en

Operating manual

Hydraulic excavator
R 9150 - R 9150B

from serial number 38079

Document identification

	ORIGINAL MANUAL
Order number:	12243720
Edition:	06 / 2020
Valid for:	R 9150 - R 9150B from serial number 38079
Author:	LEC - Technical documentation department

Product identification

Manufacturer:	Liebherr-Mining Equipment Colmar SAS
Type:	R 9150 - R 9150B
Type no.:	1657 - 1857

LEC/en/Edition: 06 / 2020

Address

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

LIEBHERR

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

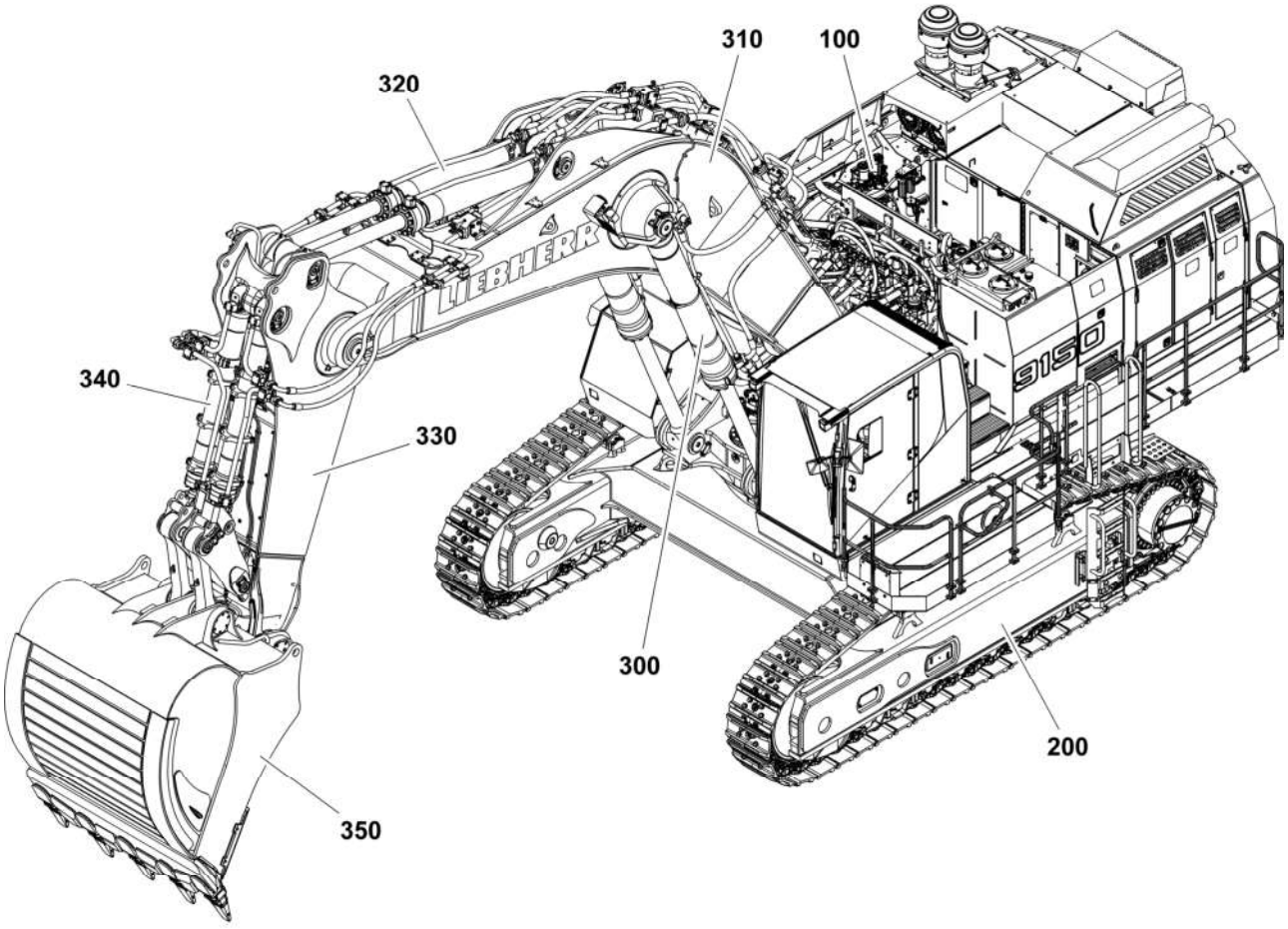


Fig. 1-1 *Machine and construction equipment - backhoe attachment*

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

LEC/en/Edition: 06 / 2020

Customer Service
World-Class Support,
Everywhere, Every Day

Safety
Protecting Your Most
Important Assets

Environment
Mining Responsibly

Safety-First Working Conditions

Safe Service Access
The R 9150 B is fitted with ergonomic access for fast and safe maintenance. All service points are within reach from one side and at machine level. The R 9150 B's upperstructure is accessible via a robust fixed ladder and integrates one large central platform equipped with slip resistant surfaces. The wide catwalks facilitate maintenance and ensure confort during all the operations.

Secure Maintenance
All components have been located to allow for effortless inspection and replacement. Numerous service lights are perfectly located in the service areas to guaranty suitable maintenance conditions, day or night. Emergency stops have been strategically placed in the cab, engine compartment and at ground level. The R 9150 B eliminates hazards to ensure a safe environment for the service staff during maintenance.

Efficient Machine Protection

Protection Against Fire Ignition
The engine compartment integrates a bulkhead wall that separates the engine from the hydraulic pumps. This reduces the risk of hydraulic oil entering the engine compartment. The turbochargers and exhaust systems are heat shielded, and all the hydraulic hoses are made from a fire resistant material.

Automatic Fire Suppression System
The R 9150 B can be equipped with a fully integrated fire suppression, employing a dual agent solution to prevent and protect the machine. The fire suppression system has both automatic and manual release capabilities, emergency stop devices are strategically located on the machine to be easily accessible in any case by the operator.

Improved Accessibility Ease of Maintenance
- Wide walkways with slip-resistant surfaces
- Emergency ladder available outside the cab
- Wide open service access
- Reflective stripes on counterweight
- 45° hydraulic driven access stair (optional)

Working Environment Control
- Rear and side camera system
- LCD color screen to display cameras view
- 9 Long-range working LED lights located on attachment and upperstructure

Commitment to Employees Safety
- Safe and protected access to the components
- Major components centralized to be easily accessible
- E-stops located for the operator and maintenance staff
- Ground-level fluid maintenance hub

Optional Equipment

Undercarriage

- Narrow track pad width
- Large track pad width
- Removable side frames
- Rock protection for travel drive
- Protection for undercarriage center frame
- Rock protection for idler wheel
- Rock protection for sprocket
- Full length chain guide

Uppercarriage

- Hydraulically operated 45° access stair
- Electric-powered refueling pump
- Heavy counterweight (22,000 kg / 48,500 lb)
- Increased fuel tank capacity (24h operation)
- Grid protection for front headlights
- Semi-automatic swing brake with joystick control
- Rock protection for swing gear and grease lines
- Wiggins fast fueling system
- Wiggins fast fueling system with Multiflo Hydrau-Flo®
- Wiggins couplings for ground level access service
- Steel grease lines on swing ring
- Swing ring scrapers
- External grease refill station (hydraulic-powered)
- Hydraulic connection with quick coupler for external grease refill station
- Right-hand bumper
- External starting device

Hydraulic System

- Oil cooler inlet screen

Operator's Cab

- 4-point seat belt
- Cab elevation (500 mm / 1'6" / 1,200 mm / 3'9" / 1,600 mm / 5'3")
- Cab pressurization / cab pressurization with HEPA filter
- FOPS top guard with additional sun protection
- Operator comfort package
- Front protective grid
- Pre-heating system for cab
- Roof glazing
- External louvers

Attachment

- Piston rod guard for bucket cylinder (BH)
- Piston rod guard for hoist cylinder (BH / FS)
- Piston rod guard for stick cylinder (FS)
- Quick change coupling

Specific Solutions

- Arctic package (–20 °C / –4 °F, –35 °C / –31 °F, –50 °C / –58 °F)
- Sound attenuation package
- Hydraulic arrangement for special application (hammer / shear / tooth ripper / grapple / coupler)
- Arrangement for object handling operation

Safety

- Additional LED lighting with timer (for main access)
- Automatic fire suppression system
- Additional emergency stop (ground level)

General

- Maritime transport packaging

- For terrain which is difficult to gain an overview of and whenever necessary, ask for the assistance of a spotter. Only permit one person to give you signals.
- Authorize only experienced people to attach load and to give indications to the machine operator. This people must be in the operator's sight or in radio contact with him.
- Depending on the attachment combination, there is a risk of collision between the work tool and the machine (uppercarriage and undercarriage). The greatest degree of care must be taken to avoid damage.
- Depending on the attachment combination, there is a risk of collision between the work tool and the cab, the cab protection or the boom cylinders. The greatest degree of care must be taken to avoid damage when the hoe teeth come within this area.
- Depending on the attachment combination, there is a risk of collision between the work tool and the attachment parts. The greatest degree of care must be taken to avoid damage.
- Depending on the attachment combination, there is a risk of collision between the lift ring of the attachment and the cab or the cab protection. Before operating, ensure that there is no risk of collision, especially on excavator with cab elevation. If necessary remove the lift ring.
- In case of a thunderstorm:
  - lower the attachment to the ground and if possible anchor the digging tool into the soil.
  - leave the cab and move away from the machine before the storm breaks out. Otherwise, you must stop the excavator, turn off the radio and keep inside the closed cab until the end of the storm.
- Auxiliary control units can have various functions. Always check their functions when starting up the machine.
- Stop the swinging motion of the uppercarriage when lowering the attachment into a ditch without striking the attachment on the ditch walls.
- Inspect the machine for damage if the attachment has been swung into a wall or any other obstacles.
- Applications in which the attachment is to be used to strike the material being extracted are not permitted, even when working in a longitudinal direction.
- Repeated strikes against an object leads to damage to the steel structures and machine components.
- Please refer to your Liebherr dealer if special teeth for heavy-duty or special applications are required.
- Do not attach too large bucket or bucket with side cutters or that are during operations with rocky material. This would prolong the work cycles and may lead to damage to the bucket as well as further machine components.
- With the 2x45° offset articulation, the offset position may only be employed if the working tool or the attachment does not touch the material.
- Operation of the offset articulation to drill into the material is not permitted.
- Do not lift the machine during operation. Should this happen, lower the machine slowly back to the ground.
- Do not let the machine fall heavily on the ground and do not hold it back with the hydraulics. This would damage the machine.
- During operation with the attachment it is forbidden to raise the machine with the dozing blade (e.g. carving at the ceiling when tunnelling).
- Do not dig under the undercarriage. Take all necessary measures to prevent ground collapse under the machine.
- The operation of Liebherr Mining machines in the following Mining applications is not approved or condoned by Liebherr:

LEC/en/Edition: 06 / 2020

- Nevertheless if welding repair should be done on components which may contain inflammable gases (welded counterweight, hydraulic tank, fuel tank, ...), these components must be previously and sufficiently ventilated with pressurized air to avoid all fire or explosion hazard
- Before welding, connect the ground cable as close as possible to the welding point, so the welding current will not run through parts like the swing ring, rotary connection, gears, bushings, bearings, hinges, joints, hydraulic hoses, sockets, rubber parts or seals.

Process materials

- When working with oils, greases and other chemical substances, observe the appropriate current safety regulations for the product.
- Ensure that process materials and replacement parts are disposed of in a safe and environmentally acceptable manner.
- Take care when handling hot process materials
  (Risk of burning and scalding).

Repair work

- Do not attempt to lift heavy parts. Use devices which are suitable for this purpose and which have sufficient load capacity. When replacing single parts and larger subassemblies, carefully secure them on lifting devices so that they do not present a risk. Only use suitable and correctly functioning lifting devices and load take-up devices with adequate load capacity.
  Do not stand or work under swinging loads.
- Do not use lifting devices which are damaged or do not have sufficient load carrying capacity.
  Wear work gloves when working with wire cables.
- Authorize only experienced people to attach load and to give indications to the crane operator. This people must be in the operator's sight or in radio contact with him.
- When working above body height, use safe climbing devices and working platforms which are appropriate for the job.
  Do not use machine parts as climbing devices if they are not designed for this purpose.
  When working at height, wear a harness to prevent falling.
  For further information, see section "Maintenance anchor points" or contact Liebherr customer service.
- Ensure that all grips, steps, rails, platforms and ladders are free of dirt, snow and ice.
- Pneumatic cylinders do not have to be used as handles. Open doors and covers carefully, so that pneumatic cylinders do not hit their stops, because this could cause mechanical damages.
- Make sure the equipment on which you will operate is securely supported before working (e.g. replacing teeth). Prevent metal touching metal when doing this.
- For safety reasons, never open and remove a track chain unless having previously totally released the pretension of the chain tensioning unit.
- Never lay under the machine if it is raised with work equipment and has not been securely supported with appropriate supports.
- Always jack the machine up in such a way that any weight displacement does not jeopardize stability and prevent metal touching metal while doing this.
- Work on the suspension, brake and steering systems may only be carried out by trained specialist personnel.

LEC/en/Edition: 06 / 2020

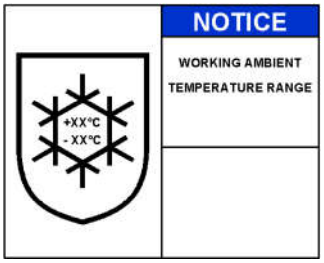


Plate 105: Arctic package label (optional equipment)

Gives the applicable working ambient temperature range if the machine has an optional arctic package.

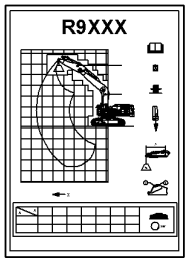
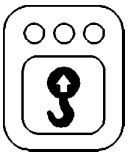


Plate 106: Load chart label for the overload warning device (optional equipment)

Gives the permitted load capacity if the machine has an optional overload warning device.



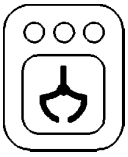
Overload warning device (optional)

If installed:

- ▶ Push the button.
  - ↳ The overload warning device is activated.
  - ↳ All the LED in the button come on.
- ▶ Do the deactivation procedure.
  - ↳ The overload warning device is stopped.
  - ↳ All the LED in the button go off.
- ▶ Refer to the related section for detailed description of the system.

If not installed:

- ▶ Push the button.
  - ↳ This symbol is shown on the display.
  - ↳ All the LED in the button are off.
- ▶ Push the button again.
  - ↳ The symbol on the display goes off.



Turn of the grapple / shear (optional)

- ▶ Push the button.
  - ↳ The LED in the button comes on.
  - ↳ You can turn the grapple / shear with the related operating and control elements.
- ▶ Push the button again.
  - ↳ The LED in the button goes off.
  - ↳ The turn function of the grapple / shear is off.

High speed gear

- ▶ Push the button.
  - ↳ Transfer from normal drive to fast drive is activated.
  - ↳ First LED in the button comes on.
- ▶ Push the button again.
  - ↳ Transfer from normal drive to fast drive is deactivated.
  - ↳ First LED in the button goes off.

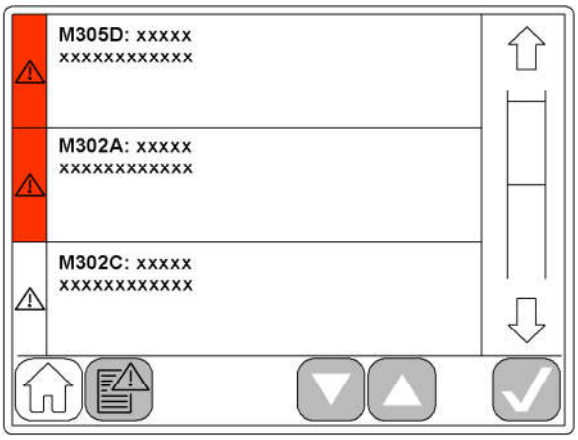


Fig. 3-14 *Menu "Diag"*

▶ Push the safety lever up to see the error messages.

A code number and a short description are shown for each error code.

▶ Push the "**Up**" and "**Down**" buttons to select an error message.

▶ Push the "**Acknowledgement**" button to acknowledge the error.

Danger!
If the error shown on the display is not rectified immediately, this could cause injuries to persons or damages to the machine.

▶ Rectify / have the error rectified immediately.

If you want to change the language of the messages:

▶ Refer to the menu "**Settings**".

Menu "Check"

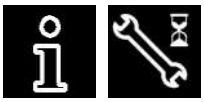
This menu gives access to the submenus that follow:

Submenu "Counter User"

This submenu shows the same information as the submenu "**Counter Engine**", but it can be managed by the operator.

▶ Push the "**Reset**" button to set to zero all the counters of this submenu.

Submenu "Services" (optional)



This optional submenu shows information about scheduled maintenance intervals. You can also confirm that you have done the related maintenance task.

The available maintenance intervals of this submenu are scheduled into time ranges, that are set by a Liebherr service personnel.

When the machine gets a minimum range value:

- ↳ This symbol is shown on the main screen to tell you that a scheduled maintenance task is necessary.
- ↳ It flashes temporarily when you start the machine. Then, it stays on until the machine gets the maximum value of the time range.

Thus, you can see working hours in this submenu:

- the last completed maintenance interval
- the remaining time before the next scheduled maintenance interval

Hours related to the engine

Hours related to the hydraulic system

When the necessary maintenance task is done:

▶ Push the "**Up**" and "**Down**" buttons to select the applicable symbol.

↳ The applicable symbol is shown by a white frame.

Coolant level low

This symbol is shown if the coolant level falls below minimal level.

↳ The engine stops automatically.

If the engine does not stop automatically:

▶ Stop operation and turn the engine to off.

▶ Find and rectify the cause of the problem.

▶ Add coolant to get the correct level.

Splitterbox oil pressure low

This symbol is shown if the splitterbox oil pressure falls below minimal level.

▶ Stop operation and turn the engine to off.

▶ Find and rectify the cause of the problem.

Battery level high

This symbol is shown if the battery level is more than a maximum level.

▶ Stop operation and turn the engine to off.

▶ Find and rectify the cause of the problem.

Battery level low

This symbol is shown if the battery level falls below a minimum level.

▶ Stop operation and turn the engine to off.

▶ Find and rectify the cause of the problem.

Battery charging

When the excavator is operating, this symbol is shown if the V-belt alternators or the electrical charging system are defective.

▶ Put the engine to low idle immediately.

▶ Allow the engine to idle for approximately 5 seconds.

▶ Switch to off the engine.

▶ Rectify the error.

Hydraulic oil overheating

This symbol is shown if the hydraulic oil temperature is more than a specified operating value.

▶ Stop operation and let the engine run at high idle until the symbol disappear.

If necessary:

▶ Turn the engine to off.

▶ Find and rectify the cause of the problem.

Hydraulic oil level low

This symbol is shown if the hydraulic oil level falls below minimal level.

↳ Pumps are automatically set to minimal flow.

▶ Stop operation and turn the engine to off.

▶ Find and rectify the cause of the problem.

▶ Add hydraulic oil to get the correct level.

Height adjustment

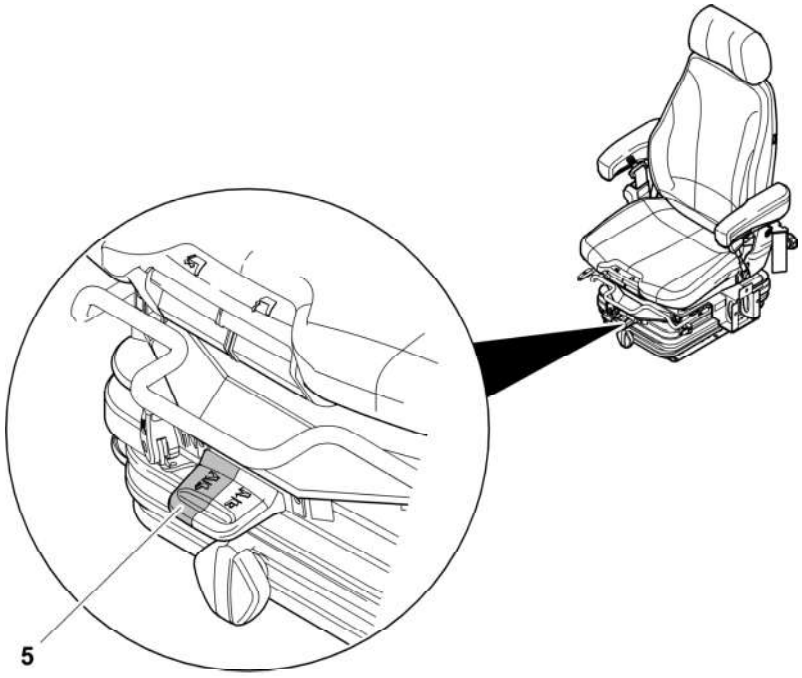


Fig. 3-28 *Setting the height*

The seat height can be set pneumatically and is continuously adjustable.

To adjust the seat height:

▶ Pull the lever **5** up or down.

Caution!
Before adjusting the height, adjust shock absorbers to the position «soft».

Danger!
Before using the excavator, make sure that the cameras and the outside mirrors are correctly adjusted.

- ▶ Regularly check mirrors and cameras for condition. If necessary:
- – Clean them with a soft, dry cloth.
- – Use an external safety device to get access to them.
- ▶ Regularly check mirrors and cameras for correct adjustment.
- ▶ For maintenance intervals, refer to the control and maintenance chart.
- ▶ Replace damaged mirrors and cameras immediately.

To cover the correct area:

- ▶ Set the cameras and adjust the outside mirrors so as to be able to see a person standing out of the hatched area defined by the four checkpoints given on the fig. above.

3.2.8 Lighting

- ▶ Regularly check lighting devices for condition. If necessary:
- – Clean them with a soft, dry cloth.
- – Use an external safety device to get access to them.
- ▶ For maintenance intervals, refer to the control and maintenance chart.

Note!
To prevent the starter motor and the battery from overloading, only switch on the air-conditioning after starting the diesel engine.

▶ If the machine is used for a longer period of time without using the air-conditioning unit, operate the compressor every 2 weeks by pressing the REHEAT button **6** (see Fig. 3-47).

Additional cab heater (optional)

An additional cab heater can be installed above the operator seat. Thus, in case of cold weather, it can improve the cab comfort during the machine operation.

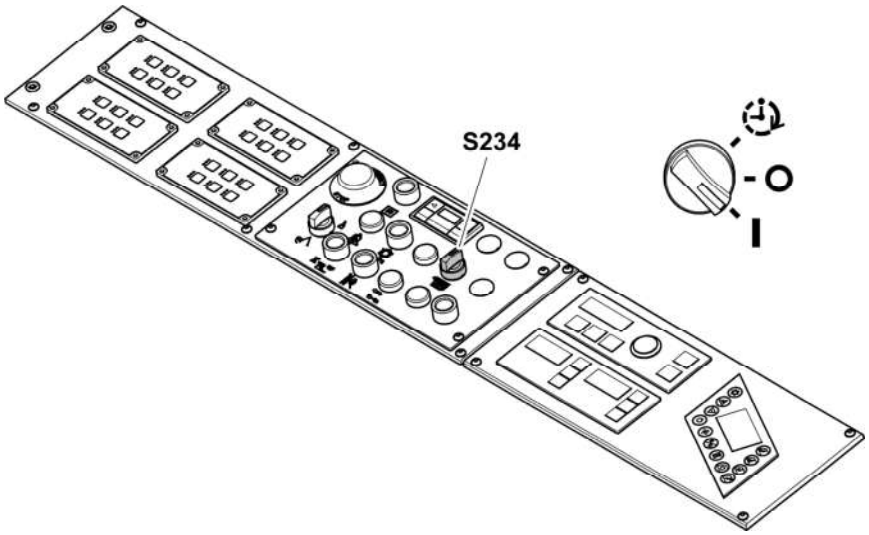


Fig. 3-50 *Rotary switch for additional cab heater*

S234 Rotary switch for the additional cab heater

▶ Start the Diesel engine.

▶ Set the rotary switch **S234** to the "**ON**" position.
- The color of the rotary switch **S234** changes to green.
- The additional cab heater starts.
- You can set the temperature of this device with the module **U38**. Refer to section "Heating/air-conditioning system" in chapter 3

▶ Set the rotary switch **S234** to the "**OFF**" position.
- The additional cab heater stops.
- The light on the rotary switch **S234** goes off.

This position of the rotary switch **S234** is not used.

- Push the "Auto idle" button.
  - The auto idle function is on, but it is not activated.
  - The LED on the button comes on.
- If you let the joysticks and pedals in neutral position during the specified auto idle interval:
  - The auto idle function is activated.
  - The engine speed is automatically reduced.
  - The E / P mode and the engine speed are stored. The related symbol flashes on the display.

You can set the auto idle interval in the submenu "Auto idle control" of the monitoring display.

- If you push on the "Increase engine speed" button while the auto idle function is activated:
  - The engine speed does not change.
  - The new step is stored.
- If you push on the "Decrease engine speed" button while the auto idle function is activated:
  - If the new step is higher than the auto idle speed, the engine speed does not change and the new step is stored.
  - If the new step is lower than the auto idle speed, the auto idle function is deactivated.
- If you operate the joysticks or the pedals:
  - The auto idle function is deactivated.
  - The engine speed is set to the stored value.
- Push the "Auto idle" button again.
  - The auto idle function is off.
  - The LED on the button goes off.

Notes after starting the engine

Danger!
Danger of suffocation.

- When operating in enclosed spaces, only run the engine in areas with sufficient ventilation.
- Open doors and windows to ensure sufficient supplies of fresh air.

Caution!

- Bring the engine and hydraulic oil up to operating temperature. The controls operate sluggishly at low oil temperatures.
- Move the machine carefully in an open space to test the function of the travel and swing brakes.
- Check that the attachment is operating perfectly.

LEC/en/Edition: 06 / 2020

H169 Temperature of Diesel engine coolant

Level of special fuel tank of coolant heater

As it will be difficult to restart the system in case of fuel exhaustion, the warning light **H168** comes on if the level in the special fuel tank is too low.

If the warning light **H168** comes on:

- ▶ Stop the Diesel engine.
- ▶ Stop the coolant heater using the control unit **U106**.
- ▶ Refer to chapter 5 of this manual to fill the special fuel tank of the coolant heater.

Danger!

- ▶ Do not fill the special fuel tank of the coolant heater and the machine fuel tank if the Diesel engine and the coolant heater are not switched to off.

Coolant heater with no special fuel tank (optional)

In option, the fuel supply of the coolant heater can directly come from the machine fuel tank. In this case, there is no warning light **H168**.

- ▶ Check the fuel level on the display.

Temperature of Diesel engine coolant

The warning light **H169** is on as long as the coolant temperature is too low to start in good conditions.

- ▶ Do not start the Diesel engine as long as the warning light **H169** is on.

The preheating of Diesel engine coolant stops automatically.

- ▶ After the coolant heater switch off, wait for 5 minutes before switch to off the batteries (to let the fan stop because of risk of device overheating).
- ▶ Do not disconnect the batteries if the fan and/or the pump of the coolant heater are on.

Preheating of hydraulic oil (if installed)

This procedure is applicable only if the optional preheating of the hydraulic oil is installed.

If not installed

- ▶ Move to the next basic equipment.

If installed

The preheating of the hydraulic oil works with immersion resistors. They are supplied by an external electric power supply (Gen-Set) which is not provided with the machine. According to the local power supply, the Gen-Set must supply a minimum of:

- 6,5 kVA, 400 V, 50 Hz
- 6,5 kVA, 480 V, 60 Hz

At this step, the preheating of the Diesel engine coolant is already in progress and the machine is switched to off.

LEC/en/Edition: 06 / 2020

Safety start of the Diesel engine

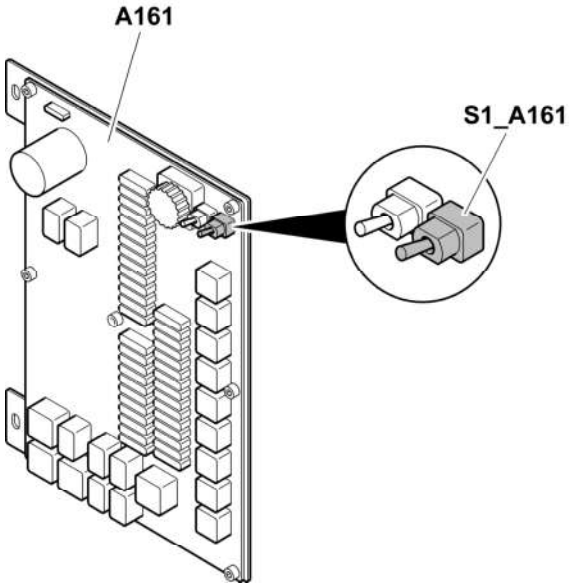


Fig. 3-70 *Safety control for the Diesel engine start*

A161 Electrical plate in **E1005**
S1_A161 Safety switch

The electrical plate **A161** is located in the cab connection box **E1005**. You can also refer to chapter 4 of this manual.

- ▶ Turn the ignition key **S1** to the stop position.
- ▶ At the same time, push the switch **S1_A161**.
  - ⇘ The Diesel engine starts in safety operation.
  - ⇘ The machine stays in this mode until you turn the ignition key **S1** to position "0".

Otherwise, you must stop the excavator, turn off the radio and keep inside the closed cab until the end of the storm.

- Auxiliary control units can have various functions. Always check their functions when starting up the machine.
- Stop the swinging motion of the uppercarriage when lowering the attachment into a ditch without striking the attachment on the ditch walls.
- Inspect the machine for damage if the attachment has been swung into a wall or any other obstacles.
- Applications in which the attachment is to be used to strike the material being extracted are not permitted, even when working in a longitudinal direction.
- Repeated strikes against an object leads to damage to the steel structures and machine components.
- Please refer to your Liebherr dealer if special teeth for heavy-duty or special applications are required.
- Do not attach too large bucket or bucket with side cutters or that are during operations with rocky material. This would prolong the work cycles and may lead to damage to the bucket as well as further machine components.
- With the 2x45° offset articulation, the offset position may only be employed if the working tool or the attachment does not touch the material.
- Operation of the offset articulation to drill into the material is not permitted.
- Do not lift the machine during operation. Should this happen, lower the machine slowly back to the ground.
- Do not let the machine fall heavily on the ground and do not hold it back with the hydraulics. This would damage the machine.
- During operation with the attachment it is forbidden to raise the machine with the dozing blade (e.g. carving at the ceiling when tunnelling).
- Do not dig under the undercarriage. Take all necessary measures to prevent ground collapse under the machine.
- The operation of Liebherr Mining machines in the following Mining applications is not approved or condoned by Liebherr:
  - Batter pulling (also known as Scaling), without exception.
  - Double benching (also known as Split benching or Double flitching) when the material is un-blasted and non-fragmented material which requires the boom down (rod side) pressure to exceed 50 bar.

    The use of these Mining methods will result in increased fatigue levels to steel structures and components of the respective Liebherr Mining Machine and therefore will significantly reduce the expected lifetime of structures and/or components.

Working safely with the machine used for demolition application

- Machines used for demolition application are subject to specific conditions and must be fitted with special safety devices (for further information, contact Liebherr customer service).
- If the machine can be used for demolition application, you must also obey the additional safety instructions that follow.

Before the operation of the machine

- Make sure that no persons are in the hazard area of the machine.
- Make sure that the working conditions are in the specified limits.
- Make sure that the special safety devices necessary for the task operate correct-

Operating the bucket

The bucket is operated using the right joystick **3**.

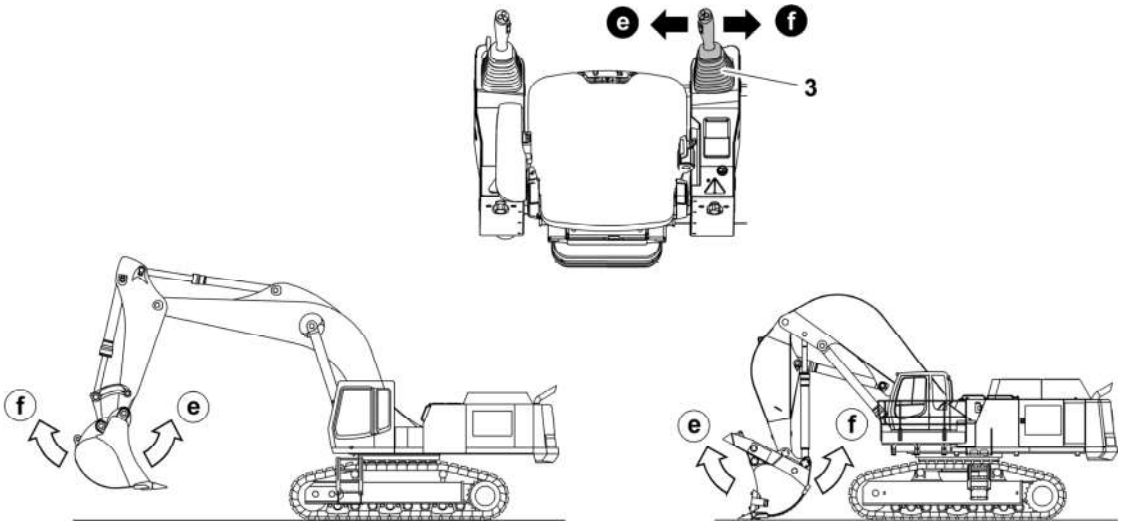


Fig. 3-85 *Operating the bucket cylinder*

- ▶ Move the joystick to the left **e**.
  ↳ Bucket will be tilted inwards.
- ▶ Move the joystick to the right **f**.
  ↳ Bucket will be tilted outwards.

Shake the bucket (with backhoe attachment only)

You can shake the bucket to remove dirt collected in the backhoe bucket.

- ▶ Operate very quickly the right joystick **3** as follows:
- – Move the joystick fully to the right or to the left.
- – Move the joystick to the neutral position.
- – Move the joystick fully to the right or to the left again.

While you do this sequence, the bucket shakes.

Caution!
Repetitive shakings cause fast wear of the components.

Operating the bottom dump bucket for shovel attachment

Danger!
Additional operating and control elements (joysticks/pedals) can have different functions.

- ▶ Always check functions of operating and control elements when you start a machine which has an additional attachment.

Manual flap control

If the selection function is installed, you can control the bottom dump shovel bucket

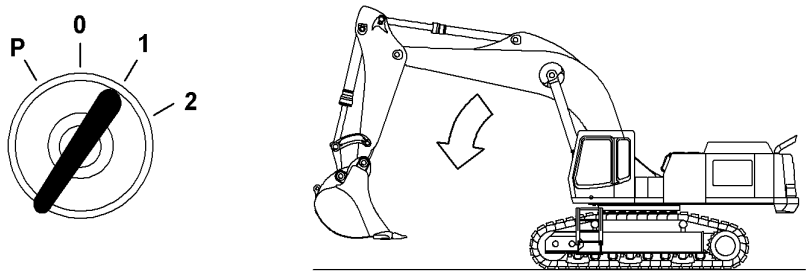


Fig. 3-99 *Lowering the attachment when engine is not running*

- ▶ Turn the ignition key to contact position **1**.
- ▶ Operate the joysticks or the foot pedals until the attachment has lowered.

The attachment can be lowered because of the control oil unit's pressure reserve. This reserve is limited and is only sufficient for small movements of the pilot control devices.

- ▶ Only operate the joystick in the directions for lowering the attachment.

3.4.5 Overload warning device (optional)

If installed, the overload warning device tells when the machine is at its maximum load capacity. In this case, a visual warning comes on in the cab and you can hear a warning signal.

This option is available only for backhoe machines.

Danger!
Although the overload warning device is installed on the machine, it is only an information. It does not stop the machine.
Thus, loads lifting remains the responsibility of the operator.

As a preliminary step:

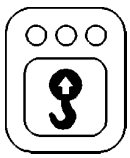
- ▶ Make sure that you obey all the precautions to prevent accidents.
- ▶ Check the permitted load capacity of the machine on the related load chart label, which is located into the cab.

The load values can change if attachment parts and/or work tools are attached or disconnected. Thus:

- ▶ Make sure that the attachment parts weights you use are always included in the load chart.

Start the overload warning device

You can start the overload warning device with the keyboard.



- ▶ Push the "**Overload warning device**" button.
  - ↳ The overload warning device is activated.
  - ↳ All the LED in the button come on.

▶ Retract the bucket cylinder to its end position.

Caution!
With the bucket removed, the cylinder operates unloaded.

▶ Operate the cylinder movement slowly and carefully to prevent damage to the cylinder.

▶ Put the attachment in position with the tool.

▶ Release hydraulic pressure as given in the related section.

▶ Push the safety lever up.

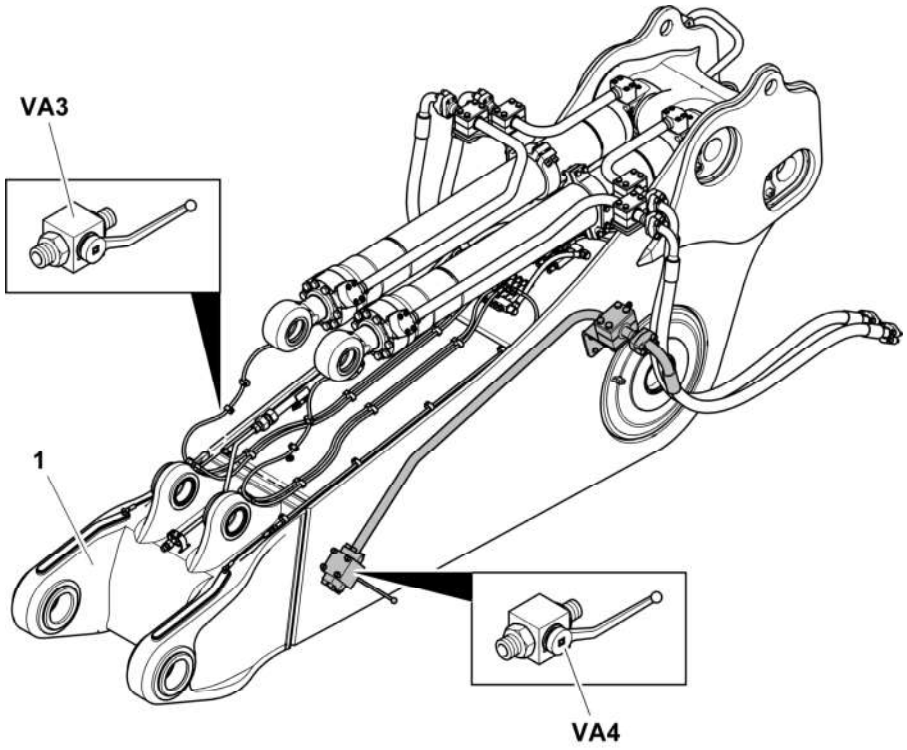


Fig. 3-108 *Manual valves for the hammer*

1 Stick
VA3/4 Valves

▶ Connect the valves **VA3** and **VA4** to the hammer as follows:
– **VA3** to the return port
– **VA4** to the pressure port

If the two hammer ports are incorrectly connected, the hammer does not work.

3.6.8 Working with the hydraulic hammer

Please also refer to the operating instructions provided by the manufacturer of the hydraulic hammer.

Danger!
The hydraulic hammer must be selected very carefully. Operating requires increased care and attention.

- ▶ Only use hydraulic hammers approved by LIEBHERR.
  - ↳ The use of a hydraulic hammer not approved by LIEBHERR could damage steel parts or other machine components.
- ▶ Only use the hydraulic hammer to break up rocks, concrete and other breakable objects.
- ▶ To avoid damaging the machine, do not try to break up rocks or concrete by moving the lever on the work equipment or by the hydraulic hammer.
- ▶ Do not use the drop power of the hydraulic hammer to break up rocks or other objects. Do not move objects with the hydraulic hammer. Do not lift the machine when using the hydraulic hammer.
  - ↳ This could damage both the hydraulic hammer and the machine.
- ▶ Do not use the hydraulic hammer to lift objects.
- ▶ Only use the hydraulic hammer in the machine's longitudinal direction.
- ▶ Do not operate the hydraulic hammer in the direction of the machine, since exploding rocks or concrete could damage the machine and / or injure the driver.
- ▶ Close all windows in the cab before working.

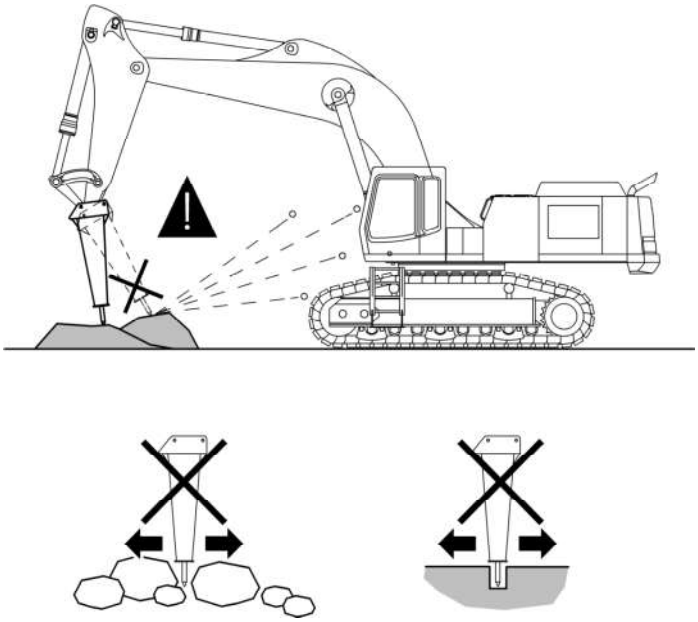


Fig. 3-122 *Hydraulic hammer*

- ❑ The machine must be positioned in the working position on level, solid ground.
- ❑ The stick may not stand vertically.
- ❑ No cylinder may be fully taken in or extended.

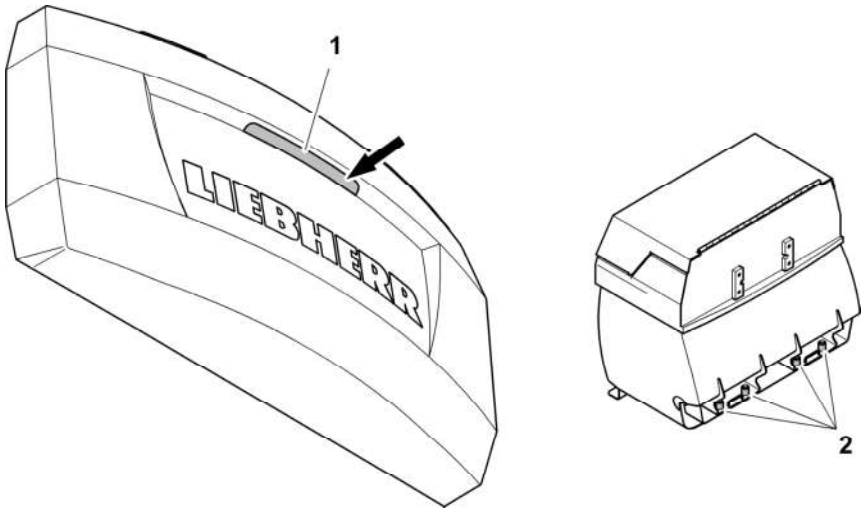


Fig. 3-135 *Rear screws of the Diesel Exhaust Fluid (DEF) tank*

1 Counterweight opening
2 Rear screws

▶ If installed, remove the protective cover from the counterweight opening **1**.

▶ Through the opening **1**, remove the rear screws **2** from the Diesel Exhaust Fluid (DEF) tank.

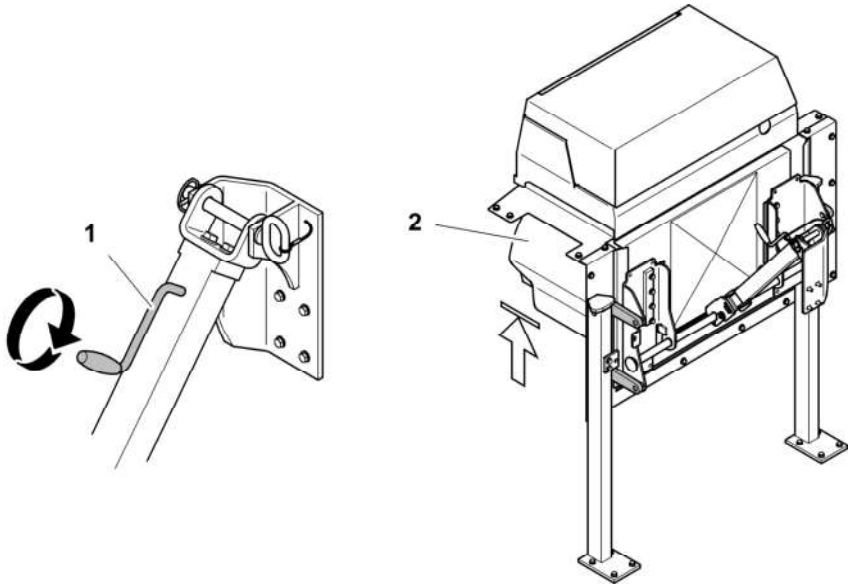


Fig. 3-136 *Lift and hold the Diesel Exhaust Fluid (DEF) tank*

1 Crank handle
2 Diesel Exhaust Fluid (DEF) tank

▶ Turn the crank handle **1** of the spindle support until the Diesel Exhaust Fluid (DEF) tank **2** is at its top position.

You can now remove the counterweight.

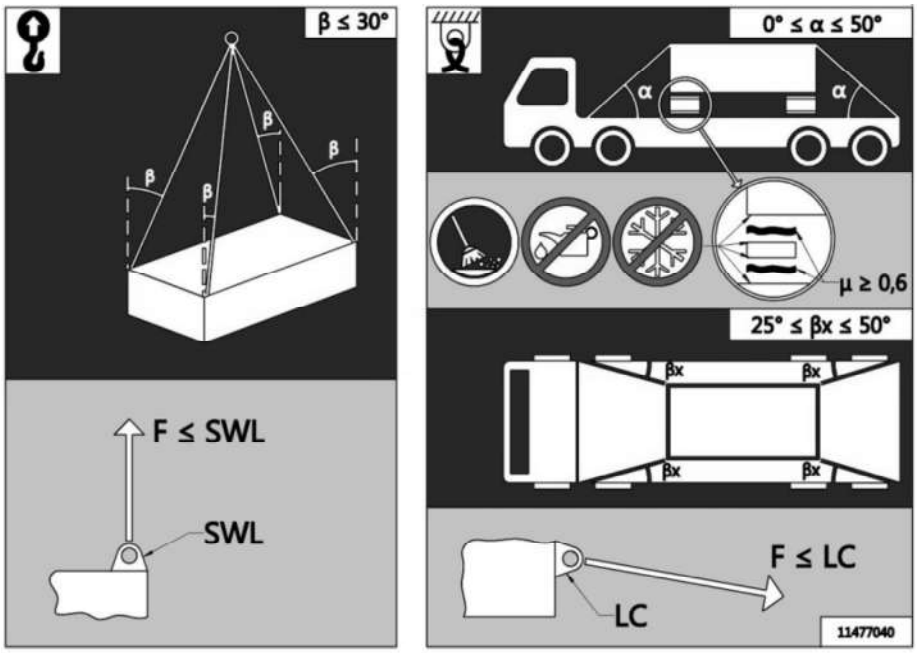


Fig. 3-139 *Sticker for lifting and lashing operations*

The Lashing Capacity **LC** is the maximum force that the lashing ring can hold in accordance with the angles given on the transport drawing.

The Safe Working Load **SWL** is the maximum load that the lifting ring can hold in accordance with the angles given on the transport drawing.

Transport drawings

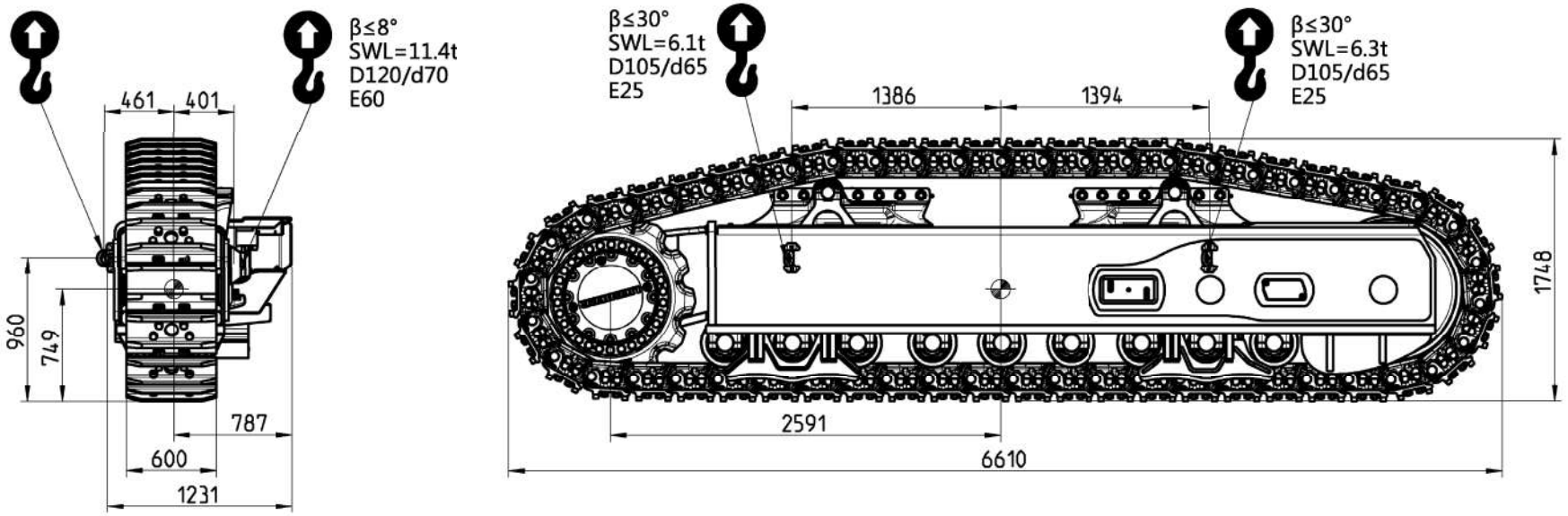
The following drawings indicate the different lashing and lifting points on the elements of the excavator. Weight (with and without transport tooling and packaging), overall dimensions as well as center of gravity are also given.

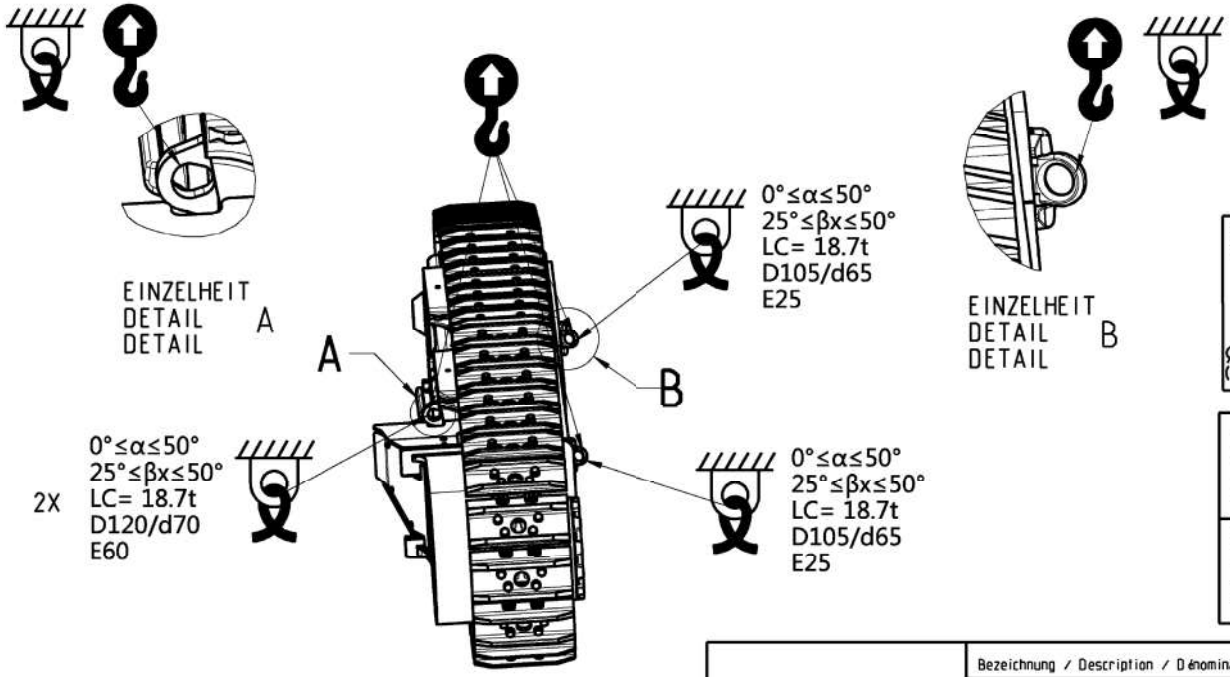
The aim of these drawings is to ensure safe operation during transport, handling and storage.

Note!
The lashing and lifting points are indicated on the concerned elements of the excavator by specific labels (see § "Signs on the machine"). To be easily recognized, lifting points are painted in yellow (in red if excavator is yellow) as well.

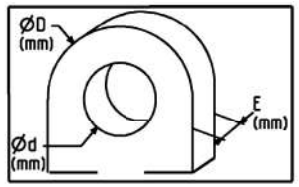
Danger!
The lifting points given on a transport drawing for an element are designed to lift this element only and nothing else.

▶ Never lift an assembly of several elements by the lifting points of only one of these elements.





Mit 750mm Schakenkette With 750mm pad-links track chain Avec chaînes à maillons de 750mm	+1400 Kg



SCHWERPUNKT
CENTER OF GRAVITY
CENTRE DE GRAVITE

	Gerechnet Calculated Calculé	Gewogen Weighed Pesé
Gewicht ohne Werkzeug und Verpackung Weight without tooling and packaging Poids sans outillage et emballage	17100 kg	
Gewicht mit Werkzeug und Verpackung Weight with tooling and packaging Poids avec outillage et emballage	17100 kg	

LIEBHERR

Bezeichnung / Description / Dénomination	Ident-Nr. / Ident No. N° d'ident	Index / Index Index	Blatt / Page Feuille
TRANSPORTPLAN LAENGSTRAEGER TRANSP.DRW.SIDE FRAME R9150 PLAN DE TRANSP.LONGERON	11752979	000	1/1

Fault / error	Cause	Solution
Diesel engine becomes too hot	Coolant level low	Fill with coolant, check for leaks
	Coolant pump defective	Repair or replace coolant pump
	Thermostat defective	Check or replace thermostat
	Coolant contaminated	Clean coolant and coolant cooler
Diesel engine has insufficient oil pressure **Note!** Switch off diesel engine immediately	Oil level low	Correct oil level
	Oil pressure display faulty	Replace oil pressure switch
Diesel engine consumes too much oil	External leak on Diesel engine	Retighten screws, replace seals if required
Oil in coolant or coolant in oil		Consult customer service
Unusual noise / sound development on exhaust side		Check exhaust system / repair

4.1.2 Hydraulic system

Fault / error	Cause	Solution
Unusual noise / sound development at hydraulic pumps **Note!** Switch off diesel engine immediately	Shutoff valve on hydraulic tank closed	Open stop cock
	Hydraulic pumps taking in air	Check oil level in hydraulic tank, check intake lines for leaks
Hydraulic oil temperature too high	Radiator cores dirty	Clean radiator cores
	Fan or fan control defective	Rectify error / consult customer service
Hydraulic oil level too low	Oil loss	Repair leaks, exchange hoses, refill oil via return-line filter
Cannot drive	Push the safety lever up	Push the safety lever down
	No direction of travel preselected	Use drive selection switch in right joystick to determine direction of travel
	Parking brake not released	Release parking brake using switch
	Parking brake will not release despite switch being operated	Servo pressure present: Operate emergency function Y6
		Servo pressure not present: Consult customer service
	Service brake engaged	Release service brake
Slewing gear not functioning	No servo control	Push the safety lever down
		Switch on servo control
	Slewing gear brake activated	Push the safety lever down
		Release slewing gear brake

LEC/en/Edition: 06 / 2020

F3_3	Fuse 10 A
F4	Fuse 10 A / Cigarette lighter
F5	Fuse 5 A / Internal light
F6	Fuse 5 A
F7	Fuse 10 A / Supply **T1**
F8	Fuse 30 A
F9	Fuse 30 A / Light fuel tank
F10	Fuse 10 A / Light travel alarm top of cab
F11	Fuse 15 A
F12	Fuse 30 A / Attachment lights
F14	Fuse 10 A
F15	Fuse 15 A / **U37** and **U38**
F16	Fuse 15 A
F17	Fuse 15 A
F18	Fuse 15 A / Supply **A164**
F19	Fuse 15 A / Supply **A164** and **A165**
F20	Fuse 5 A / Supply **A165**
F21	Fuse 5 A / Display
F22	Fuse 10 A / Master **U31**
F23	Fuse 10 A / Supply **A169**
F24	Fuse 10 A / Supply **A168**
F25	Fuse 10 A / Supply **A170**
F26	Fuse 10 A / Supply **A171**
F35	Fuse 15 A
H10	Buzzer
K01	Relay 40 A
K02	Relay 40 A / Cab and fuel tank lights
K03	Relay / Attachment light
K04	Relay 15 A / Windscreen wiper
K05	Relay 15 A / Windshield washer engine
K06	Relay 15 A / Horn travel alarm
K07	Relay / Light travel alarm top of cab
K08	Relay timer 15 A
K09	Relay 15 A
K1_1	Relay 15 A
K1_2	Relay 15 A
K1_3	Relay 15 A / Attachment horn
K2_1	Relay 15 A / **R32**
K2_2	Relay 15 A / **R35**
K2_3	Relay 15 A / Attachment horn
K3_1	Relay 15 A
K3_2	Relay 15 A
K3_3	Relay 15 A
K10	Relay
K11	Relay / Alarm motor stop

LEC/en/Edition: 06 / 2020

attached to both hose ends and should only be tightened afterwards.
- When tightening the flange on high-pressure lines and hoses with bent fittings, the side with the bent fitting must always be tightened first and then the side with the straight fitting tightened afterwards.
- Any mounting clamps which are located in the centre of the hose may only be attached and tightened subsequently.
- Check daily to ensure that all clamps, covers and protective devices are properly fastened. Doing this will prevent vibration and damage during operation.
- Install the lines and hoses in such a way that they cannot chafe on other lines, hoses or parts.
- A minimum distance from other parts of approx. half the exterior diameter of the hose is recommended. The distance should not, however, be less than 10 to 15 mm.
- When replacing the lines or hoses on moving parts (e.g. from the boom to the stick), check before initial start-up that there are no chafing areas in the entire area of movement.

Disposal

Disposal of the machine

– Make sure that the individual elements of the machine are disposed of correctly after the service life in accordance with all applicable national, regional or local regulations for waste disposal and environmental protection.
– Remove fuel, lubricants and operating fluids from all components before disposal.

Disposal of gas tanks and pressurized tanks

– Release the pressure fully from the pressurized tanks before disposal.
– Remove all fluids or gas from the tanks before disposal.
– Obey the instructions of the tank manufacturer for disposal.

Disposal of fuel, lubricants, operating fluids and consumables

– Collect and store fuel, lubricants and operating fluids in applicable containers before disposal.
– Have fuel, lubricants and operating fluids disposed of in an applicable recycling point.
– Have refrigerant disposed of only by a trained air-conditioning and refrigeration technician.
– Obey the instructions of the fuel, lubricants and operating fluids manufacturer for disposal.
– Have metal parts disposed of in an applicable recycling point.
– Have plastic parts disposed of in an applicable recycling point.
– Have rubber parts disposed of in an applicable recycling point.
– Have electronic components disposed of in an applicable recycling point.

LEC/en/Edition: 06 / 2020

Designation	Medium	Symbol	Classification	Viscosity	Quantity*
Hydraulic tank	Hydraulic oil		See section "Lubricating and operating material specifications".		1631 L in whole circuit 949 L in hydraulic tank
Swing gear	Transmission oil		See section "Lubricating and operating material specifications".		2 x 20 L
Travel gear	Transmission oil		See section "Lubricating and operating material specifications".		2 x 24 L
Splitterbox	Transmission oil		API-GL-5 MIL-L 2105 B, C or D	SAE 90 SAE 80W-90	10 L
Swing ring roller bearing races and general lubrication points	Lubricating grease		See section "Lubricating and operating material specifications".		80 L
Swing ring teeth	Lubricating grease		See section "Lubricating and operating material specifications".		8 L
Track roller			Agip Rotra MP 85W-140		18 x 0,966 kg (1080 cc)
			Cold climate conditions (optional): Agip Rotra LSX 75W90 90% + Rocol ASO 10%		
Carrier roller			SAE 40		4 x 0,5 kg
			Cold climate conditions (optional): 90% Agip Rotra LSX + 10% Agip Rocol ASO R		
Idler wheel			SAE 40 RLC		2 x 1,3 kg
			Cold climate conditions (optional): 90% Agip Rotra LSX + 10% Agip Rocol ASO R		
Hinges, joints, locks	Engine oil	-	-	-	-
Rubber seal on doors and trim panels	Silicon spray or talc	-	-	-	-

Tab. 5-3 *Lubricant chart*

* The given quantities are only guidelines. Check fluid level after each change or refilling.

Hydraulic oil selection for cold climate conditions

When a LIEBHERR Mining excavator works under cold climates conditions, in any case, the appropriate arctic kit must be installed.

Oil must match the above prescription for engine oils or hydraulic oils.

Oil's pourpoint temperature must be at least 5 K below the minimal air ambient temperature.

Oil's flash point temperature > 160°C (recommended > 200°C).

The operating range of the arctic oil depends on the ambient air temperature and must be checked as follow:

– If the maximal ambient air temperature stays below +20°C, the oil viscosity at +50°C (oil temperature) must be over 16 cst.
In this case, the fans speed regulation "**EXTRA-COLD**" must be selected.
– If the maximal ambient air temperature stays below +30°C, the oil viscosity at +60°C (oil temperature) must be over 16 cst. In this case, the fans speed regulation "**EXTRA-COLD**" or "**COLD**" must be selected.
– If the maximal ambient air temperature stays below +40°C, the oil viscosity at +70°C (oil temperature) must be over 16 cst. In this case, the fans speed regulation "**COLD**" must be selected.

▶ Contact LIEBHERR Customer Service for additional questions about oil selection.

Oil mixing

In principle, oil mixing between two different oil types must be avoided. Mixing two different oil types leads to an unknown lubricant with resultant unknown physical properties (viscosity, pourpoint, flash point, ageing behaviour, lubricity, reaction with additives...).

▶ However, if mixing is absolutely necessary, respect the following maximum mixing proportions:
– Mixing LIEBHERR oils with hydraulic oils, or LIEBHERR oils with mineral oils, or hydraulic oils with mineral oils, or two different mineral oils together, or two different hydraulic oils together:

max. 10%

– Mixing HEES oils with hydraulic oils or mineral oils or LIEBHERR oils:

max. 2%

Hydraulic oil change intervals

Oil changes at pre-set intervals (mineral oils and PAO oils only)

This procedure is applicable only for mineral oils and PAO oils. If you use HEES biodegradable oil, refer to the next section.

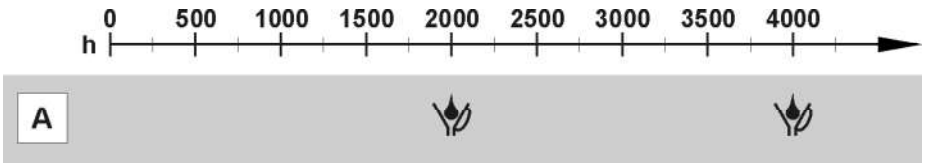
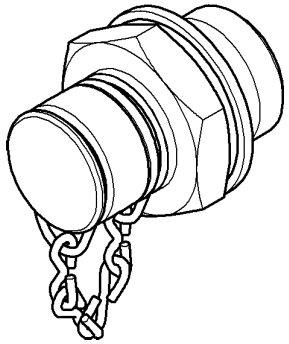
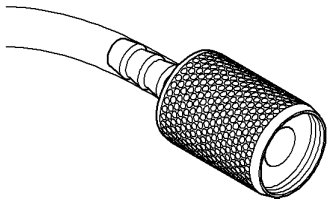


Fig. 5-13 *Oil changes at pre-set intervals*

LEC/en/Edition: 06 / 2020

Ident Nr.	Description	Quantity	Illustration
	Compact sampling valve:		
12203274	– for hydraulic oil	1	
12203276	– for engine oil	1	
12203277	– for swing gear oil	1	
12203278	– for engine coolant	1	
12203279	– for splitterbox oil	1	
12203794	Fitting for sampling hose (for compact sampling valve)	1	
7023359	ADR spill kit (International Carriage of Dangerous Goods by Road): – pads – absorbent socks (SOCs) – disposable bag – pair of gloves – instruction sheet	1	

LEC/en/Edition: 06 / 2020

5.7.2 Change the Diesel engine oil

- ▶ For oil quantities, oil specifications and oil change intervals, refer to the lubricant chart and to the control and maintenance chart.
- ▶ After each time you change or add oil, make sure that you get the correct oil level on the dipstick.

Drain the oil

Danger!
The Diesel engine oil is hot when it is at operating temperature!
Risk of burning.

- ▶ Avoid contact with hot oil and components containing oil as it can cause dangerous burns.

Depending on the machines, the oil drain device can be different.

Drain the oil through the drain plug of the Diesel engine

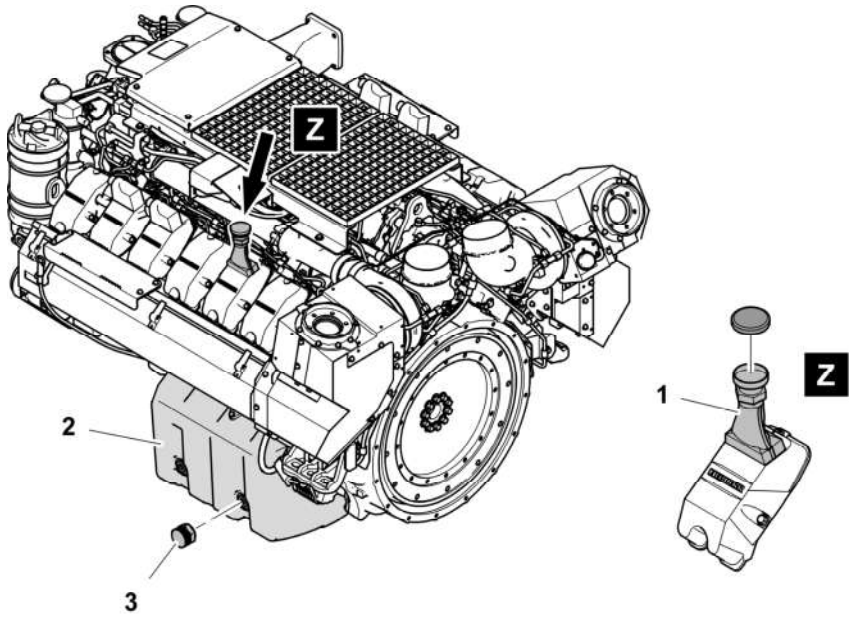


Fig. 5-25 *Oil drain plug*

1 Oil filler neck
2 Oil pan
3 Oil drain plug

- ▶ Park the machine on level ground.
- ▶ Make sure that the Diesel engine is warm.
- ▶ Stop the Diesel engine.
- ▶ Put an applicable container below the oil pan **2**.
- ▶ Remove the cap of the oil filler neck **1**.
- ▶ Remove the oil drain plug **3** from the oil pan **2** of the Diesel engine.

5.8.3 Breather filter

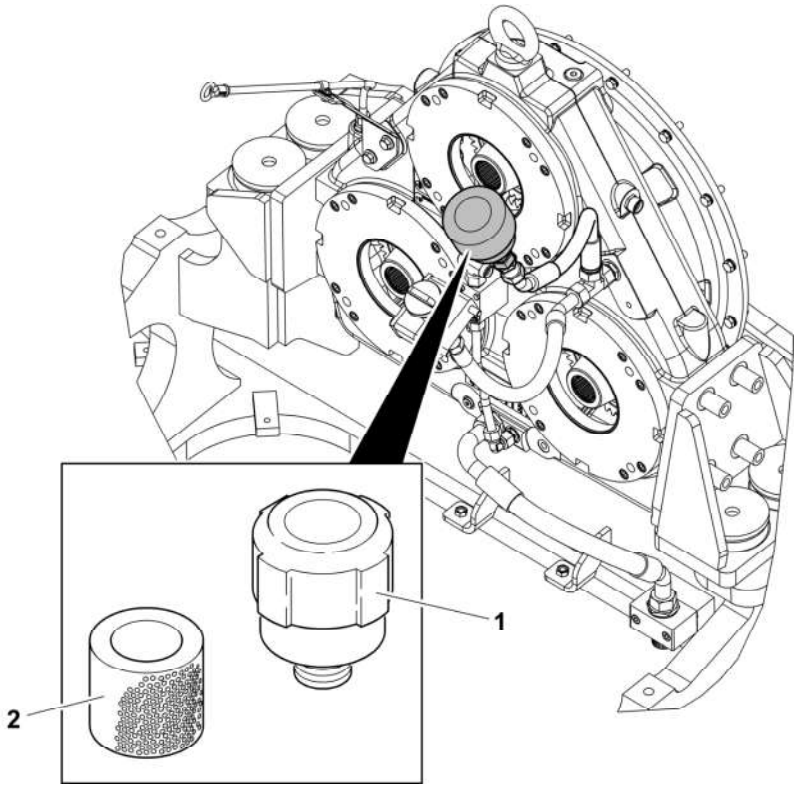


Fig. 5-35 *Breather filter on splitterbox*

The breather filter **1** on the splitterbox must be checked, cleaned and replaced regularly.

Clean the breather filter

- ▶ Open breather filter **1** by pushing it and turning it 1/4 turn.
- ▶ Remove the filter element **2** from the breather housing.
- ▶ Check filter condition and clean it with fuel.
- ▶ Reinstall the filter element in the breather housing.
- ▶ Close breather **1**.
- ▶ For check, clean and change intervals, see maintenance and control chart.

5.9 Cooling system

5.9.1 Check and clean the cooling system

To get optimal cooling, the cooler must be kept clean.

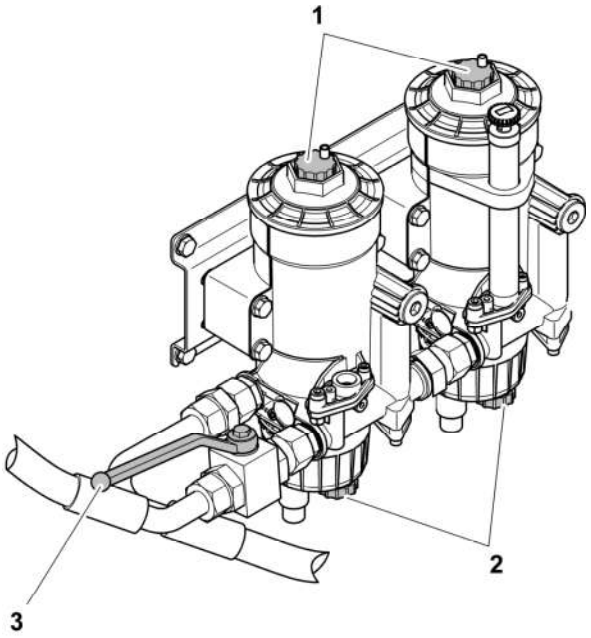


Fig. 5-45 *Fuel-water separator on fuel prefilter*

1 Bleed screw
2 Drain valve of fuel prefilter
3 Manual valve

- ▶ Stop the engine.
- ▶ Put an applicable container below the fuel prefilter.
- ▶ Close the manual valve **3**.
- ▶ Loosen the bleed screw **1**.
- ▶ Open the drain valve **2**.
- ▶ Drain water of the fuel prefilter until you can see clear fuel.
- ▶ Close the drain valve **2**.
- ▶ Open the manual valve **3**.
- ▶ Bleed the fuel system with the manual pump installed on the fuel prefilter until fuel flows out of the bleed screw. Refer to the related procedure below in this section.
- ▶ Tighten the bleed screw with your hands. Do not use tools.

If necessary, you can at this step start the engine.

- ▶ To start the engine, refer to the related procedure below in this section.

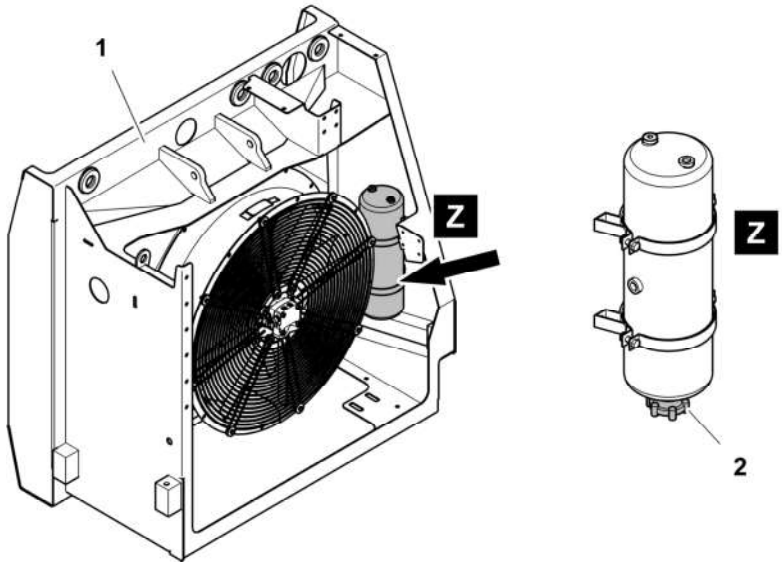


Fig. 5-55 *Air tank*

1 Engine cooler box
2 Drain valve

The air tank is installed on the engine cooler box **1**.

- ▶ Push the pin at the bottom of the drain valve **2** on the air tank.
- ▶ For maintenance intervals, refer to the control and maintenance chart.

5.12.3 Air dryer

The air dryer in the pneumatic system dries and filters the compressed air.

Replace the filter cartridge

The filter cartridge of the air dryer must be replaced at regular intervals.

Caution!
Open the air dryer only when there is no pressure in the pneumatic system.

- ▶ Release the pressure from the pneumatic system and empty the air tanks.

5.14.1 Preparatory activities

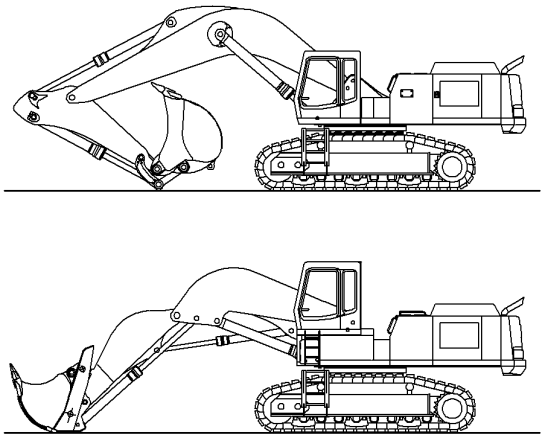


Fig. 5-66 Machine check position for hydraulic oil level check or level adjustment

Preparatory activities before to check or adjust the oil level

- ▶ The machine must stay on level ground.
- ▶ The attachment must stay on the ground, with stick and tilt cylinders fully extended and bucket closed.
- ▶ Stop the engine.

5.14.2 Check the oil level in the hydraulic tank

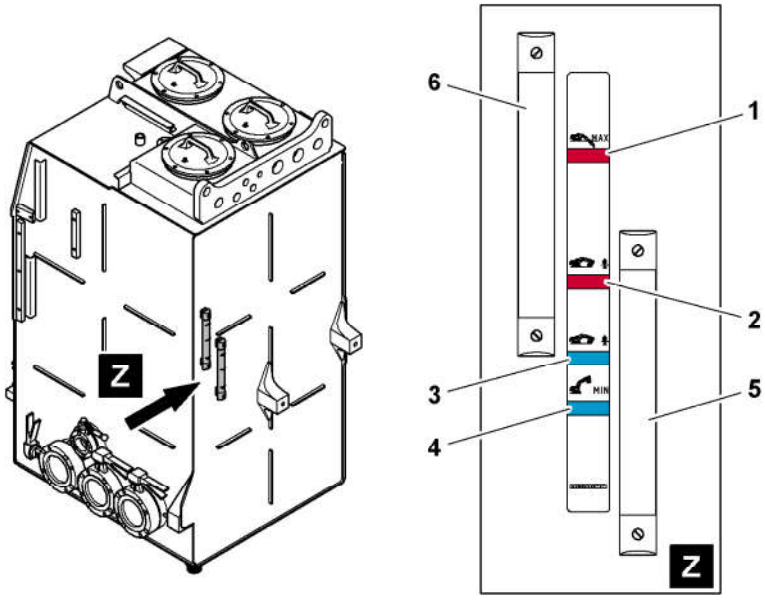


Fig. 5-67 Hydraulic tank oil level

1 Maximum oil level (warm and with fully retracted cylinders)

4 Minimum oil level (cold and with fully extended cylinders)

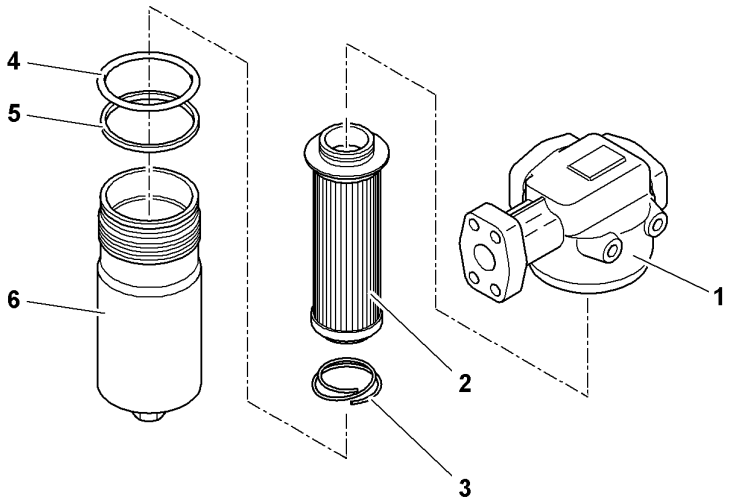


Fig. 5-75 *High pressure filter parts*

1	Filter head	**4**	O-ring
2	Filter element	**5**	O-ring
3	Compression spring	**6**	Filter housing

- ▶ Release the hydraulic pressure as given before.
- ▶ Remove the filter housing **6**.
- ▶ Remove the filter element **2**, check it and clean it with non flammable cleaning fluid, or replace it if necessary with a new element.

The filter element **2** can be cleaned up to three times. Then it must be replaced by a new one.

- ▶ Clean the filter housing **6** and the filter head **1** and install it again. Make sure that the o-rings are correctly installed.
- ▶ Fully tighten the filter housing **6** in the filter head **1**.
- ▶ Loosen the filter housing **6** by 1/6 turn.
- ▶ Close the breather filter.
- ▶ Check for leaks each time you check or you replace the filter element:
- – Start the engine.
- – Operate the machine for a short period.
- – Check for leaks between the filter housing **6** and the filter head **1**.

LEC/en/Edition: 06 / 2020

2 Return port of the external hydraulic device **4** Access panel

The auxiliary hydraulic outlet is installed in a central location with easy access under the uppercarriage structure.
During the machine operation, the manual valve **1** is in the position **A**.

First, you must get access to the necessary submenu.

- ▶ Go to the monitoring menu "**Check**".
- ▶ Go to the submenu "**Auxiliary hydraulic outlet**".

- ▶ Push the "**Accept**" button on the first page of the submenu.
  - ↳ The display shows the complete procedure that you must validate step by step.
  - ↳ While a step is in progress, a green frame highlights the related symbol.

- ▶ Push the "**Next**" button to validate and go to the next step.

Then, you must obey the procedure and validate the steps that follow to connect the external hydraulic device to the machine.

- ▶ Lay down the attachment on the ground.

- ▶ Push the safety lever up.

- ▶ Open the access panel **4**.
- ▶ Turn the manual valve **1** from position **A** to position **B**.
  - ↳ The hydraulic pressure in the port **3** is released.
- ▶ Remove the protective caps.
- ▶ Connect the coupling **2** to the return port of the external hydraulic device.
  The coupling **2** is a Faster FFH06-7/2215F female.
- ▶ Connect the coupling **3** to the pressure port of the external hydraulic device.
  The coupling **3** is a Faster FFH06-7/1815M male.
- ▶ Turn the manual valve **1** from position **B** to position **A**.
  - ↳ The port **3** is pressurized again.

Thus, the power supply of the external hydraulic device is in progress.

- ▶ Push the "**Next**" button to stop the power supply.

Add oil to the maximum level of the expansion tank.

- ▶ If oil temperature is between 20°C and 50°C:
  The oil level must be between the two level indicators.
- ▶ Install the sealing cap of the expansion tank **51** / **52** back.

Fill with oil with the service station (if installed)

- ▶ Use the swing gears connections **6** and **7** of the service station. Refer to the conditions that are given above.

5.15.3 Travel gear – Oil change

Danger!
When the oil is hot, the travel gear elements can be under pressure.

- ▶ Before you drain the oil, carefully loosen the oil filling plugs to release the internal pressure.

- ▶ For oil specifications and quantity, refer to the lubrication chart.
- ▶ For oil change intervals, refer to the control and maintenance chart.

Change the travel gear oil

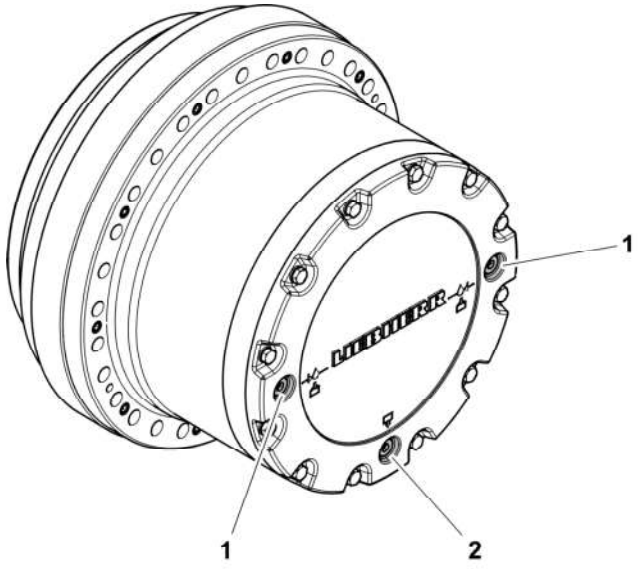


Fig. 5-95 *Oil change on travel gear*

1 Filling plugs and oil level
2 Drain plug

Each travel gear has:
– two filling plugs **1** to do a check of the oil level and add oil
– one drain plug **2**

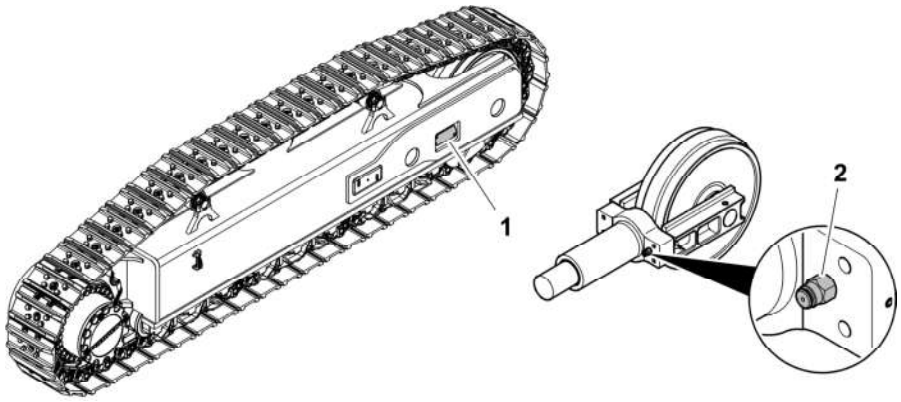


Fig. 5-108 *Tightening the track*

1 Access cover
2 Grease nipple M16x1,5

- ▶ Remove the cover **1** on the side frame of the undercarriage.
- ▶ Through this access, connect to the grease nipple **2** of the grease tensioner the high pressure hose **with manual grease gun**.
- ▶ Put grease until the track is sufficiently tensioned.
- ▶ Check the track tension as described above.
- ▶ Remove the pressure hose and reinstall the cover **1**.

5.16.4 Decrease the track tension

Danger!
Risk of injury because of sudden falling of the track chain or a spray of grease under high pressure.

- ▶ Because of the risk of grease spray, always wear protective gloves and glasses when releasing the track tension.
- ▶ When releasing the tension of the track chain, keep your head away from the opening **1** in the track side frame. Never touch the grease nipple **2** with your hand but always use an applicable tool to loosen or tighten it.
- ▶ To tighten or loosen the grease nipple **2**, always catch it at its rear part and never at its front part.

- ▶ Before trying to release the track chain tension, loosen and remove every item which can be blocked in the track chain while driving forward and rearward or doing as described in the section "Cleaning the track components" that follows.
- ▶ Carefully loosen the grease nipple **2** until the grease goes out of the nipple.
- ▶ Tighten grease nipple **2** as soon as you get the correct track tension.
- ▶ After the adjustment, drive the machine forward and rearward and check the track tension again.

LEC/en/Edition: 06 / 2020

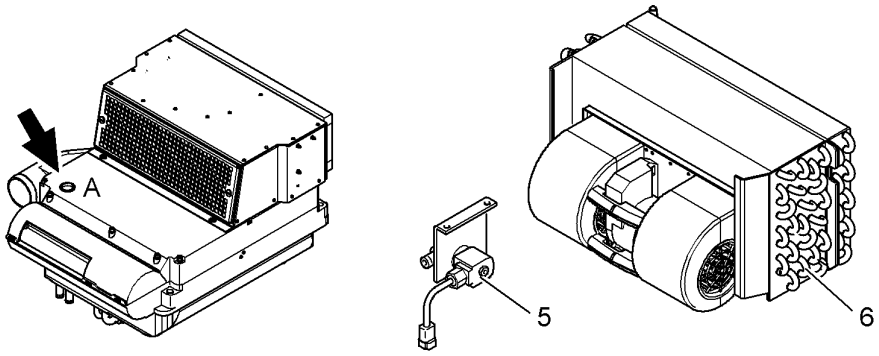


Fig. 5-116 Heater/evaporator

5 Solenoid valve
6 Heat exchanger
A Valve

Vent the heating system

- ▶ Loosen the cap of the vent valve **A**.
- ▶ Push the valve to let the air escape.

Clean solenoid valve

- ▶ Each year before the start of the heating period, remove and clean the solenoid valve **5**.
- ▶ Also clean the solenoid valve **5** if the heating performance is not sufficient.
- ▶ Flush the solenoid valve membrane with water.
- ▶ Make sure that the equalizing hole on the membrane is not blocked with dirt.

Check the heat exchanger

- ▶ Do a check of the plates of heat exchanger **6** annually for damage.
- ▶ Blow out with compressed air if dirty.
- ▶ Align the plates if necessary.

5.18.2 Air-conditioning system

- ▶ Switch on the air-conditioning system for approximately 10 minutes every 2 or 3 weeks, independently of the season.
- ▶ During the warm season, do the checks or maintenance works that follow.

In case of repair at the condenser or at the receiver, the refrigerant must be removed and collected in an applicable container. The collected refrigerant can be cleaned and re-prepared by refrigerant manufacturers.

LEC/en/Edition: 06 / 2020

5.21.5 Mounting bolts of swing gear and swing motor

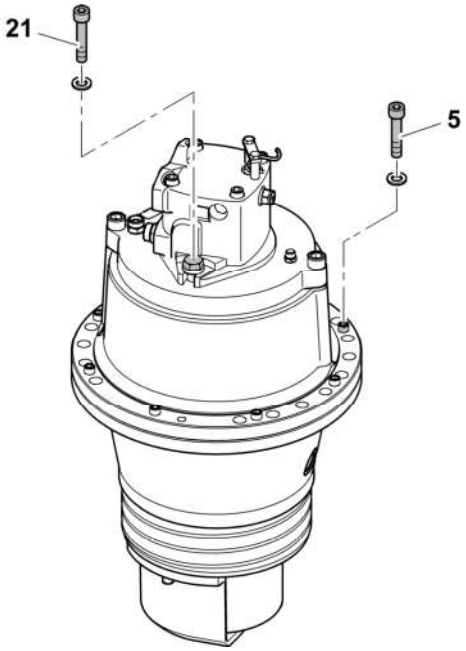


Fig. 5-127 *Bolts of swing gear and swing motor*

		Torque	Quantity
5	Screw M24x100	965 Nm	36 (2x18)
21	Screw M20x60	580 Nm	4 (2x2)

LEC/en/Edition: 06 / 2020

5.27 Control and maintenance chart

Caution!
Careful maintenance can only be carried out when the machine is clean. Visual checks such as crack testing are only applicable on a clean machine.

▶ Clean the machine before you start maintenance work (see also the chapter “Servicing the machine safely”, sections “Cleaning" and "Crack testing”).

Caution!
You must do the weekly additional maintenance tasks. Liebherr recommends that you schedule this maintenance interval carefully.

Note!
If you find damage(s) on structural components (boom, stick, bucket, central part, side frames, rotating deck, hydraulic tank, fuel tank or cabin) please fill out the "Structural Inspection" form in Service Manual - Chapter **4**.

In addition:

– A visual inspection is required every 500 hours.
– A detailed inspection is required every year or at least every 7500 hours.

5.27.1 General information

The following maintenance chart will help you to do the adequate maintenance on your excavator.

It is mandatory to follow these maintenance charts, to keep your excavator into best and safe condition.

The pre-requisite to any claim to Liebherr for operation issues or warranty, is that these maintenance charts are strictly followed and recorded.

It is mandatory to follow these requirements in order to keep your excavator safe, efficient and also for warranty reason. Liebherr is not responsible in case of damage if the maintenance requirements are not correctly followed. Moreover, your machine may not be running as efficiently and productively as it could be.

For lubricants and operating fluids, refer to the Operating Manual chapter 5.3.

Two types of inspection

Visual Check

– A visual examination of an interior or exterior area, installation or assembly to detect obvious damage, failure or irregularity. This level of inspection is made from within touching distance unless otherwise specified. A mirror may be necessary to ensure visual access to all surfaces in the inspection area. This level of inspection is made under normally available lighting conditions such as daylight, hangar lighting, flashlight or drop-light and may require removal or opening of access panels or doors. Stands, ladders or platforms may be required to have safe access to the area being checked.

LEC/en/Edition: 06 / 2020

5.27.5 500 Hours Maintenance Schedule - R 9150 - R 9150B

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

WORK TO BE PERFORMED AT 500, 1500, 2500 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
GENERAL HYDRAULIC SYSTEM			
Do a visual check of all hoses, pipes and fittings for any external damage or leakage	❍		
Do a detailed check for good condition of pipes, hoses, clamps and fittings for damage and leakage	❍		
Do a visual check of the hydraulic components for leaks and/or damages	❍		
Do a visual check of the hydraulic cylinder rods for leaks and good condition	❍		
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	❍		
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	❍		
Undercarriage: If the undercarriage has removable side frames, do a visual check for missing, broken or loosen mounting screws, tighten if necessary	❍		
Undercarriage: Do a visual check for missing, broken or loosen mounting screws of all parts, tighten if necessary	❍		
Attachment: Do a visual check for missing, broken or loosen mounting screws of the handrails, pin covers fastening and greases connections, tighten if necessary	❍		
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	❍		
Swing gear: Do a visual check for missing, broken or loosen mounting bolts of the swing gear and hydraulic motors, tighten if necessary	❍		
Diesel engine: Do a visual check for missing, broken or loosen mounting screws of the thermic protection on exhaust manifold fastening, tighten if necessary	❍		
Diesel engine: Do a visual check for missing, broken or loosen mounting bolts of the starter motors, alternator and AC compressor, tighten if necessary	❍		

LEC/en/Edition: 06 / 2020

WORK TO BE PERFORMED AT 1000, 3000, 5000 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Replace engine oil filters in accordance with the oil change	❍		
Replace oil separator filters	❍		
Check coolant level	❍		
If installed, replace coolant filters	❍		
Check Diesel Exhaust Fluid (DEF) level	❍		
Do a visual check of the engine and external pipework for leaks	❍		
Do a visual check of the exhaust gas system connections for leaks	❍		
Do a visual check of the thermic protection on the exhaust manifold fastening	❍		
Do a detailed check of mounting of the exhaust gas system	❍		
Do a visual check of the oil supply / return pipework for leaks	❍		
Drain off water and sediment at fuel tank	❍		
Do a visual check of the water separator on fuel filters, drain if necessary	❍		
Replace all fuel prefilters and fuel fine filters	❍		
Do a visual check of the vacuum indicators for air filters clogging, clean or replace if necessary and reset the indicator	❍		
Do a visual check of the precleaner	❍		
Do a detailed check of the precleaner, clean	❍		
Replace primary element of the air filter (if necessary or at least once a year)	❍		
Replace safety element of the air filter if indicated (if necessary or at least once a year)	❍		
Check oil level in the splitterbox	❍		
Sample and analyse splitterbox oil	❍		
Change oil in splitterbox	❍		
Do a visual check of the splitterbox breather for clogging, replace if necessary	❍		
Replace filter in splitterbox breather	❍		
Do a visual check of the splitterbox input shaft seal or engine main rear seal for leaks	❍		
Do a detailed check of the engine and the splitterbox rubber buffers (replace if necessary and at least every 10000 hours)	❑		
Do a visual check of the starter motors, alternator and AC compressor for cables, and brackets	❍		
Do a visual check of the air intake hose for condition and leaks	❍		

LEC/en/Edition: 06 / 2020

WORK TO BE PERFORMED AT 2000, 4000, 6000 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Replace all fuel prefilters and fuel fine filters	❍		
Do a visual check of the vacuum indicators for air filters clogging, clean or replace if necessary and reset the indicator	❍		
Do a visual check of the precleaner	❍		
Do a detailed check of the precleaner, clean	❍		
Replace primary element of the air filter (if necessary or at least once a year)	❍		
Replace safety element of the air filter if indicated (if necessary or at least once a year)	❍		
Check oil level in the splitterbox	❍		
Sample and analyse splitterbox oil	❍		
Change oil in splitterbox	❍		
Do a visual check of the splitterbox breather for clogging, replace if necessary	❍		
Replace filter in splitterbox breather	❍		
Do a visual check of the splitterbox input shaft seal or engine main rear seal for leaks	❍		
Do a detailed check of the engine and the splitterbox rubber buffers (replace if necessary and at least every 10000 hours)	❍		
Do a visual check of the starter motors, alternator and AC compressor for cables, and brackets	❍		
Do a visual check of the air intake hose for condition and leaks	❍		
Do a visual check of the coolers for clogging and damage, clean or replace if necessary	❍		
Do a visual check of the radiator core and fan, clean if necessary	❍		
Do a visual check of the radiator cap for leaks, replace if necessary	❍		
Perform the complete "Daily" Maintenance Echelon given in the Diesel engine LIEBHERR Operation and Maintenance Manual	❍		
Every 500 hours, perform a complete "500 hours" Maintenance Echelon given in the Diesel engine LIEBHERR Operation and Maintenance Manual	❍		
Every 1000 hours, perform a complete "1000 hours" Maintenance Echelon given in the Diesel engine LIEBHERR Operation and Maintenance Manual	❍		
Every 2000 hours, perform a complete "2000 hours" Maintenance Echelon given in the Diesel engine LIEBHERR Operation and Maintenance Manual	❍		

LEC/en/Edition: 06 / 2020

– Rub between the steel layers.
– Damaged rubber in between the steel layers.

The inside rubber can also be damaged if the reinforcement layer moves.

Rubber cover

The rubber cover protects the reinforcement layer from the ambient conditions (UV, ozone, different liquids) and from mechanical effects (scrubbing, corrosion).

Any rub, cut or rib in the rubber cover means that the protection is no longer satisfactory and the reinforcement layer is subject to a potential destruction.

Nipple

The nipple is necessary to connect a hydraulic hose to another component. The nipple is resistant to all the mechanical forces and bending stress caused by the pressure pulsations in the hose. Thus, it is important to have a good contact between the nipple and the hose.

Cracks on the nipple cause its fast failure.

Crimp fitting

To make sure that the assembly is correctly sealed, the crimp fitting presses the inside rubber tube onto the nipple. In addition, if the hose has a wire trap area, the crimp fitting clamps the reinforcement layer in between the nipple and the crimp fitting.

If the hose assembly starts to leak at the end of the crimp fitting, the causes that follow are possible:

– The sealing function between rubber hose and nipple is not satisfactory.
– The crimp fitting has not been done 100% correctly.
– The pressure range of the crimp fitting is lower.

6.1.4 Recommendations for hose assembly maintenance

Severity levels

Hose assembly damages can be divided into three severity levels:

– minor damage
– serious damage
– major damage

For each severity level, there are special actions to do at specific intervals.

Checks and recommendations

The sections that follow give:

– the visual checks which are necessary to make an estimate of the damage severity level
– the recommendations for the related actions and intervals

LEC/en/Edition: 06 / 2020

▶ Open, drain and clean the collecting pipe **CP3**.

▶ Move to next section about the high pressure circuit.

High pressure circuit

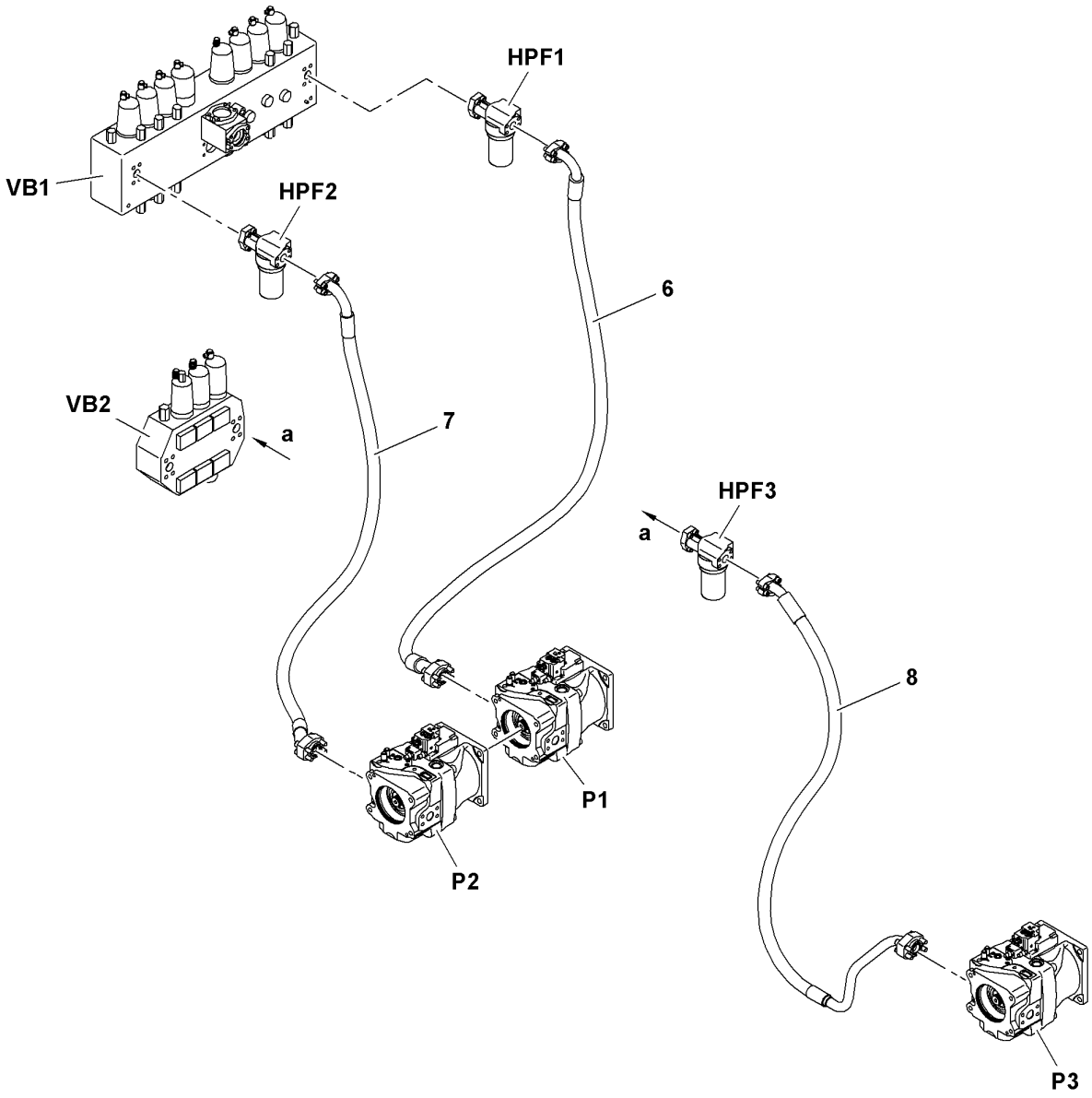


Fig. 6-10 *High pressure hoses between valves blocks and working pumps*

6	Hydraulic hose	**P1**	Working pump 1
7	Hydraulic hose	**P2**	Working pump 2
8	Hydraulic hose	**P3**	Working pump 3
HPF1	P1 high pressure filter	**VB1**	Valve block 1
HPF2	P2 high pressure filter	**VB2**	Valve block 2
HPF3	P3 High pressure filter		

LEC/en/Edition: 06 / 2020

6.2.8 Travel motors circuit

Leak oil circuit

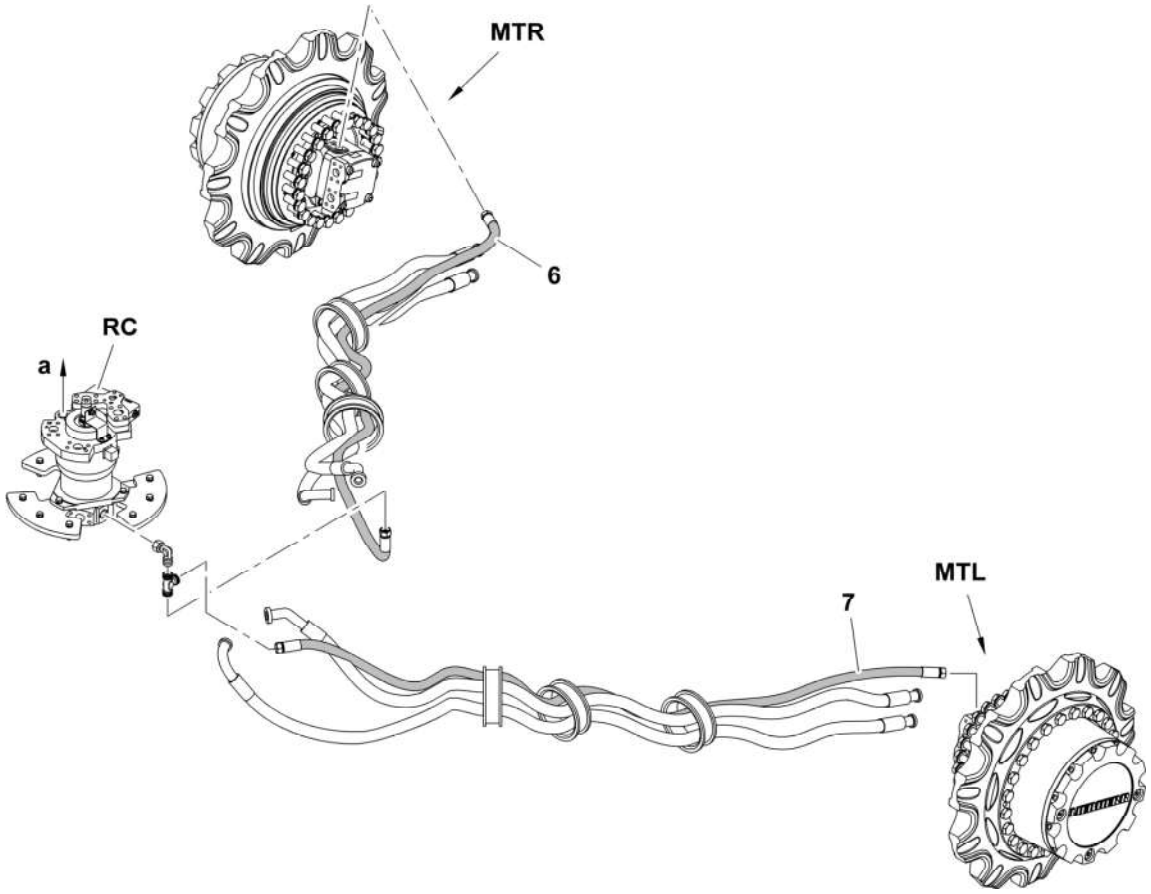


Fig. 6-21 *Leak oil circuit of travel motors*

6	Hydraulic hose	**MTL**	Left travel motor
7	Hydraulic hose	**MTR**	Right travel motor
a	Refer to section "Leak oil hoses of swing motors"	**RC**	Rotary connection

- ▶ Remove the complete leak oil filter **1**. Refer to the section above and to the 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.
- ▶ Disconnect, drain and clean all the hydraulic hoses.
- ▶ Move to next section about the oil intake circuit.

LEC/en/Edition: 06 / 2020

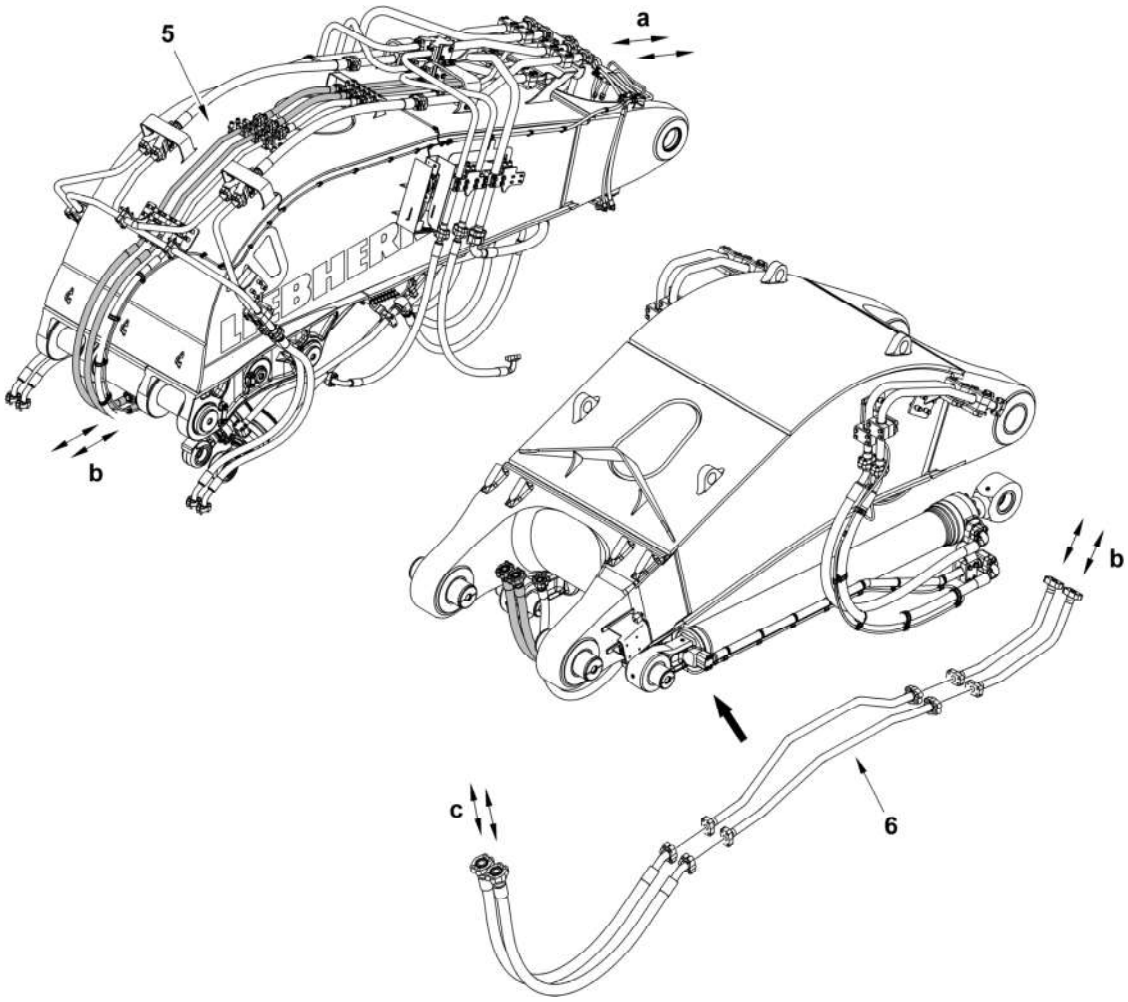


Fig. 6-31 *Hydraulic lines on the attachment*

5 Hydraulic lines installed on the boom
6 Hydraulic lines installed on the crowd

LEC/en/Edition: 06 / 2020

- ▶ Only for crawler excavators: start the travel hydraulic circuits forward and backward on approximately 10 meters. Repeat 4 times.
- ▶ Stop the engine. The attachment must stay on the ground.
- ▶ Release the pressure from the hydraulic system (refer to the Operating Manual).
- ▶ Check the return and leak oil filters with related magnetic rods and the high pressure filters.
- ▶ Check the machine for leaks.

The machine can now be operated.

6.2.13 Monitor the restarted machine

After you restart the machine, you must monitor the condition of the hydraulic oil filters as an initial set-up of the machine.

- ▶ Clean magnetic rods of the leak oil filter daily during the first 250 hours.
- ▶ Clean magnetic rods of all return filters weekly during the first 250 hours.

You can also refer to the Operating Manual.

6.3 Centralized lubrication system

LEC/en/Edition: 06 / 2020

en

Operating Manual

Centralized Lubrication Systems

R9150

Product identification

Manufacturer: SKF Lubrication Systems Germany GmbH

Type: R9150

Type no.: 1133

Address

Heinrich-Hertz-Str. 2-8

69190 Walldorf - Germany

LEC / en / Edition: 09/2018

2.13 Energies

	• Electricity
	• Temperature (hot or cold surfaces)
	• Position energy (raised components)
	• Parts subject to pressure (operating pressure, oil pressure, grease pressure, air pressure, etc.) • Bursting reservoir if filled by a high-performance pump
	• Parts subject to spring tension

2.14 Lubricants

- Greases
- Oils

Transport lifecycle	
Residual risks	**Remedy**
Tilting or falling of parts during transport, e.g. over inclines.	Secure parts against tilting or falling during transport (e.g. using tapes, belts, ropes, etc.).
Dropping of lifted parts or tools.	No people may remain under suspended loads. Keep unauthorized persons away. Secure suspended loads using suitable hoisting equipment (e.g. tapes, belts, ropes, etc.).

2.15 Existing residual risks

Installation life cycle	
Residual risks	**Remedy**
People slipping due to floor contamination with spilled or leaked lubricant	Take care when filling. Bind and remove leaked or spilled lubricant immediately with a suitable agent. Follow the operational instructions for handling lubricants and contaminated parts.

3.5 Initial commissioning / daily start-up

Ensure that:

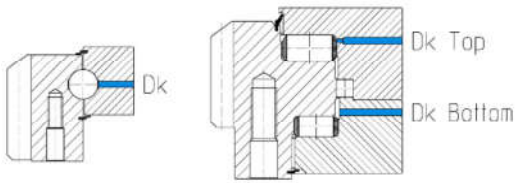
- The machine manufacturer's instructions regarding the lubricants to be used are observed.
- All safety devices are completely available and functional.
- All connections are correctly connected.
- All parts are correctly installed.
- All warning labels on the centralized lubrication system are completely available, highly visible and undamaged.
- Illegible or missing warning labels are to be replaced without delay.
- The system pressure specified for proper operation is adhered to and neither exceeding nor falling below specification.

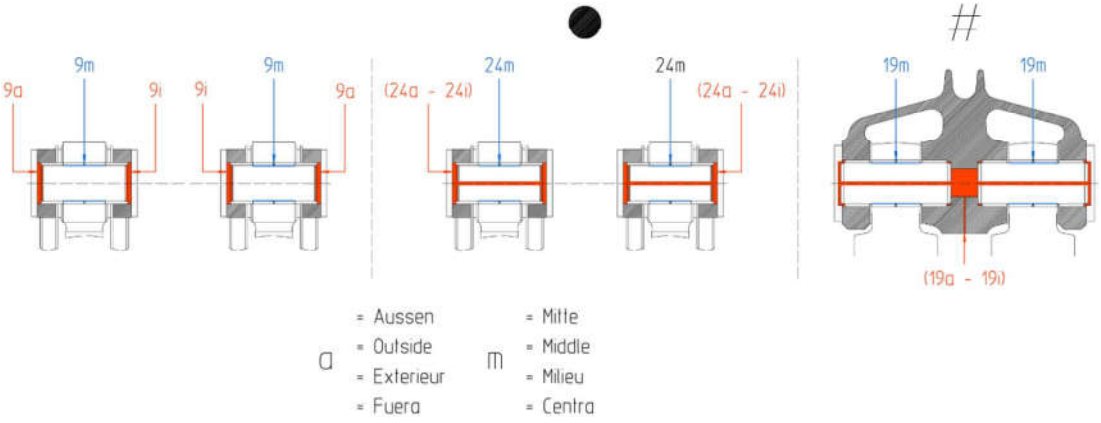
3.6 Cleaning

- Risk of fire and explosion when using inflammable cleaning agents. Only use non-flammable cleaning agents suitable for the purpose.
- Do not use any aggressive cleaning agents.
- Do not use steam jet or high pressure cleaners. Otherwise electrical components may be damaged. Observe the protection classes, e.g. IP (International Protection) and NEMA (National Electrical Manufacturers Association), required for proper operation.
- Cleaning work on energized components may be carried out by electrical specialists only.
- Do not touch cables or electrical components with wet or damp hands.
- Mark damp areas accordingly.

LEC / en / Edition: 09/2018

Characteristics of lubrication points on the excavator





All the necessary information regarding the greasing points and quantities are available in chapter 21 of the Liebherr Service Manual.

Fault signals

Each time a fault arises, an acoustic signal will be given by the controller (buzzer) and the two flashing lights on the pump stations will be activated. Buzzer and flashing lights can be deactivated by pressing the ENTER key.

In two cases this will not be possible:

- very low grease level in the barrel (LL)
- both sensors for monitoring the lubrication of the slewing rim are defective

In these cases, buzzer and flashing lights will be deactivated when switching off the motor, however, will be activated again when starting the motor.

Adjusted values

For service personnel with PC, corresponding software and authorization: