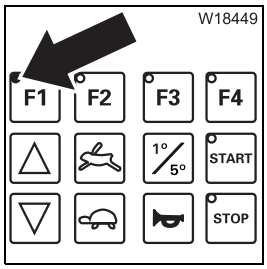
Switch between Inclination display/Raise axle menu



– **Automatic alignment**

Press button (**1**) and button (**2**) –
Truck crane is levelled horizontally
The process stops as soon as the truck crane is levelled horizontally or the button is released

➠ p. 12 - 49



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

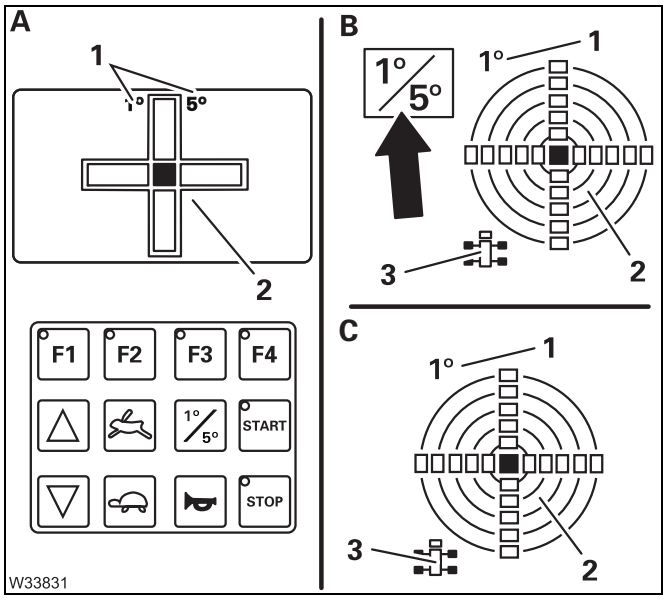
– **Display field lighting on:** Press any button

➠ p. 12 - 36

14.03.2018

9.2.8 Inclination indicators

➠ *Inclination indicators*, p. 12 - 46



Current inclination display

A On the *outrigger* control units

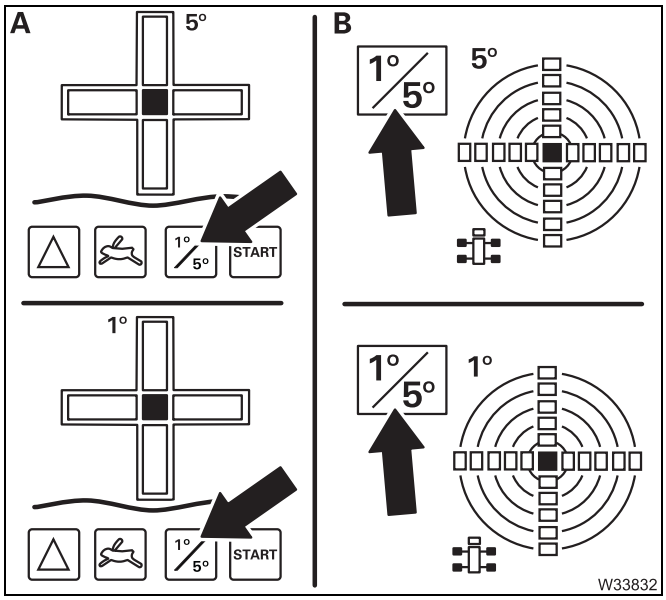
B In the main menu

C In the *Outriggers* submenu

1 Measuring range display

2 Inclination indicator

3 Directional indicator



Switching over the measuring range

A On the *outrigger* control units

Press button once – the current measuring range 1° or 5° is shown

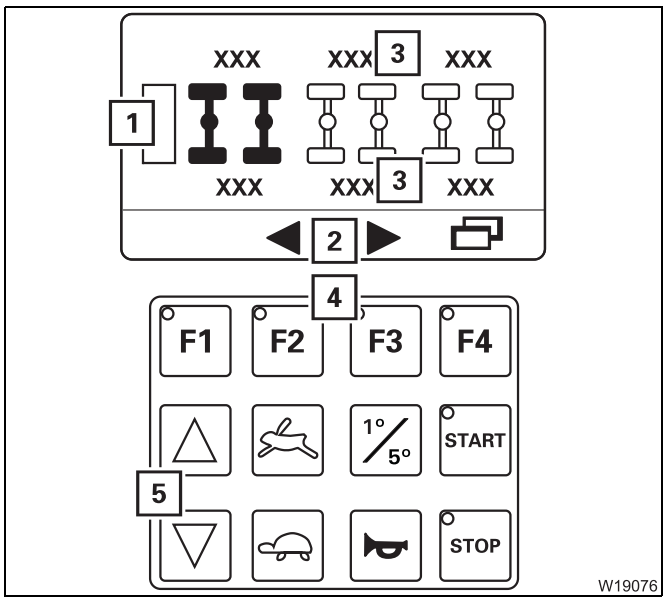
B In the *Outriggers* submenu

14.03.2018

9.2.9 Raise axle

When the suspension is switched off (blocked), the *Raise axle* function can be used to raise or lower axle lines or axle pairs, depending on the selection made.

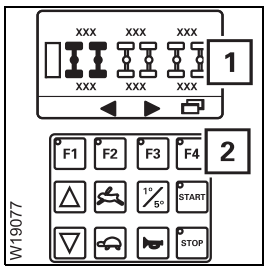
Outrigger control units



Raise axle display

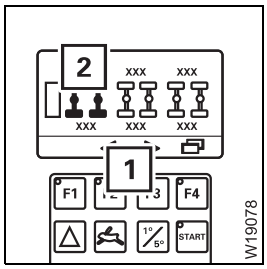
1 Selected axle pairs display
2 Directional indicator
3 Axle load display
4 Axle selection
5 Raising/lowering axles

➠ p. 13 - 5



Switching on axle raising

Press button (**2**) until display (**1**) appears.

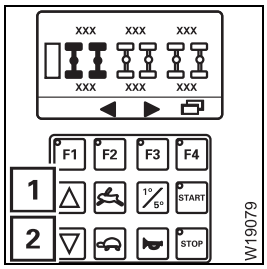


Axle selection

Pre-select: Press button (**1**) – the selected axle pairs (**2**) or axle lines turn black
Pressing the button (**1**) again changes the selection.

14.03.2018

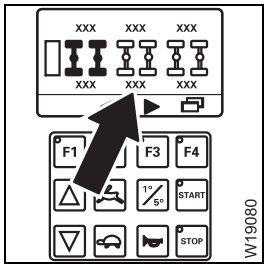
When you raise/lower the axles, the carrier's horn will sound once.



Raising/lowering axles

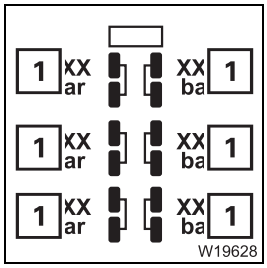
Raise:	Press button (**1**) – the selected axles are raised and the truck crane is lowered
Lower:	Press button (**2**) – the selected axles are lowered and the truck crane is raised

Movement stops after the button is released.



Axle load display

– **Unit of measurement:** Displayed depending on setting
  – **t** – tons or
  – **klbs –** kilopounds – (1 kilopound = 1,000 lbs)



Lowering the axles not functioning

If the maximum permissible operation pressure (**1**) of 210 bar (3,045 psi) per axle pair has been exceeded, then

– It is not possible to lower these axles any further

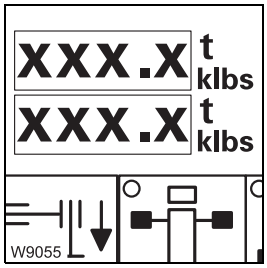
– Only the other axles can be moved.

Operation of the axle raising on the opposite control unit is the same.

14.03.2018

9.2.10 Outrigger pressure displays

Outriggers submenu

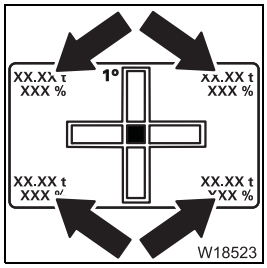


Outrigger pressure display

– **Unit of measurement:** Displayed depending on setting
  – **t** – tons or
  – **klbs –** kilopounds – (1 kilopound = 1,000 lbs)
– **Precision:** One decimal place

➠ p. 12 - 52

Outriggers control units



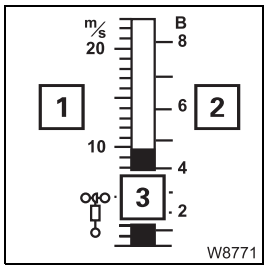
Outrigger pressure display

– **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 - 52

9.2.11 Anemometer display

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



1 Scale in meters per second (m/sec)
2 Beaufort scale (B)
3 Wind speed display

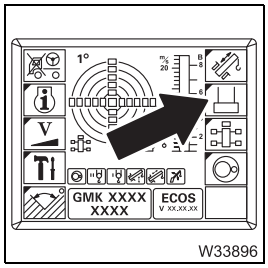
➠ p. 11 - 52

14.03.2018

9.2.12 Counterweight submenu

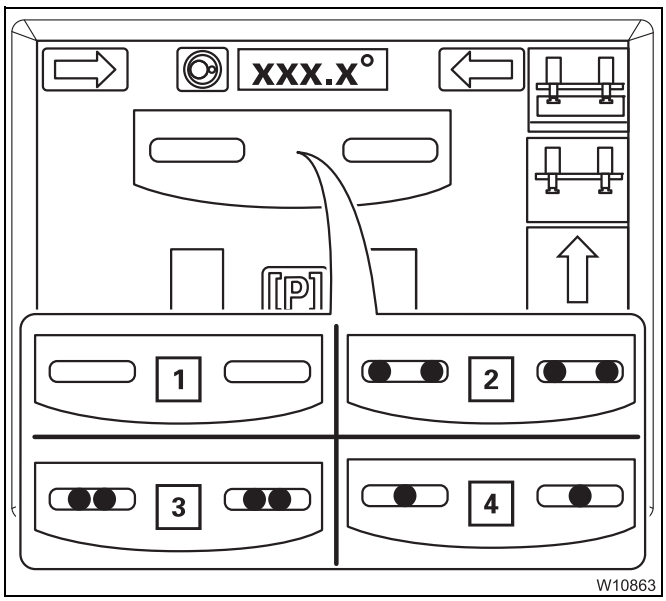
Counterweight submenu

➠ *Rigging/unrigging the counterweight*, p. 12 - 53,
➠ *Counterweight hoist unit*, p. 12 - 75.



Counterweight submenu

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



Rigging position display

1 White – not in the rigging range

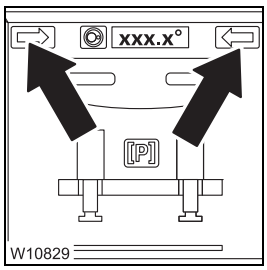
In the rigging range, the following rigging positions are displayed.

2 Green – position for lifting cylinder movements

3 Red – intermediate position, lifting cylinder movements blocked

4 Green – position for lifting/lowering the counterweight (0° position)

➠ p. 12 - 77

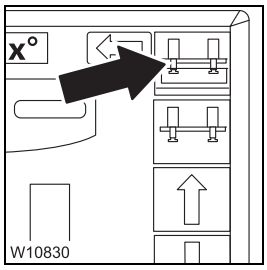


Display of slewing direction for automatic mode

Automatic mode is switched on.

– **Arrow lights up:** Move control lever for slewing gear in direction of arrow – automatic mode is executed

14.03.2018



Automatic mode, rigging

– Display

Yellow: Recognition that the counterweight is rigged

Flashing: Automatic mode on

Grey Automatic mode cancelled or no recognition that the counterweight is rigged

The superstructure is within the rigging range, the slewing gear is switched on and the lifting cylinders are retracted

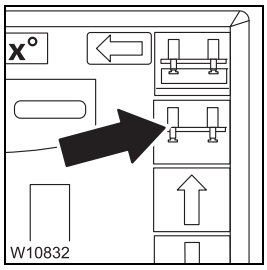
– To switch on: Press button once – symbol flashes yellow

– To execute: Move control lever for slewing gear, automatically:
– Slewing in position *Move lifting cylinders*
– Extend lifting cylinders,

Move the control lever for slewing gear in indicated direction, automatically:
– Slewing in position *Lift/lower counterweight*,
– Lift counterweight,
– Pre-tension counterweight.

Automatic mode ends – symbol yellow

p. 12 - 77



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: Press button once – symbol flashes yellow

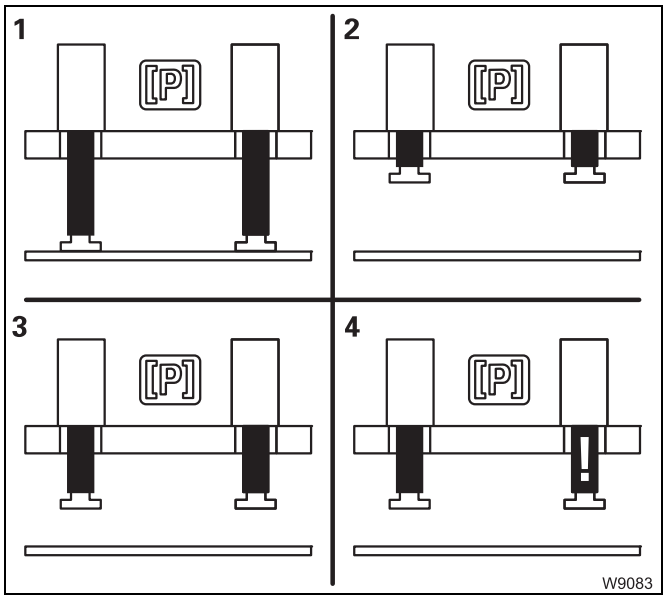
– To execute: Move control lever for slewing gear, automatically:
– Slewing in position *Lift/lower counterweight*,
– Lower the counterweight,

Move the control lever for slewing gear in indicated direction, automatically:
– Slewing in position *Move lifting cylinders*,
– Retract the lifting cylinders,

Automatic mode ends – symbol yellow

p. 12 - 78

14.03.2018



Lifting cylinder position display

The current position of the counterweight lifting cylinders is shown by different symbols:

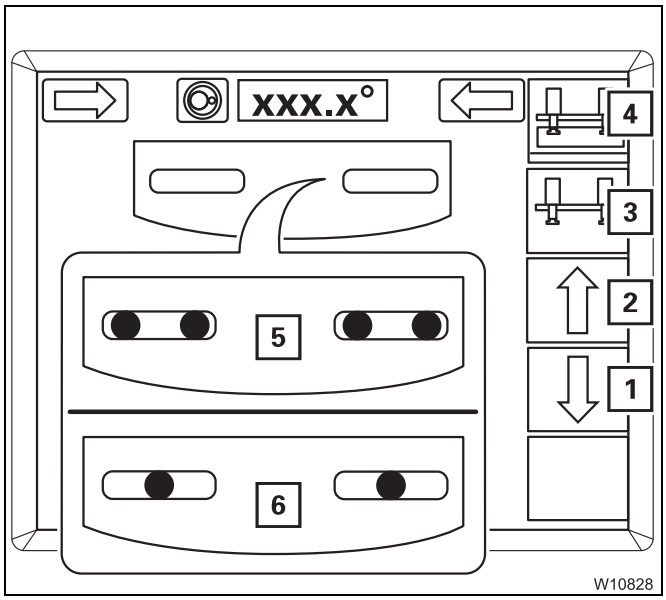
1 Green – extended

2 Green – retracted

3 Yellow – intermediate position

4 Violet – error

➠ p. 12 - 76



Extending/retracting the lifting cylinders

1 Extend:

– Display (**5**) and symbol (**3**) yellow **or**
– Display (**6**) and symbol (**4**) yellow

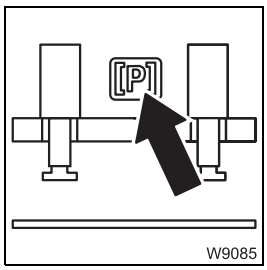
Press button – slewing is blocked after extension

2 Retract:

Press button – 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 - 76.

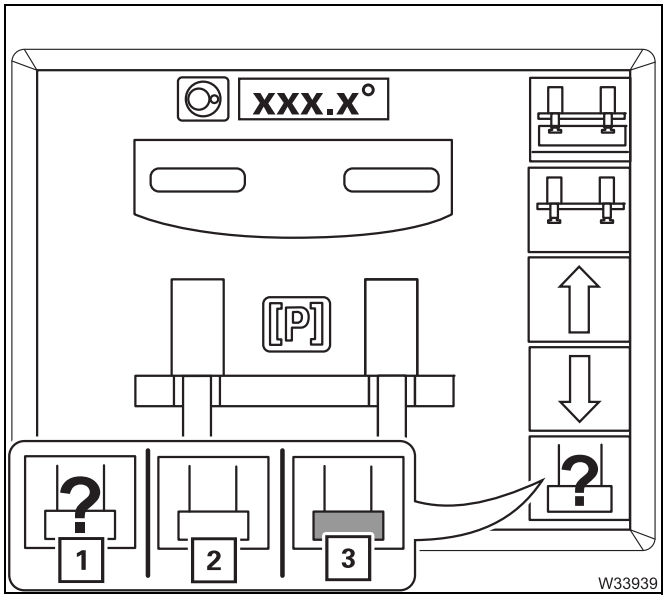
14.03.2018



Pre-tensioning pressure display

– **Green:** Pre-tensioning pressure reached
– **Red:** Pre-tensioning pressure too low – pre-tension counterweight

➠ p. 12 - 77



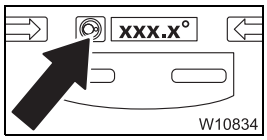
Counterweight recognition

The different states of the counterweight detection system are shown by three symbols.

1 No weight detected – counterweight lowered or unrigged

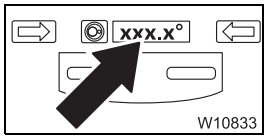
2 Weight being calculated – when raising the counterweight

3 Weight detected – counterweight raised and pretensioned. No other counterweight combination can be entered.



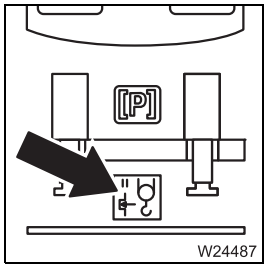
Slewing gear display

Identical with the display in the *Slewing gear/Houselock* submenu;
➠ p. 9 - 83.



Current slewing angle display

Identical with the display in the *Slewing gear/Houselock* submenu;
➠ p. 9 - 83.



Auxiliary hoist lock display

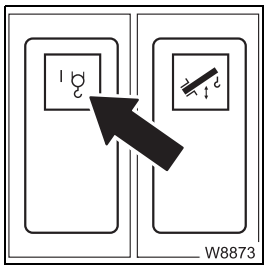
Identical with the display in the *Slewing gear/Houselock* submenu;
➠ p. 9 - 83.

➠ *Counterweight hoist unit*, p. 12 - 75

14.03.2018

9.2.13 Main hoist

Main hoist, p. 11 - 54.

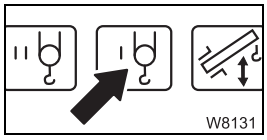


Main hoist on/off

There is a lamp in the button.

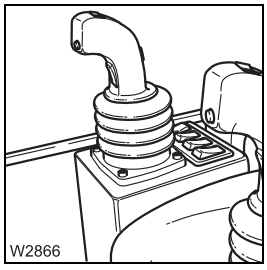
– **Press once:** – Lamp bright – main hoist on
– Lamp dim – main hoist off

p. 11 - 55



Power units display

– **Green:** Main hoist on
– **Red:** Main hoist off

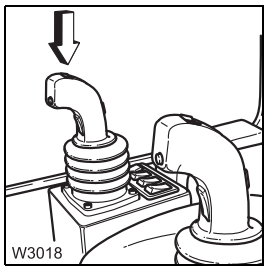


Right control lever

– **Back:** Lifting
– **Forward:** Lowering

p. 11 - 55

14.03.2018

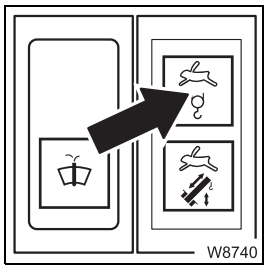


Hoist high-speed mode on/off

The parking brake must be applied.

- **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

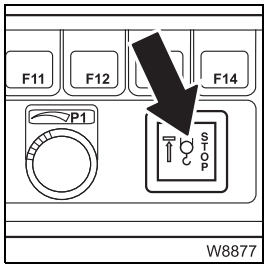
p. 11 - 95



High speed monitoring for the hoists

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

p. 11 - 95



Warning for lifting limit switch shutdown

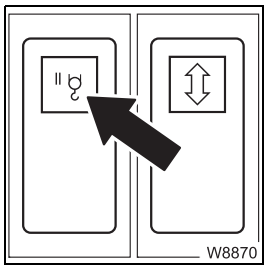
- **On:** Lifting limit switch triggered – hoist stops
- **Flashing:** Lifting limit switch triggered – shutdown overridden
- **Off:** Lifting limit switch not triggered

p. 11 - 60

14.03.2018

9.2.14 Auxiliary hoist

Auxiliary hoist, p. 11 - 57.

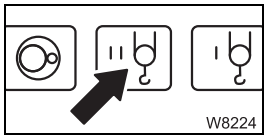


Auxiliary hoist on/off

There is a lamp in the button.

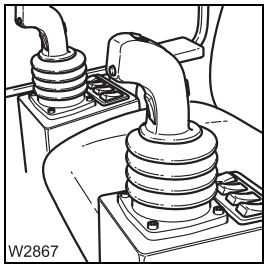
– **Press once:** – Lamp bright – auxiliary hoist on
– Lamp dim – auxiliary hoist off

p. 11 - 58



Power units display

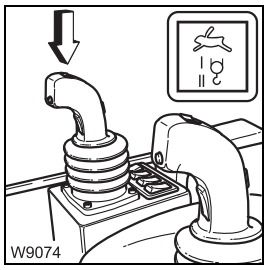
– **Green:** Auxiliary hoist on
– **Red:** Auxiliary hoist off



Left control lever

– **Back:** Lifting
– **Forward:** Lowering

p. 11 - 59



Button and lamp for hoist high-speed mode

Short description with main hoist, p. 9 - 79

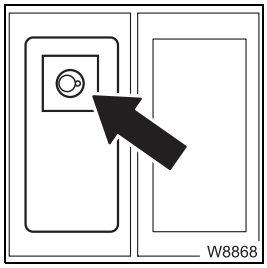
Warning for lifting limit switch shutdown

Short description with main hoist

14.03.2018

9.2.15 Slewing gear

Slewing gear, p. 11 - 96.

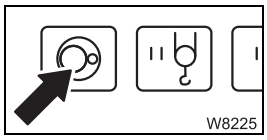


Slewing gear on/off

There is a lamp in the button.

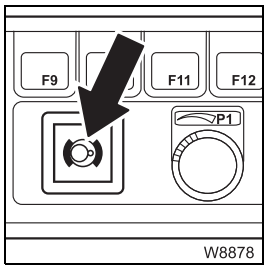
– **Press once:** – Lamp bright – slewing gear on,
Slewing gear brake released
– Lamp dim – slewing gear off
Slewing gear brake applied

p. 11 - 97



Power units display

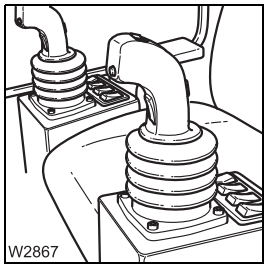
– **Green:** Slewing gear on
– **Red:** Slewing gear off



Slewing gear brake applied/released

– **On:** Slewing gear brake applied
– **Off:** Slewing gear brake released

p. 11 - 97

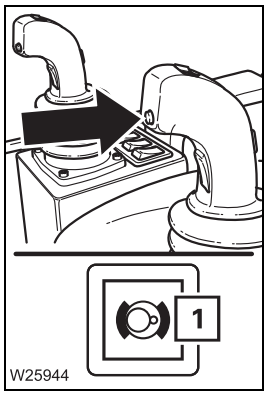


Left control lever

The counterweight lifting cylinders are retracted.

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

p. 11 - 97



Slewing gear freewheel

With additional equipment there are two ways of switching on the slewing release:

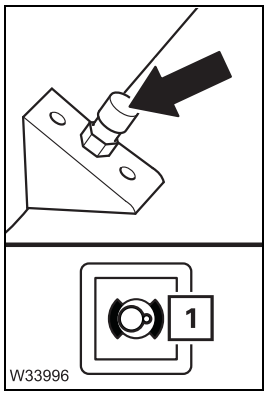
Slewing gear is switched on.

– **To switch on:** Move control lever to zero position and press button – slewing gear brake released, lamp (**1**) goes out

– **To switch off:** Release switch – slewing gear brake applied, lamp (**1**) lights up

➠ p. 11 - 100

or:

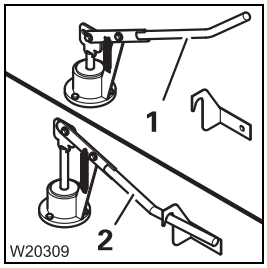


– **To switch on:** Move control lever to zero position and press button – slewing gear brake released, lamp (**1**) goes out

– **To switch off:** Release switch – slewing gear brake applied, lamp (**1**) lights up

➠ p. 11 - 100

Turntable lock



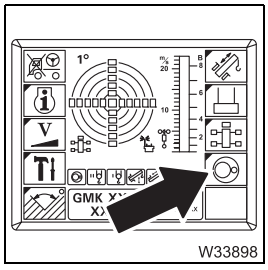
The turntable lock allows the superstructure to be mechanically locked to the carrier in the positions *0° to the rear* or *180° to the front*. The locking state is not monitored by the crane control system.

1 – Lever up: Turntable locked

2 – Lever down and latched: Turntable unlocked

➠ p. 11 - 14

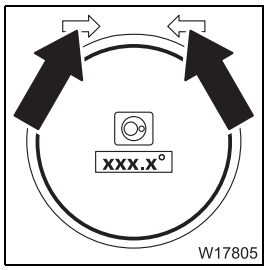
Submenu



Slewing gear/Houselock submenu

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

14.03.2018

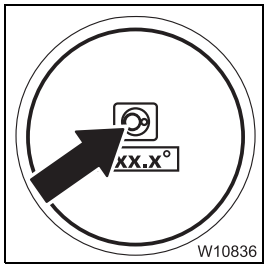


Display of slewing direction to 0°/180°

Current position ± 20° in front of the 0° or 180° superstructure position.

– **Both arrows:** 0° or 180° superstructure position reached

– **One arrow:** Arrow direction = slewing direction to reach 0° or 180°

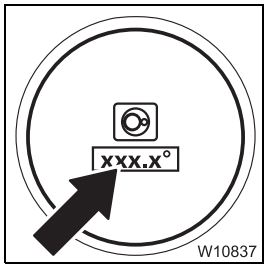


Slewing gear display

– **Green:** Slewing gear switched on

– **Red:** Slewing gear switched off

➠ p. 11 - 97



Current slewing angle display

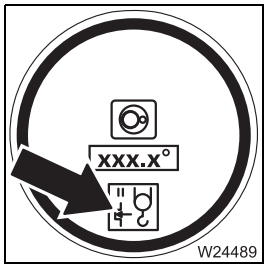
0°: Position *0° to the rear*

180°: Position *180° to the front*

+ 0.1 to +180.0°: Turned to the right from 0°

- 0.1 to -179.9°: Turned to the left from 0°

➠ p. 11 - 99



Auxiliary hoist lock display

– **Red:** Auxiliary hoist not correctly mechanically locked – functions blocked in submenu

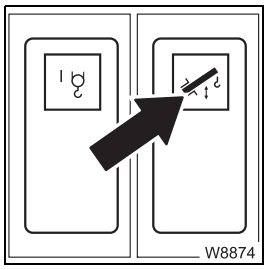
– **Off:** Auxiliary hoist correctly mechanically locked or not rigged

➠ p. 11 - 96

14.03.2018

9.2.16 Derricking gear

➠ *Derricking gear*, p. 11 - 62.

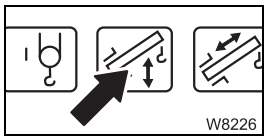


Derricking gear on/off

There is a lamp in the button.

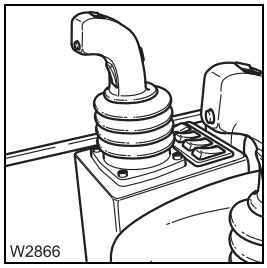
– **Press once:** – Lamp bright – derricking gear on,
Power units with the same control lever configuration off
– Lamp dim – derricking gear off

➠ p. 11 - 62



Power units display

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

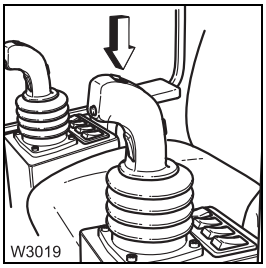


Right control lever

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

➠ p. 11 - 63

14.03.2018

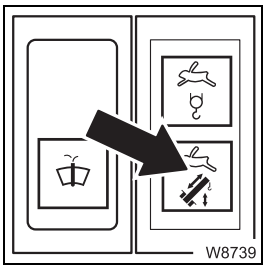


Derricking gear/telescoping mechanism high-speed mode on/off

The parking brake must be applied.

- **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

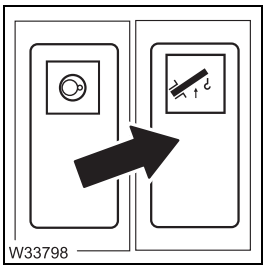
➠ p. 11 - 94



High-speed monitoring for derricking gear / telescoping mechanism

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

➠ p. 11 - 94



Raise button, shutdown bypassed

- **On:** Shutdown bypassed
- **Off:** Shutdown not bypassed

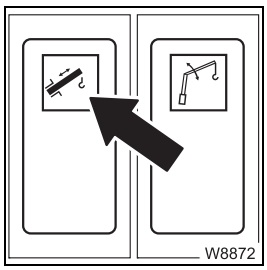
➠ p. 11 - 43

14.03.2018

9.2.17 Telescoping mechanism

Control panels

➠ *Telescoping mechanism*, p. 11 - 66.



Telescoping mechanism on/off

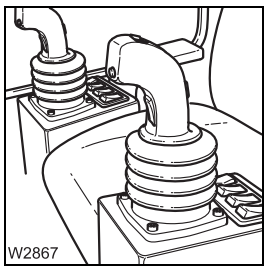
There is a lamp in the button.

– **Press once:** – Lamp bright – telescoping mechanism on,
Power units with the same control lever configuration off
– Lamp dim – telescoping mechanism off

➠ p. 11 - 74

Power units display

– **Green:** Telescoping mechanism on
– **Red:** Telescoping mechanism off

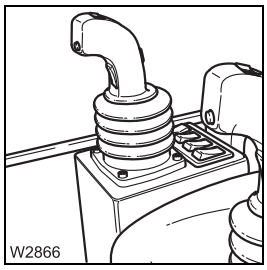


Left control lever

Control lever configuration – version 1

– **Back:** Retracting
– **Forward:** Extending

➠ p. 11 - 74

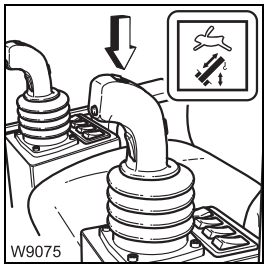


Right control lever

Control lever configuration – version 2

– **To the left:** Retracting
– **To the right:** Extending

➠ p. 11 - 74

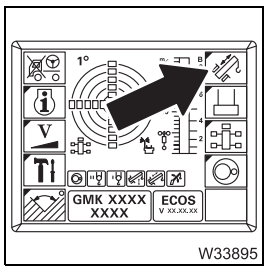


Button and lamp for derricking gear/telescoping mechanism high-speed mode

Short description with derricking gear; ➠ p. 9 - 85.

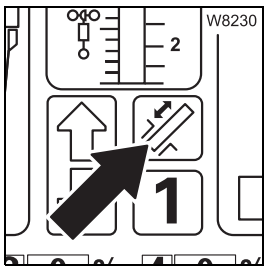
14.03.2018

Submenu



Telescoping submenu

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

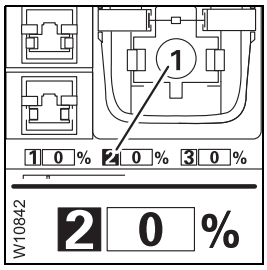


Display for telescoping mechanism on/off

– **Green:** Telescoping mechanism on

– **Red:** Telescoping mechanism off

➠ p. 11 - 77



Current telescope status display

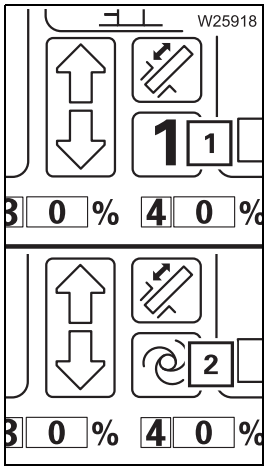
1 Extended length of the telescopic sections in per cent (%)

2 Telescopic section display is green

– **On:** Telescoping cylinder is locked here

– **Flashing:** Next possibility for locking telescoping cylinder

➠ p. 11 - 78



Telescoping cylinder in the telescopic section display

Displayed telescopic section, e.g. telescopic section I:

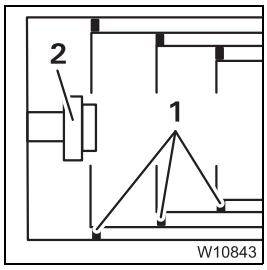
1 – **On:** Telescoping cylinder is locked here

1 – **Flashing:** Next possibility for locking telescoping cylinder

1 – **Off:** Telescoping cylinder in this telescopic section – distance to the locking point greater than 1 m (3.3 ft)
or
Teleautomation on – symbol (**2**) is displayed

➠ p. 11 - 78

14.03.2018



Telescope diagram display

Current relation of the telescopic sections to each other – section of top view.

Locking pin

1 On the telescopic section

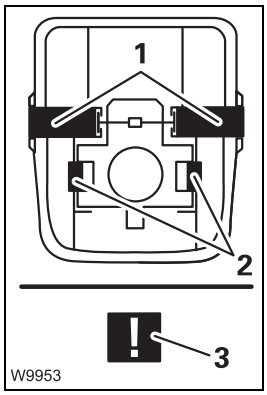
2 On the telescoping cylinder

Display 1 and 2

– **Green:** Locked

– **None:** Unlocked or intermediate position

➠ p. 11 - 78



Locking status display

The locking pins change the position and colour

Locking pin

1 On the telescopic section

2 On the telescoping cylinder

Display 1 and 2

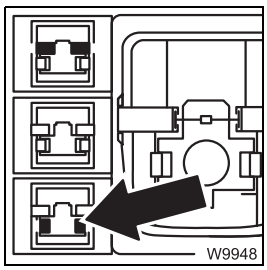
– **Green:** Locked

– **Red:** Unlocked

– **Yellow:** Intermediate position

– **Violet:** Error – symbol (**3**)

➠ p. 11 - 79



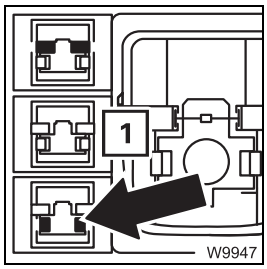
Unlock telescoping cylinder selection

– **Display**

Yellow: Telescoping cylinder unlocked

Grey: Telescoping cylinder locked

Flashing: (yellow/grey) Unlock selected



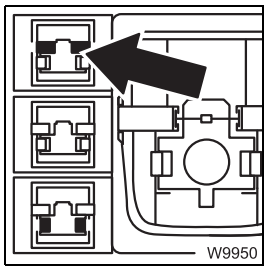
– **To select:** Press button once

– Telescopic section locked:
Unlock selected – is executed after moving the control lever

– Telescopic section unlocked:
Unlock not selected – symbol (**1**) flashes yellow/grey as a prompt to *Lock telescoping cylinder*

➠ p. 11 - 79

14.03.2018

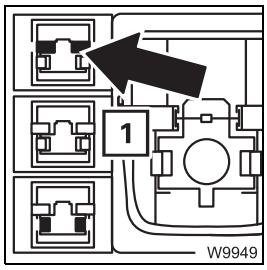


Unlock telescopic section selection

– **Display** **Yellow:** Telescopic section unlocked

Grey: Telescopic section locked

Flashing: (yellow/grey) Unlock selected

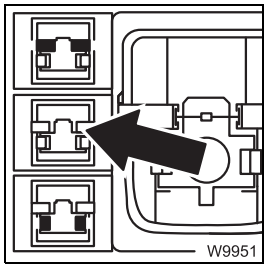


– **To select:** Press button once

– Telescoping cylinder locked:
Unlock selected – is executed after moving the control lever

– Telescoping cylinder unlocked:
Unlock not selected – symbol (**1**) flashes (yellow/grey) as a prompt to *Lock telescoping cylinder*

➠ p. 11 - 84



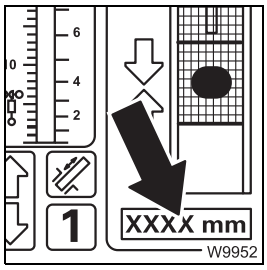
Lock selection

– **Display** **Yellow:** Telescoping cylinder and telescopic section locked

Grey: Telescoping cylinder or telescopic section unlocked

Flashing: (yellow/grey) Lock selected

➠ p. 11 - 83, ➠ p. 11 - 87



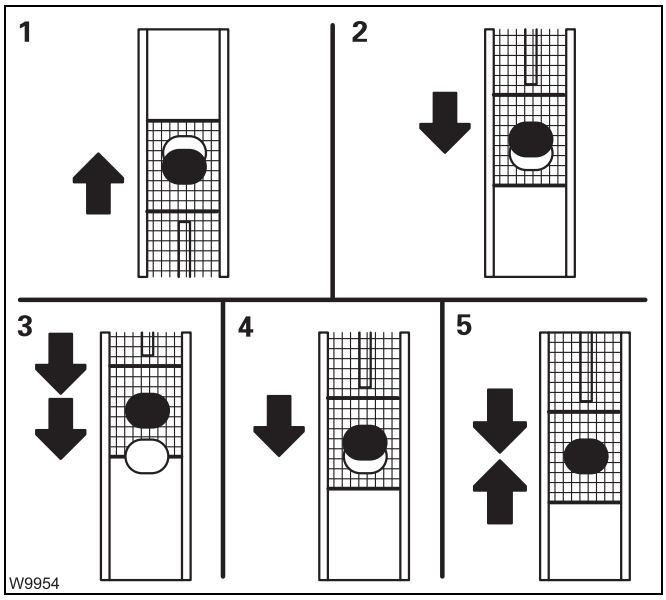
Telescoping cylinder length display

– **Display:** Current extended length of the telescoping cylinder

– **Unit of measurement:** Displayed depending on setting, mm (millimetres) or ft (feet)

➠ p. 11 - 82

14.03.2018



Locking point display

– Direction of travel to the locking point

1 Extend telescoping cylinder

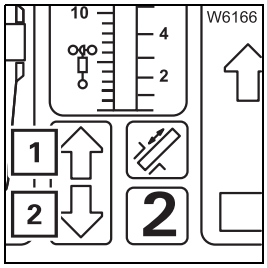
2 Retract telescoping cylinder

– Distance to the locking point

3 Yellow: approx. 1 m (3.3 ft)

4 Yellow Less than 1 m (3.3 ft)

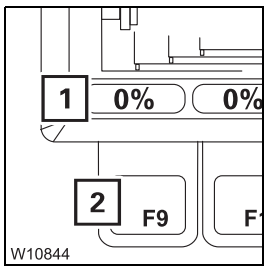
5 Green: At the locking point



Telescoping release display

1 Extending
- **Red:** Blocked
- **Green:** Enabled

2 Retracting
- **Red:** Blocked
- **Green:** Enabled



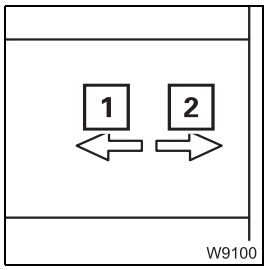
Entering the set value for teleautomation

1
- **Red:** Teleautomation off
- **Yellow:** Enter target value
- **Green:** Teleautomation on

2 Press button first time – nominal value input on
Press button once – target value to next fixed length

➠ p. 11 - 89

14.03.2018



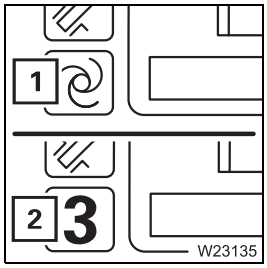
Teleautomation direction display

1 On: Start teleautomation with *Extending*

2 On: Start teleautomation with *Retracting*

Flashing = control lever movement incorrect

➠ p. 11 - 89



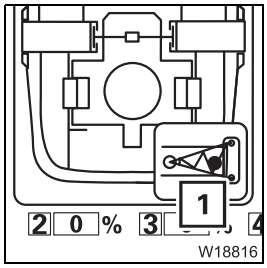
Teleautomation on/manual telescoping on

1 Teleautomation on

➠ *Telescoping with teleautomation*, p. 11 - 89

2 Manual telescoping on

➠ *Manual telescoping*, p. 11 - 77

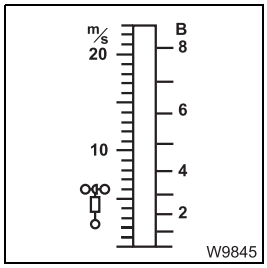


Lattice extension position display

1 – Lights up red: Retracting/extending blocked

– Off: Retracting/extending released

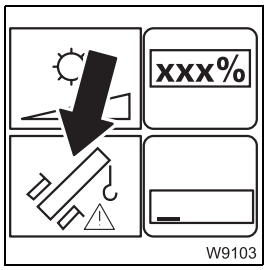
p. 11 - 76



Anemometer display

Same as in main menu; ➠ p. 9 - 73.

In the Settings submenu

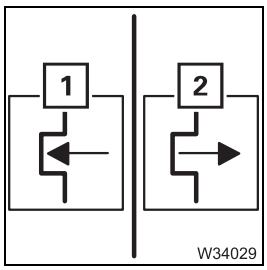


Telescoping emergency program access

The right dead man's switch is pressed.

– **Press the button once:** After entering the keycode, the emergency program *Telescoping* opens

p. 14 - 45

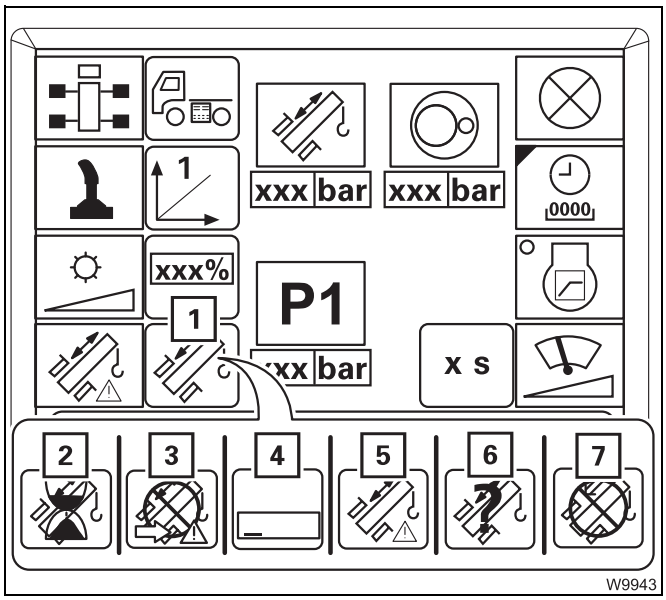


Pivoting the swing-away lattice in the emergency programme

1 Pivoting into the rigging position

2 Pivoting into the telescoping position

p. 14 - 45



Current telescoping mechanism status display

The current status is shown using different symbols:

1 Normal

2 Waiting

3 Emergency program access

4 Keycode input

5 Emergency program

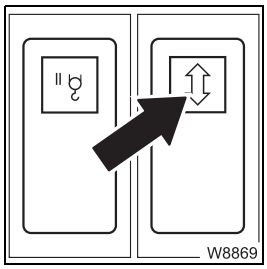
6 Telescope status divergence

7 Inactive

p. 14 - 19

14.03.2018

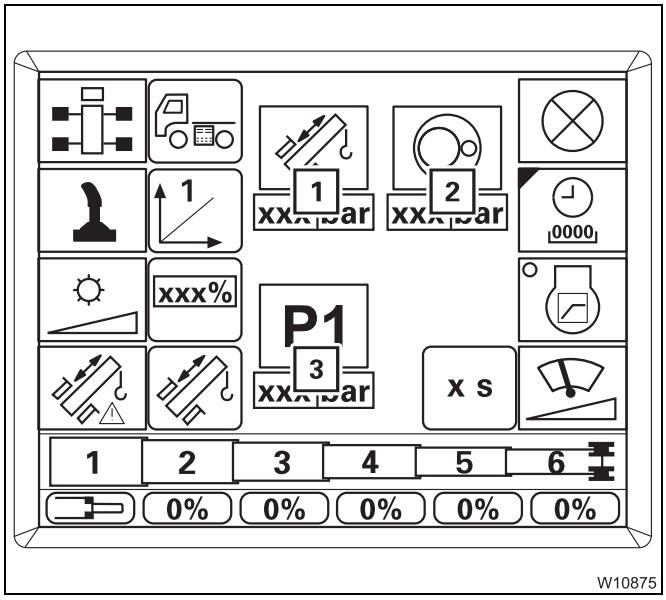
9.2.18 Hydraulic system



Inclining the crane cab

- **Press down:** Incline back
- **Press up:** Incline forward

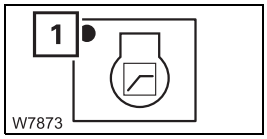
p. 11 - 103



In the Settings submenu

Current pressure in bar for movements of the

1 Telescoping mechanism
2 Slewing gear
3 – Hoist
– Derricking gear
– Counterweight hoist unit
– Incline cab
– Locking units



Critical load control

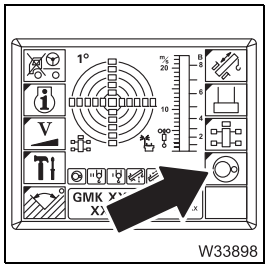
- **To switch on:** Press button until the dot (**1**) turns green
- **To switch off:** Press button until the dot (**1**) turns black

p. 11 - 107

14.03.2018

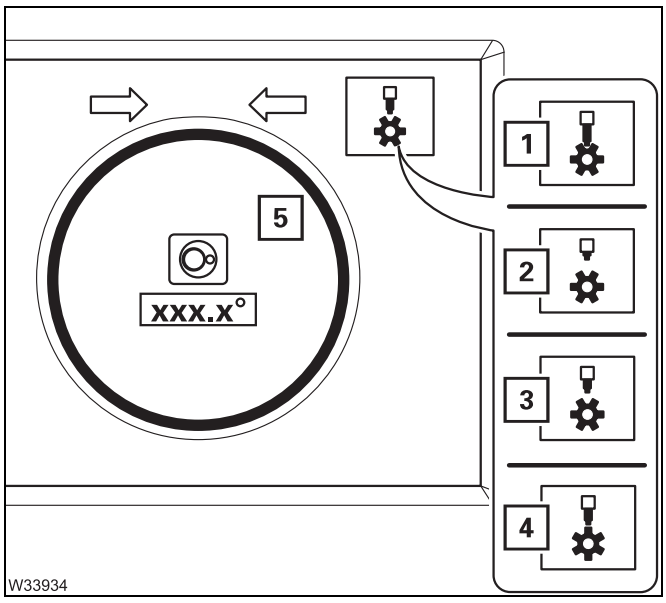
9.2.19 House lock

➠ *Switching the houselock on/off*, p. 11 - 15.



Slewing gear/Houselock submenu

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



Locking status displays

The current position of the locking pin is shown by different symbols:

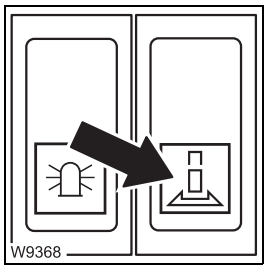
1 and 5 Green – locked

2 and 5 Red – unlocked

3 and 5 Yellow – intermediate position

4 and 5 Yellow/red – blocked, locking pin in front of a tooth

➠ p. 11 - 15



Houselock on/off

The slewing gear is switched off

– **Press up:** Switch on – pin extends

– **Press down:** Switch off – pin retracts

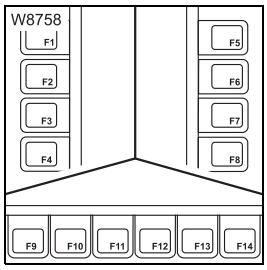
➠ p. 11 - 15

14.03.2018

9.2.20 Rated capacity limiter (RCL)

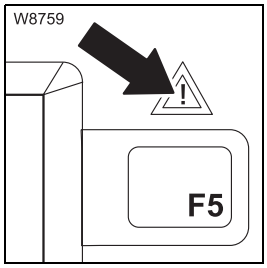
Control unit

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



Buttons F1 to F14

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

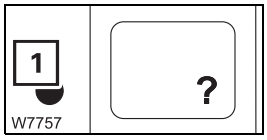


Error

– **On:** Error has occurred

– **Off:** No errors

➠ p. 11 - 39



Opening the Error submenu

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

– **Press the button once:** This opens the *Errors* submenu

➠ p. 14 - 29

Exiting the submenu/input mode

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

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

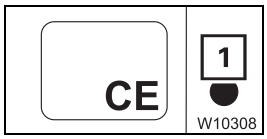
14.03.2018

Input confirmation

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

– **In the Rigging mode submenu:** Press button once – *Rigging mode monitoring* submenu opens

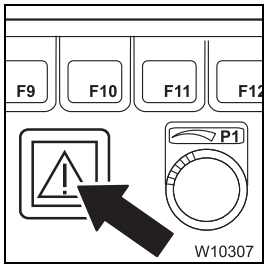
– **In the Rigging mode monitoring submenu:** Press button once – rigging mode is accepted, *Monitoring* submenu opens, lamp (**1**) goes out



Acknowledgement

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

– **Press the button once:** Buzzer tone off, error message acknowledged



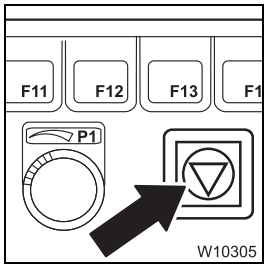
RCL early warning

– **Flashing:** Degree of utilisation 90 – 100% – buzzer tone on

– **On:** Degree of utilisation approx. 100% – buzzer tone on – shutdown

– **Off:** Degree of utilisation 0 – 90%

➠ p. 11 - 37

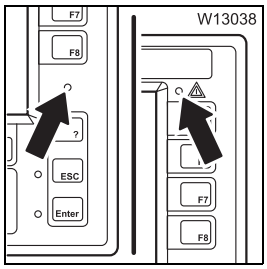


RCL switch-off

– **On:** Shutdown – buzzer tone on
  – Degree of utilisation approx. 100% or
  – Error

– **Off:** No shutdown

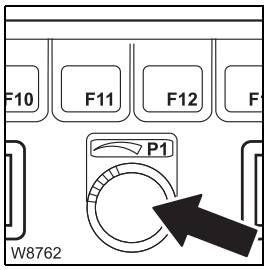
➠ p. 11 - 37



Sensor for brightness

Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted; ➠ p. 11 - 22.

14.03.2018



Entering values

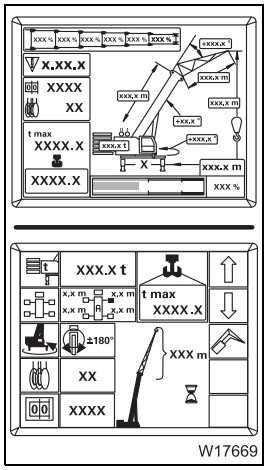
The input mode for the RCL code is switched on.

– **To the right:** Next greater value

– **To the left:** Next smaller value

Slowly turning – changes the value gradually
Quickly turning – changes the value quickly

➠ p. 11 - 28



Display RCL

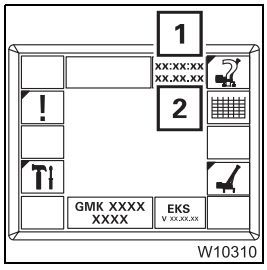
– **After a standstill of up to 48 hours**

Ignition on – *Monitoring* submenu opens; ➠ p. 11 - 21

– **After a standstill of more than 48 hours**

Ignition on – *Enter rigging mode* submenu opens; ➠ p. 11 - 22

Main menu

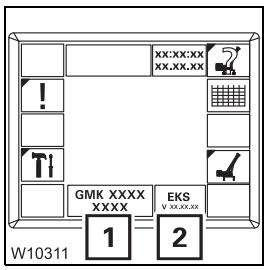


Date/time display

1 Time

2 Date

➠ *Entering the time/date*, p. 11 - 49



Serial number and program version displays

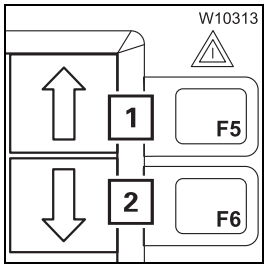
1 Truck crane serial number

2 RCL program version – always state in the event of malfunctions; ➠ p. 14 - 26

14.03.2018

Submenu Rigging mode entry

➠ *Enter rigging mode*, p. 11 - 23

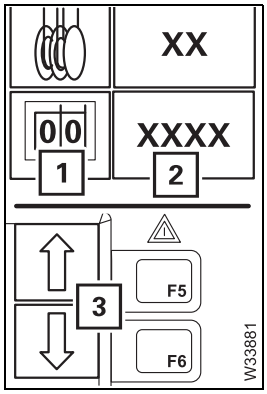


Selection

In input mode

1 Press button once – display of next highest value

2 Press button once – display next lowest value

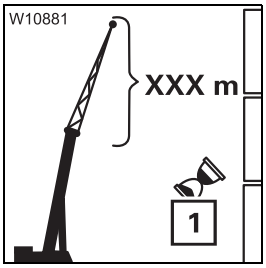


Enter RCL code

– Input mode on: Press button (**1**) once – symbol green

– Input: In input mode, press button (**3**) once – on display (**2**) next RCL code

➠ p. 11 - 28



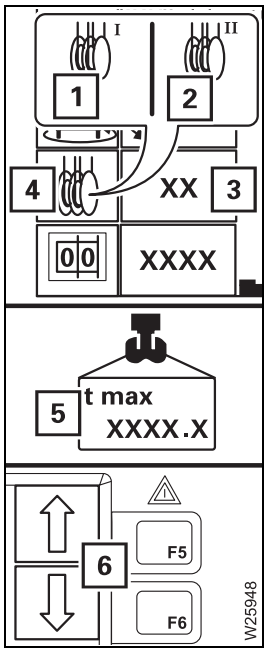
Determine the displayed RCL code

– Symbol (1): RCL code is determined after selecting Rigging mode

– No display: New RCL code is displayed

➠ p. 11 - 25

14.03.2018

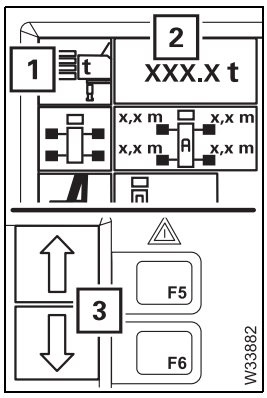


Enter reeving

– **Input mode on:** – For main hoist:
Press button (**4**) until symbol (**1**) is green
– For auxiliary hoist:
Press button (**4**) until symbol (**2**) is green

– **Input:** In input mode, press button (**6**) once
– Reeving +1 on display (**3**),
– Relevant maximum load on display (**5**)

➠ p. 11 - 24

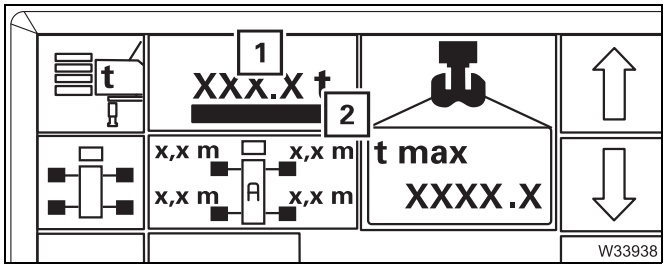


Enter counterweight

– **Input mode on:** Press button (**1**) once – symbol green

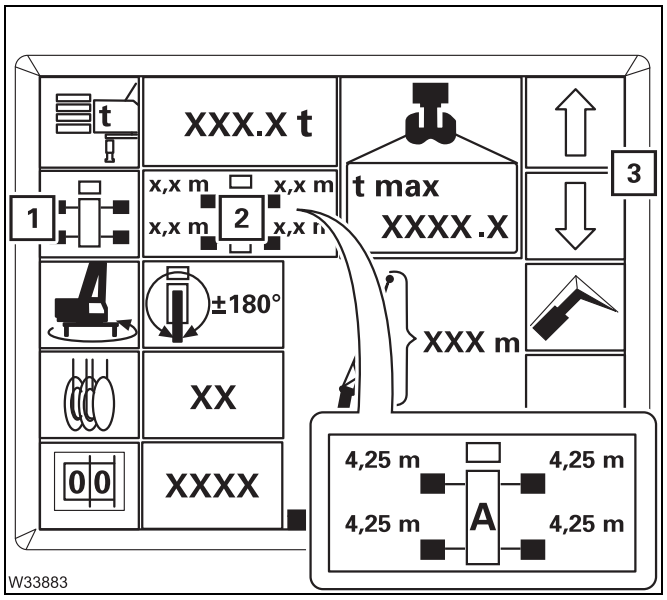
– **Input:** In input mode press button (**3**) once – on display (**2**) next combination

➠ p. 11 - 24



With counterweight detection additional equipment:
If the detected counterweight mass deviates from the value entered into the RCL then the entered value (**1**) is displayed in red and a flashing bar (**2**) is displayed under the value. The rigging state is not accepted and an error message is generated.

14.03.2018



Enter outrigger span

– **Input mode on**
Press button (**1**) once – symbol green

– **Input**
In input mode press button (**3**) once – on display (**2**) next outrigger span.

A 8.70 x 8.50 m (28.5 x 27.9 ft)

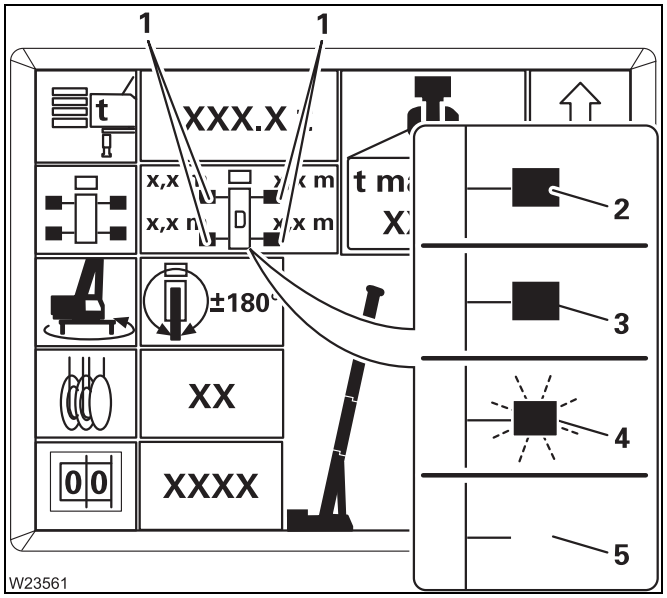
B 8.70 x 7.40 m (28.5 x 24.3 ft)

C 8.70 x 6.30 m (28.5 x 20.4 ft)

D 8.70 x 5.00 m (28.5 x 16.4 ft)

M 8.70 x 2.71 m (28.5 x 8.9 ft)

➠ p. 11 - 24



Outrigger span monitoring display

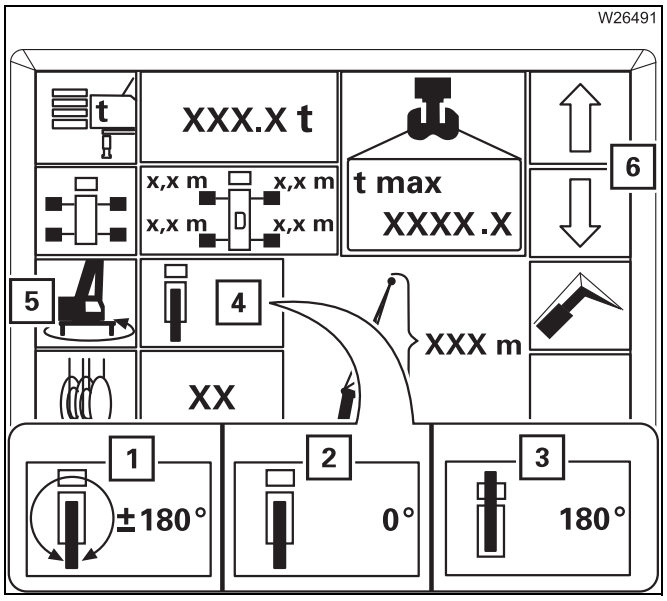
The display (**1**) is identical for all outrigger beams (**2**).

(**3**) Illuminated – the required outrigger span is rigged

(**4**) Flashes – the required outrigger span is not rigged

(**5**) No display – the current outrigger span is not permitted

With displays (**4**) and (**5**) an error message is displayed after applying the rigging code; ➠ p. 11 - 24.



Enter slewing range

– **Input mode on**
Press button (**5**) once – symbol green

– **Input**
In input mode, press button (**6**) once – next permissible slewing range on display (**4**)

1 360° slewing range

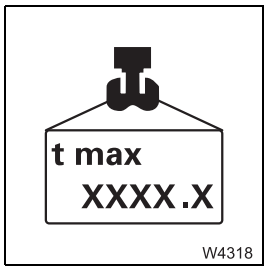
2 Working position 0° to the rear[1)]

3 Working position 180° to the front[1)]

[1)] To accept, switch off the slewing gear

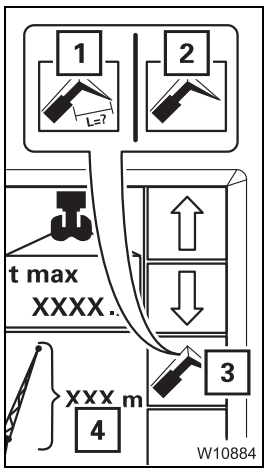
➠ p. 11 - 24

14.03.2018



Maximum load display

Short description with *Monitoring* submenu; ➠ p. 9 - 104.



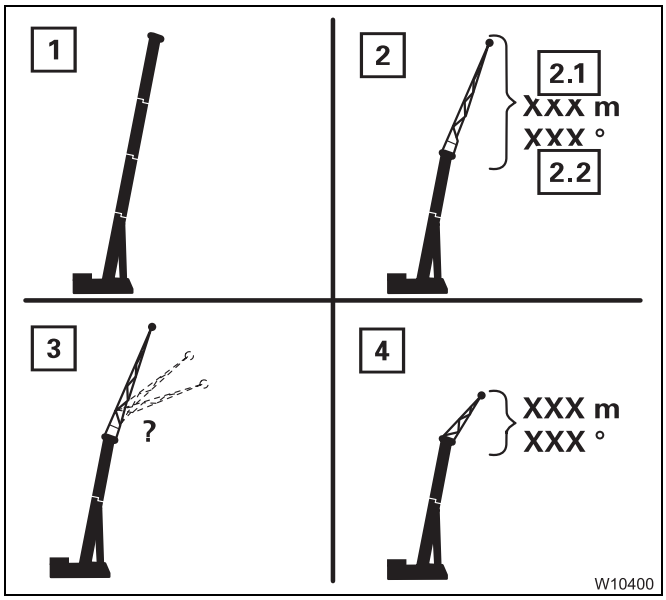
Boom system entry

– Input mode on:
- For boom system:
  Press button (**3**) until symbol (**2**) is green
- For length and angle of lattice extension[1)]:
  Press button (**3**) until symbol (**1**) is green

– Input: In input mode, press button (**3**) once – next length on display (**4**)

➠ p. 11 - 24

[1)] Lattice extension – inclinable



Boom system display

Boom system for displayed RCL code,

1 Main boom/auxiliary single-sheave boom top

2 Lattice extension

- **2.1** Length
- **2.2** Angle[1)]

3 RCL rigging code for angling entered[1)]

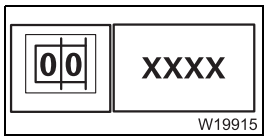
4 Heavy load lattice extension

➠ p. 11 - 26

[1)] Lattice extension – inclinable

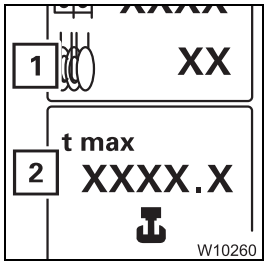
Monitoring submenu

Displays – depend on rigging mode; ➠ *Checks before operating the crane*, p. 11 - 31.



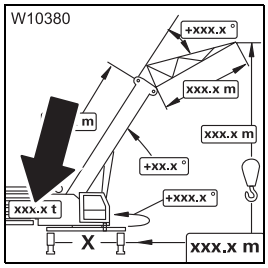
Display RCL code

RCL code, four digits



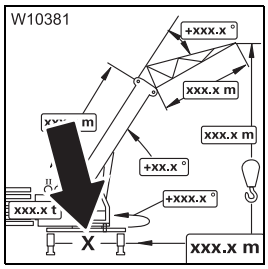
Reeving display

1 Required quantity of reeved ropes for displayed, maximum load (**2**)



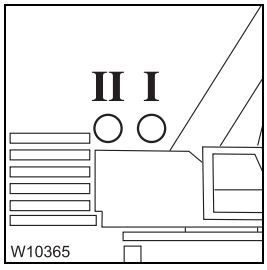
Counterweight display

Required counterweight combination in tons (t) – for displayed RCL code.



Outrigger span display

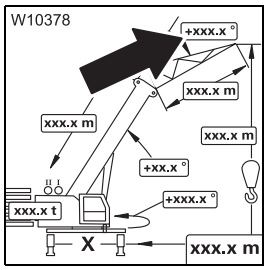
Required outrigger span for displayed RCL code – displayed in letters – overview of outrigger spans; ➠ p. 9 - 100.



Hoists display

– I on:	Main hoist switched on first – displayed reeving applies to main hoist
– II on:	Auxiliary hoist switched on first – displayed reeving applies to auxiliary hoist
– I or II flashing:	Corresponding hoist switched on as well – displayed reeving applies to the other hoist
– I or II out:	Corresponding hoist switched off

14.03.2018

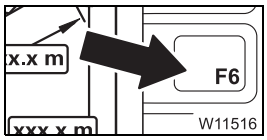


Angle of the lattice extension display

The inclinable lattice extension is connected.

– **Display:** Angle between lattice extension and main boom in degrees (°) – for displayed RCL code

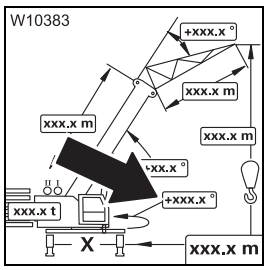
➠ p. 11 - 35



Lifting capacity table submenu

– **Press the button once:** The *Lifting capacity table* submenu opens

➠ p. 11 - 47



Current slewing angle display

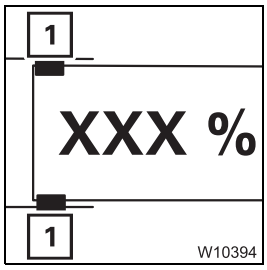
0°: Position *0° to the rear*

180°: Position *180° to the front*

+ 0.1 to +180.0°: Turned to the right from 0°

- 0.1 to -179.9°: Turned to the left from 0°

➠ p. 11 - 35



Current telescope status display

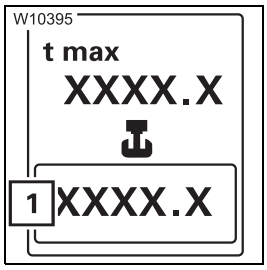
Telescope status of all telescopic sections in per cent – locking pins (**1**):

– **Green:** Fixed length – locked and set down

– **Flashing:** Intermediate length – locked, not set down

– **Black:** Intermediate length – not locked

➠ p. 11 - 34

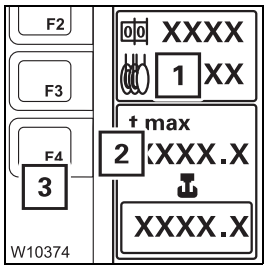


Current load display

– **Display:** Currently raised load in tons (t) or kilopounds (klbs) – precision ± 5% of actual load
Example: 55.2 klbs is equal to 55,200 lbs

➠ p. 11 - 36

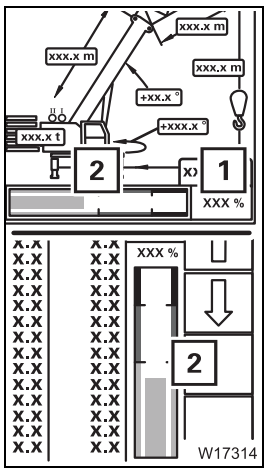
14.03.2018



Maximum load display

– **Display:** Maximum load in tons (t) or kilopounds (klbs) for the displayed RCL code
– Symbol (**1**) is red – maximum load reduced by reeving Press button (**3**) once – display (**2**) briefly shows maximum load for displayed RCL code

p. 11 - 36



Current degree of utilisation display

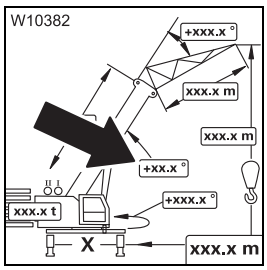
Degree of utilisation = 100 x current load/maximum load

1 Display in percentage

2 Colour display:

– **Blue:** 0 – 90%
– **Yellow:** approx. 90 – 100% – early warning
– **Red:** greater than 100% – shutdown

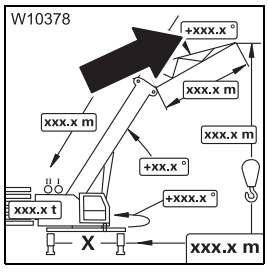
p. 11 - 36



Current main boom angle display

– **Display:** Current angle between main boom and horizontal position in degrees (°)

p. 11 - 35



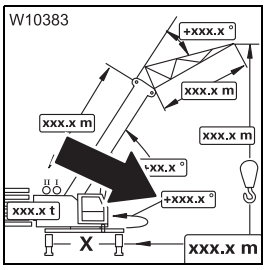
Lattice extension inclination display

The luffing jib is connected.

– **Display:** Current angle between the lattice extension and main boom in degrees (°)

p. 11 - 35

14.03.2018



Current slewing angle display

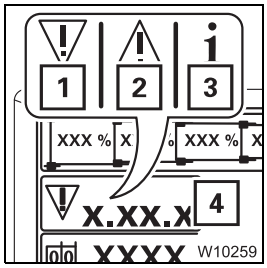
0°: Position *0° to the rear*

180°: Position *180° to the front*

+ 0.1 to +180.0°: Turned to the right from 0°

- 0.1 to -179.9°: Turned to the left from 0°

➠ p. 11 - 35



Error display

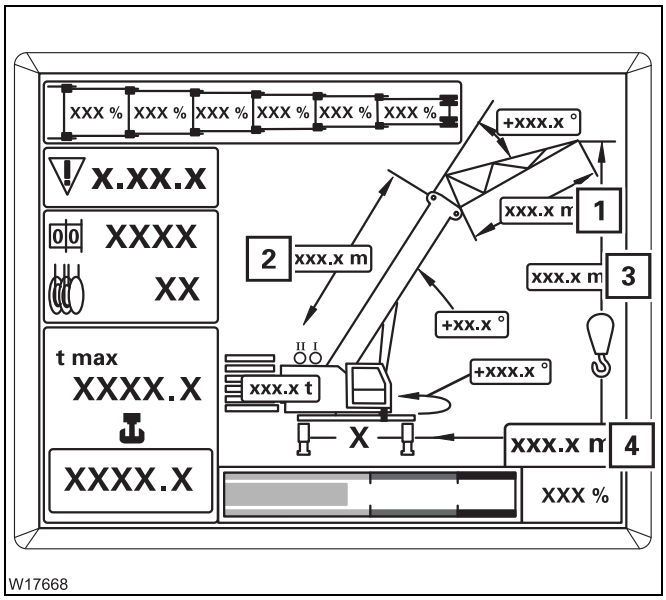
1 Error

2 Warning

3 Information

4 Corresponding number code,
press button F2 once – next available number code

➠ p. 11 - 39



Other displays

Display in metres (m) or feet (ft)

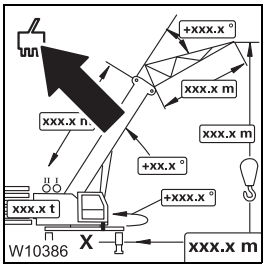
1 Current length of lattice extension

2 Current main boom length

3 Current overall height

4 Current working radius

➠ p. 11 - 34

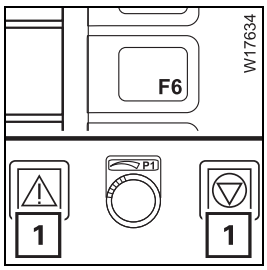


Service symbol display

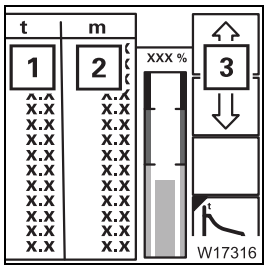
Symbol displayed – service device connected

Submenu Lifting capacity table

➠ *Displaying the lifting capacity tables*, p. 11 - 47



– **To open:** Press the button once – submenu opens, all crane movements are blocked, the lights (**1**) light up



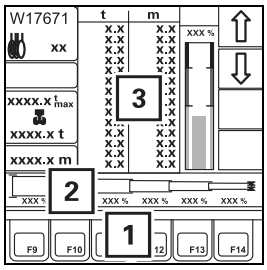
Lifting capacity table display

Values for displayed RCL code and displayed telescope status

1 Lifting capacity in tons (t) or in kilopounds (klbs)

2 Working radius in metres (m) or feet (ft)

3 Show other values given in the table



Telescope status display/input

– **Display:** Telescope status (**2**) in per cent

– **Input:** Press button (**1**)
  – New telescope status on display (**2**)
  – Corresponding table on display (**3**) or all values 0 = no table available

Other displays

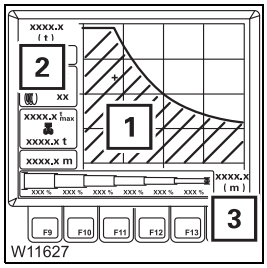
Function as in *Monitoring* submenu:

– Display RCL code ➠ p. 9 - 102
– Reeving display ➠ p. 9 - 102
– Maximum load display ➠ p. 9 - 104
– Current load display ➠ p. 9 - 103
– Current working radius display ➠ p. 9 - 105
– Current degree of utilisation display ➠ p. 9 - 104

14.03.2018

Working range submenu

➠ *Displaying the lifting capacity tables*, p. 11 - 47



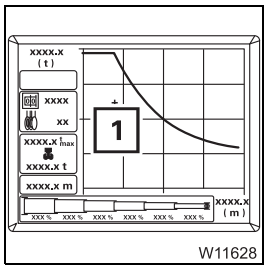
Permissible working range display

Applies for displayed RCL code and displayed telescope status

1 Permissible working range – surface under the curve

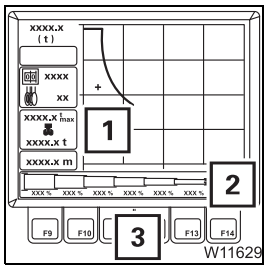
2 Maximum possible load

3 Maximum possible working radius



Current position display

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



Telescope status display/input

– **Display:** Telescope status (**2**) in per cent

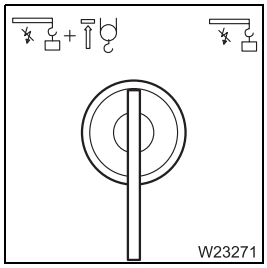
– **Input:** Press button (**3**)
  – New telescope status on display (**2**)
  – Corresponding working range on display (**1**)
    or no display = telescope status outside the working range

Other displays

Similar functionality to the *Lifting capacity table* submenu

RCL override

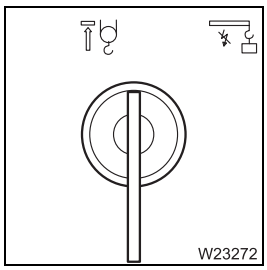
RCL override version A



RCL override key-operated switch/lifting limit switch

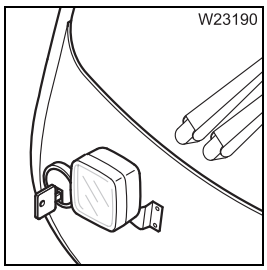
- **Turn to the right:** *RCL* shutdown overridden – crane functions released, no more monitoring; ➠ p. 11 - 40
- **Turn to the left:** *RCL* shutdown and *Lifting limit switch* shutdown overridden – crane functions released, no more monitoring; ➠ p. 11 - 61.

RCL override version B



Key-operated override lifting limit switch/RCL for rigging

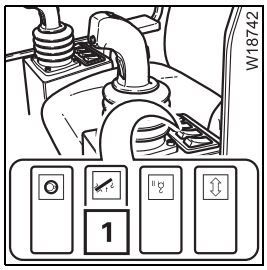
- **Once to the right:** *RCL* shutdown overridden – crane functions released up to 110% degree of utilisation; ➠ p. 11 - 40
- **Once to the left:** *Lifting limit switch* shutdown bypassed – crane functions released; ➠ p. 11 - 61.
- **Pressed:**
  - Enabled crane functions can be started within the next 10 seconds.
  - Speed of movements increasing load moment max. 15%



Key-operated switch for RCL override in an emergency

- **Once to the right or to the left:** *RCL* shutdown overridden for 30 minutes – crane functions released; ➠ p. 11 - 40.

14.03.2018



Raise button after shutdown

Switch on function
Only active if the current degree of utilisation is greater than 100% – crane movements blocked.

1 Press button up once

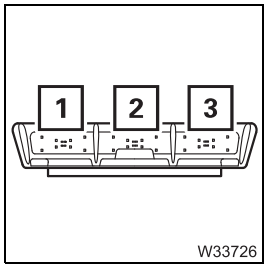
Release the raise function to the permitted working range.
If the degree of utilisation is less than 100% – release of the blocked crane movements.

Switch off function

- **Degree of utilisation less than 100%** Function switched off automatically.
- **Degree of utilisation greater than 100%** Press button (**1**) up once.

Raise main boom, p. 11 - 43

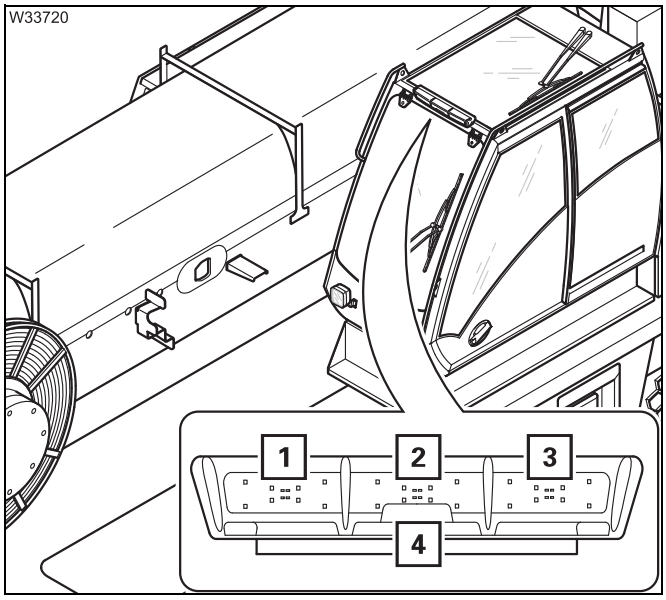
External displays **RCL override version A**



Current degree of utilisation display
Degree of utilisation = 100 x actual load/maximum load –
Coloured lights for percentage ranges,

- **1 – Green:** 0 – 90%
- **2 – Yellow:** approx. 90, 100% – early warning
- **3 – Red:** greater than 100% – shutdown

RCL override version B



Status display

To inform people in the danger area of the truck crane.

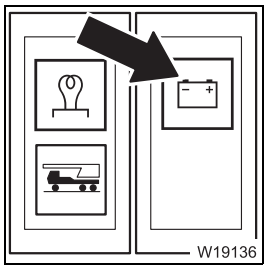
- **1** Lamp, green
- **2** Lamp, yellow
- **3** Lamp, red
- **4** Loudspeaker (warning signal)

The displays light up or flash depending on
– the current degree of utilisation,
– RCL shutdown/early warning,
– RCL override.

Status display, p. 11 - 41

14.03.2018

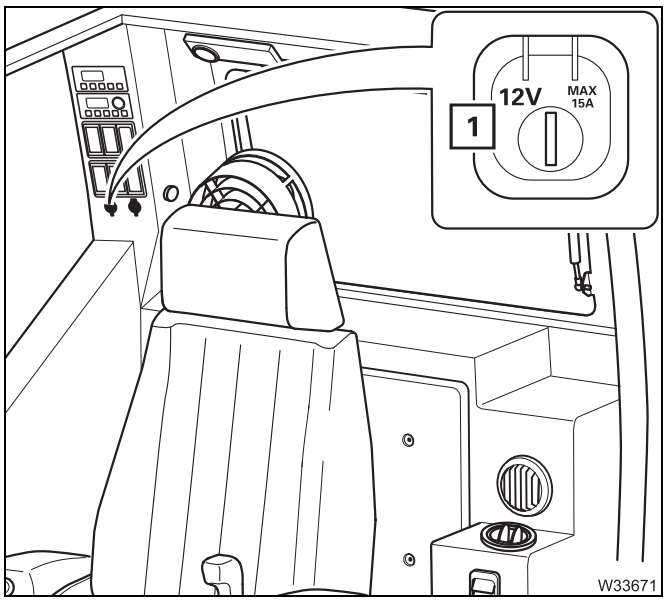
9.2.21 Electrical system



Voltage monitoring warning

- **On:** Engine off – ignition on
  or
  Engine on – power failure – switch off engine
- **Off:** Engine on – no malfunction

p. 10 - 7



Sockets 12 V

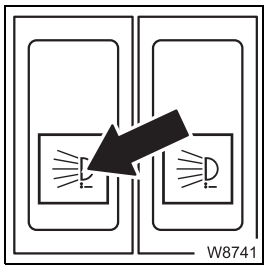
1 Socket 12 V/max. 15 A

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

14.03.2018

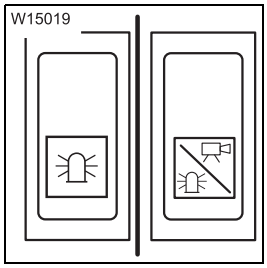
9.2.22 Lighting, windscreen wiper/washing system

Lighting



Spotlight sockets on/off

- **To switch on:** Press down – voltage on (both sockets)
- **To switch off:** Press up – voltage off (both sockets)

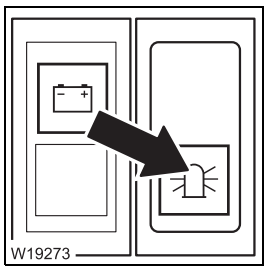


Air traffic control light/camera on/off

- **To switch on:** Press down – voltage on socket switched on/camera on
- **To switch off:** Press up – voltage on, socket switched off/camera off

➠ p. 12 - 112

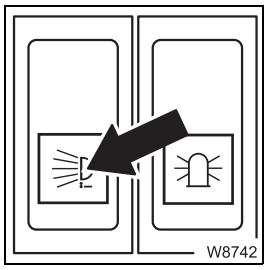
➠ *Separate operating instructions*



Rotating beacons on/off

- **To switch on:** Push down – lamp in the button on
- **To switch off:** Push up – lamp in the button off

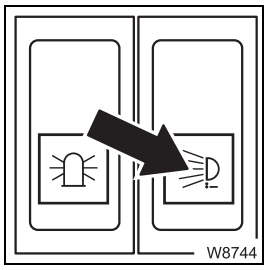
14.03.2018



Slewable spotlight on/off

- **To switch on:** Push down
- **To switch off:** Push up

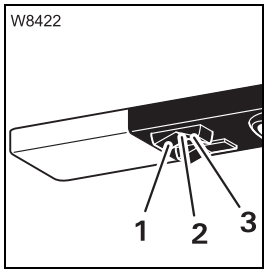
p. 11 - 108



Swing the spotlight

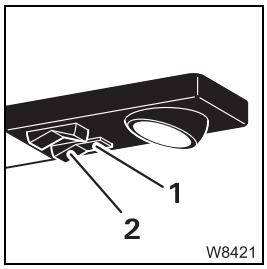
- **Back:** Push down
- **Forward:** Push up

p. 11 - 108



Cab lighting

1 **Always on**
2 **Always off**
3 **On/off via door contact**

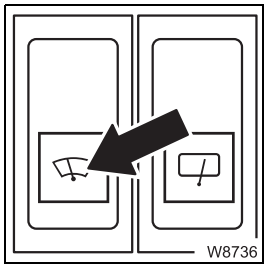


Reading lamp

1 **On**
2 **Off**

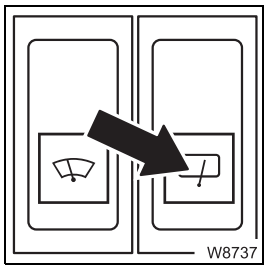
14.03.2018

Windscreen wiper/washing system



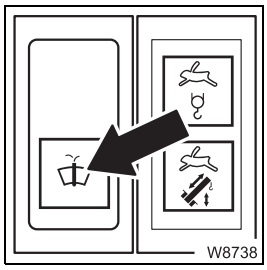
Windscreen wiper on/off

- **Off:** Push up – wiper goes to end position
- **Interval:** Middle position
- **Continuous operation:** Push down



Roof window wiper on/off

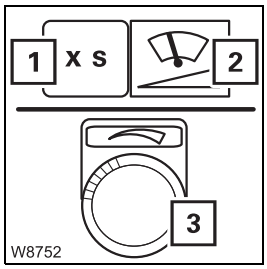
- **Off:** Push up – wiper goes to end position
- **Interval:** Middle position
- **Continuous operation:** Push down



Windscreen washing system

- **Windscreen:** Push down
- **Skylight:** Push up

No additional wiping function is performed



Adjusting the wiper stroke interval

In the *Settings* submenu

1 Interval display

2 Press once – input mode on

3 Turn – change interval

p. 11 - 104

14.03.2018

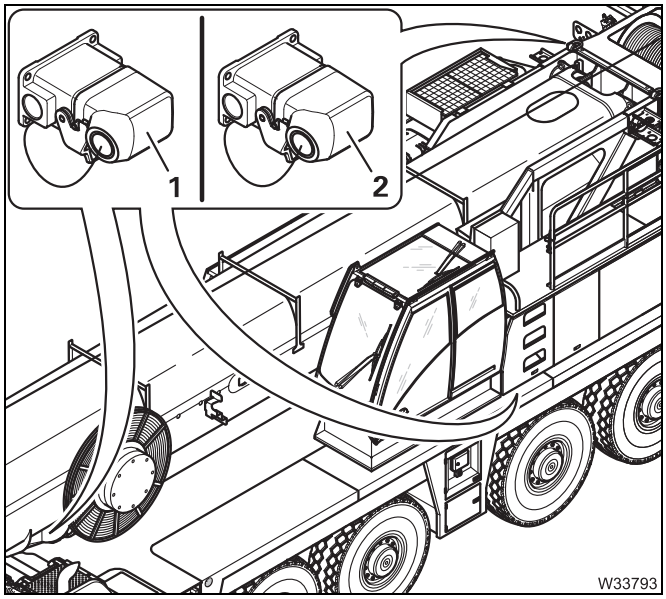
9.2.23 Hand-held control

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 - 21



Released operations

1 – Emergency operation for crane movements (except for telescoping mechanism)
  – Derrick lattice extension[1)]

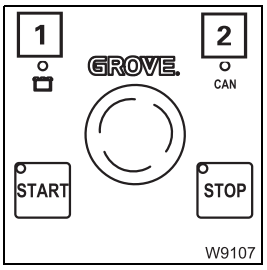
2 – Emergency operation for crane movements
  – Derrick lattice extension[1)]
  – Rigging the auxiliary hoist

[1)] Lattice extension – luffing jib

14.03.2018

Engine control panel

➠ *Starting the engine – with the hand-held control*, p. 10 - 19

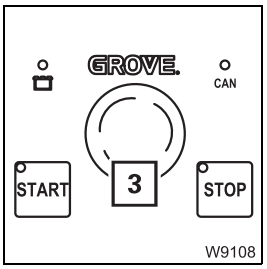


1 Voltage monitoring

- **On:** Switch the ignition on
- **Off:** Switch the ignition off

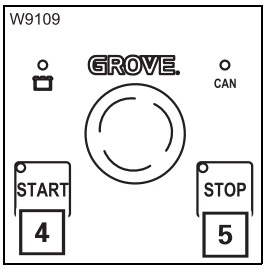
2 CAN monitoring

- **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

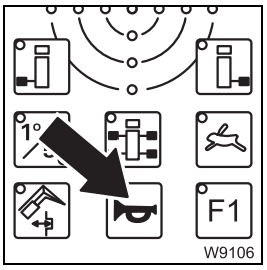
- **Press once:** Engine on

5 STOP engine

- **Press once:** Engine off

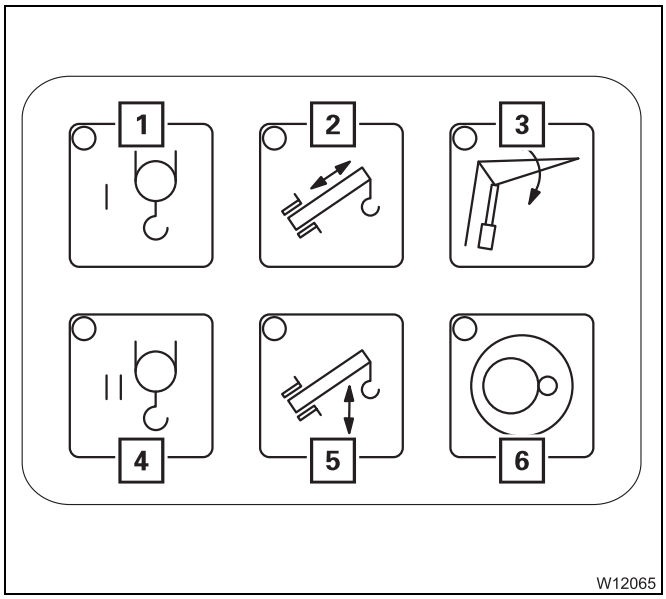
Horn

The ignition must be switched on.



- **Press once:** – Hand-held control on the superstructure socket – superstructure horn on

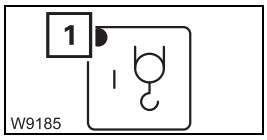
14.03.2018



Pre-select emergency operation

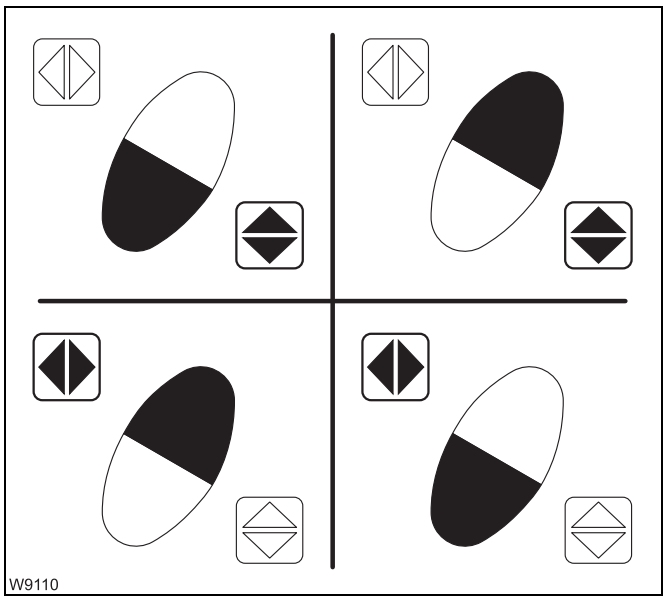
1 Main hoist
2 Telescoping mechanism
3 Derrick lattice extension[1)]
4 Auxiliary hoist
5 Derricking gear
6 Slewing gear

[1)] Lattice extension – luffable



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



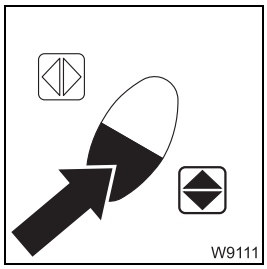
Function buttons
The operations are not monitored by the RCL.

There are four button combinations; actuated buttons are shown in black:

– **Pre-selected function on**
Press the required button combination.

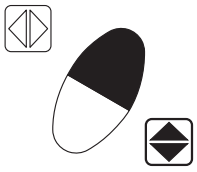
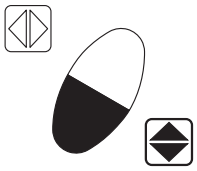
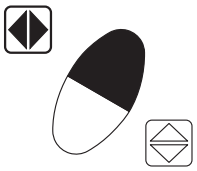
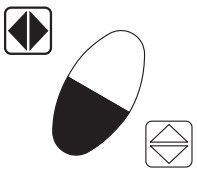
– **Pre-selected function off**
Release one or both the buttons.

Press a non-assigned button combination – pre-selection off.



– **Faster movement:** Increase pressure on button
– **Slower movement:** Decrease pressure on button

14.03.2018

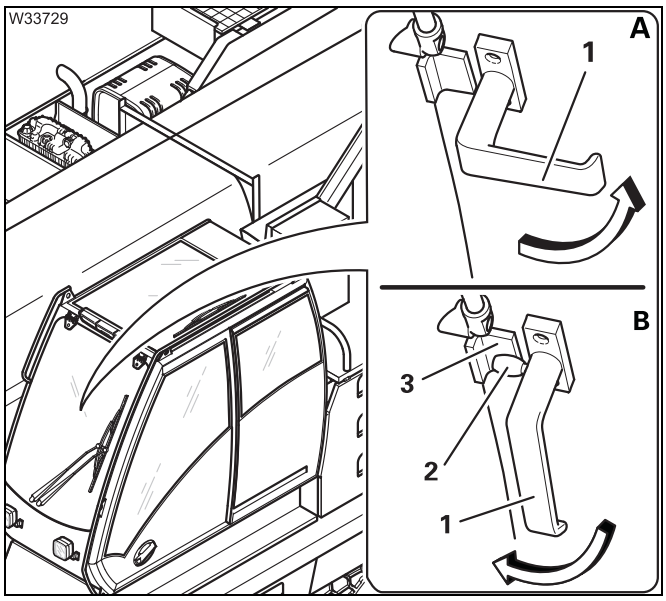
Button combination	Pre-selected power unit				
	Telescoping mechanism	Derricking gear	Slewing gear	Hoists	Lattice extension
 W3851	None	from the cabin	None	Lower	from the cabin
 W3850	Retract	Raise	None	Lift	Raise
 W3849	None	None	Slew to the right	None	None
 W3848	None	None	Slew to the left	None	None

➠ *Emergency operation with the hand-held control*, p. 14 - 59

14.03.2018

9.2.24 Windows, doors, keys

Windscreen



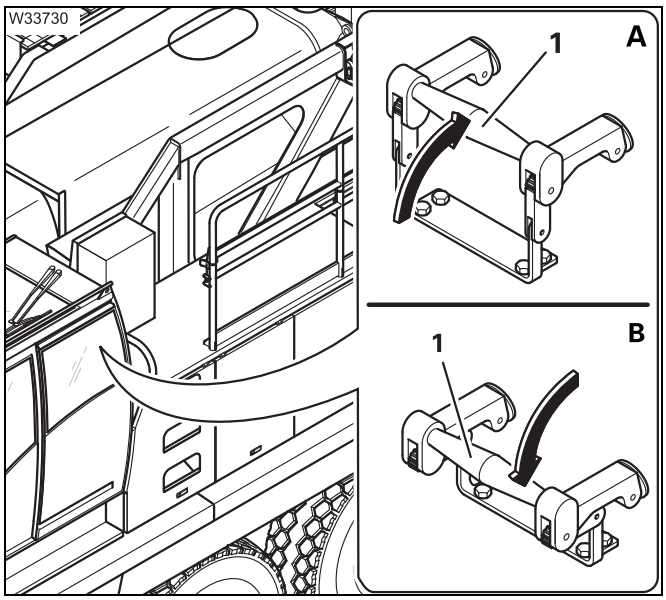
Open window (A)

- Turn both handles (**1**) inward.
- Push the window forward.

Close window (B)

- Pull the window closed.
- Turn both handles down – pegs (**2**) located behind the holder (**3**).

Rear window



Open (A)

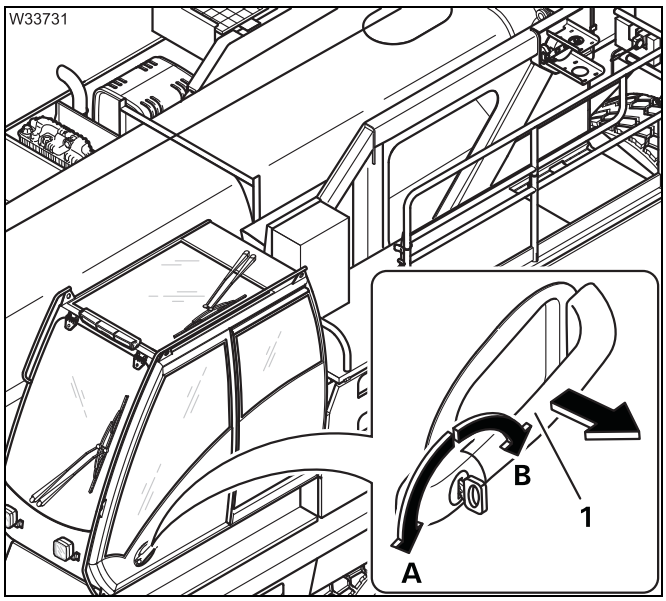
- Raise the handle (**1**).
- Push window outwards.

Close (B)

- Pull in window.
- Push down handle (**1**).

14.03.2018

Crane cab door



From outside

Unlock

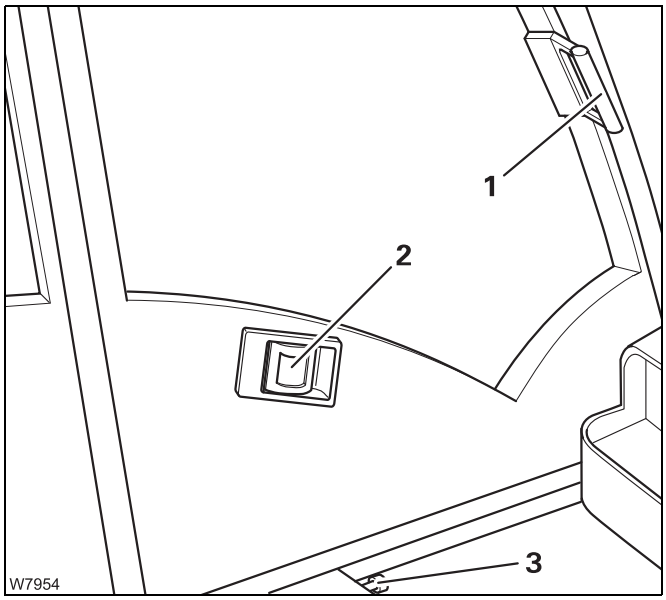
- Turn the key in direction **A**.

Lock

- Turn the key in direction **B**.

Open/close

- Pull the handle (**1**).
- Slide the door.

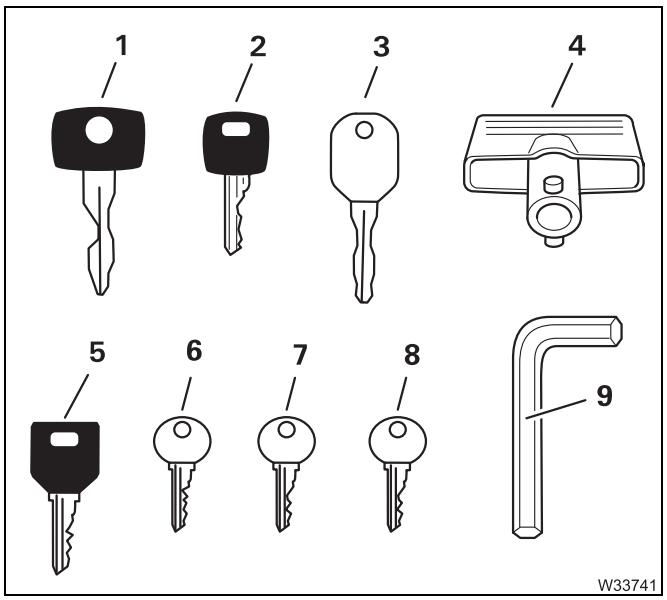


From inside

– **Closing**
Pull unlocking lever (**3**), push door forwards by handle (**1**) – latches.
Locking from inside not possible.

– **Opening**
Pull unlocking lever (**2**), push door back by handle (**1**) – engages.

Keys Different keys are supplied.

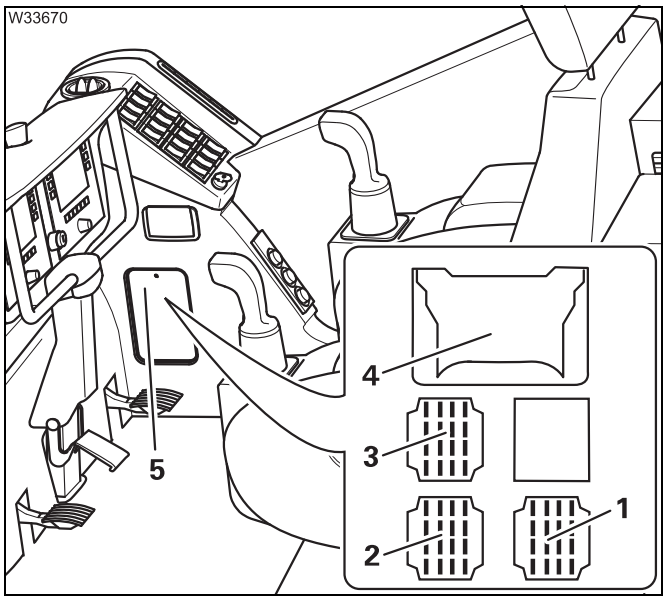


1 Crane cab door lock
2 Crane cab ignition lock
3 Urea tank [1)]
4 Distribution box
5 Key-operated override switch
6 Fuel tank
7 Boom floating position lock[1)]
8 Slewing gear freewheel lock[1)]
9 Covers, storage box[1)]

[1)] Additional equipment

9.2.25 Diagnostics

The diagnostics connections may only be operated by the service personnel.



The following connections are below the cover (**5**).

1 ECOS diagnostics – (serial interface)
2 ECOS diagnostics – CAN bus
3 RCL diagnostics
4 Engine diagnostics

14.03.2018

10 Starting/switching off the engine – for crane operation

14.03.2018

14.03.2018

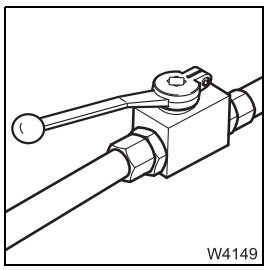
10 Starting/switching off the engine – for crane operation

10.1 Starting the engine – from the crane cab

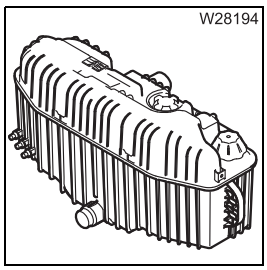
This section describes only how to start the engine from the crane cab. You can also start the engine with the hand-held control; ➠ p. 10 - 19.

10.1.1 CHECKLIST: Starting the engine

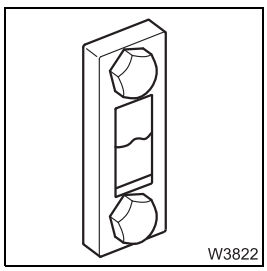
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions there!



1. Check whether the valve on the hydraulic tank is open; ➠ p. 10 - 7.

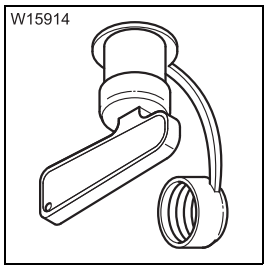


2. Check the coolant level in the engine; ➠ *Maintenance Manual*.

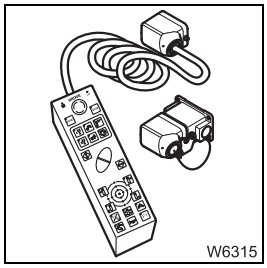


3. Check the oil level in the hydraulic system; ➠ *Maintenance Manual*.

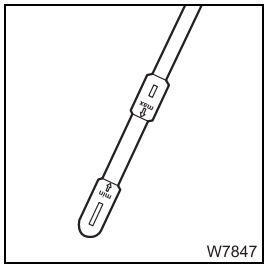
14.03.2018



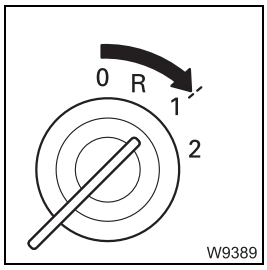
4. Switch on the battery master switch; ➠ p. 10 - 7.



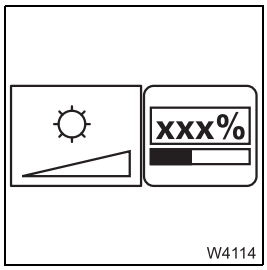
5. Remove the hand-held control and insert all bridging plugs; ➠ p. 10 - 8.



6. Check the oil level in the engine; ➠ *Maintenance Manual*.

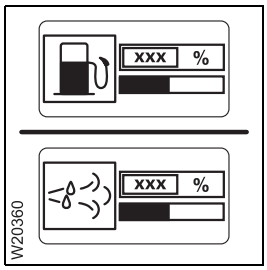


7. Switch on the ignition and check the instruments and displays; ➠ p. 10 - 8.

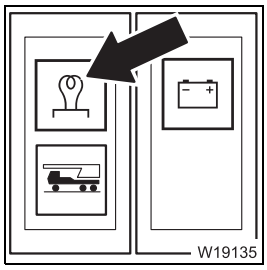


8. Adjust the brightness of the *ECOS* display as required; ➠ p. 10 - 11.

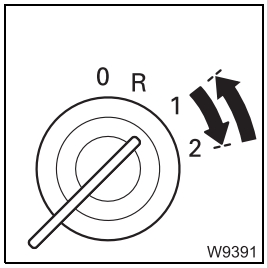
14.03.2018



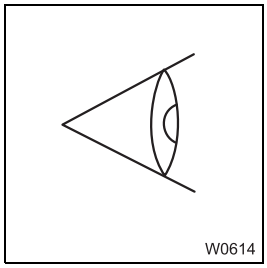
9. Check the fuel level and carbamide level if necessary; ➠ p. 10 - 4.



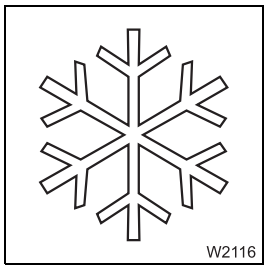
10. If the truck crane has a flame start system, wait until the lamp goes out; ➠ p. 10 - 13.



11. Start the engine; ➠ *Starting the engine*, p. 10 - 12.



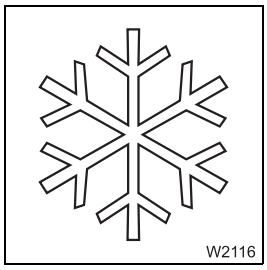
12. Check the instruments and displays when the engine is running; ➠ p. 10 - 14.



13. In the event of low outside temperatures; ➠ *CHECKLIST: At low temperatures*, p. 10 - 4.

14.03.2018

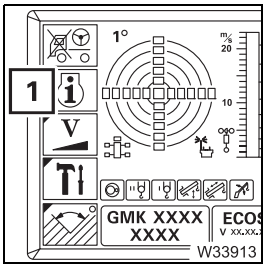
10.1.2 CHECKLIST: At low temperatures



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

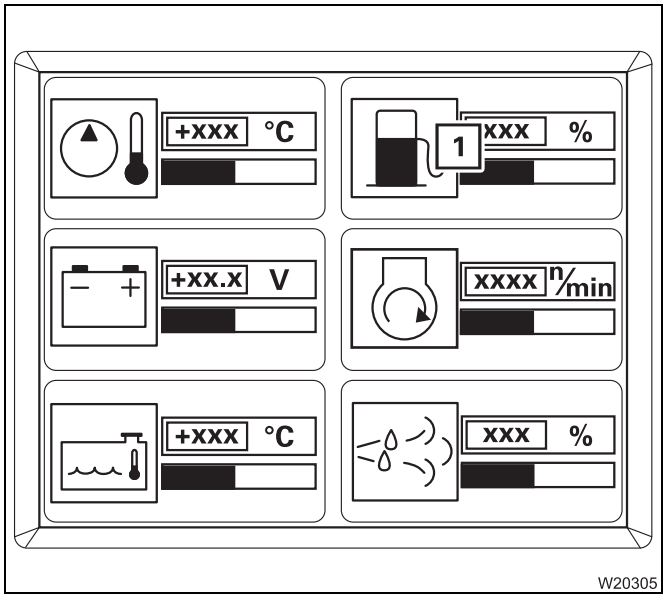
1. The fuel and engine oil must be suited for use in the outside temperature in question; ➠ *Separate engine operating instructions, provided by the manufacturer*.
2. The engine coolant must contain sufficient antifreeze; ➠ *Separate engine operating instructions, provided by the manufacturer*.
3. The windscreen washing system must contain sufficient antifreeze; ➠ *Windscreen washing system – Tank*, p. 11 - 5.
4. The engine can be preheated with the auxiliary water heating system if necessary; ➠ *Auxiliary water heater*, p. 11 - 135.
5. The hydraulic oil must be preheated; ➠ *Preheating the hydraulic oil*, p. 11 - 13.

10.1.3 Refuel



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

Fuel



The display (**1**) indicates the current level in percent. 100% corresponds to about 220 l (58 gal).

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

Green: Over 10% – over 22 l (5.8 gal)

Yellow: 5 to 10% – 11 to 22 l (2.9 to 5.8 gal)

Red: Below 5% – less than 11 l (2.9 gal)

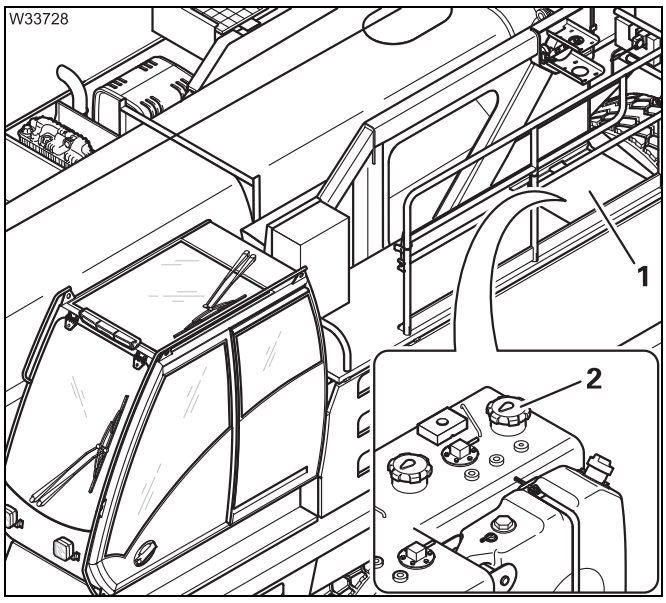
14.03.2018

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

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

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

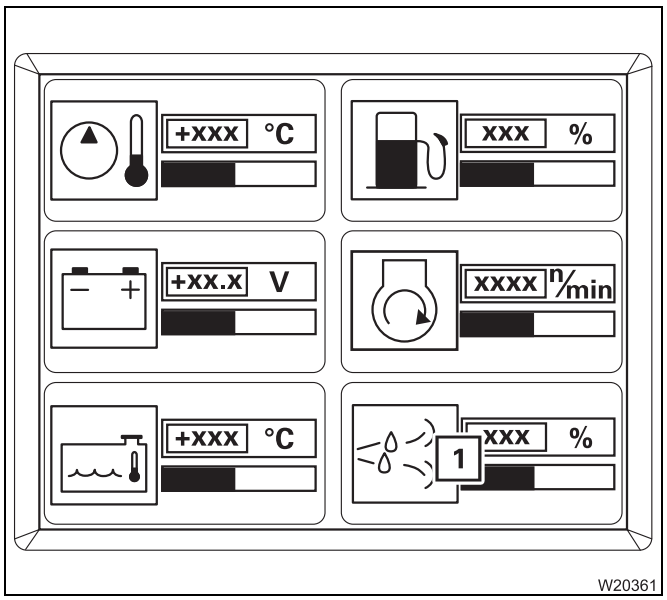
Risk of damage to the engine and catalytic converter!
Unauthorised consumables can damage the engine and catalytic converter and void the warranty. Only use consumables approved by the engine manufacturer.



- Open the cover (**1**).
- Fill in the fuel through the filler neck (**2**) in time. Leave sufficient space for the fuel to expand.
- Close the filler neck each time you have refuelled (**2**).
- Close the cover (**1**).

14.03.2018

Carbamide



The display (**1**) indicates the current level in percent. 100% corresponds to about 40 l (0.9 gal).

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

Green: Over 10% – over 4 l (0.9 gal)

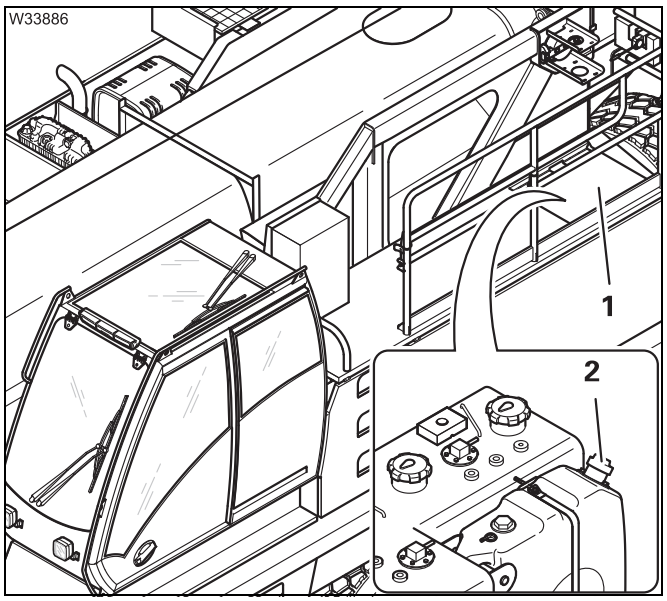
Yellow: 5 to 10% – 2 to 4 l (0.4 to 0.9 gal)

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

When the carbamide tank is empty the engine control system will reduce the motor torque. You can override this torque reduction;
➠ *Override torque reduction*, p. 10 - 17.

Risk of injury from ammonia vapours!
Ammonia vapours can escape if the carbamide 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!
Carbamide can damage these surfaces. Clean up spilled carbamide with water immediately.



- Open the cover (**1**).
- Refill the carbamide tank (**2**) via the filler neck in good time and close the tank using the cap.
- Close the cover (**1**).

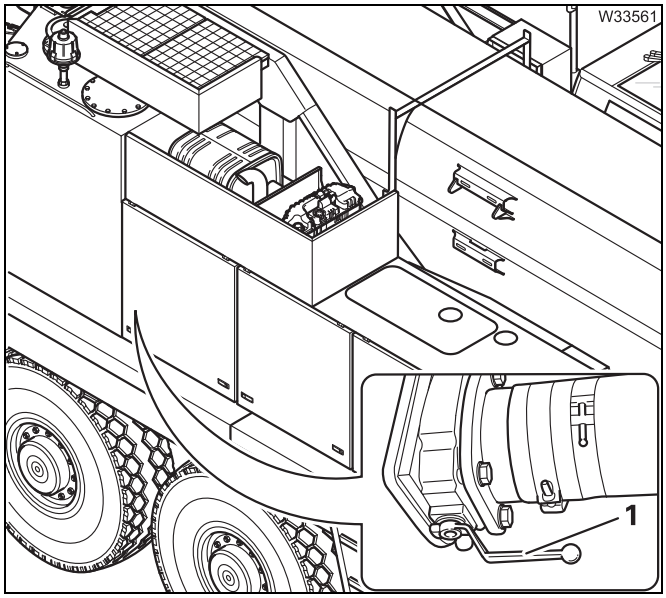
14.03.2018

10.1.4 Checks before starting the engine

At the hydraulic tank

The valve on the hydraulic tank must be open before starting the engine.

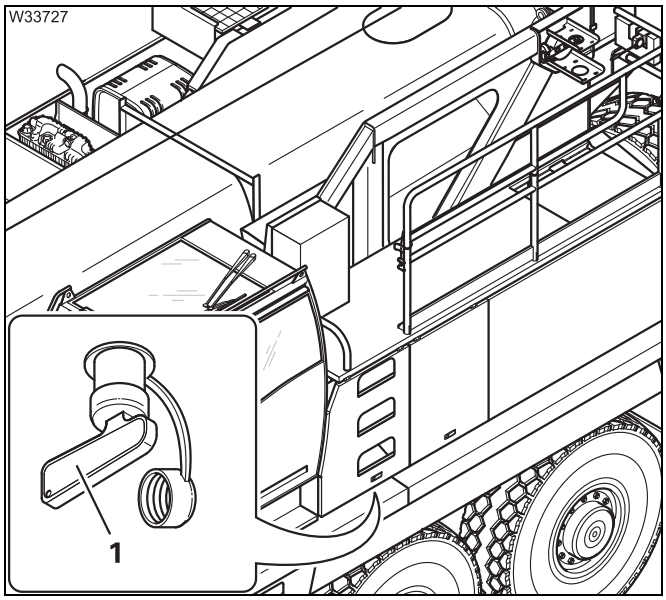
Risk of damage to the hydraulic pumps!
You may only start the engine when the valve on the hydraulic tank is open!



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

Battery master switch

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



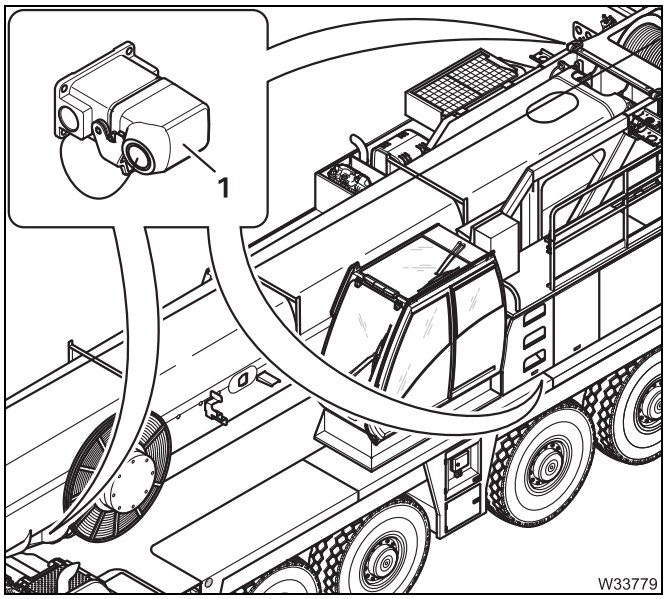
- Switch the battery master switch (**1**) on.

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

14.03.2018

Checking the hand-held control

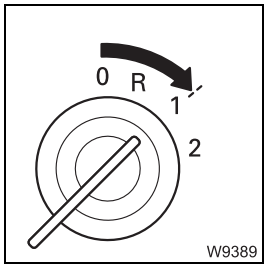
The hand-held control must be removed for crane operation from the crane cab.



- Check whether the bridging plugs (**1**) are inserted in all the sockets; ➠ p. 12 - 21.

You can start the engine from the crane cab, but if the hand-held control is connected, the operating elements for crane operation are disabled.

10.1.5 Switch on the ignition



- Insert the ignition key into the ignition lock and turn the key to position **1**.

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

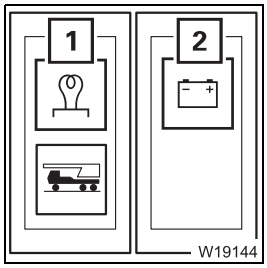
14.03.2018

10.1.6 Lamp test / switching state alignment

Lamp test

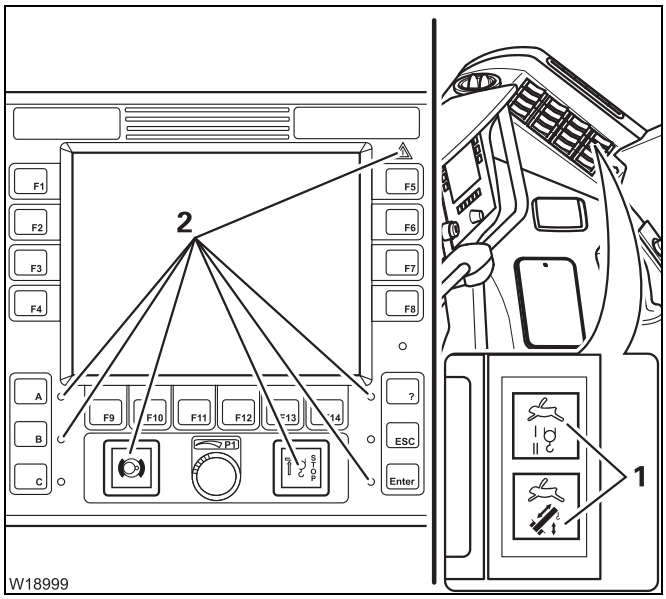
After the ignition has been switched on, a lamp test is performed.

Risk of accidents due to faulty lamps!
The lamps that are used to provide warnings and information during operation light up for control purposes whenever the ignition is switched on. Always perform the following lamp tests and immediately replace faulty lamps or have them replaced!
This prevents accidents and damage caused by detecting malfunctions too late.



- Check that the lamps (**1**) and (**2**) light up briefly.

If the specified time is insufficient, switch on the ignition again.

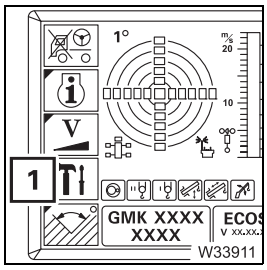


- Check whether lamps (**1**) and (**2**) light up briefly.

If one or more lamps do not light up, refer to **Manitowoc Crane Care**.

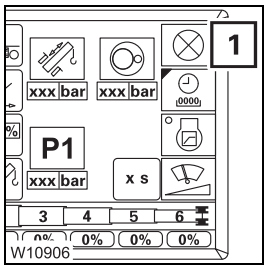
If the specified time is insufficient, you can perform the lamp test again as follows.

14.03.2018



Conducting the lamp test

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



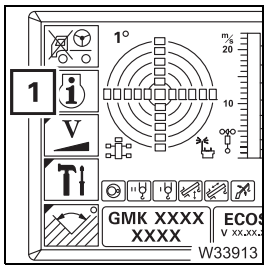
- Press the button (**1**).
  The above lamps light up until you let go of the button again.

You can adjust the minimum brightness of the display if necessary;
➠ p. 10 - 11.

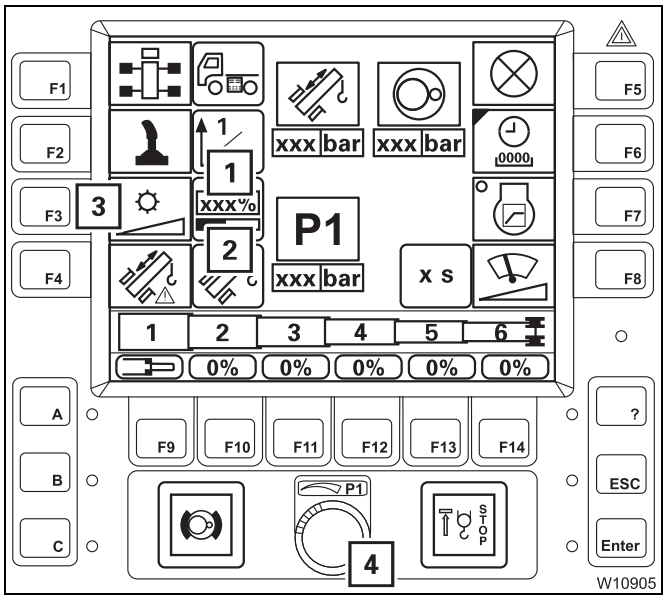
14.03.2018

10.1.7 Adjusting display brightness

The brightness of the displays is automatically regulated by the *ECOS* and the *RCL* displays and depends on the brightness of the operating environment. You can manually set a default minimum brightness for the *ECOS* and *RCL* displays.



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



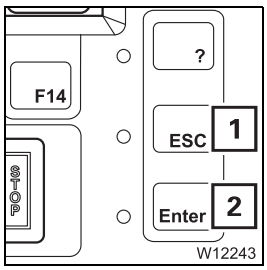
- Press the button (**3**) once.

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

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

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

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

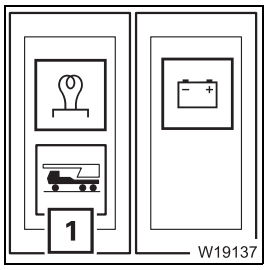


You can cancel the entry at any time using button (**1**). The settings are then reset.

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

14.03.2018

10.1.8 Starting the engine



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

– The bridging plugs have been inserted in all carrier and superstructure sockets for hand-held control; ➠ p. 12 - 21.

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

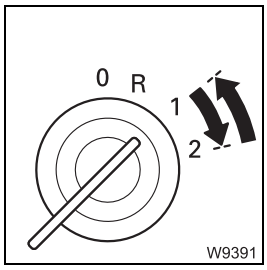
If the engine is equipped with a flame start system; ➠ *With flame start system*, p. 10 - 13.

Without flame start system

This section pertains to starting a warm and cold engine.

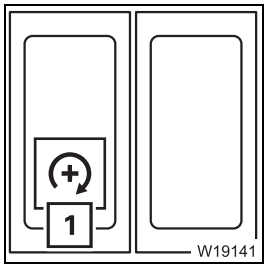
Danger of explosion when using starter fuel!
The engine may never be started with the aid of starter fuel. The starter fuel sprayed into the intake manifold can ignite.

- Do not press the accelerator.
- Turn the ignition key to position **2** and hold it there until the engine starts.
- Let go of the ignition key after the engine starts.



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

If the engine does not start after multiple attempts; ➠ *Malfunctions on the engine*, p. 14 - 13.



You can also start the engine by pressing button (**1**) down once with the ignition turned on. After starting, the idling speed corresponds to the standard value. To set the idling speed; ➠ p. 10 - 16.

14.03.2018

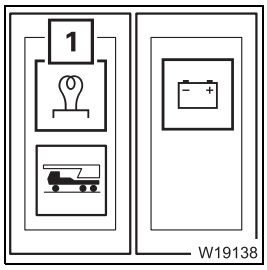
With flame start system

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

This section pertains to starting a warm and cold engine.

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

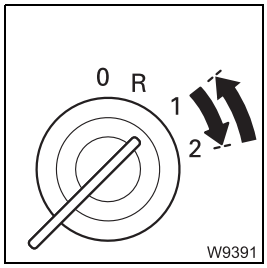
The flame start system is activated each time the ignition is turned on:



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

If the lamp (**1**) does not go out, there is a fault in the flame start system; refer to **Manitowoc Crane Care**.

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

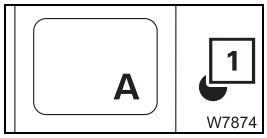


- Turn the ignition key to position **2** and hold it there until the engine starts.
- Let go of the ignition key after the engine starts.
- If the engine does not start, release the ignition key after approx. 15 seconds and wait one minute before trying again.

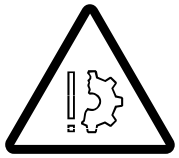
If the engine does not start after multiple attempts; ➠ *Malfunctions on the engine*, p. 14 - 13.

14.03.2018

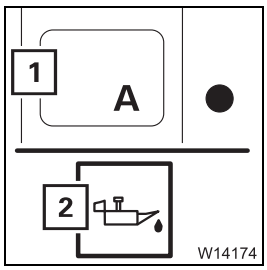
10.1.9 Checks after starting the engine



- Check the lamp (1) on the *ECOS* control unit immediately after starting the engine.
  The lamp (**1**) must go out approx. 10 seconds after starting the engine.

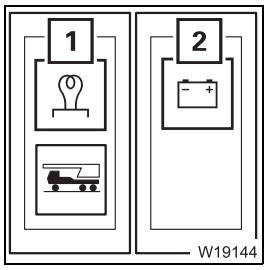


Risk of damage to the engine!
If the lamp (**1**) does not go out after approx. 10 seconds, perform the following inspection and, if necessary, turn off the engine immediately.
Running the engine when the oil pressure is too low can damage it.



- Press the button (**1**) once. This opens the *Warning* submenu.
- If the symbol (**2**) is **red**, switch off the engine immediately.
- Check the oil level; ➠ *Maintenance Manual*.
- Add oil if necessary. If the error message persists, refer to **Manitowoc Crane Care**.

If other symbols are displayed in red in this menu; ➠ *Warning submenu*, p. 11 - 110.



- Also check the following lamps on the side panel.

– If the lamp (**2**) does not go out or lights up while the engine is running, switch the engine off and look for the cause.

– If the lamp (**1**) does not go out or lights up while the engine is running, there is a malfunction in the flame start system.

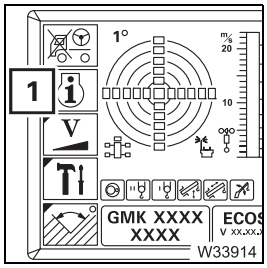
➠ *Malfunctions on the engine*, p. 7 - 27

More information can be found in the *Monitoring* submenu; ➠ p. 10 - 15.

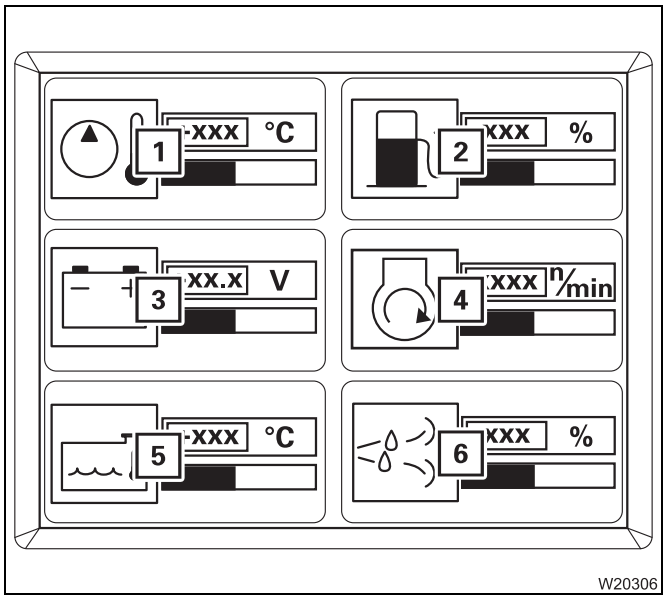
14.03.2018

10.1.10 Monitoring submenu

The *Monitoring* submenu shows the most important measured values.



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



This opens the *Monitoring* submenu.

The following values are displayed:

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

2 Fuel supply in percent

3 Voltage in volts

4 The engine speed in rpm

5 The coolant temperature in °C (°F)

6 Carbamide supply in percent

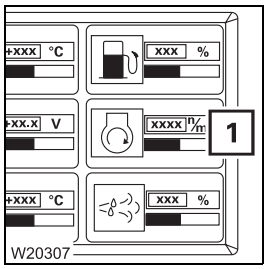
The colour of the bar below the values indicates in which area the value can be found.

Green:	Value OK.
Yellow:	Limit value almost reached
Red:	Limit value exceeded (or not reached) – warning message; ⇛ p. 11 - 110.

14.03.2018

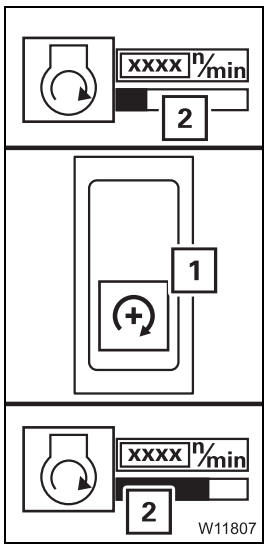
10.1.11 Setting idling speed

- Start the engine; ➠ p. 10 - 12.



The display (**1**) in the *Monitoring* submenu shows the current engine speed.

You can increase the idling speed for crane operation.
Release the accelerator in order to be able to view the settings below the current engine speed.

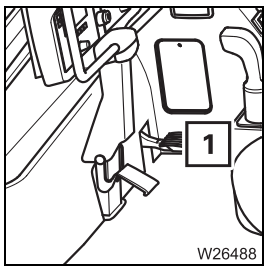


Increasing/reducing the idling speed

- Press the button (**1**) up/down until the required engine speed has been reached. When reducing:
  - After approx. 3 seconds, idling speed = standard value.
  - Engine off after approx. another 3 seconds.
    The engine cannot be restarted until approx. 7 seconds have elapsed.

or

- Press the button up/down once. The idling speed (**2**) increases/reduces by one level.



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.

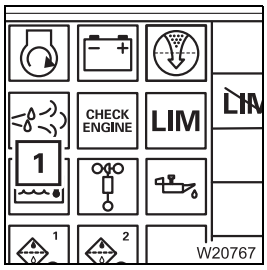
14.03.2018

10.1.12 Override torque reduction

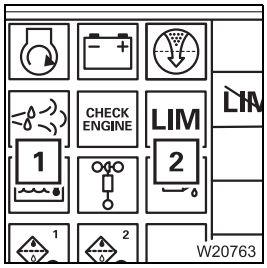
When the carbamide supply is empty, the torque reduction is activated via the engine control system.

The monitoring elements are found in the *Warning* submenu.

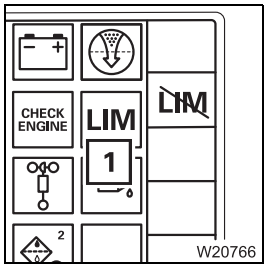
Further information can be found on the *Warning* submenu;
➠ *Warning submenu*, p. 11 - 110.



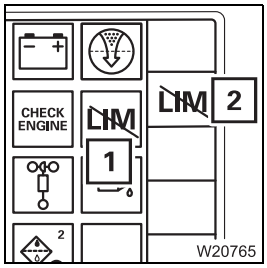
– If the carbamide supply falls to the reserve level, then the symbol (**1**) is displayed in **yellow**.



– If the carbamide supply is empty, the symbols (**1**) and (**2**) are displayed in **yellow**.



– If the symbol (**1**) flashes, the engine torque is reduced after the next engine start.



The engine torque is reduced.

- Press the (**2**) button down to override torque reduction.
  The (**1**) symbol is displayed.

  You can override torque reduction up to 3 times.
- Refill with carbamide immediately; ➠ *Carbamide*, p. 4 - 8.

  After the next engine start the torque reduction is deactivated.
  The symbol (**1**) disappears.

14.03.2018

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14.03.2018

10.2 Starting the engine – with the hand-held control

Prerequisites

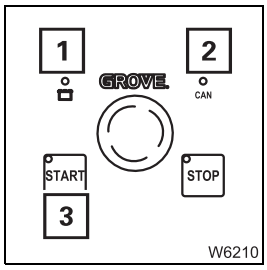
You can only start the engine for crane operation if

– The bridging plug is inserted in all unneeded sockets; ➠ p. 10 - 8 and

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

Starting the engine

All checks required before starting the engine must be carried out; ➠ p. 10 - 1.



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

If the lamp (**2**) does not go on or flash after approx. 20 seconds, there is a malfunction; ➠ p. 14 - 24.

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.

14.03.2018

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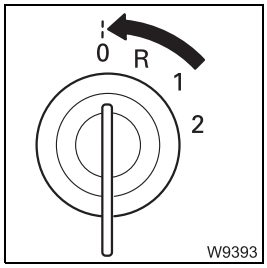
14.03.2018

10.3 Switching off the engine

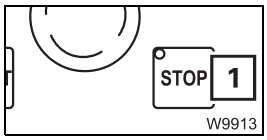
10.3.1 During normal operation, with the ignition lock/with the hand-held control

Risk of accidents due to 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.



If the hand-held control is connected:

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

It is not possible to switch off the engine with the ignition lock

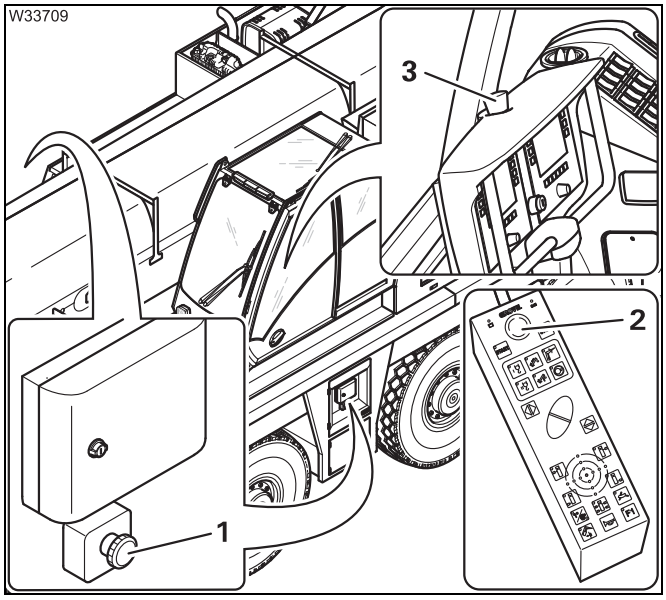
After switching off

Observe the notes in the appropriate sections;
➠ *In case of short work breaks*, p. 11 - 129,
➠ *In case of work breaks of more than 8 hours*, p. 11 - 130.

14.03.2018

10.3.2 In emergencies, with the emergency stop switches

Risk of overloading if used improperly!
Use the emergency stop switches only in an emergency, i.e. if the crane functions no longer respond to the control levers.
Stopping crane movements suddenly may cause the truck crane to become overloaded under unfavourable conditions.



Four emergency stop switches are provided for emergencies:

1 On the carrier

2 On the hand-held control

3 In the crane cab

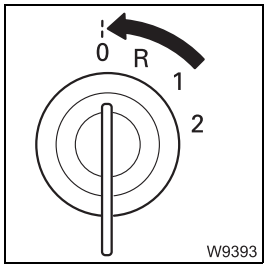
- Press an emergency stop switch (**1**), (**2**) or (**3**). The switch latches.

The engine shuts down. If the engine for driving was on, it will stop as well.

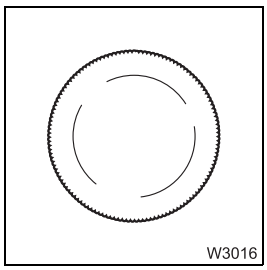
If an air intake inhibitor is present, then it will be triggered – this also applies to the engine for driving.

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.

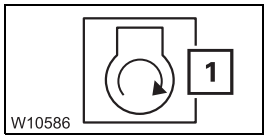
If air intake inhibitors are fitted, they must be released;
➠ *Releasing the air intake inhibitor*, p. 10 - 23,
➠ *Releasing the air intake inhibitor*, p. 4 - 25.

14.03.2018

10.4 Air intake inhibitor

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

– if an emergency stop switch is actuated or



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

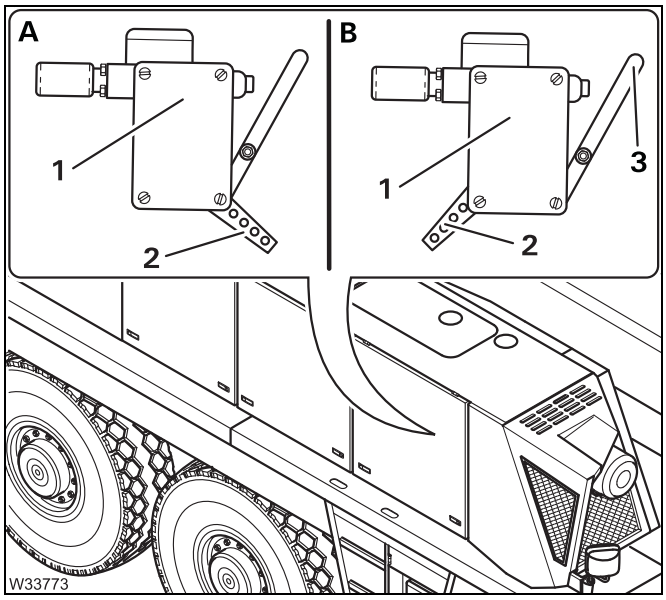
The engine can be restarted only after the air intake inhibitor has been released.

Releasing the air intake inhibitor

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

– The ignition 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.

(**B**) – Turn the indicator (**2**) clockwise until it engages in the *released* position.

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

14.03.2018

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14.03.2018

11 Crane operation

14.03.2018

14.03.2018

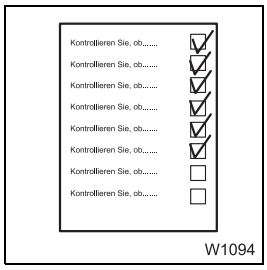
11 Crane operation

11.1 Before operating the crane

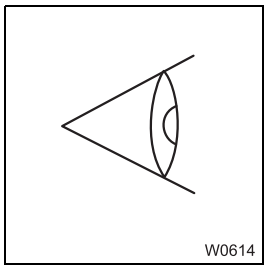
11.1.1 CHECKLIST: Checks before operating the crane

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

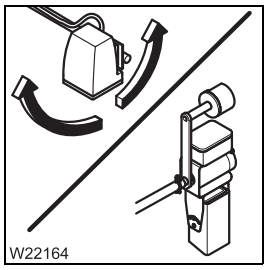
This checklist only applies to working with a rigged truck crane (supported and rigged with counterweight). If the truck crane is not yet rigged;
➠ *CHECKLIST: Rigging*, p. 12 - 1.



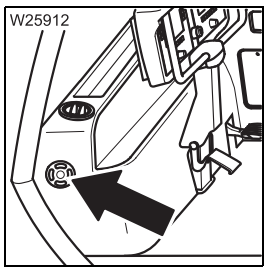
1. The truck crane has been rigged for the operation to be carried out as described in the *CHECKLIST: Rigging*; ➠ p. 12 - 1.



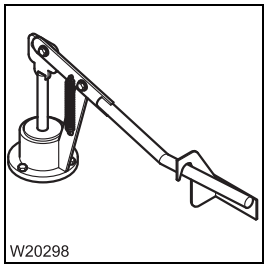
2. Carry out an inspection of the truck crane, looking out in particular for any leaking fluids (oil, fuel or water).



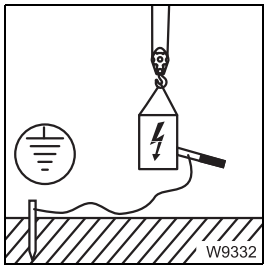
3. If necessary:
- Adjust the pivoting spotlights; ➠ p. 11 - 108,
- Adjust the cameras for crane operation; ➠ p. 12 - 123



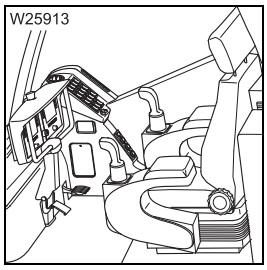
4. Windscreen washing system – check filling level; ➠ p. 11 - 5.



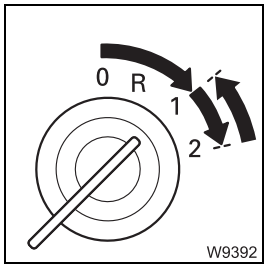
5. If necessary, mechanically lock the turntable; ➠ p. 11 - 14.



6. Earth the load, if necessary; ➠ p. 11 - 12.

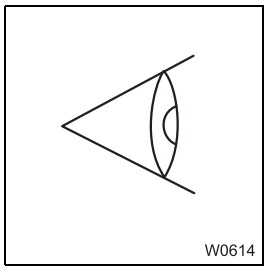


7. Adjust crane cab seat and front panel;
➠ *Adjusting the crane cab seat and front control panel*, p. 11 - 7.

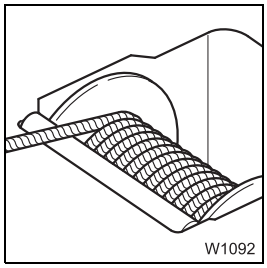


8. Start the engine for crane operation; ➠ p. 10 - 12.

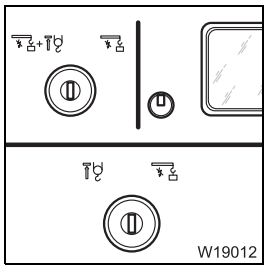
14.03.2018



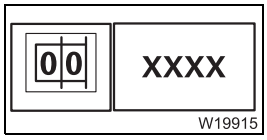
9. Check
– RCL,
– lifting limit switch,
– seat contact switch and dead man's switch,
– emergency stop switch,
for correct operation. Have faulty units repaired; ➠ p. 11 - 9.



10. Check the position of the hoist ropes; ➠ p. 11 - 6.

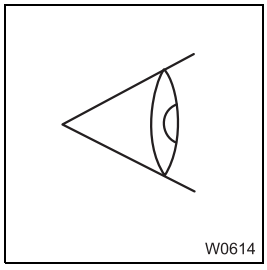


11. Remove the keys from the key-operated *Override* switches; ➠ p. 11 - 40.

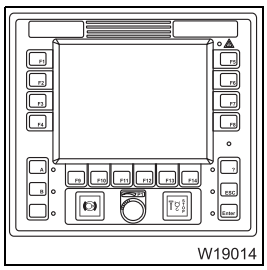


12. Compare current rigging mode to display on RCL – enter current rigging mode if necessary; ➠ p. 11 - 23.

13. Compare current reeving of hoist used against the display on the RCL – enter current reeving if necessary; ➠ p. 11 - 29.

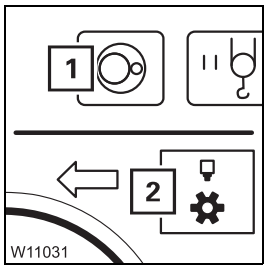


14. Check telescoping; ➠ *Checks before starting work*, p. 11 - 73.



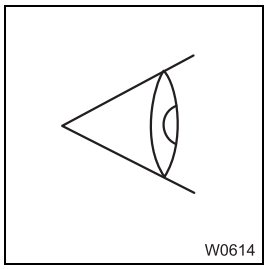
15. Perform lamp test on the RCL; ➠ p. 11 - 20.

14.03.2018

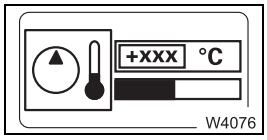


16. – Switch off the slewing gear for 0° and 180° working positions – symbol (**1**) is red; ➠ p. 11 - 100.

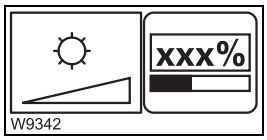
– Switch off houselock for other working positions – symbol (**2**) is red; ➠ p. 11 - 17.



17. Check the electrical system for correct operation; ➠ p. 11 - 6.



18. Check temperature of the hydraulic oil – preheat hydraulic oil if necessary; ➠ *Preheating the hydraulic oil*, p. 11 - 13.



19. Adjust the brightness on the *ECOS and RCL* displays as required; ➠ p. 10 - 11.

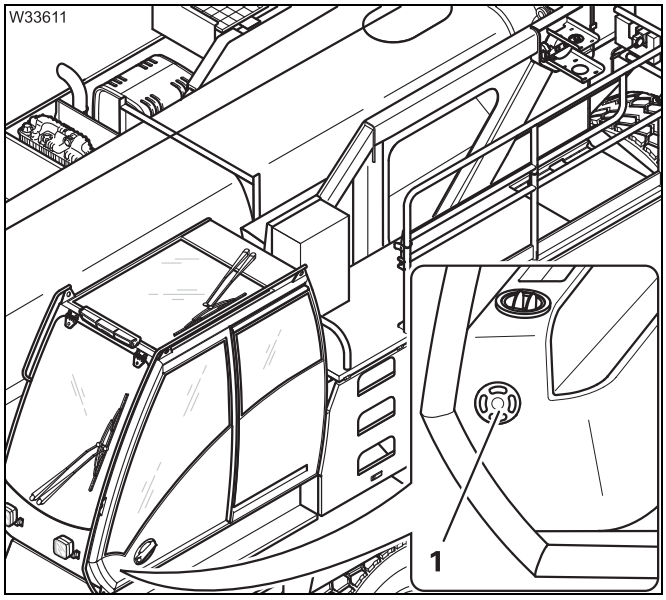
Additional information on inspections during crane operation, on permissible working positions and on how to operate the individual power units; ➠ *Crane operation with main boom*, p. 11 - 51.

14.03.2018

11.1.2 Checking the condition of the truck crane

Windscreen washing system – Tank

Use a windscreen washing agent and, at low temperatures, an appropriate antifreeze.



- Check the level in the tank (**1**).
- Top up water in due time and close 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.

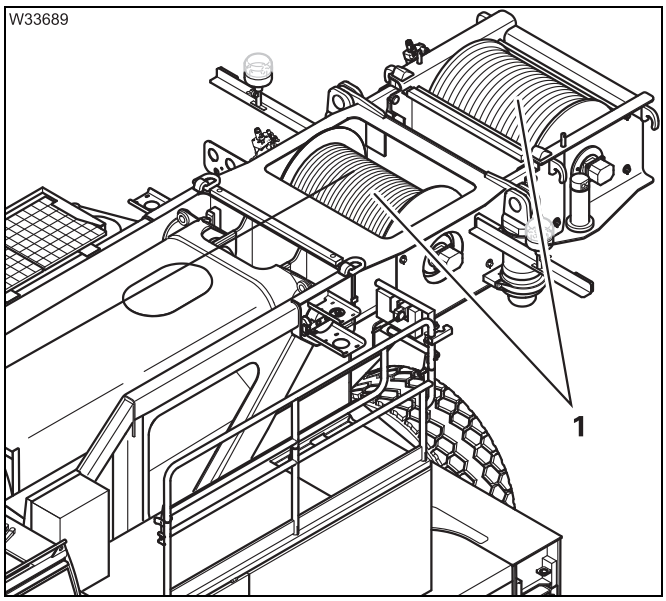
Risk of environmental damage due to leaking consumables!
Immediately repair or have repaired oil, fuel and coolant leakages.
This prevents oil or fuel from seeping into the ground or polluting waters.

14.03.2018

Checking the position of the hoist ropes

The hoist mirrors need to be folded out; ➠ p. 12 - 123.

Risk of crushing due to turning rope drum!
Keep away from the rope drum while it is turning.
This will prevent your limbs from being drawn in and getting crushed.



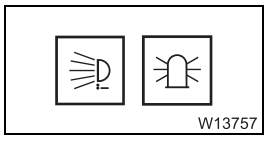
Check the position of the hoist ropes (**1**) for at least one full turn of the rope drum.

- Slowly carry out the *Lowering* movement and check the rope:
  - The hoist rope must be evenly wound.
  - The rope turns on the drum must be evenly spaced at a distance of 0 to 2 mm (0 to 0.08 in).
  - The cross-over points[1)] must be at an angle of approx. 180°.

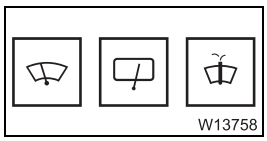
[1)] The top rope lines are laid over the next lower rope lines at the cross-over points.

Checking the electrical system

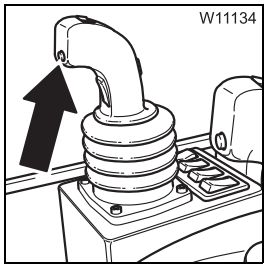
- Check the following functions and have faulty parts repaired.



  - Spotlights, air traffic control light, rotating beacons,



  - windscreen wipers, windscreen washing system,

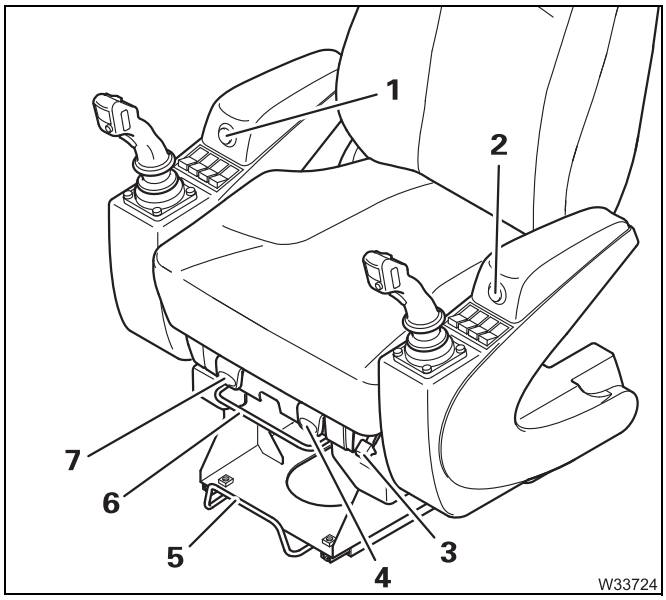


  - horn.

14.03.2018

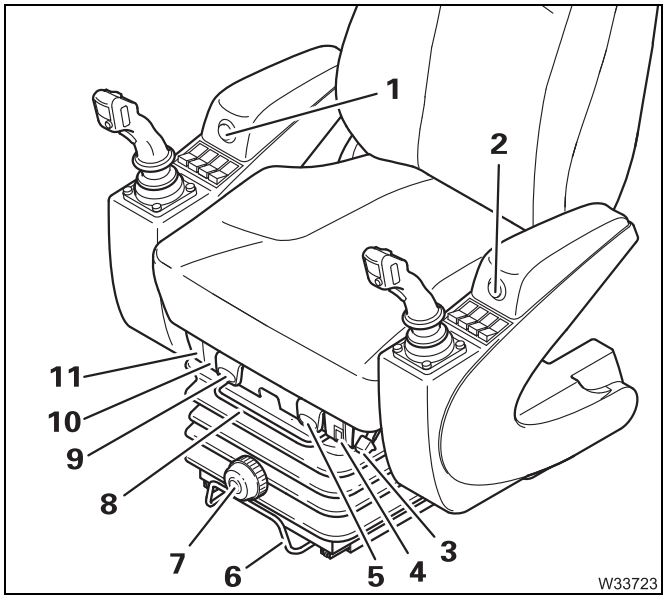
11.1.3 Adjusting the crane cab seat and front control panel

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 heating[1)] on/off
5 Seat – height[1)]
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

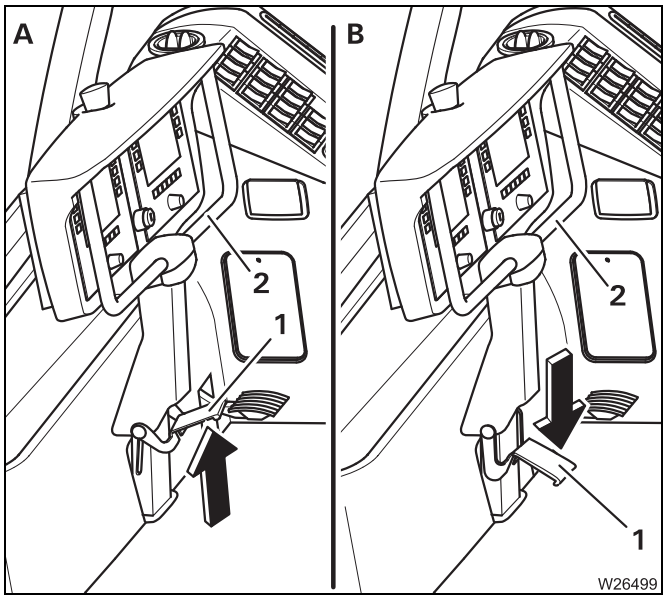
[1)] Requirement – ignition is on

- For version 2 pay attention to the seat contact switch; ➠ p. 9 - 62.

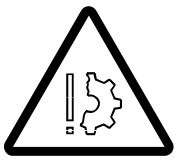
14.03.2018

Front control panel

You can adjust the height of the front control panel.



- (**A**) – Hold the front control panel by the handle **(2**).
- Fold the pedal (**1**) upwards.
- (**B**) – Adjust the front control panel to the desired height.
- Fold down the pedal (**1**) to lock the front control panel.



Risk of damage to the front control panel!
Do not use the handle on the front control panel as an aid for entering or climbing the crane. This prevents damage to the front control panel bracket. Use the handle on the crane cab for entering or climbing the crane.

14.03.2018

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

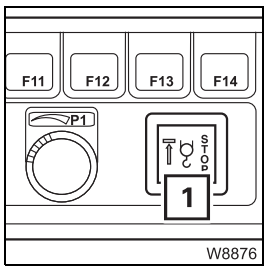
- Switch on the rated capacity limiter, do all of the checks and enter the current rigging mode; ➠ *Switch on the RCL*, p. 11 - 20.

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 work with the crane but notify **Manitowoc Crane Care**.

Lifting limit switch

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



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

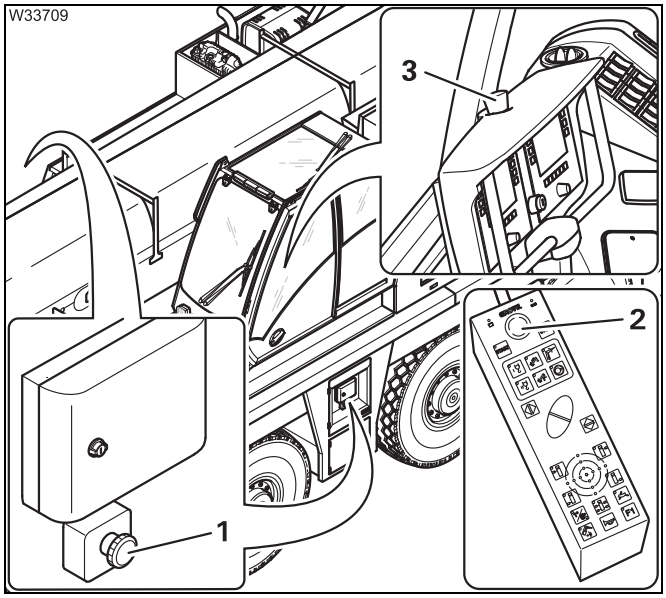
The lifting limit switch is working correctly at this point in time if the lamp (**1**) lights up and the movements *Raise*, *Lower* and *Extend* are switched off.

If the lift limit switch is not working correctly, do not start work with the crane but notify **Manitowoc Crane Care**.

14.03.2018

Emergency stop switch

- Set down the load and let go of both control levers.



- Press the emergency stop switch (**3**) so that it engages.
- Check whether the engine stops.
- Turn the emergency stop switch until it disengages.
- Release the air intake inhibitor if required; *Air intake inhibitor*, p. 4 - 25.
- Repeat the checks with the emergency stop switches (**1**) and (**2**).

If the emergency off switch is not working correctly, do not start work with the crane but notify **Manitowoc Crane Care**.

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

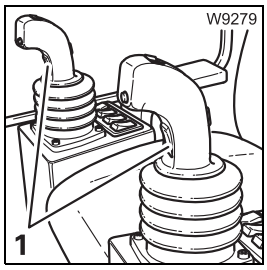
14.03.2018

Seat contact switch

This check is carried out together with the dead man's switch.

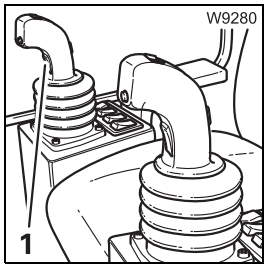
Danger of accident if the seat contact switch is faulty!
Always stand inside the crane cab when you do this check.
If you stand next to the crane cab, you may be pushed off the carrier if the superstructure slews as a result of a faulty dead man's switch.

Checks while stationary



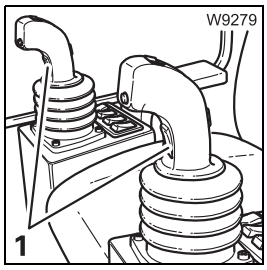
- Do not sit down on the crane cab seat.
- Do not press any dead man's switch (**1**).
- Move the control levers one after the other for all the crane movements and check whether all the crane movements are switched off.

Checks during operation



– Dead man's switch

- Do not sit down on the crane cab seat.
- Press the right dead man's switch (**1**) and slowly lift the hook block.
- With the control lever actuated, let go of the right dead man's switch and check whether the crane movement comes to a standstill within approx. 3 seconds.
- Repeat the check with the dead man's switch on the left control lever.



– Seat contact switch

- Do not press any dead man's switch (**1**).
- Sit down on the crane cab seat and slowly lift the hook block.
- With the control lever actuated, stand up and check whether the crane movement comes to a standstill within approx. 3 seconds.

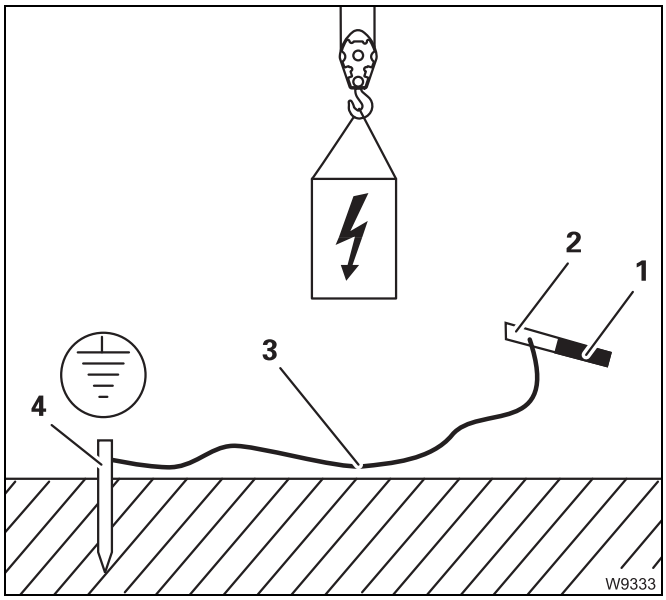
If the dead man's switch system is not working correctly, do not start work with the crane but notify **Manitowoc Crane Care**.

14.03.2018

11.1.5 Earthing the load

Even if the truck crane is already earthed (➠ p. 12 - 13), the load may become charged with static electricity. For example, if a hook block with synthetic sheaves or non-conducting sling gear is used.

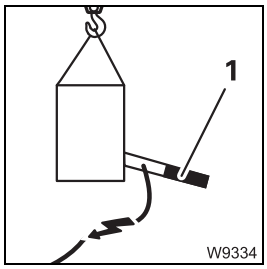
Risk of accidents due to electric shock!
Always earth the load before operating the crane
– near strong transmitters (radio transmitters, radio stations, etc.),
– near high-frequency switchgear substations,
– if a thunderstorm is forecast.
If the load is charged with static electricity, you must always 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 mm^2 (0.025 in^2)).
- Clamp the other end of the cable (**3**) to a metal rod (**2**) with an insulated handle (**1**).

Risk of accidents due to electric shock!
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.

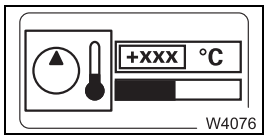


- Hold the metal rod firmly by its insulated handle (**1**).
- To earth, touch the load with the metal rod.

14.03.2018

11.1.6 Preheating the 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 *Monitoring* submenu. To open the submenu; p. 10 - 15.

– **Above 10 °C (50 °F)**

  Crane operation with load is permissible without speed restriction.

– **From 0 °C to 10 °C (50 °F to 32 °F)**

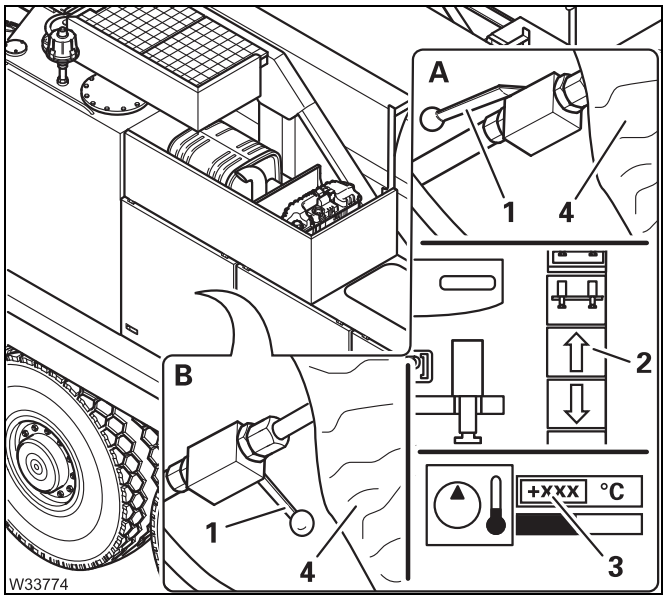
  • To preheat, carry out crane movements with loads only in normal operation mode, at average engine speed and at average operating speed.

– **From 0 °C to -15 °C (32 °F to 5 °F)**

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

– **Below -15 °C (5 °F)**

  Crane movements are not permitted. Preheat the hydraulic oil first.



(A) – Preheating

• Open the valve – lever (**1**) parallel to the line.

• Press the button (**2**) and retract the lifting cylinders to the full extent at low engine speed; p. 12 - 76.

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

(B) – Before crane operation

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

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

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

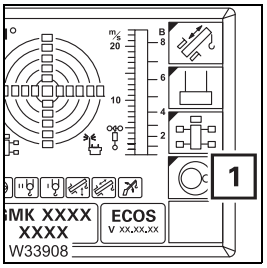
14.03.2018

11.1.7 Locking/unlocking the turntable

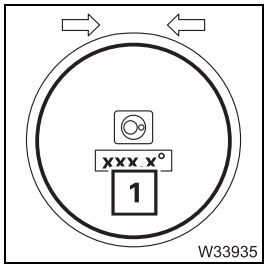
If the truck crane is equipped with a turntable lock then you can manually mechanically lock the turntable to the carrier.

Locking points

The locking points are at **0°** and **180°**.



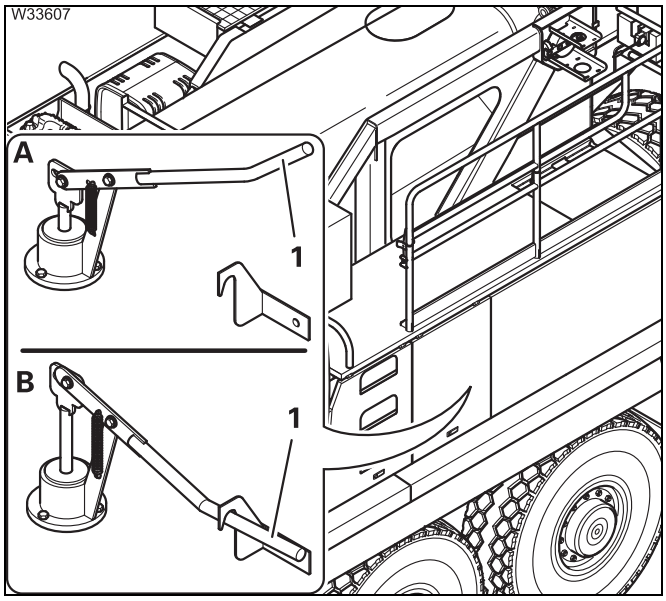
- If necessary, open the main menu and press the button (**1**) once.
  The *Slewing gear/houselock* submenu opens.



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 - 99.



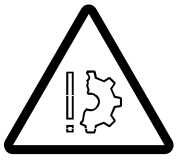
(A) – Lock

- Release the lever (**1**) and press it up.

If the lever (**1**) cannot be moved upwards then you must correct the position of the superstructure.

(B) – Unlock

- Pull the lever (**1**) down and secure it in position.



Risk of damage during slewing!
Always secure the lever when you have unlocked the turntable. Otherwise the turntable might suddenly lock during slewing.
This prevents lateral forces from affecting the main boom due to long delays or swinging loads.

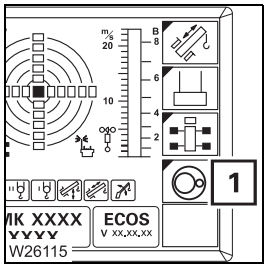
14.03.2018

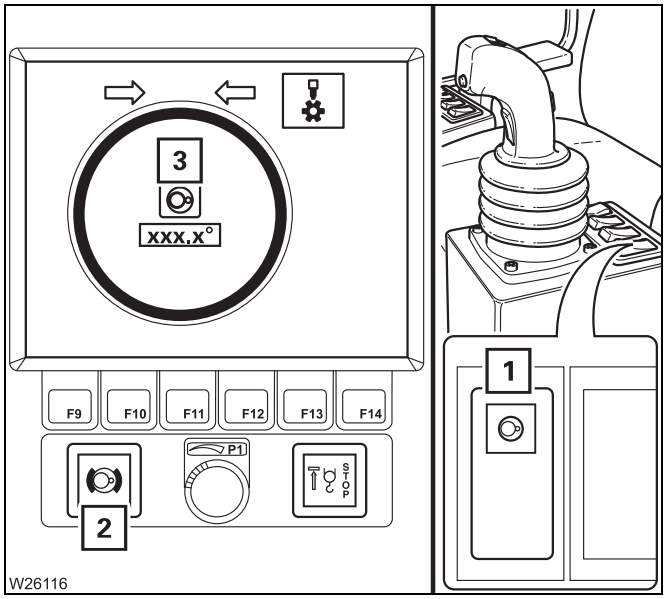
11.1.8 Switching the houselock on/off

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.
- If necessary, open the main menu and press the button (**1**) once. The *Superstructure lock* submenu will open.





Switching off the slewing gear

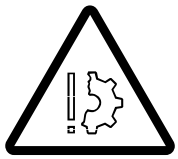
The slewing gear brake must be engaged when operating the houselock.

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

The slewing gear will be switched off and the slewing gear brake applied.

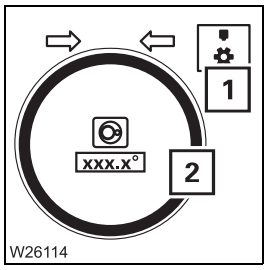
– Symbol (**3**) is **red**.

– The lamp (**2**) lights up.



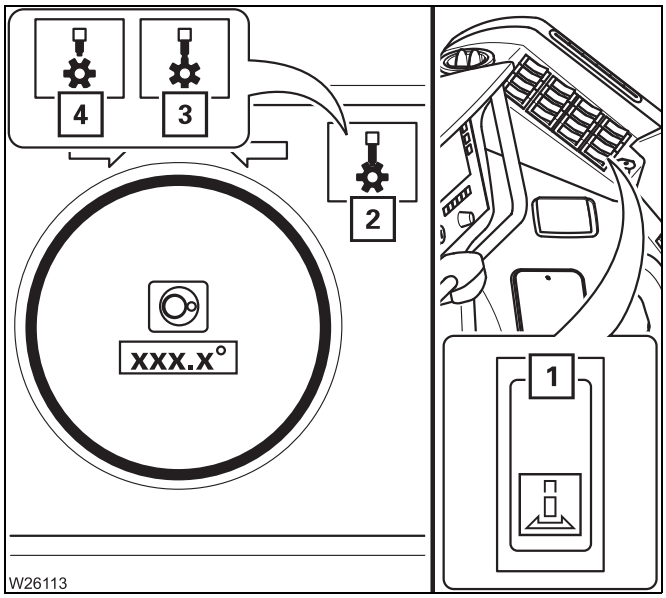
Risk of damage during slewing!
Always switch off the slewing gear before you operate the houselock. The system will be damaged if the superstructure is slewed during the locking procedure.

14.03.2018



Switching on the houselock

The slewing ring (**2**) will be displayed in the same colour as the displayed symbol (**1**) during the entire procedure.



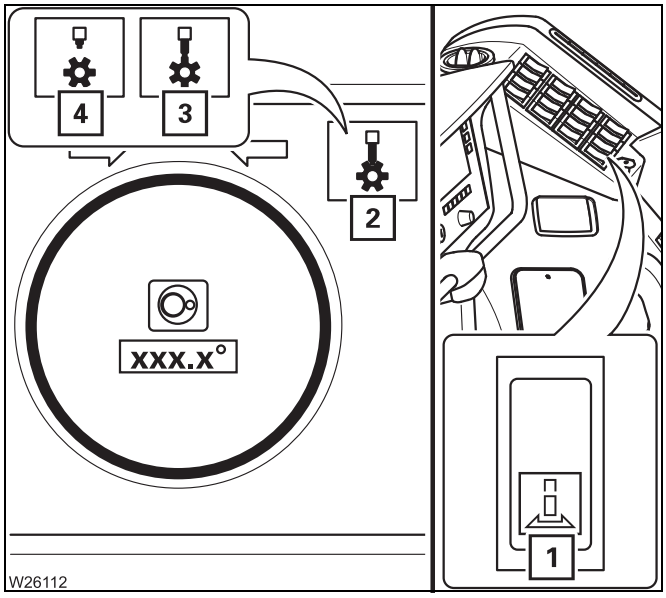
- Press in button (**1**) at the top until symbol (**2**) turns **green**.

The display will first show symbol (**4**) in **yellow** and when the houselock is switched on, it will show symbol (**2**) in **green**.

If symbol (**3**) is **red/yellow**:

- Release button (**1**).
  The lock is blocked and you need to correct the position of the superstructure as follows.

Risk of damage due to slewing with blocked lock!
Before slewing, make sure the symbol is displayed in **red** (houselock off).
Otherwise the system will be damaged during slewing.

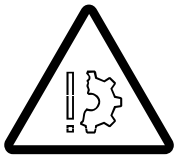


- Switch the houselock off – press in the button (**1**) at the bottom until the symbol (**4**) turns **red**.
- Switch on the slewing gear and slew the superstructure a little further (minimally).
- Switch off the slewing gear.
- Press in button (**1**) at the top until symbol (**2**) turns **green**.
- If symbol (**3**) is still shown, you must again correct the position of the superstructure.

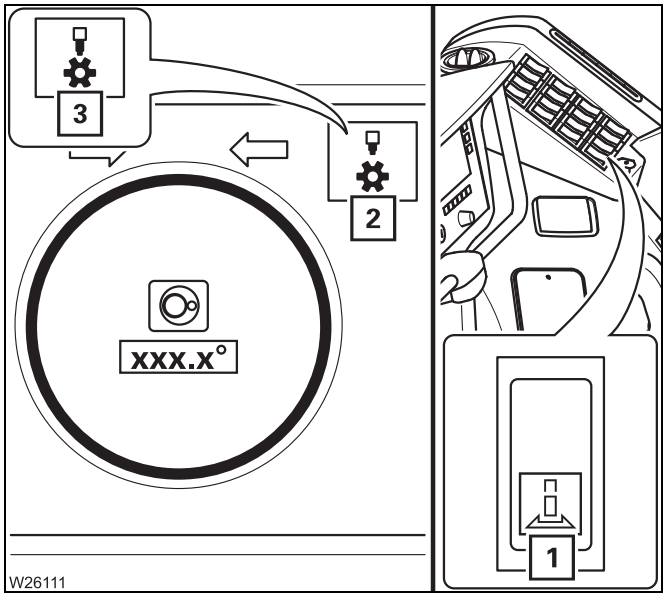
14.03.2018

Switching off the houselock

- Check that the slewing gear is switched off, and switch if off if it is not; ➠ *Switching off the slewing gear*, p. 11 - 15.



Risk of damage during slewing!
Always switch off the slewing gear before you operate the houselock. The system will be damaged if the superstructure is slewed during the locking procedure.



- Press in button (**1**) at the bottom until symbol (**2**) turns **red**.

The display will first show symbol (**3**) in **yellow** and when the houselock is switched off, it will show symbol (**2**) in **red**.

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14.03.2018

11.2 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!
Before operating the crane, ensure that the current rigging mode is correctly entered. An incorrect entry will give you a false sense of security. This may result in the truck crane overloading and causing an accident!

The current rigging mode is based on measured values and manually entered values.

Registered based on measured values	Registered based on manually entered values
– Main boom length	– Counterweight
– Main boom angle	– Reeving
– Current load	– Outrigger span[2)]
– Outrigger span[1)]	– Length of lattice extension
– Lattice extension angle[3)]	– Angle of the lattice extension[4)]

[1)] For versions without outrigger span monitoring

[2)] For versions with outrigger span monitoring

[3)] Lattice extension – luffable

[4)] 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.

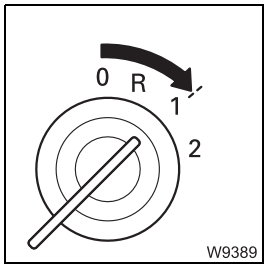
14.03.2018

11.2.1 Switch on the RCL

The RCL will not be switched off if you turn the ignition key to position **R** instead of position **0** to restart the engine. This means that the test program will not run and you will not have to acknowledge the settings again.

Switching on

The RCL is switched on together with the ignition.

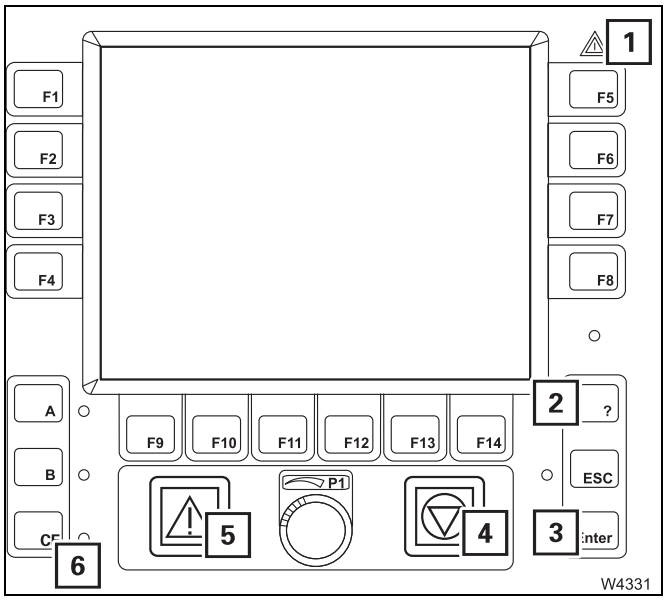


- Switch on the ignition.

A test programme runs after switching on the ignition. A continuous buzzer tone sounds for approx. 2 seconds and a lamp test is performed.

- Check whether you can hear a buzzer tone.

Risk of accidents if the safety devices are faulty!
If the lamps or buzzer fail, notify **Manitowoc Crane Care** and have the error corrected.
In the meantime, pay particular attention to the lamps in the event of a failure of the buzzer tone and vice versa.



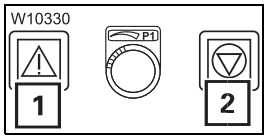
Lamp test

- Check that lamps (**1**) to (**6**) light up briefly after turning on the ignition.

If the specified time is insufficient, switch on the ignition again.

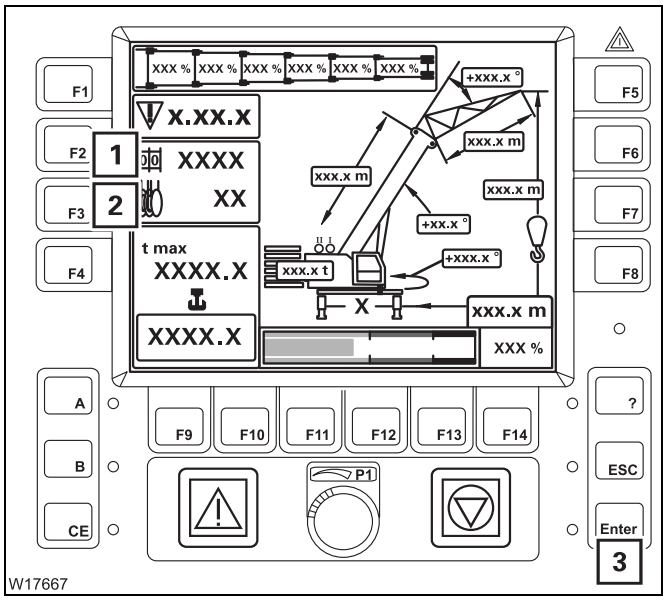
If one or more lamps do not light up, refer to **Manitowoc Crane Care**.

14.03.2018



After the test program:
– the lamps (**1**) and (**2**) light up,
– all power units are disabled.

The current display depends on whether the RCL either:
– was switched off for up to 48 hours, or
– was switched off for more than 48 hours.



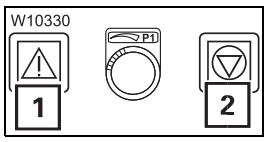
After a standstill of up to 48 hours

The *Monitoring* submenu opens.

The last set rigging mode will be displayed, and symbols (**1**) and (**2**) will be green and flash.

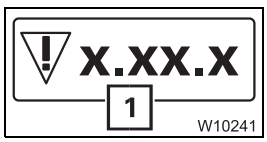
You can accept the displayed values if they correspond to the current rigging mode:

- Press button (**3**) once – symbols (**1**) and (**2**) will stop flashing.



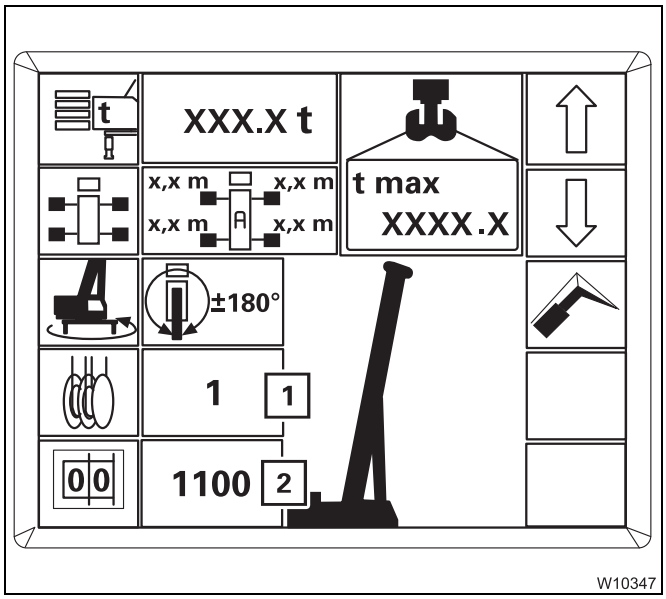
Lamps (**1**) and (**2**) will go out. The RCL code has been applied.

If no error message is displayed, the RCL is set for crane operation and crane movements are enabled; ➠ *Checks before operating the crane*, p. 11 - 31.



Any pending errors are indicated on the display (**1**); ➠ *Display in the event of errors*, p. 11 - 39.

You must re-enter the current rigging mode if the displayed values do not correspond to the current rigging mode of the truck crane; ➠ *Enter rigging mode*, p. 11 - 23.



After a standstill of more than 48 hours

The *Enter rigging mode* submenu opens.

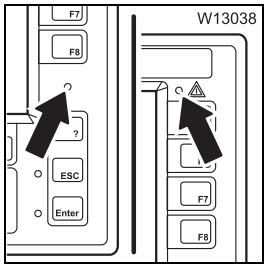
Display (**2**) will show RCL code **1100** – the corresponding rigging mode will be displayed.

The display (**1**) shows the last reeving entered, e.g. **1**.

- Enter the current rigging mode;
  ➠ p. 11 - 23.

Brightness of the displays

The brightness of the *RCL* display will adjust automatically to the ambient lighting after turning on the ignition.



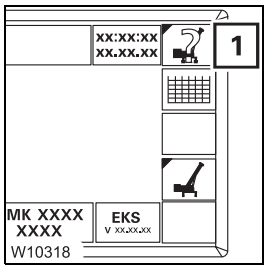
Do not cover sensor (**1**) and keep it clean to avoid contamination that can affect the brightness adjustment.

You can also adjust the brightness manually; ➠ *Adjusting display brightness*, p. 10 - 11.

14.03.2018

11.2.2 Enter rigging mode

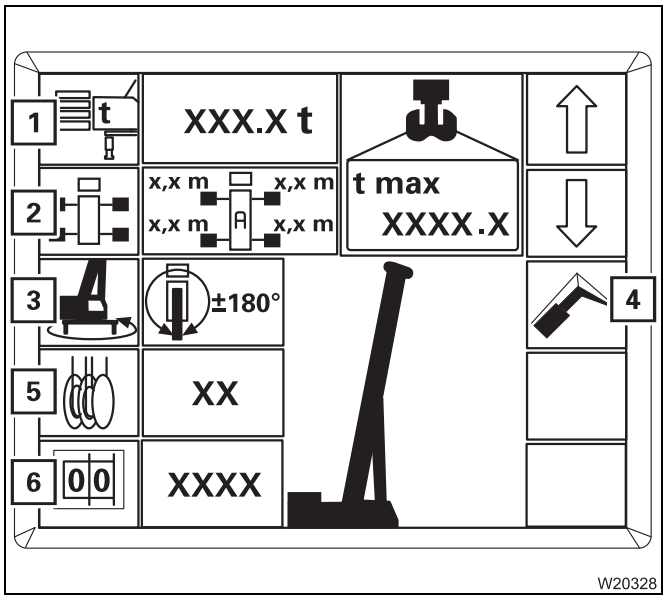
For a complete rigging mode input, you must enter, confirm and accept the rigging mode and the reeving.



Opening the submenu

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

The Esc button is only active if all crane movements have been stopped.



The *Enter rigging mode* submenu opens.

There are two ways of entering the current rigging mode.

– **Either** enter the individual components (**1**) to (**5**) one after the other.

– **Or** enter the RCL code (**6**) and the reeving (**5**)

Then you must confirm and accept the newly entered rigging mode.

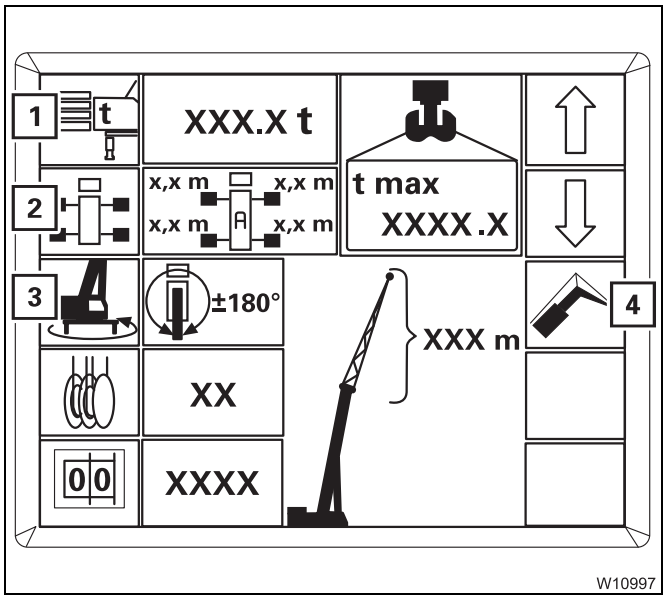
The following section describes the input procedure based on the individual components. If you want to enter the rigging mode based on the RCL code; ➠ *Entering the RCL code*, p. 11 - 28.

14.03.2018

Entering individual components

With this type of input, select all the components of the rigging mode one after the other.

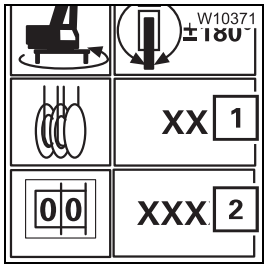
Danger of overturning due to incorrectly set rigging mode!
Values which have already been set may change when entering individual components. For this reason, you should always compare the displayed rigging mode with the current rigging mode of the truck crane after making the entry. This prevents the RCL from calculating with incorrectly set components and the truck crane from becoming overloaded or from overturning.



When re-entering the rigging mode completely, you can prevent already entered components from changing by making entries in the following order:

– Counterweight (**1**),
– Boom system (**4**),
– Outrigger span (**2**),
– Slewing range (**3**).

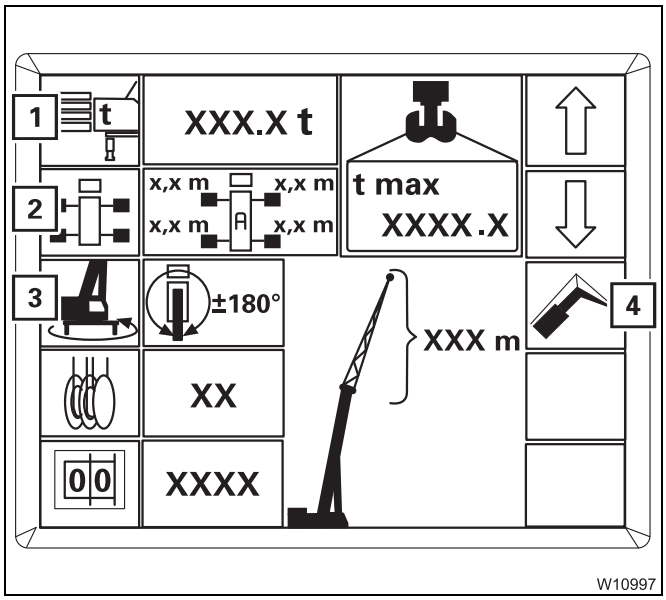
In this order, the values that can be selected for the current entry are always restricted by the previous entry. As a result, already entered values do not change.



When entering the components, the corresponding RCL code (**2**) is displayed at the same time.

Then you must enter the current reeving (**1**) and accept the indicated rigging mode.

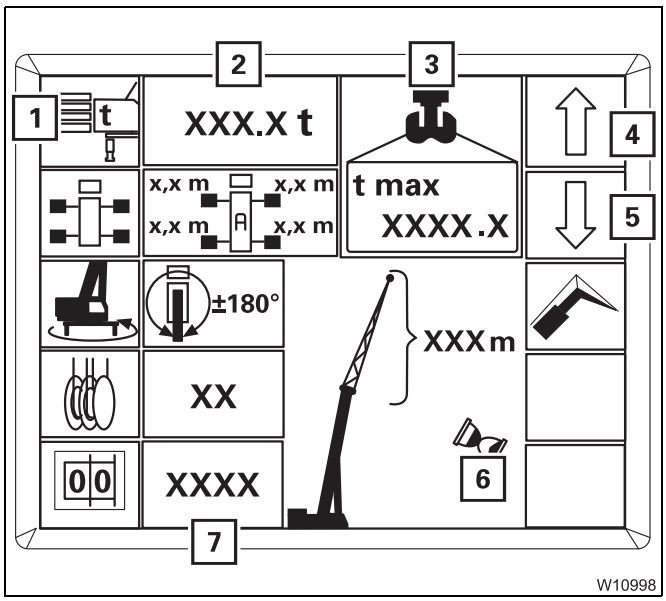
14.03.2018



Switching on input mode

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

  The symbol turns **green** – input mode is switched on.



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

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

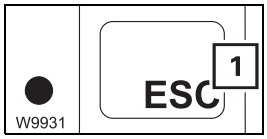
- Press button (**4**) or (**5**) repeatedly until display (**2**) shows the rigged counterweight version.

  4 Larger combinations

  5 Smaller combinations

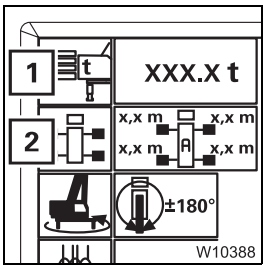
The display (**7**) indicates the corresponding RCL code – the symbol (**6**) is indicated while the RCL code is being determined.

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



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

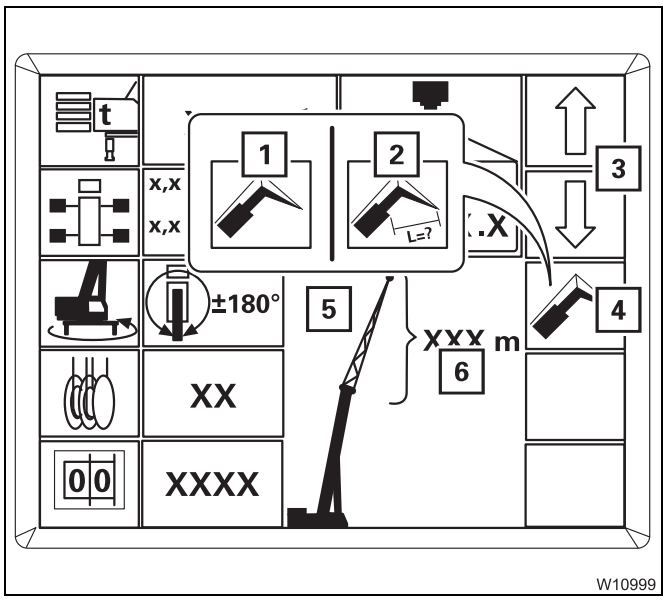
14.03.2018



After the selection procedure, there are three options:

– Switching off the input mode
  • Press button (**1**) once – symbol is grey.
– Switching over the input mode
  • Press the button for the next component once, e.g. button (**2**) – symbol is green.
– Accept the displayed rigging mode; ➠ *Accepting the rigging mode*, p. 11 - 29.

Enter the other components of the current rigging mode in the same way.



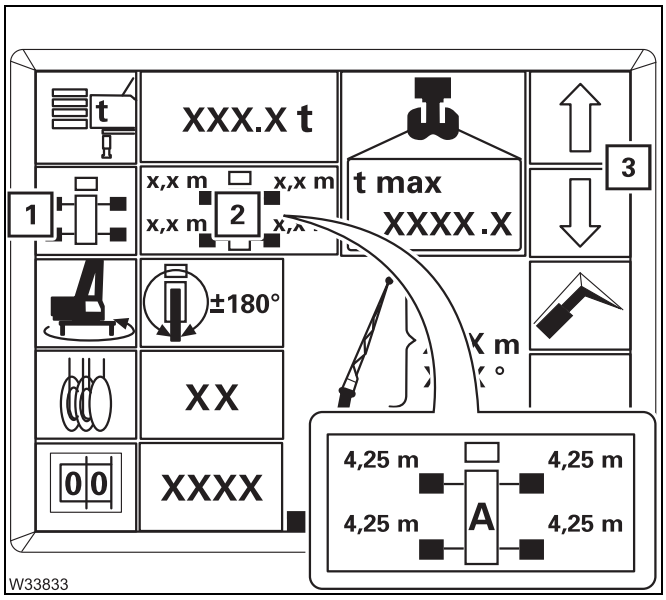
– Boom system

• Press button (**4**) repeatedly until the symbol for the required input is **green**.

  1 Boom system entry

  2 Lattice extension length/angle input

• Press button (**3**) repeatedly until:
  – The display (**5**) shows the rigged boom system, e.g. the lattice extension **or**
  – Until display (**6**) shows the rigged lattice extension length, and in the case of an inclinable lattice extension, the rigged lattice extension angle.

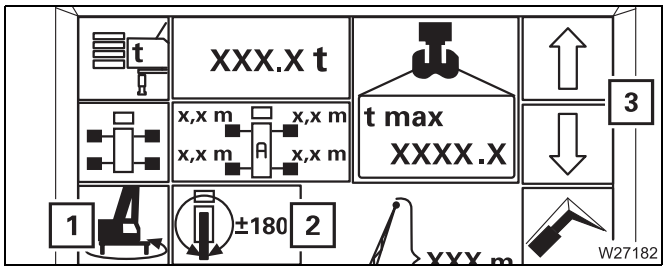


– Outrigger span – without outrigger span monitoring

Symbol (**1**) is green. Press the buttons (**3**) repeatedly until the display (**2**) indicates the current outrigger span, e.g. outrigger span **A**.

The display indicates half the outrigger span each on the left and right, e.g. 4.25 m (13.9 ft) for an outrigger span of 8.50 m (27.9 ft) in the case of outrigger span A.

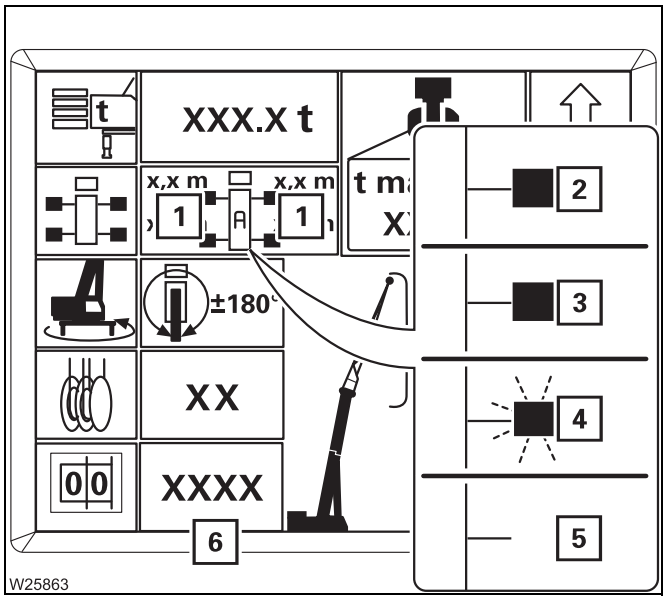
14.03.2018



Slewing range

Symbol (**1**) is green. Press button (**3**) repeatedly until the display (**2**) indicates the required slewing range, e.g. 360°.

You can only confirm rigging states for slewing ranges other than 360° when the superstructure is in the entered slewing range. If necessary, first enter the 360° slewing range and slew the superstructure into the required position.



– Outrigger span – with outrigger span monitoring

The display (**1**) indicates if the outrigger span corresponding to the RCL code (**6**) is rigged.

The display is identical for all outrigger beams (**2**).

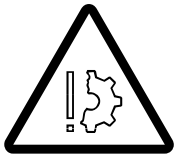
(**3**) Illuminated – the required outrigger span is rigged

(**4**) Flashes – the required outrigger span is not rigged

(**5**) No display – the current outrigger span is not permitted

- Check that the correct RCL code (**6**) for the planned operation is displayed.
- Check display (**1**).

If an incorrect or impermissible outrigger span is rigged then you must rig the correct outrigger span that is required. Otherwise an error message is displayed after applying the rigging code; ➠ p. 14 - 31.



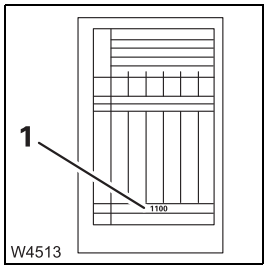
Risk of accident due to incorrectly supported truck crane!
A shutdown is not initiated as standard when an outrigger span monitoring error message is issued. When an error message is displayed, compare the rigged outrigger span with the required outrigger span and rig the required outrigger span.
This prevents the truck crane from tilting due to an outrigger span that is too low.

The error message can be supplemented by the shutdown as necessary.

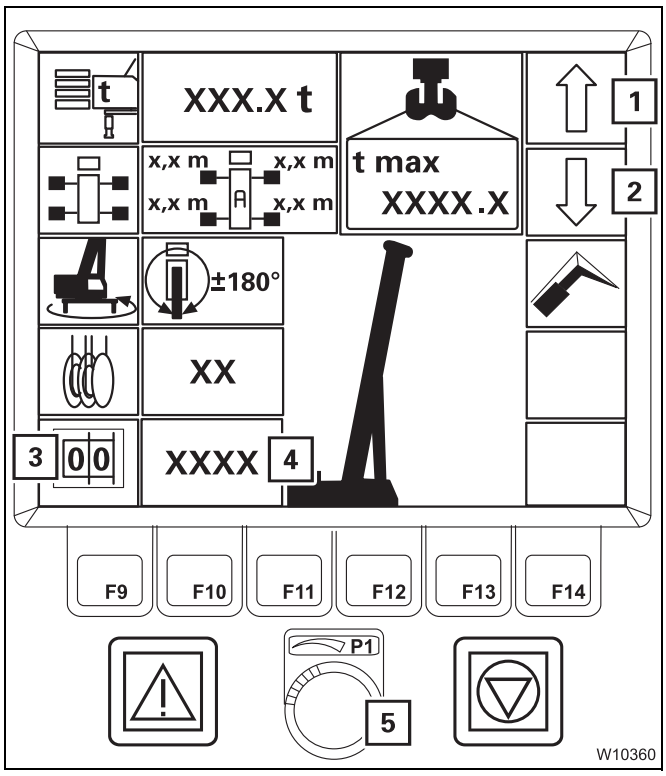
14.03.2018

Entering the RCL code

You must enter the RCL code for the rigging mode according to the *Lifting capacity table*.



- Refer to the *Lifting capacity table* for the current rigging mode. The corresponding RCL code (**1**) is specified at the bottom of the table (e.g. **1100**).



- Press button (**3**) once – symbol is **green**.
- Press button (**1**) or (**2**) repeatedly until display (**4**) shows the required RCL code.

or

- Select the RCL code with switch (**5**).

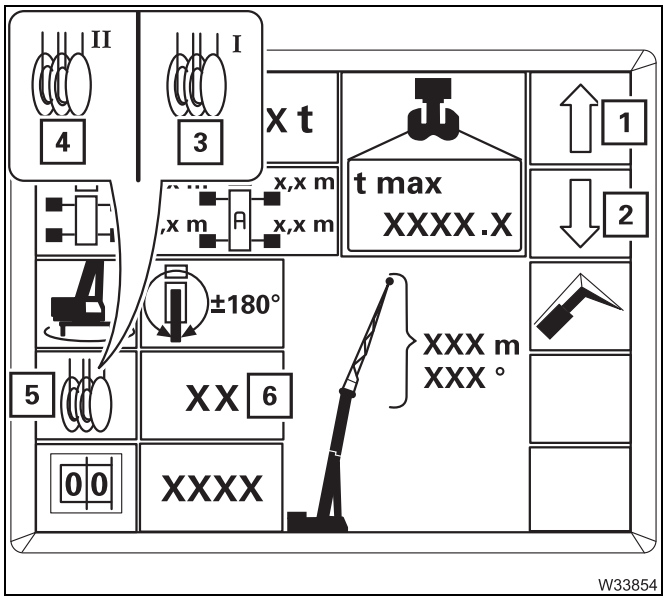
The other displays will show the corresponding rigging mode.

Now you can enter the reeving and accept the rigging mode.

14.03.2018

Entering the reeving

Entering the reeving does not have an effect on any other component that has already been entered.



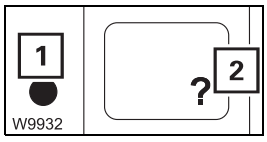
- Press button (**5**) repeatedly until the symbol for the hoist with which you want to lift the load has turned **green**.
  - **3** Symbol for main hoist
  - **4** Symbol for auxiliary hoist
- Press button (**1**) or (**2**) repeatedly until display (**6**) shows the number of currently reeved rope lines.

Accepting the rigging mode

Prior to crane operation, you must confirm and accept the newly entered rigging mode.

Confirming the rigging mode

- Press the button (**2**) once.
  - If the rigging mode is permissible, lamp (**1**) will go out. The *Rigging mode monitoring* submenu will open and you can accept the rigging mode.



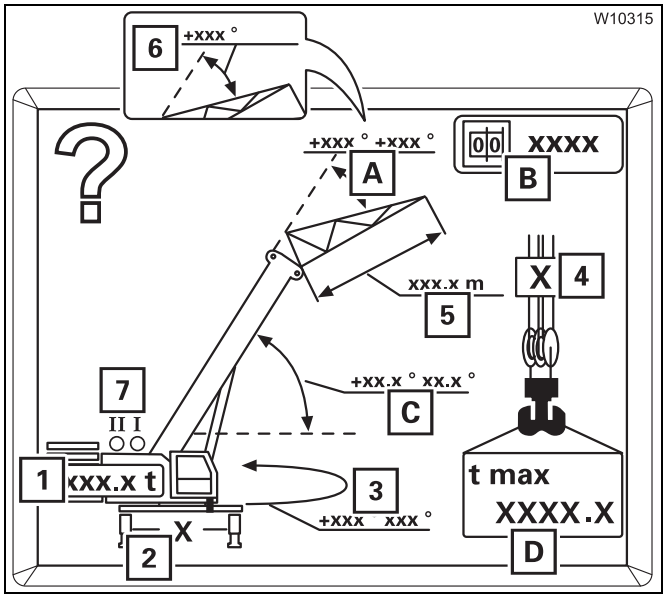
  - If the rigging mode is not permissible, lamp (**1**) will light up. Press button (**2**) once to display the error codes; ➠ p. 14 - 31.

14.03.2018

Accepting the rigging mode

- 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.

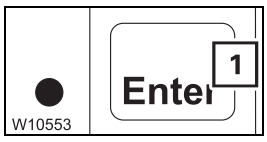


- Check:
  - **1** The rigged counterweight
  - **2** The rigged outrigger span
  - **3** the slewing range for the planned job
  - **4** The number of reeved hoist rope lines
  - **5** The length of the rigged lattice extension
  - **6** The angle of the rigged lattice extension – inclinable
  - **7** The hoist that is switched on – switch over hoists; ➠ p. 11 - 32

For the rigging mode, the following is displayed:

- **A** The permissible working range of the lattice extension
- **B** The RCL code
- **C** The permissible working range of the main boom
- **D** The maximum load

- If you need to correct the values, press button (**1**).
  The *Enter rigging mode* submenu opens.



If the current rigging mode is displayed, press button (**1**). The *Monitoring* submenu opens and the crane movements are enabled provided no error is pending; ➠ p. 11 - 31.

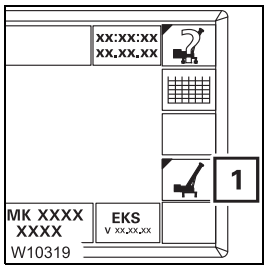
14.03.2018

11.2.3 Checks before operating the crane

Opening the submenu

Crane operation is only enabled when the *Monitoring* submenu is open.

After a standstill of less than 48 hours and after accepting a rigging mode, the *Monitoring* submenu will open automatically.



You can also open the submenu manually.

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

  The *Monitoring* submenu opens.

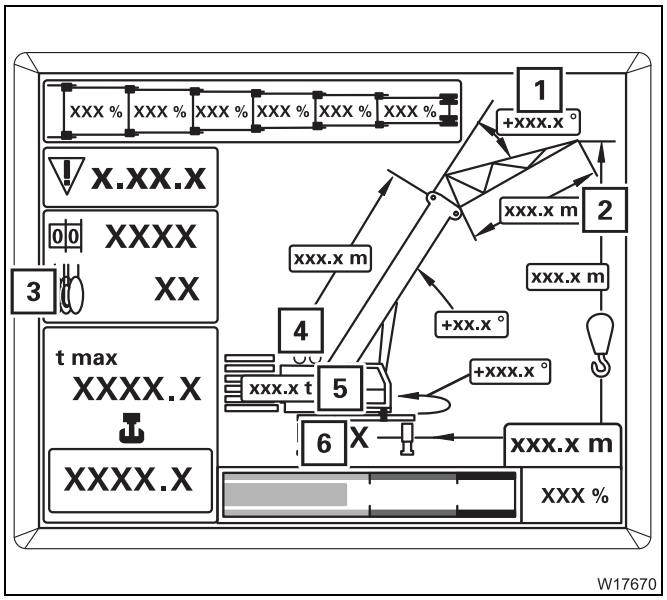
You can only quit the *RCL monitoring* submenu when all crane movements have stopped – control lever in zero position.

14.03.2018

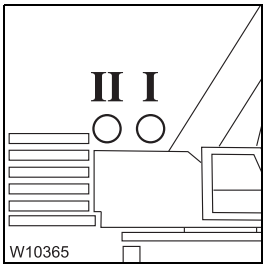
Checks

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



Hoists display

The lamp that lights up must always be for the hoist with which the load is to be lifted:

Lamp I: Must light up if the load is to be raised with the main hoist.

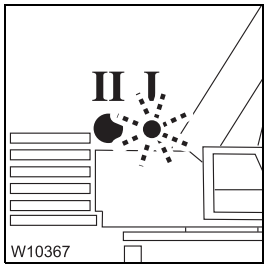
Lamp II: Must light up if the load is to be raised with the auxiliary hoist.

- Switch over the display if necessary; ➠ *Example of how to switch over the display*, p. 11 - 33.

- If you need to correct the values, press the button (**1**) and open the *Enter rigging mode* submenu.

You can start working with the crane if the current rigging mode of the truck crane is displayed.

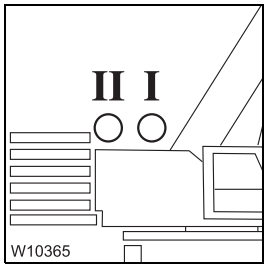
14.03.2018



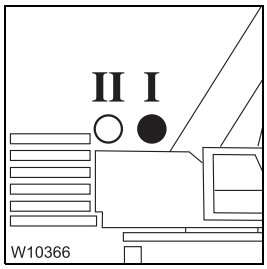
Example of how to switch over the display

The load should be raised with the main hoist, for example. However, lamp **II** for the auxiliary hoist lights up and lamp **I** for the main hoist flashes.

Switch over the display as follows:

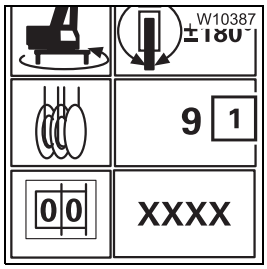


- Switch off both hoists. The lamps **I** and **II** go out.



- Switch on the main hoist.

Now the lamp **I** for the main hoist is on.



The display (**1**) shows the last entered reeving value for the main hoist, e.g. **9**.

If no reeving has been entered yet, the RCL selects reeving **1**.

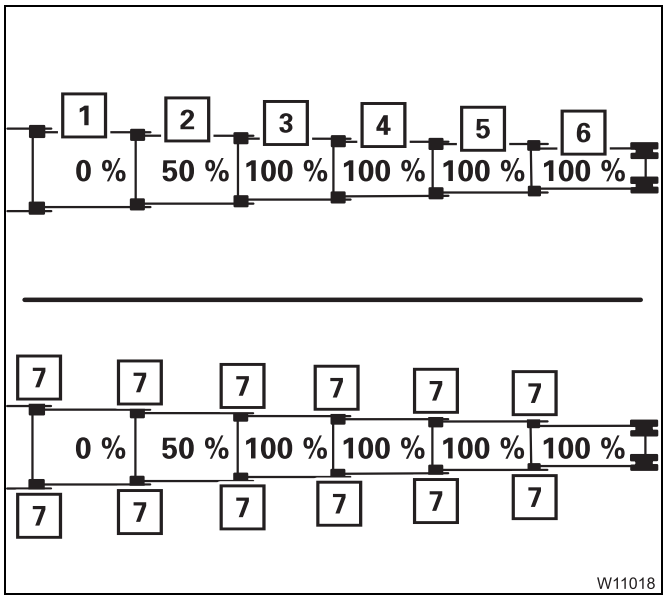
- If necessary, enter the current reeving; ➠ p. 11 - 29.

Risk of accidents due to an incorrectly set RCL!
After switching over the hoists, always check whether the displayed reeving value corresponds to the current reeving value of the displayed hoist and, if necessary, enter the current reeving value.
In this way, you can prevent the RCL from making calculations based on an incorrect reeving value and the truck crane from becoming overloaded or from overturning.

14.03.2018

11.2.4 Displays during crane operation

The following information is constantly displayed in addition to the displays of the rigging mode:

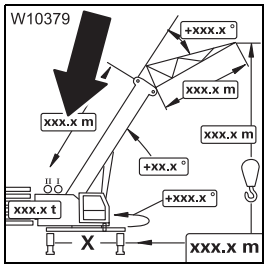


The current telescoping

The displays (**1**) to (**6**) show the current telescoping of the telescopic sections I to IV in percent, e.g. **50%.**

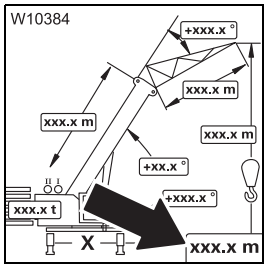
Fixed and intermediate lengths differ in the locking pins (**7**)

7 – Green: Fixed length
– Black: Intermediate length
– Flashing: Telescopic section at fixed length not set down or unlocked



The current main boom length

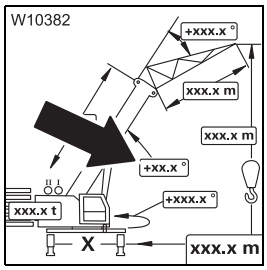
Shows the current main boom length in metres (m) or feet (ft).



The current working radius

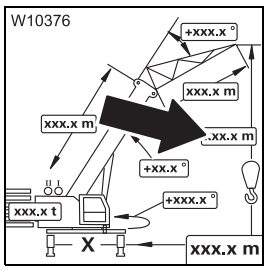
Shows the current working radius = horizontal distance between the turntable axis and the hook block axis.
The displayed value is calculated on the basis of the telescoping and the main boom or lattice extension angle.
The value is displayed either in metres (m) or feet (ft), depending on the setting.

14.03.2018



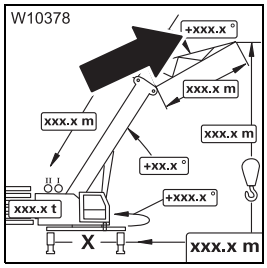
The current main boom angle

Shows the current main boom angle in relation to the horizontal. Angles below the horizontal are displayed with a minus sign, e.g. – 3°.



The current overall height

Overall height = vertical distance between the lower edge of the outrigger pad and the highest point of the main boom or lattice extension. The displayed value applies to fully extended outrigger cylinders on the largest outrigger span.
The value is displayed either in metres (m) or in feet (ft), depending on the setting.

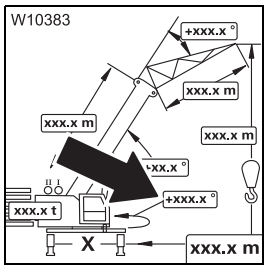


The current lattice extension angle

– **Lattice extension, luffable**: Shows the current lattice extension inclination in relation to the main boom in degrees.

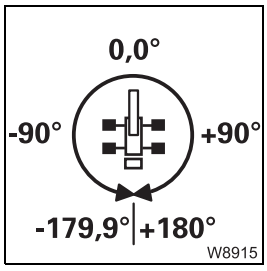
– **Lattice extension, can be angled**: Shows the angle of the lattice extension corresponding to the RCL code in degrees.

If the displayed RCL code does not apply to a lattice extension, nothing will be displayed.



The current slewing angle

Shows the angle of the current superstructure position.
0° means that the superstructure is slewed to the rear.

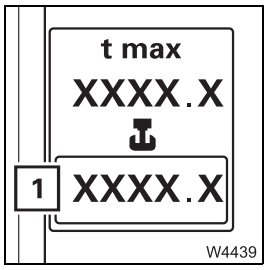


A full turn from this working position is divided into two semi-circles.

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

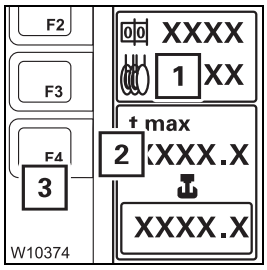
– Angles in the **left semi-circle** are displayed as **negative** values (0° to -179.9°).

14.03.2018



The currently raised load

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



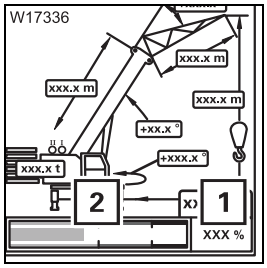
The maximum load

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

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

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

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



The degree of utilisation

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

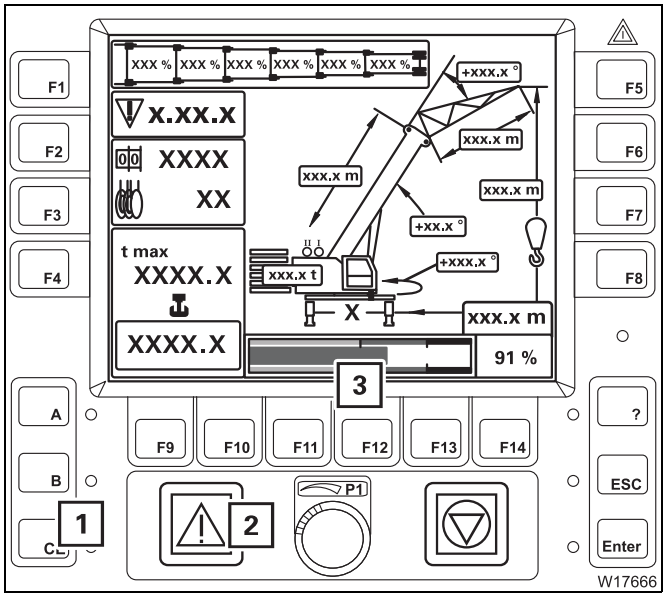
Blue: 0 – 90%

Yellow: Approx. 90 – 100%

Red: greater than 100%

14.03.2018

11.2.5 RCL early warning



If about 90% of the maximum permissible load is exceeded, an RCL early warning will be issued.

– An intermittent buzzer tone will sound. After five seconds, you can switch off the buzzer tone using button (**1**).

– The lamp (**2**) lights up.

– Display (**3**) shows the current degree of utilisation, e.g. 91%; the bar is **yellow**.

If the current crane continues to move in the same direction, there will be an RCL shutdown.

11.2.6 RCL shutdown

There are different types of RCL shutdown:

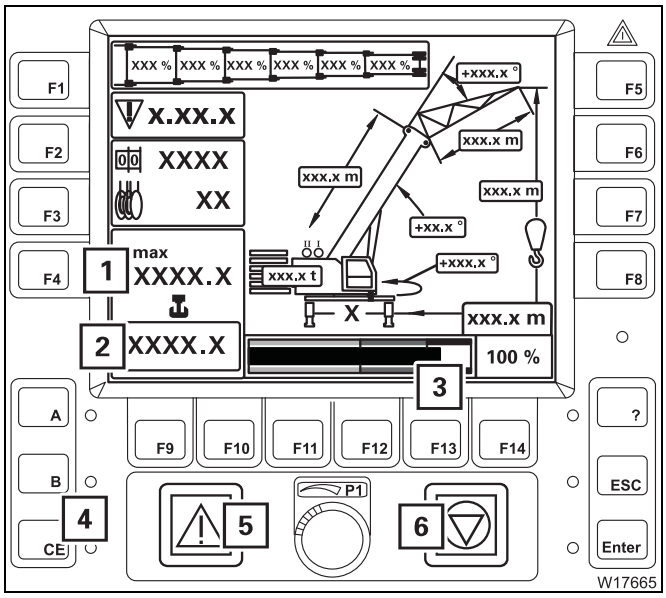
– shutdown due to overload,

– shutdown due to an error; ➠ *Error message with shutdown*, p. 14 - 28.

Shutdown due to overload

If approx. 100% of the maximum permissible load is exceeded, shutdown will occur due to overload.

14.03.2018



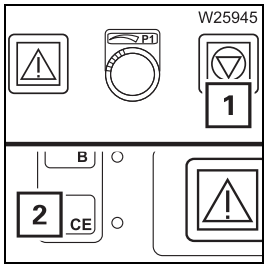
– All crane movements which increase the load moment will be switched off.
– A continuous buzzer tone will sound. After five seconds, you can switch off the buzzer tone using button (**4**).
– Lamps (**5**) and (**6**) light up.
– Display (**3**) shows the current degree of utilisation, e.g. 100%; the bar is **red**.
– The value on display (**2**) is equal to or greater than the value on display (**1**).

Cancelling a shutdown

- Turn off the buzzer tone if necessary.
- Leave the shutdown range by moving the crane according to the following table.

Switched off crane movements	Permitted crane movements
Lift loads	Lower loads
Lower the main boom	Raising the main boom[1)]
Extend the main boom	Retracting the main boom[1)]
Slew to the left	Slew to the right
Slew to the right	Slew to the left
Lower the lattice extension	Raise the lattice extension

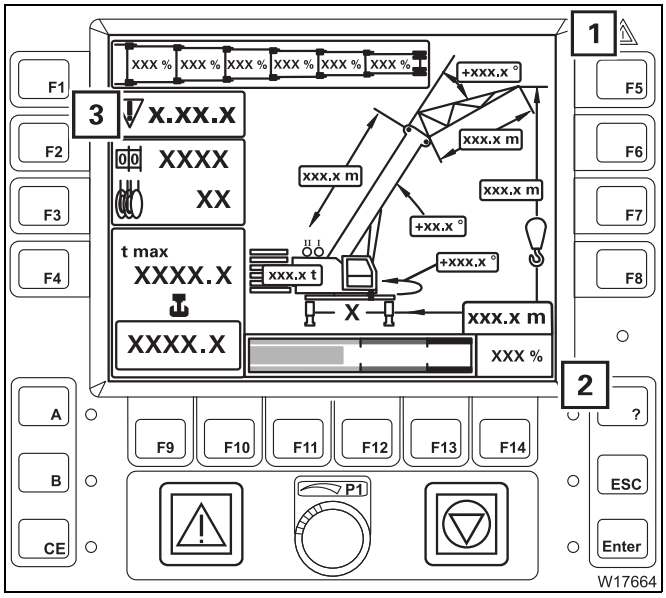
[1)] In some cases, the RCL will also switch off these movements. In this case, leave the shutdown range through other enabled movements. If this is not possible, set down the load.



If you have left the shutdown range, lamp (**1**) will extinguish.
After pressing the button (**2**) the crane movements will be enabled.

14.03.2018

11.2.7 Display in the event of errors



If an error occurs, it will be displayed as follows.

– Depending on the type of error, the buzzer tone sounds once or as a continuous buzzer tone.
– Lamps (**1**) and (**2**) light up.
– Display (**3**) shows an error code and the associated symbol flashes.

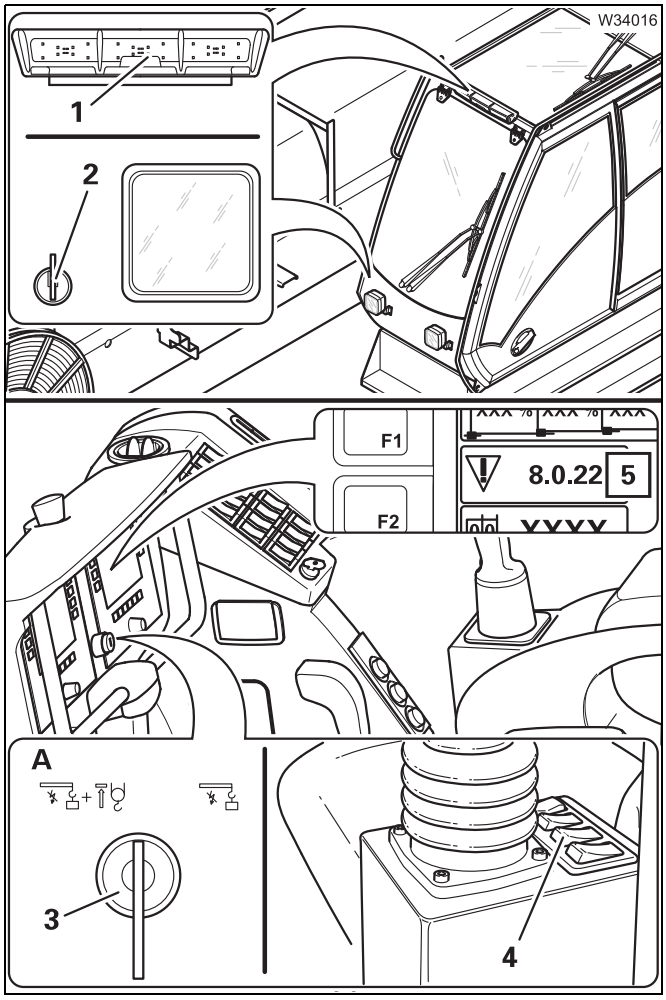
Further indications depend on the type of error; ➠ *Error messages in the Monitoring submenu*, p. 14 - 27.

14.03.2018

11.2.8 RCL override

There are two types of RCL override, depending on the version.

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 – symbol (A)

The operating elements (**1**), (**2**) and (**4**) have not been assigned functions.

- Insert the key into the key-operated switch (**3**).
- Turn the key to the right and hold it in this position.

The display (**5**) shows the error message **8022**.

Cancelling the override

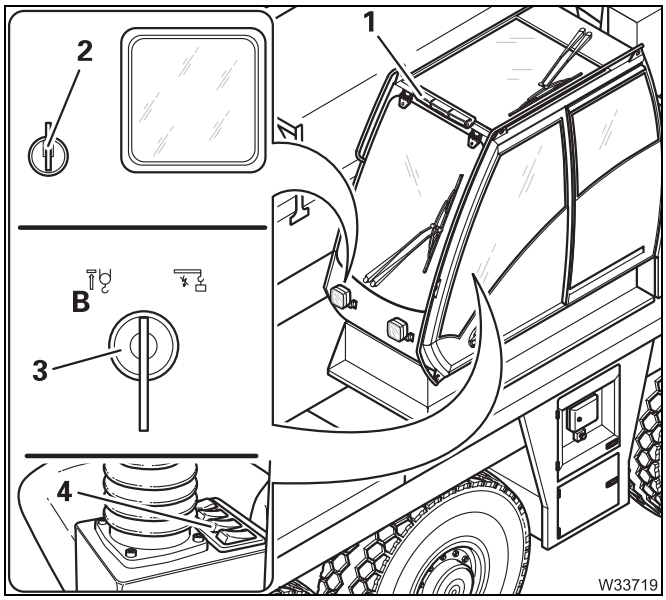
- Let go of the key (**3**).
- Remove the key.
- Press button CE once; the error message is acknowledged.

If additional equipment is used, the status display (**1**) indicates this in the same way as the RCL display in the crane cab:

Green: 0 – 90%
Yellow: approx. 90 – 100%
Red: greater than 100%

Risk of accidents due to unintentional override!
The key must not remain in the key-operated switch while the crane is operating!
This prevents the RCL from overriding unintentionally.

14.03.2018



RCL override – symbol (A)

The status display (**1**) is active.

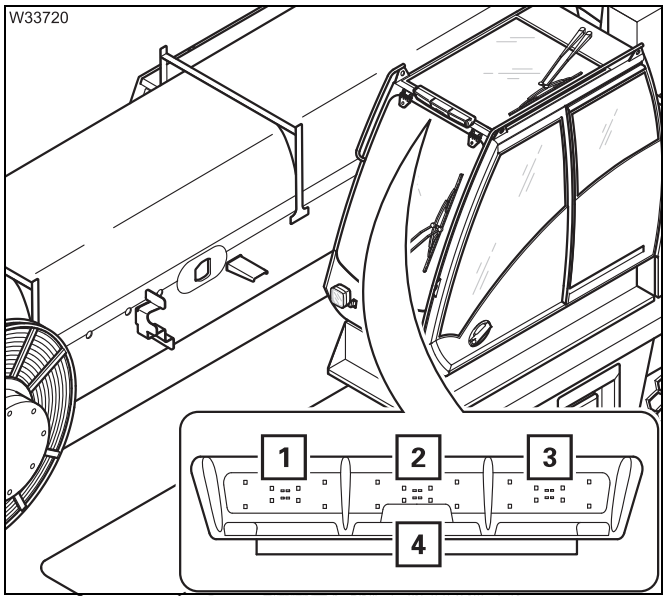
The following operating elements can be used to override the RCL:

2 Key-operated RCL override switch
3 Key-operated rigging switch
4 Raise switch

Status display

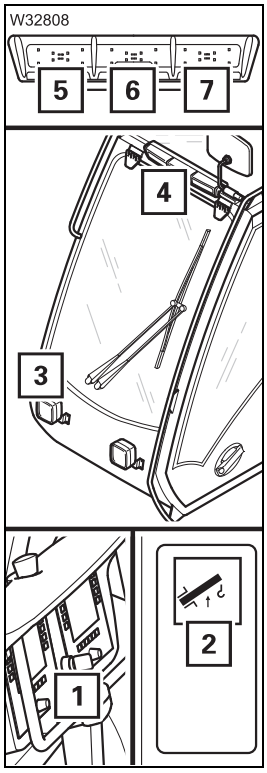
The status display informs people in the danger area of the truck crane:

– About the current degree of utilisation,
– In case of an RCL shutdown or early warning,
– When the RCL has been overridden.



The warning will be visual and, in part, audible.

1 Loudspeaker (warning signal)
2 Lamp, green
3 Lamp, yellow
4 Lamp, red



The lamps of the status display light up or flash depending on the RCL degree of utilisation and operation of the switches.

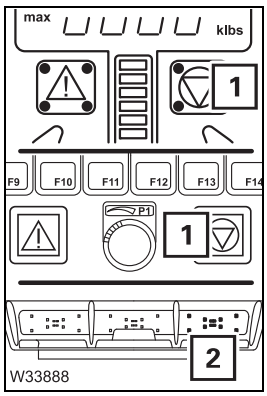
Switch pressed	**Degree of utilisation**		
	0 – 90%	approx. 90 – 100%	greater than 100%
No switch (normal operation)	Display (**5**) **green**	Display (**6**) **yellow**	Display (**7**) **red**
Key-operated rigging switch (**1**)	Display (**5**) **green**	Display (**6**) **yellow**	Display (**6**) **yellow**, flashing
Button (**2**) Raising	Display (**5**) **green**	Display (**6**) **yellow**	Display (**5**) **green**, flashing
Key-operated RCL override switch (**3**)	Display (**7**) **red**, flashing	Display (**7**) **red**, flashing	Display (**7**) **red**, flashing

RCL shutdown

There are different types of RCL shutdown:

– Shutdown due to overload, approx. 100% of the maximum permissible load is exceeded,

– Shutdown due to an error.



If the RCL has shut down the crane movements, then:

– Depending on the version, lamp (**1**) lights up,

– The status display (**2**) lights up **red**,

– A continuous buzzer tone sounds.

Now you can:

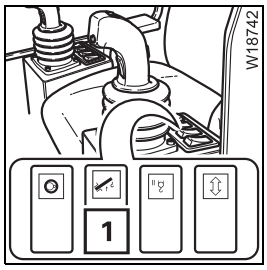
➠ *Raising after RCL shutdown*, p. 11 - 43,

➠ *Overriding RCL or lifting limit switch for rigging work*, p. 11 - 44,

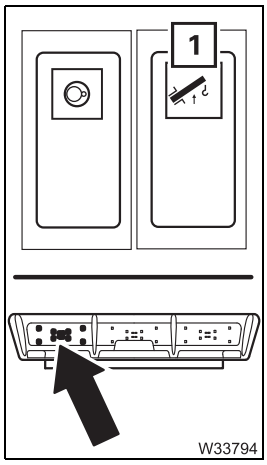
➠ *Overriding the RCL in an emergency*, p. 11 - 45

14.03.2018

Raising after RCL shutdown



You can re-enable raising with the switch (**1**) in order to leave the shutdown range.
The speed will then be reduced to 50%.

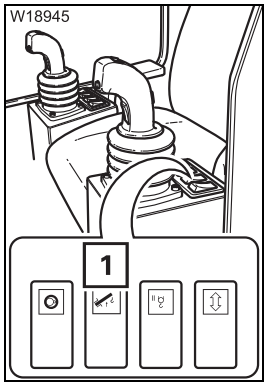


Raise main boom

- Push the button (**1**) up once.
  - Raising is enabled.
    The RCL will show an information code; ➠ p. 11 - 46.
  - The status display will flash green.
- Raise the main boom with the control lever until the degree of utilisation is less than 100%.

  The crane movements will then be enabled again.

The raising of the main boom will be shut down if the main boom angle is too great. Then all you can do is set the load down.



If the degree of utilisation is over 100%, you can cancel the function by:

– press button (**1**) up again, or

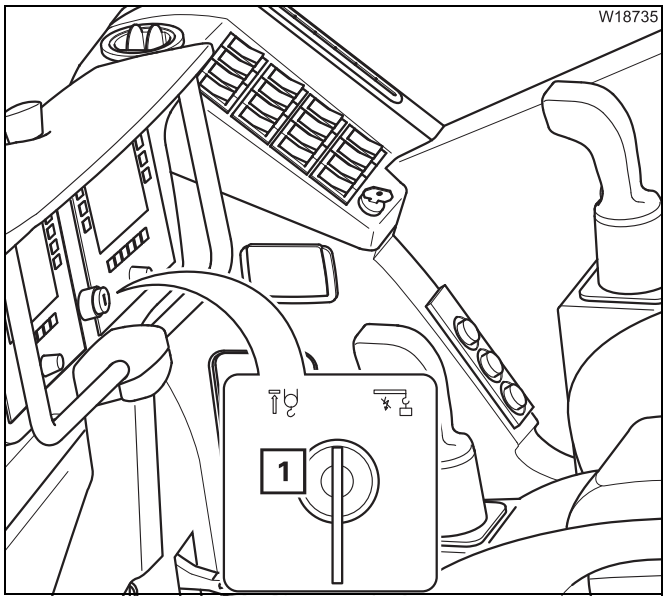
– switch off the ignition.

14.03.2018

Overriding RCL or lifting limit switch for rigging work

For rigging work, you can:
– Override the lifting limit switch
– Override the RCL and thus enable a degree of utilisation of up to 110%.

For both overrides the speed of the movements which increase the load moment is reduced to 15%.
The speed of the movements which increase the load moment is not reduced.



Overriding the lifting limit switch

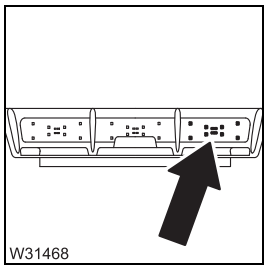
- Turn the key-operated switch (**1**) once anticlockwise.

Once the lifting limit switch has been activated, the crane movement will only be stopped **once** and will then no longer be monitored.

RCL override

- Turn the key-operated switch (**1**) once clockwise.

Now a degree of utilisation of up to 110% is enabled.



After overriding

– The status indicator will light up **red**.
– The RCL will show an information code; p. 11 - 46.

If you do not trigger a control lever movement within 10 seconds, you must press the key-operated switch again.

Cancelling the override

The override will be cancelled when you:

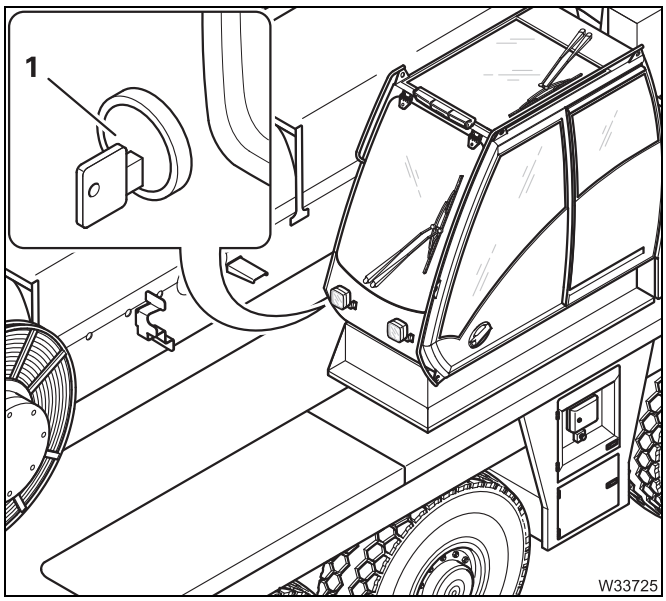
– press the key-operated switch again, or
– do not activate the control lever for 10 seconds, or
– switch off the ignition.

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 from overriding unintentionally.

14.03.2018

Overriding the RCL in an emergency

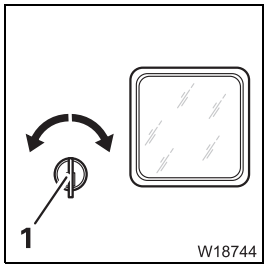
Risk of accidents due to overridden or faulty RCL!
It is not permitted to work with an overridden or faulty RCL!
Set down the load immediately and stop operating the crane if the RCL is faulty!
You may override the RCL only if it becomes absolutely necessary to do so in the event of an emergency. This 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.



If the RCL has shut down all crane movements, you can cancel the shutdown with the key-operated switch (**1**).

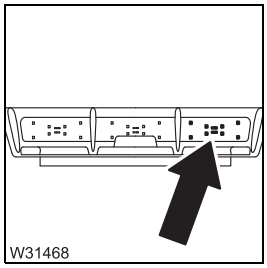
Once the shutdown is cancelled, the crane operation is no longer monitored and the switched off crane movements are enabled again.

The power unit speeds are reduced to 15%.



Cancelling a shutdown

- Turn the key-operated switch (**1**) to the left or right once.
  - Now all crane movements will be enabled for 30 minutes. The crane movements will no longer be monitored by the RCL.
  - The RCL will show an information code; ➠ p. 11 - 46.



The status display will flash **red**.
At a degree of utilisation over 110% the warning signal will sound; ➠ p. 11 - 42.

14.03.2018

Cancelling the override

The override will be cancelled when you:

– Switch off the ignition

– Press the key-operated switch again.

The override will automatically be cancelled 30 minutes after the key-operated switch has been pressed.

Risk of accidents due to unintentional override!
The key must not remain in the key-operated switch while the crane is operating!
This prevents the RCL from overriding unintentionally.

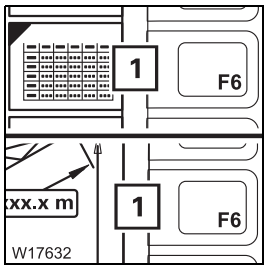
Table – error/ information codes

The following table contains error and information codes, their causes and possible solutions.

Error code			Cause	Remedy
8	**04**	**4**	Key-operated rigging switch pressed, no override effective	– Start the engine; – Reduce degree of utilisation to less than 110% – Move the control lever within 10 seconds after operation
8	**05**	**4**	Raise switch pressed, no override effective	– Start the engine; – Press switch again
8	**06**	**4**	Key-operated RCL override switch pressed, no override effective	– Start the engine; – Press switch again
8	**04**	**5**	**Information code:** Key-operated rigging switch pressed, override effective	No measures required.
8	**05**	**5**	**Information code:** Raise switch pressed, override effective	
8	**06**	**5**	**Information code:** Override RCL switch pressed, override effective	

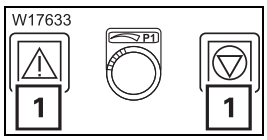
14.03.2018

11.2.9 Displaying the lifting capacity tables



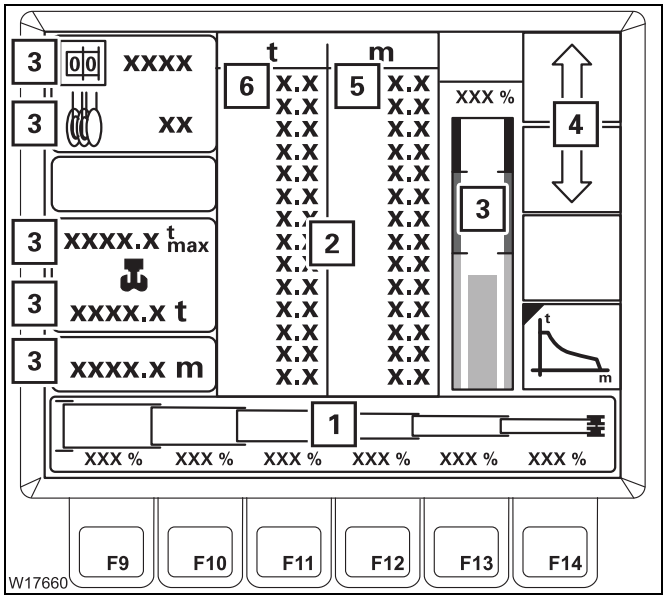
Opening the submenu

- Stop all crane movements – control lever in initial position.
- In the main menu or *Monitoring* or submenu, press button (**1**) once.



The *Lifting capacity table* submenu will open

The lamps (**1**) light up and all crane movements are blocked.



Displaying tables

The indicators (**3**) show the current status.

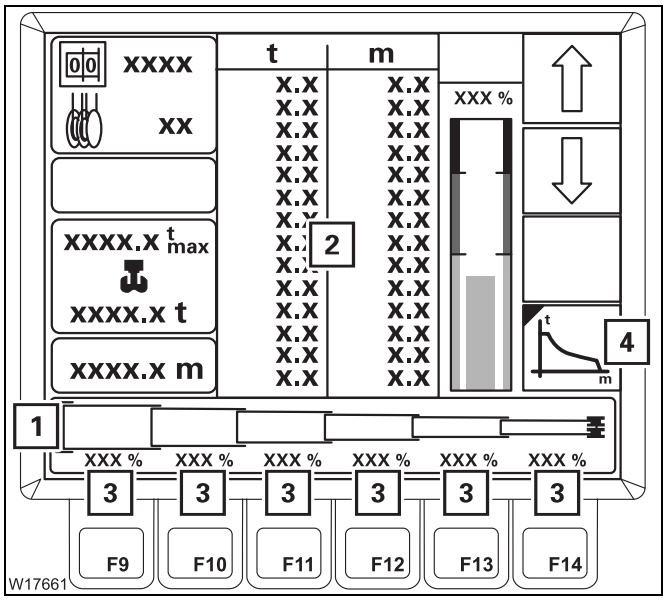
The lifting capacity table (**2**) applies to

– the entered RCL code and

– the displayed telescoping (**1**) – first the current telescoping is displayed.

The maximum load (**6**) applies to working radius (**5**).

For longer tables, press buttons (**4**) to display more values.



You can have the lifting capacity tables displayed for all permissible telescoping statuses:

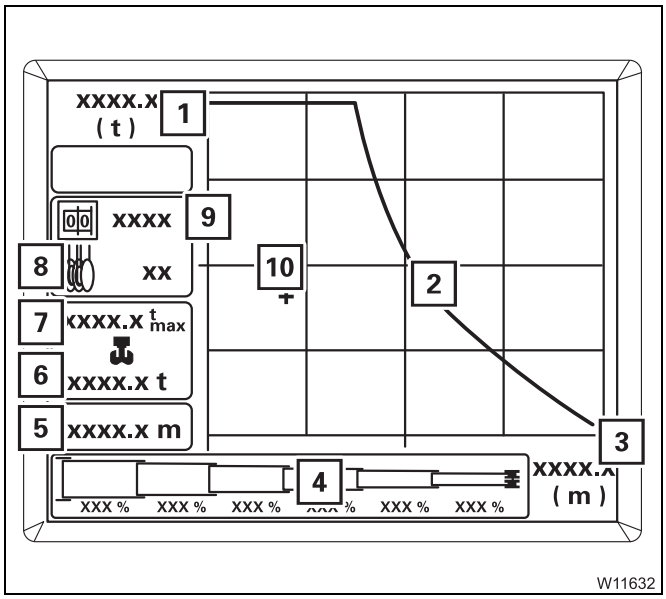
- Enter the desired telescoping status (**1**) with the buttons (**3**).

The corresponding lifting capacity table (**2**) will be displayed.
In the event of impermissible telescoping statuses, all values in the lifting capacity table are 0.

Displaying the working range

- Press the button (**4**) once.

The *Working range* submenu opens.

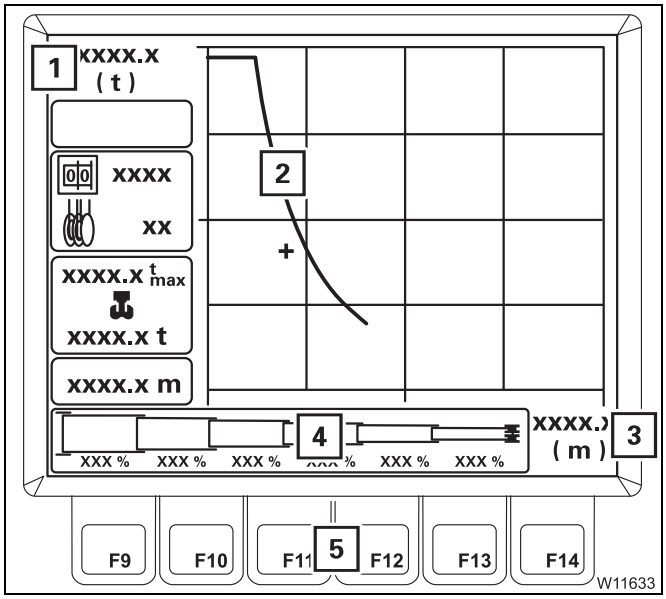


Curve (**2**) shows the permissible working range for the entered RCL code (**9**) and the telescope status (**4**).

The working range ends at the maximum possible working radius (**3**). Reduction of the working radius increases the enabled load along the curve (**2**) up to the maximum possible load (**1**). There has to be enough reeving for this load.

The maximum load (**7**) applies to the current reeving (**8**).

The cross (**10**) indicates the position in the working range for the current load (**6**) and the current working radius (**5**).



The working range for all permissible telescope statuses can be displayed:

- Enter the desired telescoping status (**4**) with the buttons (**5**).

The displays (**1**), (**2**) and (**3**) show the respective permissible working range.

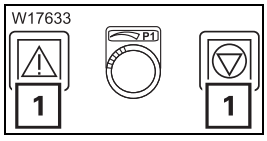
If the telescoping status is not within the working range,

– the displays (**1**) and (**3**) will show the value **0**,

– no curve (**2**) will be shown.

Exiting the submenu

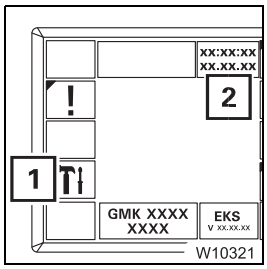
- Press button (**1**) once – the previously displayed menu opens.



If no RCL shutdown or RCL pre-warning occurs, then lights (**1**) will go out and the crane movements will be unblocked in the *Monitoring* submenu.

14.03.2018

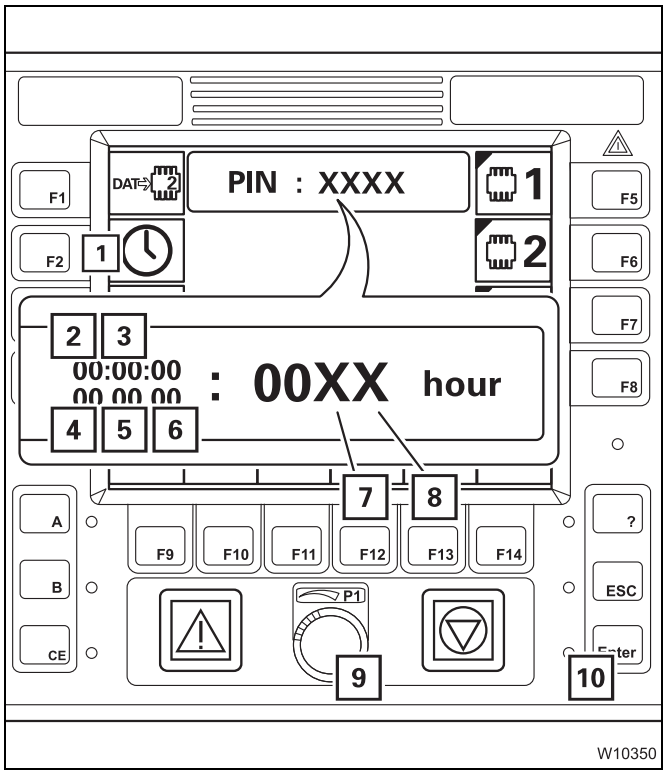
11.2.10 Entering the time/date



You can enter the time and date for the display (**2**).

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

This opens the *Settings* submenu



- Press button (**1**) repeatedly until the desired value flashes.
  - **2** Hours
  - **3** Minutes
  - **4** Day
  - **5** Month
  - **6** Year
- Enter the new value with the buttons (**7**) and (**8**) or with the switch (**9**).
- Enter all the required values.
- Press button (**10**) once – the newly entered values will be accepted and displayed in the main menu.

Illogical values (e.g. 77 minutes) will not be accepted and the display will continue to flash.

You can **cancel the input** at any time. Press the button (**1**).
None of the values will be changed.

14.03.2018

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14.03.2018

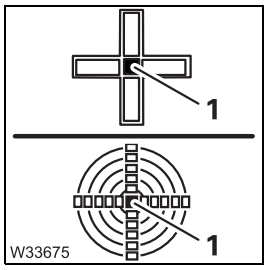
11.3 Crane operation with main boom

11.3.1 Checks during crane operation

Horizontal alignment

During crane operation, the truck crane may tilt if the ground gives way due to varying loads.

Risk of 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 - 46.

Due to deformation of the frame, the horizontal alignment can change by up to 2° when the superstructure is turned from the 0° or 180° position.
If the truck crane does not return to the horizontal position after being turned back to the 0° or 180° position, you must immediately determine the cause and eliminate it and, if necessary, realign the crane. Observe the position of the superstructure when doing so; ➠ *Levelling the truck crane on outriggers*, p. 12 - 46.

Safe distances

During crane operation, always ensure that the truck crane and the load are at a sufficiently large distance to objects and persons. Pay particular attention to objects that pose a direct danger (e.g. gas containers or scaffolding).

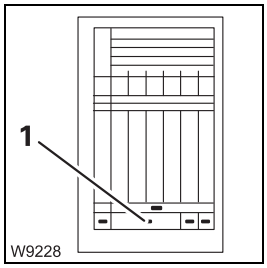
Keep a safe distance away from overhead power lines; ➠ *Safe distance from overhead power lines*, p. 12 - 14.

14.03.2018

Checking the wind speed

Strong winds can result in the truck crane becoming overloaded.

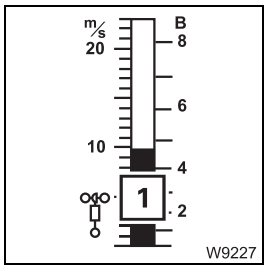
- Prior to and during crane operation, check whether the current wind speed is lower than the maximum permissible wind speed.



Maximum permissible wind speed

The maximum permissible wind speed (**1**) for the current rigging mode is specified at the bottom of the corresponding *Lifting capacity table*.

In certain cases, the specified permissible wind speed must be reduced; ➠ *Lifting capacity table*.



Current wind speed

The current wind speed is displayed in the main menu and in the *Telescoping* submenu. The colour of the bar (**1**) changes depending on the displayed range:

0 to 6 m/s:	Green bar
6 to 12 m/s:	Yellow bar
Over 12 m/s:	Red bar

The colour of the bar only depends on the value of the current wind speed. The maximum permissible wind speed does not affect the colour of the bar.

If an anemometer is not available, or in the event of a fault, you can find out which speeds 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 permitted wind speed is exceeded

No automatic shutdown occurs if the maximum permissible wind speed is exceeded.

- Immediately cease 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 that the maximum permissible wind speed, immediately stop operating the crane and set up the corresponding rigging mode *Lifting capacity table*.
This will prevent the truck crane from overturning due to overload.

14.03.2018

11.3.2 Permissible slewing ranges and working positions

The following ranges are permissible for crane operation according to the *Lifting capacity table*.

360° slewing range

- Support the truck crane with the outrigger span required according to the *Lifting capacity table*.
- Enter an RCL code for the 360° slewing range according to the *Lifting capacity table*; ➠ *Enter rigging mode*, p. 11 - 23.
- Rig a counterweight combination that is no larger than that permitted for the rigged outrigger span. Slewing with a rigged counterweight is not permitted with all outrigger spans; ➠ *Slewing with rigged counterweight*, p. 12 - 83.
- Slewing is not permissible if the truck crane is free-on-wheels; ➠ *Main hoist*, p. 11 - 54.

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; ➠ *Braking the slewing movement*, p. 11 - 99.
- Switch off the slewing gear; ➠ p. 11 - 100.
- Enter an RCL code for the *0° to the rear* according to *Lifting capacity table*; ➠ *Enter rigging mode*, p. 11 - 23.
  The RCL will only accept this code if the slewing gear has been switched off and the superstructure is in the 0° position.

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

– Either shut down the slewing gear
– Or, if slewing is permissible with the rigged counterweight (➠ p. 12 - 83), set down the load and enter an RCL code for the 360° slewing range.

- Observe the additional information if the truck crane is free on wheels; ➠ *Main hoist*, p. 11 - 54.

180° to the front rigging position

The same lifting capacity tables and RCL codes apply to this position as to the 360° slewing range.

14.03.2018

11.3.3 Main hoist

You can reeve the hoist rope of the main hoist on the main boom or on the lattice extension.

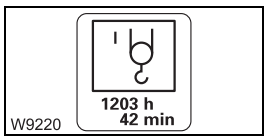
Risk of accidents from accidentally operating a hoist!
Always switch off the hoist that is not in use!
Never operate the hoist if the hook block is unreeled and the hoist rope is completely wound onto the drum.
– The rope will slacken in the course of the *Lower* movement. Rope loops will form, which 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 from dragging and helpers from being injured. Inform all helpers about this issue.

Danger due to slack rope!
Only use hook blocks and sling gear of the minimum weight prescribed in the *Lifting capacity table*, depending on the reeving and boom length. This prevents slack rope developing at large heights when lifting without a load. This can result in the load slipping during subsequent lifting procedures.

Maximum permissible hoist rope speed

The maximum permissible hoist rope speed is limited automatically depending on the degree of utilisation of the lifting capacity. The scale of the limitation is specified in the supplied lifting capacity table.

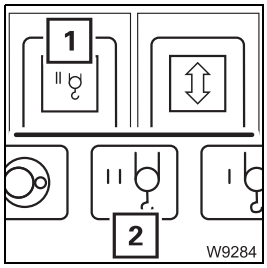


You can have the operating hours of the hoist displayed; ➠ p. 11 - 109.

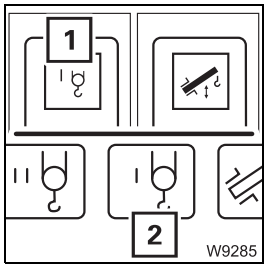
14.03.2018

Switching on the main hoist

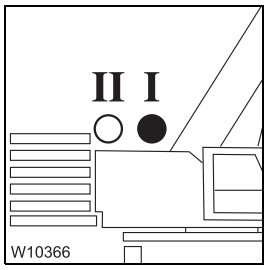
After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will light up only dimly.



- 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**) lights up brightly.
  - Symbol (**2**) is **green** when the main hoist is switched on.



- On the RCL, check whether the lamp **I** is **on**.
  If lamp **I flashes**, switch over the display; ➠ p. 11 - 33.

- Check that the current reeving of the main hoist is displayed, e.g. **10**.
  Correct the reeving if necessary; ➠ p. 11 - 29.

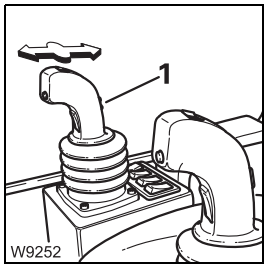
Lifting and lowering

You can adjust the sensitivity of the control levers to the operating conditions; ➠ *Setting the characteristic curves for the control levers*, p. 11 - 106.

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 - 106,
– the lifting limit switch is not overridden; ➠ p. 11 - 60,
– the lowering limit switch is correctly set; ➠ p. 11 - 60.

Risk of accidents due to 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.

14.03.2018

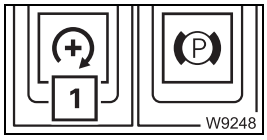


Raise: • Pull the control lever backwards.

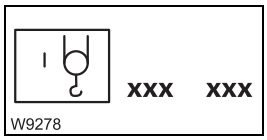
Lowering: • Push the control lever forwards.

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

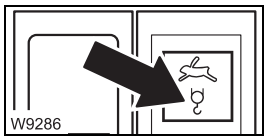
You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.



You can set the desired engine speed (idling speed) with button (**1**); ➠ p. 10 - 16.



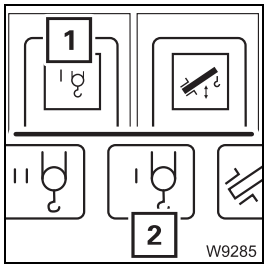
You can limit the maximum hoist speed; ➠ p. 11 - 105.



You can switch on high-speed mode for a higher speed; ➠ p. 11 - 94.

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**) lights up dimly.
  - Symbol (**2**) is **red** when the main hoist is switched off.

14.03.2018

11.3.4 Auxiliary hoist

You can reeve the hoist rope of the main hoist on the main boom or on the lattice extension.

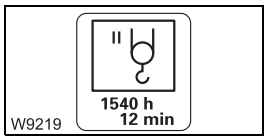
Risk of accidents when operating the auxiliary hoist!
Read and observe all of the safety instructions in the section titled *Main hoist*, p. 11 - 54 before operating the auxiliary hoist.
All safety instructions for the operation of the main hoist also apply to the auxiliary hoist, along with the information 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. Raise the main boom to at least 20° before lifting loads.
This prevents damage to the hoist ropes that results in the ropes tearing.

If you run the auxiliary hoist rope over the left head sheave, you must extend a telescopic section to the middle fixed length before lifting a load. Otherwise, the rope angle would exceed the maximum permissible value.

Maximum permissible hoist rope speed

The maximum permissible hoist rope speed is limited automatically depending on the degree of utilisation of the lifting capacity. The scale of the limitation is specified in the supplied lifting capacity table.

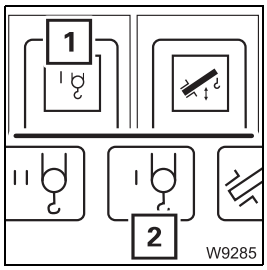


You can have the operating hours of the hoist displayed; ➠ p. 11 - 109.

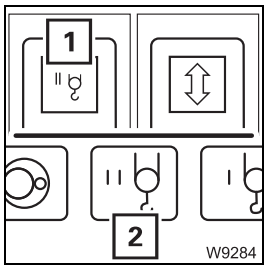
14.03.2018

Switching on the auxiliary hoist

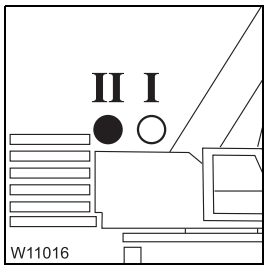
After the ignition is switched on, all of the power units will be switched off and the lamps in the corresponding buttons will light up only dimly.



- 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**) lights up brightly.
  - Symbol (**2**) is **green** when the auxiliary hoist is switched on.



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

  If lamp **II** **flashes**, switch over the display; ➠ p. 11 - 33.

- Check whether the current reeving of the auxiliary hoist is displayed, e.g. **10**. Correct the reeving if necessary; ➠ p. 11 - 29.

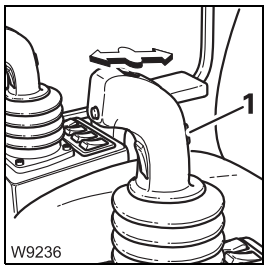
14.03.2018

Lifting and lowering

You can adjust the sensitivity of the control levers to the operating conditions; ➠ *Setting the characteristic curves for the control levers*, p. 11 - 106.

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 - 106,
– the lifting limit switch is not overridden; ➠ p. 11 - 60,
– the lowering limit switch is correctly set; ➠ p. 11 - 60.

Risk of accidents due to 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.

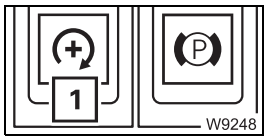


Raise: • Pull the control lever backwards.

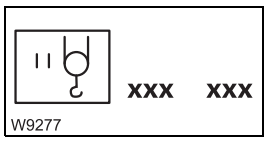
Lowering: • Push the control lever forwards.

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

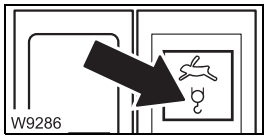
You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.



You can set the desired engine speed (idling speed) with button (**1**); ➠ p. 10 - 16.



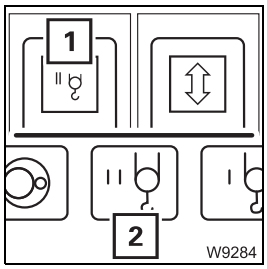
You can limit the maximum hoist speed; ➠ p. 11 - 105.



You can switch on high-speed mode for a higher speed; ➠ p. 11 - 94.

Switching off the auxiliary hoist

If the auxiliary hoist is not required, it should be switched off to avoid unintentional use.



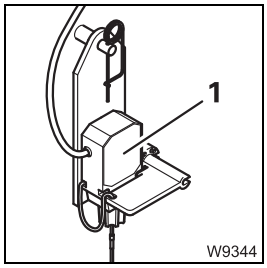
- Press the button (**1**) once.
  – The lamp in the button (**1**) lights up dimly.
  – Symbol (**2**) is **red** when the auxiliary hoist is switched off.

14.03.2018

11.3.5 Lifting limit switch and lowering limit switch

Lifting limit switch

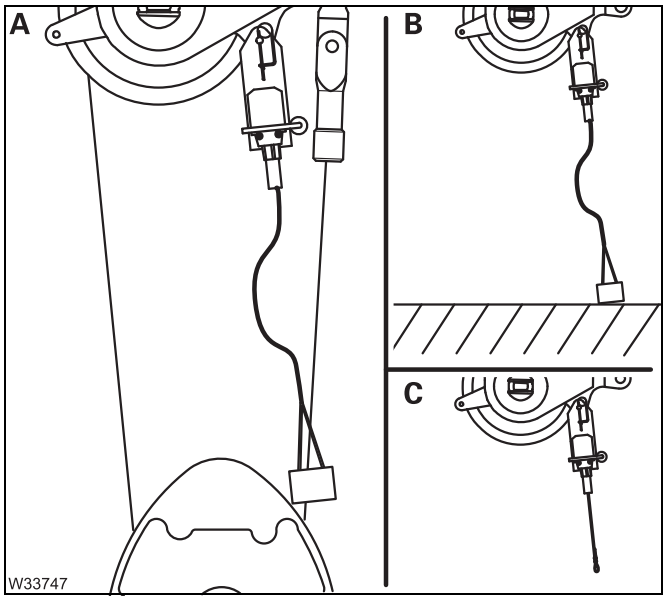
To install/remove the lifting limit switch; ➠ p. 12 - 106.



The lifting limit switch (**1**) prevents the hook block from being lifted up to the main boom head and damaging it.

The lifting limit switch only works if it has been unlocked; ➠ p. 12 - 111.

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.



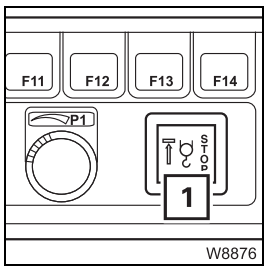
The lifting limit switch will be triggered if:

(**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.

14.03.2018

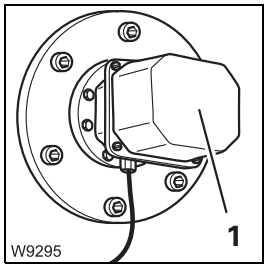
Lifting limit switch override

When overriding, the shutdown of the lifting limit switch is cancelled and the crane operation is no longer completely monitored; ➠ *Overriding RCL or lifting limit switch for rigging work*, p. 11 - 44.

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.

Lowering limit switch



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

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

Risk of 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 from becoming damaged due to complete unreeling or switching off at high speeds, and the load being dropped as a result.

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

14.03.2018

11.3.6 Derricking gear

You can raise and lower the main boom.

Depending on the size of the load and the rigging mode, the RCL will switch off the lowering process of the boom as soon as the working area specified in the *Lifting capacity table* is left.

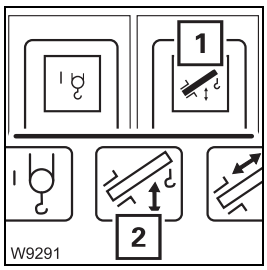
To lower the boom out of the working range; ➠ *Lowering the main boom to a horizontal position*, p. 11 - 65.

The derricking gear is not intended for lifting loads. If an overly heavy load is lifted by derricking, the RCL will switch this process off.

You can have the operating hours of the derricking gear displayed; ➠ p. 11 - 109.

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**) lights up brightly.
  - Symbol (**2**) is **green** when the derricking gear is switched on.

If the control lever is assigned more than one function, all other power units which are assigned the same control lever operation are switched off; ➠ *Control lever configuration*, p. 9 - 18.

Maximum permissible derricking speed

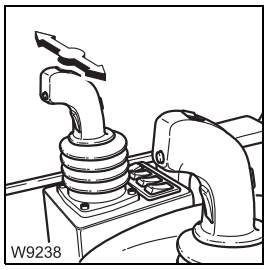
The maximum permissible derricking speed is limited automatically depending on the system length. The scale of the limitation is specified in the supplied lifting capacity table.

14.03.2018

raising and lowering

You can adjust the sensitivity of the control levers to the operating conditions; ➠ *Setting the characteristic curves for the control levers*, p. 11 - 106.

Risk of accident due to unexpected crane movements!
If assigned more than one function, check that the *Derricking* control lever function is switched on before you move the control lever for derricking. This prevents accidents due to unexpected crane movements.

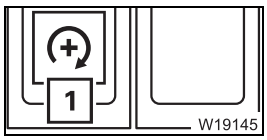


Lowering: • Push the control lever to the right – the main boom is lowered.

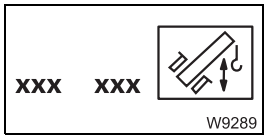
Raising: • Push the control lever to the left – the main boom is raised.

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

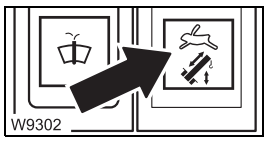
The maximum derricking speed will automatically be reduced as the system length is increased. If you now reduce the working radius (e.g. by retracting the telescoping), the derricking speed will automatically be increased again.



You can set the desired engine speed (idling speed) with button (**1**); ➠ p. 10 - 16.



You can limit the maximum derricking speed; ➠ p. 11 - 105.

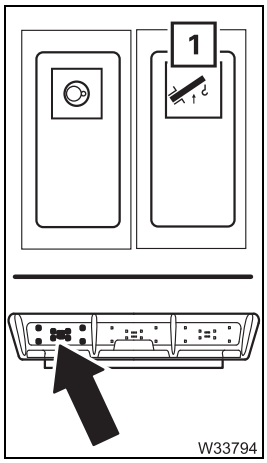


You can switch on high-speed mode for a higher speed; ➠ p. 11 - 94.

14.03.2018

Re-enable raising function

If the RCL has switched off the raising function due to an overload, you can re-enable the raising function with switch (**1**). The speed will then be reduced to 50%.



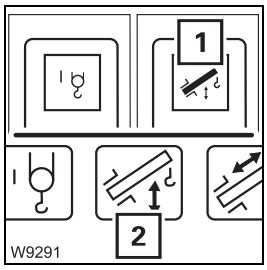
- Press button (**1**) up once.
- Use the control lever to raise the main boom.

The status display will flash green.

The raising of the main boom will be shut down if the main boom angle is too great. Then all you can do is set the load down.

Switching off the derricking gear

If the derricking gear is not required, it should be switched off to avoid unintentional use.



- Press the button (**1**) once.
  - The lamp in the button (**1**) lights up dimly.
  - Symbol (**2**) is **red** when the derricking gear is switched off.

If the control lever is assigned more than one function, the derricking gear will also be switched off if you switch on another power unit which is assigned to the same control lever movement; ➠ *Control lever configuration*, p. 9 - 18.

14.03.2018

Lowering the main boom to a horizontal position

Lowering the boom out of the working range is enabled only without a load and if there is a rigging table for the current rigging mode.
Enabling is automatic, the rigging tables cannot be entered manually.
The same tables apply to raising the boom outside of the working range.

- Set down the load.

Risk of overturning if the RCL is overridden!
Do not under any circumstances override the RCL. If the RCL shuts down the lowering procedure, the truck crane is in a condition in which the main boom may not be lowered beyond the working range (e.g. the load or working radius is too large).
The truck crane will overturn if you continue to lower the boom with the RCL overridden.

- Lower the main boom.

The RCL switches off the lowering procedure at about 10 – 15° if there are no rigging tables for the current rigging mode. In this case, you must bring the crane into a rigging mode for which a rigging table exists (e.g. retracting, setting down the load, other superstructure position).
All rigging modes for which rigging tables exist can be found in the *Lifting capacity tables*.

14.03.2018

11.3.7 Telescoping mechanism

A telescoping process requires locking and unlocking processes in the main boom. You can telescope the main boom in two ways.

– **Manual telescoping**
  For manual telescoping, you must initiate all locking and unlocking processes at the right time.

– **Telescoping with teleautomation**
  When telescoping with teleautomation, you enter a telescoping value and ECOS controls all the locking and unlocking processes automatically. You may then need to manually telescope to an intermediate length.

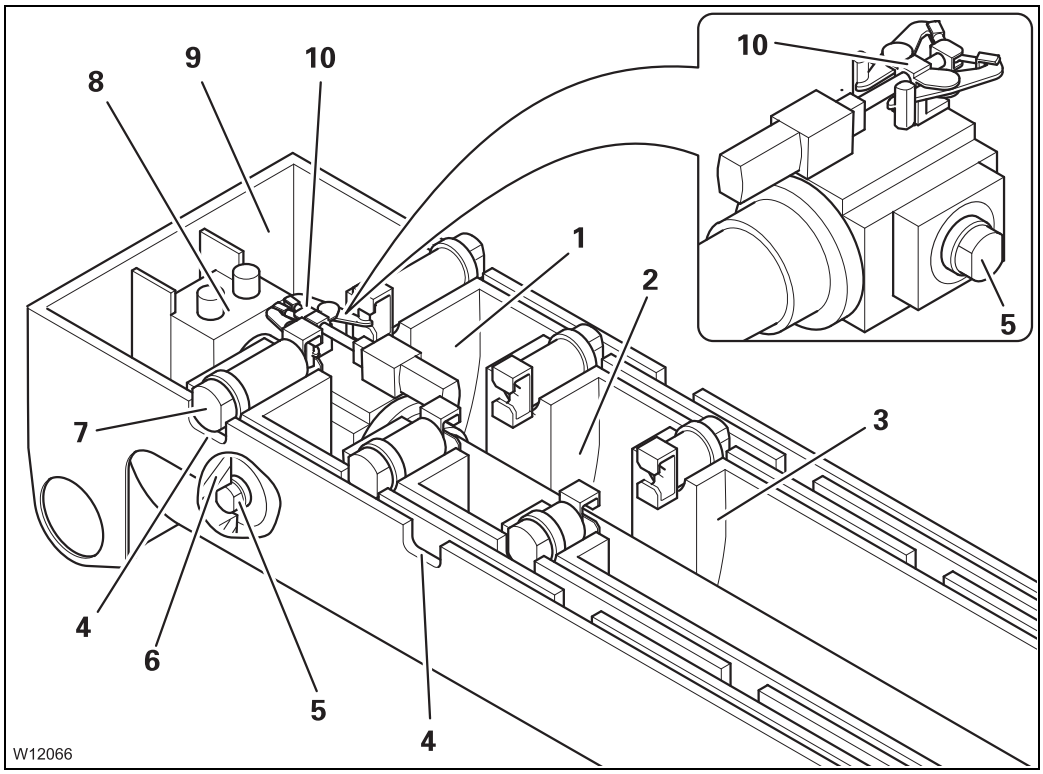
With both ways, control is possible on the *ECOS* control unit in addition to the control levers. Here you initiate processes, receive feedback and can monitor the telescoping process.

The *ECOS* display shows various sectional views of the main boom. To make you familiar with these representations more quickly, the following section begins with an overview of the telescoping mechanism and a telescoping process.

14.03.2018

Overview

This illustration shows the completely retracted main boom with the basic section (**9**) and the first three telescopic sections I to III (**1**) to (**3**).



Each telescopic section is equipped with two locking pins (**7**) which are extended by spring force.

The locking pins (**7**) are pushed into the cutouts (**4**) of the telescopic section above at the locking points – the telescopic section is locked.

The telescoping cylinder is attached to the basic section (**9**) with the piston rod (**8**). The telescoping cylinder has two locking pins (**5**) at the bottom and a mechanism at the top (**10**).

When the telescoping cylinder is positioned at a locking point:

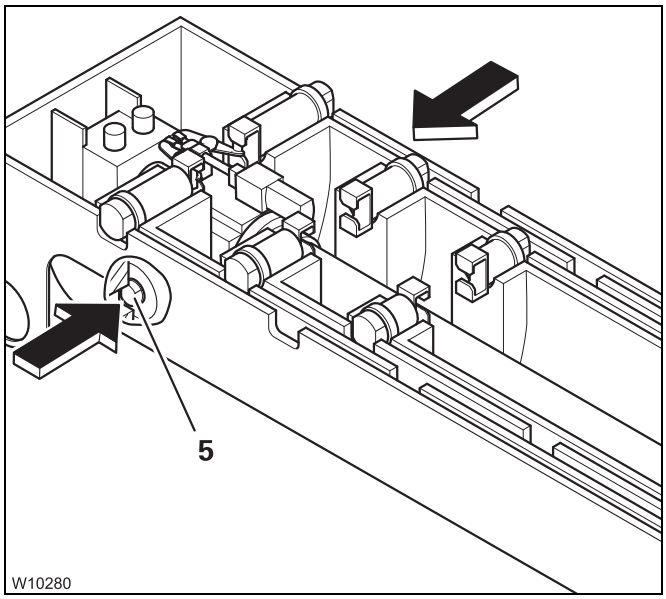
– The locking pins (**5**) can be extended into the cutouts (**6**) – the telescoping cylinder is locked.

– The mechanism (**10**) engages into the locking pins (**7**) and can retract them – the telescopic section is unlocked.

Telescoping process

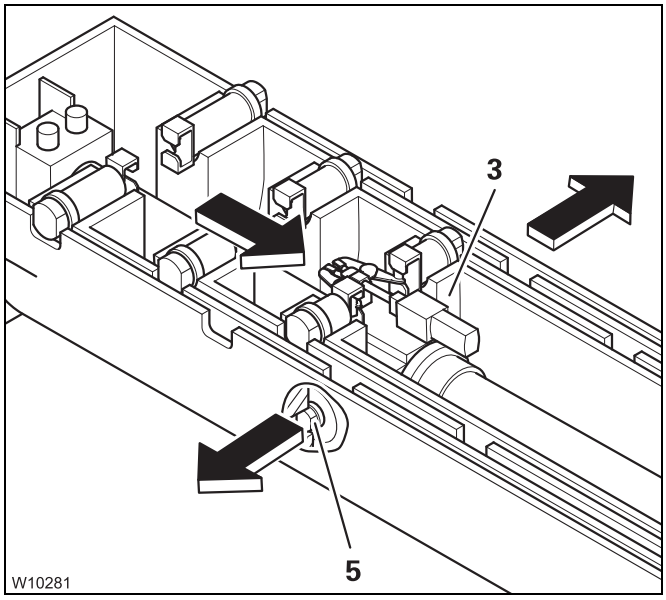
This state should be the starting point for a telescoping process.
A telescoping processes consist of 4 steps:

14.03.2018



1. Unlocking the telescoping cylinder

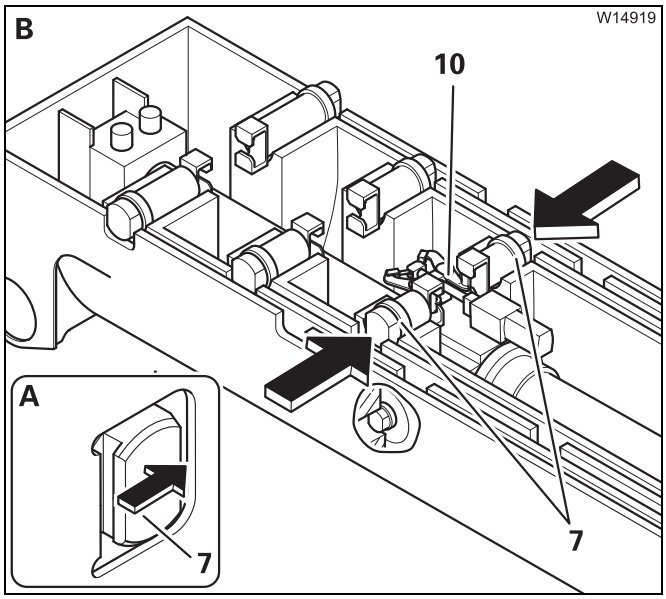
The locking pins (**5**) retract – the telescoping cylinder is unlocked.



2. Moving and locking the telescoping cylinder

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

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

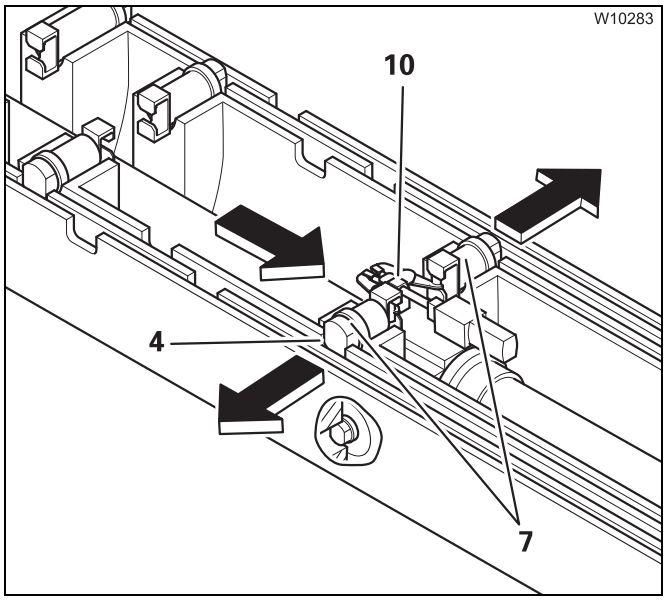


3. Unlocking the telescopic section

(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.

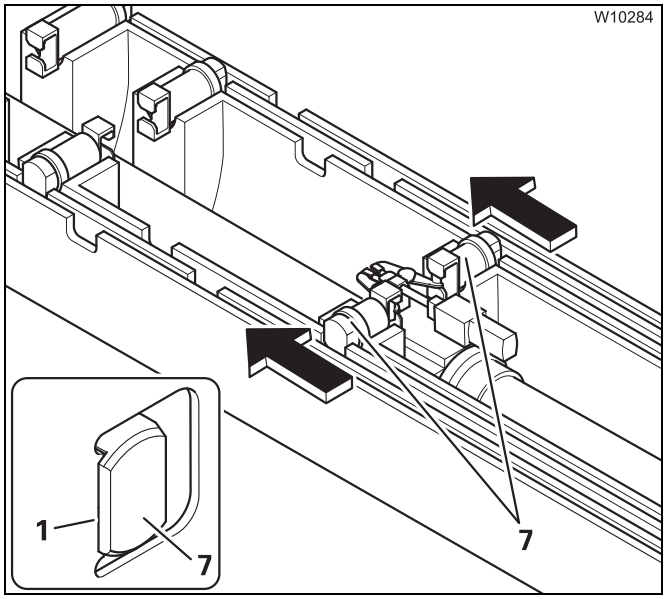
14.03.2018



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**).



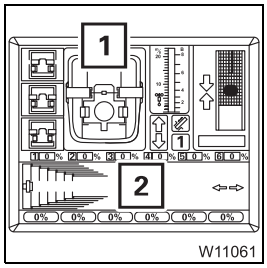
The telescopic section is automatically set down.

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 *Telescoping* submenu of the *ECOS* display shows two sectional views of the main boom.

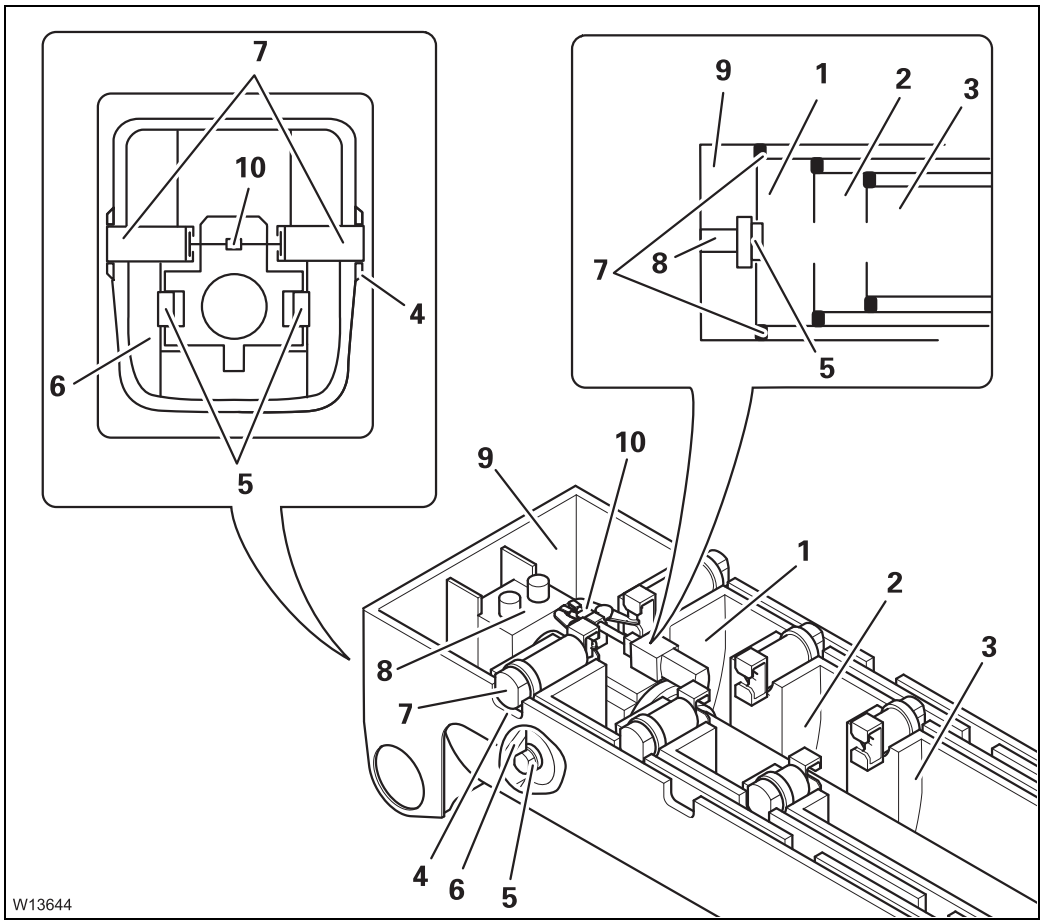


1 Sectional view from the rear

2 Sectional view from above

The following elements are displayed.

14.03.2018



1 Telescopic section I
2 Telescopic section II
3 Telescopic section III
4 Cutouts
5 Locking pins on the telescoping cylinder
6 Cutouts
7 Locking pin on the telescopic section
8 Telescoping cylinder (piston rod)
9 Basic section
10 Mechanism

14.03.2018

Fixed length, intermediate length, telescoping length

There are lifting capacity tables for main boom fixed lengths, main boom intermediate lengths and main boom telescoping lengths.
The lengths are automatically detected by the RCL, and the corresponding lifting capacities according to the *Lifting capacity tables* are enabled and displayed automatically.

Main boom fixed length

Main boom fixed lengths have the greatest lifting capacities. A main boom fixed length is reached if:
– All telescopic sections are locked to a fixed length
– All telescopic sections are set down.

Main boom intermediate length

A main boom intermediate length is reached if not all telescopic sections are locked to fixed lengths.
Extend the main boom to the required length before hoisting the load!
You cannot telescope the boom with the specified lifting capacities for main boom intermediate lengths.

Main boom telescoping length

The main boom is at a telescoping length if it is extended to an intermediate length and may be telescoped with the current load. The size of the load that can be telescoped depends on the angle of inclination and on the degree of lubrication of the main boom.

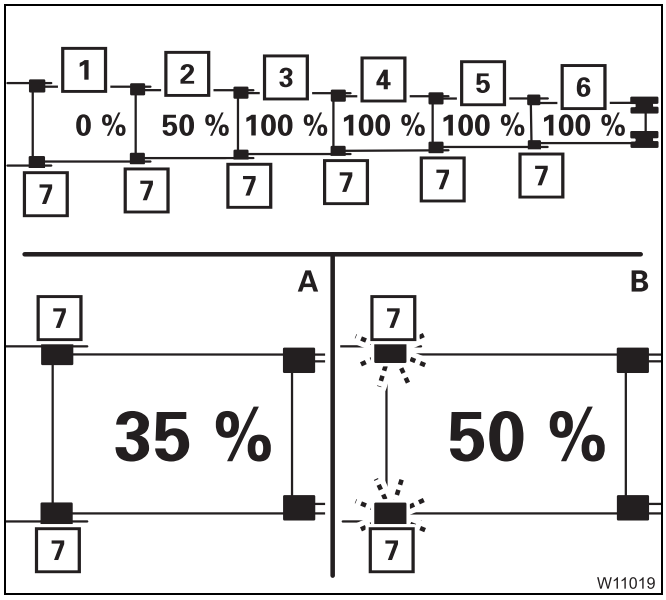
14.03.2018

Telescoping

The position of the telescopic sections (**1**) to (**6**), i.e. which telescopic section is extended to what extent, is referred to as telescoping.

This section only deals with the displays on the RCL. The telescoping is also shown on the *ECOS* display; ➠ p. 11 - 86.

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



Fixed lengths

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

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

Intermediate lengths

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

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

Telescoping sequence

The telescopic sections (**1**) to (**6**) can only be telescoped individually, one after another.

When **extending** you must always extend the telescopic section with the highest numbering first, then the telescopic section with the second highest numbering, etc. (e.g. IV, III, II, I).

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

14.03.2018

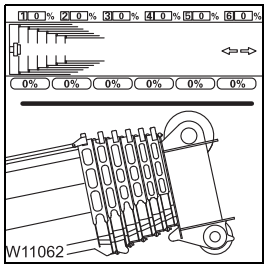
Checks before starting work

When the ignition is turned on, ECOS registers the displayed telescoping status from the current status of the telescoping mechanism and the previously saved locking and unlocking procedures.

Normally, ECOS detects differences between the current and the displayed telescoping and displays the corresponding error message; ➠ *Telescoping mechanism error messages*, p. 14 - 19.

If a **malfunction** results in values being deleted, ECOS can no longer calculate the current telescoping and will not issue an error message.

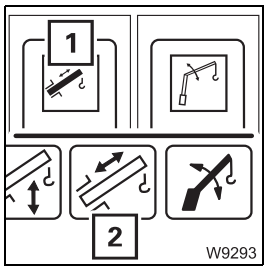
Risk of damage to the telescoping mechanism!
Before the first telescoping, always check whether the *ECOS* display is showing the current telescoping.
This prevents the telescoping mechanism from being damaged when telescoping.



- Before telescoping the first boom, compare the telescoping shown on the *ECOS* display with the current telescoping.

If the current telescope status is not correctly displayed, enter the current telescope status; ➠ *Entering the current telescoping*, p. 14 - 57.

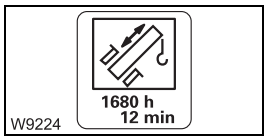
Switching on the telescoping mechanism



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**) lights up brightly.
  - The symbol (**2**) will be **green** if the telescoping mechanism is switched on.

If the control lever is assigned more than one function, all other power units which are assigned the same control lever operation are switched off; ➠ *Control lever configuration*, p. 9 - 18.



You can have the operating hours of the telescoping mechanism displayed; ➠ p. 11 - 109.

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.

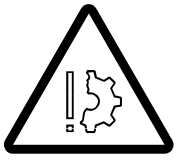
– Before manual telescoping; ➠ p. 11 - 77.

– Before telescoping with teleautomation; ➠ p. 11 - 89.

You can adjust the sensitivity of the control levers to the operating conditions; ➠ *Setting the characteristic curves for the control levers*, p. 11 - 106.

Risk of accident due to unexpected crane movements!
In the case of multiple configuration, check whether the control lever function *Telescoping* is switched on before you move the control lever for telescoping.
This prevents accidents caused by unexpected derricking!

Risk of accidents due to gaps in monitoring!
Boom extension will only be monitored completely if
– The lifting limit switch is correctly rigged; ➠ p. 12 - 106,
– The lifting limit switch is not overridden; ➠ p. 11 - 60.



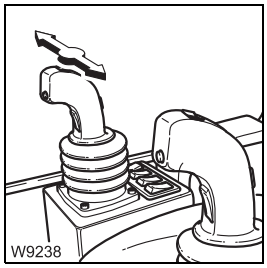
Risk of damage to the hoist rope!
The rope can become slack if the hook block touches the ground during retraction operations. Rope loops will form, which can cause the load to slip and damage the hoist rope.

14.03.2018

The distance between the hook block and the boom head changes during telescoping. Ensure that the hook block does not trigger the lifting limit switch or touch the ground.

- Additionally carry out the following movements:
  - *Lower hoist* when extending
  - *Lift hoist* when retracting.

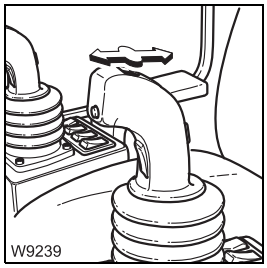
The control lever movements for telescoping vary depending on the configuration.



– With telescoping assigned to the right-hand lever

To extend: • Push the control lever to the right.

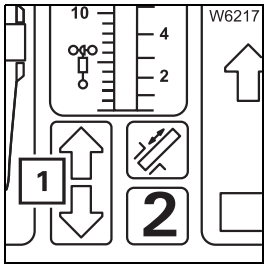
To retract: • Push the control lever to the left.



– With telescoping assigned to the left-hand lever

To extend: • Push the control lever forwards.

To retract: • Pull the control lever backwards.

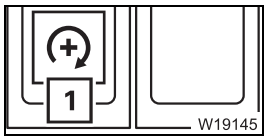


Telescoping will only start if arrow (**1**) for the selected telescoping direction is **green**.
If the arrow is red, extension operations are disabled in the indicated direction. This may have different causes, e.g. the telescopic section being in final position, a lifting limit switch shutdown, a malfunction etc.

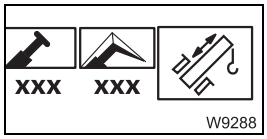
You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.

With certain telescoping states, the RCL will switch telescoping off, e.g. when you leave the telescoping lengths or when the working range limit has been reached; ➠ *RCL shutdown*, p. 11 - 37.

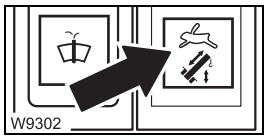
14.03.2018



You can set the desired engine speed (idling speed) with button (**1**); ➠ p. 10 - 16.

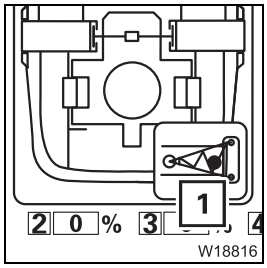


You can limit the maximum telescoping speed in the *Power unit speeds* submenu; ➠ p. 11 - 105.



You can switch on high-speed mode for a higher speed; ➠ p. 11 - 94.

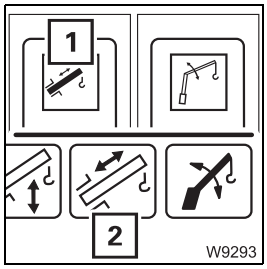
Telescoping with lattice extension folded at the side



If you select a telescope status that is greater than 0/0/0/0/0/0 then the lattice extension is pivoted slightly to the side.

1 – Red: lattice extension folded or intermediate position
– No display: lattice extension swivelled to the side

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**) lights up dimly.
  - The symbol (**2**) is **red** if the telescoping mechanism is switched off.

If the control lever is assigned more than one function, the telescoping mechanism will also be switched off if you switch on another power unit which is assigned to the same control lever movement; ➠ *Control lever configuration*, p. 9 - 18.

14.03.2018

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 - 79,

– Moving the telescoping cylinder (without telescopic section); ➠ p. 11 - 82,

– Locking the telescoping cylinder; ➠ p. 11 - 83,

– Unlocking the telescopic section; ➠ p. 11 - 84,

– Telescoping the telescopic section; ➠ p. 11 - 86,

– Locking the telescopic section; ➠ p. 11 - 87.

The operating order depends on the current initial position. For an overview of a sample telescoping process; ➠ p. 11 - 67.

The lengths given in the following illustrations are purely sample values, and may differ from the current display.

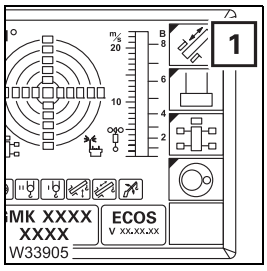
Checking the initial position

Before telescoping, you must check the following statuses:

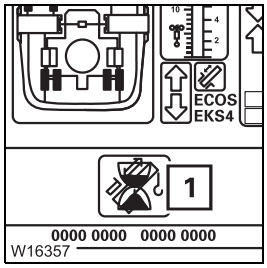
– **the current telescope status**,

– **the position of the telescoping cylinder,**

– **the position of the locking pins**.



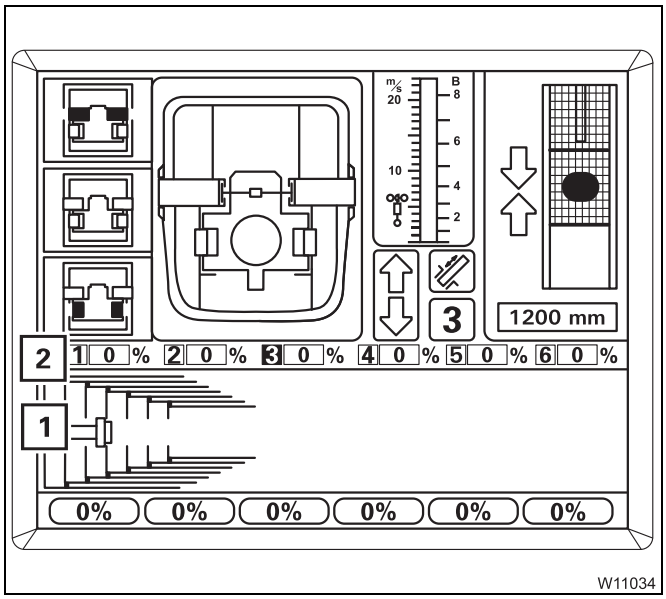
• If necessary, open the main menu Esc and press the button (**1**) once.



The *Telescoping* submenu will open.

If an error (**1**) is indicated, all operating elements will be disabled; ➠ *Telescoping mechanism error messages*, p. 14 - 19.

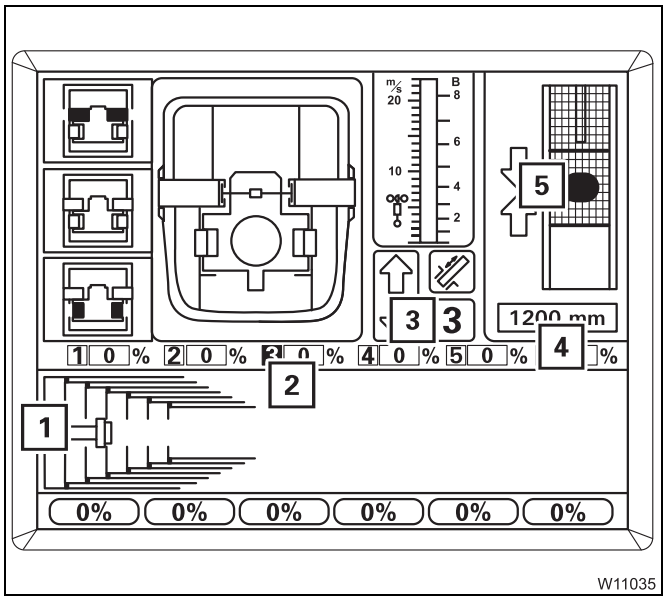
14.03.2018



Current telescoping

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

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



Position of the telescoping cylinder

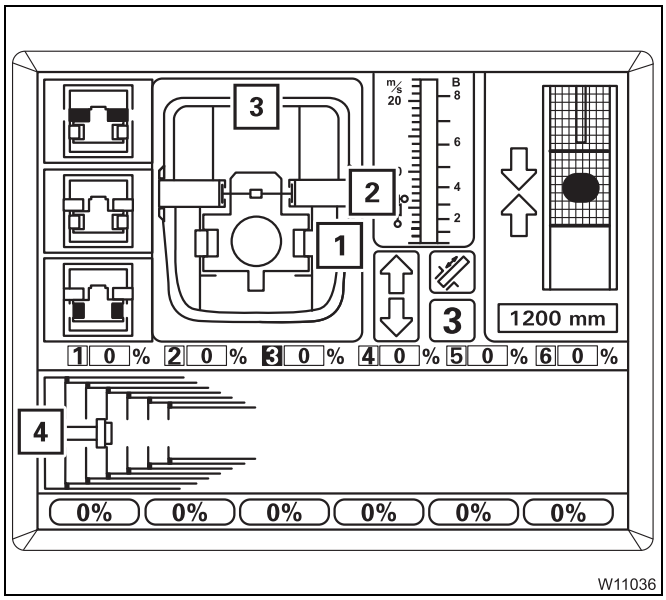
The display (**4**) shows how far the telescoping cylinder is extended, e.g. 1,200 mm (3.93 ft).

If the telescoping cylinder is near a locking point:

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

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

14.03.2018



Position of the locking pins

The display (**3**) shows the current positions of the locking pins

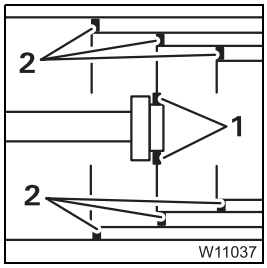
1 On the telescoping cylinder

2 On the telescopic section.

The current settings are shown in different colours.

– **Red:** Unlocked
– **Green:** Locked
– **Yellow:** Intermediate position

The display (**4**) shows the same settings:



1 Locking pins on the telescoping cylinder

2 Locking pins on the telescopic sections

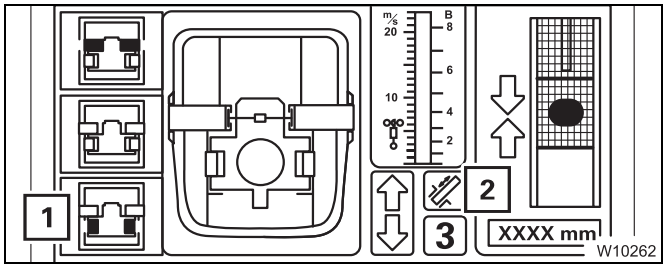
The settings are shown as follows:

– **Green:** Locked
– **No display:** Unlocked or intermediate position

Unlocking the telescoping cylinder

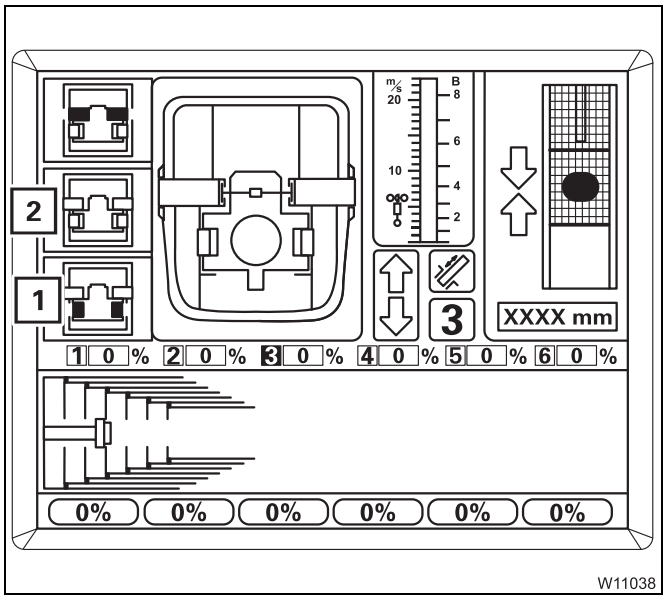
Unlocking the telescoping cylinder is required for the telescoping cylinder to be moved separately (without telescopic section).

The telescoping cylinder and the telescopic section cannot be unlocked simultaneously.



Prerequisites

– Telescoping mechanism on – symbol (**2**) is green
– Telescoping cylinder locked – symbol (**1**) is grey



To select unlock

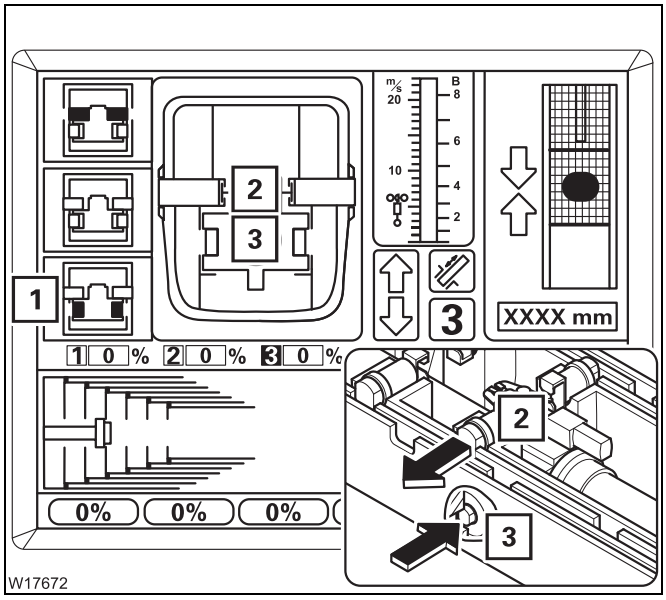
- Press the button (**1**) once.

– If the telescopic section is locked: Symbol (**1**) will flash – *Unlock telescoping cylinder* is selected.

– If the telescopic section is unlocked: Symbol (**2**) will flash – the following is selected:

1. *Locking the telescopic section*
2. *Unlocking the telescoping cylinder*

In the next step, both selections are carried out one directly after the other.



Unlocking the telescoping cylinder

- Move the control lever for telescoping.

If required, extend the locking pins (**2**) first.

The locking pins (**3**) retract.

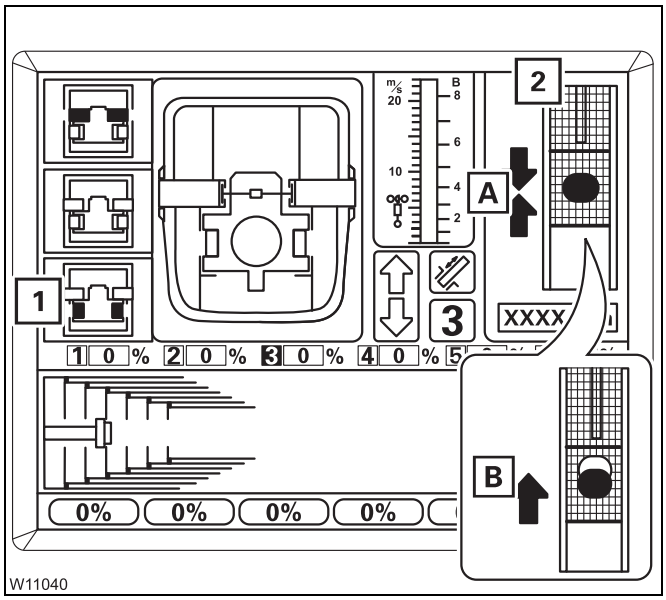
– **Yellow:** Intermediate position

– **Red:** Unlocked

In the *Unlocked* position, symbol (**1**) will be yellow.

If the control lever is moved, the telescoping cylinder will move immediately.

14.03.2018



If symbol (**1**) is still flashing after approx. 10 seconds, this means that the locking pins are under load.

- Release the control lever.

The display (**2**) shows which movement you need to carry out to take the load off:

– **A:** Retracting

– **B:** Extending

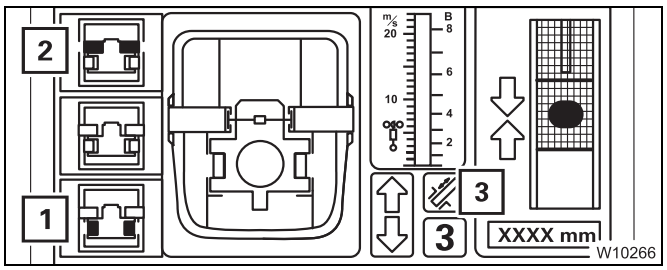
Risk of damage to the boom system!
If extending and retracting several times does not lead to the lock being released, you must not telescope any further against the stop.

If removing the load does not cause the lock to be released, you must lock the telescoping cylinder (p. 11 - 83) and then restart unlocking.

14.03.2018

Extending/retracting the telescoping cylinder

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

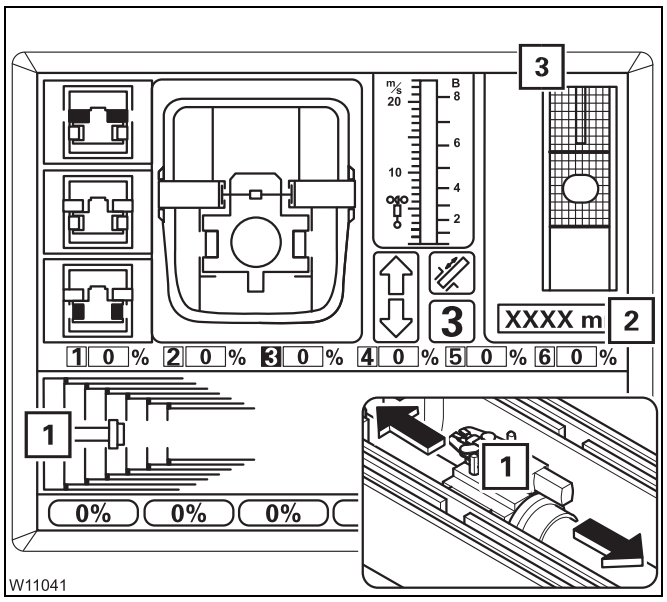


Prerequisites

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

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

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



Extending/retracting

• Move the control lever in the corresponding telescoping direction:

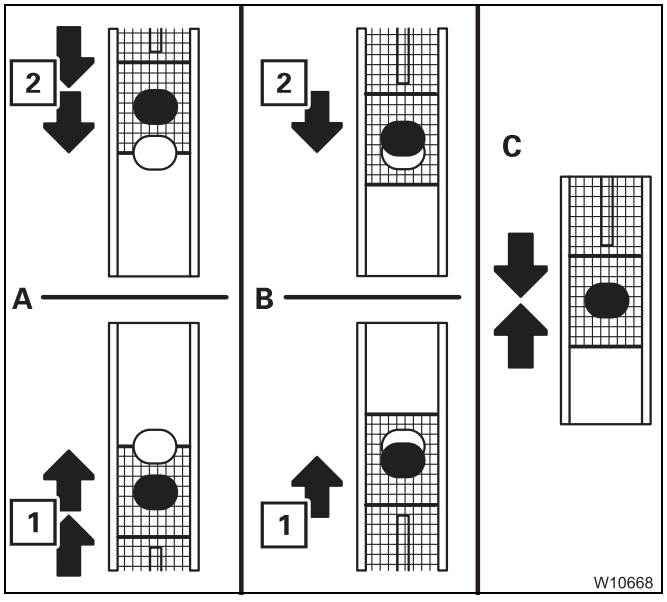
  – **Extend:** Extending

  – **Retract:** Retracting

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

The display (**2**) shows the currently extended length, e.g. 1,500 mm (4.92 ft).

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



– The distance to the locking point

  A Yellow: approx. 1 m (3.3 ft)

  B yellow Less than 1 m (3.3 ft)

  C Green: At the locking point

and

– the direction of travel to the locking point:

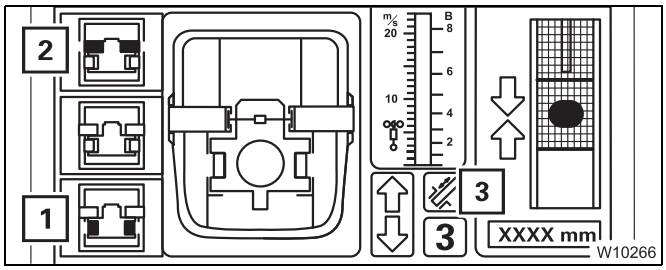
  1 Extending

  2 Retracting

14.03.2018

Lock telescoping cylinder

The telescoping cylinder must be locked to a telescopic section so that the telescopic section can be telescoped.

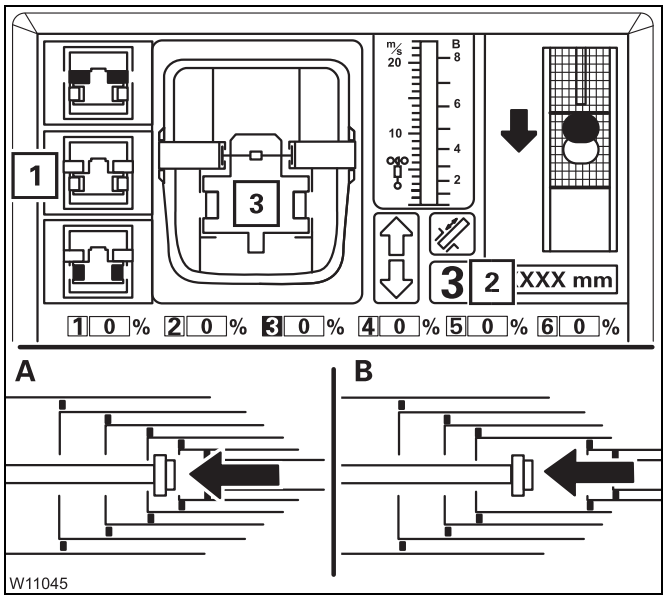


Prerequisites

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

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

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



To select lock

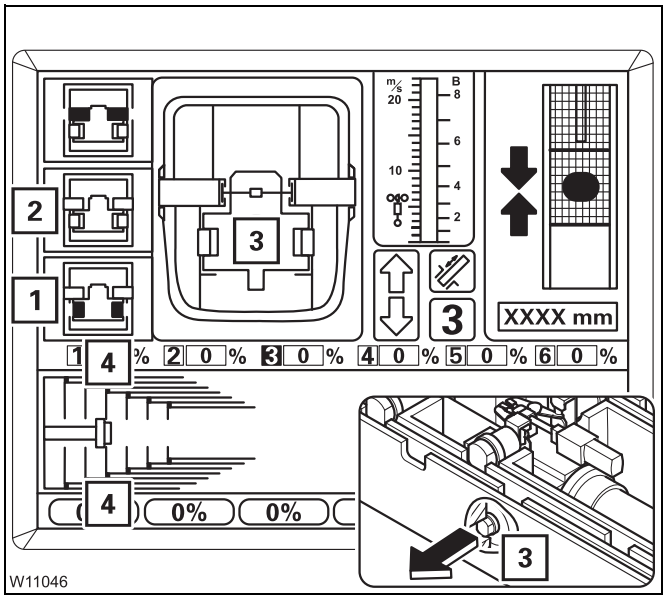
• Move the telescoping cylinder to the desired locking point, e. g. to telescopic section III.

Wait until the display (**2**):

– (**A**) shows the desired telescopic section or

– (**B**) shows no telescopic section and the desired locking point is reached next.

• Press the button (**1**) once.
Symbol (**1**) will flash – *Lock telescoping cylinder* is selected.



Lock the telescoping cylinder

• Move the control lever until locking is complete.

The locking pins (**3**) extend at the locking point.

– Yellow: Intermediate position

– Green: Locked

In *Locked* position:

– Symbol (**1**) is yellow,

– Symbol (**2**) is grey,

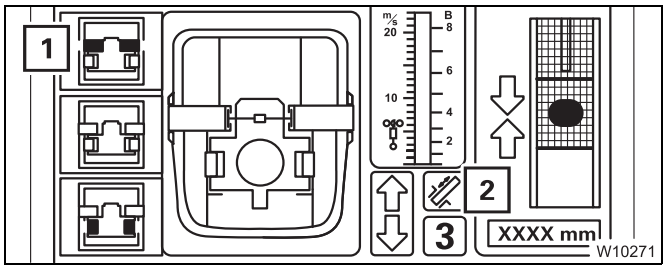
– The locking pins (**4**) are green.

14.03.2018

Unlocking the telescopic section

Unlocking a telescopic section is required for the telescopic section to be telescoped.

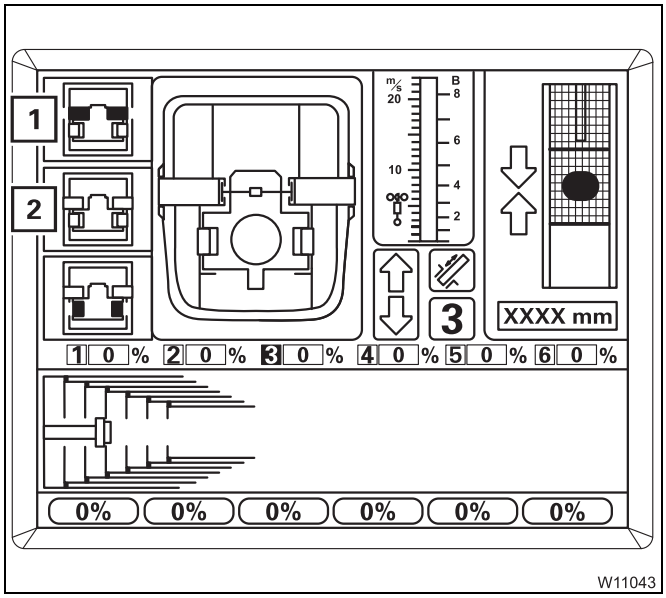
The telescoping cylinder and the telescopic section cannot be unlocked simultaneously.



Prerequisites

– Telescoping mechanism on – symbol (**2**) is green

– Telescopic section locked – symbol (**1**) is grey



To select unlock

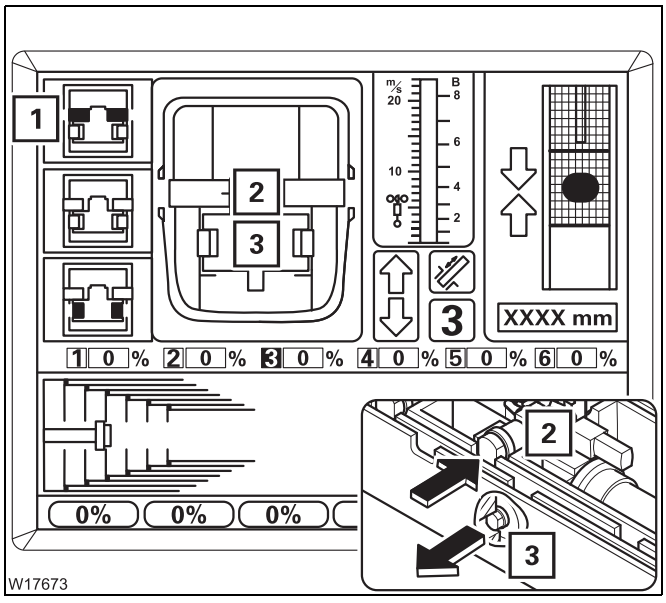
• Press the button (**1**) once.

– If the telescoping cylinder is locked: Symbol (**1**) will flash – *Unlock telescopic section* is selected.

– If the telescoping cylinder is unlocked: Symbol (**2**) will flash – the following is selected:

1. *Lock the telescoping cylinder*
2. *Unlocking the telescopic section*

In the next step, both selections are carried out one directly after the other.



Unlocking the telescopic section

• Move the control lever for telescoping.

If required, extend the locking pins (**3**) first.

The locking pins (**2**) retract.

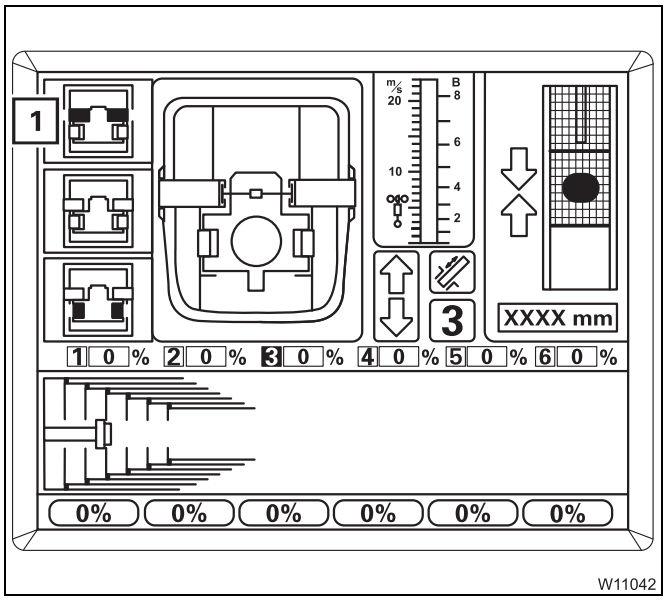
– **Yellow:** Intermediate position

– **Red:** Unlocked

In the *Unlocked* position, symbol (**1**) will be yellow.

If the control lever is moved, the telescopic section will immediately be telescoped.

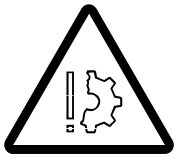
14.03.2018



If symbol (**1**) is still flashing after approx. 10 seconds, this means that the locking pins are under load.

- Release the control lever.

To relieve the load, carefully retract and extend a little.



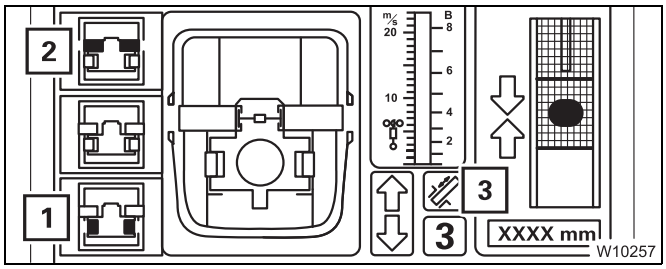
Risk of damage to the boom system!
If extending and retracting several times does not lead to the lock being released, you must not telescope any further against the stop.

If removing the load does not cause unlocking, you must lock the telescopic section (➠ p. 11 - 87) and restart unlocking.

14.03.2018

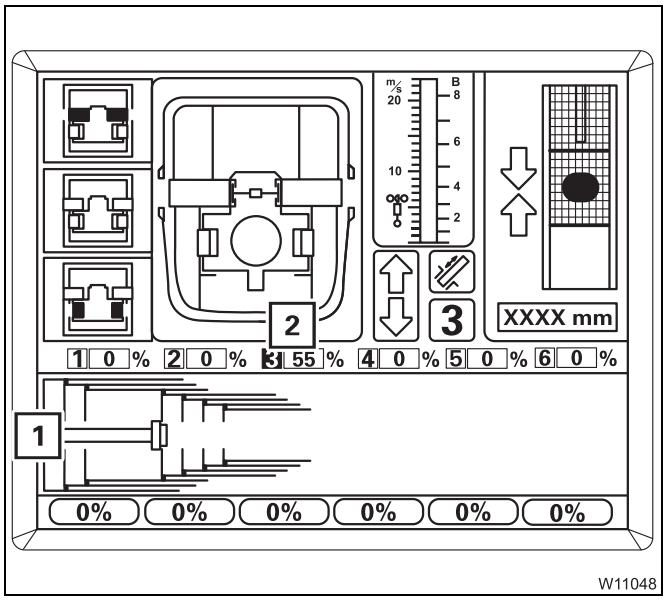
Telescoping the telescopic section

You can telescope the telescopic section once it is unlocked.



Prerequisites

– Telescoping mechanism on – symbol (**3**) is green
– Telescoping cylinder locked – symbol (**1**) is grey
– Telescopic section unlocked – symbol (**2**) is yellow



Telescoping

• Move the control lever in the desired telescoping direction.

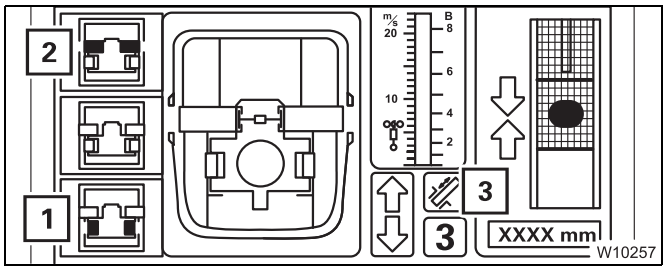
The display (**2**) will show the currently extended length (telescoping), e.g. 55% for telescopic section III.

The current telescope diagram on the display (**1**) will change continually.

14.03.2018

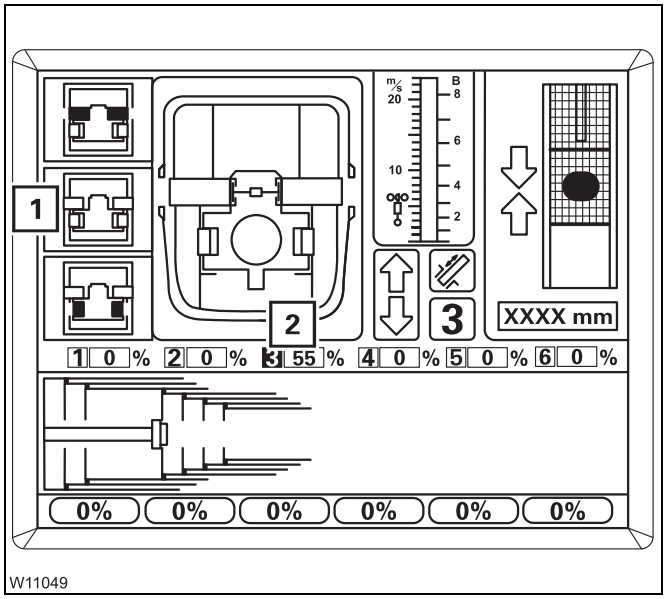
Locking the telescopic section

Every telescopic section can be locked at the fixed lengths – fixed lengths; ➠ p. 11 - 71.



Prerequisites

– Telescoping mechanism on – symbol (**3**) is green
– Telescopic section unlocked – symbol (**2**) is yellow
– Telescoping cylinder locked – symbol (**1**) is grey.

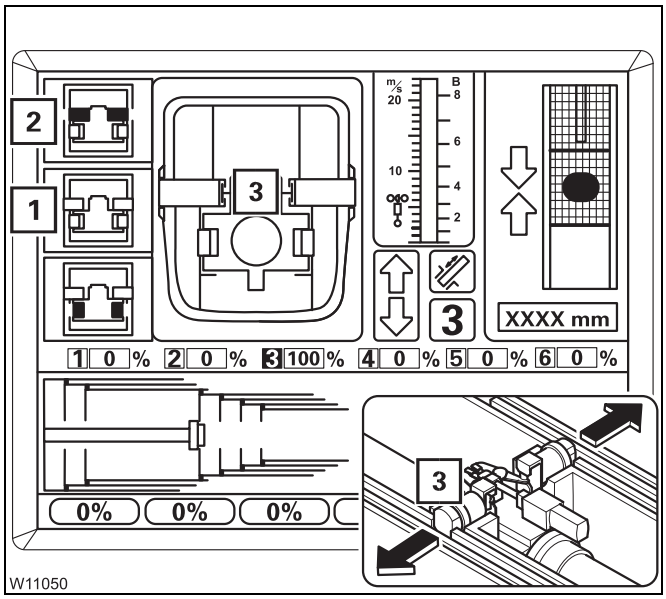


To select lock

• Telescope to the desired fixed length, e. g. telescopic section III to 100%.

If necessary, wait until the telescopic section moves past a non-desired fixed length by approx. 5%, e.g. at 50% – display (**2**).

• Press the button (**1**) once.
Symbol (**1**) flashes – *Lock telescopic section* is selected.



Locking the telescopic section

• Move the control lever until locking is complete.

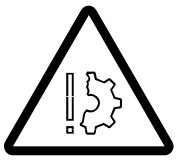
The locking pins (**3**) extend at the locking point.

– **Yellow:** Intermediate position
– **Green:** Locked

The telescopic section is set down; ➠ p. 11 - 69.

In *Locked* position:

– Symbol (**1**) is yellow,
– Symbol (**2**) is grey.



Risk of damage to the telescoping cylinder!
Move the control lever until the telescopic section is locked **and set down** – the symbol ⊡ must be yellow.
This prevents the load from exerting pressure on the telescoping cylinder and allow the load to be enabled for fixed lengths.

Locking the telescopic section for on-road driving

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

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

If another telescopic section was retracted last, you must do the following before selecting locking:
– Unlock the telescoping cylinder; ➠ p. 11 - 79,
– Move the telescoping cylinder into telescopic section I; ➠ p. 11 - 82 and
– lock the telescoping cylinder; ➠ p. 11 - 83.

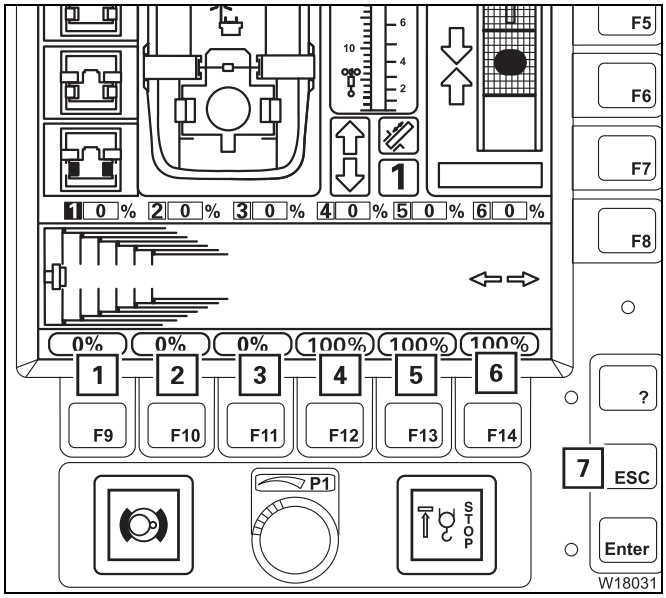
14.03.2018

Telescoping with teleautomation

When telescoping with teleautomation, you enter the desired fixed lengths and then move the control lever in the required direction. Switching between the telescopic sections is carried out automatically by ECOS.

If the desired telescoping status is not a fixed length, you can first telescope to the next closest fixed length with the teleautomation and then telescope further to the desired length manually.

- Switch the telescoping mechanism on and open the *Telescoping* submenu; p. 11 - 74.



Display

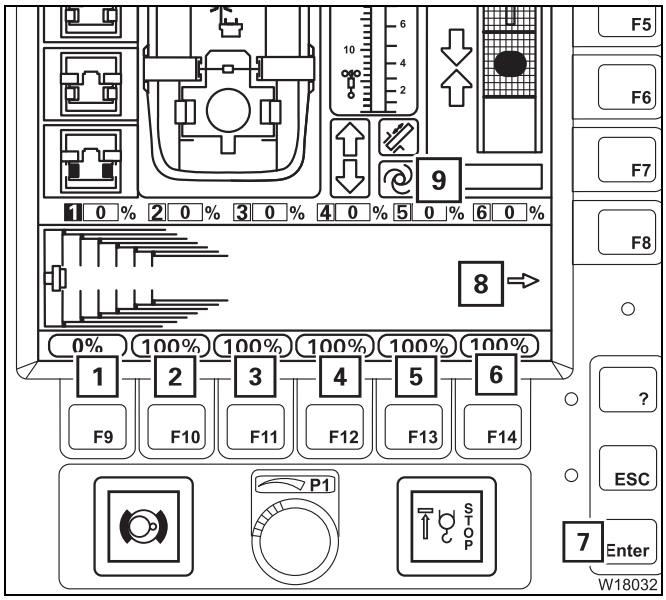
(**1**) to (**6**) – desired telescope status = objective of teleautomation:
– Red values: Teleautomation off,
– No values: Teleautomation disabled

Entering the telescoping status

- Press one of the buttons (**1**) to (**6**). Values are **yellow** – input on.

To cancel input – press button (**7**) once.

- Enter the telescope status using buttons (**1**) to (**6**), e.g. 100%, 100%, 100%, 100%, 49%, 50%.



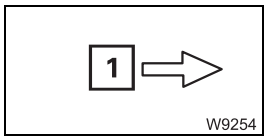
Confirming the entry

- Press the button (**7**) once:
– Values (**1**) to (**6**) are **red** – telescoping **not permissible** – teleautomation off.
– Values (**1**) are (**6**) are **green** – display of symbol (**9**) – teleautomation on.

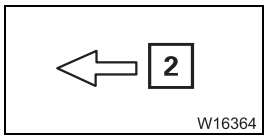
Telescoping

- Move the control lever for the displayed telescope direction (**8**), e.g. for extending.

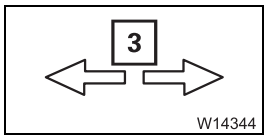
14.03.2018



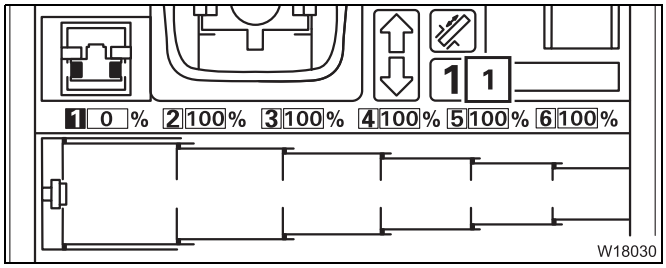
– The displayed symbol, e.g. symbol (**1**) will flash if the control lever is moved incorrectly.



– If the control lever movement is correct, ECOS will telescope automatically until a change in direction is required. Then the symbol for the new movement will be displayed, e.g. (**2**) for *Retracting*.



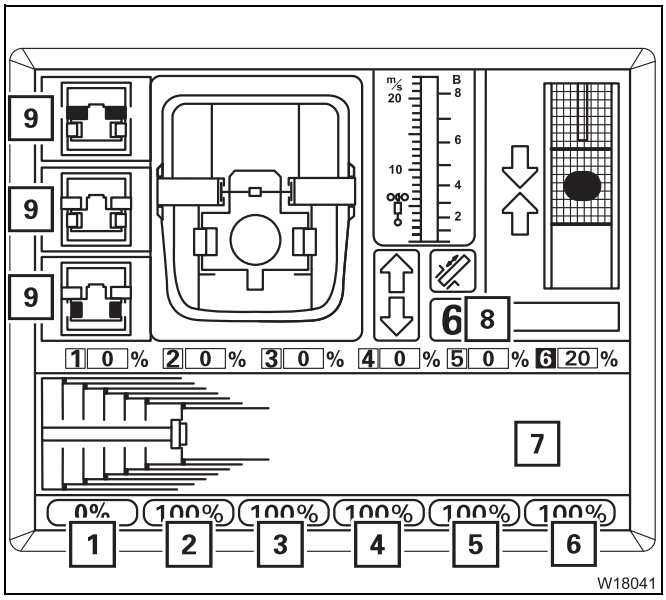
– For unloaded movements of the telescoping cylinder (without telescopic section), symbol (**3**) is displayed.



Ending teleautomation

The teleautomation will stop when the entered telescope status is reached.

- Move the control lever to its initial position. Display (**1**) – teleautomation off.



Cancelling teleautomation

- Press button (**9**) once.

Telescoping stop – teleautomation off:

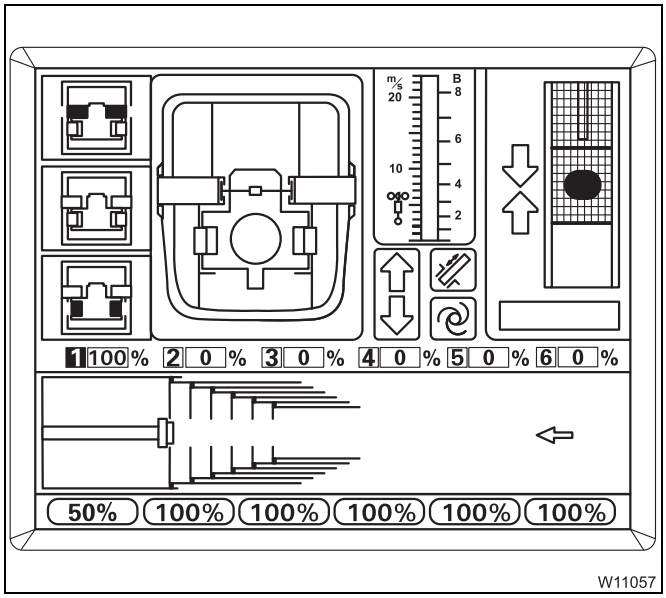
– Values (**1**) to (**6**) are **red**.

– Display (**7**) goes out,

– Display (**8**) – teleautomation off.

14.03.2018

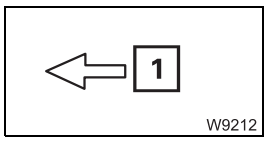
Example of telescoping with teleautomation



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

ECOS will calculate the following telescoping sequence:

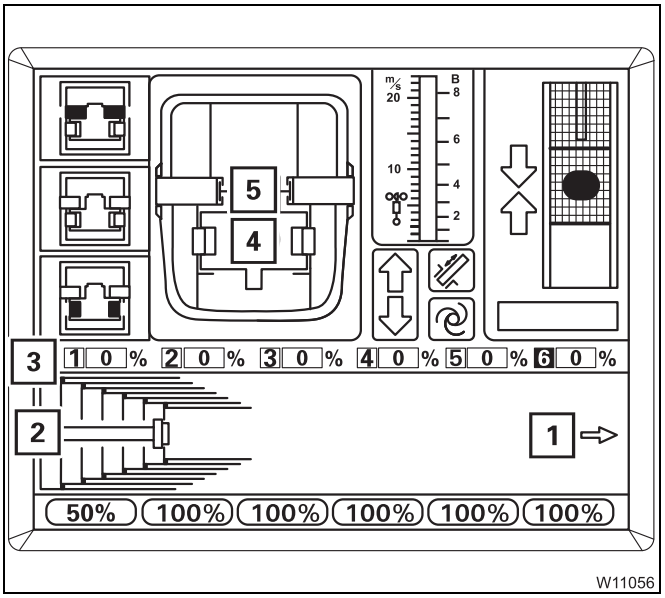
– Telescopic section I	retract	to 0%
– Telescopic section VI	extend	to 100%
– Telescopic section V	extend	to 100%
– Telescopic section IV	extend	to 100%
– Telescopic section III	extend	to 100%
– Telescopic section II	extend	to 100%
– Telescopic section I	extend	to 50%



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

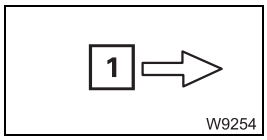
- Move the control lever to retract and hold it.

Telescopic section I is fully retracted. The following processes are carried out automatically for this.



1. Retract telescopic section I – display (**3**) 0%
2. Lock telescopic section I – pins (**5**) green
3. Unlock telescoping cylinder – pins (**4**) are red
4. The telescoping cylinder moves into telescopic section IV – display (**2**)
5. Lock telescoping cylinder – pins (**4**) are green

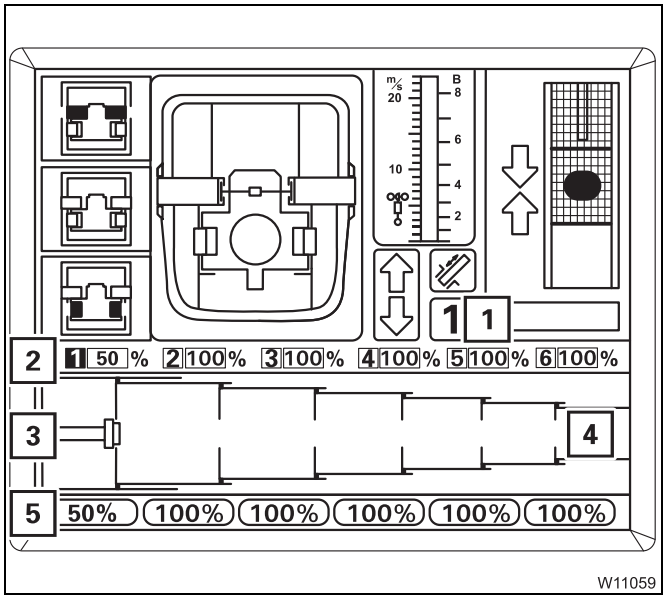
The arrow (**1**) shows the new telescoping direction – extending.



The arrow (**1**) will flash as long as you deflect the control lever for retraction.

- Move the control lever for extending and hold it there.

ECOS now automatically telescopes telescopic sections VI, V, IV, III and II to the full extent and stops when telescopic section I reaches the set value of 50%.



- Move the control lever to its initial position.

– Display (**4**) goes out.

– Display (**1**) – teleautomation off.

– Values (**5**) are **red**.

– Displays (**2**) and (**3**) – current telescoping.

Teleautomation is switched off.

To extend telescopic section I to 60%, for example, you can now further extend this telescopic section manually.

14.03.2018

Telescoping the main boom when horizontal

- Derrick the main boom to the horizontal position as described in section *Lowering the main boom to a horizontal position*; ➠ p. 11 - 65.

The RCL will automatically switch to the corresponding rigging table. This table specifies the maximum permissible telescoping at which extending will be switched off (shutdown values ➠ *Lifting capacity table*).

- Set down the load.
- Extend the main boom only until the RCL switches off the extension procedure.

If you continue to extend the main boom after an RCL shutdown, you may enter ranges in which you can neither perform retraction operations nor raise the boom.

14.03.2018

11.3.8 High-speed mode

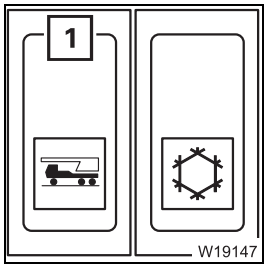
The slewing gear cannot be operated at high speed.

You can switch on the high-speed mode for a higher speed.

Risk of accidents due to the suddenly accelerating movements!
Reduce the engine speed before starting high-speed mode.
This will prevent movements from becoming excessively accelerated, which may result in the truck crane starting to sway and overturning.

Switch on function

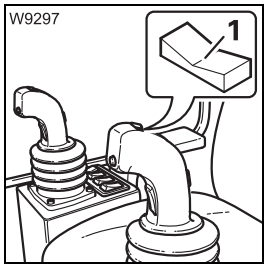
The *High speed* function will only be enabled if the carrier ignition is switched off.



- Turn off the carrier ignition, if necessary. Push the button (**1**) up once. The lamp in the button should go out.

Derricking gear/ telescoping mechanism

High-speed mode is always switched on and off for the derricking gear and the telescoping mechanism at the same time.

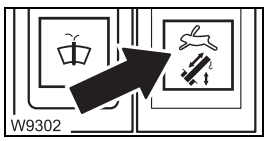


To switch on briefly

- Press button (**1**) down on the right – inwards.
  High-speed mode will be active until you release the button.

Continuous operation

- Press button (**1**) down on the left – outwards.
  High-speed mode will be enabled until you press the button again.



Lamp (**1**) indicates the current status:

On:	High-speed mode switched on
off:	High-speed mode switched off

When lowering the boom, high-speed mode only supports the start of the derricking procedure from steep boom positions. It does not increase the derricking speed.
High-speed mode is disabled for raising when performing operations with the lattice extension.

14.03.2018

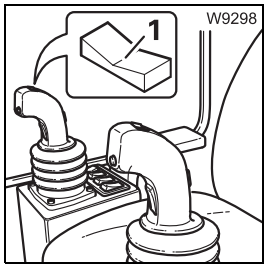
Hoists

The main hoist and auxiliary hoist are always switched simultaneously to high-speed mode.

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.

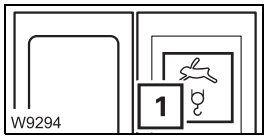


To switch on briefly

- Press button (**1**) down on the left – inwards.
  High-speed mode will be active until you release the button.

Continuous operation

- Press button (**1**) down on the right – outwards.
  High-speed mode will be enabled until you press the button again.



Lamp (**1**) indicates the current status:

On:	High-speed mode switched on
off:	High-speed mode switched off

The speed of the hoists will only be significantly increased by switching to high-speed mode if you have deflected the control lever by more than 70%.

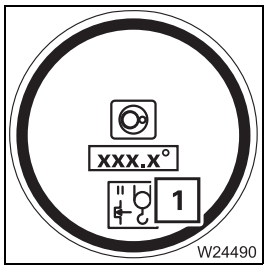
14.03.2018

11.3.9 Slewing gear

Danger of overturning when slewing with a rigged counterweight!
Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius).
Correct the rigging mode if necessary; ➠ *Slewing with rigged counterweight*, p. 12 - 83.

Maximum permissible slewing speed

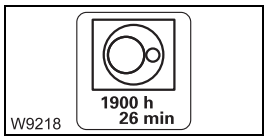
The maximum permissible slewing speed is limited automatically depending on the working radius and degree of utilisation of the lifting capacity. The scale of the limitation is specified in the supplied lifting capacity table.



If the symbol (**1**) lights up in the *Slewing gear* submenu, the functions in the submenu are disabled.

Refer to ➠ *Malfunctions in the slewing gear*, p. 14 - 21 for assistance.

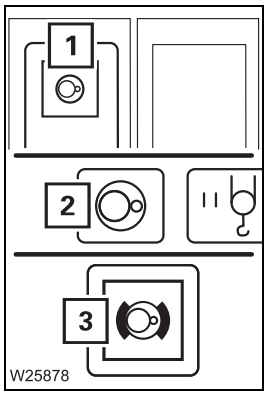
The functions of the submenu are not unblocked until the symbol (**1**) has gone out.



You can have the operating hours of the slewing gear displayed; ➠ p. 11 - 109.

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.

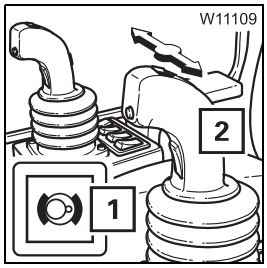


- Press the button (**1**) once.
  - The lamp in button (**1**) lights up brightly.
  - Symbol (**2**) is **green** if the slewing gear is switched on.
  - The slewing gear brake will be released – lamp (**3**) will go out.

If an RCL code has been entered for the working position *0° to the rear* or *Free-on-wheels*, an RCL shutdown will occur after switching on the slewing gear, and slewing will be disabled. To acknowledge the shutdown, you must either switch off the slewing gear or set down the load and enter an RCL code for the 360° working range.

14.03.2018

Releasing the slewing gear brake

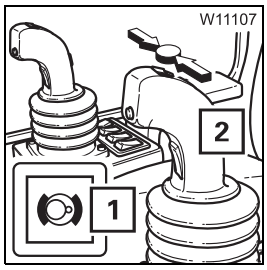


The slewing gear brake will be released as soon as you deflect the control lever (**2**).

Lamp (**1**) will extinguish if the slewing gear brake has been released.

Engaging the slewing gear brake

The slewing gear brake is applied when you switch off the slewing gear; ➠ p. 11 - 100.



The slewing gear brake will also engage if control lever (**2**) is in its initial position.

The lamp (**1**) will light up if the slewing gear brake has been applied.

Turning

The following requirements must be fulfilled before slewing:

– The houselock must be switched off; ➠ p. 11 - 15.

– The counterweight lifting cylinders are fully retracted; ➠ p. 12 - 75.

– Slewing is permissible with the current rigging mode; ➠ p. 12 - 83.

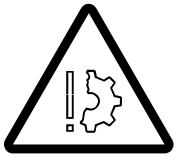
– The current rigging mode is entered on the RCL; ➠ p. 11 - 23.

If slewing is not permissible with the current rigging mode, the slewing gear will be locked.

14.03.2018

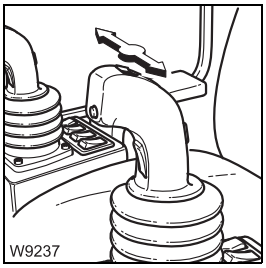
Danger of overturning when slewing with an incorrectly set RCL!
Before slewing, always check whether the RCL code valid for the current rigging mode is displayed.
This prevents slewing operations from being enabled within the impermissible ranges, which would cause the truck crane to overturn.

Risk of crushing during slewing!
Before slewing, operate the horn and ensure there are no persons in the slewing range.
This prevents persons from getting crushed between the superstructure and the carrier or between the superstructure and other parts.



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

You can adjust the sensitivity of the control levers to the operating conditions; ➠ *Setting the characteristic curves for the control levers*, p. 11 - 106.

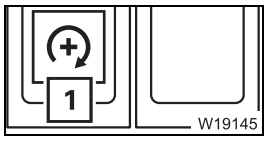


To slew to the left: • Push the control lever to the left.

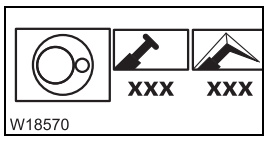
To slew to the right: • Push the control lever to the right.

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

The maximum slewing speed is automatically reduced as the working radius is increased. At a degree of utilisation above 50%, the speed will be halved again.
At a degree of utilisation under 50%, the speed will only be increased again if the control lever is brought into its initial position and the slewing gear is stationary.

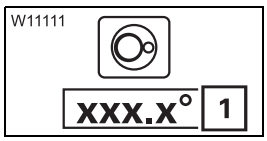


You can set the desired engine speed (idling speed) with button (**1**); ➠ p. 10 - 16.



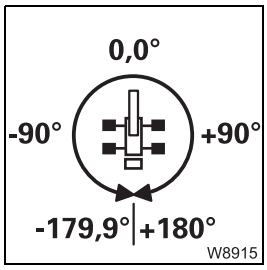
You can limit the maximum slewing speed; ➠ p. 11 - 105.

14.03.2018



Reading off the slewing angle

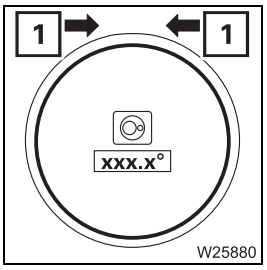
In the *Slewing gear/houselock* submenu – display (**1**) shows the current position.



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

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

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



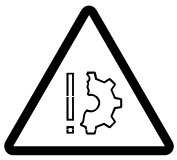
Slewing to 0° or 180°

The displays (**1**) are activated in a range of ± 20° from the superstructure positions 0° and 180°.

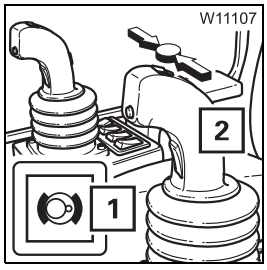
– If both arrows illuminate, the 0° or 180° superstructure position has been reached.

– If one arrow illuminates, it indicates the slewing direction that is required to reach the 0° or 180° superstructure position.

Braking the slewing movement



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



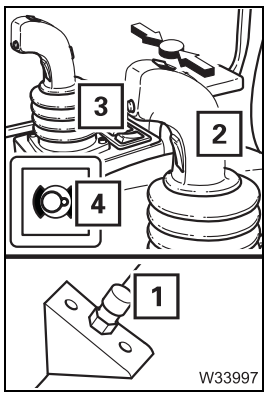
• Move the control lever (**2**) towards its initial position – the slewing movement will be braked.

At the initial position, the slewing movement will be stopped. At the same time the slewing gear brake will be applied, and lamp (**1**) will light up.

14.03.2018

Slewing gear freewheel

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

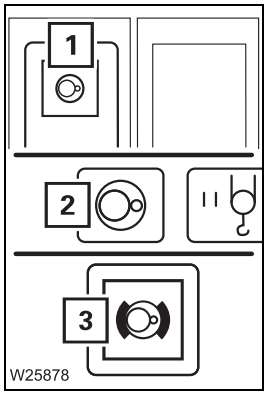


- Switch on the slewing gear.
- Shift the control lever (**2**) to its initial position.
- To do this, press button (**3**) or button (**1**) in the case of additional equipment.
  The slewing gear brake will be released – lamp (**4**) will not light up.

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 lateral forces from affecting the main boom due to long delays or swinging loads.



- Press the button (**1**) once.
  - The lamp in the button (**1**) lights up dimly.
  - Symbol (**2**) will be **red** if the slewing gear is switched off.
  - The slewing gear brake is applied – lamp (**3**) lights up.

14.03.2018

11.3.10 Possible movement combinations

– The main hoist, telescoping mechanism, derricking gear and slewing gear can be operated in almost any combination simultaneously. Restrictions are specified for the respective power units.
The telescoping mechanism and derricking gear can only be operated simultaneously when the control lever assignment is from *Version 1*;
➠ p. 9 - 18.

– The auxiliary power units – tilt crane cab, counterweight lifting unit – cannot be operated with the *Extending* movement.
Moving the auxiliary power units in combination with other power units can result in reductions of speed.

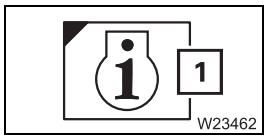
– Lattice extension derricking gear
The lattice extension derricking gear cannot be operated in combination with the *Extending* movement.

Certain movement combinations can reduce the speed in high-speed mode.

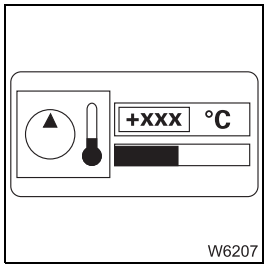
11.3.11 Hydraulic oil cooling

Depending on the truck crane version, there are one or two hydraulic oil coolers that regulate the hydraulic oil temperature automatically.

- In addition to this, you should ensure that the maximum permissible hydraulic oil temperature of 80 °C (176 °F) is not exceeded.



- In the main menu press button (**1**) once.
This opens the *Monitoring* submenu.



The current hydraulic oil temperature is displayed in the *Monitoring* submenu. If the maximum permissible temperature has been reached, the bar below the display will turn **red**. A warning message is issued additionally;
➠ *Warning submenu*, p. 11 - 110.

If the hydraulic oil temperature reaches 80 °C (176 °F):

- Stop operating the crane.
- Let the hydraulic oil cool down while the engine is running.

14.03.2018

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14.03.2018

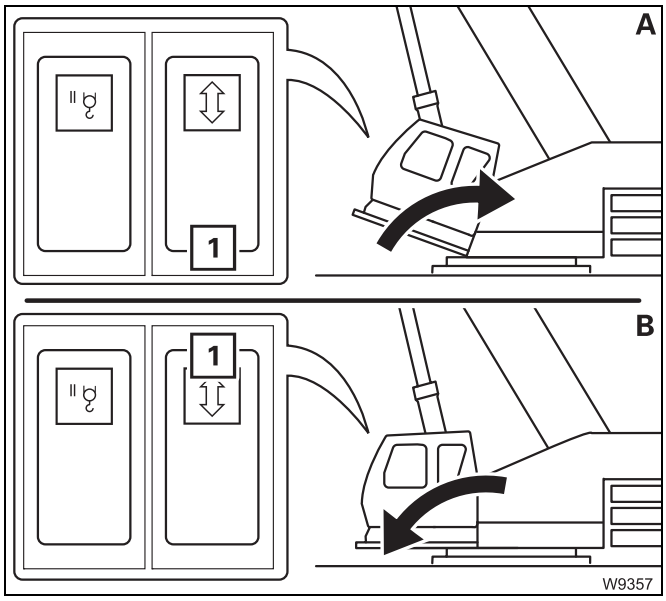
11.4 Settings and displays for crane operation

This section only describes settings and displays needed during crane operation. Operating elements that can be assigned to other procedures are described with the corresponding procedures.

11.4.1 Inclining the crane cab

With the appropriate equipment, you can incline the crane cab to the rear in order to attain a better sitting position when working at great heights.

Risk of accidents due to objects overturning in the crane cab!
Close the crane cab door before inclining and remove all loose objects (e.g. bottles) from the crane cab.
This prevents objects from tipping over, the crane cab door opening by itself, and unintended operational accidents caused by fright.



(A) – Incline to the rear

- Close the crane cab door.
- Press button (**1**) down.

(B) – Incline to the front

- Close the crane cab door.
- Press button (**1**) up.

The crane cab will tilt as long as you hold the button down or until its end position is reached.

11.4.2 Setting idling speed

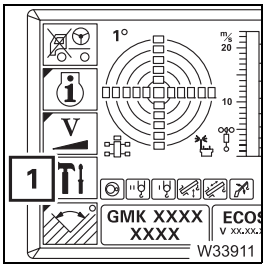
➠ *Setting idling speed*, p. 10 - 16.

14.03.2018

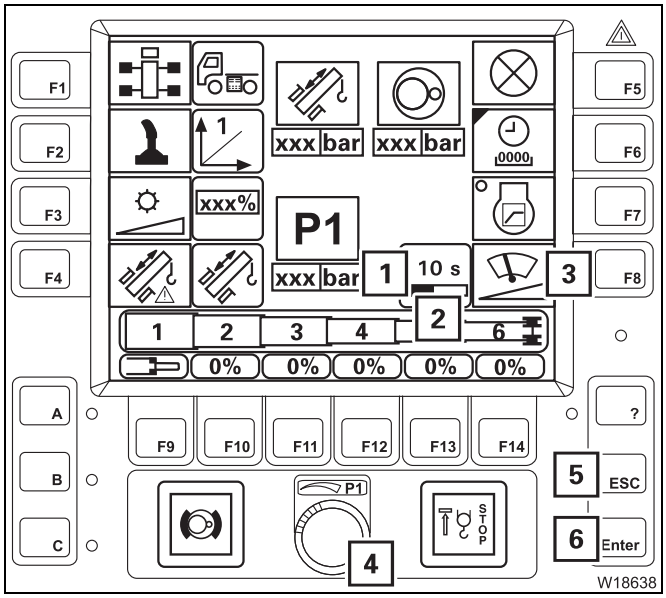
11.4.3 Adjusting the wiper stroke interval of the windscreen wiper

You can set a value between 3 and 30 seconds for the front and roof window wiper stroke interval.

The higher the selected value is, the longer the pauses between the strokes of the wiper are.



- In the main menu press button (**1**) once.
  This opens the *Settings* submenu.



The display (**1**) will show the current value.

- Press the button (**3**) once.
  Bar (**2**) is **red** – input on.

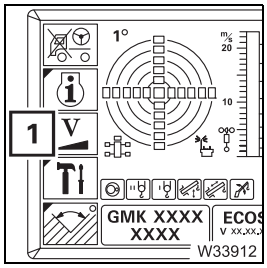
To cancel the input – press button (**5**) once.

- Change the value using switch (**4**).
- Confirm the changed value – press button (**6**) once.

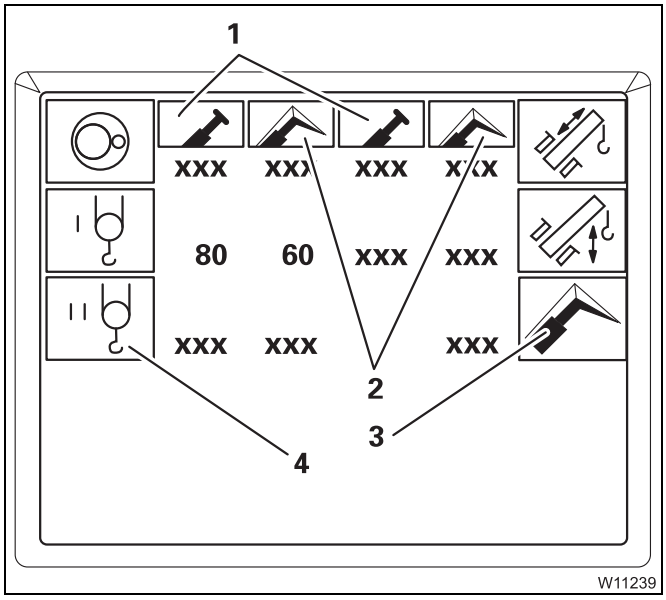
14.03.2018

11.4.4 Limiting the power unit speeds

You can enter what percentage of the maximum speed should be enabled for each power unit.



- In the main menu press button (**1**) once.
  The *Power unit speeds* submenu opens.



Symbols (**1**) or (**2**) for the current operation are **green**.

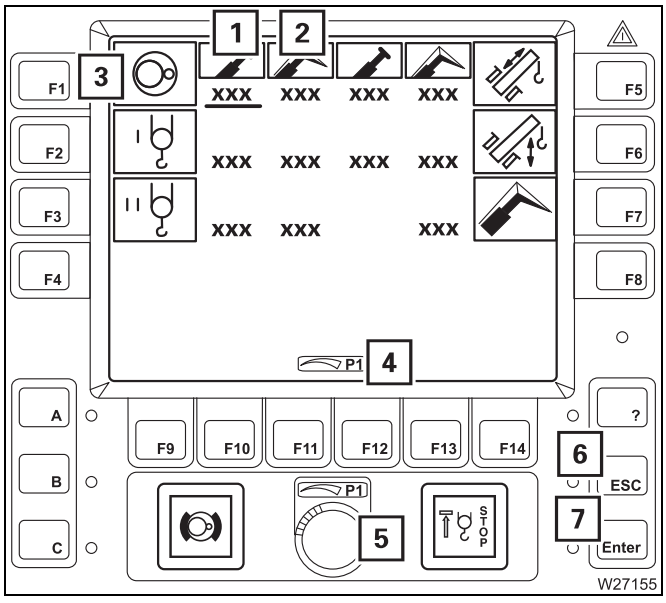
1 Main boom operation

2 Working with the lattice extension – button (**3**) active

The values below the green symbols will be used, e.g. 80% for the main hoist in main boom operation.

The values for the slewing gear and derricking gear only apply if they are lower than the automatically limited values. The automatically limited values are not displayed.

Button (**4**) will only be active if the auxiliary hoist is connected.



Changing values

- Repeatedly press, for example, button (**3**) for the slewing gear until the bar under the desired value is at (**1**) or (**2**) – input on, symbol (**4**) is displayed.

To cancel the input – press button (**6**) once.

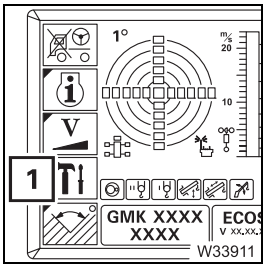
- Change the value using switch (**5**).
- If necessary, change the values for other power units in the same way.
- Confirm the changed values – press button (**7**) once. All changed values are adopted – input off, symbol (**4**) not displayed.

14.03.2018

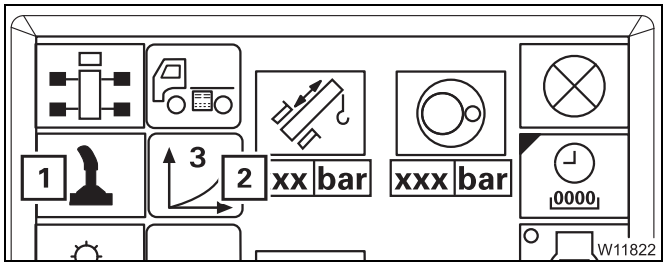
11.4.5 Setting the characteristic curves for the control levers

The control lever characteristic curve determines how high the power unit speed should be for a particular control lever movement.

The set control lever characteristic curve always applies to both control levers and to all power units moved with the control levers.



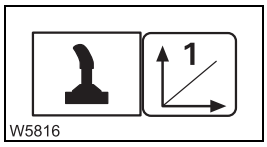
- In the main menu press button (**1**) once.
  This opens the *Settings* submenu.



The set characteristic curve will be shown on the display (**2**).

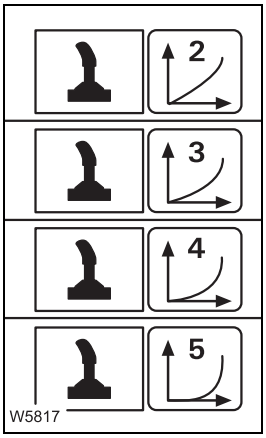
- Repeatedly press button (**1**) until the desired characteristic curve is displayed, e.g. characteristic curve (**3**).

There are five characteristic curves:



Linear characteristic curve (1)

The deflection of the control levers evenly increases the speed. Even small movements of the control lever will produce a high speed.



Progressive characteristic curves (2) to (5)

The speed is kept lower in the front range of the movement than with characteristic curve (**1**) and increases only with larger movements.

The higher the number of the characteristic curve, the further the control lever must be moved to get a clear increase in speed.

With characteristic curve (**5**), you can work particularly sensitively with the control lever.

14.03.2018

11.4.6 Critical load control

Function

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

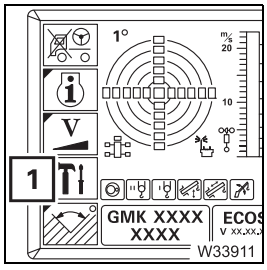
ECOS registers the currently available motor output and the hydraulic performance currently required by the power units.

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

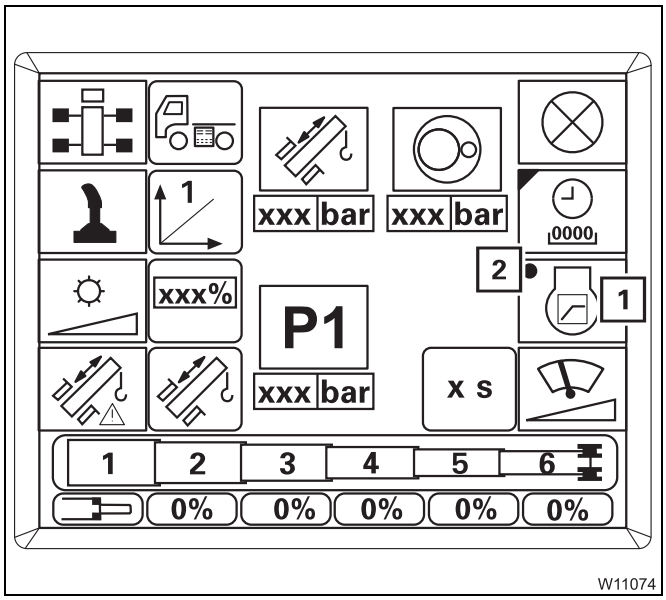
The slewing gear is not influenced by the critical load control.

Switching on and off

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



- In the main menu press button (**1**) once.
  This opens the *Settings* submenu.



To switch off the critical load control

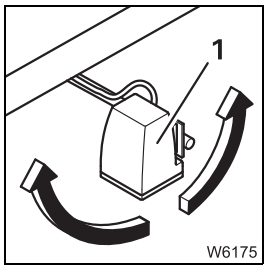
- Press the button (**1**) repeatedly until dot (**2**) **is black**.

To switch on the critical load control

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

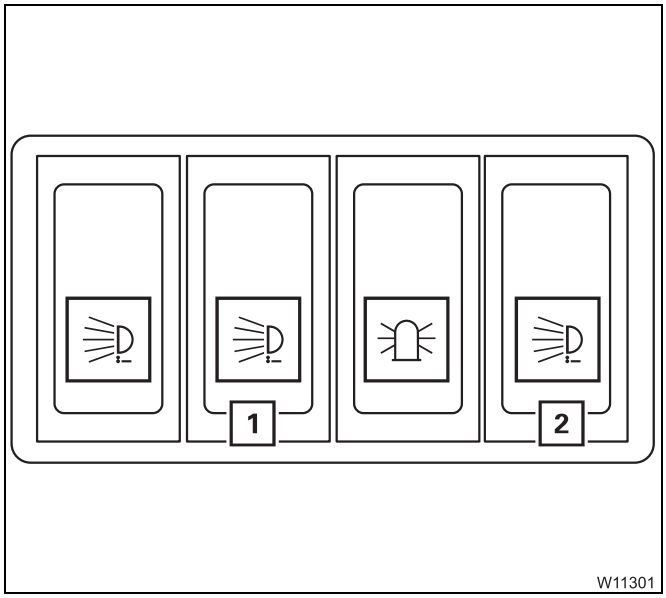
14.03.2018

11.4.7 Using the pivoting spotlights



With the relevant equipment, the pivoting spotlights (**1**) are located on the main boom. They are controlled from the crane cab.

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 from being dazzled and causing accidents.



Switching on
- Press switch (**1**) down.

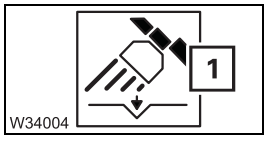
Switching off
- Press switch (**1**) up.

To direct the spotlights forwards
- Press button (**2**) up.

To direct the spotlights backwards
- Press button (**2**) down.

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

Risk of damage to the spotlights!
Check the position of the pivoting spotlights before setting the main boom down on the boom rest. This prevents the spotlights from colliding with the boom rest.

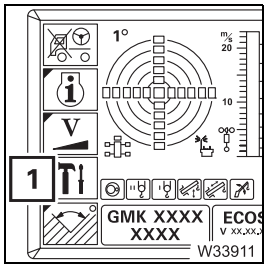


If the symbol (**1**) is displayed then:

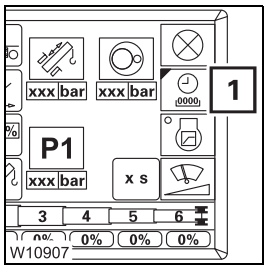
- Pivot the spotlights to prevent them from colliding with the boom rest.

14.03.2018

11.4.8 Displaying the operating hours

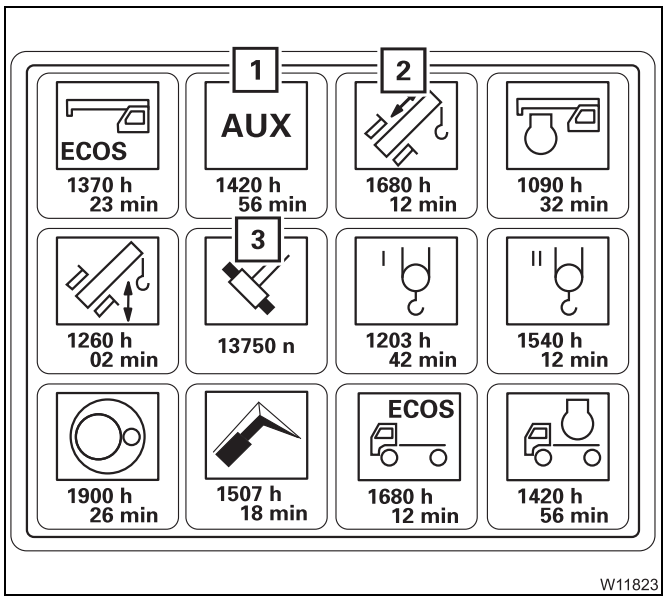


- In the main menu press button (**1**) once.
  This opens the *Settings* submenu.



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

  The *Operating hours* submenu opens.



The operating hours are displayed below the symbols, e.g. 1,680 hours and 12 minutes for the telescoping mechanism (**2**).

Exception: The value below the symbol (**3**) indicates how often the cycle*Unlock telescopic section* has been performed, e.g. 13,750 times.

Auxiliary power units (**1**) include:

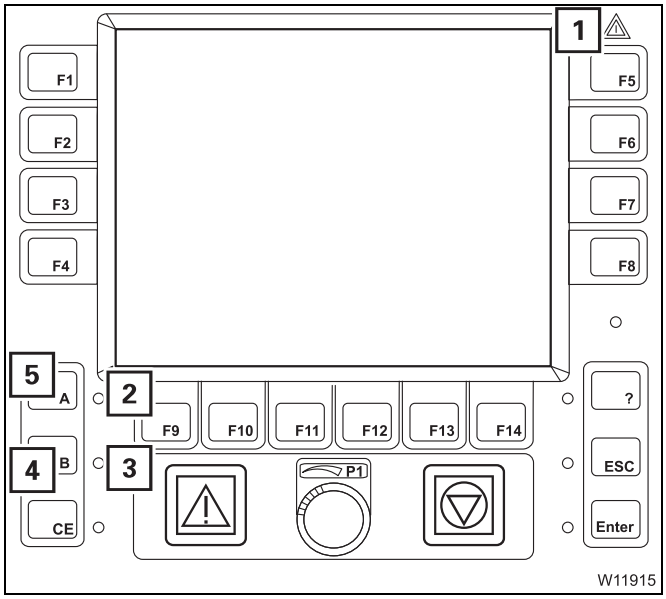
– Counterweight hoist unit,

– Crane cab inclination.

14.03.2018

11.4.9 Warning submenu

ECOS differentiates between warning messages and error messages (error messages; ➠ p. 11 - 114). A warning message indicates that certain values do not correspond to a target value.



In the event of a warning message, the following lamps will flash:

– the lamps (**1**) and

– the lamp (**2**) for *superstructure* warning or

– the lamp (**3**) for *carrier* warning.

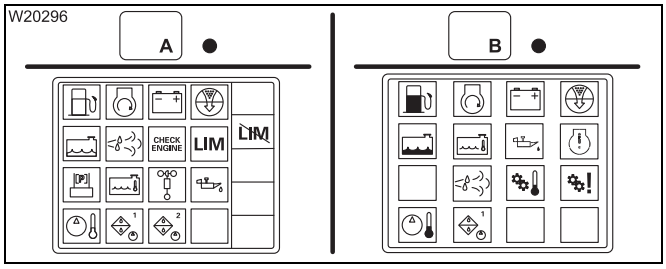
For more information

- Press button (**4**) or (**5**) next to the flashing lamp once – the corresponding *Warning* submenu will be opened.

The warning message is acknowledged – lamp (**2**) or (**3**) lights up (will no longer flash).

Meaning of the symbols

The colour of the symbols indicates whether a warning message is active in the corresponding area.



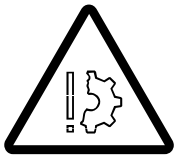
– Symbol is **grey** – no warning message.

– Symbol **red** or **yellow** – warning message.

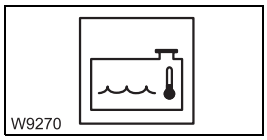
If a symbol is displayed in **red** or **yellow**, perform the following checks.

This section deals with the symbols in the *Superstructure* and *Carrier* warning submenus. Symbols which are present in both submenus are only explained once. Follow the cross-references for continued procedures in part 1 or part 2, depending on the submenu opened.

14.03.2018

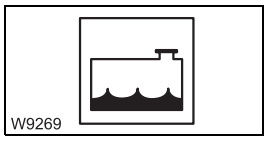


Risk of damage if warning messages are disregarded!
Observe the following information in good time and take the appropriate remedial measures if a warning message appears. This prevents these malfunctions causing defects in the truck crane.



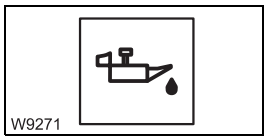
Coolant too hot

The coolant in the engine is hotter than approx. 95 °C (205 °F).
Display of the current temperature; ➠ p. 10 - 15, ➠ p. 4 - 20.
Possible cause and remedy; ➠ p. 14 - 24, p. 7 - 38.



Coolant level too low

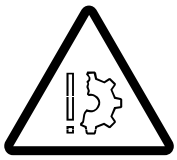
- Immediately top up the coolant so that the engine does not overheat; ➠ *Maintenance Manual*.



Oil pressure too low

A warning buzzer sounds at the same time.

- Set down the load as soon as possible and turn off the engine.
- Check the oil level; ➠ *Maintenance Manual*.
- Add oil if necessary. If the error message persists, refer to **Manitowoc Crane Care**.

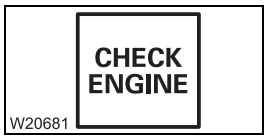


Risk of damage to the engine if the oil pressure drops!
Switch off the engine as soon as possible and look for the cause if the lamp lights up or the warning buzzer sounds!
Never restart the engine before you have found the cause and eliminated the problem! ➠ p. 14 - 13, ➠ p. 7 - 27

14.03.2018

Engine electronic system

Malfunction in the engine electronics:
Carrier – switch off engine immediately; ➠ , p. 5 - 54.



Engine electronic system

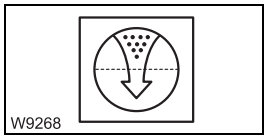
Fault in the exhaust system:
Superstructure – Switch off the engine immediately; ➠ p. 14 - 14.

Filling up

The fuel tank is only filled up to a level of approx. 5%.

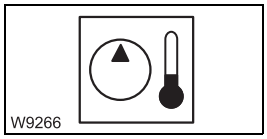
- Refuel before the fuel is used up; ➠ p. 10 - 4, ➠ p. 4 - 7.

If the fuel tank is almost empty, air will be sucked in and you will have to bleed the fuel system; ➠ *Maintenance Manual*.



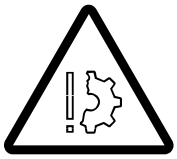
Replace air filter

- Replace the air filter as soon as possible; ➠ *Maintenance Manual*.

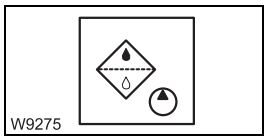


Hydraulic oil too hot

The hydraulic oil is hotter than 80 °C (176 °F).
Current temperature display; ➠ p. 10 - 15.
Possible cause and solution; ➠ p. 14 - 24.



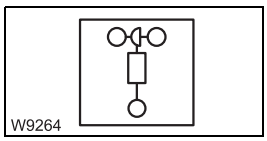
Danger of overheating!
There is a fault if the hydraulic oil temperature exceeds 80 °C (176 °F).
Set down the load as soon as possible and try to find the cause.
Set down the load as soon as possible and turn off the engine if the temperature of the hydraulic oil exceeds 100 °C (212 °F)!



Replace hydraulic oil filter

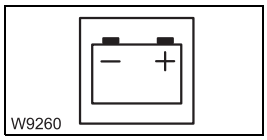
- Replace the corresponding hydraulic oil filter as quickly as possible; ➠ *Maintenance Manual*.

14.03.2018



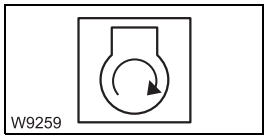
Anemometer not connected

- Connect the anemometer to the electrical power supply; p. 12 - 112.



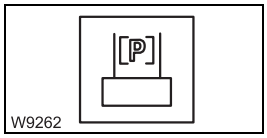
Voltage monitoring

The voltage in the superstructure electrical system is too high or too low. Display of the current voltage; p. 10 - 15, p. 4 - 20.



Air intake inhibitor triggered

The air intake inhibitor was triggered because the maximum permissible engine speed was exceeded. It is possible to start the engine only after the air intake inhibitor has been released manually; p. 10 - 23, p. 4 - 25.



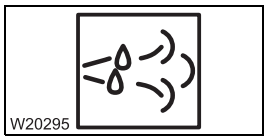
Pre-tension counterweight

The pre-tensioning pressure on the counterweight has dropped too much.

- Pre-charge the counterweight; p. 12 - 77.

Pivoting the spotlights

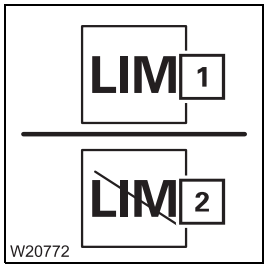
The spotlights can collided with the carrier during derricking; p. 11 - 108.



Refilling carbamide

The carbamide tank is only filled up to a level of approx. 5%.

- Refuel before the carbamide is used up; p. 10 - 6.



Torque reduction

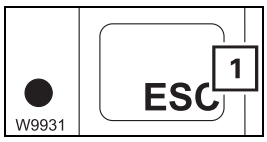
The carbamide tank is almost empty. The engine torque has been reduced by the engine control system – symbol (**1**).

Override torque reduction

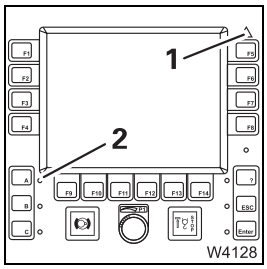
- You can override this torque reduction – Symbol (**2**); p. 10 - 17.

Exiting the submenu

You can exit the submenu at any time.



- Press the button (**1**) once.
  The same menu opens which was open before the *Warning* submenu opened.



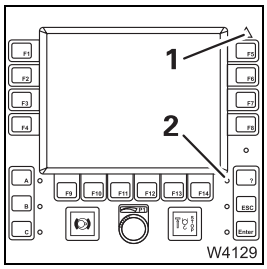
If the same warning messages are still present, the lamps (**1**) and (**2**) light up.

If no warning message is present, both lamps will go out.

Both lamps start flashing again as soon as a new warning message occurs.

11.4.10 Error submenu

ECOS differentiates between error messages and warning messages (warning messages ➠ p. 11 - 110).



In the event of an error message, the lamps (**1**) and (**2**) flash.

More information on error messages; ➠ *Error messages*, p. 14 - 36.

14.03.2018

11.5 Working range limiter

You can set and monitor four different limits in the working range limiter submenus:

– a maximum overall height,

– a maximum working radius,

– a maximum slewing angle,

– objects in the working range.

The monitoring of the programmed limits can be switched on and off separately.

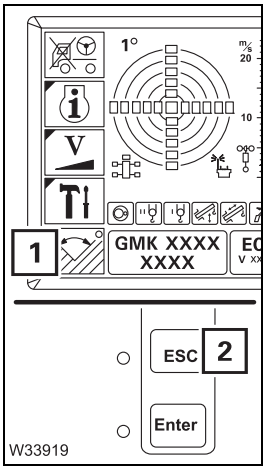
Risk of accidents due to situations which cannot be monitored!
The working range limiter only serves as an additional safety device. Brake the crane movement before contact with the obstacle becomes imminent. Do not deliberately move into the shutdown range. You, the crane operator, are still responsible 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, e.g. 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 (e.g. concerning overhead power lines) even if the working range limiter is switched on.

14.03.2018

11.5.1 Opening the working range limiter submenu



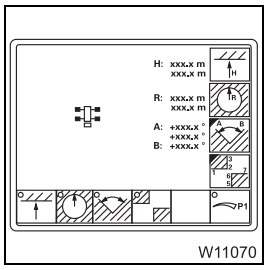
- Open the main menu, if necessary – button (**2**).

The dot in symbol (**1**) indicates whether limit values are being monitored:

– **Dot is black:** Monitoring switched off

– **Dot is green:** Monitoring switched on

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

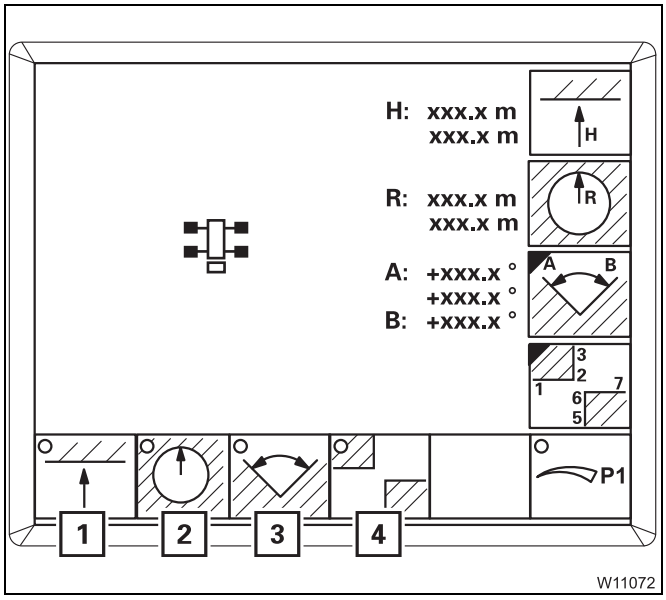


The *Working range limiter* submenu opens.

Units of measurement are displayed – metres (m) or feet (ft).

11.5.2 Viewing current settings

The *Working range limiter* submenu shows switched on monitoring functions, the limits entered and current values.



Monitoring on/off

The dots in the symbols (**1**) to (**4**) indicate the current status.

1 Overall height monitoring

2 Working radius monitoring

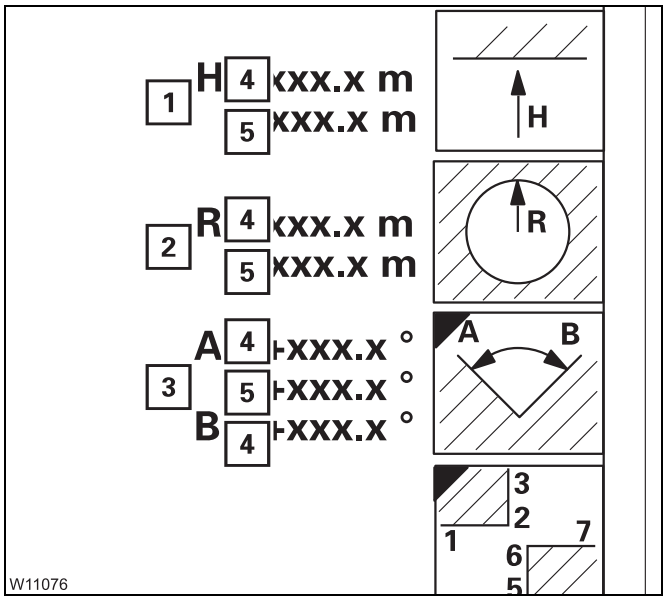
3 Slewing angle monitoring

4 Object monitoring

– **Dot is black:**
Monitoring switched off

– **Dot is green:**
Monitoring switched on, the monitored area is displayed; p. 11 - 126.

14.03.2018



Limit values/current values

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

1 Overall height

2 Working radius

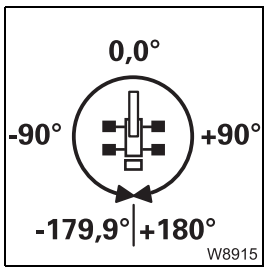
3 Slewing angle

Every display shows the following values:

4 Limit value – red

5 Current value – blue

In case of manual and switched on input, display (**5**) changes; ➠ p. 11 - 124.



The following applies to the slewing angle display:

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

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

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

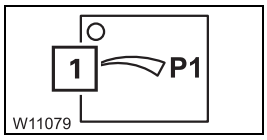
Viewing the limit values for object monitoring; ➠ *Objects*, p. 11 - 125.

14.03.2018

11.5.3 Entering limit values

This section describes how to enter unknown limit values by moving to the shutdown points.

You can enter known limit values directly; ➠ *Entering limit values/objects manually*, p. 11 - 124.

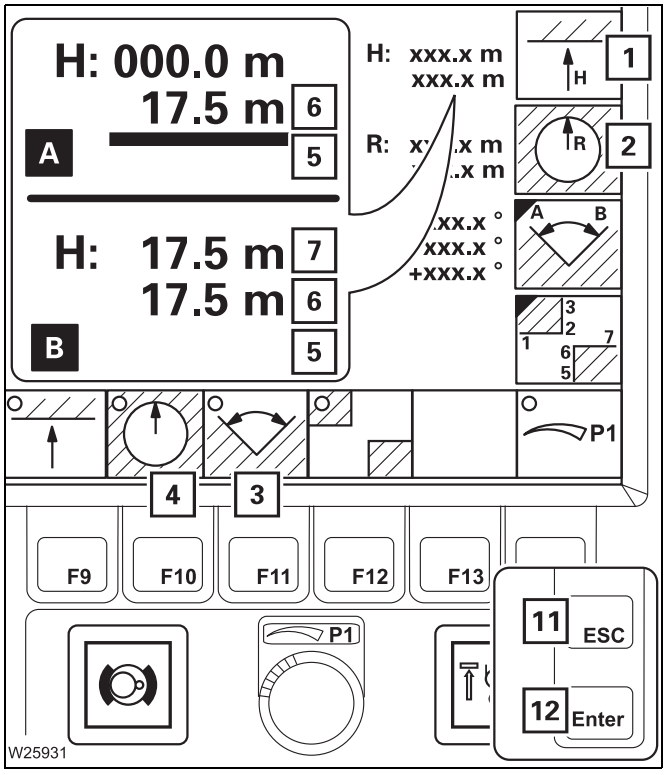


Prerequisite
Manual input must be switched off.
- Press button (**1**) repeatedly until the dot turns **black**.

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, e.g. due to the load swinging or the boom bending. For this reason, always enter the limit values with sufficient safety margin from the object.

Overall height/ working radius

The limit values for the overall height and the working radius are entered in the same way.

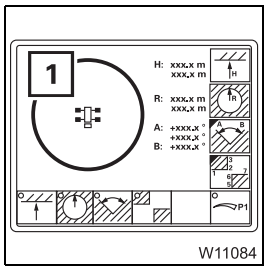


The relevant monitoring function (**3**) or (**4**) must be switched off – dot is **black**;
➠ p. 11 - 126.

- Press the button once:
  - **1** For the overall height
  - **2** For the working radius.

  Bar (**5**) is red – input on. To cancel input – press button (**11**) once.
- (**A**) – Move the main boom head to just before the shutdown point without a load, e. g. at 17.5 m – value (**6**).
- (**B**) – Press the button (**12**) once.
  - – The current value (**6**) will be accepted as the limit value (**7**).
  - – The bar (**5**) goes out.
- Switch on monitoring; ➠ p. 11 - 126.

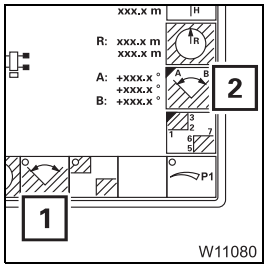
14.03.2018



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

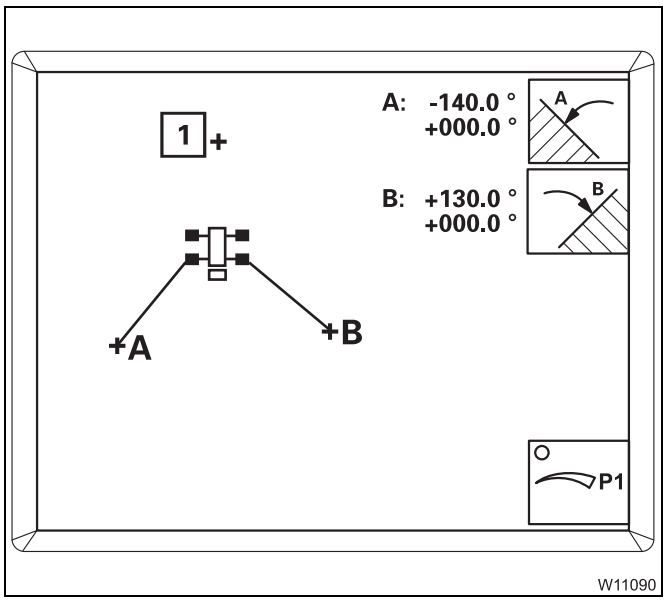
Slewing angle

Slewing angles are entered in a submenu.



Before entering values, monitoring (**1**) must be switched off – dot **black**; ➠ p. 11 - 126.

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

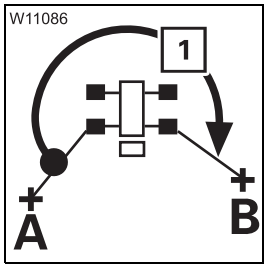


Display of the slewing angles

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

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

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



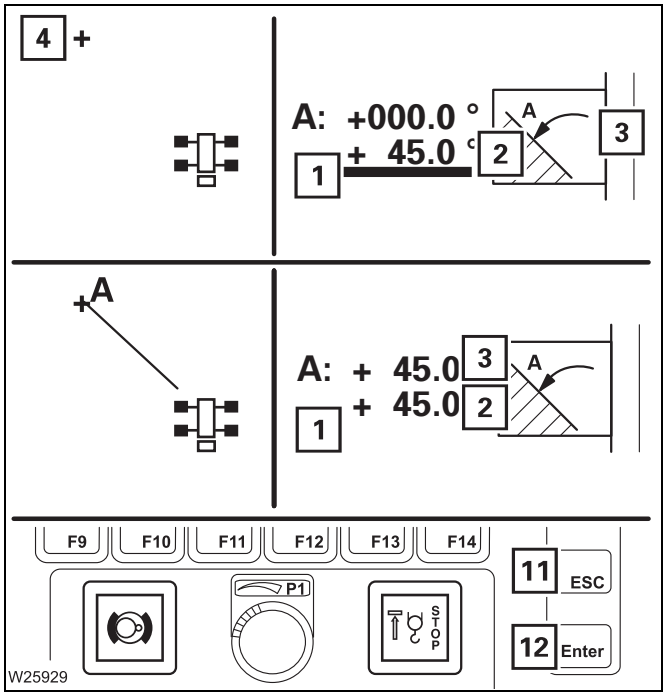
The permissible slewing range is represented by the angle going clockwise from **A** to **B**.
Approx. 270° in this illustration – arrow (**1**).

14.03.2018

Entering the permissible slewing range

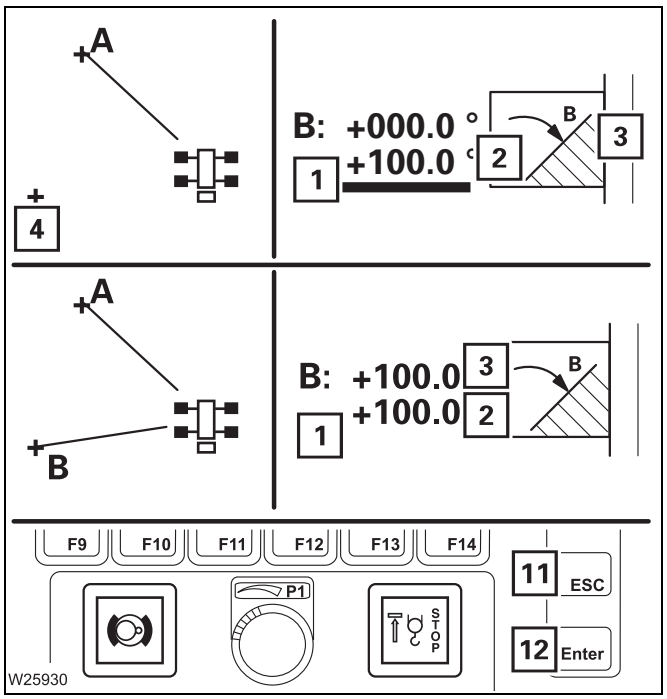
You must enter the slewing angles **A** and **B** separately.

Risk of accident due to incorrectly set slewing angles!
Always slew the main boom to the shutdown point from the right with slewing angle **A** and from the left with slewing angle **B**.
This prevents slewing into the impermissible range from being enabled.



Slewing angle **A**:

- Press the button (**3**) once.
  Bar (**1**) is red – input on. To cancel input – press button (**11**) once.
- Slew the main boom (**4**) to the shutdown point from the right, e. g. value (**2**) 45°.
- Press the button (**12**) once.
  - The slewing angle **A** will be displayed.
  - The value (**2**) will be accepted as the limit (**3**).
  - The bar (**1**) goes out.



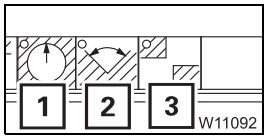
Slewing angle **B**:

- Press the button (**3**) once.
  Bar (**1**) is red – input on. To cancel input – press button (**11**) once.
- Slew the main boom (**4**) to the shutdown point from the left, e. g. value (**2**) 100°.
- Press the button (**12**) once.
  - The slewing angle **B** will be displayed.
  - The value (**2**) will be accepted as the limit (**3**).
  - The bar (**1**) goes out.

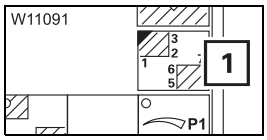
14.03.2018

Entering objects

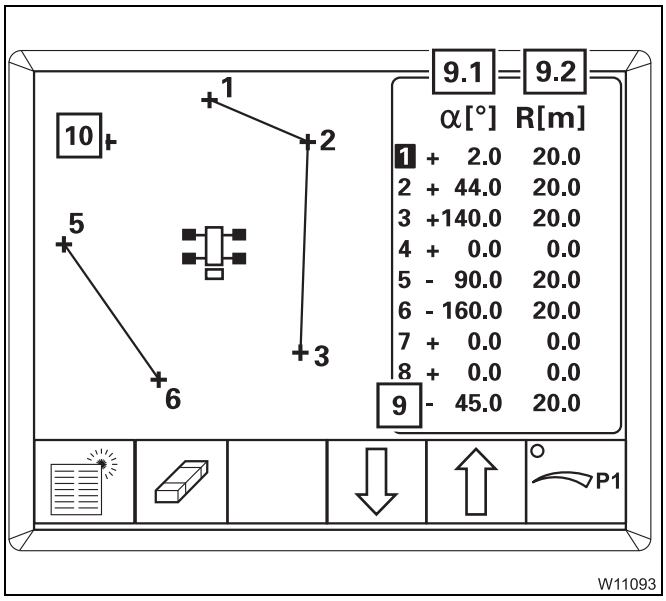
Objects are entered in a submenu.



Before entering values, the monitoring functions (**1**) to (**3**) must be switched off – dots **black**; ➠ p. 11 - 126.



- Press the button (**1**) once.
  The *Enter objects* submenu opens.



Representation of points and objects

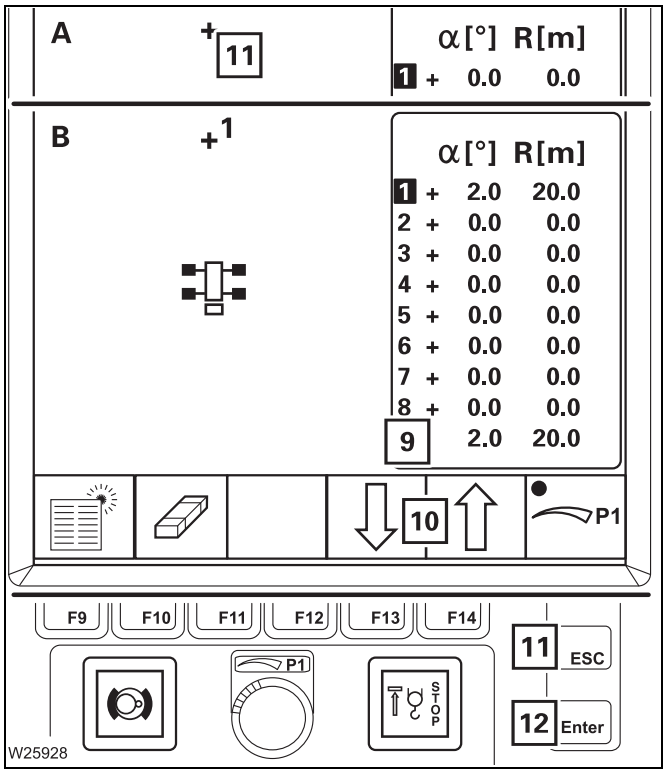
Each point shown is numbered and defined by the point data *slewing angle* (**9.1**) and *working radius* (**9.2**) – **red**.

An object is made up of points that are connected by lines, e.g. the points **1** to **3** and the points **5** and **6**.

The cross (**10**) and the point data (**9**) show the current position of the main boom – **blue**.

Only those points are displayed that are located within the entered, maximum working radius. You may need to enlarge the maximum working radius in order to display the point; ➠ p. 11 - 124.

14.03.2018

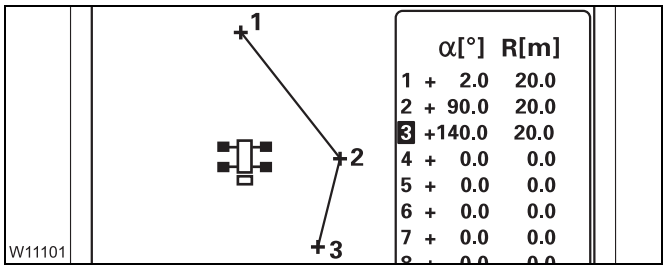


Entering objects

- (**A**) – With the buttons (**10**), select the first point, e.g. point (**1**) – blue.
- Move the main boom head (**11**) to just before the first point of the object.

- (**B**) – Press the button (**11**) once.
  - The point (**1**) will be displayed.
  - The current point data (**9**) will be accepted for point (**1**), e.g. 2° and 20 m.

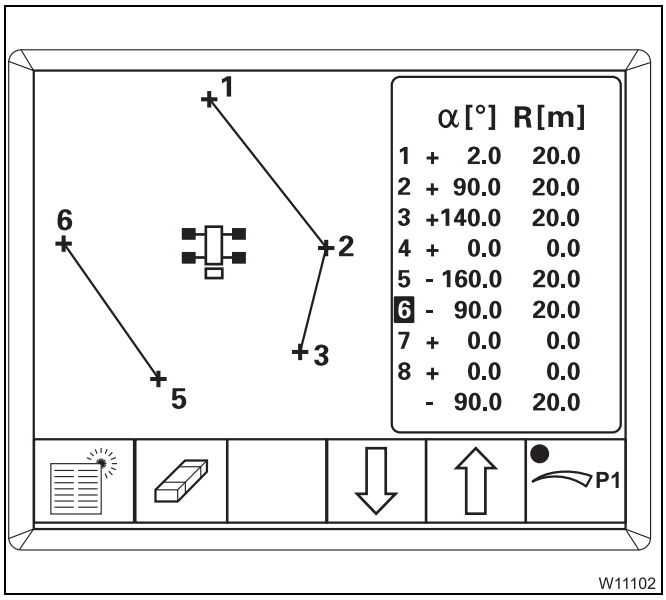
The first point has now been entered.



- Enter the next point (**2**) in the same manner, e.g. +90° and 20 m.

The point is connected with point (**1**) – an object has been entered.

To enlarge the object, you can enter subsequent points 3 to 8, e.g. point (**3**).



You can also add objects:

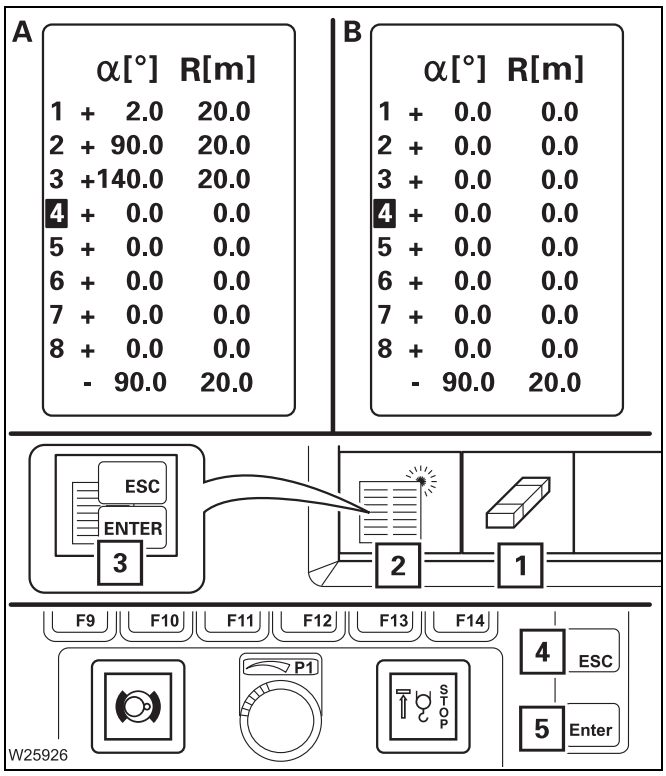
- Delete the subsequent point, e.g. point (**4**) – point data 0.0; ➠ p. 11 - 123.
- Enter the next point, e.g. point (**5**) at –160° and 20 m.

This point (**5**) will be the first point for the new object. The following point will be added to this object, e.g. point (**6**).

14.03.2018

Deleting points

You can delete selected, individual points or delete all points at once.



(A) – Selected points

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

The selected point will be deleted, e.g. point (**4**) – point data 0.0.

(B) – All points

- Press button (**2**) once – symbol (**3**) will appear.

You can cancel the process by pressing button (**4**).

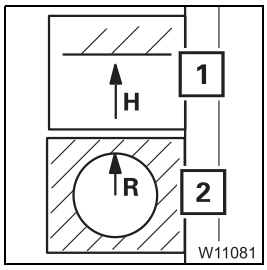
- Press button (**5**) once – all points will be deleted.

14.03.2018

11.5.4 Entering limit values/objects manually

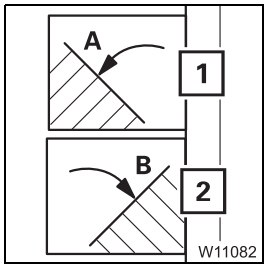
Limit values

The limit values for the overall height, the working radius, and the slewing angle are entered in the same way.



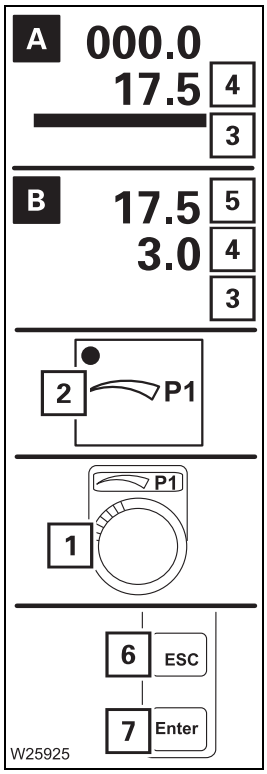
– For overall height/working radius

- Press the button once:
  - **1** For the overall height
  - **2** For the working radius.



– For slewing angles

- Open the *Enter slewing angle* submenu.
- Press the button once:
  - **1** For slewing angle A
  - **2** For slewing angle B.



Entering a limit value

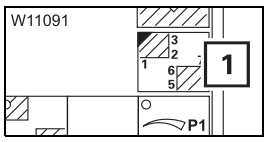
The bar (**3**) is red – input on.
To cancel the input – press button (**6**) once.

- Press button (**2**) once – the dot will turn **green**, manual input on.
- (**A**) – Enter the new limit value, e.g. 17.5, with the switch (**1**) on display (**4**).
- (**B**) – Press the button (**7**) once.
  - Display (**5**) = new limit value,
  - Display (**4**) = current value, e.g. 3.0,
  - Bar (**3**) goes out,
  - Dot (**2**) is **black**, manual input off.

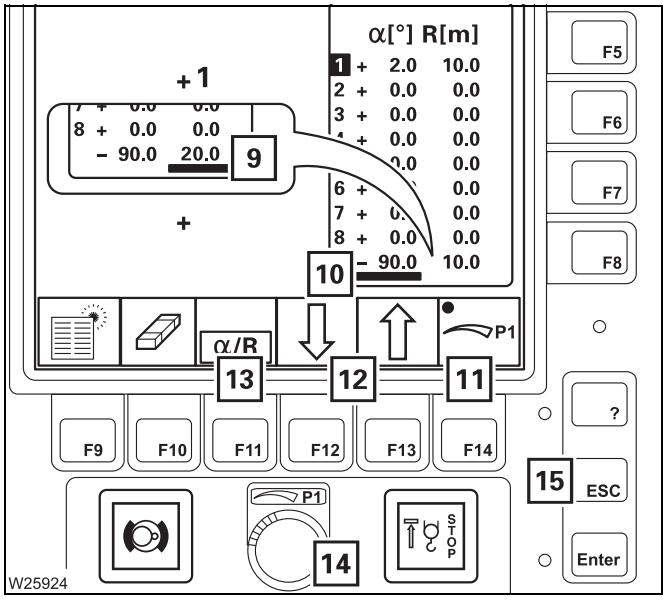
14.03.2018

Objects

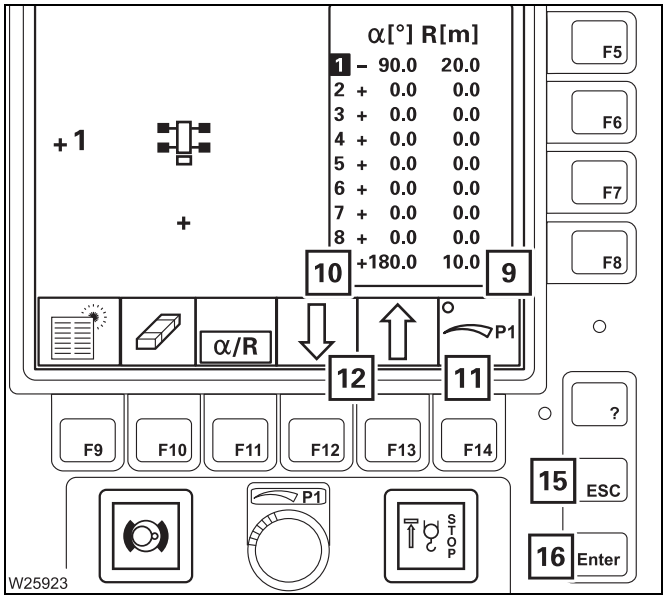
Objects are entered in a submenu.



- Press the button (**1**) once.
  The *Enter objects* submenu opens.



- With the buttons (**12**), select the desired point, e.g. point (**1**) – blue.
- Press button (**11**) once – the dot will turn **green**, manual input on.
- With button (**13**) select one of the following:
  – the slewing angle – bar (**10**) is red, or
  – the working radius – bar (**9**) is red,
  Input on. To cancel input – press button (**15**) once.
- Enter the new values, e.g. -90.0° and 20.0 m with switch (**14**).



- Press the button (**16**) once.
  The new values for point (**1**) will be accepted.

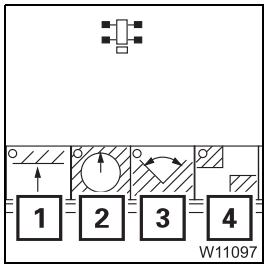
You can enter additional points in the same way – button (**12**).

- Press button (**15**) once to end the input process.
  – Bar (**9**) or (**10**) goes out – display = current main boom position,
  – Dot (**11**) is **black** – manual input off.

14.03.2018

11.5.5 Switching monitoring functions on/off

After turning on the ignition, all monitoring functions that were on before the ignition was switched off are switched on.



- Press the buttons for the required monitoring functions once.

1 Overall height **2** Working radius

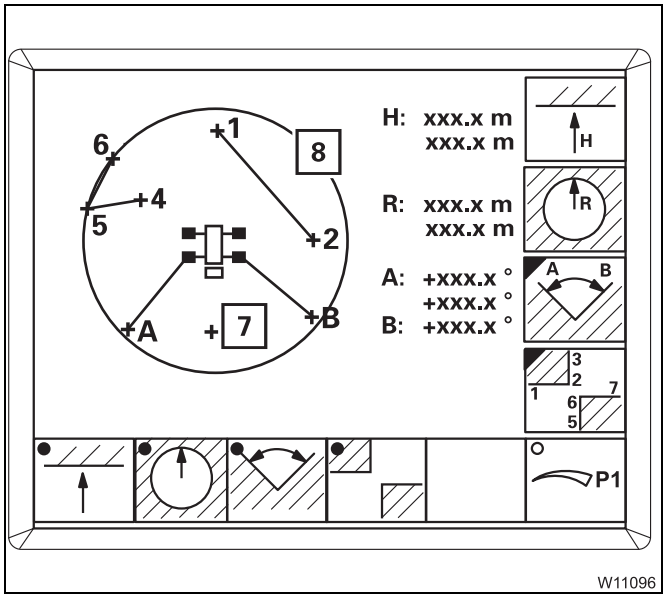
3 Slewing angle **4** Objects

Dot is green: Monitoring switched on

Dot is black: Monitoring switched off

Danger of accident due to incorrectly set limit values!
After switching on the monitoring function, slowly approach all limits and check that the system switches off in time.
If necessary, enter new values with larger safety distances.

With monitoring switched on, the speed of all power units is limited to 50%. Limits below 50% continue to be active. We recommended limiting the slewing gear speed to between 30% and 50%.



The monitored area will be displayed:

- **Working radius**
  Circle (**8**) – red.
- **Permissible slewing angle**
  Circle sector, clockwise from **A** to **B**.
- **Objects**
  Points and lines, e.g. **1** to **2** and **4** to **6**.
- **Overall height**
  No display.

The current main boom position (**7**) is always displayed.

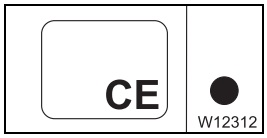
It is impossible to move behind a defined object whenever a monitoring function is switched on.

14.03.2018

11.5.6 Shutdown by working range limiter

If a limit value is reached, RCL shutdown will occur. All movements that would go closer to the limit value will be disabled. Shutdown will remain active even if you switch off the monitoring function.

Shutdown point reached for	Disabled movements
Overall height	– Raise – Extending – Lowering the hoist – Derricking the lattice extension
Working radius	– Lower – Extending – Lifting the hoist – Derricking the lattice extension
Slewing angle **A**	– Slew to the left
Slewing angle **B**	– Slew to the right
Objects	Depending on the position of the object: – Slewing to the left or right – Lower – Extending – Lifting the hoist – Derricking the lattice extension



The RCL also shows an error message. To enable the movements, you must leave the shutdown range and acknowledge the error message; ➠ *Table of error codes*, p. 14 - 31.

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

If you override the RCL, the shutdown will be overridden and all movements enabled.

14.03.2018

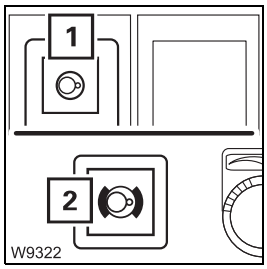
Blank page

14.03.2018

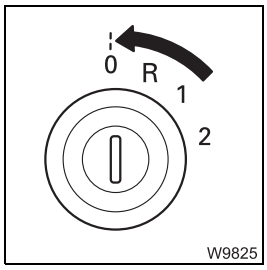
11.6 Work break

11.6.1 In case of short work breaks

Risk of accidents due to 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 (**1**) button must be dimly lit.
  - Lamp (**2**) must light up – slewing gear brake applied.



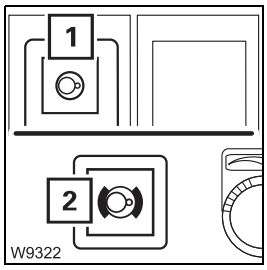
Switch the engine off, turn the ignition key to position **0** and remove it.

Ensure that no unauthorised persons can operate the truck crane;
➠ *To secure the truck crane*, p. 11 - 130.

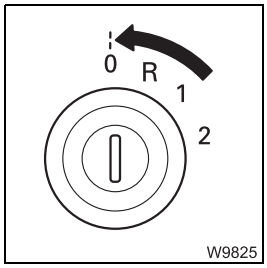
14.03.2018

11.6.2 In case of work breaks of more than 8 hours

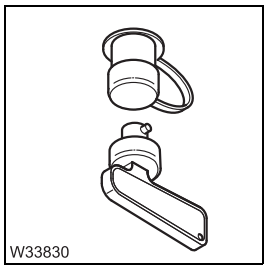
- Retract all telescopic sections.
- Set down the main boom on the boom rest.



- Switch off the slewing gear.
  - The lamp in the (**1**) button must be dimly lit.
  - Lamp (**2**) must light up – slewing gear brake 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 the hand-held control in the crane cab,

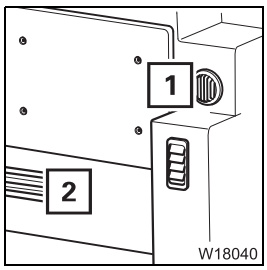
– removing the ignition key and

– locking the crane cab.

Danger due to unauthorised use!
Always lock the hand-held controller before you leave the truck crane. In this way you can prevent unauthorised persons from starting the engine with the hand-held control.

14.03.2018

11.7 Heating and air-conditioning system



- Do not cover grilles (**1**) and (**2**).
  - Air is drawn in through grilles (**1**) and (**2**).

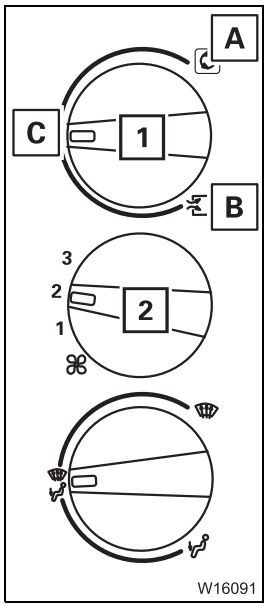
11.7.1 Standard heating system

Switching on

- Start the engine. The heating output is only provided when the engine is running.

Heating

You must set the fan, fresh air/recirculated air and the temperature.



Setting the fan

- Turn switch (**2**) to the required level **1** to **3**, depending on the desired air quantity.

Setting fresh air/recirculated air/mixed air

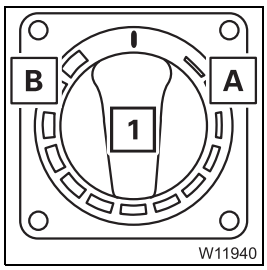
You can set the air to be sucked in by the fan.

- Turn switch (**1**) to the position for:

A Recirculated air – air is sucked out of the crane cab.
Change to fresh air often to ensure that oxygen is supplied.

B Fresh air – outer air is sucked in.

C Mixed air – outside air and air from the crane cab will be sucked in.
The percentage of the corresponding air type can be smoothly increased by turning the knob in direction (**B**) or (**A**).

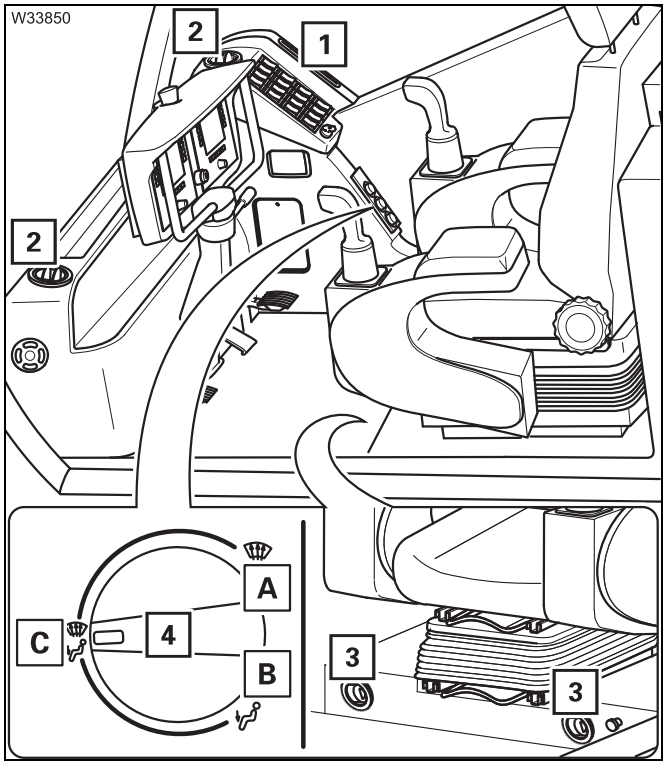


Setting the temperature

- Turn switch (**1**) in the required direction
  - **A** Colder
  - **B** Warmer

14.03.2018

Air distribution You can direct the air to flow out of various air vents.



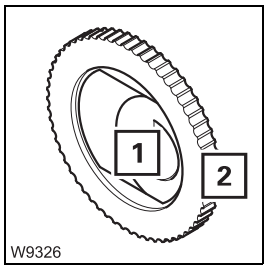
- Turn the switch (**4**) to the position for the required air vents.

  A Air vents (**1**), (**2**), windscreen, centre

  B Air vents (**3**), cab floor

  C Air vents (**1**), (**2**), (**3**)

You can adjust air vents (**2**) and (**3**).

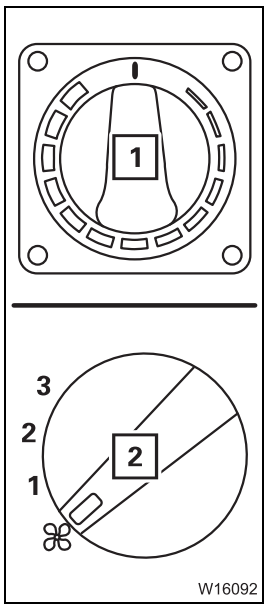


Adjusting the air vents

1 – To open: Press in and position lengthwise
– To close: Position crosswise
– To direct the air flow: In intermediate position

2 – To direct the air flow: Slewing

Switching off



Switching off the 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.

14.03.2018

11.7.2 Air-conditioning system

You can use the air-conditioning system to cool and dry the air in the crane cab.

Information

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:

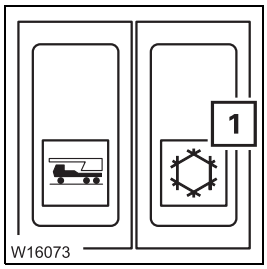
If the truck crane has been exposed to strong sunlight for a long period of time, for example, the air-conditioning system should initially be operated at the highest blower level with the engine running.
The door or at least the windows should be left open for a short while to thoroughly air the cab. 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

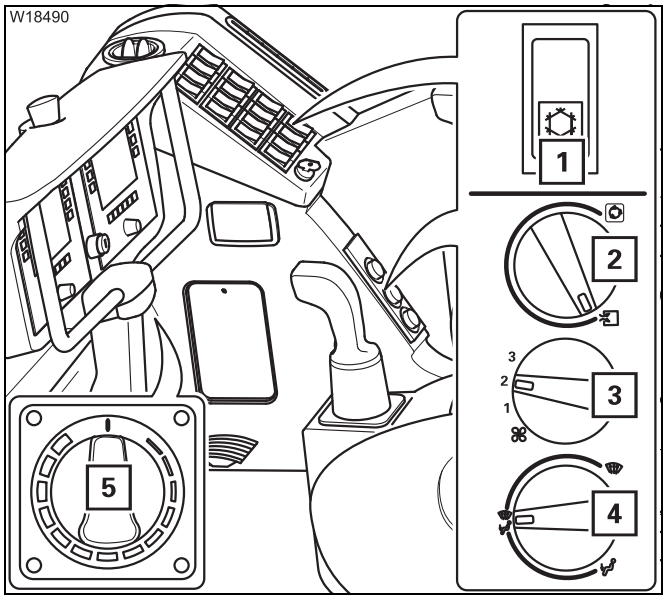
- Start the engine. The air-conditioning system operates only when the engine is running
- Switch off the auxiliary heaters.
  – Auxiliary water heater; ➠ p. 11 - 141,
  – Auxiliary air heater; ➠ p. 11 - 142.



– **To switch on:** • Press switch (**1**) down
– **To switch off:** • Press switch (**1**) up

Cooling

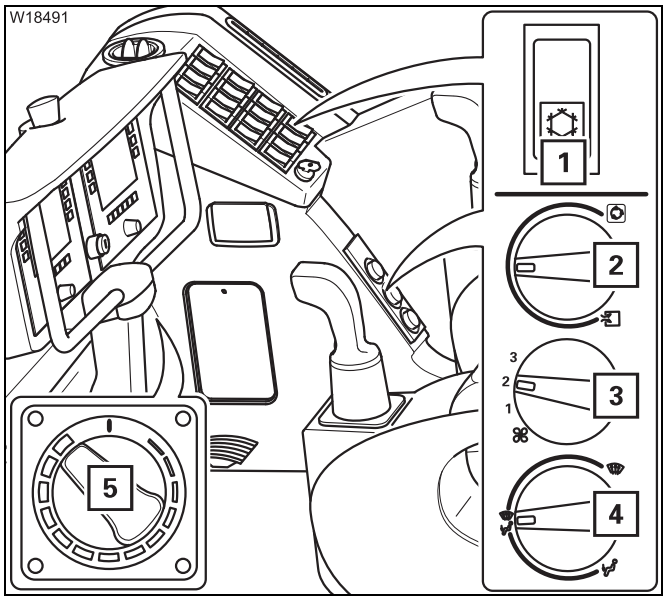
The illustration shows only a sample setting. Always adjust the setting to the current conditions.



- Press switch (**1**) down.
- Turn the switch (**5**) as far as it will go, to *Cold*.
- Turn switch (**3**) to the required level.
- Set the air distribution with switch (**4**) – open the air vents if necessary.
- If switch (**2**) is set to recirculated air, cooling will be quicker. However, no oxygen will be supplied.

Drying the air

You can dry the air in the crane cab.
Here however, no heating or only a small amount will be produced.



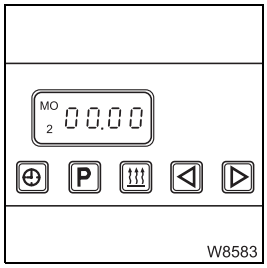
- Press switch (**1**) down.
- Turn the switch (**5**) as far as it will go, to *Warm*.
- Turn switch (**3**) to the required level.
- Adjust the setting for fresh air/recirculated air to the current conditions (humidity and temperature of the outer air) using switch (**2**).
- Set the air distribution with switch (**4**) – open the air vents if necessary.

When drying, the air conditioning system and the heating system work against each other. After drying, switch off the device that you do not require.

14.03.2018

11.7.3 Auxiliary water heater

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!



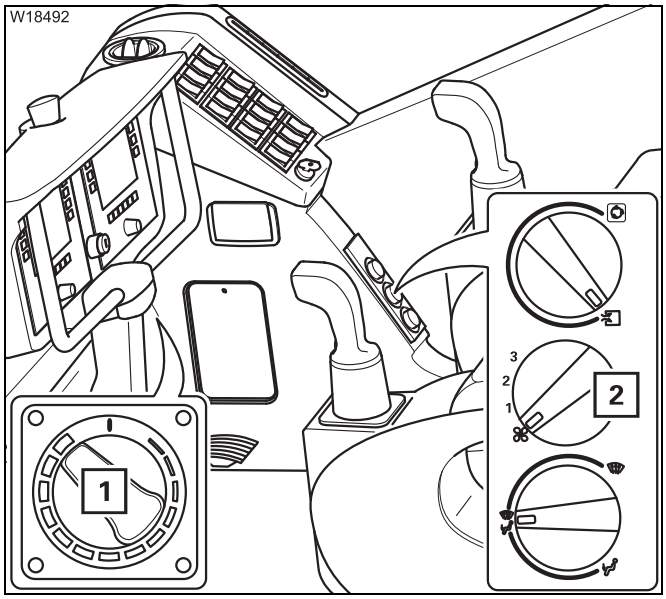
You can use the auxiliary water heater to:

– Preheat just the engine or

– Preheat the engine and crane cab simultaneously.

Preheating the engine

If only the engine is to be preheated, adjust the heating system as follows:

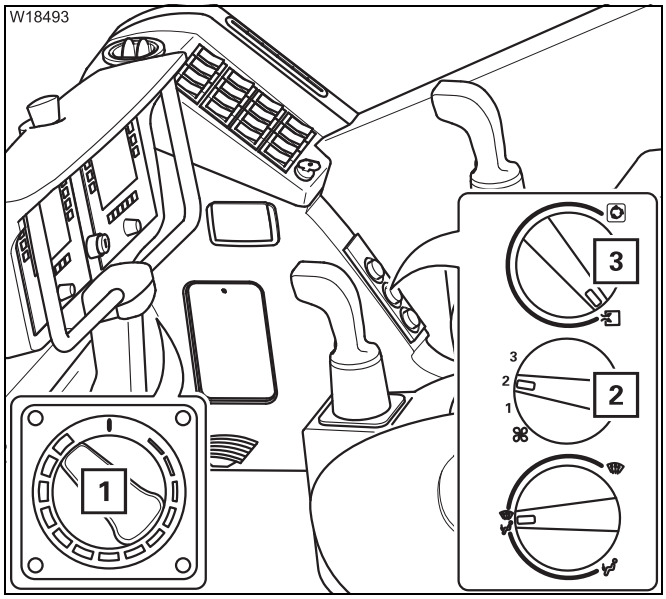


- Switch (**1**) to position *Warm*.
- Switch (**2**) to position *Fan off*.

14.03.2018

Preheating the crane cab

If the crane cab is to be preheated in addition to the engine, adjust the heating system as follows:



- Switch (**1**) to position *Warm*.
- Switch (**3**) to the *Recirculated air* symbol.
- Switch (**2**) to the required fan level.
- Open the air vents; ➠ p. 11 - 132

The amount of time required to preheat the engine will be increased significantly by simultaneously heating the crane cab.

14.03.2018

Switching on

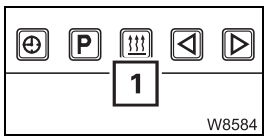
- Check whether the auxiliary heater is allowed to be operated at the current site of the truck crane before switching it on. Find out whether there are any possible sources of danger that could result in an explosion.

Risk of explosion when operating the auxiliary heater!
The auxiliary heater is not allowed to be operated:
– at service stations and tank farms,
– at places where flammable gases or vapours can be found or formed (e.g. at places where fuel is stored and in chemical factories),
– at places where explosive dust can be found or formed (e.g. carbon dust, wood dust and grain dust).

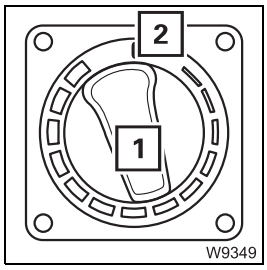
Danger of suffocation when operating the auxiliary heater!
Do not use the auxiliary heater in closed spaces (e.g. a garage).

This section describes how to switch on the heater manually. The auxiliary heater can also be switched on automatically; ➠ *Storing the heating start*, p. 11 - 138.

- Switch on the ignition; ➠ *Switch on the ignition*, p. 10 - 8.



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



Setting the temperature

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

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

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

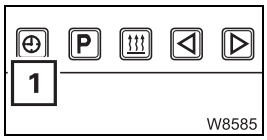
Always switch the auxiliary heater off if you switch off the truck crane whilst the battery master switch is switched on. In this way, you prevent the auxiliary heater from restarting and the batteries from running down after the engine has cooled down.

14.03.2018

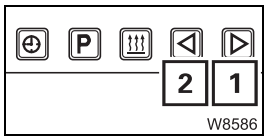
Setting the day and time

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

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

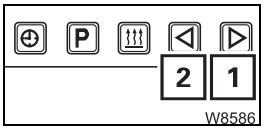


- Press the button (**1**) for longer than 2 seconds.
  The displayed time flashes, e.g. 10.00.



- Set the current time on the flashing display – button (**1**) or (**2**), e.g. 14:00.

- Wait for 5 seconds. The new time is saved and then the weekday flashes, e.g. **MO** for Monday.



- Set the current weekday on the flashing display – button (**1**) or (**2**).

After 5 seconds, the display stops flashing and the current time is displayed. The weekday goes out.

The time and weekday have now been set.

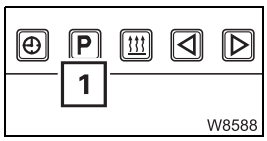
Storing the heating start

Heating is started automatically on schedule only if the time and the day of the week have been correctly set; ➠ p. 11 - 138.

You can set three different automatic heating starts – up to seven days in advance.

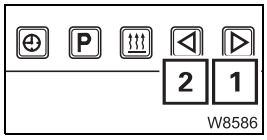
If you call up values in order to change them during the following setting process, they flash for 5 seconds. The entry must be made within this period. The value stops flashing after 5 seconds and is saved as the new value.

14.03.2018



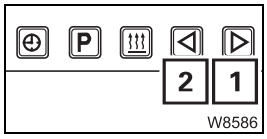
- To retrieve a storage location, press the button (**1**) once.

The following flash:
– The retrieved storage location, e. g. 2
– The last saved heating start, e.g. 06:00.



- Set the time for the desired heating start – button (**1**) or (**2**), e.g. 08:00.

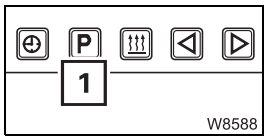
Wait for approx. 5 seconds until the weekday for the heating start flashes, e.g. **MO** for Monday.



- Set the weekday for the desired heating start – button (**1**) or (**2**).

Wait for approx. 5 seconds until the current time is displayed, e. g. 14.00.
Now, the new heating start has been saved and switched on.

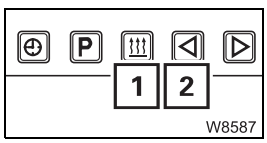
If you wish to store one or two more heating starts, retrieve a new storage location using the button (**1**) and repeat the procedure.



After you have saved the heating start, you can also set the heating period;
p. 11 - 139.

Setting the heating period

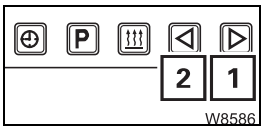
After an automatic start, the heating system will switch off automatically as soon as the set heating period has elapsed.
The heating period applies to all saved heating starts.



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

14.03.2018

The last set heating period, e.g. 27 minutes, will now flash on the display for 5 seconds.



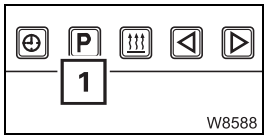
- Set the desired heating period on the flashing display – button (**1**) or (**2**). You can set a heating period of 10 to 120 minutes.

Wait for approx. 5 seconds until the current time is displayed, e. g. 14.00 .

A new heating period has now been set.

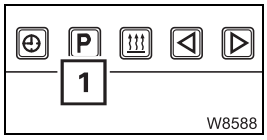
Switching heating start on/off

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

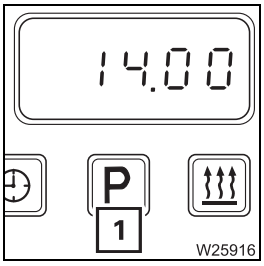


- To retrieve a storage location, press the button (**1**) once.

The display will flash for 5 seconds and then a storage location will be displayed (e.g. **2**). The heating start at this storage location is now switched on.



To switch on a different heating start, press the button (**1**) repeatedly until the desired storage location is displayed. This heating start is switched on as soon as the display stops flashing.

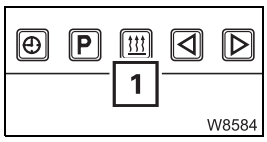


To switch off the automatic heating start, press the button (**1**) repeatedly until a storage location is no longer displayed.

14.03.2018

Switching off

This section only describes how to switch off the heater manually. If the auxiliary heater was switched on automatically, it will be switched off after a particular heating period. You can set this heating period; ➠ *Setting the heating period*, p. 11 - 139.

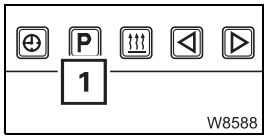


- To **switch off**, press the button (**1**) once. The auxiliary heater is switched off immediately.

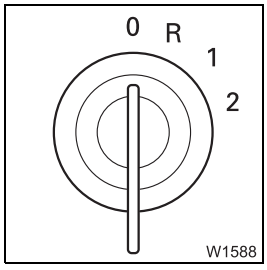
If you turn off the ignition while the auxiliary heater is in operation, the auxiliary heater continues to run for a certain period of time. You can set this remaining time; ➠ *Setting the remaining run time*, p. 11 - 141.

Setting the remaining run time

If the ignition is turned off while the auxiliary heater is running, the heating system will continue to run for the remaining run time.

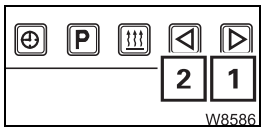


- Switch on the heating system using button (**1**).



- Switch off the ignition.

The heating system will continue to run and the last set remaining time will flash, e.g. 48 minutes.

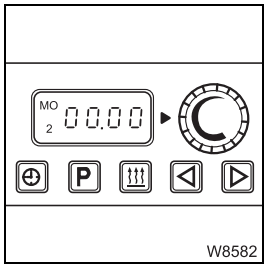


- Set the desired remaining time on the flashing display – button (**1**) or (**2**). You can set a remaining time of 1 to 120 minutes.

- Wait for 5 seconds until the current time is displayed.
  The remaining time is now set.

14.03.2018

11.7.4 Auxiliary air heater



You can use the auxiliary air heater to preheat the crane cab or provide additional heating.

The batteries will 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

To switch the auxiliary heater on and off, you can:

– Switch the auxiliary heater on and off manually; the ignition must be switched on for this.

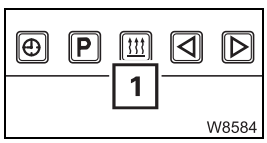
– Set an automatic heating start and heating period with the timer; ➠ *Other functions*, p. 11 - 143.

• 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 (e.g. 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 (e.g. garages).

• Switch on the ignition; ➠ *Switch on the ignition*, p. 10 - 8.

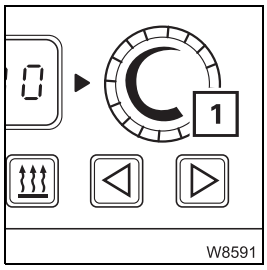


• Press the button (**1**) once.
The auxiliary heater switches on automatically – the control field lights up.

14.03.2018

Temperature

You can preselect a temperature for the crane cab. The preselected temperature is automatically set and maintained.



Increasing the temperature:

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

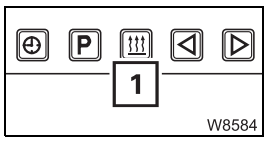
Reducing the temperature:

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

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

Switching off

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



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

Other functions

The auxiliary air heater has the same functions as the auxiliary water heater.

– Setting the time/day ➠ p. 11 - 138
– Storing the heating start ➠ p. 11 - 138
– Switching heating start on/off ➠ p. 11 - 140
– Setting the heating period ➠ p. 11 - 139
– Setting the remaining time ➠ p. 11 - 141

14.03.2018

11.8 CraneSTAR system

11.8.1 Overview

Your truck crane is equipped with the CraneSTAR system.
The CraneSTAR system is used to transmit crane data via mobile phone, thus allowing remote diagnostics and localisation of the truck crane.

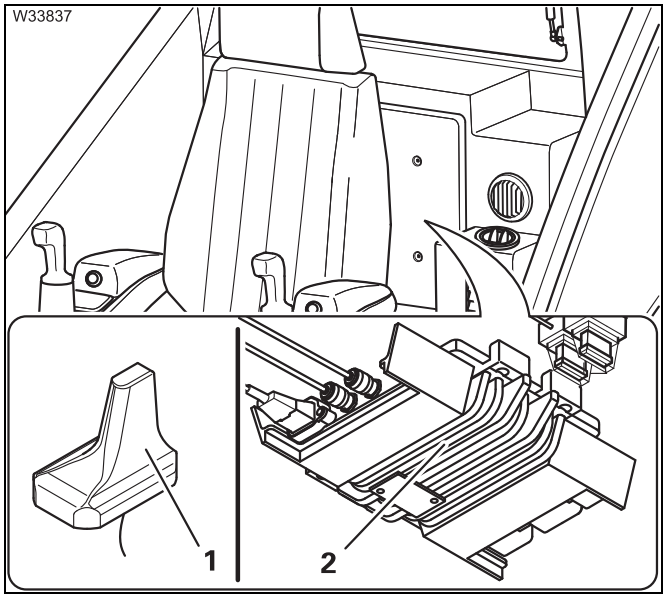
The CraneSTAR system works automatically, no controls must be operated. This sections shows only the location of the associated components.

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.

11.8.2 Position of the components

The CraneSTAR system includes an antenna and a *TCU* (**T**elematic **C**ontrol **U**nit = control unit for data transmission).



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 event of a malfunction; ➠ p. 14 - 38.

14.03.2018

12 Rigging work

14.03.2018

14.03.2018

12 Rigging work

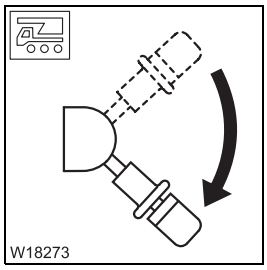
If the truck crane on the site has already been rigged, proceed according to the *CHECKLIST: Checks before operating the crane*, p. 11 - 1.

12.1 Rigging work checklists for crane operation with the main boom

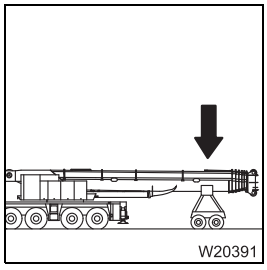
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions there!

12.1.1 CHECKLIST: Rigging

1. Choose a suitable site; ➠ *Choice of a suitable positioning site*, p. 12 - 9.

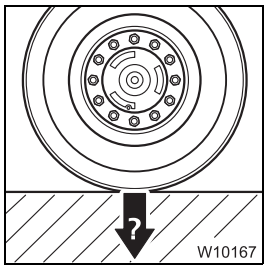


2. Check that the parking brake is applied – if necessary, apply the parking brake.



3. **If the main boom is resting on a trailer:**
   – Switch off the boom floating position; ➠ p. 12 - 17,
   – Switch off the slewing gear freewheel; ➠ p. 12 - 18,
   – If necessary, switch off boom pre-tensioning; ➠ p. 12 - 19.

14.03.2018

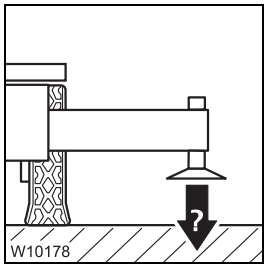


4. For the *free on wheels* working position

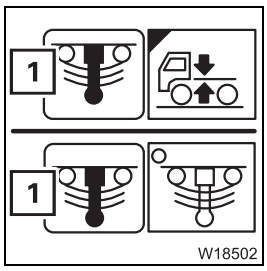
– Check whether the tyre pressure has been correctly set; ➠ p. 1 - 14.

– Check whether the ground will support the maximum axle loads; ➠ *Weight and axle loads*, p. 1 - 9; ➠ *Determining the required load-bearing area*, p. 12 - 9.

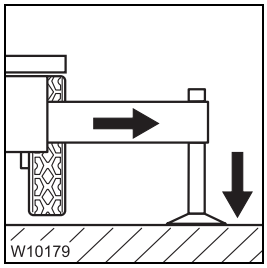
Danger of overturning if the truck crane is free-standing!
When the truck crane is free on wheels, the superstructure may not be slewed.
For the *free on wheels* working position, the truck crane is first supported and fully rigged. The truck crane is then placed on the wheels.
For this reason, always follow all items in this checklist.
This prevents the truck crane overturning when slewing.



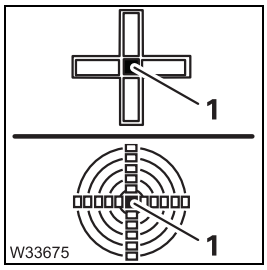
5. Check whether the ground will support the maximum occurring outrigger pressures; ➠ *Determining the required load-bearing area*, p. 12 - 9.



6. Switch off (lock) the suspension.
The symbol (**1**) must be **red** (suspension off); ➠ p. 5 - 18.

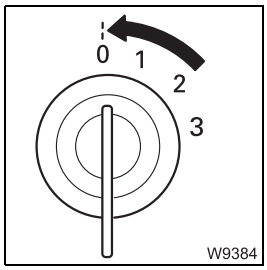


7. Support the truck crane with the outrigger span required for the job according to the *Lifting capacity table* and raise until none of the wheels touches the ground; ➠ *Outriggers*, p. 12 - 27.

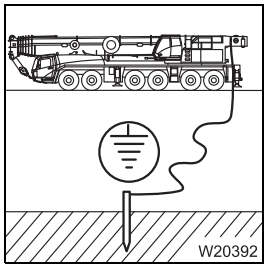


8. Align the truck crane horizontally.
The lamp (**1**) lights up in the measuring range **1°;** ➠ p. 12 - 46.

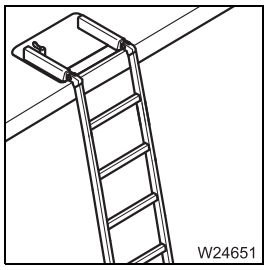
14.03.2018



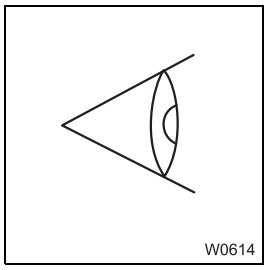
9. Turn off the engine for driving; ➠ *Switch the engine off*, p. 4 - 23.



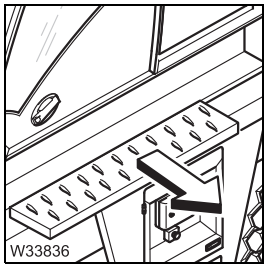
10. Earth the truck crane, if necessary; ➠ *Earthing the truck crane*, p. 12 - 13.



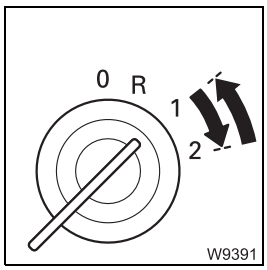
11. Fold out **all** ladders; ➠ , p. 4 - 6.



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

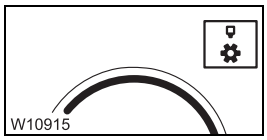


13. Extend step; ➠ *Extendable step*, p. 12 - 122.

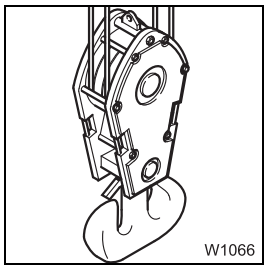


14. Start the engine for crane operation; ➠ p. 10 - 12.

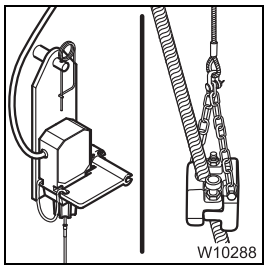
14.03.2018



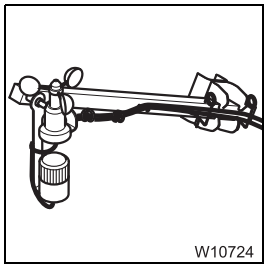
15. Switch off the houselock, if necessary; ➠ *Switching off the houselock*, p. 11 - 17.



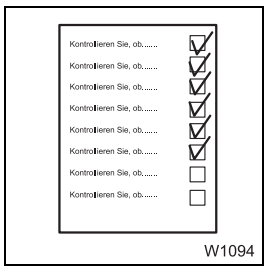
16. Pick up the hook block and reeve the hoist rope again, if necessary;
➠ *Hook block on a separate vehicle*, p. 12 - 87,
➠ *Hook block on the bumper*, p. 12 - 85,
➠ *Reeving and unreeving the hoist rope*, p. 12 - 92.



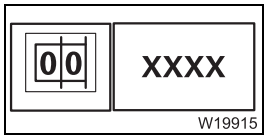
17. Install the lifting limit switch; ➠ p. 12 - 106.



18. Install the anemometer and air traffic control light;
➠ p. 12 - 112.

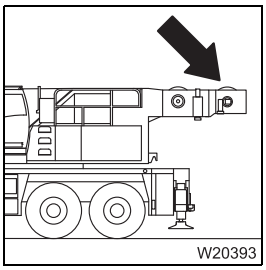


19. Perform all the required checks prior to crane operation;
➠ *CHECKLIST: Checks before operating the crane*, p. 11 - 1.

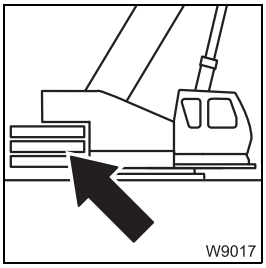


20. Enter the current rigging mode on the RCL; ➠ p. 11 - 23.

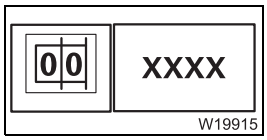
14.03.2018



21. If required, assemble the auxiliary hoist; ➠ *CHECKLIST: Auxiliary hoist, installing*, p. 6 - 89.



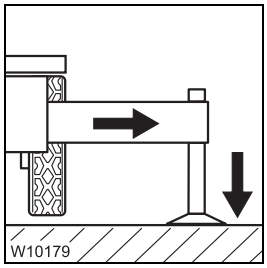
22. With the RCL adjusted accordingly, rig the counterweight combination required for the operation according to *Lifting capacity table*; ➠ *CHECKLIST: Rigging the counterweight*, p. 12 - 58.



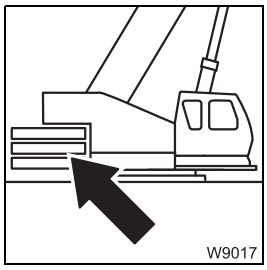
23. Enter the current rigging mode with the newly rigged counterweight combination on the RCL; ➠ p. 11 - 23.

12.1.2 CHECKLIST: Unrigging

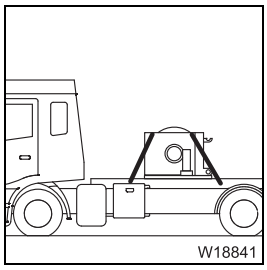
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions there!



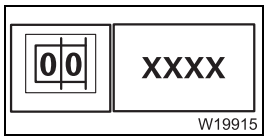
1. **If the truck crane is in the *free on wheels* working position:**
   Support the truck crane with the outrigger span required for the job according to the *Lifting capacity table* and raise until none of the wheels touches the ground; ➠ *Outriggers*, p. 12 - 27.



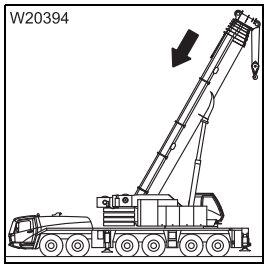
2. With the RCL set correspondingly, unrig the counterweight; ➠ *CHECKLIST: Unrigging the counterweight*, p. 12 - 60.



3. If required, remove the auxiliary hoist; ➠ *CHECKLIST: Auxiliary hoist, removing*, p. 6 - 91.

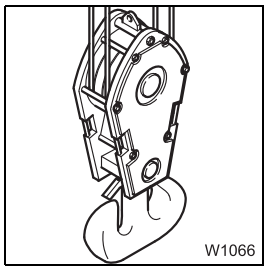


4. Enter the current rigging mode with the newly rigged counterweight combination on the RCL; ➠ p. 11 - 23.



5. Retract the main boom, lock the telescopic sections and lock the telescoping cylinder to telescopic section I for on-road driving; ➠ *Locking the telescopic section for on-road driving*, p. 11 - 88.

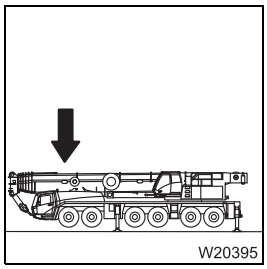
14.03.2018



6. Depending on transport:

– Attach the hook block to the bumper; ➠ p. 12 - 86 or

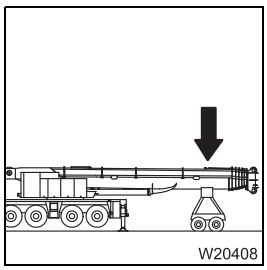
– Set down the hook block and unreeve the hoist rope;
➠ *Setting down the hook block*, p. 12 - 88,
➠ *Unreeving hoist rope*, p. 12 - 96.



7. For on-road driving without trailer:

– Turn the superstructure to the 180° position to the front with the RCL adjusted accordingly,

– Place the main boom on the boom rest.



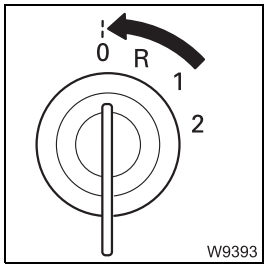
8. For on-road driving with a trailer:

– Set down the superstructure on a trailer with the RCL adjusted accordingly and switch on the boom floating position; ➠ p. 6 - 13,

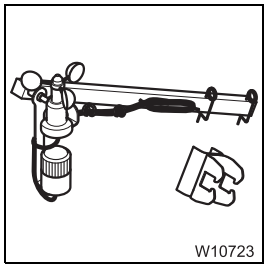
– Switch on the slewing gear freewheel; ➠ p. 6 - 12,

– If necessary, switch on the boom pre-tensioning; ➠ p. 6 - 14,

– Switching off the houselock; ➠ p. 11 - 15.

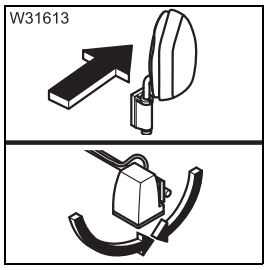


9. Switch off the engine for crane operation; ➠ p. 10 - 21.



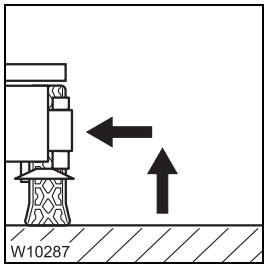
10. Remove anemometer and the air traffic control light; ➠ p. 12 - 112.

14.03.2018

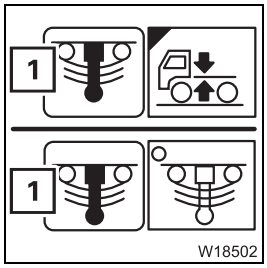


11. – Fold in the mirrors for crane operation; ➠ p. 12 - 123,

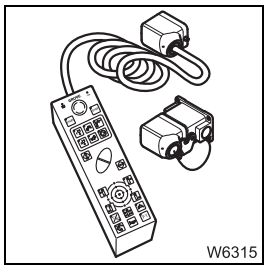
– Lower the slewable spotlights; ➠ p. 11 - 108



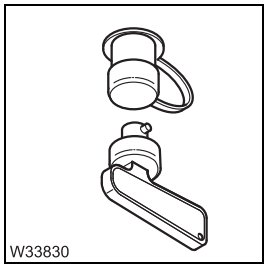
12. Retracting the outriggers; ➠ *CHECKLIST: Retracting the outriggers*, p. 12 - 29.



13. Activate the suspension (release locking).
The symbol (**1**) must be **green** (suspension on); ➠ p. 5 - 18.



14. Turn off the engine and, if necessary, remove the hand-held control and stow it away in the driver's cab; ➠ *Removing the hand-held control*, p. 12 - 21.



15. If there is no further work for the truck crane; ➠ *In case of work breaks of more than 8 hours*, p. 11 - 130.

14.03.2018

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 ground bearing area; ➠ p. 12 - 9.

– Observe the required safe distances from slopes and pits; ➠ p. 12 - 12.

– Earth the truck crane if there is a danger of it being charged with static electricity; ➠ p. 12 - 13.

– Keep a safe distance away from overhead power lines; ➠ p. 12 - 13.

– Choose the site such that the unevenness of the ground can be compensated for by adjusting the outrigger cylinders. Maximum hoist of the outrigger cylinders; ➠ p. 1 - 14.

– 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.

$$\text{Load-bearing area } (m^2) = \frac{\text{Outrigger pressure (t)}}{\text{Load bearing capacity of the ground } \left(\frac{t}{m^2}\right)}$$

Outrigger pressure

• Determine the outrigger pressure for the operation planned using the *Outrigger pressure table*.

14.03.2018

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.

14.03.2018

Load-bearing area

- Now calculate the required load-bearing area.
- Check that the surface of the outrigger pad (➠ p. 1 - 14) is larger than the calculated ground 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:

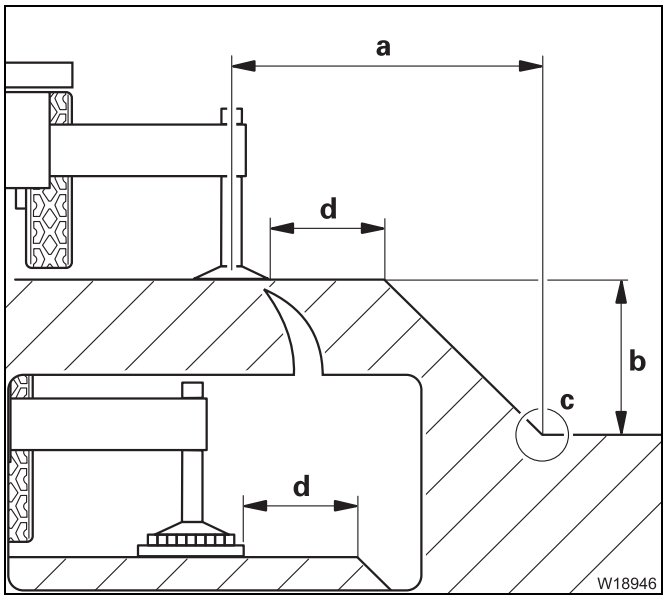
If the outrigger pressure is 25 t and the ground has a bearing capacity of 40 t/m^2. then the required ground bearing area for this supporting cylinder is 0.625 m^2 (= 6,250 cm^2).

If the outrigger pad has a surface of 2,000 cm^2, you would need to enlarge the load-bearing area by placing packing under the outrigger pads; ➠ p. 12 - 40.

14.03.2018

12.2.2 Safe distance from slopes and pits

Erect the crane at a safe distance from slopes and pits. The distance also depends on the type of ground if the slopes and pits are not supported.



Rule of thumb:

If you are working on *non-cohesive* or *filled-in* ground, the safety distance (**a**) must be twice as large as the pit depth (**b**).

a = 2 x b

If you are working on *cohesive* or *undisturbed* ground, the safe distance (**a**) be as great as the depth of the pit (**b**).

a = 1 x b

The safe distance is measured from the base of the pit (**c**).

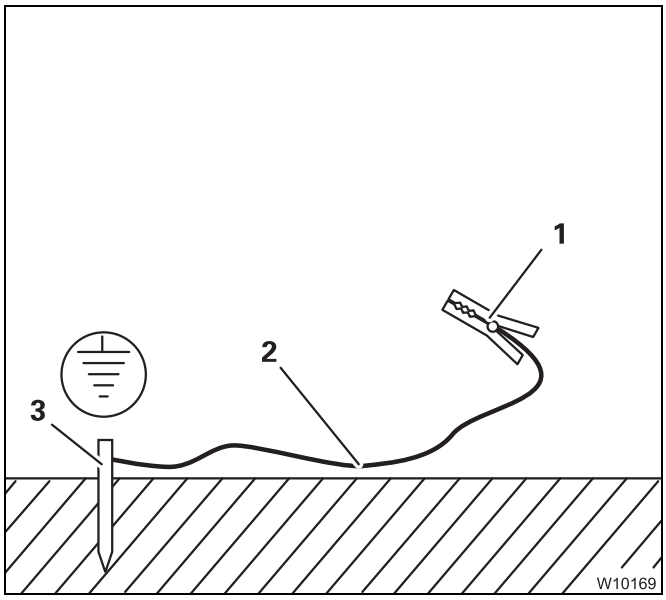
In addition to this the safe distance (**d**) between the outrigger pads or support material and the pit border must always be more than 2.00 m (6.6 ft).

14.03.2018

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).

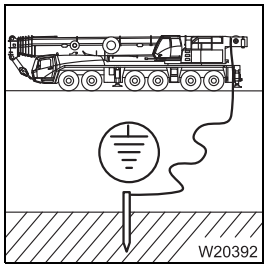
Risk of accidents due to electric shock!
Earth the truck crane before you start to work with it
– near strong transmitters (radio transmitters, radio stations, etc.),
– near high-frequency switchgear substations,
– if a thunderstorm is forecast.



Use electrically conducting material for earthing.

- Hammer a metal rod (**3**) (length approx. 2.0 m (6.6 ft)) at least 1.5 m (5 ft) into the ground.
- For better conductivity, dampen the soil around the metal rod (**3**).
- Clamp an insulated cable (**2**) to the metal rod (**3**) (cross-section of at least 16 mm^2 (0.025 in^2)).
- Connect the free end of the cable using a clamp (**1**).

Risk of accidents 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 to the superstructure.

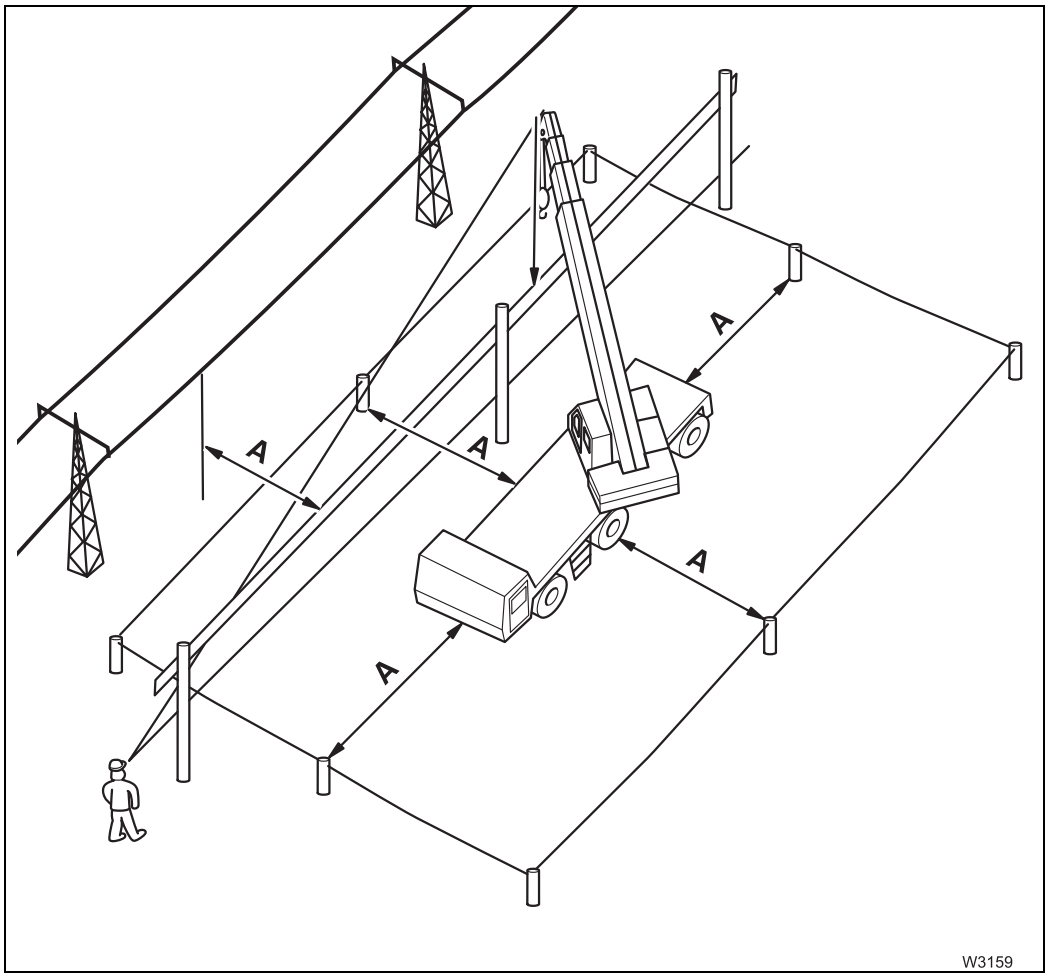
14.03.2018

12.2.4 Safe distance from overhead power lines

Always observe the regulations in the country in which you are working when working in the vicinity of overhead power lines.

Risk of accidents due to electric shock!
The truck crane is not insulated.
If the truck crane, its equipment, its load/lifting tackle or the guide ropes touch an overhead power line this will cause serious injury or even death.

- If there are overhead power lines within the working range of the truck crane, have these overhead power lines 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:

14.03.2018

For example, according to DIN VDE 0105

Voltage	Safe distance (A)
up to 1,000 V	1 m (3.3 ft)
over 1,000 V to 110,000 V	3 m (9.8 ft)
over 110,000 V to 220,000 V	4 m (13.1 ft)
over 220,000 V to 380,000 V	5 m (16.4 ft)

For example as per ASME B 30.5 (USA)

Voltage	Safe distance (A)
up to 50,000 V	3.05 m (10 ft)
From 50,000 V to 200,000 V	4.60 m (15 ft)
over 200,000 V to 350,000 V	6.10 m (20 ft)
over 350,000 V to 500,000 V	7.62 m (25 ft)
over 500,000 V to 750,000 V	10.67 m (35 ft)
over 750,000 V to 1.000,000 V	13.72 m (45 ft)

- Erect an obstacle at the minimum safe distance (**A**) from the overhead power line to 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!

14.03.2018

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14.03.2018

12.3 Rigging work after driving with a trailer

If the main boom is resting on a trailer (dolly) whilst the truck crane is being driven, you must perform the following before working with the crane:

– switch off the slewing gear freewheel; ➠ p. 12 - 18,

– switch off the boom floating position; ➠ p. 12 - 17,

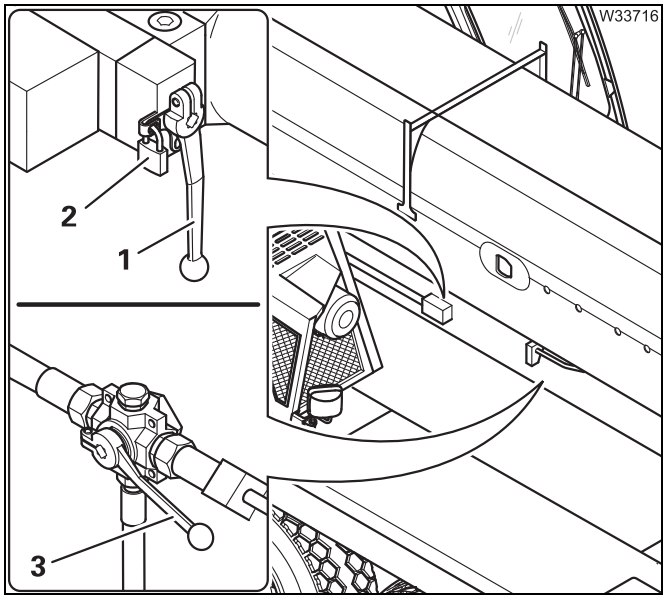
– if necessary switch off the boom pre-tensioning; ➠ p. 12 - 19.

12.3.1 Switching off the boom floating position

You must switch off the boom floating position before you raise the main boom off the trailer.

Risk of 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**) vertically down.
- Secure the lever (**1**) with the padlock (**2**).
- Switch the valve IV over – lever (**3**) points forwards.

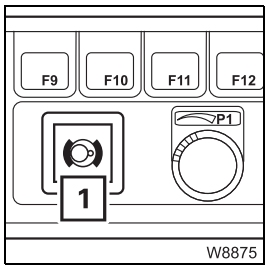
The boom floating position is now switched off.

14.03.2018

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.

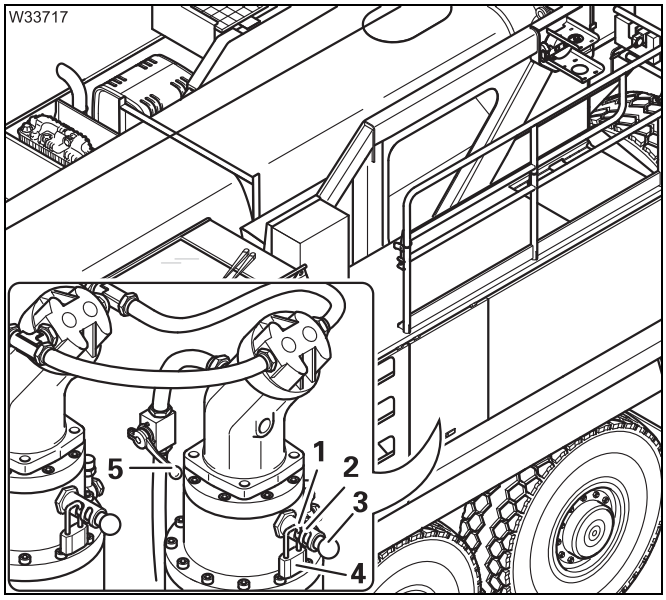
Risk of accidents with the slewing gear freewheel switched on!
Switch off the slewing gear freewheel before working with the crane.
If it is not switched off, the slewing gear brake does not work and you cannot stop slewing movements in time.



Prerequisites

– The engine for crane operation is running.

– The slewing gear brake is released, the lamp (**1**) has gone out;
➠ *Releasing the slewing gear brake*, p. 11 - 97.



Switching off

- Remove the padlock (**4**) from the bore (**1**).
- Pull the pin (**3**) out as far as possible.
- Secure the pin with the lock in the bore (**2**) and remove the key.
- Pull and secure the pin (**3**) on the other slewing gears in the same way.
- Close the valve (**5**) – the slewing gear freewheel is switched off.

Before slewing

Support the truck crane with the necessary outrigger span, enter the corresponding RCL code and derrick the main boom to an angle permissible within the working range.

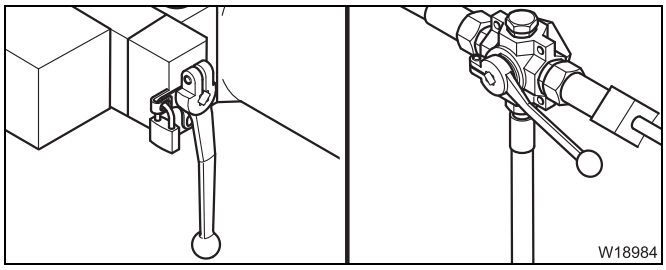
14.03.2018

12.3.3 Switching off boom pre-tensioning

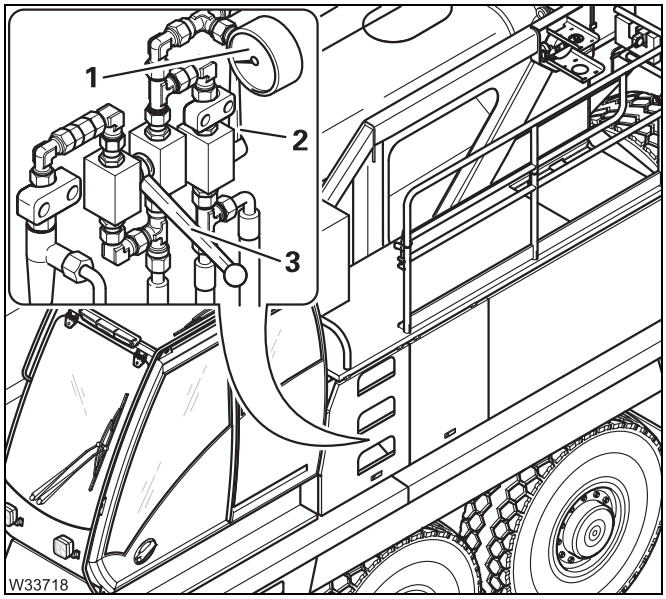
You must switch off the boom pre-tensioning before you raise the main boom off the trailer.

To switch off boom pre-tensioning, you must bring the valves I to IV into the required positions, which will empty the pressure accumulator.

Danger of the hydraulic oil overheating!
Always switch the valve IV over (lever in horizontal position) before operating the crane.
This prevents the pressure in the hydraulic circuit rising and the hydraulic oil exceeding the permissible temperature of 80 °C (176 °F).



- Switch off the boom floating position; ➠ p. 12 - 17.



The valves II and III are under the pressure gauge (**1**).

- Open valve II – the lever (**2**) is vertical.

The pressure accumulator is emptied. The pressure on the pressure gauge (**1**) must drop to 0 bar (0 psi).

Valve III stays closed – the lever (**3**) points downwards.

14.03.2018

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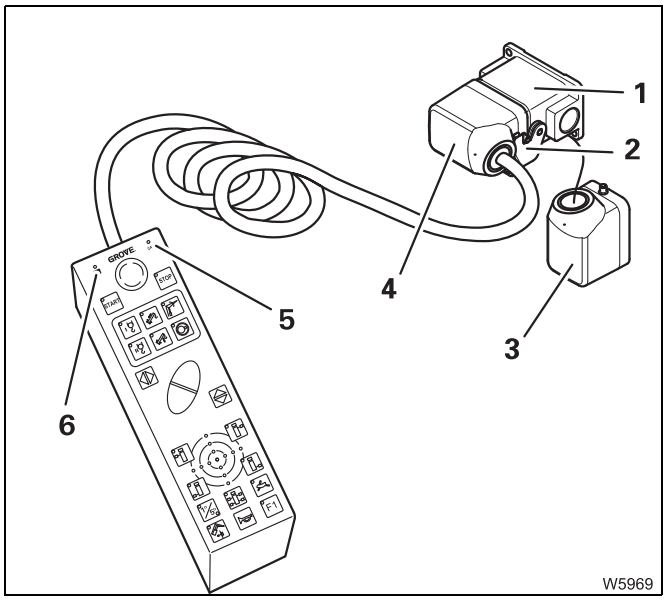
14.03.2018

12.4 Connecting/disconnecting the hand-held control

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

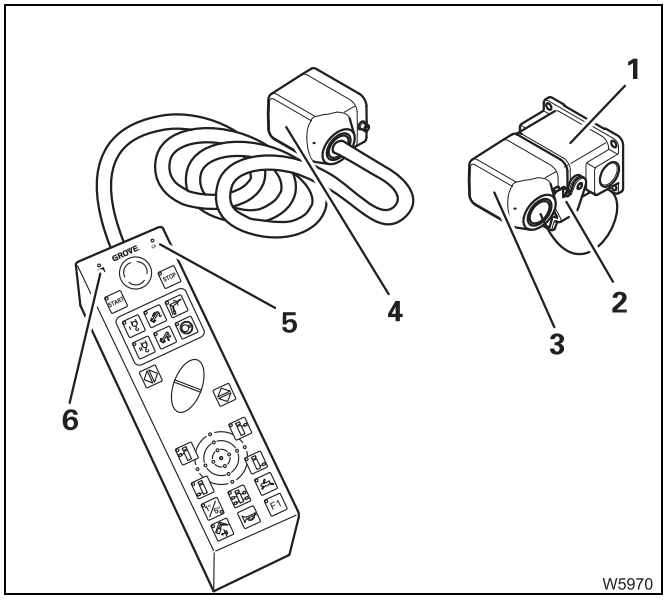


Connecting the hand-held control

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

There is a malfunction if the lamp (**5**) does not light up or flash; p. 14 - 24.

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.



Removing the hand-held control

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

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

14.03.2018

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14.03.2018

12.5 Starting the engine for driving for rigging work

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

– From the crane cab,

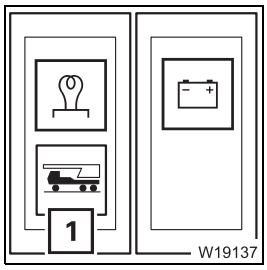
– From the control units of the outriggers.

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

12.5.1 Starting/turning off the engine from the crane cab

Prerequisites

The following requirements must be met before you can start the engine for driving from the driver's cab:



– The hand-held control must be disconnected and bridging plugs plugged into all the sockets.

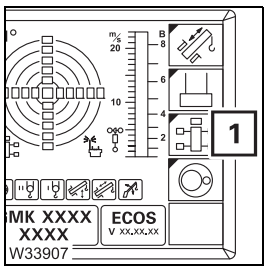
– The carrier ignition is switched off and the ignition key is removed. The lamp (**1**) in the crane cab has gone out.

– The superstructure ignition has been switched on for approx. 30 seconds.

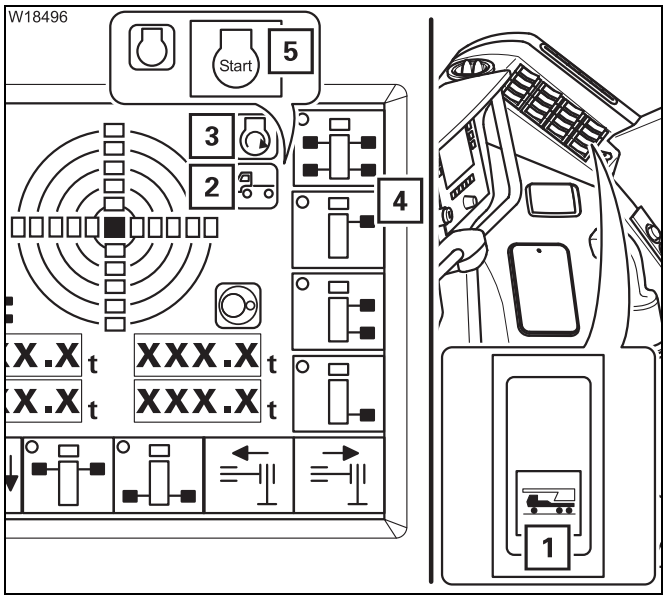
The engine for crane operation can be switched on or off.

Starting the engine

All activities and checks required to start the engine must be carried out before starting the engine; p. 4 - 1.



• In the main menu press button (**1**) once.
The *Outriggers* submenu opens.



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

  The carrier ignition is turned on:

  – The indicator lamp in the button (**1**) flashes,

  – The symbol (**2**) turns **green**.

- Press the button (**5**) once. The engine starts.

  When the engine is running:

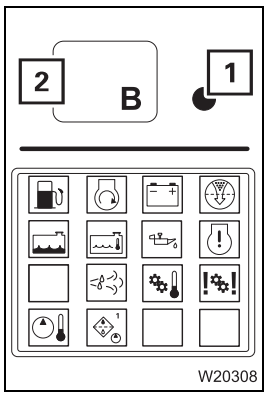
  – The symbols (**3**) and (**4**) are displayed.

  – The lamp in the button (**1**) lights up.

After starting the engine

The engine runs at idling speed. The engine speed cannot be changed.

You can operate the functions from the crane cab in the *Outriggers* submenu; ➠ p. 12 - 37.



In the event of a warning message on the carrier, the lamp (**1**) flashes.

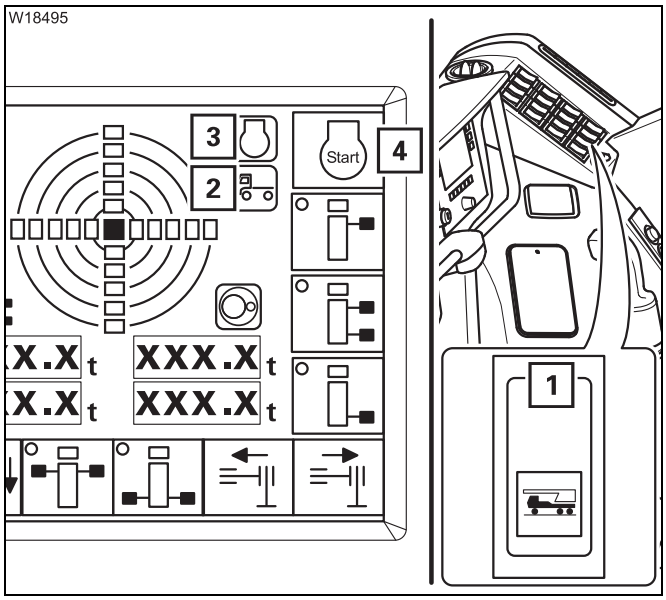
- Press the button (**2**) once.

The *Warning* submenu (carrier) opens. The corresponding symbol is **red**; ➠ p. 11 - 110.

Switching off the engine

Your can turn off the engine from the crane cab or using any of the emergency stop switches on the superstructure or the carrier.

14.03.2018



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

  The carrier ignition is turned off and the engine is switched off.

  – The lamp in the button (**1**) goes out.

  – The symbol (**2**) turns **red**.

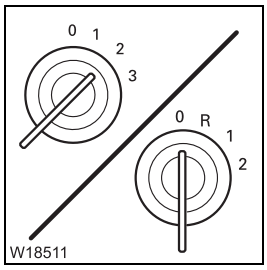
  – The symbols (**3**) and (**4**) are displayed.

14.03.2018

12.5.2 Starting/switching off the engine from the outrigger control units

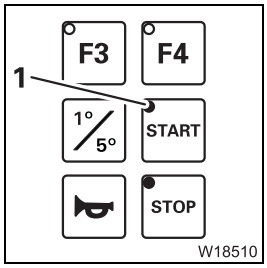
Prerequisites

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.

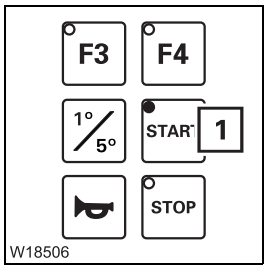
– The ignition in the crane cab must be switched off.



– The lamp in the button (**1**) lights up.

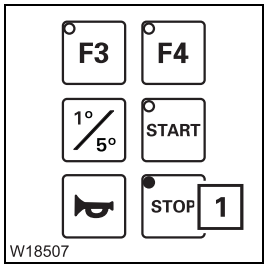
Starting the engine

All activities and checks required to start the engine must be carried out before starting the engine; ➠ p. 4 - 1.



• Press the button (**3**) once – the engine will start.

Switch the engine off



• Press the button (**1**) once – the engine will switch off.

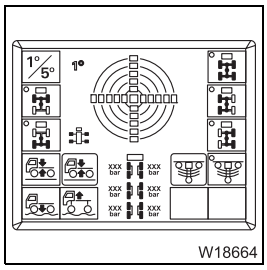
14.03.2018

12.6 Outriggers

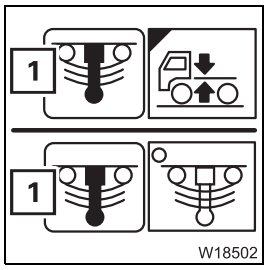
Danger of crushing from extending outrigger beams!
You may only activate the outriggers if you yourself or a banksman with whom you are in visual contact have an unobstructed view of their movements.

12.6.1 CHECKLIST: Extending the outriggers

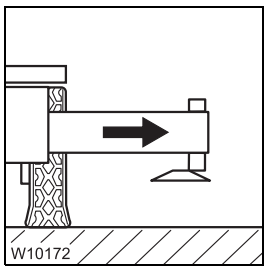
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions there!



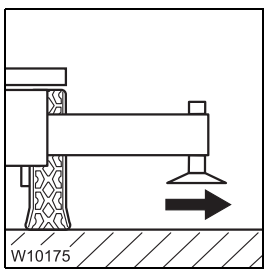
1. Level the truck crane with the level adjustment system and lower it as far as possible; ➠ p. 5 - 64.



2. Switch off (lock) the suspension.
The symbol (**1**) must be **red** (suspension off); ➠ p. 5 - 18.

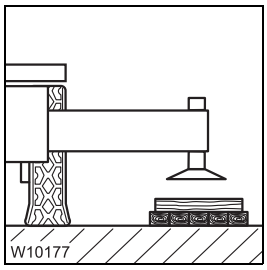


3. Extend all outrigger beams to the required span;
➠ *Permissible outrigger spans*, p. 12 - 30,
➠ *Setting the outrigger spans*, p. 12 - 32,
➠ *Extending/retracting outrigger beams*, p. 12 - 35.

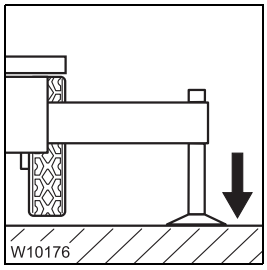


4. Move the outrigger pads into the working position and secure them;
➠ p. 12 - 39.

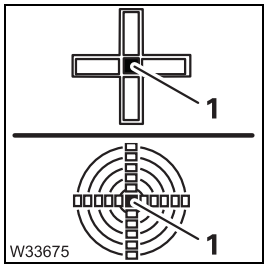
14.03.2018



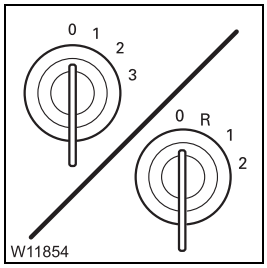
5. Enlarge the ground bearing area if necessary;
➠ *Determining the required load-bearing area*, p. 12 - 9,
➠ *Enlarging the load-bearing area*, p. 12 - 40.



6. Extend the supporting cylinders until none of the wheels is touching the ground;
➠ p. 12 - 41.



7. Level the truck crane horizontally with the outriggers.
The lamp (**1**) lights up in the measuring range **1°;** ➠ p. 12 - 46.

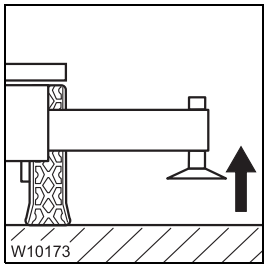


8. Switch off the engine;
– After operating it from the control units; ➠ p. 4 - 23,
– After operating it from the crane cab; ➠ p. 12 - 24.

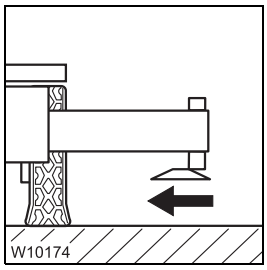
14.03.2018

12.6.2 CHECKLIST: Retracting the outriggers

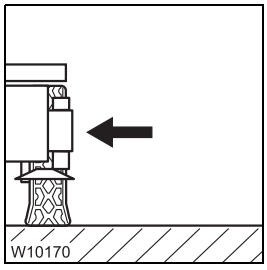
This checklist is not a complete operating manual. There are accompanying instructions, which are indicated by cross-references.
Observe the warnings and safety instructions there!



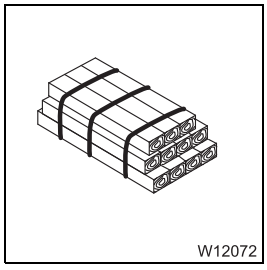
1. Retract the outrigger cylinders as far as possible; ➠ p. 12 - 41.



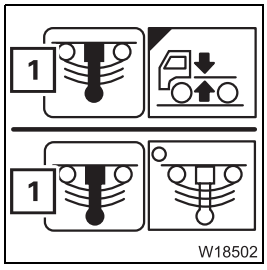
2. Move the outrigger pads into the driving position and secure them;
➠ *Moving into driving position*, p. 12 - 39.



3. Fully retract and secure all outrigger beams;
➠ *Permissible outrigger spans*, p. 12 - 30,
➠ *For on-road driving*, p. 12 - 34,
➠ *Extending/retracting outrigger beams*, p. 12 - 35.

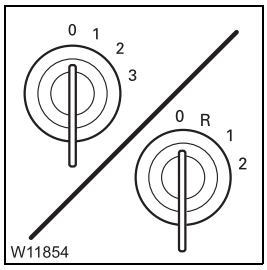


4. Stow away packing material safely, if applicable.



5. Activate the suspension (release locking).
The symbol (**1**) must be **green** (suspension on); ➠ p. 5 - 18.

14.03.2018



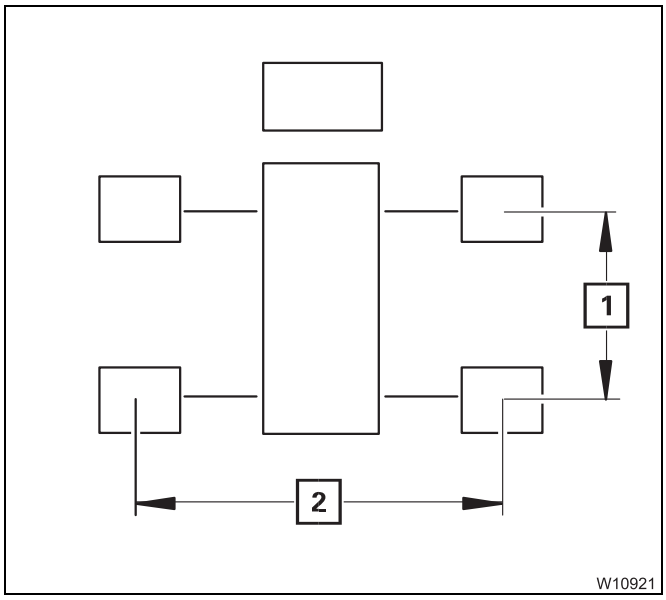
6. Switch off the engine;

– after operating it from the control units; ➠ p. 4 - 23.

– after operating it from the crane cab; ➠ p. 10 - 21.

12.6.3 Permissible outrigger spans

Risk of overturning when slewing the superstructure!
With some outrigger spans, slewing is only permissible with certain counterweight combinations and boom positions; ➠ *Slewing with rigged counterweight*, p. 12 - 83.



The *Lifting capacity table* specifies the permissible outrigger spans in metre x metre (feet x feet):

A 8.70 x 8.50 m (28.5 x 27.9 ft)

B 8.70 x 7.40 m (28.5 x 24.3 ft)

C 8.70 x 6.30 m (28.5 x 20.4 ft)

D 8.70 x 5.00 m (28.5 x 6.4 ft)

M 8.70 x 2.71 m (28.5 x 8.9 ft)

7.98 x 8.50/1.00 m (26.1 x 27.9/3.3 ft) (rear outriggers)

The first value represents the outrigger length (**1**), e.g. 8.70 m (28.5 ft).

The second value specifies the required outrigger span (**2**), e.g. 8.50 m (27.9 ft).

14.03.2018

12.6.4 Preparing the truck crane

In the driver's cab

Levelling the truck crane

- Align the truck crane horizontally with the level adjustment system; ➠ *Operating the level adjustment system*, p. 5 - 64.

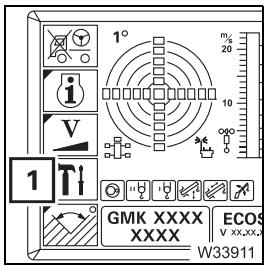
Locking the suspension

- Switch off the suspension; ➠ p. 5 - 17.

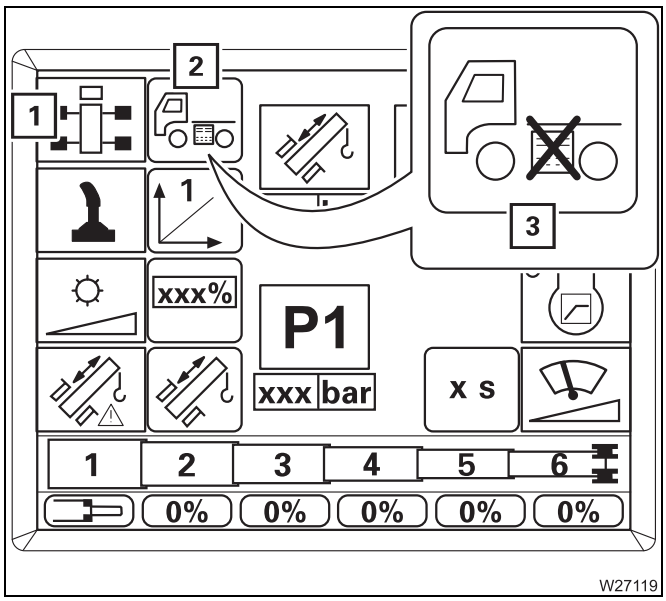
The operating elements for the outriggers are only released if the suspension is switched off. If the suspension is switched off, the wheels are lifted when the crane is put on outriggers.

Outriggers control units

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



- In the main menu press button (**1**) once.
  This opens the *Settings* submenu.



The current status is displayed:

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

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

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

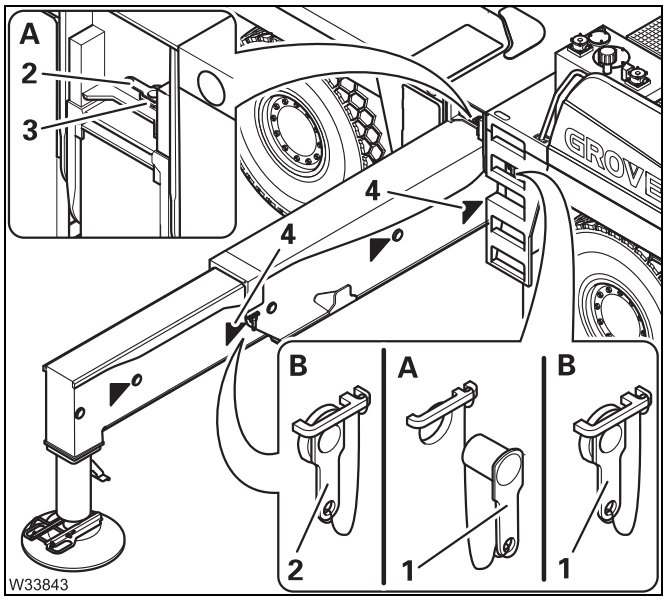
14.03.2018

12.6.5 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!
Always extend **all** outrigger beams to the required outrigger span even if you are only working on one side. Otherwise the rear stability for the rigging mode according to the RCL code is no longer guaranteed.

This section describes how to release and secure the outrigger beams, as well as the markers for the outrigger spans.
There are various ways to move the outrigger beams; ➠ *Extending/ retracting outrigger beams*, p. 12 - 35.



Outrigger span 8.70 x 8.50 m (28.5 x 27.9 ft)

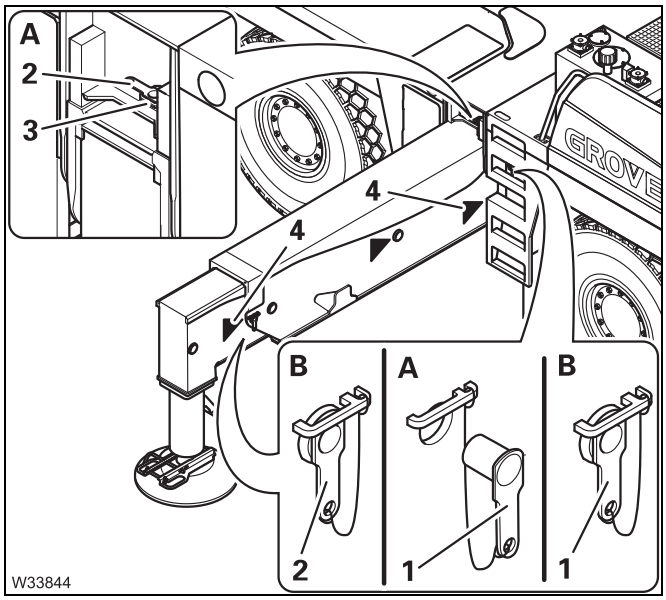
(**A**) – Prerequisites

- Pin (**1**) must be removed
- Pin (**2**) inserted in holder (**3**)

(**B**) – Setting and securing

- Extend the outrigger beam up to the mark (**4**).
- Secure the outrigger beam with the pins (**1**) and (**2**).
- Set the outrigger spans on the other outrigger beams in the same way.

14.03.2018



Outrigger span 8.70 x 7.40 m (28.5 x 24.3 ft)

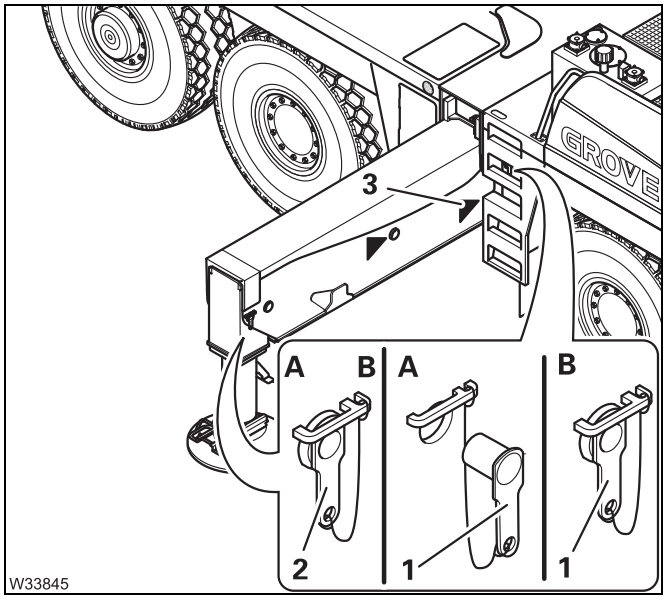
(**A**) – Prerequisites

– Pin (**1**) must be removed

– Pin (**2**) inserted in holder (**3**)

(**B**) – Setting and securing

- Extend the outrigger beam up to the mark (**4**).
- Secure the outrigger beam with the pins (**1**) and (**2**).
- Set the outrigger spans on the other outrigger beams in the same way.



Outrigger span 8.70 x 6.30 m (28.5 x 20.4 ft)

(**A**) – Prerequisites

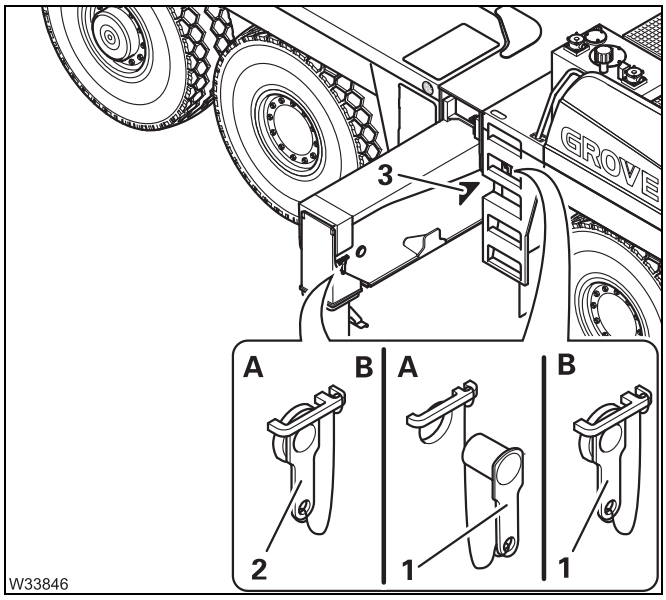
– Pin (**1**) must be removed

– Pin (**2**) must be inserted

(**B**) – Setting and securing

- Extend the outrigger beam up to the mark (**3**).
- Secure the outrigger beam with the pin (**1**).
- The pin (**2**) remains inserted.
- Set the outrigger spans on the other outrigger beams in the same way.

14.03.2018



Outrigger span 8.70 x 5.00 m (28.5 x 16.4 ft)

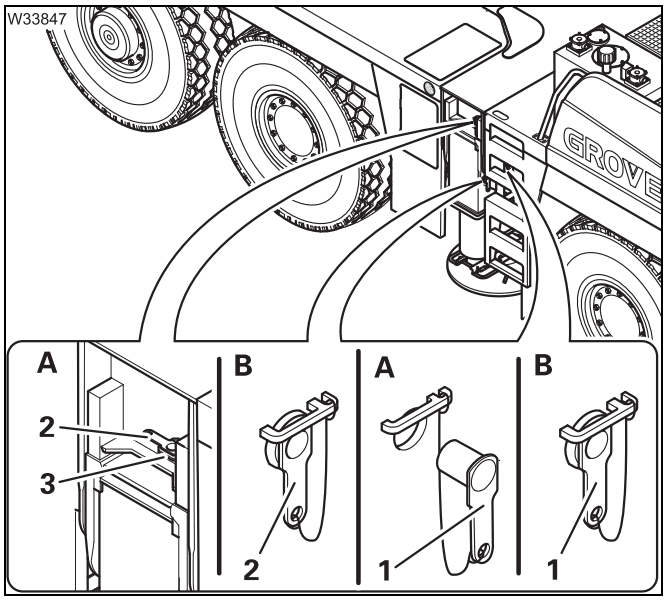
(**A**) – Prerequisites

– Pin (**1**) must be removed

– Pin (**2**) must be inserted

(**B**) – Setting and securing

- Extend the outrigger beam up to the mark (**3**).
- Secure the outrigger beam with the pin (**1**).
- The pin (**2**) remains inserted.
- Set the outrigger spans on the other outrigger beams in the same way.



Outrigger span 8.70 x 2.71 m (28.5 x 8.9 ft)

(**A**) – Prerequisites

– Pin (**1**) must be removed

– Pin (**2**) inserted in holder (**3**)

(**B**) – Setting and securing

- Completely retract the outrigger beam.
- Secure the outrigger beam with the pins (**1**) and (**2**).
- Set the outrigger spans on the other outrigger beams in the same way.

For on-road driving

- Set an outrigger span of 8.70 x 2.71 m (28.5 x 8.9 ft) on all outrigger beams and secure them.
- Secure all the outrigger pads in the driving position; ➠ p. 12 - 39.

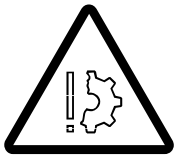
Risk of accident if outriggers/outrigger pads are not secured!
Always secure all retracted outrigger beams and all outrigger pads in the driving position. Avoid serious accidents caused by outrigger beams/ outrigger pads slipping out.

14.03.2018

12.6.6 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** the outrigger beams, and always extend them to the spans corresponding to the RCL code.
This also applies if you are working on one side only, since it ensures that the truck crane is stable at the rear.



Risk of damage to the outriggers!
Before extending, always check whether the required pins for the desired outrigger span are inserted/removed.
Before retracting the outrigger beams, always check whether they have been secured in driving position.

- Check that the pins are inserted/removed as specified in the prerequisites (**A**) for the desired outrigger span; ➠ p. 12 - 32.

Depending on the rigging, control elements are provided for moving the outrigger beams

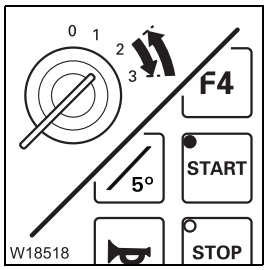
– On the *Outrigger* control units; ➠ p. 12 - 37,

– In the crane cab; ➠ p. 12 - 37.

14.03.2018

From the control units

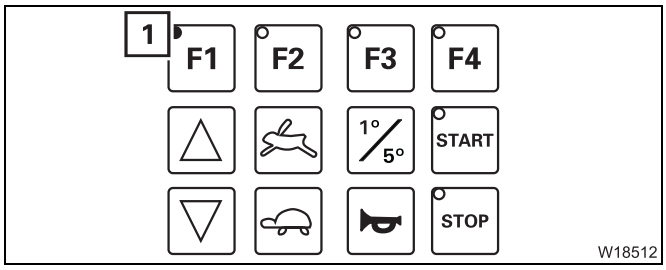
If the hand-held control is connected, the *Outrigger* operating units are inactive.



Start the engine

- Remove the hand-held control if necessary, and start the engine from the driver's cab; ➠ p. 4 - 15.

  You can also start the engine from the control units; ➠ p. 12 - 26.



Switching on the lighting

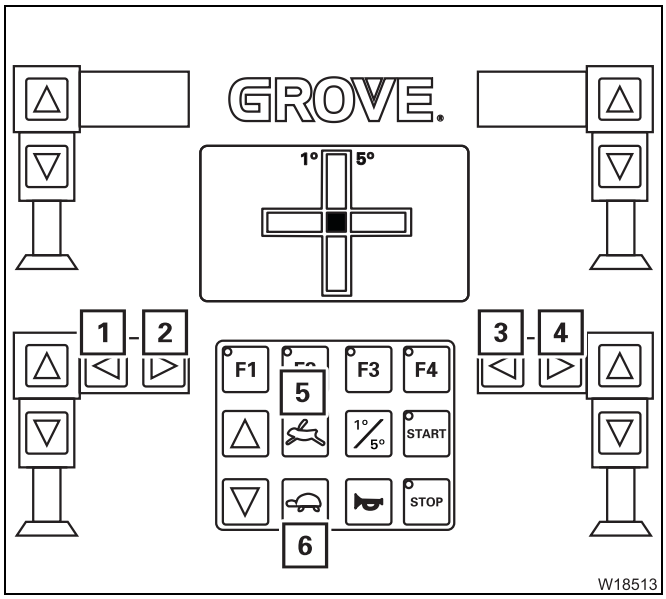
Only the lamp (**1**) lights up after opening the door.

- 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 outrigger beams; ➠ p. 12 - 35.



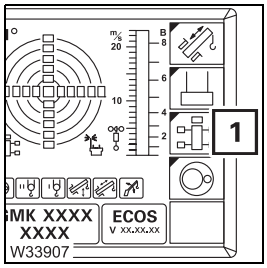
- Press the button
  - **5** For high-speed mode
  - **6** For normal speed.
- Additionally press the button for the desired outrigger beam.
  - **1** Extend left
  - **2** Retract left
  - **3** Retract right
  - **4** Extend right
  - **1 + 4** Extend both
  - **2 + 3** Retract both

The outrigger beams move until you let go of the respective button or until the respective end position has been reached.

14.03.2018

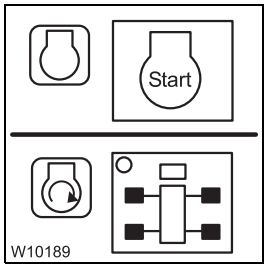
From the crane cab

The following operating elements are found in the *Outriggers* submenu.



Opening the submenu

- In the main menu, press button (**1**) once.
  The *Outriggers* submenu opens.

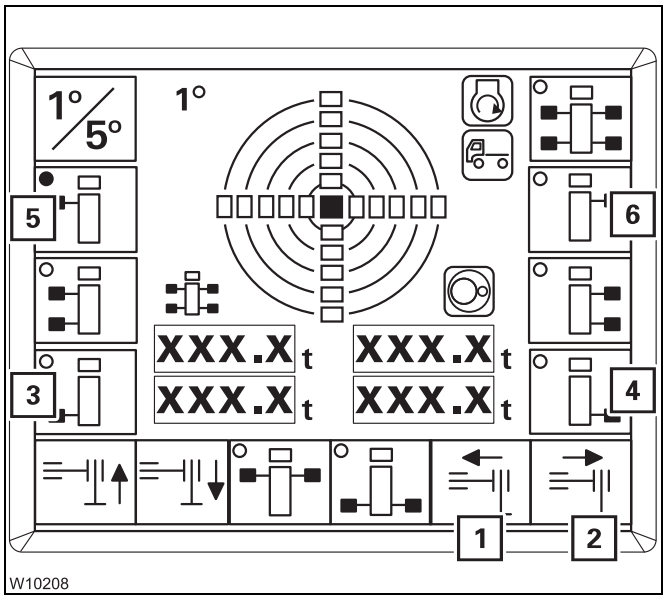


Start the engine

- Switch the carrier ignition on and start the engine for driving; ➠ p. 12 - 23.
- Switch off the slewing gear.

Pre-selecting outriggers

Only pre-select one outrigger. If you pre-select several outriggers, operation of the outriggers is not enabled.



- Press the button once next to the symbol for the desired outrigger.
  - **3** Rear left
  - **4** Rear right
  - **5** Front left
  - **6** Front right

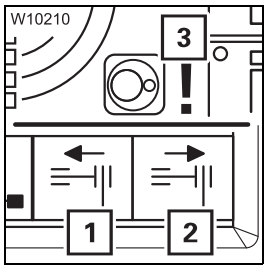
Pre-selection is switched on.

– The dot in the symbol turns **green**, e.g. in symbol (**5**).

– The symbols (**1**) and (**2**) turn **black**.

The pre-selection is switched off after approx. 10 seconds.

14.03.2018

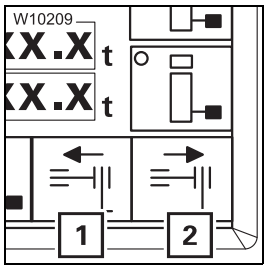


If the symbol (**3**) appears, this means that the slewing gear is switched on – the symbols (**1**) and (**2**) remain grey.

- Switch off the slewing gear.

Extending/retracting outrigger beams

- Observe the safety instructions for operating the outrigger beams; p. 12 - 35.



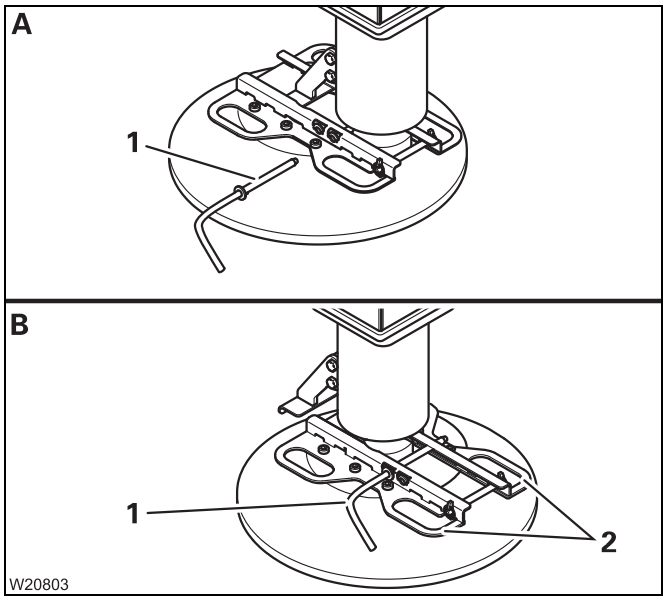
- Press the button below the symbol for the desired movement:
  - **1** Retract
  - **2** Extend

The pre-selected outrigger moves until you let go of the respective button or until the respective end position has been reached.

14.03.2018

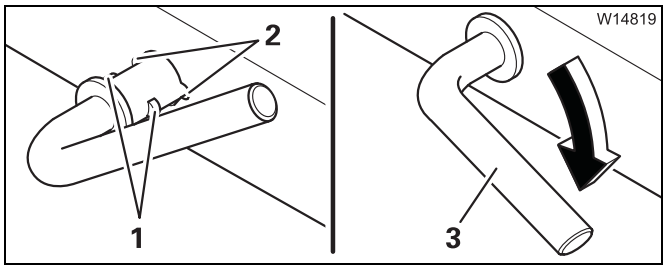
12.6.7 Moving the outrigger pads into working/driving position

The illustrations show one outrigger pad. The pulling direction of the other outrigger pads may differ from this.



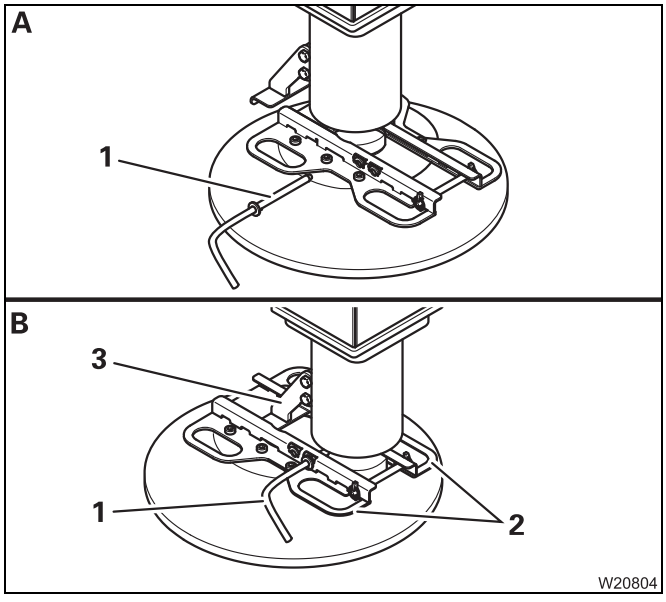
Moving them into working position

- (**A**) – Pull out the pin (**1**).
- (**B**) – Pull the outrigger pad outwards by the handles (**2**).
- Secure the outrigger pad with the pin (**1**).
- Secure the pins (**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**) downward.



Moving into driving position

- (**A**) – Pull out the pin (**1**).
- (**B**) – Push the outrigger pad by the handles (**2**) as far as possible back onto the clamp (**3**).
- Secure the outrigger pad with the pin (**1**).
- Secure the pins (**1**).
- Move the other outrigger pads into driving position in the same way.

14.03.2018

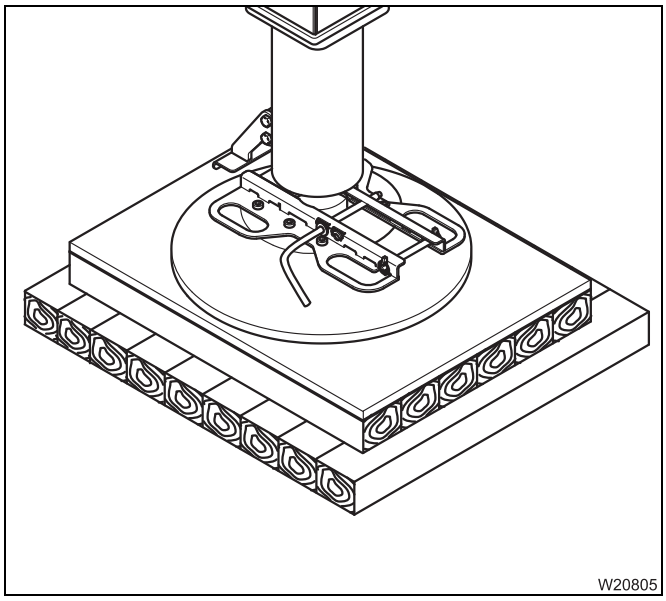
12.6.8 Enlarging the load-bearing area

If the surface of the outrigger pads is too small, you must enlarge the ground bearing area by packing the outrigger pads; *Determining the required load-bearing area*, p. 12 - 9.

For packing, use only suitable materials that will withstand the outrigger pressure, e.g. straight hardwood of similar cross-sections or steel plates with welded-on strips that will keep the outrigger pads in position.

Risk of 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.



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.

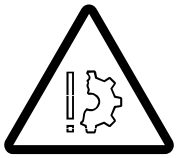
Consult your supervisor if you are in doubt.

14.03.2018

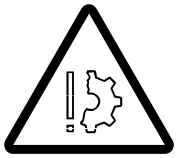
12.6.9 Extending/retracting supporting cylinders

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 support points.
This prevents the supporting cylinders being damaged due to one-sided pressure.



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

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.

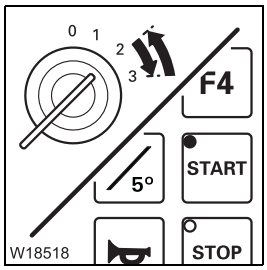
There are various operating elements for moving the outrigger beams

– On the *Outrigger* control units; ➠ p. 12 - 42,
– In the crane cab; ➠ p. 12 - 43.

14.03.2018

From the control units

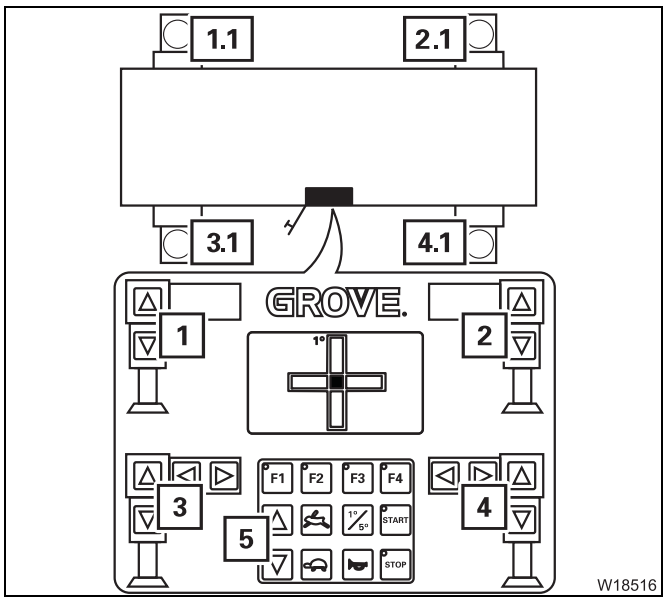
If the hand-held control is connected, the *Outrigger* operating units are inactive.



Start the engine

- Disconnect the hand-held control, if necessary, and start the engine either:

– From the driver's cab; ➠ p. 4 - 15,
or
– From the control units; p. 12 - 26.

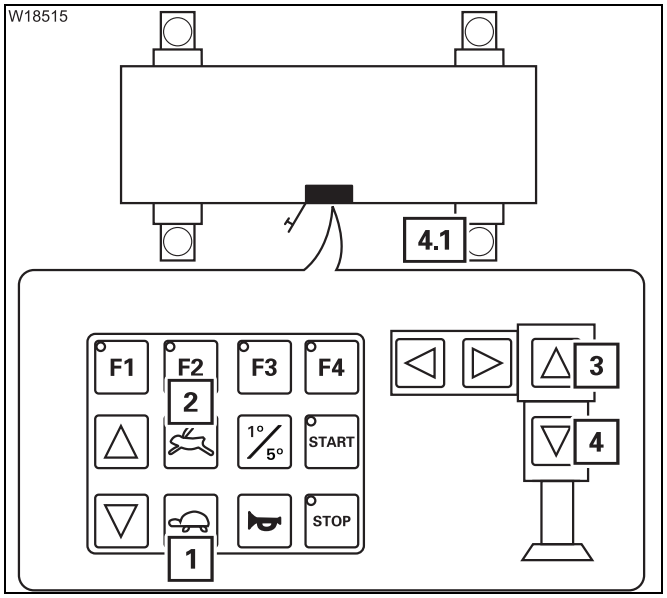


Moving the supporting cylinders

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 - 41.



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

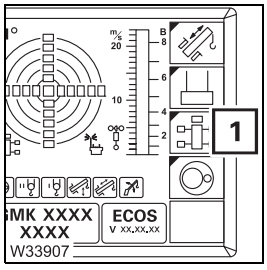
You can also operate several supporting cylinders at the same time.

The supporting cylinders move until you let go of the respective button or until the respective end position has been reached.

14.03.2018

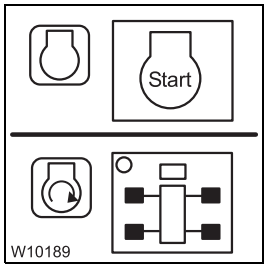
From the crane cab

The following operating elements are found in the *Outriggers* submenu.



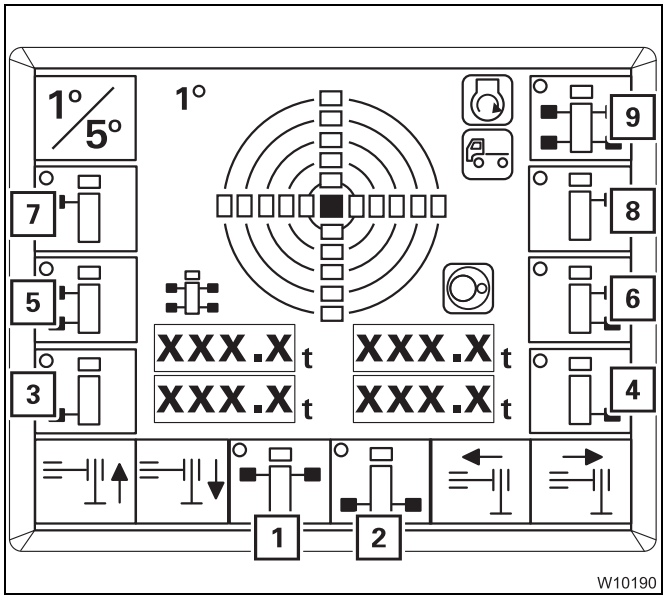
Opening the submenu

- In the main menu, press button (**1**) once.
  The *Outriggers* submenu opens.



Start the engine

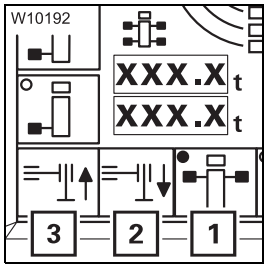
- Switch the carrier ignition on and start the engine for driving;
  ➠ p. 12 - 23.
- Switch off the slewing gear.



Pre-selecting outriggers

- Press the button once next to the symbol for the desired outrigger.

  1 Both at front
  2 Both at rear
  3 Rear left
  4 Rear right
  5 Both on left
  6 Both on right
  7 Front left
  8 Front right
  9 All

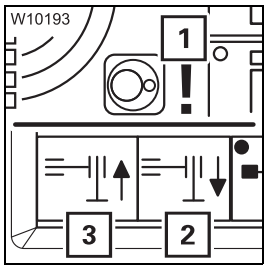


Pre-selection is switched on.

– The dot in the symbol turns **green**, e.g. in symbol (**1**).

– The symbols (**2**) and (**3**) turn **black**.

The pre-selection is switched off after approx. 10 seconds.

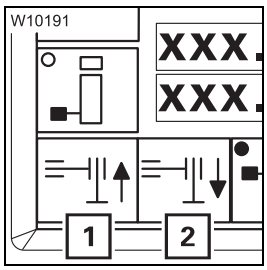


If the symbol (**1**) appears, this means that the slewing gear is switched on – the symbols (**2**) and (**3**) remain grey.

- Switch off the slewing gear.

Extending/retracting supporting cylinders

- Observe the safety instructions for operating the supporting cylinders; p. 12 - 41.



- Press the button below the symbol for the desired movement:
  - **1** Retract
  - **2** Extend

The pre-selected supporting cylinders move until you let go of the respective button or until the respective end position has been reached.

14.03.2018

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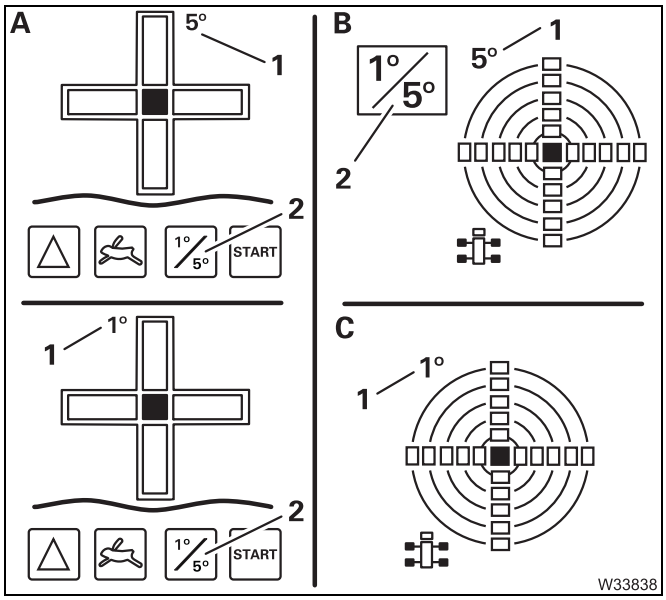
14.03.2018

12.6.10 Levelling the truck crane on outriggers

You must level the truck crane before crane operation and possibly correct its horizontal alignment during crane operation.

Inclination indicators

After switching on the ignition, various inclination indicators display the current alignment.



A On the *outrigger* control units

On the *ECOS* display

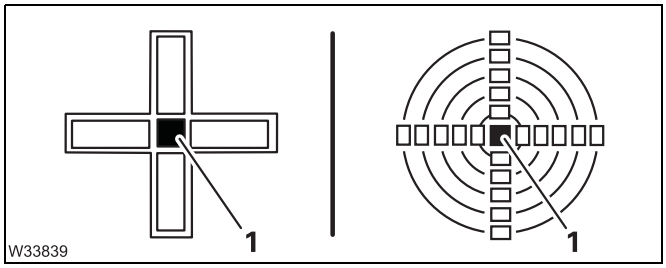
B In the *Outriggers* submenu

C In the main menu

Switch measuring range

You can change the measuring range between 1° and 5°.

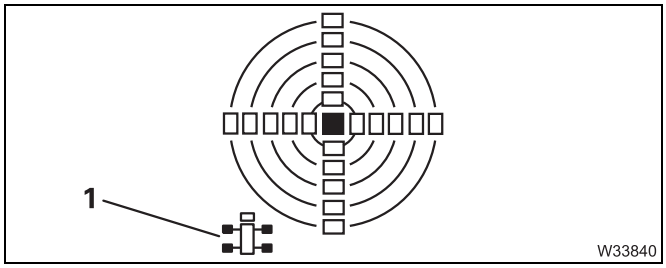
- Press the button (**2**) once.
  The current measuring range (**1**) is displayed.



Reading the display

Only the lamp (**1**) at the centre is on if the truck crane is level.

The other lamps show the sides of the truck crane which are higher.

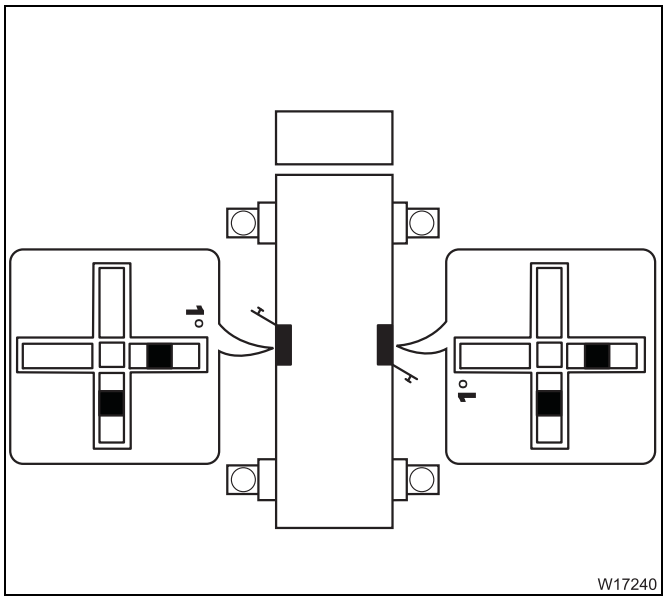


– *ECOS* hand-held control/display

The assignment to the carrier is given by the directional indicator (**1**).

In this example, the carrier would be standing higher to the rear on the right hand side.

14.03.2018



– *Outrigger* control units

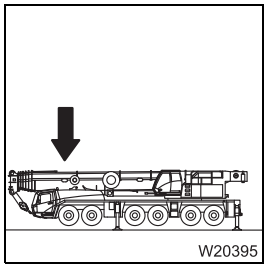
The assignment to the carrier corresponds to the top view.

Due to the position of the control units, the displays on both sides differ.

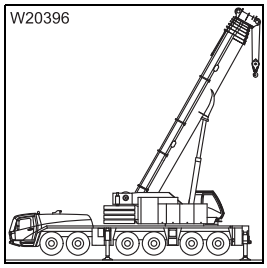
In this example, the carrier would be standing higher to the rear on the right hand side.

Prerequisites

The following prerequisites apply to manual and automatic alignment.



The main boom must be resting on the boom rest.



Or

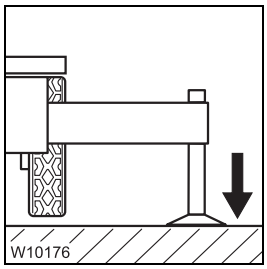
– the main boom must be raised **and**
– the load must have been set down **and**
– the superstructure must be in the 0° or 180° position.

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 distort the indicated inclination and the truck crane will be at an angle. This could cause the boom to become overloaded during crane operation.

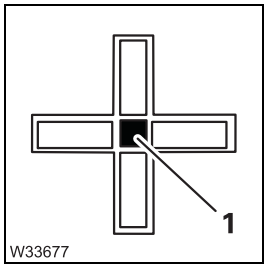
14.03.2018

Manual alignment

- Check that the prerequisites are met; ➠ p. 12 - 47.



- 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 - 41.
- Only lift the truck crane as far as necessary.

Checks to be performed after levelling

During levelling, the ground may give way and the packing may slip.

Risk of accident due to incorrectly supported truck crane!
Perform the following checks each time you have levelled the truck crane and correct any misalignments.
Otherwise the truck crane may overturn even when lifting a load allowed by the RCL.

- After you have levelled the truck crane, check:
  - whether all the wheels are lifted off the ground,
  - whether the ground under one of the outrigger pads has given way,
  - that the packing is correct for the enlarged load-bearing area.

If slewing is permissible in the current rigging mode:

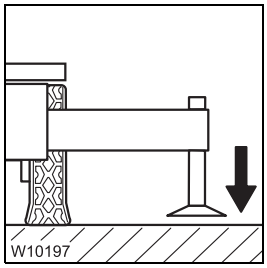
- Slew the superstructure within the permissible slewing range.
- Perform the specified checks again.
- Check the horizontal alignment on the inclination indicator.

14.03.2018

Automatic alignment

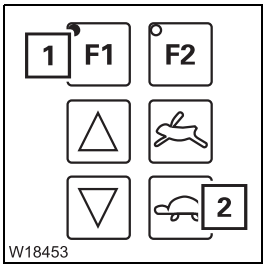
During the automatic alignment procedure, the supporting cylinders are **ex**tended only to prevent any wheels touching the ground after the alignment.

- Check that the prerequisites are met; ➠ p. 12 - 47.



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

Starting procedure

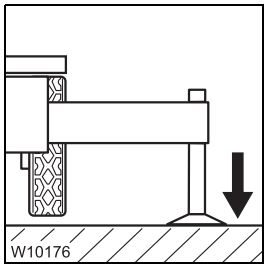


On the control units

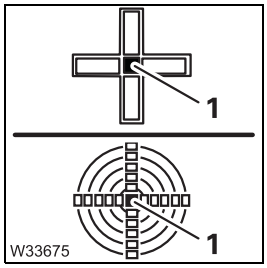
- Press the button (**1**) once.
- Additionally, press the button (**2**).

The procedure begins.

Automatic procedure



1. All the 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 levelled 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 ECOS ends the automatic alignment procedure, the truck crane is not necessarily level.
Always check the horizontal alignment on the inclination indicator after automatic levelling.

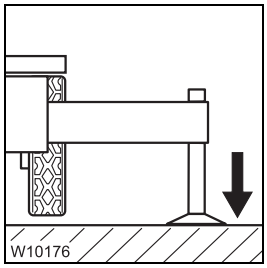
14.03.2018

12.6.11 Levelling the free-on-wheels truck crane

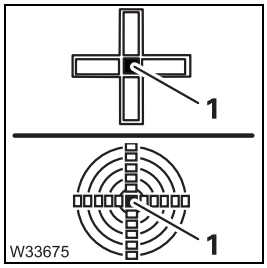
The suspension is deactivated (locked) if the truck crane is in the *Free on wheels* working position.
The suspension must remain switched off until the truck crane is on outriggers.

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 when operating individual supporting cylinders.

- Set down the load.



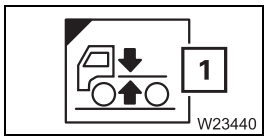
- Extend the supporting cylinders until all wheels are just above the ground.



Levelling the truck crane

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

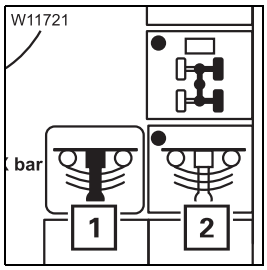
Danger of overturning when switching on the suspension!
You may under no circumstances switch on the suspension as long as the rigged truck crane is on wheels. Switching on the suspension would cause the suspension struts to be suddenly pressed together and damaged, and the truck crane could overturn.



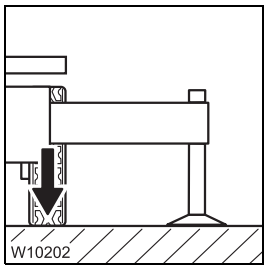
Switching on the suspension

- In the driver's cab, open the *Level adjustment system* submenu – Press button (**1**) once.

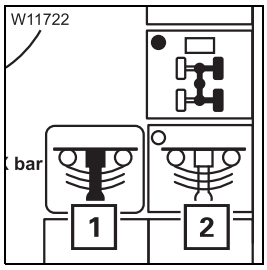
14.03.2018



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

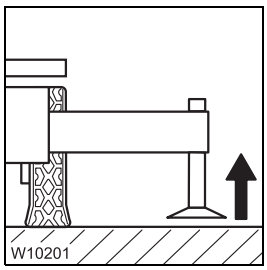


Now all wheels are lowered to the ground and are in the right position for the horizontal alignment.



Switching off the suspension

- Press the (**2**) button once – dot is **black**.
  The symbol (**1**) is **red** if the suspension is switched off.



To secure the truck crane

- Retract the supporting cylinders until the outrigger pads are about 5 to 10 cm (2 to 4 in) above the ground. Leave the outrigger beams extended.

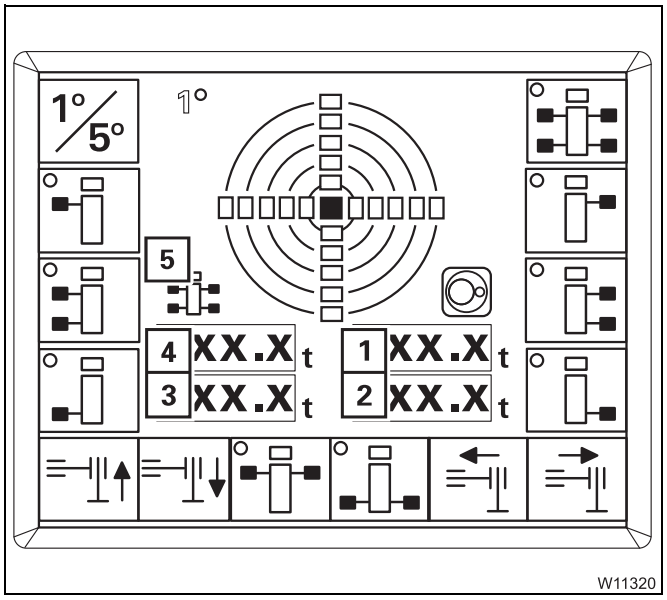
14.03.2018

12.6.12 Outrigger pressure display

After switching on the ignition, the outrigger pressure displays indicate the current outrigger pressure for all supporting cylinders.
The set unit (t or klbs) is shown next to the displays.

Outrigger cylinders retracted or extended as far as possible will lead to an incorrect outrigger pressure display.
The display will show the most accurate reading if the movement performed last was *Extend outrigger cylinders*.

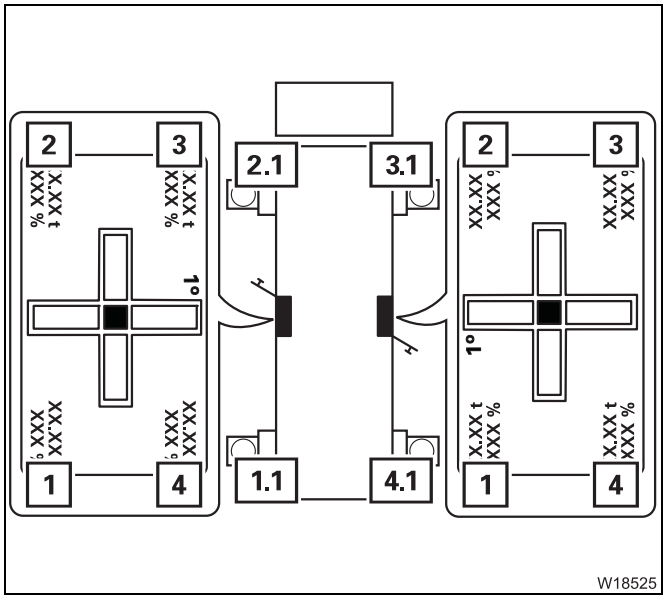
Risk of accidents when misused!
A displayed outrigger pressure over 0 t does nor guarantee protection against overturning or overloading. For this reason, never override the RCL.



In the Outriggers submenu

The assignment of the displays to the carrier is given by the directional indicator (**5**).

1 Front right outrigger pressure
2 Rear right outrigger pressure
3 Rear left outrigger pressure
4 Front left outrigger pressure



On the outrigger control units

The assignment of the displays to the carrier corresponds to the top view.

1 Display for the 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**

14.03.2018

12.7 Rigging/unrigging the counterweight

Depending on the version, the GMK6300L-1 can be equipped with a counterweight mass of 7.0 t (15,432 lbs) to 92.5 t (203,928 lbs).

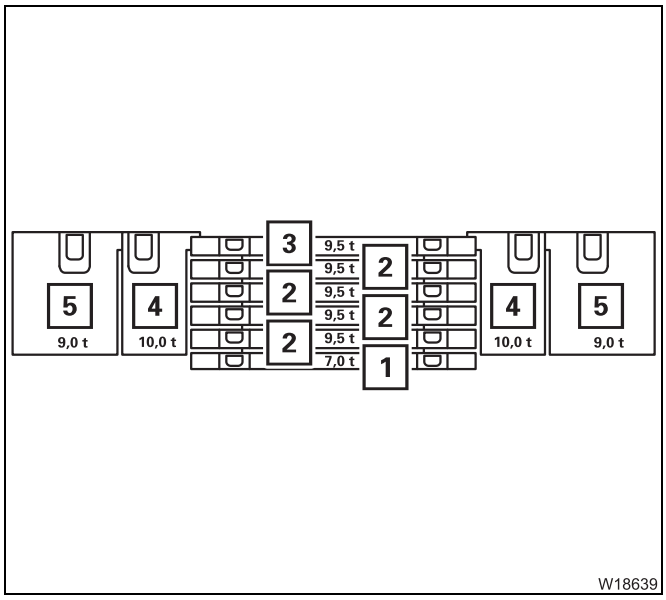
12.7.1 Counterweight sections

There are various counterweight sections, depending on the truck crane's version and additional equipment.

The counterweight combinations can be comprised of:

Version A

In this version, the counterweight must be completely unrigged when driving with axle loads of a maximum 12 t (26,455 lbs).



- one 7.0 t base plate (**1**)
- four 9.5 t counterweight sections (**2**)
- one 9.5 t counterweight section (**3**), with the cutouts and recesses

The counterweight section (**3**) must always be placed on top with the 54.5 t (120,152 lbs) counterweight combination.

- two 10.0 t counterweight blocks[1)] (**4**)
- two 9.0 t counterweight blocks[1)] (**5**)

[1)] Additional equipment

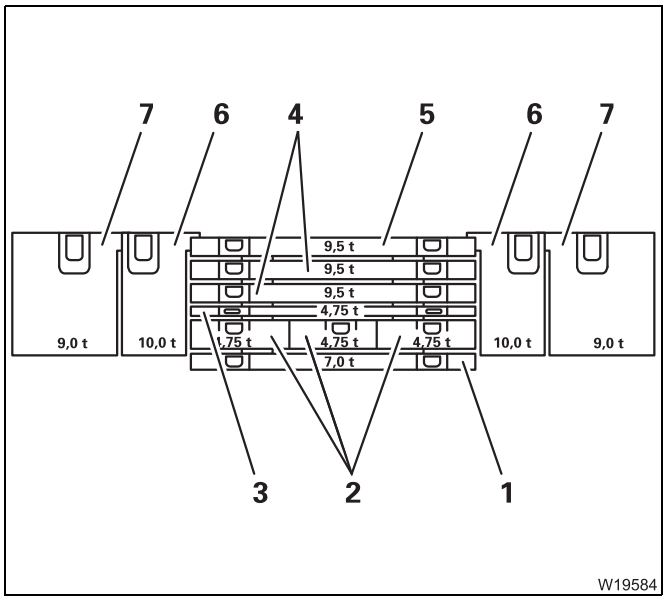
In counterweight combinations from 54.5 t (120,152 lbs), the counterweight section (**3**) must always be on top.

14.03.2018

Version B

In this version, up to a maximum of 21.2 t (46,738 lbs) can be transported with the truck crane. The axle loads are over 12 t (26,455 lbs).

The counterweight combinations can be comprised of:



- one 7.0 t base plate (**1**)
- three 4.75 t counterweight sections (**2**)
- one 4.75 t counterweight section (**3**)
- two 9.5 t counterweight sections (**4**)
- one 9.5 t counterweight section (**5**), with the cutouts and recesses

The counterweight section (**5**) must always be placed on top for counterweight combinations from 54.5 t (120,152 lbs).

- two 10.0 t counterweight blocks[1)] (**6**)
- two 9.0 t counterweight blocks[1)] (**7**)

[1)] Additional equipment

In counterweight combinations from 54.5 t (120,152 lbs), the counterweight section (**5**) must always be on top.

14.03.2018

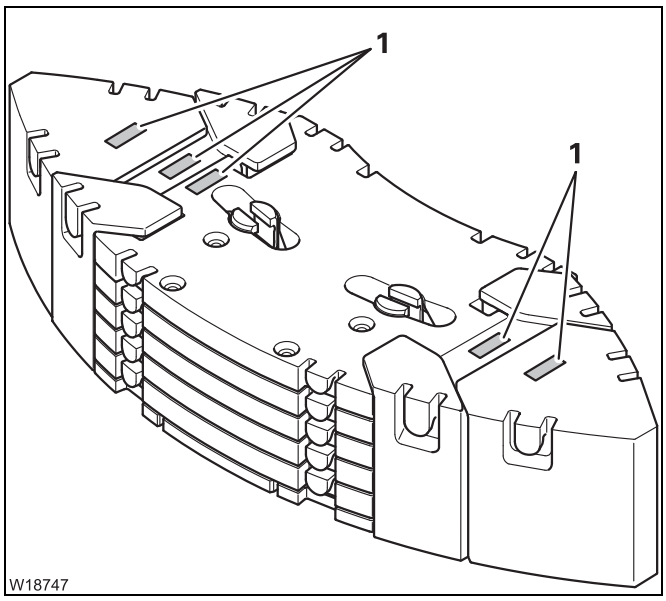
12.7.2 Identification

The truck crane and its corresponding counterweight sections are labelled with the same serial number.

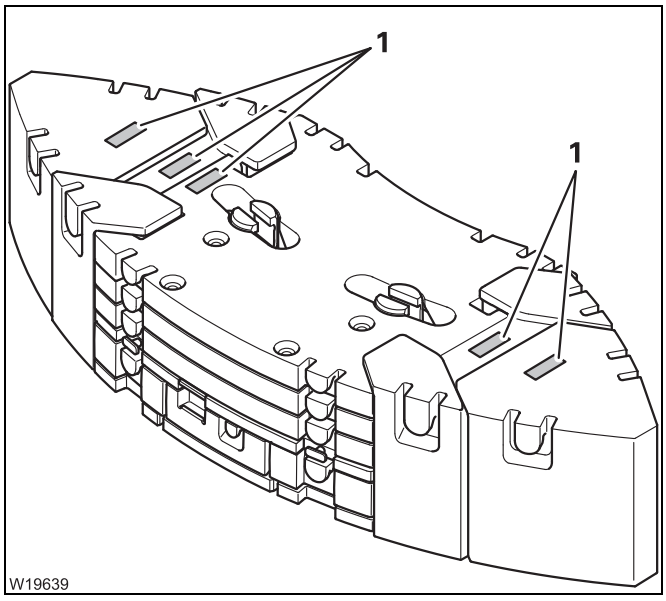
Danger if counterweight sections are interchanged!
Operate the truck crane only with the counterweight sections that belong to it. The truck crane and counterweight sections are labelled with the same serial number.
Other or additional counterweight sections may not be rigged.

The serial number (**1**) of all counterweight sections and blocks is indicated on the top.

Version A



Version B



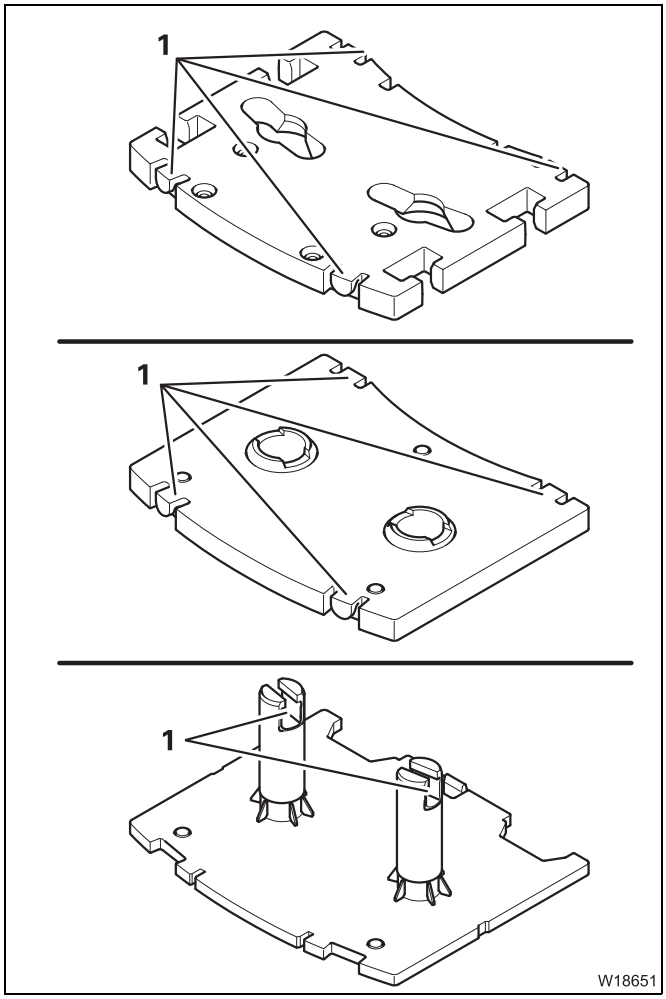
14.03.2018

12.7.3 Slinging points on the counterweight sections

Risk of accidents if used improperly!
Attach the various counterweight sections only to the intended slinging points and use lifting gear of sufficient lifting capacity.
Only lift the sections one by one, since the slinging points are not designed for lifting stacked sections.

- Only use lifting gear of sufficient load bearing capacity.
  Weights; ➠ *Counterweight parts*, p. 1 - 12.

There are different types of slinging points.



Slinging points on version A sections

Four slinging points each (**1**) are located on

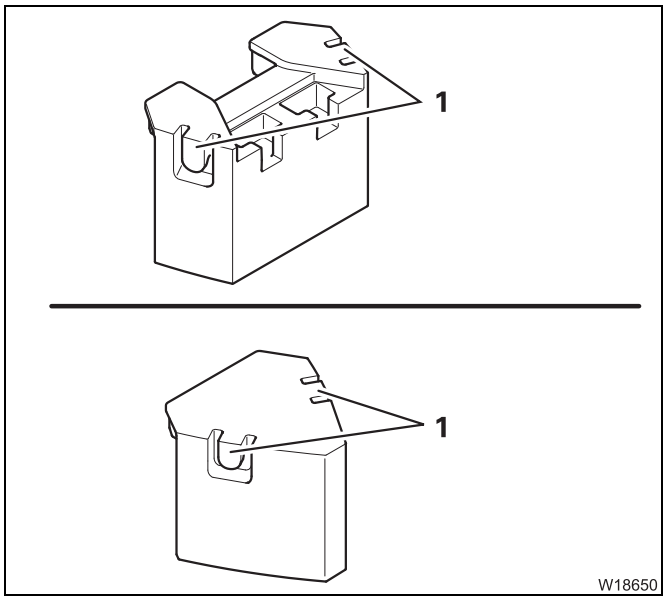
– the 9.5 t section with cutouts and recesses,

– the four 9.5 t sections and

Two slinging eyes (**2**) are located on

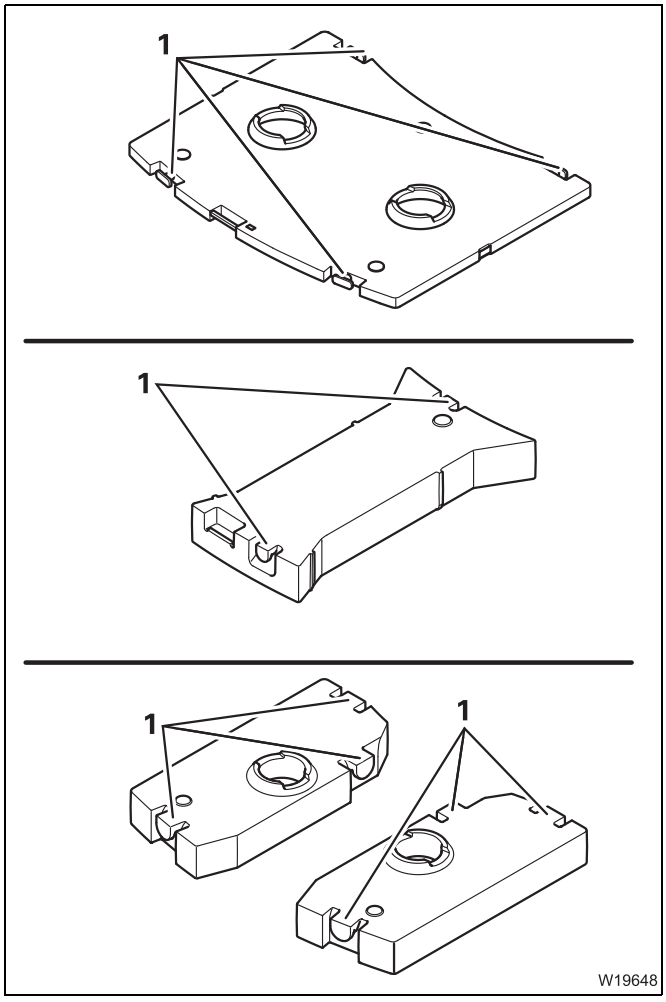
– the 7.0 t base plate.

14.03.2018



Slinging points on the blocks

Two slinging points each (**1**) are on the 9 t and 10 t blocks.



Slinging points on version B sections

In contrast to version **A**, there are:

– four slinging points (**1**) on the 4.75 t section,

– two slinging points (**1**) on the 4.75 t section,

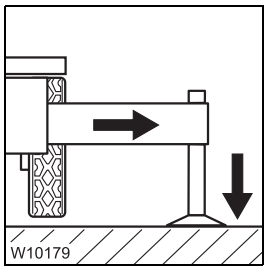
– three slinging points (**1**) respectively on the 4.75 t sections.

14.03.2018

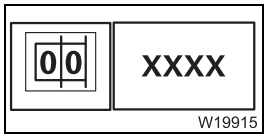
12.7.4 CHECKLIST: Rigging the counterweight

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

Danger of overturning when slewing with a rigged counterweight!
Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius).
Correct the rigging mode if necessary; ➠ *Slewing with rigged counterweight*, p. 12 - 83.

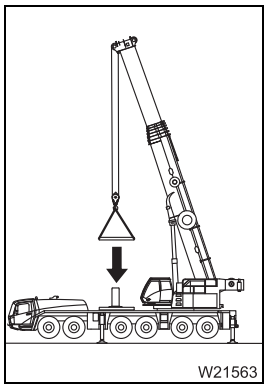


1. The truck crane is stabilised with the outrigger span required for crane work according to the *Lifting capacity table*; ➠ *Permissible outrigger spans*, p. 12 - 30.

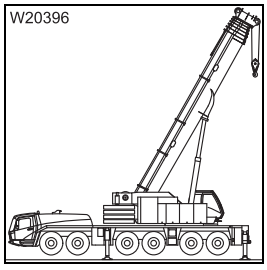


2. Enter the current rigging mode on the RCL; ➠ p. 11 - 23.

3. When the 3-sheave hook block is reeved:
   – extend telescopic section VI by 50%.

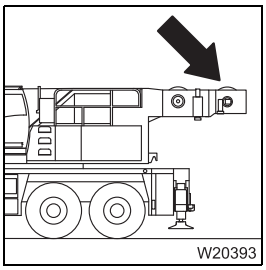


4. Assemble the required combination of counterweights:
   – Lower 7.0 t base plate on the counterweight platform; ➠ p. 12 - 64.
   – Lift the counterweight sections individually, one after another; ➠ p. 12 - 62.

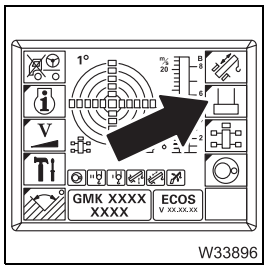


5. Slew the superstructure into the *0° to the rear* position; ➠ *Braking the slewing movement*, p. 11 - 99.

14.03.2018



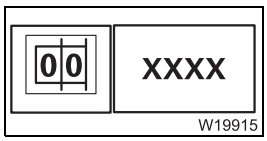
6. If required, assemble the auxiliary hoist; ➠ *CHECKLIST: Auxiliary hoist, installing*, p. 6 - 89.



7. Open the *Counterweight* submenu; ➠ p. 12 - 75.

– Correct the rigging mode, if necessary; ➠ p. 12 - 76.

– Slew the superstructure into the rigging range and lift counterweight to the turntable automatically and pretension; ➠ p. 12 - 77.



8. Enter the current rigging mode with the newly rigged counterweight combination on the RCL; ➠ p. 11 - 23.

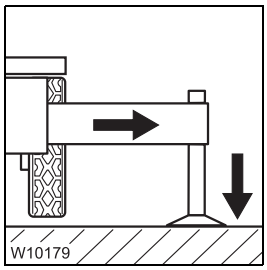
9. Only switch on the slewing gear if slewing is permissible for the current outrigger span; ➠ *Slewing with rigged counterweight*, p. 12 - 83.

14.03.2018

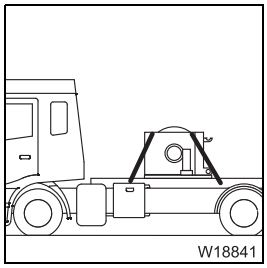
12.7.5 CHECKLIST: Unrigging the counterweight

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

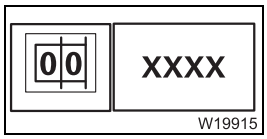
Danger of overturning when slewing with a rigged counterweight!
Before slewing with the rigged counterweight, check whether slewing is permissible with the rigged outrigger span or with the truck crane free on wheels; ➠ *Slewing with rigged counterweight*, p. 12 - 83.



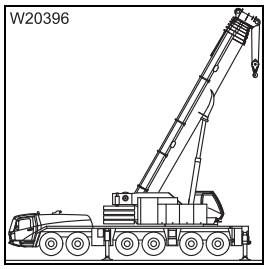
1. The truck crane is stabilised with the outrigger span required for crane work according to the *Lifting capacity chart*; ➠ *Permissible outrigger spans*, p. 12 - 30.



2. If required, remove the auxiliary hoist; ➠ *CHECKLIST: Auxiliary hoist, removing*, p. 6 - 91.

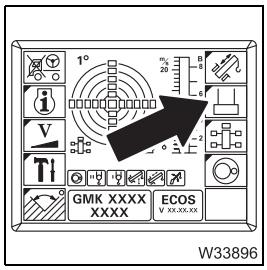


3. Enter the current rigging mode on the RCL; ➠ p. 11 - 23.

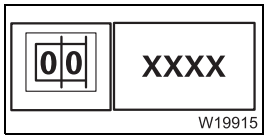


4. Slew the superstructure into the *0° to the rear* position; ➠ *Slewing with rigged counterweight*, p. 12 - 83.

14.03.2018



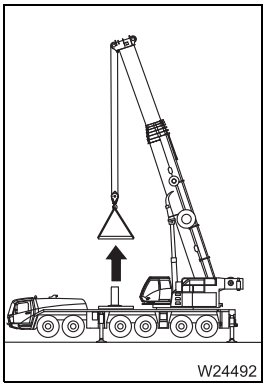
5. Open the *Counterweight* submenu; ➠ p. 12 - 75.



6. Enter the current rigging mode with the presently rigged counterweight version on the RCL; ➠ p. 11 - 23.

7. When the 3-sheave hook block is reeved:

– extend telescopic section VI by 50%.



8. Lift the counterweight sections off the counterweight platform, as required by the respective driving mode;
➠ *Driving modes*, p. 6 - 1,
➠ *Slinging points on the counterweight sections*, p. 12 - 56.

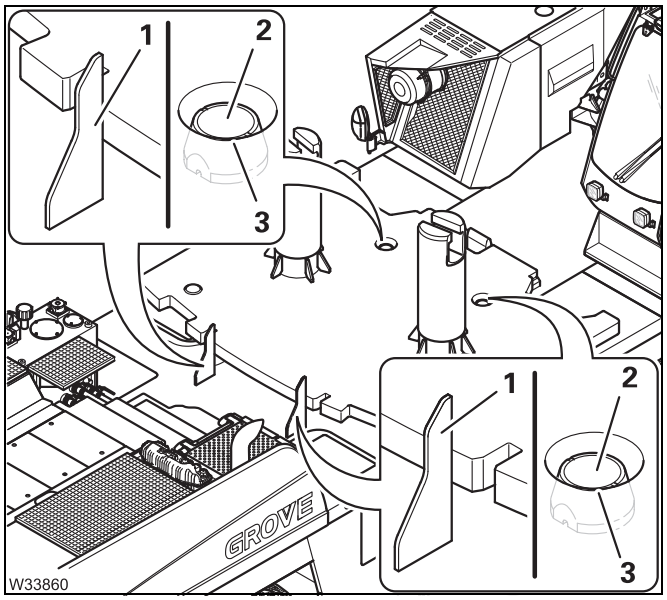
12.7.6 Assembling counterweight combination

Danger of overturning when slewing with a rigged counterweight!
When a counterweight version is rigged, check whether slewing is permitted with the current rigging mode (outrigger span, working radius). Correct the rigging mode if necessary; ➠ *Slewing with rigged counterweight*, p. 12 - 83.

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!
Anyone who climbs onto the carrier using one of the access ladders is within the slewing range of the superstructure.
Make sure nobody uses the access ladders (e.g. helpers) while you lift a section onto the carrier.

Risk of 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.
The counterweight sections should be lifted only one at a time. The slinging points are not designed for hoisting stacked counterweight sections.



Set down 7 t (15,432 lbs) base plate

Retainers (**1**) and (**2**) are fitted to the counterweight platform, which are used to bring the 7 t base plate into the correct position for rigging.

- Position the 7 t base plate in such a way that the retainers (**2**) grip into cutouts (**3**).

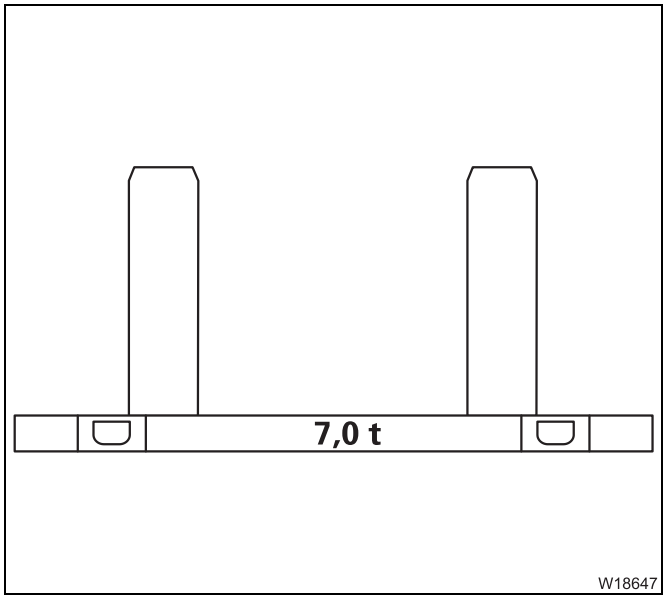
For larger counterweight combinations, now set additional counterweight sections onto the 7 t base plate.

14.03.2018

Combinations for the basic equipment in version A

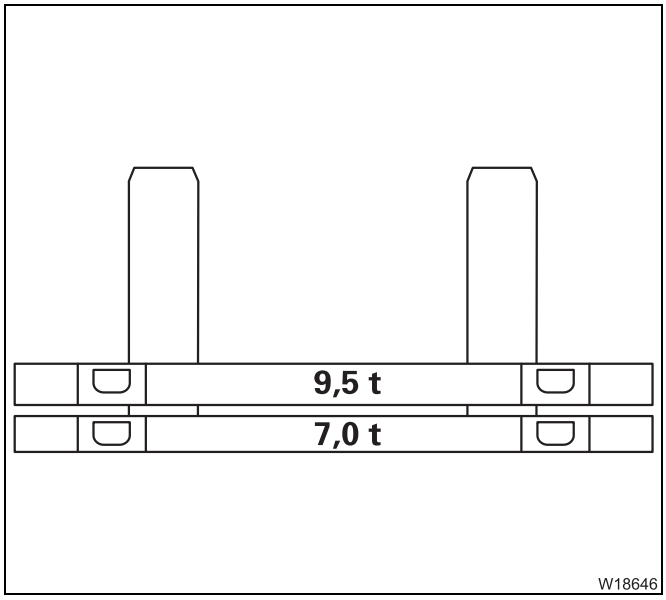
The following counterweight combinations can be combined on the counterweight platform.

Risk of accident due to an incorrect counterweight mass!
Only combine the counterweights in such a manner that the counterweight mass corresponds to the specifications in this section and in the *Lifting capacity table*. Other combinations are not permitted.



7.0 t (15,432 lbs)

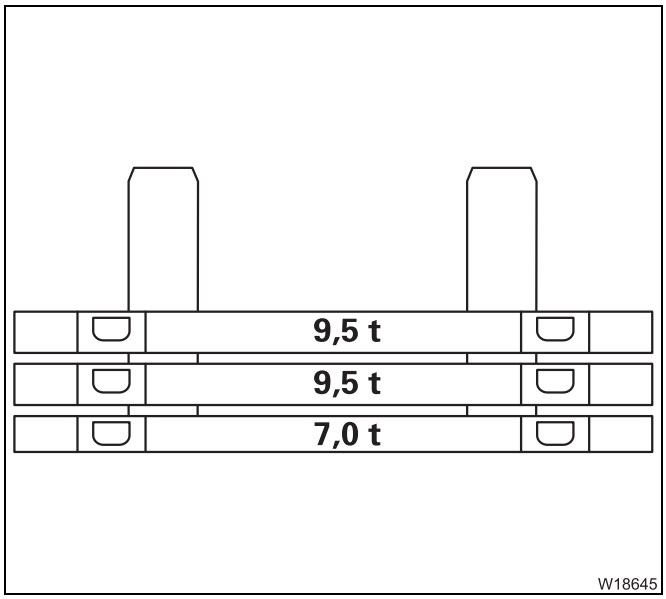
– 7 t base plate



16.5 t (36,376 lbs)

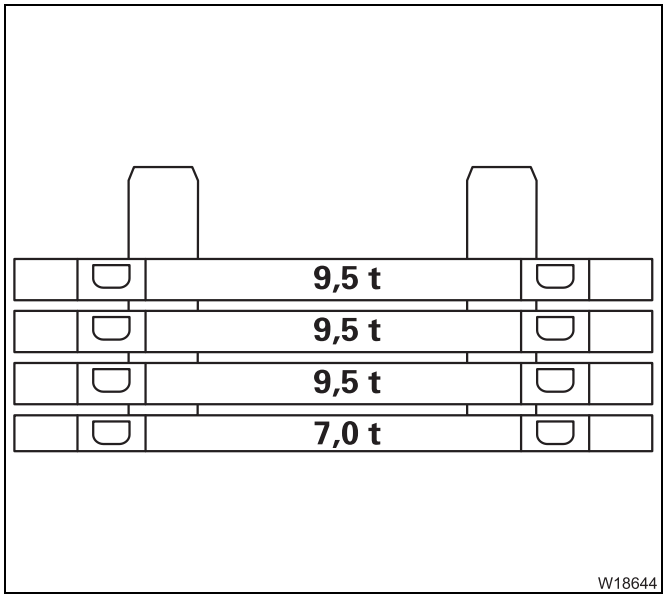
– 7 t base plate
– 9.5 t section

14.03.2018



26 t (57,320 lbs)

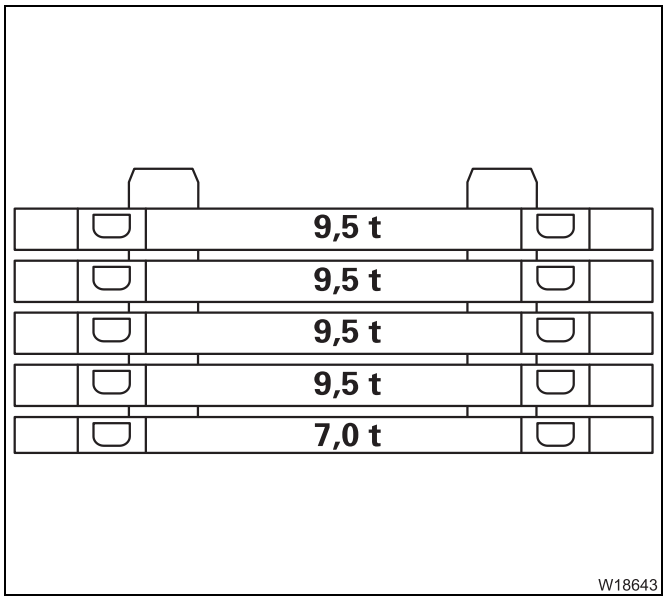
– 7 t base plate
– two 9.5 t sections



35.5 t (78,264 lbs)

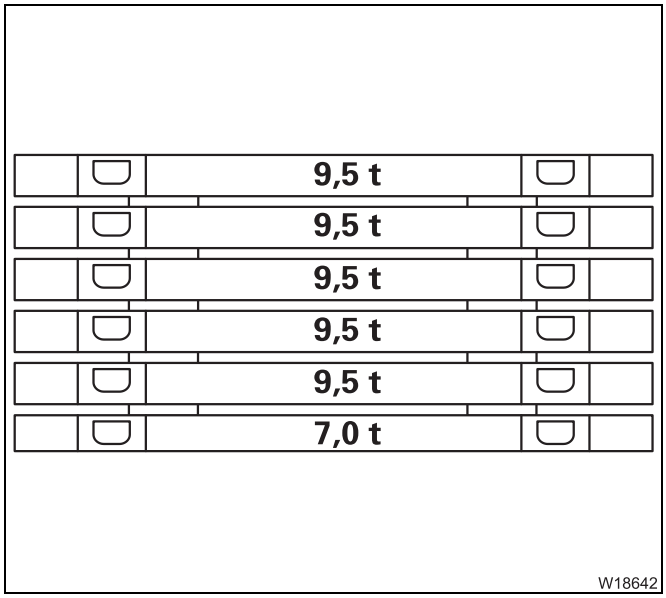
– 7 t base plate
– three 9.5 t sections

14.03.2018



45 t (99,208 lbs)

– 7 t base plate
– four 9.5 t sections



54.5 t (120,152 lbs)

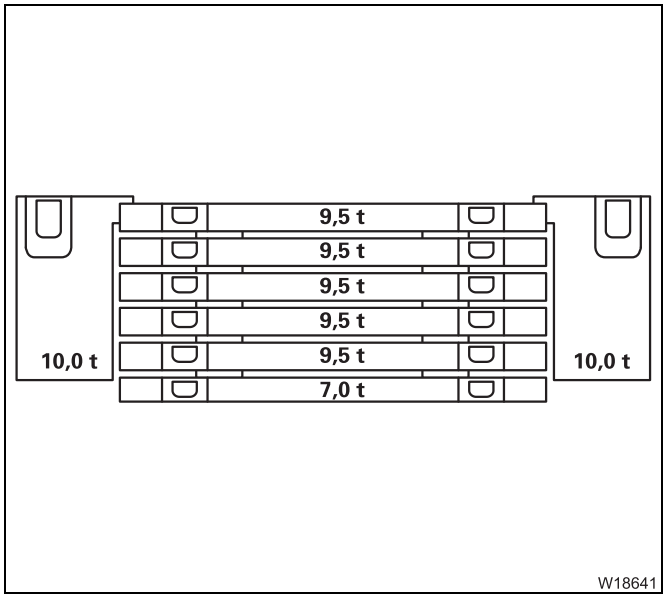
– 7 t base plate
– five 9.5 t sections

14.03.2018

Combinations for the additional equipment in version A

Depending on the additional equipment, other counterweight sections are available. This section shows how to assemble the additional counterweight combinations.

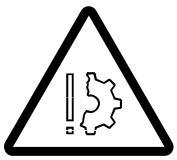
Risk of accident due to an incorrect counterweight mass!
Only combine the counterweights in such a manner that the counterweight mass corresponds to the specifications in this section and in the *Lifting capacity table*. Other combinations are not permitted.



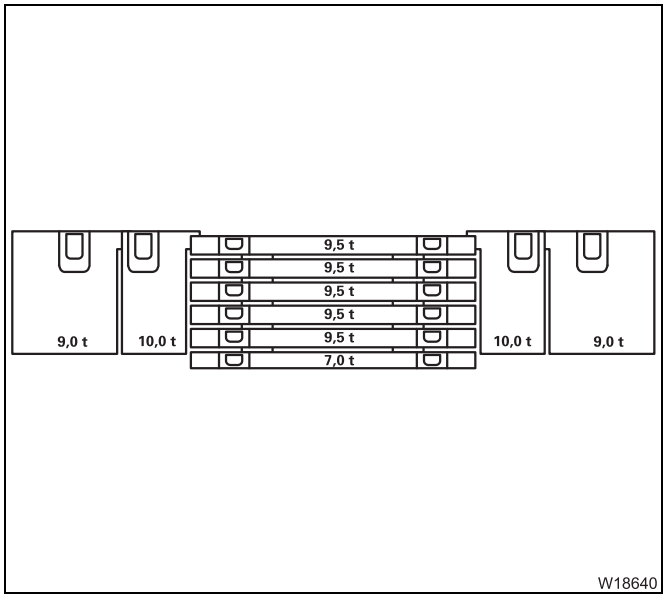
74.5 t (164,244 lbs)

– 7 t base plate
– five 9.5 t sections
– two 10 t blocks[1)]

1) Additional equipment



Risk of overturning if counterweight rigging sequence is incorrect!
When installing, always attach both 10-t counterweight blocks before you attach a 9-t counterweight block and, during removal, always remove both 9-t counterweight blocks before you remove a 10-t counterweight block. If you attach both blocks on one side first, the entire counterweight will fall off the carrier and may cause injury to you or other persons.



92.5 t (203,928 lbs)

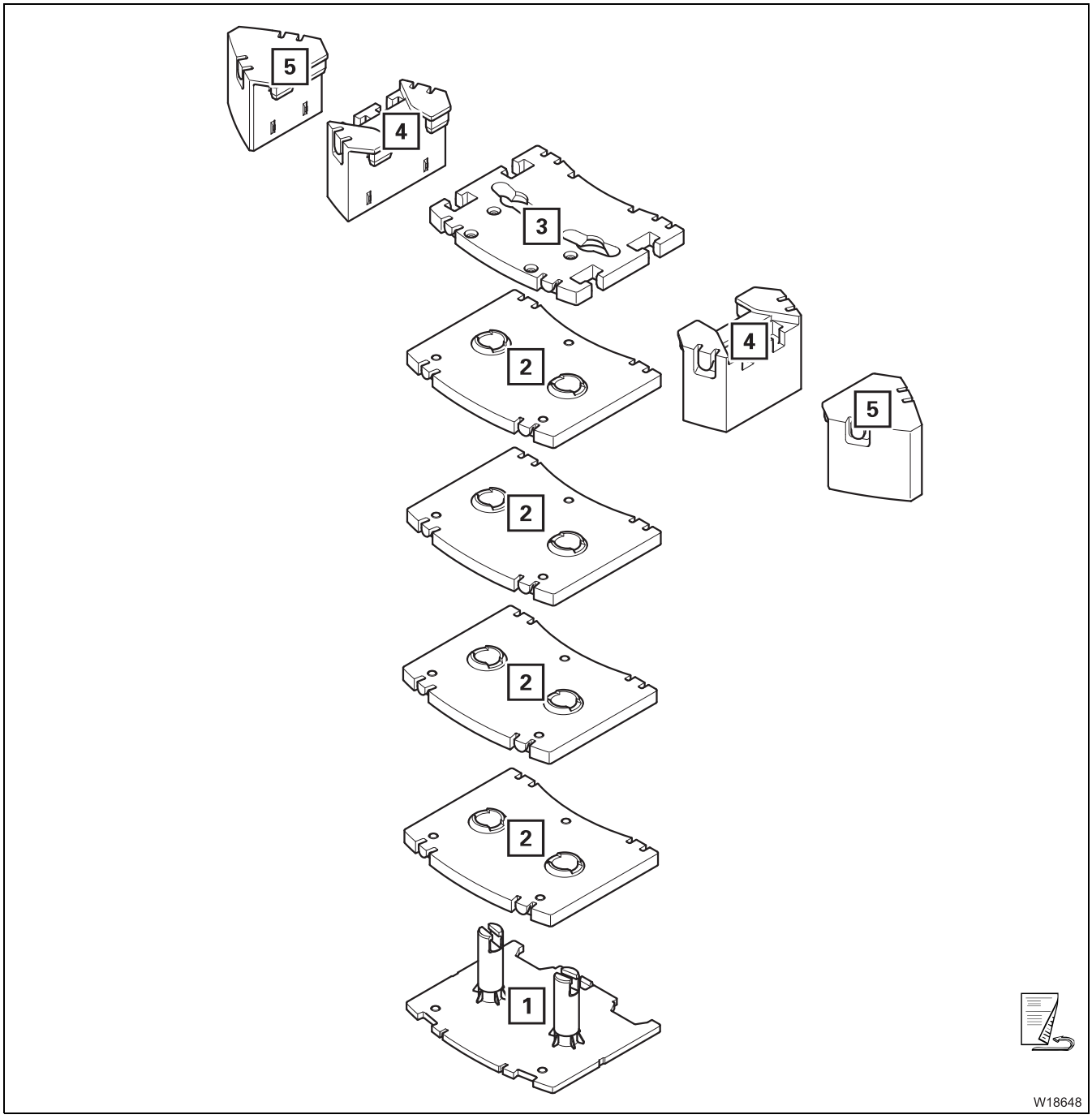
– 7 t base plate
– five 9.5 t sections
– two 10 t blocks[1)]
– two 9 t blocks[1)]

1) Additional equipment

14.03.2018

The diagram shows all counterweight sections in version **A** with additional equipment (**4**) and (**5**) with the maximum counterweight mass of 92.5 t (203,928 lbs).

– The base plate (**1**) must always be at the bottom.
– The counterweight sections (**2**) can be exchanged among each other.
– The counterweight section (**3**) must always be placed on top with the 54.5 t (120,152 lbs) counterweight combination.
– The counterweight blocks (**4**) can only be attached to the counterweight section (**3**).
– The counterweight blocks (**5**) can only be attached to the counterweight blocks (**4**).

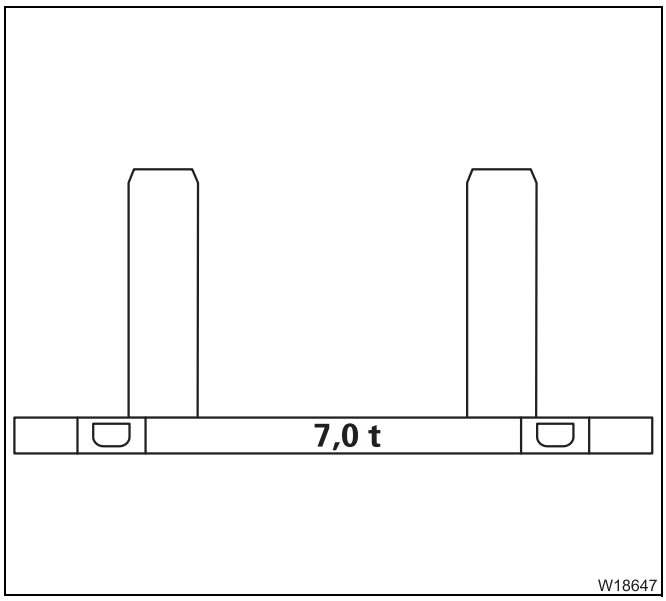


14.03.2018

Combinations for the basic equipment in version B

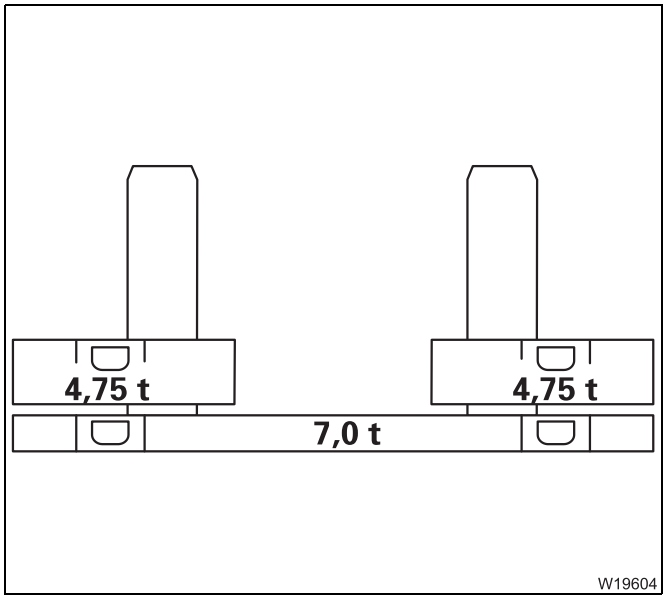
The following counterweight combinations can be combined on the counterweight platform.

Risk of accident due to an incorrect counterweight mass!
Only combine the counterweights in such a manner that the counterweight mass corresponds to the specifications in this section and in the *Lifting capacity table*. Other combinations are not permitted.



7.0 t (15,432 lbs)

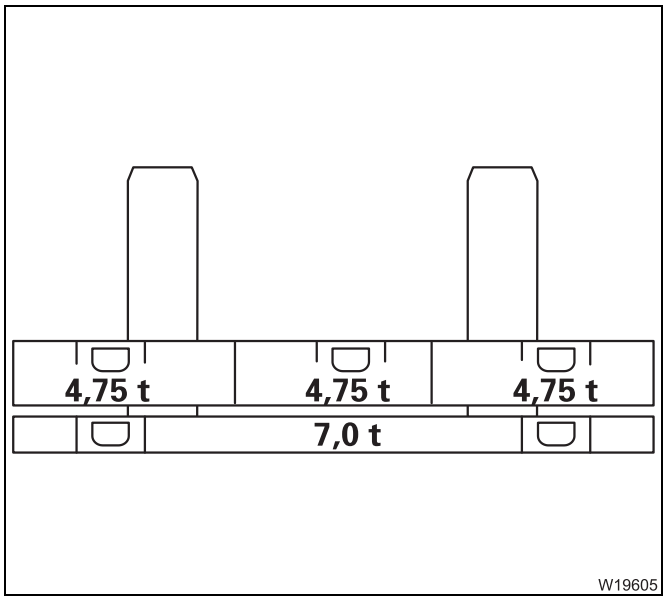
– 7 t base plate



16.5 t (36,376 lbs)

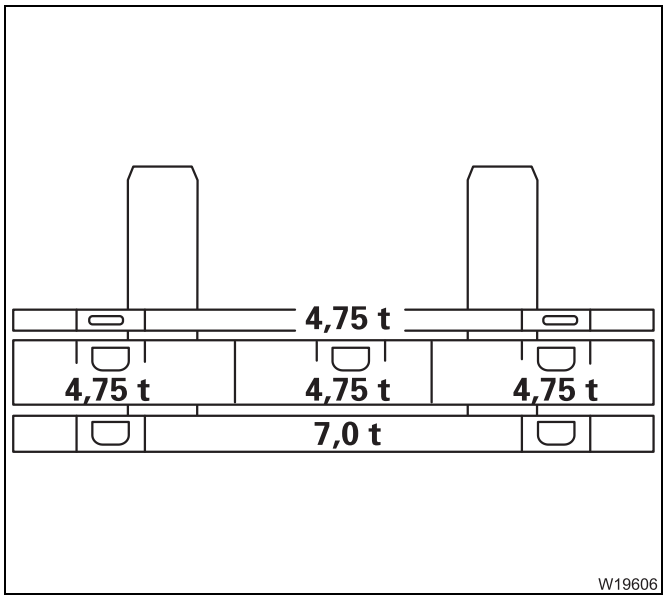
– 7 t base plate
– Two 4.75 t sections

14.03.2018



21.2 t (46,738 lbs)

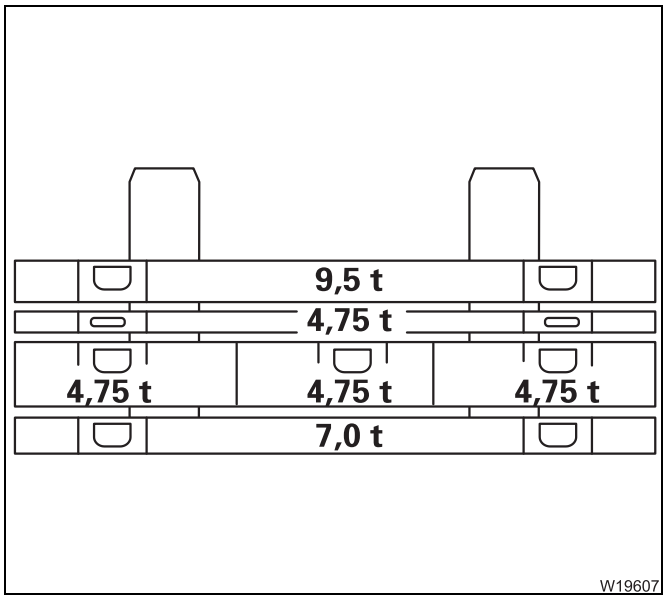
– 7 t base plate
– Three 4.75 t sections



26 t (57,320 lbs)

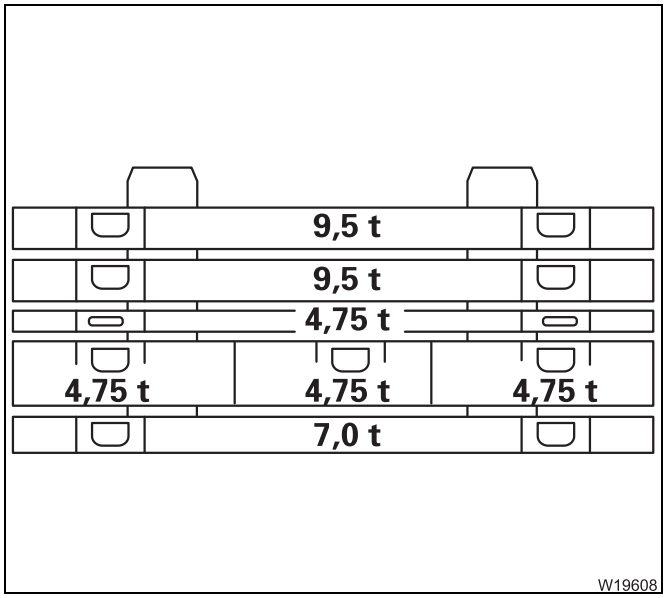
– 7 t base plate
– Four 4.75 t sections

14.03.2018



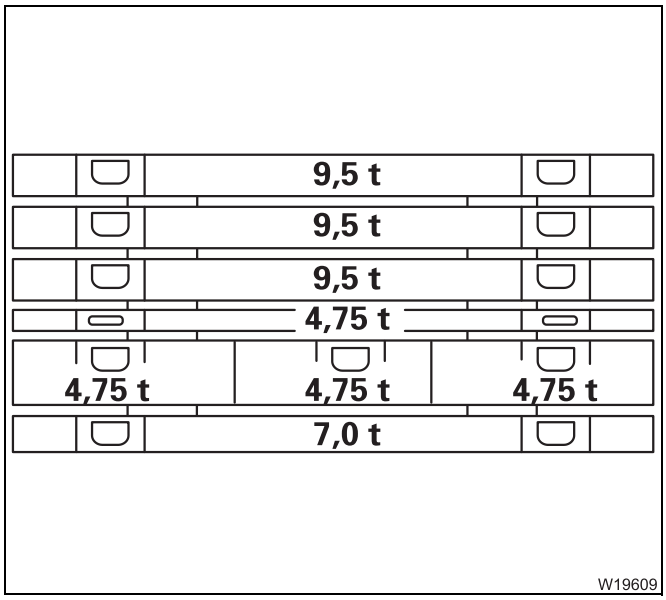
35.5 t (78,264 lbs)

– 7 t base plate
– four 4.75 t sections
– one 9.5 t section



45 t (99,208 lbs)

– 7 t base plate
– four 4.75 t sections
– two 9.5 t sections



54.5 t (120,152 lbs)

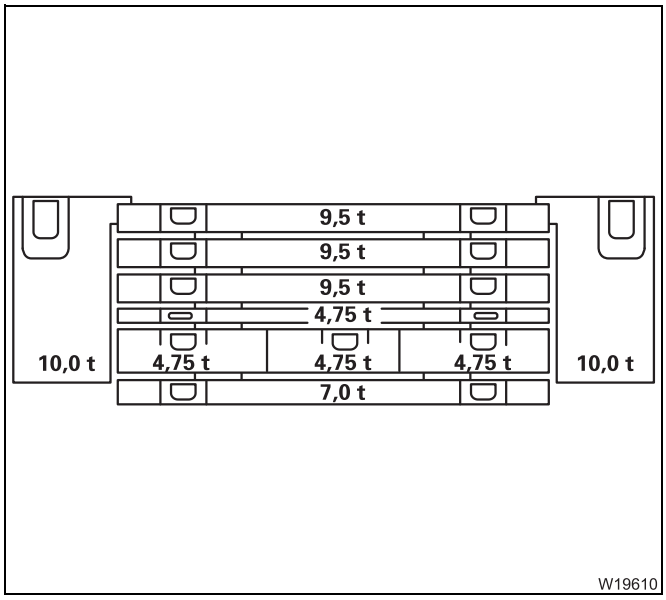
– 7 t base plate
– four 4.75 t sections
– three 9.5 t sections

14.03.2018

Combinations for the additional equipment in version B

Depending on the additional equipment, other counterweight sections are available. This section shows how to assemble the additional counterweight combinations.

Risk of accident due to an incorrect counterweight mass!
Only combine the counterweights in such a manner that the counterweight mass corresponds to the specifications in this section and in the *Lifting capacity table*. Other combinations are not permitted.

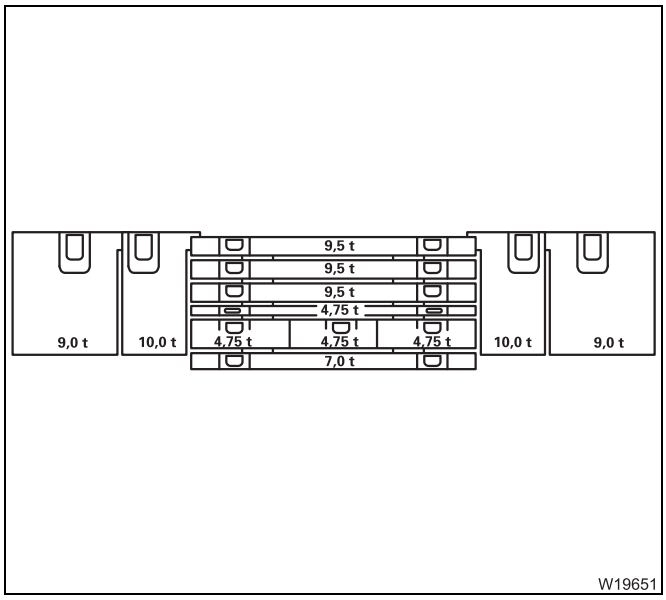


74.5 t (164,244 lbs)

- 7 t base plate
- four 4.75 t sections
- three 9.5 t sections
- two 10 t blocks[1)]

[1)] Additional equipment

Risk of overturning if counterweight rigging sequence is incorrect!
When installing, always attach both 10-t counterweight blocks before you attach a 9-t counterweight block and, during removal, always remove both 9-t counterweight blocks before you remove a 10-t counterweight block. If you attach both blocks on one side first, the entire counterweight will fall off the carrier and may cause injury to you or other persons.



92.5 t (203,928 lbs)

- 7 t base plate
- four 4.75 t sections
- three 9.5 t sections
- two 10 t blocks[1)]
- two 9 t blocks[1)]

[1)] Additional equipment

14.03.2018

The diagram shows all counterweight sections in version **B** with additional equipment (**8**) and (**9**) with the maximum counterweight mass of 92.5 t (203,928 lbs).

– The base plate (**1**) must always be at the bottom.

– The counterweight section (**3**) must lie on the right-hand side and the counterweight section (**4**) on the left-hand side of the base plate (**1**), as viewed in the direction of travel.

– The counterweight section (**2**) must lie between the counterweight sections (**3**) and (**4**).

– The counterweight section (**5**) must lie on top of the counterweight sections (**2**), (**3**) and (**4**).

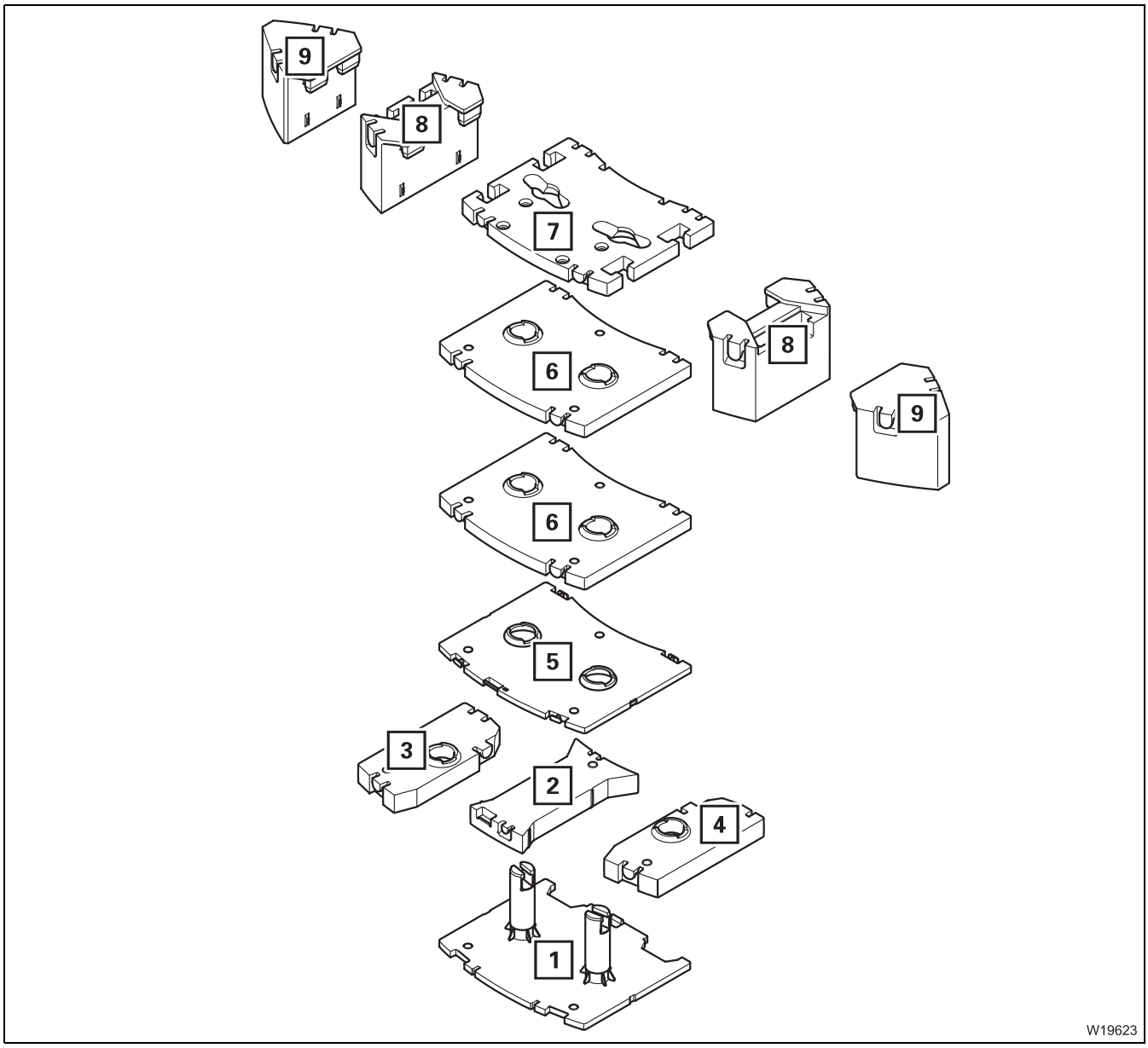
– The counterweight sections (**6**) can be exchanged among each other.

– The counterweight section (**7**) must always be placed on top for counterweight combinations from 54.5 t (120,152 lbs).

– The counterweight blocks (**8**) can only be attached to the counterweight section (**7**).

– The counterweight blocks (**9**) can only be attached to the counterweight blocks (**8**).

14.03.2018



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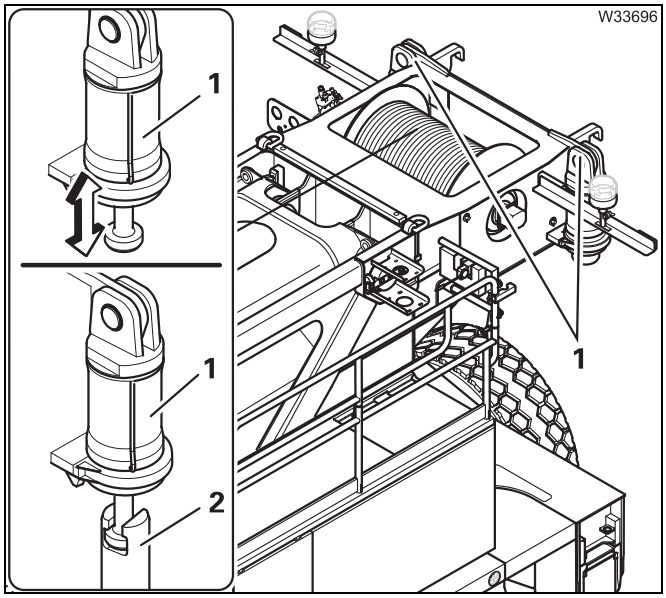
14.03.2018

12.7.7 Counterweight hoist unit



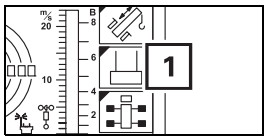
The lifting cylinders (**1**) can be extended and retracted.

To lift and lower the counterweight, the lifting cylinders are screwed into the 7.0 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.

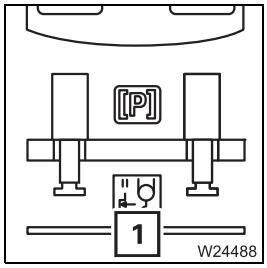
Counterweight submenu

To operate the counterweight hoist unit, you must open the *Counterweight* submenu.



Opening the submenu

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

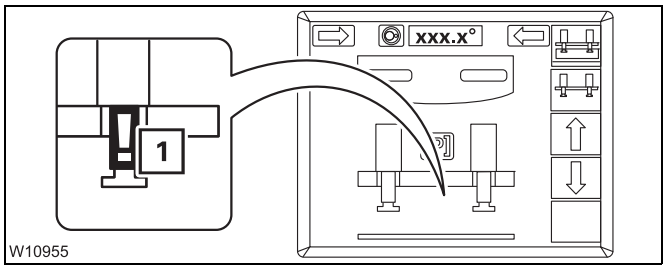


If the symbol (**1**) appears, the functions of the submenu are disabled.

The functions of the submenu are not unblocked until the symbol (**1**) has gone out.

Refer to ➠ *Malfunctions in the counterweight hoist unit*, p. 14 - 23 for assistance.

14.03.2018



The *Counterweight* submenu opens.

If an error symbol (**1**) is displayed during subsequent operation, please contact **Manitowoc Crane Care**.

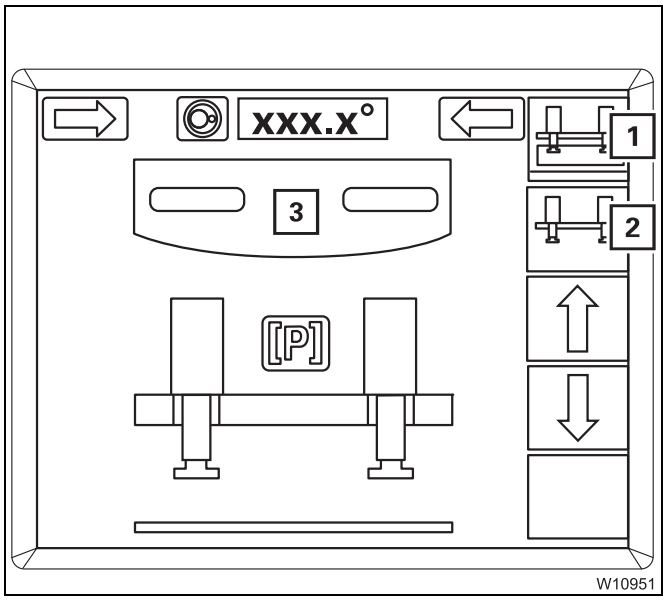
Extending/retracting the lifting cylinders

This section describes how to operate the lifting cylinders manually,

– for correcting the displayed rigging mode and

– for pre-charging the counterweight afterwards.

Always lift and lower the counterweight in automatic mode, otherwise slewing with extended lifting cylinders will be blocked; ➠ *Automatic mode rigging*, p. 12 - 77, ➠ *Automatic mode unrigging*, p. 12 - 78.

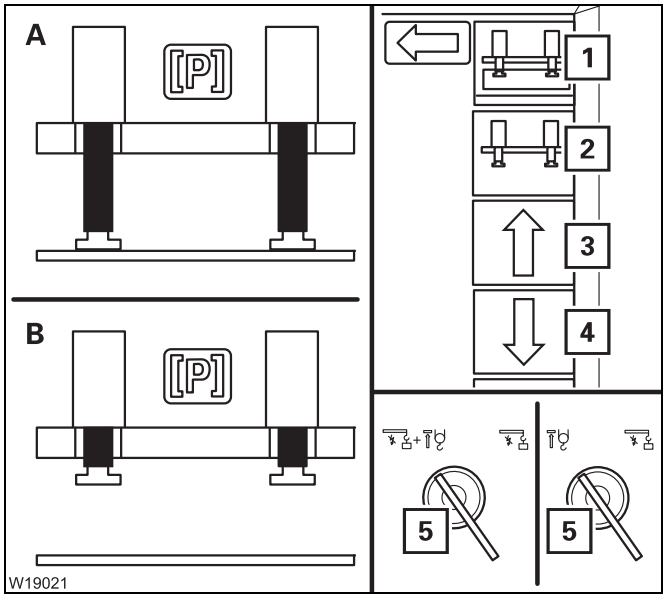


Correct the rigging mode

- You can use the automatic mode only if the current rigging mode is displayed.
  - **1** Yellow – counterweight rigged
  - **2** Yellow – counterweight unrigged

If necessary, correct the displayed rigging mode as follows:

- Slew the superstructure out of the rigging range – display (**3**) – so that the lifting cylinders can be freely extended.



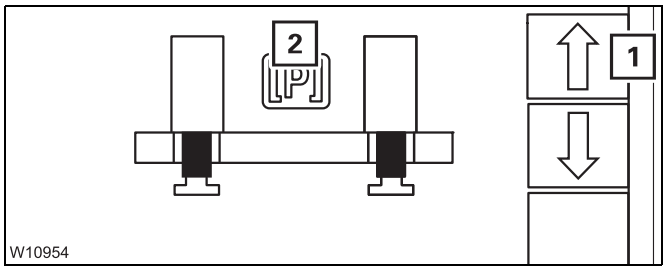
Assuming the symbol (**1**) is yellow with the counterweight unrigged.

- Turn the key-operated switch (**5**) to the left.
- (**A**) Fully extend the lifting cylinders – button (**4**).
- Let go of the key-operated switch (**5**).
- (**B**) – Fully retract the lifting cylinders – button (**3**).

The symbol (**2**) turns yellow – counterweight unrigged.

You can now use the automatic mode.

14.03.2018



Pre-tensioning

When the symbol (**2**) is **red**, you must pre-tension the counterweight.

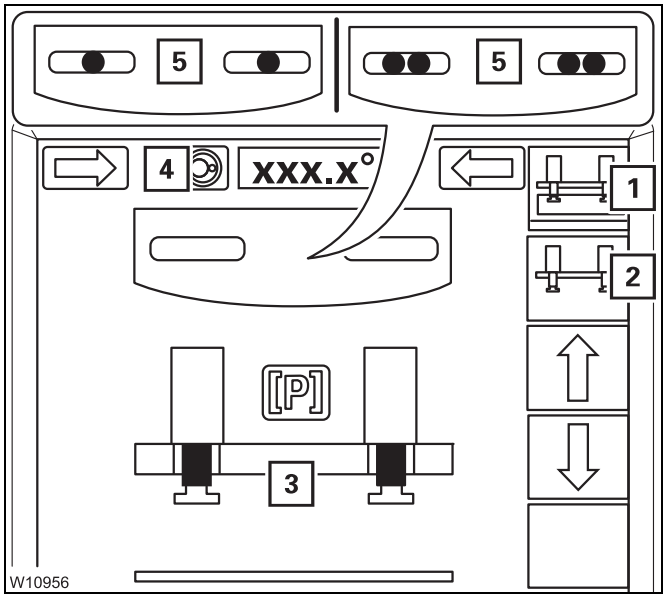
- Press button (**1**) until symbol (**2**) turns **green**.

Automatic mode rigging

While the automatic mode is being executed, you can always

– **cancel** the automatic mode; ➠ *Cancel automatic mode*, p. 12 - 80.

– **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

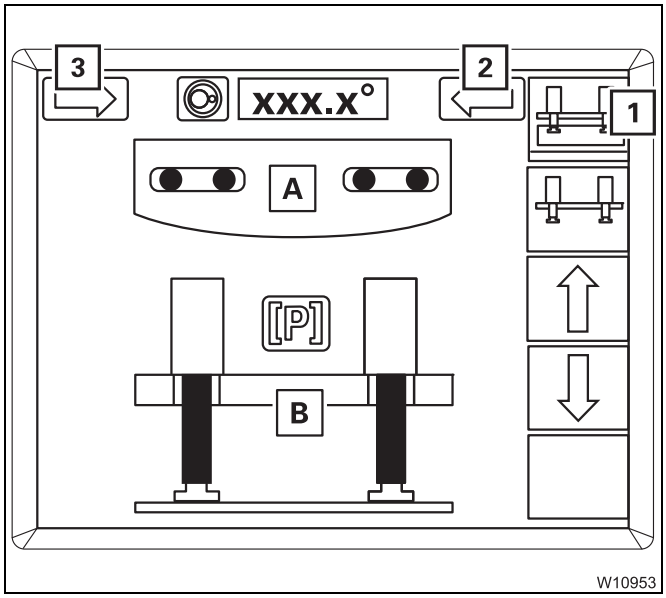
– The counterweight combination must be assembled.

– Symbol (**2**) is **yellow**. If the symbol (**1**) is yellow; ➠ *Correct the rigging mode*, p. 12 - 76.

– The lifting cylinders are fully retracted – display (**3**).

– The slewing gear must be switched on – symbol (**4**) **green**.

– The superstructure is in the rigging range – one display (**5**) **green**.

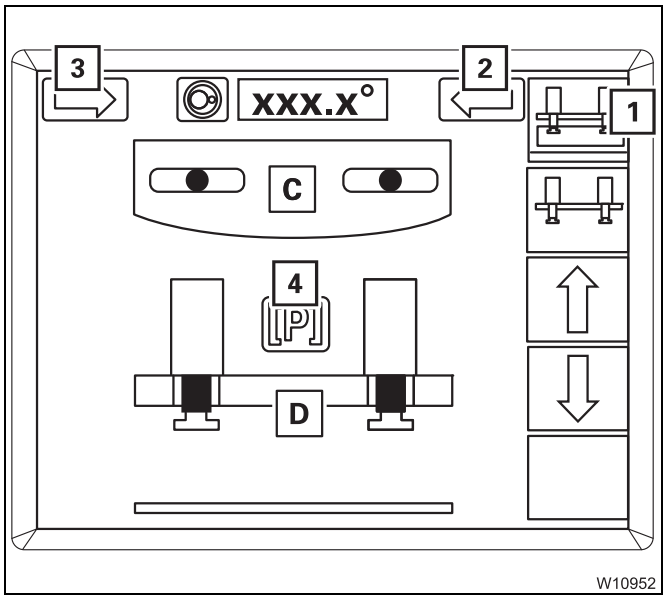


Switch on automatic mode

- Press the button (**1**) once – the symbol flashes.

Execute the automatic mode.

- To slew, move the control lever in the displayed direction (**2**) or (**3**) – the automatic mode starts.
  – The superstructure turns into position (**A**).
  – The lifting cylinders are extended (**B**).
- Release the control lever.



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

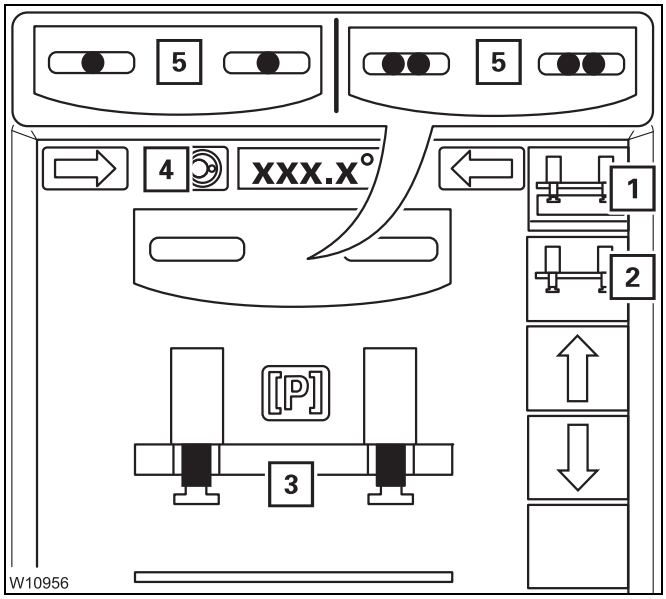
The symbol (**1**) is yellow and no longer flashes, the rigging process is complete.

- Release the control lever.

Automatic mode unrigging

While the automatic mode is being executed, you can always

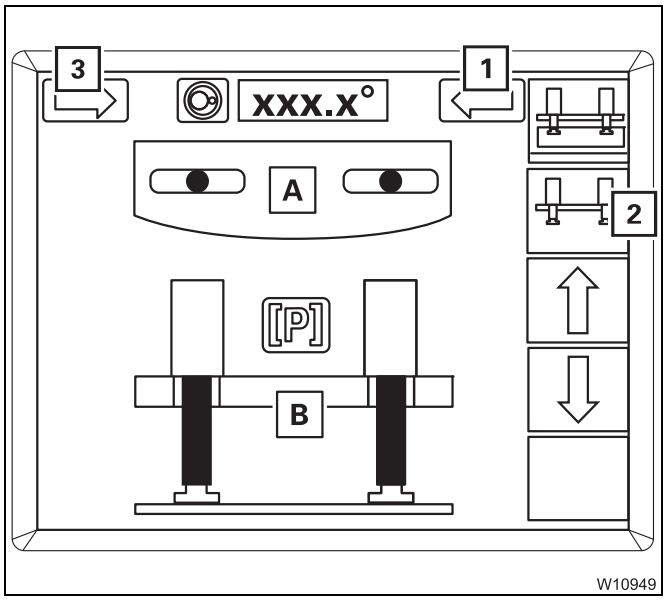
- **cancel** the automatic mode; ➠ *Cancel automatic mode*, p. 12 - 80.
- **interrupt** the automatic mode by letting go of the control lever. After moving the lever in the displayed direction once more, the automatic mode is continued.



Prerequisites

- Symbol (**1**) is **yellow**. If the symbol (**2**) is yellow; ➠ *Correct the rigging mode*, p. 12 - 76.
- The lifting cylinders are fully retracted – display (**3**).
- The slewing gear must be switched on – symbol (**4**) **green**.
- The superstructure is in the rigging range – one display (**5**) **green**.

14.03.2018

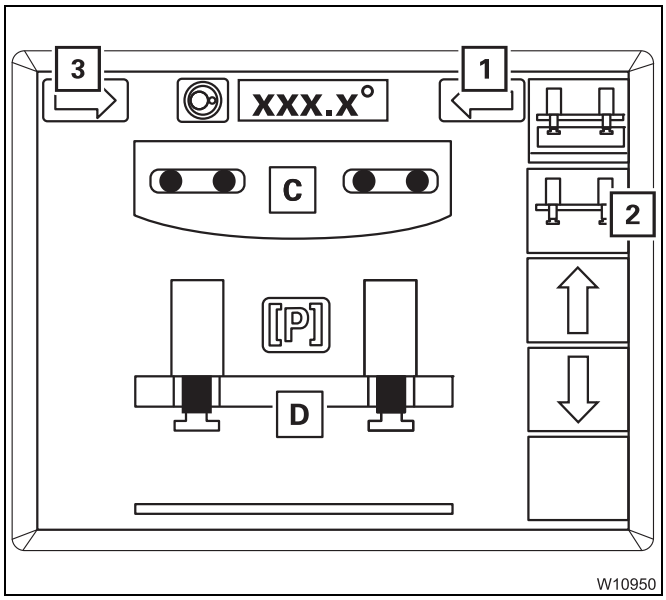


Switch on automatic mode

- Press the button (**2**) once – the symbol flashes.

Execute automatic mode

- To slew, move the control lever in the displayed direction (**1**) or (**3**) – the automatic mode starts.
  - The superstructure turns into position (**A**).
  - The lifting cylinders are extended (**B**).
- Release the control lever.



- To slew, move the control lever in the displayed direction (**1**) or (**3**) – the automatic mode continues.
  - The superstructure turns into position (**C**).
  - The lifting cylinders are retracted (**D**).

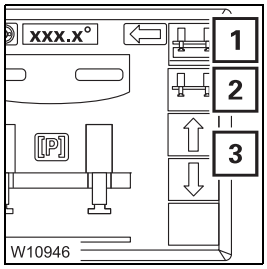
The symbol (**2**) is yellow and no longer flashes, the rigging process is complete.

- Release the control lever.

14.03.2018

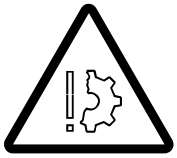
Cancel automatic mode

You can cancel the automatic mode any time.

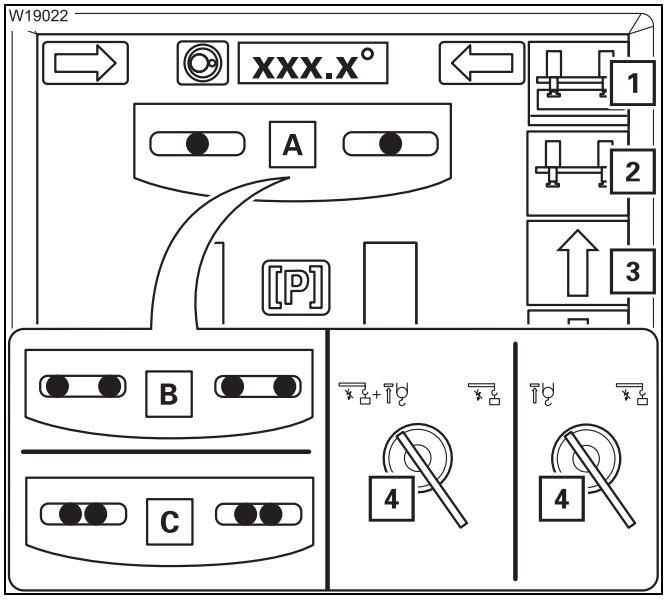


- Press the unused buttons (**1**), (**2**) or a button (**3**).
  The automatic mode is cancelled.

If the symbol (**1**) or (**2**) is **yellow**, you can re-select the automatic mode.



Risk of damage to the counterweight!
With the key-operated switch actuated, the functions are always released.
Never move the lifting cylinder to the *Intermediate position* rigging range.
Slew the superstructure only if the lifting cylinders are fully extended (or fully retracted).



If the symbols (**1**) and (**2**) are **grey**, you must retract the lifting cylinders:

In the event of position (A) or (B)

- Fully retract the lifting cylinders – button (**3**).

In the event of position on display (C)

- Turn the key-operated switch (**4**) to the left.
  The following movements are now no longer monitored.
- Slew the superstructure to position (**A**) or (**B**) – caution: no monitoring.
- Fully retract the lifting cylinders.

14.03.2018

12.7.8 Setting down counterweight for driving the truck crane

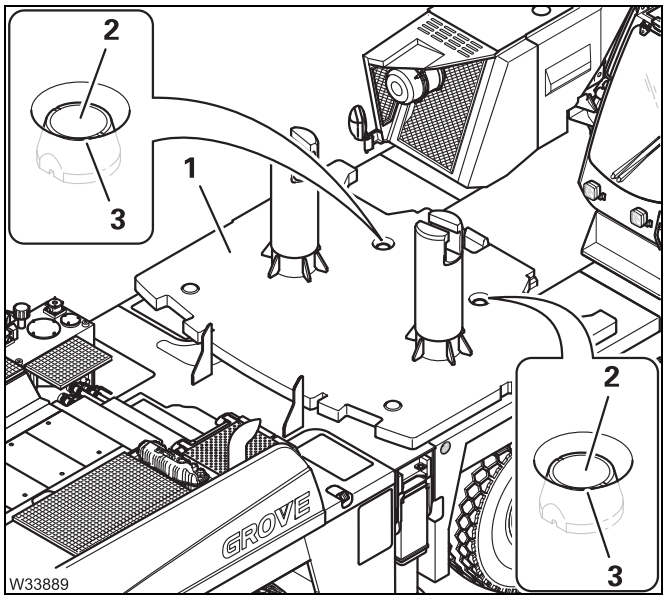
Version A

For driving with axle loads of at the most 12 t (26,500 lbs) the counterweight must be completely unrigged; ➠ *Driving modes*, p. 6 - 1.

Version B

In this version, up to 21.2 t (46,738 lbs) counterweight may be transported on the truck crane. The axle loads are then greater than 12 t (26,500 lbs).

Risk of accidents due to the counterweight slipping or tipping over!
Place only the 7.0 t base plate directly onto the counterweight platform and always fasten the counterweight to the rear storage area with lashing straps. In this way you prevent the counterweight from slipping.



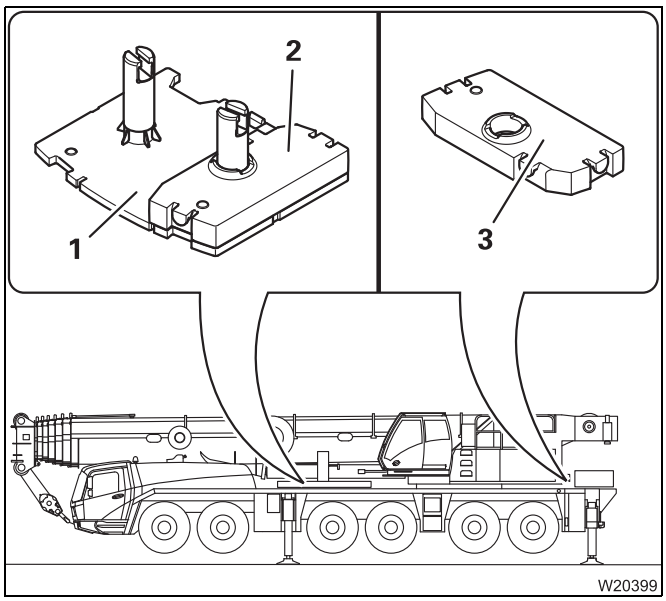
Only the 7.0 t base plate (**1**) may be set down directly on the counterweight platform.

Other sections are not secured by the retainers (**2**) and cutouts (**3**) and do not lie flat.

Risk of damage to the derricking cylinder!
Always check whether the specifications in this section apply before setting down the main boom.
In this way you can prevent the derricking cylinder from being pushed against an incorrectly assembled counterweight combination and becoming damaged.

14.03.2018

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



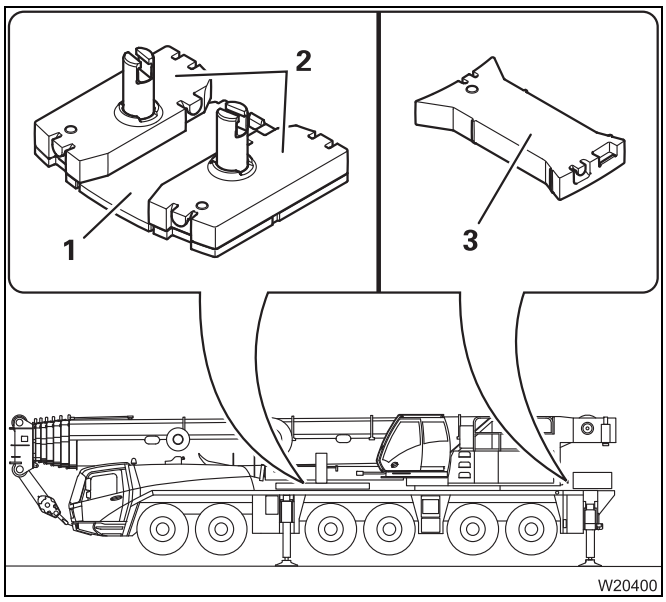
If a lattice extension is folded at the side:

At most, set down

– the 7.0 t base plate (**1**),

– one 4.75 t section (**2**),

– one 4.75 t section (**3**) down.



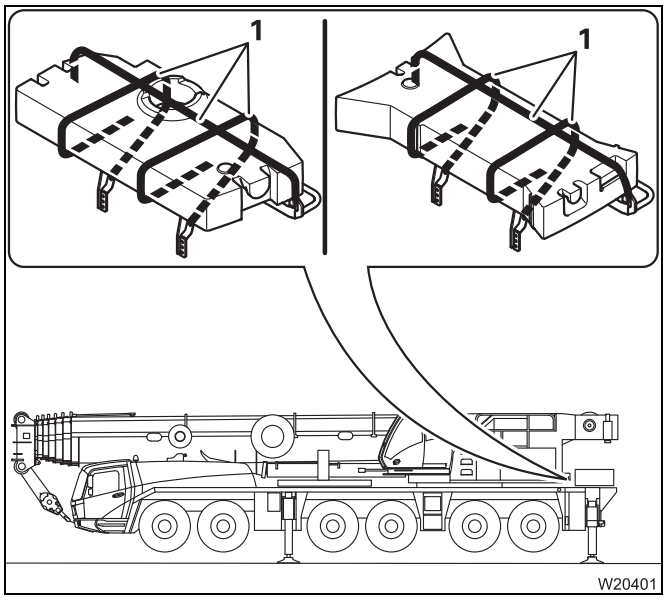
If no lattice extension is folded at the side:

At most, set down

– the 7.0 t base plate (**1**),

– two 4.75 t sections (**2**),

– one 4.75 t section (**3**) down.



Fasten the counterweight on the rear storage area

- Fasten the counterweight to the rear storage area with the lashing straps provided (**1**).

If the truck crane is fitted with a removable supporting box (ROB) then you cannot place or fasten counterweights here for driving.

14.03.2018

12.7.9 Slewing with rigged counterweight

You may only slew the superstructure with a rigged counterweight if the truck crane is supported by a sufficient outrigger span and the permissible working radii are observed. Otherwise the truck crane will overturn during slewing.
The current rigging mode is registered by the RCL code set, and the RCL disables the slewing operation if it is not permitted.

Danger of overturning when slewing with an incorrectly set RCL!
The RCL only disables the slewing operation if you have entered the RCL code correctly and if the RCL is not overridden.
Therefore always check before slewing whether the RCL code valid for the current rigging mode is displayed.
This prevents slewing operations being released within impermissible ranges and the truck crane from overturning.

Danger of overturning when slewing with the hand-held control!
Crane operations are not monitored by the RCL whilst the hand-held control is connected!
Always check whether a sufficient outrigger span has been set for the rigged counterweight before slewing.
This prevents the truck crane from overturning during slewing due to excess counterweight mass.

The following table specifies (depending on the counterweight and outrigger span) whether slewing the superstructure is:

– Permitted

– Only permitted for certain working radii

– Disabled (with the correct rigging mode).

<table>
<tr><td colspan="2" rowspan="2"></td><td colspan="5">Rigged outrigger span 8.70 x (28.5 x)</td><td>7.98 x (26.1 x)</td></tr>
<tr><td>2.71 m
(8.9 ft)</td><td>5.00 m
(16.4 ft)</td><td>6.30 m
(20.4 ft)</td><td>7.40 m
(24.3 ft)</td><td>8.50 m
(27.9 ft)</td><td>8.50 m
(27.9 ft)
1.00 m
(3.3 ft)
(auxiliary supports)[1)]</td></tr>
<tr><td rowspan="10">Rigged counterweight</td><td>0 t
(0 lbs)</td><td colspan="5" rowspan="2"></td><td></td></tr>
<tr><td>7.0 t
(15,432 lbs)</td><td rowspan="9">Slewing not permissible</td></tr>
<tr><td>16.5 t
(36,376 lbs)</td><td rowspan="9"></td><td rowspan="9">Turning permissible[2)]</td><td rowspan="9"></td></tr>
<tr><td>21.2 t
(46,738 lbs)</td></tr>
<tr><td>26.0 t
(57,320 lbs)</td></tr>
<tr><td>35.5 t
(78,264 lbs)</td></tr>
<tr><td>45.0 t
(99,208 lbs)</td></tr>
<tr><td>54.5 t
(120,152 lbs)</td></tr>
<tr><td>74.5 t
(164,244 lbs)</td></tr>
<tr><td>92.5 t
(203,928 lbs)</td></tr>
</table>

[1)] Outrigger span with the supporting box removed

[2)] Slewing only permitted if the radius permitted in the working range is observed (at least 4.0 m (13.1 ft)).

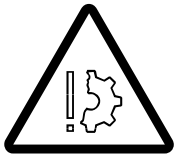
14.03.2018

12.8 Rigging work on the main boom

12.8.1 Hook block on the bumper

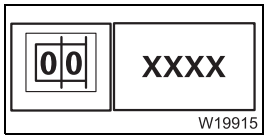
Picking up the hook block

Depending on the driving mode, you must pick up the hook block from the front bumper; ➠ *Driving modes*, p. 6 - 1.

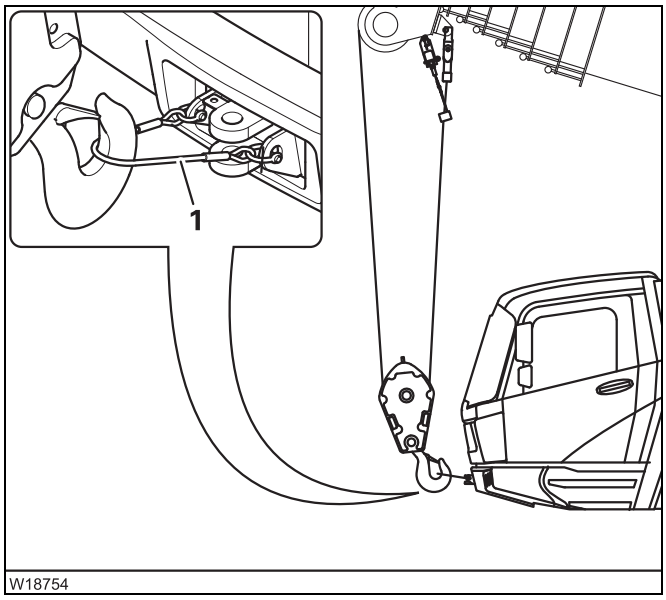


Risk of accidents if the view is obstructed!
Have someone instruct you when raising the main boom, since the view of the hook block is obstructed. That way you will not raise the boom too far, which would cause the retaining rope to tear.

The main boom must be fully retracted.



- Enter the current rigging mode on the RCL.



- Slacken the hoist rope and derrick the main boom simultaneously.
- Derrick the main boom until the boom head is in a vertical position above the hook block.
- Detach the hook block from the retaining rope (**1**).

14.03.2018

Attaching the hook block

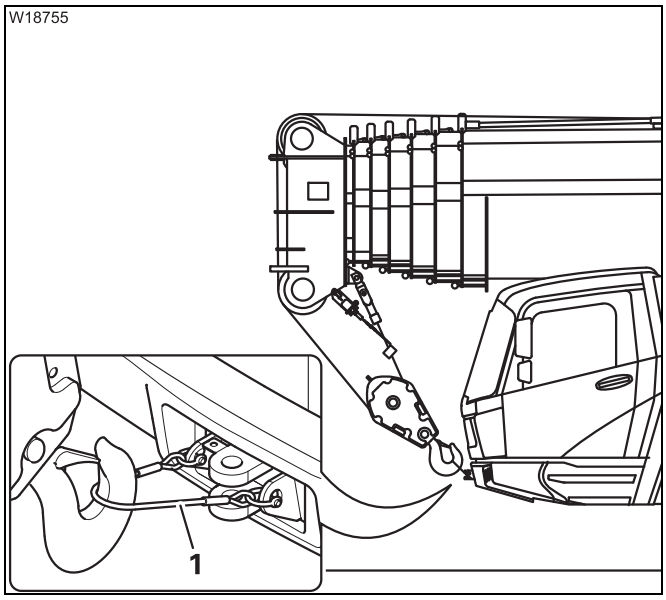
Depending on the driving mode, you can attach the hook block to the front bumper; ➠ *Driving modes*, p. 6 - 1.

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 damage to driver's cab!
Tension the hoist rope tight enough so that the hook block cannot hit the driver's cab while driving.

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 **alongside** the hook block.

Do not attach the rope end fitting to the front towing coupling! The towing coupling must be free for a tow-rod in emergencies.



- Raise the hook block vertically above the retaining rope (**1**).
- Lower the hook block and attach the hook block to the retaining rope (**1**).
- Set down the main boom onto the boom rest and pull the hoist rope tight only to the extent that the hook block is stabilised in its position.

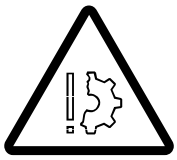
If the lifting limit switch is deactivated while you tighten the hoist rope, you can override the shutdown of the lifting limit switch; ➠ p. 11 - 61.

14.03.2018

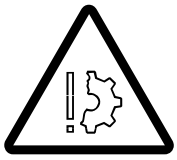
12.8.2 Hook block on a separate vehicle

Risk of overturning while slewing!
Always check before slewing whether slewing is permitted in the truck crane's current rigging mode. Correct the rigging mode if necessary;
➠ *Slewing with rigged counterweight*, p. 12 - 83.

Danger of overturning when slewing with an overridden RCL!
Do not override the RCL before slewing the superstructure.
Enter an RCL code for the 360° working range if the slewing operation is not released.
This prevents the superstructure being slewed 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.

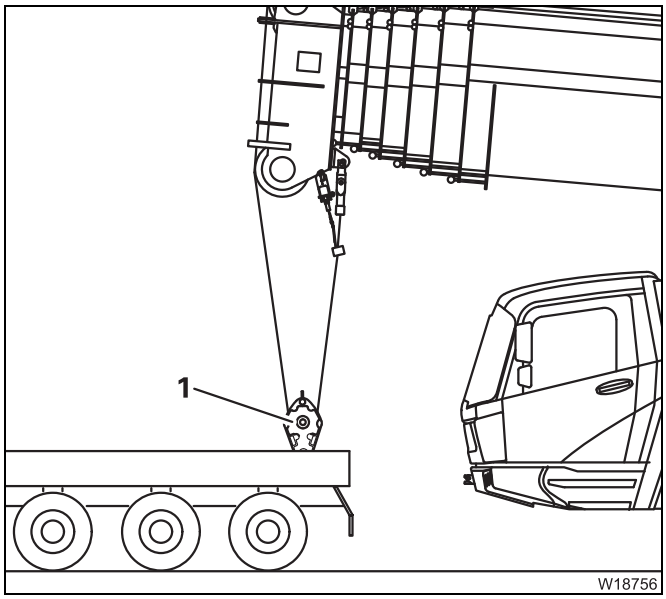


Risk of damage to the hoist rope!
To prevent slack rope, do not ease down too much hoist rope when picking up and reeving the hook block!
Slack rope causes rope loops on the hoist drum, which can result in the load slipping and the hoist rope being damaged!

14.03.2018

Picking up the hook block

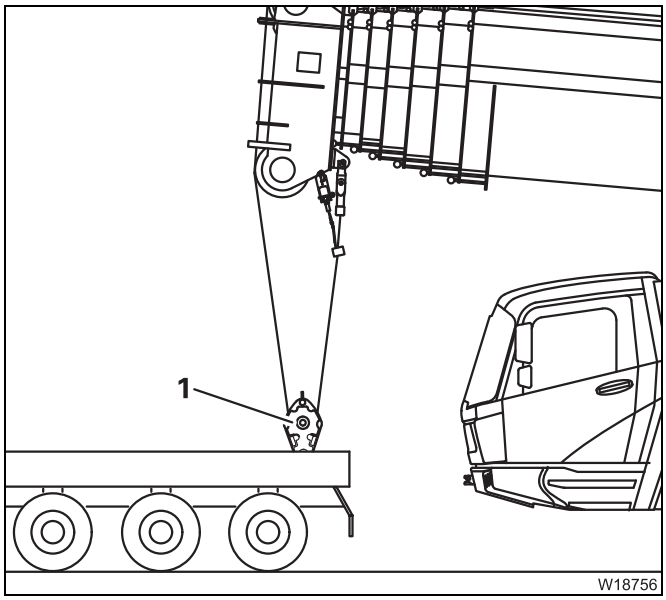
Depending on the driving mode, the hook block can be placed on a separate vehicle; ➠ *Driving modes*, p. 6 - 1.



- If the respective setting has been made in the RCL, slew the superstructure and lower the main boom until the boom head is directly above the hook block (**1**).
- Unreel the hoist rope.
- Reeve the hoist rope into the hook block (**1**); ➠ *Reeving and unreeving the hoist rope*, p. 12 - 92.
- Raise the hook block off the separate vehicle.

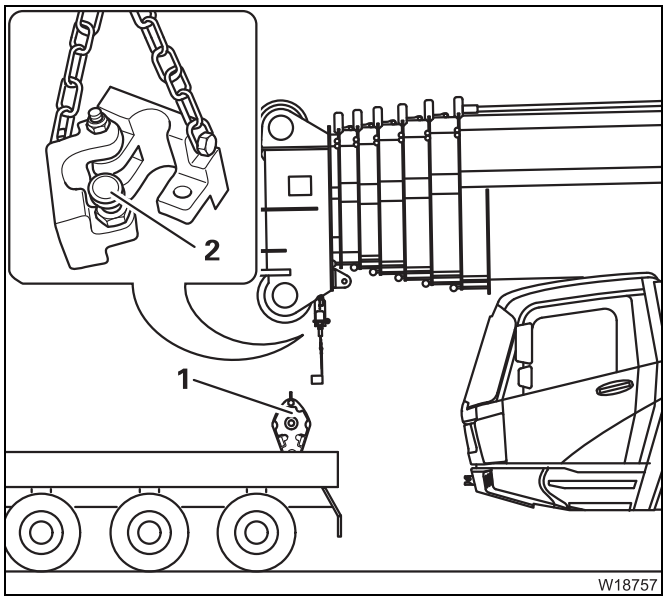
Setting down the hook block

Depending on the driving mode, the hook block must be placed on a separate vehicle; ➠ *Driving modes*, p. 6 - 1.



- With the RCL set accordingly, fully retract the main boom.
- Raise the hook block until it is approx. 1 m (3.3 ft) below the main boom.
- Lower the main boom and set the hook block (**1**) down on the separate vehicle.

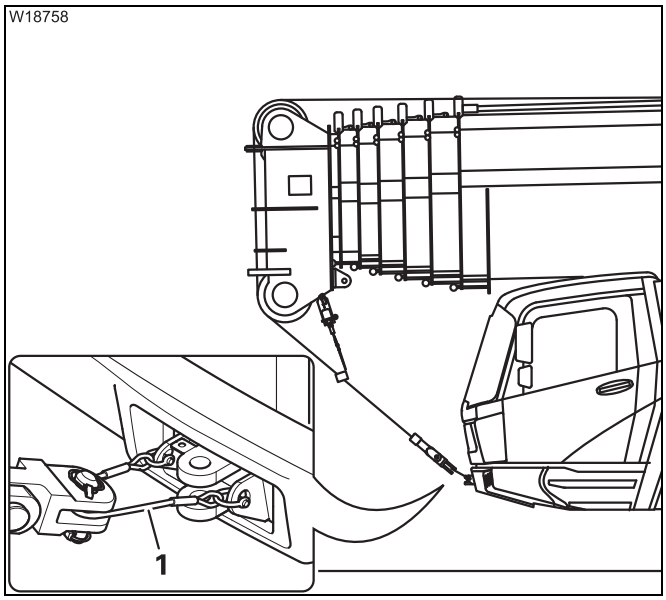
14.03.2018



- Detach the lifting limit switch weight (**2**) from the hoist rope; p. 12 - 109.
- Unreeve the hoist rope; p. 12 - 96.
- Secure the hook block (**1**) for transport.
- Set down the main boom on the boom rest.

Fastening the hoist rope to the bumper

Do not attach the rope end fitting to the front towing coupling! The towing coupling must be free for a tow-rod in emergencies.



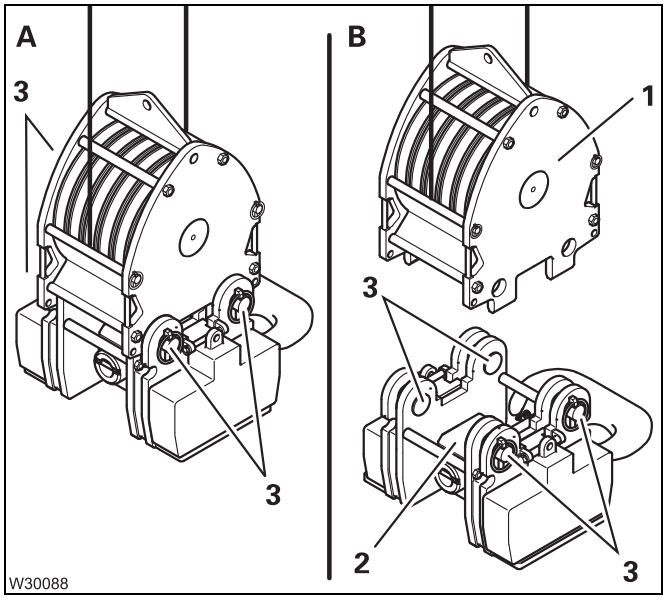
- Attach the rope end fitting to the retaining rope (**1**).
- Pull the hoist rope slightly taut.
- Fasten the lifting limit switch weight to the hoist rope.

The hoist rope and lifting limit switch weight are now secured for driving.

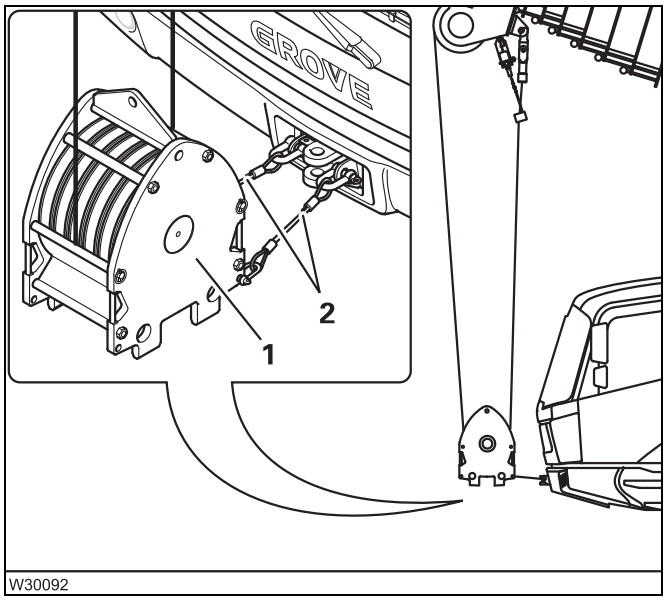
12.8.3 Hook block, separable

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**) an. Insert the pins (**3**) and secure them in the hook. Stow away the hook (**2**) so that it is safe for transportation.

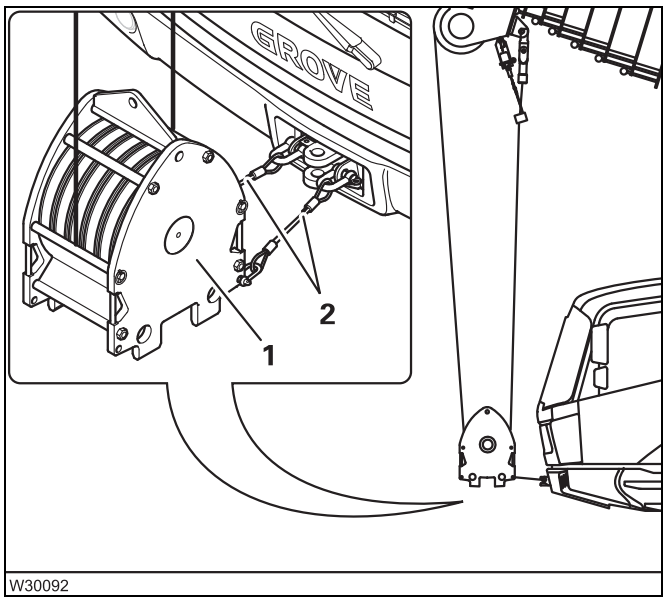


- Raise the block hook (**1**) vertically above the holding ropes (**2**).
- Lower the block hook (**1**) and fasten it using the holding ropes (**2**).

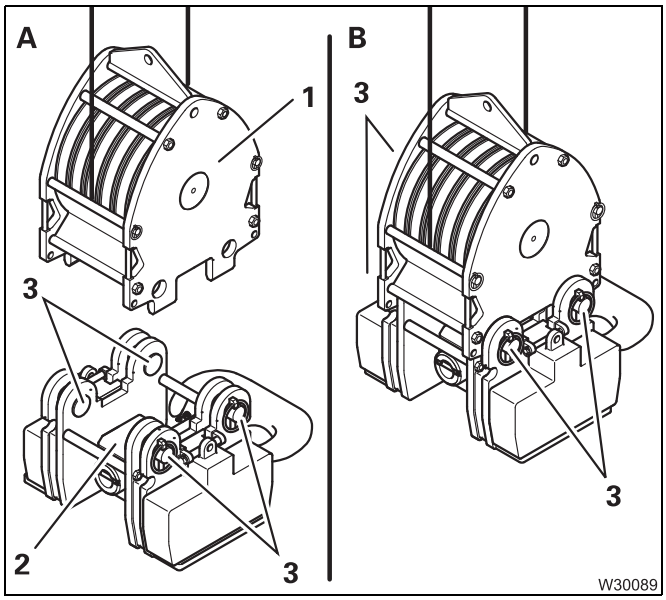
Set down the main boom onto the boom rest and pull the hoist rope tight only to the extent that the block hook is stabilised in its position.

14.03.2018

Rigging for crane operation



- Slacken the hoist rope and derrick 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**).



- (**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.

14.03.2018

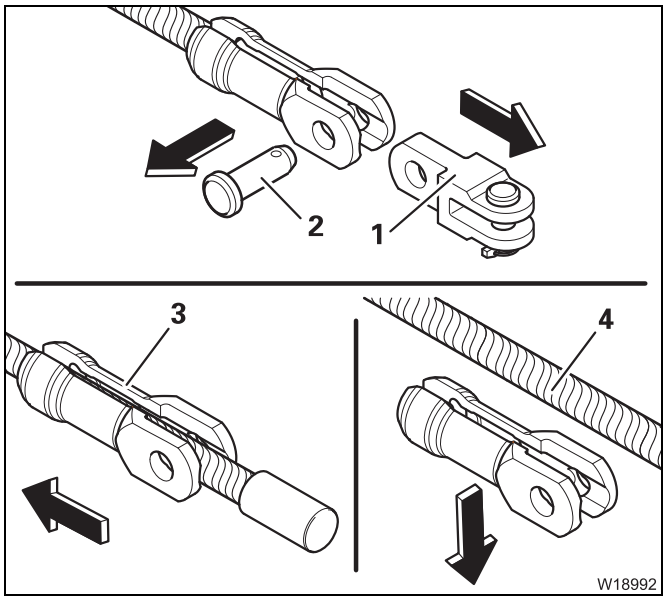
12.8.4 Reeving and unreeving the hoist rope

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 and the corresponding lifting capacities; ➠ p. 12 - 97.

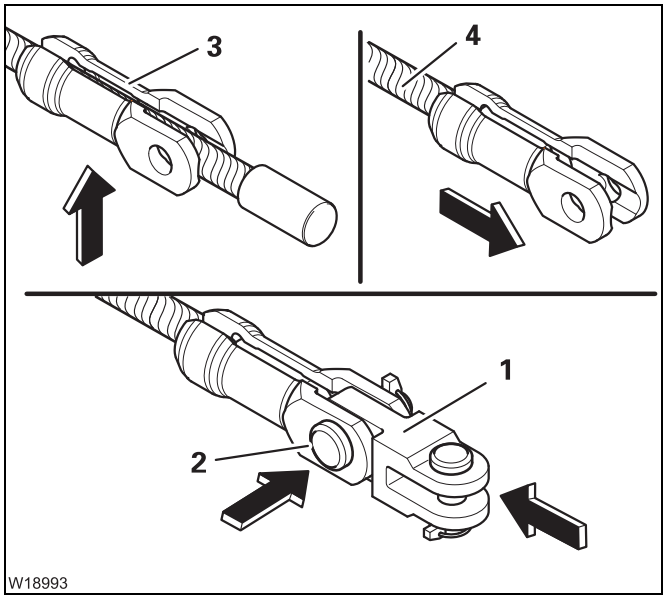
Rope end fitting

To reeve and unreeve the hoisting rope, you must remove the rope end fitting.
After reeving you must reattach the rope end fitting.



Removing the rope end fitting

- Pull the pin (**2**) and remove the fork element (**1**).
- Slide the holder (**3**) back and remove it from the hoist rope (**4**).



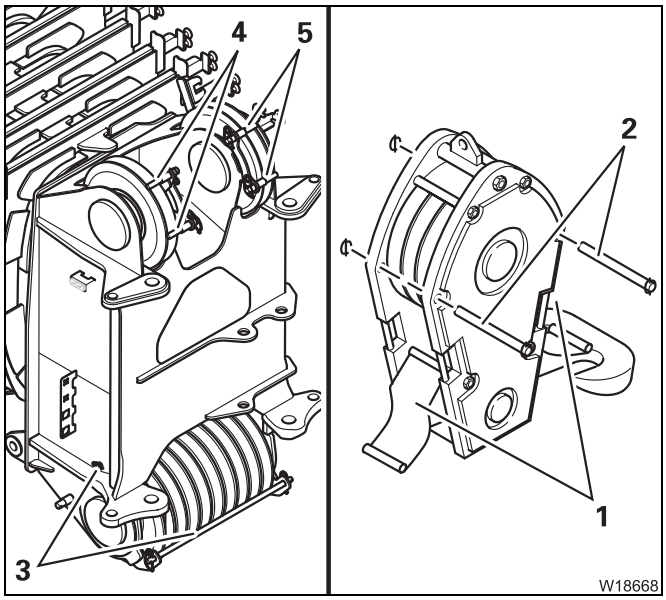
Reattaching the rope end fitting

- Insert the holder (**3**) and slide it onto the hoist rope as far as it will go (**4**).
- Fasten the fork (**1**) using the pin (**2**).
- Secure the pin using the linchpin.

14.03.2018

Reeving the hoist rope

Danger due to slack rope!
Only use hook blocks and sling gear of the minimum weight prescribed in the *Lifting capacity table*, depending on the reeving and boom length. This prevents slack rope forming at large heights when lifting without a load. This can result in the load slipping.

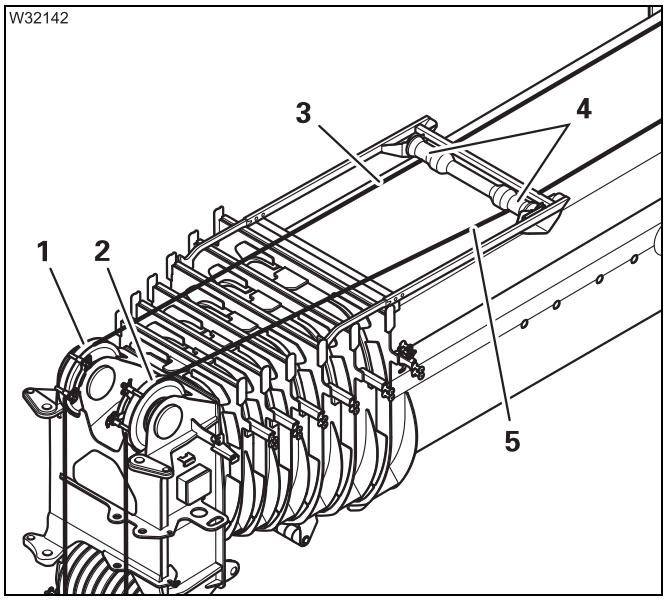


Opening the hook block

- Pull out the rods (**2**).
- Fold down the plates (**1**).

Fitting the hoist rope

- Pull out the rods (**3**).
- Pull out the rod (**4**) for the **main hoist rope**.
- Pull out the rod (**5**) for the **auxiliary hoist rope**.

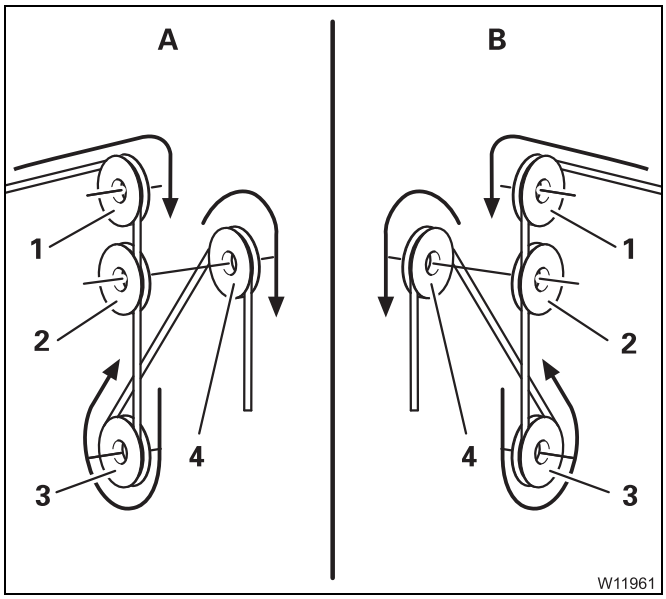


- Feed the main hoist rope (**3**) through under the sheave (**4**).
- Feed the auxiliary hoist rope (**5**) through under the sheave (**4**).

- Feed the main hoist rope (**3**) to the head sheave (**1**).
- Feed the auxiliary hoist rope (**5**) to the head sheave (**2**).

Feed the hoist rope through under the sheave (**4**) also when working with the lattice extension.

14.03.2018



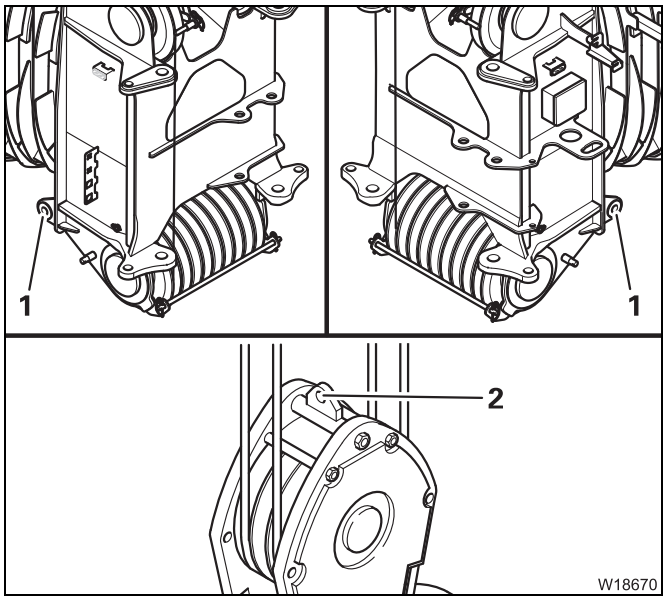
Reeving the hoist rope

A for the main hoist rope

B for the auxiliary hoist rope

- Guide the hoist rope over the upper head sheave (**1**) to the lower head sheave (**2**).
- Guide the hoist rope from the front around the outer pulley (**3**) of the hook block, upwards to the main boom head.
- Guide the hoist rope from the rear over the next required head sheave (**4**), etc.
- Reeve the hoist rope with the required number of lines.

Possible reeving methods; ➠ p. 12 - 97.



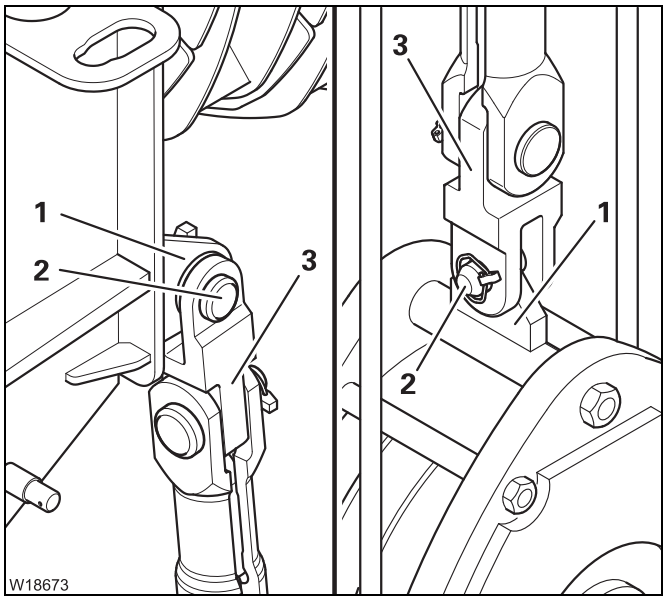
Fastening the hoist rope

The fixed point used depends on the number of reeved rope lines.

– **Fixed point for an even number of lines**
The rope end fitting is fastened to the fixed point (**1**) for 2-fall, 4-fall, 6-fall reevings, etc.

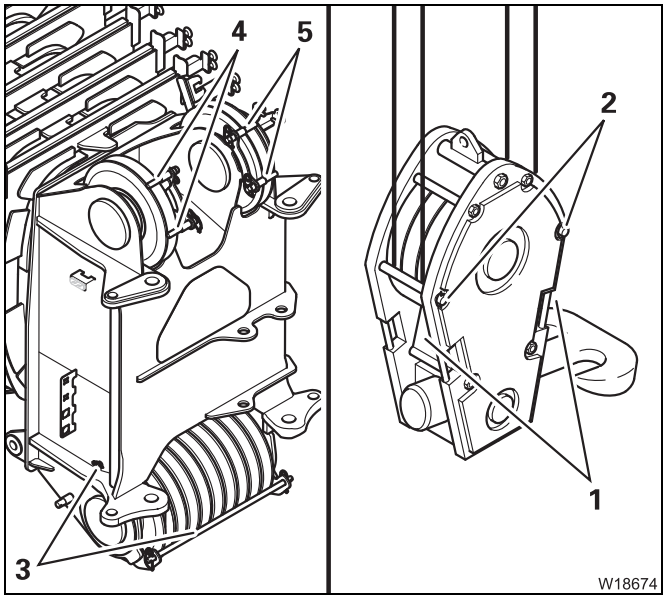
– **Fixed point for an odd number of lines**
The rope end fitting is fastened to the fixed point (**2**) for 1-fall, 3-fall, 5-fall reevings, etc.

14.03.2018



Rope end fitting

- Insert the rope end fitting (**5**) at the fixed point (**1**) and secure the pin (**2**).



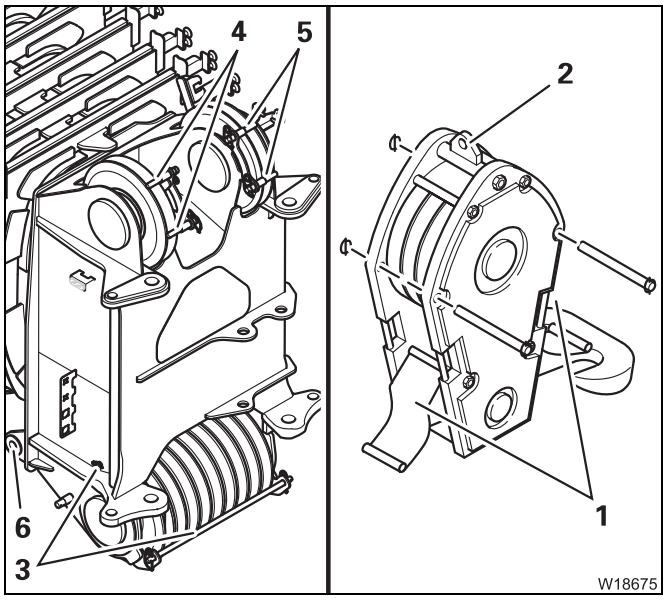
Securing the hoist rope

- Insert the rods (**3**) and (**4**), (**5**).
- Secure all rods using the retaining pins.

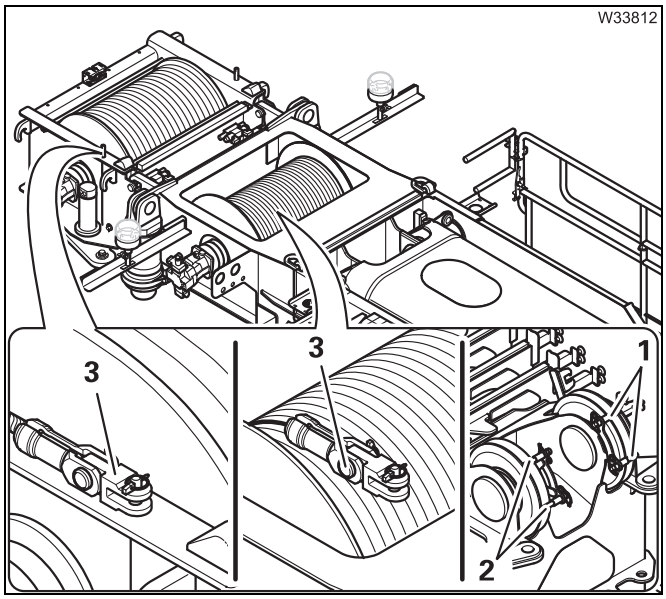
Closing the hook block

- Fold up the sheet metals (**1**) on both sides.
- Insert the rods (**2**) and secure them with the linchpins.

Unreeving hoist rope



- Remove the retaining pins and pull out the rods (**3**).
- Fold down the plates (**1**); p. 12 - 93.
- Remove the rope end fitting from the fixed point (**2**) or (**6**).
- Unreeve the hoist rope.



Depending on the driving mode, you can:

– Fasten the hoist rope to the bumper; p. 12 - 89

or

– Pull out the rods (**1**) and (**2**) and roll the hoist rope onto the drum.

- Insert the rods (**1**) and (**2**) and secure them.
- Secure the hoist rope (**3**).

14.03.2018

12.8.5 Possible reeving methods on the main boom

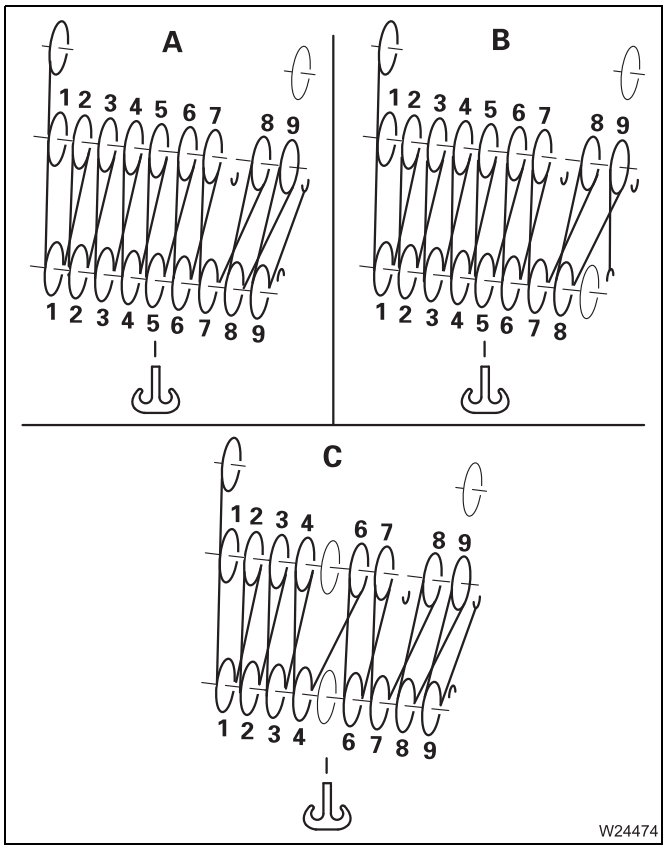
Possible reevings on lattice extensions and the auxiliary single-sheave boom top; ➠ *Operating Instructions Lattice Extension.*

The maximum load bearing capacity of individual hook blocks does not correspond to the maximum load bearing capacity of the GMK6300L-1 together with this hook block. The lifting capacity of the GMK6300L-1 depends on the rope pull, the reeving and friction force. It is lower than the load bearing capacity of the hook block.

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

14.03.2018

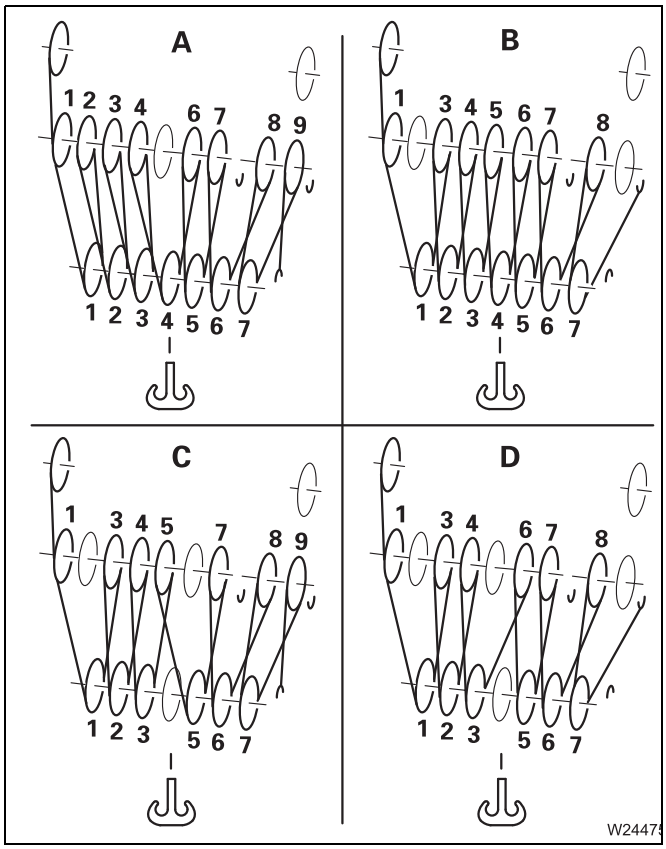
With 9 head sheaves



9-sheave hook block

Reeving

A	18x
B	17x
C	16x



7-sheave hook block

Reeving

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

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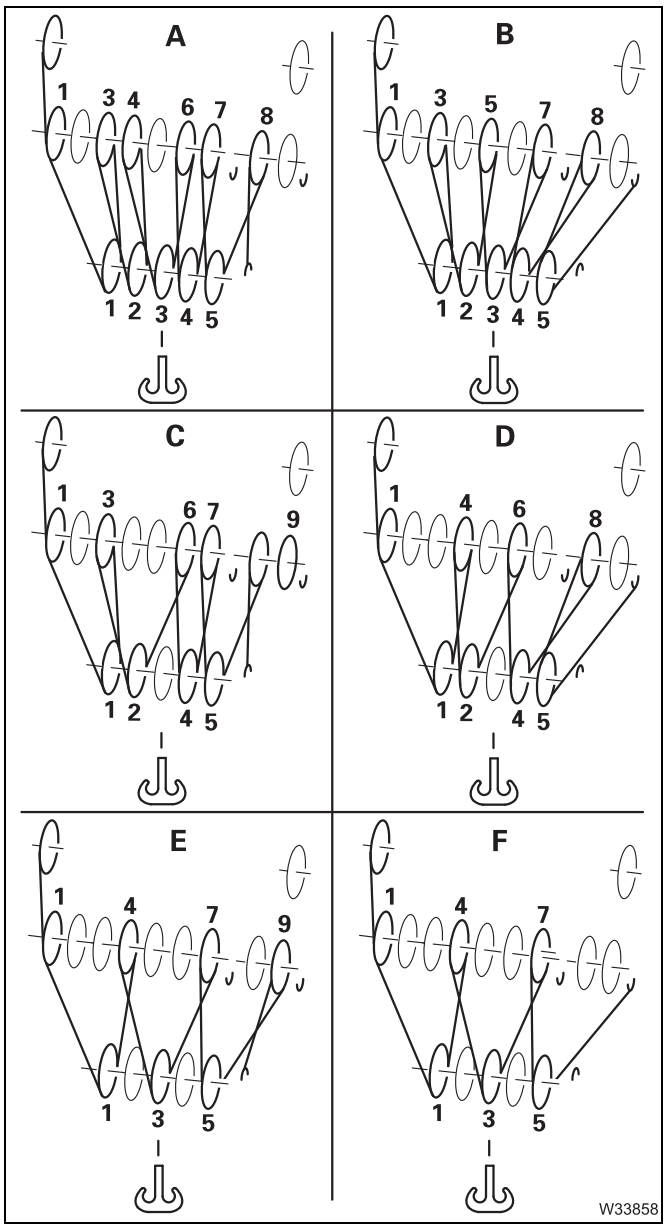
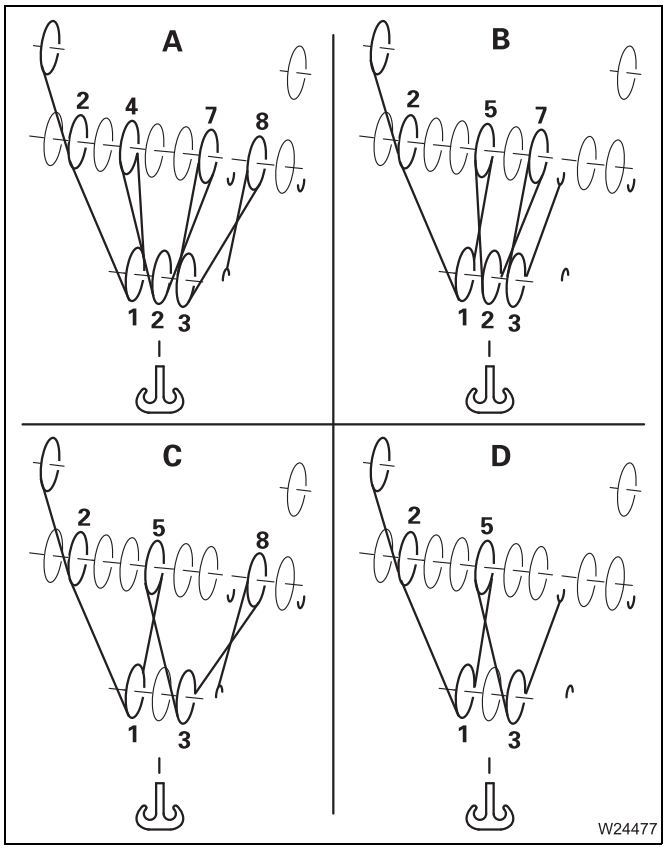


5-sheave hook block

Reeving

A	11x
B	10x
C	9x
D	8x
E	7x
F	6x

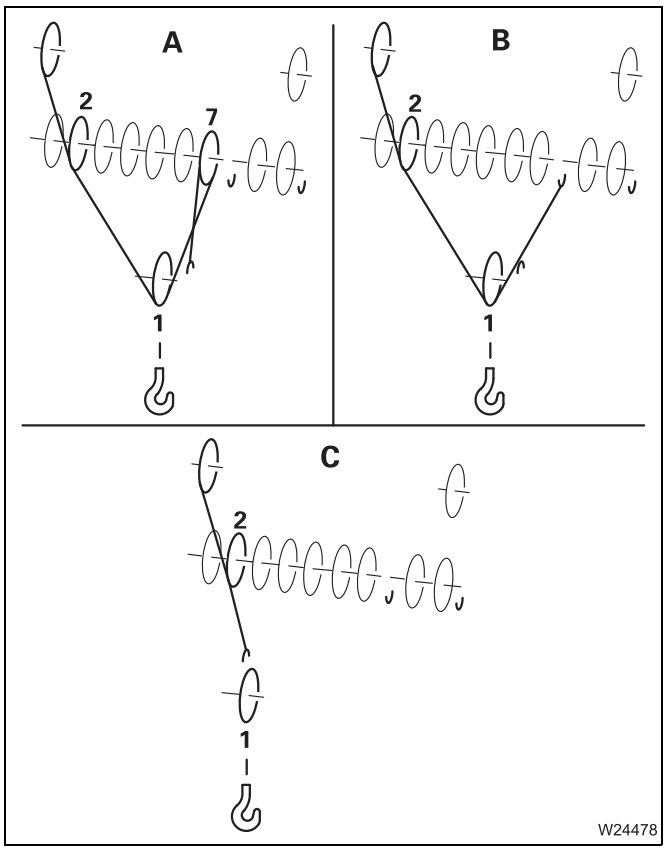
14.03.2018



3-sheave hook block

Reeving

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

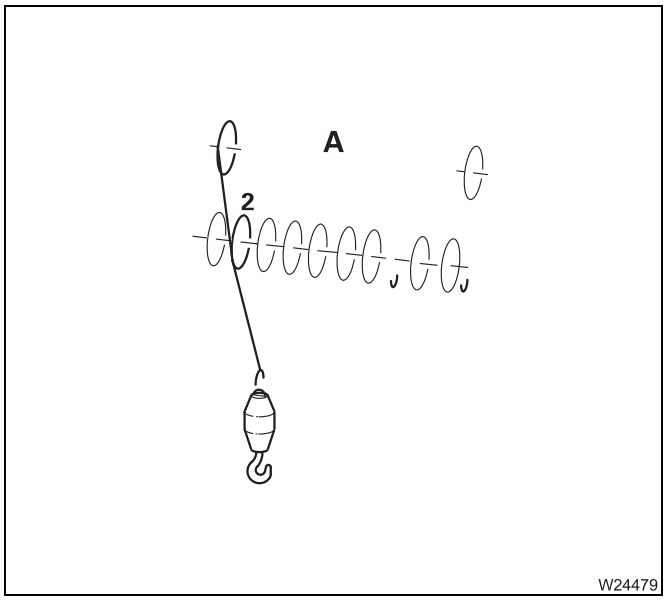


1-sheave hook block

Reeving

A	3x
B	2x
C	1x

14.03.2018

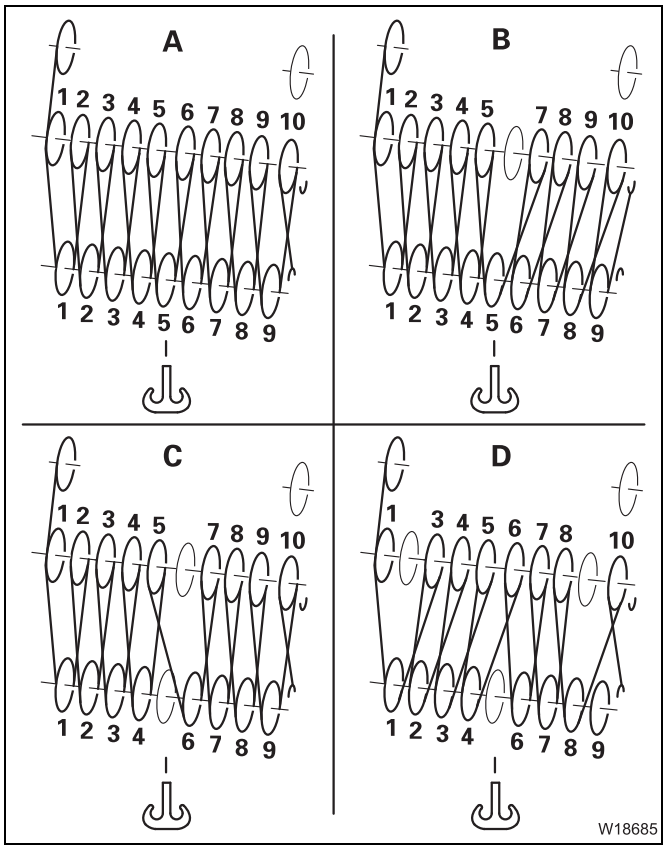


Hook tackle

Reeving

A 1x

With 10 head sheaves



9-sheave hook block

Reeving

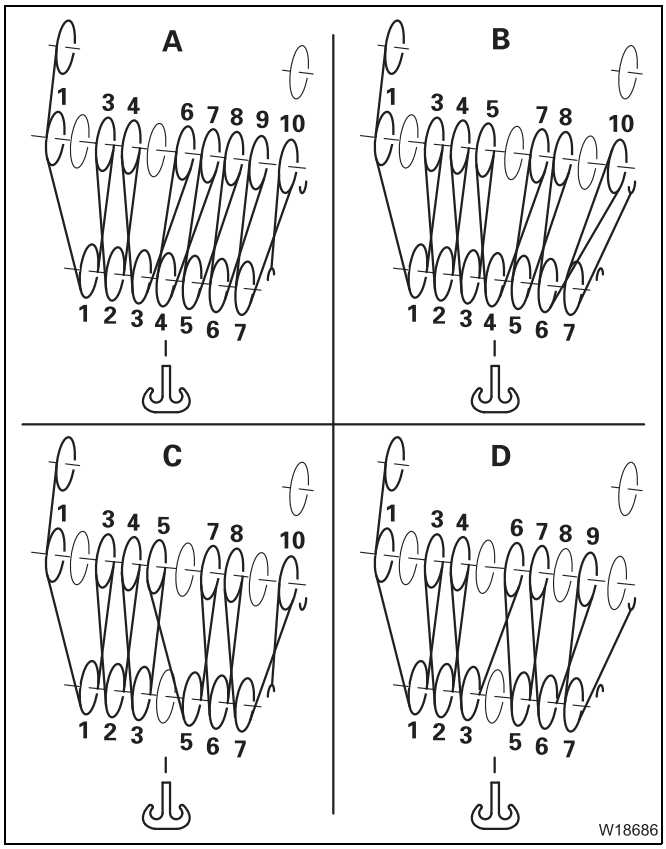
A 19x

B 18x

C 17x

D 16x

14.03.2018

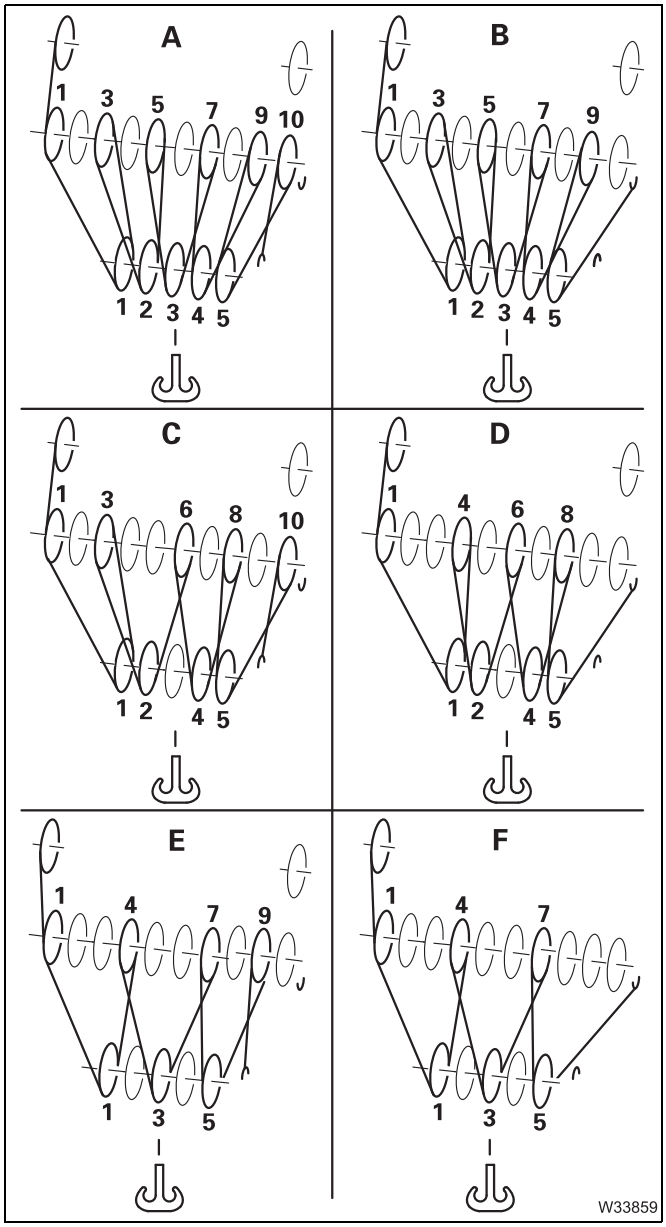


7-sheave hook block

Reeving

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

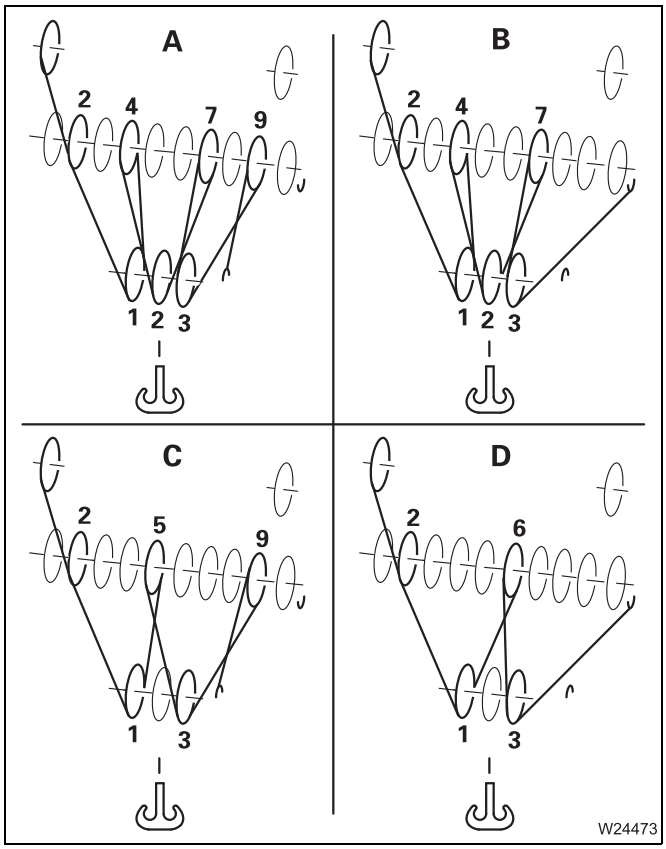
14.03.2018



5-sheave hook block

Reeving

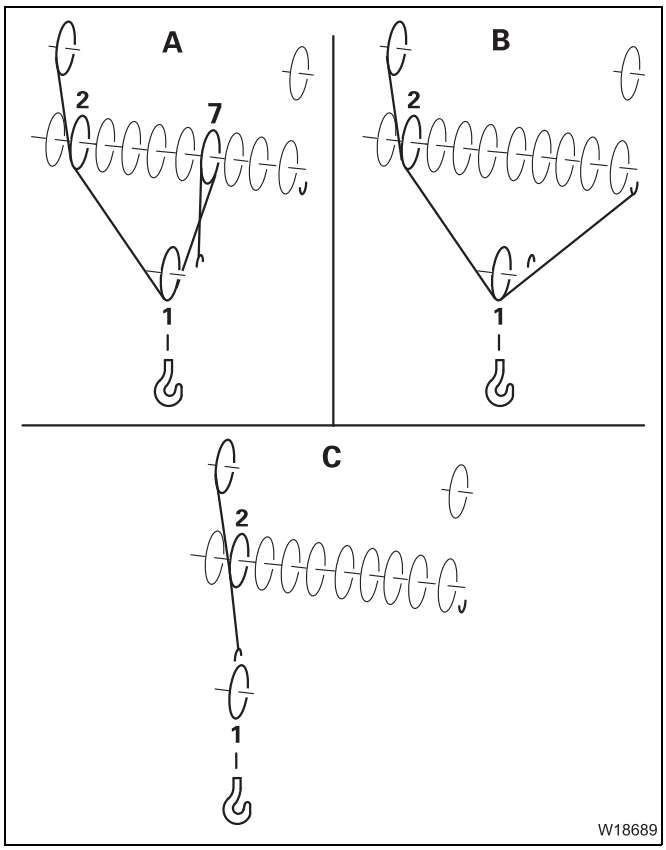
A	11x
B	10x
C	9x
D	8x
E	7x
F	6x



3-sheave hook block

Reeving

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

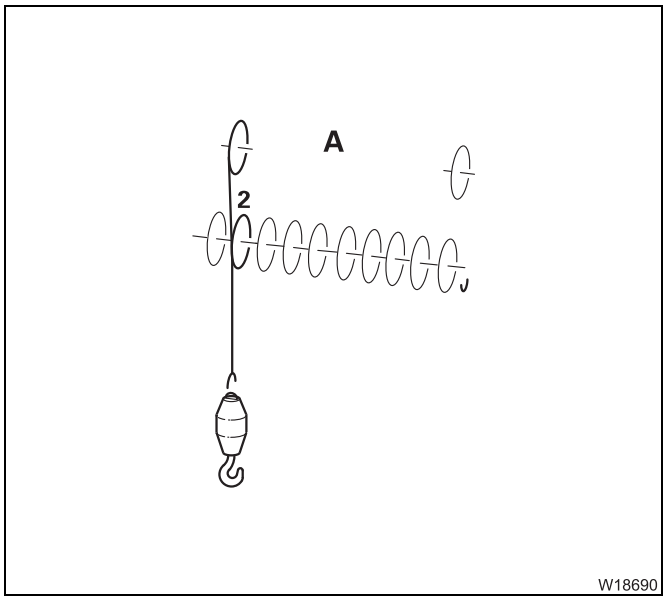


1-sheave hook block

Reeving

A	3x
B	2x
C	1x

14.03.2018



Hook tackle

Reeving

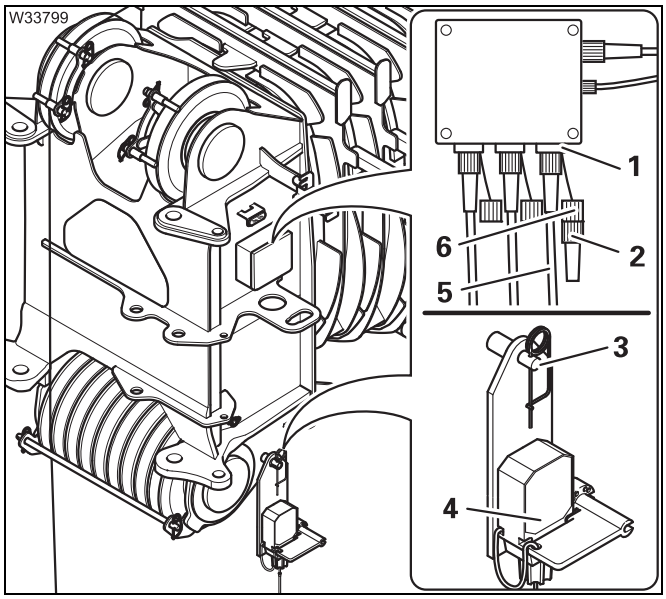
A 1x

12.8.6 Installing/removing the lifting limit switch

Function of the lifting limit switch; ➠ p. 11 - 60.
For every reeved hoist rope, you must install a lifting limit switch, attach a lifting limit switch weight and place it around the hoist rope.

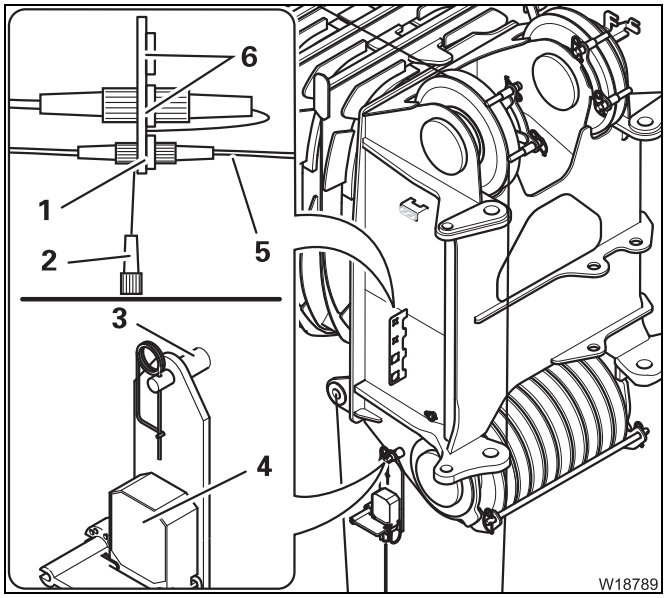
Installing the lifting limit switch

You can attach the lifting limit switch on the right or left side of main boom head. Install the switch on the side that is closer to the last rope line leading upwards. There can also be one lifting limit switch installed on each side.



On the left side

- Fit the lifting limit switch (**4**) onto the holder (**3**) and secure it with the retaining pin.
- Remove the bridging plug (**2**) from the socket (**1**) and plug it into the dummy socket (**6**).
- Lay the cable (**5**) in such a way that it will not be damaged during crane operation, and insert the lifting limit switch into the socket (**1**).

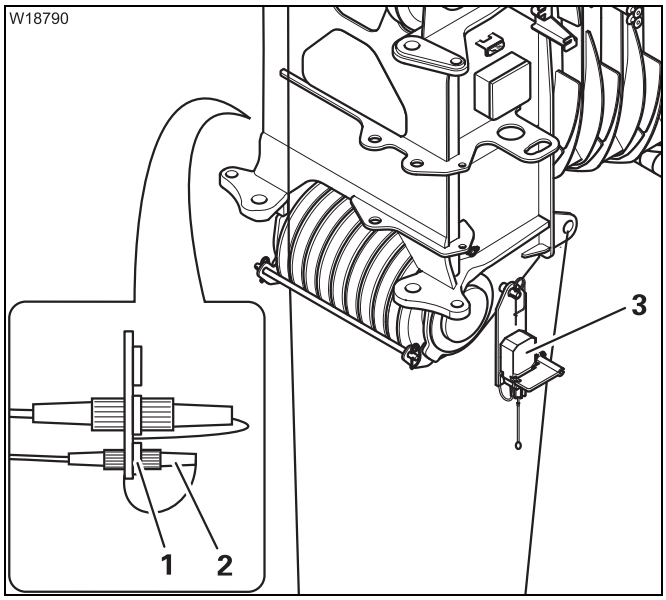


On the right side

- Fit the lifting limit switch (**4**) onto the holder (**3**) and secure it with the retaining pin.
- Remove the bridging plug (**2**) from the socket (**1**).
- Lay the cable (**5**) in such a way that it will not be damaged during crane operation, and insert the lifting limit switch into the socket (**1**).

Connections (**6**); ➠ *Operating Instructions Lattice Extension*.

14.03.2018



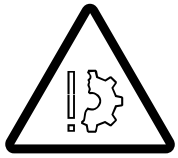
If only one lifting limit switch has been installed

- Check whether the bridging plug is in the socket that is not being used.

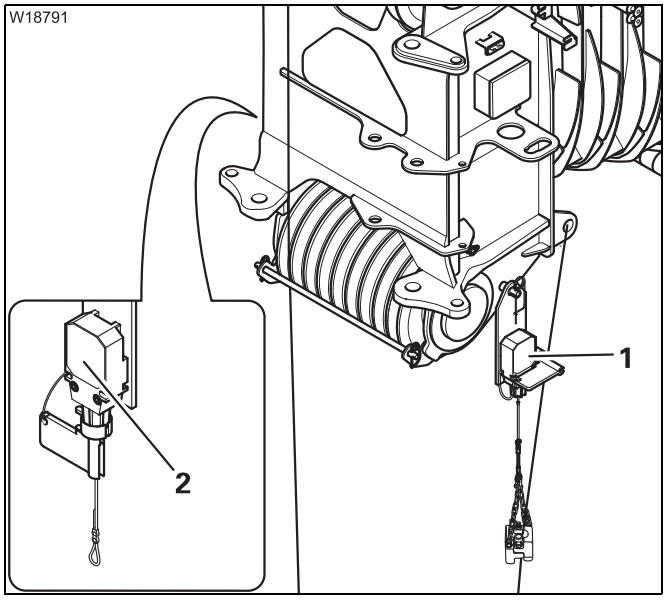
If, for example, the lifting limit switch (**3**) is installed on the left, the bridging plug (**2**) must be in the socket (**1**) on the right.

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

- Check whether the lock on the lifting limit switch (**3**) is released; ➠ *Removing the lock*, p. 12 - 111.



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

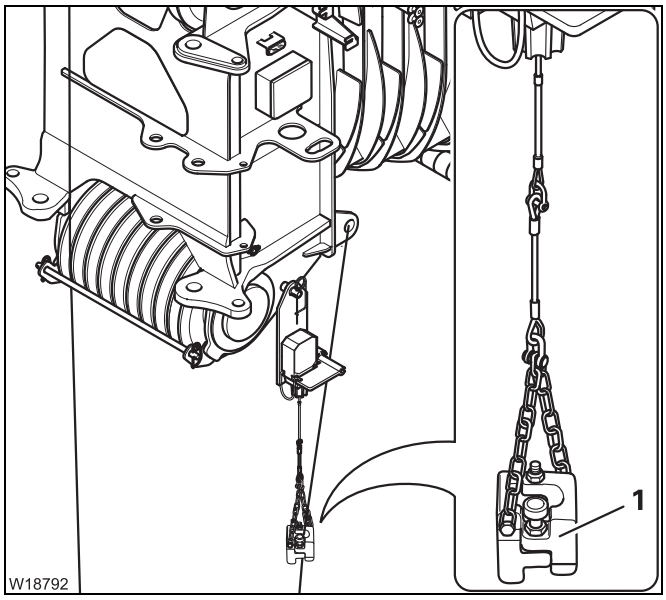
- Lock the lifting limit switch to which no lifting limit switch weight has been attached.

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 - 110.

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

If two hoist ropes are reeved, you must also use two lifting limit switch weights. In this case, both lifting limit switches must be unlocked; ➠ *Removing the lock*, p. 12 - 111.

14.03.2018

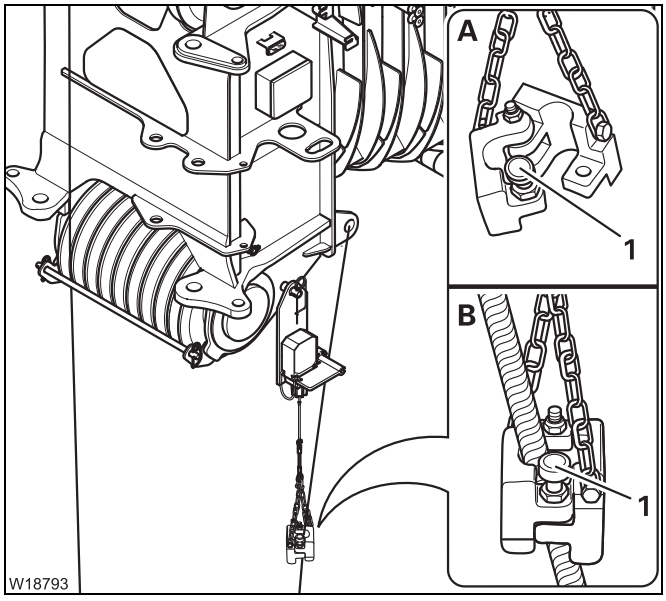


Attaching the lifting limit switch weight

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

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

This lifting limit switch must not be locked;
➠ *Removing the lock*, p. 12 - 111.



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.

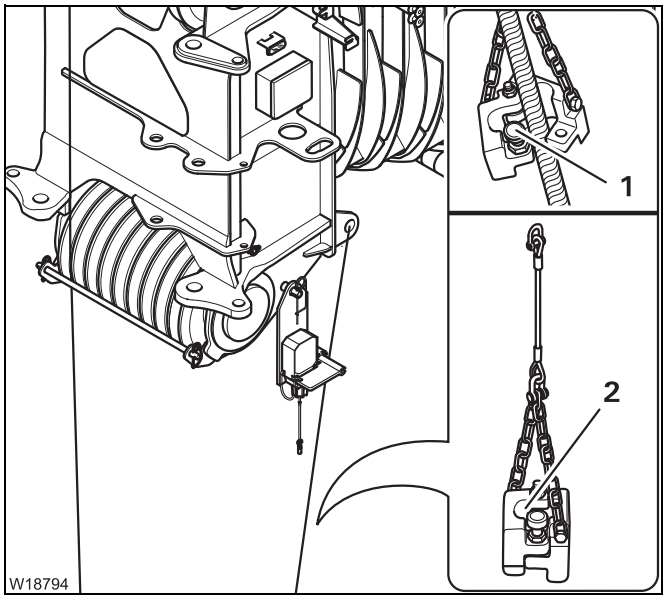
If two hoist ropes are reeved, you must also place a lifting limit switch weight around the second hoist rope.

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.

14.03.2018

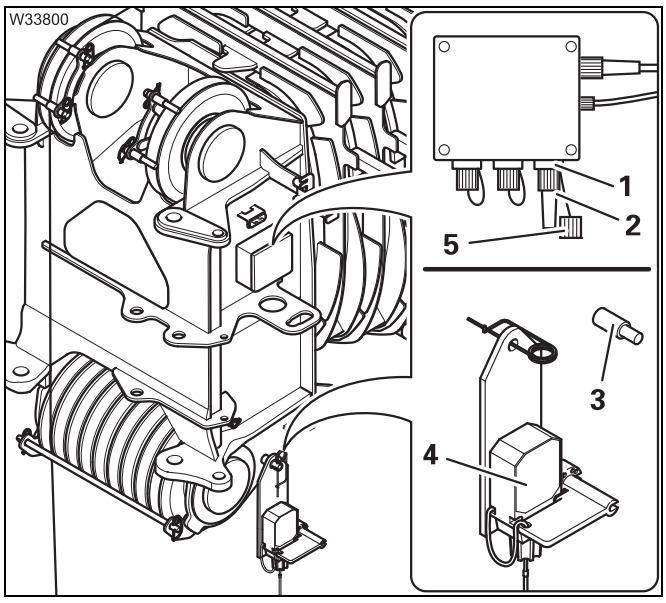
Removing the lifting limit switch

This section describes complete removal.
If the hook block is to be attached to the bumper at a later point, you will need to detach the lifting limit switch weight from the hoist rope, so that you can unreeve or reeve when unrigging the hoist rope. You can place the lifting limit switch weight around the hoist rope again before driving.



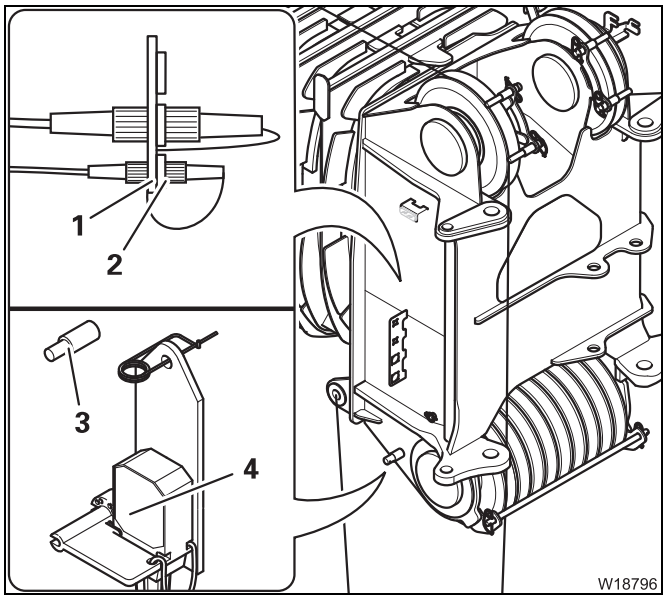
Removing the lifting limit switch weight

- Pull the safety pin (**1**) out and fold the two halves of the weight apart.
- Remove the halves of the weight from the rope line.
- Pull the safety pin (**1**) out, fold the two halves of the weight back together and let the safety pin engage.
- Remove the lifting limit switch weight (**2**).
- Remove the lifting limit switch weight on the other side too, if necessary.



Removing the left lifting limit switch

- Pull the plug from the socket (**1**).
- Remove the bridging plug (**2**) from the dummy socket (**5**) and plug it into the socket (**1**).
- Remove the lifting limit switch (**4**) from the bracket (**3**).
- Fasten the retaining pin to the lifting limit switch.



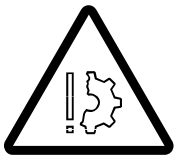
Removing the right lifting limit switch

- Pull the plug from the socket (**1**).
- Insert the bridging plug (**2**) into the socket (**1**).
- Remove the lifting limit switch (**4**) from the bracket (**3**).
- Fasten the retaining pin to the lifting limit switch.

12.8.7 Locking/unlocking the lifting limit switch

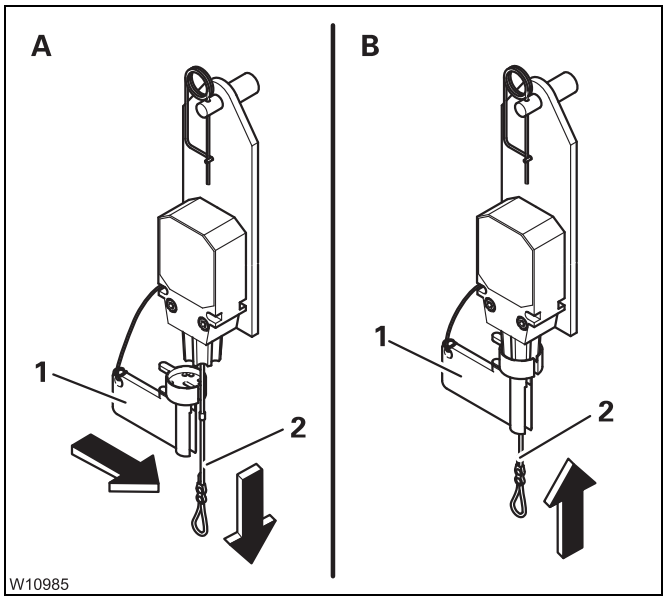
Locking

If a hoist rope has been reeved and two lifting limit switches are installed, you must lock the lifting limit switch not used in order to enable all crane operations.



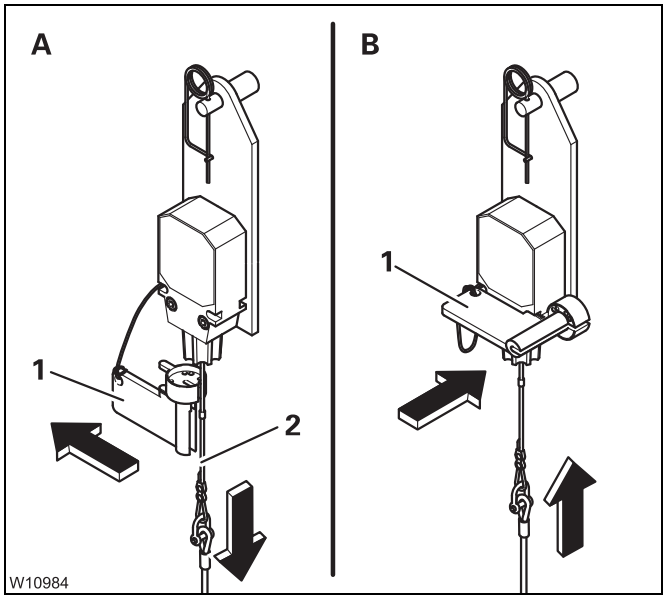
Risk of damage if the lifting limit switch is locked!
The lifting limit switch to which the lifting limit switch weight is attached may under no circumstances be locked when operating the crane.
If the lifting limit switch is locked, release the lock.
This prevents the hook block hitting the main boom head, causing damage to the hook block, main boom head and hoist rope.

14.03.2018



- Remove the lifting limit switch weight.
- (**A**) – Remove the cap (**1**).
- Pull down the rope (**2**).
- (**B**) – Secure the rope (**2**) in this position using the cap (**1**) – the lifting limit switch is locked and can no longer be triggered.

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.

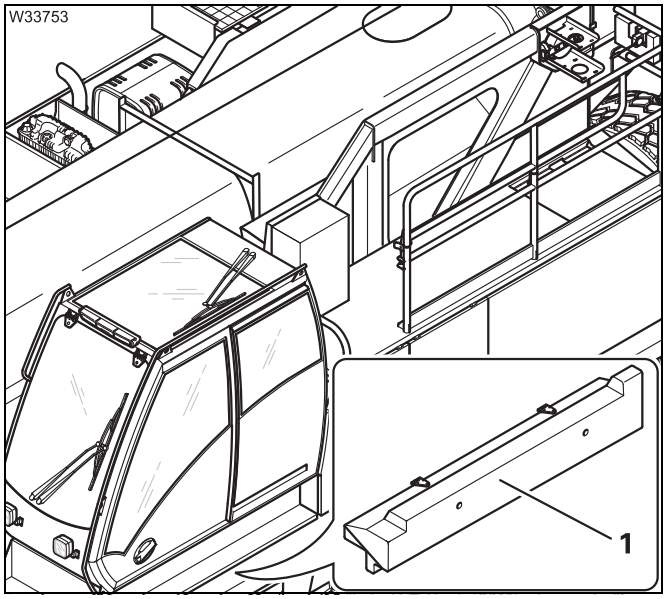
14.03.2018

12.8.8 Anemometer and air traffic control light

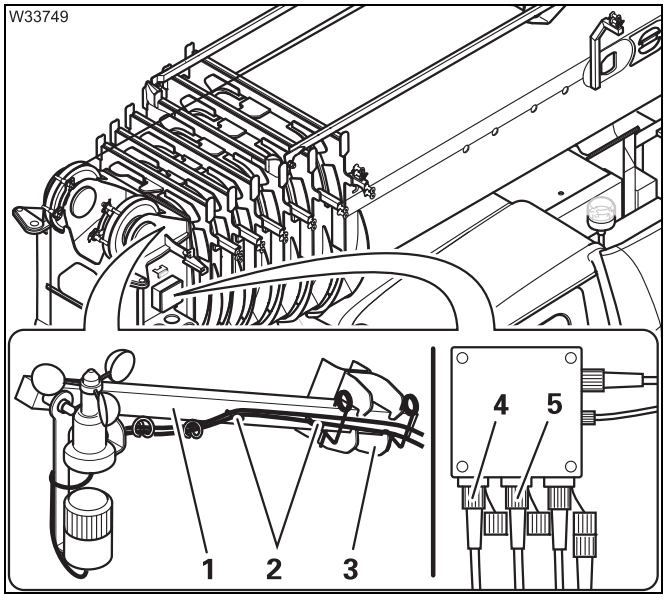
Risk of damage during on-road driving!
Always remove the anemometer and air traffic control light before on-road driving.
This prevents the specified overall height being exceeded at on-road level, and the anemometer from getting damaged due to unfavourable air currents.

Installing

The anemometer and the air traffic control light – if provided – are located on the same rod.

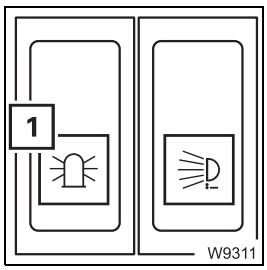


- If necessary, remove the rod from the storage compartment (**1**).



- Insert the rod (**1**) into the holder (**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.

14.03.2018



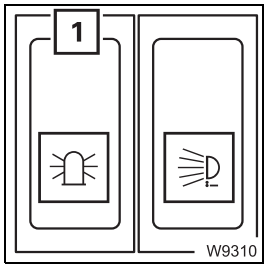
Switching the air traffic control light on and off:

To switch on: Press in switch (**1**) at the bottom

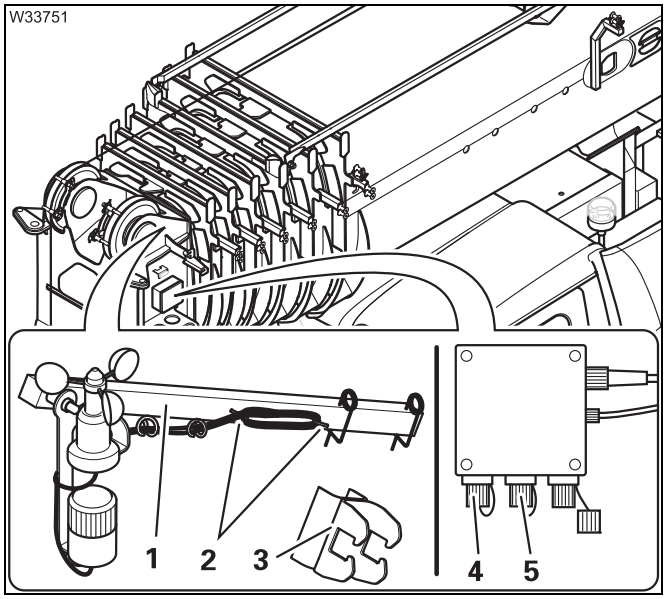
To switch off: Press in switch (**1**) at the top

Removing

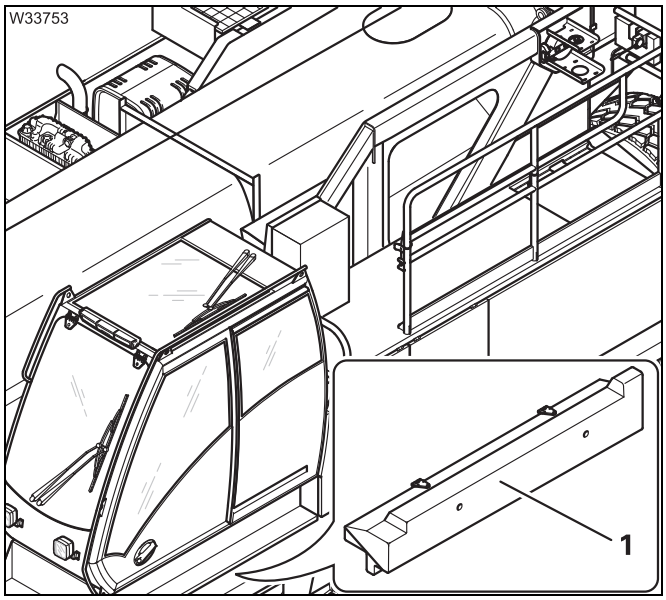
You must remove the rod with the anemometer/air traffic control light before driving on the road; ➠ p. 12 - 112.



- Switch off the air traffic control light – press the switch (**1**) upwards and inwards.



- Remove the plug and close the sockets (**4**) and (**5**) with the protective caps.
- Wind the cables on to the holder (**2**).
- Remove the rod (**1**) from the holder (**3**).
- For transportation, fasten the retaining pins to the rod (**1**).



- If necessary, store the rod in the storage compartment (**1**).

14.03.2018

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14.03.2018

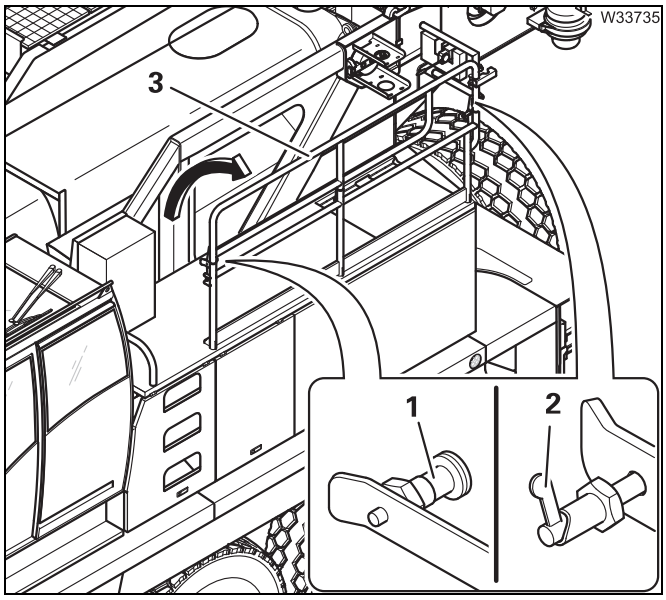
12.9 Other rigging work

12.9.1 Railings on the turntable

Always fold out the railings when you are working above on the turntable.
Always fold in the railings before driving.

Risk of accidents when railings are not folded out!
The railings provide protection from falling. Always fold out the railings before moving onto the auxiliary hoist.

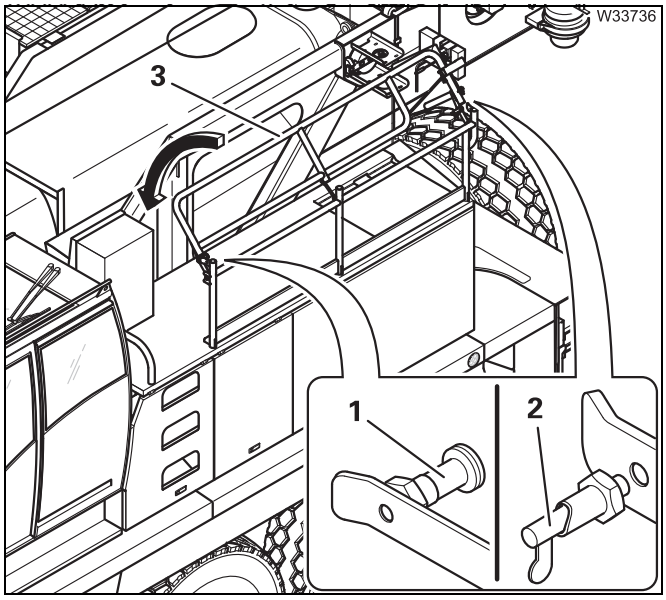
Risk of accidents due to exceeding the permissible dimensions!
Fold in the railings before driving. When the railings are unfolded, the overall height specified for on-road driving is exceeded.



Folding out

- Fold the railings (**3**) out until the latches (**1**) and (**2**) engage.

14.03.2018

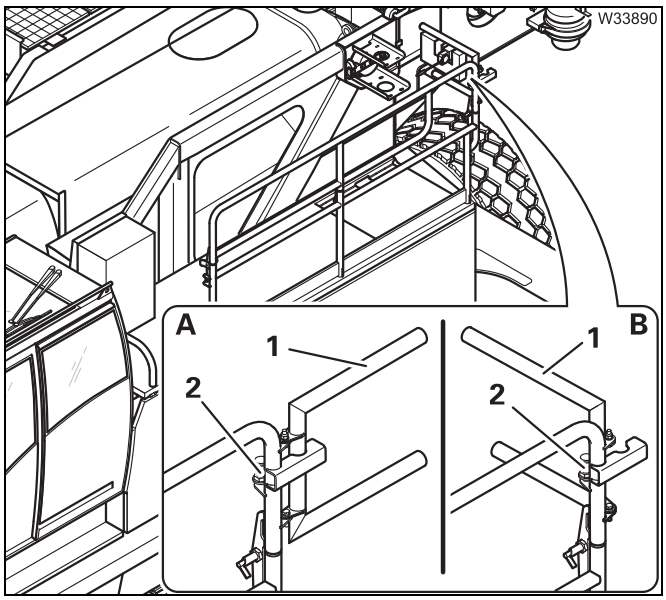


Folding in

- Open the locking bar (**2**), then open the locking bar (**1**) and fold in the railings (**3**).

You can additionally fold out the railings (**1**) for rigging work. Always fold in the railings for crane operation.

Danger of accidents through folded out railings without a rigged counterweight!
The railings only function as fall protection when the counterweight is fully rigged. Fold out the railings only when the counterweight is fully rigged. This prevents you from falling off the turntable.



(A) – Folding out

- Release the locking bar (**2**) and swing the railing (**1**) outward until it engages.

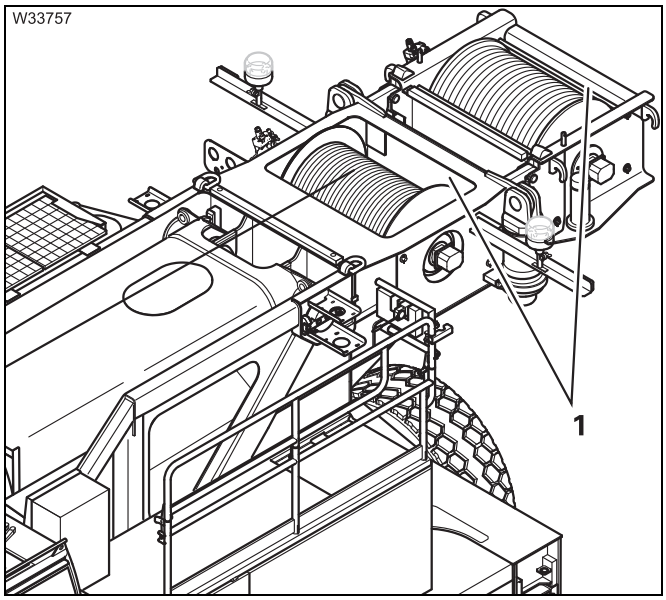
(B) – Folding in

- Release the locking bar (**2**) and swing the railing (**1**) inward until it engages.

14.03.2018

12.9.2 Cameras for crane operation

Cameras on the hoists



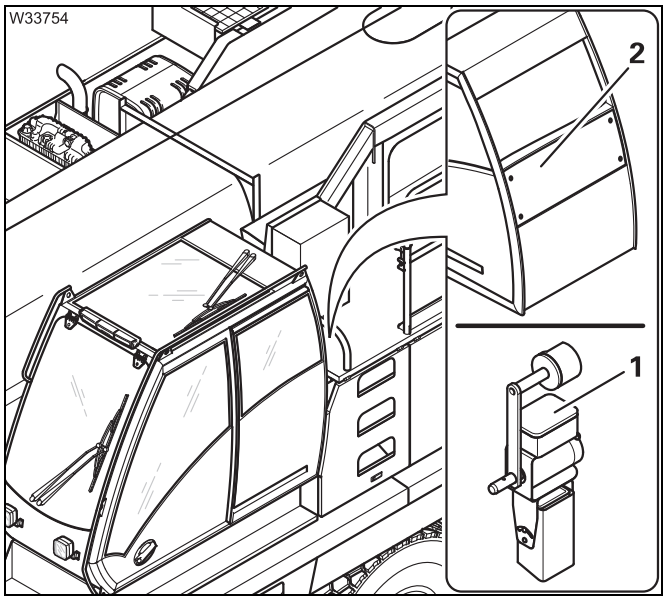
A camera can be found on both the main and auxiliary hoist (**1**).

- Clean the camera lens if necessary.

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.

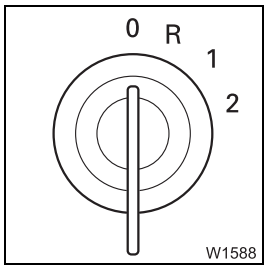


The camera (**1**) may only be installed on a truck crane equipped with the appropriate receiver (**2**). The camera and receiver are coordinated and identified with the same number on the model plate.

- Before installation, compare the numbers on the model plates.

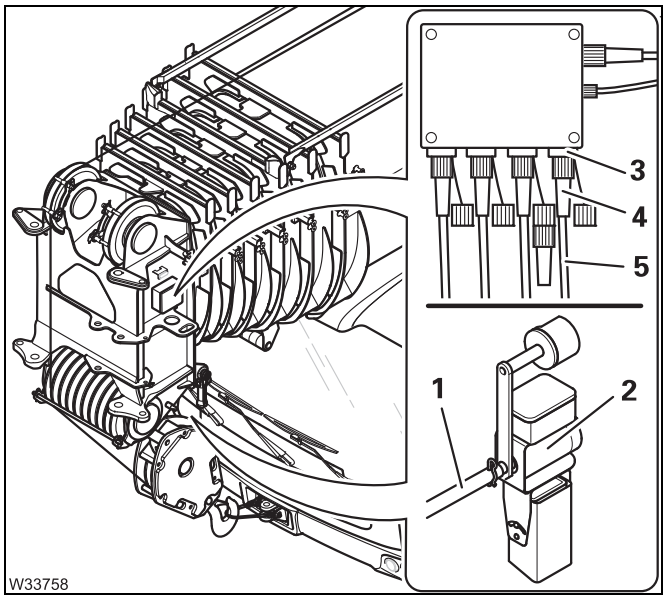
14.03.2018

Risk of accidents if the wrong camera is installed!
If you install the wrong camera in your truck crane, you will not see an image.
If your camera is installed in a neighbouring truck crane, you will see the wrong image.



- Switch off the ignition in the crane cab.

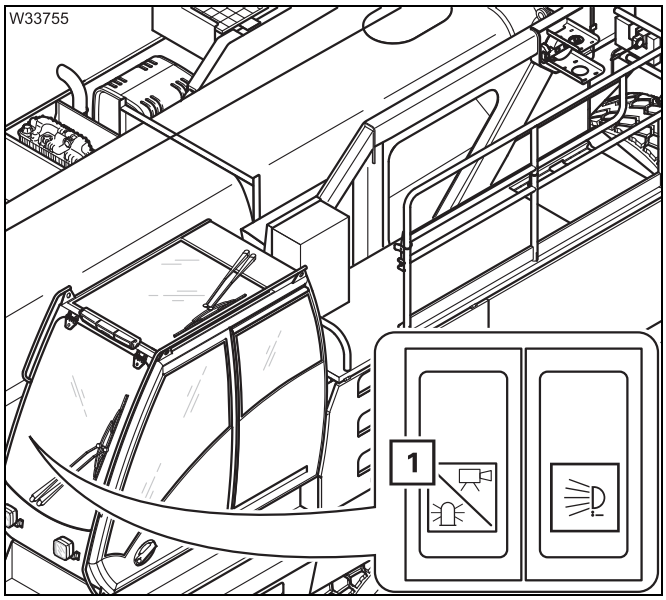
Risk of accidents due to a falling camera!
Always use a retaining pin to hold the camera in the clamp.
This prevents the camera falling down and injuring someone.



Installing

- Clean the camera lens if necessary.
- Insert the camera (**2**) into the clamp (**1**) and secure it with the retaining pin.
- Insert the plug (**4**) into the socket (**3**).
- Lay the cable (**5**) in such a way that it will not be damaged.

14.03.2018

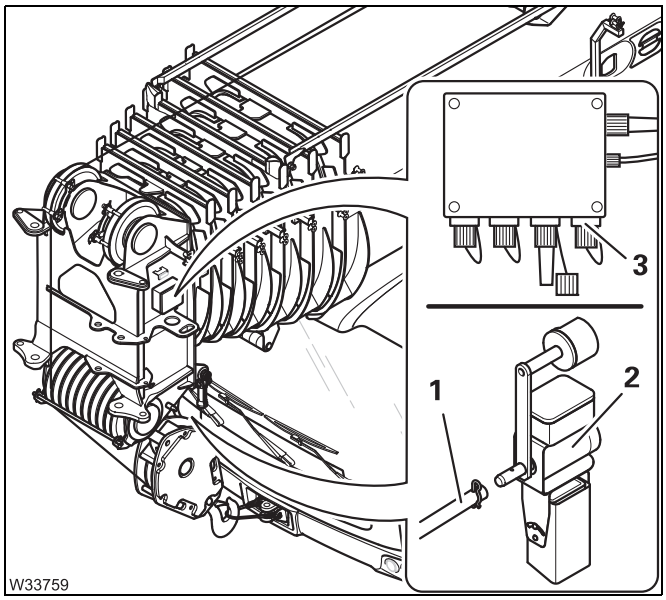


Switching on the camera

- Switch on the ignition.
- Press switch (**1**) down.
- Switch on the monitor.

Switching off the camera

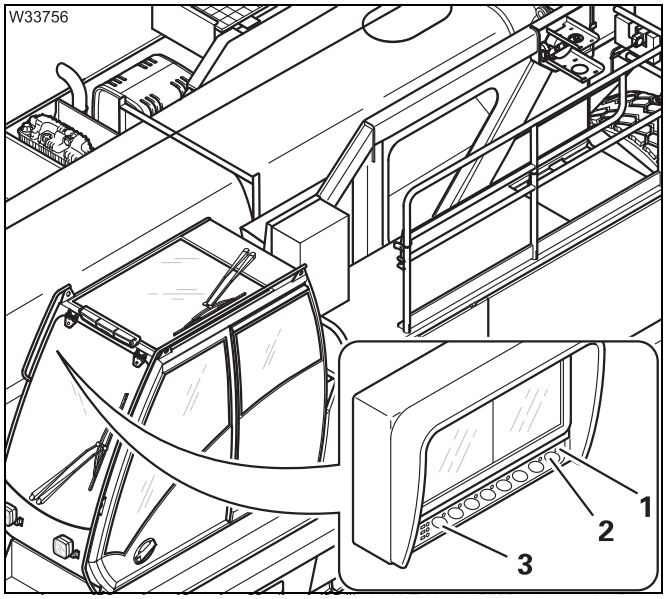
Press switch (**1**) up.



Removing

- Switch off the camera.
- Pull the plug out of the socket (**3**) and close the socket with the cap.
- Remove the camera (**2**) from the clamp (**1**) and put the retaining pin in the holder (**1**).

Turning the monitor on/off and switching



To switch on:

- Switch on the ignition.
- If necessary, press the button (**2**) once. The lamp (**1**) lights up. The image appears on the monitor after a few seconds. If an image does not appear; ➠ p. 14 - 16.

Switching off

- Press the button (**2**) once. The lamp (**1**) and the image go out.

Switching

- Alternate between the cameras using button (**3**).

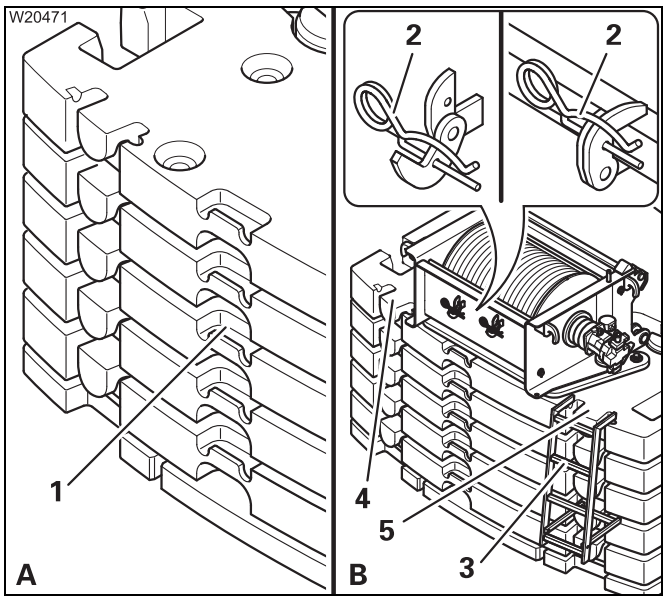
14.03.2018

12.9.3 Ladder on the counterweight

For rigging work, you reach the turntable via the counterweight.

Risk posed by folding ladder falling down!
Always secure the folding ladder before driving. This prevents the ladder from falling down while driving and endangering other vehicles.

Risk of damage during crane operation!
Always remove the ladder for crane operation.
This prevents you from exceeding the slewing radius and damaging the carrier or objects within the slewing range of the truck crane.



(A) – when an auxiliary hoist is not rigged:

- Use the rungs (**1**) for ascending.

(B) – when an auxiliary hoist not rigged:

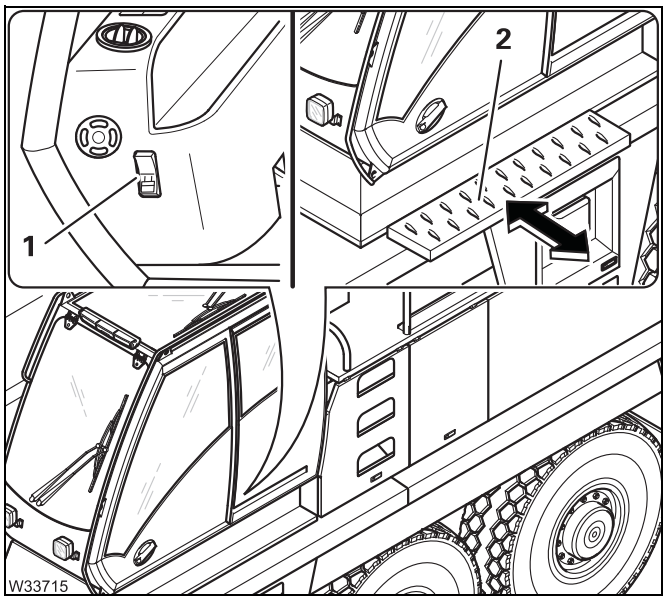
- Remove the safety pin (**2**) and remove the ladder (**3**).
- Attach the ladder at the hanging points (**4**) and (**5**).
- Always remove the ladder for crane operation and attach it to the auxiliary hoist using the retaining pins (**2**).

14.03.2018

12.9.4 Extendable step

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.

Risk of accidents due to extending steps!
The extending steps can injure you or knock you off the carrier.
Do not stand in the area of the extending steps during operation. Stand (e.g.) on the ladder hung in front of the crane cab and hold the handle at the front of the crane cab for operation.



The steps (**2**) are operated with the button (**1**).

Extend
- Press the button (**1**) down – the step (**2**) extends.

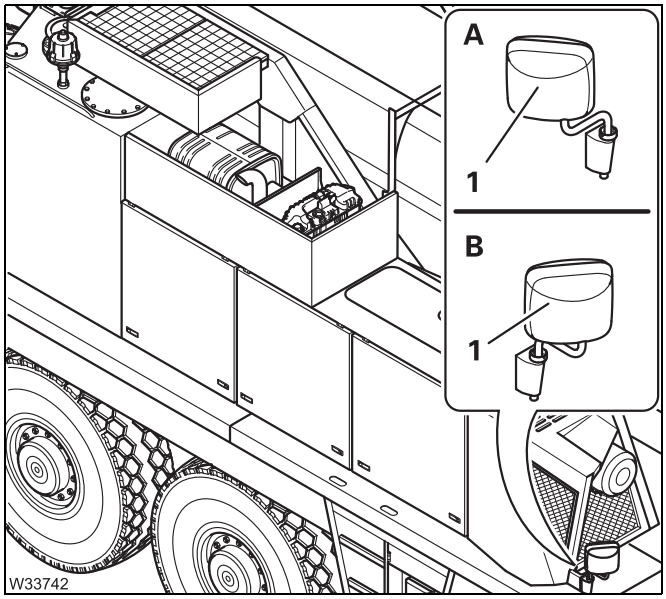
Retract
- Press the button (**1**) up – the step (**2**) retracts.

14.03.2018

12.9.5 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**) such that the rear right outrigger beam can be observed clearly from the crane cab (when the main boom is raised).

(B) – Folding in the mirror

- Fold in the mirror (**1**) until it does not protrude over the side of the carrier.

14.03.2018

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14.03.2018

13 Driving with a rigged truck crane

14.03.2018

14.03.2018

13 Driving with a rigged truck crane

This section describes driving the truck crane with the counterweight rigged. If a lattice extension is rigged as well; ➠ *Operating Instructions Lattice Extension*.

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, e.g. the raised main boom in *0° to the rear*.

Risk of overturning by slewing the 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!
Driving the truck crane with a load lifted is prohibited. Always set down the load prior to driving the truck crane and secure the hook block so it cannot swing.

13.1 Driving path

The route must be level. Uneven surfaces cannot be compensated with the level adjustment system.

The entire route must be level. The rigging modes and axle loads specified in this chapter only for driving distances which are free of inclines in longitudinal and lateral direction.

The ground must be stable enough to bear the axle loads.

If the surface pressure of the tyres exceeds the permissible load on the ground, the surface area of the tyres must be increased by packing stable material (e.g. wooden planks).

14.03.2018

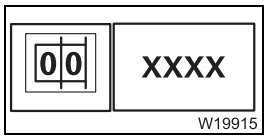
13.2 Permissible rigging modes and axle loads

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.

In certain counterweight combinations, the rigged counterweight must be set down on the counterweight platform while driving. Please observe the notes in the following table.

Risk of damage to the slewing gears!
Always set down the counterweight as described in the following table while driving. This prevents damage to the slewing gears.



- Enter the RCL code for the actual rigging mode of the truck crane in accordance with the *Lifting capacity table*.

Risk of accidents if the RCL is overridden!
Always enter the RCL code for the current rigging mode. The specified positions are within the monitored working ranges.
If the RCL is overridden, the truck crane may overturn even if you move it into the positions specified.

- Bring the superstructure and the main boom into a position that is indicated in the following table for the specified counterweight rigged.
- Tie down the hook block so that it cannot swing around.

Axle load table

The axle loads apply:

– to all permissible tyres; ➠ *Tyres*, p. 1 - 14
– a reeved 3-sheave hook block; ➠ *Hook blocks and hook tackle*, p. 1 - 11

The specified maximum axle load is only reached at the limits of the listed angle range for the main boom, e.g. at 0° or 15°. If the maximum axle load is reached at the front, it will be below the maximum value at the rear and vice versa.
The axle loads are below the specified maximum axle loads within the listed angle range.

14.03.2018

Counter weight in t (lbs)	Telescope status I/II/III/IV/V/VI in%	Main Boom Angle in °	Superstructure position[1]	Maximum Axle load[2] in t (x 1,000 lbs)	
				front	rear
0	0 - 0 - 0 - 0 - 0 - 0	15 - 50	front	13.5 (29.8)	14.5 (32.0)
7.0 (15,432)	0 - 0 - 0 - 0 - 0 - 0	15 - 35	front	11.0 (24.3)	16.0 (35.3)
	0 - 0 - 0 - 0 - 0 - 0	80	rear	7.5 (16.5)	16.5 (36.4)
16.5 (36,376)	50 - 0 - 0 - 0 - 0 - 0	15 - 40	front	15.5 (34.2)	17.0 (37.5)
	0 - 0 - 0 - 0 - 0 - 0	80	rear	9.5 (20.9)	17.5 (38.6)
21.2 (46,738)	50 - 0 - 0 - 0 - 0 - 0	15 - 35	front	14.0 (30.9)	18.5 (40.8)
	0 - 0 - 0 - 0 - 0 - 0	75 - 80	rear	11.0 (24.3)	19.0 (41.9)
26.0 (57,320)	50 - 0 - 0 - 0 - 0 - 0	15 - 30	front	12.0 (26.5)	20.0 (44.1)
	0 - 0 - 0 - 0 - 0 - 0	75 - 80	rear	12.0 (26.5)	19.5 (43.0)
35.5 (78,264)	100 - 0 - 0 - 0 - 0 - 0	20 - 40	front	16.5 (36.4)	22.0 (48.5)
	0 - 0 - 0 - 0 - 0 - 0	70 - 80	rear	14.5 (32.0)	21.5 (47.4)
45.0 (99,208)	100 - 0 - 0 - 0 - 0 - 0	15 - 25	front	14.0 (30.9)	23.5 (51.8)
	0 - 0 - 0 - 0 - 0 - 0	65 - 80	rear	17.0 (37.5)	23.0 (50.7)
54.5 (120,152)	50 - 50 - 50 - 50 - 0 - 0	20- 25	front	14.5 (32.0)	25.5 (56.2)
	0 - 0 - 0 - 0 - 0 - 0	60 - 80	rear	19.5 (43.0)	25.0 (55.1)
(74.5[3] (164,244)	0 - 0 - 0 - 0 - 0 - 0	70 - 80	rear	24.5 (54.0)	26.0 (57.3)
(92.5[3] (203,928)	0 - 0 - 0 - 0 - 0 - 0	75	rear	27.5 (60.6)	27.5 (60.6)

[1] Rear: Slewing angle display 0°
Front: Slewing angle display 180°

[2] Front: On the first and second axle line respectively
Rear On the third, fourth, fifth and sixth axle lines respectively

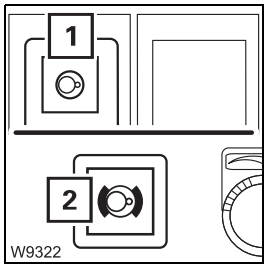
[3] Counterweight combination set down on the counterweight platform

14.03.2018

13.3 Before driving

13.3.1 Securing 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!



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

➠ *Switching off the slewing gear*, p. 11 - 100.

13.3.2 Check the tyre pressure and the wind speed

- Ensure that all the tyres are at the prescribed pressure levels;
  ➠ *Tyres*, p. 1 - 14.

Risk of damage to the tyres!
You may only drive the truck crane if the tyres are at the prescribed pressure level.
Never reduce the tyre pressure in order to increase the tyres' bearing surface!

The same maximum permissible wind speeds for working with the crane apply to driving the truck crane.

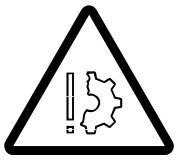
- Check the wind speed; ➠ p. 11 - 52.

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 the *Lifting capacity table*. In this case, you must bring the truck crane into a secure state.

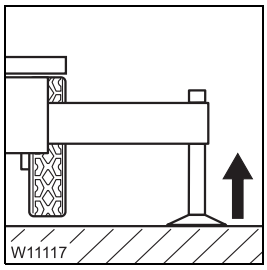
14.03.2018

13.3.3 Putting the truck crane on the wheels

Danger of overturning by unevenly retracting the outrigger cylinders!
Retract the outrigger cylinders evenly! This prevents the truck crane overturning when individual outrigger cylinders are retracted.

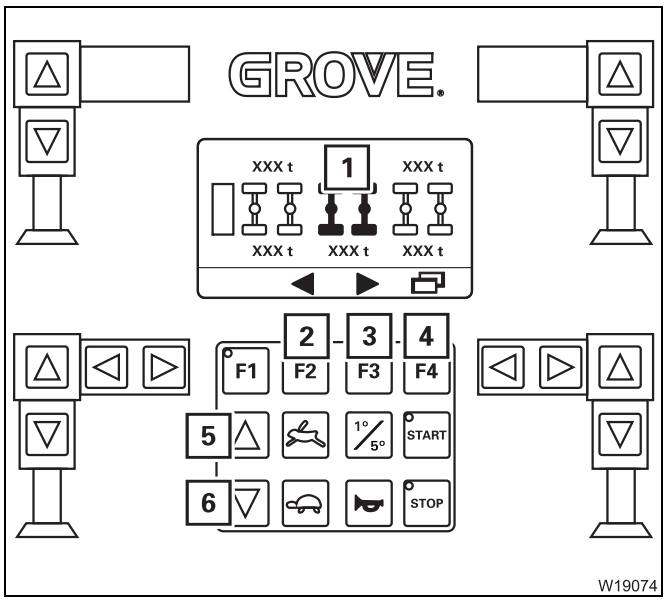


Risk of damage to the axle lines!
Retract the outrigger cylinders evenly! This prevents excessive strain on the axle lines.



- If necessary, retract the outrigger cylinders until all wheels are just above the ground.

Danger of overturning when switching on the suspension!
You may under no circumstances switch on the suspension while the rigged truck crane is on wheels. Switching on the suspension would cause the suspension struts to be suddenly pressed together and damaged, and the truck crane could overturn.



Lowering/raising the axles

- Open the Raise Axle menu – button (**4**) on the outrigger control unit.
- Select the axles to be lowered by pressing the (**2**) or (**3**) button.

– The selected axles (**1**) are displayed in black.

- Press the button for the desired movement:

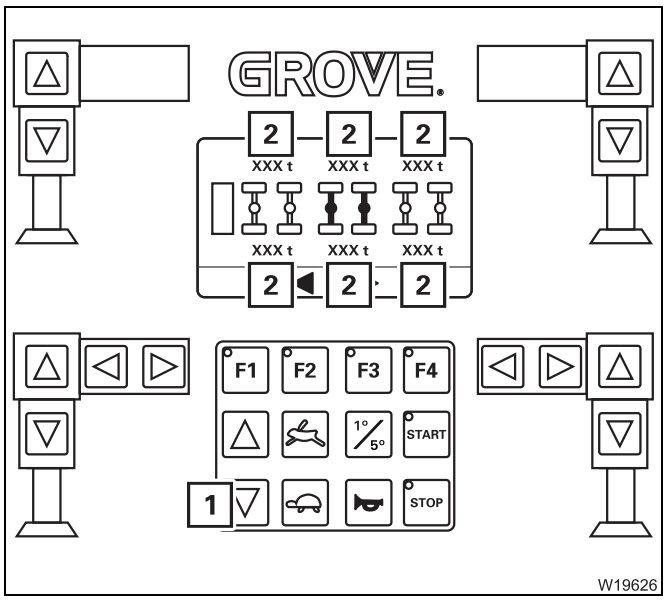
  5 Raise the axles

  6 Lower the axles

14.03.2018

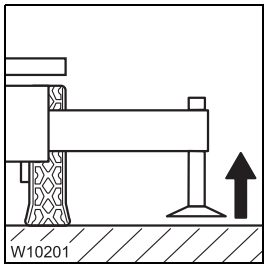
Horizontally aligning the truck crane

Risk of damage to the tyres and suspension struts!
Do not exceed the maximum permissible axle load of 32 t when levelling the truck crane.
Monitor the display while levelling and adjust the axle loads as necessary!



- Press the (**1**) button until the selected axles touch the ground.
- Repeat the procedure on the other axles until an even axle load is indicated on the display (**2**).

If required, you will have to lower or raise the lowered axles again to achieve an even axle load.



To secure the truck crane

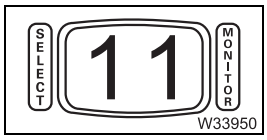
- Retract the outrigger cylinders until the outrigger pads are about 5 to 10 cm (2 to 4 in) above the ground. Leave the outrigger beams extended.

Danger of overturning if outriggers are retracted!
Always leave the outrigger beams extended and the outrigger pads just above the ground to secure the truck crane against overturning.

14.03.2018

13.3.4 Gears/connections

Transmission



- Select gear **1** as the top gear to prevent the transmission from shifting gears; ➠ p. 5 - 32.

Connections

If required, you can

– switch on the longitudinal differential locks; ➠ p. 5 - 62,

– switch on the transverse differential locks; ➠ p. 5 - 62,

– switch on separate steering; ➠ p. 5 - 71.

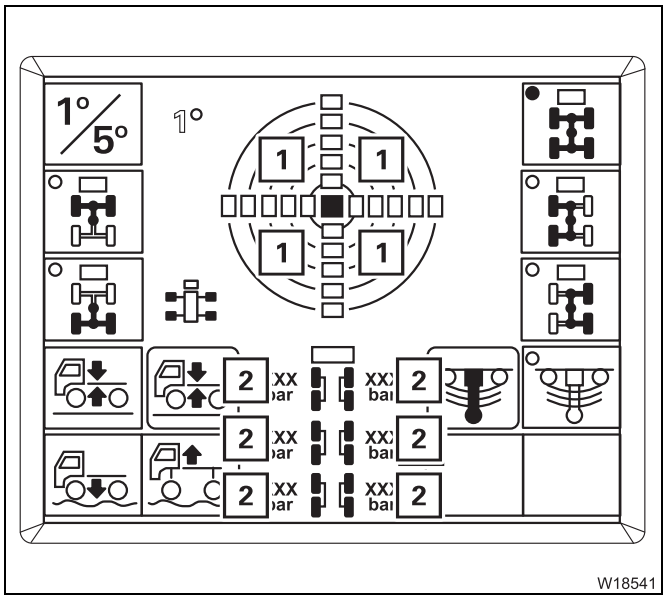
13.4 Whilst driving

- Drive only at the lowest possible speed, **max. 1.5 km/h** (1 mph).
- The turning radius should be as great as possible when driving around corners!
- 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.

14.03.2018



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°

or

– The operating pressure (**2**) of 210 bar (3,045 psi) in the suspension has been exceeded.

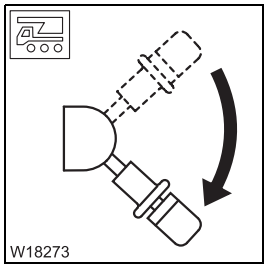
In this case, you must re-level the truck crane using the Raise axle function as described in the *Putting the truck crane on the wheels* section; ➠ p. 13 - 5.

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.

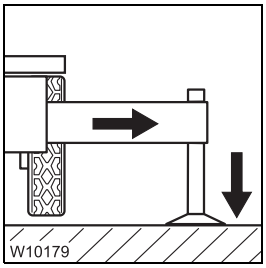
14.03.2018

13.5 After driving

- Restore the original condition:
  - Switch off the longitudinal differential locks; ➠ p. 5 - 62,
  - Switch off the transverse differential locks; ➠ p. 5 - 62,
  - Switch off separate steering; ➠ p. 5 - 74.



- Apply the parking brake.



- Support the truck crane with the outrigger span required for the job according to the *Lifting capacity table* and raise it until none of the wheels is touching the ground; ➠ *Permissible outrigger spans*, p. 12 - 30.

14.03.2018

13.6 Driving in combined operation

With additional equipment, you can drive the truck crane from the driver's cab while the engine for the crane operation is running.

- Before driving, observe the specifications in sections 13.1 to 13.2.

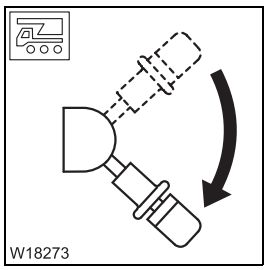
Risk of accidents when driving with a lifted load!
The truck crane may only be moved **without** a load in combined operation.
Always set the load down before you move the truck crane.

13.6.1 Switching combined operation on/off

Prerequisites

– The rigging mode for driving with or without load is set correctly;
p. 13 - 2.

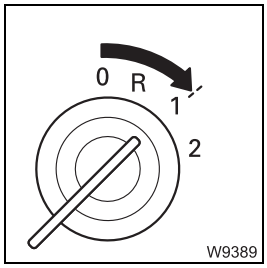
– The hand-held control has been disconnected and bridging plugs have been plugged into all superstructure and carrier sockets.



In the driver's cab

– The parking brake must be applied.

– The ignition key is in position **1**.



In the crane cab

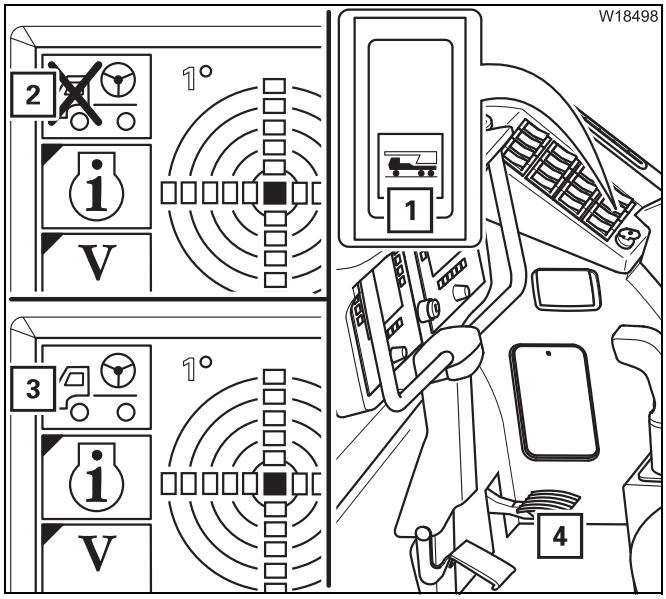
– The superstructure ignition has been switched on for approx. 30 seconds.

14.03.2018

Switching on

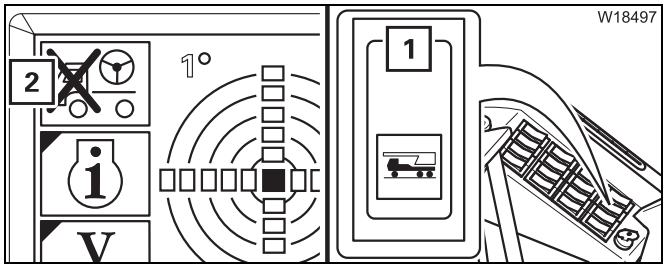
In this section, combined operation is switched on while the engine for driving is turned off. You can also first start the engine for driving from the crane cab.

- If required, open the main menu Esc in the crane cab.



- Press the (**1**) button **down** once.
  - Lamp (**1**) flashes – carrier ignition on.
  - Symbol (**2**) **red** – button (**2**) active.
- Press the button (**2**) once.
  - Symbol (**3**) **green** – combined operation on.
  - The engine for driving can now only be started from the driver's cab.
  - Button (**3**) and brake pedal (**4**) disabled.

Switching off

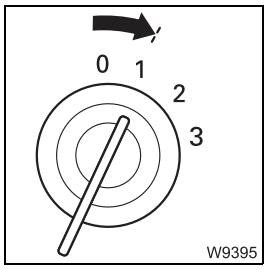


- Press the (**1**) button **up** once.
  - Lamp (**1**) goes out – engine for driving and carrier ignition off.
  - Symbol (**2**) **grey** – button (**2**) without function.

14.03.2018

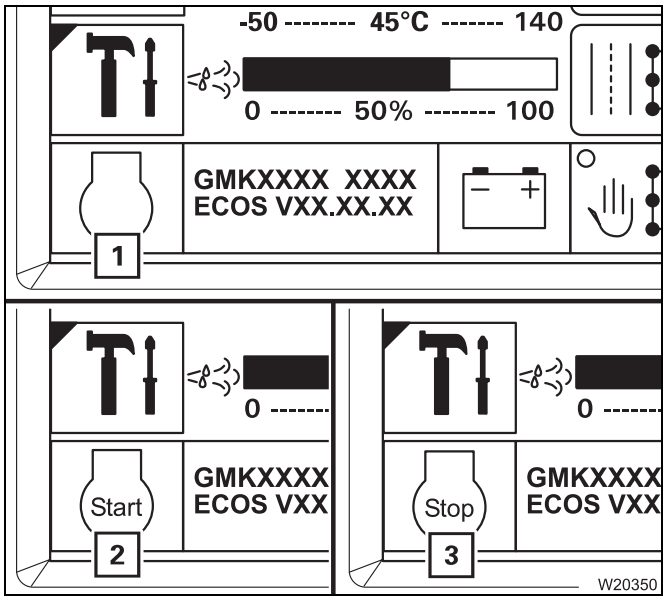
13.6.2 Starting/turning off the engine

In combined operation, the engine for driving can only be started from the driver's cab – in the main menu.



You cannot start and switch off the engine with the ignition key. The ignition key must be in position **1** so that the steering cannot block.

- If required, open the main menu Esc in the driver's cab.



Symbol (1) displayed – grey
Combined operation off; ➠ *Switching on*, p. 13 - 11.

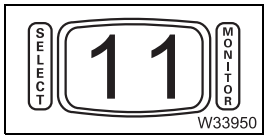
Starting the engine
The symbol (**2**) is **green**.
- Press the button (**2**) once.
  The engine is started – symbol (**3**) **red**.

Switch the engine off
Symbol (**3**) is **red**.
- Press the button (**3**) once.
  The engine is started – symbol (**2**) **green**.

14.03.2018

13.6.3 Preparing to drive

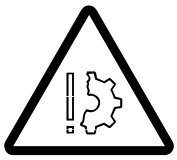
Transmission



- Shift into the lowest starting gear; ➠ p. 5 - 32.
  In this way you prevent the gears changing up and ensure that the speed is kept to a minimum.

Switching on separate steering

Separate steering must be switched on while driving the rigged truck crane; ➠ *Switching to separate steering*, p. 5 - 71.



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.

Connections

If necessary, you can connect the longitudinal and transverse differential locks; ➠ p. 5 - 62.

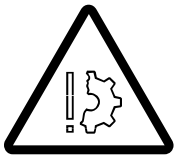
14.03.2018

13.6.4 While driving

Risk of accidents when the carrier ignition is switched off!
In the crane cab: Do not under any circumstances switch off the carrier ignition. In this way, you prevent the engine for driving from being switched off and the driver in the driver's cab from losing control of the truck crane.

Risk of accidents if the parking brake is released!
In the crane cab: Do not under any circumstances release the parking brake. If the parking brake is released from the crane cab, it cannot be engaged from the driver's cab. In this case, driving from the driver's cab is prohibited.

- The speed is limited to 8 km/h (5 mph).
- 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.

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 align the truck crane with the level adjustment system if the ground is uneven. In this case you must raise the truck crane with the outrigger cylinders, level it and then re-lower it; ➠ *Horizontally aligning the truck crane*, p. 13 - 6.

14.03.2018

14 Malfunctions during crane operation

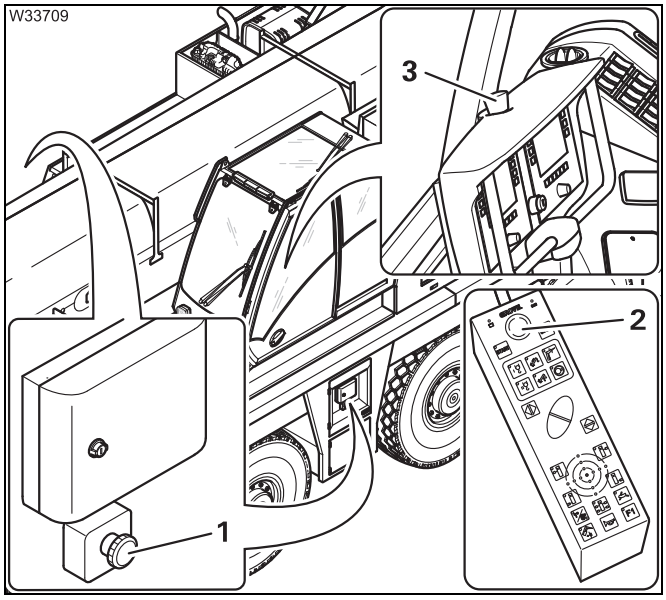
14.03.2018

14.03.2018

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

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 - 24.

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.

14.03.2018

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14.03.2018

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*; ➠ p. 11 - 40.

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 - 59,
➠ *Hydraulic emergency operation*, p. 14 - 65

- 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**.

14.03.2018

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14.03.2018

14.3 Fuses

The fuses are located in different places on the superstructure:

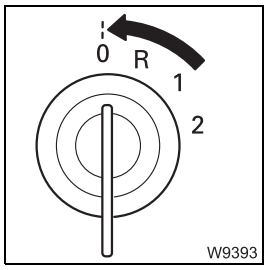
– On the turntable,

– In the crane cab,

– At the RCL.

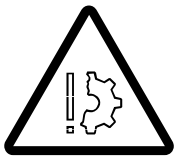
Information on replacing fuses

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

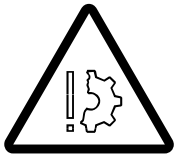


- Switch off the ignition whenever a fuse has to be replaced.

Risk of damage 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.

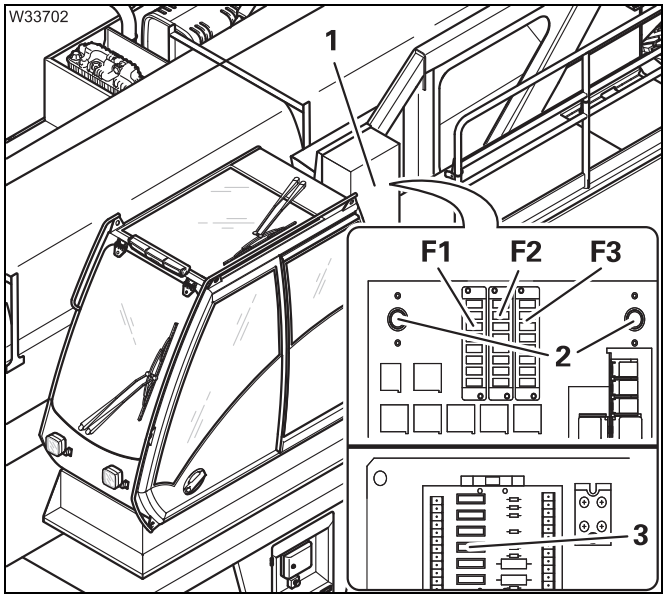


Risk of damage by overloading!
Replace blown fuses only with new fuses of the same amperage. This prevent parts being overloaded and damaged or the fuse being immediately blown again.
Notify **Manitowoc Crane Care** if a fuse with the same amperage fails again once the ignition is switched on.



Risk of fire!
Never repair a blown fuse with other electrically conductive materials.

14.3.1 Fuses on the turntable



- Open the distribution box (**1**). It contains

– the fuse groups **F1**, **F2** and **F3**,

- Remove the screws (**2**) and fold the plate down.

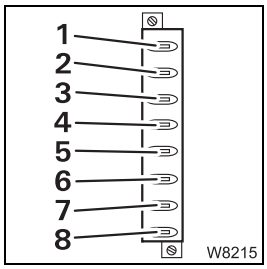
There are other fuses on the circuit board (**3**); ➠ p. 14 - 7.

Close the distributor box after checking.

- Observe the instructions on changing fuses; ➠ p. 14 - 5.

Fuse groups F1/F2/F3

The following tables show the designations of the individual fuses, including their amperage and functions.



The designations 1 to 8 in the tables correspond to the order from top to bottom (fuse 1 is the top fuse).

Designation	Amperage (A)	Function
F1/1	20	ESX 0 supply ESX 4 supply
F1/2	20	I/O-4 circuit board ESX 1 supply
F1/3	10	Central lubrication, Lattice extension
F1/4	10	Alternator, Superstructure rotating beacon
F1/5	20	Air intake inhibitor[1)] Flame start system[1)]
F1/6	5	Air intake inhibitor[1)]
F1/7	3	ESX 4 supply I/O-4 circuit board
F1/8	5	Engine E-control (PLD)

[1)] Additional equipment

14.03.2018

Designation	Amperage (A)	Function
F2/1	2	Lifting limit switch
F2/2	–	Unassigned
F2/3	10	Slewing gear brake
F2/4	20	Flame start system[1)]
F2/5	3	ESX 4 supply
F2/6	3	Emergency operation with hand-held control
F2/7	20	Oil cooler
F2/8	20	Additional oil cooler[1)]

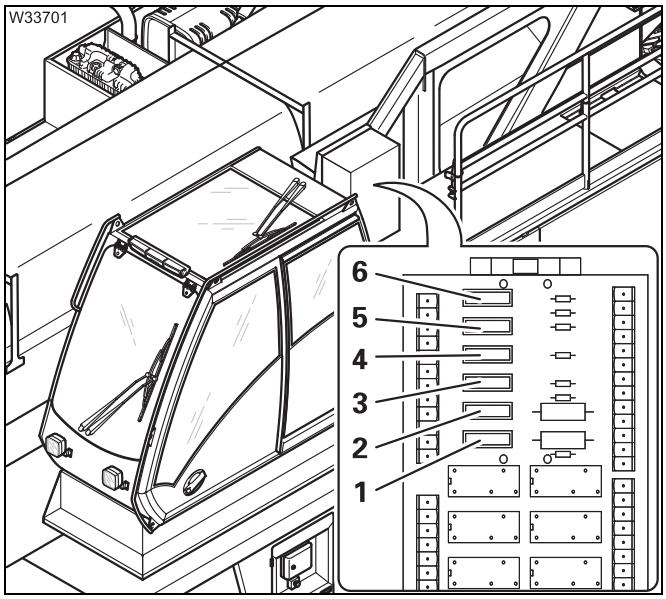
Designation	Amperage (A)	Function
F3/1	3	ESX2 control unit *ECOS* control unit supply
F3/2	2	ESX3 control unit
F3/3	10	RCL supply and *RCL* control unit
F3/4	5	Remote control[1)] Heating pump
F3/5	20	ESX2 control unit
F3/6	5	ESX2 control unit *ECOS* control unit supply
F3/7	5	Control lever
F3/8	–	Engine electronic system (ADM)

[1)] Additional equipment

Fuses on the circuit board

The fuses on the circuit board protect the ECOS control units on the superstructure.

14.03.2018

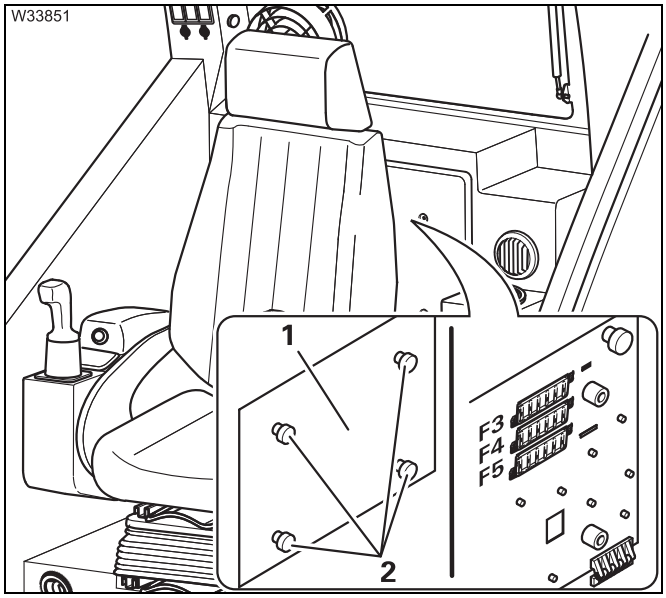


Fuse arrangement

Pos.	Designation	Amperage (A)
1	ESX 1 UE	3
2	ESX 1 D+	3
3	ESX 1 8.5 V	2
4	ESX 0 UE	3
5	ESX 0 D+	3
6	ESX 0 8.5 V	2

14.03.2018

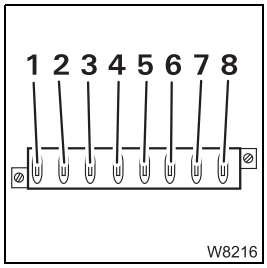
14.3.2 Fuses in the crane cab



- Loosen the bolts (**2**) and remove the cover (**1**).

The fuse groups **F3, F4** and **F5** consist of eight fuses each.

The following tables show the designations of the individual fuses, including their amperage and functions.



The designations 1 to 8 in the tables correspond to their order from left to right (fuse 1 is always the left fuse).

- Observe the instructions on changing fuses; ➠ p. 14 - 5.

Designation	Amperage (A)	Function
F3/1	3	ESX 2 supply *ECOS* control unit supply
F3/2	2	ESX 2 supply
F3/3	10	RCL supply and RCL control unit
F3/4	5	Remote control[1)] Heating system
F3/5	20	ESX 2 supply
F3/6	5	ESX 2 supply *ECOS* control unit supply
F3/7	5	Control lever supply
F3/8	5	Engine electronic system (ADM)

[1)] Additional equipment

14.03.2018

Designation	Amperage (A)	Function
F4/1	10	Engine electronic system (ADM)
F4/2	10	24 V/12 V voltage transformer Crane cab lighting Air traffic control light Radio
F4/3	3	Engine electronic system diagnostics plug Camera on the turntable[1)] auxiliary hoist[1)]
F4/4	25	Air-conditioning system[1)]
F4/5	–	Unassigned
F4/6	15	Auxiliary heater[1)]
F4/7	–	Unassigned
F4/8	20	CraneSTAR system

Designation	Amperage (A)	Function
F5/1	15	Spotlight
F5/2	15	Spotlight Status display RCL
F5/3	15	Windscreen wiper/washing system, Cigarette lighter
F5/4	10	Fan[1)] Camera on the turntable[1)] auxiliary hoist[1)]
F5/5	5	Instrument panel lighting
F5/6	5	Voltage monitoring Engine electronic system diagnostics plug
F5/7	10	Heater fan
F5/8	10	Battery heating[1)] Auxiliary heater[1)]

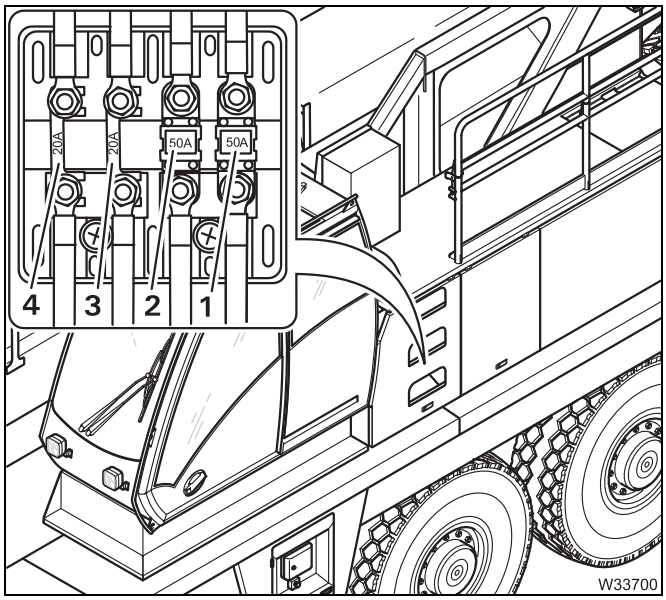
[1)] Additional equipment

14.03.2018

14.3.3 Fuses in the battery box

Fuses F10 to F13 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 on the right side next to the batteries.

- Remove the lid from the terminal box:

  1 Fuse F10
  2 Fuse F11
  3 Fuse F12
  4 Fuse F13

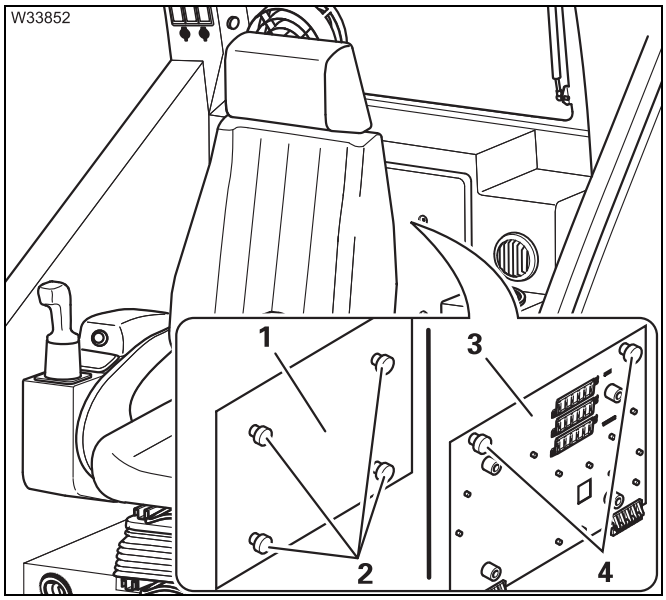
- Observe the instructions on changing fuses; ➠ p. 14 - 5.

Designation	Amperage (A)	Function
F10	50	Unassigned
F11	50	Superstructure central fuse
F12	20	Unassigned
F13	20	Preliminary fuse for time switch of auxiliary heater

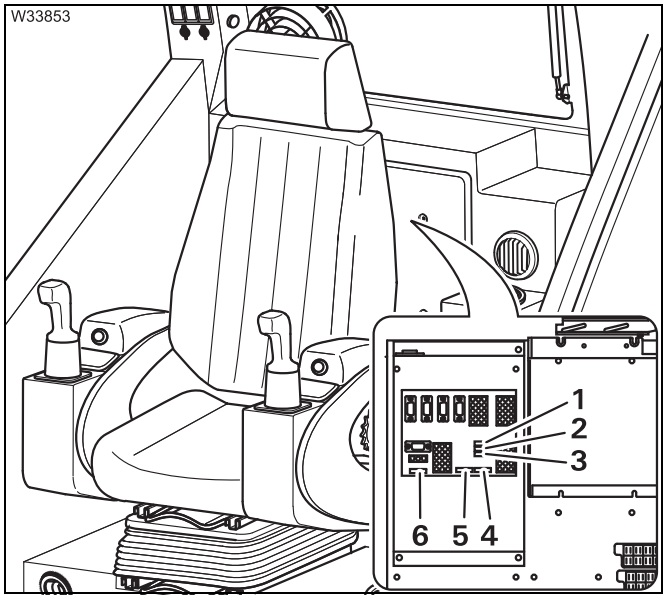
14.03.2018

14.3.4 RCL fuses

When a fuse is blown, a corresponding error code is displayed; ➠ *Table of error codes*, p. 14 - 31.



- Loosen the bolts (**2**) and remove the cover (**1**).
- Loosen the screws (**4**) and fold down the plate (**3**) to the front.
- Observe the instructions regarding fuse changes; ➠ p. 14 - 5

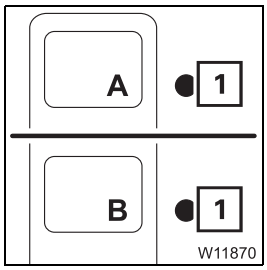


Fuse arrangement on the RCL control unit.

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

14.03.2018

14.4 Finding and eliminating malfunctions



This section does not include all malfunctions. When a lamp (**1**) lights up; ➠ *Warning submenu*, p. 11 - 110.

14.4.1 Malfunctions on the engine

Malfunction	Cause	Remedy
Engine does not start – Starter does not turn	Battery master switch is switched off	Switch on the battery master switch; ➠ p. 10 - 7
	Switch the ignition off	➠ *Switch on the ignition*, p. 10 - 8
	Fuses F1/8, F2/5, F3/8, F4/1 blown	Replace blown fuses; ➠ p. 14 - 5
	Hand-held control connected or bridging plug not inserted	Disconnect hand-held control or insert bridging plug; ➠ p. 12 - 21
	Emergency stop switch actuated	➠ *Resetting the emergency stop switch*, p. 10 - 22
	Ignition in the driver's cab switched on	Switch off the ignition in the driver's cab; ➠ p. 4 - 23
Engine does not start – Starter turns	Batteries insufficiently charged	Charge batteries
	Fuel tank empty	1. Refuel; ➠ p. 10 - 4
		2. Bleed the fuel system; ➠ *Maintenance Manual* ➠ *Separate engine operating instructions, provided by the manufacturer*
	Air intake inhibitor closed	➠ *Releasing the air intake inhibitor*, p. 10 - 23
Symbol red	Air filter clogged	Replace the dry air filter; ➠ *Maintenance Manual*

14.03.2018

Malfunction	Cause	Remedy
Coolant temperature too high	Coolant level too low	Top up coolant; ➠ *Maintenance Manual*
	Outer surface of heat exchanger dirty	Clean the outside of the heat exchanger
	V-belt of coolant pump at engine loose	Tension V-belt; ➠ *Separate engine operating instructions, provided by the manufacturer*
Engine oil pressure too low – Symbol red	Engine oil level too low	Check the oil level and top up if necessary; ➠ *Maintenance Manual*
Engine cannot be switched off using the ignition key	Malfunction in the electronics	Turn off the engine with the emergency-stop device; ➠ p. 10 - 22
Engine diagnostics plug not working	Fuse F4/3, F5/6 blown	Replace blown fuses; ➠ p. 14 - 9
The engine performance is reduced	The coolant is too hot or another malfunction. The engine is not switched off to ensure the load can be lowered and the truck crane can be unrigged	Coolant too hot: Wait until the coolant has cooled down – the performance will increase again Other malfunctions: **Manitowoc Crane Care** Report it

14.4.2 Malfunctions in the exhaust system

Malfunction		Cause	Remedy
	**– Lights up** **– Flashes**	Carbamide level in tank at reserve level Urea tank empty	Refill carbamide ; ➠ p. 4 - 8
 	**– Light up**	– Carbamide tank sensor faulty – Error on the carbamide dosing unit – Carbamide lines blocked – Temperature sensor faulty – Cable breakage in the carbamide system – Exhaust gas sensor faulty	Have the exhaust system checked by **Manitowoc Crane Care**, an authorised GROVE retailer or an authorised specialised repair shop.

14.03.2018

14.4.3 Malfunctions on the main hoist/auxiliary hoist

Malfunction	Cause	Remedy
Main hoist not working or malfunctioning	Hoist off, lamp in button lights up dimly	➠ *Switching on the main hoist*, p. 11 - 55, ➠ *Switching on the auxiliary hoist*, p. 11 - 58
	Dead man's switch not actuated	Press dead man's switch
	Emergency stop switch engaged	➠ *Resetting the emergency stop switch*, p. 4 - 24
	Fuses F1/1, F3/1, F3/2, F3/5, F3/6 blown	Replace the blown fuse; ➠ p. 14 - 5
	Fuse blown on circuit board	Replace the blown fuse; ➠ p. 14 - 7
	Control unit faulty, error message is displayed	Acknowledge error message once; ➠ p. 14 - 36 – if error persists, notify **Manitowoc Crane Care**
	Fuse F3/7 blown	Replace the blown fuse; ➠ p. 14 - 9
Only the lifting function works	Lowering limit switch approached	Leave the shutdown range and lift the main hoist
Only the lowering function works	Lifting limit switch approached, lamp lights up	Leave the shutdown range and lower the main hoist
	RCL shutdown, lamp lights up	Leave the shutdown range; ➠ p. 11 - 37
	Fuse F3/3 blown	Replace the blown fuse; ➠ p. 14 - 9
Lifting, lowering or high-speed mode function not working	Function disabled by ECOS	If necessary, acknowledge error once and briefly turn off the ignition – if error persists, notify **Manitowoc Crane Care**
No Lifting function	Fuse RCL F6 faulty	Replace the blown fuse; ➠ p. 14 - 12
	Fuse F3/3 blown	Replace the blown fuse; ➠ p. 14 - 9
Lifting or lowering is either not possible at all or only at a low speed	Speed limited	Increase limit; ➠ p. 11 - 105
Lifting or lowering function cannot be switched off	ECOS malfunction	Emergency stop switch; ➠ p. 14 - 1
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Unrig using hand-held control; ➠ p. 14 - 59

14.03.2018

14.4.4 Malfunctions in the hoist cameras

Malfunction	Cause	Remedy
No image appears on the monitor after it is switched on.	Fuse F5/5 blown	Replace blown fuse; ➠ p. 14 - 5.
	Fuse blown – in camera or monitor.	Check fuses and replace as necessary; ➠ *Manufacturer operating instructions*.
	Connection between camera and monitor is disconnected.	Check cable connection and notify **Manitowoc Crane Care** if necessary.

14.4.5 Malfunctions in the main boom camera

Malfunction	Cause	Remedy
No image appears on the monitor after it is switched on.	Fuse on the crane cab blown	Replace blown fuse; ➠ p. 14 - 5.
	Fuse blown – in camera or monitor.	Check fuses and replace as necessary; ➠ *Manufacturer operating instructions*.
	Radio communication between camera and receiver is interrupted.	Adjust the receiver on the crane cab.
	Connection between receiver and monitor is disconnected.	Check cable connection and notify **Manitowoc Crane Care** if necessary.

14.03.2018

14.4.6 Malfunctions on the derricking gear

Malfunction	Cause	Remedy
Derricking gear not working or malfunctions	Derricking gear off, lamp in button lights up dimly	Switching on the derricking gear; ➠ p. 11 - 62
	Dead man's switch not actuated	Press the dead man's switch.
	Emergency stop switch engaged	➠ *Resetting the emergency stop switch*, p. 4 - 24
	Fuses F1/1, F1/2, F2/2, F2/3, F3/1, F3/2, F3/5, F3/6 blown	Replace the blown fuse; ➠ p. 14 - 5
	Fuse blown on circuit board	Replace the blown fuse; ➠ p. 14 - 7
	Control unit faulty, error message is displayed	Acknowledge error message once; ➠ p. 14 - 36 – if error persists, notify **Manitowoc Crane Care**
	Fuse F3/7 blown	Replace the blown fuse; ➠ p. 14 - 6
Lowering function not working	Lifting limit switch approached, lamp lights up	Leave the shutdown range and lower the auxiliary hoist
	RCL shutdown, lamp lights up	Leave the shutdown range; ➠ p. 11 - 37
	Fuse F3/3 blown	Replace the blown fuse; ➠ p. 14 - 9
Derricking function not working	Function disabled by ECOS	If necessary, acknowledge error once and briefly turn off the ignition – if error persists, notify **Manitowoc Crane Care**
	Fuse RCL F6 faulty	Replace the blown fuse; ➠ p. 14 - 12
	Fuse F3/3 blown	Replace the blown fuse; ➠ p. 14 - 9
Derricking not possible, or only at low speed	Speed limited	Increase limit; ➠ p. 11 - 105
Derricking cannot be switched off	ECOS malfunction	Emergency stop switch; ➠ p. 14 - 1
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Unrig using hand-held control; ➠ p. 14 - 59

14.03.2018

14.4.7 Malfunctions in the telescoping mechanism

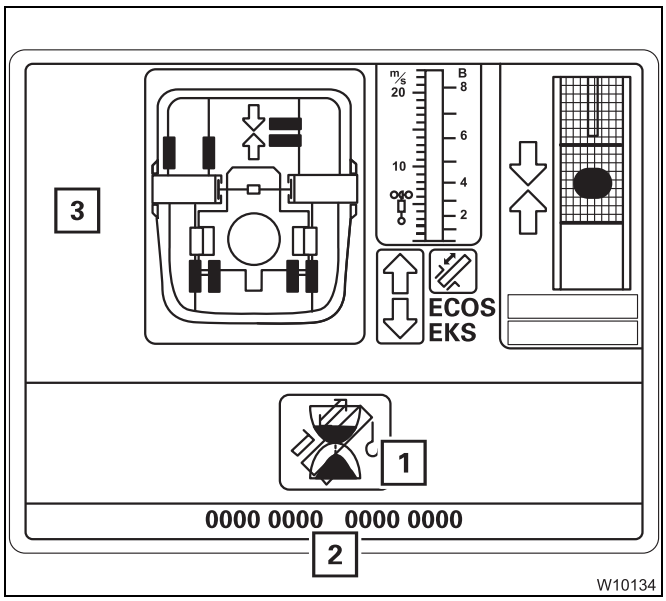
Malfunction	Cause	Remedy
Telescoping mechanism not working or malfunctioning	Telescoping mechanism off, lamp in button lights up dimly	➠ *Switching on the telescoping mechanism*, p. 11 - 74
	Dead man's switch system not actuated.	Press dead man's switch
	Emergency stop switch engaged	➠ *Resetting the emergency stop switch*, p. 10 - 22
	Fuse F1/1, F1/2, F1/7, F3/1, F3/2, F3/5 or F3/6 blown	Replace the blown fuse; ➠ p. 14 - 5
	Fuse blown on circuit board	Replace the blown fuse; ➠ p. 14 - 7
	Control unit faulty, error message is displayed	Acknowledge error message once; ➠ p. 14 - 36 – if error persists, notify **Manitowoc Crane Care**
	Fuse F3/7 blown	Replace the blown fuse; ➠ p. 14 - 9
Telescopic section and telescoping cylinder locking/ unlocking function not working	Faulty valve	Note the error code ➠ p. 14 - 36 and notify **Manitowoc Crane Care**
Extending function not working	Fuse F3/3 blown	Replace the blown fuse; ➠ p. 14 - 9
	RCL shutdown, lamp lights up	Leave the shutdown range; ➠ p. 11 - 37
	Lifting limit switch approached, lamp lights up	Leave the shutdown range, retract boom
Retracting function not working	Insufficient lubrication	Lubricate main boom; ➠ *Maintenance Manual*
	Main boom is not steep enough	Leave the shutdown range and raise the boom
Telescopic section cannot be operated by moving the control lever	Telescopic section locked	➠ *Unlocking the telescopic section*, p. 11 - 84
	Telescoping cylinder unlocked	➠ *Lock telescoping cylinder*, p. 11 - 83
Telescopic section/telescoping cylinder locking function not working	Fault in hydraulics/electrical system	Note the error codes ➠ p. 14 - 19, ➠ p. 14 - 35 and notify **Manitowoc Crane Care**

14.03.2018

Malfunction	Cause	Remedy
Telescoping function not working	Function disabled by ECOS	If necessary, acknowledge error once and briefly turn off the ignition – if error persists, notify **Manitowoc Crane Care**
	Fuse RCL F6 faulty	Replace the blown fuse; ➠ p. 14 - 12
	Fuse F3/3 blown	Replace the blown fuse; ➠ p. 14 - 9
Telescoping not possible, or only at low speed	Speed limited	Increase limit; ➠ p. 11 - 105
Telescoping cannot be switched off	ECOS malfunction	Emergency stop switch; ➠ p. 14 - 1
The main boom can no longer be telescoped; the telescoping cylinder can no longer be moved	The hydraulic supply is interrupted	Retract the telescopic section by means of mechanical emergency operation; ➠ p. 14 - 42
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Unrig using hand-held control; ➠ p. 14 - 59

Telescoping mechanism error messages

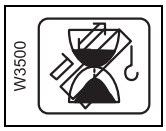
If ECOS disables the telescoping mechanism, the following display is shown in the *Telescoping* submenu.



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

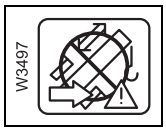
The display (**1**) shows the symbol for the current status:

14.03.2018

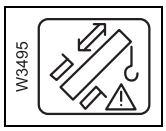


Waiting
The symbol usually disappears shortly after switching on the ignition. If the symbol does not go out or is displayed while operating the crane, this may be due to an RCL shutdown or blown F1/2 fuse. Contact **Manitowoc Crane Care** if none of these are the cause.

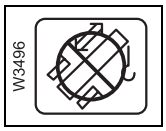
Telescope status divergence
ECOS has detected a difference between the displayed and the current telescope status. Enter the current telescope status; ➠ p. 14 - 57.



Emergency program access
The telescoping mechanism can only be operated with the emergency programme; ➠ p. 14 - 45.



Emergency program
The *Telescoping* emergency programme is open; ➠ p. 14 - 45.



Inactive
Contact **Manitowoc Crane Care** if this status is still displayed after repeatedly switching on the ignition.

14.03.2018

14.4.8 Malfunctions in the slewing gear

Malfunction	Cause	Remedy
Slewing gear not functioning	Slewing gear off, lamp in button lights up dimly	Switch on the slewing gear; ➠ p. 11 - 97
	Houselock switched on	➠ *Switching the houselock on/off*, p. 11 - 15
	Turntable locked	➠ p. 11 - 14
	Dead man's switch system not actuated.	Press dead man's switch
	Emergency stop switch engaged	➠ *Resetting the emergency stop switch*, p. 4 - 24
	Fuses F1/1, F1/2, F3/1, F3/2, F3/5, F3/6 blown	Replace the blown fuse; ➠ p. 14 - 5
	Fuse blown on circuit board	Replace the blown fuse; ➠ p. 14 - 7
	Control unit faulty, error message is displayed	Acknowledge error message once; ➠ p. 14 - 36 – if error persists, notify **Manitowoc Crane Care**
	Fuse RCL F6 faulty	Replace the blown fuse; ➠ p. 14 - 12
	Fuse F3/3 blown	Replace the blown fuse; ➠ p. 14 - 9
	 In the *Slewing gear* submenu, the symbol *Auxiliary hoist lock display* lights up.	Mechanically lock the auxiliary hoist correctly; ➠ *Extending the locking cylinders*, p. 6 - 99
Slewing function not working	Enter RCL code for the *0° to the rear* position	Enter RCL code for a slewing range
	Counterweight lifting cylinder not fully retracted	Fully retract lifting cylinder; ➠ p. 12 - 76
	Function disabled by ECOS	If necessary, acknowledge error once and briefly turn off the ignition – if error persists, notify **Manitowoc Crane Care**

14.03.2018

Malfunction	Cause	Remedy
Slewing only possible in one direction	Shutdown angle of a limited slewing range reached (additional equipment).	Enter the RCL code for a slewing range of 360° or slew in the opposite direction to leave the shutdown angle
Slewing not possible or only at low speed	Speed limited	Increase limit; ➠ p. 11 - 105
Slewing cannot be switched off	ECOS malfunction	Emergency stop switch; ➠ p. 14 - 1
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Unrig using hand-held control; ➠ p. 14 - 59

14.03.2018

14.4.9 Malfunctions in the counterweight hoist unit

Malfunction	Cause	Remedy
Counterweight hoist unit not working	Emergency stop switch engaged	➠ *Resetting the emergency stop switch*, p. 10 - 22
	 In the *Hoist* submenu, the symbol *Auxiliary hoist lock display* lights up.	Mechanically lock the auxiliary hoist correctly; ➠ *Extending the locking cylinders*, p. 6 - 99
	Fuse F1/1, F1/7	Replace the blown fuse; ➠ p. 14 - 6
	Control unit faulty, error message is displayed	Acknowledge error message once; ➠ p. 14 - 36 – if error persists, notify **Manitowoc Crane Care**
	Function disabled by ECOS	If necessary, acknowledge error once and briefly turn off the ignition – if error persists, notify **Manitowoc Crane Care**
Error symbol (!) is displayed	Electronics has identified an error	
Retract/extend lifting cylinder not working	Superstructure in the *intermediate position* rigging range	Slew to *Move lifting cylinders* or *Lift/lower counterweight* position; ➠ p. 9 - 74
Extend lifting cylinder not working	Superstructure outside of rigging range	Slew into the rigging range
	Counterweight rigged and *Move lifting cylinders* position reached	Slew to *Lift/lower counterweight* position
	Counterweight unrigged and *Lift/lower counterweight* position reached	Slew to *Move lifting cylinders* position

14.03.2018

14.4.10 Malfunctions in the hydraulic system/hydraulic oil cooler

Malfunction	Cause	Remedy
Hydraulic oil temperature above 80 °C (176 °F), fan in the hydraulic oil cooler 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	Fuse F1/7, F1/8 blown.	Stop crane operation and replace blown fuse; ➠ p. 14 - 6
	Faulty temperature sensor in the circuit of the hydraulic system, error message is displayed	Have the temperature sensor replaced
Symbol is red	Corresponding hydraulic oil filter soiled	Change hydraulic oil filter; ➠ *Maintenance Manual*

14.4.11 Malfunctions when inclining the crane cab

Malfunction	Cause	Remedy
Crane cab inclination function not working	Fuse F1/1, F1/7 blown	Replace the blown fuse; ➠ p. 14 - 6

14.4.12 Malfunctions when operating with the hand-held control

Malfunction	Cause	Remedy
CAN lamp flashes or stays off after connecting the hand-held control	Some other socket is lacking a bridging plug	Insert bridging plug; ➠ p. 12 - 21
	Fuse F2/6 blown	Replace the blown fuse; ➠ p. 14 - 6
Motor will not start	Ignition in the driver's cab switched on	Switch off the ignition in the driver's cab; ➠ p. 4 - 23
Pre-selected function cannot be performed	Another function has been pre-selected	Pre-select the desired function
Operation not possible	Malfunction in the control system	**Manitowoc Crane Care** Report it

14.03.2018

14.4.13 Malfunctions of the outriggers

Malfunction	Cause	Remedy
Outrigger cylinders and beams can neither be extended nor retracted and the inclination indicator does not work	Driver's cab: Fuses A3F3, A3F13, A3F14 blown	Replace blown fuse; ➠ p. 7 - 20.
When operating with the hand-held control	Driver's cab: Fuse A2F3 blown	Replace blown fuse; ➠ p. 7 - 20.
When operating from the crane cab	Hand-held control connected to the superstructure or a bridging plug not inserted	Disconnect hand-held control or insert bridging plug; ➠ p. 12 - 21.
When operating from the control units	Display fields switched off.	Switch on display fields; ➠ p. 12 - 31
	Hand-held control connected to the superstructure or a bridging plug not inserted	Disconnect hand-held control or insert bridging plug; ➠ p. 12 - 21
None of the specified causes apply	Solenoid valves not working	**Manitowoc Crane Care** Report it

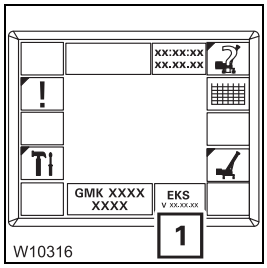
14.03.2018

14.4.14 Troubleshooting the RCL

This section contains general malfunctions which are not displayed on the *RCL* control unit as well as malfunctions which prompt an error display on the *RCL* control unit.

Risk of accidents!
Immediately stop operating the crane if an error message is displayed!
The RCL may be repaired only by qualified personnel.

Risk of accidents due to overridden or faulty RCL!
In the event of a faulty RCL, first try to correct the error with the information in this section. Only override the RCL if it becomes absolutely necessary in order to lower the load in the event of an emergency.
Do not carry out any movements which increase the load moment in the event of a faulty or overridden RCL.
If the RCL is overridden, the crane operations are not monitored and no shutdown procedures are initiated when leaving the working range.



RCL program version

Always note down the number of the program version after a malfunction occurs and before notifying **Manitowoc Crane Care**.

- If required, open the main menu Esc.

The display (**1**) shows the program version.

General malfunctions

Malfunction	Cause	Remedy
RCL not working – dark displays, no buzzer tone	Power supply not switched on	Switch on the ignition
	Fuse F2/6 blown	Replace blown fuse; p. 14 - 6.
	Fuse RCL F6 faulty	Replace blown fuse; p. 14 - 12.

14.03.2018

Error messages in the Monitoring submenu

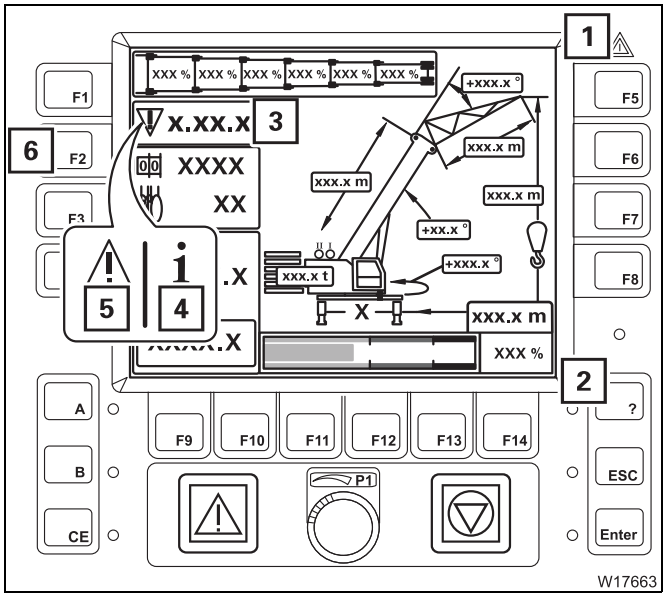
If the rated capacity limiter detects an error, an error message is shown on the *RCL* control unit.

There are different types of error messages:

– Error messages without shutdown,

– Error messages with shutdown,

Risk of accidents!
Immediately stop operating the crane if an error message is displayed! The RCL may be repaired only by qualified personnel.



Error message without shutdown
The error message is displayed either as a warning or information.

– The buzzer tone sounds once.

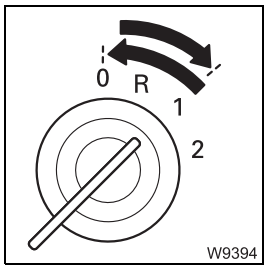
– Lamps (**1**) and (**2**) light up.

– Display (**3**) shows an error code and the associated symbol flashes.

  4 Information symbol

  5 Warning symbol

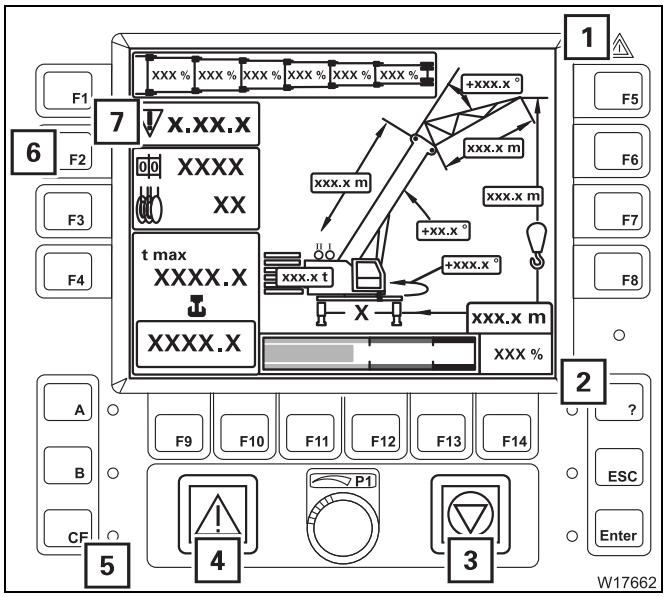
You can have all existing error messages displayed by repeatedly pressing the button (**6**).



Try to remedy the error by turning off the ignition and turning it on again after approx. 15 seconds.

If the error is displayed again, check whether the error code is contained in the *Error codes* tables. These tables contain information on how to remedy errors; ➠ p. 14 - 31.

14.03.2018



Error message with shutdown

– All crane movements not required for the correction of the error are disabled.

– A continuous buzzer tone sounds.
After five seconds, you can switch off the buzzer tone using button (**5**).

– Lamps (**1**) and (**2**) light up.

– Lamps (**3**) and (**4**) light up.

Display (**7**) shows an error code and the error symbol flashes.

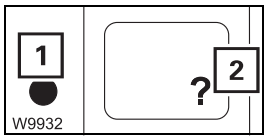
You can have all existing error messages displayed by repeatedly pressing the button (**6**).

Check whether the *Error codes* tables contain the error. These tables contain information on how to remedy errors; ➠ p. 14 - 31.

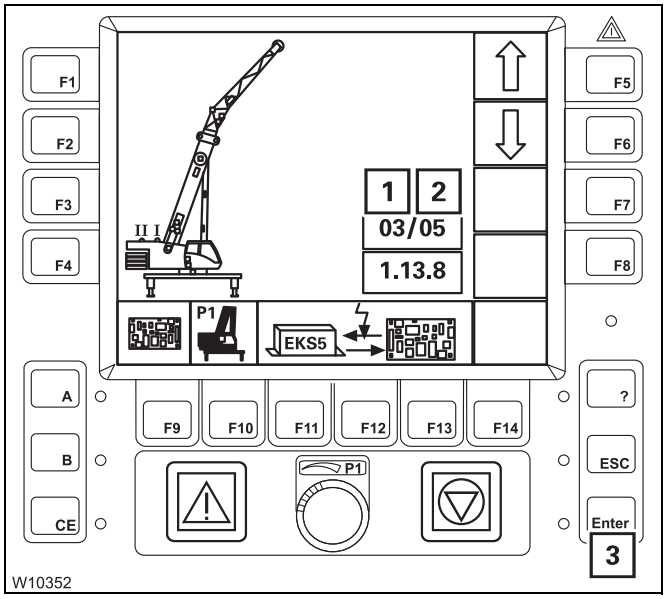
14.03.2018

Displays in the Error submenu

- Stop all crane movements and bring both control levers into initial position.



- Press the button (**2**) once. The button is only active when the lamp (**1**) flashes or lights up.



This opens the *Errors* submenu.

Display (**2**) shows the error total and display (**1**) shows which error is displayed.

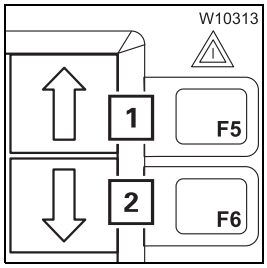
3/5, for example, means:
– Error **3** is shown,
– There is a total of **5** errors.

If the error shown is not acknowledged, the lamp next to the button (**3**) lights up.

Acknowledging the error

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

The next, pending error is displayed and can be acknowledged.

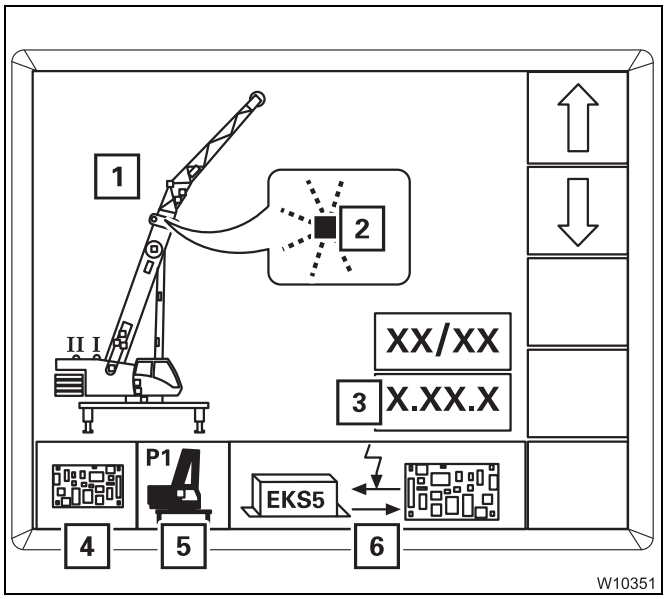


- You can call up all current errors with the buttons (**1**) and (**2**).

  1 Display errors in ascending order

  2 Display errors in descending order

Every time you press the button, the next error will be displayed.
When you keep the button pressed, all errors are shown one after the other continuously.



Error message display

For each error the display shows:

– the error code (**3**),

– the symbols for

  4 the error group

  5 the faulty component

  6 the error type

– Possibly the error location (**1**) – the respective places (**2**) flash in red.

• Check whether the *Error codes* tables contain the error. These tables contain information on how to remedy errors; ➠ p. 14 - 31.

Exiting the submenu

You can exit the *Errors* submenu at any time.

• Press the button (**1**) once.

The same menu opens that was open before the *Errors* submenu opened.

All errors remain saved until you switch off the ignition, even errors that have since been resolved. All existing errors are treated as new errors and displayed again after turning on the ignition.

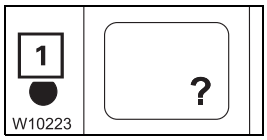
14.03.2018

Table of error codes

The following table contains a number of error codes, their causes and possible remedies.

An error code consists, from left to right, of a one-digit number (e. g. **5**), a two-digit number (e.g. **01)** and a one-digit number (e.g. **2**).

- Check whether the table contains the displayed error code. If the information in the table does not help resolve the error, note the error code(s) and contact **Manitowoc Crane Care**.



When all errors are remedied, the lamp (**1**) goes out.

Error code			Cause	Remedy
1	**01**	**1 - 7**	Error pressure sensor 1, Lower chamber	Switch off pressure sensor 1; ➠ p. 14 - 34
1	**01**	**8**	Pressure sensor 1 switched off	Have malfunction corrected
1	**02**	**1 - 7**	Error pressure sensor 2, Lower chamber	Switch off pressure sensor 2; ➠ p. 14 - 34
1	**02**	**8**	Pressure sensor 2 switched off	Have malfunction corrected
1	**04**	**1 - 7**	Error angle sensor 1, Main boom	Switch off pressure sensor 1; ➠ p. 14 - 34
1	**04**	**8**	Angle sensor 1 switched off	Have malfunction corrected
1	**05**	**1 - 7**	Error angle sensor 2, Main boom	Switch off pressure sensor 2; ➠ p. 14 - 34
1	**05**	**8**	Angle sensor 2 switched off	Have malfunction corrected
1	**13 to 21**	**1**	Lattice extension not connected or sensor faulty	Electrically connect lattice extension; if error persists, notify **Manitowoc Crane Care**

Error code			Cause	Remedy
3	**03**	**3**	Comparison of telescoping diagram between crane control and RCL resulted in differences	Compare the actual telescoping status with the values on the *ECOS* display and, if necessary, re-enter the telescoping status. Accept the ECOS telescoping position data if an incorrect telescoping position is displayed on the RCL: 1. Press the F1 button once and the RCL shows the new values 2. Acknowledging the error
5	**01**	**1**	There is no capacity diagram available for the entered rigging mode	Re-enter the current rigging mode. If the error is displayed again, check whether the current rigging mode is permissible.
5	**01**	**2**	Main boom angle too small (not steep enough)	Raising the main boom
5	**01**	**3**	Main boom angle too large (too steep)	Lower the main boom
5	**02**	**1**	There is no RCL code available for the entered rigging mode	Re-enter the current rigging mode. If the error is displayed again, check whether the current rigging mode is permissible.
5	**02**	**4**	Lattice extension inclination is too small	Raise the lattice extension
5	**02**	**5**	Lattice extension inclination is too large	Lower the lattice extension
5	**02**	**6**	Current load greater than derricking load – *Lower lattice extension* movement is disabled	1. Raise the lattice extension 2. Press button CE once 3. If necessary, increase the working radius using the *Lower main boom* movement.
5	**04**	**4**	Maximum permissible slewing angle exceeded	Slew into a permissible working range.
5	**05**	**5**	Minimum load value not reached	When the main boom is set down, raise main boom and acknowledge the error. Notify **Manitowoc Crane Care** if the error cannot be acknowledged.
6	**02**	**1**	Fuse F1 blown	Replace blown fuse; ➠ p. 14 - 12.
6	**02**	**2**	Fuse F2 blown	
6	**02**	**3**	Fuse F3 blown	
6	**02**	**4**	Fuse F11 blown	
6	**02**	**5**	Fuse F12 blown	

14.03.2018

Error code			Cause	Remedy
8	**01**	**1**	Rigging state not confirmed	➠ *Confirming the rigging mode*, p. 11 - 29.
8	**02**	**2**	RCL is overridden	Cancel override; ➠ p. 11 - 40.
8	**03**	**3**	Slewing gear switched on with RCL code for working position *0°*, *180°* or *Free-on-wheels*	Switching off the slewing gear
8	**14**	**1**	Maximum permissible overall height exceeded[1)]	Retract or lower.
8	**14**	**2**	Maximum permissible overall working radius exceeded[1)]	Raise or retract.
8	**14**	**3**	Maximum permissible overall slewing range exceeded[1)]	Slew into a permissible working range.
8	**14**	**4**	Shutdown range of a monitored object reached[1)]	Move into a permissible working range.

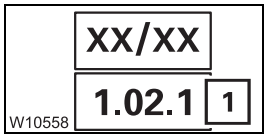
[1)] With working range limiter switched on

14.03.2018

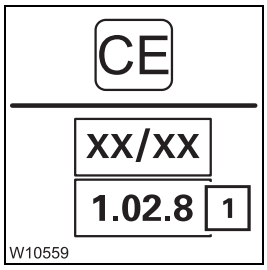
Switch off the sensor/ tachogenerator

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

Danger due to RCL failure
Have the error resolved before the next crane job.
This allows the crane to still be unrigged without RCL monitoring if the second sensor/tachogenerator fails.



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



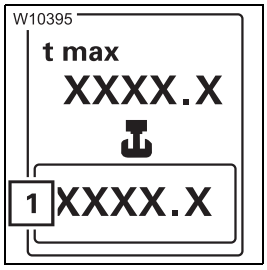
- Press button CE once.

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

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

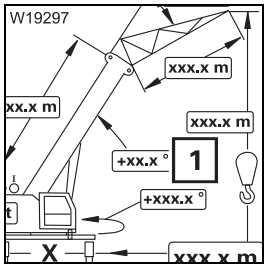
After switching off the faulty sensor/tachogenerator, you should check whether the other sensor/tachogenerator is functioning correctly.

Risk of accident from faulty functioning!
After switching off the faulty sensor/tachogenerator, begin crane operation only if the display of the remaining sensor/tachogenerator is correct.
This prevents the RCL from not switching off when leaving the working range and the truck crane overturning as a result.



Checking the pressure sensor function

- Lift the hook block without a load.
- Check whether the display (**1**) indicates the approximate weight of the hook block.



Checking the angle sensor function

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

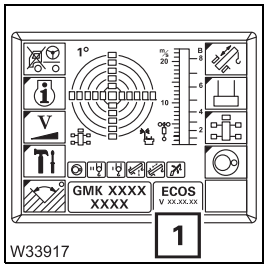
14.03.2018

14.4.15 Malfunctions ECOS – superstructure

This section contains general malfunctions and malfunctions that generate an “error” display.

ECOS programme version

Always note down the number of the program version before notifying **Manitowoc Crane Care** in the event of a malfunction.



- If required, open the main menu Esc.

The display (**1**) shows the number of the current programme version.

General malfunctions

The following table contains information on troubleshooting and possible solutions.

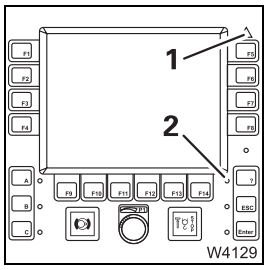
Malfunction	Cause	Remedy
The ECOS display remains dark although the ignition is switched on	Fuse F1/1, F1/2 blown.	Replace the blown fuse; ➠ p. 14 - 6.
	Fuses F2/1, F2/2, F3/1, F3/6 blown.	
	One or more fuses on the circuit board in the distribution box are blown.	

Other malfunctions on the ECOS generate corresponding error messages.

14.03.2018

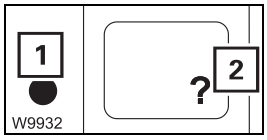
Error messages

If ECOS detects an error, an error message is shown:

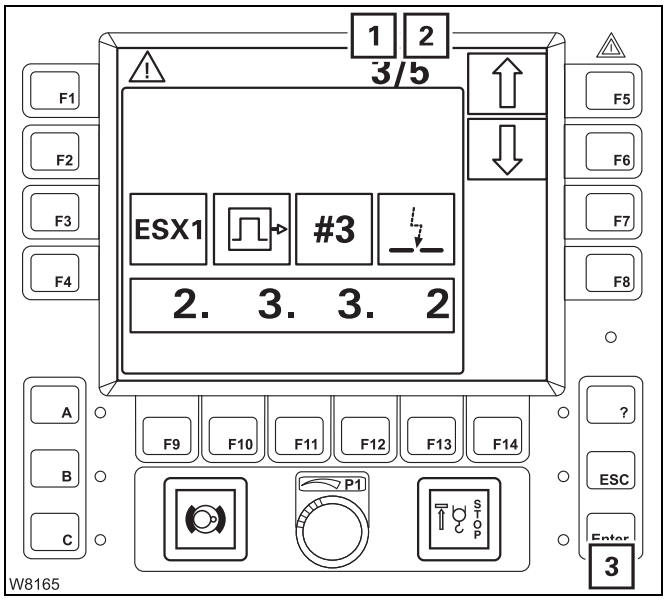


– lamp (**1**) flashes and
– lamp (**2**) flashes.

Open the *Errors* submenu for more information.



- Press the button (**2**) once. The button is only active when the lamp (**1**) flashes or lights up.



This opens the *Errors* submenu.

Display (**2**) shows the error total and display (**1**) shows which error is displayed.

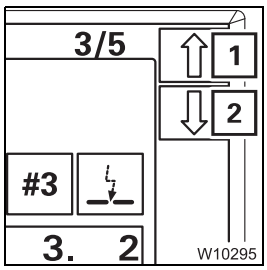
3/5, for example, means:
– Error **3** is shown
– There is a total of **5** errors.

If the error shown is not acknowledged, the lamp next to the button (**3**) lights up.

To acknowledge the error

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

If there are further errors, the next error is displayed and can be acknowledged.



- When all errors have been acknowledged, you can retrieve any pending errors using the buttons next to the symbols (**1**) and (**2**).

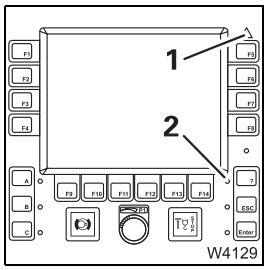
  1 Next error

  2 Previous error

Every time you press the button, the next error will be displayed.
When you keep the button pressed, all errors are shown one after the other continuously.

If not all errors have been acknowledged, the buttons ⇧ and ⇩ have no function – the symbols are grey.

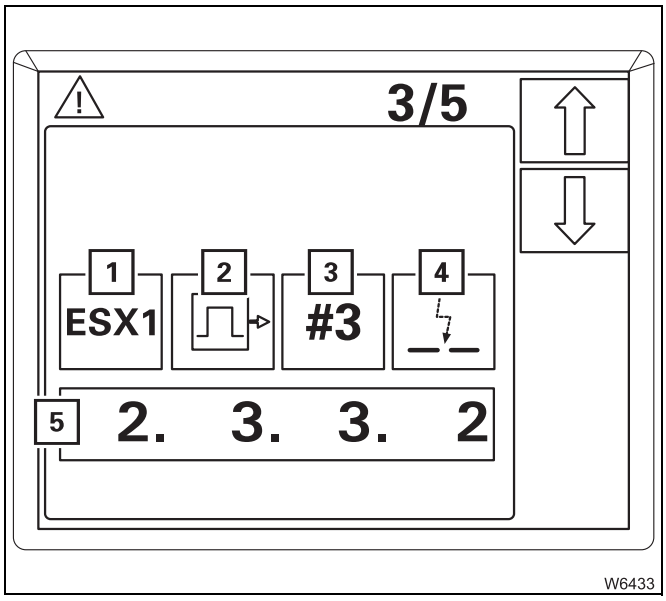
14.03.2018



When all error messages have been acknowledged, the displays change:

– lamp (**1**) lights up and
– lamp (**2**) lights up.

Both displays start to flash again as soon as a new error occurs.



Error message display

Each error is defined by an error code (**5**) and the symbols (**1**) to (**4**).

The symbols stand for:

1 the faulty device

2 the error group

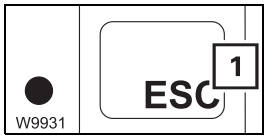
3 the index within the group

4 the error type

The error code (**5**) consists of 4 digits, e.g. **2332**.

- Always note the error code before contacting **Manitowoc Crane Care**.

Exiting the submenu



You can exit the *Errors* submenu at any time.

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

The same menu opens that was open before the *Errors* submenu opened.

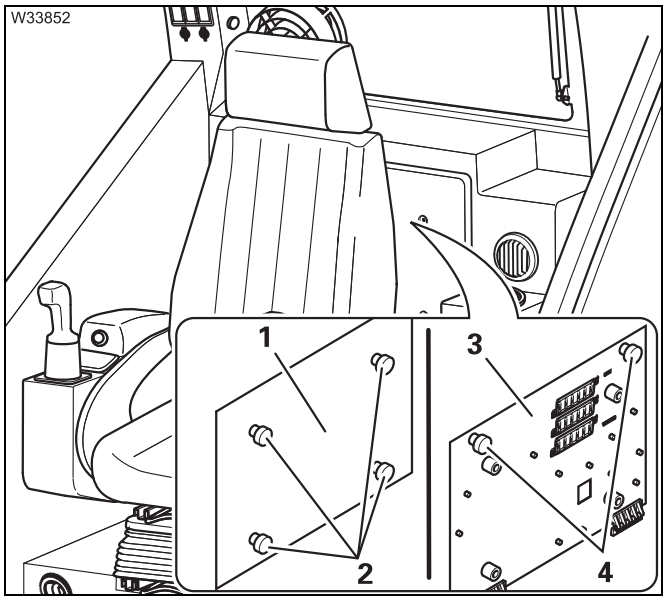
All errors remain saved until you switch off the ignition, even errors that have since been resolved. All existing errors are treated as new errors and displayed again after turning on the ignition.

14.03.2018

14.4.16 Malfunctions on CraneSTAR system

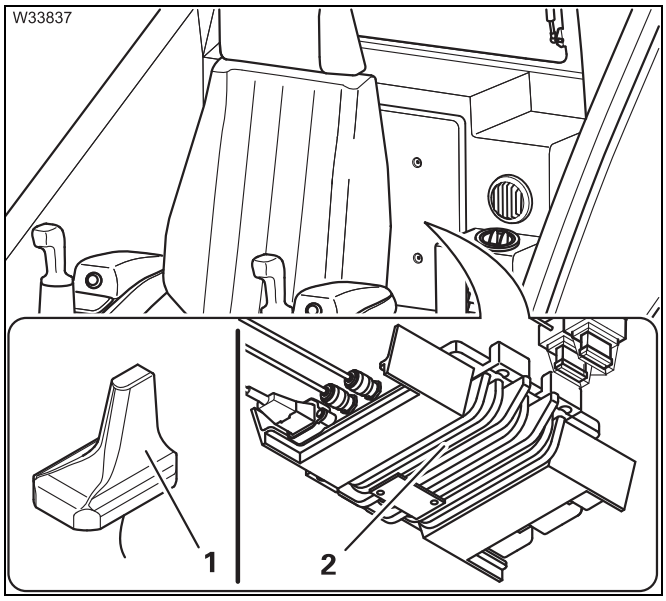
If an error is present then check the fuses and antenna plug on the *TCU* control unit.

Risk of damage if procedure is incorrect!
Observe the following notes to avoid malfunctions and damage.
– Switch off the ignition whenever a fuse has to be replaced.
– Replace blown fuses only with new fuses of the same amperage.



Locks

- 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 - 9.
- Loosen the screws (**4**) and fold down the plate (**3**) to the front.



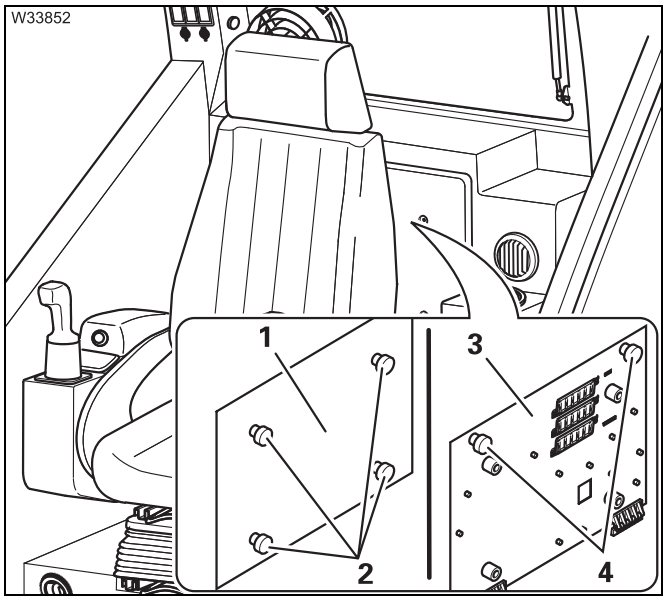
- Check the fuses (**1**) and replace them if necessary.

Designation	Amperage
F3401	5 A
F3402	5 A

Antenna plugs

- Check that the plugs (**2**) are plugged in.

14.03.2018



After troubleshooting

- Fold the plate (**3**) up and secure it with the screws (**4**).
- Fasten the cover (**1**) using the bolts (**2**).

14.03.2018

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14.03.2018

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,

– *Telescoping emergency program* submenu,

– entering the telescoping after an emergency operation and

– operation of the power units with the hand-held control.

14.03.2018

14.5.1 Mechanical emergency activation for retracting

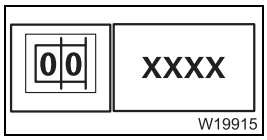
If you can no longer lock and unlock the telescopic sections from within the crane cab because of a malfunction, you can do so manually by performing mechanical emergency activation.

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 activation, 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 the current rigging mode on the RCL. The corresponding RCL code according to the *Lifting capacity table* must be displayed.

- Lower the main boom.

– **If the RCL allows the boom to be lowered into a horizontal position**
You can reach the locking points with a ladder and need only one auxiliary crane to telescope the unlocked telescopic sections.

– **If the RCL is deactivated prior to reaching the horizontal position**
In order to reach the locking points, you need an auxiliary crane with licensed passenger transportation and a second auxiliary crane to secure and telescope the unlocked telescopic sections.

If it is possible to lower but there is not sufficient space, you can check whether the truck crane can be driven in the current rigging mode;
➠ p. 13 - 1.
Operation with the lattice extension; ➠ *Operating Instructions Lattice Extension*.

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**.

14.03.2018

Mechanical emergency activation

The following requirements must be met before unlocking manually:

– The main boom must be lowered to the horizontal position so that the telescopic section cannot retract by itself.

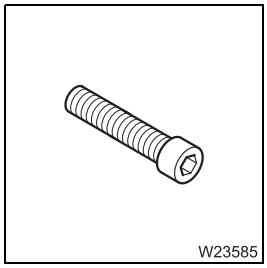
or

– The telescopic section to be unlocked is secured against retracting by itself by using an auxiliary crane. Telescoping is done with the auxiliary crane.

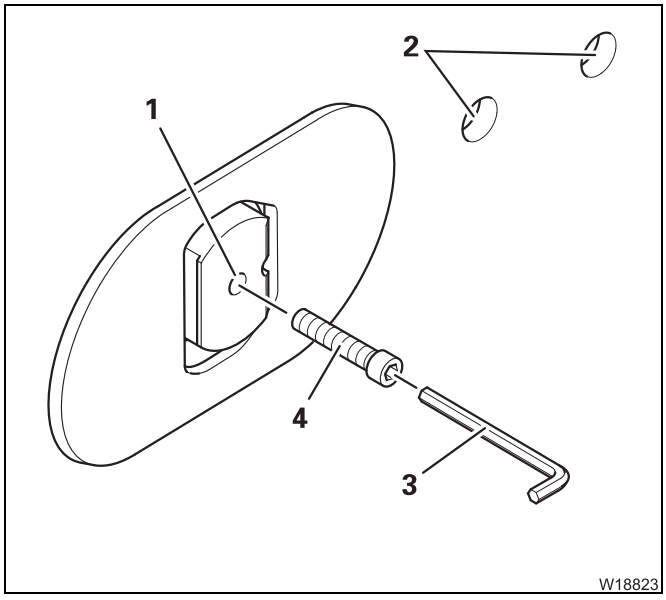
Risk of accidents due to sudden retraction of a telescopic section!
Before unlocking the telescopic section, secure it against automatic retraction. This prevents the retracting telescopic section severing one of your limbs or the truck crane being damaged or overturned by the telescopic section suddenly 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 screws for every telescopic section,



– Length 300 mm (11.8 in) for telescopic sections I to III,
– 270 mm (10.6 in) length for telescopic section IV,
– 230 mm (9.1 in) length for telescopic section V,
– 200 mm (7.9 in) length for telescopic section VI.



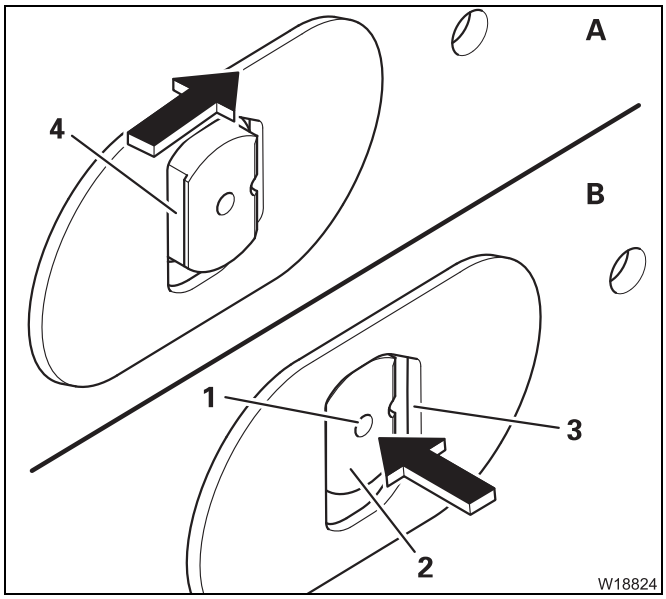
Screw (**4**) into the locking pins (**1**) to unlock.

Pins located further inside are reached through the bores (**2**).

You will need a suitable socket wrench (**3**), with one shank being at least 200 mm long.

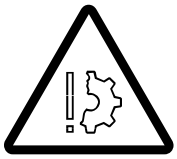
– To unlock, the screws are screwed in.
– To lock, the screws are screwed out.

14.03.2018

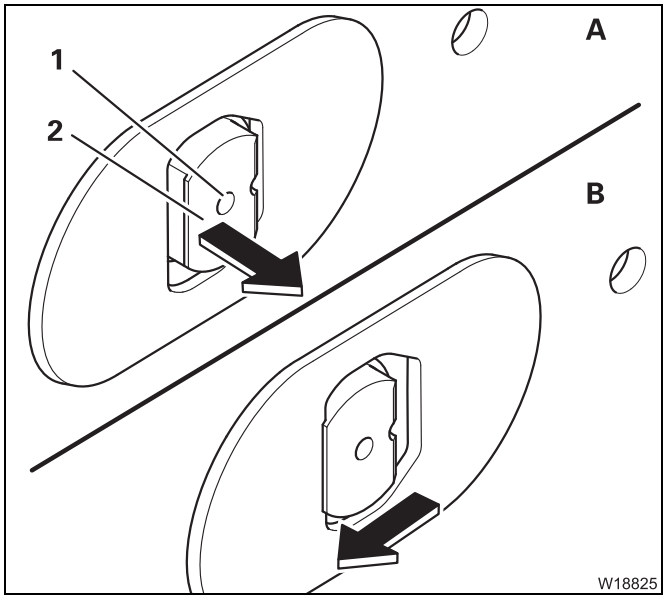


Releasing the lock

- (**A**) – Telescope out approx. 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 (**2**) a slight knock to help this procedure.
- Unlock the other side of the telescopic section as well.



Risk of damage due to a mechanically released lock!
Under no circumstances may you operate the telescoping cylinder 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.
- Screw the screw out of the bore (**1**) until the locking pin is fully extended.
- Remove the bolt from the bore hole.
- (**B**) – Retract the telescoping further until the telescopic section is set down.

14.03.2018

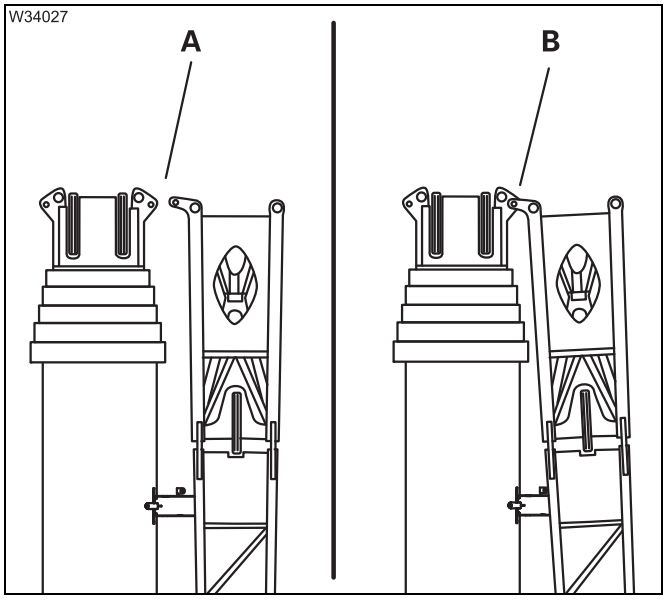
14.5.2 Telescoping emergency program

In the event of a malfunction in the telescoping mechanism, you can retract the main boom with the *Telescoping* emergency program.
The emergency program is not intended for crane operation and is therefore restricted to a certain amount of time.

– When a swing-away lattice is rigged; ➠ *Starting the emergency program*, p. 14 - 47.
– When a swing-away lattice is folded to the side then you must perform the steps in the following section before telescoping.

When the *Telescoping* emergency program is switched on, the swing-away lattice is not automatically pivoted **before** and **after** telescoping.

Risk of accidents due to the swing-away lattice falling!
Before telescoping, always check the emergency programme to ensure that the swing-away lattice is in the telescoping position.
This way you will prevent telescoping parts from colliding with the swing-away lattice, brackets from coming off and the swing-away lattice from falling down.

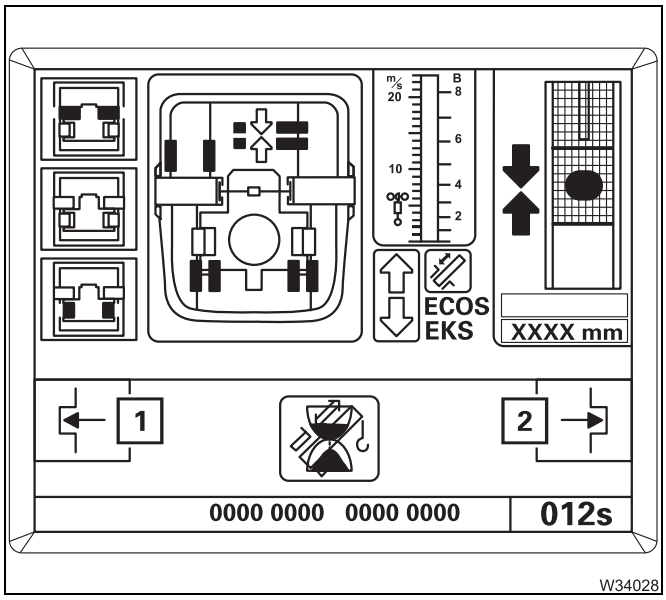


- Always check that all prerequisites are fulfilled before telescoping via an emergency program.

(A) – Telescoping position
When the swing-away lattice is in the telescoping position, you can telescope the main boom.

(B) – Rigging position
When the swing-away lattice is in the rigging position then you must first pivot it into the telescoping position (**A**) before telescoping.

14.03.2018



Requirements for swinging

The *Telescoping emergency program* submenu contains the controls (**1**) and (**2**) allowing you to pivot the swing-away lattice from the crane cab.

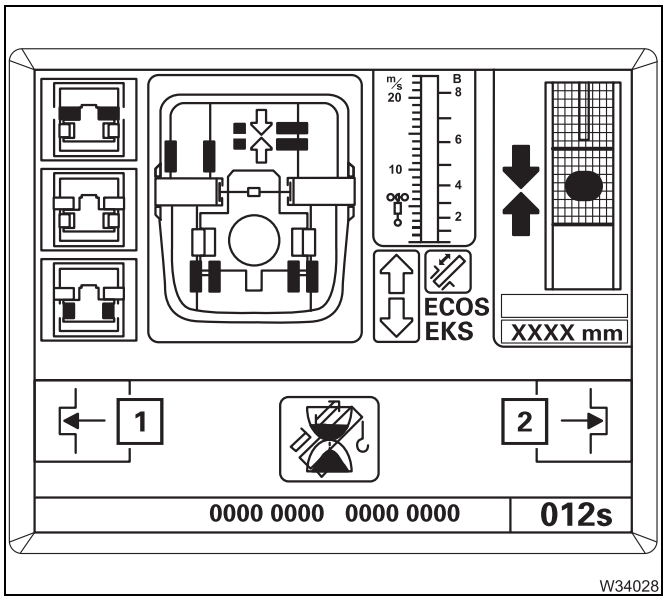
1 Pivoting the swing-away lattice into the rigging position

2 Pivoting the swing-away lattice into the telescoping position

You can also pivot the swing-away lattice with the hand-held control; ➠ *Lattice extension operating manual*.

Swinging the swing-away lattice

- Check the current position of the swing-away lattice and pivot the swing-away lattice into the necessary position.



Pivoting into the telescoping position

- Press the button (**2**) – the pivoting cylinder extends.
- Externally inspect the truck crane to see if the telescoping sections can move freely.

Pivoting into the rigging position

- Press the button (**1**) – the pivoting cylinder retracts.
- Externally inspect the truck crane to check that the swing-away lattice is folded fully in.

14.03.2018

Checks

– Before telescoping

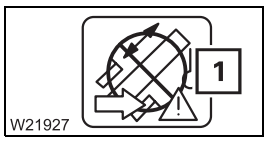
- Externally inspect the truck crane to check that the swing-away lattice is in the telescoping position.

– Before on-road driving

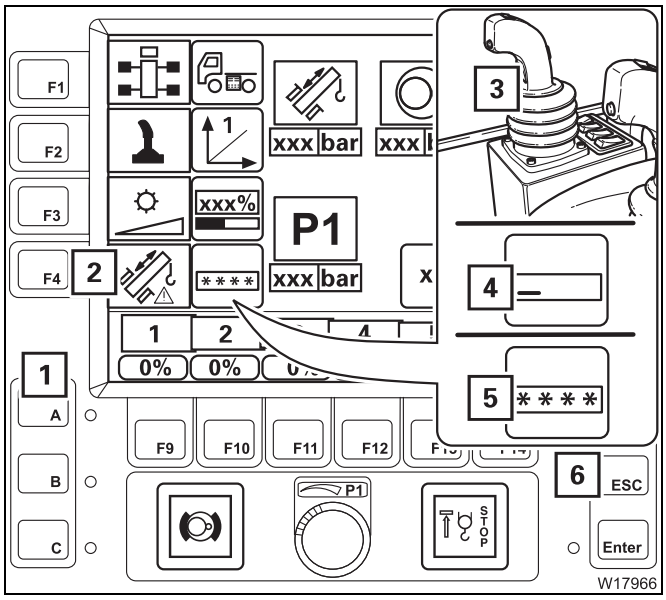
- Externally inspect the truck crane to check that the swing-away lattice is in the rigging position.

Risk of accidents by exceeding the permissible vehicle width!
Always bring the swing-away lattice to the on-road driving position before driving on public roads. In this way you can prevent putting other road users at risk and causing accidents.

Starting the emergency program



Only start the emergency program when the symbol (**1**) is displayed;
➠ *Telescoping mechanism error messages*, p. 14 - 19.

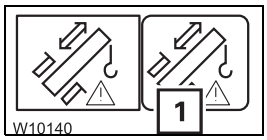


- Press the right dead man's switch (**3**).
- Also press button (**2**) once – symbol (**4**) appears.
- Press the buttons (**1**) in the following order:

The symbols (**5**) confirm the entry.

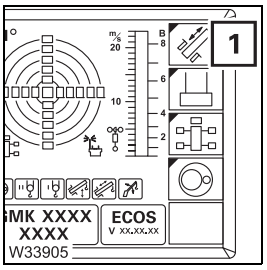
If your input was incorrect, all symbols (**5**) go out and you need to re-enter.

You can cancel the entry at any time using button (**6**).

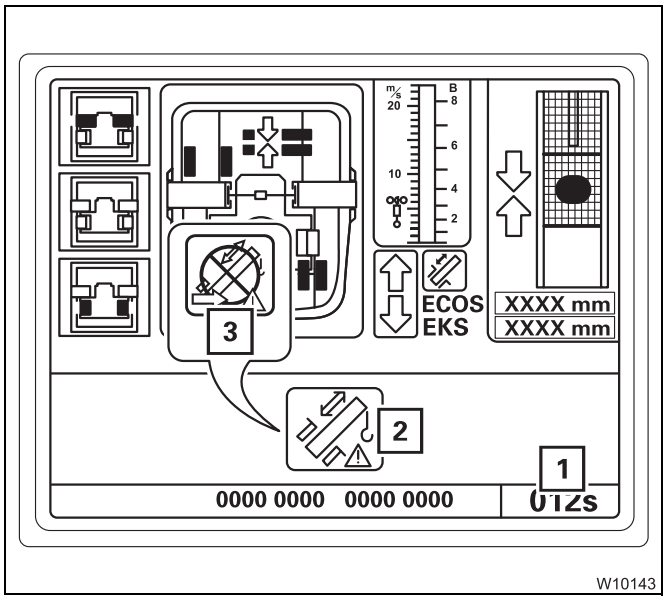


When input is correct, the symbol (**1**) is displayed – the *Telescoping* emergency programme starts.

14.03.2018



- Open the main menu Esc and press the button (**1**) once.
  The *Telescoping* submenu opens.



The emergency program is active if:

– The symbol (**2**) is displayed

– The display (**1**) is shown for approx. 360 seconds.

Within this time, the telescoping mechanism can be operated using the emergency program.

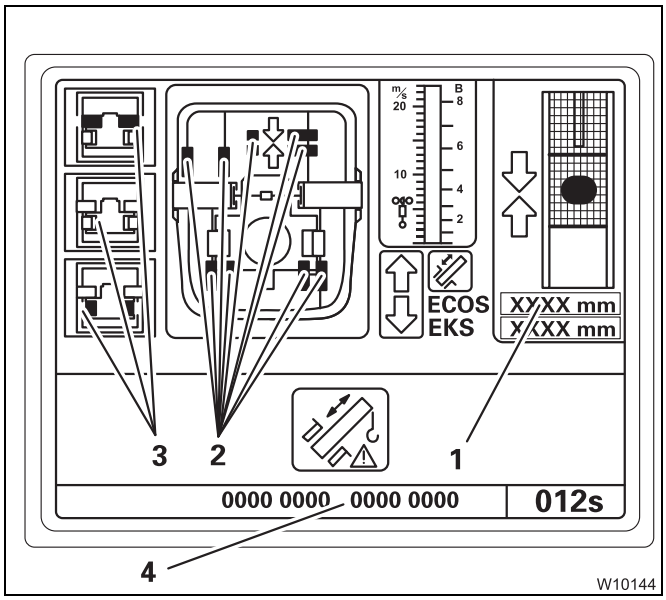
After this time has elapsed, the symbol (**3**) appears and you need to restart the emergency programme.

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.

14.03.2018



– If the display (**1**) shows no value, there is an error on the length indicator.
– If a symbol (**2**) is violet, there is an error on the proximity switch.

The buttons next to the symbols (**3**) are active. After pressing the button, locking or unlocking is performed **immediately**.

• Note the error code (**4**) first if you intend to contact **Manitowoc Crane Care** before executing the emergency program.

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

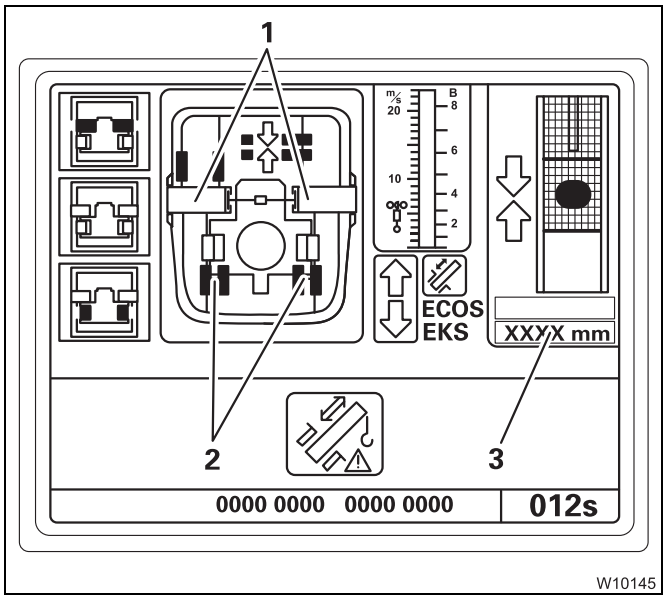
The speed is restricted to approximately 30% of the maximum speed.

– When an error occurs on the proximity switch; ➠ p. 14 - 53.
– If there is an error on the length indicator; ➠ next section.

Error at the length indicator

First register the current status of the telescoping mechanism.

14.03.2018

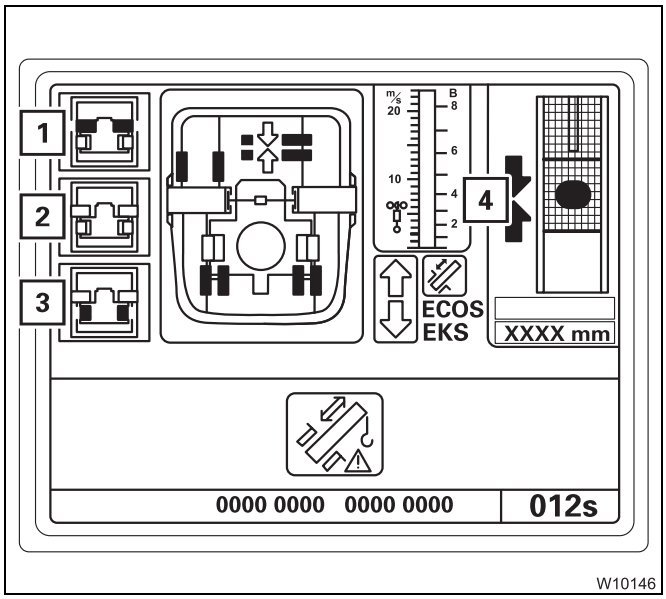


- Check the positions of the locking pins as usual, i.e. on the displays (**1**) and (**2**).
- Check that the display (**3**) shows the RCL measured value for the extended length of the telescoping cylinder.
- Check the telescoping on the RCL.

Checks before telescoping

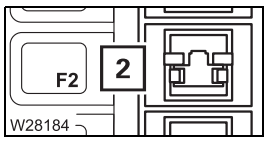
- Before telescoping, check that the following conditions are met:

Risk of accidents from sudden retraction of a telescopic section!
Press the button for unlocking the telescopic section **not more than twice**. If this does not start the unlocking procedure, contact **Manitowoc Crane Care**.



– The telescoping cylinder is locked, symbol (**3**) is **grey**.
– The telescopic section is unlocked (**press not more than twice**), symbol (**1**) is **yellow**.
– Locking is not selected, symbol (**2**) is **grey**.
– The telescoping cylinder is at the locking point, the arrows (**4**) are green.

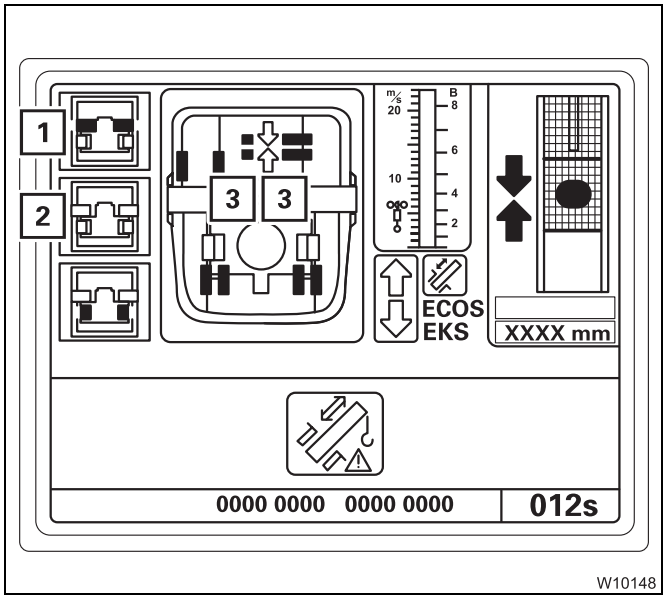
14.03.2018



Retracting and locking a telescopic section

During telescoping you may **not** select Lock. Under **no** circumstances should you press the button (**2**).

Risk of damage to the main boom!
If you select Lock during telescoping, the locking pins on the telescopic section are slid out immediately and they can damage or tear the electrical or hydraulic components in the main boom.



- Retract the telescopic section slowly and as far as possible.
- Press the button (**2**) once.
- Extend to approx. 35 mm (0,11 ft).

The telescopic section is now locked. In *Locked* position:

– the locking pins (**3**) are **green**,

– the symbol (**1**) is **grey**,

– the symbol (**2**) is **yellow**.

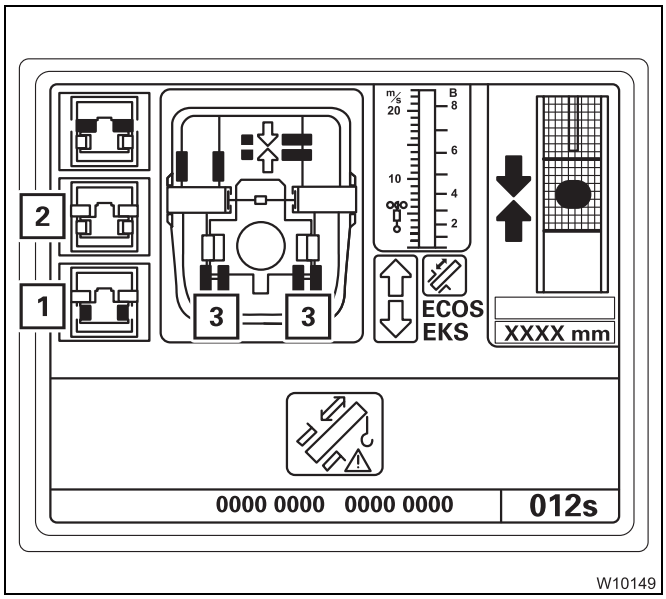
- Set down the telescopic section and retract it as far as it will go.

Unlocking the telescoping cylinder

If the telescopic section is locked, you can now unlock the telescoping cylinder.

Risk of accidents from sudden retraction of a telescopic section!
Press the button for unlocking the telescopic section **not more than twice**. If this does not start the unlocking procedure, contact **Manitowoc Crane Care**.

14.03.2018



- Press the button (**1**) once (**at the most twice**).

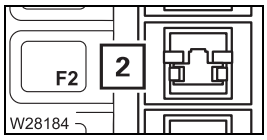
The telescoping cylinder is now unlocked. In *Unlocked* position:

– The locking pins (**3**) are **red**,

– Symbol (**1**) is **yellow**,

– Symbol (**2**) is **grey**.

You can now move the telescoping cylinder into the next telescopic section.



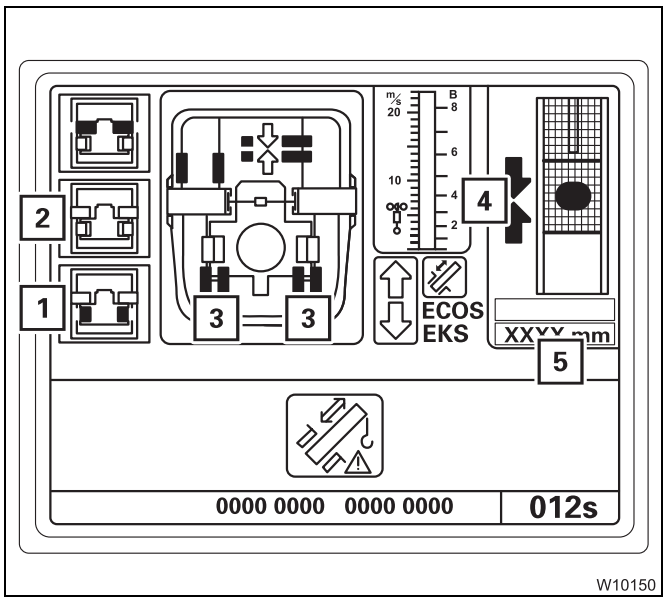
Extending and locking the telescoping cylinder

You may **not** select Lock while the telescoping cylinder is retracting or extending. Under **no** circumstances should you press the button (**2**).

Risk of damage to the main boom!

If you select Lock while the telescoping cylinder is moving, the locking pins on the telescopic section are slid out immediately and they can damage or tear the electrical or hydraulic components in the main boom.

- Slowly move the telescoping cylinder into the next extended telescopic section.



At the locking point:

– the arrows (**4**) are green,

– the display (**5**) shows the length for the current locking point; ➠ p. 14 - 55.

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

The telescoping cylinder is now locked.
In *Locked* position:

– the locking pins (**3**) are **green**,

– the symbol (**1**) is **grey**,

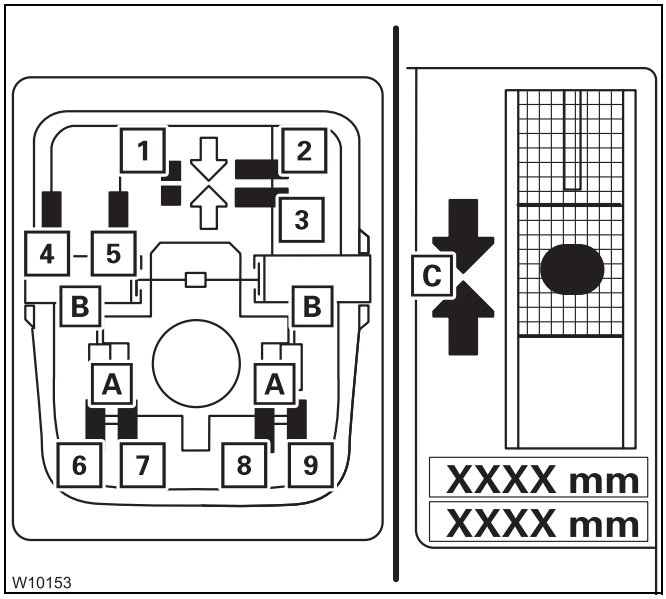
– the symbol (**2**) is **yellow**.

- You can now retract this telescopic section; ➠ p. 14 - 51.

14.03.2018

If there is an error at a proximity switch

Faulty proximity switches are shown in violet.
The displays (**A**), (**B**) and (**C**) only show the current positions when **all** the corresponding proximity switches are free of error.



Several proximity switches are related to the displays (**A**), (**B**) and (**C**).

For **A**: Proximity switches (**6**) to (**9**)

For **B**: Proximity switches (**4**) and (**5**)

For **C**: Proximity switches (**1**) to (**3**)

When a proximity switch is faulty (violet), then

– the corresponding locking pins on the displays (**A**) and (**B**) are always yellow.

– the corresponding arrows are not shown on the display (**C**).

When an error occurs, you can determine the current position more precisely based on the other, fault-free proximity switches. The proximity switches show the following positions:

– Display (C) – Telescoping cylinder at the locking point

1 At the locking point

2 Behind the locking point

3 In front of the locking point

– Display (B) – Telescopic section locked

4 Locked

5 Unlocked

– Display (A) – Telescoping cylinder locked

6 Locked left

7 Unlocked left

8 Unlocked right

9 Locked right

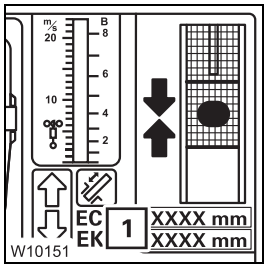
For fault-free proximity switches, the following applies:

– **Green:** Position reached

– **Red:** Position not reached

14.03.2018

Required checks

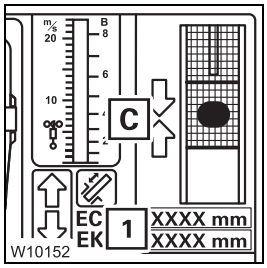


When the *locked* position can no longer be displayed, always conduct the following checks before unlocking:

• Carefully retract and extend the telescoping cylinder or telescopic section. In the *Locked* position, the length shown on the displays (**1**) should vary only slightly, i.e. by the play of the locking pins.

Retracting

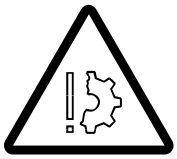
The steps for retracting are the same when an error occurs on the proximity switch as for an error on the length indicator.



– When the display (C) fails

• Calculate the telescoping cylinder length for the locking point; ➠ *Locking points for the telescoping cylinder*, p. 14 - 55, ➠ *Locking points for the telescopic sections*, p. 14 - 55.

• Move the telescoping cylinder to the required length – display (**1**).



Risk of damage if the length specifications are not observed!
Extend the telescoping cylinder (without telescopic section) only to the specified length.
This prevents the piston rod from becoming damaged if the telescoping cylinder slides out of the telescopic section.

Terminating emergency programme

The emergency programme is terminated:

– if the displayed time has expired, or

– when the ignition is turned off.

The current telescoping status does not correspond to the telescoping status last saved by ECOS if the *Telescoping* emergency programme was open. You must enter the current telescoping after terminating the emergency programme; ➠ *Entering the current telescoping*, p. 14 - 57.

14.03.2018

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.

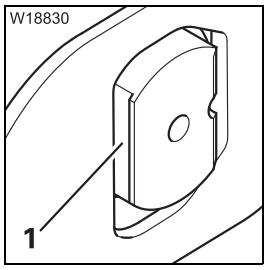
Locking points for the telescoping cylinder

The following table shows the extended length for locking the telescoping cylinder.

Locking points for the telescopic sections

Table for locking the telescoping cylinder			
Telescopic section	**Locking point at fixed length**	**Extended length of telescoping cylinder**	
	in%	**in mm**	**(in ft)**
Telescopic section I	0	5	(0.02)
	50	5,350	(17.55)
	100	10,898	(35.76)
Telescopic section II	0	447	(1.47)
	50	5,752	(18.87)
	100	11,290	(37.04)
Telescopic section III	0	846	(2.78)
	50	6,124	(20.09)
	100	11,568	(37.95)
Telescopic section IV	0	1,155	(3.79)
	50	6,445	(21.15)
	100	11,911	(39.08)
Telescopic section V	0	1,440	(4.72)
	50	6,717	(22.04)
	100	12,168	(39.92)
Telescopic section VI	0	1,712	(5.61)
	50	6,941	(22.77)
	100	12,168	(39.92)

14.03.2018



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 35 mm (0.11 ft) further than with a return run.

The following table shows the extended length for locking and unlocking the telescopic sections.

Table for locking/unlocking the telescopic sections			
Telescopic section	**Locking point at fixed length**	**Extended length of telescoping cylinder**	
	in%	**in mm**	**(in ft)**
Telescopic section I	0	40	(0.13)
	50	5,385	(17.67)
	100	10,933	(35.87)
Telescopic section II	0	482	(1.58)
	50	5,787	(18.99)
	100	11,325	(37.16)
Telescopic section III	0	881	(2.89)
	50	6,159	(20.21)
	100	11,603	(38.07)
Telescopic section IV	0	1,190	(3.90)
	50	6,480	(21.26)
	100	11,946	(39.19)
Telescopic section V	0	1,475	(4.84)
	50	6,752	(22.15)
	100	12,203	(40.04)
Telescopic section VI	0	1,747	(5.73)
	50	6,976	(22.89)
	100	12,203	(40.04)

14.03.2018

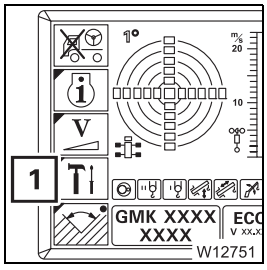
14.5.3 Entering the current telescoping

ECOS no longer displays the current telescoping,

– if you telescoped in emergency mode, or

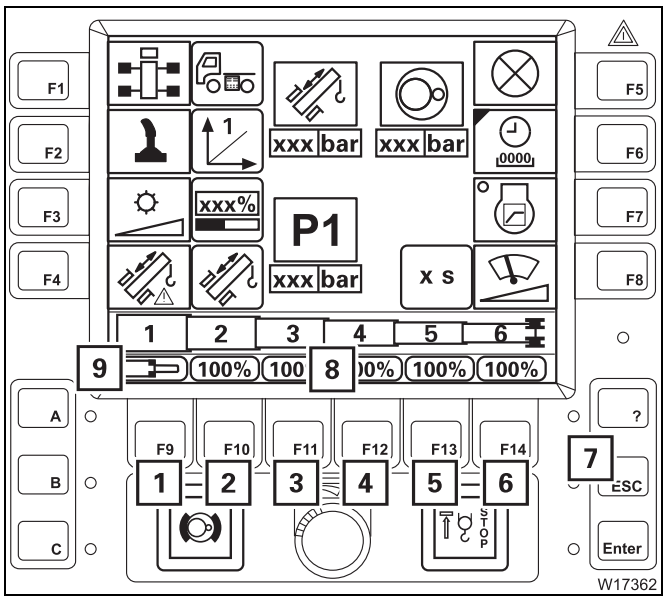
– if the power supply was interrupted in the course of saving data.

In these cases, you must enter the current telescoping, e.g. the values from the RCL display.



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

This opens the *Settings* submenu.



Entering target values

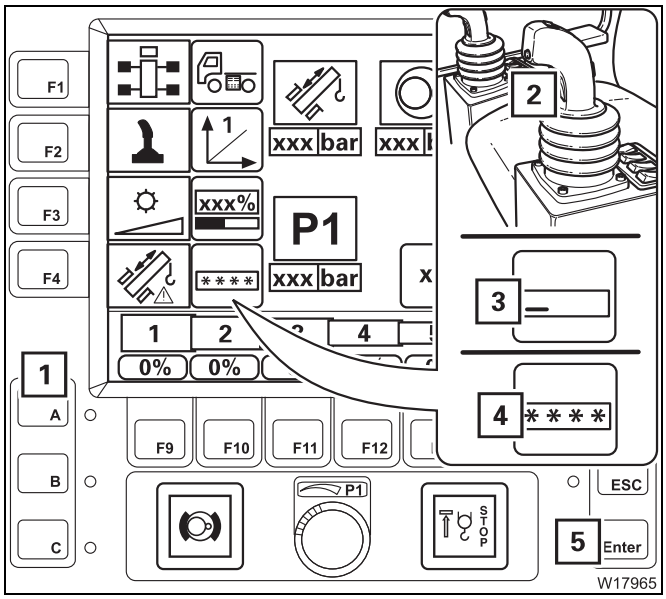
The display (**8**) shows the values for telescopic sections I to VI.

- Press one of the buttons (**1**) to (**6**) – the values in the display (**8**) turn yellow.

Each time you press a button, the corresponding value in the display (**8**) switches continuously between the fixed lengths and the symbol (**9**) for *Unlocked*.

- Enter the desired set values for all the telescopic sections, e.g. unlocked, 100%, 100%, 100%, 100%, 100%.

You can cancel the entry at any time using button (**7**).



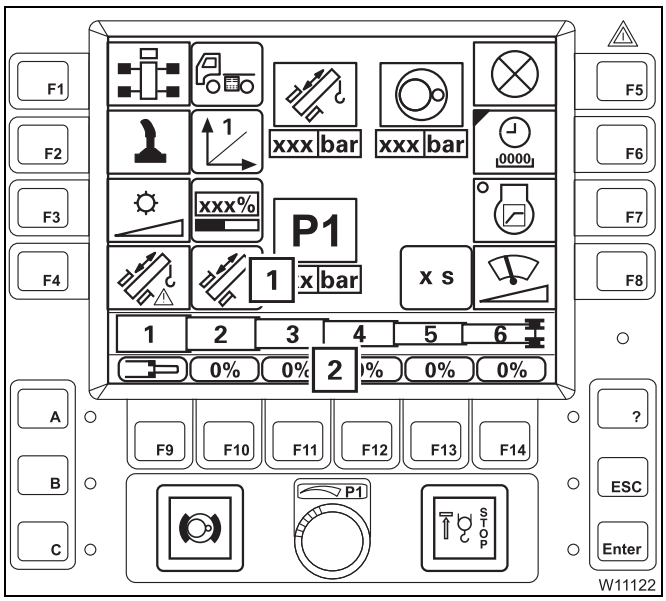
Applying values

- Press the left dead man's switch (**2**).
- Also press button (**5**) once – symbol (**3**) appears.
- Press the buttons (**1**) in the following order:

  A B A C

The symbols (**4**) confirm the entry.

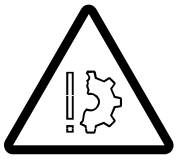
If your input was incorrect, all the symbols (**4**) go out and you need to repeat the input.



If the target values entered are **not permissible**, the values on the display (**2**) turn **red**.

If the set values entered are **permissible**, the values on the display (**2**) turn **green.**

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



Risk of damage due to incorrect input!
Before working with the crane, check whether ECOS indicates the current telescoping and correct if this is not the case.
Entering incorrect values causes malfunctions and may result in damage to the telescoping mechanism.

14.03.2018

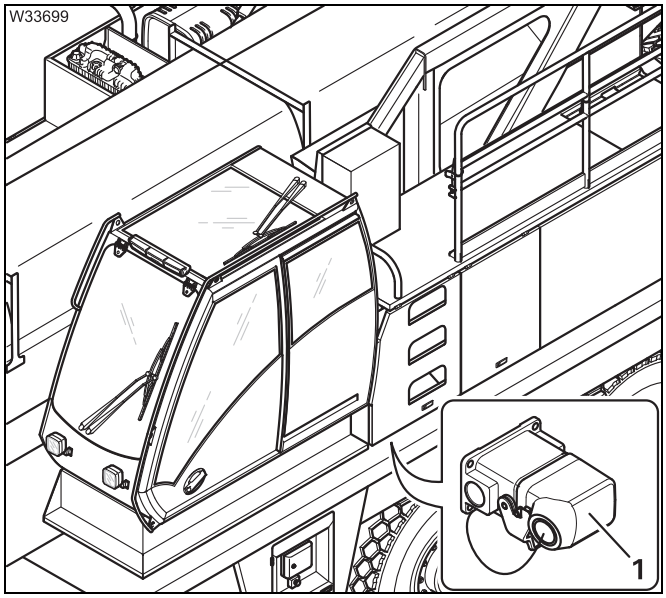
14.5.4 Emergency operation with the hand-held control

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

Operating them with the hand-held control is intended for emergencies only and for bringing the truck crane into a safe state or to shut it down.

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

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

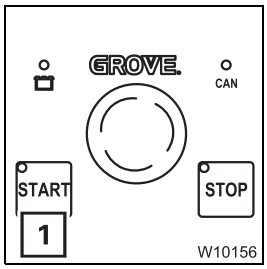


Connecting the hand-held control

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

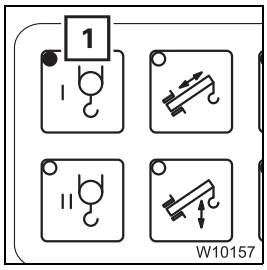
All power units can be operated from this connection.

Information on connecting; ➠ p. 12 - 21.



Start the engine

- Press the (**1**) button once – the engine starts; ➠ p. 10 - 19.



Pre-selecting a power unit

- Press the button for the desired power unit once, e.g. the button (**1**) for the main hoist.

When the function is enabled, the lamp in the button lights up.

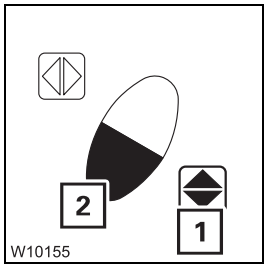
With the telescoping mechanism, teleautomation with the target 0/0/0/0/0 is always selected at the same time – fully retract.
The extension function is disabled in emergency mode.

Operating a power unit

All the safety instructions contained in the sections on the individual power units also apply to operation with the hand-held control.

Danger of overturning when moving into the shutdown ranges!
Avoid lowering the boom. If you cannot avoid lowering, try to set down the load beforehand and ensure that the maximum permissible working radius is not exceeded for the rigging mode as specified in the *Lifting capacity table*. Before slewing, always check whether this is permissible in the current rigging mode; ➠ *Slewing with rigged counterweight*, p. 12 - 83.

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.

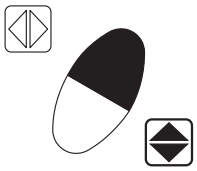
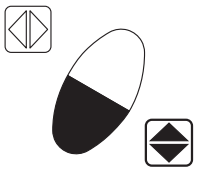
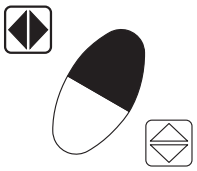
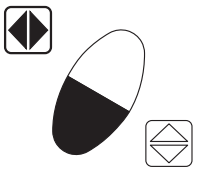


- Press the required function buttons one after the other, e.g. for *Lift main hoist*, press button (**1**) first, and then also button (**2**).

The further you press button (**2**), the quicker the movement is. The maximum speed is limited to approx. 50% for all power units.

14.03.2018

The following table shows all the button combinations. Engaged buttons are shown in black.

Button combination	Pre-selected power unit				
	Telescoping mechanism	Derricking gear	Slewing gear	Hoists	Lattice extension
 W3851	None[1)]	Lower boom	None	Lower	Lower boom
 W3850	Retract	Raise boom	None	Lift	Raise boom
 W3849	None	None	Slew to the right	None	None
 W3848	None	None	Slew to left	None	None

[1)] If the telescoping cylinder is unlocked, it will extend.

14.03.2018

Stopping movements

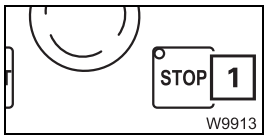
The movement continues until you release the button or the end position is reached.

Stopping movements in emergencies

You can stop operations with the *emergency stop switch* if they do not stop by letting go of the function buttons; ➠ p. 10 - 22.

Switch the engine off

You can switch off the engine only by using the hand-held control.
In this case it is not possible to switch the engine off via the ignition lock.



- Stop all crane movements.
- Press the button (**1**) – the engine will switch off.

14.03.2018

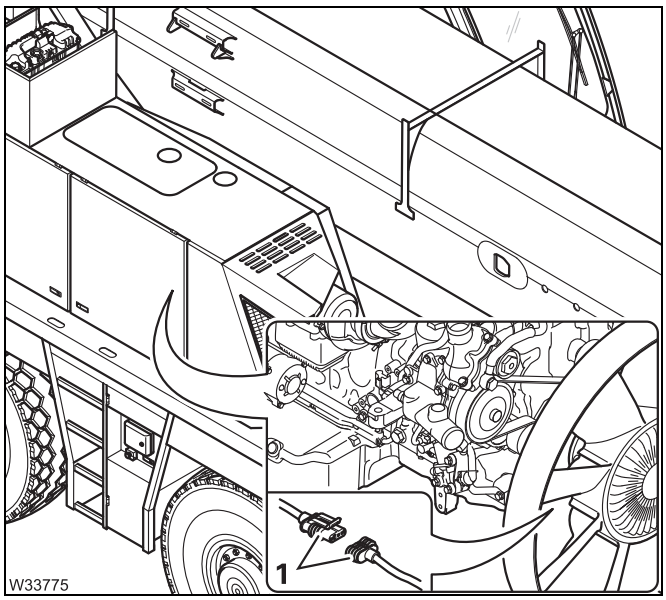
14.5.5 Switching on emergency operation in coolant circuit

The speed of the fan when for the engine is automatically controlled. You can switch on the emergency mode if this automatic system fails. The fan wheel then runs at maximum speed when the engine is switched on.

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

Risk of accidents by turning fan wheel!
Always switch off the engine and secure it against unauthorised start before switching on emergency operation.
This prevents the fan wheel from turning suddenly and injuring you.

Risk of burns when the engine is hot!
During operation, the engine and the add-on parts heat up greatly.
Wear appropriate protective gloves and be careful not to touch hot parts.



- Disconnect the plug connection (**1**).
- Fasten the plug connection (**1**) so that it will not be damaged when the engine is running.

Emergency operation is switched on and the fan wheel runs at maximum speed when the engine is switched on.

- Have the cooling system immediately checked and repaired by a specialist workshop.

14.03.2018

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14.03.2018

14.6 Hydraulic emergency operation

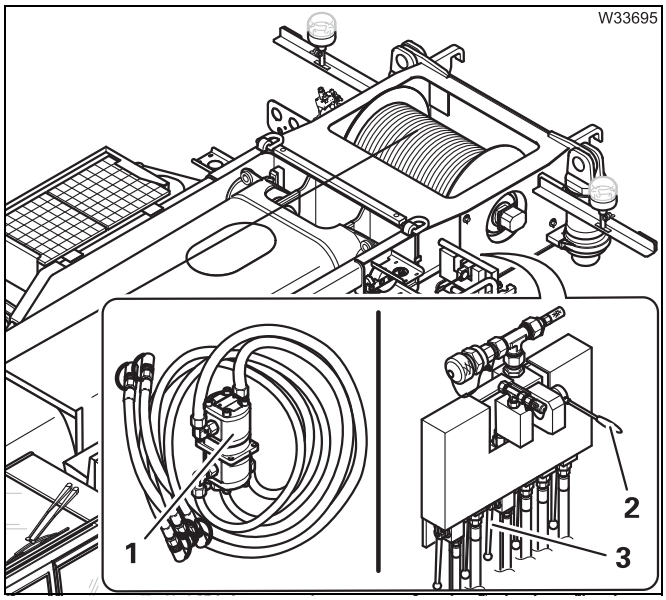
With this additional equipment, the truck crane is equipped with an hydraulic emergency bleed valve in accordance with BGR 159 (4.2.8). This allows small loads to be transported in case of emergency, e.g. in the event of an engine failure.

Risk of 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.

14.6.1 Operating principle

The hydraulic emergency operation BGR 159 enables:

- **Emergency operation** of the main hoist, derricking gear, and slewing gear
- **Emergency supply** of another truck crane that also has a hydraulic emergency operation BGR159.



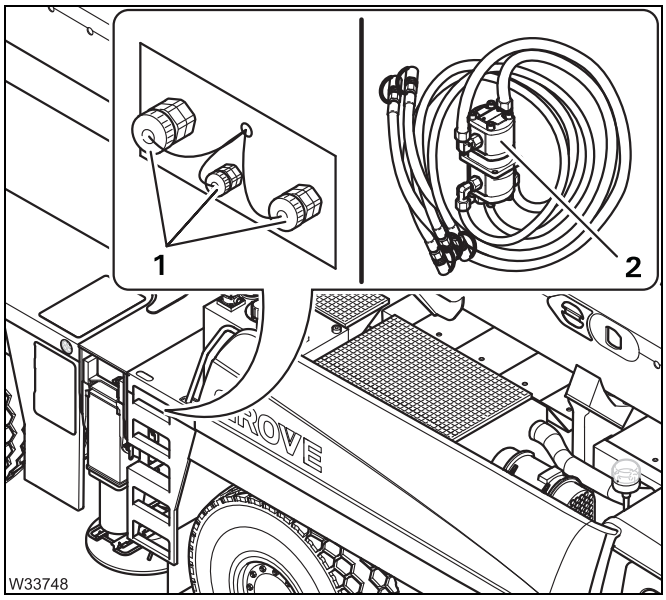
Emergency operation

The energy source for the crane hydraulic system is a transformer (**1**), which is driven by

- the carrier hydraulic system or
- the emergency hydraulic unit or
- the emergency supply of another truck crane

The hydraulic circuits are switched with the valves (**3**).

The control lever (**2**) regulates the direction of movement and the speed.



Emergency supply

When using an emergency supply, the connections (**1**) feed a transformer (**2**) that is connected to the hydraulic system of the other crane; ➠ *Emergency supply of another crane*, p. 14 - 76.

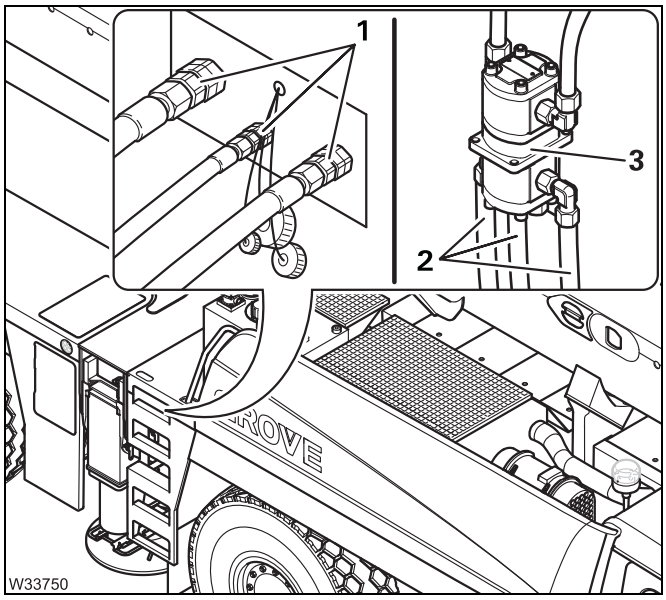
14.6.2 Connecting/disconnecting hoses

- Turn off the engines for driving and crane operations.

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.

Establishing connections

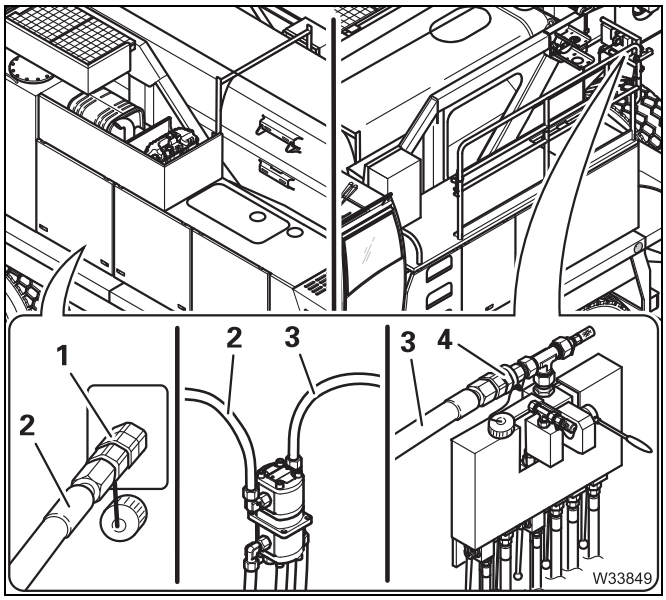
The hoses are assigned according to the various diameters.



On the carrier

- Attach the transformer (**3**) to the superstructure.
- Connect the hoses (**2**) to the connections (**1**).

14.03.2018

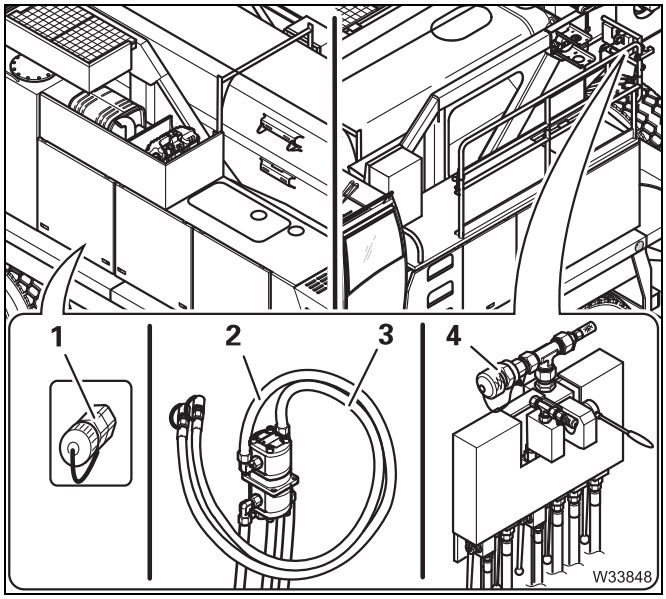


On the superstructure

- Connect the thicker hose (**2**) to the connection (**1**).
- Connect the thinner hose (**3**) to the connection (**4**).

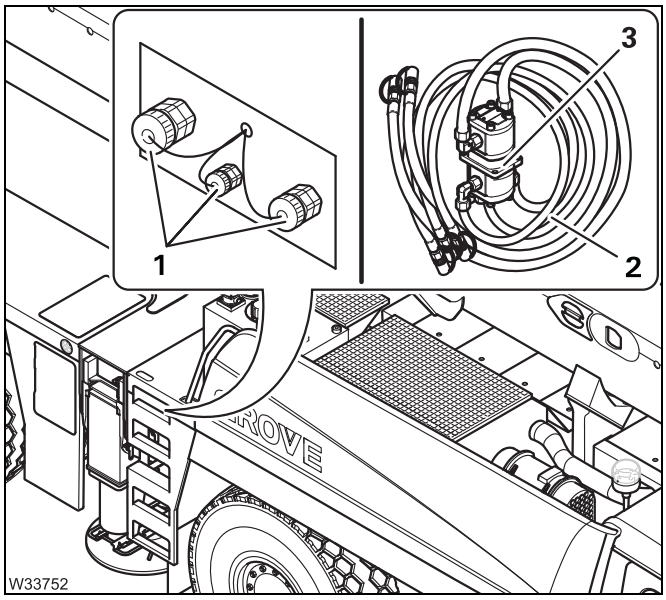
Disconnecting connections

After the emergency operation, you must disconnect the hoses and the transformer.



On the superstructure

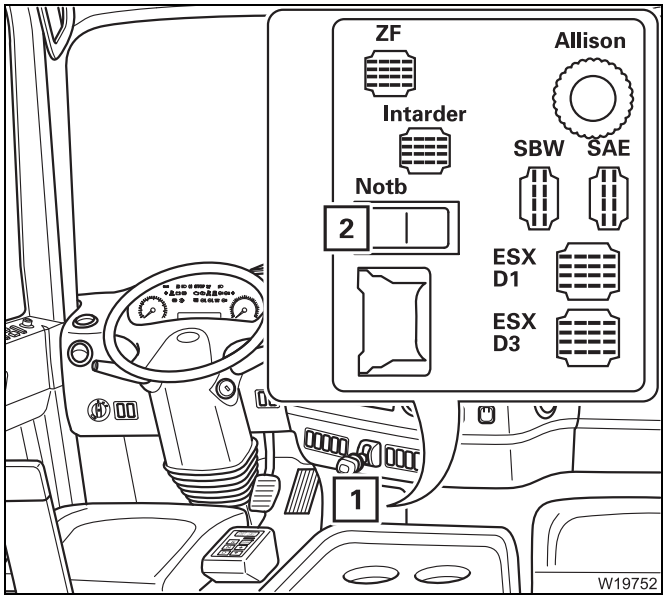
- Remove the hoses (**2**) and (**3**) from the connections (**1**) and (**4**).
- Close off the hoses and connections with the caps.



- Remove the hoses (**2**) from the connections (**1**).
- Close off the hoses and connections with the caps.
- Remove the transformer (**3**).

14.6.3 Switching emergency operation on/off

The emergency operation (or emergency supply of another crane) is switched on and off in the driver's cab.



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

Switching on
- Press switch (**2**) down.

Switching off
- Press switch (**2**) up.

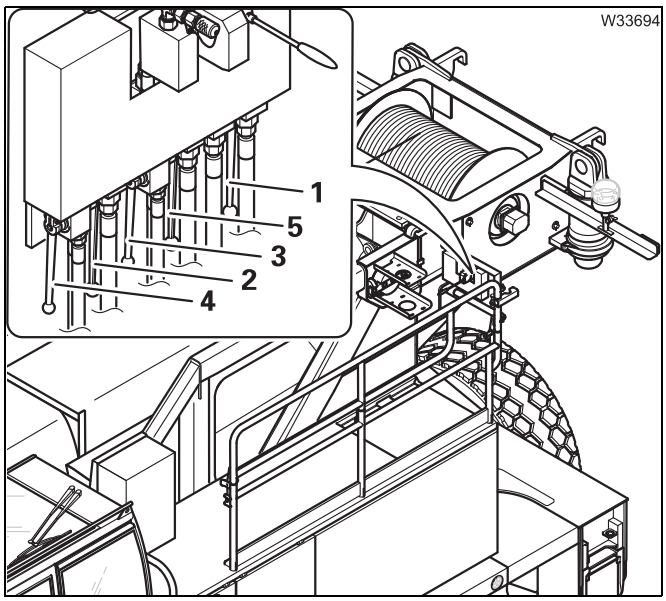
14.03.2018

14.6.4 Establishing the hydraulic circuits required

To establish an hydraulic circuit, switch over the required valves and possibly also perform additional switching operations for lifting/lowering or slewing.

Switching over valves

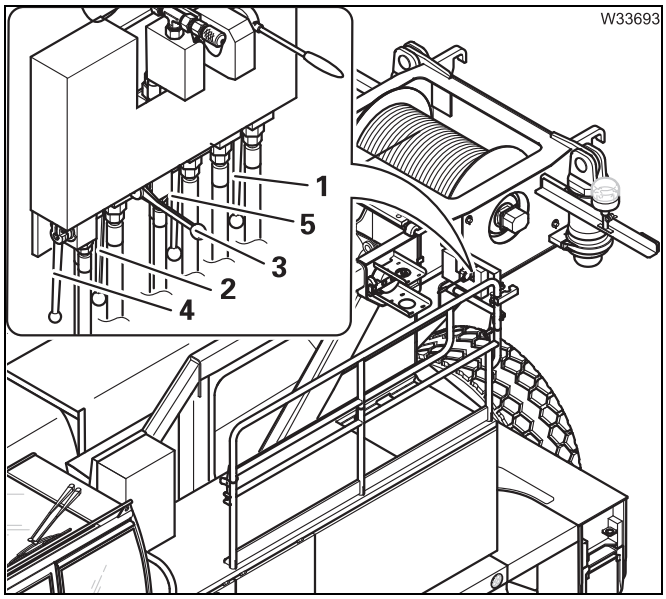
The valves **1** to **5** are numbered.



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

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

To raise the boom, for example, you must switch the valve **3 up diagonally**. Valves **1**, **2**, **4** and **5** must point down diagonally.

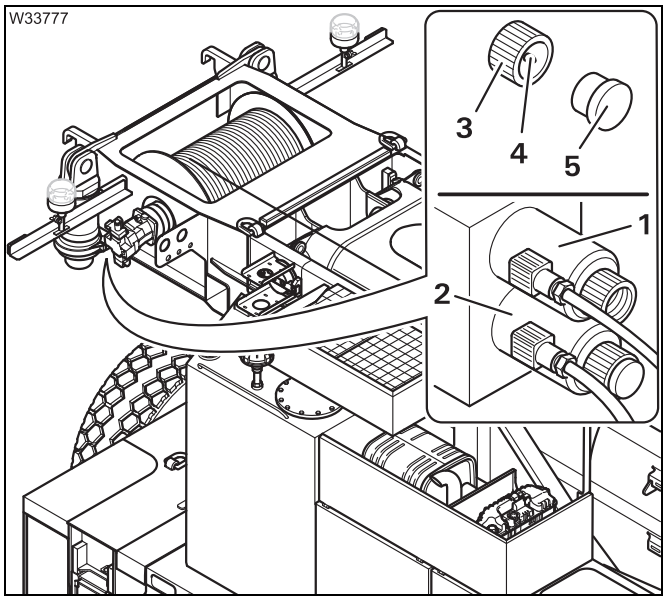
Danger from mutual interference of the power units!
Always only switch valves for **one crane movement** up diagonally at a time. This prevents wrong crane movements being performed and several movements being performed unintentionally at the same time.

Emergency operation for crane movements	Valves diagonally up	Valves diagonally down	Additional switching operations
Lifting	**1**	**2, 3, 4, 5**	Valve Y1105 on continuous operation; ➠ p. 14 - 71
Lowering	**1**	**2, 3, 4, 5**	Valve Y1104 on continuous operation; ➠ p. 14 - 71
Raise	**3**	**1, 2, 4, 5**	None
Lower	**5**	**1, 2, 3, 4**	None
Slewing to the left or right	**2, 4**	**1, 3, 5**	Valve **6** closed; ➠ p. 14 - 72

14.03.2018

For lifting/ lowering

After establishing hydraulic circuits, switch one additional valve to continuous operation.



Switching on continuous operation

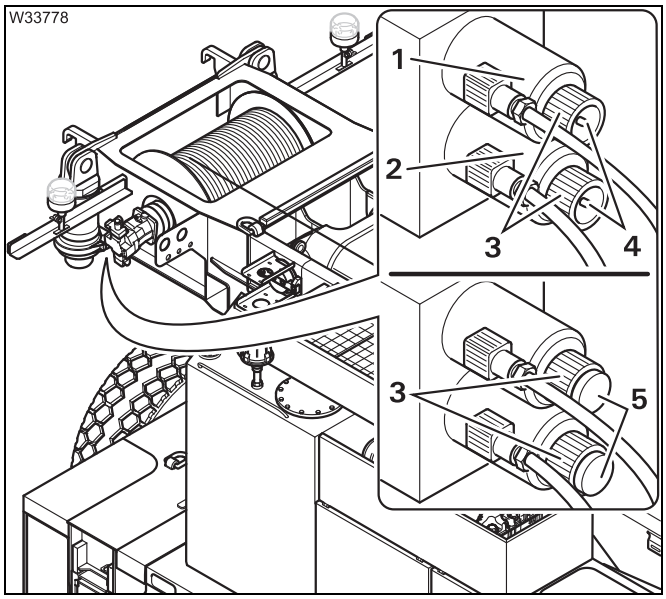
Always switch only **one** valve to continuous operation.

1 Valve Y1104 – *Lowering* **or**

2 Valve Y1105 – *Lifting*

- Unscrew the cap (**3**), e.g. from the valve (**1**).
- Remove the plug (**5**).
- Screw the cap and pin (**4**) on to the valve – continuous operation is now switched on.

Danger due to falling loads!
Switch off continuous operation immediately after the emergency activation.
Check whether the pins can be seen on both caps.
In this way, you can prevent loads falling immediately after being lifted during subsequent crane operations.



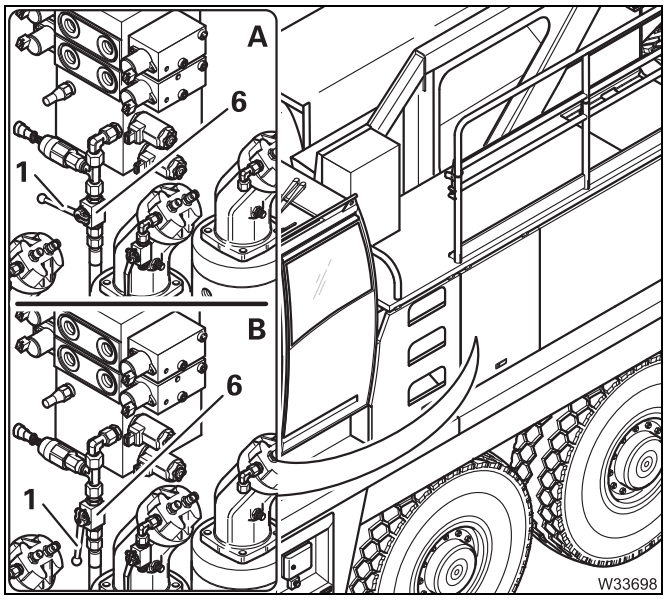
Switching off continuous operation

- 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**).

14.03.2018

For slewing

After switching over the valves behind the crane cab, you must additionally close one valve on the slewing gears.



(A) – Emergency operation position

- Close the valve **6** – lever (**1**) across the pipe.

(B) – Crane operation position

- Open the valve **6** – lever (**1**) parallel to the pipe.

14.03.2018

14.6.5 Performing emergency operation

If the required hydraulic circuit has been established, you can make the corresponding crane movement.

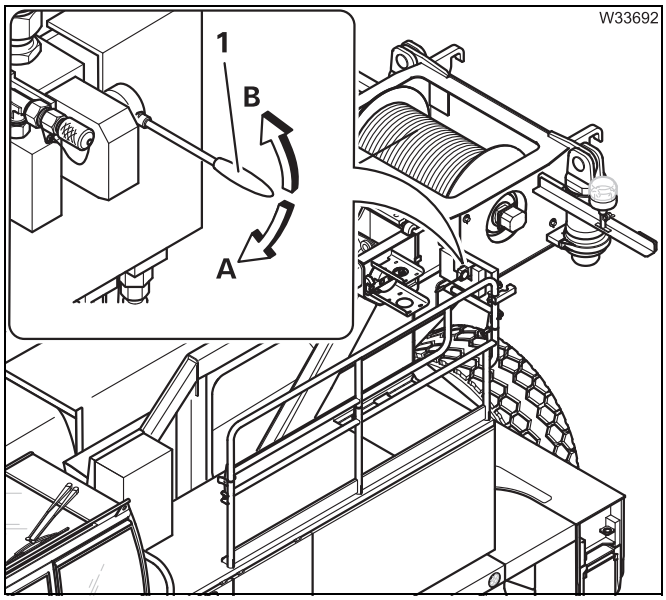
You can control the speed of all power units with the control lever.

Turning

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 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.



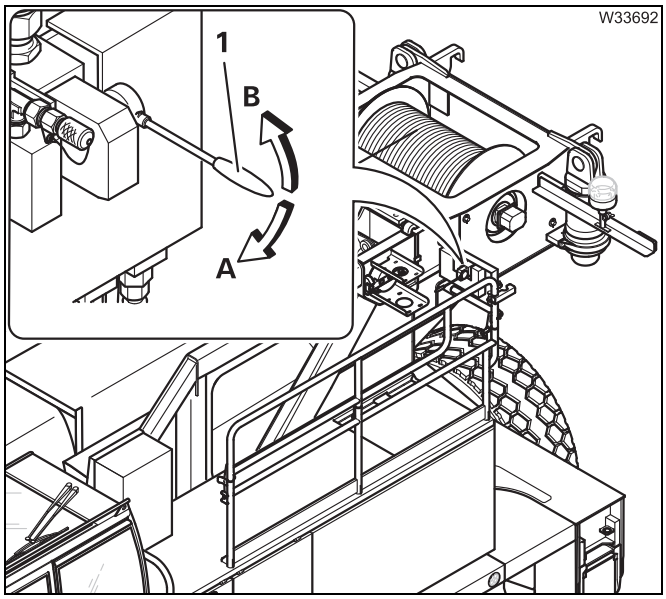
- Slowly move the control lever (**1**) in the required direction:
  - **A:** Slew to the right
  - **B:** Slew to the left

14.03.2018

Derricking

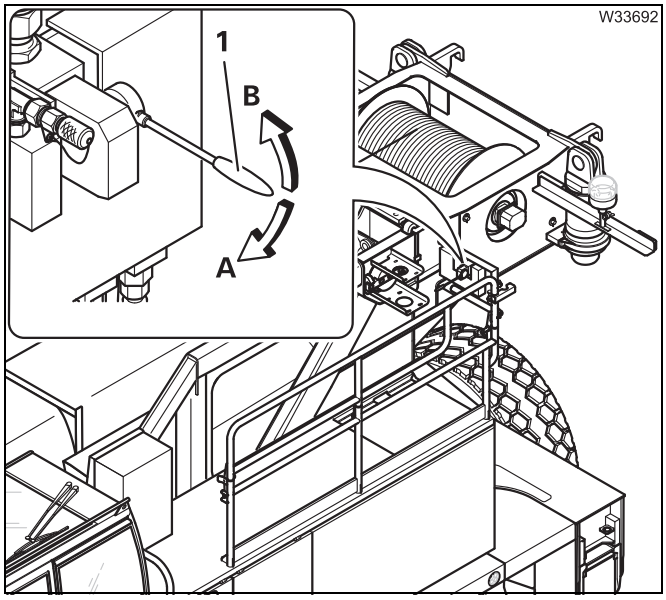
- Determine the maximum permissible working radius for the current rigging mode according to *Lifting capacity table*.

Danger of overturning if the working radius is too large when lowering the boom!
In emergency operation, operations are not shut down by the RCL. This also applies if the RCL displays are still active after switching on the ignition. The truck crane will overturn if you exceed the maximum permissible working radius for the current rigging mode as specified in the *Lifting capacity table*.



- Observe the maximum permissible working radius specified in the *Lifting capacity table* – by measuring, if necessary.
- Move the control lever (**1**) in the required direction:
  - **A:** Lower
  - **B:** Raise

Lifting/lowering



- Move the control lever (**1**) in the required direction:
  - **A:** Lowering
  - **B:** Lifting

14.03.2018

14.6.6 After emergency operation

You must restore the truck crane to its original state after finishing emergency operation.

Switching off emergency operation

- Switch off the engine.

Switching over to crane operation

After every emergency operation

- Switch valves **1** to **5** to crane operation; ➠ p. 14 - 69.

Also after lifting/lowering

- Switch off continuous operation at the valves Y1105 and Y1104; ➠ p. 14 - 71.

Also after slewing

- Open the valve **6**; ➠ p. 14 - 72.

Disconnecting the hoses

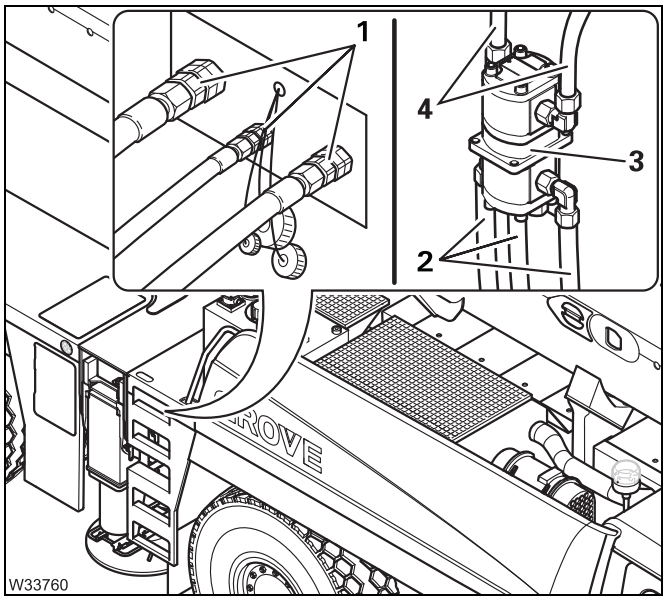
- Disconnect the hoses; ➠ p. 14 - 67.
- Close all the connections and hoses with the caps.
- Remove the transformer.

14.03.2018

14.6.7 Emergency supply of another crane

For emergency supply

The hoses are assigned according to the various diameters.



On the crane to be supplied

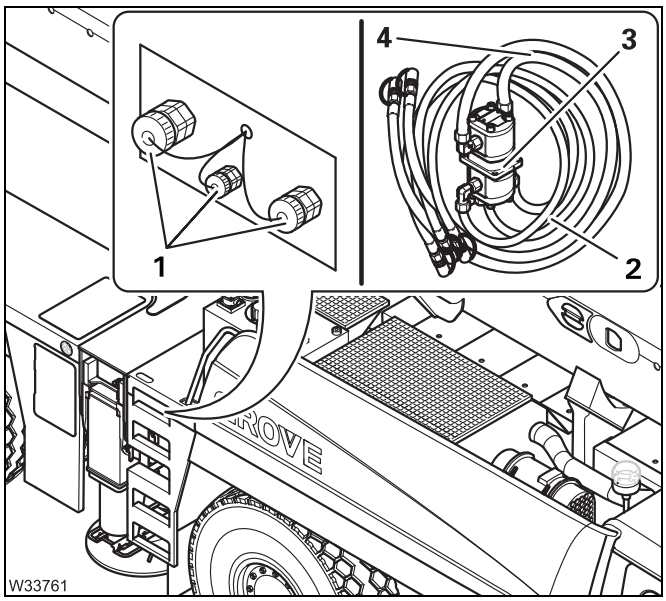
- Attach the transformer (**3**).
- Connect the hoses (**4**); ➠ *Operating manual of the other crane*.

On the GMK6300L-1

- Switch off the engine for driving.
- Connect the hoses (**2**) to the connections (**1**).
- Switch on the hydraulic emergency operation; ➠ p. 14 - 68.

After emergency supply

- Switch off the hydraulic emergency operation; ➠ p. 14 - 68.



On the GMK6300L-1

- Remove the hoses (**2**) from the connections (**1**).

On the crane that was supplied

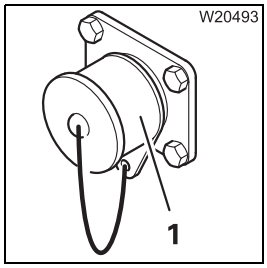
- Disconnect the hoses (**4**).
- Close all the hoses and connections with the caps.
- Remove the transformer (**3**).

14.03.2018

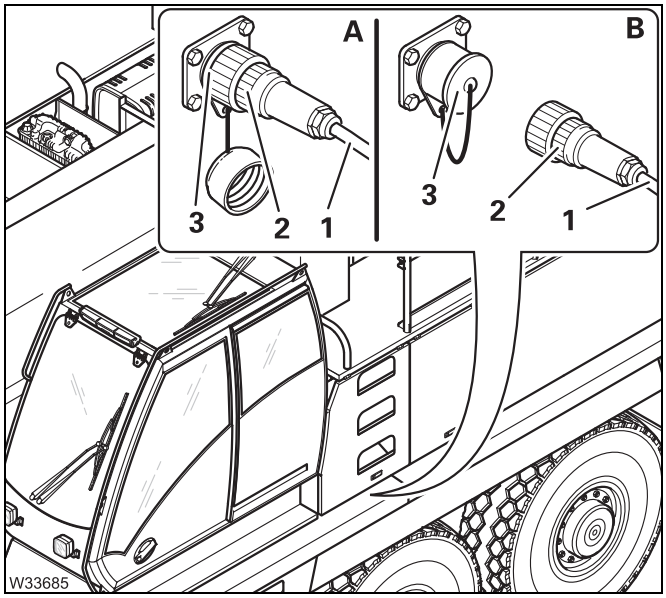
14.7 Other emergency operations

With the appropriate additional equipment, you can start the truck crane externally, perform a jump start and charge the batteries.

14.7.1 External starting socket



The truck crane is equipped with a socket for external starting (**1**) on the superstructure and on the carrier (➠ p. 7 - 42).
If the batteries are discharged, the power supply (24 V) of an auxiliary vehicle or the socket (**1**) on the carrier can be used for charging.

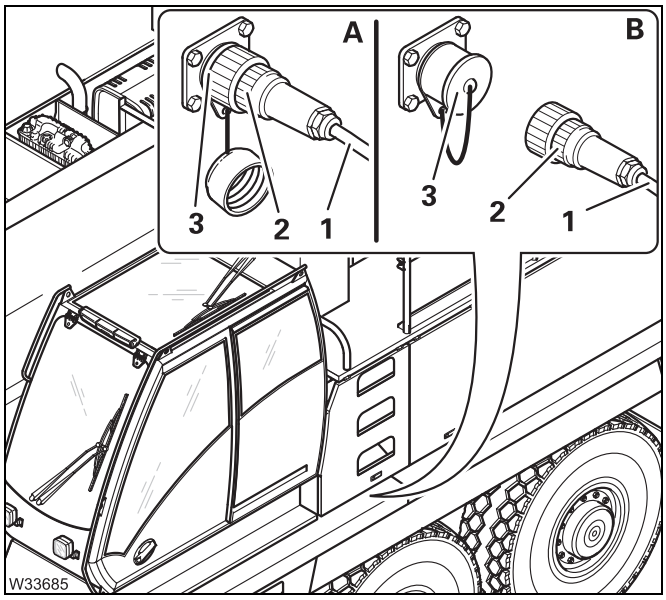


- Start the engine of the power source (24 V).
- (**A**) – Connect the cable (**1**) to the power supply.
- Insert the plug (**2**) into the socket (**3**).
- Start the engine for driving.
- (**B**) – Withdraw the plug (**2**).
- Close the socket (**3**).
- Remove the cable (**1**) from the power supply.

14.03.2018

Performing a jump start

The socket (**1**) can also be used to supply power to another vehicle (with a 24 V on-board network).



- Start the engine for crane operation.
- (**A**) – Insert the plug (**2**) into the socket (**3**) on the superstructure.
- Connect the cable (**1**) to the vehicle requiring the power (24 V).
- Start the engine of the vehicle that requires the power.
- (**B**) – Withdraw the plug (**2**).
- Close the socket (**3**).
- Remove the cable (**1**) from the vehicle.

14.03.2018

14.7.2 Battery charger

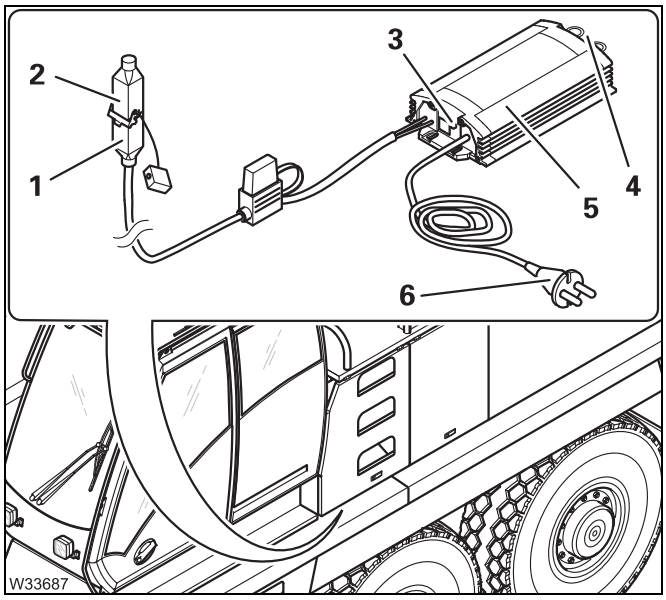
Prerequisites

– 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 (e.g. 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).



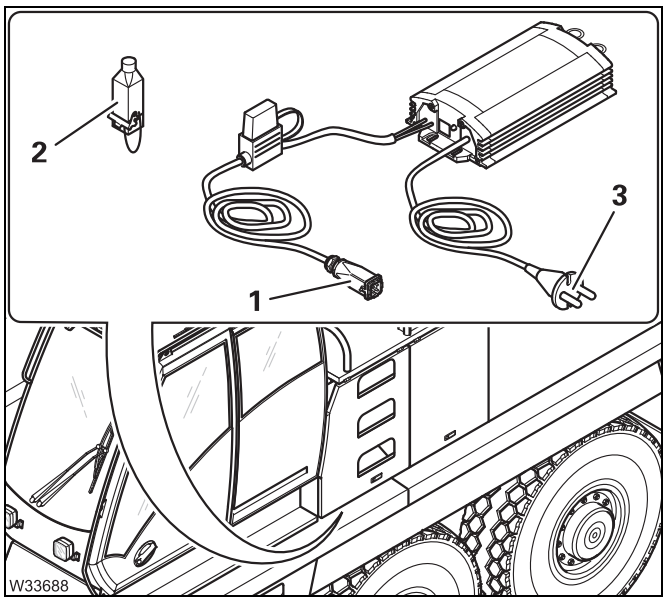
Connecting

- Insert the plug (**1**) into the socket (**2**).
- Place the battery charger (**5**) in a protected place where you can see the indicator lamp (**3**).

  The battery charger can be suspended from the ring eyes (**4**).
- Insert the plug (**6**) into the socket on the mains supply 230 V at the location.

The battery charger switches on. The lamp (**3**) on the battery charger indicates the status:

– **Flashing:** The battery is being charged
– **On:** Charging complete



Disconnecting

- Withdraw the plug (**3**) from the socket.
- Withdraw the plug (**1**) from the socket (**2**).
- Close the socket (**2**).
- Return the battery charger to the storage compartment in the driver's cab.

14.03.2018

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14.03.2018

15 Index

14.03.2018

14.03.2018

15 Index

To avoid making the index unnecessarily long and unclear, we have not included every single element from the instrument panel.
Those elements, such as switches and buttons, lamps and displays are described and named in detail in the overviews of Chapter 3 and Chapter 9 *Truck Crane Description*.
From there you will as usual be referred to more detailed descriptions of these elements.

14.03.2018

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14.03.2018

14.03.2018

C

14.03.2018

14.03.2018

14.03.2018

E

14.03.2018

14.03.2018

14.03.2018

14.03.2018

14.03.2018

14.03.2018

14.03.2018

14.03.2018

14.03.2018

14.03.2018

14.03.2018

14.03.2018

14.03.2018

14.03.2018

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