en

Operating manual

Hydraulic excavator
R 9150B

from serial number 38151

Document identification

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Product identification

Manufacturer:	Liebherr-Mining Equipment Colmar SAS
Type:	R 9150B
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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

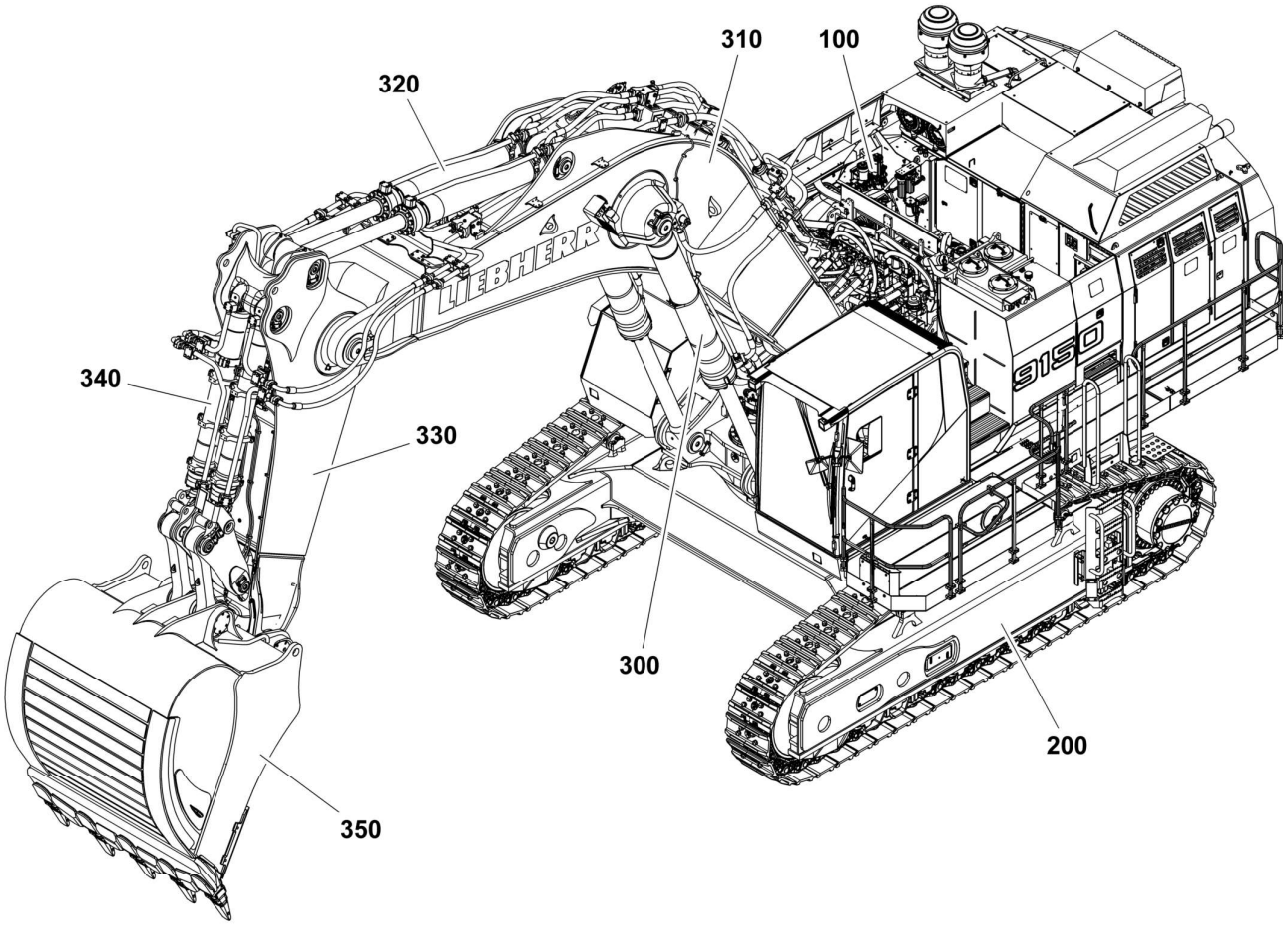

Fig. 1-1 *Machine and construction equipment - backhoe attachment*

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

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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

- Check that the attachment is operating correctly.
- Move the machine carefully to an open area and then check the function of the travel and swing gear brakes, the steering and the signalling and lighting devices. Lighting devices must always be clean.

Stopping the machine safely

- Only stop the machine on level, firm ground.
- If the machine has to be stopped on an incline, chocks should be used to secure it from rolling away.
- Before stopping the machine, each time it is possible, align the uppercarriage with the undercarriage so that the sprockets locate at the back-end. This is the only one position which enables a secured access to every maintenance locations on the uppercarriage.
- Use the stop bolts to secure the uppercarriage facing the undercarriage, if available.
- Lower the attachment and anchor the grab lightly in the ground.
- Position every control lever into neutral position and apply the travel and swing brakes.
- Stop the engine in accordance with the operating instructions and tilt the safety lever up before leaving the cab.
- Lock the machine, included hoods and compartments, remove every keys and secure the machine against unpermitted use and vandalism.

Safely getting down

- Proceed with the same precautions to climb up or down onto the machine, as to install yourself.
- Stop the machine on level, 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.
- Open and lock the door. Be sure of it's locking. Take care of weather conditions ! Unfasten the safety belt.
- Position yourself with your face toward the machine when getting out and 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. Climb down until you can close the doors safely. Always use your hand for control when closing the doors. Lock the door.
- Now climb down to the ground.

Working safely with the machine

- Before you start working, acquaint yourself with the special features of the job site and any special precautions and warning signals. Examples of particular work environments would be on-site or traffic obstructions, the load-carrying capacity of the ground and any requirements to make the job site safe from public use.
- Always maintain a safe distance from overhangs, edges, slopes and unsafe ground.
- Be particularly careful in conditions of reduced visibility and changeable ground conditions.
- Familiarize yourself with the location of power and gas lines on the job site and take particular care when working near them. If necessary, inform the responsible authorities.

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pair work and pay particular attention to connections and screw fittings.
Do not use aggressive cleaning products and use lint-free cleaning cloths.

– Do not use aggressive cleaning products or steam jet devices to clean the machine for the first two months after initial set-up of the machine (or after repainting).
– Do not use combustible liquids to clean the machine.
– Before cleaning the machine with water or steam jets (high pressure cleaner) or other cleaning materials:
  • lubricate all bearing points, bolt connections and the rim bearing to prevent water or steam entering the bearing points.
  • cover or glue shut all openings into which for safety or functional reasons water or steam may not be permitted to enter.
  Electric motors, electrical components, control boxes, plug connections and air filters are particularly at risk.
– Ensure that the fire warning systems and fire extinguishers of the engine compartment's temperature sensor do not come into contact with hot cleaning products during cleaning work.
  The fire extinguisher could start.
– If you use a high pressure cleaner with steam or hot water to clean the machine, observe following recommendations:
  • the distance between the nozzle and the surface to be cleaned must be no lower than 20 inches
  • the water temperature should not exceed 60°c (140°F)
  • limit the water pressure to 80 bar maximum (1160 PSI)
  • if you employ cleaning fluid, only use neutral cleaning agents such as customary car shampoos diluted to 2 or 3 percent maximum
– After cleaning:
  • remove all covers completely.
  • check all fuel, engine oil and hydraulic lines for leakage, loosened connections, chafing and damage.
  • rectify any defects found immediately.
  • lubricate all bearing points, bolt connections and the rim bearing to displace any water or cleaning products that may have entered.

Corrosion protection

– The corrosion protection of the machine must be inspected and renewed at regular intervals. For further information, refer to the Maintenance manual for corrosion protection.

Field of view

– Mirrors and cameras, which were possibly removed for the transport, must be inevitably reinstalled and correctly adjusted before the initial set-up of the machine.
– Regularly check that the interior and exterior mirrors as well as the cameras are 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.

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Plate 24: Operating manual label

Indicates that the informations in the Operating manual must be carefully noted.

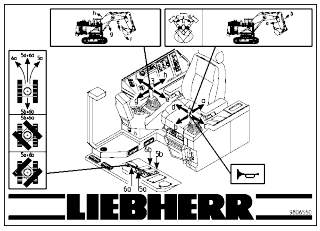


Plate 26: Information about control symbols

Schematic representation of the correlation between the main controls in the cab and the induced actions for the operation of the excavator.

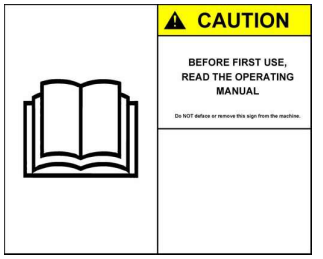


Plate 34: First use

Indicates that the informations in the Operating manual must be carefully noted before the first use.

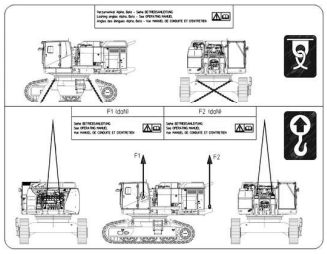


Plate 35: Latch points and lifting points

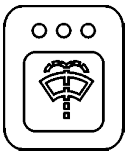
Indicates the latch points and the stopping points for the lifting on the hydraulic excavator.

Plate 36: Emergency exit label

Indicates the emergency window.

Plate 40: Burn hazard label

Indicates risks due to hot surfaces and gives associated safety instructions.



Windshield washer

- ▶ Push and hold button.
  - Washing water is sprayed onto the windshield through the outlet nozzles.
  - Windshield wiper runs continuously.
  - First LED in the button comes on.
- ▶ Release button.
  - First LED in the button goes off.
  - Washing water is stopped.
  - Windshield wiper finish its cycle.

Front working lights / Attachment headlights

- ▶ Push the button.
  - Front working lights on the uppercarriage are activated.
  - First LED in the button comes on.
- ▶ Push the button again.
  - Front working lights and attachment headlights are activated.
  - First LED and second LED in the button are on.
- ▶ Push the button a third time.
  - Front working lights are deactivated.
  - First LED in the button goes off.
  - Attachment headlights remain activated.
  - Second LED in the button is still on.
- ▶ Push the button a fourth time.
  - Attachment headlights are deactivated.
  - Second LED in the button goes off.

Rear working lights

- ▶ Push the button.
  - Rear top of cab working lights are activated.
  - First LED in the button comes on.
- ▶ Push the button again.
  - Rear counterweight working lights are activated.
  - First LED and second LED in the button are on.
- ▶ Push the button a third time.
  - Rear top of cab working lights are deactivated.
  - First LED in the button goes off.
- ▶ Push the button a fourth time.
  - Rear counterweight working lights are deactivated.
  - Second LED in the button goes off.

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Menu "Check"

With the menu "**Check**", you can see the value of different parameters and specified inputs/outputs of the machine.

▶ Push the "**Check**" button to access to this menu from the main screen.

Menu "Info"

With the menu "**Info**", you can see different technical data and working times of specified parts of the machine.

▶ Push the "**Info**" button to access to this menu from the main screen.

Menu "Settings"

With the menu "**Settings**", you can set specified parameters of the machine.

▶ Push the "**Settings**" button to access to this menu from the main screen.

Select a submenu

From each monitoring menu:

▶ Push the "**Up**" and "**Down**" buttons to select the necessary submenu.

▶ Push the "**Accept**" button to access to the selected submenu.

Return to the monitoring menu

From each submenu:

▶ Push the "**Return**" button to go back to the related monitoring menu.

Menu "Diag"

When an error occurs on the machine, the symbol of the menu "**Diag**" flashes red on the main screen. This symbol continues to flash until there are errors not acknowledged or not rectified.

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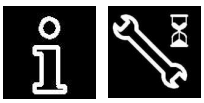
E MODE	Mode of working "Eco"	Hrs	Hours spent in the related mode of working
P MODE	Mode of working "Power"	kW	Average engine power during the related period
Σ	Total of the two modes of working **E** and **P**	L/H	Fuel consumption during the related period

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

If all the error symbol locations are on, the system show the most important symbols.

Splitterbox oil overheating

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

- ▶ Stop operation and turn the engine to off.
- ▶ Find and rectify the cause of the problem.

Servo oil pressure low

This symbol is shown if the servo oil pressure falls below a specified operating value.

- ▶ Stop operation and turn the engine to off.
- ▶ Find and rectify the cause of the problem.

Servo oil pressure high

This symbol is shown if the servo oil pressure is more than a specified operating value.

- ▶ Stop operation and turn the engine to off.
- ▶ Find and rectify the cause of the problem.

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.

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Weight adjustment

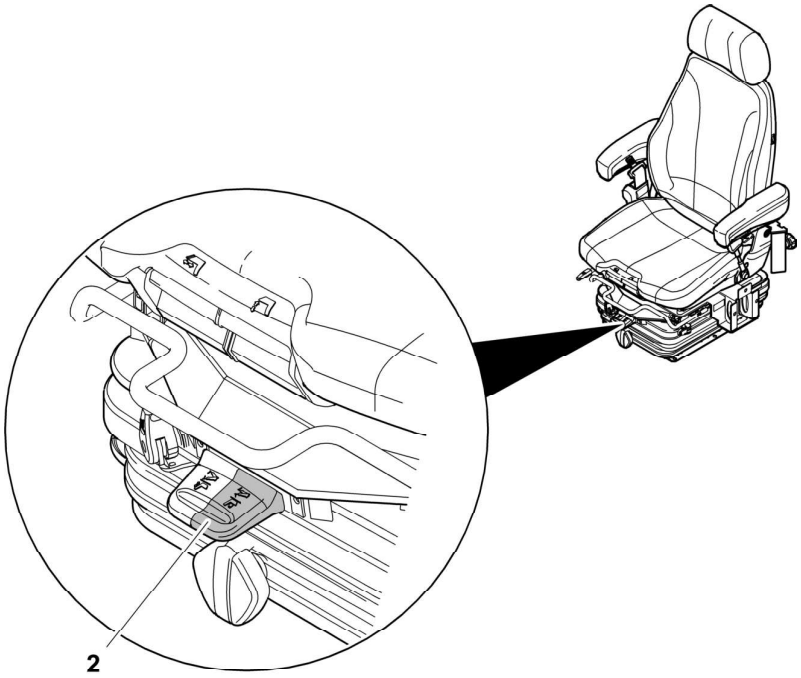


Fig. 3-27 *Setting the weight*

To adjust the seat for the driver's weight:

▶ Quickly pull the lever **2**.

Note!
The driver must be seated during the adjustment.

3.2.7 Field of view

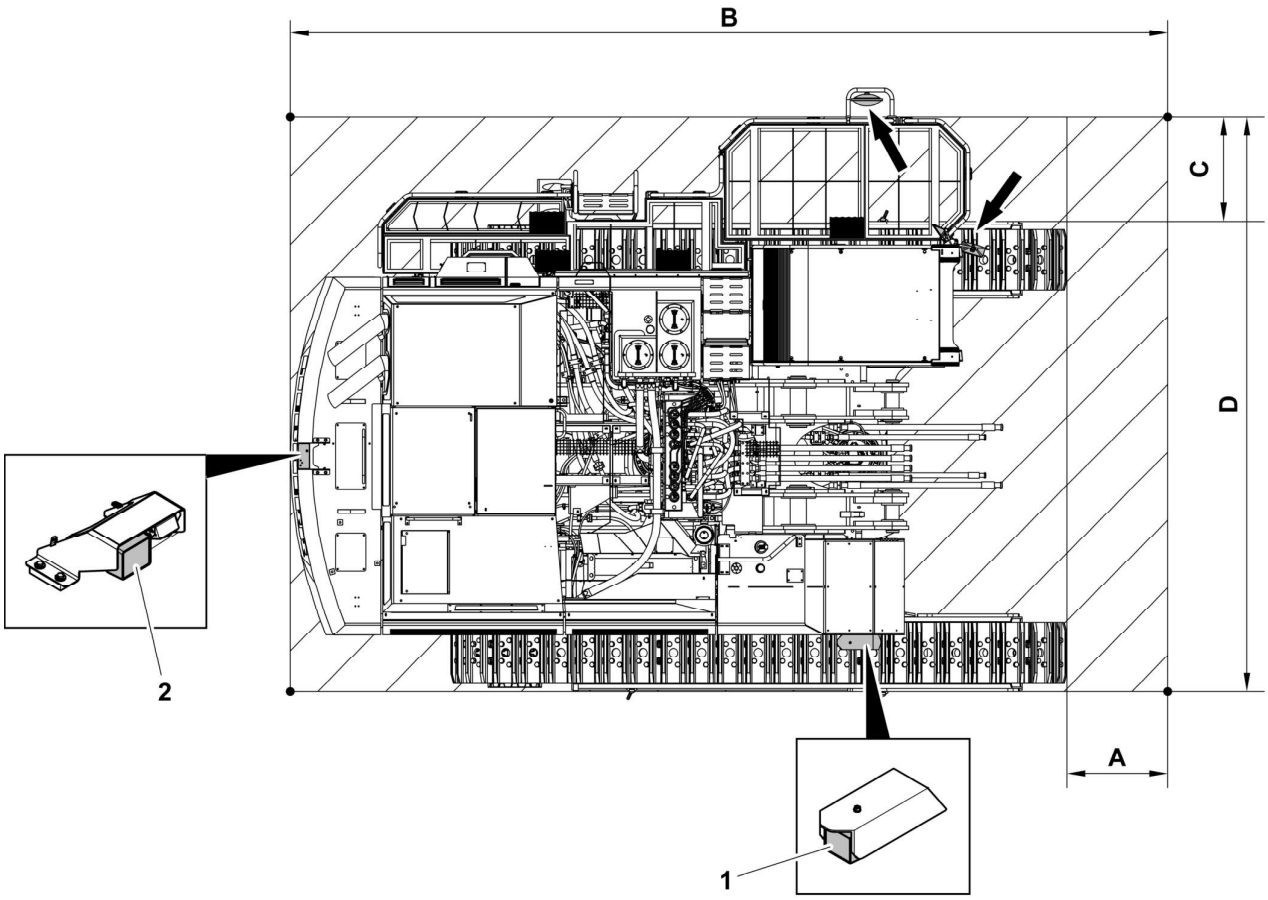


Fig. 3-38 *Field of view*

1 Camera 1: opposite side of the cab
2 Camera 2: counterweight

	Distances
A	1000 mm
B	9857 mm
C	613 mm
D	6255 mm

Tab. 3-1 *Fields of view depending on the machines*

Monitoring cameras are installed on the excavator as follows in order to extend the operator's field of view with the operating environment:

– camera 1: on the opposite side of the cab
– camera 2: on the counterweight

The combination of the cameras and the outside mirrors allows to see a person standing out of the hatched area illustrated on the figure above.

Adjustment of the air flow

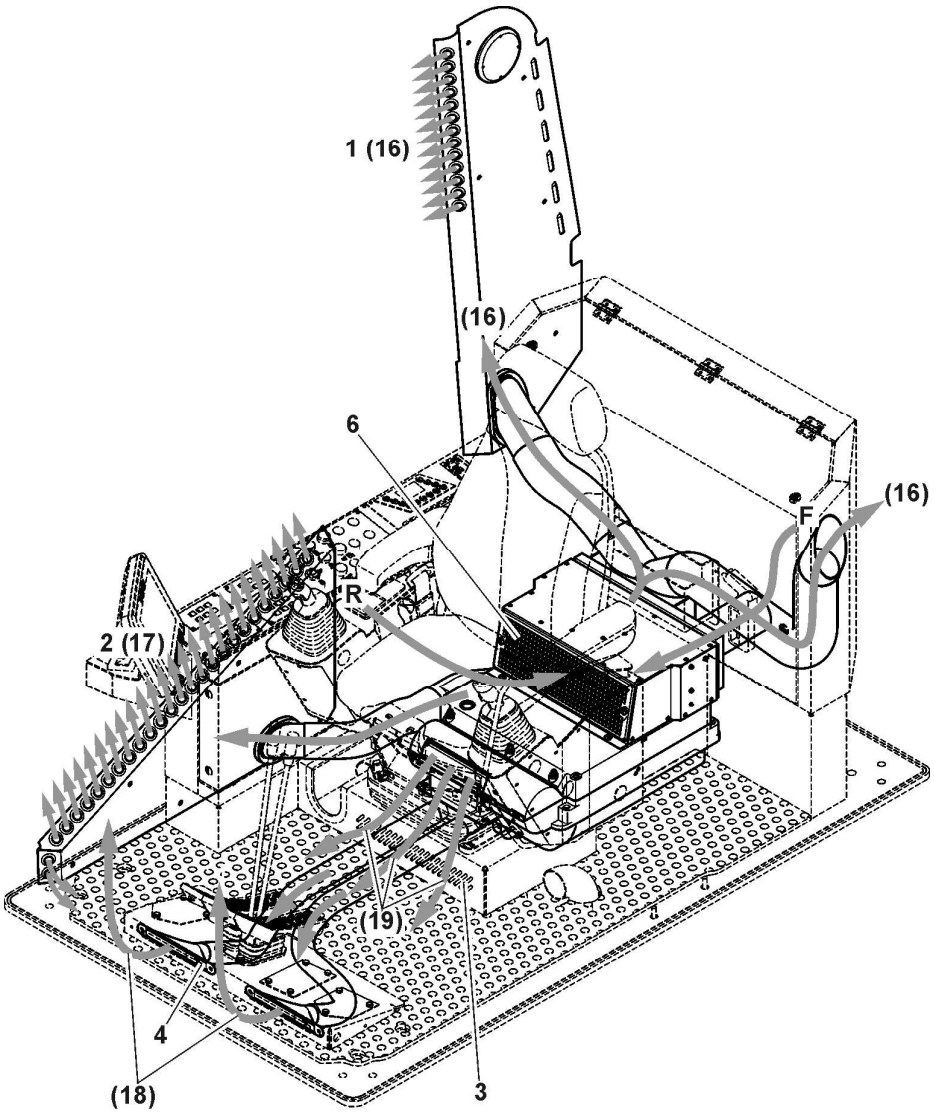


Fig. 3-49 *Position of front air vents and vents on the rear cab wall*

The air vents are located on the seat console **3 (19)**, on the right control panel **2 (17)**, on the front window **4 (18)** and on the cab rear wall **1 (16)**. The area that is open on each ventilation flap is indicated with an arrow in the display.

To obtain optimal comfort:

- When **heating**, open the air vents in the footwell **3** and possibly in the windscreen **4**.
- When **air-conditioning**, open the air vents in the cab rear wall **1** and the right control panel **2**.

The best heating or cooling effect is achieved when using the recirculated air function.

Speed adjustment

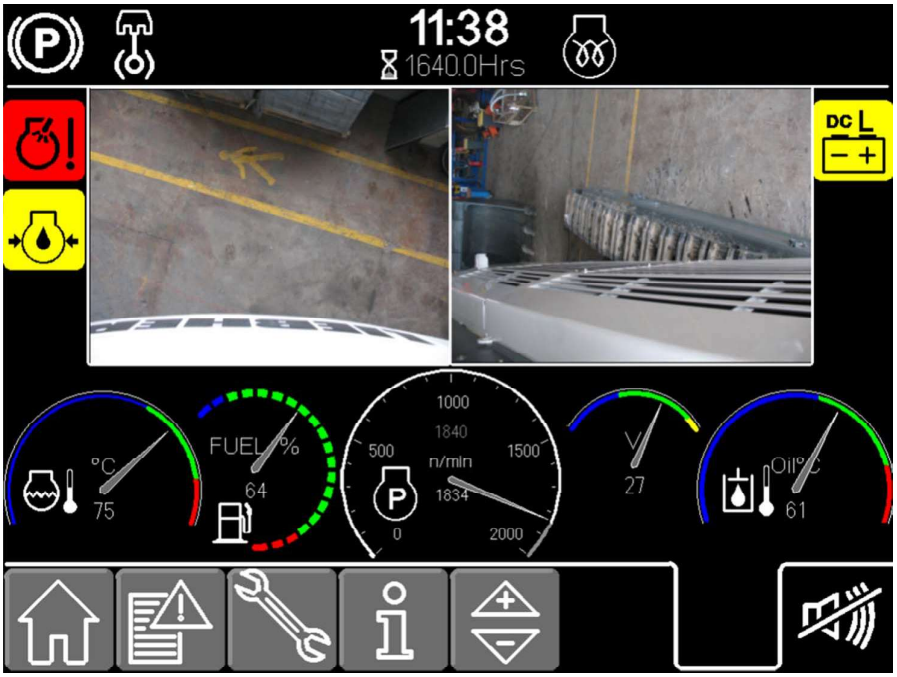
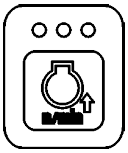


Fig. 3-54 *Speed indication on the main menu of the display*

You can set the engine speed in different specified steps with the "Increase engine speed" and "Decrease engine speed" buttons, which are located on the **A168** PowerPack keypad. The selected speed is shown on the display with a dial indicator.



Increase the engine speed

- ▶ Push and release the "Increase engine speed" button.
  - ↳ The engine speed increases until the next higher step.
- ▶ Push and hold the "Increase engine speed" button.
  - ↳ The engine speed increases continuously.
  - ↳ The LED in the button flashes until you get the maximum speed.
  - ↳ The LED in the button is on while the maximum speed is selected.

Decrease the engine speed

- ▶ Push the "Decrease engine speed" button.
  - ↳ The engine speed decreases to the previous lower step.
- ▶ Push and hold the "Decrease engine speed" button.
  - ↳ The engine speed decreases continuously.
  - ↳ The LED in the button flashes until you get the minimum speed.
  - ↳ The LED in the button is on while the minimum speed is selected.

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Set the time

▶ Start the control unit.

▶ Push the "**Previous**" or "**Next**" button to select the menu "**Settings**" in the upper frame of the **U106** display.
↳ This symbol flashes.

▶ Push the "**Filled**" button.

↳ The symbol "**Time**" flashes in the lower frame of the **U106** display.

▶ Push the "**Filled**" button to go to this submenu.

▶ Set the time with "**Previous**" or "**Next**" button.

▶ Push the "**Filled**" button each time to confirm the settings.

▶ Push the "**Blank**" button to go back to the menu "**Settings**".

▶ Push the "**Previous**" or "**Next**" button to select the submenu "**Day**" in the lower frame of the **U106** display.
↳ This symbol flashes.

▶ Push the "**Filled**" button.

▶ Set the day with "**Previous**" or "**Next**" button.

▶ Push the "**Filled**" button to confirm the setting.

Start and stop the coolant heater manually

▶ Push the "**Filled**" button for more than 2 seconds.
↳ The heater is on.

▶ Push the "**Blank**" button for more than 2 seconds.
↳ The heater is off.

Record the automatic starting time

▶ Start the control unit.

▶ Push the "**Previous**" or "**Next**" button to select the menu "**Program**" in the upper frame of the **U106** display.
↳ This symbol flashes.

▶ Push the "**Filled**" button.

▶ Push the "**Previous**" or "**Next**" button to select a program number.

▶ Push the "**Filled**" button.
↳ The program number parameters are shown.

▶ Push the "**Previous**" or "**Next**" button to select the submenu "**Settings**".
↳ This symbol flashes.

▶ Push the "**Filled**" button.

▶ Set the day, hours and minutes with "**Previous**" or "**Next**" button.

▶ Push the "**Filled**" button each time to confirm the settings.

Set the duration of the operating time

In the same submenu as above, you can also set the operating time of the coolant heater.

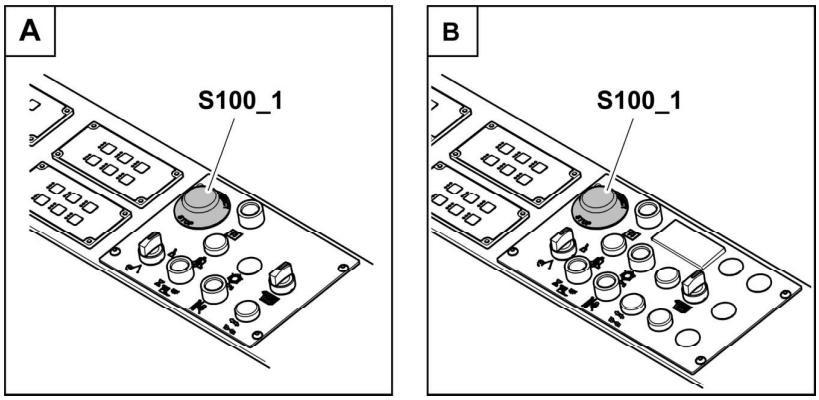

Fig. 3-68 *Cab emergency stop S100_1*

The emergency stop **S100_1** is located on the cab control board. Depending on the machines, the cab control board can be different.

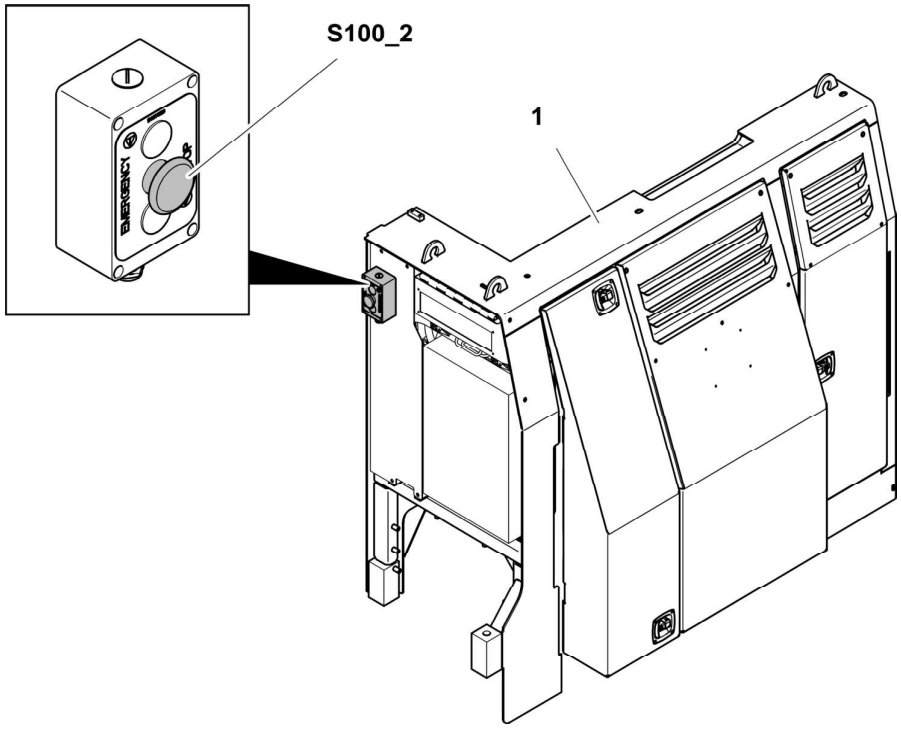

Fig. 3-69 *S100_2 emergency stop*

Depending on the machines, a second emergency stop **S100_2** is installed near the batteries box **1**.

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▶ Push the "**Travel brake**" button on the related keypad.
  ↳ The first LED in the button goes off.
  ↳ The travel brake is released.
  ↳ The undercarriage is unlocked.

▶ Push the "**Travel brake**" button again.
  ↳ The first LED in the button comes on.
  ↳ The travel brake is applied.
  ↳ The undercarriage is locked.

The travel brake is applied if the safety lever is up or the access ladder is down (if installed) or the service trap is down (if installed).

3.4 Working with the machine

Working safely with the machine

– Before you start working, acquaint yourself with the special features of the job site and any special precautions and warning signals. Examples of particular work environments would be on-site or traffic obstructions, the load-carrying capacity of the ground and any requirements to make the job site safe from public use.
– Always maintain a safe distance from overhangs, edges, slopes and unsafe ground.
– Be particularly careful in conditions of reduced visibility and changeable ground conditions.
– Familiarize yourself with the location of power and gas lines on the job site and take particular care when working near them. If necessary, inform the responsible authorities.
– When working in areas with underground lines (gas, electricity), adhere to the laws, regulations and rules applicable at the place of use.
– Maintain a safe distance from electrical aerial lines. Do not allow the attachment to come near cables when working near electrical aerial lines. Risk of fatality! Inform yourself about required safety distances.
– The following actions must be carried out in the event of any transfer of electricity:
  • do not move the machine or its attachment,
  • do not leave the driver's cab,
  • **warn any personnel in the vicinity not to come close to the excavator and not to touch it,**
  • instruct or initiate that someone turns off the voltage.
  • move the machine, if possible, from the danger zone to a sufficient distance,
  • Do not leave the machine until you are absolutely sure that voltage in the line, which had been touched or damaged, has been turned off!
– Before moving the machine, always ensure that any attachments are safely secured.
– When driving onto public roads, paths and squares, observe current traffic regulations and if necessary, ensure that the machine has been made safe as per regulations beforehand.
– Always turn on the lights in conditions of poor visibility or darkness.
– Do not permit any passengers in the machine.
– Only work when seated properly and with the safety belt securely fastened (if available).

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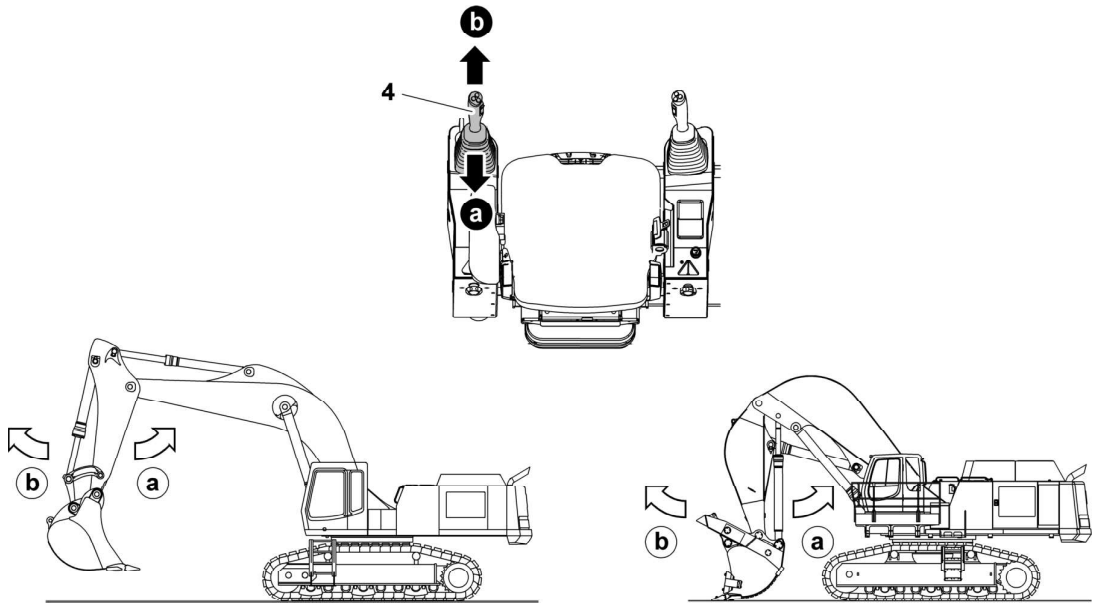

Fig. 3-82 *Operating the stick cylinder*

- ▶ Move the joystick rearward **a**.
  ↳ Stick will be drawn in.
- ▶ Move the joystick forward **b**.
  ↳ Stick will be extended.

Operating the boom cylinder

The boom cylinder is operated using the right joystick **3**.

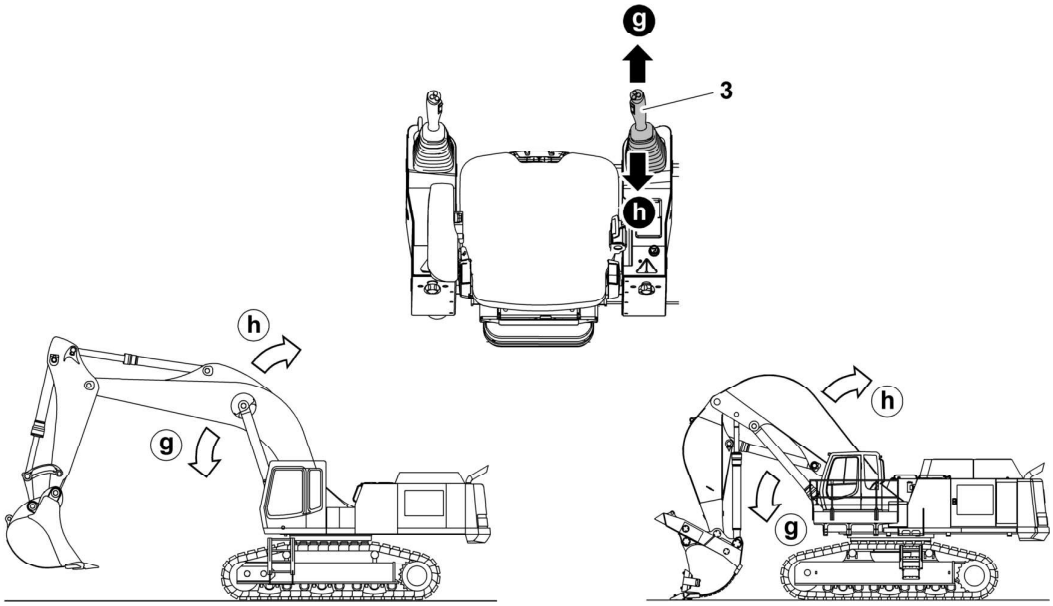

Fig. 3-83 *Operating the boom cylinder*

- ▶ Move the joystick rearward **h**.

▶ Use the rotary switch **S256** to select one of the two control modes:
– with the pedal
– with the joystick

The two control modes cannot be activated at the same time.

Open and close the grapple / shear with the pedal

▶ Make sure that the related mode is selected with the rotary switch **S256**.

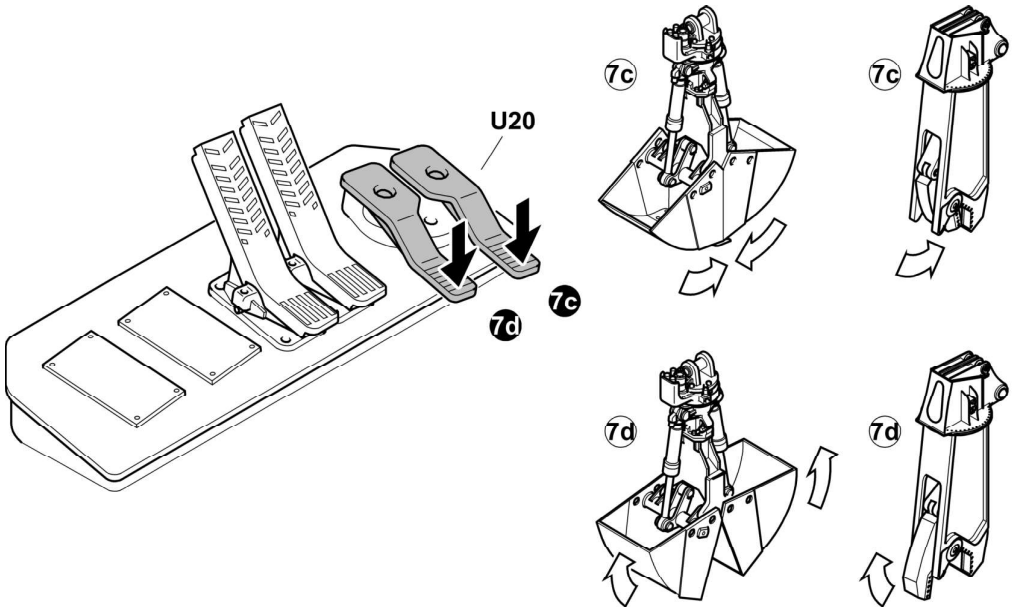

Fig. 3-98 *Grapple / shear opening with the pedal U20*

▶ Push right pedal **7c** of **U20**.
↳ Grapple / shear is closed.

▶ Push left pedal **7d** of **U20**.
↳ Grapple / shear is opened.

Open and close the grapple / shear with the analog stick

▶ Make sure that the related mode is selected with the rotary switch **S256**.

▶ 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.

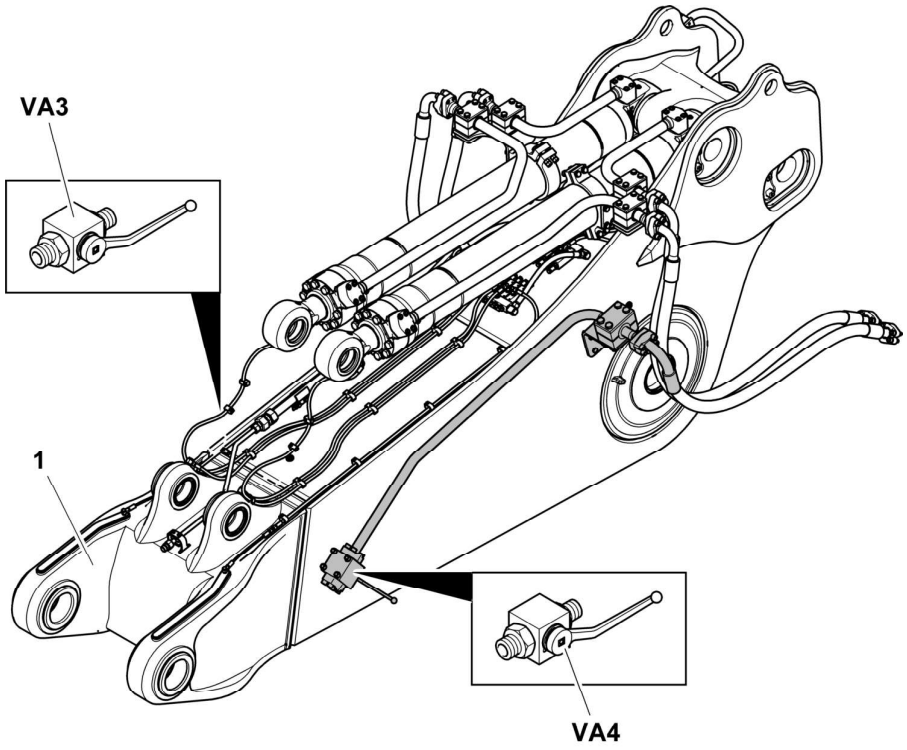

Fig. 3-108 *Manual valves for the hammer*

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.

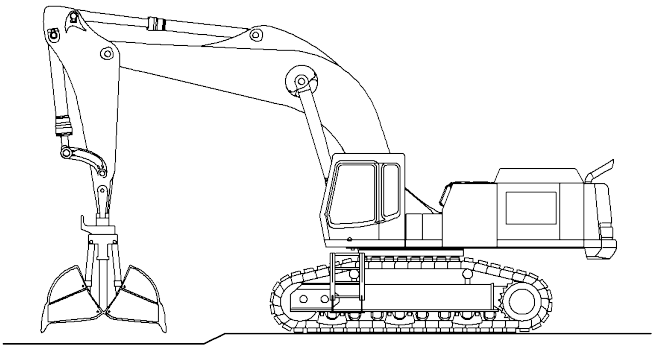

Fig. 3-119 *Straightening the stick*

- ▶ Open the grab shells fully.
- ▶ Lower the stanchion perpendicular to the excavation area.

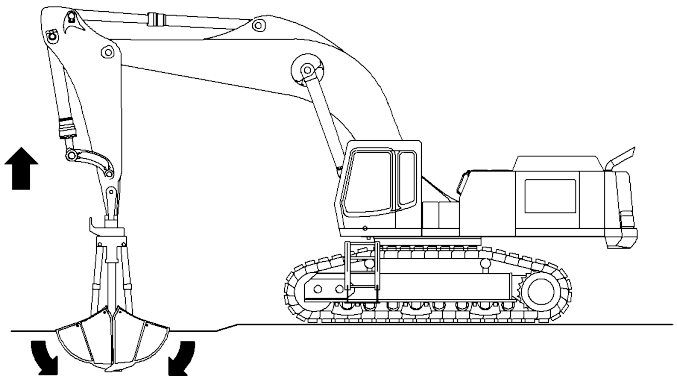

Fig. 3-120 *Closing the grab shells*

- ▶ Close the grab shells.
- ▶ Raise the stick slightly when doing this in order to reduce ground pressure.

Danger!
The device could lift out when closing the shell bucket.

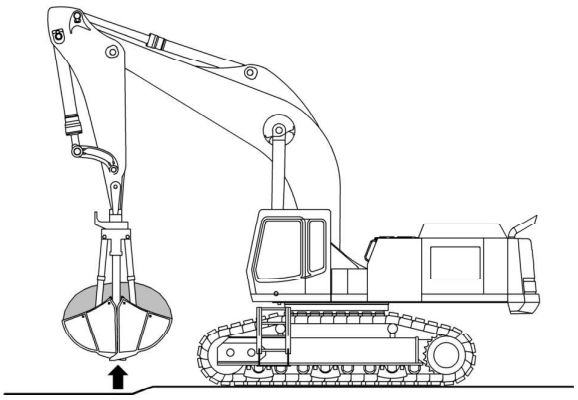

Fig. 3-121 *Raising grab material*

▶ Put a cap on filler hose **2** and on Diesel Exhaust Fluid (DEF) **1**.

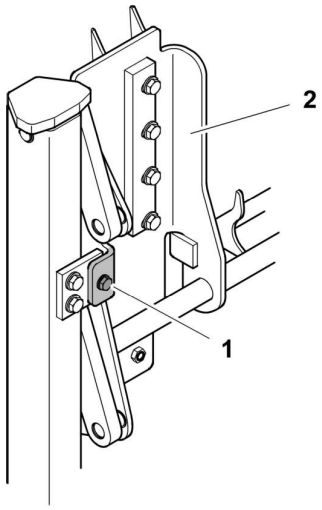

Fig. 3-132 *Locking screw*

1 Locking screw
2 Spindle support bracket

▶ Remove locking screw **1** from spindle support bracket **2**.

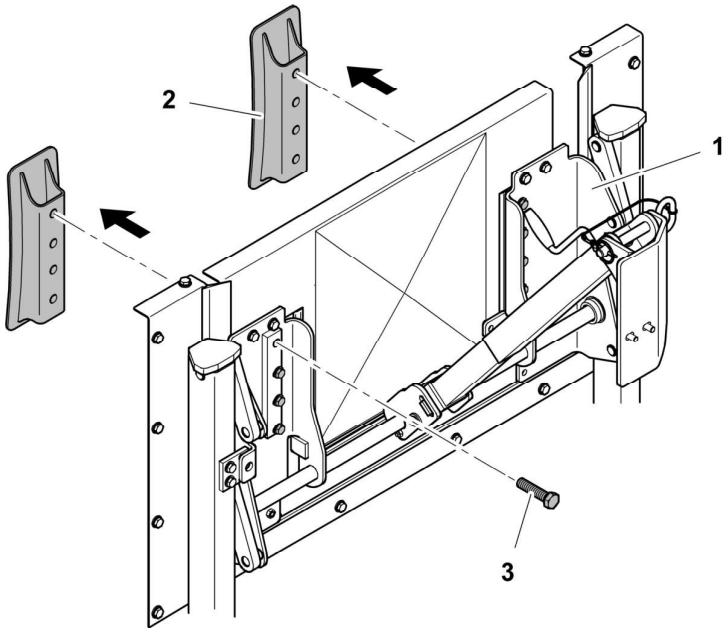

Fig. 3-133 *Attach the spindle support to the Diesel Exhaust Fluid (DEF) tank*

1 Spindle support bracket
2 Bracket of the Diesel Exhaust Fluid (DEF) tank
3 Brackets screws

▶ Attach the two spindle support brackets **1** to brackets **2** of the Diesel Exhaust Fluid (DEF) tank with the related screws **3**.

3.7.5 Excavator lifting and lashing operations

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

Lifting precautions

Lift element:

- always checking and respecting the lifting configuration indicated on the corresponding transport drawing,
- only with the provided lifting appliances,
- with adequate and approved lifting devices of other kind (cables, chains, slings) if necessary,
- only after mounting the lifting appliances in accordance with the regulations,
- only at the declared threads or lugs shown on the assembly drawing,
- with the best possible equal load distribution,
- only being sure that the lifted element has been already dismounted,
- only after having drained tanks (hydraulic, fuel…),
- if no specific value is indicated on the corresponding transport drawing, always respecting the angles given on the sticker for lifting and lashing operations (refer to the description below).

Additional lifting precautions for backhoe buckets

When you lift the backhoe bucket, also obey the precautions that follow:

- Only use the lifting points shown in the stickers placed on the bucket.
- You can use the bucket teeth as lifting points.
- Be careful about the position of the center of gravity of the bucket.
- The bucket has two possible transport positions. The height B1 gives the correct transport position as shown in the transport drawing.
- If the height B1 is more than 3,6 m, turn over the bucket safely.

Additional lifting precautions for shovel buckets

When you lift the shovel bucket, also obey the precautions that follow:

- Only use the lifting points shown in the stickers placed on the bucket.
- Do not use the bucket teeth as lifting points.
- Do not use the welded beam to lift the bucket.
- Be careful about the position of the center of gravity of the bucket.

Lashing precautions

Lash element:

- always using necessary and appropriate devices or tools (e.g. elevating platform) in order to ensure safe lashing,
- always checking and respecting the lashing configuration indicated on the corresponding transport drawing,
- if no specific value is indicated on the corresponding transport drawing, always respecting the angles given on the sticker for lifting and lashing operations (refer to the description below),
- always ensuring a sufficient coefficient of friction (0,6 or higher) between load and

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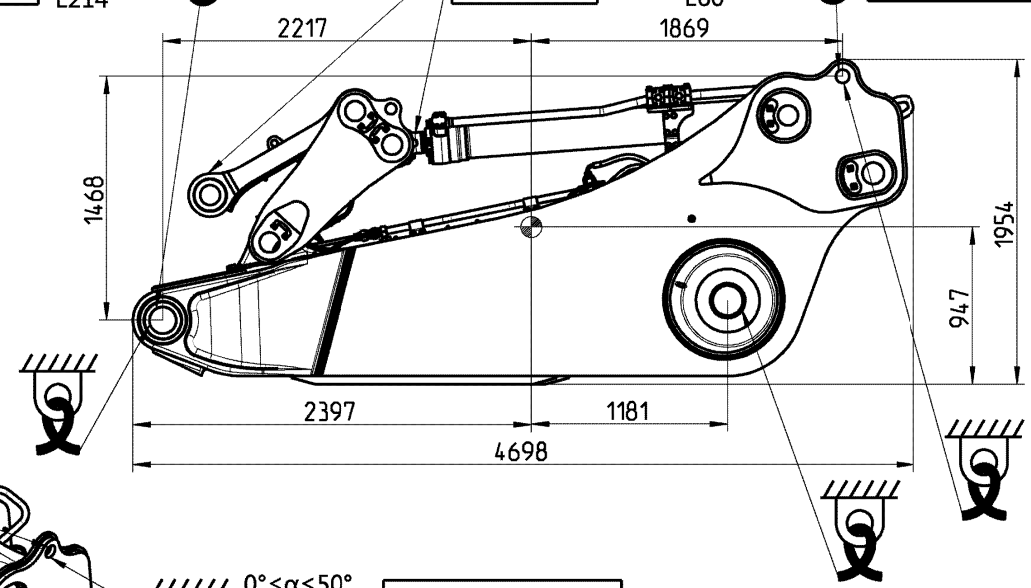
AUF BEIDEN SEITEN
ON BOTH SIDE
DES DEUX COTES

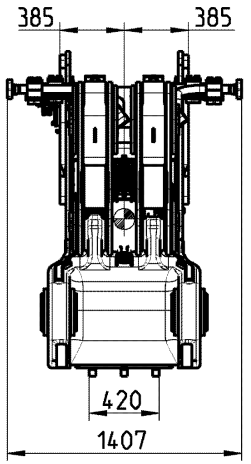
β≤30°
SWL=5t
D360/d160
E214

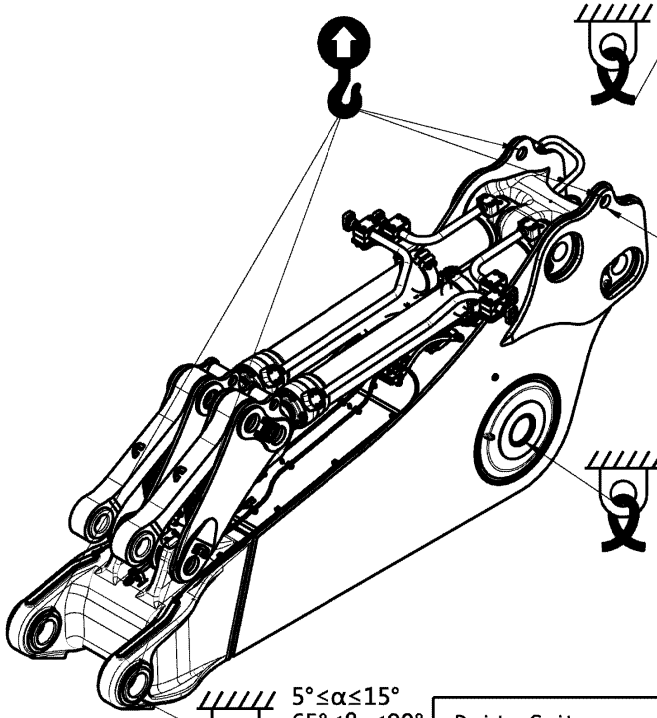
Blockieren
Immobilize
Immobiliser

β≤30°
SWL=6.2t
D200/d80
E60

AUF BEIDEN SEITEN
ON BOTH SIDE
DES DEUX COTES







2X
0°≤α≤50°
25°≤βx≤50°
LC= 6t
D200/d80
E60

Beide Seiten
Both sides
Des deux cotés

5°≤α≤15°
65°≤βx≤90°
LC= 3t
D180/d-
E734

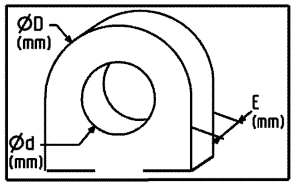
Beide Seiten
Both sides
Des deux cotés

Die Flächen schützen
Protect the surfaces
Protéger les surfaces

5°≤α≤15°
65°≤βx≤90°
LC= 3t
D360/d160
E214

Beide Seiten
Both sides
Des deux cotés

Die Flächen schützen
Protect the surfaces
Protéger les surfaces



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	7841 kg	
Gewicht mit Werkzeug und Verpackung Weight with tooling and packaging Poids avec outillage et emballage	7841 kg	

LIEBHERR

Bezeichnung / Description / Dénomination	Ident-Nr. / Ident No. N° d'ident	Index / Index Index	Blatt / Page Feuille
TRANSPORTPLAN LOEFFELSTIEL TRANSP.DRW.STICK R9150 PLAN DE TRANSP.BALAN.RETRO	11073414	001	1/1

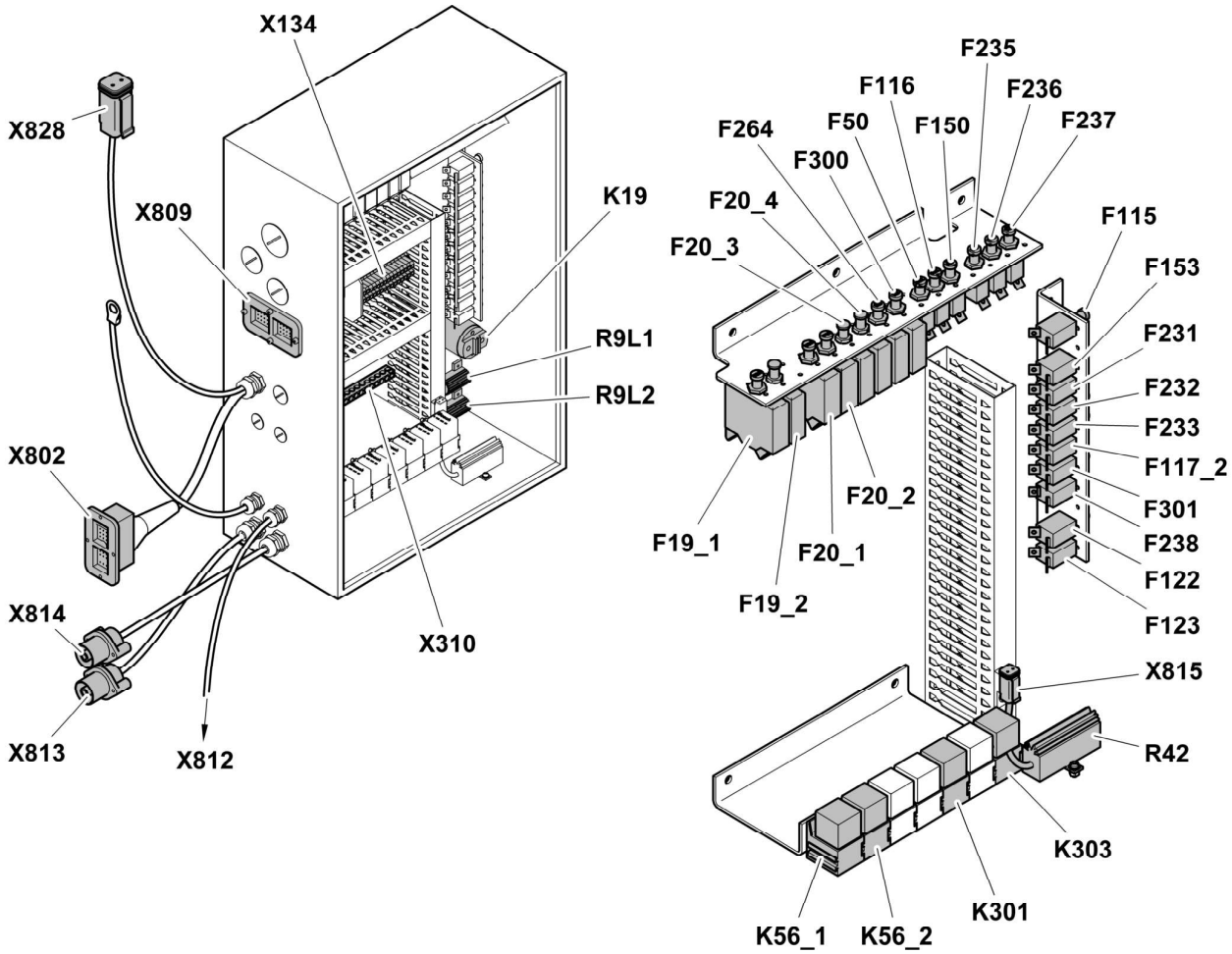


Fig. 4-3 *Fuses and relays of electrical box E50*

F19_1	Fuse 100 A / Heating flange 1	**F264**	Fuse 100 A / Starting aids
F19_2	Fuse 100 A / Heating flange 2	**F300**	Fuse 100 A / **E1091**
F20_1	Fuse 50 A / Supply **KL30**	**F301**	Fuse 20 A / **E1091** (KL15)
F20_2	Fuse 100 A / Supply **KL15**	**K19**	Relay / Optional lighting **E18_1/2**
F20_3	Fuse 100 A / Supply **KL30**	**K56_1**	Relay 10/20 A / Heating fuel filter
F20_4	Fuse 50 A / Supply **KL30**	**K56_2**	Relay 10/20 A / Heating fuel filter
F50	Fuse 15 A / Supply **A54**	**K301**	Relay 10/20 A
F115	Fuse 7,5 A / Heating fuel filter	**K303**	Relay 10/20 A
F116	Fuse 7,5 A	**R9L1**	Resistance
F117	Fuse 7,5 A	**R9L2**	Resistance
F122	Fuse 7,5 A	**R42**	Resistance 20 W
F123	Fuse 7,5 A	**X134**	Terminal bloc **E50**
F150	Fuse 7,5 A	**X310**	KL31 Service Ground **E50**
F153	Fuse 7,5 A	**X802**	Connector 40 poles / Engine

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 outriger, 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.

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Drilled anchor points

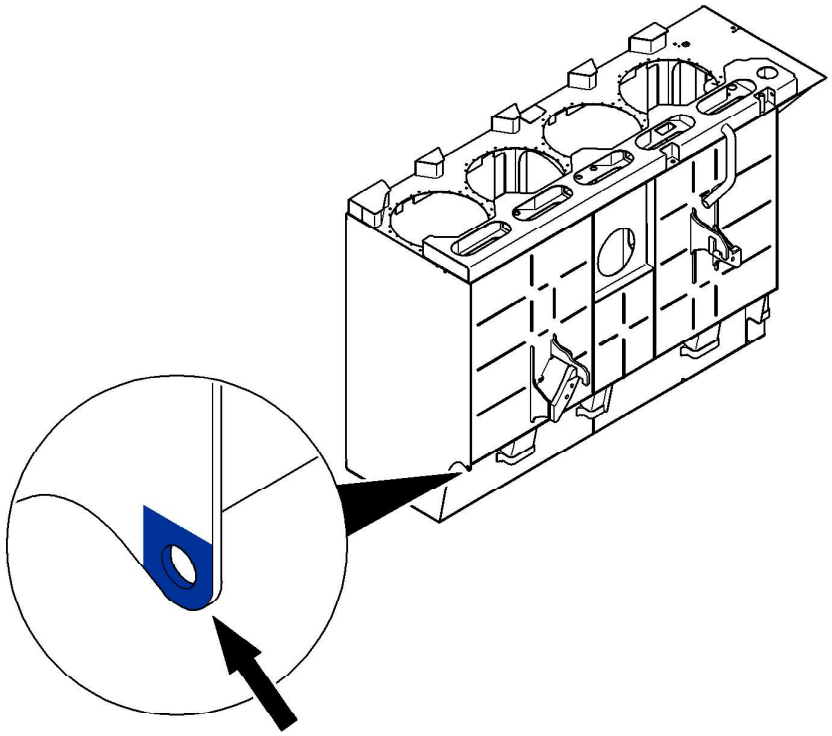

Fig. 5-5 Drilled anchor point (example)

5.3.2 Use the anchor points

- Before you use an anchor point, always do a check of its condition.
- If an anchor point has been used to arrest a fall, or if you are not sure about its safe condition, do not use this anchor point until it has been inspected and, if necessary, tested by a competent person.
- Always use the anchor points with applicable fall-arrest equipment.
- Use a harness with a maximum arrest force of 6 kN.
- Only attach to approved anchor points.
- Never attach more than three persons to a lifeline.
- Never attach more than one person to another type of approved anchor point. If several persons must attach themselves to the machine, they must use different anchor points.
- Never use an anchor point to attach parts or material.
- Persons who must work with fall-arrest equipment must be specially trained.
- All the anchor points and the tightening of the handrails mounting screws must be examined by authorized specialist personnel. For maintenance intervals, refer to the control and maintenance chart.

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Caution!
According to the oil type used for the hydraulic system, the fans speed regulation must be set specifically ("**STANDARD**", "**COLD**" or "**EXTRA-COLD**").

– If the excavator is delivered without arctic kit, it is set to "**STANDARD**" at delivery.
– If the excavator is delivered with an arctic kit, it is set to "**COLD**" at delivery.

Before first start of the excavator or if an oil type change is done afterwards, the fans speed regulation setting must be checked and corrected if necessary.

▶ Contact LIEBHERR Customer Service.

LIEBHERR oils for hydraulic system

Requirements

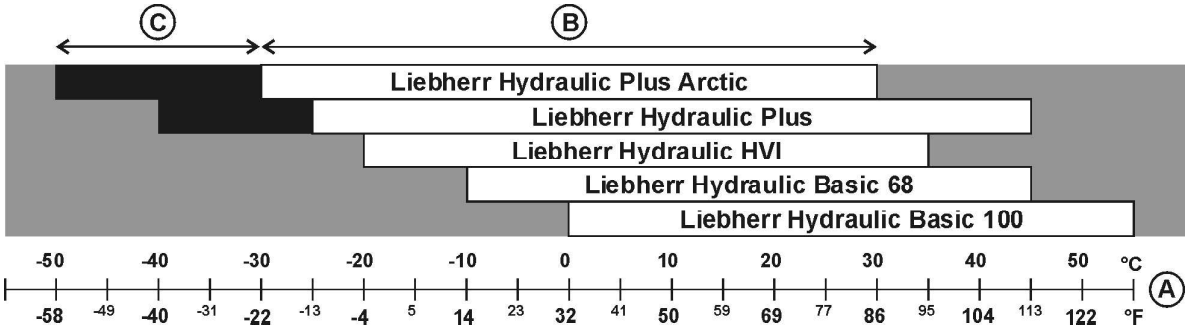

Fig. 5-10 *LIEBHERR oils for hydraulic system*

A Ambient air temperature
B Operating range
C Extra-cold start range if excavator fitted with operating Liebherr arctic kit (with warm-up instruction)

Fans speed regulation settings

LIEBHERR oil	fans speed regulation setting
Liebherr Hydraulic Plus	"**STANDARD**"
Liebherr Hydraulic Basic 68	"**STANDARD**"
Liebherr Hydraulic Basic 100	"**STANDARD**"
Liebherr Hydraulic HVI	"**COLD**"
Liebherr Hydraulic Plus Arctic	"**EXTRA-COLD**"

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Lubricant	Description / manufacturer
Contact spray for slip rings	Cramolin
Lubricant for pistons, piston nuts and piston bearing installations on the hydraulic cylinders	Gleitmo 800
Special anti-corrosive material for installation areas of sealing elements on hydraulic cylinders	Castrol-Tarp
Anti-corrosion grease for open piston rods (cylinders that do not move often or transportation)	Liebherr Cylinder Protect

5.6 Condition monitoring with oil analysis

5.6.1 General information

Oil analysis helps to monitor the main components condition by observing oil chemical and physical properties which can show either the oil contamination by foreign or wear particles, or the degradation of its properties.

Component oil analysis in accordance with the recommended procedures, intervals and specifications and the records of a component oil analysis are strongly recommended because this will support any warranty claim raised upon LIEBHERR.

By comparing the oil properties and contaminants to reference levels and even more by observing their trends over a period of operation, it is possible to optimize the component lifetime, possibly to prevent further damage (preventive exchange) and potentially to reduce rebuild and maintenance costs.
An oil analysis will give an indication of the component condition. But the measured values and their trend over a period of operation need always to be interpreted in relation to the machine operating conditions and to events such as services, top-up, component change-out, etc.
The interpretation of the analysis results need also to be compared to samples of the new oil. Therefore, new oil needs to be analysed twice a year and when changing to another oil supplier.

This procedure is applicable for these components:

- splitterbox(es)
- swing gears
- travel gears (not on pontoon machines)
- hydraulic oil
- Diesel engine(s) (not on electrical machines)

These parameters must be monitored:

- iron level
- copper level
- silicon level
- water content

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Travel gear

Component	Parameter	Action level value	Action
Travel gear	Iron level	400 ppm	Change oil (get a sample again after 250 hours).
	Copper level	50 ppm	Change oil (get a sample again after 250 hours).
	Silicon level	30 ppm	Check component for entrance of dust (sealing, breathers...). Flush and change oil (get a sample again after 250 hours).
	Water content	0,10%	Change oil (get a sample again after 250 hours).
	Viscosity change (at 40°C and 100°C)	<15%(*)	Change oil (get a sample again after 250 hours).
	Additives change	±20%(*)	Change oil (get a sample again after 250 hours).

(*) Difference compared to new oil value.

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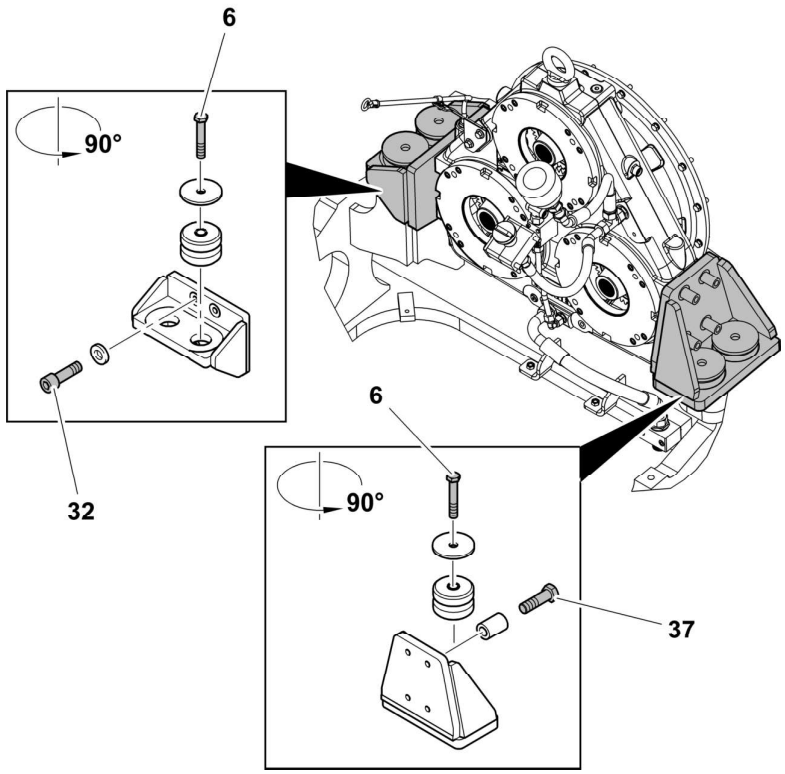

Fig. 5-32 *Splitterbox mounting screws*

		Torque	Quantity
6	Screw M24x140	965 Nm	4
32	Screw M16x55	270 Nm	4
37	Screw M16x55	270 Nm	4

- ▶ Check the mounting screws on the splitterbox brackets regularly for tightness, re-torque if necessary.
- ▶ For maintenance intervals, refer to the control and maintenance chart.

Caution!

- ▶ Loctite nr. 243 must be applied on mounting screws **6**, **32** and **37** when installing in order to avoid possible damages on the parts.
- ▶ The screws **6**, **32** and **37** must only be tightened after the engine and the splitterbox have been positioned on the uppercarriage structure as a complete unit, to avoid a pretentioning of the rubber mounting.

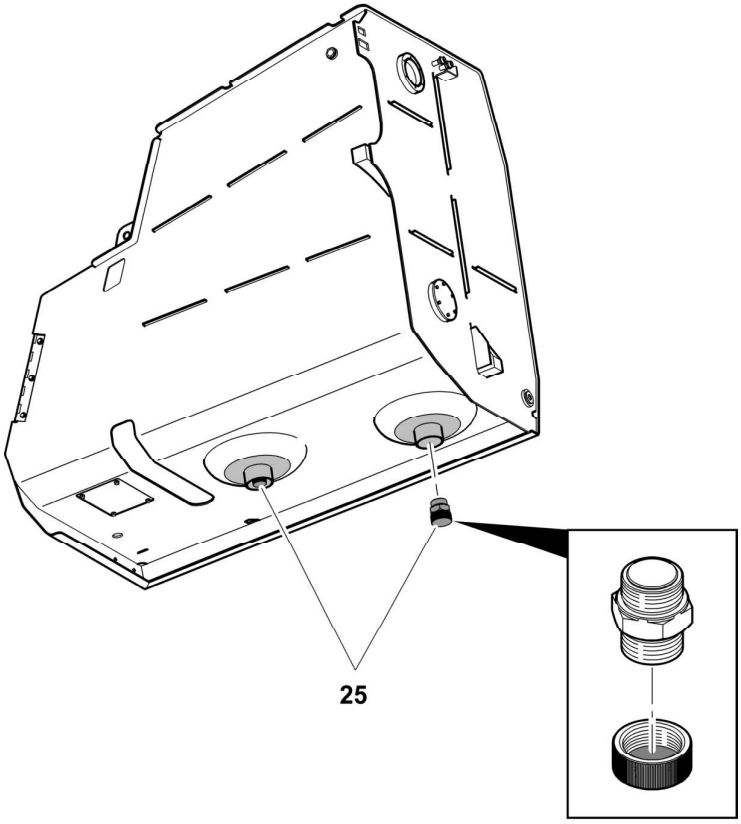

Fig. 5-42 *Drain valves of fuel tank*

Drain the water of the fuel tank

- ▶ Put an applicable container below the drain valves of the fuel tank.
- ▶ Loosen caps **25** about two turns.
- ▶ Drain the water until water free fuel flows out.
- ▶ Close caps **25**.
- ▶ To reduce the formation of condensate in the tank, keep the fuel level as high as possible.

Drain the fuel tank

- ▶ Remove caps **25** from the drain valves.
- ▶ Attach a drain hose. Drain the fuel into an applicable container.
- ▶ Remove the drain hose.
- ▶ Close the caps **25** again.
- ▶ For maintenance intervals, refer to control and maintenance chart.

5.10.3 Clean the fuel tank

Cleaning access to the tank is possible through the covers located on the tank.

- ▶ Drain the fuel tank (refer to section above).

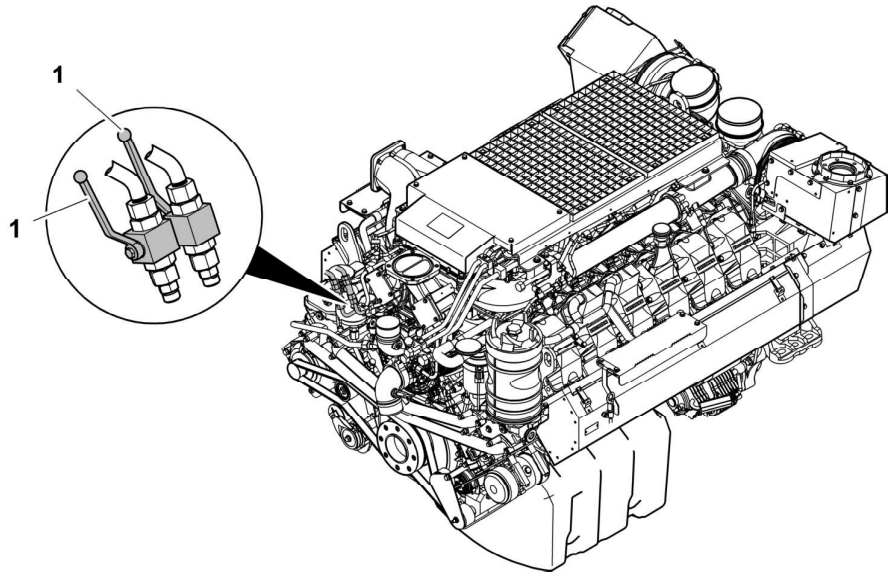

Fig. 5-52 *Coolant shutoff valves*

1 Coolant shutoff valve

5.11.4 Check the mounting of the exhaust gas system

Caution!
The exhaust gas system and the Diesel engine are hot.
Risk of burning!

▶ Make sure that the exhaust gas system and the Diesel engine are sufficiently cool to touch.

5.13.3 Clean the precleaner air channels

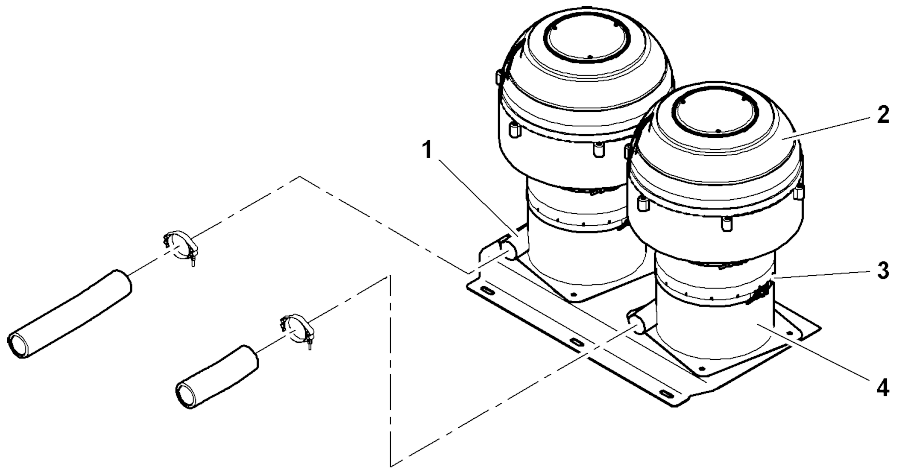

Fig. 5-62 *Precleaner*

1	Precleaner outlet	**3**	Clamp
2	Precleaner dome (cyclonic system)	**4**	Precleaner body (centrifugal system)

▶ Do a check of the condition of the precleaner at the intervals given in the control and maintenance chart.

Clean the precleaner body

▶ Loosen the clamp **3**.

▶ Remove the dome **2** from the body **4**. Put the dome **2** in a safe place.

▶ Examine outlet **1** and body **4** for unwanted materials. If necessary, use compressed air to blow it out from the inside towards the outside.

Clean the precleaner dome

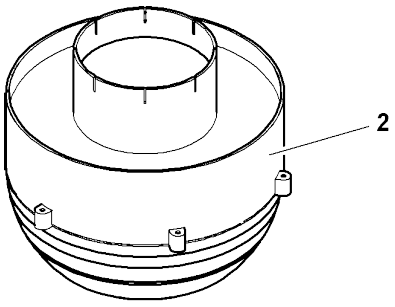

Fig. 5-63 *Precleaner dome with head down*

2 Precleaner dome

▶ Install the dome **2** with the head down.

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getting into the hydraulic tank. If necessary, you can remove this protective cylinder from the filling opening.

- ▶ Release the hydraulic pressure as given before.
- ▶ Loosen the screws **6** on the filter cover **5**. Remove cover **5** and magnetic rod **7**.
- ▶ Carefully clean any metal particles collection on the magnetic rod **7**.
- ▶ Remove the used filter element **3** from the bracket.

Caution!
Contamination!
Risk of damage to the hydraulic system.

- ▶ Make sure that dirt, unwanted material or oil which is possibly dirty does not go into the filter housing.
- ▶ Carefully clean the filter housing.

- ▶ Insert a new filter element **3** on the bracket vertically in the tank and press down lightly.

Caution!

- ▶ Make sure that the filter insert is standing vertical in the tank.

- ▶ Make sure that the seal kit **4** is put correctly and it is in good condition.
- ▶ Each time you replace the filter element **3**, also replace the filter element of the piloting filter (refer section below).
- ▶ Install the cover **5** again.
- ▶ Tighten the screws **6**.
- ▶ Close the breather filter.

5.14.7 Piloting and replenishing oil filters

Two hydraulic filters do the filtration of the auxiliary circuits:

- a piloting oil filter **1**
- a replenishing oil filter **2** for the swing circuit

1	Bleed screw	**3**	Bottom cover of valve blocks
2	Top cover of valve blocks	**VB2**	Valve block 2

The top covers **2** are installed on the top of the valve blocks. The bottom covers **3** are installed below the valve block **VB2**.

▶ Do the steps that follow on the covers **2** and **3**:
– Loosen the bleed screw **1** by 0,5 turn.
– Let the oil escape until free-air oil flows out.
– Torque the bleed screw **1** to 8 ± 0,8 Nm.

▶ Operate the engine at low idle.

▶ Check that the attachment is operating correctly.

5.14.14 Return-line filter for the hydraulic hammer (optional)

The optional return-line filter for the hydraulic hammer has two oil filters:
– the additional filtration (by-pass)
– the hammer return-line filter

▶ For maintenance intervals, refer to the control and maintenance chart.

Additional filtration (bypass)

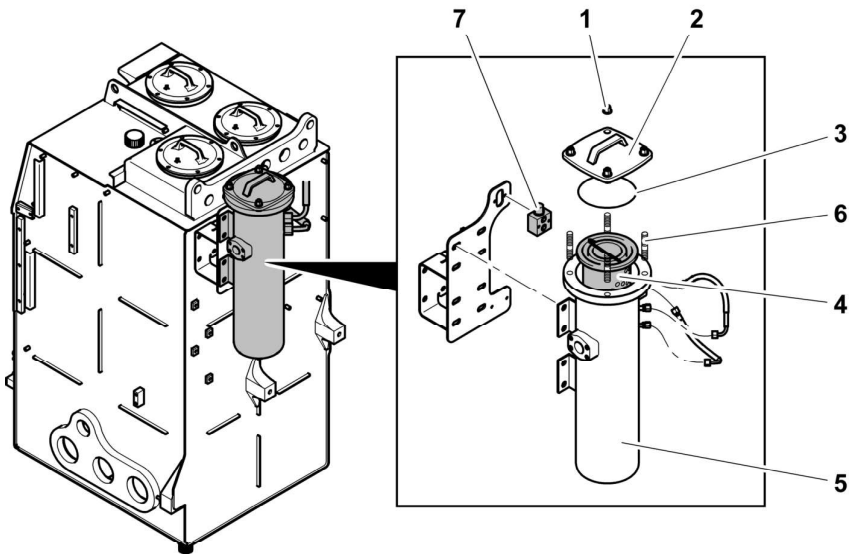

Fig. 5-82 *Additional filtration*

1	Nut	**5**	Filter housing
2	Cover	**6**	Stud screw
3	Seal ring	**7**	Contamination indicator
4	Filter element		

The filter element **4** must be replaced immediately if the contamination indicator **7** stays constantly red at operating temperature.

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

Drain the oil

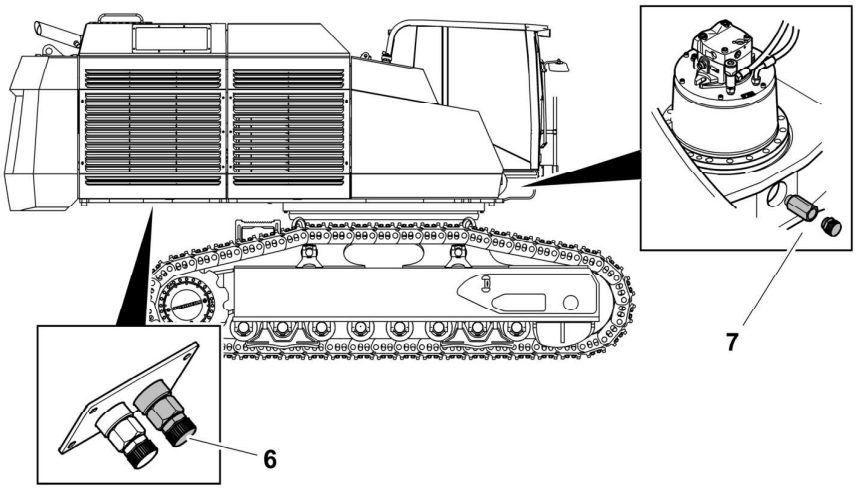

Fig. 5-92 *Swing gears connections of the service station*

6 Connection of rear swing gear
7 Connection of front swing gear

- ▶ Make sure that the oil is at operating temperature.
- ▶ Remove the sealing cap of the expansion tank **51** / **52**.
- ▶ Use the swing gears connections **6** and **7** of the service station.
- ▶ Install the drain hose and let the oil flow into an applicable container.
- ▶ Remove the drain hose and install the connections **6** and **7** caps back.
- ▶ Install the sealing cap of the expansion tank **51** / **52** back.

Fill with oil

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

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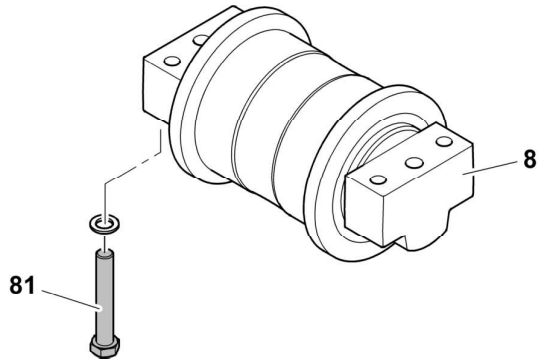

Fig. 5-102 *Track roller*

		Torque
8	Track roller	-
81	Screw M30x200 x quantity 4 for each track roller	1920 Nm

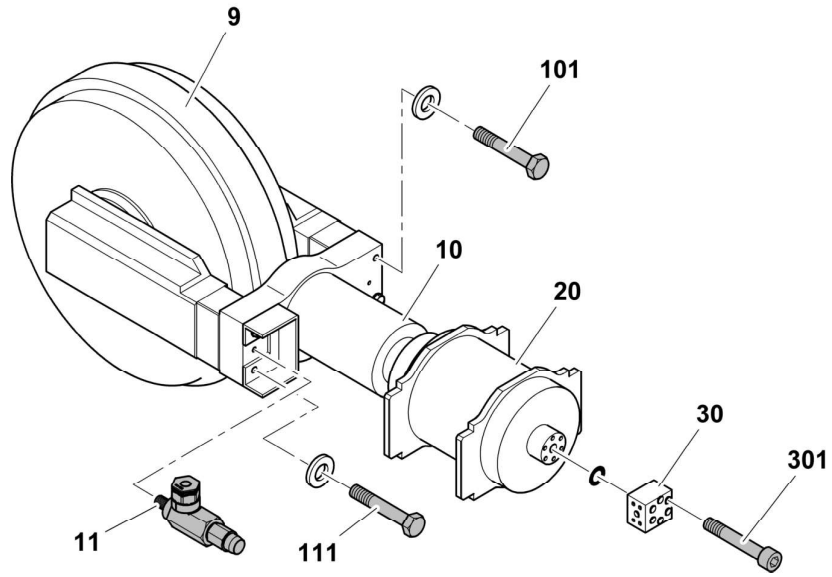

Fig. 5-103 *Idler and tension unit*

		Torque
9	Idler	-
10	Grease tensioner	-
11	Grease nipple	140 - 180 Nm
20	Hydraulic cylinder	-
30	Hydraulic block	-
101	Screw M30x290 x quantity 2 for each idler	1920 Nm
111	Screw M30x300 x quantity 2 for each idler	1920 Nm
301	Screw M16x100 x quantity 6 for each idler	270 Nm

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A161	Electrical plate	**E1005**	Cab connection box
A168	PowerPack keypad	**E1022**	Control box of top of cab lights
A169	Standard functions keypad 1	**E1022_3**	Control box of the access ladder (optional)
A170	Standard functions keypad 2	**E1091**	Electrical box for the Selective Catalytic Reduction (SCR) system
A171	Optional functions keypad	**G1 - G4**	Batteries
A1002	Electrical plate	**S1**	Ignition key
A1004	Electrical plate	**S7**	Safety lever
C1	Camera 1 / Opposite side of the cab	**S9_1/2**	Principal battery circuit breakers
C2	Camera 2 / Counterweight	**S100_1**	Cab emergency stop
D	Display	**S100_2**	Emergency stop on pumps box
E1	Front working light / Uppercarriage	**S100_4**	Emergency stop under the counterweight (if installed)
E6	Front working light / Fuel tank	**SUPP_ E1005**	Electrical plate
E18_1/2	Rear working lights / Counterweight	**U21**	Left joystick
E58_1/2	Front working lights / Top of cab	**U22**	Right joystick
E59_1/2	Rear working lights / Top of cab	**U23**	Right travel pedal
E60	Front working light / Fuel tank	**U24**	Left travel pedal
E61_1	Camera lighting / Fuel tank	**U38**	Module air-conditioning

5.18 Heating/air-conditioning system

The machine has a heating and air-conditioning system as standard.

The heating system operates with a heater under the cab floor.

The air-conditioning system operates with:

– an evaporator under the cab floor
– a belt driven compressor on the Diesel engine
– a dryer/receiver unit
– a condenser

▶ For maintenance intervals, see control and maintenance chart.

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5.21.1 Counterweight mounting bolts

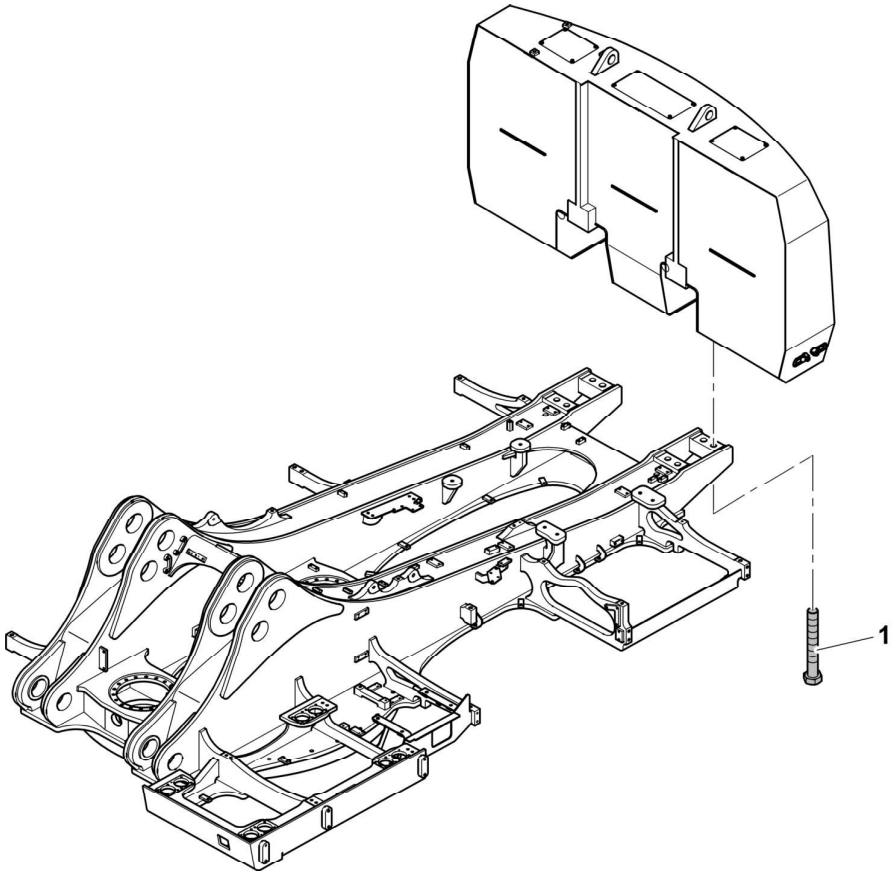

Fig. 5-123 *Counterweight bolts*

Depending on the machines, the quantity of the screw **1** can be different.

		Torque	Quantity
1	Screw M42x300	4975 Nm	4/6/10

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Danger!
Risk of explosion!

- ▶ Avoid naked flame when working on the fuel system and when refuelling.
- ▶ Do not smoke.
- ▶ Only work on the Diesel engine and the coolant heater when they are switched off.
- ▶ Do not fill the machine fuel tank if the Diesel engine and the coolant heater are not switched to off.

▶ Refer to the section "Fuel system" in chapter 5 to refuel.

Bleed the water system

You must bleed the water system of the optional starting aids after maintenance works on:

– the basic equipment of the optional starting aids:
  • the coolant heater system (filling, draining or other)
  • the water system of the additional cab heater
– the Diesel engine cooling system

You must also bleed the water system of the optional starting aids after it does not work for a long time.

Bleed the coolant heater

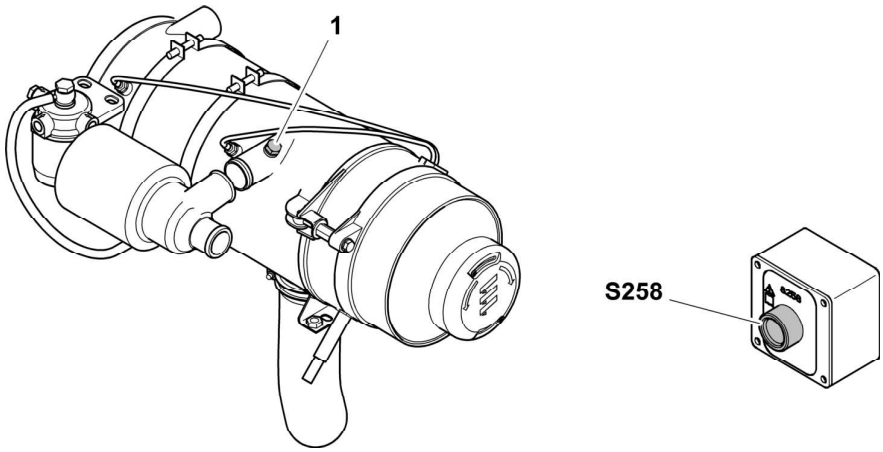

Fig. 5-134 *Water system of the coolant heater*

1	Bleeding screw
S258	Water pump actuator

▶ Refer to section "Start the coolant heater" of the "Starting aids" in chapter 3 and make sure that:

– The machine Diesel engine and the coolant heater are switched to off.
– The Diesel engine and the coolant heater system are cold.
– The manual valves are opened.

▶ Open the expansion tank of the Diesel engine cooling system. Refer to section "Cooling system" in chapter 5.

WORK TO BE PERFORMED DAILY Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
General comments:			

Tab. 5-10 *Daily maintenance schedule* - R 9150B

5.27.6 1000 Hours Maintenance Schedule - R 9150B

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

WORK TO BE PERFORMED AT 1000, 3000, 5000 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	❍		
Track components: Do a detailed check for missing, broken or loosen mounting screws of the rollers, pins locking and track guides, tighten the screws	❑		
Track components: Do a detailed check for missing, broken or loosen mounting screws of the idler axis locking keys, tighten the screws	❑		
Track components: Do a detailed check for missing, broken or loosen mounting screws of the track pads, tighten the screws	❑		
Travel gear: Do a detailed check for missing, broken or loosen mounting screws of the gears, sprocket wheels and hydraulic motors, tighten the screws	❑		
Undercarriage: If the undercarriage has removable side frames, do a visual check for missing, broken or loosen mounting screws, tighten if necessary	❍		
Undercarriage: If the undercarriage has removable side frames, do a detailed check for missing, broken or loosen mounting screws, tighten the screws	❑		
Undercarriage: Do a visual check for missing, broken or loosen mounting screws of all parts, tighten if necessary	❍		

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WORK TO BE PERFORMED AT 2000, 4000, 6000 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Attachment: Do a detailed check for missing, broken or loosen mounting screws of the handrails, pin covers fastening and greases connections, tighten the screws	❍		
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	❍		
Uppercarriage: Do a detailed 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 the screws	❍		
Swing gear: Do a visual check for missing, broken or loosen mounting bolts of the swing gear and hydraulic motors, tighten if necessary	❍		
Swing gear: Do a detailed check for missing, broken or loosen mounting bolts of the swing gear and hydraulic motors, tighten the bolts	❍		
Swing ring: Do a detailed check for missing, broken or loosen mounting screws and protective nuts of swing ring, tighten the bolts	❍		
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	❍		
Diesel engine: Do a detailed check for missing, broken or loosen mounting screws of the splitterbox, tighten the screws	❍		
Diesel engine: Do a detailed check for missing, broken or loosen mounting screws of the engine, tighten the screws	❍		
Hydraulic: Do a detailed check for missing, broken or loosen mounting screws of pumps, motors, clamps, ..., tighten the screws	❍		
TRACK COMPONENTS			
Clean track chains (after the end of each shift)	❍		
Do a visual check of the tensioning cylinders, idler, carrier and track rollers for leaks	❍		
Do a visual check of the track chains tension	❍		
Liebherr recommends to measure the track chains with TCM software	❍		
TRAVEL GEAR			
Do a visual check of the gear for leaks, if there are leaks, check oil level	❍		
Sample and analyse gear oil, change oil if necessary	❍		
Change gear oil (if filled with COB-1 gear oil)	❍		

6 Appendix

6.1 Visual check of the hydraulic hoses

6.1.1 Preface

This section describes the **procedure for the visual check of the hydraulic hoses**.

Note!
These instructions have been written for the **maintenance personnel** of the machine.
The activities described in this section may only be carried out by specially trained personnel.

The instructions are to be read and used carefully by all persons who carry out work with or on the machine before putting the machine into service for the first time and later, at regular intervals.

The instructions must be completed by information on current national regulations for accident prevention and protection. In addition, authorized specialist rules for safe and correct working procedures are also to be observed.

However, should you require any further explanations or information, LIEBHERR technical documentation, sales school and customer service departments are available for your convenience.

Danger!
Fluid injection injuries have to be treated immediately!

- Fluid under pressure can cause serious injury. It can be almost invisible when it escapes from a pinhole and it can go through the skin and contaminate the blood.
- Do not touch a pressurized hydraulic hose assembly with any part of your body.
- If a fluid-injection accident occurs, medical treatment is necessary immediately.
- Stay out of hazardous areas while testing hose assemblies under pressure. Use available safety protection.
- Refer to "Isolate machine for hydraulic repair" safe work procedure in the Service Manual.

6.2.3 General cleaning procedure

▶ For the complete description about the works to do, also refer to the chapter 2 "Safe Works Procedures" of the Service Manual.

▶ Always obey the sequence that follows:

– **Step 1**: Stop the engine. The attachment must stay on the ground.
– **Step 2**: Make sure that there is no pressure in the system. Refer to the Operating manual.
– **Step 3**: Drain the hydraulic tank. Refer to the Operating Manual.
– **Step 4**: Disconnect, drain and clean with applicable tools all of the related hydraulic circuits. Refer to the sections below that give all the components of each hydraulic circuit.

Depending on the different assemblies, it is possible that you must disassemble some components.

– **Step 5**: Clean the hydraulic tank. Refer to the section "Hydraulic tank" below.
– **Step 6**: Install all of the hydraulic circuits again. Refer to the Operating manual for general installation procedures.
– **Step 7**: Do the restart procedure before you put the machine in operation. Refer to the section "Restart the machine" below.

6.2.4 Location of the hydraulic tank filters

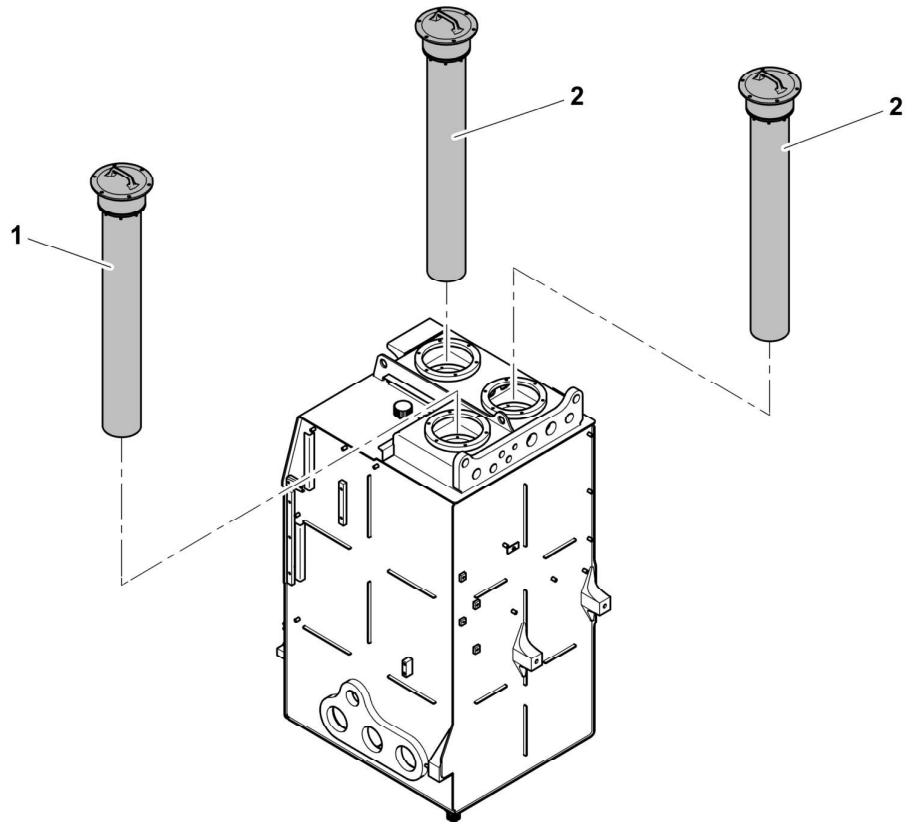

Fig. 6-6 *Filters on the hydraulic tank*

Oil intake and oil replenishing circuit

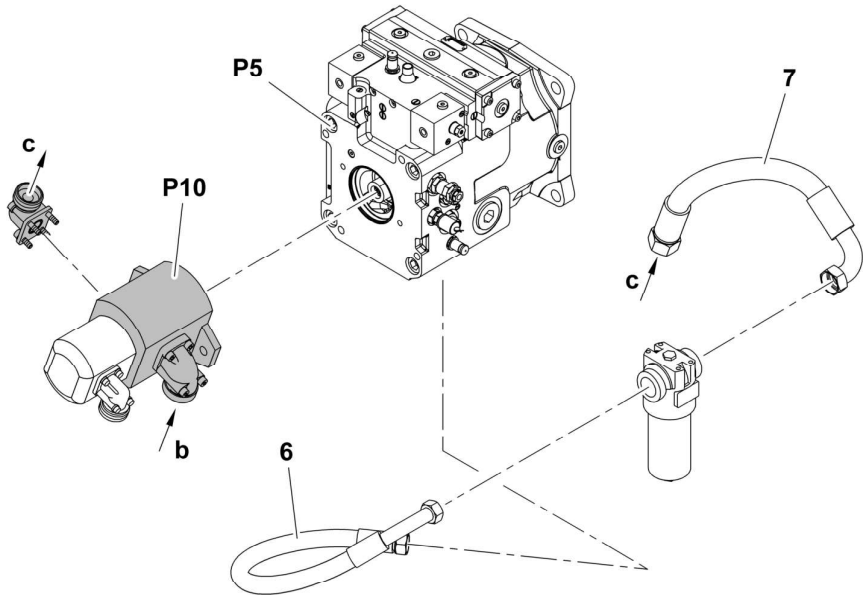

Fig. 6-16 *Intake and replenishing hoses*

6	Hydraulic hose	**P5**	Swing pump
7	Hydraulic hose	**P10**	Replenishing oil pump
b	Refer to section "Oil intake circuit" of the working pumps		

- ▶ Disconnect, drain and clean all the hydraulic hoses.
- ▶ 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).

6.2.7 Cooling pumps circuit

Return oil circuit

- ▶ Refer to sections "Return oil circuit" of the working pumps.
- ▶ Move to next section about the leak oil circuit.

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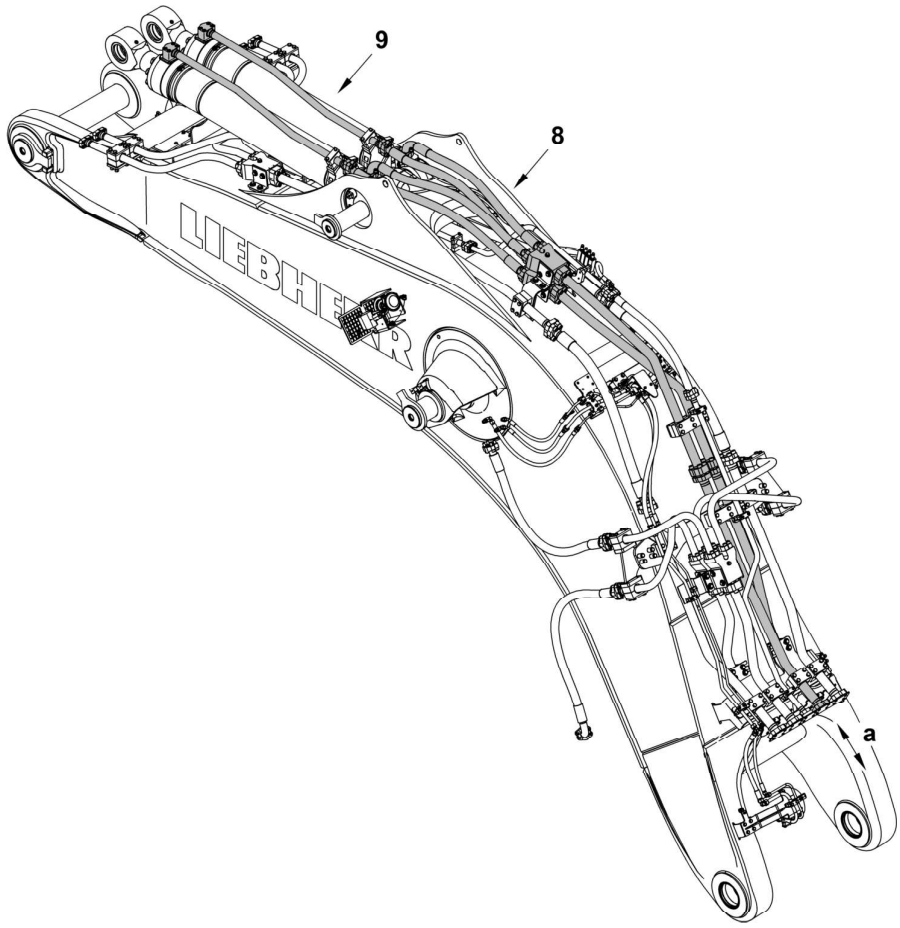

Fig. 6-27 *Hydraulic lines on the boom*

8 Hydraulic lines installed on the boom
9 Hydraulic pipe installed on the stick cylinders

▶ Disconnect, drain and clean all the hydraulic hoses, pipes and distribution blocks.

▶ Do the restart procedure before you put the machine in operation (refer to the related section).

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Boom cylinders circuit

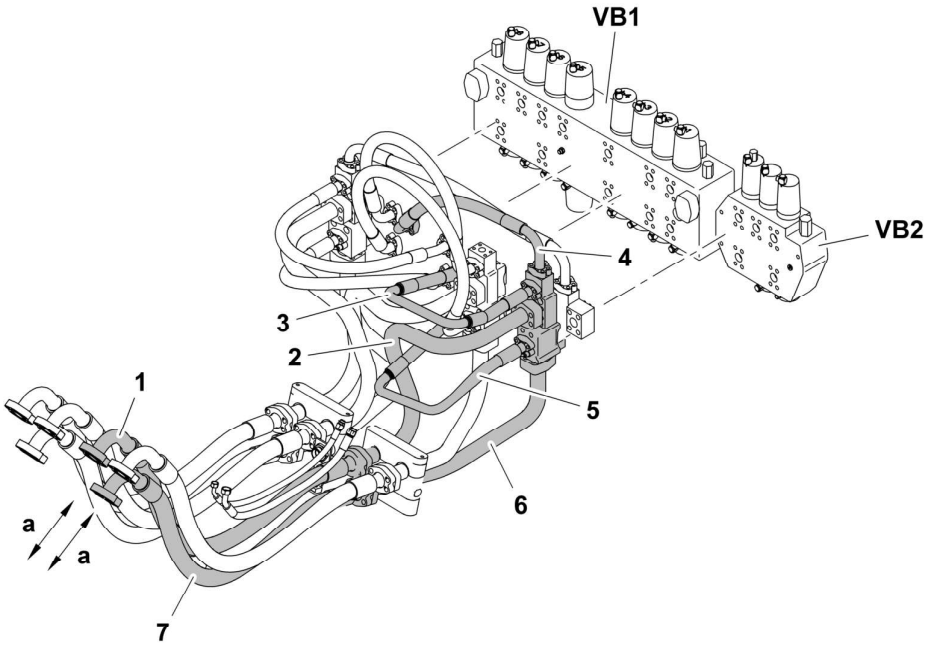

Fig. 6-37 *Hydraulic lines on the uppercarriage*

1	Hydraulic hose	**6**	Hydraulic pipe
2	Hydraulic pipe	**7**	Hydraulic hose
3	Hydraulic hose	**VB1**	Valve block 1
4	Hydraulic hose	**VB2**	Valve block 2
5	Hydraulic hose		

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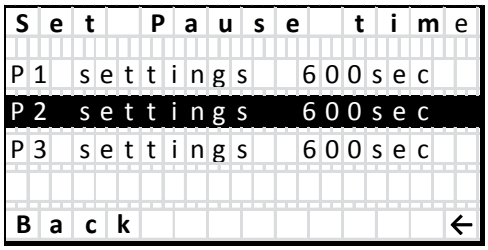
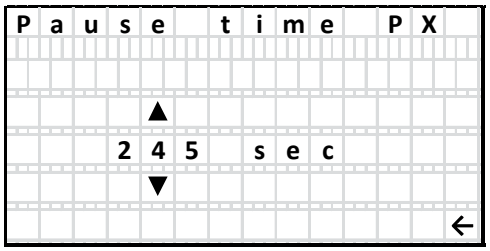
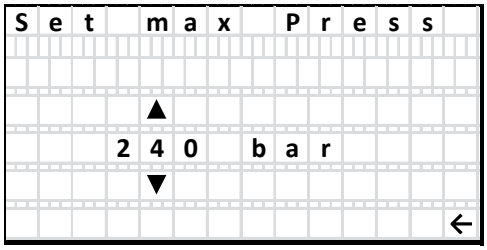
- **Set Pause Time :**





- **Set max Press :**



1.4 Manufacturer and Service addresses

Manufacturer	Customer Service
SKF Lubrication Systems Germany GmbH Heinrich-Hertz-Str. 2-8 DE - 69190 Walldorf	**SKF Lubrication Systems Germany GmbH** Heinrich Hertz Straße 2-8 DE - 69183 Walldorf +49 (0)6227-330 **SKF Lubrication Systems Germany GmbH** 2. Industriestraße 4 DE - 68766 Hockenheim +49 (0)620527101 **SKF Lubrication Systems Germany GmbH** Motzener Straße 35-37 DE - 12277 Berlin +49 (0)30-720020

1.5 Warranty

The installation instructions do not contain any information on the warranty. This can be found in our general terms and conditions.

1.6 Copyright

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3 Safety recommendations to be complied with

3.1 General behaviour when handling the system

- The centralized lubrication system, pump or single components may be used only in awareness of the potential dangers, in proper technical condition, and according to the information in these installation instructions.
- Familiarize yourself with the functions and operation of the product. The specified assembly and operating steps and their sequences must be observed.
- Any unclear points regarding proper condition or correct assembly/ operation must be clarified. Operation is prohibited until issues have been clarified.
- Keep unauthorized persons away from the centralized lubrication system.
- Precautionary operational measures and instructions for the respective work must be observed.
- Responsibilities for different activities must be clearly defined and observed. Uncertainty seriously endangers safety.
- Safety-related protective and emergency devices must not be removed, modified or affected otherwise in their function and are to be checked at regular intervals for completeness and function.
- Remedy occurring faults in the frame of responsibilities. Immediately inform your superior in the case of faults beyond your competence.
- Do not reach into the system during operation.
- Wear personal protective equipment always.
- When handling lubricants observe the relevant safety data sheets and operating instructions by the lubricant manufacturer or supplier.
- Never use parts of the centralized lubrication system or of the machine as standing or climbing aids.

3.2 Explosion protection

- Always behave so that fire and explosion hazards are avoided.
- A written work approval from the operator is required prior to working in potentially explosive areas.
- There must be no indications that parts of the explosion protection are missing or are not working. Should such indications become apparent, switch off the machine and inform a superior without delay. Keep unauthorized persons away.
- Measures for explosion protection must never be deactivated, modified or bypassed.
- It is forbidden to bring in ignition sources such as sparks, open flames and hot surfaces in potentially explosive areas.
- Check the machine at regular intervals for damage which may represent an ignition risk.
- The ignition temperature of the lubricant must lie at least 50 K over the maximum admissible surface temperature of the components.
- Only use tools and clothing which are permitted for use in potentially explosive areas (ESD).
- Transport, installation, repairs and work on electrical components may only be carried out, if it has been ensured that the atmosphere is not potentially explosive.

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6 Standard operation

6.1 Daily start-up

Below find the activities to be carried out in case of standard operation.

6.2 Inspections

With regard to the actions listed below "Inspections prior to commissioning" the operator has to determine adequate control intervals depending on the respective operating situation of the pump or centralized lubrication system.

6.3 Filling of the reservoir during operation

Fill the reservoir as described in chapter "Installation and commissioning".

6.4 Cleaning

Execution, required protective clothes, cleaning agents and devices following the valid operational regulations of the operator.

DANGER

Danger to life

Risk of fire and explosion when using inflammable cleaning agents. Do not use steam jet or high pressure cleaners. Electrical components may be damaged. Do not touch cables or electrical components with wet or damp hands. Cleaning work on energized components may be carried out by electrical specialists only. Wear personal protective equipment always.

Exterior cleaning

- Thorough cleaning of all surfaces.
- Mark and secure wet areas.

Interior cleaning

- Normally, interior cleaning is not required.

ATTENTION

Risk of damage to the machine

If using solvents for cleaning, ensure compatibility with plastic parts and painting. Do not use polar organic solvents such as alcohol, methanol or acetone.

Pump station 80+8L (R9150)

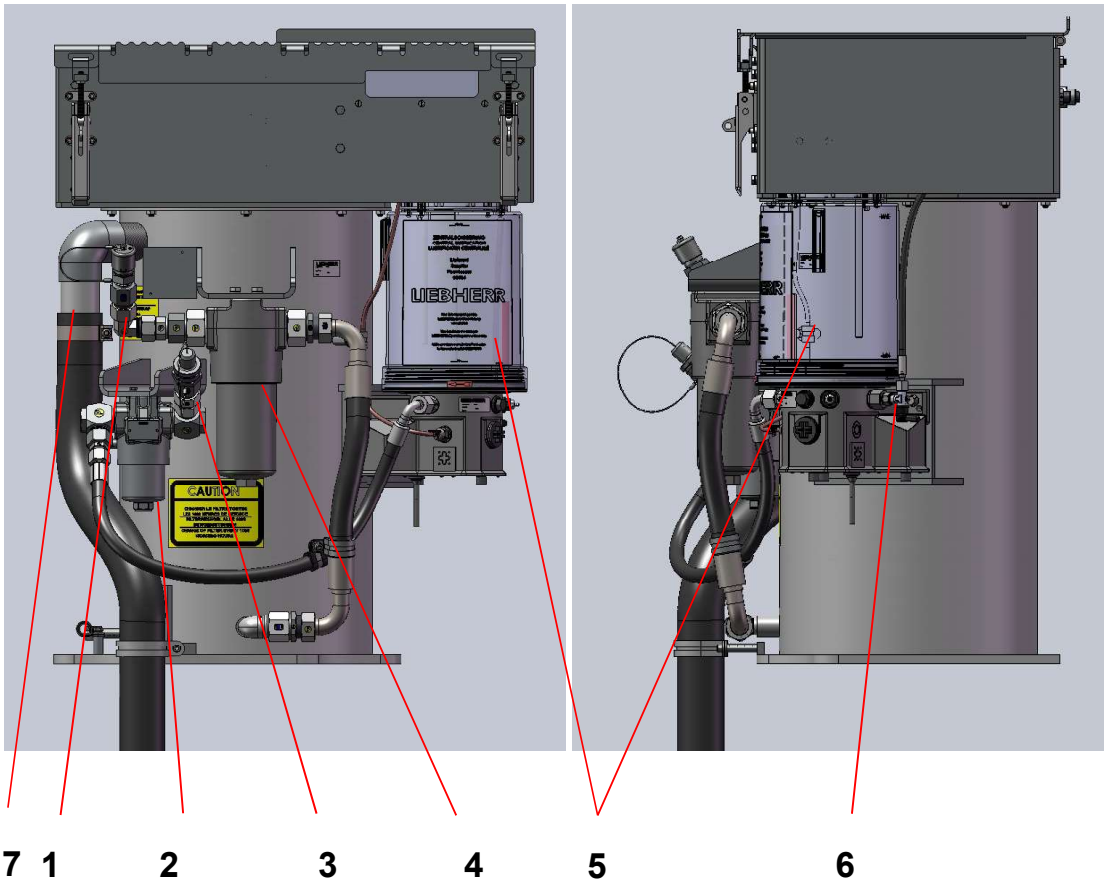

Fig. 7 Central lubrication pump 80+8L (complete view)

1 Solenoid Y34_1 (pump control)
2 Hydaulic relief (vent) valve
3 Grease reservoir 200L for FlowMaster II-pump
4 Lubricant filter, refilling
5 Check valve
6 Filtering unit
7 Overflow pipe

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11 Inspection and Maintenance

	**DANGER!**
	– Do not carry out any repair works while the system is pressurized – Grease: Relieve system from pressure by carefully opening a fitting and/or the manual vent valve(s) if installed (option) – Hydraulic Oil: Relieve hydraulic system from pressure as described in the Operator Manual – Warning: Lubricant may spurt out while system is under pressure.

	**NOTE!**
	Regular inspection and maintenance intervals are prerequisites for the proper functioning of the centralized lubrication system over a longer period of time. Any claim for warranty or liability will be null and void, if the prescribed maintenance intervals are not adhered to.

Please observe the following regular inspections and maintenance works:

Daily:

- Visually check the lubrication points with regard to leaking lubricant
- Visually check the hose connections with regard to leaks and abrasions
- Check movement of indicator pins: During the lubrication time the pins have to retract, in the pause time all pins have to be extracted.

Weekly:

- Visually check of tube fittings with regard to leaks
- Determine the time required for one lubrication cycle. If the determined time deviates much from the usual lubrication time, check each single component (pumps, metering devices, tube lines).

Every 1000 operating hours:

- Clean or replace strainer assembly
- Clean or replace lubricant filter (refilling)
- Check the oil level in the crankcase of the pump model FlowMaster (if applicable) at the dip stick

Every 2000 operating hours:

- Change the oil in the crankcase of the pump model FlowMaster.
  Use SAE 10W30 motor oil in all units used in an ambient temperature between –40° to 65°C.
  For ambient temperatures between 10° to 21°C uses Mobil Aero HFA low temperature oil.