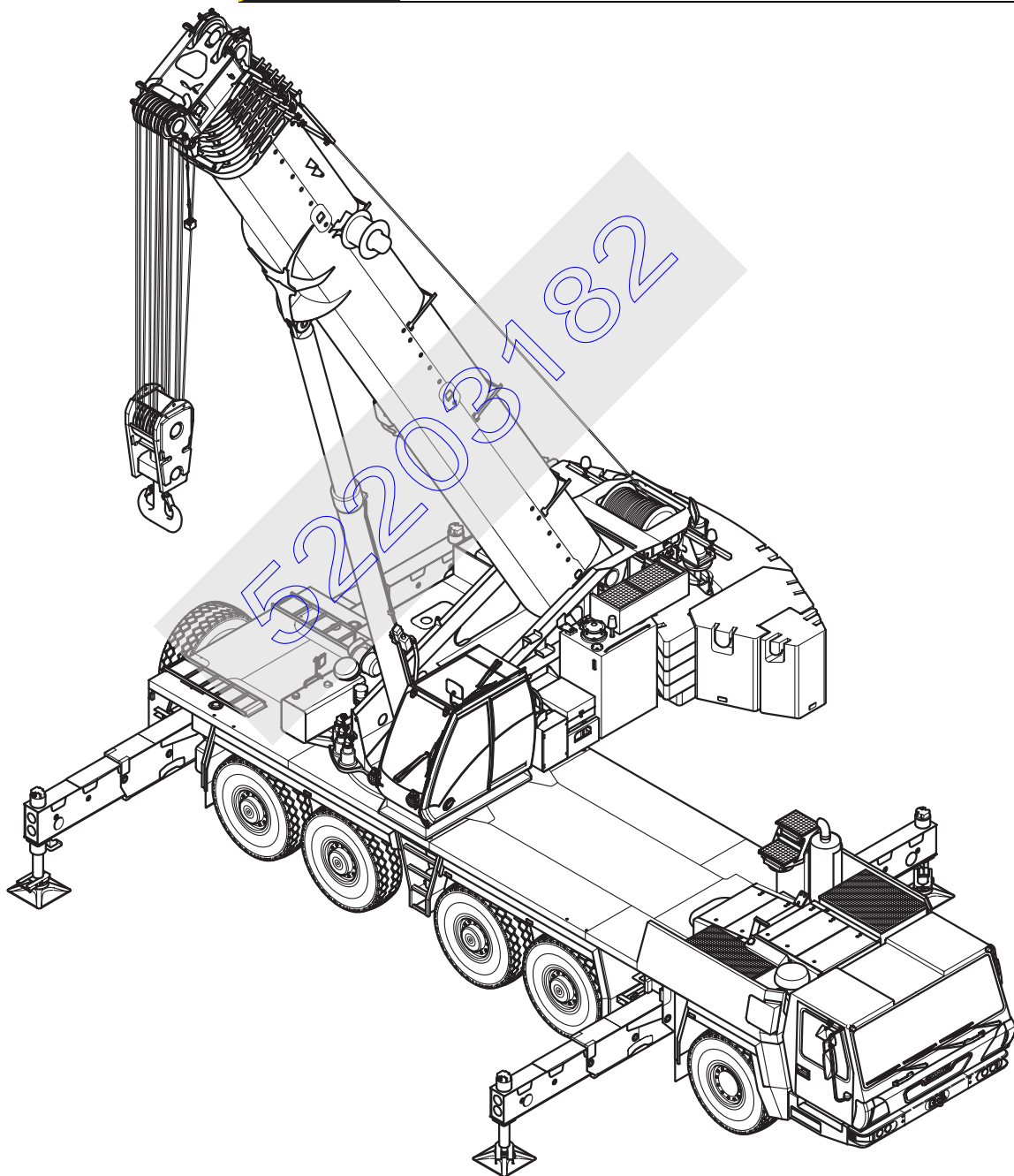


GROVE®

GMK 5220



Operating instructions Part 1 – Driving



Manitowoc®
Crane Group

Serial number

3 112 378 en
31.01.2007

A **Manitowoc** Company

Important note

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31.01.2007

Maximum permitted speeds with an axle load of over 12 t (26 500 lbs)

Should your national regulations allow driving with axle loads of over 12 t (26 500 lbs), you may under no circumstances exceed the maximum permitted speed given here.



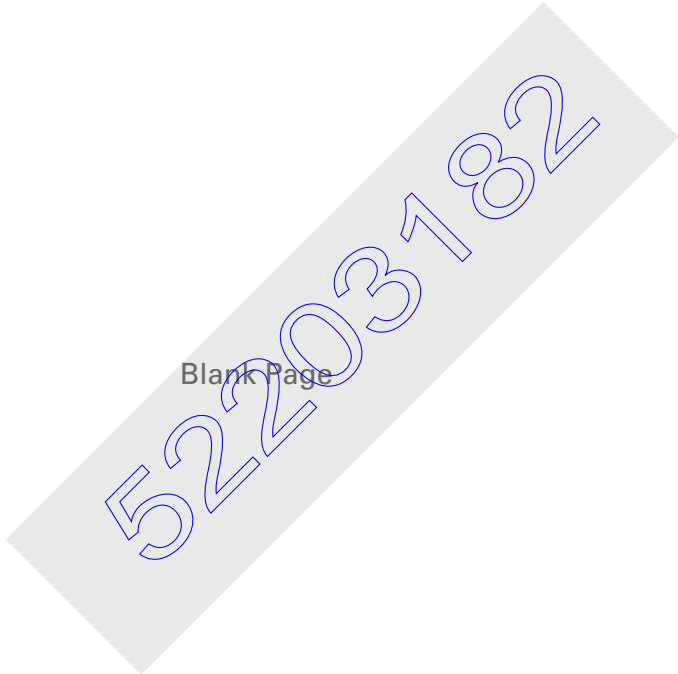
Risk of accidents due to overloading of the tyres

Never exceed the maximum permitted speed which is given for the current axle load and tyre size.

This prevents the rope tyres from becoming overloaded and rupturing.

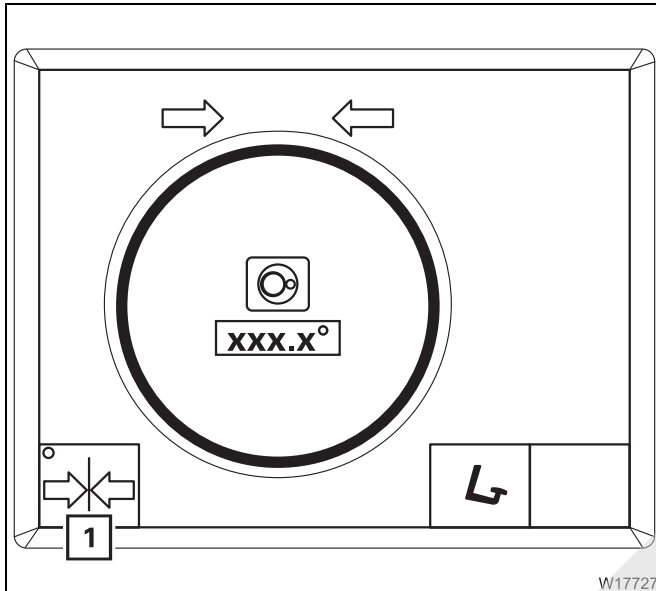
The maximum permissible speed depends on the size of the tyres and the axle load. The following values only apply to the given tyre pressure, and are maximum values. Also note the information provided by the tyre manufacturer regarding the maximum permitted load duration.

Tyre size / tyre pressure in bar (psi)	Current axle load in t (lbs)	Maximum permissible speed in km/h (mph)
14.00 R 25 / 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)
16.00 R 25 / 9 (130.5) 20.5 R 25 / 7 (101.5)	up to 13.5 (29 800)	65 (40)
	up to 13.5 (29 800)	65 (40)
	up to 14.5 (32 000)	65 (40)
	up to 15.5 (34 200)	58 (36)



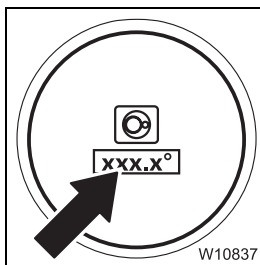
Additional page

Stop at 0° or 180°



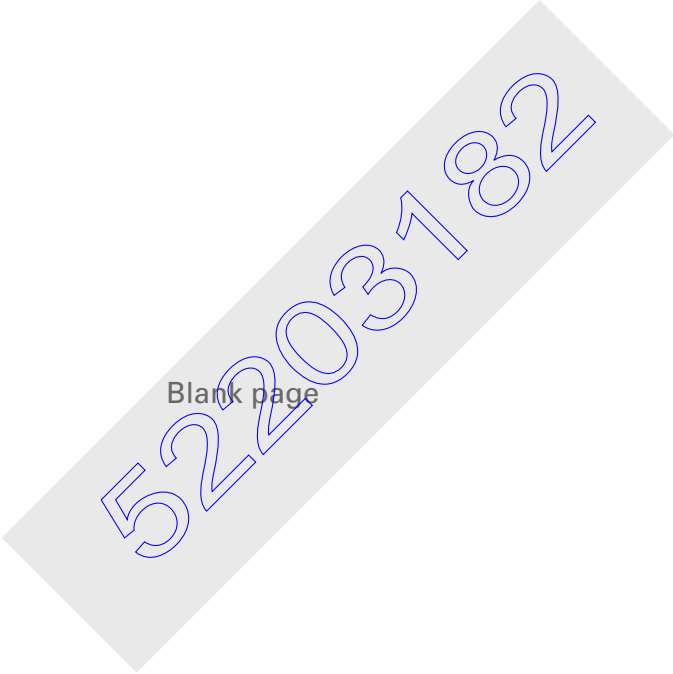
The *Stop at 0° or 180°* function in the supplied operating instructions is only available when the *Slewing gear/houselock* submenu displays the the symbol (1).

If the symbol (1) is not available, then this function is not required.



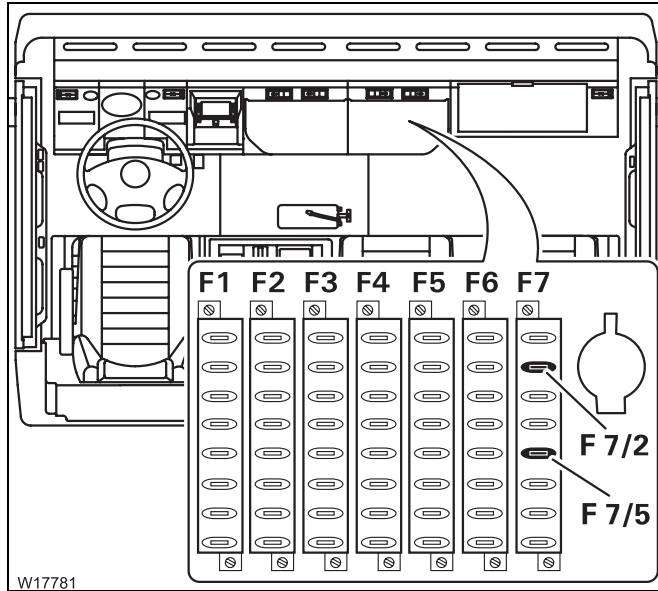
Slewing to 0°/180° without automatic mode

- Use the *Current slewing angle* display to slew the superstructure to the required position.



Correction sheet

Fuses



Contrary to the information specified in the operating instructions, changes have been made to the fuses.

Depending on the version of the electrical system, the amperage of the F 7/2 and F 7/5 fuses are either **5 amps** or **2 amps**.

Replace the blown fuses with fuses of the same amperage.



Risk of damage due to overheating!

If fuse F 7/2 and F 7/5 in the driver's cab are blown, replace them with fuses of the same amperage only.

This prevents damage to the electrical parts from overheating.

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Additional brakes

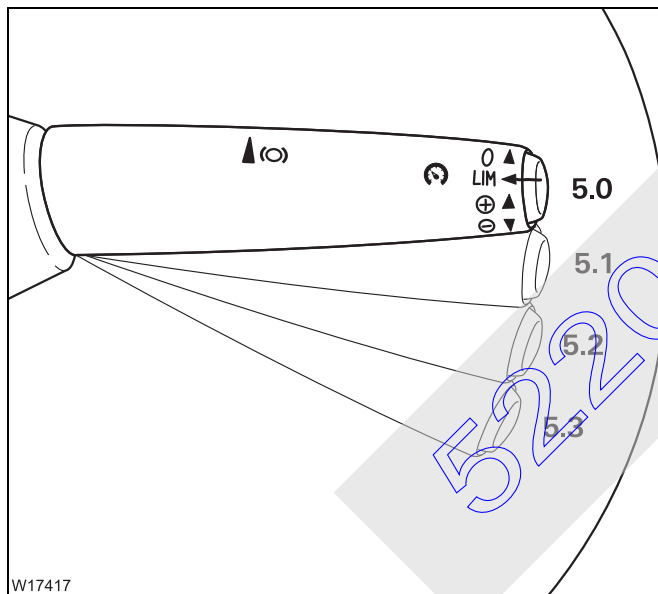
Validity

These additional pages apply to all truck cranes **GMK 5170/GMK 5220** that are equipped with a Cummins engine.

Reasons for the additional information

Contrary to the information in the operating manual, the truck crane is equipped with an engine brake **or**, for additional equipment, with a transmission retarder.

Engine brake



Switching on the engine brake

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

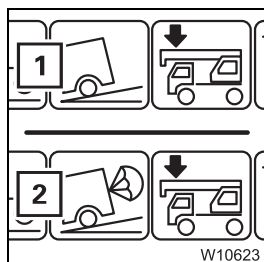
The engine brake is switched on. The brake power equals:

- 5.1** Level 1 = 33% brake power
- 5.2** Level 2 = 66% brake power
- 5.3** Level 3 = full brake power

Switching off the engine brake

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

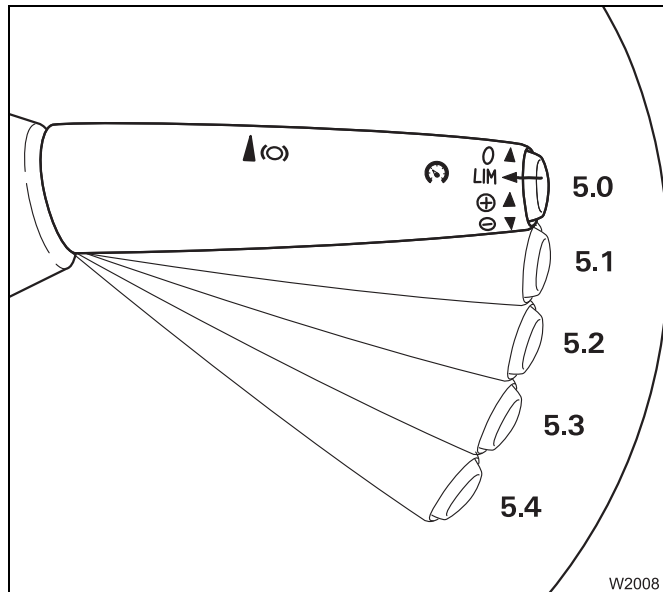
The engine brake is switched off.



- At level **5.0**, the symbol (1) is displayed – engine brake off.
- At levels **5.1** to **5.3**, the symbol (2) is shown – engine brake on.



Retarder



Switching on the retarder

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

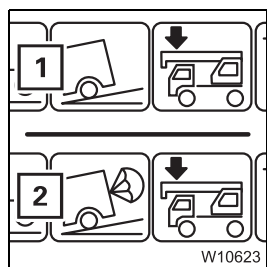
The retarder is switched on. The brake power equals:

- 5.1** Level 1 = 25% brake power
- 5.2** Level 2 = 50% brake power
- 5.3** Level 3 = 75% brake power
- 5.4** Level 4 = full brake power

Switching off the retarder

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

The retarder is switched off.



- At level **5.0**, the symbol **(1)** is shown – retarder off.
- At levels **5.1** to **5.4**, the symbol **(2)** is shown – retarder on.

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Correction sheet

Driving with a trailer (dolly)/Pressure relief

Contrary to the information given in the operating instructions supplied, additional valves must be actuated when operating the slewing gear freewheel, the boom floating position and the boom pre-tensioning.

This changes the operating procedures

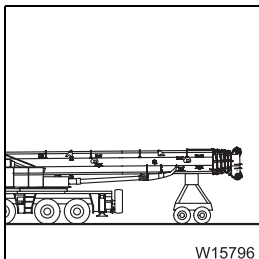
- when rigging for towing a trailer (dolly),
- when switching the pressure relief on and off after removing and installing the main boom.

Carry out operating procedures only as described in this correction sheet.




1

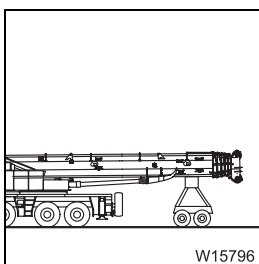
Driving with a trailer (dolly)

To reduce the axle loads to the specifications which apply in the country of use, you can set the main boom onto a trailer (dolly) when driving. For this purpose, the truck crane must be fitted with a slewing gear freewheel, boom floating position and if necessary, with a boom pre-tensioning device.






Before driving with the trailer, you must:

- Switch on the boom floating position; , S. 2,
- switch on the slewing gear freewheel; , S. 4,
- switch on boom pre-tensioning, if necessary; , S. 6.



After driving with the trailer, you must::

- Switch off the boom floating position; , S. 3,
- switch off the slewing gear freewheel; , S. 5,
- switch off boom pre-tensioning, if necessary; , S. 7.

1.1

Switching on boom floating position

Switching on

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 when the boom floating position is switched off!

Always switch on the boom floating position when the main boom is on a trailer.

This prevents the trailer hanging briefly with its full weight on the main boom on uneven ground, the axle loads from rising suddenly, or the truck crane from tipping when driving around corners.

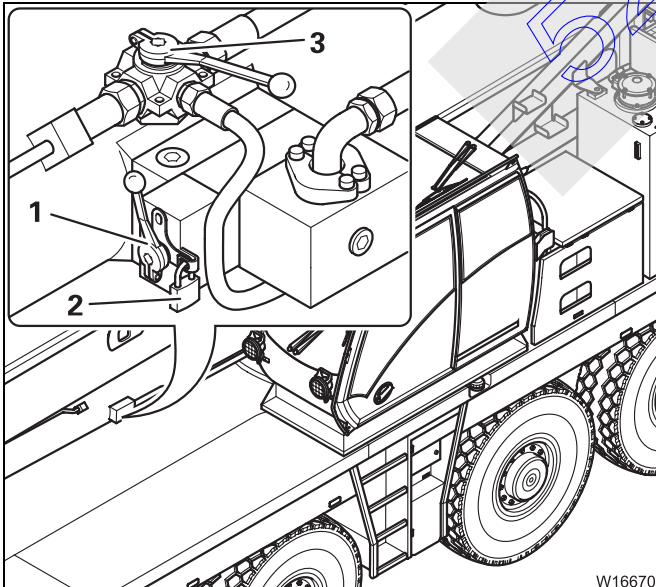
- Enter the SLI code for the current rigging mode.
- Fully retract the main boom.
- Raise the main boom to a permitted angle within the working range.
- Turn the superstructure to the 0° to the rear working position and place the main boom on a trailer.



Risk of accidents due to the main boom falling down!

You may only switch on the boom floating position when the main boom is already set down on the trailer.

In this way, you prevent the raised main boom from falling down.



- Remove the padlock (2).
- Switch the valve I over – and position the lever (1) vertically, moving it either upwards or downwards depending on its fitting position.
- Secure the lever (1) with the padlock (2).
- Switch the valve IV over – lever (1) positioned outwards.

The boom floating position is now switched on.

Switching off

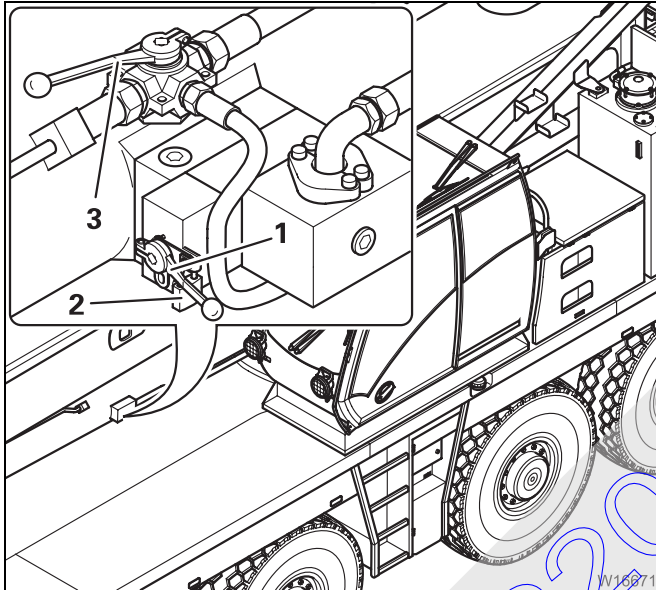
You must switch off the boom floating position before you raise the main boom off the trailer.



Risk of accidents due to the main boom falling down!

Always secure the lever with the padlock after switching off the boom floating position.

This prevents the raised main boom from falling down when actuating the lever.



- Remove the padlock (2).
- Switch the valve I over – lever (1) positioned horizontally pointing outwards or inwards, depending on its fitting position.
- Secure the lever (1) with the padlock (2).
- Switch the valve IV over – lever (1) positioned to the front.

The boom floating position is now switched off.

1.2

Switching on the slewing gear freewheel

Switching on

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.

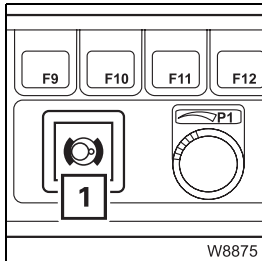
- If a houselock is fitted, switch it off.



Risk of accidents with the houselock 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 III►, S. 2.



Prerequisites

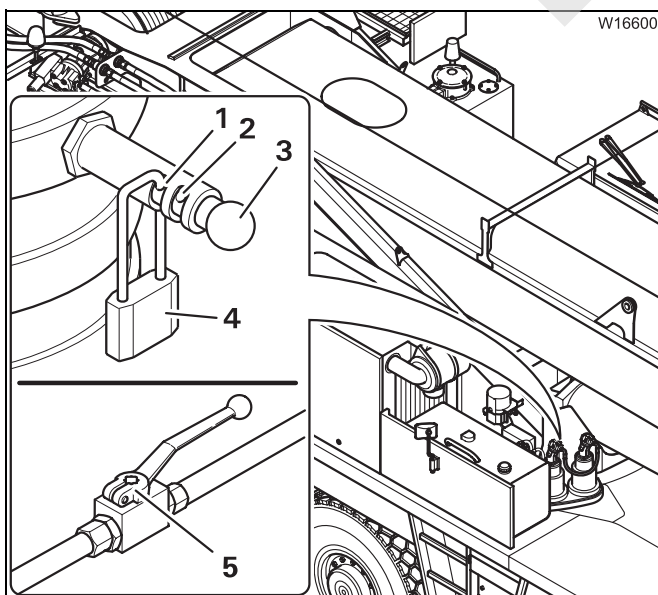
- The engine for crane operation is running.
- The slewing gear brake is released, the lamp (1) has gone out.



Risk of accidents if the bolts are not secured!

Always secure the bolts with the lock.

This prevents the slewing gear freewheel from being switched off unintentionally while driving.



- Remove the lock (4) from the bore (2).
- Push the pin (3) inward as far as it will go.
- Secure the pin with the lock in the bore (1) and remove the key.
- Push and secure the pin (3) at the other slewing gears in the same way.
- Open the wave (5) – the slewing gear freewheel is now switched on.

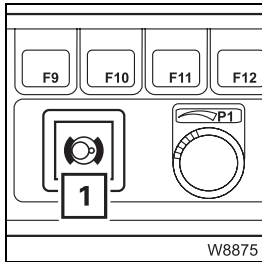
Switching off

If the slewing gear freewheel is switched on, switch it off prior to working with the crane.



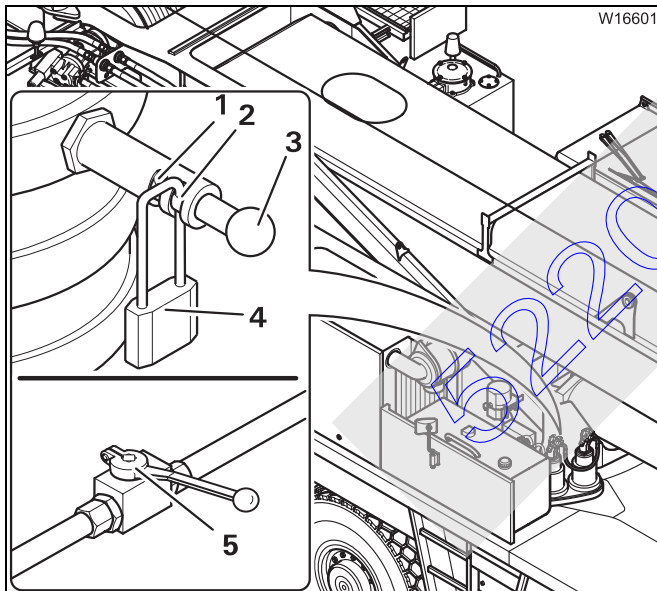
Risk of accidents with the slewing gear freewheel switched on!

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.



- Remove the lock (4) from the hole (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) at the other slewing gears in the same way.
- Close the wave (5) – the slewing gear free-wheel is now switched off.

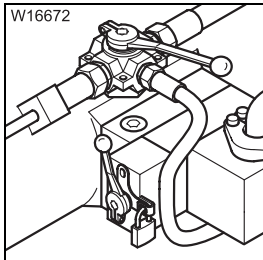
Before slewing


If necessary, support the truck crane, enter the corresponding SLI code and derrick the main boom to an angle permissible within the working range.

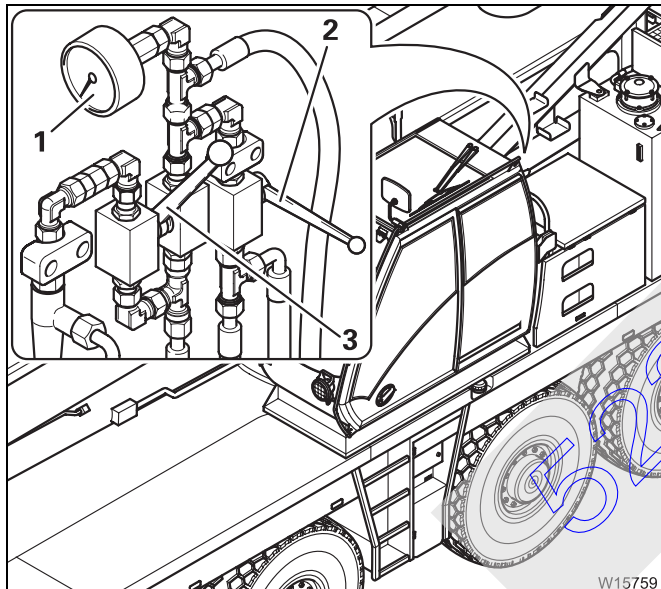
1.3 Switching on boom pre-tensioning

Switching on

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.



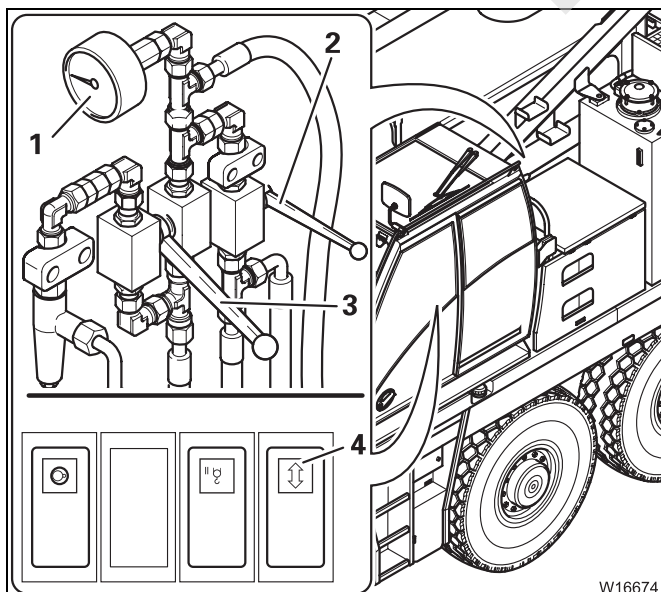
- Switch on the boom floating position; , S. 2.



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 the button (4) up.
The pressure accumulator is filled.
- Fill up the pressure accumulator until the pressure stops rising on the pressure gauge (1).
- Close the valve III – lever (3) points down.

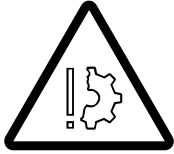
The valve II stays closed – lever (2) is horizontal.

Now the boom pre-tensioning is switched on.

Switching off

SYou must switch off the boom pre-tensioning before you raise the main boom off the trailer.

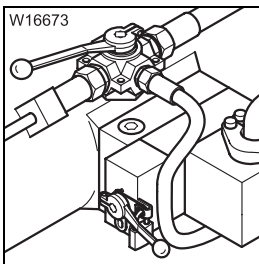
To switch off boom pre-tensioning, you must bring the valves I to IV into the required positions, which will empty the pressure accumulator.




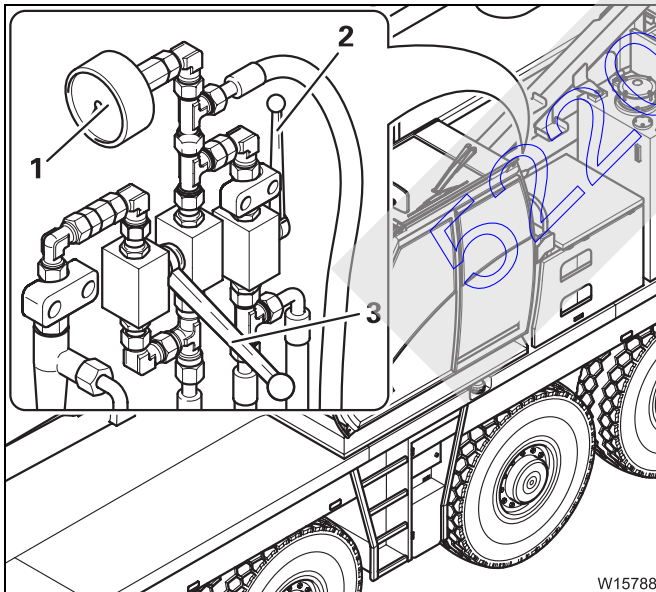
Danger of the hydraulic oil overheating

Always switch the valve IV over (lever in horizontal position) before operating the crane.

This prevents the pressure in the hydraulic circuit from rising and the hydraulic oil from exceeding the permissible temperature of 80 °C (176 °F).



- Switch off the boom floating position; , S. 3.



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 II stays closed – the lever (3) points downwards.

2 Pressure relief for removing the main boom

Contrary to the information given in the operating instructions supplied, additional valves must be actuated when switching the pressure relief on and off.

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

When removing the main boom

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

When installing the main boom

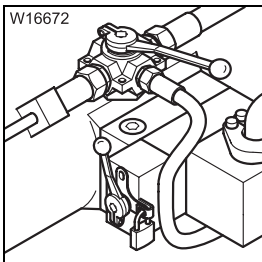
- Only switch off the pressure relief after fitting the derricking cylinder head axle.



Risk of accidents from falling boom!

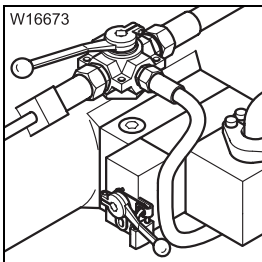
Check to see whether the main boom is in the boom rest before switching off the pressure relief.

In this way, you prevent the raised main boom from falling down.



Switching on

- Switch on the boom floating position; , S. 2.



Switching off

- Switch off the boom floating position; , S. 3.



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

Correction sheet

Fuses

Contrary to the information specified in the operating instructions two changes have been made to the fuses.

- When crane functions fail or are faulty, you must check additional fuses on the turntable.
- The amperage of a fuse in the driver's cab has changed.

On the turntable

The following table shows the designation, the amperage and the deviating function of individual fuses.

Designation	Amperage (A)	Function
F1/1	20	ESX0 control unit, I/O-3 circuit board
F2/1	2	Lifting limit switch

When crane functions fail or are faulty, check the following fuses additionally.

In case of malfunctions on the main hoist/auxiliary hoist

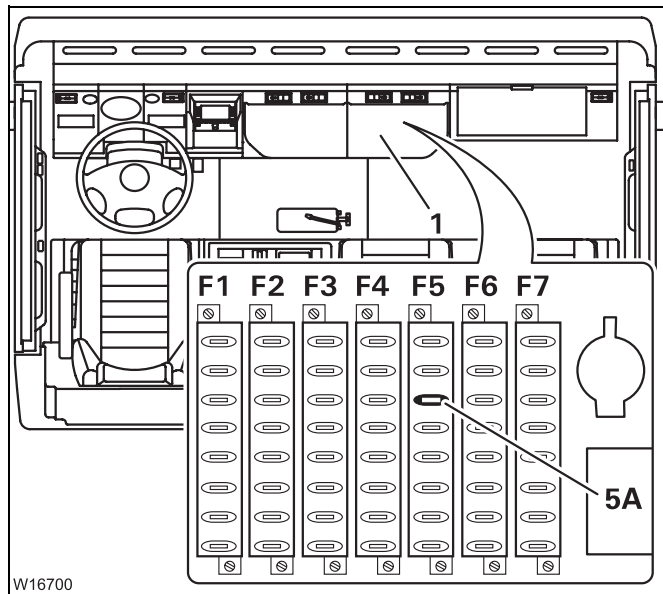
Malfunction	Cause	Remedy
Only the lowering function works	Fuses F3/3, F2/1 blown	Replace the blown fuse; ▣▣▣▣► <i>Operating instructions</i>

In case of malfunctions on the derricking gear

Malfunction	Cause	Remedy
Derricking function not working	Fuses F3/3, F2/1 blown	Replace the blown fuse; ▣▣▣▣► <i>Operating instructions</i>



In the driver's cab This section is valid only for truck cranes with a Mercedes engine.



Contrary to the information in the operating instructions, the amperage of the fuse F 5/3 is **5 amperes**.

If this fuse is blown, replace it only with a **5 ampere** fuse.



Risk of damage due to overheating!

If fuse F 5/3 in the driver's cab is blown, replace it only with a **5 ampere** fuse. This prevents damage to the electrical parts from overheating.

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Additional page Interruption during pressure build-up

Pressure accumulators are monitored in the steering circuit of the GMK 5220. If the pressure falls too far, the pressure accumulator will be automatically filled.

Since filling is treated as a priority, there can be short interruptions – for a maximum of approx. 10 seconds – in the operation of the

- level adjustment system and
- outriggers.



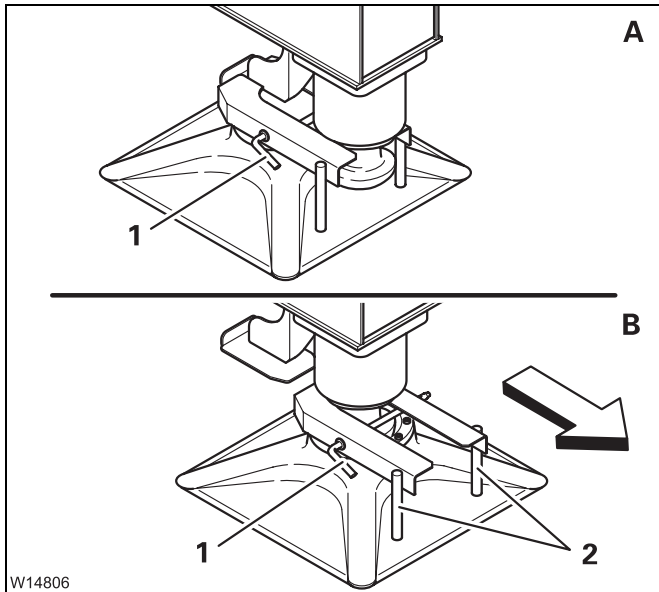
You can largely avoid these interruptions by not operating these functions at the same time as the steering.

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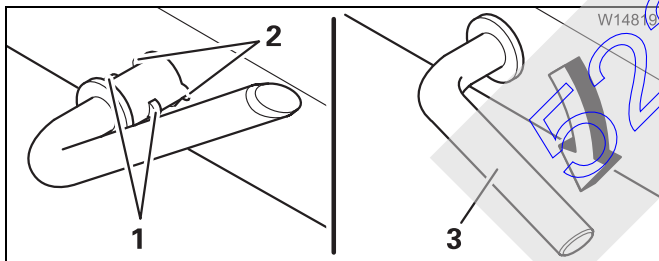
Additional page Rigging outrigger pads

Depending on the version you must rig the outrigger pad as is described here.



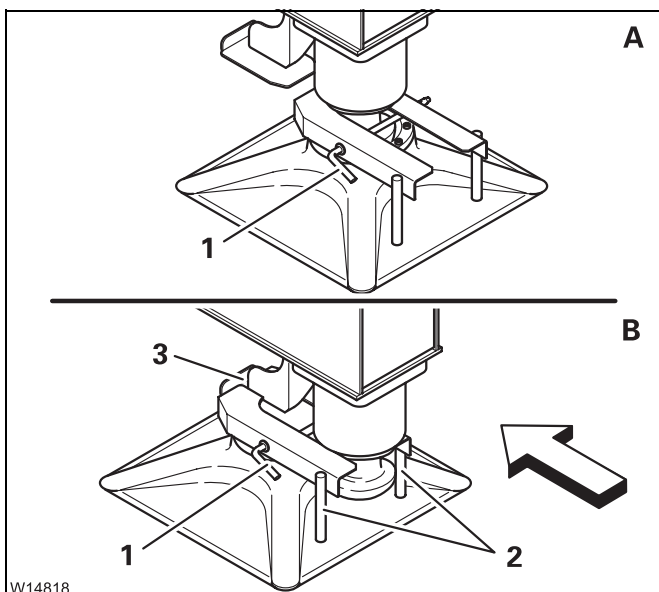
Moving them into working position

- (A) – Pull out the pin (1).
- (B) – Pull the outrigger pad outwards by the handles (2).
- Secure the outrigger pad with the pin (1).
- Secure the pin (1).
- Move the other outrigger pads into working position in the same way.



Secure the pin

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



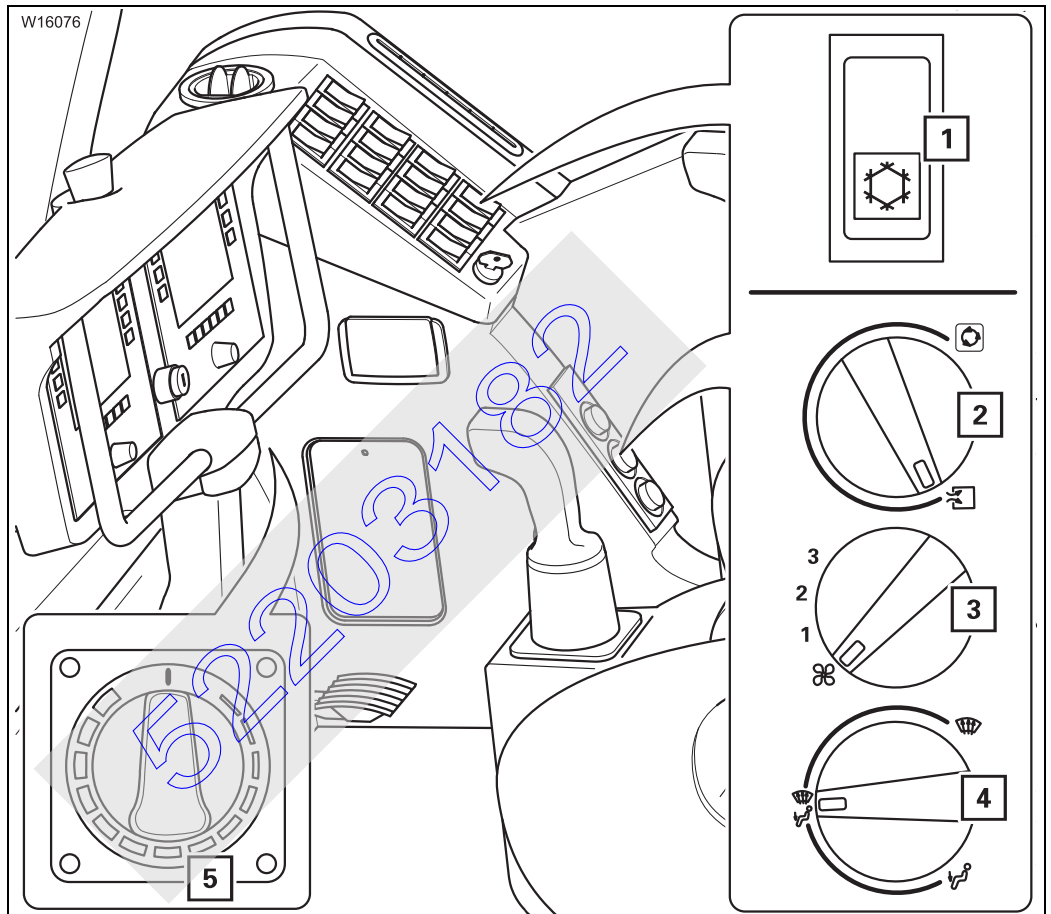
Moving them into driving position

- (A) – Pull out the pin (1).
- (B) – Push the outrigger pad by the handles (2) as far as possible onto the bracket (3).
- Secure the outrigger pad with the pin (1).
- Secure the pin (1).
- Move the other outrigger pads into driving position in the same way.

Additional page Controls for crane cabin heating

Differing slightly from the details in the operating instructions, depending on the version, the position and function of the controls may change. This additional page shows you the changed position of the controls.

Position of controls

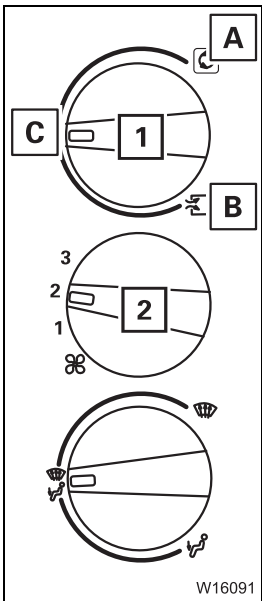


		Function
1	Air-conditioning system ¹⁾	Operating instructions
2	Setting fresh air/recirculated air/mixed air	Function, p. 2
3	Setting the fan	Function, p. 2
4	Air distribution	Function, p. 2
5	Setting the temperature	Operating instructions

¹⁾ Additional equipment



Function



Setting fresh air/recirculated air/mixed air

You can set the air to be sucked in by the fan.

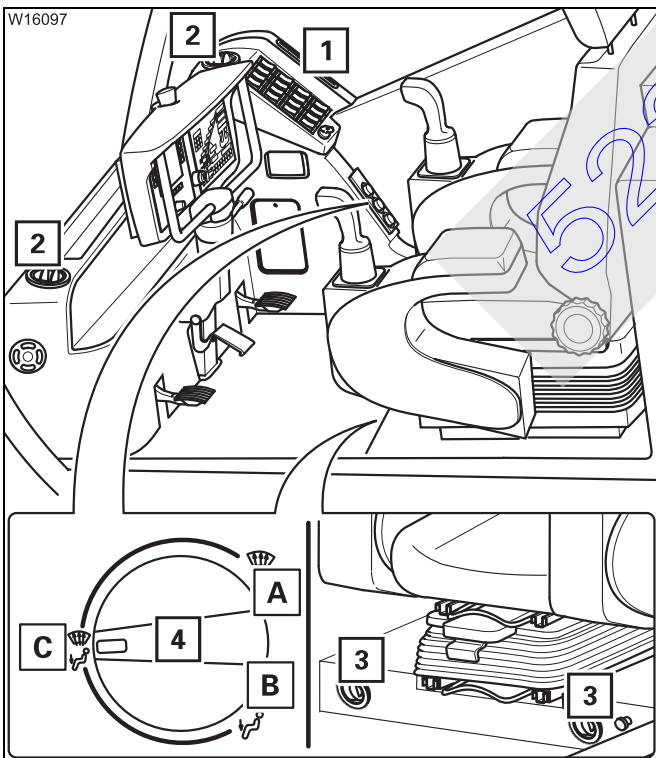
- Turn the switch (1) to the position for
 - A** Recirculated air – air is sucked in from the driver's cab. Change to fresh air often to ensure that oxygen is supplied.
 - B** Fresh air – outer air is sucked in.
 - C** Mixed air – outer air and air from the driver's cab is sucked in. The percentage of the corresponding air type is increased continuously by turning the switch in direction (B) or (A).

Setting the fan

- Turn the switch (2) to the required level 1 to 3 depending on the desired air quantity.

Air distribution

You can allow the air to flow out from various air vents.

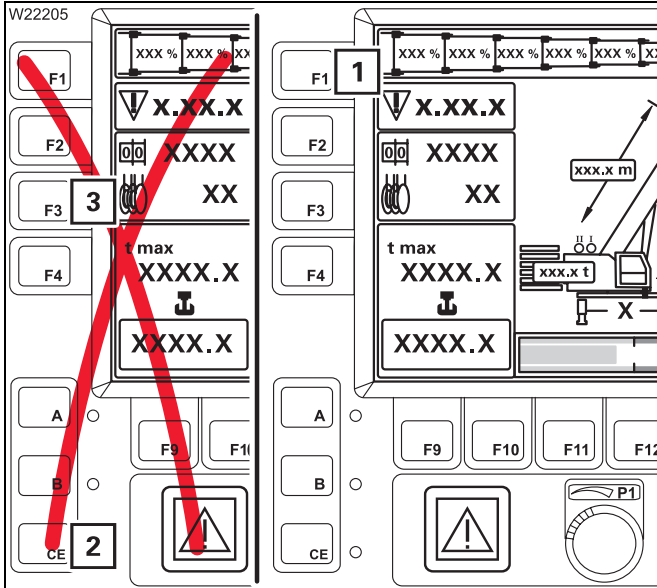


- Turn the switch (4) to the position for the required air vents.

- A** Air vents (1), (2), windscreen, centre
- B** Air vents (3), cab floor
- C** Air vents (1), (2), (3)

Correction sheet

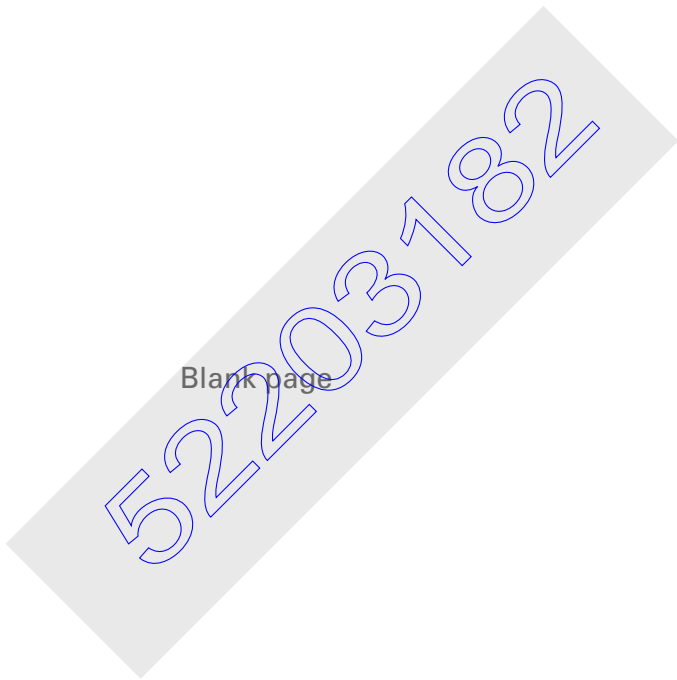
Accepting the telescope status



Contrary to the information in the operating manual provided, in the event of a malfunction on the RCL (Table – Error codes) the ECOS telescope diagram is not accepted using the buttons (2) and (3).

Accepting the ECOS telescope diagram

- Press the button (1) once.
- Acknowledge the error message.



These operating instructions are divided into two parts:

Part 1 – Driving

Part 2 – Crane Operation

Part 1 consists of the following chapters:

- 1 Overview**
- 2 Basic safety instructions**
- 3 Operating elements when driving**
- 4 Starting/turning off the engine for driving**
- 5 Driving**
- 6 Hinweise und Rsten fr die Straenfahrt**
- 7 Malfunctions in driving mode**
- 8 Technical information on the carrier**
- 9 Index**

You will find chapter 10 to chapter 17 in section 2 – Crane operation.

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1 Overview

1.1 Identification 1 - 1

1.2 EC Declaration of Conformity..... 1 - 5

1.3 Documentation supplied..... 1 - 6

1.4 Information about the operating instructions 1 - 7

1.4.1 What do the symbols used mean? 1 - 7

1.4.2 How are the operating instructions structured? 1 - 9

1.4.3 How do I find the information I need? 1 - 11

1.4.4 What information is available for operations planning? 1 - 14

1.5 Conversion table for US measurements..... 1 - 15



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1

Overview

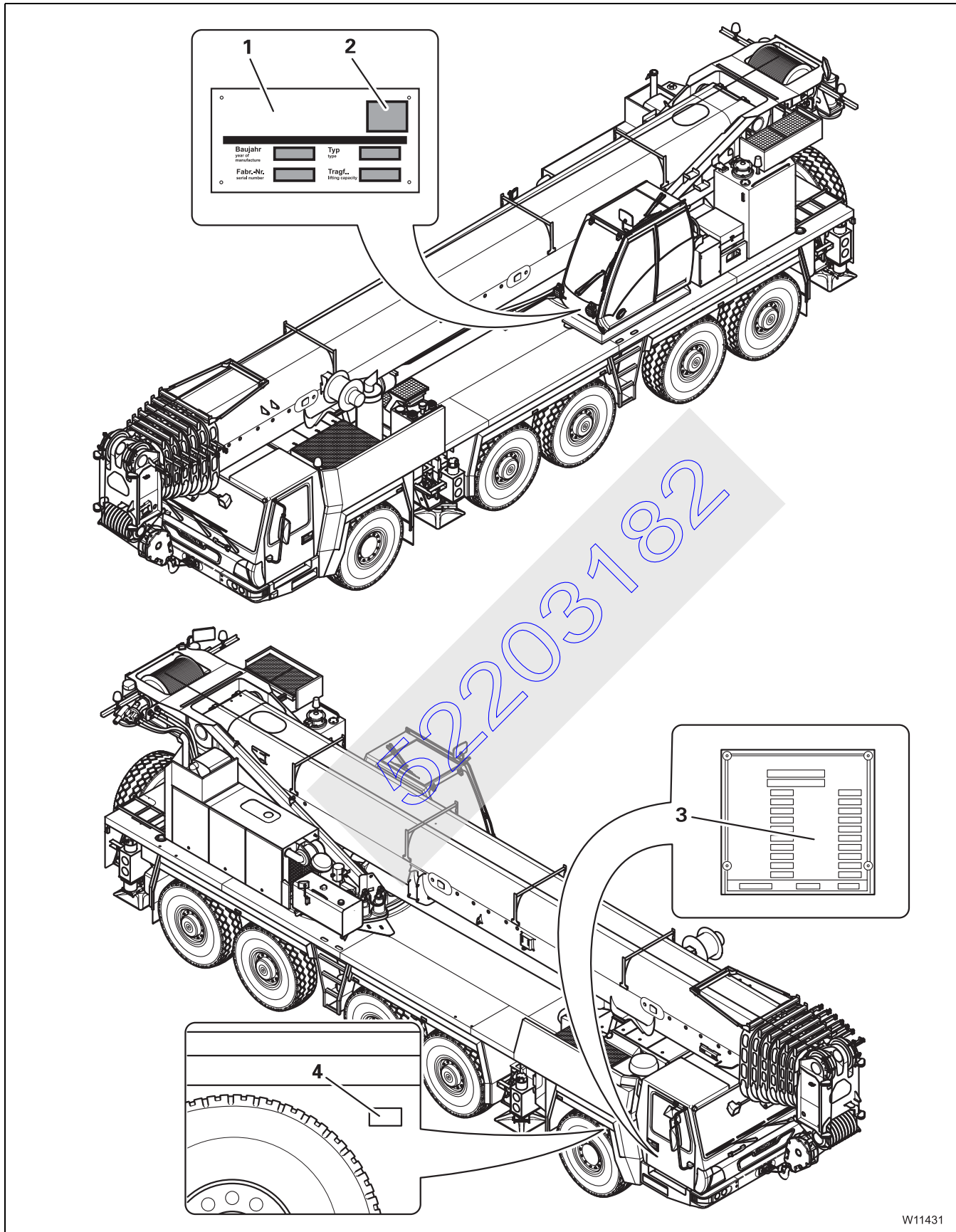
1.1

Identification

These operating instructions are intended only for the truck crane with the serial number specified on the cover.



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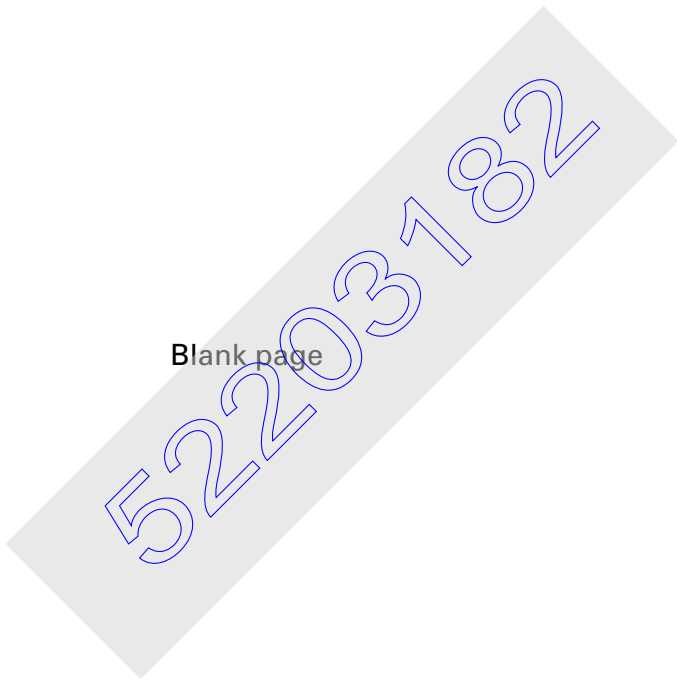


The following plates and numbers are attached to the mobile crane for identification purposes:

- 1** The name plate for the superstructure, with the serial number and crane type
- 2** The CE mark, only with truck cranes that are delivered to member countries of the EU
- 3** The chassis name plate, on the console of the passenger seat with the chassis number, the crane and the closing number for the ignition lock and the doors of the driver's cab
- 4** 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 specific operating instructions supplied.

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1.2

EC Declaration of Conformity

Operators of truck cranes which are delivered to EU member countries receive a declaration of conformity as a supplement to the delivery protocol. An example of the declaration of conformity is illustrated below.

GROVE

Deutsche GROVE GmbH
 Manitowoc Crane Group

EU-Konformitätserklärung

Hierby erkläre ich, dass die nachfolgend benannte Maschine aufgrund ihrer Konfiguration und Ausstattung in der von uns in Verkehr gebrachten Ausführung den einschlägigen grundlegenden Sicherheits- und Gesundheitsanforderungen der nachfolgenden EU-Richtlinien entspricht. Bei einer Modifikation oder anderen Änderung der Maschine verliert diese Erklärung ihre Gültigkeit.

- 1) Maschinenrichtlinie 2006/42/EG und Anhänge
- 2) Niederspannungsrichtlinie 2006/95/EG und Anhänge
- 3) Geräuterichtlinie 2000/14/EG (Beratungsgremium nach Anhang VI)

Bezeichnung der Maschine: **EM 100**

Hersteller: **Deutsche GROVE GmbH**

Typ: **GMK 5220**

Fabrik-Nr.: **42000000000000000000**

Fabrikations-Nr.: **10000000000000000000**

Stichtag: **2007**

Modelltyp: **GMK 5220 LA 200 (Antriebsleistung: 610 kW bei 1000 min⁻¹)**

Zusätzliche Informationen:

EM 100-200 p/7

EM 100-200 p/7 (Antriebsleistung für diese Ausführung: 610 kW bei 1000 min⁻¹)

Anwendungsspezifische Normen, insbesondere: **EN 280-4; EN 280-5; EN 280-6; EN 280-7**

Anwendungsspezifischer Normenbereich: **EN 280**

Normen für die Prüfung von Vorrichtungen: **EN 771, EN 772, EN 773**

Normen für die Prüfung von Vorrichtungen: **EN 10000 Teil 1-4, EN 10000 Teil 2, EN 10000 3**

Stichtag: **Waldkirch, ...**

Hersteller-Unterschrift: _____

Angaben zum Unternehmen: **Gebrüder Heilmann**

Leiter Name: _____

Gebrüder Heilmann

Leiter Unterschrift: _____

Fernschreiben:

- Ausführung der- oder Maschinenrichtlinie: **- Original für Deutsche GROVE GmbH**

- Ausführung des Vorzeichens: **- Nach dem Kunden**

- Rückverfolgbarkeit der Maschinenrichtlinie: **Deutsche GROVE Ausführung GM 4170 0201**

Gebrüder Heilmann, Waldkirch, Waldkirch 11, 76227, Waldkirch, Waldkirch 11, 76227

Typ der Maschine: Hersteller- oder Kundennummer: GM 4170 0201-020 020 020 angegeben am 09.01.2007

Die Maße der weiteren angegebenen Normen sind keine. Qualitätsnorm der Waldkirch 0 010 010 010

Deutsche GROVE GmbH

Waldkirch 11

76227 Waldkirch

Germany

Vertrieb in Deutschland

Gebrüder Heilmann

Waldkirch 11

76227 Waldkirch

Germany

Vertrieb in Österreich

Gebrüder Heilmann

Waldkirch 11

76227 Waldkirch

Germany

A Company

31.01.2007

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1.3

Documentation supplied

The precise number of the documents supplied depends on how the truck crane is rigged. The following documents are included in delivery:

– **Operating instructions**

Contain information on driving and crane operation.

– **Lattice extension operating instructions**

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

– **Operating instructions for additional equipment**

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

– **Documents from other manufacturers**

Original documentation for parts which are not manufactured by GROVE in Germany, such as the engine and central lubrication system, as well as the tachograph, auxiliary heaters, radio and, when appropriate, other additional equipment.

– **Maintenance manual**

Contains information on maintenance work alone, and contains no repair work instructions.

– **Safety manual**

Provides information on the safe operation of the truck crane.

– **Circuit diagrams**

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

– **Lifting capacity table**

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

– **Outrigger pressure table**

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

– **Spare parts list and list with the standard and traded parts**

For the procurement of spare parts.

1.4

Information about the operating instructions

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

These operating instructions are designed as a reference manual. They provide either a brief or a detailed explanation to the crane driver, based on their prior knowledge, of the individual operating steps and procedures.

1.4.1

What do the symbols used mean?

The following definitions and symbols are used in the operating instructions and in the maintenance instructions to highlight particularly important information:

The vertical line to the left of the warning text indicates that this text, regardless of its length, relates to the warning symbol.

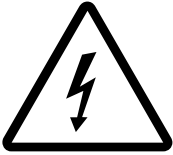


This symbol indicates hazards related to the described operation, which can endanger persons. The type of danger (e.g. danger to life, risk of injury or danger of being crushed) usually precedes the warning.





This symbol indicates dangers which put objects at risk, 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 electrocution.



This symbol reminds 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, Safety and environmental protection* chapter.



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



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

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

1.4.2

How are the operating instructions structured?

Division

The operating instructions are divided into two parts.

- **Part 1** with chapters **1** to **9** contains a description of how to drive the truck crane.
- **Part 2** with chapters **10** to **17** contains a description of the crane operation.

One part on its own does not constitute a complete set of operating instructions; both parts must be included with the truck crane.

The basic safety instructions, including for the crane operation, are included in **chapter 2** only. Please be aware of these safety instructions and observe them.

Structure of the chapters

Chapters **3** and **10** are structured in relation to the product, and give an overview of all operating elements on the truck crane. You will find cross-references to the related brief descriptions, and from there, to further chapters.

Chapters **4** to **7** and **11** to **15** describe procedures, and are therefore structured in relation to these operations. For more extensive processes, the description is given with **checklists** and **operation instructions**.

- The checklists show the procedure in the necessary sequence, e.g. during 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 complete description of a rigging procedure.

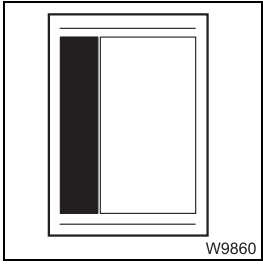
It is only safe to operate the truck crane by referring to the checklists when you are familiar with all the dangers which may occur, and are confident in completing the necessary steps as described in the relevant operation instructions.

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



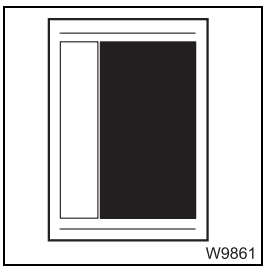
Structure of the pages

Each page of the operating instructions consists of a wide text column and a narrow column.



The **narrow column** contains different 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**:

- Where sentences are preceded by a hyphen (as in this section, for example) are lists.
- Where sentences are preceded by a full stop, you will be required to take concrete action, e.g.
 - switch the transmission into neutral position **N**.
- The following text passages are highlighted in italics:
 - Designations of operating elements and switching states, such as *auto-*
matic or *manual*.
 - Heading of sections to which a reference is made.
 - The names of other documents to which a reference is made.

1.4.3

How do I find the information I need?

The operating instructions contain the following guides for orientation.

- The **contents** at the front in sections 1 and 2 list all the chapters in the section.
- The **table of contents** before each chapter provide an overview of the topics it contains.
- The **index** in chapters 9 and 17 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 (III▶) and refer to other pages in the operating instructions. These pages contain more detailed information, or information which is related to the topic in question. Furthermore, you can use the cross-references to systematically familiarize yourself with specific information on the truck crane or look up functions of individual elements.

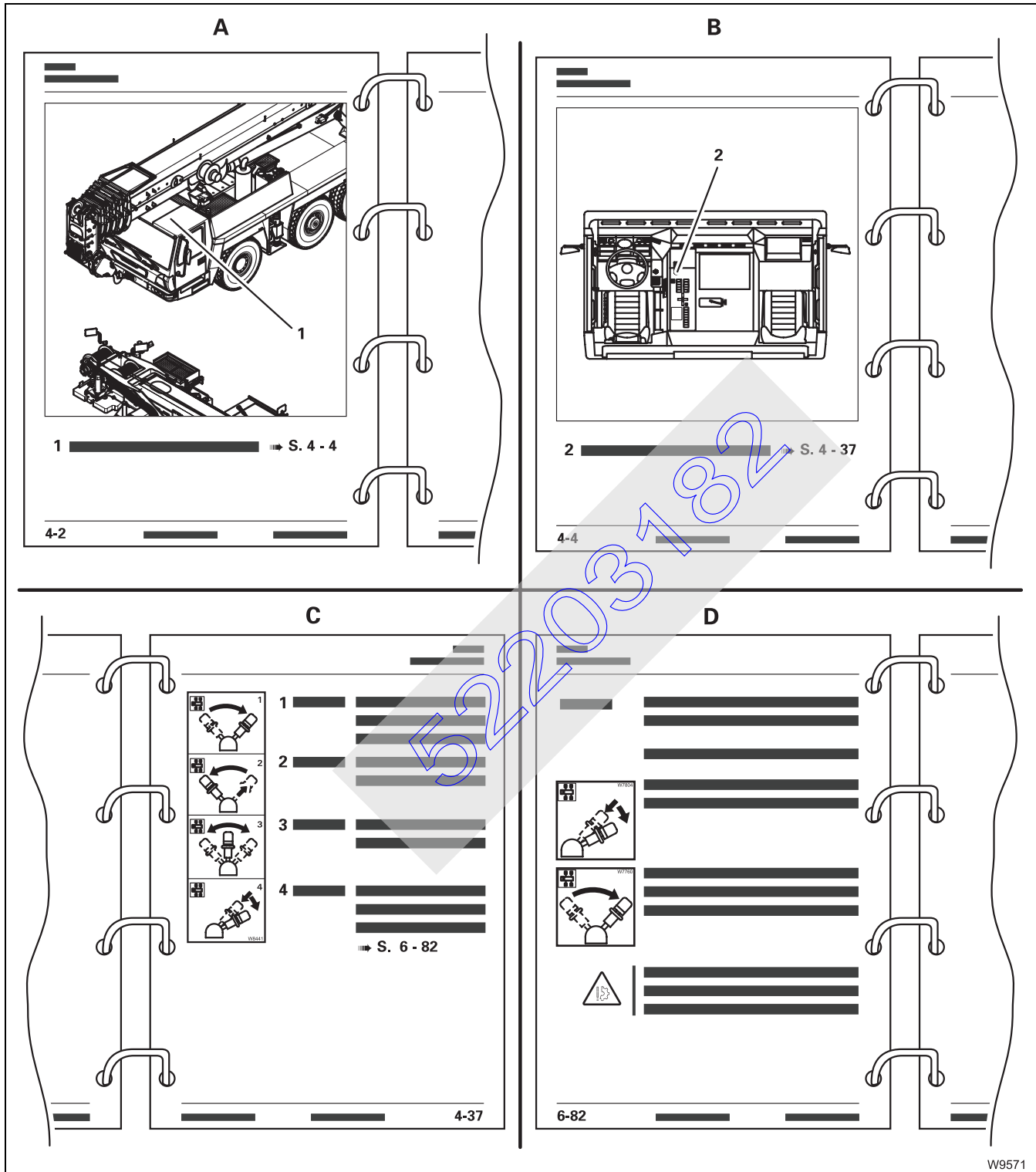
The following pages give an example of how to use the cross-references.



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Cross-references example

All illustrations and texts in this section are only an example, and may deviate from the conditions on your truck crane.



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

- A** In this example, the general overview is shown on page 4 - 2.
The driver's cab is labelled as number **1**. The related table contains a cross-reference in the form
- 1 Driver's cab** ▣▣▣▣▶ p. 4 - 4
- B** Page 4 - 4 shows a top view of the driver's cab.
The parking brake lever is labelled as number **2**. The related table contains a cross-reference in the form
- 2 Parking brake lever** ▣▣▣▣▶ p. 4 - 37
- C** Page 4 - 37 gives a brief description of all functions of the parking brake lever.
If further information is available, the brief description contains a cross-reference, e.g.
- 4 Test position for towing a trailer:**
- Pull the parking brake lever back until it locks into place
 - Press in the parking brake lever and pull it further backwards
- The parking brake for the trailer is released;
▣▣▣▣▶ p. 6 - 82.
- D** Follow the cross-reference on page 6 - 82. Here, the test position of the parking brake when towing a trailer is described in detail, with all the preliminary requirements and safety instructions.
If appropriate, there are additional cross-references here, such as to related pages in chapter *Malfunctions*.
-

1.4.4

What information is available for operations planning?

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

The operating instructions contain

- Measurements and weights of the truck crane; ■■■▶ p. 8 - 2, ■■■▶ p. 16 - 2,
- Driving modes permitted on public roads; ■■■▶ p. 6 - 1,
- Dimensions and weights of equipment that can be removed; ■■■▶ p. 8 - 4, ■■■▶ p. 16 - 2,
- Dimensions and turning circle radiuses for manoeuvring; ■■■▶ p. 8 - 8,
- The permitted outrigger spans; ■■■▶ p. 13 - 30,
- Size of the outrigger pads; ■■■▶ p. 8 - 7.

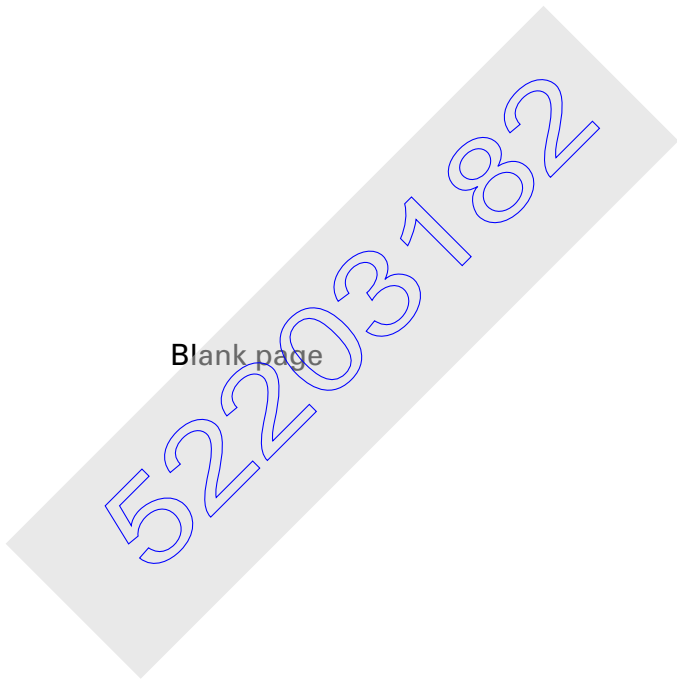
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1.5

Conversion table for US measurements

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

Converting from	to	Multiply by
mm	to	0.03937
to	mm	25.4
m	ft	3.28084
ft	m	0.30479
m ²	ft ²	10.76391
cm ²	in ²	0.155
cm ³	in ³	0.061
l	gal (US)	0.264178
kg	lbs	2.204622
lbs	kg	0.45359
t	lbs	2204.622
lbs	t	0.0004536
kN	lbf	224.809
daN/cm ²	lbf/in ²	14.50378
lbf/in ²	daN/cm ²	0.06895
bar	psi	14.50378
psi	bar	0.06895
m/s	ft/s	3.28084
km/h or km	mph or mi	0.62137
mph or mi	km/h or km	1.60935
Nm	lbf ft	0.7375
°C	°F	1.8 x °C+32
°F	°C	(°F-32) / 1.8
t/m ²	lbs/ft ²	204.8
m ² /t	ft ² /lbs	0,04882



2 Basic safety instructions

2.1	Intended use	2 - 1
2.1.1	Improper use	2 - 2
2.2	Organisational measures	2 - 3
2.3	Personnel qualification	2 - 5
2.4	Safety instructions for driving the truck crane	2 - 6
2.5	Safety instructions for crane operation	2 - 7


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2

Basic safety instructions



Information on the warnings to be used;  *What do the symbols used mean?*, p. 1 - 7.

2.1


Intended use

The GMK 5220 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.

Modifications may only be made to the truck crane following the approval of Deutsche GROVE GmbH.

The GMK 5220 truck crane may only be used in a perfect technical condition as intended and with due attention paid to safe operation and possible hazards.

Any malfunctions that could impair safety must be eliminated immediately.

The GMK 5220 truck crane may only be operated without the corresponding special equipment within the permitted temperature range;  *Technical information on the carrier*, p. 8 - 1.

The GMK 5220 truck crane is designed solely for lifting loads which are within the permitted GMK 5220 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 entails

- Observing the entire crane documentation, consisting of the operating instructions, the lifting capacity table, the outrigger pressure table and the safety manual
- Adhering to the inspection and maintenance requirements specified in the maintenance manual



The GMK 5220 may only be operated with parts of equipment which are permitted by Deutsche GROVE GmbH, and which are labelled with the serial number of the GMK 5220.

The manufacturer is not liable for any damage caused by improper or unauthorized use of the GMK 5220 truck crane. The user alone bears the risk.

2.1.1

Improper use

Deutsche GROVE GmbH is not liable for any damage caused by improper or unauthorized use of the GMK 5220 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, beams or outrigger cylinders
- Pushing or pulling loads or lifting them off the ground using the slewing gear, derricking gear or telescoping mechanism
- Pulling off fixed objects with the crane
- Two-hook operation with the boom extension and two-hook operation on the main boom head without additional equipment
- Setting SLI codes that do not correspond to the actual rigging mode
- Working with an overridden SLI or overridden lifting limit switch
- After SLI deactivation, increasing the radius by pulling the raised load at an angle (e.g. with a chain hoist)
- Misuse of the outrigger pressure indicator as a safety function to prevent the crane from overturning after an SLI shutdown (outrigger pressure higher than 0 t)
- On-road driving in an unauthorised driving mode (axle load, dimension)
- Moving the rigged crane in an unauthorized driving mode
- Using parts of equipment that are not authorised 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 sufficiently long break
- Usage for any kind of sport or recreational activities, especially for “bungee” jumping

2.2

Organisational measures

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

In addition to the operating instructions and the lifting capacity table, observe all general, statutory and otherwise applicable regulations concerning accident prevention and environmental protection. You must read and understand them and behave accordingly.

They could include:

- How to deal with hazardous materials
- Wearing personal protective equipment
- Traffic regulations
- All applicable regulations concerning the operation of a crane

Make sure those persons appointed to work on the truck crane are provided with the information required for their work before beginning with work. Instruct your personnel (e.g. banksmen, slingers, rigging personnel) accordingly.

Make sure the maintenance personnel have the necessary expertise to operate the crane safely. Make sure the maintenance personnel have access to the operating instructions.

Only trained or instructed personnel may carry out any work on the truck crane.

The responsibilities regarding the operation of the crane and rigging, maintenance and repair work must be clearly defined.



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

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

Use your personal protective gear whenever necessary or prescribed.

Observe all safety instructions and warnings on the truck crane.

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

Observe the operational organisation on the site. Report your arrival to the 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.

Observe 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 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 SLI).

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 permission of Deutsche GROVE GmbH.

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

Make sure both the prescribed intervals and the intervals specified in the operating and maintenance instructions for regular tests, inspections 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 service equipment is absolutely necessary in order to carry out maintenance work.

Observe the national regulations that apply to transport when loading the truck crane. Also observe the prescribed safety measures of the carrier (e.g. 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 qualification

These operating instructions are not a training manual for prospective crane operators.

All descriptions are written explicitly for crane operators who have been trained to operate truck cranes.

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

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

As 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 on working with cranes and any 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 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 regulations) must be clearly defined. You must be in a position to refuse to carry out any instructions given to you by third parties that violate 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.

Deutsche GROVE GmbH conducts general and type-related crane operator courses and technical courses.

2.4

Safety instructions for driving the truck crane

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

Check that all covers and safety devices are fitted properly and that they are in a 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.

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

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

Secure the truck crane after driving against unauthorized use.

2.5

Safety instructions for crane operation

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

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

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

Check the safety devices (SL, lifting limit switch, dead man's switch, emergency stop switches) every day before beginning with work.

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

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

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

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



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

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

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

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

Always level the truck crane before operating the crane.

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

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

Set the load down whenever you interrupt work and never leave the truck crane as long as a load is raised.

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

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

3 Operating elements when driving

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3.1.4	ECOS control unit	3 - 14
3.1.5	ECOS display – main menu	3 - 16
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3.2.19	Front flap	3 - 67

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3

Operating elements when driving

All operating elements for crane operation are described in chapter 10.

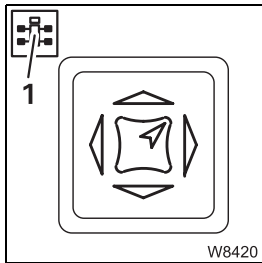
3.1

Overview of the operating elements

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



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

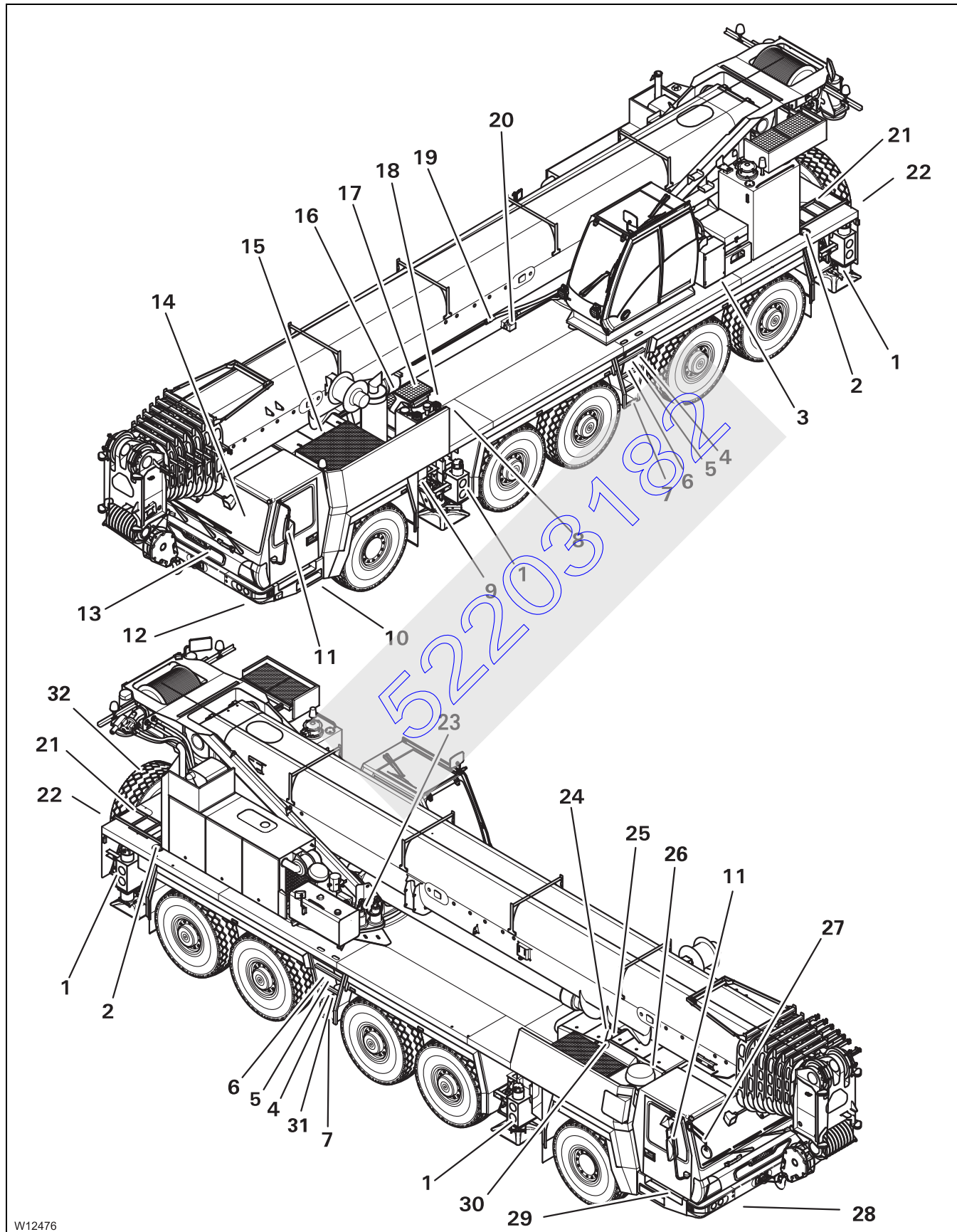


Some figures show details from a different perspective than the total view. The perspective is indicated by the symbol (1).

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3.1.1

On the outside of the truck crane



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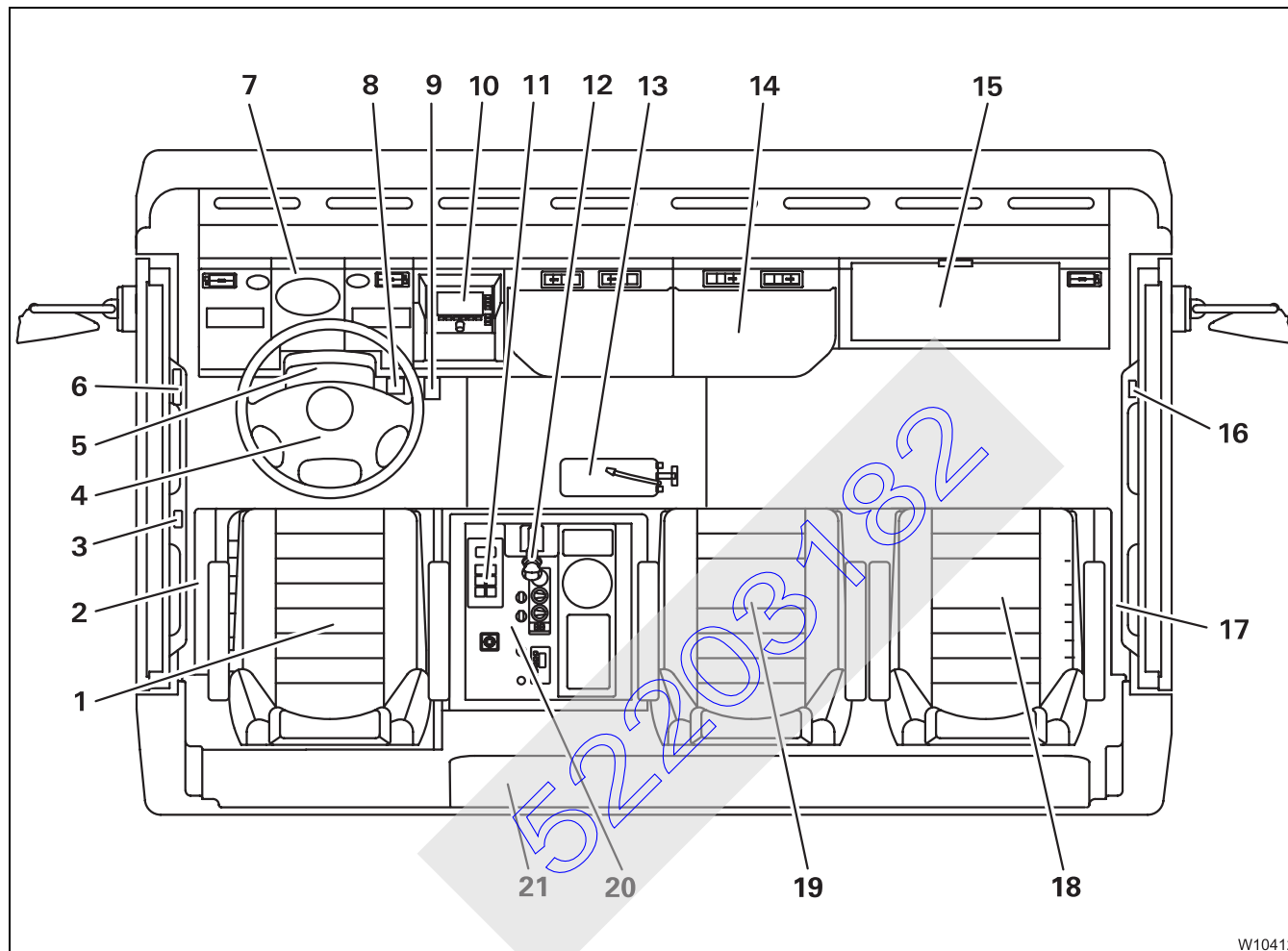
1	Outriggers, operation	▶▶▶▶ p. 13 - 27
	Lighting, outriggers ¹⁾ ,	▶▶▶▶ p. 3 - 59
	Removing/installing	▶▶▶▶ p. 6 - 33
2	Filler neck, fuel tank	▶▶▶▶ p. 4 - 7
3	Driving lights for the superstructure on/off ¹⁾	▶▶▶▶ p. 6 - 8
4	Control units, outriggers ¹⁾	▶▶▶▶ p. 3 - 31
5	Emergency stop switch	▶▶▶▶ p. 4 - 22
6	Connections for hand-held control	▶▶▶▶ p. 3 - 30
7	Access ladder to the superstructure	▶▶▶▶ p. 4 - 4
8	Hydraulic oil tank, inspection glass ²⁾	
9	Battery master switch	▶▶▶▶ p. 4 - 9
10	Filler connection for the compressed air system	▶▶▶▶ p. 7 - 6
	Tyre inflator connection	▶▶▶▶ p. 7 - 13
11	Wing mirror	▶▶▶▶ p. 5 - 9
12	Warning signs for vehicle width	▶▶▶▶ p. 5 - 7
13	Front flap	▶▶▶▶ p. 3 - 67
14	Driver's cab	▶▶▶▶ p. 3 - 4
15	Dipstick, engine ²⁾	
16	Valve on hydraulic tank	▶▶▶▶ p. 4 - 8
17	Hydraulic oil cooler, second cooler ¹⁾	
18	Connections for hydraulic emergency operation ¹⁾	▶▶▶▶ p. 15 - 59
19	Boom pre-tensioning ¹⁾	▶▶▶▶ p. 6 - 6
20	Boom floating position ¹⁾	▶▶▶▶ p. 6 - 5
21	Ladder	▶▶▶▶ p. 4 - 5
22	Wheel chocks	▶▶▶▶ p. 5 - 49
23	Slewing gear freewheel ¹⁾	▶▶▶▶ p. 6 - 3
24	Engine	▶▶▶▶ p. 4 - 1
25	Oil filler neck, engine ²⁾	
26	Air intake inhibitor ¹⁾	▶▶▶▶ p. 4 - 23
27	Mirror setting ¹⁾	▶▶▶▶ p. 5 - 8
28	Extendable ladder	▶▶▶▶ p. 4 - 6
29	Windscreen washing system reservoir	▶▶▶▶ p. 5 - 7
30	Coolant reservoir, engine ²⁾	
31	Grease container, central lubrication system ²⁾	
32	Spare wheel ¹⁾	▶▶▶▶ p. 7 - 9

1) Additional equipment

2) ▶▶▶▶ *Maintenance Manual*

3.1.2 In the driver's cab

Top view of driver's cab

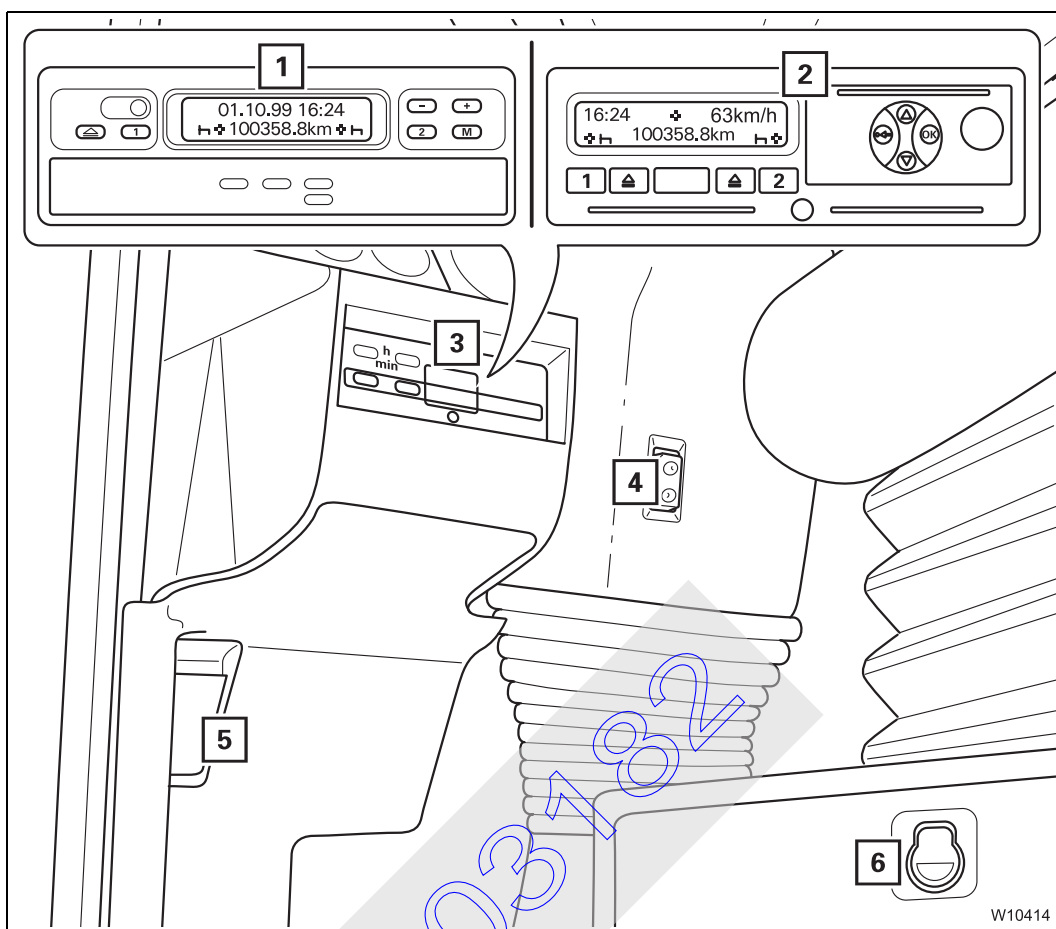


W10412

1	Driver's seat	▣▣▣▣▶ p. 5 - 12
2	Storage compartment	▣▣▣▣▶ p. 3 - 6
3	Separate steering	▣▣▣▣▶ p. 3 - 55
4	Steering wheel	▣▣▣▣▶ p. 3 - 29
5	Steering column	▣▣▣▣▶ p. 3 - 29
6	Window winder for driver/passenger door	▣▣▣▣▶ p. 3 - 65
7	Front instrument panel	▣▣▣▣▶ p. 3 - 9
8	Brake pedal	▣▣▣▣▶ p. 5 - 30
9	Accelerator	▣▣▣▣▶ p. 5 - 43
10	ECOS control unit	▣▣▣▣▶ p. 3 - 14
11	Transmission operating elements	▣▣▣▣▶ p. 3 - 28
12	Parking brake lever	▣▣▣▣▶ p. 3 - 51
13	Fire extinguisher ²⁾	
14	Operating elements behind the cover	▣▣▣▣▶ p. 3 - 8
15	Storage compartment	
16	Window winder, passenger door	▣▣▣▣▶ p. 3 - 65
17	Storage compartment	
18	Passenger's seat	▣▣▣▣▶ p. 5 - 13
19	Storage compartment or third seat ¹⁾	
20	Side instrument panel	▣▣▣▣▶ p. 3 - 24
21	Fold-up berth	▣▣▣▣▶ p. 5 - 51
1)	Additional equipment	
2)	▣▣▣▣▶ <i>Maintenance Manual</i>	



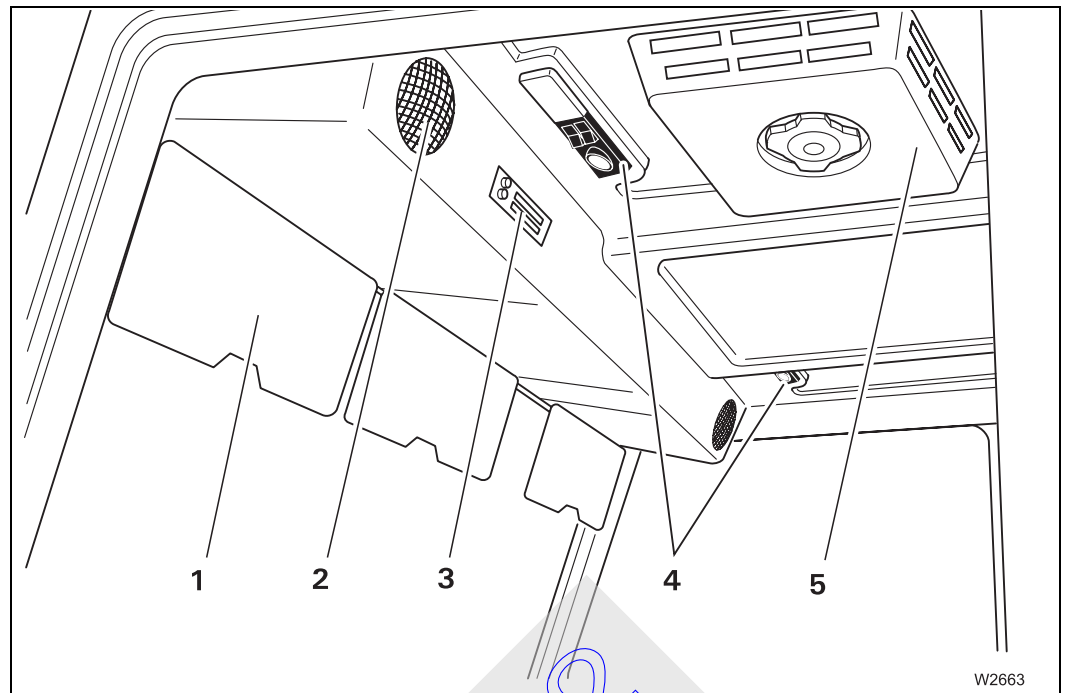
**Below in the
driver's cab**



- | | | |
|---|--|-----------------|
| 1 | Tachograph version 1 ¹⁾ | ▣▣▣▣ p. 3 - 10 |
| 2 | Tachograph version 2 ^{1), 2)} | ▣▣▣▣ p. 3 - 10 |
| 3 | Set the speedometer time | ▣▣▣▣ p. 3 - 63 |
| 4 | Unlock/lock the steering column | ▣▣▣▣ p. 5 - 14 |
| 5 | Unlock the front flap | ▣▣▣▣ p. 3 - 67 |
| 6 | Storage compartment (e.g. for hand-held control) | ▣▣▣▣ p. 13 - 21 |

- 1) Additional equipment
2) ▣▣▣▣ *Separate operating instructions*

**Above in the
driver's cab**



1 Sun visor

2 Loudspeaker¹⁾

3 Radio/cassette/CD^{1), 2)}

4 Cab lighting

▣▣▣ p. 3 - 59

5 Roof fan¹⁾

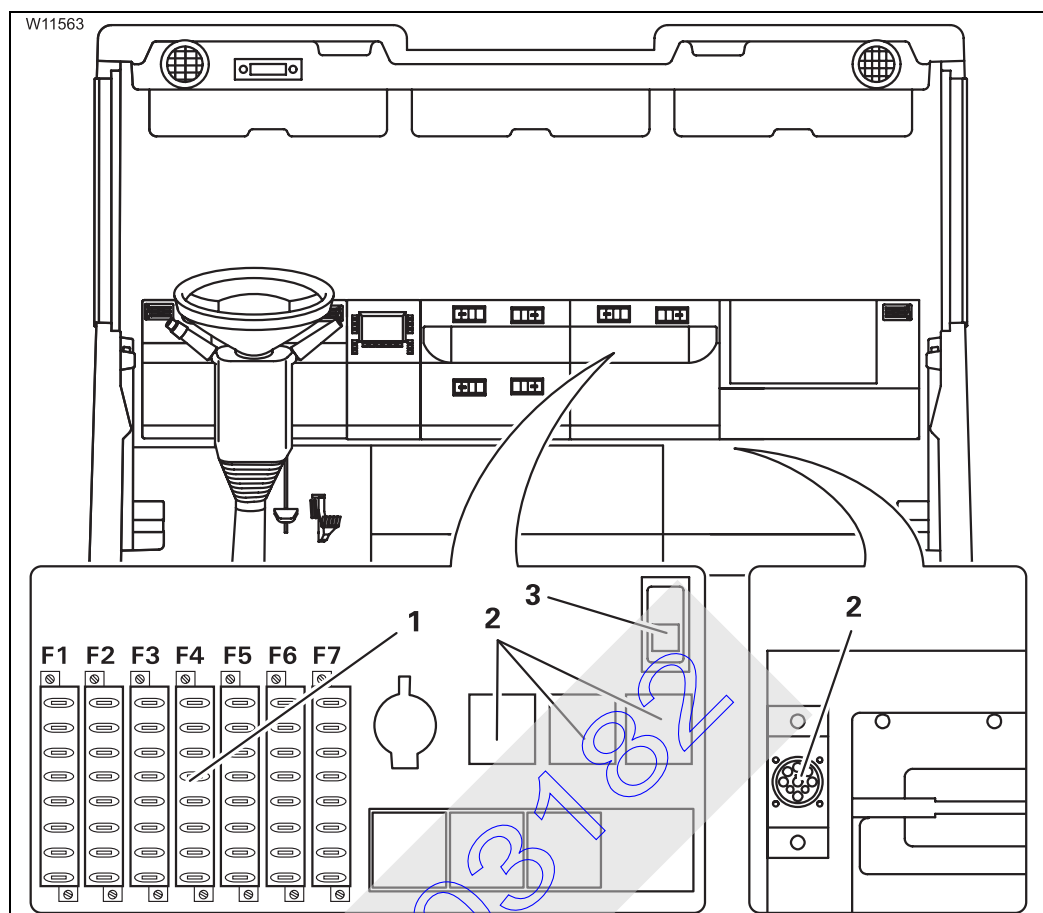
▣▣▣ p. 3 - 63

1) Additional equipment

2) ▣▣▣ Separate operating instructions



Behind the cover



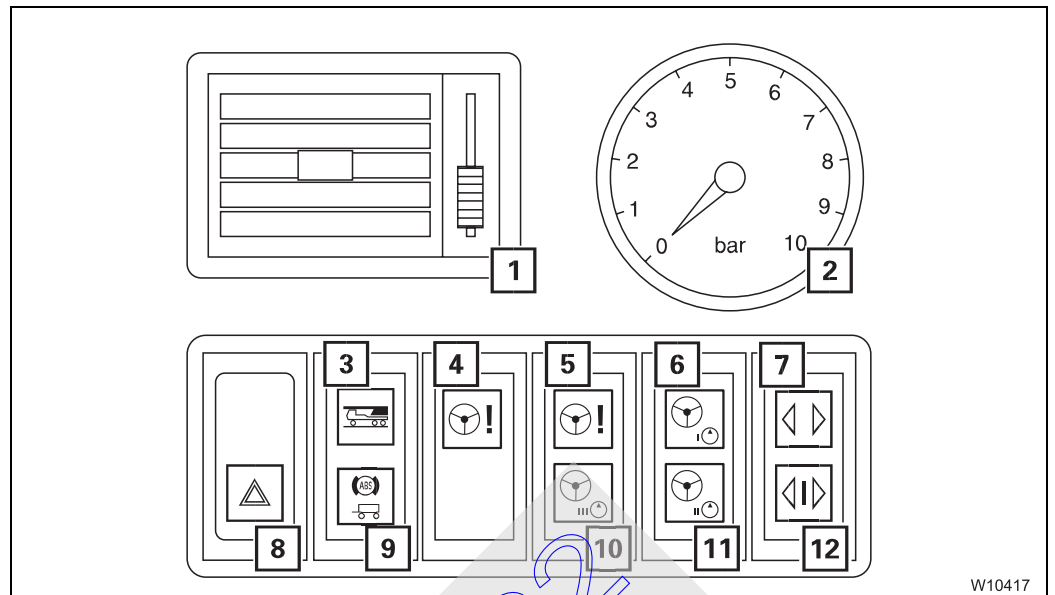
- 1 Fuses ➡ p. 7 - 15
- 2 Diagnostics ➡ p. 3 - 64
- 3 Hydraulic emergency operation on/off¹⁾ ➡ p. 15 - 65

1) Additional equipment

3.1.3

Front instrument panel

Left



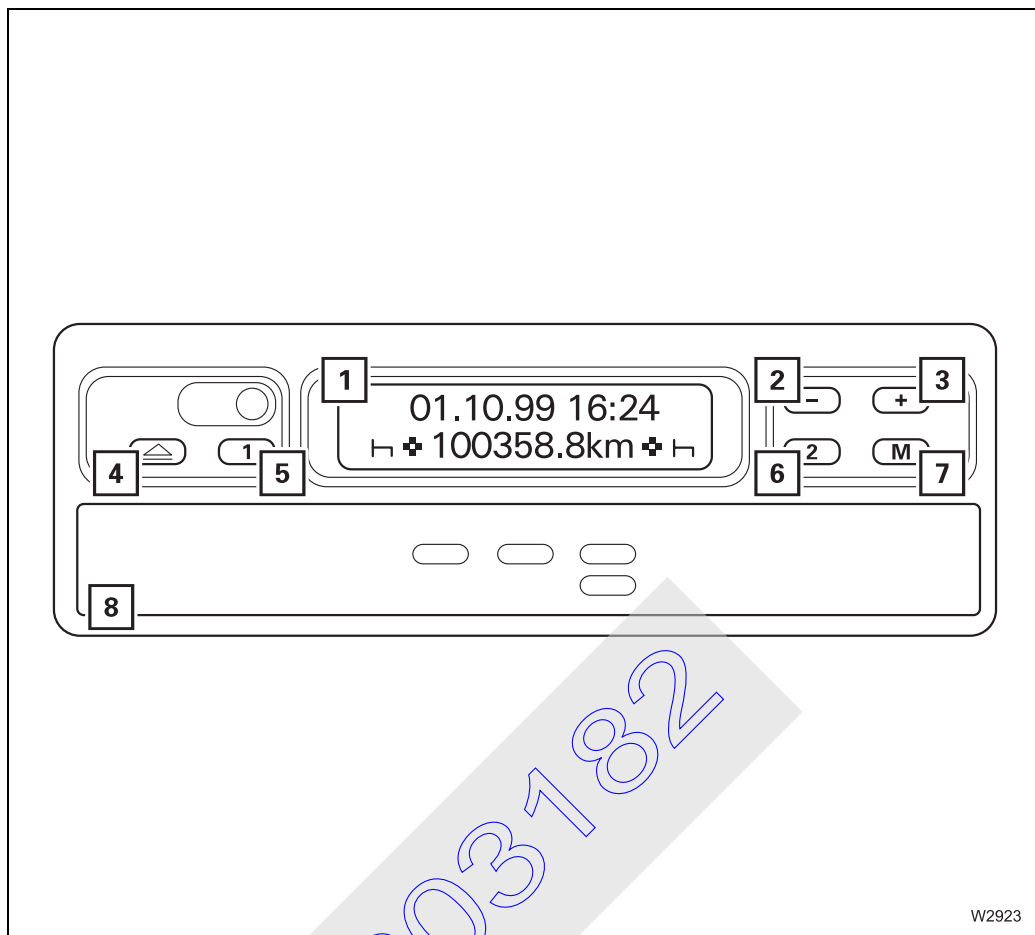
W10417

- | | |
|--|-------------|
| 1 Air vent | ➡ p. 5 - 73 |
| 2 Supply pressure gauge for brake circuits I and II | ➡ p. 3 - 50 |
| 3 Superstructure ignition monitoring | ➡ p. 3 - 37 |
| 4 Error in steering system | ➡ p. 3 - 53 |
| 5 Steering system warning | ➡ p. 3 - 54 |
| 6 Steering circuit warning I | ➡ p. 3 - 53 |
| 7 Turn signal indicator monitoring | ➡ p. 3 - 57 |
| 8 Hazard warning system on/off | ➡ p. 3 - 58 |
| 9 Trailer ABS warning ¹⁾ | ➡ p. 3 - 50 |
| 10 Emergency steering pump warning | ➡ p. 3 - 53 |
| 11 Steering circuit warning II | ➡ p. 3 - 53 |
| 12 Turn signal indicator monitoring, trailer ¹⁾ | ➡ p. 3 - 57 |

¹⁾ Additional equipment



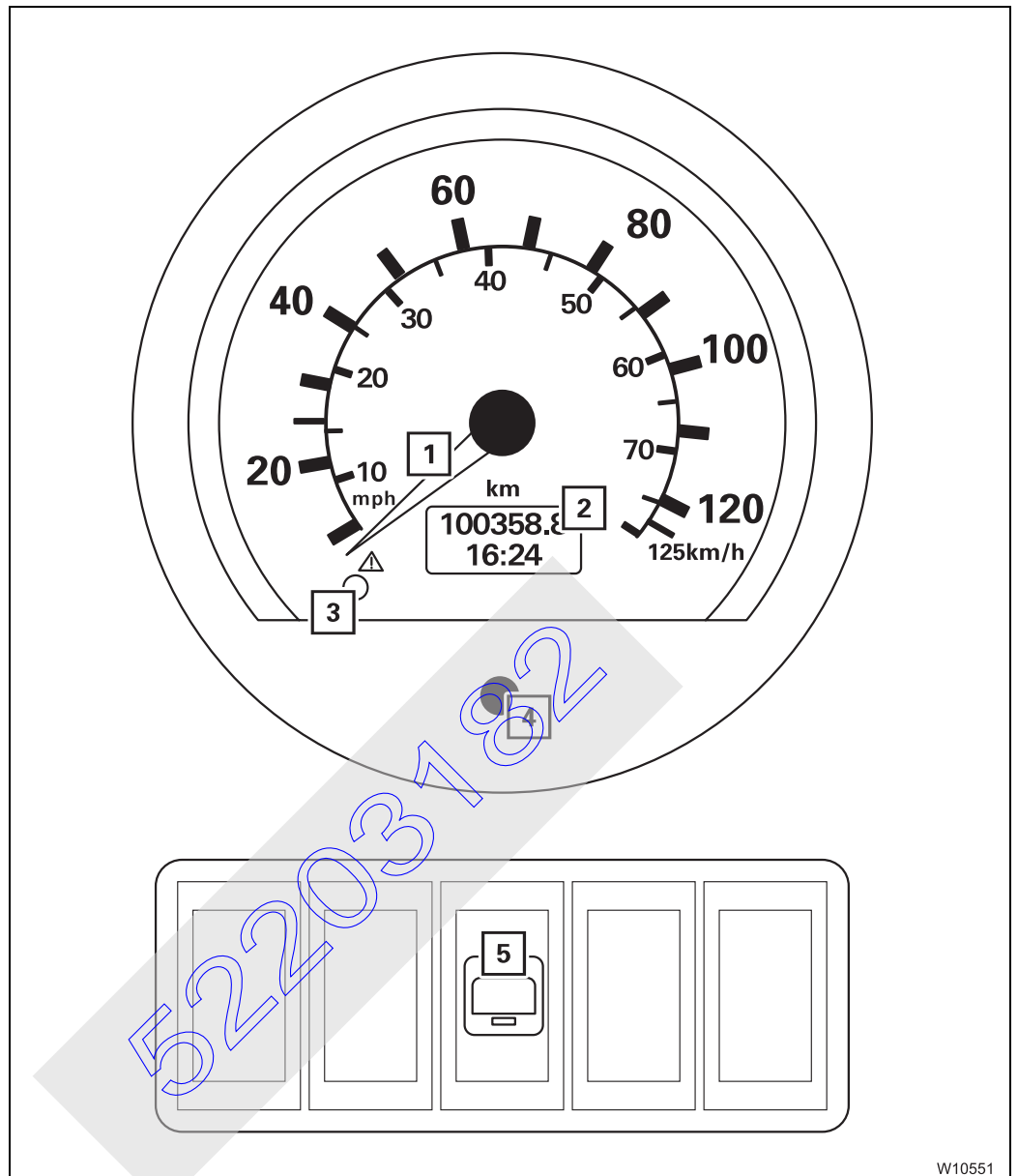
Tachograph version 1



W2923

- | | |
|--------------------------------------|-------------|
| 1 Tachograph display | ➡ p. 5 - 20 |
| 2 Button for setting the minutes - | ➡ p. 3 - 62 |
| 3 Button for setting the minutes + | ➡ p. 3 - 62 |
| 4 Button for unlocking the drawer | ➡ p. 5 - 18 |
| 5 Button for time group for driver 1 | ➡ p. 5 - 19 |
| 6 Button for time group for driver 2 | ➡ p. 5 - 19 |
| 7 Button for time setting menu | ➡ p. 3 - 62 |
| 8 Drawer | ➡ p. 5 - 18 |

Middle

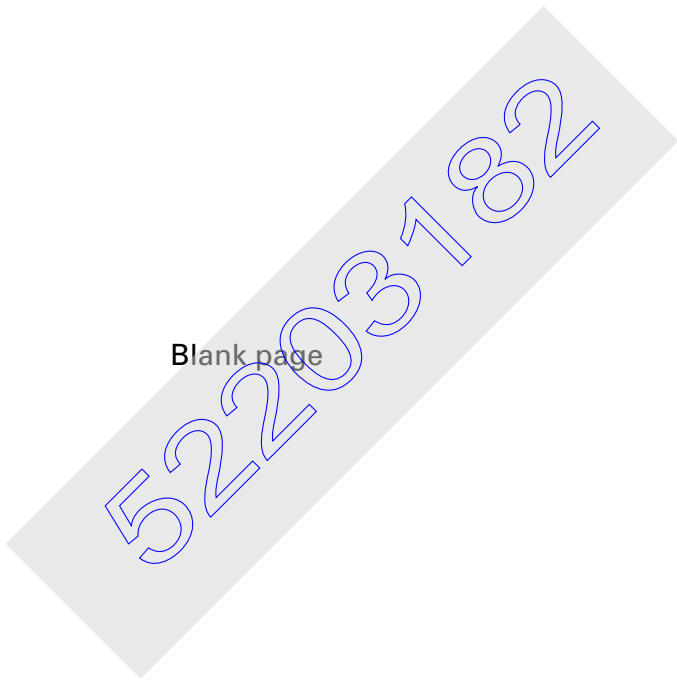


W10551

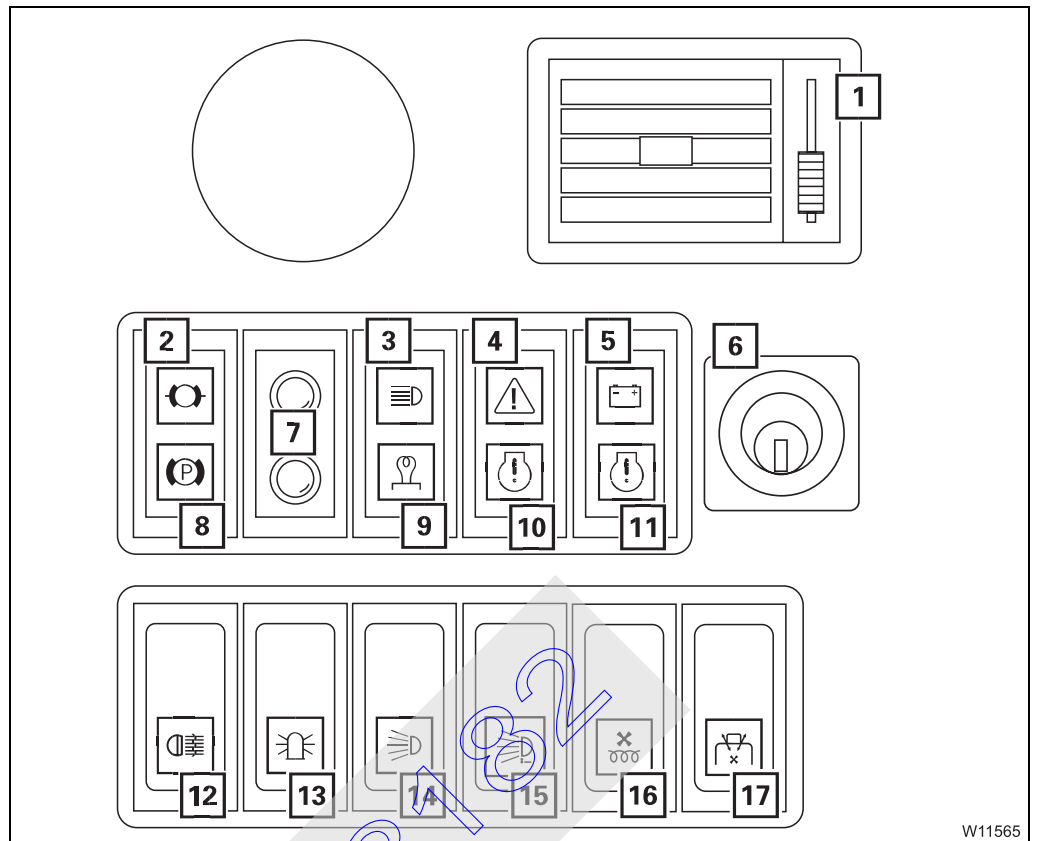
- | | | | |
|---|--|-------|-----------|
| 1 | Speed indicator | ▣▣▣▣▶ | p. 3 - 62 |
| 2 | Speedometer display | ▣▣▣▣▶ | p. 3 - 62 |
| 3 | Tachograph malfunction warning ¹⁾ | ▣▣▣▣▶ | p. 5 - 17 |
| 4 | Display time/day's kilometres | ▣▣▣▣▶ | p. 3 - 62 |
| 5 | Data logger ^{1), 2)} | | |

1) Additional equipment

2) ▣▣▣▣▶ *Separate operating instructions*



Right



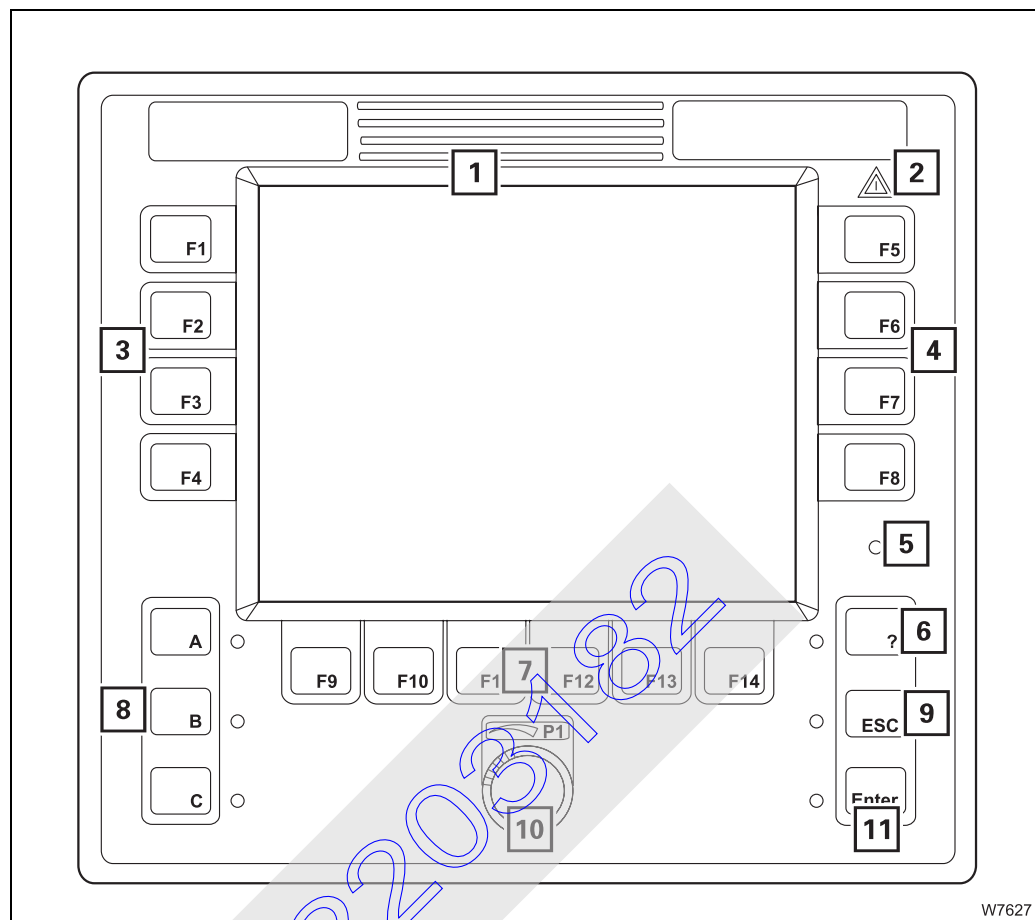
W11565

- | | | |
|--|------|-----------|
| 1 Air vent | ▬▬▬▬ | p. 5 - 73 |
| 2 Supply pressure warning for brake circuits I and II | ▬▬▬▬ | p. 3 - 50 |
| 3 High beam headlight monitoring | ▬▬▬▬ | p. 3 - 58 |
| 4 oil change monitoring | ▬▬▬▬ | p. 3 - 37 |
| 5 Battery charge indicator warning | ▬▬▬▬ | p. 3 - 38 |
| 6 Key-operated switch | ▬▬▬▬ | p. 3 - 42 |
| 7 Soot particle filter monitoring ¹⁾ | ▬▬▬▬ | p. 3 - 38 |
| 8 Parking brake monitoring | ▬▬▬▬ | p. 3 - 51 |
| 9 Flame start system monitoring ¹⁾ | ▬▬▬▬ | p. 3 - 37 |
| 10 Engine warning | ▬▬▬▬ | p. 3 - 37 |
| 11 Engine malfunction | ▬▬▬▬ | p. 3 - 37 |
| 12 Fog tail light/fog light on/off ¹⁾ | ▬▬▬▬ | p. 3 - 59 |
| 13 Rotating beacon on/off | ▬▬▬▬ | p. 3 - 58 |
| 14 Parking light/headlight on/off | ▬▬▬▬ | p. 3 - 58 |
| 15 Outrigger lighting on/off ¹⁾ | ▬▬▬▬ | p. 3 - 59 |
| 16 Battery heating system on/off ¹⁾ | ▬▬▬▬ | p. 3 - 38 |
| 17 Roof ventilator on/off ¹⁾ | ▬▬▬▬ | p. 3 - 63 |

¹⁾ Additional equipment

3.1.4

ECOS control unit

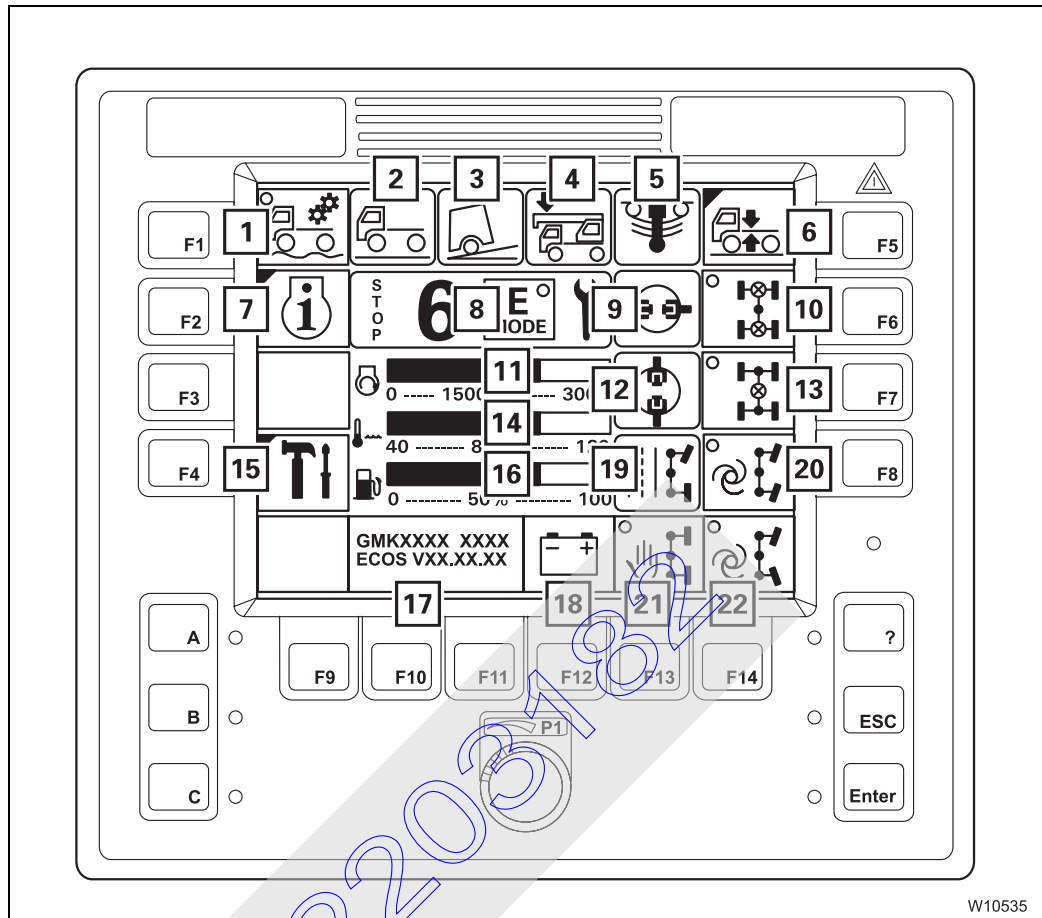


1	ECOS display	▣▣▣▣▶ p. 3 - 40
	Main menu overview	▣▣▣▣▶ p. 3 - 16
2	Error/warning message	▣▣▣▣▶ p. 3 - 39
3	Buttons F 1 to F 4	▣▣▣▣▶ p. 3 - 39
4	Buttons F 5 to F 8	▣▣▣▣▶ p. 3 - 39
5	Sensor for brightness	▣▣▣▣▶ p. 3 - 40
6	Open Error submenu	▣▣▣▣▶ p. 5 - 48
	Submenu overview	▣▣▣▣▶ p. 3 - 23
7	Buttons F 9 to F 14	▣▣▣▣▶ p. 3 - 39
8	Open Warning (carrier) submenu	▣▣▣▣▶ p. 5 - 45
	Submenu overview	▣▣▣▣▶ p. 3 - 22
9	Exit the submenu/input mode	▣▣▣▣▶ p. 3 - 40
10	Enter values	▣▣▣▣▶ p. 3 - 40
11	Confirm your entry	▣▣▣▣▶ p. 3 - 40



Various menus are displayed on the ECOS display. The menus are operated with the buttons F 1 to F 14. The individual buttons are assigned different functions in each menu. The functions of the buttons in the displayed menu correspond to the symbols next to or above the buttons; ▣▣▣▣▶ p. 3 - 39.

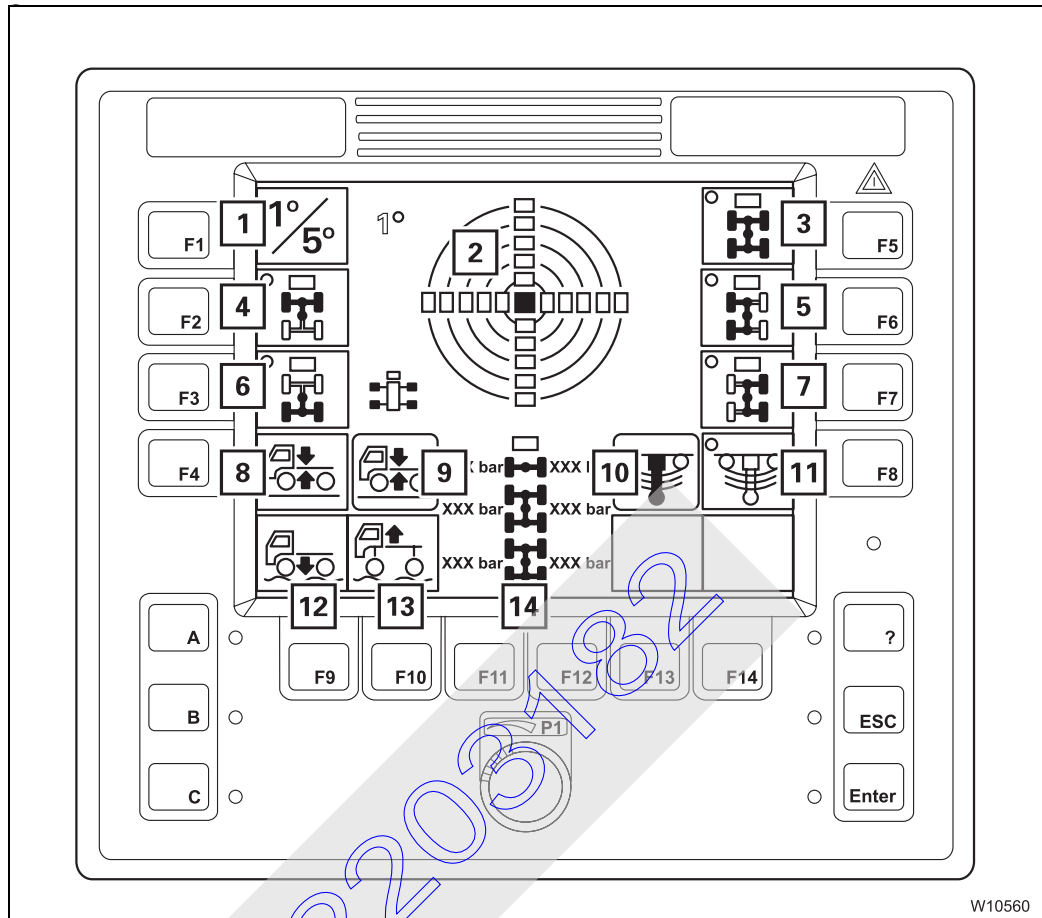
3.1.5 ECOS display – main menu



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

3.1.6 ECOS display – submenus

Level adjustment system submenu



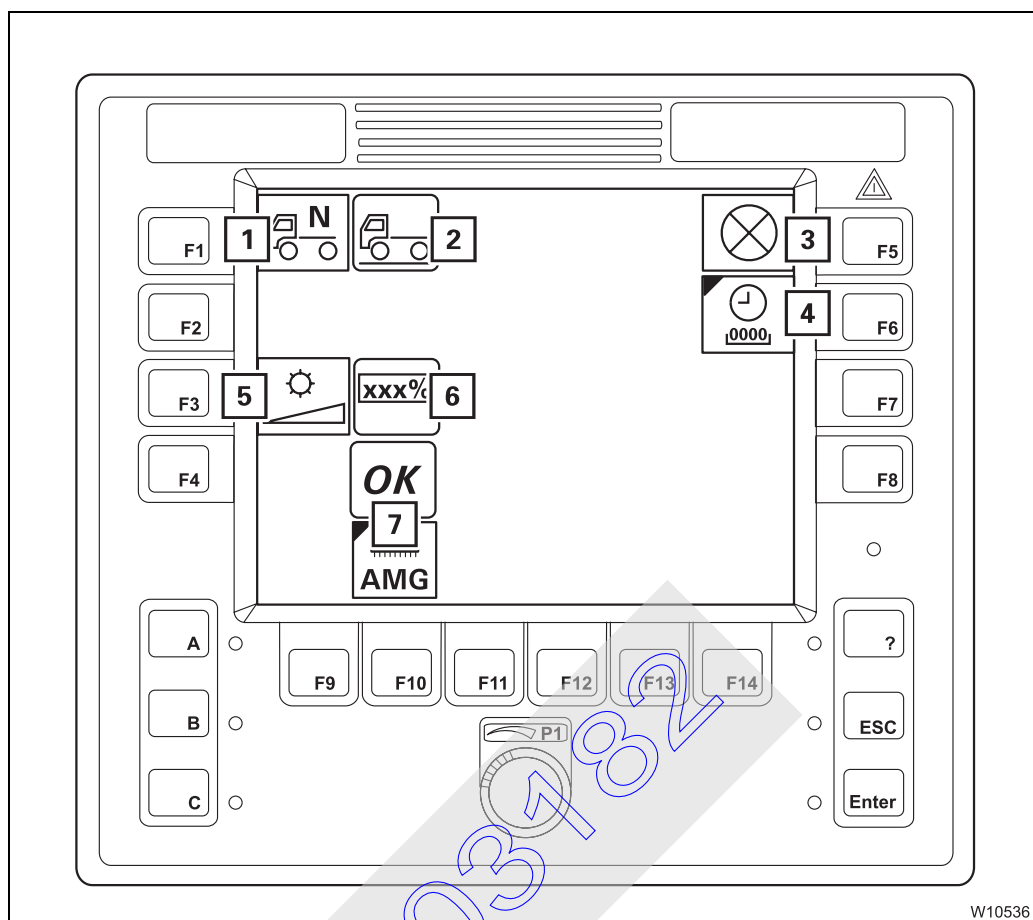
1	Change the measurement range	➡ p. 3 - 60
2	Display of current inclination	➡ p. 3 - 60
3	Overall level pre-selection	➡ p. 3 - 60
4	Front level pre-selection	➡ p. 3 - 60
5	Left level pre-selection	➡ p. 3 - 60
6	Rear level pre-selection	➡ p. 3 - 60
7	Right level pre-selection	➡ p. 3 - 60
8	Set on-road driving level	➡ p. 3 - 61
9	Vehicle level display	➡ p. 3 - 61
10	Suspension display	➡ p. 3 - 56
11	Suspension on/off	➡ p. 3 - 56
12	Lower level	➡ p. 3 - 61
13	Raise level	➡ p. 3 - 61
14	Suspension operation pressure display ¹⁾	➡ p. 3 - 56

¹⁾ Additional equipment



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Settings submenu

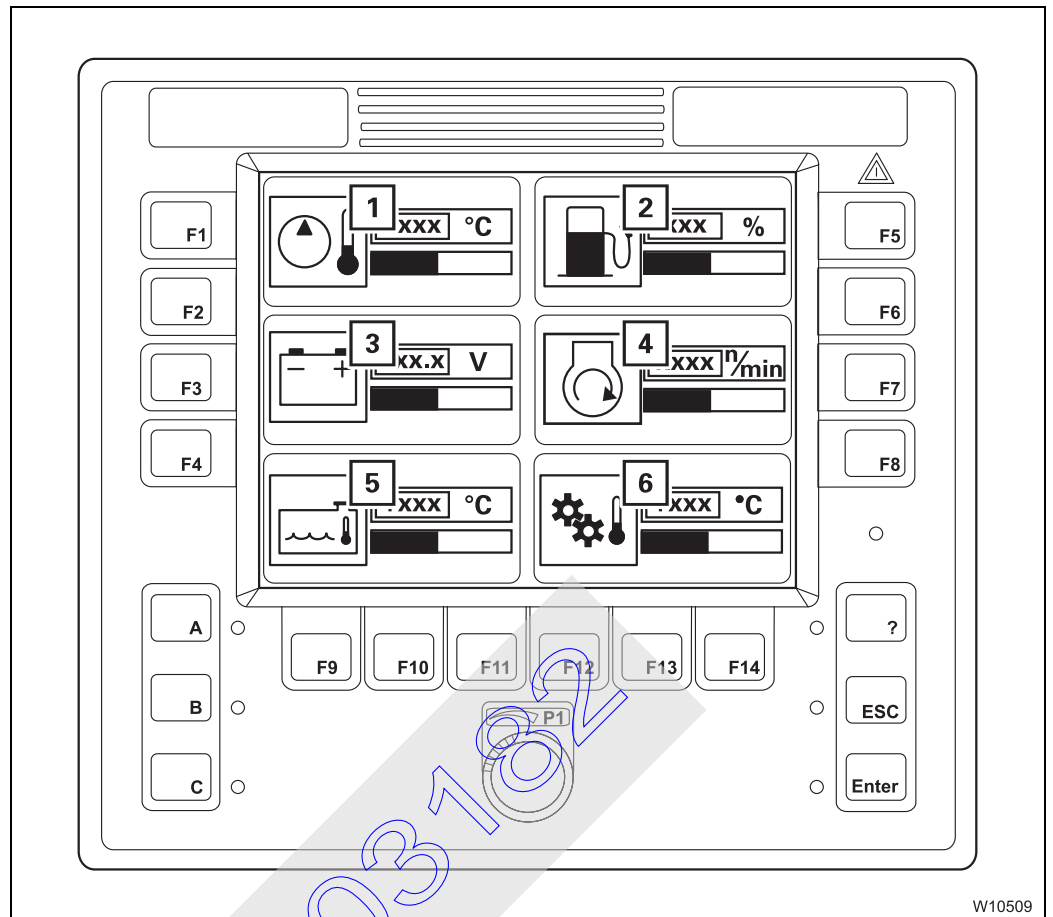


W10536

- | | |
|---|----------------|
| 1 Neutral transfer case on | ▣▣▣▣ p. 3 - 47 |
| 2 Transfer case display | ▣▣▣▣ p. 3 - 47 |
| 3 Lamp test | ▣▣▣▣ p. 4 - 10 |
| 4 Operating hours submenu | ▣▣▣▣ p. 3 - 22 |
| 5 Set brightness of display | ▣▣▣▣ p. 4 - 13 |
| 6 Display brightness value | ▣▣▣▣ p. 4 - 13 |
| 7 Malfunction/diagnostics AMG ¹⁾ | ▣▣▣▣ p. 3 - 64 |

¹⁾ For service personnel only

Submenu Monitoring



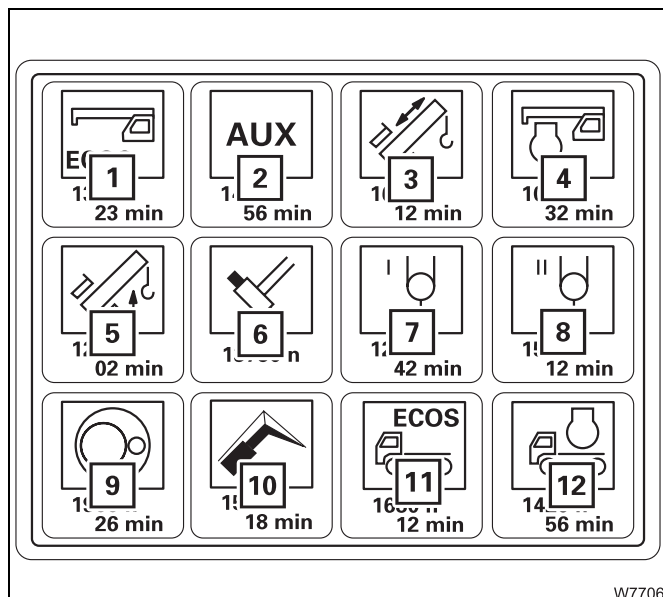
W10509

- | | |
|--|-----------------|
| 1 Hydraulic oil temperature display | ▣▣▣▣▶ p. 4 - 19 |
| 2 Fuel level display | ▣▣▣▣▶ p. 4 - 19 |
| 3 Voltage monitoring display | ▣▣▣▣▶ p. 4 - 19 |
| 4 Engine speed display | ▣▣▣▣▶ p. 4 - 19 |
| 5 Coolant temperature display | ▣▣▣▣▶ p. 4 - 19 |
| 6 Gear oil temperature display | ▣▣▣▣▶ p. 4 - 19 |



Operating hours submenu

Description of the displays;  *Displaying the operating hours*, p. 5 - 22.

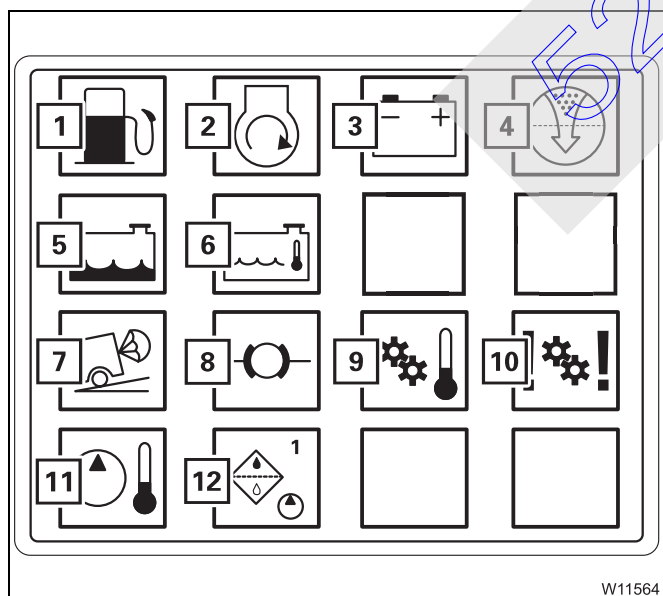


- 1 ECOS – superstructure
- 2 Auxiliary power units
- 3 Telescoping mechanism
- 4 Engine for crane operation
- 5 Derricking gear
- 6 Locking system
- 7 Main hoist
- 8 Auxiliary hoist¹⁾
- 9 Slewing gear
- 10 Lattice extension¹⁾
- 11 ECOS – carrier
- 12 Engine for driving

1) Additional equipment

Warning submenu

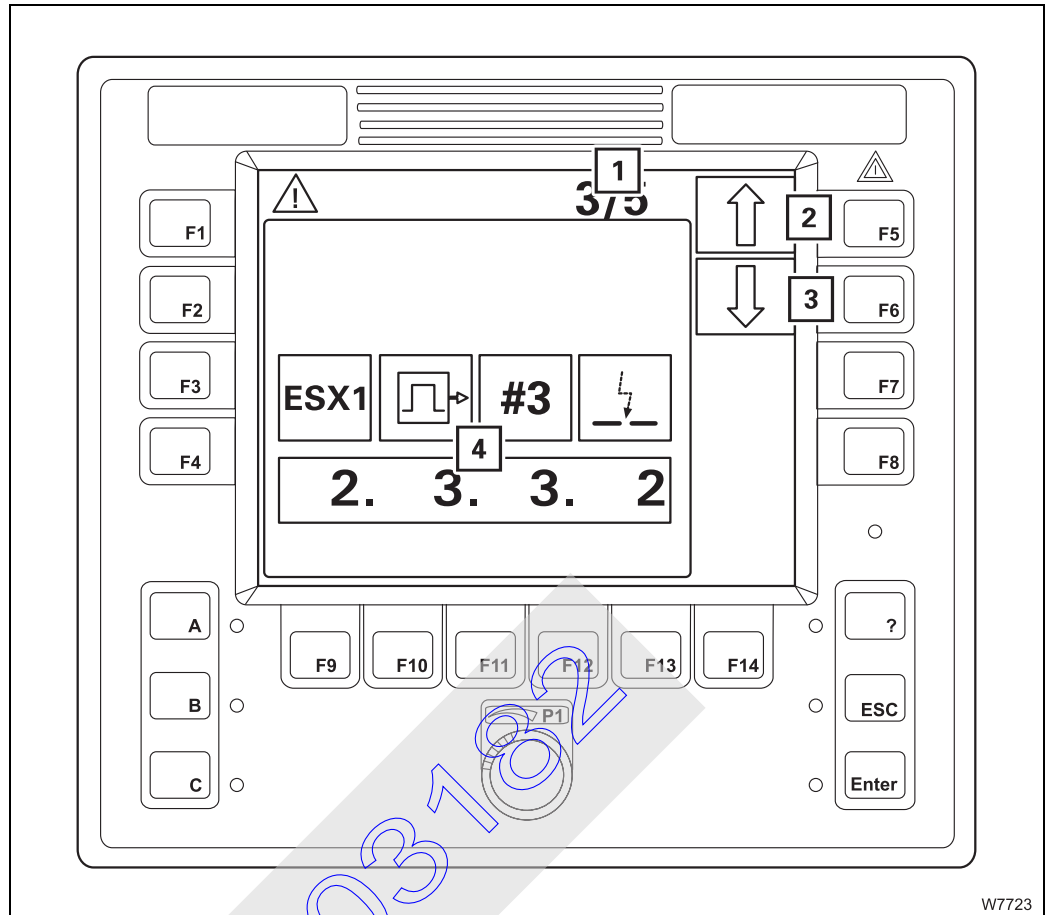
Description of the displays;  *Warning submenu*, p. 5 - 45.
Engine-related displays apply to the engine for driving.



- 1 Refuelling
- 2 Air intake inhibitor has been triggered¹⁾
- 3 Voltage monitoring
- 4 Replace air filter
- 5 Coolant level too low
- 6 Coolant too hot
- 7 Retarder too hot
- 8 Supply pressure in the brake circuit too low
- 9 Gear oil too hot
- 10 Shift lock, transmission
- 11 Hydraulic oil too hot
- 12 Replace hydraulic oil filter

1) Additional equipment

Error submenu

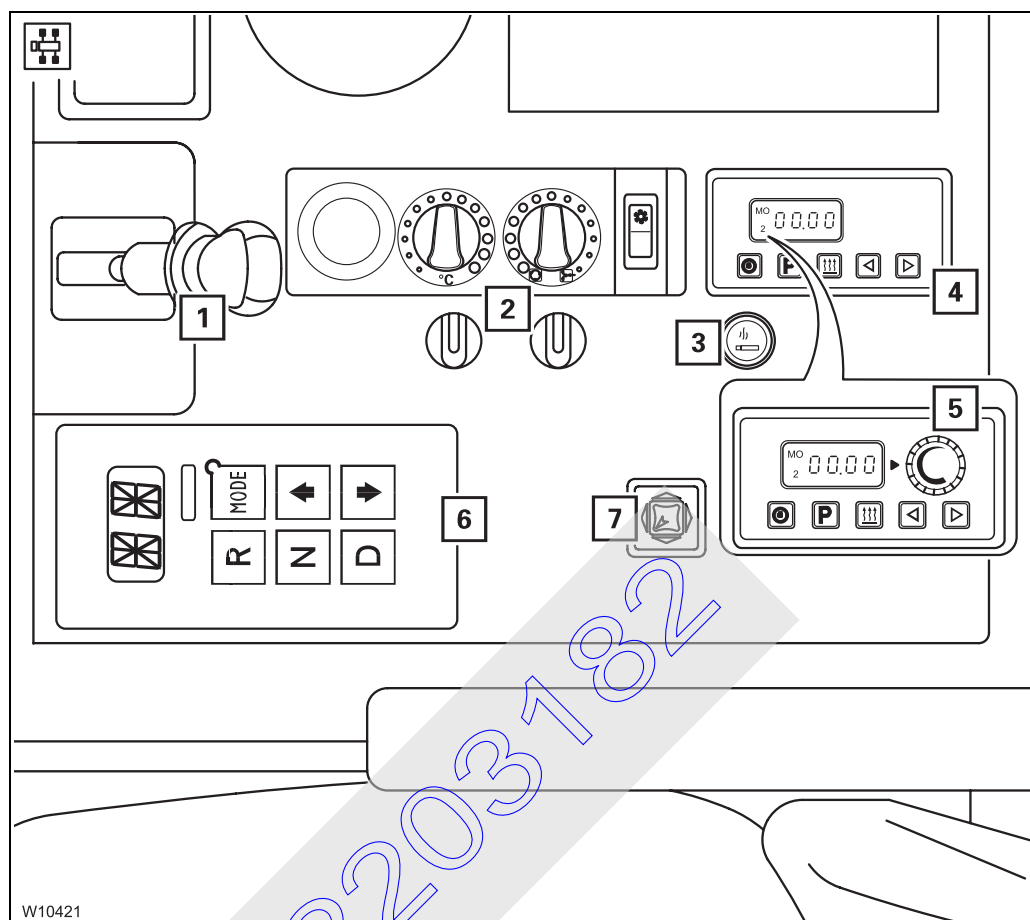


W7723

- | | | |
|---|---------------------------------------|----------------|
| 1 | Display of current error/total errors | ▣▣▣▣ p. 7 - 32 |
| 2 | Page up | ▣▣▣▣ p. 7 - 32 |
| 3 | Page down | ▣▣▣▣ p. 7 - 32 |
| 4 | Error display | ▣▣▣▣ p. 7 - 32 |

3.1.7

Side instrument panel



W10421

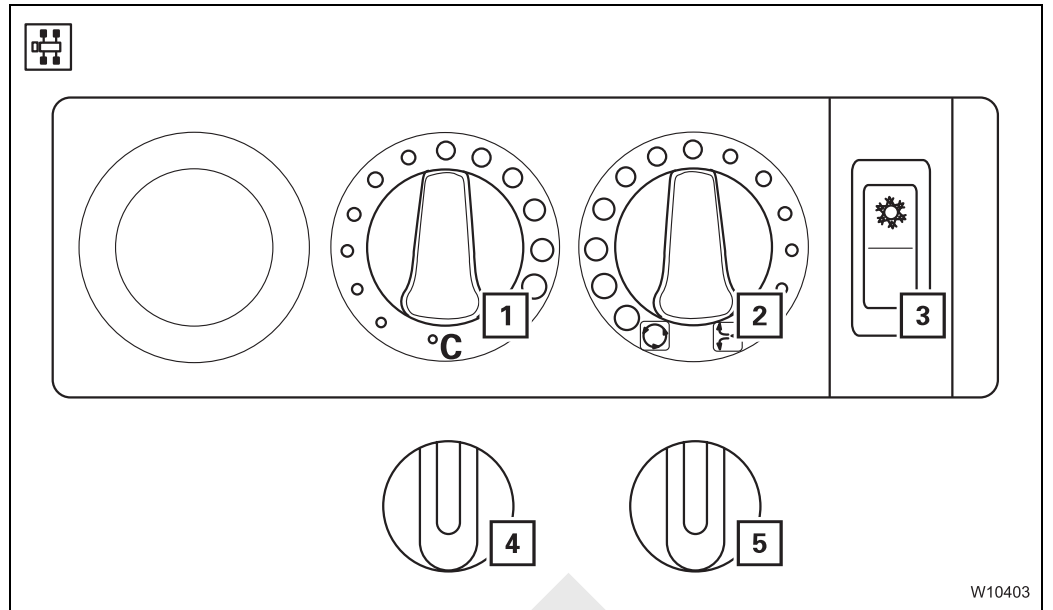


In the illustration of the side instrument panel, the left-hand edge corresponds to the front, i.e. the direction of travel of the truck crane.

- | | | |
|---|--------------------------------------|-------------|
| 1 | Parking brake lever | ➡ p. 3 - 51 |
| 2 | Standard heating | ➡ p. 3 - 25 |
| 3 | Cigarette lighter (24 volts) | |
| 4 | Auxiliary water heater ¹⁾ | ➡ p. 3 - 26 |
| 5 | Auxiliary air heater ¹⁾ | ➡ p. 3 - 27 |
| 6 | Transmission operating elements | ➡ p. 3 - 28 |
| 7 | Adjust mirror | ➡ p. 5 - 9 |

1) Additional equipment

Standard heating



1 Air temperature

2 Fresh air/recirculated air

3 Air-conditioning system on/off

4 Upper fan

5 Lower fan

▣▣▣▣ p. 5 - 71

▣▣▣▣ p. 5 - 72

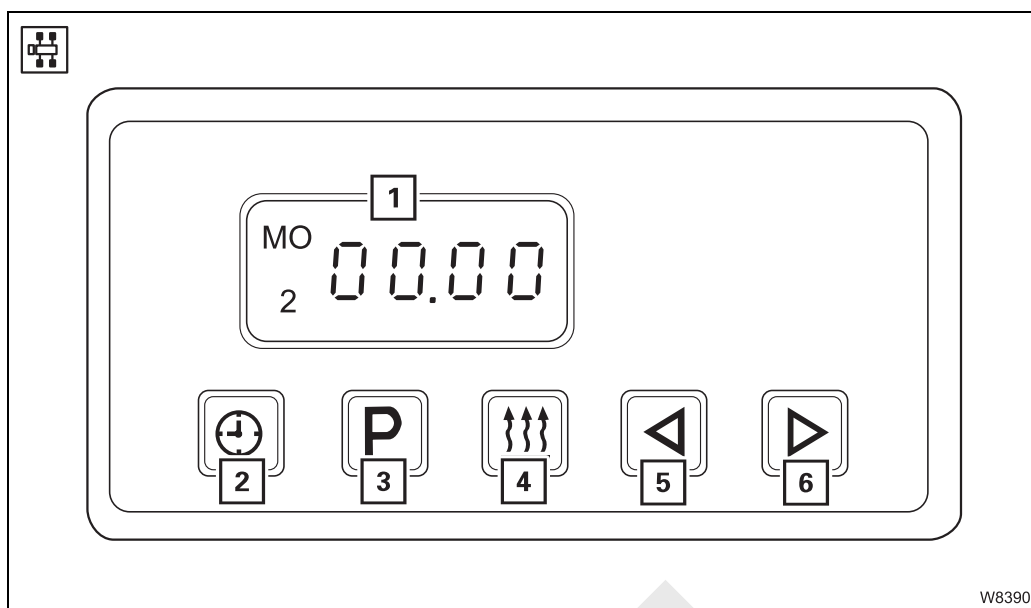
▣▣▣▣ p. 5 - 82

▣▣▣▣ p. 5 - 71

▣▣▣▣ p. 5 - 71



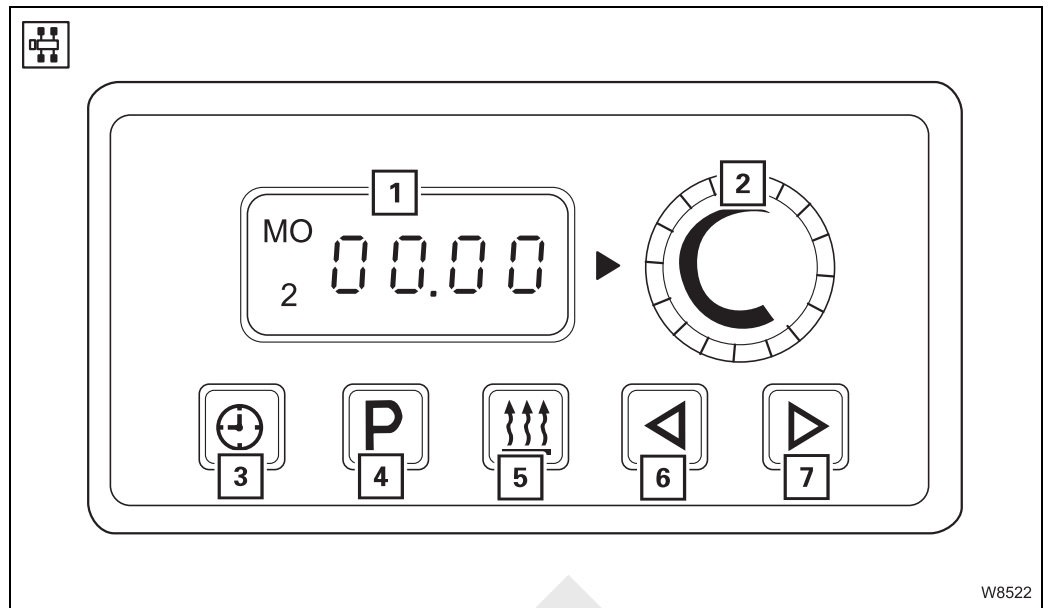
Auxiliary water heater



- | | |
|------------------------------|-----------------|
| 1 Heating display | ▶▶▶▶▶ p. 5 - 76 |
| 2 Set time/day | ▶▶▶▶▶ p. 5 - 76 |
| 3 Retrieve storage locations | ▶▶▶▶▶ p. 5 - 77 |
| 4 Switch heating on/off | ▶▶▶▶▶ p. 5 - 75 |
| 5 Input - | ▶▶▶▶▶ p. 5 - 76 |
| 6 Input + | ▶▶▶▶▶ p. 5 - 76 |

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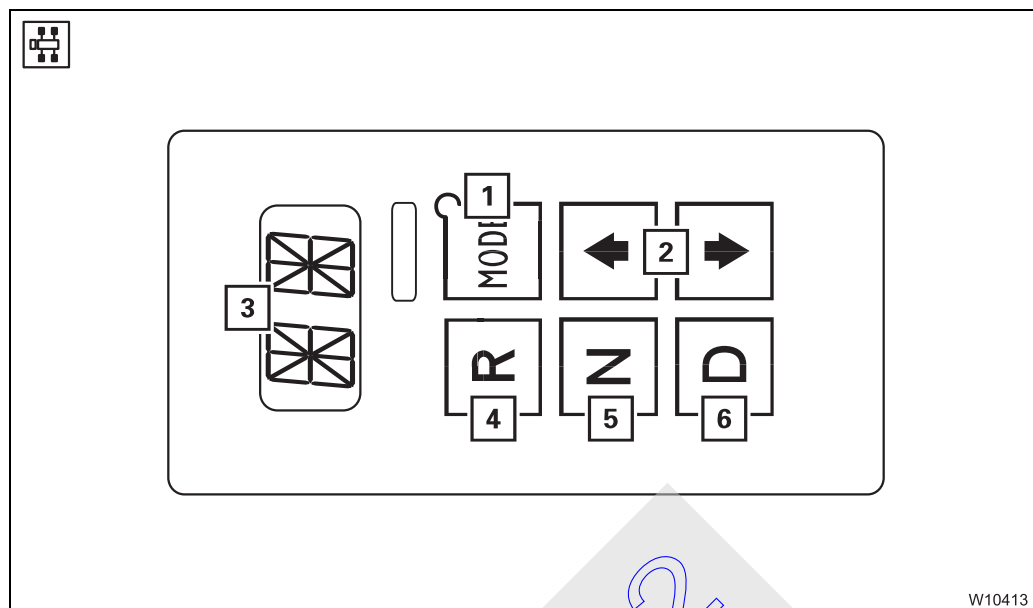
Auxiliary air heater



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

3.1.8


Transmission

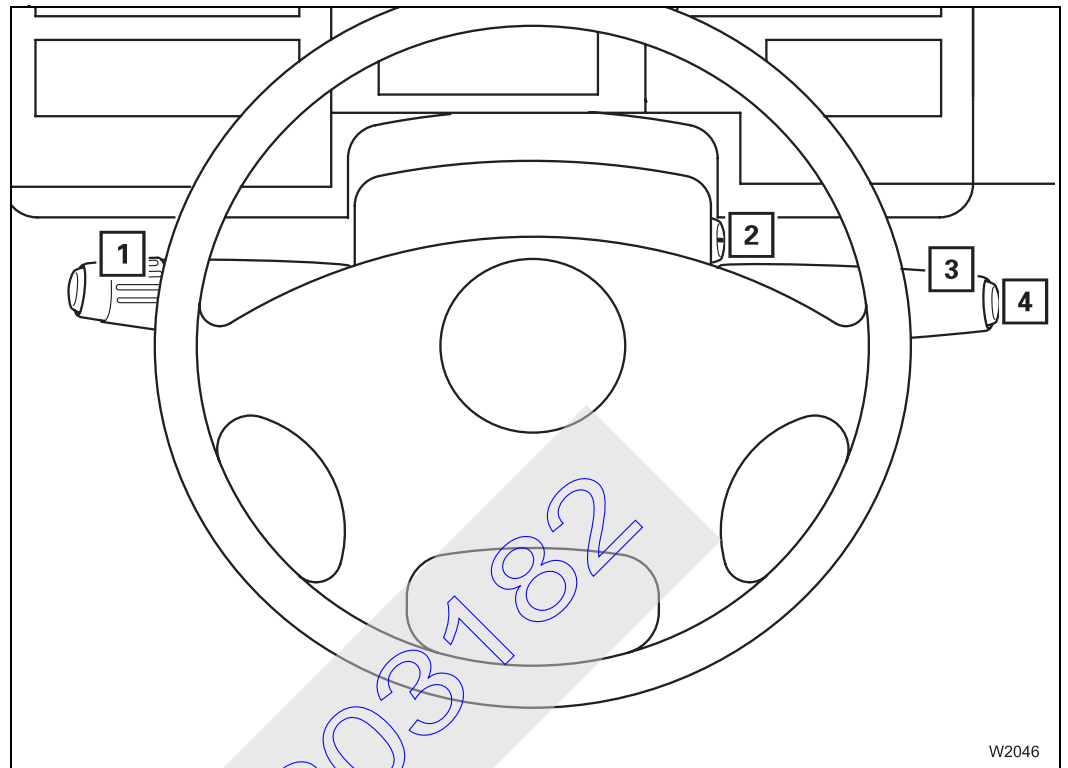


- | | | | |
|---|-------------------------|-------|-----------|
| 1 | Change the driving mode | ▣▣▣▣▶ | p. 3 - 45 |
| 2 | Select gears | ▣▣▣▣▶ | p. 3 - 46 |
| 3 | Transmission display | ▣▣▣▣▶ | p. 3 - 44 |
| 4 | Gear position R | ▣▣▣▣▶ | p. 3 - 45 |
| 5 | Neutral position | ▣▣▣▣▶ | p. 3 - 45 |
| 6 | Gear position D | ▣▣▣▣▶ | p. 3 - 45 |

3.1.9


Steering column

Adjusting the steering column;  p. 5 - 14




W2046

1 Multipurpose switch

 p. 3 - 57


- Lighting/horn
- Windscreen wiper/washing system

2 Ignition lock


 p. 3 - 36

3 Multipurpose switch


Setting the idling speed

 p. 3 - 36


Tempomat

 p. 3 - 36


Retarder

 p. 3 - 52

Retarder in the transmission¹⁾

 p. 3 - 52

4 Button

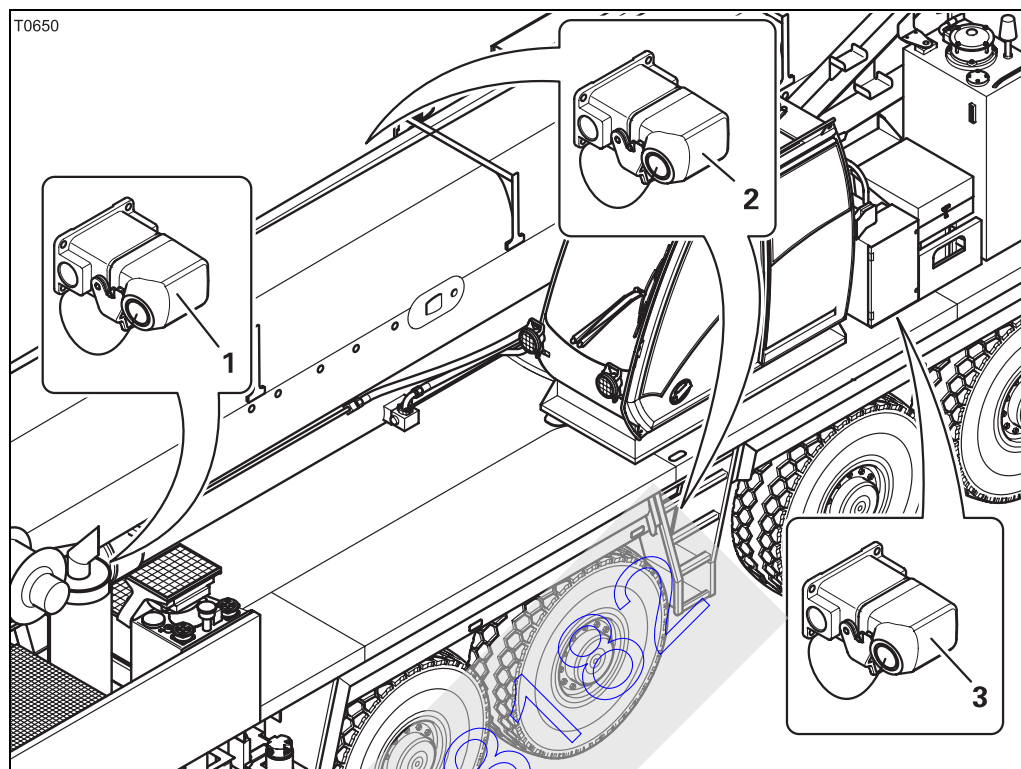
 p. 3 - 36

Tempomat is ready to operate

¹⁾ Additional equipment


3.1.10

Sockets for hand-held control

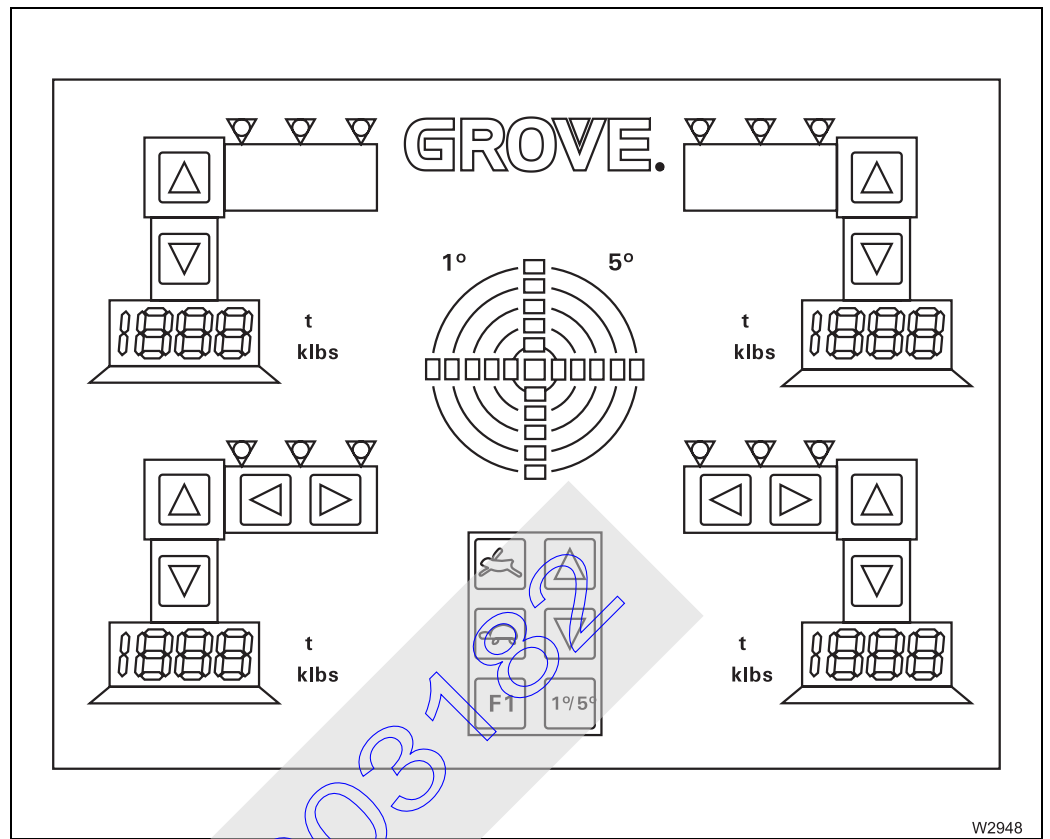


There are sockets (2) on the carrier and sockets (1) and (3) on the superstructure for the hand-held control supplied.

The hand-held control contains the operating elements for the outriggers, the inclination indicator and for driving the power units in case of emergency.

As these operating instruments are required for crane operation, they are described in Part 2 – *Crane operation*;  *Hand-held control*, p. 10 - 104.

3.1.11 Outrigger control units



Contain operating elements for the outriggers, the inclination indicator and the outrigger pressure indicator.

Since these operating instruments are required for crane operation, they are described in Part 2 – *Crane operation*; ■■■► *On the outrigger control units*, p. 10 - 50.



When driving, error messages relating to the carrier electronics can be read on this display; ■■■► p. 7 - 34.

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3.2

Short description of the operating elements



Risk of accidents due to operating error!

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

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

This section does not contain all of the requirements which must be fulfilled in order for several operating elements to be active.

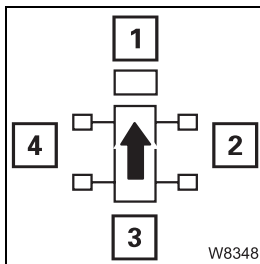
If some operating elements do not work, first read the following chapters which are referred to at the respective places before contacting **CraneCARE**.

3.2.1

Definition of positional references

Basic rule

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



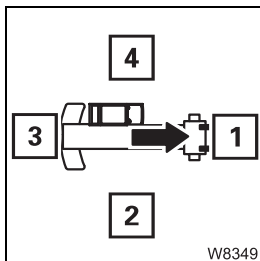
On the carrier

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

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

Forwards always means the driver's cab is to the front of the direction of travel.

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



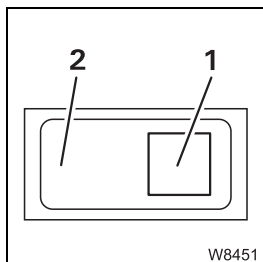
On the superstructure

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

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



Switches and buttons



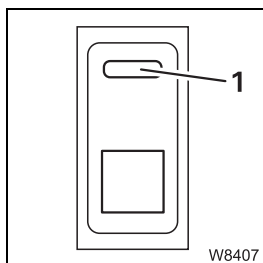
For switches and buttons, the terms **down** and **up** are used.

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

- **down:** press (1) – next to the symbol
- **up:** press (2) – opposite the symbol

3.2.2

General information on the operating elements



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

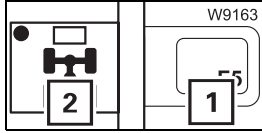
- **To switch on:**
 - first press the lock button
 - then push the switch down and inwards
- **To switch off:** push the switch inwards and up until the lock button latches into place

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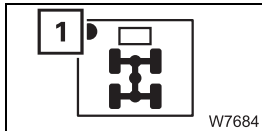
3.2.3

General rules for buttons and symbols on the display

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

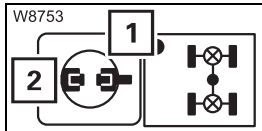


- A button (1) is only active when the corresponding symbol (2) is black. Buttons next to a grey symbol always have no function.

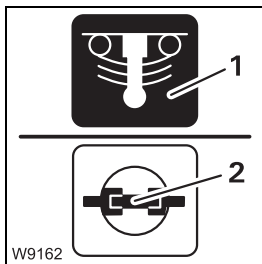


- Some switches have a dot (1). The colour of the dot indicates the current switching state of the button.

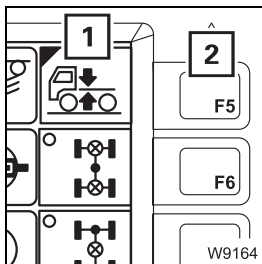
- **green:** button on – the corresponding switching operation is being carried out.
- **black:** button off – the corresponding switching operation is not being carried out.



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



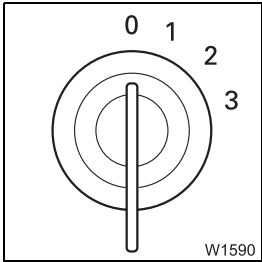
- In these operating instructions, the designation of colours always means, for example, "The symbol is red". Regardless of whether the background (1) of a symbol is red or whether only parts (2) of a symbol are red. This applies to all symbols and all colours.



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

3.2.4 Engine

Steering column



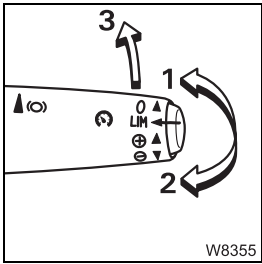
Ignition lock

- 0** Ignition off, engine off, key can be removed
- 1** Power supply on for:
heating, engine/transmission diagnostics, radio/telephone
- 2** Ignition on
- 3** Starting position

▶▶▶ p. 4 - 9

Multipurpose switch

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

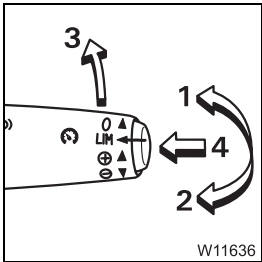


- Setting the idling speed

The truck crane is stationary.

- 1 Up:** Increase the idling speed
- 2 Down:** Decrease the idling speed
- 3 Forwards:** Idling speed setting off

▶▶▶ p. 4 - 20



- Setting the Tempomat

The truck crane drives with at least 50 km/h (30 mph). Button (4) is pressed once – Tempomat is ready to operate.

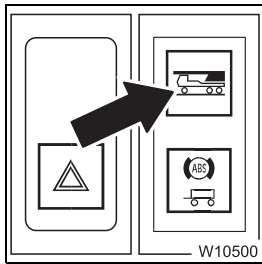
- 1 Up:** switch on or increase speed
- 2 Down:** switch on or decrease speed
- 3 Forwards:** switch off

Tempomat on = current speed is maintained

▶▶▶ p. 5 - 37

Instrument panels

Front instrument panel – left

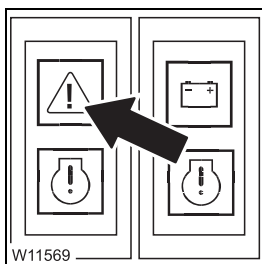


Superstructure ignition monitoring

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

➡ p. 4 - 147

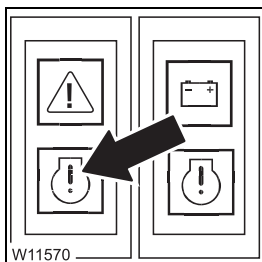
Front instrument panel – right



Oil change monitoring

- **On:** engine off – ignition on
or
engine on – Oil change is necessary
- **Off:** engine on – No oil change necessary

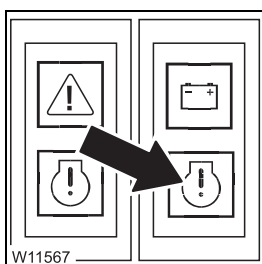
➡ Maintenance Manual



Engine warning

- **On:** engine off – ignition on
or
engine on – Malfunction at the engine
- **Off:** engine on – no malfunction

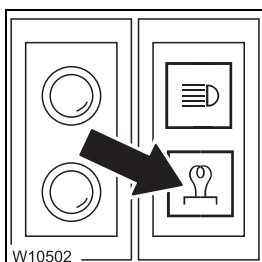
➡ p. 7 - 36



Engine malfunction

- **On:** engine off – ignition on
or
engine on – Severe malfunction at the engine
- **Off:** engine on – no malfunction

➡ p. 7 - 36

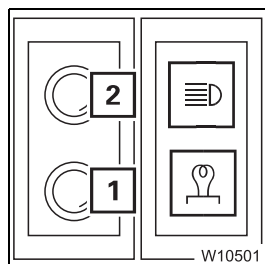


Monitoring the flame start system

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

➡ p. 4 - 16





Soot particle filter control

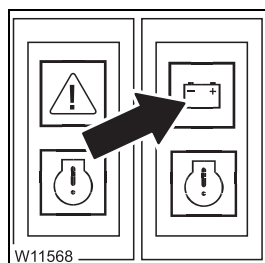
- 1 **Yellow lamp lights up:** Early warning: clean soot particle filtering system
- 2 **Orange lamp lights up:** Clean/replace soot particle filtering system;
 ▶ *Maintenance Manual*

3.2.5

Electrical system/electronics

Electrical system

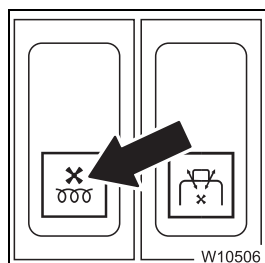
Front instrument panel – *right*



Battery charge indicator warning

- **On:** engine off – ignition on
or
engine on – power failure – switch off engine
- **Off:** engine on – no malfunction

▶ p. 5 - 34



Battery heating system on/off

- **down:** Heating system on/off via thermostat
- **up:** Heating system off

Further information on operation; ▶ *Separate operating instructions.*

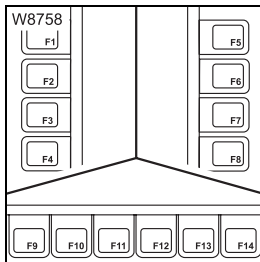
3.2.6

ECOS crane control

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

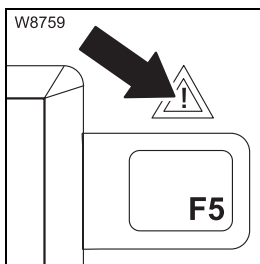
Control unit

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



Buttons F1 to F14

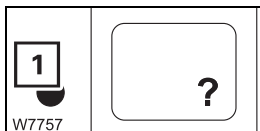
The function of buttons F1 to F4 is shown via the symbol next to or above the button. After the button is pressed, the function displayed is executed if it has been released.



Error/warning message

- **Flashing:** new warning message or error has occurred
- **On:** error acknowledged – but still present
- **Off:** no warning message or error present

➡ p. 12 - 108

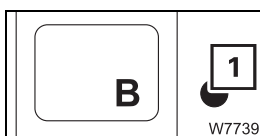


Open Error submenu

The lamp (1) lights up or flashes.

- **Open:** press button 1 x – submenu is opened

➡ p. 12 - 108



Open the Warning submenu

The lamp (1) lights up or flashes.

- **Open:** press button 1 x – submenu is opened

➡ p. 5 - 45





Exit the submenu/input mode

The lamp (1) lights up.

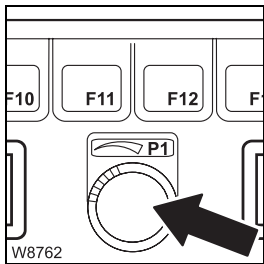
- **Press button once:**
 - the opened submenu is closed – the menu from the next level up is opened
 - the input mode is switched off



Confirm your entry

The lamp (1) lights up.

- **Press button once:** A newly entered value is stored



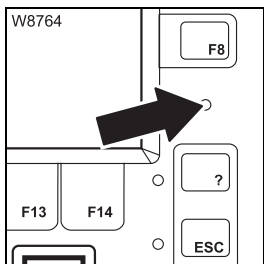
Enter values

Input mode is activated.

- **To the right:** increase the value
- **To the left:** reduce the value

Slow slewing leads to a slow value change
 Fast slewing leads to a rapid value change

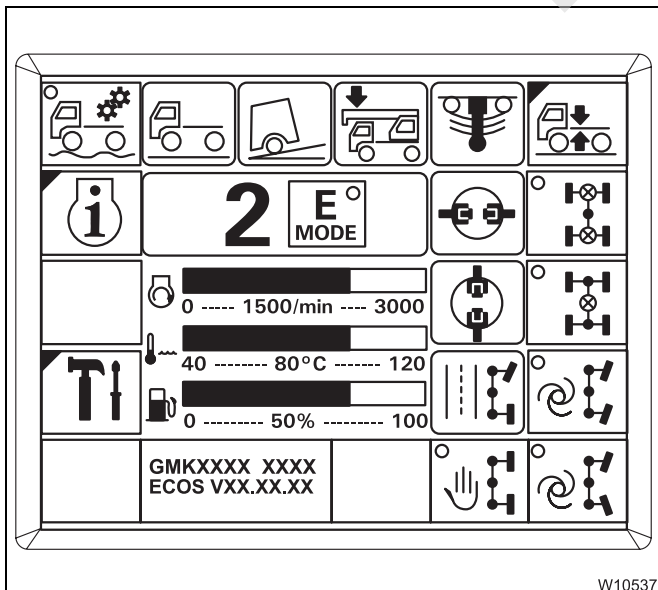
➡ p. 4 - 13



Sensor for brightness

Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted.

Manual input; ➡ p. 4 - 13.

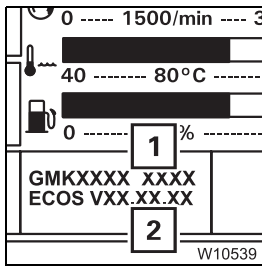


ECOS display

The main menu appears after switching on the ignition.

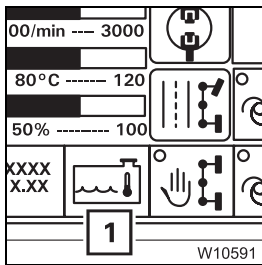
Symbols which represent submenus are indicated at the top left by a blue corner.

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



Serial number and program version displays

- 1 Shows the serial number which is on the *name plate on the superstructure*; p. 1 - 3.
- 2 Shows the current ECOS program version – always enter when a malfunction occurs; p. 7 - 31.



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 - 45.



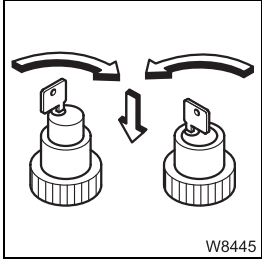
52203182

Instrument panel

Front instrument panel – *right*

Key-operated switch

The truck crane drives slower than approx. 5 km/h (3 mph).

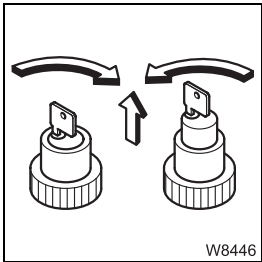


- **To switch on:** turn the key to the right, push in the switch and turn the key to the left – the switch latches into place.

The following functions are active:

- Open the *Level adjustment system* submenu
- Transverse differential locks on/off
- Longitudinal differential locks on/off
- Separate steering on/off

The speed is limited to a maximum of approx. 20 km/h (12 mph). If the speed when switching on is higher, the speed limitation is only activated when a speed of approx. 20 km/h (12 mph) is not reached.



- **To switch off:** turn the key to the right – the switch disengages, remove the key

The buttons next to the following symbols are active:

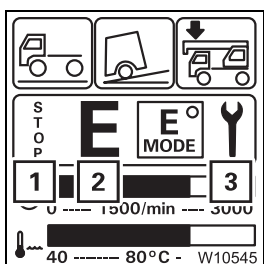
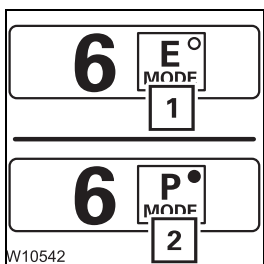
- Open the *Level adjustment system* submenu
- Transverse differential locks off
- Longitudinal differential locks off
- Separate steering off

3.2.7

Transmission

▣▣▣▣▶ *Operating the transmission*, p. 5 - 23.

ECOS display



Transmission display

– Neutral position **N** switched on

– Currently selected gear – reverse

– Currently selected gear – forwards (1 to 6) e.g. **4**

– Additional symbols

1 Driving mode **E** on

2 Driving mode **P** on

– When malfunctions are present:

1 Severe malfunction in the engine – stop the truck crane

2 Malfunction in the electronics

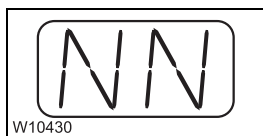
3 Malfunction in the transmission or AMG

▣▣▣▣▶ *Malfunctions on the engine*, p. 7 - 36

▣▣▣▣▶ *Malfunctions to the transmission*, p. 7 - 37

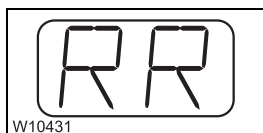


Side instrument panel

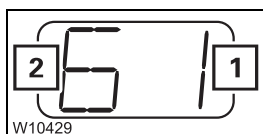


Transmission display

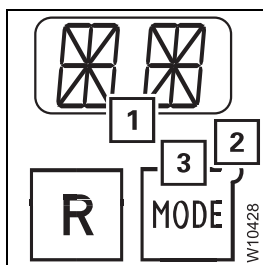
- Neutral position **N** switched on



- Gear position **R** switched on

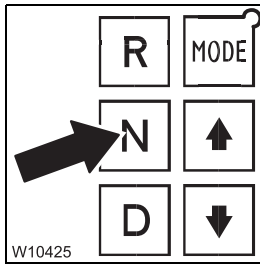


- Gear position **D** switched on
 - 1 Currently selected gear
 - 2 Highest possible gear, 1 to 6 possible
 - Number flashing – motor off



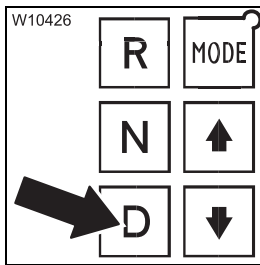
- For diagnostics and oil-level gauge
 - 1 Continuous character string for error/oil level
- For diagnostics
 - 2 Flashes – error displayed is active
 - 3 Press button once – display of next error

Switching on diagnostics/oil-level gauge;  p. 3 - 46



Neutral position N

- **Press once:** Neutral position on – no gear engaged
- ▣▣▣▣ p. 5 - 24

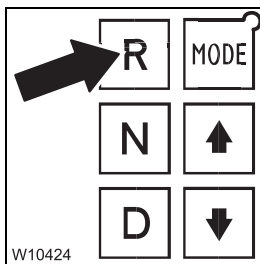


Gear position D

Press once

- **At a standstill:** Forward starting gear on
- **For driving forwards:** suitable gear on – clutch engages
- **For driving in reverse:** firstly, no gear change, just before standstill – forward gear on

▣▣▣▣ p. 5 - 26

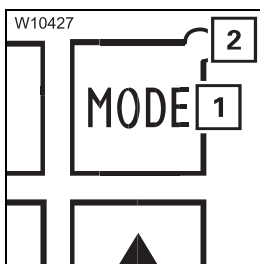


Gear position R

Press once

- **At a standstill:** Reverse starting gear on
- **For driving in reverse:** suitable gear on – clutch engages
- **For driving forwards:** firstly, no gear change, just before standstill – reverse gear on

▣▣▣▣ p. 5 - 26



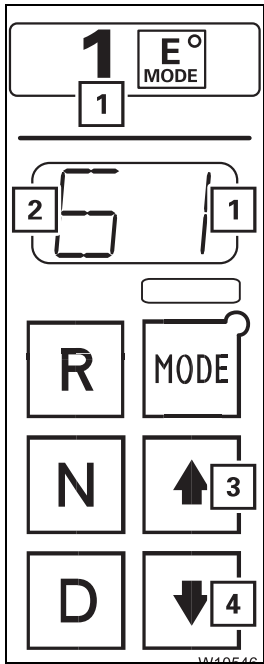
Change the driving mode

- 1 Press button once:** Driving mode switches to other driving mode
- **Light on:** Driving mode **P** on (Power)
Gear change at high engine speed
- **Light off:** Driving mode **E** on (Economy)
Gear change at low engine speed

▣▣▣▣ *Changing the driving mode, p. 5 - 25*

Additional function; ▣▣▣▣ *For diagnostics, p. 3 - 44*





Select gears

– The truck crane is stationary – starting gear engaged

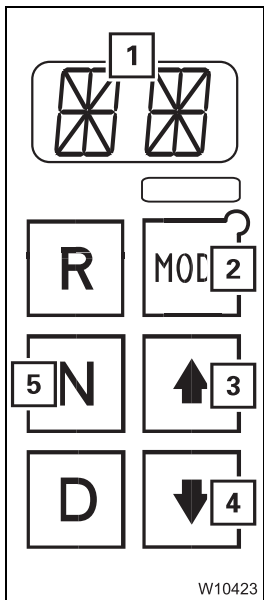
- 1 Starting gear
- 2 Highest possible gear
- 3 Press button once: Highest possible gear +1
If starting gear = highest possible gear, depending on driving mode – starting gear +1
- 4 Press button once: Highest possible gear -1
If highest possible gear = starting gear, starting gear -1

➡ p. 5 - 26

– The truck crane is in motion

- 1 Current gear
- 2 Highest possible gear
- 3 Press button once: Highest possible gear +1, depending on driving mode – current gear +1
- 4 Press button once: Highest possible gear -1, depending on driving mode – current gear -1

➡ p. 5 - 28



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

- **To switch on:** Press buttons (3) + (4) once –
Display (1) switched to oil-level gauge
- **To switch off:** Press button (5) once

➡ p. 5 - 31

– Additional function, diagnostics – the truck crane is stationary

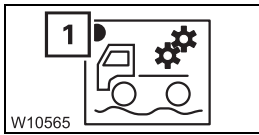
- **To switch on:** Press buttons (3) + (4) twice –
Display (1) switched to error display
- **To switch off:** Press button (5) once or
Press buttons (3) + (4) once

➡ p. 7 - 39

3.2.8

Transfer case

In the main menu

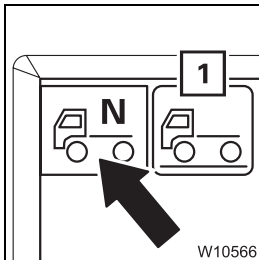


Transfer case for off-road gear on/off

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

➡ p. 5 - 54

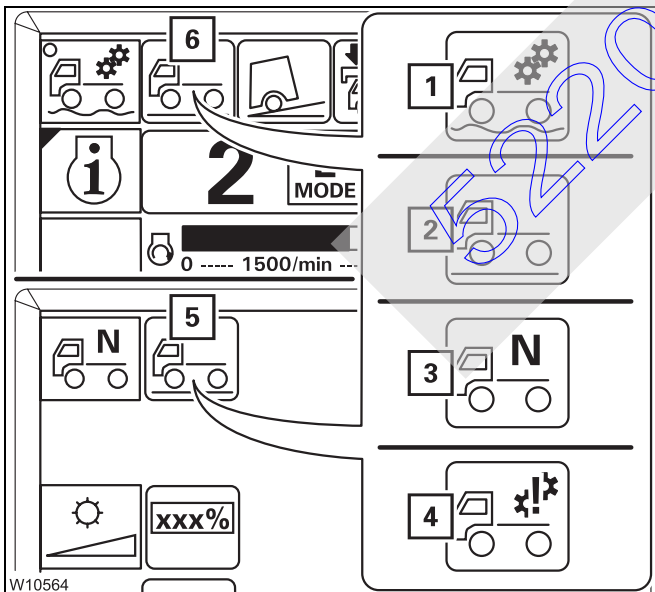
In the *Settings* submenu



Transfer case neutral position on

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

➡ p. 7 - 7



Transfer case display

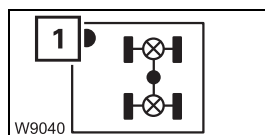
The current status is shown using different symbols:

- 1 Off-road gear on
- 2 Off-road gear – on-road driving
- 3 Neutral position on
- 4 Error – violet

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

3.2.9

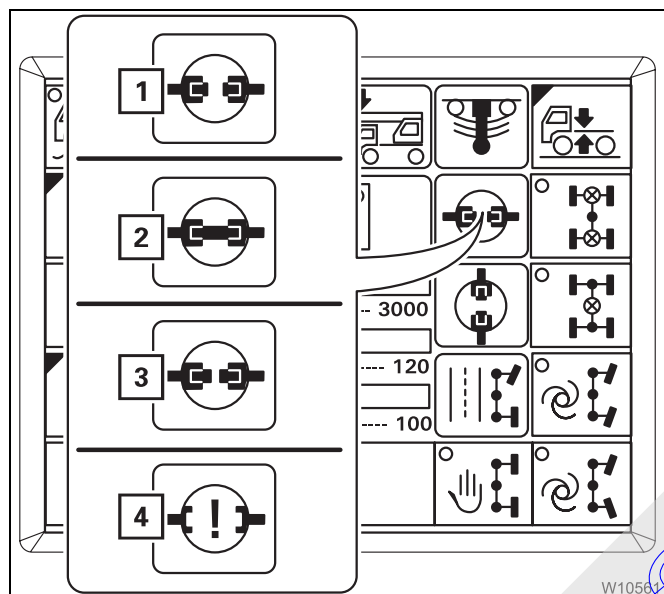
Final drive



Transverse differential locks on/off

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

➡ p. 5 - 58

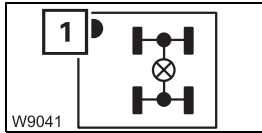


Transverse differential locks display

The current status is shown using different symbols:

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

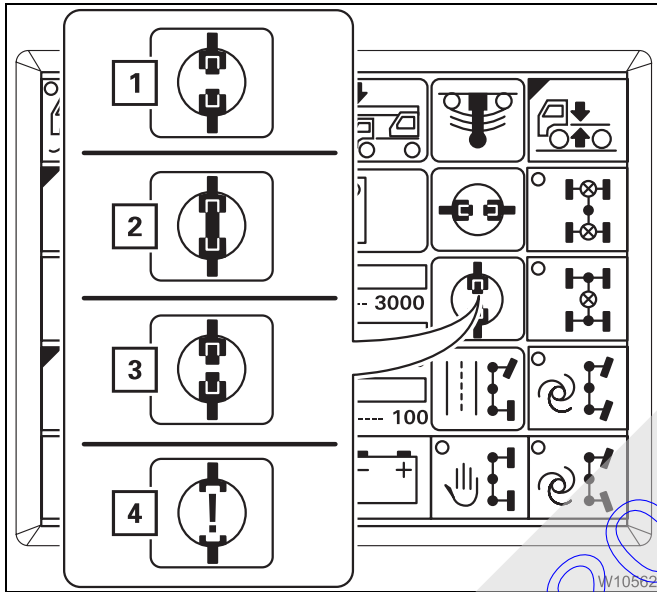
➡ p. 5 - 58



Longitudinal differential locks on/off

- **To switch on:** Press button once – point (1) green, maximum 20 km/h (12 mph)
 - **To switch off:** Press button once – point (1) black
- ➡ p. 5 - 56

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



Longitudinal differential locks display

The current status is shown using different symbols:

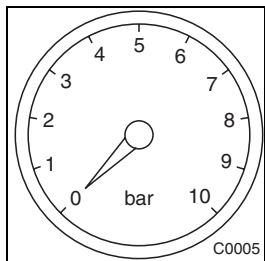
- 1 Green – block off
 - 2 Red – block on
 - 3 Yellow – intermediate position
 - 4 Violet – error
- ➡ p. 5 - 56

3.2.10

Brakes

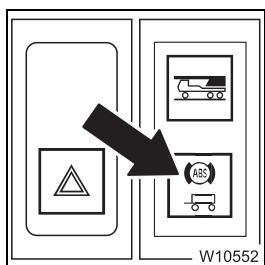
Service brake

Front instrument panel – *left*



Supply pressure gauge for brake circuits I and II

Shows the current supply pressure in the brake circuit in bar (two pointers);
▶▶▶ p. 5 - 46.

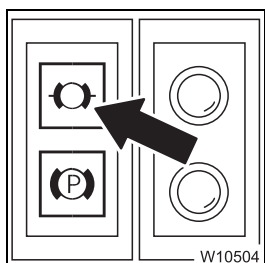


Warning for trailer ABS

- **On:** approx. 6 km/h (4 mph) not reached
or
ABS trailer defective
- **Off:** approx. 6 km/h (4 mph) exceeded, and ABS trailer ready
to function

▶▶▶ p. 5 - 34

Front instrument panel – *right*



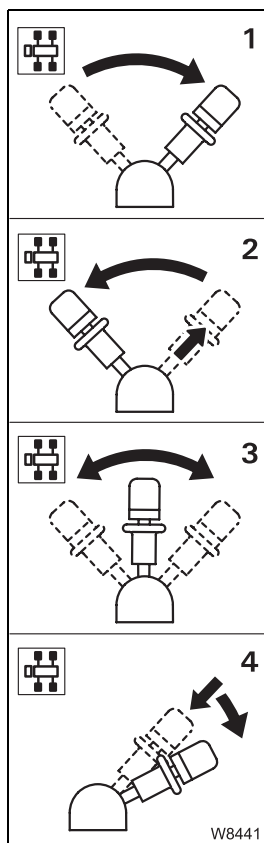
Supply pressure warning for brake circuits I and II

- **On:** Supply pressure below approx. 5 bar (73 psi)
- **Off:** Supply pressure above 5.5 bar (80 psi)

▶▶▶ p. 5 - 46

Parking brake

Side instrument panel



Parking brake lever

1 To engage the parking brake:

Pull the parking brake lever back until it locks into place

2 To release the parking brake:

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

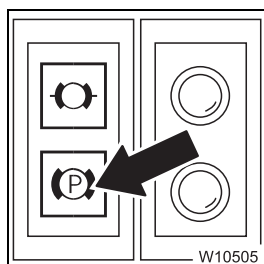
3 To operate it as an auxiliary brake:

Shift the parking brake lever to intermediate position. The braking force is increased continuously by moving the lever from the front to the rear.

4 Test position for towing a trailer:

- Pull the parking brake lever back until it locks into place.
 - Press in the parking brake lever and pull it further backwards
- The parking brake for the trailer is released;
▶ p. 5 - 90.

Front instrument panel – right



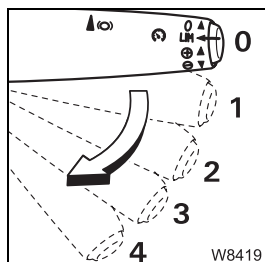
Parking brake monitoring

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



Additional brakes The transmission contains the sustained action brake and the retarder.

Multipurpose switch

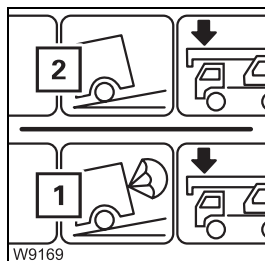


- 0 Forwards:** Engine retarder and retarder off
- 1 Backwards:** Sustained action brake, level 1
- 2 Backwards:** Sustained action brake, level 1
retarder, level 2
- 3 Backwards:** Sustained action brake, level 1
retarder, level 3
- 4 Backwards:** Sustained action brake, level 1
retarder, level 4

- ▣▣▣▣ Sustained action brake, p. 5 - 41
- ▣▣▣▣ Retarder, p. 5 - 42.

ECOS display – main menu

Additional brake display



- 1** Sustained action brake/retarder off
- 2** Sustained action brake/retarder on

- ▣▣▣▣ Sustained action brake, p. 5 - 41
- ▣▣▣▣ Retarder, p. 5 - 42.

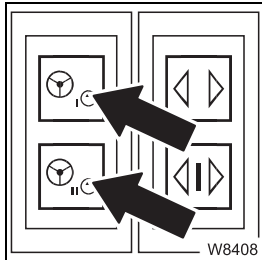
52203182

3.2.11

Normal steering mode/separate steering

Instrument panels

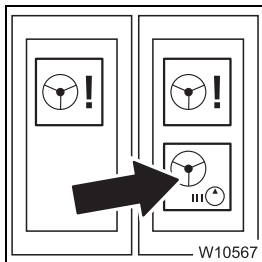
Front instrument panel – left



Steering circuit I and steering circuit II

- **On:** engine off – ignition on
or
engine on – malfunction, stop – check oil loss
- **Off:** engine on – no malfunction

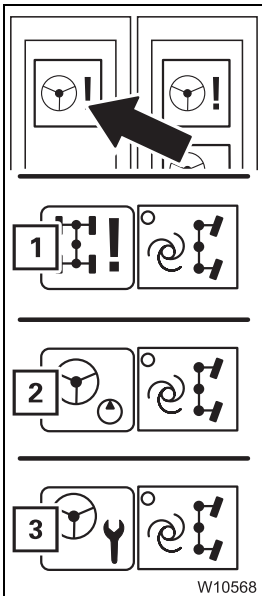
➡ p. 5 - 33



Emergency steering pump warning

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

➡ p. 5 - 33



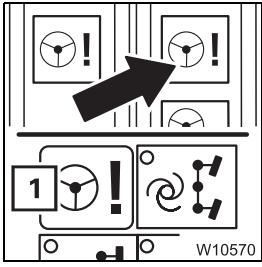
Error in steering system

- **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) – 4th and 5th axle still in straight running position, forward drive possible
- **Flashing:** after engine start:
 - Steering angle on the 4th and 5th axle incorrect
 - Steer front axle lines – steering angle is adapted
- **Off:** no error in the steering system

After engine start; ➡ p. 4 - 17

While driving; ➡ p. 5 - 34





Steering system warning

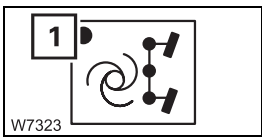
- **On:** steering system defective – stop immediately
Display symbol (1) – 4th and 5th axle cannot be steered; if it is possible, it can only be steered in straight running position – max. 20 km/h (12 mph)
- **Off:** no error in the steering system

After engine start; ■■■▶ p. 4 - 17

While driving; ■■■▶ p. 5 - 34

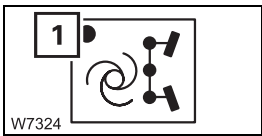
ECOS display

Main menu



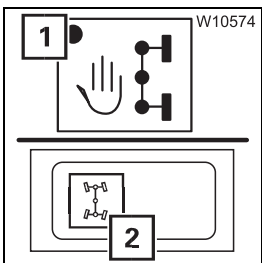
Separate steering crab travel mode on/off

- **To switch on:** Press button once – point (1) green, maximum 20 km/h (12 mph)
 - Steering wheel steers 1st to 3rd axle line
 - 4th and 5th axle lines steer in the same direction
- **To switch off:** Press button once – point (1) black
■■■▶ p. 5 - 68



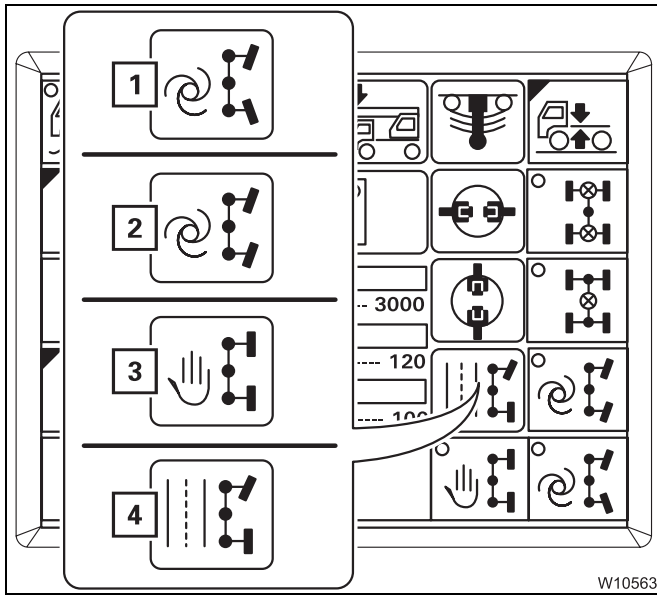
Separate steering driving around corners on/off

- **To switch on:** Press button once – point (1) green, maximum 20 km/h (12 mph)
 - Steering wheel steers 1st to 3rd axle line
 - 4th and 5th axle lines steer for the smallest turning circle
- **To switch off:** Press button once – point (1) black
■■■▶ p. 5 - 68



Separate steering manual on/off

- **To switch on:** Press button once – point (1) green, maximum 20 km/h (12 mph)
 - Steering wheel steers 1st to 3rd axle line
 - Rocker button (2) steers the 5th axle line
 - 4th axle line steers 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 – point (1) black
■■■▶ p. 5 - 68



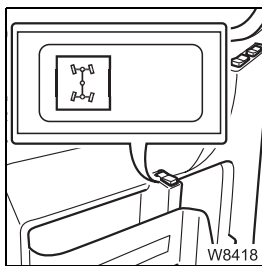
Steering mode display

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 - 68

Driver's door



Separate steering

The separate steering is switched on.

- **Left:** 5th axle line – turn to the left
- **Right:** 5th axle line – turn to the right

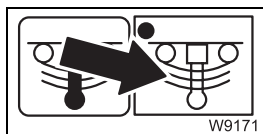
The 4th axle line steers in a suitable manner for crab travel mode or driving around corners, depending on the position of the axle lines.

▶▶▶ p. 5 - 68

3.2.12

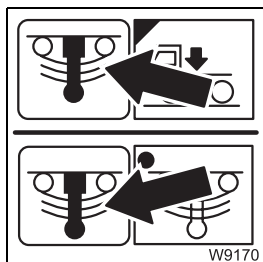
Suspension

▣▣▣▣ ➔ *Switching the suspension on/off*, p. 5 - 15.



Suspension on/off

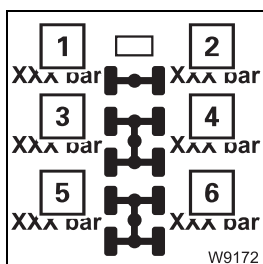
- **To switch on:** Press button once – point green
 - **To switch off:** Press button once – point black
- ▣▣▣▣ ➔ p. 5 - 16



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 - 16



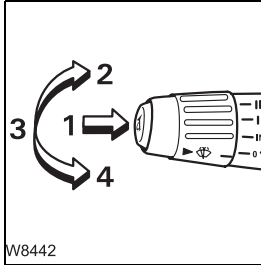
Suspension operating pressure gauge

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

3.2.13

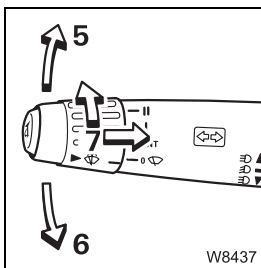
Lighting/windscreen wipers/horn

Steering column



W8442

- 1 Horn:** press the button
- 2 Headlight flasher:** press up the switch
The parking light/headlight is switched on:
- 3 Parking light/headlight:** Middle position
- 4 Full-beam headlight:** down – latches into place

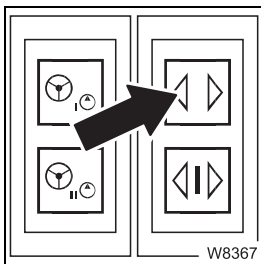


W8437

- 5 Right turn signal indicator:** forwards
- 6 Left turn signal indicator:** backwards
- 7 Windscreen wiper/washing system:** press
- 7 Windscreen wiper:** slew
 - **Off:** to 0
 - **interval:** to INT
 - **slow:** to I
 - **fast:** to II

Instrument panels

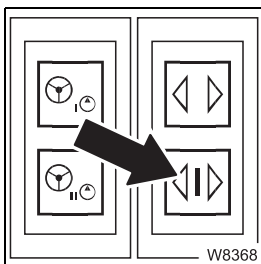
Front instrument panel – left



W8367

Turn signal indicator monitoring

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



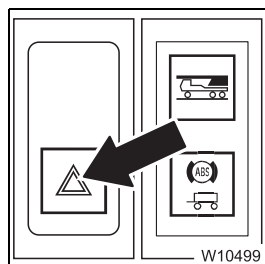
W8368

Trailer turn signal indicator lamp monitoring

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

31.01.2007

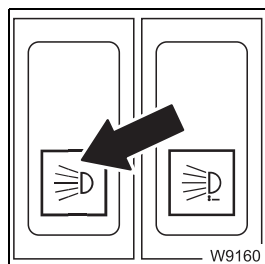




Hazard warning system

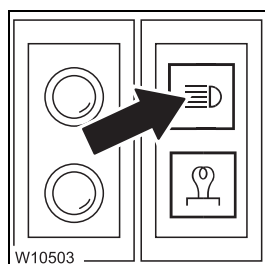
- **To switch on:** press down
When the lamp in the switch does not flash, a filament lamp is defective.
- **To switch off:** press up

Front instrument panel – right



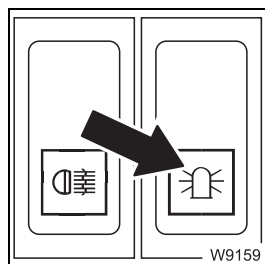
Parking light/headlight on/off

- **To switch off the light:** press up
- **Parking light:** Middle position – instrument lighting on
- **Headlight:** press down – instrument lighting on



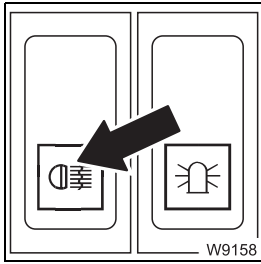
High beam headlight monitoring

- **On:** headlight – full beam on
- **Off:** headlight – full beam off



Rotating beacon on/off

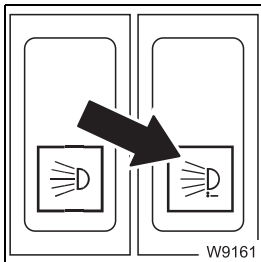
- **To switch on:** press down
- **To switch off:** press up



Fog tail light/fog light on/off

The headlight is switched on.

- To switch off the fog light/
fog tail light: press up
- To switch on the fog light: in middle position
- To switch on the fog light/
fog tail light: press down – the lamp in the switch lights up.



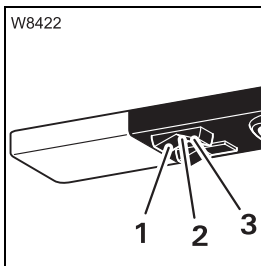
Side instrument panel

Outrigger lighting on/off

- To switch on: press down
- To switch off: press up

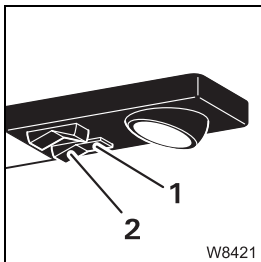
Overhead in the driver's cab

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



Cab lighting

- 1 Permanently on
- 2 Permanently off
- 3 On/off via door contact



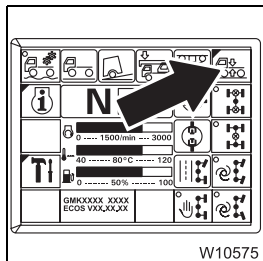
Reading lamp

- 1 On
- 2 Off

3.2.14

Level adjustment system

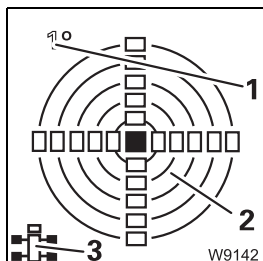
▣▣▣▣ Operation of the level adjustment system, p. 5 - 60.



W10575

Level adjustment system submenu

- **Open:** press button 1 x – submenu is shown

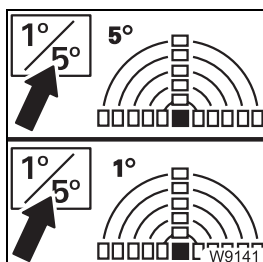


W9142

Display of current inclination

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

▣▣▣▣ p. 5 - 62

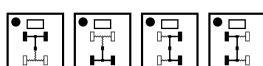


W9141

Change the measurement range

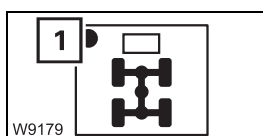
- **Switch over:** press button once – the current measuring range 1° or 5° is shown

▣▣▣▣ p. 5 - 62



Pre-selection of front/rear/right/left level

Control is identical with the **Overall level** pre-selection.

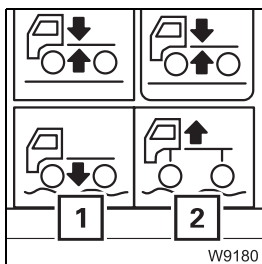


W9179

Overall level pre-selection

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

▣▣▣▣ p. 5 - 61



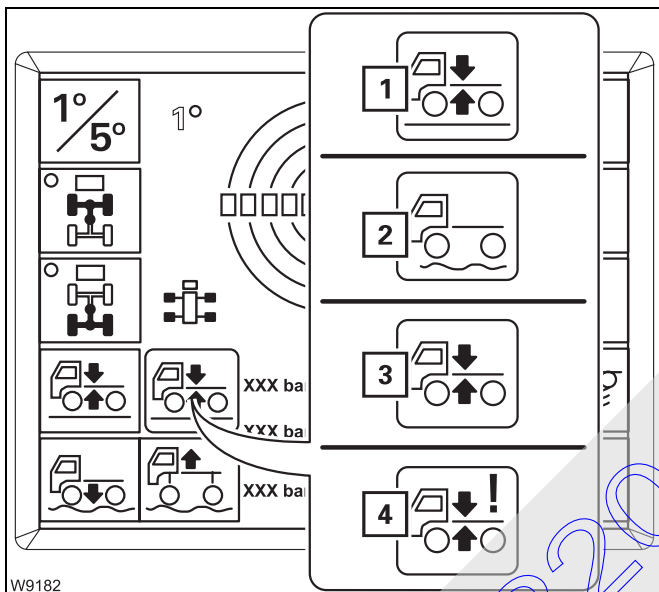
Lowering/raising the level

Suspension struts are pre-selected.

- 1 To lower:** press button – suspension struts retract
- 2 To raise:** press button – suspension struts extend

➡ p. 5 - 62

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

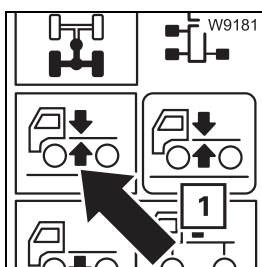


Vehicle level display

The current status is shown using different symbols:

- 1 green** – on-road level
- 2 white** – no on-road driving level
- 3 yellow** – level change
- 4 violet** – error

➡ p. 5 - 68



Set on-road driving level

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

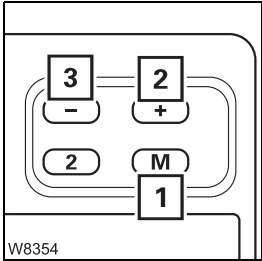
➡ p. 5 - 61

3.2.15 Tachograph/Speedometer

▣▣▣▣▶ *Setting the tachograph – version 1, p. 5 - 17.*

Tachograph

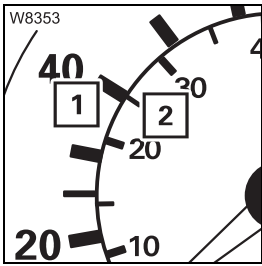
Correcting the time – version 1



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

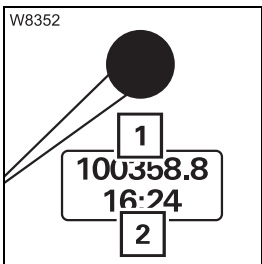
Speedometer

Displays the speed, route and time:



Speed indicator

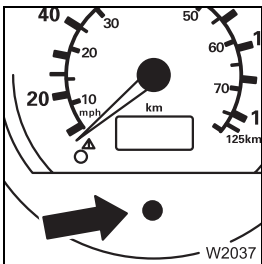
- 1** Speed indicator in km/h
- 2** Speed indicator in mph



Speedometer display

The ignition is switched on.

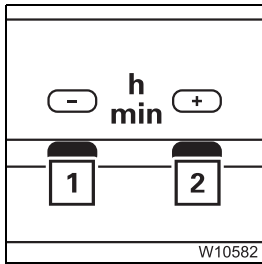
- 1** Overall route in kilometres –
Position after the decimal point: 1 = 100 m (33 ft)
- 2** Displays the time or day's kilometres as required



Display time/day's kilometres

- **Switch over the display:** press button once – the display switches between the time and the day's kilometres.
- **Reset the day's kilometres to zero:**
 - 1.** Switch over to day's kilometres
 - 2.** Press the button for longer than two seconds.

The day's kilometres display will be set to zero.



Set the speedometer time

- 1 Press the button – the time is increased
- 2 Press the button – the time is decreased

Set the hours:

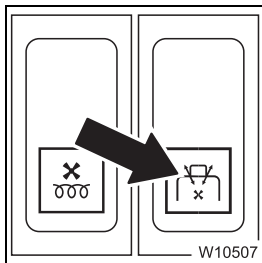
Press buttons (1) + (2) once – press the button for setting within 10 seconds

Set the minutes:

Ignition on or
do not press a button for approx. 10 seconds

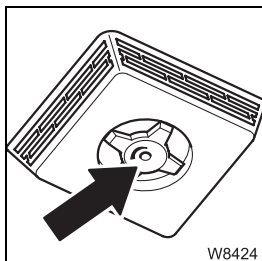
3.2.16

Roof ventilator



Roof ventilator on/off

- To ventilate: press up
- Off: in middle position
- To blow air: press down



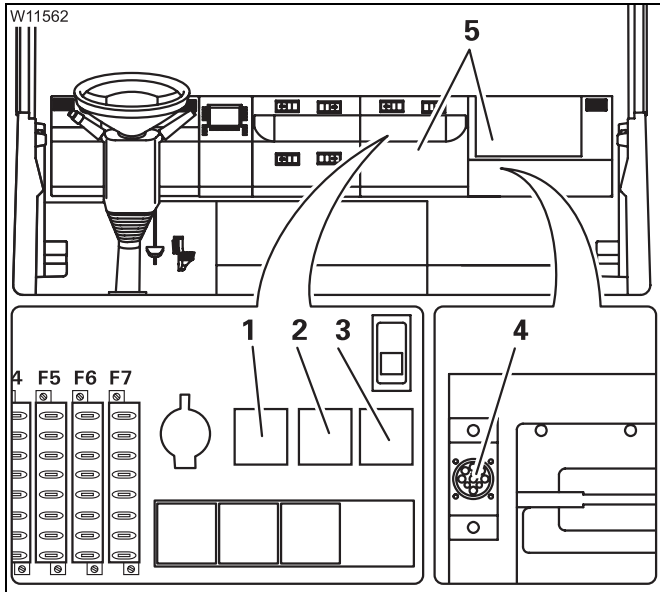
Roof ventilator

- To close the roof ventilator: turn the handwheel anti-clockwise.
- To open the roof ventilator: turn the handwheel clockwise.

3.2.17 Diagnostics

Connections

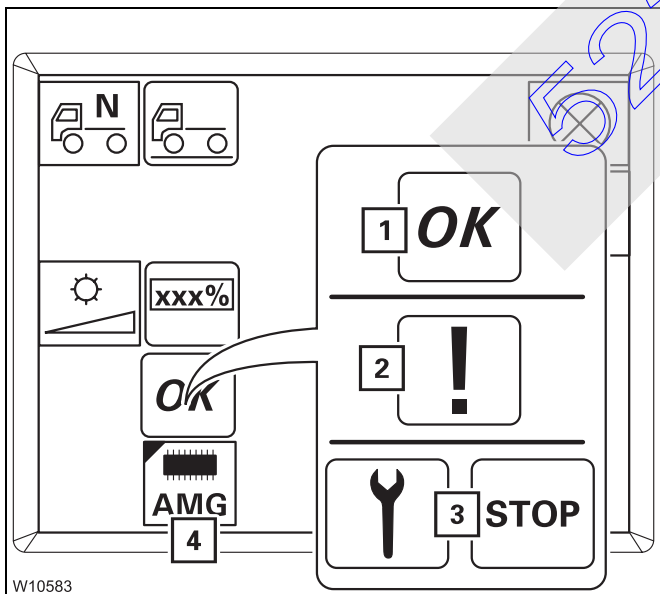
The diagnostics connections may only be operated by service staff from the engine transmission manufacturer, or by **CraneCARE**.



The following connections are below the covers (5):

- 1 ECOS diagnostics
- 2 Steering system diagnostics
- 3 SAE-BUS diagnostics
- 4 Engine/transmission diagnostics

Display/submenu *Settings* submenu



AMG malfunction display

Shows the symbol for the current status.

- 1 No error
- 2 Slight error – continued driving possible
- 3 AMG malfunction – observe the engine malfunction displays; see p. 7 - 36.

AMG Diagnostics submenu

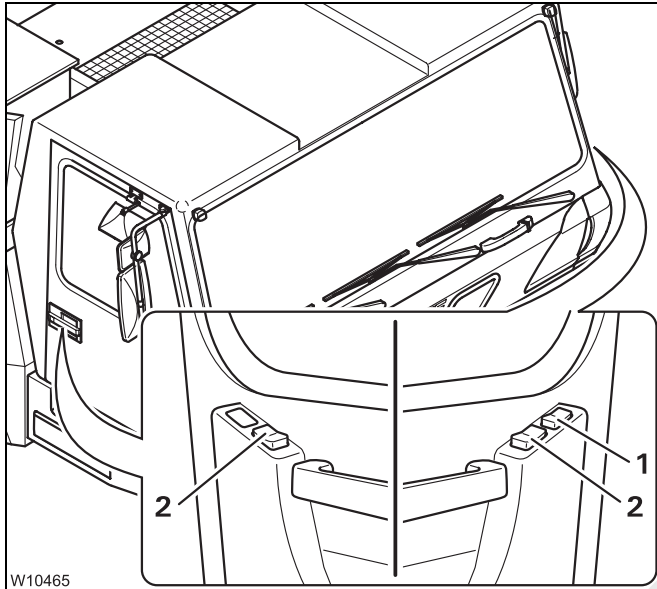
If there is a malfunction, press button (4) once, read the values in the submenu and report to **CraneCARE**.

3.2.18

Windows, doors, keys

Windows

Buttons for electric window winders



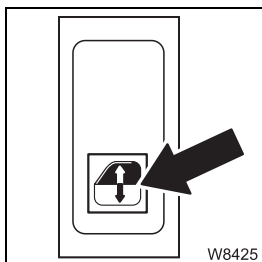
- 1 Window winder in the driver's door
- 2 Window winder in the driver's door

The operation is the same for all buttons.



Risk of being squeezed by closing the windows!

If the window winder encounters any resistance, it does not stop but keeps on moving at reduced power.



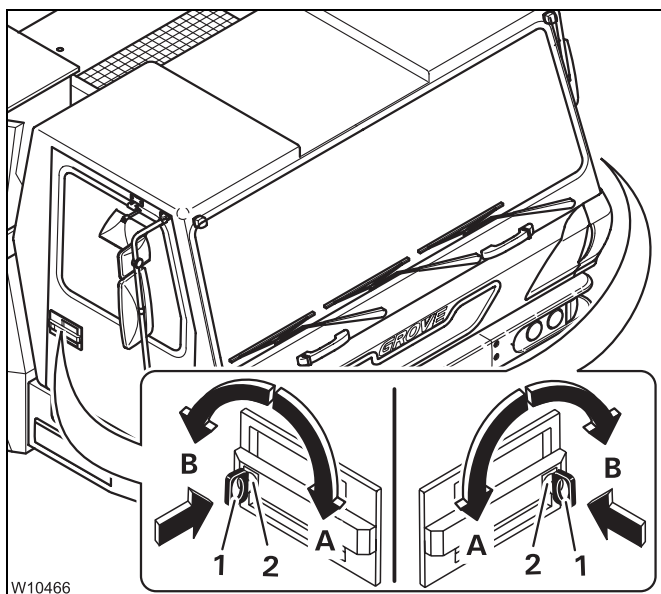
- **To open the window:** press down
- **To close the window:** press up

The window is opened or closed until the button is released, or until an end position is reached.



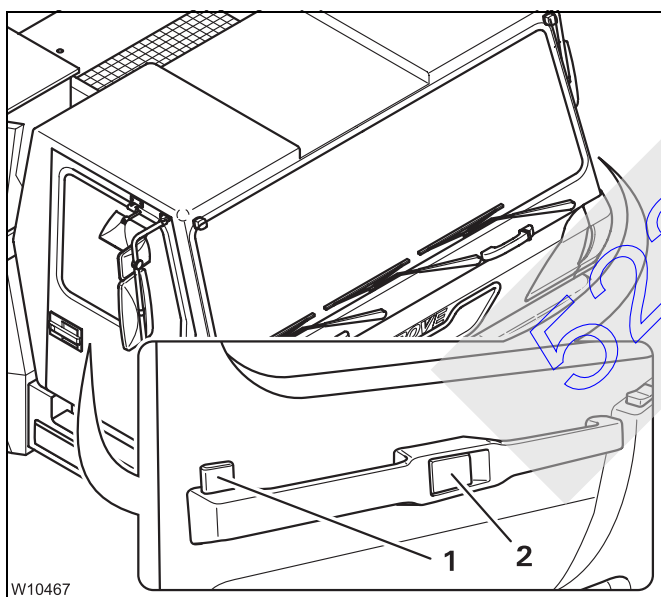
Doors

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



From outside

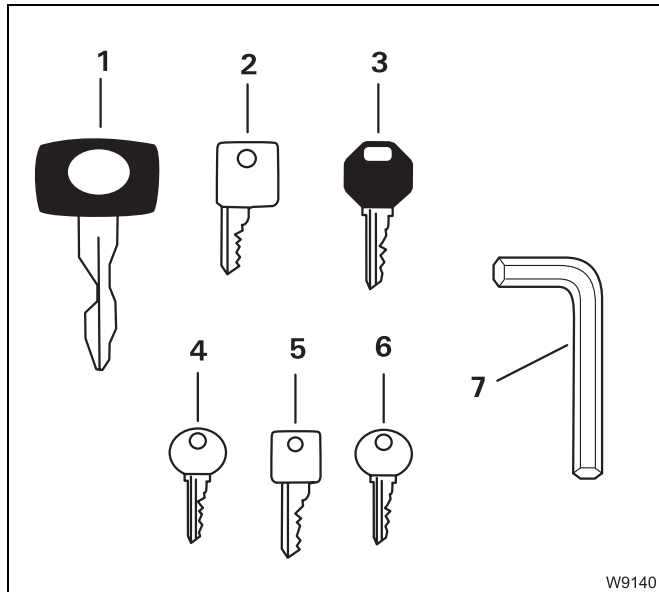
- **Unlocking**
Turn the key (1) forwards in the **A** direction
- **Locking**
Turn the key (1) backwards in the **B** direction
- **Opening**
Press the knob (2).



From inside

- **Locking**
Push down the knob (1).
- **Unlocking**
Push up the knob (1).
- **Opening**
Pull the lever (2).

Keys



The keys supplied belong to the following locks and covers:

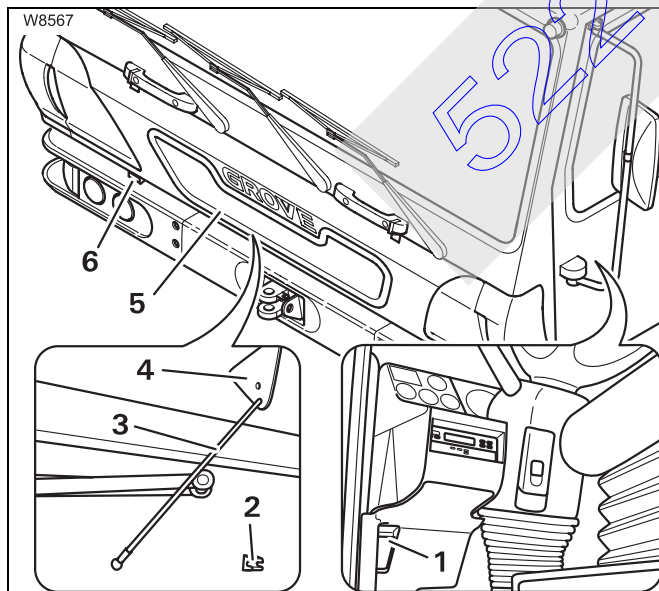
- 1 Door/ignition lock of driver's cab
- 2 Key-operated switch
- 3 Control unit, outriggers¹⁾
- 4 Boom floating position lock¹⁾
- 5 Slewing gear freewheel lock¹⁾
- 6 Fuel reserve tank¹⁾
- 7 Carrier covers

¹⁾ Additional equipment

3.2.19

Front flap

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



Opening the front flap

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

Closing the front flap

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

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4 Starting/turning off the engine for driving

4.1	Starting the engine from the driver's cab	4 - 1
4.1.1	CHECKLIST: Starting the engine	4 - 1
4.1.2	CHECKLIST: In low temperatures	4 - 4
4.1.3	Access ladders and ladders	4 - 4
4.1.4	Refuelling.	4 - 7
4.1.5	Checks before starting the engine.	4 - 8
4.1.6	Ignition, switching on.	4 - 9
4.1.7	Lamp test/equalisation of the switching states	4 - 10
4.1.8	Adjusting the brightness of the display	4 - 13
4.1.9	Starting the engine	4 - 14
4.1.10	Checks after starting the engine	4 - 17
4.1.11	Monitoring submenu	4 - 19
4.1.12	Setting the idling speed	4 - 20
4.2	Turning off the engine.	4 - 21
4.2.1	Usually with the ignition lock/with the hand-held control	4 - 21
4.2.2	With emergency stop switches in emergencies.	4 - 22
4.3	Air intake inhibitor.	4 - 23

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4

Starting/turning off the engine for driving

4.1

Starting the engine from the driver's cab

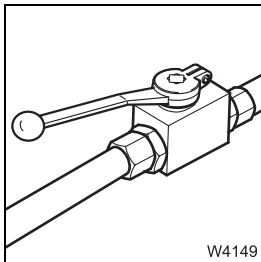
This section only describes how to start the engine from within the driver's cab. You can also start the engine using the hand-held control, or from the crane cab; **▶▶▶▶ Starting the engine for driving for rigging work**, p. 13 - 23.

4.1.1

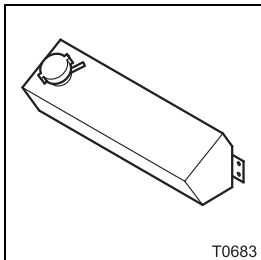
CHECKLIST: Starting the engine



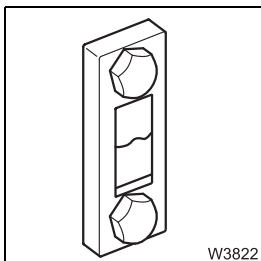
This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references. **Observe the warnings and safety instructions specified there.**



1. Check that the valve on the hydraulic tank is open; **▶▶▶▶ p. 4 - 8.**

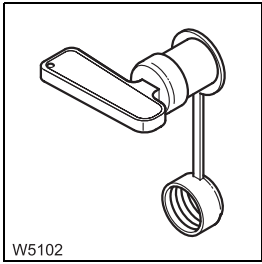


2. Check the coolant level of the engine; **▶▶▶▶ Maintenance Manual.**

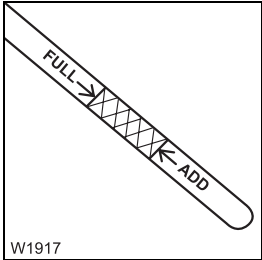


3. Check the oil level in the hydraulic system; **▶▶▶▶ Maintenance Manual.**

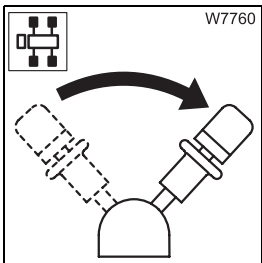




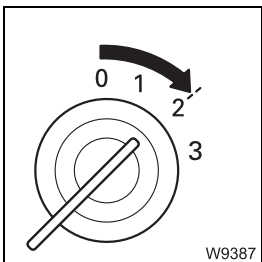
4. Switch on the battery master switch; p. 4 - 9.



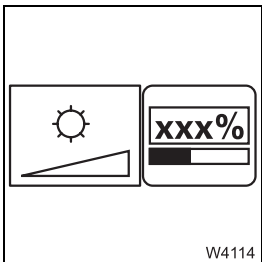
5. Check the oil level in the engine; *Maintenance Manual*.



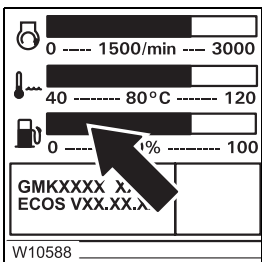
6. Check whether the parking brake is engaged (parking brake lever pointing toward the rear).



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

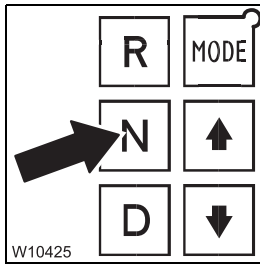


8. Adjust the brightness of the *ECOS* display as required; p. 4 - 13.

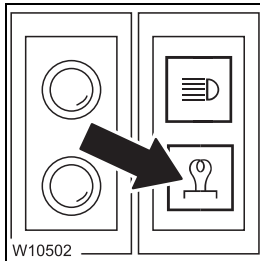


9. Check the fuel reserve; p. 4 - 7.

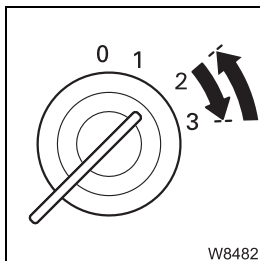
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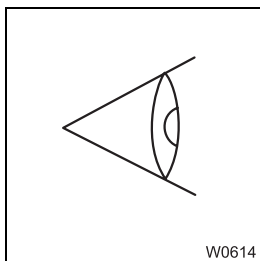
10. Shift the transmission to neutral position **N**; p. 5 - 24.



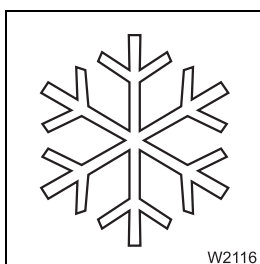
11. If the truck crane has a flame start system, wait until the lamp goes out;
 p. 4 - 16.



12. Start the engine; p. 4 - 14.



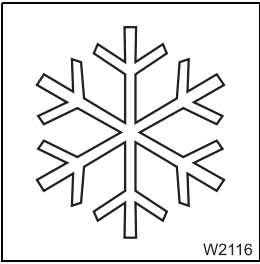
13. Check the instruments and displays with the engine running;
 p. 4 - 17.







14. When outside temperatures are low; *CHECKLIST: In low temperatures*, p. 4 - 4.

4.1.2

CHECKLIST: In low temperatures



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

1. The fuel and engine oil must be suited for use in the outside temperature in question;  *Separate operating instructions from the engine manufacturer.*
2. The engine coolant must contain sufficient antifreeze;  *Separate operating instructions from the engine manufacturer.*
3. The windscreen washing system must contain sufficient antifreeze;  *Windscreen washing system, p. 5 - 7.*
4. The engine can be pre-warmed with the auxiliary water heater if necessary;  *Auxiliary water heating system, p. 5 - 74.*

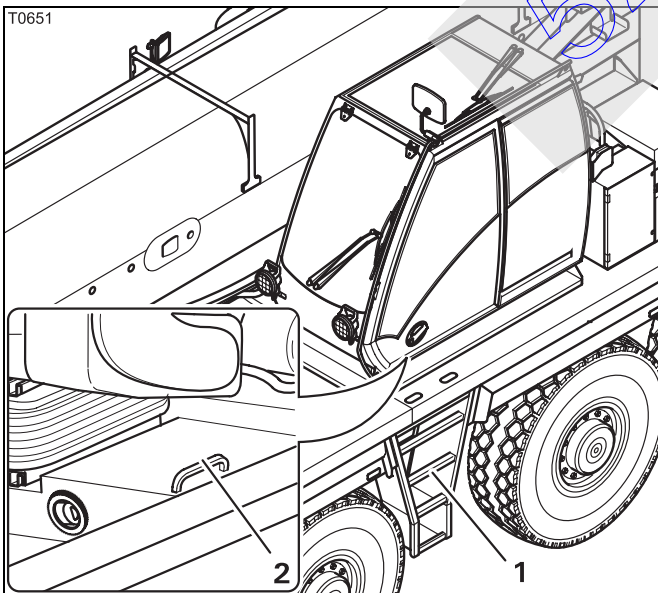
4.1.3

Access ladders and ladders

Access ladders and other different ladders, which are required for monitoring and rigging work, are located on the carrier.

Access ladders

Ladders have been attached to the truck crane in order to access the carrier.



The access ladders are located on the right hand side (1).

One access ladder is located on each of the two sides (2).

When the crane cab door is opened, you can also reach the grip (3).

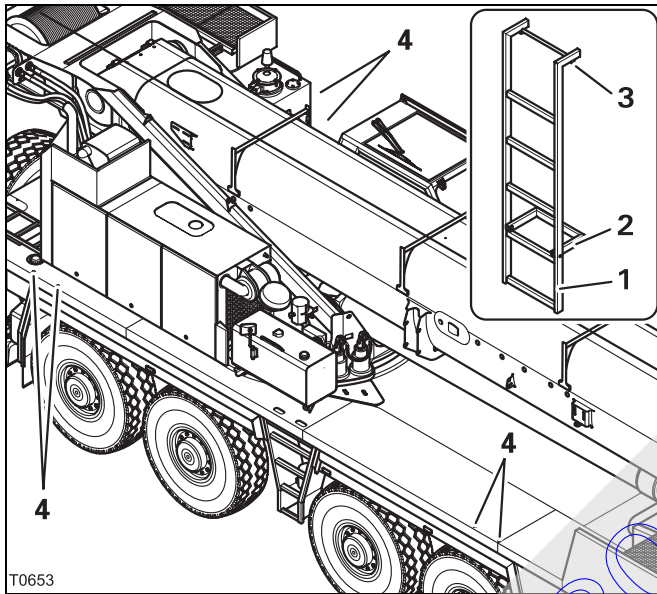
Ladders

Two ladders for attachment and an extendable ladder are located on the truck crane.



Risk posed by ladders falling down!

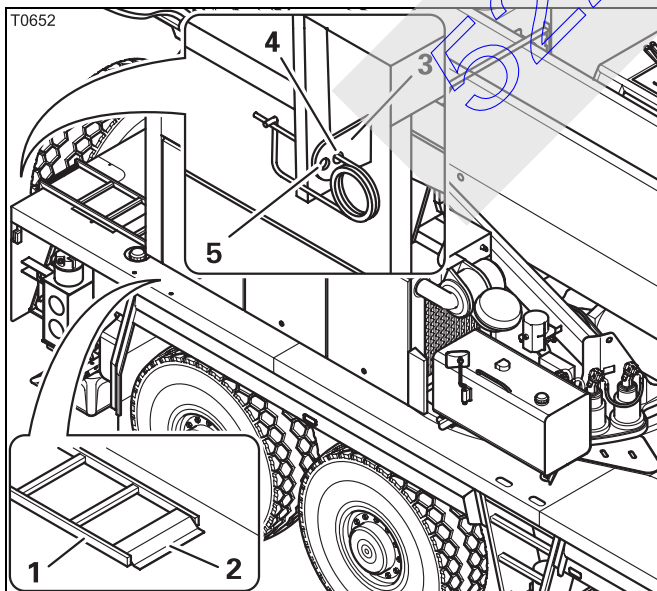
Secure the ladders in the appropriate holder each time you use it. This prevents the ladders from falling down during on-road driving, endangering other vehicles.



Ladder for attachment

The ladder (1) can be attached in the bores (4).

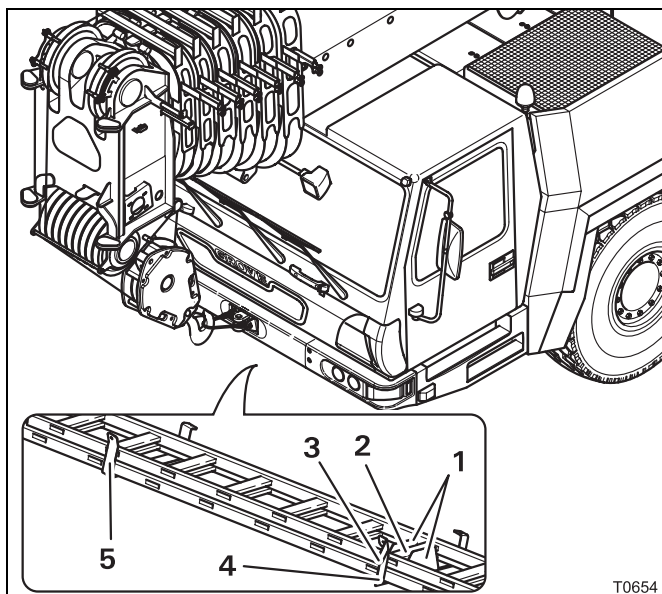
- Attach the ladder in such a way that the pegs (3) are inserted as far as possible into the bore holes.
- Fold out the spacer (2) in order to provide a secure installation.



- For driving, push the ladder (1) below the angle (2) with the lowest rung.
- Secure the ladder on the holder (3) using the retaining pin (4).

The bore (5) is secured with the lock provided.





Extendable ladder

The extendable ladder can be transported at the front underneath the truck crane.

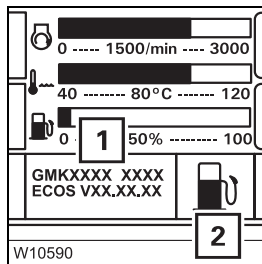
- Raise the holder (4) slightly and release the lock with the lever (3).
- Fold down the holder (4).
- Insert the retaining pins into the holder (5).
- Position the ladder with a rung (2) between the bracket (1), so that it cannot slip to one side.
- Fold up the holder (4) and secure it with the lock (3).

You can also secure the holder (4) with a lock.

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4.1.4

Refuelling



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

- green:** over 10% – over 40 l (10,5 gal)
 - yellow:** 5 to 10% – 20 to 40 l (5 to 10.5 gal)
 - red:** below 5% – less than 20 l (5 gal)
- The red symbol (2) is displayed.

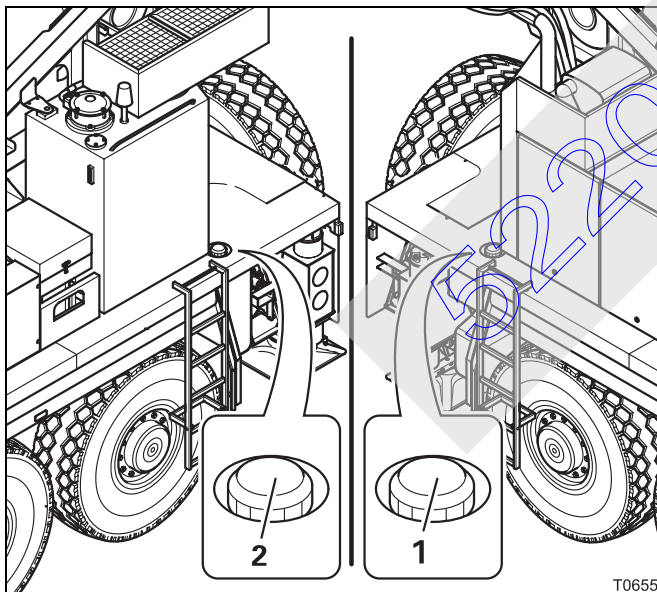


A further display is contained in the *Monitoring* submenu. The percentage is displayed there as a numerical value; p. 4 - 19.



Danger of fire due to inflammable gases!

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



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

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



Risk of accidents if the fuel tank is not closed!

Screw the cap back onto the filler neck each time after refuelling. In this way you can prevent other vehicles from being endangered by the cap falling off or fuel escaping.

4.1.5

Checks before starting the engine

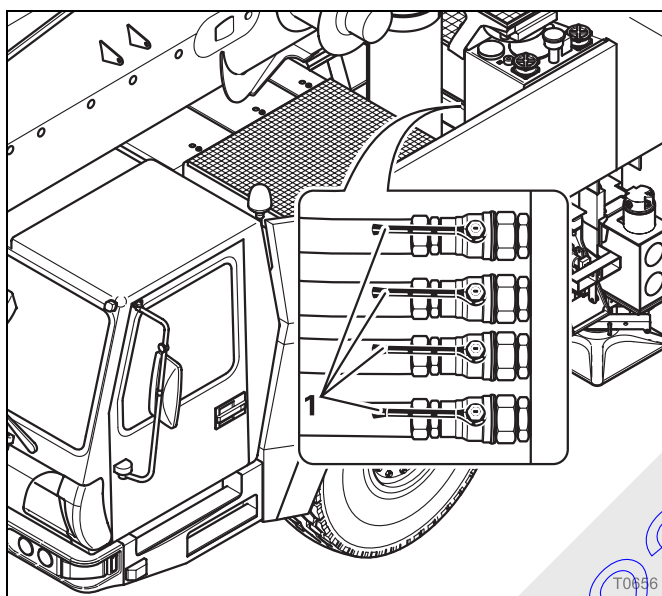
On the hydraulic tank

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



Risk of damage to the hydraulic pumps

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

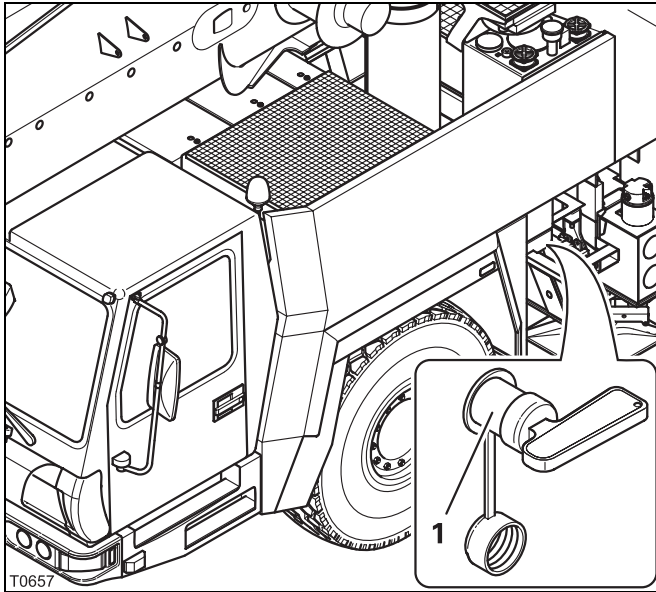


- Check whether the valves are open – lever (1) parallel to the line.
- Open the closed valves.

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Battery master switch

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



- Switch on the battery master switch (1).
The battery master switch is switched on if you are unable to pull off the selector handle.

Checking the hand-held control

Check whether the hand-held control has been removed, and that the bridging plugs for the hand-held control are inserted into all sockets;
▶▶▶ p. 10 - 104.

4.1.6

Ignition, switching on

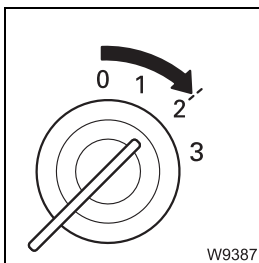


Risk posed by unexpected rolling

At ignition, 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.



- Insert the ignition key into the ignition lock and turn the key to position **2**.
After switching on the ignition, a lamp test is carried out, and switching states are equalised.

4.1.7 Lamp test/equalisation of the switching states

Lamp test

After ignition has been switched on,

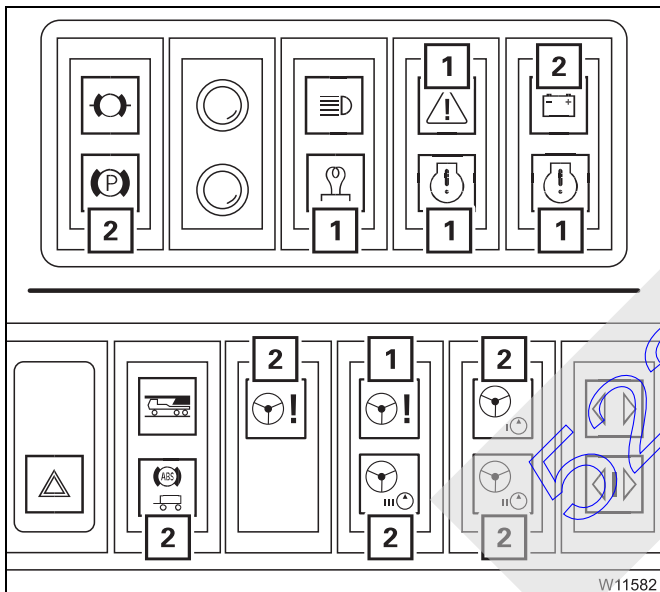
- an ECOS lamp test and
- a lamp test of the electrical system are carried out.



Risk of accidents due to faulty lamps.

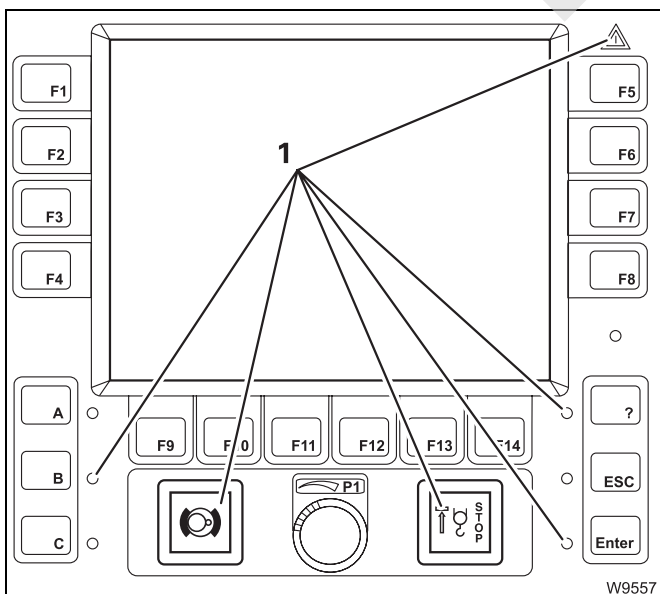
The lamps that are used to provide warnings and information during operation go on for control purposes whenever the ignition is switched on. Always perform the following lamp tests and immediately replace defective lamps or have them replaced.

In this way you can avoid accidents and damage caused by detecting malfunctions too late.



On the instrument panels

- 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, close the parking brake and check that the lamps (2) light up continuously.

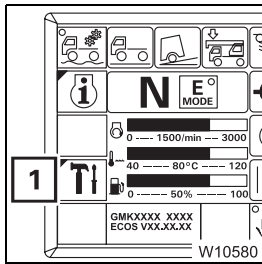


On the control unit ECOS


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

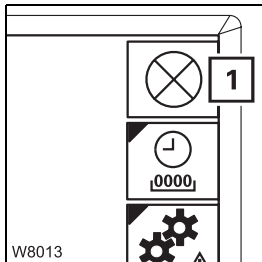
Contact **CraneCARE** if one or more lamps do not go on.


If it has not been possible to check all the lamps in the specified time, the lamp test can be repeated at the crane control display as follows.



Conducting a lamp test

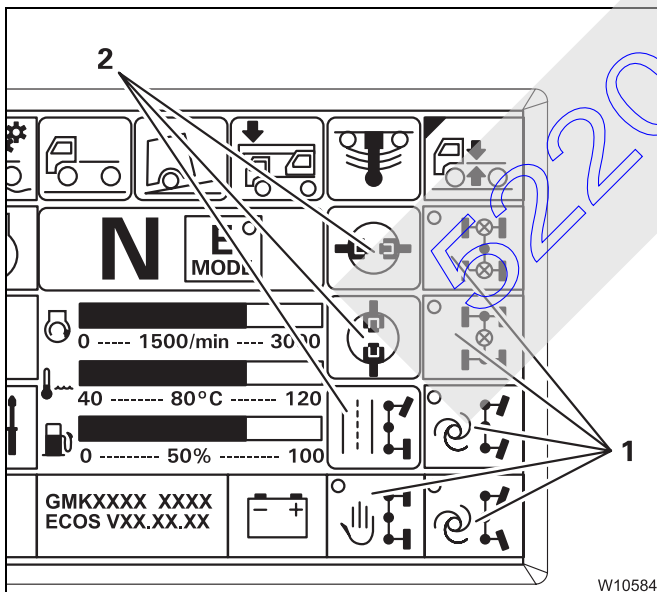
- If necessary, open the main menu  and press the button (1) once. The *Settings* submenu is opened.



- Press the button (1). The above lamps go on until you let go of the button again. If necessary, you can set the minimum brightness of the display;  p. 4 - 13.

Equalisation of the switching states

When the ignition is switched on, the switching states for 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 display (2) shows the current switching states.

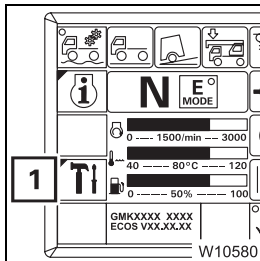
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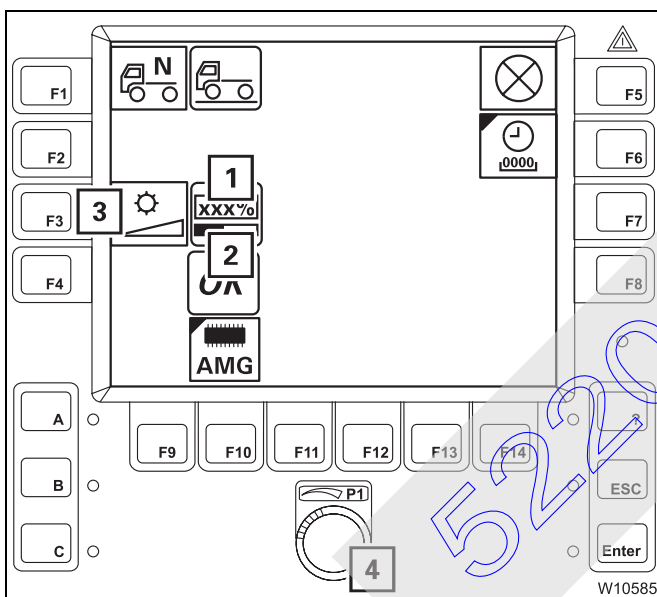
4.1.8

Adjusting the brightness of the display

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 adhered to when regulating the brightness.



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



- Press the button (3) once. A red bar (2) appears below the display (1).
- Set the required minimum degree of brightness with the rotary switch (4).

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



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



You can **quit the input** at any time. The settings are reset.



- Accept the entered **minimum brightness**. The red bar below the display goes out. The brightness is automatically regulated between the newly set value and 100%.

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 hand-held control; p. 13 - 23.

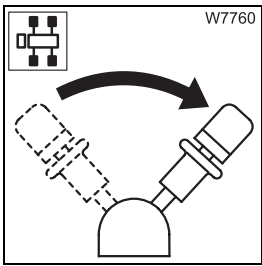
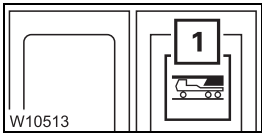


Risk of crushing from turning wheels!

When you start the engine, no persons may be within the steering range of the 4th and 5th axle line. These axle lines are steered each time the engine is started, sometimes with a 5-second delay, in order to test the steering system.

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

- The bridging plugs have been inserted in all sockets of the carrier and superstructure for the hand-held control; p. 13 - 21.
- The lamp (1) has gone out (superstructure ignition off).

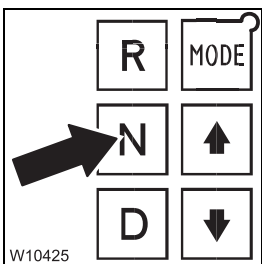


- Check that the vehicle parking brake is locked.

If the brake is locked, the parking brake lever will point to the rear.



Inspections of the electronic gear system may cause the Service symbol (1) to be shown briefly after the ignition is switched on. If the display does not go out; p. 7 - 37.

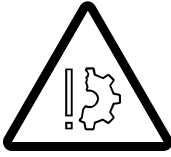


- Switch the transmission to neutral position **N**; p. 5 - 24. Only in this shift position can the engine be started.



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

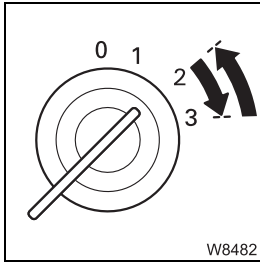
Without flame start system



This section applies to starting the warm and cold engine.

Danger of explosions when using starter fuel!

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



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

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



If the engine does not go on after several attempts;  *Malfunctions on the engine for driving*, p. 7 - 23.



With flame start system

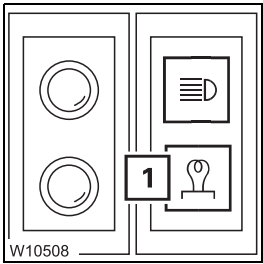
The flame start system warms the suction air of the engine.
This section applies to starting the warm and cold engine.



Danger of explosions when using starter fuel!

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


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

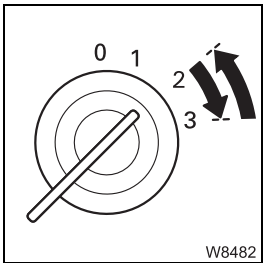



- **When the engine is warm**, the lamp (1) will light up only briefly (2 to 3 seconds).
- **When the engine is cold**, the lamp (1) goes out as soon as the engine has been pre-warmed (duration of up to 20 seconds).
Start the engine within the next 30 seconds; otherwise, you must switch on the ignition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



If the lamp  does not go out, there is a malfunction on the flame start system. Contact **CraneCARE**.

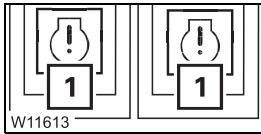
- Wait until the lamp  goes out.
- Do not press the accelerator.
- Turn the ignition key to position **3** and hold it there until the engine goes on.
- Let go of the ignition key after the engine goes on.
- If the engine does not go on, abort the starting procedure after about 15 seconds and wait one minute before trying again.



If the engine does not go on after several attempts;  *Malfunctions on the engine for driving*, p. 7 - 23.

4.1.10

Checks after starting the engine

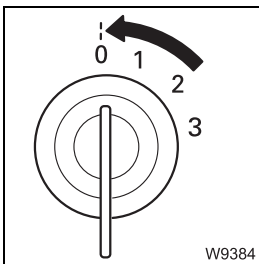


- Watch the lamp (1) immediately after starting the engine.
- The lamps may only stay lit together for a maximum of ten seconds.



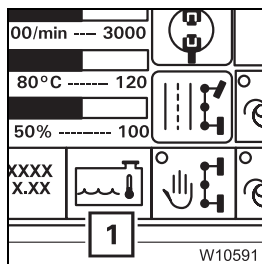
Risk of damage to the engine!

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



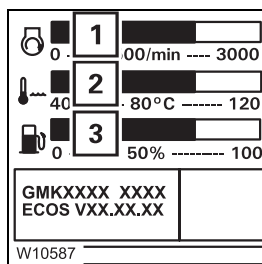
Turn the ignition key to 0 if both lamps are still lit about ten seconds after starting the engine; *Malfunctions on the engine for driving*, p. 7 - 23.

Checks in the main menu



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

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

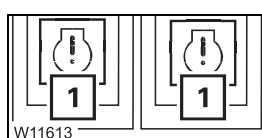


Furthermore the following information can be viewed in the main menu at any time:

- The current engine speed (1)
- The current temperature of the engine coolant (2)
- The current fuel reserve (3)

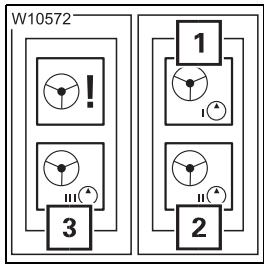
Checks on the instrument panels

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



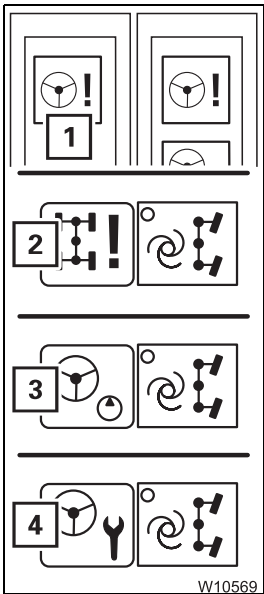
If one of the of the lamps (1) is lit, turn off the engine; *Malfunctions on the engine for driving*, p. 7 - 23.





- Check that the lamps (1) and (2) go out.
 If one or both lamps are lit, refer to the information in section Directly after you start to move; ►► p. 5 - 33.

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

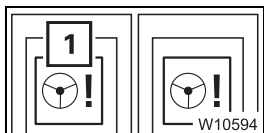


- Check that the lamp (1) goes out.
- When the lamp (1) **lights up**:
 The main menu shows a symbol.

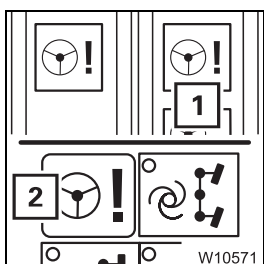
With the symbol (2): The oil supply for the steering is still being built up.
 If the symbol has not yet gone out, contact **CraneCARE**

With the symbol (3): Service mode on.
 Briefly turn off the ignition and then on again. If the symbol is still not shown, contact **CraneCARE**.

With the symbol (4): The 4th and 5th 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 3rd axle lines.
 Arrange for the error to be rectified.



- When the lamp (1) **flashes**:
 The steering angle of the 4th and 5th axle line does not relate correctly to the 1st to 3rd axle line.
 - Steer using the steering wheel – the steering angle is automatically off-set, and the lamp (1) goes out.



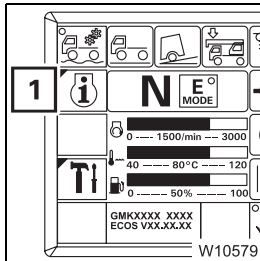
- Check that the lamp (1) goes out.
 If the lamp (1) **is lit**, the symbol (2) is shown. The steering system has failed. You may not under any circumstances drive the truck crane.
 Contact **CraneCARE** and arrange for the error to be rectified.




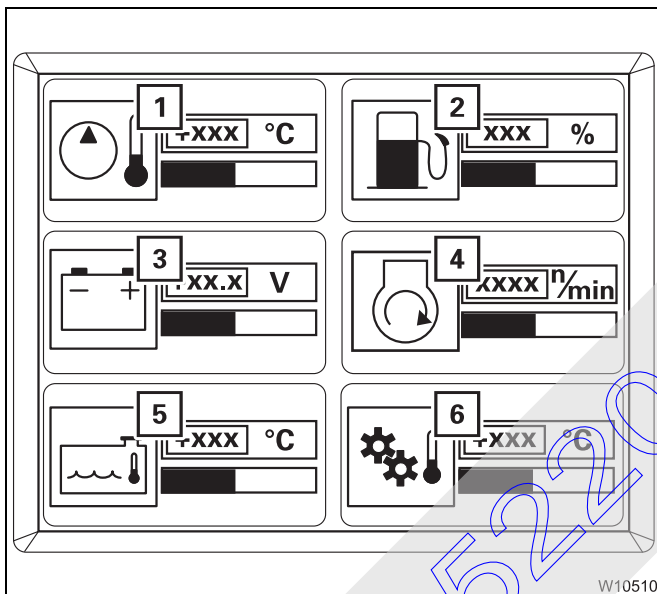
Risk of accidents by the truck crane not being able to be steered!
 Under no circumstances should you drive the truck crane when the red lamp (1) is lit. The truck crane can no longer be steered safely.
 The 4th and 5th axle can steer in an uncontrolled manner, which may lead to serious accidents, even when driving at reduced speed.

4.1.11 Monitoring submenu

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



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



The *Monitoring* submenu is opened.


The following values will be displayed:

- 1 The hydraulic oil temperature in °C (°F)
- 2 The fuel supply as a percentage (100% approx. 395 l (104 gal))
- 3 The voltage in Volts
- 4 The engine speed in min⁻¹ (rpm)
- 5 The coolant temperature in °C (°F)
- 6 The transmission oil temperature in °C (°F)

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

green: current value is OK.

yellow: current value is close to the limit value.

red: current value is higher (or lower) than the limit value. An appropriate warning message appears;  *Warning submenu*, p. 5 - 45.

4.1.12

Setting the idling speed

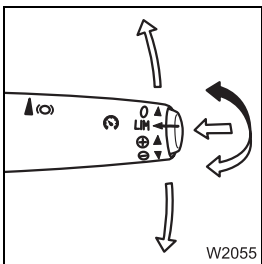
After the engine is started, the idling speed is regulated automatically. If necessary, you can adjust the idling speed manually using the multipurpose switch on the right-hand side.



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

Increasing the idling speed:

You can increase the idling speed by a maximum of approx. 200 revolutions per minute (rpm).



- Pull the multipurpose switch upwards and hold it until the required speed has been reached.
When you release the switch, this engine speed is set as the idling speed.

or

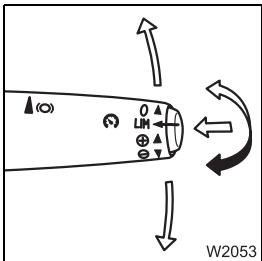
- Press the multipurpose switch upwards once. The idling speed increases by 20 revolutions per minute (rpm).

Decreasing the idling speed:

- Push the multipurpose switch downwards and hold it until the required speed has been reached.
When you release the switch, this engine speed is set as the idling speed.

or

- Press the multipurpose switch downwards once. The idling speed decreases by 20 revolutions per minute (rpm).

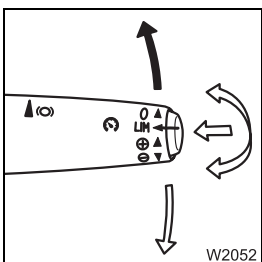


Switching off the idling speed change:

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

or

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



4.2

Turning off the engine

4.2.1

Usually with the ignition lock/with the hand-held control



Risk of accidents by the truck crane not being able to be steered!

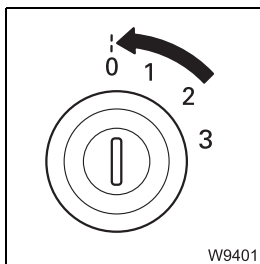
Only turn off the engine once the truck crane is at a standstill. If you remove the ignition key, the steering will lock and you will lose control of the moving truck crane.

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

You must distinguish between whether the hand-held control is connected or not when turning off the engine.

Hand-held control not connected

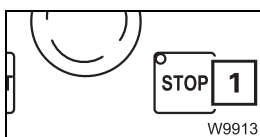
You can switch off the engine with the ignition lock if the hand-held control is not connected to a carrier socket.



- Turn the ignition key to position **0**. The engine goes out.
- Remove the ignition key.

Hand-held control connected

You can switch off the engine only with the hand-held control if the hand-held control is connected to a carrier socket. In this case it is not possible to turn off the engine via the ignition lock.



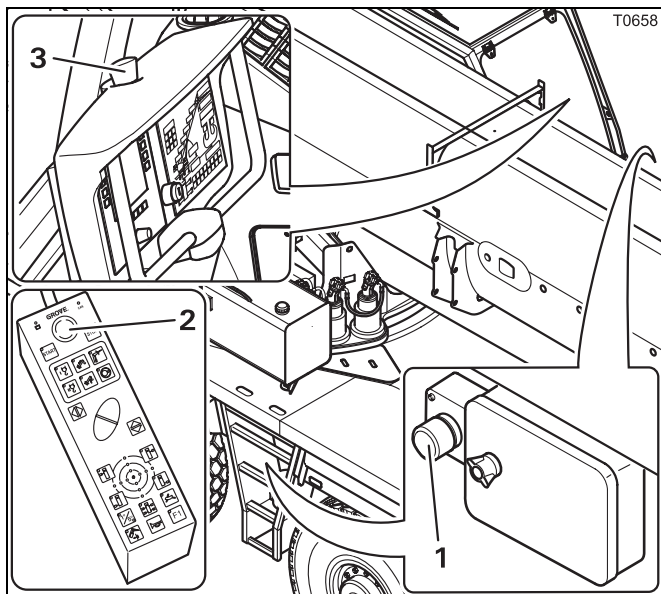
- Press the button **(1)** once – the engine switches off.

After parking

If you want to park the truck crane; *Parking the truck crane*, p. 5 - 49.

4.2.2

With emergency stop switches in emergencies



Four emergency stop switches are provided in case of an emergency:

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

- Press one of the emergency-stop switches (1), (2) or (3). The switch engages.

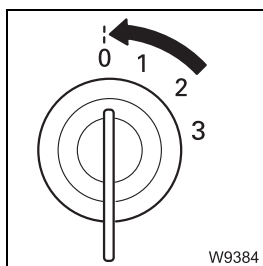
The engine goes out. If the engine for crane operation has previously been started, it is also shut down.



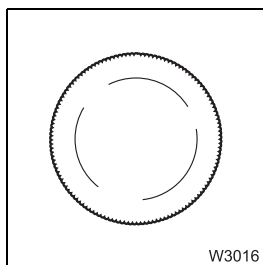
If an air intake inhibitor is present, then it will be triggered – this also applies to the engine for crane operation.

Resetting the emergency stop switch

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



- Turn off the ignition.



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

If air intake inhibitors are fitted, they must be loosened;

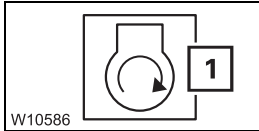
- ▣▶ *Air intake inhibitor*, p. 4 - 23.
- ▣▶ *Air intake inhibitor*, p. 11 - 21.

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:

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

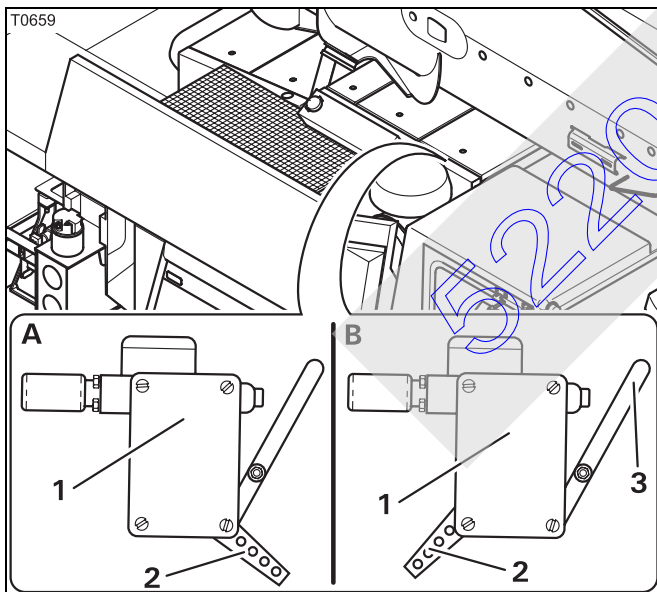


The engine can only be restarted after the air intake inhibitor has been removed.

Removing the air intake inhibitor

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

- The ignition is switched off.
- The emergency-stop circuit is deactivated.



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 latches into the *Removed* position.

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

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5 Driving

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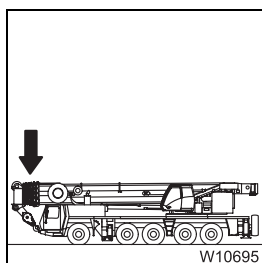
5 Driving

5.1 Before driving

5.1.1 CHECKLIST: Checks before on-road driving

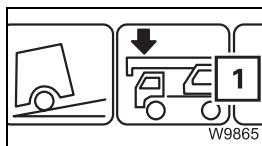


This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references. **Observe the warnings and safety instructions specified there.**

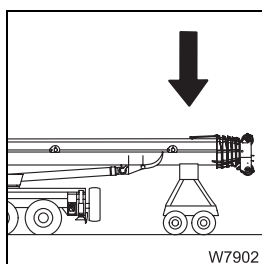


1. If the boom is on the boom rest

- All telescopic sections are interlocked; the telescoping cylinder is locked with telescopic section I
- The slewing gear is switched off; ||||▶ p. 12 - 94,



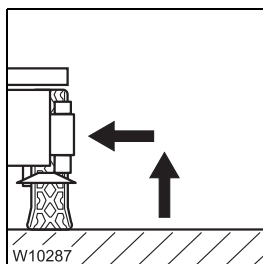
- The symbol (1) is displayed (if present); ||||▶ p. 5 - 9.



2. When the main boom is lying on a trailer

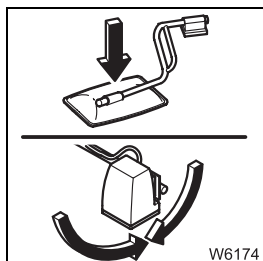
- All telescopic sections are locked,
- The slewing gear is switched off; ||||▶ p. 12 - 94,
- The boom floating position is switched on; ||||▶ p. 6 - 5,
- The slewing gear freewheel is switched on; ||||▶ p. 6 - 3,
- The boom pre-tensioning may be switched on; ||||▶ p. 6 - 6,
- The houselock may be switched off; ||||▶ p. 12 - 14.





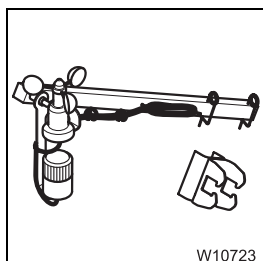
3. On the outriggers

- All outriggers are fully retracted and secured to prevent extension; p. 13 - 34.
- The outrigger pads are in the driving position; p. 13 - 41.



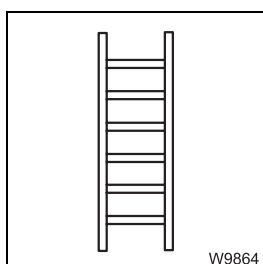
4. All mirrors for crane operation are folded in; p. 13 - 110.

The spotlight is turned downwards (if present); p. 12 - 103.



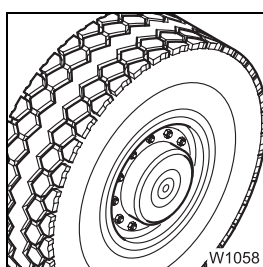
5. The anemometer has been removed; p. 13 - 108.

The air traffic control light has been removed (if present); p. 13 - 108.



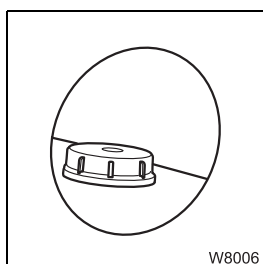
6. All ladders are secured in the holders

- Ladder for attachment*, p. 4 - 5,
- Extendable ladder*, p. 4 - 6.



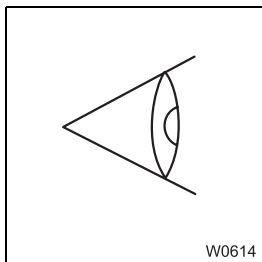
7. Check the tyres:

- Tyre pressure when tyres are cold in on-road mode; p. 8 - 6
- Further checks; *Maintenance Manual*.

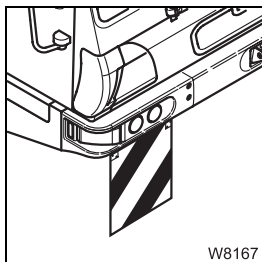


8. The reservoir of the windscreen washing system is sufficiently full;

p. 5 - 7.



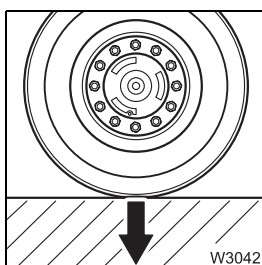
9. Carry out an inspection of the truck crane, looking out in particular for any leaking fluids (oil, fuel or water).



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

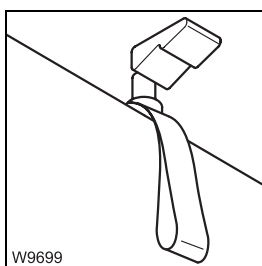
Vehicle width; ■■■▶ p. 8 - 2

Warning signs; ■■■▶ p. 5 - 7

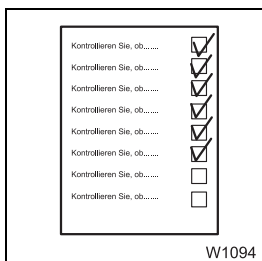


11. The detachable equipment parts are stripped down so that they fulfil the regulations of the country in which you are working as regards permissible weights and axle loads, lengths, widths, height etc.

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

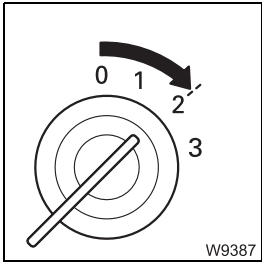


13. The fold-up berth is folded up and secured; ■■■▶ *Folding berth*, p. 5 - 51.

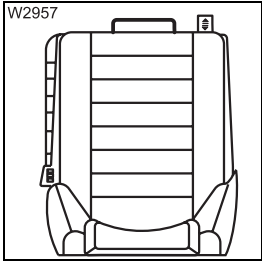


14. Carry out all activities and inspections required for starting the engine; ■■■▶ *CHECKLIST: Starting the engine*, p. 4 - 1.

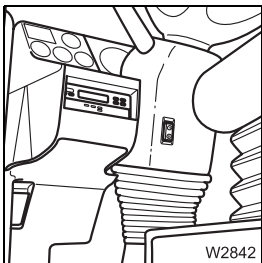




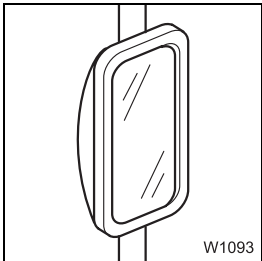
15. Turn on the ignition; p. 4 - 9.



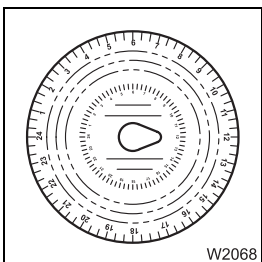
16. Adjust the driver's seat; p. 5 - 12.



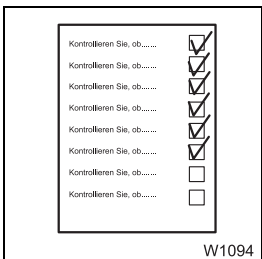
17. Adjust the steering column; p. 5 - 14.



18. Adjust the mirrors; p. 5 - 8.



19. Depending on the tachograph:
– Insert the diagram sheets; p. 5 - 17.

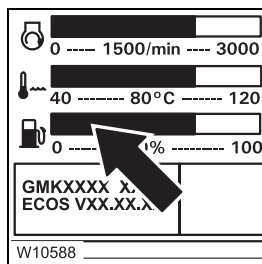


20. Start the engine and carry out all checks; *Checks after starting the engine*, p. 4 - 17.

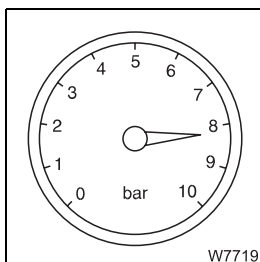
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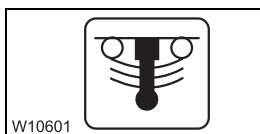
21. Check the electrical system; p. 5 - 8.



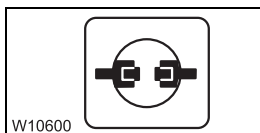
22. Check the fuel reserve; *Refuelling*, p. 4 - 7.



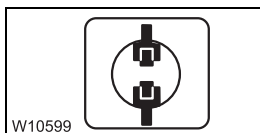
23. Check the compressed air and brake systems; p. 5 - 10.



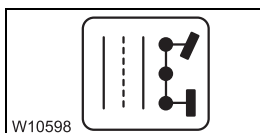
– Suspension switched on; p. 5 - 16,



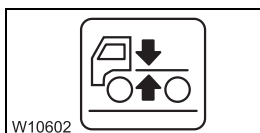
– Transverse differential locks switched off; p. 5 - 59,



– Longitudinal differential locks switched off; p. 5 - 57,

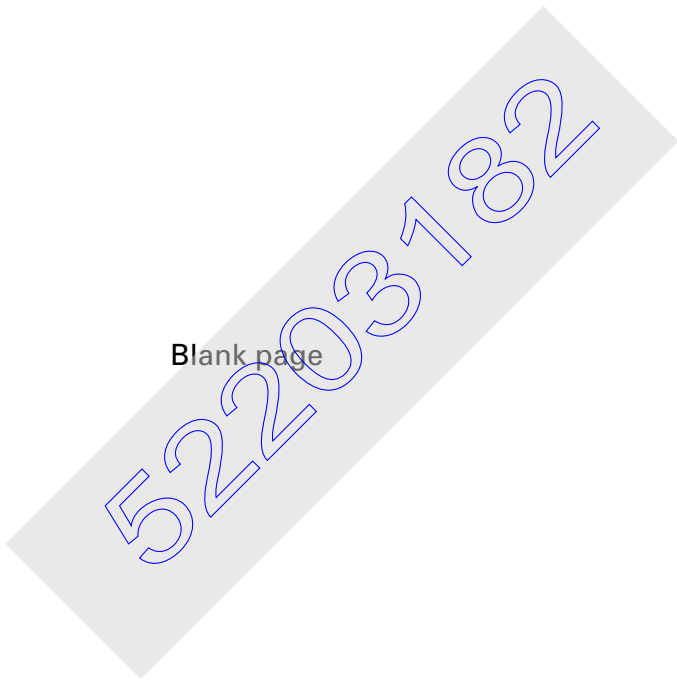


– Separate steering switched off – the symbol for on-road driving is shown; p. 5 - 70,



– On-road level is set; p. 5 - 61.

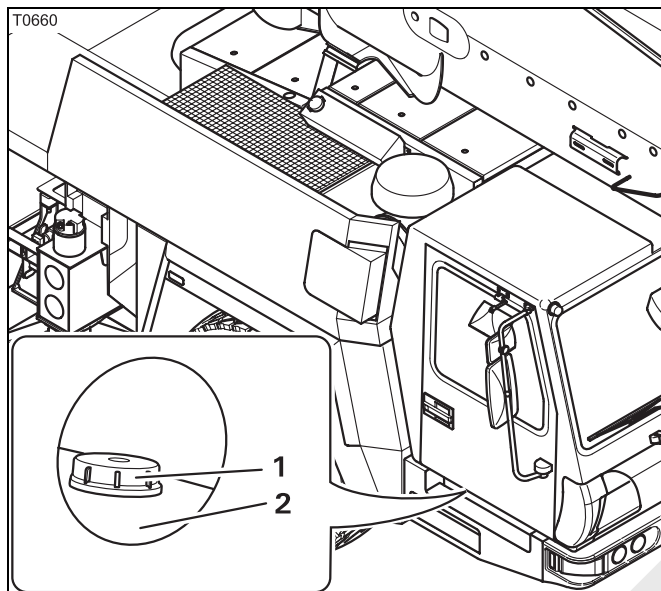
Establish the switching states for on-road driving if necessary.



5.1.2 Checking the condition of the truck crane

Windscreen washing system

Ensure that the receptacle of the windscreen washing system is always sufficiently full.



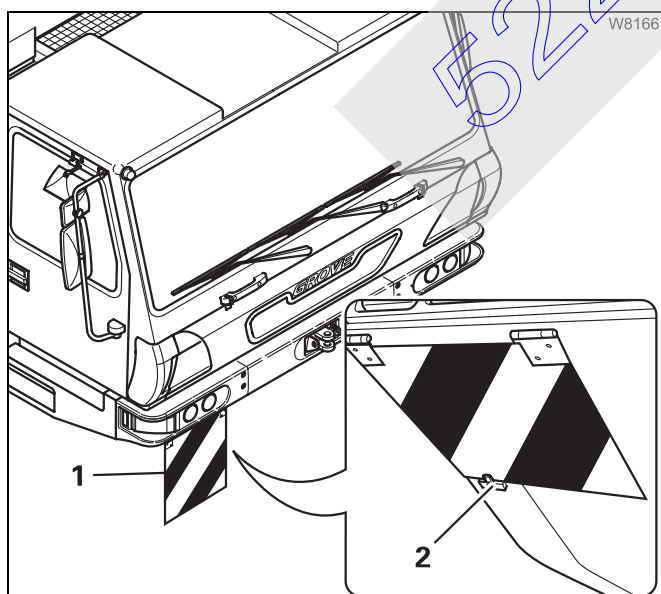
- Check the level in the container (2).

If the level is too low:

- Open the cap (1) and refill with water. If possible, use a windscreen washing agent and, at low temperatures, an appropriate antifreeze.
- Close the container with the cap (1).

Warning signs for vehicle width

Depending on the vehicle width, fold-up warning signs have been fitted below the driver's cab.



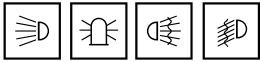
The warning signs (1) must be folded down to indicate the vehicle width during on-road driving.

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



Electrical system

- Check the following functions and arrange for defective parts to be repaired:



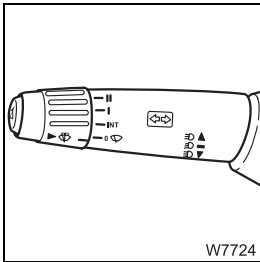
- Parking light/Headlight, rotating beacons, fog tail light, fog light, clearance lamps,



- Hazard warning system

- Brake lights

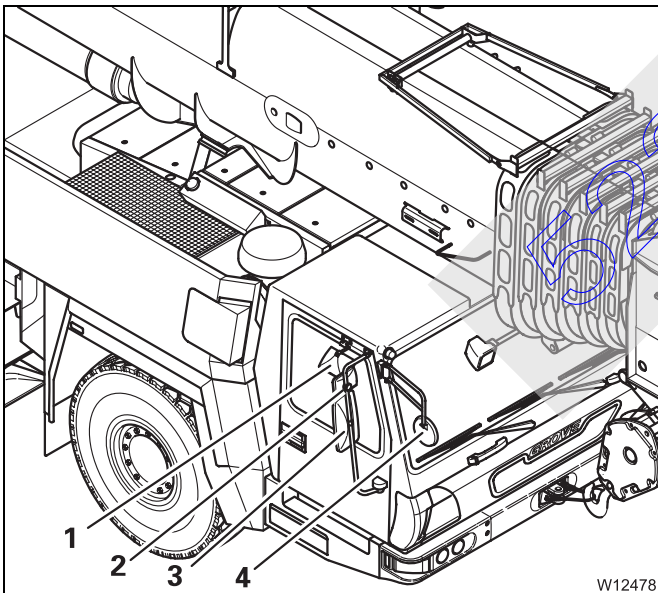
- Reversing lamp/buzzer



- Full-beam headlight
- Turn signal indicator
- Windscreen wipers
- Windscreen washing system
- Horn

Mirror setting

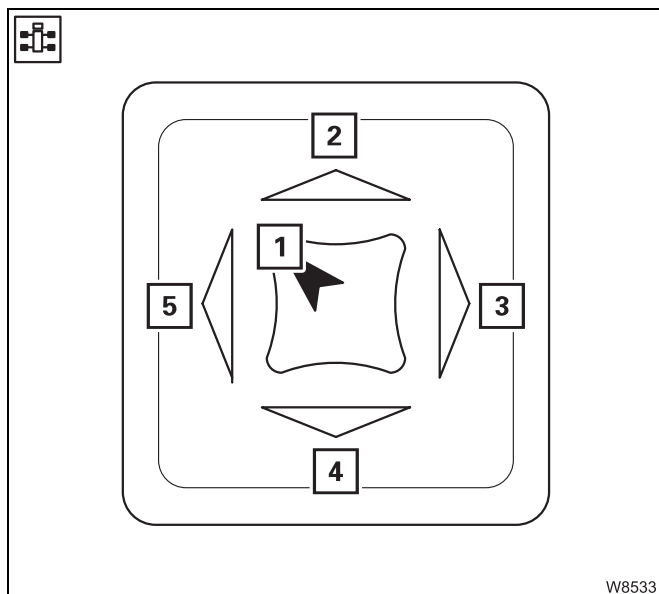
Adjust all the mirrors according to your sitting position.



Manual adjustment

- Adjust the mirrors (1), (2) and (4) manually.

The mirrors (3) are adjusted electrically on both sides.

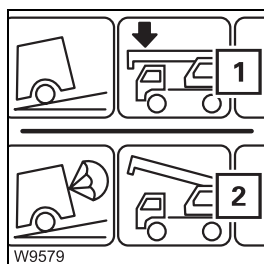



Electrical adjustment

- Turn the button (1) so that the arrow points to the mirror to be adjusted, e.g. to the left.
- Press the button (1) in the required direction in order to turn the mirror.
 - 2 Turn upwards
 - 3 Turn to the right
 - 4 Turn downwards
 - 5 Turn to the left

Checking the vehicle height


The vehicle height given at on-road driving level is only maintained when the main boom is lying in the boom rest; see p. 8 - 2.



- 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 from exceeding the permissible overall height

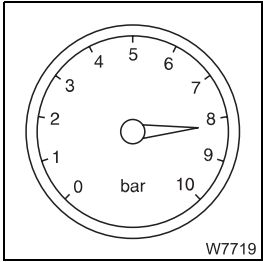
Check that the symbol  is shown. Otherwise the given overall height will also be exceeded at on-road level.



Checking the compressed air and brake systems

The compressed air system consists of the brake circuits I, II and III and the secondary consumer circuit.

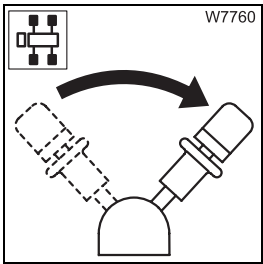
- Sufficient air pressure must be available in brake circuits I, II and III in order for you to be able to start driving.
- There must be sufficient air pressure available in the secondary consumer circuit for the operation of the connected consumers (suspension, differential locks, switching gears, adjusting the driver's seat and steering column).
- Check that the supply pressure is approx. 8 bar (116 psi).



If the supply pressure is too low, for example after repairs, you can build up the air pressure as follows.

Building up the supply pressure

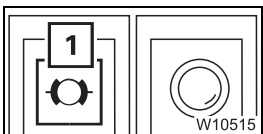
- Pull the parking brake lever backwards until it engages (*Close* position).



Risk of accidents due to the truck crane rolling without control!

Make sure the parking brake lever is in the *Close* position (to the rear) before refilling the compressed air supply.

In this way you can prevent the parking brake from being released when refilling the compressed-air supply and the truck crane rolling in an uncontrolled manner.

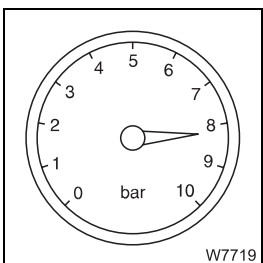


- Allow the motor to run. The supply pressure is refilled. You can speed up this procedure by pressing the accelerator.

With a supply pressure of approx. 5.5 bar (80 psi), the light (1) goes out.

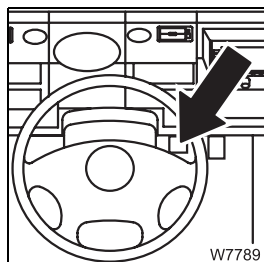
- Refill the supply pressure until
 - approx. 8 bar (116 psi) are reached **and**
 - you can hear the pressure control valve blowing off under the driver's cab.

Sufficient air pressure is now available in brake circuit III and in the secondary consumer circuit.



Functional check of the parking brake

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



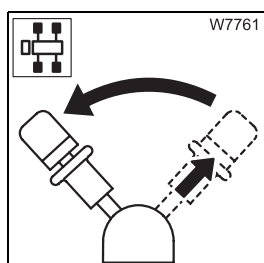
- Operate the brake pedal.



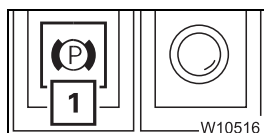
Risk of accidents due to the truck crane rolling without control!

Always activate the brake pedal before releasing the parking brake.

In this way you prevent the truck crane from starting to roll in an uncontrolled manner when the parking brake is released.



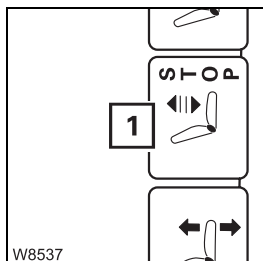
- Raise the locking ring and push the parking brake lever forwards as far as it will go.



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

5.1.3 Adjusting the seats and steering column

Adjusting the driver's seat

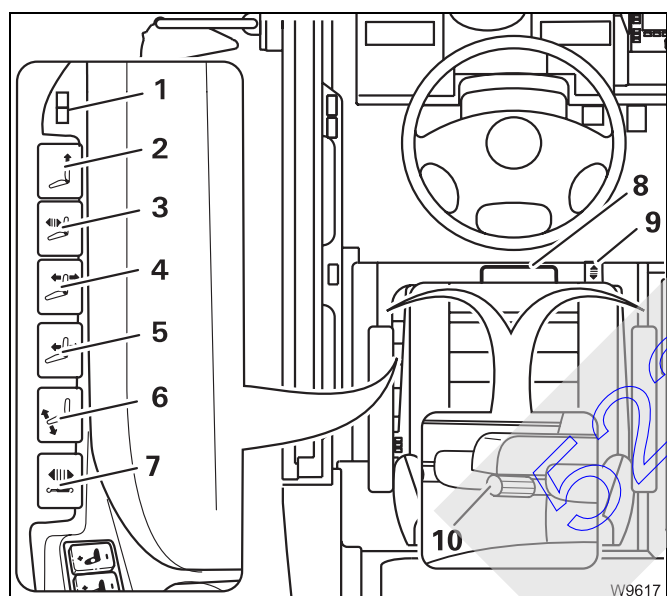


The seat height and lumbar support are adjusted pneumatically. You can only carry out these adjustments when

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

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

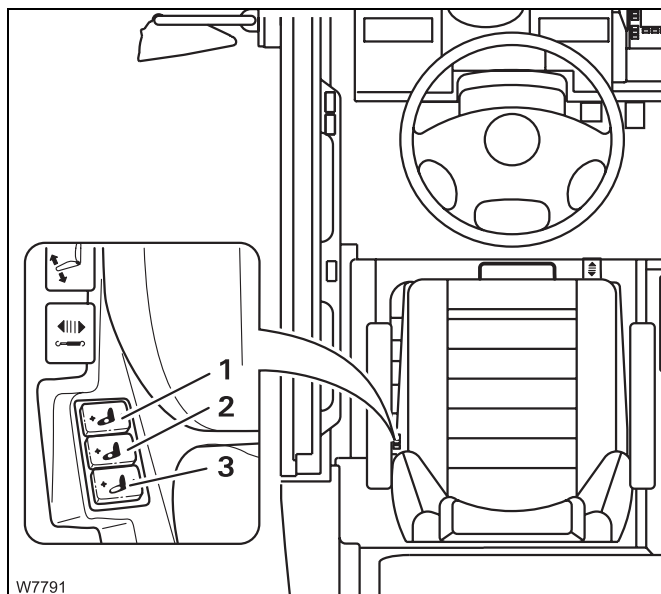
You can make adjustments to suit your body size and shape.



Settings for body size

- 1 Seat heating on/off¹⁾
- 2 Length adjustment of the seat cushion
- 3 Lowering to lowest position
- 4 Seat – inclination
- 5 Seat – height
- 6 Angle of the back rest
- 7 Vertical suspension – hardness
- 8 Length adjustment of the seat
- 9 Horizontal suspension on/off
- 10 Angle setting of the armrest

- 1) Additional equipment



Settings for body shape

- 1 Lumbar area support – bottom
- 2 Lumbar area support – top
- 3 Lateral support

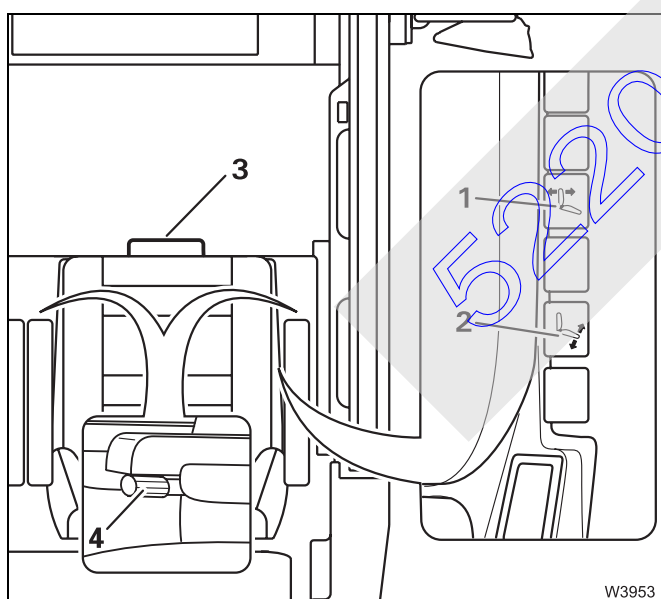
The settings are made pneumatically. The following applies to all buttons:

Empty air cushion: Press –

Fill air cushion: Press +

Adjusting the passenger seat

The passenger's seat and the third seat are adjusted mechanically.



- 1 Seat – inclination
- 2 Angle of the back rest
- 3 Length adjustment of the seat
- 4 Angle setting of the armrest



Adjusting the steering column



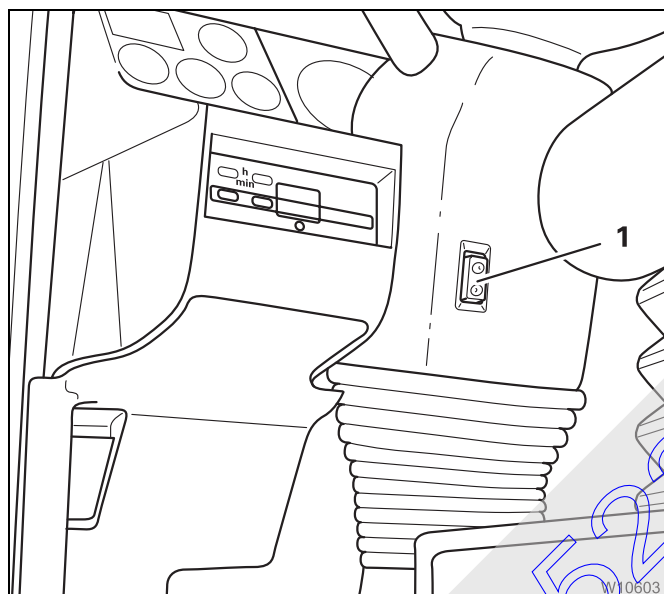
The steering column is unlocked pneumatically.

Risk of accidents if the steering column is unlocked!

Always stop the truck crane before you unlock the steering column. You can no longer steer safely after unlocking the steering column.



The steering column is only unlocked when sufficient supply pressure has been built up in the secondary consumer circuit; ■■■► *Building up the supply pressure*, p. 5 - 10.

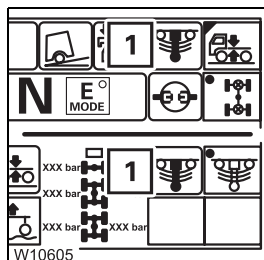


- Press the button (1) down once. The steering column is unlocked for approx. 6 seconds.
- Bring the steering column into the desired position.
- Press the button (1) up once.
Or wait until the steering column is locked automatically (after about 6 seconds).

5.1.4

Switching the suspension on/off

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



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

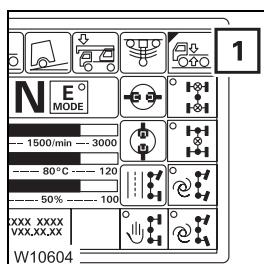
Symbol is green: The suspension is switched on.

Symbol red: The suspension is switched off.

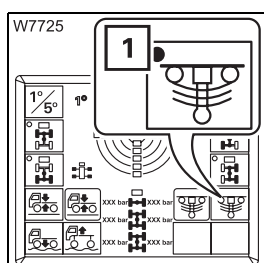
To switch the suspension on and off, you must open the *Level adjustment system* submenu.

Opening the submenu

You can only open the submenu when the truck crane is standing, 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 is opened.

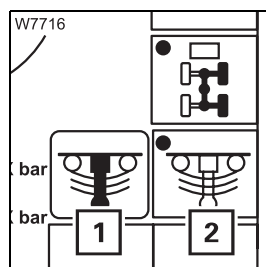
The dot (1) indicates the selected switching state:

Dot is green: Switch on suspension has been selected.

Dot is black: Switch off suspension has been selected.




Switching on the suspension



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

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

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

When the symbol (1) stays **red**, the air pressure may be too low. In this case the suspension would only be switched on if sufficient supply pressure had been built up;  *Building up the supply pressure*, p. 5 - 10.

Switching off the suspension

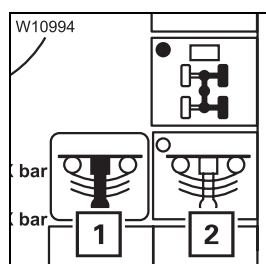


The suspension cylinders are locked if the suspension is switched off. This state is only intended for crane operation.

Risk of damage to the axle lines!

Always switch on the suspension for on-road driving.

The axle lines can become damaged and the steering behaviour changed if the suspension is switched off.



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

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

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5.1.5 Setting the tachograph – version 1

In the tachographs for the GMK 5220 the diagram sheets (24-hour discs) can be inserted for two drivers simultaneously.

You are obliged as a crane operator to set the respective 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 separate operating instructions from the tachograph manufacturer.

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). By doing this, you can prevent contamination and damage.

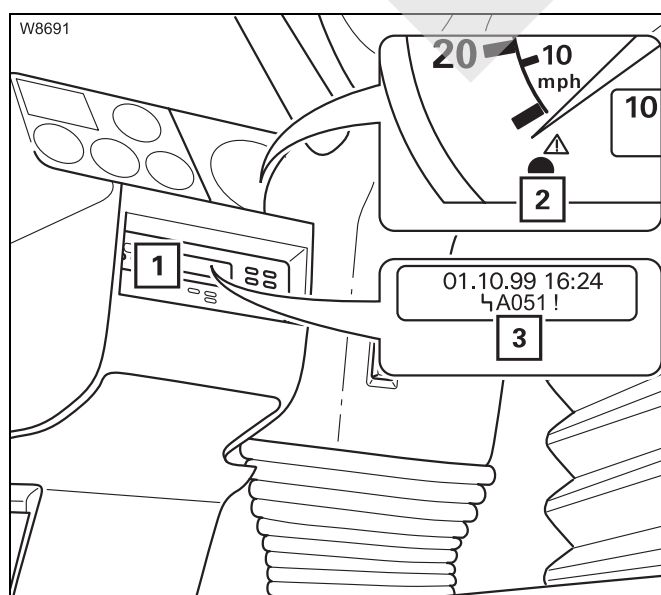
Prerequisites

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

Display of error messages

The tachograph and speedometer form a unit.



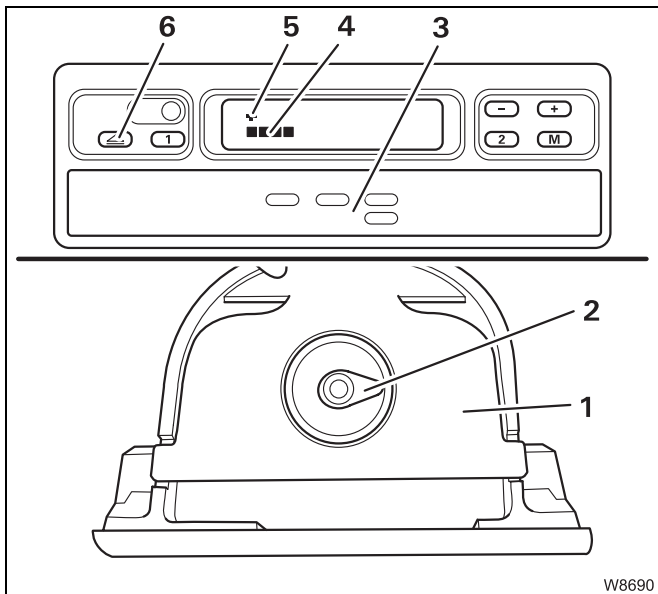
If there is a malfunction on the tachograph (1), the lamp (2) on the tachometer lights up.

The display (3) on the tachograph shows an error message; *Separate operating instructions* from the tachograph manufacturer.



Adjusting the tachograph

To adjust 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.



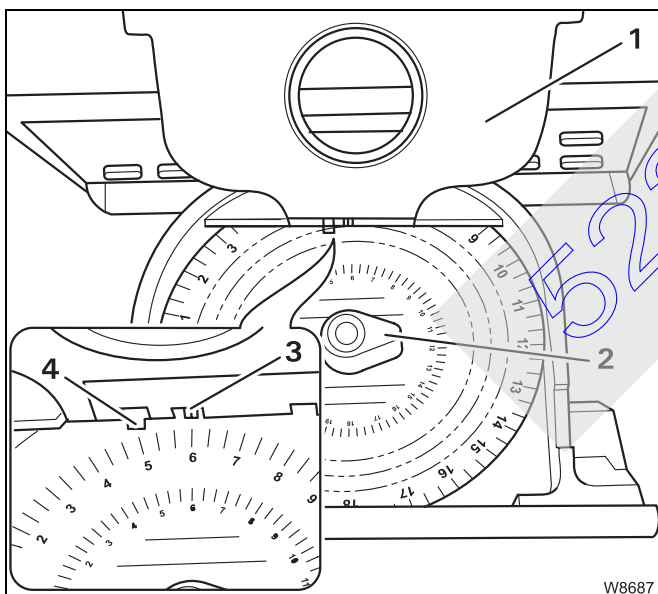
Open the drawer

- Press the button (6) once.

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

- Pull out the drawer (3) as far as possible.

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.

You can correct the time in the following way:

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

Inserting diagram sheets

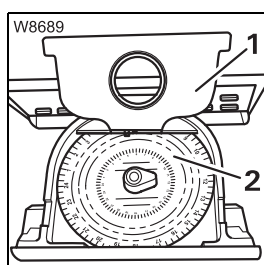


Only insert diagram sheets which are properly marked.
The diagram sheets are always inserted with the front facing upwards.



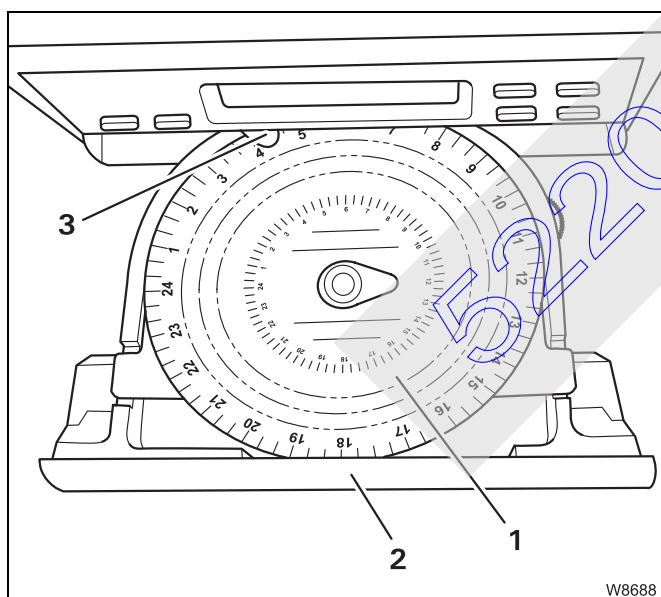
Risk of malfunctions in the electronics!

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



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

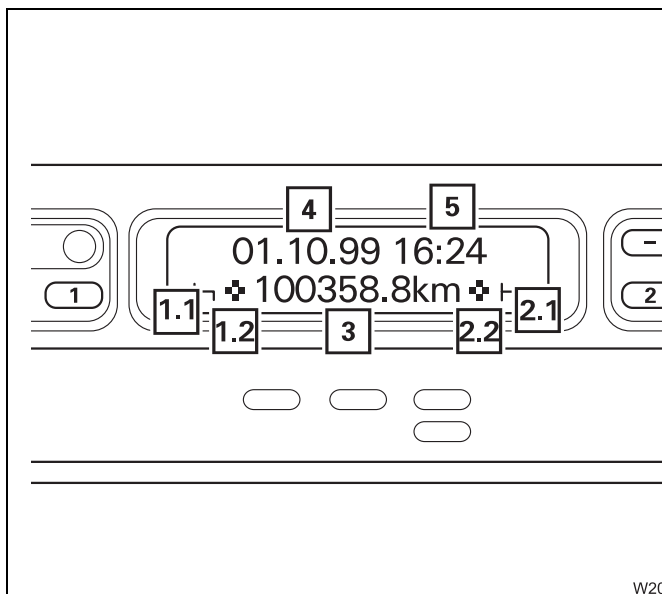
- After checking the time, leave the diagram sheet (2) where it is.
- After checking the time, insert the diagram sheet (2).



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

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

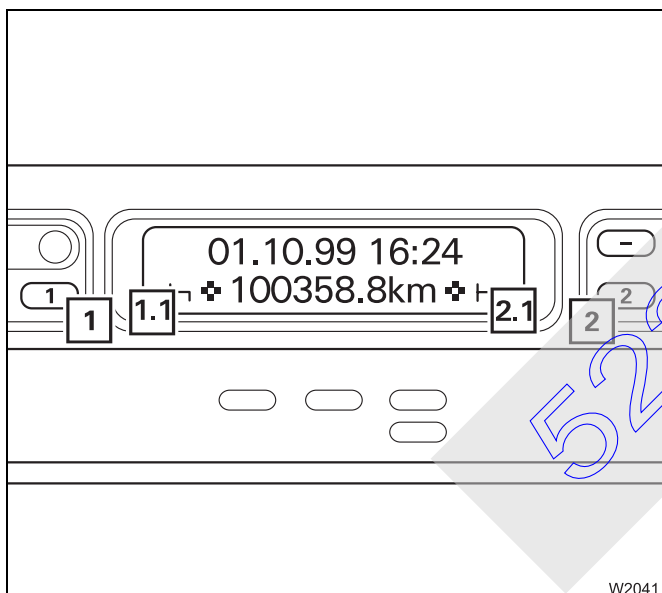




On the display

If no malfunction is present, the *Tachograph* display now shows the basic display:

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



Setting time groups

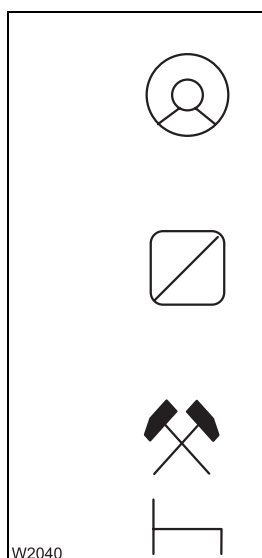
Set the time group for driver 1 using the button (1).

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

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

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

The different time groups are shown with the following symbols:



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

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

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

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



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

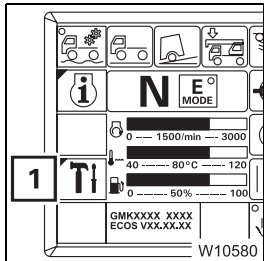



The symbol for resting time has to be set for driver 2 in **single-driver operation**. Otherwise an error message will appear.

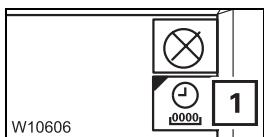
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5.1.6 Displaying the operating hours

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

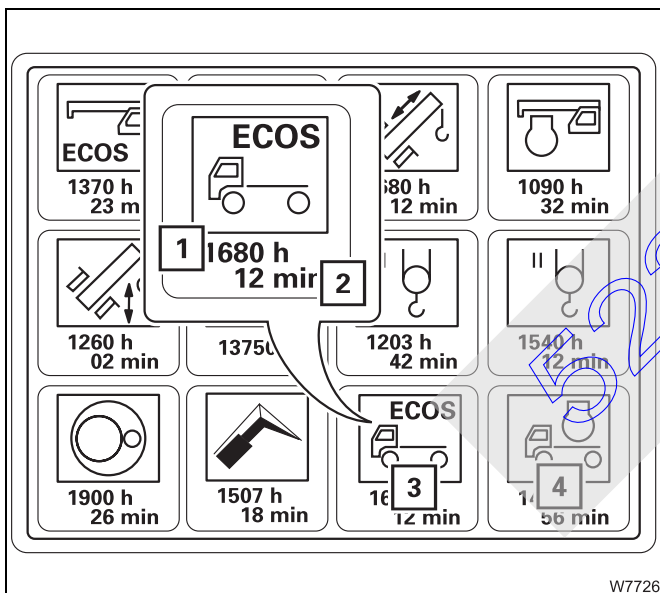


- If necessary, open the main menu  and press the button (1) once.



The *Settings* submenu is opened.

- 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. 1680 hours.

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

The other displays relate to crane operation;

▣▣▣▣ *Displaying the operating hours*, p. 12 - 104:

5.2 Operating the transmission

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

5.2.1 Switching on

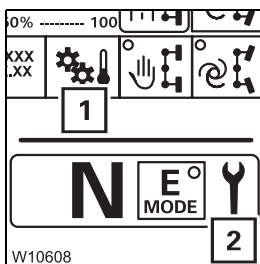
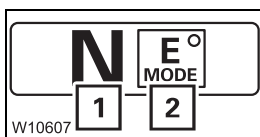
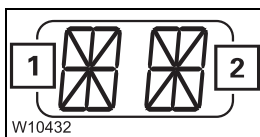
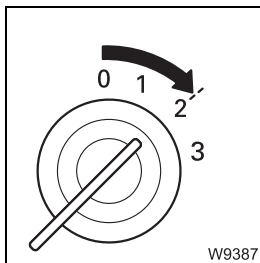


Risk posed by unexpected rolling

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.



- Turn on the ignition.

– The electronic gear 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

- 1 The neutral position
- 2 The switched on driving mode, e.g. **E**

If an error occurs, which may be of importance for continued driving, the corresponding symbols appear on the displays (1), (2); see p. 7 - 37.

5.2.2

Switching the transmission to 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.



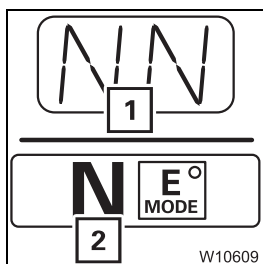
Risk of accidents when driving in neutral position N

Never switch into neutral position while driving.

In the neutral position, you cannot accelerate the truck crane and the engine retarder does not work.



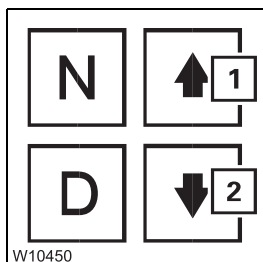
- Press the button (1) once.



As soon as the neutral position is switched on, it is shown on the displays (1) and (2).

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**.

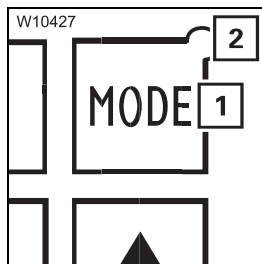
An appropriate gear will be engaged.

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.

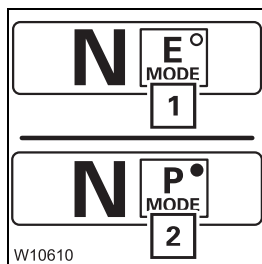


- Press button **(1)** once – the driving mode switches to the other driving mode.

- The light **(2)** indicates the current status.

Light off: Driving mode **E** on

Light on: Driving mode **P** on



- The *transmission* display shows the current state.

1 Driving mode **E** on

2 Driving mode **P** on

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



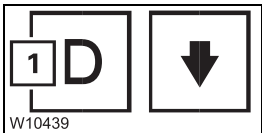
Risk of accidents from unexpected movement

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.



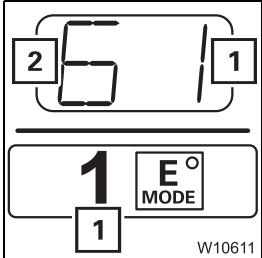
Risk of accidents if brakes not applied

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.



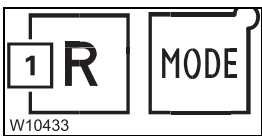
For forward travel

- Press the button (1) once.



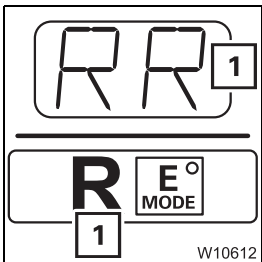
A suitable starting gear (1) is selected and displayed, e.g. gear 1.

Additionally, the highest gear (2) which is selected during driving is displayed. You can change this gear; p. 5 - 27.



For backwards driving

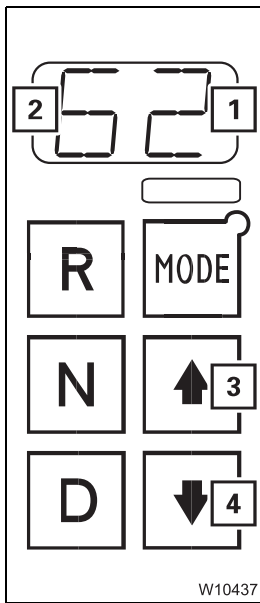
- Press the button (1) once.



The reverse gear (1) is selected and displayed.

5.2.5

Selecting highest gear/starting gear



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

Selecting 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 about 93 °C (199 °F);  *Monitoring submenu*, p. 4 - 19.
- Select a lower starting gear or driving mode **P** and start driving again.

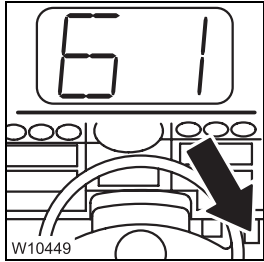
5.2.7

Driving and changing gears

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



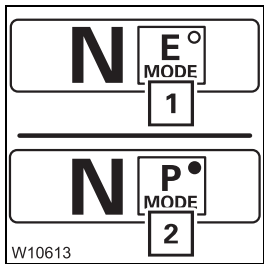
When the gear oil temperature falls below about $-7\text{ }^{\circ}\text{C}$ ($20\text{ }^{\circ}\text{F}$), only gears 1 and 2 are used **D**.



Automatic upshifting

You can influence upshifting by using the accelerator.

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

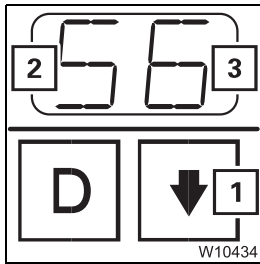


You can influence upshifting by using the driving mode.

- 1 Driving mode **E** on: Upshifting at low engine speed
- 2 Driving mode **P** on: Upshifting at high engine speed

Automatic downshifting

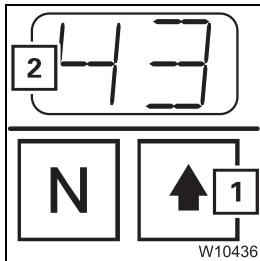
- When you slow down the truck crane by braking, the transmission shifts down when the appropriate engine speed is reached.
- When you step on the accelerator to the full (kick down), the transmission first shifts to a lower gear. After that, it will shift to a higher gear once a higher engine speed has been reached in order to attain a maximum acceleration.



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

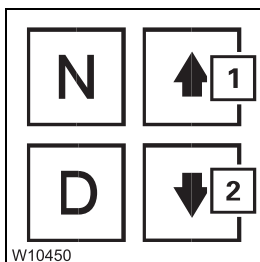
The truck crane is being driven in the highest gear that is smaller than gear 6.

- 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

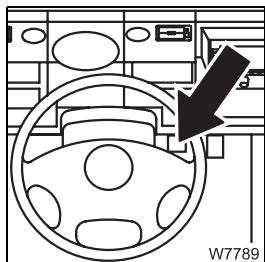
Changing the driving direction



- 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.

5.2.9

Stopping



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

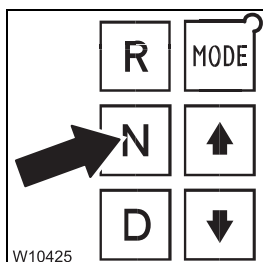
Stopping for a long period of time

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

- Apply the parking brake.
- 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 motor to run.

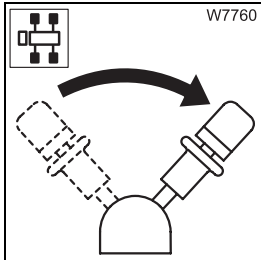
52203182

5.2.11 Oil level gauge

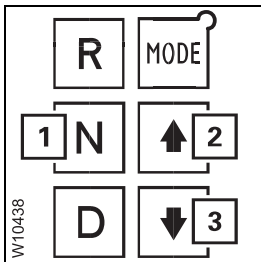
You can call up information on the current oil level in the transmission.



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



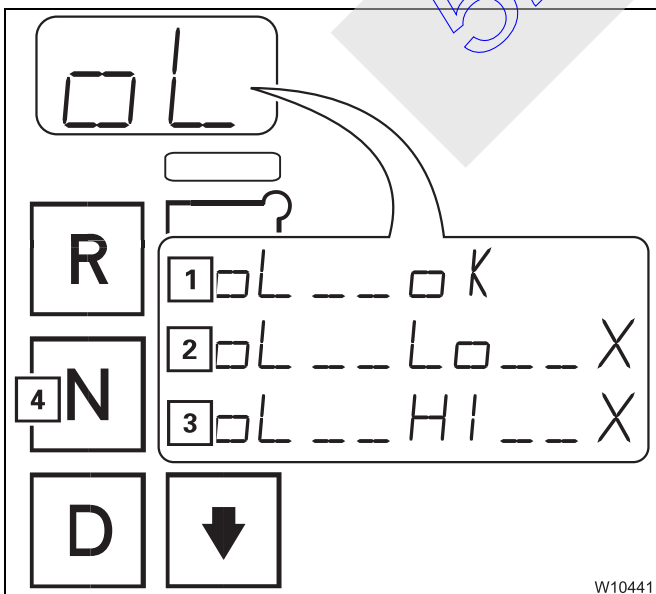
- Park the truck crane on a level surface.
- Engage the parking brake.
- Let the motor run at idling speed.
- Wait about 3 minutes – required resting time.



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

The *transmission* display shows a code
– for the oil level or,
– if the oil level cannot be read, for an error.

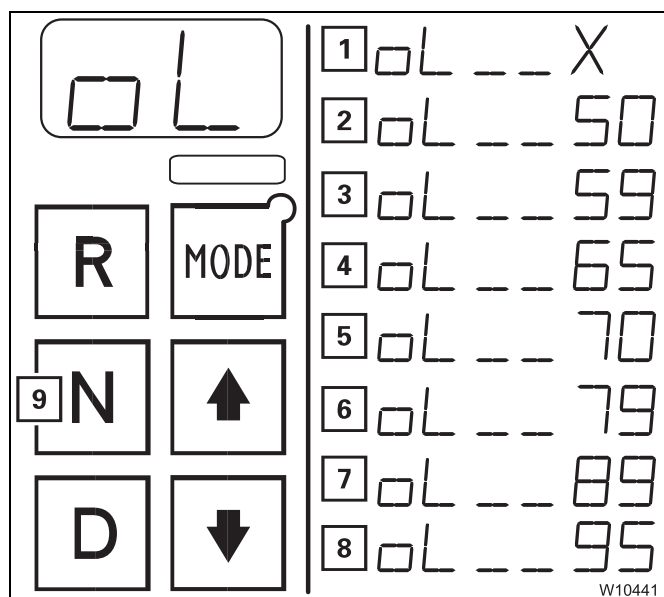
Each code consists of different displays which are shown continuously in succession.



Displays for the oil level

- 1 Oil level correct
 - 2 Oil level x litres too low
 - 3 Oil level x litres too high
- Press button (4) once to exit the oil-level gauge.





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 Gear oil too cold
 - 6 Gear 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.

52203182

5.3

Driving and turning off the truck crane



Risk of accidents by the truck crane not being able to 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 accidents when the ignition is switched off.

Never switch off the ignition while driving.

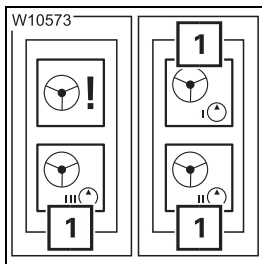
After the ignition is switched off, the 4th and 5th axle lines are brought into the straight-ahead position, and can no longer be steered.

This changes the turning radius of the truck crane.

5.3.1

Checks while driving

Directly after you start to move



- Check the service and parking brakes as soon as you begin to move.

- Check the lamps (1).

With speeds of above 10 km/h (6 mph) **all** lamps (1) must go out. If a lamp does not go out, a malfunction may have occurred in the steering.



Risk of accidents if the steering circuit fails!

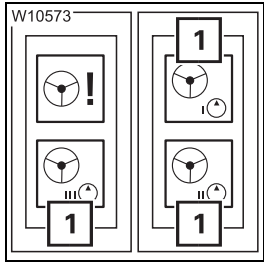
If one or more lamps light up, stop the truck crane immediately and switch off the engine.

Check whether oil has been lost. Depending on the size of a leak, the oil supply in a steering circuit may be lost within 2 minutes.

If oil has run out

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

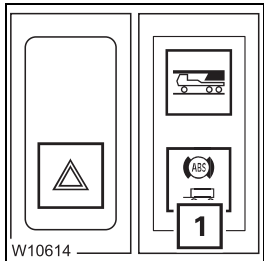




If no oil has run out

- Start the engine
- If all 3 lamps (1) light up:
 - Switch off the engine. Contact **CraneCARE**.
- If **at least 2** lamps (1) light up:
 - Drive at a speed of over approx. 10 km/h (6 mph).
 - If only one lamp is still lit, drive **slowly** to the next garage. The steering may be sluggish.
 - If two lamps are still lit, stop immediately. Contact **CraneCARE**.

➡ *Steering malfunctions, p. 7 - 28.*



Lamp for the trailer ABS system

- Check the lamp (1).

With speeds of above 6 km/h (4 mph), the lamp (1) must go out. The Anti-Blocking System (ABS) of the trailer is functioning correctly and wheels are prevented from being blocked when you brake.

If the lamp does not go out, the ABS system is defective, and the wheels will no longer be prevented from blocking. The full braking force remains intact; ➡ *Service brake malfunctions, p. 7 - 27.*

While driving



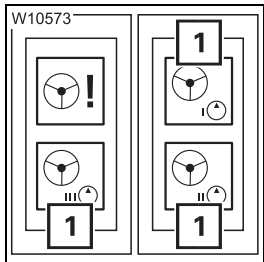
- Observe all warning messages.

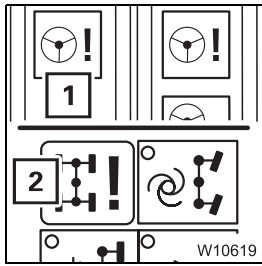
Risk of damage if warning messages are not observed!

Observe all information in the section titled Warning submenu and take the appropriate remedial measures if a warning message appears. In this way, you can prevent these malfunctions resulting in errors at the truck crane.

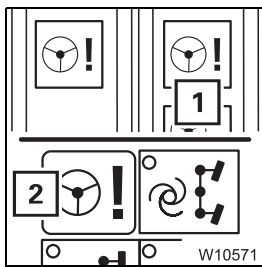
On the instrument panels

- Observe the following lamps.
- If one of the lamps (1) which has already been checked lights up again, observe the information in the previous section.





- The lamp (1) lights up when an error is detected in the steering system – the symbol (2) is shown. The 4th and 5th axles are brought into the straight running position and can no longer be steered. It is possible to continue driving. Only the 1st to 3rd axle line is used for steering – the turning circle increases in size accordingly.
- Have the error rectified as soon as possible.

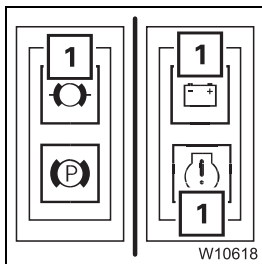



- The lamp (1) lights up when a severe error is detected in the steering system – the symbol (2) is shown. The 4th and 5th axle lines can no longer be steered in a controlled manner.
- Stop the vehicle as soon as possible. Briefly turn off the ignition and then on again. If the lamp is still lit, contact **CraneCARE**.



Risk of accidents due to the fact that the truck crane cannot be steered.

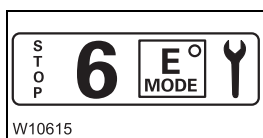
Stop as quickly as possible when the red lamp lights up. The 4th and 5th axle can steer in an uncontrolled manner, which may lead to serious accidents, even when driving at reduced speed.



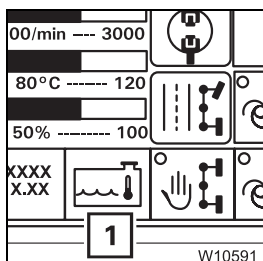
- When a lamp (1) lights up, the same symbol is shown on the ECOS display as a warning message;  *Warning submenu*, p. 5 - 45.



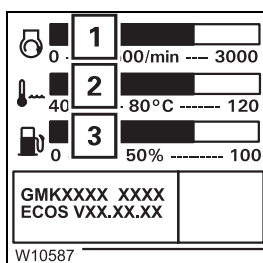
On the ECOS display



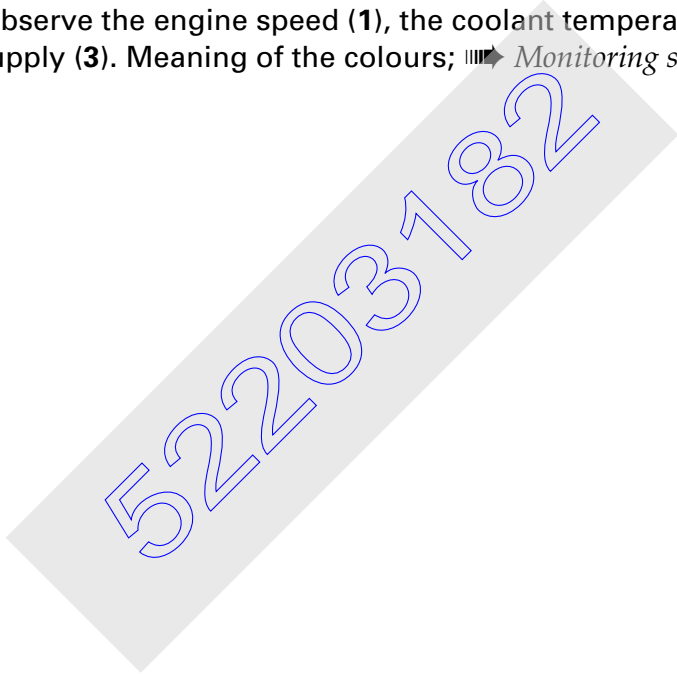
- If an engine or transmission malfunction is shown;
 - ▣▣▣▣ ➔ *Malfunctions on the engine, p. 7 - 36,*
 - ▣▣▣▣ ➔ *Malfunctions to the transmission, p. 7 - 37.*



- If a warning message (1) is shown; ▣▣▣▣ ➔ *Warning submenu, p. 5 - 45.*



- Also observe the engine speed (1), the coolant temperature (2) and the fuel supply (3). Meaning of the colours; ▣▣▣▣ ➔ *Monitoring submenu, p. 4 - 19.*



5.3.2

Tempomat

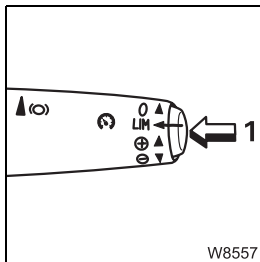
The Tempomat allows you to drive at a speed that you have determined.



Risk of accidents due to carelessness!

Always be ready to brake even if the Tempomat is switched on!
Only switch the Tempomat on if the traffic situation permits a constant speed.

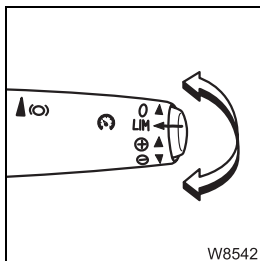
Activating the Tempomat



You can only switch on the Tempomats at speeds of over 50 km/h (30 mph).

- Press the button (1) once.


The Tempomat is ready for operation.



- Press the multipurpose switch upwards or downwards once.

The Tempomat is switched on, and the current speed is maintained.



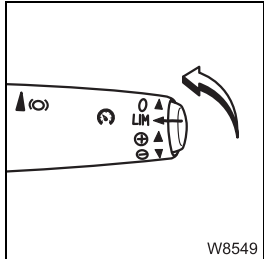
On downhill slopes, the speed set may be exceeded, since the Tempomat does not brake the truck crane. Switch the Tempomat off on downhill slopes;  p. 5 - 38.



Driving with the Tempomat

When Tempomats are switched off, the set speed is also maintained when you release the accelerator.

In an emergency, or when overtaking, you can increase the speed with the accelerator. After the accelerator is released, the truck crane slows down again to the speed set.



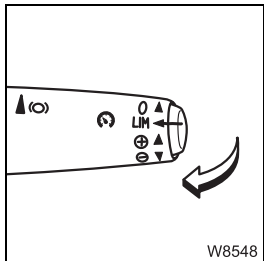
To increase the speed:

- Pull the multipurpose switch upwards and hold it until the required speed has been reached.

or

- Pull the multipurpose switch upwards once. The speed will increase by 0.5 km/h (0.3 mph).

The re-set speed is maintained.



To decrease the speed:

- Push the multipurpose switch downwards and hold it until the required speed has been reached.

or

- Press the multipurpose switch downwards once: the speed decreases by 0.5 km/h (0.3 mph).

The re-set speed is maintained.

Switching off the Tempomat

Automatic switch-off

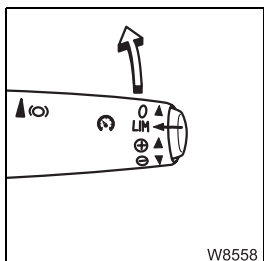
The Tempomat is switched off automatically

- If the service brake, the sustained action brake or the retarder are actuated
- If 10 km/h (6 mph) are not reached
- If the ignition is turned off.

Manual switch-off

- Press the multipurpose switch forwards once.

The Tempomat is switched off. You must regulate the speed again with the accelerator.



5.3.3

Driving downhill



Risk of accidents when driving in neutral position.

Never switch into neutral position while driving.

In the neutral position, you cannot accelerate the truck crane, and the engine retarder does not work.

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 holding and service brakes
- Actuate the accelerator



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

Checks when driving downhill



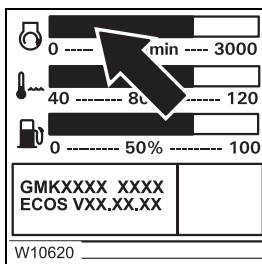
While driving, the engine speed may not exceed 2300 min^{-1} (2300 rpm). The speed is not automatically limited.

Risk of damage due to excessive engine speed!

When the maximum permitted speed is reached, brake the truck crane using the service brake.

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

If an air intake inhibitor is present, then it will be triggered by the maximum permissible engine speed and the motor will stop running; p. 4 - 23.



- Check the current speed on the tachometer while driving.
- Brake the truck crane before the speed exceeds 2300 min^{-1} (2300 rpm).

When the maximum permitted engine speed is reached (bar red), a warning buzzer will sound. In addition,

- the sustained action brake is switched on and
- the transmission shifts up, and if appropriate, an upward shift is made to the highest gear.






Risk of damage from oscillating movements

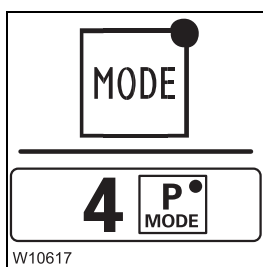
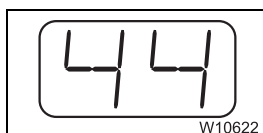
Always maintain a speed below 85 km/h (53 mph). Stop the truck crane in good time.



When driving downhill, you can also slow down the truck crane with the service brake as follows:

- By shifting down from the highest gear;  p. 5 - 40
- With the sustained action brake;  p. 5 - 41
- With the retarder;  p. 5 - 42

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** 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.

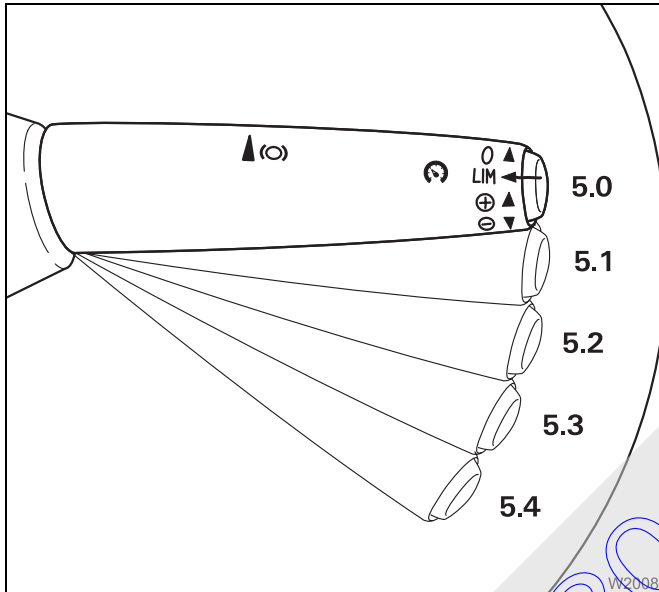
Sustained action brake

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



Risk of accidents due to unexpected acceleration!

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



Switching on the engine retarder

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

The sustained action brake is on.

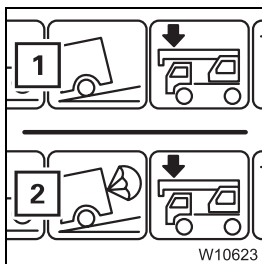
Levels **5.2** to **5.4** are only active when the transmission is fitted with a retarder;

▮▮▮▮ p. 5 - 42.

Switching off the engine retarder

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

The sustained action brake (and retarder) are switched off.



- At level **5.0**, the symbol (1) is shown – the auxiliary brake is off.
- At levels **5.2** to **5.4**, the symbol (2) is shown – the auxiliary brake is on.
- If the sustained action brake has been switched on automatically, the symbol (1) is shown.

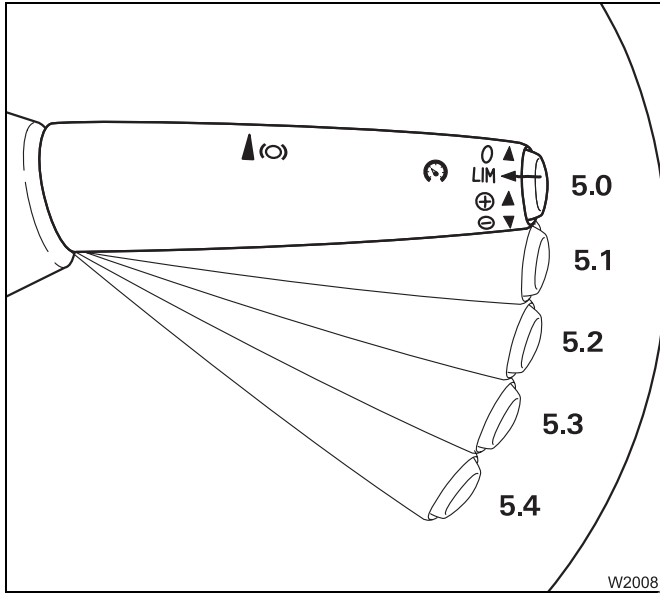


Retarder

The braking force of the transmission retarder depends on the driving speed. The higher the speed, the higher the brake power.



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



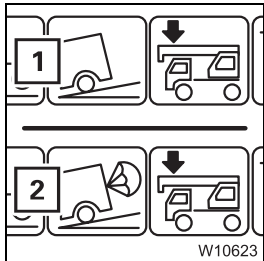
Switching on the retarder

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

- 5.1 Sustained action brake only
- 5.2 Level 2 on = 1/2 brake power
- 5.3 Level 3 on = 3/4 brake power
- 5.4 Level 4 on = full brake power

Switching off the retarder

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



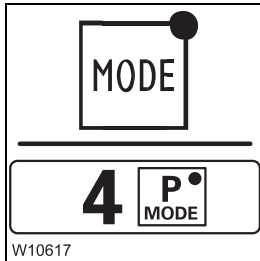
- At level 5.0, the symbol (1) is shown – the auxiliary brake is off.
- At levels 5.2 to 5.4, the symbol (2) is shown – the auxiliary brake is on.

5.3.4

Driving uphill

Starting

The engine must be running.



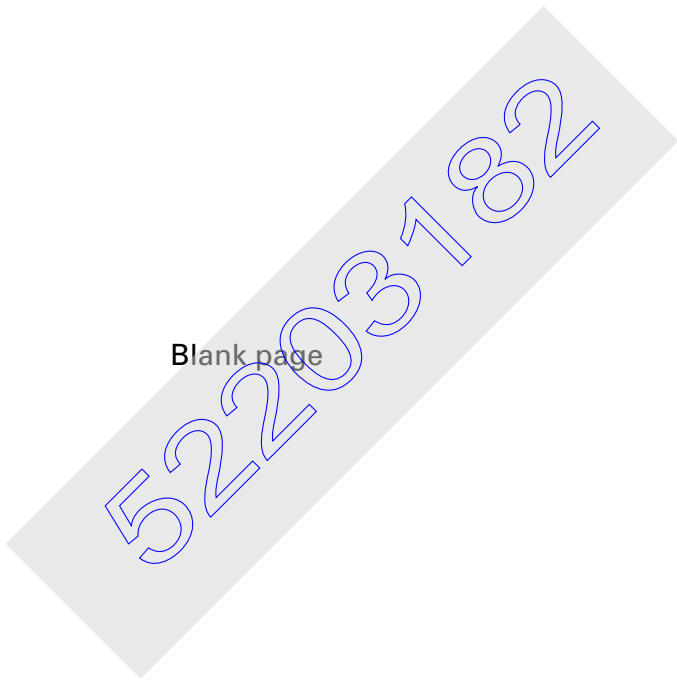
- To start moving and to drive on steep uphill roads, switch to the **P** driving mode.

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

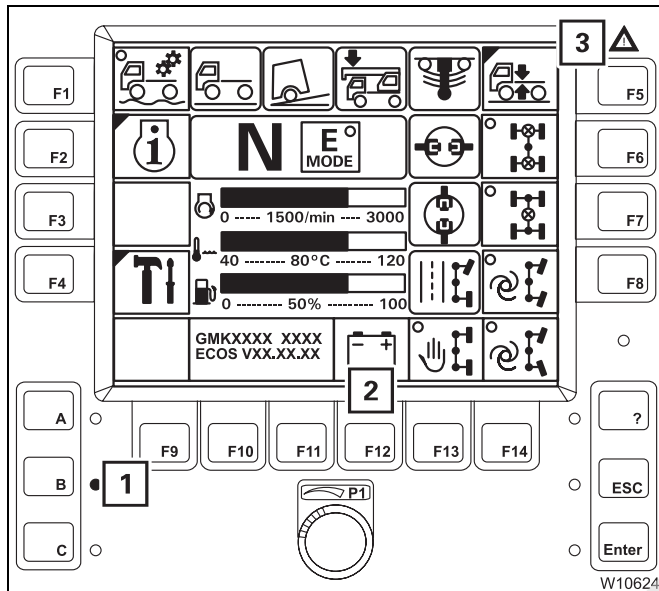
The transmission can switch between two gears for certain gradients. Then remove the pressure from the accelerator slightly, or shift the highest gear down.



5.3.5

Warning submenu

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



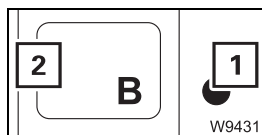
A warning message indicates that certain values do not correspond to a nominal value. With a warning message:

- The lamps (1) and (3) flash
- The display (2) shows the red symbol for the imminent warning message.

For more information on warning messages, refer to the *Warning submenu*.

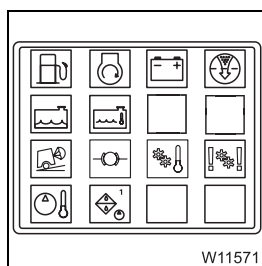
Opening the submenu

You can open the *Warning submenu* if a warning message is displayed.



- Press the button (2) once. The button is only active when the lamp (1) flashes or lights up

When opening, a new warning message is acknowledged, and the lamp (1) lights up (no longer flashes).

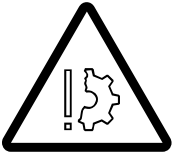


The submenu appears. The colours of the symbols indicate whether a warning message is active in the corresponding area:

- Symbol **grey** – no warning message present.
- Symbol **red** – a warning message is present.



Meaning of the symbols



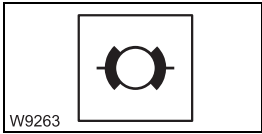
Make the following inspections if a symbol is displayed in **red**.

Risk of damage if warning messages are not observed!


Observe the following information in good time and take the appropriate remedial measures if a warning message appears. In this way, you can prevent these malfunctions resulting in errors at the truck crane.



All warning messages which relate to the engine apply to the engine for driving on the carrier.



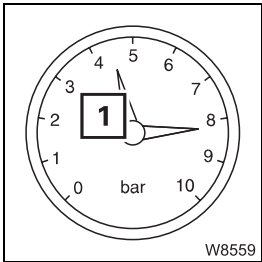
Supply pressure in the brake circuit too low

The pressure in a brake circuit is below approx. 5.5 bar (80 psi). At the same time, the lamp  lights up on the instrument panel.



Risk of accidents if one or both brake circuits fail.

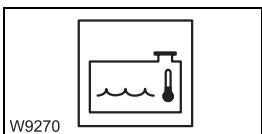
Stop the truck crane immediately and identify the cause.



- Check the supply pressure.


If the supply pressure in only one brake circuit, e.g. (1) is below approx. 5.5 bar (80 psi) and you cannot identify the cause, you may still continue driving at a low speed until you reach the next garage.


If the supply pressure in both brake circuits is below approx. 5.5 bar (80 psi), the parking brake is engaged and you may only continue driving after repairs have been carried out.

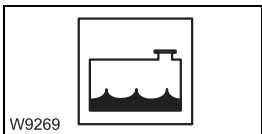


Coolant too hot


The coolant in the engine is hotter than approx. 95 °C (205 °F).

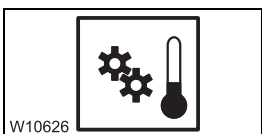
Display of the current temperature;  p. 11 - 15.

Possible cause and remedy;  p. 7 - 23.




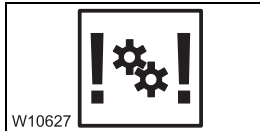
Coolant level too low

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



Gear oil too hot

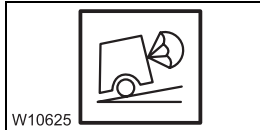
- Stop the truck crane at the next opportunity and try to find the cause;  *Transmission malfunction*, p. 7 - 38.



Shift lock, transmission

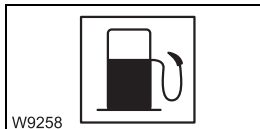
The transmission no longer shifts.

- Drive to the next safe place to stop and stay there – you can no longer drive further; *Transmission malfunction*, p. 7 - 38.



Retarder too hot

The retarder in the transmission has no function. When the retarder has cooled down, the symbol turns grey and the retarder is ready to function again.

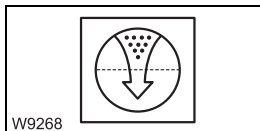


Refuelling

The fuel tank is only filled up to a level of approx. 5%.

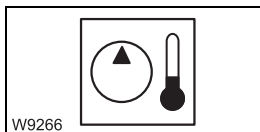
- Refuel before the fuel is used up; p. 4 - 7.

When the fuel tank is almost empty, air is sucked in and you must bleed the fuel system; *Maintenance Manual*.



Replacing the air filter

- Replace the air filter as quickly as possible; *Maintenance Manual*.



Hydraulic oil too hot

The hydraulic oil is hotter than 80 °C (176 °F).

Display of the current temperature; p. 4 - 19.

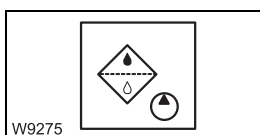
Possible cause and remedy; p. 7 - 30.



Danger of overheating!

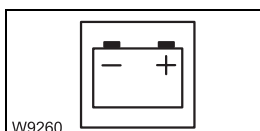
There is a malfunction if the hydraulic oil temperature exceeds 80 °C (176 °F). Stop the truck crane at the next opportunity and try to find the cause.

Stop the truck crane immediately and turn off the vehicle engine if the temperature of the hydraulic oil rises to over 100 °C (212 °F).



Replace hydraulic oil filter

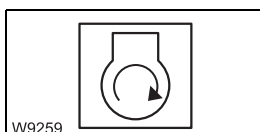
- Replace the hydraulic oil filter as quickly as possible; *Maintenance Manual*.



Voltage monitoring

The voltage in the carrier electrical system is too high or too low.

Display of the current voltage; p. 4 - 19.

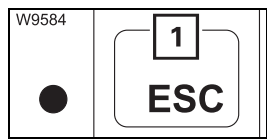


Air intake inhibitor has been triggered

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 removed manually; p. 4 - 23.

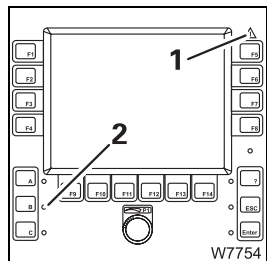


Exiting the submenu



You can exit the submenu at any time.

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



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

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

Both lamps start to flash again as soon as a new warning message appears.

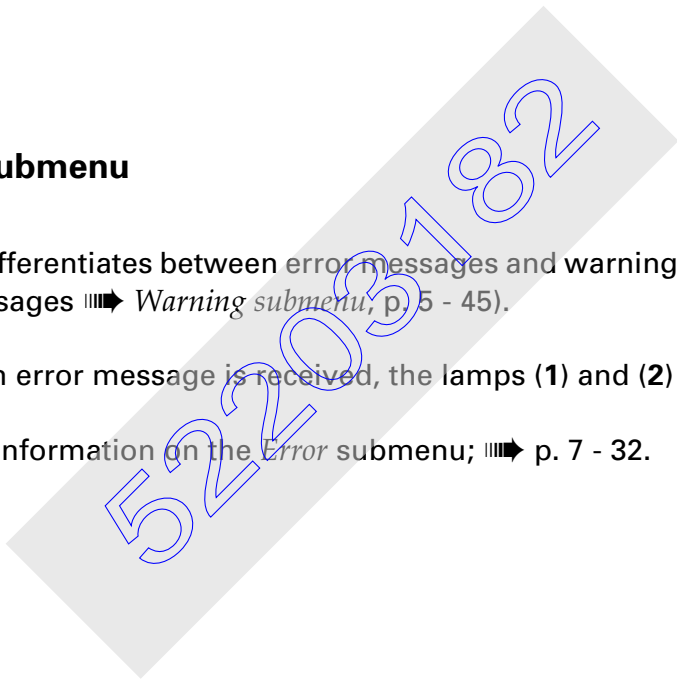
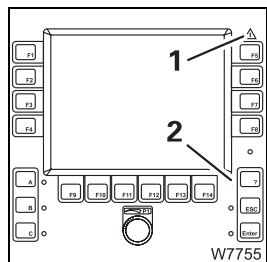
5.3.6

Error submenu

ECOS differentiates between error messages and warning messages (warning messages \Rightarrow *Warning submenu*, p. 5 - 45).

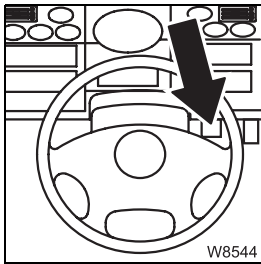
When an error message is received, the lamps (1) and (2) flash.

Further information on the *Error submenu*; \Rightarrow p. 7 - 32.

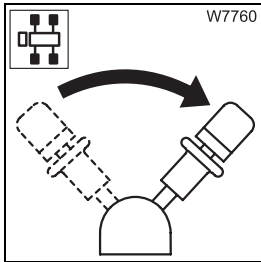


5.3.7

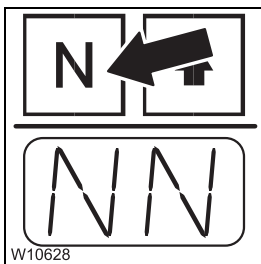
Parking the truck crane



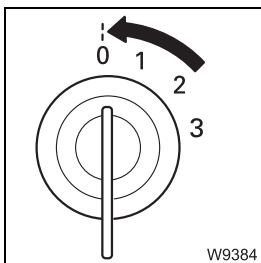
- Stop the truck crane with the service brake.



- Engage the parking brake.



- Move into neutral on the transmission; ►► p. 5 - 24.



- Switch off the engine; ►► p. 4 - 21.

Securing the truck crane against rolling away

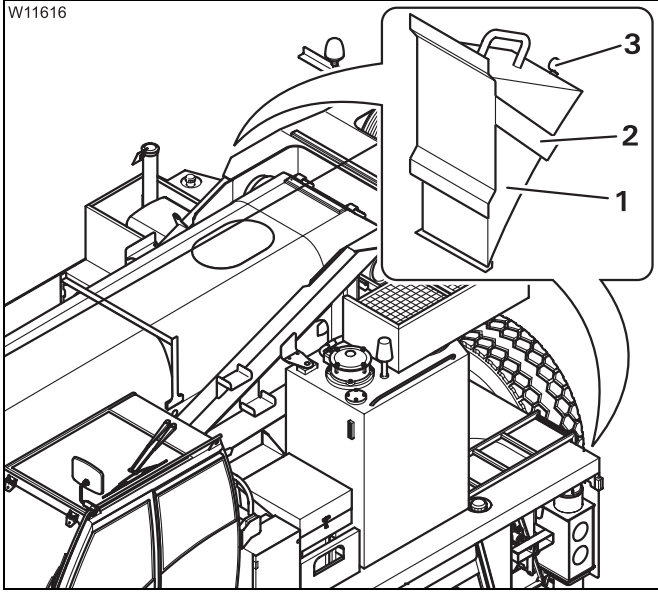
The number of wheel chocks supplied varies according to the specifications in the country of use.



Risk of accidents due to the truck crane rolling without control!

Secure the truck crane on uphill and downhill roads by using wheel chocks together with the parking brake.





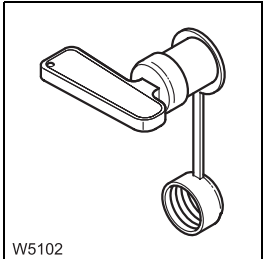
- Insert the wheel chock (1) in the bracket (2).
- Press the chock downwards until the clamp (3) engages.
- Affix further wheel chocks in the same way.

When standing still for more than 8 hours

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



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



- Switch off the battery master switch.

Securing the truck crane against unauthorised use

- Secure the truck crane against unauthorised by:
 - Stowing away the hand-held control in the crane cab or in the driver's cab,
 - Pulling out the ignition key
 - And locking the crane cab



Danger due to unauthorised use

Always stow away the hand-held control in the crane cab before leaving the truck crane, and lock the door to the crane cab or the driver's cab. In this way you can prevent unauthorised persons from starting the engine with the hand-held control.

5.3.8

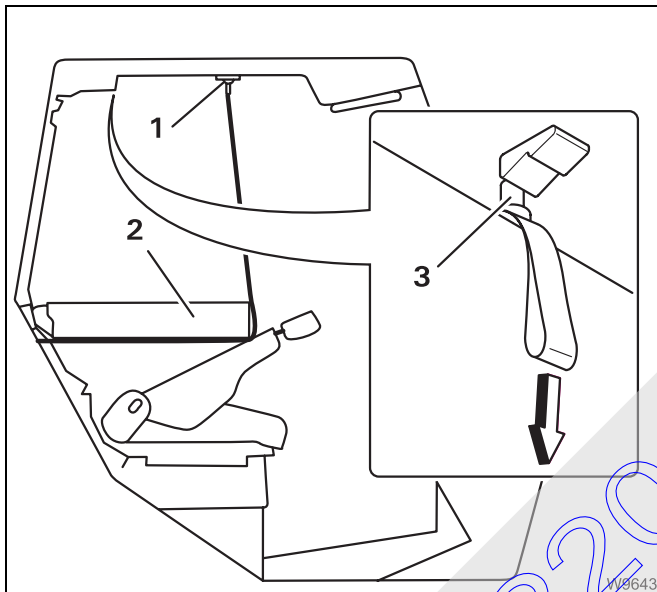
Folding berth

The berth must always be folded up for driving.



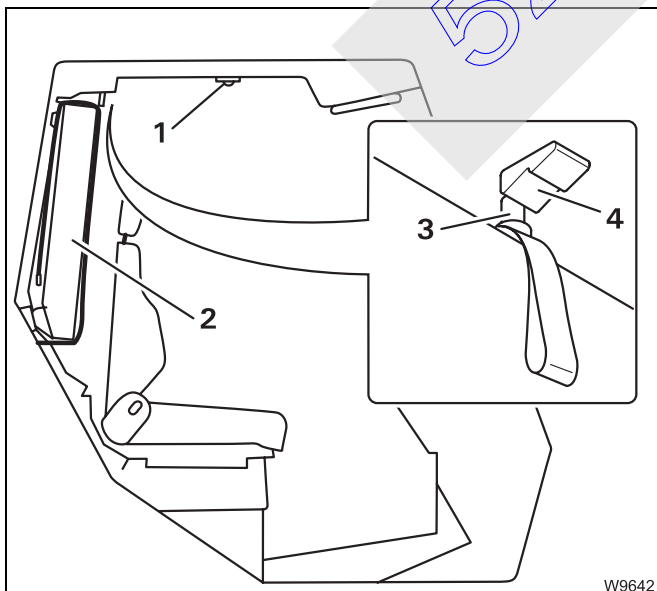
Risk of accidents due to the berth falling open!

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



Folding down

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



Folding up

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

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5.4

Off-road driving

This section is about adjustments, connections and procedures which you can use to adapt the way the vehicle is driven to off-road conditions.

Adjustments to the transmission

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

- Shift to the lowest starting gear; ■■■▶ p. 5 - 27.
- Select the **P** driving mode for more power; ■■■▶ p. 5 - 25.

Connections

If the adjustments to the transmission are insufficient on their own, you can additionally perform the following connections one after the other:

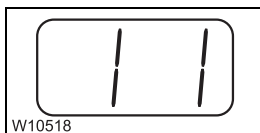
- First, you can switch on the **off-road gear** in the transfer case; ■■■▶ p. 5 - 54.
- You can then connect the **longitudinal differential lock**; ■■■▶ p. 5 - 56.
- You can then connect the **transverse differential lock**; ■■■▶ p. 5 - 58.

Changing the vehicle level

You can also adapt the truck crane to the off-road inclination using the level adjustment system, or lift and lower the truck crane; ■■■▶ p. 5 - 60.

Rocking the vehicle free and towing

If the truck crane is stuck in terrain; ■■■▶ *Freeing the immobilised truck crane*, p. 5 - 64.

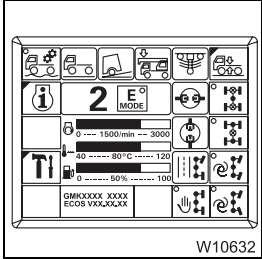



For all connections and to change the level, you must switch on the key-operated switch. When the key-operated switch is on, the 1st gear is always selected as the highest gear.

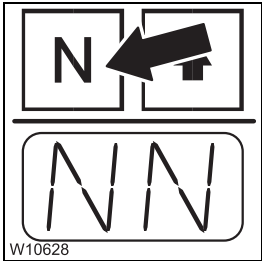
5.4.1 Transfer case – off-road gear on/off


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

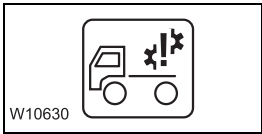
Prerequisites



- Stop the truck crane.
- If appropriate, open the main menu .

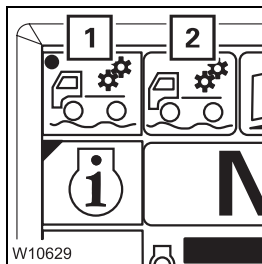


- Move into neutral on the transmission .



If the error symbol is shown during the following gear changes, contact **CraneCARE**.



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  and back to .

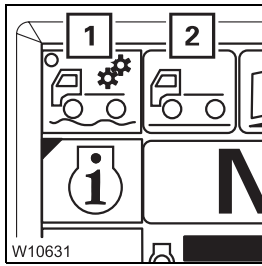
Or

- 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

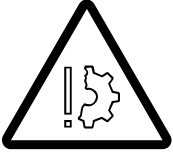
For towing away, you can also switch the transfer case to the neutral position;  p. 7 - 7.

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5.4.2 Operation of the longitudinal differential locks

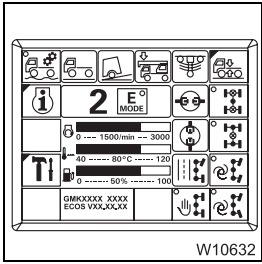
The longitudinal differential locks prevent individual axle lines from spinning when driving on a slippery surface.


With a 10 x 8 x 10 drive, the drive of the 2nd axle line is switched on and off together with the longitudinal differential locks.

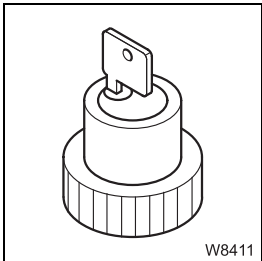


Risk of damage to the longitudinal differential locks!

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



- Stop the truck crane.
- Straighten the steering.
- If appropriate, open the main menu .



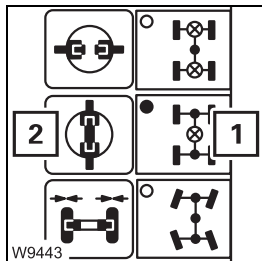
- Switch on the key-operated switch – the speed is limited to a maximum of approx. 20 km/h (12 mph).

You can only switch the longitudinal differential locks on or off if the current speed is below approx. 5 km/h (3 mph).




If the error symbol is shown during the following gear changes, contact **CraneCARE**.

Switching on



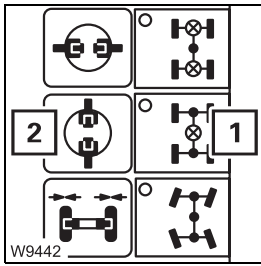
- Press the button (1) once – the dot turns **green**.
- Start moving slowly until the **red** symbol (2) is shown.

The display first shows the  symbol in **yellow** and when all longitudinal differential locks are switched on, it shows the symbol (2) in **red**.




When the longitudinal differential locks are switched on, the speed is limited to approx. 20 km/h (12 mph) – even after the key-operated switch has been switched off.


Switching off

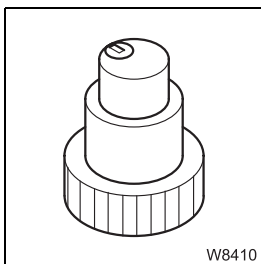


- Press the button (1) once – the dot turns **black**.

The display first shows the  symbol in **yellow** and when all longitudinal differential locks are switched off, it shows the symbol (2) in **green**.



Support the switch-off procedure by slowly driving back and forth if the symbol  for *Locks off* is not displayed.



- Switch off the key-operated switch if it is no longer required for other gear shifts.

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5.4.3

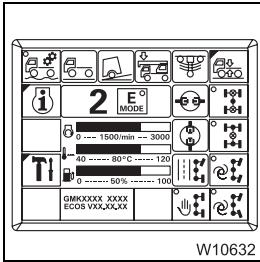
Operation of the transverse differential locks


The transverse differential locks prevent individual wheels from spinning when driving on a slippery surface.

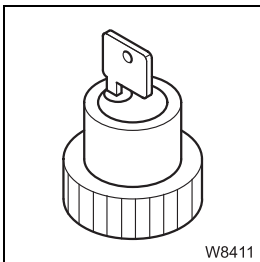


Risk of damage to the transverse differential locks!

Leave the transverse differential locks switched on only for as long as necessary. Always switch off the transverse differential locks when driving on firm ground and around corners.



- Stop the truck crane.
- Straighten the steering.
- If appropriate, open the main menu .



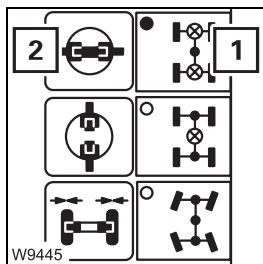
- Switch on the key-operated switch – the speed is limited to a maximum of approx. 20 km/h (12 mph).

You can only switch the transverse differential locks on or off if the current speed is below approx. 5 km/h (3 mph).




If the error symbol is shown during the following gear changes, contact **CraneCARE**.

Switching on



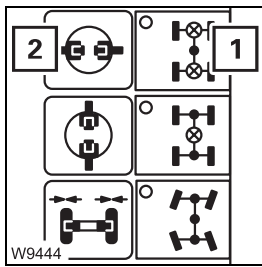
- Press the button (1) once – the dot turns **green**.
- Start moving slowly until the **red** symbol (2) is shown.

The display first shows the  symbol in **yellow** and when all transverse differential locks are switched on, it shows the symbol (2) in **red**.




When the longitudinal differential locks are switched on, the speed is limited to approx. 20 km/h (12 mph) – even after the key-operated switch has been switched off.

Switching off

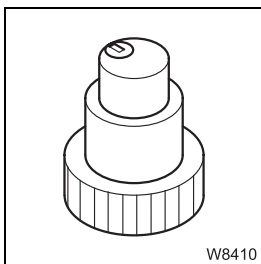


- Press the button (1) once – the dot turns **black**.

The display first shows the  symbol in **yellow** and when all transverse differential locks are switched off, it shows the symbol (2) in **green**.



If the symbol (2) is not shown, aid the switch-off procedure by driving forwards and backwards slowly.

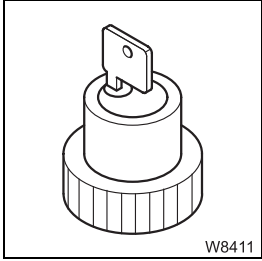


- Switch off the key-operated switch if it is no longer required for other gear shifts.

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5.4.4 Operation of 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.

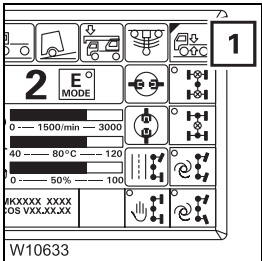


W8411


- Switch on the key-operated switch – the speed is limited to a maximum of approx. 20 km/h (12 mph).

Opening the submenu

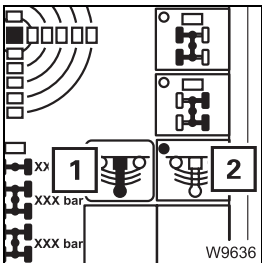
You can only open the *Level adjustment system* submenu when the current speed is below approx. 5 km/h (3 mph).



W10633

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

The *Level adjustment system* submenu is opened.

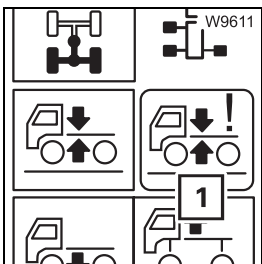


W9636

- 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
- or pre-select the suspension struts and change the vehicle level.



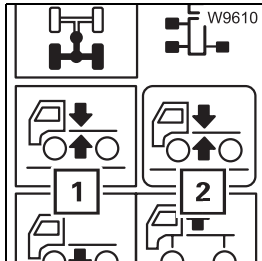
W9611


If the symbol (1) is shown for an error, contact **CraneCARE**.

Setting the on-road level

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

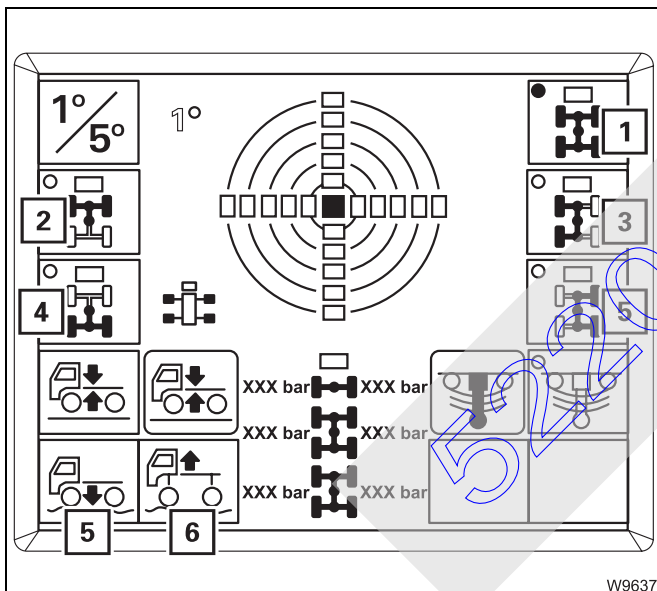
- Park the truck crane on a level surface.
- Straighten the steering.
- Press the button (1) until the symbol (2) turns **green**.



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

Pre-selecting suspension struts

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



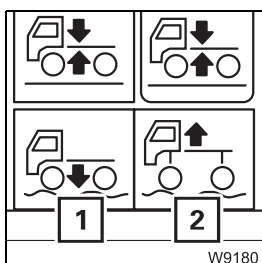
- For a uniform level change

- 1 Overall level – all suspension struts

- For inclination

- 2 Front level – suspension strut for the 1st to the 3rd axle line
- 3 Left level – all suspension struts on the left
- 4 Rear level – suspension struts for the 4th and 5th axle line
- 5 Right level – all suspension struts on the right

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



The corresponding suspension struts remain pre-selected for approx. 5 seconds.

During this time, the symbols (1) and (2) are **black** and the corresponding buttons are active.



Changing the vehicle level

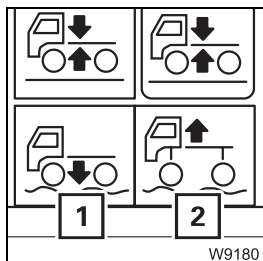
You can extend or retract the pre-selected suspension struts to change the vehicle level.



Risk of accidents from exceeding the permissible overall height

Always bring the truck crane to on-road level before driving on roads after changing the level.

If the truck crane is on a higher level, then the specified overall height will be exceeded.



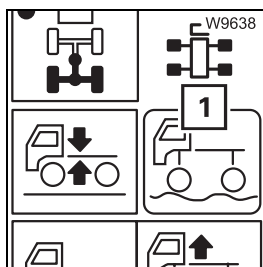
Lower level

- Press the button (1).
The pre-selected suspension struts retract.

Raise level

- Press the button (2).
The pre-selected suspension struts extend.

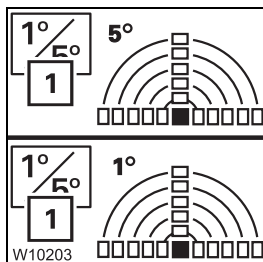
The level is continuously changed until you release the button or the end position is reached.



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

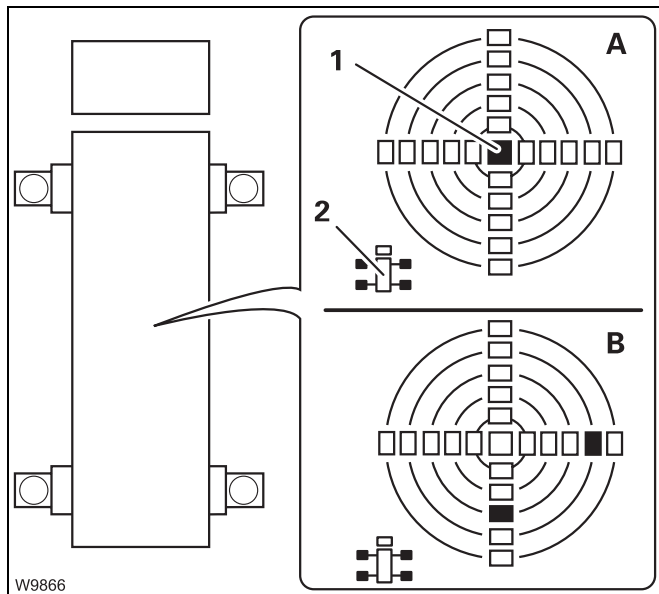
The inclination indicator shows the current alignment.



Changing the measurement range

You can change the measuring range between 1° and 5°.

- Press the button (1) once.
The current measuring range is displayed.



(A) – When the truck crane is aligned horizontally, 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).

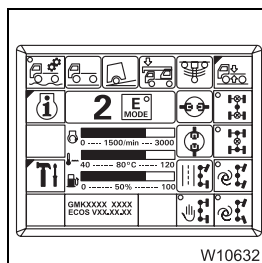
(B) – In this example, the carrier would be standing higher to the rear on the right hand side.

Exiting the submenu



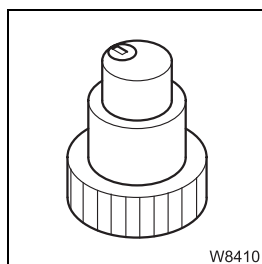
You can exit the *Level adjustment system* submenu at any time.

- Press the button (1) once.



The main menu opens.

The *Level adjustment system* submenu is automatically closed as soon as the current speed rises above approx. 5 km/h (3 mph).



- Switch off the key-operated switch if it is no longer required for other gear shifts.

5.4.5

Freeing the immobilised truck crane

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

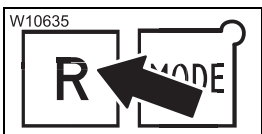
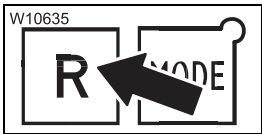
- Switch on the transverse differential locks
- Switch on the longitudinal differential locks
- Switch to the **P** driving mode
- Switch on the off-road gear in the transfer case



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.

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 is designed for a maximum tractive 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 axis towards the rear without diverting up or down.

Towing free backwards

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

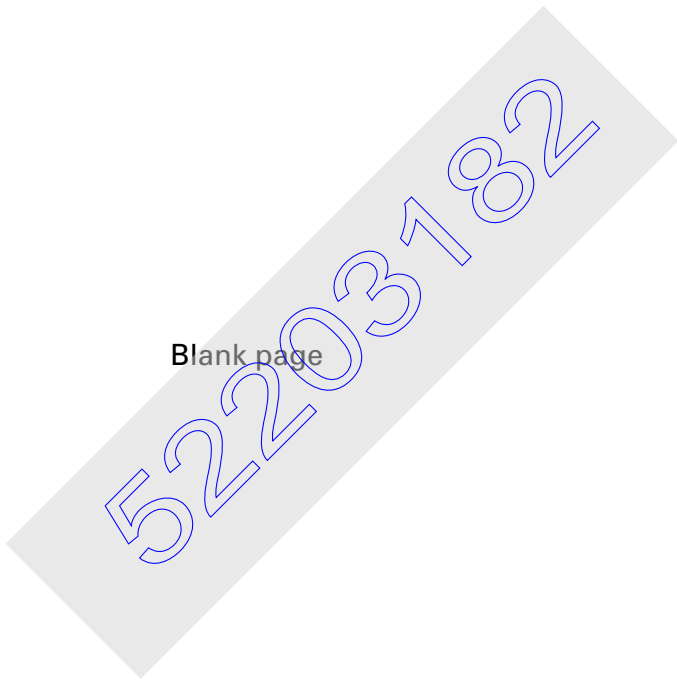


Risk of damage to the chassis!

Only tow the truck crane free while observing the procedure given for the pulling direction. Otherwise the chassis may be damaged or the towing eyes may bend off.

The towing eyes on the vehicle tail or the ROB are designed for a maximum tractive force of 75 kN (approx. 7.5 t) (16 860 lbf (approx. 16 530 lbs)), when:

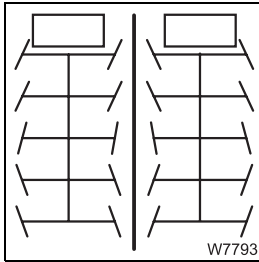
- The direction of pull runs along the level of the longitudinal axle **and**
- The direction of pull runs along the longitudinal axis towards the rear without diverting up or down.



5.5

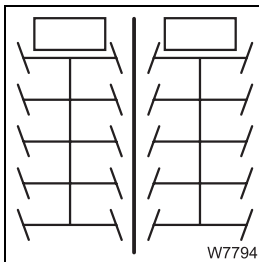
Separate steering

There are two types of steering with separate steering



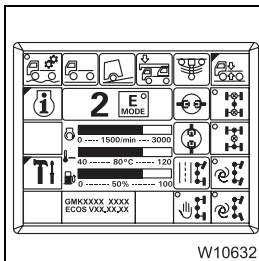
– **Driving around corners:**


When the separate steering is switched on, the steering angle is larger than for normal steering mode, and the turning circle is smaller.



– **Crab travel:**

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.

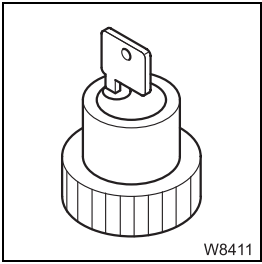


- If appropriate, open the main menu .

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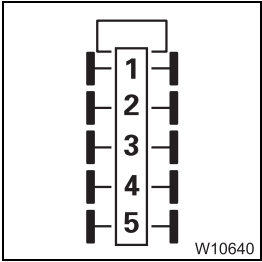
5.5.1

Switching on separate steering



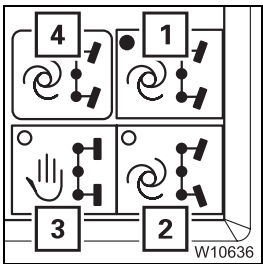
- Switch on the key-operated switch – the speed is limited to a maximum of approx. 20 km/h (12 mph).

You can only switch on the separate steering when the current speed is below approx. 5 km/h (3 mph).



The 1st to 3rd axle lines should always be steered using the steering wheel. The 4th axle line is always steered automatically.

The 5th axle line can be steered automatically or manually. This depends on how you switch on the separate steering.



- Press the button for the required steering mode once.

- 1 When driving around corners, the 5th axle line is steered automatically.
- 2 With crab travel mode, the 5th axle line is steered automatically.
- 3 With manual mode, the 5th 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.



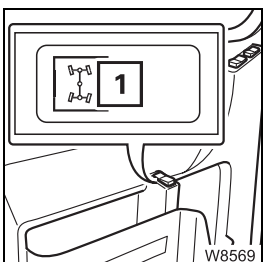
When the separate steering is switched on, the speed is limited to approx. 20 km/h (12 mph) – even after the key-operated switch has been switched off.

5.5.2

Steering with separate steering

The procedure depends on whether the 5th axle line is steered manually or automatically.

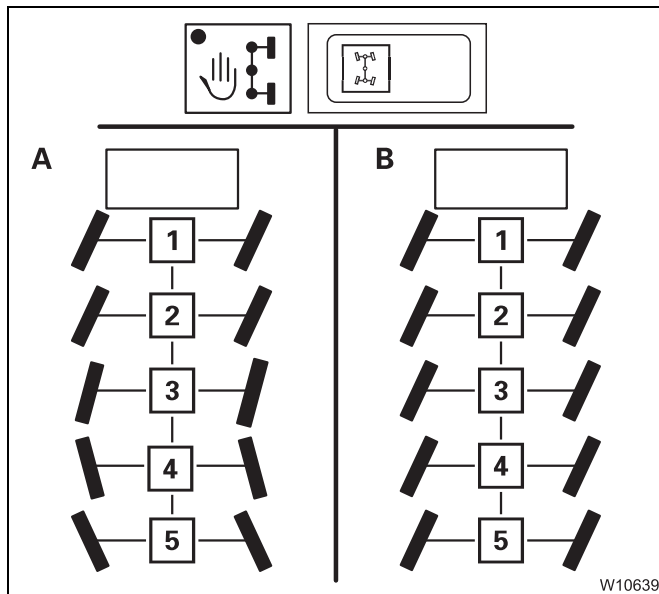
Manually



- Steer the 1st to 3rd axle line with the steering wheel.
- Steer the 5th 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 line is steered as long as you keep the button pressed or until an end position is reached.



(A) – for driving around corners

- Steer the 5th axle line in the opposite direction to the 1st to 3rd axle line.

The 4th axle line is always steered to suit the turning radius.

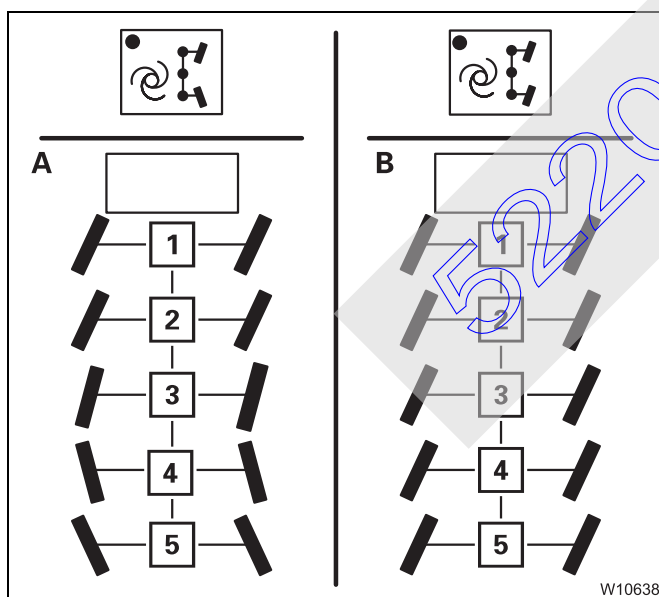
(B) – for crab travel mode

- Steer the 5th axle line in the same direction as the 1st to 3rd axle line.

The 4th axle line is always steered in the same direction.

Automatically

- Steer the 1st to 3rd axle line with the steering wheel.



(A) – for driving around corners

The 4th and 5th axles lines are steered out in line with the turning radius, and against the steering angle on the 1st to 3rd axle line.

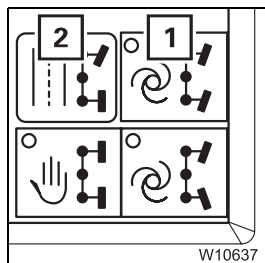
(B) – for crab travel mode

The 4th and 5th axle lines are steered in the same direction as the 1st to 3rd axle lines.

5.5.3

Switching off separate steering

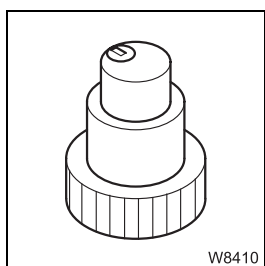
It is possible to switch off the separate steering when at a standstill and while driving.



- Press the button for the steering mode which is switched on, e.g. the button (2) 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 (1) shows the symbol for on-road driving. Now

- Steer the 1st to 3rd axle line with the steering wheel.
- The 4th and 5th axle line always remains in the straight running position.



- Switch off the key-operated switch if it is no longer required for other gear shifts.

The speed is no longer limited.

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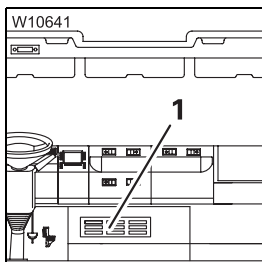
5.6

Heating and ventilating the driver's cab

5.6.1

Standard heating

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

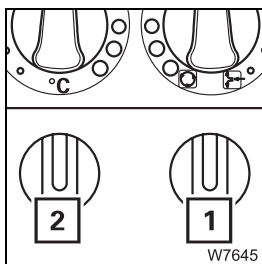


Do not cover the grille (1).

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

Switching the heating on and off

The heating is switched on and off with the fan.



Switching on

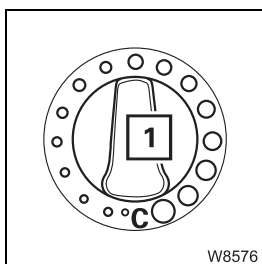
- Turn one or both switches (1), (2) clockwise.
The switches latch into place one after the other in three stages.

Switching off

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

Setting the temperature

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



Reducing the temperature

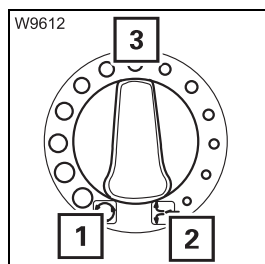
- Turn the switch (1) anti-clockwise.

Increasing the temperature

- Turn the switch (1) clockwise.



Setting recirculated/fresh air



You can set which air is sucked in by the heating.

Fresh air

- Turn the switch to symbol (2).

Recirculated air

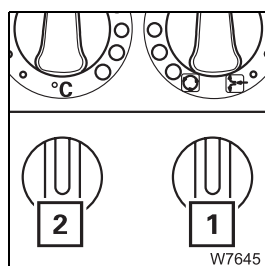
- Turn the switch to symbol (1).

Mixed air

- Turn the switch to the intermediate position (3).

By turning the symbol (3) towards the symbol (1) or (2) the proportion of air included is increased continuously.

Setting the air distribution



You can adjust the air distribution by switching on the various fans:

Air vents on the windscreen and in the centre

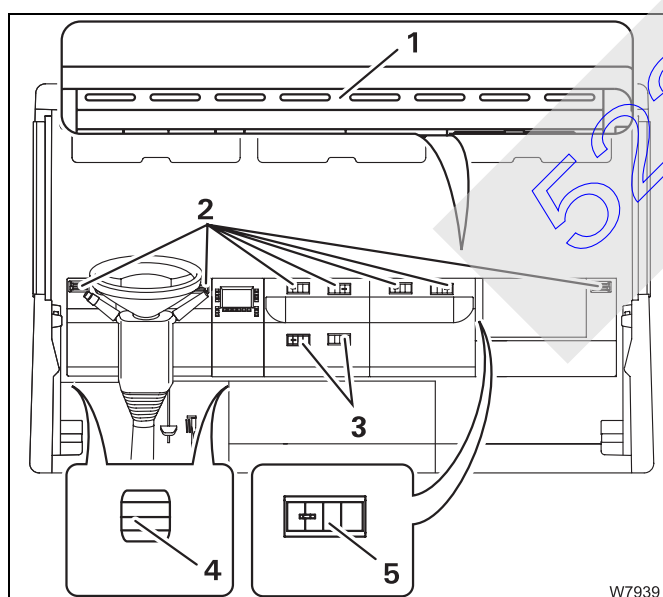
- Turn the switch (2) to the required level.

Air vents on the cab floor

- Turn the switch (1) to the required level.

All air vents:

- Turn the switches (1) and (2) to the required level.

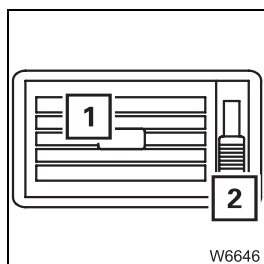


The upper fan supplies the air vents (1) and (2).
The lower fan supplies the air vents (3), (4) and (5).

You can also set the direction of the air flow at the air vents (2) and (3) and (5).

Adjusting the air vents

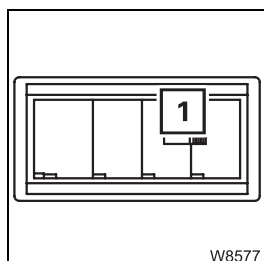
– Version 1



W6646

- To open the vent:** Push up regulator (2).
- To direct the air flow:** Push regulator (1) to the left or right.
- To close the vent:** Push down regulator (1).

– Version 2

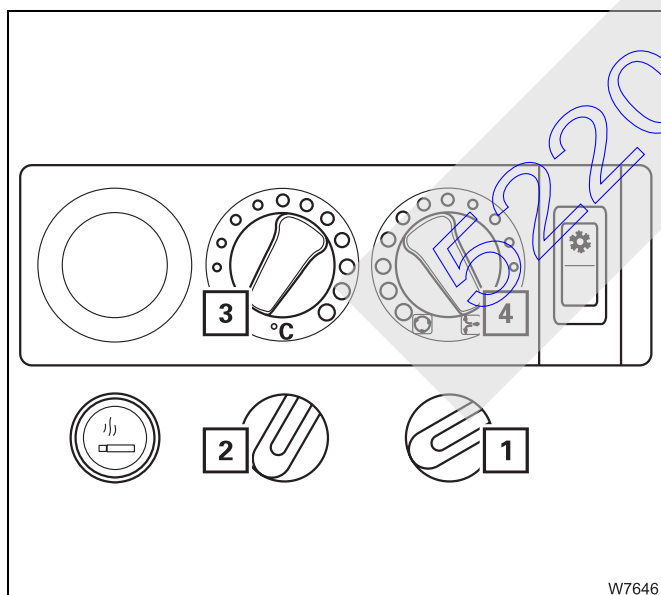


W8577

- Open air vent and direct air flow:** Push the regulator (1) between the left and the right.
- To close the vent:** Push the regulator (1) to the left or right.

Ventilating the driver's cab

This section describes how to ventilate the cab using the standard heating system. You can, if necessary, also ventilate the driver's cab using the roof ventilator; *Roof ventilator*, p. 3 - 63.



W7646

• Set the heating for ventilation of the driver's cab in the following way:

- Switch (3) in the *cold* position,
- Switch (4) to the *fresh air* symbol,
- Switches (1) and (2) to the required fan level,
- Open air vents and set air flow if necessary; p. 5 - 73.



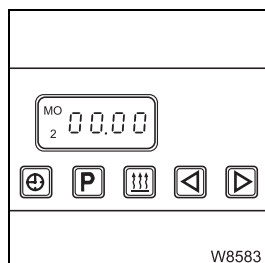
If the front window becomes foggy, then let the air out only from the air vents of the front window and turn the switch 3 to *warm*. To dry the air, you can switch on the air conditioning if necessary; p. 5 - 84.

5.6.2

Auxiliary water heating system



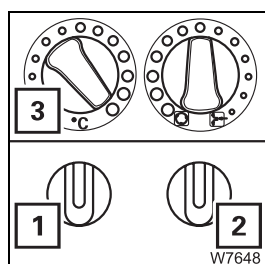
The batteries will run down if you operate the auxiliary heater with the engine switched off. You must recharge the batteries at shorter intervals if you use the auxiliary heater frequently.



You can use the auxiliary water heater to:

- Either preheat the engine or
- Preheat the engine and driver's cab simultaneously.

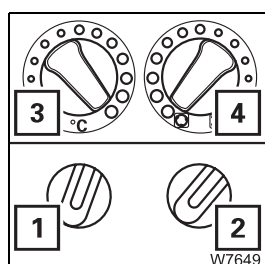
Preheating the engine



Adjust the heating system as follows if only the engine is to be preheated:

- Switch (3) in the *warm* position
- Switches (1) and (2) to the *fan off* position.

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 (3) in the *warm* position
- Switch (4) to the *recirculated air* symbol,
- Switches (1) and (2) to the required fan level,
- Open the air vents; p. 5 - 73.



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 sources of danger that could result in explosions.



Danger of explosions when operating the auxiliary heater!

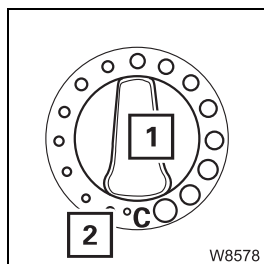
The auxiliary heater is not allowed to be operated:

- At service stations and tank farms
- At places where inflammable gases or vapours can be found or form (e.g. at places where fuel is stored and at chemical factories)
- At places where explosive dust can be found or form (e.g. coal dust, wood dust, grain dust)



Danger of suffocation when operating the auxiliary heater!


Do not use the auxiliary heating in closed spaces (e.g. a garage).




- Turn the switch (1) to the required temperature.

When the switch (1) is turned until it reaches the (cold) stop (2), the auxiliary heating is not switched on.

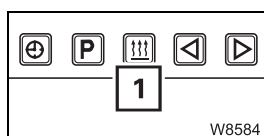


This section describes how to switch on the heater manually. You can also switch on the auxiliary heating automatically;  *Saving the automatic heating start*, p. 5 - 7.

- Turn on the ignition;  *Ignition, switching on*, p. 4 - 9.

- Press the button (1) once.

The auxiliary heating switches itself on and the insert lights up.




The auxiliary heating only supports the heating capacity of the standard heating system as long as the engine is cold. When the engine is warm, the heater is switched off. The pump for the auxiliary heating continues to run, however, until you switch off the auxiliary heating.

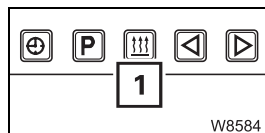


Always switch off the auxiliary heating when you turn off the truck crane when the battery master switch is switched on. In this way, you prevent the auxiliary heater from restarting and running down the batteries after the engine has cooled down.




Switching off the auxiliary heater

This section 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 - 78



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

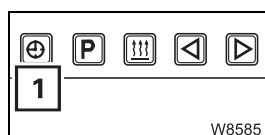
If you turn off the ignition while the auxiliary heater is in operation, the auxiliary heater continues to run for a certain period of time. You can set this remaining time;  *Air-conditioning system*, p. 5 - 82.

Setting the time and weekday

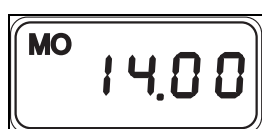
Always set the current time and weekday. These settings are required for the correct activation point of the automatic heating start.



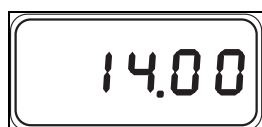
If the power supply is interrupted, all symbols in the display will flash and you must set the time and day again.



- Press the button (1) for longer than 2 seconds. The displayed time flashes, e.g. 10.00.



- Set the current time on the flashing display, e.g. 2 pm.
- Wait five seconds. The new time is saved and then the weekday flashes (e.g. **MO** for Monday).




- Set the current day of the week on the flashing display.

The display stops flashing after five seconds and the current time is displayed. The day of the week disappears.

The time and day of the week have not been set.

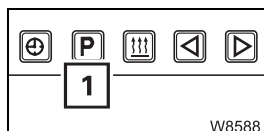
Saving the automatic heating start

The automatic heating is only started at the required time when the time and week day have been set correctly;  p. 5 - 76.

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 procedure, they flash for five seconds. The entry must be made within this period of time. The value stops flashing after five seconds and is saved as the new value.



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



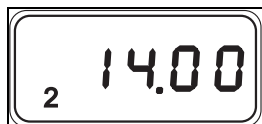
Flashing displays:

- The retrieved storage location, e. g. 2 and
- The last stored heating start, e.g. 6 am.



- Set the time for the required heating start, e.g. 8 am.

Wait for approx. 5 seconds until the day of the week for the heating start flashes, e.g. **MO** for Monday.




- Set the day of the week for the required heating start.

Wait for approx. 5 seconds until the current time is shown, e. g. 2 pm. Now the new heating start has been stored and switched on.



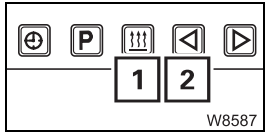
If you still wish to store one or two further heating starts, retrieve a new storage location using the **P** button and repeat the procedure.

After you have stored the heating start, you can also set the heating period;  *Setting the heating period*, p. 5 - 78.



Setting the heating period

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



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



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



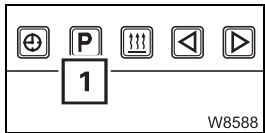
- Set the required heating period on the flashing display. You can set a heating period of 10 to 120 minutes.



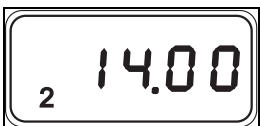
Wait for approx. 5 seconds until the current time is shown, e. g. 2 pm.
A new heating period has now been set.

Switching the automatic heating start on and off

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

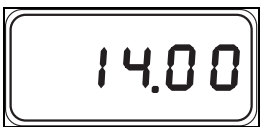


- To retrieve a storage location, press the button (1) once.



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

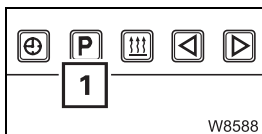
To activate a different heating start, press the **P** button repeatedly until the required storage location is displayed. This heating start is activated as soon as the display stops flashing.



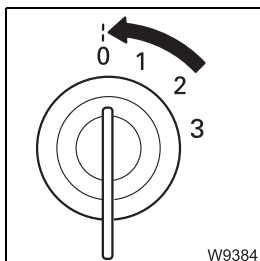
To deactivate the automatic heating start, press the **P** button repeatedly until the storage location is no longer displayed.

Setting the remaining time

If the ignition is turned off while the auxiliary heater is running, the auxiliary heater continues to run for the remaining time.



- Switch on the auxiliary heating using the (1) button.



- Turn off the ignition.



The auxiliary heating continues to run and the residual run time last set flashes, e.g. 48 minutes.



- Set the required residual run time on the flashing display. You can set a residual run time of 1 to 120 minutes.

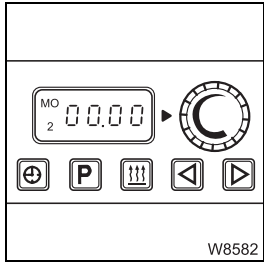


- Wait for 5 seconds until the current time is shown. The residual run time is now set.

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5.6.3

Auxiliary air heater with timer



You can use the auxiliary air heating to preheat the driver's cab or provide additional heating.

The auxiliary air heating is supplied from the fuel tank.



The batteries will run down if you operate the auxiliary heater with the engine switched off. You must recharge the batteries at shorter intervals if you use the auxiliary heater frequently.

Switching on the auxiliary heater

To switch the auxiliary heater on and off, you can:

- Switch the auxiliary heater on and off manually. For this purpose the ignition must be turned on.
- Or set an automatic heating start and automatic heating period with the timer.
- Before switching on the heater, check whether it is allowed to be operated at the current site of the truck crane. Find out whether there are any sources of danger that could result in explosions.



Danger of explosions when operating the heating!

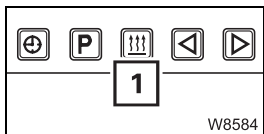
The heater may not be operated:

- At service stations and tank farms
- At places where inflammable gases or vapours can be found or form (e.g. at places where fuel is stored and at chemical factories)
- At places where explosive dust can be found or form (e.g. coal dust, wood dust, grain dust)



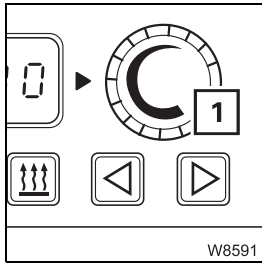
Danger of suffocation when operating the heating!

Do not operate the heating or the heating with timer in enclosed rooms (e.g. garages).



- Turn on the ignition; Ignition, switching on, p. 4 - 9.
- Press the button (1) once.
The auxiliary heating switches itself on and the control field lights up.

Setting the temperature



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

Increasing the temperature:

- Turn the switch (1) clockwise.

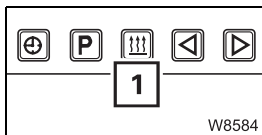
Reducing the temperature:

- Turn the switch (1) anti-clockwise.

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

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

Switching off the auxiliary heater



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

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

Further functions

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

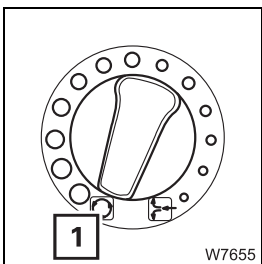
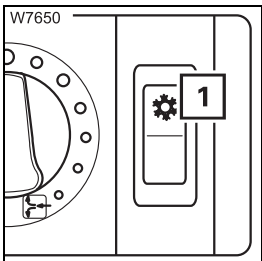
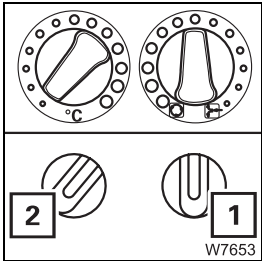
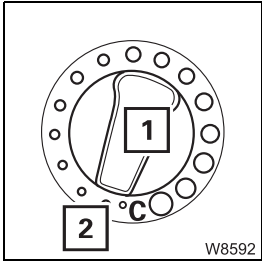
- ▣▣▣▣▶ *Setting the time and weekday*, p. 5 - 76,
- ▣▣▣▣▶ *Saving the automatic heating start*, p. 5 - 77,
- ▣▣▣▣▶ *Setting the heating period*, p. 5 - 78,
- ▣▣▣▣▶ *Setting the remaining time*, p. 5 - 79.

5.6.4**Air-conditioning system**

You can use the air-conditioning system to cool and humidify the air in the driver's cab when the engine is running.

Switching on

- Switch off the driver's cab auxiliary heater:
 - With auxiliary water heating; ►► p. 5 - 76
 - With auxiliary air heating; ►► p. 5 - 81;
- Turn the switch (2) until it reaches a stop (1) in the *cold* position.



- Turn the switch (2) for the upper fan to the required level.
- Turn the switch (1) for the lower fan counterclockwise until it reaches a stop (fan off).

- Press the switch next to symbol (1) – *air-conditioning system on*.

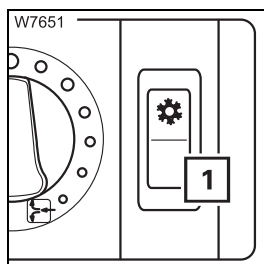
- To cool more quickly, turn switch (1) to the *recirculated air* symbol.

Setting the air distribution

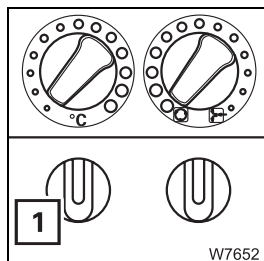
The cooled down air escapes from the air vents at the windscreen and at the top of the instrument panel.

- Adjust these air vents in such a way that the cool air can mix well with the air in the driver's cab; ►► *Adjusting the air vents*, p. 5 - 73.

Switching off



- Press the switch opposite symbol (1) – *air-conditioning system off*.



- If you do not wish air to be circulated in the driver's cab, turn the switch (1) for the upper fan counterclockwise until it reaches a stop.

Information on how to get the maximum benefit from the air conditioning

Do not cool the air in the driver's cab too strongly.

The difference between the outside temperature and the inside temperature should be maximum 10 °C to 14 °C (18 °F to 25 °F).

Excessive cooling frequently results in physical discomfort, mostly after you have left the cab.

Avoid exposing your body directly to cold air.

When using recirculated air, you should switch over to fresh air mode to ensure a fresh supply oxygen at the same time. Adapt the cooling output to your actual needs:

If the truck crane has, for example, been exposed to strong sunlight for a long period of time, the cooling system should be initially operated at the highest blower level with the engine running.

The driver's cab doors or at least the windows should be kept open for a time to ventilate the cab. The cooling-down procedure can be accelerated by increasing the engine speed.

When continuously operating the air-conditioning system, close the windows and other air vents to ensure the driver's cab is cooled sufficiently.

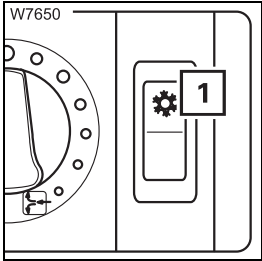
Set the fan to a lower level once the inside temperature is as desired.



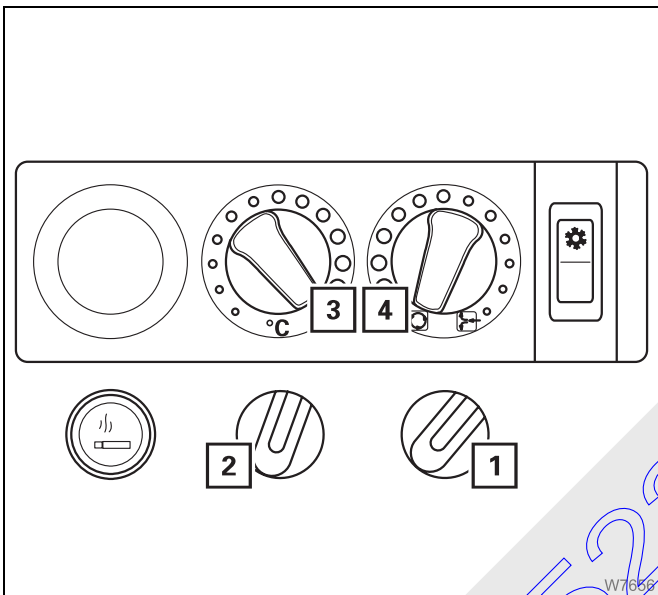
Dry air in the driver's cab

You can also dry the air in the driver's cab using the air-conditioning system.

Here, however, no heating capacity, or only a low heating capacity level, is reached.



- Switch on the air-conditioning system and press the switch by the symbol (1).



- Turn the switch (2) to the required level.
- Additionally switch on the heating as follows:
 - Turn the switch (1) to the required fan level.
 - Switch (3) in the *warm* position,
 - Switch (4) to the recirculated air *symbol*.

The heating circuit with the lower fan now heats the lower part of the driver's cab and, as a result, the air absorbs a large amount of humidity from the driver's cab.

The heating circuit with the upper fan sucks in this humid air and directs it first over the air conditioning system. Part of the humidity condensates in the process. This air then is heated and blown into the top of the driver's cab. This dry air now mixes with the humid air in the cab floor area and again absorbs humidity before being directed through the air conditioning system. This circuit dries the air in the driver's cab.

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 the trailer rolling away!

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.



Please observe the relevant national regulations regarding the 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:

- With every 100 kg (220 lbs) of drawbar load, the axle loads on the 1st to the 3rd axle line are reduced by 25 kg (55 lbs).
- For every 100 kg (220 lbs) of drawbar load, the axle loads on the 4th and 5th axle lines are increased by 87 kg (192 lbs).



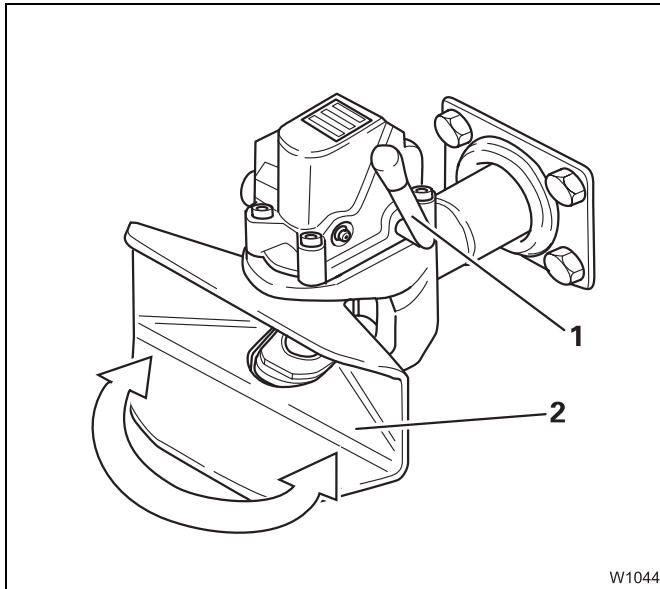
Coupling the trailer



Risk of injury if the automatic closing device is actuated.

Do not put your hand into the coupling jaw when the towbar coupling is open.

This may activate the automatic closing device, causing the coupling pin to move down with great force, seriously injuring your hand.

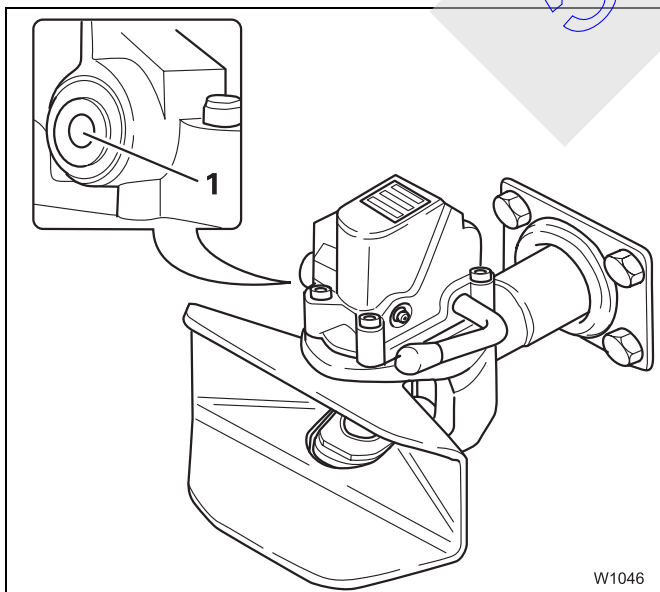


- Open the towbar coupling. Push the lever (1) up until it latches into place.
- Check whether the coupling jaw (2) is stable. It may not be allowed to move to the left or the right when the towbar coupling is open.
- Carefully drive the truck crane backwards so that the towbar of the trailer is pushed into the coupling jaw.

The towbar coupling closes automatically, and the lever (1) swings downwards.



Make sure you check the prescribed condition of the coupling after each coupling procedure.



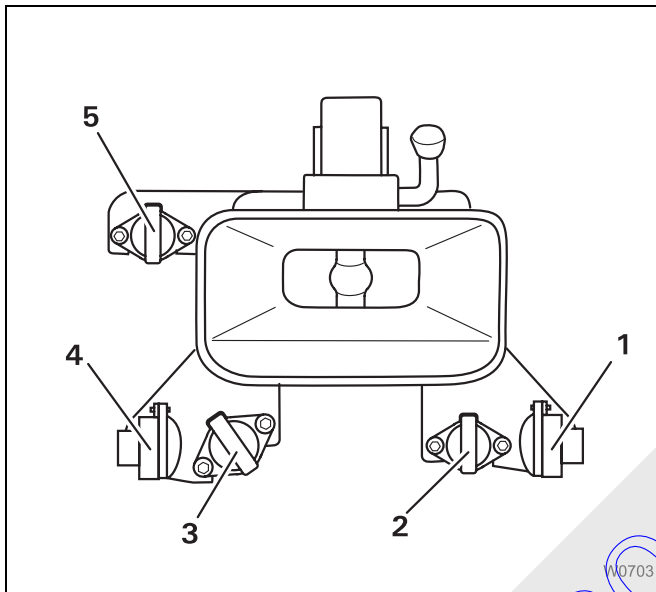
The control pin (1) may no longer protrude from the guide bushing after the coupling procedure.



Risk of accidents if the trailer is coupled improperly!

If the control pin is protruding from the guide bushing, the trailer is not coupled properly and could become disengaged from the towbar coupling while driving.

Connecting the supply lines



- Insert the plug of the trailer's electrical system into the socket (5).
- If necessary, insert the ABS connection cable into the socket (3).
- First connect the hose of the brake cable to the yellow coupling head (4).
- Then connect the hose of the supply line to the red coupling head (1).

This socket (2) is designed for special equipment.



Risk of accidents if the hoses are too short or installed improperly!

The hose lines may not come off, also when driving around corners. When connecting the hoses, make sure they are long enough and have enough clearance.

- Check whether the trailer's direction indicators and light system are working properly.
- Test the service brake and parking brake immediately after setting off.

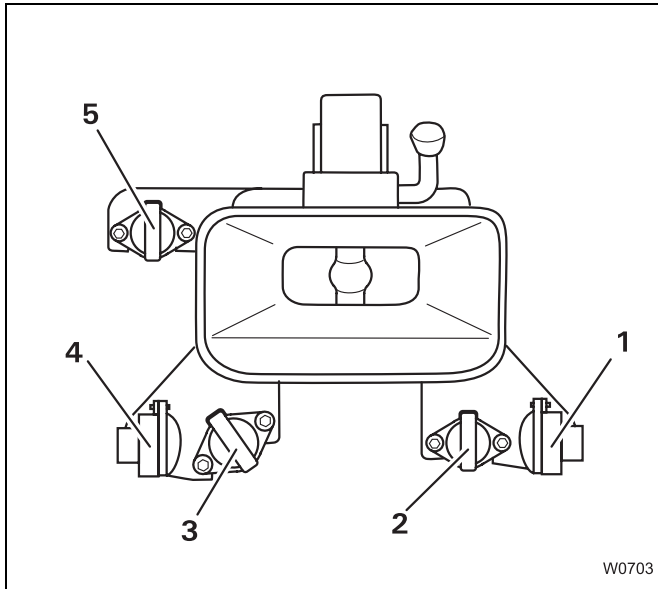


Removing supply lines



Risk of accidents by the trailer rolling!

Always first remove the hose from the supply line so that the trailer is braked. This prevents the trailer from rolling 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).

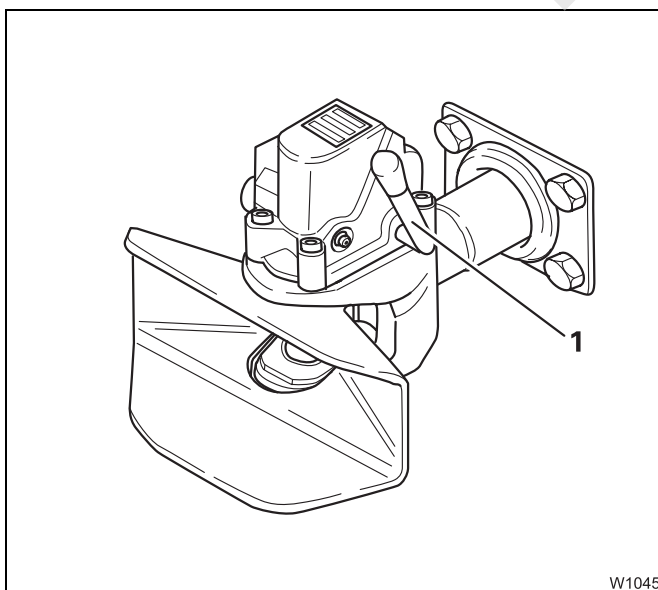
Uncoupling the trailer



Risk of injury if the automatic closing device is actuated.

Never put your hand into the coupling jaw when the towbar coupling is open.

This prevents the coupling from closing automatically, and the coupling bolt causing serious injury to your hand.

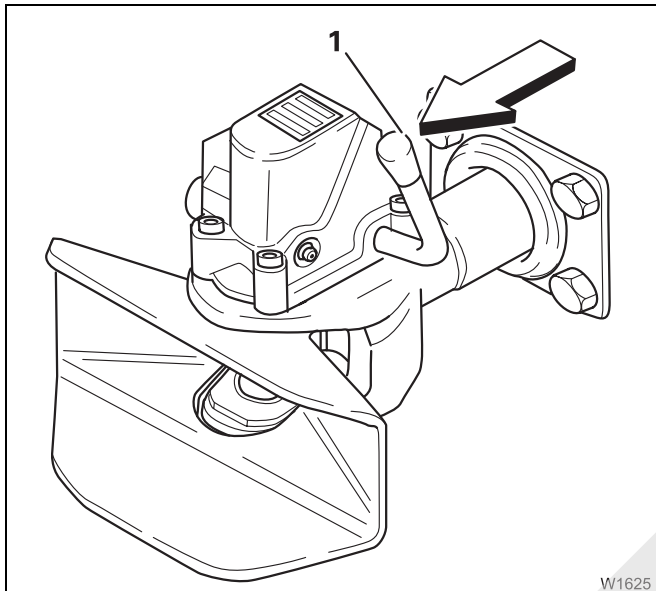


- Secure the trailer with the service brake and chocks as prescribed to prevent it from rolling away.
- Open the towbar coupling. Push the lever (1) up until it latches into place.
- Drive the truck crane carefully away from the trailer.



Risk of injury when closing the towbar coupling by hand

When closing, the lever moves down with great force in the direction of the coupling jaw. Therefore start the closing process only by moving the lever briefly in the direction of the coupling jaw with the hand balls. 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 if the automatic closing device is actuated.

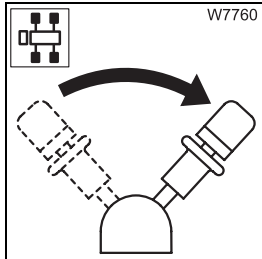
Always close the coupling if no trailer is connected. This prevents people being injured by the automatic closing device being activated unintentionally.



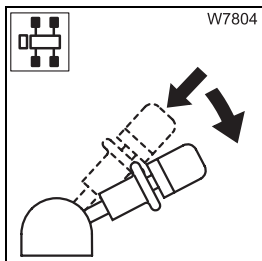
Checking the braking force

When a trailer is coupled and connected, you can check that 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 carry out the check, you can release the parking brake of the trailer on its own.



- Engage the parking brake.



- Press the parking brake lever downwards and pull it further back. As long as you hold the lever in this position, the parking brake on the trailer is released – the parking brake on the truck crane remains engaged.

In this way, you can check whether the braking force of the parking brake on the truck crane alone is sufficient to brake the truck crane and the trailer.

- Release the parking brake lever again. The parking brake lever latches into the *parking brake engaged* position and the trailer's parking brake is engaged again.



Risk of accidents by the truck crane rolling away!

When parking on downhill or uphill roads, always secure the truck crane and trailer against rolling away with wheel chocks in addition to the parking brake. Even when the check of the parking brake has delivered a positive result. Observe the corresponding regulations in your country when doing this.



The chocks are only supplied if they are part of the ordered country package.

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6

Information and rigging for on-road driving

This chapter contains:

- Information for on-road driving.
- Rigging work required in order to set down the main boom on a trailer.
- Removing/installing the main boom, outrigger beams and auxiliary hoist.

6.1

Information

For on-road driving you must unrig the counterweight completely and remove all lattice extensions.

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6.2

Rigging work for driving with a trailer

To reduce the axle loads to the specifications which apply in the country of use, you can set the main boom onto a trailer (dolly) when driving. For this purpose, the truck crane must be fitted with a slewing gear free-wheel, 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 - 3.
- Switch on the boom floating position;  p. 6 - 5.
- Switch on boom pre-tensioning, if necessary;  p. 6 - 6.

6.2.1

Switching on the slewing gear freewheel

The superstructure must be able to turn when driving around corners if the main boom is set down on a trailer. You must switch on the slewing gear freewheel for this purpose.

- If a houselock is fitted, switch it off;  *Switching off the houselock*, p. 12 - 16.




Risk of accidents with the houselock switched on!

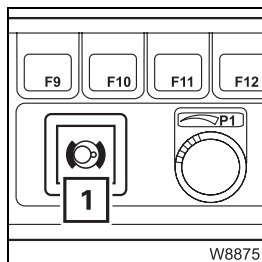
Always switch off the houselock before setting down the main boom on the trailer. Otherwise the superstructure will be unable to turn when driving around corners.

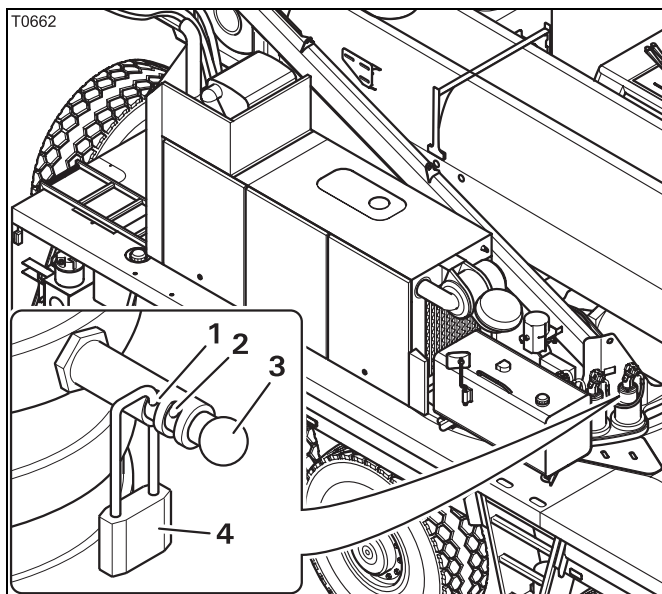
- Place the boom on the trailer as described in section *Switching on boom floating position*, p. 6 - 5.

Prerequisites

You can only switch on the slewing gear freewheel once the following requirements have been met:

- The engine is running for crane operation.
- The slewing gear brake is released, the lamp (1) has gone out;
 *Releasing the slewing gear brake*, p. 12 - 89.





- Remove the lock (4) from the bore hole (2).
- Push the pin (3) inward as far as it will go.
- Secure the bolt with the lock in the bore (1) and remove the key.

Now the slewing gear freewheel is switched on and secured.

- Switch on the slewing gear freewheel on all slewing gears in the same way.



Risk of accidents if the bolts are not secured

Always secure the bolts with the lock.

This prevents the slewing gear freewheel from being switched off unintentionally while driving.



Switching off the slewing gear freewheel; p. 13 - 18.

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6.2.2

Switching on boom floating position

If the main boom has been placed on a trailer, the boom floating position must be switched on so that the main boom can move up and down.



Risk of accidents when the boom floating position is switched off

Always switch on the boom floating position when the main boom is on a trailer.

This prevents the trailer hanging briefly with its full weight on the main boom on uneven ground, the axle loads from rising suddenly, or the truck crane from tipping when driving around corners.

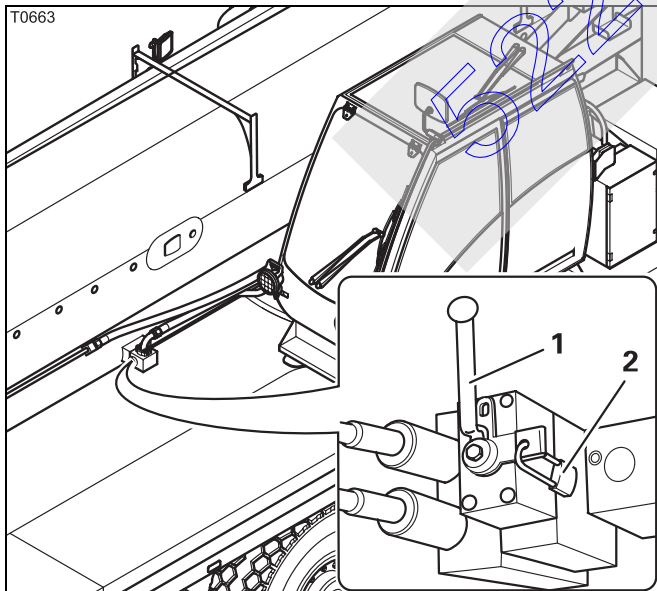
- Enter the SLI code for the current rigging mode.
- Fully retract the main boom.
- Raise the main boom to a permitted angle within the working range.
- Turn the superstructure to the 0° to the rear working position and place the main boom on a trailer.



Risk of accidents due to the main boom falling down!

You may only switch on the boom floating position when the main boom is already lying on the trailer.


In this way, you prevent the raised main boom from falling down.



- Remove the lock (2).
- Switch the valve I over – and position the lever (1) vertically, moving it either upwards or downwards depending on its fitting position.
- Secure the lever (1) with the lock (2).

The boom floating position is now switched on.



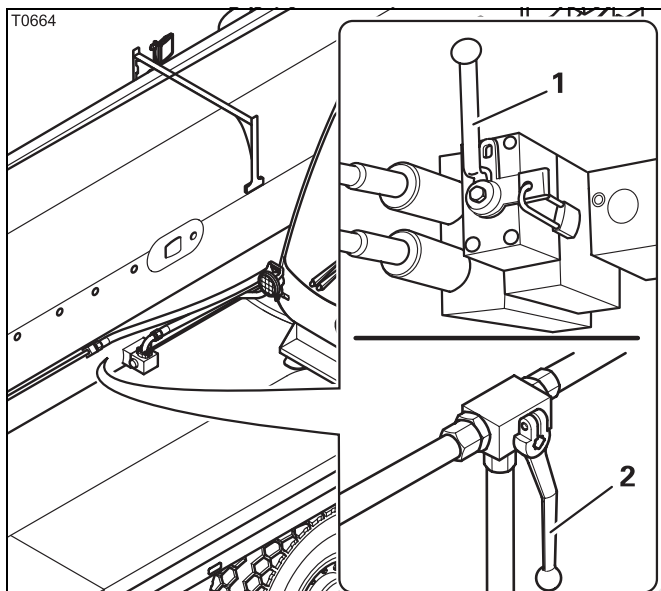
Switching off the boom floating position;  p. 13 - 19.


6.2.3

Switching on boom pre-tensioning

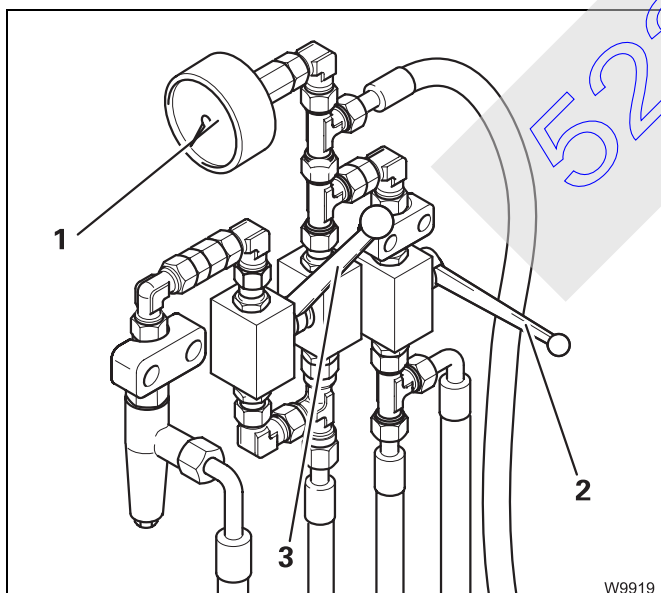
If the main boom has been set down on a trailer, you can change the axle loads on the rear axle lines by switching on the boom pre-tensioning.

To switch on the boom pre-tensioning, you must bring the valves I to IV into the required positions, and fill the pressure accumulator.



The valve I (1) is in the correct position if the boom floating position is switched on;  p. 6 - 5.

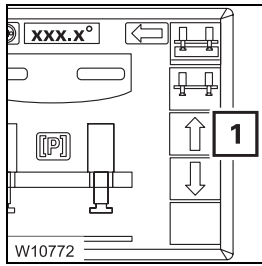
- Switch the valve IV over, and the lever (2) downwards.




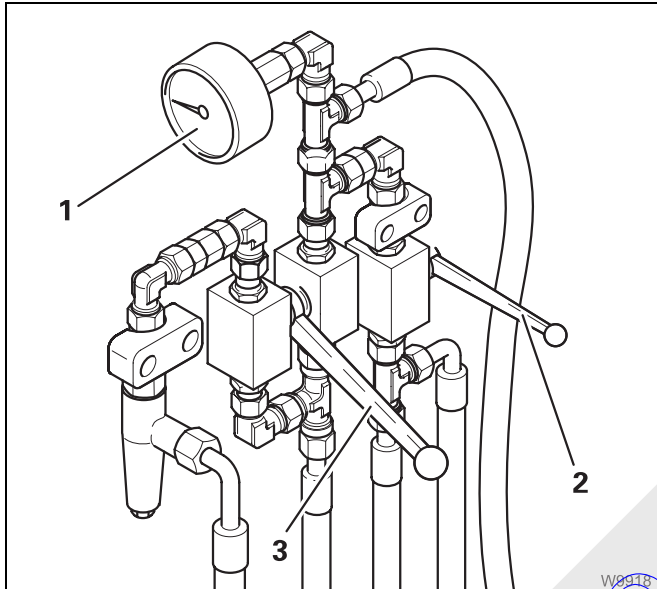
The valves II and III are under the pressure gauge (1).

- Close the valve II – the lever (2) is horizontal.
- Open the valve III – the lever (3) goes up.

You can now fill the pressure accumulator.



- Open the counterweight  submenu.
- Press the button (1) – retract lifting cylinders.
The pressure accumulator is filled.



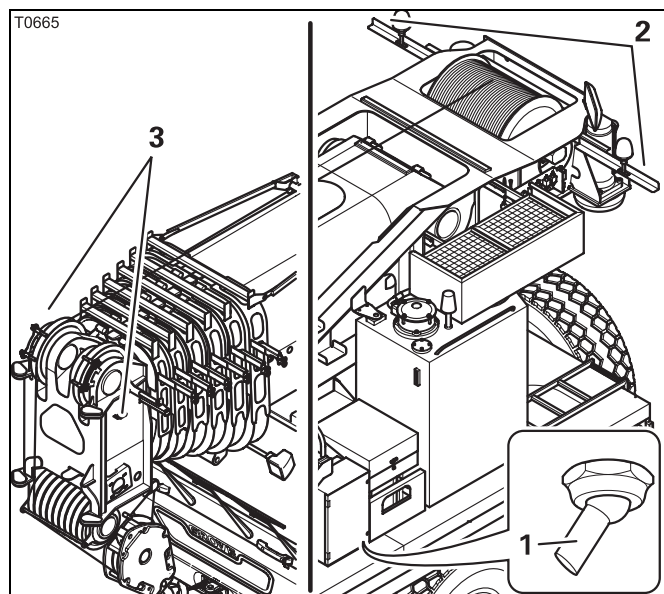
- Fill up the pressure accumulator until the pressure stops rising on the pressure gauge (1).
- Close the valve III – the lever (3) goes down.
The valve II stays closed – the lever (2) is horizontal.
Now the boom pretensioning is switched on.



Switching off the boom pre-tensioning;  p. 13 - 20.

6.2.4

Switching the superstructure driving lights on/off



The lighting for the *superstructure* includes lamps (2) and (3).

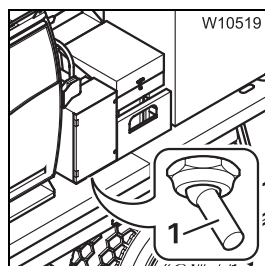
With standard equipment, lamps (2) and (3) are always switched on or off together with the parking light and the headlights.

With additional equipment consisting of the switch (1), lamps (2) and (3) can be switched on or off 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.

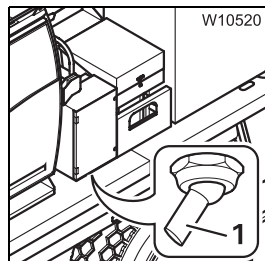
- Push the switch (1) to the right and outwards.



Switching on

When the main boom is in the boom rest, the *Superstructure* driving lights must be switched on.

- Push the switch (1) to the left – towards the turntable.



6.3

Rigging the main boom

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

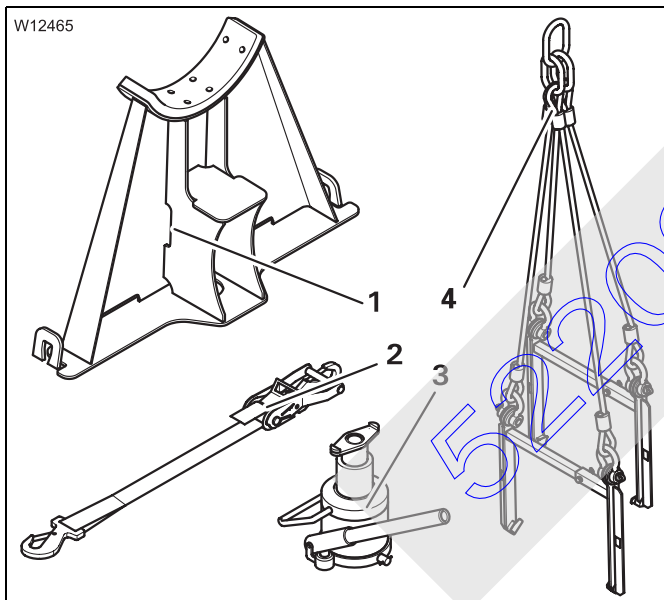


Risk of accidents when installing/removing the main boom without pulling devices!

Only remove or install the main boom if the truck crane is equipped with the factory-installed pulling devices and with the necessary accessories. Without these factory-installed pulling devices, the main boom may be removed by **CraneCARE** only.

Additional equipment required

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



- A derricking cylinder support (1)
- A tightening belt (2),
- Lifting equipment (3),
- A sling gear (4),
- An auxiliary crane of sufficient lifting capacity
- A separate vehicle with sufficient load bearing capacity and loading area.

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

6.3.1

CHECKLIST: Removing the main boom



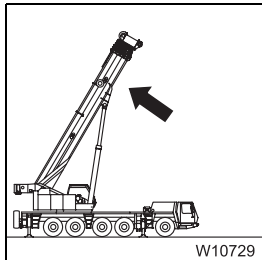
This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.

Observe the warnings and safety instructions specified there.

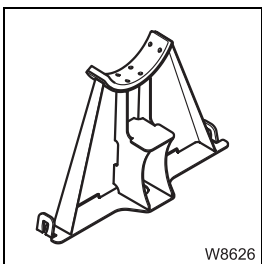
Prerequisites

- The counterweight and auxiliary hoist have been removed.
- 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 and the slewing gear brake is engaged; *Engaging the slewing gear brake*, p. 12 - 89.
- The truck crane is supported with at least an outrigger span of 8.55 x 2.74 m (28.1 x 9.0 ft).
Or the parking brake is on, the truck crane has been aligned horizontally with the level adjustment system and the suspension is locked.

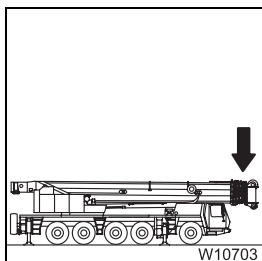
Checklist



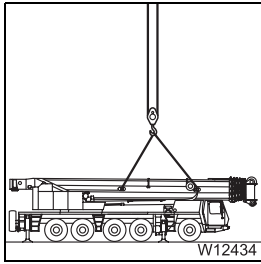
1. Raise the main boom and remove the clamp with the cables and hoses;
 p. 6 - 18.



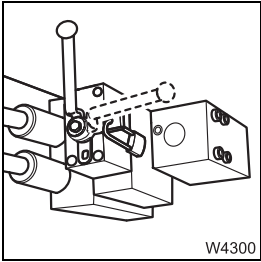
2. Place the derricking cylinder support on the counterweight platform;
 p. 6 - 20.



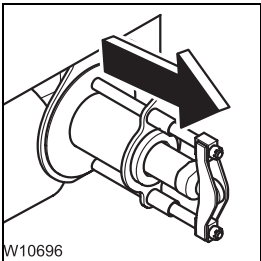
3. Place the main boom on the boom rest.



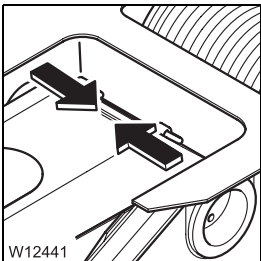
4. Fit the auxiliary crane sling to the main boom; ■■■▶ p. 6 - 16.



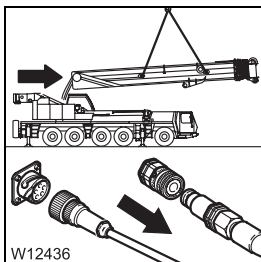
5. Switch on the derricking cylinder pressure relief; ■■■▶ p. 6 - 19.



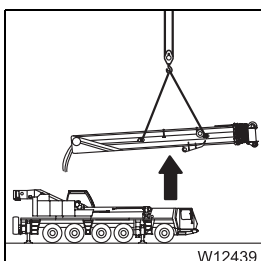
6. On the derricking cylinder head axle:
– take the load off of the head pin
– release the head pin,
– pull the head pin out.
■■■▶ p. 6 - 20.



7. On the boom pivot pin:
– release the pivot pin,
– switch the hydraulic circuit over,
– retract the pivot pin.
■■■▶ p. 6 - 23.

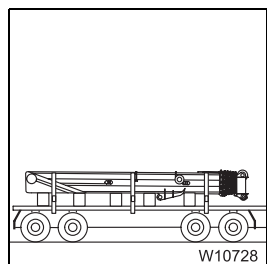


8. Lift the main boom in front of the turntable and separate the hydraulic/ electrical connection; ■■■▶ p. 6 - 25.



9. Raise the main boom from the turntable.

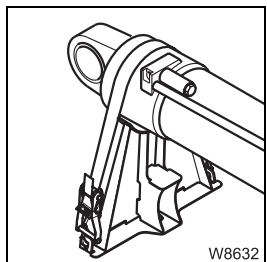




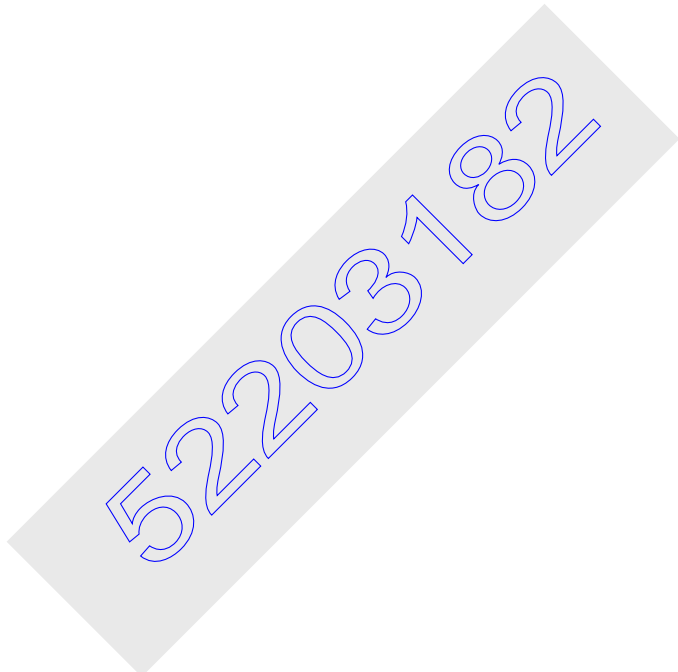
10. – Put the main boom on the separate vehicle and secure for transport.

– Insert the pins for the pivot pin safety device.

▀▀▀ p. 6 - 30



11. Secure the derricking cylinder with a tightening belt; ▀▀▀ p. 6 - 29.



6.3.2

CHECKLIST: Mounting the main boom



This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.

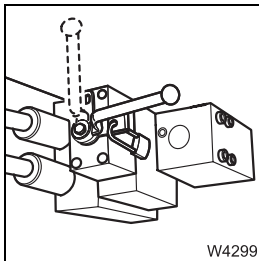
Observe the warnings and safety instructions specified there.

Prerequisites

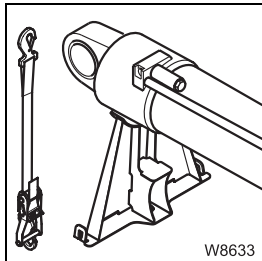
The truck crane is supported by an outrigger span of at least 8.55 x 2.74 m (28.1 x 9.0 ft).

Or the parking brake is on, the truck crane has been aligned horizontally with the level adjustment system and the suspension is locked.

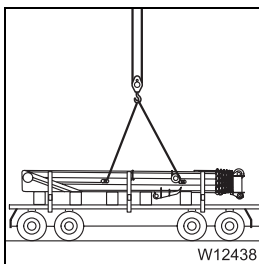
Checklist



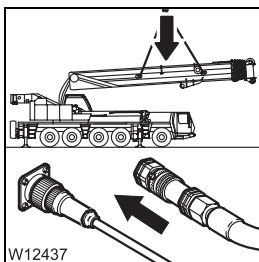
1. Check whether the pressure relief for the derricking cylinder is switched on; p. 6 - 19.



2. Remove the tightening belts from the derricking cylinder; p. 6 - 29.

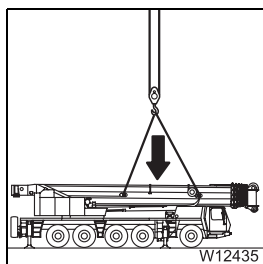


3. – Fit the auxiliary crane sling to the main boom; p. 6 - 16.
– Pull the pins for the pivot pin safety device; p. 6 - 23.

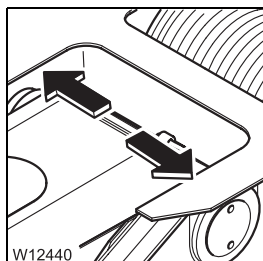


4. Lift the main boom onto the turntable and create the hydraulic/electrical connection; p. 6 - 27.

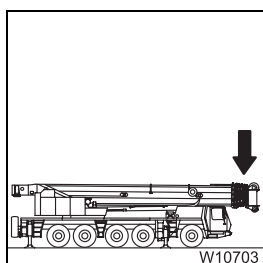




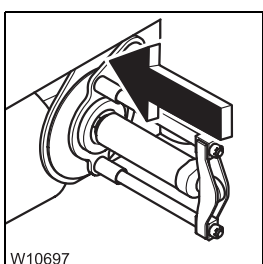
- 5.** Lift the main boom into the turntable and align the connecting points;
 ■■■▶ p. 6 - 29.



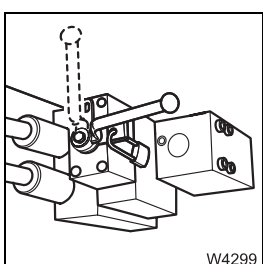
- 6.** On the boom pivot pin:
 – switch the hydraulic circuit over,
 – extend the pivot pin,
 – secure the pivot pin
 ■■■▶ p. 6 - 23.



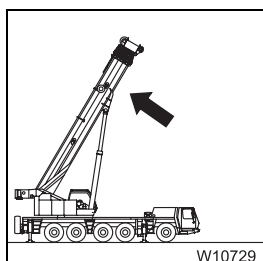
- 7.** Set down the main boom in the boom rest with the auxiliary crane and remove the sling gear; ■■■▶ p. 6 - 17.



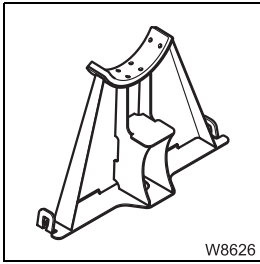
- 8.** On the derricking cylinder head axle:
 – align the derricking cylinder,
 – fit the head pin,
 – secure the head pin.
 ■■■▶ p. 6 - 20.



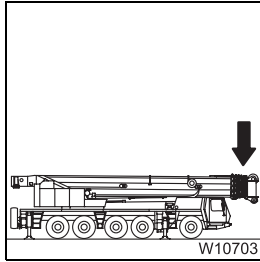
- 9.** Switch off the derricking cylinder pressure relief; ■■■▶ p. 6 - 19.



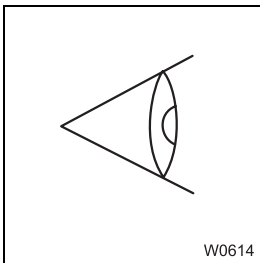
- 10.** Raise the main boom and attach the clamp with the cables and hoses;
 ■■■▶ p. 6 - 18.



11. Remove the derricking cylinder support from the counterweight platform.



12. Place the main boom on the boom rest.




13. Carry out the checks for the main boom when set down;  p. 6 - 31.

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6.3.3

Slings the main boom

Slings are fitted to the main boom when rigging and it is lifted with an auxiliary crane. Note the equipment necessary to do that;  p. 6 - 9.

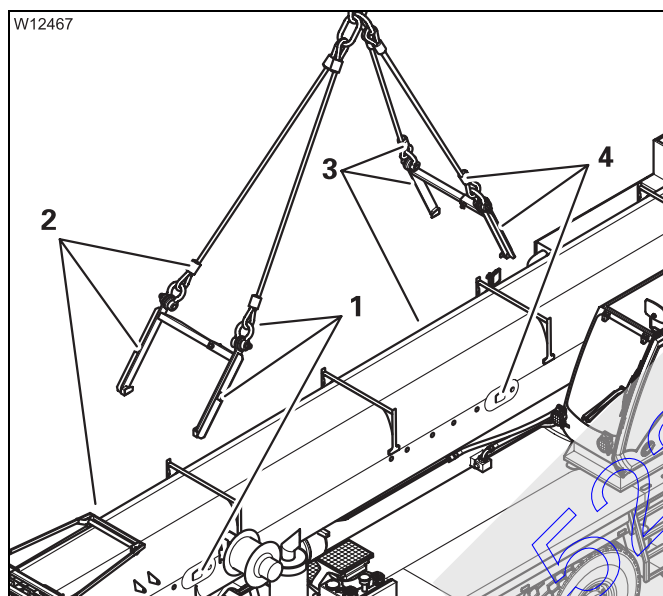


Risk of accidents due to an incorrect procedure

Only use the sling gear included in the delivery and proceed as described in the following section.

Marking

The sling gear is labelled.

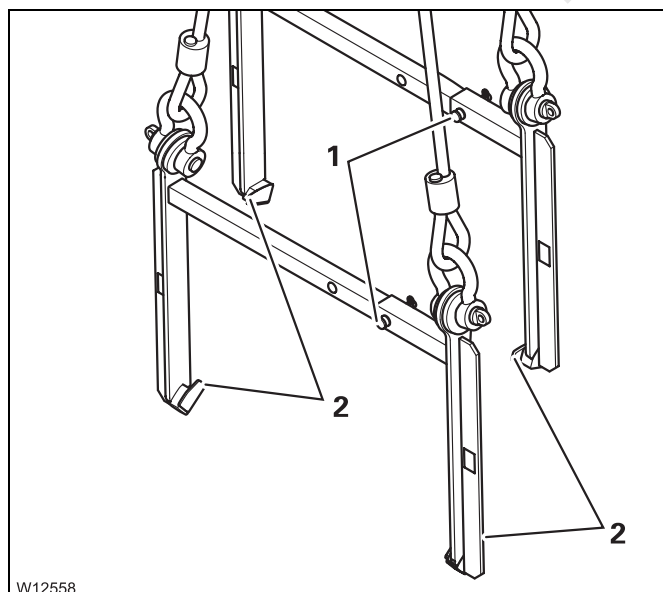


Only connect the parts of the sling gear that have the same marking.

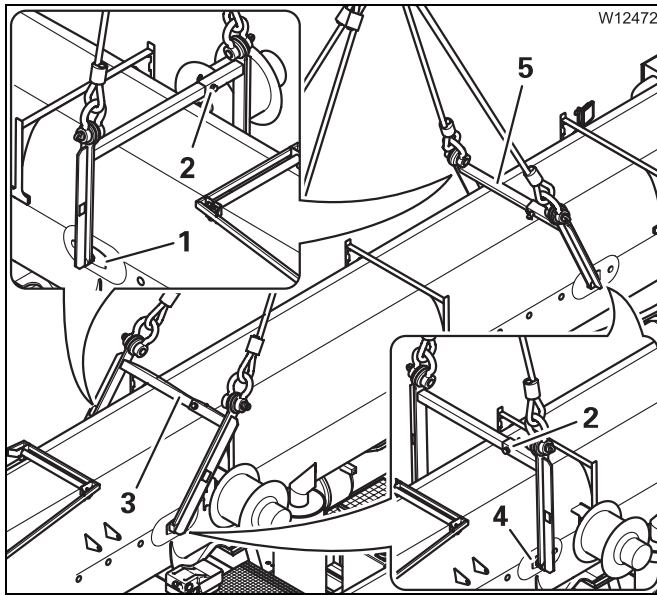
Only fasten the sling gear to the slinging points intended for this purpose. The markings are of following significance:

- 1 VL – front left
- 2 VR – front right
- 3 HR – rear right
- 4 HL – rear left

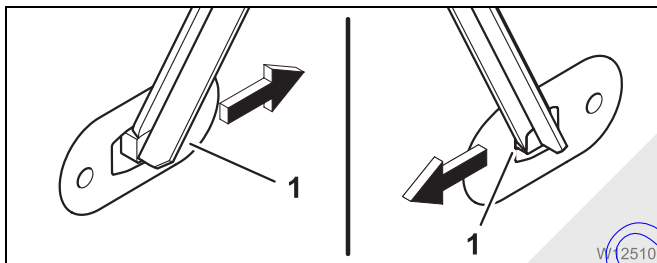
Installing the sling gear



- If the installation is correct, the load-bearing equipment (2) of both brackets point to each other.
- Lock both brackets in the wide position. Secure the pins (1) using the retaining pins.
- Install the front bracket first. It hangs on longer ropes, which makes installing the back bracket easier.

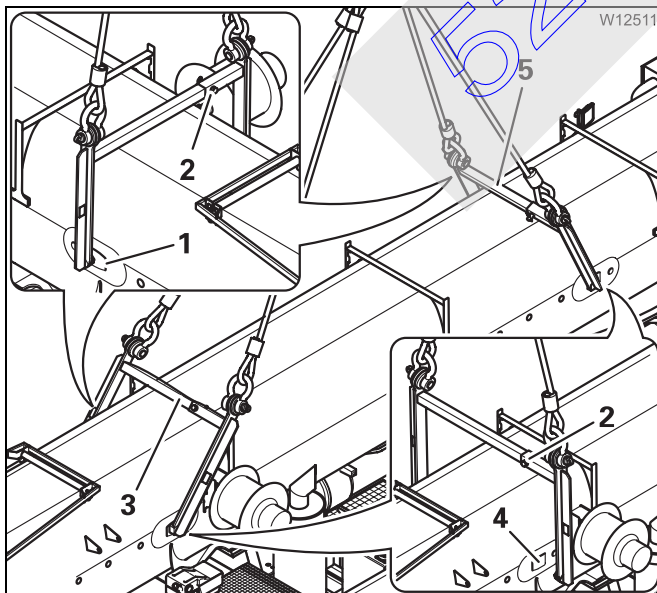


- Insert the bracket (3) into the slinging point (1). Pull the pin (2).
- Insert the bracket into the sling gear (4).
- Secure the bracket with the pin (2) and the retaining pin.
- Pull the bracket to the centre – the bracket must rest on the slinging point on both sides.
- Install the bracket (5) in the same manner.



- Before lifting, make sure the brackets on both sides are resting on the slinging point (1).

Removing the sling gear



- Remove the pin (2) and pull the bracket (3) out of the slinging point (4).
- Secure the bracket with the pin (2) and the retaining pin.
- Pull the bracket out of the slinging point (1).
- Remove the bracket (5) in the same manner.
- Remove the brackets.

6.3.4

Removing/attaching the clamp

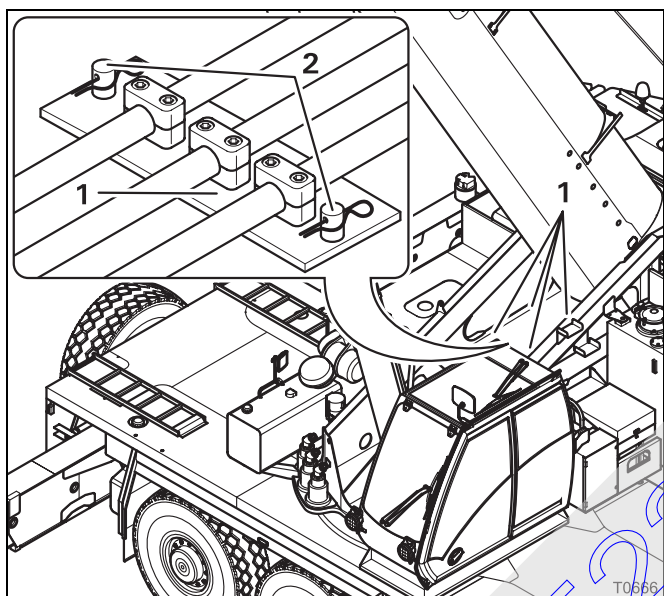


Risk of hands and arms being crushed

Make sure that the boom pivot pin is bolted before making or removing or attaching the clamp.

This means that 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 clamps.



There are two clamps on each side (1).

Removing the clamp

- Loosen the retaining pins from the pins (2).
- Remove the clamp (1).

Attaching the clamp

- Insert the clamp (1) onto the pins (2).
- Secure the clamp using the retaining pins.

6.3.5

Switching the pressure relief on/off

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

When removing the main boom

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

When installing the main boom

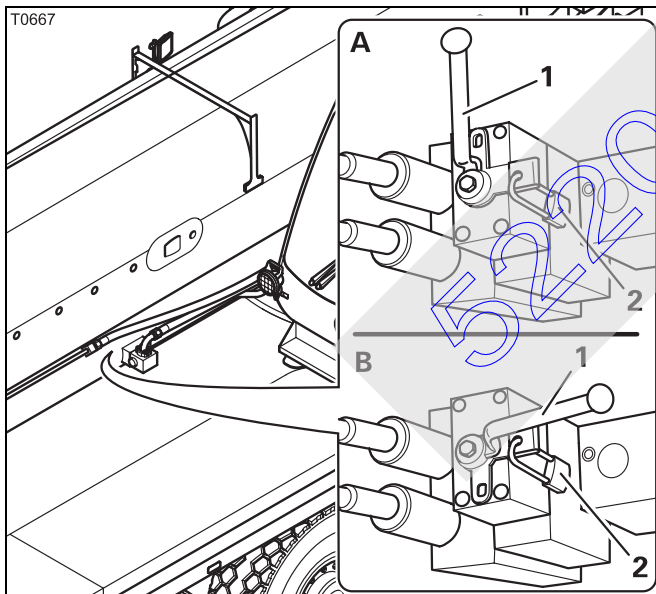
- Only switch off the pressure relief after fitting the derricking cylinder head axle.



Risk of accidents from falling boom

Check to see whether the main boom is in the boom rest before switching off the pressure relief.

In this way, you prevent the raised main boom from falling down.



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



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

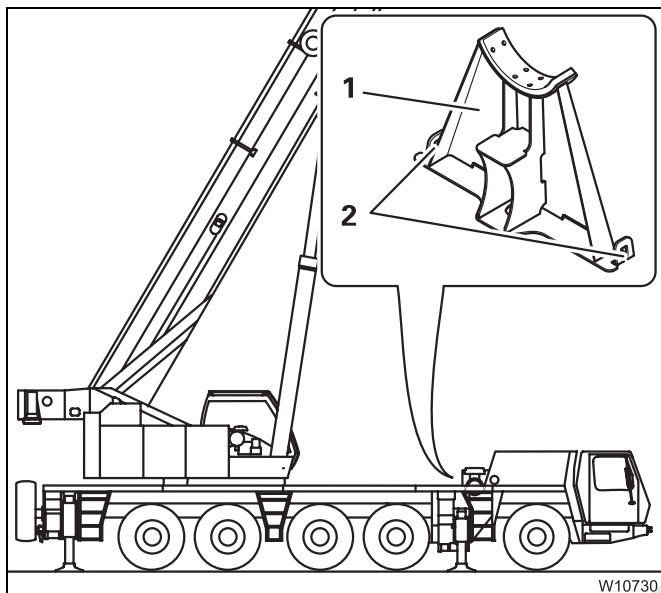
6.3.6

Retracting/fitting the derricking cylinder head pin

The derricking cylinder head axle is retracted and fitted with a pulling device.

Derricking cylinder

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.

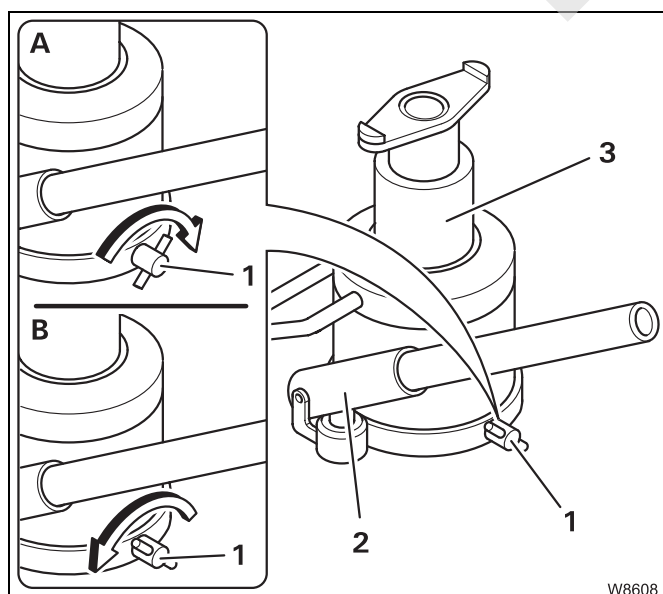
Operation of the lifting device

A lifting device is needed in order to relieve and level the derricking cylinder.



Risk posed by lifting equipment not working

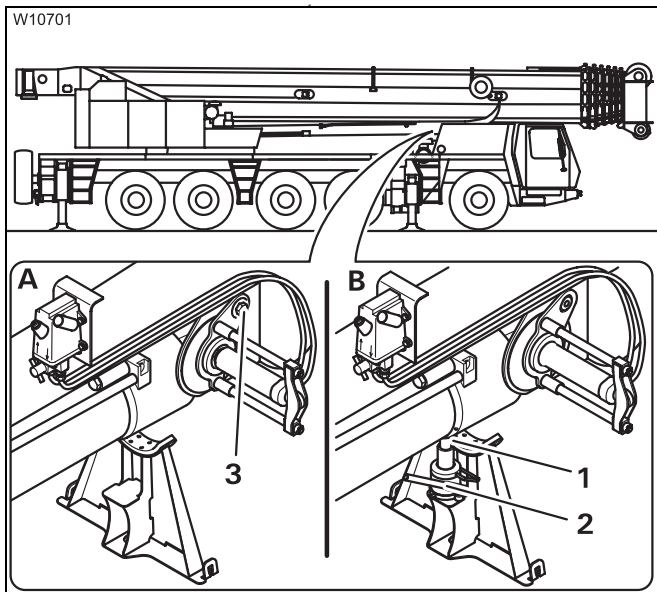
Have the lifting device serviced in time before the maintenance interval specified on the label expires.



- Fasten the lever in the holder (2).
- (A) – Hoisting**
- Close the drain plug (1) and pump the lever. The piston rod (3) will extend.
- (B) – Lowering**
- Open the drain screw (1) slowly. The piston rod (3) will retract.

Retracting the derricking cylinder head axle

After you have pulled the head pin, you can not longer raise the main boom.



(A) – Releasing the head pin

- Loosen the bolt (3) and remove the disc.

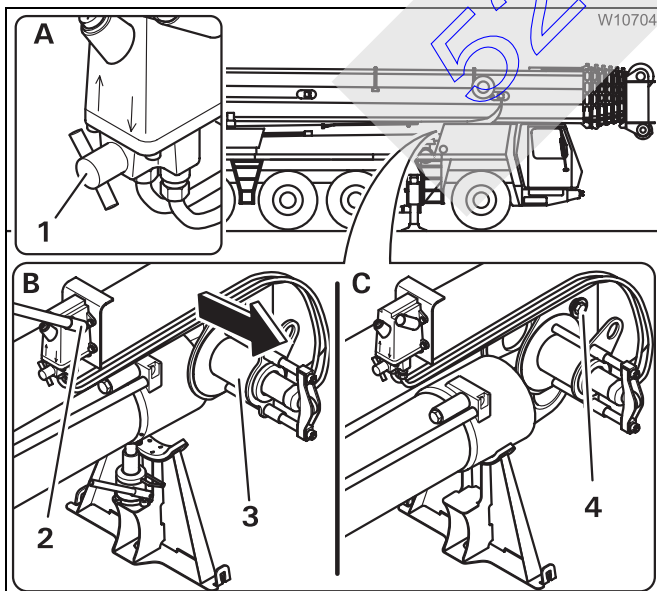
(B) – Taking the load off of the head pin

- Place the lifting device (2) underneath the middle of the derricking cylinder.
- Carry out the movement operation *Raise* until the bracket (1) is resting firmly on the derricking cylinder.



Risk of accidents from falling derricking cylinder

Always take the load off of the derricking cylinder using the lifting device before retracting the head pin. By doing this, you prevent the derricking cylinder from falling off, injuring people or being damaged while retracting the head pin.



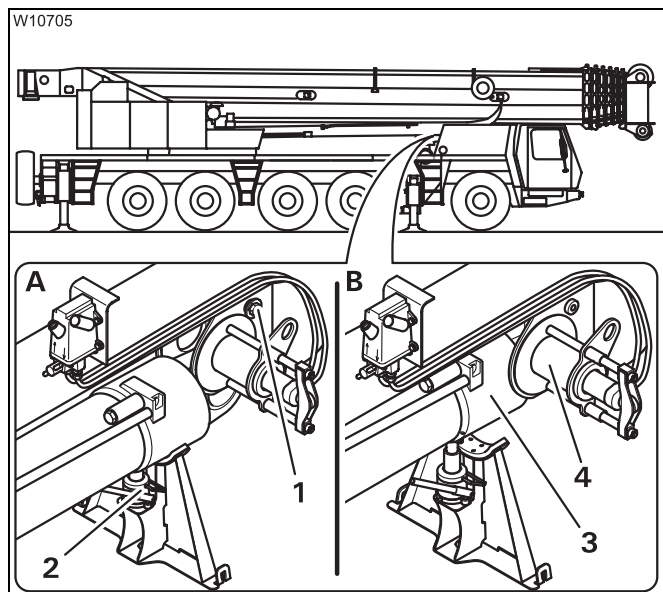
Retracting the head pin

- (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 operation *Raise* until the derricking cylinder is in the derricking cylinder support.
- (C) – Fasten the disc with the bolt (4).
- Stow away the lever and the lifting device.



Fitting the derricking cylinder head axle

- Check to see if the tightening belt of the derricking cylinder is taken off.



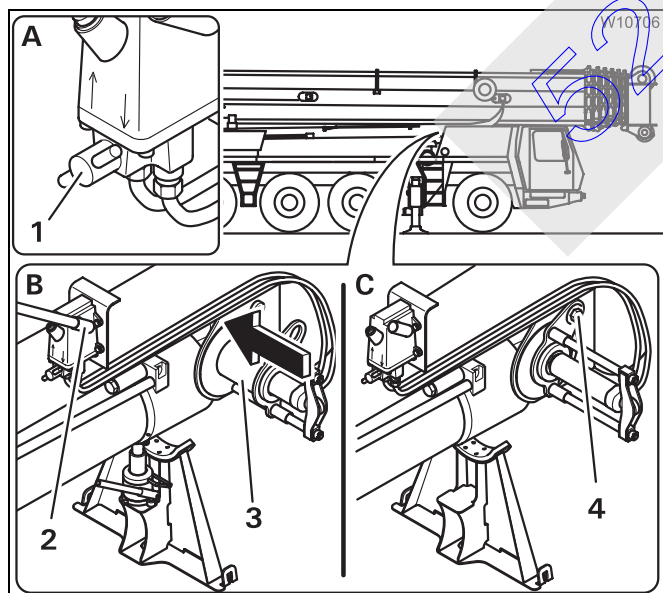
Aligning the derricking cylinder

- (A) – Loosen 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 completely fitted.

Securing the head pin

- (C) – Fasten the disc with the bolt (4).
- Stow away the lever and the lifting device so that it is safe to drive on the road.

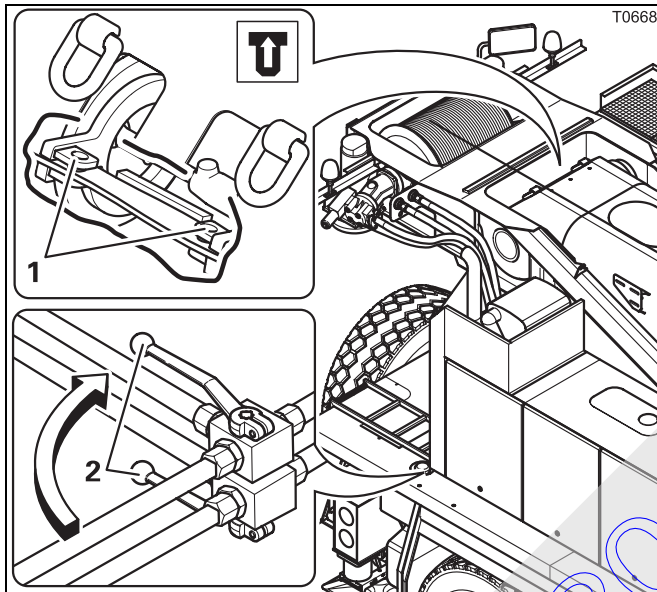
6.3.7

Retracting/extending the boom pivot pin

The boom pivot pin is retracted and extended with a hydraulic pulling device.

Before retracting

Before retracting the pivot pin, the hydraulic circuit must be switched over and the pivot pin must be released.



Switching over the hydraulic circuit

The valves (2) can be reached from underneath.

- Switch the valves (2) back.

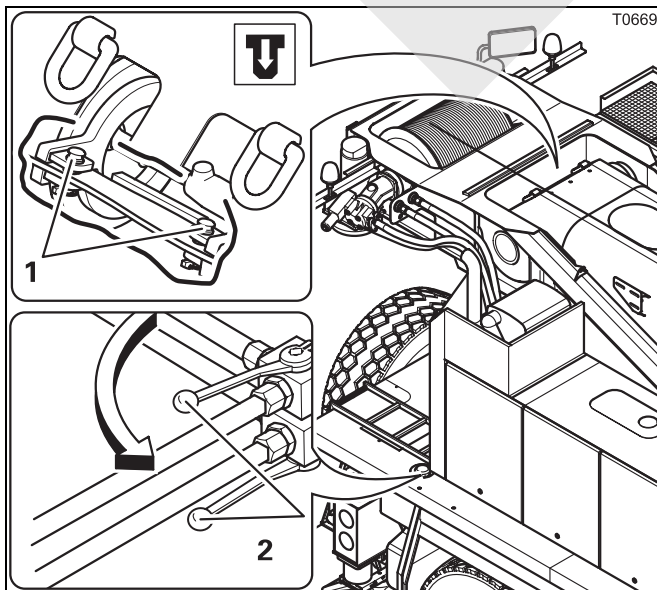
Release the pivot pin

- Loosen the linchpin and pull the pins out of the bore holes (1).

The pins are inserted again later for transportation purposes; ► p. 6 - 30.

After extension

After extension, the hydraulic circuit must be switched over and the pivot pin must be secured.



Switching over the hydraulic circuit

- Switch the valves (2) outwards.

Secure the pivot pin

- Insert the rope pins (1) and secure them with the linchpins.



Retracting/extending the pivot pin

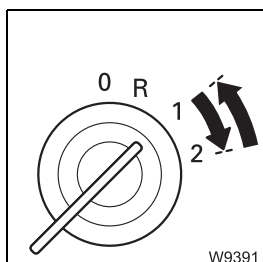
You can operate the pulling device from the crane cab.



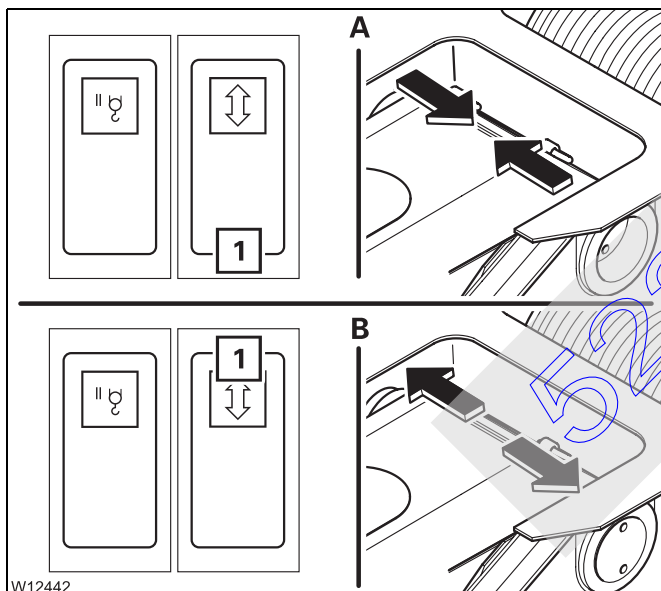
Risk of damage to the main boom!

Before **retracting**, the main boom must be slung and all other sling gear must be tightened.

Before **extending**, the bearing points on the turntable must be aligned with the boom pivot pin.



- Start the engine for crane operation.

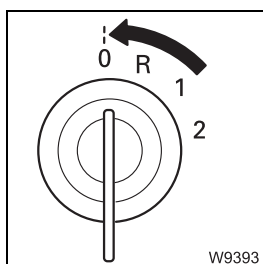


(A) – Retract the pivot pin

- Press the button (1) down.
The pivot pin is retracted.

(B) – Extend the pivot pin

- Press the button (1) up.
The pivot pin is extended.



- Turn off the crane engine.

6.3.8

Separate the hydraulic/electrical connection

To separate the hydraulic and electrical connections, you must lift the main boom in front of the turntable.

Lifting in front of the turntable

The following prerequisites must be met before the main boom can be raised in front of the turntable:

- The clamp must be removed together with the cables and hoses.
- The main boom is slung.
- The derricking cylinder head pin is retracted.
- The boom pivot pin is retracted.



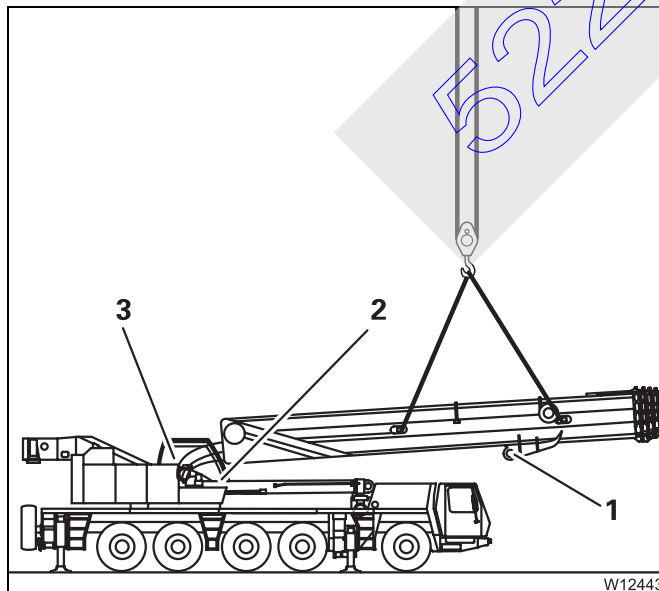
Risk of damage to connection lines and the driver's cab

Lift the main boom far enough to ensure that the pivot point does not damage the driver's cab. Only lift the main boom so far in front of the turntable that the cables and hoses do not tear off.



Risk of hands and arms being crushed

Lift the main boom far enough in front of the turntable to ensure that you are not crushed between the turntable and the main boom.



- Lift the main boom in front of the turntable, ensuring that
 - The connection lines (3) do not tear off
 - The pivot point (1) is higher than the driver's cab
 - The main boom is in front of the edge of the turntable (2)

Now you can separate the electrical and hydraulic connections.



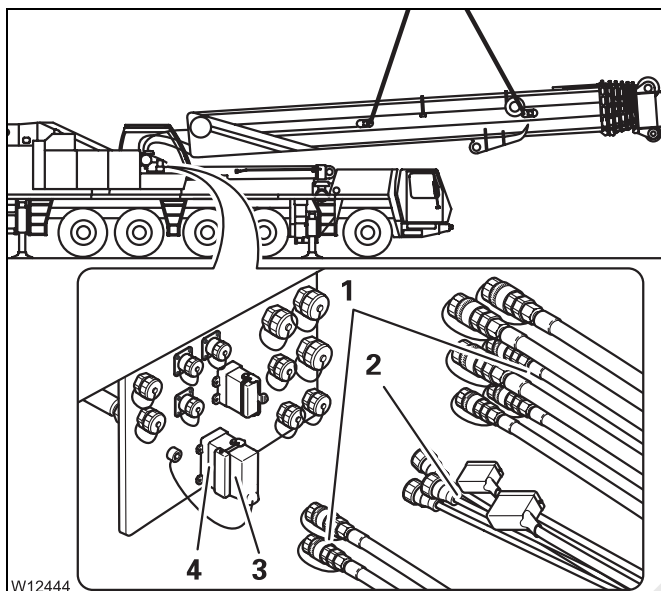
Breaking

The number of hoses/cables depends upon how the truck crane is equipped.



Risk of malfunction in the superstructure electronics

Always turn off the ignition in the crane cab before you make or break the electrical connection. In this way you prevent malfunctions in the electronics and corresponding error messages in the crane operation which follows.



- Remove all hoses (1) from the connections.
- Remove the plugs (2) from the sockets.
- Insert the bridging plug (3) into the socket (4).
- Close all hoses, connections, plugs and sockets.
- Lay the all hoses/cables onto the turntable so that they do not get caught when the main boom is raised.

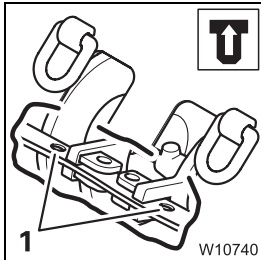
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6.3.9

Establishing the hydraulic/electrical connection

To make the hydraulic and electrical connections, you must lift the main boom onto the turntable so that you can access the separating point without risk.

Lifting onto the turntable



- Sling the main boom; p. 6 - 16.
- Loosen the linchpin and pull the pins out of the bore holes (1); p. 6 - 23.
- Align the auxiliary crane in such a way that the main boom can be raised vertically, without swinging.



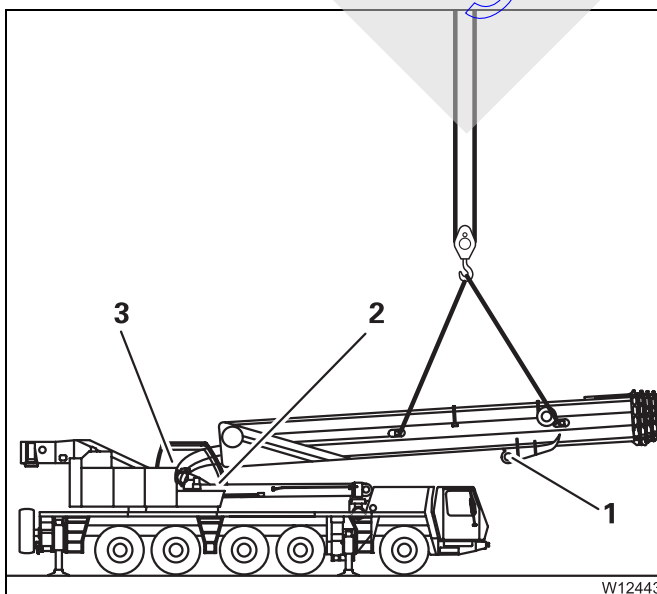
Risk of damage to driver's cab

Lift the main boom far enough to ensure that the pivot point does of the derricking cylinder does not damage the driver's cab.



Risk of hands and arms being crushed

Lift the main boom only far enough onto the turntable to ensure that you are not crushed between the turntable and the main boom.



- Lift the main boom onto the turntable in such a way that
 - The connection lines (3) reach the separating points
 - The pivot point (1) is higher than the driver's cab
 - The main boom is in front of the edge of the turntable (2)

Now you can create the electrical and hydraulic connections.



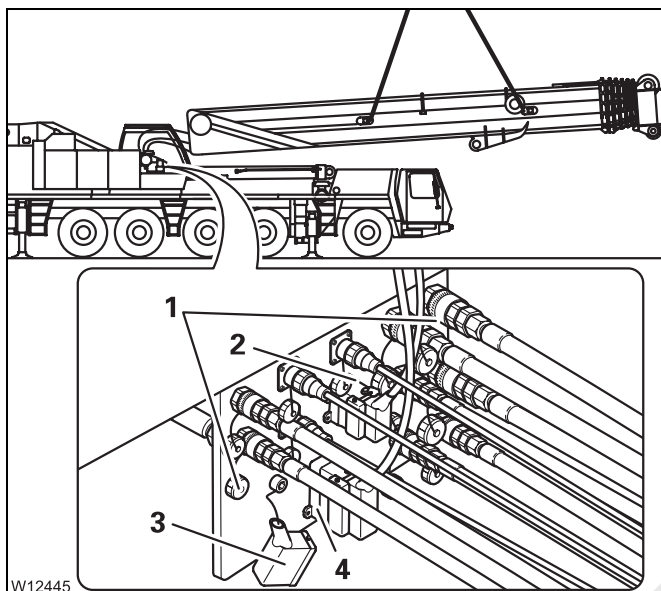
Establishing

The number of hoses/cables depends upon how the truck crane is equipped.



Risk of malfunction in the superstructure electronics

Always turn off the ignition in the crane cab before you make or break the electrical connection. In this way you prevent malfunctions in the electronics and corresponding error messages in the crane operation which follows.



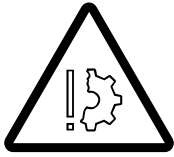
- Remove the bridging plug (3) from the socket (4).
- Connect the plug (2) to the sockets. The assignment is given by the number of poles and the shape of the plug.
- Connect all hoses (1). The assignment is given by the size and colour designations.

Lay the hoses/cables so that they won't be damaged.

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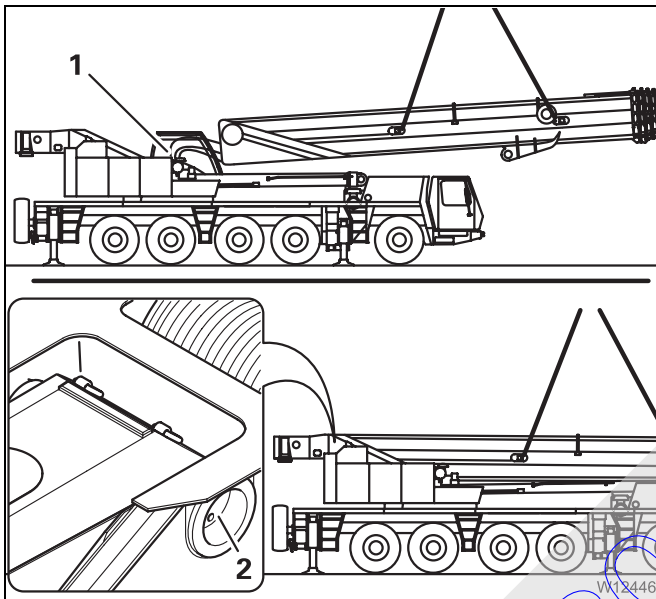
6.3.10

Aligning the connecting points



Risk of damage to the turntable and the connection lines

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



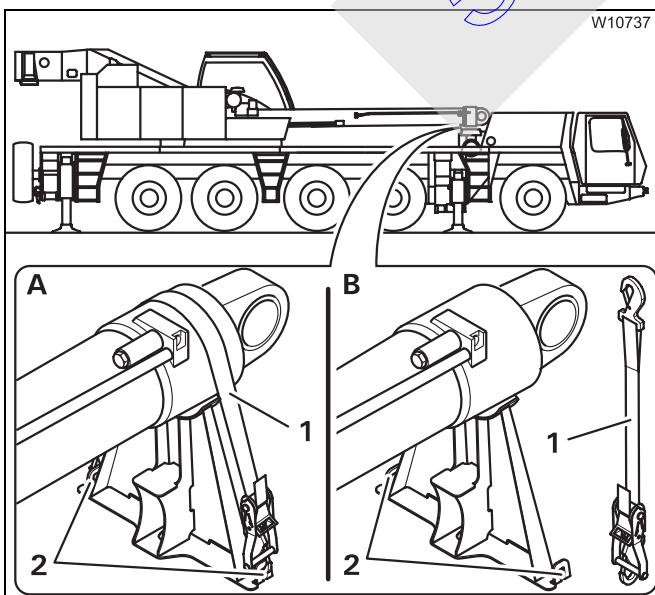
Aligning the connecting points

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

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

6.3.11

Securing/releasing derricking cylinder



(A) – Securing


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

(B) – Releasing

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

6.3.12

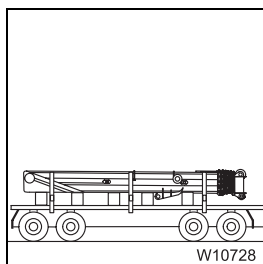
Transporting the main boom

- Transport the main boom only on a separate vehicle which is of sufficient size and has sufficient lifting capacity. Transport dimensions and weight;  p. 8 - 5.

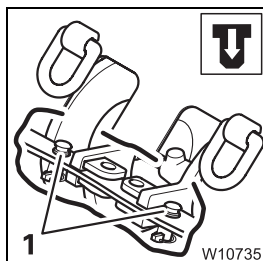


Risk of damage to the main boom!

Always place the main boom onto a suitable packing. If you lay the main boom on its side the 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 no motorists and cyclists are 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.




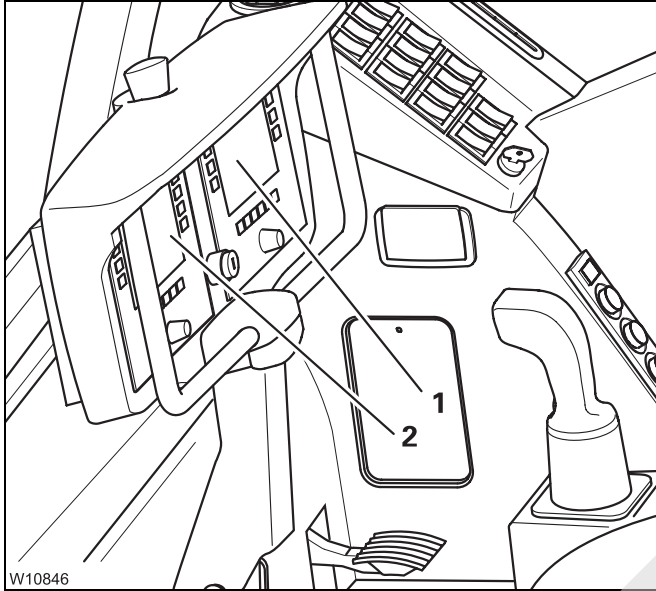
- Insert both pins (1) into the bore holes and secure them with the lynchpins.


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6.3.13

Checks after main boom installation

- Check to see if the pressure relief is switched off and is secured with the lock;  p. 6 - 19.



- Turn on the ignition.
- Check whether the *SLI* control unit (1) or *ECOS* (2) shows an error message.
- If an error message is being displayed, check to see if all electrical connections are established;  p. 6 - 28.

The following prerequisites must be met for the next inspection:

- The truck crane is supported on outriggers.
- The main boom must be resting in the boom rest.
- The current rigging mode is entered on the SLI.

- 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.



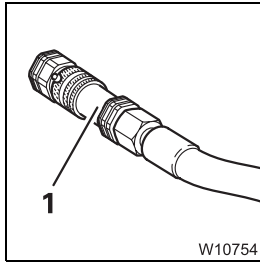
Before operating for the first time, complete the *Incline lattice extension* movement and check if the corresponding connections in the turntable are sealed.

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6.4

Rigging the outrigger beam



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

The lifting of loads is only permitted 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. 8 - 4.

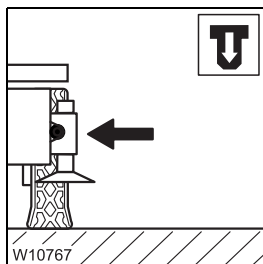
6.4.1

CHECKLIST: Removing the outrigger beams

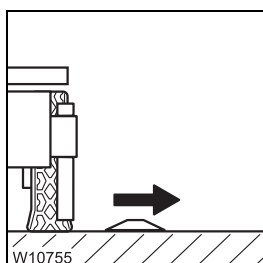


This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.

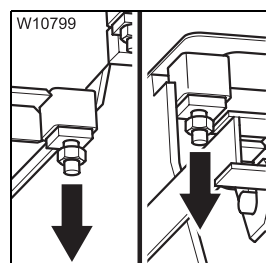
Observe the warnings and safety instructions specified there.



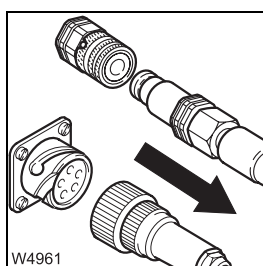
1. Prepare the truck crane – label the outrigger beams, retract, release and lock them to each other; p. 6 - 39.



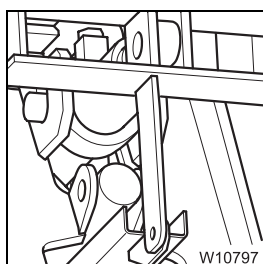
2. If necessary, remove the outrigger pad; p. 6 - 40.



3. Unscrew the spacer; p. 6 - 44.

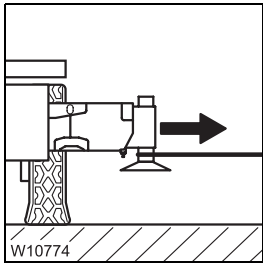



4. – Separate the hydraulic connections; p. 6 - 42.
– Separate the electrical connection if necessary; p. 6 - 43.

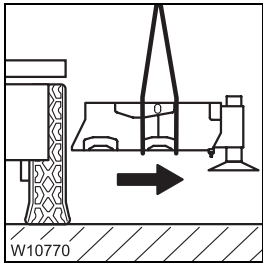




5. Loosen the connections to the outrigger box; p. 6 - 46.

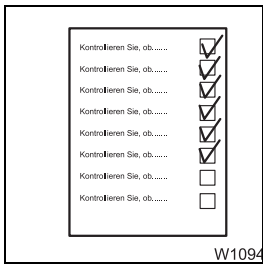
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6. Sling the outrigger beam and pull it out of the outrigger box until it reaches the centre of distribution;  p. 6 - 46.



7. – Sling the outrigger beams in the centre of distribution and pull them out of the outrigger box.
– Lift the outrigger beams onto the separate vehicle.
– Attach the connecting elements on the outrigger box.
 *Pulling out the outrigger beam, p. 6 - 46*
 *Transporting the outrigger beams, p. 6 - 50*



8. Remove all necessary outrigger beams in the same way in accordance with this checklist.

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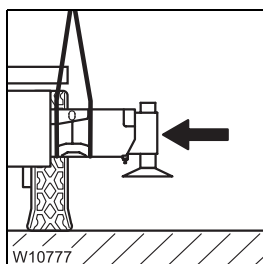
6.4.2

CHECKLIST: Mounting the outrigger beams



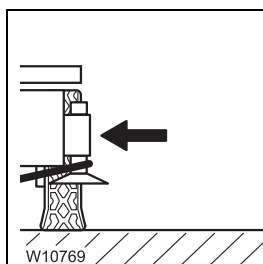
This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references. **Observe the warnings and safety instructions specified there.**

1. Prepare the truck crane for the installation of the outrigger beams; p. 6 - 39.

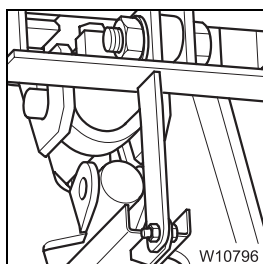


2. – Remove the connection elements from the outrigger box.
– Sling the outrigger beams in the centre of distribution.
– Lift the outrigger beams in the outrigger boxes and remove the lifting gear.

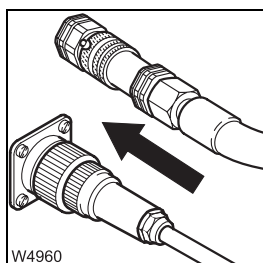
Inserting the outrigger beam, p. 6 - 48



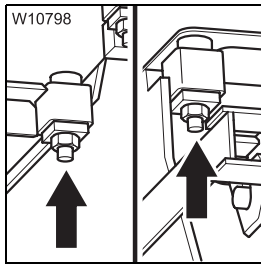
3. Sling the outrigger beams and pull in the outrigger boxes until the connection points align; p. 6 - 48.



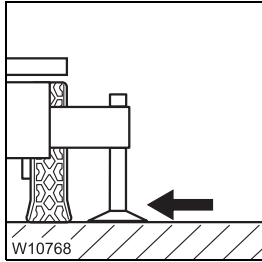
4. Establish the connections to the outrigger box; p. 6 - 46.



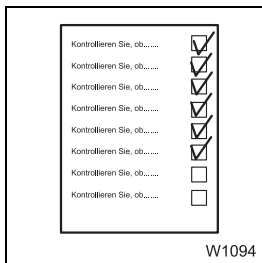
5. – Establish the hydraulic connections; p. 6 - 42.
– Establish the electrical connection if necessary; p. 6 - 43.



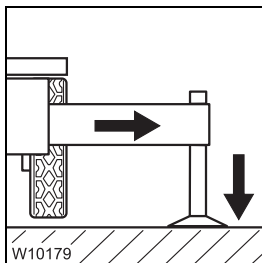
6. Screw in the spacers; p. 6 - 44.



7. Place on an outrigger pad if necessary; p. 6 - 40.

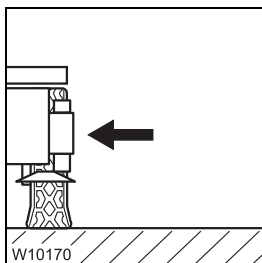


8. Mount all necessary outrigger beams in the same way in accordance with this checklist.



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 the outrigger beams, p. 13 - 35.

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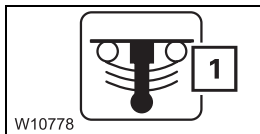
6.4.3

Preparing the truck crane

Prerequisites

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

- All rigging work which involves slewing the superstructure was completed.
- The parking brake is engaged.
- The truck crane is aligned horizontally using the level adjustment system;
 ▶ p. 5 - 60.
- The suspension is switched off (blocked), and the symbol (1) is red
 ▶ p. 5 - 15.

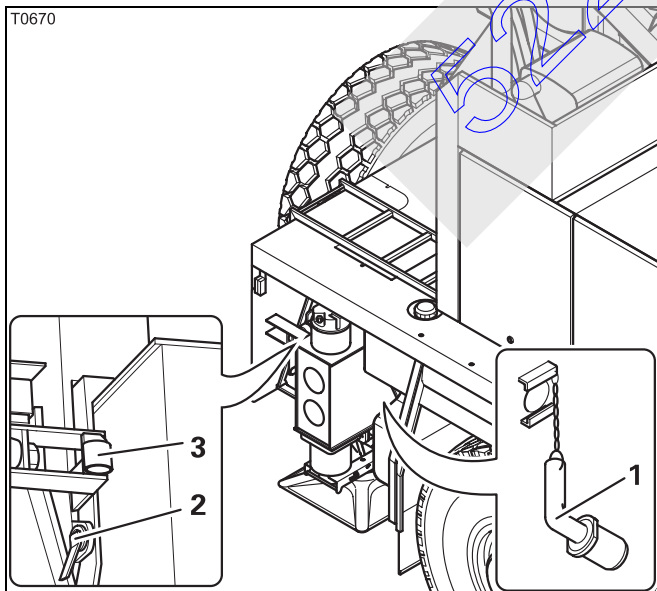


For removal

Each outrigger beam is 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 outrigger beams

All outrigger beams are retracted.

- Pull out the pin (1).

Lock the outrigger beams together

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

6.4.4

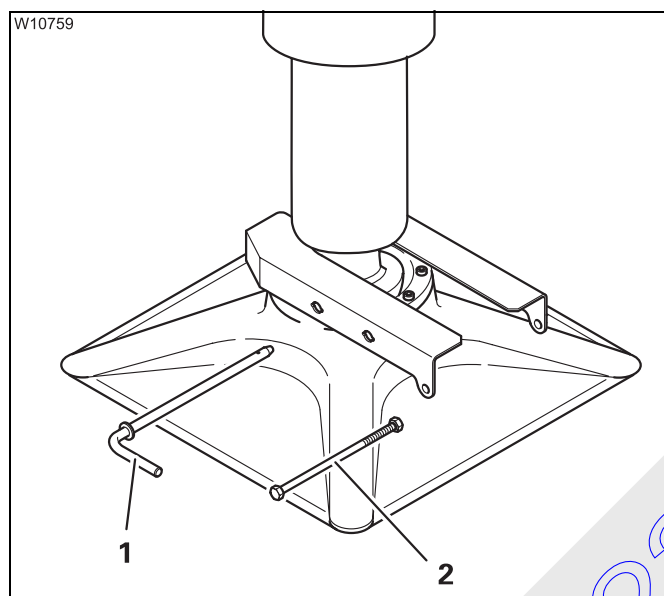
Removing/attaching outrigger pads

You must only remove the outrigger pads if the outrigger beams are to be transported lying on their side.

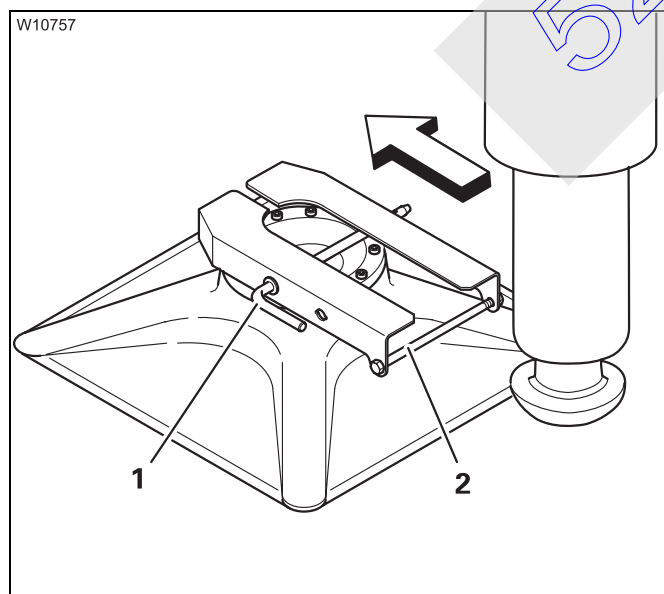
For transportation in a suitable holding frame, the outrigger beams can be set down on the outrigger pad.

Removing the outrigger pad

Handling is easier if you remove the outrigger pad before removing the outrigger beams.



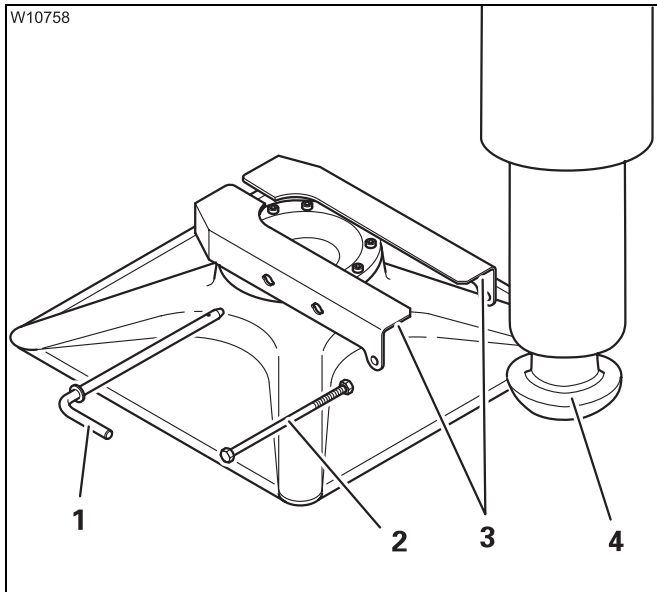
- Move the outrigger pad into operating position.
- Remove the pins (1).
- Remove the screw (2).
- Extend the outrigger cylinder until the outrigger pad just touches the ground but is not yet under strain.



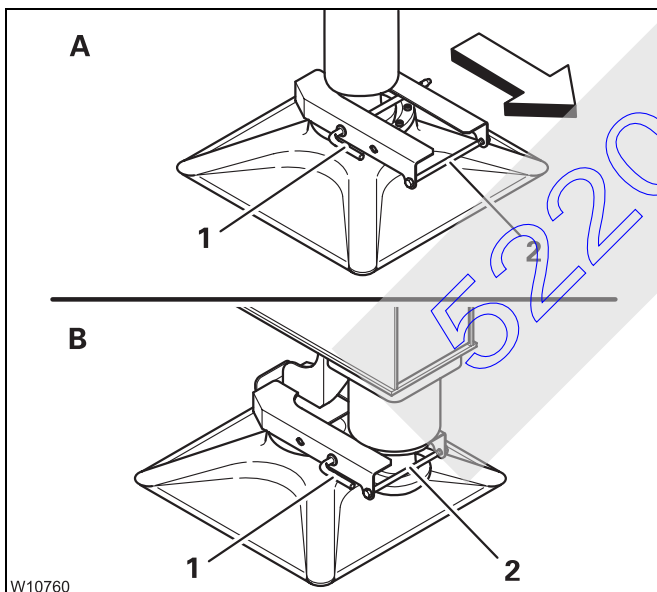
- Pull the outrigger pad off the outrigger cylinder.
- Fasten the screw (2).
- Insert the pin (1) and secure it.
- Fully retract the outrigger cylinder.
- Remove the other outrigger pads in the same way.

Applying the outrigger pads

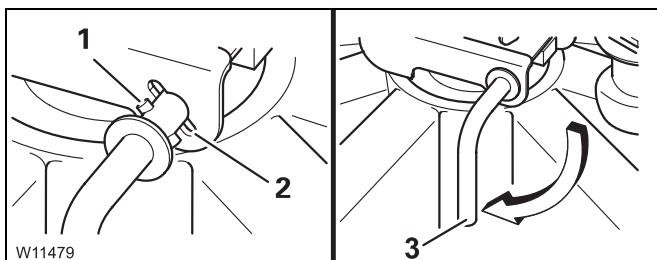
After mounting the outrigger beams, you must apply the outrigger cylinder.



- Remove the pins (1).
- Remove the screw (2).
- Extend the outrigger cylinder far enough so that the bearing surface (3) is below the guide mechanism (4).



- Push the outrigger pad onto the outrigger cylinder.
- Fasten the screw (2).
- Move the outrigger pad into required position.
 - On site, move it to the working position (A).
 - If you need to drive to the site, in driving position (B).
- Insert the pin (1) and secure it.



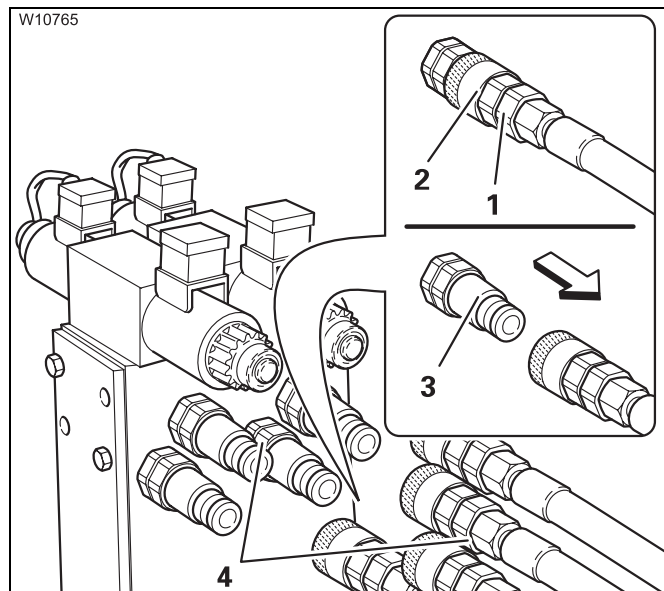
Secure the pin

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

6.4.5

Disconnecting/establishing the hydraulic connection

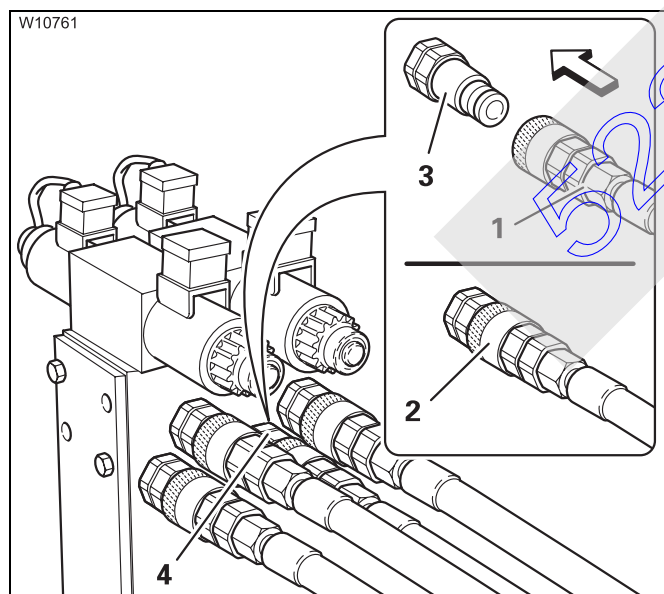
There is a valve block on the outrigger beam. The position of the valve block may differ from the drawings, depending on the outrigger beam.



Disconnecting

Always disconnect all connections (4).

- Hold the hose firmly (1).
- Pull the lock (2) against the stop (3). The hose is pushed out of the connection (3).
- Seal all connecting points.



Establishing a 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.

6.4.6

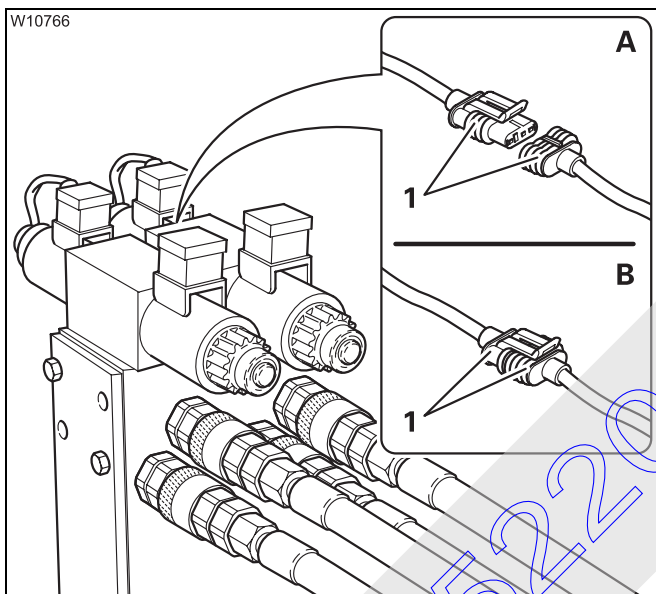
Establishing/disconnecting the electrical connection

The electrical connection is only present on truck cranes with an outrigger pressure indicator.



Risk of malfunctions in the electronic system

Always turn off the ignition before you disconnect or establish the electrical connection. In this way you prevent malfunctions and corresponding error messages in the subsequent crane operation.



(A) – Separating the connection

- Pull the plugs (1) apart. Protect the plugs against dirt and moisture.

(B) – Making a connection

- Put the plugs (1) together.
- Protect the separating points against dirt and moisture.

6.4.7

Unscrewing/screwing in the spacers

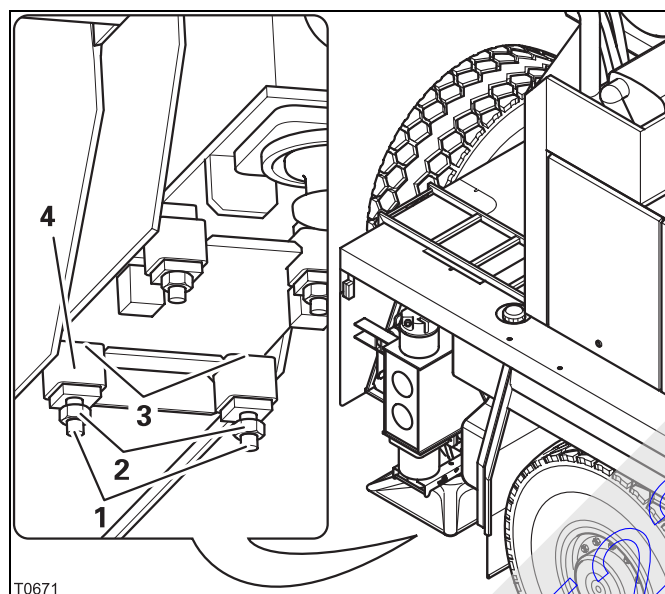
There are two spacers for each outrigger beam

- In the outrigger box and
- In the outrigger beam on the opposite side.

The illustrations show as an example the spacers for the outrigger beams on the rear right hand side.

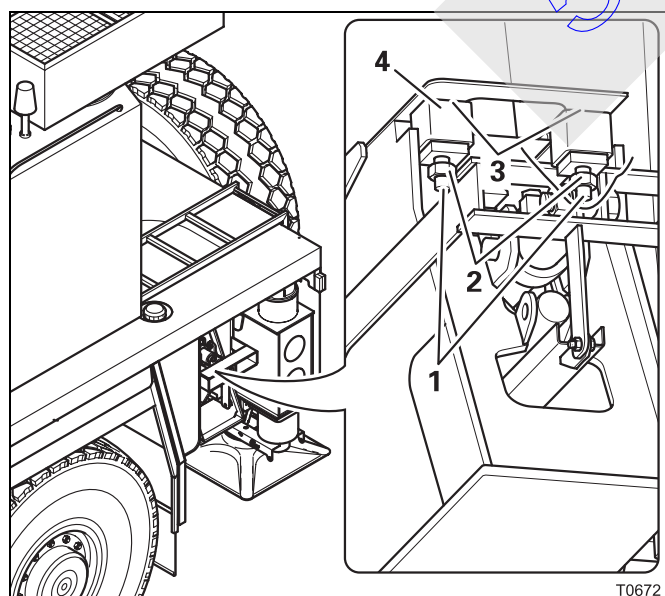
Unscrewing

Before you pull out the outrigger beams, you must unscrew the spacers.



On the outrigger box

- Undo the nuts (2).
- Unscrew the screws (1) until the spacers (3) are screwed into the outrigger box (4) completely.

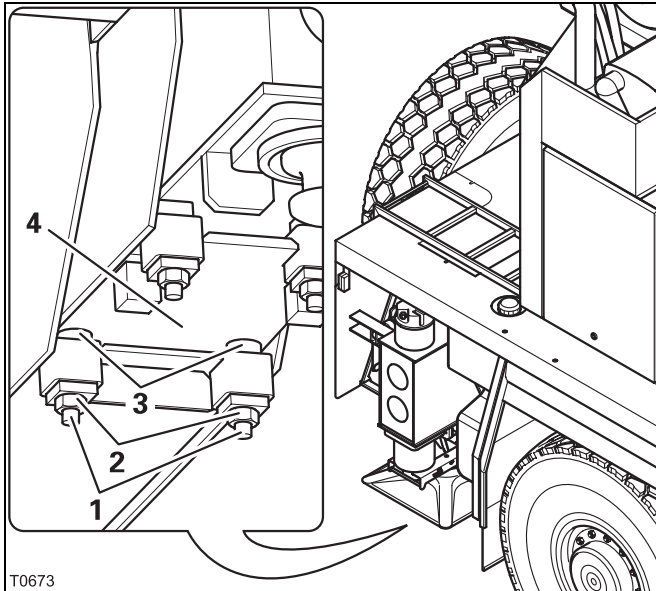


On the outrigger beam

- Undo the nuts (2).
- Unscrew the screws (1) until the spacers (3) are screwed into the outrigger beam (4) completely.

Screwing in

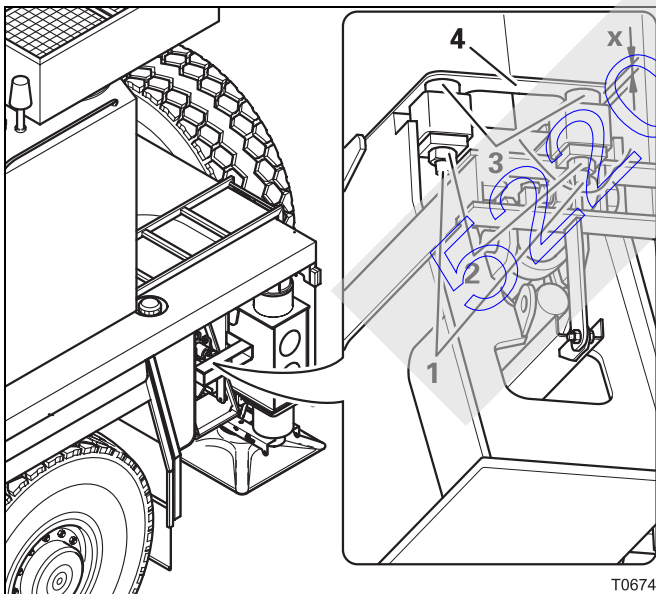
Before you retract/extend an outrigger beam after mounting, you must screw in the spacers.



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On the outrigger box

- Screw in the screws (1) as far as possible until the spacers (4) are touching the outrigger beam (3) at the top.
- Ensure that the outrigger beam is aligned horizontally.
- Lock the screws in place with the nuts (2).



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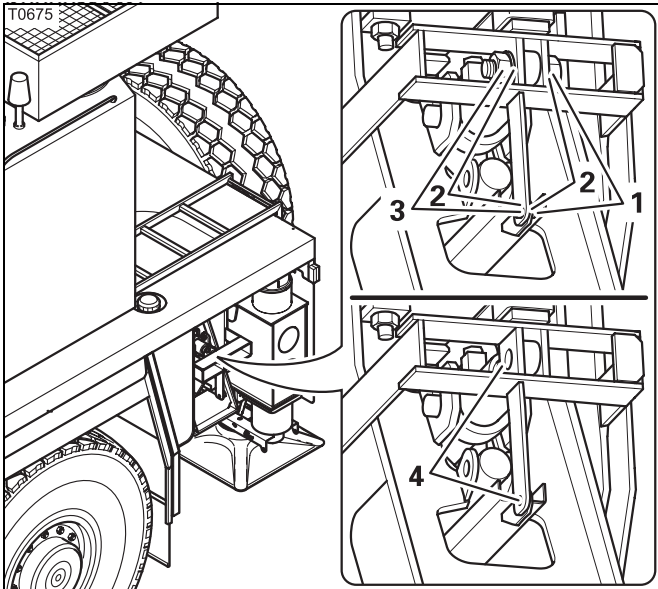
On the outrigger beam

- Screw in the screws (1)
 - until the spacers (3) lie on top on the outrigger box (4) and
 - until the distance (X) to the outrigger box (4) is an even 4 mm over the entire width.
- Lock the screws in place with the nuts (2).

6.4.8

Disconnecting/establishing the connections to the outrigger box

The illustrations show as an example the connecting points for the outrigger beam on the rear right hand side.



Releasing the connection

- Undo the nuts (3).
- Remove the screws (1) and the discs (2) from the connecting points (4).


Establishing a connection

- Remove the screws (1) and the discs (2) with the nuts (3) in the connecting points (4).

6.4.9

Pulling out/Inserting the outrigger beam

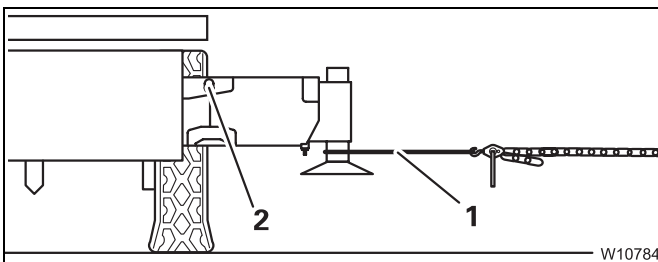
Pulling out the outrigger beam

- Check that the outrigger beams are released and are secured among each other;  *Preparing the truck crane, p. 6 - 39.*

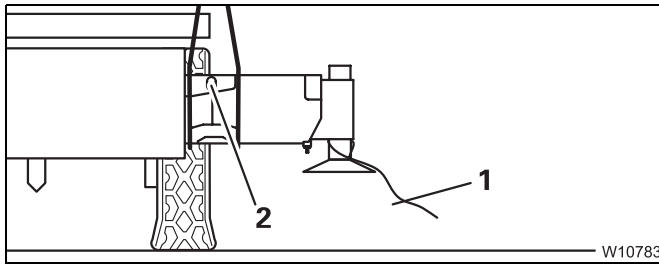


Risk of damage to hydraulic lines

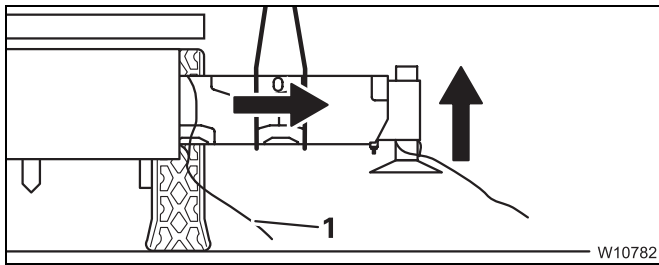
Ensure that the hydraulic lines on the outrigger beam do not remain hanging on the outrigger box and become damaged.



- Attach the lifting gear (1) and a chain hoist.
- Pull the outrigger beam out so far that the centre of distribution (2) is accessible.



- Using the auxiliary crane, sling the outrigger beam in the centre of distribution (2).
 - Remove the chain hoist and lifting gear.
- Fasten a guide rope (1).

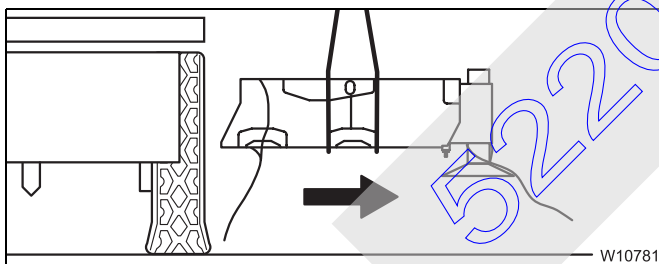


- Lift the outrigger beam slightly to ease the load.
- Lift the outrigger beam almost completely out of the outrigger box.
- Fasten another guide rope (1).

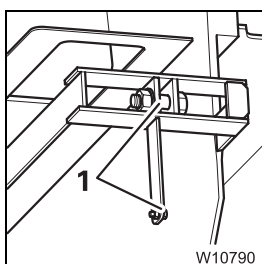


Risk of being crushed by the swinging outrigger beam!

Secure the outrigger beam with the guide ropes if it is lifted out of the outrigger box.
Keep a suitable distance to avoid injuring yourself or others on the swinging outrigger beam.



- Lift the outrigger beam out of the outrigger box.
- Lift the outrigger beam onto a separate vehicle; ►► p. 6 - 50.



- Fasten the connecting elements onto the connecting points (1).



Inserting the outrigger beam

- Only insert the outrigger beam at the correct installation point. Note the information on the label.



Risk of being crushed by the swinging outrigger beam!

Do not guide the outrigger beam with your hands when inserting it. Always use guide ropes and keep a suitable distance. This will prevent limbs from being crushed between the outrigger box and the carrier.



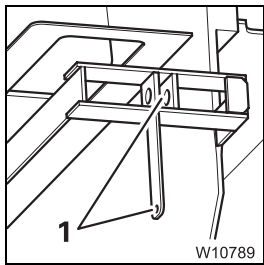
Risk of damage to hydraulic lines

Ensure that the hydraulic lines on the outrigger beam do not remain hanging on the outrigger box and become damaged.

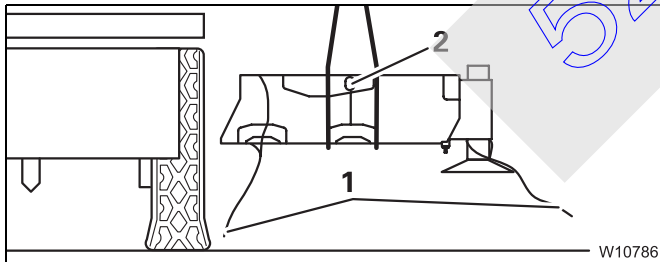


Risk of damage to the spacers

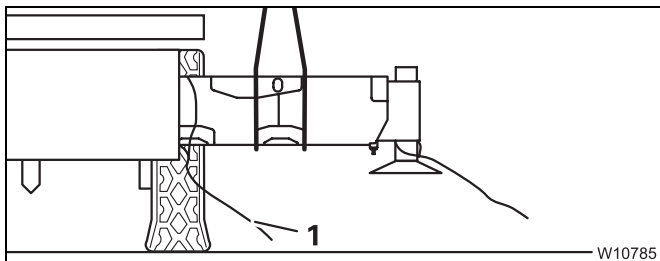
Check that all spacers have been screwed in completely. This prevents the spacers from remaining hanging in the outrigger box and becoming damaged.



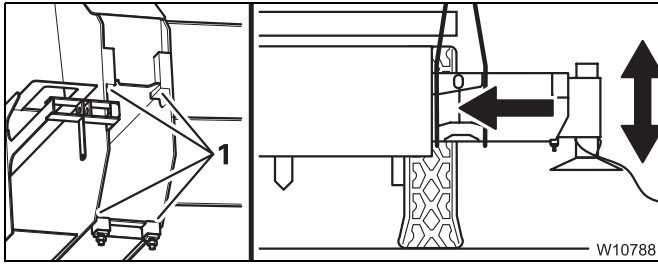
- Remove the connecting elements from the connecting points (1).



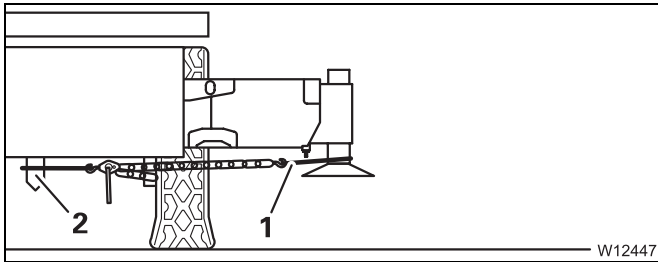
- Sling the outrigger beam in the centre of distribution (2).
- Fasten two guide ropes (1).



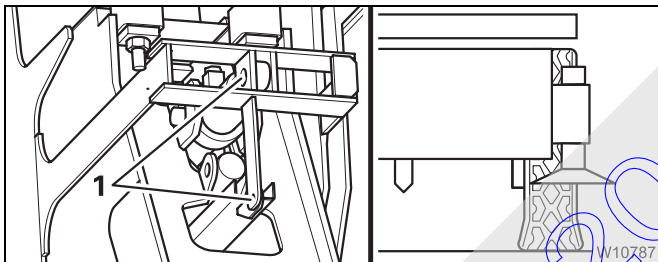
- Set the outrigger beam in the outrigger box.
- Remove the guide rope (1).



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




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

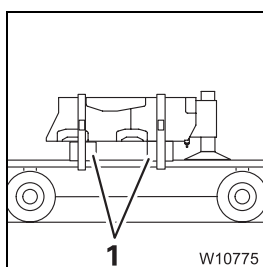


- Pull the outrigger beam in so far until the connecting points (1) align.
- Remove the chain hoist and lifting gear.

6.4.10

Transporting the outrigger beams

- For transportation, only use a separate vehicle with sufficient lifting capacity. Transport dimensions and weight;  p. 8 - 4.
- Load the separate vehicle in such a way that the weight is evenly distributed.
- Load the outrigger beam in such a way that no motorists and cyclists are put at risk.



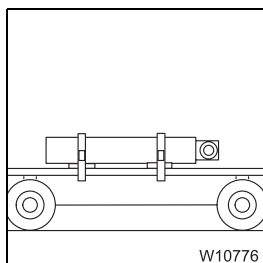
When the outrigger pads have been mounted

- Place the outrigger beam onto a suitable device (2).
- 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 have been removed


- Lay the outrigger beam onto the side.
- Secure the outrigger beam from slipping.
- Lay the outrigger pads onto the separate vehicle and secure them for transportation.

6.5

Rig the auxiliary hoist

You will require the following equipment with a sufficient load bearing capacity:

- An auxiliary crane
- Suitable lifting gear and guide ropes
- A separate vehicle

Transport dimensions and weight;  p. 8 - 5.

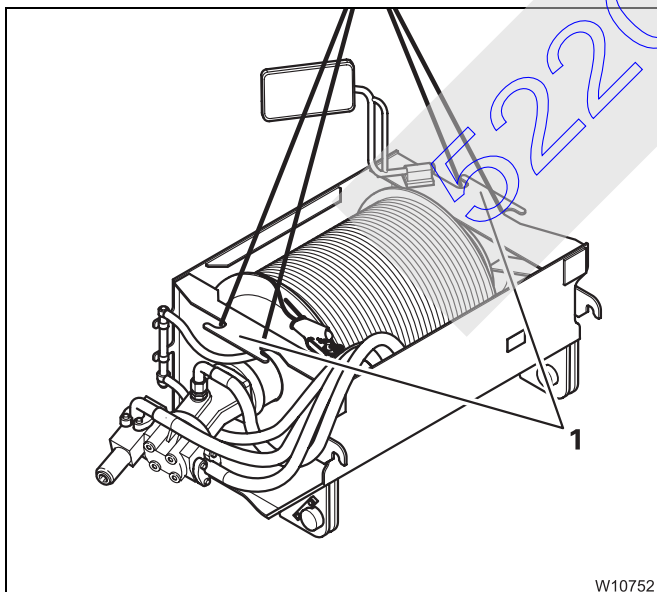
6.5.1

Slinging the auxiliary hoist



Risk of damage to the auxiliary hoist and truck crane!

Only sling the auxiliary hoist onto the slinging points provided. Always use lifting gear with a sufficient lifting capacity.



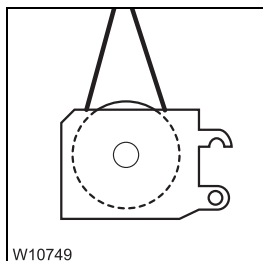
- Sling the auxiliary hoist only on the slinging points (1).

Use lifting gear with the same length, so that the auxiliary hoist hangs in the centre of distribution.

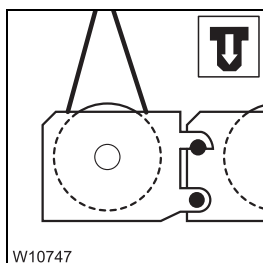
6.5.2

CHECKLIST: Installing the auxiliary hoist

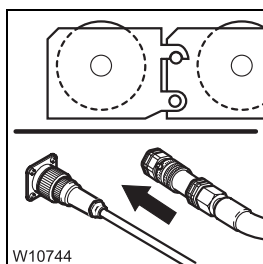
- The superstructure is slewed to the front.
- The main boom must be resting in the boom rest.



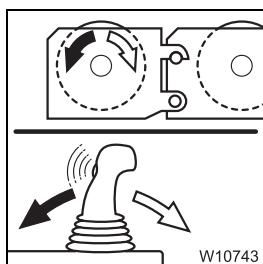
1. Sling the auxiliary hoist in the centre of distribution; p. 6 - 51.



2. – Hang the auxiliary hoist on the turntable and create the connections; p. 6 - 54.



3. – Establish the hydraulic connections; p. 6 - 55.
– Establish the electrical connection; p. 6 - 56.

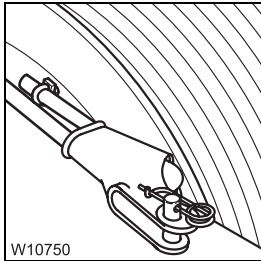


4. – Check that the auxiliary hoist is functioning properly; p. 6 - 59.
– Place on and reeve the hoist rope.

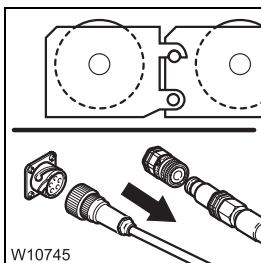
6.5.3

CHECKLIST: Removing the auxiliary hoist

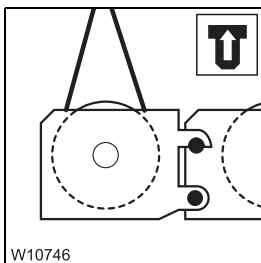
- The superstructure is slewed to the front.
- The main boom must be resting in the boom rest.
- The hoist rope on the auxiliary hoist must be unreeved and wound up.



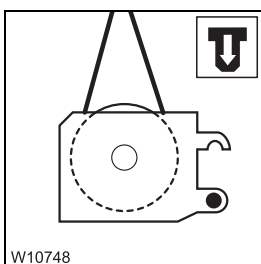
1. – Secure the hoist rope; p. 6 - 57.



2. – Separate the hydraulic connections; p. 6 - 55.
– Separate the electrical connection; p. 6 - 56.



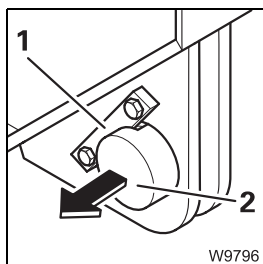
3. – Sling the auxiliary hoist in the centre of distribution; p. 6 - 54.
– Loosen the connection to the turntable; p. 6 - 54.



4. Lift the auxiliary hoist onto the separate vehicle and make ready for transportation; p. 6 - 58.

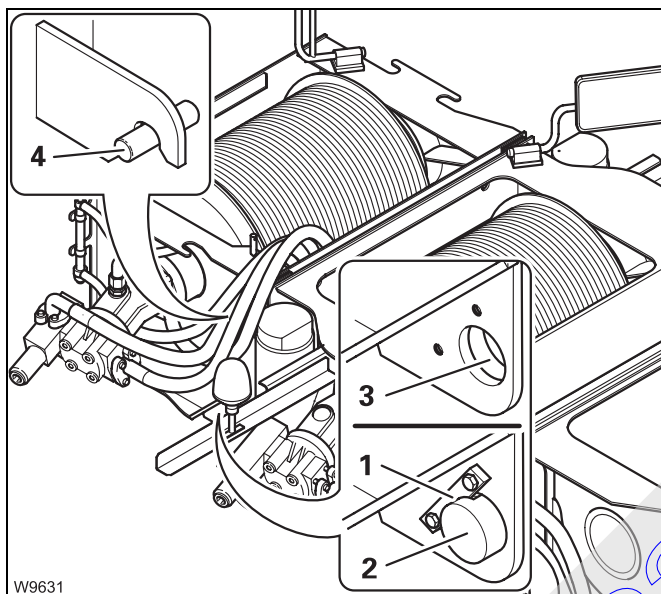
6.5.4

Creating/loosening the connection to the turntable

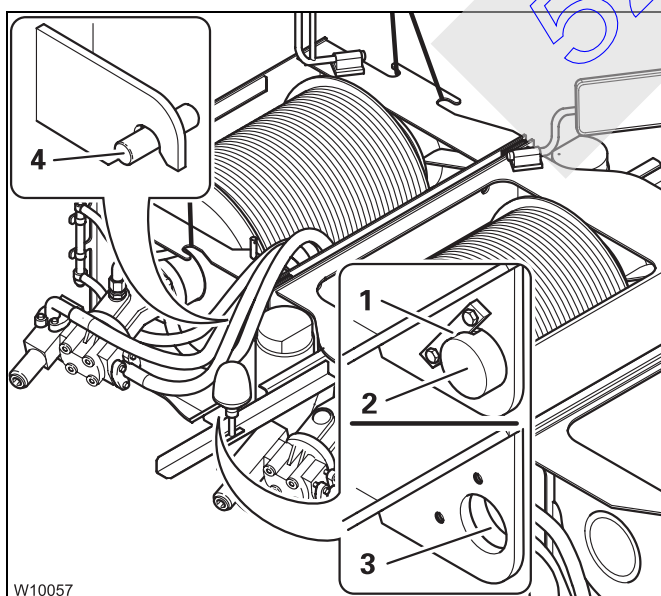


Establishing a connection

- Remove the pin-type keepers (1) on the auxiliary hoist.
- Pull out the pins (2).



- Lift the auxiliary hoist onto the turntable with the auxiliary crane.
- Hang the auxiliary hoist in the clamps (4). The connecting points (3) must be aligned.
- Insert the pins (2) into the connecting points on both sides.
- Fasten the pin-type keepers (1) using the screws.
- Remove the lifting gear.

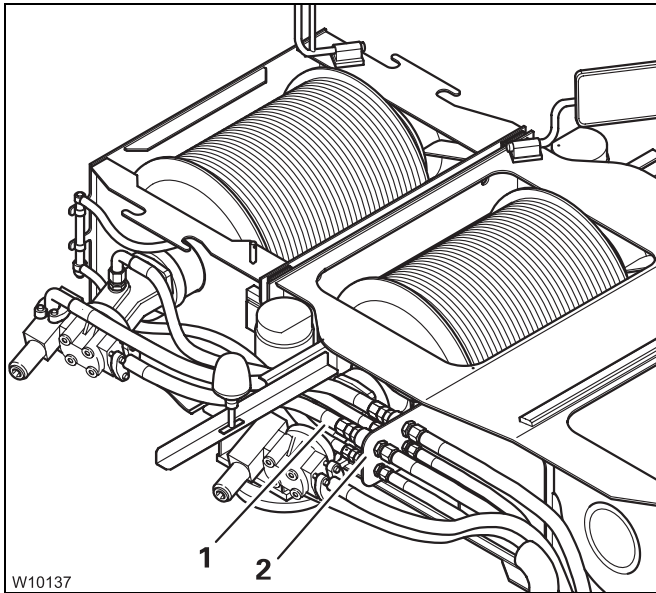


Disconnecting

- Sling the auxiliary hoist onto an auxiliary crane.
- Remove the pin-type keepers (1) on both sides.
- Pull the pins (2) out of the connecting points (3).
- Remove the auxiliary hoist from the clamps (4).
- Lift the auxiliary hoist onto a separate vehicle; ►► p. 6 - 58

6.5.5

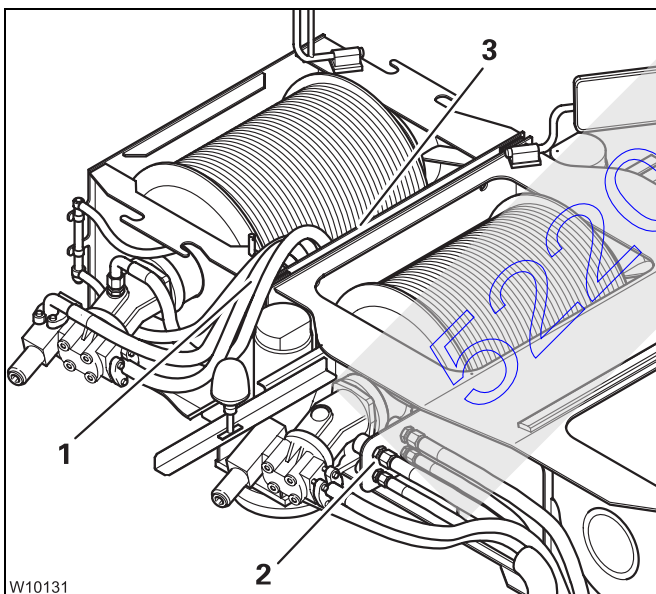
Establishing/disconnecting the hydraulic connection



Establishing a connection

The assignment is given by the size and colour designations.

- Connect the hoses (1) to the connections (2).

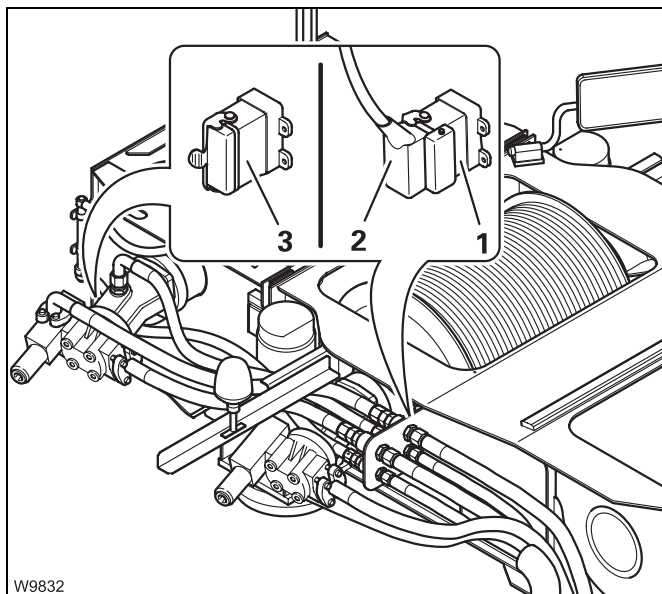


Disconnecting

- Remove the hoses (1) from the connections (2).
- Close all hoses and connections.
- Insert the hoses into the hoisting gear frame (3).

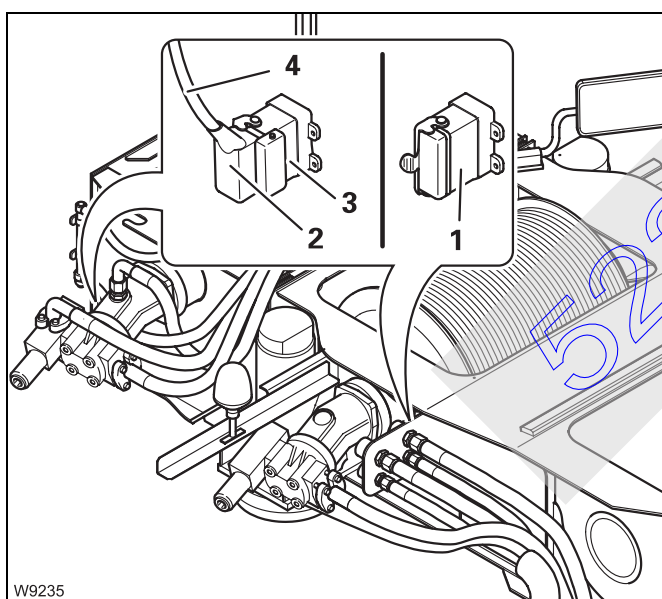
6.5.6

Making/breaking the electrical connection



Establishing a connection

- Remove the plug (2) from the dummy socket (3) and plug it into the socket (1).
- Close the dummy socket (3).



Disconnecting

- Remove the bridging plug (2) from the socket (1) and plug it into the dummy socket (3).
- Close the plug (1).
- Lay the cable (4) in such a way that it does not remain hanging during removal.

6.5.7

Securing the hoist rope

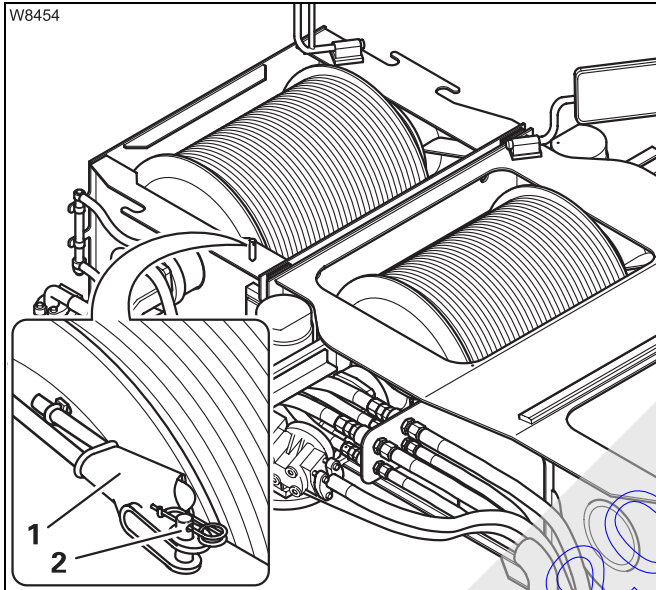
If you have wound up the hoist rope, you must secure it prior to removal.



Risk of accidents 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.

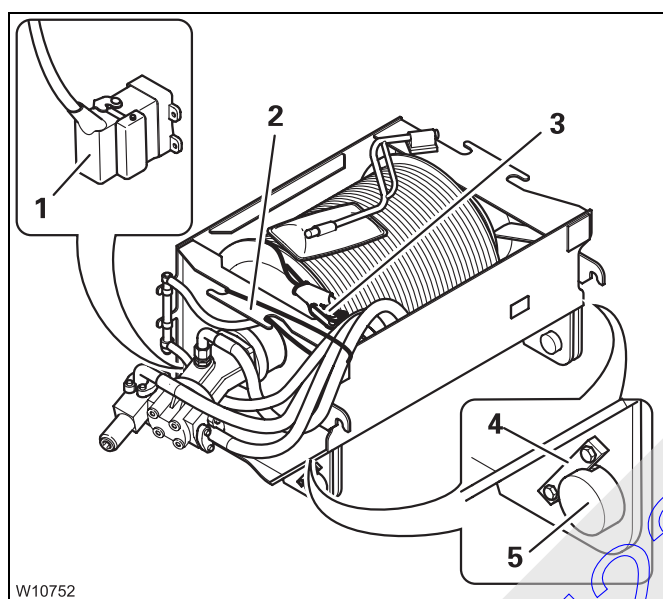


- Attach the rope end clamp (1) to the clamp (2).
- Secure the rope end clamp with a retaining pin.

6.5.8

Transporting the auxiliary hoist

- For transportation, only use a separate vehicle with sufficient lifting capacity. Transport dimensions and weight; ▮▮▮▮ p. 8 - 4.
- Load the separate vehicle in such a way that the weight is evenly distributed.
- Load the auxiliary hoist in such a way that no motorists and cyclists are put at risk.



- Lift the auxiliary hoist onto the separate vehicle and remove the lifting gear.
- Insert the pins (5) on both sides and attach the pin-type keepers (4).
- Secure the hoses, e.g. on the slinging point (2).
- The plug (1) must be inserted in the dummy socket.
- The hoist rope is secured on the clamp (3).

6.5.9

Check that the auxiliary hoist is functioning properly

Slewing direction

Check the slewing direction before laying on the hoist rope.



Risk of accidents due to incorrect slewing direction

Check after each installation that the slewing direction is correct.

This prevents accidents caused by the hoist rope winding up unexpectedly when it is applied.

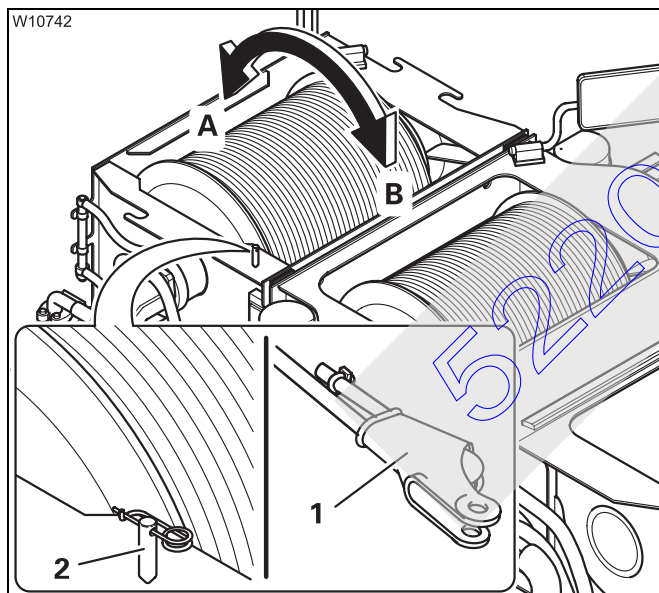


Danger posed by rope slack

Only drive the auxiliary hoist briefly and at the lowest speed.

This prevents slack rope from being created, or rope end clamps being pulled into the hoisting gear frame.

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



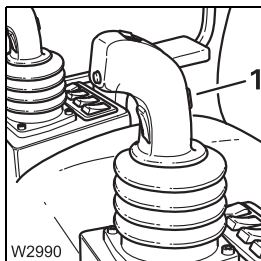
- Remove the rope end clamp (1) from the clamp (2).
- Drive slowly, and complete the *lifting* and *lowering* movements – stop the movement as soon as the hoist drum turns.
- Check that the slewing direction is correct:
 - A** Lifting
 - B** Lowering

If the slewing direction is incorrect

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

Slewing indicator

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



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

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7 Malfunctions in driving mode

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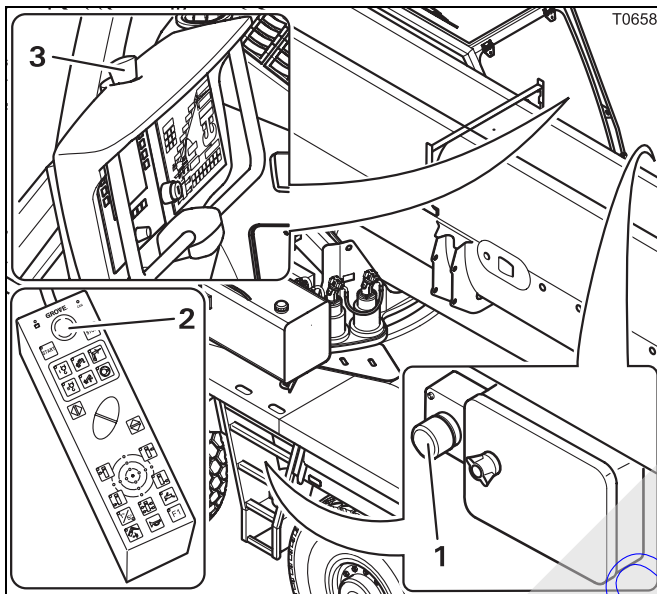
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7

Malfunctions in driving mode

7.1

Emergency stop devices



Four emergency stop switches are provided in case of an emergency:

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

- Press one of the emergency switches (1), (2) or (3). The switch engages.

The engine goes out. If the engine for crane operation has previously been started, it is also shut down.

After activating an emergency stop switch;

▮▮▮▮ *Resetting the emergency stop switch, p. 4 - 22.*



The battery master switch cannot be used as an emergency stop switch for the engine. The engine continues to run after the battery master switch has been switched off.

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7.2

What to do when a malfunction occurs in road traffic

If the truck crane can no longer be driven due to an accident or another malfunction, observe the following:

- Keep calm.
- Brake the truck crane. Observe the motorists and cyclists behind you.
- Stop at a place which is 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 behind a curve.

- Secure the truck crane in compliance with the legal regulations which currently apply in the country where you are working.



Risk of accidents during repair work in danger areas!

Even simple repairs can be dangerous in danger areas (e.g. tunnels, cross-roads, motorway bridges).

In danger areas, only carry out the repair work required to leave the danger area.

If you are unable to rectify the damage yourself, contact **CraneCARE** or have the crane towed away; ► *Towing the truck crane*, p. 7 - 5.

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7.3

Towing the truck crane

Observe the following when towing the truck crane:

- The truck crane may only be towed away with a tow bar. Attach the towing bar to the tow-rod coupling on the front bumper.
- The statutory regulations in the country of use concerning the overall length of the towing and towed vehicle, including the towing bar, must be observed.
- If the engine, the steering and the service brake still work, you can tow the truck crane with a lorry.
- The wheels of the 4th and 5th axle lines must remain in the straight forward position. If it is no longer possible to steer in the straight running position, inform **CraneCARE** prior to being towed away.
- If the engine, the steering or the 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). The tractive force may only be applied forwards or at an angle of 45° to both sides from the longitudinal axle of the truck crane.

7.3.1

Towing in the event of engine or transmission damage

The following information only applies to towing the truck crane out of the immediate danger area in the event of damage to the engine or transmission.



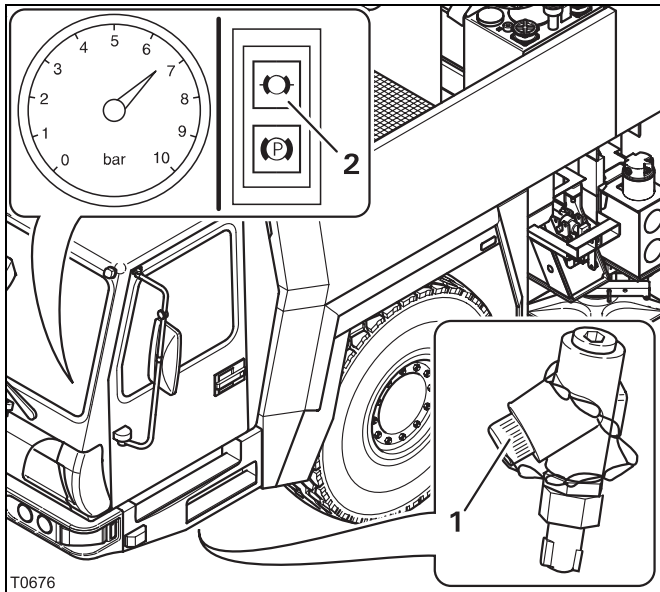
Risk of accidents and damage when towing the truck crane long distances!

Tow the truck crane at a maximum speed of 10 km/h (approx. 6 mph) and over a distance of max. 1 km (0.62 mi). Additional measures must be taken for longer distances. In these cases, contact **CraneCARE**.



Compressed-air supply

When the engine fails, the truck crane must be supplied with compressed air by the towing vehicle so that the brake system is still supplied with compressed air.

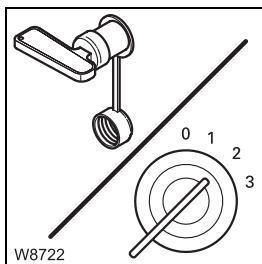


- Connect the filler connection (1) with the *Supply* coupling head of the towing vehicle.

When towing, the following must be available in the driver's cab:

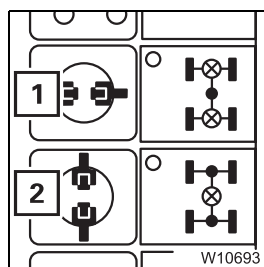
- A supply pressure of at least 6 bar (87 psi) must be displayed, and
- The lamp (2) must have gone out.

Electric power supply



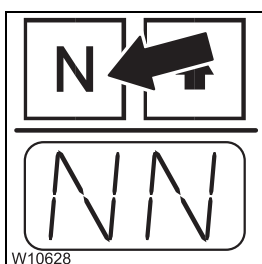
- Switch on the battery master switch.
- Turn on the ignition.

Axle drives



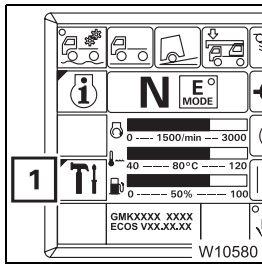
- Switch off all differential locks.
- The **green** symbols (1) and (2) must be shown,
- Transverse differential locks; p. 5 - 59,
 - Longitudinal differential locks; p. 5 - 57.

Transmission



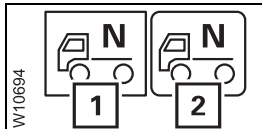
- Switch the transmission to neutral position **N**.

Transfer case



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

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



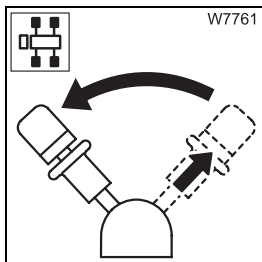
- Press the button **(1)** once.

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



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

Parking brake



- Release the parking brake.
The lamp must go out.

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

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



Risk of accidents in the event of defective brakes!

If damage has occurred to the service brake system, you may only tow the truck crane away from the immediate danger area after receiving permission to do so from **CraneCARE**.



Towing the truck crane out of the danger area

If you have made all the adjustments in the way described in this section, you can tow the truck crane away from the danger area.

- Ensure that the tractor-vehicle only drives off slowly.



Risk of damage to the chassis!

Starting to tow too quickly or in jolts can damage the chassis.

- Remember that the steering is sluggish.
If the engine fails, only the emergency steering pump will be available, which only supports the steering from a speed of at least 2 km/h (1.2 mph).



Risk of accidents due to stiff steering!

At speeds of less than 2 km/h (1.2 mph), the truck crane can hardly be steered.

- Tow the truck crane at a **maximum of 10 km/h** (ca. 6 mph).
- Ensure that the towing distance does not exceed **1 km** (0.62 mi).



Risk of accidents and damage when towing the truck crane long distances!

Tow the truck crane at a maximum of 6 to 7 km/h (approx. 4 mph) and no further than 1 km (0.62 miles). Additional measures must be taken for longer distances. In these cases, contact **CraneCARE**.

7.3.2

Starting to tow

It is **not** possible to start towing the truck crane for gear-related reasons.

7.4

Wheels and tyres

This section contains all information about changing a wheel and about the use of the tyre inflator connection.

7.4.1

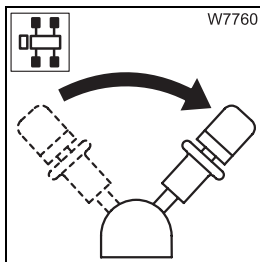
Wheel change

- If a puncture occurs while driving, stop the truck crane, taking the following traffic into account, and secure in the way described in the legal regulations stipulated in the country of use.
- Select an even place, if possible, to change the tyres.



Risk of accidents due to an overturning wheel!

If you lean a wheel against the truck crane briefly when changing a wheel, secure it against falling over with a rope. Only move the outriggers if no wheel is leaning against the truck crane.



- Engage the parking brake.



Risk of crushing when starting the engine.

Each time the engine is started, the 4th and 5th axle lines are steered to test the steering system, sometimes with a 5-second delay. Ensure that the engine is not started while you are changing a wheel.

This will help prevent you being crushed between the steering wheels.



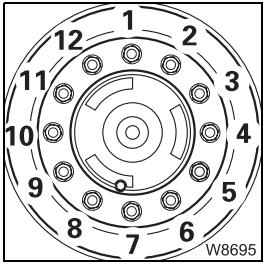
Removing a damaged wheel

- Switch off the suspension; ▮▮▮▮▶ p. 5 - 16.
- Raise the truck crane with the outriggers until the wheel that is to be changed only just leaves the ground.



Risk of accidents due to an overturning wheel!

When unscrewing the last wheel nuts, the wheel can slip off the hub and fall in your direction. Secure the wheel and step back quickly if the wheel threatens to tip.



- Remove the wheel nuts (1) to (12) and remove the damaged wheel.
- Secure the wheel against falling if you set it down temporarily.

On the spare wheel holder

When changing a wheel, you must remove the spare wheel from the spare wheel holder and mount the damaged wheel onto the spare wheel holder. To lift the wheel, use a chain hoist or the truck crane.

- If you lift the wheel with the truck crane,
 - Support the truck crane and
 - Enter the current rigging mode on the SLI.

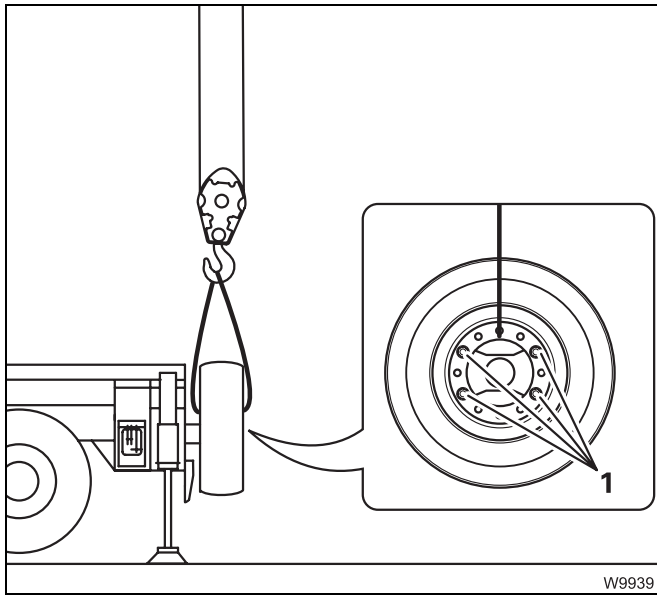


Risk of overturning while slewing!

Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius).

Correct the rigging mode if necessary; ▮▮▮▮▶ *Slewing with rigged counterweight*, p. 13 - 76.

- Lift the spare wheel using only lifting gear with sufficient load bearing capacity; ▮▮▮▮▶ *Spare wheel*, p. 8 - 4.



Wheel, removing

- Undo the nuts (1).
- Raise the spare wheel from the spare wheel holder.
- Secure the spare wheel against falling over when you put it down temporarily.

Wheel, installing

- Lift the wheel onto the spare wheel holder.
- Fit the wheel with the nuts (1), and tighten the nuts with 500 Nm (370 lbf ft).

Wheel, installing

- Check whether the bearing surfaces of the wheel rim and hub are clean (no paint, grease or oil).
- Grease the wheel studs slightly.



Risk of accidents

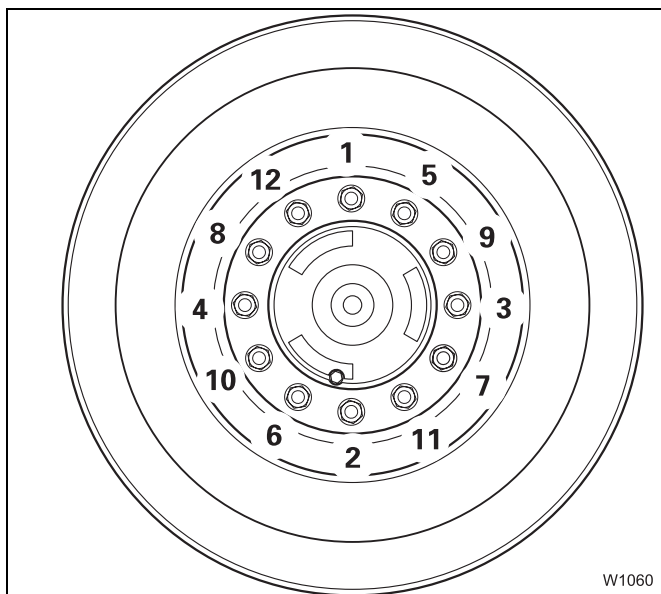
Check the wheel rim, the tyres, the wheel nuts and the wheel studs for damage before mounting the spare wheel.

Damaged parts may not be mounted.

Now mount the original wheel supplied by Deutsche GROVE, or an approved wheel of the same size and load bearing capacity.

- Put the wheel on the hub in an upright position.
- Extend or retract the outrigger cylinders until the holes in the wheel rims are in line with the wheel studs.
- Push the wheel on the wheel studs. Make sure the thread of the wheel studs is not damaged.





- Turn the wheel nuts (1) and (2) tight in order to secure the wheel.
- Turn the remaining the wheel nuts tight.
- Always tighten the wheel nuts in the order (1) to (12).
 - First all wheel nuts with 200 Nm (150 lbf ft).
 - Then all wheel nuts with 400 Nm (300 lbf ft).
 - Finally, all wheel nuts with 650 Nm (480 lbf ft).


Tighten all wheel nuts after 50 km (30 mi) and 150 km (90 mi) again with 650 Nm (480 lbf ft).

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7.4.2

Filling the tyres yourself

If an appropriate filling hose is available, you can fill the tyres with the compressed air system of the truck crane in emergencies.

The tyres can be filled 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. 8 - 6.

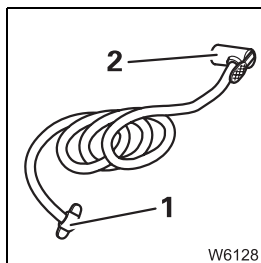


Risk of accidents due to impermissible tyre pressure!

If the maximum pressure is above the specified tyre pressure, fill the tyres up to the maximum specified pressure.

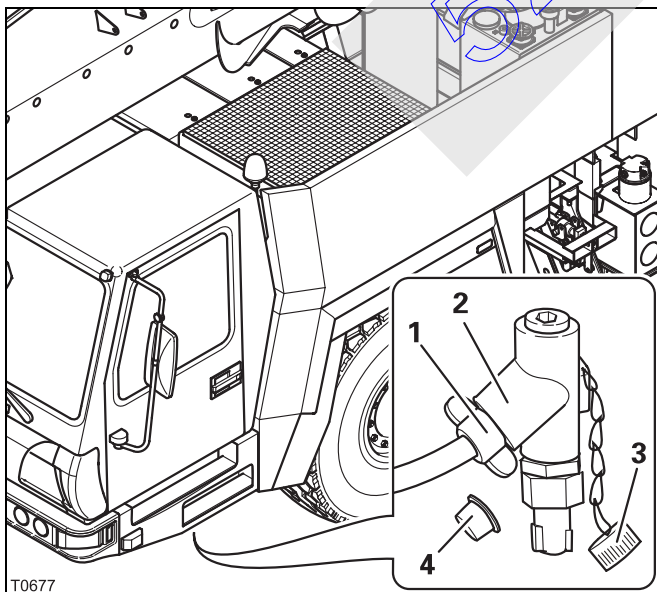
In this way you prevent the tyres from becoming damaged during driving, and bursting.

Always drive directly to a service station or garage and adjust the tyre pressure as soon as you have filled the tyres yourself.



The filling hose has a tyre inflator connection (2) and a connection (1).

Connecting the filling hose



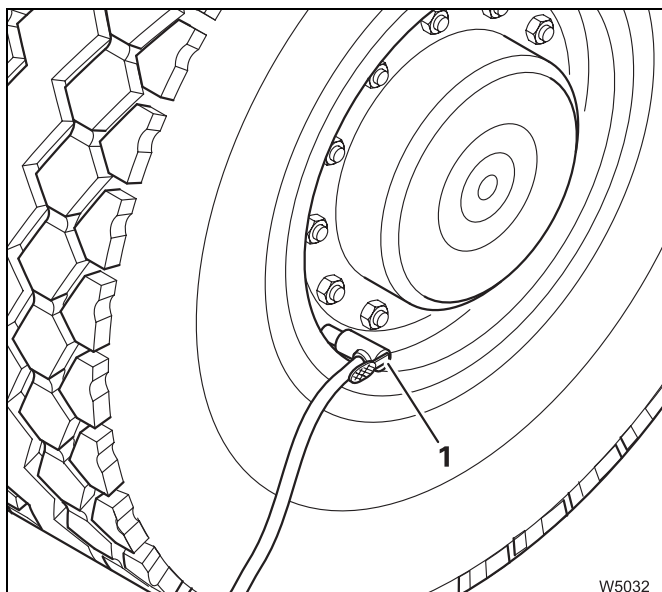
- Remove the cap (3) from the filler connection (2).
- Remove the cap (4) and attach the connection (1) to the filler connection (2).

You can now fill the tyres.



Filling the tyres

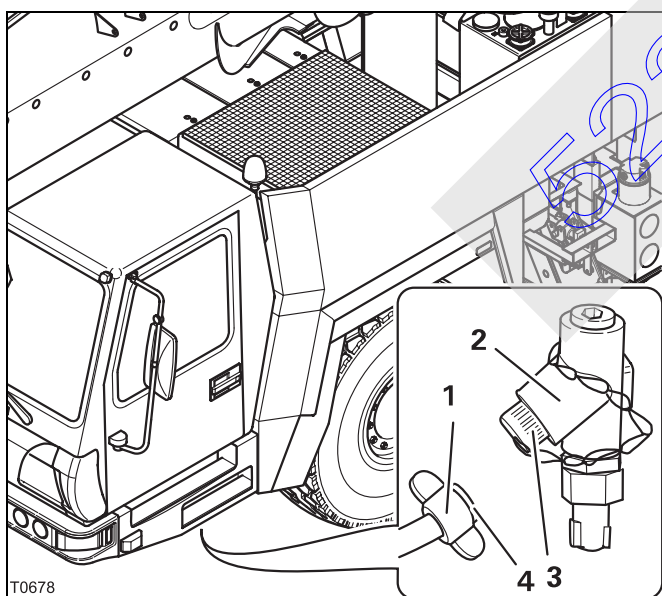
The maximum operation pressure of the compressed air system of 8 bar (116 psi) can only be reached with the engine running.



- Start the engine; ►► p. 4 - 14.
- Fasten the tyre connection (1) to the tyre valve.
- Actuate the button on the tyre connection and fill the tyre.
- Disconnect the tyre connection (1) from the tyre valve.

Remove the filling hose

Before driving, you must remove the filling hose from the filler connection.



- Remove the connection (1) from the filler connection (2) and put on the cap (4).
- Close the filler connection (2) with the cap (3).
- Stow the filling hose away.
- Drive to a service station or workshop and adjust the tyre pressure.



Risk of damage to the compressed air system!

Always close the filler connection with the cap.

This prevents damage and contamination occurring in the compressed air system.

7.5

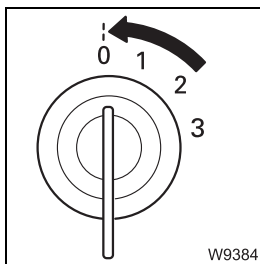
Fuses on the carrier

The fuses are divided into groups and are at various points of the carrier:

- In the driver's cab
- In the battery box
- On I/O boards

Information on replacing fuses

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



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



Risk of damage when the ignition is switched on!

Switch off the ignition whenever a fuse has to be replaced. In this way you can prevent the new fuse from being damaged by the increased starting current immediately after inserting it.



Risk of damage due to overloading!

Replace blown fuses only with new fuses of the same amperage. In this way you can prevent parts from being overloaded and damaged or the fuse from being immediately damaged again.

Notify **CraneCARE** if a fuse of the same amperage blows again after turning on the ignition.

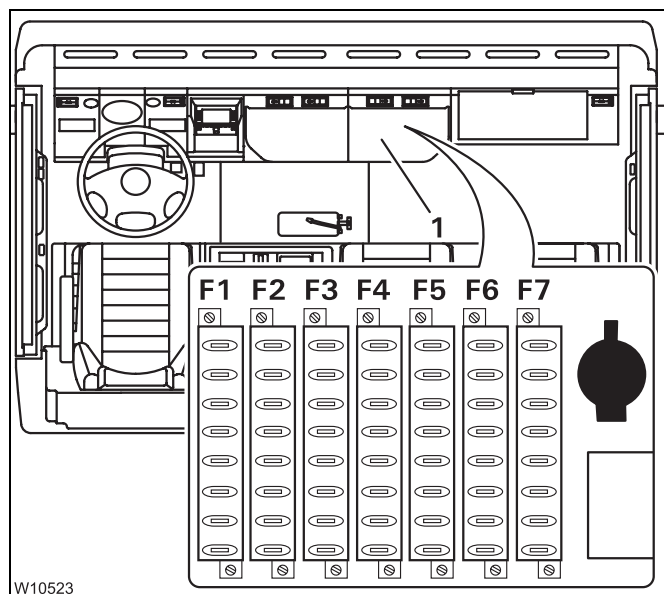


Danger of fire!

Never repair a defective fuse with other electrically conductive materials.

7.5.1

Fuses in the driver's cab

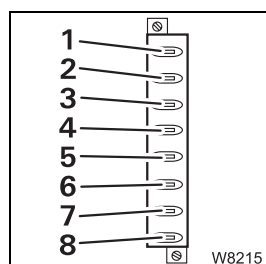


The driver's cab contains fuse groups **F1** to **F7**.

- Remove the covering (1).

Each group consists of eight fuses.

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 always the top fuse).

- Observe the instructions regarding fuse changes; ► p. 7 - 15.

Designation	Amperage (A)	Function
F1/1	20	Engine E control
F1/2	10	Engine diagnostics plug, SAE diagnostic, Hand-held control, driver's cab lighting, cigarette lighter
F1/3	20	24 V/12 V voltage transformer, oil cooler
F1/4	15	Hazard warning system, brake lights
F1/5	5	ECOS display, AMG Electronic
F1/6	10	Electronic gear system
F1/7	15	Battery heating
F1/8	20	ABS trailer

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

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



Designation	Amperage (A)	Function
F4/1	15	Position lights for indicator lamps for displays, Trailer socket, Motor brake
F4/2	10	Soot particle filter
F4/3	10	Central lubrication system
F4/4	10	Fuel pump
F4/5	10	Tachograph
F4/6	10	ECOS display, battery charge indicator, AMG
F4/7	10	Engine diagnostics plug
F4/8	10	Electronic gear system, Transmission diagnostics plug, warning driving in reverse

Designation	Amperage (A)	Function
F5/1	5	Free
F5/2	5	Engine emergency stop switch Air intake inhibitor
F5/3	20	Power supply for I/O-0, I/O-1, I/O-2, hand-held control, inclination indicator
F5/4	20	ESX3 control unit, circuit boards I/O-0, I/O-1, I/O-2
F5/5	5	Air intake inhibitor
F5/6	10	Engine electronics
F5/7	2	8.5 V for ESX3 control unit
F5/8	15	Fog headlight, fog tail light

Designation	Amperage (A)	Function
F6/1	5	Left parking light, left clearance lamps (driver's cab/turntable)
F6/2	10	Right parking light, right clearance lamps (driver's cab/turntable)
F6/3	10	Left side clearance lamps, left tail lamp, instrument lighting for heating/speedometer/brake circuit supply pressure
F6/4	5	Right side clearance lamps, right tail lamp
F6/5	5	Left headlight full beam, fog light
F6/6	5	Right headlight – full beam, headlight – full beam display
F6/7	5	Left low-beam headlight
F6/8	5	Right low-beam headlight

Designation	Amperage (A)	Function
F7/1	2	Left steering system, ESX4
F7/2	5	
F7/3	20	
F7/4	2	Right steering system, ESX5
F7/5	5	
F7/6	20	
F7/7	5	Free
F7/8	5	Free

7.5.2

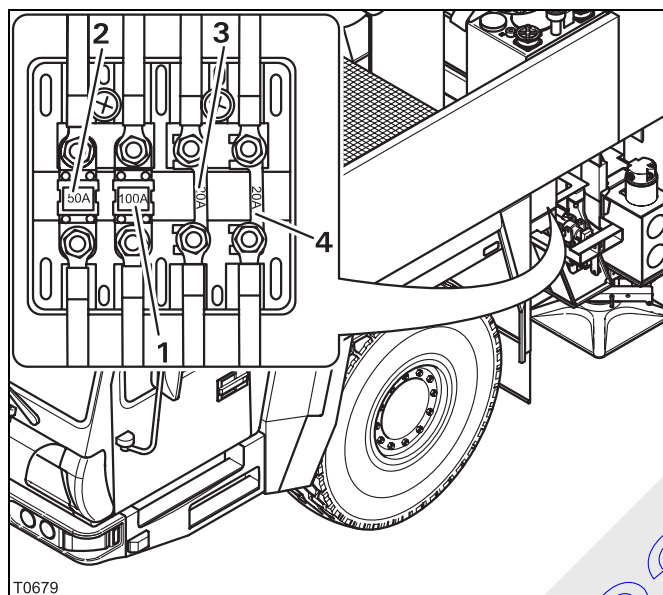
Fuses in the battery box

Fuses F7 to F10 are contained in the battery box.



Danger due to lead and lead compounds of 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 behind 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	Central fuse, carrier
F8	50	Free
F9	20	Preliminary fuse for auxiliary heater timer, tachograph and radio
F10	20	Free

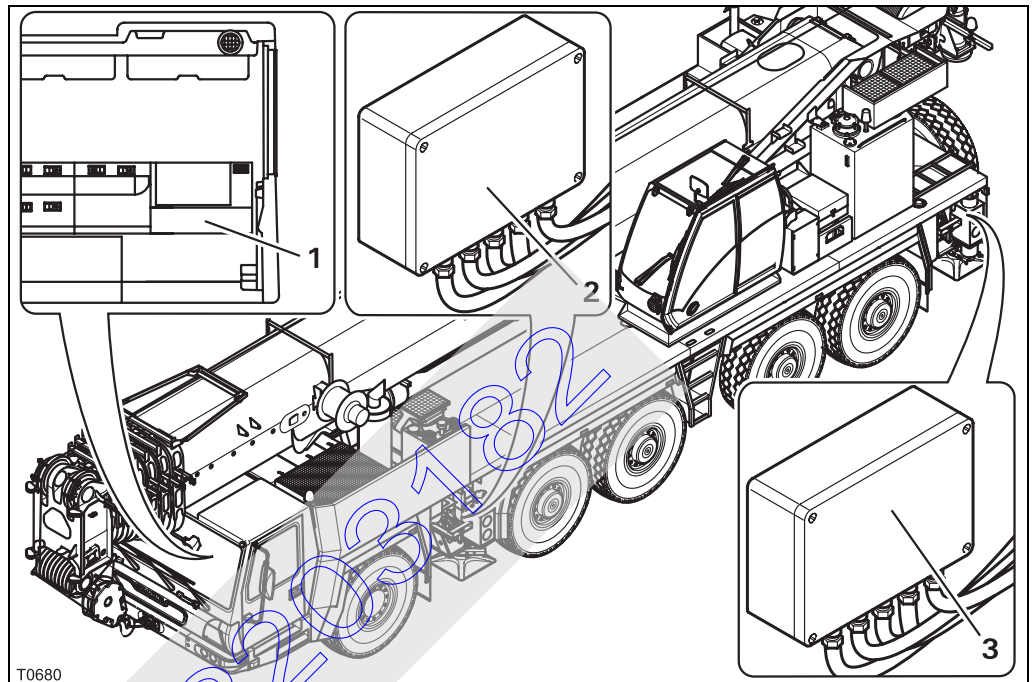
7.5.3

Fuses on I/O boards

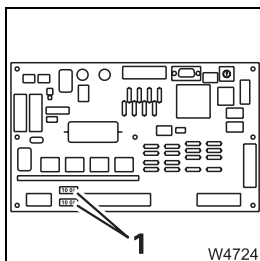
ECOS contains the I/O-0, I/O-1 and I/O-2 circuit boards.

Each board controls several functions. These functions are blocked when a fuse is defective on the circuit board.

The assignment of the functions to the circuit boards is shown in the fault identification tables;  p. 7 - 23.



Designation	Position on the truck crane
I/O-0	Behind the panelling (1)
I/O-1	In the switch box (2)
I/O-2	In the switch box (3)



All fuses (1) have a strength of **10 amps**.

Depending on the model, one or two fuses may be located on a single circuit board.

- Check the fuses and replace defective ones.

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7.6

Finding and eliminating malfunctions

7.6.1





Malfunctions on the engine for driving



In addition to this information *Separate operating instructions from the engine manufacturer.*

Malfunction	Cause	Remedy
Engine will not start Starter does not turn	Battery master switch is switched off	Switch on the battery master switch; p. 4 - 9
	Ignition off	<i>Ignition, switching on,</i> p. 4 - 9
	Transmission not in neutral position	<i>Switching the transmission to neutral position,</i> p. 5 - 24
	Parking brake released	Locking the parking brake; p. 5 - 49
	Fuse F1/1, F5/6 defective	Replace the defective fuses; p. 7 - 15
	Emergency stop switch has been actuated	Reverse the emergency stop switch; p. 4 - 22
Engine will not start Starter turns	Batteries insufficiently charged	Charge the batteries; <i>Maintenance Manual</i>
	Fuel tank empty	1. Refuel; p. 4 - 7
		2. Bleed the fuel system; <i>Maintenance Manual</i> <i>Separate operating instructions from the engine manufacturer</i>
Air intake inhibitor closed	<i>Removing the air intake inhibitor,</i> p. 4 - 23	
The lamp does not light up when the ignition is started when the engine is cold	F3/2 fuse defective	Replace the defective fuses; p. 7 - 16, p. 7 - 20
Symbol red	Air filter clogged	Replace the dry air filter; <i>Maintenance Manual</i>
Symbol red	Coolant level too low	Top up coolant; <i>Maintenance Manual</i>




Malfunction	Cause	Remedy
The truck crane drives at a maximum of 20 km/h (12 mph)	Key-operated driver's cab switch activated	Switch off the key-operated switch; ■■■▶ p. 3 - 42
	A locking procedure is not yet over.	Lock the differential locks
Symbol  red	Coolant level too low	Top up coolant; ■■■▶ <i>Maintenance Manual</i>
	Oil level in the transmission too low	Check the oil level; ■■■▶ <i>Maintenance Manual</i>
	Outside of heat exchanger dirty	Clean outside of heat exchanger.
	V-belt of coolant pump at engine loose	Tension V-belt; ■■■▶ <i>Separate operating instructions from the engine manufacturer</i>
	The fan wheel on the engine does not turn	Switch the fan wheel to emergency operation; ■■■▶ p. 7 - 35
Engine unable to be turned off with ignition	Malfunction in the electronics	Turn off the engine with the emergency-stop device; ■■■▶ p. 7 - 1
Motor brake (sustained action brake) cannot be switched on.	F2/6 fuse defective	Replace the defective fuses; ■■■▶ p. 7 - 15
Engine diagnostics plug not working	F1/2, F4/7 fuse defective	Replace the defective fuses; ■■■▶ p. 7 - 15
The engine output has fallen and the engine coolant temperature has been increased.	The engine output is reduced due to an increase in the coolant temperature. If the maximum permissible temperature is exceeded, the lamp  (yellow) lights up.	Wait until the coolant has cooled down and the engine output has been raised again.
The lamp  (yellow) lights up	Engine oil level too low	Check the oil level and top up if necessary; ■■■▶ <i>Maintenance Manual</i> .
	Other causes	Open the <i>Warning</i> submenu ■■■▶ p. 5 - 45; correct the displayed malfunction; if the warning message is still present, notify, CraneCARE benachrichtigen.
The lamp  (red) lights up	Severe malfunction at the engine	Do not start the engine and/or immediately stop the truck crane, turn off the engine and notify CraneCARE .

7.6.2 Differential lock malfunctions

This section applies to malfunctions on all transverse and longitudinal differential locks.

Malfunction	Cause	Remedy
Differential locks unable to be switched on	Key-operated switch switched off	Switch on the key-operated switch; ►►► p. 5 - 56.
	Current speed over approx. 5 km/h (3 mph)	Slow down or stop the truck crane.
	Drive line under tension	Drive the truck crane slowly back and forth in a straight line, ►►► p. 5 - 56, ►►► p. 5 - 58
	Compressed air system insufficiently filled	Build up the supply pressure; ►►► p. 5 - 10
	F5/3, F5/4 fuses defective	Replace the defective fuses; ►►► p. 7 - 15.
	Fuse on I/O-0 defective	Replace the defective fuses; ►►► p. 7 - 21.
Differential locks unable to be switched off	Current speed over approx. 5 km/h (3 mph)	Slow down or stop the truck crane.
	Drive line under tension	Drive the truck crane slowly back and forth in a straight line, ►►► p. 5 - 57, ►►► p. 5 - 59.






7.6.3 Malfunctions on the transmission

Malfunction	Cause	Remedy
Transmission only shifts up to second gear	Key-operated switch switched on	Switch off the key-operated switch; ■■■▶ p. 3 - 42
	Gear oil too hot	■■■▶ <i>Gear oil too hot</i> , p. 7 - 38
	Gear oil cooler than approx. -7 °C (20 °F)	Wait until gear oil temperature rises
Transmission is not upshifting at speeds over approx. 20 km/h (12 mph).	A locking procedure is not yet over.	Lock the differential locks
Transmission not shifting	Retarder switched on	■■■▶ <i>Switching off the engine retarder</i> , p. 5 - 41
The transmission does not react to the operating elements	F1/6, F4/8 fuse defective	Replace the defective fuses; ■■■▶ p. 7 - 15
Symbol  red	Transmission cannot switch to a lower gear, since the maximum permissible engine speed would otherwise 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	■■■▶ <i>Malfunctions to the transmission</i> , p. 7 - 37
Transmission diagnostics plug not working	F4/8 fuse defective	Replace the defective fuses; ■■■▶ p. 7 - 15


















7.6.4 Malfunctions of the transfer case

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

7.6.5 Service brake malfunctions

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

7.6.6 Steering malfunctions

Malfunction	Cause	Remedy
The lamp  ,  or  lights up	The oil level in the hydraulic oil tank is too low	Stop and check whether oil has run out  <i>If oil has run out</i> , p. 5 - 33  <i>If no oil has run out</i> , p. 5 - 34
	Steering circuit has failed, e.g. pump defective	
The lamp  , yellow, lights up	Error in the steering system; the corresponding symbol is shown.	It is possible to drive; arrange for the error to be rectified; When driving;  p. 5 - 34 At a standstill;  p. 4 - 17
The lamp  , red, lights up	There is a severe error in the steering system	The steering is defective. Stop as quickly as possible and inform CraneCARE When driving;  p. 5 - 34 At a standstill;  p. 4 - 17
Symbol  red	Hydraulic oil filter dirty	Replace the hydraulic oil filter  <i>Maintenance Manual</i>
Separate steering is cannot be switched on/off	Key-operated switch switched off	Switch on the key-operated switch;  p. 5 - 68
Separate steering is unable to be activated.	Current speed over approx. 5 km/h (3 mph)	Slow down or stop the truck crane.
Steering has no function	Fuse F7/1, F7/3, F7/4 defective	Replace the defective fuses;  p. 7 - 15
The steering has no function, and the ECOS display shows an error message	The fuse is defective If an error message is given: 40.30.1.2 – F7/2 40.30.2.2 – F8/1 40.30.3.2 – F7/3 41.30.1.2 – F7/5 41.30.2.2 – F8/2 41.30.3.2 – F7/6	Replace the defective fuses;  p. 7 - 15
	With other error messages	Read the error messages ( p. 7 - 31) and inform CraneCARE

7.6.7 Malfunctions to the suspension


Malfunction	Cause	Remedy
Suspension is unable to be activated.	Current speed over approx. 5 km/h (3 mph)	Slow down or stop the truck crane.
	Compressed air system insufficiently filled	Build up the supply pressure; ▶▶▶▶▶ p. 5 - 10
Suspension is unable to be switched on or off.	F5/3, F5/4 fuse defective	Replace the defective fuses; ▶▶▶▶▶ p. 7 - 15
	Fuse on I/O-0 defective	Replace the defective fuses; ▶▶▶▶▶ p. 7 - 21

7.6.8 Level adjustment system malfunctions

Malfunction	Cause	Remedy
Level adjustment system sub-menu cannot be opened.	Current speed over approx. 5 km/h (3 mph)	Slow down or stop the truck crane.
Level adjustment system not working	Suspension switched off	Switch on the suspension; ▶▶▶▶▶ p. 5 - 60
	F5/3, F5/4 fuse defective	Replace the defective fuses; ▶▶▶▶▶ p. 7 - 15
	The fuse on I/O-1 or I/O-2 is defective	Replace the defective fuses; ▶▶▶▶▶ p. 7 - 21

7.6.9

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	F1/3 fuse defective	Stop the truck crane while taking the traffic situation into account, and replace the defective fuse if necessary; ▶ p. 7 - 15
	Defective temperature sensor in the hydraulic system (error message is displayed)	Have the temperature sensor replaced.
Symbol  red	Hydraulic oil filter dirty	Replace the hydraulic oil filter ▶ Maintenance Manual

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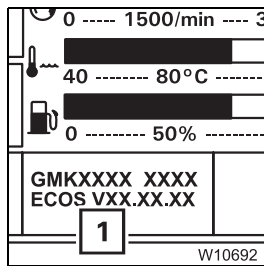
7.6.10


Malfunctions on the ECOS carrier

This section contains general malfunctions, and malfunctions which lead to an "error" display. It also contains information on reading error messages on the *outrigger* control units.

ECOS program version

Always note down the number of the program version after a malfunction occurs before notifying **CraneCARE**.




- If appropriate, open the main menu .

The display (1) shows the number of the current program version.

General malfunctions

The following table contains information on finding faults and possible remedial measures.

Malfunction	Cause	Remedy
The ECOS display remains dark although the ignition is switched on.	F1/5, F4/6 fuse defective.	Replace the blown fuse;  p. 7 - 16



If further malfunctions occur, the corresponding error messages are shown in the ECOS display.

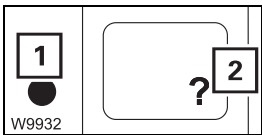
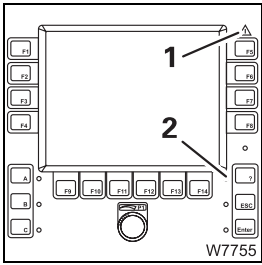


Error messages

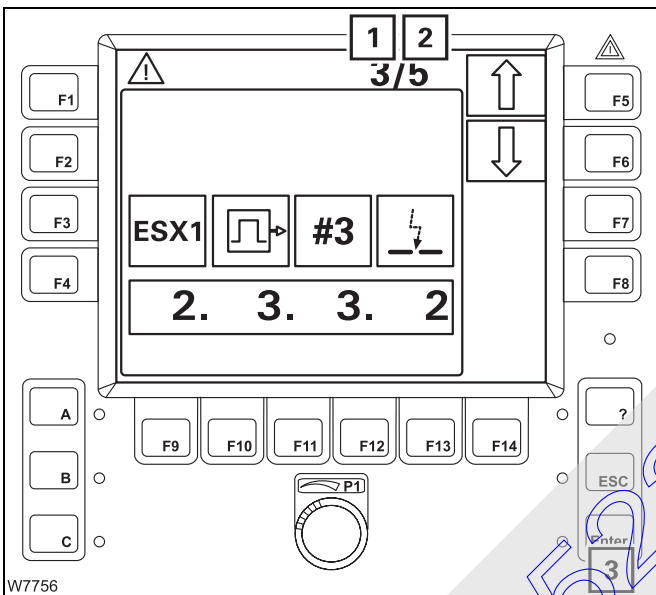
If ECOS detects an error, an error message is shown:

- The lamp (1) flashes and
- The lamp (2) flashes.

For further information, you must open the *Error* menu.



- Press the button (2) once. The button is only active when the lamp (1) flashes or lights up.



The *Error* submenu is opened.

Display (2) shows the error total, and display (1) shows which error is shown.

3/5, for example means:

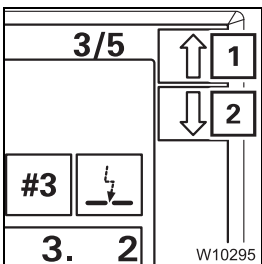
- The error 3 is shown.
- There are a total of 5 errors.

If the error shown is not acknowledged, the lamp next to the button (3) lights up.

Acknowledging errors

- Press the button (3) once.

If there are further errors, the next error is displayed and can be acknowledged.





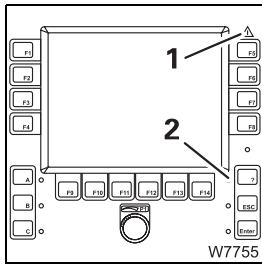
- When all errors have been acknowledged, you can retrieve any errors present using the buttons next to the symbols (1) and (2).
 - 1 Errors displayed in ascending order.
 - 2 Error displayed in descending order.

Every time you press, the next error will be displayed.

When you keep a button held down, all errors are shown one after the other continuously.



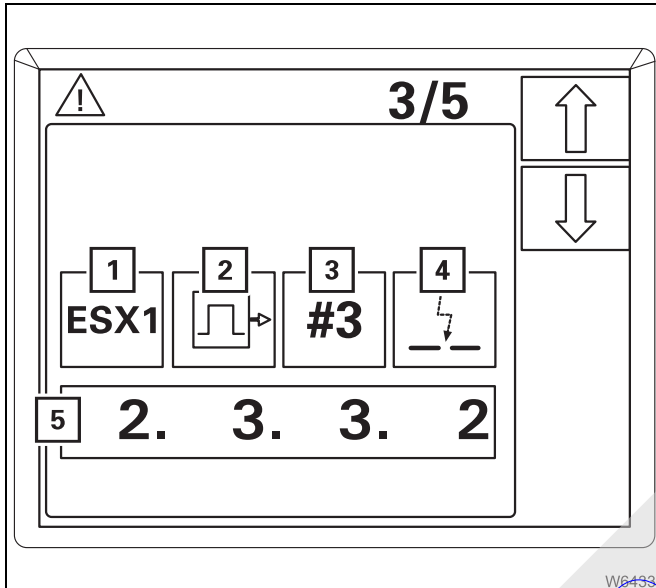
If not all errors have been acknowledged, the buttons   have no function – the symbols are grey.



When all error messages have been acknowledged, the displays change:

- The lamp (1) lights up and
- The lamp (2) lights up.

Both displays start to flash again as soon as a new error occurs.



Displaying an error

Each error is defined by an error code (5) and the symbols (1) to (4).

The symbols stand for:

- 1 The defective device
- 2 The error group
- 3 The index within the group
- 4 The type of error

The error code (5) consists of four digits, e.g. 2332.

- Always note down the error code before contacting **CraneCARE**.

Exiting the submenu



You can exit the *Error* submenu at any time.

- Press the button (1) once.

The same menu is opened which was open before the *Error* submenu was opened.

All errors remain saved until you switch off the ignition, even those errors of which the cause has been eliminated in the mean time. All existing errors are treated as new errors and displayed again after turning on the ignition.

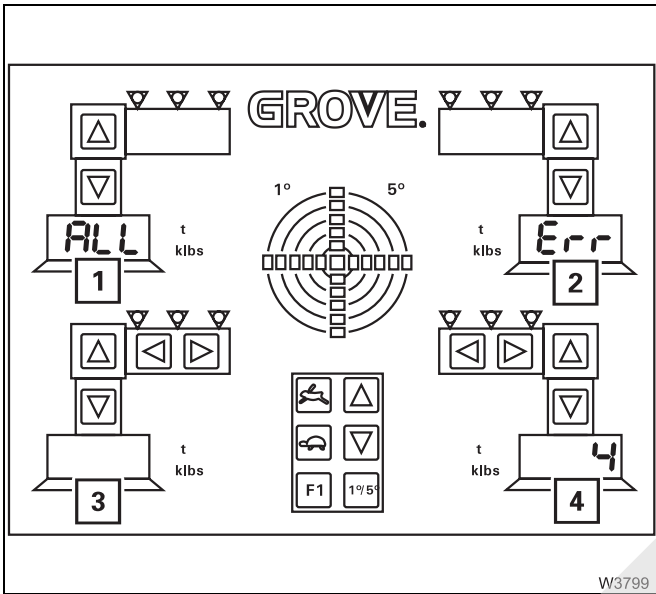
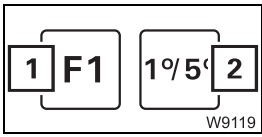


Error display on the control units

You can also have all the error codes of all errors present display on the *outrigger* control units.

Switching on the error display

- Press the button (1) and keep it held down.
- Press the button (2) once additionally.

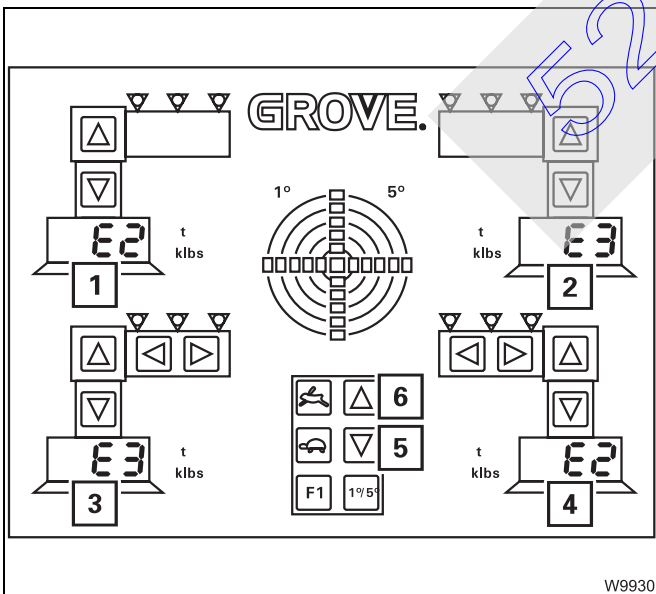


The "error" display is switched on.

The displays (1) to (4) show e.g.

ALL	Err
	4

The number in the field (4) shows the total number of existing error messages (e.g. 4).



Displaying error codes

- Press the button (5) once. The oldest error in the memory is shown.

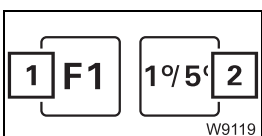
Displays (1) to (4) show the figures for the error code, e.g. 2. 3. 3. 2.

You can retrieve all the stored error codes one after the other.

- To show the
 - next error code, press button (6)
 - previous error code, press button (5)

Switching off the error display

- Press the button (1) and keep it held down.
- Press the button (2) once additionally.



7.7

Procedure in the event of malfunctions

7.7.1

Switching on emergency operation in coolant circuit

For cooling purposes, the fan wheel of the engine is switched on and off automatically. When this automatic system fails, you can switch on emergency operation so that the fan wheel always runs when the engine is switched on.

- Switch off the engine and secure against unauthorized use (e.g. lock the hand-held control in the driver's cab and the doors).



Risk of accidents due a turning fan wheel!

Always switch off the engine and secure against unauthorized use before switching on emergency operation.

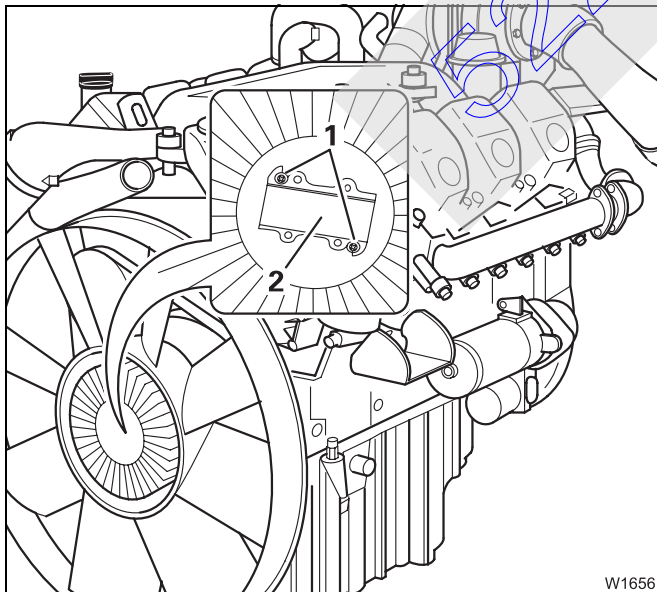
In this way you prevent the fan wheel from being suddenly moved and injuring your fingers or hands.



Risk of burning yourself 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 when you switch on the emergency operation.



Emergency operation is switched on at the fan wheel's hub.

- Remove both bolts (1).
- Screw the metal plate (2) to one side out of the holder and pull it out.
- Press in the pin under the metal plate.
- Emergency operation is activated and the fan wheel will run continuously as long as the engine has been switched on.

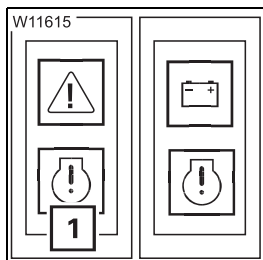


When the fan wheel is blocked, the engine can be operated for a maximum of 1000 km (620 miles).

7.7.2

Malfunctions on the engine

The engine electronic system displays warnings and malfunctions.

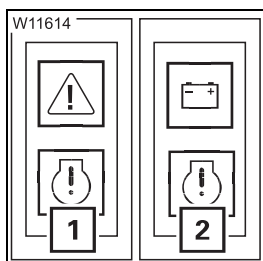


Engine warning

The lamp (1) lights up.

The engine capacity is reduced continuously.

- Drive on until you have a chance to stop.
- Stop immediately and switch the engine off.
- Identify the cause; p. 7 - 32



Engine malfunction

The lamps (1) and (2) lights up.

- Stop the truck crane immediately while taking into account the traffic situation.
- Switch off the engine.



Risk of damage to the engine!

Turn off the engine immediately after stopping the truck crane.

Do not by any means restart the engine. Serious damage to the engine can be avoided this way.

- Inform **CraneCARE**.

7.7.3

Malfunctions to the transmission

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

General malfunctions

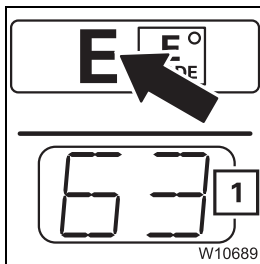
When a general transmission malfunction occurs, only error codes are stored.

There is no display in the driver's cab.



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

Display E



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

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

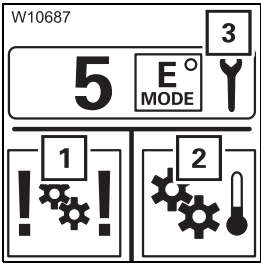
At the end of the journey

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

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



Transmission malfunction

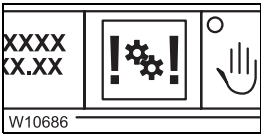


When a transmission malfunction occurs, when the engine is running,

- The symbol (3) is displayed, and
- The *warning* display shows the (1) or (2) symbol.

If no symbol (1) or (2) is shown, a malfunction in the AMG is present; p. 3 - 64.

If a transmission malfunction occurs, proceed as follows:



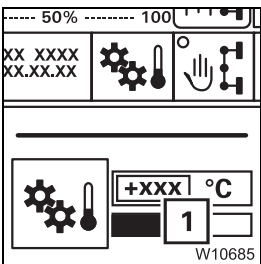
Shift lock, transmission

The transmission no longer shifts.

- 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**.

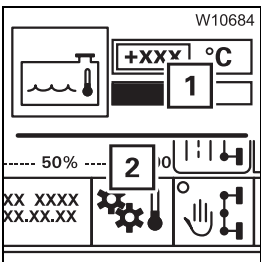


Gear oil too hot

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 - 19), then check the oil level in the transmission and top up if necessary; *Oil level gauge*, p. 5 - 31.

- 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 - 39) and contact **CraneCARE**.



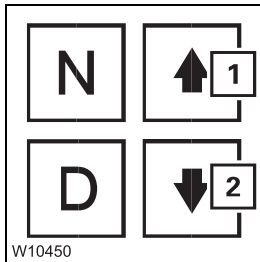
Risk of the transmission overheating

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.

- Engage the parking brake.
- Switch to neutral position **N**. You can now not select any gear position.
- Read the error codes (▮▮▮▮ p. 7 - 39) and contact **CraneCARE**.

Reading error codes

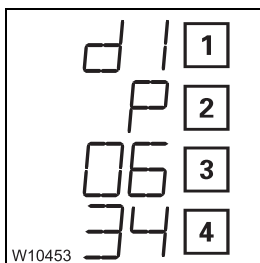
You can display all the stored error codes one after the other.



- Press buttons (1) and (2) simultaneously.

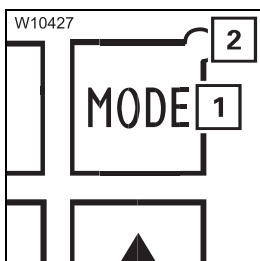
The *Transmission* display shows the first stored error code.

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



- | | |
|---------------------------------|---------------------------------|
| 1 Storage location | 2 Error type |
| 3 Error number, 1st part | 4 Error number, 2nd part |

In this example, the error code **P0634** is saved to storage location **d1**.

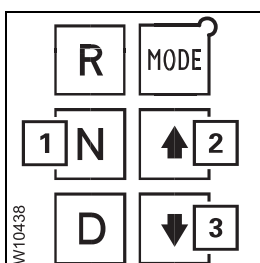


When the lamp (2) lights up, the corresponding error is currently active.

- To read further error codes, press button (1).
Every time you press, the next error code will be displayed, e.g. d2.
After the last error code, the display starts again with d1.



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.

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8 Technical information on the carrier

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8.1.2	Dimensions and weights of removable parts.	8 - 4
8.1.3	Carrier	8 - 5

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8

Technical information on the carrier

8.1

Technical data

GROVE truck crane GMK 5220

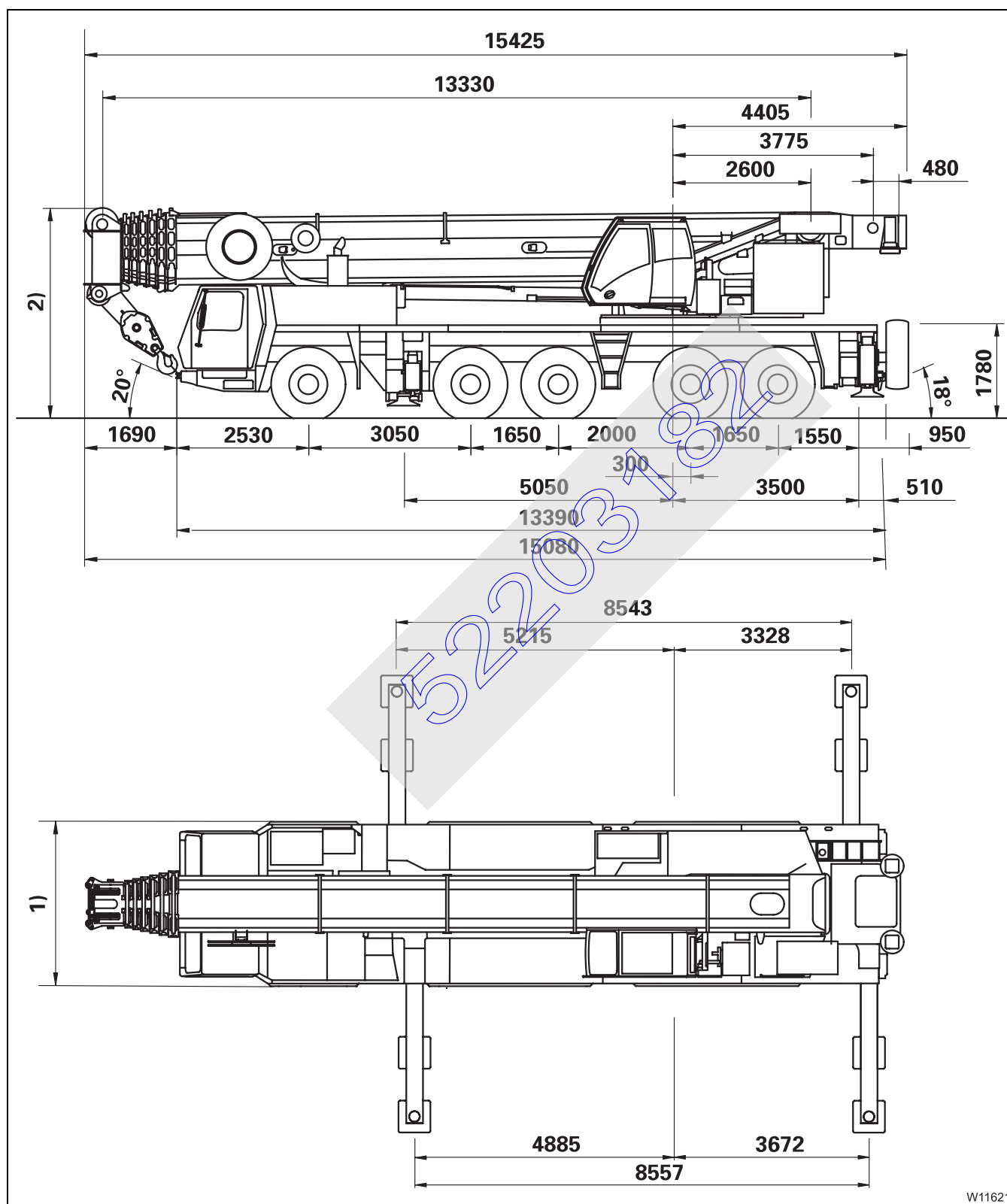
Permissible temperature range: -25 °C to $+40\text{ °C}$ (-13 °C to $+104\text{ °F}$)

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8.1.1

Dimensions and weights of the truck crane, axle loads


The dimensions in the illustration are given in mm.



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31.01.2007

Dimensions


All measurements relate to the on-road driving mode;  *Hinweise*, p. 6 - 1.

Length without auxiliary hoist:	15.43 m (50.6 ft)
1) Width:	
– 14.00 R25/16.00 R25	3.00 m (9.8 ft)
– 20.5 R25	3.10 m (10.2 ft)
2) Height:	at on-road level:
– 14.00 R25	3.95 m (12.8 ft)
– 16.00 R25/20.5 R	4.00 m (13.0 ft)
Max. level change	–120/+160 mm (–4.7 in/+6.3 in)
Angle of negotiable banks:	at on-road level (14.00 R25)
front:	20°
rear:	18



If a ladder is in the holder under the driver's cab or the spare wheel and the rear outrigger pads are installed, the specified angle of negotiable banks is reduced correspondingly.

Weight and axle loads


Dimensions and weights of the removable parts;  p. 8 - 4 and  p. 16 - 2.



Axle loads when the truck crane is rigged;  p. 14 - 2.

8.1.2

Dimensions and weights of removable parts

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

Spare wheel

Description	Length x width x height in m (ft)	Weight in kg (lbs)	
		1)	2)
Spare wheel 14.00 R 25	1.36 x 1.36 x 0.40 (4.45 x 4.45 x 1.30)	245 (540)	220 (485)
Spare wheel 16.00 R 25	1.50 x 1.50 x 0.45 (4.95 x 4.95 x 1.50)	310 (685)	250 (551)
Spare wheel 20.5 R 25	1.50 x 1.50 x 0.53 (4.95 x 4.95 x 1.75)	355 (785)	325 (772)

- 1) with steel rim
2) with aluminium rim

Outriggers

Description	Length x width x height in m (ft)	Weight in kg (lbs)
Plastic outrigger pads	0.60 x 0.60 x 0.30 (2.00 x 2.00 x 1.00)	51 (115)
Steel outrigger pads ¹⁾	0.60 x 0.60 x 0.30 (2.00 x 2.00 x 1.00)	70 (155)
Front outrigger ¹⁾ , complete, per packet	2.90 x 0.40 x 0.85 (9.50 x 1.30 x 2.80)	800 (1875)
Rear outriggers ¹⁾ , complete, per packet	2.90 x 0.40 x 1.10 (9.50 x 1.30 x 3.60)	950 (2100)

- 1) Additional equipment
2) Consists of two complete packets

Main boom

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

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

Auxiliary hoist

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

8.1.3

Carrier

Engine

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

Transmission

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

Transfer case

Kessler VG 2600, 2-stage



Axle lines

Drive:	10 x 6 x 10
1st axle line:	Steered axle line
2nd axle line:	Steered axle line
3rd axle line:	Steered and driven axle line
4th axle line:	Steered and driven axle line
5th axle line:	Steered and driven axle line
Drive:	10 x 8 x 10
1st axle line:	Steered axle line
2nd axle line:	Steered and driven axle line
3rd axle line:	Steered and driven axle line (drive can be activated)
4th axle line:	Steered and driven axle line
5th axle line:	Steered and driven axle line

Steering

Make:	ZF
Type:	Dual-circuit hydraulic steering with emergency steering pump which operates independently of the engine
1st to 3rd axle line:	Mechanical/hydraulic steering
4th and 5th axle lines:	Electronic/hydraulic steering

Tyres

10 x 14.00 R 25 on disk wheels 9.50-25 / 1.7
 10 x 16.00 R 25¹⁾ on disk wheels 11.00-25/1.7
 10 x 20.5 R 25¹⁾ on disk wheels 17.00-25/1.7

¹⁾ Additional equipment

Tyre pressure for total wight of a maximum of 60 t (132 280 lbs)

Tyres	Air pressure of cold tyres in bar (psi)
14.00 R 25	10 (145)
16.00 R 25	9 (131)
20.5 R 25	7 (102)

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

Vehicle's electrical system


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

Tools

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 if a particular tension angle is observed;  p. 5 - 65

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:	8.55 x 8.10 m (28.1 x 26.6 ft) 8.55 x 6.80 m (28.1 x 22.4 ft) 8.55 x 5.60 m (28.1 x 18.4 ft) 8.55 x 4.40 m (28.1 x 14.4 ft) 8.55 x 2.74 m (28.1 x 9.0 ft)	
Outrigger pads	Size:	600 x 600 mm (23.6 x 59.94 cm)
	Surface:	3,600 cm ² (557 in ²)
Stroke of the support cylinders:	front 430 mm (17.0 in) rear 600 mm (23.6 in)	
Inclination indicator:	On the hand-held control, in the crane cab, on the <i>outrigger</i> operating units.	
Outrigger pressure indicator:	Depending on the design in the outriggers, integrated with a display in the crane cab and on the <i>outrigger</i> operating units.	



Driving speeds

Forwards: max. 85.0 km/h (53 mph)
Backwards: approx. 10 km/h (6 mph), depending on the tyres

Climbing ability

Transport weight 60 t, off-road gear on

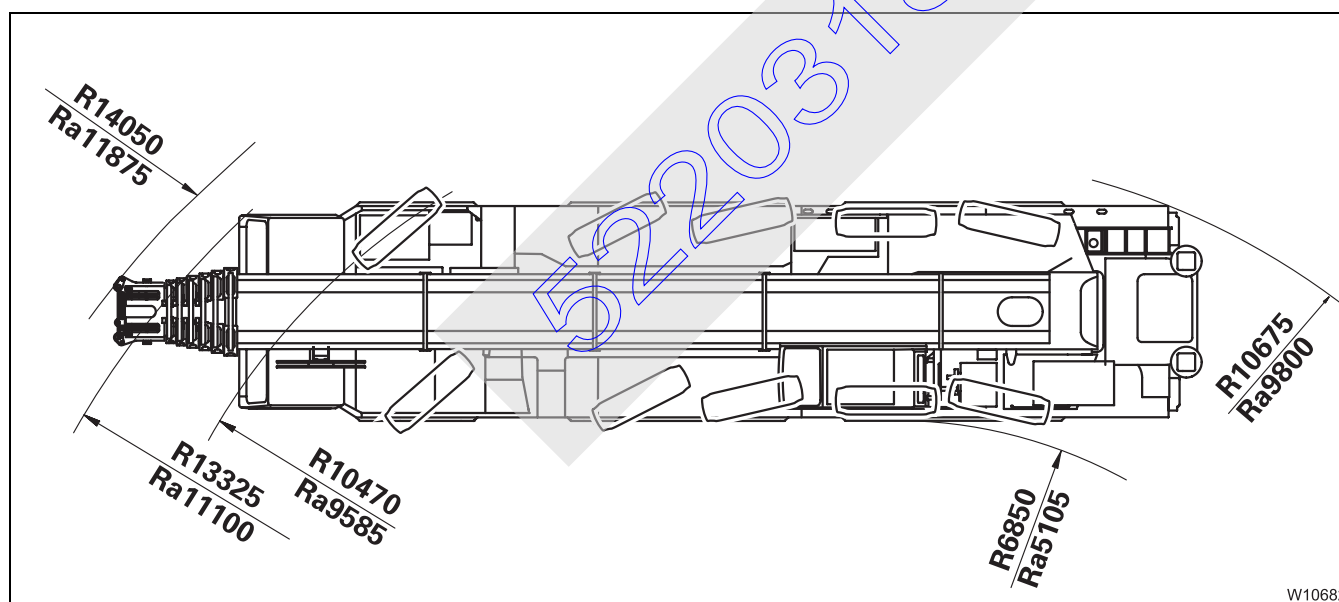
14.00 tyres: 50%
16.00 tyres: 45%
20.5 tyres: 45%

Turning circle radi- uses

The dimensions in the illustration are given in mm.

R = values for normal steering mode

Ra = values for separate steering mode



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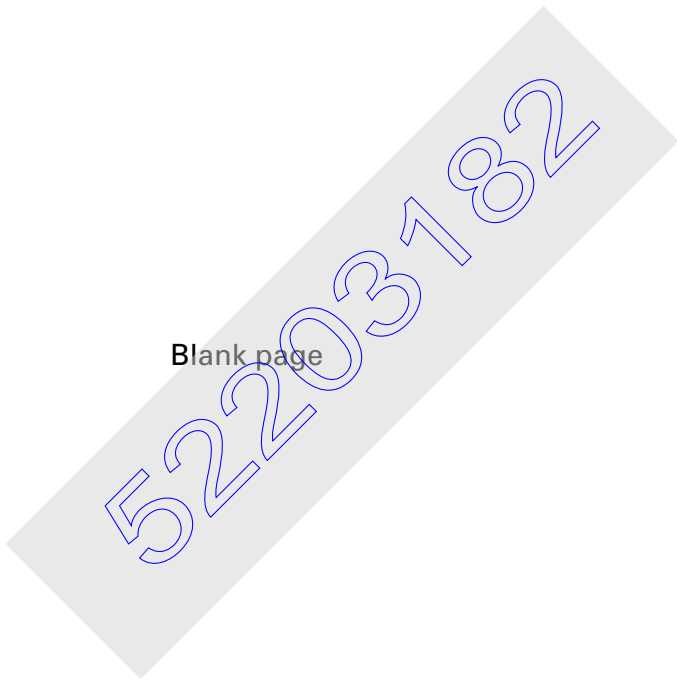


To avoid making the index unnecessarily long and unclear, we have not included every single element from the instrument panel.

Those elements such as switches and buttons, lamps and displays are described and named in detail in the overviews of chapter 3 and chapter 10, *Description of the truck crane*.

You are referred to more detailed descriptions of these elements from there as usual.

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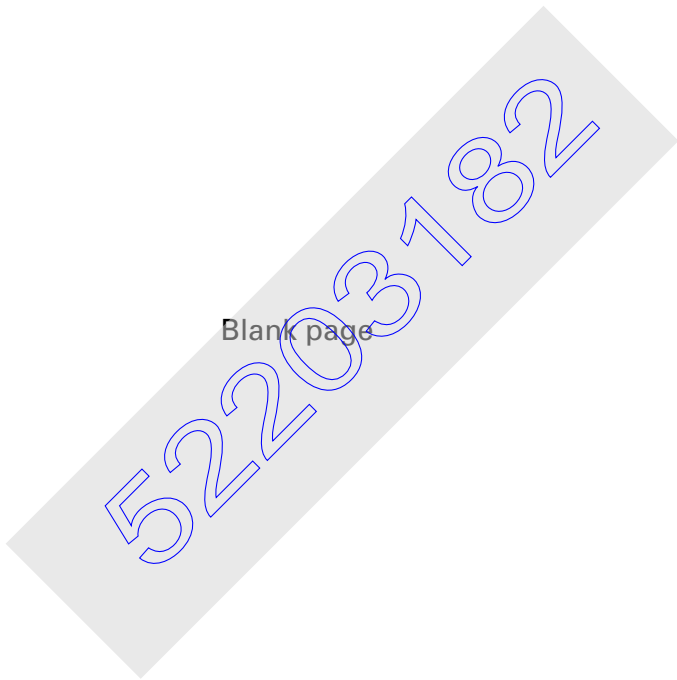
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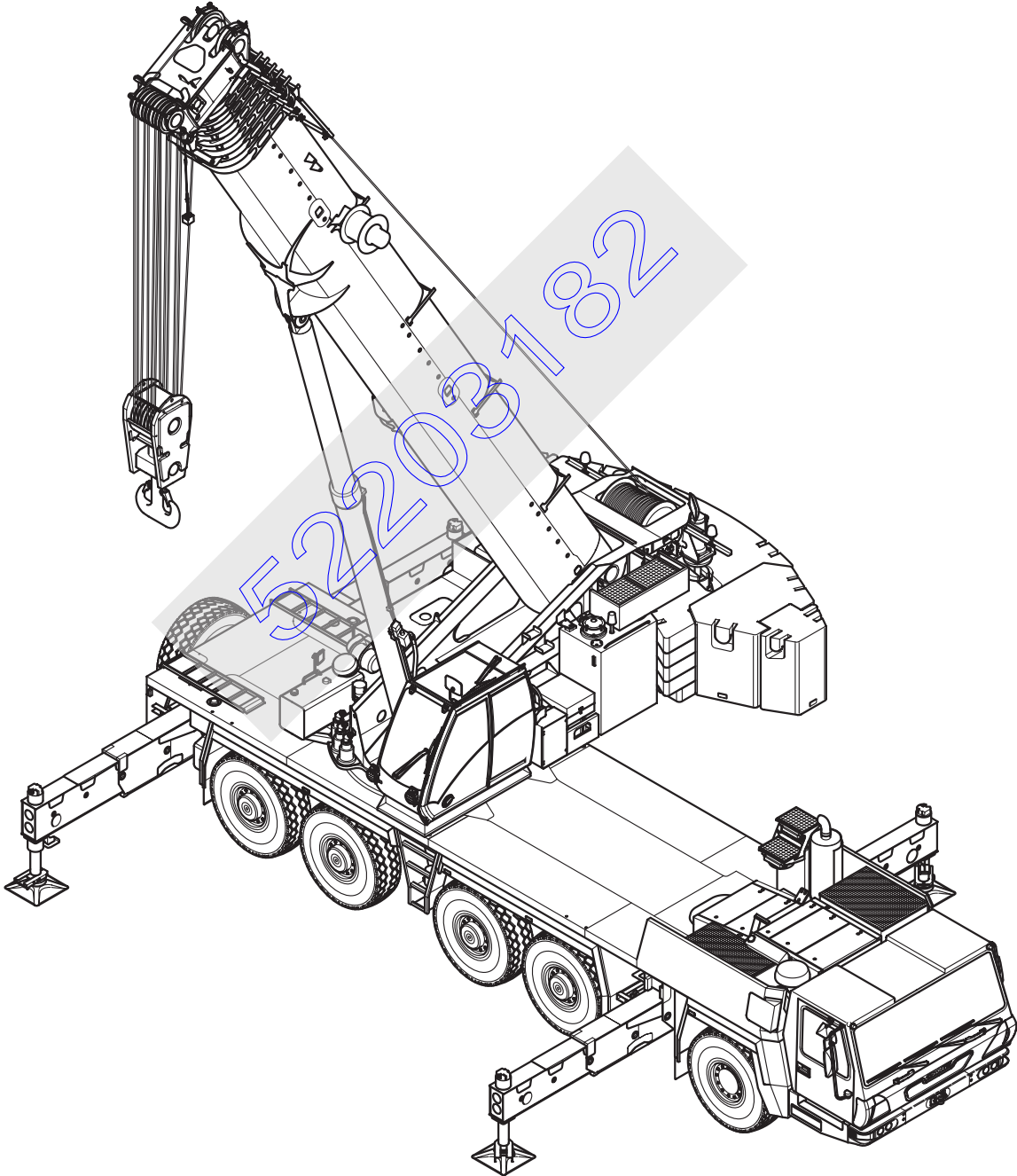
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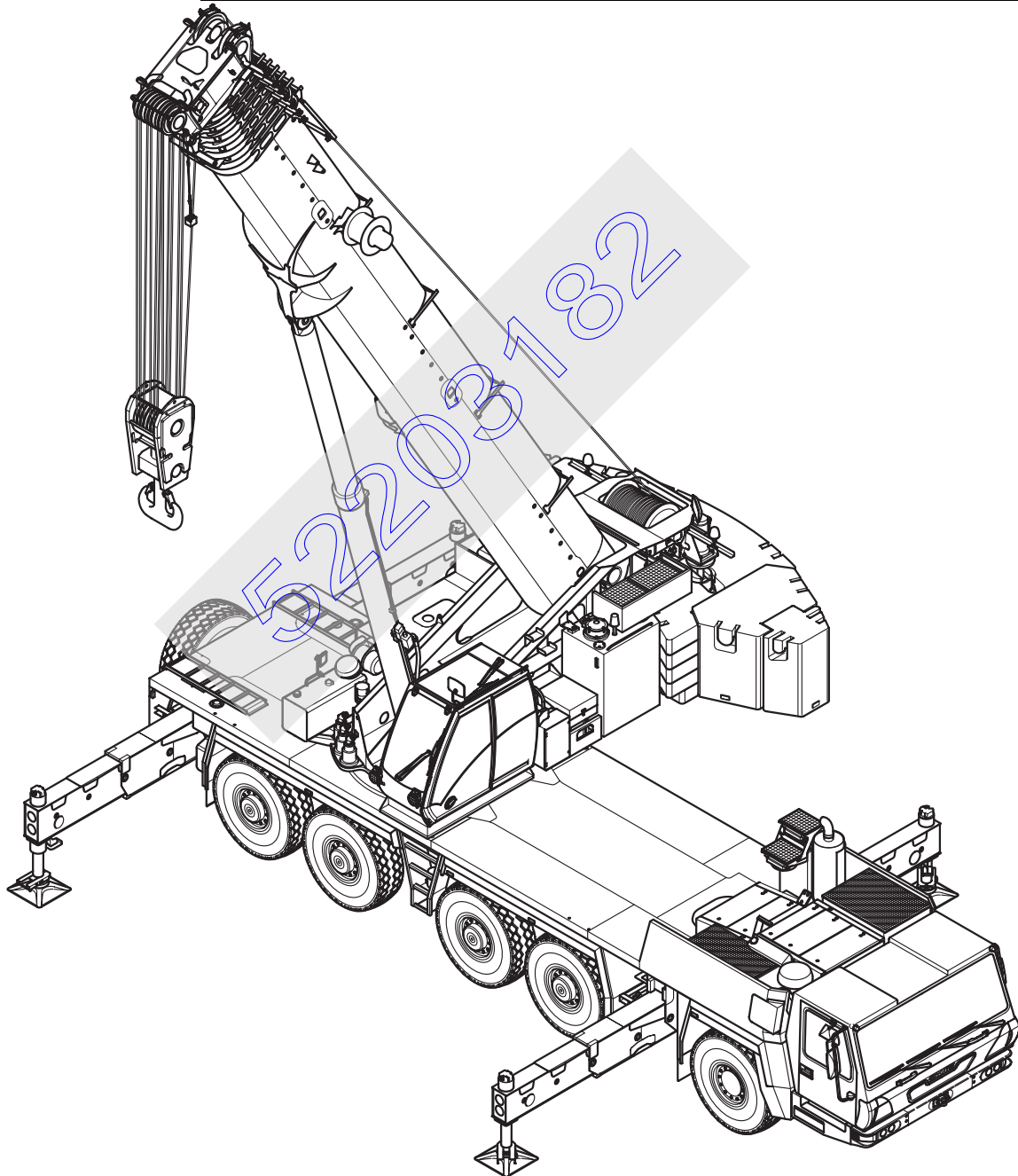
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Operating instructions Part 2 – Crane Operation



Manitowoc®
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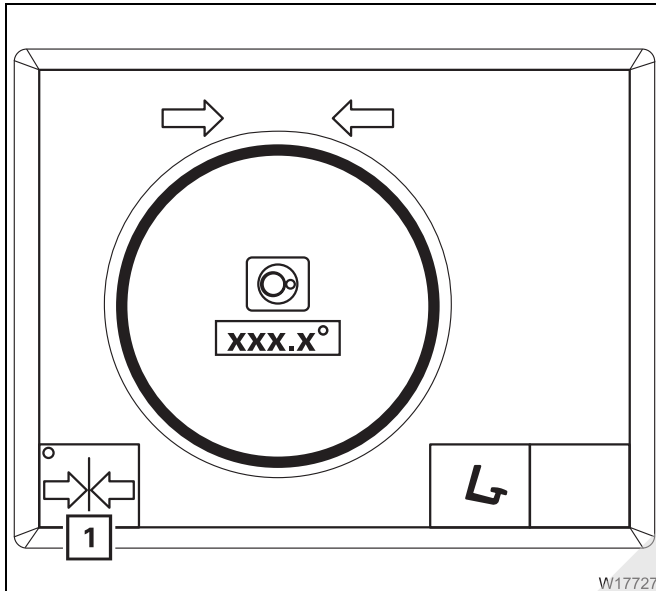
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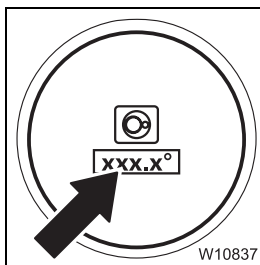
Additional page

Stop at 0° or 180°



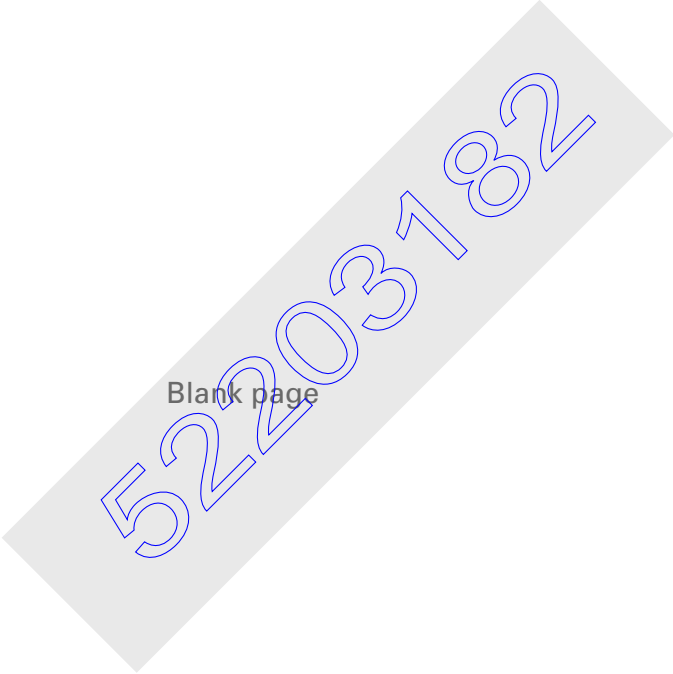
The *Stop at 0° or 180°* function in the supplied operating instructions is only available when the *Slewing gear/houselock* submenu displays the the symbol (1).

If the symbol (1) is not available, then this function is not required.



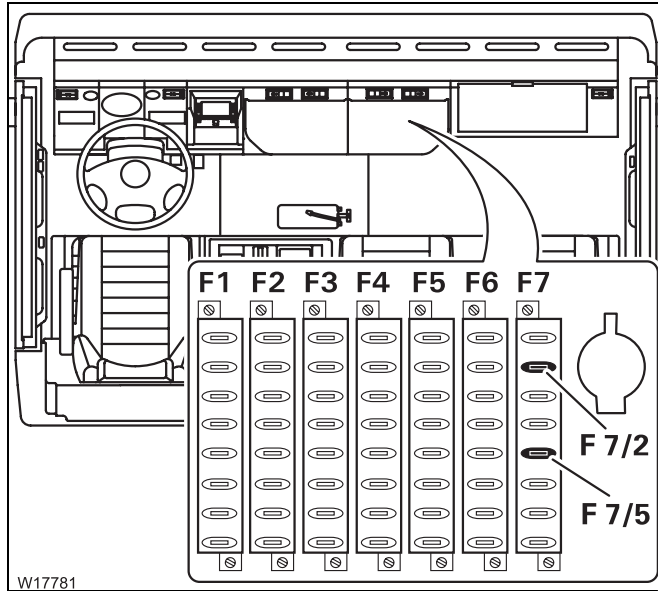
Slewing to 0°/180° without automatic mode

- Use the *Current slewing angle* display to slew the superstructure to the required position.



Correction sheet

Fuses



Contrary to the information specified in the operating instructions, changes have been made to the fuses.

Depending on the version of the electrical system, the amperage of the **F 7/2** and **F 7/5** fuses are either **5 amps** or **2 amps**.

Replace the blown fuses with fuses of the same amperage.



Risk of damage due to overheating!

If fuse **F 7/2** and **F 7/5** in the driver's cab are blown, replace them with fuses of the same amperage only.

This prevents damage to the electrical parts from overheating.

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Correction sheet

Driving with a trailer (dolly)/Pressure relief

Contrary to the information given in the operating instructions supplied, additional valves must be actuated when operating the slewing gear freewheel, the boom floating position and the boom pre-tensioning.

This changes the operating procedures

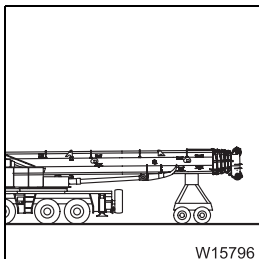
- when rigging for towing a trailer (dolly),
- when switching the pressure relief on and off after removing and installing the main boom.

Carry out operating procedures only as described in this correction sheet.




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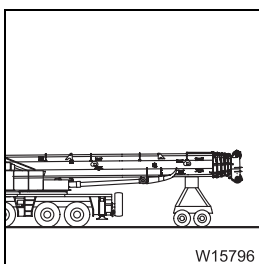
Driving with a trailer (dolly)

To reduce the axle loads to the specifications which apply in the country of use, you can set the main boom onto a trailer (dolly) when driving. For this purpose, the truck crane must be fitted with a slewing gear freewheel, boom floating position and if necessary, with a boom pre-tensioning device.






Before driving with the trailer, you must:

- Switch on the boom floating position; , S. 2,
- switch on the slewing gear freewheel; , S. 4,
- switch on boom pre-tensioning, if necessary; , S. 6.



After driving with the trailer, you must::

- Switch off the boom floating position; , S. 3,
- switch off the slewing gear freewheel; , S. 5,
- switch off boom pre-tensioning, if necessary; , S. 7.

1.1

Switching on boom floating position

Switching on

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 when the boom floating position is switched off!

Always switch on the boom floating position when the main boom is on a trailer.

This prevents the trailer hanging briefly with its full weight on the main boom on uneven ground, the axle loads from rising suddenly, or the truck crane from tipping when driving around corners.

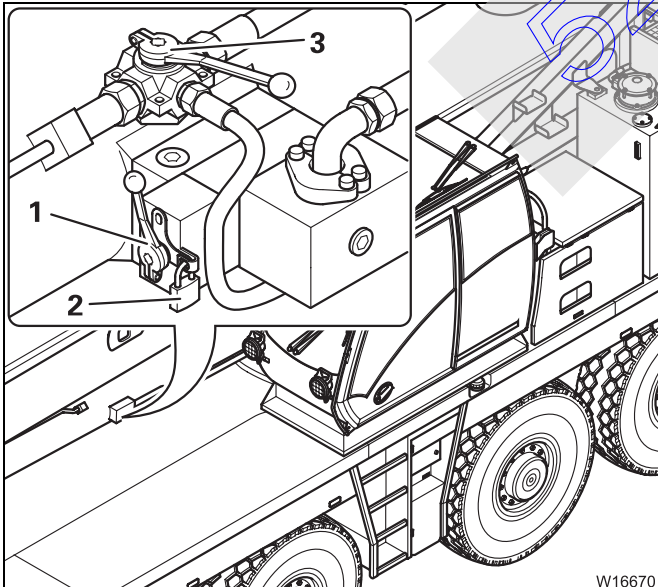
- Enter the SLI code for the current rigging mode.
- Fully retract the main boom.
- Raise the main boom to a permitted angle within the working range.
- Turn the superstructure to the 0° to the rear working position and place the main boom on a trailer.



Risk of accidents due to the main boom falling down!

You may only switch on the boom floating position when the main boom is already set down on the trailer.

In this way, you prevent the raised main boom from falling down.



- Remove the padlock (2).
- Switch the valve I over – and position the lever (1) vertically, moving it either upwards or downwards depending on its fitting position.
- Secure the lever (1) with the padlock (2).
- Switch the valve IV over – lever (1) positioned outwards.

The boom floating position is now switched on.

Switching off

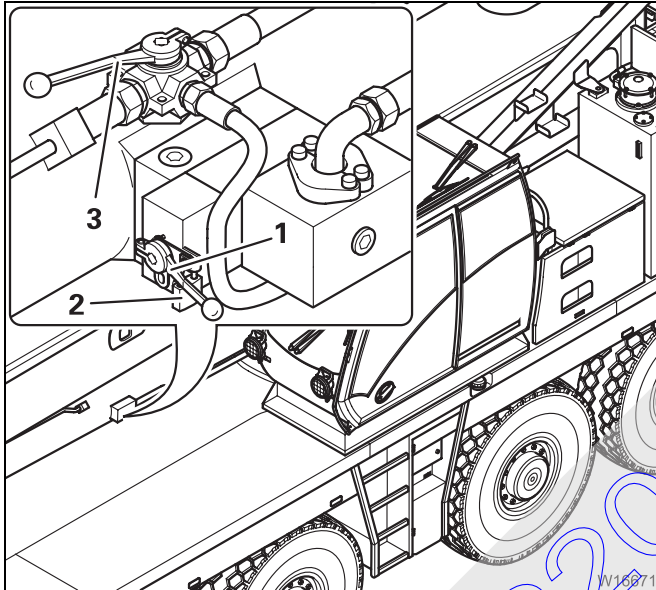
You must switch off the boom floating position before you raise the main boom off the trailer.



Risk of accidents due to the main boom falling down!

Always secure the lever with the padlock after switching off the boom floating position.

This prevents the raised main boom from falling down when actuating the lever.



- Remove the padlock (2).
- Switch the valve I over – lever (1) positioned horizontally pointing outwards or inwards, depending on its fitting position.
- Secure the lever (1) with the padlock (2).
- Switch the valve IV over – lever (1) positioned to the front.

The boom floating position is now switched off.

1.2

Switching on the slewing gear freewheel

Switching on

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.

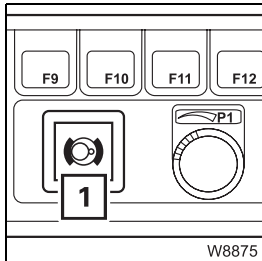
- If a houselock is fitted, switch it off.



Risk of accidents with the houselock 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 III►, S. 2.



Prerequisites

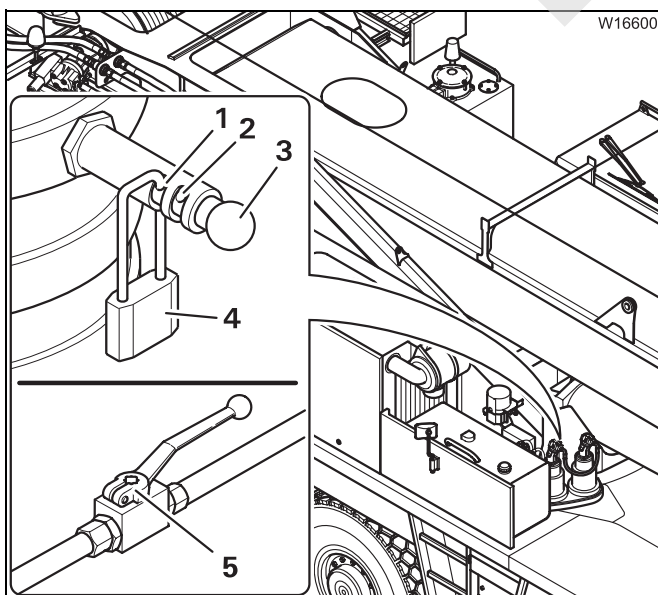
- The engine for crane operation is running.
- The slewing gear brake is released, the lamp (1) has gone out.



Risk of accidents if the bolts are not secured!

Always secure the bolts with the lock.

This prevents the slewing gear freewheel from being switched off unintentionally while driving.



- Remove the lock (4) from the bore (2).
- Push the pin (3) inward as far as it will go.
- Secure the pin with the lock in the bore (1) and remove the key.
- Push and secure the pin at the other slewing gears in the same way.
- Open the wave (5) – the slewing gear freewheel is now switched on.

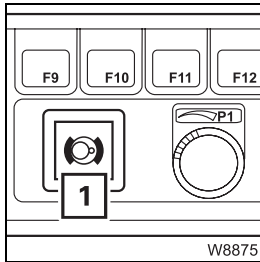
Switching off

If the slewing gear freewheel is switched on, switch it off prior to working with the crane.



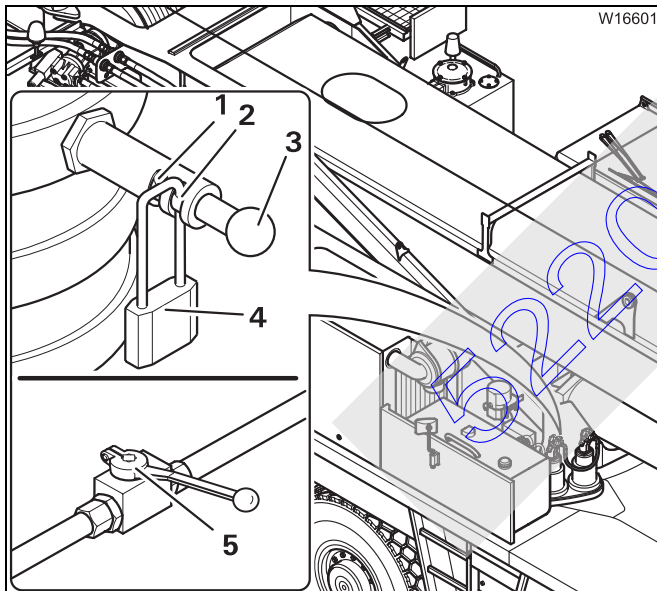
Risk of accidents with the slewing gear freewheel switched on!

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.



- Remove the lock (4) from the hole (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 at the other slewing gears in the same way.
- Close the wave (5) – the slewing gear free-wheel is now switched off.

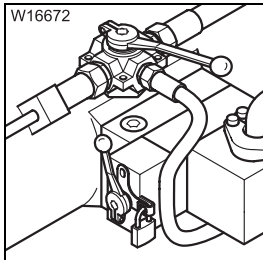
Before slewing


If necessary, support the truck crane, enter the corresponding SLI code and derrick the main boom to an angle permissible within the working range.

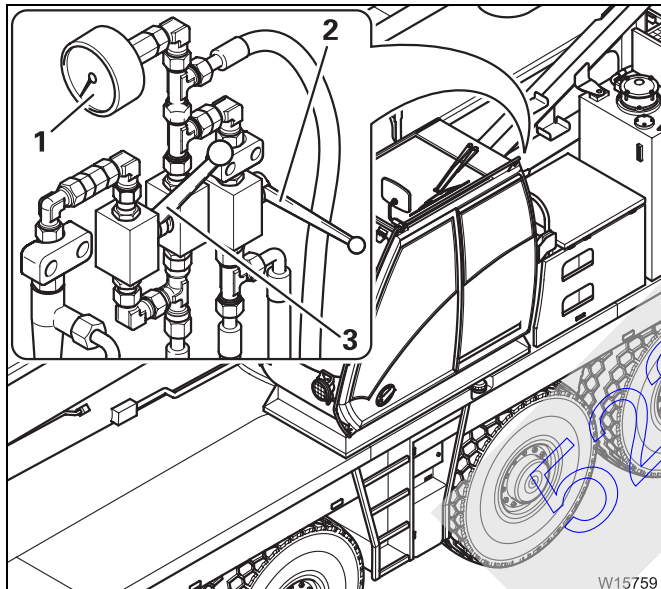
1.3 Switching on boom pre-tensioning

Switching on

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.



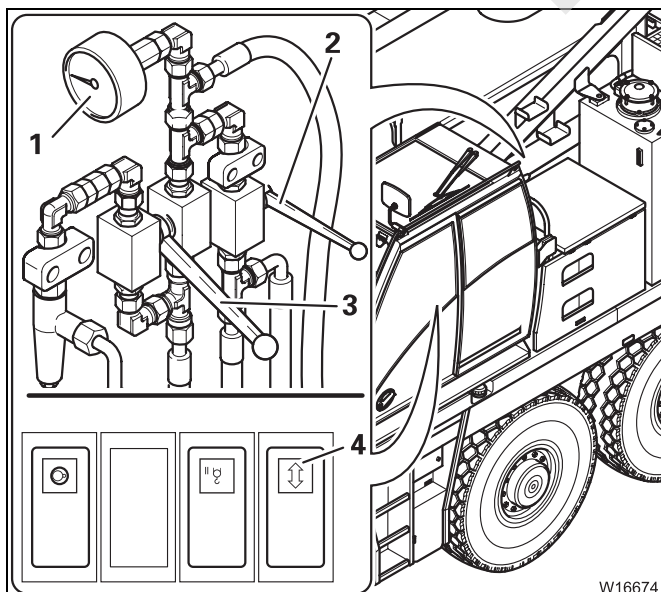
- Switch on the boom floating position; , S. 2.



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 the button (4) up.
The pressure accumulator is filled.
- Fill up the pressure accumulator until the pressure stops rising on the pressure gauge (1).
- Close the valve III – lever (3) points down.

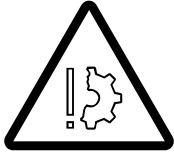
The valve II stays closed – lever (2) is horizontal.

Now the boom pre-tensioning is switched on.

Switching off

SYou must switch off the boom pre-tensioning before you raise the main boom off the trailer.

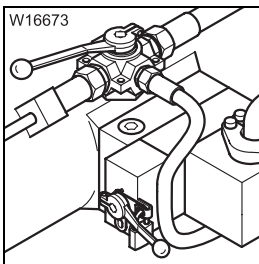
To switch off boom pre-tensioning, you must bring the valves I to IV into the required positions, which will empty the pressure accumulator.




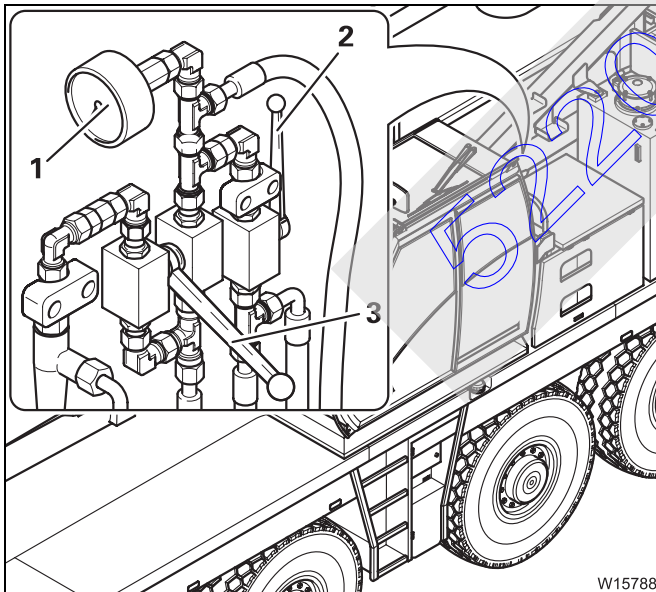
Danger of the hydraulic oil overheating

Always switch the valve IV over (lever in horizontal position) before operating the crane.

This prevents the pressure in the hydraulic circuit from rising and the hydraulic oil from exceeding the permissible temperature of 80 °C (176 °F).



- Switch off the boom floating position; , S. 3.



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 II stays closed – the lever (3) points downwards.

2 Pressure relief for removing the main boom

Contrary to the information given in the operating instructions supplied, additional valves must be actuated when switching the pressure relief on and off.

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

When removing the main boom

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

When installing the main boom

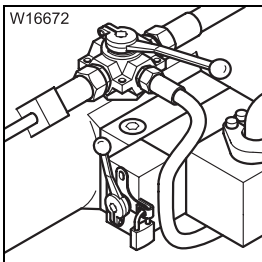
- Only switch off the pressure relief after fitting the derricking cylinder head axle.



Risk of accidents from falling boom!

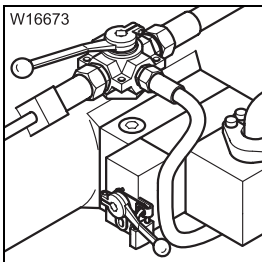
Check to see whether the main boom is in the boom rest before switching off the pressure relief.

In this way, you prevent the raised main boom from falling down.



Switching on

- Switch on the boom floating position; , S. 2.



Switching off

- Switch off the boom floating position; , S. 3.



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

Correction sheet

Fuses

Contrary to the information specified in the operating instructions two changes have been made to the fuses.

- When crane functions fail or are faulty, you must check additional fuses on the turntable.
- The amperage of a fuse in the driver's cab has changed.

On the turntable

The following table shows the designation, the amperage and the deviating function of individual fuses.

Designation	Amperage (A)	Function
F1/1	20	ESX0 control unit, I/O-3 circuit board
F2/1	2	Lifting limit switch

When crane functions fail or are faulty, check the following fuses additionally.

In case of malfunctions on the main hoist/auxiliary hoist

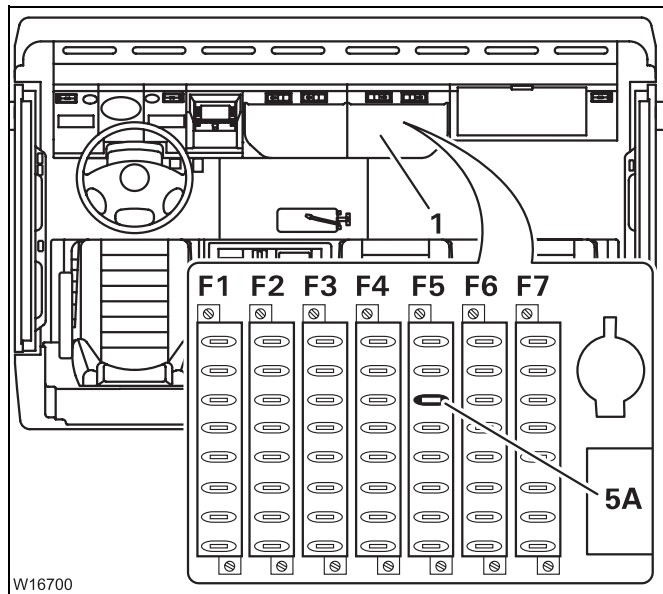
Malfunction	Cause	Remedy
Only the lowering function works	Fuses F3/3, F2/1 blown	Replace the blown fuse; ▣▣▣▣► <i>Operating instructions</i>

In case of malfunctions on the derricking gear

Malfunction	Cause	Remedy
Derricking function not working	Fuses F3/3, F2/1 blown	Replace the blown fuse; ▣▣▣▣► <i>Operating instructions</i>



In the driver's cab This section is valid only for truck cranes with a Mercedes engine.



Contrary to the information in the operating instructions, the amperage of the fuse F 5/3 is **5 amperes**.

If this fuse is blown, replace it only with a **5 ampere** fuse.



Risk of damage due to overheating!

If fuse F 5/3 in the driver's cab is blown, replace it only with a **5 ampere** fuse. This prevents damage to the electrical parts from overheating.

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Additional page Interruption during pressure build-up

Pressure accumulators are monitored in the steering circuit of the GMK 5220. If the pressure falls too far, the pressure accumulator will be automatically filled.

Since filling is treated as a priority, there can be short interruptions – for a maximum of approx. 10 seconds – in the operation of the

- level adjustment system and
- outriggers.



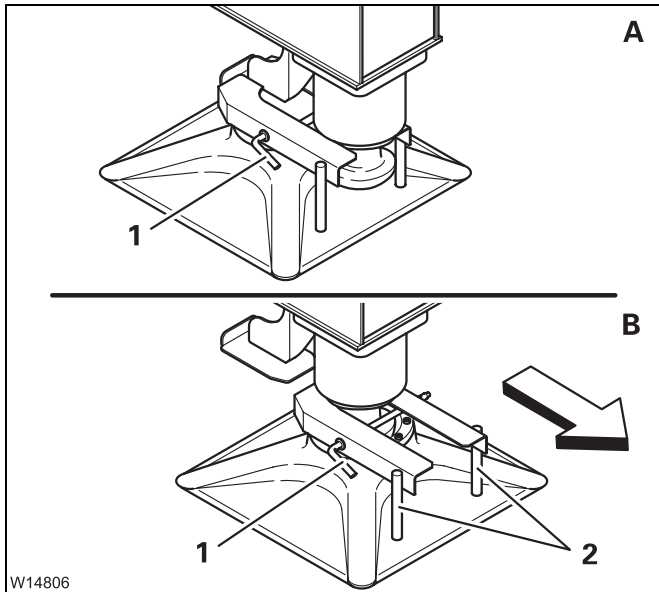
You can largely avoid these interruptions by not operating these functions at the same time as the steering.



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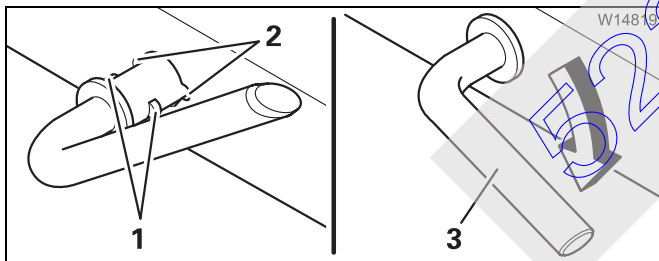
Additional page Rigging outrigger pads

Depending on the version you must rig the outrigger pad as is described here.



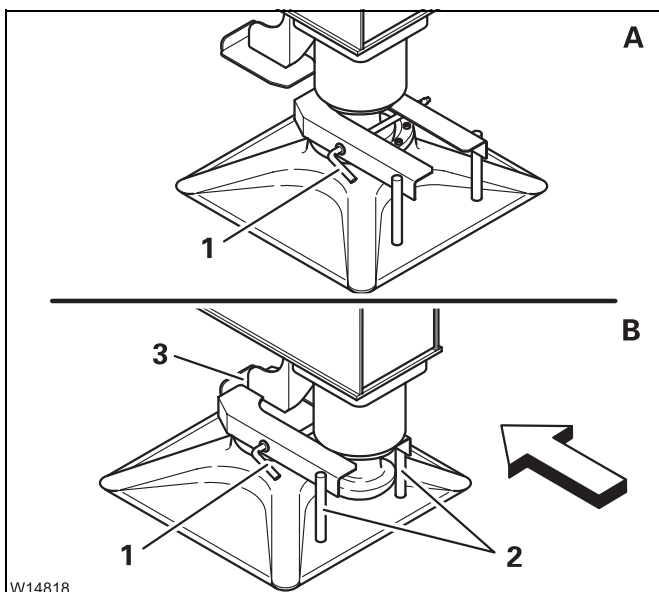
Moving them into working position

- (A) – Pull out the pin (1).
- (B) – Pull the outrigger pad outwards by the handles (2).
- Secure the outrigger pad with the pin (1).
- Secure the pin (1).
- Move the other outrigger pads into working position in the same way.



Secure the pin

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



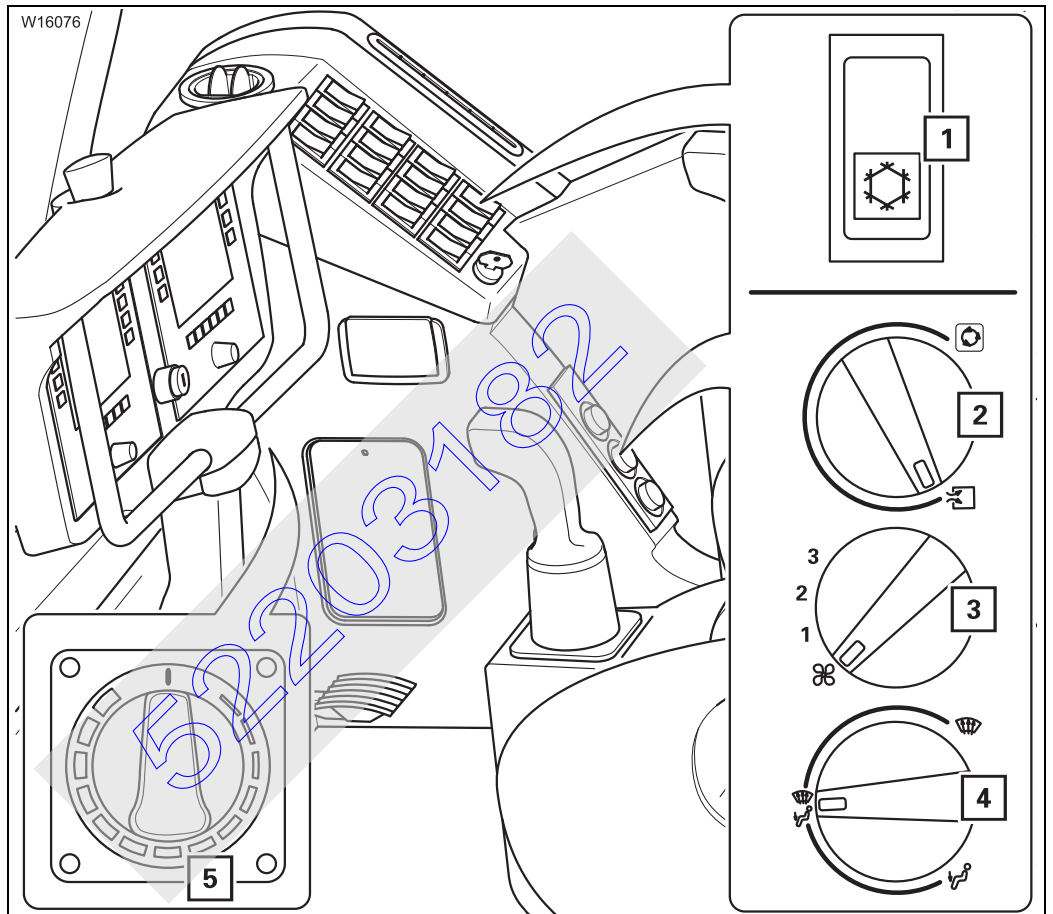
Moving them into driving position

- (A) – Pull out the pin (1).
- (B) – Push the outrigger pad by the handles (2) as far as possible onto the bracket (3).
- Secure the outrigger pad with the pin (1).
- Secure the pin (1).
- Move the other outrigger pads into driving position in the same way.

Additional page Controls for crane cabin heating

Differing slightly from the details in the operating instructions, depending on the version, the position and function of the controls may change. This additional page shows you the changed position of the controls.

Position of controls

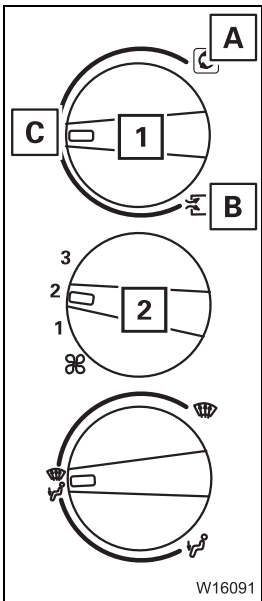


		Function
1	Air-conditioning system ¹⁾	Operating instructions
2	Setting fresh air/recirculated air/mixed air	Function, p. 2
3	Setting the fan	Function, p. 2
4	Air distribution	Function, p. 2
5	Setting the temperature	Operating instructions

¹⁾ Additional equipment



Function



Setting fresh air/recirculated air/mixed air

You can set the air to be sucked in by the fan.

- Turn the switch (1) to the position for

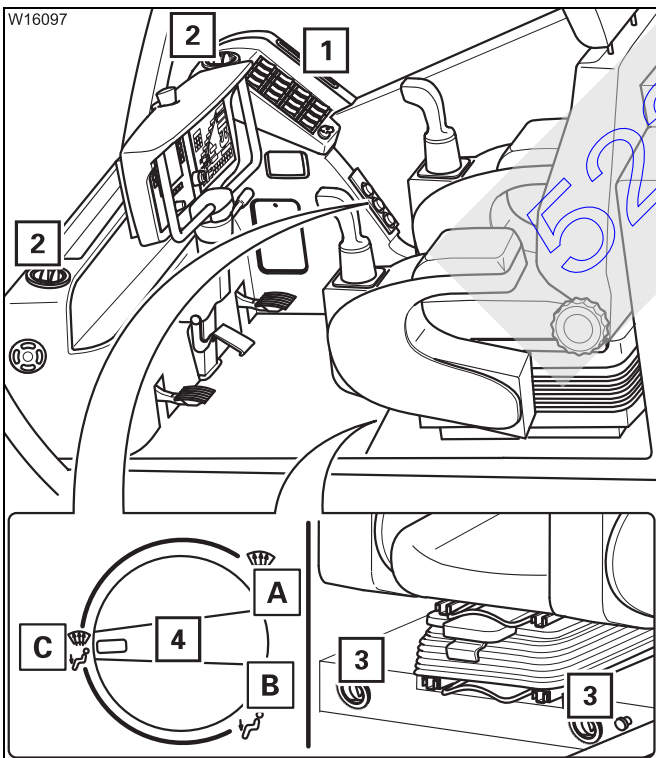
- A** Recirculated air – air is sucked in from the driver's cab. Change to fresh air often to ensure that oxygen is supplied.
- B** Fresh air – outer air is sucked in.
- C** Mixed air – outer air and air from the driver's cab is sucked in. The percentage of the corresponding air type is increased continuously by turning the switch in direction (B) or (A).

Setting the fan

- Turn the switch (2) to the required level 1 to 3 depending on the desired air quantity.

Air distribution

You can allow the air to flow out from various air vents.

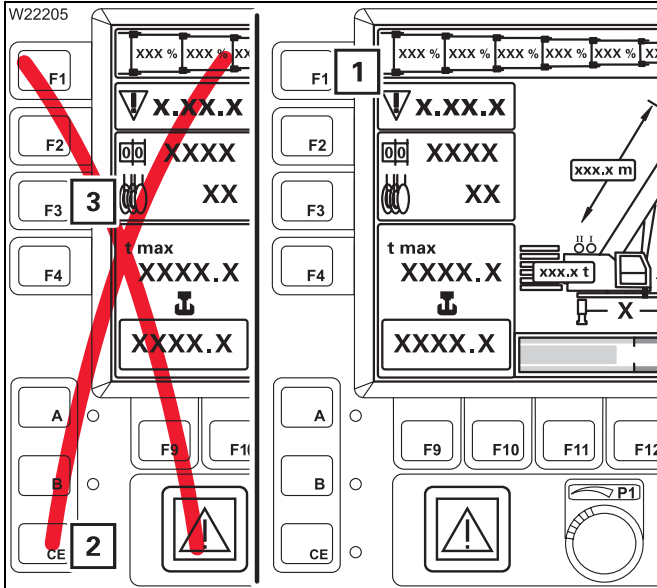


- Turn the switch (4) to the position for the required air vents.

- A** Air vents (1), (2), windscreen, centre
- B** Air vents (3), cab floor
- C** Air vents (1), (2), (3)

Correction sheet

Accepting the telescope status

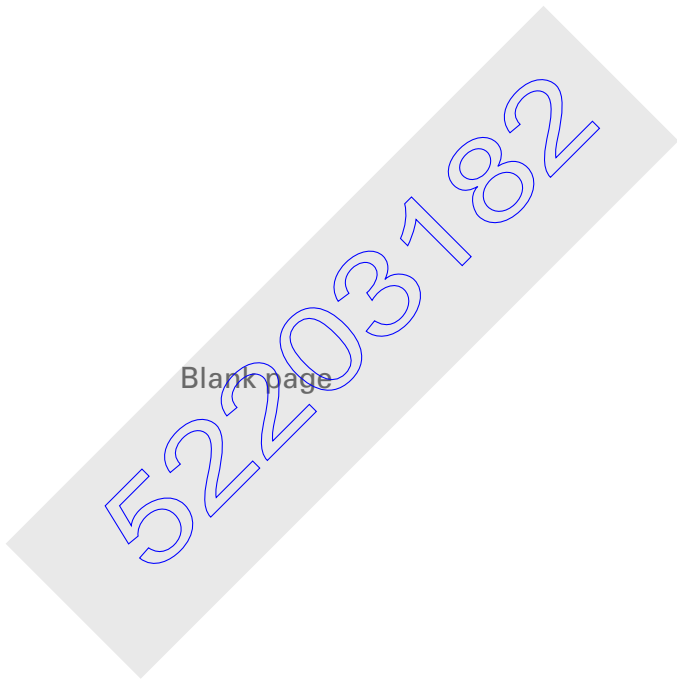


Contrary to the information in the operating manual provided, in the event of a malfunction on the RCL (Table – Error codes) the ECOS telescope diagram is not accepted using the buttons (2) and (3).

Accepting the ECOS telescope diagram

- Press the button (1) once.
- Acknowledge the error message.

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These operating instructions are divided into two parts:

Part 1 – Driving

Part 2 – Crane Operation

Part 2 consists of the following chapters

10 Operating elements for crane operation

11 Starting/turning off the engine – for crane operation

12 Crane operation

13 Rigging work

14 Driving the rigged truck crane

15 Malfunctions during crane operation

16 Technical information for the superstructure

17 Index

You will find chapter 1 to chapter 9 in section 1 – Driving.

**This part does not constitute the complete operating instructions.
The basic safety instructions for crane operation can be
found in Part 1, Chapter 2.**

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10 Operating elements for crane operation

10.1	Overview of the operating elements	10 - 1
10.1.1	On the outside of the truck crane	10 - 2
10.1.2	Crane cab	10 - 4
10.1.3	Front panel	10 - 6
10.1.4	Side panel	10 - 7
10.1.5	Control panels	10 - 14
10.1.6	Control lever assignment	10 - 16
10.1.7	ECOS control unit	10 - 18
10.1.8	ECOS display – main menu	10 - 20
10.1.9	ECOS display – submenus	10 - 22
10.1.10	SLI control unit	10 - 36
10.1.11	SLI display – main menu	10 - 38
10.1.12	SLI display – submenus	10 - 39
10.1.13	Hand-held control	10 - 48
10.1.14	On the outrigger control units	10 - 50
10.2	Short description of the operating elements	10 - 53
10.2.1	Definition of positional references	10 - 53
10.2.2	General rules for buttons and symbols on the display	10 - 54
10.2.3	Engine for crane operation	10 - 55
10.2.4	Engine for driving	10 - 57
10.2.5	Seat contact switch and dead man's switch	10 - 58
10.2.6	ECOS crane control	10 - 59
10.2.7	Outriggers	10 - 63
10.2.8	Inclination displays	10 - 68
10.2.9	Outrigger pressure displays	10 - 69
10.2.10	Anemometer displays	10 - 69
10.2.11	Counterweight submenu	10 - 70
10.2.12	Main hoist	10 - 73
10.2.13	Auxiliary hoist	10 - 75
10.2.14	Slewing gear	10 - 76
10.2.15	Derricking gear	10 - 79
10.2.16	Telescoping mechanism	10 - 80
10.2.17	Hydraulic system	10 - 87
10.2.18	Houselock	10 - 88
10.2.19	Safe load indicator (SLI)	10 - 89
10.2.20	Electrical system	10 - 101
10.2.21	Lighting, windscreen wiper/washing system	10 - 101
10.2.22	Hand-held control	10 - 104
10.2.23	Diagnostics	10 - 108
10.2.24	Windows, doors, keys	10 - 109

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10

Operating elements for crane operation

All operating elements for driving are described in chapter 3.

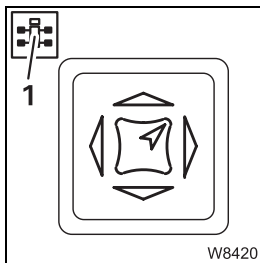
10.1

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

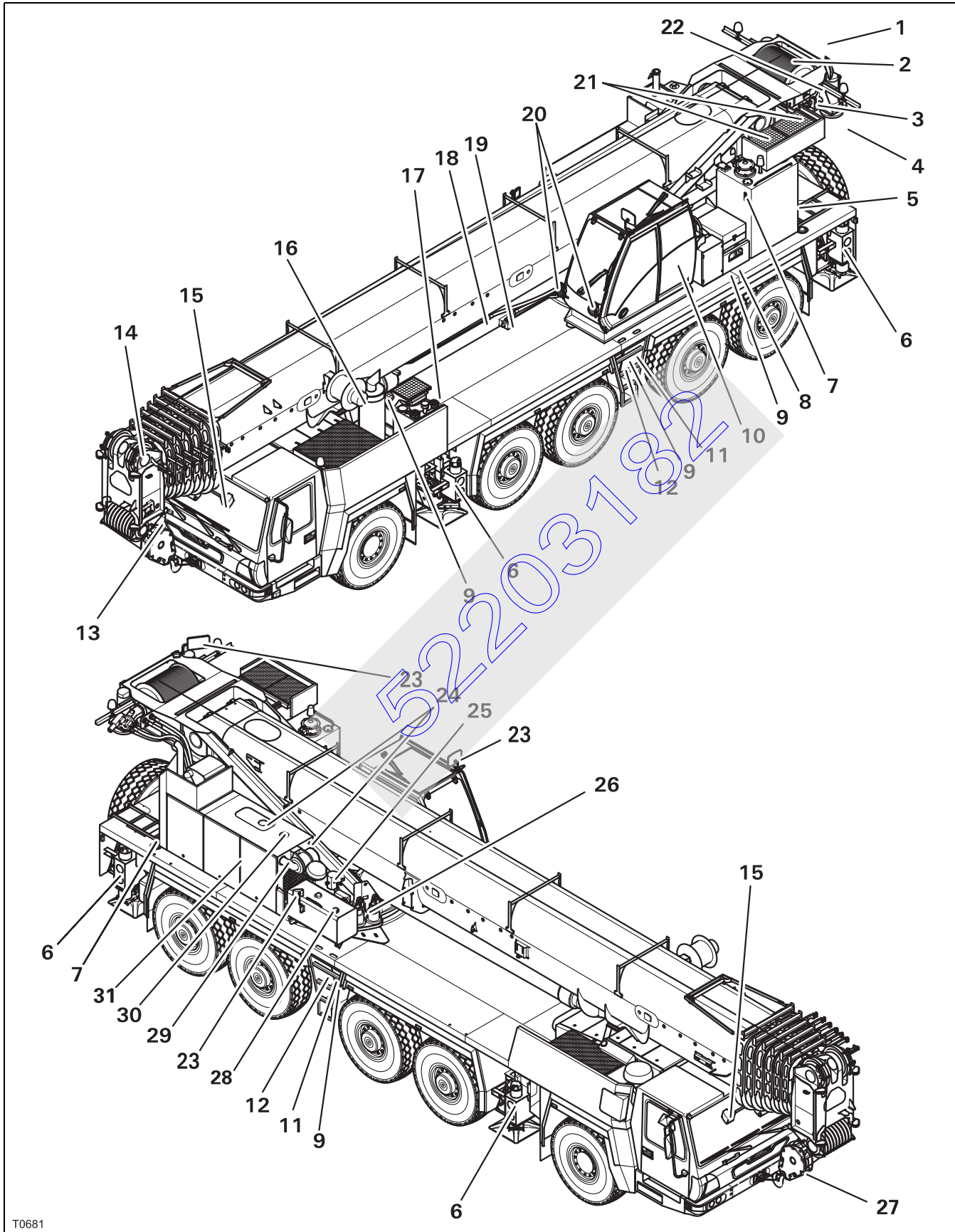


Some figures show details from a different perspective than the total view. The perspective is indicated by the symbol (1).

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10.1.1

On the outside of the truck crane



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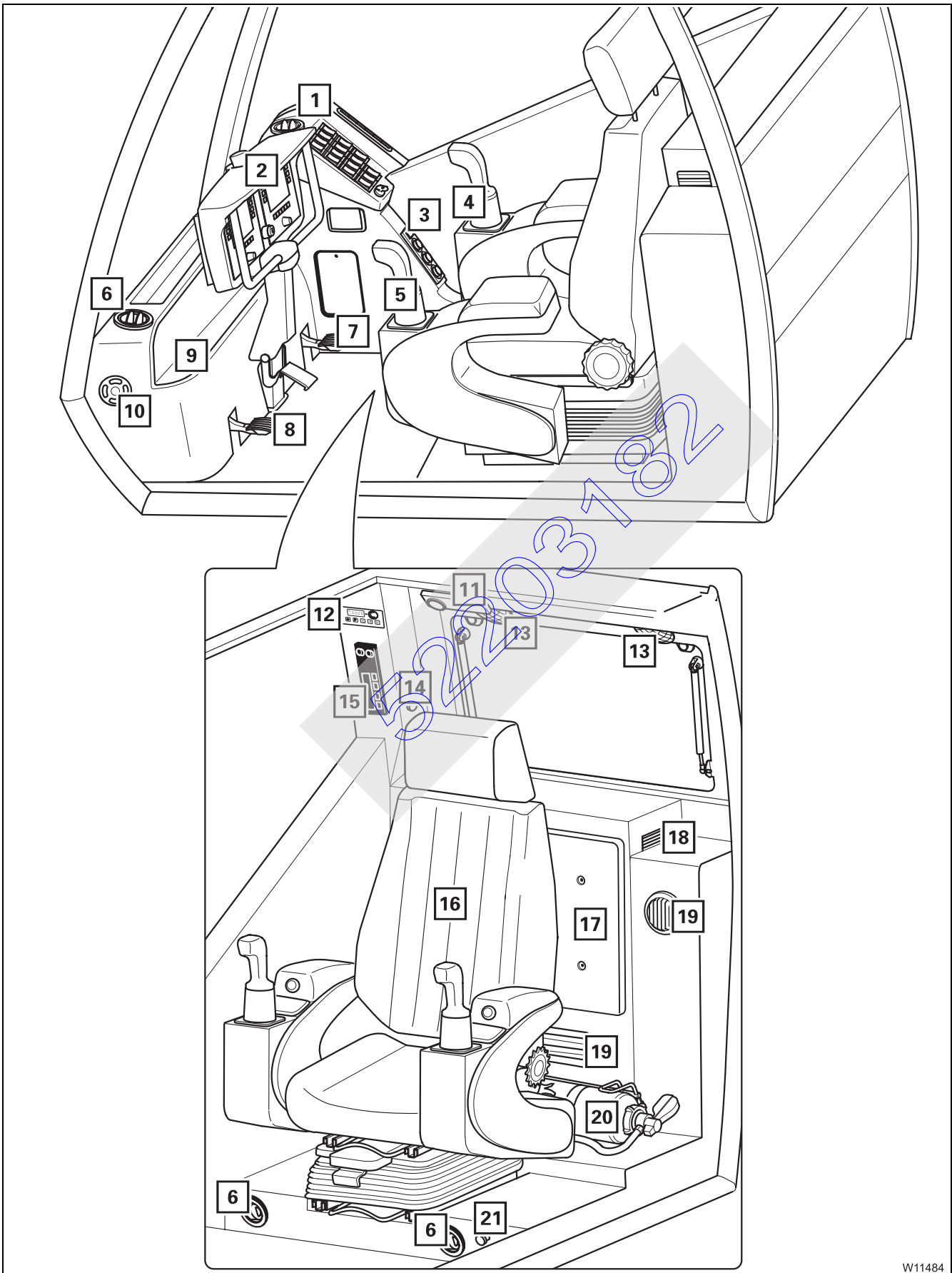
1	Auxiliary hoist¹⁾	▣▣▣▣ p. 10 - 75
2	Main hoist	▣▣▣▣ p. 10 - 73
3	Control panel for hydraulic emergency operation¹⁾	▣▣▣▣ p. 15 - 59
4	Counterweight	▣▣▣▣ p. 13 - 55
5	Valve on hydraulic tank	▣▣▣▣ p. 11 - 7
6	Outriggers	▣▣▣▣ p. 13 - 27
	Outrigger lighting¹⁾	▣▣▣▣ p. 3 - 59
7	Inspection glass on hydraulic oil tank²⁾	
8	Battery master switch	▣▣▣▣ p. 11 - 7
9	Connections for hand-held control	▣▣▣▣ p. 10 - 48
10	Crane cab	▣▣▣▣ p. 10 - 4
11	Control units for outriggers¹⁾	▣▣▣▣ p. 10 - 50
12	Emergency stop switch	▣▣▣▣ p. 15 - 1
13	Lifting limit switch – function	▣▣▣▣ p. 12 - 51
	Lifting limit switch – rigging	▣▣▣▣ p. 13 - 99
14	Anemometer/Air traffic control light	▣▣▣▣ p. 13 - 108
15	Slewing working area spotlight¹⁾	▣▣▣▣ p. 12 - 103
16	Data transmitter²⁾	
17	Emergency supply connections for hydraulic emergency operation¹⁾	▣▣▣▣ p. 15 - 62
18	Boom pre-tensioning¹⁾	▣▣▣▣ p. 6 - 6
19	Boom floating position¹⁾	▣▣▣▣ p. 6 - 5
20	Spotlights¹⁾	▣▣▣▣ p. 10 - 101
21	Hydraulic oil cooler, second cooler¹⁾	▣▣▣▣ p. 12 - 96
22	Lowering limit switch	▣▣▣▣ p. 12 - 53
23	Mirror for crane operation	▣▣▣▣ p. 13 - 110
24	Dipstick and oil filler neck, engine²⁾	
25	Grease container, central lubrication system²⁾	
26	Slewing gear	▣▣▣▣ p. 12 - 88
	Slewing gear freewheel¹⁾	▣▣▣▣ p. 6 - 3
27	Hook block	▣▣▣▣ p. 13 - 79
28	Filler neck on fuel tank	▣▣▣▣ p. 11 - 5
29	Air intake inhibitor	▣▣▣▣ p. 11 - 21
30	Coolant reservoir, engine²⁾	
31	Engine for crane operation	▣▣▣▣ p. 11 - 1

1) Additional equipment

2) ▣▣▣▣ *Maintenance Manual*

10.1.2

Crane cab



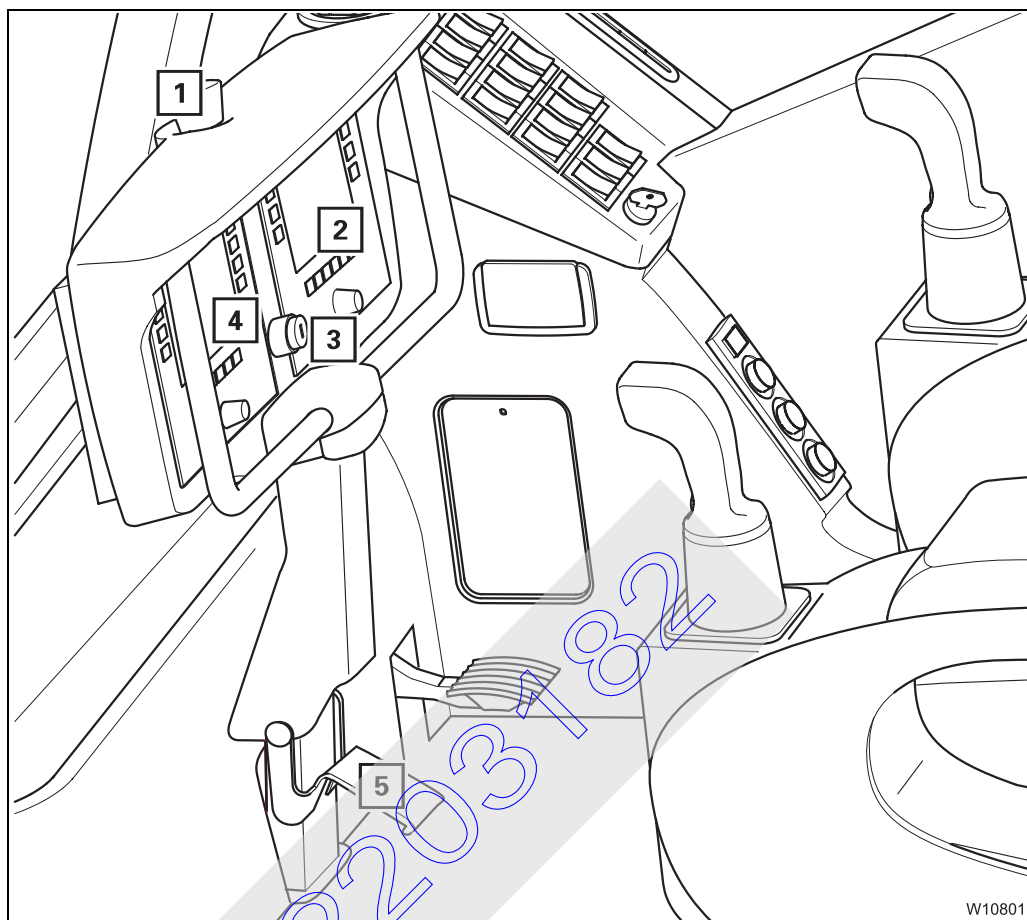
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1	Side panel	▣▣▣▣ p. 10 - 7
2	Front panel	▣▣▣▣ p. 10 - 6
3	Standard heating system	▣▣▣▣ p. 10 - 11
4	Right-hand control panel	▣▣▣▣ p. 10 - 15
5	Left-hand control panel	▣▣▣▣ p. 10 - 14
6	Air vents	▣▣▣▣ p. 12 - 127
7	Accelerator	
8	Brake pedal on slewing gear – to switch on/off	▣▣▣▣ p. 10 - 78
9	Storage compartment	
10	Windscreen washing system reservoir	▣▣▣▣ p. 12 - 5
11	Cab lighting	▣▣▣▣ p. 10 - 102
12	– Auxiliary water heating system ¹⁾ – Auxiliary air heater ¹⁾	▣▣▣▣ p. 10 - 12 ▣▣▣▣ p. 10 - 13
13	Loudspeakers	
14	12 Volt socket ¹⁾	
15	Radio cassette player ^{1), 3)} Radio CD player ^{1), 3)}	
16	Crane cab seat with seat contact switch	▣▣▣▣ p. 12 - 7 ▣▣▣▣ p. 10 - 58
17	Detachable cover with fuses behind it	▣▣▣▣ p. 15 - 9
18	Air vent	▣▣▣▣ p. 12 - 127
19	Intake for auxiliary air heater ¹⁾	▣▣▣▣ p. 12 - 125
20	Fire extinguisher ²⁾	
21	Door unlocking mechanism	▣▣▣▣ p. 10 - 110
1)	Additional equipment	
2)	▣▣▣▣ <i>Maintenance Manual</i>	
3)	▣▣▣▣ <i>Separate operating instructions</i>	

10.1.3

Front panel

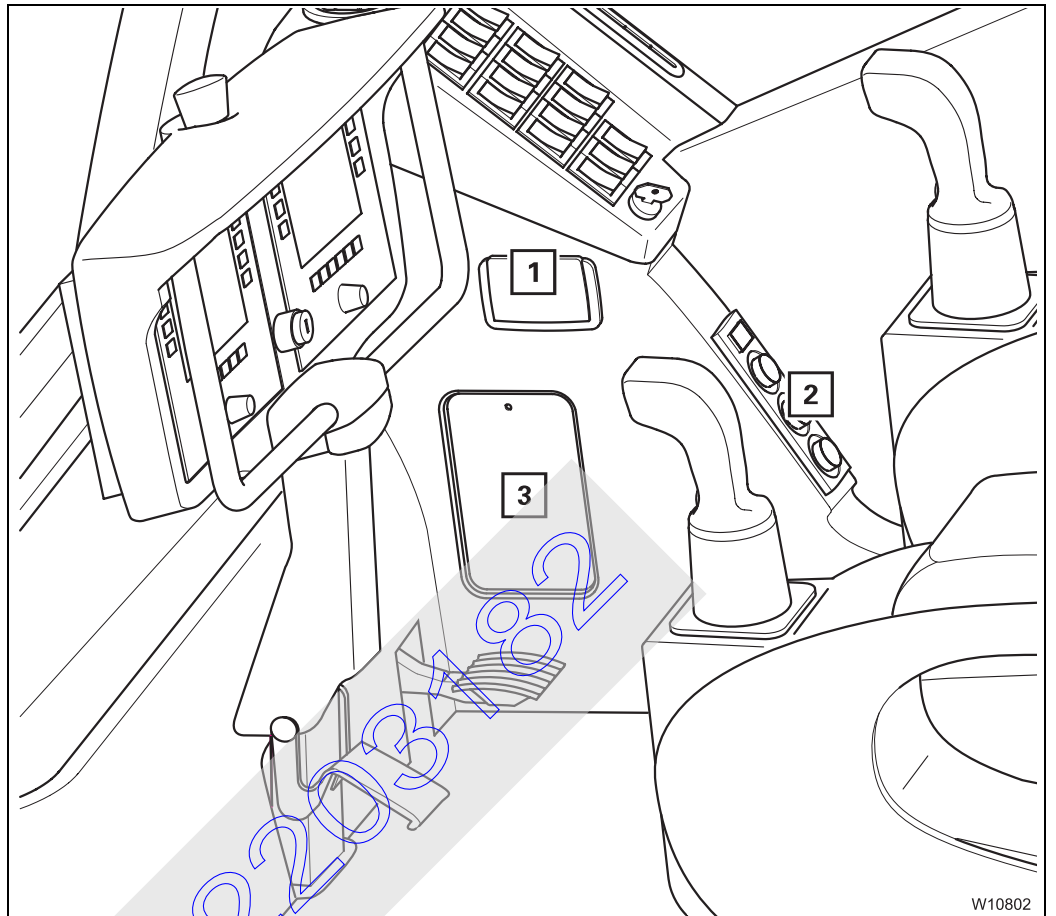


- | | |
|--|-------------------|
| 1 Emergency stop switch | ▣▣▣▣▶ p. 10 - 61 |
| 2 SLI Control unit (Safe Load Indicator) | ▣▣▣▣▶ p. 10 - 36 |
| 3 Key-operated override switch
– for SLI
– for SLI and lifting limit switch | ▣▣▣▣▶ p. 10 - 100 |
| 4 ECOS control unit | ▣▣▣▣▶ p. 10 - 18 |
| 5 Front panel, adjustable | ▣▣▣▣▶ p. 12 - 7 |

10.1.4

Side panel

Bottom



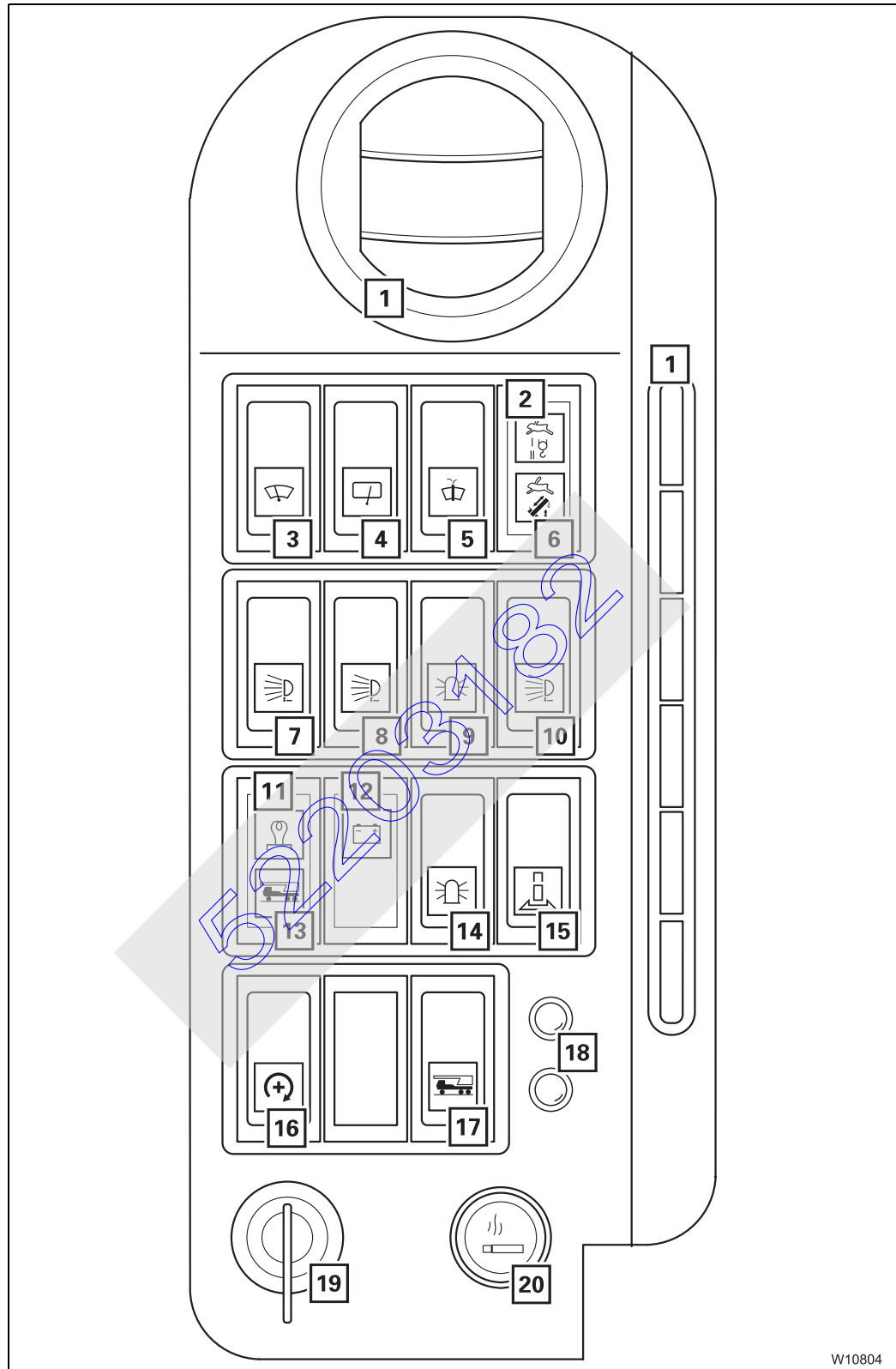
- 1 Ashtray
- 2 Heating/Air-conditioning insert
- 3 Diagnostics plugs (behind the cover)

▣▣▣▣ p. 10 - 11

▣▣▣▣ p. 10 - 108



Top



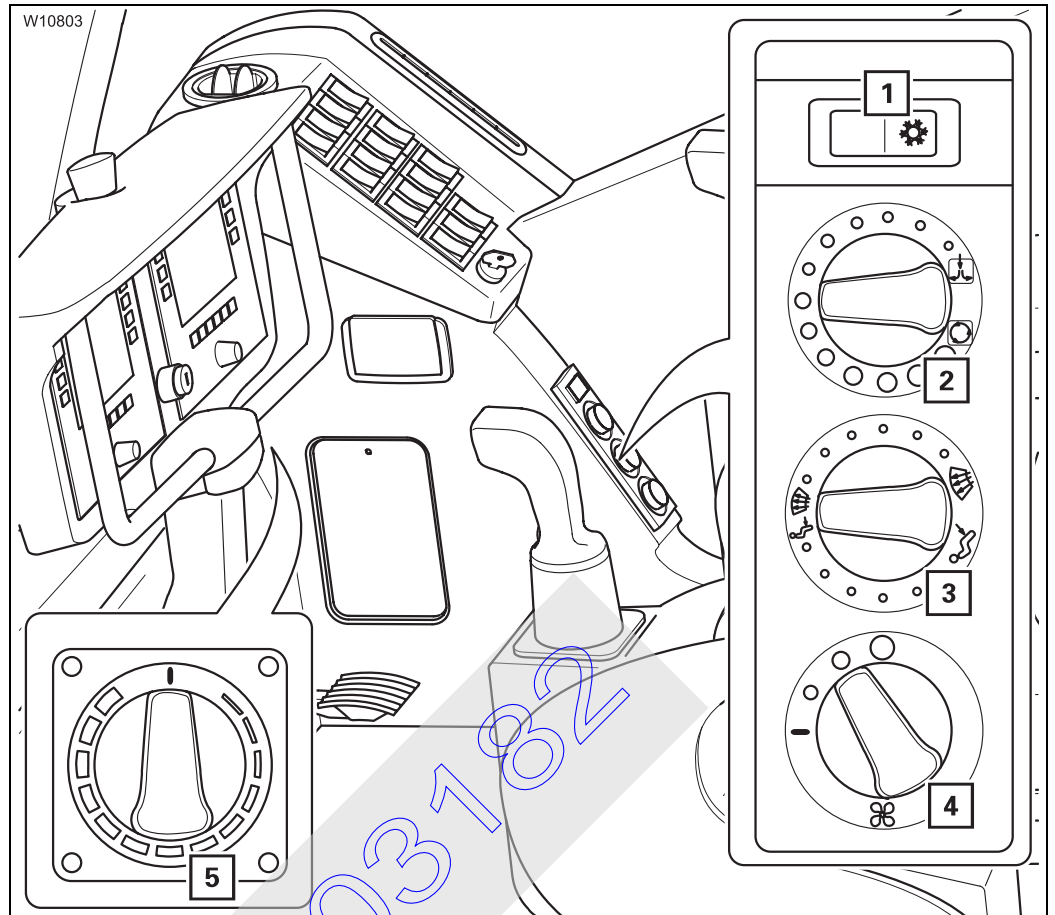
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1	Air vents	▶▶▶▶ p. 12 - 127
2	Hoisting gear high-speed mode on/off display	▶▶▶▶ p. 10 - 74
3	Front windscreen wipers on/off	▶▶▶▶ p. 10 - 103
4	Roof window wipers on/off	▶▶▶▶ p. 10 - 103
5	Windscreen washing system	▶▶▶▶ p. 10 - 103
6	Derricking gear/Telescoping mechanism high-speed mode on/off display	▶▶▶▶ p. 10 - 79
7	Spotlight sockets on/off	▶▶▶▶ p. 10 - 101
8	Sleuable spotlights on/off¹⁾	▶▶▶▶ p. 10 - 102
9	Air traffic control light on/off¹⁾	▶▶▶▶ p. 10 - 101
10	Slew sleuable spotlights¹⁾	▶▶▶▶ p. 10 - 102
11	Flame start system indicator lamp¹⁾	▶▶▶▶ p. 10 - 55
12	Battery charge indicator warning	▶▶▶▶ p. 10 - 101
13	Carrier ignition indicator lamp	▶▶▶▶ p. 10 - 55
14	Rotating beacon on/off¹⁾	▶▶▶▶ p. 10 - 101
15	Houselock on/off¹⁾	▶▶▶▶ p. 10 - 88
16	Setting the idling speed	▶▶▶▶ p. 10 - 55
17	Carrier ignition on/off	▶▶▶▶ p. 10 - 57
18	Soot particle filter indicator lamp¹⁾	▶▶▶▶ p. 10 - 56
19	Ignition lock	▶▶▶▶ p. 10 - 55
20	Cigarette lighter (24 volts)	
	1) Additional equipment	

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Standard heating system



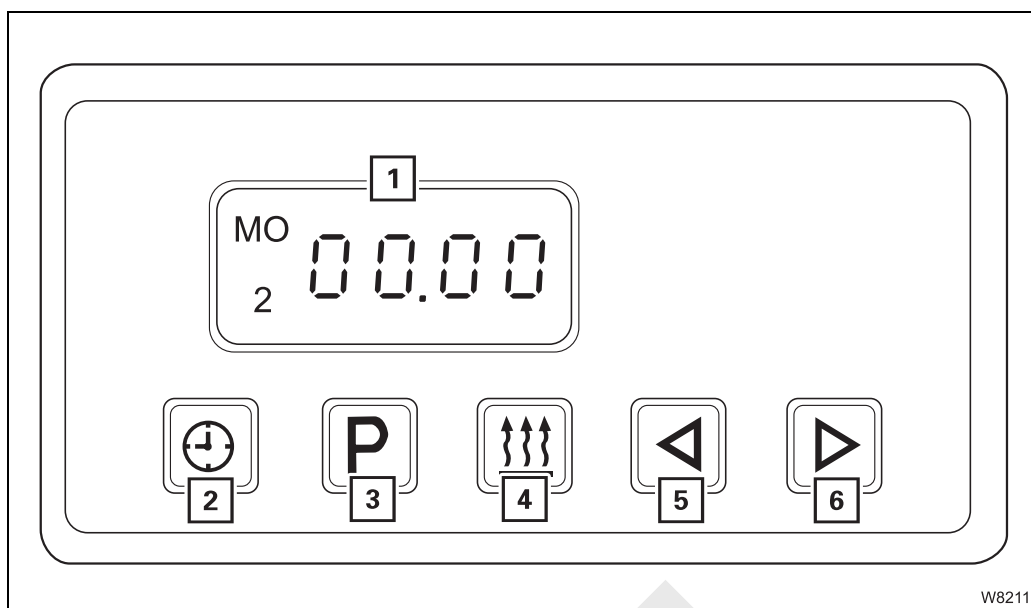
- 1 Air-conditioning on/off¹⁾
- 2 Fresh air/recirculated air
- 3 Air distribution
- 4 Fan
- 5 Set temperature

- ▮ p. 12 - 137
- ▮ p. 12 - 126
- ▮ p. 12 - 126
- ▮ p. 12 - 125
- ▮ p. 12 - 126

1) Additional equipment



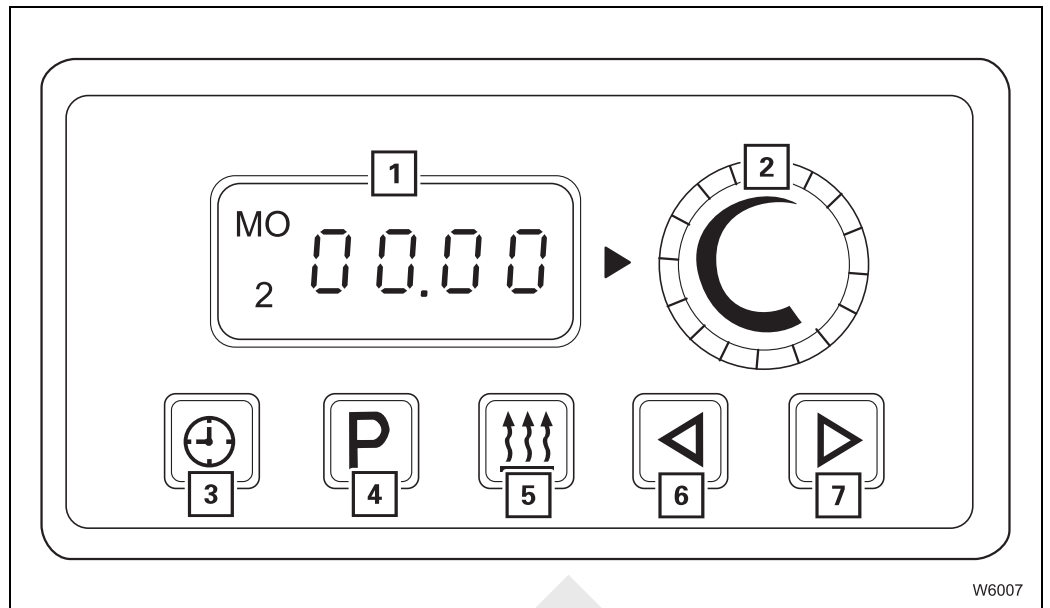
Auxiliary water heating system



- | | |
|------------------------------|-------------------|
| 1 Heating display | ▣▣▣▣▶ p. 12 - 129 |
| 2 Set time/day | ▣▣▣▣▶ p. 12 - 131 |
| 3 Retrieve storage locations | ▣▣▣▣▶ p. 12 - 132 |
| 4 Switch heating on/off | ▣▣▣▣▶ p. 12 - 129 |
| 5 Input – | ▣▣▣▣▶ p. 12 - 132 |
| 6 Input + | ▣▣▣▣▶ p. 12 - 132 |

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Auxiliary air heater

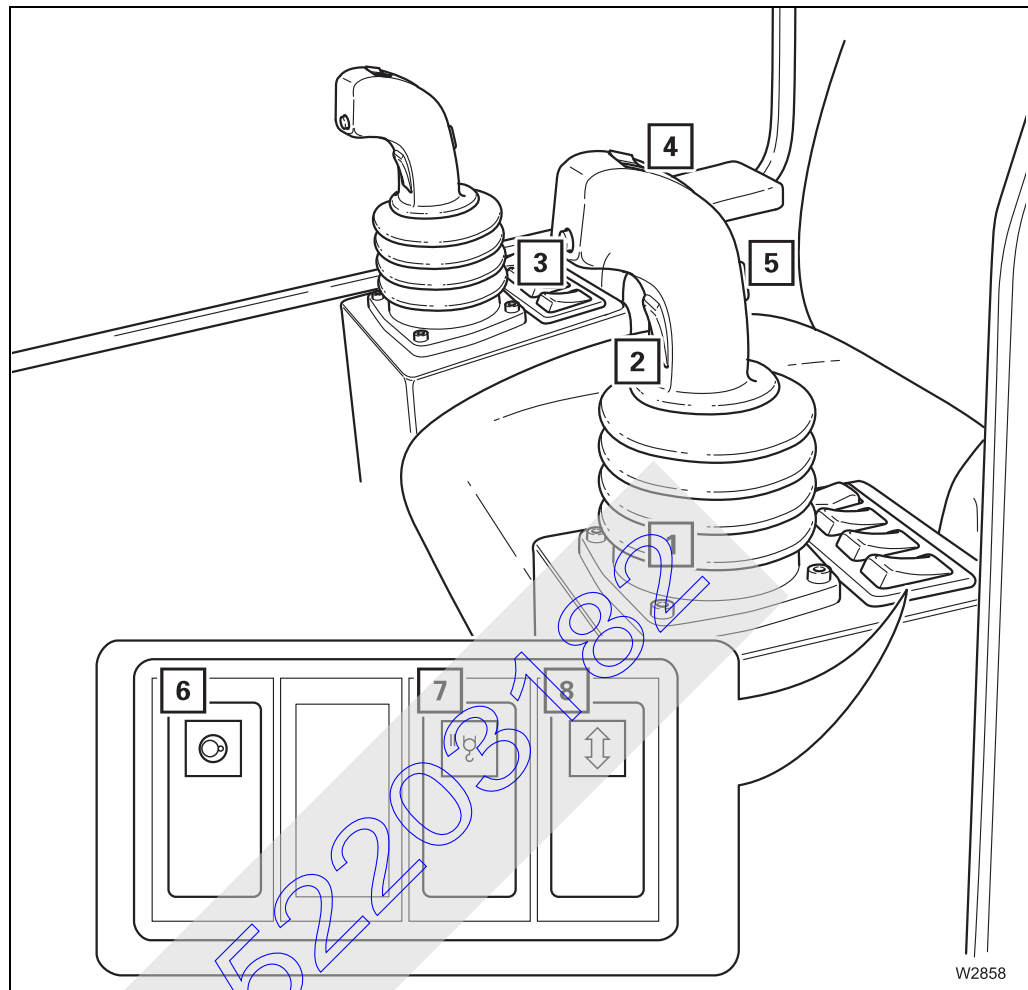


- | | |
|------------------------------|------------------|
| 1 Heating display | ▣▣▣▣ p. 12 - 135 |
| 2 Regulate temperature | ▣▣▣▣ p. 12 - 136 |
| 3 Set time/day | ▣▣▣▣ p. 12 - 136 |
| 4 Retrieve storage locations | ▣▣▣▣ p. 12 - 136 |
| 5 Switch heating on/off | ▣▣▣▣ p. 12 - 136 |
| 6 Input - | ▣▣▣▣ p. 12 - 136 |
| 7 Input + | ▣▣▣▣ p. 12 - 136 |

10.1.5

Control panels

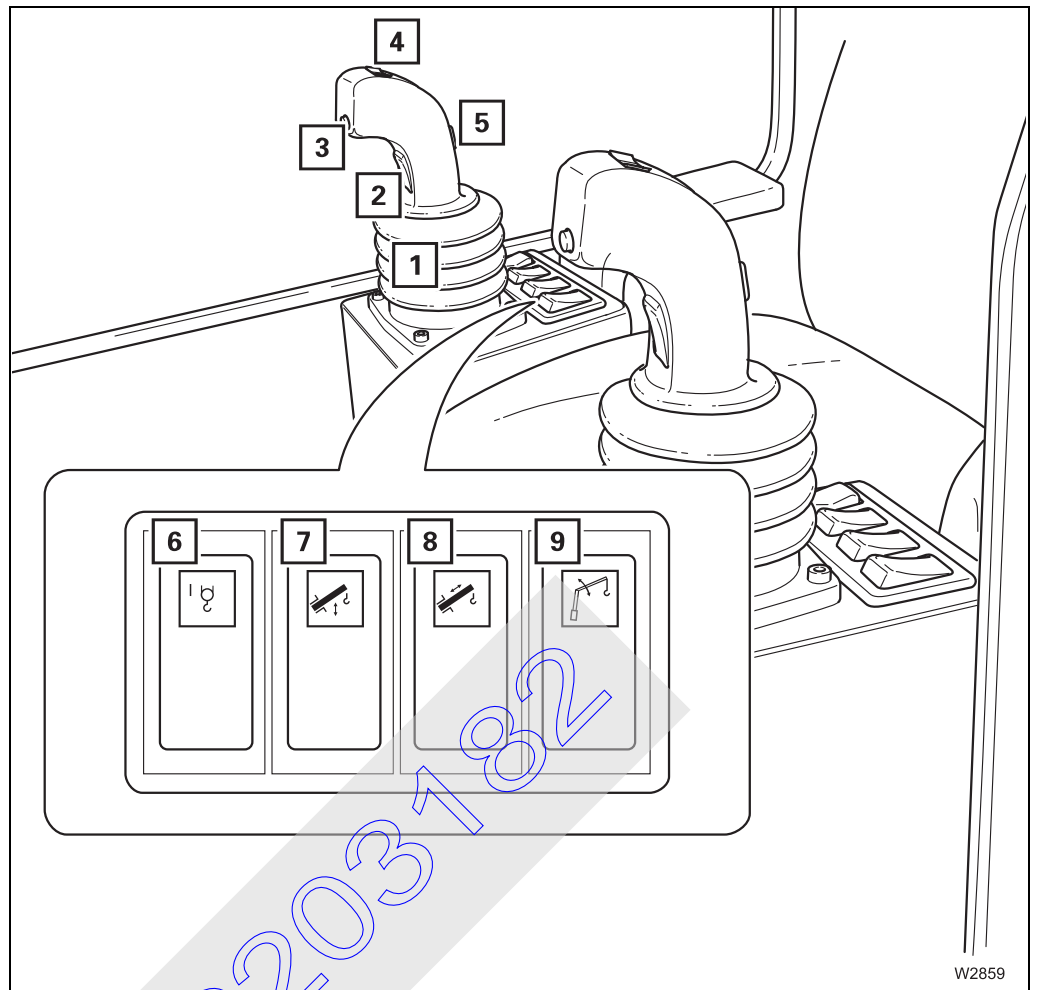
Left-hand control panel



- 1 Left-hand control lever (configuration varies depending on the version) ▣ p. 10 - 16
- 2 Dead man's switch ▣ p. 10 - 58
- 3 Slewing gear freewheel ▣ p. 10 - 76
- 4 Derricking gear/Telescoping mechanism high-speed mode on/off ▣ p. 10 - 80
- 5 Auxiliary hoist slewing indicator ▣ p. 12 - 49
- 6 Slewing gear on/off ▣ p. 10 - 76
- 7 Auxiliary hoist on/off ▣ p. 10 - 75
- 8 Incline crane cab¹⁾ ▣ p. 10 - 87

1) Additional equipment

Right-hand control panel



- 1 Right-hand control lever (configuration depends on version) ▣ p. 10 - 16
- 2 Dead man's switch ▣ p. 10 - 58
- 3 Horn button
- 4 Hoisting gear high-speed mode on/off ▣ p. 10 - 74
- 5 Main hoist slewing indicator ▣ p. 12 - 46
- 6 Main hoist on/off ▣ p. 10 - 73
- 7 Derricking gear on/off ▣ p. 10 - 79
- 8 Telescoping mechanism on/off ▣ p. 10 - 80
- 9 Derrick lattice extension on/off^{1) 2)}

1) Additional equipment

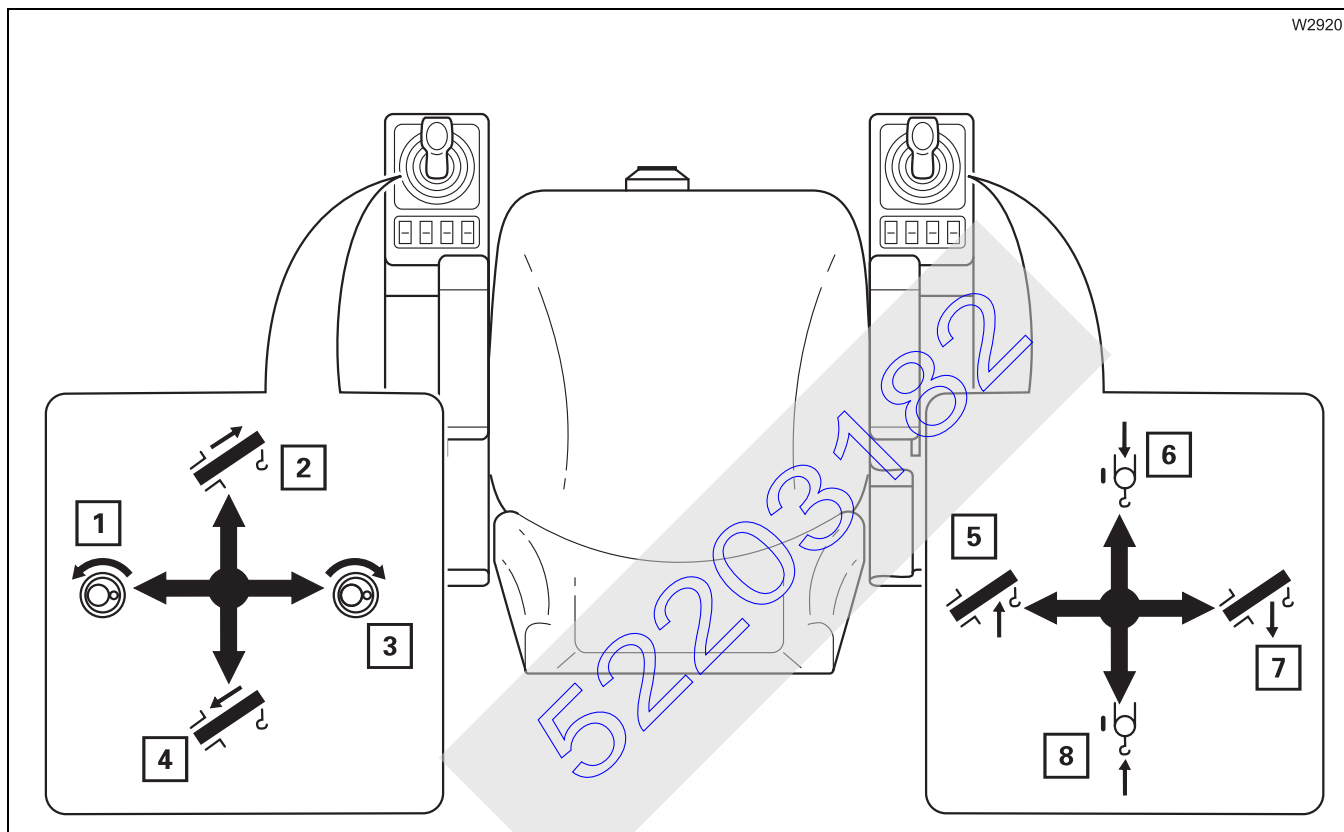
2) ▣ *Operating instructions lattice extension GMK 5220*

10.1.6 Control lever assignment

The truck crane can be equipped with two different control lever assignments. The current configuration of the control levers is indicated by symbols on the control levers.

Version 1

With version 1 the left-hand control lever is assigned the function *Telescope*.



Left-hand control lever assignment

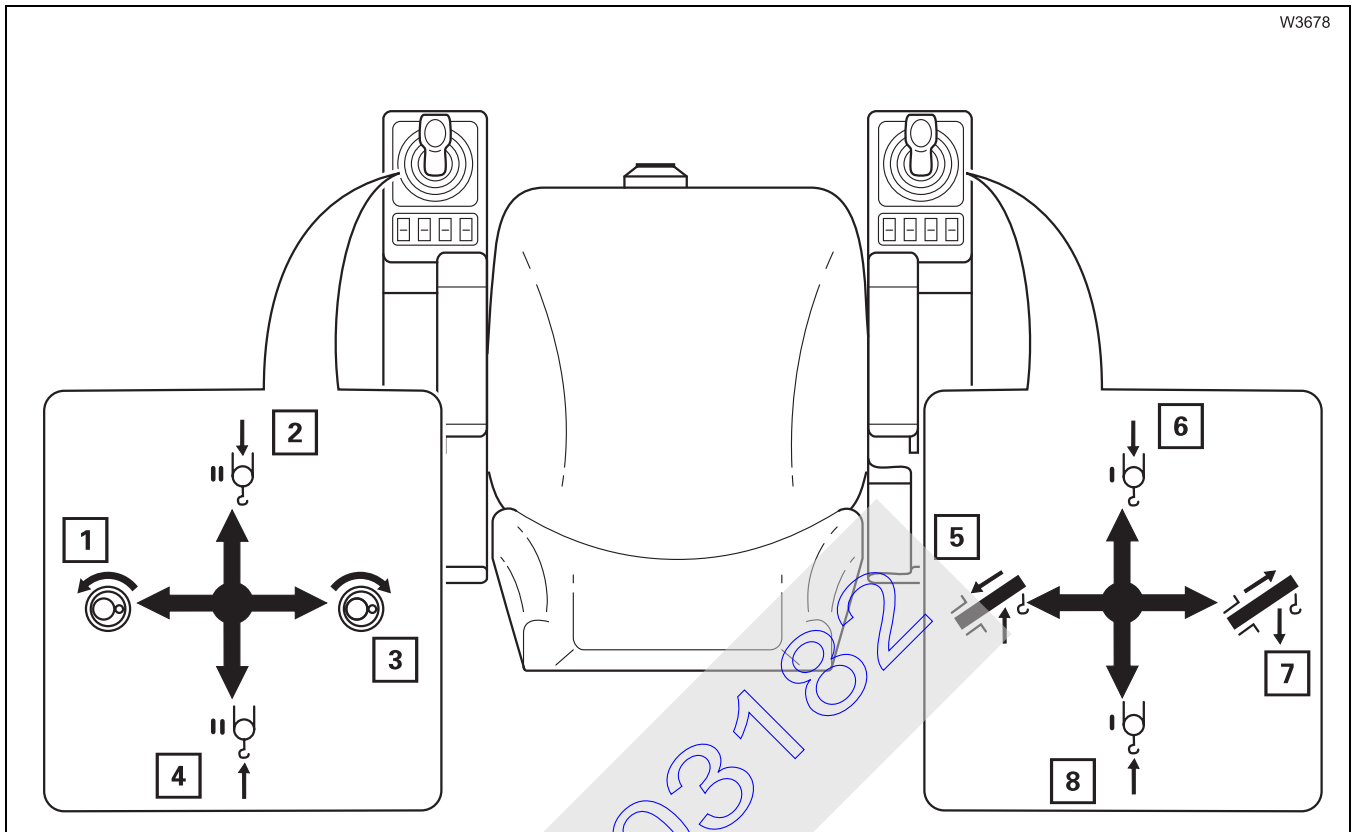
- 1 Slew to the left
- 3 Slew to the right
- 2 Extend
- 4 Retract

Right-hand control lever assignment

- 5 Raise
- 7 Lower
- 6 Lower main hoist
- 8 Raise main hoist

Version 2

With version 2 the right-hand control lever is assigned the function *Telescope*.



Left-hand control lever assignment

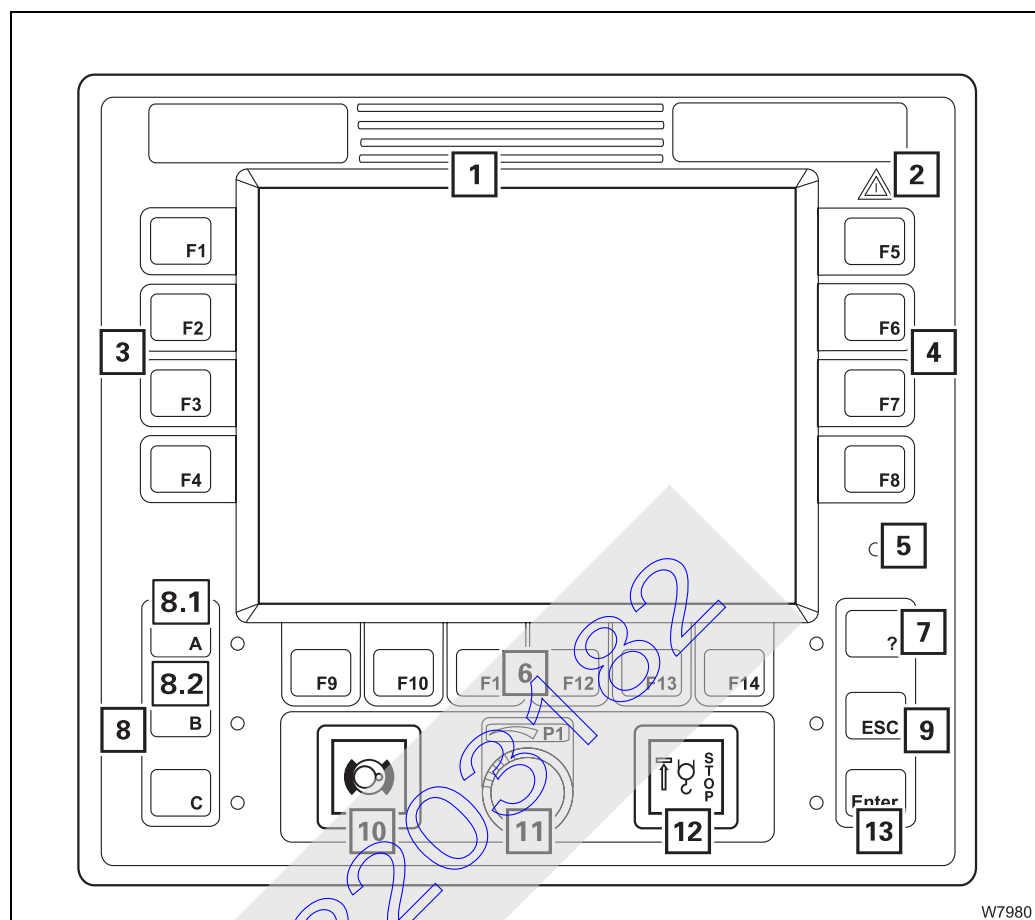
- 1** Slew to the left
- 3** Slew to the right
- 2** Lower auxiliary hoist¹⁾
- 4** Raise auxiliary hoist¹⁾

Right-hand control lever assignment

- 5** Raise/Retract
- 7** Lower/Extend
- 6** Lower main hoist
- 8** Raise main hoist

¹⁾ Additional equipment

10.1.7 ECOS control unit



1	ECOS display	▣▣▣▣▶ p. 10 - 61
	Main menu overview	▣▣▣▣▶ p. 10 - 20
2	Error/warning message	▣▣▣▣▶ p. 10 - 59
3	Buttons F1 to F4	▣▣▣▣▶ p. 10 - 59
4	Buttons F5 to F8	▣▣▣▣▶ p. 10 - 59
5	Sensor for brightness	▣▣▣▣▶ p. 10 - 61
6	Buttons F9 to F14	▣▣▣▣▶ p. 10 - 59
7	Open Error submenu	▣▣▣▣▶ p. 10 - 59
	Submenu overview	▣▣▣▣▶ p. 10 - 33
8	Keycode input	▣▣▣▣▶ p. 10 - 60
8.1	Open Warning (superstructure) submenu	▣▣▣▣▶ p. 10 - 59
	Submenu overview	▣▣▣▣▶ p. 10 - 32
8.2	Open Warning (carrier) submenu	▣▣▣▣▶ p. 10 - 60
	Submenu overview	▣▣▣▣▶ p. 3 - 22
9	Exit the submenu/input mode	▣▣▣▣▶ p. 10 - 60
10	Slewing gear brake engaged/released	▣▣▣▣▶ p. 10 - 77
11	Enter values	▣▣▣▣▶ p. 10 - 60
12	Warning lamp for lifting limit switch shutdown	▣▣▣▣▶ p. 10 - 74
13	Confirm your entry	▣▣▣▣▶ p. 10 - 60

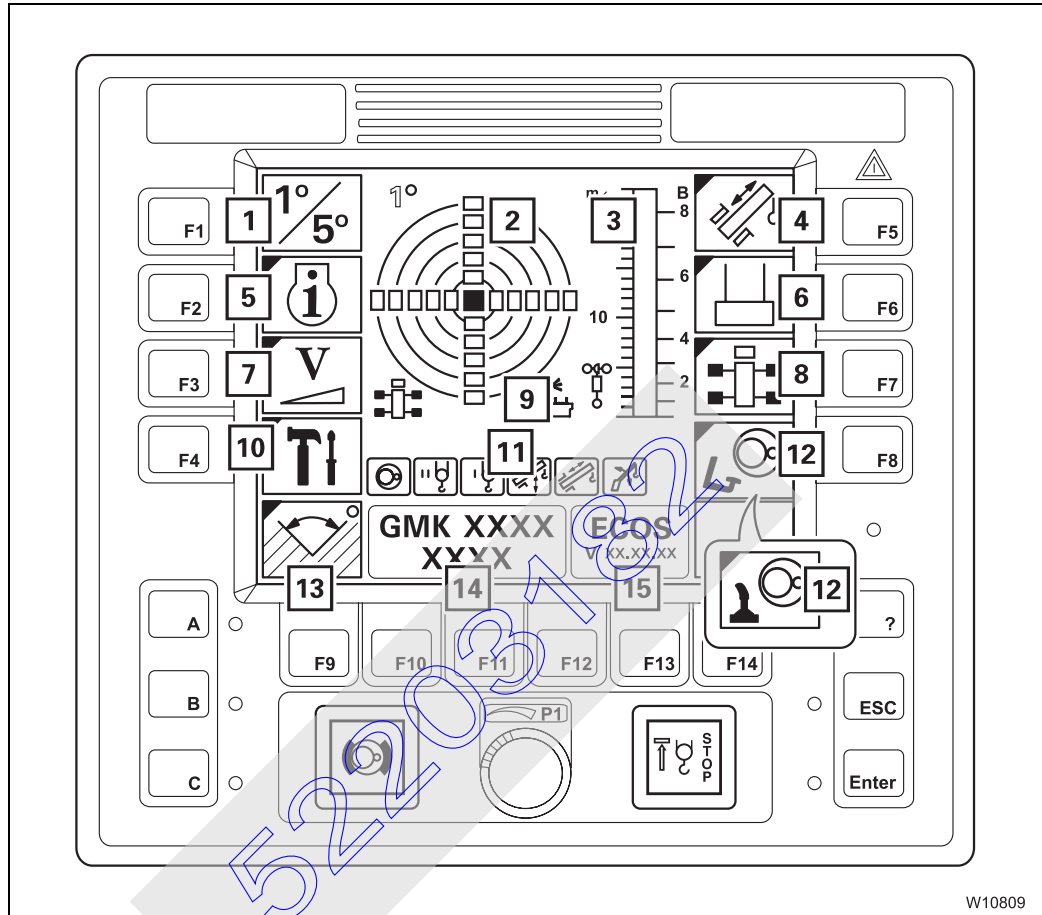


Various menus are displayed on the *ECOS* display.

The menus are operated with the buttons F1 to F14. The individual buttons are assigned different functions in each menu. The functions of the buttons in the displayed menu correspond to the symbols next to or above the buttons; ▣▣▣▣▶ p. 10 - 59.

10.1.8 ECOS display – main menu

The main menu displays symbols for further submenus and symbols for current displays.



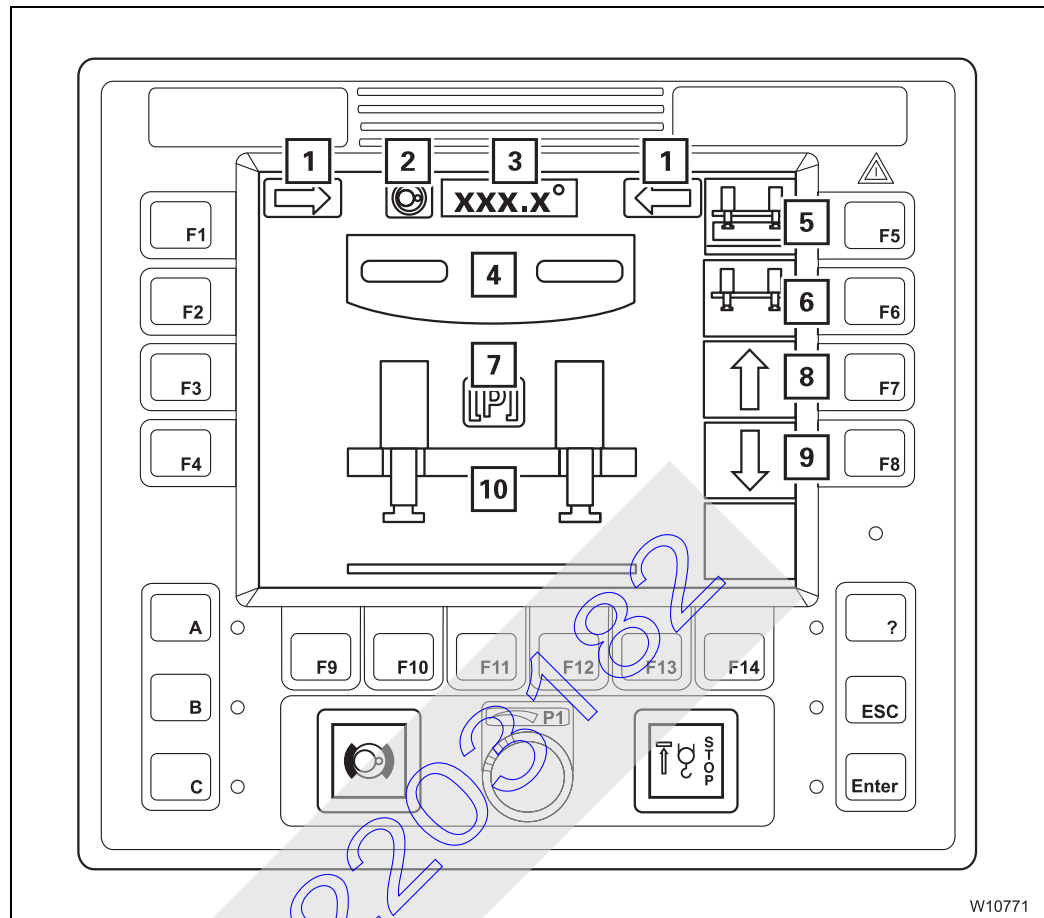
W10809

1	Change measurement range	▣▣▣▣ p. 10 - 68
2	Display of current inclination	▣▣▣▣ p. 10 - 68
3	Anemometer display	▣▣▣▣ p. 10 - 69
4	Telescoping submenu	▣▣▣▣ p. 10 - 26
5	Monitoring submenu	▣▣▣▣ p. 10 - 29
6	Counterweight submenu	▣▣▣▣ p. 10 - 22
7	Power unit speeds submenu	▣▣▣▣ p. 10 - 28
8	Outriggers submenu	▣▣▣▣ p. 10 - 64
9	Remote control display ^{1), 3)}	
10	Settings submenu	▣▣▣▣ p. 10 - 30
11	Power units display	
	Slewing gear	▣▣▣▣ p. 10 - 76
	Auxiliary hoist ¹⁾	▣▣▣▣ p. 10 - 75
	Main hoist	▣▣▣▣ p. 10 - 73
	Derricking gear	▣▣▣▣ p. 10 - 79
	Telescoping mechanism	▣▣▣▣ p. 10 - 80
	Derricking the lattice extension ^{1), 2)}	
12	Slewing gear/Houselock submenu ¹⁾	▣▣▣▣ p. 10 - 23
	Slewing gear brake function display	▣▣▣▣ p. 10 - 78
13	Working range limitation submenu ¹⁾	▣▣▣▣ p. 10 - 34
14	Serial number display	▣▣▣▣ p. 10 - 61
15	Program version display	▣▣▣▣ p. 10 - 61
1)	Additional equipment	
2)	▣▣▣▣ <i>Operating instructions lattice extension GMK 5220</i>	
3)	▣▣▣▣ <i>Separate operating instructions</i>	

10.1.9

ECOS display – submenus

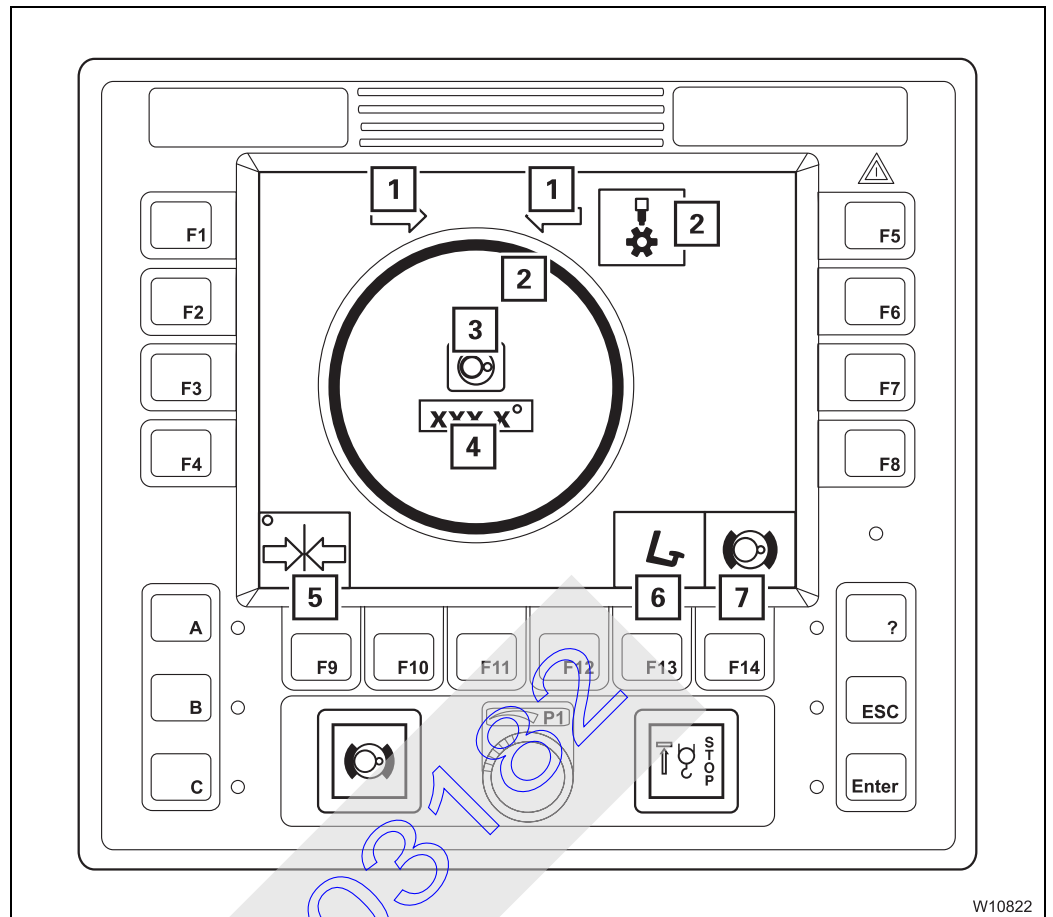
Counterweight submenu



W10771

- | | |
|--|-----------------|
| 1 Display of slewing direction for automatic mode | ▮▮▮▮ p. 10 - 70 |
| 2 Slewing gear display | ▮▮▮▮ p. 10 - 73 |
| 3 Current slewing angle display | ▮▮▮▮ p. 10 - 73 |
| 4 Rigging position display | ▮▮▮▮ p. 10 - 70 |
| 5 Automatic mode, rigging | ▮▮▮▮ p. 10 - 71 |
| 6 Automatic mode, unrigging | ▮▮▮▮ p. 10 - 71 |
| 7 Charging pressure display | ▮▮▮▮ p. 10 - 72 |
| 8 Retracting the lifting cylinders | ▮▮▮▮ p. 10 - 72 |
| 9 Extending the lifting cylinders | ▮▮▮▮ p. 10 - 72 |
| 10 Lifting cylinder position display | ▮▮▮▮ p. 10 - 72 |

Submenu slewing gear/Houselock



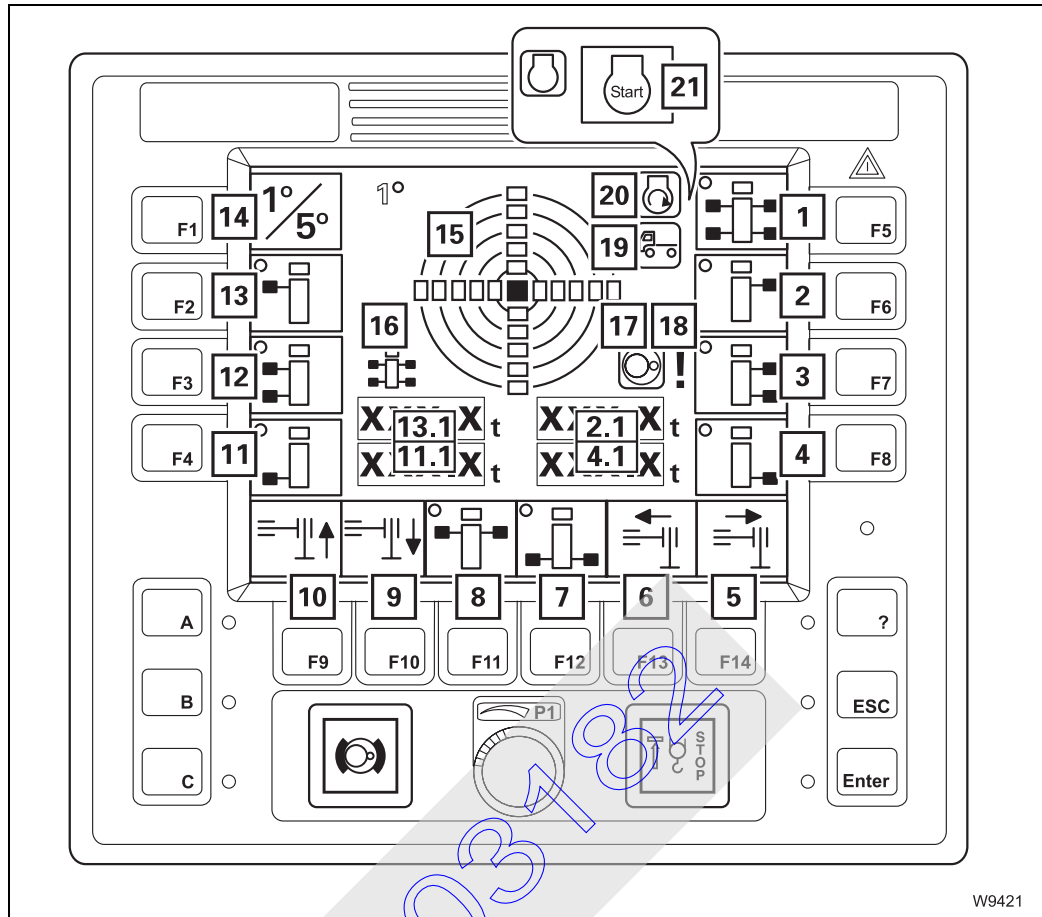
W10822

- | | |
|--|-----------------|
| 1 Display of slewing direction to 0°/180° ¹⁾ | ▮▮▮▮ p. 10 - 78 |
| 2 Houselock locking status displays ¹⁾ | ▮▮▮▮ p. 10 - 88 |
| 3 Slewing gear display | ▮▮▮▮ p. 10 - 77 |
| 4 Current slewing angle display | ▮▮▮▮ p. 10 - 77 |
| 5 Stop at 0°/180° ¹⁾ | ▮▮▮▮ p. 10 - 78 |
| 6 Slewing gear brake function display | ▮▮▮▮ p. 10 - 78 |
| 7 Switch slewing gear brakefunction | ▮▮▮▮ p. 10 - 78 |

¹⁾ Additional equipment



**Outriggers sub-
menu**

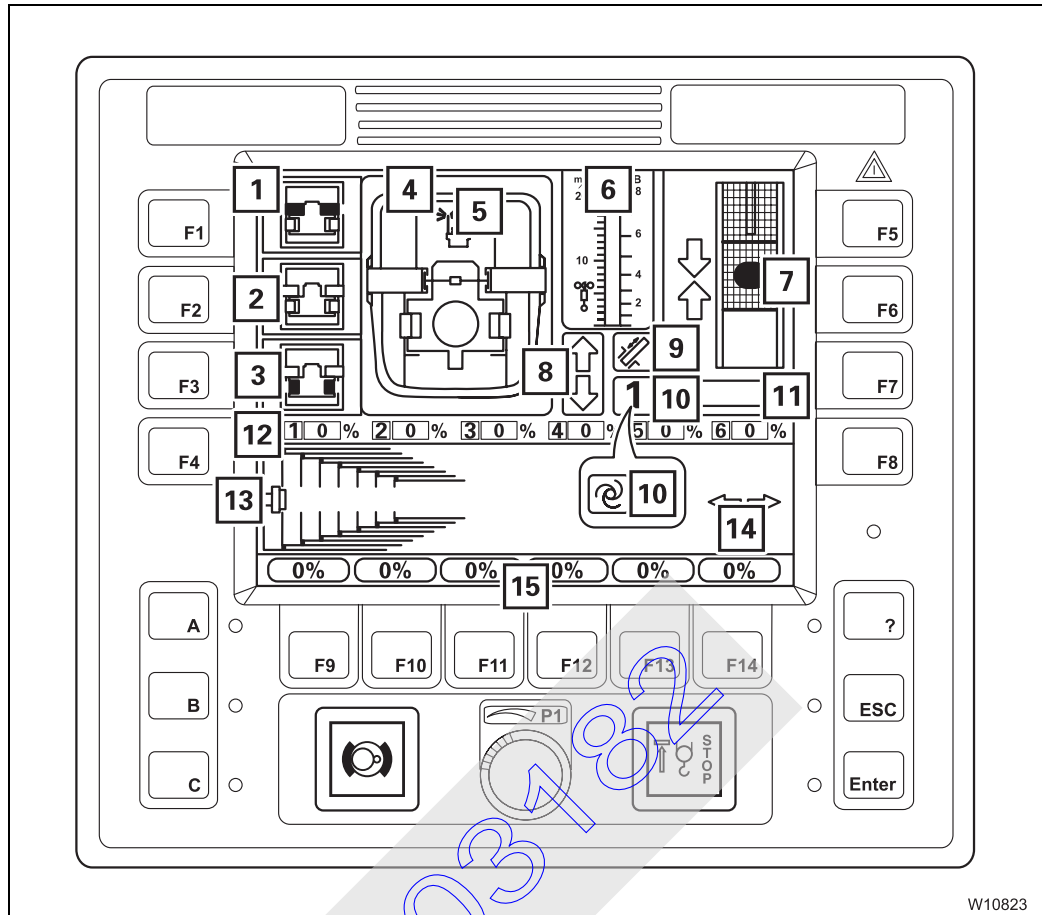


1	All outrigger cylinders	▶▶▶▶▶ p. 10 - 63
2	Front right outrigger	▶▶▶▶▶ p. 10 - 65
2.1	Front right-hand outrigger pressure display ¹⁾	▶▶▶▶▶ p. 10 - 69
3	Right-hand outrigger cylinder	▶▶▶▶▶ p. 10 - 65
4	Rear right-hand outrigger	▶▶▶▶▶ p. 10 - 65
4.1	Rear right-hand outrigger pressure display ¹⁾	▶▶▶▶▶ p. 10 - 65
5	Extending the outrigger beams	▶▶▶▶▶ p. 10 - 65
6	Retracting the outrigger beams	▶▶▶▶▶ p. 10 - 65
7	Rear outrigger cylinder	▶▶▶▶▶ p. 10 - 65
8	Front outrigger cylinders	▶▶▶▶▶ p. 10 - 65
9	Extending the outrigger cylinders	▶▶▶▶▶ p. 10 - 65
10	Retracting the outrigger cylinders	▶▶▶▶▶ p. 10 - 65
11	Rear left-hand outrigger	▶▶▶▶▶ p. 10 - 65
11.1	Rear left-hand outrigger pressure display ¹⁾	▶▶▶▶▶ p. 10 - 65
12	Left-hand outrigger cylinder	▶▶▶▶▶ p. 10 - 65
13	Front left-hand outrigger	▶▶▶▶▶ p. 10 - 65
13.1	Front left-hand outrigger pressure display ¹⁾	▶▶▶▶▶ p. 10 - 65
14	Change measurement range	▶▶▶▶▶ p. 10 - 68
15	Display of current inclination	▶▶▶▶▶ p. 10 - 68
16	Direction of inclination display	▶▶▶▶▶ p. 10 - 68
17	Slewing gear display	▶▶▶▶▶ p. 10 - 65
18	Display for locked movements	▶▶▶▶▶ p. 10 - 65
19	Carrier ignition display	▶▶▶▶▶ p. 10 - 57
20	Display for engine for driving on/off	▶▶▶▶▶ p. 10 - 57
21	Start engine for driving	▶▶▶▶▶ p. 10 - 57

¹⁾ Additional equipment



**Telescoping sub-
menu**



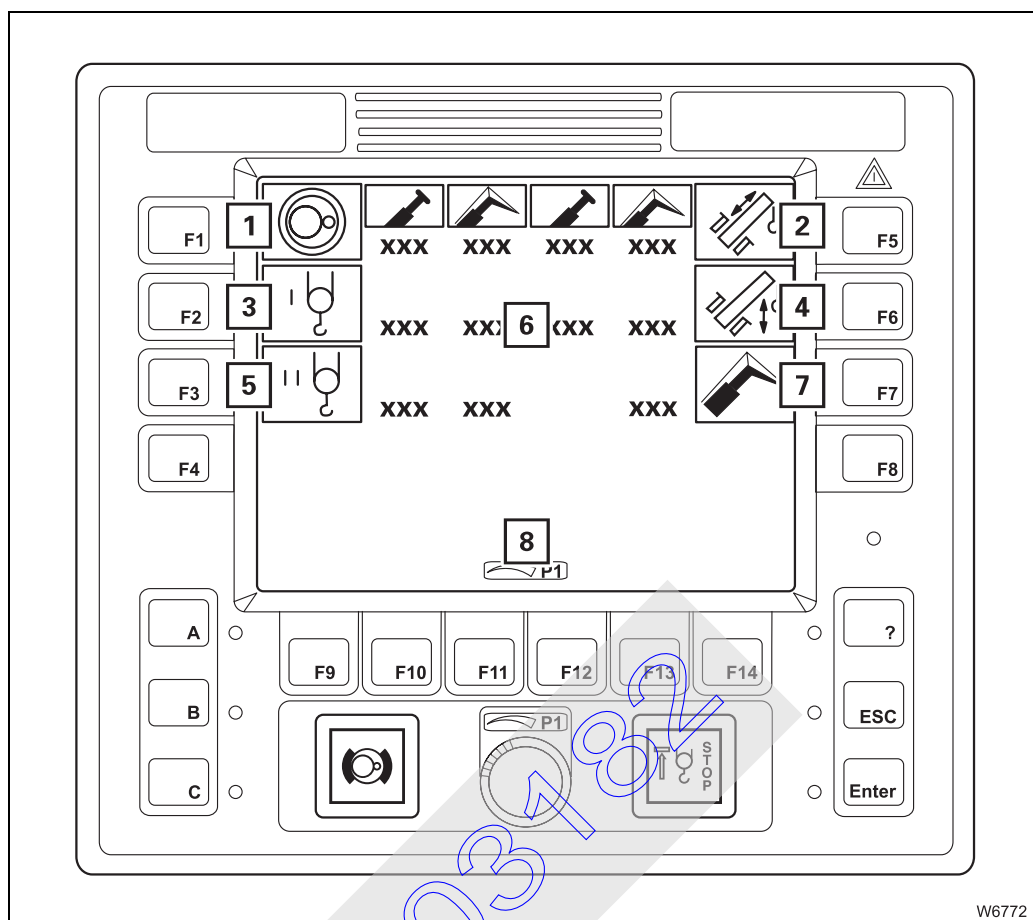
52203

1	Select Unlock telescopic section	▣▣▣▣▶ p. 10 - 83
2	Select Lock	▣▣▣▣▶ p. 10 - 83
3	Select Unlock telescoping cylinder	▣▣▣▣▶ p. 10 - 82
4	Locking status display	▣▣▣▣▶ p. 10 - 82
5	Remote control display ¹⁾	
6	Anemometer display	▣▣▣▣▶ p. 10 - 69
7	Locking point display	▣▣▣▣▶ p. 10 - 84
8	Display for releasing telescoping	▣▣▣▣▶ p. 10 - 84
9	Display for telescoping mechanism on/off	▣▣▣▣▶ p. 10 - 81
10	Display:	
	– Telescoping cylinder in the telescopic section	▣▣▣▣▶ p. 10 - 81
	– Teleautomation on/off	▣▣▣▣▶ p. 10 - 85
11	Telescoping cylinder length display	▣▣▣▣▶ p. 10 - 83
12	Current telescoping display	▣▣▣▣▶ p. 10 - 81
13	Telescope diagram display	▣▣▣▣▶ p. 10 - 82
14	Teleautomation direction display	▣▣▣▣▶ p. 10 - 85
15	Entering the nominal value for teleautomation	▣▣▣▣▶ p. 10 - 84

1) ▣▣▣▣▶ *Separate operating instructions*



Power unit speeds submenu

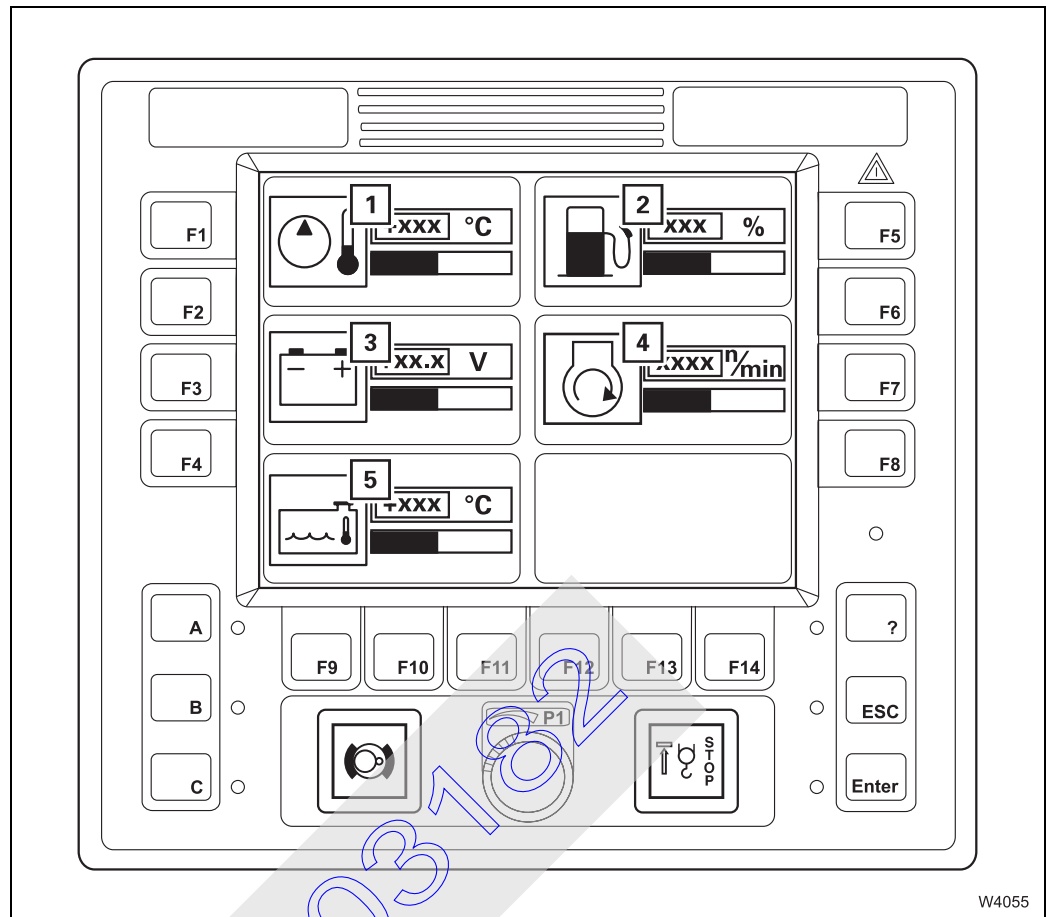


W6772

- | | |
|---|-----------------|
| 1 Enter slewing gear speed | ▣▣▣▣ p. 12 - 97 |
| 2 Enter telescoping mechanism speed | ▣▣▣▣ p. 12 - 97 |
| 3 Enter main hoist speed | ▣▣▣▣ p. 12 - 97 |
| 4 Enter derricking gear speed | ▣▣▣▣ p. 12 - 97 |
| 5 Enter auxiliary hoist speed | ▣▣▣▣ p. 12 - 97 |
| 6 Display set speed | ▣▣▣▣ p. 12 - 97 |
| 7 Enter speed for derricking gear of lattice extension ¹⁾ | |
| 8 Display for input mode on | ▣▣▣▣ p. 12 - 98 |

¹⁾ Additional equipment

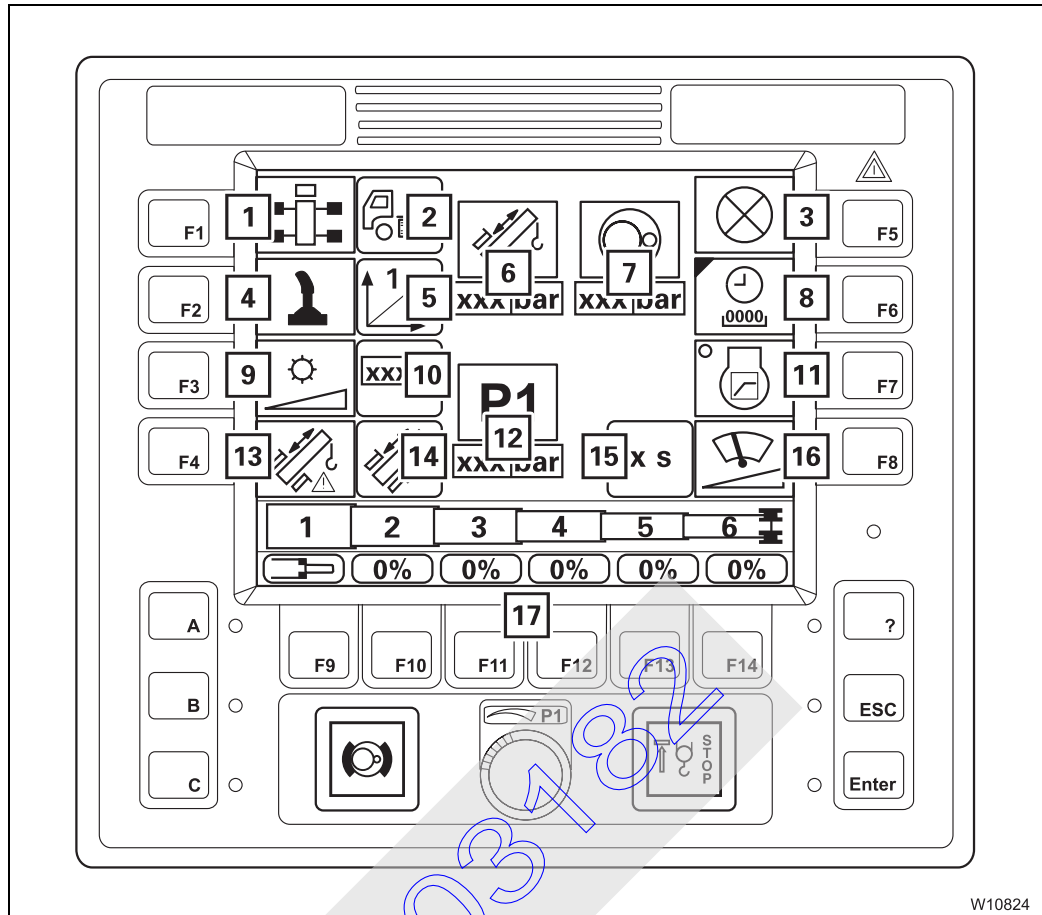
Monitoring sub-menu



- | | |
|-------------------------------------|-----------------|
| 1 Hydraulic oil temperature display | ▣▣▣▣ p. 11 - 15 |
| 2 Fuel level display | ▣▣▣▣ p. 11 - 15 |
| 3 Voltage monitoring display | ▣▣▣▣ p. 11 - 15 |
| 4 Engine speed display | ▣▣▣▣ p. 11 - 15 |
| 5 Coolant temperature display | ▣▣▣▣ p. 11 - 15 |



Settings submenu




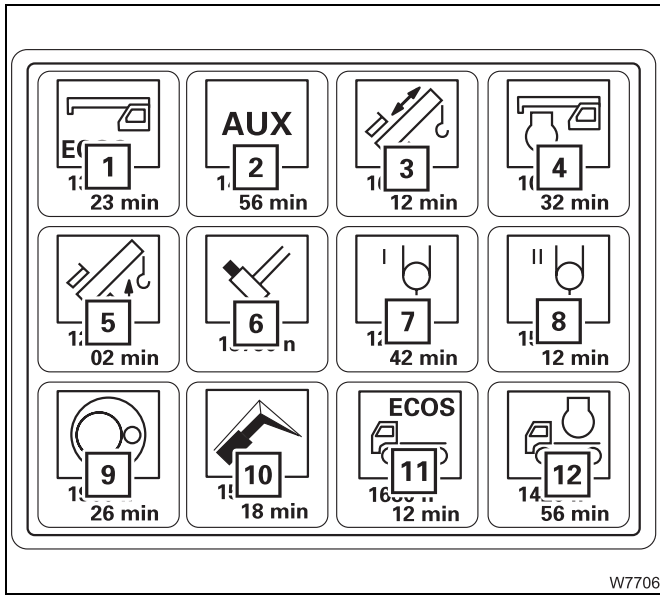
W10824

1	Carrier display fields on/off ¹⁾	➡ p. 10 - 65
2	Display for carrier display fields on/off ¹⁾	➡ p. 10 - 65
3	Lamp test	➡ p. 11 - 9
4	Control lever characteristic curve	➡ p. 12 - 99
5	Control lever characteristic curve display	➡ p. 12 - 99
6	Telescoping cylinder pressure display	➡ p. 10 - 87
7	Slewing gear hydraulic circuit pressure display	➡ p. 10 - 87
8	Operating hours submenu	➡ p. 10 - 32
9	Set brightness of display	➡ p. 11 - 11
10	Display brightness value	➡ p. 11 - 11
11	Critical load control on/off	➡ p. 10 - 87
12	Hydraulic circuit pressure display	➡ p. 10 - 87
13	Telescoping emergency program access	➡ p. 10 - 85
14	Current telescoping mechanism status display	➡ p. 10 - 86
15	Wiper interval display	➡ p. 10 - 103
16	Wiper interval setting	➡ p. 10 - 103
17	Enter telescoping status after emergency operation	➡ p. 15 - 53
1)	Additional equipment	



Operating hours submenu

Description of the displays;  *Displaying the operating hours, p. 12 - 104.*



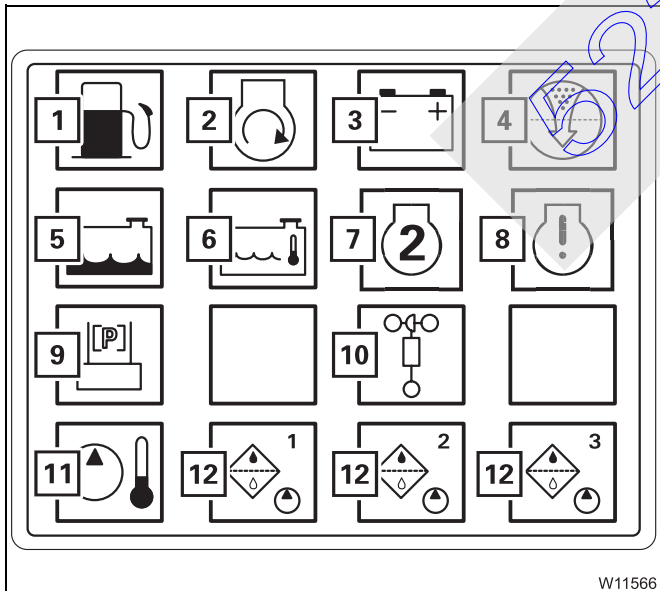
W7706

- 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 hoist¹⁾
- 9 Slewing gear
- 10 Lattice extension¹⁾
- 11 ECOS – carrier
- 12 Engine for driving

¹⁾ Additional equipment

Warning submenu

Description of the displays;  *Warning submenu, p. 12 - 105.*
 Engine-related displays apply to the engine for crane operation.

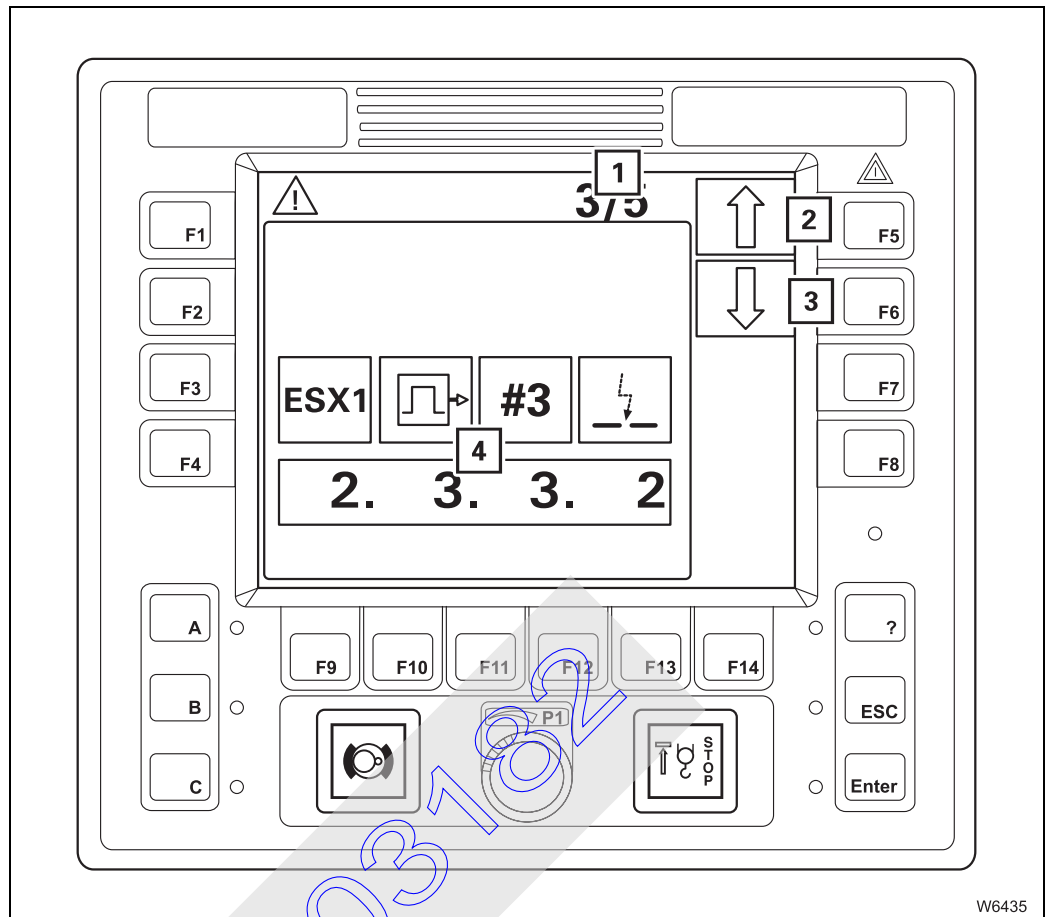


W11566

- 1 Refuelling
- 2 Air intake inhibitor closed¹⁾
- 3 Voltage monitoring
- 4 Replace air filter
- 5 Coolant level too low
- 6 Coolant too hot
- 7 Engine malfunction
- 8 Engine warning
- 9 Pre-tension counterweight
- 10 Anemometer not connected
- 11 Hydraulic oil too hot
- 12 Replace hydraulic oil filter

¹⁾ Additional equipment

Error submenu

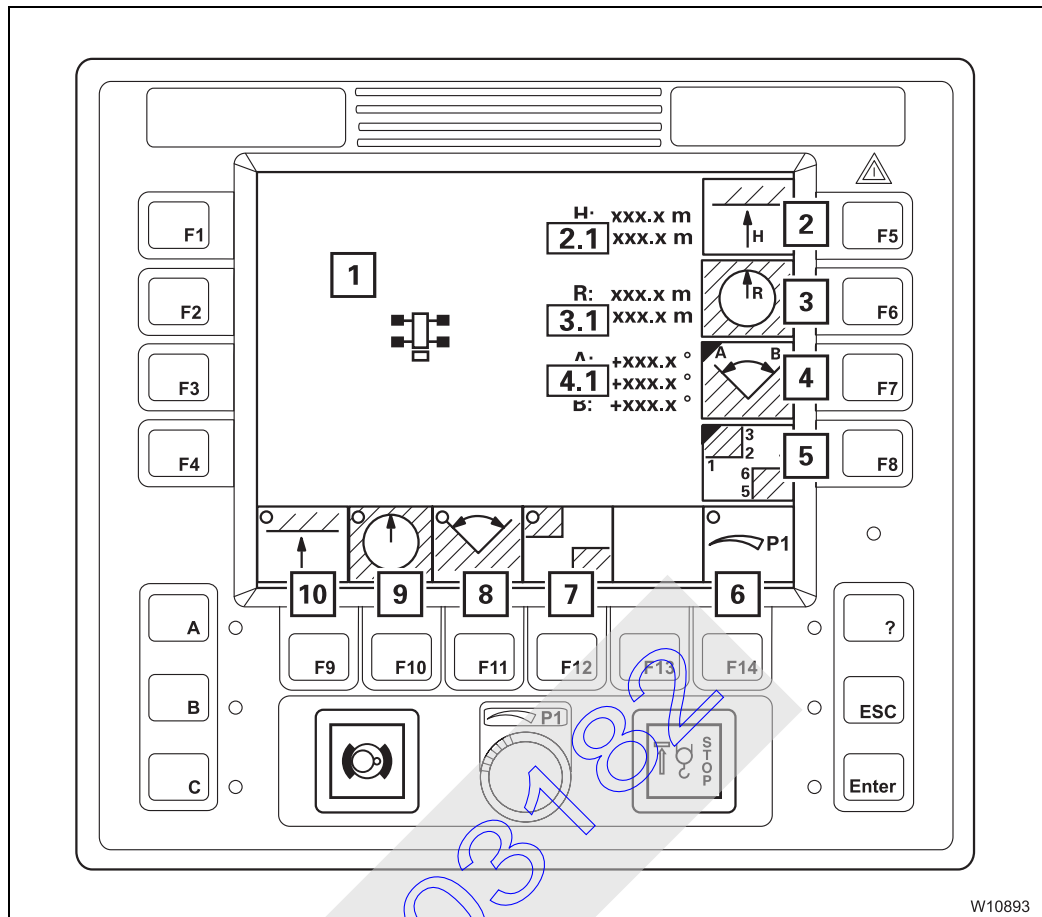


W6435

- | | |
|---|--------------|
| 1 Display of current error/total errors | ➡ p. 15 - 37 |
| 2 Page up | ➡ p. 15 - 37 |
| 3 Page down | ➡ p. 15 - 37 |
| 4 Error display | ➡ p. 15 - 37 |

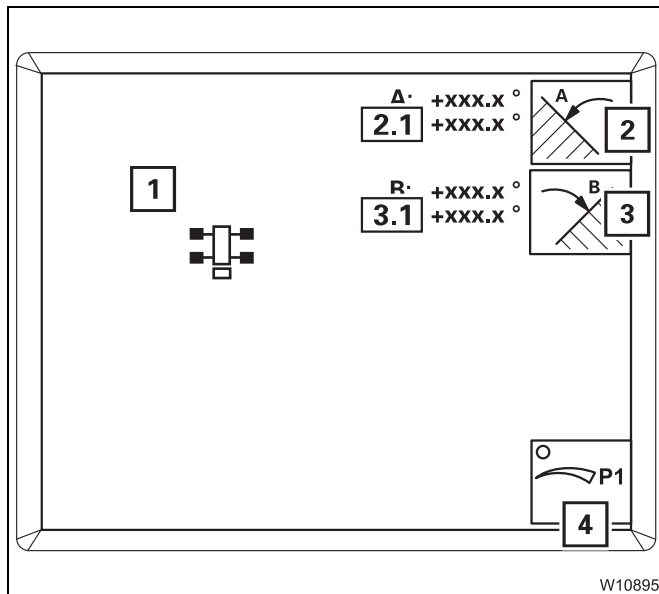


**Working range
 limitation
 submenu**



W10893

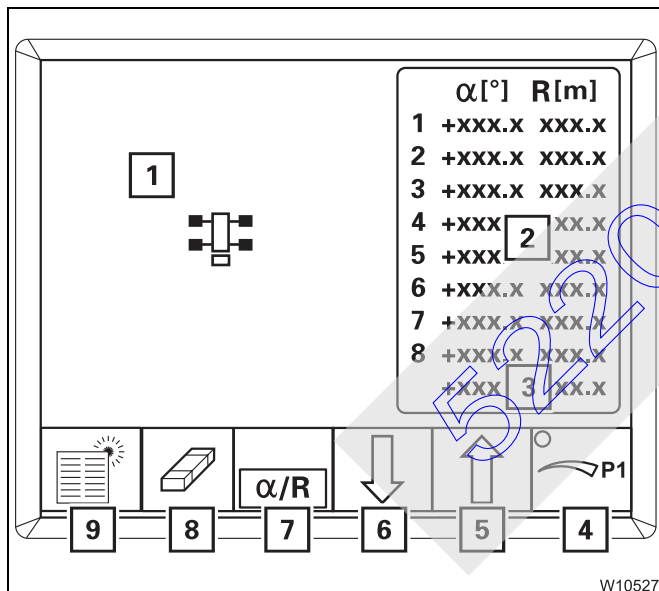
- | | |
|---|------------------|
| 1 Working range limitation display | ▣▣▣▣ p. 12 - 120 |
| 2 Enter maximum overall height | ▣▣▣▣ p. 12 - 112 |
| 2.1 Maximum overall height display | ▣▣▣▣ p. 12 - 112 |
| 3 Enter maximum working radius | ▣▣▣▣ p. 12 - 112 |
| 3.1 Maximum/Current working radius display | ▣▣▣▣ p. 12 - 112 |
| 4 Enter slewing angle submenu | ▣▣▣▣ p. 12 - 113 |
| 4.1 Maximum/Current slewing angle display | ▣▣▣▣ p. 12 - 113 |
| 5 Enter rigging mode objects | ▣▣▣▣ p. 12 - 115 |
| 6 Manual input on/off | ▣▣▣▣ p. 12 - 118 |
| 7 Object monitoring on/off | ▣▣▣▣ p. 12 - 120 |
| 8 Slewing angle monitoring on/off | ▣▣▣▣ p. 12 - 120 |
| 9 Working radius monitoring on/off | ▣▣▣▣ p. 12 - 120 |
| 10 Overall height monitoring on/off | ▣▣▣▣ p. 12 - 120 |



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. 12 - 113.

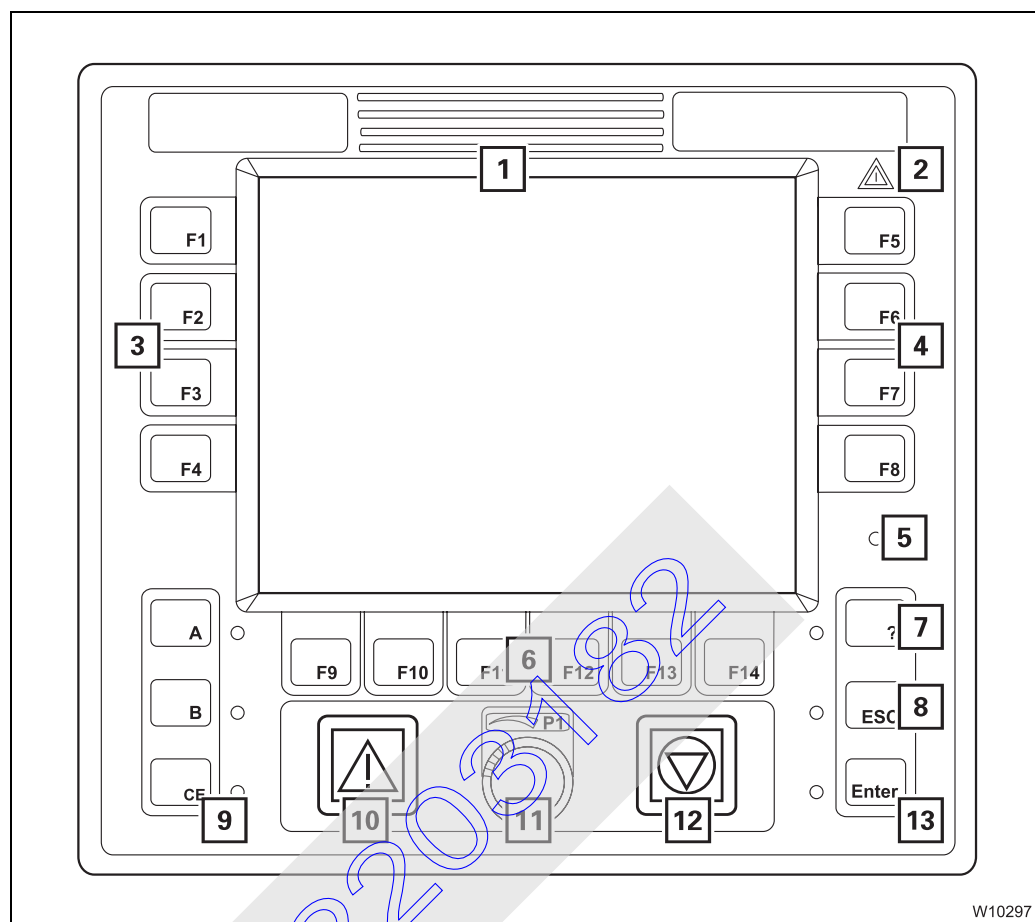


Enter rigging mode objects

- 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. 12 - 115.

10.1.10 SLI control unit

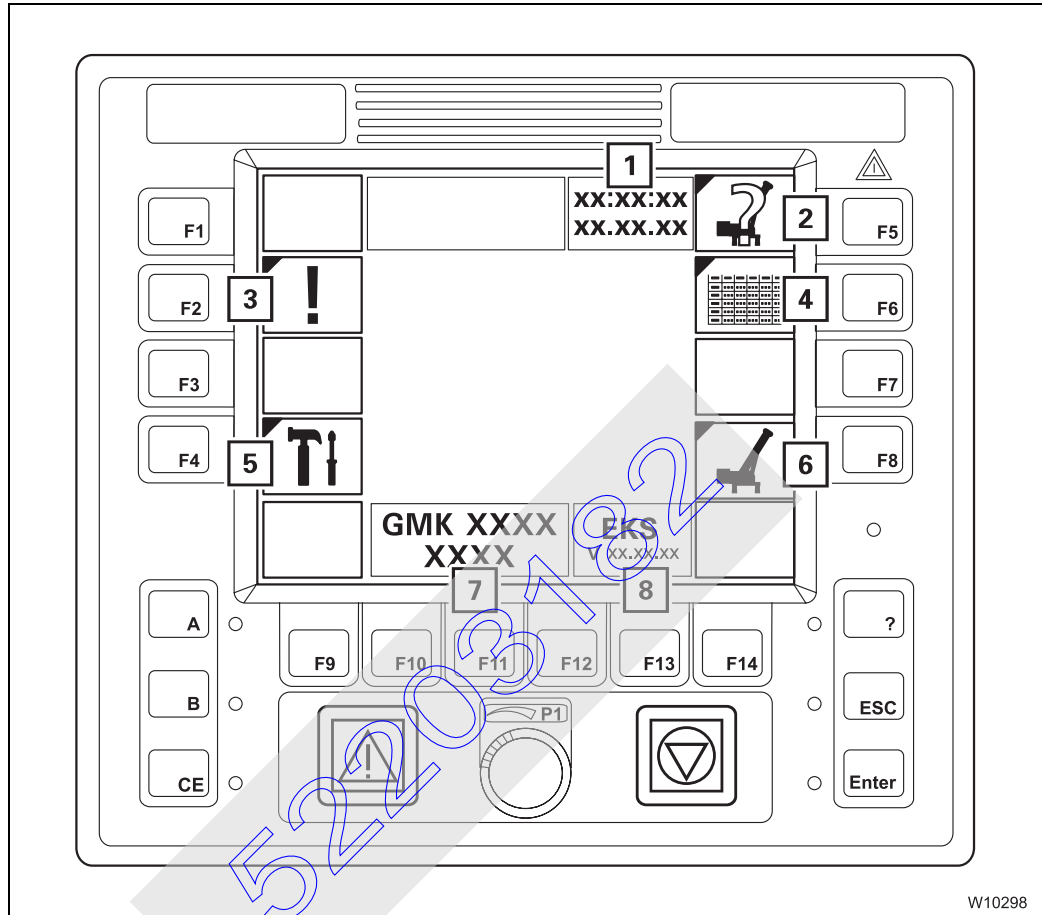


1 SLI display	▣▣▣▣▶ p. 10 - 91
Main menu overview	▣▣▣▣▶ p. 10 - 20
2 Error	▣▣▣▣▶ p. 10 - 59
3 Buttons F1 to F4	▣▣▣▣▶ p. 10 - 59
4 Buttons F5 to F8	▣▣▣▣▶ p. 10 - 59
5 Sensor for brightness	▣▣▣▣▶ p. 10 - 90
6 Buttons F9 to F14	▣▣▣▣▶ p. 10 - 59
7 Open Error submenu	▣▣▣▣▶ p. 10 - 59
Submenu overview	▣▣▣▣▶ p. 10 - 45
8 Exit the submenu/input mode	▣▣▣▣▶ p. 10 - 60
9 Acknowledge	▣▣▣▣▶ p. 10 - 90
10 SLI early warning	▣▣▣▣▶ p. 10 - 90
11 Enter values	▣▣▣▣▶ p. 10 - 60
12 SLI shutdown	▣▣▣▣▶ p. 10 - 90
13 Confirm your entry	▣▣▣▣▶ p. 10 - 90

52203182

10.1.11 SLI display – main menu

The main menu shows symbols for further submenus and symbols for current displays.

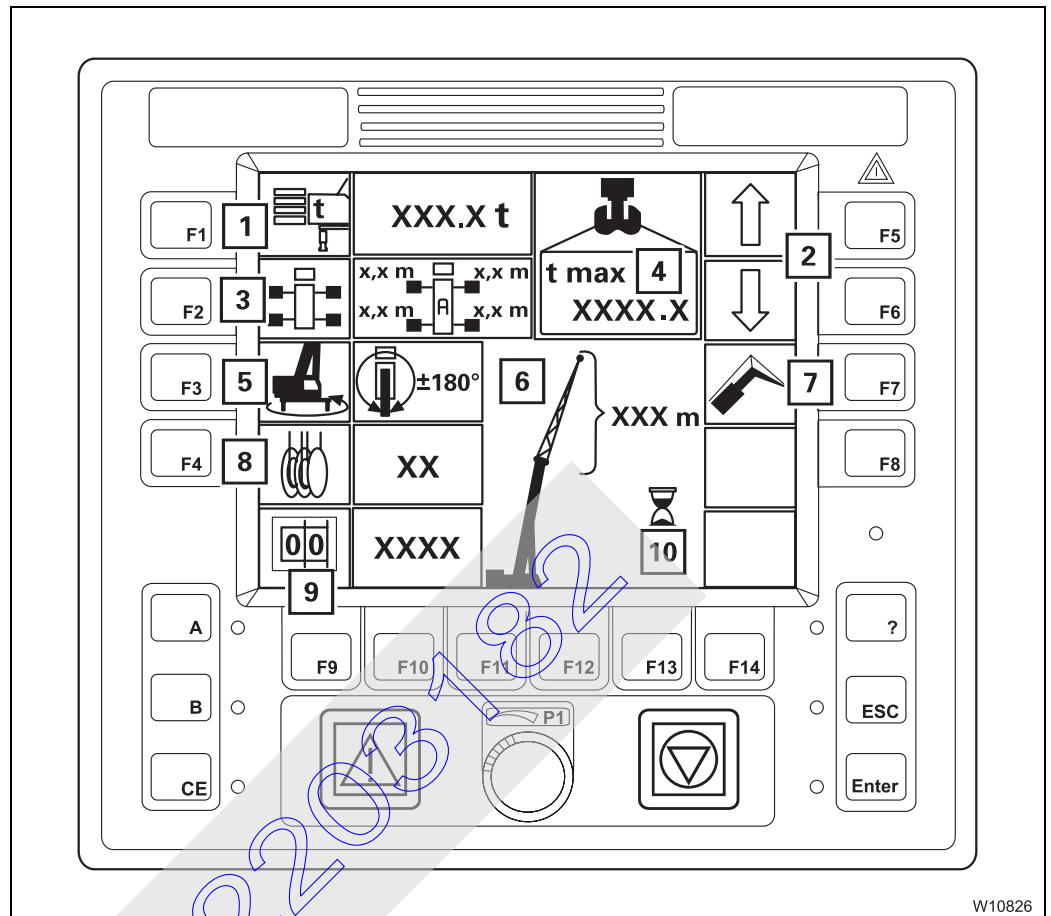


W10298

- | | |
|----------------------------------|-----------------|
| 1 Date/time display | ▣▣▣▣ p. 10 - 91 |
| 2 Enter rigging mode submenu | ▣▣▣▣ p. 10 - 39 |
| 3 Error submenu | ▣▣▣▣ p. 10 - 45 |
| 4 Lifting capacity table submenu | ▣▣▣▣ p. 10 - 43 |
| 5 Settings submenu | ▣▣▣▣ p. 10 - 47 |
| 6 Monitoring submenu | ▣▣▣▣ p. 10 - 40 |
| 7 Serial number display | ▣▣▣▣ p. 10 - 61 |
| 8 Program version display | ▣▣▣▣ p. 10 - 61 |

10.1.12 SLI display – submenus

Enter rigging mode submenu



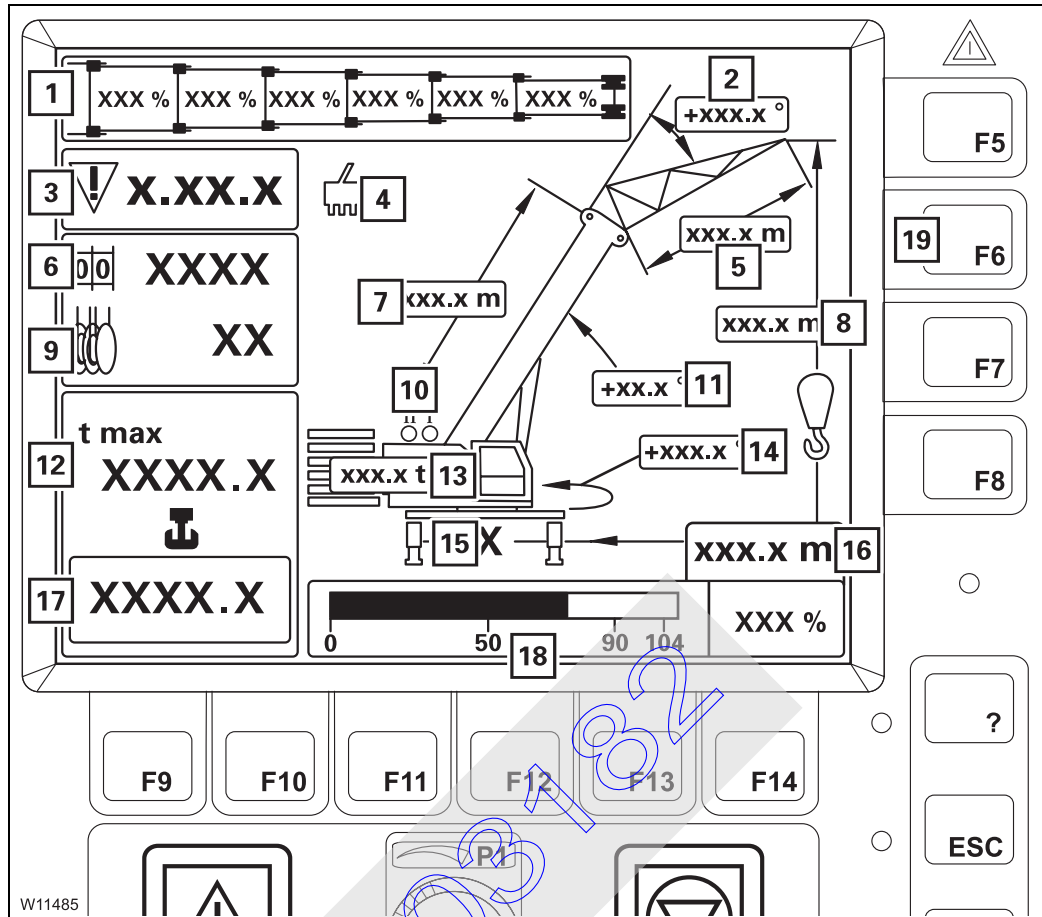
W10826

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

¹⁾ Additional equipment



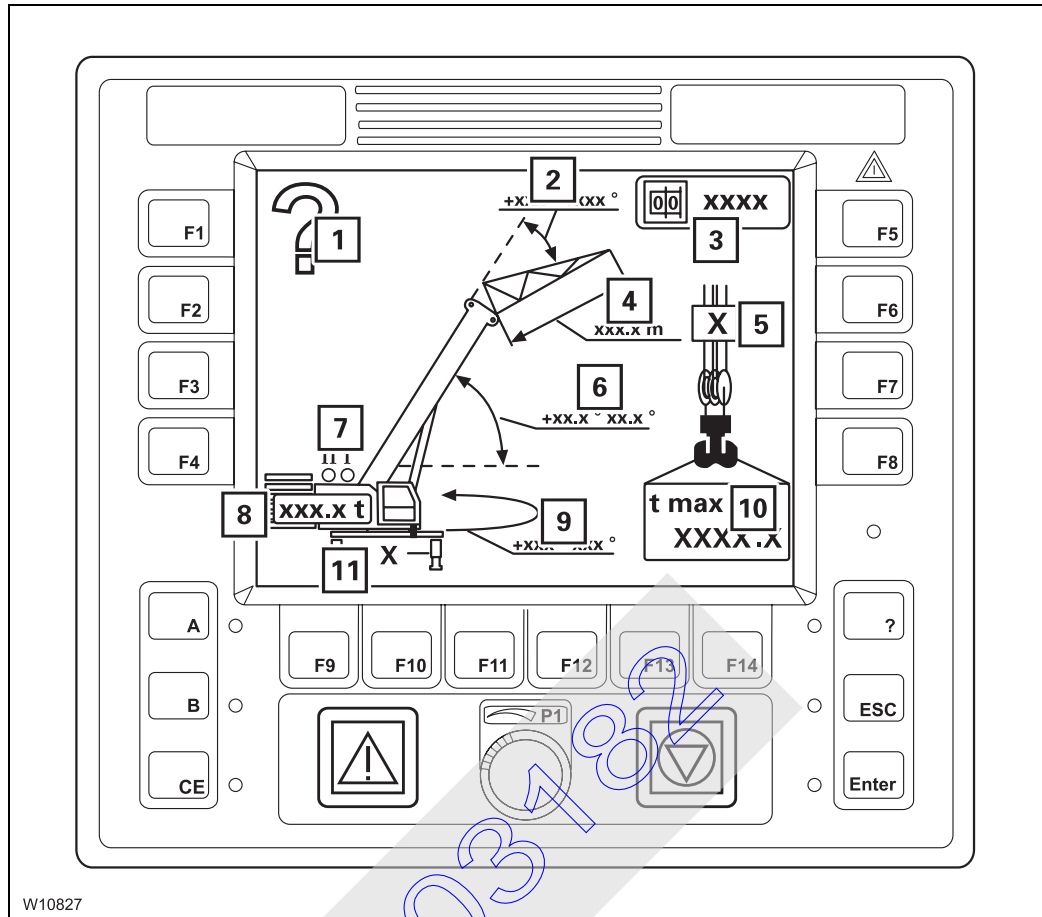
**Monitoring
 submenu**



1	Current telescoping display	▶▶▶▶ p. 10 - 96
2	Current lattice extension inclination display ¹⁾	▶▶▶▶ p. 10 - 97
3	Error display	▶▶▶▶ p. 10 - 97
4	Service symbol display	▶▶▶▶ p. 10 - 98
5	Lattice extension length display ¹⁾	▶▶▶▶ p. 10 - 98
6	SLI code display	▶▶▶▶ p. 10 - 95
7	Display of current main boom length	▶▶▶▶ p. 10 - 98
8	Current overall height display	▶▶▶▶ p. 10 - 98
9	Reeving display	▶▶▶▶ p. 10 - 95
10	Hoisting gears display	▶▶▶▶ p. 10 - 95
11	Current main boom angle display	▶▶▶▶ p. 10 - 97
12	Maximum load display	▶▶▶▶ p. 10 - 96
13	Counterweight display	▶▶▶▶ p. 10 - 95
14	Current slewing angle display	▶▶▶▶ p. 10 - 97
15	Outrigger span display	▶▶▶▶ p. 10 - 95
16	Current working radius display	▶▶▶▶ p. 10 - 98
17	Current load display	▶▶▶▶ p. 10 - 96
18	Current degree of utilization display	▶▶▶▶ p. 10 - 96
19	Lifting capacity table submenu	▶▶▶▶ p. 10 - 96
	submenu overview	▶▶▶▶ p. 10 - 43
1)	Additional equipment	



Rigging mode monitoring sub- menu



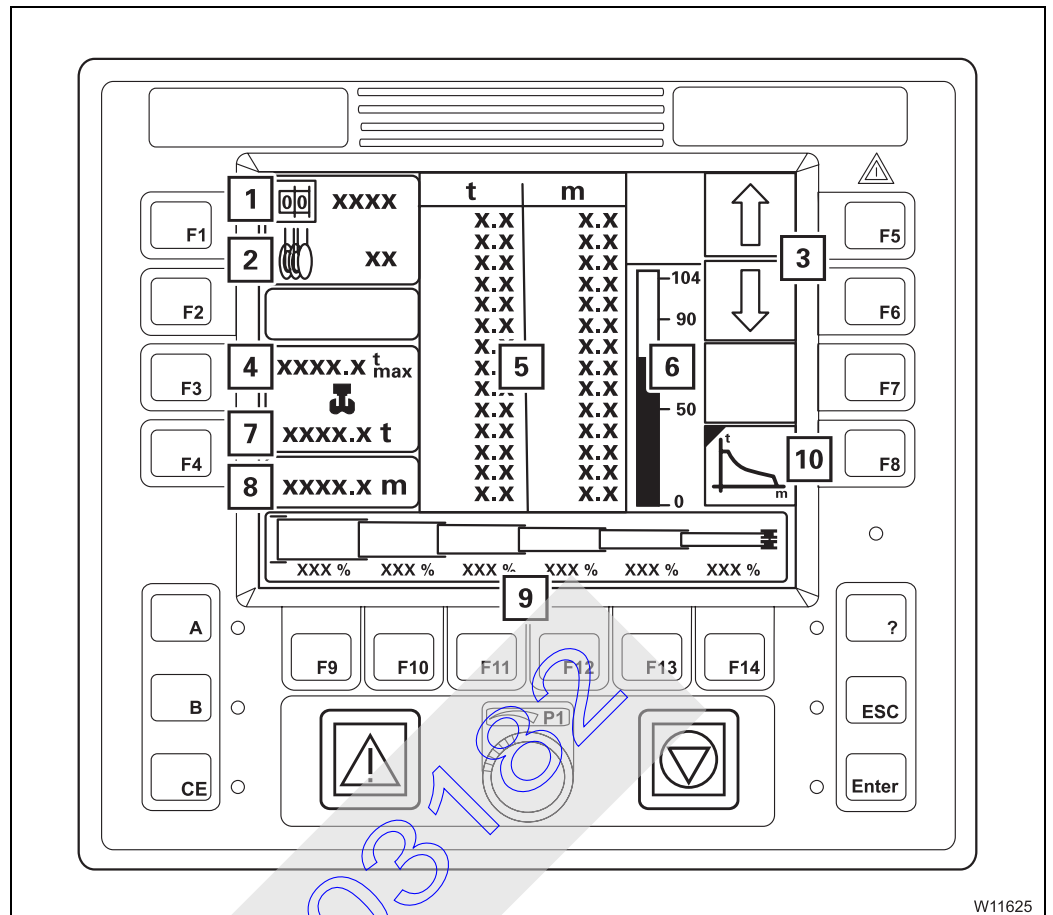
W10827

- 1 Query – accept rigging mode?
- 2 Permissible lattice extension working range¹⁾
- 3 SLI code
- 4 Lattice extension length
- 5 Reeving
- 6 Permissible main boom working range
- 7 Hoisting gears display
- 8 Counterweight
- 9 Permissible slewing range
- 10 Maximum load
- 11 Outrigger span

➡ Accept rigging mode, p. 12 - 26

- 1) Additional equipment

Lifting capacity table submenu



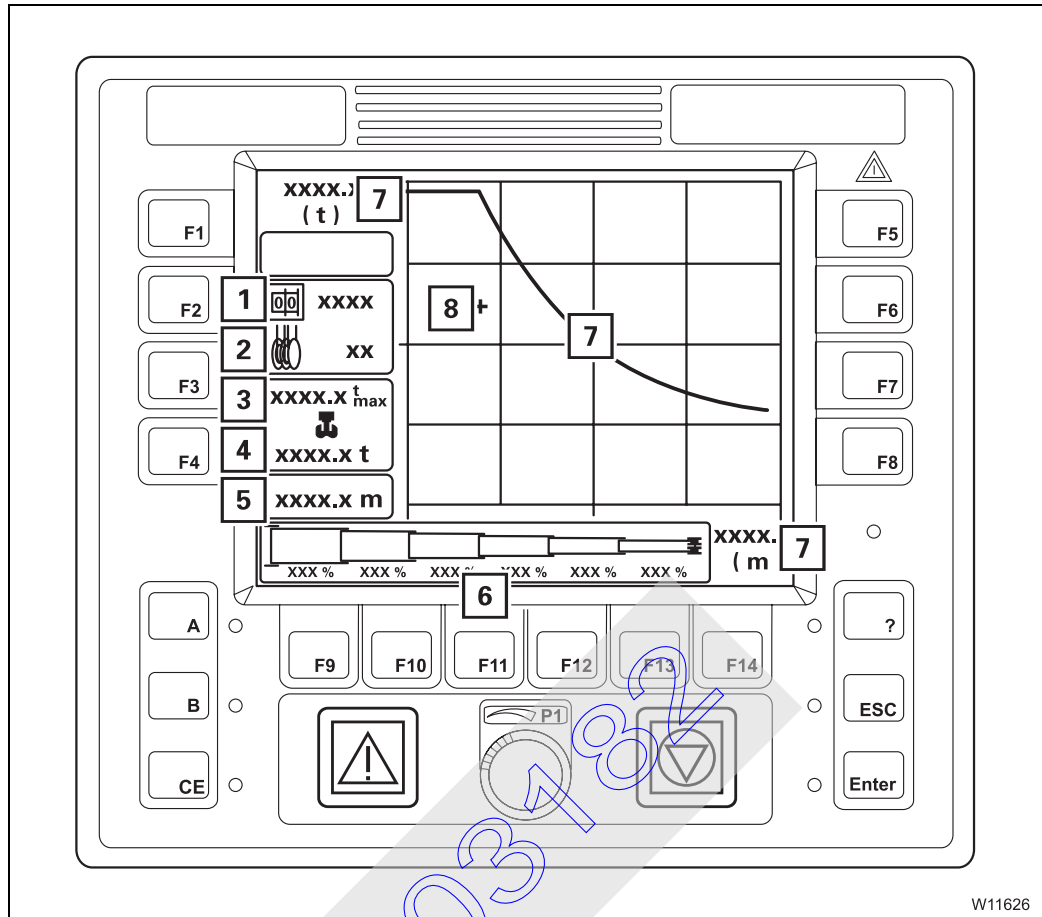
W11625

- | | | |
|--|------|------------|
| 1 SLI code display | ▣▣▣▣ | p. 10 - 99 |
| 2 Reeving display | ▣▣▣▣ | p. 10 - 99 |
| 3 Selection | ▣▣▣▣ | p. 10 - 98 |
| 4 Maximum load display | ▣▣▣▣ | p. 10 - 99 |
| 5 Lifting capacity table display | ▣▣▣▣ | p. 10 - 98 |
| 6 Current degree of utilization display | ▣▣▣▣ | p. 10 - 99 |
| 7 Current load display | ▣▣▣▣ | p. 10 - 99 |
| 8 Current working radius display | ▣▣▣▣ | p. 10 - 99 |
| 9 Telescoping display/input | ▣▣▣▣ | p. 10 - 98 |
| 10 Working range submenu ¹⁾ | ▣▣▣▣ | p. 10 - 44 |

¹⁾ Additional equipment



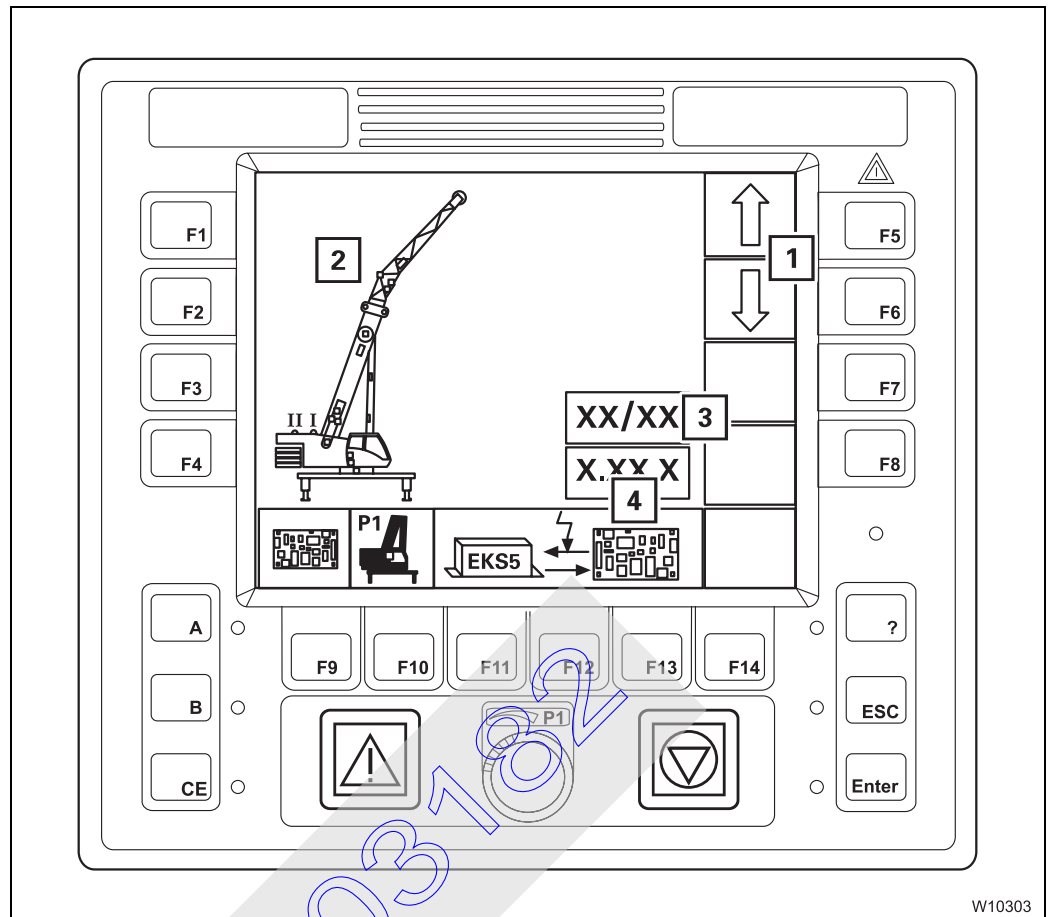
Working range submenu



W11626

- | | | |
|--|-------|------------|
| 1 SLI code display | ▣▣▣▣▶ | p. 10 - 99 |
| 2 Reeving display | ▣▣▣▣▶ | p. 10 - 99 |
| 3 Maximum load display | ▣▣▣▣▶ | p. 10 - 99 |
| 4 Current load display | ▣▣▣▣▶ | p. 10 - 99 |
| 5 Current working radius display | ▣▣▣▣▶ | p. 10 - 99 |
| 6 Telescoping display/input | ▣▣▣▣▶ | p. 10 - 99 |
| 7 Permissible working range display | ▣▣▣▣▶ | p. 10 - 99 |
| 8 Current position display | ▣▣▣▣▶ | p. 10 - 99 |

Error submenu



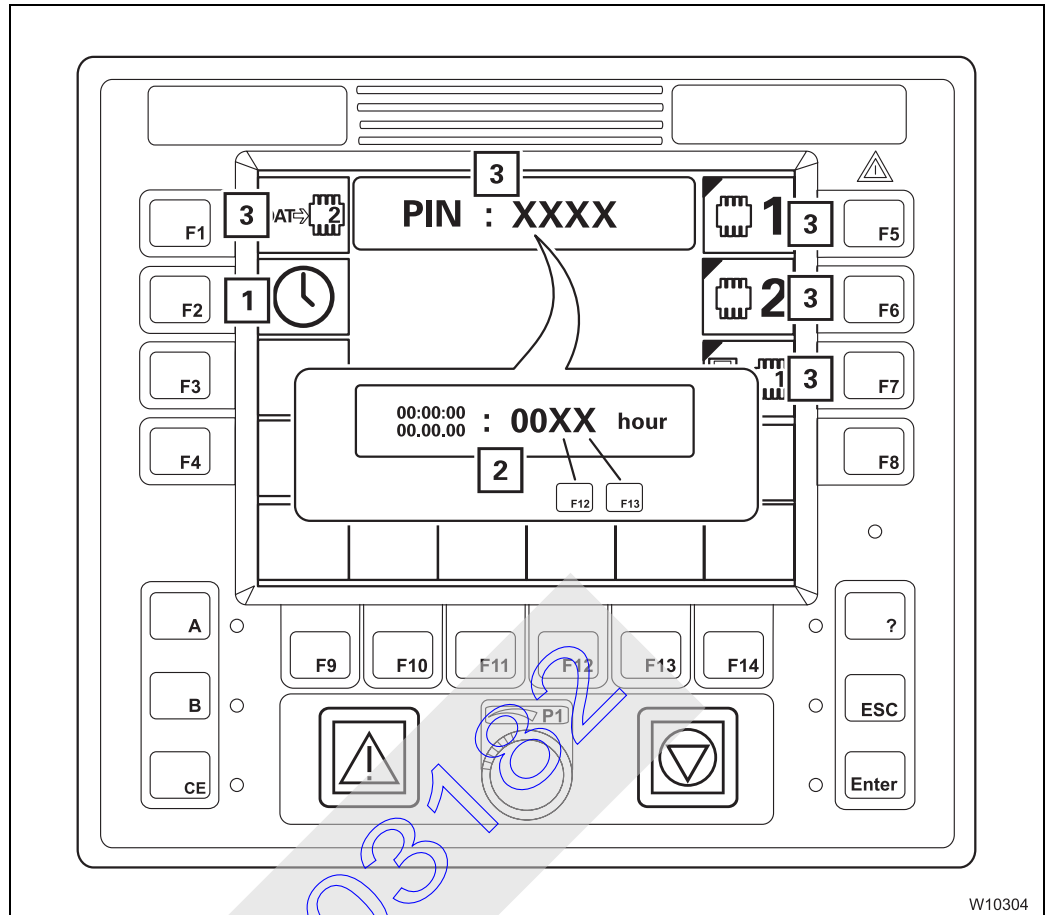
W10303

- | | | |
|--|-------|------------|
| 1 Selection | ▣▣▣▣▶ | p. 15 - 30 |
| 2 Display error location | ▣▣▣▣▶ | p. 15 - 30 |
| 3 Display of current error/total errors | ▣▣▣▣▶ | p. 15 - 30 |
| 4 Error display | ▣▣▣▣▶ | p. 15 - 30 |

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Settings submenu



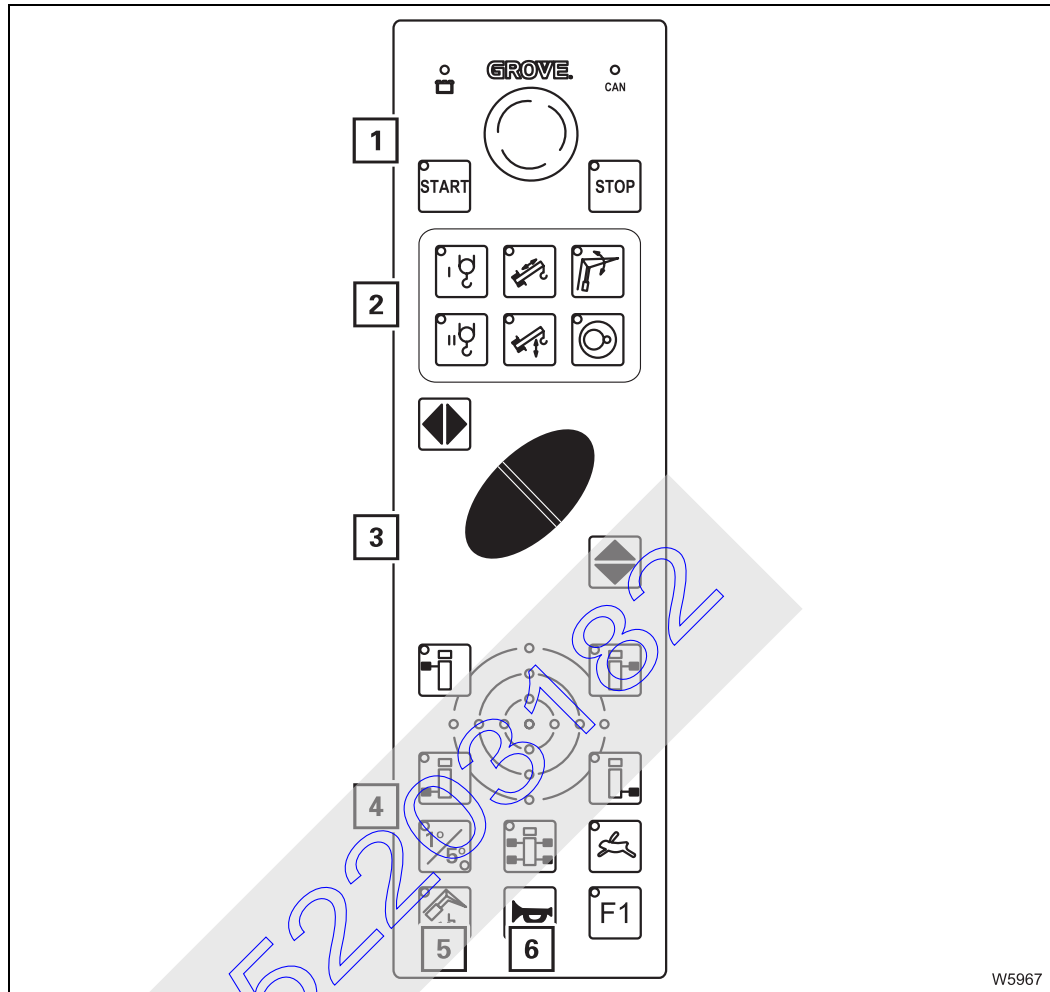
W10304

- 1** Enter time/ date ▶▶▶ p. 12 - 40
- 2** Enter time/ date display ▶▶▶ p. 12 - 40



Displays/buttons (3) are only shown if a service device is connected. Therefore, these functions are not described in these operating instructions.

10.1.13 Hand-held control

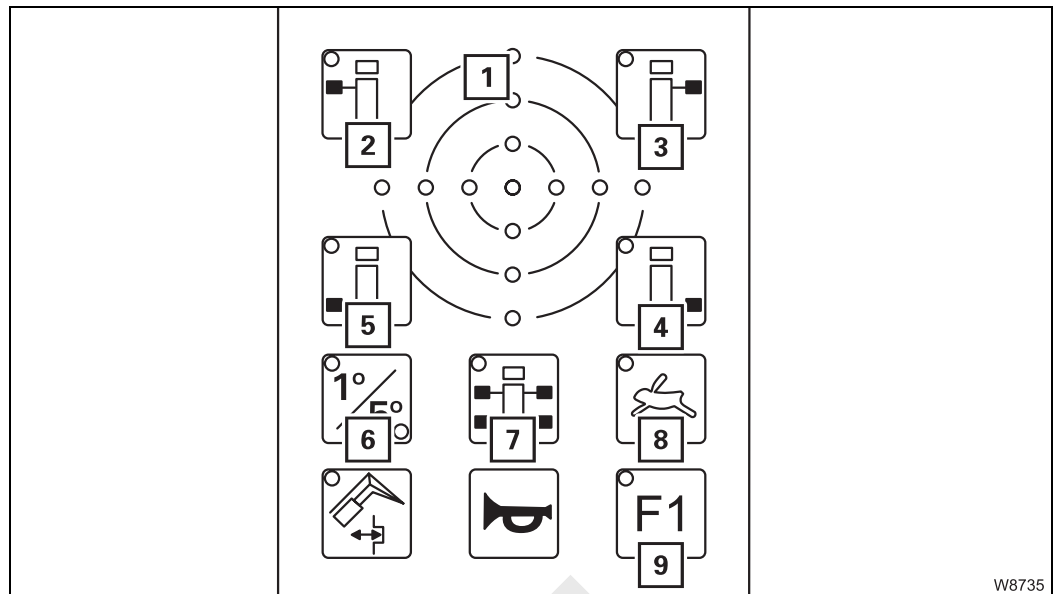


- 1 Engine control panel ➡ p. 10 - 105
- 2 Pre-select emergency operation ➡ p. 10 - 106
- 3 Function button ➡ p. 10 - 106
- 4 Outriggers control panel ➡ p. 10 - 49
- 5 No function
- 6 Horn ➡ p. 10 - 105



Required connections for the various operations; ➡ p. 10 - 104.

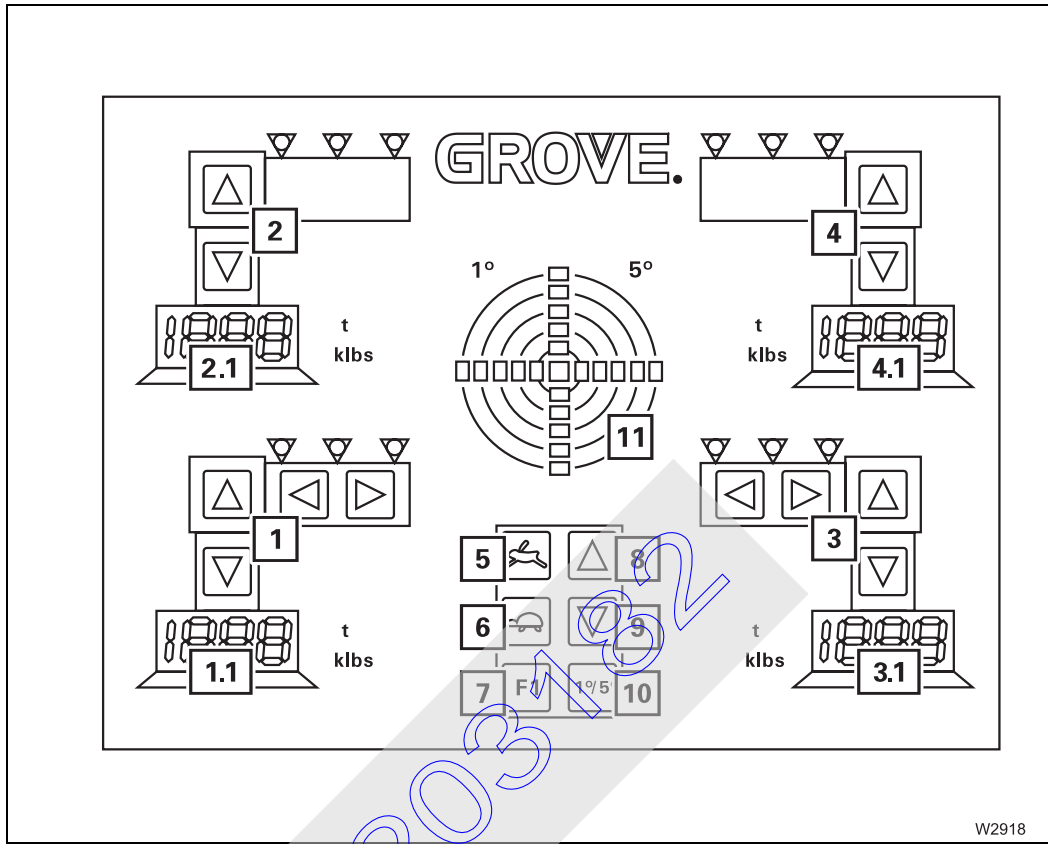
Outriggers control panel



W8735

- | | |
|--|---------------------------------|
| 1 Display of current inclination | ▶ p. 10 - 68 |
| 2 Pre-select front left-hand outrigger | ▶ p. 10 - 63 |
| 3 Pre-select front right-hand outrigger | ▶ p. 10 - 63 |
| 4 Pre-select rear left-hand outrigger | ▶ p. 10 - 63 |
| 5 Pre-select rear right-hand outrigger | ▶ p. 10 - 63 |
| 6 Change measuring range | ▶ p. 10 - 68 |
| 7 – Pre-select all outrigger cylinders
– Pre-select automatic alignment
(as additional function F1) | ▶ p. 10 - 63
 ▶ p. 10 - 63 |
| 8 Pre-select high-speed/normal speed mode | ▶ p. 10 - 63 |
| 9 Additional function F1 on | ▶ p. 10 - 63 |

10.1.14 On the outrigger control units





Opposite means: On the side of the carrier which is opposite to the operator when he/she is looking at the control unit.

Left-hand and right-hand mean: To the left or to the right of the control unit.

Outriggers

- | | | |
|---|---|------------------|
| 1 | Controlling the left-hand outrigger | ▶▶▶▶▶ p. 10 - 66 |
| 2 | Controlling the left-hand outrigger, opposite side | ▶▶▶▶▶ p. 10 - 66 |
| 3 | Controlling the right-hand outrigger | ▶▶▶▶▶ p. 10 - 66 |
| 4 | Controlling the right-hand outrigger, opposite side | ▶▶▶▶▶ p. 10 - 66 |
| 5 | Pre-select high-speed mode | ▶▶▶▶▶ p. 10 - 66 |
| 6 | – Pre-select normal mode | ▶▶▶▶▶ p. 10 - 66 |
| | – Automatic alignment (as additional function F1) | ▶▶▶▶▶ p. 10 - 67 |
| 7 | Additional function F1 on/position lights for indicator lamps | ▶▶▶▶▶ p. 10 - 67 |
| 8 | Retract all outrigger cylinders | ▶▶▶▶▶ p. 10 - 67 |
| 9 | Extend all outrigger cylinders | ▶▶▶▶▶ p. 10 - 67 |

Outrigger pressure display

- | | | |
|-----|--|------------------|
| 1.1 | Outrigger pressure display ¹⁾ for left-hand outrigger | ▶▶▶▶▶ p. 10 - 69 |
| 2.1 | Outrigger pressure display ¹⁾ for left-hand outrigger, opposite side | ▶▶▶▶▶ p. 10 - 69 |
| 3.1 | Outrigger pressure display ¹⁾ for right-hand outrigger | ▶▶▶▶▶ p. 10 - 69 |
| 4.1 | Outrigger pressure display ¹⁾ for right-hand outrigger, opposite side | ▶▶▶▶▶ p. 10 - 69 |

1) Additional equipment

Inclination display

- | | | |
|----|--------------------------------|------------------|
| 10 | Change measuring range | ▶▶▶▶▶ p. 10 - 68 |
| 11 | Display of current inclination | ▶▶▶▶▶ p. 10 - 68 |

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10.2

Short description of the operating elements



Risk of accidents due to operating error!

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

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 of the requirements that must be fulfilled in order for several operating elements to be active.

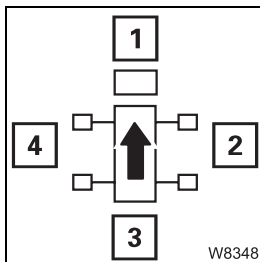
If some operating elements do not work, first read the following chapters which are referred to at the respective places before contacting **CraneCARE**.

10.2.1

Definition of positional references

Basic rule

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

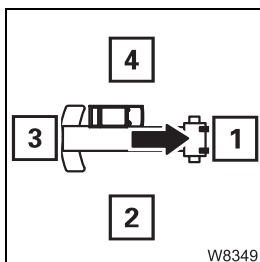


On the carrier

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

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

Forwards always means the driver's cab is to the front of the direction of travel, **backwards** always means the rear lights on the carrier are to the front of the direction of travel.



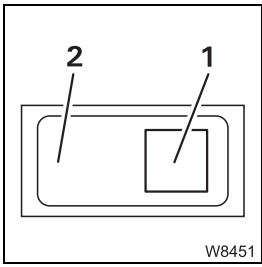
On the superstructure

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

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



Switch



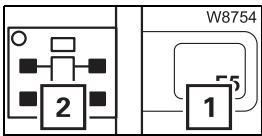
For switches and buttons, the terms **down** and **up** are used. Regardless of the fitting position (vertical, horizontal, diagonal, perpendicular or turned), the following always applies:

- **down:** press (1) – next to the symbol
- **up:** press (2) – opposite the symbol

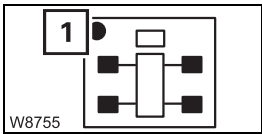
10.2.2

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:

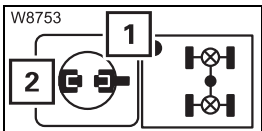


- A button (1) is only active when the corresponding symbol (2) is black. Buttons next to a grey symbol always have no function.

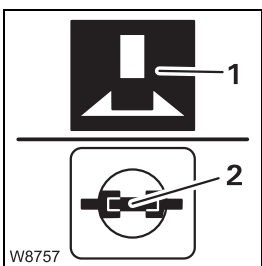


- Some switches have a dot (1). The colour of the dot indicates the current switching state of the button.

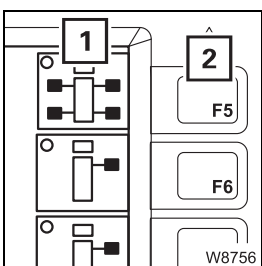
- **green:** Button on – the corresponding switching operation is being carried out.
- **black:** Button off – the corresponding switching operation is not being carried out.



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



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



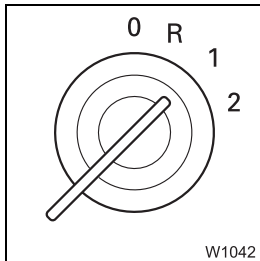
- If it says in this section e.g. to “Press button (1)...”, this always refers to the button (2) next to or below the symbol shown (1). Even when the button itself is not visible in the illustration.

10.2.3

Engine for crane operation

Side panel

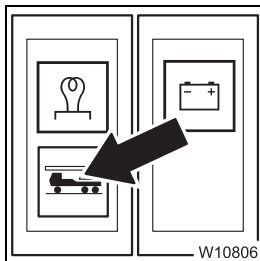
▣▣▣▣▶ Starting/turning off the engine – for crane operation, p. 11 - 1.



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, SLI
- **2** Starting position

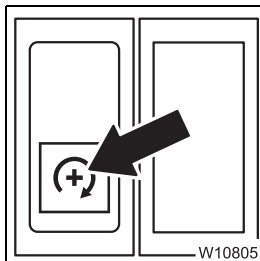
▣▣▣▣▶ p. 11 - 8



Carrier ignition indicator lamp

- **On:** Ignition in driver's cab on,
engine start for crane operation not possible
- **Off:** Ignition in driver's cab off,
engine start for crane operation possible

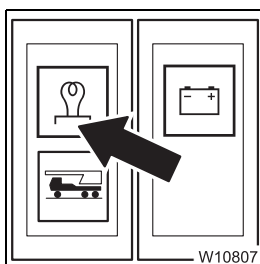
▣▣▣▣▶ p. 11 - 12



Setting the idling speed

- The engine is off:
 - **press down once:** Engine starts,
idling speed = standard
- The engine is running:
 - **press down:** Increases the idling speed
 - **press up:** Decreases the idling speed,
engine cutout after approx. 6 seconds.

▣▣▣▣▶ p. 11 - 16

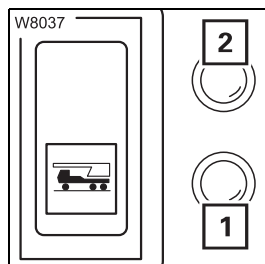


Flame start system indicator lamp

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

▣▣▣▣▶ p. 11 - 13





Soot particle filter indicator lamp

- 1 Yellow lamp lights up:** Early warning: clean soot particle filtering system
- 2 Orange lamp lights up:** Clean/replace soot particle filtering system;
 ▣▣▣▣▶ *Maintenance Manual*

ECOS display

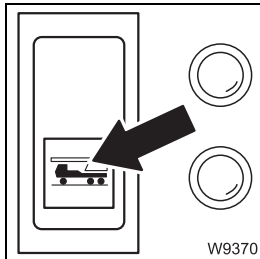
There is no short description of the displays in the submenus;
▣▣▣▣▶ *Monitoring submenu*, p. 11 - 15,
▣▣▣▣▶ *Warning submenu*, p. 12 - 105.

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10.2.4

Engine for driving

Side panel



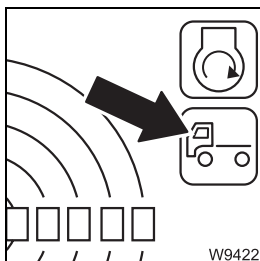
Carrier ignition indicator lamp

There is an indicator lamp in the button.

- **once down:** Ignition on – lamp flashes
after engine start: lamp lights up
- **once up:** Ignition off – lamp goes out when engine is running – engine cutout

➡ p. 13 - 23

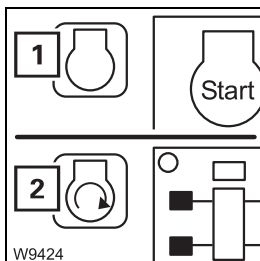
Outriggers sub-menu



Carrier ignition display

- **red:** Ignition off – engine start not possible
- **green:** Ignition on – engine start possible

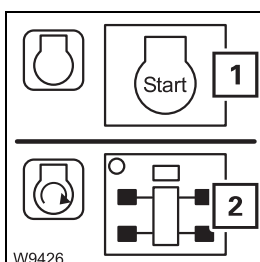
➡ p. 13 - 25



Display for engine for driving on/off

- 1 red:** Engine off
- 2 green:** Engine on

➡ p. 13 - 25



Start engine for driving

The carrier ignition is switched on.

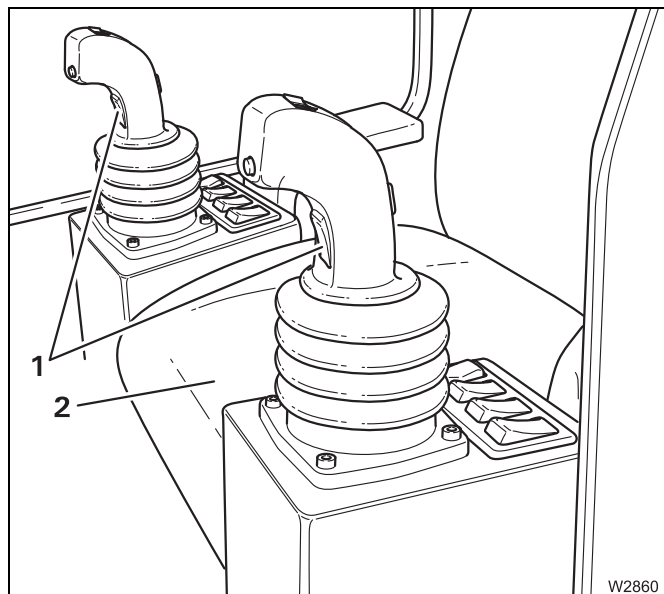
- 1 Starting the engine:** Press button 1 once – motor starts
- 2 Motor running:** Button has function *Pre-select all outrigger cylinders,*
switch off engine – carrier ignition off

➡ p. 13 - 25

10.2.5

Seat contact switch and dead man's switch

The seat contact switch and the dead man's switch are safety devices for crane function enabling.



Enable 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.

► *Seat contact switch and dead man's switch, p. 12 - 10*

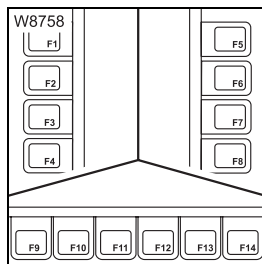
10.2.6

ECOS crane control

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

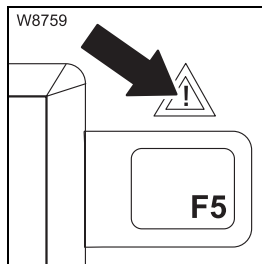
Control unit

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



Buttons F1 to F14

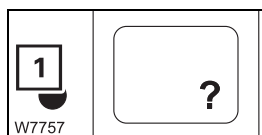
The function of buttons F1 to F14 is shown on the symbol next to or above the button. After the button is pressed, the function displayed is executed if it has been released.



Error/warning message

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

➡ p. 12 - 108

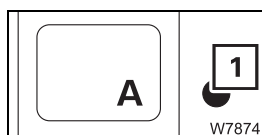


Open Error submenu

The lamp (1) lights up or flashes.

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

➡ p. 12 - 108

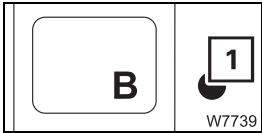


Open the Warning submenu

The lamp (1) lights up or flashes.

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

➡ p. 12 - 105

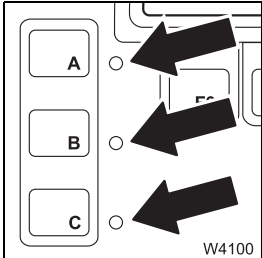


Open the Warning submenu

The lamp (1) lights up or flashes.

– **Press button once:** The *Warning* submenu for the carrier opens

▣▣▣▣▶ p. 5 - 45



Enter keycode

The lamps next to all three buttons are lit.

– **Enter keycode:** Press buttons in the required order and confirm keycode.

▣▣▣▣▶ p. 15 - 43



Exit the submenu/input mode

The lamp (1) lights up.

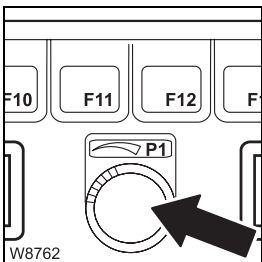
– **Press button once:** – The opened submenu is closed – the menu from the next level up opens
 – Input mode is deactivated



Confirm your entry

The lamp (1) lights up.

– **Press button once:** A newly entered value is stored



Enter values

Input mode is activated.

– **To the right:** Increase the value

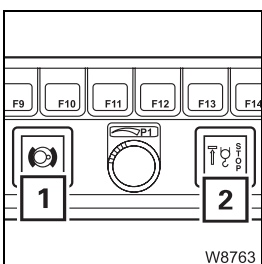
– **To the left:** Reduce the value

Slow turning changes the value slowly

Fast turning changes the value fast

▣▣▣▣▶ p. 12 - 98

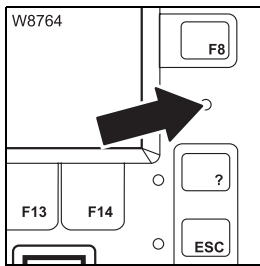
▣▣▣▣▶ p. 12 - 118



Other:

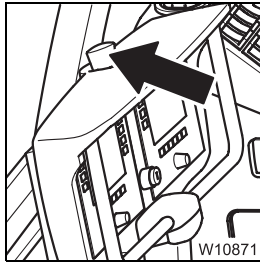
1 Slewing gear brake indicator lamp; ▣▣▣▣▶ p. 10 - 76

2 Lifting limit switch warning; ▣▣▣▣▶ p. 10 - 76



Sensor for brightness

Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted.
Manual input; p. 11 - 11.

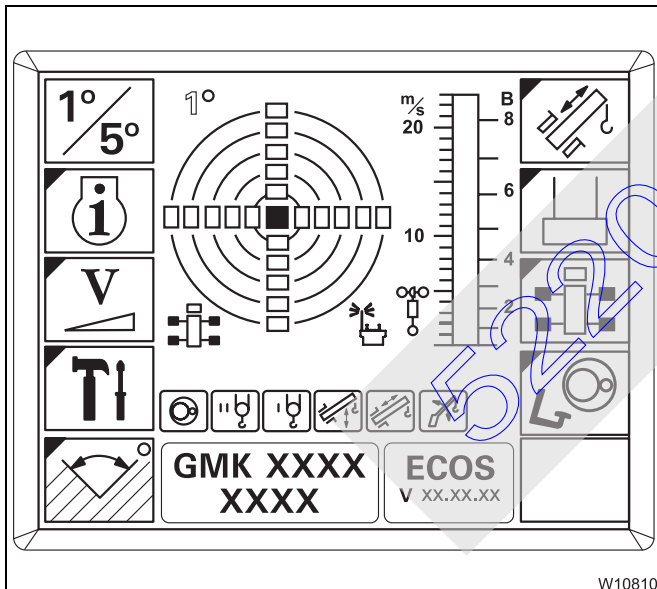


Emergency stop switch

May be actuated in an emergency only.

- **Press:** Engine off – crane functions stop immediately. Switch engages
- **Turn engaged switch:** Switch returns to initial position – crane functions released

p. 11 - 20

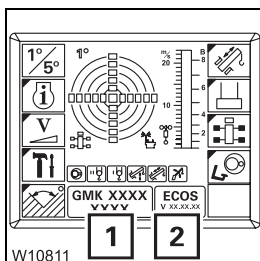


ECOS display

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 and program version displays

- 1 Shows the serial number which is on the *name plate on the superstructure*; p. 1 - 3.
- 2 Shows the current ECOS program version – always state in the event of malfunctions; p. 15 - 36.

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10.2.7

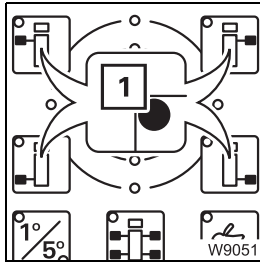
Outriggers

▣▣▣▣ Extending/Retracting the outrigger beams, p. 13 - 35

▣▣▣▣ Extending/Retracting outrigger cylinders, p. 13 - 43

Hand-held control

All directional information relates to the carrier; ▣▣▣▣ p. 10 - 53.

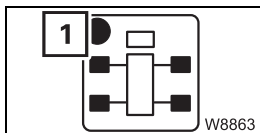


Pre-selecting the outriggers at the front left/right and rear left/right

The pre-selection buttons are all operated in the same way.

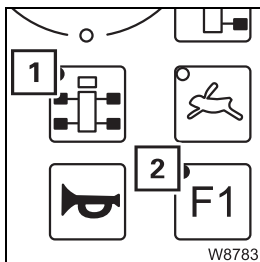
- **Pre-select:** Press button once – lamp (1) lights up – pre-selection on
After 10 seconds – lamp (1) goes out – pre-selection off

As long as the lamp (1) is on, you can pre-select additional outriggers.



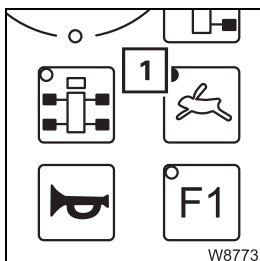
Pre-select all outrigger cylinders

- **Pre-select:** Press button once – lamp (1) lights up – pre-selection on
After 10 seconds – lamp (1) goes out – pre-selection off



Pre-select automatic alignment

- **Pre-select:** Press button once, press button once, lamps (1) and (2) light up – pre-selection on
After 10 seconds – lamps go out – pre-selection off



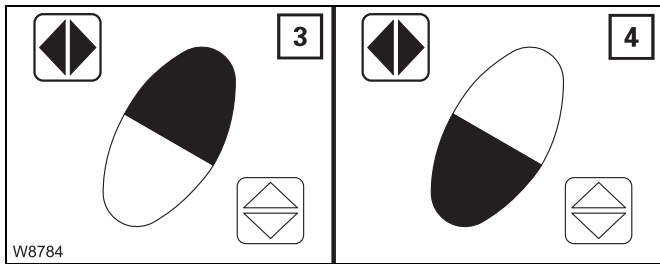
Pre-select high-speed/normal speed mode

- **Pre-select:**
 - Press button once – lamp (1) lights up – high-speed mode pre-selection on
 - Press button once – lamp (1) goes out – normal speed mode pre-selection on



Function buttons

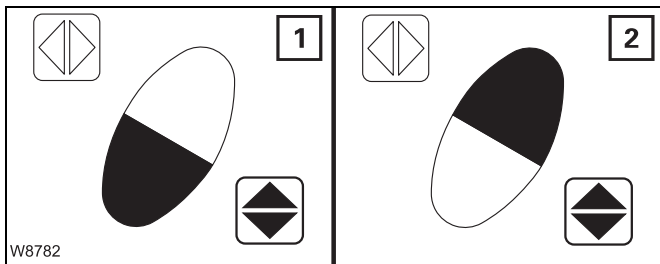
There are four button combinations to execute the pre-selected functions.
 Actuated buttons are shown black:



Outrigger beams

Only outrigger beams on the same side have been pre-selected.

- 3 Extend
 - 4 Retract
- ➡ p. 13 - 37

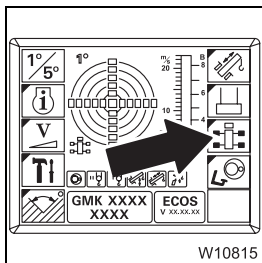


Outrigger cylinders

- 1 Extend
Automatic alignment
 - 2 Retract
- ➡ p. 13 - 45

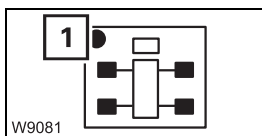
In the Outriggers submenu

All directional information relates to the carrier; ➡ p. 10 - 53.



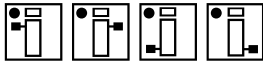
Outriggers submenu

- Open: Press button once – submenu opens



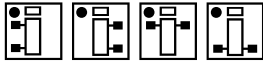
Pre-selecting all outrigger cylinders

- Pre-select: Press button once – dot (1) green – pre-selection on
 After 10 seconds – dot (1) black – pre-selection off



Pre-selecting the outriggers at the front left/right and rear left/right

The operation is the same as for *Pre-selecting all outrigger cylinders*.

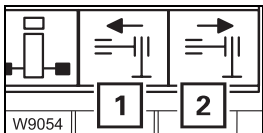


Pre-selecting left, right, front and rear outriggers

The operation is the same as for *Pre-selecting all outrigger cylinders*.

Retracting/Extending outrigger beams/cylinders

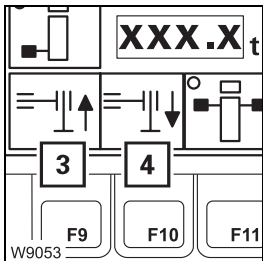
The slewing gear is switched off – outrigger pre-selection on



1 To retract: Press button – outrigger beam retracts

2 To extend: Press button – outrigger beam extends

➡ p. 13 - 39

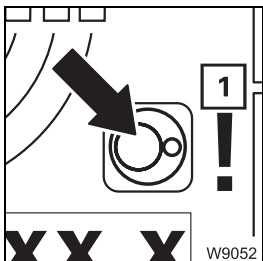


3 To retract: Press button – outrigger cylinder retracts

4 To extend: Press button – outrigger cylinder extends

➡ p. 13 - 46

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

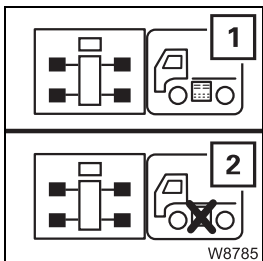


Slewing gear/movements locked display

– **Red:** Slewing gear switched off

– **Green:** Slewing gear switched on – outrigger movements locked, symbol (1) appears after outrigger pre-selection

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

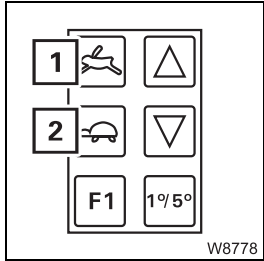
➡ p. 13 - 31



On the outrigger control units

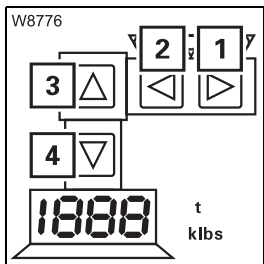
All directional information relates to the carrier; p. 10 - 53.

For operation in crane mode, the display fields in the *Settings* submenu need to be switched on.



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-hand outriggers (next to control unit)

Button or is pressed.

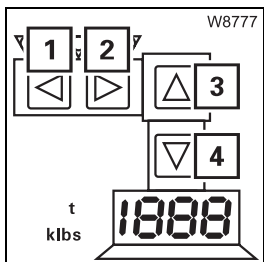
- 1 To retract:** Press button – outrigger beam retracts¹⁾
- 2 To extend:** Press button – outrigger beam extends¹⁾
- 3 To retract:** Press button – outrigger cylinder retracts
- 4 To extend:** Press button – outrigger cylinder extends

¹⁾ only on operator's side

Outrigger beams; p. 13 - 35

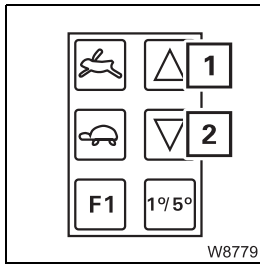
Outrigger cylinders; p. 13 - 44

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



Operating the right-hand outriggers (next to control unit)

Operation is the same as on the button unit for *Outriggers to the left of display field*.

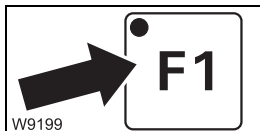


Retracting/Extending all outrigger cylinders

Button or is pressed.

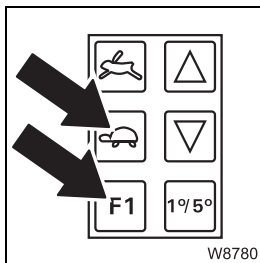
- 1 To retract:** Press button – all outrigger cylinders retract
- 2 To extend:** Press button – all outrigger cylinders extend

The movement stops after the button is released, and when an end position is reached; p. 13 - 44.



Additional function F1 on

Use always in combination with other buttons.



– Automatic alignment:

Press and additionally –

Truck crane is aligned horizontally

The process stops as soon as the truck crane is aligned horizontally or when releasing the button.

p. 13 - 51



Position lights for indicator lamps

Light up when the ignition is on.

– Display field lighting off:

Ignition on and no button actuated yet or no button actuated within the last 10 seconds

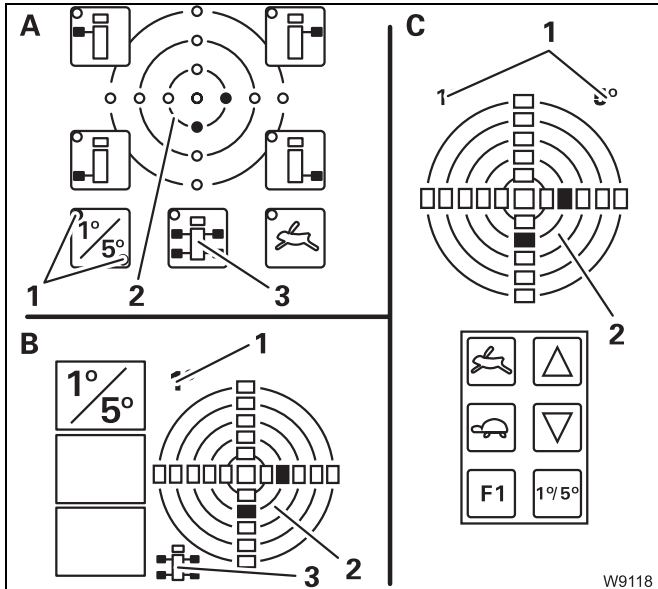
– Display field lighting on:

Press any button

p. 13 - 36

10.2.8 Inclination displays

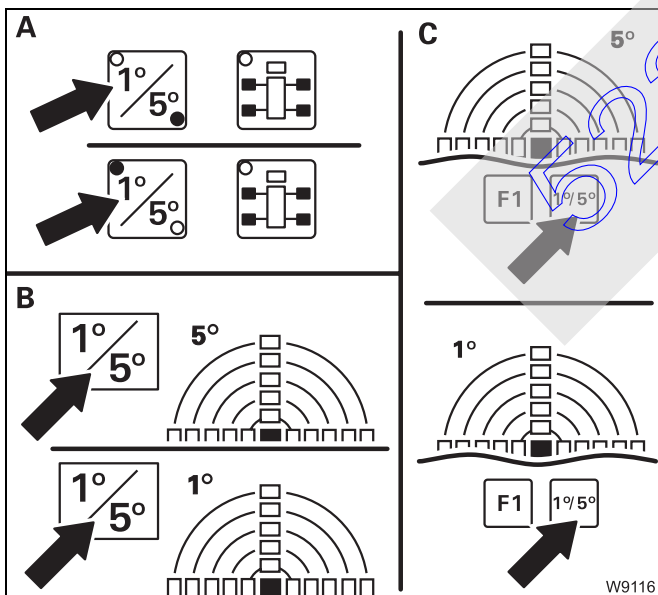
► *Inclination displays*, p. 13 - 48



Display of current inclination

- A** On the hand-held control
- B** In the main menu
In the *Outriggers submenu*
- C** On the *Outrigger control units*

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



Change measuring range

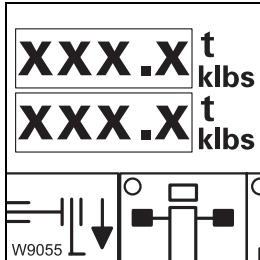
- A** On the hand-held control
Press button once – lamp for current measuring range 1° or 5° lights up

- B** In the main menu
In the *Outriggers submenu*
- C** On the *Outrigger control units*
Press button once – the current measuring range 1° or 5° is shown

10.2.9

Outrigger pressure displays

Outriggers submenu

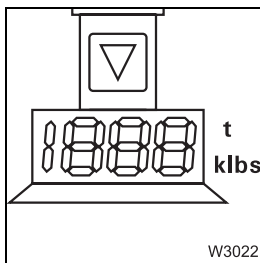


Outrigger pressure display

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

➡ p. 13 - 53

Outrigger control units



Outrigger pressure display

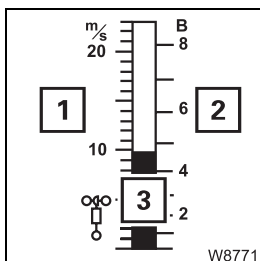
- **Unit of measurement** Lights up, depending on setting
 - **t** – tons or
 - **klbs** – kilopounds – (1 kilopound = 1000 lbs)
- **Precision:** With **t** one decimal place
With **klbs** no decimal point

➡ p. 13 - 53

10.2.10

Anemometer displays

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



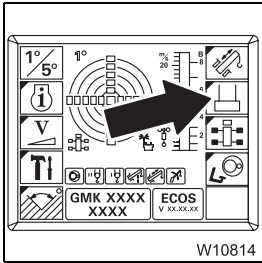
- 1 Scale in meters per second (m/sec)
- 2 Beaufort scale (B)
- 3 Display of wind speed

➡ p. 12 - 42

10.2.11 Counterweight submenu

Counterweight submenu

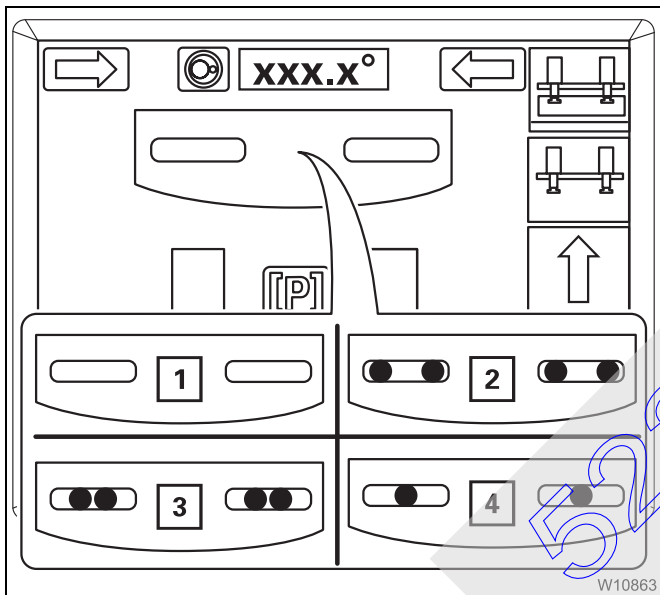
- ▣▣▣▣ *Rigging/Unrigging the counterweight*, p. 13 - 55,
- ▣▣▣▣ *Counterweight hoist unit*, p. 13 - 68.



W10814

Counterweight submenu

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



W10863

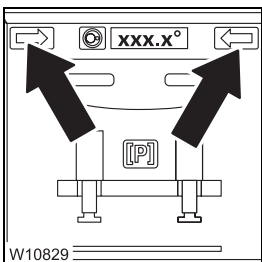
Rigging position display

- 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 locked
- 4 green – position for lifting/lowering the counterweight (0° position)

- ▣▣▣▣ p. 13 - 70

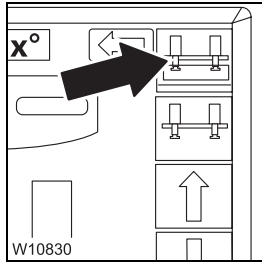


W10829

Display of slewing direction for automatic mode

The automatic mode is switched on.

- **Arrow lights up:** Move control lever for slewing gear in direction of arrow – automatic mode is executed



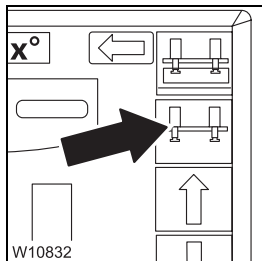
Automatic mode, rigging

- **Display** **yellow:** Recognition that counterweight is rigged
- flashing:** Automatic mode on
- grey:** Automatic mode cancelled or no recognition that counterweight is rigged

The superstructure is within the rigging range, the slewing gear is switched on and the lifting cylinders are retracted

- **To switch on:** 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 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. 13 - 70



Automatic unrigging

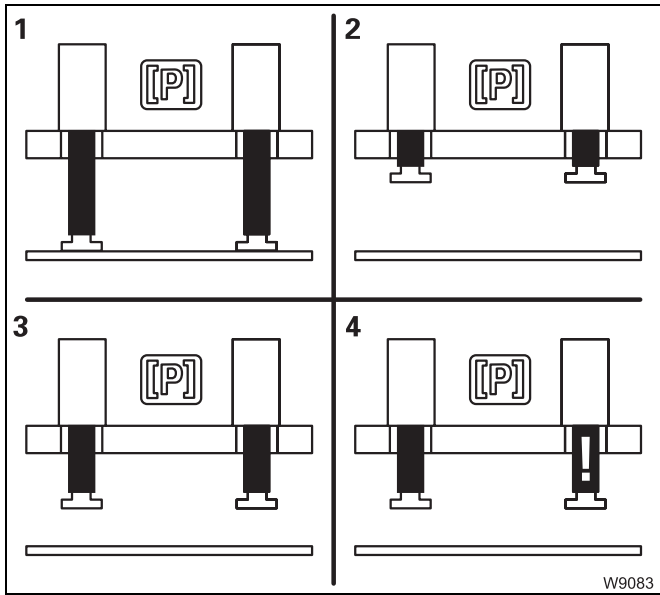
- **Display** **yellow:** Recognition that counterweight is unrigged
- flashing:** Automatic mode on
- grey:** Automatic mode cancelled or no recognition that counterweight is unrigged

The superstructure is in 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 counterweight,
 move control lever for slewing gear in indicated direction, automatically:
 - Slewing in position *Move lifting cylinders*,
 - Retract lifting cylinders,
 Automatic mode ends – symbol yellow

➡ p. 13 - 72



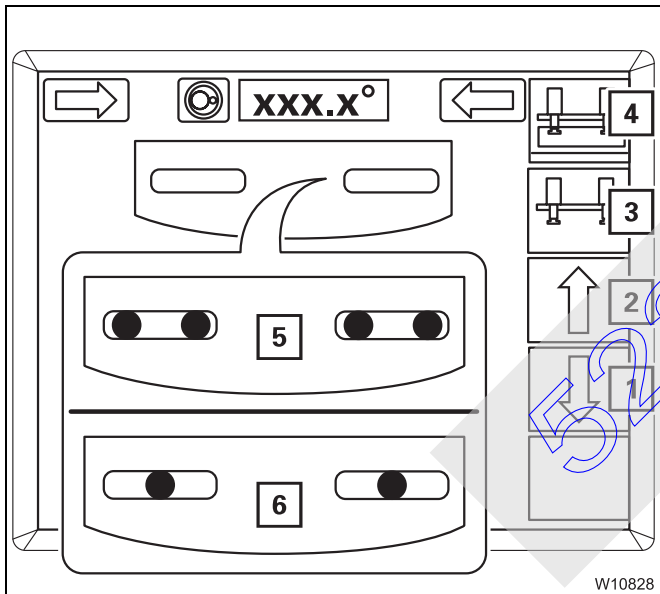


Lifting cylinder position display

The current status of the counterweight lifting cylinders is shown by different symbols:

- 1 green – extended
- 2 green – retracted
- 3 yellow – intermediate position
- 4 violet – error

➡ p. 13 - 69



Extending/Retracting the lifting cylinders

1 To extend:

- Display (5) and symbol (3) yellow or
- Display (6) and symbol (4) yellow

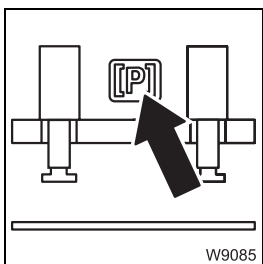
Press button – slewing is locked after extension

2 To 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;

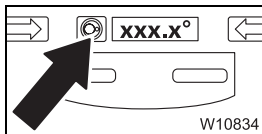
➡ p. 13 - 69.



Charging pressure display

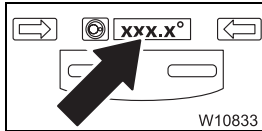
- Green: Charging pressure reached
- Red: Charging pressure too low – precharge counterweight

➡ p. 13 - 70



Slewing gear display

Identical with the display in the *Slewing gear/Houselock* submenu;
p. 10 - 77.



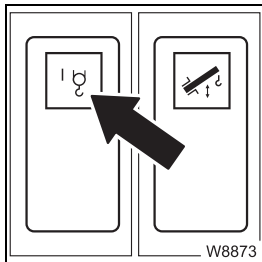
Current slewing angle display

Identical with the display in the *Slewing gear/Houselock* submenu;
p. 10 - 77.

10.2.12

Main hoist

Main hoist, p. 12 - 45.

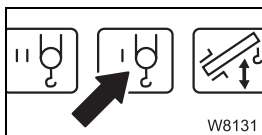


Main hoist on/off

There is an indicator lamp in the button.

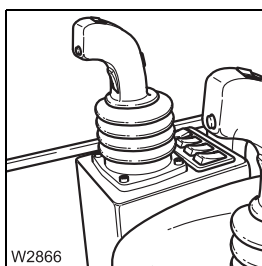
- **Press once** – Lamp bright – main hoist on
- Lamp dim – main hoist off

p. 12 - 46



Power units display

- **Green:** Main hoist on
- **Red:** Main hoist off

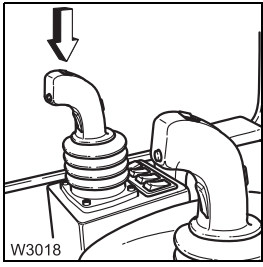


Right-hand control lever

- **To the rear:** Lifting
- **To the front:** Lowering

p. 12 - 46

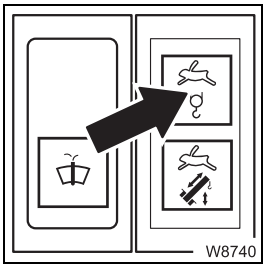




Hoisting gear high-speed mode on/off

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

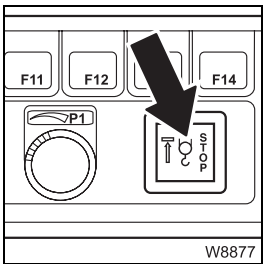
▣▣▣▶ p. 12 - 46



Hoisting gear high-speed mode on/off display

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

▣▣▣▶ p. 12 - 46



Warning lamp for lifting limit switch shutdown

- **On:** Lifting limit switch triggered – hoisting gear stops
- **Flashing:** Lifting limit switch triggered – shutdown bypassed
- **Off:** Lifting limit switch not triggered

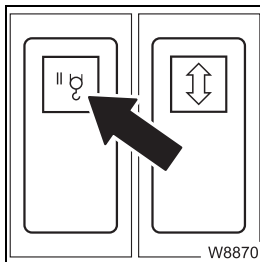
▣▣▣▶ p. 12 - 51

52203192

10.2.13

Auxiliary hoist

▣▣▣▣▶ *Auxiliary hoist*, p. 12 - 48.

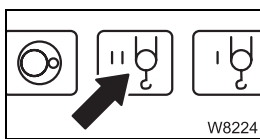


Auxiliary hoist on/off

There is an indicator lamp in the button.

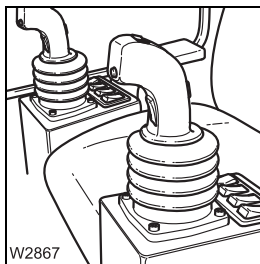
- **Press once** - Lamp bright – auxiliary hoist on
- Lamp dim – auxiliary hoist off

▣▣▣▣▶ p. 12 - 48



Power units display

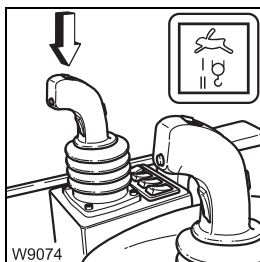
- **Green:** Auxiliary hoist on
- **Red:** Auxiliary hoist off



Left-hand control lever

- **To the rear:** Lifting
- **To the front:** Lowering

▣▣▣▣▶ p. 12 - 49



Button and lamp for hoisting gear high-speed mode

Short description with main hoist

Warning lamp for lifting limit switch shutdown

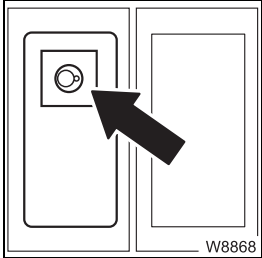
Short description with main hoist

10.2.14

Slewing gear

Control panels

▣▣▣▣▶ *Slewing gear*, p. 12 - 88.

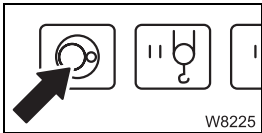


Slewing gear on/off

There is an indicator lamp in the button.

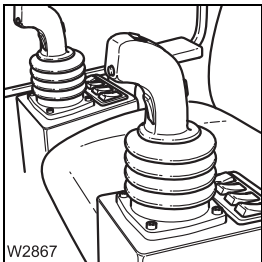
- **Press once**
- Lamp bright – slewing gear on
Slewing gear brake released
- Lamp dim – slewing gear off
Slewing gear brake engaged

▣▣▣▣▶ p. 12 - 89



Power units display

- **Green:** Slewing gear on
- **Red:** Slewing gear off

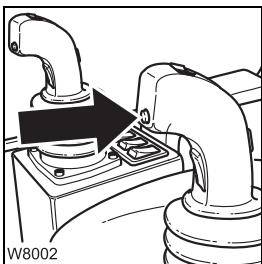


Left-hand control lever

The counterweight lifting cylinders are retracted.



- **To the left:** Slew to the left
- **To the right:** Slew to the right

▣▣▣▣▶ p. 12 - 90

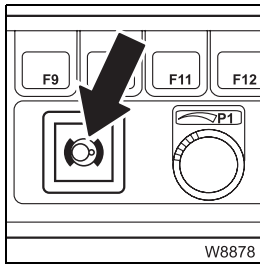


Slewing gear freewheel

The slewing gear brake is switched to function *control lever* (▣▣▣▣▶ p. 10 - 78), the slewing gear is switched on.

- **To switch on:** Move control lever to zero position and press button – slewing gear brake released, lamp  goes out.
- **To switch off:** Release switch – slewing gear brake engaged, lamp  lights up

▣▣▣▣▶ p. 12 - 93

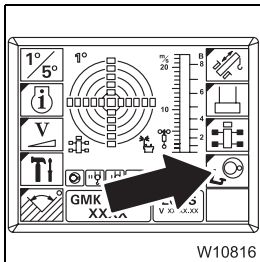


Slewing gear brake engaged/released

- **On:** Slewing gear brake engaged
- **Off:** Slewing gear brake released

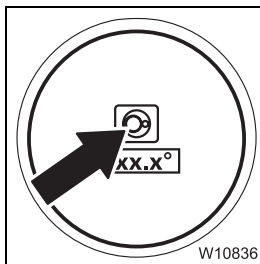
▣▣▣▣▶ p. 12 - 89

Submenu



Slewing gear/Houselock submenu

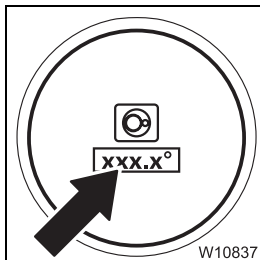
- **To open:** Press button once – submenu opens



Slewing gear display

- **Green:** Slewing gear switched on
- **Red:** Slewing gear switched off

▣▣▣▣▶ p. 12 - 89

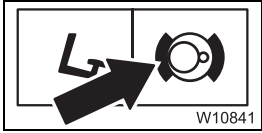


Current slewing angle display

- 0°:** Position 0° to the rear – locking point
- 180°:** Position 180° to the front – locking point
- +0.1 to +180.0°:** Turned to the right from 0°
- 0.1 to -179.9°:** Turned to the left from 0°

▣▣▣▣▶ p. 12 - 91

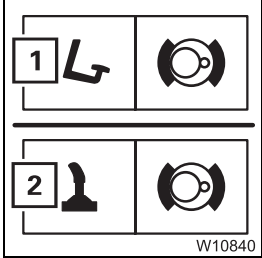




Switch slewing gear brake function

Slewing gear is switched on

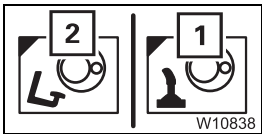
- **To switch:** Press button once – function is shown



Slewing gear brake function display

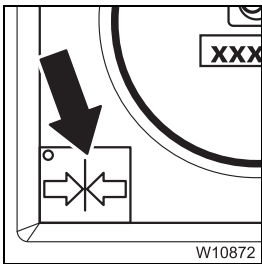
- 1 Brake plate function**
 Brake slewing movements – actuate *Slewing gear* brake pedal
- 2 Control lever function**
 Brake slewing movement – control lever in zero position
Slewing gear brake plate without function

▶▶▶ p. 12 - 93



Slewing gear function display – main menu

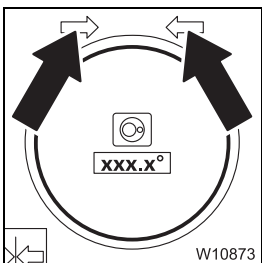
- 1 Brake plate function**
- 2 Control lever function**



Stop at 0°/180°

- **To switch on:** Press button until the dot turns **green**.
 When 0° or 180° is reached:
 - Automatic slewing stop
 - Slewing gear brake engaged
 - Slewing blocked
- **To switch off:** Press button until the dot turns **black**.
 - Enable slewing
 After switching on the ignition, the dot is black

▶▶▶ p. 12 - 92



Display of slewing direction to 0°/180°

Current position $\pm 20^\circ$ in front of the 0° or 180° superstructure position.

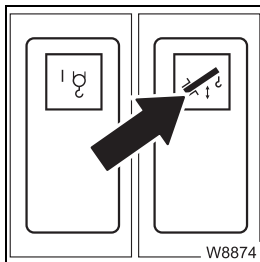
- **Both arrows:** 0° or 180° superstructure position reached
- **One arrow:** Arrow direction = slewing direction to reach 0° or 180°

▶▶▶ p. 12 - 92

10.2.15

Derricking gear

▣▣▣▣ ▸ *Derricking gear*, p. 12 - 54.

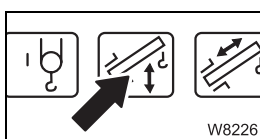


Derricking gear on/off

There is an indicator lamp in the button.

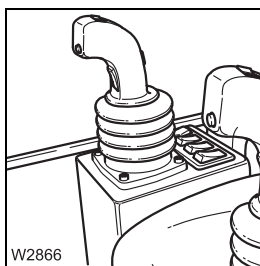
- **Press once** - Lamp bright – derricking gear on,
 Power units with the same control lever assignment off
- Lamp dim – derricking gear off

▣▣▣▣ ▸ p. 12 - 54



Power units display

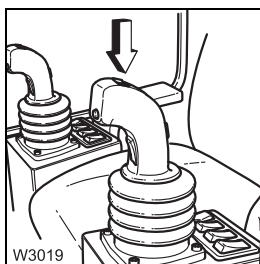
- **Green:** Derricking gear on
- **Red:** Derricking gear off



Right-hand control lever

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

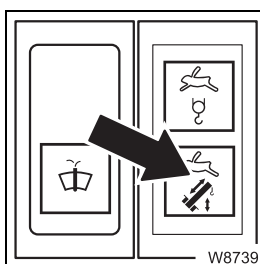
▣▣▣▣ ▸ p. 12 - 54



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

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

▣▣▣▣ ▸ p. 12 - 54



Derricking gear/Telescoping mechanism display on/off

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

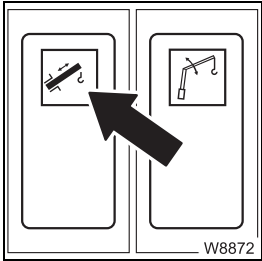
▣▣▣▣ ▸ p. 12 - 54

10.2.16

Telescoping mechanism

Control panels

▣▣▣▣ ➔ *Telescoping mechanism*, p. 12 - 57.



Telescoping mechanism on/off

There is an indicator lamp in the button.

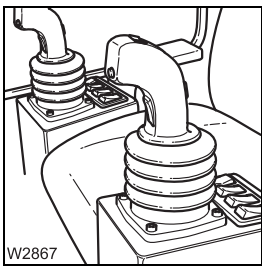
- **Press once**
- Lamp bright – telescoping mechanism on, Power units with the same control lever assignment off
- Lamp dim – telescoping mechanism off

▣▣▣▣ ➔ p. 12 - 65



Power units display

- **Green:** Telescoping mechanism on
- **Red:** Telescoping mechanism off

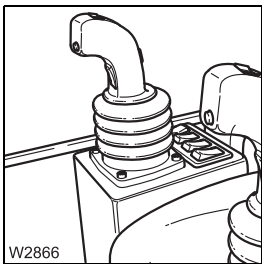


Left-hand control lever

Control lever assignment – version 1

- **To the rear:** Retract
- **To the front:** Extend

▣▣▣▣ ➔ p. 12 - 65

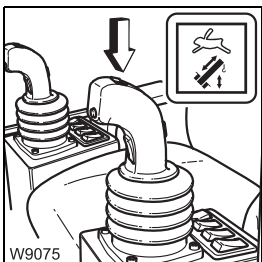


Right-hand control lever

Control lever assignment – version 2

- **To the left:** Retract
- **To the right:** Extend

▣▣▣▣ ➔ p. 12 - 65

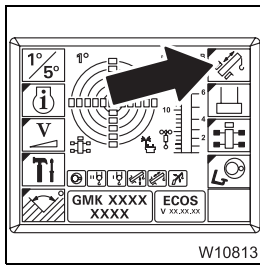


Button and lamp for derricking gear/telescoping mechanism high-speed mode

Short description with derricking gear; ▣▣▣▣ ➔ p. 10 - 79.

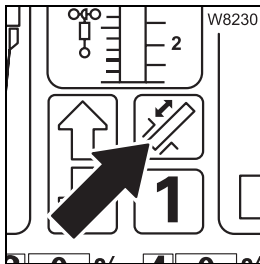
Telescoping; ▣▣▣▣ ➔ p. 12 - 65

Submenu



Telescoping submenu

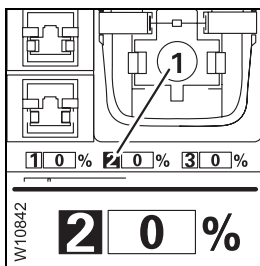
- **To open:** Press button once – submenu opens



Display for telescoping mechanism on/off

- **Green:** Telescoping mechanism on
- **Red:** Telescoping mechanism off

➡ p. 12 - 68

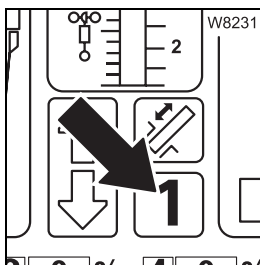


Current telescoping display

- 1 Extended length of the telescopic sections in percent (%)
- 2 Telescopic section display green


- **On:** The telescoping cylinder is locked here
- **Flashing:** next possibility for locking telescoping cylinder

➡ p. 12 - 69



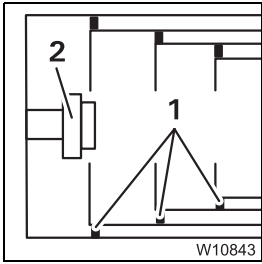
Display of telescoping cylinder in the telescopic section

Displayed telescopic section, e.g. telescopic section I:

- **On:** The telescoping cylinder is locked here
- **Flashing:** next possibility for locking telescoping cylinder
- **Off:** Telescoping cylinder in this telescopic section – distance to the locking point larger than 1 m (3.3 ft)
or
Teleautomation on – symbol  is displayed

➡ p. 12 - 69





Telescope diagram display

Current relation of the telescopic sections to each other – section of top view

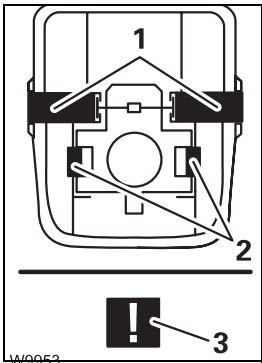
Locking pins

- 1 On the telescopic section
- 2 On the telescoping cylinder

Representation

- **green:** Locked
- **none:** Unlocked or intermediate position

➡ p. 12 - 69



Locking status display

The locking pins change the position and the colour

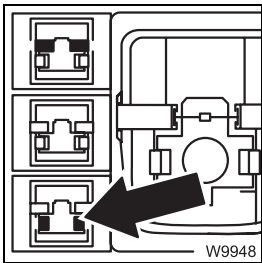
Locking pins

- 1 On the telescopic section
- 2 On the telescoping cylinder

Representation

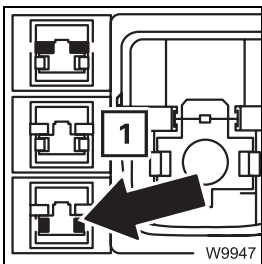
- **green:** Locked
- **red:** Unlocked
- **yellow:** Intermediate position
- **violet:** Error – symbol (3):

➡ p. 12 - 70



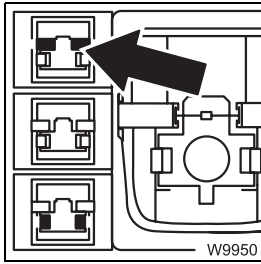
Select Unlock telescoping cylinder

- **Display**
 - yellow:** Telescoping cylinder unlocked
 - grey:** Telescoping cylinder locked
 - flashing:** Unlock selected (yellow/grey)



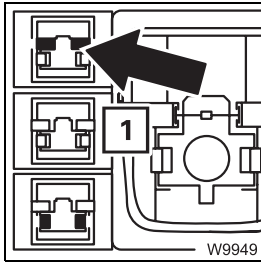
- **To select:** Press button once
 - Telescopic section locked: Unlock selected – is executed after moving the control lever
 - Telescopic section unlocked: Unlock not selected – symbol (1) flashes (yellow/grey) as a prompt to *Lock telescopic section*

➡ p. 12 - 71



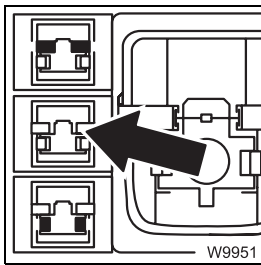
Select Unlock telescopic section

- **Display** **yellow:** Telescopic section unlocked
- grey:** Telescopic section locked
- flashing:** Unlock selected
(yellow/grey)



- **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*

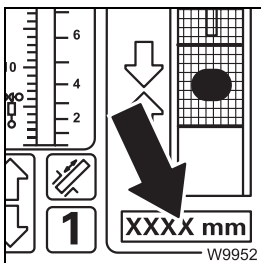
➡ p. 12 - 75



Select Lock

- **Display** **yellow:** Telescoping cylinder and telescopic section locked
- grey:** Telescoping cylinder or telescopic section unlocked
- flashing:** Lock selected
(yellow/grey)

➡ p. 12 - 74, ➡ p. 12 - 78

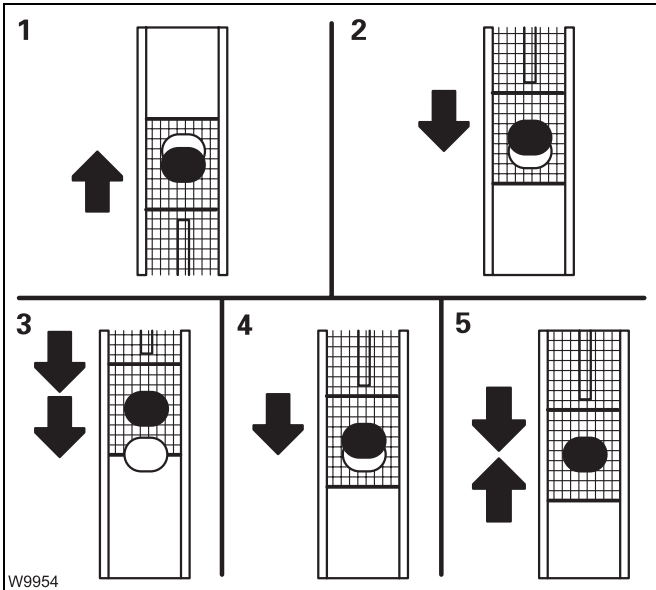


Telescoping cylinder length display

- **Display:** Current extended length of the telescoping cylinder
- **Unit of measurement:** Displayed depending on setting, mm (millimetres) or ft (feet)

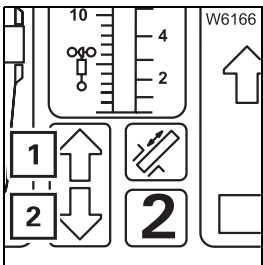
➡ p. 12 - 73





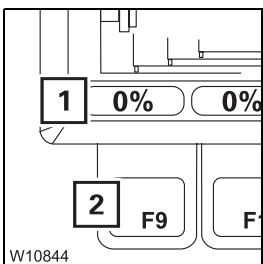
Locking point display

- 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 smaller than 1 m (3.3 ft)
 - 5 green: at the locking point



Display for releasing telescoping

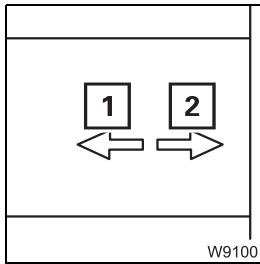
- 1 Extend**
 - red: blocked
 - green: released
- 2 Retract**
 - red: blocked
 - green: released



Entering the nominal value for teleautomation

- 1 - red:** Teleautomation off
- **yellow:** Enter nominal value
- **green:** Teleautomation on
- 2** Press button first time - nominal value input on
- Press button once - nominal value to next fixed length

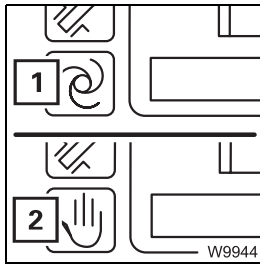
▶▶▶▶▶ p. 12 - 80



Teleautomation direction display

- 1 On:** Start teleautomation with *Extend*
- 2 On:** Start teleautomation with *Retract*

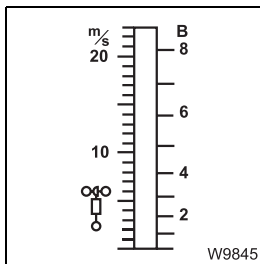
Flashing = control lever movement not correct
 p. 12 - 81



Teleautomation on/off display

- 1** Teleautomation on
- 2** Teleautomation off

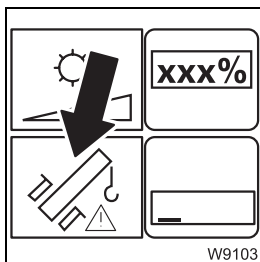
p. 12 - 80



Anemometer display

Same as in the main menu; p. 10 - 69

In the Settings submenu



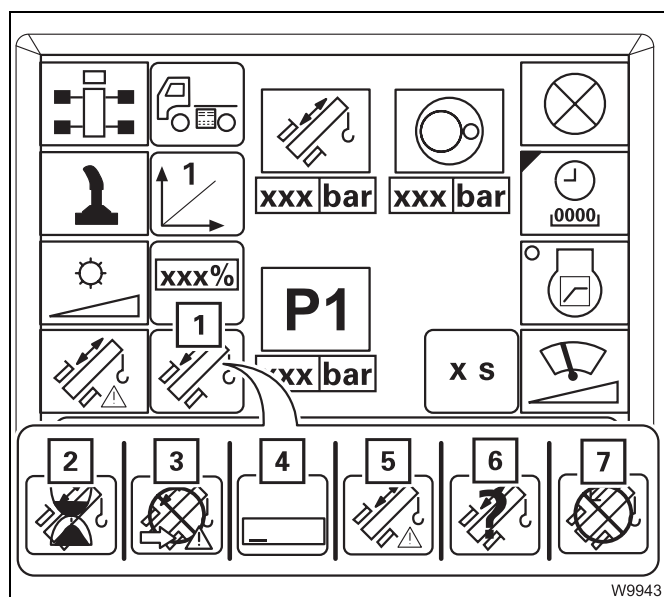
Telescoping emergency program access

Right-hand dead man's switch is pressed.

- **Press button once:** After entering the keycode, the emergency program opens *Telescoping*

p. 15 - 42





Current telescoping mechanism status display

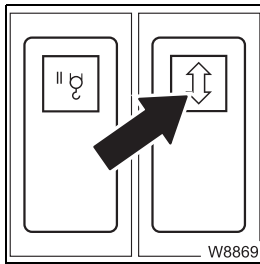
The current status is shown using different symbols:

- 1 Normal
- 2 Waiting
- 3 Emergency program access
- 4 Keycode input
- 5 Emergency program
- 6 Telescoping difference
- 7 Not active

▣ p. 15 - 25

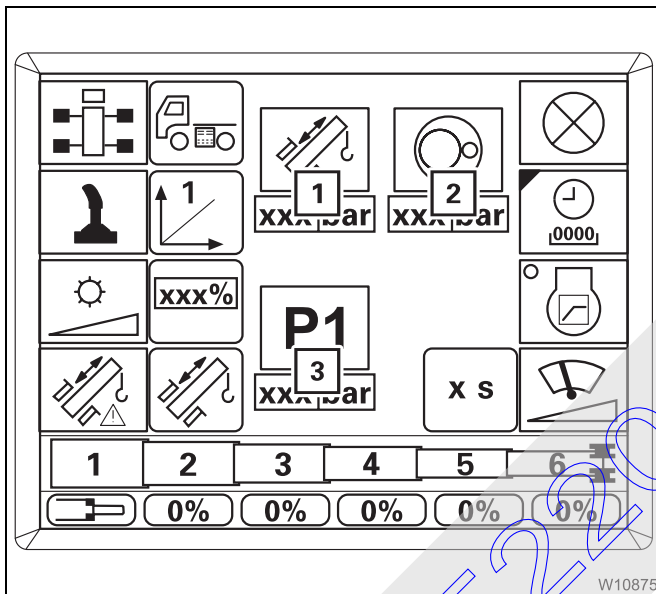
52203182

10.2.17 Hydraulic system



Incline crane cab

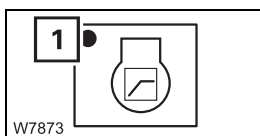
- Press down: incline to the rear
 - Press up: incline to the front
- ➡ p. 12 - 100



In the Settings submenu

Current pressure in bar for movements of the

- 1 Telescoping mechanism
- 2 Slewing gear
- 3 - Hoisting gear
- Derricking gear
- Counterweight hoist unit
- Incline cab
- Locking units



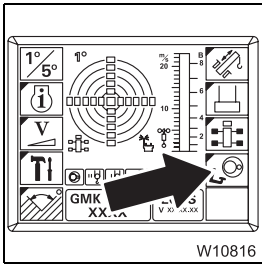
Critical load control

- To switch on: Press button until the dot (1) turns green.
 - To switch off: Press button until the dot (1) turns black.
- ➡ p. 12 - 101

10.2.18

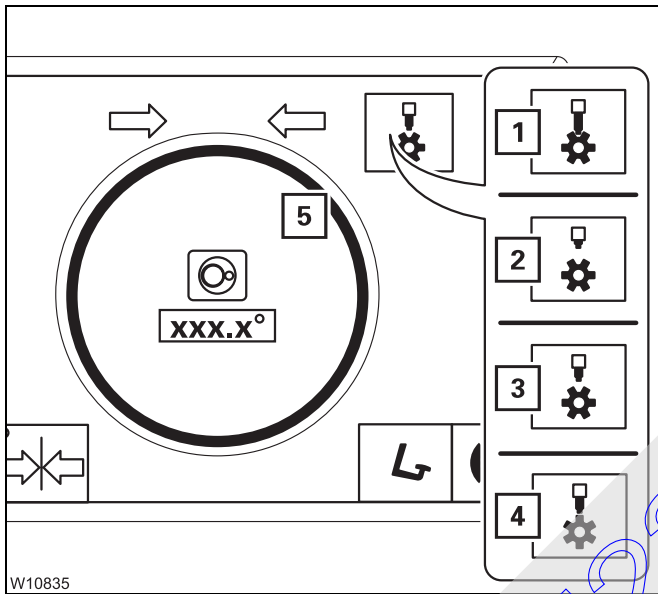
Houselock

▣▣▣▣ Switching the houselock on/off, p. 12 - 14.



Slewing gear/Houselock submenu

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

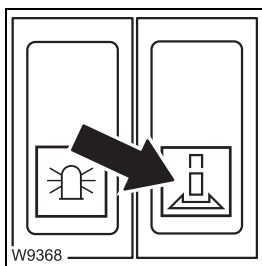


Locking status displays

The current status of the locking pin is shown by different symbols:

- 1 and 5** green – locked
- 2 and 5** red – unlocked
- 3 and 5** yellow – intermediate position
- 4 and 5** yellow/red – blocked, locking pin in front of a tooth

▣▣▣▣ p. 12 - 14



Houselock on/off

The slewing gear is switched off

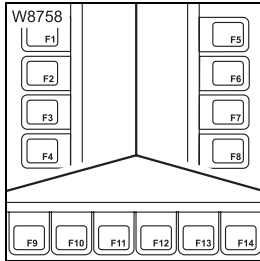
- **Press up:** switch on – pin extends
- **Press down:** switch off – pin retracts

▣▣▣▣ p. 12 - 14

10.2.19 Safe load indicator (SLI)

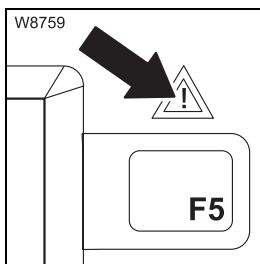
Control unit

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



Buttons F1 to F14

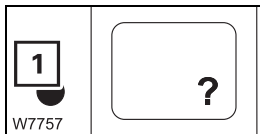
The function of buttons F1 to F14 is shown on the symbol next to or above the button. After the button is pressed, the function displayed is executed if it has been released.



Error

- On: Error present
- Off: No error present

➔ p. 12 - 36



Open Error submenu

The lamp (1) lights up or flashes.

- Press button once: The Errors submenu opens.

➔ p. 15 - 30



Exit the submenu/input mode

The lamp (1) lights up.

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





Confirm your entry

The lamp (1) lights up.

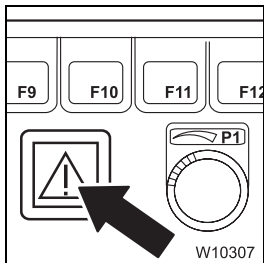
- **In the Rigging mode sub-menu** Press button once – *Rigging mode monitoring* submenu opens
- **In the Rigging mode monitoring submenu:** Press button once – rigging mode is accepted, *Monitoring* submenu opens, lamp (1) goes out.



Acknowledge

The lamp (1) lights up.

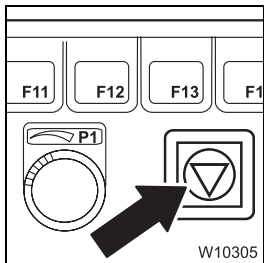
- **Press button once:** Buzzer tone off, error message acknowledged



SLI early warning

- **Flashing:** Degree of utilization 90 – 100% – buzzer tone on
- **On:** Degree of utilization about 100% – buzzer tone on – shutdown
- **Off:** Degree of utilization 0 – 90%

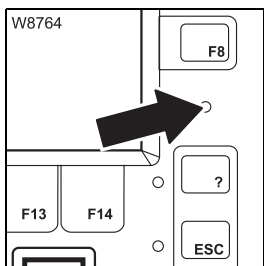
▶▶▶▶▶ p. 12 - 34



SLI shutdown

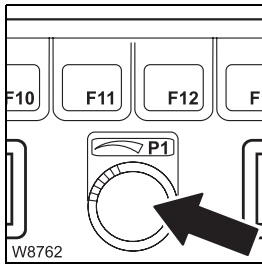
- **On:** Shutdown – buzzer tone on
 Degree of utilization about 100% or Error
- **Off:** No shutdown

▶▶▶▶▶ p. 12 - 34



Sensor for brightness

Registers the brightness of the operating environment. The brightness of all displays is automatically adjusted; ▶▶▶▶▶ p. 12 - 20.

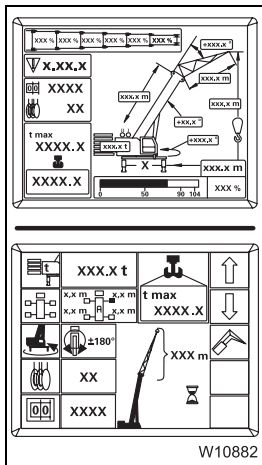


Enter values

The input mode for the SLI code is switched on.

- **To the right:** next, larger value
 - **To the left:** next, smaller value
- Slow turning – slow change of values
Fast turning – fast change of values

▣▣▣▣ p. 12 - 25



SLI display

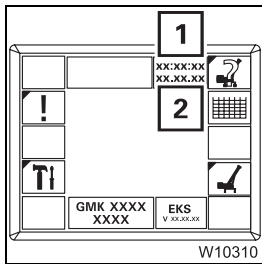
- **After a standstill of up to 48 hours**

Ignition on – *Monitoring* submenu opens; ▣▣▣▣ p. 12 - 19

- **After a standstill of more than 48 hours**

Ignition on – *Enter rigging mode* submenu opens; ▣▣▣▣ p. 12 - 20

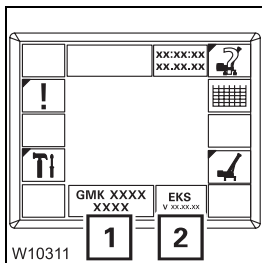
Main menu



Date/time display

- 1 Time
- 2 Date

▣▣▣▣ *Entering the time/date*, p. 12 - 40



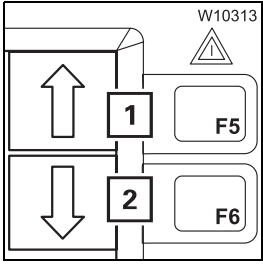
Serial number and program version displays

- 1 Truck crane serial number
- 2 SLI program version – always state in the event of malfunctions;
▣▣▣▣ p. 15 - 27



Enter rigging mode submenu

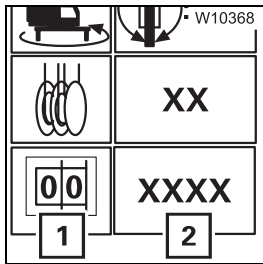
▣▣▣▣▶ *Entering the rigging mode, p. 12 - 21*



Selection

In input mode

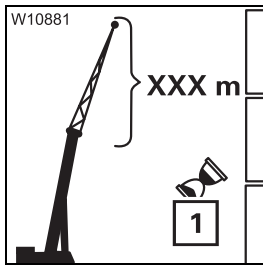
- 1 Press button once – display of next, larger value
- 2 Press button once – display of next, smaller value



Enter SLI code

- **Input mode on:** Press button (1) once – symbol green
- **Enter:** In input mode, press button once – on display (2) next SLI code

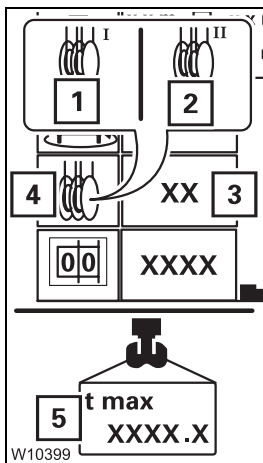
▣▣▣▣▶ p. 12 - 25



Determine SLI code display

- **Symbol (1):** SLI code is determined after selecting Rigging mode
- **No display:** New SLI code is displayed

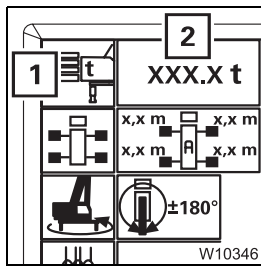
▣▣▣▣▶ p. 12 - 23



Enter reeving

- **Input mode on:**
 - For main hoist: Press button (4) until symbol (1) turns green
 - For auxiliary hoist: Press button (4) until symbol (2) turns green
- **Enter:** In input mode, press button once
 - on display (3) reeving +1,
 - on display (5) relevant maximum load

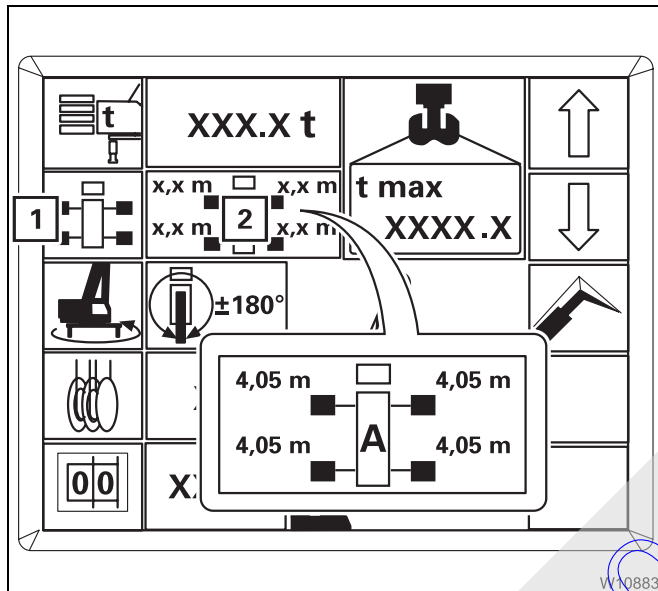
▣▣▣▣▶ p. 12 - 22



Enter counterweight

- **Input mode on:** Press button (1) once – symbol green
- **Enter:** In input mode, press button once – on display (2) next combination

➡ p. 12 - 22

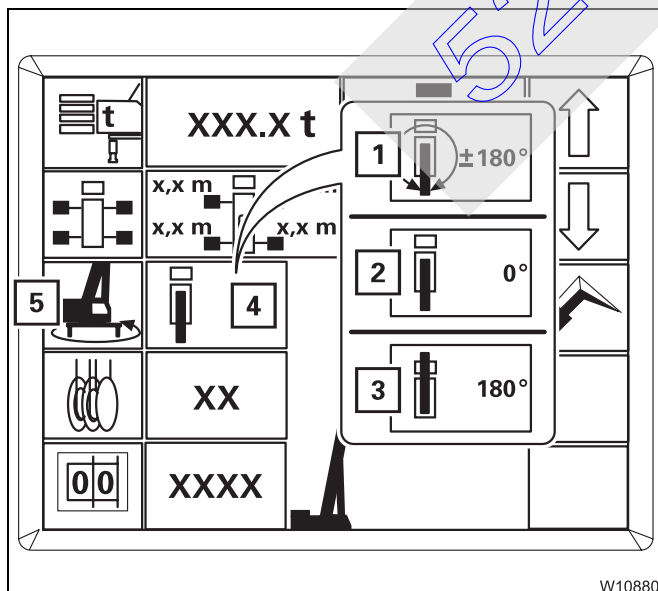


Enter outrigger span

- **Input mode on**
Press button (1) once – symbol green
- **Enter**
In input mode, press button once – on display (2) next outrigger span.

- A 8.55 x 8.10 m (28.1 x 26.6 ft)
- B 8.55 x 6.80 m (28.1 x 22.4 ft)
- C 8.55 x 5.60 m (28.1 x 18.4 ft)
- D 8.55 x 4.40 m (28.1 x 14.4 ft)
- E 8.55 x 2.74 m (28.1 x 9.0 ft)

➡ p. 12 - 22



Enter slewing range

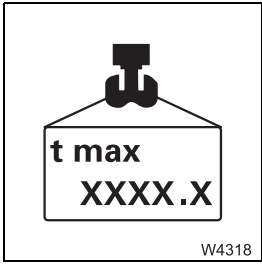
- **Input mode on**
Press button (5) once – symbol green
- **Enter**
In input mode, press button once – on display (4) next permissible slewing range

- 1 360° slewing range
- 2 Working position 0° to the rear¹⁾
- 3 Working position 180° to the front¹⁾

¹⁾ To accept, switch off slewing gear

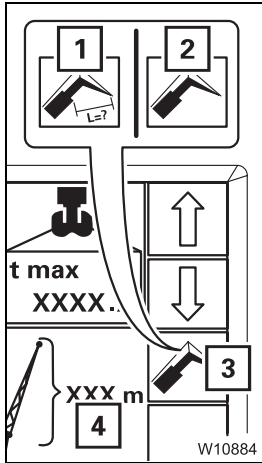
➡ p. 12 - 22





Maximum load display

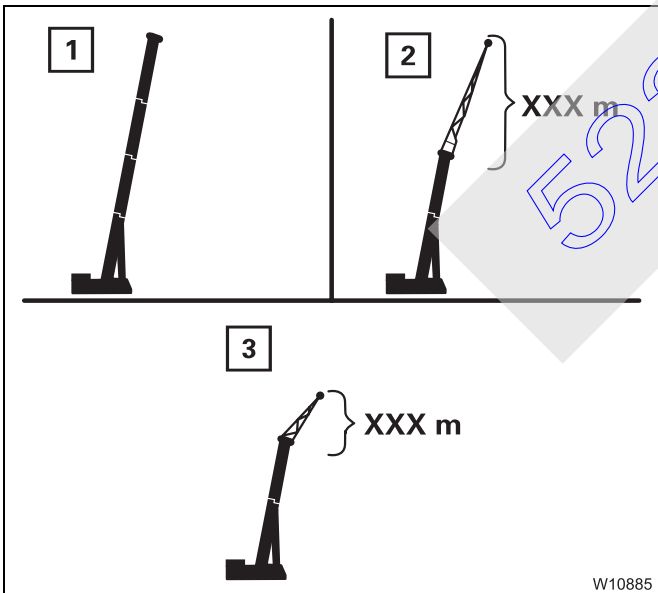
Short description with *Monitoring* submenu; p. 10 - 96.



Enter boom system

- **Input mode on:**
 - For boom system: Press button (3) until symbol (2) turns green
 - For lattice extension length: Press button (3) until symbol (1) turns green
- **Enter:** In input mode, press button (3) once – on display (4) next length.

p. 12 - 22




Boom system display

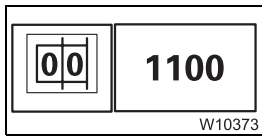
Boom system for displayed SLI code,

- 1 Main boom/auxiliary single-sheave boom top
- 2 Lattice extension
- 3 Heavy load lattice extension

p. 12 - 24

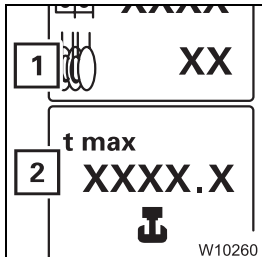
Monitoring sub-menu

Displays – depend on rigging mode;  Checks prior to crane operation, p. 12 - 28.



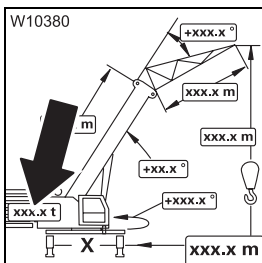
SLI code display

SLI code, four digits



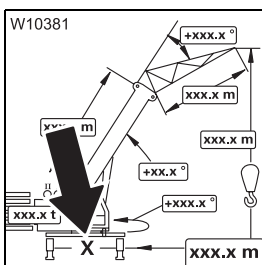
Reeving display

1 Required quantity of reeved ropes for displayed, maximum load (2)




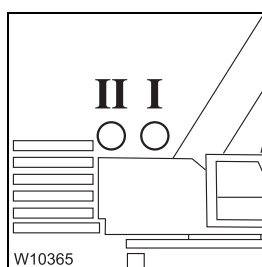
Counterweight display

Required counterweight combination in tons (t) – for displayed SLI code.



Outrigger span display

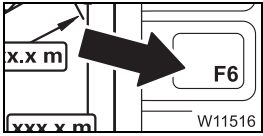
Required outrigger span for displayed SLI code – displayed in letters – overview of outrigger spans;  p. 10 - 93.



Hoisting gears display

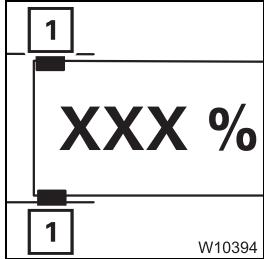
- **I on:** Main hoist switched on first – displayed reeving applies to main hoist
- **II on:** Auxiliary hoist switched on first – displayed reeving applies to auxiliary hoist
- **I or II flashing:** Corresponding hoisting gear additionally switched on – displayed reeving applies to the other hoisting gear
- **I or II off:** Corresponding hoisting gear switched off





Lifting capacity table submenu

- **Press button once:** The *Lifting capacity table* submenu opens.
- ➡ p. 12 - 38

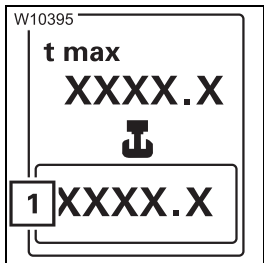


Current telescoping display

Telescoping of all telescopic sections in percent – locking pins (1):

- **green:** Fixed length – locked and set down
- **flashing:** Intermediate length – locked, not set down
- **black:** Intermediate length – not locked

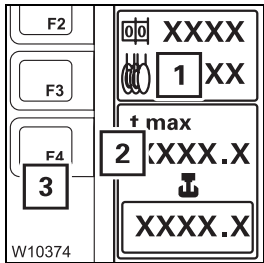
➡ p. 12 - 31



Current load display

- **Display:** Currently raised load in tons (t) or kilopounds (klbs) – precision ± 5% of actual load
 Example: 55.2 klbs equal 55 200 lbs

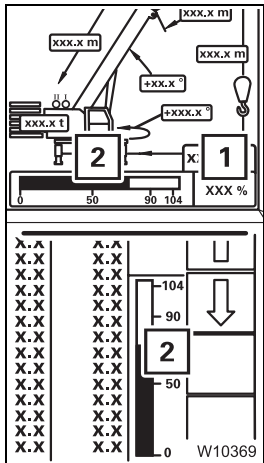
➡ p. 12 - 33



Maximum load display

- **Display:** Maximum load in tons (t) or kilopounds (klbs) for displayed SLI code
- **Symbol (1) red** – maximum load reduced by reeving
- **Press button (3) once** – on display (2) briefly maximum load for displayed SLI code

➡ p. 12 - 33

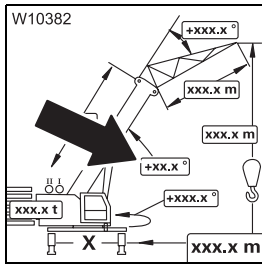


Current degree of utilization display

Degree of utilization = 100 x current load / maximum load

- 1 Display in percent
- 2 Colour display:
 - **blue:** 0 – 90%
 - **yellow:** ca. 90 – 100% – early warning
 - **red:** greater than 100% – shutdown

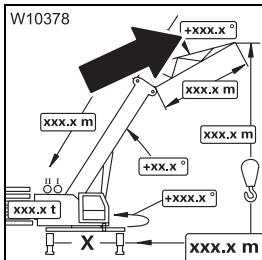
➡ p. 12 - 33



Current main boom angle display

– **Display:** Current angle between main boom and horizontal position in degrees (°)

▣▣▣▣ p. 12 - 32

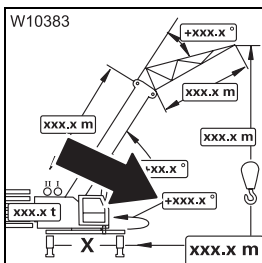


Lattice extension inclination display

The lattice extension is connected.

– **Display:** Current angle between the lattice extension and main boom in degrees (°)

▣▣▣▣ p. 12 - 32



Current slewing angle display

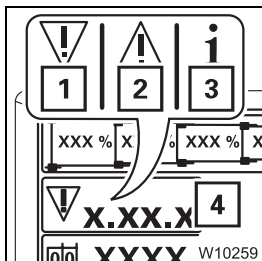
0°: Position 0° to the rear

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. 12 - 32



Error display

1 Error

2 Warning

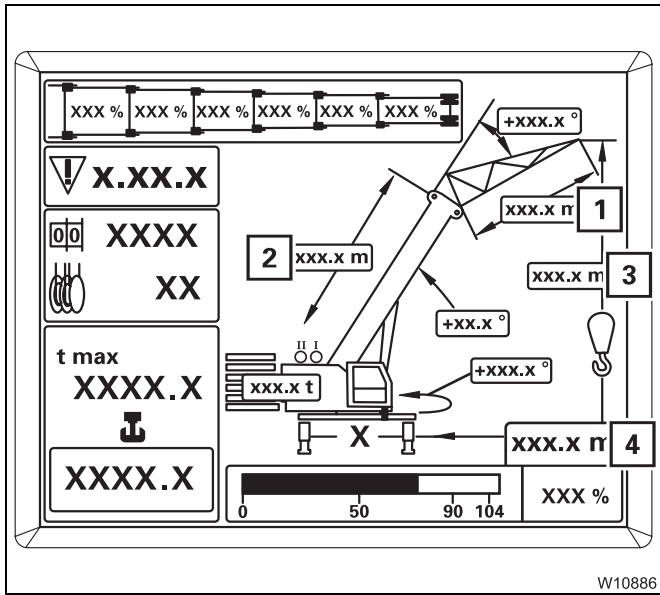
3 Information

4 Corresponding number code,

Press button  once – next available number code

▣▣▣▣ p. 12 - 36

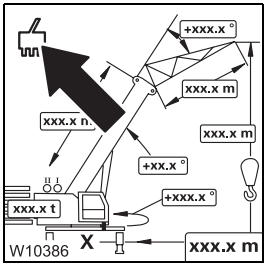




Other displays

- Display in metres (m) or feet (ft)
- 1 Current lattice extension length
 - 2 Current main boom length
 - 3 Current overall height
 - 4 Current working radius

▣▣▣▣ p. 12 - 31

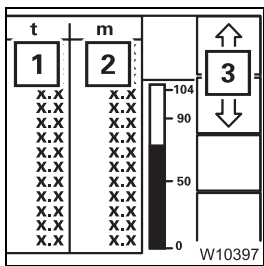


Service symbol display

Symbol displayed – service device connected

Lifting capacity table submenu

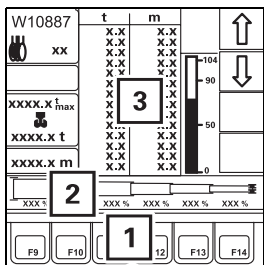
▣▣▣▣ *Displaying the lifting capacity tables, p. 12 - 38*



Lifting capacity table display

Values for displayed SLI code and displayed telescoping

- 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



Telescoping display/input

- **Display:** Telescoping (2) in percent
- **Enter:** Press button (1)
 - Display (2) new telescoping
 - Display (3) corresponding table or all values 0 = no table available

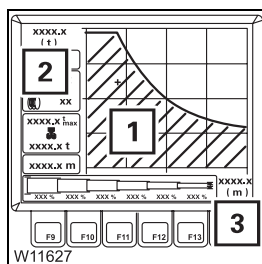
Other displays

Function like in the *Monitoring* submenu:

- SLI code display; p. 10 - 95
- Reeving display; p. 10 - 95
- Maximum load display; p. 10 - 96
- Current load display; p. 10 - 96
- Current working radius display; p. 10 - 98
- Current degree of utilization display; p. 10 - 96

Working range submenu

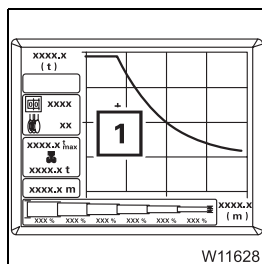
Displaying the lifting capacity tables, p. 12 - 38



Permissible working range display

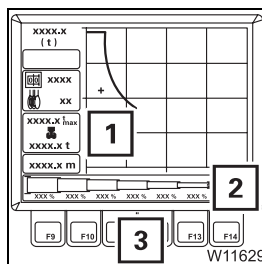
Applies to displayed SLI code and displayed telescoping

- 1 Permissible working range – surface under the curve
- 2 Maximum possible load
- 3 Maximum possible working radius



Current position display

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



Telescoping display/input

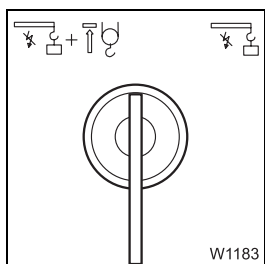
- **Display:** Telescoping (2) in percent
- **Enter:** Press button (3)
 - Display (2) new telescoping
 - Display (1) corresponding working range or no display = telescoping outside the telescope status

Other displays



Function as in the *Lifting capacity table* submenu.



Other

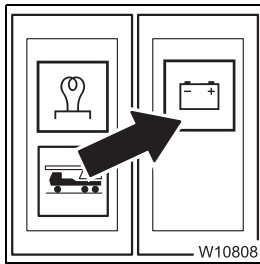


Key-operated override switch

- **Turn to the right:** *SLI* shutdown bypassed – crane functions released, no more monitoring;  p. 12 - 37
- **Turn to the left:** *SLI* shutdown and *Lifting limit switch* shutdown bypassed – crane functions released, no more monitoring;  p. 12 - 52.

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10.2.20 Electrical system



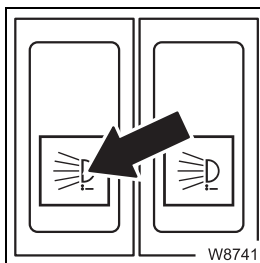
Battery charge indicator warning

- **On:** Engine off – ignition on
or
Engine on – power failure – switch off engine
- **Off:** Engine on – no malfunction

▶▶▶ p. 11 - 14

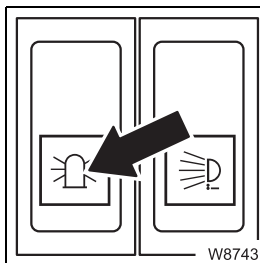
10.2.21 Lighting, windscreen wiper/washing system

Lighting



Spotlight sockets on/off

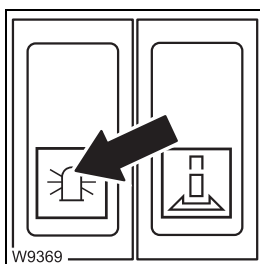
- **To switch on:** press down – voltage on (both sockets)
- **To switch off:** press up – voltage off (both sockets)



Air traffic control light on/off

- **To switch on:** press down – voltage on socket switched on
- **To switch off:** press up – voltage on socket switched off

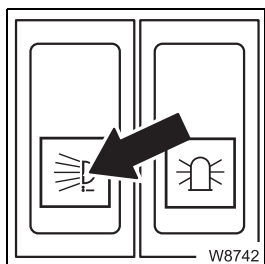
▶▶▶ p. 13 - 108



Rotating beacon on/off

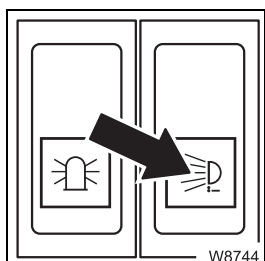
- **To switch on:** press down – lamp in button on
- **To switch off:** press up – lamp in button off





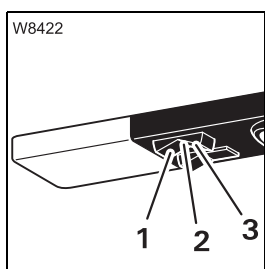
Slewable spotlight on/off

- **To switch on:** press down
 - **To switch off:** press up
- ➡ p. 12 - 103



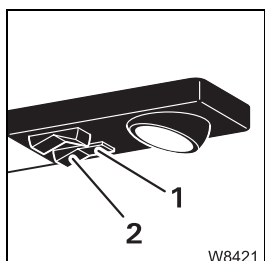
Slew slewable spotlight

- **To the rear:** press down
 - **To the front:** press up
- ➡ p. 12 - 103



Cab lighting

- 1 Permanently on
- 2 Permanently off
- 3 On/off via door contact

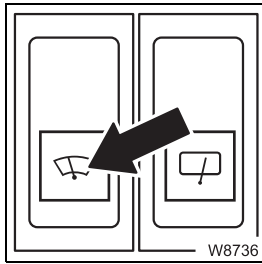


Reading lamp

- 1 On
- 2 Off

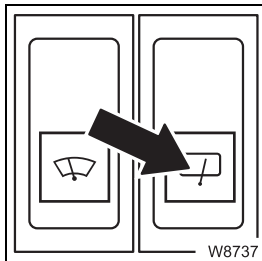
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Windscreen wiper/washing system



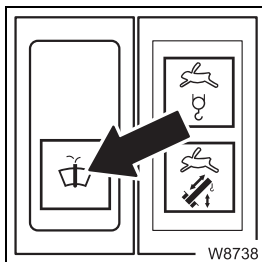
Front windscreen wiper on/off

- **Off:** Press up – wiper goes to end position
- **Interval:** Middle position
- **Continuous operation:** Press down



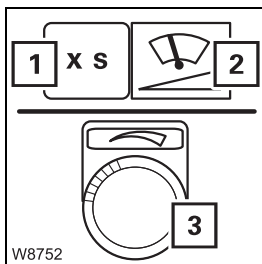
Roof window wiper on/off

- **Off:** Press up – wiper goes to end position
- **Interval:** Middle position
- **Continuous operation:** Press down



Windscreen washing system

- **Windscreen:** Press down
 - **Skylight:** Press up
- No additional wiping function is performed



Adjust wiper stroke interval

In the *Settings* submenu

- 1 Display of interval
- 2 Press once – input mode on
- 3 Turn – change interval

▶▶▶ p. 12 - 102

10.2.22

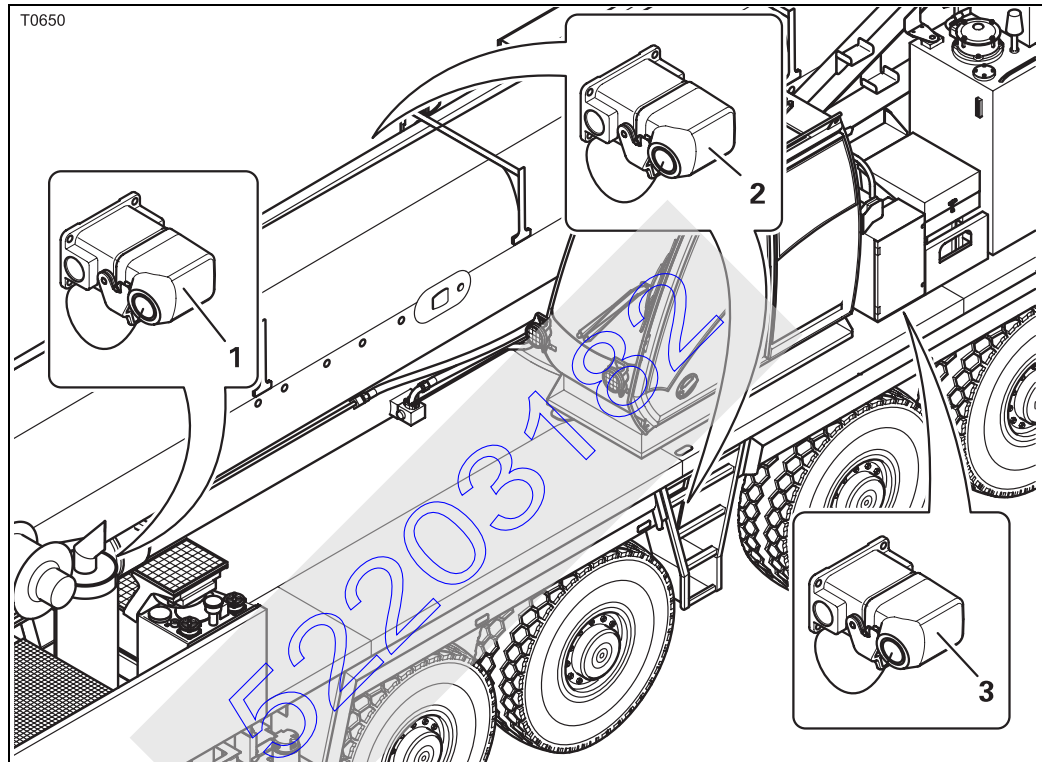
Hand-held control

Sockets on truck crane

The following applies to all sockets:

- Pull plug: Engine off – ignition on
- Plug in hand-held control plug: Ignition off

▶▶▶ p. 13 - 21

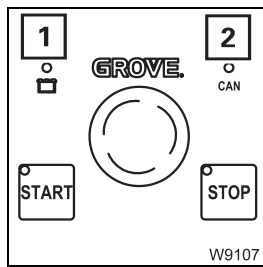


Enabled operations	
1	– Emergency operation for crane movements (except for telescoping mechanism) – Derrick lattice extension ¹⁾
2	– Operation of the outriggers
3	– Emergency mode for crane operations – Derrick lattice extension ¹⁾

¹⁾ Additional equipment

Engine control panel

▶▶▶ *Starting/Turning off the engine with the hand-held control, p. 13 - 23*

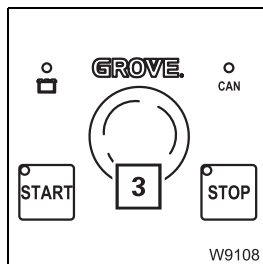


1 Battery charge indicator

- On: Ignition on
- Off: Ignition off

2 CAN indicator lamp

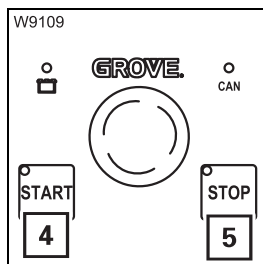
- On: Hand-held control connected – no malfunction – goes out after 20 seconds
- Flashing: Hand-held control connected – malfunction



3 Emergency stop switch

May be actuated in an emergency only

- Press: Engine off – crane functions stop immediately switch engages
- Turn engaged switch: Switch returns to initial position – crane functions released



4 START engine

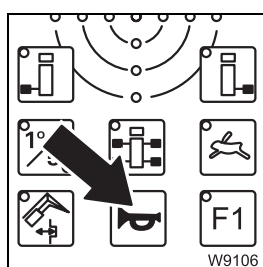
- Press once: Engine on

5 STOP engine

- Press once: Engine off

Horn


The ignition is switched on.

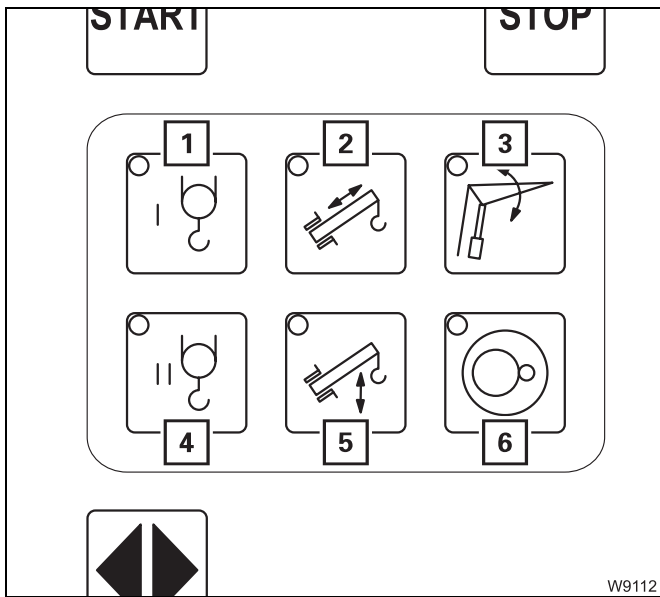


- Press once:
 - Hand-held control on the superstructure socket – superstructure horn on
 - Hand-held control on the carrier socket – carrier horn on



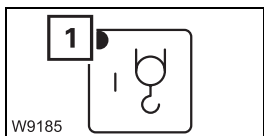
Outriggers control panel

Brief description;  *Outriggers control panel*, p. 10 - 49.



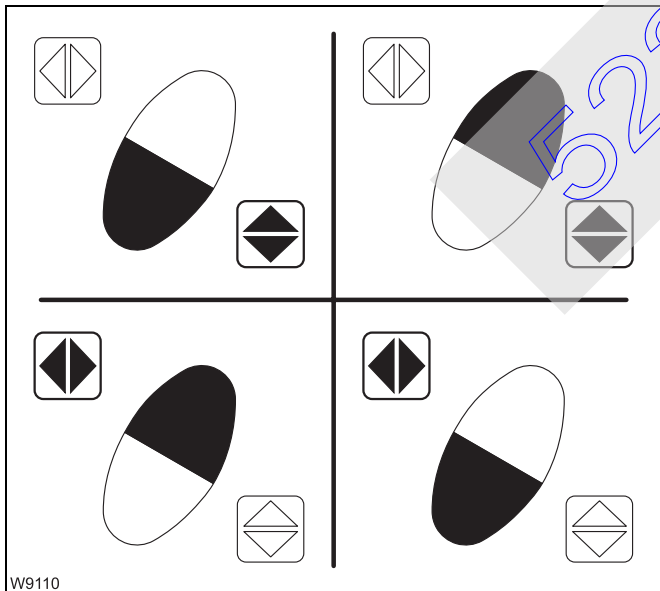
Pre-select emergency operation

- 1 Main hoist
- 2 Telescoping mechanism
- 3 Derrick the lattice extension
- 4 Auxiliary hoist
- 5 Derricking gear
- 6 Slewing gear



The operation is the same for all buttons

- **Pre-select:** Press button once – lamp (1) lights up – pre-selection on until other pre-selection is made



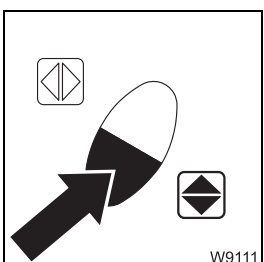
Function buttons

The operations are not monitored by the SLI.







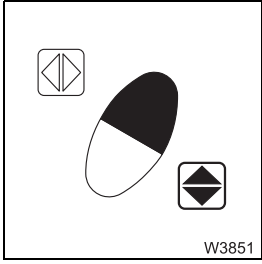
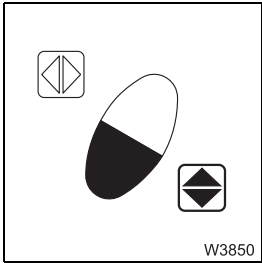
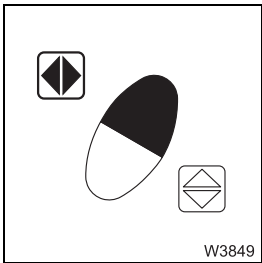
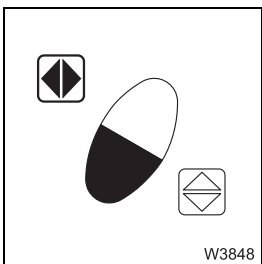
There are four button combinations, actuated buttons are shown in black:

- **Pre-selected function on**
Press required button combination.
- **Pre-selected function off**
Release one or both of the buttons.

Press a non-assigned button combination – pre-selection off.



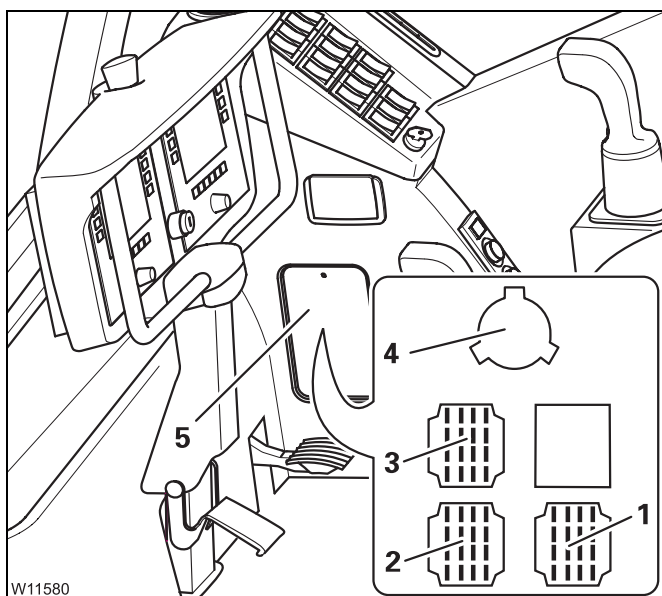
- **Faster movement:** Press button to a greater degree
- **Slower movements:** Press button to a lesser degree

Button combination	Pre-selected power unit					
	Telescoping mechanism 	Derricking gear 	Slewing gear 	Hoisting gears  		Lattice extension 
 W3851	none	lower	none	lower		lower
 W3850	retract	raise	none	lift		raise
 W3849	none	none	turn to right	none		none
 W3848	none	none	turn to left	none		none

Emergency operation in the event of a failure of the operating elements in the crane cab, p. 15 - 55

10.2.23 Diagnostics

The diagnostics connections may only be operated by the service staff.



The following connections are below the cover (5).

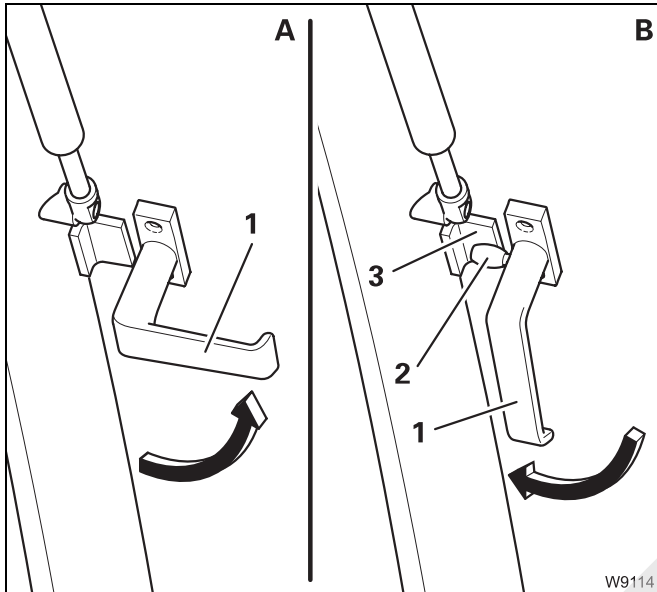
- 1 ECOS diagnostics – serial interface
- 2 ECOS diagnostics – Can bus
- 3 SLI diagnostics
- 4 Engine diagnostics

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10.2.24 Windows, doors, keys

Windows

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



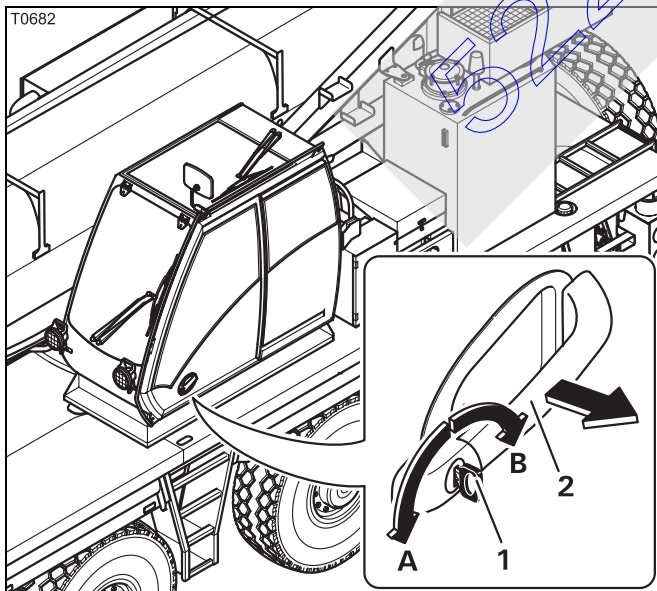
- Open window (A)

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

- Close window (B)

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

Crane cab door



From outside

- Unlock

Turn the key (1) forwards, towards A

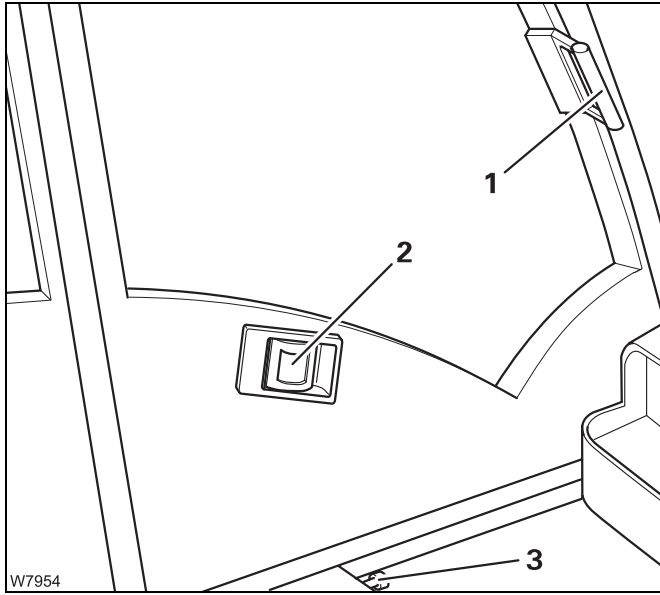
- Lock

Turn the key (1) backwards, towards B

- Open/Close

Pull handle (2), slide door





From inside

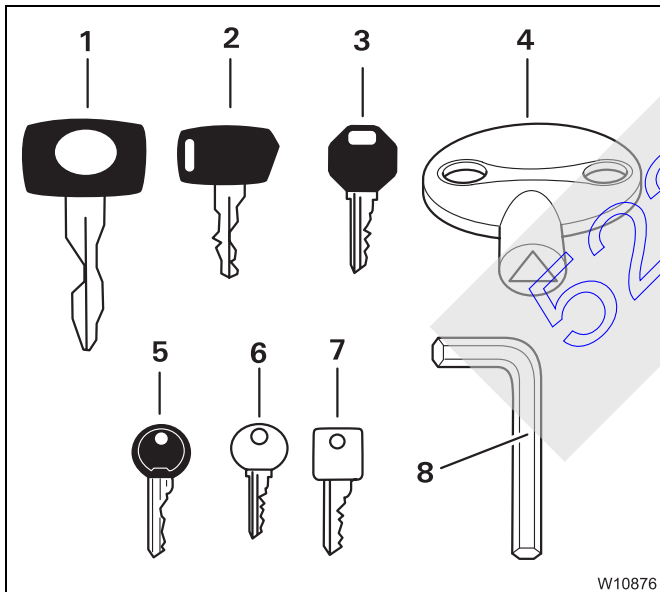
- Close

Pull unlocking lever (3), push door forwards by handle (1) – engages.
Locking from inside not possible.

- Open

Pull unlocking lever (2), push door back by handle (1) – engages.

Keys



The keys supplied belong to the following locks and covers:

- 1 Door lock of the crane cab
- 2 Ignition lock of the crane cab
- 3 Key-operated override switch
- 4 Distribution box
- 5 Windscreen washing system reservoir
- 6 Boom floating position lock¹⁾
- 7 Slewing gear freewheel lock¹⁾
- 8 Superstructure cover

1) Additional equipment

11 Starting/turning off the engine – for crane operation

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11

Starting/turning off the engine – for crane operation

11.1

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 from the hand-held control;  p. 11 - 17.

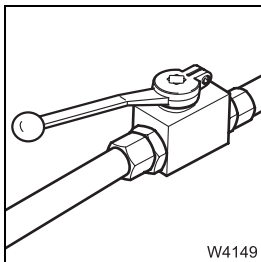
11.1.1

CHECKLIST: Starting the engine

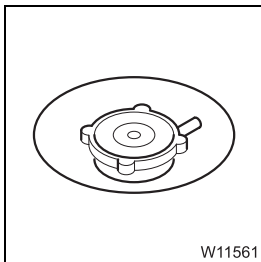



This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.

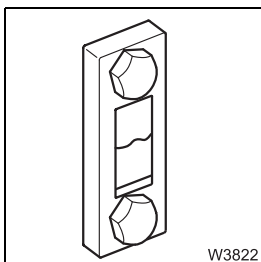
Observe the warnings and safety instructions specified there.



1. Check that the valve on the hydraulic tank is open;  p. 11 - 7.

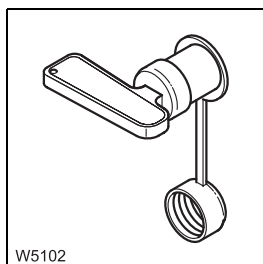


2. Check the coolant level of the engine;  *Maintenance Manual*.

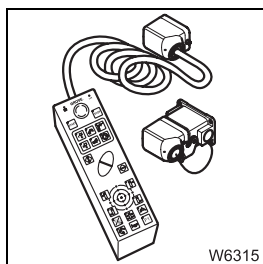


3. Check the oil level in the hydraulic system;  *Maintenance Manual*.

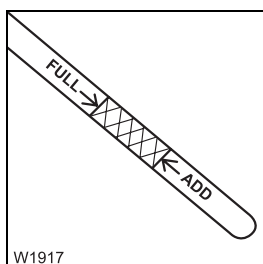




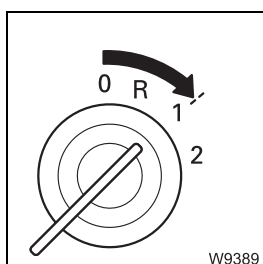
4. Switch on the battery master switch; p. 11 - 7.



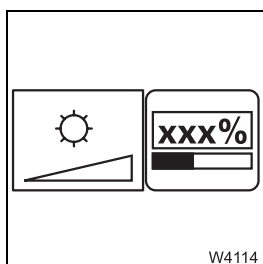
5. Remove the hand-held control and insert all bridging plugs;
 p. 11 - 8.



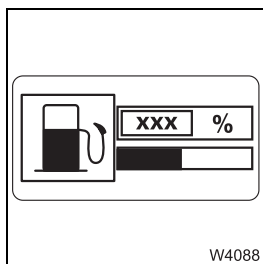
6. Check the oil level in the engine; *Maintenance Manual*.



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

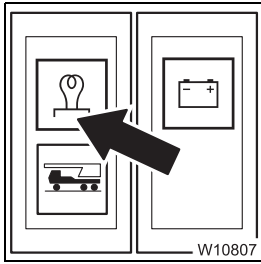


8. Adjust the brightness of the *ECOS* display as required; p. 11 - 11.

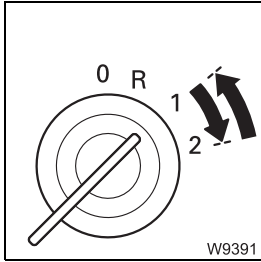


9. Check the fuel reserve; p. 11 - 5.

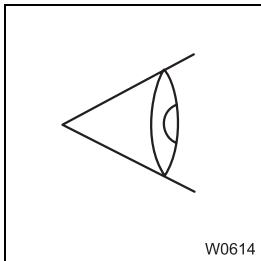
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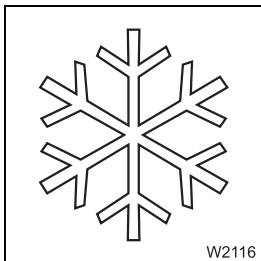
- 10.** If the truck crane has a flame start system, wait until the lamp goes out; ■■■▶ p. 11 - 13.



- 11.** Start the engine; ■■■▶ *Starting the engine*, p. 11 - 12.



- 12.** Check the instruments and displays with the engine running; ■■■▶ p. 11 - 14.

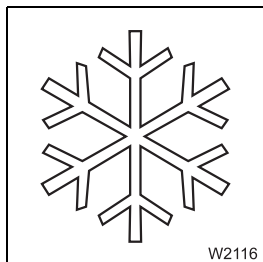


- 13.** In the event of low outside temperatures; ■■■▶ *CHECKLIST: for low temperatures*, p. 11 - 4.

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11.1.2

CHECKLIST: for low temperatures

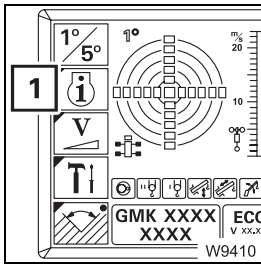



You must also observe the following points when operating the truck crane in low outside temperatures:

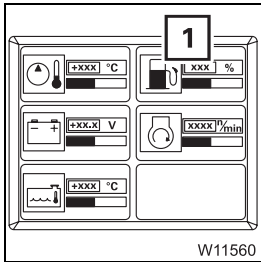
1. The fuel and engine oil must be suited for use in the outside temperature in question; ■■■▶ *Separate operating instructions from the engine manufacturer.*
2. The engine coolant must contain sufficient antifreeze; ■■■▶ *Separate operating instructions from the engine manufacturer.*
3. The windscreen washing system must contain sufficient antifreeze; ■■■▶ *Windscreen washing system, p. 12 - 5.*
4. The engine can be preheated with the auxiliary water heater if necessary; ■■■▶ *Auxiliary water heating system, p. 12 - 128.*
5. The hydraulic oil must be preheated; ■■■▶ *Preheating the hydraulic oil, p. 12 - 13.*

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11.1.3 Refuelling



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



The display (1) indicates the current level as a percentage. 100% correspond to about 240 l (63 gal).

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

green: over 10% – over 24 l (6.3 gal)

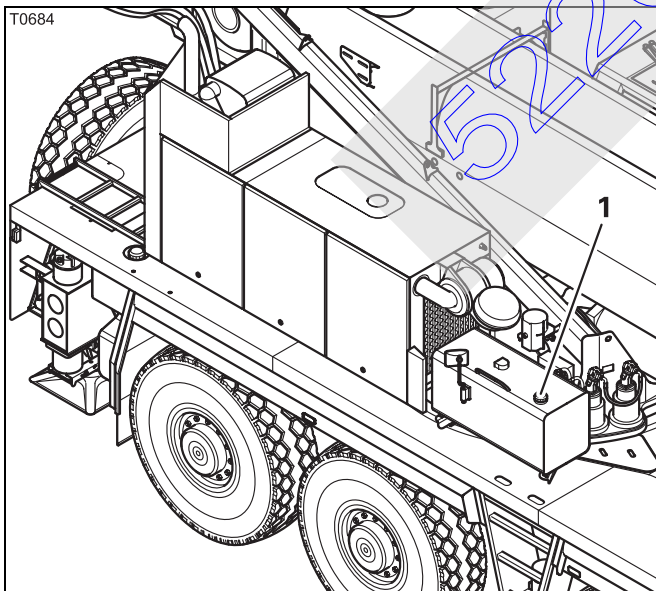
yellow: 5 to 10% – 12 to 24 l (3 to 6.3 gal)


red: below 5% – less than 12 l (3 gal)



Danger of fire due to inflammable gases!

Turn off the crane engine, crane cab heater and all auxiliary heaters before refuelling.



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

- Fill in the diesel through the filler neck (1).
- Screw the cap onto the filler neck after refuelling.



Risk of accidents if the fuel tank is not closed!

Screw the cap back onto the filler neck each time after refuelling.

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

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11.1.4 Checks before starting the engine

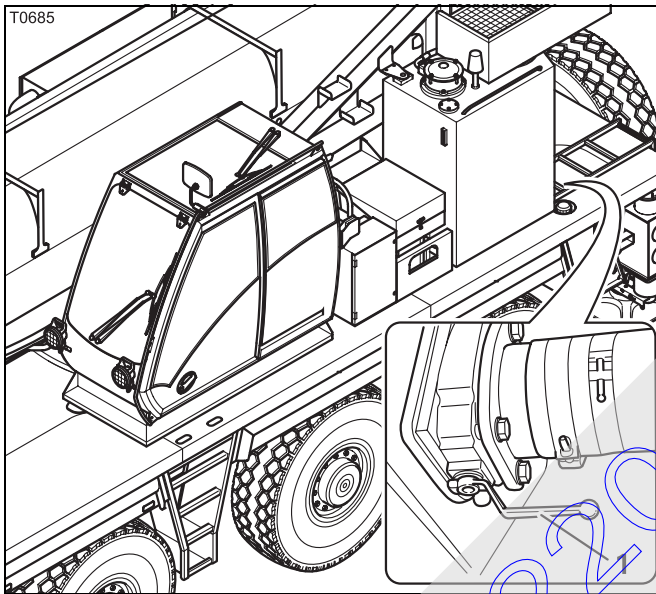
On the hydraulic tank

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



Risk of damage to the hydraulic pumps!

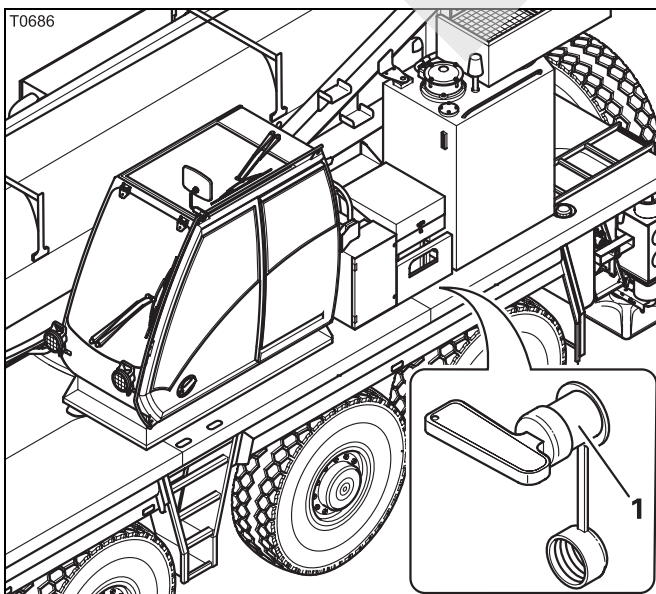
You may only start the engine when the valve on the hydraulic tank is open.



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

Battery master switch

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

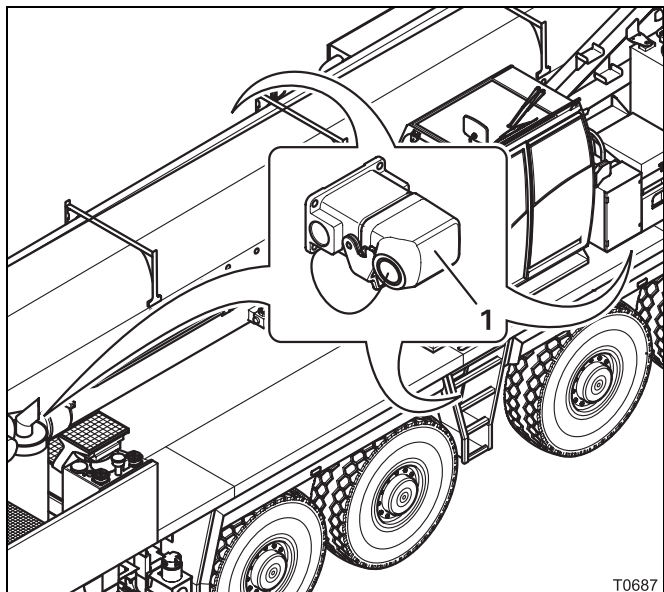



- Switch on the battery master switch (1).
- The battery master switch is switched on if you are unable to pull off the selector handle.



Checking the hand-held control

For crane operation from the crane cab the hand-held control must be removed.

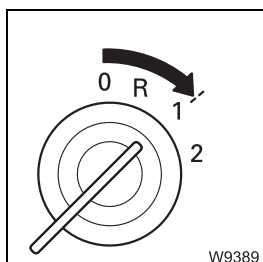


- Check whether the bridging plugs (1) are inserted in all the sockets;  p. 13 - 21.

You can start the engine from the crane cab, but the operating elements for crane operation are disabled, if the hand-held control is connected.

11.1.5

Switching on the ignition



- Insert the ignition key into the ignition lock and turn the key to position **1**. After switching on the ignition, a lamp test is carried out, and switching states are checked.

11.1.6

Lamp test

Lamp test

After the ignition has been switched on,

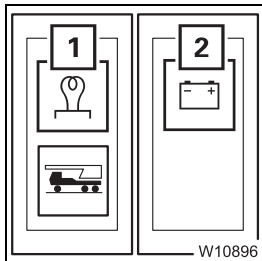
- an ECOS lamp test and
- a lamp test of the electrical system are carried out.



Risk of accidents due to faulty lamps.

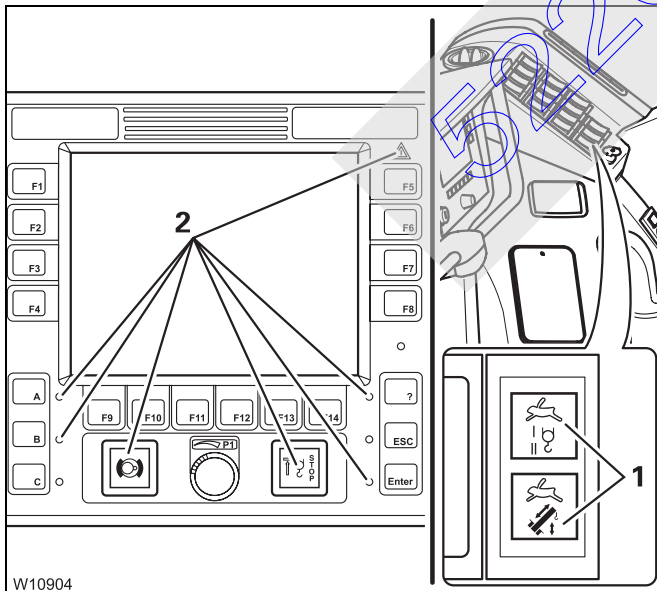
The lamps that are used to provide warnings and information during operation go on for control purposes whenever the ignition is switched on. Always perform the following lamp tests and immediately replace defective lamps or have them replaced.

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



- Check whether the lamps (1) and (2) light up briefly.

If the specified time is insufficient, switch on the ignition again.

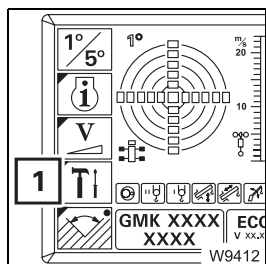


- Check whether the lamps (1) and (2) light up briefly.

Contact **CraneCARE** if one or more lamps do not go on.

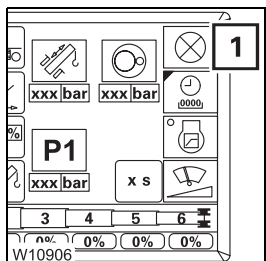
If the specified time is insufficient, you can carry out the lamp test again as follows.






Conducting a lamp test

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



- Press the button **(1)**. The above lamps go on until you let go of the button again. At the same time the lamps on the *SLI* control unit light up.

If necessary, you can set the minimum brightness of the display;

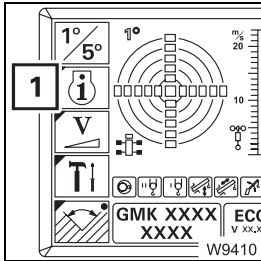
 p. 11 - 11.


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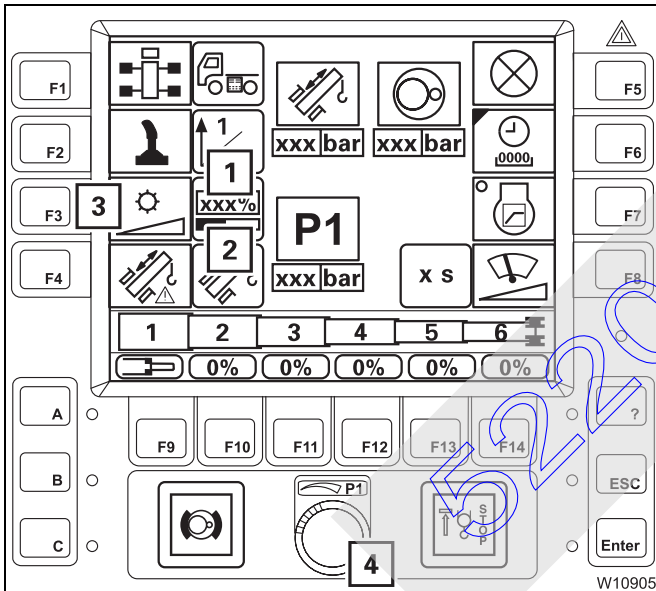
11.1.7

Adjusting the brightness of the display

The brightness of the displays is automatically regulated by the *ECOS* and the *SLI* displays, and depends on the brightness of the operating environment. You can set a minimum brightness for the *ECOS* and the *SLI* display manually.



- To do so, open the main menu  and press the button (1) once. The *Settings* submenu opens.



- Press the button (3) once. A red bar (2) appears below the display (1).
- Set the required minimum degree of brightness with the rotary switch (4). The brightness of the display changes during the setting procedure and you can view the set value (0 to 100%) on the display (1). The degree of brightness which you set here is the minimum value for the automatic regulation.



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



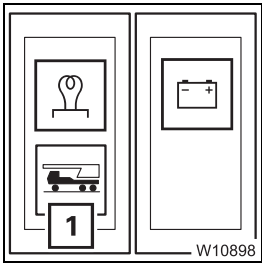
You can **quit the input** at any time. The settings are then reset.



- Accept the entered **minimum brightness**. The red bar below the display goes out. The brightness is automatically regulated between the newly set value and 100%.

11.1.8

Starting the engine

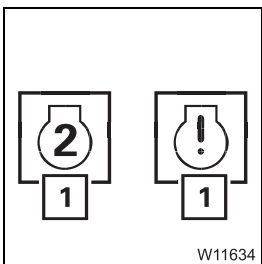


Refer to the separate operating instructions provided by the engine manufacturer for the operation of the engine. The engine can only be started if

- The bridging plugs have been inserted in all sockets of the carrier and superstructure for the hand-held control; p. 13 - 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. 11 - 13.



If ECOS displays a warning message, then make sure that a symbol (1) is red in the *Warning submenu*. If a symbol (1) is red, then you may not start the engine; p. 15 - 16.

Without flame start system

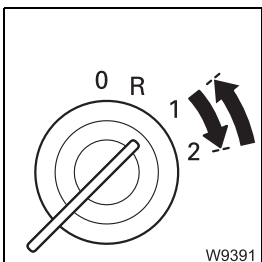


This section applies to starting a warm and a cold engine.

Danger of explosions when using starter fuel!

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

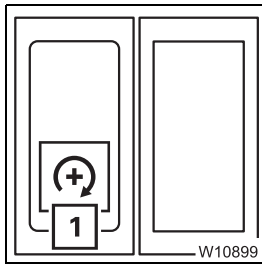
- Do not press the accelerator.
- Turn the ignition key to position 2 and hold it there until the engine goes on.
- Let go of the ignition key after the engine goes on.



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



If the engine does not go on after several attempts; *Malfunctions on the engine for crane operation*, p. 15 - 15.



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. 11 - 16.

With flame start system

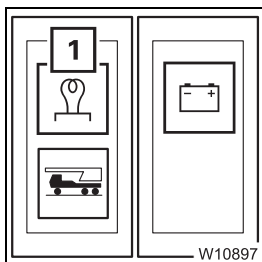
The flame start system warms the suction air of the engine. This section applies to starting a warm and a cold engine.



Danger of explosions when using starter fuel!

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

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

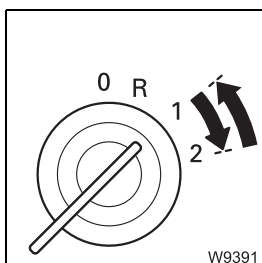


- **When the engine is warm**, the lamp (1) will light up only briefly (2 to 3 seconds).
- **When the engine is cold**, the lamp (1) goes out as soon as the engine has been pre-warmed (duration of up to 20 seconds). Start the engine within the next 30 seconds; otherwise, you must switch on the ignition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



If the lamp does not go out, there is a malfunction on the flame start system; *Malfunctions on the engine for crane operation*, p. 15 - 15.

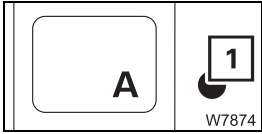
- Wait until the lamp goes out.
- Do not press the accelerator.
- Turn the ignition key to position **2** and hold it there until the engine goes on.
- Let go of the ignition key after the engine goes on.
- If the engine does not go on, abort the starting procedure after about 15 seconds and wait one minute before trying again.



If the engine does not go on after several attempts; *Malfunctions on the engine for crane operation*, p. 15 - 15.

11.1.9

Checks after starting the engine

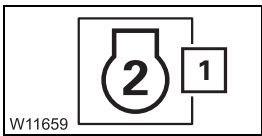



- Immediately after starting the engine, check the lamp (1) on the *ECOS* control unit.
The lamp (1) must go out approx. 10 seconds after starting the engine.




Risk of damage to the engine!

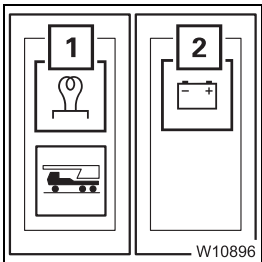
If the lamp (1) does not go out after about 10 seconds, perform the following inspection and turn off the engine immediately if necessary.



- Press the button  once. The *Warning* submenu opens.


If the symbol (1) is **red**, then turn off the engine immediately and notify **CraneCARE**.

If other symbols are displayed in red in this menu;  *Warning submenu*, p. 12 - 105.



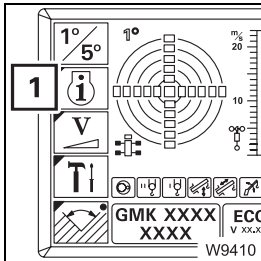
- Also check the following lamps on the side panel.
 - If the lamp (2) does not go out or lights up while the engine is running, switch the engine off and look for the cause.
 - If the lamp (1) does not go out or lights up while the engine is running, there is a malfunction in the flame start system.


 *Malfunctions on the engine for driving*, p. 7 - 23

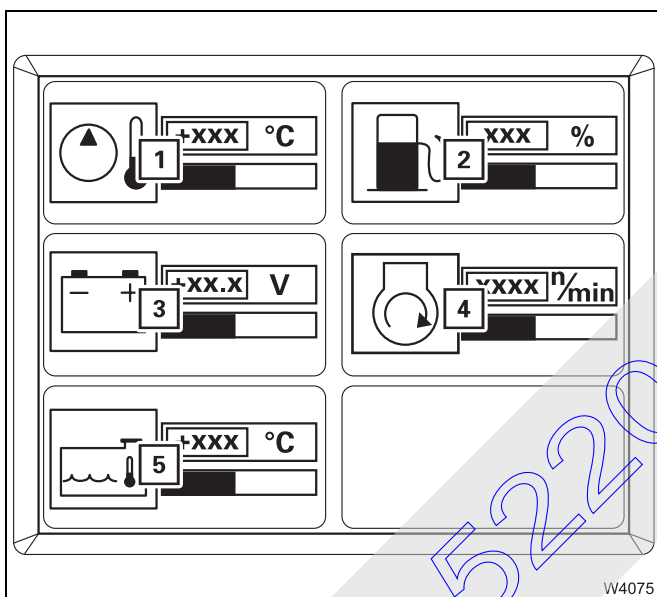
For more information please refer to the *Monitoring* submenu;  p. 11 - 15.

11.1.10 Monitoring submenu

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



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



The *Monitoring* submenu opens.


The following values will be displayed:

- 1 The hydraulic oil temperature in °C (°F)
 - 2 The fuel supply as a percentage (100% approx. 240 l (63 gal))
 - 3 The voltage in Volts
 - 4 The engine speed in min⁻¹ (rpm)
 - 5 The coolant temperature in °C (°F)
- 1) Additional equipment

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

green: current value is OK.

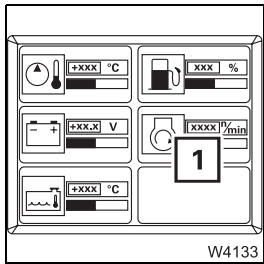
yellow: current value is close to the limit value

red: current value is higher (or lower) than the limit value. The respective warning message appears;  *Warning submenu*, p. 12 - 105.

11.1.11

Setting the idling speed

- Start the engine;  p. 11 - 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 those settings which are below the current engine speed.

Increasing the idling speed

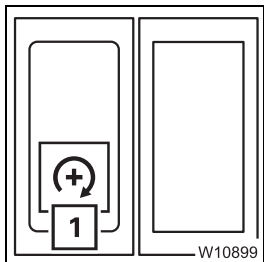
- Press the button (1) **down**.

The idling speed increases continuously until you release the button or the maximum value is reached.

Or

- Press the button **down** once.

The idling speed is increased by one step.



Decreasing the idling speed

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

The idling speed is decreased by one step.

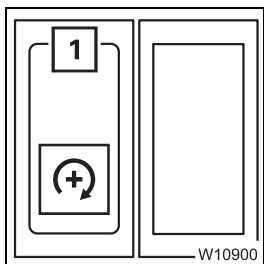
Or

- Press the button (1) **up** and hold it there.

- The idling speed corresponds to the standard value after about 3 seconds.

- After a further about 3 seconds, the engine will go off.

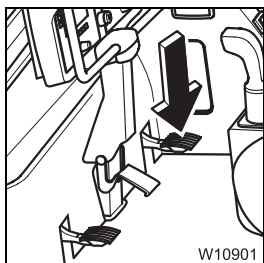
It is only possible to restart the engine when about 7 seconds have elapsed.



Exceeding the idling speed

You can exceed the idling speed at any time using the accelerator.


The engine speed is reduced to the preset idling speed if you release the accelerator.



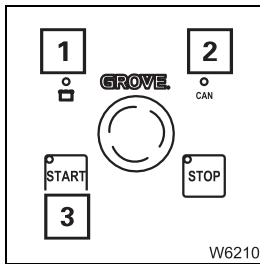
11.2


Starting the engine – with the hand-held control

Prerequisites


- You can only start the engine for crane operation if
- the bridging plug is inserted in all sockets not used;  p. 11 - 8 and
 - the ignition in the driver's cab is switched off.

Starting the engine



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

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

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

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

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

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11.3 Turning off the engine

11.3.1 During normal operation, with the ignition lock/with the hand-held control

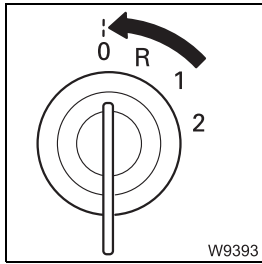


Risk of accidents due to suspended loads!

Never turn off the engine with a load suspended. You must have the control levers at hand in order to intervene at any time.
Always set down the load before you leave the crane cab.

Hand-held control not connected

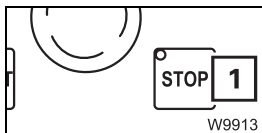
You can turn off the engine via the ignition lock if the hand-held control is not connected.



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

Hand-held control connected

You can switch off the engine only with the hand-held control if the hand-held control is connected.
In this case it is not possible to turn off the engine via the ignition lock.



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

After parking

Refer to the instructions in the respective section for each type of stopping work;

- ▣▣▣▣▶ *Short work breaks*, p. 12 - 123,
- ▣▣▣▣▶ *Work breaks of more than 8 hours*, p. 12 - 124.

11.3.2

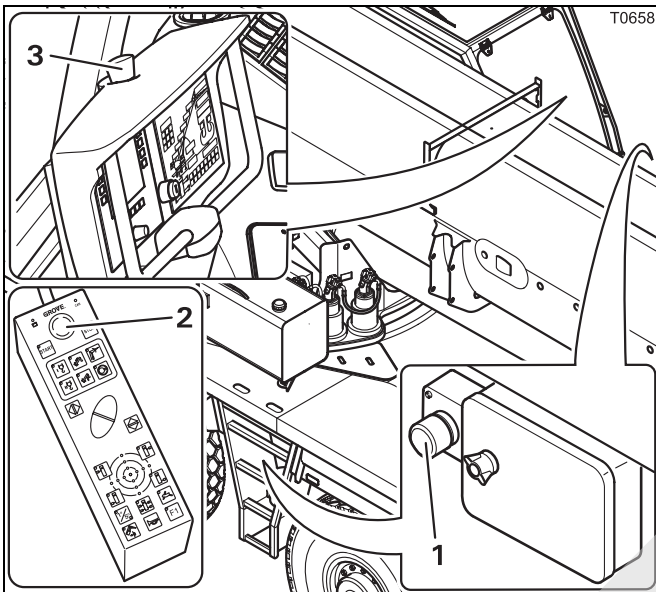
In emergencies, with the emergency-stop switches



Risk of overloading if used improperly

Use the emergency stop switches only in an emergency, i.e. if the crane functions no longer respond to the control levers.

Stopping crane movements suddenly may cause the truck crane to become overloaded under unfavourable conditions.



Four emergency stop switches are provided for an emergency:

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

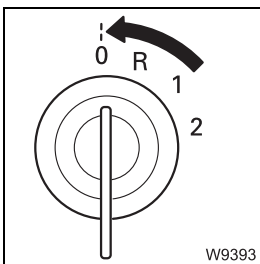
- Press one of the emergency switches (1), (2) or (3). The switch engages.

The engine goes out. If the engine for driving was on, it will go off as well.



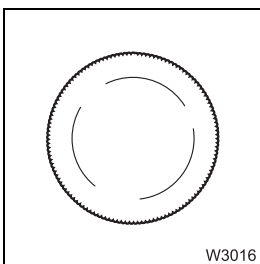
If an air intake inhibitor is present, then it will be triggered – this also applies to the engine for driving.

Resetting the emergency stop switch



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

- Turn off the ignition.



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

If air intake inhibitors are fitted, they must be released;

▣▣▣ *Air intake inhibitor*, p. 11 - 21

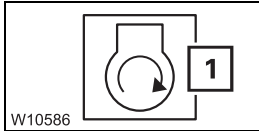
▣▣▣ *Air intake inhibitor*, p. 4 - 23.

11.4 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:

– when the 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* menu. The symbol stays red until the ignition has been turned off.

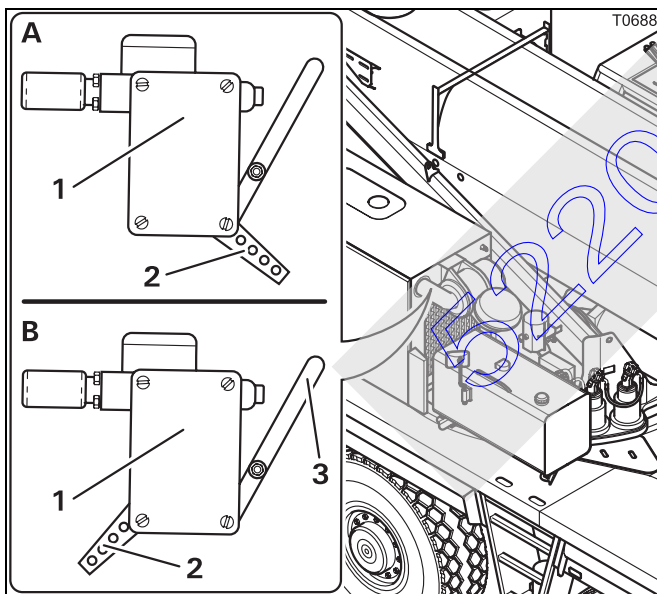


The engine can only be restarted after the air intake inhibitor has been released.

Releasing the air intake inhibitor

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

- The ignition is switched off.
- The emergency-stop switch is reset.



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

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

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

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

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12 Crane operation

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12 Crane operation

12.1 Before crane operation

12.1.1 CHECKLIST: Inspections before operating the crane

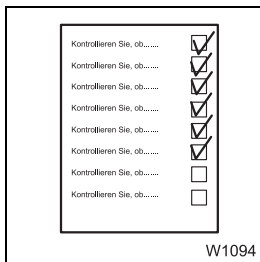


This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.

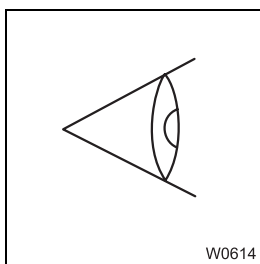
Observe the warnings and safety instructions there.



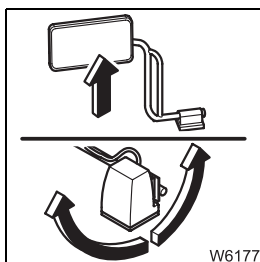
This checklist only applies to working with a rigged truck crane (supported and rigged with counterweight). If the truck crane is not yet rigged; **▶▶▶ CHECKLIST: Rigging, p. 13 - 1.**



1. The truck crane has been rigged for the operation to be carried out as described in the CHECKLIST: Rigging; ▶▶▶ p. 13 - 1.

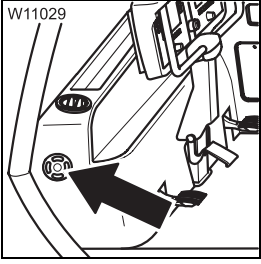


2. Carry out an inspection of the truck crane, looking out in particular for any leaking fluids (oil, fuel or water).

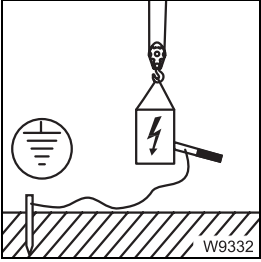


**3. – Adjust mirrors for crane operation; ▶▶▶ p. 13 - 110.
– Adjust the slewable spotlights if necessary; ▶▶▶ p. 12 - 103.**

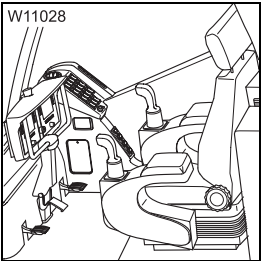




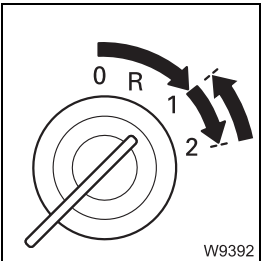
4. Check reservoir of the windscreen washing system – top up if necessary; ||||▶ p. 12 - 5.



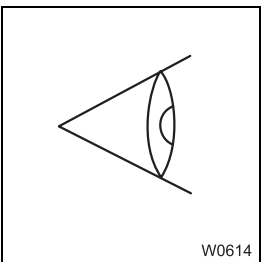
5. Earth the load, if necessary; ||||▶ p. 12 - 11.



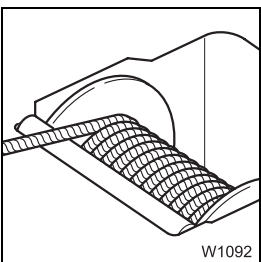
6. Adjust crane cab seat and front panel;
|||▶ *Adjusting the crane cab seat*, p. 12 - 7,
|||▶ *Adjusting the front panel*, p. 12 - 7.



7. Start the engine for crane operation; ||||▶ p. 11 - 12.

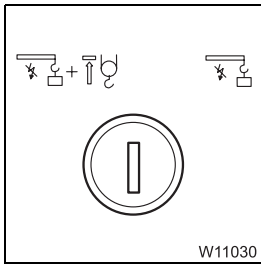


8. Check
- SLI
 - Lifting limit switch
 - Seat contact switch and dead man's switch
 - Emergency stop switch
- for correct operation. Have faulty components repaired; ||||▶ p. 12 - 8.

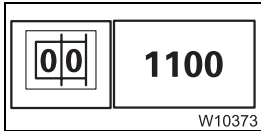


9. Check the position of the hoist ropes; ||||▶ p. 12 - 6.

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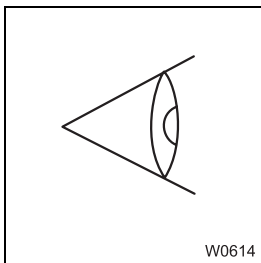
10. Remove key from the *Override* key-operated switch; p. 12 - 37.



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

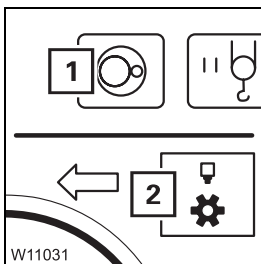


12. Compare current reeving of hoisting gear used to the display on the SLI – enter current reeving, if necessary; p. 12 - 26.



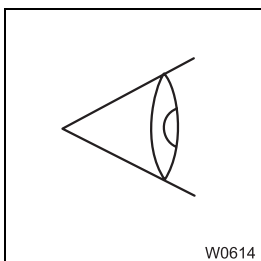
13. Check telescoping; *Checks prior to starting operations*, p. 12 - 64.

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



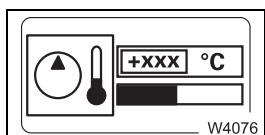
15. – Switch off the slewing gear for 0° and 180° working positions – symbol (1) red; p. 12 - 94.

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

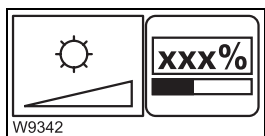


16. Check electrical system for correct operation; p. 12 - 6.





17. Check temperature of the hydraulic oil – preheat hydraulic oil, if necessary; ■■■► *Preheating the hydraulic oil*, p. 12 - 13.



18. Adjust the brightness of the *ECOS* display and the *SLI* display as required; ■■■► p. 11 - 11.



Additional information on checks during crane operation, on permissible working positions and on how to operate the individual power units; ■■■► *Crane operation with main boom*, p. 12 - 41.

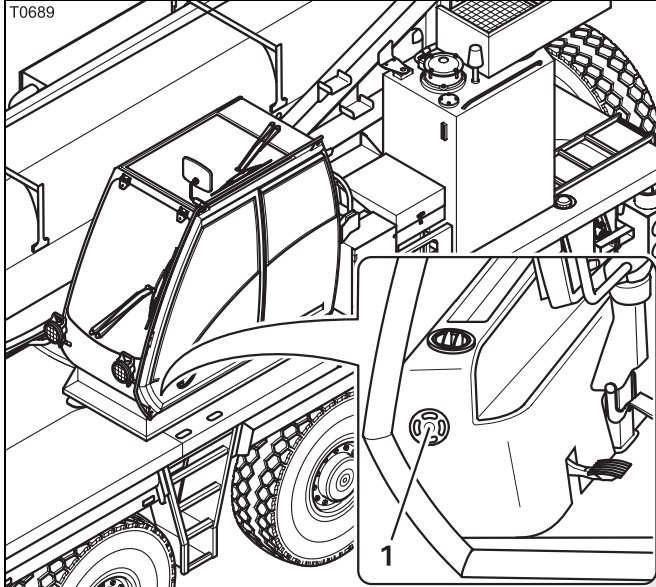
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12.1.2

Checking the condition of the truck crane

Windscreen washing system

Ensure that the receptacle of the windscreen washing system is always sufficiently full.



- Remove the cap (1) and check the level.

If the level is too low:

- Top up with water.
Use a windscreen washing agent and, at low temperatures, an appropriate antifreeze.
- Close the reservoir with the cap (1).

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!

In the event of loss of oil, you may no longer be able to perform crane movements. Not even in emergency mode.




Risk of environmental damage due to leaking consumables

Immediately repair or have repaired oil, fuel and coolant leakages. That way you prevent oil or fuel from seeping into the ground or polluting waters.



Checking the position of the hoist ropes

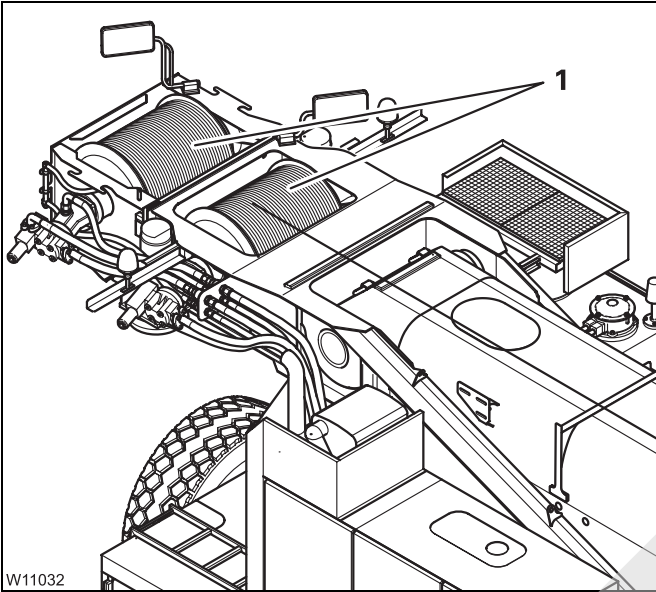
The hoist mirrors need to be folded out;  p. 13 - 110.



Risk of crushing due to turning rope drum

Keep away from the turning rope drum.

This will prevent your limbs from being drawn in and getting crushed.



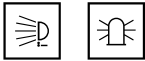
Check the position of the hoist ropes (1) on at least one full turn of the rope drum.

- Slowly carry out the movement *Lowering* and check the rope:
 - The hoist rope needs to be evenly wound.
 - The turns on the drum must be at an even distance of 0 to 2 mm (0 to 0.08 inches).
 - The cross-over points¹⁾ must be at an angle of about 180°.

- 1) The top rope lines are laid over the next lower rope lines at the cross-over points.

Checking the electrical system

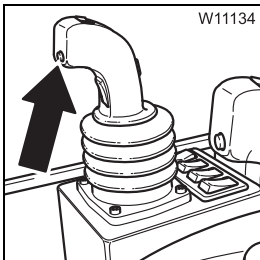
- Check the following functions and have faulty parts repaired.



- Working area spotlights, air traffic control light, rotating beacons



- Windscreen wipers, windscreen washing system



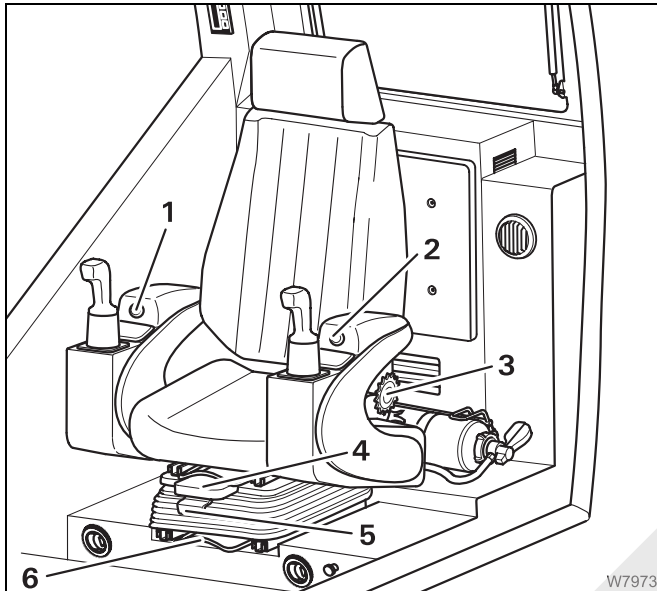
- Horn

12.1.3

Adjusting the crane cab seat and front panel

Adjusting the crane cab seat

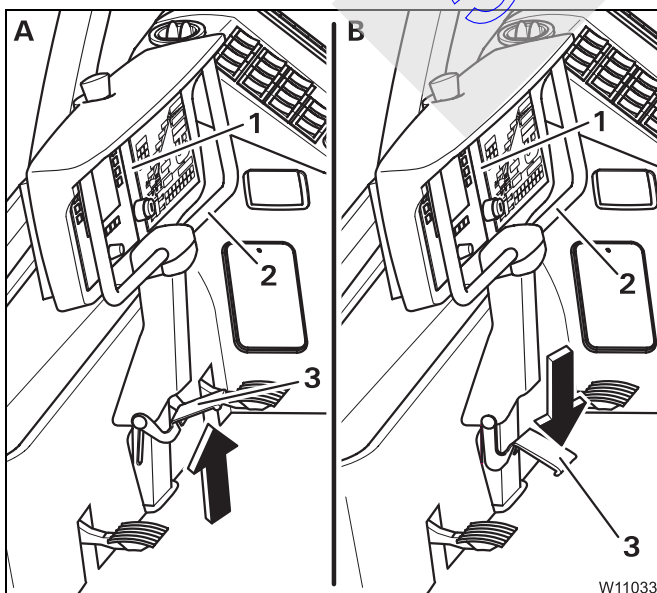
You can adjust the crane cab seat to your height.



- 1 Height adjustment with right-hand control console
- 2 Height adjustment with left-hand control console
- 3 Inclination of backrest (on both sides)
- 4 Length adjustment of the seat/backrest without control consoles
- 5 Seat height adjustment
- 6 Length adjustment of the seat/backrest with control consoles

Adjusting the front panel

You can adjust the height of the front panel.



- Hold the front panel (1) by the handle (2).
- (A) – Fold the pedal (3) upwards.
- (B) – Adjust the front panel (1) to the desired height.
- Fold down the pedal (3) to lock the front panel.

12.1.4

Checking the safety devices




Risk of accidents when working with faulty safety devices!

It is prohibited to operate the crane with safety devices that are faulty, overridden or out of service.

Have faulty safety devices repaired immediately by **CraneCARE**.

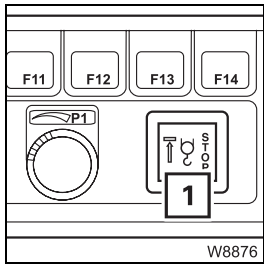
Safe load indicator

- Switch on the safe load indicator, perform all checks and enter the current rigging mode;  *Switching on the SLI*, p. 12 - 18.

The SLI is working correctly at this point in time if no error message is pending and if the crane movements have been enabled.

If the SLI is not working correctly, do not begin to work with the crane but notify **CraneCARE**.

Lifting limit switch



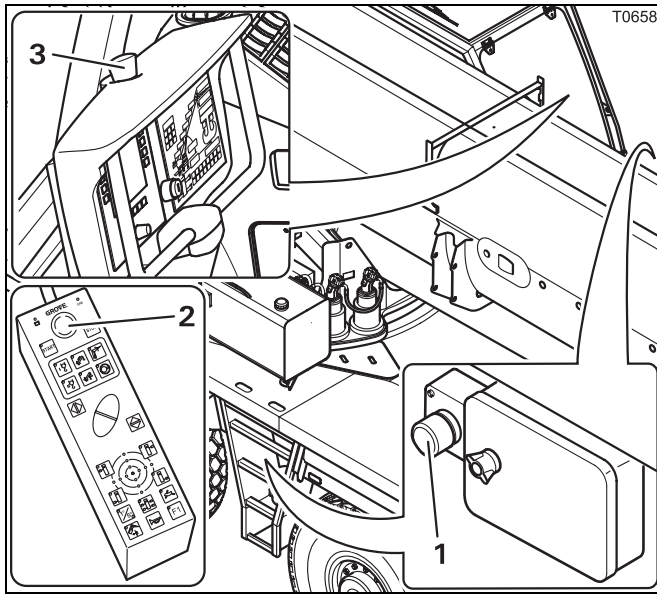
- Raise the main boom until the hook block is lifted off the ground.
- Slowly perform the movement *Raise* until the hook block lifts the lifting limit switch weight.
- Now check whether the movement *Raise* is switched off and the lamp (1) lights up.
- Check whether the movements *Lower* and *Extend* are also switched off.


The SLI 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 lifting limit switch is not working correctly, do not begin to work with the crane but notify **CraneCARE**.

Emergency stop switch

- Set down the load and let go of both control levers.



- Press the emergency stop switch (3) so that it engages.
- Check whether the engine stops.
- Turn the emergency stop switch until it disengages again.
- Release the air intake inhibitor if it is locked;  *Air intake inhibitor*, p. 11 - 21.
- Perform the same check for the emergency switches (1) and (2).

If the emergency stop switches are not working correctly, do not begin to work with the crane but notify *CraneCARE*.



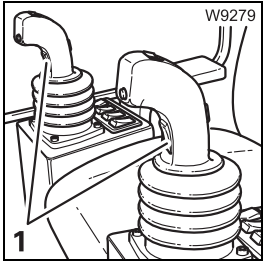
Seat contact switch and dead man's switch



Danger of accidents if the seat contact switch is faulty!

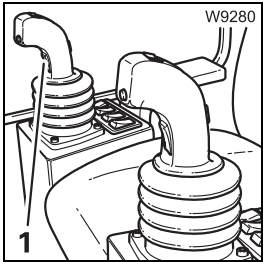
Always stand inside the crane cab when you perform this check.
If you stand next to the crane cab, you may be pushed off the carrier if the superstructure slews as a result of a faulty dead man's switch.

Checking with the truck crane at a standstill

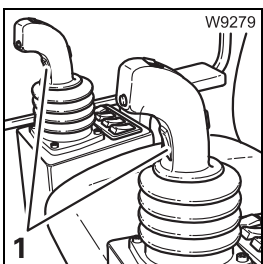


- Do not sit down on the crane cab seat.
- Do not press any of the dead man's switches (1).
- Move the control levers one after the other for all the crane movements and check whether all the crane movements are switched off.

Checking during operation



- Dead man's switch
 - Do not sit down on the crane cab seat.
 - Press the right-hand dead man's switch (1) and slowly lift the hook block.
 - With the control lever actuated, let go of the right-hand 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-hand control lever.



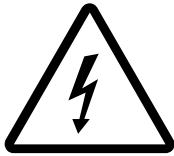
- Seat contact switch
 - Do not press any of the dead man's switches (1).
 - Sit down on the crane cab seat and slowly lift the hook block.
 - With the control lever actuated, stand up and check whether the crane movement comes to a standstill within approx. 3 seconds.

If the dead man's switch system is not working correctly, do not begin to work with the crane but notify **CraneCARE**.

12.1.5

Earthing the load

Even if the truck crane is already earthed (p. 13 - 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.

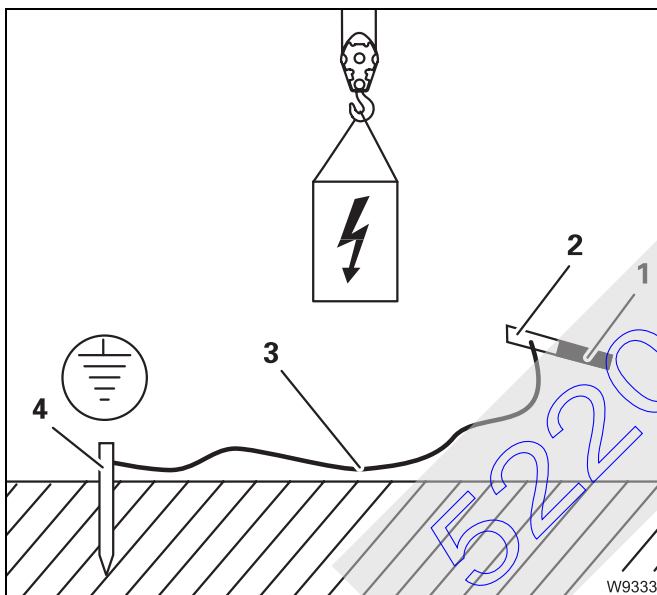


Risk of accidents due to electric shock!

Always earth the load before operating the crane

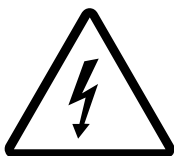
- Near strong transmitters (radio transmitters, radio stations, etc.)
- Near high-frequency switching stations
- If a thunder storm is forecasted

If the load is charged with static electricity, you must always earth the load before touching it.



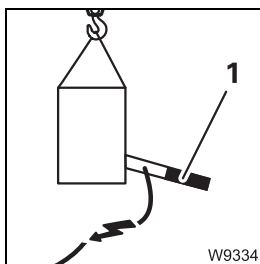
Use electrically conducting material for earthing.

- Hammer a metal rod (4) (length of approx. 2.0 m (6.6 ft) at least 1.5 m (5 ft) into the ground.
- Moisten the soil around the metal rod (4) for better conductivity.
- Clamp an insulated cable (3) to the metal rod (4) (cross-section of at least 16 mm² (0.025 inches²)).
- Clamp the other end of the cable (3) to a metal rod (2) with an insulated grip (1).

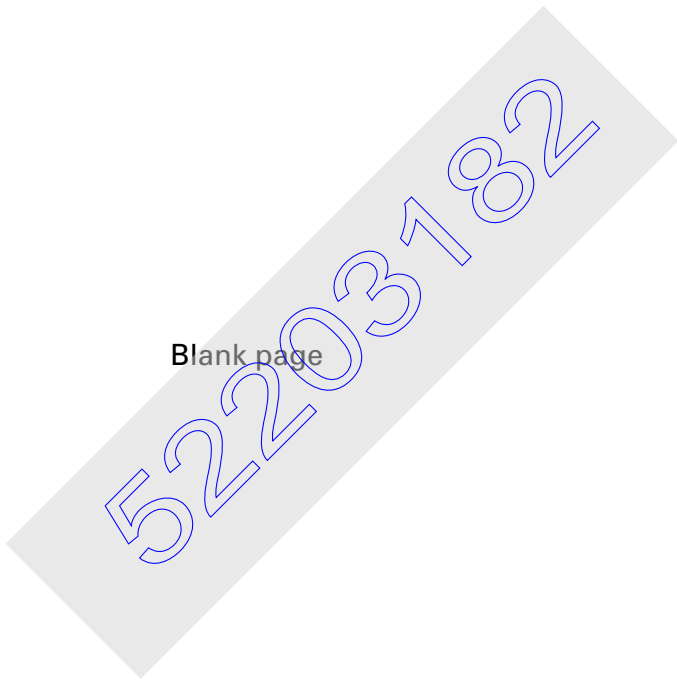


Risk of accidents due to electric shock!

Ensure that the connections between the cable and the metal rods are electrically conductive. When earthing, hold the metal rod only by the insulated grip and keep a sufficient distance to the metal rod in the ground.



- Hold the metal rod by the insulated grip (1).
- To earth, touch the load with the metal rod.

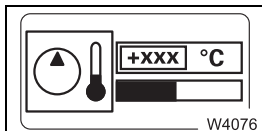


12.1.6

Preheating the hydraulic oil



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



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

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

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

- **from 10 °C to 0 °C (50 °F to 32 °F)**

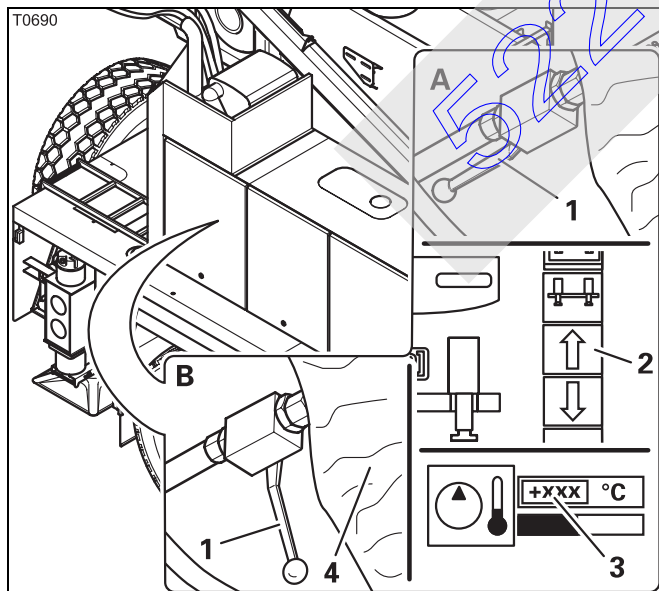
You can carry out crane movements with loads only in normal operation mode, at average engine speed and at average operating speed.

- **from 0 °C to -15 °C (32 °F to 5 °F)**

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

- **below -15 °C (5°F)**

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



(A) – Preheating

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

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

(B) – Prior to crane operation

Do not touch the hot exhaust system (4).

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




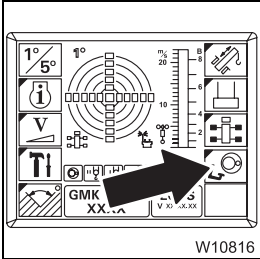
Operate all crane functions at least twice after preheating (hydraulic oil temperature above 10 °C (50 °F)) in order to remove the cold oil from all parts of the hydraulic system.

12.1.7 Switching the houselock on/off

If the truck crane is equipped with a houselock, the turntable can be locked in the entire slewing range. For locking, a pin extends and blocks the slewing gear.

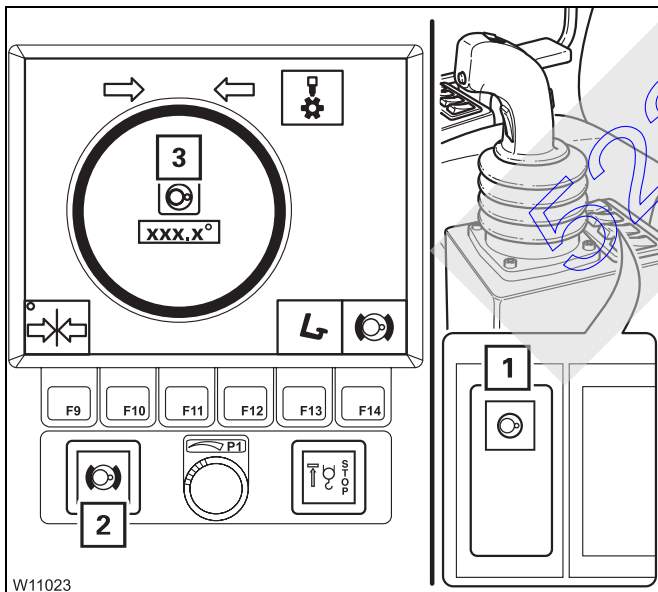
Switching on the houselock

- Slew the superstructure to the position in which it is to be locked and then stop the slewing movement.
- If necessary, open the main menu  and press the button **(1)** once. The *Superstructure lock* submenu opens.



Risk of damage during slewing

Always switch off the slewing gear before you operate the houselock. The system will be damaged when slewing the superstructure during the locking procedure.



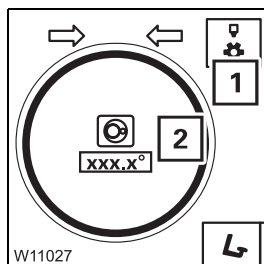
Switching off the slewing gear

The slewing gear brake must be engaged when operating the houselock.

- Press the button **(1)** once.
- The slewing gear is switched off and the slewing gear brake is engaged.
- The symbol **(3)** is red.
 - The lamp **(2)** lights up.

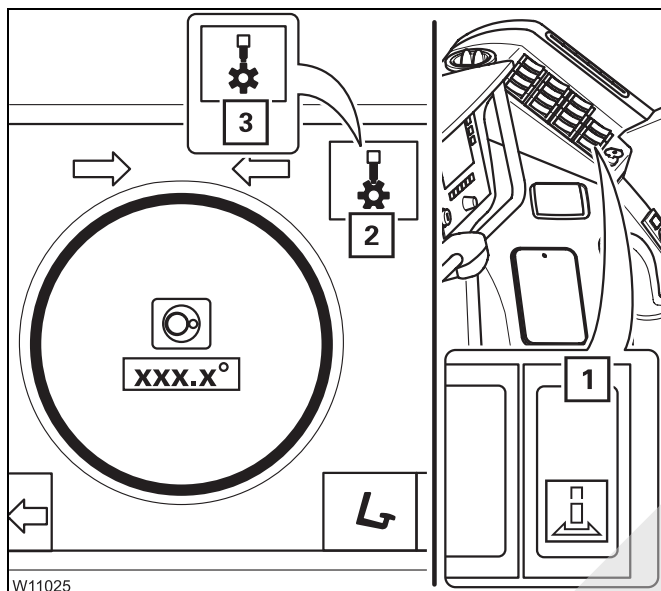


With the *Control lever* function, the slewing gear brake is already engaged when the control lever is in zero position. Switch the slewing gear off in this case, too. This provides additional safety against unintentional slewing.




Switching on the houselock

The slewing ring (2) is displayed in the same colour as the symbol on the display (1) during the entire procedure.



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


The display first shows the symbol  in **yellow** and when the houselock is switched on, it shows the symbol (2) in **green**.

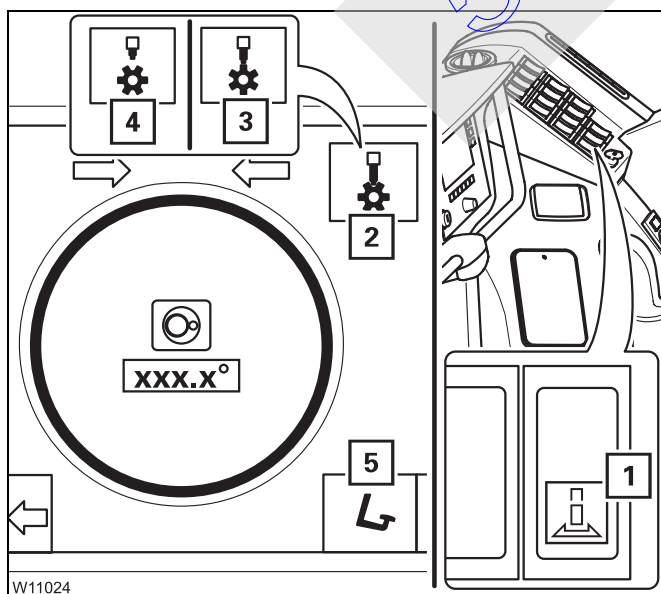
When the symbol (3) is **red/yellow**:

- Let go of the 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 the button (1) in at the bottom until the symbol (4) turns **red**.
- With the *Brake pedal* function (5) active, actuate the slewing gear brake.
- Switch on the slewing gear and slew the superstructure a little further (minimal).
- Switch off the slewing gear.
- Press the button (1) in at the top until the symbol (2) turns **green**.
- If the symbol (3) is still displayed, you must correct the position of the superstructure once more.



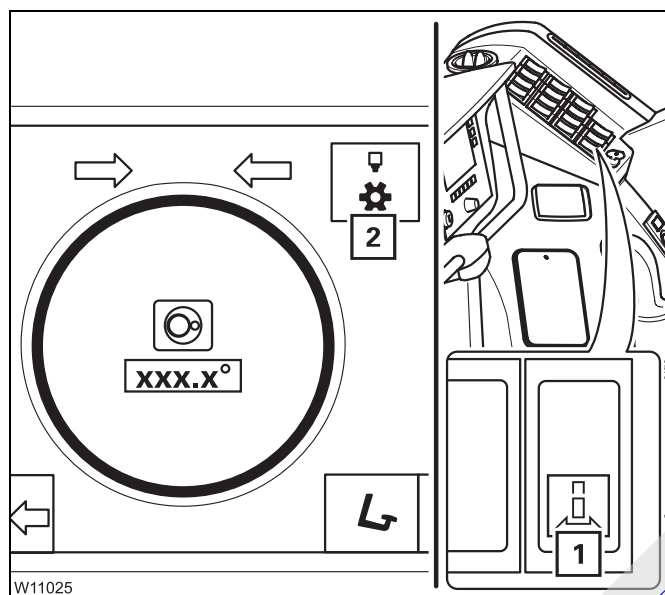
Switching off the houselock

- Check that the slewing gear is switched off;  *Switching off the slewing gear*, p. 12 - 94.




Risk of damage during slewing

Always switch off the slewing gear before you operate the houselock. The system will be damaged when slewing the superstructure during the locking procedure.



- Press the button (1) in at the bottom until the symbol (2) turns **red**.

The display first shows the symbol  in **yellow** and when the houselock is switched on, it shows the symbol (2) in **red**.

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12.2

Operation of the safe load indicator

If the current rigging mode of the truck crane is registered properly, the SLI prevents the permissible lifting capacity from being exceeded and the truck crane from being overloaded.



Risk of accidents due to incorrectly set SLI!

Before operating the crane, ensure that the current rigging mode is correctly entered. An incorrect input will give you a false sense of security. This results in the truck crane overloading and causing an accident!

The current rigging mode is based on measured values and values entered manually.

Based on measured values	Based on values entered manually
<ul style="list-style-type: none"> - Main boom length - Main boom angle - Current load - Lattice extension inclination 	<ul style="list-style-type: none"> - Outrigger span - Counterweight - Lattice extension length - Reeving

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 from overridden or faulty SLI!

The SLI must never be overridden.

It is prohibited to work with the SLI if it is switched off, overridden, out of service or faulty!



Danger of overturning in two-hook operation mode!

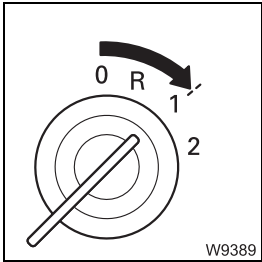
The safe load indicator only secures one-hook operations! Two-hook operations are not permitted.

12.2.1 Switching on the SLI



The SLI is not switched off if you turn the ignition key to position **R** instead of position **0** to restart the engine. The test program will not run and you will not have to acknowledge the settings again.

Switching on



The SLI is switched on together with the ignition.

- Turn on the ignition.

A test program runs after switching on the ignition. A continuous buzzer tone sounds for about 2 seconds and a lamp test is performed.

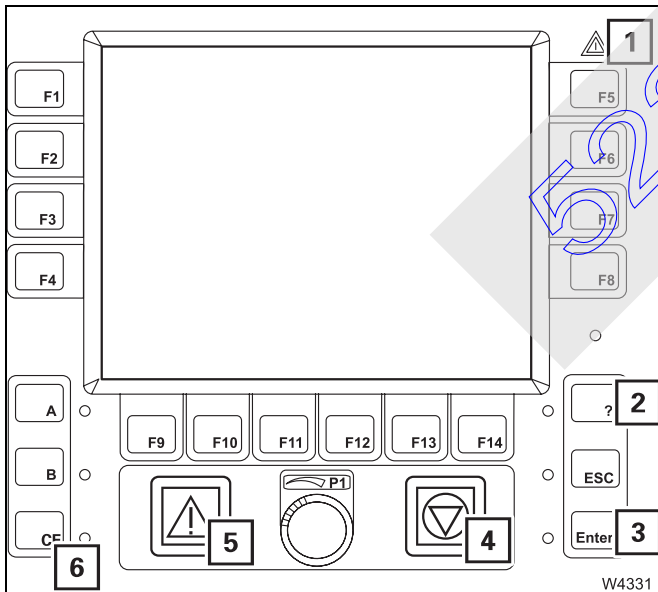
- Check whether you can hear a buzzer tone.



Risk of accidents if the safety devices are faulty

If the lamps or the buzzer fail, notify **CraneCARE** and have the error eliminated.

In the meantime, pay particular attention to the lamps in the event of a failure of the buzzer tone and vice versa.

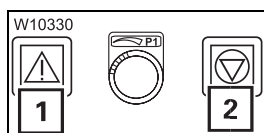


Lamp test

- Check that the lamps (1) to (6) go on briefly after turning on the ignition.

If the specified time is insufficient, switch on the ignition again.

Contact **CraneCARE** if one or more lamps do not go on.

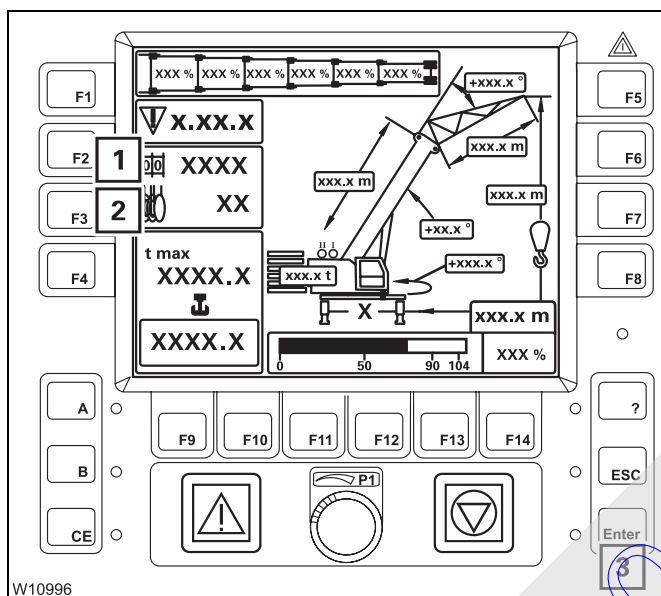


After the test program is over:

- The lamps (1) and (2) are on.
- All power units are disabled.

The current display depends on whether the SLI:

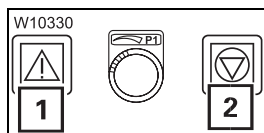
- Had been switched off for less than 48 hours or
- Had been switched off for longer than 48 hours.



After a standstill of less than 48 hours

The *Monitoring* submenu opens.
The rigging mode set last is displayed, and the symbols (1) and (2) are green and flashing.
You can save the displayed values if they correspond to the current rigging mode:

- Press the button (3) once – the symbols (1) and (2) stop flashing.



The lamps (1) and (2) go out. The SLI code is accepted.

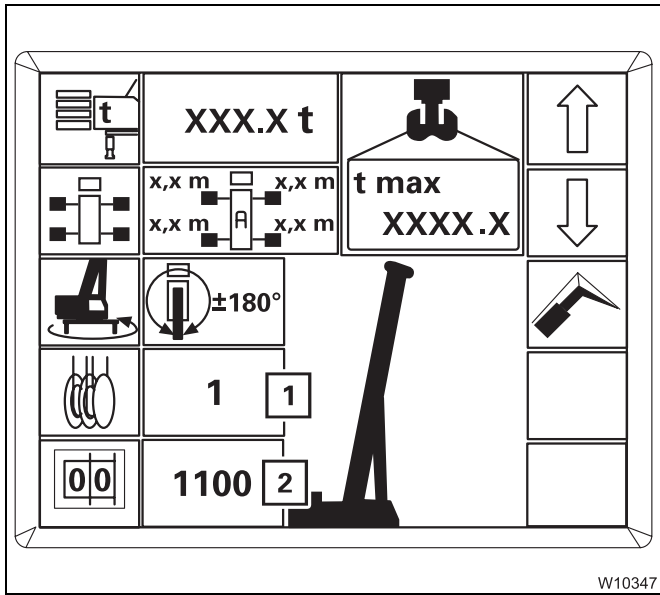
If no error message is displayed, the SLI is now set for crane operation and the crane movements are enabled; *Checks prior to crane operation*, p. 12 - 28.



Any pending errors are indicated on the display (1); *Display in the event of errors*, p. 12 - 36.

You must re-enter the current rigging mode if the displayed values do not correspond to the current rigging mode of the truck crane; *Entering the rigging mode*, p. 12 - 21.





After a standstill of more than 48 hours

The *Enter rigging mode* submenu opens.

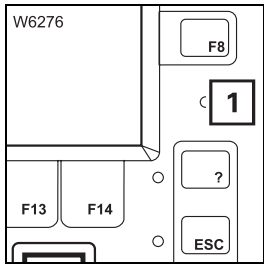
The display (2) indicates the SLI code **1100** – the corresponding rigging mode is displayed.

The display (1) indicates the reeving entered last, e.g. **1**.

- Enter the current rigging mode; p. 12 - 21.

Brightness of the displays

The brightness of the *SLI* display adjusts automatically to the ambient brightness after turning on the ignition.



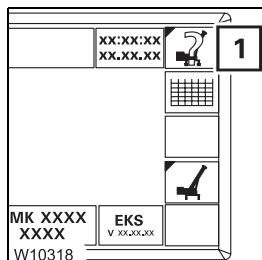
Do not cover the sensor (1) and keep it clean to avoid soiling affecting the adjustment of the brightness.

You can also adjust the brightness manually; *Adjusting the brightness of the display*, p. 11 - 11.

12.2.2

Entering the rigging mode

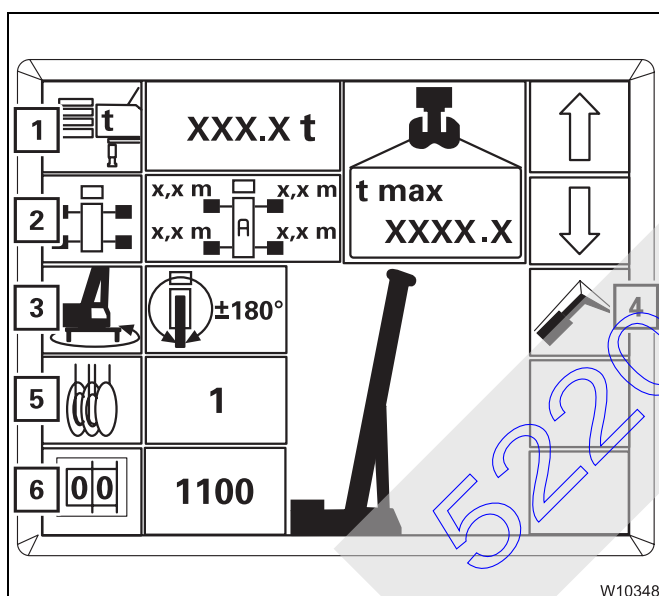
For a complete rigging mode input, you must enter, confirm and accept the rigging mode and the reeving.



Open 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 rigging mode.

- You can enter the individual components (1) to (5) for the current rigging mode one after another.

- or
- You can enter the SLI code (6) and the reeving (5) for the current rigging mode.

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 SLI code; **|||** *Entering the SLI code*, p. 12 - 25.



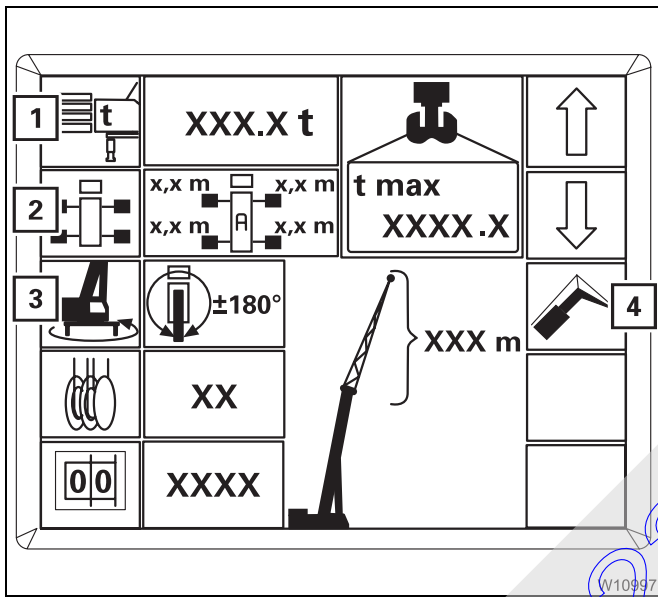
Entering individual components

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!

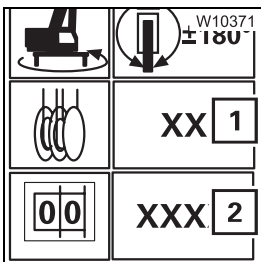
Values which have already been set may be changed by entering individual components. For this reason, you should always compare the displayed rigging mode with the current rigging mode of the truck crane after making the entry. In this way you can prevent the SLI from calculating with incorrectly set components and the truck crane from becoming overloaded or overturning.



When completely re-entering the rigging mode, you can prevent changes to the components already entered by making the entries in the following order:

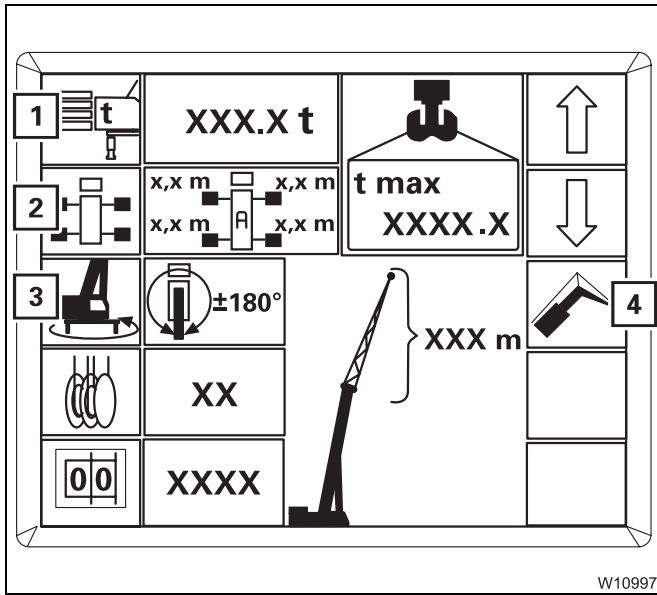
- Counterweight (1)
- Boom system (4)
- Outrigger span (2)
- Slewing range (3)

In this order, the values which can be selected for the current entry are always restricted by the previous entry. As a result, values which have already been entered cannot be changed.



When entering the components, the corresponding SLI code (2) is displayed at the same time.

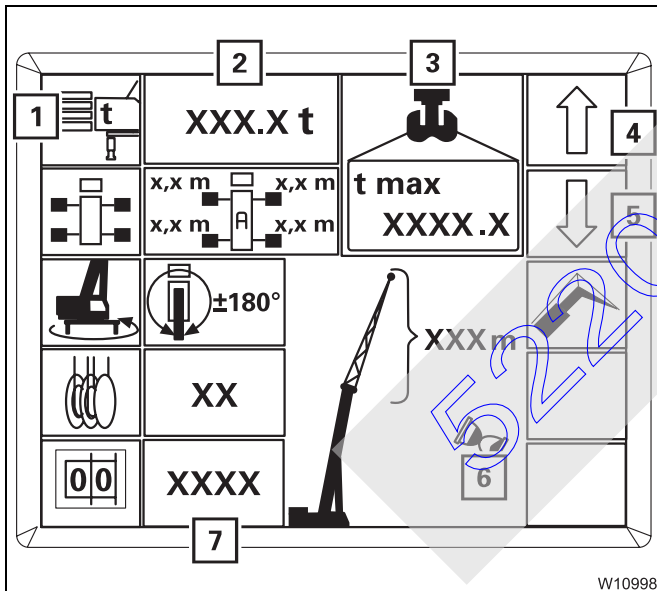
Then you must enter the current reeving (1) and accept the indicated rigging mode.



Switching to input mode

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

The symbol turns green – input mode is switched on.



Selecting values

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

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

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

- 4 larger versions
- 5 smaller versions

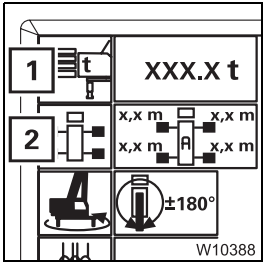
The display (7) indicates the corresponding SLI code – the symbol (6) is indicated while the SLI code is being determined.

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



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

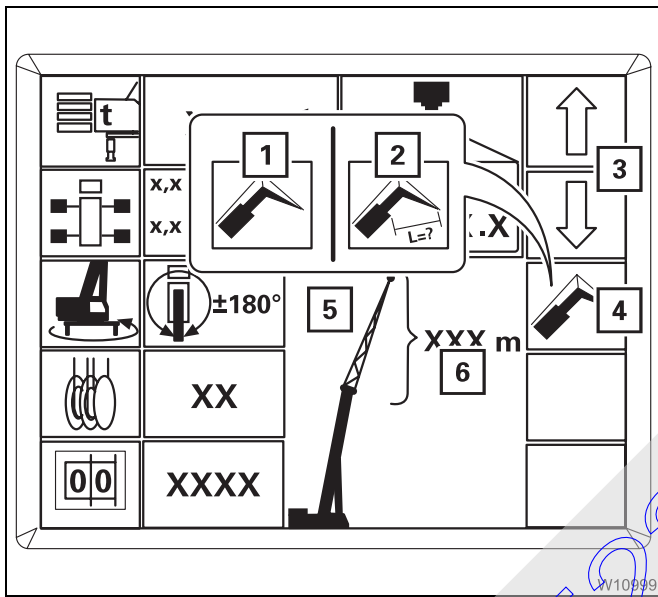




After the selection procedure, there are three options:

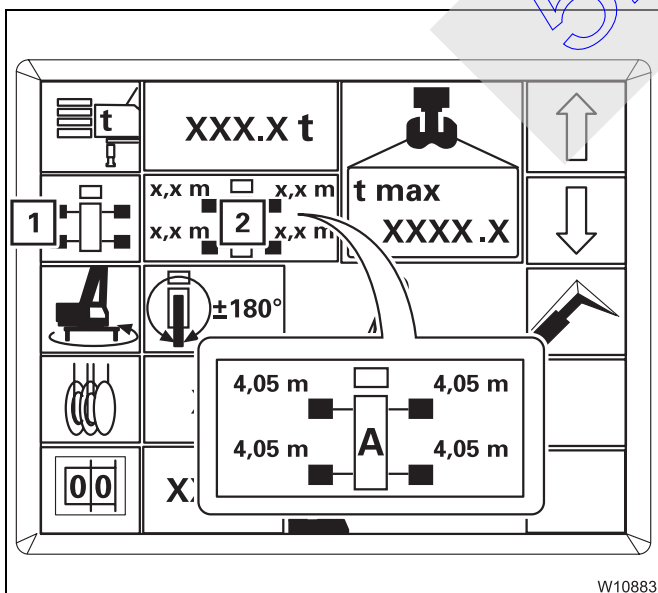
- Switching off the input mode
 - Press the button (1) once – symbol grey.
- Switching the input mode over
 - Press the button for the next component once, e.g. button (2) – symbol green.
- Accept displayed rigging mode; Accept rigging mode, p. 12 - 26.

Enter the other components of the current rigging mode in the same way.



- Boom system

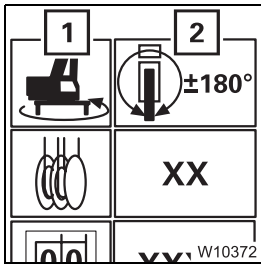
- Press the button (4) repeatedly until the symbol for the required input is **green**.
 - 1 Enter boom system
 - 2 Enter lattice extension length
- Press the button (3) repeatedly until
 - the display (5) shows the rigged boom system, e.g. the lattice extension **or**
 - the display (6) indicates the rigged lattice extension length.



- Outrigger span

Symbol (1) is green. Press the buttons 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. 4.05 m (13.3 ft) for an outrigger span of 8.10 m (26.6 ft) in the case of outrigger span A.

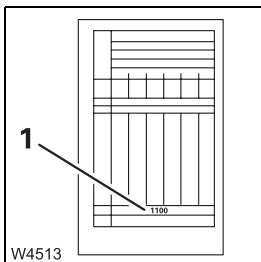


- Slewing range

Symbol (1) is green. Press the buttons repeatedly until the display (2) indicates the required slewing range, e.g. 360°.

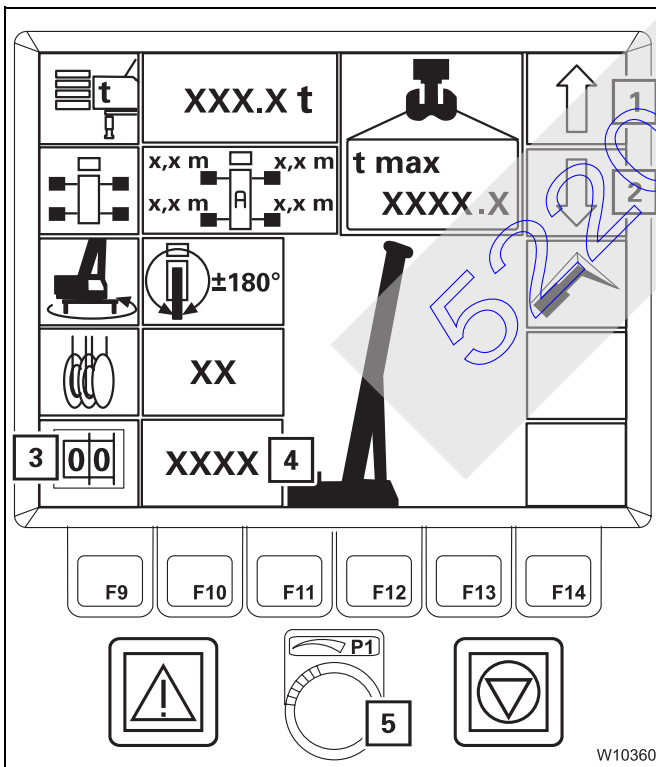
- You can only confirm rigging modes for slewing ranges other than 360°
- if the slewing gear is switched off in the 0°/180° working position.
 - if the superstructure is in the entered slewing range. If necessary, first enter the 360° slewing range and slew the superstructure into the required position.

Entering the SLI code



You must enter the SLI code for the rigging mode according to the *Lifting capacity table*.

- Refer to the *Lifting capacity table* for the current rigging mode. The corresponding SLI code (1) is specified at the bottom of the table (e.g. 1100).



- Press the button (3) once – symbol **green**.
 - Press the button (4) or (2) repeatedly until the display (4) shows the required SLI code.
- or
- Select the SLI code with the switch (5).

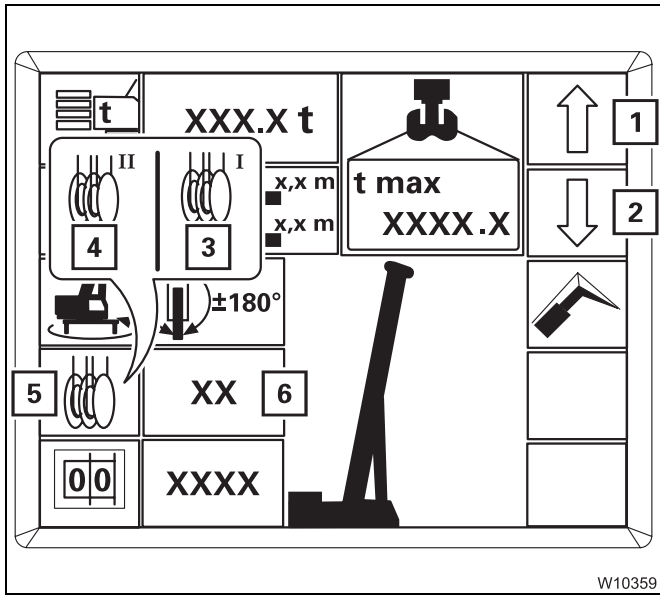
The other displays show the corresponding rigging mode.

Now you can enter the reeving and accept the rigging mode.



Entering the reeving

Entering the reeving does not have an effect on any other components which are already entered.



- Press the button (5) repeatedly until the symbol for the hoisting gear with which you want to lift the load has gone **green**.
 - 3 Symbol for main hoist
 - 4 Symbol for auxiliary hoist
- Press the button (1) or (2) repeatedly until the display (6) shows the number of currently reeved rope lines.

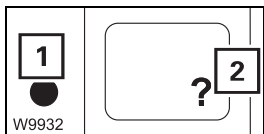
Accept rigging mode

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, the lamp (1) goes out. The *Rigging mode monitoring* submenu opens and you can accept the rigging mode.
 - If the rigging mode is not permissible, the lamp (1) lights up. Press button (2) once to display the error codes; see p. 15 - 32.



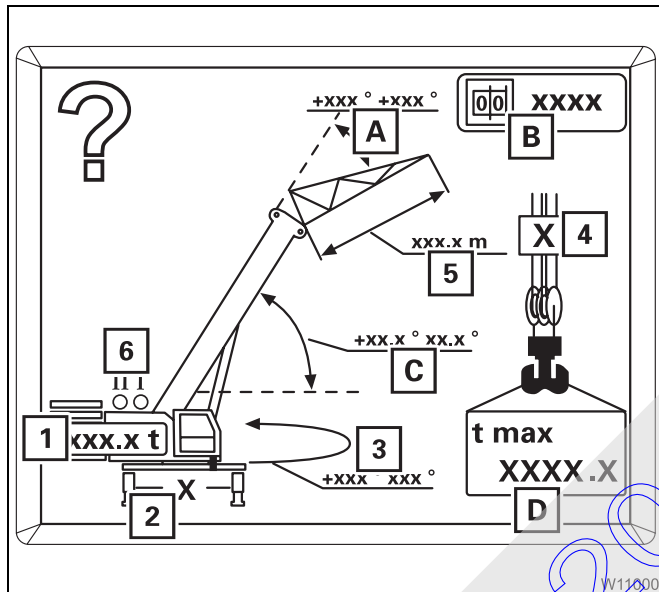
Accepting the rigging mode

- Check whether the current rigging mode of the truck crane corresponds to the displayed rigging mode.



Risk of accidents due to incorrectly set SLI!

If the current rigging mode varies from the displayed rigging mode, the maximum load displayed by the SLI does not correspond to the actually permissible lifting capacity according to the *Lifting capacity table*. Overloading and accidents will be the result.



- Check:

- 1 The rigged counterweight
- 2 The rigged outrigger span
- 3 The slewing range for the job planned
- 4 The number of reeved rope lines
- 5 The length of the rigged lattice extension
- 6 The hoisting gear that is switched on
- switch hoisting gears over;
p. 12 - 29

For the rigging mode, the following is displayed:

- A** The permissible working range of the lattice extension
- B** The SLI code
- C** The permissible working range of the main boom
- D** The maximum load



- If you need to correct some values, press the button (1). The *Enter rigging mode* submenu opens.



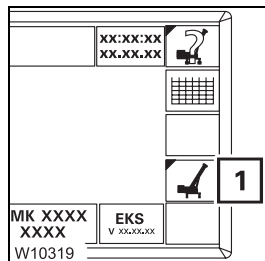
- If the current rigging mode is displayed, press the button (1). The *Monitoring* submenu opens, and the crane movements are enabled provided no error is pending; p. 12 - 28.

12.2.3


Checks prior to crane operation

Open the sub-menu

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 opens automatically.



You can also open the submenu manually.

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

The *Monitoring* submenu opens.



You can only cancel the *SLI monitoring* submenu when all crane movements have stopped – control lever in zero position.

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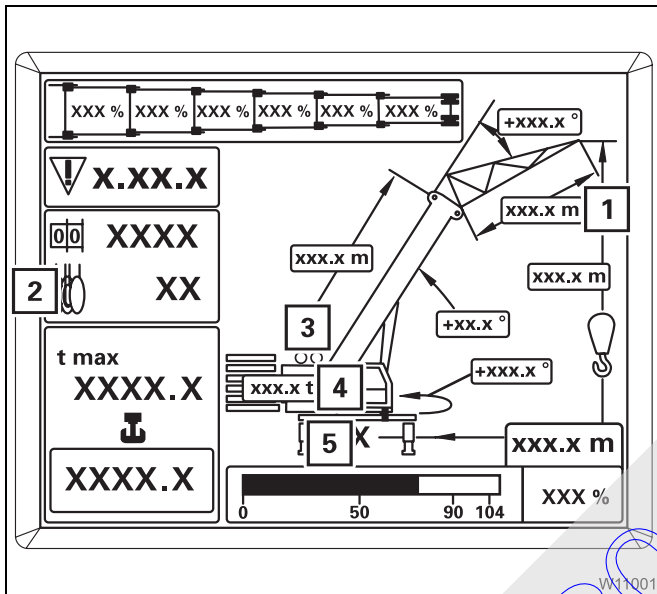
Checks

- Check whether the current rigging mode of the truck crane corresponds to the displayed rigging mode.



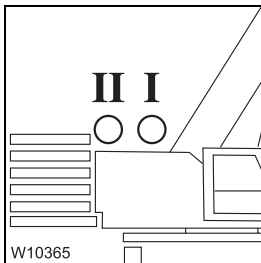
Risk of accidents due to incorrectly set SLI!

If the current rigging mode varies from the displayed rigging mode, the maximum load displayed by the SLI does not correspond to the actually permissible lifting capacity according to the *Lifting capacity table*. Overloading and accidents will be the result.



- Check:

- 1 The length of the rigged lattice extension
- 2 The number of reeved rope lines
- 3 The hoisting gear that is switched on
- 4 The rigged counterweight
- 5 The rigged outrigger span



Hoisting gears display

The lamp that goes on must always be for the hoisting gear with which the load is to be lifted.

- Lamp I:** must go on if the load is to be raised with the main hoist.
- Lamp II:** must go on if the load is to be raised with the auxiliary hoist.

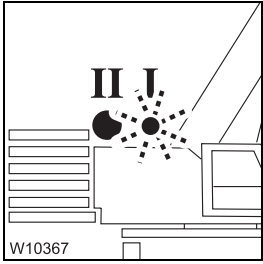
- Switch over the display if necessary; Example of how to switch over the display, p. 12 - 30.



- If you need to correct values, press the button (1) and open the *Enter rigging modes* submenu.

You can start working with the crane, if the current rigging mode of the truck crane is displayed.

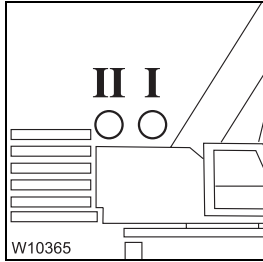




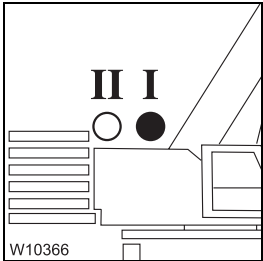
Example of how to switch over the display

The load is to be raised with the main hoist, for example. However, lamp **II** for the auxiliary hoist goes on and lamp **I** for the main hoist flashes.

Switch over the display as follows:

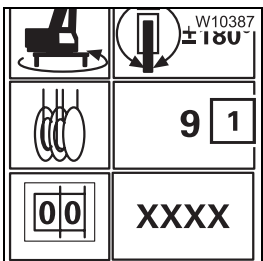


- Switch off both hoisting gears. The lamps **I** and **II** go out.



- Switch on the main hoist.

Now the lamp **I** for the main hoist is on.



The display **(1)** shows the reeving value entered last for the main hoist (e.g. **9**).

If no reeving has been entered yet, the SLI selects reeving **1**.

- If necessary, enter the current reeving; p. 12 - 26.



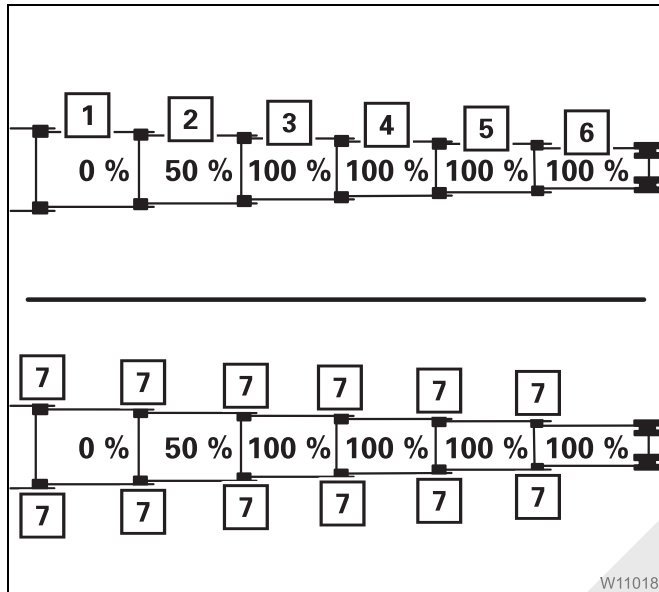
Risk of accidents due to incorrectly set SLI!

After switching over the hoisting gears, always check whether the displayed reeving value corresponds to the current reeving value of the displayed hoisting gear and, if necessary, enter the current reeving value. In this way, you can prevent the SLI from making calculations based on an incorrect reeving value and the truck crane from becoming overloaded or overturning.

12.2.4

Displays during crane operation

The following information is constantly displayed in addition to the displays of the rigging mode:

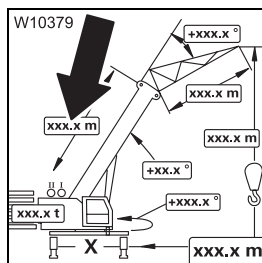


The current telescoping

The displays (1) to (6) show the current telescoping of the telescopic sections I to VI in percent, e.g. **100%**.

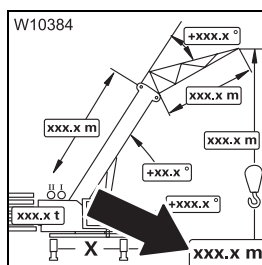
Fixed and intermediate lengths differ in the locking pins (7).

- 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).



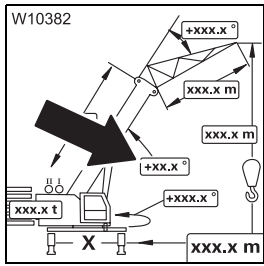
The current working radius

Shows the current working radius = horizontal distance between the turntable axle and hook block axle.

The displayed value is calculated on the basis of the telescoping and the main boom or lattice extension angle.

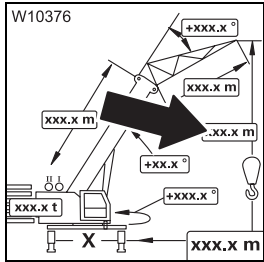
The value is displayed either in metres (m) or feet (ft), depending on the setting.





The current main boom angle

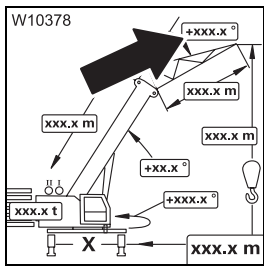
Shows the current main boom angle in relation to the horizontal. Angles below the horizontal are displayed with a minus sign, e.g. -3° .



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.

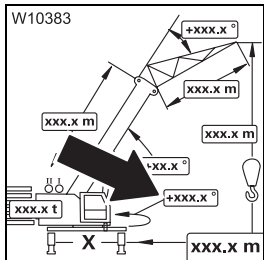
The value is displayed either in metres (m) or feet (ft), depending on the setting.



The current lattice extension inclination

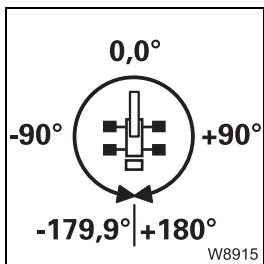
Shows the current lattice extension inclination in relation to the main boom in degrees.

If the displayed SLI code does not apply to a lattice extension, there is no display.



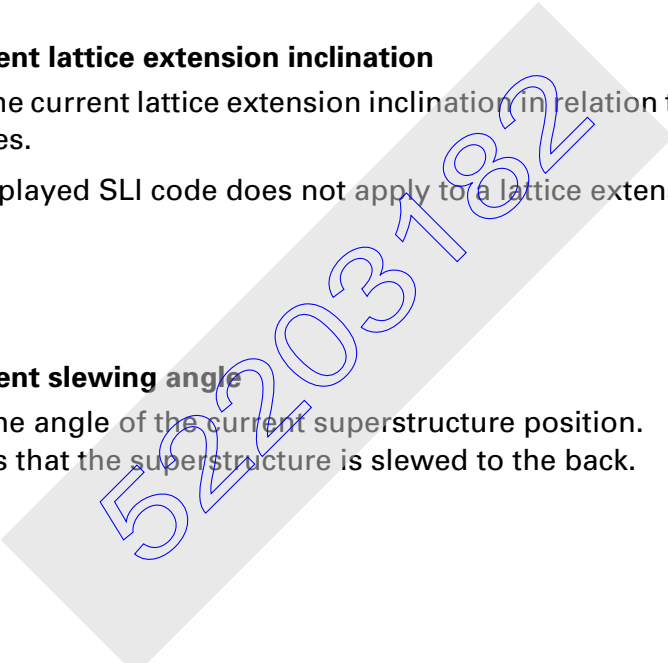
The current slewing angle

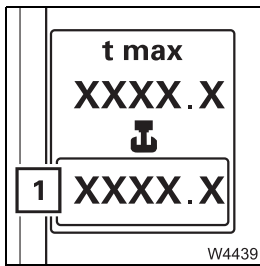
Shows the angle of the current superstructure position. 0° means that the superstructure is slewed to the back.



A full turn out of this working position is divided into two semicircles:

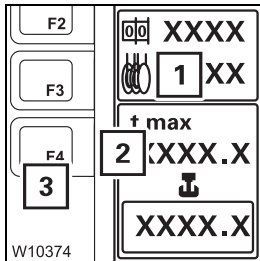
- Angles in the **right-hand semi-circle** are displayed as **positive** values (0° to 180.0°).
- Angles in the **left-hand semi-circle** are displayed as **negative** values (0° to -179.9°).





The currently raised load

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



The maximum load

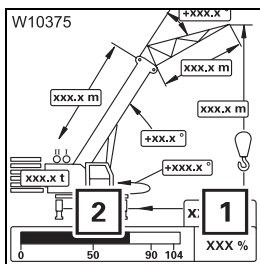
The display (2) shows the maximum load that can be lifted in the current rigging mode with the current working radius.

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

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

- Press the button (3) once.

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



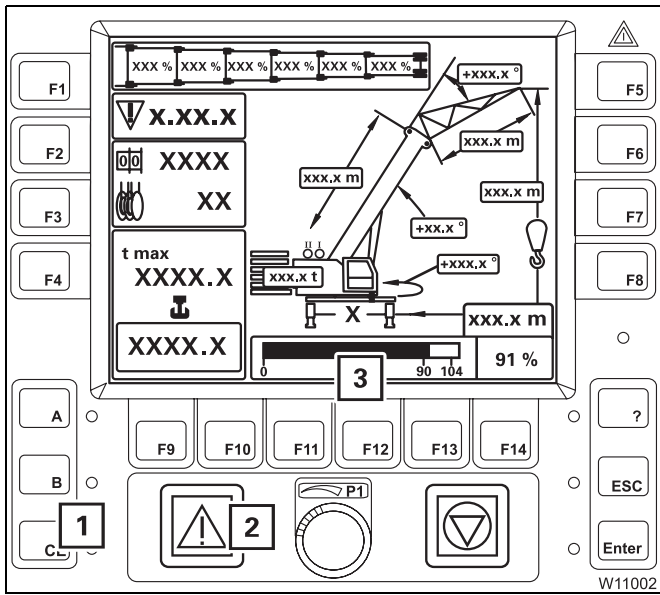
The degree of utilisation

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

- blue:** 0 – 90%
- yellow:** approx. 90 – 100%
- red:** greater than 100%

12.2.5

SLI early warning



If about 90% of the maximum permissible load is exceeded, a SLI pre-warning is given.

- An intermittent buzzer tone sounds. After five seconds, you can switch off the buzzer tone using the button (1).
- The lamp (2) lights up.
- The display (3) shows the current degree of utilisation, e.g. 91%; the bar is **yellow**.



If the current crane movements continue to be carried out in the same direction, an SLI shutdown occurs.

12.2.6

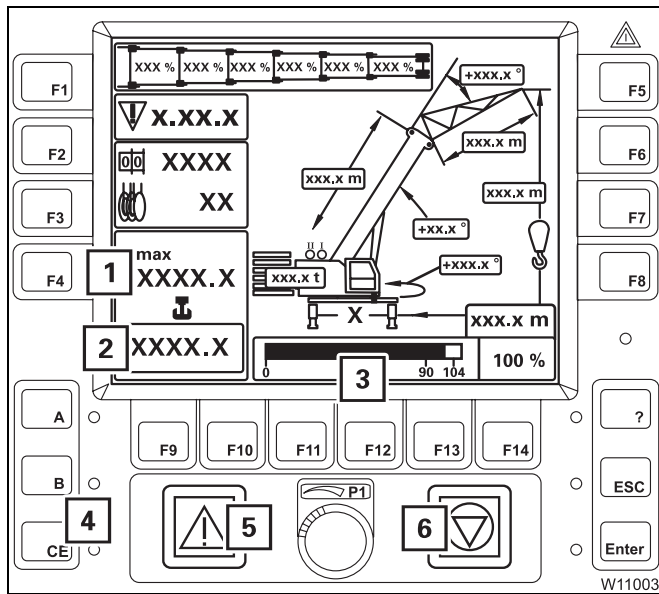
SLI shutdown

There are different types of SLI shutdowns:

- Shutdown due to overload,
- Shutdown due to an error message; Error message with shutdown, p. 15 - 29.

Shutdown due to overload

If about 100% of the maximum permissible load is exceeded, shutdown occurs due to overload.



- All crane movements that increase the load moment are switched off.
- A continuous buzzer tone sounds. After five seconds, you can switch off the buzzer tone using the button (4).
- Lamps (5) and (6) light up.
- The display (3) shows the current degree of utilisation, e.g. 100%; the bar is red.
- The value on display (2) is the same or greater than the value on display (1).

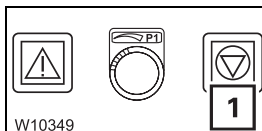
Cancelling a shutdown

- Turn off the buzzer tone if necessary.
- Leave the shutdown range by carrying out the crane movements according to the following table.

Deactivated crane movements	Permitted crane movements
Raising loads	Lowering loads
Lowering the main boom	Raising the main boom
Extending the main boom	Retracting the main boom ¹⁾
Slewing to the left	Slewing to the right
Slewing to the right	Slewing to the left
Lowering the lattice extension	Raising the lattice extension

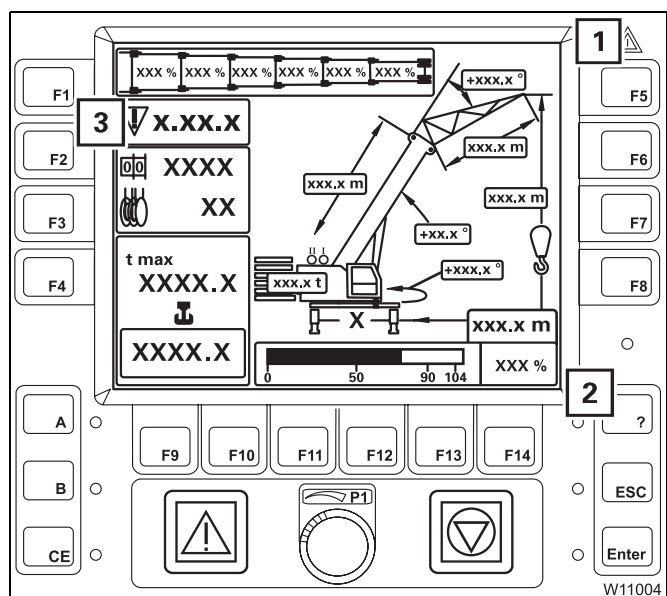


- ¹⁾ In some cases the SLI also switches off boom retracting. In this case, leave the shutdown range by raising the boom. If this is not possible, set down the load, telescope to the next fixed length and raise the load again.



If you have left the shutdown range, the lamp (1) goes out. After pressing the button CE all crane movements are enabled.

12.2.7 Display in the event of errors



If an error occurs, it is 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 respective symbol flashes.

Further displays depend on the type of error;
▶ *Error messages in the Monitoring submenu, p. 15 - 28.*

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12.2.8

SLI override

If the SLI is overridden, crane operation is not monitored, and deactivated crane movements are re-enabled.

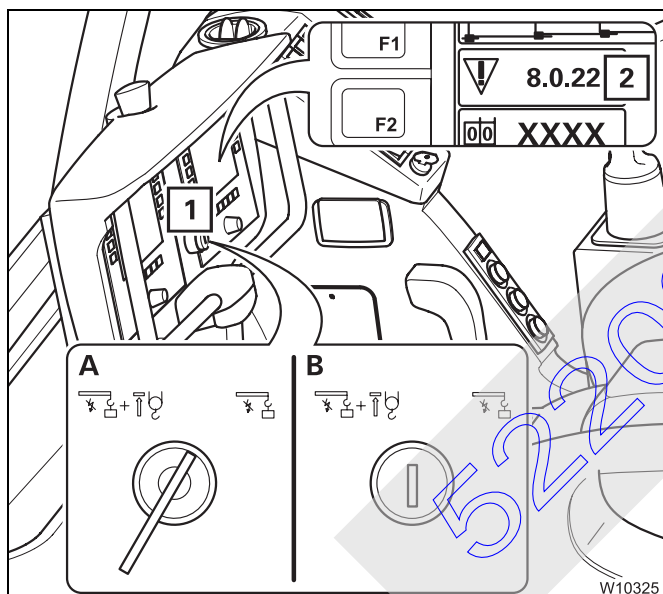


Risk of accidents from overridden or faulty SLI!

It is not permitted to work with an overridden or faulty SLI!

Set down the load immediately and stop operating the crane if the SLI is faulty!

You may only override the SLI in the event of an emergency in order to put the truck crane into a safe condition in the event of a malfunction. In this case, do not perform any movements that would increase the load moment.




Overriding the SLI

- Insert the key into the key-operated switch (1).
- (A) – Turn the key to the right and hold it in this position.

The display (2) shows the error message (8022).

Cancelling the override

- (B) – Let go of the key.
- Remove the key.
- Press the button  once; the error message is acknowledged.

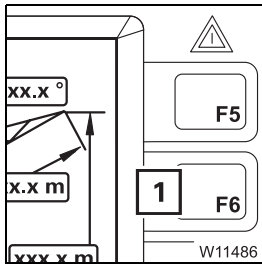


Risk of accidents due to accidental override!

The key must not remain in the key-operated switch when operating the crane!

In this way, you avoid accidentally overriding the SLI.

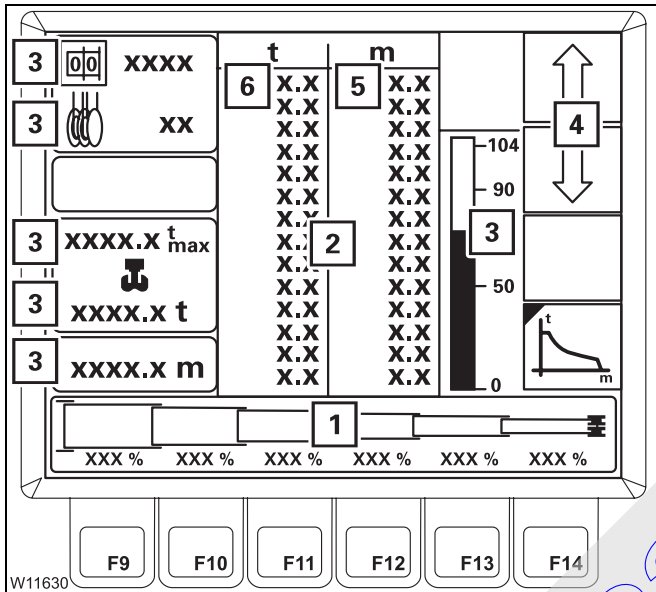
12.2.9 Displaying the lifting capacity tables



Open the submenu

- In the main menu: press the button (1) once.
- In the *Monitoring* submenu: press the button (1) once.

The *Lifting capacity table* submenu opens.



Display tables

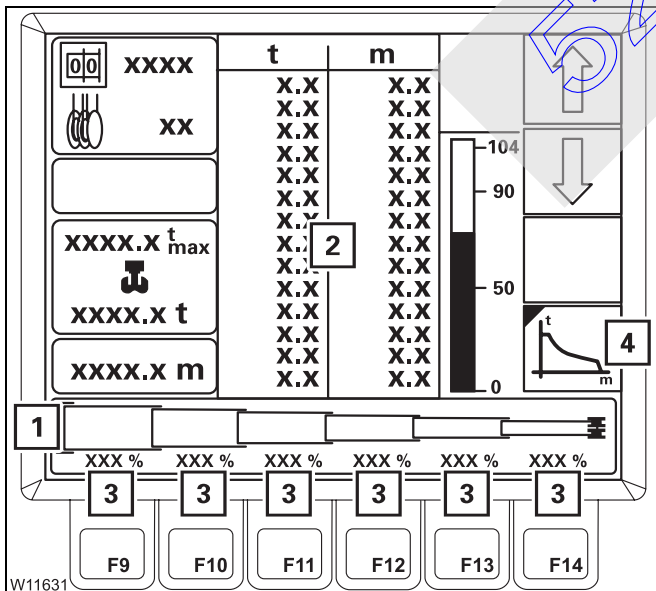
The displays (3) indicate the current status.

The lifting capacity table (2) applies to

- the entered SLI code and
- the displayed telescoping (1) – first the current telescoping is indicated.

The maximum load (6) applies to the working radius (5).

In the event of longer tables, press buttons (4).



You can have the lifting capacity tables displayed for all permissible telescoping statuses:

- Enter the desired telescoping status (1) with the buttons (3).

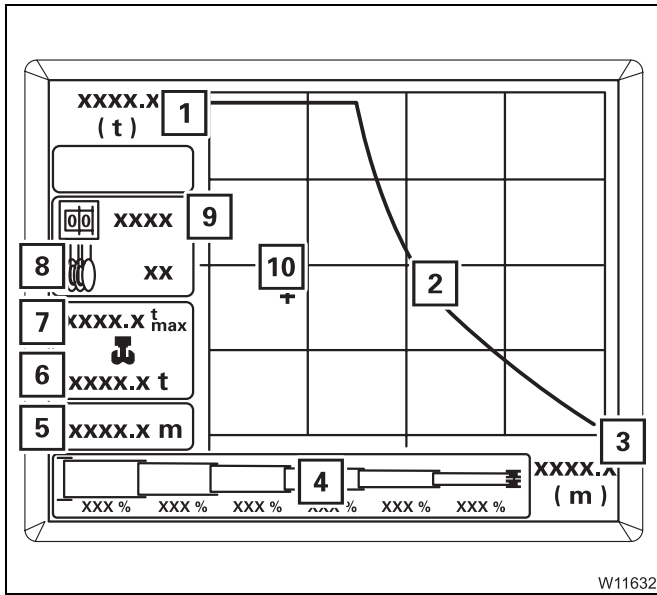
The corresponding lifting capacity table (2) is displayed.

In the event of impermissible telescoping statuses, all values in the lifting capacity table are 0.

Display working range

- Press the button (4) once.

The *Working range* submenu is opened.

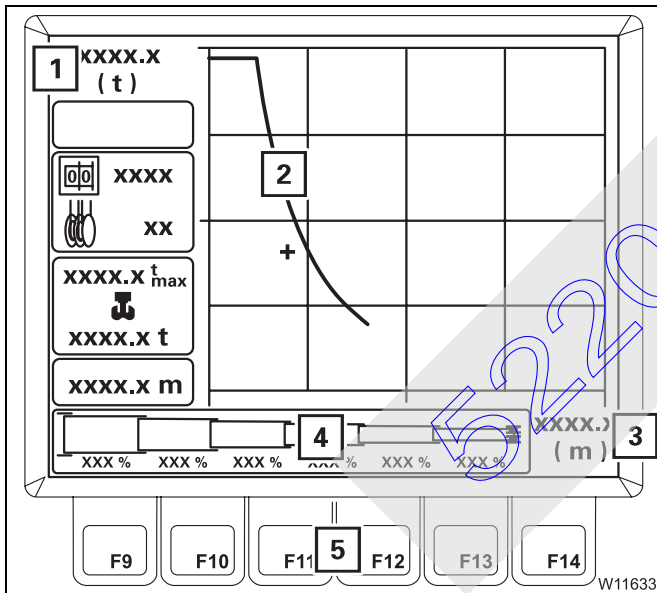


The curve (2) displays the permissible working range for the entered SLI code (9) and the telescoping (4).

The working range ends at the maximal 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).



You can have the working range displayed for all permissible telescoping statuses:

- Enter the desired telescoping status (4) with the buttons (5).

The displays (1), (2) and (3) show the respective permissible working range.

If the telescope status is not within the working range:

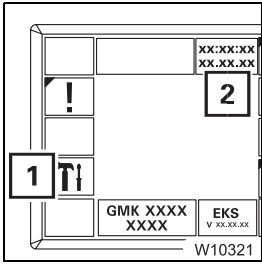
- the displays (1) and (3) will show the value 0,
- no curve (2) will be shown.



Exiting the submenu

- Press the button (4) once – the previously displayed menu opens.

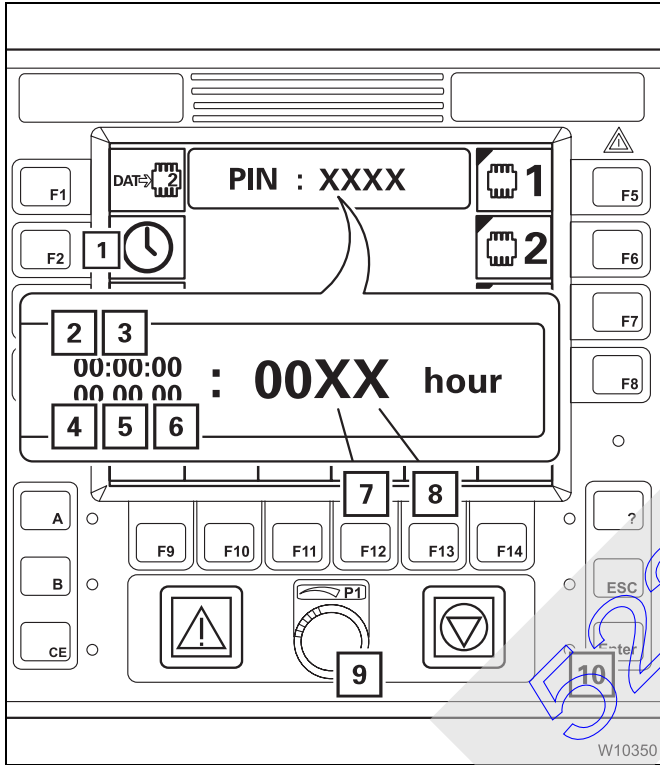
12.2.10 Entering the time/date



You can enter the time and date for the display (2).

- Press the button (1) once.

The *Settings* submenu opens.



- Press the 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 the button (10) once – the newly entered values are saved and displayed in the main menu.

Illogical values (e.g. 77 seconds) are not saved and the display continues to flash.



You can **cancel the input** at any time. Press the button (1). None of the values are changed.

12.3

Crane operation with main boom

12.3.1

Checks during crane operation

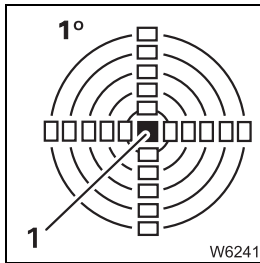
Horizontal alignment

During crane operation the truck crane may become inclined if the ground gives way due to varying loads.



Risk of accidents if the truck crane is not level!

The SLI calculates the 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 truck crane for horizontal alignment during crane operation on the display (1); p. 13 - 48.

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. 13 - 48.

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 risk (e.g. scaffolding or gas containers).

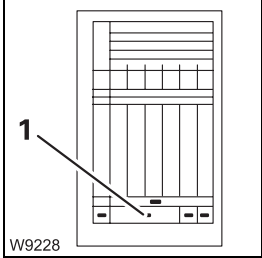
Keep a safe distance away from electrical lines; *Safe distance from electrical lines*, p. 13 - 14.



Checking the wind speed


Strong winds can result in the truck crane becoming overloaded.

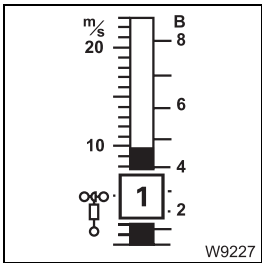
- Prior to and during crane operation, check whether the actual wind speed is lower than the maximum permissible wind speed.



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 bar (1) changes colour, depending on the range displayed:

- 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 depends only on the value of the current wind speed. The maximum permissible wind speed does not affect the colour of the bar.

You can find out which speeds have been forecasted from the respective weather stations if the anemometer is defective.

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 stop crane operation.
- Bring the truck crane into the rigging mode specified for the current wind speed given by the *lifting capacity table*.



Risk of accidents due to excessively high wind speeds!

If the current wind speed is higher than the maximum permissible wind speed, stop crane operation immediately and establish the corresponding rigging mode.



This prevents the truck crane from overturning due to overloading.

12.3.2




Permissible slewing ranges and working positions for crane operation

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

360° slewing range


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

0° to the rear working position

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



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

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

180° to the front rigging position

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

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12.3.3

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 hoisting gear!

Always switch off the hoisting gear that is not in use.

Never operate the hoisting gear if the hook block is unreeved and the hoist rope is completely wound onto the drum.

- Slack rope forms in the course of the *Lower* movement. Rope loops form, which can cause the load to slip and destroy the hoist rope.
- The switch-off point of the lowering limit switch shifts in the course of the *Raise* movement. The lowering limit switch loses its function as a safety device.



Risk of accidents when raising loads at a slant!

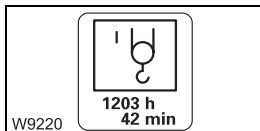
Loads can bend the main boom, resulting in the hoist rope no longer being aligned in a vertical position. Compensate the deflection by lowering the boom in order to raise the load vertically. In this way, you can prevent the load from dragging and helpers from being injured.

Inform all helpers about this issue.



Danger posed by rope slack

Only use hook blocks and sling gear of the minimum weight prescribed in the *Lifting capacity tables*, depending on the reeving and boom length. That way you prevent slack rope developing at large heights when lifting without a load. This can result in the load slipping during subsequent lifting procedures.

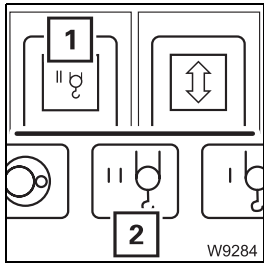


You can have the operating hours of the hoisting gear displayed;
▮▮▮▮ p. 12 - 104.

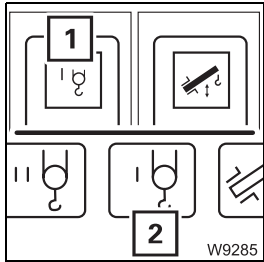


Switching on the main hoist

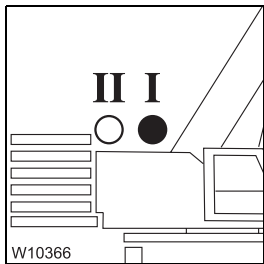
All power units are switched off and the lamps in the corresponding buttons light up only dimly after turning on the ignition.



- Check whether the auxiliary hoist is switched off and therefore secured against unintentional operation.
 - The lamp in the button (1) should only light up dimly.
 - The symbol (2) must be **red**.



- Press the button (1) once.
 - The lamp in the button (1) lights up brightly.
 - The symbol 2 is **green** if the main hoist is switched on.



- On the SLI, check whether the lamp **I** is on.
When the lamp **I** flashes, switch the display over; ■■■▶ p. 12 - 30.



- Check whether the current reeving of the main hoist is displayed, e.g. **10**. Correct the reeving if necessary; ■■■▶ p. 12 - 26.

Lifting and lowering

You can adjust the sensitivity of the control levers to the operating conditions; ■■■▶ *Setting the characteristic curve for the control levers*, p. 12 - 99.



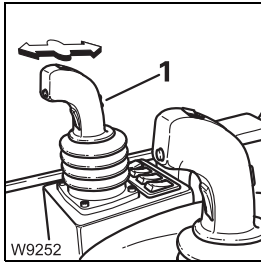
Risk of accidents due to incomplete monitoring

- Operation of the hoisting gear is only monitored fully if
- the lifting limit switch is correctly rigged; ■■■▶ p. 13 - 99
 - the lifting limit switch is not overridden, ■■■▶ p. 12 - 51,
 - the lowering limit switch is correctly set; ■■■▶ p. 12 - 51.



Risk of accidents due to suspended loads!

Never turn off the engine with a load suspended. You must have the control levers at hand in order to intervene at any time.
Always set down the load before you leave the crane cab.

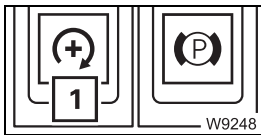


To lift: Pull the control lever backwards.

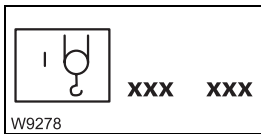
To lower: Push the control lever forwards.

When the hoist drum is turning, you will notice an impulse on the slewing indicator (1).

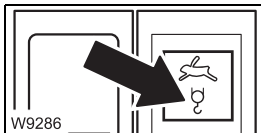
You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.



You can set the desired engine speed (idling speed) with the button (1);
▶▶▶ p. 11 - 16.

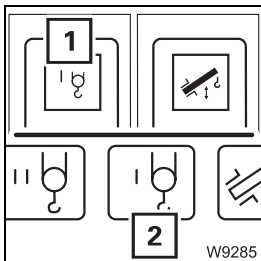


You can limit the maximum hoist speed; ▶▶▶ p. 12 - 97.



For higher speeds, you can also switch to high-speed mode; ▶▶▶ p. 12 - 86.

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.
 - The symbol (2) is **(red)** if the main hoist is switched off.

12.3.4

Auxiliary hoist

You can reeve the hoist rope of the main hoist on the main boom or on the lattice extension.



Danger of accidents when operating the auxiliary hoist!

Read and observe all of the safety instructions in the section titled *Main hoist*, p. 12 - 45 before operating the auxiliary hoist.

All of the safety instructions for the operation of the main hoist also apply to the auxiliary hoist, along with the information in this section.



Danger of accidents due to a damaged hoist rope!

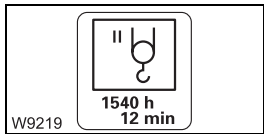
If you reeve the auxiliary hoist rope in addition to the main hoist rope, make sure the hoist ropes do not rub against each other and that the auxiliary hoist rope does not touch the rotating flanged wheel of the main hoist.

Raise the main boom to about 20° before lifting loads.

This prevents damage to the hoist ropes, resulting in the ropes tearing.



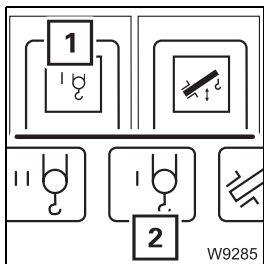
If you run the auxiliary hoist rope over the left head sheave, you must extend a telescopic section to the middle fixed length before lifting a load. Otherwise, the rope angle would exceed the maximum permissible value.



You can have the operating hours of the hoisting gear displayed;
▶ p. 12 - 104.

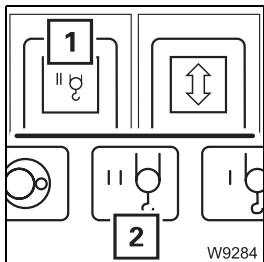
Switching on the auxiliary hoist

All power units are switched off and the lamps in the corresponding buttons light up only dimly after turning on the ignition.

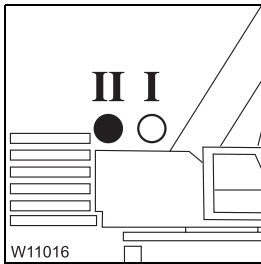


- Check whether the main hoist is switched off and therefore secured against unintentional operation.

- The lamp in the button (1) should only light up dimly.
- The symbol (2) must be **red**.



- Press the button (1) once.
 - The lamp in the button (1) lights up brightly.
 - The symbol 2 is **green** if the auxiliary hoist is switched on.



- On the SLI, check whether the lamp **II is on**.

When the lamp **II flashes**, switch the display over; ▮▮▮▮ p. 12 - 30.



- Check whether the current reeving of the auxiliary hoist is displayed, e.g. **10**. Correct the reeving if necessary; ▮▮▮▮ p. 12 - 26.

Lifting and lowering

You can adjust the sensitivity of the control levers to the operating conditions; ▮▮▮▮ *Setting the characteristic curve for the control levers*, p. 12 - 99.



Risk of accidents due to incomplete monitoring

Operation of the hoisting gear is only monitored fully if

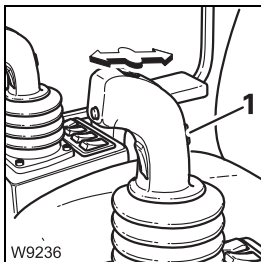
- the lifting limit switch is correctly rigged; ▮▮▮▮ p. 13 - 99
- the lifting limit switch is not overridden, ▮▮▮▮ p. 12 - 51,
- the lowering limit switch is correctly set; ▮▮▮▮ p. 12 - 51.



Risk of accidents due to suspended loads!

Never turn off the engine with a load suspended. You must have the control levers at hand in order to intervene at any time.

Always set down the load before you leave the crane cab.

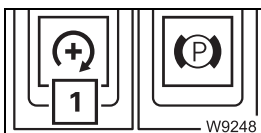


To lift: Pull the control lever backwards.

To lower: Push the control lever forwards.

When the hoist drum is turning, you will notice an impulse on the slewing indicator (1).

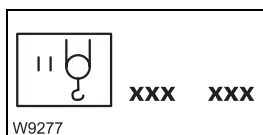
You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.



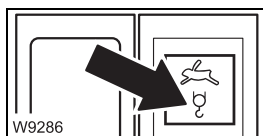
You can set the desired engine speed (idling speed) with the button (1);

▮▮▮▮ p. 11 - 16.





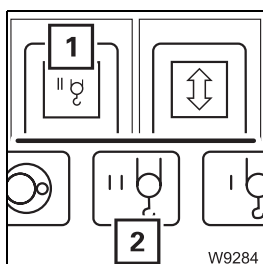
You can limit the maximum hoist speed; p. 12 - 97.



For higher speeds, you can also switch to high-speed mode; p. 12 - 86.

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.
 - The symbol **(2)** is **(red)** if the auxiliary hoist is switched off.

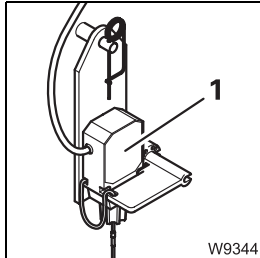
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12.3.5

Lifting limit switch and lowering limit switch

Lifting limit switch

To rig the lifting limit switch; p. 13 - 99.



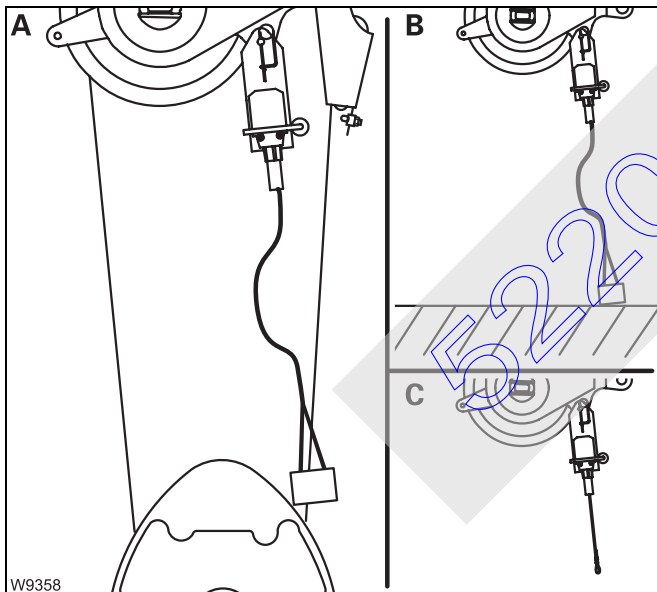
The lifting limit switch (1) prevents the hook block from being lifted up to the main boom head and damaging it.

The lifting limit switch only works if it has been unlocked; p. 13 - 107.



Danger of accidents due to intentional triggering of the lifting limit switch!

Always complete the hoisting operation (and extending) before raising the lifting limit switch. 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.



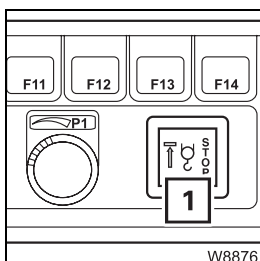
The lifting limit switch is triggered if

(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 is not triggered when it is locked.



The lamp (1) lights up if the lifting limit switch has been triggered.

At the same time all load moment increasing movements are switched off – *lifting, lowering, extending and derricking the lattice extension.*

To cancel the shutdown, leaving the shutdown range by performing a different crane movement or setting down the load.



Lifting limit switch shutdown

When overriding, the deactivation of the lifting limit switch is cancelled and crane operation is no longer monitored completely. You can only override the lifting limit switch together with the SLI.



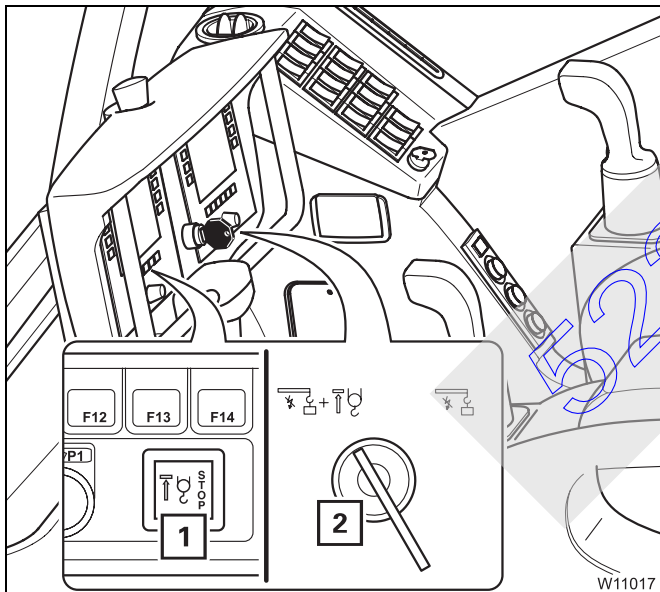
Risk of accidents if the lifting limit switch is overridden!

You may only override the lifting limit switch if required to do so by with the operating instructions when carrying out maintenance or rigging work. With the lifting limit switch overridden, you may drive at minimum speed and without a load.



Risk of accidents due to incomplete monitoring

If the lifting limit switch is overridden, crane operation is no longer monitored completely. When hoisting the lifting limit switch weight, the crane movement is stopped once. After moving the control lever again, the crane movement is re-enabled and thereafter not disabled again.

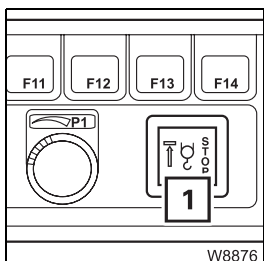


- Insert the key into the key-operated switch (2).
- Turn the key to the left. The lifting limit switch and the SLI are overridden until you let go of the key.

If the lifting limit switch is triggered now, the crane movement is stopped **once** and the lamp (1) flashes.

The stopped crane movement is re-enabled if you put the control lever into zero position and then move it again.

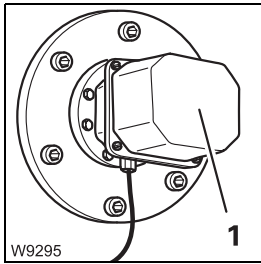
This crane movement will now not be stopped again.




The lamp (1) goes out

- if you let go of the key-operated switch (override cancelled) or
- if you leave the shutdown range.

Lowering limit switch



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

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



Risk of accidents due to incorrect setting or intended triggering

Prior to crane operation, ensure that the lowering limit switch is set correctly and always complete the lowering operation before the lowering limit switch is triggered.

This prevents the hoist rope from becoming damaged due to complete unreeling or switching off at high speeds, and the load being dropped as a result.



Risk of accidents due to adjustments made to the lowering limit switch!

Always re-adjust the lowering limit switch if you unreel hoist rope from the stationary rope drum. The lowering limit switch does not record the number of these winds.


In this way you avoid the lowering limit switch switching off too late or not at all, the hoist rope being damaged and the load being dropped.

12.3.6

Derricking gear

You can raise and lower the main boom.

Depending on the size of the load and the rigging mode, the SLI switches 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. 12 - 56.



Danger of overturning when hoisting loads!

It is prohibited to hoist loads by raising the boom, since the SLI does not monitor this procedure.



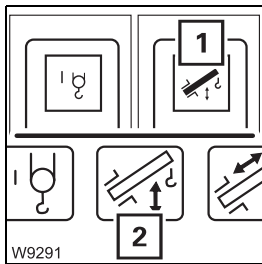
Raising the boom is a movement that reduces the load moment and that is not deactivated by the SLI. However, raising the boom is the movement which can cause the truck crane to overturn if the load hoisted is too heavy.




You can have the operating hours of the hoisting gear displayed;  p. 12 - 104.

Switching on the derricking gear


All power units are switched off and the lamps in the corresponding buttons light up only dimly after turning on the ignition.



- Press the button (1) once.
 - The lamp in the button (1) lights up brightly.
 - The symbol 2 is **green** if the derricking gear is switched on.

In the case of multiple configuration of the control lever, all other power units which are assigned the same control lever operation are switched off;  *Control lever assignment*, p. 10 - 16.

Raising and lowering the boom

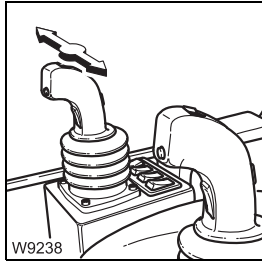
You can adjust the sensitivity of the control levers to the operating conditions;  *Setting the characteristic curve for the control levers*, p. 12 - 99.



Risk of accidents due to unexpected crane movements!

In the case of multiple configuration, check whether the control lever function *Derricking* is switched on before you move the control lever for derricking.

This avoids accidents caused by unexpected telescoping.



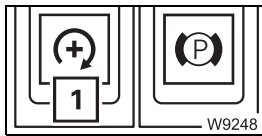
To lower: Push the control lever to the right – the main boom is lowered.

To raise: Push the control lever to the left – the main boom is raised.

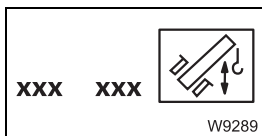
You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.



The maximum derricking speed is automatically reduced as the system length is increased. If you now reduce the working radius (e.g. by retracting the telescoping), the derricking speed is automatically increased again.



You can set the desired engine speed (idling speed) with the button (1);
▣▣▣ p. 11 - 16.



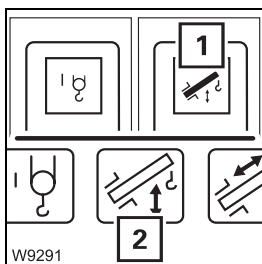
You can limit the maximum derricking speed; ▣▣▣ p. 12 - 97.



For higher speeds, you can also switch to high-speed mode; ▣▣▣ p. 12 - 86.

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.
 - The symbol (2) is (red) if the derricking gear is switched off.

In the case of multiple configuration of the control lever, the derricking gear is also switched off if you switch on another power unit which is assigned the same control lever movement; ▣▣▣ *Control lever assignment*, p. 10 - 16.



Lowering the main boom to a horizontal position

Lowering the boom out of the working range is only released without a load and if there is a rigging table for the current rigging mode. Releasing is automatic, the rigging tables cannot be entered manually. The same tables apply to raising outside of the working range.

- Set down the load.



Danger of overturning with overridden SLI!

Do not under any circumstances override the SLI. If the SLI 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 SLI overridden.

- Lower the main boom.

The SLI switches off the lowering procedure at about 10 – 15° if there are no rigging tables for the current rigging mode. In this case you must bring the crane into a rigging mode for which a rigging table exists (e.g. retracting, setting down the load, other superstructure position).

All rigging modes for which rigging tables exist can be found in the *Lifting capacity tables*.

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12.3.7

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 point in time.

– Telescopic extension with teleautomation

When telescoping with teleautomation, you enter a telescoping and ECOS controls all the locking and unlocking processes automatically. You may additionally need to telescope to an intermediate length manually.

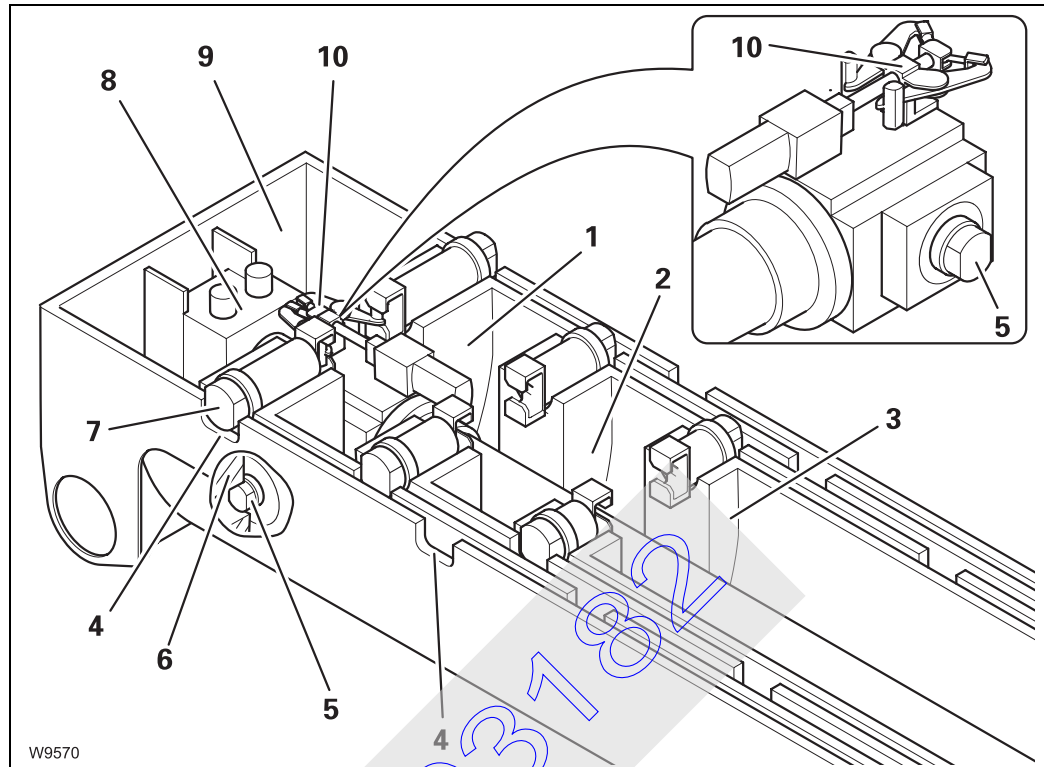
With both ways, operation is performed on the control unit in addition to the control levers *ECOS*. Here you initiate processes, receive feedback and can monitor the telescoping process.

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.



Overview

The 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.

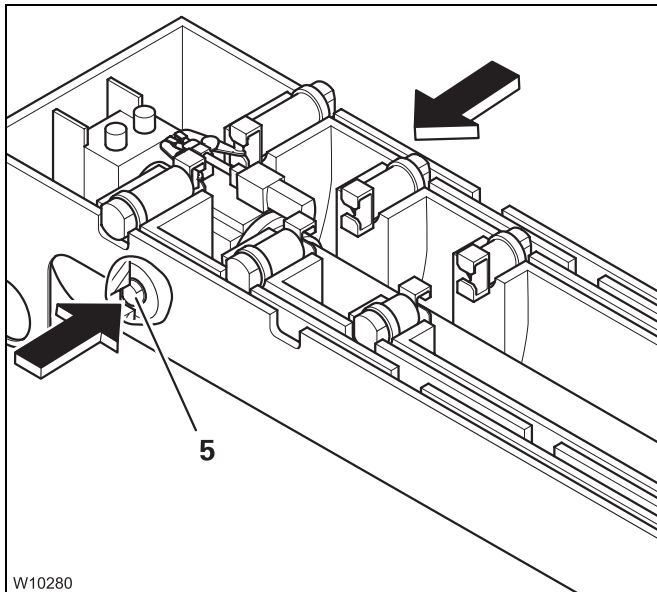
The telescoping cylinder is attached to the basic section (9) with the piston rod (8). The telescoping cylinder has two locking pins (5) at the bottom and a mechanism at the top (10).

When the telescoping cylinder is positioned at a locking point:

- Then the locking pins (5) can be extended into the cutouts (6) – the telescoping cylinder is locked.
- Then the mechanism (10) engages into the locking pins (7) and can retract them – the telescopic section is unlocked.

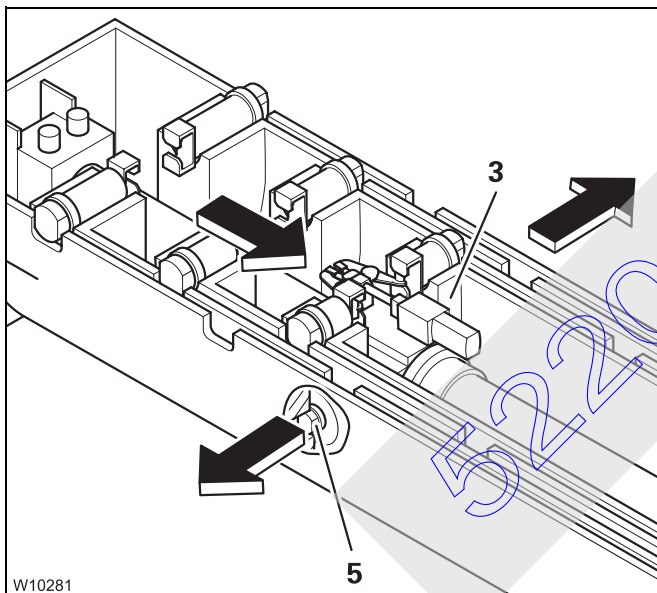
Telescoping process

This condition should be the starting point for a telescoping process. Telescoping processes consist of 4 steps:



1. Unlocking the telescoping cylinder

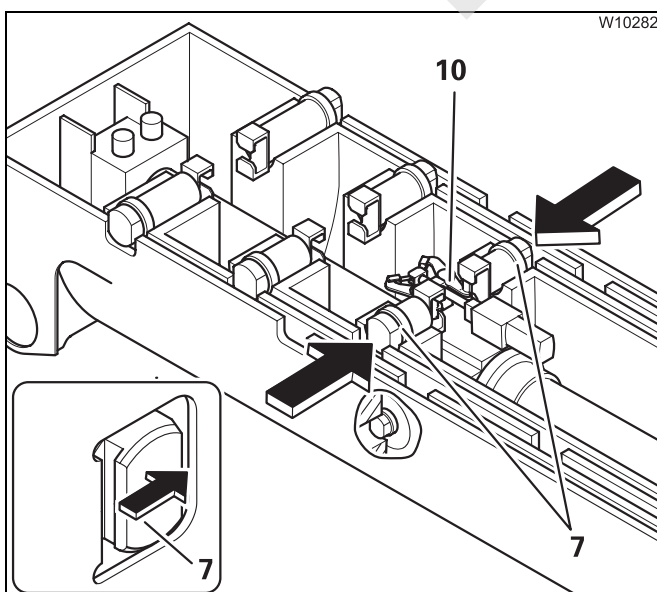
The locking pins (5) retract – the telescoping cylinder is unlocked.



2. Moving and locking the telescoping cylinder

The telescoping cylinder moves into the telescopic section which is to be telescoped, e.g. telescopic section III (3)

The locking pins (5) extend – the telescoping cylinder is locked.

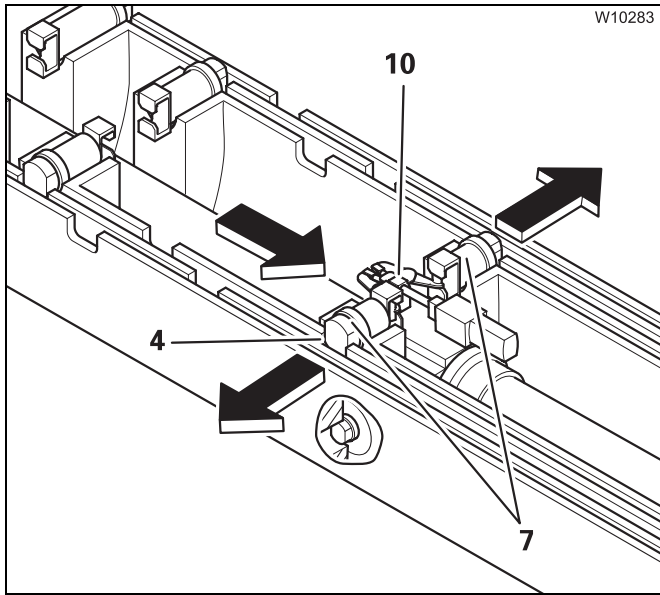


3. Unlocking a telescopic section

The telescoping cylinder extends until the locking pins (7) are clear.

The mechanism (10) retracts the locking pins (7) – the telescopic section is unlocked.

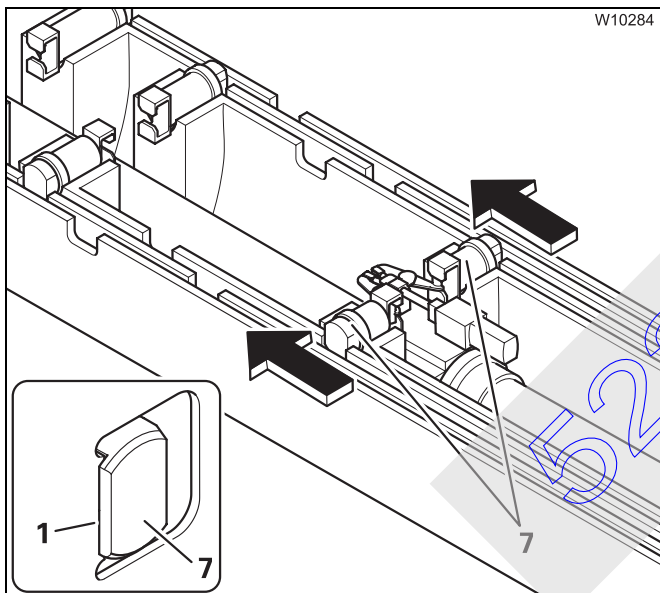




4. Telescoping, locking and setting down a telescopic section

The telescoping cylinder pushes the telescopic section to a locking point.

The weight is taken off the mechanism (10).
The locking pins (7) extend into the cutouts (4).



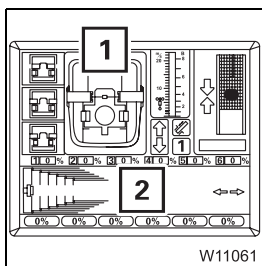
The telescopic section is automatically set down.

The telescopic cylinder retracts until the locking pins (7) are positioned on the above telescopic section (1).

The weight of the load is now on the telescopic sections and not on the telescoping cylinder.

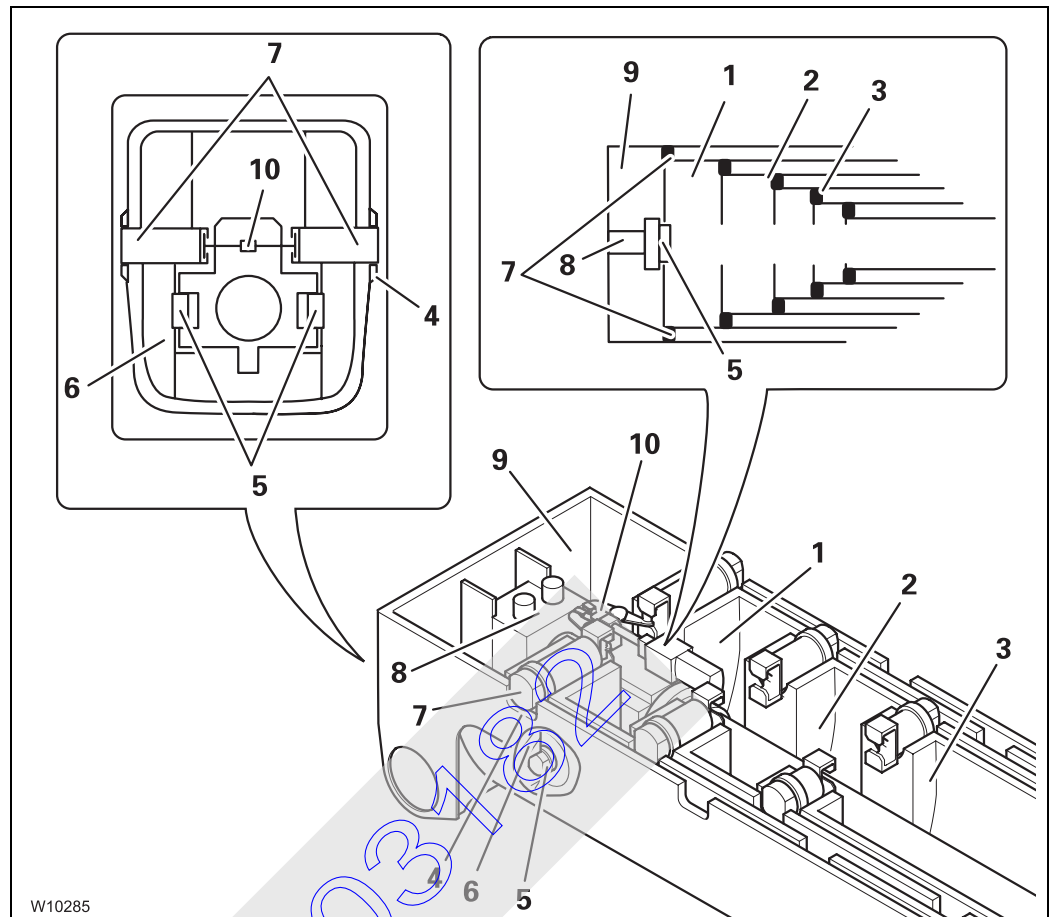
Assignment to display

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 the front

The following elements are displayed.



- 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 pins on the telescopic section
- 8 Telescoping cylinder (piston rod)
- 9 Basic section
- 10 Mechanism



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 SLI, and the corresponding lifting capacities according to the *Lifting capacity tables* are released 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 and
- 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.

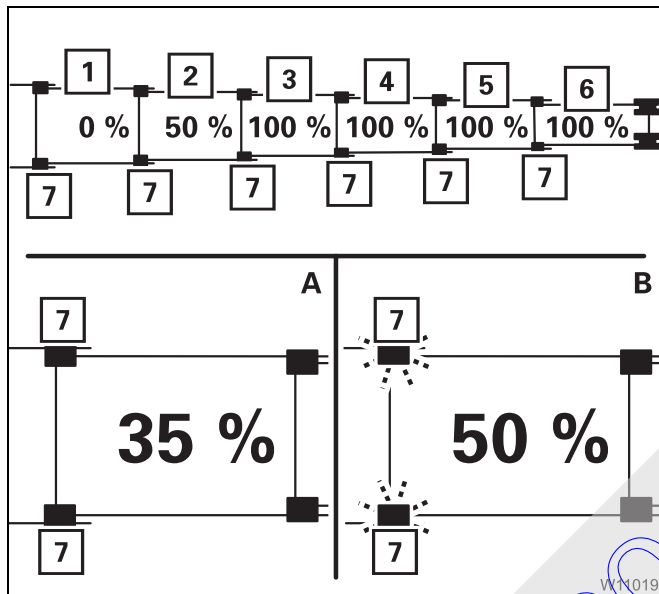
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Telescoping

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

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

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



Fixed lengths

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

The locking pins (7) are green.

Intermediate lengths

- A** Locking pins (7) black – e.g. to 35%.
- B** Locking pins (7) flashing – e.g. to 50% and telescopic section unlocked or – not set down.

Telescoping sequence

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


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

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



Checks prior to starting operations

When turning on the ignition, 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 indicates the corresponding error message;  *Telescoping mechanism error messages*, p. 15 - 25.


If, in the event of a **malfunction**, values have been deleted, ECOS can no longer calculate the current telescoping and does not issue an error message.



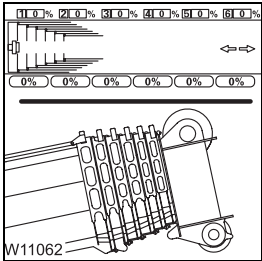
Risk of damage to the telescoping mechanism!

Before telescoping the first boom, always check whether the ECOS display indicates the current telescoping.

This prevents the telescoping mechanism from being damaged when telescoping.

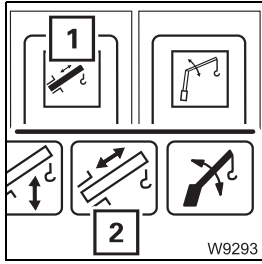
- Before telescoping the first boom, compare the telescoping indicated on the ECOS display with the current telescoping;  *Checking the initial position*, p. 12 - 68.

You must enter the current telescoping if the current telescoping is not displayed correctly;  *Entering the current telescoping*, p. 15 - 53.



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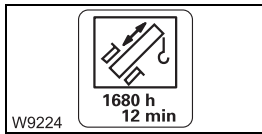
Switching on the telescoping mechanism



All power units are switched off and the lamps in the corresponding buttons light up only dimly after turning on the ignition.

- Press the button (1) once.
 - The lamp in the button (1) lights up brightly.
 - The symbol 2 is **green** if the telescoping mechanism is switched on.

In the case of multiple configuration of the control lever, all other power units which are assigned the same control lever operation are switched off; *Control lever assignment*, p. 10 - 16.



You can have the operating hours of the telescoping mechanism displayed; p. 12 - 104.

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. 12 - 68.
- Before telescoping with teleautomation; p. 12 - 80.

You can adjust the sensitivity of the control levers to the operating conditions; *Setting the characteristic curve for the control levers*, p. 12 - 99.



Risk of accidents 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 avoids accidents caused by unexpected derricking.



Risk of accidents due to incomplete monitoring

Boom extension is only monitored completely if

- the lifting limit switch is correctly rigged; p. 13 - 99
- the lifting limit switch is not overridden; p. 12 - 51



Risk of damage to the hoist rope

The rope can become slack if the hook block touches the ground during retraction operations. Rope loops form, which can cause the load to slip and destroy the hoist rope.

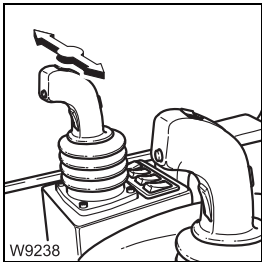


The distance between the hook block and the boom head changes during telescoping. Ensure that the hook block does not trigger the lifting limit switch or touch the ground.

• Additionally carry out the following movements:

- Lower hoisting gear when extending and
- Lift hoisting gear when retracting.

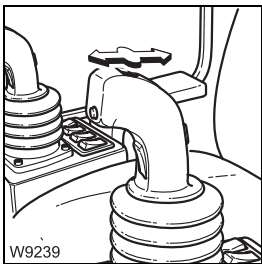
The movements of the lever for telescoping differ depending on the configuration.



- **With telescopic extension on the right-hand side**

To extend: Push the control lever to the right.

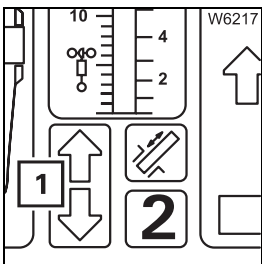
To retract: Push the control lever to the left.



- **With telescopic extension on the left-hand side**

To extend: Push the control lever forwards.

To retract: Pull the control lever backwards.




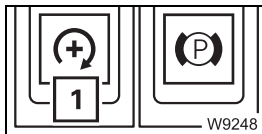
Telescoping starts only if the arrow (1) for the selected telescoping direction is **green**.

If the arrow is red, extension operations are disabled in the indicated direction. This may have different causes, e.g. the telescopic section being in final position, a lifting limit switch shutdown, a malfunction, etc.

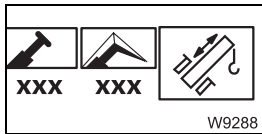
You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.



With certain telescoping statuses, the SLI switches telescoping off, e.g. when you leave the telescoping lengths or when the working range limit has been reached;  *SLI shutdown*, p. 12 - 34.



You can set the desired engine speed (idling speed) with the button (1);
 ■■■▶ p. 11 - 16.



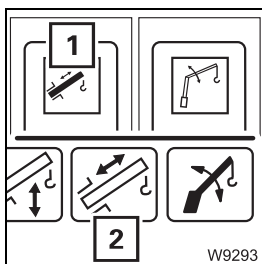
You can limit the maximum telescoping speed in the *Power unit speeds* sub-menu; ■■■▶ p. 12 - 97.



For higher speeds, you can also switch to high-speed mode; ■■■▶ p. 12 - 86.

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.







In the case of multiple configuration of the control lever, the telescoping mechanism is also switched off if you switch on another power unit which is assigned the same control lever movement; ■■■▶ *Control lever assignment*, p. 10 - 16.




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. 12 - 71
- Moving the telescoping cylinder (without telescopic section);  p. 12 - 73
- Locking the telescoping cylinder;  p. 12 - 74
- Unlocking the telescopic section;  p. 12 - 75
- Telescoping the telescopic section;  p. 12 - 77
- Locking the telescopic section;  p. 12 - 78



The operating order depends on the current initial position. For an overview of a telescoping process (example);  p. 12 - 58.




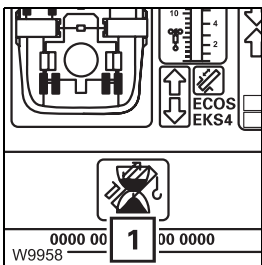
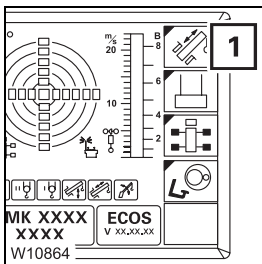
The lengths given in the following illustrations are purely sample values, and may therefore deviate from the current display.

Checking the initial position


Before telescoping you must check the following statuses:

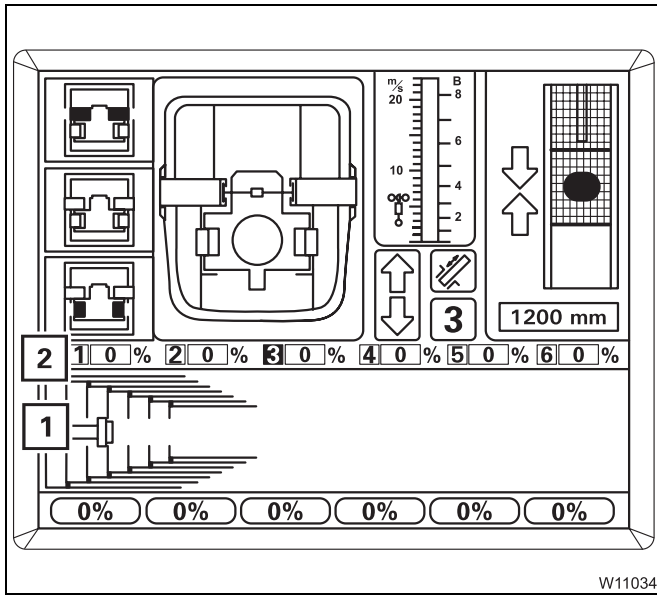
- **the current telescoping**
- **the position of the telescoping cylinder**
- **the position of the locking pins**

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



The *Telescoping* submenu opens.

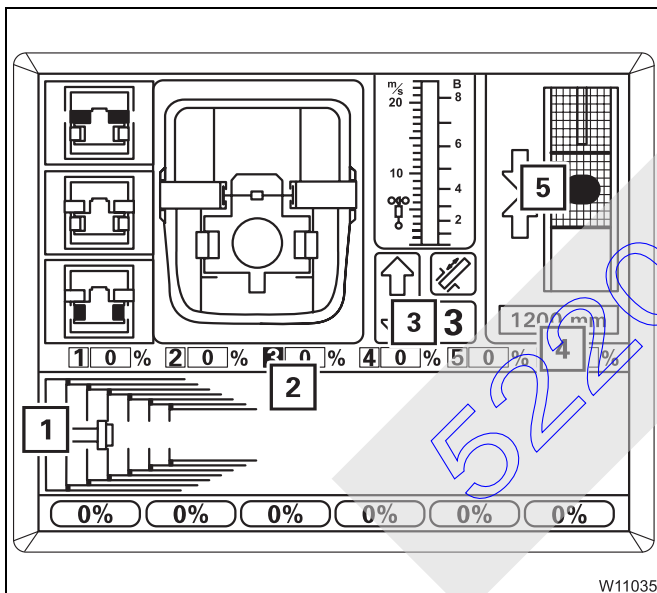
If an error message **(1)** is pending, all operating elements are disabled;  *Telescoping mechanism error messages*, p. 15 - 25.



Current telescoping

The display (2) shows the current telescoping in percent for each telescopic section.

The display (1) shows the current telescope diagram.



Position of the telescoping cylinder

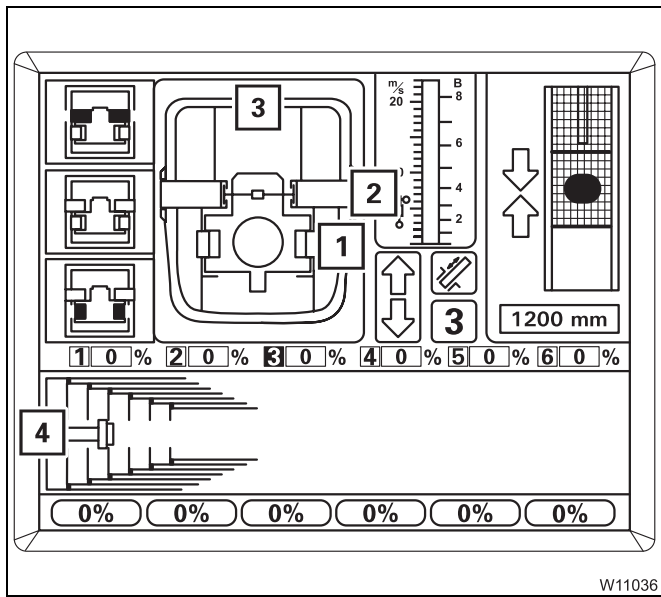
The display (4) shows how far the telescoping cylinder is extended, e.g. 1,200 mm (3.93 ft).

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 **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.





Position of the locking pins

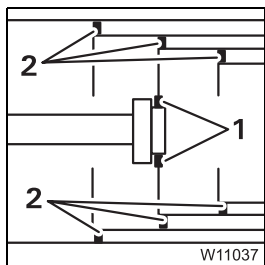
The display (3) shows the current positions of the locking pins

- 1 on the telescoping cylinder and
- 2 on the telescopic section.

The current positions are shown in different colours.

- **red:** unlocked
- **green:** locked
- **yellow:** intermediate position

The display (4) shows the same positions:



- 1 Locking pins on the telescoping cylinder
- 2 Locking pins on the telescopic sections

The positions are shown as follows:

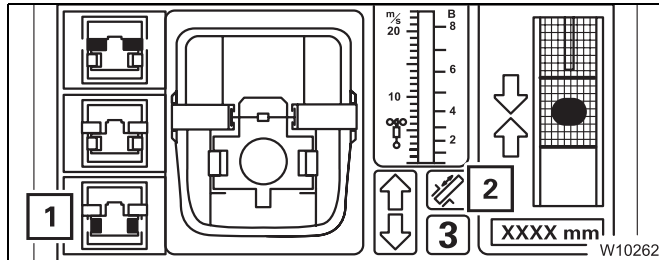
- **green:** locked
- **no display:** unlocked or intermediate position

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Unlocking the telescoping cylinder

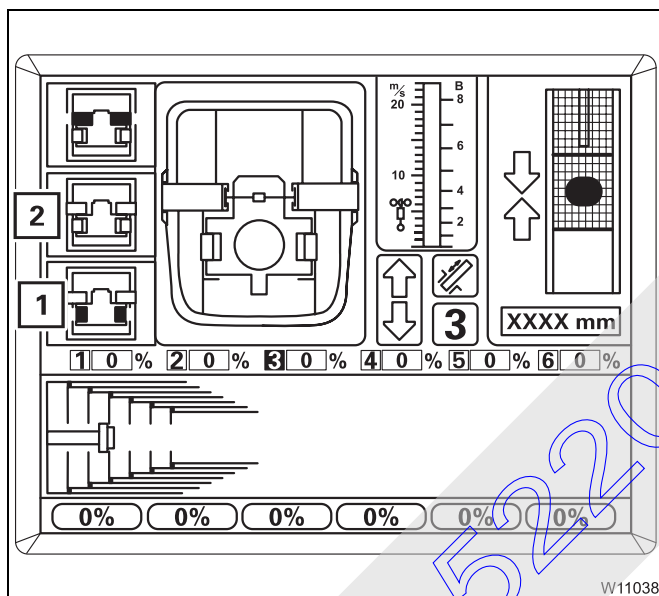
Unlocking the telescoping cylinder is required for the telescoping cylinder to be operated separately (without telescopic section).

The telescoping cylinder and the telescopic section cannot be unlocked simultaneously.



Prerequisites

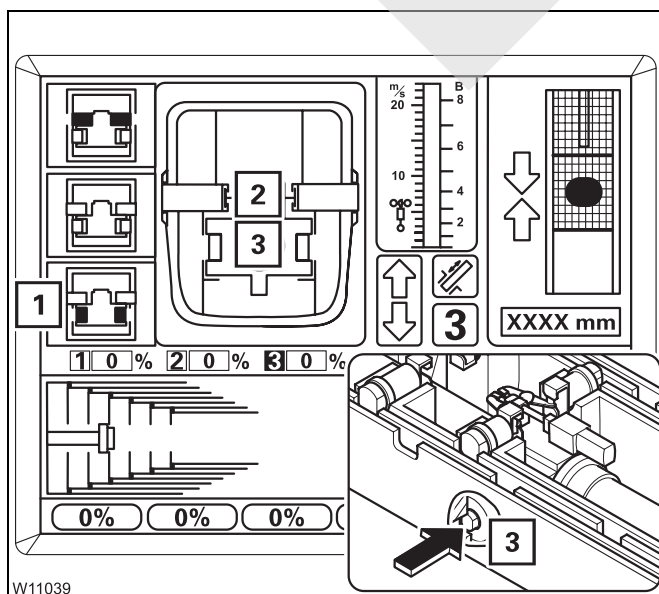
- Telescoping mechanism on – symbol (2) green
- Telescoping cylinder locked – symbol (1) grey



To select Unlock

- Press the button (1) once.
- If the telescopic section is locked:
Symbol (1) flashes – *Unlock telescoping cylinder* is selected.
- If the telescopic section is unlocked:
Symbol (2) flashes – selected are
 1. *Lock telescopic section*
 2. *Unlock telescoping cylinder*

In the next step, both selections are carried out one directly after the other.



To unlock the telescoping cylinder

- Move the control lever for telescopic extension.

The locking pins (2) may extend first, as required.

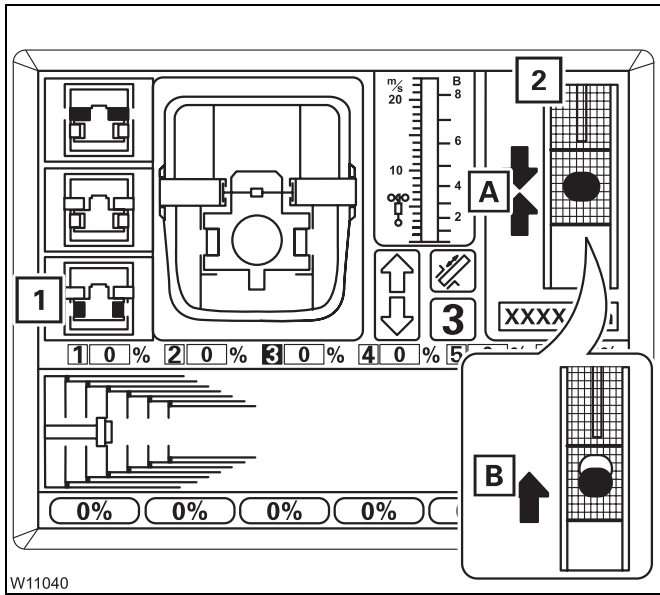
The locking pins (3) retract.

- **yellow:** intermediate position
- **red:** unlocked

In the *Unlocked* position the symbol (1) is yellow.

If the control lever is moved, the telescoping cylinder moves immediately.





If the symbol (1) is still flashing after approx. 10 seconds, this means that the locking pins are under load.

- Let go of the control lever.

The display (2) shows which movement you need to carry out to take the load off:

- A: Retract
- B: Extend



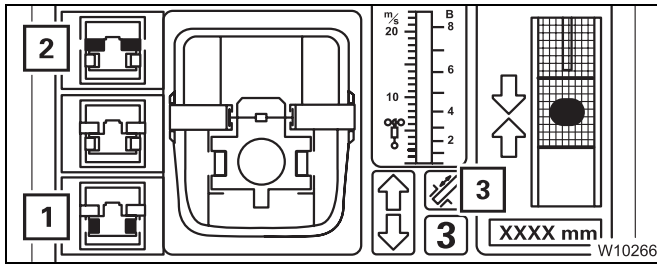
Risk of damage to the boom system!

If extending and retracting several times does not cause unlocking, you must not telescope any further towards the stop.

If removing the load does not cause unlocking, you must lock the telescoping cylinder (p. 12 - 74) and start unlocking anew.

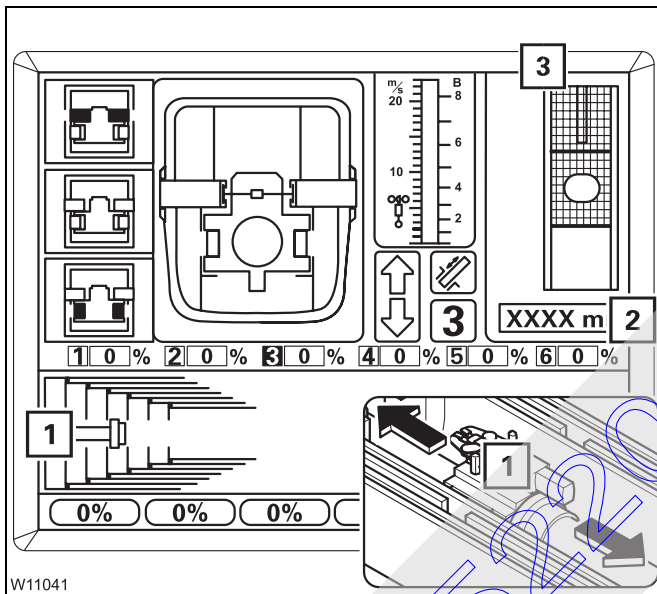
Extending/Retracting the telescoping cylinder

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



Prerequisites

- Telescoping mechanism on – symbol (3) green
- Telescopic section locked – symbol (2) grey
- Telescoping cylinder unlocked – symbol (1) yellow



Extend/Retract

- Move the control lever in the corresponding telescoping direction:

- **To extend:** telescope out
- **To retract:** telescope in

The telescoping cylinder (1) retracts/extends.

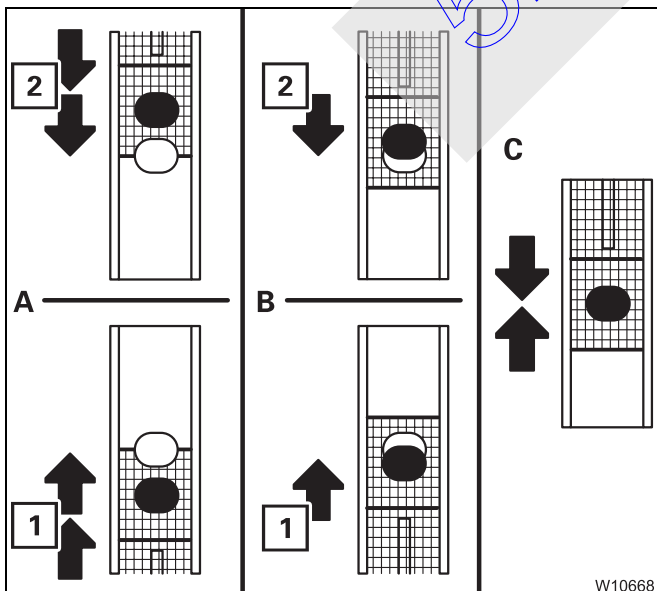
The display (2) shows the currently extended length, e.g. 1500 mm (4.92 ft).

Near a locking point the display (3) shows:

- the distance to the locking point
 - A** yellow: approx. 1 m (3.3 ft)
 - B** yellow: smaller than 1 m (3.3 ft)
 - C** green: at the locking point

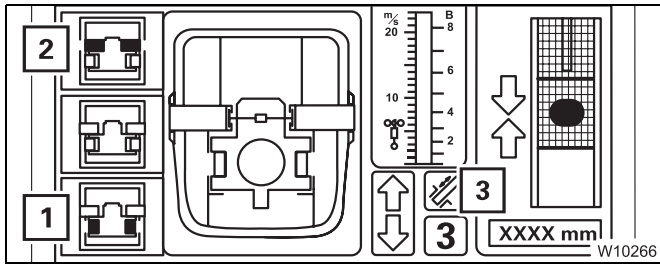
and

- the direction of travel to the locking point:
 - 1** extending
 - 2** retracting



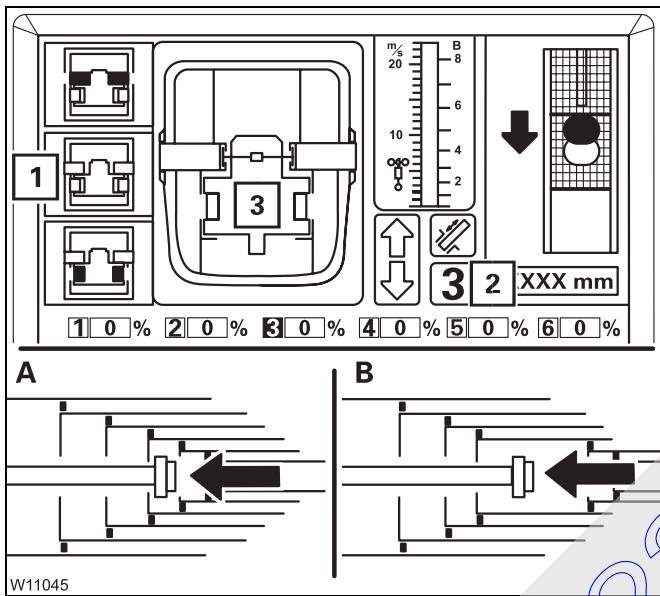
Locking the telescoping cylinder

The telescoping cylinder must be locked to a telescopic section for the telescopic section to be telescoped.



Prerequisites

- Telescoping mechanism on – symbol (3) green
- Telescopic section locked – symbol (2) grey
- Telescoping cylinder unlocked – symbol (1) yellow

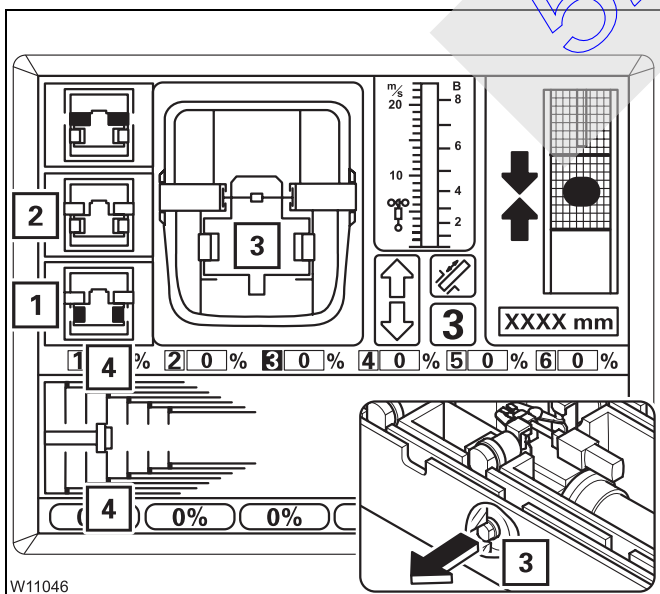


To select Lock

- 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) flashes – Lock telescoping cylinder is selected.



To 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

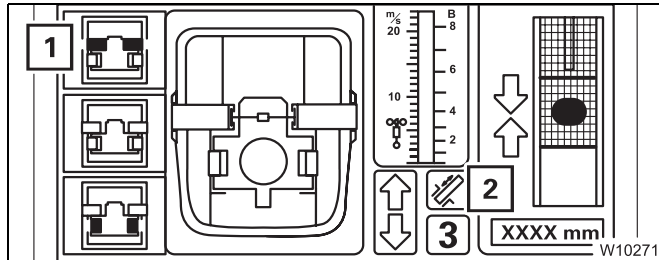
In *Locked* position

- the symbol (1) is yellow
- the symbol (2) is grey
- the locking pins (4) are green.

Unlocking a telescopic section

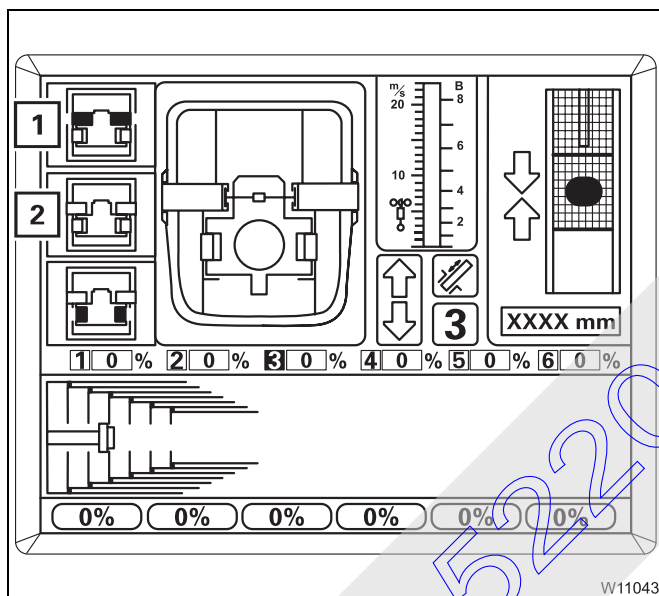
Unlocking a telescopic section is required for the telescopic section to be telescoped.

The telescoping cylinder and the telescopic section cannot be unlocked simultaneously.



Prerequisites

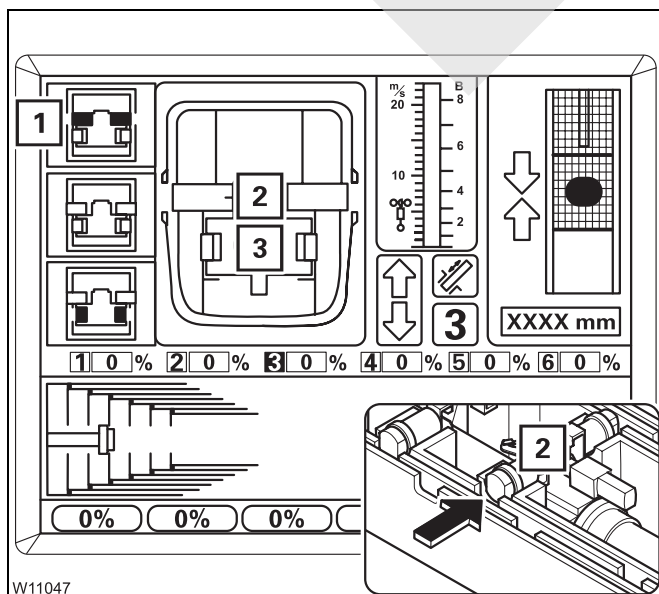
- Telescoping mechanism on – symbol (2) green
- Telescopic section locked – symbol (1) grey



To select Unlock

- Press the button (1) once.
- If the telescoping cylinder is locked: symbol (1) flashes – *Unlock telescopic section* is selected.
- If the telescoping cylinder is unlocked: symbol (2) flashes – selected are
 1. *Lock telescoping cylinder*
 2. *Unlocking telescopic section*

In the next step, both selections are carried out one directly after the other.



To unlock the telescopic section

- Move the control lever for telescopic extension.

The locking pins (3) may extend first, as required.

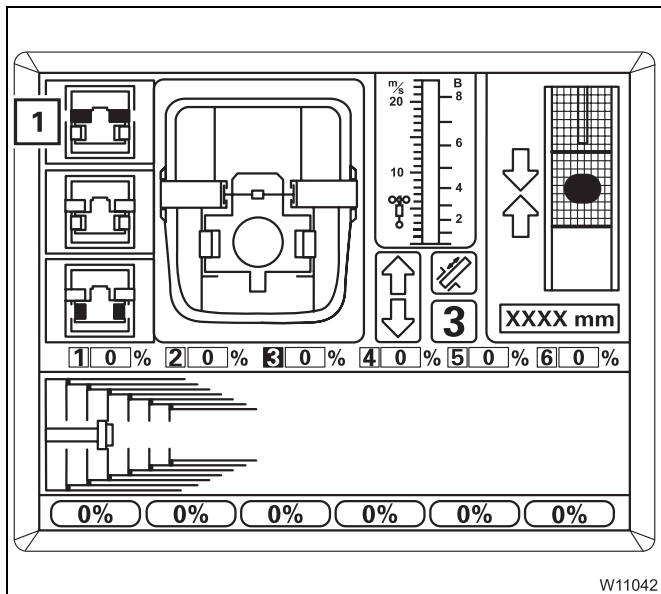
The locking pins (2) retract.

- **yellow:** intermediate position
- **red:** unlocked

In the *Unlocked* position the symbol (1) is yellow.

If the control lever is moved, the telescopic section is telescoped immediately.





If the symbol (1) is still flashing after approx. 10 seconds, this means that the locking pins are under load.

- Let go of the control lever.

To relieve the load, carefully retract and extend a little bit.



Risk of damage to the boom system!

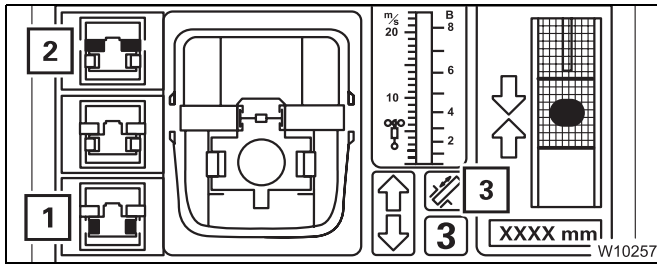
If extending and retracting several times does not cause unlocking, you must not telescope any further towards the stop.

If removing the load does not cause unlocking, you must lock the telescopic section (▮▮▮▮ p. 12 - 78) and start unlocking anew.

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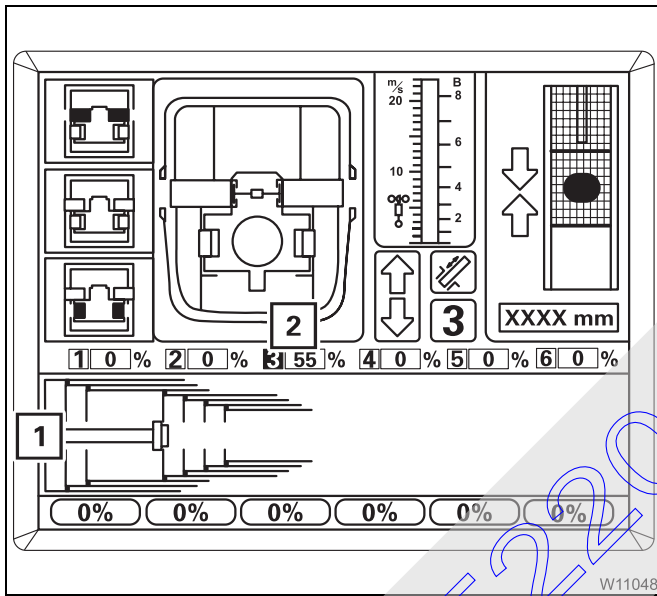
Telescope tele- scopic section

You can telescope the telescopic section once it is unlocked.



Prerequisites

- Telescoping mechanism on – symbol (3) green
- Telescoping cylinder locked – symbol (1) grey
- Telescopic section unlocked – symbol (2) yellow



Telescoping


- Move the control lever in the desired telescoping direction.

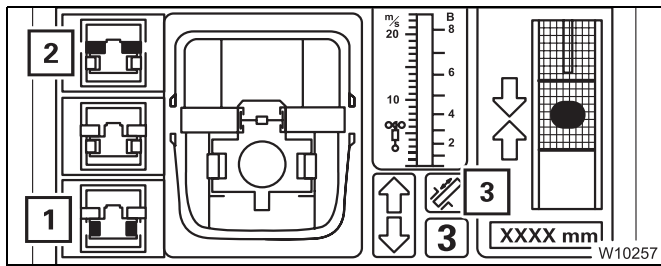
The display (2) shows the currently extended length (telescoping), e.g. 55% for telescopic section III.

The current telescope diagram on the display (1) changes continually.



Locking the telescopic section

Every telescopic section can be locked at the fixed lengths – fixed lengths;
 p. 12 - 62.



Prerequisites

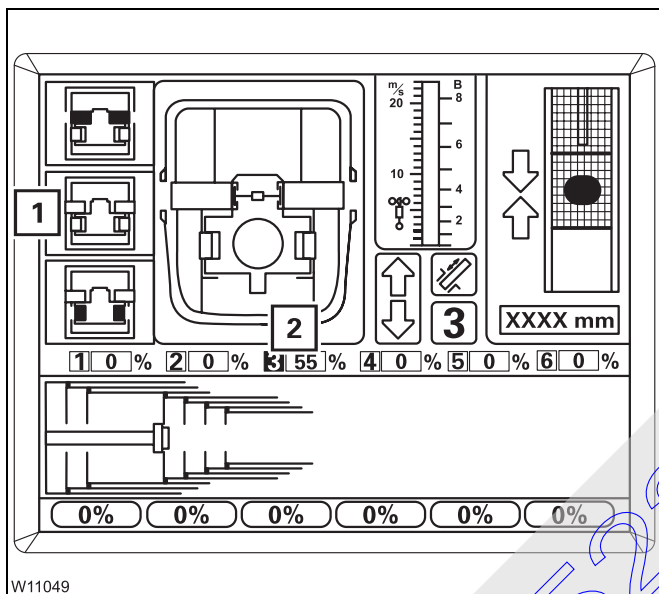
- Telescoping mechanism on – symbol (3) green
- Telescopic section unlocked – symbol (2) yellow
- Telescoping cylinder locked – symbol (1) grey

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.




To lock the telescopic section

- Move the control lever until locking is complete.

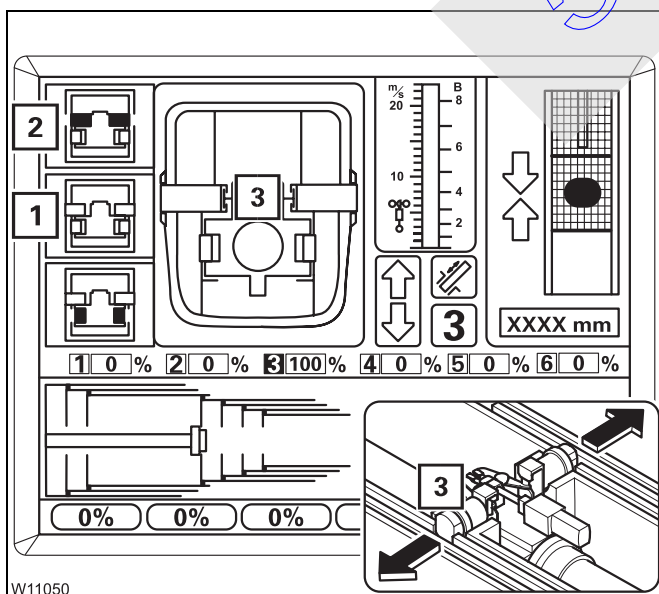
The locking pins (3) extend at the locking point.

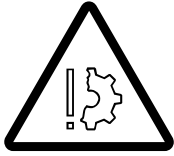
- **yellow:** intermediate position
- **green:** locked

The telescopic section is set down;
 p. 12 - 60.


In *Locked* position

- the symbol (1) is yellow
- the 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  needs to be yellow.

In this way you can prevent the load from exerting pressure on the telescoping cylinder and allow the load to be released 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;

▮▮▮▮ *Hinweise*, 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. 12 - 71
- Move the telescoping cylinder into telescopic section I; ▮▮▮▮ p. 12 - 73 and
- Lock the telescoping cylinder; ▮▮▮▮ p. 12 - 74.



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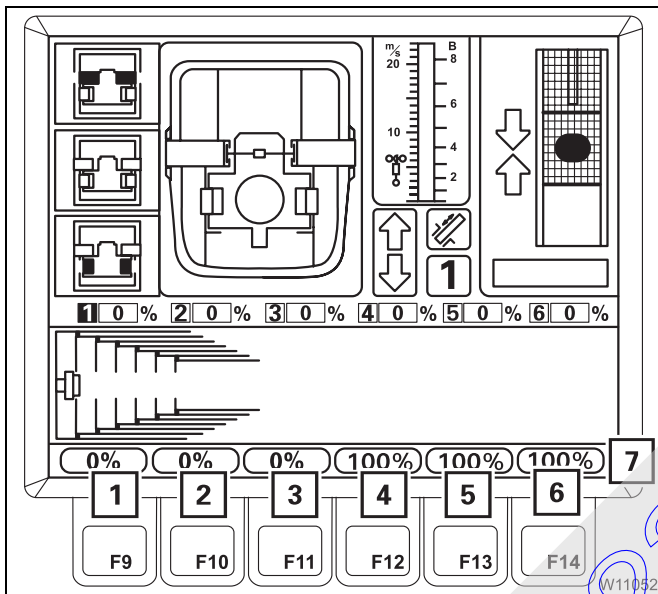
Telescopic extension with teleautomation

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 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. 12 - 65.



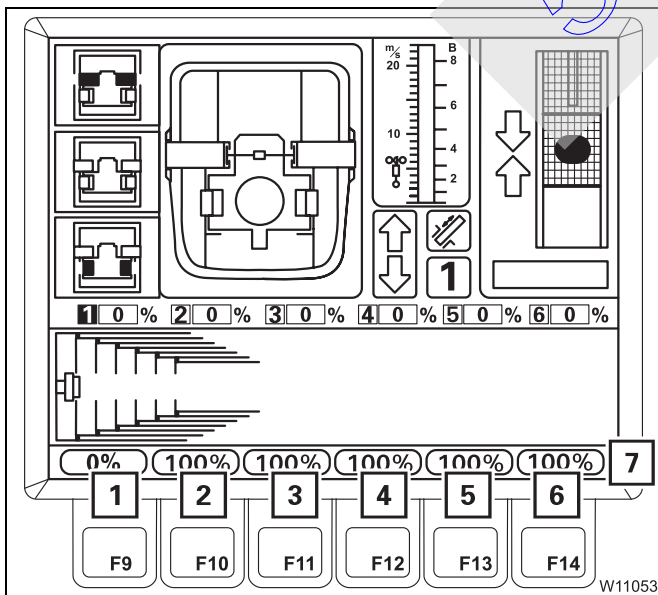
Switching to input mode

The display (7) shows the set values for all telescopic sections. The values are displayed in **red** if teleautomation is switched off. No values are shown if the teleautomation is disabled.

- Press one of the buttons (1) to (6).

The values in the display (7) turn yellow. Input mode is now activated.

You can exit the input mode with the button . The values in the display (7) turn red.

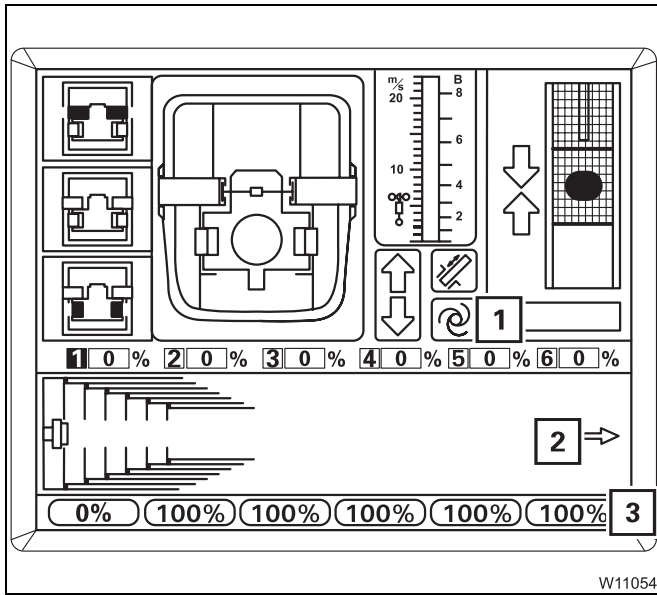


Entering set values

- Press one of the buttons (1) to (6).

Each time you press a button, the corresponding value in the display (7) switches continuously between the fixed lengths.

- Enter the desired set values for all telescopic sections, e.g. 0%, 100%, 100%, 100%, 100%.
- Press the button once. The entered set values are confirmed.



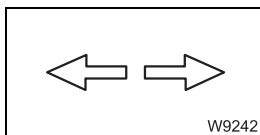
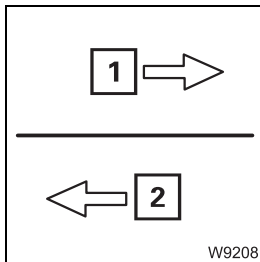
If the set values entered are **not permissible**, the values on the display (3) turn **red**. Teleautomation remains switched off.

If the set values entered are **permissible**, the values on the display (3) turn **green**.

- The symbol (1) is displayed and teleautomation is switched on.
- The display (2) shows the telescoping direction for the teleautomation start, e.g. the arrow pointing to the right, for *Telescoping out*.

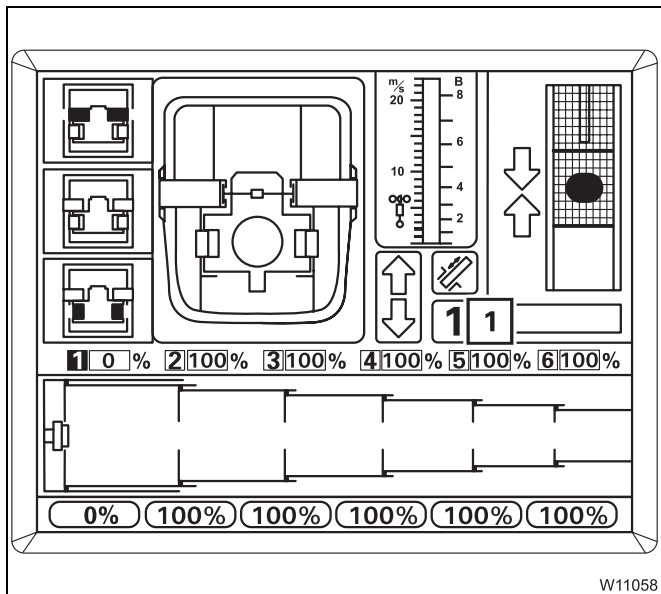
Telescoping

- Move the control lever for the displayed telescoping direction.
- The arrow (1) for the indicated telescoping direction flashes if you move the control lever in the wrong direction.
- If you move the control lever in the correct direction, ECOS telescopes automatically until the direction has to be changed. Then the arrow (2) for the new telescoping direction is indicated, e.g. for *Retracting*.
- In the case of empty trips of the telescoping cylinder (without telescopic section), both arrows are displayed. Empty trips are automatically performed in both directions, irrespective of the control lever movement.



You can regulate the speed for telescoping in the same way as for telescoping without teleautomation.

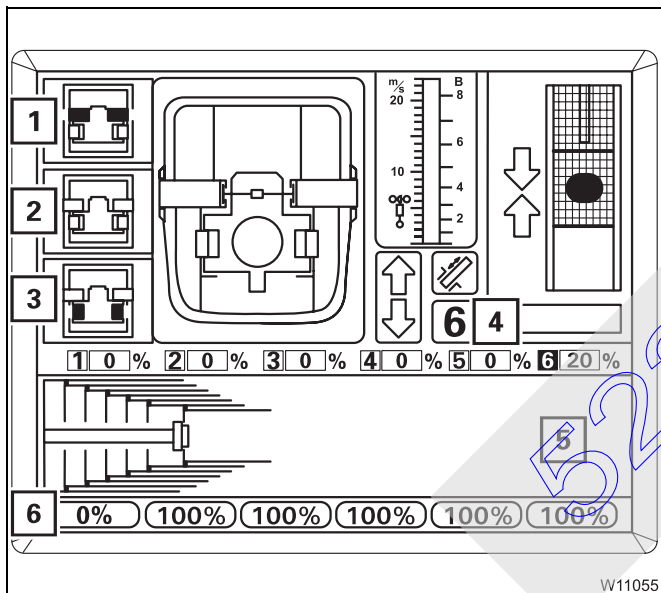




When the set values that have been entered are reached, the telescoping process will be halted.

- Shift the control lever to the zero position.

The display (1) appears. Teleautomation is switched off.



Cancelling teleautomation

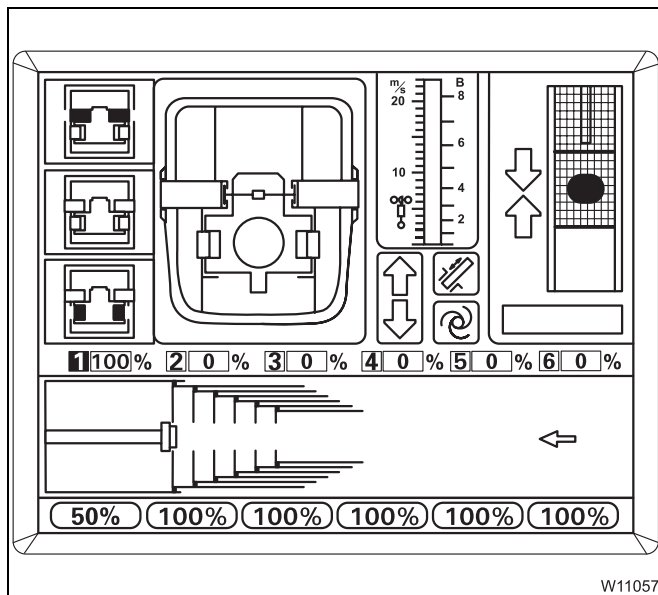
- Press one of the buttons (1), (2) or (3) once.

The telescoping process is stopped:

- The display (5) goes out.
- The display (4) appears.
- The values in the display (6) are red.

Teleautomation is now switched off.

Example of telescoping with teleautomation

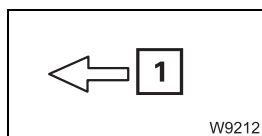


Assuming the current telescoping is 100/0/0/0/0 and the telescoping cylinder is locked in telescopic section I.

The desired telescoping is 50/100/100/100/100. The display should correspond to the opposite diagram once you have entered the desired telescoping and confirmed it.

ECOS calculates the following telescoping order:

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

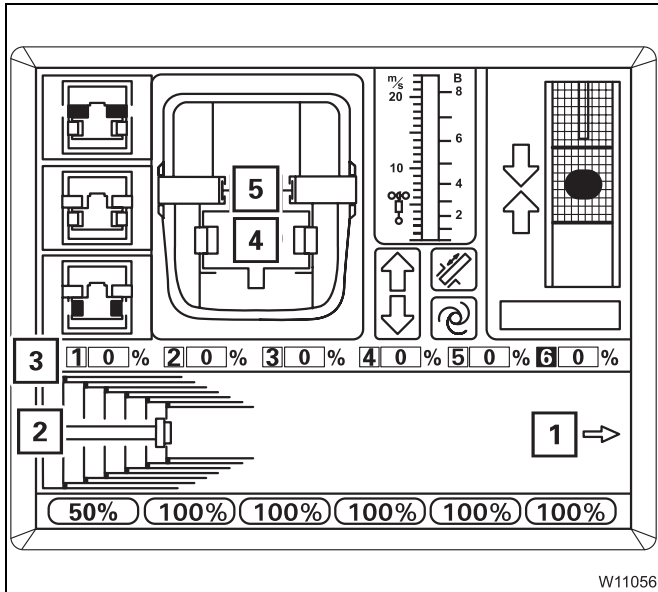


Since the first step is retracting, the arrow (1) points to the left.

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

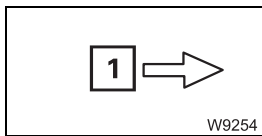
Telescopic section I will be fully retracted. For this to be done, the following processes are carried out automatically.





1. Retract telescopic section I – display (3) 0%
2. Lock telescopic section I – pins (5) green
3. Unlock telescoping cylinder – pins (4) red
4. The telescoping cylinder moves into telescopic section VI – display (2)
5. Lock telescoping cylinder – pins (4) green

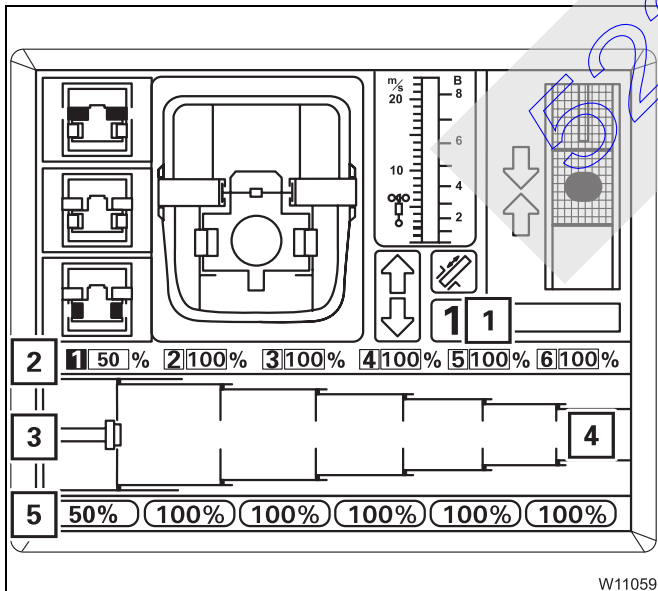
The arrow (1) shows the new telescoping direction – extending.



The arrow (1) flashes as long as you are still holding the control lever to retract.

- Move the control lever to extend 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%.



- Shift the control lever to the zero position.
 - The display (4) goes out.
 - The display (1) is active again.
 - The values in the display (5) are **red**.
 - The display (2) shows the current telescoping, e.g. 50/100/100/100/100.
 - The display (3) shows the current telescoping.
- Teleautomation is switched off.



To extend telescopic section I to 60%, for example, you can now further extend this telescopic section manually.

Telescoping the main boom in horizontal position

- Derrick the main boom to the horizontal position as described in section *Lowering the main boom to a horizontal position*; ■■■▶ p. 12 - 56.

The SLI automatically switches to the corresponding rigging table. It specifies the maximum permissible telescoping where extending is deactivated (shutdown values ■■■▶ *Lifting capacity table*).

- Set down the load.
- Extend the main boom only until the SLI switches off the extension procedure.



If you continue to extend the main boom after an SLI shutdown, you may enter ranges in which you can neither perform retraction operations nor raise the boom.

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12.3.8

High speed



The slewing gear cannot be operated at high speed.

For higher speeds, you can switch to high-speed mode.

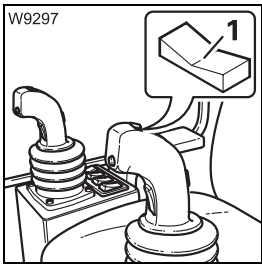


Risk of accidents due to the sudden acceleration of operations!

Reduce the engine speed before starting high-speed mode. This prevents the movements from becoming excessively accelerated, which may result in the truck crane starting to sway and overturning.

Derricking gear/ Telescoping mechanism

High-speed mode is always switched on and off for the derricking gear and the telescoping mechanism simultaneously.

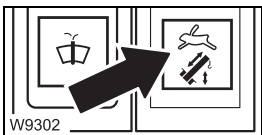


To switch on briefly

- Press the button (1) down on the right (in).
High-speed mode is active until you let go of the button.

Continuous operation

- Press the button (1) down on the left (out).
High-speed mode is active until you press the button again.



The lamp (1) indicates the current status:

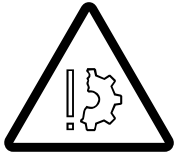
- On:** high-speed mode switched on
Off: high-speed mode switched off



When lowering the boom, only the start of the derricking procedure from steep boom positions is performed in high-speed mode. The derricking speed is not increased in high-speed mode. High-speed mode is disabled for raising when performing operations with the lattice extension.

Hoisting gears

High-speed mode is always switched on and off simultaneously for the main hoist and the auxiliary hoist.



Risk of accidents due to overloading

Make sure the lifted load is no more than 50% of the maximum load according to the *Lifting capacity table* (maximum degree of utilisation of 50%) before operating the hoisting gears in high-speed mode.



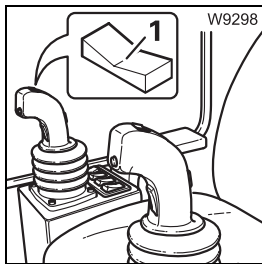
Danger of slack rope formation with a light hook block

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 formation with large number of reevings

If you switch on high-speed mode with a large number of reevings and without a load, slack rope may form because the hook block is lowered too slowly due to the high degree of friction.

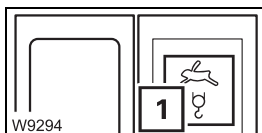


To switch on briefly

- Press the button (1) down on the left (in).
High-speed mode is active until you let go of the button.

Continuous operation

- Press the button (1) down on the right (out).
High-speed mode is active until you press the button again.



The lamp (1) indicates the current status:

- On:** high-speed mode switched on
Off: high-speed mode switched off



The speed of the hoisting gears will only be significantly increased by switching to high-speed mode if you have extended the control lever by more than 70%.

12.3.9

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. 13 - 76.



You can have the operating hours of the slewing gear displayed; p. 12 - 104.

Slewing gear brake

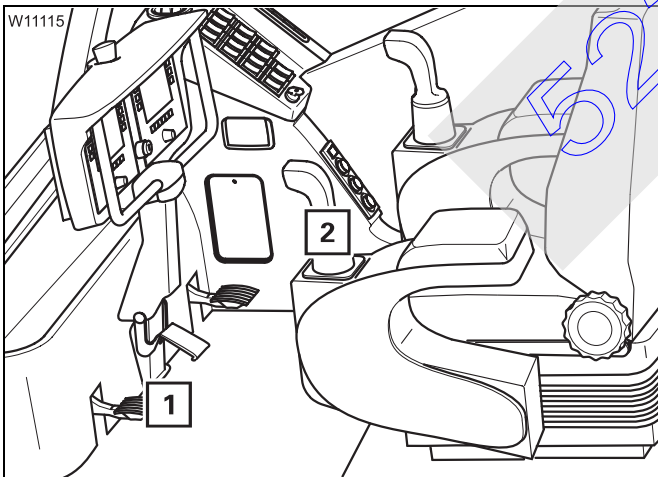
Depending on the function that is switched on, the slewing gear is braked with the brake pedal or with the control lever.



Risk of accidents due to deactivated operating elements

Always check that the slewing gear brake function is switched on and switch to the function you prefer as required.

This prevents the slewing movement from continuing when you use the deactivated operating element for braking.



Checking for functioning

- Check which function is switched on.
 - (A) – in the main menu or
 - (B) – in the *Slewing gear/houselock* submenu

1 Brake pedal function

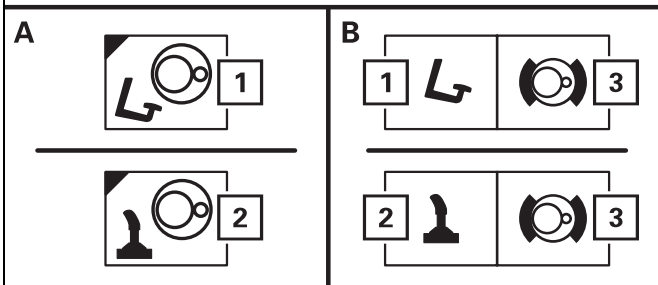
Braking the slewing movement is only possible with the brake pedal (1).

2 Control lever function

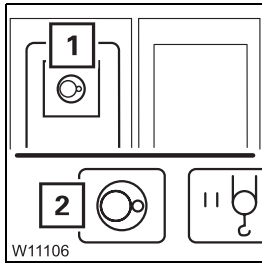
Braking the slewing movement is only possible with the control lever (2).

Switching the function

- Press the button (3) until the desired function is displayed.



Switching on the slewing gear



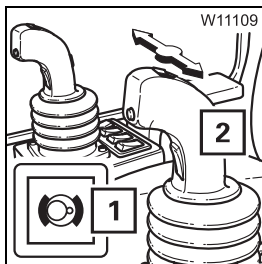
All power units are switched off and the lamps in the corresponding buttons light up only dimly after turning on the ignition.

- Press the button (1) once.
 - The lamp in the button (1) lights up brightly.
 - The symbol 2 is **green** if the slewing gear is switched on.



If a SLI code has been entered for the 0° or 180° position, an SLI 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 SLI code for the 360° working range.

Releasing the slewing gear brake

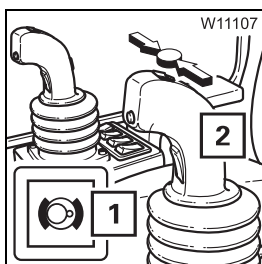


- With the *brake pedal* function
The slewing gear brake is released when you switch on the slewing gear.

- With the *control lever* function
The slewing gear brake is released as soon as you move the control lever (2).

The lamp (1) no longer lights up if the slewing gear brake has been released.

Engaging the slewing gear brake



- With the *brake pedal* and the *control lever* function
The slewing gear brake is engaged when you switch off the slewing gear; p. 12 - 94.


- With the *control lever* function
The slewing gear brake is also engaged if the control lever (2) in the zero position.

The lamp (1) lights up if the slewing gear brake has been engaged.



Slewing

The following prerequisites must be fulfilled before slewing:

- The houselock is switched off.
- The counterweight lifting cylinders are fully retracted.
- Slewing is permissible with the current rigging mode;  p. 13 - 76.
- The current rigging mode is entered on the SLI.

If slewing is not permissible with the current rigging mode the slewing gear is disabled.



Danger of overturning when slewing with an incorrectly set SLI!

Therefore always check before slewing whether the SLI code valid for the current rigging mode is displayed.

This prevents slewing operations from being released within impermissible ranges, which would cause the truck crane to overturn.



Risk of crushing during slewing

Before slewing, actuate the horn and ensure there are no persons in the slewing range of the superstructure.

In this way you prevent persons from becoming crushed between the superstructure and the carrier or between the superstructure and other parts.




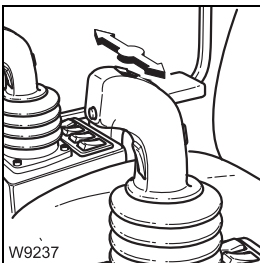
Risk of the main boom buckling!

Do not accelerate the slewing speed to such a degree that the load starts to swing.

You can adjust the sensitivity of the control levers to the operating conditions;  *Setting the characteristic curve for the control levers*, p. 12 - 99.



With the *brake pedal* function, slewing movements are not braked automatically. If you let go of the control lever or move it to zero position, the slewing movement will slowly run down;  *Braking the slewing movement*, p. 12 - 93.



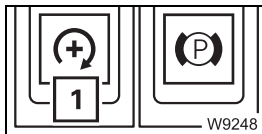
To slew to the left: Push the control lever to the left.

To slew to the right: Push the control lever to the right.

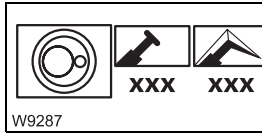
You can regulate the speed by moving the control lever and changing the engine speed with the accelerator.



The maximum slewing speed is automatically reduced as the working radius is increased. If you now reduce the working radius (e.g. by retracting the boom), the slewing speed is automatically increased again.




You can set the desired engine speed (idling speed) with the button (1);
 ■■■► p. 11 - 16.

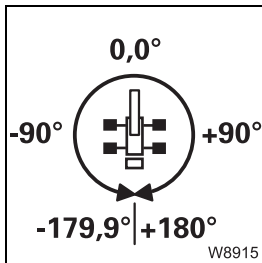


You can limit the maximum slewing speed; ■■■► p. 12 - 97.



Viewing the slewing angle

The display (1) in the *Slewing gear/houselock*  submenu indicates the current position.



0° means that the superstructure is slewed to the back.

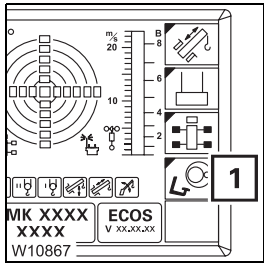
- Angles in the **right-hand semi-circle** are displayed as **positive** values (0° to 180.0°).
- Angles in the **left-hand semi-circle** are displayed as **negative** values (0° to -179.9°).



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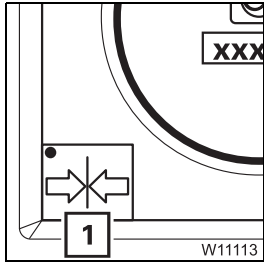
Slewing to 0° or 180°

You can automatically stop the slewing movement at the slewing angles 0° and 180°, e.g. in order to set down the main boom.



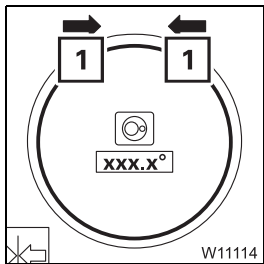
- If necessary, open the main menu **Esc** and press the button **(1)** once.

The *Slewing gear/houselock* submenu opens.



After switching on the ignition, the *Stop at 0°/180°* function is switched off.

- Press the button **(1)** once.
The dot turns **green**, and the *Stop at 0°/180°* function is switched on.



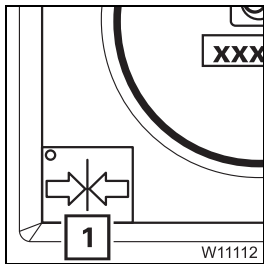
- Slew to slewing angle 0° or 180°.

When the slewing angle of 0° or 180° has been reached:

- the slewing movement is stopped automatically,
- the slewing gear brake is engaged,
- both arrows **(1)** are shown.

If you have stopped too late, an arrow **(1)** indicates in which direction you need to slew in order to reach the slewing angle.

Slewing is blocked until you switch off the *Stop at 0°/180°* function.



- Press the button **(1)** once.
The dot turns **black**, and the *Stop at 0°/180°* function is switched off.

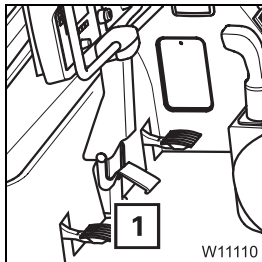
Braking the slewing movement



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

Risk of the main boom buckling!

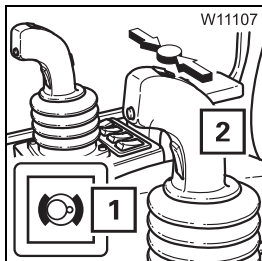
Do not under any circumstances switch off the slewing gear to brake it. Only switch off the slewing gear after the superstructure has stopped turning.



With the *brake pedal* function active

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

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



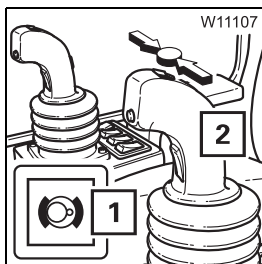
With the *control lever* function active

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

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

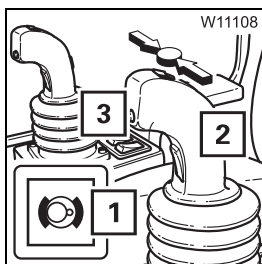
Slewing gear free-wheel

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



With the *brake pedal* function active

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



With the *control lever* function active

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



Switching off the slewing gear

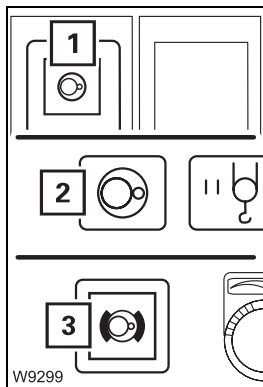
If the slewing gear is not required, it should be switched off to avoid unintentional use.



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 engaged when the slewing gear is switched off.

In this way you can prevent lateral forces taking effect on the main boom due to long delays or swinging loads.





- Press the button (1) in at the bottom once.
 - The lamp in the button (1) lights up dimly.
 - The symbol (2) is **red** if the slewing gear is switched off.
 - The slewing gear brake engages, and the lamp (3) lights up.

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12.3.10 Possible movement combinations

The specified power units can be operated simultaneously in almost every combination. Restrictions are specified for the respective power units.

- Main hoist
- Telescoping mechanism and derricking gear
The telescoping mechanism and derricking gear can be operated simultaneously only if they are controlled by different control levers;  *Control lever assignment*, p. 10 - 16.
- Slewing gear
- Auxiliary hoist
- Auxiliary power units (Incline crane cab, counterweight hoist unit).
The auxiliary power units cannot be operated in combination with the *Extending* movement.
Moving the auxiliary power units in combination with other power units can result in reductions of speed. For this reason, you should only use these combinations if it is absolutely necessary.
- Lattice extension derricking gear
The telescoping mechanism and lattice extension derricking gear can be operated simultaneously only if they are controlled by different control levers;  *Control lever assignment*, p. 10 - 16.
The lattice extension derricking gear cannot be operated in combination with the *Extending* movement.

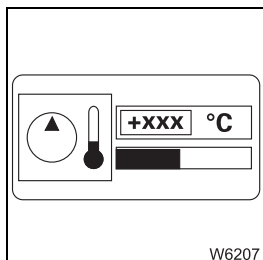




Certain movement combinations can reduce the speed in high-speed mode.

12.3.11 Hydraulic oil cooling

Depending on the truck crane version, there are one or two hydraulic oil coolers that regulate the hydraulic oil temperature automatically.

- In addition to this, you should ensure that the maximum permissible hydraulic oil temperature of 80 °C (176 °F) is not exceeded.



The current hydraulic oil temperature is displayed in the *Monitoring*  sub-menu. If the maximum permissible temperature has been reached, the bar next to the display turns **red**. A warning message is issued additionally;  *Warning submenu*, p. 12 - 105.

When the hydraulic oil temperature reaches 80 °C (176 °F):

- Stop crane operation.
- Let the hydraulic oil cool down while the engine is running.

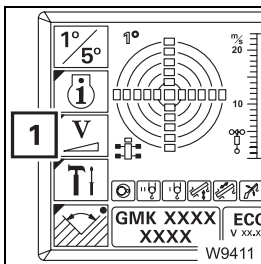
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
12.4 Settings and displays for crane operation

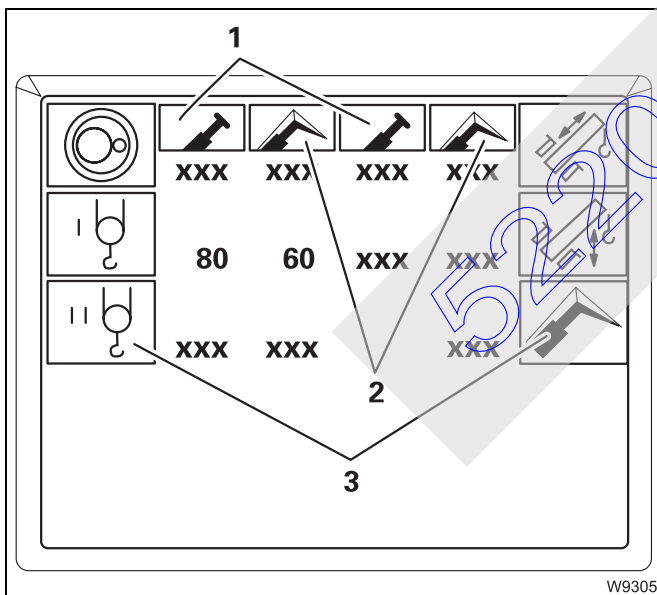
This section only describes settings and displays needed during crane operation. Operating elements that can be assigned to other procedures are described with the corresponding procedures.

12.4.1 Limiting the power unit speeds

You can enter how many percent of the maximum speed shall be enabled for each power unit.



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



All values are given in percent.

Only the values below the green symbols are used.

- When working with the main boom, the symbols (1) are green.
- If a lattice extension is connected, the symbols (2) are green.

During main boom operation, the slewing speed would now be limited to 80% of the maximum possible speed, for example.

The buttons next to the symbols (3) are only active if the power units are available and electrically connected.

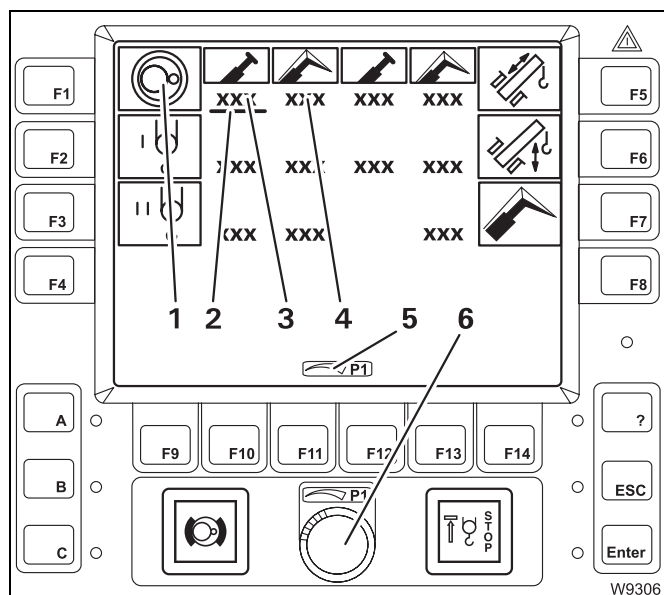


With the slewing gear and the derricking gear, the displayed values only apply if they are lower than the automatically limited values. The automatically limited values are not displayed.



Changing values

You want to limit the slewing gear speed, for example.



- Press the button (1) repeatedly until the bar (2) is below the value (3) or (4) you want to change.

The symbol (5) shows that the switch (6) is active.

- Change the selected value using the switch (6).
- If necessary, change the values for other power units in the same way.

Esc You can **cancel the input** at any time.
The values are not changed in that case and the main menu opens.

Enter • Confirm the changed values. All changed values are accepted and used.


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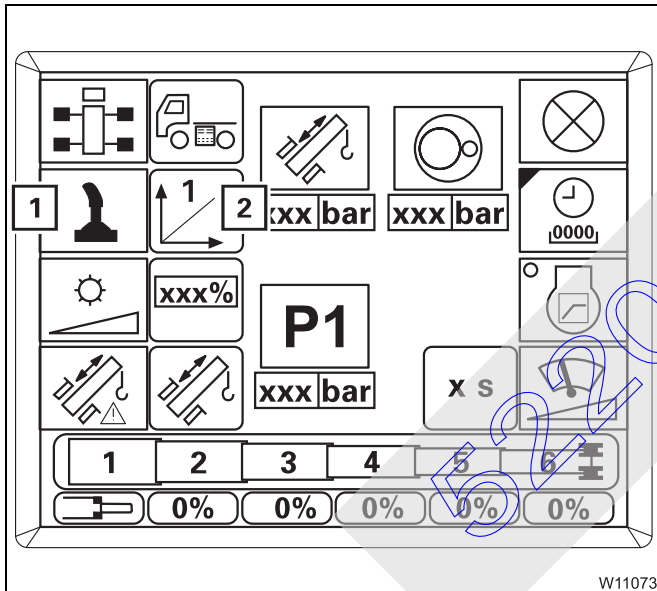
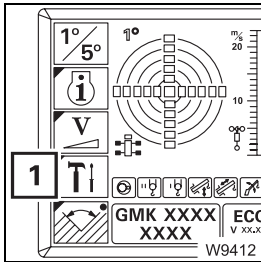
12.4.2

Setting the characteristic curve 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 control lever characteristic curve set always applies to both control levers and to all power units which are controlled with the control levers.

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

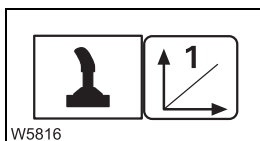


The *Settings* submenu opens.

The currently set characteristic curve is shown on the display (2).

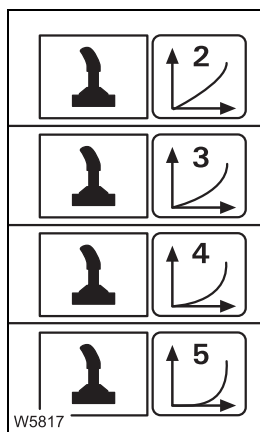
Press the button (1) repeatedly until the display (2) shows the desired characteristic curve.

You can set the following characteristic curves:



Linear characteristic curve (1)

The movement of the control levers effects a uniform speed increase. In this case 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 instigate a clear increase in speed.

With characteristic curve (5), you work particularly sensitively with the control lever.

12.4.3

Inclining the crane cab

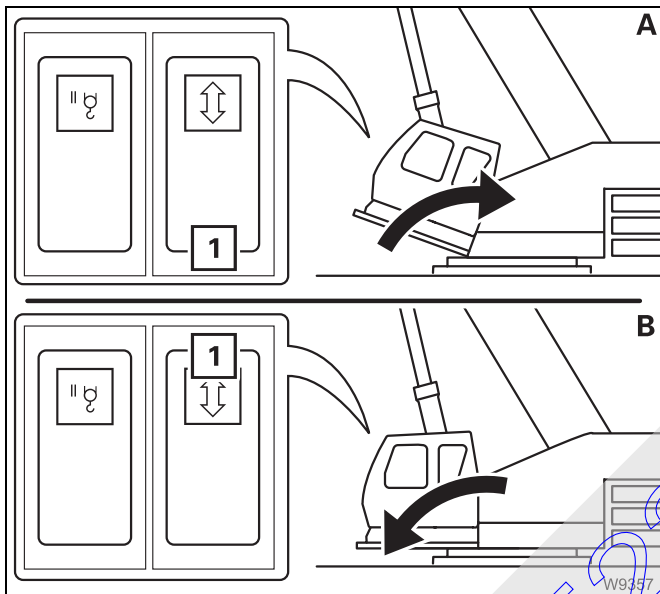
With the relevant equipment, you can incline the crane cab to the rear in order to attain a better sitting position when working at great heights.



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.

In this way you prevent 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 the button (1) down at the bottom.

(B) – Incline to the front

- Close the crane cab door.
- Press the button (1) up at the top.

The crane cab is inclined as long as you hold the button down or the end position is reached.

12.4.4

Setting the idling speed

▣▣▣▣▶ *Setting the idling speed*, p. 11 - 16.

12.4.5 Critical load control

Function

The critical load control prevents the engine from stalling at low engine speeds.

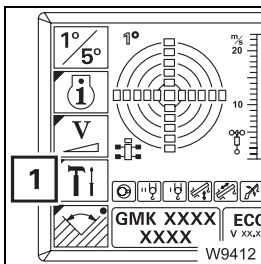
ECOS registers the currently available motor output and the hydraulic performance instantaneously required by the power units.

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. In this, the control lever movement is taken into account so that the power unit speeds remain equal.

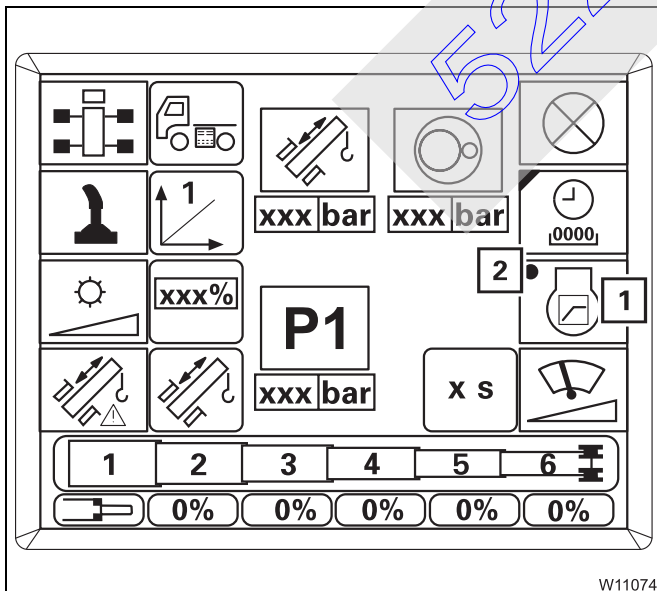
The slewing gear is not influenced by the critical load control.

Switching on and off

You should only switch off the critical load control if it is faulty (engine stalls or individual power units can no longer be controlled).



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



The *Settings* submenu opens.

Switching off the critical load control

- Press the button (1) repeatedly until the dot (2) turns black.

Switching on the critical load control

- Press the button (1) repeatedly until the dot (2) turns green.

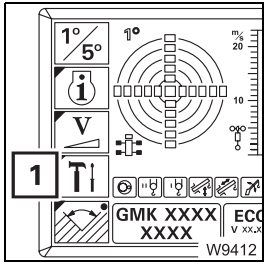
12.4.6


Adjusting the stroke interval of the windscreen wiper

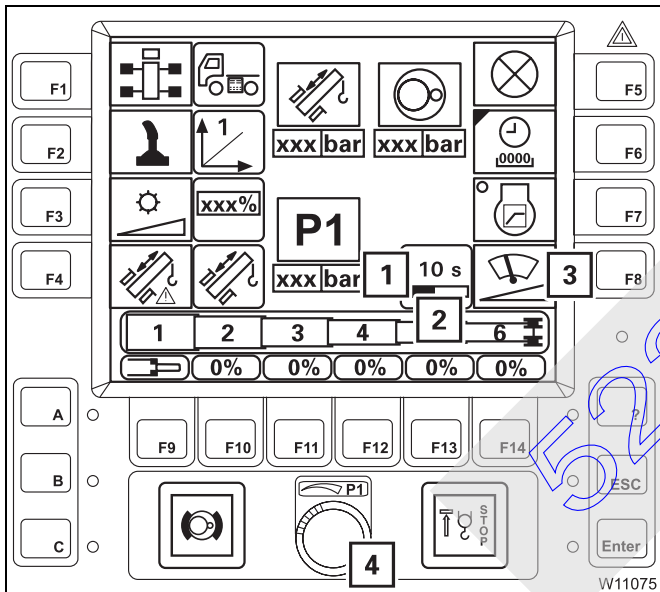
You can set a value between 3 and 30 seconds for the front and roof window wiper stroke interval.



The higher the selected value is, the longer the pauses between the strokes of the wiper are.



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



The *Settings* submenu opens.

The display (1) shows the value entered last.

- Press the button (3) once.

The bar (2) shows that the switch (4) is active.

- Using the switch (4), set the value for the desired wiper interval, e.g. 10 seconds.



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

The bar (2) goes out and the settings are reset.

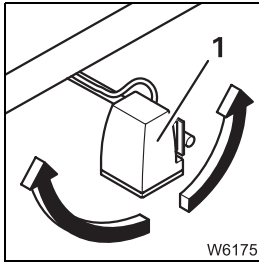


- Confirm the newly entered wiper interval.

The new wiper interval is accepted.

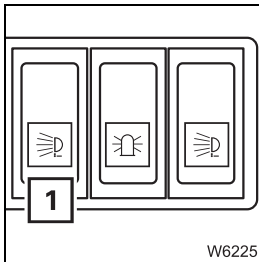
12.4.7

Operation of the directional spotlights



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

Switching on/off



Switching on

- Press the switch (1) down at the bottom.

Switching off

- Press the switch (1) down at the top.

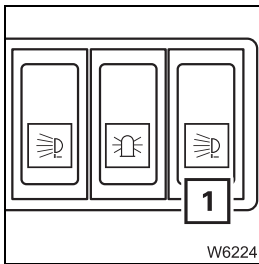
Directing



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

Risk of accidents due to being blinded when driving on the road!

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



To direct the spotlights forwards

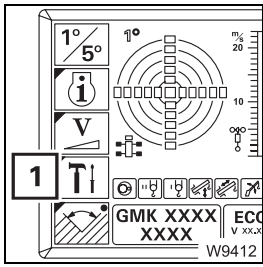
- Press the button (1) up at the top.

To direct the spotlights backwards

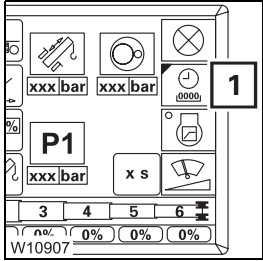
- Press the button (1) down at the bottom.

12.4.8

Displaying the operating hours



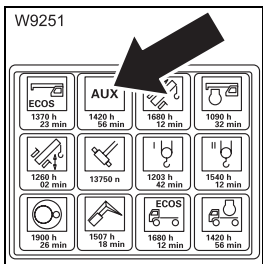
If necessary, open the main menu  and press the button (1) once.



The *Settings* submenu opens.

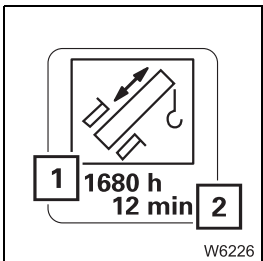
- Press the button (1).

The *Operating hours* submenu opens.



The *Operating hours* submenu opens.

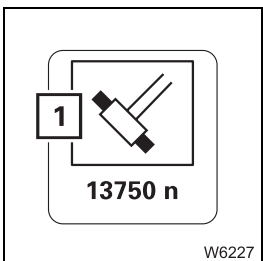
The auxiliary power units include the counterweight lifting cylinder and locking cylinder and the inclination of the crane cab.



The operating hours are indicated directly below the symbols:

- The top value (1) represents the hours.
- The bottom value (2) represents the minutes.


The values indicate the operating time only. For the slewing gear, for example, all the times during which the slewing gear was operated are added up.



Exception: The value under the symbol (1) for the locking system indicates how many times the mechanism has carried out the *Unlock the telescopic section* cycle.

12.4.9

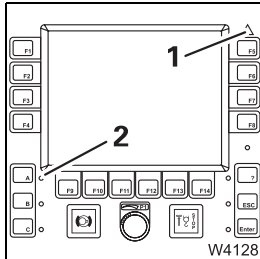
Warning submenu

ECOS differentiates between warning messages and error messages (error messages  p. 12 - 108).

A warning message indicates that certain values do not correspond to a set value. Warning messages are displayed as follows:

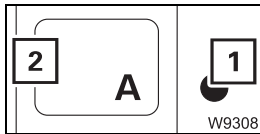
- the lamp (1) flashes and
- the lamp (2) flashes.

For more information on warning messages, refer to the *Warning* submenu.



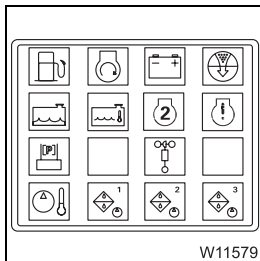
Opening the submenu

You can open the *Warning* submenu if a warning message is displayed.



- Press the button (2) once. The button is only active when the lamp (1) flashes or lights up.

When opening, a new warning message is acknowledged, and the lamp (1) lights up (no longer flashes).



The submenu opens. The colours of the symbols indicate whether a warning message is active in the corresponding area:

- Symbol **grey** - no warning message present.
- Symbol **red** - a warning message is present.

Meaning of the symbols

Make the following inspections if a symbol is displayed in **red**.

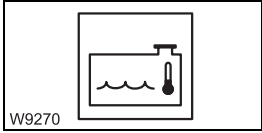


Risk of damage if warning messages are not observed!

Observe the following information in good time and take the appropriate remedial measures if a warning message appears. In this way, you can prevent these malfunctions from causing malfunctions on the truck crane.

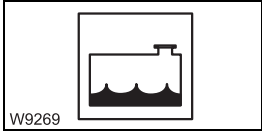
All warning messages which relate to the engine apply to the engine for crane operation.





Coolant too hot

The engine coolant is hotter than approx. 95 °C (205 °F).
Display of the current temperature; p. 11 - 15.
Possible cause and remedy; p. 15 - 15.



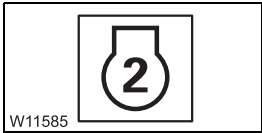
Coolant level too low

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



Engine warning

Engine malfunction
• Turn off the engine; p. 15 - 15.



Engine malfunction

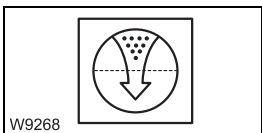
Severe malfunction at the engine
• Turn off the engine; p. 15 - 15



Refuelling

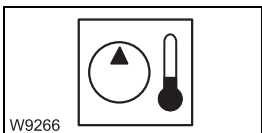
The fuel tank is only filled up to a level of approx. 5%.
• Refuel before the fuel is used up; p. 11 - 5.

When the fuel tank is almost empty, air is sucked in and you must bleed the fuel system; *Maintenance Manual*.



Replacing the air filter

- Replace the air filter as soon as possible; *Maintenance Manual*.



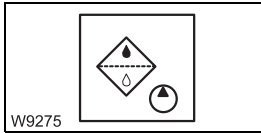
Hydraulic oil too hot

The hydraulic oil is hotter than 80 °C (176 °F).
Display of the current temperature; p. 11 - 15.
Possible cause and remedy; p. 15 - 22.



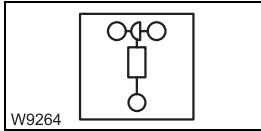
Danger of overheating!

There is a malfunction if the hydraulic oil temperature exceeds 80 °C (176 °F). Set down the load as soon as possible and try to find the cause. Set down the load as soon as possible and turn off the engine if the temperature of the hydraulic oil exceeds 100 °C (212 °F).



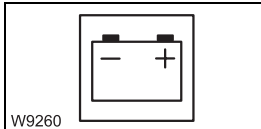
Replacing the hydraulic oil filter

- Replace the corresponding hydraulic oil filter as soon as possible; *Maintenance Manual*.



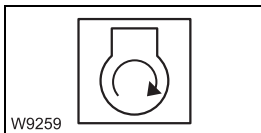
Anemometer not connected

- Connect the anemometer to the electrical power supply; p. 13 - 108.



Voltage monitoring

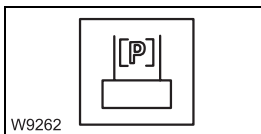
The voltage in the superstructure electrical system is too high or too low. Display of the current voltage; p. 11 - 15.



Air intake inhibitor has been 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. 11 - 21.



Precharging the counterweight

The precharging pressure on the counterweight has dropped too much.

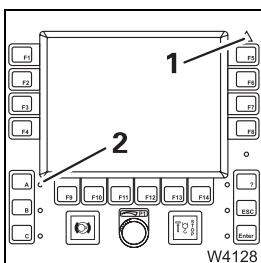
- Precharge the counterweight; p. 13 - 70.

Exiting the sub-menu



You can exit the submenu at any time.

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




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

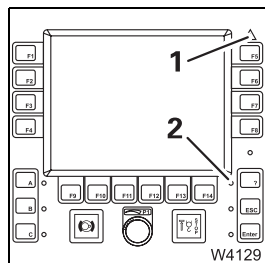
If no warning message is present, both lamps will have gone out.

Both lamps start to flash again as soon as a new warning message appears.

12.4.10

Error submenu

ECOS differentiates between error messages and warning messages (warning messages  p. 12 - 105).



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

More information on error messages;  *Error messages*, p. 15 - 37.

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12.5

Working range limiter

You can set and monitor four different limitations in the working range limiter submenus:

- a maximum overall height
- a maximum working radius
- a maximum permissible slewing angle
- Objects in the working range

The monitoring of the programmed limiting values can be switched on and off separately.



Danger of accidents due to situations which cannot be monitored!

The working range limiter only serves as an additional safety device. Brake the crane movement in time in front of the obstacle. Do not consciously enter 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 are cannot be monitored electronically.



Danger of accidents due to limit values set too low!

When entering the limit values, bear in mind that, even after switching off the engine, movements can still occur that would bring the load into the shutdown range (e.g. due to the load swinging or the boom bending). For this reason, always enter the limit values with a sufficient safety distance to the object.

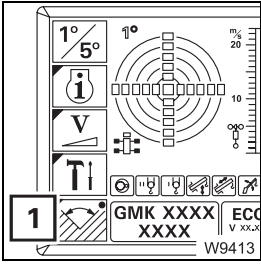


Risk of accidents if the statutory safety distance is not complied with!

Always observe all safety distances in accordance with the national legal regulations (e.g. concerning electrical cables) even if the working range limiter is switched on.

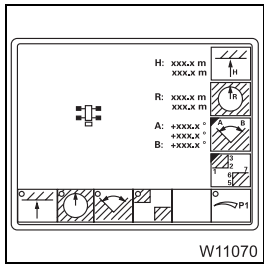
12.5.1

Opening the Working range limiter submenu



• Open the main menu **[Esc]**, as required.
The dot in the 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.



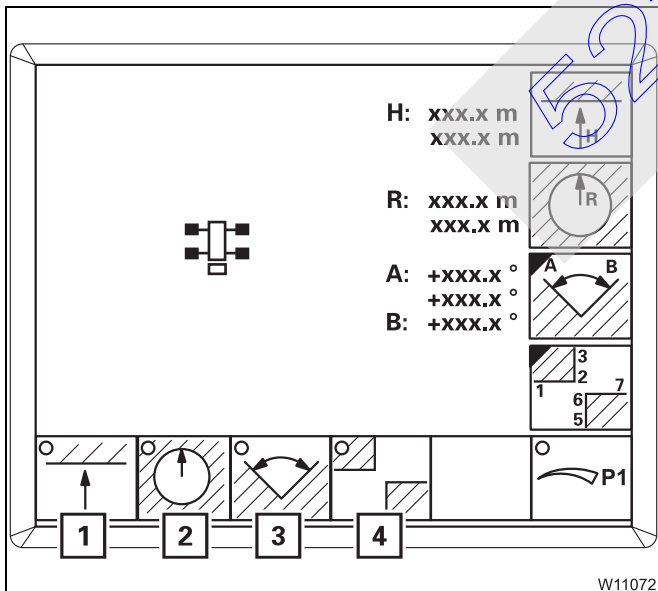
The *Working range limiter* submenu opens.

Units of measurement are displayed – metres (m) or feet (ft).

12.5.2

Viewing current settings

The *Working range limiter* submenu shows active monitoring functions, entered limit values and current values.

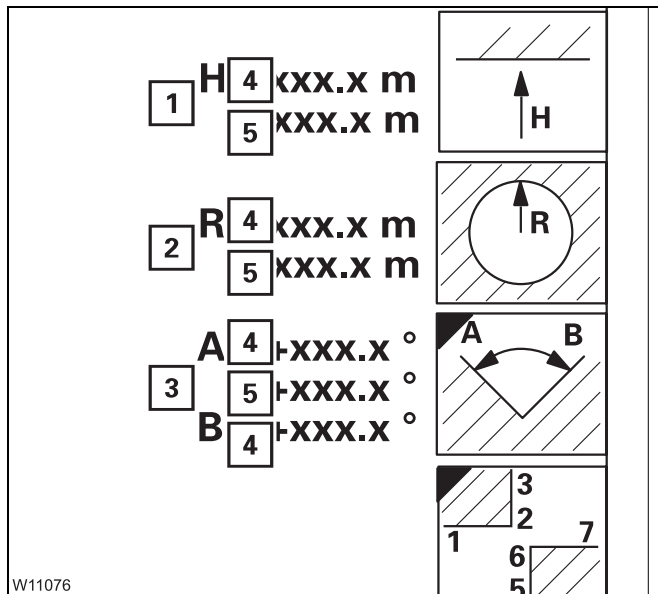


Monitoring on/off

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. 12 - 120.



Limit values/Current values

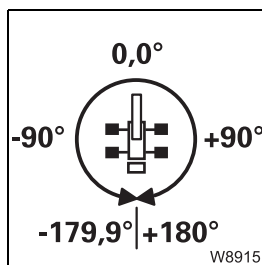
The displays (1) to (3) indicate values for

- 1 Overall height
- 2 Working radius
- 3 Slewing angle

Every display shows the following values:

- 4 Limit value – red
- 5 Current value – blue

With manual input switched on, the display (5) changes; p. 12 - 118.



The following applies to the slewing angle display:

0° means that the superstructure is slewed to the back.

- Angles in the **right-hand semi-circle** are displayed as **positive** values (0° to 180.0°).
- Angles in the **left-hand semi-circle** are displayed as **negative** values (0° to -179.9°).




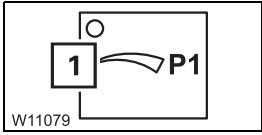
Viewing the limit values for object monitoring; *Objects*, p. 12 - 119.

12.5.3

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. 12 - 118.



Prerequisite

Manual input must be switched off.

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

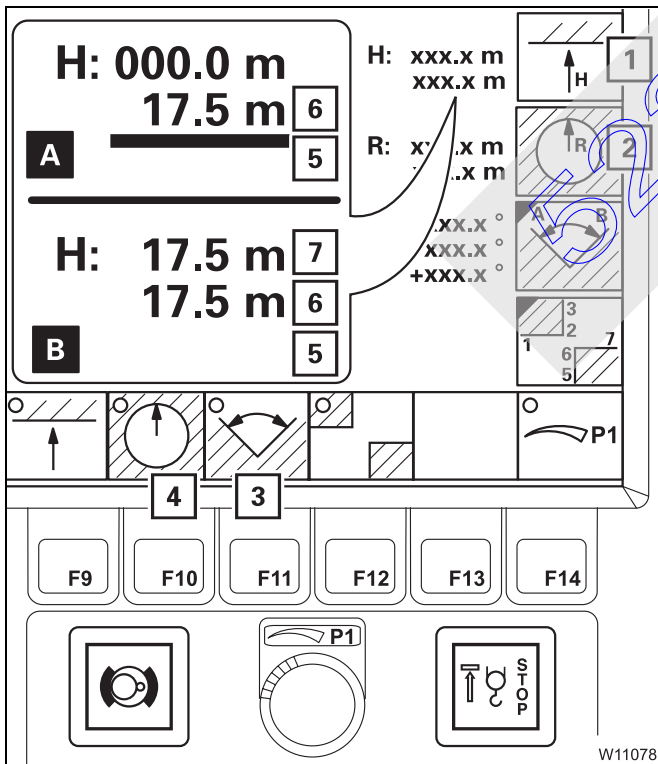



Danger of accidents due to limit values set too low!




When entering the limit values, bear in mind that, even after switching off the engine, movements can still occur that would bring the load into the shutdown range (e.g. due to the load swinging or the boom bending). For this reason, always enter the limit values with a sufficient safety distance to the object.

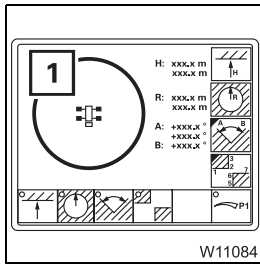
Overall height/ Working radius

The limit values for the overall height and the working radius are entered in the same way.



The relevant monitoring function (3) or (4) must be switched off – dot **black**;  p. 12 - 120.

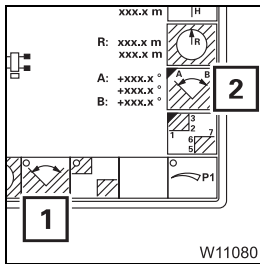
- Press the button
 - 1 for the overall height or
 - 2 the working radius once.
- Bar (5) red – input on. Cancel input – press button  once.
- (A) – Move the main boom head to just before the shutdown point without a load, e.g. at 17.5 m – value (6).
- (B) – Press the button  once.
 - The current value (6) is accepted as the limit value (7).
 - The bar (5) goes out.
- Switch on monitoring;  p. 12 - 120.



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

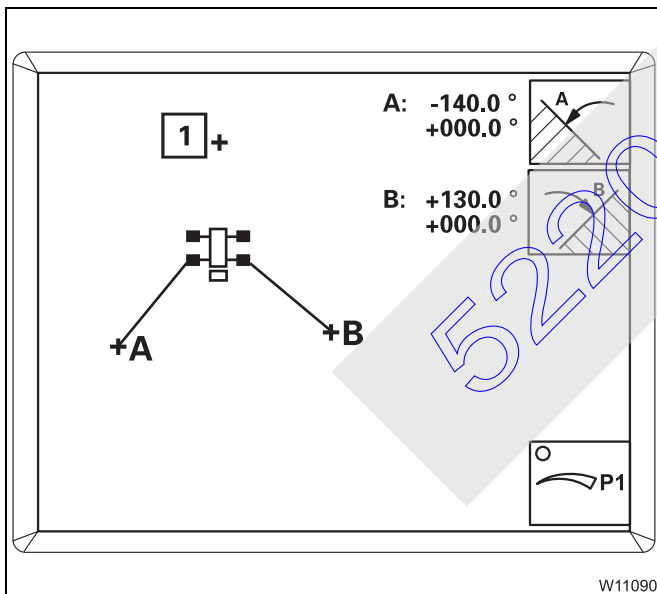
Slewing angle

Slewing angles are entered in a submenu.



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

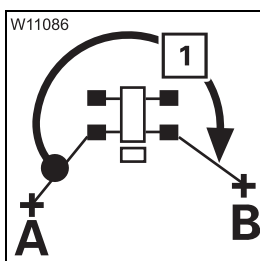
- Press the button (2) once.
The *Enter slewing range* submenu opens.



Display of the slewing angles

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

- The slewing angle **A** limits slewing to the left.
- The slewing angle **B** limits slewing to the right.



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



Entering the permissible slewing range

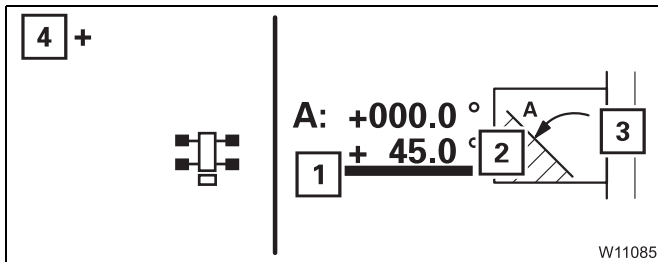
You must enter the slewing angles **A** and **B** separately.



Risk of accidents 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 released.

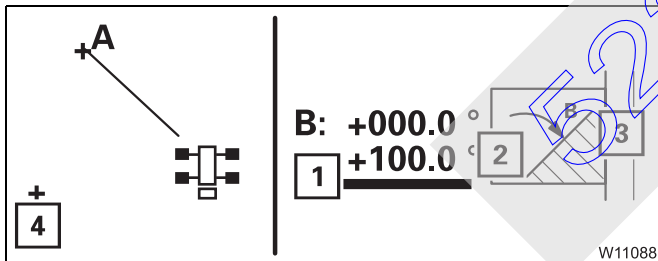
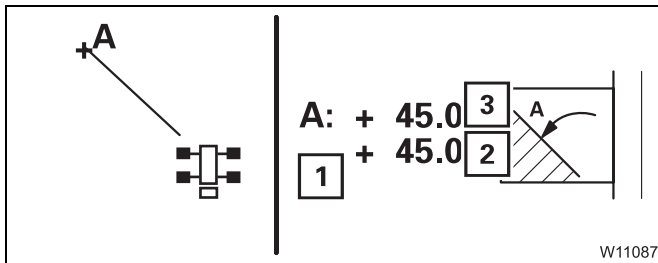


Slewing angle A:

- Press the button (3) once.
Bar (1) red – input on. Cancel input – press button **Esc** once.

- Slew the main boom (4) to the shutdown point from the right, e.g. to value (2) 45°.

- Press the button **Enter** once.
 - The slewing angle **A** is displayed.
 - The value (2) is accepted as the limit value (3).
 - The bar (1) goes out.

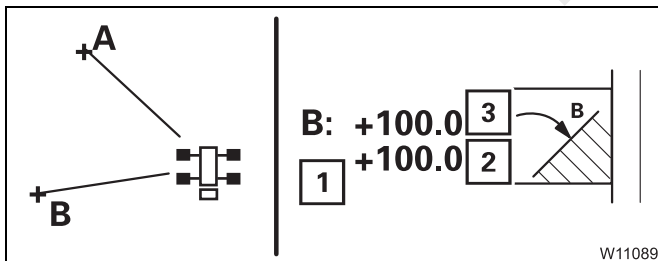


Slewing angle B:

- Press the button (3) once.
Bar (1) red – input on. Cancel input – press button **Esc** once.

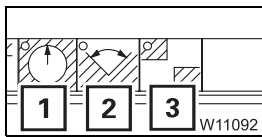
- Slew the main boom (4) to the shutdown point from the left, e.g. to value (2) 100°.

- Press the button **Enter** once.
 - The slewing angle **B** is displayed.
 - The value (2) is accepted as the limit value (3).
 - The bar (1) goes out.

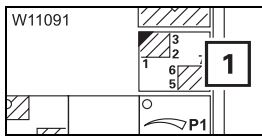


Entering objects

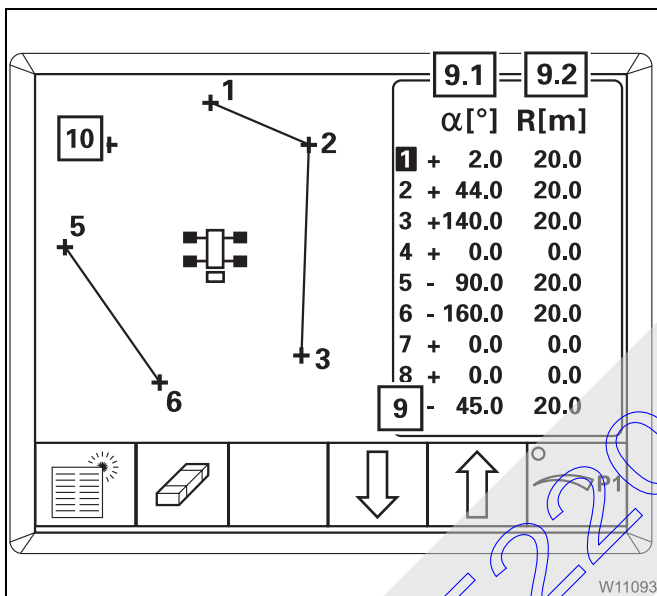
Objects are entered in a submenu.



Before entering values, the monitoring functions (1) to (3) must be switched off – dot **black**; p. 12 - 120.



- 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.

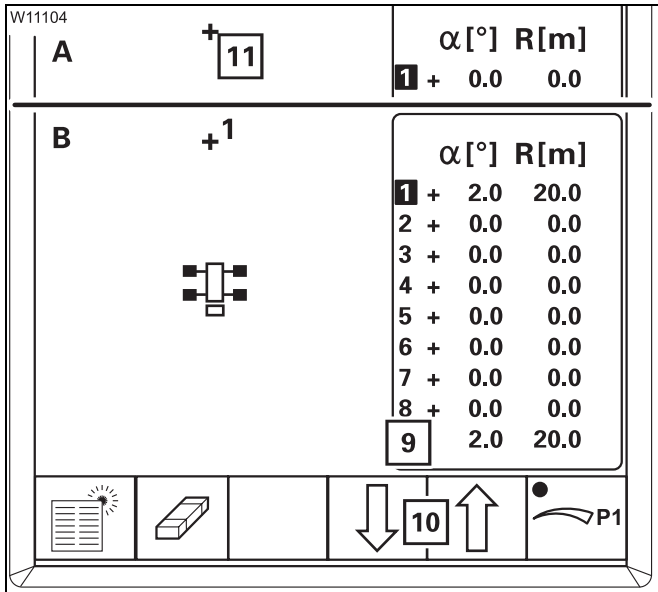
An object is made up of points that are connected by lines, e.g. the points 1 to 3 and the points 5 and 6).

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. 12 - 118.

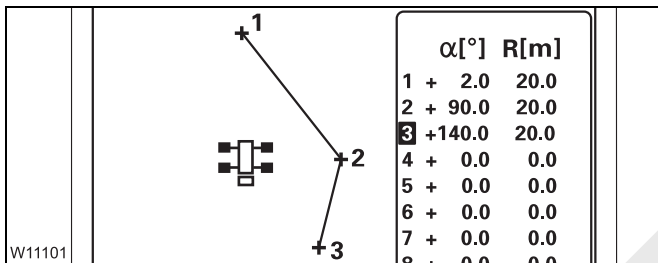




Entering objects

- (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 once.
 - The point (1) is displayed.
 - The current point data (9) is accepted for point (1), e.g. 2° and 20 m.

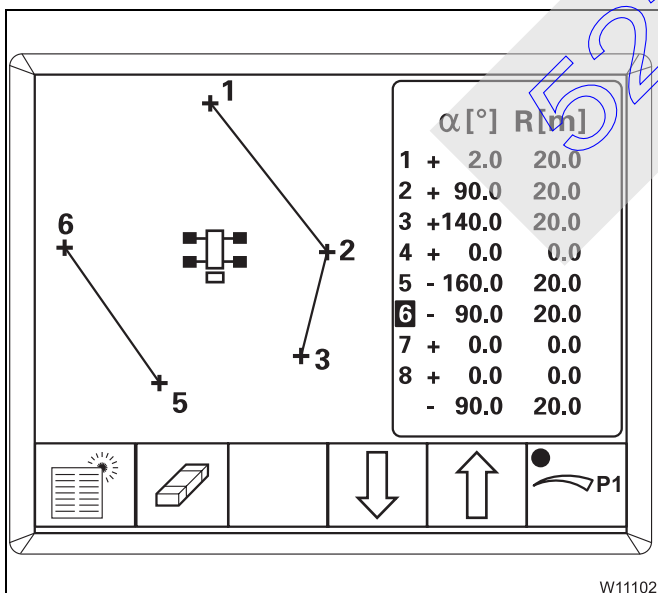
The first point has now been entered.



- Enter the next point (2) in the same way, 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. 12 - 117.
- Enter the next point, e.g. point (5) at -160° and 20 m.

This point (5) is the first point for the new object. The following point is added to this object, e.g. point (6).

Deleting points

You can delete selected, individual points or delete all points at once.

A			B		
	α [°]	R[m]		α [°]	R[m]
1	+ 2.0	20.0	1	+ 0.0	0.0
2	+ 90.0	20.0	2	+ 0.0	0.0
3	+140.0	20.0	3	+ 0.0	0.0
4	+ 0.0	0.0	4	+ 0.0	0.0
5	+ 0.0	0.0	5	+ 0.0	0.0
6	+ 0.0	0.0	6	+ 0.0	0.0
7	+ 0.0	0.0	7	+ 0.0	0.0
8	+ 0.0	0.0	8	+ 0.0	0.0
-	90.0	20.0	-	90.0	20.0

(A) – Selected points

- Press the button (1) once.

The selected point is deleted, e.g. point (4) – point data 0.0.

(B) – All points

- Press the button (2) once – symbol (3) appears.

You can cancel the process with the button .

- Press the button once – all points are deleted.

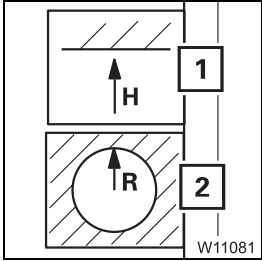
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12.5.4

Entering limit values/objects manually

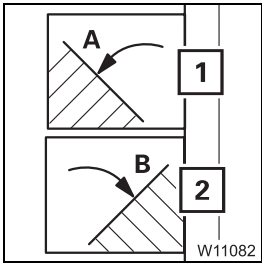
Limit values

The limit values for the overall height, the working radius, and the slewing range are entered in the same way.



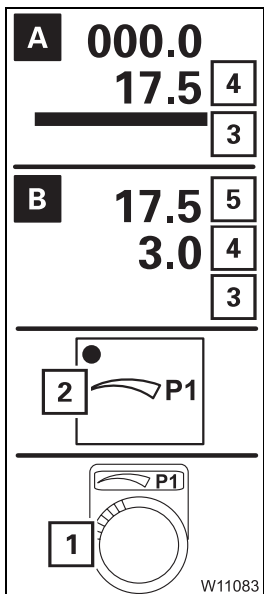
– For overall height/working radius

- Press the button
 - 1 for the overall height or
 - 2 the working radius once.



– For slewing angles

- Open the *Enter slewing angle* submenu.
- Press the button
 - 1 for slewing angle A or
 - 2 for slewing angle B once.



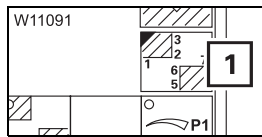
Enter limit value

The bar (3) is red – input on.
To cancel the input – press button **Esc** once.

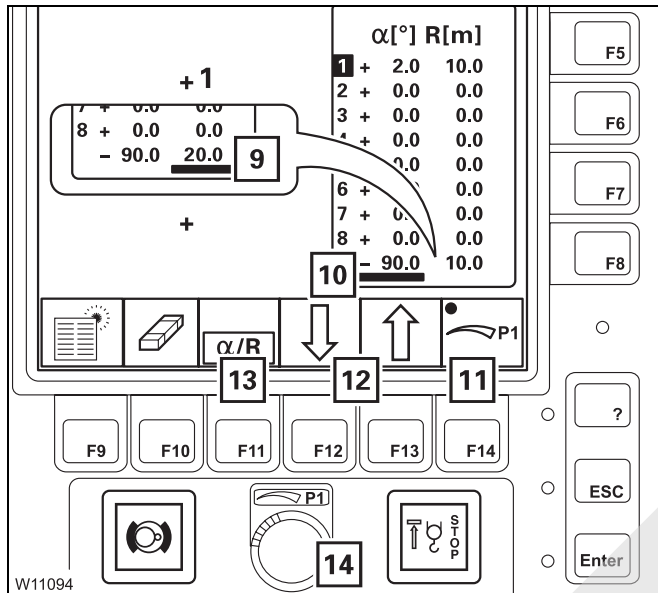
- Press the button (2) once – the dot turns **green**, manual input on.
- (A) – Enter the new limit value, e.g. 17.5, with the switch (1) on display (4).
- (B) – Press the button **Enter** once.
 - Display (5) = new limit value,
 - Display (4) = current value, e.g. 3.0
 - Bar (3) goes out.
 - Dot (2) **black**, manual input off.

Objects

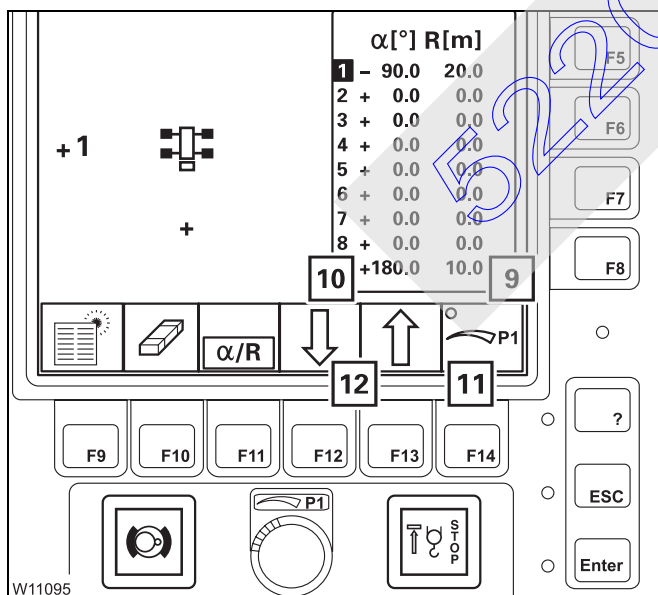
Objects are entered in a submenu.



- Press the button (1) once.
The *Enter objects* submenu opens.



- With the buttons (12), select the desired point, e.g. point (1) – blue.
- Press the button (11) once – the dot turns **green**, manual input on.
- With the button (13) select
 - the slewing angle – bar (10) red or
 - the working radius – bar (9) red, input on. Cancel input – press button **ESC** once.
- Enter the new values, e.g. -90.0° and 20.0 m with the switch (14).

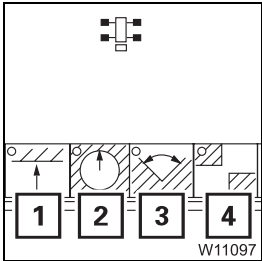


- Press the button **Enter** once. The new values for point (1) are accepted.
- You can enter additional points in the same way – button (12).
- To end your input, press the **Enter** button once.
 - Bar (9) or (10) goes out – display = current main boom position,
 - dot (11) **black**, manual input off.

12.5.5

Switching monitoring functions on/off

After turning on the ignition, all monitoring functions are switched on that were on before the ignition was turned off.



- Press the buttons for the required monitoring functions once.

- | | |
|-------------------------|-------------------------|
| 1 Overall height | 2 Working radius |
| 3 Slewing angle | 4 Objects |

Dot is green: Monitoring switched on
Dot is black: Monitoring switched off



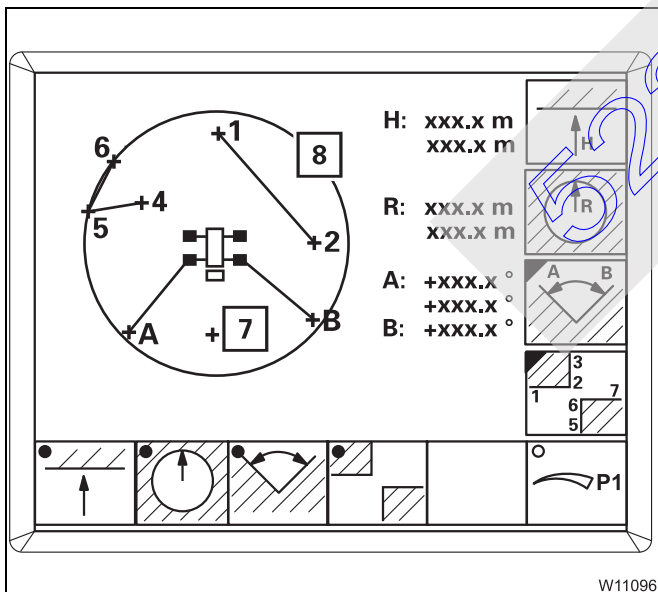
Danger of accidents due to incorrectly set limit values!

After switching on the monitoring function, slowly approach all limit values and check that they are switched off in time.

If necessary, enter new values with a 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 is displayed:

- **Working radius**
Circle (8) – red.
- **permissible slewing angle**
Circle sector 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.



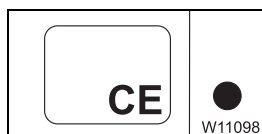
It is impossible to move behind a defined object whenever a monitoring function is switched on.


12.5.6

Shutdown by working range limiter

If a limit value is reached, SLI shutdown occurs. All movements that would go closer to the limit value are disabled. Shutdown remains active even if you switch off the monitoring function.

Shutdown point reached for	Disabled movements
Overall height	<ul style="list-style-type: none"> - Raising - Extending - Lowering the hoisting gear - Derricking the lattice extension
Working radius	<ul style="list-style-type: none"> - Lowering - Extending - Lifting the hoisting gear - Derricking the lattice extension
Slewing angle A	<ul style="list-style-type: none"> - Slewing to the left
Slewing angle B	<ul style="list-style-type: none"> - Slewing to the right
Objects	<p>Depending on the position of the object:</p> <ul style="list-style-type: none"> - Slewing to the left or right - Lowering - Extending - Lifting the hoisting gear - Derricking the lattice extension



The SLI also shows an error message. To enable the movements, you must leave the shutdown range and acknowledge the error message;  *Table of error codes.*



Danger of accidents by overriding shutdown procedures!

Only override SLI 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 of the truck crane is increased by setting down the load.

If you override the SLI, the shutdown is overridden and all movements are enabled.

Blank page

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12.6

Work break

12.6.1

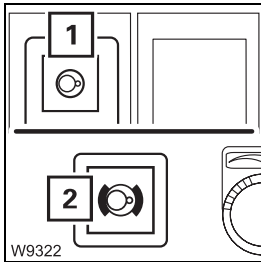
Short work breaks



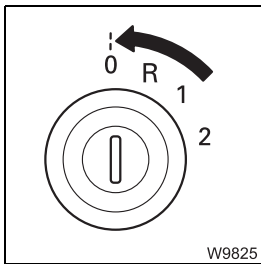
Risk of accidents due to suspended loads!

Never turn off the engine with a load suspended. You must have the control levers at hand in order to intervene at any time.

Always set down the load before you leave the crane cab.



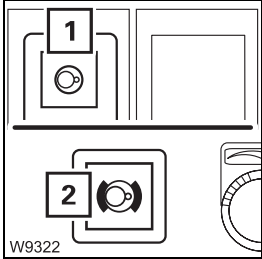
- Switch off the slewing gear.
 - The lamp in the button (1) must light up dimly.
 - The lamp (2) must light up – slewing gear brake engaged.



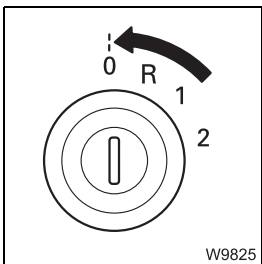
- Switch the engine off, turn the ignition key to position **0** and remove it.
- Ensure that no unauthorised persons can operate the truck crane;
 - ▶ *Securing the truck crane against unauthorised use, p. 12 - 124.*

12.6.2

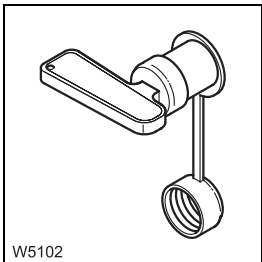
Work breaks of more than 8 hours



- Retract all telescopic sections.
- Set down the main boom on the boom rest.
- Switch off the slewing gear.
 - The lamp in the button (1) must light up dimly.
 - The lamp (2) must light up – slewing gear brake engaged.



- Switch the engine off, turn the ignition key to position **0** and remove it.
- Switch off all current consumers.



- Switch off the battery master switch.

You can switch off the battery master switch even if the auxiliary heater is still running down. The run-down procedure of the auxiliary heater is not interrupted.

Securing the truck crane against unauthorised use

- Secure the truck crane against unauthorised use
 - stowing away the hand-held control in the crane cab
 - removing the ignition key and
 - locking the crane cab.

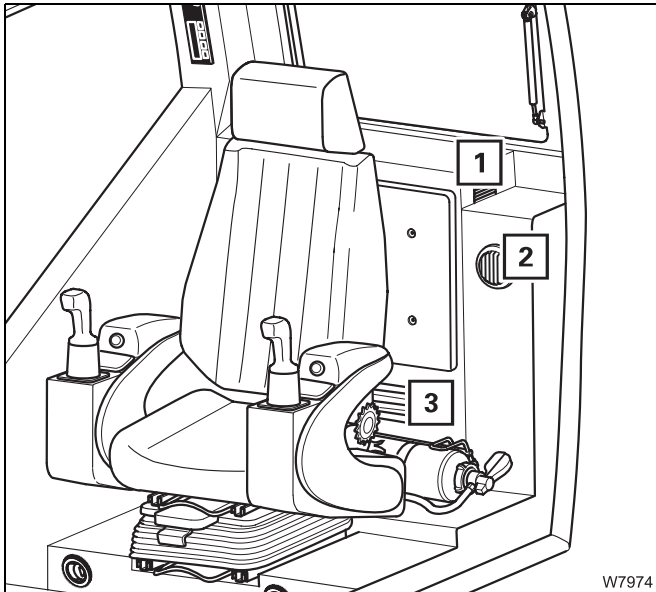


Danger due to unauthorised use

Always stow away the hand-held control in the crane cab before leaving the truck crane, and lock the door to the crane cab. In this way you can prevent unauthorised persons from starting the engine with the hand-held control.

12.7 Heating and ventilating the crane cab

There are various intake openings and air vents behind the crane cab seat.



Do not cover the grilles (1), (2) and (3).

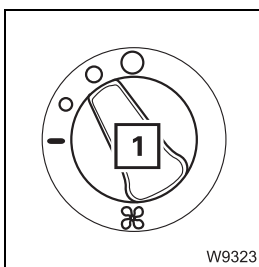
- Air is drawn in through the grilles (2) and (3).
- The grille (1) is used to ventilate the electronics.

12.7.1 Standard heating system

The standard heating system only heats when the engine is running.

Switch heating system on/off

The heating system is switched on and off with the fan.



To switch on

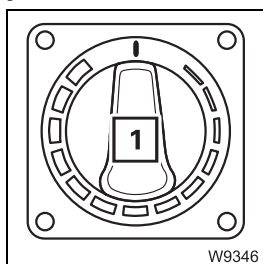
- Turn the switch (1) clockwise. The switch engages in three different positions.

To switch off

- Turn the switch (1) anti-clockwise as far as it will go.



Setting the temperature



You can adjust the temperature of the air flowing from the heater:

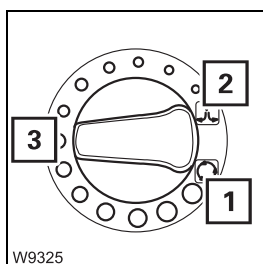
To reduce the temperature

- Turn the switch (1) anti-clockwise.

To increase the temperature

Turn the switch (1) clockwise.

Setting recirculated/fresh air



You can set which air is sucked in by the heating.

Fresh air

- Turn the switch to symbol (2).

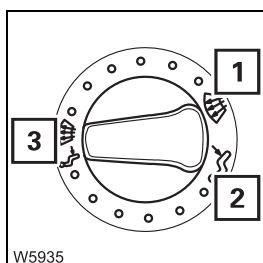
Recirculated air

- Turn the switch to symbol (1).

Mixed air

- Turn the switch to the intermediate position (3).
Turning the switch (3) towards symbol (1) or (2) continuously increases the proportion of the corresponding type of air.

Setting the air distribution



You can make the heating air flow from the different air vents.

Air vents on the windscreen and in the centre

- Turn the switch to symbol (1).

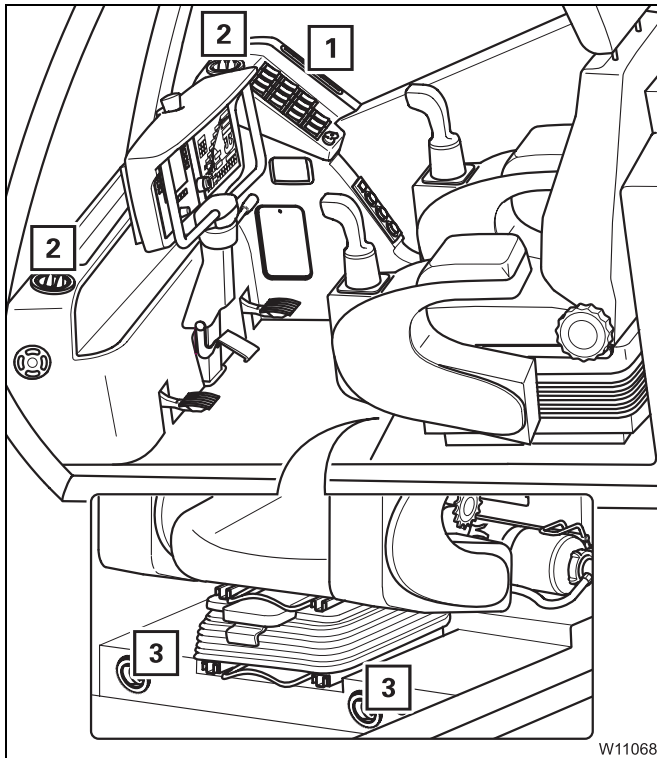
Air vents on the cab floor

- Turn the switch to symbol (2).

All air vents

- Turn the switch to symbol (3).

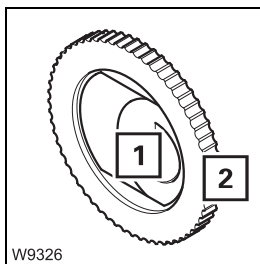
Turning the switch (3) towards symbol (1) or (2) continuously increases the air flow from the corresponding air vents.



The air flows from the air vents (1) to (3), depending on the setting.

- 1, 2 Windscreen and centre
- 3 Cab floor

You can additionally set the direction of the air flow on the air vents (2) and (3).



Adjusting the air vents

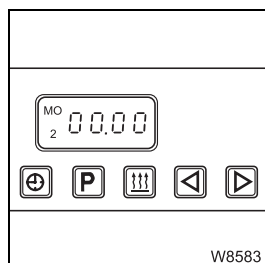
- To open the vent:** Press the fins (1) down and set them lengthwise
- To direct the air flow:** Turn the ring (2)/adjust fins
- To close the vent:** Fold fins (1) to the side

12.7.2

Auxiliary water heating system



The batteries will run down if you operate the auxiliary heater with the engine switched off. You must recharge the batteries at shorter intervals if you use the auxiliary heater frequently.

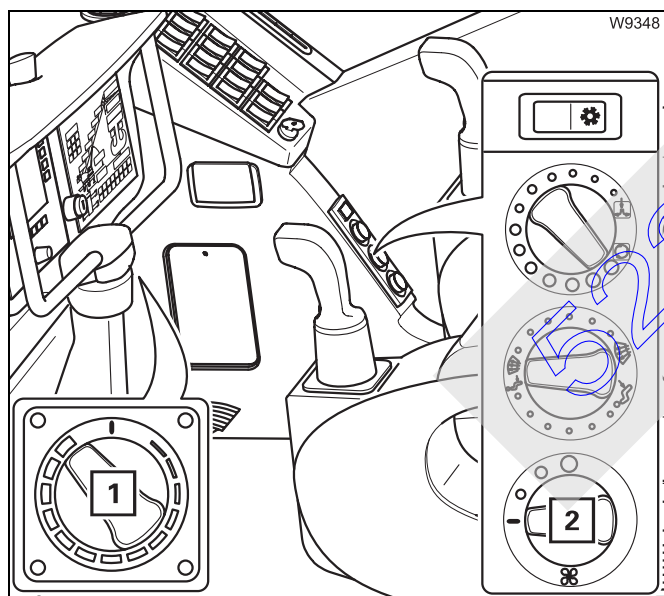


You can use the auxiliary water heater to:

- either preheat the engine or
- preheat the engine and crane cab simultaneously.

Preheating the engine

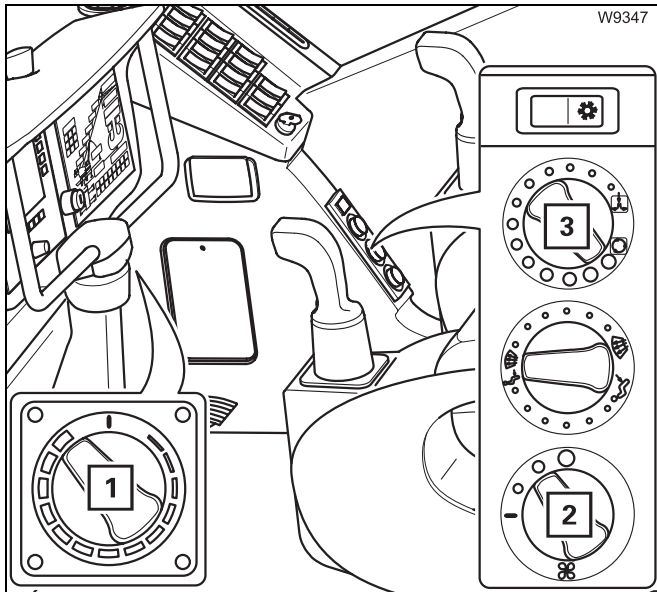
If only the engine is to be preheated, adjust the heating system as follows:



- Switch (1) to *warm* setting.
- Switch (2) to *fan off* setting.

Preheating the crane cab

If the crane cab is to be preheated in addition to the engine, adjust the heating system as follows:



- Switch (1) to *warm* setting.
- Switch (3) to the *recirculated air* symbol.
- Turn the switch (2) to the required fan level.
- Open the air vents; p. 12 - 127



The amount of time required to preheat the engine is increased significantly by simultaneously heating the crane cab.

Switching on the heating system

- 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 sources of danger that could result in explosions.



Danger of explosions when operating the auxiliary heater!

The auxiliary heater is not allowed to be operated:

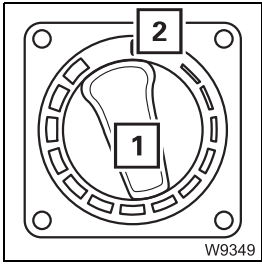
- At service stations and tank farms
- At places where inflammable gases or vapours can be found or may form (e.g. at places where fuel is stored and at chemical factories)
- At places where explosive dust can be found or form (e.g. coal dust, wood dust, grain dust)



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.

When the switch (1) is turned as far as possible (2) (*cold*), the auxiliary heater is not switched on.

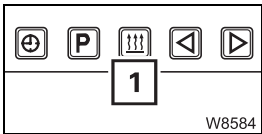


This section describes how to switch on the heater manually. You can also have the auxiliary heater switch on automatically; *Saving the automatic heating start*, p. 12 - 132.

- Turn on the ignition; *Switching on the ignition*, p. 11 - 8.

- Press the button (1) once.

The auxiliary heater switches itself on and the insert lights up.



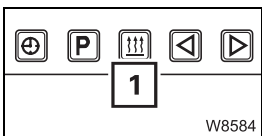
The auxiliary heater only supports the heating capacity of the standard heating system as long as the engine is cold. When the engine is warm, the heater is switched off. The pump for the auxiliary heater continues to run, however, until you switch the auxiliary heater off.



Always switch off the auxiliary heater when you turn off the truck crane when the battery master switch is switched on. In this way, you prevent the auxiliary heater from restarting and running down the batteries after the engine has cooled down.

Switching off the heater

This section only describes how to switch off the heater manually. The auxiliary heater is switched off after a certain time if it was switched on automatically. You can set this heating time; *Setting the heating period*, p. 12 - 133.



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



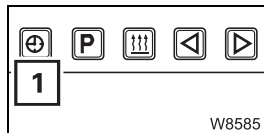
If you turn off the ignition while the auxiliary heater is in operation, the auxiliary heater continues to run for a certain period of time. You can set this remaining time; *Setting the remaining time*, p. 12 - 134.

Setting the time and weekday

Always set the current time and weekday. These settings are required for the correct activation point of the automatic heating start.



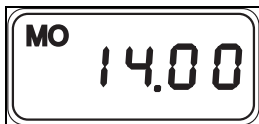
If the power supply is interrupted, all symbols in the display will flash and you must set the time and day again.



- Press the button (1) for longer than 2 seconds. The displayed time flashes, e.g. 10.00.



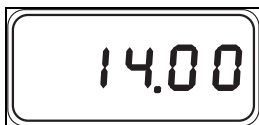
- Set the current time on the flashing display, e.g. 2 pm.



- Wait five seconds. The new time is saved and then the weekday flashes (e.g. **MO** for Monday).



- Set the current day of the week on the flashing display.




The display stops flashing after five seconds and the current time is displayed. The day of the week disappears.

The time and day of the week have been set.



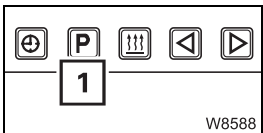
Saving the automatic heating start

The automatic heating is only started at the required time when the time and week day have been set correctly;  p. 12 - 131.

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 procedure, they flash for five seconds. The entry must be made within this period of time. The value stops flashing after five seconds and is saved as the new value.



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



Flashing displays:

- The retrieved storage location, e.g. 2 and
- The last stored heating start, e.g. 6am.



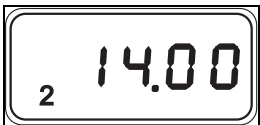
- Set the time for the required heating start, e.g. 8am.



Wait for approx. 5 seconds until the day of the week for the heating start flashes, e.g. **MO** for Monday.




- Set the day of the week for the required heating start.



Wait for approx. 5 seconds until the current time is shown, e. g. 2pm. Now the new heating start has been stored and switched on.

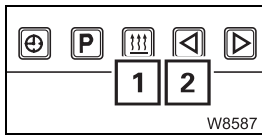


If you still wish to store one or two further heating starts, retrieve a new storage location using the **P** button and repeat the procedure.

After you have stored the heating start, you can also set the heating period;  p. 12 - 133.

Setting the heating period

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



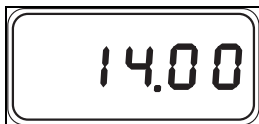
- Switch off the heating using the button (1).
- Press the button (2) for longer than 3 seconds.



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



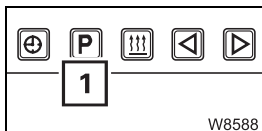
- Set the required heating period on the flashing display. You can set a heating period of 10 to 120 minutes.



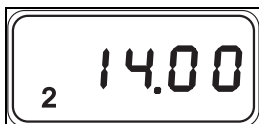
Wait for approx. 5 seconds until the current time is shown, e. g. 2pm.
A new heating period has now been set.

Switching the automatic heating start on and off

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



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



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

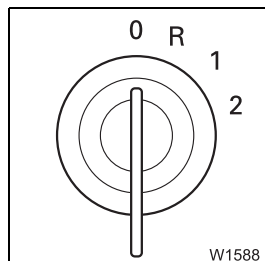
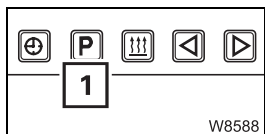
To activate a different heating start, press the **P** button repeatedly until the required storage location is displayed. This heating start is activated as soon as the display stops flashing.



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



Setting the remaining time



If the ignition is turned off while the auxiliary heater is running, the heater continues to run for the remaining time.

- Switch on the heater using the (1) button.

- Turn off the ignition.

The heater continues to run and the remaining run time set last flashes, e.g. 48 minutes.

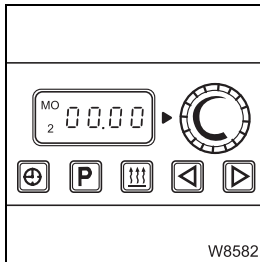
- Set the required remaining run time on the flashing display. You can set a remaining run time of 1 to 120 minutes.

- Wait for 5 seconds until the current time is shown.
The remaining run time is now set.

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12.7.3

Auxiliary air heater



You can use the auxiliary air heater to preheat the crane cab or provide additional heating.



The batteries will run down if you operate the auxiliary heater with the engine switched off. You must recharge the batteries at shorter intervals if you use the auxiliary heater frequently.

Switching on the heater

To switch the auxiliary heater on and off, you can:

- Switch the auxiliary heater on and off manually. For this purpose the ignition must be turned on.
- Or set an automatic heating start and heating period with the timer.
- Before switching on the heater, check whether it is allowed to be operated at the current site of the truck crane. Find out whether there are any sources of danger that could result in explosions.



Danger of explosions when operating the heater!

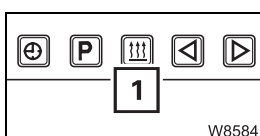
The heater may not be operated:


- At service stations and tank farms
- At places where inflammable gases or vapours can be found or may form (e.g. at places where fuel is stored and at chemical factories)
- At places where explosive dust can be found or form (e.g. coal dust, wood dust, grain dust)



Danger of suffocation when operating the heating!

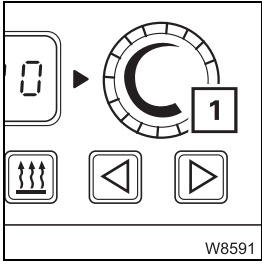
Do not operate the heater or the heater with the timer in enclosed rooms (e.g. garages).



- Turn on the ignition;  *Switching on the ignition*, p. 11 - 8.
- Press the button (1) once.
The auxiliary heater switches itself on and the insert lights up.



Setting the temperature



You can preselect a temperature for the crane cab. If the temperature drops below the preselected value, the auxiliary heater switches itself on. The auxiliary heater goes off once the value is reached.

Increasing the temperature:

- Turn the switch (1) clockwise.

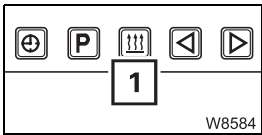
Reducing the temperature:

- Turn the switch (1) anti-clockwise.

The position of the marking on the switch in relation to the arrow indicates the current preselection.

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

Switching off the heater



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

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

Additional functions

The auxiliary air heater has the same functions as the auxiliary water heater.



- ▣▣▣▣▶ *Setting the time and weekday*, p. 12 - 131,
- ▣▣▣▣▶ *Saving the automatic heating start*, p. 12 - 132,
- ▣▣▣▣▶ *Setting the heating period*, p. 12 - 133,
- ▣▣▣▣▶ *Setting the remaining time*, p. 12 - 134.

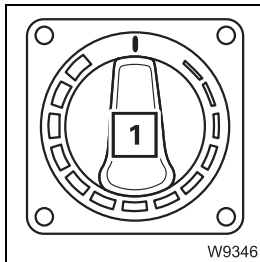
12.7.4

Air-conditioning system

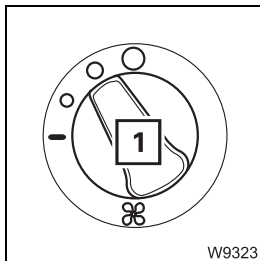
You can use the air-conditioning system to cool and dry the air in the crane cab when the engine is running.

To switch on

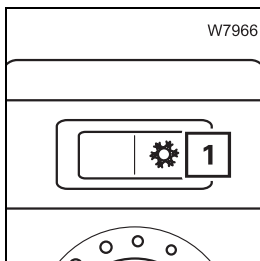
- Switch off the auxiliary heater, if necessary:
 - Auxiliary water heater;  p. 12 - 130
 - Auxiliary air heater;  p. 12 - 136.
- Turn the switch (1) as far as possible to the *cold* setting.



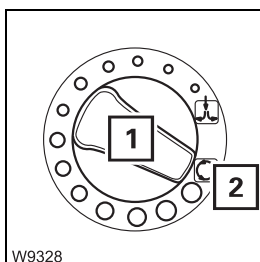
- Turn the switch (1) to the required fan level.





- Press the switch next to symbol (1) – *air-conditioning system on*.



- To cool the driver's cab more quickly, turn the switch (1) to the *recirculated air* symbol (2).

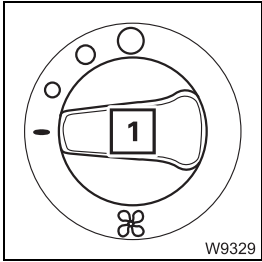
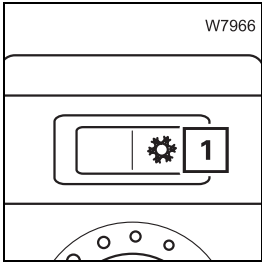


Setting the air distribution

- Set the air distribution in the same way as for warm air;  p. 12 - 127.
- Adjust the air vents in such a way that the cool air is able to mix well with the crane cab air;  p. 12 - 126.



Switching off



- Press the switch opposite symbol **(1)** – *air-conditioning system off*.
- Turn the switch **(1)** anti-clockwise as far as it will go if no air is to be recirculated in the crane cab.

For pleasant air conditioning in the crane cab

Do not cool the air in the crane cab to much. The difference between the outside temperature and the inside temperature should be 10 °C to 14 °C (18 °F to 25 °F) at the most. Excessive cooling often leads to feelings of physical discomfort, usually after leaving the crane cab.

Avoid having cold air blowing directly onto your body.

When using recirculated air, you should switch over to fresh air mode to ensure a fresh supply of oxygen at the same time. Adapt 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.

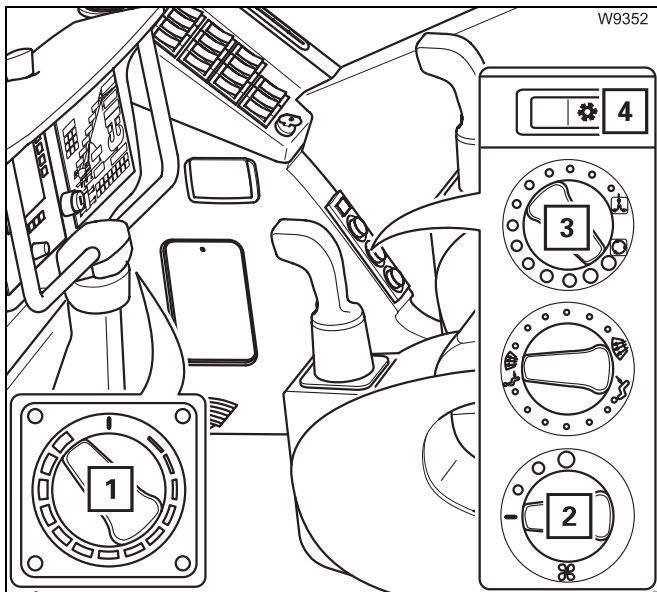
The crane cab door or at least the windows should be left open for a short while to air thoroughly. The cooling-down procedure can be accelerated by increasing the engine speed.

If the air-conditioning system is operated continuously, close the windows and the door to ensure the crane cab is cooled sufficiently .

Set the fan to a lower level once the inside temperature has reached the desired temperature.

Drying the air

You can also use the air conditioning system to dry the air in the crane cab. Here, however, no heating capacity, or only a low heating capacity level, is reached.



- Press the switch next to symbol (4).
- Additionally switch on the heater as follows:
 - Turn the switch (2) to the required fan level.
 - Switch (3) to the *recirculated air* symbol
 - Switch (1) as far as it will go to *warm*.

The heating system now heats the crane cab. In the process, the air absorbs a lot of humidity from the crane cab. The fan draws the humid air in, directing it first via the air conditioning system, where part of the humidity condensates. Subsequently this air is heated and blown into the crane cab. This dry air now mixes with the humid air in the crane cab and again absorbs humidity before being directed via the air conditioning system. In this way the air in the crane cab is dried.

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13

Rigging work

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

13.1

Rigging work checklists for crane operation with the main boom

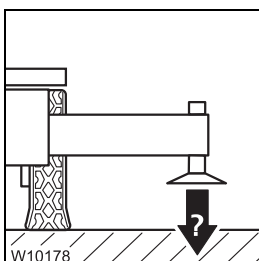
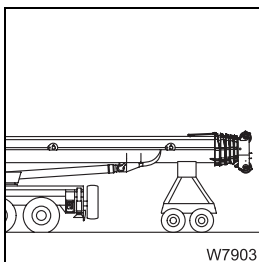
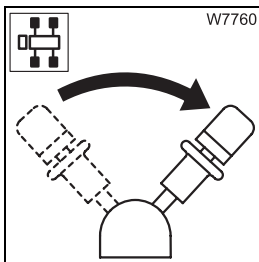


This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.

Observe the warnings and safety instructions specified there.

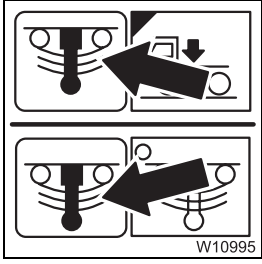
13.1.1



CHECKLIST: Rigging

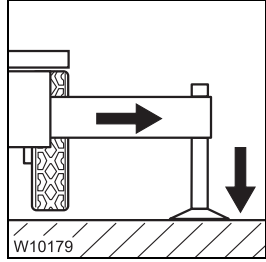



1. Choose a suitable site; ■■■▶ p. 13 - 9.
2. Check that the parking brake is engaged – if not, engage parking brake.
3. **If the main boom is resting on a trailer:**
 - Switching off the boom floating position; ■■■▶ p. 13 - 19,
 - Switch off the slewing gear freewheel; ■■■▶ p. 13 - 18,
 - If necessary, switch off boom pre-tensioning; ■■■▶ p. 13 - 20.
4. Check whether the ground will support the maximum occurring outrigger pressures; ■■■▶ *Determining the required ground bearing area*, p. 13 - 9.

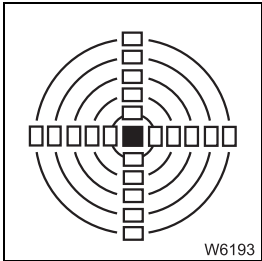




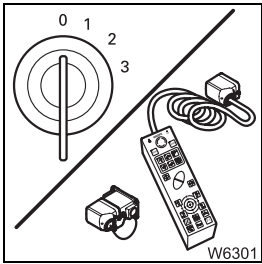
5. Deactivate (lock) the suspension.
The symbol  must be **red** (suspension off);  p. 5 - 16.





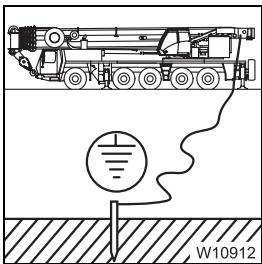
6. Support the truck crane with the outrigger span required for the job according to the *Lifting capacity table* and raise until none of the wheels touches the ground;  *Outriggers*, p. 13 - 27.




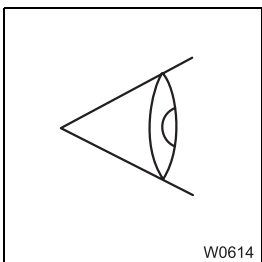
7. Align the truck crane horizontally;  *Levelling the truck crane on outriggers*, p. 13 - 48.



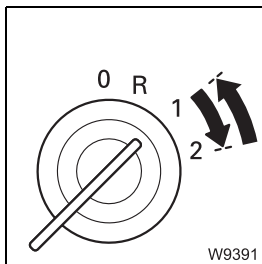
8. Turn off the engine for driving and remove the hand-held control;
 *Starting/Turning off the engine with the hand-held control*, p. 13 - 23,
 *Disconnecting the hand-held control*, p. 13 - 21.



9. Earth the truck crane, if necessary;  *Earthing the truck crane*, p. 13 - 13.



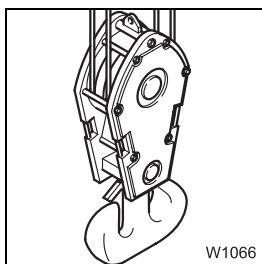
10. Inspect the truck crane, while looking out in particular for any leaking fluids (oil, fuel or water).



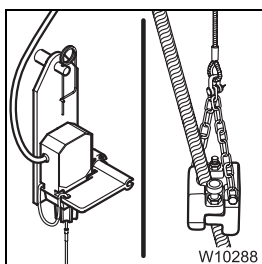
11. Start the engine for crane operation; p. 11 - 12.



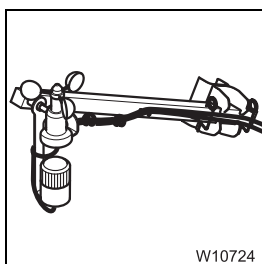
12. Switch off the houselock, if necessary; *Switching off the houselock*, p. 12 - 16.



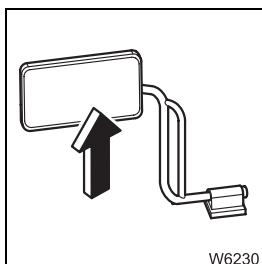
13. Pick up the hook block and re-reeve the hoist rope, if necessary;
Hook block on a separate vehicle, p. 13 - 81,
Hook block on the bumper, p. 13 - 79,
Reeving and unreeving the hoist rope, p. 13 - 84.



14. Install the lifting limit switch; p. 13 - 100.

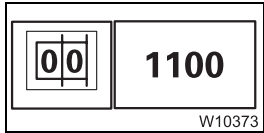


15. Install anemometer and, if necessary, air traffic control light;
 p. 13 - 108.

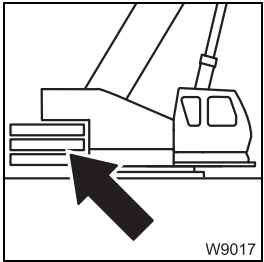


16. Fold out and adjust all mirrors for crane operation; p. 13 - 110.

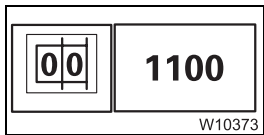




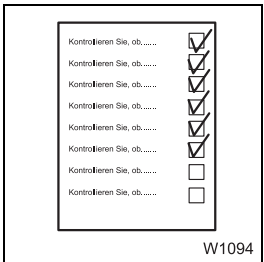
17. Enter the current rigging mode on the SLI; p. 12 - 21.



18. With the SLI adjusted accordingly, rig the counterweight version required for the operation according to the *Lifting capacity table*; *CHECKLIST: Rigging counterweight*, p. 13 - 60.



19. Enter the current rigging mode with the newly rigged counterweight version on the SLI; p. 12 - 21



20. Perform all the required checks prior to crane operation; *CHECKLIST: Inspections before operating the crane*, p. 12 - 1.

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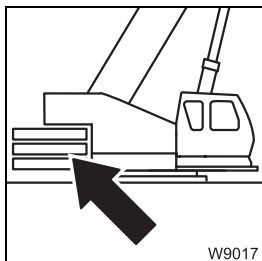
13.1.2

CHECKLIST: Unrigging

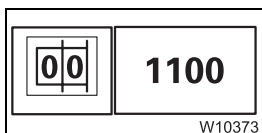


This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.

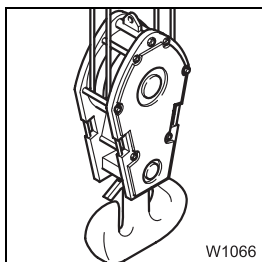
Observe the warnings and safety instructions specified there.



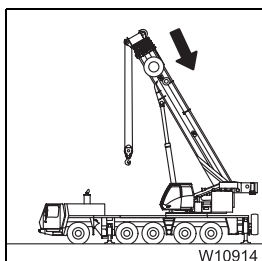
1. With the SLI adjusted accordingly, unrig the counterweight;
 - ▣▣▣▣ *CHECKLIST: Unrigging counterweight*, p. 13 - 61.



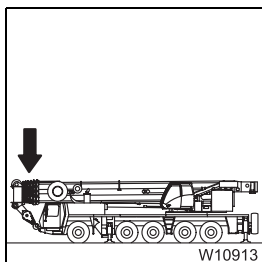
2. Enter the current rigging mode with the currently rigged counterweight version on the SLI; ▣▣▣▣ p. 12 - 21



3. Depending on transport:
 - Attach the hook block to the bumper; ▣▣▣▣ p. 13 - 80 or
 - Set down the hook block and unreeve the hoist rope;
 - ▣▣▣▣ *Setting down the hook block*, p. 13 - 82
 - ▣▣▣▣ *Unreeving the hoist rope*, p. 13 - 90

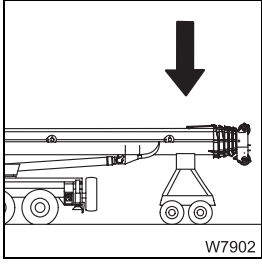


4. Retract the main boom, lock the telescopic sections and lock the telescopic cylinder to telescopic section I for on-road driving; ▣▣▣▣ *Locking the telescopic section for on-road driving*, p. 12 - 79.



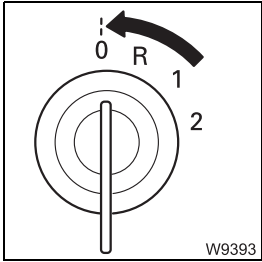
5. **For on-road driving without trailer:**
 - Turn superstructure to the 180° position to the front with the SLI set accordingly,
 - Set down the main boom on the boom rest.



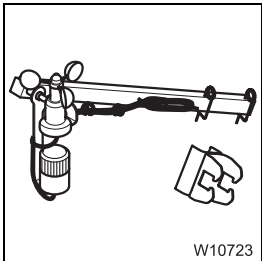


6. For on-road driving with a trailer:

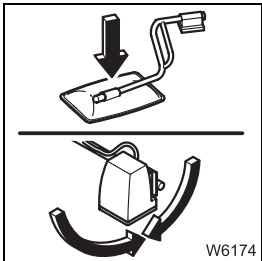
- Set down the superstructure on a trailer with the SLI set accordingly and switch on the boom floating position; ■■■▶ p. 6 - 5,
- Switch on slewing gear freewheel; ■■■▶ p. 6 - 3,
- Switch on boom pre-tensioning if necessary ; ■■■▶ p. 6 - 6,
- Switch off houselock; ■■■▶ p. 12 - 14.



7. Turn off the engine for crane operation; ■■■▶ p. 11 - 19.

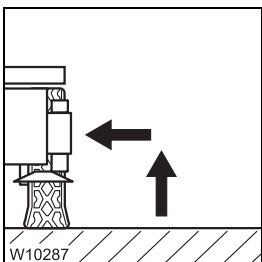


8. Remove anemometer and, if necessary, air traffic control light; ■■■▶ p. 13 - 108.

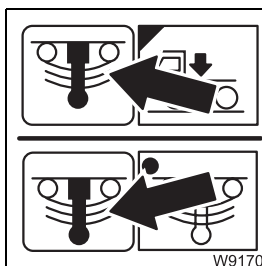


9. Fold in all mirrors for crane operation; ■■■▶ *Folding mirrors in and out and adjusting them, p. 13 - 110.*

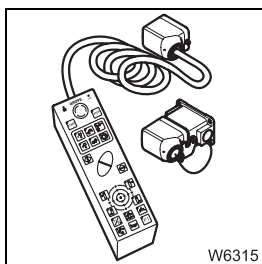

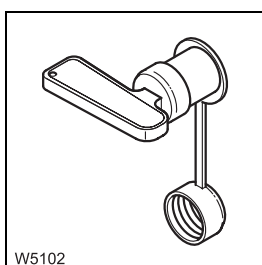
Turn the slewable spotlight downwards, if necessary; ■■■▶ p. 12 - 103.



10. Retract the outriggers; ■■■▶ *CHECKLIST: Retract outriggers, p. 13 - 29.*

**11. Activate (unlock) the suspension.**

The symbol  must be **green** (suspension on);  p. 5 - 16.

**12. Turn off the engine and, if necessary, remove the hand-held control and stow it away in the driver's cab;  *Disconnecting the hand-held control*, p. 13 - 21.****13. When the truck crane is no longer being used;  *Work breaks of more than 8 hours*, p. 12 - 124.**

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

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13.2

Choosing a suitable site

Choose the position of your truck crane at the site with care. Observe the following points:

- Check whether that ground has sufficient load bearing capacity. You may need to enlarge the ground bearing area;  p. 13 - 9.
- Observe the required safe distances to slopes and pits;  p. 13 - 12.
- Earth the truck crane if there is a danger of it being charging with static electricity;  p. 13 - 13.
- Keep a safe distance to electrical lines;  p. 13 - 13.
- Choose the site so that unevenness of the ground can be compensated for by adjusting the outrigger cylinders. Maximum hoist of the outrigger cylinders;  p. 8 - 7.
- 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.

13.2.1

Determining the required ground bearing area

The stability of the truck crane depends primarily on the load bearing capacity of the ground. The load bearing capacity of the ground and the occurring outrigger pressure determine the ground bearing area required for the operation.

$$\text{surface area (m}^2\text{)} = \frac{\text{outrigger pressure (t)}}{\text{loadbearing capacity of the ground} \left(\frac{\text{t}}{\text{m}^2} \right)}$$

Outrigger pressure

- Determine the outrigger pressure for the operation planned using the *Outrigger pressure table*.



Load bearing capacity of the ground

- Determine the load bearing capacity of the ground using the table.

APPROXIMATE VALUES FOR THE LOAD BEARING CAPACITY OF THE GROUND		Load bearing capacity (t/m ²) (lbs/ft ²)
Backfilled, not artificially compacted ground:		0 to 10 (0 to 2050)
Natural, apparently untouched ground:		
Mud, peat, marsh		0
Non-cohesive ground which is sufficiently firm:	Fine to medium sand	15 (3 070)
	Coarse sand to gravel	20 (4 100)
Cohesive ground:	Mushy	0
	Soft	4 (820)
	Stiff	10 (2 050)
	Semi-solid	20 (4 100)
	Hard	40 (8 200)
Rock with minimal fissures in sound, unweathered condition and with favourable strata:	In closed bed sequence	150 (30 700)
	In massive or columnar formation	300 (61 400)



If you are unsure about the load bearing capacity of the ground, please have the ground tested.

Ground bearing area

- Now calculate the required ground bearing area.
- Check that the surface of the outrigger pad (▮▮▮ p. 8 - 7) is larger than the calculated ground bearing area. If the surface of the outrigger pad is smaller, you will need to enlarge the ground bearing area.



Danger of overturning if the ground bearing area is too small!

Ensure that the actual ground bearing area is at least as large as specified in the table.

This prevents the ground from giving way and the truck crane from overturning.

Example for calculating the required ground bearing area:

If the outrigger pressure is 25 t and the ground has a bearing capacity of 40 t/m², then the required ground bearing area for this outrigger cylinder is 0.624 m² (=6.250 cm²).

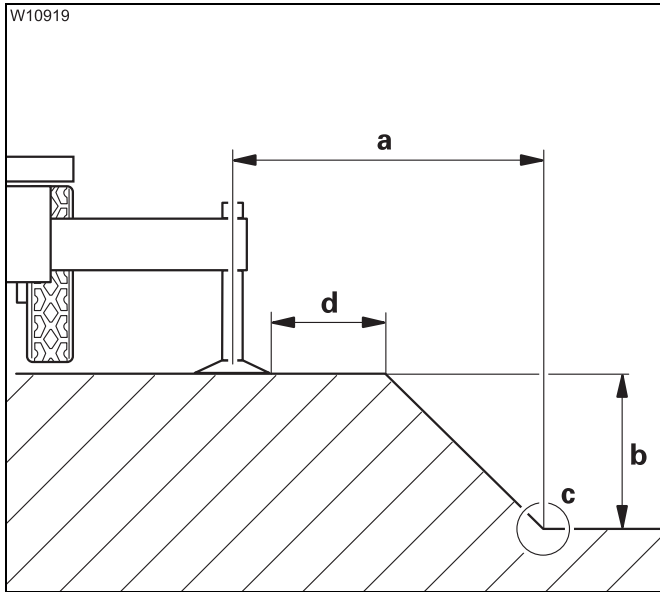
If the outrigger pad has a surface of 2,000 cm², you would need to enlarge the ground bearing area by packing the outrigger pads; ▮▮▮ p. 13 - 42.

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13.2.2

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:

With *loose or backfilled* ground, the safe distance (a) must be twice the depth of the pit (b).

$$a = 2 \times b$$

With *vegetated, cohesive* ground, the safe distance (a) must equal the depth of the pit (b).

$$a = 1 \times b$$

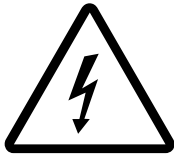
The safe distance is measured from the base of the pit (c).

In addition to this the safe distance (d) between the outrigger pads and the edge of the slope must always be more than 2.00 m (6.6 ft).

13.2.3

Earthing the truck crane

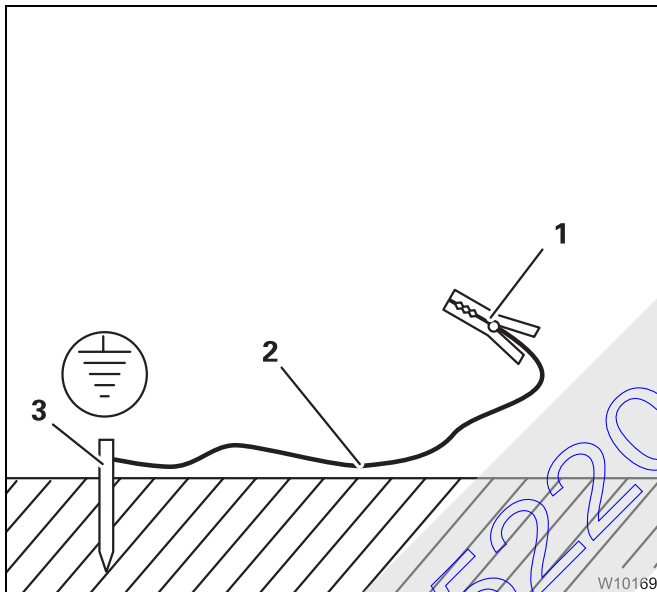
The truck crane may become charged with static electricity. This may occur especially when using outrigger pads made of plastic or when the outrigger pads are packed with insulating material (e.g. wooden planks).



Risk of accidents due to electric shock!

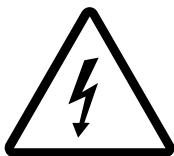
Earth the truck crane before you start to work with it

- Near strong transmitters (radio transmitters, radio stations, etc.)
- Near high-frequency switching stations
- If a thunder storm is forecasted



Use electrically conducting material for earthing.

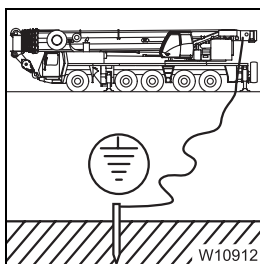
- Take a metal rod (3) (approx. length 2.0 m (6.6 ft)) and ram it at least 1.5 m (5 ft) into the ground.
- Moisten the soil around the metal rod (3) for better conductivity.
- Clamp an insulated cable (2) to the metal rod (3) (cross-section of at least 16 mm² (0.025 in²)).
- Connect the free end of the cable with a clamp (1).



Risk of accidents due to electric shock!

Ensure that the connections between the cable and the clamp are electrical-ly conductive.

Do not attach the clamp to parts that are screwed on, such as valves, covers or similar parts.

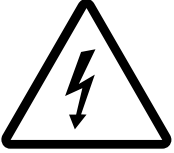


- Attach the clamp to the main boom or to the superstructure.

13.2.4

Safe distance from electrical lines

Always observe the respective national regulations when working in the vicinity of electrical lines.

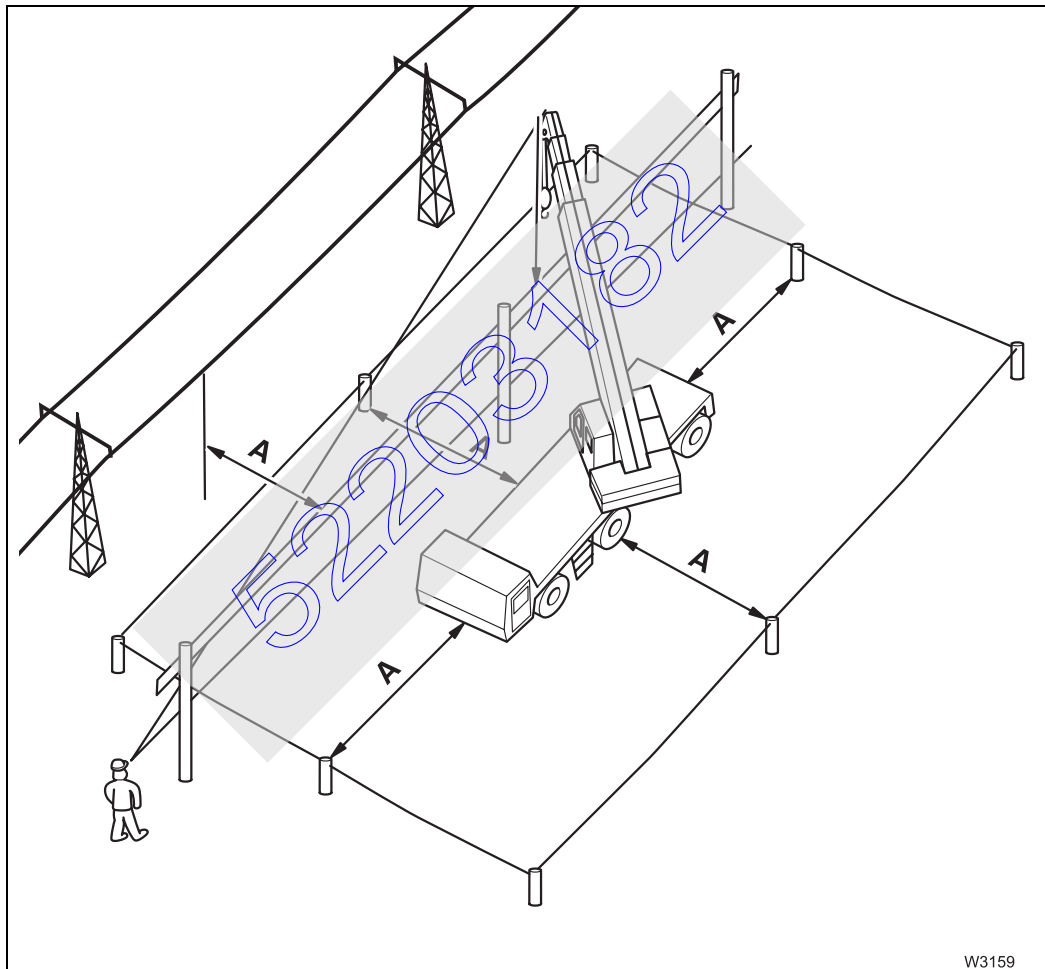


Risk of accidents due to electric shock!

This truck crane is not insulated.

If the truck crane, its equipment, its load/lifting tackle or the guide ropes touch an electric cable, this will cause serious injury or even death.

- If there are electric cables in the working range of the truck crane, have these cables disconnected from the source of power, if possible.



If this is not possible, you must at least observe the prescribed safe distance (**A**).

Different safe distances are recommended by the respective national regulations:

E.g. as per DIN VDE 0150

Voltage	Safe distance (A)
Up to 1,000 V	1 m (3.3 ft)
From more than 1,000 V to 100,000 V	3 m (9.8 ft)
From more than 110,000 V to 220,000 V	4 m (13.1 ft)
From more than 220,000 V to 380,000 V	5 m (16.4 ft)

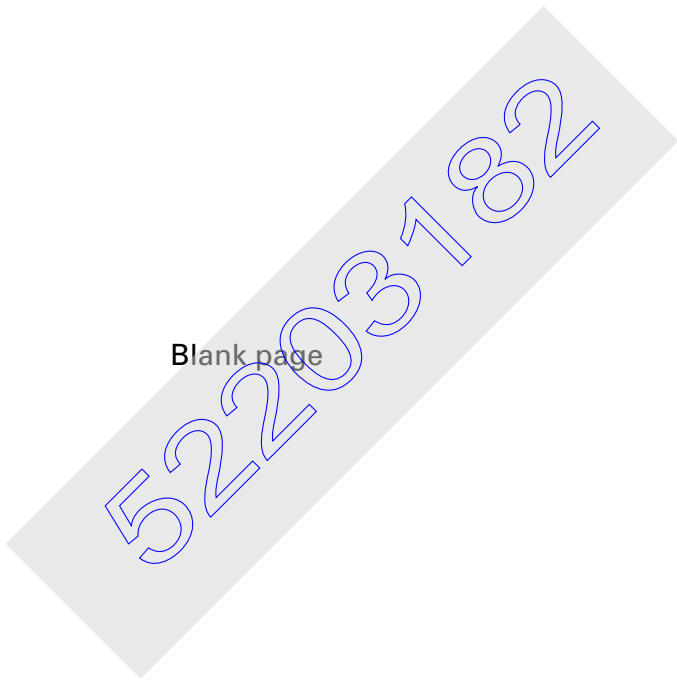
E.g. as per ASME B30.5 (USA)

Voltage	Safe distance (A)
Up to 50 000 V	3.05 m (10 ft)
From more than 50,000 V to 200,000 V	4.60 m (15 ft)
From more than 200,000 V to 350,000 V	6.10 m (20 ft)
From more than 350,000 V to 500,000 V	7.62 m (25 ft)
From more than 500,000 V to 750,000 V	10.67 m (35 ft)
From more than 750,000 V to 1,000,000 V	13.72 m (45 ft)

- Erect an obstacle at a minimum safe distance (A) from the electric cable which will keep the equipment of the truck crane and load/lifting tackle away from the cable. Account for possible swaying of the load or the cable.
- Cordon off the area around the truck crane at the safe distance (A). That way the safety area is enlarged in case the cable is touched.
- Have banksmen in visual or radio contact with you check that you are observing the safe distance (A).
- Only use guide ropes of non-conductive material if the load has to be guided.

If you have touched the electric cable:




- Keep calm.
- Do not leave the crane cab.
- Tell anyone standing outside not to touch the crane, the load or the lifting tackle.
- Move the main boom out of the danger area.



13.3

Rigging work after driving with a trailer

If the main boom was resting on a trailer (dolly) while driving the truck crane, you must perform the following before working with the crane:

- Switch off the slewing gear freewheel;  p. 13 - 18,
- Switch off the boom floating position;  p. 13 - 19,
- Switch off boom pre-tensioning, if necessary;  p. 13 - 20.

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13.3.1

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!

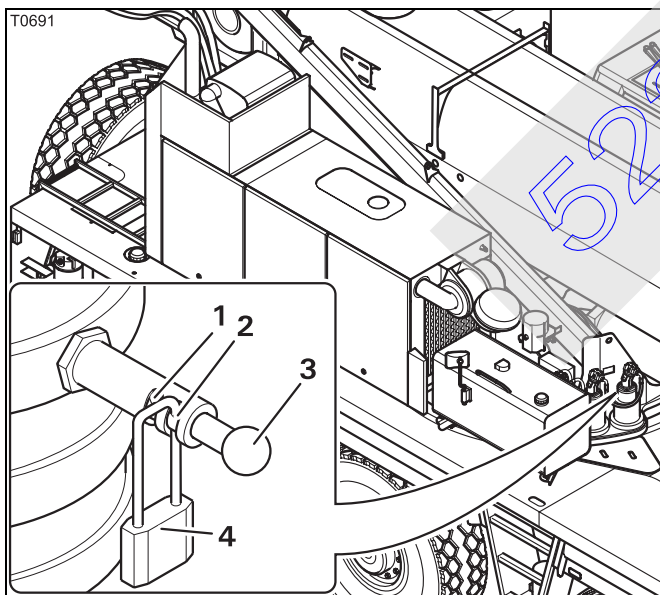
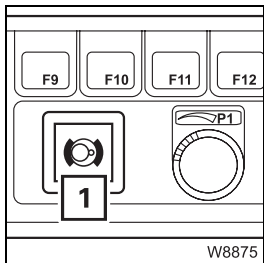
Switch off the slewing gear freewheel before working with the crane.

If it is not switched off, the slewing gear brake does not work and you cannot stop slewing movements in time.

Prerequisites

You can only switch off the slewing gear freewheel if the following conditions apply:

- 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. 12 - 89.*



- Remove the lock (4) from the bore (1).
- Pull the pin (3) out as far as possible.
- Secure the pin with the lock in the bore (2) and remove the key.

Now the slewing gear freewheel is switched off and secured.

- Switch off the slewing gear freewheel on all slewing gears in the same way.

Before slewing

- Check whether the free-on-wheels truck crane may be slewed with the currently rigged counterweight; ▶▶▶ p. 13 - 76.

If necessary, support the truck crane, enter the corresponding SLI code and derrick the main boom to an angle permissible within the working range.

13.3.2

Switching off the boom floating position

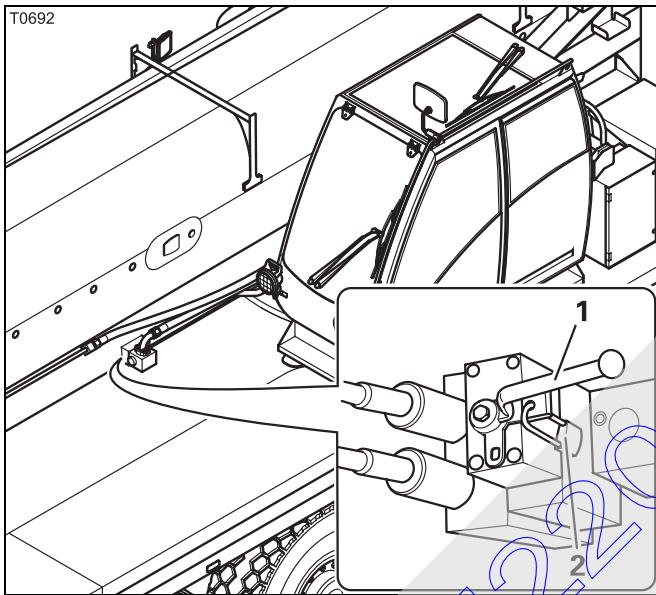
You must switch off the boom floating position before you raise the main boom off the trailer.



Risk of accidents due to the main boom falling down!

Always secure the lever with the padlock after switching off the boom floating position.

This prevents the raised main boom from falling down when actuating the lever.



- Remove the padlock (2).
- Switch the valve I over – lever (1) positioned vertically pointing outwards or inwards, depending on its fitting position.
- Secure the lever (1) with the padlock (2).

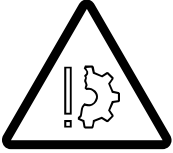
The boom floating position is now switched off.

13.3.3

Switching off boom pre-tensioning

You must switch off the boom pre-tensioning before you raise the main boom off the trailer.

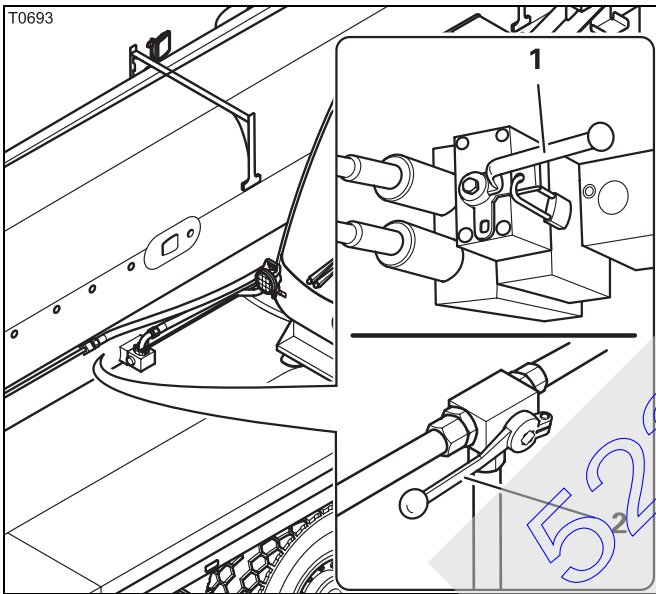
To switch off boom pre-tensioning, you must bring the valves I to IV into the required positions, which will empty the pressure accumulator.



Danger of the hydraulic oil overheating

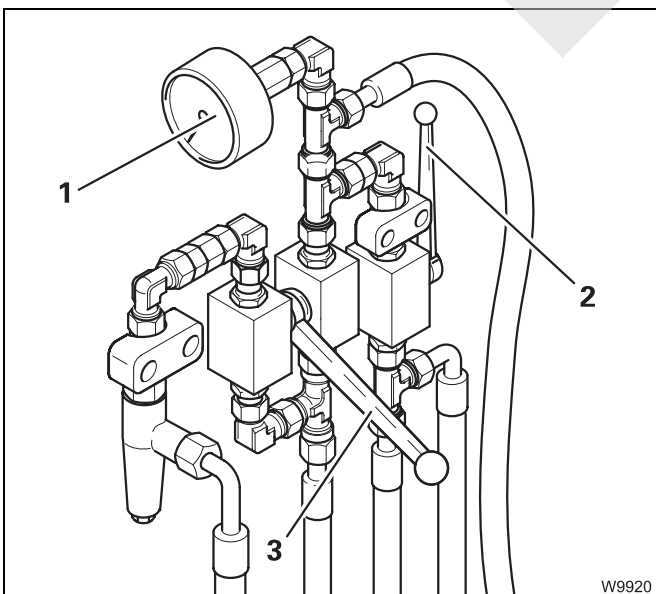
Always switch the valve IV over (lever in horizontal position) before operating the crane.

This prevents the pressure in the hydraulic circuit from rising and the hydraulic oil from exceeding the permissible temperature of 80 °C (176 °F).



The valve I (1) is in the correct position if the boom floating position is switched off;
▣▣▣ p. 13 - 19.

- Switch the valve IV over – lever (2) in horizontal position.



The valves II and III are under the pressure gauge (1).

- Open the valve II – the lever (2) is vertical.

The pressure accumulator is emptied. The pressure on the pressure gauge (1) must drop to 0 bar (0 psi).

The valve II stays closed – the lever (3) points downwards.

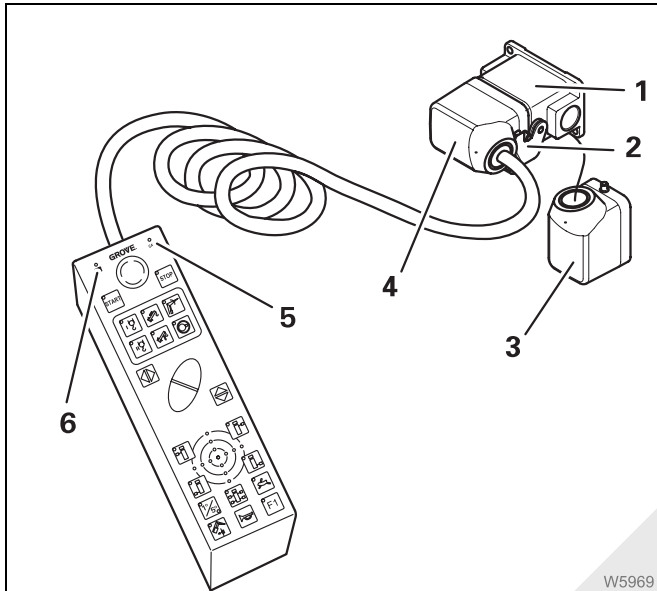
13.4

Connecting/Disconnecting the hand-held control



Switch off the engine for driving and crane operation. Pulling a bridging plug will make the engines go out, but this action is only designed for emergencies.

The ignition can be switched on or off.



Connecting the hand-held control

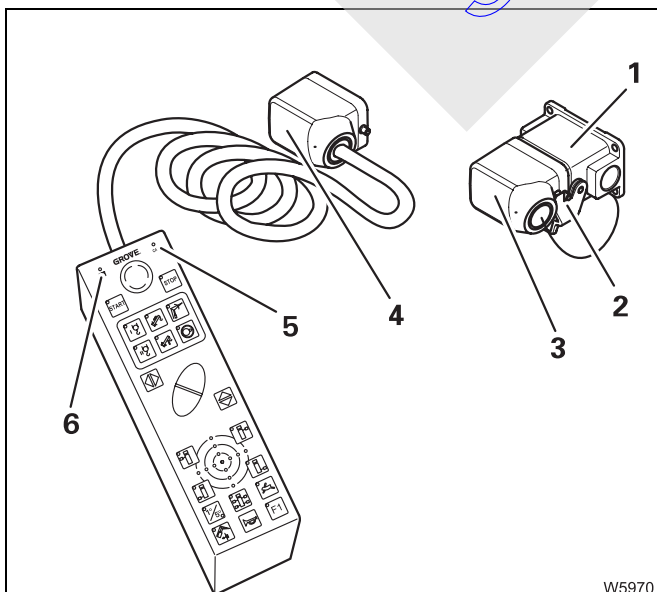
- Open the cap (2) and pull the bridging plug (3) out of the socket (1).
- Insert the plug (4) into the socket (1) and secure it with the cap (2).
- After approx. 20 sec. the lamps (5) and (6) light up – the ignition is switched on.

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



Danger due to unauthorised use

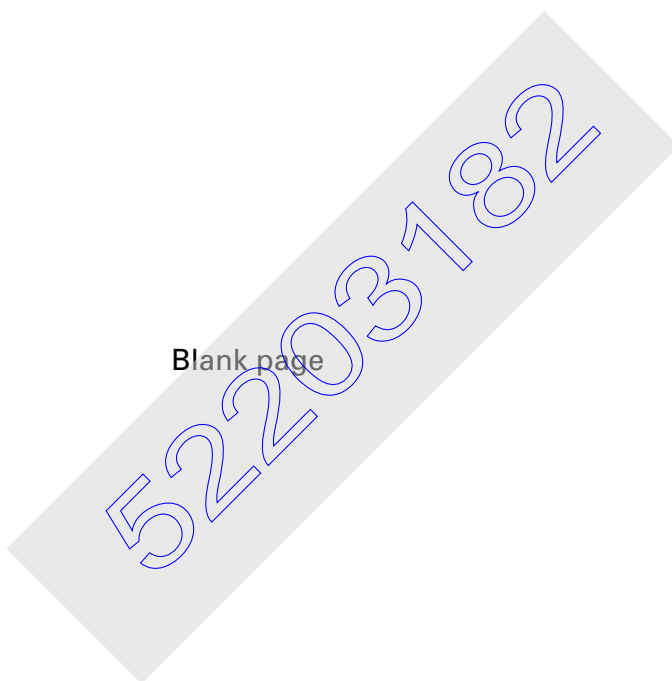
Always stow the hand-held control in the driver's cab or in the crane cab before you leave the crane, and lock the doors. That way you can prevent unauthorised persons from starting the engine.



Disconnecting the hand-held control

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

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



13.5

Starting the engine for driving for rigging work

For rigging work, the engine for driving must be running, e.g. to move the outriggers. You can start the engine for driving

- with the hand-held control
- from the crane cab



You can generally only start the engine if a bridging plug is inserted in all sockets which are not required.



Risk of crushing from turning wheels!

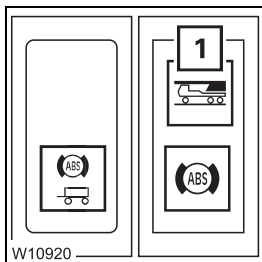
When you start the engine, no persons may be within the steering range of the 4th and 5th axle line. These axle lines are steered to test the steering system each time the engine is started.

13.5.1

Starting/Turning off the engine with the hand-held control

Prerequisites

The following requirements must be met before you can start the engine for driving with the hand-held control:



- The ignition is switched off in the crane cab. The lamp (1) in the driver's cab must be out.
- The ignition must be turned off in the driver's cab.

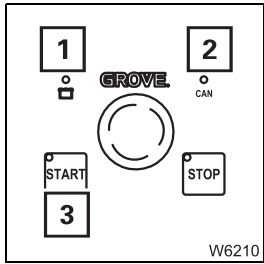
- Connect the hand-held control to a socket on the carrier; p. 13 - 21.



If you connect the hand-held control to a carrier socket while the engine for crane operation is running, that engine will go out. In that case you cannot start the engine for driving since the ignition in the crane cab is still switched on.



Starting the engine

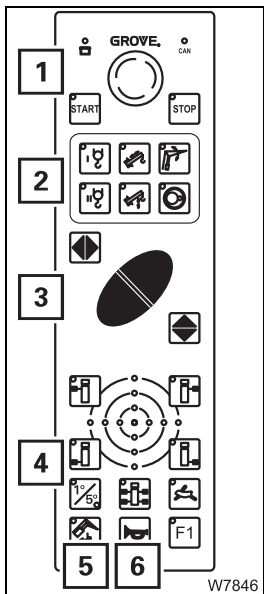


All activities and inspections required to start the engine must be carried out before starting the engine; p. 4 - 1.

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

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

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



The following buttons are now active on the hand-held control:

- All buttons on the control panel (1).
- The function buttons (3).
- All buttons on the control panel (4).
- The button (6) for the horn on the carrier.

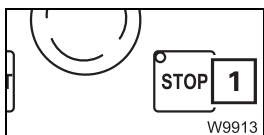
The button (2) and button (5) are inactive.

The control units *Outriggers* are locked after connection of the hand-held control.



You can start the engine from the crane cab, but the operating elements for crane operation are disabled after starting the vehicle engine with the hand-held control.

Turning off the engine



You cannot turn off the engine with the ignition lock in the driver's cab if it was started with the hand-held control.

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

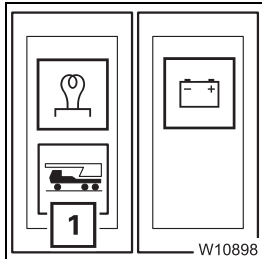
13.5.2

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:

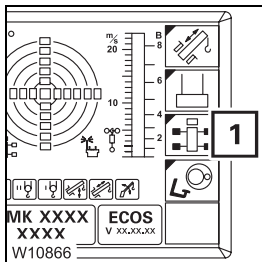
- The ignition in the crane cab is switched on.
- The ignition in the driver's cab is switched off and the ignition key is removed. The lamp (1) in the crane cab has gone out.
- The hand-held control has been disconnected and bridging plugs have been plugged into all superstructure and carrier sockets.



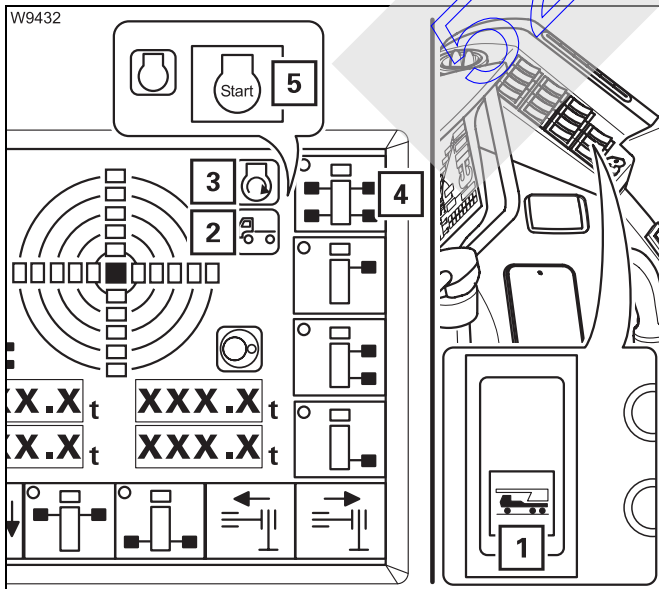
The engine can be started regardless of whether the crane engine is switched on or off.

Starting the engine

All activities and inspections required to start the engine must be carried out before starting the engine; see p. 4 - 1.




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

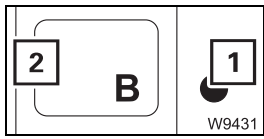


- Press the button (1) once **at the bottom**.
The carrier ignition is turned on:
 - The indicator lamp in the button (1) flashes.
 - The symbol (2) turns **green**.
- Press the button (5) once. The engine starts.
When the engine is running
 - The symbols (3) and (4) are displayed.
 - The lamp in the button (1) lights up.



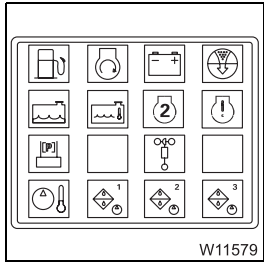
After starting the engine


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. 13 - 39.



In the event of a warning message on the carrier, the lamp (1) flashes.

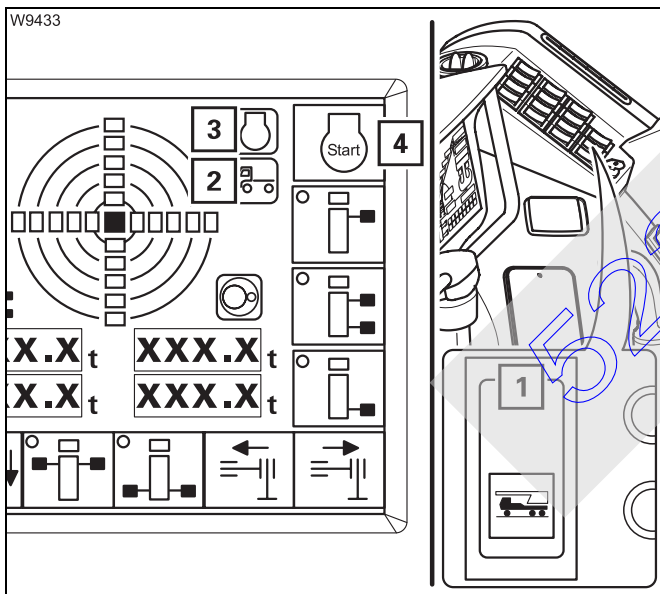
- Press the button (2) once.



The *Warning* submenu (carrier) opens. The corresponding symbol is **red**;  p. 5 - 45.

Turning off the engine

You can turn off the engine from the crane cab or using any of the emergency stop switches on the superstructure or the carrier.



- Press the button (1) 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.

13.6

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.

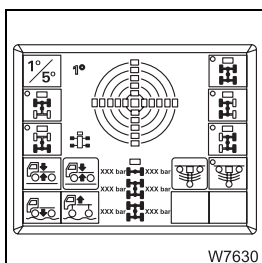
13.6.1

CHECKLIST: Extending the outriggers

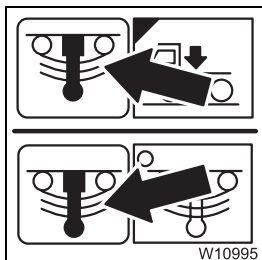


This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.

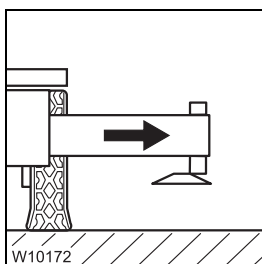
Observe the warnings and safety instructions specified there.



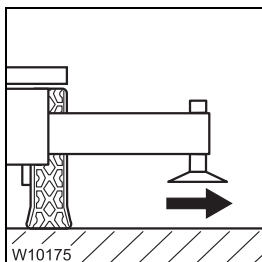
1. Level the truck crane with the level adjustment system and lower it as far as possible; p. 5 - 60.



2. Deactivate (lock) the suspension.
The symbol must be **red** (suspension off); p. 5 - 16.

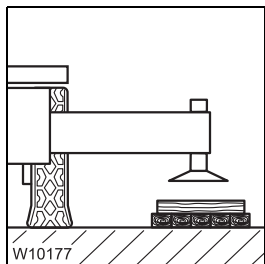


3. Extend all outrigger beams to the necessary span and secure;
 - Permissible outrigger spans*, p. 13 - 30,
 - Setting the outrigger spans*, p. 13 - 32,
 - Extending/Retracting the outrigger beams*, p. 13 - 35.

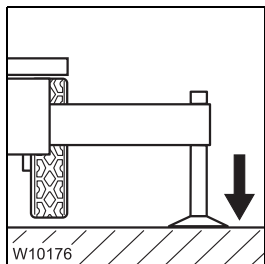


4. Move the outrigger pads into working position and secure them; p. 13 - 41.

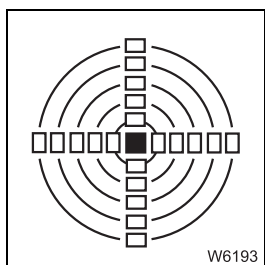




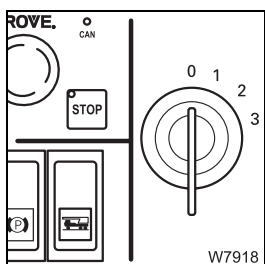
5. Enlarge the ground bearing area if necessary;
 ▣▣▣▣▶ *Determining the required ground bearing area, p. 13 - 9,*
 ▣▣▣▣▶ *Enlarging the ground bearing area, p. 13 - 42.*



6. Extend the outrigger cylinders until none of the wheels are touching the ground; ▣▣▣▣▶ p. 13 - 43.



7. Level the truck crane with the outriggers; ▣▣▣▣▶ p. 13 - 48.



8. Turn off the engine for driving;
 – After operating it with the hand-held control; ▣▣▣▣▶ p. 13 - 24,
 – After operating it from the control units; ▣▣▣▣▶ p. 4 - 21,
 – After operating it from the crane cab; ▣▣▣▣▶ p. 13 - 26.

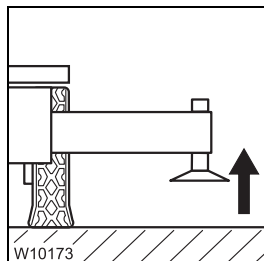
13.6.2

CHECKLIST: Retract outriggers

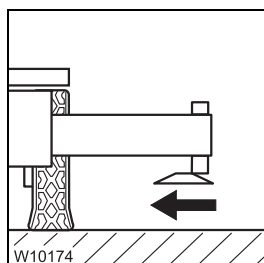


This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.

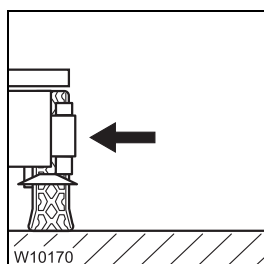
Observe the warnings and safety instructions specified there.



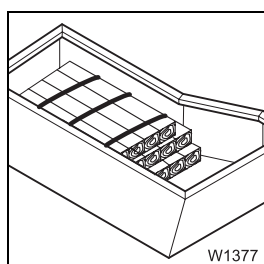
1. Retract the outrigger cylinders as far as possible; p. 13 - 43.



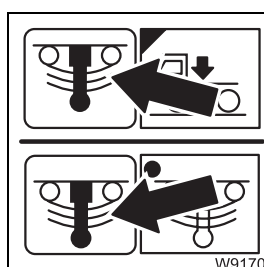
2. Move the outrigger pads into driving position and secure them; *Moving them into driving position*, p. 13 - 41.



3. Fully retract and secure all outrigger beams;
 - Permissible outrigger spans*, p. 13 - 30,
 - Setting the outrigger spans*, p. 13 - 32,
 - Extending/Retracting the outrigger beams*, p. 13 - 35.

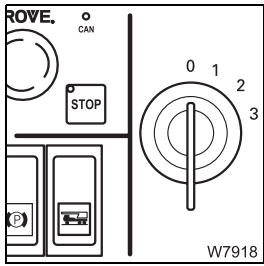


4. Stow away packing material safely, if applicable.

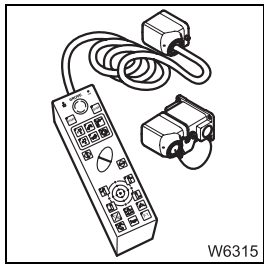


5. Activate (unlock) the suspension.
The symbol must be **green** (suspension on); p. 5 - 16.





6. Turn off the engine for driving;
- After operating it with the hand-held control; ||||▶ p. 13 - 24.,
 - After operating it from the control units; ||||▶ p. 4 - 21.
 - After operating it from the crane cab; ||||▶ p. 13 - 26.



7. If necessary, disconnect the hand-held control and stow it away; ||||▶ p. 13 - 21.

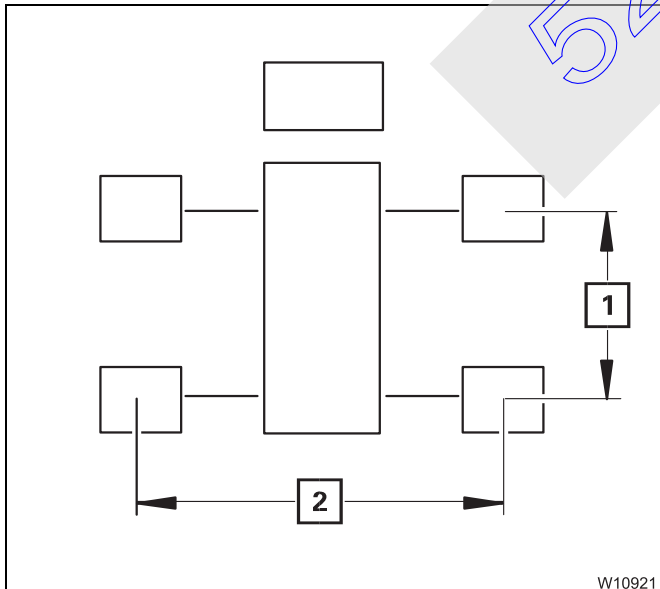
13.6.3

Permissible outrigger spans



Risk of overturning when slewing the superstructure!

With some outrigger spans, slewing is only permissible with certain counterweight versions and boom positions; ||||▶ *Slewing with rigged counterweight*, p. 13 - 76.



The *Lifting capacity table* specifies the permissible outrigger spans in metres x metres (feet x feet):

- 8.55 x 8.10 m (28.1 x 26.6 ft),
- 8.55 x 6.80 m (28.1 x 22.4 ft),
- 8.55 x 5.60 m (28.1 x 18.4 ft),
- 8.55 x 4.40 m (28.1 x 14.4 ft),
- 8.55 x 2.74 m (28.1 x 9.0 ft).

The first value represents the outrigger length (1), e. g. 8.55 m (28.1 ft).

The second value specifies the required outrigger span (2), e. g. 8.10 m (26.6 ft).

13.6.4

Preparing the truck crane

In the driver's cab

Levelling the truck crane

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

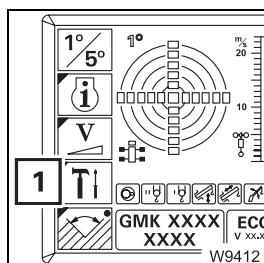
Locking the suspension

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

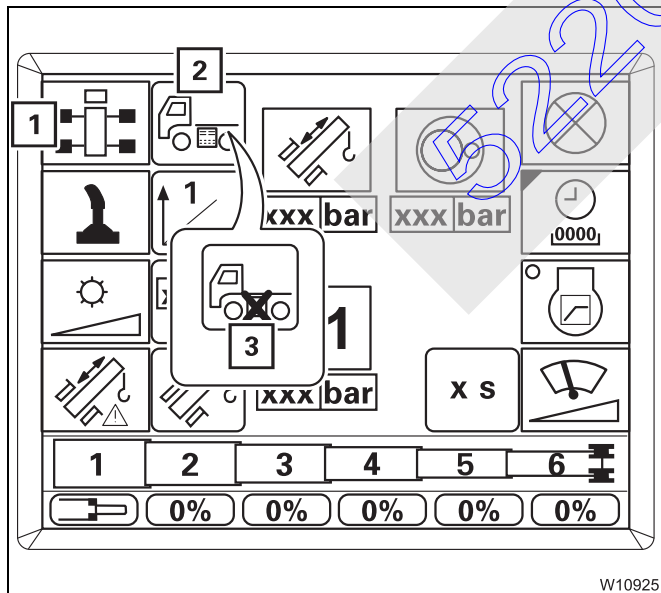
The control elements for the outriggers are only released if the suspension is deactivated. If the suspension is switched off, the wheels are lifted when the crane is put on outriggers.

Outrigger control units

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



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



The *Settings* submenu opens.

The current status is displayed:

- Symbol (2) – operating units on, buttons enabled.
- Symbol (3) – operating units off, buttons disabled.
- To switch on or off, press the button next to the symbol (1) once.

13.6.5

Setting the outrigger spans

Only extend the outrigger beams to the permissible span.



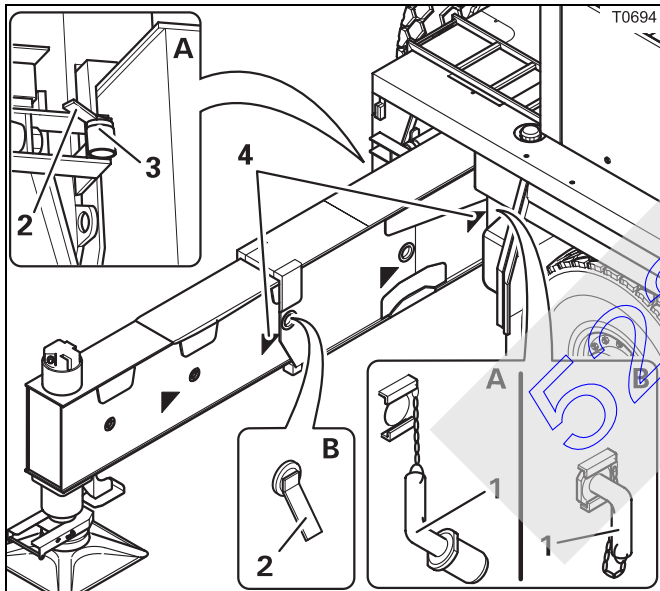
Danger of overturning if the outrigger beams are not correctly extended

Always extend **all** outrigger beams to the required outrigger span even if you are only working on one side. Otherwise the rear stability for the rigging mode according to the SLI code is no longer guaranteed.



This section describes what connections need to be made and removed in order to move and secure the outrigger beams.

There are various ways to operate the outrigger beams; *Extending/Retracting the outrigger beams*, p. 13 - 35.



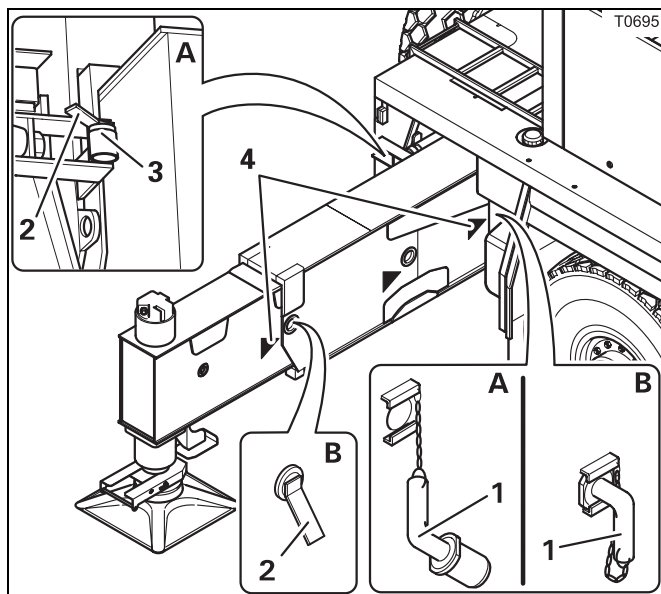
Outrigger span of 8.55 x 8.10 m (28.1 x 26.6 ft)

(A) – Prerequisites

- Pin (1) is 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 pin (1) and (2).
- Set the outrigger span on the other outrigger beams in the same way.



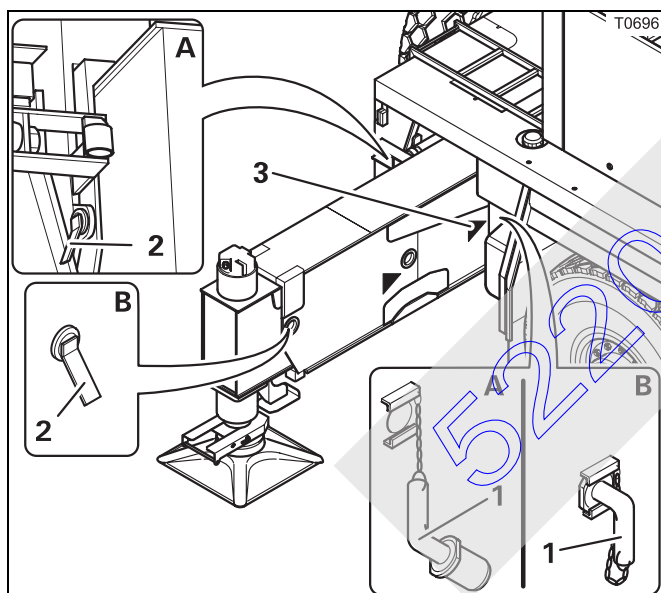
Outrigger span of 8.55 x 6.80 m (28.1 x 22.4 ft)

(A) – Prerequisites

- Pin (1) is 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 pin (1) and (2).
- Set the outrigger span on the other outrigger beams in the same way.



Outrigger span of 8.55 x 5.60 m (28.1 x 18.4 ft)

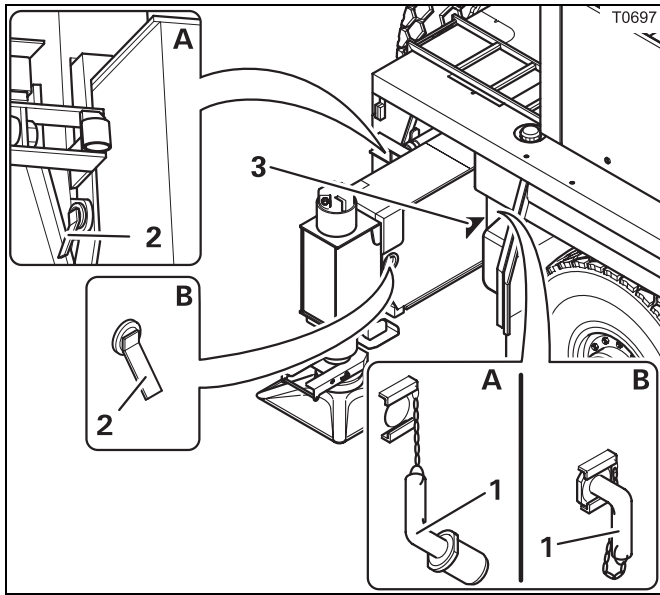
(A) – Prerequisites

- Pin (1) is removed
- Pin (2) is inserted

(B) – Setting and securing

- Extend the outrigger beam up to the mark (3).
- Secure the outrigger beam with the pin (1) and (2).
- Set the outrigger span on the other outrigger beams in the same way.





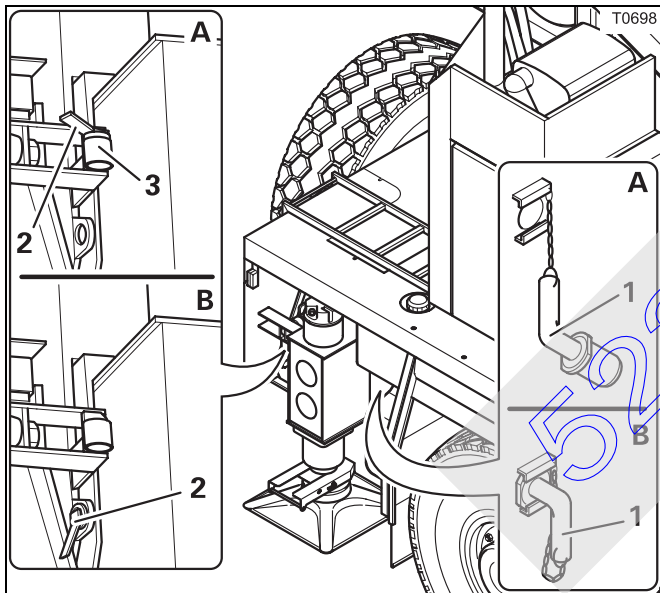
Outrigger span of 8.55 x 4.40 m (28.1 x 14.4 ft)

(A) – Prerequisites

- Pin (1) is removed
- Pin (2) is inserted

(B) – Setting and securing

- Extend the outrigger beam up to the mark (3).
- Secure the outrigger beam with the pin (1) and (2).
- Set the outrigger span on the other outrigger beams in the same way.



Outrigger span of 8.55 x 2.74 m (28.1 x 9.0 ft)

(A) – Prerequisites

- Pin (1) is removed
- Pin (2) inserted in holder (3)

(B) – Setting and securing

- Completely retract the outrigger beam.
- Secure the outrigger beam with the pin (1) and (2).
- Set the outrigger span on the other outrigger beams in the same way.

For on-road driving

- Set an outrigger span of 8.55 x 2.74 m (28.1 x 9.0 ft) on all outrigger beams and secure them.
- Bring all the outrigger pads into driving position; ►►► p. 13 - 41.



Danger of accidents due to outrigger beams moving out

Always fully retract all the outrigger beams and secure them with pins. This prevents the outrigger beams from swaying out in curves and causing serious accidents.

13.6.6

Extending/Retracting the outrigger beams



Risk of accidents if outrigger beams cannot be observed

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 SLI 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 driving, always check whether the required pins for the desired outrigger span are inserted/removed.

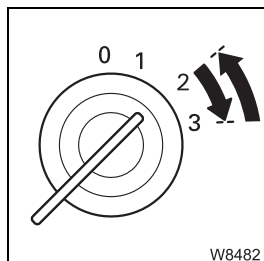
- Check that the pins are inserted/removed as specified in the prerequisites (A) for the desired outrigger span; ► p. 13 - 32.

There are various operating elements to operate the outrigger beams

- on the *Outriggers* control units; ► p. 13 - 39,
- on the hand-held control; ► p. 13 - 37 and
- in the crane cab; ► p. 13 - 39.

From the control units

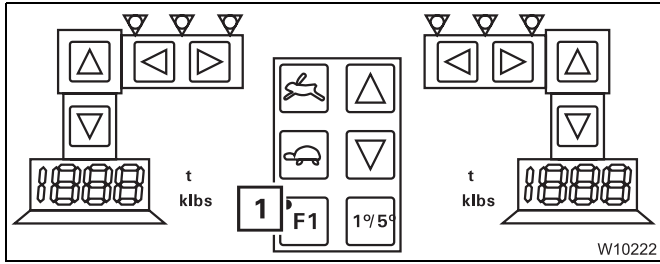
If the hand-held control is connected, the *Outriggers* operating units are inactive.



Starting the engine

- Remove the hand-held control if necessary, and start the engine from the driver's cab; ► p. 4 - 9.





Switching on the lighting

Only the lamp (1) lights up after opening the door.

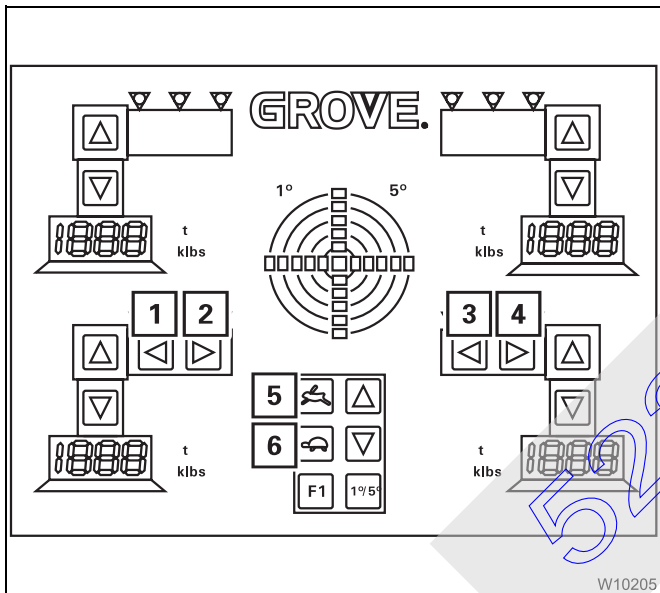
- Press any button.
The lights are switched on.

Operating the outrigger beams



You can only operate the outrigger beams to the left and right of the operating unit on the operator's side.

- Observe the safety instructions for operating the outrigger beams;
p. 13 - 35.

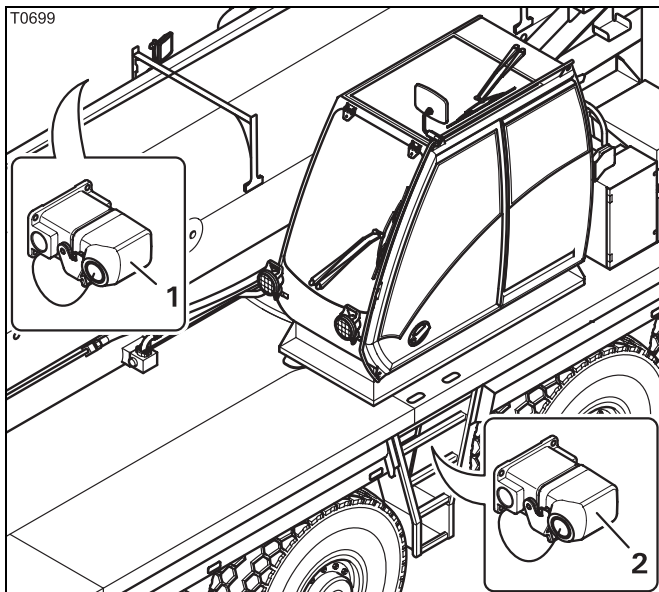


- Press the button
5 for high-speed mode or
6 for normal speed.
- Additionally press the button for the desired outrigger beam.
 - 1 Extend left
 - 2 Retract left
 - 3 Retract right
 - 4 Extend right
 - 1 + 4 Extend both
 - 2 + 3 Retract both

The outriggers move until you let go of the respective button or until the respective end position has been reached.

With the hand-held control

The hand-held control needs to be connected to the carrier.



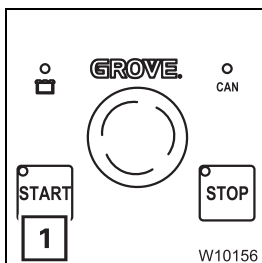
- Connect the hand-held control to the required socket (1) or (2).
 - 1 Right-hand outrigger beam
 - 2 Left-hand outrigger beam

Information on connecting; p. 13 - 21.



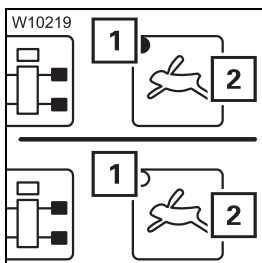
Risk of crushing from turning wheels!

When you start the engine, no persons may be within the steering range of the 4th and 5th axle line. These axle lines are steered each time the engine is started, sometimes with a 5-second delay, in order to test the steering system.



Starting the engine

- Press the button (1).
The engine starts; p. 13 - 23.



Pre-select high-speed mode/normal mode

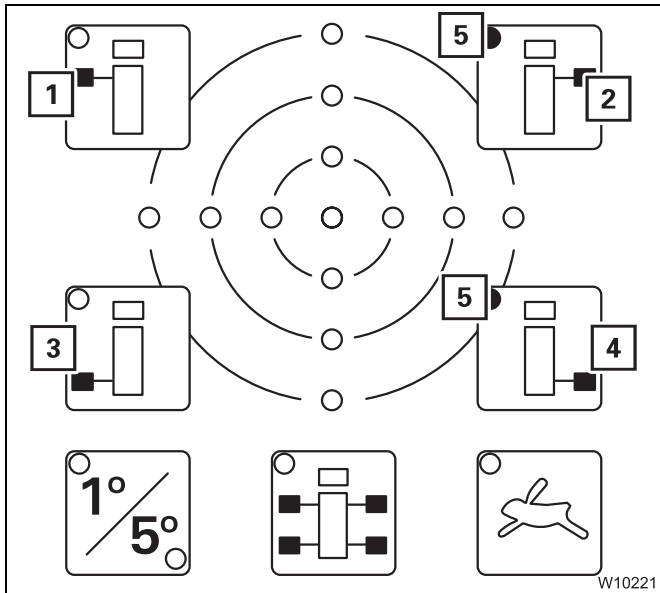
- Press the button (2).
 - Lamp (1) lights up – high-speed mode pre-selected,
 - Lamp (1) goes out – normal speed pre-selected.



Pre-select outriggers



You can only pre-select outriggers on the side to which the hand-held control is connected.



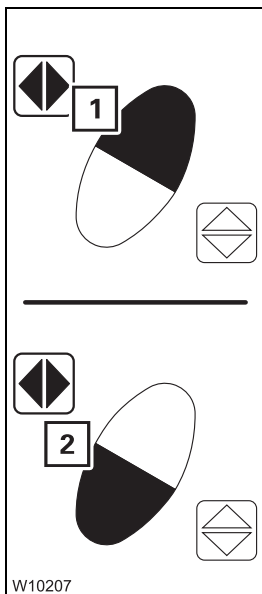
- Press the button for the required outrigger once.

- 1 Front left
- 2 Front right
- 3 Rear left
- 4 Rear right

- 1 + 3 Both on left
- 2 + 4 Both on right

Pre-selection is switched on – the lamp in the corresponding button lights up, e.g. the lamps (5).

After approx. 10 seconds the pre-selection is switched off.



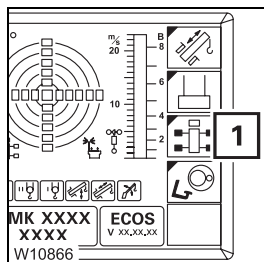
Extending/retracting the outrigger beams

- Observe the safety instructions for operating the outrigger beams;
 p. 13 - 35.
- Press the button combination for the desired movement:
 - 1 Extend
 - 2 Retract

The pre-selected outrigger beams move until you let go of the respective button or until the respective end position has been reached.

From the crane cab

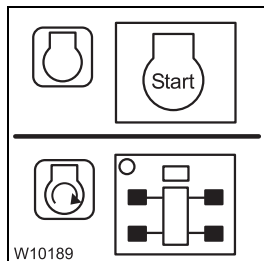
The following operating elements are in the *Outriggers* submenu.



Open the submenu

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

The *Outriggers* submenu opens.



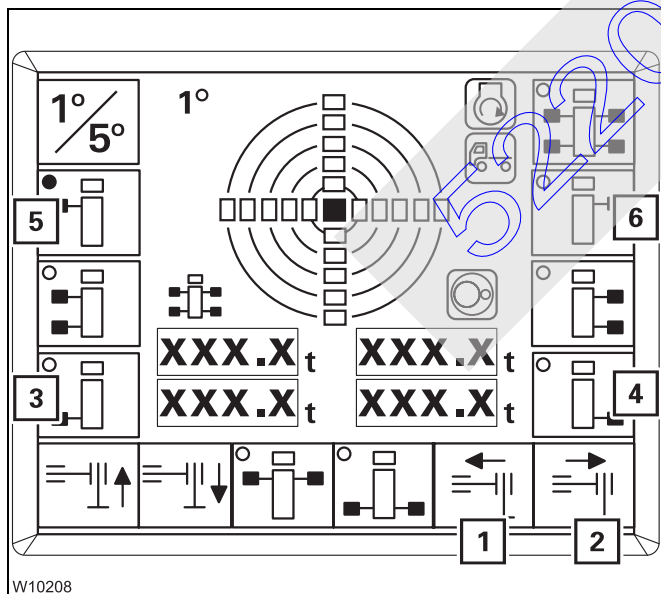
Start the engine

- Switch the carrier ignition on and start the engine for driving;
 p. 13 - 25.

Pre-select outriggers



Only pre-select one outrigger. If you pre-select several outriggers, operation of the outrigger beams is not released.



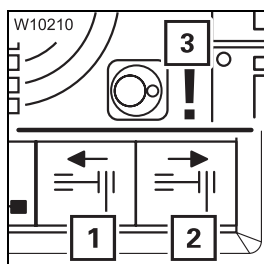
- Press the button for the required outrigger once.

- 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) are displayed in **black**.

After approx. 10 seconds the pre-selection is switched off.



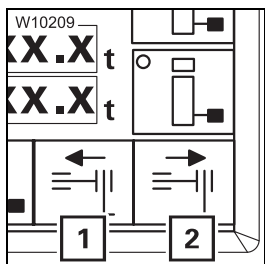
If the symbol (3) appears, this means that the slewing gear is switched on – the symbols (1) and (2) remain grey.

- Switch off the slewing gear.



Extending/retracting the outrigger beams

- Observe the safety instructions for operating the outrigger beams;
▮▮▮ p. 13 - 35.
- Press the button for the desired movement:
 - 1 Retract
 - 2 Extend



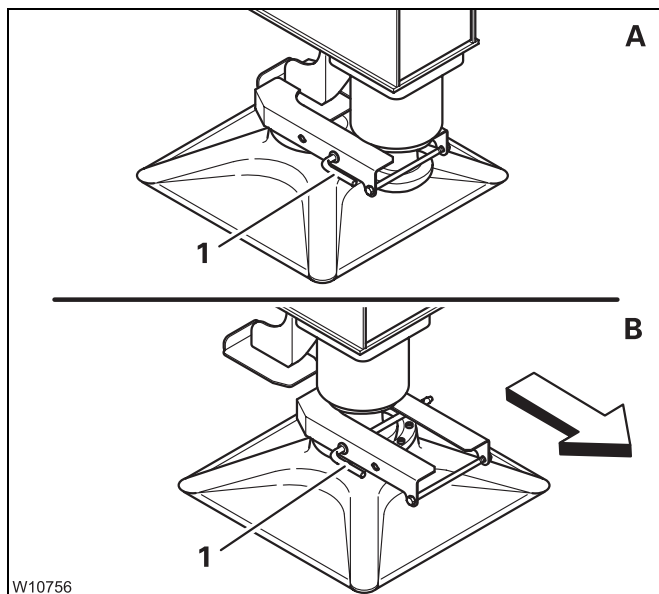
The pre-selected outrigger beams move until you let go of the respective button or until the respective end position has been reached.

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13.6.7

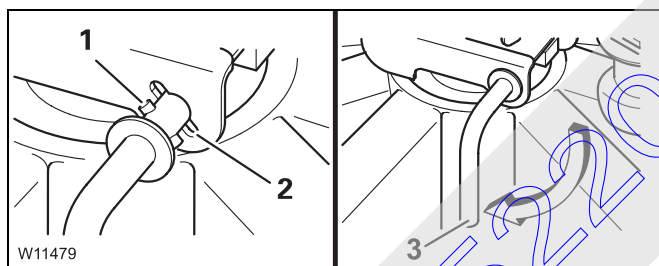
Moving the outrigger pads into working/driving position

The procedure is the same for all outriggers.



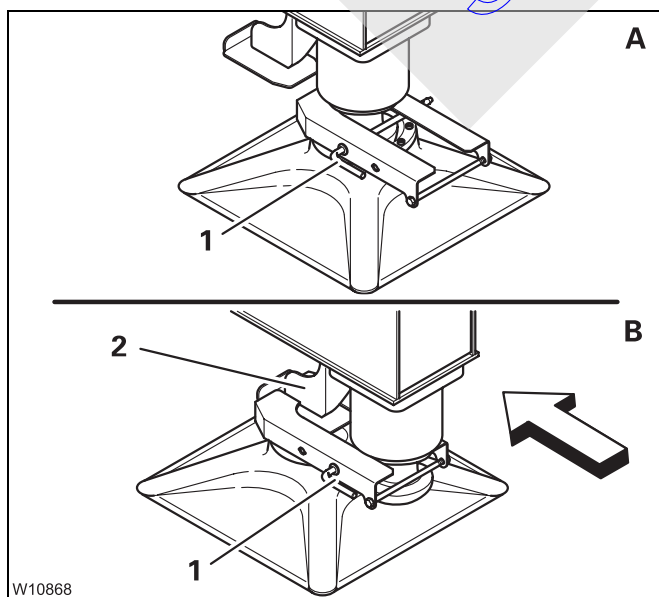
Moving them into working position

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



Secure the pin

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




Moving them into driving position

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

13.6.8

Enlarging the ground bearing area

If the surface of the outrigger pads is too small, you must enlarge the ground bearing area by packing the outrigger pads;  *Determining the required ground bearing area*, p. 13 - 9.

For packing, only use suitable materials that will withstand the outrigger pressure, e.g. straight hardwood of similar cross-sections or steel plates with welded-on strips that will keep the outrigger pads in position.



Risk of accidents if the packing is insufficient

Only use materials of sufficient strength.

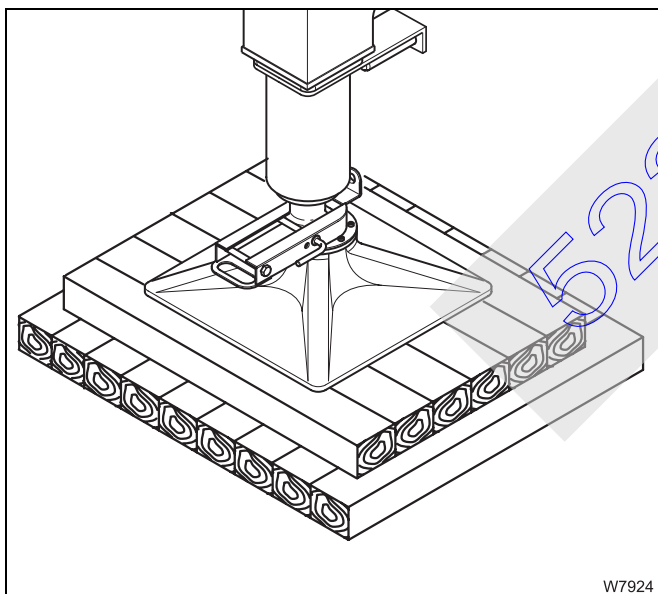
This will prevent the packing from giving way and causing the truck crane to tilt and overturn.



Danger of overturning if the packing or truck crane is at an angle

Level the truck crane and the packing.

This prevents the outrigger pads from slipping off the inclined packing and causing the truck to overturn.



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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.
- In the event of several layers, offset one below the other by 90°.

Consult your supervisor if you are in doubt.

13.6.9

Extending/Retracting outrigger cylinders



Danger of overturning due to insufficient load bearing capacity of the ground

Enlarge the ground bearing area if the ground cannot withstand the resulting outrigger pressure.

This prevents the ground under the outrigger pad from giving way and causing the truck crane to tilt and overturn.



Risk of accidents if outrigger cylinders cannot be observed

Nobody is allowed to be in the area of the outrigger cylinders.

Observe the moving outrigger cylinders or have them observed by a banksman who is in visual contact with you.



Risk of damage to the outrigger cylinders

Move the outriggers as uniformly as possible on all four support points.

This prevents the outrigger cylinders from getting damaged due to one-sided pressure.



Risk of damage to the tyres




Before retracting the outrigger cylinders, remove any sharp-edged and pointed materials from below the tyres.

This keeps the tyres from being punctured or damaged when the truck crane is lowered.



Do not extend the outrigger cylinders as far as possible. The outrigger cylinders must have a remaining stroke of at least 25 mm (1 in) in order to carry out alignment corrections.

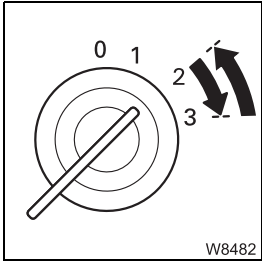
There are various operating elements to operate the outrigger beams

- on the *Outriggers* control units;  p. 13 - 44,
- on the hand-held control;  p. 13 - 45,
- in the crane cab;  p. 13 - 46.



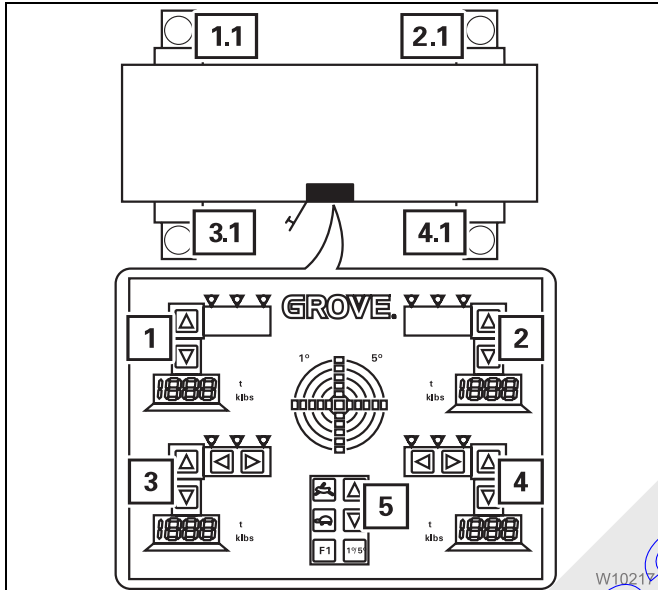
From the control units

If the hand-held control is connected, the *Outriggers* 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 - 14.

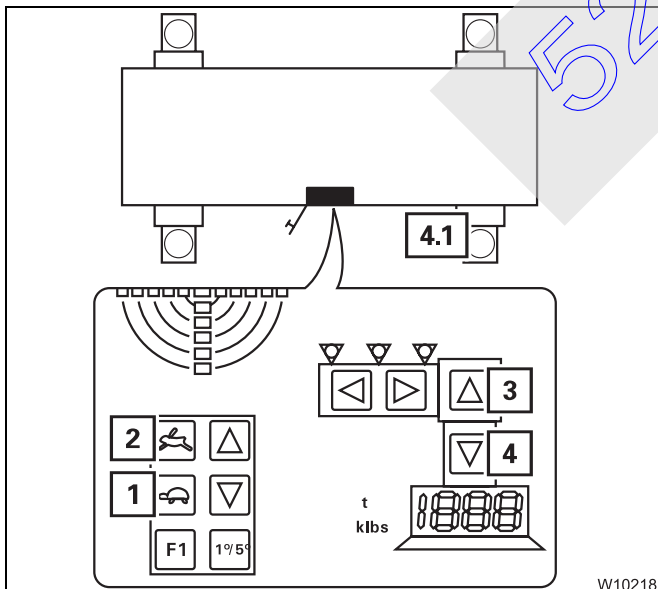


Extend the outrigger cylinders

Assignment of buttons:

- 1 Outrigger cylinder 1.1
- 2 Outrigger cylinder 2.1
- 3 Outrigger cylinder 3.1
- 4 Outrigger cylinder 4.1
- 5 All outrigger cylinders (1.1) to (4.1)

- Observe the safety instructions for operating the outrigger cylinders; p. 13 - 43.



The operation is the same for all outrigger cylinders.

- Press the button
 - 1 for normal speed or
 - 2 for high-speed mode .
- Also press the button for the desired outrigger cylinder, e.g. for 4.1.
 - 3 for extending
 - 4 for retracting

You can also operate several outrigger cylinders at the same time.

The outrigger cylinder move until you let go of the respective button or until the respective end position has been reached.

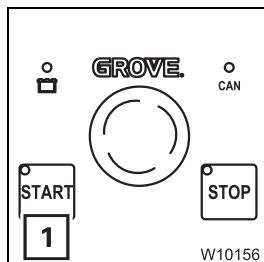
With the hand-held control



- Connect the hand-held control to any socket on the carrier; p. 13 - 21.

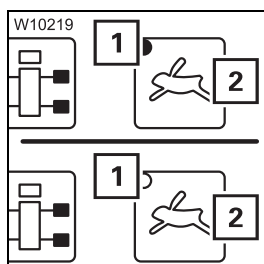
Risk of crushing from turning wheels!

When you start the engine, no persons may be within the steering range of the 4th and 5th axle line. These axle lines are steered each time the engine is started, sometimes with a 5-second delay, in order to test the steering system.



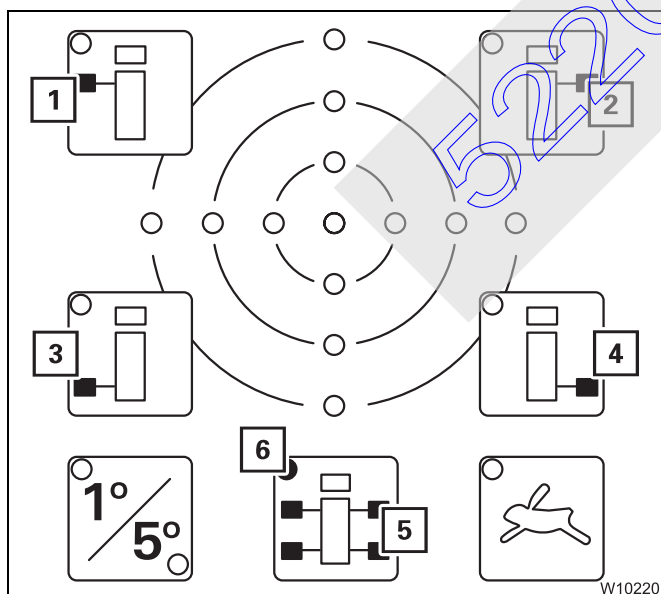
Start the engine

- Press the button (1).
The engine starts; p. 13 - 23.



Pre-select high-speed mode/normal speed

- Press the button (2).
 - Lamp (1) lights up – high-speed mode pre-selected,
 - Lamp (1) goes out – normal speed pre-selected.



Pre-select outriggers

- Press the button for the required outrigger once
 - 1 Front left
 - 2 Front right
 - 3 Rear left
 - 4 Rear right
 - 5 All

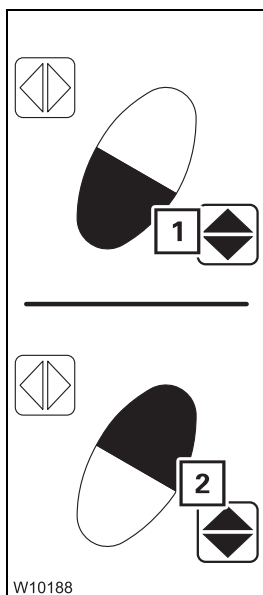
Pre-selection is switched on and the lamp in the corresponding button lights up, e.g. the lamp (6).

After approx. 10 seconds the pre-selection is switched off.



Combinations of the buttons (1) to (4) are also possible, e.g. buttons (1) and (2), in order to lift the truck crane at the front.





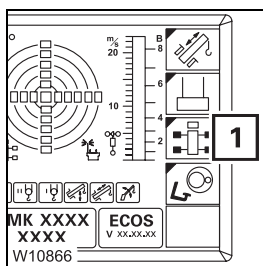
Extend/retract outrigger cylinder

- Observe the safety instructions for operating the outrigger cylinders;
 ■► p. 13 - 43.
- Press the button combination for the desired movement:
 - 1 Extend
 - 2 Retract


The pre-selected outrigger cylinders move until you let go of the respective button or until the respective end position has been reached.

From the crane cab

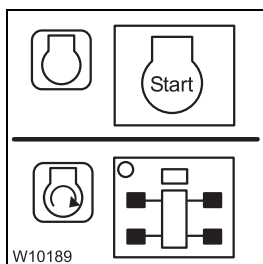
The following operating elements are in the *Outriggers* submenu.



Open the submenu

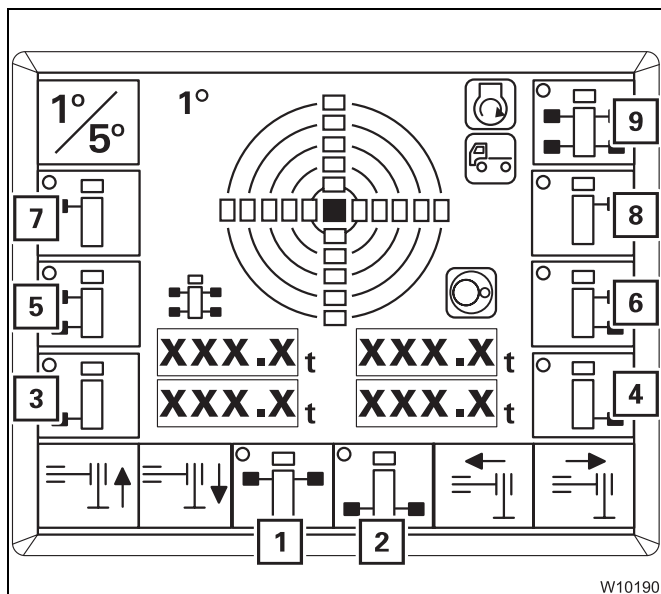
- If necessary, open the main menu  and press the button (1) once.

The *Outriggers* submenu opens.



Start the engine

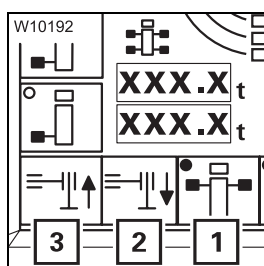
- Switch the carrier ignition on and start the engine for driving;
 ■► p. 13 - 25.



Pre-select outriggers

- Press the button for the required outrigger once.

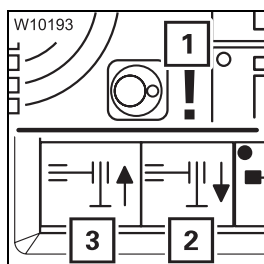
- 1 Both at front
- 2 Both at rear
- 3 Rear left
- 4 Rear right
- 5 Both on left
- 6 Both on right
- 7 Front left
- 8 Front right
- 9 All



Pre-selection is switched on.

- The dot in the symbol turns **green**, e.g. in symbol (1).
- The symbols (2) and (3) turn **black**.

After approx. 10 seconds the pre-selection is switched off.



If the symbol (1) appears, this means that the slewing gear is switched on – the symbols (2) and (3) remain grey.

- Switch off the slewing gear.

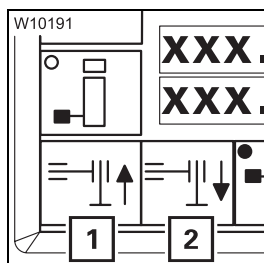
Extend/retract outrigger cylinder

- Observe the safety instructions for operating the outrigger cylinders;
 p. 13 - 43.

- Press the button for the desired movement:

- 1 Retract
- 2 Extend

The pre-selected outrigger cylinders move until you let go of the respective button or until the respective end position has been reached.

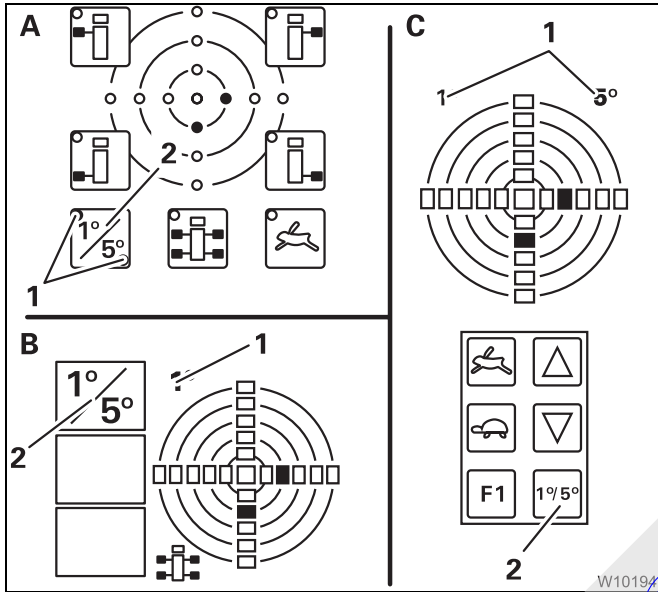


13.6.10 Levelling the truck crane on outriggers

You must level the truck crane before crane operation and possibly correct its horizontal alignment during crane operation.

Inclination displays

After switching on the ignition, various inclination displays indicate the current alignment.



A On the hand-held control

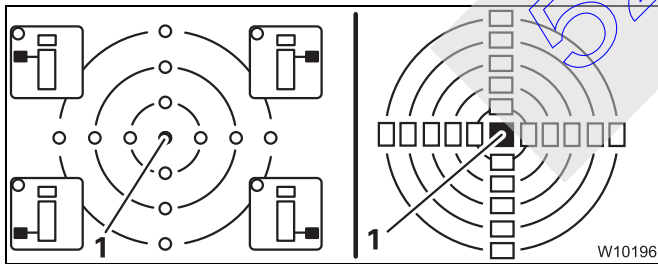
B On the *ECOS* display –
in the *Outriggers* main menu/submenu

C On the *Outrigger* control units

Change measuring range

You can change the measuring range between 1° and 5°.

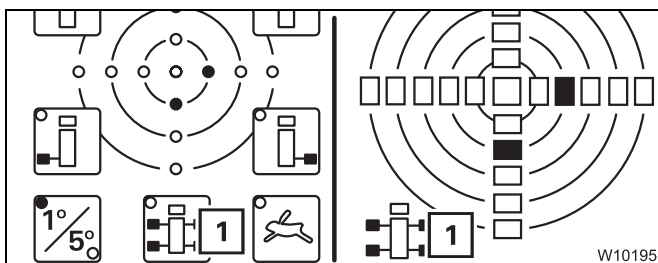
- Press the button (2) once.
The current measuring range (1) is displayed.



Read the display

Only the lamp (1) at the centre is on if the truck crane is level.

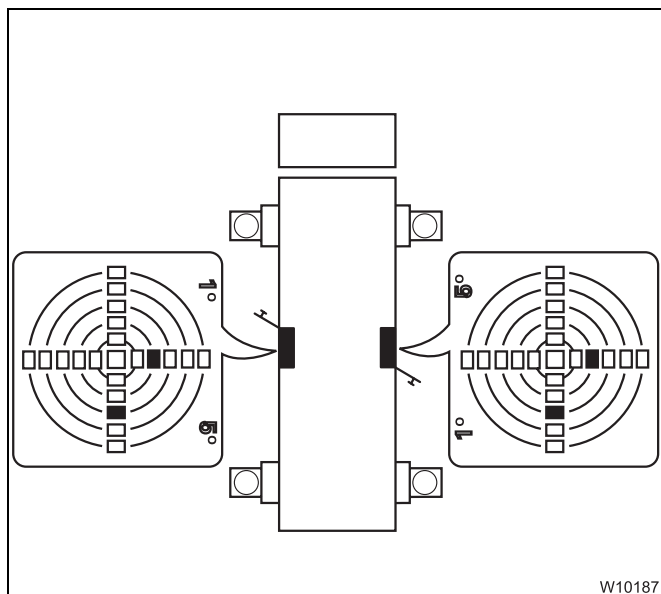
The other lamps show the sides of the truck crane which are higher.



– *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.



– *Outrigger control units*

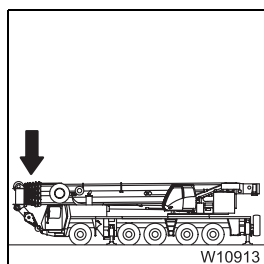
The assignment to the carrier corresponds to the top view.

Due to the position of the control units, the displays on both sides differ.

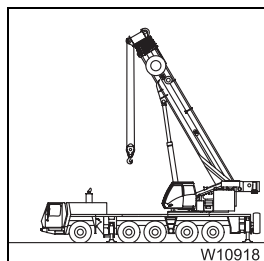
In this example, the carrier would be standing higher to the rear on the right hand side.

Prerequisites

The following prerequisites apply to manual and automatic alignment.



The main boom must be resting in the boom rest.



Or

- The main boom must be raised **and**
- the load has been set down **and**
- the superstructure is in the 0° or 180° position.



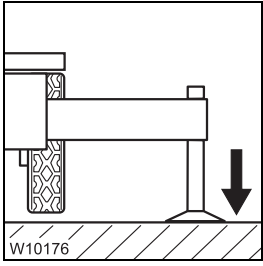
Risk of overloading the main boom


Always slew the superstructure to the 0° or 180° position and set down the load before levelling the truck crane.

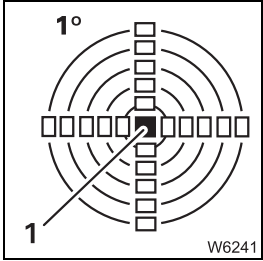
In other positions the deformation of the carrier will create incorrect results for the inclination and the truck crane will be at an angle. This could cause the outrigger beam to become overloaded during crane operation.




Manual alignment



- Check that the prerequisites are met;  p. 13 - 49.
- Extend all outrigger cylinders until none of the wheels is touching the ground.



- Level the truck crane on outriggers until the lamp (1) is the only one lighting up in the measuring range 1°;  *Extending/Retracting outrigger cylinders*, p. 13 - 43.
- Only lift the truck crane as much as necessary.

Checks to be performed after levelling

During levelling, the ground may give way and the packing may slip.



Risk of accidents due to incorrectly supported truck crane

Perform the following checks each time you have levelled the truck crane and correct any misalignments.

Otherwise the truck crane may overturn even when lifting a load released by the SLI.


- Check after you have levelled the truck crane:
 - whether all the wheels are lifted off the ground,
 - whether the ground under one of the outrigger pads has given way,
 - whether the packing is correct for the enlarged ground bearing area.

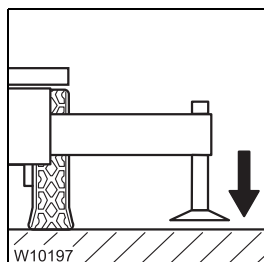
If slewing is permissible with the current rigging mode:

- Slew the superstructure within the permissible slewing range.
- Perform the specified checks again.
- Check the horizontal alignment on the inclination display.

Automatic alignment

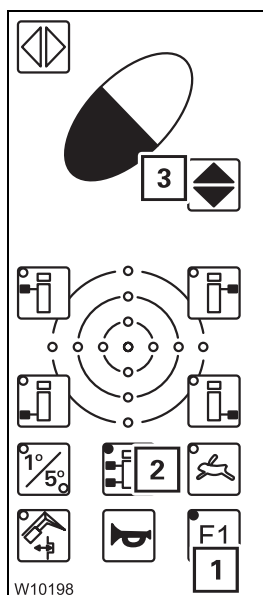
During automatic alignment, the outrigger cylinders are only **extended** to prevent the wheels from touching the ground after alignment.

- Check that the prerequisites are met;  p. 13 - 49.
- Extend the outrigger cylinders until the outrigger pads are just above the ground.



Start procedure

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



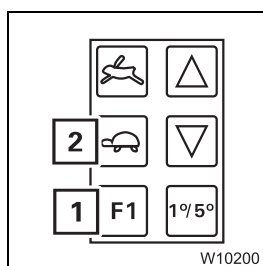
– On the hand-held control

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

The lights in the buttons go on.

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

The procedure begins.



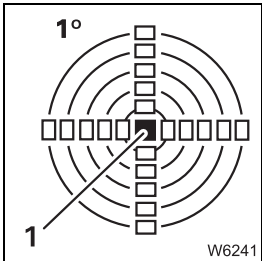
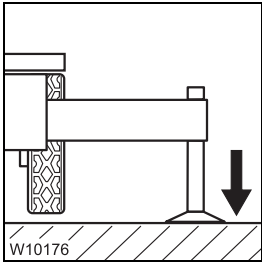
– On the control units

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

The procedure begins.



Automatic procedure



1. All outrigger cylinders are extended one after the other until the outrigger pads touch the ground.
2. All outrigger cylinders extend simultaneously so that none of the wheels touch the ground anymore.

3. The truck crane is automatically levelled.

This procedure is performed

- until horizontal alignment is reached, the lamp (1) in the centre is the only one lighting up in measuring range 1° or
- until you let go of a button or
- until horizontal alignment is no longer possible, e.g. when an outrigger 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 display after automatic levelling.

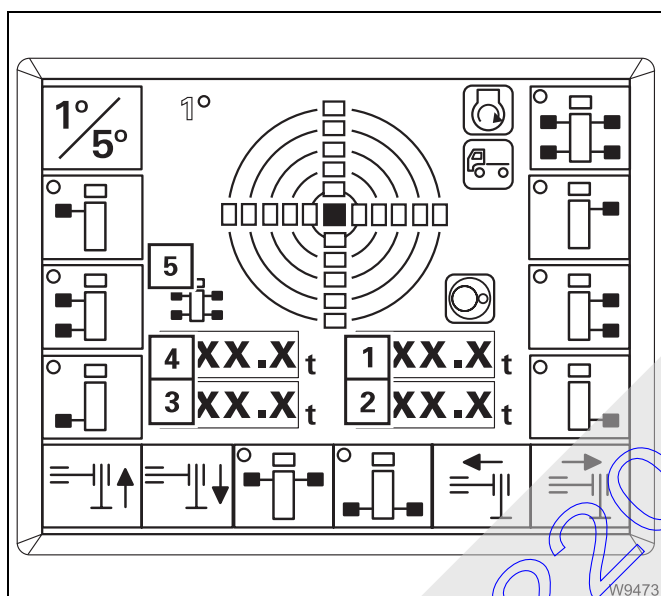
13.6.11 Outrigger pressure display

After switching on the ignition, the outrigger pressure displays indicate the current outrigger pressure for all outrigger cylinders. The set unit (t or klbs) is shown next to the displays.



Outrigger cylinders retracted or extended as far as possible will create incorrect outrigger pressure readings.

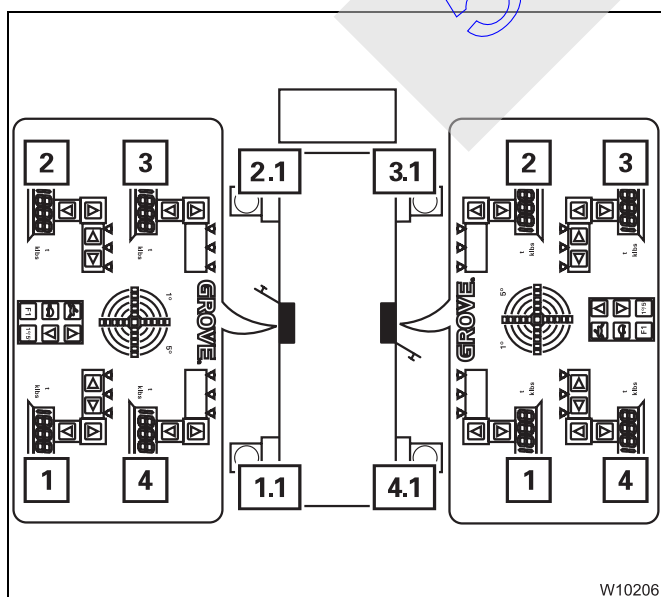
The display will show the most accurate reading if the movement performed last was *Extend outrigger cylinders*.



In the Outriggers submenu

The assignment of the displays to the carrier is given by the directional indicator (5).

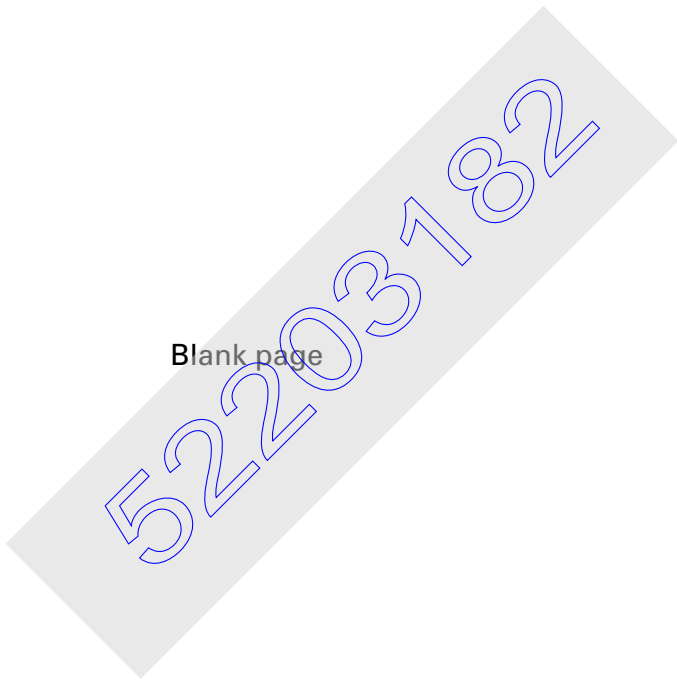
- 1 Front right outrigger pressure
- 2 Rear right outrigger pressure
- 3 Rear left outrigger pressure
- 4 Front left outrigger pressure



On the Outrigger control units

The assignment of the displays to the carrier corresponds to the top view.

- 1 Display for outrigger cylinder 1.1
- 2 Display for outrigger cylinder 2.1
- 3 Display for outrigger cylinder 3.1
- 4 Display for outrigger cylinder 4.1



13.7

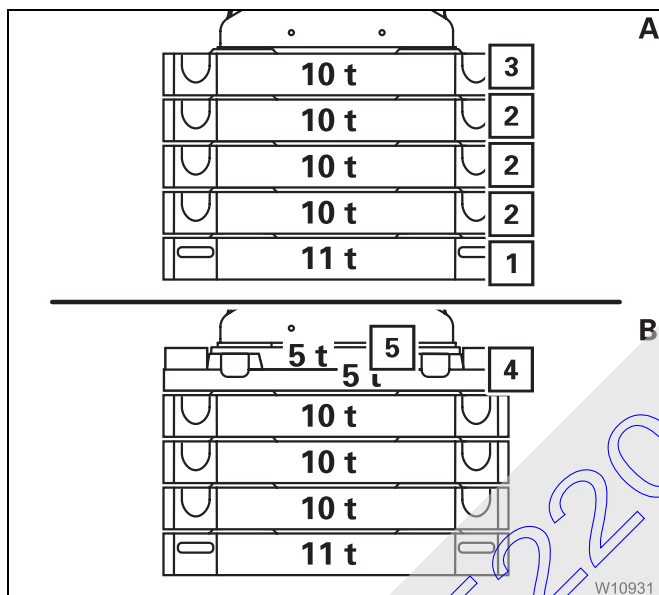
Rigging/Unrigging the counterweight

There are counterweight masses of 51 t (112,400 lbs) to 77 t (169,700 lbs) available for the GMK 5220.

13.7.1

Counterweight parts

There are various counterweight parts, depending on the truck crane's version and additional equipment.



51 t (112,400 lbs) counterweight

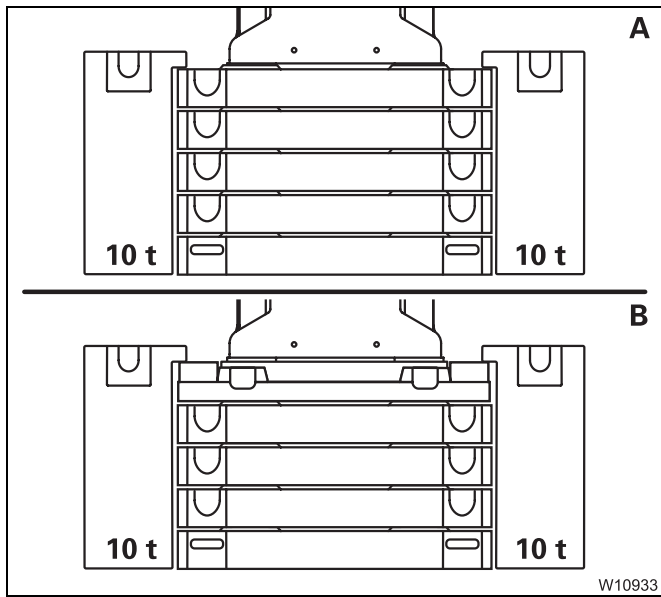
– Version A

- an 11 t base plate (1)
- three 10 t counterweight sections (2)
- one 10 t counterweight section (3) with recesses

– Version B

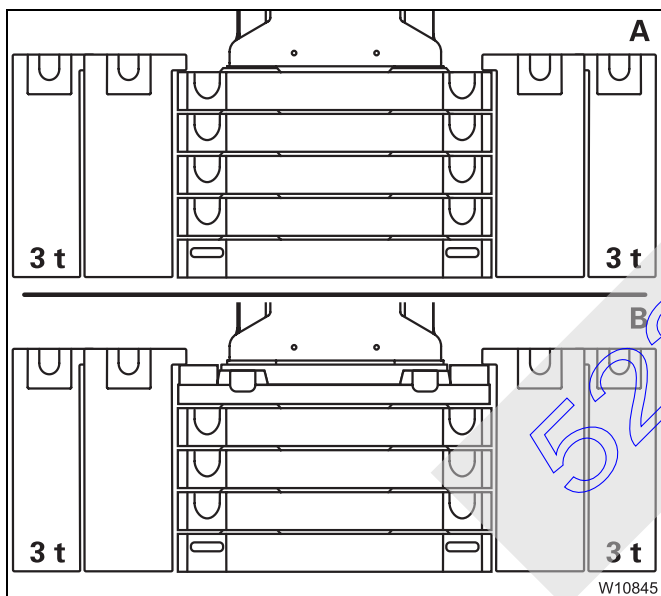
- Like Version A, but replacing the 10 t counterweight section (3) with
 - a 5 t counterweight section (4) with recesses,
 - a 5 t counterweight section (5) – needs to be screwed to the turntable; ►► p. 13 - 75.





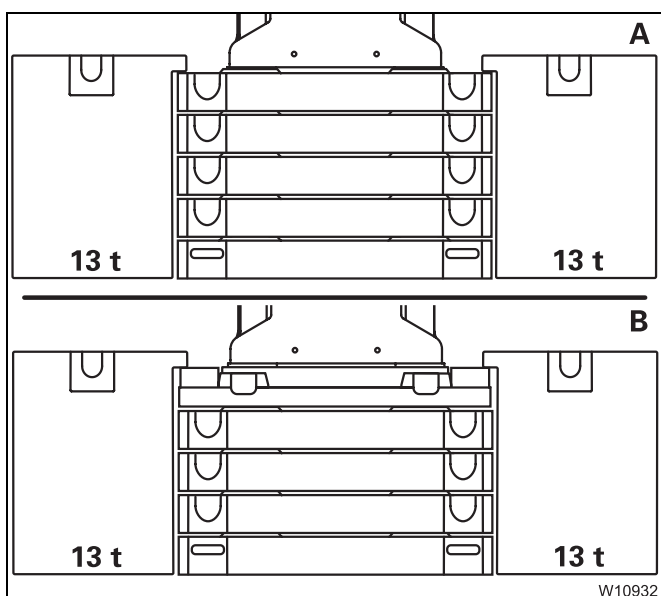
71 t (156,500 lbs) counterweight

There are two **10 t** blocks as additional equipment for the 51 t counterweight.



77 t (169,700 lbs) counterweight

– There are two **3 t** blocks as additional equipment for the 71 t counterweight.

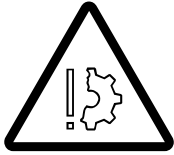


– There are two **13 t** blocks as additional equipment for the 51 t counterweight.

13.7.2

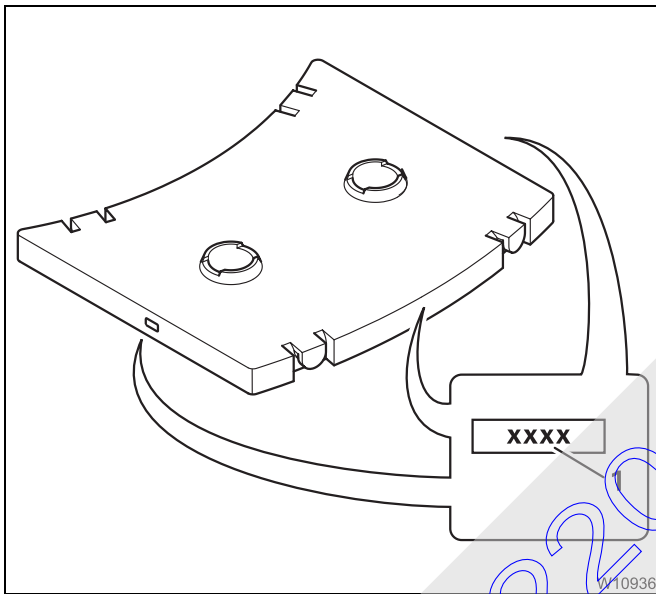
Identification

The truck crane and its corresponding counterweight parts are labelled with the same serial number.

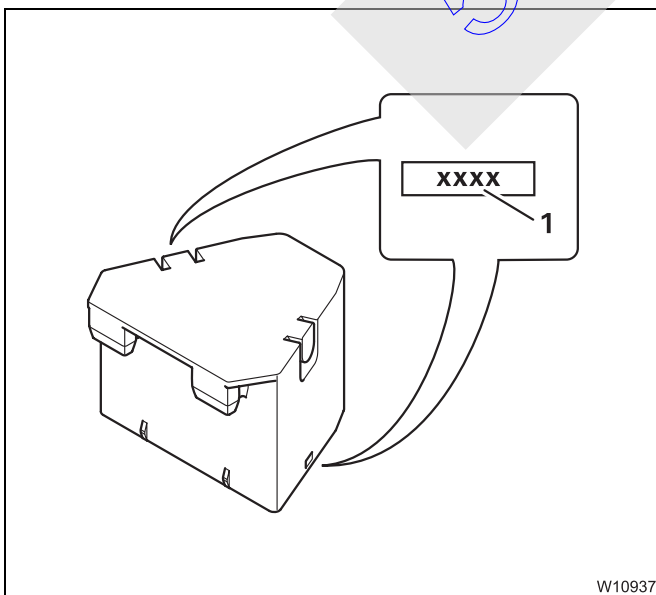


Danger if counterweight parts are interchanged

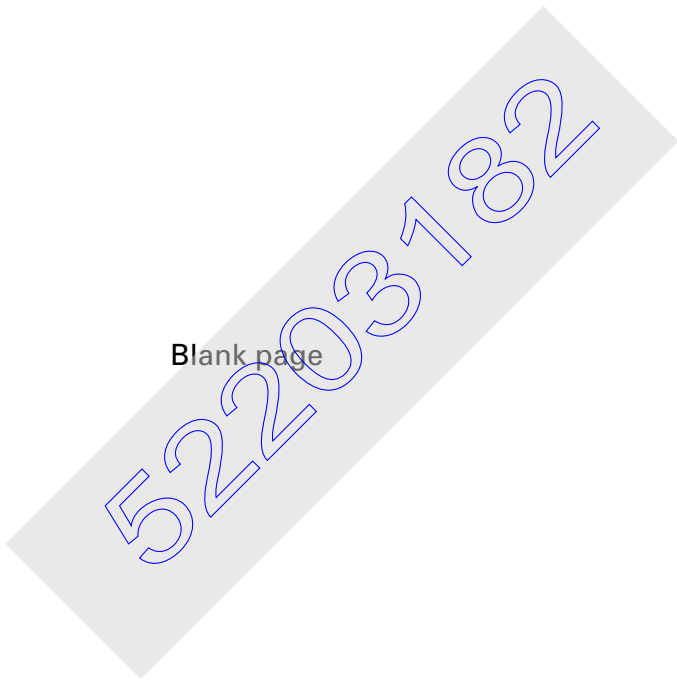
Use only counterweight parts that belong to your truck crane. The truck crane and counterweight parts are labelled with the same serial number. Other or additional counterweight parts may not be rigged.



The serial number (1) of all counterweight sections is either on the back or indicated together with the weight.



The serial number (1) of all counterweight blocks is indicated together with the weight.



13.7.3

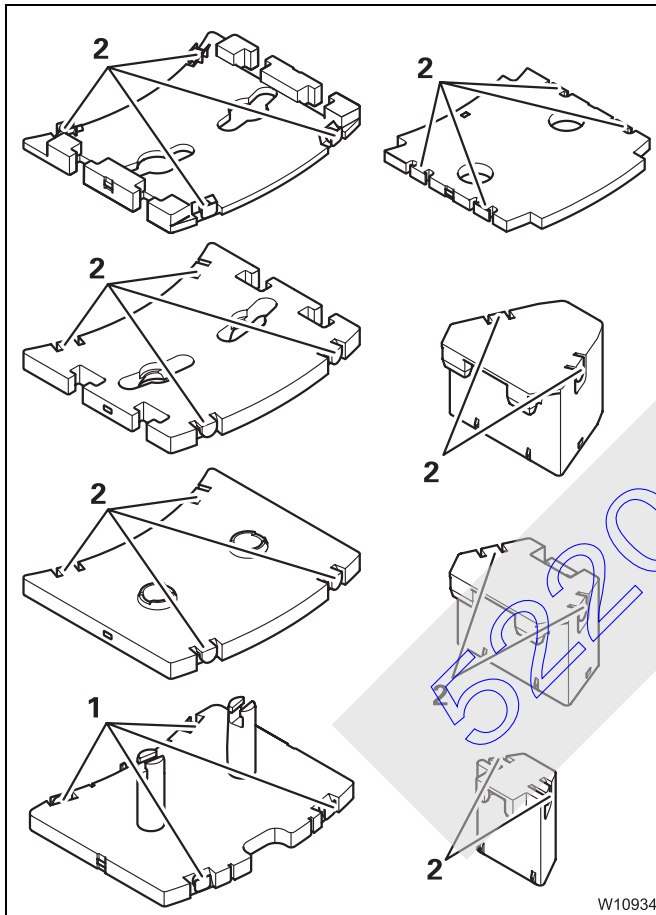
Slinging points



Danger of accidents if used improperly!

Attach the various counterweight parts only to the intended slinging points and use lifting gear of sufficient lifting capacity.

Only lift the counterweight sections and blocks one by one, since the slinging points are not designed for lifting stacked counterweight sections.



- Only use lifting gear of sufficient lifting capacity; Counterweight parts, p. 16 - 3.

The slinging points (1) on the base plate are designed for lifting the base plate with a 10 t counterweight section on top.

The slinging points (2) are only designed for the dead weight of the counterweight parts.

13.7.4

CHECKLIST: Rigging counterweight



This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.

Observe the warnings and safety instructions specified there.

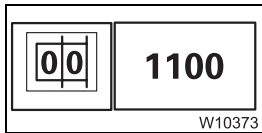


Danger of overturning when slewing with a rigged counterweight

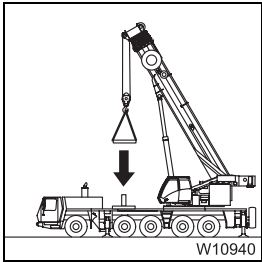
Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius).

Correct the rigging mode if necessary; *Slewing with rigged counterweight*, p. 13 - 76.

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



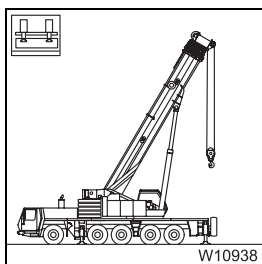
2. Enter the current rigging mode on the SLI; p. 12 - 21.



3. Assemble required counterweight version – lift counterweight parts one after the other;

Slings points, p. 13 - 59,

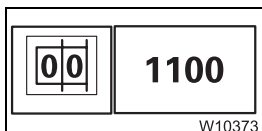
Assemble counterweight versions, p. 13 - 62.



4. – Open the *Counterweight* submenu; p. 13 - 68.

– Correct the rigging mode, if necessary; p. 13 - 69.

– Slew the superstructure into the rigging range and lift counterweight to the turntable (automatic) and pre-charge; p. 13 - 70.



5. Enter the current rigging mode with the newly rigged counterweight version on the SLI; p. 12 - 21.

13.7.5

CHECKLIST: Unrigging counterweight



This checklist is not a complete set of operating instructions. There are accompanying operating instructions which are referred to by cross-references.

Observe the warnings and safety instructions specified there.

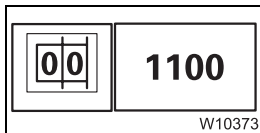


Danger of overturning when slewing with a rigged counterweight

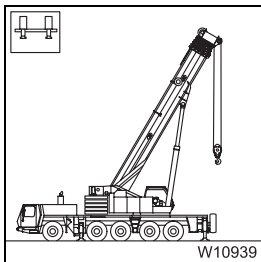
Before slewing with the rigged counterweight, check whether slewing is permissible with the rigged outrigger span or with the truck free on wheels;

▣▣▣▣▣ *Slewing with rigged counterweight*, p. 13 - 76.

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

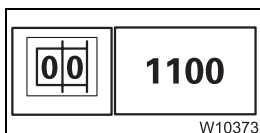


2. Enter the current rigging mode on the SLI; ▣▣▣▣▣ p. 12 - 21.

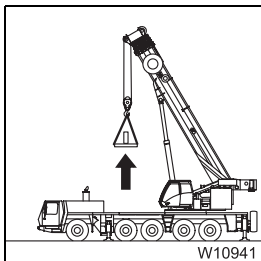


3. – Open the *Counterweight* submenu; ▣▣▣▣▣ p. 13 - 68.

– Slew the superstructure into the rigging range and set down the counterweight onto the counterweight platform (automatic); ▣▣▣▣▣ p. 13 - 72.



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



5. Lift the counterweight parts off the counterweight platform, as required by the respective driving mode;

▣▣▣▣▣ *Slinging points*, p. 13 - 59,


▣▣▣▣▣ *Hinweise*, p. 6 - 1.

13.7.6

Assemble counterweight versions



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. 13 - 76.



Danger of crushing when setting down the counterweight parts!

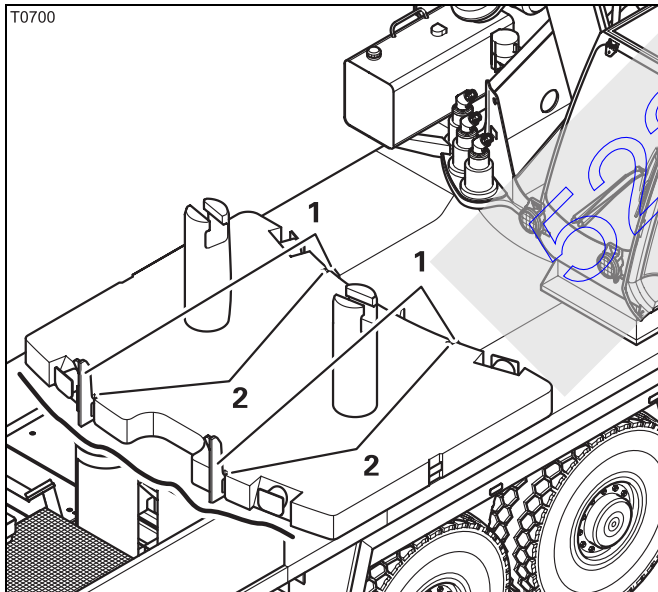
Make sure any helpers keep a sufficient distance away from the counterweight parts with any parts of their body when setting down the counterweight parts.

Remove all objects from the counterweight platform that could become jammed or crushed!



Danger of crushing when slewing the superstructure

The access ladders are located in the slewing range of the superstructure. Make sure nobody uses the access ladders (helpers for example) while you lift a counterweight section onto the counterweight platform.



Setting down the 11 t base plate

For counterweight versions of more than 11 t, you must first lift the 11 t base plate onto the counterweight platform.

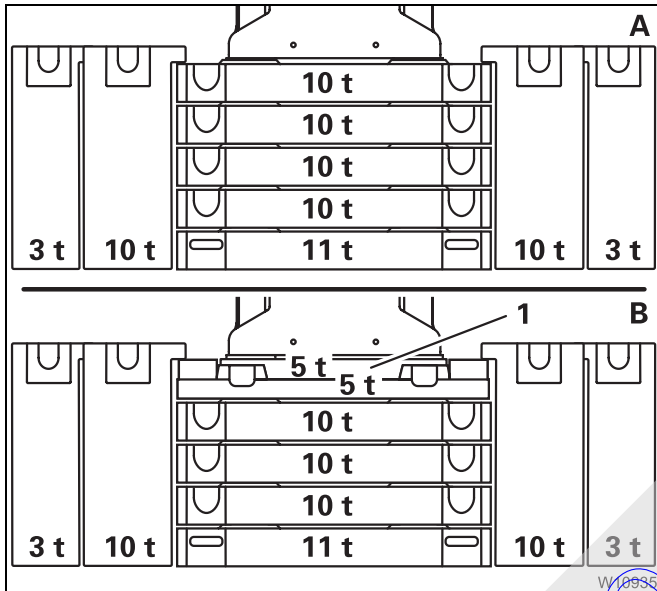
- Position the 11 t base plate in such a way that the recesses (2) grip into the retaining sheets (1).

For larger counterweight versions, now set additional counterweight sections onto the 11 t base plate.



Risk of accidents due to falling counterweight parts

Only attach the counterweight parts to the appropriate slinging points and use lifting gear of sufficient lifting capacity. Always lift the counterweight sections and counterweight blocks one at a time.



Possible counterweight versions with Version A; p. 13 - 64.

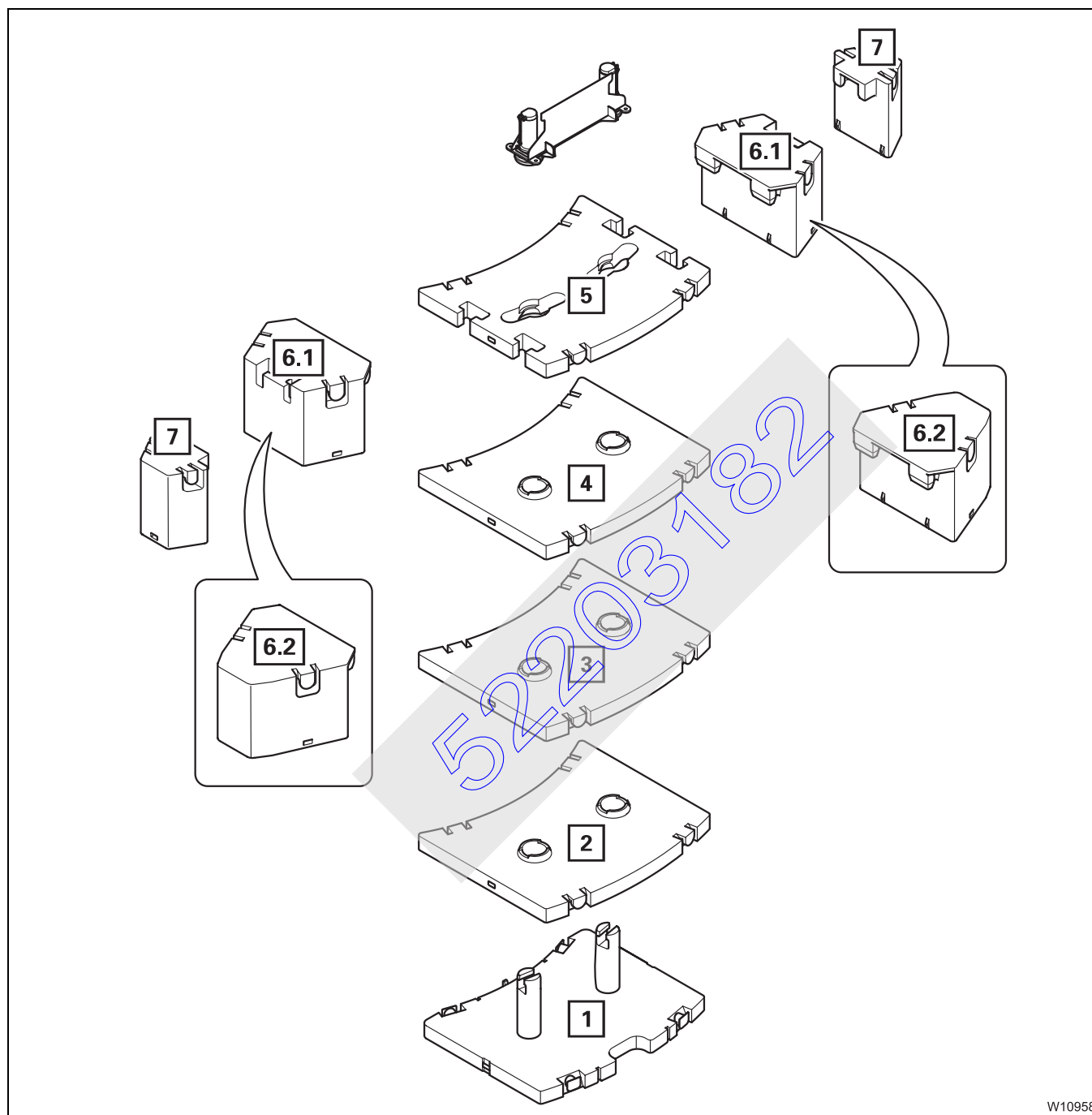
With Version B, the 5 t counterweight section (1) needs to be screwed to the turntable before assembling the version; p. 13 - 75.

Possible counterweight versions with Version B; p. 13 - 66.



With Version A

The figures and tables contain all the counterweight parts and versions that are possible. Not all counterweight versions shown may be possible. This depends on the truck crane's additional equipment.



- The tables specify what counterweight parts are needed for the respective counterweight versions.
- Lift the counterweight parts onto the base plate one after the other in the specified sequence 1 to maximum 7.

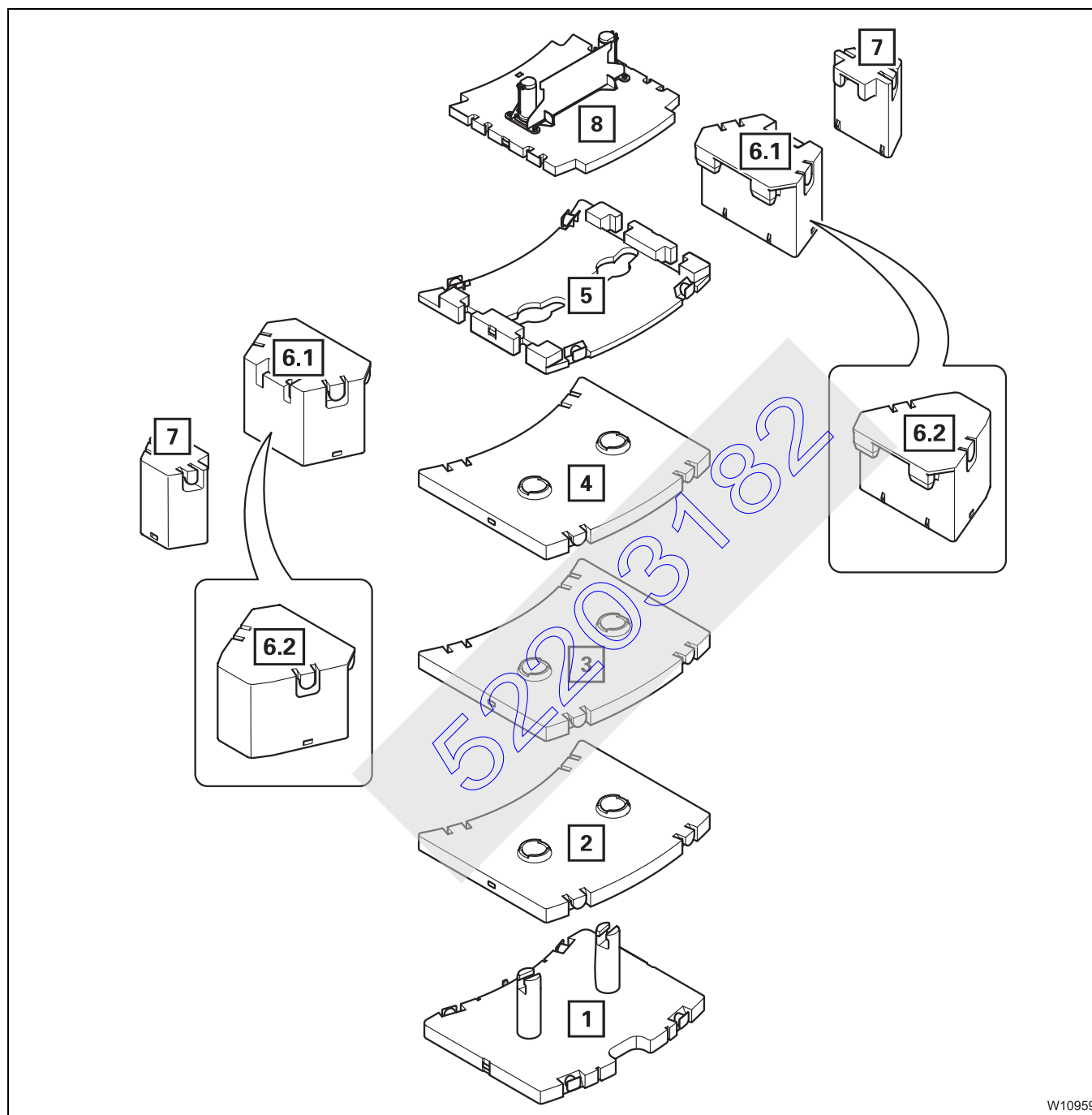
Counterweight parts	Counterweight version in t (lbs)						
	0 (0)	11 (24 200)	21 (46 200)	31 (68 300)	41 (90 300)	51 (101 400)	71 (156 500)
13 t blocks	-	-	-	-	-	-	-
3 t blocks	-	-	-	-	-	-	-
10 t blocks	-	-	-	-	-	-	6.1
10 t section	-	-	-	-	-	5	5
10 t section	-	-	-	-	4	4	4
10 t section	-	-	-	3	3	3	3
10 t section	-	-	2	2	2	2	2
11 t base plate	-	1	1	1	1	1	1

Counterweight parts	Counterweight version in t (lbs)	
	77 (169 700)	77 (169 700)
13 t blocks	-	6.2
3 t blocks	7	-
10 t blocks	6.1	-
10 t section	5	5
10 t section	4	4
10 t section	3	3
10 t section	2	2
11 t base plate	1	1



With Version B

The figures and tables contain all the counterweight parts and versions that are possible. Not all counterweight versions shown may be possible. This depends on the truck crane's additional equipment.



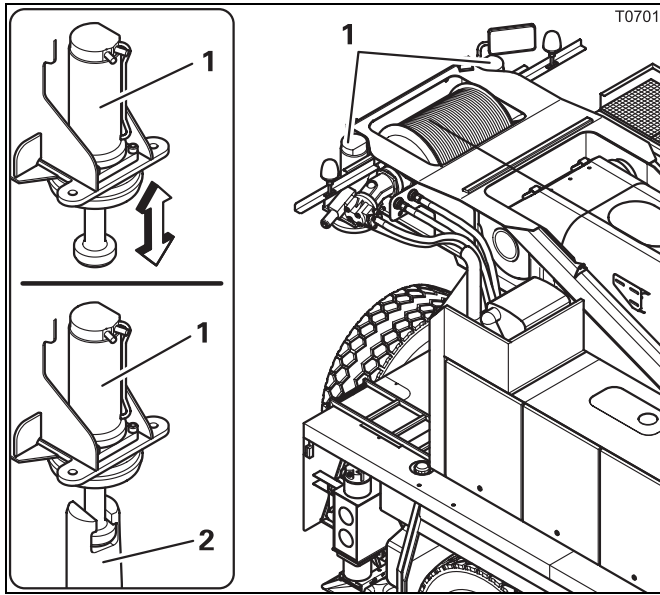
- The tables specify what counterweight parts are needed for the respective counterweight versions.
- Lift the counterweight parts onto the base plate one after the other in the specified sequence [1] to maximum [7].

Counterweight parts	Counterweight version in t (lbs)						
	0 (0)	5 (11 000)	16 (35 200)	21 (46 200)	26 (57 300)	31 (68 300)	36 (79 300)
5 t section ¹⁾	–	8	8	8	8	8	8
13 t blocks	–	–	–	–	–	–	–
3 t blocks	–	–	–	–	–	–	–
10 t blocks	–	–	–	–	–	–	–
5 t section	–	–	–	5	–	5	–
10 t section	–	–	–	–	–	–	–
10 t section	–	–	–	–	–	–	3
10 t section	–	–	–	–	2	2	2
11 t base plate	–	–	1	1	1	1	1

Counterweight parts	Counterweight version in t (lbs)					
	41 (90 300)	46 (101 400)	51 (101 400)	71 (156 500)	77 (169 700)	77 (169 700)
5 t section ¹⁾	8	8	8	8	8	8
13 t blocks	–	–	–	–	–	6.2
3 t blocks	–	–	–	–	7	–
10 t blocks	–	–	–	6.1	6.1	–
5 t section	5	–	5	5	5	5
10 t section	–	4	4	4	4	4
10 t section	3	3	3	3	3	3
10 t section	2	2	2	2	2	2
11 t base plate	1	1	1	1	1	1

¹⁾ screwed onto turntable

13.7.7 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 11 t base plate (2).

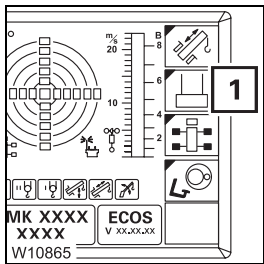


Danger of crushing when lifting and lowering the counterweight

Before lifting or lowering the counterweight, remove all objects from the top counterweight section which could be clamped or crushed. Make sure nobody is on the counterweight platform while the counterweight is being lifted or lowered.

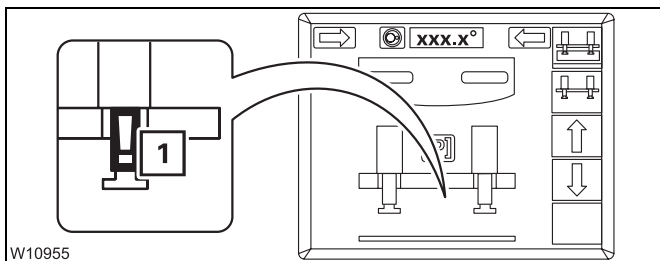
Counterweight submenu

To operate the counterweight hoist unit, you must open the *Counterweight* submenu.



Open the submenu

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



The *Counterweight* submenu opens.

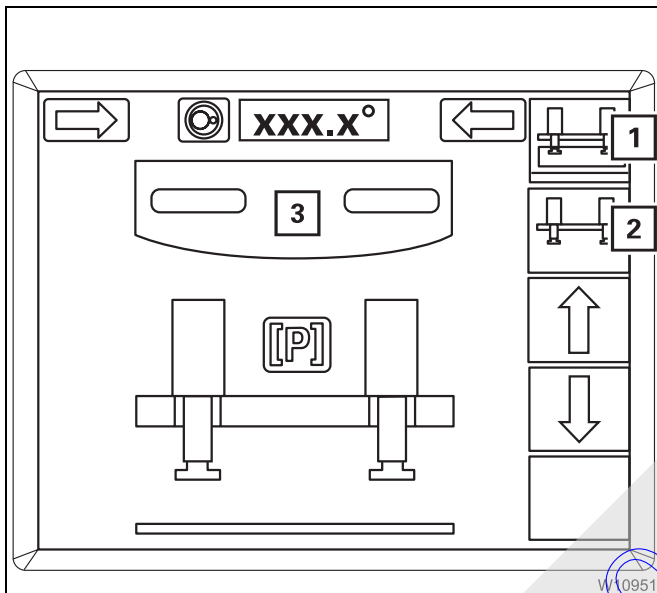
If an error symbol (1) is displayed with subsequent operation, please contact **CraneCARE**.

**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. 13 - 70, *Automatic mode, unrigging*, p. 13 - 72.

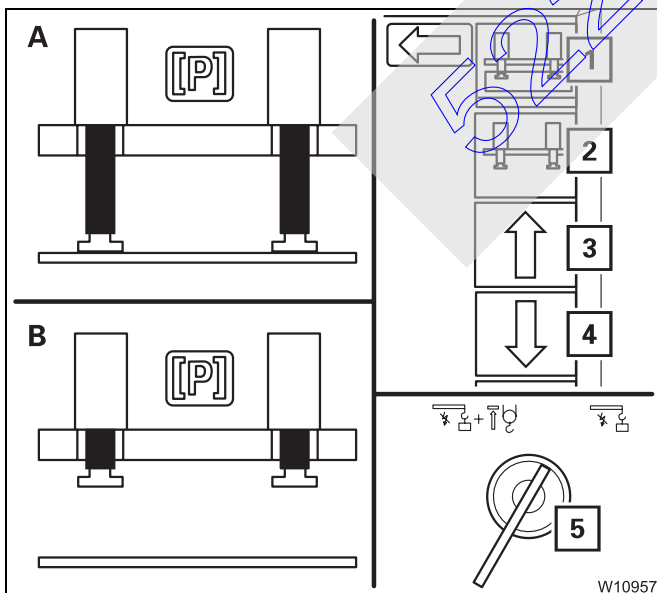


Correct the rigging mode

- You can only use the automatic mode 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.



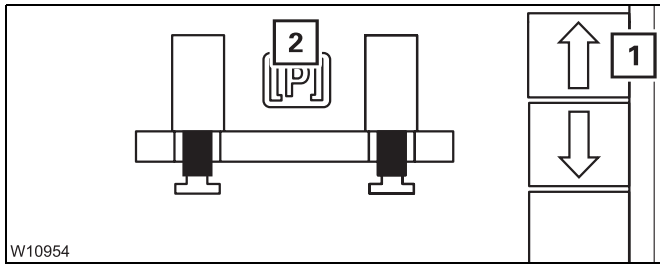
If the symbol (1) is yellow with the counterweight unrigged:

- Turn the key-operated switch (5) to the right.
- (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.





Pre-charge

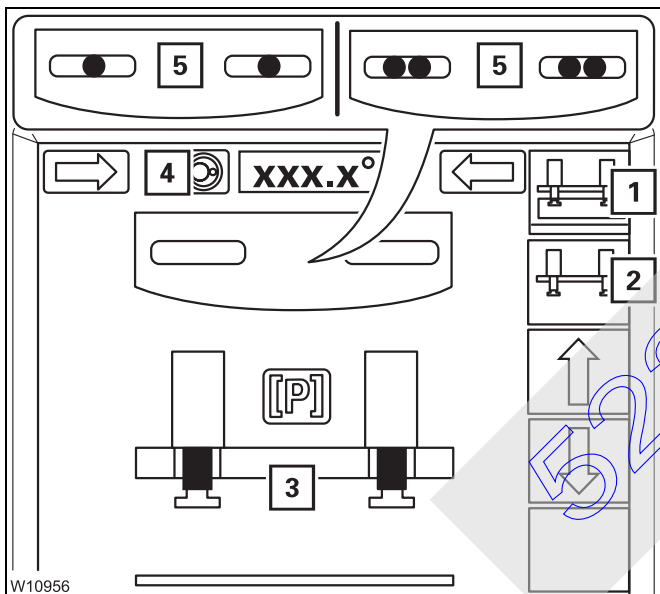
When the symbol (2) is **red**, you must pre-charge the counterweight.

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

Automatic mode, rigging

While the automatic process is being performed, you can always

- **cancel** the automatic process; *Cancel automatic mode*, p. 13 - 74.
- **interrupt** the automatic process by letting go of the control lever. After moving the lever in the displayed direction once more, the automatic process is continued.



Prerequisites

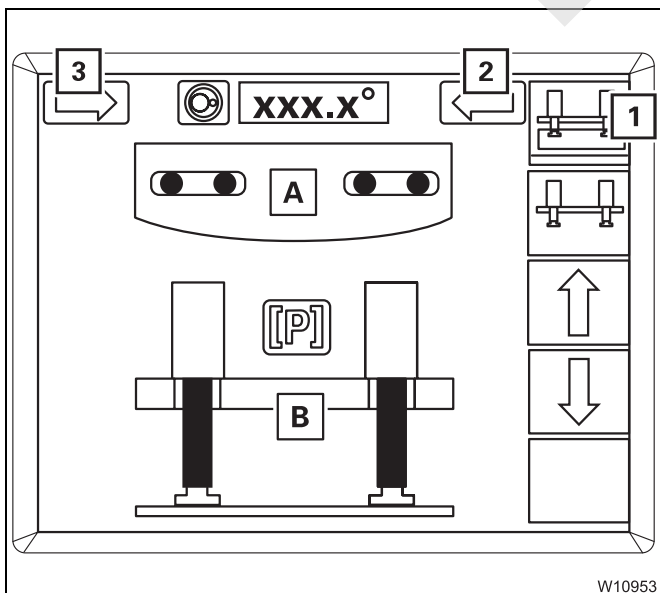
- The counterweight version has been assembled.
- The symbol (2) is **yellow**. If the symbol (1) is yellow, *Correct the rigging mode*, p. 13 - 69.
- The lifting cylinders are fully retracted – display (3).
- The slewing gear is switched on – symbol (4) **green**.
- The superstructure is in the rigging range – one display (5) **green**.

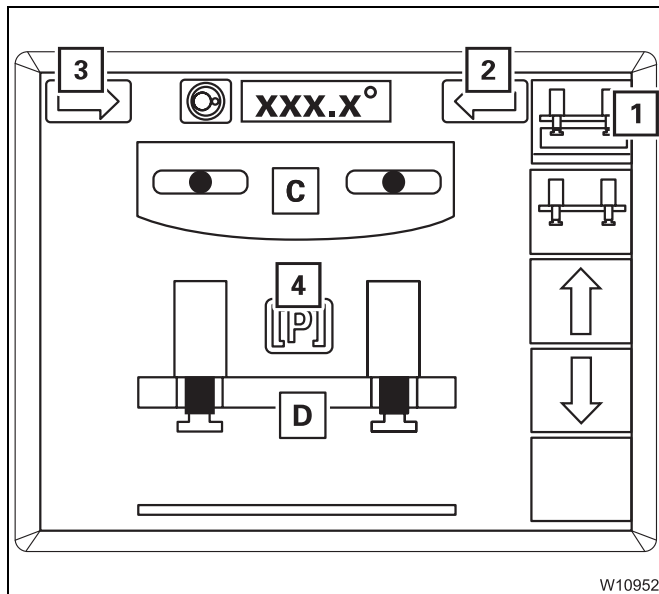
Switch on automatic mode

- Press the button (1) once – the symbol flashes.

Perform automatic process

- To slew, move the control lever in the displayed direction (2) or (3) – the automatic process starts.
 - The superstructure turns into position (A).
 - The lifting cylinders are extended (B).
- Let go of the control lever.





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

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


- Let go of the control lever.

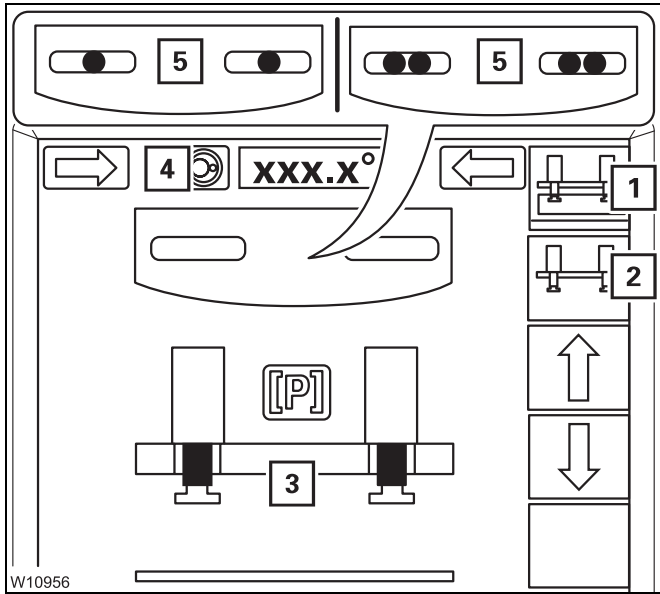


52203182


Automatic mode, unrigging

While the automatic process is being performed, you can always

- **cancel** the automatic process;  *Cancel automatic mode*, p. 13 - 74.
- **interrupt** the automatic process by letting go of the control lever. After moving the lever in the displayed direction once more, the automatic process is continued.



Prerequisites

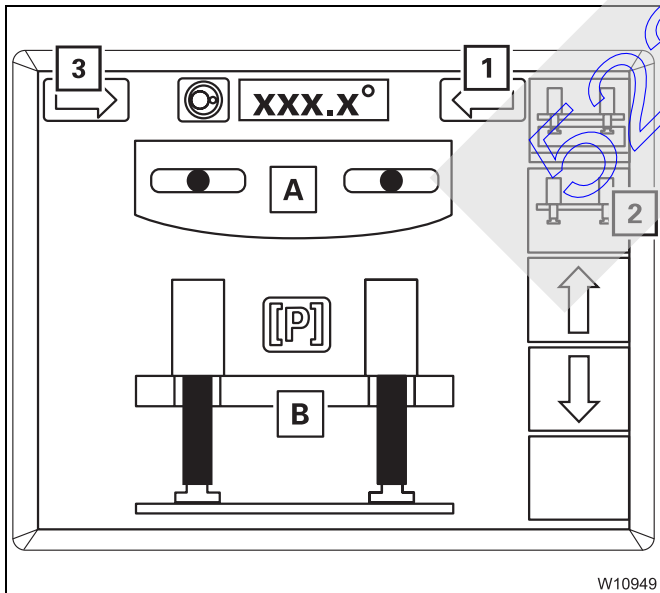
- The symbol (1) is **yellow**. If the symbol (2) is yellow;  *Correct the rigging mode*, p. 13 - 69.
- The lifting cylinders are fully retracted – display (3).
- The slewing gear is switched on – symbol (4) **green**.
- The superstructure is in the rigging range – one display (5) **green**.

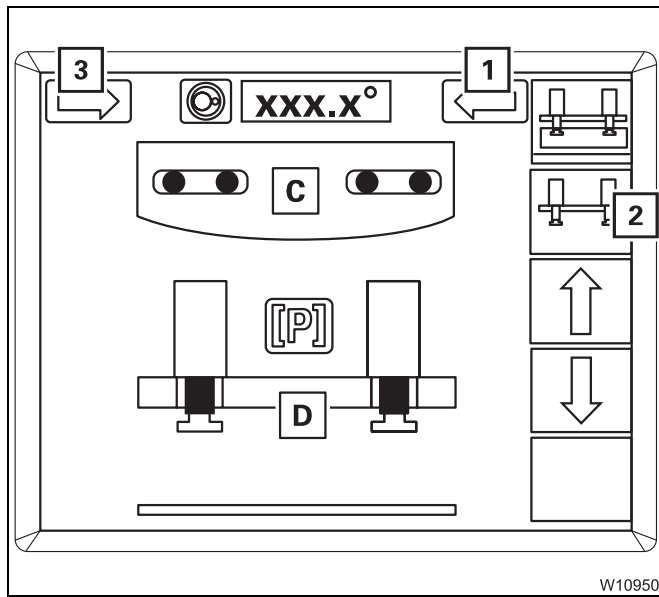
Switch on automatic mode

- Press the button (2) once – the symbol flashes.

Perform automatic process

- To slew, move the control lever in the displayed direction (1) or (3) – the automatic process starts.
 - The superstructure turns into position (A).
 - The lifting cylinders are extended (B).
- Let go of the control lever.





- To slew, move the control lever in the displayed direction (1) or (3) – the automatic process continues.

- The superstructure turns into position (C).
- The lifting cylinders are retracted (D).

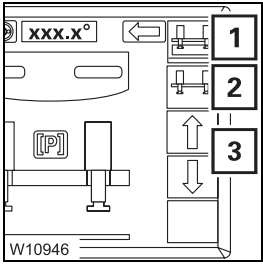
The symbol (2) is yellow and no longer flashes, the rigging process is complete.

- Let go of the control lever.



52203182

Cancel automatic mode



You can cancel the automatic process any time.

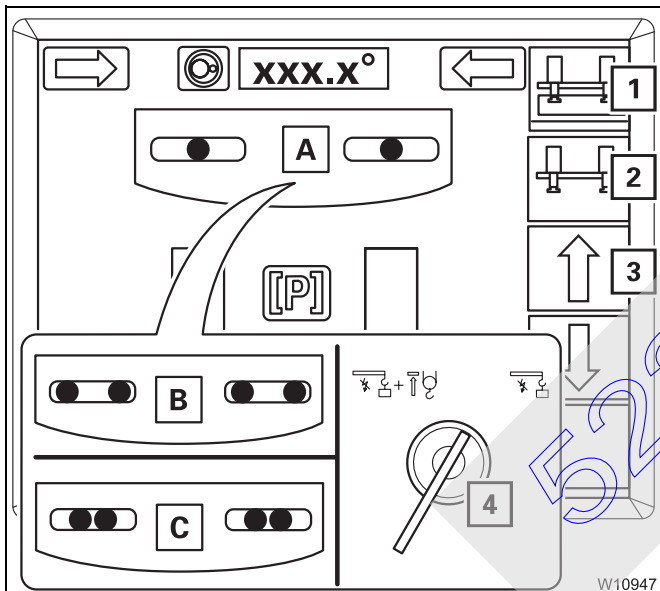
- Press the button not used (1), (2) or a button (3)
The automatic process is cancelled.

If the symbol (1) or (2) is **yellow**, you can re-activate the automatic process.



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. Only slew the superstructure when 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)

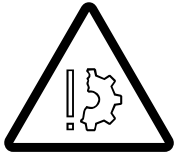
- Turn the key-operated switch (4) to the right. The following movements are now no longer monitored.
- Slew the superstructure to position (A) or (B) – caution: no monitoring.
- Fully retract the lifting cylinders.

13.7.8

Screwing the counterweight section to the turntable

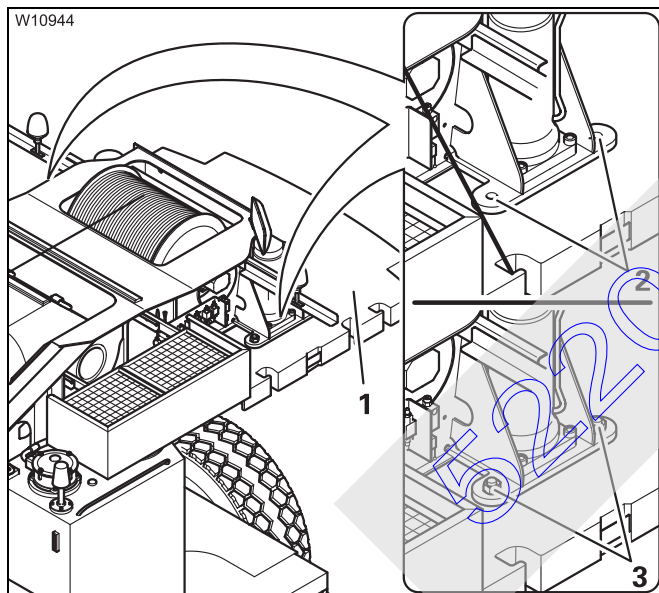
With counterweight version **B**, the 5 t section (without recesses) must be screwed to the turntable.


If the 5 t section is supplied separately, you must screw it on before you use the crane for the first time.



Risk of damage to the counterweight

Do not stack the 5 t section without recesses onto the counterweight version. This prevents the extending lifting cylinders from being pushed against the 5 t section and becoming damaged, and it ensures that the counterweight sections are stacked flush on top of each other and stay in place.



- Lift the 5 t section (1) to the turntable;  *Slings points*, p. 13 - 59.
- Align the connection points (2).
- Attach the 5 t section to the turntable on both sides using the supplied screws and nuts (3).
- Tighten the screws with a torque of 1890 Nm (1395 lbf ft).
- Remove the sling gear.

13.7.9

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 SLI code set, and the SLI disables the slewing operation if it is not permitted.



Danger of overturning when slewing with an incorrectly set SLI!

The SLI only disables the slewing operation if you have entered the SLI code correctly and if the SLI is not overridden.

Therefore always check before slewing whether the SLI code valid for the current rigging mode is displayed.

This prevents slewing operations from being released within impermissible ranges, which would cause the truck crane to overturn.



Danger of overturning when slewing with the hand-held control!

The crane operations are not monitored by the SLI whenever the hand-held control is connected.


Therefore always check before slewing whether a sufficient outrigger span has been set for the rigged counterweight.

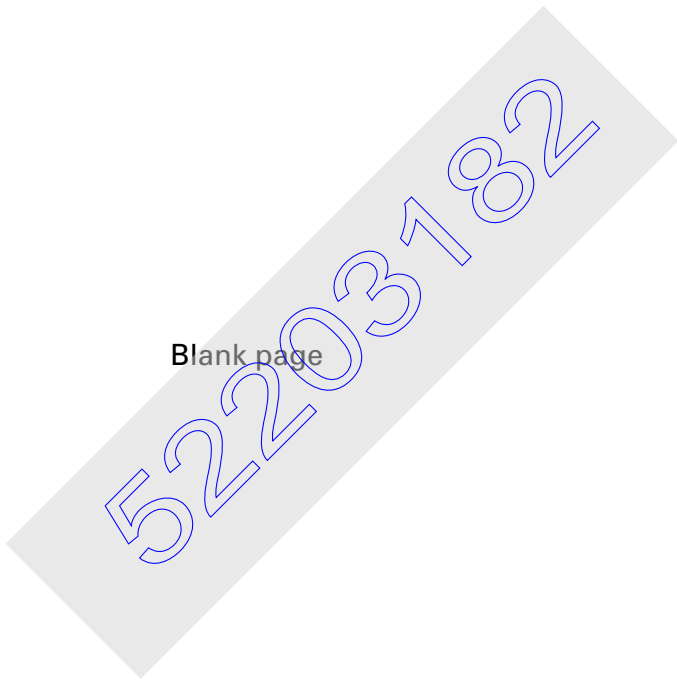
This prevents the truck crane from overturning during slewing due to excess counterweight mass.

The following table specifies (depending on the counterweight and outrigger span) whether slewing the superstructure is:

- permissible
- only permitted for certain working radii or
- is not permissible.


		Rigged outrigger span				
		8.55 x 2.74 (28.1 x 9.0 ft)	8.55 x 4.40 m (28.1 x 14.4 ft)	8.55 x 5.60 m (28.1 x 18.4 ft)	8.55 x 6.80 m (28.1 x 22.4 ft)	8.55 x 8.10 m (28.1 x 26.6 ft)
Rigged counterweight	0 t	1)				
	5 t		slewing permissible	slewing permissible	slewing permissible	slewing permissible
	11 t					
	16 t					
	21 t					
	26 t					
	26 t	rigging modes not permissible				
	31 t					
	36 t					
	41 t	slewing not permissible				
	51 t					
	71 t					
77 t						

1) Slewing is only permissible if the radius permitted in the working range is observed (at least 3.0 m (9.8 ft));  *Lifting capacity table.*




13.8 Rigging work on the main boom

13.8.1 Hook block on the bumper

When the hook block is transported on a separate vehicle;  p. 13 - 81.

Picking up the hook block

Depending on the driving mode, you must pick up the hook block from the front bumper;  *Hinweise*, p. 6 - 1.

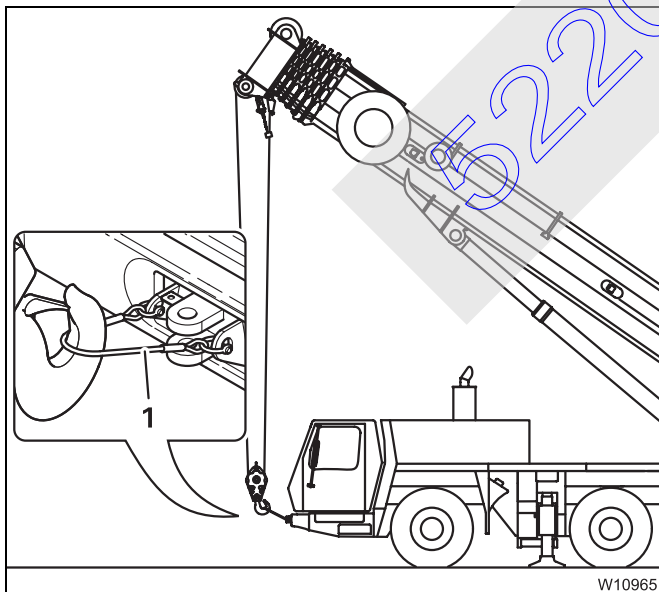
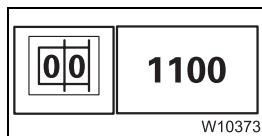


Danger of accidents if the view is obstructed

Have someone instruct you when raising the main boom, since the view on the hook block is obstructed. That way you will not raise the boom too far, which would cause the retaining rope to tear.

The main boom is fully retracted.


- Enter the current rigging mode on the SLI.



- Slacken the hoist rope and raise the main boom simultaneously.
- Raise the main boom until the boom head is in a vertical position above the hook block.
- Detach the hook block from the retaining rope (1).



Attaching the hook block

Depending on the driving mode, you can attach the hook block to the front bumper;  *Hinweise*, p. 6 - 1.



Danger of accidents if the view is obstructed

The reeved rope lines obstruct the view on the road. The number of legally permissible rope lines can vary depending on the country in which you are working. According to EU regulations, the hook block may not be reeved more than four times when driving on the road.

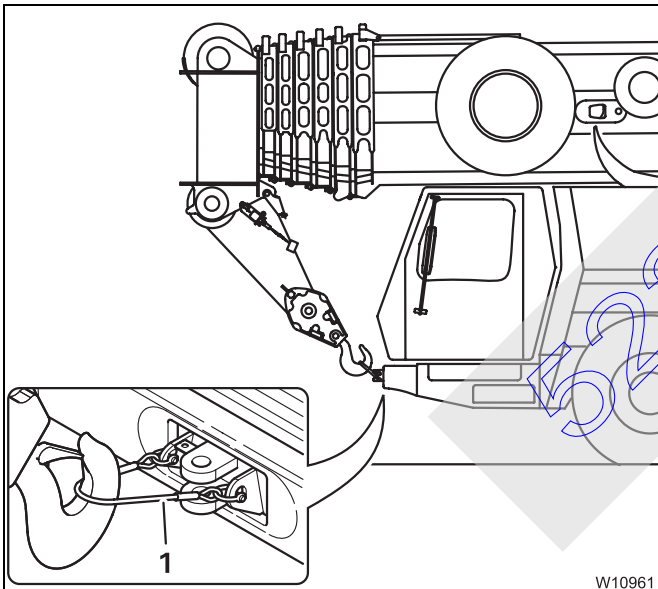


Danger of accidents due to the hook block swinging unexpectedly

The hook block will suddenly swing **forwards** if the retaining rope for the hook block tears when tightening the hoist rope. Therefore make sure that the banksman or other persons are always at a safe distance **to the side** of the hook block.




Do not attach the rope end clamp to the front towing coupling. The towing coupling must be free for a tow-rod in emergencies.



- Raise the hook block vertically above the retaining rope (1).
- Lower the hook block and attach the hook block to the retaining rope (1).
- Set down the main boom onto the boom rest and pull the hoist rope tight only to the extent that the hook block is stabilized in its position.



If the lifting limit switch is deactivated while you tighten the hoist rope, you can override the deactivation of the lifting limit switch;  p. 12 - 52.


13.8.2

Hook block on a separate vehicle



Risk of overturning while slewing!

Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius).

Correct the rigging mode if necessary;  *Slewing with rigged counterweight*, p. 13 - 76.



Danger of overturning when slewing with an overridden SLI!

Do not override the SLI before slewing the superstructure.

Enter an SLI code for the 360° working range if the slewing operation is not released.

In this way you prevent the superstructure from being slewed into impermissible areas and the truck crane tipping over as a result.



Risk of damage to the separate vehicle

Only raise the hook block from the separate vehicle if the main boom head is directly above the hook block.

This prevents the hook block from swinging and damaging the separate vehicle.



Risk of damage to the hoist rope

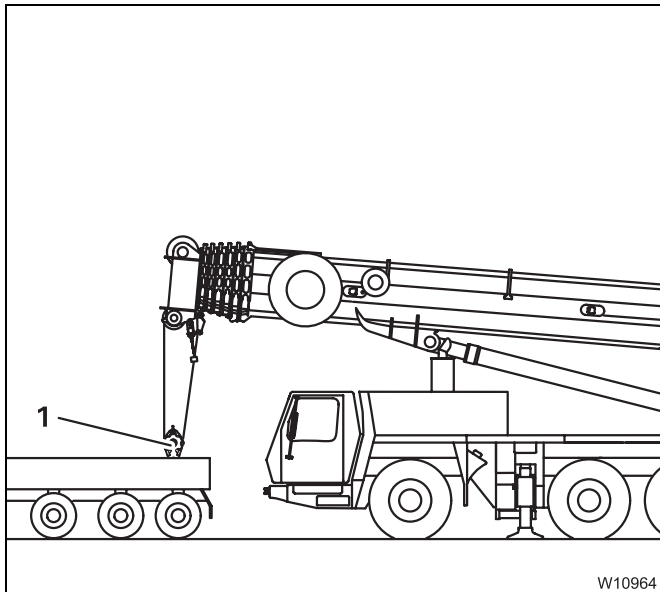
To prevent slack rope, do not ease down too much hoist rope when picking up and reeving the hook block.

Slack rope causes rope loops on the hoist drum, which can result in the load slipping and the hoist rope becoming destroyed.



Picking up the hook block

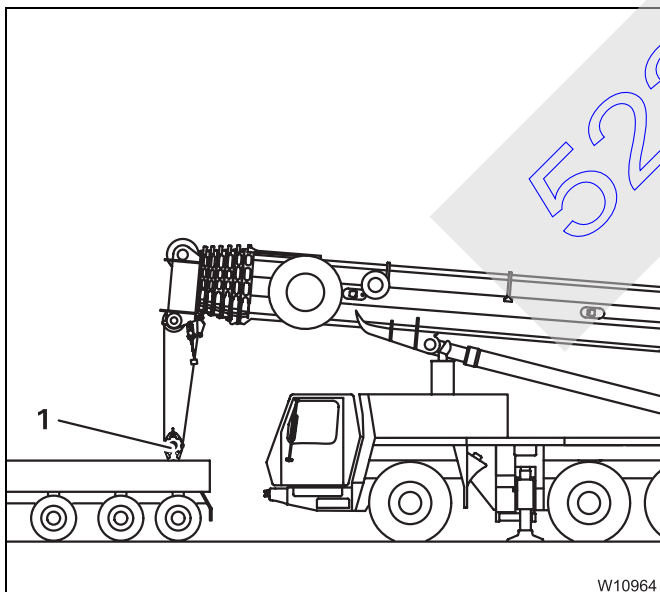
Depending on the driving mode, the hook block can be placed on a separate vehicle; **►► Hinweise**, p. 6 - 1.



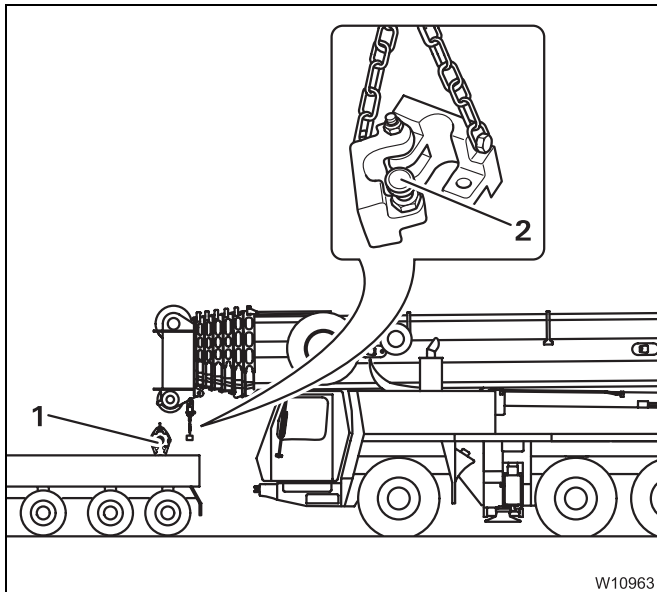
- If the respective setting has been made in the SLI, slew the superstructure and lower the main boom until the boom head is directly above the hook block (1).
- Unreel the hoist rope.
- Reeve the hoist rope into the hook block (1); **►► Reeving and unreeling the hoist rope**, p. 13 - 84.
- Raise the 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; **►► Hinweise**, p. 6 - 1.



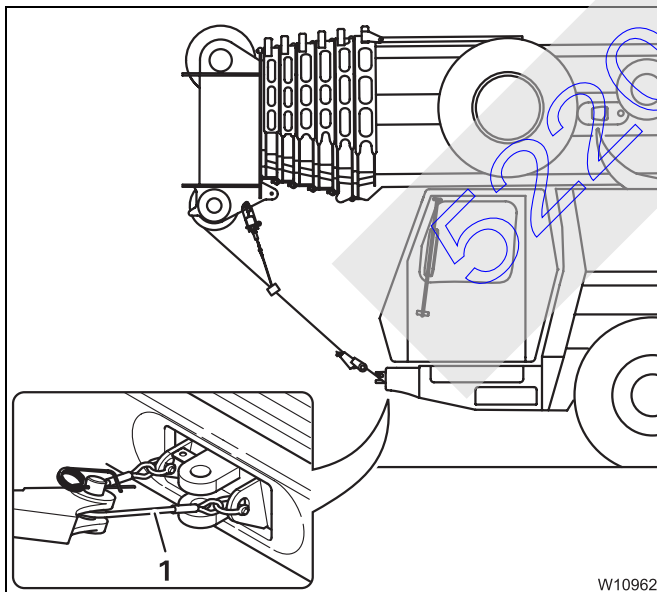
- With the SLI set accordingly, fully retract the main boom.
- Raise the hook block until it is approx. 1 m (3.3 ft) below the main boom.
- Lower the main boom and set the hook block (1) down on the separate vehicle.



- Detach the lifting limit switch weight (2) from the hoist rope; ► p. 13 - 104.
- Unreeve the hoist rope; ► p. 13 - 90.
- Secure the hook block (1) for transport.
- Set down the main boom on the boom rest.

Fastening the hoist rope to the bumper

Do not attach the rope end clamp to the front towing coupling. The towing coupling must be free for a tow rod in emergencies.




- Attach the rope end clamp to the retaining rope (1).
- Pull the hoist rope slightly taut.
- Fasten the lifting limit switch weight to the hoist rope.

The hoist rope and lifting limit switch weight are now secured for driving.

13.8.3

Reeving and unreeving the hoist rope

You must reeve a certain number of rope lines, depending on the required lifting capacity. Four reeved rope lines correspond to 4-fall reeving, for example.

Possible reevings and the corresponding lifting capacities;  p. 13 - 91.

Fastening the rope end clamp

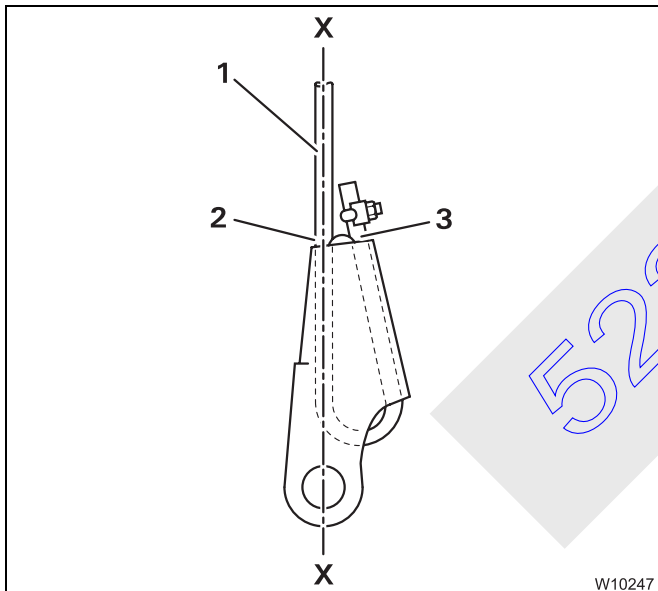
The rope end clamp is used to fasten the hoist rope to the main boom head or the hook block after reeving.



Risk of accidents due to incorrect rope guide

Always thread the hoist rope through as shown in the section *Correct rope guide*.

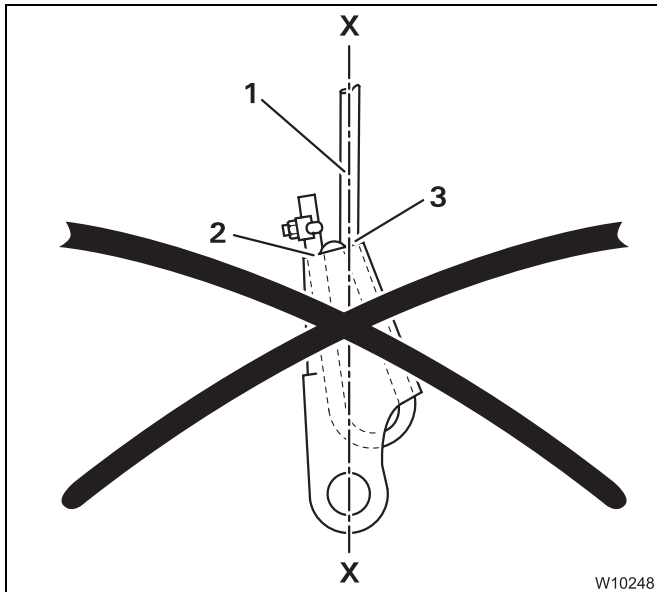
This prevents the load-bearing rope from becoming kinked, which would damage it and make it tear.



Correct rope guide

The hoist rope end must run into the rope end clamp at point (2) and protrude from the rope end clamp at point (3).

Under a load, the load-bearing rope (1) runs along the pulling axis (X-X) and is not kinked.



Incorrect rope guide

The hoist rope end must **never** run into the rope end clamp at point (3) and protrude from the rope end clamp at point (2).

Under a load, the load-bearing rope would become kinked at point (3) and become damaged as a result.

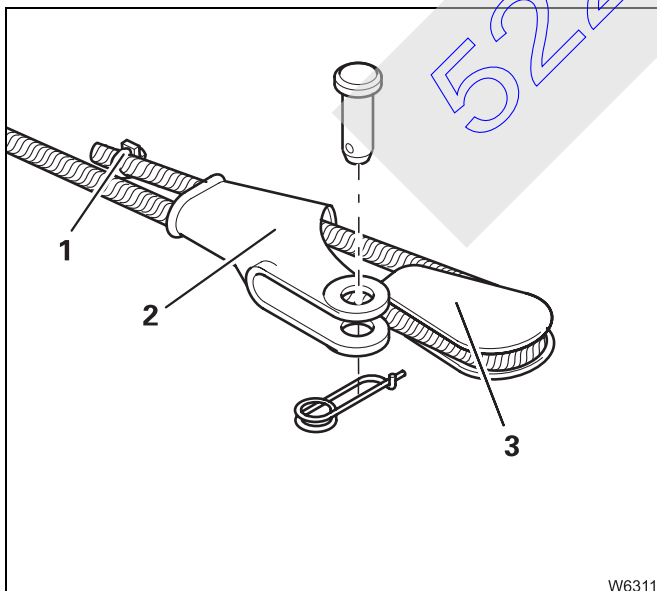
The rope end clamp and the rope wedge are marked with their size and the rope diameter they are designed for.



Risk of accidents from incorrect rope end clamp/rope wedge

Only use rope end clamps and rope wedges of the same size that are designed for the cross-section of the hoist rope you are using.

This will prevent the hoist rope from slipping out of the rope end clamp when under a load, which would cause the load to be dropped.



- Observe the correct rope guide!
- Insert the hoist rope with the corresponding rope wedge (3) into the rope end clamp (2).
- Fasten the rope clamp (1) to the loose end of the hoist rope.
- Pull the hoist rope taut until the rope wedge and the hoist rope sit tightly in the rope end clamp.



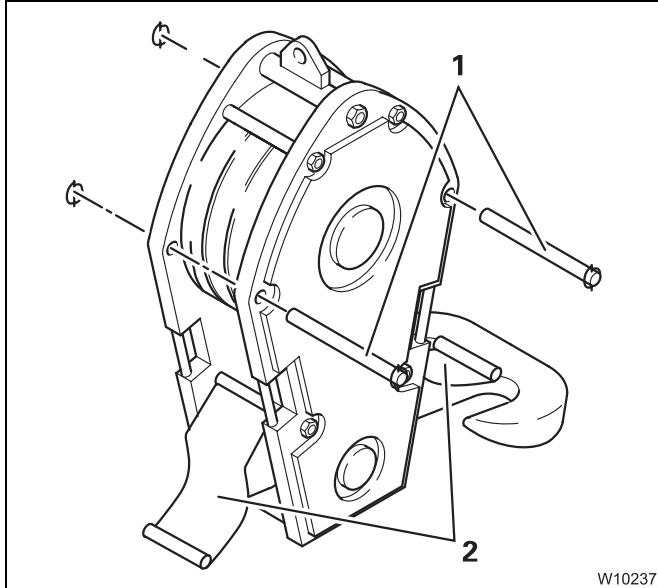
Reeving the hoist rope

Reeving is also possible when the rope end clamp is fastened.



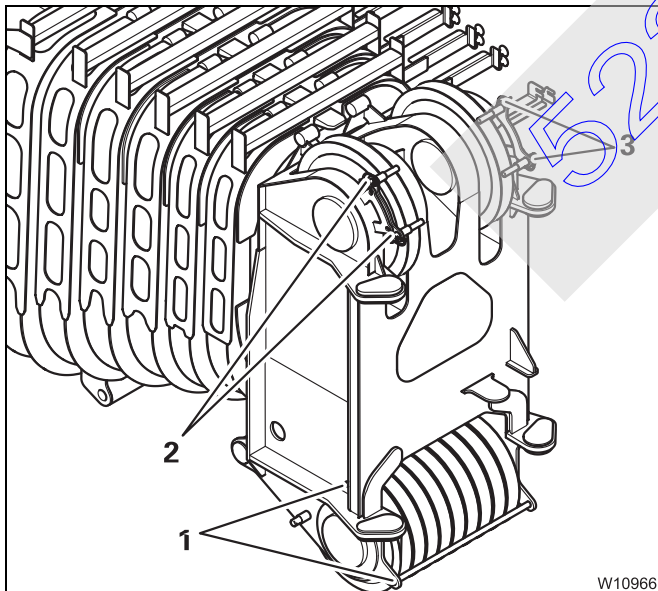
Danger posed by rope slack

Only use hook blocks and lifting gear of the minimum weight prescribed in the *Lifting capacity tables*, depending on the reeving and boom length. That way you prevent slack rope forming at large heights when lifting without a load. This can result in the load slipping.



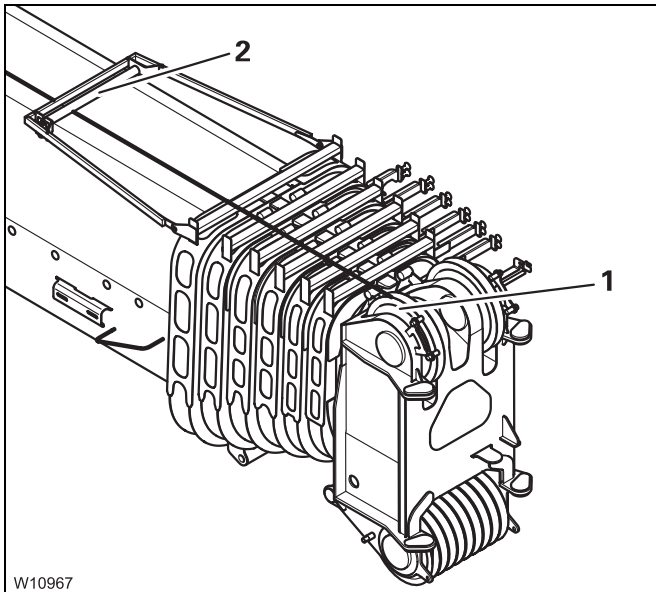
Opening the hook block

- Remove the spring cotters and pull out the rods (1).
- Fold down the plates (2).



Positioning the hoist rope

- Remove the retaining pin and pull out:
 - the rods (1) and (2) for the main hoist rope,
 - the rods (1) and (3) for the auxiliary hoist rope.



- Feed the hoist rope under the rope grab (2) to the upper, right-hand head sheave (1).

If the ropes of both hoists are reeved, you must feed the auxiliary hoist rope **over** the rope grab.

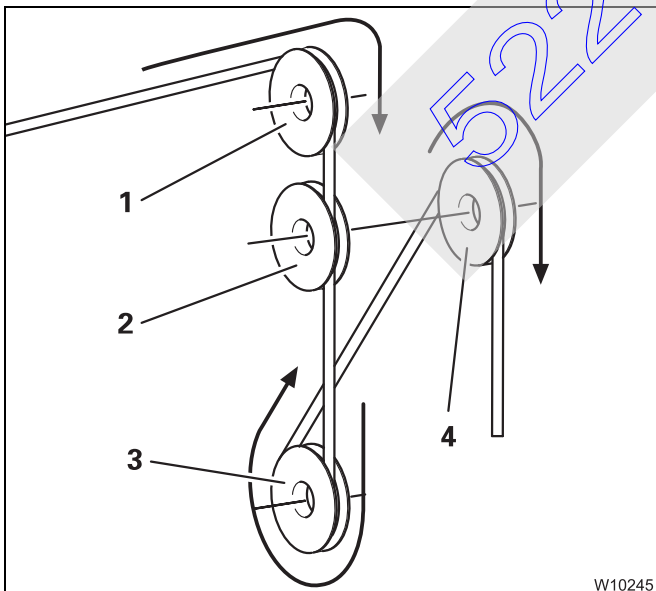
Use the rope grab also when operating the lattice extension.



Risk of damage to the hoist rope

Always guide the hoist rope over the right-hand head sheave. You must extend a telescopic section at least to the middle fixed length before lifting a load if a second hoist rope is to be guided over the left head sheave.

This prevents the maximum permissible rope angle from being exceeded, which would damage the hoist rope.



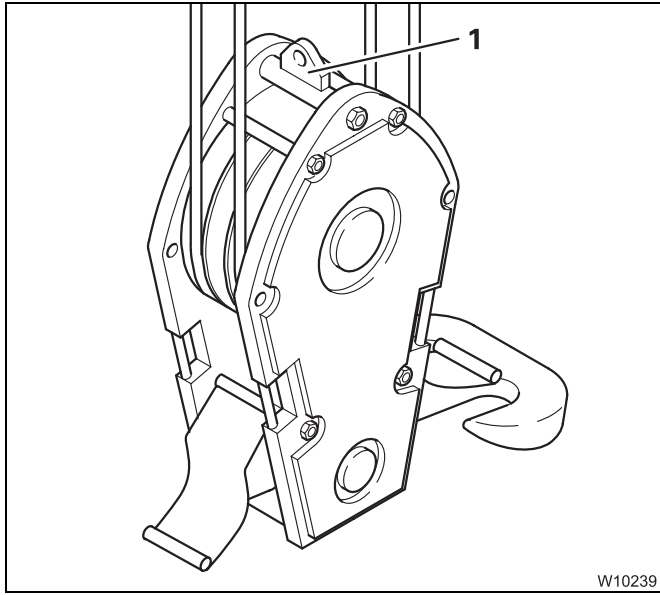
Reeving the hoist rope

Possible reevings; p. 13 - 91.

- Feed the hoist rope over the upper, right-hand head sheave (1) to the lower, right-hand 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.

After reeving, you must attach the hoist rope to a fixed point.



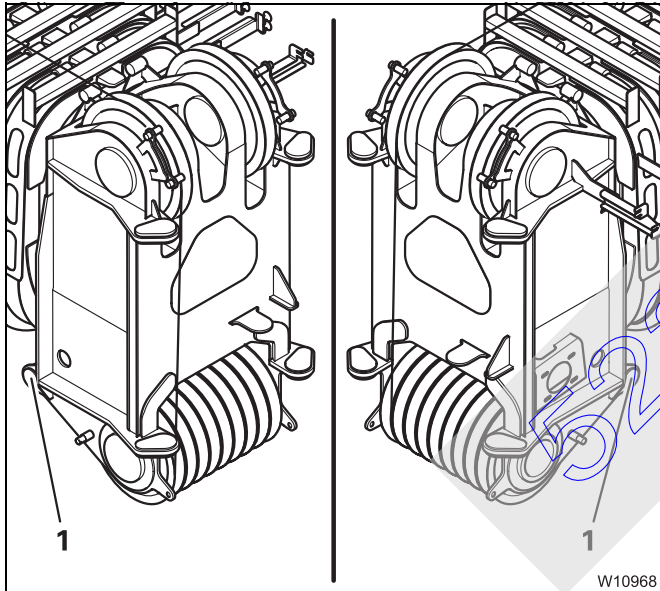


Fastening the hoist rope

The fixed point used depends on the number of reeved rope lines.

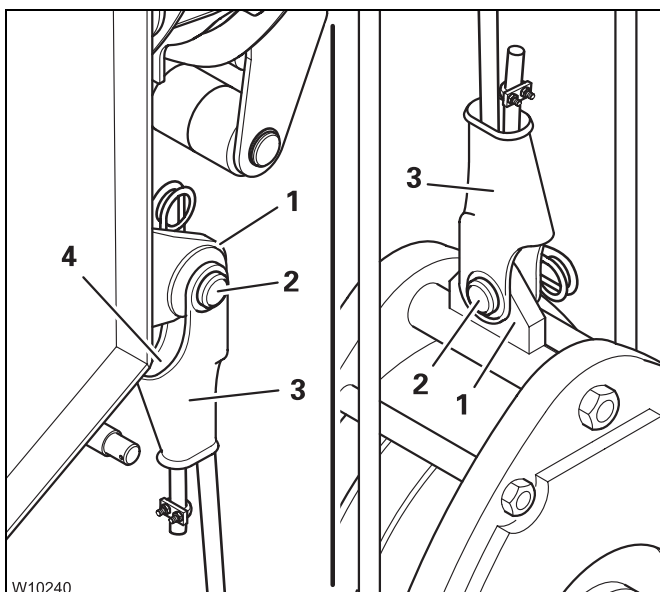
– Fixed point for an odd number of lines

The rope end clamp is fastened to the fixed point (1) with 1-fall, 3-fall, 5-fall etc. reevings.

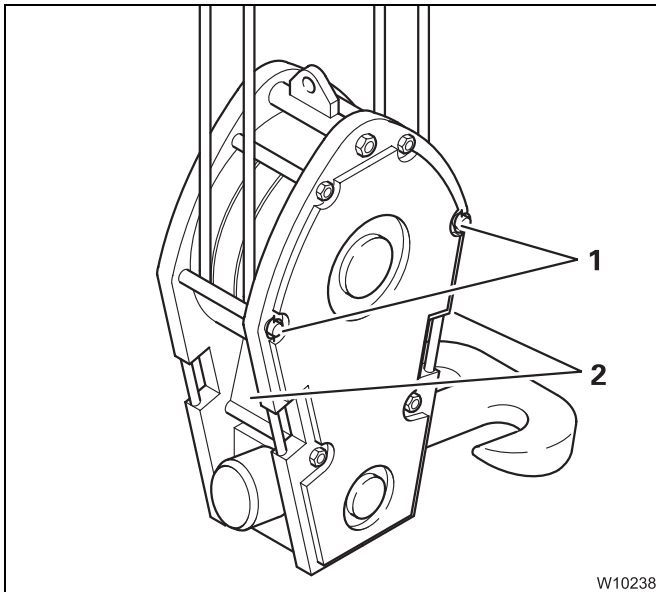


– Fixed point for an even number of lines

The rope end clamp is fastened to the fixed point (1) with 2-fall, 4-fall, 6-fall etc. reevings.



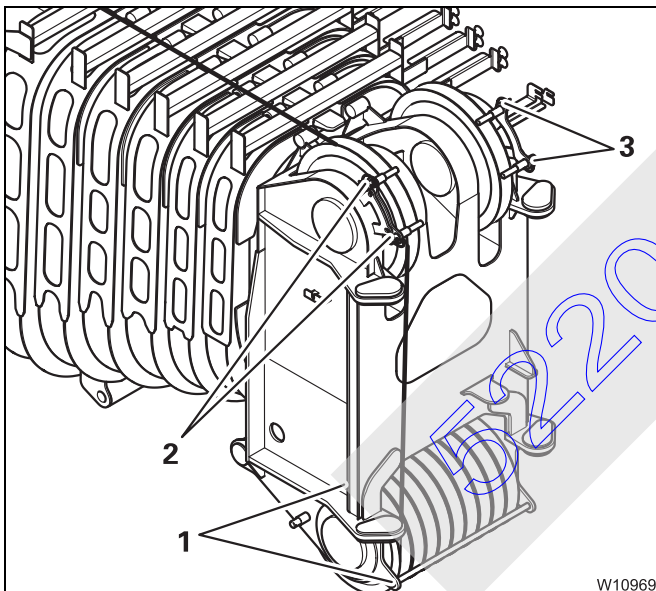
- Fit the rope end clamp (3) onto the fixed point (1). When the number of lines is even, the cutout (4) must point to the front.
- Fasten the rope end clamp with the pin (2) and secure the pin with the retaining pin.



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Closing the hook block

- Fold up the plates (2) on both sides.
- Insert the rods (1) and secure them with the cotter pins.



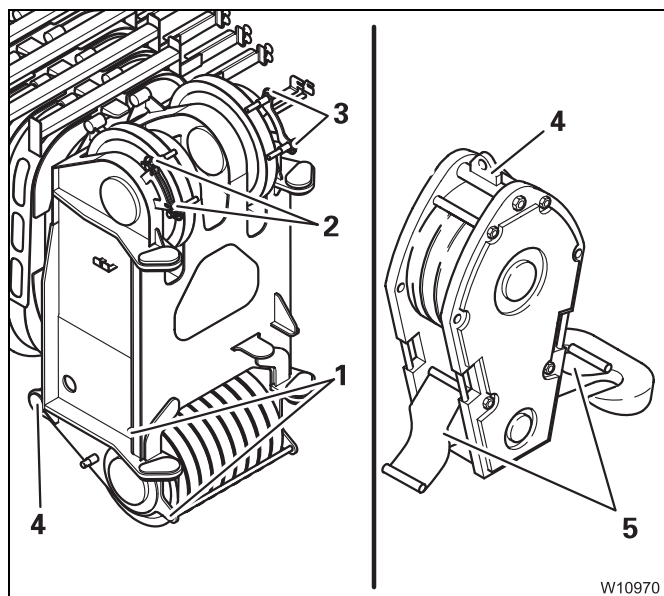
W10969

Securing the hoist rope

- Insert:
 - the rods (1) and (2) for the main hoist rope,
 - the rods (1) and (3) for the auxiliary hoist rope.
- Secure all rods using the retaining pins.



Unreeving the hoist rope



- Remove the retaining pins and pull out the rods (1).
- Fold down the plates (5); p. 13 - 86.
- Remove the rope end clamp from the fixed point (4).
- Unreeve the hoist rope.

Depending on the driving mode, you can:

- fasten the hoist rope to the bumper;
 p. 13 - 83 or
- pull out the rods (2) and (3) and roll the hoist rope onto the drum.





For driving, insert all rods and secure them with the retaining pins. Close the hook block.

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13.8.4

Possible reevings with 8 head sheaves

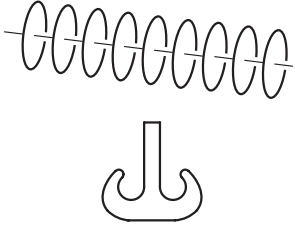
Possible reevings on lattice extensions and the auxiliary single-sheave boom top;   *Operating instructions lattice extension GMK 5220.*



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



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



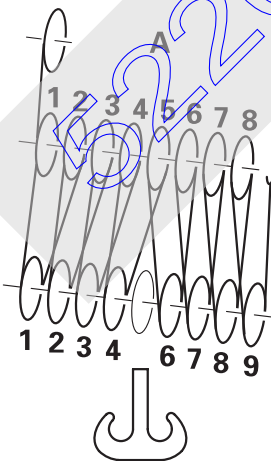
9-sheave hook block


Max. lifting capacity of the hook block 200.0 t

Max. lifting capacity with the GMK 5220: (440,900 lbs)

A With 16-fall reeving 144.0 t

 (317,500 lbs)

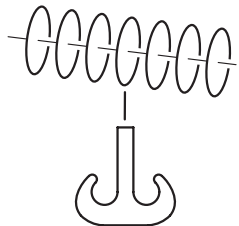
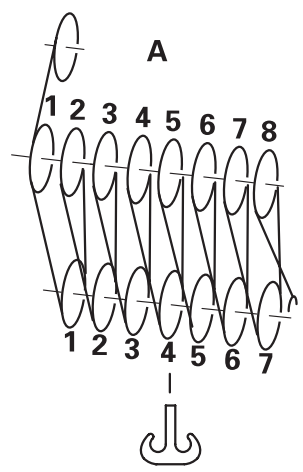
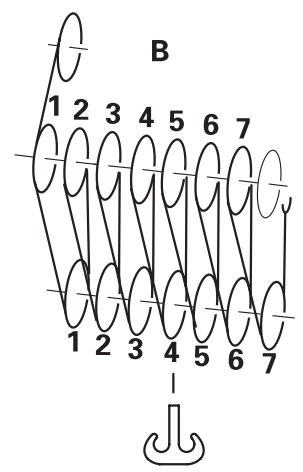
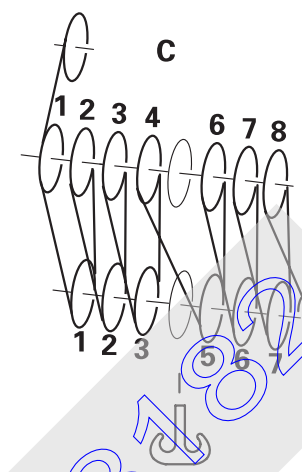
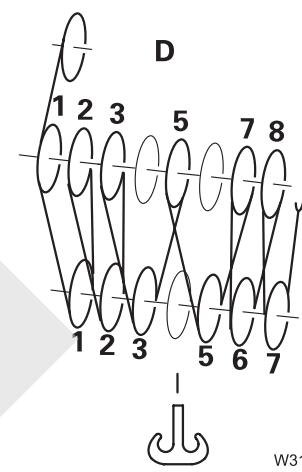




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7-sheave hook block
 Max. lifting capacity of the hook block 160.0 t (352,800 lbs)
Max. lifting capacity with the GMK 5220:

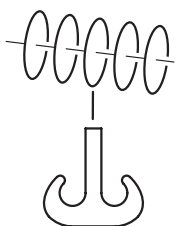
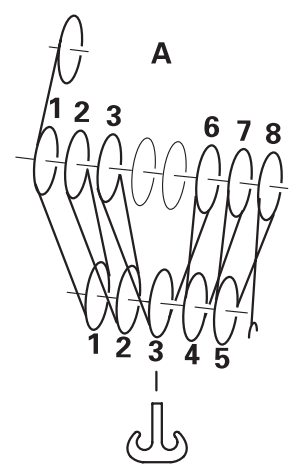
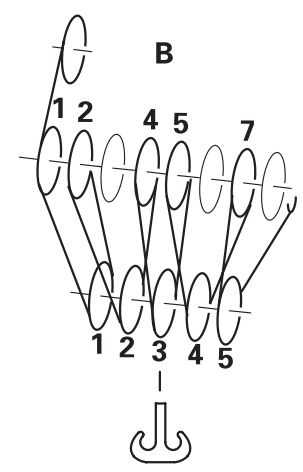
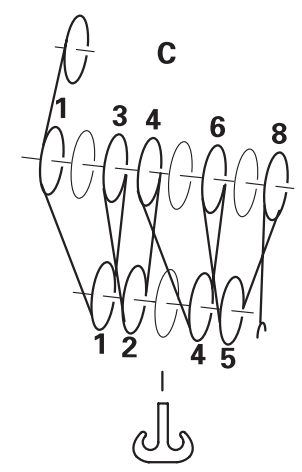
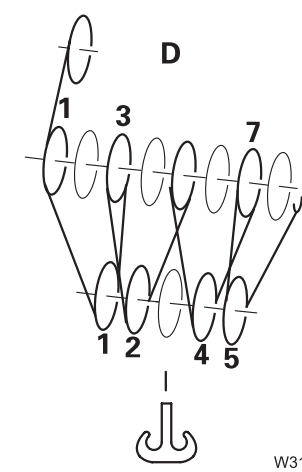
A With 15-fall reeving	135.0 t (297,600 lbs)
B With 14-fall reeving	126.5 t (278,900 lbs)
C With 13-fall reeving	117.9 t (260,000 lbs)
D With 12-fall reeving	109.2 t (240,800 lbs)

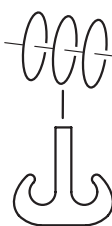
W3165

5-sheave hook block
 Max. lifting capacity of the hook block 125.0 t (275,600 lbs)
Max. lifting capacity with the GMK 5220:

A With 11-fall reeving	100.4 t (221,300 lbs)
B With 10-fall reeving	91.6 t (201,900 lbs)
C With 9-fall reeving	82.7 t (182,300 lbs)
D With 8-fall reeving	73.8 t (162,700 lbs)

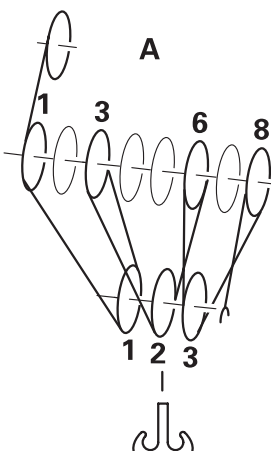
W3166



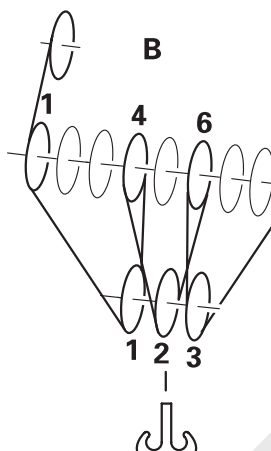
3-sheave hook block
Max. lifting capacity of the hook block 80.0 t (176,400 lbs)
Max. lifting capacity with the GMK 5220:

A With 7-fall reeving	64.8 t (142,900 lbs)
B With 6-fall reeving	55.7 t (122,800 lbs)
C With 5-fall reeving	46.6 t (102,700 lbs)
D With 4-fall reeving	37.4 t (82,500 lbs)

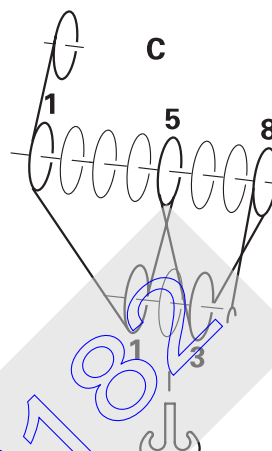
A



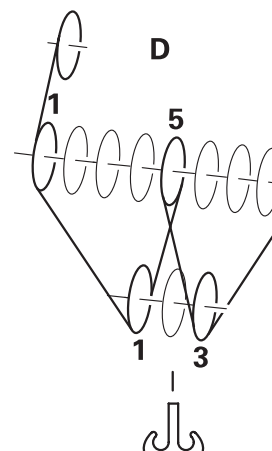
B




C



D



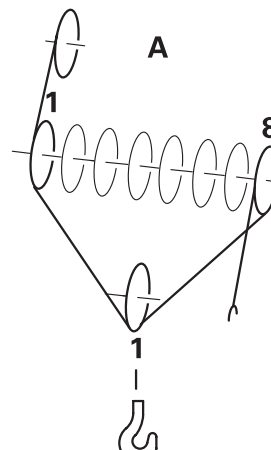
W3167



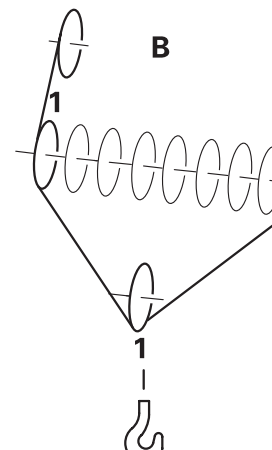
1-sheave hook block
Max. lifting capacity of the hook block 35.0 t (77,200 lbs)
Max. lifting capacity with the GMK 5220:

A With 3-fall reeving	28.2 t (62,200 lbs)
B With 2-fall reeving	18.8 t (41,500 lbs)
C With 1-fall reeving	9.5 t (21,000 lbs)

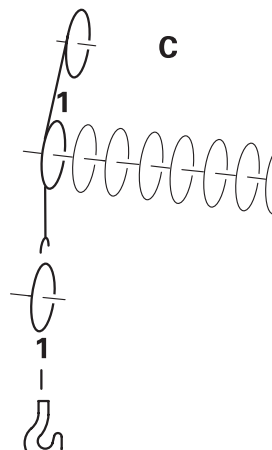
A



B



C



W3168



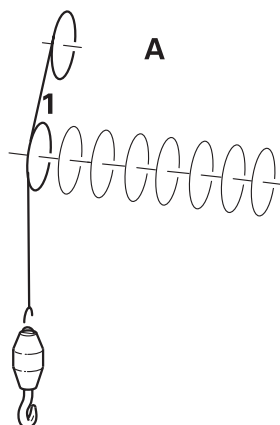


Hook tackle

Max. lifting capacity of the hook tackle 12.0 t (26,500 lbs)

Max. lifting capacity with the GMK 5220:

A 1-fall reeving 9.5 t (21,000 lbs)





W3169

52203182

13.8.5

Possible reevings with 9 head sheaves

With other additional equipment, the hoist rope can also be reeved 22 times;  p. 13 - 112.

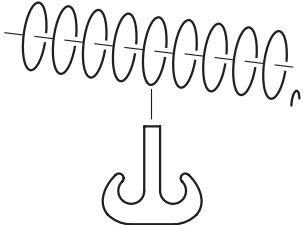
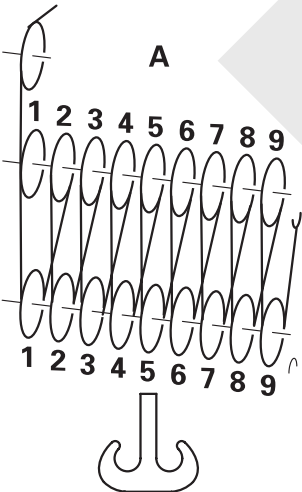
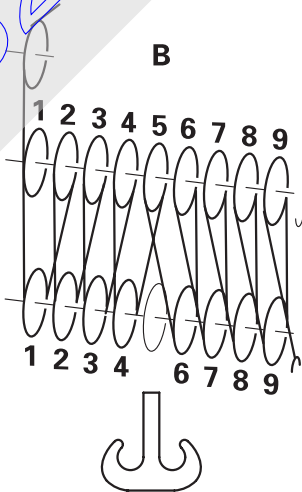
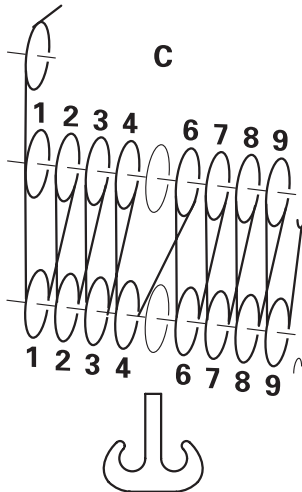
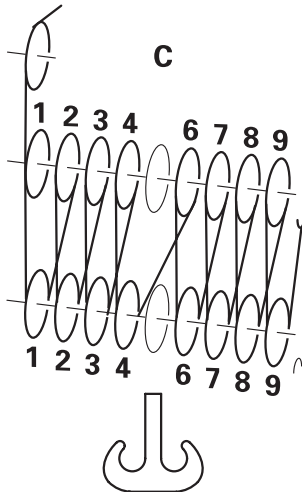
Possible reevings on lattice extensions and the auxiliary single-sheave boom top;  *Operating instructions lattice extension GMK 5220.*



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

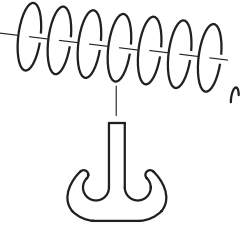


Please note that the maximum lifting capacities already include the weight of the hook block and the sling gear. You must subtract these weights in order to obtain the actual payload.

	<p>9-sheave hook block Max. lifting capacity of the hook block 200.0 t Max. lifting capacity with the GMK 5220: (440,900 lbs)</p>	<p>A With 18-fall reeving 160.0 t (352,800 lbs)</p>
	<p>B</p> 	<p>B With 17-fall reeving 152.0 t (335,100 lbs)</p>
	<p>C</p> 	

W4446

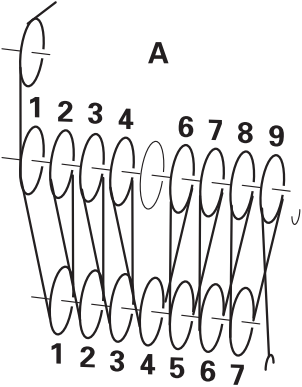




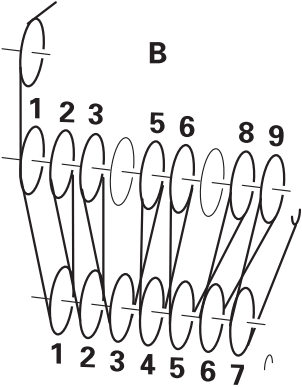
7-sheave hook block
Max. lifting capacity of the hook block 160.0 t (352,800 lbs)
Max. lifting capacity with the GMK 5220:

A With 15-fall reeving	135.0 t (297,600 lbs)
B With 14-fall reeving	126.5 t (278,900 lbs)
C With 13-fall reeving	117.9 t (260,000 lbs)
D With 12-fall reeving	109.2 t (240,800 lbs)

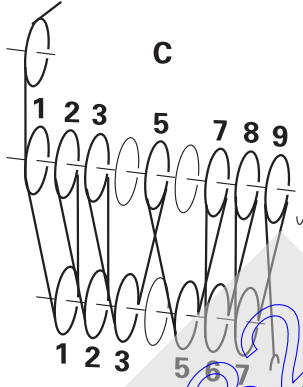
A



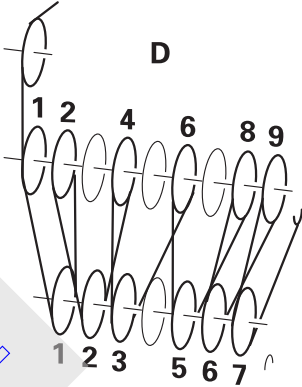
B

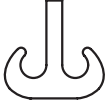





C

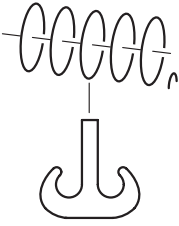


D



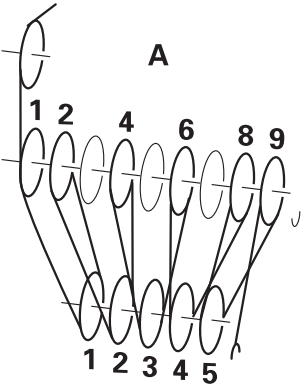
W4448



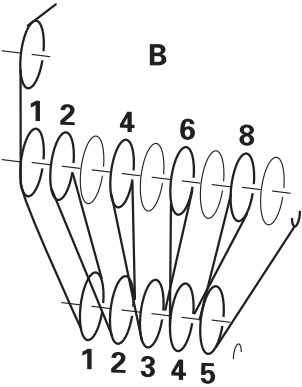
5-sheave hook block
Max. lifting capacity of the hook block 125.0 t (275,600 lbs)
Max. lifting capacity with the GMK 5220:

A With 11-fall reeving	100.4 t (221,300 lbs)
B With 10-fall reeving	91.6 t (201,900 lbs)
C With 9-fall reeving	82.7 t (182,300 lbs)
D With 8-fall reeving	73.8 t (162,700 lbs)

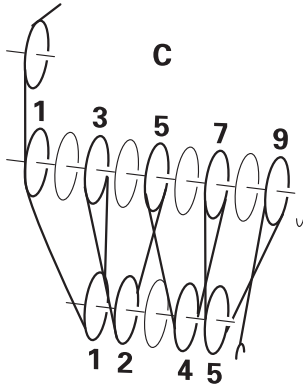
A



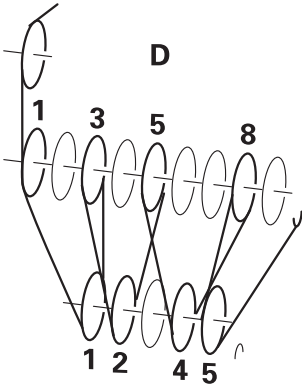
B







C



D

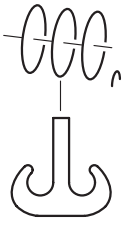
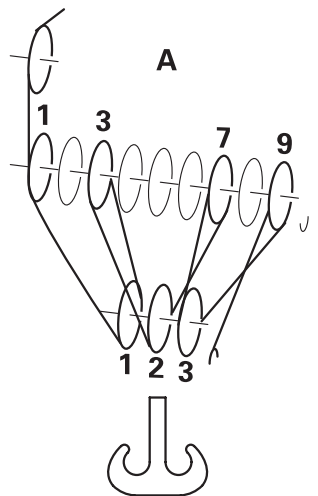
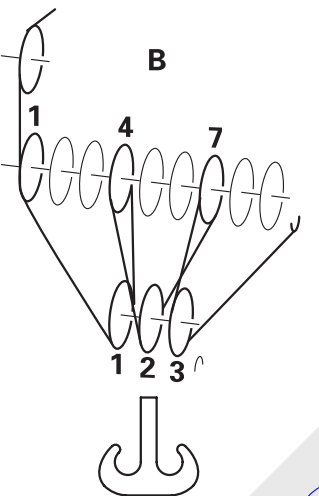
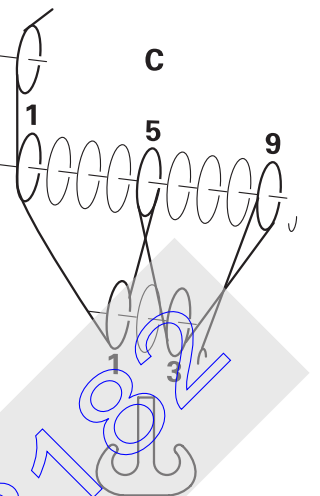
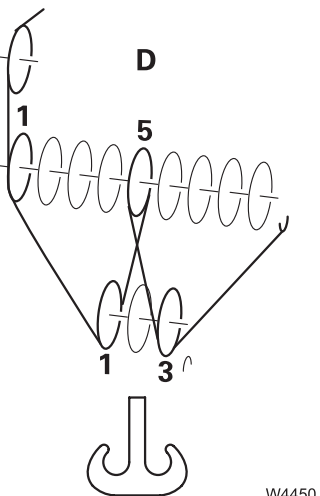


W4449

3-sheave hook block
 Max. lifting capacity of the hook block 80.0 t (176,400 lbs)
Max. lifting capacity with the GMK 5220:

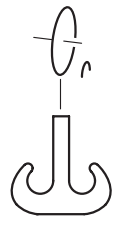
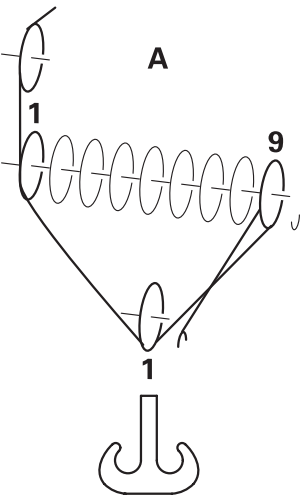
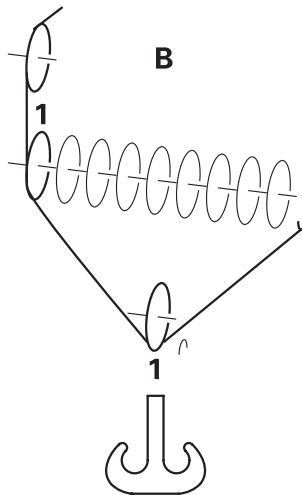
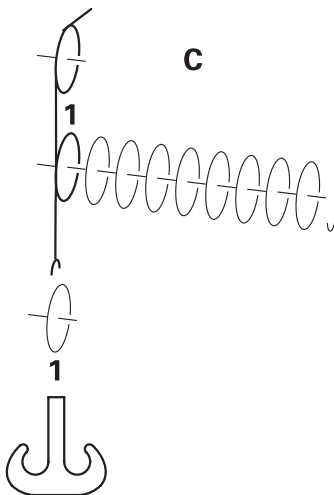
A With 7-fall reeving	64.8 t (142,900 lbs)
B With 6-fall reeving	55.7 t (122,800 lbs)
C With 5-fall reeving	46.6 t (102,700 lbs)
D With 4-fall reeving	37.4 t (82,500 lbs)

W4450

1-sheave hook block
 Max. lifting capacity of the hook block 35.0 t (77,200 lbs)
Max. lifting capacity with the GMK 5220:

A With 3-fall reeving	28.2 t (62,200 lbs)
B With 2-fall reeving	18.8 t (41,500 lbs)
C With 1-fall reeving	9.5 t (21,000 lbs)

W4447

31.01.2007



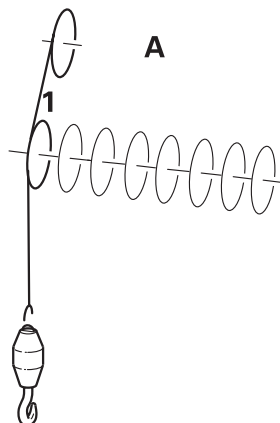


Hook tackle

Max. lifting capacity of the hook tackle 12.0 t (26,500 lbs)

Max. lifting capacity with the GMK 5220:

A 1-fall reeving 9.5 t (21,000 lbs)




W3169

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13.8.6

Installing/Removing the lifting limit switch

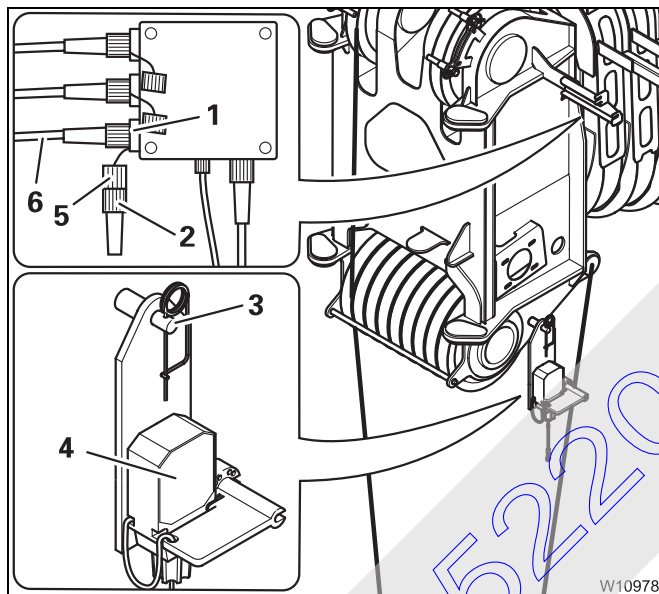
Function of the lifting limit switch;  p. 12 - 51.

If the truck crane is supplied with an auxiliary hoist, two lifting limit switches are included in the scope of delivery.

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

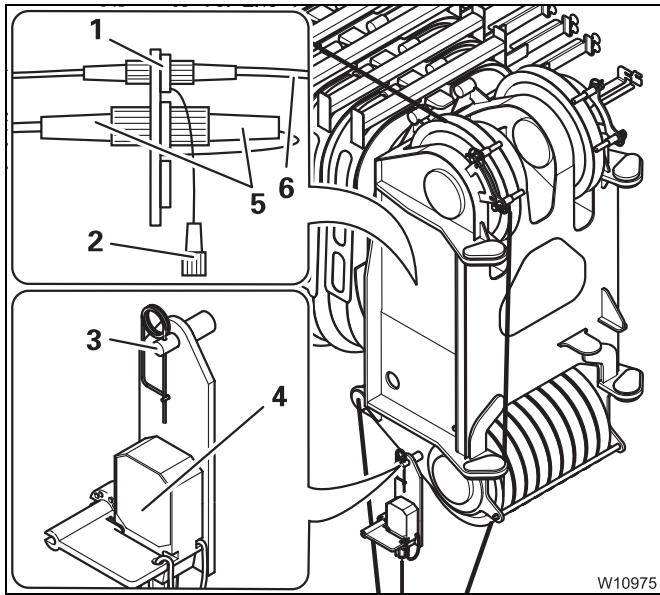
You can attach the lifting limit switch on the right or left side of main boom head. Install the switch on the side that is closer to the last rope leading upwards. There can also be one lifting limit switch installed on each side.



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 (5).
- Lay the cable (6) in such a way that it will not be damaged during crane operation, and insert the lifting limit switch into the socket (1).

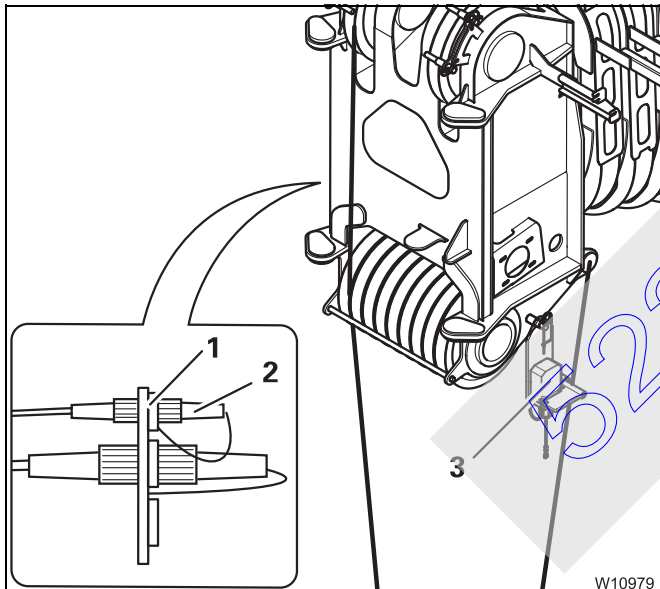




On the right side

- 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 (6) in such a way that it will not be damaged during crane operation, and insert the lifting limit switch into the socket (1).

Connections (5); *Operating instructions lattice extension GMK 5220.*



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.

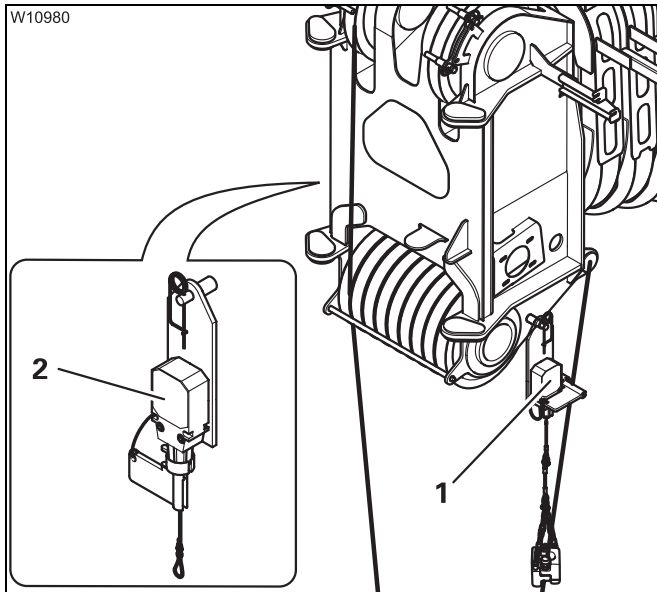
Otherwise the movements *Raise hosting gear, Telescope out* and *Lower the boom* will be locked.

- Check whether the lock on the lifting limit switch is released; *Removing the lock, p. 13 - 107.*



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

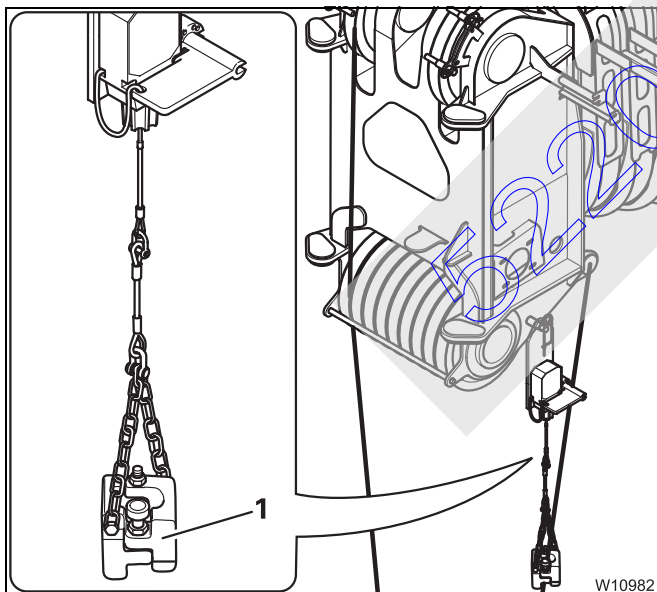
- Lock the lifting limit switch to which no lifting limit switch weight has been attached.

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. 13 - 106.

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



If two hoist ropes are reeved, you must also use two lifting limit switch weights. In this case, both lifting limit switches must be unlocked; **Removing the lock**, p. 13 - 107.



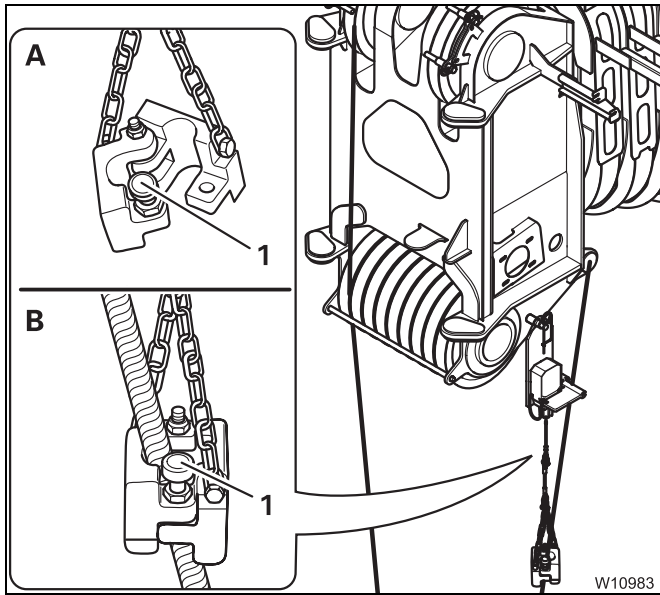
Attaching the lifting limit switch weight

- Attach the lifting limit switch weight (1).

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

This lifting limit switch must not be locked; **Removing the lock**, p. 13 - 107.





Placing a lifting limit switch weight around the hoist rope

- (A) – Pull the safety pin (1) out and fold the two halves of the weight apart.
- (B) – Place the two halves of the weight around the last rope line leading upwards.
- Pull the safety pin (1) out and fold the two halves of the weight back together.
- Make sure the safety pin locks into place and the two halves of the weight are securely attached to each other.

If two hoist ropes are reeved, you must also place a lifting limit switch weight around the second hoist rope.



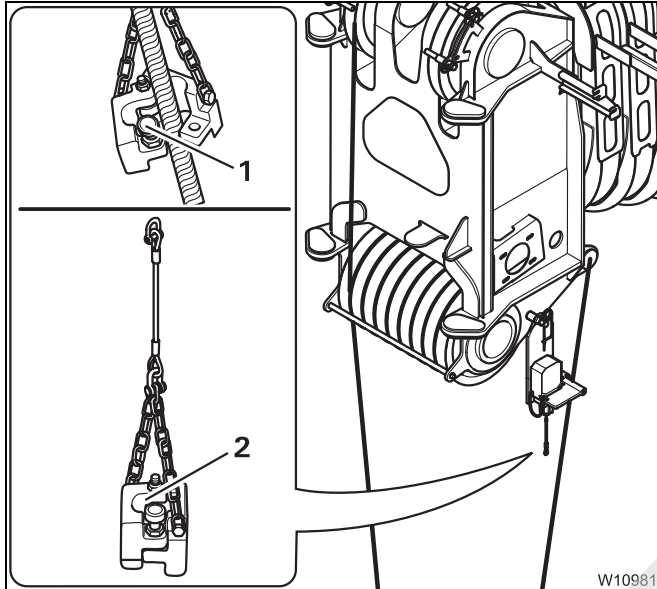
If you place the lifting limit switch weight around the last rope line leading upwards, less rope will run through the lifting limit switch weight, especially if there is a high number of reevings per lifting operation. This rope line will even be at a standstill if the number of rope lines is even.

This allows you to reduce the wear of the hoist rope and lifting limit switch weight and prevent unintentional deactivation procedures that may be caused by the running hoist rope lifting the lifting limit switch weight.

Removing the lifting limit switch

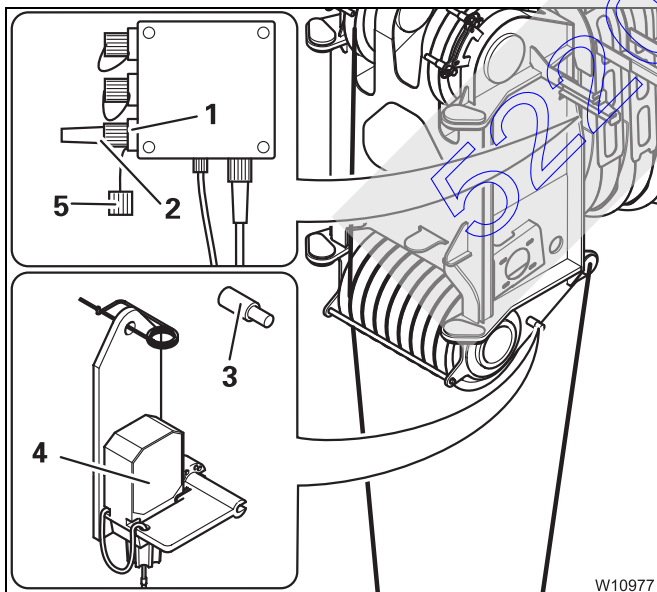
This section describes complete removal.

If the hook block is to be attached to the bumper at a later point, you will need to detach the lifting limit switch weight from the hoist rope, so that you can unreeve or reeve when rigging the hoist rope. You can place the lifting limit switch weight around the hoist rope again before driving.



Removing the lifting limit switch weight

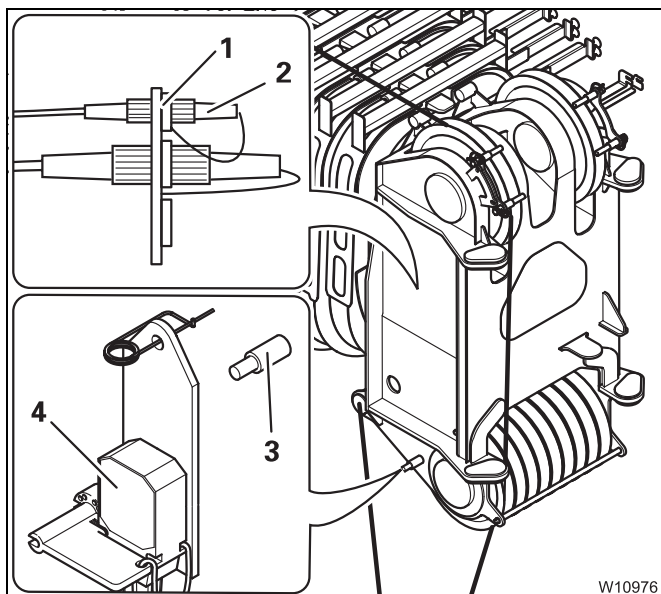
- Pull the safety pin (1) out and fold the two halves of the weight apart.
- Remove the halves of the weight from the rope.
- Pull the safety pin (1) out, fold the two halves of the weight back together and let the safety pin engage.
- Remove the lifting limit switch weight (2).
- Remove the lifting 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 holder (3).
- Attach 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 holder (3).
- Attach the retaining pin to the lifting limit switch.

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13.8.7

Locking/Unlocking the lifting limit switch

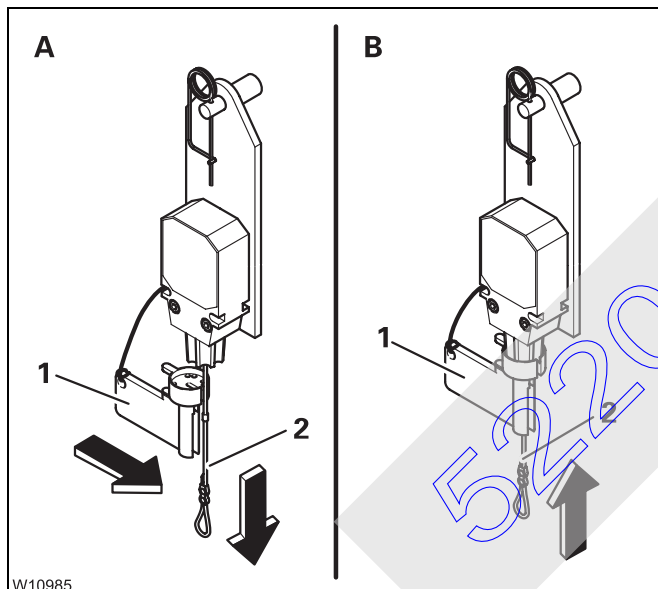
Locking

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

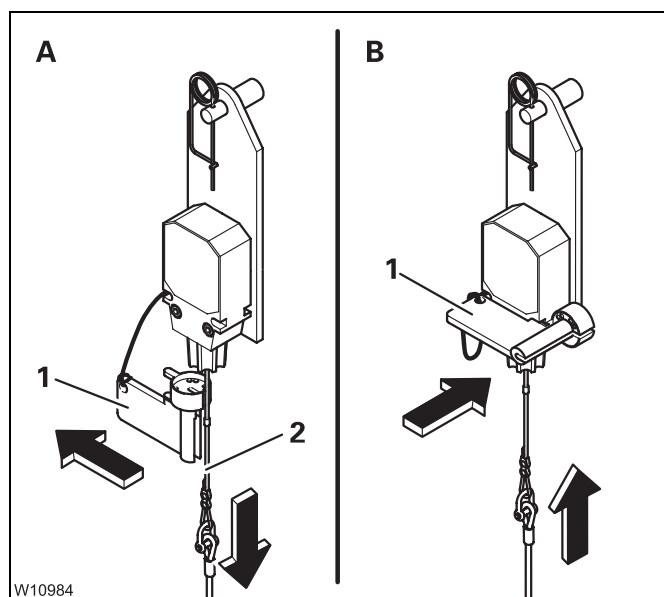
The lifting limit switch to which the lifting limit switch weight is attached may under no circumstances be locked when operating the crane. If the lifting limit switch is blocked, release the locking system. If the lifting limit switch is locked, the hook block could hit the bottom of the main boom head, resulting in damage to the hook block, main boom head and hoist rope.



- Remove the lifting limit switch weight.
- (A) – Remove the cap (1).
- Pull the rope (2) down – the lifting limit switch is triggered.
- (B) – Secure the rope (2) in this position using the cap (1) – the lifting limit switch is locked.



Removing the lock You must always remove the lock before you place a lifting limit switch weight around the hoist rope.

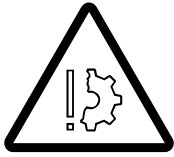


- **(A)** – Pull the rope (2) down and take off the cap (1) – the lock is removed.
- **(B)** – Fit the cap (1) onto the lifting limit switch.

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13.8.8

Anemometer and air traffic control light



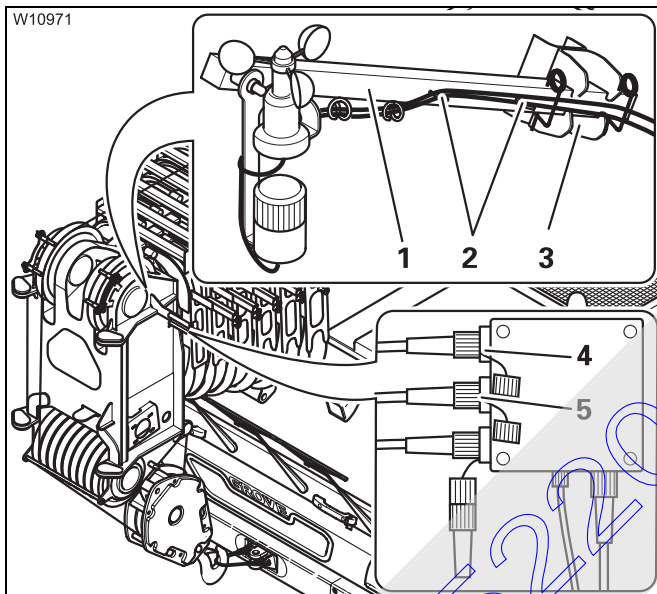
Risk of damage when driving on roads!

Always remove the anemometer and air traffic control light before on-road driving.

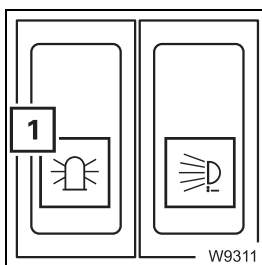
This prevents the specified overall height from being exceeded at on-road level, and the anemometer from being damaged by air currents.

Installing

The anemometer and the air traffic control light are located on the same rod.



- Insert the rod (1) into the holder (3) and secure it with the retaining pins.
- Remove the cables from the holders (2) and plug
 - the anemometer into socket (4),
 - the air traffic control light into socket (5).
- Lay the cables so 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.



Switching the air traffic control light on and off:

To switch on: Press switch (1) in at the bottom.

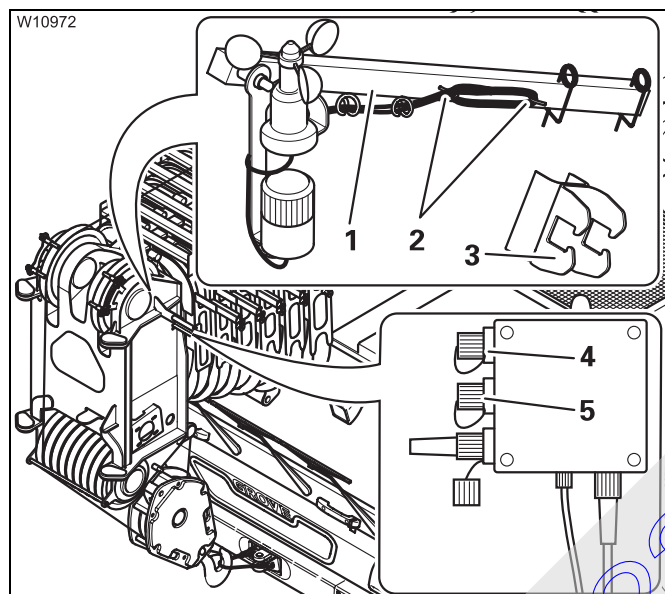
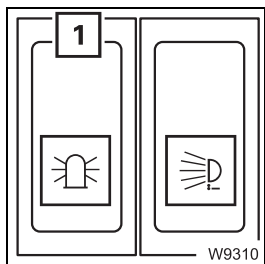
To switch off: Press switch (1) in at the top.



Removing

You must remove the rod with the anemometer/air traffic control light before driving on the road.

- Switch off the air traffic control light – press the switch (1) in at the top.



- Remove the plug and close the sockets (4) and (5) with the protective caps.
- Wind the cables onto the holders (2).
- Take the rod (1) out of the holder (3).
- For transportation, attach the retaining pins to the rod (1).

13.9 Other rigging work

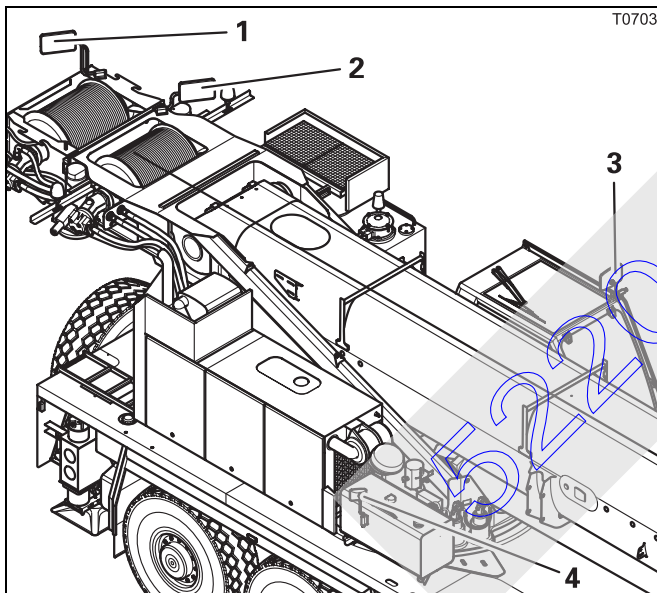
13.9.1 Folding mirrors in and out and adjusting them

All mirrors must be folded in for driving. For crane operation you must fold out the mirrors again and adjust them.



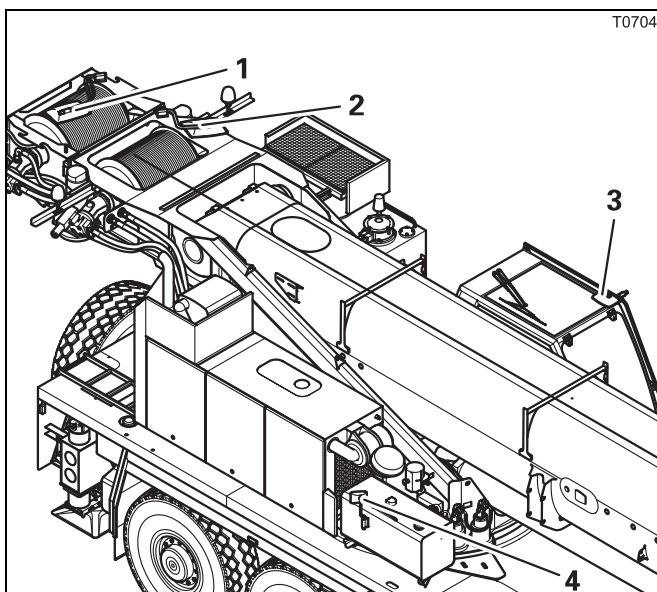
Risk of accidents when exceeding the permissible dimensions

Fold all mirrors in for driving. With the mirrors folded out, the specified overall height at on-road level and the specified overall width for driving on roads is exceeded.



Folding out and adjusting the mirrors

- Fold the mirrors (1), (2) and (3) up.
- Adjust the mirrors in such a way that you have a clear view of the rope running on the hoisting gears.
- Adjust the mirror (4) in such a way that the rear right outrigger beam can be observed clearly from the crane cab when the main boom is raised.



Folding in the mirrors

- Fold the mirrors (1), (2) and (3) down.
- Fold in the mirror (4) until it no longer protrudes over the side of the carrier.

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13.9.2

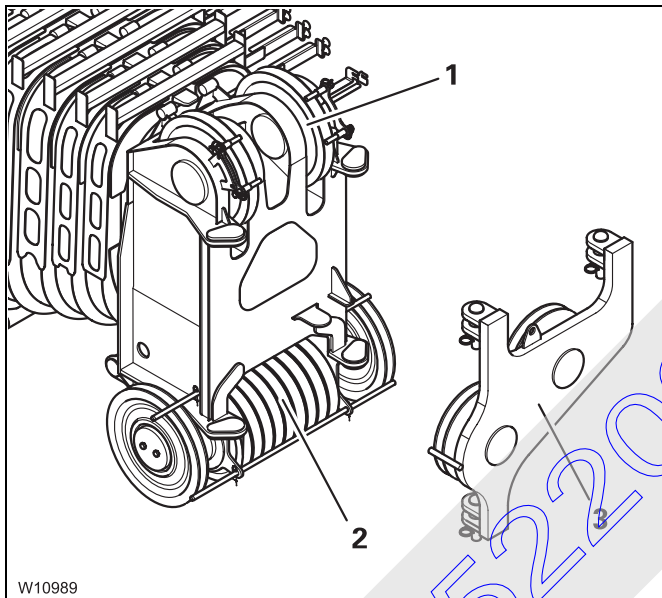
Installing/removing the heavy duty equipment

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

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

Additional equipment required

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




Mounted parts

- 1 Left-hand head sheave
- 2 Head sheave axle with 11 sheaves

Supplied parts

- 3 Adapter with pins

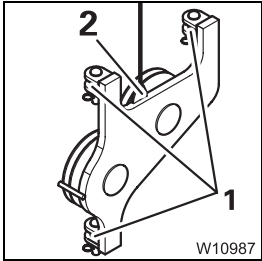
Equipment required

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



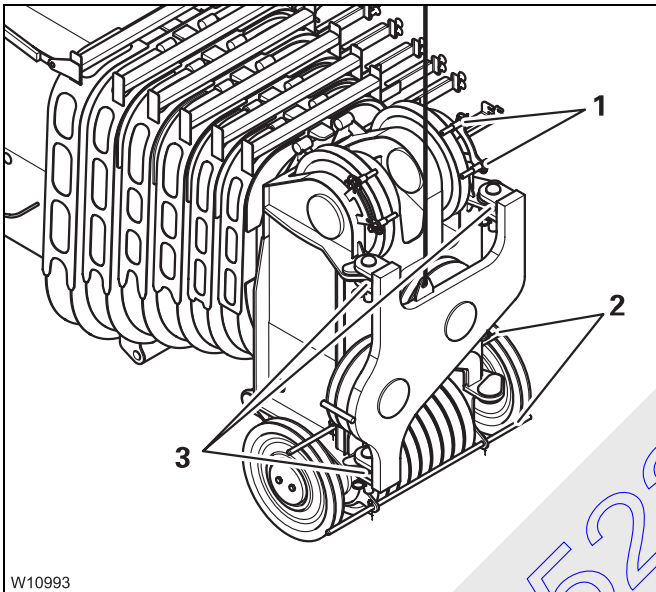
Installing

- Support the truck crane with an outrigger span of at least 8.55 x 8.10 m (28.1 x 26.6 ft).
- Unreeve the required hoist rope and set down to the left of the main boom.



Attaching the adapter

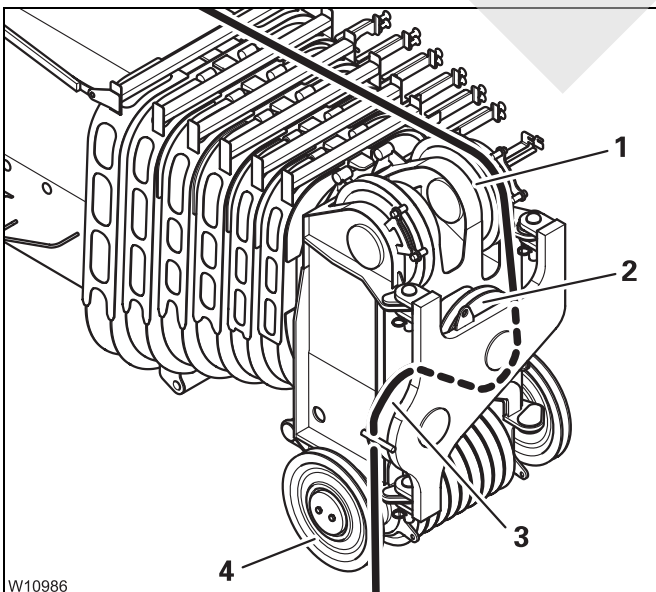
- Remove the pins (1).
- Sling the adapter to the slinging point (2).




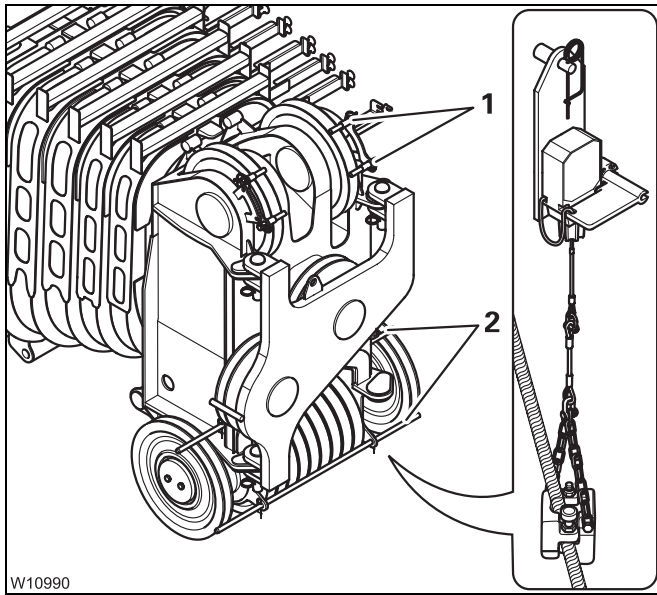
- Lift the adapter in front of the main boom head and make the connecting points (3) flush.
- Insert the pins into the connecting points (3).
- Secure the pins using the retaining pins.
- Remove the sling gear.

Positioning the hoist rope

- Pull out the rods (1) and (2).



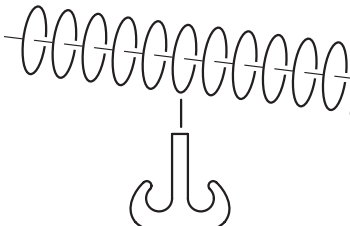
- Guide the hoist rope over the left head sheave (1) to the deflection sheave (2).
- Feed the hoist rope under the deflection sheave (2) and over the deflection sheave (3).
- Feed the hoist rope down, over the head sheave (4).
- Reeve the hoist rope;  *Maximum reeving*, p. 13 - 114.



- Insert the rods (1) and (2).
- Secure all rods using the retaining pins.
- Install the lifting limit switch and the lifting limit switch weight; |||▶ p. 13 - 100.
- Remove the lock, if necessary; |||▶ p. 13 - 107.

Maximum reeving

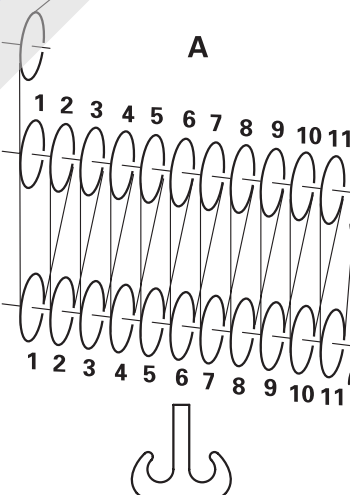
Please note that the maximum lifting capacities specified already include the weight of the hook block and the sling gear. You must subtract these weights in order to obtain the actual payload.



11-sheave hook block
Max. lifting capacity with the GMK 5220:

A With 22-fall reeving	175 t (385,800 lbs)
-------------------------------	----------------------------

A

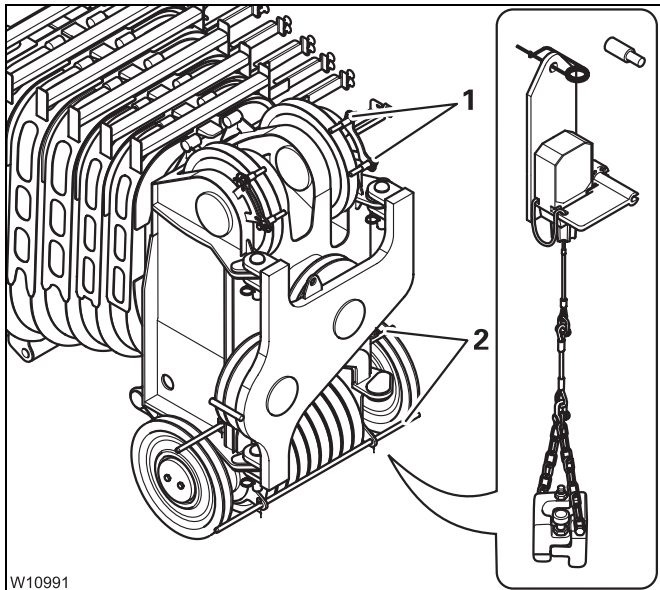


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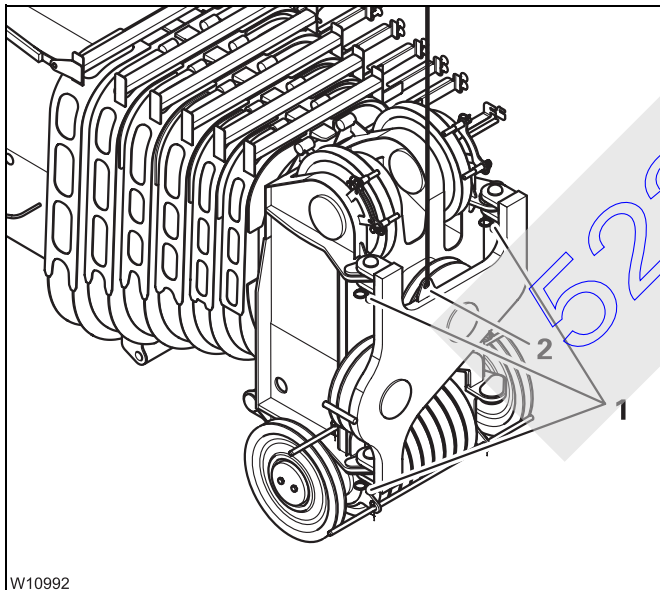
Removing

- Unreeve the hoist rope from the hook block.
- Fully retract the main boom and set it down on the boom rest.



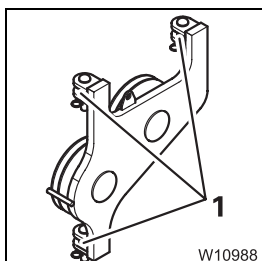
Removing the hoist rope

- Remove the lifting limit switch weight and the lifting limit switch; see p. 13 - 104.
- Pull out the rods (1) and (2).
- Remove the hoist rope.
- Insert the rods (1) and (2).
- Secure all rods using the retaining pins.



Removing the adapter

- Sling the adapter to the slinging point (2).
- Raise the adapter until the load has been removed from the pins.
- Remove the pins (1).



- Lift the adapter onto a separate vehicle and remove the sling gear.
- Insert the pins (1) and secure them with the retaining pins.

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14 Driving the rigged truck crane

14.1 Route 14 - 1

14.2 Permissible rigging modes and axle loads 14 - 2

14.3 Before driving 14 - 4

14.3.1 Secure superstructure so it cannot slew. 14 - 4

14.3.2 Checking the tyre pressure and the wind speed 14 - 4

14.3.3 Putting the truck crane on the wheels. 14 - 5

14.3.4 Transmission/Connections. 14 - 7

14.4 While driving 14 - 7


14.5 After driving 14 - 8



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14

Driving the 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 GMK 5220.*



Risk of accidents by not having a clear overview of the entire truck crane!

When driving the truck crane, always stay in visual or radio contact with a banksman who can observe the parts you are unable to see (e.g. the raised boom in 0° to the rear position).



Risk of overturning due to superstructure slewing!

When driving the rigged crane, the slewing gear must be switched off – slewing gear brake engaged.



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.

14.1

Route

The route must be even. Uneven surfaces cannot be compensated with the level adjustment system.

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 with packing of stable material (e.g. wooden planks).

14.2

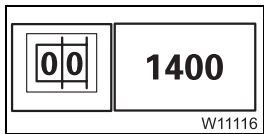
Permissible rigging modes and axle loads

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!

Bring the superstructure and the main boom into the positions specified only. This prevents excessive strain on the axle lines.



- Enter the SLI code for the actual rigging mode of the truck crane in accordance with the *Lifting capacity table*. For example **1,400**, with a 21.0 t (46,200 lbs) counterweight and an outrigger span of 8.55 x 8.10 m (28.1 x 26.6 ft).



Risk of accidents with overridden SLI!

Always enter the SLI code for the current rigging mode. The specified positions are within the monitored working ranges.

If the SLI is overridden, the truck crane may overturn even if you approach the positions specified.

- Bring the superstructure and the main boom into a position that is specified in the following table for the respective counterweight rigged.
- Tie down the hook block so that it cannot swing back and forth.

Axle load table

All axle loads specified apply to 16.00 R 25 tyres and a reeved 3-sheave hook block, weight 950 kg (2,095 lbs).



The specified maximum axle load is only reached at the limits of the stated angle range for the main boom, e.g. with 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 stated angle range.

Counter weight in t (lbs)	Telescoping I/II/III/IV/V/VI	Main boom angle in °	Superstructure position ¹⁾	Maximum axle load ²⁾ in t (x 1000 lbs)	
				front	rear
0,0 (0)	0 - 0 - 0 - 0 - 0 - 0	15	front	13,5 (29.8)	11,0 (24.3)
	0 - 0 - 0 - 0 - 0 - 0	80	rear	11,0 (24.3)	15,0 (33.1)
5,0 (11,000)	0 - 0 - 0 - 0 - 0 - 0	15	front	12,5 (27.6)	15,0 (33.1)
	0 - 0 - 0 - 0 - 0 - 0	60 - 80	rear	12,5 (27.6)	20,0 (44.1)
11,0 (24,200)	0 - 0 - 0 - 0 - 0 - 0	15	front	11,5 (25.4)	19,5 (43.0)
	0 - 0 - 0 - 0 - 0 - 0	45 - 75	rear	13,5 (29.8)	23,0 (50.7)
16,0 (35,200)	50 - 50 - 0 - 0 - 0 - 0	15 - 45	front	19,0 (41.9)	18,0 (39.7)
	0 - 0 - 0 - 0 - 0 - 0	45 - 75	rear	15,0 (33.1)	23,5 (51.9)
21,0 (46,200)	50 - 50 - 0 - 0 - 0 - 0	15 - 45	front	18,0 (39.7)	22,0 (48.5)
	0 - 0 - 0 - 0 - 0 - 0	30 - 60	rear	14,5 (32.0)	25,5 (56.2)
26,0 (57,300)	50 - 50 - 0 - 0 - 0 - 0	15 - 30	front	17,0 (37.5)	21,5 (47.4)
	0 - 0 - 0 - 0 - 0 - 0	30 - 60	rear	16,0 (35.3)	25,5 (56.2)
31,0 (68,300)	50 - 50 - 0 - 0 - 0 - 0	15 - 30	front	16,0 (35.3)	25,5 (56.2)
	0 - 0 - 0 - 0 - 0 - 0	30 - 60	rear	17,5 (38.6)	26,0 (57.3)
36,0 (79,300)	50 - 50 - 0 - 0 - 0 - 0	15 - 20	front	15,0 (33.1)	27,5 (60.6)
	0 - 0 - 0 - 0 - 0 - 0	30 - 60	rear	19,5 (43.0)	26,0 (57.3)
41,0 (90,300)	50 - 50 - 50 - 50 - 0 - 0	15 - 30	front	18,5 (40.8)	27,0 (59.5)
	0 - 0 - 0 - 0 - 0 - 0	30 - 60	rear	21,0 (46.3)	26,0 (57.3)
46,0 (101,400)	100 - 50 - 50 - 50 - 50 - 0	15 - 30	front	24,0 (52.9)	23,0 (50.7)
	0 - 0 - 0 - 0 - 0 - 0	30 - 60	rear	22,5 (49.6)	26,0 (57.3)
51,0 (112,400)	100 - 50 - 50 - 50 - 50 - 0	15 - 30	front	23,0 (50.7)	27,0 (59.5)
	0 - 0 - 0 - 0 - 0 - 0	30 - 60	rear	24,0 (52.9)	26,0 (57.3)
71,0 (156,500)	0 - 0 - 0 - 0 - 0 - 0	10	rear	26,0 (57.3)	28,0 (61.7)
77,0 (169,700)	0 - 0 - 0 - 0 - 0 - 0	10	rear	28,0 (61.7)	28,0 (61.7)

- 1) Rear: Indicated slewing angle 0°
Front: Indicated slewing angle 180°
- 2) Front: On the first, second and third axle line
Rear: on the fourth and fifth axle line

14.3

Before driving

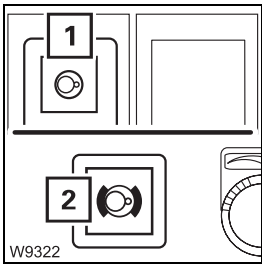
14.3.1

Secure superstructure so it cannot slew



Danger of overturning by slewing the superstructure while driving the truck crane

Always lock the superstructure before driving the rigged truck crane to prevent it from slewing. When slewing the superstructure while driving the truck crane, there is an increased risk of overturning!



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

➡ *Switching off the slewing gear, p. 12 - 94.*

14.3.2

Checking the tyre pressure and the wind speed

- Check that the tyres are all at the prescribed pressure levels; ➡ *Tyres, p. 8 - 6.*



Risk of damage to 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 bearing surface of the tyres.

The same maximum permissible wind speeds apply to driving the truck crane as to working with the crane.

- Check the wind speed; ➡ p. 12 - 42.

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 safe condition.

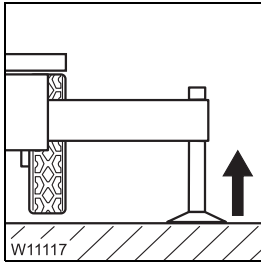


14.3.3

Putting the truck crane on the wheels



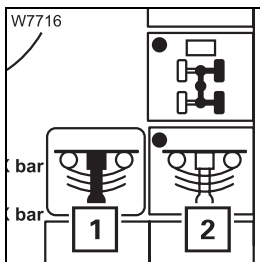
Danger of overturning if the outrigger cylinders are retracted unevenly!
Retract the outrigger cylinders evenly. In this way you can prevent the truck crane from overturning when retracting individual outrigger cylinders.




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

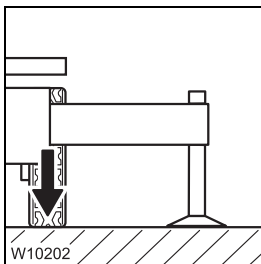


Danger of overturning when switching on the suspension
You may under no circumstances switch on the suspension as long as the rigged truck crane is on wheels. The suspension struts would be suddenly pressed together and damaged and the truck crane could overturn when switching on the suspension.



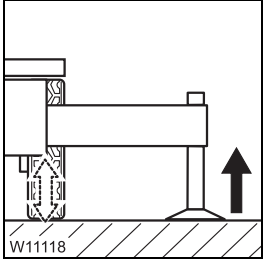
Switching on the suspension

- In the driver's cab, open the *Level adjustment system* submenu – button .
- Press the button (2) once – dot **green**.
The symbol (1) is **green** if the suspension is switched on.



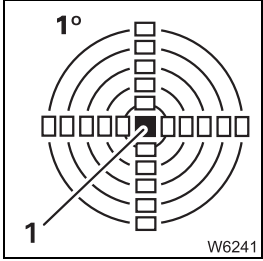
All wheels are now lowered to the ground.



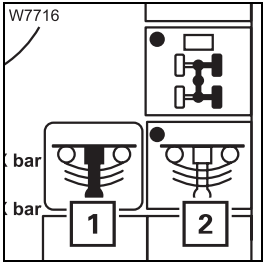


Levelling the truck crane

- Retract the outrigger cylinders evenly. Lower the truck crane only until the suspension struts still have enough play for alignment.

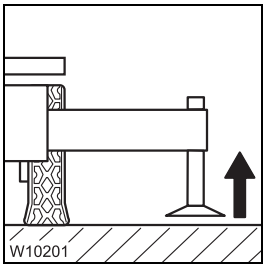


- Level the truck crane on outriggers until the lamp (1) is the only one lighting up in the measuring range 1°.



Switching off the suspension

- Press the button (2) once – dotblack.
The symbol (1) is (red) if the suspension is switched off.



Securing the truck crane

- Retract the outrigger cylinders until the outrigger pads are about 5 to 10 cm (2 to 4 in) above the ground. Leave the outrigger beams extended.

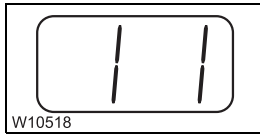



Danger of overturning if outriggers are retracted

Always leave the outriggers extended and the outrigger pads just above the ground to secure the truck crane against overturning.

14.3.4 Transmission/Connections




Transmission



- Select gear **1** as top gear to prevent the transmission from shifting gears;  p. 5 - 27.

Connections

If required, you can

- switch on the longitudinal differential locks;  p. 5 - 56.
- switch on the transverse differential locks;  p. 5 - 58,
- switch on separate steering;  p. 5 - 68.

14.4 While driving

- Drive only at the lowest possible speed, **max. 1.5 km/h** (1 mph).
- The turning radius should be as large as possible when driving around corners.
- Steer the truck crane only when it is rolling and avoid sudden steering movements.



Risk of damage to the steering linkage!

The steering linkage can become damaged if the steering is operated while the vehicle is stationary.





Danger of overturning when switching on the suspension

The suspension must be deactivated (locked) as long as 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.

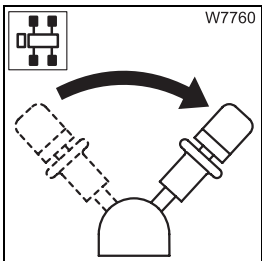
Never align the truck crane with the level adjustment system if the ground is uneven.

In this case you must raise the truck crane with the outrigger cylinders, level it and lower it again, as described in the section *Putting the truck crane on the wheels*; ■■■▶ p. 14 - 5.

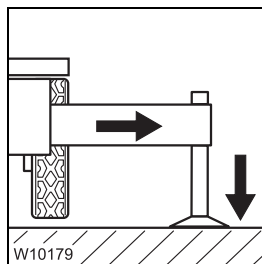
14.5

After driving

- Restore the original condition:
 - Switch off the longitudinal differential locks; ■■■▶ p. 5 - 56,
 - Switch off the transverse differential locks; ■■■▶ p. 5 - 58,
 - Switch off separate steering; ■■■▶ p. 5 - 70.



- Engage the parking brake.



- Support the truck crane with the outrigger span required for the job according to the *Lifting capacity table* and raise until none of the wheels touches the ground.

15 Malfunctions during crane operation

15.1	Emergency stop devices	15 - 1
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Malfunctions during crane operation

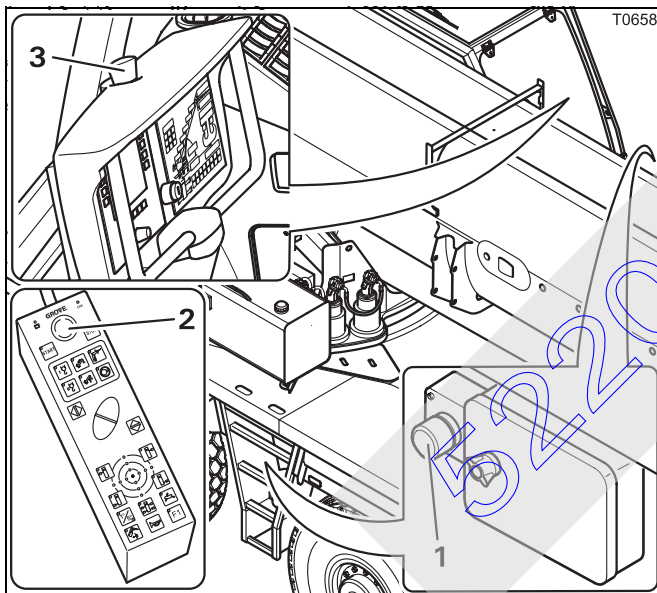
15.1

Emergency stop devices



Risk of overloading if used improperly

Only actuate the emergency stop switch if it is no longer possible to stop the crane movements with the normal operating elements. The emergency stop switch stops the crane movements suddenly. This may overload the truck crane, e.g. in the event of high working speeds and large working radiuses.



- Stop all crane movements.

Four emergency stop switches are provided for an emergency:

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

- Press one of the emergency-stop switches (1), (2) or (3). The switch engages.

The engine goes out. If the engine for driving was on, it will go off as well.

After actuating an emergency stop switch;

▣▶ *Resetting the emergency stop switch,*
p. 11 - 20.



The battery master switch cannot be used as an emergency stop switch for the engine. The engine continues to run after the battery master switch has been switched off.

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15.2

What to do when a malfunction occurs during crane operation

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 hoisted.

Always try to lower the load before carrying out repairs.

Only properly qualified personnel may perform crane movements with the solenoid valves.

Load can be lowered

- Set down the load. Retract the main boom completely and set it down on the main boom rest.

If you need to override the SLI, observe all of the information in the section *SLI override*; ►► p. 12 - 37.



Risk of accidents due to overridden or faulty SLI!

You may only override the SLI in the event of an emergency in order to put the truck crane into a safe condition in the event of a malfunction. In this case, do not perform any movements that would increase the load moment.

If it is no longer possible to operate the crane from the crane cab, you can use the emergency activation, if necessary;

►► *Emergency operation in the event of a failure of the operating elements in the crane cab*, p. 15 - 55,

►► *Hydraulic emergency operation*, p. 15 - 59.

- Lock the crane cab to prevent unauthorized use. Remove the ignition key and lock away the hand-held control.
- Inform your supervisor.
- Try to eliminate the malfunction. Inform **CraneCARE** if you cannot eliminate the malfunction.

Load cannot be lowered

- Secure the danger zone using cordons and warning signs.
- Notify **CraneCARE**.

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15.3

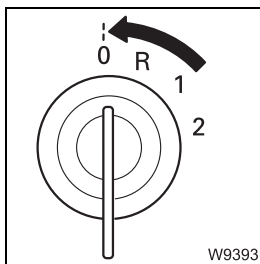
Fuses on the superstructure

The fuses are located in different places on the superstructure:

- On the turntable
- In the crane cab
- In the battery box
- On the SLI

Notes on changing fuses

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



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



Risk of damage when the ignition is switched on!

Switch off the ignition whenever a fuse has to be replaced. In this way you can prevent the new fuse from being damaged by the increased starting current immediately after inserting it.



Risk of damage due to overloading!

Replace faulty fuses only with new fuses of the same amperage. In this way you can prevent parts from being overloaded and damaged or the fuse from being immediately damaged again.

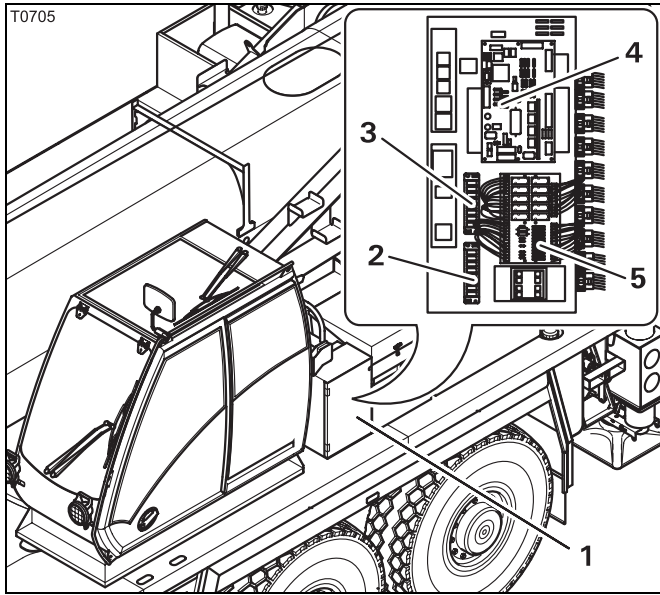
Notify **CraneCARE** if a fuse of the same amperage blows again after turning on the ignition.



Danger of fire!

Never repair a defective fuse with other electrically conductive materials.

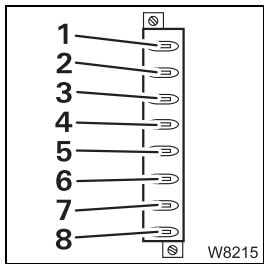
15.3.1 Fuses on the turntable



- Open the distribution box (1). It contains
 - the fuse groups **F1** (3) and **F2** (2),
 - fuses on the circuit board (5).
 - fuses on the circuit board I/O-3 (4).

Fuse groups F1/F2

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).

- Observe the instructions regarding fuse changes; p. 15 - 5.

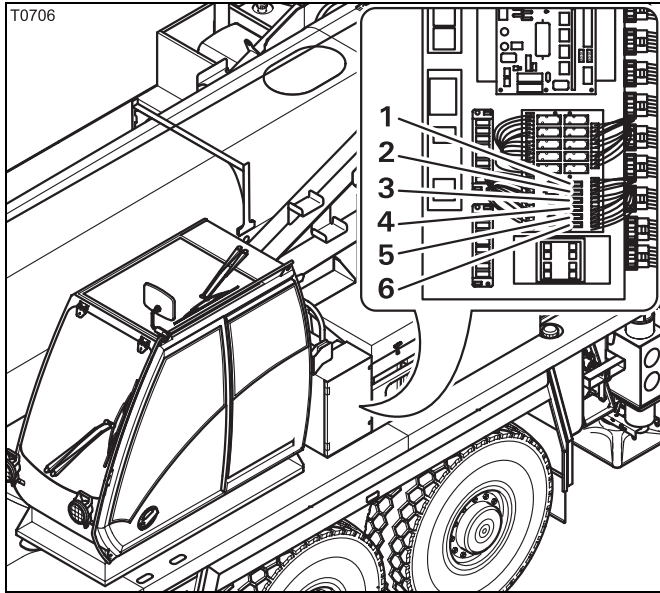
Designation	Amperage (A)	Function
F1/1	20	ESX2 control unit, I/O-3 circuit board
F1/2	20	ESX1 control unit, I/O-4 circuit board
F1/3	10	Central lubrication, lattice extension
F1/4	10	Alternator, rotating beacon of the superstructure
F1/5	20	Air intake inhibitor
F1/6	5	Air intake inhibitor
F1/7	3	I/O-3 circuit board, I/O-4 circuit board, Length indicator
F1/8	5	Engine E control (PLD)

Designation	Amperage (A)	Function
F2/1		Lifting limit switch
F2/2	–	Working platform
F2/3	–	Radio control
F2/4	–	Free
F2/5	20	Engine E control (PLD)
F2/6	3	Emergency operation with hand-held control
F2/7	20	Oil cooler
F2/8	20	Oil cooler



Fuses on the circuit board

The fuses on the circuit board protect the ECOS control units on the superstructure.

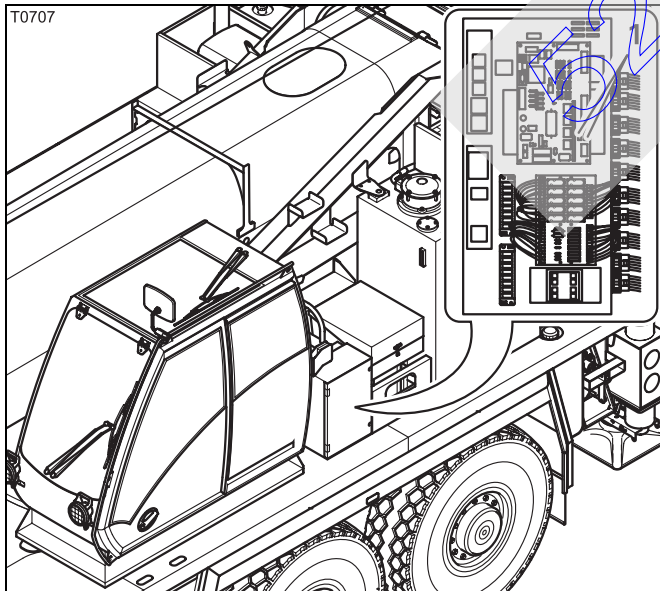


Arrangement of the fuses:

Pos.	Designation	Amperage (A)
1	ESX 1 D+	3
2	ESX 1 UE	3
3	ESX 1 8.5 V	2
4	ESX 0 D+	3
5	ESX 0 UE	3
6	ESX 0 8.5 V	2

Fuses on I/O circuit boards

The circuit boards I/O-3 and I/O-4 are assigned to ECOS. Each circuit board controls several functions. These functions are disabled when a fuse on the circuit board is faulty. The assignment of the functions to the circuit boards is shown in the fault identification tables; ► p. 15 - 15.



I/O-3 circuit board

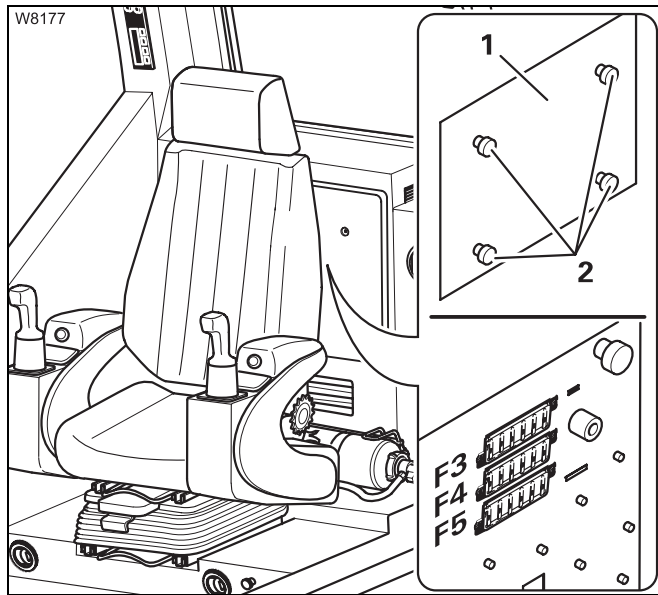
The fuses (1) have a strength of **10 amps**.

- Check the fuses and replace faulty ones.

I/O-4 circuit board

The circuit board is located in the distribution box on the telescoping cylinder and is intended for servicing purposes only.

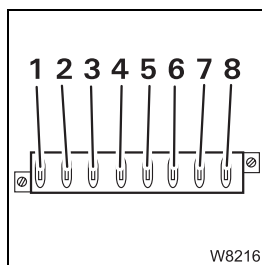
15.3.2 Fuses in the crane cab



- Undo the screws (2) and remove the cover (1).

The fuse groups **F3**, **F4** and **F5** consist of eight fuses each.

The following tables show the designations of the individual fuses, including their amperage and functions.



The designations 1 to 8 in the tables correspond to their order from left to right (fuse 1 is always the left fuse).

- Observe the instructions regarding fuse changes; p. 15 - 5.

Designation	Amperage (A)	Function
F3/1	3	ESX2 control unit ECOS control unit supply
F3/2	2	8.5V protection for ESX2 control unit
F3/3	10	SLI and SLI control unit supply
F3/4	–	Free
F3/5	20	ESX2 control unit
F3/6	5	ESX2 control unit ECOS control unit supply
F3/7	5	Control lever supply
F3/8	5	Free



Designation	Amperage (A)	Function
F4/1	10	Free
F4/2	10	24 V/12 V voltage transformer Radio, lighting in the crane cab Air traffic control light
F4/3	3	Engine electronics diagnostics plug
F4/4	25	Air-conditioning system
F4/5	–	Free
F4/6	15	Heating system
F4/7	–	Free
F4/8	–	Free

Designation	Amperage (A)	Function
F5/1	15	Spotlights
F5/2	15	Spotlights
F5/3	15	Windshield wiper washer system, Cigarette lighter
F5/4	10	Heating system
F5/5	5	Instrument panel lighting
F5/6	5	Battery charge indicator, Engine electronics diagnostics plug
F5/7	10	Heater fan
F5/8	–	Free

15.3.3

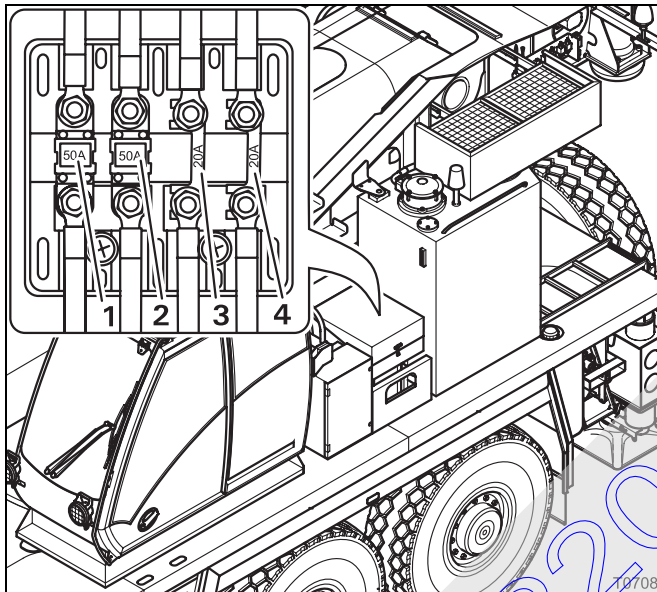
Fuses in the battery box

Fuses F10 to F13 are contained in the battery box.



Danger due to lead and lead compounds of 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 regarding fuse changes; p. 15 - 5.

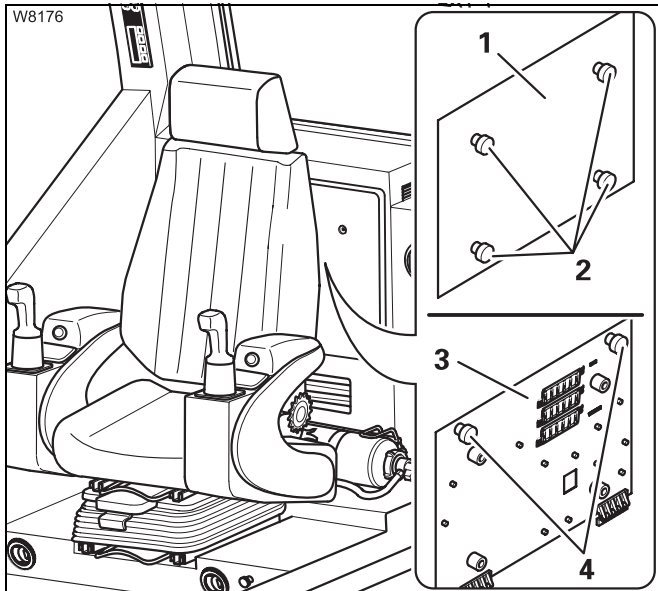
Designation	Amperage (A)	Function
F10	50	Free
F11	50	Superstructure central fuse
F12	20	Free
F13	20	Preliminary fuse for auxiliary heater timer

15.3.4

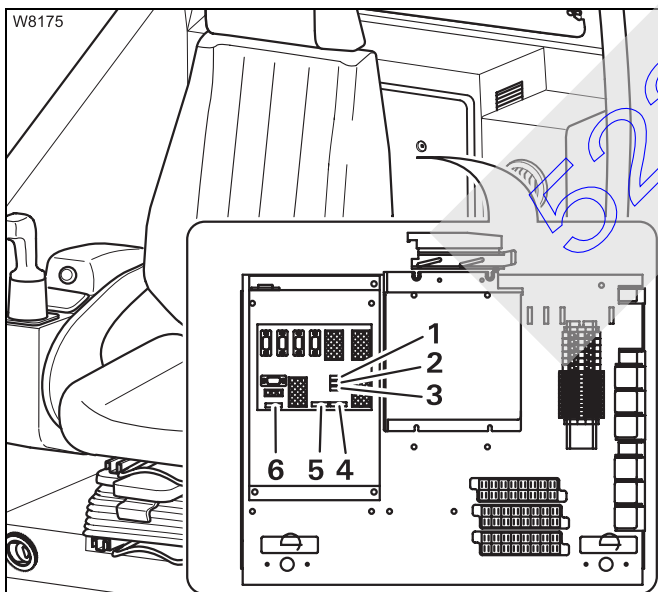
SLI fuses

There are six fuses on the SLI control unit.

When a fuse is faulty, a corresponding error code is displayed;  *Table of error codes*, p. 15 - 32.




- Undo the screws (2) and remove the cover (1).
- Undo the screws (4) and fold down the plate (3) to the front.



The SLI control unit is at the bottom left on the back of the plate.

The fuses are arranged as follows:

- 1: Fuse F1
- 2: Fuse F2
- 3: Fuse F3
- 4: Fuse F11
- 5: Fuse F12
- 6: Fuse F6

Observe the instructions regarding fuse changes;  p. 15 - 5.

Designation in the <i>Error message submenu</i>	Amperage (A)	Function
F1	5	For internal main relay
F2	5	Display for external SLI shutdown ¹⁾
F3	5	Power supply for movements of all power units at connection 0
F6	5	SLI power supply
F11	5	Display for external SLI early warning ¹⁾
F12	5	Free

¹⁾ Additional equipment


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15.4 Finding and eliminating malfunctions

15.4.1 Malfunctions on the engine for crane operation




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



Malfunction	Cause	Remedy
Symbol  red	Coolant level too low	Top up coolant;  <i>Maintenance Manual</i>
	Oil level in the transmission too low	Check the oil level;  <i>Maintenance Manual</i>
	Outside of heat exchanger dirty	Clean outside of heat exchanger
	V-belt of coolant pump at engine loose	Tension V-belt;  <i>Separate operating instructions from the engine manufacturer</i>
Engine cannot be turned off with ignition key	Malfunction in the electronics	Switch off the engine using the emergency stop device;  p. 11 - 20
Engine electronics (ADM) diagnostics plug not working	Fuse F4/3, F5/6 faulty	Replace faulty fuses;  p. 7 - 16
The engine output has dropped and the engine coolant temperature has increased	The engine output was reduced due to increased coolant temperature – if the maximum temperature is exceeded, lamp  lights up	Wait until the coolant has cooled down and the engine power increases again.
Symbol  red	Engine oil level too low	Check the oil level and top up if necessary;  <i>Maintenance Manual</i> .
	Other causes	Open the <i>Warning</i> submenu  p. 5 - 45; correct the displayed malfunction; if the warning message is still present, notify, CraneCARE benachrichtigen.
Symbol  red	Severe malfunction at the engine	Do not start the engine or immediately turn off the engine and notify CraneCARE .

15.4.2



Malfunctions when operating with the hand-held control

Malfunction	Cause	Remedy
CAN lamp flashes or stays off after connecting the hand-held control	A bridging plug is not inserted on another socket.	Insert bridging plug;  p. 13 - 21
	Fuse F2/6 faulty	Replace faulty fuse;  p. 15 - 6
Motor will not start	Ignition in the driver's cab switched on	Switch off the ignition in the driver's cab;  p. 4 - 21
Pre-selected function cannot be performed	Another function has been preselected	Preselect the desired function
Operation not possible	Malfunction in the control system	CraneCARE must be notified



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15.4.3

Malfunctions on the main hoist/auxiliary hoist

Malfunction	Cause	Remedy
Main hoist not working or malfunctioning	Main hoist off, lamp in button lights up dimly	▣▣▣▣▶ <i>Switching on the main hoist</i> , p. 12 - 46
	Dead man's switch not actuated	Press dead man's switch
	Emergency stop switch actuated	▣▣▣▣▶ <i>Resetting the emergency stop switch</i> , p. 11 - 20
	Fuse F1/1, F3/1, F3/2, F3/5, F3/6 faulty	Replace faulty fuse; ▣▣▣▣▶ p. 15 - 6
	Fuse on the circuit board in the distribution box faulty	Replace faulty fuse; ▣▣▣▣▶ p. 15 - 8
	ESX0 control unit faulty, error message displayed	Acknowledge error message once; ▣▣▣▣▶ p. 15 - 37 – if it occurs again, notify CraneCARE .
	Fuse F3/7 faulty	Replace faulty fuse; ▣▣▣▣▶ p. 15 - 6
Only the lifting function works	Lowering limit switch activated	Leave the shutdown range and lift the main hoist
Only the lowering function works	Activate the lifting limit switch, lamp  lights up	Leave the shutdown range and lower the main hoist
	SLI shutdown, lamp  lights up	Leave the shutdown range; ▣▣▣▣▶ p. 12 - 34
	Fuse F3/3 faulty	Replace faulty fuse; ▣▣▣▣▶ p. 15 - 6
Lifting, lowering or high-speed mode function not working	Function disabled by ECOS	If required, acknowledge error message once and briefly turn off the ignition – if it occurs again, notify CraneCARE .
No lifting function	Fuse SLI F6 faulty	Replace faulty fuse; ▣▣▣▣▶ p. 15 - 12
	Fuse F3/3 faulty	Replace faulty fuse; ▣▣▣▣▶ p. 15 - 6
Lifting or lowering is either not possible at all or only at a low speed	Speed limited	Increase limit; ▣▣▣▣▶ p. 12 - 97
Lifting or lowering function cannot be deactivated	ECOS malfunction	Actuate emergency stop switch; ▣▣▣▣▶ p. 15 - 1
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Unrig using hand-held control; ▣▣▣▣▶ p. 15 - 55

15.4.4 Malfunctions on the derricking gear

Malfunction	Cause	Remedy
Derricking gear not working or malfunctioning	Derricking gear off, lamp in button lights up dimly	▣▣▣▣ <i>Switching on the derricking gear</i> , p. 12 - 54
	Dead man's switch not actuated	Press dead man's switch
	Emergency stop switch actuated	▣▣▣▣ <i>Resetting the emergency stop switch</i> , p. 11 - 20
	Fuse F1/1, F1/2, F3/1, F3/2, F3/5, F3/6 faulty	Replace faulty fuse; ▣▣▣▣ p. 15 - 6
	Fuse on the circuit board in the distribution box faulty	Replace faulty fuse; ▣▣▣▣ p. 15 - 8
	ESX0, ESX1 or ESX2 control unit faulty, error message displayed	Acknowledge error message once; ▣▣▣▣ p. 15 - 37 – if it occurs again, notify CraneCARE .
	Fuse F3/7 faulty	Replace faulty fuse; ▣▣▣▣ p. 15 - 6
Lowering function not working	Activate the lifting limit switch, lamp  lights up	Leave the shutdown range and lower the auxiliary hoist.
	SLI shutdown, lamp  lights up	Leave the shutdown range; ▣▣▣▣ p. 12 - 34
	Fuse F3/3 faulty	Replace faulty fuse; ▣▣▣▣ p. 15 - 6
Derricking function not working	Function disabled by ECOS	If required, acknowledge error message once and briefly turn off the ignition – if it occurs again, notify CraneCARE .
	Fuse SLI F6 faulty	Replace faulty fuse; ▣▣▣▣ p. 15 - 12
	Fuse F3/3 faulty	Replace faulty fuse; ▣▣▣▣ p. 15 - 6
Derricking not possible, or only at low speed	Speed limited	Increase limit; ▣▣▣▣ p. 12 - 97
Derricking cannot be switched off	ECOS malfunction	Actuate emergency stop switch; ▣▣▣▣ p. 15 - 1
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Unrig using hand-held control; ▣▣▣▣ p. 15 - 55

15.4.5 Malfunctions on the slewing gear

Malfunction	Cause	Remedy
Slewing gear not functioning	Slewing gear off, lamp in button lights up dimly	▣▣▣▣▶ <i>Switching on the slewing gear</i> , p. 12 - 89
	Houselock switched on	▣▣▣▣▶ <i>Switching off the houselock</i> , p. 12 - 16
	Dead man's switch not actuated	Press dead man's switch
	Emergency stop switch actuated	▣▣▣▣▶ <i>Resetting the emergency stop switch</i> , p. 11 - 20
	Fuse F1/1, F1/2, F3/1, F3/2, F3/5, F3/6 faulty	Replace faulty fuse; ▣▣▣▶ p. 15 - 12
	Fuse on the circuit board in the distribution box faulty	Replace faulty fuse; ▣▣▣▶ p. 15 - 8
	Fuse on I/O-3 circuit board faulty	Replace faulty fuses; ▣▣▣▶ p. 15 - 8
	ESX0, ESX1 or ESX2 control unit faulty, error message displayed	Acknowledge error message once; ▣▣▣▶ p. 15 - 37 – if it occurs again, notify CraneCARE .
	Fuse SLI F6 faulty	Replace faulty fuse; ▣▣▣▶ p. 15 - 12
	Fuse F3/3, F3/7 faulty	Replace faulty fuse; ▣▣▣▶ p. 15 - 6
Slewing function not working	Enter SLI code for position 0° to the rear or 180° to the front	Enter SLI code for a slewing range
	Counterweight lifting cylinder not fully retracted	Fully retract lifting cylinder; ▣▣▣▶ p. 13 - 69
	Function disabled by ECOS	If required, acknowledge error message once and briefly turn off the ignition – if it occurs again, notify CraneCARE .
Slewing only possible in one direction	Shutdown angle of a limited slewing range reached	Enter the SLI 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. 12 - 97
Slewing gear no longer responds to the control lever	ECOS malfunction	Actuate emergency stop switch; ▣▣▣▶ p. 15 - 1
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Unrig using hand-held control; ▣▣▣▶ p. 15 - 55


15.4.6

Malfunctions on the counterweight hoist unit

Malfunction	Cause	Remedy
Counterweight hoist unit not working	Emergency stop switch actuated	▣▣▣▣ ➔ <i>Resetting the emergency stop switch</i> , p. 11 - 20
	Fuse F1/1, F1/7	Replace faulty fuse; ▣▣▣▣ ➔ p. 15 - 6
	Fuse on I/O-3 circuit board faulty	Replace faulty fuse; ▣▣▣▣ ➔ p. 15 - 8
	Control unit faulty, error message displayed	Acknowledge error message once; ▣▣▣▣ ➔ p. 15 - 37 – if it occurs again, notify CraneCARE .
	Function disabled by ECOS	If required, acknowledge error message once and briefly turn off the ignition – if it occurs again, notify CraneCARE .
Error symbol (!) is displayed	Electronics has identified an error	
Retract/extend lifting cylinder not working	Superstructure in the intermediate position	Slew to <i>Move lifting cylinders</i> or <i>Lift/lower counterweight</i> position; ▣▣▣▣ ➔ p. 10 - 70
Extend lifting cylinder not working	Superstructure outside of rigging range	Slew into the rigging range
	Counterweight rigged and <i>move lifting cylinders</i> position reached	Slew to <i>Lift/lower counterweight</i> position
	Counterweight unrigged and <i>Lift/lower counterweight</i> position reached	Slew to <i>Move lifting cylinders</i> position
Retract/extend lifting cylinder and slewing not working	Automatic mode cancelled	Meet requirements for automatic mode; ▣▣▣▣ ➔ p. 13 - 74

15.4.7

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 under extreme strain	Stop working with the crane 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 F2/7, F2/8 faulty	Stop crane operation and replace faulty fuse; ►► p. 15 - 6
	Faulty temperature sensor in the circuit of the hydraulic system, error message displayed	Have the temperature sensor replaced
Symbol  red	Corresponding hydraulic oil filter soiled	Change hydraulic oil filter; ►► <i>Maintenance Manual</i>



15.4.8

Malfunctions during the inclination of the crane cab







Malfunction	Cause	Remedy
Crane cab inclination function not working	Fuse F1/1, F1/7 faulty	Replace faulty fuse; ►► p. 15 - 6
	Fuse on I/O-3 circuit board faulty	Replace faulty fuse; ►► p. 15 - 8

15.4.9

Malfunctions in the telescoping mechanism

Malfunction	Cause	Remedy
Telescoping mechanism not working or malfunctioning	Telescoping mechanism off, lamp in button lights up dimly	▣▣▣▣ ➤ <i>Switching on the telescoping mechanism</i> , p. 12 - 65
	Dead man's switch not actuated	Press dead man's switch
	Emergency stop switch actuated	▣▣▣▣ ➤ <i>Resetting the emergency stop switch</i> , p. 11 - 20
	Fuse F1/1, F1/2, F1/7, F3/1, F3/2, F3/5, F3/6 faulty	Replace faulty fuse; ▣▣▣▣ p. 15 - 6
	Fuse on the circuit board in the distribution box faulty	Replace faulty fuse; ▣▣▣▣ p. 15 - 8
	ESX0, ESX1 or ESX2 control unit faulty, error message displayed	Acknowledge error message once; ▣▣▣▣ p. 15 - 37 – if it occurs again, notify CraneCARE .
	Fuse F3/7 faulty	Replace faulty fuse; ▣▣▣▣ p. 15 - 6
Telescopic section and telescoping cylinder locking/unlocking function not working	Valve 1 faulty	Note down error code ▣▣▣▣ p. 15 - 37 and notify CraneCARE
Extending function not working	Fuse F3/3 faulty	Replace faulty fuse; ▣▣▣▣ p. 15 - 6
	SLI shutdown, lamp  lights up	Leave the shutdown range; ▣▣▣▣ p. 12 - 34
	Activate the lifting limit switch, lamp  lights up	Leave the shutdown range, retract boom
Retracting function not working	Insufficient lubrication	Lubricate main boom; ▣▣▣▣ <i>Maintenance Manual</i>
	Main boom is not steep enough	Leave the shutdown range and raise the boom.
Telescopic section cannot be operated by moving the control lever	Telescopic section locked	▣▣▣▣ ➤ <i>Unlocking a telescopic section</i> , p. 12 - 75
	Telescoping cylinder unlocked	▣▣▣▣ ➤ <i>Locking the telescoping cylinder</i> , p. 12 - 74
Telescopic section / telescoping cylinder locking function not working	Fault in hydraulics/electrical system	Note down error codes ▣▣▣▣ p. 15 - 25, ▣▣▣▣ p. 15 - 36 and notify CraneCARE

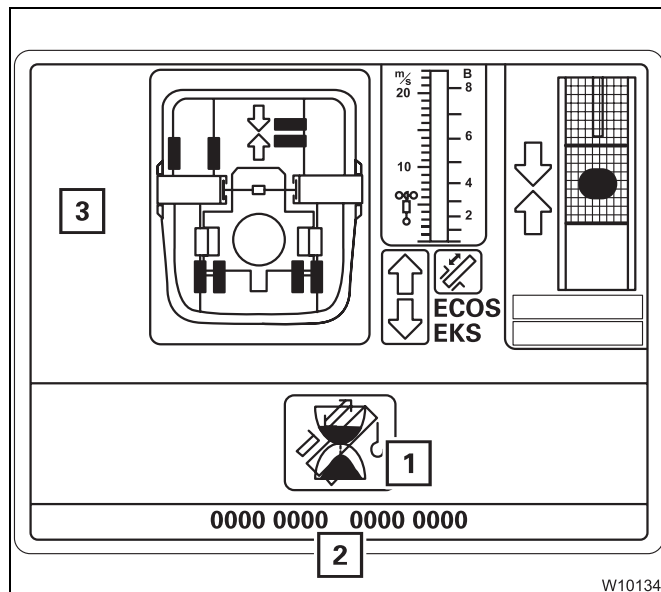


Malfunction	Cause	Remedy
Telescoping function not working	Function disabled by ECOS	If required, acknowledge error message once and briefly turn off the ignition – if it occurs again, notify CraneCARE .
	Fuse SLI F6 faulty	Replace faulty fuse;  p. 15 - 12
	Fuse F3/3 faulty	Replace faulty fuse;  p. 15 - 6
Telescoping not possible, or only at low speed	Speed limited	Increase limit;  p. 12 - 97
Telescoping cannot be switched off	ECOS malfunction	Actuate emergency stop switch;  p. 15 - 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. 15 - 40
No response to control lever movements	ECOS malfunction concerning operating elements in the crane cab	Overrig using hand-held control;  p. 15 - 55

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Telescoping mechanism error messages

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



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

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



Waiting

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



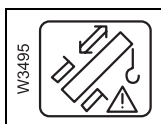
Telescope status divergence

ECOS has detected a difference between the displayed and the current telescoping. Enter the current telescoping; ||||► p. 15 - 53.



Emergency program access

The telescoping mechanism can only be operated with the emergency program; ||||► p. 15 - 43.



Emergency program

The *Telescoping* emergency program is open; ||||► p. 15 - 43.



Not active

Contact **CraneCARE** if this status is still displayed after repeatedly switching on the ignition.

15.4.10 Malfunctions on 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: Fuse F5/3, F5/4 faulty	Replace faulty fuses; ■■■▶ p. 7 - 16.
	Driver's cab: Fuse on I/O-1 or I/O-2 circuit board is faulty	Replace faulty fuses; ■■■▶ p. 7 - 21.
When operating with the hand-held control	Driver's cab: Fuse F2/1, F5/3 faulty	Replace faulty fuse; ■■■▶ p. 7 - 16.
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. 13 - 21.
When operating from the operating elements	Display fields have been switched off.	Switch on display fields; ■■■▶ p. 13 - 31
	Hand-held control connected to the superstructure or a bridging plug not inserted	Disconnect hand-held control or insert bridging plug; ■■■▶ p. 13 - 21
None of the specified causes apply	Solenoid valves not working	CraneCARE must be notified

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15.4.11 Troubleshooting on the SLI

This section contains general malfunctions which are not displayed on the *SLI* control unit as well as malfunctions which prompt an error display on the *SLI* control unit.



Risk of accidents

Immediately stop operating the crane if an error message is displayed. The *SLI* may only be repaired by trained, qualified personnel.

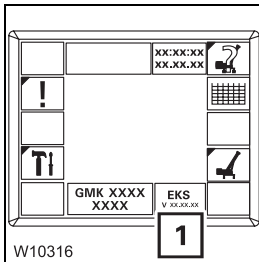


Risk of accidents in the event of a faulty or overridden *SLI*

In the event of a faulty *SLI*, first try to correct the error with the information in this section. Only override the *SLI* 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 *SLI*.

If the *SLI* is overridden, the crane operations are not monitored and no shutdown procedures are initiated when leaving the working range.



SLI program version

Always note down the number of the program version after a malfunction occurs and before notifying **CraneCARE**.

- If required, open the main menu .

The display (1) indicates the program version.

General malfunctions

Malfunction	Cause	Remedy
SLI not working – dark displays, no buzzer tone	Power supply not switched on	Switch on the ignition
	Fuse F2/6 faulty	Replace the faulty fuse; p. 15 - 6.
	Fuse <i>SLI</i> F6 faulty	Replace the faulty fuse; p. 15 - 12.



Error messages in the Monitoring submenu

If the safe load indicator detects an error, an error message is shown on the *SLI* control unit.

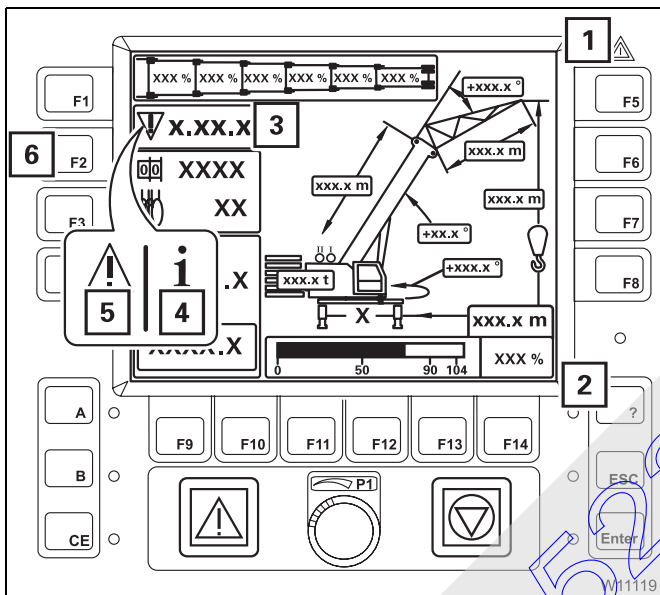
There are different types of error messages:

- Error messages without shutdown
- Error messages with shutdown



Risk of accidents

Immediately stop operating the crane if an error message is displayed. The SLI may only be repaired by trained, qualified personnel.



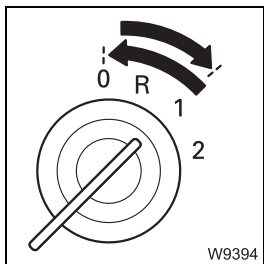
Error message without shutdown

The error message is displayed either as a warning or an information.

- The buzzer tone sounds once.
- Lamps (1) and (2) light up.
- Display (3) shows an error code and the respective symbol flashes..

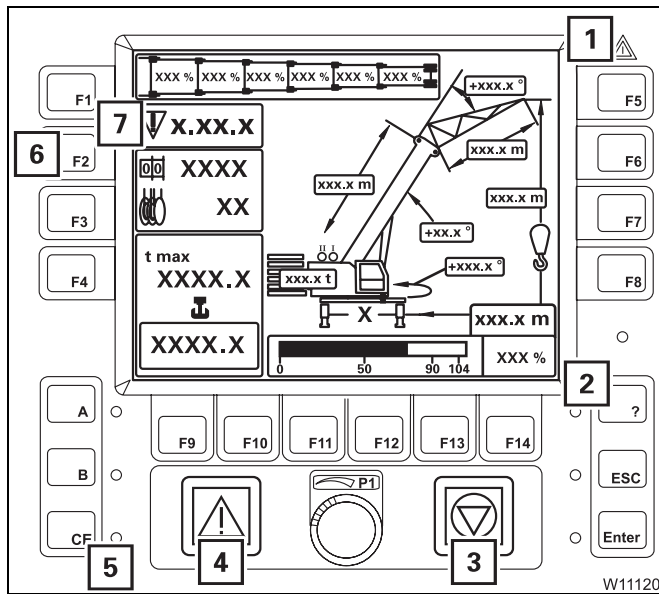
- 4 Information symbol
- 5 Warning symbol

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 about 15 seconds.

If the error is displayed again, check whether the error code is contained in the *Error codes* tables. These tables contain information on how to remedy errors; see p. 15 - 32.



Error message with shutdown

- All crane movements will be turned off which are not required for the correction of the error.
- A continuous buzzer tone sounds. After five seconds, you can switch off the buzzer tone using the button (5).
- Lamps (1) and (2) light up.
- Lamps (3) and (4) light up.

Display (7) shows an error code and the symbol for the error flashes.

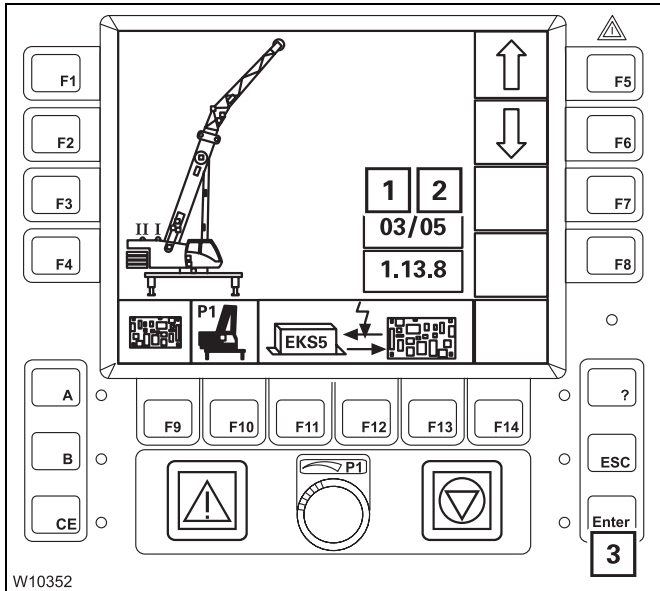
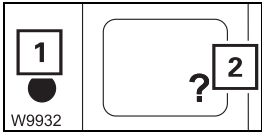
You can have all existing error messages displayed by repeatedly pressing the button (6).

Check whether the *Error codes* tables contain the error. These tables contain information on how to remedy errors, p. 15 - 32.



Displays in the Errors submenu

- Stop all crane movements and bring both control levers into zero position.
- Press the button (2) once. The button is only active when the lamp (1) lights up.



The *Errors* submenu opens.

Display (2) shows the error total, and display (1) shows which error is displayed.

3/5, for example, means:

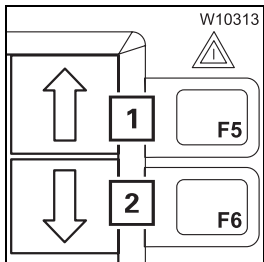
- error **3** is shown
- there is a total of **5** errors.

If the error shown is not acknowledged, the lamp next to the button (3) lights up.

Acknowledging errors

- Press the button (3) once.

The next, pending error is displayed and can be acknowledged.

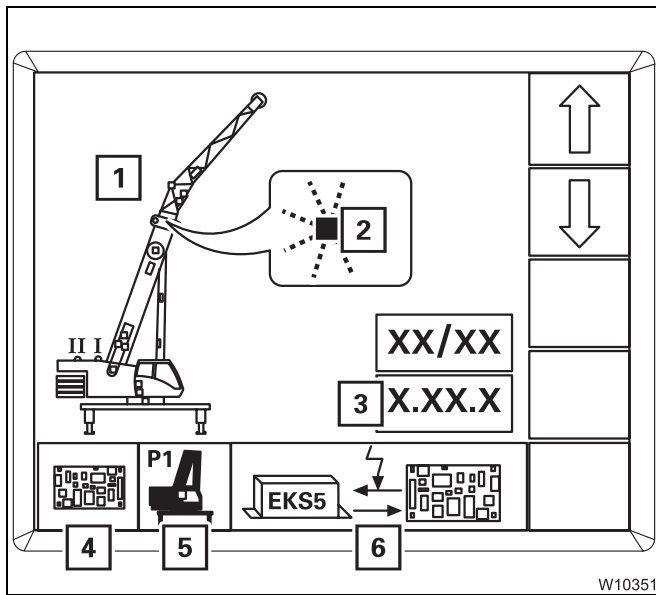


You can call up all current errors with the buttons (1) and (2).

- 1 Errors displayed in ascending order.
- 2 Error displayed in descending order.

Every time you press, the next error will be displayed.

When you keep a button held down, all errors are shown one after the other continuously.



Error message display

For each error there is

- the error code (3)
- the symbols for
 - 4 the error group
 - 5 the defective components
 - 6 the type of error
- 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. 15 - 32.

Exiting the submenu

You can exit the *Errors* submenu at any time.



- Press the button (1) once.

The same menu opens which was open before the *Errors* submenu was open.

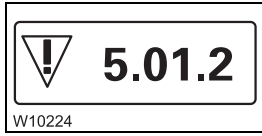


All errors remain saved until you switch off the ignition, even those errors of which the cause has been eliminated in the meantime. All existing errors are treated as new errors and displayed again after turning on the ignition.



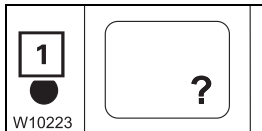
Table of error codes

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 to remedy an error, note the error code(s) down and contact **CraneCARE**.



When all errors are remedied, the lamp in the button (1) goes out.

Error code			Cause	Remedy
1	01	1...7	Error pressure sensor 1, lower chamber	Switch off pressure sensor 1; ▶▶▶▶ p. 15 - 35
1	01	8	Pressure sensor 1 switched off	Have malfunction rectified
1	02	1...7	Error pressure sensor 2, lower chamber	Switch off pressure sensor 2; ▶▶▶▶ p. 15 - 35
1	02	8	Pressure sensor 2 switched off	Have malfunction rectified
1	04	1...7	Error angle sensor 1, main boom	Switch off pressure sensor 1; ▶▶▶▶ p. 15 - 35
1	04	8	Angle sensor 1 switched off	Have malfunction rectified
1	05	1...7	Error angle sensor 2, main boom	Switch off pressure sensor 2; ▶▶▶▶ p. 15 - 35
1	05	8	Angle sensor 2 switched off	Have malfunction rectified
1	13 to 21	1	Lattice extension not connected or sensor faulty	Electrically connect lattice extension; if the error persists, inform CraneCARE
3	03	3	Comparison of telescoping diagram between crane control and SLI resulted in differences	Compare actual telescoping with values on <i>crane control</i> display and re-enter telescoping if required. Accept the telescoping data from the crane control if incorrect telescoping is displayed on the SLI: 1. Press the buttons FR + CE once. The SLI shows the new values. 2. Acknowledge error

Error code			Cause	Remedy
5	01	1	There is no capacity diagram available for the entered rigging mode	Re-enter the current rigging mode. If the error is displayed again, check whether the current rigging mode is permissible.
5	01	2	Main boom angle too small (not steep enough)	Raise main boom
5	01	3	Main boom angle too large (too steep)	Lower main boom
5	02	1	There is no SLI 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 lattice extension
5	02	5	Lattice extension inclination is too large	Lower lattice extension
5	02	6	Current load greater than derricking load – movement <i>Lower lattice extension</i> is disabled.	<ol style="list-style-type: none"> 1. Raise lattice extension 2. Press button  once 3. If necessary, increase the working radius using the movement <i>Lower main boom</i>
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 CraneCARE if the error cannot be acknowledged.
6	02	1	Fuse F1 faulty	Replace faulty fuse;  p. 15 - 12.
6	02	2	Fuse F2 faulty	
6	02	3	Fuse F3 faulty	
6	02	4	Fuse F11 faulty	
6	02	5	Fuse F12 faulty	



Error code			Cause	Remedy
8	01	1	rigging mode SLI code not yet confirmed	▣▣▣▣ ➔ <i>Confirming the rigging mode</i> , p. 12 - 26.
8	02	2	SLI is overridden	Cancel the override; ▣▣▣▣ ➔ p. 12 - 37.
8	03	3	Slewing gear switched on with SLI code for 0° or 180° position	Switch off slewing gear.
8	14	1	Maximum permissible overall height exceeded ¹⁾	Retract or lower.
8	14	2	Maximum permissible overall working radius exceeded ¹⁾	Raise or retract.
8	14	3	Maximum permissible overall slewing range exceeded ¹⁾	Slew into a permissible working range.
8	14	4	Shutdown area of a monitored object reached ¹⁾	Move into a permissible working range.

¹⁾ with working range limiter switched on

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Switch off sensor/ tachogenerator

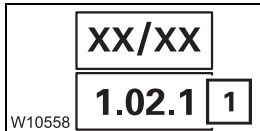
For values measured twice, you can switch off the faulty sensor/tachogenerator in the case of an error and continue working with one sensor/tachogenerator for a short time.



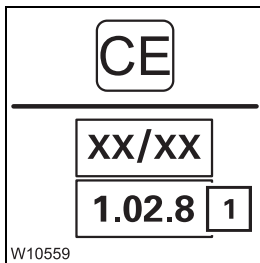
Danger due to failure of the SLI

Have the error rectified before the next crane job.

By doing this, the crane can then still be unrigged with SLI monitoring if the second sensor/tachogenerator fails.



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



- Press button **CE** once.

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

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

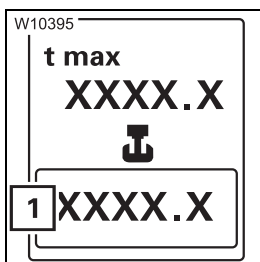
After switching off the faulty sensor/tachogenerator, you should check whether the other sensor/tachogenerator is functioning correctly.



Risk of accidents due to defective functioning

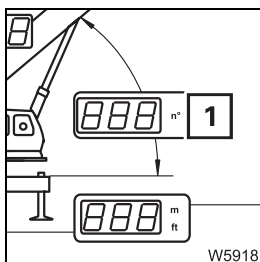
After switching off the faulty sensor/tachogenerator, only begin crane operation if the remaining sensor/tachogenerator is displaying correctly.

In this way, you prevent the SLI from not switching off when leaving the working range and the truck crane overturning as a result.



Check the pressure sensor function

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



Check the angle sensor function


- Set down the main boom on the boom rest.
- Check whether the display (1) shows an angle of 0°.

15.4.12 Malfunctions ECOS – superstructure

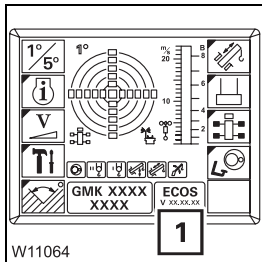
This section contains general malfunctions, and malfunctions which generate an error display. It also contains information on reading error messages on the *Outrigger* control units.

ECOS program version

Always note down the number of the program version after a malfunction occurs before notifying **CraneCARE**.


- If required, open the main menu .

The display (1) shows the number of the current program version.



General malfunctions

The following table contains information on finding faults and possible remedial measures.

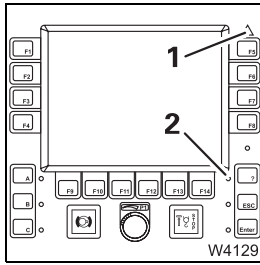
Malfunction	Cause	Remedy
The ECOS display remains dark although the ignition is switched on	Fuse F1/1, F1/2 faulty	Replace faulty fuse;  p. 15 - 6.
	Fuse F3/1, F3/2, F3/5, F3/6 faulty.	
	One or more fuses on the circuit board in the distribution box are faulty.	



Other malfunctions on the ECOS generate corresponding error messages.

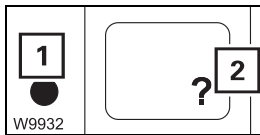
Error messages

If ECOS detects an error, an error message is indicated:

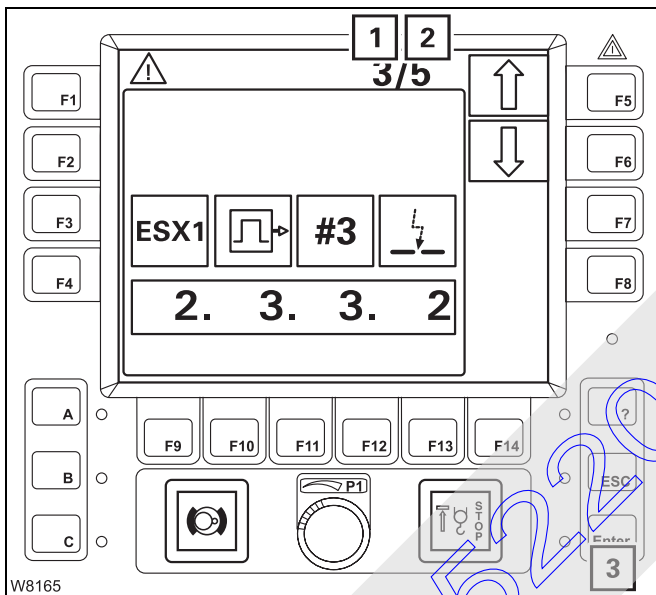


- lamp (1) flashes and
- lamp (2) flashes.

For more information, you must open the *Errors* submenu.



- Press the button (2) once. The button is only active when the lamp (1) flashes or lights up.



The *Errors* submenu opens.

Display (2) shows the error total, and display (1) shows which error is displayed.

3/5, for example, means:

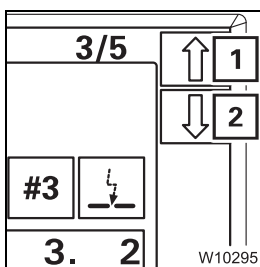
- that error 3 is shown
- there is a total of 5 errors.

If the error shown is not acknowledged, the lamp next to the button (3) lights up.

Acknowledge 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 errors present using the buttons next to the symbols (1) and (2).

- 1 Errors displayed in ascending order.
- 2 Error displayed in descending order.

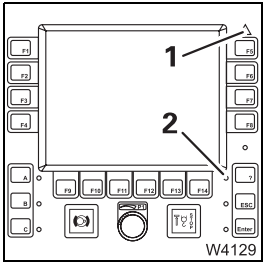
Every time you press, the next error will be displayed.

When you keep a button held down, all errors are shown one after the other continuously.



If not all errors have been acknowledged, the buttons   have no function – the symbols are grey.

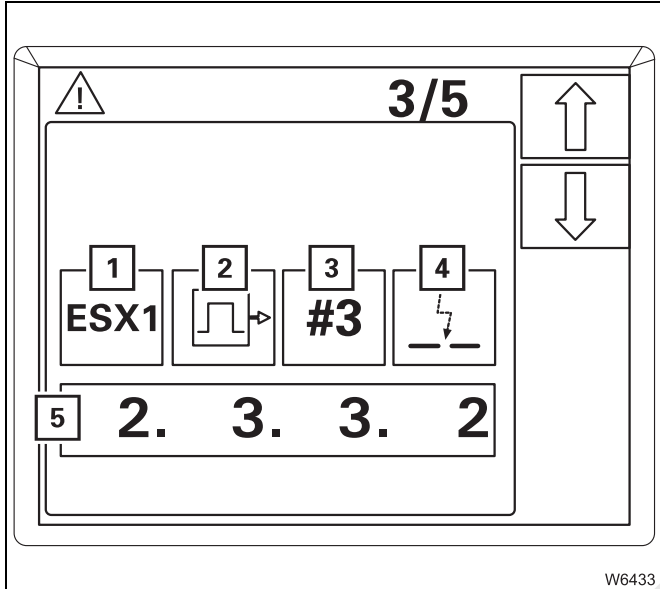




When all error messages have been acknowledged, the displays change:

- 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 defective device
- 2 The error group
- 3 The index within the group
- 4 The type of error

The error code (5) consists of four digits, e.g. **2332**.

- Always note down the error code before contacting **CraneCARE**.

Exiting the sub-menu



You can exit the *Errors* submenu at any time.

- Press the button (1) once.

The same menu opens which was open before the *Errors* submenu opened.



All errors remain saved until you switch off the ignition, even those errors of which the cause has been eliminated in the meantime. All existing errors are treated as new errors and displayed again after turning on the ignition.

15.5

Emergency operations and programs

This section contains all the information about possible emergency operations and emergency programs. There is:

- a mechanical emergency operations for retraction operations
- the *Telescoping emergency program* submenu
- the entering of the telescoping after an emergency operation
- the operation of the power units with the hand-held control and
- a hydraulic emergency operation, depending on the equipment.

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15.5.1

Mechanical emergency operation for retracting

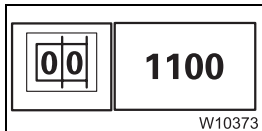
If you can no longer lock and unlock the telescopic sections from within the crane cab because of a malfunction, you can do so by performing mechanical emergency operations.

In this case you need one or two auxiliary cranes.

In the worst case, emergency operation has to be performed by properly trained personnel, because incorrect operation poses the risk of injury and damage to the main boom.

- Always check the following option first.

Check prior to the emergency operation



First check whether it is permitted to lower the main boom to horizontal position with the current telescoping. Proceed as follows:

- Enter the current rigging mode on the SLI. The corresponding SLI code according to the *Lifting capacity table* must be displayed.
- Lower the main boom.
- **If the SLI 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 SLI is deactivated prior to reaching horizontal position**
In order to reach the locking points, you need an auxiliary crane with licensed passenger transportation and a second auxiliary crane to secure and telescope the unlocked telescopic sections.



If it is possible to lower the main boom but there is not sufficient space, you can check whether it is permissible to drive the truck crane in the current rigging mode; p. 14 - 1.

For operation with the lattice extension; *Operating instructions lattice extension GMK 5220*.

Procedure

Which of the retracting procedures is best in your particular case depends on the conditions on site and on the crane functions that can still be operated.

Select the procedure best suited to your particular case and consult **CraneCARE**.

Mechanical emergency operation

The following requirements must be met before unlocking manually:

- The main boom must be lowered to the horizontal position so that the telescopic section cannot retract by itself.

or

- The telescopic section to be unlocked is secured against retracting by itself with an auxiliary crane. Telescoping is done with the auxiliary crane.

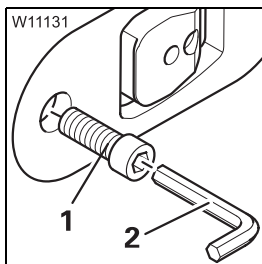


Risk of accidents due to sudden retraction of a telescopic section!

Before unlocking the telescopic section secure it against automatic retraction. In this way you can prevent the retracting telescopic section from shearing off any of your limbs or the truck crane from being damaged or overturned by the telescopic section suddenly retracting.



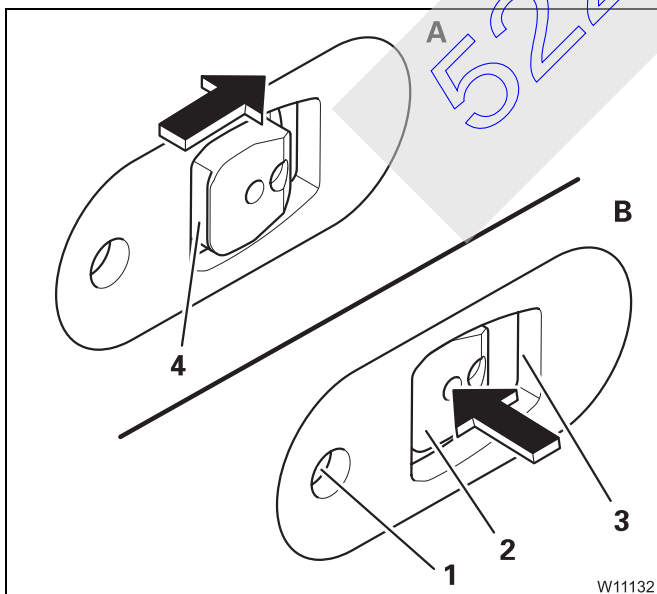
If the telescoping cylinder is positioned at a locking point, the corresponding telescopic section cannot be locked or unlocked manually.



There are two screws for each telescopic section, M 16 (1) – length 200 mm (7.9 in) for telescopic section I and 155 mm (6.1 in) for telescopic section VI.

- To unlock, the screws are screwed in.
- To lock, the screws are screwed out.

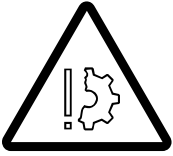
For this you need a suitable socket wrench (2), at least 200 mm (7.9 in) long.



Unlocking telescopic sections

- (A) – extend approx. 35 mm (0.11 ft), so that the cutout (4) is cleared.
- (B) – Screw a threaded bar into the bore (1). The locking pin (2) must retract to behind the telescopic section (3). If necessary, give the locking pin (2) a slight knock to help this procedure.
- Unlock the other side of the telescopic section as well.

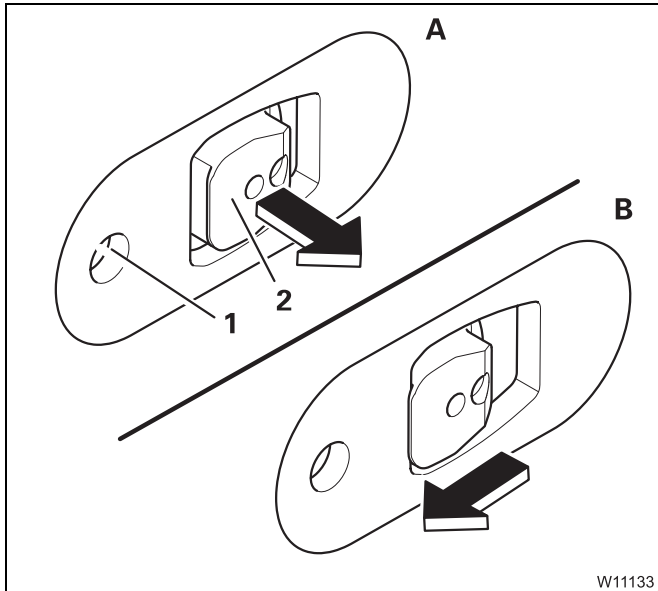




Risk of damage due to a mechanically released lock!

Under no circumstances may you operate the telescoping cylinder as long as the lock is mechanically released. Screw all threaded pins out of the bores immediately after finishing the repair work.

This prevents damage to the telescoping cylinder and the locking system.



Locking telescopic sections

- **(A)** – retract until the locking pin (2) is in the middle of the opening.
- Screw the threaded pin out of the bore (1) until the locking pin is fully extended.
- Take the threaded pin out of the bore.
- **(B)** – retract further until the telescopic section is set down.

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15.5.2

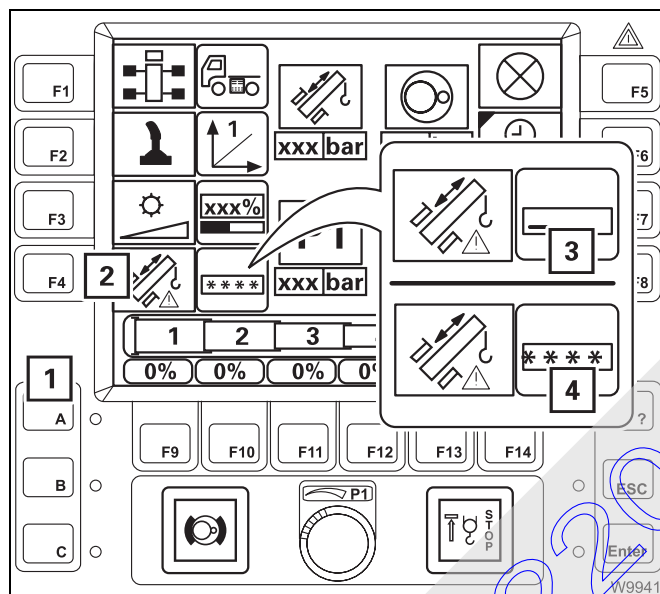
Telescoping emergency program

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.

Starting the emergency program

Only start the emergency program when the  symbol is displayed;  *Telescoping mechanism error messages*, p. 15 - 25.



- Press the right-hand dead man's switch.
- Additionally press the button (2) once – symbol (3) appears.
- Press the buttons (1) in the order:

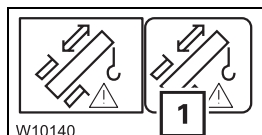


The symbols (4) confirm the entry.

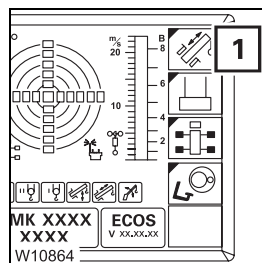
If your input was incorrect, all the symbols (4) go out and you need to repeat the input.




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

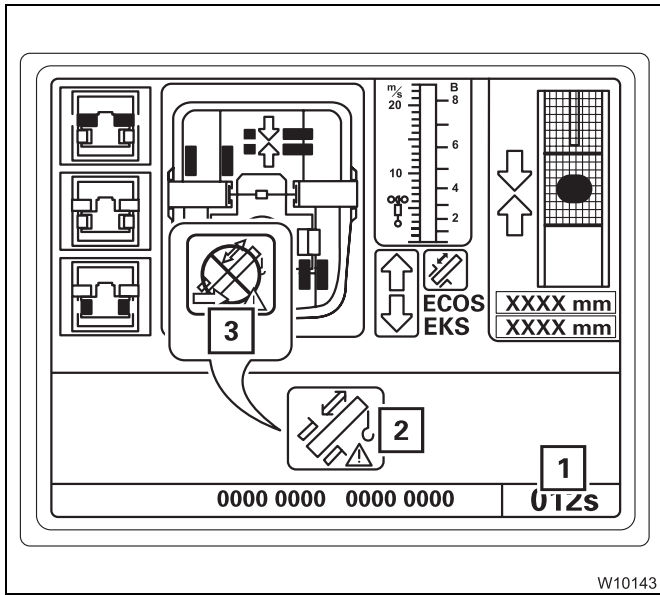


After correct input, the symbol (1) is displayed – the emergency program *Telescoping* starts.



- If necessary, open the main menu  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 – a time of approx. 360 seconds elapses.

The telescoping mechanism can be operated with the emergency program within this time.

After this time has elapsed, the symbol (3) appears, and you need to restart the emergency program.

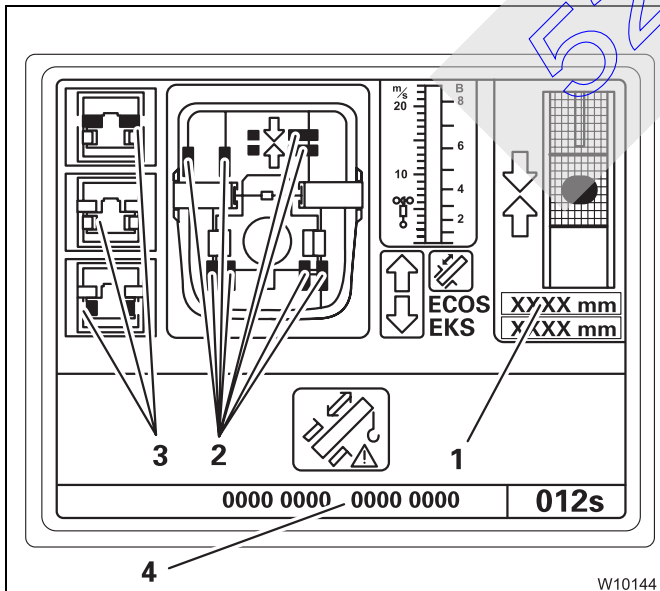
Determining the type of error

- Check which emergency program procedure is suitable for the current error:



Risk of damage to the telescoping mechanism!

Ensure you always have an overview of the current status of the telescoping mechanism before you initiate locking or unlocking. In emergency mode, there is no monitoring of prerequisites – the function is performed **immediately** after pressing the button.



- If the display (1) shows no value, there is an error on the length indicator.
- If a symbol (2) is violet, there is an error on the proximity switch.

The buttons next to the symbols (3) are active. After pressing the button, locking or unlocking is performed **immediately**.

- Note down the error code (4) first if you intend to contact **CraneCARE** before carrying out the emergency program.



Risk of damage to the main boom!

Never telescope the main boom if there is an error on the length indicator and on the proximity switch at the same time.

It would then not be possible for you to monitor operations, and components in the main boom could be damaged, or a situation could arise in which the main boom can no longer be extended or retracted.



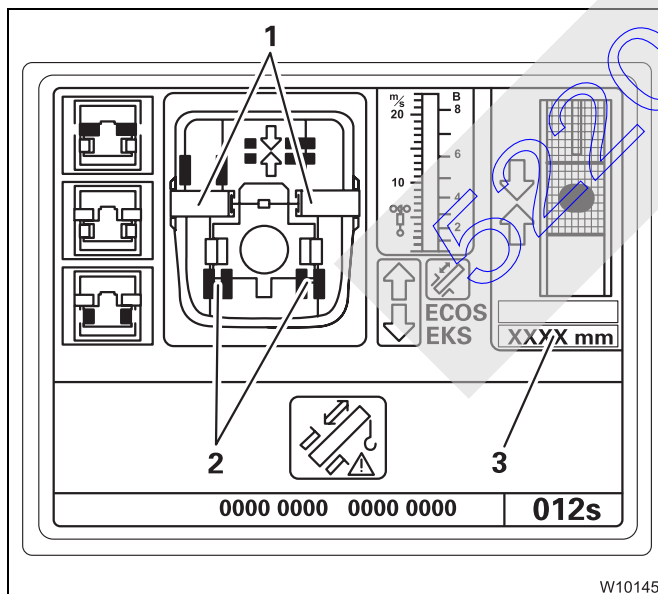
In the *Telescoping* emergency program, all functions for retracting the main boom remain enabled as long as there are no other errors (hydraulic or mechanical).

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

- If there is an error on the proximity switch; p. 15 - 49.
- If there is an error on the length indicator; next section.

If there is an error on the length indicator

First register the current status of the telescoping mechanism.




- Check the positions of the locking pins as usual, i.e. on the displays (1) and (2).
- Check whether the display (3) shows the SLI measured value for the extended length of the telescoping cylinder.
- Check the telescoping on the SLI.

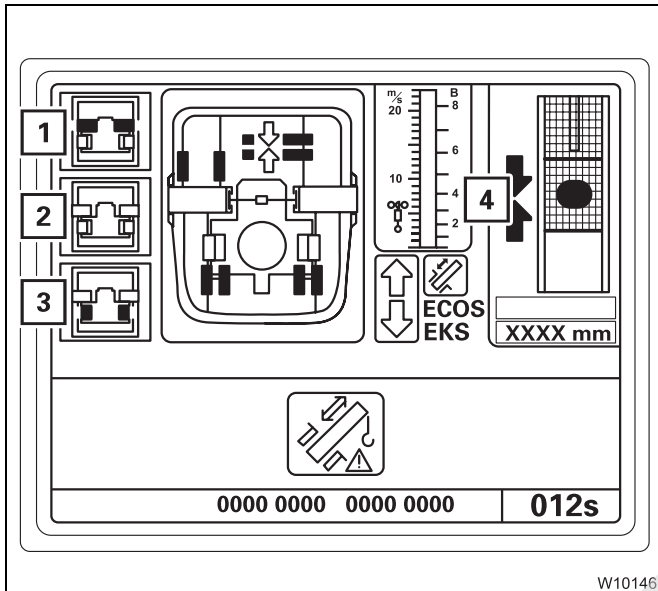
Checks prior to telescoping

- Before telescoping, check that the following conditions are met:

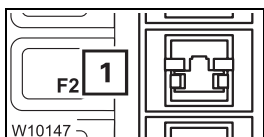


Risk of accidents from sudden retraction of a telescopic section

Press the  button for unlocking the telescopic section **no more than twice**. If this does not start the unlocking procedure, contact **CraneCARE**.



- The telescoping cylinder is locked, symbol (3) is **grey**.
- The telescopic section is unlocked (**press no 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.



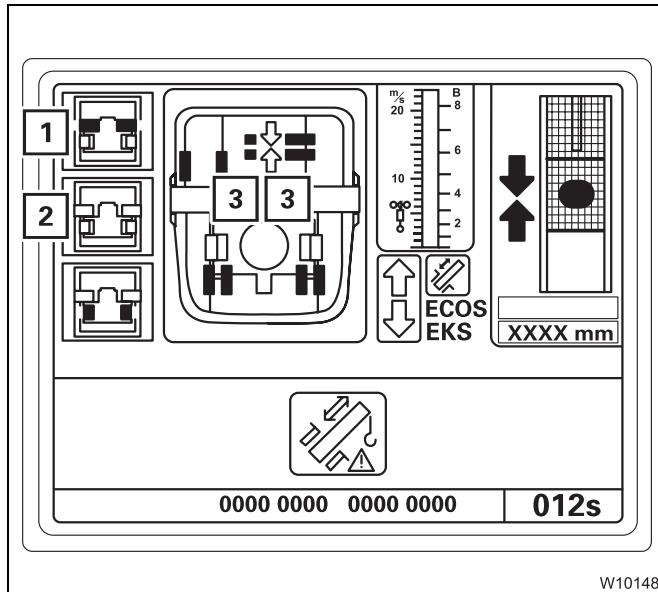
Retracting and locking a telescopic section

During telescoping you must **not** select Lock. **Under no circumstances** press the button (1).



Risk of damage to the main boom!

If you select Lock during telescoping, the locking pins on the telescopic section are slid out immediately and they can damage or tear the electrical or hydraulic components in the main boom.



- Retract the telescopic section slowly and as far as possible.
- Press the button (i) once.
- Extend to approx. 35 mm (0.11 ft).

The telescopic section is locked In *Locked* position:

- the locking pins (3) are **green**,
- the symbol (1) is **grey**,
- the symbol (2) is **yellow**.
- Set down the telescopic section and retract it as far as it will go.

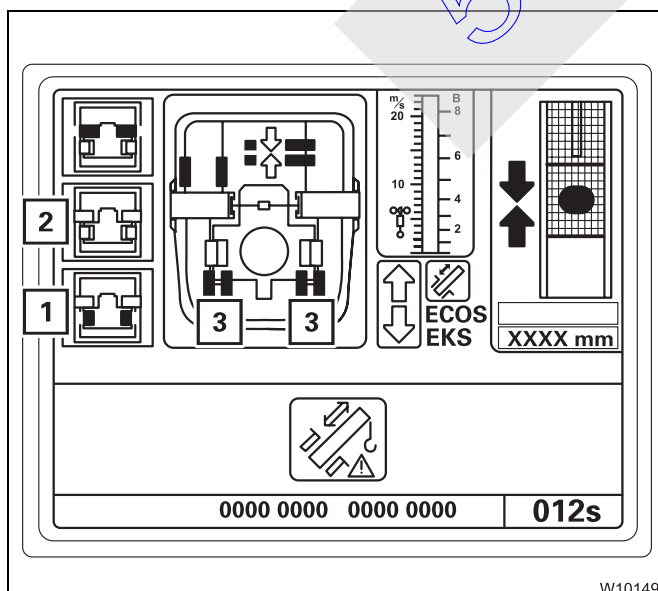
Unlocking the telescopic cylinder

If the telescopic section is locked, you can now unlock the telescopic cylinder.



Risk of accidents from sudden retraction of a telescopic section

Press the  button for unlocking the telescopic cylinder **no more than twice**. If this does not start the unlocking procedure, contact **CraneCARE**.



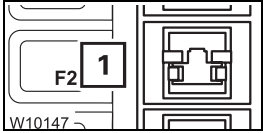
- Press the button (1) once (**at the most twice**).

The telescopic cylinder is unlocked. In *Unlocked* position:

- the locking pins (3) are **red**,
- the symbol (1) is **yellow**,
- the symbol (2) is **grey**.

You can now move the telescopic cylinder into the next telescopic section.





Extending and locking the telescoping cylinder

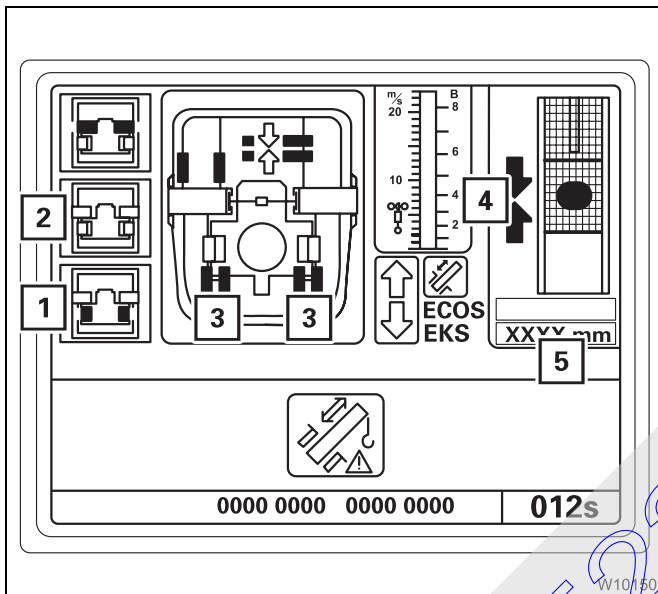
You must **not** select Lock while the telescoping cylinder is retracting or extending. **Under no circumstances** press the button (1).



Risk of damage to the main boom!

If you select Lock while the telescoping cylinder is moving, the locking pins on the telescopic section are slid out immediately and they can damage or tear the electrical or hydraulic components in the main boom.

- Slowly move the telescoping cylinder into the next extended telescopic section.



At the locking point:

- the arrows (4) are green,
- the display (5) shows the length for the current locking point; p. 15 - 51.

- Press the button (1) once.

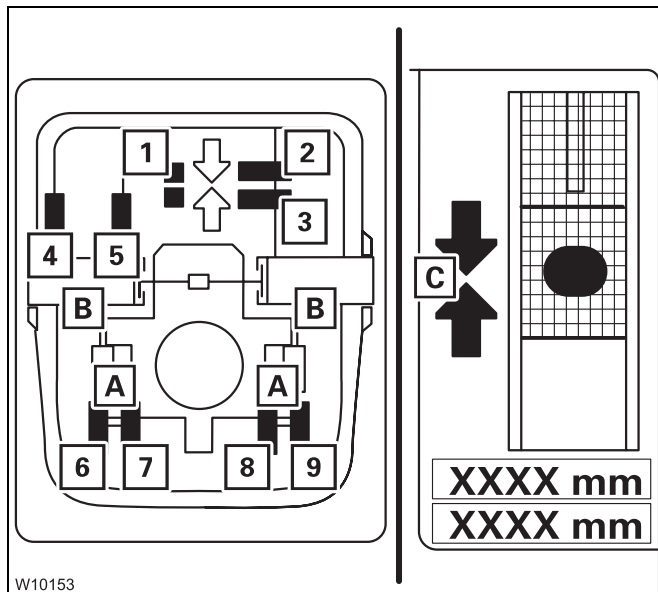
The telescoping cylinder is locked. In *Locked* position:

- the locking pins (3) are **green**,
- the symbol (1) is **grey**,
- the symbol (2) is **yellow**.

- You can now retract this telescopic section; p. 15 - 46.

If there is an error on a proximity switch

Defective 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.



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Several proximity switches are related to the displays (A), (B) and (C).

- For **A**: proximity switch (6) to (9)
- For **B**: proximity switch (4) and (5)
- For **C**: proximity switch (1) to (3)

When a proximity switch is defective (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

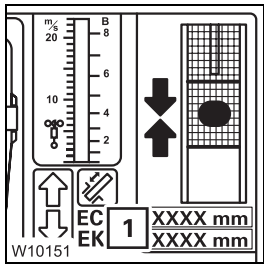
– **Display (A) – telescoping cylinder locked**

- 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





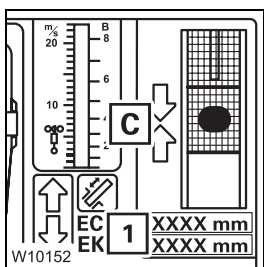
Required check

When the *locked* position can no longer be shown, always conduct the following checks before unlocking:

- Carefully retract and extend the telescoping cylinder or telescopic section. In the *locked* position, the length shown on the displays (1) should only vary 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. 15 - 51, ▶ *Locking points for the telescopic sections*, p. 15 - 52.
- Move the telescoping cylinder to the required length – display (1).



Risk of damage if the length specifications are not observed!

Extend the telescoping cylinder (without telescopic section) only to the specified length.

This prevents the piston rod from becoming damaged if the telescoping cylinder slides out of the telescopic section.

Terminating the emergency program



The emergency program is terminated:

- If the displayed time has expired or
- If the ignition is turned off.

The current telescoping status does not correspond to the telescoping status last saved by ECOS if the *telescoping* emergency program was open. You must enter the current telescoping after terminating the emergency program; ▶ *Entering the current telescoping*, p. 15 - 53.

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:

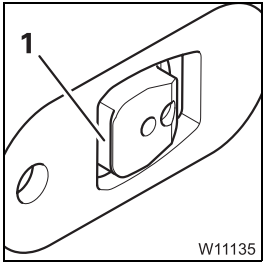
- want to lock the telescoping cylinder or
- lock a telescopic section.

Locking points for the telescoping cylinder

The following table shows the extended length for locking the telescoping cylinder.

Table for locking the telescoping cylinder			
Telescopic section	Locking point at fixed length in %	Extended length of the telescoping cylinder	
		in mm	(in ft)
Telescopic section I	0	5	(0.02)
	50	4 701	(15.42)
	100	9 396	(30.83)
Telescopic section II	0	415	(1.36)
	50	5 026	(16.49)
	100	9 638	(31.62)
Telescopic section III	0	775	(2.54)
	50	5 351	(17.56)
	100	9 928	(32.57)
Telescopic section IV	0	1 105	(3.63)
	50	5 660	(18.57)
	100	10 216	(33.52)
Telescopic section V	0	1 390	(4.56)
	50	5 912	(19.40)
	100	10 434	(34.23)
Telescopic section VI	0	1 635	(5.36)
	50	6 009	(19.71)
	100	10 384	(34.07)





Locking points for the telescopic sections

The telescopic section must not be set down for locking or unlocking it.

The cutout (1) must be clear. You must therefore extend the telescoping cylinder 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.

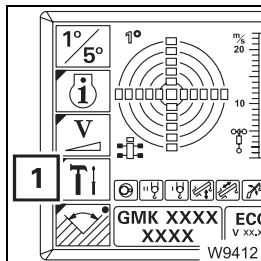
Table for locking/unlocking the telescopic sections			
Telescopic section	Locking point at fixed length in %	Extended length of the telescoping cylinder	
		in mm	(in ft)
Telescopic section I	0	40	(0.13)
	50	4 736	(15.53)
	100	9 431	(30.94)
Telescopic section II	0	450	(1.47)
	50	5 061	(16.60)
	100	9 673	(31.74)
Telescopic section III	0	810	(2.66)
	50	5 386	(17.67)
	100	9 963	(32.69)
Telescopic section IV	0	1 140	(3.74)
	50	5 695	(18.67)
	100	10 251	(33.63)
Telescopic section V	0	1 425	(4.68)
	50	5 947	(19.51)
	100	10 469	(34.35)
Telescopic section VI	0	1 670	(5.48)
	50	6 044	(19.83)
	100	10 419	(34.18)


15.5.3 Entering the current telescoping

ECOS no longer displays the current telescoping

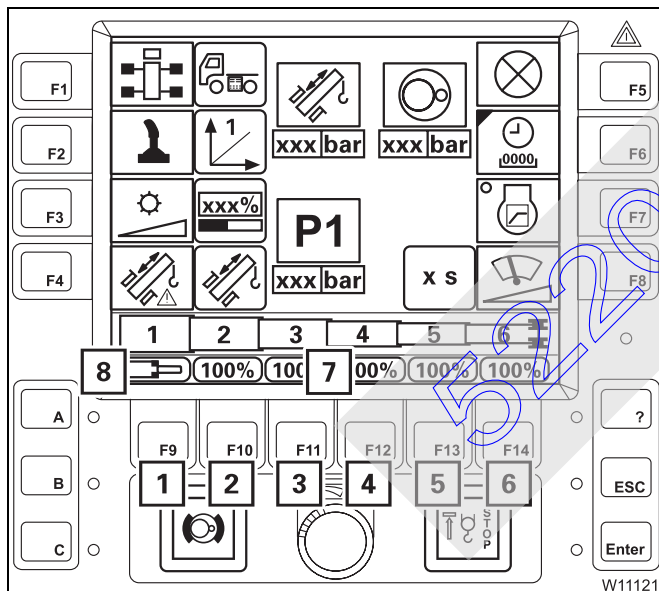
- if you telescoped in emergency mode or
- if the power supply was interrupted in the course of saving data.

In these cases you must enter the current telescoping, e.g. the values from the SLI display.



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

The *Settings* submenu opens.



Entering set values

The display (7) shows the values for telescopic sections I to VI.

- Press one of the buttons (1) to (6) – the values in the display (7) turn yellow.

Each time you press a button, the corresponding value in the display (7) switches continuously between the fixed lengths and the symbol (8) for *Unlocked*.

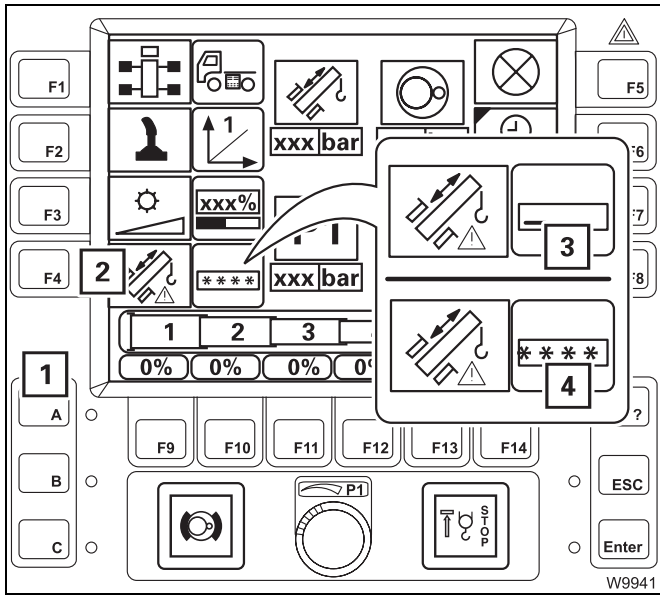
- Enter the desired set values for all the telescopic sections, e.g. unlocked, 100%, 100%, 100%, 100%, 100%.

 If you **cancel the input**, the main menu opens.

- Confirm the entered set values.

You must not accept the values.



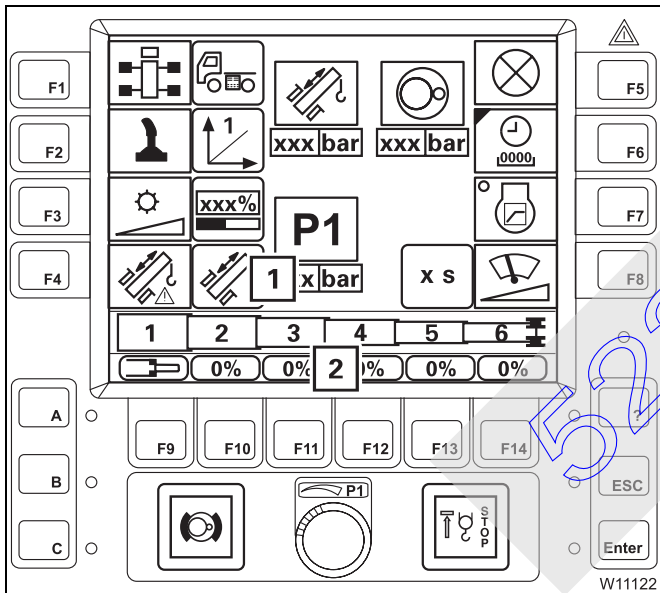


- Press the left-hand dead man's switch.
- Additionally press the button (2) once – symbol (3) appears.
- Press the buttons (1) in the order:



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 set 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 now indicates the correct telescoping and correct the input, if necessary. Entering incorrect values causes malfunctions and may cause damage to the telescoping mechanism.

15.5.4

Emergency operation in the event of a failure of the operating elements in the crane cab

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

Operating them with the hand-held control is intended for emergencies only and for bringing the truck crane into a safe condition or supporting it.

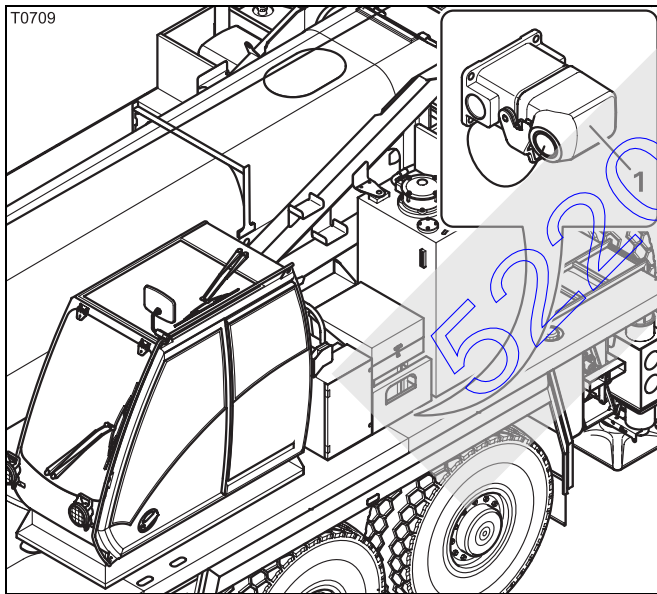


Danger of overturning due to deactivated monitoring function

The **SLI is switched off** and the crane operations are not monitored when operating with the hand-held control. If you move into a critical range the truck crane will overturn.

Preparations

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

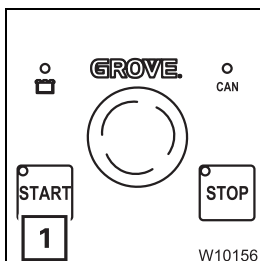


Connecting the hand-held control

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

All power units can be operated from this connection.

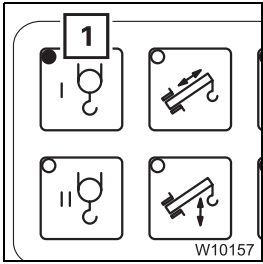
Information on connecting; p. 13 - 21.



Starting the engine

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





Preselecting 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 goal 0/0/0/0/0/0 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 driving into the shutdown ranges!

Avoid lowering. If you cannot avoid lowering, try to set down the load beforehand, and ensure that the maximum permissible working radius for the rigging mode as specified in the *Lifting capacity table* is not exceeded.

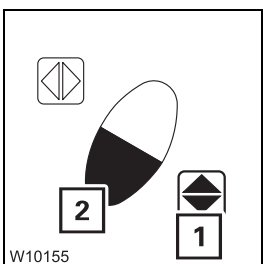
Before slewing, always check whether this is permissible in the current rigging mode; *Slewing with rigged counterweight*, p. 13 - 76.



Risk of accidents when operating the slewing gear!

Sit down in the crane cab to operate the slewing gear. This prevents you from being pushed off the carrier or being crushed by the carrier as a result of slewing.







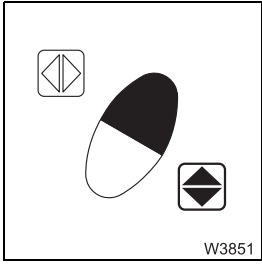
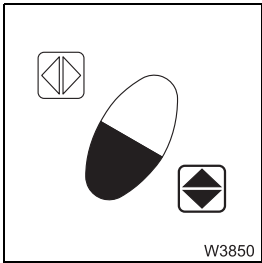
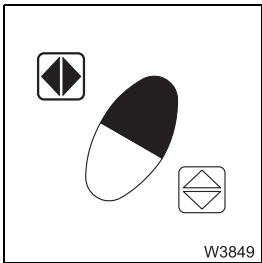
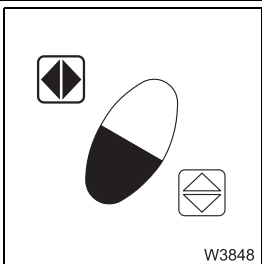
Lay the connecting cable of the hand-held control so that it will not catch on anything.



- Press the required function buttons one after the other, e.g. for *Lift main hoist*, press button (1) first, and then also button (2).

The further you press button (2), the quicker the movement is. The maximum speed is limited to approx. 50% for all power units.

The following table shows all the button combinations. Actuated buttons are marked black.

Button combination	Preselected power unit					
	Telescoping mechanism 	Derricking gear 	Slewing gear 	Hoisting gears  		Lattice extension 
 W3851	none ¹⁾	lower	none	lower		lower
 W3850	retract	raise	none	lift		raise
 W3849	none	none	slew to right	none		none
 W3848	none	none	slew to the left	none		none


1) If the telescoping cylinder is unlocked, it extends.



Stopping movements

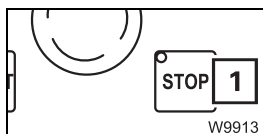
The movement continues until you let go of the button or the end position is reached.

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. 11 - 20.

Turning off the engine

You can only turn off the engine with the hand-held control. In this case it is not possible to turn off the engine via the ignition lock.



- Stop all crane movements.
- Press the button (1) – the engine goes off.

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15.6

Hydraulic emergency operation

15.6.1

Important instructions for hydraulic emergency operation

With this additional equipment the truck crane is supplied with a hydraulic emergency bleed valve in accordance with German employers liability association guidelines BGR 159 (4.2.8). This equipment allows supplying the superstructure hydraulics from

- the carrier hydraulic system,
- another crane with the same equipment or
- an external hydraulic source of power.

This allows small loads to be transported in case of emergency, e.g. in the event of a failure of the engine.

In hydraulic emergency operation, you operate the slewing gear, the main hoist and the derricking gear.

Furthermore, truck cranes with this equipment can be used as a hydraulic power source for the emergency supply of another crane.



Risk of accidents due to improper use

Only operate in hydraulic emergency mode to transport small loads in emergencies and have the malfunction rectified as soon as possible. Crane operation in hydraulic emergency mode is prohibited since it is not monitored by the SLI.

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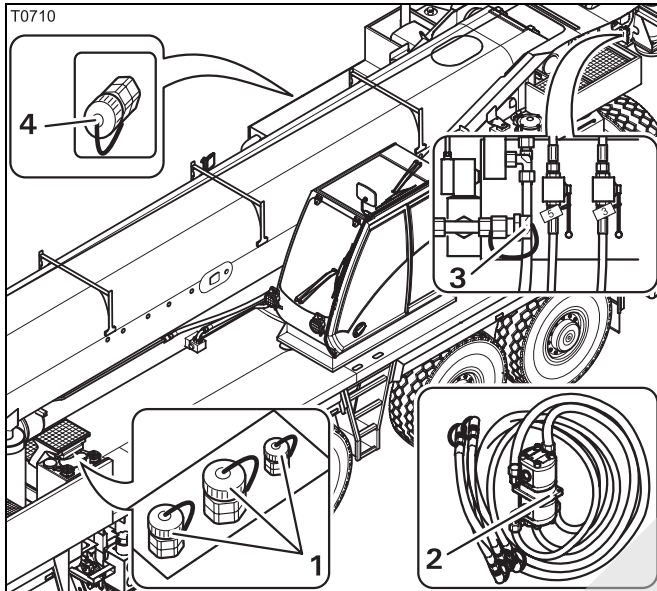
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15.6.2

Operating principle and accessories

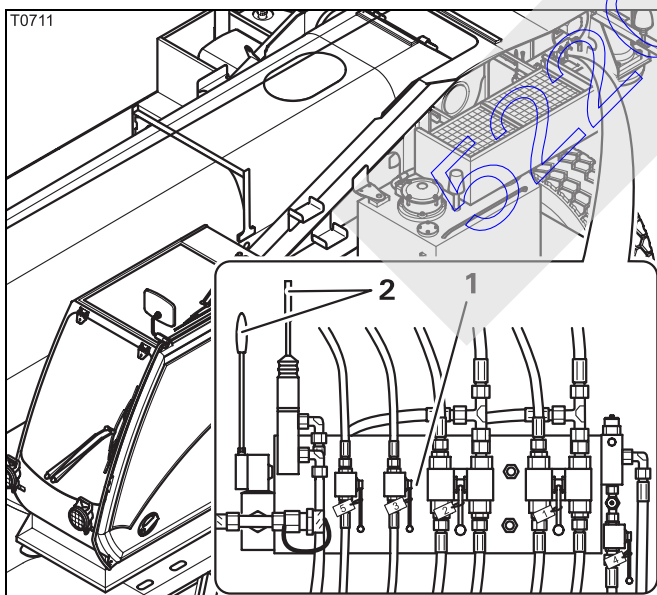
For emergency operation

This section gives a broad overview of the operating principle of the emergency operation, supplied accessories and additional connections on the truck crane.



For emergency operation you also need a hydraulic transformer (2).

- One side of the transformer is powered by the carrier hydraulic system, for example, and connected to connections (1) for this purpose.
- The other side of the transformer is connected to the connections (3) and (4) and pumps the oil of the superstructure hydraulic system.



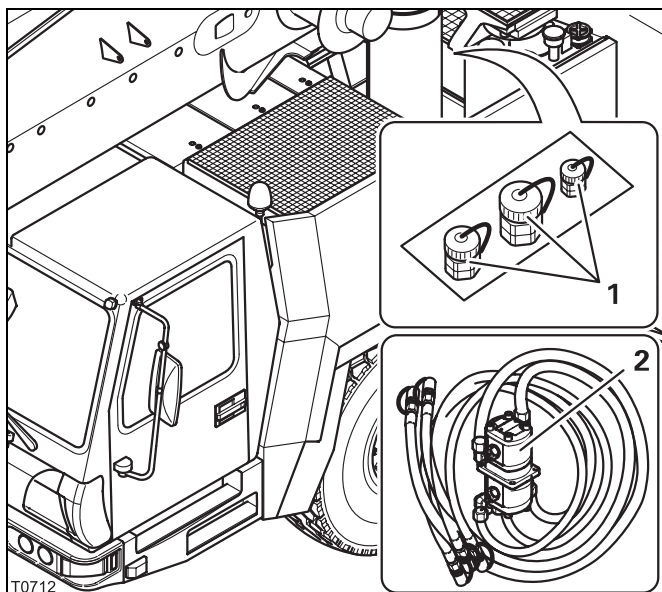
The hydraulic circuits for the crane movements are switched with the valves (1).


The control levers (2) are used to control the direction of movement and the speed.



For the emergency supply

Truck cranes with hydraulic emergency operation can be used as a hydraulic power source for other cranes that are also equipped with hydraulic emergency operation.



In the event of emergency supply, the connections (1) feed a transformer (2) which is connected to the hydraulic system of another crane;  *Emergency supply of another crane, p. 15 - 74.*

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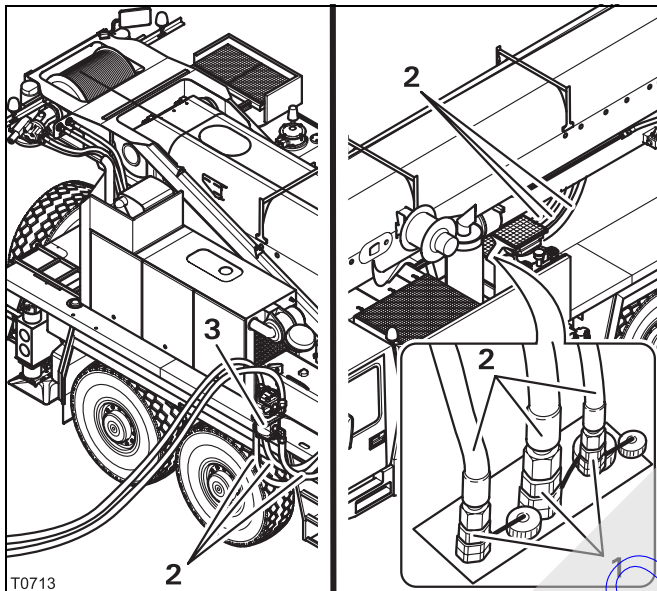
15.6.3

Connecting/Disconnecting hoses

- Turn off the engine for driving and for crane operation.

Establishing connections

The hoses are assigned according to the various diameters.



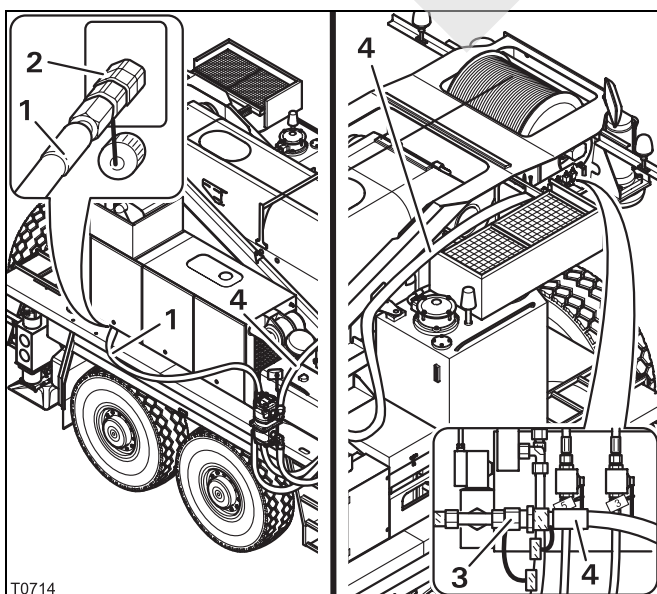
On the carrier

- Attach the transformer (3) to the superstructure.
- Connect the hoses (2) to the connections (1).



Risk of damage to the hoses!

Lay the hoses in such a manner that they can be moved freely, so as to prevent them from being crushed or torn or getting caught during subsequent crane movements.



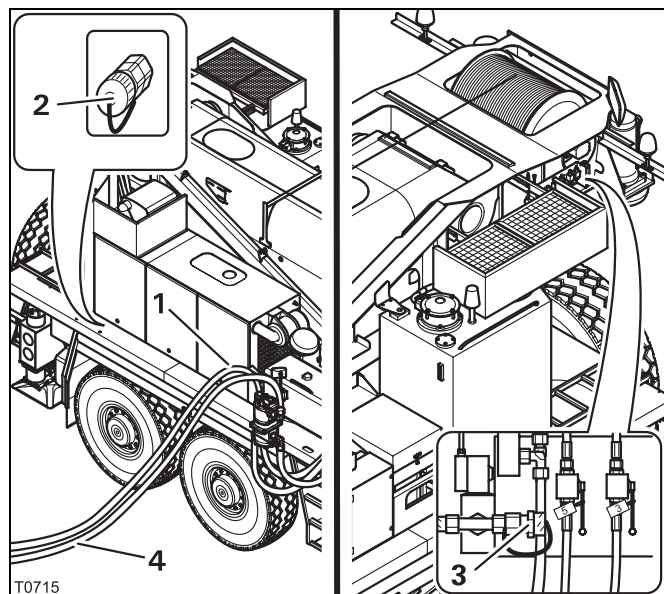
On the superstructure

- Connect the thicker hose (1) to the connection (2).
- Connect the thinner hose (4) to the connection (3).



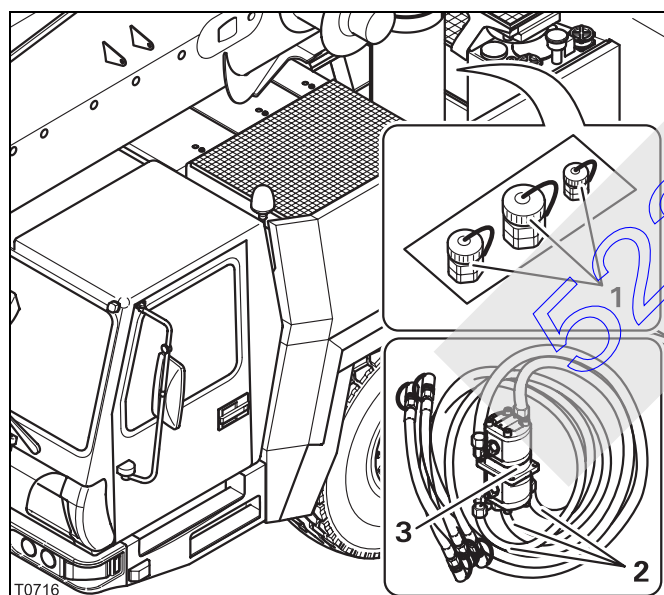
Disconnecting

After emergency operation you must disconnect the hoses and the transformer.



On the superstructure

- Remove the hoses (1) and (4) from the connections (2) and (3).
- Close the hoses and the connections with the caps.

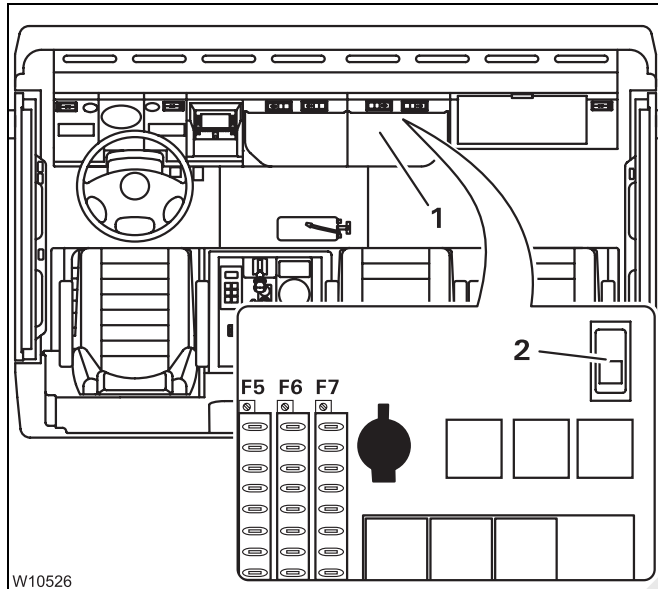


- Remove the hoses (1) from the connections (2).
- Close the hoses and the connections with the caps.
- Remove the transformer (3).

15.6.4

Activating/Deactivating emergency mode

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



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

To switch on

- Press the switch (2) down at the bottom.

To switch off

- Press the switch (2) down at the top.

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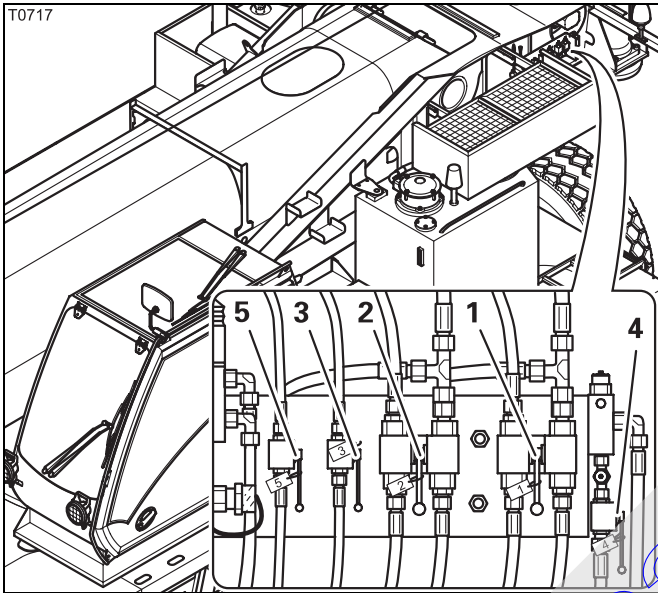
15.6.5

Establishing the required hydraulic circuits

To establish a hydraulic circuit, you must 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.



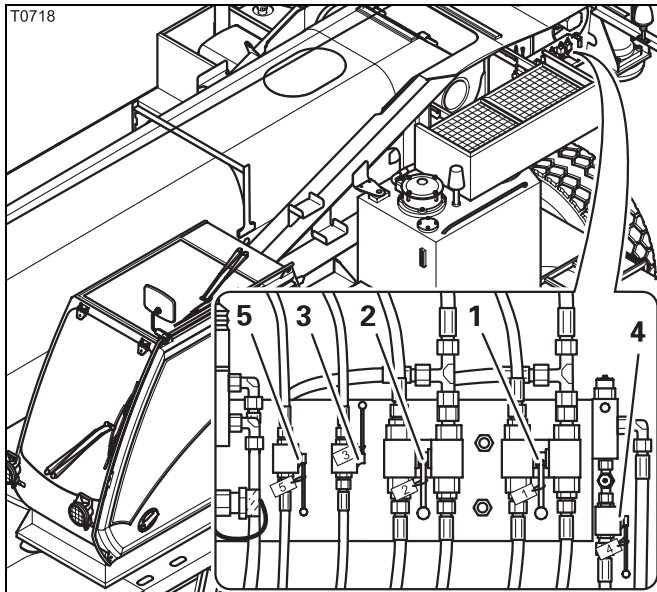
For crane operation

- Switch the valves **1** to **5** **down** diagonally



Danger due to mutual interference of the power units!

For crane operation always switch **all** the valves **1** to **5** down diagonally. This prevents the power units from suddenly starting to move.



For emergency operation




- 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 due to mutual interference of the power units!

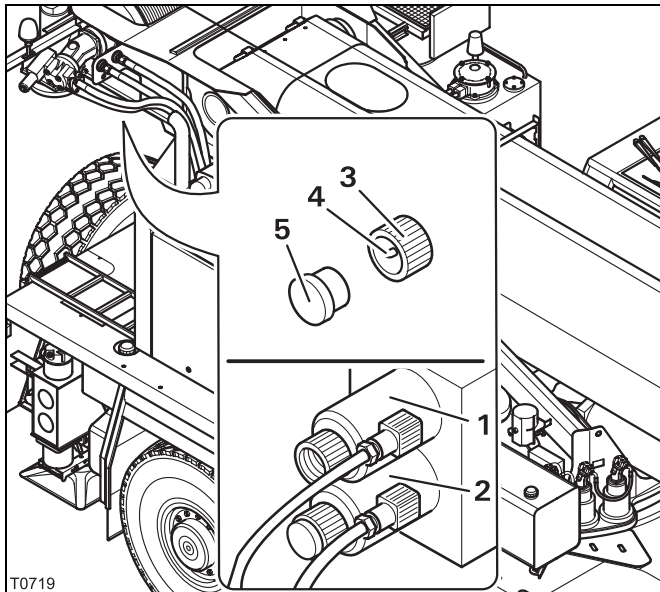
Always switch valves for **one** crane movement up diagonally at a time. This prevents wrong crane movements from being performed and several movements from being performed unintentionally at the same time.

Emergency mode for crane operations	Valves diagonally up	Valves diagonally down	Additional switching operations
Lifting	1	2, 3, 4, 5	Valve Y1105 on continuous operation;  p. 15 - 68
Lowering	1	2, 3, 4, 5	Valve Y1104 on continuous operation;  p. 15 - 68
Raising	3	1, 2, 4, 5	none
Lowering	5	1, 2, 3, 4	none
Slewing to the left or right	2, 4	1, 3, 5	Valve 6 closed;  p. 15 - 69



For lifting/lowering

After switching over the valves, you must additionally switch one valve to continuous operation.



Switching on continuous operation

Always switch only **one** valve to continuous operation.

- 1 Valve Y1104 – Lowering **or**
- 2 Valve Y1105 – Lifting

- Screw off the cap (3), e.g. off valve (1).
- Remove the plug (5).
- Screw the cap and pin (4) onto the valve – continuous operation is switched on.

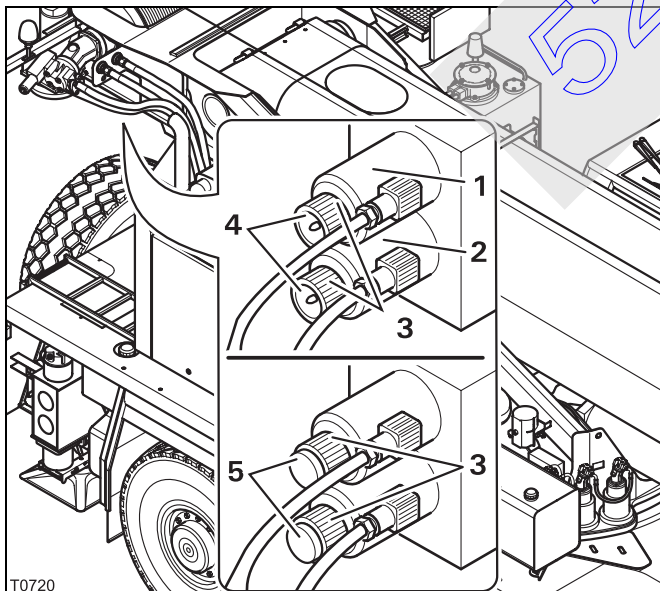


Danger due to falling loads

Switch off continuous operation immediately after the emergency operation.

Check whether the pins can be seen on both caps.

In this way, you can prevent loads from falling immediately after being lifted during subsequent crane operations.

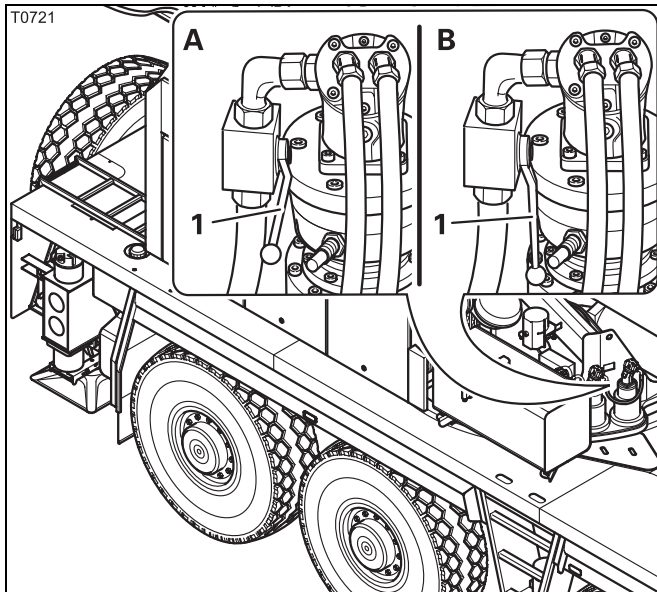


Switching off continuous operation

- Remove the cap (3) from the actuated valve (1), (2).
- Screw on the cap so that the pin (4) can be seen.
- Insert the plug (5).

For slewing

After switching over the valves behind the crane cab, you must additionally close one valve on the slewing gears.



(A) – Emergency operation position

- Close the valve 6 – lever (1) at right angles to the line.

(B) – Crane operation position

- Open the valve 6 – lever (1) parallel to the line.

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15.6.6

Carrying out emergency operation

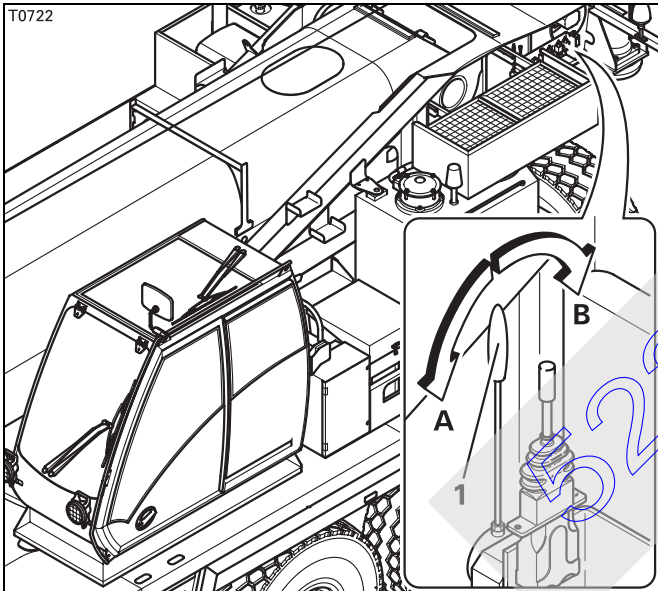
If the required hydraulic circuit has been established, you can operate the corresponding crane movement. There are two control levers provided for this behind the crane cab.



You can control the speed of all power units with the control lever. You can increase the speed by increasing the speed of the engine that drives the hydraulic power source.

Lifting/Lowering in emergency mode

For these crane movements you only need the large control lever.



- Move the control lever (1) in the required direction:

A: Lifting

B: Lowering

Slewing in emergency mode

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.



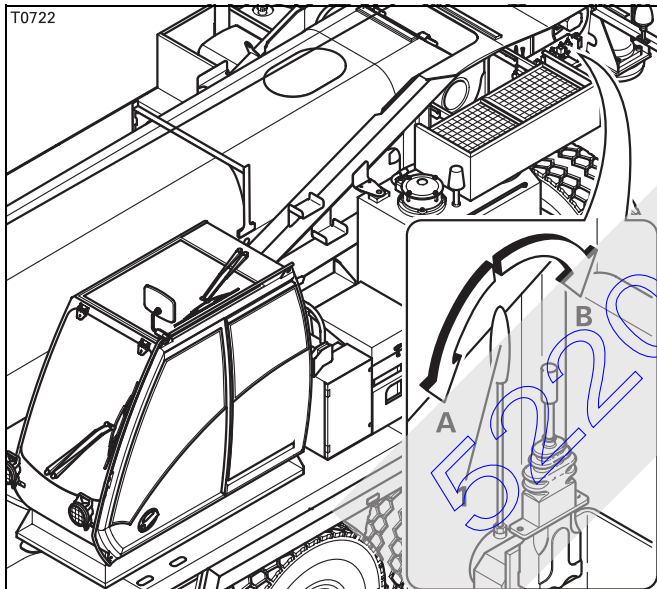
Risk of accidents during slewing!

Do not stand on the carrier. This prevents you from being pushed off the carrier or being crushed by the carrier as a result of slewing.



Risk of damage to the hoses and transformer

Make sure the hoses do not get caught and torn off while performing slewing operations.



- Move the control lever (1) slowly in the required direction:

A: Slewing to the right

B: Slewing to the left



Raising/Lowering in emergency mode

Before lowering

- Determine the maximum permissible working radius for the current rigging mode according to the *Lifting capacity tables*.



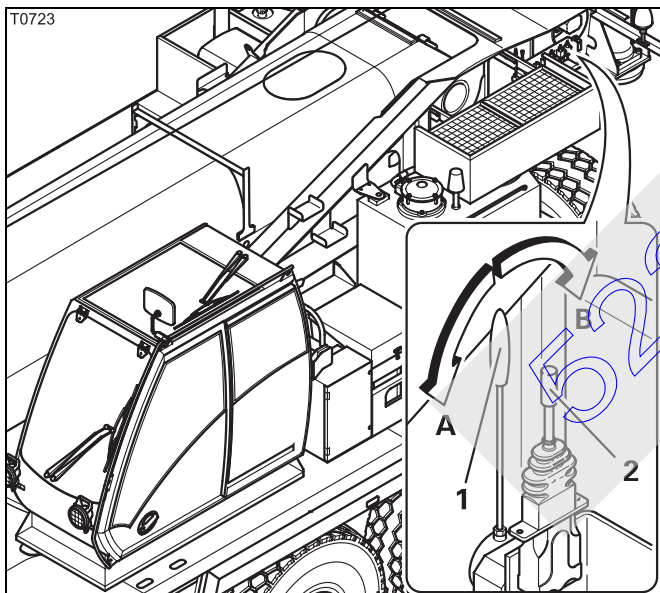
Danger due to unexpected changes in the direction of movement

Only operate the small control lever to lower the boom. The direction of movement is changed and the main boom is raised if you additionally actuate the large control lever.



Danger of overturning if the working radius is too large when lowering the boom!

In emergency mode operations are not shut down by the SLI. This also applies if the SLI displays are still active after switching on the ignition. The truck crane will overturn if you exceed the maximum permissible working radius for the current rigging mode as specified in the *Lifting capacity table* when lowering the boom.



Lowering

- Observe the maximum permissible working radius specified in the *Lifting capacity table* – if necessary by measuring.
- Move the control lever (2) in direction B.

Raising


- Move the control lever (1) in the required direction A.

15.6.7

After emergency operation


You must restore the truck crane to its original condition after finishing emergency operation.

Switching off emergency operation

- Switch off emergency mode;  p. 15 - 65.
- Switch off the engine for driving.

Switching over the crane operation


After every emergency operation

- Switch the valves 1 to 5 to crane operation;  p. 15 - 66.

Additionally after lifting/lowering

- Switch off continuous operation on the valves Y1105 and Y1104;  p. 15 - 68.

Additionally after slewing

- Open the valve 6;  p. 15 - 69.

Disconnecting the hoses

- Disconnect the hoses between the transformer
 - and the superstructure,
 - and the carrier or the hydraulic power source.
- Close all the connections and hoses with the caps.
- Remove the transformer, provide all the hoses with caps and stow away the transformer.

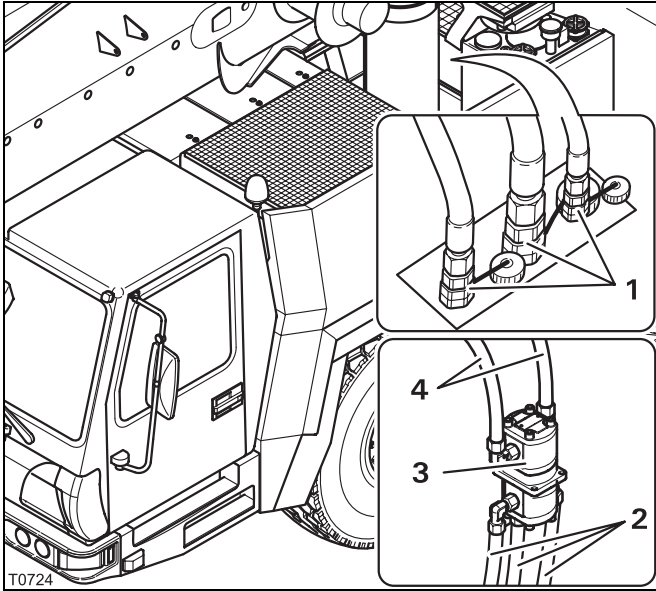
 *Disconnecting*, p. 15 - 64.

15.6.8

Emergency supply of another crane

For emergency supply

- Turn off the engine for driving.
- The hoses are assigned according to the various diameters.



On the GMK 5220

- Connect the hoses (2) to the connections (1).

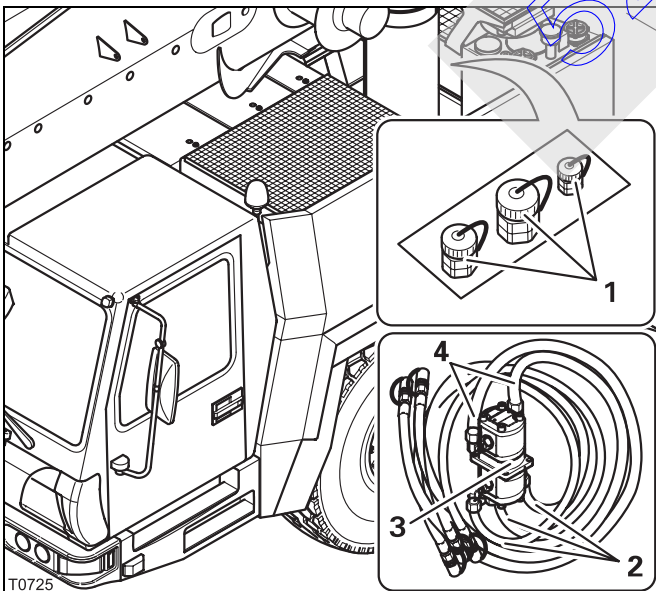
On the crane to be supplied

- Attach the transformer (3).
- Connect the hoses (4) to the connections provided. Observe the information in the operating manual of the other crane.

- Switch on hydraulic emergency mode; p. 15 - 65.

After emergency supply

- Switch off hydraulic emergency mode; p. 15 - 65.



On the GMK 5220

- Remove the hoses (2) from the connections (1).

On the crane to be supplied

- Remove the hoses (4).
- Close all the connections and hoses with the caps.
- Remove the transformer (3).

16 Technical information for the superstructure

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Technical information for the superstructure

16.1

Technical data

GROVE truck crane GMK 5220

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

Crane designation: Truck crane in accordance with
DIN 15 001, part 1

Crane application: Service crane in accordance with
DIN 15 001, part 2

Crane classification: Hoist class H1 in accordance with
DIN 15 018, part 1
Crane class A1 in accordance with
ISO 4301, part 2

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

16.1.1

Maximum lifting capacity (DIN/ISO/EN)

Max. load bearing capacity: 175 t (385,800 lbs)

Max. load moment

- In working position 0° to the rear: 656.5 tm (50.5 t x 13 m)
- Within the 360° slewing range: 636.0 tm (53.0 t x 12 m)

16.1.2

Maximum lifting capacity (ASME B 30.5)




Max. load bearing capacity: 175 t (385,800 lbs)

Max. load moment

- In working position 0° to the rear: 689.0 tm (53.0 t x 13 m)
- Within the 360° slewing range: 666.0 tm (55.5 t x 12 m)

16.1.3

Dimensions and weights of the truck crane, axle loads

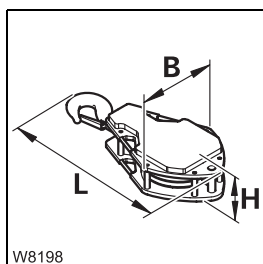
- Dimensions;  p. 8 - 3.
- Weights and axle loads in condition for driving on-road;  p. 8 - 3.
- Rigging mode and axle loads when driving with rigged crane;
 p. 14 - 2.

16.1.4

Dimensions and weights of removable parts

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

Hook blocks and hook tackle



Description	Length x width x height (L) x (B) x (H)	Weight in kg (lbs)
	in m (ft)	
Double hook 9 sheaves	2.30 x 0.95 x 0.85 (7.55 x 3.15 x 2.8)	2 400 (5 290)
Single or double hook, 7 sheaves	2.00 x 0.80 x 0.70 (6.55 x 2.65 x 2.30)	1 750 (3 860)
Single or double hook, 5 sheaves	1.85 x 0.70 x 0.60 (6.10 x 2.30 x 2.0)	1 650 (3 640)
Single or double hook, 3 sheaves	1.95 x 0.65 x 0.40 (6.40 x 2.15 x 1.30)	950 (2 095)
Single hook, 1 sheave	1.50 x 0.65 x 0.35 (4.90 x 2.15 x 1.15)	600 (1 320)
Hook tackle	0.91 x 0.35 x 0.35 (3.00 x 1.15 x 1.15)	300 (660)

Lifting capacity of the hook blocks;  p. 13 - 91.

Counterweight parts

Description	Length x width x height in m (ft)	Weight in kg ¹⁾ (lbs)
11 t base plate	3.00 x 2.40 x 1.20 (9.85 x 7.88 x 3.94)	11 000 (24 250)
10 t section, each	3.00 x 2.60 x 0.30 (9.85 x 8.53 x 0.98)	10 000 (22 050)
10 t section with recesses	3.00 x 2.60 x 0.25 (9.85 x 8.53 x 0.82)	10 000 (22 050)
5 t section	2.35 x 2.30 x 0.15 (7.71 x 7.55 x 0.49)	5 000 (11 025)
5 t section with recesses	3.00 x 2.60 x 0.25 (9.85 x 8.53 x 0.82)	5 000 (11 025)
10 t block, each	1.75 x 1.10 x 1.20 (5.74 x 3.61 x 3.94)	10 000 (22 050)
3 t block, each	1.05 x 0.75 x 1.20 (3.44 x 2.46 x 3.94)	3 300 (7 280)
13 t block, each	1.75 x 1.60 x 1.20 (5.74 x 5.25 x 3.94)	13 000 (28 660)

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

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

Heavy duty equipment

Description	Length x width x height in m (ft)	Weight in kg (lbs)
Adapter with pins	1.15 x 1.10 x 0.25 (3.77 x 3.61 x 0.82)	260 (580)

Auxiliary hoist

▣▣▣▣ *Auxiliary hoist*, p. 8 - 5

16.1.5

Superstructure

Engine

Make:	Cummins
Type:	QSB 6.7
Power:	164 kW (226 HP) at 2200 min ⁻¹ (EC 80/1269 - 89/491 EEC, fan detached)
Engine emissions:	EUROMOT \ EPA \ CARB (off road)
Fuel tank:	approx. 240 l (63 gal)

Main hoist

Make:	Siebenhaar
Type:	3050
Drum diameter:	458 mm (18.0 in) (rope centre to rope centre)
Rope diameter:	22 mm (0.87 in)
Rope length:	290 m (950 ft)
Max. rope pull:	93.5 kN/line (21 020 lbf)
Power unit group:	M 3 (in accordance with ISO 4301 - 2)
Load spectrum:	L 1
Factor of the load spectrum	Km = 0.125
Theoretical service life:	D = 3 200 h

Auxiliary hoist

Make:	Siebenhaar
Type:	3050
Drum diameter:	458 mm (18.0 in) (rope centre to rope centre)
Rope diameter:	22 mm (0.87 in)
Rope length:	290 m (950 ft)
Max. rope pull:	93.5 kN/line (21 020 lbf)
Power unit group:	M 3 (in accordance with ISO 4301 - 2)
Load spectrum:	L 1
Factor of the load spectrum	Km = 0.125
Theoretical service life:	D = 3 200 h

Slewing gears

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


Derricking gear

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

Main boom

Main boom lengths:	13.3 m to 68.0 m (43.8 ft to 223 ft)
Main boom head:	8 or 9 sheaves, depending on equipment
Cylinder:	One single-level telescoping cylinder with locking / unlocking mechanism
Power unit group	M 1 (in accordance with ISO 4301 - 2)
Telescoping mechanism:	

Lattice extension

As additional equipment;  *Operating instructions lattice extension GMK 5220.*



Operating speeds The specified operating speeds only apply to an engine speed of about 2,000 min⁻¹ (rpm) without load.

Main hoist:	Rope speed when lifting and lowering Normal speed: Maximum 60 m/min (197 ft/min) High speed: Maximum 125 m/min (410 ft/min)
Auxiliary hoist:	Rope speed when lifting and lowering Normal speed: Maximum 60 m/min (197 ft/min) High speed: Maximum 125 m/min (410 ft/min)
Slewing gear:	0 to 1.3 revolutions per minute
Telescoping mechanism:	Telescoping out 13.3 m to 68.0 m (43.8 ft to 223 ft) ca. 460 s In automatic mode during uninterrupted locking and telescoping processes
Derricking gear:	Derricking between -1.5° and 83° Normal speed: To raise: ca. 120 s High speed: To raise: ca. 60 s

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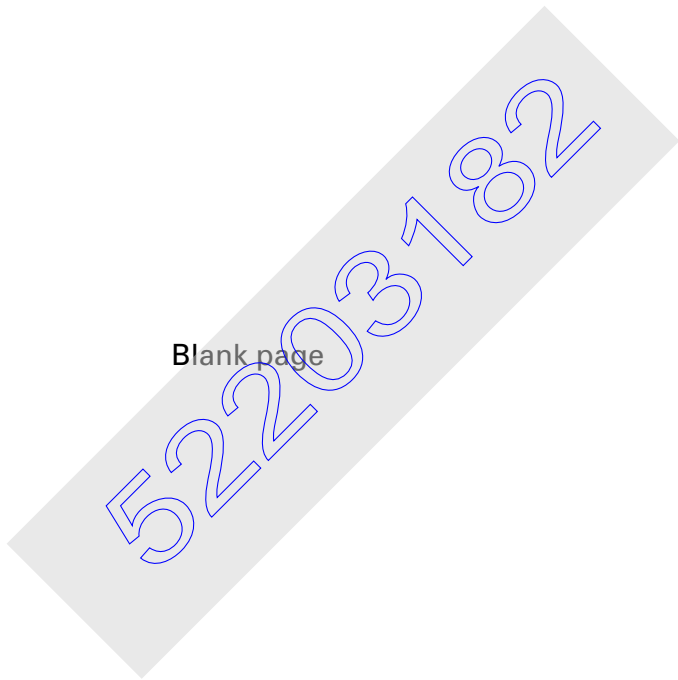


To avoid making the index unnecessarily long and unclear, we have not included every single element from the instrument panel.

Those elements such as switches and buttons, lamps and displays are described and named in detail in the overviews of chapter 3 and chapter 10, *Description of the truck crane*.

You are referred to more detailed descriptions of these elements from there as usual.

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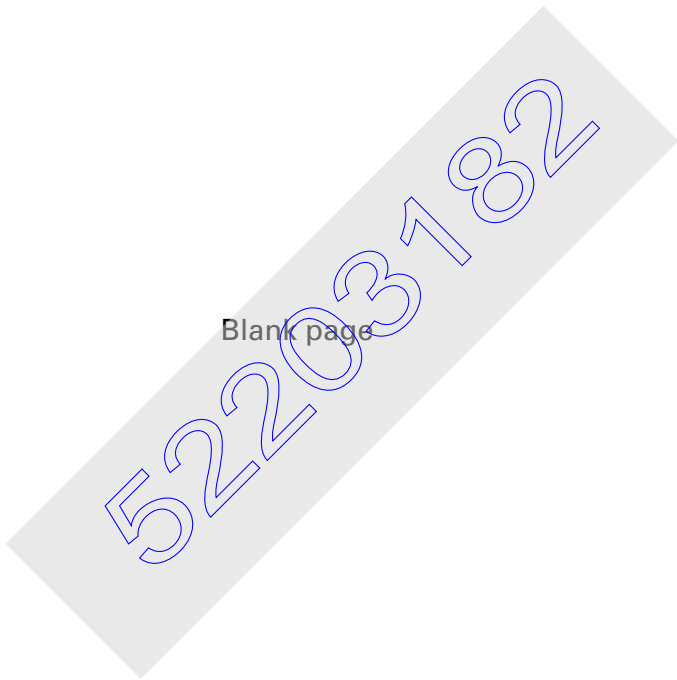
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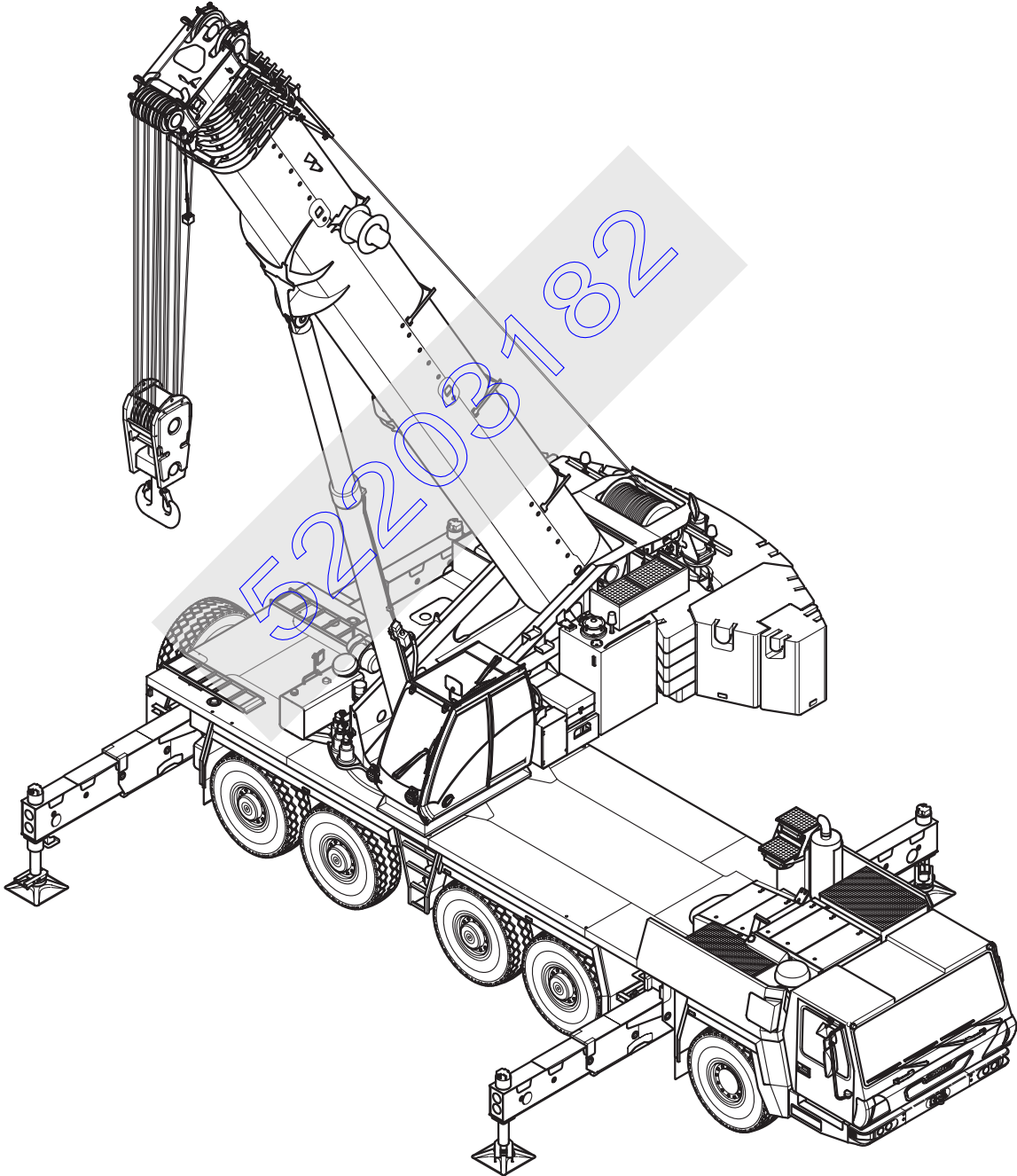
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