en **Operator's manual**

Machine for Industrial Applications

Document ID

ORIGINAL OPERATOR'S MANUAL

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Product ID

Manufacturer: Liebherr-Hydraulikbagger GmbH
Type: LH 50 M Litronic
Type no.: 1203 (USA / CAN)
From Serial no.: 89397

Contact

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LHB/12220532/01/2017-12-11/en

1.1.4 Energy recuperation cylinder (option)

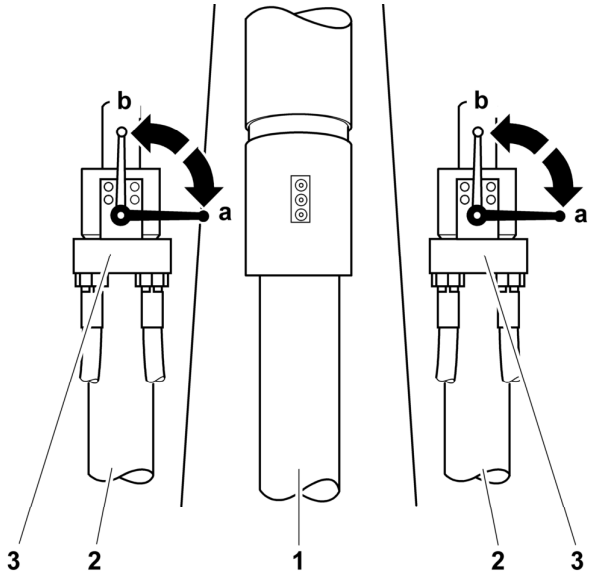

Fig. 4: Block type ball valve on the hoist cylinders

1 Energy recuperation cylinder
2 Hoist cylinder
3 Block ball cock
a Block type ball valve closed
b Block type ball valve open

Energy recuperation cylinder (ERC) is a pressure vessel filled with gas, which supports the hoisting movement of boom. This system can be identified in the form of a third cylinder between the hoist cylinders.

When developing the energy recuperation system, which was specially designed for material handling machines, focus was on the overall efficiency of hydraulic system and efficiency of machine. In real operation this means an increase in energy efficiency and more consistent operating cycles.

The energy recuperation system works on the operating principle that gas stored in the energy recuperation cylinder is compressed when the attachment is lowered. The saved energy supports the two hoist cylinders when lifting.

Outside temperature differences may lead to pressure fluctuations inside energy recuperation cylinder. This may result in reduced load lift values as well as inadvertent retraction or extension of energy recuperation cylinder and resulting movement of boom.

To prevent unintentional extension and boom movements, the energy recuperation cylinder must be locked when exiting the machine. This is done with the help of two block type ball valves installed on the hoist cylinders. The block type ball valves must be closed when exiting the machine. Unlike the hydraulic system, the energy recuperation cylinder is still completely pressurised.

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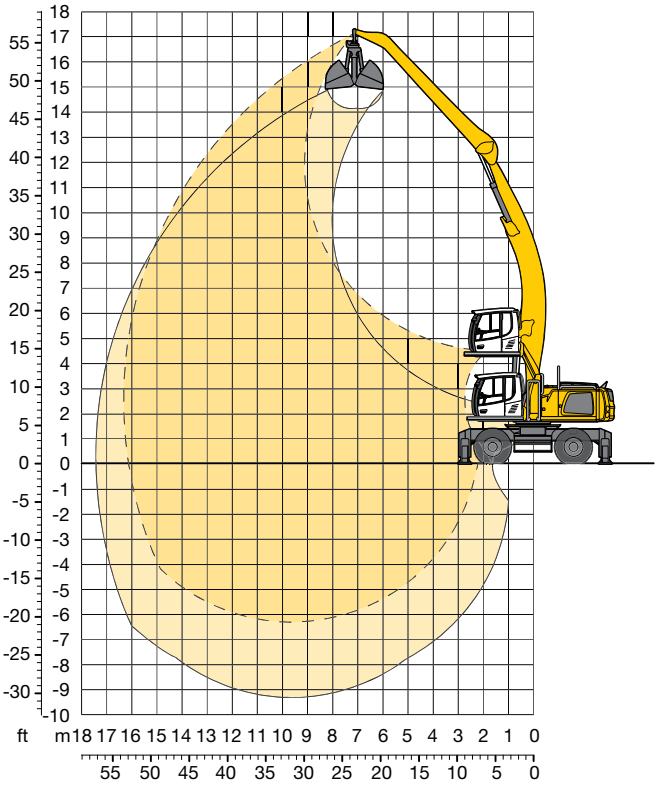
Attachment AF16 (Kinematic 2D)

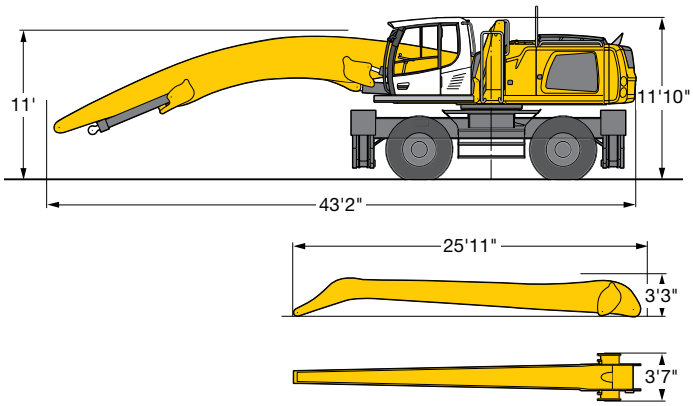


Operating Weight

The operating weight includes basic machine with 4 point outriggers, hydr. cab elevation, 4 solid tires, industrial-type angled mono boom 31'6" and industrial-type flat angled stick 24'7".

with clamshell model GM 20B/1.96 yd³ shells for loose material	95,900 lb

Dimensions



Industrial Stick 24'7"

ft	Undercarriage	10 ft		15 ft		20 ft		25 ft		30 ft		35 ft		40 ft		45 ft		50 ft		55 ft				ft in
55	Stabilizers raised							11,9*	11,9*													11,0*	11,0*	26' 1"
	4 pt. outriggers down							11,9*	11,9*													11,0*	11,0*	
50	Stabilizers raised									12,4*	12,4*											9,6*	9,6*	33' 7"
	4 pt. outriggers down									12,4*	12,4*											9,6*	9,6*	
45	Stabilizers raised									13,4*	13,4*	10,8	12,2*									8,6	8,9*	39'
	4 pt. outriggers down									13,4*	13,4*	12,2*	12,2*									8,9*	8,9*	
40	Stabilizers raised									13,2*	13,2*	11,0	12,0*	8,4	10,7							7,0	8,5*	43' 2"
	4 pt. outriggers down									13,2*	13,2*	12,0*	12,0*	11,2*	11,2*							8,5*	8,5*	
35	Stabilizers raised									13,3*	13,3*	10,9	12,1*	8,4	10,8	6,4	8,5					5,9	7,9	46' 5"
	4 pt. outriggers down									13,3*	13,3*	12,1*	12,1*	11,1*	11,1*	9,9*	9,9*					8,2*	8,2*	
30	Stabilizers raised									13,6*	13,6*	10,7	12,2*	8,3	10,6	6,4	8,4					5,2	7,0	49'
	4 pt. outriggers down									13,6*	13,6*	12,2*	12,2*	11,2*	11,2*	10,4*	10,4*					8,1*	8,1*	
25	Stabilizers raised									13,5	14,0*	10,3	12,5*	8,0	10,4	6,3	8,3	4,9	6,6			4,6	6,4	50'11"
	4 pt. outriggers down									14,0*	14,0*	12,5*	12,5*	11,4*	11,4*	10,5*	10,5*	9,4*	9,4*			8,1*	8,1*	
20	Stabilizers raised							17,0*	17,0*	12,7	14,6*	9,7	12,5	7,6	10,0	6,0	8,0	4,8	6,5			4,2	5,9	52' 4"
	4 pt. outriggers down							17,0*	17,0*	14,6*	14,6*	12,9*	12,9*	11,6*	11,6*	10,6*	10,6*	9,7*	9,7*			8,2*	8,2*	
15	Stabilizers raised	43,5*	43,5*	29,2*	29,2*	21,8	22,2*	15,5	18,1*	11,7	15,2	9,1	11,9	7,2	9,5	5,7	7,7	4,6	6,3			4,0	5,6	53' 1"
	4 pt. outriggers down	43,5*	43,5*	29,2*	29,2*	22,2*	22,2*	18,1*	18,1*	15,4*	15,4*	13,4*	13,4*	11,9*	11,9*	10,8*	10,8*	9,8*	9,8*			8,4*	8,4*	
10	Stabilizers raised	7,3*	7,3*	28,0	33,0*	19,0	24,2*	13,9	18,4	10,6	14,1	8,4	11,1	6,7	9,0	5,4	7,4	4,4	6,1			3,8	5,4	53' 6"
	4 pt. outriggers down	7,3*	7,3*	33,0*	33,0*	24,2*	24,2*	19,3*	19,3*	16,1*	16,1*	13,9*	13,9*	12,2*	12,2*	11,0*	11,0*	9,9*	9,9*			8,6*	8,6*	
5	Stabilizers raised	4,1*	4,1*	14,4*	14,4*	16,5	22,7	12,4	16,8	9,6	13,0	7,7	10,4	6,2	8,5	5,1	7,1	4,2	5,9			3,6	5,2	53' 5"
	4 pt. outriggers down	4,1*	4,1*	14,4*	14,4*	25,8*	25,8*	20,3*	20,3*	16,8*	16,8*	14,3*	14,3*	12,5*	12,5*	11,1*	11,1*	9,8*	9,8*			8,9*	8,9*	
0	Stabilizers raised	5,3*	5,3*	11,4*	11,4*	14,7	20,7	11,1	15,5	8,8	12,1	7,1	9,8	5,8	8,1	4,8	6,8	4,0	5,7			3,6	5,2	52'11"
	4 pt. outriggers down	5,3*	5,3*	11,4*	11,4*	25,9*	25,9*	20,9*	20,9*	17,2*	17,2*	14,6*	14,6*	12,6*	12,6*	11,1*	11,1*	9,7*	9,7*			8,8*	8,8*	
- 5	Stabilizers raised	7,2*	7,2*	11,6*	11,6*	13,6	19,5	10,3	14,6	8,2	11,5	6,6	9,3	5,5	7,7	4,6	6,5	3,9	5,6			3,6	5,3	51'10"
	4 pt. outriggers down	7,2*	7,2*	11,6*	11,6*	21,1*	21,1*	21,0*	21,0*	17,2*	17,2*	14,6*	14,6*	12,5*	12,5*	10,8*	10,8*	9,2*	9,2*			8,5*	8,5*	
- 10	Stabilizers raised			12,7*	12,7*	13,0	19,0	9,8	14,0	7,7	11,0	6,3	9,0	5,2	7,5	4,4	6,4	3,8	5,5			3,8	5,5	50' 2"
	4 pt. outriggers down			12,7*	12,7*	20,2*	20,2*	20,3*	20,3*	16,8*	16,8*	14,2*	14,2*	12,1*	12,1*	10,2*	10,2*	8,2*	8,2*			8,1*	8,1*	
- 15	Stabilizers raised					12,9	18,8	9,5	13,8	7,5	10,8	6,1	8,8	5,1	7,4	4,4	6,3					4,1	6,0	47' 1"
	4 pt. outriggers down					20,8*	20,8*	18,7*	18,7*	15,6*	15,6*	13,2*	13,2*	11,1*	11,1*	9,0*	9,0*					8,0*	8,0*	
- 20	Stabilizers raised									7,5	10,8	6,1	8,8									5,8	8,3	36' 7"
	4 pt. outriggers down									13,6*	13,6*	11,4*	11,4*									10,7*	10,7*	

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 lb x 1,000 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 comply with 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.

9. Diesel oxidation catalyst
10. Fuel additive devices
11. Selective catalytic reduction
12. Diesel exhaust fluid tanks
13. Electronic control, sensors, switching magnets and wire harnesses
14. Information sticker, emission limitation

1.3.7 Exclusions

This warranty provides no cover for:

- Malfunctions in parts that were caused by misuse, incorrect use, modifications, manipulation, shut-off or incorrect or inadequate maintenance.
- Damage caused by fire, accidents, negligence, an act of god or other events that Liebherr cannot influence.
- Consequential damage, for example the loss of the diesel engine or the attachment powered by the diesel engine, towing, machine transports, loss of time, downtimes, inconvenience, costs for telephone, travel and accommodation, and all indirect or direct damage.
- Loss of or damage to personal property, lost profits, commercial losses or other issues that are not specifically included in this warranty.
- Any replacement parts can be used in the performance of maintenance work or repairs. However, the manufacturer accepts no liability for parts that are not original spare parts.
- Any damage resulting from the use of non-original Liebherr spare parts.

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  - Operator's manuals for components
  - Operator's manuals from third party manufacturers
  - Additional instructions
- Maintain and repair machine for safe and reliable function.
- Perform all prescribed maintenance tasks and repair work.
- Isolate battery main switch of power supply system and secure it against switching on again.
- Clearly define and label working position.
- Wear personal protective equipment.
- Use adapted tools.
- Adhere to safety regulations at place of use.
- Report all changes to machine that affect safety to operating company.
- Exclusively perform retrofittings of machine after consultation with manufacturer.
- Exclusively use original Liebherr spare parts.

Requirement

The refrigeration technician has following qualification and skills:
- Has completed the legally specified minimum age.
- Is physically and mentally capable of maintaining the machine.
  - Satisfactory eyesight
  - Satisfactory hearing ability
  - Quick reactions
- Has the authorisation necessary for maintenance and repair of machine.
- The refrigeration technician has following skills:
  - Is able to estimate distance, height and gaps.
  - Is able to assess work correctly.
  - Is able to recognise dangers.
  - Is able to take safety measures.
- Has knowledge of 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 Rigger

Responsibility

The rigger has following tasks:
- 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 rigger 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

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Load capacity signs

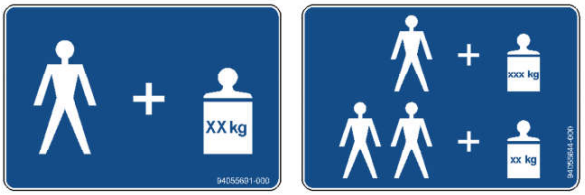

Fig. 34: Load capacity signs

Indicate maximum load capacity value of height adjustable cab.

Close upper windscreen sign

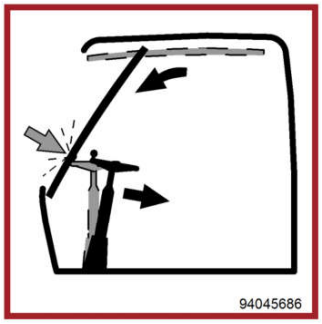

Fig. 35: Close upper windscreen sign

Indicates sequence for closing upper windscreen:
- Fold back steering wheel.
- Pull upper windscreen down.

Applies to wheeled excavators.

Speed 20 km/h sign

Fig. 36: Speed 20 km/h sign

Indicates the maximum permitted speed.

Applies to wheeled excavators.

Lifting point sign

Fig. 71: Lifting point sign

This sign contains following information:
– Indicates lifting points.
– Use of lifting points depends on transportation method.

Lifting point sign

Fig. 72: Lifting point sign

This sign contains following information:
– Indicates lifting points on counterweight.
– Indicates lifting points on gooseneck boom.

Applies to machines with indicated lifting points on counterweight and gooseneck boom.

Lifting angle sign

Fig. 73: Lifting angle sign

Indicates maximum angle between steel ropes on counterweight.

Applies to machines with indicated lifting points on counterweight and gooseneck boom.

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2.7.4 Access to machine

Injury

Incorrect entry and exit

- Uppercarriage and undercarriage are positioned so that steps and ladders are aligned with each other.
- Clean dirt, oil, ice and snow from steps, ladders, anti-slip mats, handrails and handles.
- Enter and exit carefully on muddy roads, ice, snow, traffic on access roads and in narrow conditions.
- Regularly check steps, ladders, anti-slip mats, handrails and handles and have them repaired if necessary.
- Before entering machine, clean mud, grease, ice and snow from shoes and climbing aids.
- Put on gloves for secure grip.
- Do not climb up or down using tyres, wheel hubs, rims or track chains.
- When exterior influences (for example wind) make opening and closing the door more difficult: Always guide door with your hand.
- Make sure that the opened or closed door has engaged properly.
- If the machine is still moving: Do not stand up from the operator's seat.
- Never jump off machine.
- Enter and leave the machine exclusively using the access system.
- Do not use control elements as handles.
- Keep your face towards machine during entry and exit.
- Make sure you always have two hands and a foot or two feet and one hand in contact with the access system.
- After entering the operator's cab, find out about emergency exit.

If the machine has an operator's cab elevation:
- Climb until the door is reached.
- When you reach door handle with your free hand: Open door.
- Continue climbing.

Adhere to safety instructions on entry and exit in operator's manual of complete machine:
- If the uppercarriage is mounted on a support.
- If the machine is part of a system.
- If the uppercarriage is mounted on a pontoon or rail guide system.

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3 Control and operation

3.1 Control and operating elements

3.1.1 Overview of operator's platform

Note
Different machine configuration!

▶ Adhere to control description sticker.

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Symbol	Meaning
	Control changed over

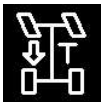
Tab. 7: Status symbols of working attachment and working tool

Brake

Symbol	Meaning
	Brake system inoperative
	Brake system inoperative, wire break

Tab. 8: Status symbols of brake

Travelling

Symbol	Meaning
	Travel speed reduced
	Travel mode blocked
	Travel mode; neutral position of travel direction switch and travelling pedal required
	Travelling backwards
	Travel backwards with speed controller
	Travelling forward
	Travel forwards with speed controller

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Determining assignment of camera image and camera

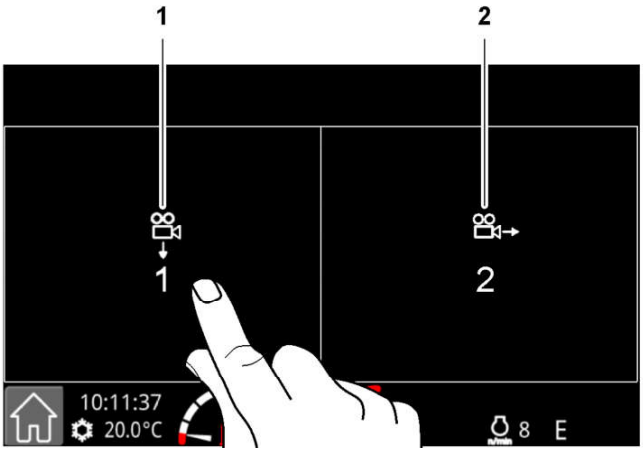


Fig. 247: Camera menu: Determining assignment of camera image and camera

1 *Rear area camera* symbol **2** *Side area camera* symbol

▶ Display camera symbols: Touch camera image with finger.
▷ Camera symbols appear during contact.

3.2.5 Automatic air conditioning

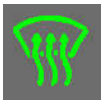
The cooling function is guaranteed exclusively when the diesel engine is running. When the cooling function is switched on, the humidity in the operator's cab is reduced at the same time.

The ventilation blows fresh air into the operator's cab.

It is possible to set the temperature in a range of 61 °F to 82 °F.

The air conditioning system functions optimally under the following conditions:
– Diesel engine is running.
– Automatic mode is switched on.
– Windows and doors are closed.
– Air outlets are opened.

The colour of buttons on the display show whether the function is active.

Representation	Meaning
	Function not active
	Function active

Tab. 19: Example representation for all buttons

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▶ Increase camera image contrast: Press *increasing camera image contrast* button **3**.

If display for cameras is available:
▶ Adjust camera image contrast via display for cameras.

Setting return time

If the display is not operated, the display will show the camera menu after the return time elapses.

If display for cameras is not available:
▶ Press *return time* menu button **4**.

▶ Reduce return time: Press *reducing return time* button.

▶ Increase return time: Press *increasing return time* button.

If display for cameras is available:
▶ Set return time via display for cameras.

3.2.14 *Unit selection* submenu

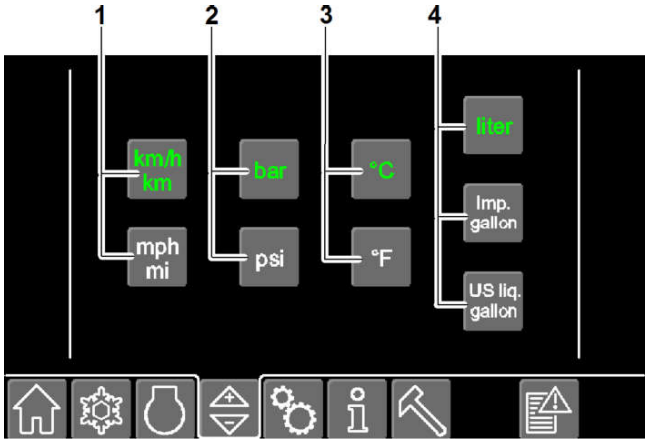

Fig. 281: Unit selection submenu

1 *Speed unit* buttons
2 *Pressure unit* buttons
3 *Temperature unit* buttons
4 *Volume unit* buttons

3.2.15 *System diagnosis* submenu

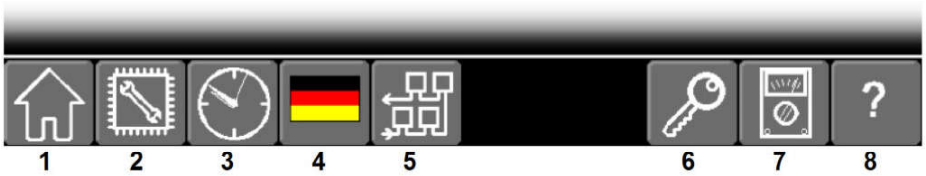

Fig. 282: System settings menu bar

1 *Start page* menu button
2 *System diagnosis* menu button
3 *Time zone and time* menu button
5 *CAN-Bus information* menu button
6 *Access rights* menu button
7 *Test system* menu button

See next page for continuation of the image legend

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3.2.25 *Stick cylinder shut-off* submenu (option)

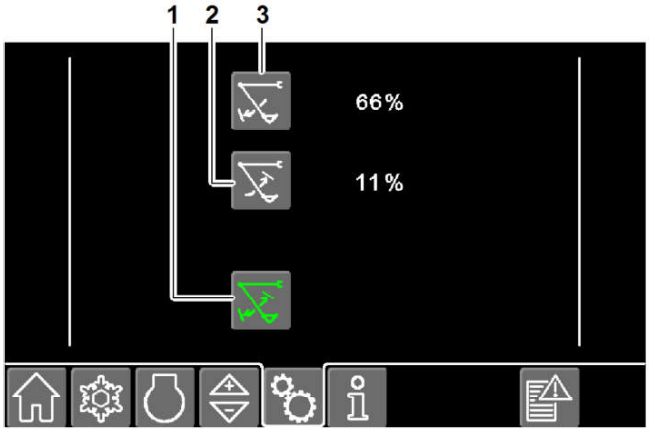

Fig. 323: Stick cylinder shut-off submenu

1 *Activating stick cylinder shut-off* button
2 *Upper shut-off point* button
3 *Lower shut-off point* button

In machines without *activating stick cylinder shut-off* button **1** the stick cylinder shut-off is always activated.

▶ Activate stick cylinder shut-off: (For more information see: 3.5.1 Stick cylinder shut-off (option), page 187)

3.2.26 *Hoist cylinder shut-off* submenu (option)

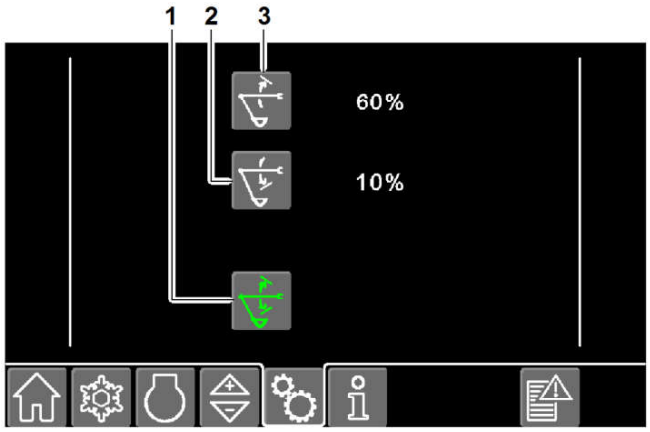

Fig. 324: Hoist cylinder shut-off submenu

1 *Activating hoist cylinder shut-off* button
2 *Lower shut-off point* button
3 *Upper shut-off point* button

▶ Activate hoist cylinder shut-off:

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- ▶ Make sure you always have two hands and a foot or two feet and one hand in contact with the ladder.
- ▶ Climb down facing the machine.

3.3.3 Step lighting (option)

The flood lights of the step lighting go out after a preset time.

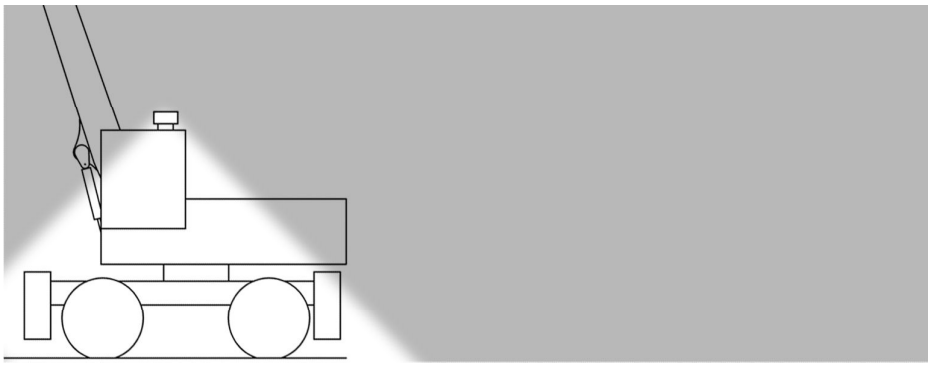

Fig. 352: Step lighting

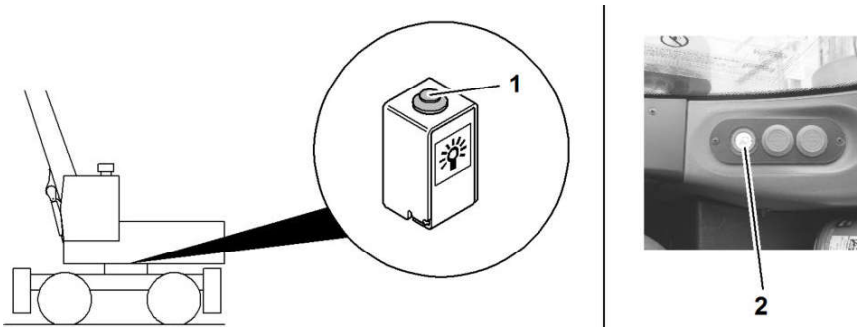

Fig. 353: Step lighting key

1 *Step lighting* button on ladder

2 *Step lighting* button in operator's cab

▶ Activate step lighting: Press *step lighting* button on ladder **1**.

or

Activate step lighting: Press *step lighting* button **2** in operator's cab.

▷ Spotlights of the step lighting come on.

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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)

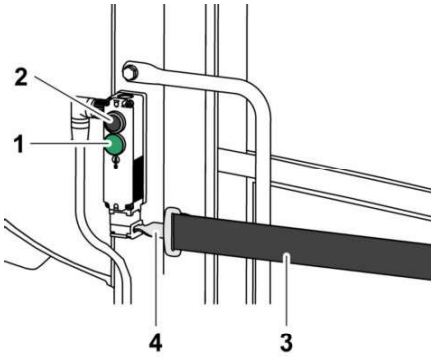

Fig. 373: Exit protection

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

Closing exit protection

▶ Pull belt **3** out of belt reel and insert belt buckle latch into belt lock with locking mechanism **4**.
▷ Indicator light **1** lights up.
▷ *Lifting operator's cab blocked* status symbol appears.

With exit protection closed, lifting and lowering of operator's cab is possible.

Opening exit protection

Opening of belt buckle is exclusively possible if operator's cab is in park position and indicator light lights up.

▶ Lower operator's cab to park position.
▷ Indicator light **1** lights up.

▶ Press *opening belt buckle* button **2**.
▷ Locking mechanism of belt buckle opens.

▶ Make sure that the belt spools evenly and completely onto the belt reel.

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DANGER
Incorrectly adjusted mirrors!
Danger to life.

▶ Before starting work and starting driving, check field of vision of mirrors.

If mirrors collide with an obstacle:
▶ Check adjustment of mirrors.

DANGER
Defective mirrors!
Danger to life.

▶ Replace defective mirrors.

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)

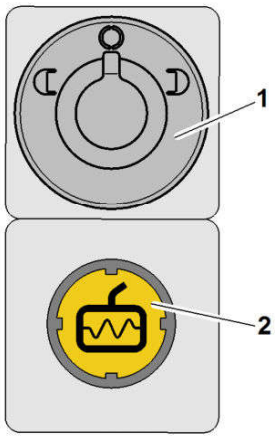

Fig. 398: Control unit for electrical mirrors

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.

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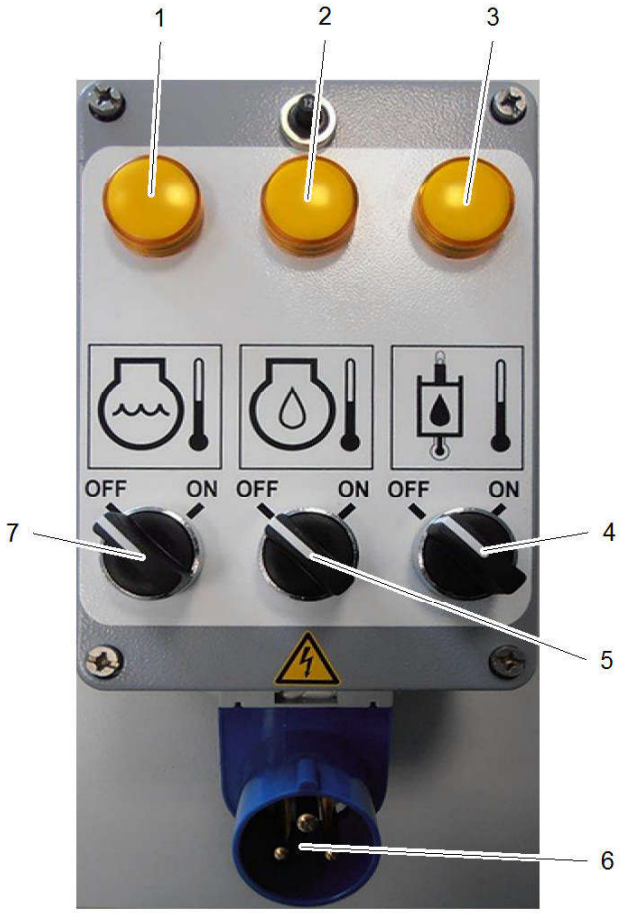

Fig. 434: Preheating for lubricants and fuels

1 *Coolant preheating* indicator light
2 *Engine oil preheating* indicator light
3 *Hydraulic oil preheating* indicator light
4 *Hydraulic oil preheating* switch
5 *Engine oil preheating* switch
6 Connecting plug for electric cable
7 *Coolant preheating* switch

Make sure the following preconditions are met:
- ❑ Stationary connection is protected with residual current circuit breaker 30 mA.
- ❑ Stationary connection is protected with 16 A fuse.
- ❑ Cross-section of electric cable is at least 0 in^2.
- ❑ Cable is completely unwound from cable drum.

Connecting preheating

▶ Connect electric cable to connecting plug **6**.

▶ Connect electric cable to stationary connection.

Preheating hydraulic oil

▶ Set *hydraulic oil preheating* switch **4** to **ON**.
  ▷ *Hydraulic oil preheating* indicator light **3** lights up.
  ▷ Hydraulic oil preheating switches off at set temperature.

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Depending on the equipment variant, the machine is equipped with different steering variants:
– Steering wheel steering
– Joystick steering (For more information see: 3.4.16 Joystick steering, page 166)

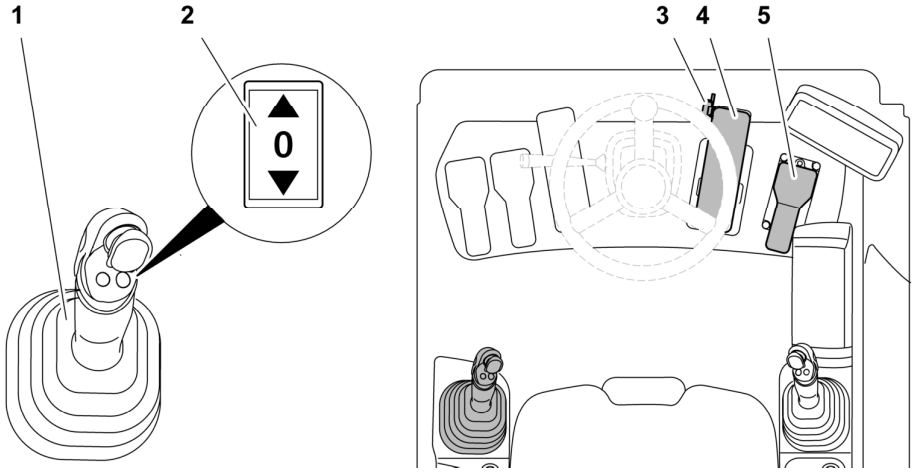

Fig. 465: Control elements

1 Joystick
2 Travel direction switch
3 Retainer
4 Pedal of service brake
5 Travelling pedal

Switch position		Symbol	Travel direction
0	Top	R	Reverse
	0	N	Neutral
	Bottom	F	Forward

Tab. 35: Travel direction switch and status symbols

Note
Different machine configuration.

▶ Adhere to control description sticker in operator's cab.

Make sure the following preconditions are met:
❑ Driveway is clear.
❑ Travel without danger is possible.
❑ Working attachment is in suitable travel position. (For more information see: Basic travel position, page 163)

If parking brake is applied:
▶ Press *parking brake* key.

If service brake is applied:

▶ 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.

3.4.22 Slewing brake

Key	Status of LEDs	Slewing brake
	LEDs light up 	Applied
	LEDs do not light up ○ ○ ○	Released

Tab. 44: Status of slewing brake

Activating locking mechanism

NOTICE
Incorrect use!
Damage to slewing brake.

▶ Lock uppercarriage exclusively when stationary.

▶ Press *slewing brake* key.
▷ LEDs in *slewing brake* key light up.
▷ Uppercarriage is locked.

Deactivating locking mechanism

▶ Press *slewing brake* key.
▷ LEDs in *slewing brake* key go out.
▷ Uppercarriage can be turned.

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Switching off magnet system

▶ Press *magnet system* key on control unit A. (For more information see: 3.1.2 Control unit A, page 77)
▷ 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.

Key	Status of LEDs	Meaning
	○ ○ ☀	Fan changes from normal mode to stationary.
	○ ☀ ○	Fan turns in opposite direction of rotation for 30 seconds.
	☀ ○ ○	Fan changes from opposite direction of rotation to stationary.

Tab. 46: Fan modes

▷ Fan turns again in normal mode.

Automatic reversible fan drive (option)

With an additional configuration of the machine it is possible to switch the reversible fan drive for radiator cleaning to a selectable time interval. If this option is configured, the *function settings* menu contains an additional *automatic reversible fan drive* menu.

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▶ Press *maximum working height* button.

▶ Press confirmation button.
▷ Maximum working height limit value is saved.

▶ Enable height limitation.

or

Lock height limitation.

Entering maximum working height limit value manually

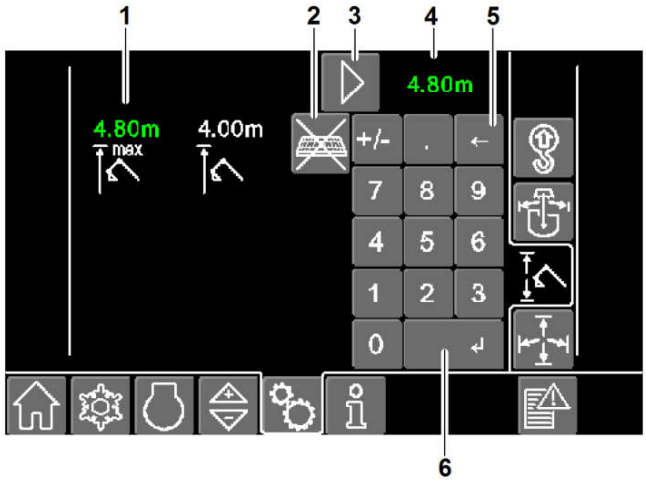


Fig. 591: Entering limit value manually menu

1	Limit value of maximum working height	**4**	Manually set limit value
2	*Hiding manual entry* button	**5**	*Delete* button
3	*Changeover* button	**6**	*Accept* button

Make sure the following preconditions are met:
- ❑ Machine is in working position.
- ❑ Working tool operating mode is selected.
- ❑ Height limitation is enabled.
- ❑ Height limitation is switched on.

▶ Press *manual entry* button.
▷ *Manual entry* menu appears on the display.

If limit value of reduced maximum working height is green:

▶ Press *changeover* button **3**.
▷ Limit value of maximum working height **1** appears in green.

▶ Enter the maximum working height limit value.

If a wrong limit value has been entered:

▶ Press *delete* button **5**.

▶ Enter limit value of maximum working height again.

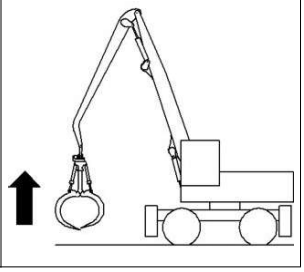
▶ Press *accept* button **6**.

▶ Press confirmation button.
▷ Maximum working height limit value is saved.

- ❑ Banksman is aware of his task.
- ❑ Banksman knows hand gestures.
- ❑ Banksman wears high visibility clothing.
- ❑ In the dark or if visibility is poor, banksman works with signal lights.

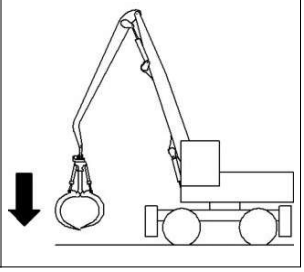
Hand gestures

Raising load

Hand gesture	Banksman	Machine
Extend forearm upwards. Extend index finger upwards. Move hand in small circles.		

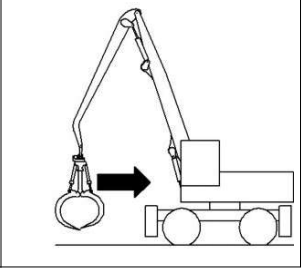
Tab. 50: Raising load

Lowering load

Hand gesture	Banksman	Machine
Extend arm downwards. Extend index finger downwards. Move hand in small circles.		

Tab. 51: Lowering load

Retracting load

Hand gesture	Banksman	Machine
Extend arms. Orient backs of hands towards body. Move hands away from body.		

Tab. 52: Retracting load

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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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Parking machine with uncoupled transmission

DANGER
Insufficient braking effect!
Danger to life.

If transmission is uncoupled:
- ▶ Make sure that no unauthorised persons are in the danger area.
- ▶ Secure machine to prevent use.

Note
When transmission is uncoupled, the parking brake does not function!
- ▶ Use warning sign to draw attention to insufficient braking effect.

- ▶ Park machine on level and firm ground.
- ▶ Secure machine with chocks to prevent it rolling away.

3.10.5 Transmission

Uncoupling transmission

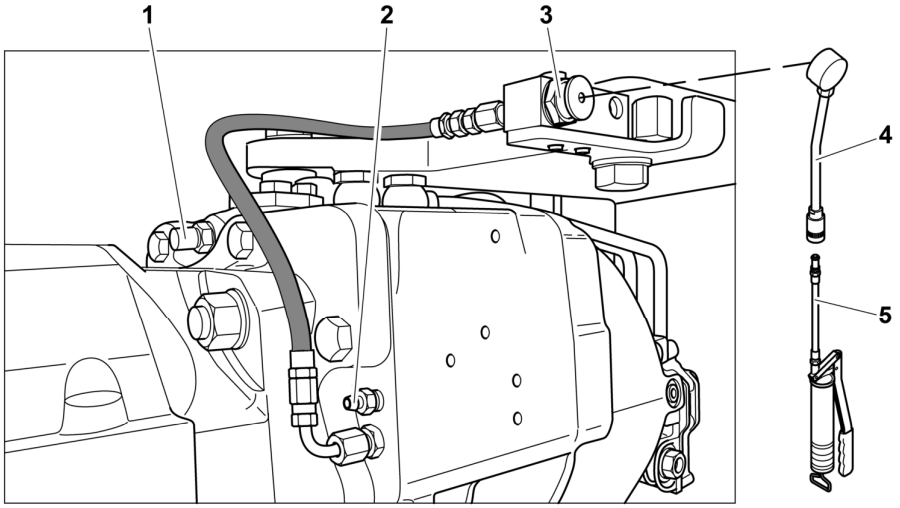

Fig. 661: Uncoupling transmission

1	Pressure relief valve	**4**	Adapter
2	Drain plug	**5**	Grease gun
3	Emergency release connection		

Adapter **4** and grease gun **5** are located in tool box.

DANGER
Service brake and parking brake inoperative!
Danger to life.
- ▶ Secure machine before uncoupling transmission to prevent it rolling away.

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Malfunction / error	Cause	Remedy
Diesel engine has difficulty starting.	Fuel low pressure circuit leaks or its pressure is too low.	Have leak test performed by Liebherr customer service.
	Diesel engine compression is too low.	Contact Liebherr customer service.
	Heating flange is defective (at cold temperatures).	Contact Liebherr customer service.
	Malfunction exists in electrical system.	Have error memory read by Liebherr customer service.
Diesel engine stops.	Power supply is interrupted.	Contact Liebherr customer service.
	Fuel low pressure circuit leaks or its pressure is too low.	Have leak test performed by Liebherr customer service.
Diesel engine performance too low (underperformance).	Fuel system is defective (clogged, leaking).	Performing visual inspection for leaks. Replace filter. Contact Liebherr customer service.
	Charging pressure is too low.	Tighten loose clamps. Replace defective seals and hoses. Clean air filter. Repair turbocharger.
	Charge air temperature is too high (automatic power reduction by engine control unit).	Clean intercooling air circuit. Lower ambient temperature. Contact Liebherr customer service.
	Fuel temperature is too high (automatic power reduction by engine control unit).	Contact Liebherr customer service.
	Coolant temperature is too high (automatic power reduction by engine control unit).	Check radiator for damage. Check fan and thermostat. Check coolant level. Contact Liebherr customer service.
	Area of deployment more than 5905‘ 6“ ft-in above sea level.	No remedy
	Injectors get stuck or do not atomize.	Contact Liebherr customer service.
	Diesel engine compression is too low.	Contact Liebherr customer service.
	Malfunction exists in electrical system.	Contact Liebherr customer service.
	Exhaust -treatment system is clogged.	Contact Liebherr customer service.
Diesel engine has inadequate engine braking power.	Diesel engine brake flap not functional.	Contact Liebherr customer service.
	Malfunction exists in electrical system.	Contact Liebherr customer service.

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Fuse	Consumer	Rating [A]
F6	A63, A64	5
F7	A63	10
F8	A63	5
F9	Reserve	
F10	Reserve	
F11	A54	7.5
F12	A54	3
F13	A54	2
F14	A54	3
F15	A54	2
F16	A54	5
F17	A54	2
F18	A54	2
F19	A51	7.5
F20	A51	5

Tab. 75: Fuse strip A128.XF1

Fuse	Consumer	Rating [A]
F1	A51	7.5
F2	A51	3
F3	A51	2
F4	A51	2
F5	A51	2
F6	A61	5
F7	A61	7.5
F8	A61	3
F9	A61	
F10	A61	
F11	A61	
F12	A61	
F13	A61	2
F14	A62	7.5
F15	A62	7.5
F16	A62	7.5
F17	A62	10
F18	A62	3
F19	A62	2

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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
			❍	❍	❍			Fuel system and lubrication system: Check condition and tightness.		
			❍	❍	❍	✧		Fuel pre-filter: Replace filter cartridge.		
			❍	❍	❍	✧		Fuel fine filter: Replace filter element (adapt the maintenance interval according to operating conditions, for example dust intensive applications, barrel fuelling).		
						✧		Bleed fuel system. Do not remove injection line.		
☐			❍	❍	❍			Fuel tank: Check mounting.		
			❍	❍	❍	✧		Air filter: Check contamination level.		
		●	❍	❍	❍	✦		Air filter: Emptying dust collecting tank.		286
						✦		Air filter: Replacing main filter cartridge (when service indication appears/once a year).		287
						✦		Air filter: Replacing safety filter cartridge (on every third renewal of the main filter cartridge / every year).		289
						✦		Air filter and air lines: Checking tightness and condition.		290
		●	❍	❍	❍			Pump distributor gear: Check oil level.		
			❍	❍	❍			Pump distributor gear: Change oil.		
						✦		Diesel particulate filter (option): Activate and deactivate regeneration.		292
					❍	✦		Clean and replace diesel particulate filter.		297
			❍	❍	❍			Diesel particulate filter (option): Check tightening torque of filter module profile clamps.		
						✧ ❍4500h		Diesel particulate filter: Changing filter module.		
Cooling system										
☐	●	●	❍	❍	❍	✦		Check coolant level.		299
			❍	❍	❍			Check cooling system and heating system for tightness and condition.		
☐	●	●	❍	❍	❍	✦		Check cooling system and heat exchanger for contamination and cleaning.		300
						❄		Coolant: Check the concentration (at least once a year).		
						❍3000h		Cooling system: Change coolant Liebherr Antifreeze (at least every two years).		
						❍6000h		Cooling system: Change coolant Liebherr Antifreeze **OS** (at least every four years).		

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5.3.3 Refrigerant

The air conditioning contains fluorinated greenhouse gases.

Designation	Air conditioning unit
Refrigerant	R134a
Global warming potential	1430
CO_2 equivalent of 2.20 lb R134a at 77 °F	3,153 lb

Tab. 89: Refrigerant

Adhere to machine-specific filling quantity of air conditioning.

5.3.4 Coolant

Requirements for water used

Make sure that water used meets the following requirements:
– In accordance with directive on drinking water of the World Health Organisation (WHO) from 2006

Corrosion inhibitors

Liebherr recommendation

Description	Manufacturer
DCA 4 (Diesel Coolant Additives 4)	Fleetguard, Cummins Filtration
Caltex XL Corrosion Inhibitor Concentrate	Chevron Texaco
Chevron Heavy Duty Extended Life Corrosion Inhibitor Nitrite Free (ELC)	Chevron Texaco
Havoline Extended Life Corrosion Inhibitor (XLI)	Chevron Texaco
Total WT Supra	Total, Paris

Tab. 90: Liebherr recommendation with mixing ratio 50:50

Anti-freeze and corrosion protection agent

Liebherr recommendation

Type	Description
Concentrate	Liebherr-Antifreeze OS Concentrate
Premix [A)]	Liebherr-Antifreeze OS Mix

Tab. 91: Liebherr recommendation

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5.5 Preparing for maintenance

5.5.1 Preparing for maintenance

Maintenance instructions

The sequence of maintenance work is based on the maintenance and inspection schedule. The ideal sequence for maintenance work is not allowed for.

- ▶ Clean machine carefully before starting maintenance work.
- ▶ Observe maintenance intervals.

Safety instructions

- ▶ Make sure that no persons are in the danger zone during maintenance and repair work.
- ▶ If necessary, secure a large area.
- ▶ Inform operating before starting maintenance and repair work.
- ▶ Appoint a supervisor.

If no other instructions have been made:
- ▶ Maintain machine on even, firm ground with working attachment lowered and diesel engine or electric motor switched off.

When working under machine:
- ▶ Hang warning sign stating "Do not switch on!" on ignition lock so it is clearly visible.
- ▶ Pull out ignition key.
- ▶ Switch off power supply.

If working above head height:
- ▶ Exclusively use approved safe ladders and working platforms.
- ▶ Exclusively use designated machine components as climbing aids.

Put on personal protective equipment against falling:
- – When working with one hand on the machine at a height above 6‘ 7“ ft-in without a possibility of standing with your feet sufficiently far apart to ensure firm standing
- – When working with two hands on the machine at a height above 6‘ 7“ ft-in without fall protection constructions
- ▶ Wear safety harnesses when working at height.
- ▶ Clean dirt, oil, ice and snow from steps, ladders, anti-slip mats, handrails, pedestals, platforms and handles.

If machine is equipped with height adjustable cab:
- ▶ Lower operator’s cab to bottom position.

If maintenance work or repair work requires operator's cab in top position:
- ▶ Make sure that operator’s cab is supported in proper and secure manner.

When working under a raised machine:
- ▶ Make sure that machine is supported in a proper and secure manner.
- ▶ Avoid metal on metal contact.

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5.8.4 Fuel pre-filter: Draining water

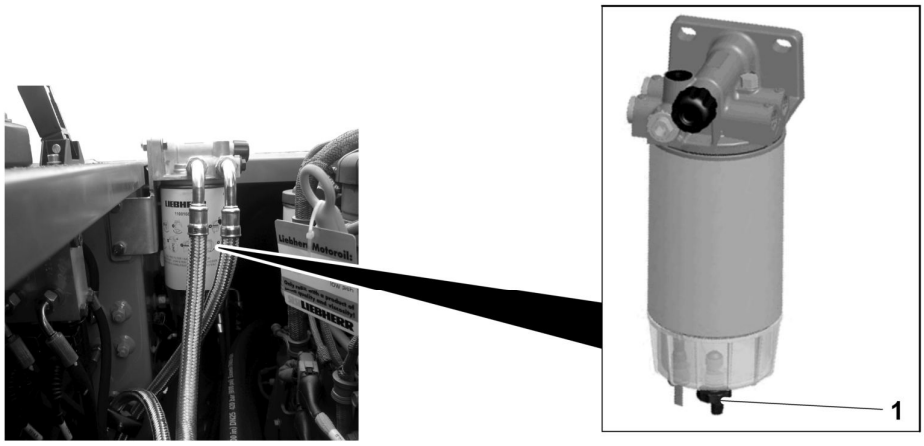

Fig. 752: Draining water

1 Water drain tap

DANGER
Explosion of highly flammable fuel!
Danger to life.

- ▶ Avoid naked flames.
- ▶ Do not smoke.

WARNING
Engine hot!
Burns.

- ▶ Let engine cool down.
- ▶ Wear protective gloves.
- ▶ Avoid skin contact with engine when hot.

- ▶ Place suitable receptacle under the fuel pre-filter.
- ▶ Open water drain tap **1**.
  ▷ Condensed water in transparent container flows out.
- ▶ Drain water until pure fuel emerges.
- ▶ Close water drain tap **1**.
- ▶ Dispose of condensed water in an eco-friendly manner.

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▷ *Activating filter regeneration* button is deactivated as button and lights up green:

▷ Filter regeneration starts.
▷ Diesel engine runs at higher speed.
▷ Remaining filter regeneration time is displayed:

▷ Diesel engine drops to idle speed: Filter regeneration is complete.

Deactivating automatic filter regeneration

In following cases it is necessary to deactivate automatic filter regeneration:
– Working in enclosed spaces
– Working in areas at risk of fire

Blocking is possible depending on the degree of contamination of the diesel particulate filter. (For more information see: Contamination level of diesel particulate filter, page 292)

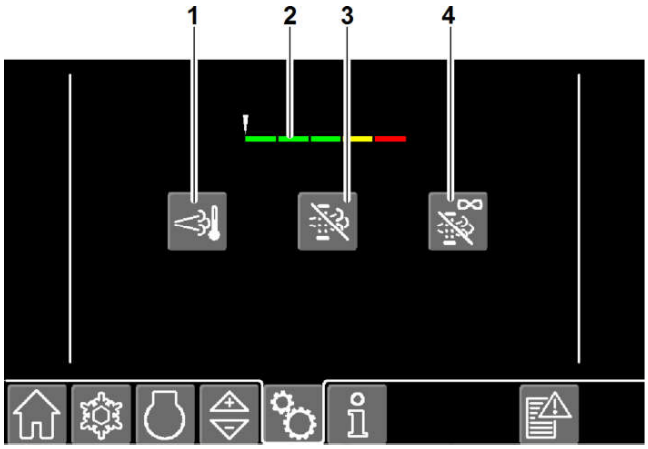

Fig. 775: Deactivating automatic filter regeneration

1 *Activating filter regeneration* button
2 Contamination level of diesel particulate filter
3 *Temporarily deactivating filter regeneration* button
4 *Permanently deactivating filter regeneration* button

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NOTICE
Escaped oil!
Environmental pollution.

- ▶ Collect oil in suitable receptacle.
- ▶ Dispose of discharged oil in eco-friendly manner.

- ▶ Remove existing covers.
- ▶ Depressurise hydraulic tank. (For more information see: Depressurising hydraulic tank, page 302)
- ▶ Remove protective cap from suction side drain valve **4**.
- ▶ Place suitable receptacle under suction side drain valve **4**.
- ▶ Place free end of drain hose **3** in receptacle.
- ▶ Screw drain hose **3** onto suction side drain valve **4** until oil is discharged slowly.
- ▶ Monitor hydraulic oil level, work with assistant if necessary.

When required hydraulic oil level is reached:
- ▶ Remove drain hose **3** from suction side drain valve **4**.
- ▶ Dispose of hydraulic oil in eco-friendly manner.
- ▶ Screw protective cap onto suction side drain valve **4**.

5.10.3 Hydraulic tank: Draining water and sediments

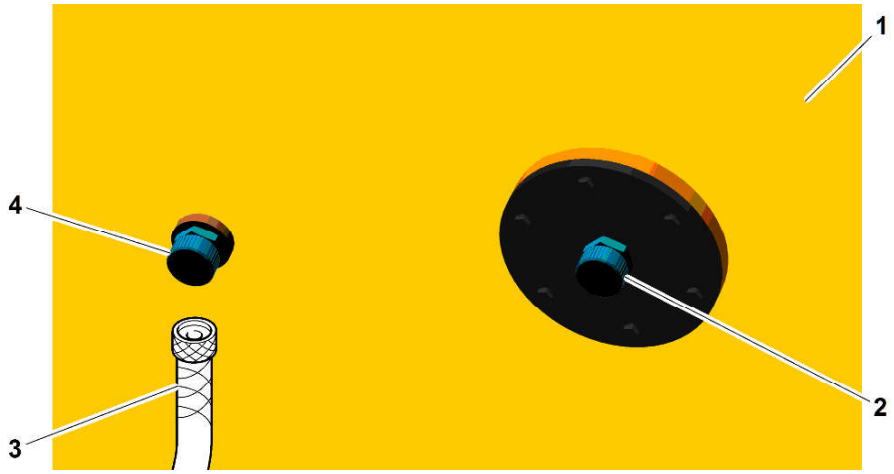

Fig. 793: Hydraulic tank drain valves

1	Hydraulic tank	**3**	Drain hose
2	Return side drain valve	**4**	Suction side drain valve

NOTICE
Not approved water content in eco-friendly liquid!
Damage to hydraulic components.

- ▶ Make sure that water content is under 0.1% of total content.
- ▶ Install bypass filter.
- ▶ Take an oil sample for oil analysis.

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– Working tool (for example bucket or grapple)

▶ Carefully check working attachment and bearings of uppercarriage for cracks or hairline cracks by means of visual inspection.

If cracks are suspected or there are hard-to-access areas:
▶ Apply dye penetration test.

If there are cracks or hairline cracks:
▶ Do not put machine into service.

▶ Have machine checked and repaired performed by Liebherr customer service.

5.13.4 Pin bearing: checking for wear

▶ Check bearings of complete working attachment for proper condition.

▶ Check play between pin and bearing: Operate working attachment quickly and stop it suddenly.

▶ In case of excessive wear contact Liebherr customer service.

5.13.5 Energy recuperation cylinder: Performing visual inspection

▶ Check energy recuperation cylinder for leaks.

▶ Check energy recuperation cylinder for cracks.

▶ Check energy recuperation cylinder for scoring.

If there are leaks, cracks or scoring:
▶ Contact Liebherr customer service.

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▶ Check leaks for tightness.

▶ Check all lubricating points for emerging grease.

If no grease emerges:
▶ Check lubricating pump and control.

Undercarriage (option)

Checking function of entire system

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

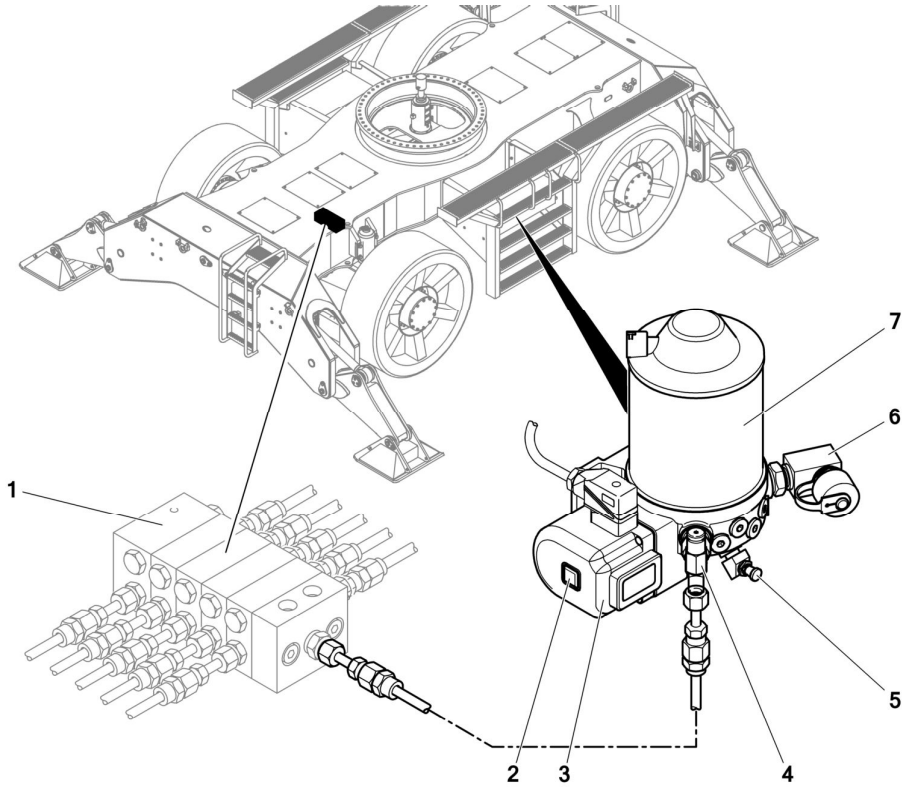

Fig. 814: Lubricating pump with grease container and main distributor

1 Main distributor
2 *Intermediate lubrication* button
3 Lubricating pump
4 Pressure relief valve
5 Grease nipple
6 Filling pump adapter
7 Grease container

▶ Press *intermediate lubrication* button **2**.

▶ Check main distributor **1** for tightness.

▶ Check leaks for tightness.

▶ Check all lubricating points for emerging grease.

If no grease emerges:
▶ Check function of pump control.