OPERATING MANUAL

TYPE

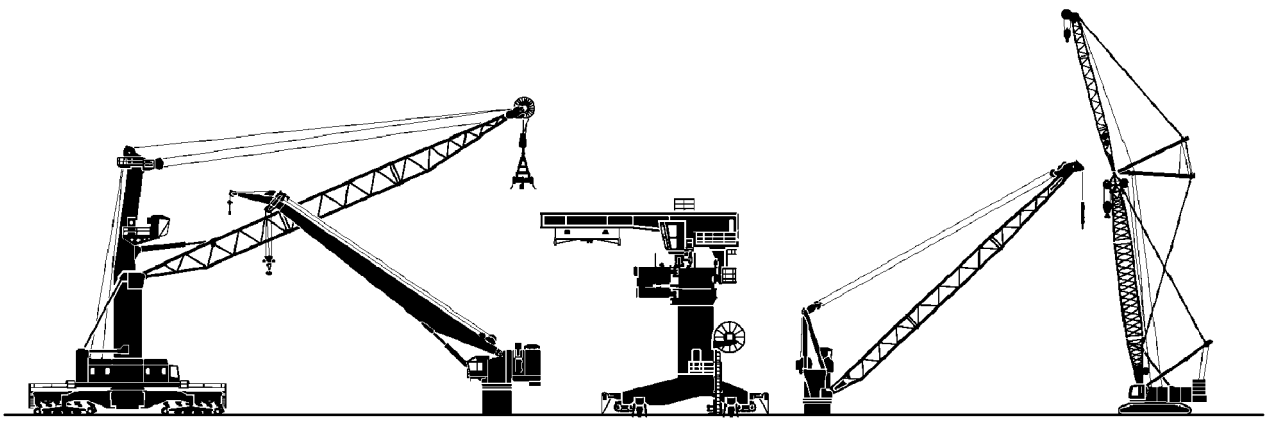
HS 885 HD

SERIAL NUMBER

187 406

VERSION

001



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1.2.1 How is the operating manual in Volume 1 organized?

The operating manual is made up of individual, serially numbered chapters. These chapters are listed in the yellow index of the ring binder.

The chapter summary at the beginning of the operating manual provides a quick overview. The table of contents which follows shows how the individual chapters are structured.

At the start of the subsequent chapters, the "General" section briefly describes the content of the chapter. At the end of each chapter is a blank page for writing your own notes.

The page numbers and the numbers of illustrations and charts are prefixed by the current chapter number. For example page "2-10" designates the tenth page of chapter two "Product description".

1.2.2 System requirements for use of the CD-ROM

Hardware:

- At least Intel® Pentium® or equivalent processor
- At least 32 MB RAM
- CD-ROM drive
- At least 16-bit graphics card with 256 colours and a resolution of 800 x 600 (1024 x 768 recommended)

Software:

- WIN9x operating system or later
- Optional:
  Internet Explorer 5.5 or later version
  Netscape Navigator 4.5 or later version
- Acrobat Reader 7.0 or later version
- ISOView 2.01, installed from CD-ROM

IMPORTANT!

The additional functions of the spare parts catalogue require a special security setting in your Internet Explorer: **Active Scripting**must be enabled.

1.2.3 Current status of the documentation

The supplied documentation is specially compiled for the machine indicated in the machine license and is therefore not transferable to other machines from the same range.

To ensure that the documentation is always complete and up to date
- do not remove individual documents,
- replace unreadable pages by reprinting them from the CD-ROM
- new documents supplied as a result of modifications must be filed immediately,
- replace amended documents and destroy the old version (particularly in the case of load capacity charts),
- always replace the CD with any new version sent, for example, with amended documents (throw away out-of-date CDs),
- with multilingual documents, always update **all languages**.

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1.6 Conformity declaration

The applicable declaration of conformity for delivery of the machine to a country of the European Union appears here. Additional documents required for type testing or national acceptance testing may also be enclosed.

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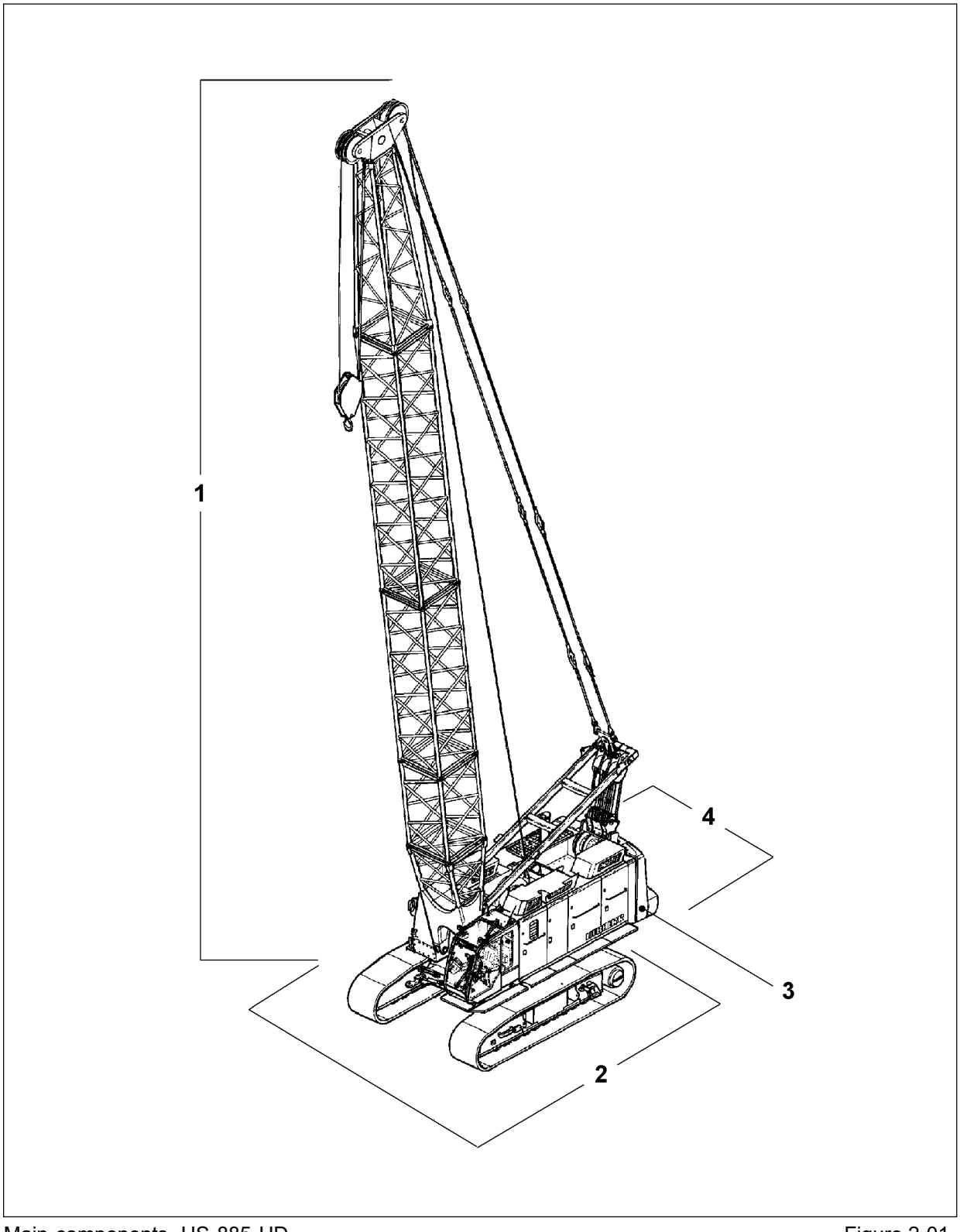
2.3 Machine overview



Main components, HS 885 HD — Figure 2-01

1 Boom
2 Undercarriage
3 Ballast
4 Superstructure

The main components of the machine are described in detail in the following pages.

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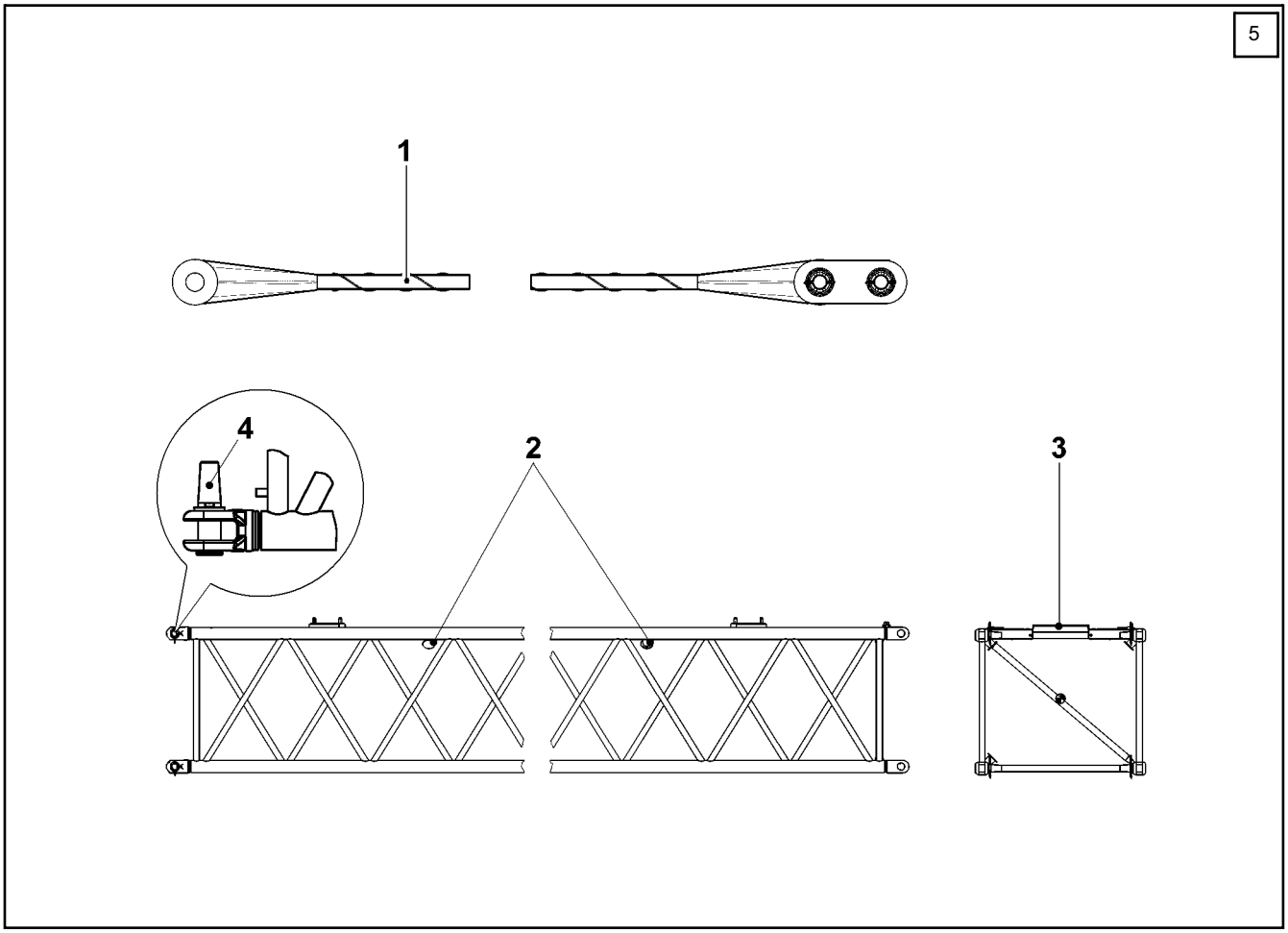
Main boom intermediate piece, 12 m [40 ft] *



Main boom intermediate piece 12 m [40 ft], HS 885 HD

1 Main boom anchoring rods (2x), 12 m [40 ft]
2 Attachment points (4x)
3 Rope supports (3x)
4 Bolts (4x) with cotter pins (4x)

This main boom intermediate piece
- is used in varying numbers depending on the overall length of the main boom and only in crane operation,
- is essentially of the same construction as the short main boom intermediate piece.

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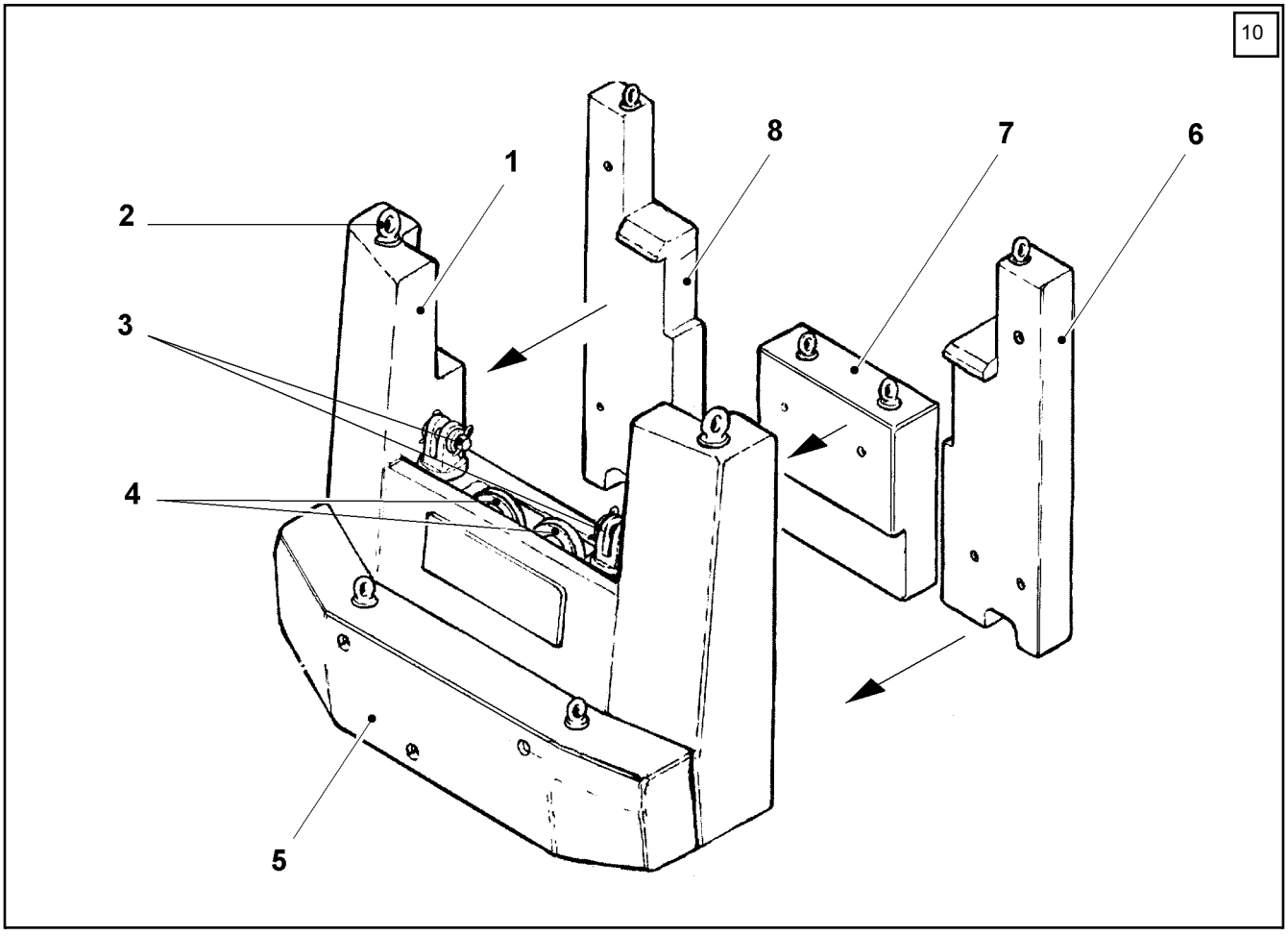
2.8 Ballast

2.8.1 Rear counterweight



Rear counterweight, HS 885 HD

1 Basic counterweight 19.6 t [43211 lbs]
2 Eyebolts (2x)
3 Rig bolts (2x)
4 Deflection pulley
5 Additional counterweight 4.5 t [9921 lbs]
6 Additional counterweight 2.6 t [5732 lbs]
7 Additional counterweight 3.2 t [7055 lbs]
8 Additional counterweight 2.6 t [5732 lbs]

The **rear counterweight**
- is essential to the stability of the machine
- in its standard format consists of a basic counterweight (Figure 10, item 1) with additional counterweight attached (item 5)
- can be fitted with additional ballast plates for optional crane operation (item 6, 7, and 8),
- is suspended by the two eyebolts (item 2) without additional counterweight for loading and unloading on the low-loader.

It is **mounted**
- using the main boom adjusting winch and special mounting ropes reeved in the rope pulleys (item 4).

The **rear counterweight**
- is bolted to the superstructure via two straps
- is lashed to the superstructure with two turnbuckles.

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2.9.5 Hydraulic system

The hydraulic unit
- is driven by the diesel engine via a power divider,
- consists of 5 axial flow piston pumps, 2 axial piston pumps and 5 gear pumps,
- works with closed and open hydraulic circuits,
- is equipped with an energy-saving "current-on-demand" system that is also easy on the hydraulic pumps.

In the hydraulic system
- a pressure cut-off limits any pressure peaks,
- electronically monitored filters clean the hydraulic oil.

The LUDV block
- is the central distribution block in the hydraulic system,
- enables a pressure-independent flow distribution,
- can be separated with a plate into two compartments, for separate control of the right-hand and left-hand travel gear for example.

The hydraulic system must be specially adapted in order to connect hydraulically operated options (casing oscillator etc.).

Hydraulic oil . . . . . recommended hydraulic oils
Capacity . . . . . 1,100 l [1,100.04 l]
Working pressure . . . . . max. 350 bar [5076 psi]

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3.1.2 Appropriate use

Appropriate use of the machine is
- a fundamental requirement for safe operation,
- defined in Chapter 2, section 2.2.2.

The special safety precautions and protective measures relevant to the appropriate use of the machine during assembly and dismantling, commissioning, maintenance and repair are listed in the respective sections of the operating manual.

3.2 Areas of responsibility

The **operator** or a **person authorized by him**
- ensures that only adequately trained personnel who have read and understood the operating manual, particularly Chapter 3 "Safety precautions", operate and maintain the machine,
- defines the powers and responsibilities of the operating and maintenance personnel working with the machine,
- makes the necessary personal protective gear available to the operating and maintenance personnel,
- regularly checks that personnel carry out their work in a safety-conscious manner,
- is responsible for ensuring the safe condition of the machine,
- immediately takes the machine out of operation in case of defects adversely affecting safety,
- carries out the inspections of the machine required under national regulations, in addition to those inspections stipulated by Liebherr,
- checks that the required and stipulated inspections have been carried out correctly,

• ensures that the machine is serviced at the prescribed intervals,
- informs the manufacturer of any accident involving the machine leading to serious injury or major damage to property,
- allows Liebherr personnel unlimited access to the machine in order that they may fulfil their duty to keep the product under observation,
- carefully and conscientiously carries out operational planning for the machine.

The **crane driver** of the machine
- wears the personal protective gear needed to operate the machine,
- makes a visual inspection of the machine every day before operating it,
- checks the operation of the brakes and emergency stopping equipment of the machine every day before operating it,
- is responsible for the safe operation of the machine,
- operates the machine for the purposes intended, within the limits specified in the applicable load capacity chart for the given set-up,
- informs his superior or the operator of any change to the machine adversely affecting its safety,
- halts operation immediately if safe operation is no longer possible,

• - after operation he locks
the cab and the engine compartment doors and
keeps the ignition key and the keys to the cab and engine compartment doors in a safe place to prevent unauthorized use,
- keeps the cab, windshields, platforms and steps clean,

• makes sure that
- all controls are set to zero or neutral
before powering up any moving parts,
- all controls are set to zero and the power is
switched off before leaving the controls,
- on shutting down the control unit for the Litronic emergency control system, that this is secured against being switched on accidentally.

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3.7.1 Meaning of the safety signs

The symbols on the safety signs
- have an exact meaning,
- are divided into three groups with different shapes and colors.

Prohibition signs

These symbols
- are round and of a bold red color,
- are located wherever an action that could create a dangerous situation is prohibited.

No fire, naked flames or smoking.

No access for unauthorized personnel.

No access for persons with pacemakers.

Access prohibited - keep off.

Warning signs

These symbols
- are triangular and of a bold yellow color,
- should draw attention to obstacles and situations that could bring about danger to life and limb.

Warning of a suspended load.

Warning of dangerous machine drives.

Warning of hot surfaces.

Warning of danger of slipping.

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- Only refuel the machine in a well ventilated area.
- Before filling the fuel tank or the hydraulic tank
  - turn off the engine,
  - turn off the cab heater,
  - turn off the auxiliary heating*.
- While filling the fuel tank or the hydraulic tank
  - smoking and the use of fire or naked flames is prohibited,
  - no one may remain in the cab (in case the machine is started by accident).
- When filling the fuel tank through the filler neck, electrostatic discharges may occur between the machine and the fuel rig. Therefore
  - make sure there is good metallic contact between the pump nozzle and the filler neck
  - or before refuelling, create a conductive connection between the machine and the fuel rig.
- If any fuel has spilled while refuelling, immediately
  - wipe it off the machine,
  - neutralize it on the ground with bonding agents.
- After refuelling, only start the diesel engine when
  - the lockable tank cap has been replaced,
  - the refuelling rig has been taken away or the suction hose of the refuelling system removed,
  - no personnel are in the vicinity of the machine.
- Only start the diesel engine as described in this operating manual.
  Do not use any starting aids containing ether - risk of explosion!
- Do not carry any combustible liquids on the machine other than in the tanks provided for this purpose.
- Do not use any combustible liquids to clean the machine!
- In the area of the central power unit
  - do not store cleaning cloths, rags etc.,
  - regularly remove flammable residues and deposits (e.g. pools of oil, dry leaves, pine needles, ash, waste paper, etc.).
- Regularly check that protective covers, cable and hose holders are complete and fit tightly. Attach loose cables and hoses and secure them to stop them fraying.
- Check all the lines, hoses and screw fittings of the hydraulic and fuel systems regularly for leaks and possible damage. Fix leaks immediately and replace any damaged components with new original parts.
- The following are strictly prohibited in the vicinity of battery acid
  - smoking,
  - fire and naked flames,
  - ignition sources (for example, electrical devices).
- Make regular checks on the electrical system and fix all faults immediately, such as loose clamping connections, scorched or frayed cables, etc.
- At the site where the machine is being used, only the small amounts of fuel or highly flammable or self-igniting material absolutely essential for the work in hand may be stored.

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CAUTION!

Pay special attention to all wind-related safety instructions and protective measures at the front of the applicable load capacity chart and also to the following points:

- Even at the planning stage, learn from and take into consideration the wind conditions at the site (profile of the landscape and the building, areas sheltered from the wind, etc.), as well as the weather forecast for the period the crane is to be used.
- Before starting work, the crane driver must find out the weather forecast and current wind speed on the site where the machine is to be used. If excessive wind speeds are expected within the next few hours, work must not start. Instead, precautions must be taken to prevent storm damage.
- While operating the machine at permitted wind speeds
  - watch out for dangerous gusts of wind,
  - loads with large surface areas (such as prefabricated elements) should only be lifted with a reduced hoisting load,
  - hoist the loads slowly and carefully and do not let them become unstable.

DANGER!

Halt operation at once if the permitted wind speed is exceeded. Lay down the load at once and place the machine in the parked position.

The **parked position**
- is used in the range above the maximum permitted wind speed up to a wind speed of 20 m/s [45 mph]; this corresponds to gale force 8.
- is defined for the different main operating modes in section 5.9.1 "Parked position".

DANGER!

At wind speeds above 20 m/s [45 mph], remaining near the machine poses a risk of fatal accidents!
The wind stresses occurring may partially or totally wreck the boom and cause the machine to topple over.

Precautions:

At wind speeds above 20 m/s [45 mph] or gale force 8, the entire boom must be laid flat on the ground.

It is always preferable to lay down the boom completely, as this is the safest course of action.

NOTE!

Refer to the instructions for "Laying down the boom".

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Leaving the machine in case of an emergency

DANGER!

When you leave the machine in an emergency, you are putting your life at risk:

- **Touching the machine and the ground at the same time will be fatal!**
- **Remaining in the resistance area is life-threatening!**

So only leave the machine if there is imminent danger to your life through flashover or fire.
When in doubt, leave the machine as if there had been an accident involving a high voltage power line.

The procedure for leaving the machine varies depending on whether the accident occurred with a low-voltage or a high-voltage power line.

In the case of **low voltage** the danger lies in touching live parts of the machine (including the hoisting rope, hoisting load etc.) or a torn-down cable **at the same time as touching the ground**.

In the case of **high voltage lines** in addition to the danger of touching parts of the machine that are under voltage or a torn down conductor cable, there is also the **risk posed by the resistance area** that forms around the machine.

Procedure for low voltage incidents:

- Jump to a safe distance from the machine and land on both feet at the same time.
- Jump in a direction that avoids any contact with metallic parts that are touching the machine or a power line.
- When leaving the danger zone, avoid any contact with metal objects.

Procedure for high voltage incidents:

- Jump to a safe distance from the machine and land on both feet at the same time.
- Jump in a direction that avoids any contact with metallic parts that are touching the machine or a power line.
- Land with both feet close together to avoid exposing yourself to a dangerous step voltage.
- Leaving the resistance area: With the legs pressed together, hop along on both legs until you reach the minimum safe distance of 10 m [33 ft] from the machine.
- While jumping away, keep well clear of any metal objects within the danger zone.

NOTE!

Instead of hopping, you can also leave the danger zone by pressing your knees together and taking small steps.

Your shoes must
- always rub against each other to remain in contact with each other,
- never leave the ground completely.

Safety precautions for signalling with hand signals

WARNING!

Misunderstood hand signals between the signalman, the rigger and machine operator can lead to serious accidents!

Precautions:

- When signalling, always remain in visual contact with the machine operator and always stand in a clearly visible position. Arrange sufficient lighting for night work.
- When signalling, wear clearly visible gloves such as white ones.
- The hand signals
  - should be given slowly and clearly,
  - are to be arranged with the machine operator and rigger beforehand, particularly if the application is out of the ordinary.
- When working together with a rigger, the signalman relays the rigger's hand signals to the machine operator.
- The machine operator, signalman and rigger must always keep an overview of all the hand signals used close to hand.

NOTE!

A compilation of the most widely-used hand signals can be found in the following pages.

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Names of components in Figure 4-03:

1 Spirit level for inclinometer
2 Brake pedal for free-fall brake* of winch 1
3 Pedal for left-hand travel gear
4 Air vent
5 Hand lever for left and right travel gear
6 Pedal for right-hand travel gear
7 LCD screen
8 Right-hand control panel (X23)
9 Inner T-bar joystick for winch 1
10 Outer T-bar joystick for winch 2
11 Ignition starter switch
12 Emergency shut-down switch
13 Cigarette lighter
14 Ash tray
15 Litronic service panel
16 Radio
17 Windshield wash container, front
18 Storage compartment
19 Drink holder
20 Windshield wash container, roof
21 Left-hand control panel (X12)
22 Left-hand control panel (X11)
23 Safety lever for Litronic control system
24 Two-axis joystick for adjusting main boom and slewing gear
25 Holding strap
26 Mounting position of foot pedal for stabilizing winch *

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"Vibrator operation on/off" button (optional)

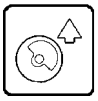
Switches the vibrator on and off.
(see "Vibrator" in Chapter 9)

"Close clamping tongs" button (optional)

To close the clamping tongs or switch on the clamping tongs system.
(see Chapter 9 "Hammer" or "Vibrator")

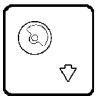
"Open clamping tongs" button (optional)

Opens the clamping tongs.
(see Chapter 9 "Hammer" or "Vibrator")



"Extend eccentric/increase lift" button (optional)

In vibrator operation: to extend the eccentric.
In hammer operation: to increase the lift
(see Chapter 9 "Hammer" or "Vibrator").



"Retract eccentric/reduce lift" button (optional)

In vibrator operation: to retract the eccentric.
In hammer operation: to reduce the lift
(see Chapter 9 "Hammer" or "Vibrator").

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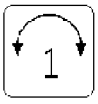
NOTE!

The status displays do **not** appear on the start-up screen, the set-up screen or the "Fault monitor" screen!

Example of a status display:



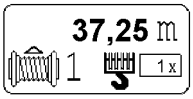
"Slewing gear speed" display

Displays selected speed setting 1 for the slewing gear.

Control displays and input fields (Figure 9, item 2)

In the central area of the LCD screen, all the currently required control displays are shown (e.g. power operation screen, engine and filter monitoring, set-up, error texts etc.). Some of these control displays become entry fields in set-up mode.

Example of a control display:



"Rope length winch 1" display (optional)

Shows the current rope length of winch 1 in **m [ft],** the reeve of the load hook and the running direction of the winch.

Function symbols and display fields (Figure 9, item 3)

The lower part of the LCD screen contains the symbols assigned to the functions keys **F1 - F8** and the display fields.

These function symbols
- may change depending on the mode screen,
- in certain cases are assigned to more than one function key.

Example of a function symbol:

"Power unit screen" symbol

Pressing function key **F2**takes you to screen 2 for "Power unit monitoring".

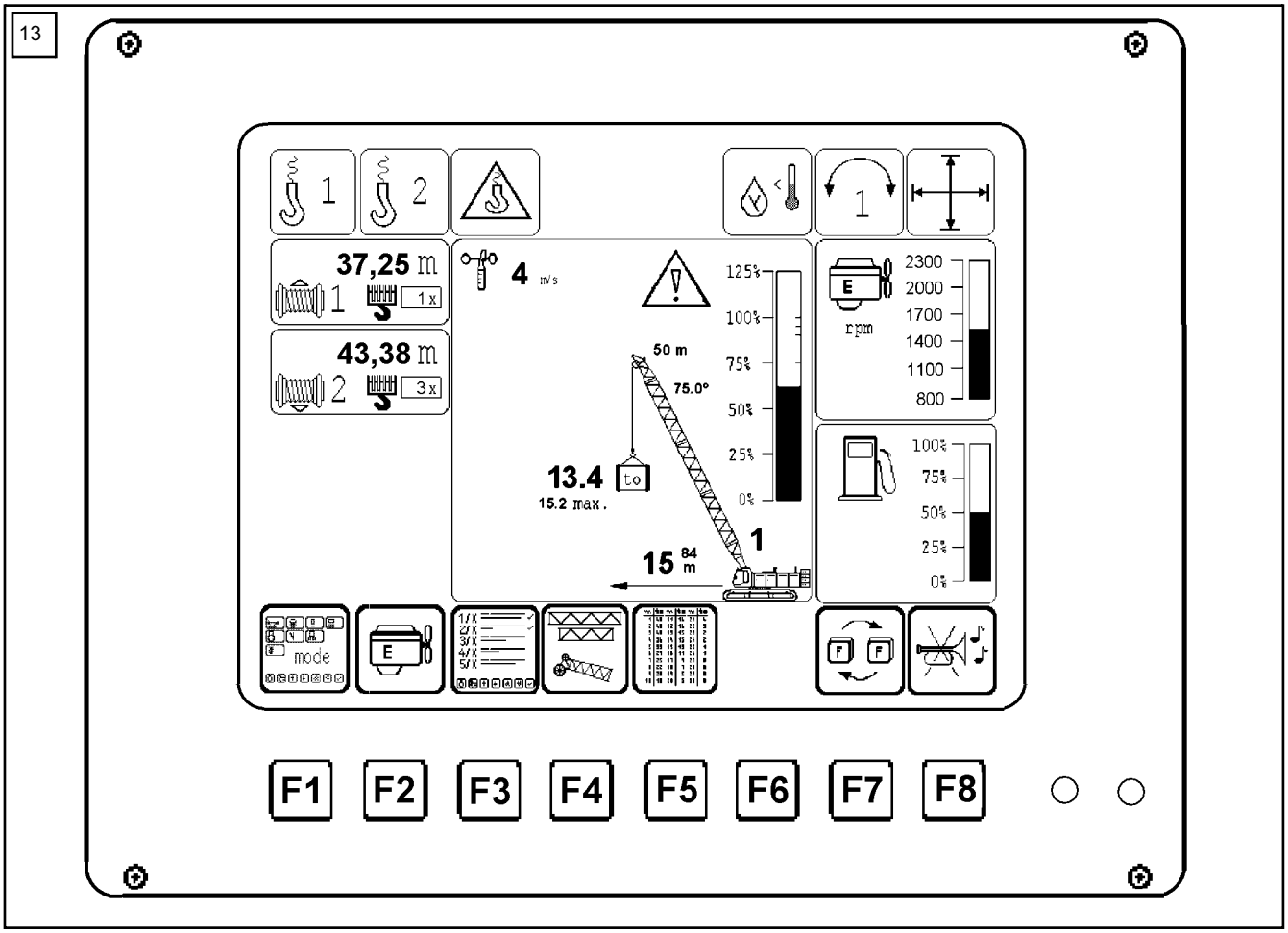
Function keys F1 - F8 (Figure 9, item 4)

Function keys **F1 - F8**
- are arranged below the LCD screen,
- are defined by associated function symbols,
- can have different functions assigned depending on the display.

The two LEDs next to function key F8 **indicate the status** of the LCD screen:

- The green LED lights up during normal operation.
- If the red LED lights up, an error has occurred.

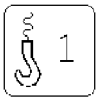
4.13 "Mode screen" screen



"Mode screen" screen

The mode screen includes important displays and information for operating the machine.

Description of status displays



"Free-fall winch 1" symbol*

Indicates that winch 1 is currently in free-fall.

"Free-fall winch 2" symbol*

Indicates that winch 2 is currently in free-fall.

"Secured free-fall mode" symbol*

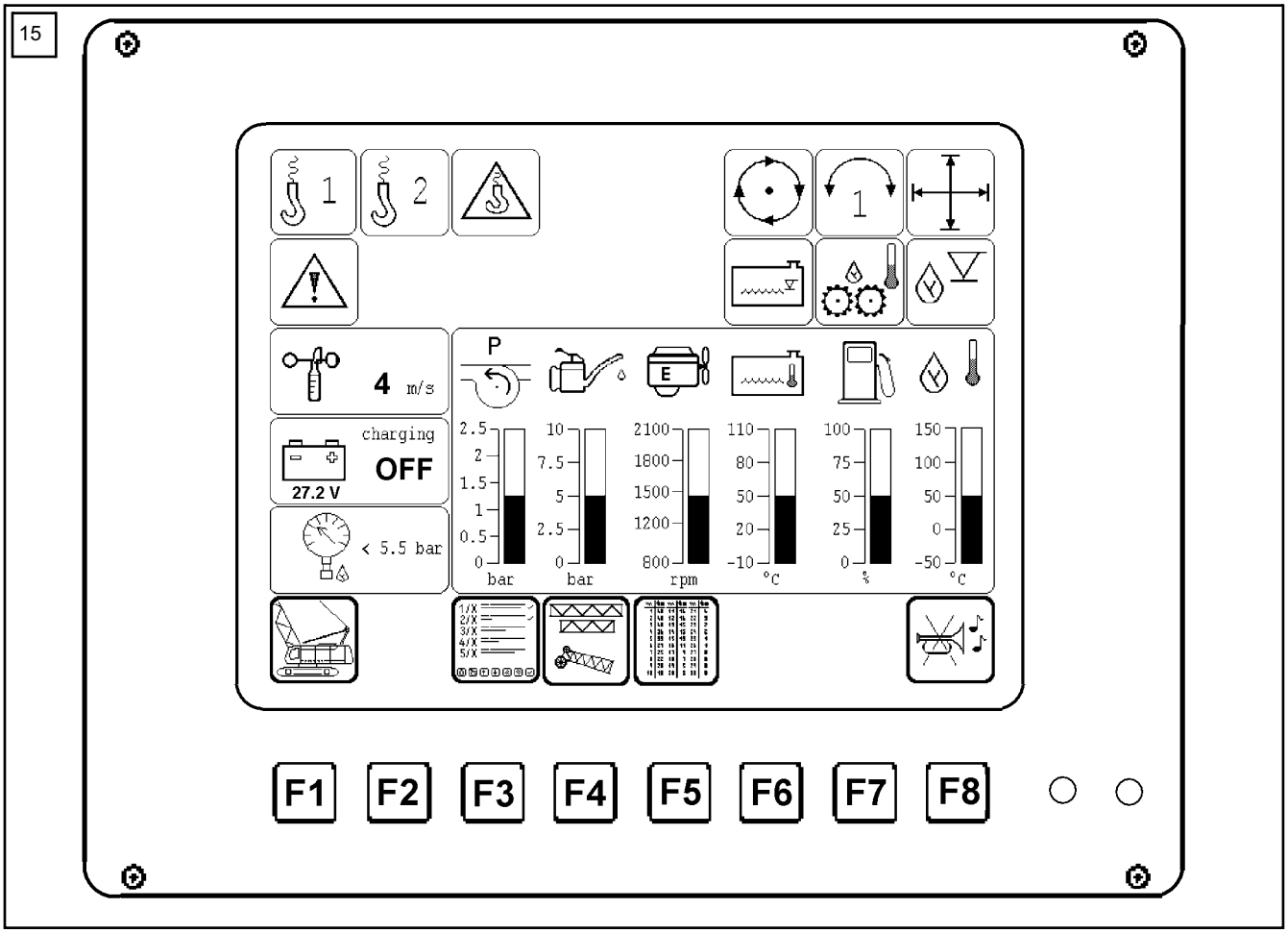
Indicates that secured free- fall mode has been selected.

"Unsecured free-fall mode" symbol*

Indicates that unsecured free-fall mode has been selected.

In the mode screen, either the "Secured free-fall mode" symbol or the "Unsecured free-fall mode" symbol is displayed.

4.15 "Power unit monitoring" page



"Power unit monitoring" mode screen

This mode screen provides information on the operating status of the central power unit.

Description of status displays

The status displays are described in Chapter 4 under "Mode screen".

Description of the warning symbols

"Caution" symbol

"Stop" symbol

"Danger of tilting" signal

"Set-up mode" symbol

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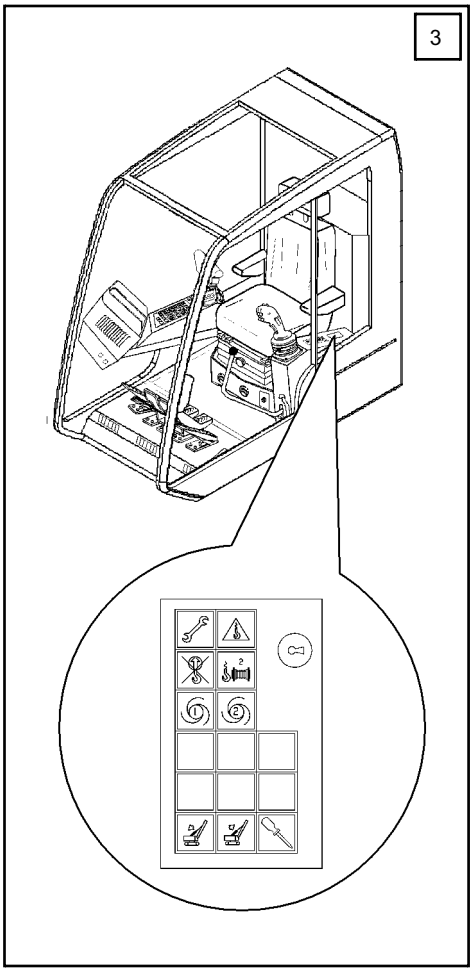
5.3.7 Select operating mode on the left hand control desk (X12)

Selection buttons are located on the left-hand control panel (X12) (Figure 3).

These selection buttons are accessible after opening the lockable cover.

Each selection button
- activates a special operating mode,
- has its own control lamp.

If a selection button is activated when the ignition is on, the corresponding control lamp lights up.



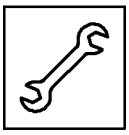
Operating instructions

- You can switch between the operating modes in any sequence.
- Once a selection has been made, it is retained when the ignition is turned on again.

IMPORTANT!

Once a special operating mode is no longer required, the relevant selection button must be switched off **immediately**.

Selection buttons



"Set-up mode" switch

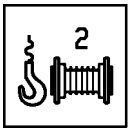
Set-up mode is enabled by pressing this switch.

"Unsecured free-fall" switch

This switch activates unsecured free-fall for winch 1 and winch 2.

"Enable LML bridging" switch

Pressing this switch enables LML to be bridged.



"Interlock control" switch

This switch is used to enable the interlock control for winch 2.

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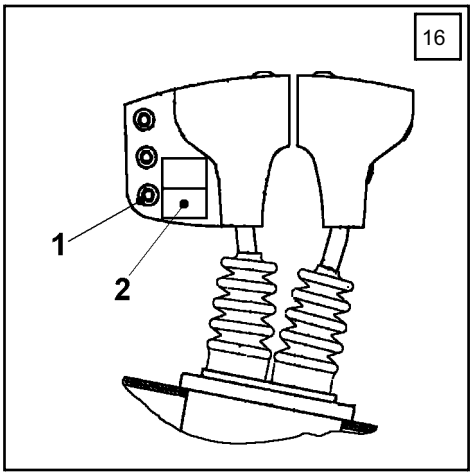
5.4.2 Adjusting the engine speed



The speed of the diesel engine can be steplessly adjusted from idle to maximum speed using the rocker switch (Figure 16, item 2) on the inner T-bar joystick:

- push rocker switch upwards = increase speed
- push rocker switch downwards = decrease speed

Automatic idle

If a joystick is not moved, the speed of the diesel engine set with the rocker switch is only maintained for about **7 seconds**.

The speed is then reset to idle. Moving a joystick causes the diesel engine to rev back up to the engine speed last set.

Electronic load limit regulation

The electronic load limit regulator protects the diesel engine from possible overload and a sudden standstill.

If, due to overload, the speed of the diesel engine falls below the defined current nominal speed, the hydraulic flow rate of the axial flow piston pumps is reduced until the diesel engine reverts to its optimum speed.

Setting constant speed

A particular speed from the overall speed range can be selected and set as a constant speed.

Procedure:

- Set the desired speed using the rocker switch (Figure 16, item 2).
- Press the button (Figure 16, item 1) on the inner T-bar joystick.

A short beep confirms that the constant speed value has been saved.
Pressing this button again deletes the constant speed value; the diesel engine returns to idle.

NOTE!

The constant speed entered has to be at least 1400 rpm in order for the diesel engine to work effectively and support loads.

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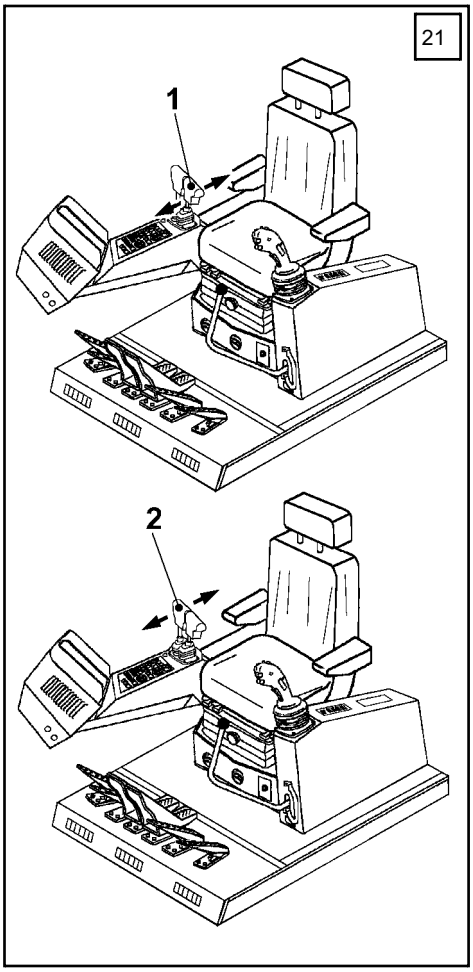
5.6 Operating the hoisting winches



The type of hoisting winches (free-fall winches, rapid hoisting winches) installed on the machine is indicated in section 1.3 "Machine license" under "Winch 1, winch 2".

NOTE!

Operation of the hoisting winches in free-fall mode is explained in section 5.5.4.

WARNING!

Danger of accidents and possible damage to the machine!

- **The winches must not be unwound if there is no tension on the hoisting rope!**
  Otherwise, the hoisting rope will be lifted off the winch, causing the 3-windings limit switch and the pay out metering to malfunction!

The operation of the hoisting winches is the same in lifting mode and in set-up mode:

- Using the **inner T-bar joystick** (Figure 21, item 1), **winch "1"** can be moved steplessly from standstill to maximum speed.
- Using the **outer T-bar joystick** (Figure 21, item 2), **winch "2"** can be moved steplessly from standstill to maximum speed.

For both winches "1" and "2":

- Push joystick forwards = lower load hook
- Place joystick in neutral = load hook stays in position
- Pull joystick back = raise load hook

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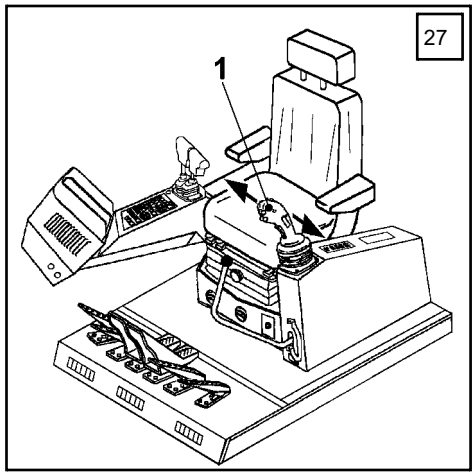
Turning the superstructure with the slewing gear in free-wheel



WARNING!

Before making any slewing movement of the superstructure, the machine operator must personally satisfy himself that there are no people or obstacles within the danger zone!

Strong acceleration and braking of the superstructure rotation can cause the boom to buckle or the machine to topple over. Therefore every rotary movement must be started and braked in a sensitive fashion.

The superstructure is rotated steplessly to left or right with the joystick (Figure 27, item 1):

- Move joystick to the left = superstructure turns to the left (anticlockwise)
- Joystick in neutral position = slewing gear free-wheels
- Move 2-axis joystick to the right = superstructure turns to the right (clockwise)

If the 2-axis joystick is moved back into neutral after starting a slewing movement, the superstructure continues to turn at approximately the same speed and is only slowed by the friction in the slewing gear.

The slewing speed of the superstructure
- depends on the selected speed level,
- is proportional to the joystick position:

- Move joystick further in the direction of rotation = superstructure turns faster (the slewing gear accelerates)
- Move control lever beyond the neutral position, opposite to the turning direction = superstructure turns more slowly (the slewing gear brakes)

IMPORTANT!

When braking, move the 2-axis joystick back to the neutral position as soon as the superstructure is at a standstill. Otherwise, after coming to a standstill, the superstructure will immediately start turning in the opposite direction.

Turning off the slewing gear free-wheel

To turn off the slewing gear free-wheel, press the "slewing gear free-wheel" preselect key on the right-hand control panel again.

- If the preselect key is operated during a slewing movement, the slewing gear will be braked automatically beyond the integration time set with the Litronic control unit!

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Switch off free-fall operation:

Before leaving the cab, the machine operator must check that the free-fall function has been switched off correctly.

Procedure:

- Fully depress and hold down both brake pedals until the winches have stopped moving.

- Press the "Free-fall on/off" switch on the right-hand control panel (X23); the LED in the key will go out.

- The symbol in the status display on the LCD monitor goes out when the control system has deactivated secured free-fall.

- Raise the safety lever

⚠ WARNING!

Raising the safety lever is not the correct way to switch off free-fall; it is simply a safety precaution. If the winches are not completely stationary when the safety lever is raised, free-fall is not deactivated.
This can lead to fatal injury or serious damage to property if the free-fall releases the raised load.

- Set "Free-fall operation" ball valve to "crane operation" position.

⚠ CAUTION!

If free-fall operation is not needed, then the ball valve **must** be set to the "Crane operation" position to prevent accidental activation of free-fall operation.

Free-fall operation is switched off automatically once the diesel engine is switched off.

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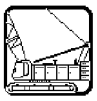
Prerequisites for ramming operation:

The following conditions must be met in order to operate the ramming control system:

- The "Ramming control" option must be fully installed on the machine and enabled by Liebherr.
- Main boom lengths from 20 m to 33 m are permitted.
  For greater boom lengths or drop weights over **25 t [55.116 lbs]** , please consult the manufacturer.
- The main boom angle must be between 65° and 82°. The main boom tilting-back supports only engage within this range.
- Ballast: only **32.5 t [71.650 lbs]** rear counterweight
- The "Ramming operation" screen has been selected on the operating screen. Switching from the "Lifting operation" screen to the "Ramming operation" screen is described in sections 4 and 5.
- Free-fall operation enabled via the ball valve (see Chapter 5 under "Free-fall operation"). Free-fall winches must be installed.

Switching from "Set-up screen" screen to "Ramming operation" screen.

After selecting "Ramming operation" on the "Operating modes" screen, the "Set-up screen" appears after ignition.

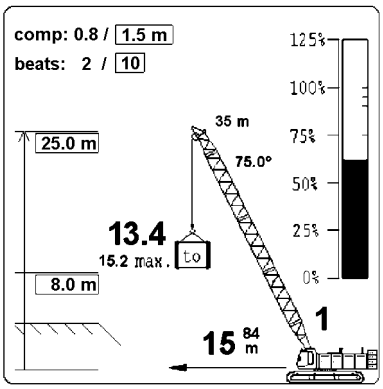


"Mode screen" symbol

Pressing this symbol takes the machine operator from the "Set-up screen" to the "Ramming operation screen".

Lifting appliance display field

The "Ramming operation screen" shows the current status of the machine. If ramming control has been selected, the following data (parameters) are also shown:
(explanation based on an example)



comp: 0.8 / 1.5 m [ft] . . already achieved **compaction** (0.8 m [ft]) of the preset compaction (1.5 m [ft])

beats: 2/10 . . . . . already executed **number of beats (2)** of the preset 10 beats

25.0 m [ft] . . . . . selected **lifting height** in **m [ft]**

8.0 m [ft] . . . . . preset **slow-down height** in **m [ft]**

The **parameters**are in boxes and can be altered by the machine operator.

IMPORTANT!
The other elements of the lifting appliance display field are described in Chapter 4.

5.8 Litronic® test system

The Litronic® test system is a comprehensive diagnostic and servicing tool, that can be operated on the Litronic® monitor, a Service Notebook and or via a modem connection*.

It is used to examine inputs/outputs, flags, internal variables and status.

The Litronic® test system can be called simultaneously and completely independently from several interfaces (Litronic® monitor, Service Notebook, Modem* etc.).

5.8.1 Properties

The Litronic® test system provides the following functions:

- It displays the identification number and version of the installed software
- It displays all inputs/outputs to and from the modules with comments
- It displays the internal memory variables with comments
- It displays a selection list
- It displays the correction values (machine setting values)
- It displays messages (message stack)
- It displays special functions:
  - Modem configuration*
  - Memory card control (CF)
  - CAN configuration / status

5.8.2 General

The Litronic® test system consists of several pages. It is possible to use the function symbols to switch between these pages.

Many of the pages have two menu bars, and it is possible to switch between these using the **MENU 1/2**function symbol. When the page is called, the first menu bar always appears.

When the Litronic® test system is called for the first time the Main Menu is loaded. Whenever the program is called again, it will load the page that had been active prior to exiting last time. The remaining settings also remain intact.

IMPORTANT!

Only LIEBHERR service personnel are allowed to make changes to the setting and/or corrected values through the Litronic® service console.

How to execute the function symbols several times in succession

Some commands can be carried out several times in succession, by entering the number of times it is to execute (appears on the input bar) and then actuating the function symbol you want.

This can include, for example **PREVIOUS**and **NEXT**

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Drive function menu

This page displays information about the current disk drive.

Description of the function symbols.

- **REMOVE CARD** has to be activated before you can remove a memory card from the drive. Another option is to switch off the Litronic® control system. If you insert a new card it is detected automatically.
- **DIR LIST** shows the files and the directories (no sub-directories) on the current drive.
- **PREVIOUS DRIVE** and **NEXT DRIVE** switch between the various drives available on the Litronic® control system.
- **CHECK CARD** checks the current drive for errors.
- **BACK** goes back to the SPECIAL FUNCTIONS menu.

Time function menu

This page displays the date and time.

Description of the function symbols.

- **DAYLIGHT SAVING** changes the time setting to summer time.
- **TIMEZONE MOVE WEST** moves the time zone setting one hour to the west.
- **BACK** goes back to the SPECIAL FUNCTIONS menu.

Priority Level menu (only for LIEBHERR Service staff)

This page can be used to enter the Litronic® code to reach Supervisor Level. Supervisor Level is required to set the time, for example.

Description of the function symbols.

- The **LEVEL CHANGE** function accepts the value in the input line, and checks whether it is in fact a valid Litronic® code.
- **BACK** goes back to the SPECIAL FUNCTIONS menu.

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5.10.1 Laying down the boom

⚠ DANGER!

At wind speeds above 20 m/s [45 mph], remaining near the machine poses a risk of fatal accidents!
The wind stresses can totally wreck the boom and cause the machine to topple over.

Precautions:

If wind speeds exceeding 20 m/s [45 mph] or gale force 8 are expected, the entire boom must be placed flat on the ground.

It is always preferable to lay down the boom completely, as this is the safest course of action.

- Laying down the boom, see Chapter 6.

  Observe the following safety rules and instructions when laying down the boom:

  - As the machine operator you must always be aware of the weather situation on the site, so as to be in a position to lay the boom down safely and in good time.

  - Always lay down the entire main boom flat on the ground.
    Resting it across an undulation in the ground is always dangerous.
    If the main boom is not laid down completely (but just lowered close to the ground), this can wreck the boom or the slewing gear brake.

  - Always lay down the main boom in the **direction of the wind**.
    If, for reasons of space, it is only possible to lay the main boom down at right angles to the wind direction, then it must be laid down before the wind speed reaches 20 m/s [45 mph].

  - If stormy weather is either prevailing or forecast, and if there will be a break in work of one working day or more, or also if the crane operator and assistants are likely to be off-site, then the whole boom should normally be laid down on the ground.

  - If the planning process determines that, for reasons of space, the boom cannot be completely laid down and there is risk of a storm:
    contact the manufacturer **in good time** to arrange special precautionary measures against storm damage.

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6. ASSEMBLY AND DISMANTLING

6.1 General

This chapter describes
- assembly and dismantling,
- on-site reconfiguring,
- transportation between sites.
- operational planning.

The HS 885 HD offers the following cost advantages and time-savings:

- No auxiliary crane required for unloading or for assembling/disassembling the ballast on the machine.
- Guide rails on connecting parts simplify assembly, dismantling and reconfiguring.
- During set-up, loading and unloading, the machine operator is provided with information on the LCD monitor.

Overview of set-up operations
Besides detailed descriptions, the set-up operations to be carried out are listed in the form of overviews.
The set-up team should use copies of these overviews as memory-aids and to check progress.

NOTE!

For the sake of convenience, some of the illustrations in this chapter appear in simplified form.
For example, the undercarriage of the basic machine is shown without the superstructure, so as to illustrate the described activities more clearly.

Directional indications
The directional indications "right/left", "forward/back" are always from the point of view of the driver sitting in the cab.

Dimensions
The precise measurements follow the ISO system of units. The US measurements given in square brackets are in some cases rounded upon conversion.

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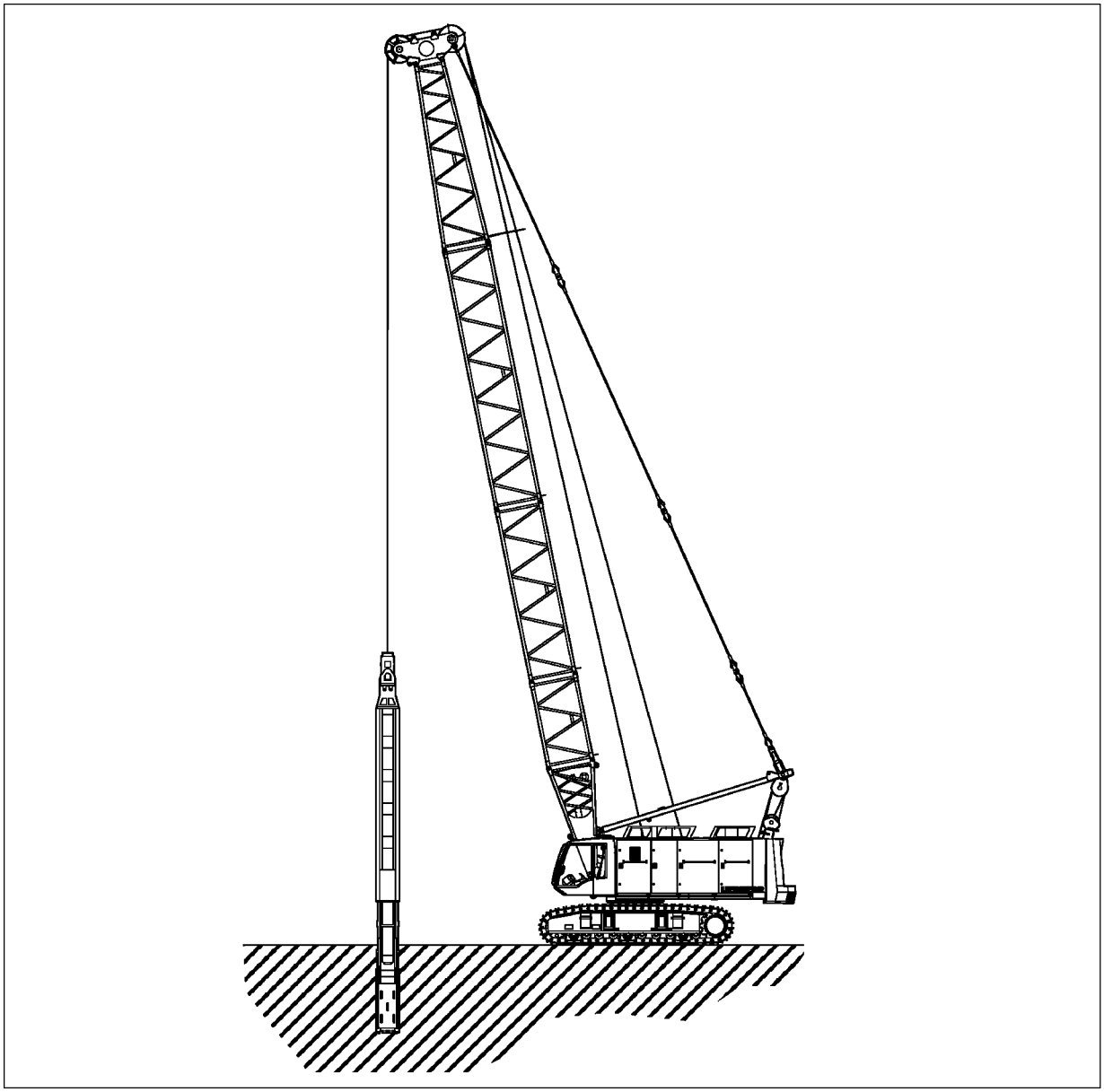
Diaphragm wall grab



Diaphragm wall grab

Figure 6-09

Winch options	**2 x 250 kN**	**2 x 300 kN**
Max. rope speed in first gear (m/min)	0 - 69	0 - 55
Max. rope speed in second gear (m/min)	0 - 123	0 - 119
Max. bit weight	20 tons	25 tons
Max. permitted weight in 2-rope operation	25.5 tons	32.5 tons

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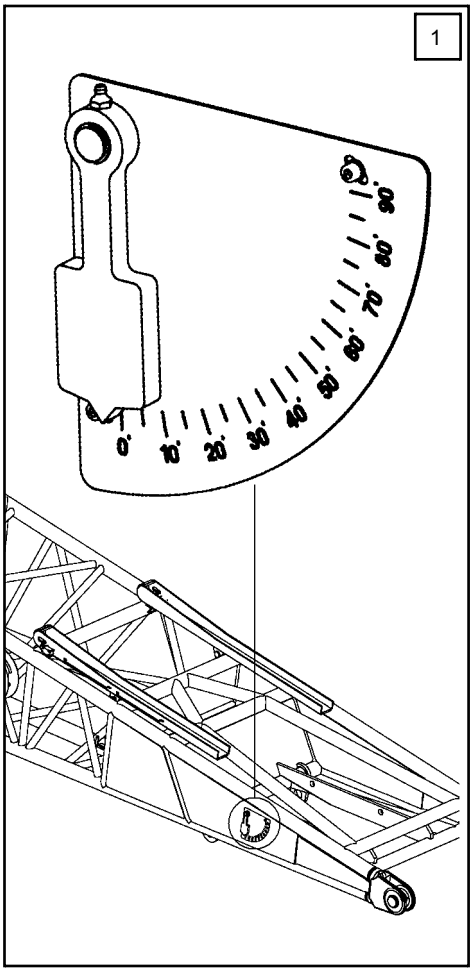
6.5.3 Preparing for assembly mode

Check the angle indication (Figure 1)

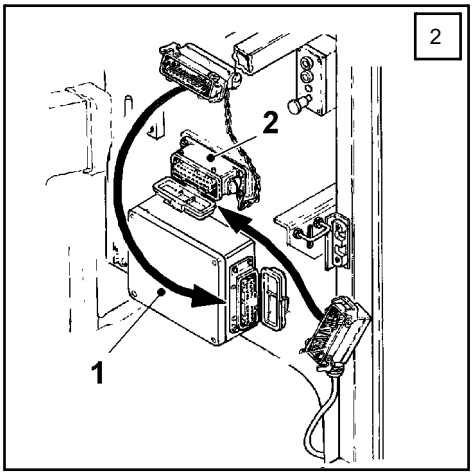
- Check pendulum for smooth operation.
- If necessary, grease the pendulum bearing and clean the scale.



Plug in the bypass plug

CAUTION!

The bypass plug and the connecting cable of the boom electrical system may only be unplugged/plugged in when the machine is switched off (ignition key in 0 position).



- Open front right side doors of the superstructure: Unlock the upper and lower door locks with the special key.
- Check the plug position according to Figure 2. If necessary, change the position of the bypass plug.

The bypass plug
- is held captive with a chain,
- for assembly mode must be plugged into the electric box (Figure 2, item 1), while the connecting cable for the boom electrical system is fixed to the blank plug (Figure 2, item 2).

6.5.8 Removing the superstructure locking

The superstructure locking mechanism prevents the superstructure from slewing unintentionally.
It must be fitted
- during transport,
- during decommissioning and
- during maintenance and repair work on the rotary connection.

CAUTION!

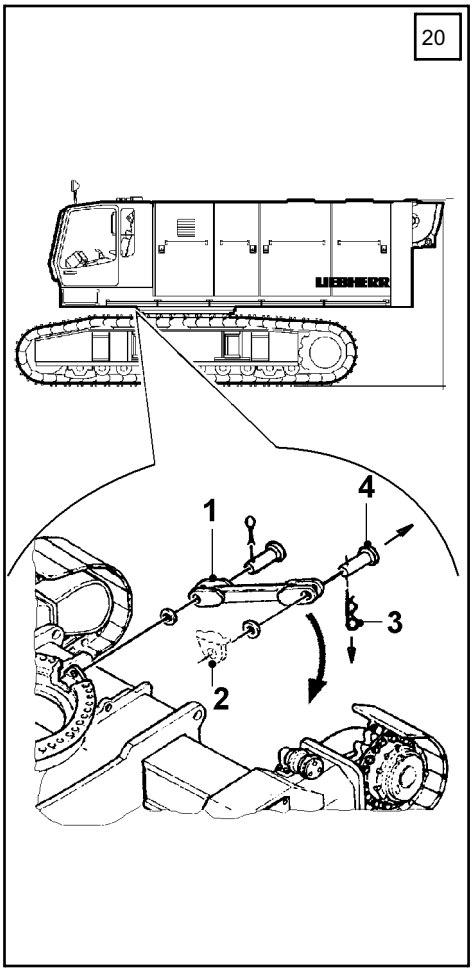
Crushing hazard and risk of damage!

The slewing gear must not be operated when the superstructure is locked.
Exception: to remove the superstructure locking shackle if the bolt is stuck.

Be careful if the slewing gear must be operated to remove the bolt and when laying down the shackle on the undercarriage. Crushing hazard!

Procedure:

- Pull out the retaining springs (Figure 20, item 3) and remove the bolts (4) from the shackle on the superstructure (2).
- Lay down the shackle on the undercarriage.
- Put the bolts back into the shackle and secure with retaining springs and washers.



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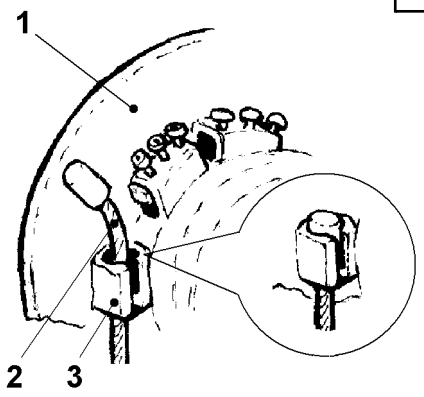
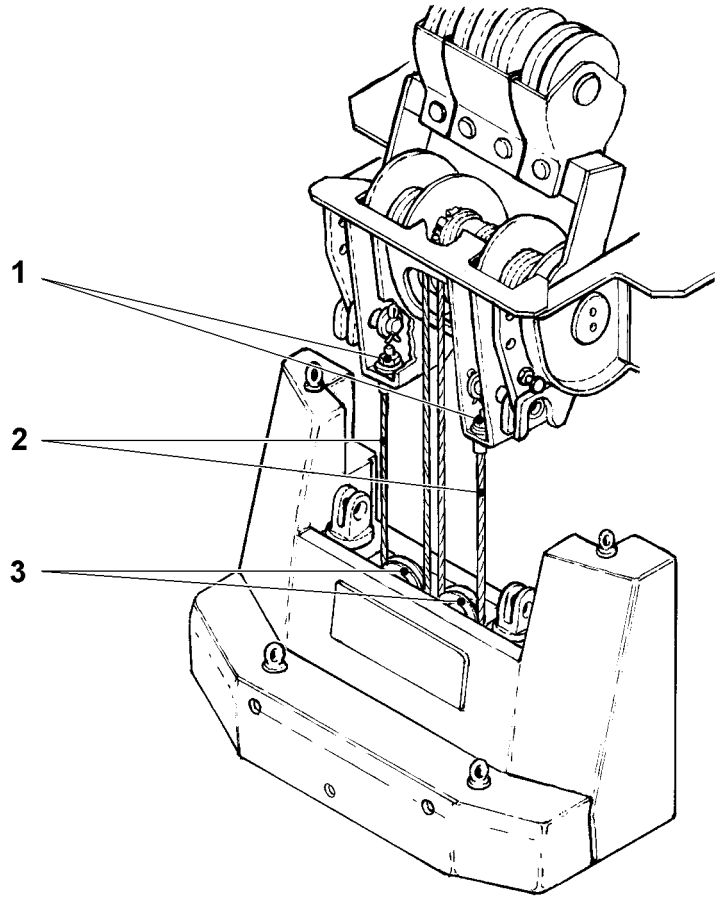
6.5.15 Mounting the rear counterweight (Figure 32).

The stability of the machine depends on the counterweighting. The rear counterweight is mounted with an auxiliary crane or using the main boom adjusting winch (1). For this purpose, two mounting ropes (2) are fastened to special fixtures (3) on the central section of the winch drum.

32



33



Mounting the rear counterweight

CAUTION!

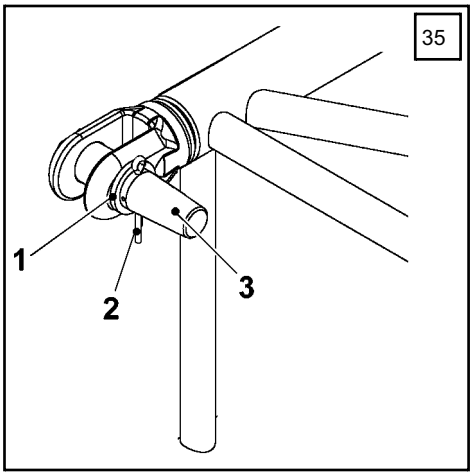
The ballast may only be mounted with the crawler carriers extended (work track).

Bolting the main boom intermediate pieces

The main boom intermediate pieces are fixed with bolts. In view of the different hole diameters of the connecting shackles, the upper and lower connecting pins are of different diameters.

Bolt connection on main boom, upper (Figure 35):

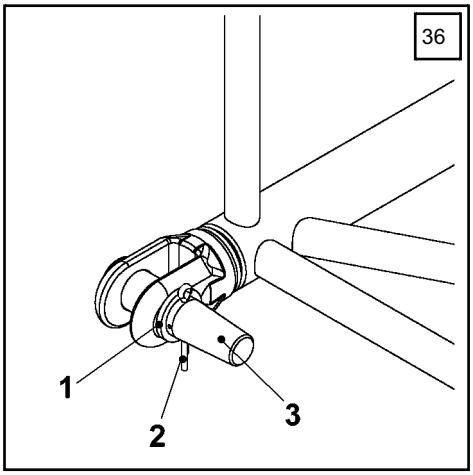
1 Washer
2 Cotter pin
3 Bolt, Ø 70 mm x 275 mm



Bolt connection on main boom, lower (Figure 36):

1 Washer
2 Cotter pin
3 Bolt, Ø 65 mm x 275 mm

The connecting pins are inserted from the outside in and then secured with a washer and a cotter pin.



Main boom pivot piece

On the main boom pivot piece, bolts are used at the top and double tapered bolts at the bottom. Double tapered bolts may only be used at the bottom of the boom pivot piece.

⚠ DANGER!

Damaged or corroded bolts or locking elements must not be used.
Full pre-tensioning force must be applied to retaining springs and cotter pins. If necessary, replace all damaged parts with new original parts.

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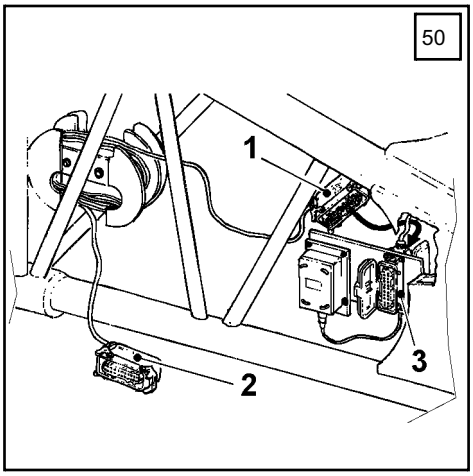
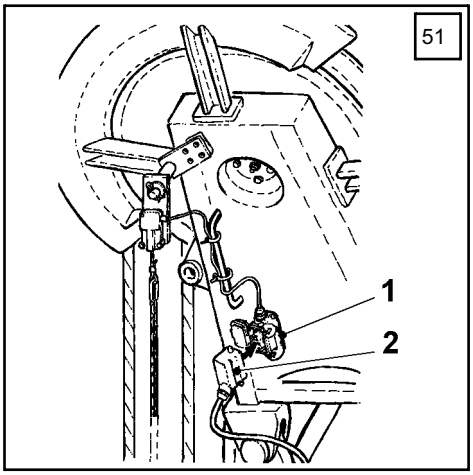


- Take the front plug (Figure 50, item 2) out of the socket (Figure 50, item 3).
- Unwind the connecting cable from the cable holder and pull it inside the main boom to the boom head.



- Insert the plug (Figure 50, item 2) of the connecting cable in the clamping socket (Figure 50, item 1) on the boom head and secure it with the holding bracket (Figure 51).
- Wind the cable on the cable holder on the boom pivot piece until the connecting cable runs in a straight line to the boom head.
- Insert and secure the second plug (Figure 51, item 1) in the rear socket.

The front socket (Figure 51, item 3) next to the angle sensor is a dummy socket. It is there for protection during transport and as a second bypass facility. By-passing is possible if the connecting cable is plugged into the electrical box in the superstructure.

- Check the dummy socket: The protective cover must be closed.

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6.8 Dismantling the main boom

6.8.1 Prerequisites

Dismantling of the **HS 885 HD** is basically done in the reverse sequence of assembly.

At certain stages, additional operations must be carried out or some important steps **are carried out in a different order to assembly** .

When dismantling the HS 885 HD, the following conditions must be met:

- The "Safety precautions for assembly and dismantling" in section 6.3 must be observed.
- Precautions must be taken in relation to the storage or removal of the basic machine and equipment.
- The required personnel, the necessary tools and equipment and any auxiliary crane must be present on the site.
- Start the machine as described in Chapter 5 under "Checks before operation".
- The load pick-up equipment must have been removed from the load hook.
- The machine must be in full working order. Any faults must be rectified prior to dismantling. If the Litronic control system should fail, the boom can also be laid down with the optional Litronic emergency control system. However, this should only be done in an emergency.

6.8.2 Overview of dismantling stages

- Lower the main boom
- Lay down the load hook
- Lay down the main boom
- Detach the hoisting limit switch*
- Pull out the hoisting rope(s)
- Disconnect the electrics *
- Detach the main boom from the pivot piece
- Connect the main boom guy ropes / anchoring rods
- Dismantle the main boom
- Load up the equipment

NOTE!

The erectability of the boom depends on the counterweighting, the boom length, the weight of the load hook and the method of laying down (over the guide wheel/in the direction of travel or across it). We recommend the boom is laid down over the guide wheel.
The boom may only be laid down with wide track (working track). One quick way of assembling or reconfiguring the boom is described under "Reconfiguring" in Chapter 6.

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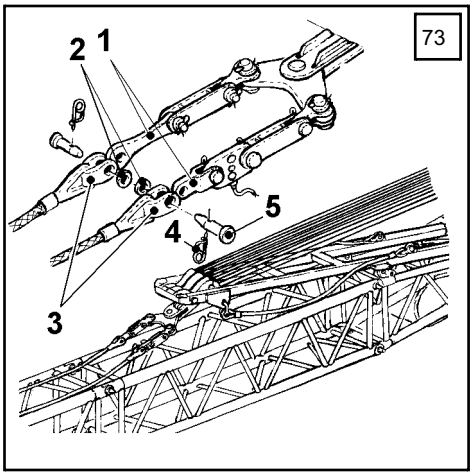
Lay down the main boom guy ropes / anchoring rods

Slowly move the A-frame forwards and lay down the main boom guy ropes / anchoring rods on the main boom.

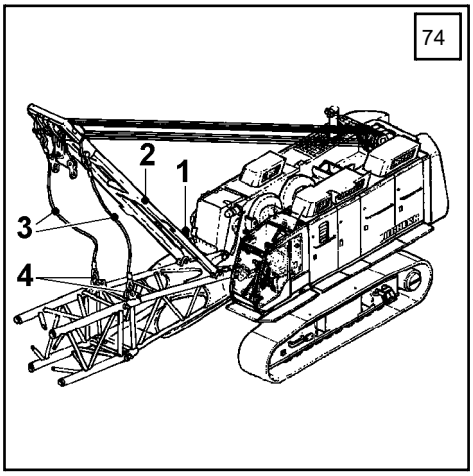
DANGER!

Ensure no one is standing under the A-frame while it is being moved! The guy ropes / anchoring rods of the main boom may only be detached or connected if the A-frame is standing still!



Detach the main boom guy ropes / anchoring rods (Figure 73)

Move the A-frame further forwards until the guy ropes / anchoring rods of the main boom intermediate piece can be detached. The connecting pins remain with the main boom intermediate piece.



Attach the mounting rope to the main boom pivot piece

Undo the fastening of the mounting rope on the A-frame. Pull the mounting rope forwards and fasten it to the main boom pivot piece.

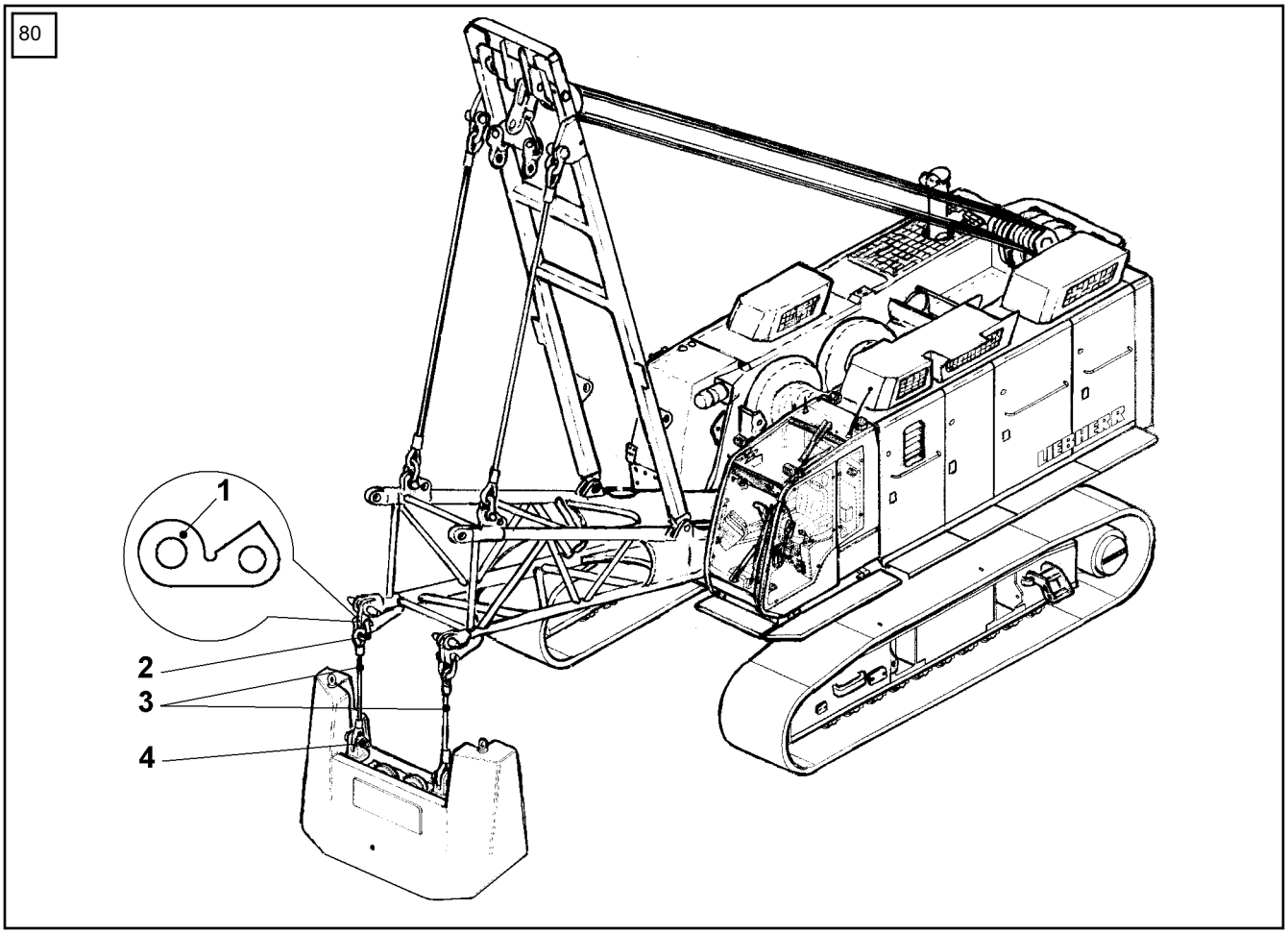
DANGER!

The attached main boom must not be erected from this position using the A-frame.

DANGER!

The A-frame must not be laid down forwards below an angle of 2.5°. Otherwise the A-frame cannot be raised again. The machine will be damaged as a result.

6.9.7 Loading the rear counterweight



Loading the rear counterweight

A suitable auxiliary crane is needed to load the rear counterweight.
With the optional ballast transport device, the basic machine can be used as an auxiliary crane. Special sling ropes are used as the load pick-up equipment. The load capacity of the auxiliary crane is limited to **24.1 tons. [53.100 lbs].**

⚠ CAUTION!

When the pivot piece is raised without a load or with a small load, care must be taken to ensure that the A-frame is not moved backwards beyond the tilt point.
The rear counterweight may only be raised in the direction of travel and the superstructure must not be rotated.

Procedure

- Fix both sling ropes (Figure 80, item 3) with bolts and shackles (Figure 80, item 2) to the pivot piece and by means of a strap (Figure 80, item 4) to the rear counterweight.
- Carefully lift the rear counterweight with the main boom adjusting winch and set it down on the transport vehicle.
- Remove the transport device

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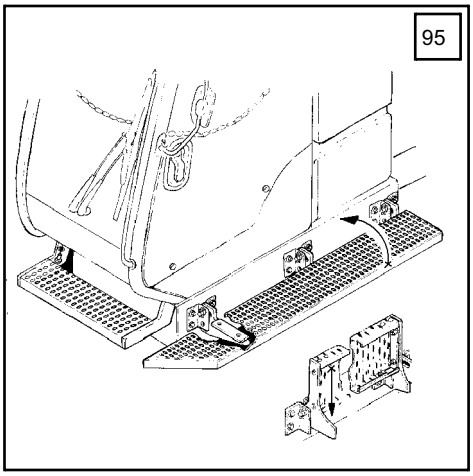
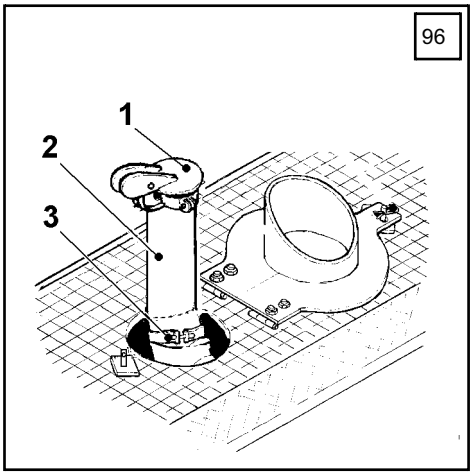
6.9.14 Taking the basic machine out of operation



- Switch off the diesel engine: turn ignition key to "0" position and remove it.
- Tidy up the cab, lock all windows and sliding doors.
- Lock all side doors on the superstructure.
- Fold the platform (Figure 94) on the cab back and then push it down. The platform at the front is screwed to the cab and cannot be folded.



CAUTION!

Danger of burns!
After the machine is loaded the exhaust pipe remains hot.

Precaution:
Wear working gloves!

- Loosen the exhaust pipe mounting for transport,
- Remove the pipe (Figure 96).
- Unlock the transport cover
- Fold the transport cover forward and lock it.

NOTE!

- Lock the cab and all side doors on the superstructure. If necessary, take additional precautions against falling rocks, theft and vandalism.

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Service/Inspection according to operating hours								WORK TO BE CARRIED OUT
8 hrs / daily	40 hrs / weekly	500 hrs / 3-monthly	1000 hrs / half-yearly	2000 hrs / annually	4000 hrs / every 2 years	6000 hrs / every 3 years	Special intervals	**by maintenance personnel** / **by authorized qualified personnel** [x] one-off task / x one-off task [o] at regular intervals / o at regular intervals [+] as and when necessary / + as and when necessary [*] every year at the start of the cold season / * every year at the start of the cold season
WINCH 1, WINCH 2, ROPE LUG WINCH, MAIN BOOM ADJUSTING WINCH, FLY JIB ADJUSTING WINCH, AUXILIARY WINCH, KELLY WINCH, FEED WINCH and CONSTANT PULL WINCH								
	[o]							Check oil level of winch gearbox
		o						Check winch gearbox for leaks and if necessary carry out an oil analysis
			o					Change winch gearbox oil
		o						Change feed winch oil
	[o]							Lubricate the counter bearing if possible
[o]								Check rope end fastening for tight fit
		o						Check the 3-windings limit switch for tight fit and correct operation
		o						Check winches for tight fit (pin clearance, retainer)
		o						Check the fastening screws for tight fit and tighten if necessary
				o				Check the mechanical connection hydraulic motor/gearbox or drive (pinion/sleeve) for wear, replace if necessary
		o						Check the standstill monitor for tight fit and correct operation
				o				Conduct visual inspection; record running time for the winches
		o						Check that stopping brakes are working
		o						Check that the free-fall brakes are working (where present)
		o						Check that the constant pull of winches 1 and 2 operates properly (where present)
		o						Check that the free-wheel works properly (if present)
				x	o			Hydraulic motor and planetary drive gear: Check toothed profile for wear and change if necessary
		o						Check that the rope pull limitation is working properly
					o			Check the rope pull limitation for correct operation using test weights

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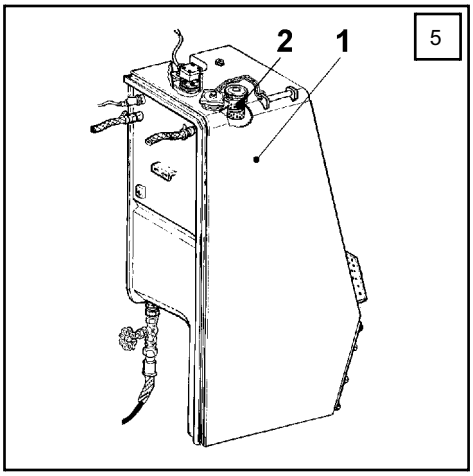
7.4.4 Cleaning the fuel tank

Clean the completely drained tank (Figure 5, item 1) with a commercial detergent. Drain off the detergent in the same way as the fuel, via the drain plug using a drainage hose.

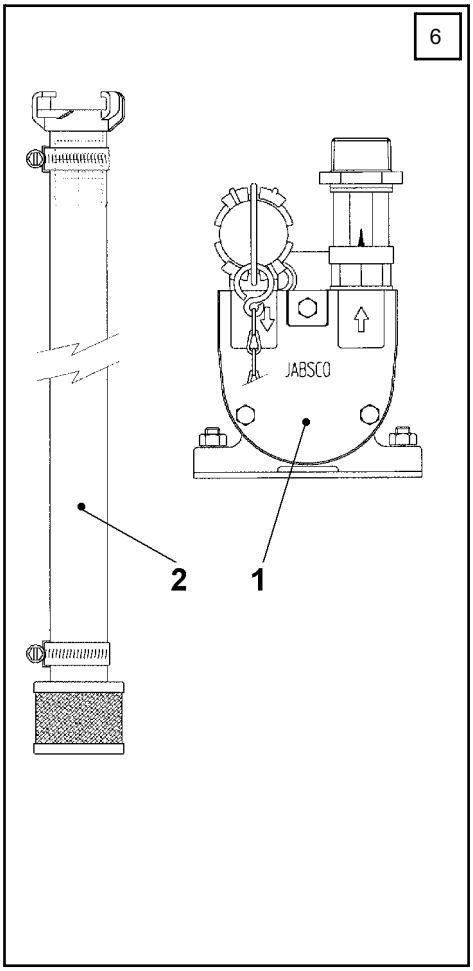


5

7.4.5 Refuelling

NOTE!

Only fill the fuel tank with fuel via the filler sieve (Figure 5, item 2) in the filler neck or with the suction hose (Figure 6, item 2) of the refuelling pump (Figure 6, item 1). To avoid heavy condensation, always refuel in the evening or during shift changes. Regularly check the fuel quality against the fuels and lubricants specifications.



6

7.9.1 General

Absolute cleanliness is particularly important for the hydraulic system. For this reason, it is essential to adhere to the prescribed maintenance interval for the hydraulic oil filter.

7.9.2 Checking the oil level

- Check the oil level in the upper sight glass (Figure 12, item 6) every day. With the machine standing level, the hydraulic oil must be visible in the upper sight glass.

IMPORTANT!

- To avoid a false reading of the oil level of the tank, fully retract all the hydraulic cylinders before filling.
- If necessary top up the hydraulic fluid via the **filler neck** (Figure 12, item 2).
- To improve the braking properties of the multi-disc brake, add **1% LS CONCENTRATE** to the hydraulic oil.

7.9.3 Filling with hydraulic oil

- Remove the stopper on the filler neck.
- Fill with hydraulic oil until the upper sight glass (Figure 12, item 6) is filled with oil.

The hydraulic system is filled in the factory with hydraulic oil of the type AVILUB FLUID LWE 46.

NOTE!

Before changing to a different hydraulic oil (e.g.: synthetic hydraulic oil), inform Liebherr Customer Service.

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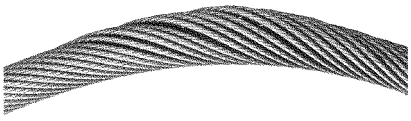
7.12.3 Check for rope deformations

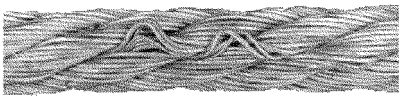
Pockets: these can occur when the outer layer of wires loosens or the outer wire braids are longer than the inner ones. Movement of the outer wires or strands in relation to the inner ones causes movement of the excess length at a particular location.

22



Loop formation: single wires or groups of wires emerge from the rope structure. The loops usually lie in a series of braids.

23



Contractions: are reductions in the diameter of the wire rope over short lengths. Rope sections immediately before the end attachment must be checked for contractions with particular care. The contractions are often difficult to recognize at these points.

24

Knots: are deformations of the wire rope. They are formed when a eyelet-shaped rope loop is pulled straight without the wire rope being able to compensate by turning on its axis.

25

- The material inspection documents must be filed away carefully.
- Store wire ropes in a dry, well- ventilated area. The rope and rope drum must be protected against the effects of the weather and must not be stored directly on the ground.
- Storage out of doors for an extended period must be avoided at all costs!

7.12.10 Transporting ropes

Ropes are very susceptible to external damage, therefore great care must be taken when they are lifted, transported or unloaded.

34

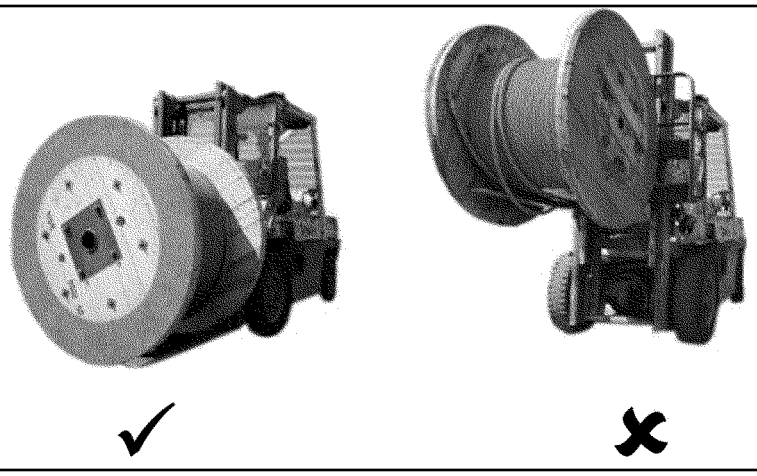


Figure 34 shows a rope drum being transported correctly (left) and incorrectly (right) on a forklift truck.

Correct procedure to avoid damage to ropes during transport:

- Lift rope drums using textile slinging equipment (flat lifting slings or round slings).
- Ideally, rope drums should be lifted with a spindle through the center of the drum.
- Lift rope drums using forklift forks, Figure 34.

7.12.11 Checking the rope drive

The service life of the rope depends to a large extent on checking of the rope drive. Any fault on the rope drive will damage the rope. The rope will reach the end of its service life more quickly due to increased wear. The grooves of the winching drums and the rope pulleys are therefore checked for wear using test templates. In addition, the condition of the rope pulley bearings, the draw rolls on the winch drums, etc. are checked to ensure the rope drive works correctly.

NOTE!
▪ Test templates are available in many different shapes. The best are round templates manufactured on a lathe.

Make sure that the following requirements are met:
- the engine has been switched off and secured against unauthorized starting.

Checking winch drum groove base for wear

Make sure that the following requirements are met:
- the engine has been switched off and secured against unauthorized starting
- A suitable test template is available.

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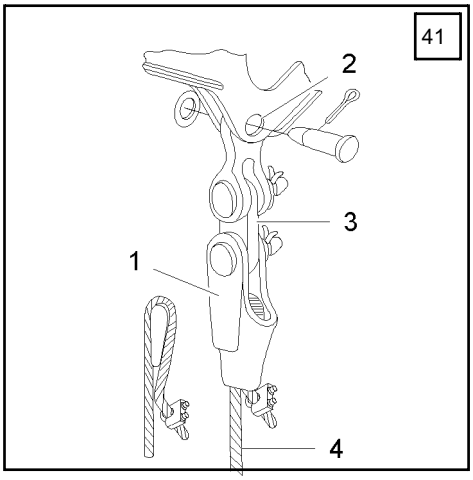
- Check the pocket locks for cracks and corrosion.
- Check the pocket locks for the correct functioning of self-locking safety latch (item 5, figure 40).
- Check the ease of movement of the safety button for the safety latch.
- Check that the safety bolt is present (item 2, Figure 40).

7.12.17 Check the rope fixation and rope thimble

Rope lock

1 Rope lock
2 Rope fixation
3 Intermediate connector
4 Hoisting rope



- Check the rope lock for damage and proper operation.
- Check rope clamp for tight fit.

Troubleshooting
If the rope shows signs of wire break or corrosion:
▪ remove the rope.

Troubleshooting
If the rope lock is cracked:
▪ immediately replace the rope lock with an original LIEBHERR spare part.

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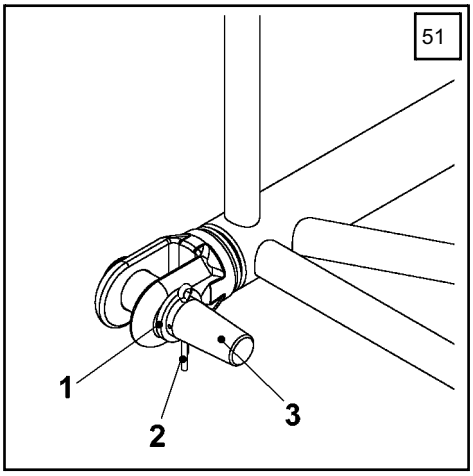
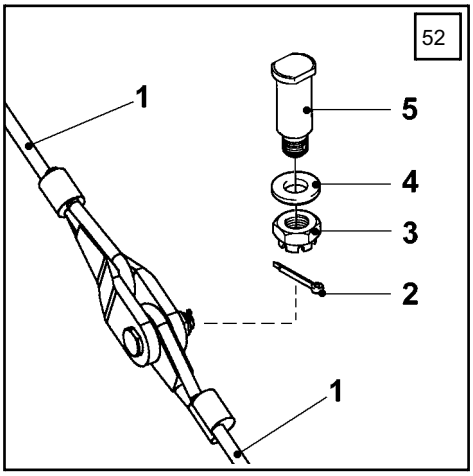
7.15.4 Checking the boom bolting and the guy rope connections



- The fastenings of all the boom intermediate pieces each consist of a (Figure 51, item 3), washer (item 1) and cotter pin (item 2), except for the connection between the first intermediate piece and the main boom pivot piece, which for safety reasons has two double tapered bolts at the bottom.
- Damage to the paintwork on the boom parts must be professionally repainted. This is a precautionary measure to prevent corrosion increasing the damage.
- The connecting bolts of the anchoring and tensioning ropes (Figure 52, item 1) must be checked every week. These consist of a bolt (5), washer (4), nut (3) and cotter pin (2).
- **No welding work** must ever be carried out on the boom sections without the manufacturer's consent. The attaching of secondary profiles and tubes is also forbidden. This could cause severe damage. **The results could be fatal!**
- Take special care to ensure that bolts are properly secured by the cotter pins.
- Replace bent or corroded cotter pins with new ones.



CAUTION!

Damaged guy ropes can lead to serious accidents!

If guy ropes are found to be damaged, they should no longer be used and must be replaced at once by original LIEBHERR guy ropes.

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No.	Lubrication points	Outside temperature	Type: ISO VG/SAE	Specification	LIEBHERR lubricants
6	Open gear wheels and crown gears Ropes	to -25° C lubrication system	Lubrication and Preservation media	DIN 51502 OGPF 2	Liebherr Universal grease 9900 ID no. 10296812
		to -60° C lubrication system		OGPF 1	Liebherr Universal grease Arctic ID no. 10296824
		all areas		OGPF 00	Liebherr spray paste ID no. 10330311
7	Telescopic boom	all areas	Special regulation	DIN 51502 KP 2 K-30	Liebherr telescope grease 9613 Plus ID no. 861305308

Lubricant table Table 7-02

1) Absolutely essential in the case of excavator hydraulics.
2) At lower temperatures observe the warm-up rules in the operating manual.
Amounts of lubricants and consumables and maintenance intervals are given in the operating manual.

NOTE!

For authorisation to use oils from other manufacturers, please contact:
Liebherr-Lubricant-Hotline: + 49 (0) 7354/80-6060 or lubricants@liebherr.com

7.19.1 Rapidly biodegradable hydraulic oils

NOTE!

Damage to the hydraulic system may occur!

Mixing of ester-based rapidly biodegradable hydraulic oils with mineral oils can cause aggressive reactions which subsequently cause damage to the hydraulic system.

Do not mix rapidly biodegradable hydraulic oils from different manufacturers and do not mix rapidly biodegradable oils with mineral oils.

The rapidly biodegradable hydraulic oils recommended by Liebherr are restricted to polyalphaolefin (PAO)-based oils, HEPR.

Use of a rapidly biodegradable hydraulic oil must be cleared in advance with Liebherr.

Plant-based oils must not be used because of their poor temperature resistance.

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9. OPTIONS

9.1 General

This chapter
- provides an overview of the retrofit kits and special equipment available for the HS 885 HD rope excavator,
- contains important information and safety notices that supplement those of the standard operator's manual.

IMPORTANT!

The options actually installed are listed in Chapter 1, section 1.3 "Machine license".
The standard operating manual remains valid even after adding options to the machine, and must still be adhered to!

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9.7 GSM Service Modem

A GSM telephone modem is attached to the Litronic system. The modem is located in the switch cabinet of the machine and works with an antenna on the cab roof. This allows the current operating data and the stored machine data to be transmitted to the Liebherr service department. The Liebherr service department is then able to identify the causes of faults with a diagnostic system, arrange engineer visits accordingly and organize the procurement of spare parts both quickly and efficiently. The SIM card is not included with the machine and must be provided by the operator.

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- Let the fuel filter drain off and then wipe it clean.
- Wind up the suction hose and stow it away under the refuelling pump.
- Replace the sealing cap on the refuelling pump.

CAUTION!

Wipe up any spilled diesel fuel, especially from the metal tray under the refuelling pump.

Keep the fuel filter on the suction hose clean.

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Shut-downs

The lowering movement of the additional winch is limited by a 3-windings limit switch.
The additional winch is also monitored by the load moment limiter (LML).

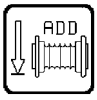
Lowering movement limitation

The lowering movement of the additional winch is monitored by a 3-windings limit switch

- which switches off the lowering movement of the additional winch when the 3-windings limit switch is activated.

Display

The fact that the lowering movement has been switched off is indicated to the driver by means of the limitation symbol (shown below) on all the LCD screens.



"3-windings limit switch activated" indicator

This symbol appears if the 3-windings limit switch on the additional winch is operated and the joystick is moved in the blocked direction.

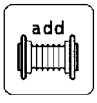
Switch off using the load moment limiter (LML)

The additional winch is also monitored by the load moment limiter (LML).

- If the machine's maximum load is reached, the LML switches off the raising movement of the additional winch, winch 1 and winch 2, and the lowering movement of the main boom adjusting winch.

9.15.2 Deselecting the additional winch

"Additional winch" selection button



The additional winch is deselected by pressing the "Additional winch" selection button on the right- hand control panel again. The **LED**in the selection button goes out.

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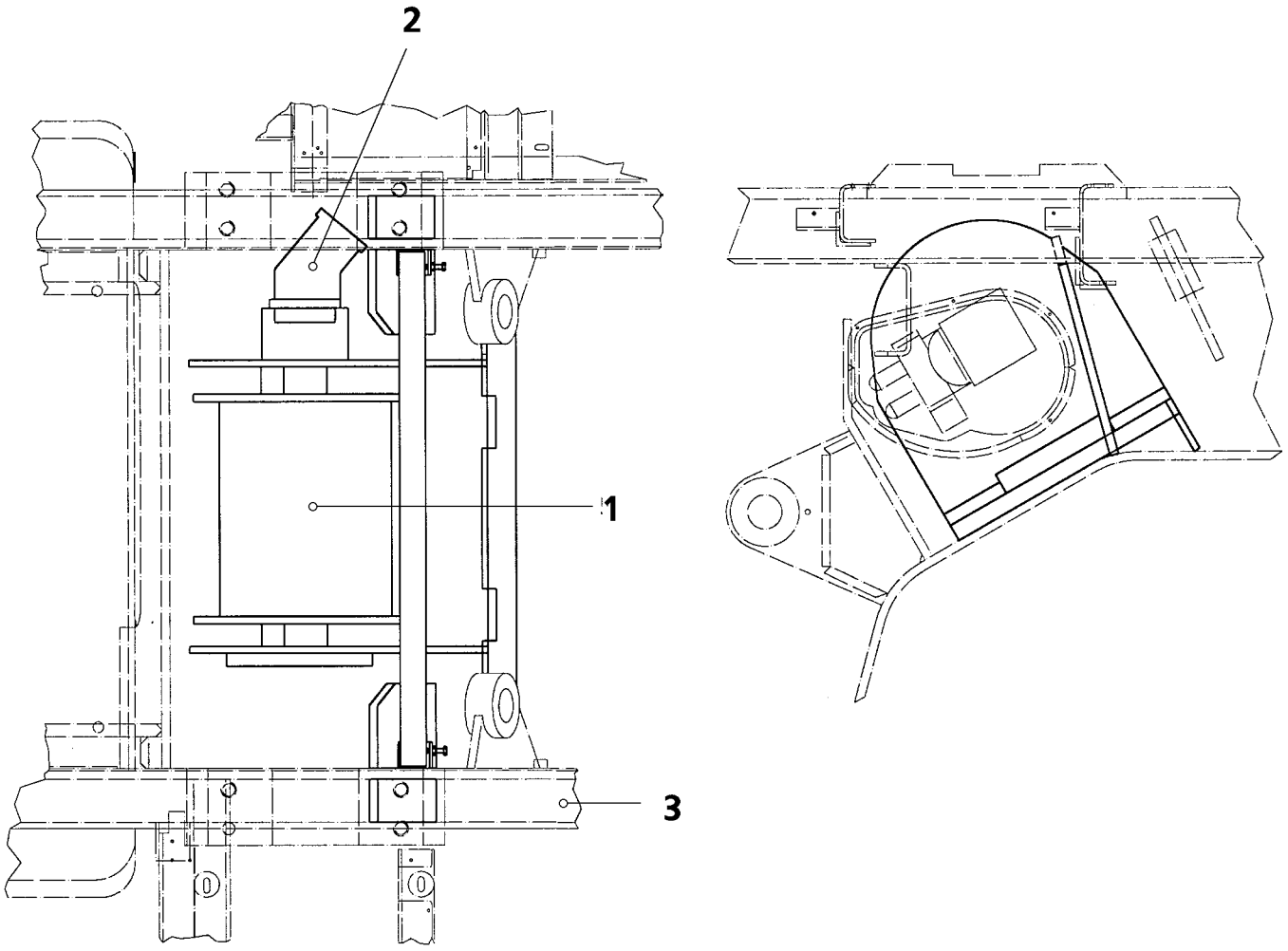
9.19 Auxiliary winch

9.19.1 General

The optional auxiliary winch is used
- to transport tubes and
- to install working equipment.



Auxiliary winch, HS 885 HD

1 Auxiliary winch
2 Hydraulic motor
3 Superstructure

The auxiliary winch (1)
- is mounted on the superstructure (3) behind hoisting winch 1,
- is driven by a hydraulic motor (2) via a planetary gear,
- is equipped with a stopping brake,
- has a 3-windings limit switch.

9.19.2 Technical data

Rope pull	max. 75 KN
Rope diameter	20 mm
Usable rope length	57.5 m
Safety windings 3	3.8 m
Rope drum diameter	398 mm
Gearbox oil capacity	3.0 litres

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9.22 Milling operation

9.22.1 General

Milling operation is pre-selected on the page "pre-select operating modes". The machine operator selects milling operation by tapping the milling symbol on the page “pre-select operating modes” and pressing the button on left control console X12.

DANGER !

The load torque limitation (LMB) function is bypassed as soon as milling operation has been pre-selected.
There is no automatic shutdown if the torque is exceeded!

Milling cutter control

All important milling cutter control functions are performed by the Bauer control system.

Undercarriage lock

The button for pre-selecting driving operation with attached milling cutter is located on the Bauer control console. Once milling operation has been pre-selected, it is only possible to drive the undercarriage if it is released by pressing the corresponding button on the Bauer control console.

Slewing gear lock

The button for pre-selecting slewing gear operation with attached milling cutter is located on the Bauer control console. Once milling operation has been pre-selected, it is only possible to drive the slewing gear if it is released by pressing the corresponding button on the Bauer control console.

Operating the hoist winches during milling operation

Hoist winch 1 is blocked during milling operation as the pump is required to supply the bentonite pump. Hoist winch 2 can be used at any time during milling operation.

NOTE !

Safety, assembly and maintenance instructions for the milling cutter attachment are given in the Bauer operating manual.

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0.2 Sensitive hoisting winch 2

The "Sensitive hoisting" function carries out particularly sensitive hoisting.
Winch 2 exclusively is permitted to carry out the "Sensitive hoisting" function.

The function applies the following safety limitations to crane operation.
- Maximum speed of winch 2 is limited to 30 m/min in the uppermost winding layer.

- The maximum pull force on the winch is 50% of the value permitted for lifting gear.
Select suitable rigging material for this line pull!
If necessary, develop strategy for emergency rescue!

- Permitted load chart values are reduced by 50%.

The load chart that can be called up on the monitor is not affected and displays the standard load chart values.

"Sensitive hoisting" cannot be activated during free-fall and excavator operation.

If excavator operation "Hoist rope protection deactivated" is preselected and the Sensitive hoisting button is pressed, the operator receives a message on the monitor about the incorrect setup.

0.2.1 Ensure that the following conditions are satisfied:

- ▶ Gate valve (ball valve) for free-fall operation in the uppercarriage in "Free-fall operation switched off" position.
- ▶ Gate valve (ball valve) is secured using a padlock.
- ▶ Hoist rope protection switched on.

0.2.2 Preselect sensitive hoisting

Sensitive hoisting button.

Press Sensitive hoisting button on control panel X23.

Sensitive hoisting symbol

Sensitive hoisting symbol appears in the status display on the monitor:

0.2.3 Operate sensitive hoisting

Ensure that the following conditions are satisfied:
- □ Speed level 1 of the swing is selected.
- □ Speed level 1 of boom luffing is selected.

Crawlers
- Crawlers are not limited.
- ▶ Operate crawlers sensitively.

- ▶ Operate sensitive hoisting.

1. Verwendung der Wasserheizgeräte

Die Wasserheizgeräte dienen in Verbindung mit der fahrzeugeigenen Heizanlage
○ zum Beheizen des Fahrgastinnenraumes,
○ zum Entfrosten der Fahrzeugscheiben sowie
○ zum Vorwärmen wassergekühlter Motoren.

Die Wasserheizgeräte arbeiten unabhängig vom Fahrzeugmotor und werden an das Kühlsystem, das Kraftstoffsystem und an die elektrische Anlage des Fahrzeuges angeschlossen.
Das Heizgerät ist zur Beheizung des Fahrgastraumes oder der Fahrerkabine, jedoch nicht zur Beheizung eines Gefahrgut-Transportraumes zugelassen.
Soll der Betrieb der Wasserheizgeräte in einem separat installierten Heizsystem erfolgen, ist zuvor in jedem Falle eine Einbauplanung bei Webasto zur Genehmigung vorzulegen.

Nur für DBW 2012 und DBW 2022:
Für den Einbau der Heizgeräte in Fahrzeuge für den Transport gefährlicher Güter müssen zusätzlich zur StVZO die Anforderungen der TRS 002 und TRS 003 (Technische Richtlinien zur Gefahrgut-Verordnung Straße) erfüllt werden.
Die nachstehende Einbauanweisung ist allgemeiner Art und muß auf die Einbaugegebenheiten des jeweiligen Fahrzeugtyps sinngemäß übertragen werden.

2. Technische Daten

2.1 Heizgeräte		DBW 2010 DBW 2012	DBW 2020 DBW 2022	DBW 300	DBW 350
Allgem. Bauartgenehmigung (Prüfzeichen)		⁓ S 129 ⁓ S 198	⁓ S 136 ⁓ S 216	⁓ S 164	⁓ S 196
Bauart		Hochdruckzerstäuber			
Wärmestrom	kW (kcal/h)	11,6 / 9,3 (10000/8000)	23,3 (20 000)	30 (26 000)	35 (30 000)
Brennstoff		Dieselkraftstoff DIN 51601 Heizöl EL DIN 51603 (Wintermischung beachten, siehe Betriebsanleitung)			
Brennstoffverbrauch	kg/h l/h	1,3 / 1,0 1,5 / 1,2	2,5 3,0	3,3 4,0	3,7 4,5
Nennspannung	V –	12 oder 24		24	
Betriebsspannung	V –	10 ... 14 oder 20 ... 28		20 . . . 28	
Nennleistungsaufnahme (ohne Umwälzpumpe)	W	60	90 **ab .33:** 120	130	170
zul. Umgebungstemperatur im Betrieb (Heizgerät, Steuergerät, Umwälzpumpe)	°C	– 40 . . . + 60			
zul. Lagertemperatur (Heizgerät, Steuergerät, Umwälzpumpe)	°C	– 40 . . . + 85			
zul. Betriebsüberdruck	bar	0,4 . . . 2,0			
Füllmenge des Wärmeübertragers	l	1,1	2,4		
Mindestmenge des Kreislaufes	l	10	10		
Temperaturdifferenz max.	°C	15	10		
Einstellung des CO_2-Wertes	Vol.-% Vol.-%	11 – 0,5	= 9,5 ± 0,5 **ab .33:** 11 – 0,5	= 11 – 0,5	
CO im Abgas	Vol.-%	0,2 max.			
Rußzahl nach Bosch		< 4,0			
Abmessungen, siehe Bild:		10 / 11	12 ... 14	12 ... 14	15 / 16
Gewicht Heizgerät inkl. Steuergerät	kg	15	24 **ab .33:** 22	24 **ab .16:** 22	23

2.2 Umwälzpumpen		U 4810	U 4814	U 4816
Volumenstrom	l/h	1 600 (gegen 0,15 bar)	5 200 (gegen 0,2 bar)	6 000 (gegen 0,4 bar)
Nennspannung	V–	12 oder 24		24
Betriebsspannung	V–	10 ... 14 oder 20 ... 28		20 . . . 28
Nennleistungsaufnahme	W	25	104	215
Abmessungen, siehe Bild:		17	18	19
Gewicht	kg	0,8	2,1	4,75
Empfohlen für Heizgerät: [3]		DBW 2010 DBW 2012	DBW 2020/22 DBW 300/350	DBW 2020/22 DBW 300/350

Die nebenstehenden technischen Angaben verstehen sich, soweit keine Grenzwerte angegeben sind, mit den bei Heizgeräten üblichen Toleranzen von ca. ± 10 % bei einer Umgebungstemperatur von + 20°C und bei Nennspannung.

Elektrische Bauteile:
Steuergerät, Motoren für Brennluftgebläse und Umwälzpumpe, Magnetventile, Zündfunkengeber und Vorwahluhr [1] sind entweder für 12 Volt oder 24 Volt ausgelegt.
Die Bauteile Temperatursicherung, Thermostate, Temperaturbegrenzer, Flammwächter, Temperaturfühler [2] und Schalter sind spannungsunabhängig.

[1] nicht für Heizgeräte DBW 2012 / 2022 (TRS).
[2] nur für »Sensoric«-Heizgeräte.

Heizgerät-Typen:

Ausrüstung mit Steuergerät 1553:

DBW 2010	bis	Typ .60	*	
DBW 2012		Typ .02	*	(TRS)**
DBW 2020	bis	Typ .50	*	
DBW 300	bis	Typ .30	*	
DBW 350	bis	Typ .10	*	

Ausrüstung mit Steuergerät 1563 und 1564 »Sensoric«:

DBW 2010	ab	Typ .61	*	
DBW 2012	ab	Typ .11	*	(TRS)**
DBW 2020	ab	Typ .51	*	
DBW 2022	ab	Typ .01	*	(TRS)**
DBW 300	ab	Typ .31	*	
DBW 350	ab	Typ .11	*	

* siehe Typschild des Heizgeräts.
** Heizgeräte für Fahrzeuge zum Transport gefährlicher Güter gemäß TRS.

[3] Die Zuordnung der Umwälzpumpen zu den Heizgeräten muß entsprechend der wasserseitigen Widerstände erfolgen.

1. Using the water heaters

The water heater is used for pre-heating and retaining the heat of water-cooled motors engines. The heater works in conjunction with the heating system of the vehicle
○ to heat the driver's cabin and passenger compartment and
○ to defrost the windows and windscreen of the vehicle.
The heater operates independently of the vehicle engine. It is connected to the coolant circuit or the heating circuit, the fuel supply system and the electrical system of the vehicle.

The heaters are licensed for heating the vehicle's or driver's compartment, however, not for heating the compartment of dangerous goods.

If the heater is to operate with a separately installed heating system, the installation plan must always be presented to Webasto for approval.
Only for DBW 2012 and DBW 2022:
If the heaters are installed in vehicles used for the transport of dangerous goods, the requirements of TRS 002 and TRS 003 (technical directions dangerous goods versions) must be observed additionally to the german StVZO.
The following instructions are of a general nature and, naturally, they must be interpreted according to the type of vehicle construction.

2. Technical data

2.1 Heaters		DBW 2010 DBW 2012	DBW 2020 DBW 2022	DBW 300	DBW 350
General approval (test symbol)		⁓ S 129 ⁓ S 198	⁓ S 136 ⁓ S 216	⁓ S 164	⁓ S 196
Type of construction		High pressure nozzle			
Heat output	kW (kcal/h)	11.6 / 9.3 (10000/8000)	23.3 (20 000)	30 (26 000)	35 (30 000)
Fuel		Diesel to DIN 51601 EL Heating oil to DIN 51603 (mixing may be necessary in winter, see Operating Instr.)			
Fuel consumption	kg/h l/h	1.3 / 1.0 1.5 / 1.2	2.5 3.0	3.3 4.0	3.7 4.5
Nominal voltage	V –	12 or 24		24	
Operating voltage	V –	10 ... 14 or 20 ... 28		20 ... 28	
Nominal power consumption (without water pump)	W	60	90 **from .33:** 120	130	170
Perm. ambient temperature in operation (heater, control unit, water pump)	°C	– 40 ... + 60			
Perm. storage temperature (heater, control unit, water pump)	°C	– 40 ... + 85			
Perm. operatating system pressure	p.s.i.	0.4 ... 2.0			
Capacity of heat exchanger	l	1.1	2.4		
Minimum circuit capacity	l	10	10		
Temperature difference max.	°C	15	10		
CO_2 levels	Vol.-% Vol.-%	11 – 0.5	= 9.5 ± 0.5 **from .33:** 11 – 0.5	= 11 – 0.5	
CO in exhaust	Vol.-%	0.2 max.			
Smoke number (Bosch)		< 4.0			
Dimensions, see drawing:		10 / 11	12 ... 14	12 ... 14	15 / 16
Weight of heater incl. control unit	kg	15	24 **from .33:** 22	24 **from .16:** 22	23

2.2 Water circulating pumps		U 4810	U 4814	U 4816
Water flow	l/h	1 600 (against 0.15 bar)	5 200 (against 0.2 bar)	6 000 (against 0.4 bar)
Nominal voltage	V–	12 or 24		24
Operating voltage	V–	10 ... 14 or 20 ... 28		20 ... 28
Nominal power consumption	W	25	104	215
Dimensions, see drawing:		17	18	19
Weight	kg	0.8	2.1	4.75
Recommended for use with heater: [3]		DBW 2010 DBW 2012	DBW 2020/22 DBW 300/350	DBW 2020/22 DBW 300/350

The following data is subject to the normal tolerances for heaters, if no tolerance is quoted. This is around ± 10 % in an ambient temperature of 20°C at nominal voltage.

Electrical components:
Electronic control unit, motors for combustion air fan and water circulating pump, solenoid valve, electronic ignition unit and digital timer [1] are rated at either 12 or 24 volts.
The components overheat fuse, thermostats, overheat thermostat, flame detection photocell, temperature sensor [2] and switch are independent on voltage.

[1] not for heaters DBW 2012 / 2022 (TRS).
[2] only for »Sensoric« heaters.

Types of heater:

Heaters with control unit 1553:

DBW 2010	up to	type .60	*
DBW 2012		type .02	* (TRS)**
DBW 2020	up to	type .50	*
DBW 300	up to	type .30	*
DBW 350	up to	type .10	*

Sensoric heaters with control unit 1563 (Economy) and 1564 (TRS):

DBW 2010	from	type .61	*
DBW 2012	from	type .11	* (TRS)**
DBW 2020	from	type .51	*
DBW 2022	from	type .01	* (TRS)**
DBW 300	from	type .31	*
DBW 350	from	type .11	*

* see manufacturer's nameplate.
** specifically for installation in vehicles transporting dangerous goods (ADR).

[3] the choice of water pump depends on resistance of water circuit.

1. Utilisation des appareils de chauffage

Les appareils de chauffage à eau servent
○ à chauffer l'habitacle et
○ à dégivrer les vitres du véhicule
○ ainsi qu'à préchauffer les moteurs à refroidissement à eau, en liaison avec le dispositif de chauffage propre du véhicule.
Les appareils de chauffage à eau fonctionnent indépendamment du moteur du véhicule et sont raccordés au système de refroidissement, au système d'alimentation en combustible et au réseau électrique du véhicule.
Les appareils de chauffage sont autorisés à chauffer le compartiment ou la cabine du véhicule, mais ils ne sont pas autorisés au chauffage un compartiment de matières dangereuses.
Si les appareils de chauffage à eau fonctionnent dans un circuit de chauffage séparé, il faut, en tout cas, présenter un plan de montage à la firme Webasto pour autorisation.

Uniquement pour les DBW 2012 et DBW 2022: Pour le montage d'appareils de chauffage à eau sur des véhicules de transport de marchandises dangereuses, il faut en plus des conditions StVZO, remplir les conditions des TRS 002 et TRS 003 (directives techniques relatives au transport par route de produits dangereux / pour l'Allemagne).
La notice de montage suivante est de nature générale et doit être appliquée judicieusement aux conditions de montage du type de véhicule en question.

2. Caractéristiques techniques

2.1 Appareils de chauffage		DBW 2010 DBW 2012	DBW 2020 DBW 2022	DBW 300	DBW 350
Autorisation générale de fabrication, marque de contrôle		⁓ S 129 ⁓ S 198	⁓ S 136 ⁓ S 216	⁓ S 164	⁓ S 196
Type de construction		Atomiseur pour hautes pressions			
Débit calorifique	kW (kcal/h)	11,6 / 9,3 (10000/8000)	23,3 (20 000)	30 (26 000)	35 (30 000)
Combustible		Carburant pour moteur Diesel DIN 51601 Huile de chauffage EL DIN 51603 (attention à l'antigel, voir notice de service)			
Consommation de combustible	kg/h l/h	1,3 / 1,0 1,5 / 1,2	2,5 3,0	3,3 4,0	3,7 4,5
Tension nominale	V –	12 ou 24		24	
Tension de serive	V –	10 ... 14 ou 20 ... 28		20 . . . 28	
Consommation électr. nominale (sans pompe de circulation)	W	60	90 **de .33:** 120	130	170
Température amb. autorisée en fonction (app. de chauf., boîtier de com., pompe de circ.)	°C	– 40 . . . + 60			
Températ. de stockage aut. (app. de chauf., boîtier de com., pompe de circ.)	°C	– 40 . . . + 85			
Surpression de service autorisée	bar	0,4 . . . 2,0			
Volume de remplissage de l'éch. de chaleur	l	1,1	2,4		
Quantité minimale dans le circuit	l	10	10		
Différence de température max.	°C	15	10		
Réglage de la valeur en CO_2	Vol.-% Vol.-%	11 – 0,5	= 9,5 ± 0,5 **de .33:** 11 – 0,5	= 11 – 0,5	
CO dans les gaz d'échappement	Vol.-%	0,2 max.			
Indice de fumée selon (Bosch)		< 4,0			
Dimensions, voir les figures:		10 / 11	12 ... 14	12 ... 14	15 / 16
Poids de l'appareil de chauffage y compris le boîtier de commande	kg	15	24 **de .33:** 22	24 **de .16:** 22	23

2.2 Pompes de circulation		U 4810	U 4814	U 4816
Débit	l/h	1 600 (vers 0,15 bar)	5 200 (vers 0,2 bar)	6 000 (vers 0,4 bar)
Voltage nominal	V–	12 ou 24		24
Voltage de service	V–	10 ... 14 ou 20 ... 28		20 . . . 28
Puissance électr. nominale	W	25	104	215
Dimensions, voir les figures:		17	18	19
Poids	kg	0,8	2,1	4,75
Conseillé pour appareil de chauffage: [3]		DBW 2010 DBW 2012	DBW 2020/22 DBW 300/350	DBW 2020/22 DBW 300/350

Les caractéristiques techniques sont conformes aux tolérances s'appliquant aux appareils de chauffage d'environ ± 10 % pour une température ambiante de + 20°C et une tension nominale, si aucunes valeurs extrêmes ne sont indiquées.

Eléments électriques:
Le boîtier de commande, les moteurs de turbine à air de combustion et d'électropompe de circulation, les électrovannes, les bougies à incandescence et la montre de pré-sélevction [1]) sont conçus soit pour 12 volts ou 24 volts.
Les éléments comme le contrôleur de température, les thermostats, le limiteur de température, les contrôleurs de flamme, la sonde de température [2]) et les interrupteurs sont indépendants de la tension.

[1]) pas pour les DBW 2012 / 2022 (TRS).
[2]) uniquement pour les appareils »Sensoric«.

Types des appareils:

Appareils de chauffage avec le boîtier de commande 1553:
DBW 2010 jusqu'à type .60 *
DBW 2012 type .02 * (TRS)**
DBW 2020 jusqu'à type .50 *
DBW 300 jusqu'à type .30 *
DBW 350 jusqu'à type .10 *

Appareils de chauffage avec le boîtier de commande 1563/64 »Sensoric«:
DBW 2010 à partir de type .61 *
DBW 2012 à partir de type .11 * (TRS)**
DBW 2020 à partir de type .51 *
DBW 2022 à partir de type .01 * (TRS)**
DBW 300 à partir de type .31 *
DBW 350 à partir de type .11 *

* voir la plaque constructeur.
** uniquement pour l'installation dans des véhicules pour le transport de marchandises dangereuses.

[3]) La disposition des électro-pompes de circulation doit s'effectuer selon les résistances de côte d'eau.

Legende für Bilder 1 bis 3:

1 Steuergerät
2 Motor
3 Zündfunkengeber
4 Kupplung
5 Brennluftgebläse
6 Magnetventil
7 Kerzenstecker
8 Wasser-Stutzen
9* Regelthermostat
9a Temperaturfühler (Sensor)
10 Zündelektroden
11 Zerstäuberdüse
12 Temperatursicherung
13* Gebläsethermostat
14 Temperaturbegrenzer
15 Wärmeübertrager
16 Brennkammer
17 Drallkörper
18 Abgas-Austritt
19 Flammwächter
20 Brennstoffpumpe
21 Brennstoffleitungen
22 Brennluft-Eintritt mit Regulierung

* je nach Ausführung

Legend for Figures 1 to 3:

1 Electronic control unit
2 Motor
3 Electronic ignition unit
4 Clutch
5 Combustion air fan
6 Solenoid valve
7 Electrode plug
8 Water pipes
9* Control thermostat
9a Temperature sensor
10 Ignition electrodes
11 Fuel nozzle
12 Overheat fuse
13* Fan thermostat
14 Overheat thermostat
15 Heat exchanger
16 Combustion chamber
17 Combustion air swirler
18 Exhaust pipe
19 Flame detection photocell
20 Fuel pump
21 Fuel pipes
22 Combustion air intake, with adjusting shutter

* as to version of heater

Légende pour les figures 1 à 3:

1 Boîtier de commande
2 Moteur
3 Emetteur d'étinc. d'allumage
4 Embrayage
5 Turbine à air de comb.
6 Electrovanne
7 Prise de bougie
8 Tubulure d'eau
9* Thermostat de réglage
9a Sonde de température
10 Electrodes d'allumage
11 Gicleur atomiseur
12 Fusible de température
13* Thermostat de turbine
14 Sécurité de températ.
15 Echangeur de chaleur
16 Chambre de combustion
17 Corps à rayures
18 Tubulure d'échappement
19 Contrôleur de flamme
20 Pompe à combustible
21 Conduites de combustible
22 Tubulure d'entrée d'air de combustion avec réglage

* selon le type de chauffage

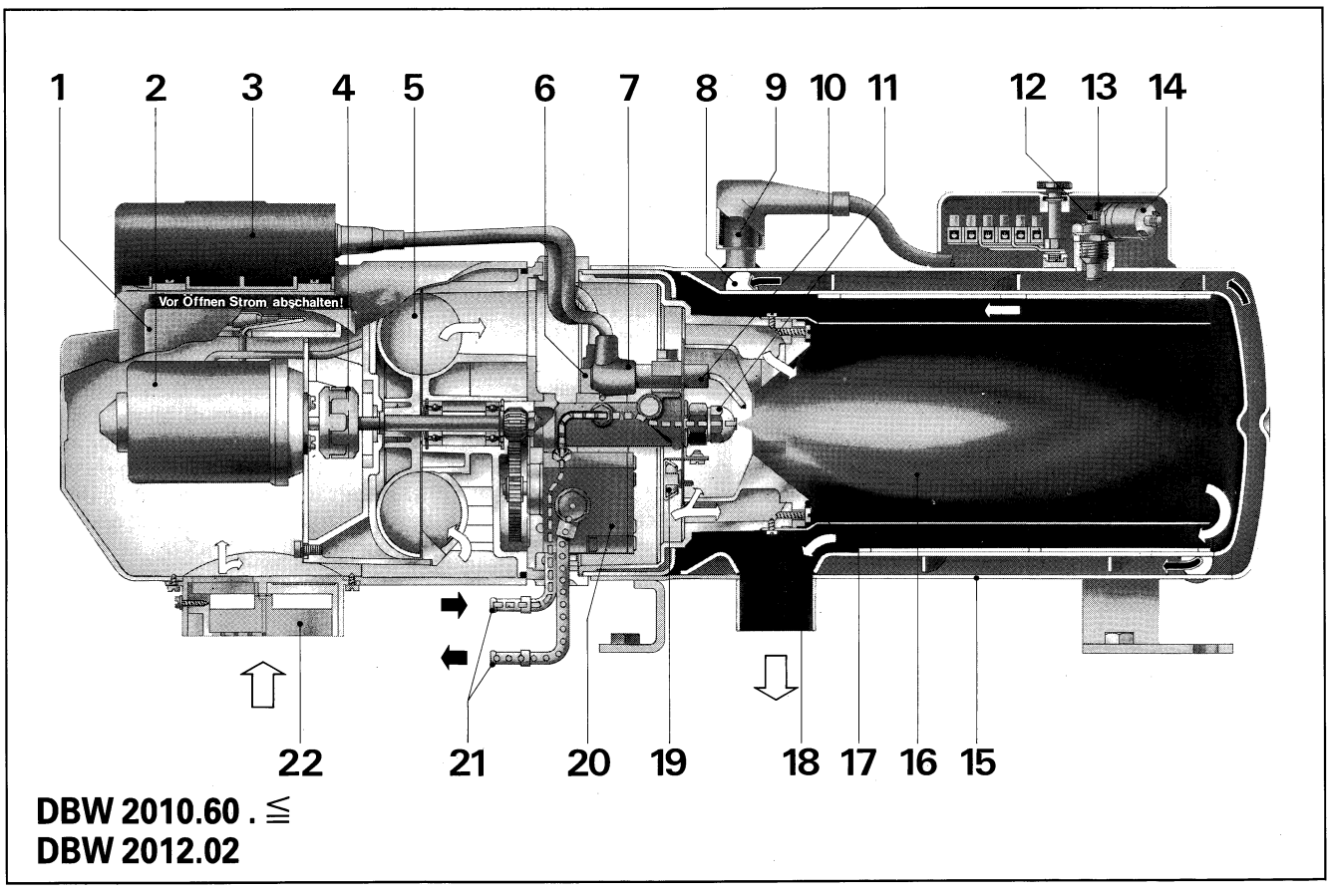

Bild 1: Wasserheizgeräte DBW 2010 bis .60 und DBW 2012.02 (TRS)

Fig. 1: Water heaters DBW 2010 to .60 and DBW 2012.02 (TRS)

Fig. 1: App. de chauffage à eau DBW 2010 à .60 et DBW 2012.02 (TRS)

Bild / Fig. 8

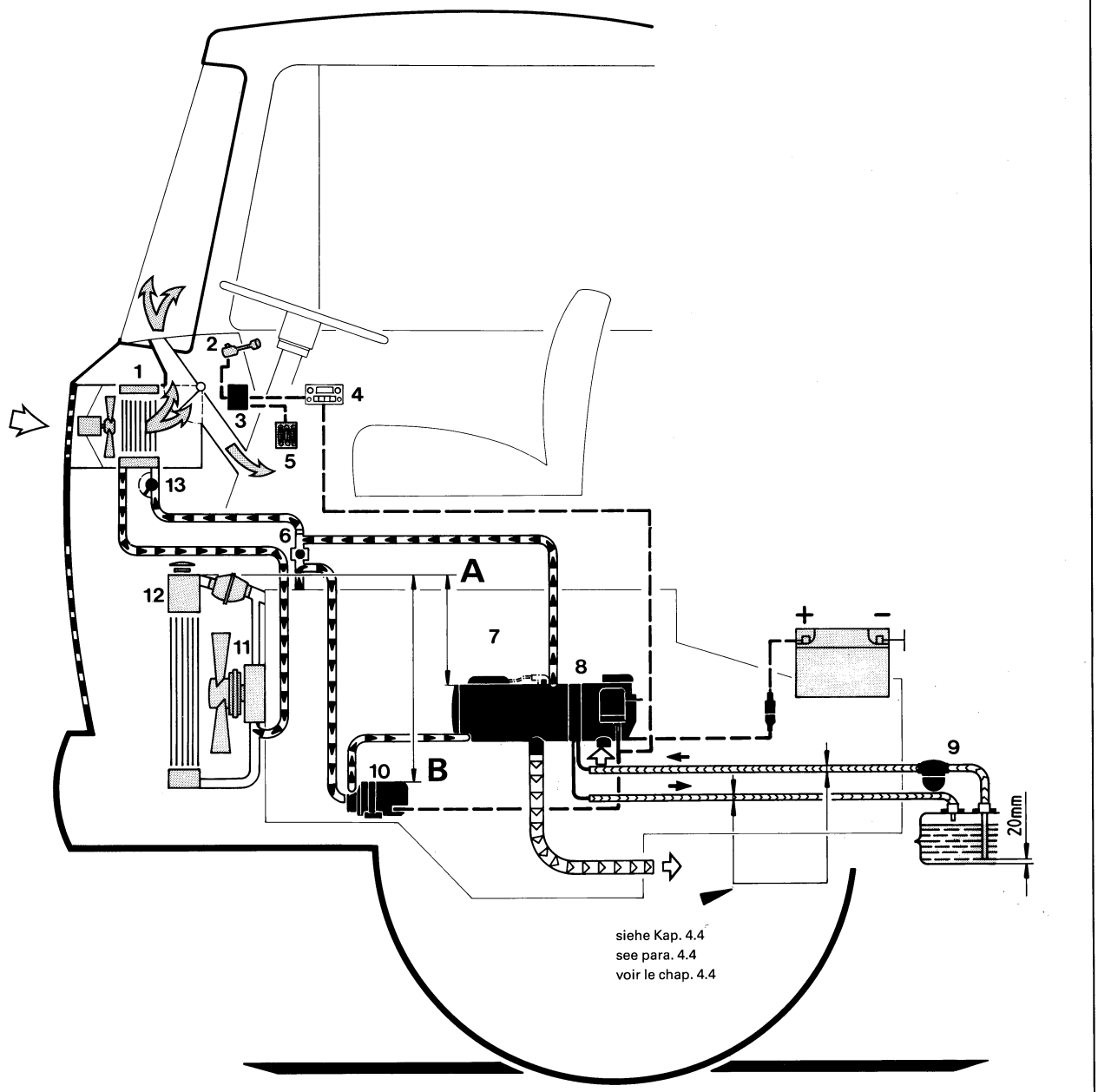

Bild 8: Einbau- und Funktionsschema für DBW 2010 und DBW 2012

(Legende siehe Seite 22)

Fig. 8: Installation and function scheme for DBW 2010 and DBW 2012

(legend see page 22)

Fig. 8: Montage et schéma de fonctionnement pour DBW 2010 et DBW 2012

(légende voir la page 22)