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Operating Manual

Hydraulic excavator
R 9150 - R 9150B

from serial number 30614

Document identification

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Product identification

Manufacturer:	Liebherr-Mining Equipment Colmar SAS
Type:	R 9150 - R 9150B
Type no.:	1133 / 1438 / 1653
Conformity:	CE

Address

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

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1 Product description

1.1 Assembly - overview

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

1.1.1 Machine and construction equipment

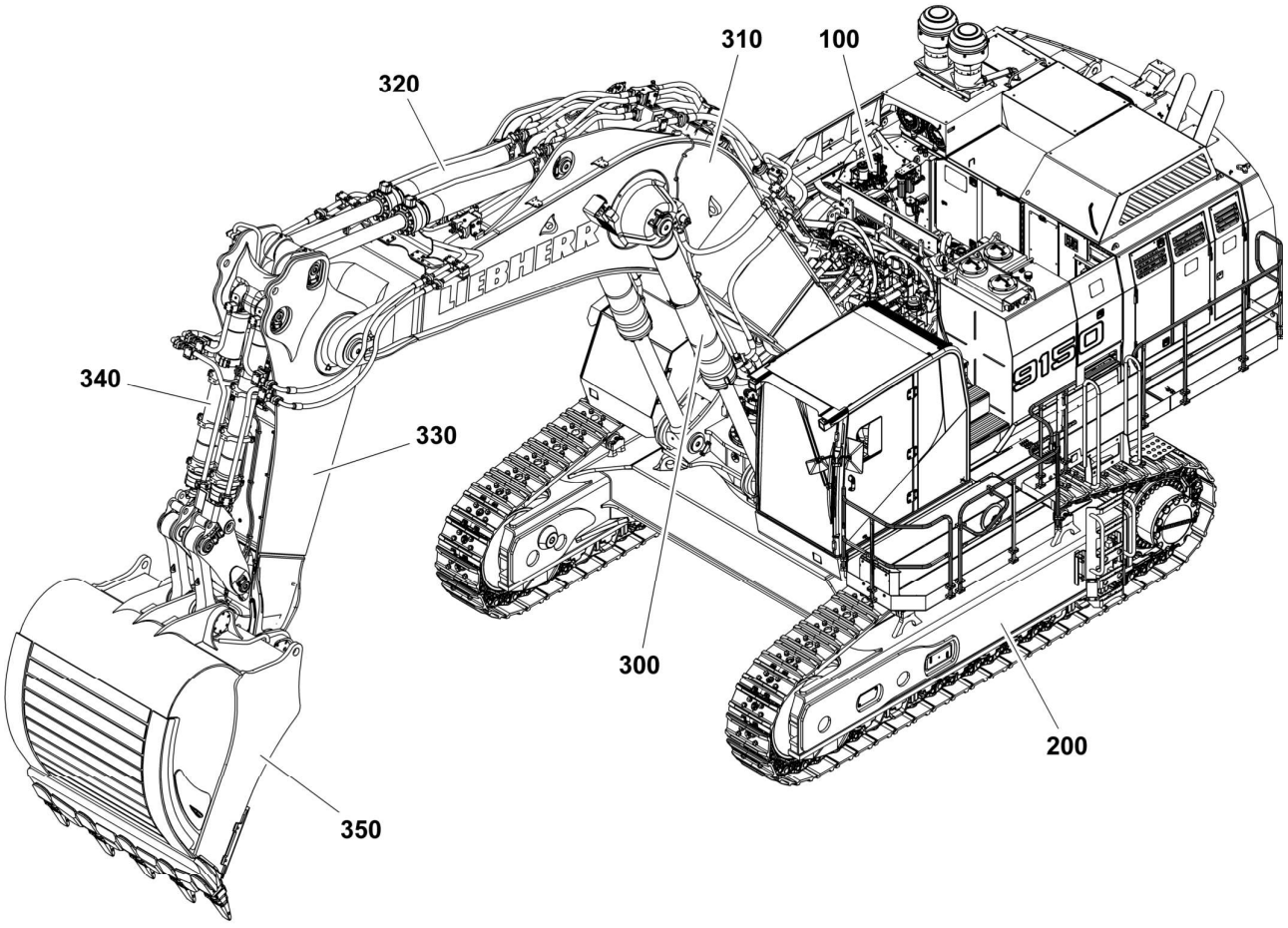

Fig. 1-1 *Machine and construction equipment - backhoe attachment*

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

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

Bringing the machine safely into service

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

Safely getting up

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

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vices with sufficient load-carrying capacity.

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

2.4 Servicing the machine safely

General safety instructions

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

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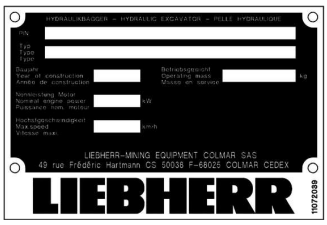


Plate 3: Typeplate LEC (Liebherr-Mining Equipment Colmar SAS)

This typeplate gives the following information:

- Product identification number.
- Type.
- Construction year.
- Nominal engine power.
- Max. speed.
- Operating mass*.

Plate 4: Typeplate LAM (Liebherr America)

This typeplate gives the following information:

- Type.
- Product identification number.

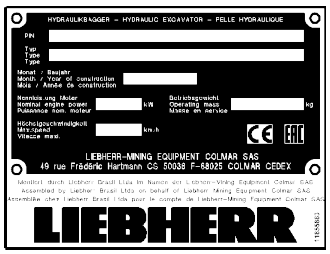


Plate 5: Typeplate LBR (Liebherr Brazil) "CE" / "EAC"

This typeplate gives the following information:

- Product identification number.
- Type.
- Construction month and year.
- Nominal engine power.
- Max. speed.
- Operating mass*.

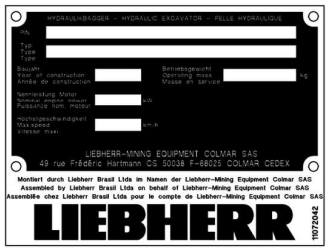


Plate 6: Typeplate LBR (Liebherr Brazil)

This typeplate gives the following information:

- Product identification number.
- Type.
- Construction year.
- Nominal engine power.
- Max. speed.
- Operating mass*.

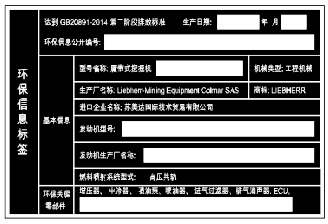


Plate 7: Typeplate LEC (Liebherr-Mining Equipment Colmar SAS) (for the China market)

This typeplate gives the following information:

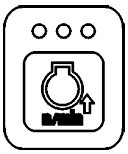
- Emission stage.
- Product identification number.
- Type.
- Construction month and year.
- Brand and manufacturer.
- Import company.
- Information about Diesel engine.

* Estimated mass of the machine in its standard version (without optional equipment) according to its configuration: Diesel, electric, backhoe, shovel or pontoon.

A168 – Powerpack keypad

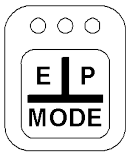
Decrease the engine speed

- ▶ 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.



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.



Eco / Power modes

Use this button to switch quickly between the "Eco" mode (fuel saving mode) and the "Power" mode (full engine speed).

- ▶ Push the button.
  - ↳ The engine speed is set to the "Eco" mode.
  - ↳ The LED above "Eco" in the button comes on.
- ▶ Push the button again.
  - ↳ The engine speed is set to the "Power" mode.
  - ↳ The LED above "Power" in the button comes on.

Each time you push the button, the engine speed switches from one mode to the other.

You can also set the "Power" mode when you set the engine speed to the last step with the "Increase engine speed" button.

Start / Stop

- ▶ Make sure that the electrical system is switched to on.
- ▶ Push and hold the "Start/Stop" engine button on the keyboard.
  - ↳ The engine start procedure begins and the first LED in the button comes on.
  - ↳ First LED in the button goes off when you release the button.
- ▶ Push the "Start/Stop" engine button on the keyboard again.
  - ↳ The engine turns at minimum speed during a specified interval.
  - ↳ The right LED in the button and the related symbol on the display flash.
  - ↳ Then the engine stops. The right LED and the display symbol are on.
  - ↳ The right LED goes off.
- ▶ Turn the ignition key **S1** to position "**0**" to switch to off the machine.
- ▶ Remove the ignition key **S1**.

Camera views

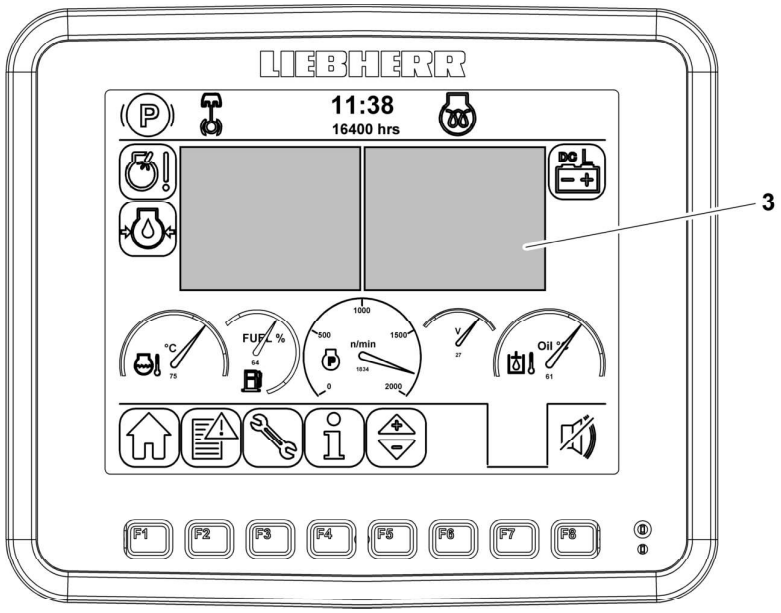


Fig. 3-11 *Camera views*

3 Camera views field

The main screen has two windows **3**, which show the image from the monitoring cameras.

▶ Push the "**Main screen**" button to go back to the camera views from all others menus.

Buzzer and links field

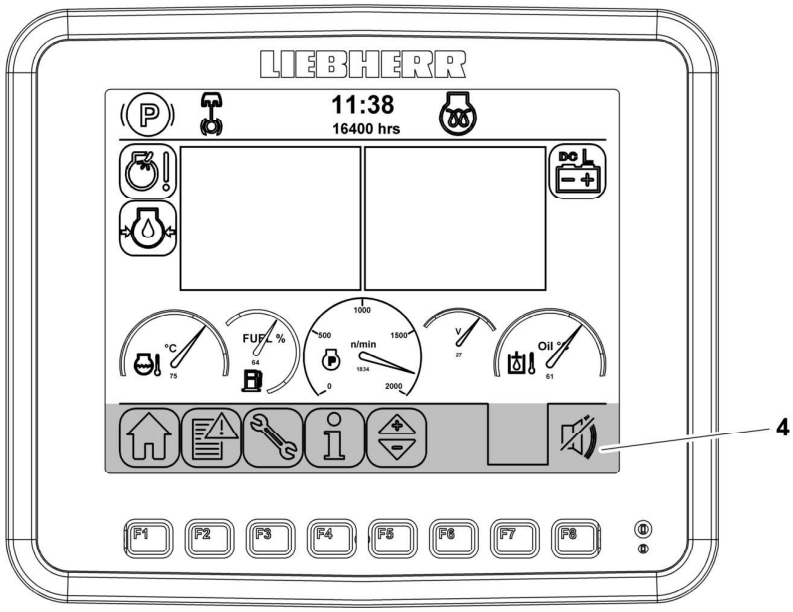


Fig. 3-12 *Links field*

Submenu "Tool control" (optional)

This optional submenu is available when you can install special tools on the machine. Thus, when you connect a tool, you must use this submenu to select its related parameters (tool type, operating flows and pressures).

These parameters are set by a Liebherr service personnel.

Caution!
Risk of damage!
Incorrect setting of the operating flow and/or pressure can cause damage to the attachment or limited operation of the attachment.

▶ Do the related procedure to select the correct parameters for the tool that you will install. Refer to the section "Attaching and dismounting equipment parts" of this manual.

Highlight for the parameters selection

Selected parameters

When you select a tool, a special message is also shown in the menu "**Diag**".

▶ To use this submenu, refer to the section "Attaching and dismounting equipment parts".

Submenu "Auxiliary hydraulic outlet" (optional)

This submenu is available when the machine has an optional hydraulic outlet. Thus, you use this submenu to stop the standard functions of the machine and directly supply hydraulic power to an external device.

Position of the attachment

Position of the safety lever

Hydraulic couplings connection

Hydraulic power supply in progress

Hydraulic couplings removal

▶ To use this submenu, refer to the section "Auxiliary hydraulic outlet".

Hydraulic oil temperature low

This symbol is shown if the hydraulic oil temperature is below a specified operating value at the excavator start.

- The working pumps are automatically limited to 50%.
- The maximum limitation time of the working pumps is set to 15 minutes.

Service necessary (optional)

This symbol is shown when a scheduled maintenance task is necessary.

- The symbol flashes temporarily when you start the machine.
- This symbol stays on until the specified time range is applicable.

▶ Go to the submenu "**Services**" of the monitoring menu "**Info**". Refer to the related section of this manual.

Overload warning device (optional)

Option not available

This symbol is shown if you push the "Overload warning device" button when this option is not installed on the machine.

▶ Push the button again.
- The symbol on the display goes off.

Maximum load capacity sensed/failure of the system

This symbol is shown if the machine gets its maximum load capacity.

▶ Stop the movement immediately.

Deactivation waiting time

This symbol is shown during the time you have to confirm the deactivation of the overload warning device. If it is necessary to stop the system:

▶ Push the **S497** button in less than 5 seconds.

Incorrect deactivation procedure

This symbol is shown if you push at the same time "Overload warning device" and **S497** buttons.

- The overload warning device continues to operate.
- The deactivation procedure is cancelled after 5 seconds.

Quick coupler (optional)

▶ Find all information and details in the Operating Manual of the quick coupler manufacturer.

Activation waiting time

This symbol is shown while the system waits the activation of the quick coupler.

Activation of the system

These two symbols are shown at the same time while the activation of the quick coupler is confirmed.

▶ Lower the ladder **1** to the stop.

Move the ladder into upper position (working position)

▶ Lift the ladder **1** to the stop.

Caution!
For safety reason, the excavator can only be operated if the ladder is locked in its top position. This means that the swing and travel movements remain locked.

This safety measure can be momentarily by-passed by pushing and holding the button **S122** on the control board.

Depending on the machines, the cab control board can be different.

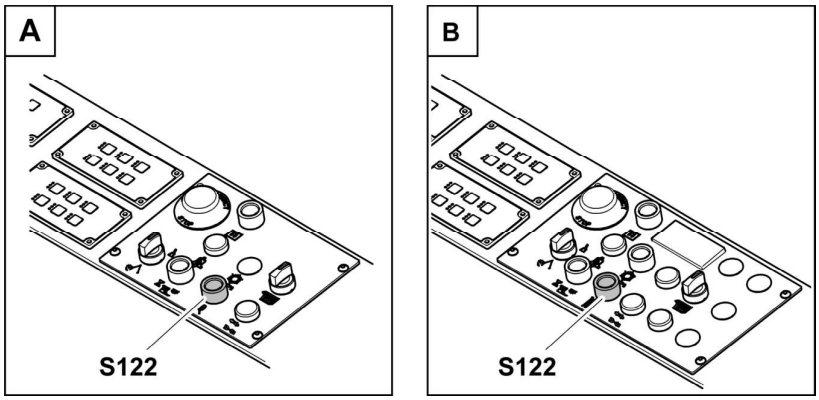


Fig. 3-22 *Button S122: Disable of ladder control position*

45° access ladder (optional)

An optional 45° access ladder can be installed on the excavator. It is automatically extended and retracted from the uppercarriage with the control box **E1022_3**. Depending on the excavators and the access ladder configuration, the control box **E1022_3** can be in different locations.

Setting the horizontal seat position

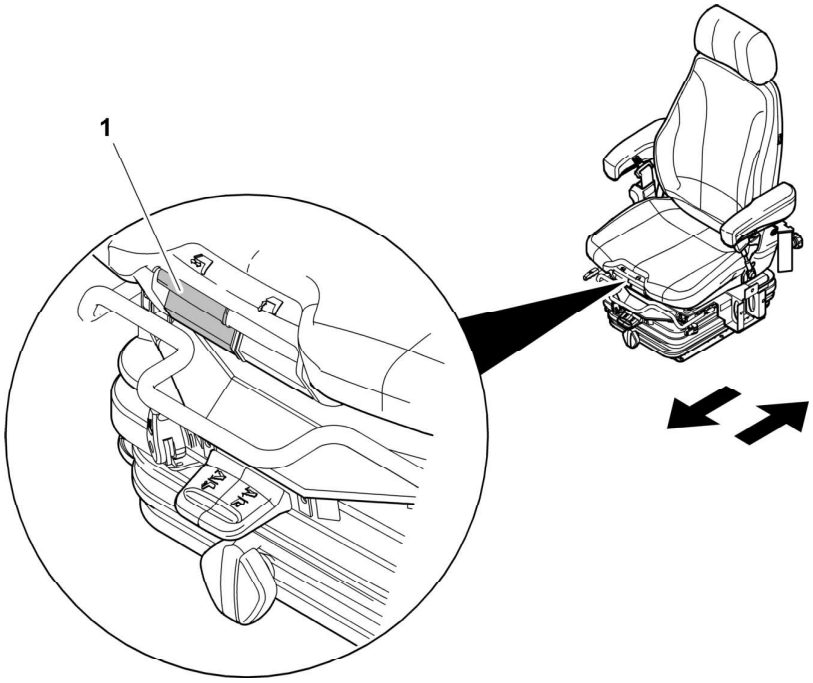


Fig. 3-35 *Setting the horizontal*

To adjust the horizontal position of the seat:

- ▶ Pull up the lever **1**.
- ▶ Move the seat backwards or forwards to the correct position.

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Front working lights and 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.

Rear working lights on the top of the cab (if installed)

Switch the lights to on from the cab

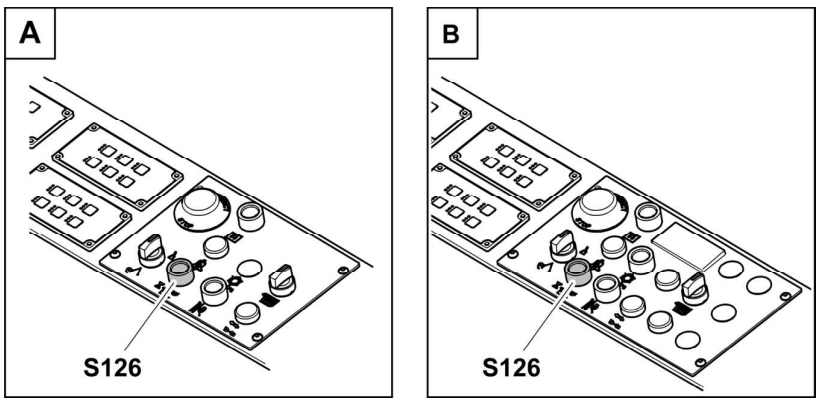

Fig. 3-46 *Button S126*

Note!
If necessary, you can stop the automatic operation before the end of the recorded operating time of the coolant heater.

▶ Start the Diesel engine.

or

Set the rotary switch **S234** to the "**OFF**" position.
↳ The symbol "**SH**" on the display of the module **U38** goes off.
↳ You can set the cab temperature with the module **U38**.

Manual operation

This mode lets you start and stop the cab preheating manually. If an automatic starting time was recorded before you use the manual mode, the recorded time has no effect.

Start the cab preheating

▶ Turn on the electrical system of the machine.
Refer to section "Turn on the electrical system" of the "Start and stop the machine" in chapter 3.

▶ Turn on the electrical system of the cab preheating system.
Refer to section "Turn on the preheating electrical system" of the "Starting aids" in chapter 3.

▶ Let the ignition key of the machine on "**OFF**" position.

▶ Set the rotary switch **S234** to the "**ON**" position.
↳ The color of the rotary switch **S234** changes to green.
↳ The symbol "**SH**" is shown on the display of the module **U38** when all the specified conditions are met.
↳ Standard, and additional cab heater if installed, is (are) put in operation at a specified and non adjustable speed.
↳ The other functions of the module **U38** are not available.

Stop the cab preheating

▶ Start the Diesel engine.
↳ The symbol "**SH**" on the display of the module **U38** goes off.

▶ Set the rotary switch **S234** to the "**OFF**" position.
↳ The light on the rotary switch **S234** goes off.

Then, you can set the cab temperature with the module **U38**. Refer to section "Heating/air-conditioning system" in chapter 3.

Warning light

When you use the optional cab preheating system, you must also monitor the level of the special fuel tank of the coolant heater.

▶ Monitor the status of the warning light **H168**.
Refer to section "Warning lights" of the "Starting aids" in chapter 3.

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Stop the Diesel engine

Caution!
The engine could be damaged.

▶ Do not switch off the engine suddenly from full throttle.

▶ Push the "Start/Stop" engine button on the keyboard.
  - The engine turns at minimum speed during 10 seconds (180 seconds optional).
  - The right LED in the button and the related symbol on the display flash.
  - Then the engine stops. The right LED and the display symbol are on.
  - The right LED goes off.

▶ Turn the ignition key **S1** to position "**0**" to switch to off the machine.

▶ Remove the ignition key **S1**.

Note!
When the optional timer of 180 seconds is activated, the Diesel engine continues to turn during this time independently of the position of the ignition key **S1**.

Disconnect the electrical system with remote battery switches (optional)

In option, the principal battery switches can be installed under the counterweight (battery switches box **E1092**).

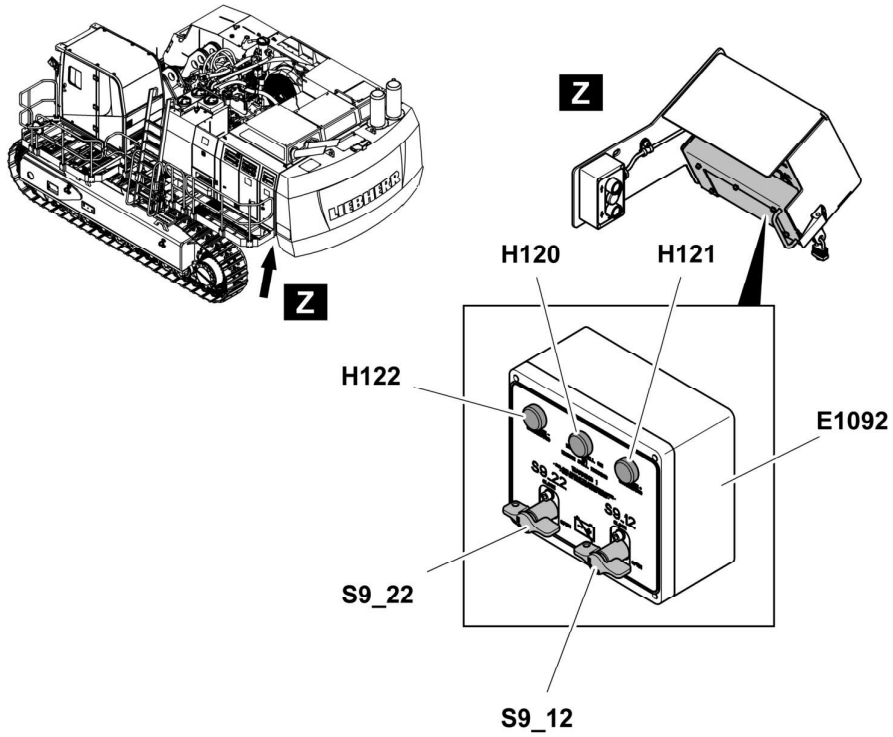

Fig. 3-60 *Principal battery switches under the counterweight (E1092)*

3 External socket

The external socket **3** is located under the catwalk.

▶ Connect the Gen-Set to the external socket **3**.

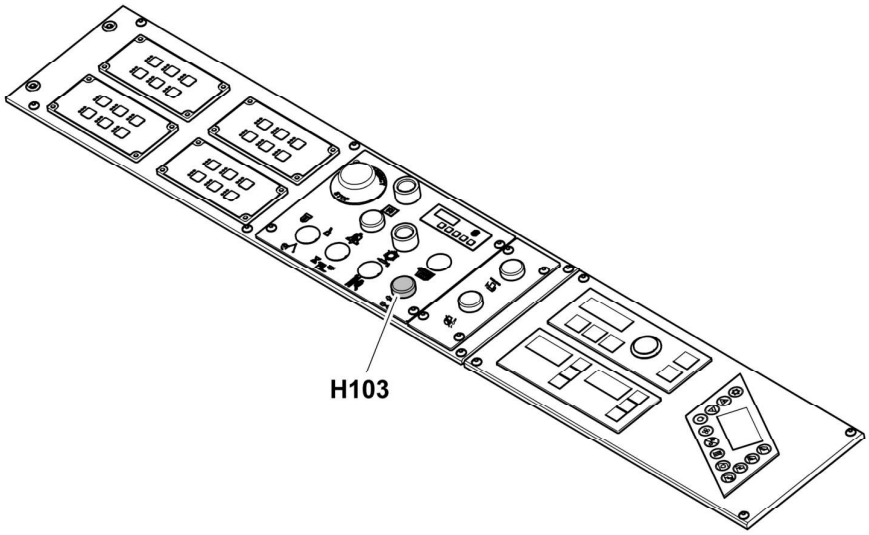

Fig. 3-70 *Warning light H103: external Gen-Set connected*

H103 External Gen-Set connected

The warning light **H103** located on the cab control board comes on. This function is automatically regulated.

▶ Do not disconnect the Gen-Set at this step.

▶ Do not wind and/or attach the Gen-Set cable on the machine (e.g. on the catwalk).

Caution!
If it is necessary to start the Diesel engine during this step, travel and swing movements are not allowed if the additional external Gen-Set is connected.

▶ When the **U163** display is blank, push the "**OK**" button.
  ↳ The diagnostic starts automatically.

Get the error codes

This section is available only for the diagnostic unit **U163**.

For the error codes chart, you must refer to the Troubleshooting Instructions of the coolant heater manufacturer.

– If the symbol "**STOP**" is shown on the display:
  ↳ There is no error code that is active at the moment.

– If the symbol "**ERR**" is shown on the display:
  ↳ There is an active error code.

– In the two cases:
  ↳ You can have a view of the recorded error codes.
  ↳ You can erase the error codes memory.

Get the active error code

▶ Push the two buttons "**Previous**" and "**Next**" at the same time.
  ↳ The active error code is shown with the label "**AF**".

Get the recorded error codes

▶ Push one of the two buttons "**Previous**" or "**Next**".
  ↳ The recorded error codes are shown with the label "**F**".

Erase the error codes memory

▶ Select the active error code or a recorded error code.

▶ Push the "**OK**" button.
  ↳ The symbol "**DEL**" is shown on the display.

▶ Push the "**OK**" button again.
  ↳ The error codes memory is erased.
  ↳ The symbol "**STOP**" is shown on the display.

If necessary, you can also unlock the control unit with this procedure.

Stop the diagnostic

This section is available only for the diagnostic unit **U163**.

When the symbol "**STOP**" is shown on the display:

▶ Push the "**OK**" button.

▶ Set the fuse **F266** to off.

3.3.5 Warm-up procedure for Diesel engine and hydraulic circuit

If the excavator is started when the exterior temperature is below 0°C, the operator must do the warm-up procedure:

❑ Make sure that the hydraulic oil temperature is sufficient (refer to lubricating section in chapter 5) to do this procedure. If this temperature is not sufficient when a preheating system is installed on the excavator, keep preheating.

▶ Let the engine idle at approximately 1/2 rated speed during the first 3 to 5 minutes and make sure that no error symbols are shown on the monitoring display (refer to the functions of the display in chapter 3).

Safety fans control

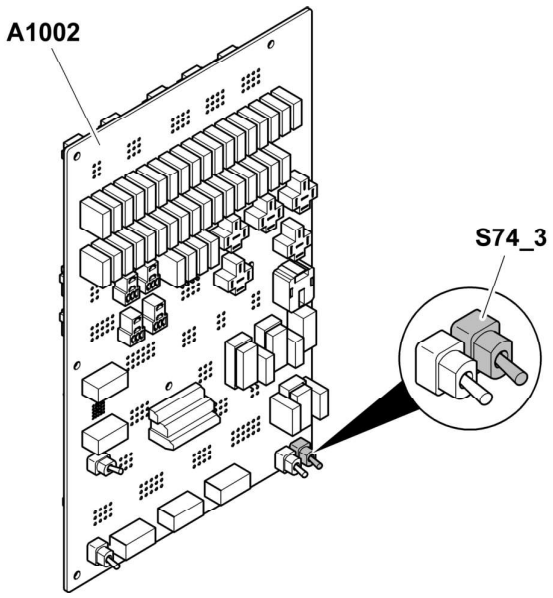

Fig. 3-86 *Safety fans control*

A1002 Electrical plate in **E1005**
S74_3 Safety switch

The electrical plate **A1002** is located in the cab connection box **E1005**. You can also refer to chapter 4 of this manual.

If the engine cooling and/or oil cooling fan(s) does/do not operate correctly:

▶ Push the switch **S74_3**.
  ↳ The fans operate at maximum speed.

  ↳ When you use this mode, this symbol "**Fan control off**" is shown on the display.

Tow the machine

It is not permitted to tow the machine.

▶ If you must move or recover a defective or unserviceable machine, contact Liebherr customer service.

- Carry out all movements with increased care.
- To slew the load, move the attachment as close as possible to the machine **(Caution! swinging grab)** and hold the load close to the undercarriage and above the substrate.
- Avoid braking or accelerating the attachment or uppercarriage abruptly.
- Do not lift any loads which are heavier than those given in the load chart.

Protection from vibration

– Vibrational loads on mobile building machinery are mainly the result of the type and method of use. The following parameters in particular are decisive influences:
  - Terrain conditions: Uneven areas and potholes;
  - Operational techniques: Speed, steering, brakes, controlling the machine's control elements when driving and working.

– To a large extent, the machine operator determines the vibrational loads since he selects the speed, gearbox ratio, working method and route himself.
  This means that there is a wide range of different vibrational loads for the same machine type.

Whole-body vibrational load for the machine operator can be reduced if the following recommendations are observed:

– Select suitable machines, attachment parts and auxiliary devices for each part of the job.

– Use a machine that has a suitable seat (i.e. for earth-moving machinery such as hydraulic excavators, this should be a seat which corresponds with EN ISO 7096).

– Keep the seat in good condition and adjust it as follows:
  - The seat and its damping action should be adjusted depending on the weight and height of the operator.
  - Check the seat's damping action and adjustment mechanisms regularly and ensure that these seat characteristics remain as per the seat manufacturer's instructions.

– Check the maintenance status of the machine, particularly with respect to: tyre pressure, brakes, steering, mechanical connections etc.

– Do not steer, brake, accelerate, shift gears, move or load the machine's attachment jerkily.

– To reduce vibrational load, adjust the machine speed to suit the route as follows:
  - Reduce speed when driving on difficult terrain;
  - Drive around obstacles and avoid driving on very difficult terrain.

– Keep the terrain on which the machine is working and driving in good condition:
  - Remove large stones and obstacles;
  - Fill in ruts and holes;
  - Have machines ready to prepare and maintain suitable ground conditions and calculate in sufficient time to carry out any work required.

– Drive longer distances (e.g. on public roads) at an appropriate (medium) speed.

– Use special auxiliary systems (if available) which reduce vibration for machines that are driven frequently.
  If such auxiliary systems are not available, regulate speed to avoid "oscillating" the machine.

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Control of the quick coupler (optional equipment)

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.
- ▶ For safety instructions, also refer to the Operator's Manual of the quick coupler manufacturer.

Danger!
Special tools used for hoisting are subject to specific conditions and must be fitted with special safety devices.

- ▶ For further information, refer to the Operator's Manual of the quick coupler manufacturer.

- ▶ For use and control, refer to:
- – The section "Attaching and dismounting equipments parts" of this manual.
- – The Operator's Manual of the quick coupler manufacturer.

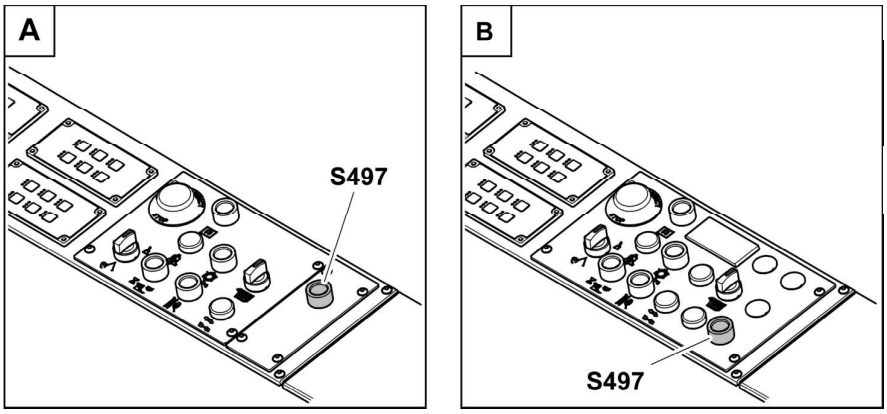


Fig. 3-103 *Confirmation button*

- ▶ For use and control, you must also know that:
- – The confirmation button **S497** is located on the cab control board. Depending on the machines, the cab control board can be different.
- – The button "**Quick coupler**" is located on the **A170** keypad.

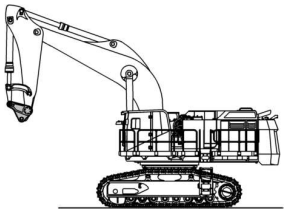
Control of the hydraulic hammer (optional equipment)

- ▶ Install the hydraulic hammer. Refer to the section "Attaching and dismounting equipments parts" of this manual.

hole conductor held by another person must be used.

– To drive in a bolt, screw the drive screws provided in the toolbox if provided into the bolt's threaded hole and only hammer these screws.
– When installing bolts locked by means of castle nuts and cotter pins, first drive the bolt to the stop, then screw the castle nut by hand until contact and then only pull it far enough to push in the cotter pin.

3.5.1 Use a quick coupler (optional)



The optional quick coupler is used to attach optional special tools which replace the bucket (third member).

▶ For safety instructions, also refer to the Operator's Manual of the quick coupler manufacturer.

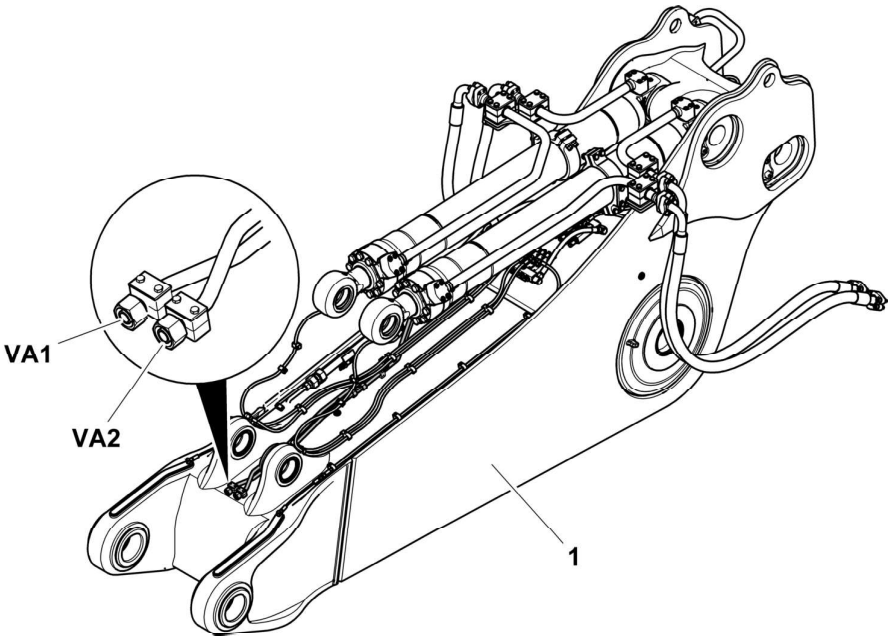


Fig. 3-114 *Pressure ports for the quick coupler*

1 Stick
VA1/2 Pressure ports for the quick coupler

▶ Make sure that the pressure ports **VA1** and **VA2** are connected to the quick coupler as follows:
– **VA1** to the locking port
– **VA2** to the unlocking port

▶ For use and control, refer to the related section of this manual.

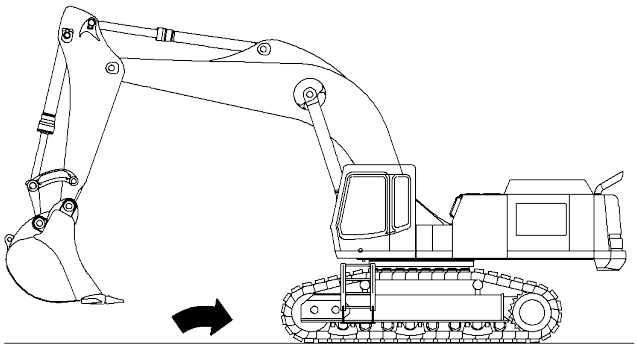
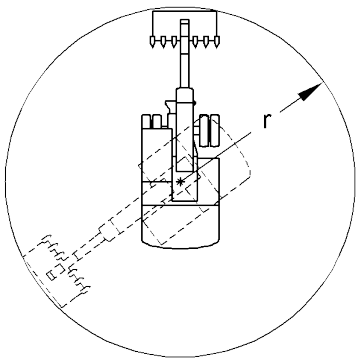


Fig. 3-123 *Working position – machine*

▶ Position the machine so that the load or grab material can be taken up above the idler.

Danger!
Insufficient support and machine damage.
Do **not** use a skimming shield to support the machine.



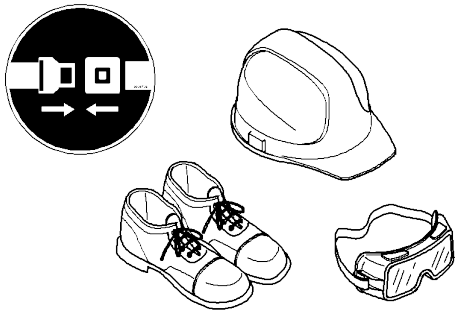


Fig. 3-124 *Hazard area*

Danger!
Risk of fatal injury due to rotating the machine.

▶ Ensure that nobody stands within the hazard area **r** of the machine.

Caution!
Risk of injury when working.

▶ Always wear safety shoes and, particularly when leaving the cab when demolition work is going on, a protective helmet and goggles.

▶ Always wear the seat belt.

▶ Use the horn to give a short warning signal before starting work.

Danger!
Serious risk of injury when moving the machine.

▶ Ensure that nobody is standing within the working area of the machine.

Caution!
The machine could be damaged.

▶ Never move the machine while the work equipment is touching the ground.

▶ To skim with a backhoe bucket, lay this on the ground and move the stick slowly forwards and backwards. Move the boom steadily up and down while the stick is moving.

▶ If a skimming shield is present (optional extra), lower it to the ground and move slowly forwards and backwards with the machine.

3.7 Transport

Transporting the machine safely

– Due to transport restrictions, use only suitable means of transport and lifting devices with sufficient load-carrying capacity.
– Park the machine on a flat surface and wedge the crawler or wheels securely.
– If required, detach a part of the machine's working attachment during transportation.
– The ramp used to drive the machine up onto the flatbed trailer should not exceed an inclination of the angle value indicated in the "Technical data" section of this manual (machine must be able to walk up unaided) and should have a wooden cover to prevent sliding back.
– The undercarriage should be swept clean, i.e. before driving up the ramp, clean any snow, ice and mud from the crawler / wheels of the machine.
– Align the machine precisely with the loading ramp.
– Attach the hand levers for fine-tune driving (crawler excavator) onto the travel pedals.
– Ensure that a spotter gives the machine operator the required signal.
– Prepare the placing block to ensure against rolling back when the machine is driving up onto the flatbed.
– Tilt the attachment up and drive up the loading ramp. While doing this, always hold the attachment securely over the loading area, drive very carefully up the ramp and onto the transportation vehicle.
– Rotate the uppercarriage carefully to the rear and lower the attachment. Due to restrictions during transport on hoe attachment, tilt the arm in and dismantle the bucket during transportation.
– After loading the machine onto the flatbed trailer, the upper structure must be secured facing the undercarriage using the stop bolts (only A devices).
– Secure the undercarriage and the remaining individual parts using chains and blocks to prevent slipping.
– Before you leave the machine, reduce pressure on all pressure lines, remove the ignition key and tilt up the safety lever.
– Lock all cab and panel doors.

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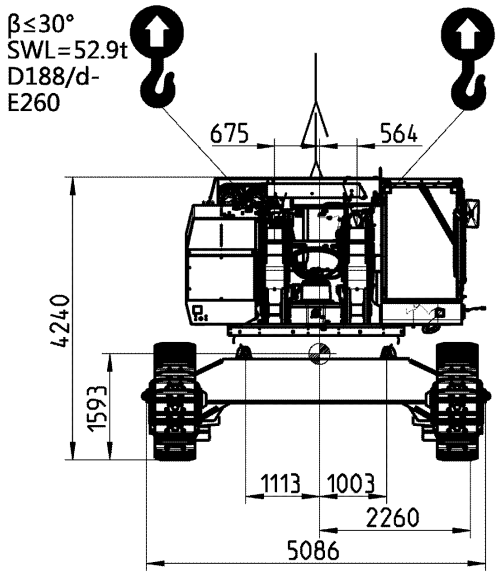
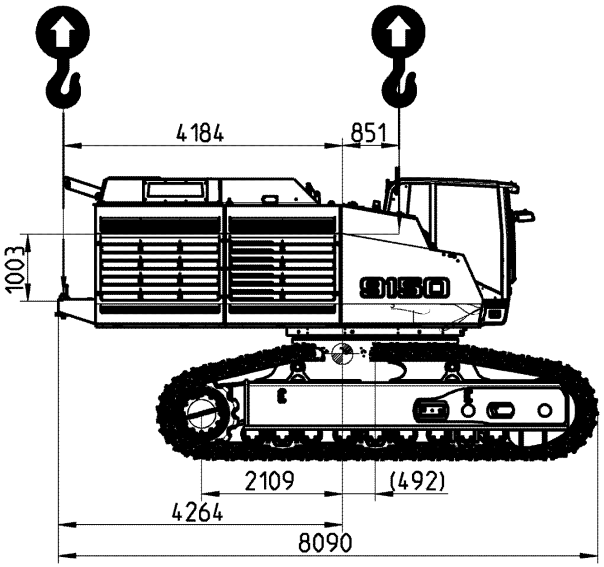
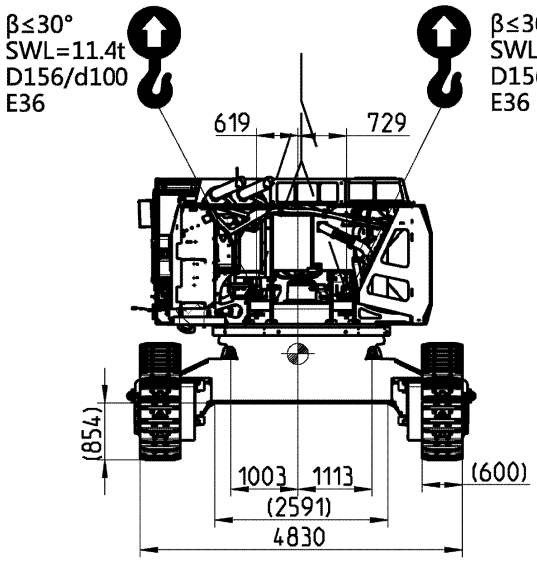
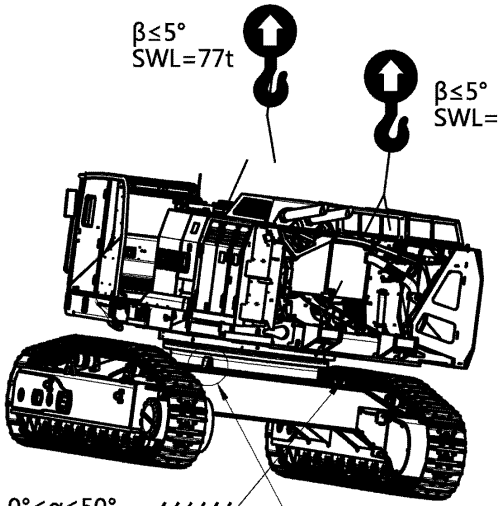
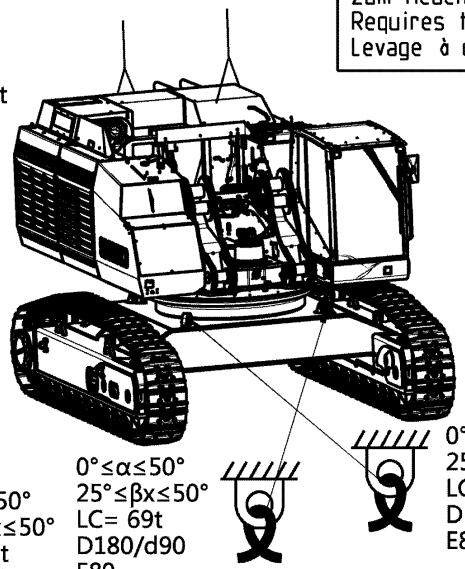
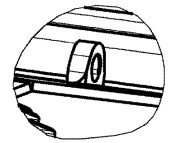








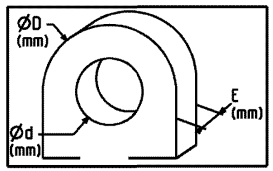




EINZELHEIT
DETAIL A
DETAIL

Zum Heben sind entweder zwei Kräne oder eine Traverse von 4.6 bis 5.5 m Länge obligatorisch
Requires two cranes for lifting or a spreaderbeam with a length of 4.6 to 5.5 m
Levage à deux grues obligatoire ou avec un palonnier de longueur 4.6 à 5.5 m

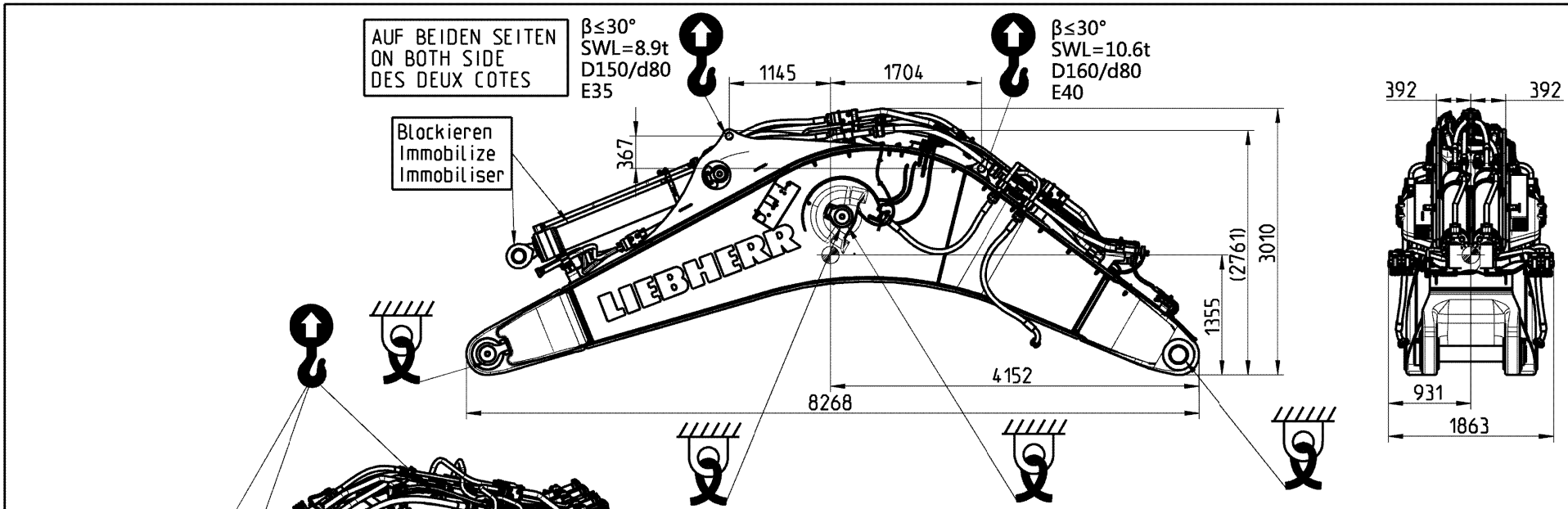
"Safe Work Procedure" 0.13 folgen Follow "Safe Work Procedure" 0.13 Suivre "Safe Work Procedure" 0.13	Mit Oel und Kraftstoff With oil and fuel Avec huile et gasoil	+ 3290 kg
	Mit 750mm Schakenketten With 750mm pad-liks track chains Avec chaines à maillons de 750mm	+ 2825 kg

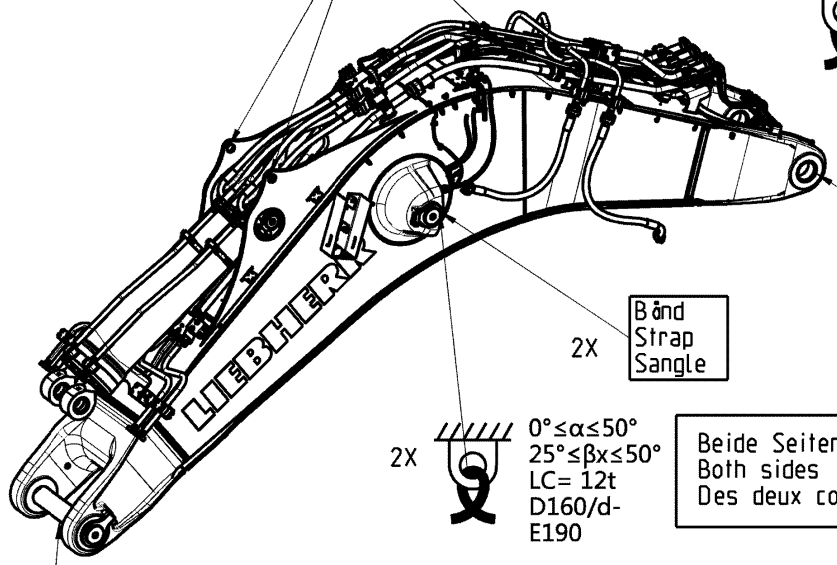


SCHWERPUNKT CENTER OF GRAVITY CENTRE DE GRAVITE	Gerechnet Calculated Calculé	Gewogen Weighed Pesé
Gewicht ohne Werkzeug und Verpackung Weight without tool and packaging Poids sans outillage et emballage	73 710 kg	
Gewicht mit Werkzeug und Verpackung Weight with tool and packaging Poids avec outillage et emballage	73 750 kg	

LIEBHERR

Bezeichnung / Description / Dénomination	Ident-Nr. / Ident No. N° d'ident	Index / Index Index	Blatt / Page Feuille
TRANSPORTPLAN OHNE AUSRUESTUNG TRANSP.DRW.WITHOUT EQUIPMENTR9150 PLAN DE TRANSP.SANS EQUIPEMT	11074553	002	1/1





2X Bänd
Strap
Sangle

5°≤α≤15°
65°≤βx≤90°
LC= 5t
D180/d-
E260

Die Flächen schützen
Protect the surfaces
Protéger les surfaces

Beide Seiten
Both sides
Des deux cotés

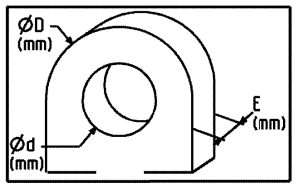
2X 0°≤α≤50°
25°≤βx≤50°
LC= 12t
D160/d-
E190

Beide Seiten
Both sides
Des deux cotés

5°≤α≤15°
65°≤βx≤90°
LC= 5t
D180/d-
E205

Die Flächen schützen
Protect the surfaces
Protéger les surfaces

Beide Seiten
Both sides
Des deux cotés



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	15 641 kg	
Gewicht mit Werkzeug und Verpackung Weight with tooling and packaging Poids avec outillage et emballage	15 641 kg	

LIEBHERR

Bezeichnung / Description / Dénomination	Ident-Nr. / Ident No. N° d'ident	Index / Index Index	Blatt / Page Feuille
TRANSPORTPLAN MONOBLOCKAUSLEG. TRANSP.DRW.GOOSENECK BOOM R9150 PLAN DE TRANSP.FLECHE RETRO	11073413	002	1/1

Fault / error	Cause	Solution
Poor diesel engine output (output deficiency)	Boost pressure too low	Check air filter and air supply to the turbocharger. Check charge air system, check for loose clamps, defective seals, broken hoses, broken intercooler, defective pressure regulating valve on the turbocharger, check intake manifold for leaks and turbocharger. Check pressure sensor
	Charge air temperature too high (automatic decrease in output via control unit)	Intercooler contaminated, check fan control, ambient temperature too high. Check temperature sensor.
	Coolant temperature too high. (automatic decrease in output via control unit)	Check coolant level, check coolant for contamination, check fan, cooling water thermostat and the sealing cap of the expansion tank. The cooling system must have a pressure of 0.6 to 0.8 bar. Check temperature sensor.
	Application region more than 1800 metres above sea level	No remedy, diesel engine output was reduced automatically
	Engine brake flap, if installed, defective	Check engine brake flap and activation of engine brake flap, replace as required
	Injection nozzles not functioning correctly	Remove and replace injection nozzles.
	Compression insufficient	Check battery voltage. Check valve clearance before testing the compression. Make sure that the engine brake flap is open.
Poor diesel engine braking action	Defective electronics	Read out the error memory from the engine control unit with diagnostic tool and carry out the repair indicated by the error respectively highlighted. Note: check the earth connections.
	Engine brake flap not functioning	Check engine brake flap and activation of engine brake flap, replace as required.

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F231	Fuse 15 A / Supply greasing **U4_2**	**X809**	Connector 40 poles / **E50**
F232	Fuse 15 A / Supply greasing **U4_1**	**X812**	Connector 1 pole / **BTKP** (Optional)
F233	Fuse 7,5 A	**X813**	Connector 1 pole / **R51_2**
F235	Fuse 15 A / Heating fuel filter	**X814**	Connector 1 pole / **R51_1**
F236	Fuse 15 A / Supply greasing	**X815**	Connector 2 poles / **R42**
F237	Fuse 7,5 A	**X828**	Connector 2 poles / **S100_2**
F238	Fuse 7,5 A / Supply KT56		

4.2.2 Cab connection box E1005

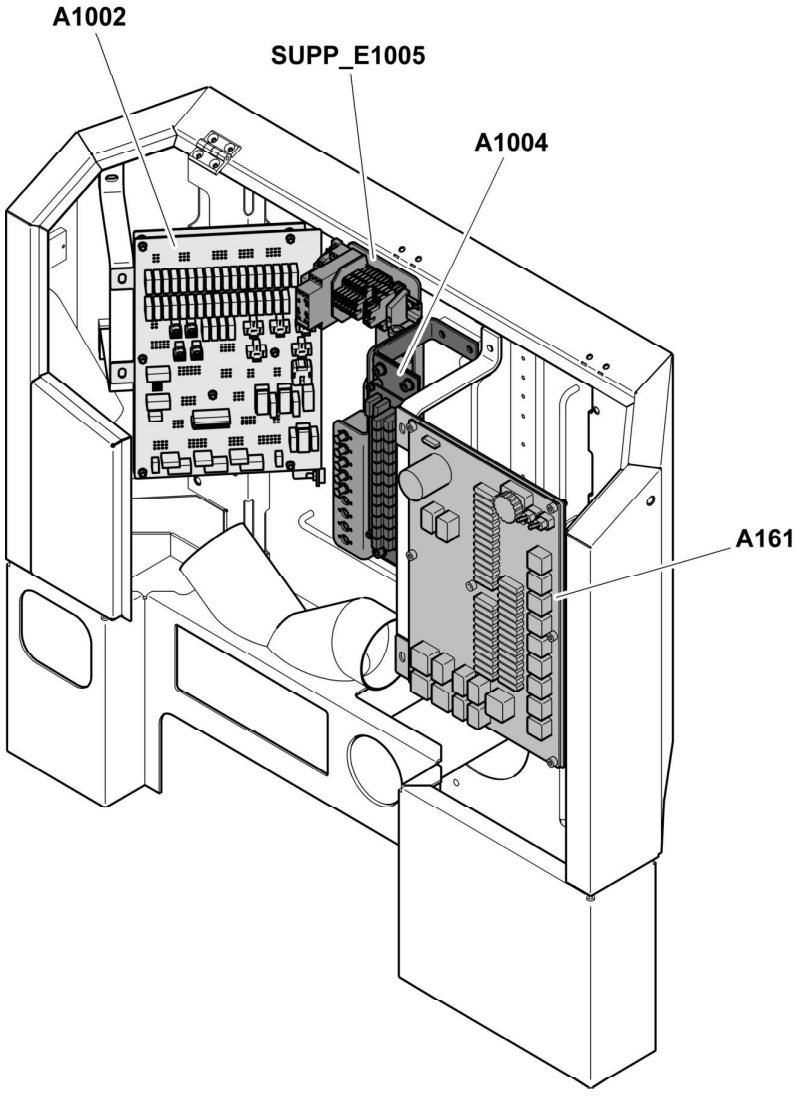

Fig. 4-4 *Locations of the electrical plates in E1005*

A161 Electrical plate

- 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.
- If the machine has to be repaired on a slope, secure the crawler with chocks and connect the upper structure to the chassis using stop bolts.
- Only personnel with special training and experience may work on hydraulic equipment.
- When searching for leakage, wear protective gloves. A fine jet of liquid under pressure can penetrate the skin.
- Do not unscrew any lines or connections before you have set aside the equipment, switched off the engine and depressurized the hydraulic system. After switching off the engine, with the start key in contact position and with the safety lever down into its lowest position, you must operate all pilot control devices (joystick and pedals) in all directions in order to reduce the actuating and dynamic pressures in the work circuits. You must then reduce the internal tank pressure as described in these operating instructions.

Electrical system

- Check the electrical system regularly.
  Have all faults, such as loose connections, blown fuses and lamps and clogged or abraded cables rectified by personnel.
- Only use original fuses with approved current strength.
- For machines with electrical neutral and high tension leads:
  • switch the machine off immediately in the event of malfunctions in the power supply.
- Work on the machine's electrical equipment may only be carried out by skilled electrical personnel or by trained personnel under the supervision of an electrician in accordance with electrical regulations.
- When working on live parts, ensure that a second person is available to operate the emergency-off or the main switch and overvoltage release. Cordon off the working area with a red and white safety chain and a warning sign. Only use insulated tools.
- When working on neutral and high tension subassemblies, after releasing the voltage, briefly disconnect the supply cable at earth and electronic devices such as capacitors using an earthing rod.
- First test the released parts to make sure that they are off circuit, earth them and then disconnect them briefly. Insulate adjacent live parts.
- Disconnect the battery before working on the electrical system or carrying out any electric arc welding on the machine.
  First disconnect the negative, then the positive pole. When reconnecting, proceed in the reverse order.

Hydraulic accumulator

- All work on the hydraulic accumulators must be carried out by trained specialist

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5.4.2 Lubrication chart

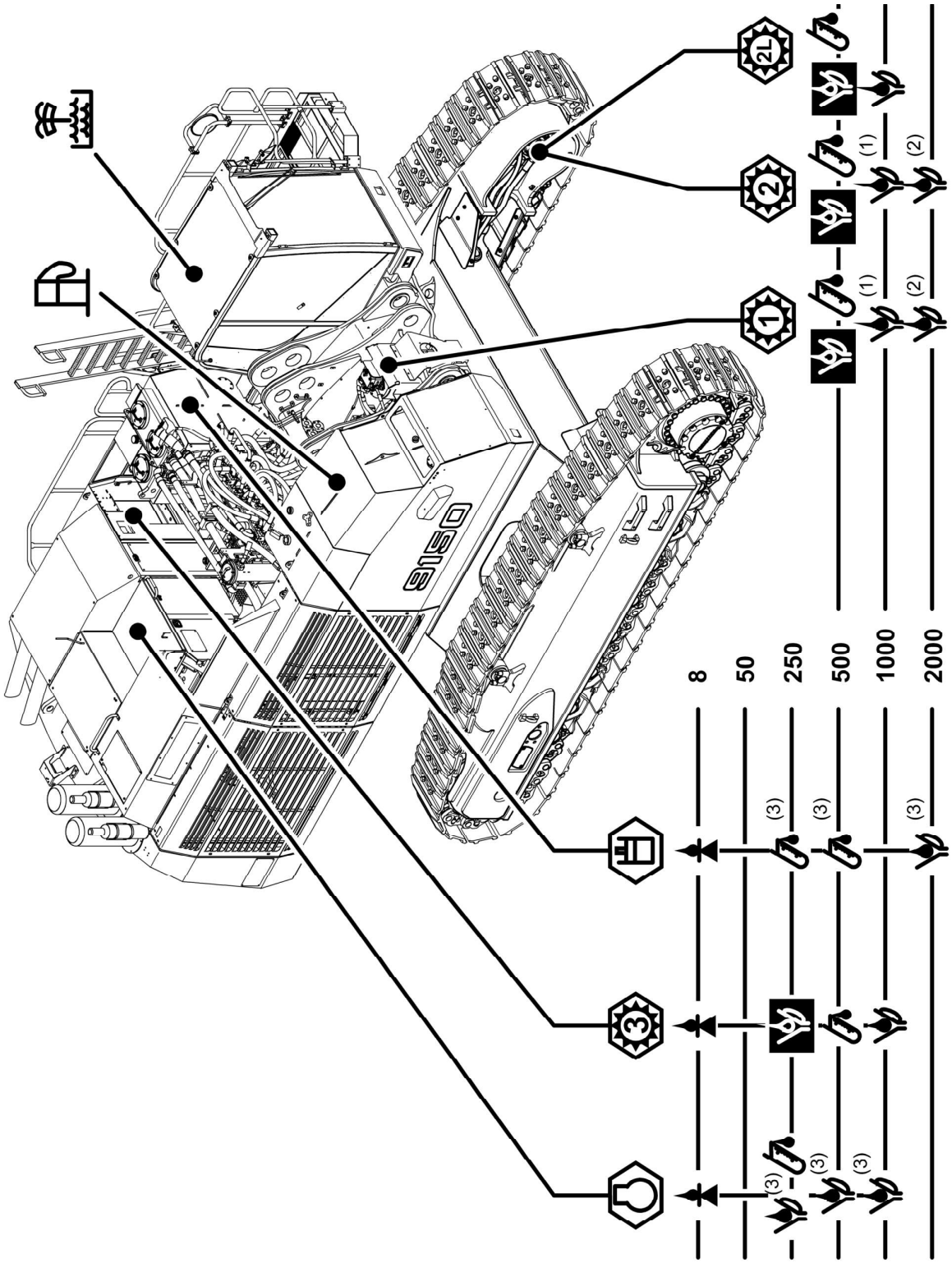

Fig. 5-6 *Lubrication chart - R9150*

Fig. 5-12 Hydraulic oil 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)

Caution!
Minimum ambient air temperature for extra-cold start depends on oil type and brand and equals to oil pourpoint temperature +5 degrees K.

Hydraulic oils must contain dispersant and detergent additives and conform to one of the following specifications:

DIN	ISO
51524-2 (HLP, HLP-D)	ISO 11158 (HM)
51524-3 (HVLP, HVLP-D)	ISO 11158 (HV)

Additional requirements:

Test/Requirement	Standard/Reference	Required level/ Performance
Shear stability	DIN 51350-6 CEC L 45-A-99	KRL/C < 15%

Fans speed regulation settings

Hydraulic oil	fans speed regulation setting
ISO VG68	"**STANDARD**"
ISO VG100	"**STANDARD**"
ISO VG46	"**COLD**"
ISO VG32	"**EXTRA-COLD**"

Warm-up procedure

The black bar **C** indicates that the ambient temperatures are maximum 20 °C below the operating range **B**.

In the event of a cold start at an ambient temperature included in range **C**, the following warm-up instruction applies to the hydraulic oil:

▶ 1. Start the diesel engine and run it at approx. 1/2 rated speed. Carefully activate the working hydraulic circuits. Operate a hydraulic cylinder (Stick for example) and move them to the stop quickly and many times. After approx. 5 minutes, start the travel hydraulic circuits.
Warm-up duration: approx 10 minutes

For temperature below the limits **A** :

If you get the oil sample with a sampling pump:

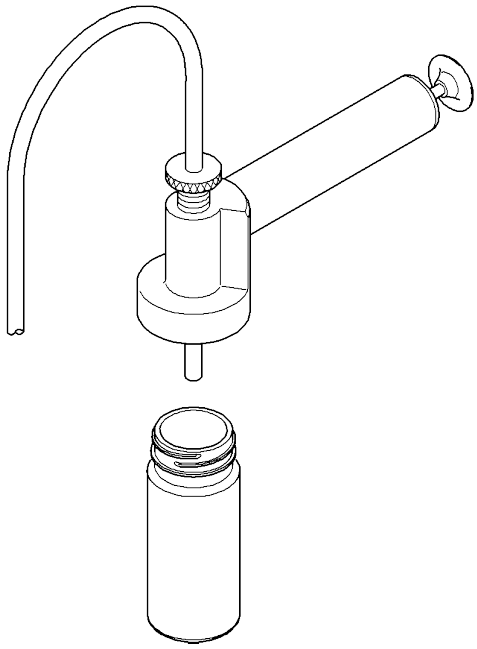

Fig. 5-17 *Sampling pump*

- ▶ Use a sampling pump if you get the sample directly in the tank or on the component (machine stopped).
- ▶ Always use a new sampling hose.
- ▶ Cut the sampling hose to the correct length (e.g. dipstick length plus 20 mm).
- ▶ First, let sufficient oil flow to flush the sampling hose.
- ▶ If you get the oil sample in the tank, take the sample in the middle of the tank.

If you get the oil sample through a sampling valve:

- ▶ Always use a new sampling hose.
- ▶ First, let sufficient oil flow to flush the sampling hose.
- ▶ Get the oil sample in the mid-stream, i.e. first let a small amount of oil flow through the valve before sampling it.

Sampling material

- ▶ You can order LIEBHERR approved sampling material to get the samples:

Note!
These sampling kits are prepaid kits and include the cost of the analysis.

Before ordering these sampling kits, check for sample export licence: make sure that the export of the sample is authorized from your location to Europe.

5.7 Diesel engine

- ▶ Refer to the Diesel engine Liebherr operation and maintenance manual for detailed description of maintenance to be performed.
- ▶ In addition, accurately obey the items that follow and perform all maintenance work according to the intervals given in the control and maintenance chart.

5.7.1 Check the oil level of the Diesel engine

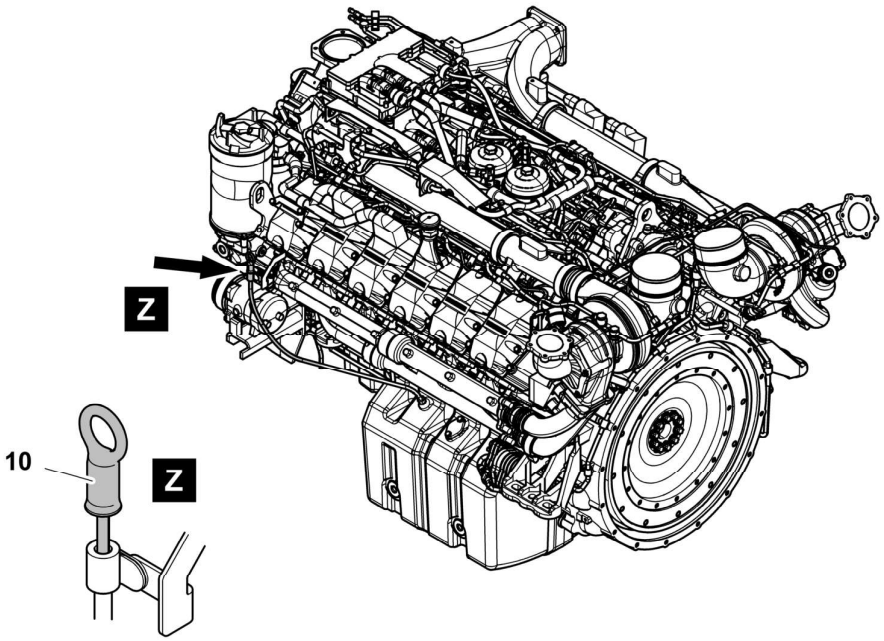

Fig. 5-24 *Dipstick for indication of Diesel engine oil level*

10 Dipstick

Danger!
Risk of burning.
The Diesel engine oil is hot when it is at operating temperature.
Avoid contact with hot oil and components containing oil as it can cause dangerous burns.

- ▶ Park the machine tightly on level ground.
- ▶ Stop the Diesel engine.
- ▶ Wait a minimum of 15 minutes to let the oil collect at the bottom of the engine oil pan.
- ▶ Check the oil level with the dipstick **10**.

5.8.3 Breather filter

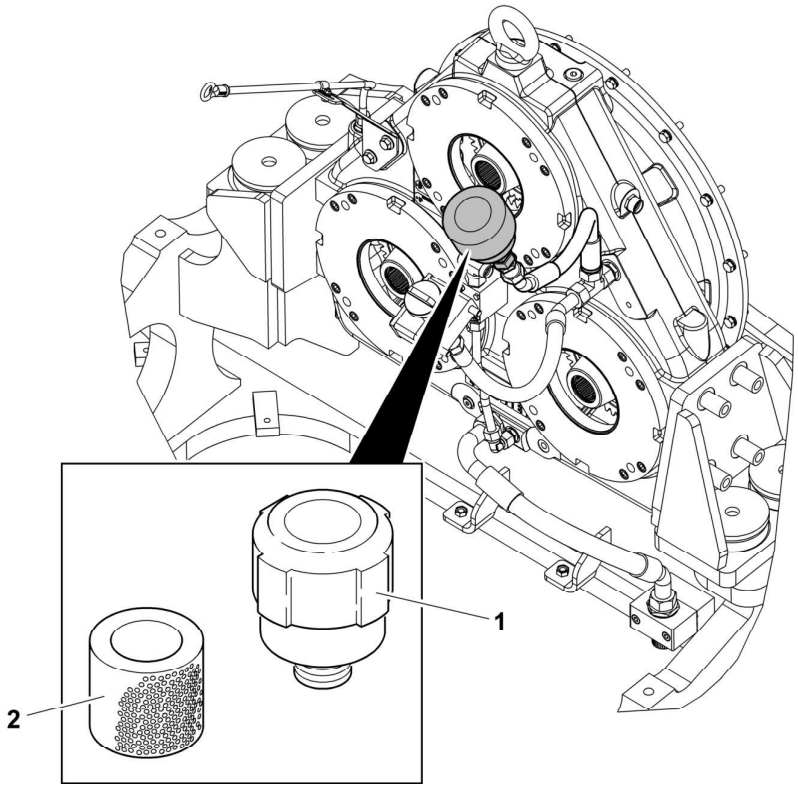

Fig. 5-34 *Breather filter on splitterbox*

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.

- ▶ Always use an applicable container to collect the water and the fuel.
- ▶ Check and clean the fuel tank.
- ▶ Close covers back.

5.10.4 Fuel filtering system

Caution!
Risk of damage to the fuel injection system!
It is important to keep all parts clean during the procedures that follow.

- ▶ For detailed description, see Diesel engine Liebherr operation and maintenance manual.

The fuel filtering system is composed of fuel prefilters and fuel fine filters.

Depending on the machines, the configuration of the fuel filtering system can be different:

- The fuel prefilters can have:
  - a remote bleeding pump
  - an integrated bleeding pump
- The fuel fine filters can be:
  - integrated in the Diesel engine
  - installed on the outer side of the engine cooler box.

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On remote fuel fine filter

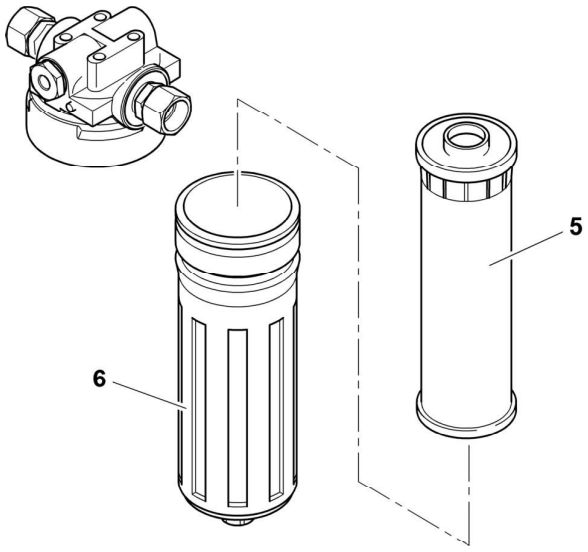

Fig. 5-53 *Filter elements of fuel fine filter*

5 Filter element
6 Filter housing

- ▶ Loosen the filter housing **6** and remove it with the filter element **5** of fuel fine filter.
- ▶ Carefully clean the filter housing **6**.
- ▶ Install the new filter element.
- ▶ Install the filter housing **6** back. Torque it to 40 Nm.
- ▶ Bleed the fuel system with the manual pump installed on the fuel prefilter. Refer to the related procedure below in this section.

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

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

Bleed the fuel system

On fuel prefilter with remote pump

- ▶ For detailed description of maintenance work to be performed, see Diesel engine Liebherr operation and maintenance manual.

On fuel prefilter with integrated pump

- ▶ Make sure that the manual valve is open.
- ▶ Loosen the bleed screw.
- ▶ Operate the manual pump installed on the fuel prefilter until fuel flows out of the bleed screw.
- ▶ Do the steps that follow as necessary until free-air fuel flows out of the bleed screw:

– Tighten the bleed screw with your hands.
– Operate the manual pump again.

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5.12.5 Check the air intake system, hoses, elbow tubes, clamps

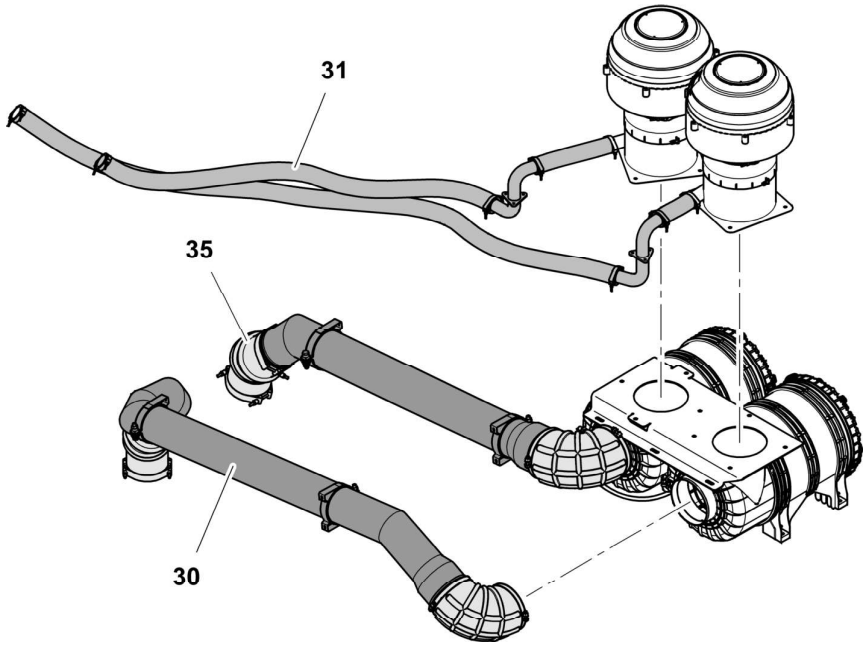

Fig. 5-63 *Air intake hoses, tubes and elbow tubes*

30 Tubes between the filters and the engine
31 Tubes between the precleaner and the exhaust system
35 Elbow tubes

The hoses and tubes **30**, **31** and the elbow tubes **35** between the filter housings and the engine must be checked for damage, wear, tightness and leaks when the filter elements are replaced.

- ▶ If necessary, retighten the screws on the clamps.
- ▶ Do a visual check of the air intake system at the intervals given in the control and maintenance chart.
- ▶ Do a sealing control of the air intake system at the intervals given in the control and maintenance chart.
- ▶ Do also a sealing control of the air intake system each time you replace a component of the air intake duct.
- ▶ Use the Liebherr special tool which is dedicated for this purpose to do the sealing control of the air intake system.

5.13 Hydraulic system

Maintenance work on the hydraulic system is restricted mainly to the hydraulic tank. All other units on the system do not require any special maintenance.

Strict cleanliness is of particular importance for the hydraulic system.

- ▶ Obey the intervals given to:

Replace the filter element

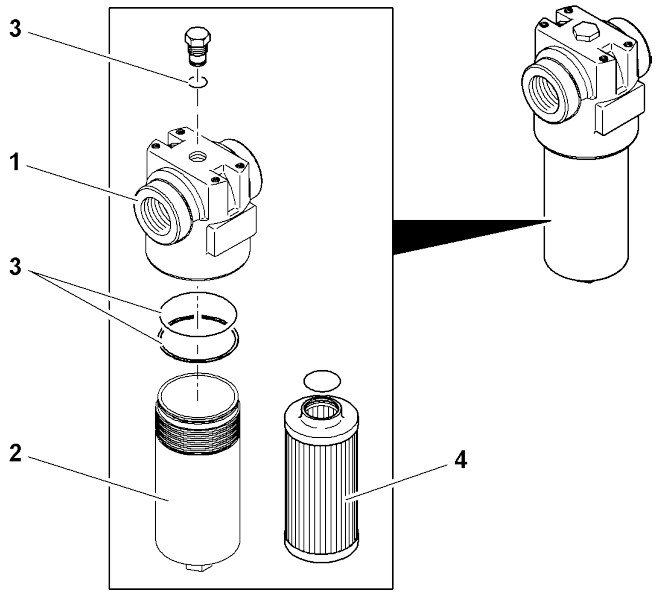

Fig. 5-71 *Piloting and replenishing oil filters parts*

1 Filter head
2 Filter housing
3 O-ring
4 Filter element

- ▶ Release the hydraulic pressure as given before.
- ▶ Make sure the filter head **1** and housing **2** are in good conditions.
- ▶ Make sure sealings and o-ring **3** are correctly installed.
- ▶ Lightly lubricate the threads of the filter housing **2**.
- ▶ Manually, fully tighten the filter housing **2** in the filter head **1**.
- ▶ Close the breather filter.

5.13.8 High pressure filters in working circuit

Three high pressure filters are installed on the inlet ports of the control valves.

- ▶ Check condition of the seal ring **3** and change them if defective.
- ▶ Remove the used filter element **4**.
- ▶ Examine the inlet and the outlet in the filter housing **5**. Clean if necessary.
- ▶ Put a new filter element **4** vertically into the housing **5**.
- ▶ Install the seal ring **3** again.
- ▶ Install the cover **2** again.
- ▶ Tighten nuts **1** with stud screws **6**.

5.13.15 Oil cooler protection filters (optional equipment)

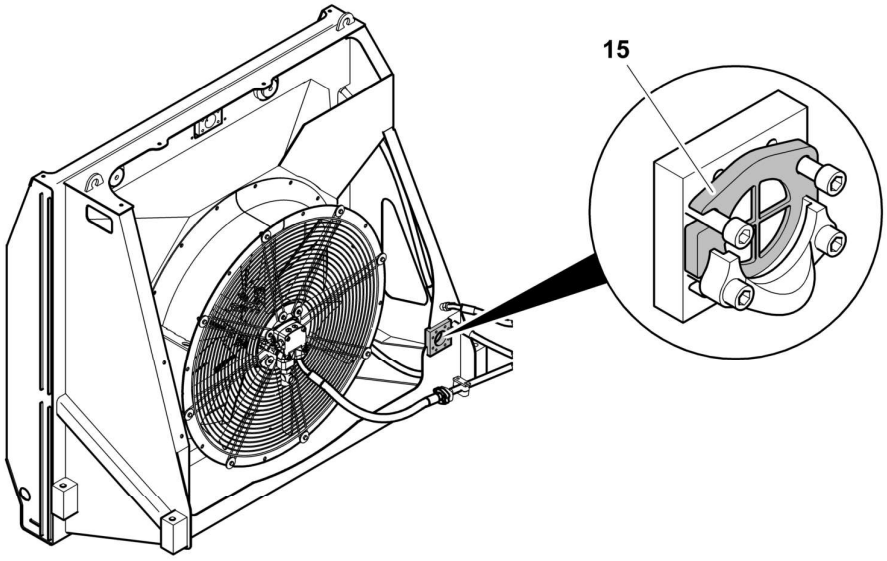

Fig. 5-82 *Oil cooler protection filter*

Protection filters **15** can be installed between the valve bank and the oil cooler in order to reduce the impact on the operating conditions of the excavator in case of possible hydraulic component failure.

- ▶ Check and clean filters regularly.
- ▶ Check filters in case of hydraulic component failure.
- ▶ Change filter in case of impact or mesh rupture.
- ▶ For maintenance intervals, see control and maintenance chart.

Caution!
If filters maintenance isn't correctly carried out, filters clogging due to regular operation of the excavator could lead to following risks:

– cooling capacity drop,
– negative impact on oil quality.

To check or change a filter:

❑ Shutoff valve between hydraulic tank and pumps must be closed.

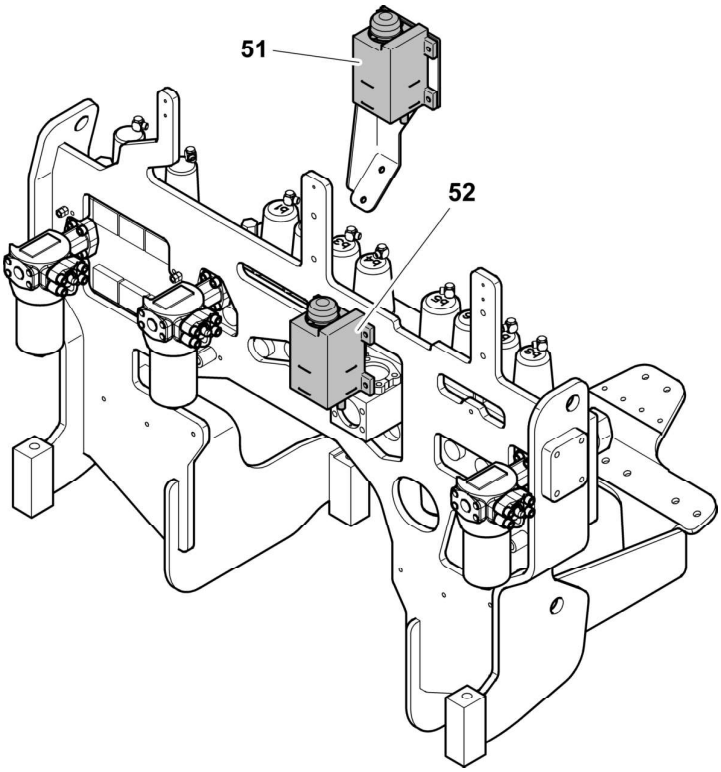

Fig. 5-90 *Expansion tanks of swing gears*

51 Expansion tank of front swing gear
52 Expansion tank of rear swing gear

▶ For oil specifications and quantity, refer to the lubrication chart.

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

Drain the oil

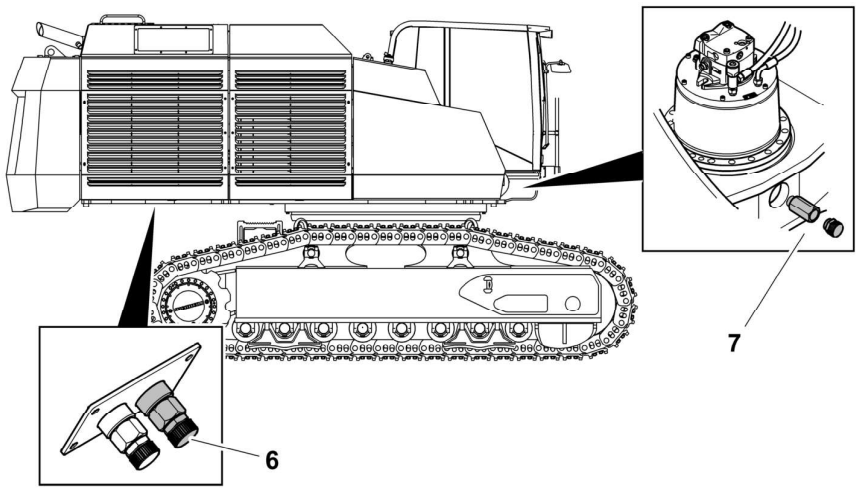

Fig. 5-91 *Swing gears connections of the service station*

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5	Side frame	**11**	Sprocket
6	Carrier roller		

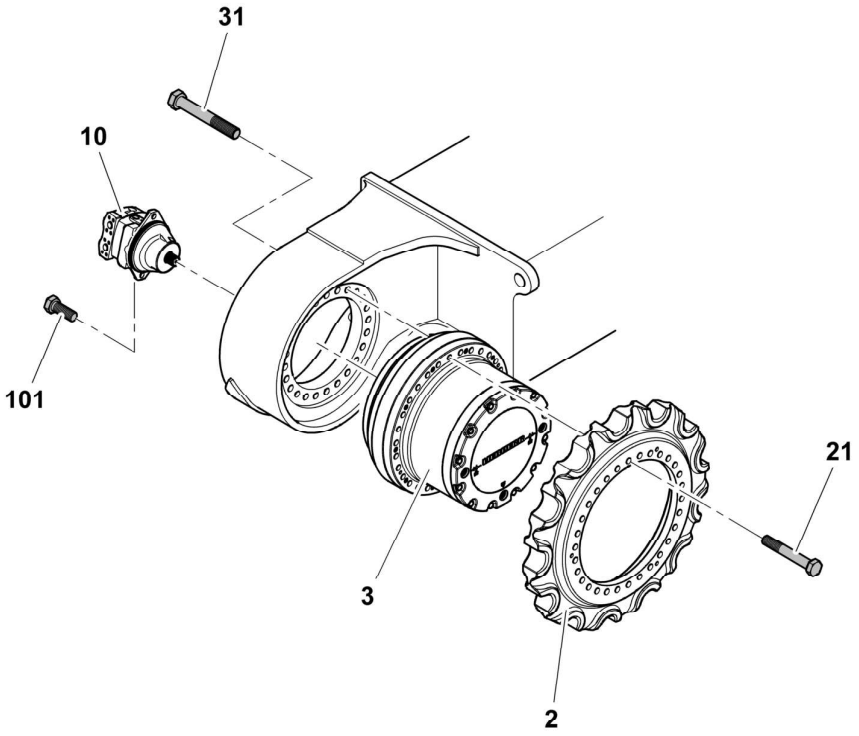

Fig. 5-99 *Travel gear components (right and left sides)*

		Torque
2	Sprocket	-
3	Travel gear	-
10	Hydraulic motor	-
21	Screw M30x150 x quantity 30 for each side	1920 Nm
31	Screw M30x160 x quantity 24 for each side	1920 Nm
101	Screw M24x65 x quantity 2 for each side	965 Nm

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5.16.4 Electrical components location

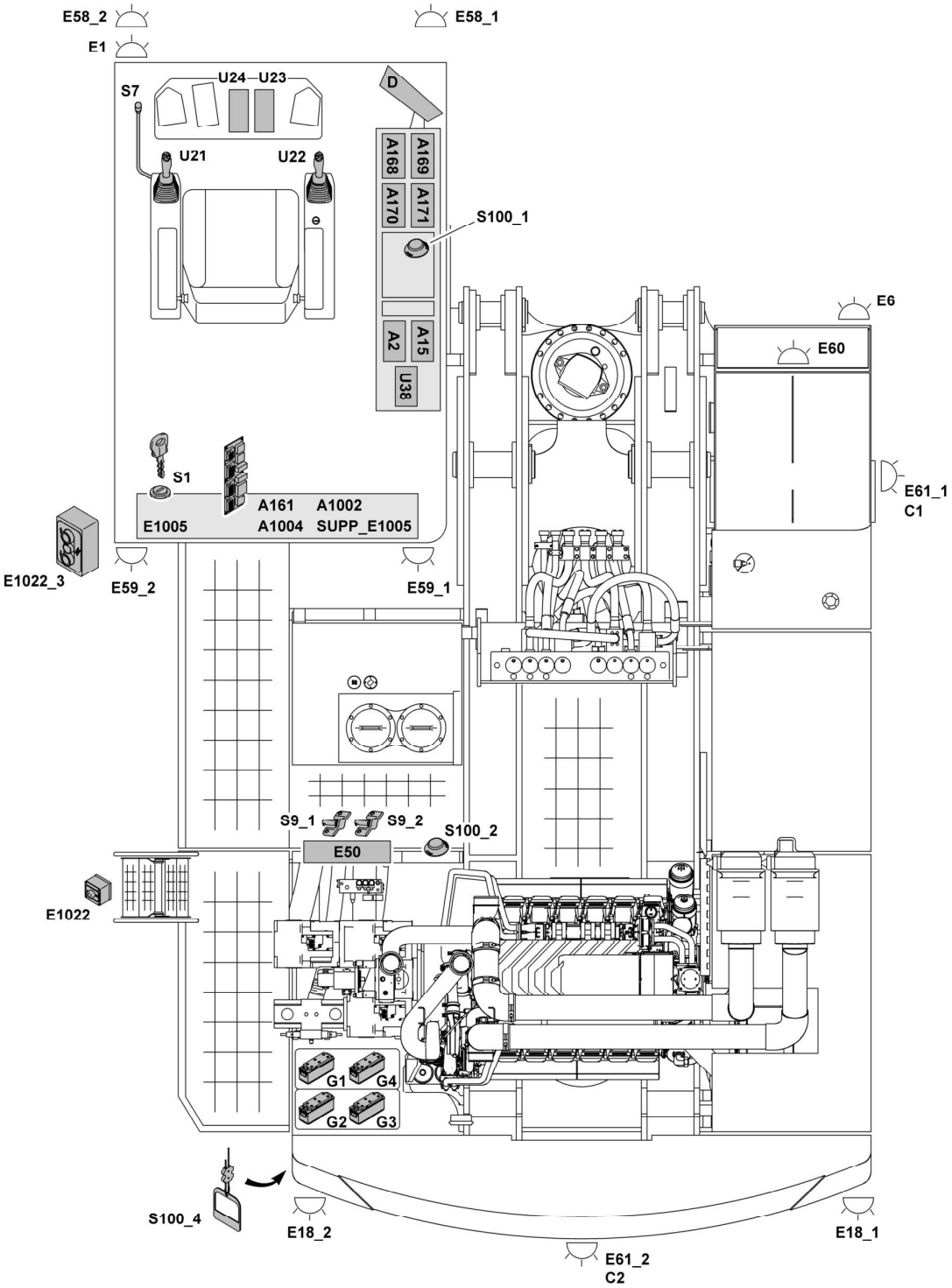

Fig. 5-112 *Electrical components location*

A2	Radio	**E61_2**	Camera lighting / Counter-weight

5.19.2 Lubrication of special tools (optional)

▶ Refer to the Operator's Manual of the special tool manufacturer for:
– detailed description of maintenance work to be performed on this device
– maintenance intervals
– grease specifications

5.20 Check mounting bolts for tightness

The mounting bolts listed below must be regularly checked and retightened if necessary. Refer to the control and maintenance chart for checks intervals.

Note!
When installing bolts of size bigger than M40 the thread of the screw must be slightly coated with a MoS2 based grease. Also grease the bolt head supporting surface, unless hereafter otherwise specified.

Danger!
Due to their size, most of the below listed mounting bolts require, to be tensioned to the prescribed torque, the use of a special, hydraulic or electric actuated tensioning device.
These high torque tensioning devices are power tools, which must be operated by trained mechanics, knowing the safety precautions edicted by the tool manufacturer and that must be observed to avoid accidents or personal injury.
In particular, pay attention to chose a solid and secure reaction point for the tool and position the reaction arm during operation. Keep clear of the reaction arm during operation; if it must be held or steaded during operation, use alternative means of securing the tool during operation.

Caution!
The mounting bolts of the main components (especially the bolts listed below), of the hydraulic hoses and of the counterweight must be replaced after every removal.

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2 Special fuel tank of coolant heater **4** Cap of special fuel tank

▶ For description of maintenance to be performed on the coolant heater, refer to the control and maintenance chart.

Fuel system

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 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.

Check the fuel level and refuel

The special fuel tank **2** is installed on the engine cooler box. Its capacity is 20 L.

▶ Check the fuel level with the sight gauges **3**.

▶ Make sure the Diesel engine and the coolant heater are switched to off.

▶ Add fuel in the special tank **2** through the tank cap **4**.

Fuel filter

A fuel filter **5** is installed on the fuel line, between the coolant heater and the special fuel tank.

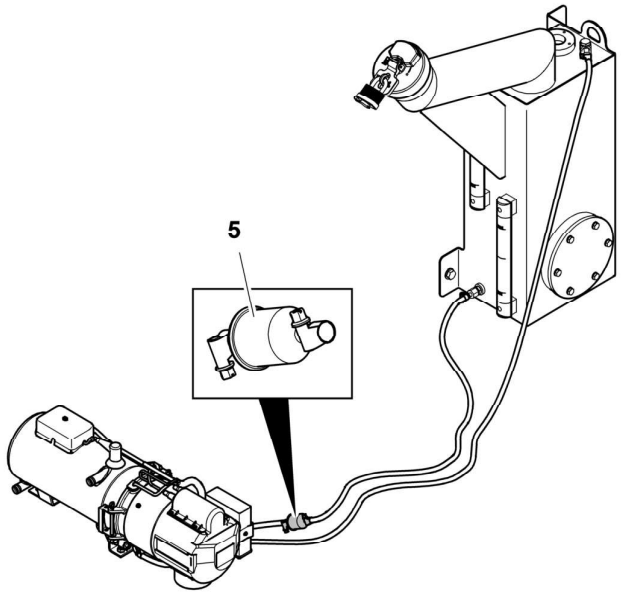

Fig. 5-133 *Fuel filter of coolant heater*

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

5.26.3 Daily Maintenance Schedule - R9150

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

WORK TO BE PERFORMED DAILY 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 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 and 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	❍		
TRACK COMPONENTS			
Clean track chains (after the end of each shift)	❍		

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WORK TO BE PERFORMED AT 500, 1500, 2500 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Change gear oil (if filled with COB-2, COB-3 or COB-4 gear oil)	❑		
SWING RING			
Do a detailed check of the grease supply (outlet of new grease around the swing ring)	❍		
CENTRALIZED LUBRICATION SYSTEM			
Perform a complete daily maintenance given in the SKF / Lincoln Operating Instructions Manual	❍		
Do a check of the grease tank level	❍		
DIESEL ENGINE AND SPLITTERBOX			
Do a visual check in and around the engine compartment for leaks, contaminations and damage	❍		
Check engine oil level	❍		
Sample and analyse engine oil	❍		
Change oil in Diesel engine in accordance with the difficulty factors, (for maintenance intervals, see Diesel engine LIEBHERR operation and maintenance manual)	❍		
Replace engine oil filters in accordance with the oil change	❍		
Check coolant level	❍		
If installed, replace coolant filters	❍		
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 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, replace if necessary and reset the indicator	❍		
Do a visual check of the precleaner	❍		
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	❍		
Do a visual check of the splitterbox breather for clogging, replace if necessary	❍		

WORK TO BE PERFORMED AT 1000, 3000, 5000 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Do a visual check of electric harness, sensors for damage and/or rubbing zone	❍		
Do a detailed check of fuses and circuit breakers	❍		
Do a visual check of wiring system damage	❍		
Check battery electrolyte level (refill if necessary) and clean battery terminals	❍		
CABIN			
Do a detailed check of the V-belt tension for air conditioner	❍		
Do a visual check of the cabin for oil/fluids leaks	❍		
Operate air conditioner every week for 10 minutes	❍		
Check the condition of the condenser, blow it out if necessary	❍		
Do a visual check of the fresh air filter and the recirculated air filter	❍		
Do a visual check of the dryer / accumulator unit for moisture degree, coolant level and good condition, replace if necessary (at least once a year)	❍		
The function of the air flaps and the defrosting thermostat must be checked yearly by a refrigeration specialist	❍		
Perform maintenance for the second air-conditioning system (optional equipment)	❍		
Lubricate all doors seals with silicone or talc (before cold season)	❍		
Do a visual check of the AC for leaks or rubbing hoses or pipes	❍		
Do a visual check of the locks and hinges on doors and windows (lubricate if necessary)	❍		
Do a detailed check of the cabin fluid bearing	❍		
FIRE FIGHTING SYSTEM			
Do a visual check of the fire fighting system condition (optional equipment, refer to the fire fighting system documentation) - If any issue contact fire fighting local dealer	❍		
Follow the inspection intervals recommended by the specific Health and Safety rules existing in country and/or on mine site	❍		
START THE ENGINE TO CHECK THE FOLLOWING ACTIONS			
General: Maintenance work must include the check of the correct functions of hydraulic and electric systems before starting operation	❍		
Attachment: Check function of the working attachment lubrication system during operation	❍		
Attachment: Check if the damping system on equipment is working correctly	❍		
Uppercarriage: Check position of the hydraulic shut-off valve	❍		
Uppercarriage: Check movement and locking of the access ladder (optional equipment)	❍		

WORK TO BE PERFORMED AT 2000, 4000, 6000 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
Do a visual check of the locks and hinges on doors and windows (lubricate if necessary)	❍		
Do a detailed check of the cabin fluid bearing	❍		
Do a detailed check of the heater exchanger and filter for leaks	❍		
Do a detailed check of the warm water solenoid valve for function and chocking, clean it if necessary	❍		
Check the condition of the evaporator, clean it if necessary	❍		
FIRE FIGHTING SYSTEM			
Do a visual check of the fire fighting system condition (optional equipment, refer to the fire fighting system documentation) - If any issue contact fire fighting local dealer	❍		
Follow the inspection intervals recommended by the specific Health and Safety rules existing in country and/or on mine site	❍		
START THE ENGINE TO CHECK THE FOLLOWING ACTIONS			
General: Maintenance work must include the check of the correct functions of hydraulic and electric systems before starting operation	❍		
Attachment: Check function of the working attachment lubrication system during operation	❍		
Attachment: Check if the damping system on equipment is working correctly	❍		
Uppercarriage: Check position of the hydraulic shut-off valve	❍		
Uppercarriage: Check movement and locking of the access ladder (optional equipment)	❍		
Uppercarriage: Check that the swing movement of the uppercarriage is locked when the access ladder is lowered (optional equipment)	❍		
Swing Gear: Check function and operation of the swing brake	❍		
Swing Ring: Check function of the swing ring bearing lubrication system during operation	❍		
Swing Ring: Check function of the swing ring teeth lubrication system during operation	❍		
Diesel engine: Check speed on RPM gauge	❍		
Diesel engine: Check running noises	❍		
Diesel engine: Check exhaust gas colour	❍		
Diesel engine: Check oil pressure and coolant temperature during operation	❍		
Electrical system: Clean and check LCD screen of the display for proper function when starting	❍		
Electrical system: Check indicator lights and gauges on the control panel when starting	❍		

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Serious damage

If you find a serious damage:

Immediately	▶ Inform formally the responsible Maintenance Manager about the condition of the hose assembly. ▶ Make sure that you have the correct replacement part in stock.
Daily	▶ Examine the hose assembly. Monitor if the deterioration increases. ▶ If the deterioration of the hose assembly increases in a small number of days, refer to next section "Major damage" for the actions to do.
One of the next services, but not later than 250 hours	▶ Replace the hose assembly.

Rubber cover has many cuts or cracks - Reinforcement layer is not corroded or not cut - No sign of oil



Rubber cover is rubbed - Reinforcement layer is uncovered but not corroded - No sign of oil

Hoses and fittings are visually wet - Oil propagates
There is a surface of remaining oil which is visually wet and results in the formation of non-falling or falling drop.



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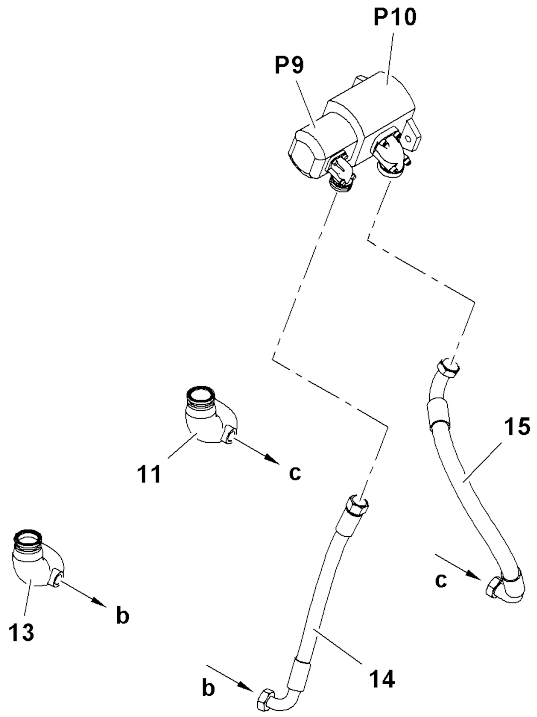

Fig. 6-12 *Intake lines connected to the working pumps circuit*

11	Suction pipe connected to P3	**15**	Suction hose connected to P10
13	Suction pipe connected to P2	**P9**	Pilot oil pump
14	Suction hose connected to P9	**P10**	Replenishing oil pump

- ▶ Disconnect, drain and clean all the hoses and pipes.
- ▶ Clean the shutoff valves **6**.
- ▶ Clean the hydraulic tank **3** (refer to the related section).
- ▶ Do the restart procedure before you put the machine in operation (refer to the related section).

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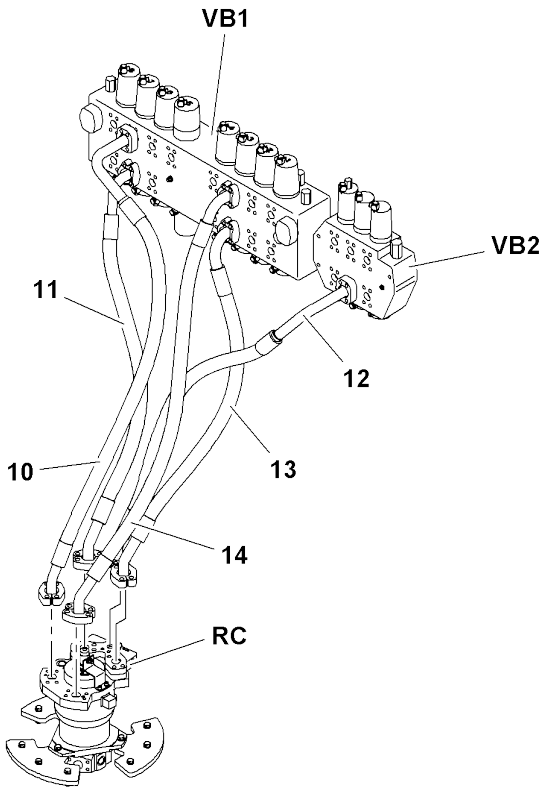

Fig. 6-23 *Working pressure circuit on the uppercarriage*

10	Hydraulic hose	**14**	Hydraulic hose
11	Hydraulic hose	**RC**	Rotary connection
12	Hydraulic hose	**VB1**	Valve block 1
13	Hydraulic hose	**VB2**	Valve block 2

- ▶ 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).

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Circuit of shovel tilt cylinders

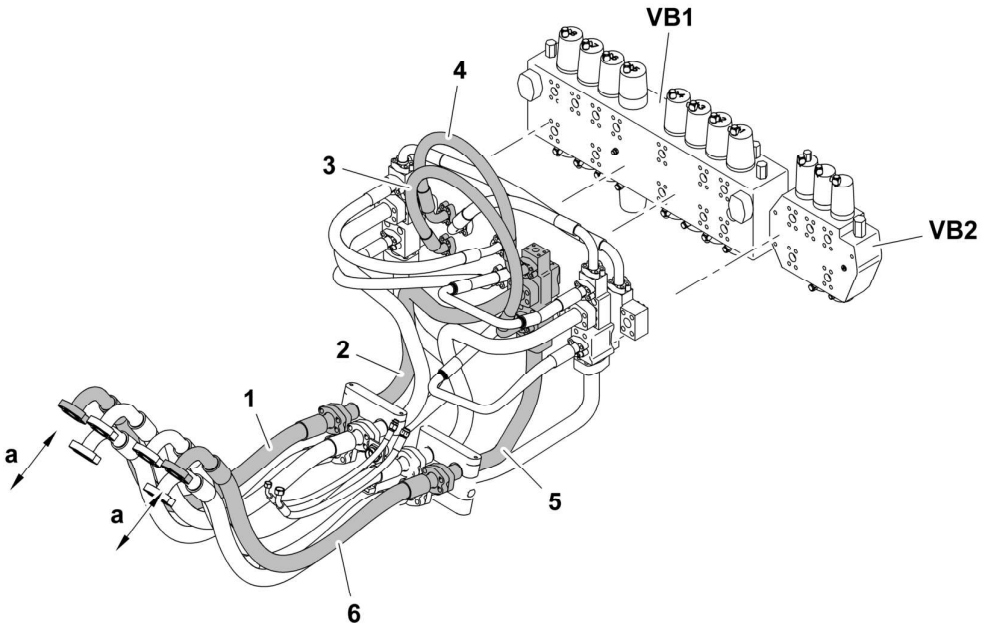
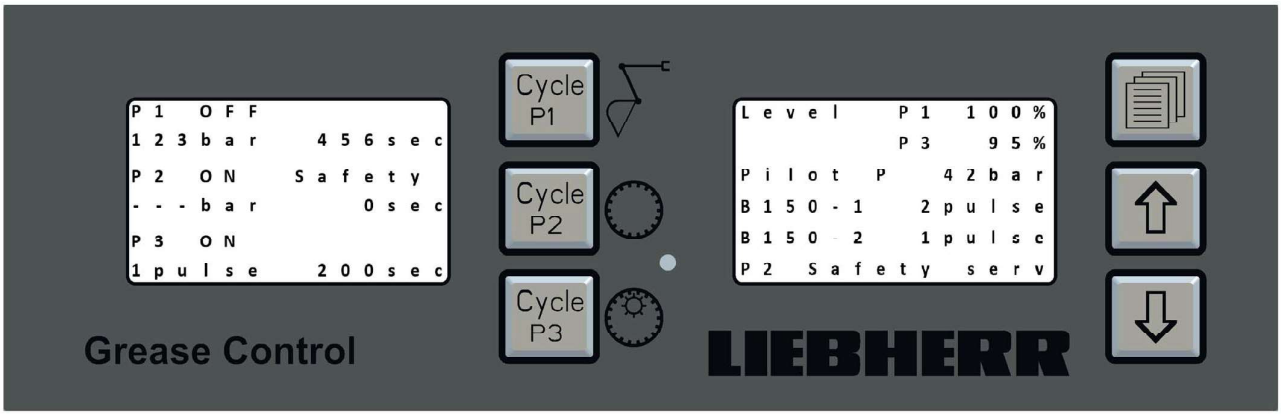


Fig. 6-33 *Hydraulic lines on the uppercarriage*

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

1. Main Screens and Control Buttons



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

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

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

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

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

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

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

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

 **Start Cycle P”X”:**

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

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

LEC / en / Edition: 09/2018

Life cycle – commissioning	
Residual risks	**Remedy**
Lubricant spraying out due to incorrect screw connection of components or lines.	Tighten all parts with appropriate tightening torques. Use suitable hydraulic screw connections and lines for the stated pressures. Check these prior to commissioning for correct connection and damage.
Contact with corrosive or toxic substances that may be set free by a defective battery.	Wear protective clothes. Ensure sufficient ventilation. Storage and disposal of defective batteries in accordance with the corresponding safety data sheets for lithium.
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. Observe the legal or company regulations on dealing with oils and greases and contaminated parts.
Falling of parts due to insufficient fixing to the machine.	Fix parts only to machine parts with sufficient load capacity. Observe the weight and the stated tightening torques. If no tightening torques are stated, the tightening torques are to be applied to the screw size for 8.8 screws. ➔ Literature, see screw manufacturer.
Bursting reservoir if filled by a high-performance pump	Monitor the filling procedure and stop it when reaching the max marking of the reservoir
Contact with stirring paddle or shovel foot during "test operation" without lubricant reservoir or barrel	Always operate pump with lubricant reservoir or barrel. Do not reach into the stirring paddle, the drive or the supply piston.
Tearing or damaging of lines when installed on moving machine parts (e.g. pivot arm).	If possible, do not mount on moveable parts. Should this not be possible, use flexible hose lines of sufficient lengths.

4.7 Inspection of the delivery / returns

The delivery must be inspected for completeness based on the delivery papers. Transport damages must be reported to the forwarder immediately. Keep the packaging material until any discrepancies are resolved.

Returns

Clean all parts and pack them properly, i.e. following the regulations of the recipient country, before returning them. Mark returns on the packaging as follows;

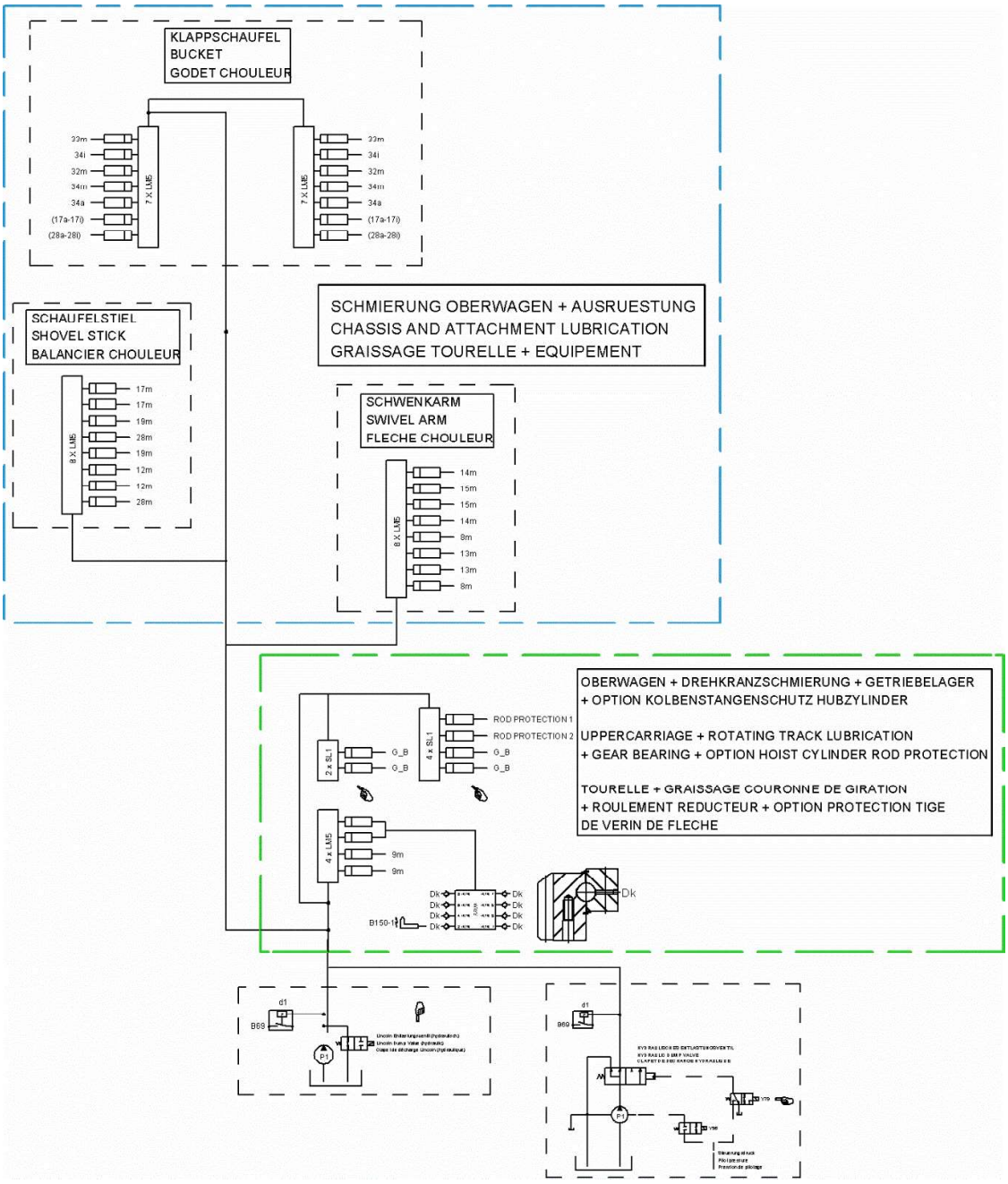
	Do not burden / this side up!
	Protect against moisture!
	Handle with care! Fragile, do not throw!

Disposal

At the end of their service life, the centralized lubrication system and its components must be dismantled and disposed of according to the respective valid provisions in an environmentally friendly manner. It is forbidden to use parts of a centralized lubrication system that is to be disposed of or to assemble these parts to build a new system.

In case of a final shutdown follow the applicable rules and regulations on the disposal of contaminated parts or means of operation. The product can also be returned to SKF for proper disposal, in which case the customer is responsible for reimbursing the costs incurred. The parts are recyclable.

 **CAUTION**
Lubricants may pollute ground and waters. Lubricants have to be handled and disposed of properly. Observe the instructions by the machine manufacturer regarding the lubricants to be used.



Legend:

Equipment:
Uppercarriage:

Fig. 4 Automatically operated single-line system with LM5 and subsequent progressive divider valve for shovel attachment

Pump P3 - Multi-line pump type P203-8XYBAU (R9150)

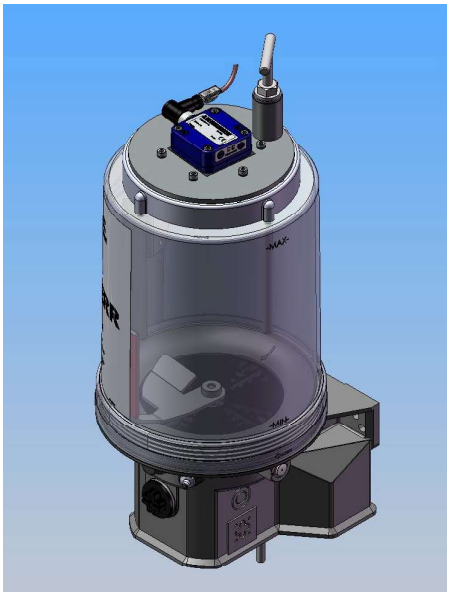


Fig. 12 Option P203- 8XYBAU-1K6-24-1A8.XX

The pump is a compact multiline pump consisting of the following components:

- · Housing with integrated motor
- · Reservoir with stirring paddle
- · Printed circuit board
- · Pump element
- · Pressure relief valve
- · Filling nipple
- · Electrical connection parts
- · Operates according to lubrication cycles (pause and operating times)
- · Designed for the delivery of greases up to NLGI 2
- · Can be used at low temperatures down to -40 °C.
- · During the operating time the pump dispenses lubricant to the connected lubrication points via one device.

Number of outlets:	1
Piston diameter:	6 mm
Lubricant output:	approx. 2.8 cm³/min
Reservoir capacity:	8 liters

For more details:

- Description
- Mode of operation
- Maintenance
- Troubleshooting
- Technical data

Refer to Technical Description: 21EN-30001-xxx; 20EN-20003-xxx; 26A-20003-xxx

For information and descriptions of the components, refer to chapter 13.