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 24 M Litronic
Type no.: 1198 (USA / CAN)
From Serial no.: 89416

Contact

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1.2 Technical data

1.2.1 Vibration emission

Description	Unit	Value
Hand/arm vibrations	m/s^2	≤ 2.5
Whole-body vibrations	m/s^2	≤ 0.5

Tab. 1: Vibration emission

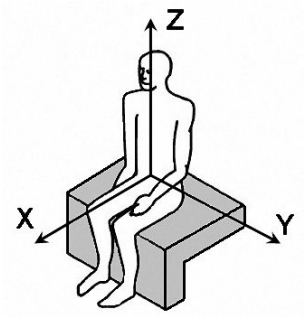
Operator's seat

– The operator's seat built into this machine by the manufacturer conforms to ISO 7096:2000, EM 6.

Hand/arm vibrations

– If the machine is operated as intended, the weighted (frequency-weighted) effective value of the hand/arm vibrations in accordance with ISO 5349- 1:2001 is less than 8.2 ft/s^2.

Whole-body vibrations



– This value conforms to the details of technical report ISO/TR 25398:2006.
– The measuring inaccuracy is defined in standard EN 12096:1997.
– As the specified values are individual effective values for specific typical application areas, only a limited assessment of the load imposed on the operator by whole-body vibrations is possible.
– In order to accurately assess the daily exposure of an operator in the course of an 8-hour working day, use the Liebherr brochure concerning whole-body vibrations as well as the specially written software.
– Both documents are available from Liebherr dealers and are provided with every new machine on a documentation CD (Liebherr-Parts).

1.2.2 Sound level

The sound values of the machine are specified in the technical data.

The sound pressure level (L_{WA}) is measured according to Directive 2000/14/EC. The measuring inaccuracy of the value for the sound pressure level corresponds to the difference between the guaranteed and the measured values.

The sound pressure level (L_{pA}) is measured according to ISO 6396. The measuring inaccuracy is defined in this standard.

1.2.3 Specifications

The specifications for this machine are contained in the following technical description.

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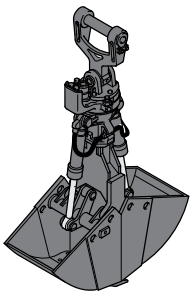
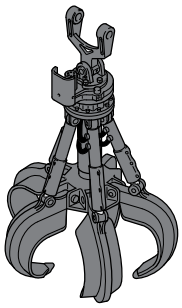
Variety of Tools



Shells for Loose Material

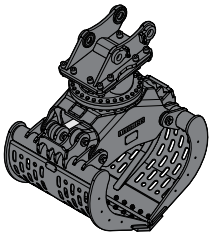
Shells for loose material with cutting edge (without teeth)

Clamshell model GM 10B (direct attached, single-motor, single-piece, HD suspension)						
Cutting width of shells	mm	1,000	1,300	1,500	1,500	1,800
Capacity	m^3	1.00	1.30	1.50	1.80	1.80
For loose material, specific weight up to	t/m^3	1.5	1.5	1.5	1.5	1.5
Weight	kg	1,050	1,135	1,195	1,255	1,440



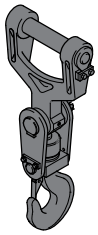
Multiple Tine Grapples

Grapple model GM 64, 4 tines (direct attached, single-motor, HD suspension)							
		open		semi-closed		closed	
Capacity	m^3	0.40	0.60	0.40	0.60	0.40	0.60
Weight	kg	1,050	1,160	1,190	1,310	1,350	1,515
Grapple model GM 65, 5 tines (direct attached, single-motor, HD suspension)							
		open		semi-closed		closed	
Capacity	m^3	0.40	0.60	0.40	0.60	0.40	0.60
Weight	kg	1,175	1,310	1,350	1,490	1,370	1,605



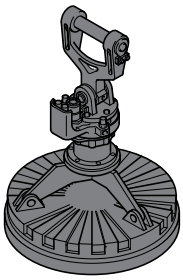
Sorting Grapple

Grapple model SG 25B (direct attached, bolt-on edge)							
		ribbed	perforated	closed	ribbed	perforated	closed
Cutting width of shells	mm	800	800	800	1,000	1,000	1,000
Capacity	m^3	0.50	0.55	0.55	0.65	0.75	0.75
Max. closing force	t	6	6	6	6	6	6
Weight incl. adapter plate	kg	1,235	1,175	1,120	1,320	1,240	1,180



Load Lift Hook

Load lift hook for industrial stick (direct attached, HD suspension)		
Max. load	t	12.5
Height with suspension	mm	945
Weight	kg	135



Magnet Devices/Lifting Magnets

Generator	kW	10	10
Electromagnets with suspension (direct attached)			
Power	kW	5.5	8.8
Diameter of magnet	mm	1,150	1,250
Weight	kg	1,125	1,415

- Remove fuels, operating fluids and lubricants from all components before disposal.
- Collect and store fuels, operating fluids and lubricants in suitable containers before disposal.
- Adhere to instructions of relevant manufacturer when disposing of fuels, operating fluids and lubricants.
- Have fuels, operating fluids and lubricants disposed of by old oil recycling point.
- Have metal parts disposed of by metal recycling point.
- Have plastic parts disposed of by plastic recycling point.
- Have rubber parts disposed of by rubber recycling point.
- Have electronic components disposed of by electronics recycling point.

2.3 Description of staff

2.3.1 Personal protective equipment

Operators, assistants and maintenance staff are responsible for the following:
- Wearing personal protective equipment
- Regular cleaning and care of protective equipment
- Immediate replacement of damaged parts of protective equipment

The protective equipment consists of following elements:
- Protective helmet
- Safety glasses
- Hearing protection
- Breathing equipment
- Protective gloves
- Warning clothing (reflective, in signal colour)
- Safety boots
- Special protective clothing
  - To prevent burns
  - To prevent freezing
  - To prevent acid burns
  - To prevent stabbing and cutting injuries

2.3.2 Requirements for staff

- Make sure that exclusively authorised and trained persons operate, maintain or repair the machine.
- Make sure that all persons operating, maintaining or repairing the machine have the specified minimum age.
- Make sure that staff training involves theoretical information (technology and safety) and practical training on the machine.
- Make sure that the staff have read and understood the operator's manual and supplied documentation.
- Make sure that staff undergoing training, education, instruction, or a general apprenticeship exclusively work on the machine under constant supervision by an experienced person.
- Regularly check safety-aware and danger-aware working of staff.
- Clearly specify staff responsibility for operation, set-up, maintenance and repair work.

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Operator's manual sign

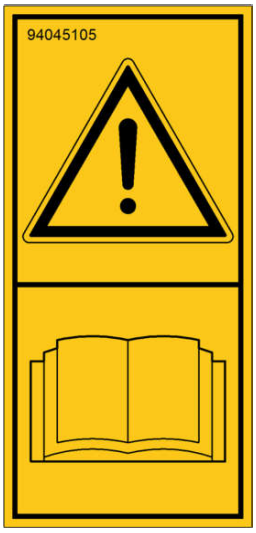

Fig. 24: Operator's manual sign

Read accident prevention instructions in operator's manual.

Accident prevention sign

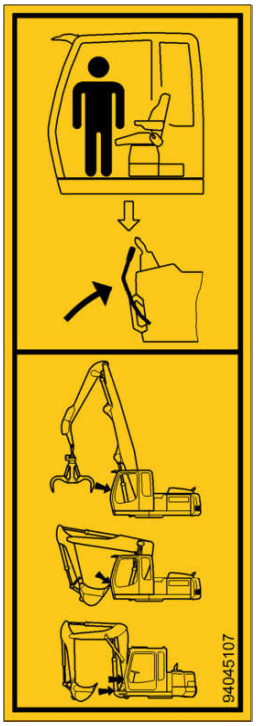

Fig. 25: Accident prevention sign

This sign contains following information:
- Move safety lever up before leaving the operator's seat.
- Working attachment reaches as far as operator's cab
- Be careful when working attachment is retracted

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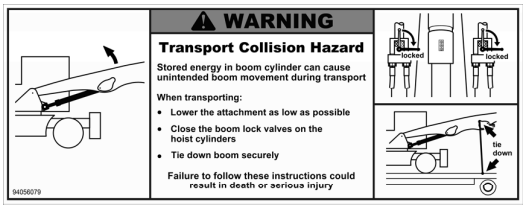

Fig. 57: "WARNING – Transport Collision Hazard" sign (option)

Applies to machines with energy recuperation cylinder.

Fig. 58: "IMPORTANT – Avoid Engine Damage" sign

2.4.3 Information signs

These signs contain information about:
– Machine operation
– Machine maintenance
– Machine characteristics

Control description sticker sign

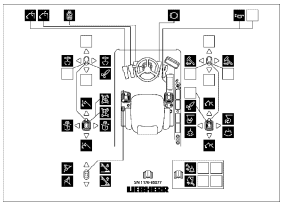

Fig. 59: Control description sticker sign

Indicates functions of controls not otherwise identified.

Control changeover sign

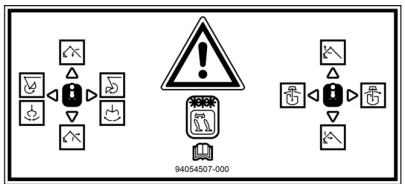

Fig. 60: Control changeover sign

Indicates modified control elements by activating the "control changeover" option.

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Damage to operator's cab and machine

Collision with obstacles

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

2.5.4 Tip over protective structure (TOPS)

Danger to life

Damaged falling object protective structures

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

Exceeding of total weight

- Make sure that total weight of machine (see identification plate) is not exceeded.
- Make sure that the machine does not exceed the total weight with heavy working tools.
- Make sure that the machine does not exceed the total weight after changing the working attachment.
- Make sure that the machine does not exceed the total weight with add-ons or after retrofitting.

2.5.5 Roll over protective structure (ROPS)

Danger to life

Damaged falling object protective structures

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

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2.8 Safe work

2.8.1 Machines with height adjustable cab

Danger to life

Persons in the danger zone

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

Machine tipping

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

Injuries

Falling out of operator's cab

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

Damage

Collision

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

2.9 Safe maintenance

2.9.1 Spare parts

Danger to life

Incorrect spare parts

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

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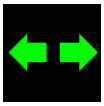
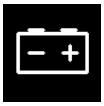
Symbol	Meaning
	Turn signal active
	Charge indicator; battery not charging.
	Emergency stop button 1 pressed
	Emergency stop button 2 pressed
	Emergency stop button 3 pressed
	Air flow reversal blocked
	Refuelling active
	Hydraulic system emergency mode switched on
	Valves blocked
	Maintenance due
	Maintenance of working tool due
	Servo control inoperative
	Control changeover
	Control pressure too low

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Symbol	Meaning
	Locking quick coupler 2
	Quick coupler locks.
	Quick coupler 2 locks.
	Quick coupler unlocks.
	Quick coupler 2 unlocks.
	Quick coupler is unlocked.
	Quick coupler 2 is unlocked.
	No working tool in locking position

Tab. 14: Status of quick coupler

Support

Symbol	Meaning
	Pontoon actuation active
	Outrigger movement
	Outrigger movement blocked
	Outrigger extension blocked

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3.2.8 *Operating hour meter and kilometre counter* submenu

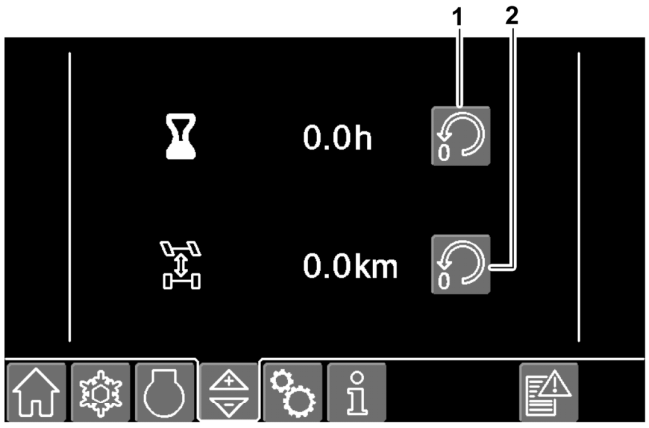

Fig. 271: Operating hour meter and kilometre counter submenu

1 *Resetting daily operating hour meter* button

2 *Resetting daily kilometre counter* button [3)]

3.2.9 *Windscreen wiper interval* submenu

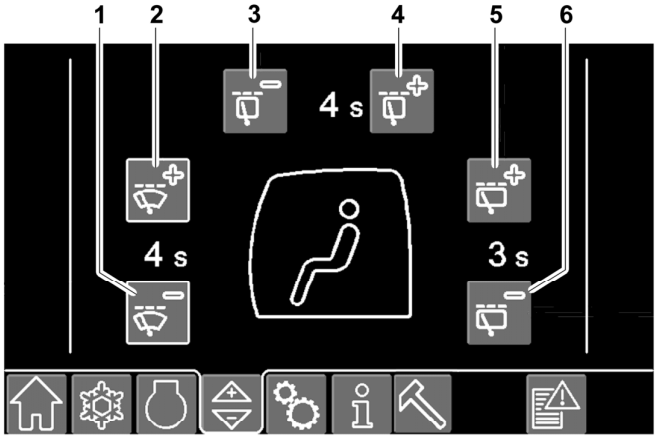

Fig. 272: Windscreen wiper interval submenu [4)]

1 *Reducing windscreen wiper interval* button

2 *Increasing windscreen wiper interval* button

3 *Reducing roof glass panel windscreen wiper interval* button

4 *Increasing roof glass panel windscreen wiper interval* button

5 *Increasing rear windscreen wiper interval* button

6 *Reducing rear windscreen wiper interval* button

[3)] Applies to machines with wheeled undercarriage

[4)] Quantity of windscreen wipers depending on machine type and equipment

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Diesel particulate filter menu

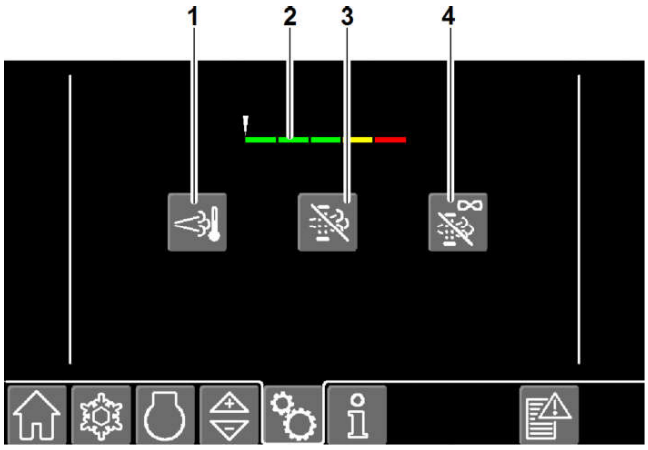

Fig. 289: Activate filter regeneration

1 *Activating filter regeneration* button
2 Contamination level of diesel particulate filter[6)]
3 *Temporarily deactivating filter regeneration* button
4 *Permanently deactivating filter regeneration* button

Sensor-controlled low idle automatic menu (option)

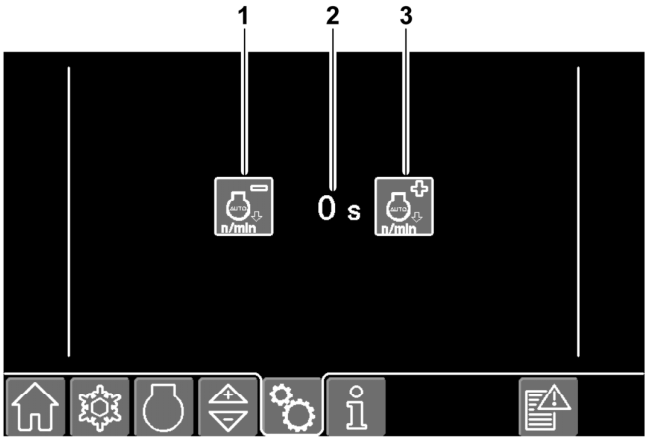

Fig. 290: Sensor-controlled low idle automatic menu

1 *Reducing time period* button
2 Time period
3 *Increasing time period* button

▶ Activate sensor-controlled low idle automatic: (For more information see: 3.4.12 Sensor-controlled low idle automatic, page 166)

6) Applies to machines with diesel engine D924

Laterally adjustable boom fine adjustment menu button[16)]

Fine adjustment of speed of laterally adjustable boom

Rotary stick fine adjustment menu button[17)]

Fine adjustment of speed of rotary stick

3.2.24 *User profile* submenu

In the *user profile* submenu it is possible to save the fine adjustment of control elements. The most recently saved conditions are restored when a user profile is activated.

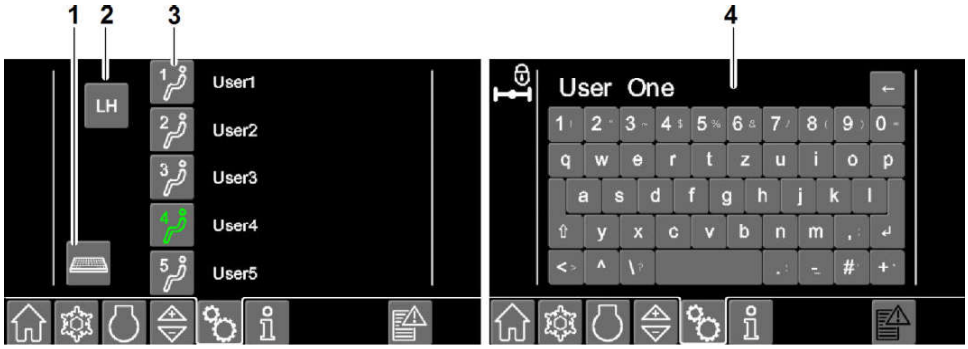

Fig. 326: User profile submenu and on-screen keyboard submenu

1 *On-screen keyboard* menu button
2 *Factory settings* button
3 *User profile* button
4 *On-screen keyboard* submenu

▶ Rename user profile: Press *on-screen keyboard* menu button **1**.
▷ *On-screen keyboard* submenu **4** appears.

▶ Rename user profile.

▶ Reset adjustments: Press *factory settings* button **2**.
▷ Machine operates with basic settings.
▷ User profiles remain saved.

16) Applies to machines with laterally adjustable boom

17) Applies to machines with rotary stick

3.3.2 Entering and exiting machine

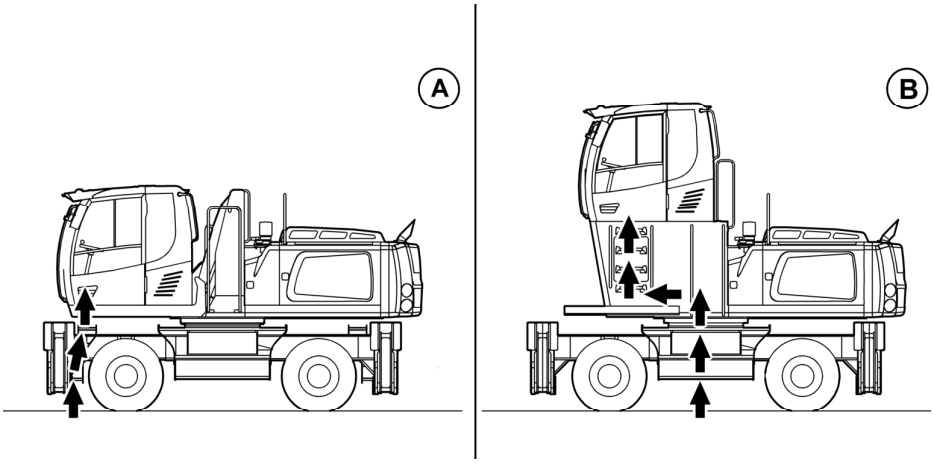

Fig. 355: Getting in using climbing aids

A Access without platform or walkway

B Access with platform or walkway

WARNING
Incorrect entry and exit!
Injuries.

- ▶ Enter and leave machine exclusively using climbing aids.
- ▶ Do not use control elements as handles.
- ▶ Do not jump from machine.
- ▶ When using the ladder, make sure you always have two hands and a foot, or two feet and one hand in contact with the ladder.

Entering machine

- ▶ Climb up facing the machine.
- ▶ Open door and enter operator's cab.
- ▶ Close door.
- ▶ Sit on operator's seat.
- ▶ Adjust operator's seat.

Exiting machine

- ▶ Park machine. (For more information see: 3.8 Parking machine, page 223)
- ▶ Align uppercarriage parallel to undercarriage.

If machine is not equipped with platform or walkway:

- ▶ Slowly swivel uppercarriage to the right until climbing aid is visible.
- ▶ Open door and leave operator's cab.
- ▶ Close door.
- ▶ Climb down facing the machine.

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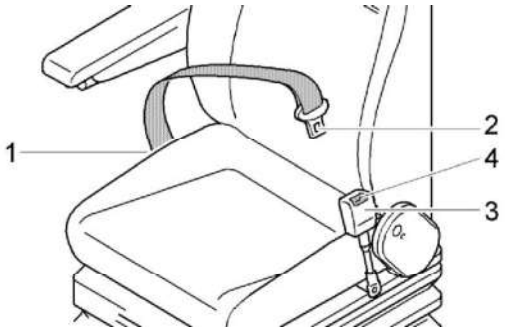

Fig. 376: Safety belt

1 Belt reel
2 Safety belt tongue
3 Belt buckle assembly
4 Release tab

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)

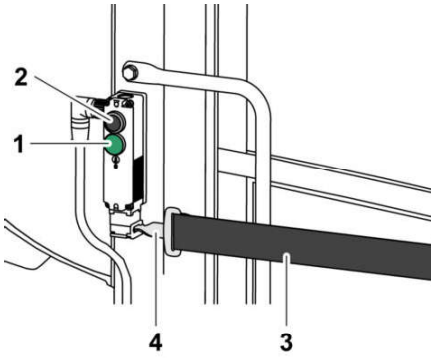

Fig. 377: Exit protection

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

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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)

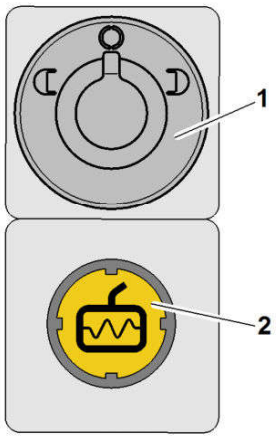

Fig. 402: Control unit for electrical mirrors

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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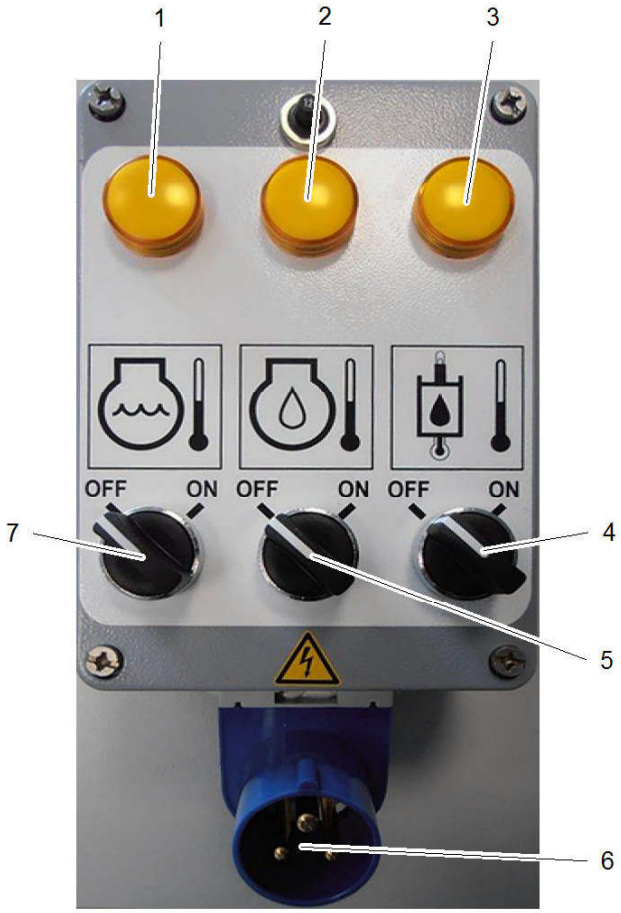

Fig. 438: Preheating for lubricants and fuels

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 in².
- ❑ 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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Key	Status of LEDs	Travel speed
	○ ○ ○	Normal travel
	✱ ✱ ✱	Creeper gear

Tab. 35: Creeper gear key

CAUTION
Sudden braking!
Damage to machine.

▶ Exclusively select creeper gear if machine is stationary.

▶ Press *creeper gear* key.

Travelling

WARNING
Steering directions reversed!
Injuries.

▶ Align uppercarriage so that the oscillating axle is in front during forward travel.

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 171)

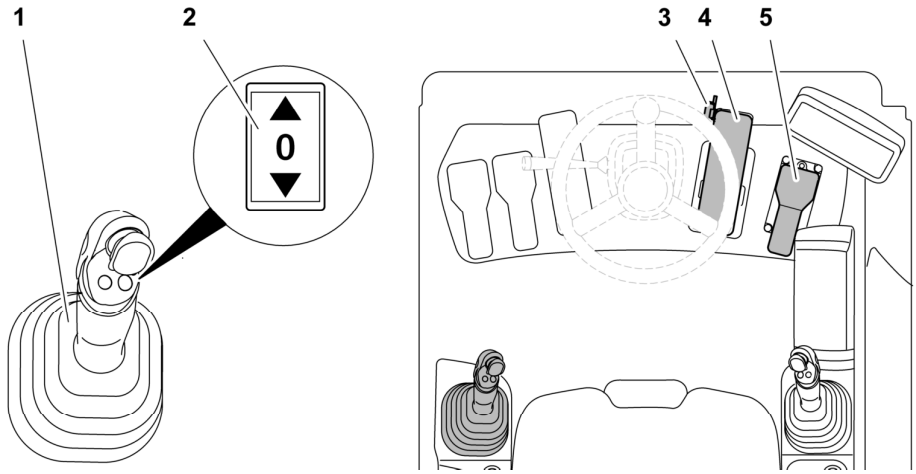

Fig. 470: Control elements

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

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Controlling working attachment with two-piece boom

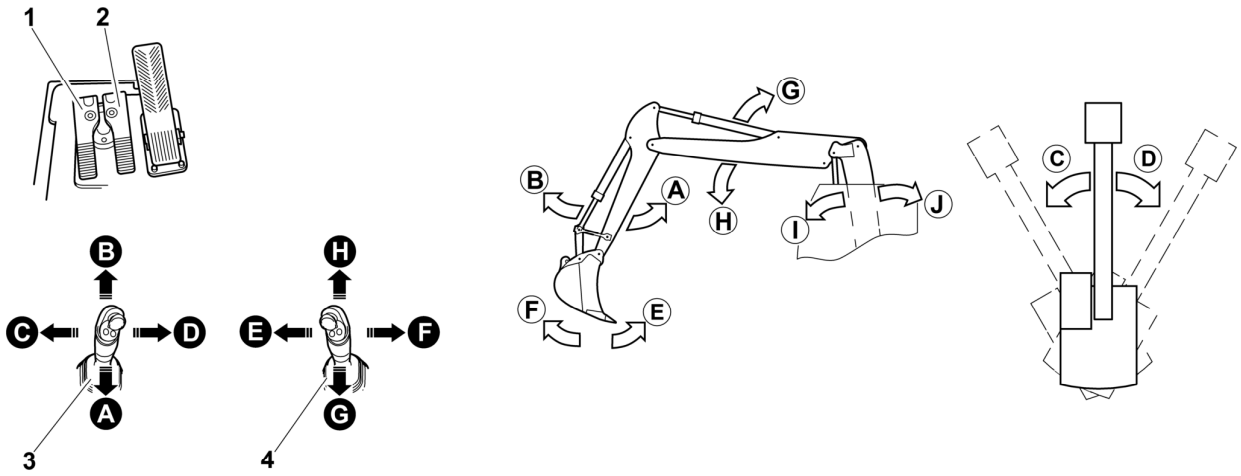

Fig. 516: Controlling working attachment with two-piece boom

1	Double pedal	**B**	Extending stick	**G**	Raising boom
2	Double pedal	**C**	Turning uppercarriage left	**H**	Lowering boom
3	Left joystick	**D**	Turning uppercarriage right	**I**	Lowering two-piece boom
4	Right joystick	**E**	Tilting bucket in	**J**	Raising two-piece boom
A	Retracting stick	**F**	Tilting bucket out		

Note
Different machine configuration!

▶ Observe control description sticker.

Left joystick

Function	Operation
Retract stick.	Move in direction retracting stick **A**.
Extend stick.	Move in direction extending stick **B**.
Turn uppercarriage left.	Move in direction turning uppercarriage left **C**.
Turn uppercarriage right.	Move in direction turning uppercarriage right **D**.

Tab. 45: Left joystick

Right joystick

Function	Operation
Tilt bucket in.	Move in direction tilting bucket in **E**.
Tilt bucket out.	Move in direction tilting bucket out **F**.
Raise boom.	Move in direction raising boom **G**.
Lower boom.	Move in direction lowering boom **H**.

Tab. 46: Right joystick

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Controlling working tool

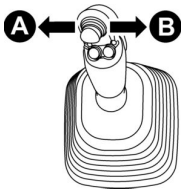


Fig. 543: Controlling working tool with mini-joystick

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

3.4.31 Grapple priority (option)

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

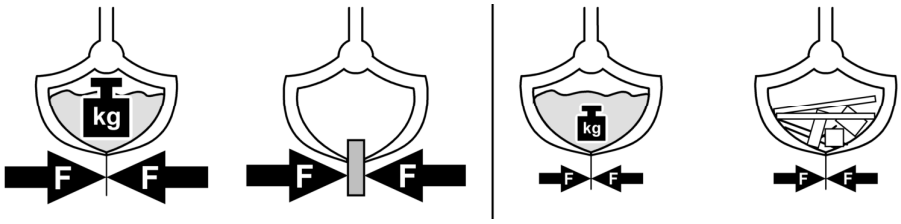


Fig. 544: Differently powerful closing forces for loads of different weights

WARNING
Falling load!
Danger to life.

▶ Make sure there are no persons in danger zone

▶ Deactivate grapple priority before picking up heavy loads.

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

Tab. 49: Grapple priority key

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

Locking height limitation

Note
Activated slew limitation and activated load moment limitation are locked when height limitation is locked.

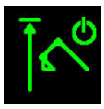
- ▶ Check whether slew limitation is switched on.
- ▶ Check whether load moment limitation is switched on.

A supervisor is authorised to lock height limitation functions for the operator:
– Switch off height limitation.
– Change maximum working height limit value.

When working height limitation is locked it is possible to change the limit value of the reduced working height (option) up to the maximum working height. (see: fig. 598, page 200)

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

- ▶ Insert authorisation key in key switch.
- ▶ Turn key to right into enabled position.
- ▶ Switch on height limitation. (For more information see: Switching on height limitation, page 199)
- ▶ Turn key to left.
- ▶ Pull out key.
  ▷ *Height limitation* button lights up green.
  ▷ *Height limitation* button is not active:



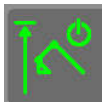
  ▷ *Maximum working height* button is not active:

- ▶ Hand over key to supervisor.

Switching on height limitation

Make sure the following precondition is met:
❑ Height limitation is enabled.

- ▶ Press *height limitation* button.
- ▶ Press confirmation button.
  ▷ *Height limitation* button lights up green:



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NOTICE
Damage to the machine due to incorrect handling of the tool attachment!
High pressures, torques and stresses can build up in the working attachment when working tools are used. The load is at its greatest when the hydraulic cylinders are completely extended or retracted (limit position) or the attachment is fully extended. Incorrect handling of the working tool can exceed the load limit. Attachment components, hydraulic cylinders and machines can be damaged!

- ▶ Do not move the hydraulic cylinders in or out all the way.
- ▶ Move the hydraulic cylinders carefully and slowly in the area of the limit positions (boundary area).
- ▶ When turning working tools, maintain a distance of at least 10° from the limit position of the bucket cylinder.

NOTICE
Damage to ballcocks!
Ballcocks are not used for controlling fluid flows, but for shutting off pipelines. Ballcocks must always be completely opened or closed. If the lever is in an intermediate position, the seals in the ballcock can be damaged.

- ▶ Always turn the lever of the ballcock all the way to the stop. The ballcock must be completely opened or closed.

3.6.2 Putting machine in working position

NOTICE
Unapproved use of parking brake!
Damage to travel gearbox.

- ▶ During work exclusively use service brake.

Putting machine with wheeled undercarriage with two axles in working position

- ▶ Make sure that travel direction switch is in neutral position.
- ▶ Make sure that parking brake is released.
- ▶ Lock service brake.
- ▶ Lock oscillating axle.
- ▶ Support machine.

Putting machine with wheeled undercarriage with more than two axles in working position

- ▶ Extend folding wings.
- ▶ Support machine.

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3.7 Installing and removing working attachment

3.7.1 Using quick coupler

▶ Follow operator's manual of the quick coupler manufacturer.

3.7.2 Installing and removing grapple on industrial stick

WARNING
Incorrect work on working attachment!
Injuries.

▶ Make sure that person by working tool is prepared for movements of working attachment.

▶ Make sure that no persons are in danger zone during movement of working attachment.

▶ Carefully move working attachment.

There are two ways to attach the grapple to the industrial stick of the machine.

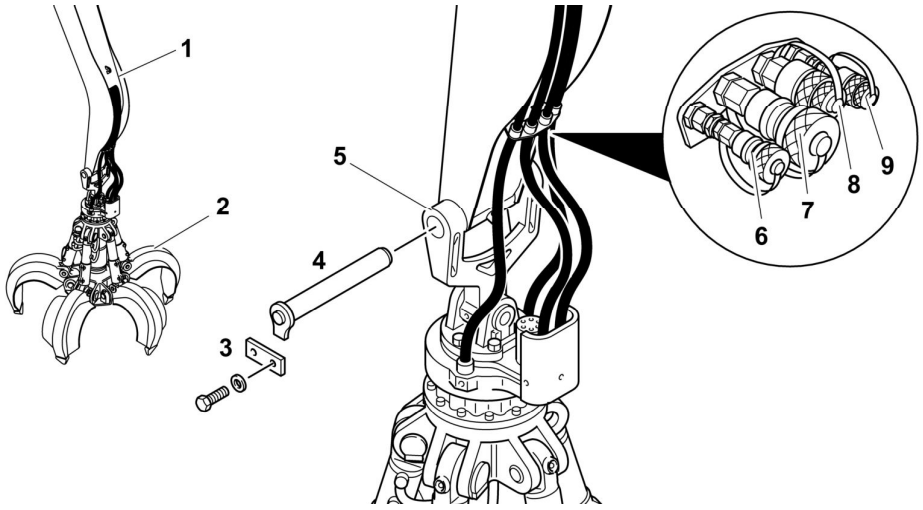

Fig. 656: Grapple on industrial stick, variant 1

1	Stick	**6**	Connection for turning grapple
2	Grapple	**7**	Connection for opening or closing grapple
3	Pin retention	**8**	Connection for opening or closing grapple
4	Pin	**9**	Connection for turning grapple
5	Grapple suspension		

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Emergency lowering lever in operator's cab

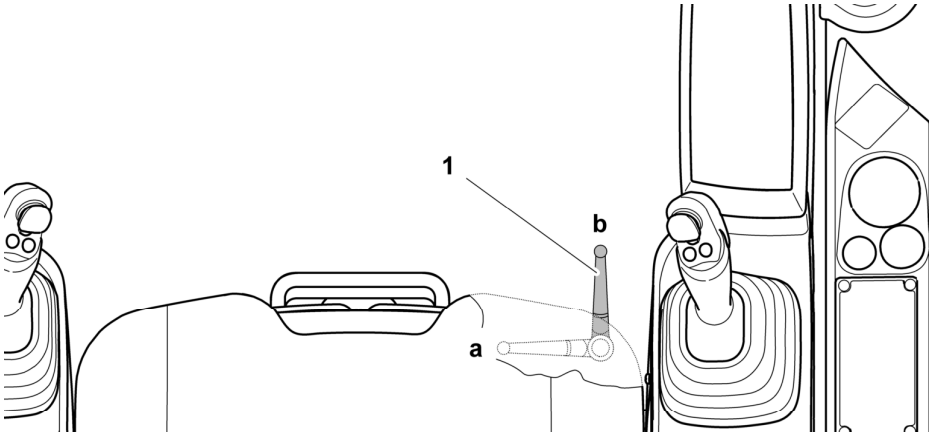

Fig. 667: Emergency lowering lever in operator's cab

1 Emergency lowering lever
a Cab adjustment mode position
b Emergency lowering position

▶ Move emergency lowering lever **1** to emergency lowering position **b**.
▷ Operator's cab is lowered.

▶ Stop lowering of operator's cab: Move emergency lowering lever **1** to cab adjustment mode position **a**.

Emergency lowering lever on pillar of cab lift frame

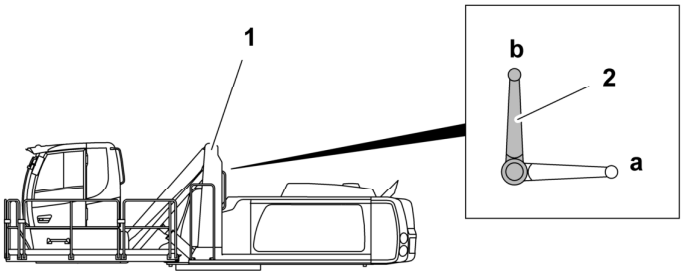

Fig. 668: Emergency lowering lever on pillar of cab lift frame

1 Pillar of cab lift frame
2 Emergency lowering lever
a Cab adjustment mode position
b Emergency lowering position

▶ Move emergency lowering lever **2** to emergency lowering position **b**.
▷ Operator's cab is lowered.

▶ Stop lowering of operator's cab: Move emergency lowering lever **2** to cab adjustment mode position **a**.

3.10.4 Towing

Towing is a stopgap measure and exclusively permitted in following situations:
– Tow machine out of danger area.
– Tow machine for repair.

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Symbol	Meaning	Effect, characteristic	Remedy
	A control error occurred while actuating diesel engine.	Diesel engine is damaged.	Shut off diesel engine. Contact Liebherr customer service.
	Control unit of diesel engine is defective.	Diesel engine is damaged.	Shut off diesel engine. Contact Liebherr customer service.
	Engine speed sensor is defective.	Diesel engine is damaged.	Shut off diesel engine. Contact Liebherr customer service.
	An error occurred in the injection system of diesel engine.	Diesel engine is damaged.	Shut off diesel engine. Contact Liebherr customer service.
	Prewarning in case of control error of diesel engine: Emergency shut-off of diesel engine is recommended.	Diesel engine runs in emergency mode. Diesel engine is damaged.	Shut off diesel engine. Contact Liebherr customer service.
	Control error of diesel engine: Emergency shut-off of diesel engine is recommended.		
	A synchronisation error occurred while actuating the diesel engine.	Diesel engine is damaged.	Shut off diesel engine. Contact Liebherr customer service.
	Control circuit of hydraulic system is depressurised.	Control of working attachment and uppercarriage is not possible.	Shut off diesel engine and restart. If symbol is still displayed: Contact Liebherr customer service.
	A general control error has occurred.	Functionality is restricted. Machine is damaged.	Shut off diesel engine. Contact Liebherr customer service.
	Software parameters missing after software update.	Diesel engine does not start.	Contact Liebherr customer service.
	Machine and attachment parameters do not match.	Diesel engine output is reduced automatically.	Contact Liebherr customer service.
	Prewarning: Diesel particulate filter is heavily contaminated.		Start manual filter regeneration.
	Diesel particulate filter is excessively contaminated.	Diesel engine output is reduced automatically.	Contact Liebherr customer service.

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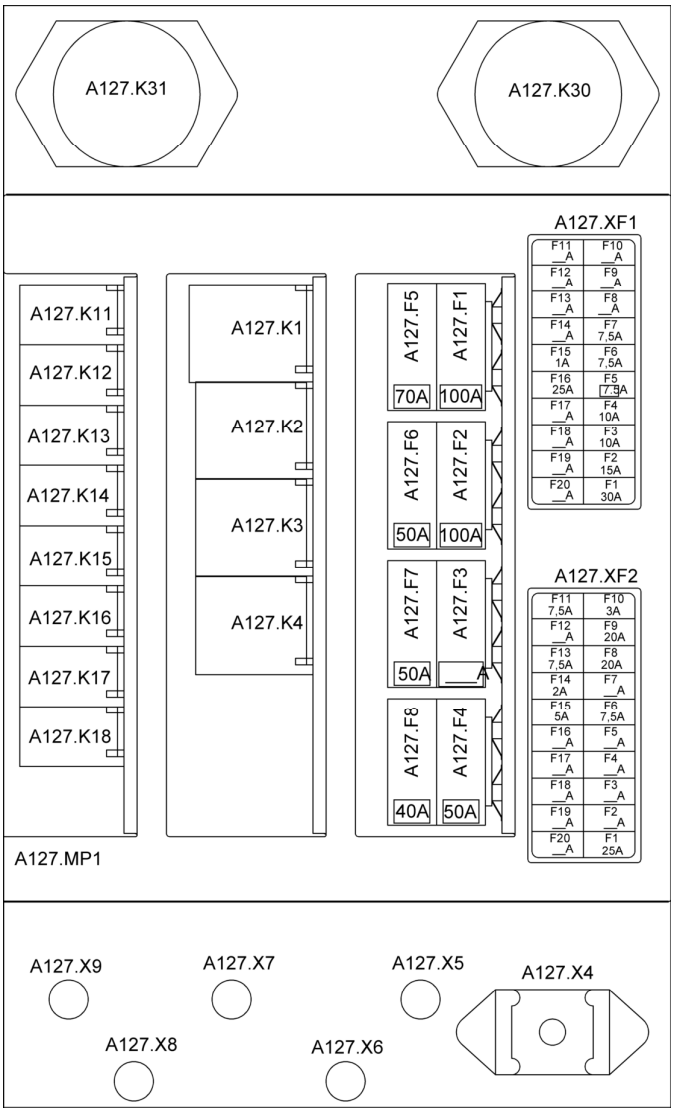

Fig. 743: Electric cabinet A127

Fuse	Consumer	Rating [A]
F1	Main fuse, terminal 15	100
F2	Operator's cab, terminal 30	100
F3	Heater flange, flame glow plug	100 , 30
F4	A128, terminal 15, S7	50
F5	Terminal 15	70
F6	Operator's cab, terminal 15	50
F7	Engine control unit	50
F8	Reserve	40

Tab. 74: Electric cabinet A127

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Relay	Consumer
K3	Turn indicator

Tab. 85: Additional printed circuit board A166

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

▶ Fold backrest forwards.

▶ Open cover **1**.

▶ Replace fuse.

▶ Close cover **1**.

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5.2.2 Lubricating chart

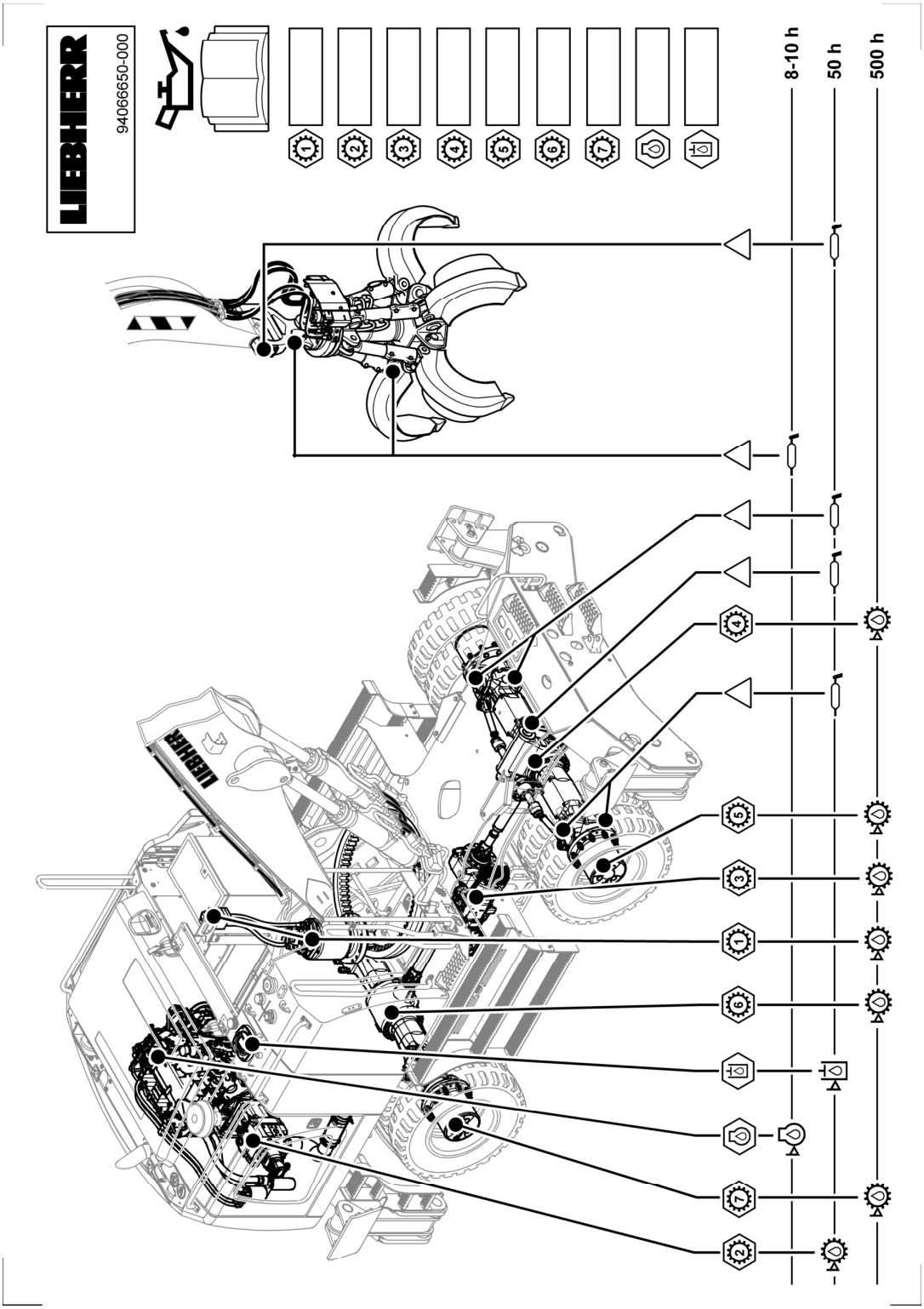

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Fig. 749: Lubricating chart

5.4 Access points for maintenance work

5.4.1 Access points on uppercarriage

General overview

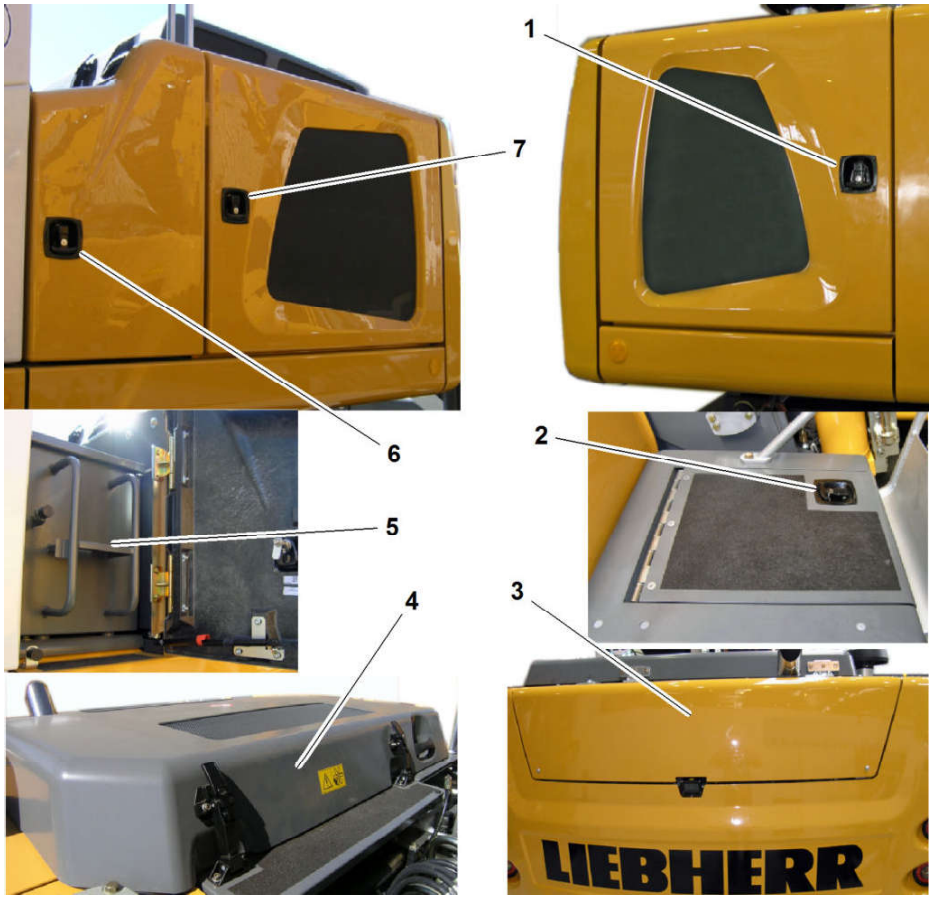

Fig. 759: Access points on uppercarriage

No.	Access point	Access to
1	Right side door	Fuel pre-filter, fuel fine filter, oil filter, air filter
2	Cab access	Fuel tank
3	Rear hood	Exhaust muffler, diesel particulate filter
4	Engine bonnet	Diesel engine, coolant container, hydraulic pumps, servo control unit
5	Tool boxes with cab access	On-board tool kit
6	Middle left side door	Cab access, hydraulic tank, grease container and engine bonnet

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5.8 Drive group

5.8.1 Diesel engine: Bringing into maintenance position

- ▶ Make sure diesel engine is standing horizontally.
- ▶ Shut off diesel engine.
- ▶ Let diesel engine cool down.
- ▶ Switch off battery main switch.
- ▶ Observe diverging instructions in description of the work steps.

5.8.2 Diesel engine: Checking oil level

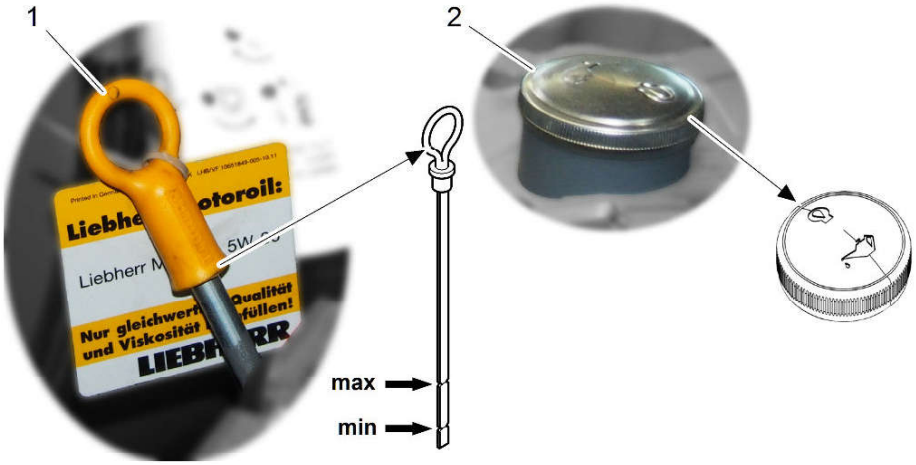

Fig. 762: Diesel engine: Checking oil level

1 Dipstick **2** Oil fill pipe

CAUTION
Hot engine oil!
Burns.

- ▶ Let diesel engine cool down.
- ▶ Wear gloves.
- ▶ Avoid skin contact with hot diesel engine.
- ▶ Avoid skin contact with hot engine oil.

Make sure the following preconditions are met:
❑ Machine is horizontal.

- ▶ Shut off diesel engine.
- ▶ Wait until oil has collected in the oil pan.
- ▶ Pull out dipstick **1**.
- ▶ Clean dipstick **1** with clean lint-free cloth.

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5.9 Cooling system

5.9.1 Checking coolant level

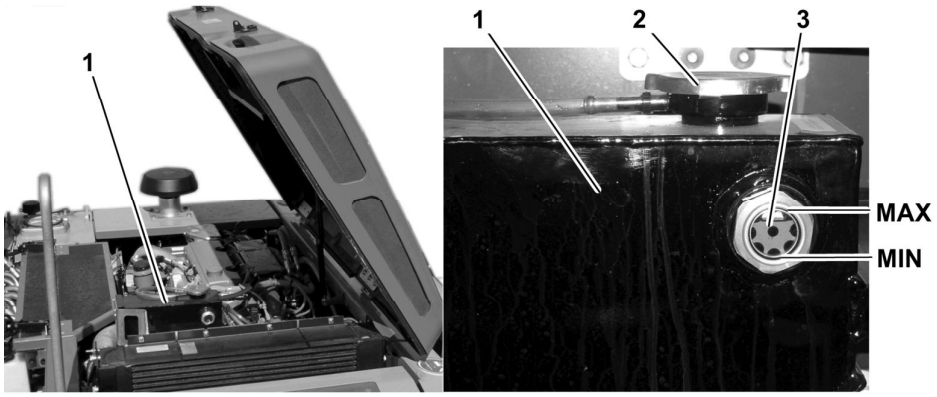

Fig. 771: Coolant container

1 Coolant container
2 Cover
3 Sight glass

WARNING
Hot, pressurised coolant!
Scalding, injuries.

- ▶ Avoid contact with coolant and parts carrying coolant.
- ▶ Check whether cover **2** on the coolant container has sufficiently cooled.

- ❑ Make sure the diesel engine is shut off
- ❑ Make sure the diesel engine has cooled down

Check coolant level.

- ▶ Check whether sight glass **3** is completely filled with coolant.

If sight glass **3** is not completely filled with coolant:

- ▶ Top up coolant.

Top up coolant.

- ▶ Release any excess pressure: Open cover **2** by half a turn.
- ▶ Slowly open cover **2** completely.
- ▶ Pour in coolant until sight glass **3** is filled completely with coolant.
- ▶ Close cover **2**.

Bleeding the heating circuit:

- ▶ Switch on operator's cab heating and set to the highest level.
- ▶ Let diesel engine run at idle speed for one minute.
- ▶ Shut off diesel engine.
- ▶ Check coolant level, top up if necessary.

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5.12 Axles

5.12.1 Lubricating axles

NOTICE
Unapproved grease!
Damage to bearings.

▶ Exclusively use grease in approved quality.

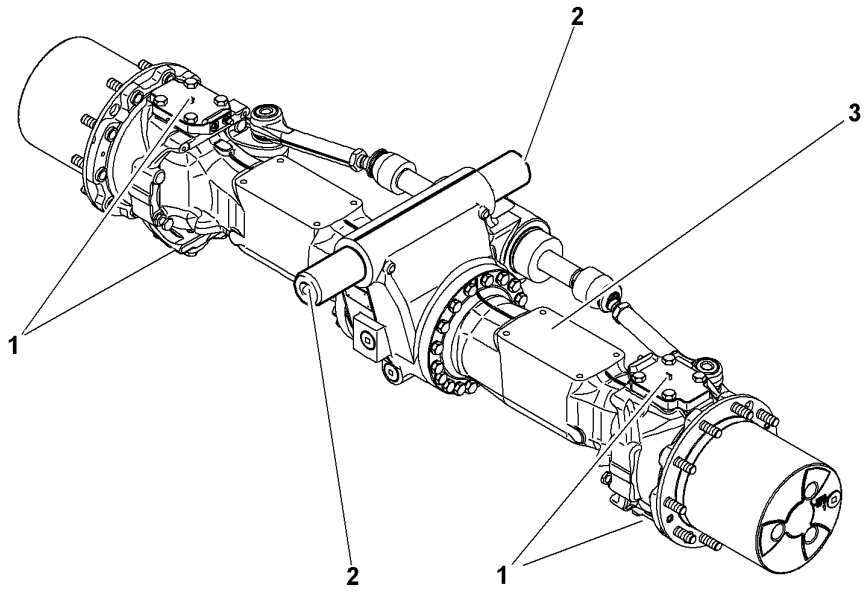

Fig. 779: Lubricating axles

1 Steering knuckle bearing grease fitting
2 Pendulum bolt bearing grease fitting
3 Oscillating axle

Lubrication intervals depend on the operating conditions. Extended travelling times reduce lubrication intervals.

If there is no central lubrication system on the undercarriage, the oscillating axle **3** must be manually lubricated.

Manually lubricating oscillating axle

▶ Remove plug from grease fitting.

▶ Lubricate steering knuckle bearing grease fittings **1** with hand grease gun until clean grease comes out at bearings.

▶ Lubricate pendulum bolt bearing grease fittings **2** with hand grease gun until clean grease comes out at bearings.

▶ Put plug onto grease fitting.

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5.15 Lubrication system

5.15.1 Lubrication system: Filling with grease

Uppercarriage

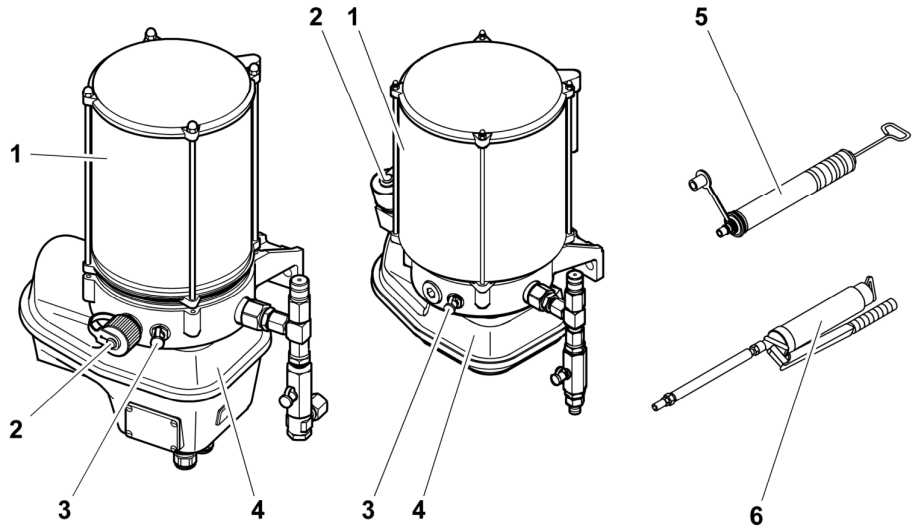

Fig. 791: Filling grease container

1	Grease container	**4**	Lubricating pump
2	Filling pump adapter	**5**	Filling pump
3	Grease nipple	**6**	Grease gun

NOTICE
Incorrect filling of grease container!
Machine damage.

▶ Exclusively fill grease container through adapter or grease fitting.

▶ Insert grease cartridge in filling pump **5**.

▶ Connect filling pump **5** to filling pump adapter **2**.

▶ Press contents of grease cartridge into grease container **1**.

If no filling pump **5** is available:

▶ Fill grease container **1** with grease gun **6** via grease nipple **3**.

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6 Appendix

If your machine has special attachments, you can find relevant information on the subsequent pages.

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