en **Operator's manual**

Machine for Industrial Applications

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ORIGINAL OPERATOR'S MANUAL

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Contact

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1.1.2 Uppercarriage

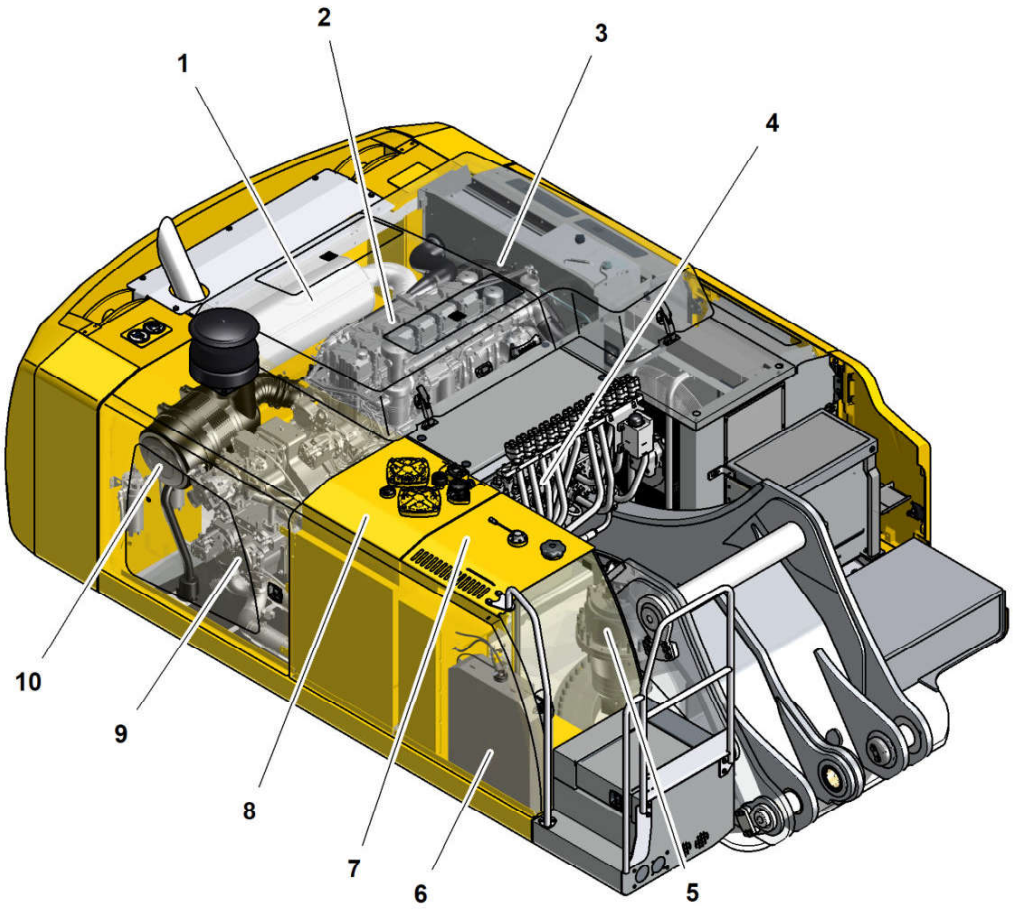

Fig. 3: Uppercarriage

1	Exhaust treatment system	**5**	Slewing gearbox	**9**	Hydraulic pump
2	Diesel engine	**6**	Diesel exhaust fluid tank	**10**	Engine air filter
3	Engine cooling	**7**	Fuel tank		
4	Control valve block	**8**	Hydraulic tank		

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Maximum Handling Capacity

New power unit
The LH 60 Industry material handling machine features a powerful Liebherr 4-cylinder in-line engine with constant 180 kW and 8.0 l displacement. This guarantees the high performance level of the machine and at the same time reduces fuel consumption.

High Swing Torque
The separate hydraulic pump in the closed slewing circuit only supplies hydraulic fluid to the swing mechanism. The maximum delivery volume is thus available at any time for turning the uppercarriage for fast and dynamic rotational movements.

Energy Recovery System ERC
The energy saved by lowering of the attachment in the ERC system is also available to the machine for the engine power, the resulting system performance for the material handling machine LH 60 is 334 kW. The result is more powerful, faster and more homogeneous operating cycles, which lead to increased handling capacity.

Precision Operation

LSC Hydraulic System with Electrical Pilot Control
The new 2-circuit Liebherr-Synchron-Comfort-system (LSC) with LUDV technology (flow distribution independent of load pressure) ensures faster working movements with up to 20 % less fuel consumption in comparison to the predecessor models. All work functions of the machine are controlled electrically, whereby the signals of the transmitters are only converted directly at the control block by hydraulic means. This technology enables end position damping of the attachment in order to protect the components and thus extend their service life. Simple, individual setting and adjustment of the working speed of boom, stick and slewing mechanism allow the driver to adjust the machine to each application and fully utilise the machine's capacity.

Firm and Stable Positioning
An essential prerequisite for precise working and maximum handling capacity is the firm and stable positioning of the machine. The design of the Liebherr undercarriage optimises the way forces are induced on components and minimised stress. Together with the elaborate support geometry, maximum stability and durability are guaranteed.

Liebherr Diesel Engine Compliant with Stage IV and IIIA
- Powerful, robust and reliable
- Maximum torque even at low speeds to ensure fast movements with low fuel consumption
- Common rail injection system for maximum efficiency
- Emissions treatment with Liebherr SCR technology at stage IV

Closed Slewing Circuit
- High torque for maximum acceleration and fast rotary movements
- Integrated speed sensor for controlling and monitoring braking movement for greater safety
- Greater fuel efficiency thanks to intelligent energy management in the closed system

Electrical Pilot Control
- Precision control irrespective of the ambient temperature for maximum precision
- Simpler and faster fault diagnostics for optimal availability
- Up to 5 individual driver profiles can be saved

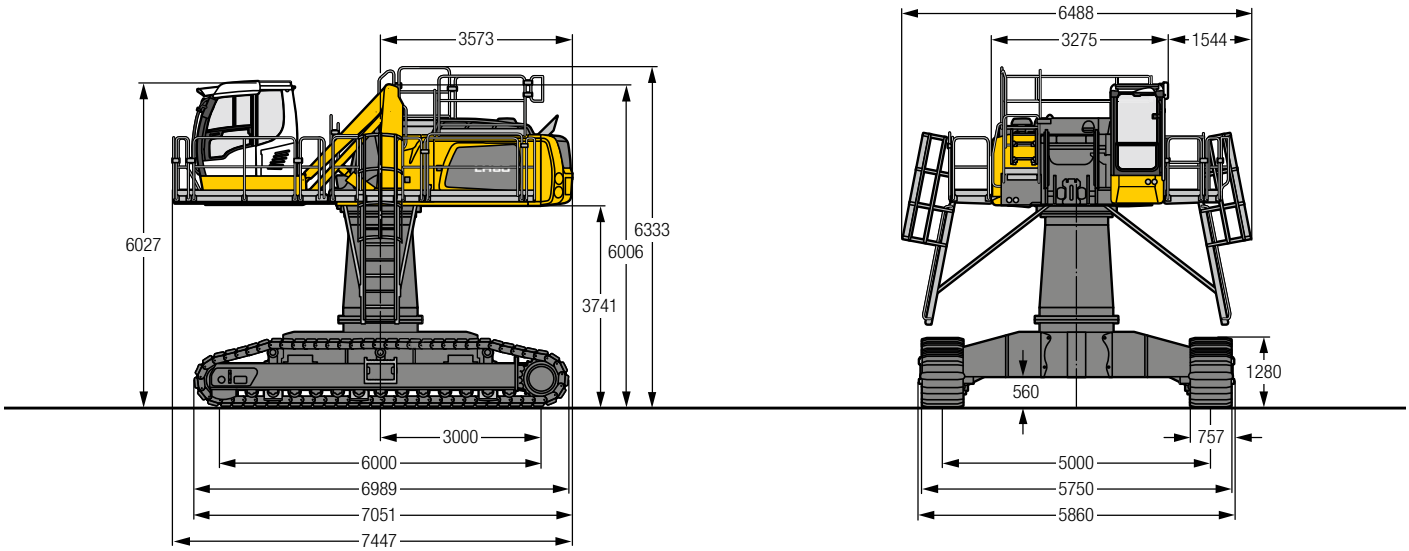
Attachment

- High load capacities and long reaches thanks to optimised kinematic properties and robust construction for greater handling performance
- Energy recovery cylinder filled with nitrogen for maximum efficiency through less fuel consumption at more handling capacity
- Pipe fracture safety valves on hoist and stick cylinders and retract stick shut-off for maximum safety during every application
- Electro-hydraulic end position control extends the service life of the components
- Quick coupling systems and working tools made by Liebherr for maximum machine capacity utilisation and greater handling performance

Operator's Cab

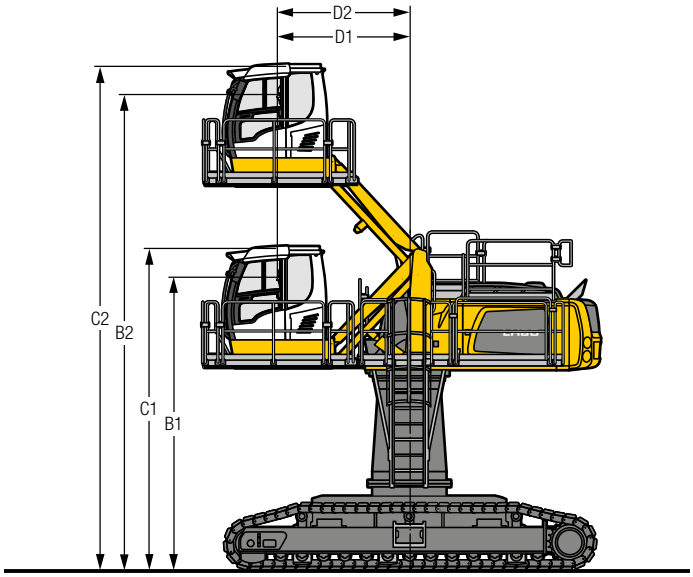
- Joystick steering without steering column as standard for convenient operation, greater legroom and clear view of the working area
- Less strain on the operator, workers and reduced environmental pollution due to lower noise emissions
- Optimum visibility thanks to large glass surfaces and standard rear and side area monitoring with camera
- Proportional control as standard with 4-way minijoystick for greater precision, highprecision control and functions

LH 60 C HR – Dimensions



LH 60 C HR – Cab Elevation

Cab Elevation LHC (Hydraulic Elevation)

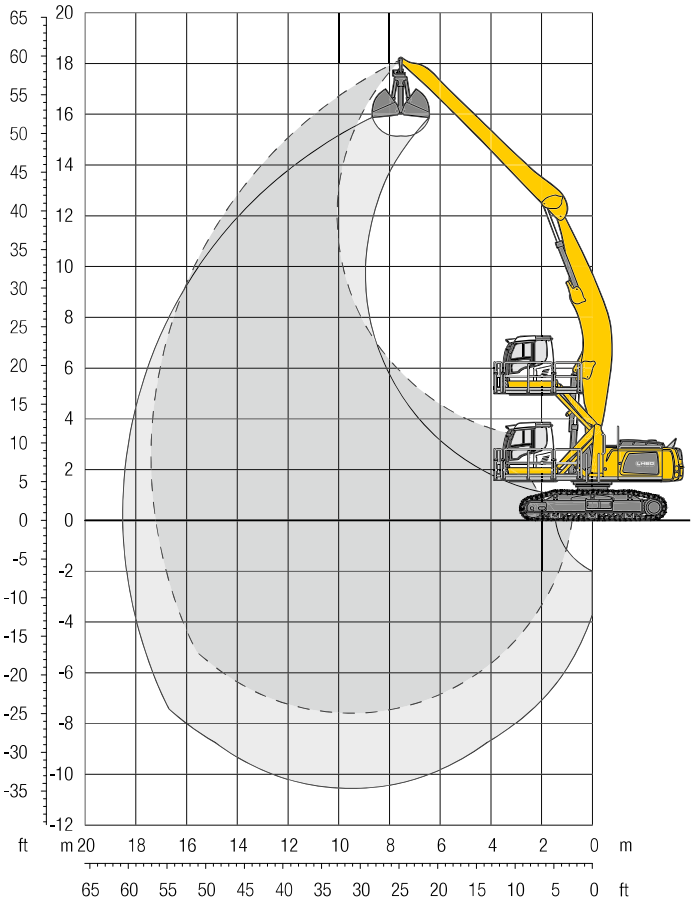


Increase type	LHC 340-35
B1	5,484 mm
B2	8,899 mm
C1	6,027 mm
C2	9,442 mm
D1	2,484 mm
D2	2,485 mm

The hydraulically adjustable cab allows the driver, that he can choose his field of view freely and at any time within the stroke.

LH 60 C EW – Attachment AG17

Industry – Kinematic 2D

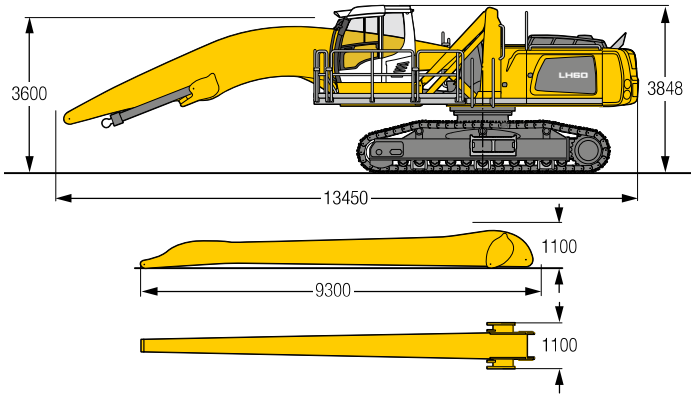


Operating Weight and Ground Pressure

The operating weight includes the basic machine with hydr. cab elevation, angled boom 9.50 m, straight stick 8.80 m and grab model GM 20C/1.50 m³ shells for loose material.

Weight	56,200 kg
Pad width	600 mm
Ground pressure	on request

Dimensions



m	Undercarriage	6.0 m		7.5 m		9.0 m		10.5 m		12.0 m		13.5 m		15.0 m		16.5 m				m
18.0	EW																	7.3*	7.3*	**7.9**
16.5	EW					8.0*	8.0*											6.3*	6.3*	**10.3**
15.0	EW							7.3*	7.3*	5.9*	5.9*							5.7*	5.7*	**12.1**
13.5	EW							7.1*	7.1*	6.6*	6.6*							5.4*	5.4*	**13.5**
12.0	EW							7.0*	7.0*	6.6*	6.6*	6.2*	6.2*					5.2*	5.2*	**14.6**
10.5	EW							7.1*	7.1*	6.6*	6.6*	6.2*	6.2*	5.9*	5.9*			5.1*	5.1*	**15.4**
9.0	EW							7.2*	7.2*	6.6*	6.6*	6.2*	6.2*	5.8*	5.8*			5.0*	5.0*	**16.1**
7.5	EW					8.2*	8.2*	7.4*	7.4*	6.8*	6.8*	6.3*	6.3*	5.9*	5.9*	5.2	5.4*	5.0*	5.0*	**16.7**
6.0	EW					8.6*	8.6*	7.7*	7.7*	7.0*	7.0*	6.4*	6.4*	6.0*	6.0*	5.1	5.6*	4.8	5.1*	**17.0**
4.5	EW	12.7*	12.7*	10.6*	10.6*	9.2*	9.2*	8.1*	8.1*	7.3*	7.3*	6.6*	6.6*	6.0	6.1*	5.0	5.7*	4.6	5.2*	**17.3**
3.0	EW	14.2*	14.2*	11.5*	11.5*	9.7*	9.7*	8.5*	8.5*	7.5*	7.5*	6.8*	6.8*	5.8	6.2*	4.9	5.7*	4.4	5.3*	**17.4**
1.5	EW	15.6*	15.6*	12.4*	12.4*	10.3*	10.3*	8.9*	8.9*	7.8*	7.8*	6.7	7.0*	5.6	6.3*	4.8	5.7	4.4	5.3	**17.3**
0	EW	16.8*	16.8*	13.1*	13.1*	10.8*	10.8*	9.2*	9.2*	7.7	8.1*	6.5	7.1*	5.5	6.4*	4.7	5.6	4.4	5.3	**17.2**
−1.5	EW	17.4*	17.4*	13.6*	13.6*	11.2*	11.2*	9.0	9.5*	7.4	8.2*	6.2	7.2*	5.3	6.4*	4.6	5.5	4.4	5.3*	**16.9**
−3.0	EW	15.9*	15.9*	13.8*	13.8*	10.7	11.3*	8.7	9.5*	7.2	8.2*	6.1	7.2*	5.2	6.2*			4.6	5.2*	**16.5**
−4.5	EW	15.2*	15.2*	13.5*	13.5*	10.4	11.1*	8.4	9.4*	7.0	8.0*	6.0	6.9*	5.2	5.8*			4.8	5.0*	**15.9**
−6.0	EW	15.4*	15.4*	12.6*	12.6*	10.3	10.5*	8.3	8.8*	6.9	7.4*	5.9	6.2*					5.3*	5.3*	**14.5**
−7.5	EW					9.2*	9.2*	7.7*	7.7*									7.6*	7.6*	**10.6**

Height **Can be slewed through 360°** **In longitudinal position of undercarriage** **Max. reach** *** Limited by hydr. capacity**

The lift capacities on the stick end without attachment are stated in metric tons (t) and can be slewed through 360° on a firm, level supporting surface. Capacities are valid for 600 mm wide triple grouser pads (resp. flat pads). Indicated loads based on the ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity. The lift capacity values indicated are attained at the corresponding operating temperature. This operating temperature is ensured by continuous movement of the boom. Weights of fitted working tools (grabs, load hooks, etc.) and load accommodation equipment are to be deducted from the lift capacity values. The lift capacity of the unit is limited by its stability, the lifting capability of the hydraulic elements, or the maximum permissible lifting capacity of the load hook.
In accordance with the harmonised European Standard EN 474-5, hydraulic excavators used for lifting operations must be equipped with pipe fracture safety valves, an overload warning device, a load hook and a lift capacity chart.

2 Safety warnings

2.1 Information on these instructions

2.1.1 Representation of warning messages

Warning symbol

	The warning symbol warns of potential dangers. Obey all measures marked with this symbol to avoid injury or death.

Tab. 3: Warning symbol

Grading of warning messages

The grading of warning messages is defined by following signal words:

DANGER
WARNING
CAUTION
NOTICE

Definition of warning levels

	**DANGER**	Indicates an immediately hazardous situation which, if not avoided, will result in death or serious injury.
	**WARNING**	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	**CAUTION**	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	NOTICE	Indicates a hazardous situation which, if not avoided, could result in property damage.

Tab. 4: Warning levels

2.1.2 Graphic symbols in these instructions

Symbol	Meaning
	**Note** Identifies useful information and tips.

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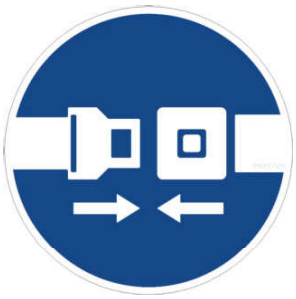
2.4 Signs on the machine

2.4.1 Warning signs

Note

- ▶ Make sure that all safety signs are in place on the machine and legible.
- ▶ Adhere to warning signs.

Sign	Description
	**Safety belt** Before putting machine into service, put on safety belt.
	**Safety glasses** Put on safety glasses before starting work.
	**Protective gloves** Put on protective gloves before starting work.
	**Protective mask** Put on protective mask before starting work.

Injuries

Objects in the operator's cab

– Remove objects that are not necessary for the work from the operator's cab.
– Stow and fasten objects that are necessary for the work before starting.
– Make sure that objects carried do not protrude into the operator’s workspace.

2.5.3 Height-adjustable operator's cab

Danger to life

Persons in the danger zone

– Make sure there are no persons in the danger zone under the operator's cab.
– Keep your distance from moving parts when the operator's cab is moving down.

Machine tipping

– On slopes, travel with lowered operator's cab.

Injuries

Falling from operator's cab

– Close cab door before raising and adjusting operator's cab.
– If operator's cab is raised: Make sure that cab door is closed.

Damage to operator's cab and machine

Collision with obstacles

– Make sure there are no obstacles in the range of movement of operator's cab.
– Exclusively adjust operator's cab when machine is at a standstill.
– Move operator's cab to upper park position before starting travel.
– Move slowly to end positions (upper or lower park position) using automatic mode.

2.5.4 Roll over protective structure (ROPS)

Danger to life

Damaged falling object protective structures

– Do not put machine into service with damaged falling object protective structures.
– Do not put machine into service with deformed falling object protective structures.
– Do not use falling object protective structures with structural changes.
– Do not use repaired falling object protective structures.
– Do not perform welding on falling object protective structures.
– Do not cut or saw falling object protective structures.
– Do not drill falling object protective structures.

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2.8 Safe work

2.8.1 Machines with height adjustable cab

Danger to life

Persons in the danger zone

- Make sure there are no persons in the danger zone under the operator's cab.
- If operator's cab is being lowered: Keep distance from moving parts.

Machine tipping

- On slopes, exclusively travel with lowered operator's cab.

Injuries

Falling out of operator's cab

- Make sure that the cab door is closed during adjustment of operator's cab.
- Make sure that cab door is closed when in raised state.

Damage

Collision

- Make sure there are no obstacles in the range of movement of operator's cab.
- Exclusively adjust operator's cab when machine is stationary.
- Move operator's cab to park position before starting travel.
- Slowly approach park positions in automatic mode.
- Maintain sufficient distance from machine.
- Adjust operator's cab with caution.
- Exclusively switch off collision check in an emergency.

2.9 Safe maintenance

2.9.1 Spare parts

Danger to life

Incorrect spare parts

- Use original spare parts.
- Make sure that the spare parts meet the technical requirements specified by the manufacturer.
- After replacing parts, tighten loosened screw connections with prescribed tightening torque.
- Find prescribed tightening torque in supplied documentation.

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Symbol	Meaning
	Air flow reversal blocked
	Refuelling active
	Hydraulic system emergency mode switched on
	Valves blocked
	Maintenance due
	Maintenance of working tool due
	Servo control inoperative
	Control changeover
	Control pressure too low
	Request denied
	Teleservice enabled
	Liebherr measuring system
	Socket on stick: Voltage 1
	Socket on stick: Voltage 2

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Symbol	Meaning
	Quick coupler is unlocked.
	Quick coupler 2 is unlocked.
	No working tool in locking position

Tab. 17: Status of quick coupler

Support

Symbol	Meaning
	Pontoon actuation active
	Outrigger movement
	Outrigger movement blocked
	Outrigger extension blocked
	Outrigger retraction blocked
	Support adjustment lever; neutral position required
	Outrigger support extended
	Support fully extended

Tab. 18: Support status symbols

3 *Increasing idling time until automatic engine stop* button

▶ Activate sensor-controlled low idle automatic: (For more information see: 3.4.14 Sensor-controlled low idle automatic, page 151)

▶ Activate automatic engine stop after idling: (For more information see: 3.4.15 Automatic engine shut-off after idling (option), page 151)

3.2.9 *System settings* menu

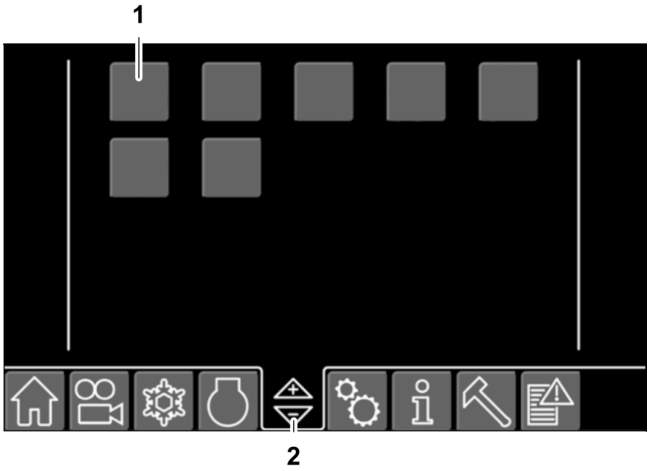

Fig. 243: System settings menu

1 Menu buttons **2** *System settings* menu

Quantity of menu buttons on the display depends on machine type and equipment.

Menu buttons	Description
	Operating hour meter and kilometre counter (For more information see: 3.2.10 *Operating hour meter and kilometre counter* submenu, page 88)
	Windscreen wiper interval (For more information see: 3.2.11 *Windscreen wiper interval* submenu, page 88)
	Radio remote control (For more information see: 3.2.12 *Radio remote control* submenu, page 89)
	Display settings (For more information see: 3.2.13 *Display settings* submenu, page 89)
	Regional settings and system parameters (For more information see: 3.2.17 *Regional settings and system parameters* submenu, page 91)

Tab. 24: System settings menu

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Menu buttons	Description
	Bleeding engine oil circuit Bleeding hydraulic circuit (For more information see: 3.2.36 *Bleeding hydraulic circuit* submenu, page 105)
	Contact pressure

Tab. 27: Function settings menu

3.2.26 *Central lubrication system* submenu (option)

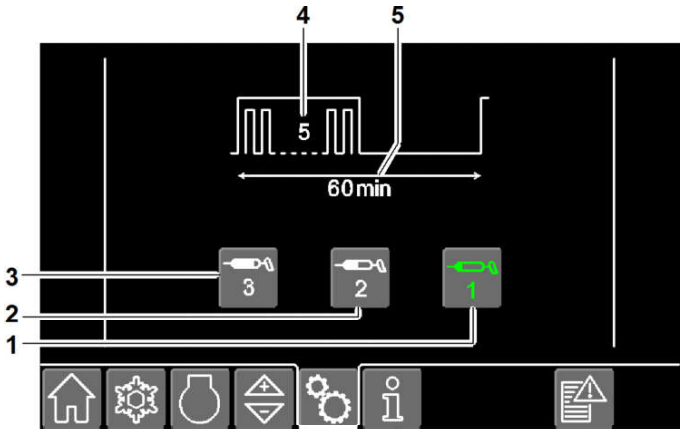

Fig. 289: Central lubrication system submenu

1 *Mode 1* button
2 *Mode 2* button
3 *Mode 3* button
4 Cycle rate of lubrication
5 Time period

If the central lubrication system is equipped with two lubricating pumps, the menu is shown in two columns.

Mode	Operating conditions	Lubrication
1	Light-duty operation	Low volume of grease
2	Medium-duty operation	Medium volume of grease
3	Heavy-duty operation	High volume of grease

Tab. 28: Lubricating modes

3.2.27 *Maintenance* submenu

The display of this submenu varies depending on machine configuration:

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3.2.38 *Operating time* submenu

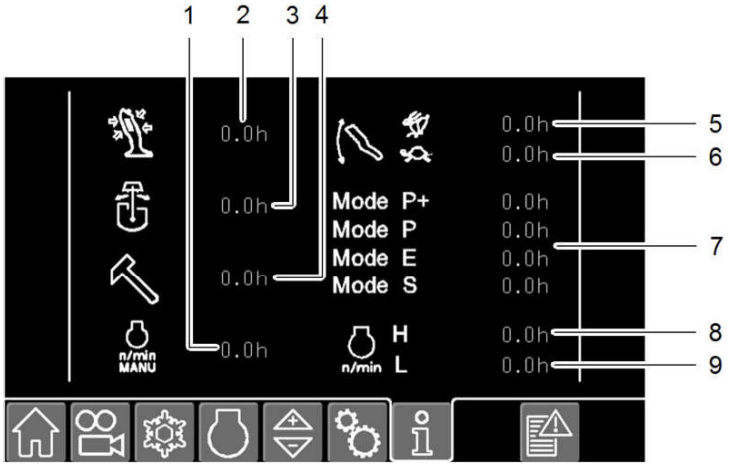

Fig. 321: Operating time submenu

1 No function assigned
2 Joysticks
3 Slewing gear
4 Working tool
5 Driving in high gear
6 Driving in creeper gear
7 Modes
8 Maximum engine speed
9 Minimum engine speed

3.2.39 *Fuel consumption* submenu

If machine is equipped with an SCR system, the *fuel consumption* menu additionally displays the values for the consumption of diesel exhaust fluid.

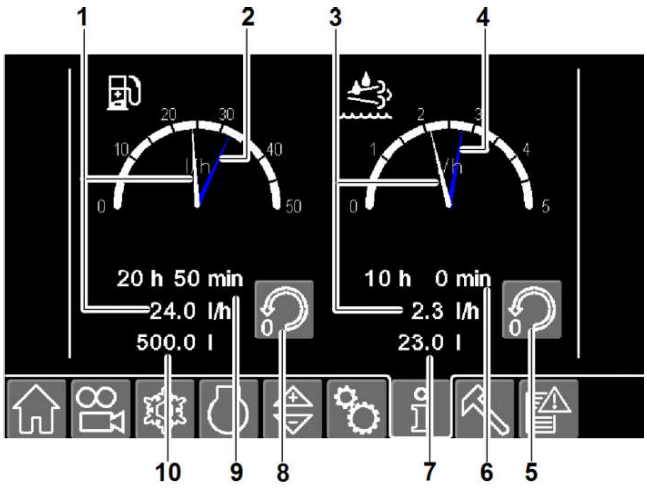

Fig. 322: Fuel consumption submenu

1 Average fuel consumption
2 Current fuel consumption
3 Average diesel exhaust fluid consumption
4 Current diesel exhaust fluid consumption
5 *Resetting counter* button
6 Measurement period
7 Consumed diesel exhaust fluid
8 *Resetting counter* button
9 Measurement period
10 Consumed fuel

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Adjusting seat position

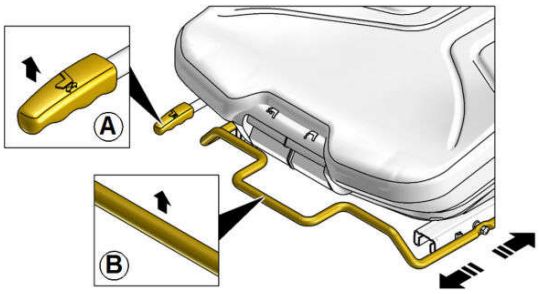

Fig. 342: Adjusting seat position

A Adjusting seat position without armrests

B Adjusting seat position with armrests

Adjusting armrests

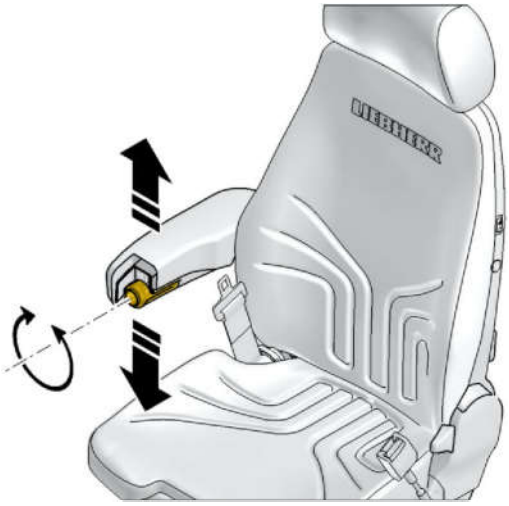

Fig. 343: Adjusting armrest angle

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NOTICE
Incorrect adjustment of operator's cab!
Damage to operator's cab and machine.

- ▶ Make sure there are no obstacles in the range of movement of operator's cab.
- ▶ Exclusively adjust operator's cab when machine is at a standstill.

Raising and lowering operator's cab

Note
Different machine configuration!

- ▶ Adhere to control description sticker. (For more information see: 2.4.3 Control description sticker, page 45)

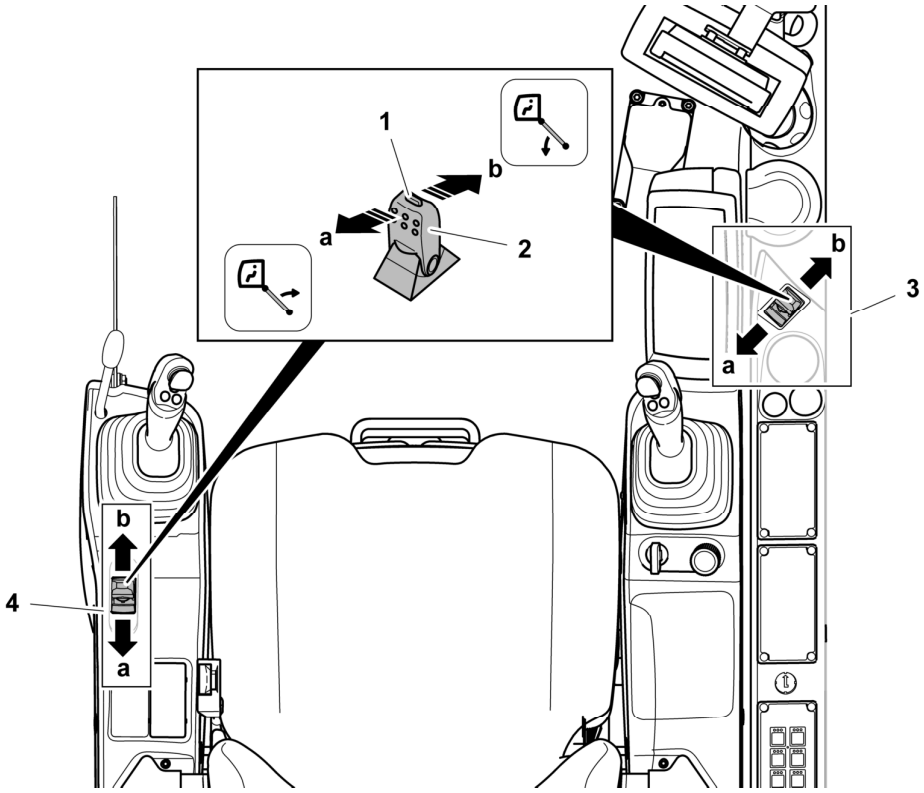

Fig. 373: Raising and lowering operator's cab

1	Unlocking button	**4**	Cab adjustment lever in left control console (control description sticker)
2	Cab adjustment lever	**a**	Raising operator's cab
3	Cab adjustment lever in right cab trim (control description sticker)	**b**	Lowering operator's cab

Raising operator's cab

- ▶ Press unlocking button **1**.
- ▶ Move cab adjustment lever **2** in direction **a**.

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3.3.22 Auxiliary heater (option)

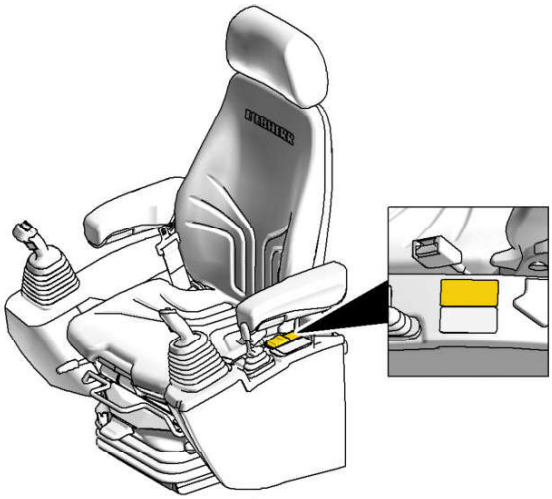

Fig. 412: Position of control module

Note

Activation of auxiliary heater prevents activation of air conditioning.

Activation of auxiliary heater initiates activation of heating system of operator's cab.

Note

Auxiliary heater improves starting of diesel engine.

Liebherr recommends switching on auxiliary heater at very low temperatures.

▶ You will find further information in the operator's manual of the supplier.

3.3.23 LiDAT (option)

LiDAT is a data transfer and tracking system for Liebherr machines and machines from other manufacturers.

Based on the latest data transfer technology, LiDAT provides tracking information as well as data about the operation of the machines. As a result, it permits efficient machine management, optimised application planning and remote monitoring.

LiDAT means that all important machine data can be viewed at any time. Depending on the subscription, data is updated several times a day and can be called up at any time using a web browser. It is also possible to call up particularly important information such as when the machine exits a predefined zone, or messages relating to certain operating statuses and application parameters.

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Enabling machine for starting

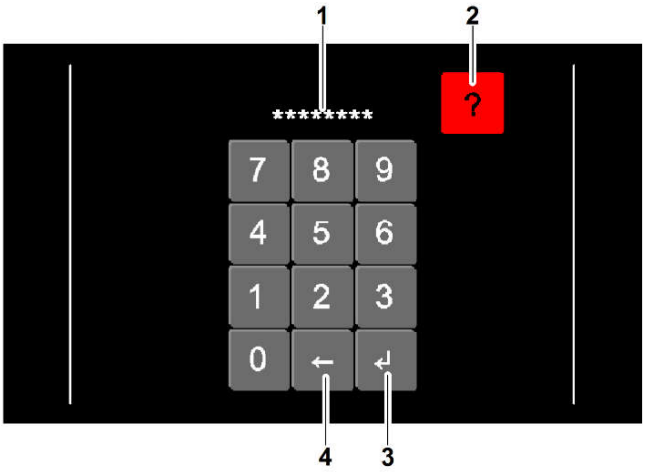

Fig. 423: Display keyboard for operator code

1	Display for operator code	**3**	*Accept* button
2	*Operator code incorrect* symbol	**4**	*Delete* button

Make sure the following preconditions are met:
- ❑ Battery main switch is switched on.
- ❑ Folding console is up.
- ❑ Ignition key is in position 1.

If no operator code has been programmed:
- ▶ Enter any 8-digit number via display keyboard.

If operator code has been programmed:
- ▶ Enter operator code via display keyboard.
  - ▷ Operator code is displayed as asterisks on display for operator code **1**.
- ▶ Confirm entry: Press *accept* button **3**.

If operator code was entered incorrectly:
- ▶ Enter operator code again.
  - ▷ Operator code is displayed as asterisks on display for operator code **1**.
- ▶ Confirm entry: Press *accept* button **3**.
  - ▷ *Operator code incorrect* symbol **2** disappears:

3.4.10 Starting diesel engine

NOTICE
Insufficient oxygen content!
Damage to diesel engine.

If machine is being operated above 2000 m:
- ▶ Contact Liebherr customer service before starting the diesel engine.

Make sure the following preconditions are met:
- ❑ Battery main switch is set to **I**.

3.4.20 Turning and braking uppercarriage

Turning uppercarriage

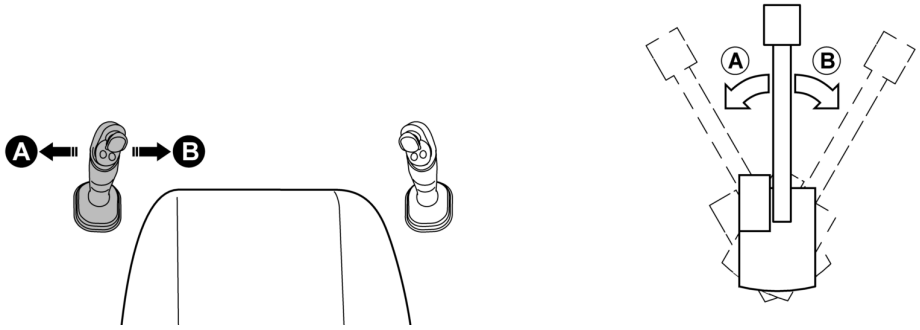

Fig. 453: Turning uppercarriage

Make sure the following preconditions are met:
❑ Slewing brake is released.

▶ Move joystick in direction **A**.
▷ Uppercarriage turns to the left.

▶ Move joystick in direction **B**.
▷ Uppercarriage turns to the right.

Braking uppercarriage

▶ Release joystick.
▷ Uppercarriage is braked hydraulically.

▶ Move joystick in opposite direction.
▷ Uppercarriage is braked hydraulically to maximum extent.

3.4.21 Slewing brake

Key	Status of LEDs	Slewing brake
	LEDs light up ☀☀☀	Applied
	LEDs do not light up ○○○	Released
	Two LEDs flash ☀☀○	Slewing brake is applied as soon as uppercarriage is stationary.

Tab. 43: Status of slewing brake

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Controlling working tool

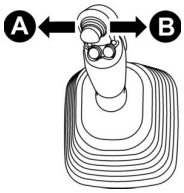

Fig. 485: Controlling working tool with mini-joystick

▶ Move right mini-joystick **1** in direction **A** or **B**.

3.4.29 Grapple priority (option)

For reduced grapple priority adhere to following points:
– Control limits hydraulic pressure of grapple.
– Closing force of grapple is reduced.
– Hydraulic system has sufficient oil flow for fast and smooth working attachment movements.

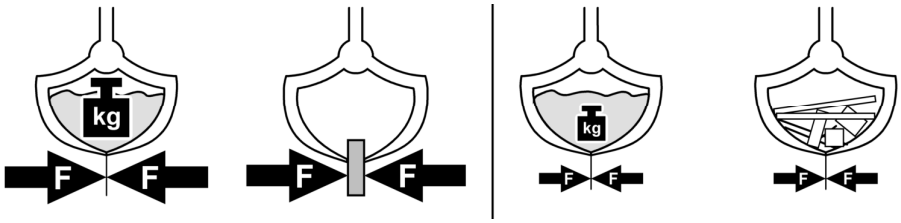

Fig. 486: Differently powerful closing forces for loads of different weights

WARNING
Falling load!
Danger to life.

▶ Make sure there are no persons in danger zone

▶ Deactivate grapple priority before picking up heavy loads.

Key	Status of LEDs	Function
	○ ○ ○	Grapple priority: Suitable for loads that require a significant closing force from the grapple. Working attachment movements are slower.
	✹ ✹ ✹	Reduced grapple priority: Suitable for loads that require a low closing force from the grapple. Working attachment movements remain fast and smooth.

Tab. 44: Grapple priority key

Make sure the following preconditions are met:
❑ Grapple is selected in *Tool Control* menu.
❑ *Grapple* status symbol appears on the display.

Switching off hoist cylinder shut-off

- ▶ Press *function settings* menu button.
- ▶ *Hoist cylinder shut-off* menu button.

- ▶ Press *hoist cylinder shut-off* button **1**.
  - ▷ *Confirmation required* status symbol appears on the display:

- ▶ Press confirmation button within 5 seconds.
  - ▷ *Hoist cylinder shut-off* button lights up white:

Setting hoist cylinder shut-off

DANGER
Swinging working tool!
Danger to life.

- ▶ Set shut-off points with adequate safe distance (swinging working tool, long stopping distance for working attachment).

Teaching in upper shut-off point

If hoist cylinder shut-off is switched on, new shut-off points are exclusively possible within approved movement range.

- ▶ Put machine in working position.

If machine is equipped with 4-point support:
- ▶ Extend support.

If the machine is equipped with 2-point support or a support blade:
- ▶ Extend support and move working attachment over support.
- ▶ Move boom up to required maximum working height.

- ▶ Press *upper shut-off point* button **3**.
  - ▷ *Confirmation required* status symbol appears on the display:

- ▶ Press confirmation button within 5 seconds.
  - ▷ Upper shut-off point is saved.

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Scale	Status symbol	Meaning
Font of current height of working attachment **2** is red. Arrow is at set limit value.		Movement of working attachment has stopped. Exclusively movement into safe area possible.
Font of current height of working attachment **2** is red. Arrow is in red area of scale.		Height limitation is bypassed.

Tab. 51: Height limitation function

DANGER
Collision between working attachment and obstacles!
Danger to life.

- ▶ Move working attachment slowly.

- ▶ Make sure that limit values are set correctly: Check height limitation. (For more information see: Checking height limitation, page 188)

Bypassing height limitation

It is possible to bypass the height limitation temporarily. After 10 seconds, the working attachment can exclusively be moved downward.

DANGER
Collision between working attachment and obstacles!
Danger to life.

- ▶ Bypass height limitation exclusively in exceptional cases.
- ▶ Carefully move working attachment.

- ▶ Press *bypassing height limitation* key.
- ▶ Press confirmation button.
  - ▷ *Height limitation bypassed* status symbol appears on the display:

  - ▷ Height limitation is bypassed for 10 seconds.
  - ▷ Intermittent warning sound sounds.

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Troubleshooting
Depth limitation not enabled?
If confirmation button is not pressed within 5 seconds, depth limitation is not enabled.

▶ Enable depth limitation again.

▶ Turn key to left.

▶ Pull out key.

▶ Hand over key to supervisor.

If depth limitation is to be locked:
▶ Turn key to left.

▶ Pull out key.
▷ *Depth limitation* button is not active:

▷ *Minimum working height* button is not active:

▶ Hand over key to supervisor.

Teaching in lower shut-off point

Make sure the following preconditions are met:
❑ Machine is in working position.

▶ Switch on depth limitation. (For more information see: Switching on depth limitation, page 192)

If new bottom shut-off point is lower than previously set shut-off point:
▶ Bypass depth limitation. (For more information see: Bypassing depth limitation, page 200)

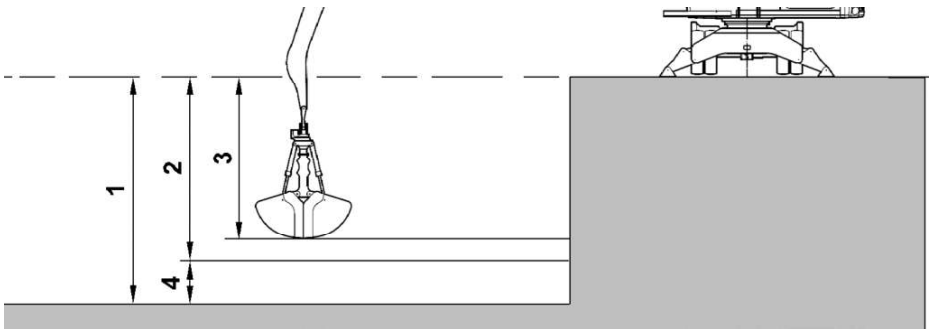

Fig. 615: Teaching in lower shut-off point

1	Restricting depth	**3**	Bottom shut-off point
2	Minimum working height	**4**	Prescribed safe distance

▶ Move working attachment up to bottom shut-off point **3**.

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- ▶ Move key switch to 1.
- ▶ Switch on load moment limitation. (For more information see: Switching on load moment limitation, page 202)
- ▶ Move key switch to 0.
- ▶ Pull out key.
  - ▷ *Load moment limitation* button on display lights up green and is deactivated:

  - ▷ LEDs in *load moment limitation* key on control unit A light up:

- ▶ Hand over key to supervisor.

Enabling load moment limitation for operator

With load moment limitation enabled, it is possible for the operator to switch load moment limitation on and off.

Make sure the following preconditions are met:
- ❑ Supervisor is present with authorisation key.

- ▶ Move key switch to 1.
- ▶ Switch off load moment limitation. (For more information see: Switching off load moment limitation, page 205)
- ▶ Move key switch to 0.
- ▶ Pull out key.
  - ▷ *Load moment limitation* button on display lights up white and is active:

  - ▷ LEDs in *load moment limitation* key on control unit A go out.
- ▶ Hand over key to supervisor.

Bypassing load moment limitation

DANGER
Machine tipping over!
Danger to life.

- ▶ Exclusively bypass load moment limitation as an exception.
- ▶ Carefully move working attachment.

- ▶ Press *bypassing load moment limitation* key.
  - ▷ *Confirmation required* status symbol appears on the display:

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3.7.3 Installing and removing boom

DANGER
Machine tipping over!
Danger to life.

▶ Make sure that uppercarriage is aligned parallel to undercarriage.

If boom is removed:
▶ Do not turn uppercarriage.

▶ Contact Liebherr customer service.

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Symbol	Meaning	Effect, characteristic	Remedy
	Control circuit of hydraulic system is depressurised.	Control of working attachment and uppercarriage is not possible.	Shut off diesel engine and restart. If symbol is still displayed: Contact Liebherr customer service.
	A general control error has occurred.	Functionality is restricted. Machine is damaged.	Shut off diesel engine. Contact Liebherr customer service.
	Software parameters missing after software update.	Diesel engine does not start.	Contact Liebherr customer service.
	Machine and attachment parameters do not match.	Diesel engine output is reduced automatically.	Contact Liebherr customer service.
	Prewarning: Diesel particulate filter is heavily contaminated.		Start manual filter regeneration.
	Diesel particulate filter is excessively contaminated.	Diesel engine output is reduced automatically.	Contact Liebherr customer service.
	Prewarning: DPF: Diesel exhaust fluid level is low.		Fill with diesel exhaust fluid.
	DPF: Diesel exhaust fluid level is too low.	Diesel engine output is reduced automatically.	Fill with diesel exhaust fluid.
	SCR: Diesel exhaust fluid level is too low.	Diesel engine output is reduced automatically.	Fill with diesel exhaust fluid.
	Malfunction of oscillating axle.	Machine stability is at risk.	Shut off diesel engine. Contact Liebherr customer service.
	Oil temperature of pump distributor gear is too high.	Pump distributor gear is damaged.	Shut off diesel engine. Reduce load. Clean hydraulic oil cooler. If symbol is still displayed: Contact Liebherr customer service.

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Fuse	Consumer	Rating [A]
F15	Supply voltage: B314 angular transmitter slip ring transmitter signal 2, B315 angle sensor swivel arm signal 1, B316 angle sensor boom signal 1, B317 angle sensor stick signal 1, B347 bucket cylinder lift or stick, B372 height-adjustable operator's cab down, B373 height-adjustable operator's cab up, socket monitoring	5
F16	Supply voltage: B1 tank sensor, B8 sensor hydraulic oil temperature, B14 sensor hydraulic oil level, B26 quick coupler proximity switch 1, B44 pressure switch air conditioning condenser, B53 speed sensor slewing gear, B314 angle sensor slip ring transmitter signal 1, B315 angle sensor swivel arm signal 2, B316 angle sensor boom signal 2, B317 angle sensor stick signal 2, B318 pressure sensor hoist cylinder, left, B319 pressure sensor hoist cylinder, right, B335 servo pressure slewing gear, B378 quick coupler proximity switch 2, B379 pressure sensor system pressure, pressure sensor hoist cylinder, reserve, cycle lubrication system	5
F17	Not occupied	15
F18	Not occupied	
F19	Fuel pre-heating	25
F20	Not occupied	

Tab. 57: Fuse strip A214.XF4

Fuse	Consumer	Rating [A]
F1	Not occupied	
F2	Not occupied	
F3	Operator's cab, terminal 15	50
F4	Heater flange	100
F5	Terminal 15	100
F6	Terminal 30	50
F7	Operator's cab, terminal 30	100

Tab. 58: Fuse strip A214.XF5

Relay	Consumer
K1	Terminal 15, safety lever or folding console
K2	Working headlight of working attachment
K3	Auxiliary heater
K4	Not used
K5	Step lighting
K6	Not used
K11	Counterweight working headlight
K12	Horn

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Customer:.....Machine type:.....Serial no.:.....Operating hours:.....Date:.....

Maintenance / inspection after service hours								Tasks to be performed		
On handover	All 8-10 h	All 50 h	All 500 h	All 1000 h	All 2000 h	Other intervals	Additional labelling	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** ☐ Once-only activity ❍ Repeat interval ✧ If necessary **Additional labelling** Assistance required Have this task carried out exclusively by a certified electrician	Confirm tasks	See page
						✧		**For machines with stage III-A or Tier 3:** Diesel engine: Change oil. (at least once a year) (For more information see: Difficulty factors, page 257)		
						✧		Diesel engine: Replace oil filter. (at least during every engine oil change)		
						✧		Diesel engine: Replace oil separator filter cartridge. (at least during every engine oil change)		
			❍	❍	❍			Diesel engine: Check belt drive.		
						❍5000h		Diesel engine: Replace belt.		
			☐	❍	❍			Diesel engine: Check intake system and exhaust system for condition, mounting and tightness.		
				❍	❍			Diesel engine: Check pump distributor gear, oil pan and engine bearing for firm seat.		
						❍4000h		Diesel engine: Check and adjust valve play.		
			❍	❍	❍			Diesel engine: Check heater flange.		
						❍10000h		Diesel engine: Replace heater flange.		
	●	●	❍	❍	❍	✦		Fuel pre-filter: Drain water.		278
		●	❍	❍	❍			Fuel tank: Drain water and sediments.		278
			❍	❍	❍			Fuel system and lubrication system: Check condition and tightness.		
				❍	❍	✧		Fuel pre-filter: Replace filter cartridge.		
				❍	❍	✧		Fuel fine filter: Replace filter element.		
						✧		Bleed fuel system.		
☐			❍	❍	❍			Fuel tank: Check mounting.		
			❍	❍	❍	✧		Air filter: Check contamination level.		
		●	❍	❍	❍	✦		Air filter: Empty dust collecting tank.		280
						✦		Air filter: Replacing main filter cartridge (when service indication appears/once a year).		281
						✦		Air filter: Replacing safety filter cartridge (on every third renewal of the main filter cartridge / every year).		283
						✦		Air filter and air lines: Checking tightness and condition.		284
		●	❍	❍	❍			Pump distributor gear: Check oil level.		286
			❍	❍	❍			Pump distributor gear: Change oil.		

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Description
Liebherr Motoroil 5W-30 low ash [35]

Tab. 70: Liebherr recommendation

Other approved engine oils[36]

Description
Liebherr Motoroil 10W-40
Liebherr Motoroil 10W-40 low ash [35]

Tab. 71: Other approved engine oils

Minimum quality requirements

Specification
LH-00–ENG3A
LH-00–ENG3A LA[35]

Tab. 72: Minimum quality requirements

If engine oils from other manufacturers are used, information on change intervals must be obtained from respective manufacturer or supplier.

Difficulty factors

Difficulty factors have influence on the change interval of engine oil.

Adapt change interval of engine oil.

Difficulty factors are:
- Frequent cold starts
- Sulphur content in fuel
- Environmental influences
  - Operating temperature
  - Dust
  - High humidity

The sulphur content in the fuel determines the change interval in dependence on the quality of the engine oil.

Sulphur content of fuel	LH-00ENG3A LH-00ENG3A LA[35]	Liebherr Motoroil 10W-40 Liebherr Motoroil 10W-40 low ash [35]	Liebherr Motoroil 5W-30 Liebherr Motoroil 5W-30 low ash [35]
Up to 15 ppm	500 h	1000 h	2000 h
15 ppm to 300 ppm	500 h	1000 h	1000 h

[35] For machines with diesel particulate filter use low ash engine oil.
[36] Adhere to change interval.

5.4.2 Access points under the uppercarriage

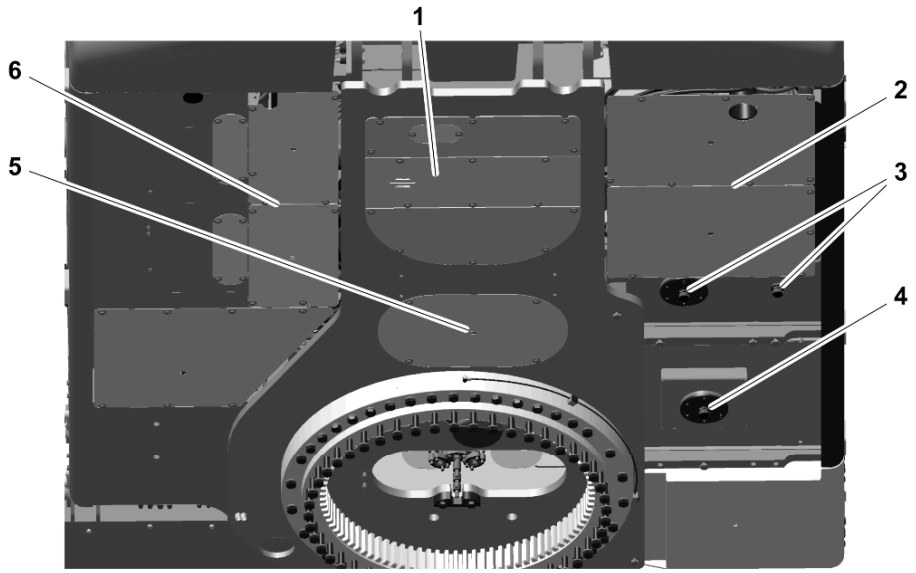

Fig. 763: Access points under the uppercarriage

No.	Access to
1	Engine oil discharge
2	Pump distributor gear discharge
3	Hydraulic tank discharge
4	Fuel tank discharge
5	Slewing gearbox discharge
6	Coolant discharge

Tab. 94: Access points under the uppercarriage

5.4.3 Access points on the undercarriage

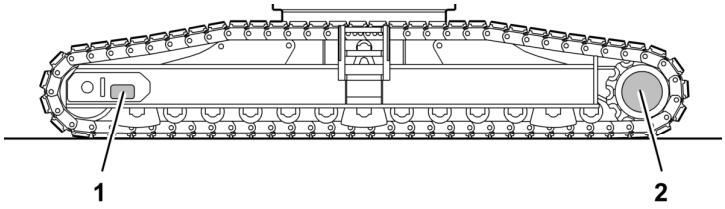

Fig. 764: Access points on the undercarriage

1 Track tensioner **2** Travel gear

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- ▶ Insert dipstick **1** fully.
- ▶ Pull out dipstick **1** again.
- ▶ Check that oil level is between **min** mark and **max** mark on dipstick **1**.

NOTICE
Incorrect mixture of engine oils!
Damage to diesel engine.

- ▶ Do not mix engine oils.

NOTICE
Unsuitable engine oil!
Damage to diesel engine.

- ▶ Exclusively use engine oil in approved quality.

If oil level is below **min** mark:

- ▶ Unlock oil fill cap.
- ▶ Remove oil fill cap.
- ▶ Fill oil through oil fill pipe **2** until **max** mark is reached.
- ▶ Clean oil fill cap with clean lint-free cloth.
- ▶ Put oil fill cap on oil fill pipe **2**.
- ▶ Lock oil fill cap.

5.8.3 Diesel engine: Checking condition, tightness and cleanliness

- ▶ Make a visual inspection to check diesel engine for leaks.
- ▶ Check fittings, motor head, oil pan, housing and diesel engine mounts for damage.
- ▶ Perform visual check of fittings, sealing points on engine head, oil pan, housing, etc. for oil leaks.
- ▶ Check whole diesel engine for excessive contamination.
- ▶ Make a visual inspection to check lines and hoses for leaks.
- ▶ Check lines and hoses for damage and that they are laid in an abrasion-free manner and they are mounted in accordance with regulations.

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NOTICE
Incorrect mixture of gear oils!
Damage to gearbox.

▶ Do not mix gear oils.

NOTICE
Unsuitable gear oil!
Damage to gearbox.

▶ Exclusively use gear oil in approved quality.

If oil level is below **min** mark:
▶ Fill with oil until **max** mark is reached.

▶ Screw in dipstick **1**.

5.8.11 Diesel particulate filter: Activating and deactivating regeneration

Operating condition of diesel particulate filter

Following symbols and menus indicate the operating condition of the diesel particulate filter on the display:
– *Start page* menu
– *Diesel particulate filter* menu
– Bar chart display
– Status symbols
– Warning symbols

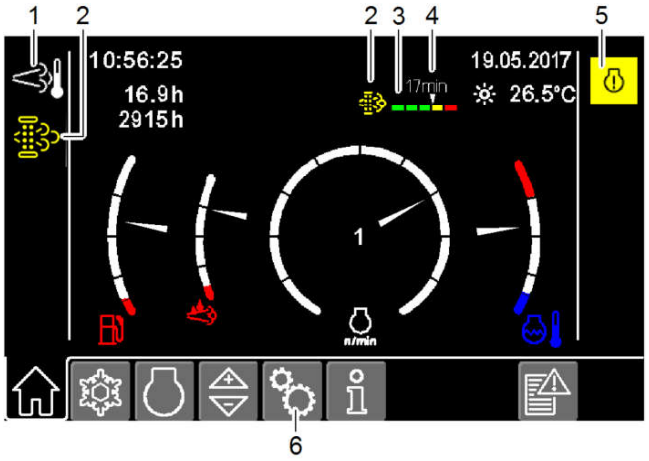

Fig. 773: Start page menu

1 *Increased exhaust temperature* status symbol
2 *Diesel particulate filter contaminated* status symbol
3 Contamination level of diesel particulate filter
4 Remaining filter regeneration time
5 *Prewarning: Control error of diesel engine* warning symbol
6 *Function settings* menu

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5.10 Working hydraulics

5.10.1 Depressurising hydraulic system

Depressurising hydraulic hoses

Make sure the following preconditions are met:
❑ Ignition key is in position 1.

▶ Lower working attachment to the ground.

▶ Shut off diesel engine or electric motor immediately.

▶ Move folding console downwards.

▶ Operate joysticks and pedals carefully in all directions.
▷ Hydraulic lines are depressurised.

Depressurising hydraulic tank

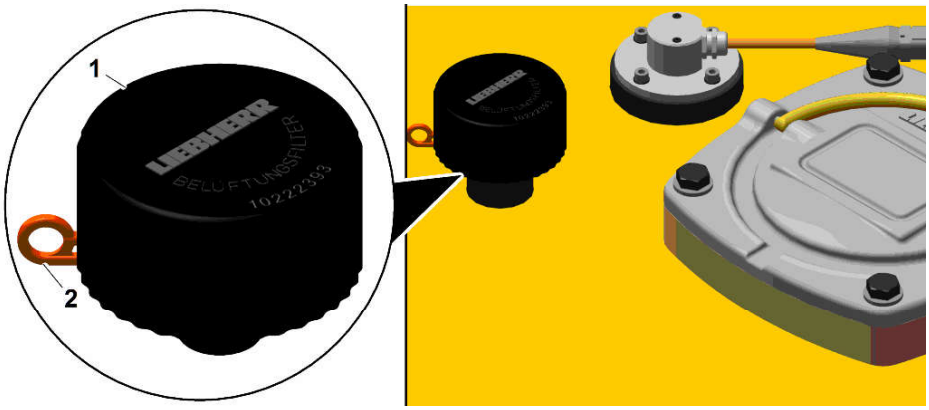

Fig. 805: Depressurising hydraulic tank

1 Breather filter **2** Securing pin

▶ Insert securing pin **2**.

▶ Unscrew breather filter **1** by hand by a maximum of one turn. Use open-end spanner if necessary.
▷ Hydraulic tank is depressurised.

When maintenance tasks on hydraulic system are complete:
▶ Screw in breather filter **1**.

▶ Pull out securing pin **2** (theft prevention).

5.10.2 Hydraulic tank: Checking oil level

Checking hydraulic oil level

The hydraulic oil level depends on the hydraulic oil temperature.

Make sure the following preconditions are met:
– Machine is parked on level ground.

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5.12.2 Tightening track

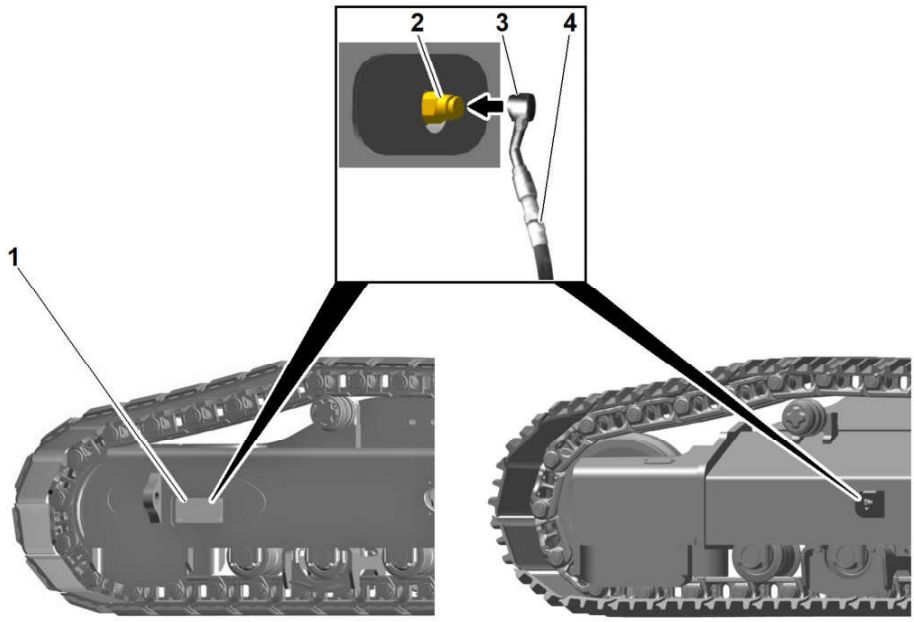

Fig. 814: Tightening track

1	Cover (type dependent)	**3**	Grease fitting adapter
2	Grease fitting	**4**	Grease gun hose

Make sure the following preconditions are met:
- ❑ Machine is parked on level and firm ground.
- ❑ Machine is secured against rolling away.

▶ Clean track.

▶ Remove objects jammed in track.

If cover **1** is installed:

▶ Remove cover **1**.

▶ Clean grease fitting **2**.

▶ Connect supplied grease fitting adapter **3** to grease gun hose **4**.

▶ Connect grease fitting adapter **3** to grease fitting **2**.

▶ Inject grease until track tension corresponds to specifications. (For more information see: 5.12.1 Checking track tension, page 306)

▶ Attach cover **1**.

Troubleshooting

Track tension is not increasing?

Grease fitting or tensioning unit is damaged.

▶ Replace grease fitting and tensioning unit. For procedure see service manual under chapter 130.

If service manual cannot be accessed:

▶ Have repairs performed by Liebherr customer service.

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5.14.3 Auxiliary heater (option): Checking function

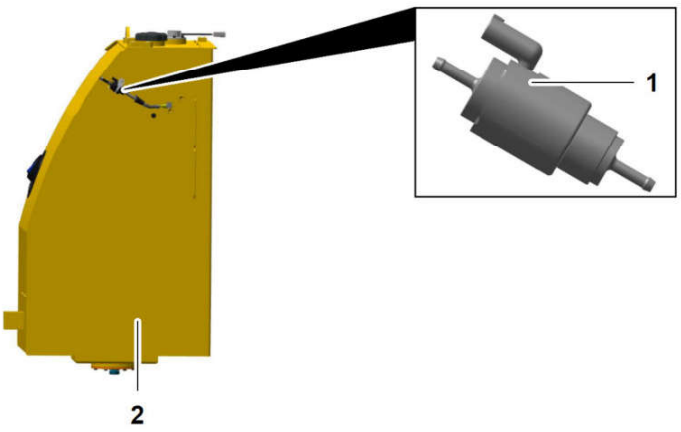

Fig. 826: Checking auxiliary heater

1 Fuel filter **2** Fuel tank

- ▶ Put auxiliary heater into service according specifications in manufacturer's manual.
- ▶ Check heating air flow for sufficient air outlet output.
- ▶ Repair auxiliary heater. For procedure, refer to component documentation.

If component documentation cannot be accessed:

- ▶ Have repairs performed by Liebherr customer service.
- ▶ Clean fuel filter **1** if necessary.

5.14.4 Switching on air conditioning unit

NOTICE
Downtime too long!
Damage to air conditioning unit.

- ▶ Switch on air conditioning unit in winter too.

- ▶ Make sure diesel engine or electric motor is running.
- ▶ Activate AUTO operating mode.
- ▶ Wait 15 minutes.
- ▶ Deactivate AUTO operating mode.

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