en

Operating manual

Machine for Industrial Applications
R 984 C Litronic

from serial number 57000

Document identification

	ORIGINAL OPERATING MANUAL
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Product identification

Manufacturer:	LIEBHERR Hydraulikbagger GmbH
Type:	R 984 C Litronic
Type no.:	1224
Conformity:	CE

Address

Liebherr Hydraulikbagger GmbH
Liebherr-Straße 12
D - 88457 Kirchdorf / Iller

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1.3 Technical data

Engine	
Power according to ISO 9249	504 kW (685 HP) at 1800 rpm
Engine type	Cummins-QSK-19 C 750
Design	6 cylinders, series
Cylinder capacity	159/159 mm
Displacement	18.9 l
Operating method	Low-emission 4-stroke diesel engine with direct injection, exhaust gas turbocharger
Cooling system	Water cooling
Air filter	Dry air cleaner with preliminary cleaner, main and safety element, automatic dust removal
Fuel tank capacity	1585 l
Standard equipment	Sensor-controlled idle automatic
Electrical system	Operating voltage: 24 V Battery: 2 x 144 Ah/12 V Starter: 24 V/9.0 kW Generator: 24 V/100 A three-phase current

Hydraulic system	
Hydraulic pumps for attachment 3 and travel gear	3 Liebherr swash-plate type variable-displacement pumps Max. flow rate: 3 x 472 l/min Max. operating pressure: 320 bar
Pump actuation	Electro-hydraulic, with electronic horsepower control, pressure limitation and on-demand flow control
Hydraulic pump for slewing gear	Reversible swash plate variable-displacement pump, closed circuit Max. flow rate: 403 l/min Max. operating pressure: 340 bar
Hydraulic tank capacity	800 l
Hydraulic system capacity	1970 l
Filtration	2 filters in return line with integrated ultrafine filter (5 µm), 1 high-pressure filter each per working pump
Cooling	Compact cooler, consisting of a cooling unit for water, hydraulic oil and intercooling air, hydrostatically driven fan
MODE switching	Adjustment of engine power and hydraulic through a MODE preselection switch to suit the actual operating conditions LIFT - for load-lifting work FINE - for precision work with fine-controlled movements ECO - for particularly economical and environmentally friendly operation POWER - for maximum power and heavy-duty tasks
Speed adjustment	Stepless adjustment of the engine power through speed adjustment in the preselected mode
Auxiliary function menu	4 permanently adjustable flow rates for optional attachments

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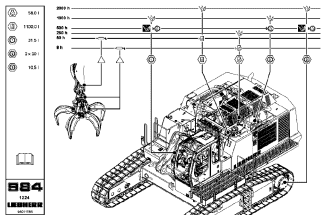
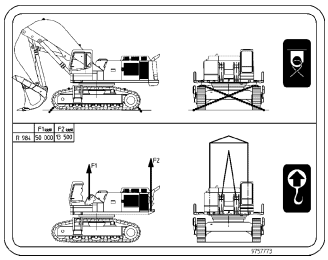


5: Lubrication chart

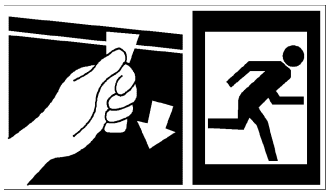
Provides information on work to be carried out in connection with lubricants and specifies the test, lubrication and change intervals.



6: Loading and tie-down points

Indicates the position of the loading and tie-down points and the respective weight of the machine.

The values are maximum values. The actual values might deviate from those indicated on the signs.



7: Emergency exit through rear window

Pull the handle at the inside of the rear window to remove the rubber insert. Push the rear window outwards.

8: Tie-down point

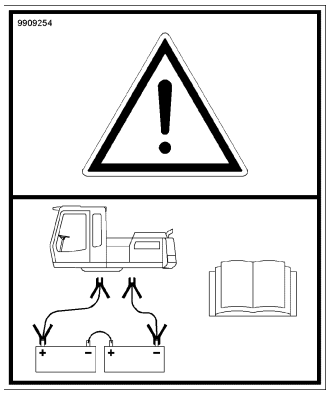
Indicates tie-down points.

The use of the tie-down points depends on the chosen method of transport. For more information, refer to chapter "Transport".

9: Point of danger

Risk of injury!

Do not stand inside the danger area of the machine while it is in operation.



10: Jump-starting

When jump-starting the machine, strictly adhere to the instructions in the operating manual.

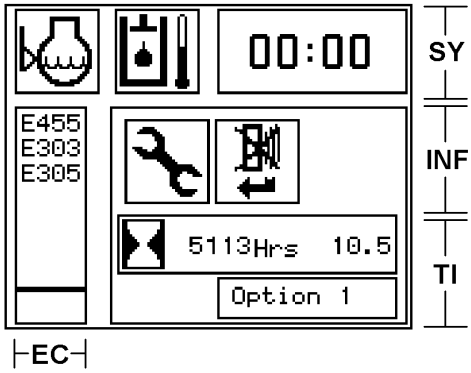


Fig. 3-6 *Display: main screen*

SY	Symbols / time	**EC**	Error codes
INF	Information	**TI**	Total operating hours, daily counter, current tool (Tool Control)

3.1.4.1 Using the main screen

Field SY

Indicates the time and warning symbols. If the system needs to display more than 2 symbols, the clock is not displayed. If more than 4 symbols are to be displayed, they are moved across the screen from left to right by one symbol every 10 seconds.

For a description of the warning symbols, see chapter "Malfunctions".

Field EC

Indicates the error code (E xxx) of current electrical faults (line faults, sensor faults, etc.). As soon as a fault condition displayed in field SY is confirmed as "new", the display returns to the main screen.

Certain error codes are accompanied by a warning symbol in the **SY** field. For a description of the warning symbols, see chapter "Malfunctions".

Up to 7 error codes can be shown at any time. If there are more than 7 faults, an arrow is displayed beside the error code field, indicating that there are more faults than can be displayed.

▶ Press the **UP** and/or **DOWN** button.
  ↳ The display scrolls through the list in the selected direction.

Danger!
If the error indicated is not eliminated immediately, there is a danger people get hurt or equipment gets damaged.

▶ Make sure all faults are dealt with without delay.

Depending on the error (level of urgency), a buzzer signal is issued (continuous signal or sequence of short signals).

Acknowledging errors:

When an error code is displayed the symbol for the acknowledgement of errors is shown in the **INF** field.

LHB/en/Edition: 06 / 2014

▶ Press the **BACK** button.
↳ The first page of the submenu is displayed.

▶ Press the **BACK** button again to select a different error type. Alternatively, press the **UP** or **DOWN** button to select a new error code.

s*: Error was announced by a buzzer signal and confirmed by the operator with pressing the **BACK** button. The duration is indicated in seconds.

m*: Error was announced by a buzzer signal and confirmed by the operator with pressing the **BACK** button. The duration is indicated in minutes.

Note!
Menu **list Exxx** shows only operating errors assigned the **E5xx** error code.

Wire fault list E-elec.:

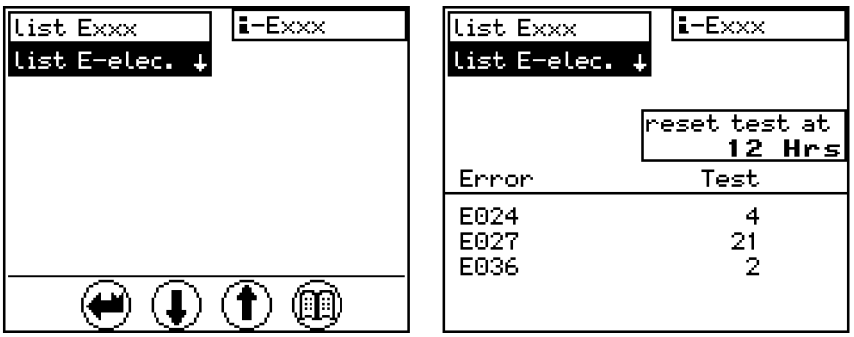


Fig. 3-21 *Occurrence of electrical faults (left) and fault statistics (right)*

▶ Select list **E-elec.**

▶ Press the **Menu** button.
↳ The submenu is displayed.

It contains a list of all electrical faults with codes.

The "Test" column shows the number of faults that have occurred since the last reset of the list.

The figure in the "reset test at x Hrs" field (e. g. 12 Hrs) indicates the time at which the "Test" column was last deleted.

▶ Press the **BACK** button.
↳ Select a different fault type, if required.

Other error list S-Exxx:

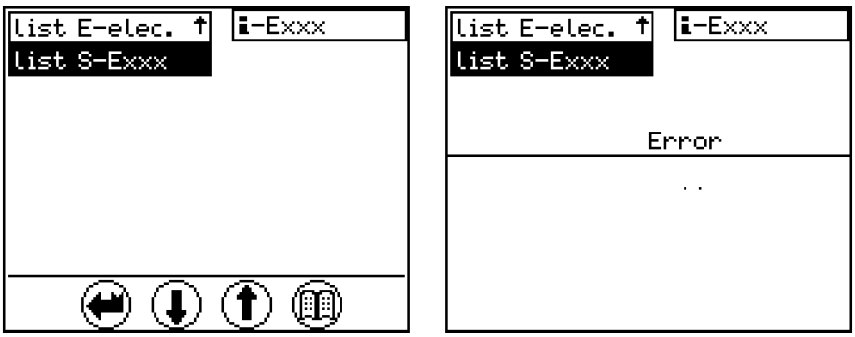


Fig. 3-22 *Service operation error list menu*

3.2.7 Emergency exit through rear window

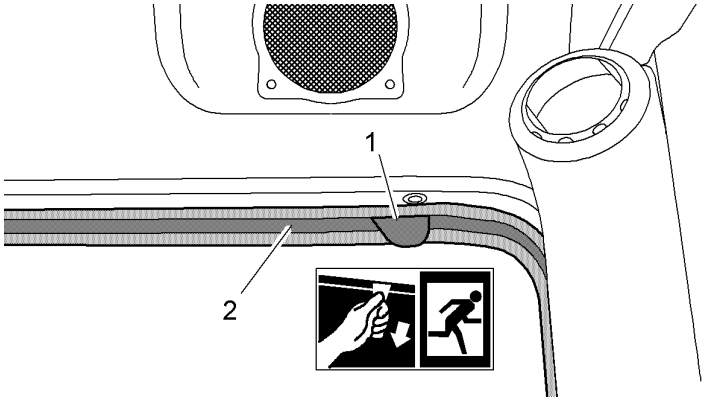


Fig. 3-37 *Emergency exit through rear window*

Pull the latch **1** at the inside of the rear window to remove the rubber seal **2**.

▶ In the event of an emergency, pull out the rubber seal **2** along the entire circumference of the rear window panel and push out the window.

3.2.8 Inside lighting

Fig. 3-38 *Inside lighting*

The inside lighting is switched on/off with a rocker switch.

▶ Set the rocker switch to position **1**.
↳ The light is switched on.

▶ Set the rocker switch to position **0**.
↳ The light is switched off.

▶ Switch position **2** is not assigned a function.

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3.3 Operation

3.3.1 Safety instructions

3.3.1.1 Bringing the machine into service

- Before starting the machine, perform a thorough walkaround inspection.
- Visually check the machine for loose bolts, cracks, wear, leaks and damage.
- Never start or operate a damaged machine.
- Make sure to correct any problems immediately.
- Verify that all hoods, covers and doors are closed, however, the locks should remain unlocked.
- Verify that all safety signs are in place.
- Make sure that all windows, as well as the inside and outside mirrors are clean. Secure all doors and windows to prevent unintentional movement.
- Before operating the machine, adjust the operator's seat, the mirror, the armrests and the other items to ensure comfortable and safe working conditions.
- The noise protection devices on the machine must be in working order.
- Never operate the machine without the cab.

3.3.1.2 Starting the machine

- Before start up, check all indicator lights and instruments for proper function, bring all controls into neutral position and insure that the safety lever is in the raised position.
- Blow the horn briefly prior to starting the diesel engine, in order to warn persons located near the machine.
- Only start the machine from the driver's seat.
- Start the diesel engine according to the regulations in the operating instructions, if you have not received any other instructions.
- Lower the safety lever and check all indicators, gauges, warning devices and controls for their proper indication.
- Only operate the diesel engine in a well-ventilated area, if the area is enclosed. If necessary, open doors and windows in the building to provide ample fresh air.
- Bring the engine and hydraulic oil to operating temperature. Low oil temperatures cause a slow reaction of the controls.
- Check that all attachment functions are operating properly.
- Carefully take the machine to an open area and check all control functions.

3.3.1.3 Shutting down the machine

- Park the machine on level and stable ground whenever possible. Otherwise, chock or block wheels when parking on a slope.
- Lower the attachment so that it rests on the ground.
- Move all control elements into the neutral position. Set the parking and slewing gear brake.
- Switch off the diesel engine according to the operating instructions and move the safety lever up, prior to leaving the driver's seat.
- Lock the machine, as well as all hoods, covers and doors; remove all keys and secure the machine against any unauthorized use.

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3.3.5.5 Speed regulation

The max. achievable travel speed is set with the switch **S21**. The machine features two speed steps:

– **Normal travel** (position 1):
  Maximum drawing pull at moderate speed.
– **Fast travel** (position 2):
  Reduced drawing pull at maximum speed.

▶ Press the switch **S21**.
  ↳ Switching over from normal to fast travel is activated.
  ↳ LED 1 in the switch is on.

During travel, the system automatically switches between normal and fast travel, provided that the ground conditions permit this (LED 2 is on). On difficult terrain, the system switches back to normal travel and LED 2 is off.

▶ Press the switch **S21** again.
  ↳ The switchover function is deactivated.
  ↳ LED 1 in the switch is off.

When the switchover function is deactivated, the machine can only be operated in normal travel mode.

3.3.5.6 Braking

Caution!
Quick release of the travel pedals causes the machine to come to an abrupt halt. The operator might find it difficult to remain seated in the cab. The machine might vibrate or swing! There is thus an increased risk of accidents!

▶ Prior to starting the machine, put on the seat belt.

▶ If possible, avoid quick braking manoeuvres.

Applying hydraulic brake:

The hydrostatic travel drive acts as a working brake.

▶ Slowly release the travel pedals.
  ↳ The pedals automatically return to their neutral positions.
  ↳ The travel drive is stopped, and the machine is slowed down.

When travelling on slopes, the brake valves prevent excessive acceleration of the machine. They thus ensure that the permissible travel speed is not exceeded.

Applying mechanical brake:

When the travel pedals are in neutral position, the machine is secured and cannot roll away. Approximately five seconds after the pedals have been released, the **parking brake** is applied automatically. The working attachment can still be moved.

Applying parking brake:

If the parking brake is to be applied before this happens automatically, press the switch **S354** (SF).

▶ Press the switch **SF**.
  ↳ The LED in the switch is on.
  ↳ The parking brake is applied.

▶ Press the switch **S17** again:
  ↳ The slewing gear brake is released and is operated in **semi-automatic** mode.
  ↳ The LED in the switch is off.

Mechanical slewing gear brake (semi-automatic):

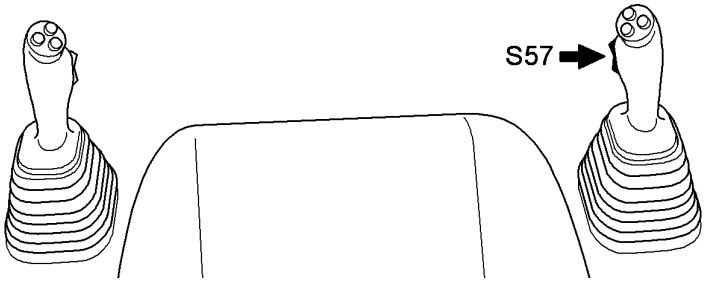

Fig. 3-63 *Semi-automatic slewing gear brake*

The slewing gear brake in semi-automatic mode is operated by means of the switch **S57** at the right joystick.

▶ Press the switch **S57** down.
  ↳ The slewing gear brake is applied automatically, if the uppercarriage is not rotating or if it has come to a standstill.

▶ Press the switch **S57** up.
  ↳ The slewing gear brake is released.

Note!
The LED in the switch **S17** is always on when the brake is applied.
If the slewing gear brake cannot be released with the switch **S57**, this might be due to the following:
The slewing gear brake has been applied before the brake was set to semi-automatic mode. In this case, it can only be released by actuating the switch **S17** again.

Checking mechanical slewing gear brake:

❑ Ensure that the uppercarriage is stationary.

▶ Press the switch **S17**.
  ↳ The slewing gear brake is applied.
  ↳ The LED in the switch is on.

▶ Move the left joystick **1** to the right and then to the left stop.
  ↳ The uppercarriage must not swivel.
  ↳ The slewing gear brake is working properly.

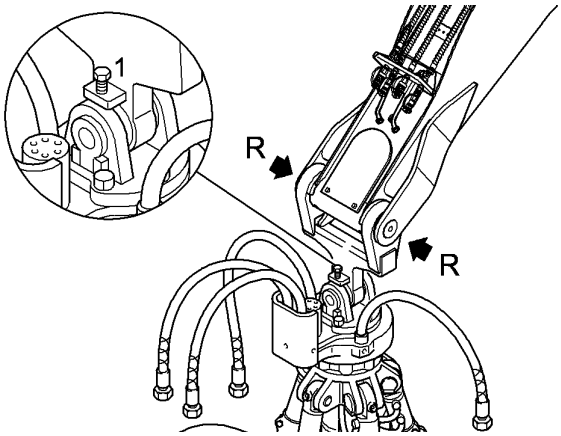

Fig. 3-75 *Tightening the locking screw, disconnecting the lines and releasing*

▶ If in place: Tighten the locking screw **1** (optional equipment) at the suspension (without tightening the screw, the suspension would tilt to the side during removal, so that it would be difficult to take it up at the next attachment).

Caution!
The hydraulic lines are under pressure.

▶ Before disconnecting the hydraulic lines, depressurise them using the joystick (switch off diesel engine, turn ignition key to contact position, operate the joystick).

▶ Disconnect all hydraulic or electrical lines to the working tool (e.g. for dismantling of grapple).

▶ Release the quick-change adapter.

▶ Release all buttons.

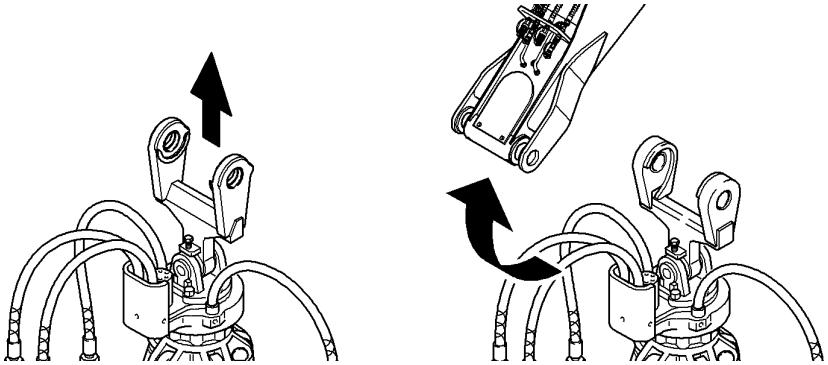

Fig. 3-76 *Disconnecting working tool*

▶ Move the industrial stick in such a way that the front side is removed from the half shells.

▶ Attach the other working tool.
- alternatively -
To switch off the buzzer, lock the quick-change adapter without attaching a working tool.

- ▶ Dismantle the attachment.
- ▶ Switch off the diesel engine.
- ▶ Turn the ignition key to contact position and depressurise all pressure lines by carefully operating the joysticks repeatedly in all directions.
- ▶ Remove the ignition key and tilt the safety lever upwards.
- ▶ Close all doors, hoods and covers of the machine and lock them.
- ▶ Fold in the rear mirror.
- ▶ Attach the lifting tackle to the points provided.
- ▶ Carefully lift the machine with the crane and place it on the transport vehicle.
- ▶ To restart the machine, strictly adhere to the instructions in the operator's manual.

3.7.4 Securing the machine for transportation

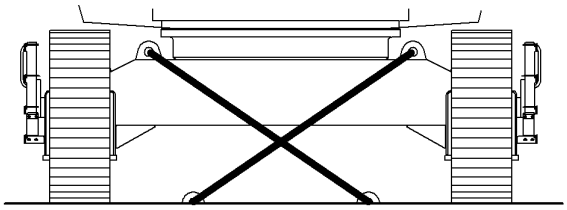

Fig. 3-81 *Securing the machine*

Danger!
If the machine begins to shift or becomes dislodged during transport, there is a risk of serious accidents.

- ▶ Secure the machine against shifting.
- ▶ To do this, used tie-down cables or chains.

- ▶ Secure the machine by placing cables or chains diagonally through the tie-down eyelets of the undercarriage (at front and rear) (see Fig. 3-81).

Error / fault	Cause	Remedy
Speed cannot be adjusted through keyboard (mode and arrow keys)	Idle automatic is activated	Grab the joystick or deactivate the idle automatic
	Excavator electronics for speed adjustment not working	Switch hydraulic pump to emergency mode, contact LIEBHERR customer service
	No signal from speed sensor	
Idle automatic without function; speed fails to drop	Permanent sensor signal	Contact LIEBHERR customer service
	Idle automatic is deactivated	Activate idle automatic
Slewing gear brake cannot be released with switch	Fault in electrical system of excavator	Actuate emergency mode control Caution: The keyboard is disabled; contact LIEBHERR customer service

4.3.5 Heating and air conditioning system

Error / fault	Cause	Remedy
No warm air escaping from heating system	Shut-off valves (if installed) of coolant line on the diesel engine closed	Open shut-off valve
	Diesel engine too cold	Warm up diesel engine to its normal operating temperature
Heating blower not working	No power	Check fuse and cable; replace or repair if required
	Blower motor defective	Replace blower motor
Low air circulation rate in operator's cab	Ambient air filter / recirculation air filter contaminated	Clean air intake openings; replace ambient air filter
	Air outlets closed	Open air outlets

4.3.6 Working attachment

Error / fault	Cause	Remedy
Cylinder responds to load	Piston seal on cylinder defective	Service hydraulic cylinder
Excessive bearing play in attachment	Bearing points worn	Replace bearing components
Grapple / bucket cannot be moved	Valve block at tilt cylinder connected incorrectly	Change connections to valve block
Attachment cannot be rotated, swivelled or operated	Additional function not activated	Release additional function
	Lines not connected	Connect lines

4.4 Fuses and relays

Danger!
Incorrect or bridged fuses do not provide the protection required for the safety of the machine operator and the electrical equipment.

- ▶ Use only original fuses.
- ▶ Never bridge electrical fuses.

- ▶ If necessary, order replacement fuses from LIEBHERR.

- When working overhead, use appropriate safe access ladders and working platforms.
  Do not use parts of the machine as climbing devices, if they are not designed for this purpose.
  Wear a harness when working at great heights.
  Keep handles, steps, railings, platforms, and ladders free of dirt, ice and snow.
- When working on the attachment (for example when replacing teeth), make sure the machine is properly supported. Never use metal-on-metal support.
- Never stand underneath a machine that has been raised with the aid of work equipment unless it has been properly and securely supported.
- Always support the machine in such a ways that any shifting weight will not endanger the stability of the machine and avoid metal to metal contact.
- Work on travel gears, brake and steering systems may only be carried out by specially trained expert personnel.
- If the machine must be repaired on an incline, block the track chains with chocks and secure the uppercarriage to the undercarriage with the locking pin.
- Only qualified, specially trained personnel may work on the hydraulic system.
- Do not check for hydraulic leaks with your hand. Use cardboard or similar material to detect leaks. Wear work gloves.
- Do not loosen any lines or bolts before lowering the equipment, turning off the diesel engine and relieving the hydraulic system. After the diesel engine has been turned off, you must move all pilot controls (right handed joystick and pedals) into all directions to reduce the control pressure and the dynamic pressure in the work cycles. Then release the pressure in the tank, as described in this operating manual.

5.1.6 Electrical system

- Check the electrical system regularly.
  All defects, such as loose connections, burnt out fuses and bulbs, burnt or damaged wires or cables must be repaired immediately by an electrician or specially trained personnel.
- Only use original fuses with the correct amperage.
- Only qualified technicians should attempt troubleshooting or repairs on high voltage systems.
- DO NOT work on energized attachments.
- When working on mid and high voltage components, shut off the voltage and connect the supply cable to the ground to discharge any stored energy.
- Check all disconnected parts if they are truly free of current, ground them and short circuit them. Insulate adjacent, current carrying parts.
- Disconnect the battery before working on the electrical system or before carrying out any arc welding work on the machine.

5.1.7 Pressure accumulator

- Pressure accumulators contain stored energy and operate at high pressures. Only specially trained personnel may work on pressure accumulators.
- Do not operate damaged pressure accumulators.
- You must reduce the pressure in the hydraulic system as described in this operating manual prior to working on a hydraulic accumulator.

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5.6.2 Engine oils

Liebherr recommendation

Description
Liebherr Motoroil 5W- 30
Liebherr Motoroil 10W-40
Liebherr Motoroil 10W-40 low ash[2)]

Tab. 5-3 *Liebherr recommendation*

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

[2)] For machines with diesel particulate filters, use low ash engine oil (LH-00-ENG3A LA).

Minimum quality requirement

Specification
LH-00-ENG3A
LH-00-ENG3A LA

Tab. 5-4 *Minimum quality requirement*

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

5.6.2.1 Adverse factor

Adverse factors affect the change interval of the engine oil.

Adapt change interval of the engine oil.

Adverse factors are:

- Frequent cold starts
- Sulphur content of fuel
- Environmental factors
  - Operating temperature
  - Dust
  - High humidity

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

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❑ Ensure that the machine is in a horizontal position.

▶ Switch off the diesel engine.

▶ Wait a few minutes until the engine oil has collected in the oil pan.

▶ Pull out the dip stick and clean with a clean cloth.

▶ Insert the dip stick to the stop.

▶ Pull out the dip stick again and check the oil level.

The oil level must be between the **min** and **max** marks.

▶ If necessary, add engine oil until the level reaches the **max** mark.

5.7.2 Changing engine oil

Preparation:

❑ Ensure that the machine is in a horizontal position.

❑ The engine oil must be warm (increased fluidity).

The diesel engine can be accessed from the engine compartment. The oil pan and the oil filter cartridges can be accessed through an opening at the bottom of the upper carriage.

▶ Remove the cover plate of the diesel engine and replace it after completion of the maintenance tasks.

Draining off engine oil:

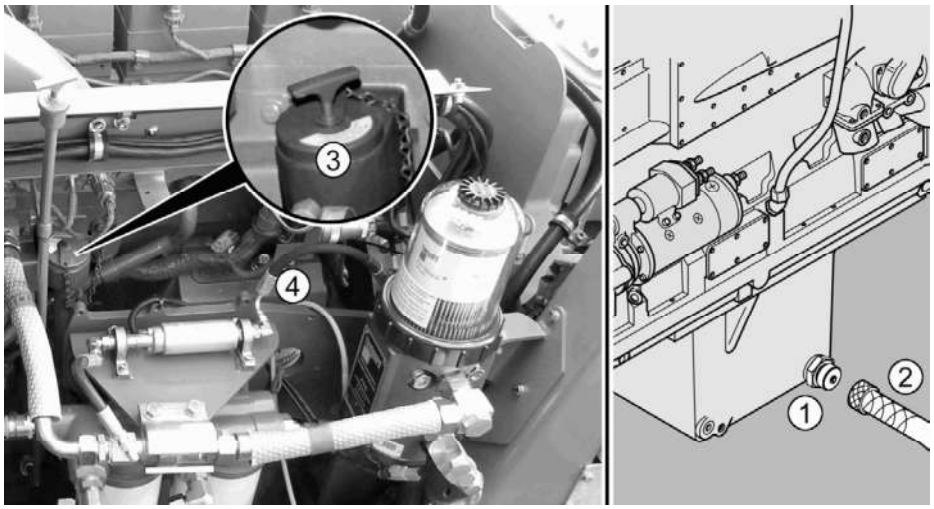

Fig. 5-7 *Filler neck, drain valve*

1 Drain valve
2 Drain hose
3 Filler neck
4 Oil filter cartridges (see Fig. 5-8)

▶ protect the V-ribbed belt against escaping engine oil.

▶ Open the filler neck **3**.

▶ Remove the cover cap from the drain valve **1** on the oil pan.

▶ Screw the drain hose **2** to the drain valve of the oil pan.

5.10.4 Checking the clean air lines

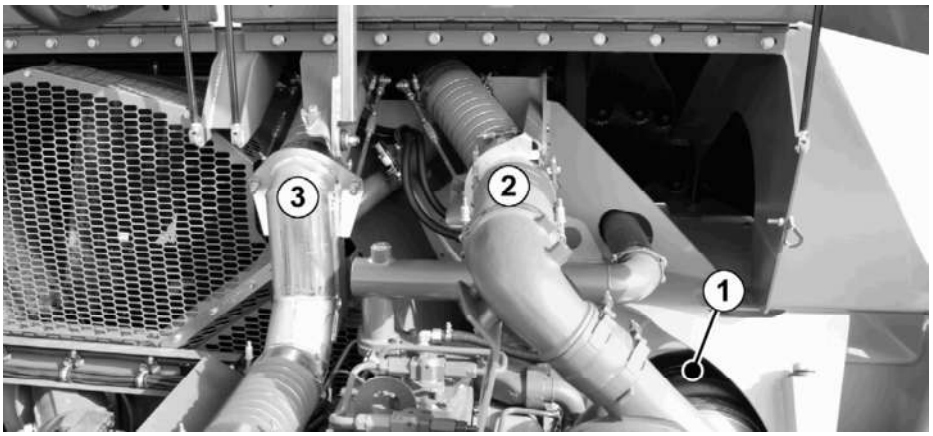

Fig. 5-20 *Checking the clean air line*

The clean air lines can be accessed from the engine compartment. Then connect the components of the suction system:

– **1** Connection of dry air filter and turbocharger
– **2** Connection of turbocharger and intercooling air cooler
– **3** Connection of intercooling air cooler and engine suction pipe

▶ Each time you replace the filter cartridge, check the clean air lines for damage and leakage.

▶ If necessary, retighten clamps of the lines.

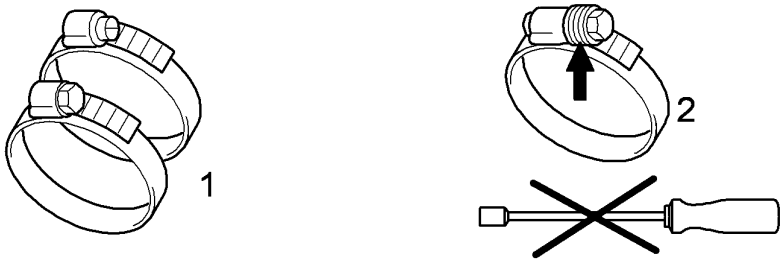

Fig. 5-21 *Please note that certain clamps may not be retightened.*

1 Clamp

2 Clamp with spring pack

Note!
Clamps with spring packs (**2**, see arrow) can compensate changes in diameter. Retightening might interfere with this function.

▶ Do not retighten clamps with spring packs.

▶ If necessary, retighten the clamps **1**.

- ▶ Wash the filter cartridge **4** with petrol or replace it.
- ▶ Clean the filter pot **2** and the head section **1**.
- ▶ Mount the filter pot **2** with the filter cartridge **4**.

Leakage check:

- ▶ Start the diesel engine and move the working attachment for a short period of time (approx. 1 minute).
- ▶ Switch off the diesel engine and check the connections at the filter pot and filter head for leaks.

5.11.12 Bypass oil filter (optional equipment)

The bypass oil filter is designed to remove small particles and water from the hydraulic system.

The filter cartridge must be replaced each time the return filter is changed, or at least every 6 months.

Note!
Where environmentally friendly hydraulic oils are used, LIEBHERR prescribes the use of bypass oil filters.

The machine can be equipped with two bypass oil filters. They are installed behind a cover to the side of the engine compartment (see Fig. 5-33).

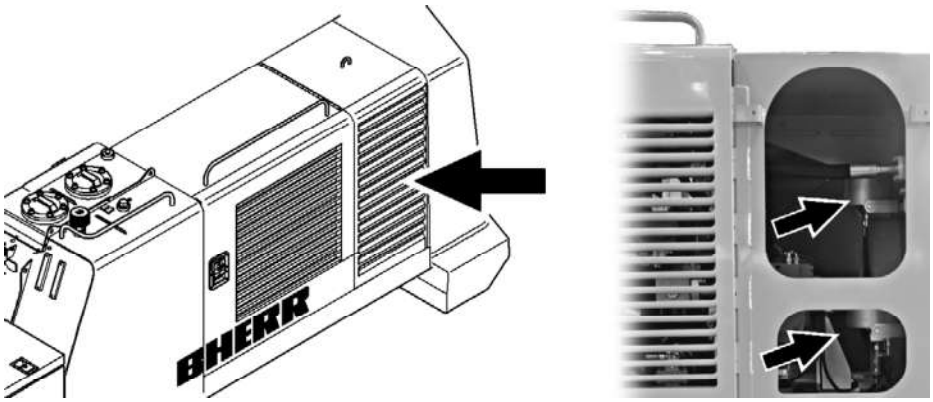

Fig. 5-33 *Location of installation of bypass oil filter*

- ▶ Fully screw in and tighten the preassembled unit (lubrication nipple extension **2** and lubrication nipple **1**).
- ▶ Tension the chain as described in section "Tensioning chain".

5.14 Electrical system

5.14.1 Notes regarding the electrical system

- ▶ Regularly inspect the electrical system of the machine for defects.
- ▶ Defects such as loose connections, chaffed cables or poorly fixed clamps must be replaced without delay.
- ▶ Identify the cause for blown fuses and broken incandescent lamps, eliminate it and replace the fuse or the lamp.
- ▶ Before carrying out any work on the electrical equipment, or carrying out electric arc welding work disconnect the batteries.

5.14.2 Battery main switch

Caution!
The auxiliary heater (optional equipment) remains on for a little while after the ignition has been switched off. It might be damaged, if it is suddenly switched off with the battery main switch during this afterrun time.

- ▶ Only switch off the battery main switch after the afterrun time of the auxiliary heater has lapsed.

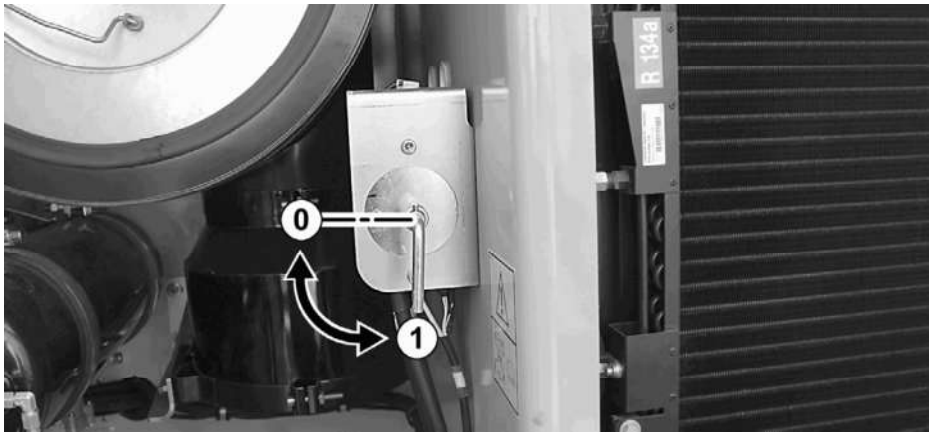

Fig. 5-43 *Battery main switch*

- ▶ Before carrying out any work on the electrical system or performing welding work on the machine, set the battery main switch to position **0** (off).

Note!
The battery might discharge itself during prolonged standstills.

- ▶ Prior to prolonged standstills, switch the battery main switch to position **0** (off).

Filling the grease tank with the filling pump (optional equipment):

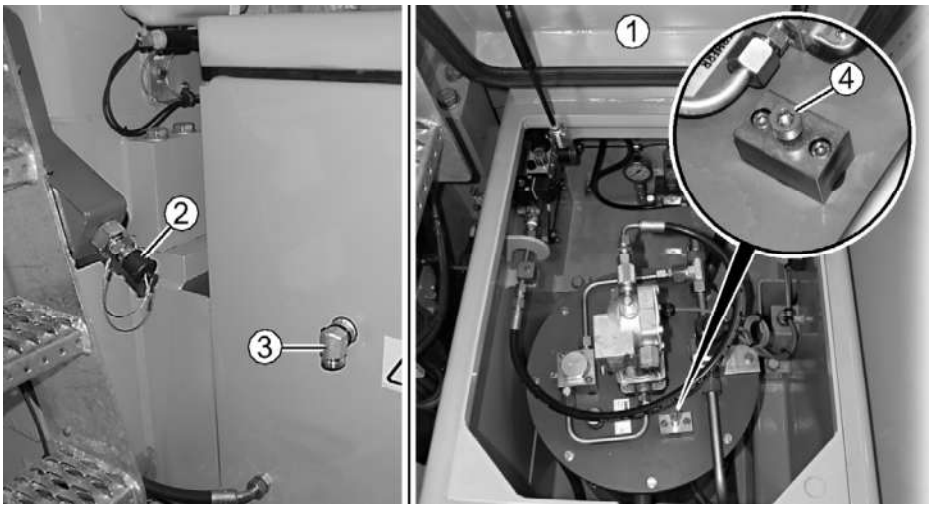

Fig. 5-56 *External filling of the central lubrication system*

1 Cover of lubrication box
2 Hose coupling
3 Overflow
4 Check pin

The grease tank is filled by means of the external filling pump. The filling hose coupling is located beside the lubrication box at the access ladder to the operator's cab.

- ▶ Open and lock the cover of the lubrication box **1**.
- ▶ Remove the dust protection cap from the hose coupling **2**.
- ▶ Connect the filling hose and switch on the filling pump.
- ▶ Observe the red check pin **4** in the lubrication box.
  - ↳ The grease tank is full when the check pin **4** begins to move upwards or when grease exits through the overflow **3**.

Note!
Overfilling can damage the grease tank.

- ▶ When the red check pin **4** begins to move upwards, immediately switch off the filling pump.
- ▶ Do not block the overflow **3**.

- ▶ Disconnect the filling hose and replace the dust protection cap.

5.18 Manual lubrication of the machine

Certain parts of the working tools, attachments and the undercarriage are lubricated manually. The affected lubricating points are equipped with lubricating nipples.

Note!
We recommend using a grease gun, as it reduces the force required and ensures that the grease is squeezed in slowly.