en **Operator's manual**

Hydraulic excavator

R 924

From serial number 40692

Document ID

	ORIGINAL OPERATOR'S MANUAL
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Manufacturer:	Liebherr Machinery (Dalian) Co. Ltd.
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Conformity:	

Contact

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Dalian

LFR/11824096/01/2016-02-02/en

Efficiency
High level of productivity for a lower overall operating cost

Reliability
Result of ongoing improvements

Comfort
Spacious, ergonomic and with high-visibility

Maintainability
Simplified daily checks, longer maintenance intervals

Ease of maintenance
All the walking areas of the uppercarriage are covered with anti-slid material to guarantee a safe and easy access. The swing gear is greased for life and requires no daily maintenance. The batteries, all filters and most centralized lubrication points are accessible from ground level, ensuring that daily maintenance and checks are quick and easily performed.

Simplified daily checks
The daily checks were taken into account from the start of the design, to make them simpler, more accessible and shorter. The optional automatic lubrication system reduces precious servicing time while guaranteeing optimal lubrication of the excavator.

Longer service intervals
The frequency of the service intervals is optimised to guarantee that each part is operating optimally and that the maintenance operations are only performed as necessary. Whether it is the interval for changing the hydraulic oil, which can be up to 3,000 hours, or the interval for changing the engine oil, every 500 hours, everything has been taken into account to reduce the frequency of interventions and thus limit the machine's downtime and reduce costs.

Expert advice and service provisions
Liebherr offers an expert advice service. Qualified personnel will help you make the appropriate decisions to meet your needs: sales discussion based on the application, service agreements, advantageous repair alternatives, original parts management, and remote data transfer for fleet management.

LiDAT data transfer system
- Complete fleet management, all from one source
- Optimized economical performance of the machine park thanks to detailed view of the distribution of operating states and times
- Reports on capacity commitment and the use of the machine park can be called up daily via the Web portal
- Precise location of the machine
- Regional delimitation and fixed service times increase safety and reliability

Accessibility to service areas
- Access to batteries and filters from ground level
- Access platform to engine oil dipstick

Central lubrication system
- The manual central lubrication system (3 points), fitted as standard, allows for daily lubrication of elements and reduction of machine downtimes
- The optional automatic lubrication system provides only the required amount of grease to the various components and increases their lifetime. It avoids spillage and waste, and quickly pays for itself

Options

Undercarriage

- Steps, wide version for 700 mm and 800 mm track pads
- Track guides (three pieces per track frame)
- Track guides (two pieces per track frame)
- Track pads 700 mm, 800 mm

Uppercarriage

- Automatic central lubrication system
- Diesel refuelling pump (electric)
- Electric socket for external start-up aid (24 V)
- Fuel anti-theft device
- Fuel tank cap lockable with padlock
- Rearview mirror on counterweight
- Right-hand rearview mirror

Hydraulic System

- Liebherr hydraulic oil, adapted for extreme climate conditions

Engine

- Air pre-filter with dust trap
- Fuel preheating (24 V)

Operator's Cab

- Additional front and/or rear cab headlights (Halogen or LED)
- Amber beacon
- Auxiliary heater (programmable)
- Dark tinted windows
- Electric socket (12 V)
- Emergency stop button in cab
- Falling objects protection structure (FOPS)
- Front guard protection structure (FGPS)
- Front headlights (two pieces, LED)
- Handrest for joysticks
- Liebherr proportional control (mini-joysticks 2 axis)
- Operator seat "Comfort" with pneumatic damping and retractable seat belt
- Preparation for LiDAT (Liebherr data transfer system)
- Protection guard (front window and/or roof window)
- Rear view monitoring camera
- ROPS safety cab structure (ISO 12117-2)
- Sun visor
- Travel alarm

Attachment

- Additional headlight on boom (left, Halogen or LED)
- Automatic central lubrication system
- Bottom protection for boom
- Bottom protection for stick
- Filter for hydraulic hammer return flow
- Headlight on boom (right, LED)
- High pressure circuit
- Hydraulic or mechanical quick coupler
- Liebherr bucket range
- Liebherr tooth system
- Medium pressure circuit
- Overload warning device
- Safety check valves for stick cylinder
- Safety check valves on hoist cylinders
- Tool Control, 10 tool adjustments selectable via display

Non-exhaustive list, please contact us for further information.

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.

2.5 Safety warnings

2.5.1 General safety instructions

Qualification of the operating personnel

Only expressly authorised and trained people are allowed to operate, maintain or repair the machine. The statutory minimum age shall be complied with.

Training of the personnel should include theoretical information about technology and safety as well as practical training on the machine.

It is essential to make sure that the operating personnel have read and understood the operator's manual and any other additional instructions which may be provided.

Personnel who are undergoing training or instruction or are taking part in a general apprenticeship are only allowed to work on the machine if permanently supervised by an experienced person.

The owner must check regularly that the personnel are working safely, with awareness of the potential dangers and in accordance with the operating manual.

The responsibility of the personnel for operation or setup, maintenance and repair must be clearly defined.

Personal protective equipment

Wear safe working clothes when you are working on or with the machine.

For certain work, it is mandatory to wear safety glasses, safety boots, a protective helmet, working gloves, a high-visibility tabard, ear defenders and additional protective equipment.

Avoid wearing rings, wristwatches, ties, scarves, open jackets and loose-fitting clothing. Risk of injury, for example by getting snagged or pulled in.

Safety instructions at the place of use

Find out from the construction site manager whether there are special safety instructions applicable on the construction site, and comply with them.

Do not work in any way which represents a safety risk. Refuse to comply with instructions from third parties which contravene safety instructions. This also applies with regard to the rules of the road.

2.5.2 Protection from crushing and burns

Never work under an attachment that is not on the ground or firmly supported.

Never use damaged or insufficiently strong ropes or slings.

Always wear protective gloves when handling wire ropes.

When working on the attachment, never attempt to align the bores with your bare hands. Use a suitable adjustment spike.

Make sure no objects can fall down or be sucked in by the fan while the engine is running. The fan can be damaged by these objects or throw them out.

At operating temperature, the coolant and the hot oil can cause burns. Avoid any contact with parts that conduct coolant, oil or hot fluids.

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Even when stored and used correctly, hoses and hose lines are subject to natural ageing. This restricts their service life. Incorrect storage, mechanical damage and impermissible loading are the most frequent causes of accidents. Use at the limits of the permissible load can shorten the service life (e.g. high temperatures, frequent movement cycles, extremely high pulse frequencies, multi-shift working).

Hoses and hose lines must be replaced if an inspection reveals the following circumstances:
- Damage to the outer layer down as far as the insert (e.g. chafe marks, cuts and tears).
- Embrittlement of the outer layer (crack formation in the hose material)
- Deformation that does not correspond to the natural shape of the hose or hose line, both in depressurised and in pressurised condition or in the case of bends, e.g. delamination, blister formation
- Leaks
- Failure to comply with the installation requirements
- Damage or deformation to the hose fitting which reduces the strength of the fitting or of the connection between the hose and the fitting
- Dislocation of the hose from the fitting
- Corrosion on the fitting which impairs function and strength

Note the following when renewing hoses and hose lines:
- Exclusively use genuine spare parts.
- Install and fit the hoses and lines proficiently, and make sure that the correct connections are used.
- Always make sure that the hoses and hose lines are installed without torsion. With high-pressure hoses, it is always necessary to attach the bolts of the half clamps or full flanges at both hose ends, and only having done this should they be tightened.
- For high-pressure hoses and hose lines with an elbow fitting, always first tighten the flange at the end with the elbow fitting, and only subsequently at the end with the straight fitting.
- Any fastening clamps in the middle of the hose are not allowed to be fitted and tightened until afterwards.
- Check every day that all clamps, covers and protective devices have been fastened correctly. This will avoid vibration and damage during operation.
- Install the hoses and hose lines so as to avoid any possibility of chafing on other hoses, hose lines or other parts.
- A minimum distance from the other parts of approx. 1/2 the external diameter of the hose is recommended. However, the distance should not be less than 10 mm to 15 mm.
- When renewing hoses and hose lines on moving parts, check that there are no restrictions, chafe marks or overlapping lines anywhere along the entire range of movement.

Safety devices

If it is necessary to remove safety devices, the safety devices must be re-attached and checked immediately on completion of the work.

Electrical and electronic systems

Avoid standing near the running diesel engine. People with pacemakers must not stand near the running diesel engine (minimum distance 50 cm).

When the diesel engine is running, do not touch any live parts on the electrical connection of the injection pumps which are controlled by solenoid valves.

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- ▶ Shut off the diesel engine.
- ▶ Move the safety lever to the upper position.
- ▶ Push the handle **5** downwards.
- ▶ Open the cab door and engage it in the locking mechanism **1**.
- ▶ Climb out with your face towards the machine.
- ▶ Move the release lever **4** outwards.
- ▶ Close the door.

3.2.3 Emergency exit

Fig. 43: Information sign: emergency exit / emergency hammer

An information sign on the rear window identifies the rear of the operator's cab as the emergency exit. The emergency hammer is located next to the cab door under the cab roof.

- ▶ In an emergency, break the rear window with the emergency hammer.

3.2.4 Fire extinguisher (option)

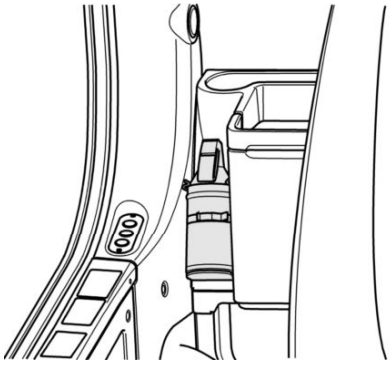

Fig. 44: Fire extinguisher

The fire extinguisher is in the operator's cab.

- ▶ Have fire extinguisher inspected according to the regulations in force where the machine is used.
- ▶ Observe operating instructions on fire extinguisher.

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Upper windscreen

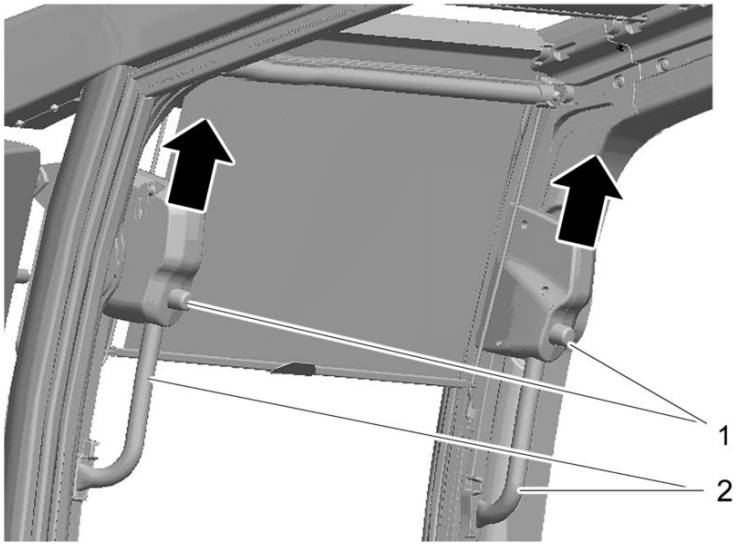

Fig. 62: Upper windscreen

1 Knob **2** Handle

Opening upper windscreen

- ▶ Press knobs **1** simultaneously.
- ▶ Push upper windscreen upwards with handles **2** and pull back at the same time until it engages in the roof of the operator's cab.

Closing upper windscreen

- ▶ Press knobs **1** simultaneously.
- ▶ Pull upper windscreen downwards with handles **2** and push forwards at the same time until it engages in the roof of the operator's cab.

Complete windscreen

Opening complete windscreen

- ▶ Open lower windscreen.
- ▶ Open upper windscreen.

Closing complete windscreen

- ▶ Close upper windscreen.
- ▶ Close lower windscreen.

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Air in operator's cab is recirculated.

DANGER
Limited visibility caused by fogged windows!
Danger to life, injuries, damage.

- ▶ Do not leave recirculated air mode switched on for long periods.
- ▶ Activate AUTO operating mode.

Defrosting operating mode

Fan runs on maximum power.

Front air outlet (at windscreen) is open, other air outlets are closed.

Operator can control temperature.

Switching air conditioning unit on and off

- ▶ Switch on air conditioning unit: Press *Power* key **1**.
  ▷ LED in *Power* key **1** lights up.
- ▶ Switch off air conditioning unit: Press *Power* key **1**.
  ▷ LED in *Power* key **1** goes out.

Setting air conditioning unit

- ▶ Set temperature and blower power: Press corresponding key.
- ▶ Set air supply: Press corresponding key.
  ▷ LED of corresponding key lights up.

Activating and deactivating operating mode

- ▶ Activate operating mode: Press corresponding key.
  ▷ LED of corresponding key lights up.
- ▶ Deactivate operating mode: Press corresponding key.
  ▷ LED of corresponding key goes out.

Displaying temperature

- ▶ Display outside temperature: Press *ECON* key **8** for 5 seconds.
- ▶ Display inside temperature: Press *defrosting* key **9** for 5 seconds.

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Fuel consumption menu

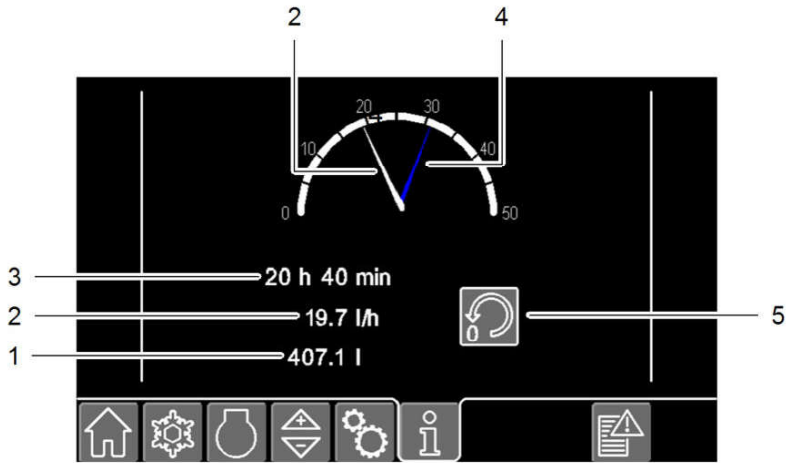


Fig. 127: Fuel consumption menu

1 Fuel consumed[10)]

2 Average fuel consumption[10)]

3 Elapsed time of fuel consumption[10)]

4 Average fuel consumption in past 60 seconds

5 *Resetting fuel consumption hour meter* button

CodingKey menu

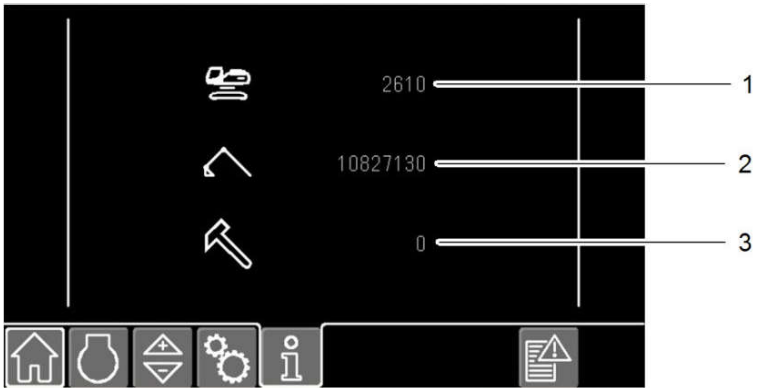


Fig. 128: CodingKey menu

1 CodingKey of machine

2 CodingKey of working attachment

3 Number of installed working tool

[10)] Since last reset

3.3.5 Engine speed and operating mode

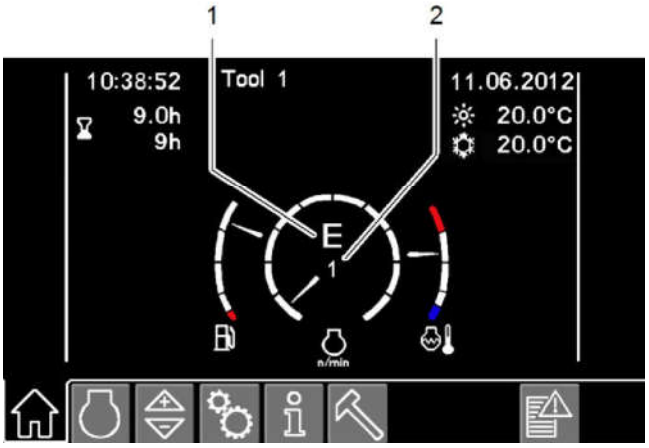
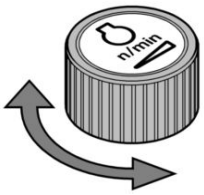


Fig. 138: Display of engine speed level and operating mode in the main menu

1 Operating mode **2** Engine speed level

Engine speed

Ten engine speed levels can be selected.



- ▶ Increase engine speed level: Turn turning knob for adjusting the engine speed in clockwise direction.
- ▶ Reduce engine speed level: Turn turning knob for adjusting the engine speed in anti-clockwise direction.

Operating mode

The four operating modes permit optimum use of the machine according to the work to be done.

Operating mode			Operation	Engine speed level	Hydraulic power
Key	Status of LEDs	Mode			
	☀ ○ ○	S (SENSITIVE)	Precise work or lifting loads	7	Limited
	○ ☀ ○	E (ECO)	Light to medium work	8	Slightly limited
	○ ○ ☀	P (POWER)	Heavy work	9	Unlimited
	☀ ☀ ☀	P+ (POWER PLUS)	Very heavy work	10	Unlimited

Tab. 14: Operating modes

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The controls described below meet the **ISO standard for controllers** and are part of the standard equipment of the machine.

In a machine with a control variant:
– It is the operator who decides how the control variant is activated.
– Controls are specific to the options.

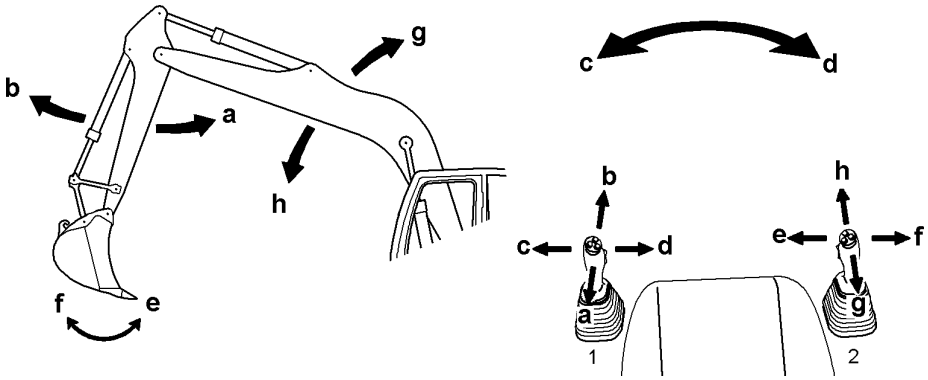

Fig. 164: Controls for the working attachment

1 Left joystick **2** Right joystick

Controlling the boom

▶ Raise the boom: move the right joystick **2** in direction **g**.

▶ Lower the boom: move the right joystick **2** in direction **h**.

Controlling the stick

▶ Retract the stick: move the left joystick **1** in direction **a**.

▶ Extend the stick: move the left joystick **1** in direction **b**.

Controlling the bucket or grapple

DANGER
Guiding the bucket or grapple by hand!
Fatal or serious injuries.

▶ Do not allow anyone to guide the bucket or grapple by hand.

▶ Tilt the bucket in or close the grapple: move the right joystick **2** in direction **e**.

▶ Tilt the bucket out or open the grapple: move the right joystick **2** in direction **f**.

Combining the controls

▶ Operate the joysticks diagonally.

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3.4.4 Preparatory work

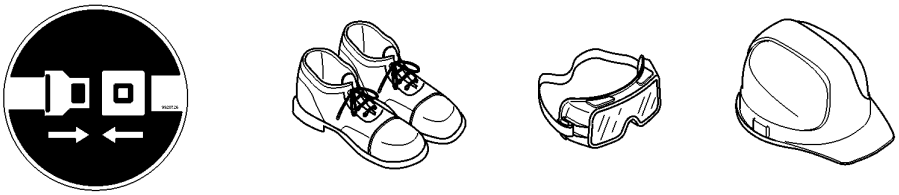

Fig. 178: Protect yourself

WARNING
Risk of injury during work!

- ▶ Wear safety boots. If required for certain jobs, wear a protective helmet and safety glasses.
- ▶ Put on the safety belt before starting work.
- ▶ Give a warning signal with the horn before starting work.

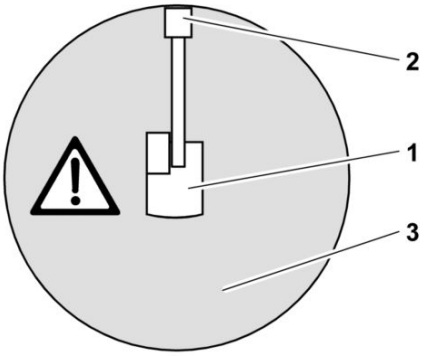

Fig. 179: Plan view of the danger zone of the machine

1 Machine
2 Reach of the working attachment
3 Danger zone

DANGER
Risk of fatal injury within the reach of the working attachment!

- ▶ Make sure that no-one is in the danger zone.

- ▶ Position the transport vehicle and machine so that the machine operator can easily see the load which is to be moved.

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3.5 Installation and removal of attachment parts

3.5.1 Installing and removing bucket

The affected working tools are:
- Backhoe bucket
- Ditch-cleaning bucket
- Ripper teeth

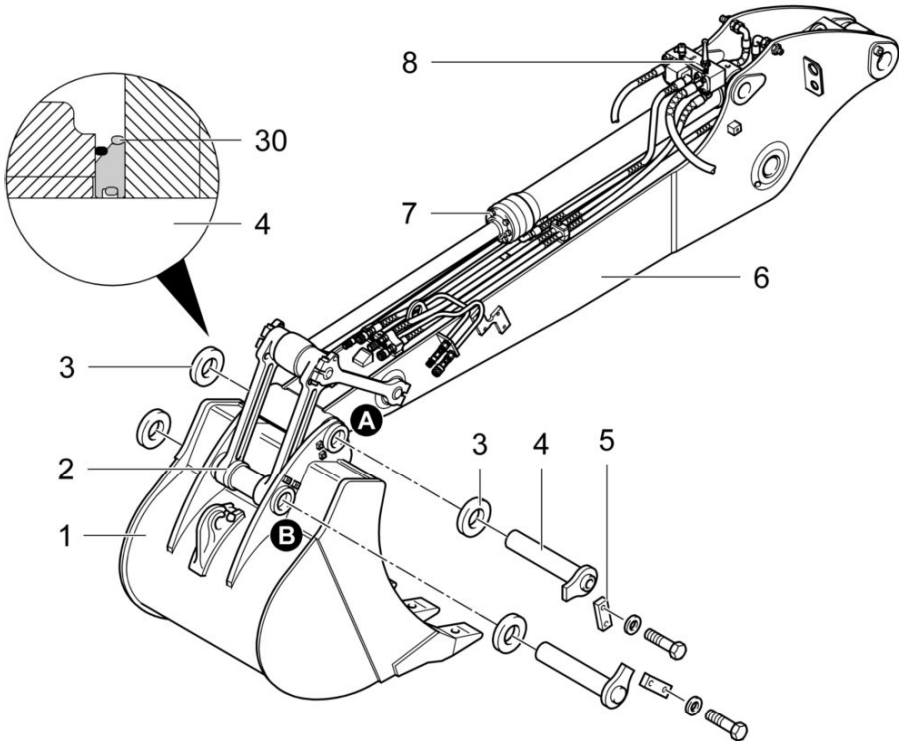

Fig. 189: Installing and removing bucket

A	Bearing (stick side)	**4**	Pin
B	Bearing (connecting rod side)	**5**	Locking plate
1	Bucket	**6**	Stick
2	Connecting rod	**7**	Restrictor check valve
3	Sealing ring	**8**	Stopcock
30	O-ring		

Make sure the following preconditions are met:
❑ Bottom part of bucket **1** is resting fully on ground.

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DANGER
Slewing brake in emergency mode!
Danger to life, damage.

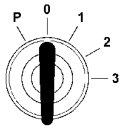
- ▶ Make sure that no-one is in danger zone.
- ▶ Inform staff that machine is in emergency mode.
- ▶ Reduce machine movements to a minimum.
- ▶ Have malfunctions that require using emergency mode repaired immediately.

NOTICE
Missing warning symbols and error messages on function of diesel engine on the display!
Damage to diesel engine.

- ▶ Have malfunctions that require using emergency mode repaired immediately.

Starting emergency mode

Make sure the following preconditions are met:
- ❑ Battery main switch is in the *ON* position.
- ❑ Safety lever is up.



- ▶ Turn ignition key to position *1*.
- ▶ Move switch **2** to position *II* (see: fig. 202, page 126) .
- ▶ Turn ignition key to position *3*.
  - ▷ Diesel engine starts.
  - ▷ Slewing brake opens.
- ▶ Push down safety lever.
- ▶ Move machine into open area and have malfunctions remedied immediately.

Switching off emergency mode

- ▶ Move switch **2** to position *I* (see: fig. 202, page 126) .
- ▶ Move safety lever up.
- ▶ Turn ignition key to position *0*.

3.7.2 Jump starting

DANGER
Explosion caused by hydrogen ejected from battery!
Death, injuries, damage.

- ▶ Wear safety glasses and protective gloves.
- ▶ Keep away from ignition sources.
- ▶ Avoid sparks near flat battery.
- ▶ Exclusively use jump starting cable with adequate diameter.

Connecting flat battery to jump starting battery

- ▶ Use first jump starting cable to connect positive pole of flat battery with positive pole of jump starting battery.

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Malfunction / error	Cause	Remedy
Diesel engine oil pressure too low	Oil level in oil pan too low	Fill with oil up to mark on dipstick.
	Oil too thin (oil diluted with fuel)	Drain oil and fill with prescribed oil.
	Oil pressure switch defective	Check oil pressure and replace defective oil pressure switch. Contact Liebherr customer service.
	Oil pressure regulating valve defective or contaminated	Contact Liebherr customer service.
	Excessive play or damages of bearings caused by worn bearings	Contact Liebherr customer service.
Engine oil in cooling system	Engine oil cooler or engine oil cooler housing leaking	Contact Liebherr customer service.
Coolant in diesel engine oil	O-rings of cylinder liner leaking	Contact Liebherr customer service.
	Diesel engine oil cooler or diesel engine oil cooler housing leaking	Contact Liebherr customer service.

4.2.2 Hydraulic system

Malfunction / error	Cause	Remedy
Unusual noises or noise emissions can be heard. Hydraulic pumps draw in air.	Stop valves on hydraulic tank are closed. Hydraulic oil level is too low.	Shut off diesel engine immediately. Check stop valve and fill level.
Machine movements are too slow.	Selected speed step too low.	Select higher speed step or different operating mode.
Power modes do not achieve required performance.	Control is defective.	Contact Liebherr customer service.
Hydraulic oil temperature is too great.	Radiator is contaminated.	Clean radiator.
	Fan drive is defective.	Shut off diesel engine. Contact Liebherr customer service.
Hydraulic oil level is too low.	Hydraulic system is leaking and losing oil.	Contact Liebherr customer service.
No function assigned to control elements.	Servo control is switched off. Safety lever is in upper position.	Switch on servo control. Push down safety lever.
	Control is defective.	Contact Liebherr customer service.

4.2.3 Travel gear

Malfunction / error	Cause	Remedy
Oil escapes from the travel gearbox, travel gearboxes, carrier rollers or idler-wheel.	Seal is damaged.	Contact Liebherr customer service.

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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
				❍	❍			Diesel engine: Check pump distributor gear, oil pan and engine bearing for firm seat.		
				❍	❍			Diesel engine: Check and adjust valve play.		
			❍	❍	❍			Diesel engine: Check vibration damper for deformation.		
			❍	❍	❍			Diesel engine: Check condition of the silent blocks.		
	●	●	❍	❍	❍	✦		Fuel pre-filter: Drain water.		173
		●	❍	❍	❍	✦		Fuel tank: Drain water and sediments.		174
			❍	❍	❍			Fuel system and lubricating oil system: checking for tightness and condition.		
			❍	❍	❍			Fuel pre-filter: Replace filter element (every 6 months or when power is lost).		
			❍	❍	❍	✦		Fuel fine filter: Replace filter element (at least every 6 months).		
						✧		Bleed fuel system.		
☐			❍	❍	❍			Fuel tank: Checking mounting.		
		●	❍	❍	❍	✦		Air filter: Emptying dust collecting tank.		174
			❍	❍	❍	✦		Air filter: Replace main filter cartridge (at least 1x per year).		175
					❍			Air filter: Replacing safety filter cartridge (at least once per year).		
						✧		Air filter and air lines: Check tightness and condition (when replacing filter cartridges).		
Cooling system										
☐	●	●	❍	❍	❍	✦		Check coolant level.		177
			❍	❍	❍			Checking cooling system and heating system for tightness and condition.		
					❍	❄		Coolant: Check concentration (at least once a year).		178
					❍			Cooling system: Change coolant (at least every 2 years).		
						✧		Grease cooling system.		
Working hydraulics system										
☐		●	❍	❍	❍	✦		Hydraulic tank: Check oil level.		183
			❍	❍	❍			Hydraulic tank: Drain water and sediments.		
☐			❍	❍	❍			Hydraulic tank: Checking mounting.		
				❍	❍			Hydraulic tank: Perform oil analysis (at least once a year). (For more information see: 5.3.6 Hydraulic oils, page 160)		

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5.3.4 Engine oil

Liebherr recommendation

Ambient temperature	Description
-30 °C to 35 °C	Liebherr-engine oil 5W-30
-30 °C to 35 °C	Liebherr-engine oil 5W-30 low ash[17)]

Tab. 25: Liebherr recommendation

Minimum quality requirements

Specification
ACEA E4, ACEA E6[17)]
Liebherr specification 500

Tab. 26: Minimum quality requirements

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

Difficulty factors

Various operating conditions have influence on the maintenance interval. Modify engine oil change interval in difficult operating conditions.

Difficulty factors are:
– Frequent cold starts
– Low operation temperature

5.3.5 Coolant for the diesel engine

General recommendations

The cooling system only functions reliably if it is operating under pressure. It is therefore essential that it is kept clean and leak-tight, that the radiator cap and service valves function correctly, and that the required coolant level is maintained.

Liebherr-approved anti-freeze and corrosion protection agents guarantee adequate protection against low temperatures, corrosion and cavitation, do not attack seals and hoses, and do not foam.

Coolants containing unsuitable anti-freeze and corrosion protection agents, or coolants that have been prepared inadequately or incorrectly, can cause the failure of aggregates and components in the coolant circuit as a result of cavitation or corrosion damage. In addition, deposits with thermal insulation properties can build up on components that conduct heat, leading to overheating and ultimately to failure of the engine.

[17)] For machines with diesel particulate filter, Liebherr engine oil 5W30 low ash (ACEA E6) must be used.

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5.6 General maintenance

5.6.1 Welding

Welding on any main load-bearing or power-transmitting components must only be done by the manufacturer or a dealership authorised by the manufacturer. This applies irrespective of the welding process and the scope of the repair required.

NOTICE
Heating by powerful welding currents!
Bearings and sealing elements can burn.

- ▶ Attach the earth cable of the welding equipment close to the welding point.
- ▶ Avoid electrical current flowing through electronic components and parts such as the slewing ring, joints, bearings, bushings, rubber elements or seals.

Before starting electric welding:

- ▶ Switch off the battery main switch.
- ▶ Disconnect the negative (-) terminal on the battery.
- ▶ Disconnect the electronic components.

After electric welding:

- ▶ Connect the electronic components.
- ▶ Connect the negative (-) terminal on the battery.
- ▶ Switch on the battery main switch.

5.6.2 Bleeding hydraulic cylinders

Cylinders must be bled in following cases:
– After maintenance work on cylinder
– After replacing cylinder
– After maintenance work on hydraulic system for supplying cylinder, for example after replacing a hose

Bleeding hydraulic cylinder with vent plugs

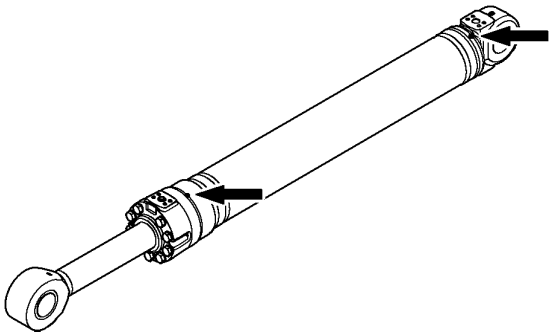

Fig. 244: Vent plugs of cylinder

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5.8 Cooling system

5.8.1 Checking coolant level

Filling with coolant

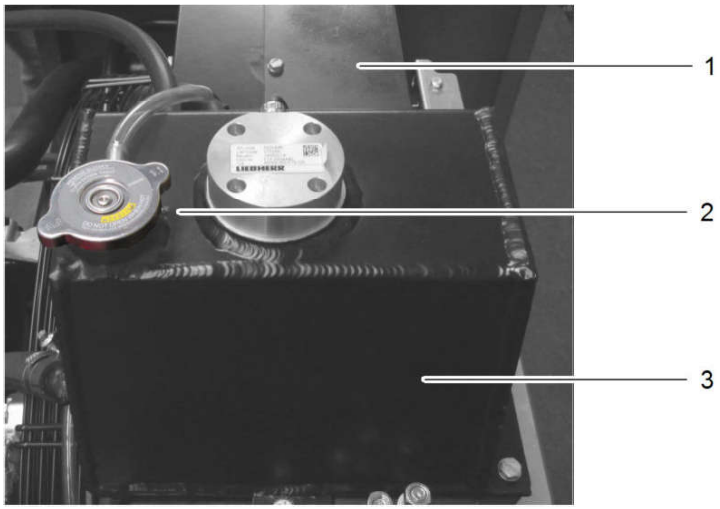

Fig. 250: Filling with coolant

1 Radiator
2 Filler cap
3 Coolant container

DANGER
Hot surfaces! Hot coolant spraying out!
Severe burns.

- ▶ Wear protective gloves and safety glasses.
- ▶ Do not touch parts carrying coolant.

CAUTION
Corrosive coolant!
Allergic reactions.

- ▶ Avoid contact with coolant.
- ▶ Thoroughly rinse with water in case of direct contact with coolant.

Make sure the following preconditions are met:
- ❑ Diesel engine has cooled down.
- ❑ Filler cap **2** is cold.
- ❑ Coolant used for filling is approved.

- ▶ Depressurise coolant container **3**: Unscrew filler cap **2** by half a turn.
- ▶ Slowly and completely unscrew filler cap **2**.
- ▶ Fill coolant container **3** up to rim.
- ▶ Screw in filler cap **2**.

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5.11 Travel gear

5.11.1 Checking track tension

Normal wear on the travel gear causes the track tension to slacken over time. The track tension must be checked regularly and increased if necessary.

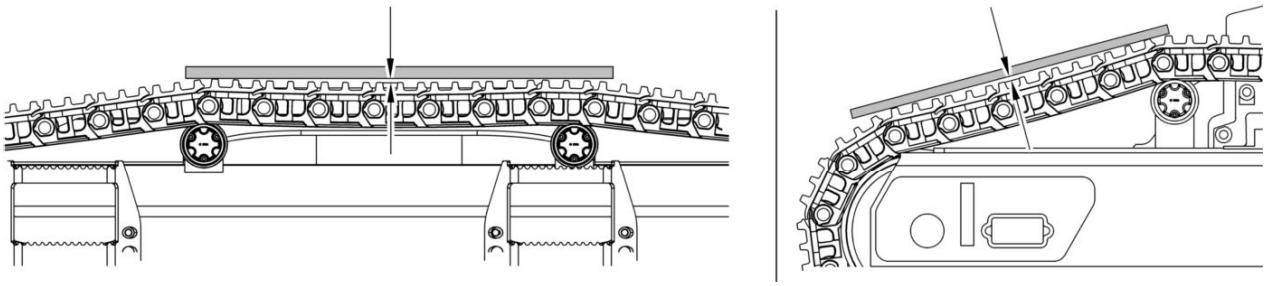

Fig. 259: Checking track tension

Make sure the following preconditions are met:

❑ Machine is secured to prevent it rolling.

▶ Move machine forwards and backwards to release tension in tracks.

▶ Measure centre-to-centre distance between two carrier rollers.

▶ Measure centre-to-centre distance between idler-wheel and the first carrier roller.

▶ Place measuring bar on the section of the track with the biggest centre-to-centre distance.

▶ Measure distance between bottom of measuring bar and top of track pad.
▷ In normal conditions the track should sag by 25 $^{\pm 5}$ mm.

▶ If necessary: Tighten track.

▶ Repeat procedure for the second track.

5.11.2 Tightening tracks

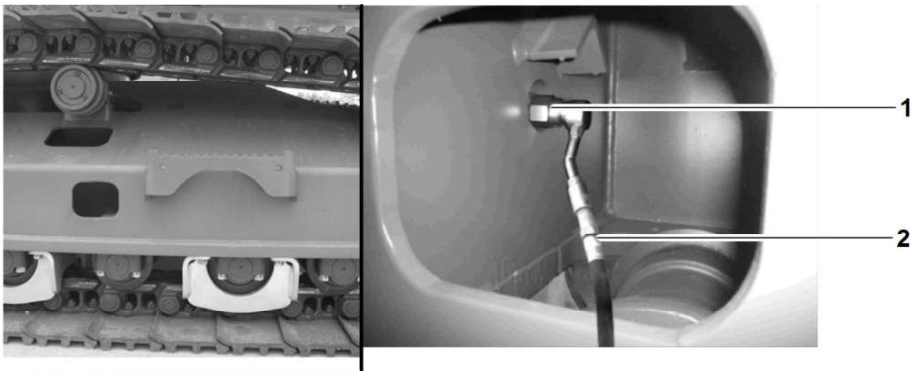

Fig. 260: Tightening tracks

1 Grease fitting

2 Hose of grease gun

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Lubricating working attachment

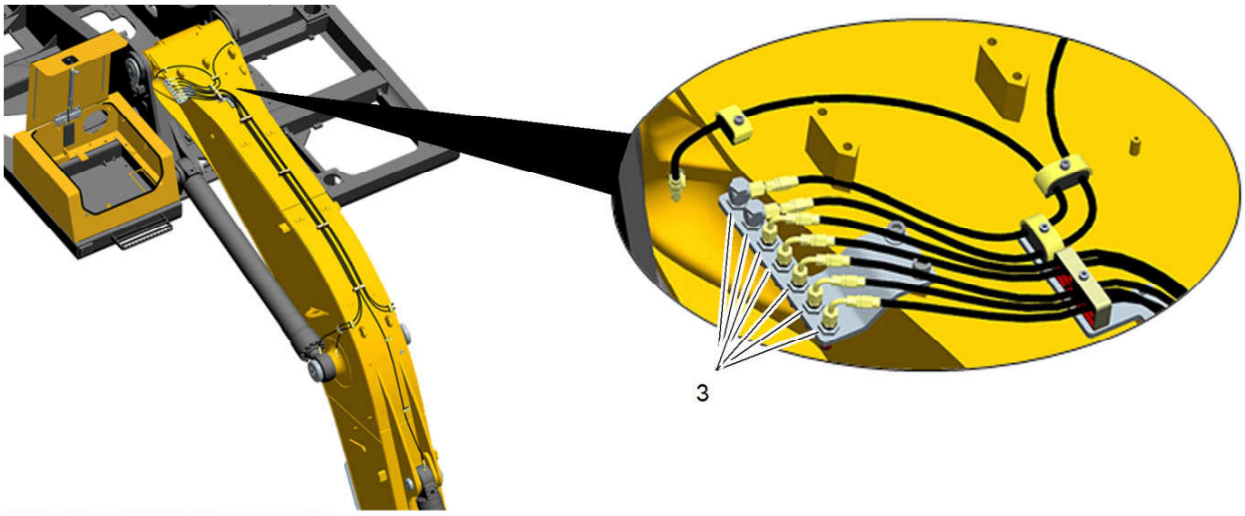

Fig. 268: Lubricating boom

3 Lubricating points of the boom

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