en **Operator's manual**

Machine for Industrial Applications

Document ID

ORIGINAL OPERATOR'S MANUAL

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From Serial no.: 111369

Conformity: CE

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1.1.3 Undercarriage

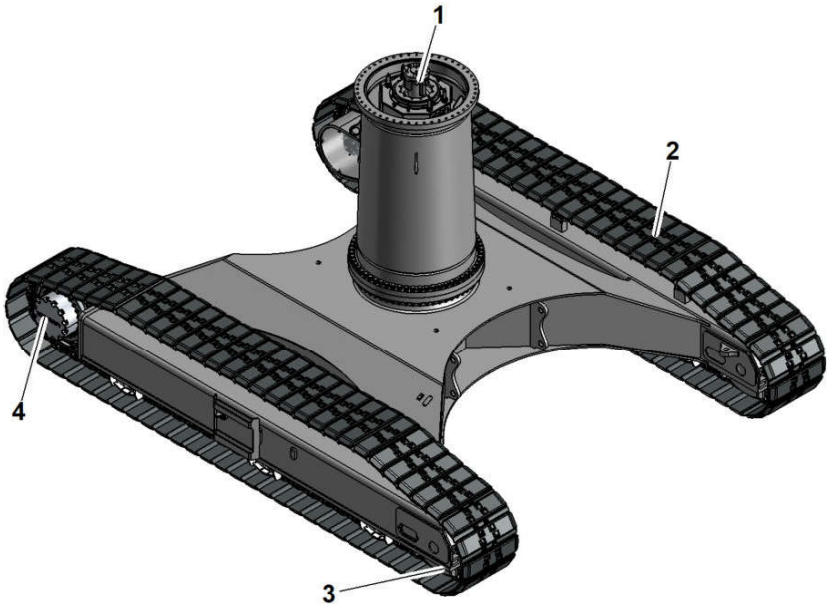

Fig. 4: Undercarriage

1	Rotary connection	**3**	Idler-wheel
2	Track	**4**	Travel gearbox with sprocket wheel

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Fuel Efficiency

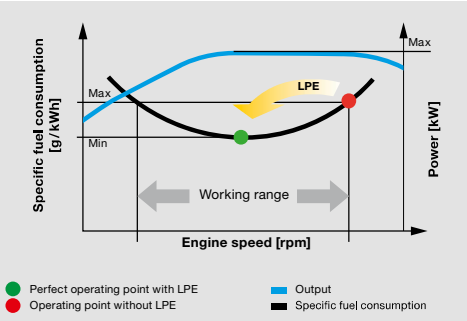
Engine Idling and Engine Shut-down
The standard automatic idling function reduces the engine speed to idle as soon as the operator takes his hand from the joystick so that no hydraulic function is activated. Proximity sensors in the joystick levers restore the original engine speed as soon as the operator's hand is moved towards the lever again. This ensures that the set engine speed is available immediately. The result is a combination of fuel saving and reduced noise levels. Operating costs can be reduced even further with the optional automatic engine shut-down function.

Closed Hydraulic Circuit for the Swing Mechanism
The closed slewing circuit feeds the braking energy back into the system when the uppercarriage is braked. Here, new standards are set in terms of efficiency and economy. Simple yet effective.

Increased Productivity

Energy Recovery System ERC
The ERC system not only brings about an enormous increase in performance and a higher handling capacity, but it also generates fuel savings of up to 30 %, lower operating costs, as well as reduced pollutant and noise emissions.

Efficient Management
LiDAT, Liebherr's own data transmission and positioning system, facilitates efficient management, monitoring and control of the entire fleet park in terms of machinery data recording, data analysis, fleet park management and service. All of the important machinery data can be viewed at any time in a web browser. LiDAT offers you comprehensive work deployment documentation, greater availability thanks to shorter downtimes, faster support from the manufacturer, quicker detection of strain / overload and subsequently a longer service life of the machine as well as greater planning efficiency in your company. This service includes 1 year of use without charge as standard for the material handlers LH 40 and LH 50.

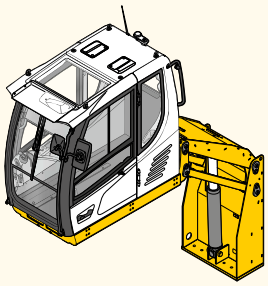


Low Fuel Consumption Thanks to Intelligent Machine Control
- Liebherr-Power Efficiency (LPE) optimises the interaction of the drive components in terms of efficiency
- LPE enables machine operation in the area of the lowest specific fuel use for less consumption and greater efficiency with the same performance

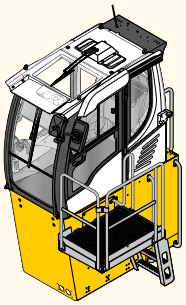
Liebherr-Working Tools
- Robust and service-friendly slewing drive, can be turned 360°
- Optimum filling and clamping performance for effective material handling
- Finite element method (FEM) optimised for a perfect relationship between grapple weight, volume and a very long service life

ERC System
- Increased total power
- Higher handling capacity
- Fuel savings of up to 30 %
- Lower running costs
- Reduced pollutant and noise emissions

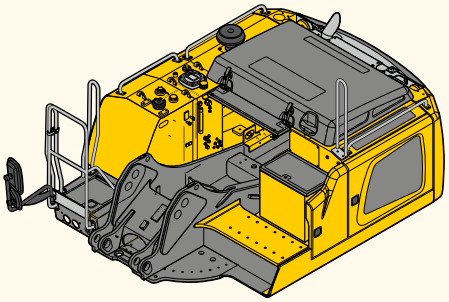
Cab Elevations



Hydraulic cab elevation

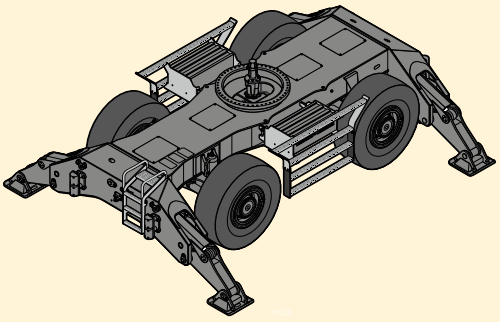


Rigid cab elevation

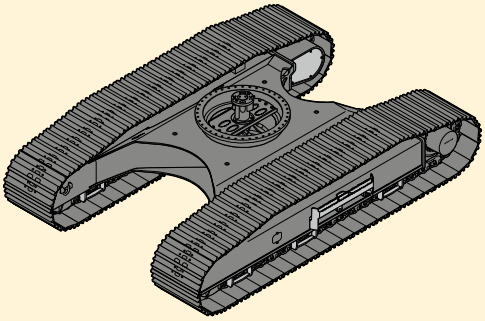


Uppercarriage

Turret Elevations



Mobile

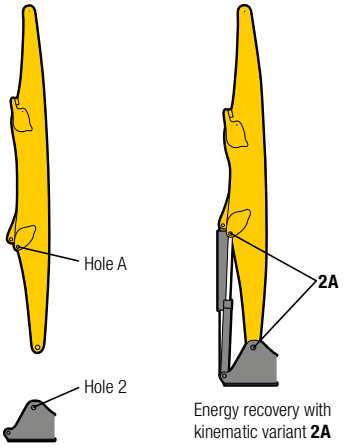


Crawler

Undercarriage

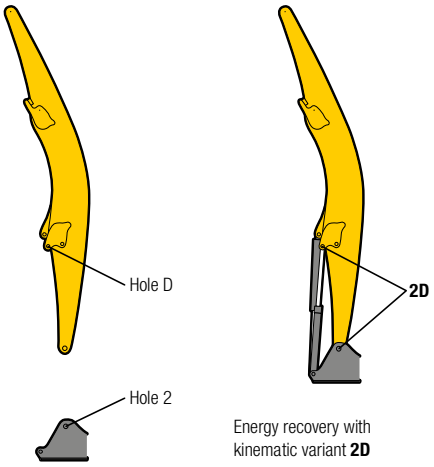
Kinematic Variants

Kinematic Variant 2A

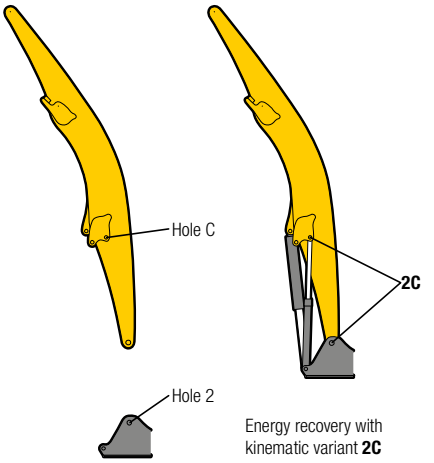


Energy recovery with kinematic variant **2A**

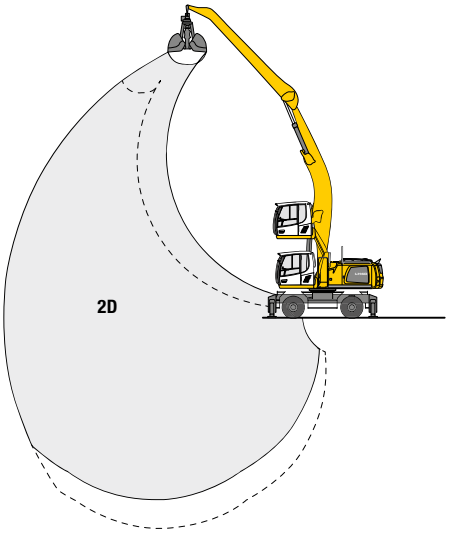
Kinematic Variant 2D / 2C

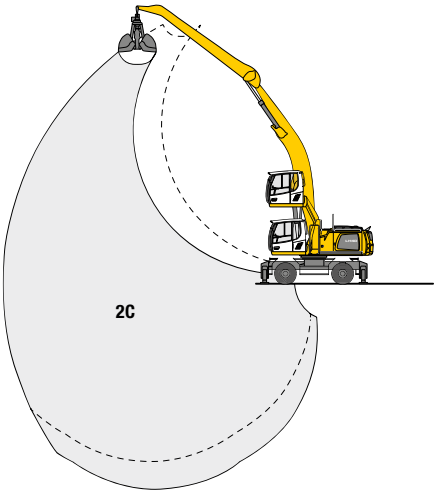


Energy recovery with kinematic variant **2D**



Energy recovery with kinematic variant **2C**

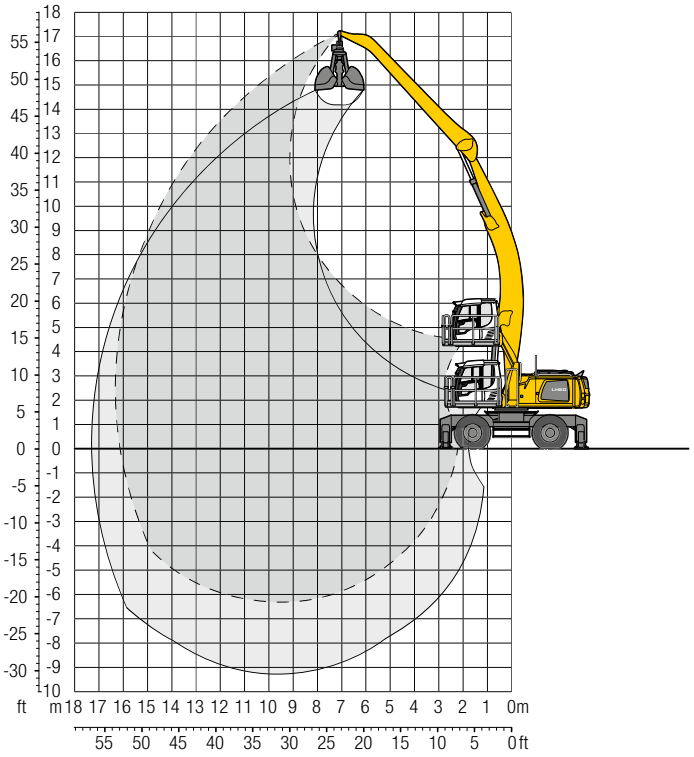




Altered range curve with additional reach depth, e.g. for unloading from ships

LH 50 M – Attachment AF16

Industry – Kinematic 2D

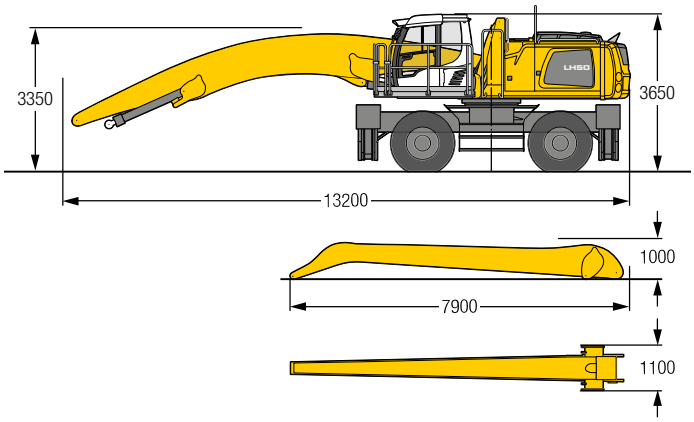


Operating Weight

The operating weight includes the basic machine with 4 point outriggers, hydr. cab elevation, 4 solid tyres, angled boom 9.60 m, flat angled stick 7.50 m and grab model GM 20C/ 1.50 m³ shells for loose material.

Weight	44,500 kg

Dimensions



m	Undercarriage	4.5 m		6.0 m		7.5 m		9.0 m		10.5 m		12.0 m		13.5 m		15.0 m		16.5 m		18.0 m				m
18.0	Stabilizers raised																							
	4 pt. outriggers down																					4.8*	4.8*	8.2
16.5	Stabilizers raised																					4.8*	4.8*	
	4 pt. outriggers down							5.7*	5.7*													4.3*	4.3*	10.4
15.0	Stabilizers raised							5.7*	5.7*													4.3*	4.3*	
	4 pt. outriggers down							6.0*	6.0*	5.1	5.5*											3.9	4.0*	12.0
13.5	Stabilizers raised							6.0*	6.0*	5.5*	5.5*											4.0*	4.0*	
	4 pt. outriggers down									5.2	5.4*	4.0	5.0*									3.2	3.8*	13.2
12.0	Stabilizers raised									5.4*	5.4*	5.0*	5.0*									3.8*	3.8*	
	4 pt. outriggers down							6.0*	6.0*	5.1	5.4*	4.0	5.0*	3.1	4.0							2.7	3.6	14.1
10.5	Stabilizers raised							6.0*	6.0*	5.4*	5.4*	5.0*	5.0*	4.7*	4.7*							3.7*	3.7*	
	4 pt. outriggers down							6.1*	6.1*	5.0	5.5*	3.9	5.0	3.0	4.0							2.4	3.2	14.9
9.0	Stabilizers raised							6.1*	6.1*	5.5*	5.5*	5.0*	5.0*	4.7*	4.7*							3.7*	3.7*	
	4 pt. outriggers down							6.3	6.4*	4.8	5.7*	3.8	4.9	3.0	3.9	2.3	3.2					2.2	2.9	15.5
7.5	Stabilizers raised							6.4*	6.4*	5.7*	5.7*	5.1*	5.1*	4.7*	4.7*	4.4*	4.4*					3.7*	3.7*	
	4 pt. outriggers down					7.7*	7.7*	5.9	6.6*	4.6	5.9*	3.6	4.7	2.8	3.8	2.3	3.1					2.0	2.7	15.9
6.0	Stabilizers raised					7.7*	7.7*	6.6*	6.6*	5.9*	5.9*	5.3*	5.3*	4.8*	4.8*	4.4*	4.4*					3.7*	3.7*	
	4 pt. outriggers down	13.3*	13.3*	10.1*	10.1*	7.2	8.2*	5.5	7.0*	4.2	5.6	3.4	4.5	2.7	3.6	2.2	3.0					1.8	2.6	16.1
4.5	Stabilizers raised	13.3*	13.3*	10.1*	10.1*	8.2*	8.2*	7.0*	7.0*	6.1*	6.1*	5.4*	5.4*	4.9*	4.9*	4.4*	4.4*					3.8*	3.8*	
	4 pt. outriggers down	13.0	15.0*	8.8	11.0*	6.5	8.6	5.0	6.6	3.9	5.2	3.1	4.2	2.5	3.5	2.1	2.9					1.7	2.5	16.2
3.0	Stabilizers raised	15.0*	15.0*	11.0*	11.0*	8.7*	8.7*	7.3*	7.3*	6.3*	6.3*	5.5*	5.5*	4.9*	4.9*	4.4*	4.4*					3.9*	3.9*	
	4 pt. outriggers down	6.5*	6.5*	7.7	10.6	5.8	7.9	4.5	6.1	3.6	4.9	2.9	4.0	2.4	3.3	2.0	2.8					1.7	2.4	16.2
1.5	Stabilizers raised	6.5*	6.5*	11.7*	11.7*	9.2*	9.2*	7.6*	7.6*	6.5*	6.5*	5.6*	5.6*	5.0*	5.0*	4.4*	4.4*					4.0*	4.0*	
	4 pt. outriggers down	5.2*	5.2*	6.9	9.8	5.2	7.3	4.1	5.7	3.3	4.6	2.7	3.8	2.3	3.2	1.9	2.7					1.7	2.4	16.0
0	Stabilizers raised	5.2*	5.2*	11.4*	11.4*	9.5*	9.5*	7.8*	7.8*	6.6*	6.6*	5.7*	5.7*	5.0*	5.0*	4.4*	4.4*					3.9*	3.9*	
	4 pt. outriggers down	5.3*	5.3*	6.4	9.2	4.8	6.9	3.8	5.4	3.1	4.4	2.6	3.6	2.2	3.1	1.8	2.6					1.7	2.5	15.7
−1.5	Stabilizers raised	5.3*	5.3*	9.4*	9.4*	9.5*	9.5*	7.8*	7.8*	6.6*	6.6*	5.6*	5.6*	4.9*	4.9*	4.2*	4.2*					3.8*	3.8*	
	4 pt. outriggers down	5.8*	5.8*	6.1	9.0	4.6	6.6	3.6	5.2	3.0	4.2	2.5	3.5	2.1	3.0	1.8	2.6					1.8	2.5	15.2
−3.0	Stabilizers raised	5.8*	5.8*	9.0*	9.0*	9.1*	9.1*	7.6*	7.6*	6.4*	6.4*	5.4*	5.4*	4.6*	4.6*	3.8*	3.8*					3.6*	3.6*	
	4 pt. outriggers down			6.1	8.9	4.5	6.5	3.5	5.1	2.9	4.2	2.4	3.5	2.1	3.0							1.9	2.7	14.4
−4.5	Stabilizers raised			9.2*	9.2*	8.4*	8.4*	7.0*	7.0*	5.9*	5.9*	5.0*	5.0*	4.1*	4.1*							3.5*	3.5*	
	4 pt. outriggers down							3.5	5.1	2.9	4.1											2.5	3.7	11.6
−6.0	Stabilizers raised							6.1*	6.1*	5.2*	5.2*											4.5*	4.5*	

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 are valid on a firm, level supporting surface with blocked oscillating axle. These capacities can be slewed through 360° with the undercarriage in the transverse position. Capacities in the longitudinal position of the undercarriage (+/– 15°) are specified over the steering axle with the stabilizers raised and over the rigid axle with the stabilizers down. 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.

Operator's Cab

	40 M	50 M	40 C	50 M HR	50 C HR
Stabilizer, proportional control on left joystick	•	•		•	
Cab lights rear, halogen	+	+	+	+	+
Cab lights rear, LED	+	+	+	+	+
Cab lights front, halogen	+	+	+	+	+
Cab lights front, halogen (under rain cover)	•	•	•	•	•
Cab lights front, LED	+	+	+	+	+
Cab lights front, LED (under rain cover)	+	+	+	+	+
Left arm console, folding	•	•	•	•	•
Armrest adjustable	•	•	•	•	•
Circular bubble level				•	•
Slewing gear brake, rocker switch in the right joystick	+	+	+	+	+
Driver profile, personalised (max. 5 drivers)	+	+	+	+	+
Operator's seat Comfort	•	•	•	•	•
Operator's seat Premium	+	+	+	+	+
Driving alarm (acoustic signal is emitted during travel, can be switched ON/OFF)	+	+	+	+	+
Fire extinguisher	+	+	+	+	+
Footrest			+		+
Horn, button on left joystick	•	•	•	•	•
Joystick steering (max. 12 km/h)	•	•		•	
Joystick and wheel steering (slim version)	+	+		+	
Cab elevation, hydraulic (LHC)	•	•	•	•	•
Cab elevation, rigid (LFC)	+	+	+		
Automatic air conditioning	•	•	•	•	•
Wheel steering (slim version)	+	+		+	
LiDAT, vehicle fleet management	•	•	•	•	•
Automatic engine shut-down (time adjustable)	+	+	+	+	+
Proportional control	•	•	•	•	•
Radio Comfort, control via display with handsfree set	+	+	+	+	+
Preparation for radio installation	•	•	•	•	•
Back-up alarm (acoustic signal is emitted traveling backward, can not be switched off)	+	+		+	
Warning beacon on cab, LED	+	+	+	+	+
Windows made from impact-resistant laminated safety glass	+	+	+	•	•
Windscreen wiper, roof	+	+	+	+	+
Windshield wiper, entire windscreen	•	•	•	•	•
Top guard	+	+	+	+	+
Front guard, adjustable	+	+	+	+	+
Sun visor	+	+	+	+	+
Flashing light (xenon)	+	+	+	+	+

Attachment

	40 M	50 M	40 C	50 M HR	50 C HR
Boom lights, 2 pieces, halogen	•	•	•	•	•
Boom lights, 2 pieces, LED	+	+	+	+	+
Stick lights, 2 pieces, halogen	•	•	•	•	•
Stick lights, 2 pieces, LED	+	+	+	+	+
Boom shutoff (retract/extend), electronically	+	+	+	•	•
Attachment with electro-hydraulic end position control	•	•	•		
AutoLift	+	+	+	+	+
Pressure warning mechanism hoist cylinder	•	•	•	•	•
ERC system	•	•	•	•	•
Filter system for working tool	+	+	+	+	+
Electronic lift limitation	+	+	+	+	+
Boom cylinder cushioning	•	•	•	•	•
Industrial stick with quick coupling	+	+	+	+	+
Stick camera (with separate monitor), bottom side, with protection	+	+	+	+	+
Load torque limitation	+	+	+	+	+
Liebherr multi coupling system	+	+	+	+	+
Liebherr quick coupler, hydraulic	+	+	+		
Pipe fracture safety valves hoist cylinders	•	•	•	•	•
Pipe fracture safety valve stick cylinder	•	•	•	•	•
Quick coupling system LIKUFIX	+	+	+		
Quick coupling system MH40	+	+	+		
Protection for piston rod, energy recovering cylinder	+	+	+	+	+
Protection for piston rods, hoist cylinder	+	+	+	+	+
Stick shutoff (retract), electronically	•	•	•	•	
Stick shutoff (retract/extend), electronically	+	+	+	+	•
Retract stick without pressure	•	•	•	•	•
Overload warning device	+	+	+	+	+

Complete Machine

	40 M	50 M	40 C	50 M HR	50 C HR
Lubrication					
Lubrication undercarriage, manually – decentralised (grease points)	•	•			
Lubrication undercarriage, manually – centralised (one grease point)				•	
Central lubrication system for uppercarriage and attachment, automatically	•	•	•	•	•
Central lubrication system for undercarriage, automatically	+	+		+	
Special coating, variants	+	+	+	+	+
Monitoring					
Rear view monitoring with camera*	•	•	•	•	•
Side view monitoring with camera	•	•	•	•	•

• = Standard, + = Option
* = country-dependent

Options and/or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr in order to retain warranty.

- Has knowledge and experience of the relevant field of activity.
- Knows the relevant national standards.
- Has the necessary authorisation for maintenance and repair of machine.
- Knows the machine and the hazards.
- Knows all procedures and precautions for maintenance.
- Has knowledge of handling special tools for maintenance and repair.
- Is not under any physical or mental impairment that limits one of the prescribed requirements.
- Is not under the influence of alcohol.
- Is not under the influence of drugs.

2.3.8 Slinger

Responsibility

The slinger is responsible for the following:
- Wear personal protective equipment.
- Choose correct and undamaged slinging gear.
- Correctly attach slinging gear to load or lifting accessory.
- Correctly remove slinging gear from load or lifting accessory.
- Grant approval for movement or accompaniment.

Requirement

The slinger has following qualification and skills:
- Has completed the legally specified minimum age.
- Is physically and mentally capable of attaching loads.
  - Satisfactory eyesight
  - Satisfactory hearing ability
  - Quick reactions
  - Is able to estimate distance, height and gaps.
- The slinger has following skills:
  - Is able to estimate mass distribution and load distribution.
  - Is able to operate radio units.
  - Is able to give clear instructions on radio units.
  - Is able to guide a load.
- Has the necessary authorisation for attaching loads.
- The slinger has the necessary education (theoretical and practical) for the following:
  - Selecting the suitable slinging gear
  - Attaching slinging gear
  - Securing to prevent unintended disengaging of slinging gear
  - Avoiding damage to slinging gear
  - Spotting
  - Applying all necessary signal signs
- Is not under any physical or mental impairment that limits one of the prescribed requirements.
- Is not under the influence of alcohol.
- Is not under the influence of drugs.

2.3.9 Spotter

Responsibility

The spotter is responsible for the following:
- Wear personal protective equipment.

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Sign	Description
	**Step lighting** Indicates step lighting button.

Tab. 7: Information signs

2.4.3 Control description sticker

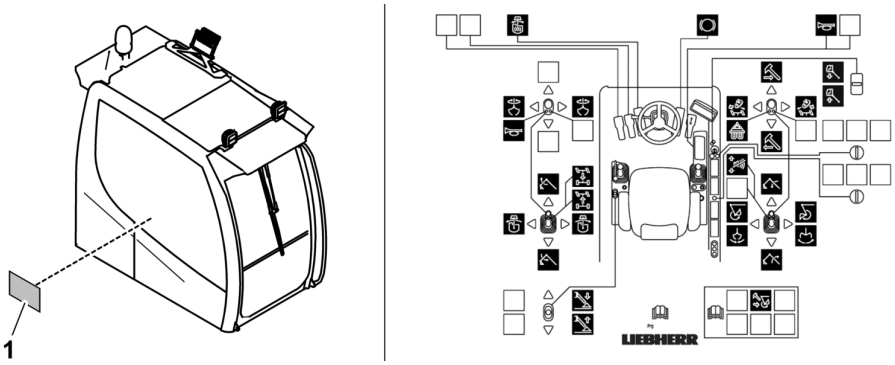

Fig. 56: Control description sticker in the operator's cab, example of control description sticker

1 Control description sticker

The control description sticker indicates the function allocation of the following control elements:
- Joysticks
- Keys
- Switch
- Lever
- Pedals

The assignment of control elements differs depending on machine configuration.

The control description sticker corresponds to the machine configuration.

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Incorrect maintenance

- Make sure there are no persons in danger zone.
- Park machine and secure to prevent rolling or driving away.
- Park machine on level, firm ground.
- Park machine with lowered working attachment.
- When searching for leaks in the hydraulic system wear protective gloves.
- Exclusively search for leaks in the hydraulic system with cardboard or similar material.
- Do not weld or solder accumulators.
- Do not perform mechanical work on accumulators.
- Make sure that the permanent labelling of the accumulators (operating data) is kept visible.

Crushing injuries

Unexpected movements of machine

- Make sure there are no persons in danger zone.
- Park machine and secure to prevent rolling or driving away.

Unintended closing of access doors

- Secure access doors by inserting the securing mechanisms.

Incorrect lifting accessories

- Exclusively use undamaged lifting accessories.
- Make sure that load capacity value of lifting accessories is sufficient.

Incorrect work clothing

- Wear protective gloves when handling wire ropes.

Incorrect work equipment

- Exclusively align bores with suitable pin.

Burns

Incorrect maintenance

- Shut off engine before any maintenance or repair.

Hot pressurised engine cooling system

- Do not touch coolant and parts carrying coolant.
- Let the cover and parts carrying coolant cool down.

Incorrect heat protection

- Make sure that all holders and protective shields against vibration, chafing and heat build-up have been installed correctly.

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3.2 Display

3.2.1 Display

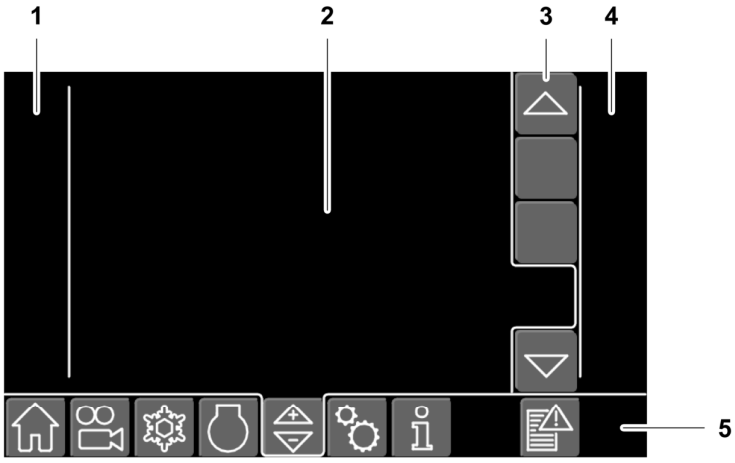

Fig. 62: Display

1	Status bar	**4**	Warning bar
2	Display field	**5**	Menu bar
3	Submenu bar		

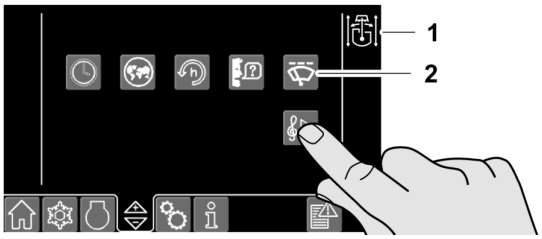

Fig. 63: Symbols with a grey background are buttons.

1	Symbol	**2**	Button

Selecting menu via menu bar

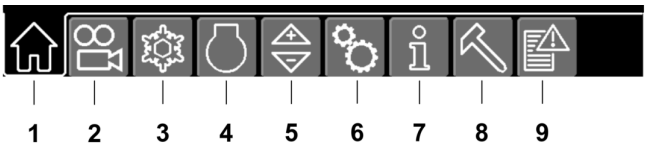

Fig. 64: Menu bar

1	*Start page* menu button	**6**	*Function settings* menu button
2	*Camera* menu button	**7**	*Information* menu button
3	*Automatic heating, automatic ventilation and automatic air conditioning system* menu button	**8**	*Tool Control* menu button
4	*Operating status* menu button	**9**	*Service codes* menu button
5	*System settings* menu button		

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Symbol	Meaning
	Automatic mode locked

Tab. 13: Status symbols of height-adjustable cab

Diesel engine

Symbol	Meaning
	Power reduction of diesel engine
	Power reduction of diesel engine
	Automatic engine stop
	Automatic engine stop blocked
	Delayed engine stop active or Automatic engine stop before long
	Engine start blocked
	Engine shut-down blocked
	Diesel engine emergency mode active
	Preglowing

Tab. 14: Status symbols of diesel engine

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3.2.6 *Operating status* menu

Menu call: 

The display of this submenu varies depending on machine configuration:

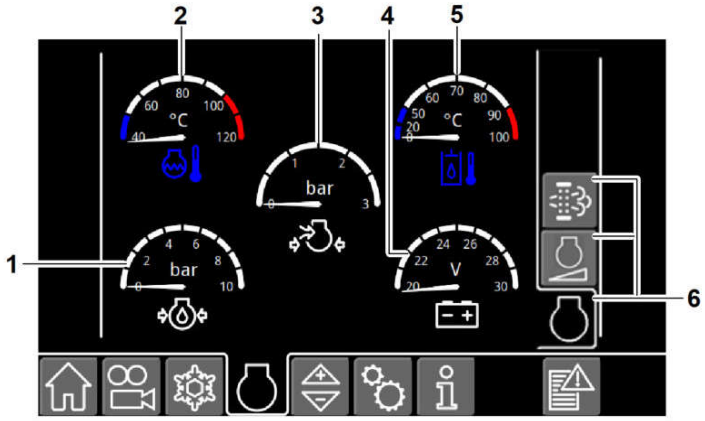

Fig. 238: Operating status menu

1 Engine oil pressure
2 Coolant temperature
3 Charging pressure
4 Battery voltage
5 Hydraulic oil temperature
6 Menu buttons

In normal mode, the symbols are displayed in white, for a warning, they are displayed in red.

Menu button	Designation
	Diesel particulate filter (For more information see: 3.2.7 *Diesel particulate filter* submenu (option), page 83)
	Sensor-controlled low idle automatic and automatic engine stop
	Measurement display

Tab. 22: Menu buttons

3.2.7 *Diesel particulate filter* submenu (option)

Menu call:  >

The display of this submenu varies depending on machine configuration:

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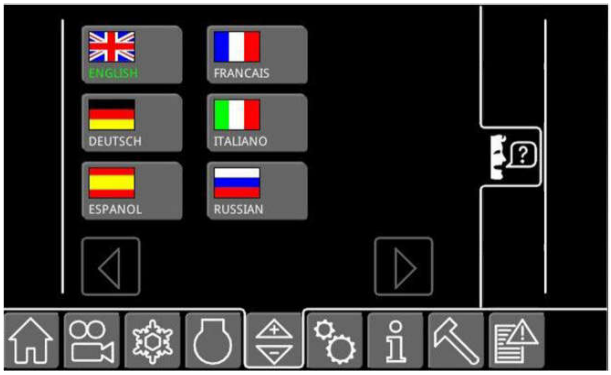

Fig. 271: Language selection submenu

- ▶ Press button for the desired language.
  - ▷ Button of selected language is framed in white.

The change of language only takes effect after the system data are stored.

- ▶ Set ignition key to **0**.
- ▶ Wait 40 seconds.
- ▶ Set ignition key to **1**.
  - ▷ Change of language takes effect.

3.2.23 *Electrical outputs* submenu

Menu call:  >  > 

The display of this submenu varies depending on machine configuration:

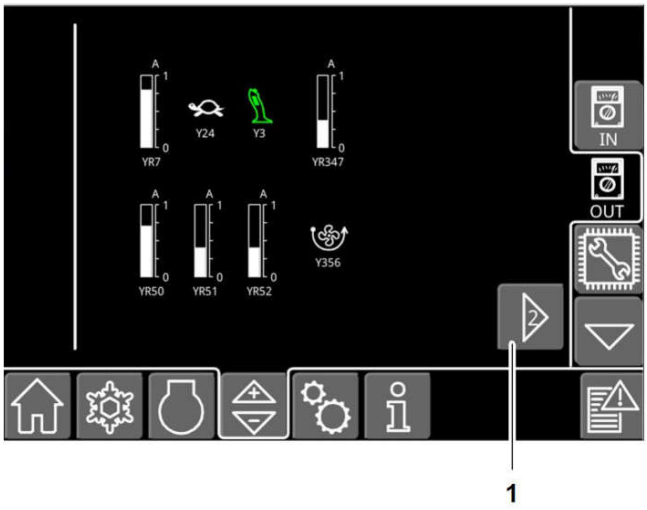

Fig. 272: Electrical outputs submenu

1 *Scroll* button

The *electrical outputs* submenu provides a quick overview for Liebherr customer service. It shows the operating status of the electrical outputs.

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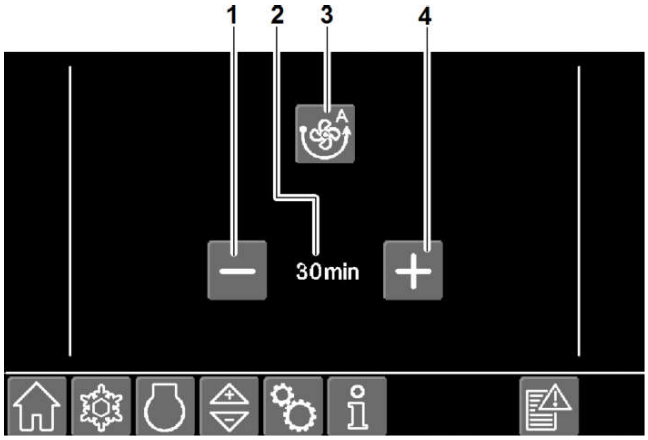

Fig. 310: Automatic reversible fan drive submenu

1	*Reducing time interval* button	**3**	*Automatic reversible fan drive* button
2	Time interval	**4**	*Increasing time interval* button

▶ Activate automatic reversible fan drive: (For more information see: 3.4.34 Reversible fan drive for radiator cleaning (option), page 173)

3.2.34 *Comfort slewing brake* submenu (option)

Menu call:  >

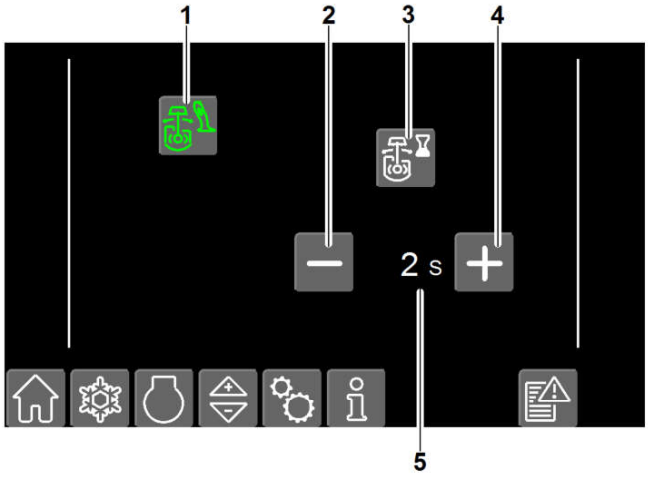

Fig. 311: Comfort slewing brake submenu

1	*Semi-automatic* button	**4**	*Increasing closing time* button
2	*Reducing closing time* button	**5**	Locking time
3	*Automatic* button		

▶ Lock uppercarriage with comfort slewing brake: (For more information see: Locking uppercarriage with comfort slewing brake (option), page 162)

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Fig. 336: Contents of rescue system suitcase

1 Rescue overall

2 Descender

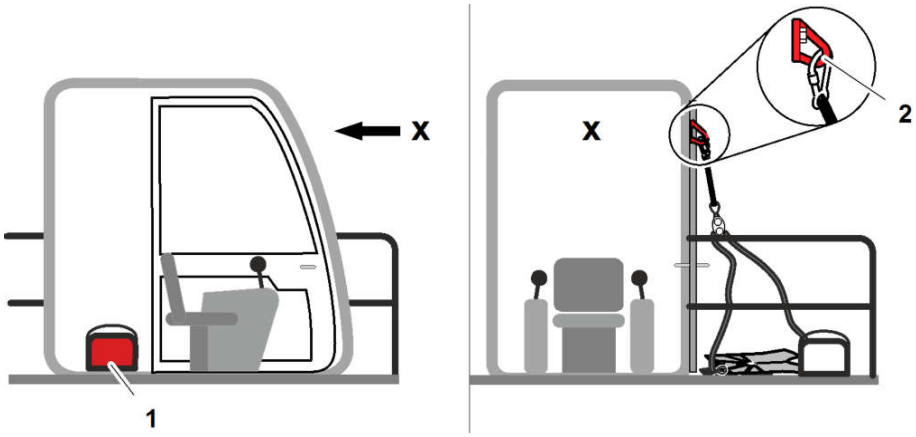

Fig. 337: Rescue system in operator's cab

1 Rescue system

2 Attachment point for rescue system

Application

DANGER
Defective rescue system!
Danger to life.

- ▶ Protect rescue system from sharp-edged objects (radius smaller than 3 mm).
- ▶ Protect rescue system from effects of heat.
- ▶ Protect rescue system from chemicals (oils, acids).

DANGER
Use of non-approved accessories!
Danger to life.

- ▶ Combine rescue system exclusively with approved accessories.

- ▶ Use rescue system **1** according to info graphic.

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DANGER
Safety belt not engaged!
Fatal or serious injuries.

- ▶ Put on the safety belt before starting.
- ▶ Make sure the safety belt is not twisted.
- ▶ Regularly check the condition, function and attachment of the safety belt. Have damaged parts renewed immediately.

Putting on the safety belt

- ▶ Pull the safety belt out of the belt reel **1**.
  - ▷ Pulling sharply can cause the belt to be blocked.
- ▶ Insert the belt tongue **2** into the belt buckle **3**.

Releasing the safety belt

- ▶ Press the release tab **4**.
  - ▷ Safety belt is pulled into the belt reel **1**.

3.3.9 Exit protection (option)

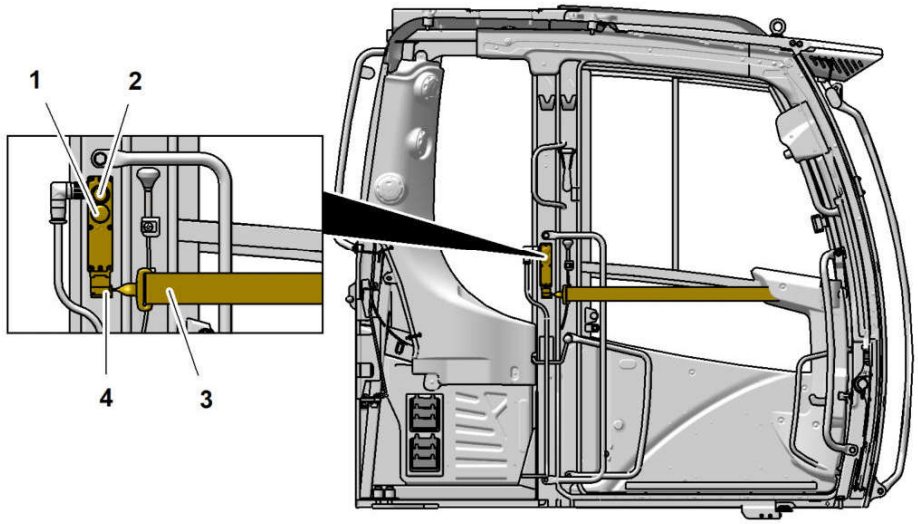

Fig. 357: Exit protection

1	Indicator light	**3**	Belt
2	*Opening belt buckle* button	**4**	Belt buckle with locking mechanism

Closing exit protection

- ▶ Insert belt **3** in belt buckle with locking mechanism **4**.
  - ▷ Indicator light **1** lights up.
  - ▷ Raising and lowering of operator's cab is possible.

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Adjusting mirrors mechanically

Make sure the following preconditions are met:
❑ Machine is standing on level ground.

If no helper is present:
▶ Lower working attachment to the ground.
▶ Move travel direction switch to neutral position.
▶ Move folding console up.
▶ Shut off diesel engine.
▶ Adjust mirrors.

Adjusting mirrors electrically (option)

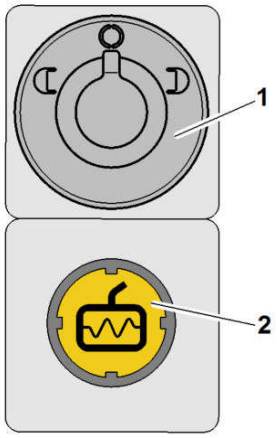

Fig. 382: Control unit for electrical mirrors

1 *Mirror adjuster* joystick **2** *Mirror heater* button

Make sure the following preconditions are met:
❑ Machine is standing on level ground.

Adjusting right mirror

▶ Turn *mirror adjuster* joystick **1** right.
▶ Move *mirror adjuster* joystick **1** and adjust mirror.

Adjusting left mirror

▶ Turn *mirror adjuster* joystick **1** left.
▶ Move *mirror adjuster* joystick **1** and adjust mirror.

Mirror heater (option)

▶ Switch on mirror heater: Press *mirror heater* button **2**.
▷ *Mirror heater* button **2** lights up.
▶ Switch off mirror heater: Press *mirror heater* button **2**.
▷ *Mirror heater* button **2** goes out.

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NOTICE
Corrosive diesel exhaust fluid!
Damage to machine.

- ▶ After contact with diesel exhaust fluid clean affected areas with plenty of water and soap.
- ▶ Adhere to safety data sheet of diesel exhaust fluid.

CAUTION
Corrosive diesel exhaust fluid!
Injuries.

- ▶ Do not inhale vapours.

If skin comes into contact with diesel exhaust fluid:
- ▶ Clean affected areas with plenty of water and soap.

If eyes come into contact with diesel exhaust fluid:
- ▶ Rinse eyes under running water for at least 15 minutes.
- ▶ Consult a doctor if irritation persists.

If diesel exhaust fluid was swallowed:
- ▶ Do not vomit.
- ▶ Rinse mouth and drink plenty of water.
- ▶ Consult a doctor immediately.
- ▶ Adhere to safety data sheet of diesel exhaust fluid.

Make sure the following preconditions are met:
- ❑ Strainer of diesel exhaust fluid tank is clean and in good condition.
- ❑ Diesel exhaust fluid used is approved. (For more information see: 5.3.2 Diesel exhaust fluids, page 236)

- ▶ Unscrew tank lid **1**.
- ▶ Fill with diesel exhaust fluid.
- ▶ Screw in tank lid **1**.

3.4.5 Preheating system for fuels and operating fluids (option)

Following fuels and operating fluids can be preheated or kept at a steady temperature with electric heating:
- Coolant
- Engine oil
- Hydraulic oil

The control unit with power supply is installed at different locations for different machine types.

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The machine lowers the engine speed to idle if one of the following preconditions are met:
– Folding console is up.
– Joysticks and travel control are not actuated.

The machine does not automatically shut off the diesel engine if one of the following preconditions are met:
– Magnet system is activated.
– Regeneration of diesel particulate filter is running.
– Coolant temperature is below 50 °C.

Status symbol	Warning sound	Meaning
	Intermittent warning sound	Automatic engine stop before long.
		Automatic engine stop active. Diesel engine is shut off.
		Automatic engine stop is blocked.

Tab. 39: Status symbols and warning sounds

▶ Set shut-off period for automatic engine stop. (For more information see: 3.2.8 *Sensor-controlled low idle automatic and automatic engine stop* submenu (option), page 84)

▶ Activate automatic engine stop. (For more information see: 3.2.8 *Sensor-controlled low idle automatic and automatic engine stop* submenu (option), page 84)

▷ LEDs in *sensor-controlled low idle automatic* key light up.
▷ *Sensor-controlled low idle automatic* key does not function.

▶ Start diesel engine after automatic engine stop: Move folding console up.

▶ Press *start/stop* key.

3.4.16 Shutting off diesel engine

▶ Make sure that all control elements are in neutral position.

▶ Press *start/stop* key.

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Deactivating locking mechanism

▶ Press *slewing brake* switch **1** to position **A**.
▷ LEDs in *slewing brake* key go out.
▷ Uppercarriage can be turned.

Semi-automatic locking of uppercarriage

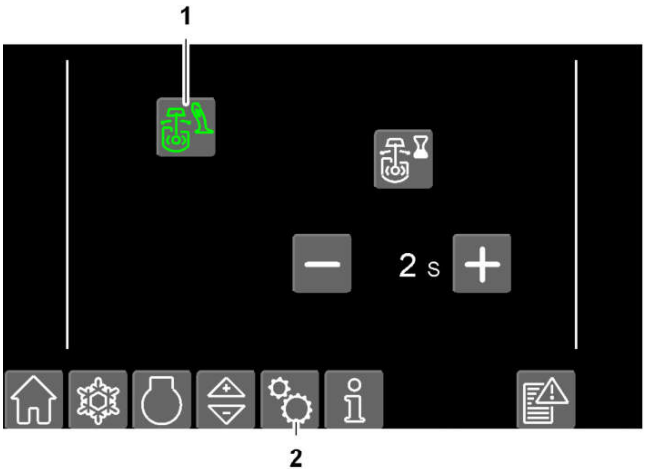

Fig. 470: Comfort slewing brake menu: Semi-automatic mode

1 *Semi-automatic* button **2** *Function settings* menu button

Switching on semi-automatic

▶ Press *function settings* menu button **2**.

▶ Press *comfort slewing brake* menu button.
▷ *Comfort slewing brake* menu appears on the display.
▶ Press *semi-automatic* button **1**.
▷ *Semi-automatic* button lights up green.

Activating locking mechanism

Note
Different machine configuration!

▶ Observe control description sticker.

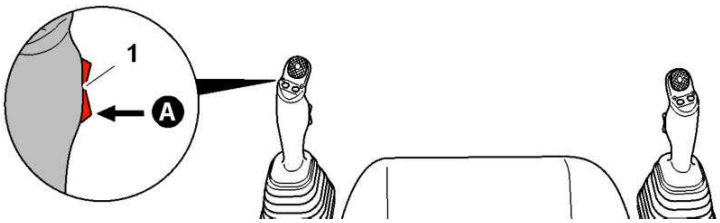

Fig. 473: Slewing brake switch (example of switch on left joystick)

1 *Slewing brake* switch

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▷ Holding force of magnet increases.

▶ Wait until magnet has reached required holding force and lift load.

▶ Release *magnet* button **2**.
▷ Magnet has maximum holding force.

▶ Carefully move working attachment.

▶ Put down load.

Deactivating magnet with sorting function (option)

▶ Press and hold *magnet* button **2**.
▷ Holding force of magnet drops.

▶ Wait until magnet has reached required holding force.

▶ Release *magnet* button **2**.
▷ Magnet has maximum holding force.

▶ Press *magnet* button **2** again.

Switching off magnet system

▶ Press *magnet system* key on control unit A. (For more information see: 3.1.2 Control unit A, page 61)
▷ LEDs in *magnet system* key go out.
▷ Magnet system is switched off.

3.4.34 Reversible fan drive for radiator cleaning (option)

The reversing fan for radiator cleaning changes the direction of rotation of the fan. Air is blown out from the engine compartment and removes contamination from the air intake area.

NOTICE
Insufficient cooling performance!
Damage to machine.

▶ Activate reversible fan drive for radiator cleaning no more than once within a 10 minute period.

▶ Check air intake area before starting work and remove stubborn contamination.

Switching on reversible fan drive manually

▶ Press *reversible fan drive* key.
▷ LEDs in *reversible fan drive* key light up one after the other.

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3.5.3 Height limitation

Height limitation menu

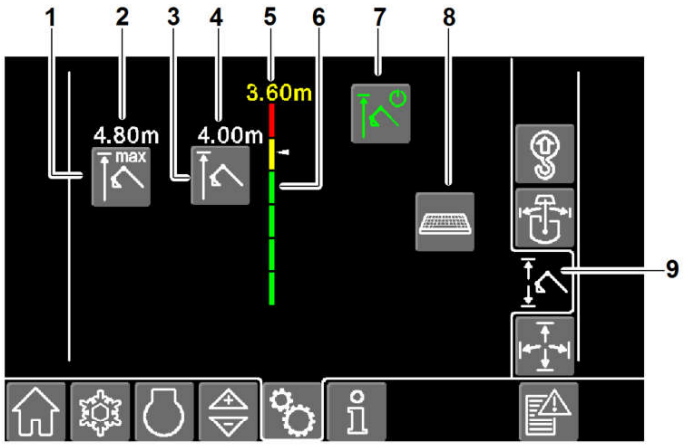
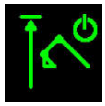


Fig. 555: Height limitation menu

1 *Maximum working height* button
2 Limit value set for maximum working height
3 *Reduced working height* button (option)
4 Limit value set for reduced working height
5 Current height of working attachment
6 Scale
7 *Height limitation* button
8 *Showing keyboard* button
9 *Height limitation* menu button

Key	Meaning
	Settings for height limitation are enabled. Height limitation is switched off.
	Settings for height limitation are enabled. Height limitation is switched on.
	Settings for height limitation are locked. Height limitation is switched on.

Tab. 51: Status of height limitation button

Enabling settings for height limitation

A supervisor is authorised to enable following settings for the operator:
– Switching off height limitation
– Switching on height limitation
– Changing maximum working height limit value

Make sure the following precondition is met:
❑ Supervisor is present with authorisation key.

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DANGER
Machine setting incorrect!
Danger to life.

If working attachment is changed:
▶ Have depth limitation re-programmed by Liebherr customer service.

If depth limitation limit values are changed:
▶ Inform all operators of machine about changes.

Operating principle

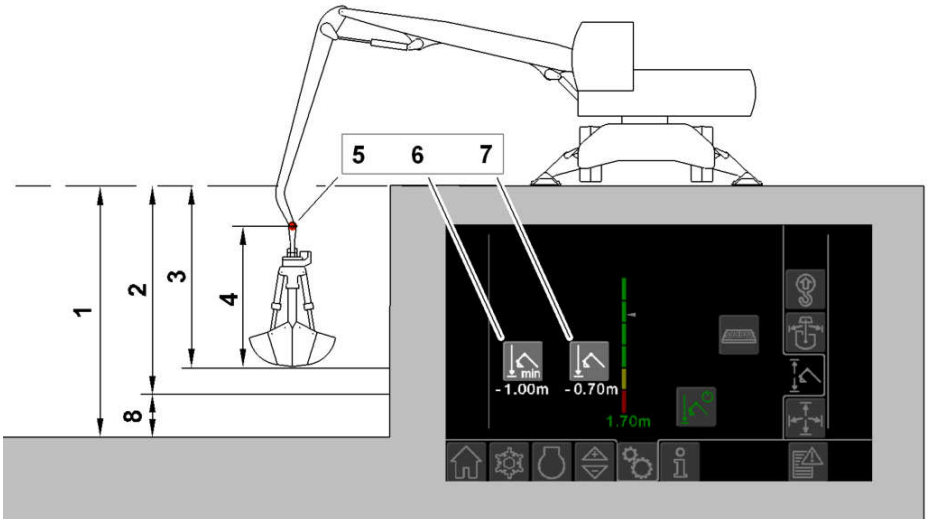

Fig. 581: Depth limitation

1	Restricting depth	**5**	Bolt-in point of working tool
2	Minimum working height without working tool	**6**	Limit value of minimum working height for bolt-in point of working tool
3	Bottom shut-off point without working tool	**7**	Limit value of bottom shut-off point for bolt-in point of working tool
4	Height of working tool	**8**	Prescribed safe distance

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If limit value of bottom shut-off point for bolt-in point of working tool is displayed in green:

▶ Press *toggling height* button **2**.
▷ Limit value of bottom shut-off point for bolt-in point of working tool is displayed in green.

▶ Enter limit value of bottom shut-off point for bolt-in point of working tool **6** .

If a wrong limit value has been entered:

▶ Press *delete* button **4**.

▶ Enter limit value of bottom shut-off point for bolt-in point of working tool **6** again.

▶ Press *accept* button **5**.
▷ *Confirmation required* status symbol appears on the display:

▶ Press confirmation button within 5 seconds.
▷ Limit value of bottom shut-off point is saved.

Troubleshooting
Limit value of bottom shut-off point for bolt-in point of working tool is not saved?
If confirmation button is not pressed within 5 seconds, limit value of bottom shut-off point for bolt-in point of working tool is not saved.

▶ Save limit value of bottom shut-off point for bolt-in point of working tool again.

▶ Press *display keyboard* button.
▷ *Depth limitation* menu appears on the display.

Checking depth limitation

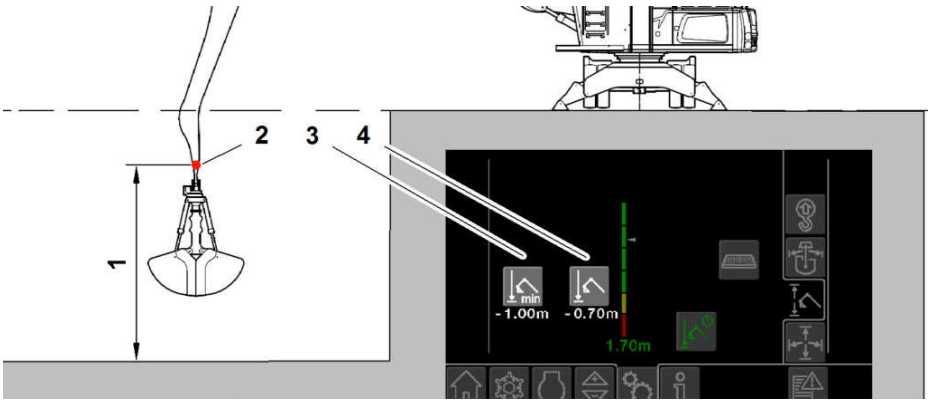

Fig. 636: Checking depth limitation

1	Working height	**3**	Limit value of minimum working height for bolt-in point of working tool
2	Bolt-in point of working tool	**4**	Limit value of bottom shut-off point for bolt-in point of working tool

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Putting machine with travel gear in working position

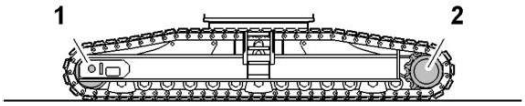

Fig. 672: Travel gear

1 Idler-wheel **2** Travel gearbox

▶ Perform work using idler-wheel.

3.6.3 Travelling at operating location

Basic travel position

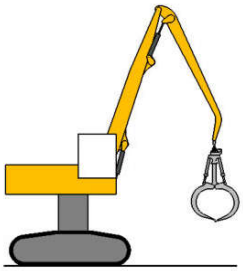

Fig. 673: Basic travel position

▶ Empty working tool.

▶ Turn operator's cab over idler-wheel.

▶ Move to basic travel position.

▶ Position working tool correctly: Make sure that working tool does not knock against machine during oscillating motions.

Travelling

Make sure the following preconditions are met:
❑ Driveway is clear.
❑ Travel without danger is possible.
❑ Basic travel position has been assumed.

▶ Warn persons in the area: Sound horn.

▶ Slowly press accelerator pedals.

▶ Maintain basic travel position while travelling.

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3.10 Emergency operation

3.10.1 Lowering working attachment when engine is shut off

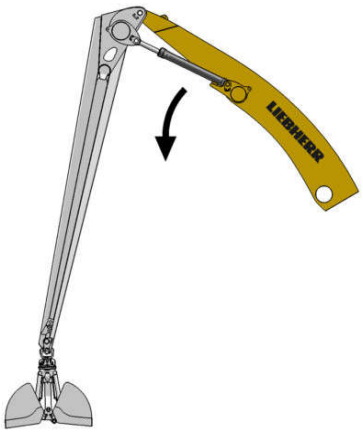
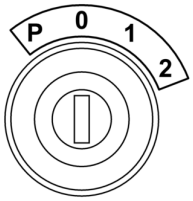


Fig. 677: Lowering working attachment when engine is shut off

Note
Limited pressure reserve!

- ▶ When engine is shut off, move joysticks exclusively to lower working attachment.
- ▶ When engine is shut off, press pedals exclusively to lower working attachment.



- ▶ Set ignition key to 1.
- ▶ Move folding console down.
- ▶ Lower working attachment: Operate joystick or pedal.

3.10.2 Lowering operator's cab in an emergency (option)

DANGER
Unapproved presence in danger zone!
Danger to life.

- ▶ Make sure no-one is in the danger zone under the operator's cab.
- ▶ Keep your distance from moving parts when the operator's cab is moving down.

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.

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5.2 Filling quantities and lubrication chart

5.2.1 Filling quantities

Lubricants

Description	Quantity[29)]
Diesel engine	32.0 l
Hydraulic system: System capacity	585.0 l
Hydraulic system: Oil change volume	430.0 l
Hydraulic system: Tank capacity	300.0 l
Slewing gearbox	10.25 l
Pump distributor gear	2.9 l
Travel gearbox	each 8.7 l
Oil chamber of energy recuperation cylinder	390.0 ml [30)]
Oil chamber of energy recuperation cylinder	490.0 ml [31)]
Oil chamber of energy recuperation cylinder	600.0 ml [32)]
Container of central lubrication system	4.0 kg

Tab. 55: Filling quantities, lubricants

Fuels and operating fluids

Description	Quantity[29)]
Fuel tank	460.0 l
Diesel exhaust fluid tank	65.0 l
Cooling system	51.0 l
Air conditioning - CO_2 equivalent	1.6 kg [33)] 2.29 t
Air conditioning compressor	200 ml
Windscreen washer system	8.0 l

Tab. 56: Filling quantities, fuels and operating fluids

29) Guidance values
30) Item code 11681465 serial number: 1 - 358
31) Item code 11681465 serial number: 359 - 849
32) Item code 11681465 serial number: 850 - 902; item code 11681468 serial number: From 1
33) With height adjustable cab LHC 340-35

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5.3.8 Pump distributor gear oils

Machine without pump distributor gear oil cooler

Liebherr recommendation

Ambient temperature	Description
-25 to 50 °C	Liebherr Hypoid 85W-140 EP
-30 to 50 °C	Liebherr Gear Basic 90 LS
-30 to 50 °C	Liebherr Gear Hypoid 90 EP
-40 to 50 °C	Liebherr Syntogear Plus 75W-90

Tab. 80: Liebherr recommendation

Minimum quality requirements

Specification
API: GL-5
MIL-L: 2105 D or E, PRF-2105 D or E

Tab. 81: Minimum quality requirements

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

Machine with pump distributor gear oil cooler

Liebherr recommendation

Ambient temperature	Description
5 to 50 °C	Liebherr Hypoid 85W-140 EP
-5 to 50 °C	Liebherr Gear Basic 90 LS
-5 to 50 °C	Liebherr Gear Hypoid 90 EP
-20 to 50 °C	Liebherr Syntogear Plus 75W-90

Tab. 82: Liebherr recommendation

Minimum quality requirements

Specification
API: GL-5
MIL-L: 2105 D or E, PRF-2105 D or E

Tab. 83: Minimum quality requirements

Make sure the following preconditions are met:
– Oil viscosity is approved for hydraulic oil cooler

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5.7.5 Checking rescue system (option)

Visual inspection

Note

▶ Liebherr recommends documenting inspection of rescue system with inspection table.

▶ Make sure that rescue system is ready for use: Perform visual inspection every year.

▶ Make sure that suitcase is undamaged.

▶ Make sure that lead seal on suitcase is undamaged.

▶ Make sure that inspection date on inspection seal is not exceeded.

If inspection has negative result:

▶ Have rescue system inspected by manufacturer.

▶ After return by manufacturer, stow rescue system in intended space in operator's cab.

Inspection table

Date	Inspection performed by	Signature

Tab. 89: Inspection table

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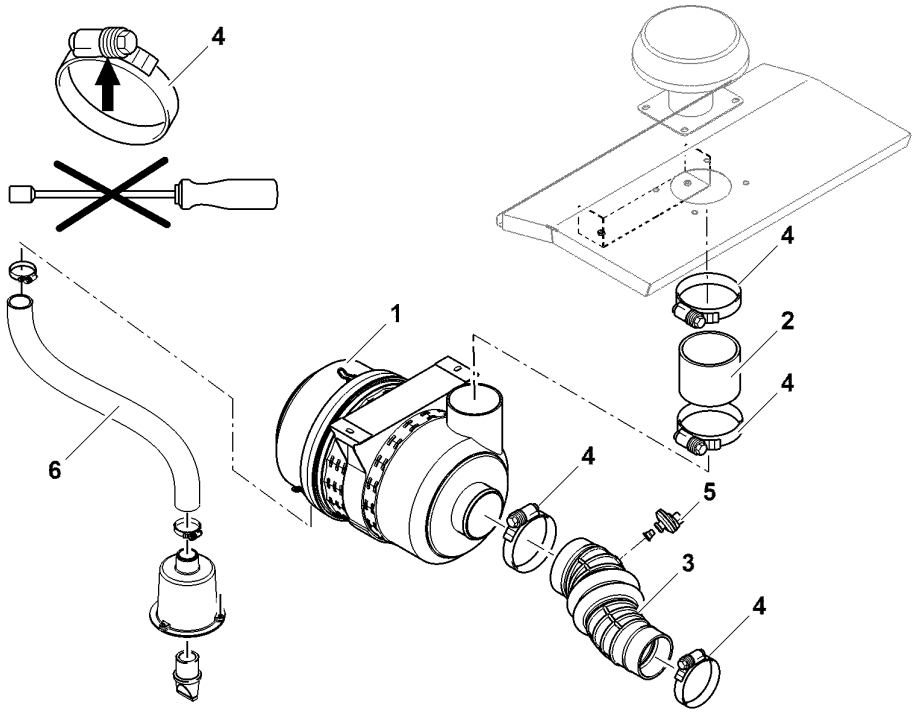

Fig. 699: Filter housing, clean air line and air hose with hose clamps

1	Filter housing	**4**	Hose clamp with spring plate package
2	Air hose	**5**	Vacuum switch
3	Clean air line	**6**	Air hose

NOTICE
Loose or damaged hose connections!
Diesel engine damage.

- ▶ Regularly check hose connections and hose clamps.
- ▶ Replace damaged hose connections.
- ▶ Replace hose clamps on loose or damaged hose connections.
- ▶ Observe prescribed tightening torques.

Check the following air lines:
- Between air filter and turbocharger
- Between turbocharger and intercooling air cooler
- Between intercooling air cooler and diesel engine

The hose clamps **4** with spring plate package compensate any diameter changes.

- ▶ For loose hose connections replace hose clamp **4**.
- ▶ Tighten hose clamp, observe prescribed tightening torque specified in table.

Check following components for condition, mounting and tightness:
- Filter housing **1**
- All mounting clamps
- All intake lines
- All intake pipes

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- ▶ Fill coolant no faster than 8 l/min into coolant container **3** until coolant container **3** is completely filled with coolant.
- ▶ Fill coolant no faster than 8 l/min into expansion chamber **1** until sight glass **5** is half filled with coolant.
- ▶ Close sealing cover **4**.
- ▶ Close bleeding cover **2**.

Bleeding cooling system

- ▶ Start diesel engine.
- ▶ Turn on operator's cab heating.
- ▶ Set operator's cab heating to highest level.
- ▶ Let diesel engine run at idle speed for 5 minutes.
- ▶ Shut off diesel engine.
- ▶ Check coolant level, refill coolant if necessary. (For more information see: Filling with coolant, page 272)

When machine has cooled down:

- ▶ Check coolant level, refill coolant if necessary. (For more information see: Filling with coolant, page 272)

5.9.2 Checking cooling system and heat exchanger for contamination and cleaning

NOTICE
Incorrect cleaning!
Damage to condenser fins.

- ▶ Never clean condenser fins by machine or by steam cleaning.
- ▶ Clean condenser fins exclusively with compressed air.

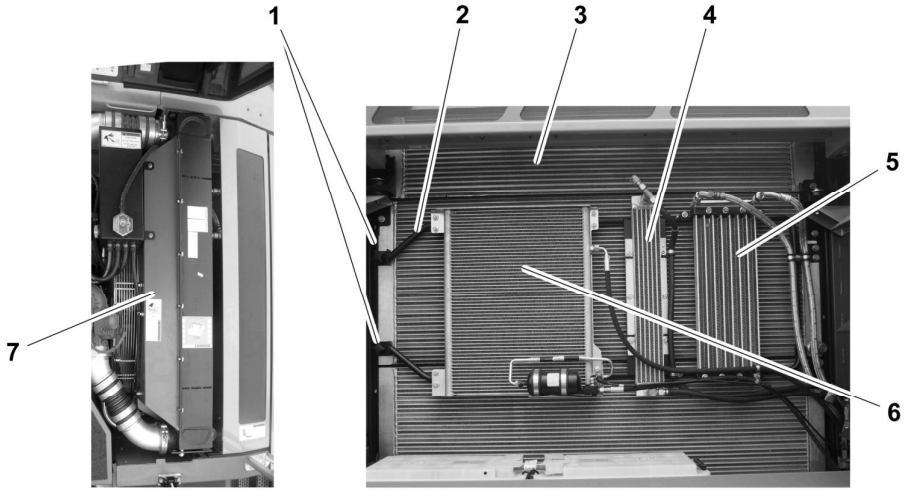

Fig. 732: Radiator fan from above and cooling system

1 Star knob screw
5 Fuel cooler

See next page for continuation of the image legend

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5.11 Electrical system

5.11.1 General information

Before any intervention in electrical system

- ▶ Put on safety glasses and work gloves.
- ▶ Switch off battery main switch.
- ▶ Disconnect batteries: First disconnect negative terminal **(-)**.
- ▶ Connect batteries: Connect negative terminal **(-)** last.

General maintenance work

- ▶ Check correct condition of electrical system.
- ▶ Have all defects repaired immediately.

If fuse or bulb is damaged:

- ▶ Remove cause.
- ▶ Replace damaged fuse or bulb immediately.

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