

Operating manual

Hydraulic excavator
R 9600

from serial number 47001

Document identification

ORIGINAL MANUAL

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Type: R 9600
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Conformity:



Address

Liebherr-Mining Equipment Colmar SAS
49 rue Frédéric Hartmann
CS 50038, F-68025 Colmar Cedex

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1 Product description

1.1 Assembly - overview

This section comprises an overview of the machine and descriptions of the components shown.

1.1.1 Machine and construction equipment

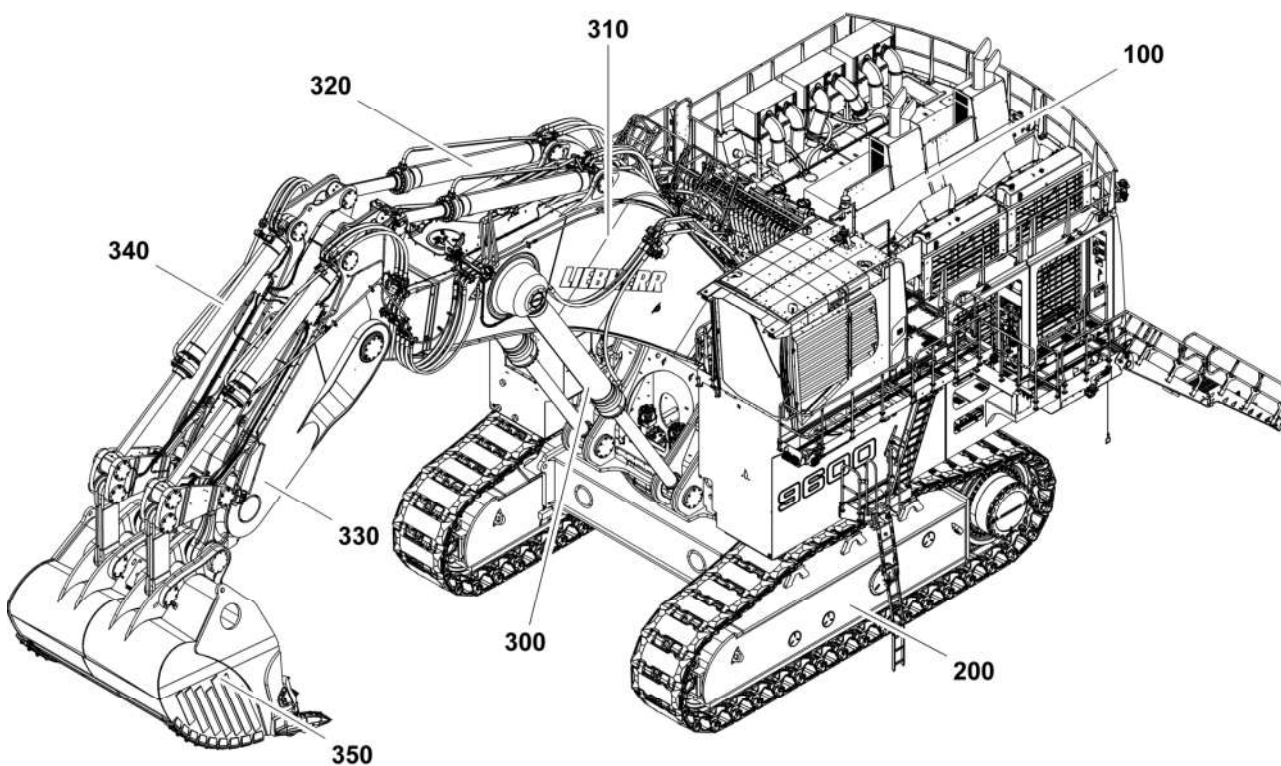


Fig. 1-1 Machine and construction equipment

100	Uppercarriage	320	Stick cylinder
200	Undercarriage	330	Stick
300	Boom cylinder	340	Bucket tilt cylinder
310	Boom	350	Bucket

- Do not use cold start materials (ether) in the vicinity of heat sources, naked flames or in inadequately ventilated areas.
- Do not use any starting aids containing flammable material to start diesel engines with preheating or flame glow systems. There is a risk of EXPLOSION.
- Familiarize yourself with the location and operation of fire extinguishers on the machine and with local fire warning and fire abatement options.
- It is possible to install an extinguisher into the driver's cab.
- All doors, covers and boxes locks have to be unlocked before operation in order to facilitate firefighting in case of fire. Only electrical boxes from and over 50V must remain locked during operation.

Bringing the machine safely into service

- Carry out a careful inspection tour around the machine each time before starting it.
- Ensure that no one, except an authorized person, is in the work and movement area of the machine.
- Check the machine for loose bolts, cracks, wear, leakage and damage.
- Never attempt to operate a damaged machine.
- Ensure that any damage is immediately rectified.
- Ensure that all hoods and covers are closed, but that locks are unlocked, to facilitate the fight against fire in case of.
- Ensure that all warning signs are present.
- Keep windows and interior and exterior mirrors clean. Secure doors and windows against unintended movement.
- Ensure that no one is working on or under the machine and warn personnel in the vicinity of the machine that it is about to start by sounding the horn.

Safely getting up

- Proceed with the same precautions to climb up or down onto the machine, as to install yourself at the operator's seat.
- When getting up or down, position the machine on even, horizontal ground. The upper structure should be positioned with the undercarriage in such a way that the steps and ladders are aligned with each other.
- Ensure that steps, ladders and hand-rails (grips) are in good condition. In particular, you should ensure that they are free of dirt, oil, ice and snow.
NOTE: To ensure that the doors open properly in all weather conditions, the door seals must be dusted with talc or silicon at least every two months or more often if required. The door hinges and locks should be greased regularly.
- Face the machine when getting in or out and always use three-point support, i.e. two hands and one foot or two feet and one hand must always be in contact with the access system at the same time.
- If you are able to reach the door handle with your free hand, open the doors before you climb any higher. External influences, such as wind, can make it more difficult to open doors. Because of this, always use your hand for control when opening doors. Ensure that the door is latched open to prevent it slamming open and shut.
- In case of bad weather conditions, be particularly vigilant to realise the climbing and descent from the cab with the best safety conditions, and do or give the instructions to the execution of prior preparations to be accomplished, as enunciated above, in order to displace yourself safely.
- Be particularly vigilant with those prerequisites conditions.

- vices with sufficient load-carrying capacity.
- Park the machine on a flat surface and wedge the crawler or wheels securely.
 - If required, detach a part of the machine's working attachment during transportation.
 - The ramp used to drive the machine up onto the flatbed trailer should not exceed an inclination of the angle value indicated in the "Technical data" section of this manual (machine must be able to walk up unaided) and should have a wooden cover to prevent sliding back.
 - The undercarriage should be swept clean, i.e. before driving up the ramp, clean any snow, ice and mud from the crawler / wheels of the machine.
 - Align the machine precisely with the loading ramp.
 - Attach the hand levers for fine-tune driving (crawler excavator) onto the travel pedals.
 - Ensure that a spotter gives the machine operator the required signal.
 - Prepare the placing block to ensure against rolling back when the machine is driving up onto the flatbed.
 - Tilt the attachment up and drive up the loading ramp. While doing this, always hold the attachment securely over the loading area, drive very carefully up the ramp and onto the transportation vehicle.
 - Rotate the uppercarriage carefully to the rear and lower the attachment. Due to restrictions during transport on hoe attachment, tilt the arm in and dismantle the bucket during transportation.
 - After loading the machine onto the flatbed trailer, the upper structure must be secured facing the undercarriage using the stop bolts (only A devices).
 - Secure the undercarriage and the remaining individual parts using chains and blocks to prevent slipping.
 - Before you leave the machine, reduce pressure on all pressure lines, remove the ignition key and tilt up the safety lever.
 - Lock all cab and panel doors.
 - Before transportation, find out all details about the route to be travelled, particularly as they relate to width, height and weight restrictions.
 - Pay particular attention when driving under electrical lines and bridges and through tunnels.
 - When unloading the machine, take the same amount of care as was taken when it was loaded. Remove all chains and blocks. Start the engine as per the operating instructions. Drive carefully off the trailer's loading area and down the ramp. Hold the working attachment as securely as possible over the ground while doing this. Have a spotter guide you.

2.4 Servicing the machine safely

General safety instructions

- Maintenance and repair work may only be carried out by specially trained personnel.
- Observe statutory timetables or intervals given in the operating instructions for repeat tests / inspections. It is imperative that a suitably equipped workshop is available in order to carry out maintenance work.
- The inspection and maintenance schedule given at the end of these operating instructions defines precisely who is required / permitted to carry out what work.

Powerpack signs

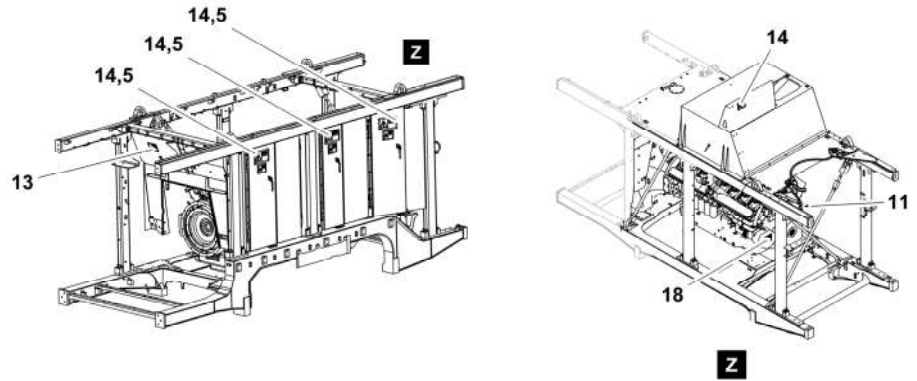


Fig. 2-2 Powerpack signs arrangement

- | | | | |
|-----------|-----------------------------|-----------|---------------------------------|
| 5 | Closed door label | 14 | Burn Hazard label |
| 11 | Rotation blade hazard label | 18 | Crush hazard label due to belts |
| 13 | Oil injection hazard label | | |

Cabin signs

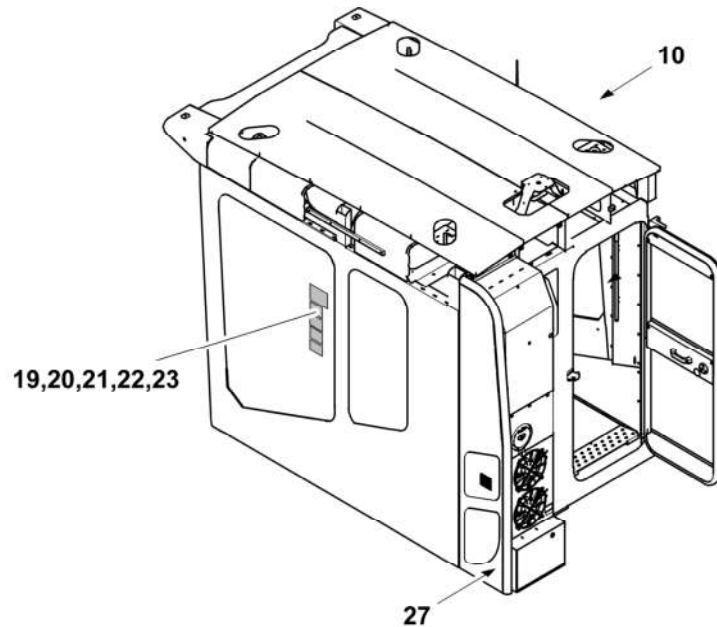


Fig. 2-3 Cabin signs arrangement

- | | | | |
|-----------|-------------------------------|-----------|------------------------|
| 10 | Emergency exit label | 21 | Safety belt label |
| 19 | Control symbols label | 22 | Operating manual label |
| 20 | Safety lever label | 23 | Operating manual label |
| 27 | Air conditioning system label | | |

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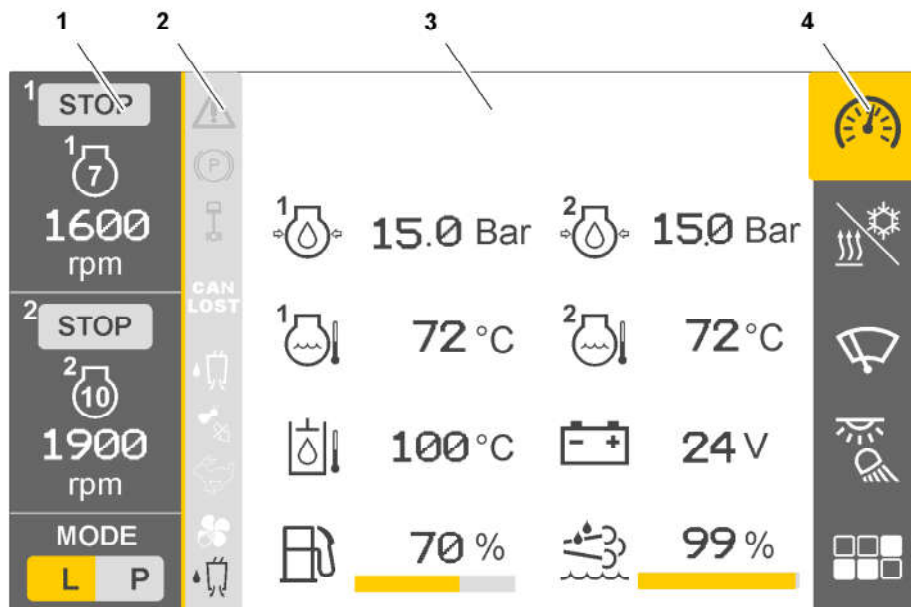


Fig. 3-5 Page structure of the control unit

- | | |
|------------------------------|------------------|
| 1 Diesel engines information | 3 Page content |
| 2 Information bar | 4 Navigation bar |

Navigation bar

- ▶ Use the navigation bar 4 to navigate through the pages of the control unit:
 - The dashboard,
 - The heating and the air conditioning,
 - The windscreen wiper,
 - The lighting,
 - And the "other" menu

Diesel engine information

The Diesel engine information area 1 gives information about the conditions and the setting of the two Diesel engines. You can also control some of these settings.

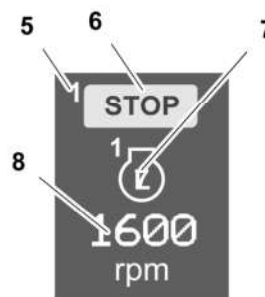


Fig. 3-6 Diesel engine information

- | | |
|--------------------------------------|-------------------------|
| 5 Diesel engine 1 or Diesel engine 2 | 6 Start and stop button |
|--------------------------------------|-------------------------|

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Other menu

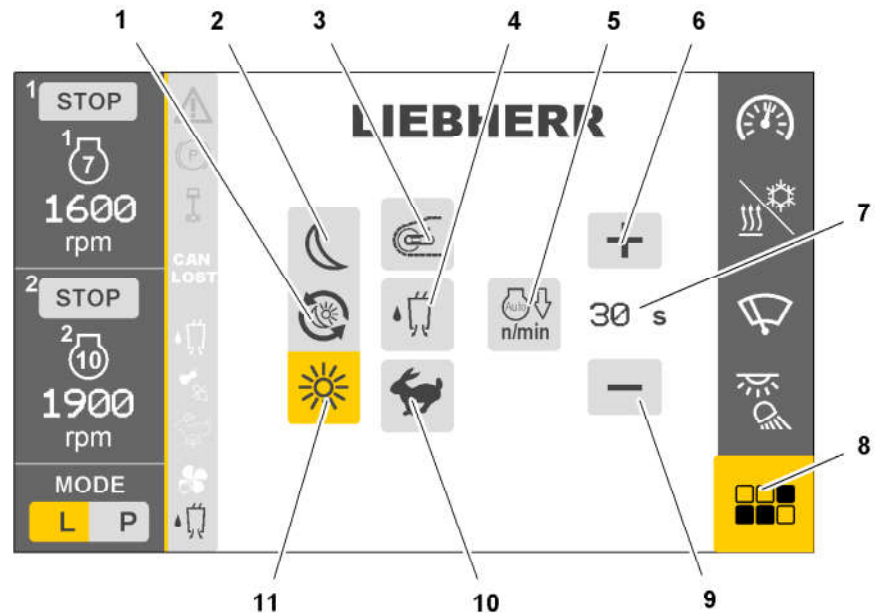


Fig. 3-12 Other menu page

- | | |
|--------------------------------------|-----------------------|
| 1 Auto night / day | 7 Auto idle time |
| 2 Night mode | 8 Other menu |
| 3 Idler special mode for soft ground | 9 Auto idle time down |
| 4 Solenoid valves bleeding | 10 High speed gear |
| 5 Auto idle | 11 Day mode |
| 6 Auto idle time up | |

Other menu



- ▶ Tap button 8.
- ↪ The screen to control different functions shows.
- ↪ The button comes yellow.

Auto night / day



To improve the visibility of the screen between day and night, you can change the combination of the colors of the screen.

- ▶ Tap button 1.
- ↪ The switch to day mode and night mode is automatic, depending on whether the headlights are on.

Day mode



- ▶ Tap button 11.
- ↪ The button comes yellow.
- ↪ The screen is always shown with bright colors.

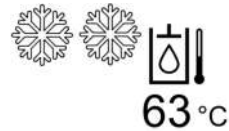


Fig. 3-21 Example of symbol for extra cold mode

- ▶ For more information, refer to the section "Indicator and error warning symbols".
- ▶ For more information on hydraulic oils, refer to the section "Hydraulic oil specifications" of the Operating manual of the machine.

Diesel engine indicators

The Diesel engine indicators **2** give information about the condition and the setting of the Diesel engines.

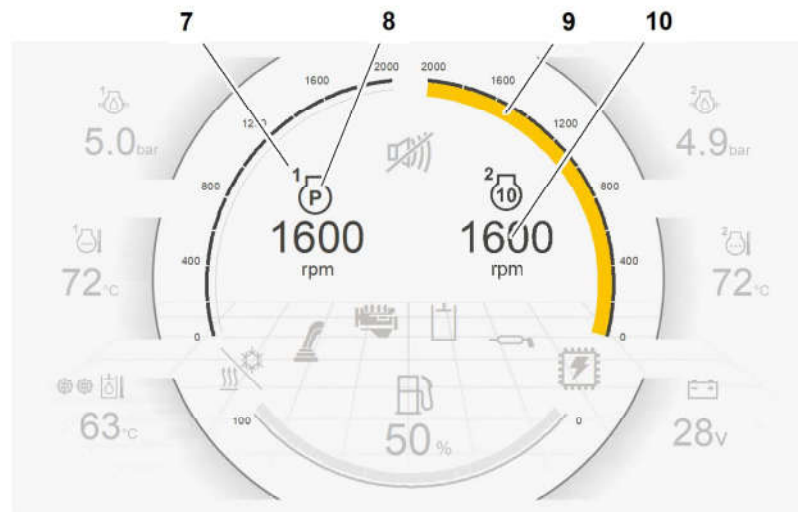


Fig. 3-22 Diesel engine indicators

- | | |
|-------------------------------|--|
| 7 Diesel engine 1 or 2 | 8 Speed step of the Diesel engine |
| 9 Gauge | 10 Diesel engine speed |

For each Powerpack, you have:

- A smart symbol for the Diesel engine step **8**
- A gauge **9**
- A label for the Diesel engine speed **10**.

The information about the powerpack 1 is given on the left side of the screen. The information about the powerpack 2 is given on the right side of the screen.

Each information or error symbol is related to a category. Use the symbol to know which system of the machine is concerned by the error or the information.

**Air-conditioning and heating system**

This symbol shows when there is an event on the air-conditioning system or the heating system.

**Controls**

This symbol shows when there is an event on control unit.

**Diesel engines**

This symbol shows when there is an event on the Diesel engine.

**Hydraulic**

This symbol shows when there is an event on the hydraulic system.

**Centralized lubrication system**

This symbol shows when there is an event on the centralized lubrication system.

**Electrical and electronic system**

This symbol shows when there is an event on the electrical and electronic system.

3.2.2 Safety lever

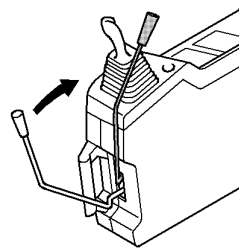


Fig. 3-37 Safety lever

For safety purposes, the left control panel is provided with a safety lever.



Caution!

The safety lever must always be pushed up into its highest position (see arrow) when entering or exiting the cab.

When the safety lever is pushed up, the pilot control circuit is disconnected. This means that:

- No work movements can be carried out when pilot control devices, e.g. the joystick or foot pedals, are operated.
- The slewing gear brake is locked (LED in switch **S325 on the keyboard** illuminates).
- It is not possible to release the slewing gear brake using switch **S325**.

When the safety lever is pushed (push up / push down) to its lowest position, the slewing gear brake and the LED in switch **S325** will return to their original states and the pilot control devices will be active.

- ▶ Before the operator starts working, he must push the safety lever down into its lowest position while seated in the operator's seat.

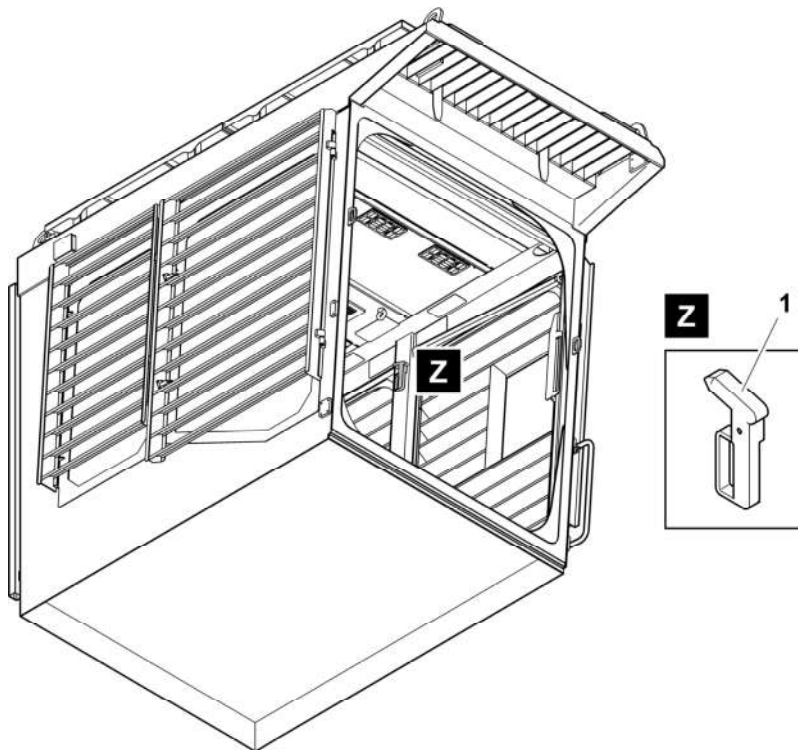


Fig. 3-48 Emergency hammer for the lateral emergency exit

3.2.7 Interior lightings

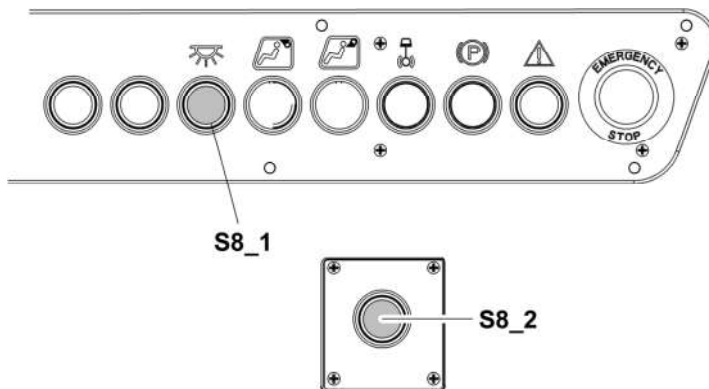


Fig. 3-49 Interior lightings

The interior lightings are switched on using the switches **S8_1** on the control board and **S8_2** on the left of the auxiliary seat.

- ▶ Press the switch **S8_1**.
 - ↪ The lights **E80_1** is switched on.
- ▶ Press the switch **S8_2**.
 - ↪ The lights **E80_2** is switched on.
- ▶ Press the switch **S8_1** again.
 - ↪ Interior lighting **E80_1** is switched off.

Turning on the electrical system

Ignition key switching positions

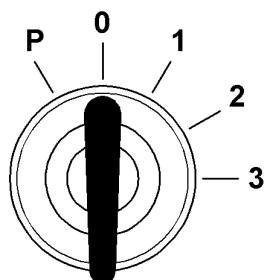


Fig. 3-56 Ignition key

- | | |
|---------------------------|---------------------------|
| P Parking position | 2 Contact position |
| 0 Off | 3 Contact position |
| 1 Contact position | |

Switching on the electrical system

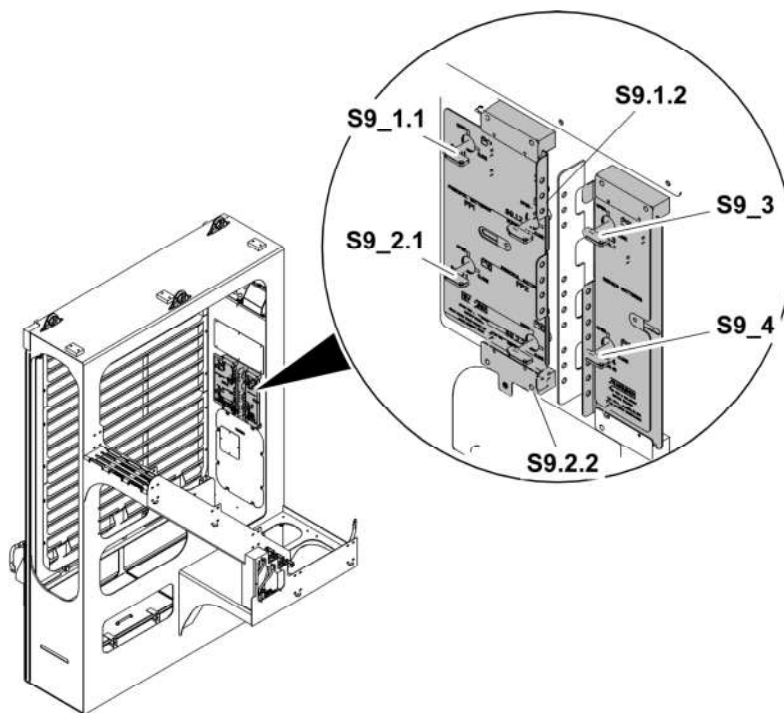


Fig. 3-57 Battery switches

- | | |
|---|---|
| 1 Battery switch electrical box PP1
S9_1.1 | 4 Battery switch electrical box PP2
S9_2.2 |
| 2 Battery switch electrical box PP1
S9_1.2 | 5 Service batteries circuit breaker
S9_3 |
| 3 Battery switch electrical box PP2
S9_2.1 | 6 Service batteries circuit breaker
S9_4 |

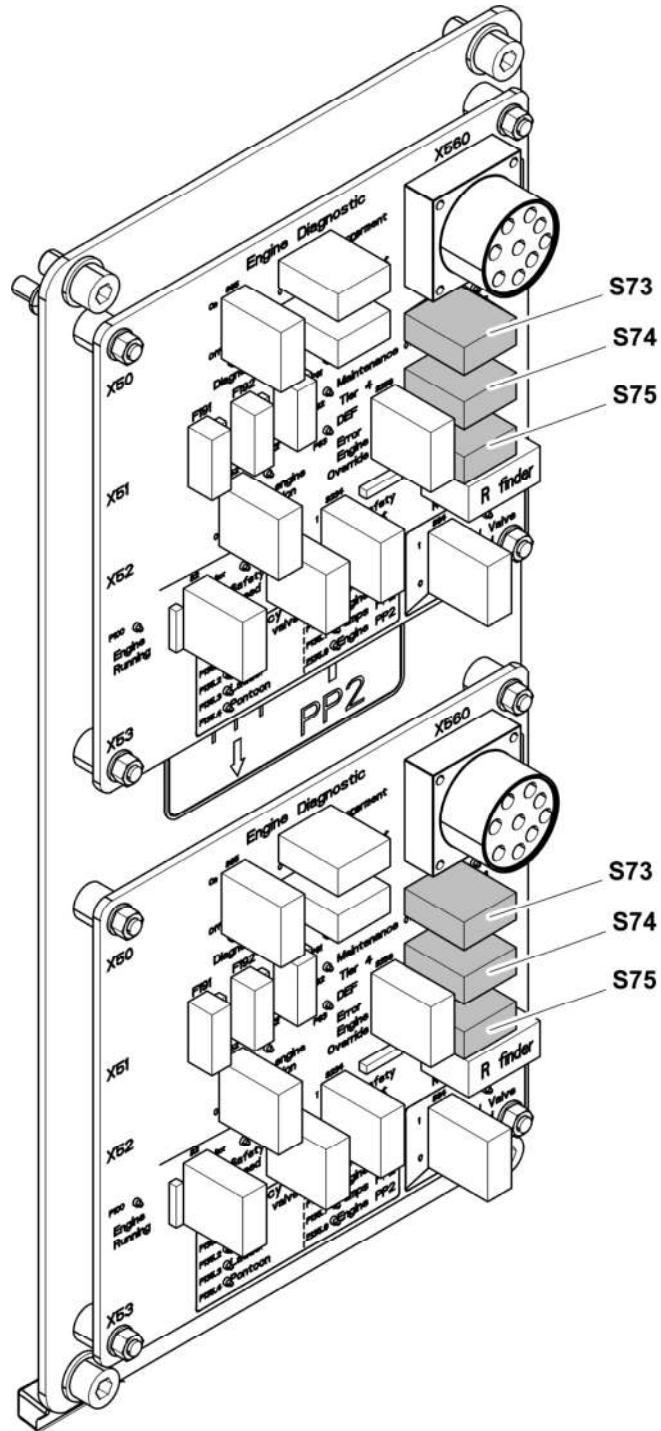


Fig. 3-62 Safety controls for hydraulic pumps on U1005

S73 Pumps power safety control

S74 Pumps flow safety control

S75 Pumps fan safety control

Pumps power safety control

During normal operation of the excavator, the electronic horsepower control contin-

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Incorrect use of the attachment or special tool used for demolition application

- Make sure that you use an attachment or special tool exclusively designed for the task.
- Only use attachment or special tool approved by Liebherr.
- Only operate the attachment or the special tool with closed windshield and with a front protective grid.
- Only operate the attachment or the special tool with closed door.
- Do not clean the ground with the special tool.
- Make sure that the special tool works in its specified limits. For more information, also refer to the Operator's Manual of the tool manufacturer.

Safe use of a hydraulic hammer or a hydraulic ripper

- According to the severity of the application, the use of a hydraulic hammer or a hydraulic ripper can result in vibrations, shocks or stresses which are higher than in normal use. It may reduce the expected lifetime of structures and/or components.
- The hydraulic hammer or the hydraulic ripper must be selected with particular care. When using a hydraulic hammer or a hydraulic ripper not permitted by Liebherr, warranty for steel structures and machine components will be ceased.
- Before beginning breaking tasks, position the machine on firm and level ground.
- Use a hydraulic hammer or a hydraulic ripper designed exclusively for breaking stone, concrete and other breakable materials.
- Only operate the hydraulic hammer or the hydraulic ripper in the longitudinal direction of the machine and with the windshield closed or with a front protective grid.
- Ensure during hammer or ripper operation that no cylinder is entirely extended or retracted and that the stick is not in the vertical position.
- In order to avoid damages to the machine, try not to break stone or concrete while performing retraction and extension motions of the hydraulic hammer.
- Do not apply the hydraulic hammer uninterrupted for more than 15 seconds at a time to the same place. Change the breaking point. Too long uninterrupted operation of the hydraulic hammer leads to an unnecessary overheating of the hydraulic oil.
- Do not use the drop force of the hydraulic hammer or of the hydraulic ripper to break stone or other materials. Do not move obstacles with the hydraulic hammer. Misuse of this nature would damage both the hammer and the machine.
- Do not use the hydraulic hammer or the hydraulic ripper to lift objects.
- Before beginning breaking tasks, the pressure of the dampening accumulator of the hydraulic ripper must be adjusted depending on the nature of the ground and the excavator model.

Safe use of a ripper

- Rippers are generally used in applications where the use of a bucket is not efficient to break out rocks. Thus, these applications are more severe than in normal use.
- According to the severity of the application, the use of a ripper can result in vibrations, shocks or stresses which are higher than in normal use. It may reduce the expected lifetime of structures and/or components.
- Special hydraulic devices can be necessary. Contact the Liebherr customer service.

- ▶ Push pedal **7b**.
 - ↳ Shovel bucket will be closed.

Semi-automatic flap closing

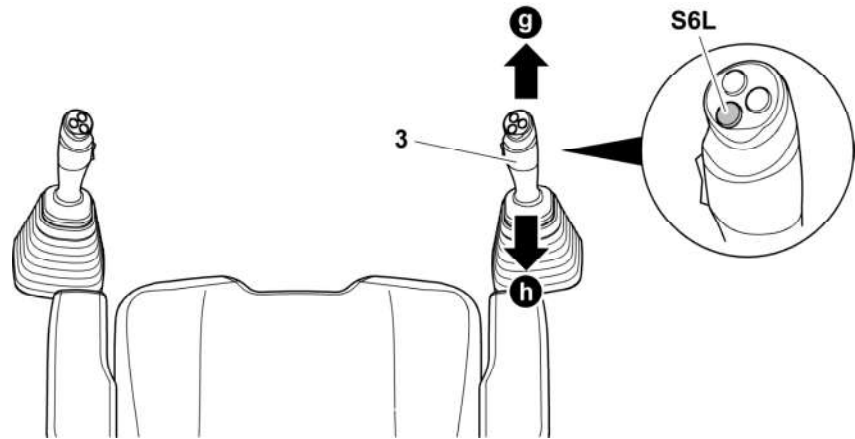


Fig. 3-76 Semi-automatic flap closing

- ▶ Push the button **S6L** on bottom of the right joystick.
 - ↳ Shovel flap will be closed automatically with full speed.
- ▶ Push the button **S6L** again during semi-automatic flap movement.
 - ↳ Shovel flap movement will be stopped.



Note!

If you keep the button **S6L** pushed, the semi-automatic flap closing movement will not start.

If you operate the shovel bucket pedal **7a** or **7b** during semi-automatic flap closing movement, the automatic movement will be stopped and flap control is switch to manual operation through pedals **7a** and **7b**.

Combined movements

Moving a joystick diagonally results in the work functions concerned being combined. This allows different attachment movements to be activated at the same time.

The operator can do the following movements without any additional manipulations.

When the swing movement is actuated, all working functions / movements are possible without affecting the swing movement.

During travel, every attachment movement is possible, but the swing movement has priority. In this case, the travel movement is reduced.

3.4.4 Lowering the work attachment when the engine is not running

In an emergency, the attachment can be lowered when the Diesel engine is not running.

**Danger!**

During the movement of the machine, the person which is checking the temperature of the different rollers must always be out of the hazard area **r** of the machine and always be in the operator's sight and in radio contact with him.

For the checking of the temperature, the excavator should stop moving. And only when the excavator is stopped, the person could go in the hazard area **r** to check the temperature of the different rollers.

The machine could only start moving again when the driver has seen the operator out of the hazard area **r**.

- If temperature of any moving part is growing up about 20°C above ambient temperature, interrupt travel and only commence again after parts have sufficiently cooled.
- To prevent overheating during travelling or to speed up cooling procedure it is advisable to have a water truck standby, to hose the heating components during travelling or cooling break.
- Move with idler and attachment forwards. Whenever possible, and not to contravene with mine safety regulations, swing whilst travelling to equally load track rollers. However, always ensure that clear forward vision is maintained.

Travelling the machine down grades or upgrades

In addition to above mentioned guidelines, when moving the machine during loading operations or when walking the machine distances, the following procedures apply:

- When travelling down grades greater than 5,7° (10%), it would be better to walk the machine down with the track motor first, i.e. the machine is moved backwards.
- When travelling up an incline, the final drives must be at the rear of the excavator.
- When walking down from a bench, firstly prepare a ramp. Respect the angle value indicated in the "Technical data" section of this manual (machine must be able to walk up unaided). When moving down the ramp never allow the machine to fall down on the attachment. When walking up the ramp never use attachment to assist the movement by pushing with the hydraulic power of the bucket, stick or boom.

Travelling the machine first time

The slide bearing (friction bearing) of the track rollers needs some time for running-in. If the bearing becomes hot at an early stage of machine life, this may cause lubrication problems during further life. Therefore when travelling the machine the first time aside from all above mentioned guidelines it is strongly recommended to move carefully and at reduced speed.

**Note!**

Warranty may become void if failure to recognize and comply with the recommended travel operating procedures, as outlined in this document, is noted.

3.6.2 Excavator lifting and lashing operations

**Danger!**

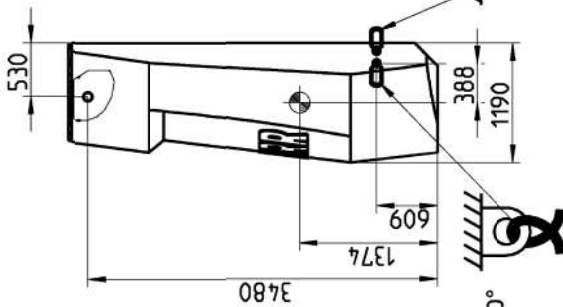
For safety reasons, always consider the precautions given in this section.

$0^\circ \leq \alpha \leq 50^\circ$
 $25^\circ \leq \beta \times \leq 50^\circ$
 LC= 24t
 D160/d80
 E70

$0^\circ \leq \alpha \leq 50^\circ$
 $25^\circ \leq \beta \times \leq 50^\circ$
 LC= 24t
 D160/d80
 E70

$\beta \leq 30^\circ$
 SWL=22t

$\beta \leq 30^\circ$
 SWL=22t

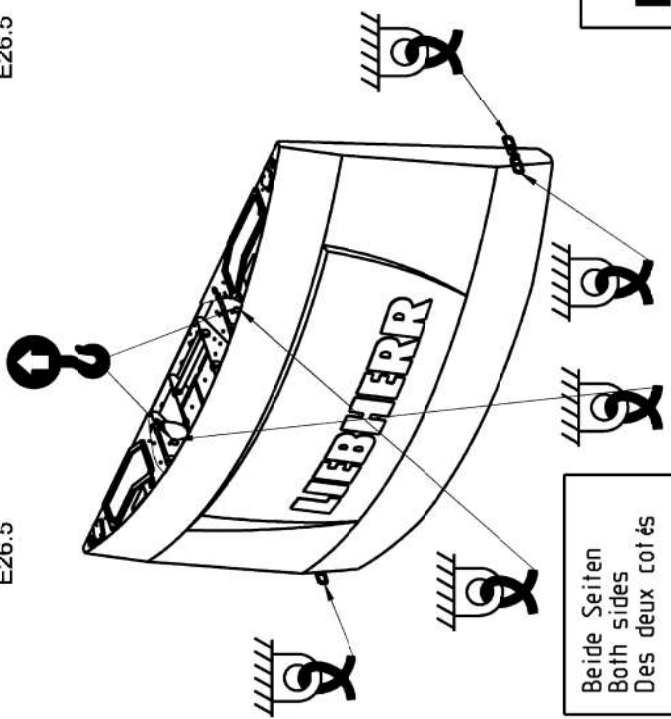


Beide Seiten
 Both sides
 Des deux cotés

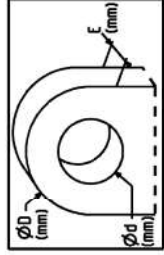
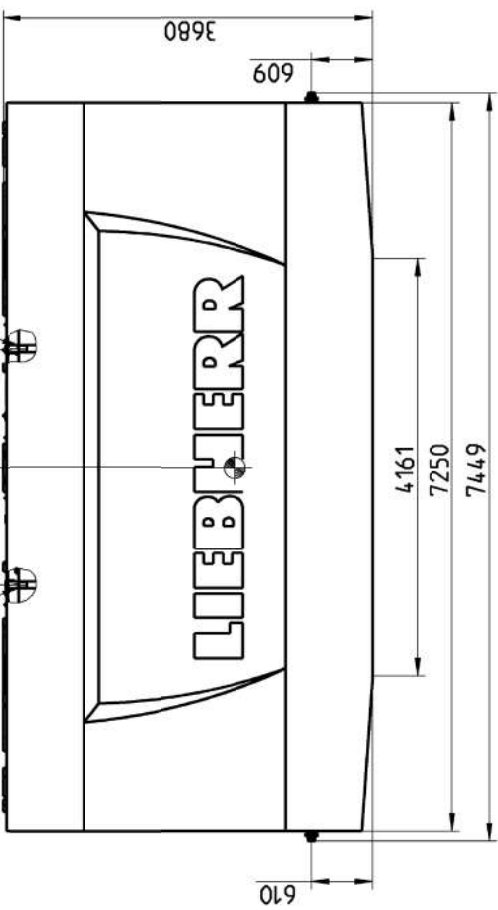
$0^\circ \leq \alpha \leq 50^\circ$
 $25^\circ \leq \beta \times \leq 50^\circ$
 LC= 16t
 D122/d82
 E26.5

Beide Seiten
 Both sides
 Des deux cotés

$0^\circ \leq \alpha \leq 50^\circ$
 $25^\circ \leq \beta \times \leq 50^\circ$
 LC= 16t
 D122/d82
 E26.5



Beide Seiten
 Both sides
 Des deux cotés



SCHWERPUNKT
 CENTER OF GRAVITY
 CENTRE DE GRAVITE



Gerechnet Calculated Calculé	Gewogen Weighed Pesé
31 000 kg	
Gewicht ohne Werkzeug und Verpackung Weight without tool and packaging Poids sans outillage et emballage	31 000 kg
Gewicht mit Werkzeug und Verpackung Weight with tool and packaging Poids avec outillage et emballage	31 000 kg

LIEBHERR

Bezeichnung / Description / Désignation
 TRANSPORTPLAN BALLASTGEWICHT
 TRANSP.DRW .COUNTERWEIGHT R9600
 PLAN DE TRANSP.CONTRÉPOIDS

Ident.-Nr. / Ident N.° d'ident	Index / Index Index	Blatt / Page Feuille
12716029	000	1/1

4.1.7 Display

When an error occurs on the display, the related status indicators stay on constantly or flash as follows:

! Fault / error	? Cause	✓ Solution
	Battery voltage too low	Contact Liebherr customer service
<p>(flashes slowly)</p>	Input voltage too low	Contact Liebherr customer service
	Internal system temperature too low	Contact Liebherr customer service
<p>(flashes slowly) (flashes slowly)</p>	Internal system temperature too high	Contact Liebherr customer service
<p>(flashes slowly)</p>	Fan does not operate	Contact Liebherr customer service
<p>(slowly)</p>	Overheating protection, the display brightness is dim	Contact Liebherr customer service
<p>(flashes quickly)</p>	Overheating protection, the display is off	Contact Liebherr customer service

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- correctly adjusted.
- Control the surroundings, and particularly the nearness area of the machine, during operation or when travelling.
 - Mirrors are installed on the machine:
 - on the left to check the left side of the machine.
 - on the front to check the front side of the machine.
 - on the right to check the right side of the machine.
 - above the counterweight to check the rear side of the machine.
 - On some machines, some mirrors may be replaced with cameras.
 - At each extension, construction or change on the machine, the sight conditions must be maintained. These conditions must otherwise be checked according to ISO 5006.
 - Mirrors and cameras must always be clean.
 - Damaged mirrors and cameras must be immediately replaced.
 - The site has to be organised so that the dangers due to a restricted field of view are minimized, particularly for machines with an operating weight which is superior to 40 tons.

Crack testing

- Even when the machine is operated carefully, there is a possibility of individual cases of overloading occurring, which could lead to cracks or loose connections. The machine should therefore be checked regularly for cracks, loose connections or other visible damage to maintain operational safety.
- In order to be able to check for cracks, it is essential that the machine is kept clean and cleaned regularly.
- The tests should be carried out in accordance with the monitoring and maintenance plan:
 - every 250 operating hours by the machine owner's maintenance personnel.
 - every 500 operating hours by authorised specialist personnel.
- It is advisable to carry out these tests: supported, on firm, horizontal substrate, with the equipment in longitudinal and cross direction for variable loads. Current accident prevention regulations must be adhered to.
- Especially check the supporting components, in particular:
 - framed construction undercarriage with axle and gearbox storage, support outrigger, lower slewing ring support with tower and slewing ring.
 - framed construction uppercarriage with bearing for boom and hoist cylinder, upper slewing ring support, cab suspension, mounting for slewing gear and counter weight.
 - framed construction components of attachments, e.g. boom, stick, quick change adapter, digging tool and grapple.
 - hydraulic cylinders, axles, steering, pins and pin connections, ascents, ladders and mounting elements.
- The crack test should be carried out visually. If a crack is suspected, the dye penetration test should be carried out as a crack test on areas which do not have good visibility, such as the ring bearing support, in order to increase testing safety.
- Any damage found must be rectified immediately. Welding work on load-bearing parts of the earth-moving machinery, loading devices and transport devices may only be carried out by trained specialist personnel and only in accordance with the accepted rules of welding engineering. In case of doubt, contact the LIEBHERR customer support service to discuss suitable remedies.

Welded anchor points

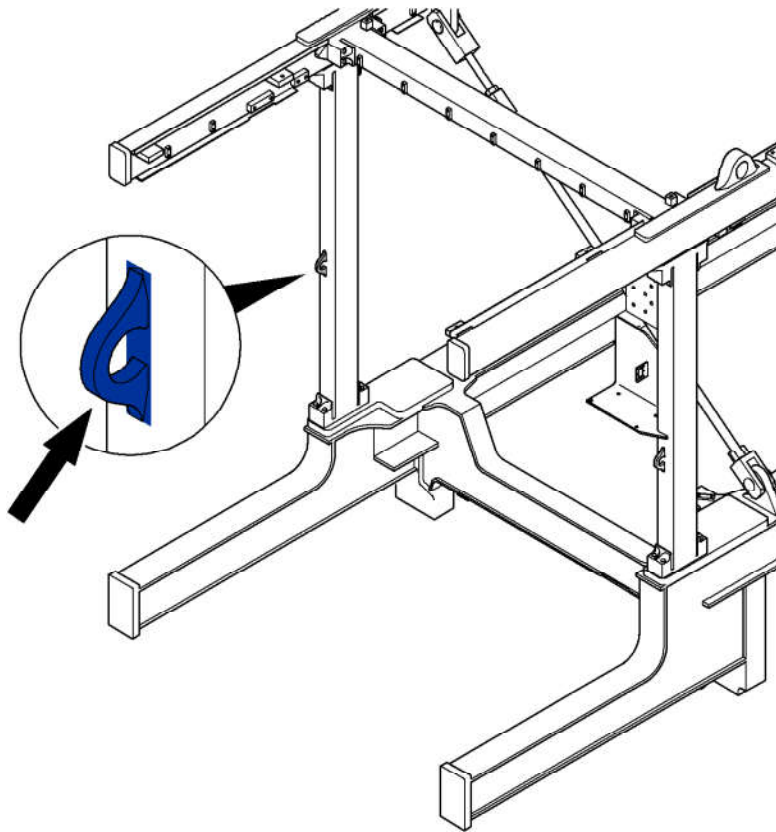


Fig. 5-4 Welded anchor point (example)

5.4.6 Service trap

For safety reasons and for easy maintenance, oil for the connected components should only be drained and refilled through the quick-change couplings on the service trap.

However, these components have also oil drain valves (refer to the description for oil change procedure of these components).

To lower and retract the service trap

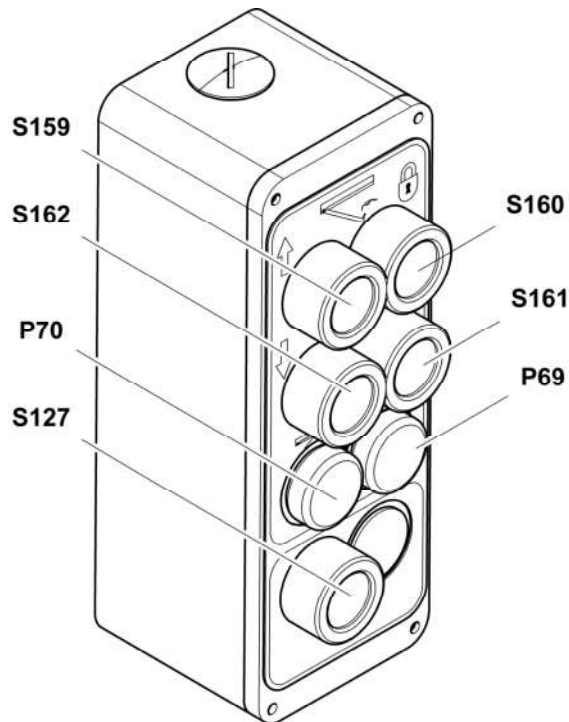


Fig. 5-9 Service trap control box **U1022_2**

P69 Indicator / service trap not up	S160 Switch / service trap lock
P70 Indicator / service trap not locked	S161 Switch / service trap unlock
S127 Switch / service lighting	S162 Switch / service trap lowering (down movement)
S159 Switch / service trap retraction (up movement)	

When the service trap is lowered, the service plate is accessible from the ground level.

The service trap can be moved up and down with the four push buttons on the control box **U1022_2** at the lower end of the access ladder.

The service trap can also be operated with the engine stopped.

It should only be moved down if the uppercarriage and the undercarriage are aligned.

To lower the service trap from its up position:

- ▶ Push the switch **S161** to unlock the trap.

** COB-2: Gear oil according to DIN 51517, part 3, CLP		
Pour point temperature	ISO 3016	VG220: T _{Pour point} < -15°C VG320: T _{Pour point} < -15°C VG460: T _{Pour point} < -10°C VG680: T _{Pour point} < -5°C

Tab. 5-7

*** COB-3: Gear oil according to API classification GL5		
TEST / REQUIREMENT	STANDARD / REFERENCE	REQUIRED LEVEL / PERFORMANCE
API classification	GL 5	-
Scuffing load capacity FZG test A/8.3/90	DIN ISO 14635-1	>12
MIL-L	2105 B/C/D	-
MAN	342 type M1	-
Mercedes Benz	235.0	-
ZF Friedrichshafen	TE-ML 05A, 16C, 17B, 19B, 21A	-

Tab. 5-8

**** COB-4: Gear oil according to API classification GL5		
TEST / REQUIREMENT	STANDARD / REFERENCE	REQUIRED LEVEL / PERFORMANCE
API classification	GL 5	-
Scuffing load capacity FZG test A/8.3/90	DIN ISO 14635-1	>12
MIL-L	2105 D, PRF-2105E	-
MAN	342 type N	-
ZF Friedrichshafen	TE-ML 05A, 07A, 16D, 21A	-

Tab. 5-9

5.5.6 Splitterbox oil



Use gear oil with viscosity classification SAE 90 or SAE 80W90 and meeting specifications API-GL-5 and MIL-L-2105 B, C or D.

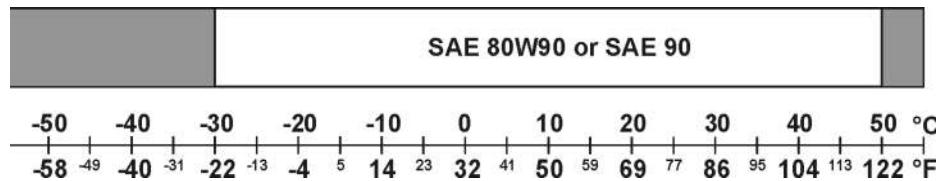


Fig. 5-17 Gear oils for use as splitterbox oil

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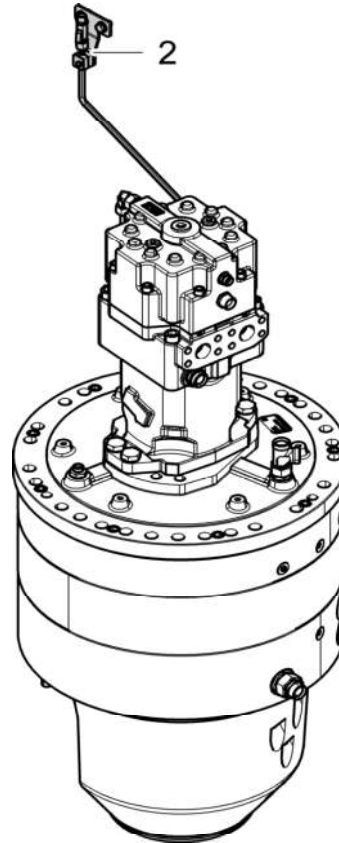


Fig. 5-21 Sampling valve 2 for oil of rear swing gears

To get a sample of the swing gear oil:

- ▶ Use the sampling valve **2** which is installed on the swing gear.

With the oil filter for the swing gear (optional equipment)

The oil filters are installed on the catwalk at the bottom of the control valve. They improve the lifetime of the swing gears.

Two filters are installed: one filters the oil of the swing gear installed at the left front side of the machine. The other filters the oil of the swing gear installed at the right rear side of the machine.

- ▶ A small amount of oil can also be refilled via the filler neck **2**.
- ▶ For oil quantities, oil specifications and oil change intervals, see lubrication and maintenance charts.



Note!

To extend the oil change interval, it is advised to use the chart method of CUM-MINS.

5.7.4 Oil reserve system (optional)

The oil reserve system is made to extend oil change intervals by increasing the oil quantity available for the Diesel engine lubrication and decreasing the engine oil deterioration.

Each Powerpack has an oil reserve system. Both oil reserve systems operates independently.

- ▶ For oil quantities, oil specifications and oil change intervals, refer to the lubricant and control and maintenance charts.
- ▶ For specific maintenance, refer to the control and maintenance chart.

5.9.1 Wear check (only for Geislinger coupling)

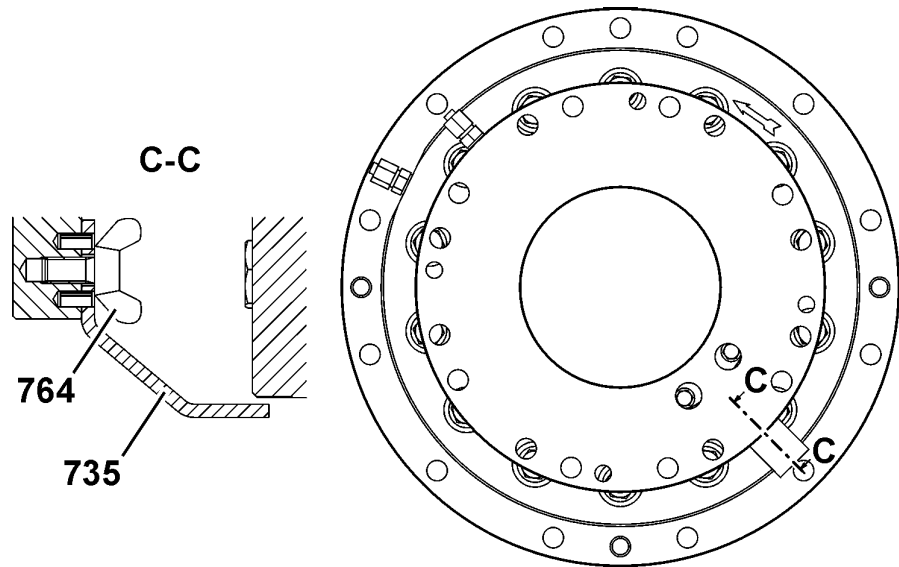


Fig. 5-37 Wear gauge 735 on Geislinger coupling

764 Wing bolt

735 Wear gauge

To check wear on Geislinger coupling:

- Make sure the Diesel engine is switched off.
- ▶ Fix the wear gauge **735** to the coupling with the wing bolt **764**.
- ▶ After measurement, unscrew wing bolt **764** and remove wear gauge **735**.



Caution!

The wear gauge **735** must never remain installed on the coupling when the Diesel engine is started.

- ▶ For detailed information about wear measurement, refer to Geislinger instruction handbook.

- ▶ Drain off the water until clean fuel starts to come out.
- ▶ Remove drain hose and close the drain plug 1.
- ▶ For maintenance intervals, refer to control and maintenance chart.

**Note!**

To reduce the formation of condensate in the tank, keep the fuel level as high as possible.

- ▶ In the event of a low fuel level, refill the tank before starting to work.

5.11.3 Emptying and cleaning the fuel tank

Use the drain valve 2 to drain the fuel tank. Cleaning access to the tank is possible via covers located on the top of the tank or via the tank access door.

- ▶ Always use a suitable container to collect the water and the fuel.
- ▶ Check the fuel tank.
- ▶ Wash out the fuel tank.
- ▶ Close covers and access door again.

5.11.4 Fuel filtering system

The fuel filtering system has a preliminary filter 2 and fuel filters 1.

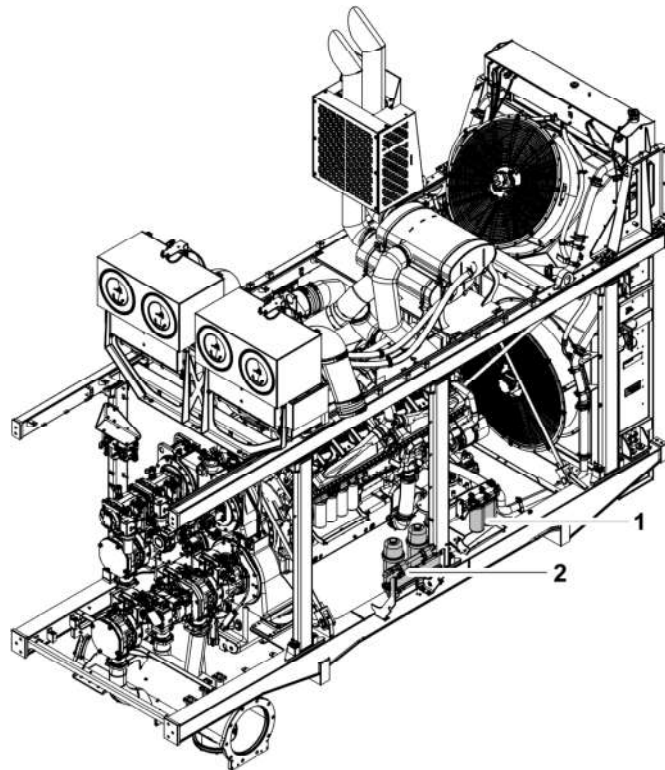


Fig. 5-48 Fuel filters system

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5.13.3 To clean the air channels for the precleaner

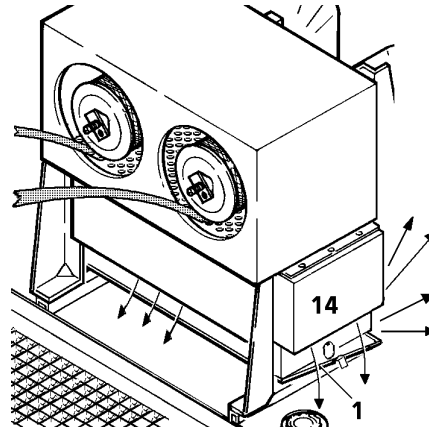


Fig. 5-57 Air channels for the precleaner

Check the condition of the air channels in the precleaner **14** at the intervals specified in the maintenance schedule.

- ▶ Open the filter cover **1** and check the channels.
- ▶ If the channels are plugged with dust, use compressed air to blow the channels out from the inside of the filter towards the outside.



Caution!

Do not use steam.

The safety elements **6** must remain in place.

Do not direct the air flow towards the filter elements.

5.13.4 Check the air intake system, hoses, elbows, clamps

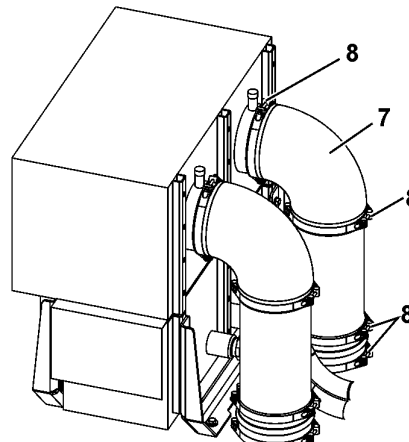


Fig. 5-58 Rubber hoses

The rubber hoses and elbows between filter housing and engine (pos. **7**) must be checked for damage, wear, tightness and leaks whenever the filter elements are replaced.

- ▶ If necessary, retighten the screws on the clamps **8**.

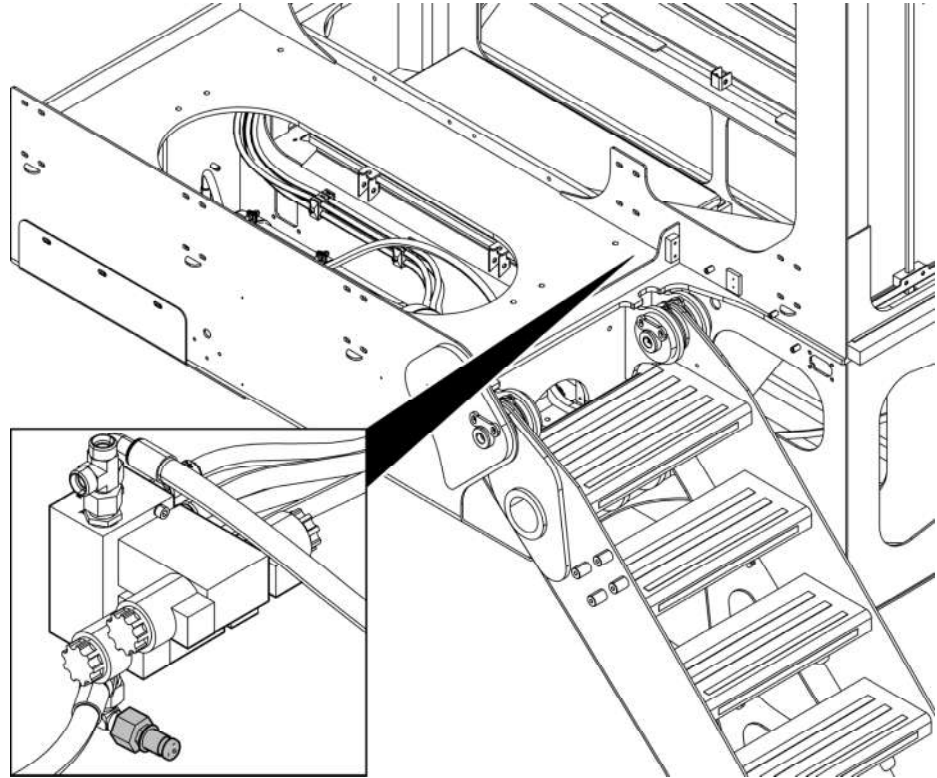


Fig. 5-67 Gauge port of the service trap

- ▶ Connect a gauge on port. If possible, connect the gauge as close as possible to the cylinders. Make sure the pressure is less than 2 bar.

Check the pressure in the hydraulic circuit of the air conditioning

- ▶ The machine must be in the check position described above.
- ▶ Stop the engine.
- ▶ Set the ignition key in contact position.
- ▶ Push the air conditioning buttons.
- ▶ Put the safety lever in its up position.
- ▶ Switch off the batteries, refer to the chapter "turning on the electrical system".

5.14.10 Bleeding the cooling fans pumps

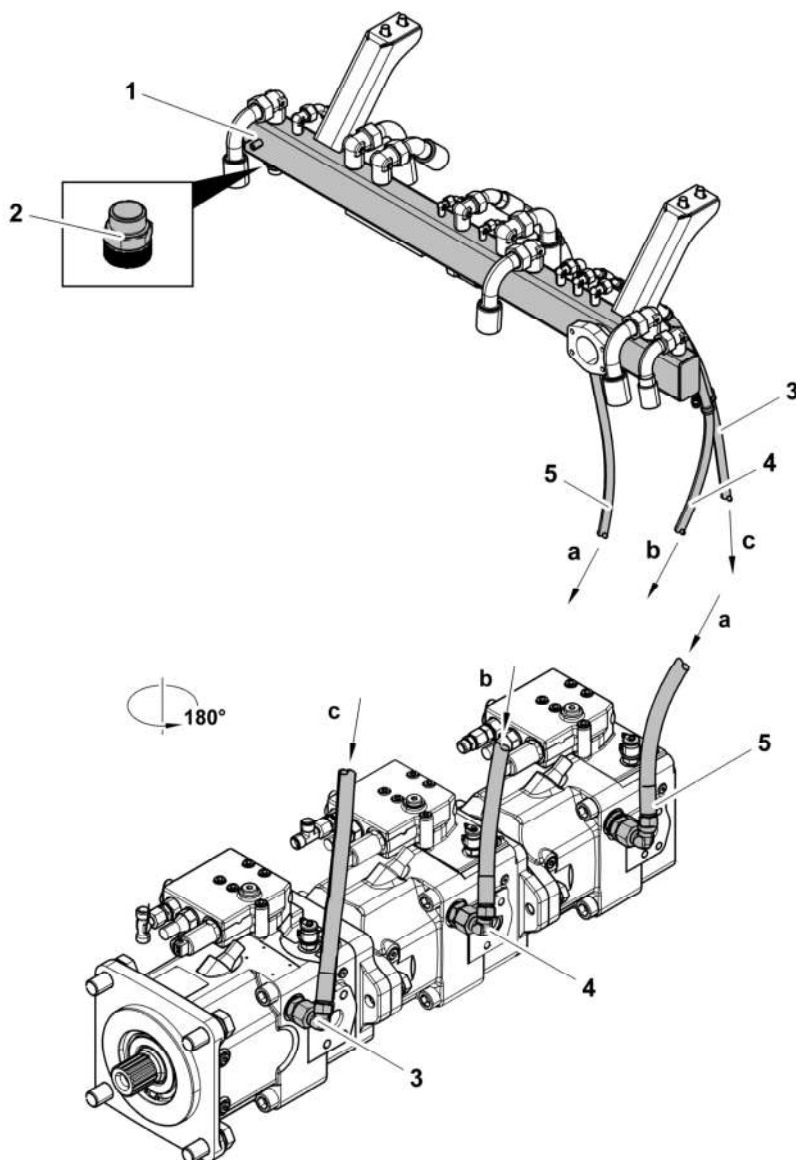


Fig. 5-77 Cooling fans pumps bleeding

- | | | | |
|---|----------------|---|---------------|
| 1 | Collector pipe | 4 | Leak oil hose |
| 2 | Drain valve | 5 | Leak oil hose |
| 3 | Leak oil hose | | |

After working on the pump or after changing oil in the hydraulic system, the hydraulic pump must be bled.

- ▶ Remove the drain valve **2** from the collector pipe **1**.
- ▶ Drain the oil from the collector pipe **1** into a suitable container.
- ▶ Unscrew the leak oil hoses **3**, **4** and **5** from the collector pipe **1** to bleed the pumps.
- ▶ As soon as hydraulic oil flows out densely, reinstall the leak oil hoses again.

5.14.17 Servicing the hydraulic cylinder

Checking the condition of the piston rod mount

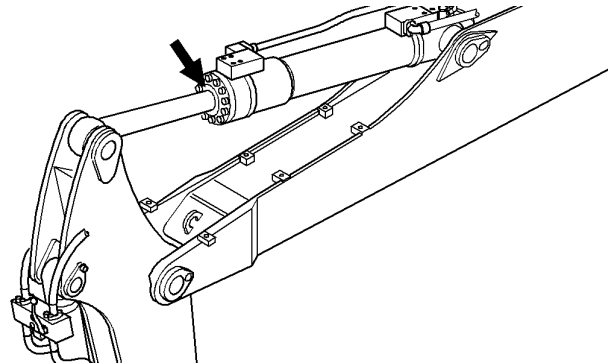


Fig. 5-84 Piston rod mount



Note

When a leak appears on the piston rod mount of a hydraulic cylinder (see arrow), the sealing kit must be replaced by a LIEBHERR dealer.

Protecting the piston rods

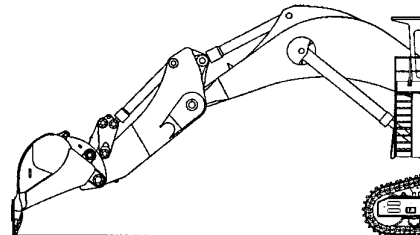


Fig. 5-85 Machine with piston rods drawn in

When the machine is out of service for more than 4 weeks and particularly for transportation by sea, the following measures must be taken:

- ▶ Position or transport the machine in such a way that the piston rods are fully drawn into the cylinders.
- ▶ Cover any loose piston rods with a thick layer of non-corrosive anti-corrosion fluid to all exposed sections of the piston rods.

Grease quality: see "Lubricating and operating materials"

- ▶ For sea transportation (salt water), or in winter (road salt), check the condition of the piston rods once more after loading the machine, since the anti-corrosive grease may have been removed by the wiper ring.
- ▶ Additionally, cover piston rods with anti-corrosion fluid if a cylinder only has a low stroke for certain work, meaning that the piston rod is not regularly moistened with

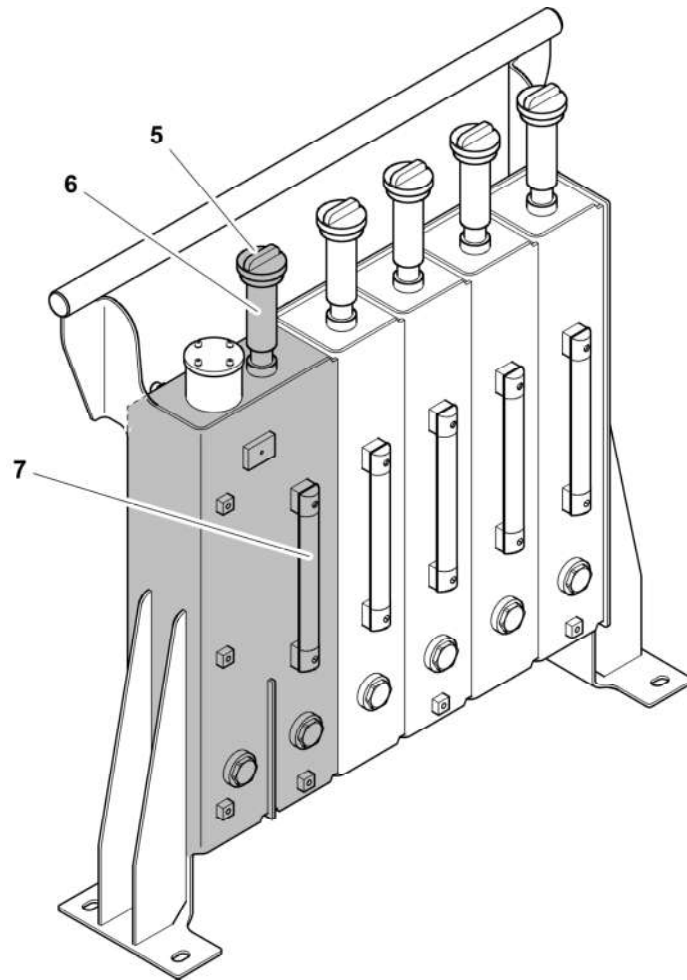


Fig. 5-92 Expansion tank

- | | | | |
|---|-------------|---|-------------|
| 5 | Sealing cap | 6 | Filler tube |
| 7 | Sight gauge | | |



Caution!

For the Lifetime sealing interspaces and associated expansion tank, always use the same oil as used to fill the hydraulic tank.

To drain the oil:

- Make sure you have a suitable oil drain container at your disposal.
- ▶ Remove sealing cap **5**.
- ▶ Remove drain plug **3** on the travel gear.
- ▶ Drain the oil into a suitable container.
- ▶ Reinstall both plug **3** and cap **5**.

To flush the Lifetime interspace:

- Make sure that you have an used oil container.

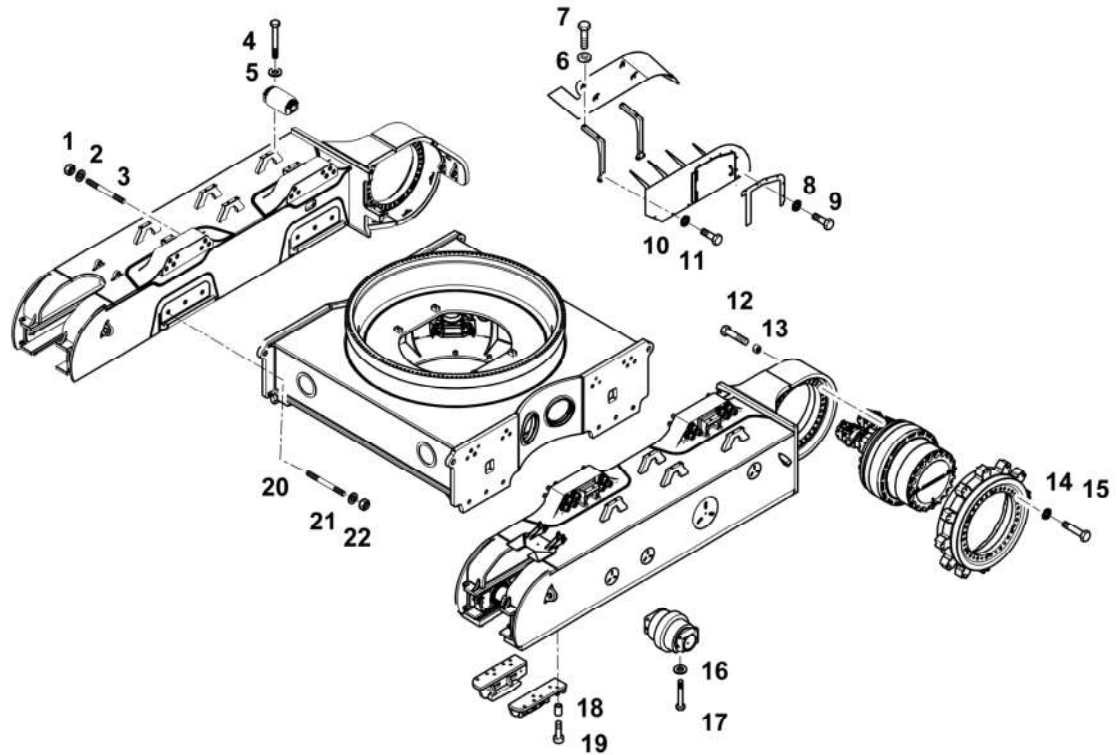


Fig. 5-100 Undercarriage mounting screw

	Torque		Torque
1 Stud		12 Hexagonal screw M48	
2 Washer		13 Sleeve	
3 Protection nut M64	1400 Nm	14 Washer	
4 Hexagonal screw M30	1920 Nm	15 Hexagonal screw M48	
5 Washer		16 Washer	
6 Washer		17 Hexagonal screw M42	
7 Hexagonal screw M20	560 Nm	18 Sleeve	
8 Washer		19 Hexagonal screw M42	
9 Hexagonal screw M16	270 Nm	20 Stud	
10 Washer		21 Washer	
11 Hexagonal screw M20	560 Nm	22 Protection nut M64	1400 Nm

5.19.1 Heating system

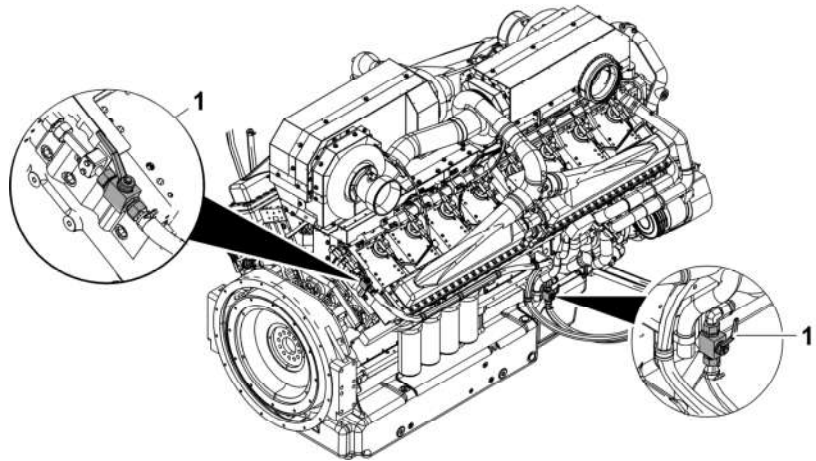


Fig. 5-110 Coolant shut-off valves **1** on Diesel engine

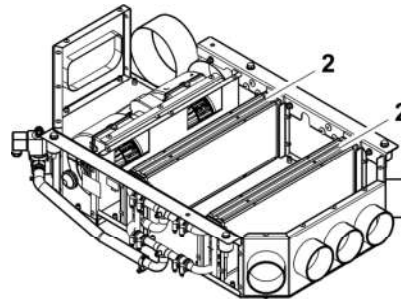


Fig. 5-111 Heater

2 Heat exchangers

Fresh air filter is installed on the left side of the cab, above the cab floor, behind the operator seat.

If filters are dirty, the air flow in both heating and air conditioning systems is reduced. This results in the forming of frost and system shut-off.

- ▶ Remove and clean the heat exchangers **2** and the fresh air filter at intervals specified in the control and maintenance chart.
- ▶ Do not operate the machine, even briefly, without these filters, since the heat exchangers **2** will otherwise quickly become blocked.



Caution!

Independently from weather conditions, the two coolant shut-off valves **1** located on the Diesel engine must always remain open.

However, the coolant shut-off valves **1** must be closed during coolant change.

To clean and change the fresh air filter:

- ▶ Remove fresh air filter.

5.21.5 Powerpack mounting bolts

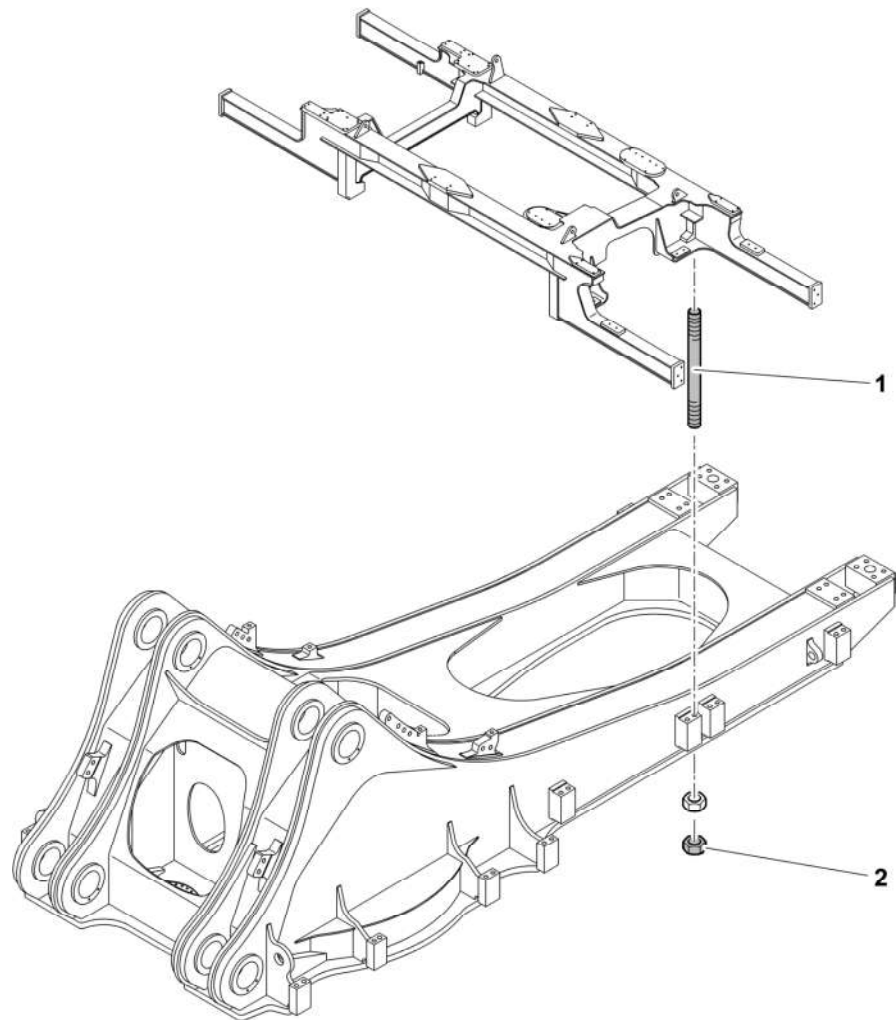


Fig. 5-122 Powerpack bolts

	Torque	Tension	Quantity
1 Bolt M48x505		1290 kN	12
2 Protection nut M48	600 ±100 Nm		12

The use of special tensioning procedure and tool is necessary to obtain the correct bolt tension (contact Liebherr customer service).



Danger!

The special tool may only be operated by qualified personnel, especially trained for the use of this high pressure tensioning device and aware of the operating instructions as well of the recommendations for accident and damage prevention concerning this tool.

Use appropriate working platforms and lifting devices to install and hold in position the special tool while tensioning the bolts.

WORK TO BE PERFORMED DAILY	Check	Initials	Comments
Check <input type="checkbox"/> for first and only interval or Check <input type="radio"/> for repeat interval			
Check coolant level	<input type="radio"/>		
Do a visual check of the engine and external pipework for leaks	<input type="radio"/>		
Do a visual check of the exhaust gas system connections for leaks	<input type="radio"/>		
Do a visual check of the oil supply / return pipework for leaks	<input type="radio"/>		
Do a visual check of the water separator on fuel filters, drain if necessary	<input type="radio"/>		
Replace all preliminary filters and fuel filters as soon as fuel level reaches the red mark on the bell of the preliminary filters (replace the filters at least every 500 hours)	<input type="radio"/>		
Do a visual check of the vacuum indicators for air filters clogging, clean or replace if necessary and reset the indicator	<input type="radio"/>		
Do a visual check of the coupling for cracks, chips and missing parts (only for Centa coupling)	<input type="radio"/>		
Do a visual check of the coupling for leaks (only for Geislinger coupling)	<input type="radio"/>		
Check oil level in the splitterbox	<input type="radio"/>		
Do a visual check of the splitterbox input shaft seal or engine main rear seal for leaks	<input type="radio"/>		
Do a visual check of the starter motors and alternator for cables, and brackets	<input type="radio"/>		
Do a visual check of the coolers for clogging and damage, clean or replace if necessary	<input type="radio"/>		
Perform the complete "Daily" Maintenance Echelon given in the CUM-MINS Operating and Maintenance Manual	<input type="radio"/>		
HYDRAULIC SYSTEM			
Check oil level in hydraulic tank	<input type="radio"/>		
Clean magnetic rods of the leak oil filter (daily during the first 250 hours)	<input type="checkbox"/>		
Clean magnetic rods of bypass filter (daily during the first 250 hours)	<input type="checkbox"/>		
ELECTRICAL SYSTEM			
Press to open dust discharge valve on aeration devices for cabin and electrical boxes	<input type="radio"/>		
FIRE FIGHTING SYSTEM			
Do a visual check of the fire fighting system condition (optional equipment, refer to the fire fighting system documentation) - If any issue contact the fire fighting local dealer	<input type="radio"/>		
Follow the inspection intervals recommended by the specific Health and Safety rules existing in country and/or on mine site	<input type="radio"/>		
START THE ENGINE TO CHECK THE FOLLOWING ACTIONS			

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5.24.5 500 Hours Maintenance Schedule - R 9600

Serial Number: Fleet Number: SMU Hours: Travel Hours:	Completed by: Date and Signature:
--	--

WORK TO BE PERFORMED AT 500, 1500, 2500 HOURS, ...	Check	Initials	Comments
Check <input type="checkbox"/> for first and only interval or Check <input type="radio"/> for repeat interval			
GENERAL HYDRAULIC SYSTEM			
Do a visual check of all hoses, pipes and fittings for any external damage or leakage	<input type="radio"/>		
Do a detailed check for good condition of pipes, hoses, clamps and fittings for damage and leakage	<input type="radio"/>		
Do a visual check of the hydraulic components for leaks and/or damages	<input type="radio"/>		
Do a visual check of the hydraulic cylinder rods for leaks and good condition	<input type="radio"/>		
GENERAL FASTENING			
General hydraulic: Do a visual check for missing, broken or loosen mounting screws of all hoses, pipes, fittings and clamps, tighten if necessary	<input type="radio"/>		
Track components: Do a visual check for missing, broken or loosen mounting screws of the sprockets, rollers, idlers, track guides, track pads, protection covers and final drives, tighten if necessary	<input type="radio"/>		
Undercarriage: Do a visual check for missing, broken or loosen mounting screws of the side frames, tighten if necessary	<input type="radio"/>		
Undercarriage: Do a visual check for missing, broken or loosen mounting screws of all parts, tighten if necessary	<input type="radio"/>		
Attachment: Do a visual check for missing, broken or loosen mounting screws of the handrails, pin covers fastening and greases connections, tighten if necessary	<input type="radio"/>		
Uppercarriage: Do a visual check for missing, broken or loosen mounting screws of the counterweight, tanks, Powerpack, control valve console, cab, cab elevation, catwalks, handrails, grease box, ladder, tighten if necessary	<input type="radio"/>		
Swing gear: Do a visual check for missing, broken or loosen mounting bolts of the swing gear and hydraulic motors, tighten if necessary	<input type="radio"/>		
Diesel engine: Do a visual check for missing, broken or loosen mounting screws of the thermic protection on exhaust manifold fastening, tighten if necessary	<input type="radio"/>		

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WORK TO BE PERFORMED AT 1000, 3000, 5000 HOURS, ...	Check	Initials	Comments
Check <input type="checkbox"/> for first and only interval or Check <input type="radio"/> for repeat interval			
Do a visual check of the bucket teeth and wear kit for wear	<input type="radio"/>		
Do a visual check of the grease supply at each lube point	<input type="radio"/>		
Do a visual check of cable harness and sensors for damage	<input type="radio"/>		
Do a visual check of all parts for cracks - If necessary fill out the "Structural Inspection" form in Service Manual - Chapter 4	<input type="radio"/>		
Do a visual check of the pin covers fastening	<input type="radio"/>		
Do a visual check of the non-slip surfaces for wear and damage	<input type="radio"/>		
UPPERCARRIAGE			
Do a visual check of the service trap for leaks or damage	<input type="radio"/>		
Do a visual check of oil, grease or fuel for leaks	<input type="radio"/>		
Do a detailed check of all structural parts for cracks - If necessary fill out the "Structural Inspection" form in Service Manual - Chapter 4	<input type="radio"/>		
Do a detailed check of the dust separator on air filter (cyclone) and hoses for damage	<input type="radio"/>		
Do a detailed check and lubricate covers, doors hinges, locks as well as service trap, access ladder cylinders bushings and swivel pins	<input type="radio"/>		
Do a visual check if fan guards are in place and secured	<input type="radio"/>		
Do a visual check of mirrors and cameras, clean and adjust if necessary	<input type="radio"/>		
Do a visual check of the non-slip surfaces for wear and damage	<input type="radio"/>		
SWING GEAR			
Do a visual check of the swing gears for leaks and oil level in expansion tanks	<input type="radio"/>		
Sample and analyse gear oil, change oil if necessary	<input type="radio"/>		
Change gear oil (if filled with COB-2, COB-3 or COB-4 gear oil)	<input type="radio"/>		
Replace oil filters	<input type="radio"/>		
SWING RING			
Do a detailed check of the grease supply (outlet of new grease around the swing ring)	<input type="radio"/>		
CENTRALIZED LUBRICATION SYSTEM			
Perform a complete daily maintenance given in the SKF / Lincoln Operating Instructions	<input type="radio"/>		
Do a check of the grease tank level	<input type="radio"/>		
Every 1000 hours, perform a complete 1000 hours Maintenance Echelon given in the SKF / Lincoln Operating Instructions	<input type="radio"/>		

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WORK TO BE PERFORMED AT 2000, 4000, 6000 HOURS, ...	Check	Initials	Comments
Check <input type="checkbox"/> for first and only interval or Check <input type="radio"/> for repeat interval			
Do a visual check of the non-slip surfaces for wear and damage	<input type="radio"/>		
Do a detailed check of all the anchor points and the tightening of the hand-rails mounting screws, only by authorized specialist personnel (at least once a year)	<input type="radio"/>		
SWING GEAR			
Do a visual check of the swing gears for leaks and oil level in expansion tanks	<input type="radio"/>		
Sample and analyse gear oil, change oil if necessary	<input type="radio"/>		
Change gear oil (if filled with COB-1 gear oil)	<input type="radio"/>		
Change gear oil (if filled with COB-2, COB-3 or COB-4 gear oil)	<input type="radio"/>		
Replace oil filters	<input type="radio"/>		
Measure the axial play of the output shaft bearing, replace if necessary	<input type="radio"/>		
SWING RING			
Do a detailed check of the grease supply (outlet of new grease around the swing ring)	<input type="radio"/>		
Do a detailed check of the meshing of the swing gears with the swing ring	<input type="radio"/>		
Do a detailed check of the swing ring teeth for damage	<input type="radio"/>		
Do a detailed check of the swing ring axial play	<input type="radio"/>		
CENTRALIZED LUBRICATION SYSTEM			
Perform a complete daily maintenance given in the SKF / Lincoln Operating Instructions	<input type="radio"/>		
Do a check of the grease tank level	<input type="radio"/>		
Every 1000 hours, perform a complete 1000 hours Maintenance Echelon given in the SKF / Lincoln Operating Instructions	<input type="radio"/>		
Every 2000 hours, perform a complete 2000 hours Maintenance Echelon given in the SKF / Lincoln Operating Instructions	<input type="radio"/>		
DIESEL ENGINE AND SPLITTERBOX			
Do a visual check in and around the engine compartment for leaks, contaminations and damage	<input type="radio"/>		
Check engine oil level	<input type="radio"/>		
Sample and analyse engine oil	<input type="radio"/>		
Check oil level in oil reserve system (optional equipment)	<input type="radio"/>		
Check that the monitoring LED of the oil reserve system shows correct operation (optional equipment)	<input type="radio"/>		

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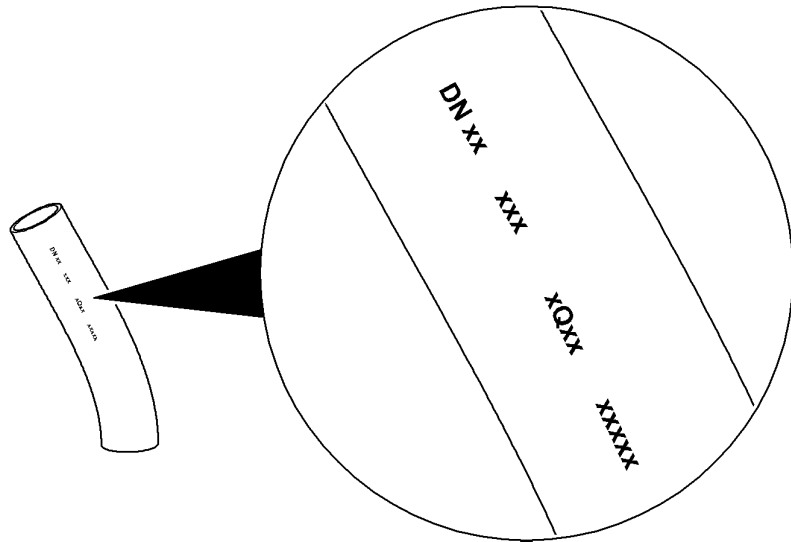


Fig. 6-2 Marking of hose

Hose assembly marking

The hose assembly is marked on the fittings with:

- the manufacturer identification
- the date when the hose assembly has been made
- the hose identification number
- the service pressure

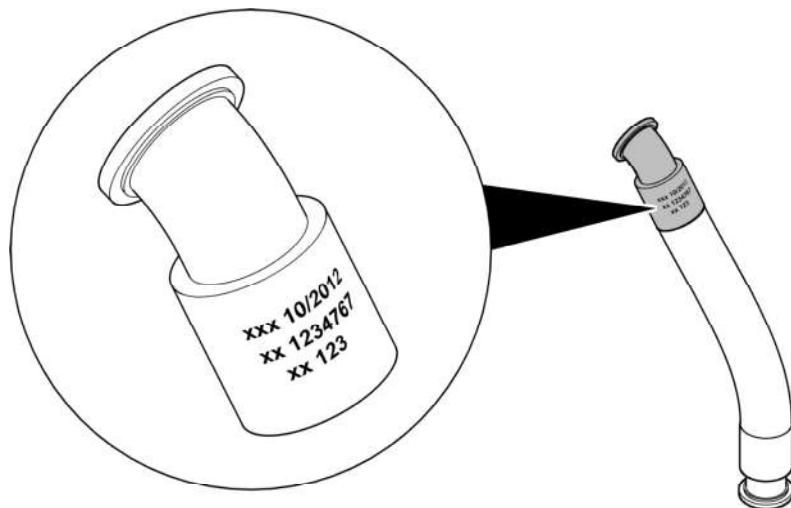


Fig. 6-3 Marking of hose assembly

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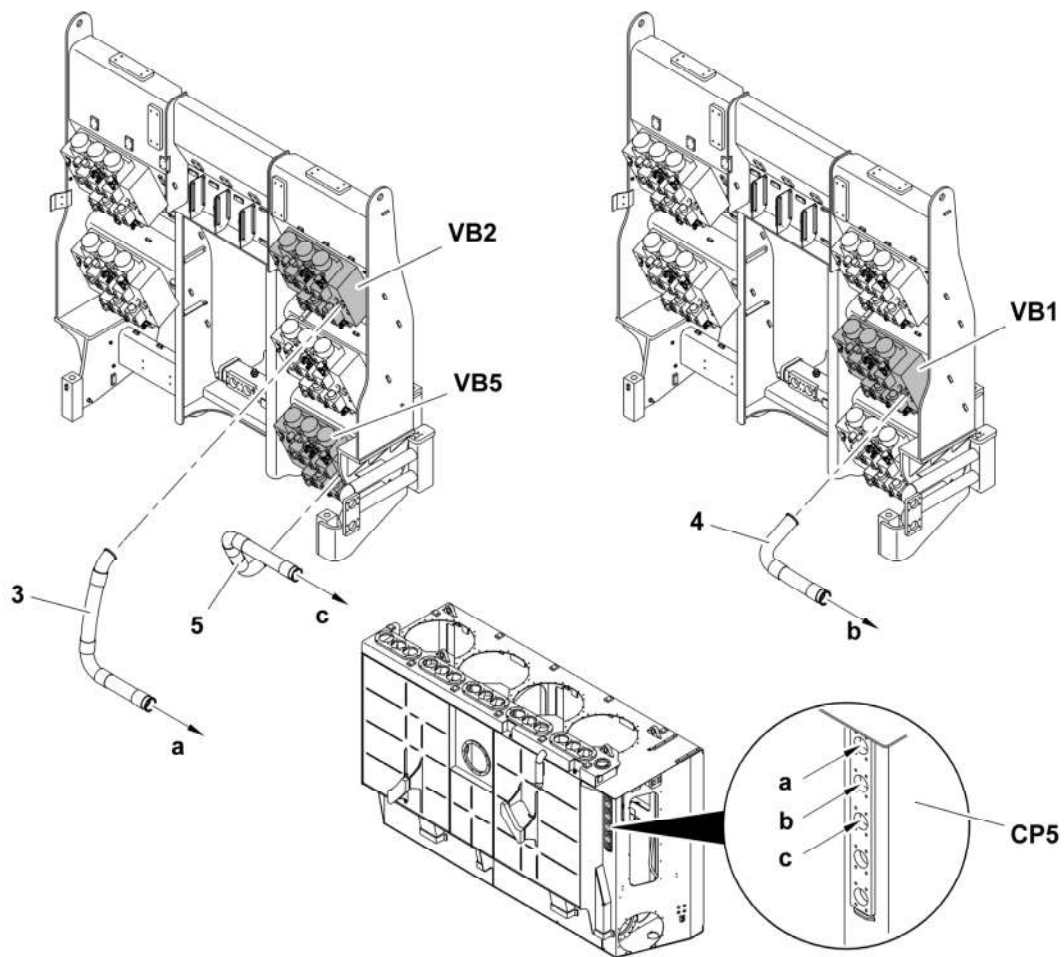


Fig. 6-7 Return lines on the hydraulic tank

3	Hydraulic hose	CP5	Internal collecting pipe of the hydraulic tank, before the oil coolers
4	Hydraulic hose	VB1	Valve block 1
5	Hydraulic hose	VB2	Valve block 2
		VB5	Valve block 5

► Disconnect, drain and clean the hoses **3**, **4** and **5**.

P2.1 Working pump 2 PowerPack 1 **SP2** PowerPack 2 suction pipe

P3.1 Working pump 3 PowerPack 1

- ▶ Disconnect, drain and clean all the compensators of the two PowerPacks.
- ▶ Clean the shutoff valve **9**.
- ▶ Open, drain and clean the suction pipes **SPx**.
- ▶ Clean the hydraulic tank (refer to the related section).
- ▶ Do the restart procedure before you put the machine in operation (refer to the related section).

6.2.5 Swing circuit

Leak oil circuit

- ▶ Remove the complete leak oil filter **1** (refer to section above and Operating Manual).
- ▶ Make sure that, during removal, contaminated oil does not go into the tank.
- ▶ Carefully clean the oil inlet compartment where the filter **1** is installed.
- ▶ Carefully clean the housing of the filter **1** and the related magnetic rod.
- ▶ Replace the filter if necessary. Refer to the Operating manual.

- ▶ Carefully clean the housing of the filter 1 and the related magnetic rod.
- ▶ Replace the filter if necessary. Refer to the Operating manual.
- ▶ Disconnect, drain and clean all the hydraulic hoses.

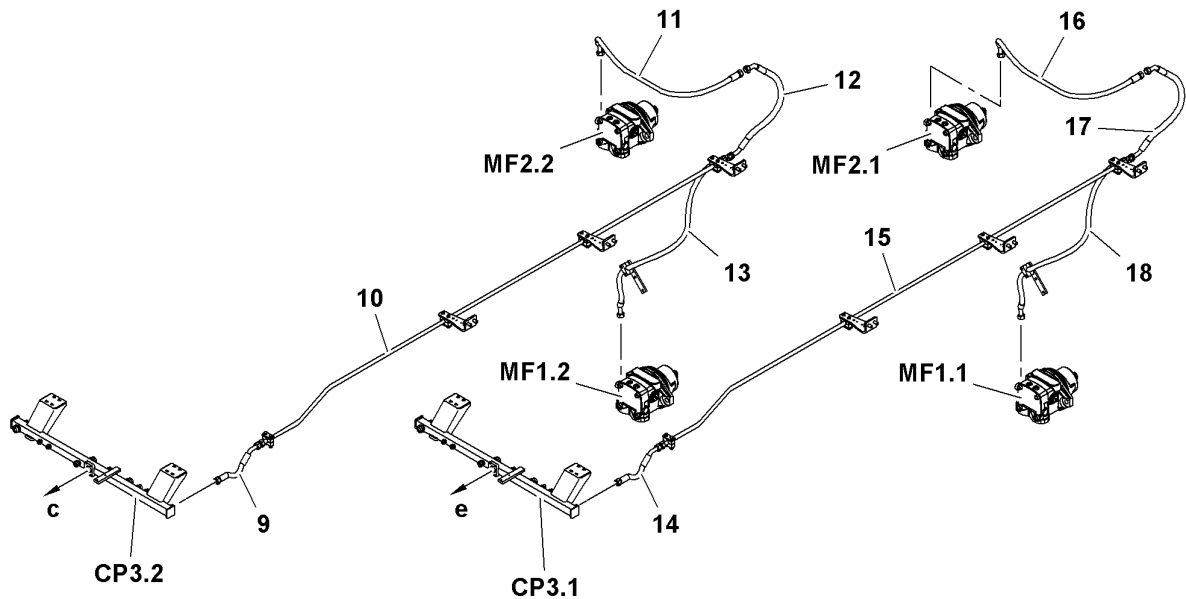


Fig. 6-27 Leak oil hoses of water fan motors

9	Hydraulic hose PowerPack 2	18	Hydraulic hose PowerPack 1
10	Hydraulic pipe PowerPack 2	c	Refer to section "Leak oil circuit of working pumps"
11	Hydraulic hose PowerPack 2	e	Refer to section "Leak oil circuit of working pumps"
12	Hydraulic hose PowerPack 2	CP3.1	PowerPack 1 collecting pipe
13	Hydraulic hose PowerPack 2	CP3.2	PowerPack 2 collecting pipe
14	Hydraulic hose PowerPack 1	MF1.1	Water fan motor 1 PowerPack 1
15	Hydraulic pipe PowerPack 1	MF2.1	Water fan motor 2 PowerPack 1
16	Hydraulic hose PowerPack 1	MF1.2	Water fan motor 1 PowerPack 2
17	Hydraulic hose PowerPack 1	MF2.2	Water fan motor 2 PowerPack 2

- ▶ Disconnect, drain and clean all the hoses and pipes.



Note!

Depending on the machines, you can have only one hydraulic hose as an alternative to the two connected hoses **11-12** and **16-17**.

- ▶ Open, drain and clean the collecting pipes **CP3.x**.

Overspeed pressure circuit

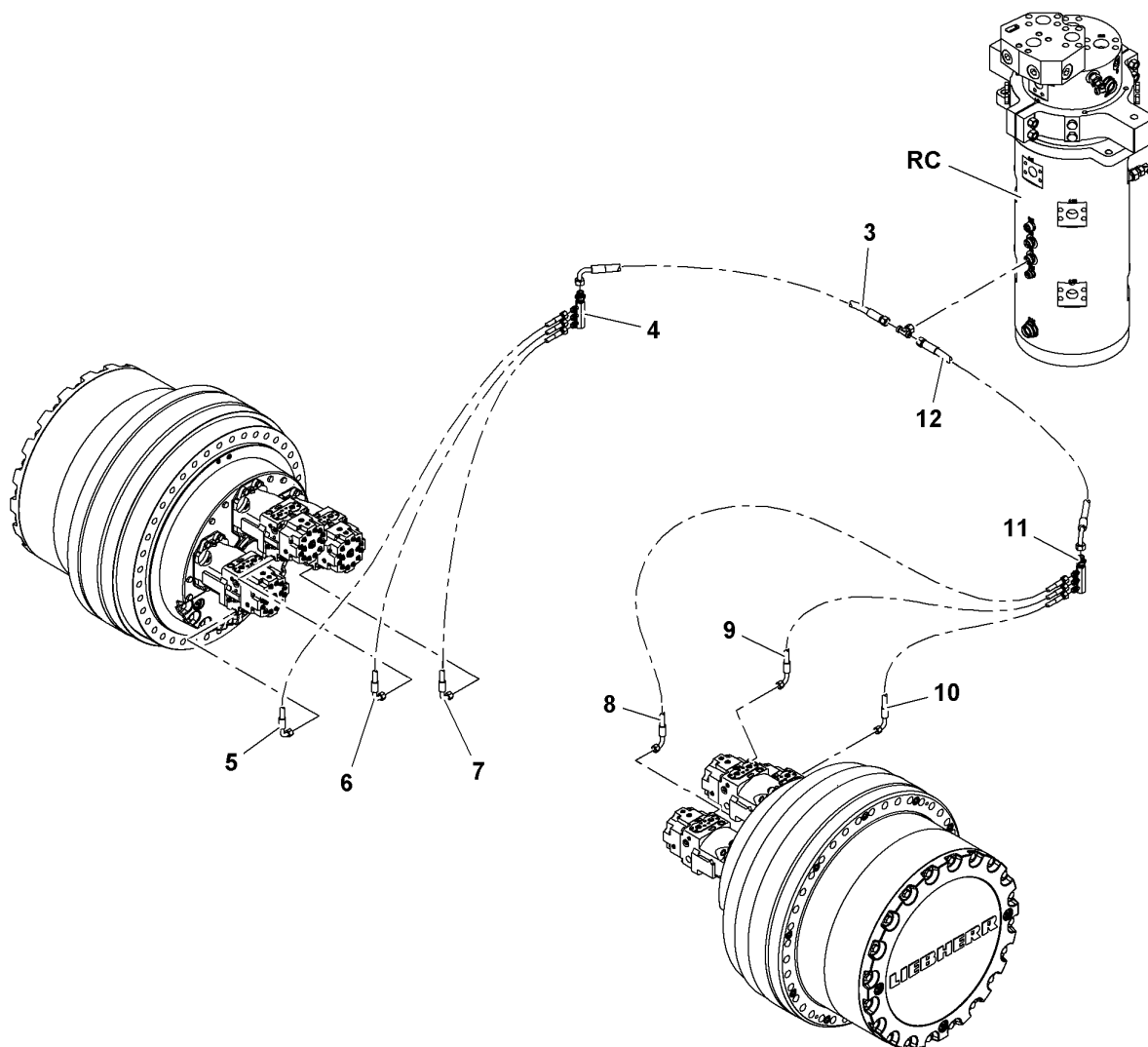


Fig. 6-35 Hydraulic hoses of overspeed pressure circuit on the undercarriage

- | | | | |
|----------|-----------------|-----------|-------------------|
| 3 | Hydraulic hose | 9 | Hydraulic hose |
| 4 | Collecting pipe | 10 | Hydraulic hose |
| 5 | Hydraulic hose | 11 | Collecting pipe |
| 6 | Hydraulic hose | 12 | Hydraulic hose |
| 7 | Hydraulic block | RC | Rotary connection |
| 8 | Hydraulic hose | | |

► Disconnect, drain and clean all the hydraulic hoses and the pipes **4** and **11**.

Circuit of shovel tilt cylinders

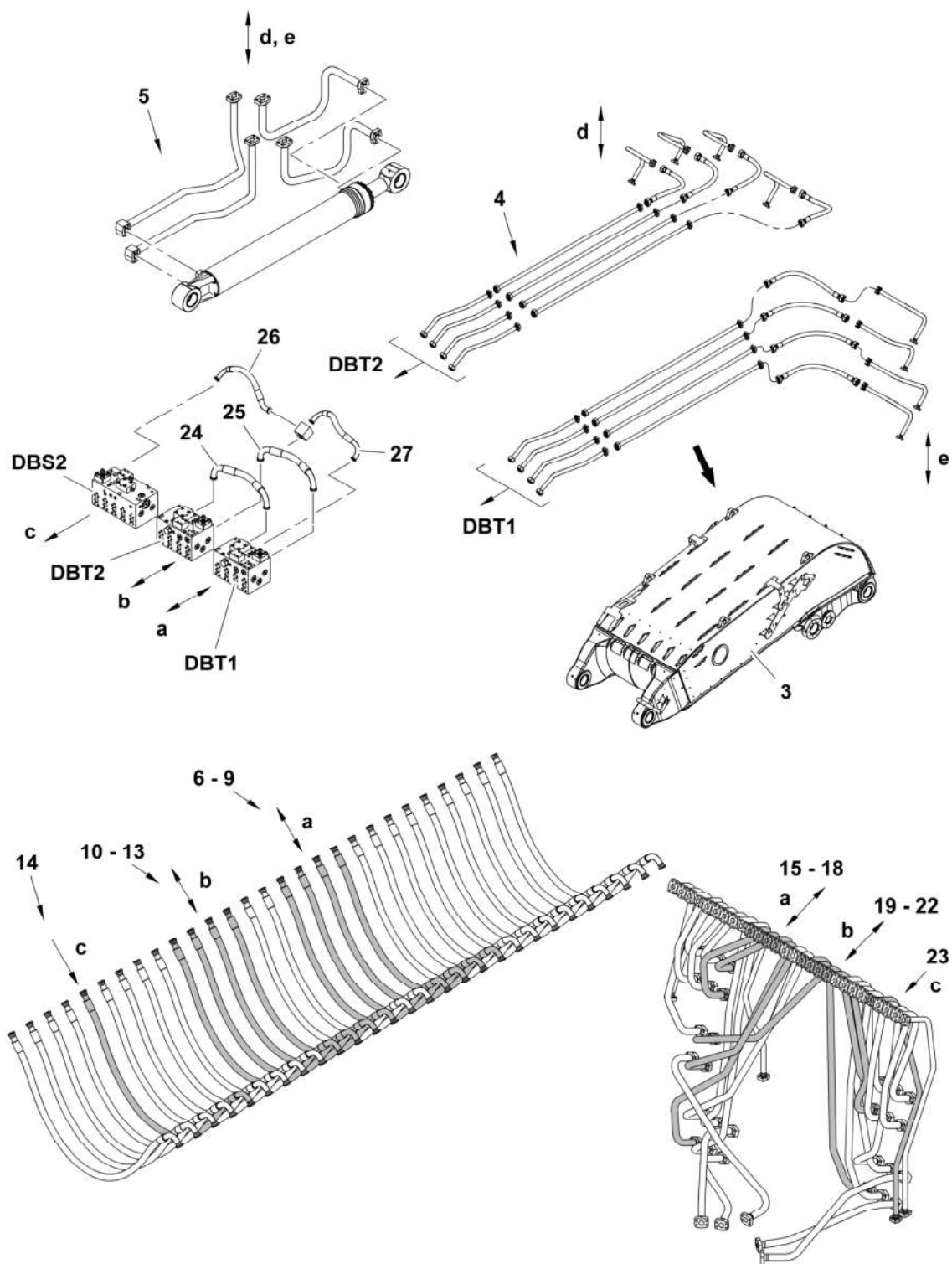


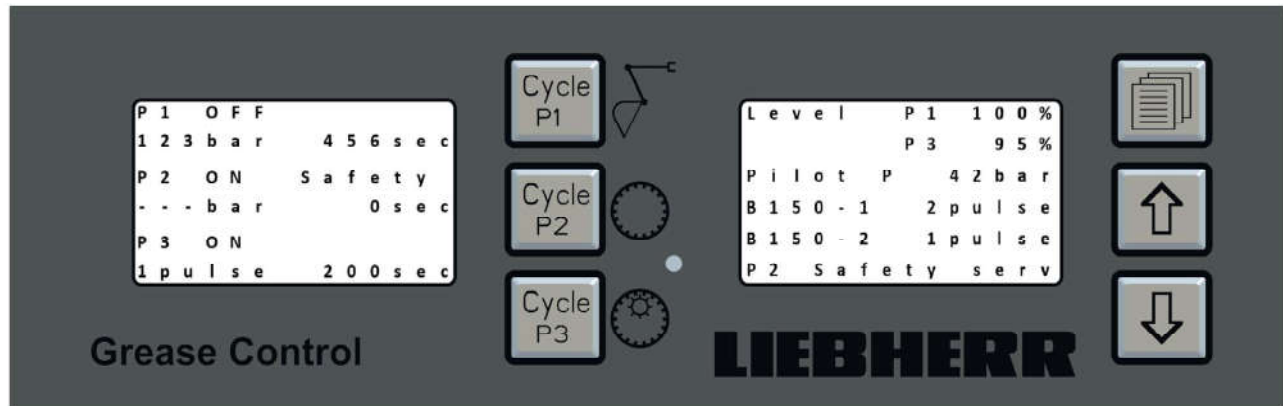
Fig. 6-41 Hydraulic lines of the shovel tilt cylinders

3 Boom

17 Hydraulic pipe

LEC/en/Edition: 06 / 2020

1. Main Screens and Control Buttons



Menu: Used to Enter into Menu List and return to Previous Menu.



Up: Used to move up cursor in the Menu Lists and to increase a Value.



Down: Used to move down cursor in the Menu Lists and to decrease a Value.

The main menu is accessed through the "Menu" button; all the menus are displayed on the right display.

In a given Menu list, you can press the "Up" and "Down" buttons to scroll through menus. Pressing the "Down" button will then scroll through menus from top of screen to the last menu on screen; but if the "Up" button is pressed, selection will scroll from top to bottom of menus list.

The active line is "inverse video" (white text, black highlighted), use the "Menu" key to get inside the selected submenu.

The last line of a menu list is always defined as "Back", it is used to move to the previous menu by pressing the "Menu" button when highlighted.

Within a given Menu where the value can be changed, the change can be made by using the "Up" button to increase the value and using the "Down" button to decrease the value. Changes are immediately registered in controller. Pressing the "Menu" button returns you to the previous menu.



Start Cycle P"X":

The three keys "Start Cycle PX" can be used to start a new lubrication cycle at the corresponding pump. Pushing this buttons acts like simulating an Enabling signal coming to the greasing controller, for each pump independently. The chosen pump will start if the Pilot pressure is sufficient.

If pump PX is in safety mode, a three seconds activation of the button „Cycle PX“ makes the pump PX return to the normal mode.

1 Guidelines

This manual contains a number of illustrations and symbols to assist you in navigating this manual and understanding it.

Read the instructions thoroughly and follow them. Please heed these instructions and proceed with special care in such cases.

Please forward all safety instructions to other users.

Text displays	Meaning
Bold	Emphasizes especially important words or passages
• Bullet point level 1	Indicates bullet list items
○ Bullet point level 2	Indicates bullet list items
(parentheses)	Item numbers
➤ Instructions	Instructions for personnel; These are always performed in chronological order.

1.1 Explanation of symbols and signs





Activities that present specific hazards (to life and limb or possible material assets) are indicated with warnings. The instructions in the warnings must be followed.

These symbols, which warn of specific dangers to persons, material assets, or the environment, are found next to all safety instructions in these instructions find.

Read the instructions thoroughly and follow the warning and safety instructions. Please heed these instructions and proceed with special care in such cases.

Please forward all safety instructions to other users.

The following warnings may be present:

Warning level	Consequence	Probability
 DANGER	Death / serious injury	Immediate
 WARNING	Serious injury	Possible
 CAUTION	Minor injury	Possible
 IMPORTANT NOTE	Property damage	Possible

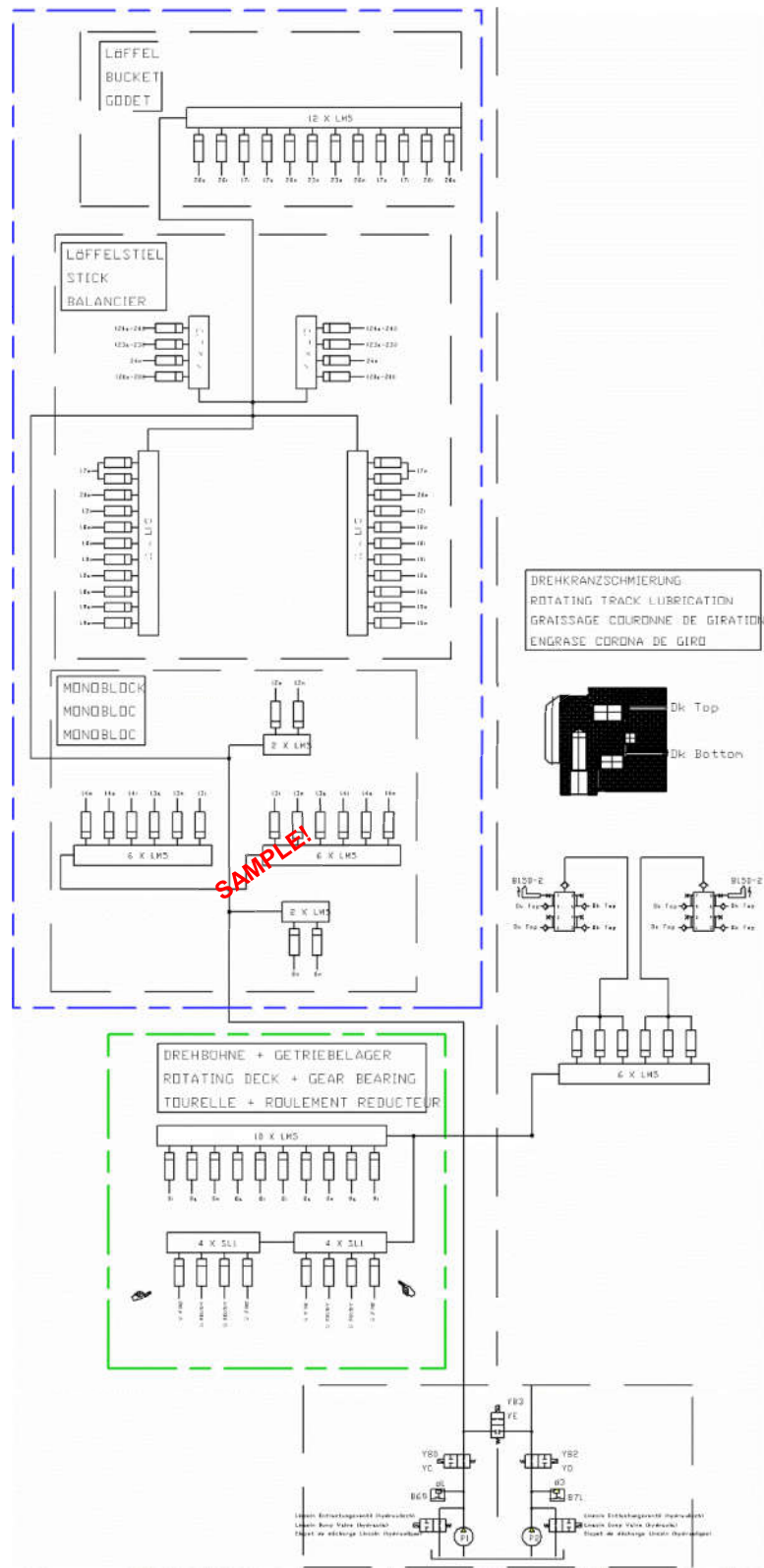
Life cycle: Operation, repair, maintenance	
Residual risk	Remedy
Contact with the cup piston on while replacing the drum on a pneumatic, hydraulic, or electric drum pump.	Replace the drum only after the centralized lubrication system and pump have been depressurized. Before replacing the drum, switch off the pump and relieve the existing system pressure.
Contact with agitator blade when filling a reservoir pump from above while the pump is running.	Preferably fill via the fill connection. Fill from above or replace the drum (for drum pumps) only while the pump is at a standstill. Do not reach into the reservoir while filling.
Electric shock due to defective power lead.	Switch off the centralized lubrication system and check power lead for damage.
People slipping due to floor contamination with spilled lubricant.	Exercise caution when connecting the system. Promptly apply suitable binding agents and then remove the leaked/spilled lubricant. Follow operational instructions for handling the lubricant and contaminated parts.
Tearing down of or damage to lines	Switch off the centralized lubrication system, check hose line routing, optimize or replace defective hose/line. If this is not possible, use flexible hose lines of a sufficient length.

Life cycle: Malfunctions	
Excessive heating of the motor or other electrical components	Switch off the pump and system. Let parts cool off; remedy the cause. Replace defective motor or other defective components.
Excessive heating of hydraulically driven components	Switch off the system or affected component. Ensure the oil cooler functions properly.
Strong cooling and ice formation on silencer and at air outlet on pneumatically operated pumps or other components	Inspect the compressor and dryer on the compressed air feed. Reduce the running speed of the pump in question. If necessary, briefly switch off or heat the system.
Impermissible lubricant discharge at components or lubrication lines of the centralized lubrication system	Switch off the centralized lubrication system and determine the cause. Replace defective lines or components.

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5 Lubricant

Information on lubricants can be found in Chapter 5.3, “Lubricants and operating fluids” in the Liebherr operating instructions.



Legend:

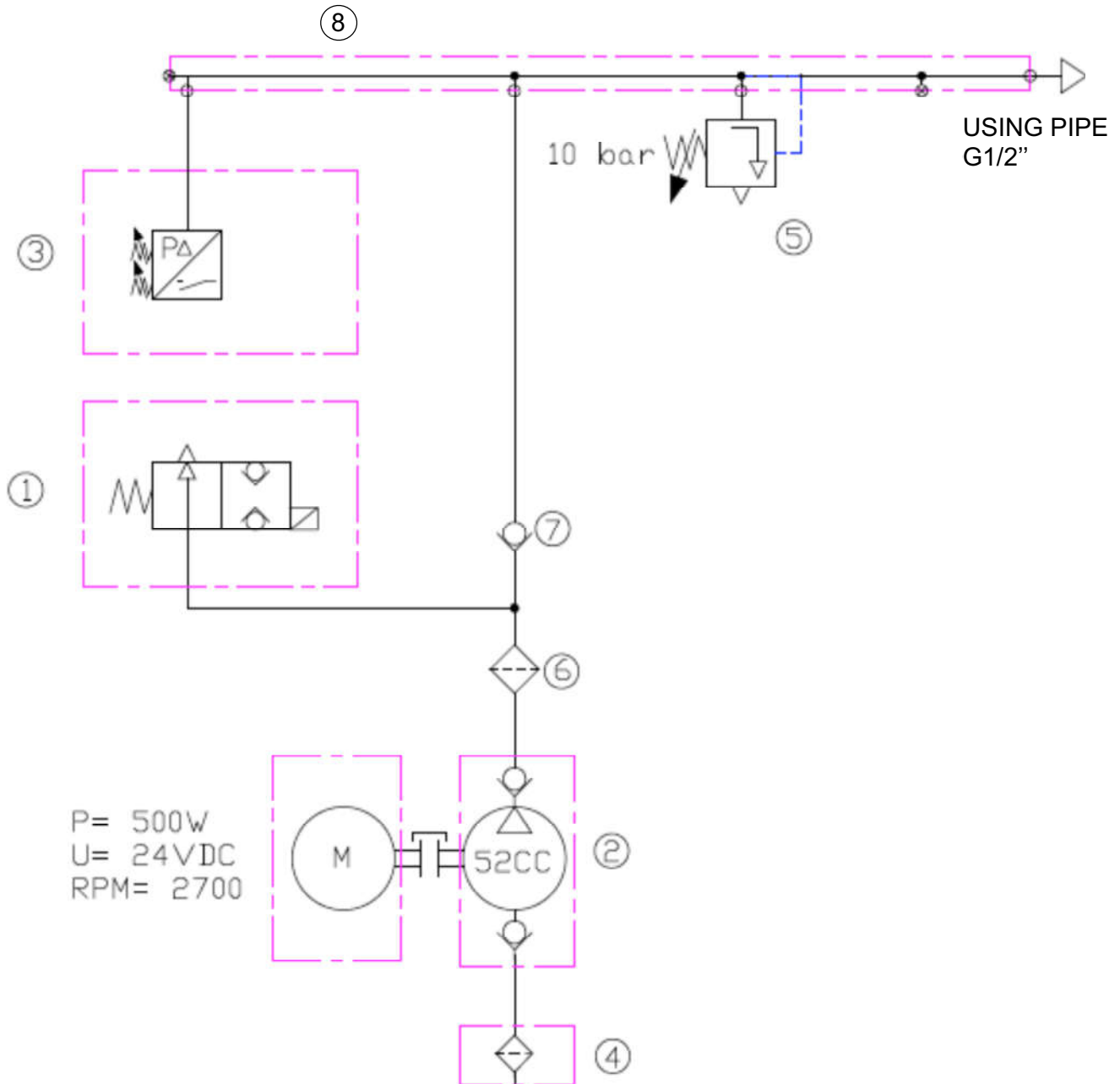
Equipment: - - - - -
 Upper structure: - - - - -

Fig. 3 Automatically operated single-line lubrication system with LM5 and subsequent progressive metering device for shovel equipment

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5. Pneumatic connections

- ☑ Connect air dryer to 3/8"G air output located on the aluminium block.



Discharge valve (RH) **1** - Compressor head **2** - Pressure switch **3** - 1" suction filter **4** - Safety valve **5** -
 1/4" water separator **6** - Non-return valve **7** - Mounting block **8**

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