en

Operating manual

Hydraulic excavator
R 9250

from serial number 30616

Document identification

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Manufacturer:	Liebherr-Mining Equipement Colmar SAS
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Conformity:	CE

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LIEBHERR

1.1.2 Uppercarriage

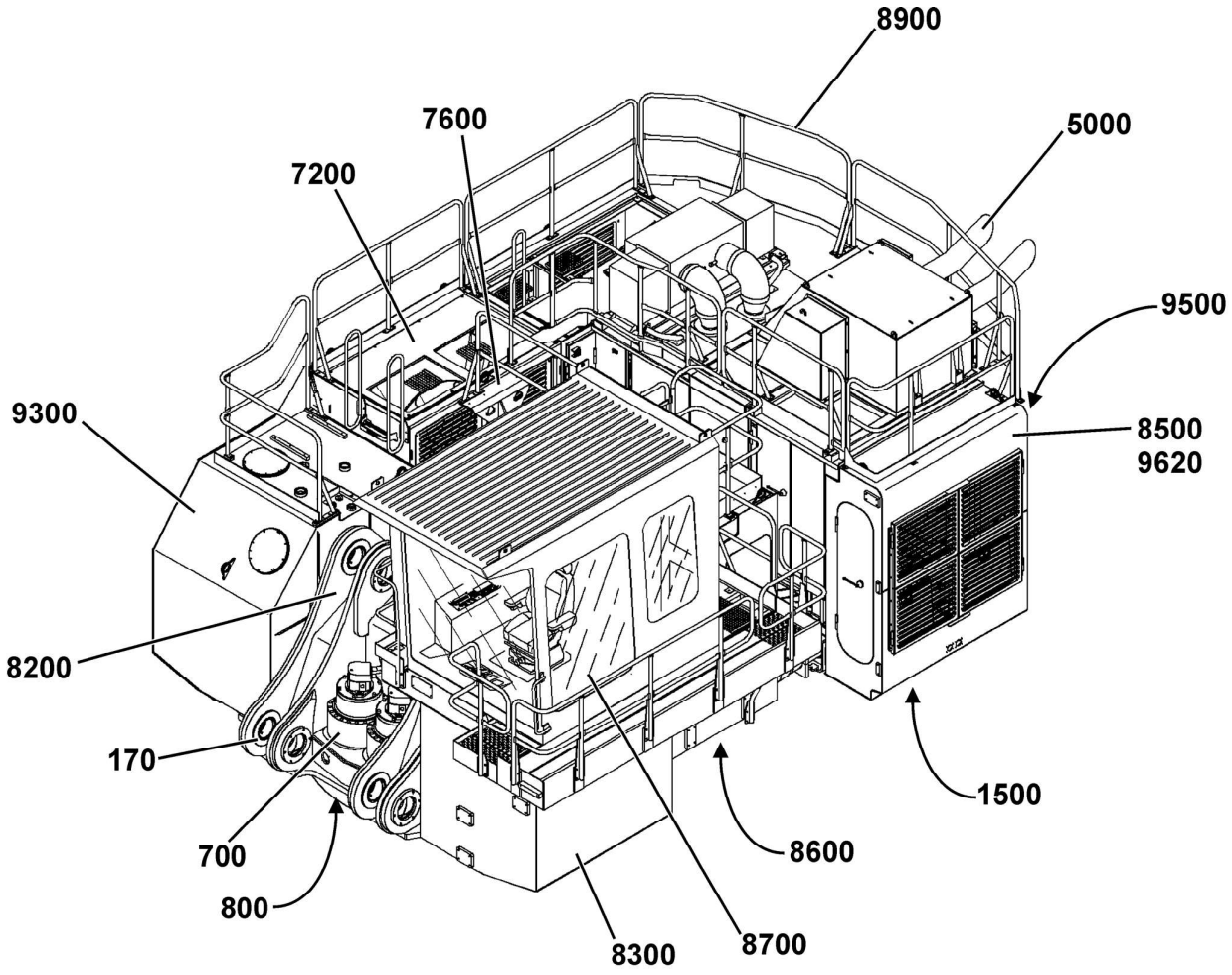

Fig. 1-3 Uppercarriage

170	Attachment mounting parts	**8300**	Cab elevation
700	Swing gear installation	**8500**	Covering
800	Swing ring installation	**8600**	Lower covering
1500	Service trap	**8700**	Cab
5000	Engine installation	**8900**	Catwalk and handrail
7200	Oil cooler installation	**9300**	Fuel tank
7600	Control valve installation	**9500**	Counterweight installation
8200	Rotating deck		

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Fast and Precise Movement

Powerful Drive System
The R 9250 is equipped with a Cummins diesel engine which has been specifically adapted to withstand the most extreme environments and to reach the highest uptime performance for maximum productivity. The electric drive system provides superior performance when the machine is used in the most specific conditions.

Optimized Cycle Times
Rather than using open hydraulic circuit, the R 9250 employs a closed-loop swing circuit to enable maximum swing torque while retaining the full oil flow for the working circuit. The independent swing circuit in combination with the powerful drive system leads to fast arm motion, which contributes to faster cycle times.

Precise Machine Motions
The R 9250 design integrates the Litronic Plus electronic control system to allow for easy control even when simultaneous movements are required. The patented Liebherr electronic damping system provides controlled end-cushioning for smooth attachment motions.

High Digging and Lifting Capabilities

High Digging Forces
Designed for the best mechanical force distribution, the production-tailored attachment delivers high digging and lifting forces. Integrating Liebherr-made cylinders and a wide range of buckets with mining optimized GET, the R 9250's attachment ensures the highest forces, easy bucket penetration and high fill factor to perform even in the most demanding conditions.

Power-Oriented Energy Management
The R 9250's attachment is equipped with the pressureless boom down function to enable fast cylinder retraction without the need for pump energy. Intelligent energy management diverts the pump flow during boom lowering, allowing other cylinder motions to operate unimpeded.

Litronic plus®

Litronic Plus Electronic Control
A power management system developed to optimize electrical, mechanical, hydraulic power distribution which encompasses:
- Liebherr designed and built power components
- Continuous monitoring of the engine and electrical system
- Safe, fast and precise control
- Optimum equipment operation
- Productivity and efficiency maximization

Engine / Motor Options
Diesel engine available version:
- Cummins QSK 38 (US EPA Tier 2 compliant)
- Cummins QSK 45 (US EPA Tier 1)
- Fuel consumption optimized version on QSK38 engine (optional)

Electric drive (optional):
- 3 phase AC squirrel cage motor
- Voltage on request
- 50 or 60 Hz frequency

Exclusive EVO Bucket Solution
- Liebherr patented EVO design to maximize the loading capacity
- Optimized Liebherr GET and wear package according to customer application
- Ensures optimal penetration efficiency
- Single GET hammerless locking system for safe and easy maintenance
- Fully patented GET system design for optimal penetration / lifetime
- 4 tooth profiles available for various range of applications

Minimized Impact on Life

Optimized Energy Consumption, Fewer Emissions
The intelligent energy management system coordinates optimal interaction between the hydraulic system and engine output with the goal of a maximum performance with a minimum consumption. With the “Eco-Mode”, the machine is set up to reduce engine load, improve significantly fuel consumption and optimize emissions while maintaining highest production levels.

Controlled Emission Rejection
The R 9250 is powered by a high horsepower diesel engine which complies with the US EPA Tier 2 compliant emission limits. This power drive makes the R 9250 cost effective without compromising productivity whilst reducing the machines impact on the environment.

Sustainable Design and Manufacturing Process

Certified Environment Management Systems
Subject to the stringent European program for the regulation of the use of chemical substances in the manufacturing process REACH*, Liebherr undertakes a global evaluation to minimize the impacts of hazardous material, pollution control, water conservation, energy and environmental campaigns.

Extended Components and Fluids Lifetime
Liebherr is constantly working on ways to extend component life. Through the Exchange Components program, superior lubrication systems and the reinforcement of parts under stress, Liebherr can reduce frequency of part replacement. The result minimizes environmental impact and lowers the overall cost of ownership.

*REACH is the European Community Regulation on chemicals and their safe use (EC 1907 / 2006)
It deals with the Registration, Evaluation, Authorization and Restriction of Chemical Substances.

The Liebherr-Mining Remanufacturing Program
- Second life for your components
- Liebherr certified workshops
- Reduced environmental impact
- Reduced costs and investment
- Alternative to purchase brand-new replacement components

Electric Drive Version
- Lower maintenance costs
- No service for engine oil
- No replacement for oil and fuel filter
- Less noise pollution
- High motor efficiency
- Less vibration resulting in higher component lifetime
- Maximum efficiency in cold climate conditions when combined with the Arctic Package

Sound Attenuation Package (optional)
Developed with the latest noise measurement technologies, this approach is based on both removal of noise at the source and passive sound attenuation:
- Noise-optimized fan regulation
- Valve bank covering
- Sound attenuation on louvers, doors and walls

relating to special accessories for the machine.

- Only specifically authorized persons may operate, maintain or repair the machine. The legal minimum age is to be adhered to.
- Only employ trained or appropriately instructed personnel. Clearly establish which personnel are responsible for operating, setting up, maintaining and repairing the machine. Give personnel the power to refuse to carry out unsafe instructions. This also applies in relation to traffic regulations.
- Only permit apprentices and personnel who are in training or who have only general training to operate on the machine under the constant supervision of an experienced member of staff.
- As far as possible, monitor personnel to ensure that they are adhering to safe working practices, are aware of risks and are observing the operating instructions.
- Always wear safe work clothes when you are working on or with the machine. Avoid wearing rings, wrist watches, ties, scarves, open jackets, baggy clothing etc... There is a risk of injury from, for example, getting caught up or being drawn in.
- Wear individual protective equipment (protective goggles, safety helmets, safety shoes and gloves, reflective vests and ear protection etc....).
- Ensure that you obtain information on any special safety regulations for the job site from the site foreman.
- Always tilt up the safety lever before leaving the operator's seat.
- When getting in and out, do not hold on to the steering column, control panel or joystick. Doing this could cause unintentional movement, which could result in an accident.
- Never jump from the machine; use the steps, ladders, gangplanks and supporting straps provided for this purpose.
- 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.
- Familiarize yourself with the location of the emergency exit.
- In the absence of any other instructions, proceed as follows for all maintenance and repair work:
  - park the machine on firm, level ground
  - align the uppercarriage with the undercarriage so that the sprockets locate at the back-end
  - anchor the bucket in the ground.
  - place all operating levers into neutral and tilt the safety lever up.
  - switch off the engine and remove the start key.
- Before touching any parts of the hydraulic circuits, you must also operate all pilot control devices (joystick and pedals) in all directions with the start key in contact position and with the security lever lowered, 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.
- Secure all loose parts on the machine.
- Never operate a machine before carrying out a careful inspection tour and checking whether any warning signs are missing or illegible.
- Respect all danger and safety instructions.
- For special applications the machine must be equipped with specific safety equipments. Work only if they are mounted and functional.
- Do not carry out any modifications, alterations or conversions to the machine which may affect safety without the express permission of the manufacturer. This also applies for the installation of safety devices and valves and for welding work on load-bearing parts.

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- Draw the attachment as close as possible to the machine.
- Only at this point may the support feet be retracted and the machine moved.
- Moving with loads is not permitted.
- Check the terrain to be covered to ensure that the ground is solid and even. Potholes and uneven surfaces jeopardize the stability of the machine.
- Adjust vehicle handling to suit the altered machine characteristics (high centre of gravity) and environmental conditions.
- Reduce your speed to prevent the need for sudden braking and steering manoeuvres.
- Avoid sudden speed changes, such as braking, accelerating and changing direction.
- Ascending gradients and obstacles may only be approached in the longitudinal direction in order to prevent unacceptable banking of the machine.
- Special care should be taken when driving through narrow passages - drive slowly!

When loading and unloading:

- The machine must be supported and aligned horizontally before moving (swing) the uppercarriage out of the transport position.
- It is imperative that you check the contact surface of the support (load carrying capacity of the substrate). A support subsiding would have disastrous consequences!
- 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 attach-

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Danger!
Non-observance of **safety plates** can result in serious injury or death.

- ▶ Check warning plates regularly to ensure that they are complete and clearly legible.
- ▶ Replace missing or illegible safety and information plates immediately. You will find the ordering numbers of these plates in the spare parts book of the excavator.

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3 Control and operation

3.1 Operating and control elements

3.1.1 Overview of the control cab

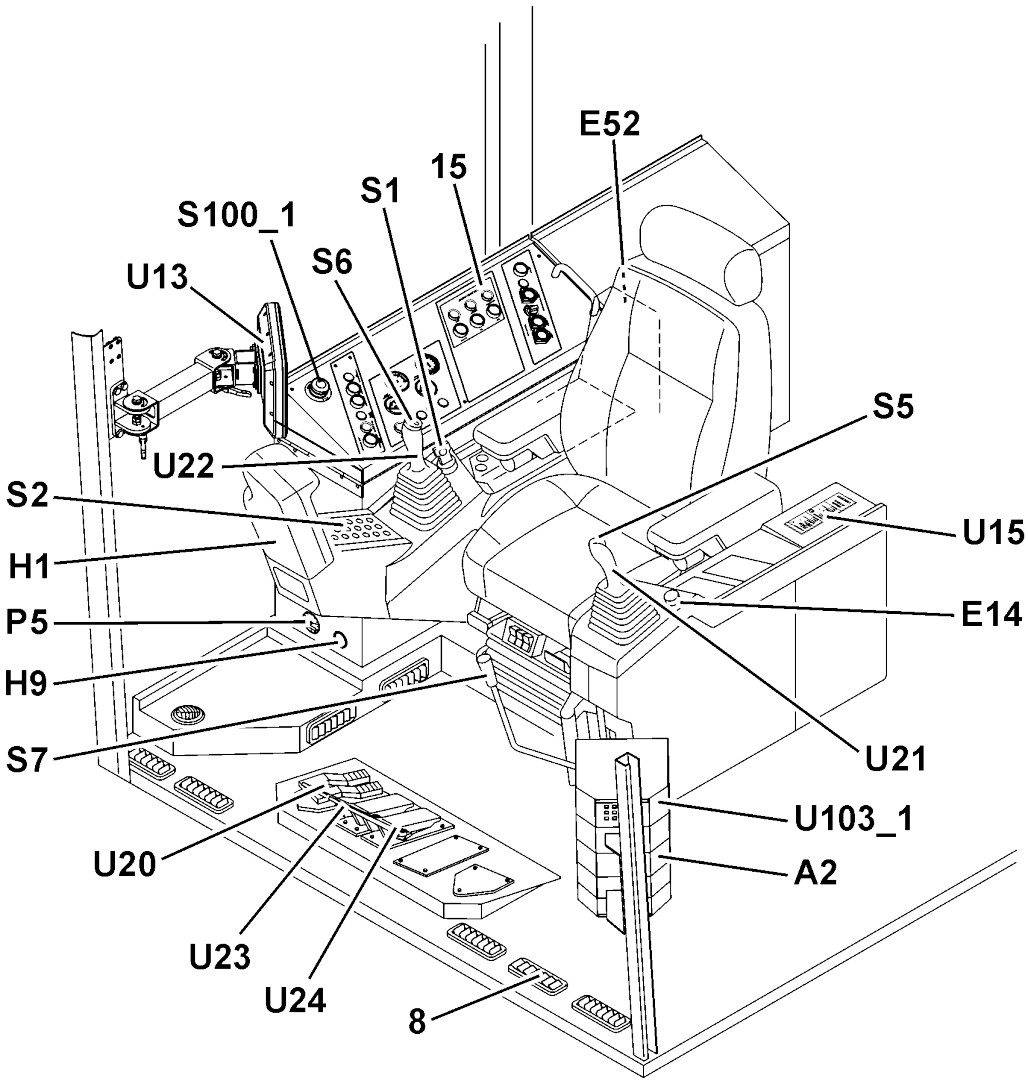


Fig. 3-1 *Control cab*

8	Heater vent	**S6**	Switch / float position attachment
15	Control board	**S7**	Safety lever
A2	Radio	**S100_1**	Emergency stop
E14	Cigarette lighter	**U13**	Display for monitoring cameras
E52	Control board for safety operation	**U15**	Greasing module

Area A: Diesel engine monitoring

P2 – Diesel engine coolant temperature display

The display must be in the green area when operating the machine.

In the event of overheating (over 98 °C = 204°F), the red LEDs **P2.1** at the end of indicator **P2** will flash.

The buzzer in the cab also sounds.

When this Indicator light illuminates, the error will be saved as error code **E 503**.

- ▶ The red indicator protection **H62** on the control board will light up.
- ▶ The Quantum system will cause an engine shutdown.
- ▶ Find and rectify the cause of the problem.

P3 – Fuel level display

The LED indicator lights show the fuel level. When the both red light **P3.1** light up, about 10% to 20% fuel are left in the tank as reserves.

Area B: Indicator lights

H2 – Indicator light, low engine oil pressure

The Indicator light illuminates if the engine oil pressure drops below a given value when the machine is operating.

The buzzer in the cab also sounds.

When this Indicator light illuminates, the error will be saved as error code **E 501**.

- ▶ The red indicator protection **H62** on the control board will light up.
- ▶ The Quantum system will cause an engine shutdown.
- ▶ Find and rectify the cause of the problem.

H12 – Indicator light, battery charge

The Indicator light illuminates if the ignition key is placed in the contact position.

The Indicator light goes out as soon as the engine is started.

When the machine is operating, this Indicator light illuminates if the V-belt alternators or the electrical charging system are defective.

- ▶ Bring the engine to a low idle immediately.
- ▶ Allow the engine to idle for approximately 5 seconds.
- ▶ Switch off the engine.
- ▶ Rectify the error.

H19 – No function

H20 – No function

H23 – No function

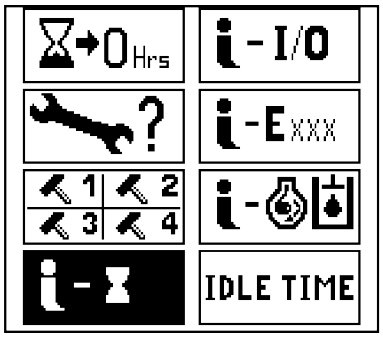


Fig. 3-10 *Menu selection in the operator's menu.*

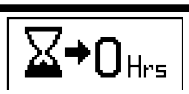
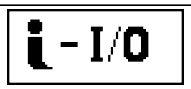
To select the operator's menu:

▶ Press arrow key **Down** or **Up**.
  ↳ The following or previous operator's menu will be displayed on screen with a black background.

❑ The selected menu is displayed with a black background, the **Reset daily operating hours** menu is used here as an example.

▶ Press the **Menu** button again.
  ↳ The submenu for the function selected is displayed.

▶ Press the **Back** button again.
  ↳ The submenu will be aborted.

Symbol	Description
	Reset daily operating hours counter
	Confirm service interval
	Select quantity limitation relating to attachments (eg. hammer)
	Operating hours and device data
	Status of hydraulic pumps and electrical inputs and outputs
	Recorded and stored errors
	Information about the Diesel engine
	Set the time interval for the automatic idling function
	Immobilizer (must be activated by LIEBHERR customer service using a service connector)

Tab. 3-1 *Overview of menu options*

IDLE TIME

Idle time setting menu

In this menu, you can set the time interval for the automatic idling function.

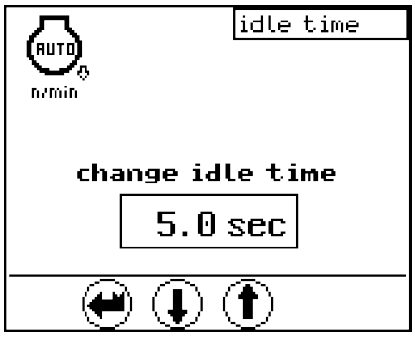


Fig. 3-27 *Idle time setting menu*

To set the time interval:

▶ Press the **Down** or **Up** arrow key to set the time interval.

To exit the menu:

▶ Press the **Back** button to save the value and/or exit the menu.

Setting the horizontal seat position

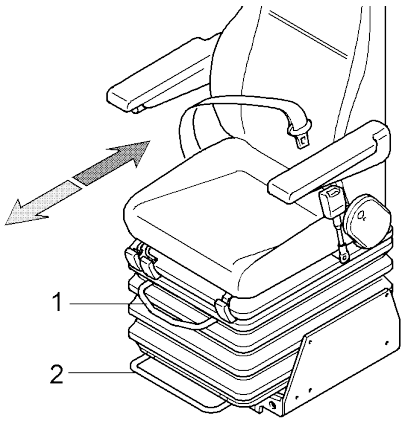


Fig. 3-38 *Setting the horizontal*

- ▶ Pull up the lever **1** to push the operator's seat in the horizontal direction.
- ▶ Pull up the lever **2** to push the operator's seat and control panels in the horizontal direction.

Setting the vibration damping and lumbar support, switching on the seat heating (air-cushioned operator's seat, optional extras)

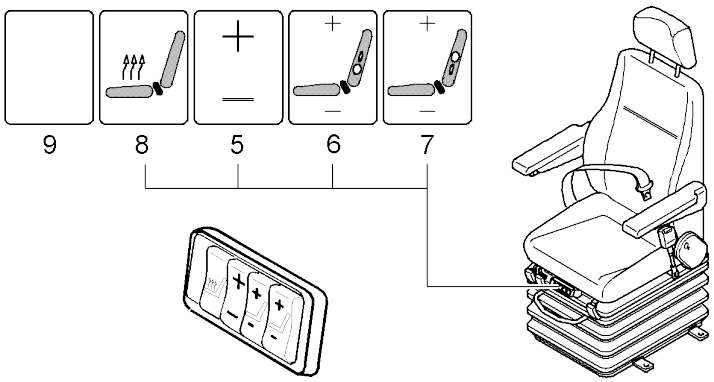


Fig. 3-39 *Switch bar on the air-cushioned operator's seat*

To set the vibration damping:

- ▶ Press button **5** (**+** or **-**) and set the vibration system according to body weight.

To set the lumbar support:

- ▶ Press button **6** (**+** or **-**) to inflate or deflate the lower lumbar chamber.
- ▶ Press button **7** (**+** or **-**) to inflate or deflate the upper lumbar chamber.

To set the seat heating:

- ▶ Use switch **8** to switch the seat heating on or off.

The seat heating switches off automatically when the temperature set is reached.

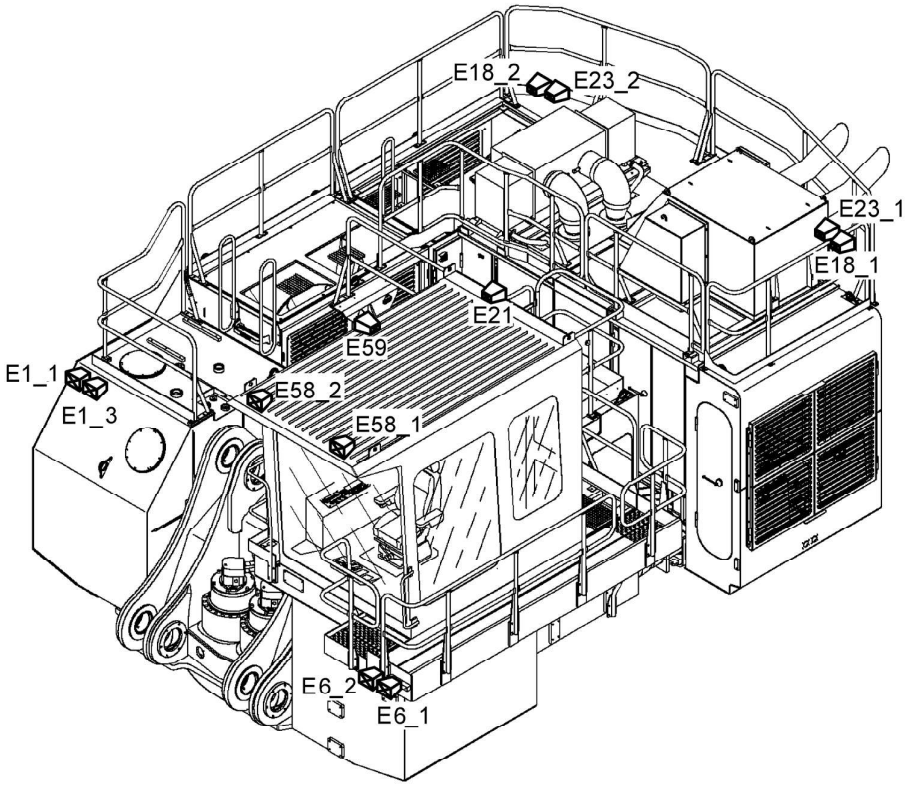


Fig. 3-50 *Arrangement of lighting for the uppercarriage*

E1_1 Fuel tank floodlight
E1_2 Fuel tank floodlight (option, not represented)
E1_3 Fuel tank floodlight
E1_4 Fuel tank floodlight (option, not represented)
E2_1 Equipment floodlight
E2_2 Equipment floodlight
E3_1 Equipment floodlight
E3_2 Equipment floodlight
E4_1 Equipment floodlight (option, not represented)
E4_2 Equipment floodlight (option, not represented)
E5_1 Equipment floodlight (option, not represented)
E5_2 Equipment floodlight (option, not represented)
E6_1 Cabin catwalk floodlight
E6_2 Cabin catwalk floodlight (option, not represented)
E6_3 Cabin catwalk floodlight
E6_4 Cabin catwalk floodlight (option, not represented)
E8_1 Under uppercarriage floodlight (option, not represented)
E8_2 Under uppercarriage floodlight (option, not represented)
E18_1 Counterweight floodlight (option)
E18_2 Counterweight floodlight (option)
E21 Top of cabin floodlight
E23_1 Counterweight floodlight (option)
E23_2 Counterweight floodlight (option)
E58_1 Top of cabin floodlight
E58_2 Top of cabin floodlight
E59 Top of cabin floodlight

run through a self test.

- Make sure all indicators function properly after turning the electrical system on, i.e. the light emitting diodes (indicator lights and gauges) turn on for a short time then the complete field of the LCD indicator 200 turns momentarily black (the matrix indicator is energised completely for a short time).
- Only the diode in the button S22 turns not on that time.

Note!
If no automatic check of the keypad and monitoring screen is carried out when the ignition key is in the contact position, check that the main battery switch is set to on.

Service interval display

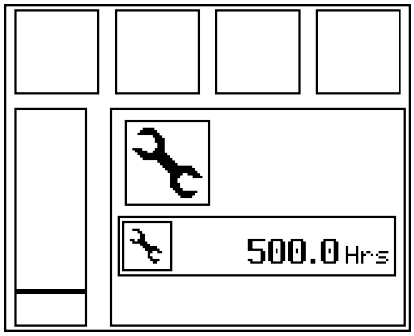


Fig. 3-57 *Service interval request*

After the automatic check, any service interval that may be due will be indicated by a graphic symbol.

In place of the operating hours information, the number of hours relating to the service interval required will now be displayed.

The service interval request will go out after approx. 8 seconds.

Starting the engine

Note!

- ▶ Only operate the starter motor when the diesel engine is off.
- ▶ Operate the starter motor continuously for no longer than 10 seconds.
- ▶ If the engine does not start, turn the ignition key back to contact position **0, before** restarting the engine.
- ▶ And repeat the starting procedure at 20 seconds intervals to allow the starter motor to cool off.

According to the exterior temperature, the starting procedure is different:

- above 0 °C: follow the **Starting procedure when the exterior temperature is above 0 °C**,
- between -18 °C and 0 °C: follow the **Cold start aid procedure for exterior temperature between -18 °C and 0 °C (optional)**,
- below -18 °C: follow the **Starting procedure when the exterior temperature is below -18 °C (optional LIEBHERR preheating system necessary).**

Starting procedure when the exterior temperature is above 0 °C (32 °F)

During the starting procedure of the engine, a pre-lubricating oil pump sets the cor-

S86, **S228** and **S229**, and the engine speed is controlled in consequence by the electronic system of the machine.

If the engine has been started in safety mode via the rocker switch **S71** so it can be operated only with two different RPM values. The commutation between the two values is achieved via the switch **S72**.

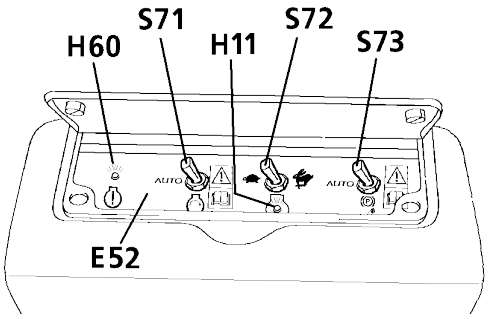


Fig. 3-64 *Emergency control of the engine RPM*

▶ Manually choose one of the values:
- with the switch **S72** tilted to the left, the engine runs at the lower safety RPM.
- with the switch **S72** tilted to the right, the engine runs at the upper safety RPM..

Note!
When the engine is switched automatically into safety operation, the current engine speed is maintained as long as the engine is not shutdown.

Safety operation of the servo control circuits

During normal operation, the servo pressure supply to the swing brake and to the joysticks and pedals is controlled over the electronic circuit of the machine.

While tilting the switch **S73** in safety position, this servo pressure supply can be enforced, and is maintained even in case of a trouble in the normal control circuit.

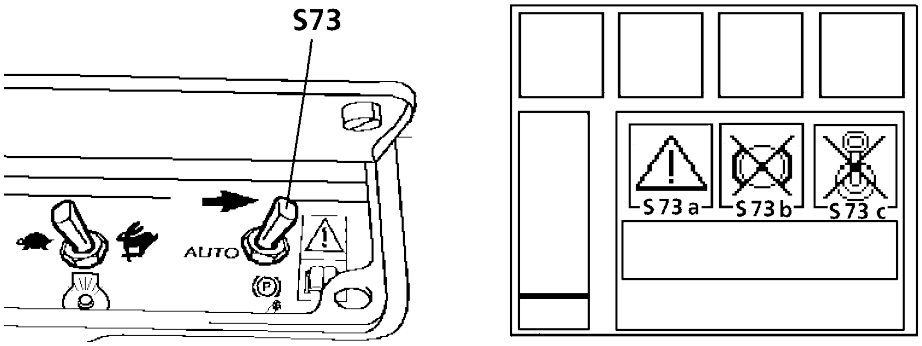


Fig. 3-65 *Safety mode of servo circuits - Safety switch and symbols at the display*

▶ Tilt the safety lever down.

▶ Commute the switch **S73** into safety position (tilt to the right).
- the three indicator symbols S73a, S73b and S73c appear on the display.
- the joysticks and pedals are supplied with servo pressure.
- the swing brake is released.

- Adjust vehicle handling to suit the altered machine characteristics (high centre of gravity) and environmental conditions.
- Reduce your speed to prevent the need for sudden braking and steering manoeuvres.
- Avoid sudden speed changes, such as braking, accelerating and changing direction.
- Ascending gradients and obstacles may only be approached in the longitudinal direction in order to prevent unacceptable banking of the machine.
- Special care should be taken when driving through narrow passages - drive slowly!

When loading and unloading:

- The machine must be supported and aligned horizontally before moving (swing) the uppercarriage out of the transport position.
- It is imperative that you check the contact surface of the support (load carrying capacity of the substrate). A support subsiding would have disastrous consequences!
- 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:

resulting repairs, please note the following points:

- Do not stop the rotary motion of the upper carriage when slewing into a ditch by stopping the equipment on the walls of the ditch.
- Using the machine for applications where the equipment is knocked against the material to be removed, in the longitudinal direction too, is not permitted. Repeatedly hitting the work equipment against rock or other hard material will damage steel parts and machine components.
- With specific combinations of boom, stick and work tool, the work tool could hit or break through into the cab. This could damage the cab and injure the machine's operator.
- Do not attach buckets which are too big or side cutters when using the machine in rocky material. This will extend the work cycles and could result in damage to the bucket and other machine components.
- Please contact your LIEBHERR contractual partner if special teeth are required for heavy or special applications.
- Operating the drag bearing to bore into material is not permitted.
- Do not raise the machine when working. If this should occur, slowly lower the machine to the ground. Do not permit the machine to lower quickly and do not intercept the falling movement using the hydraulics, since this could result in damage to the machine.

3.5.2 Preparatory activities

Danger!
Risk of fatal injury and damage to the machine when working.

▶ Observe the safety information "Notes for safe working" at the start of these operating instructions.

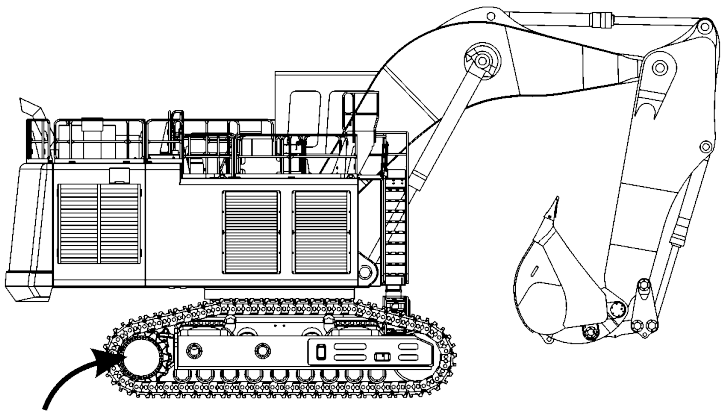


Fig. 3-79 *Working position – machine*

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

Danger!
Insufficient support and machine damage.

- 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.

3.6.2 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:

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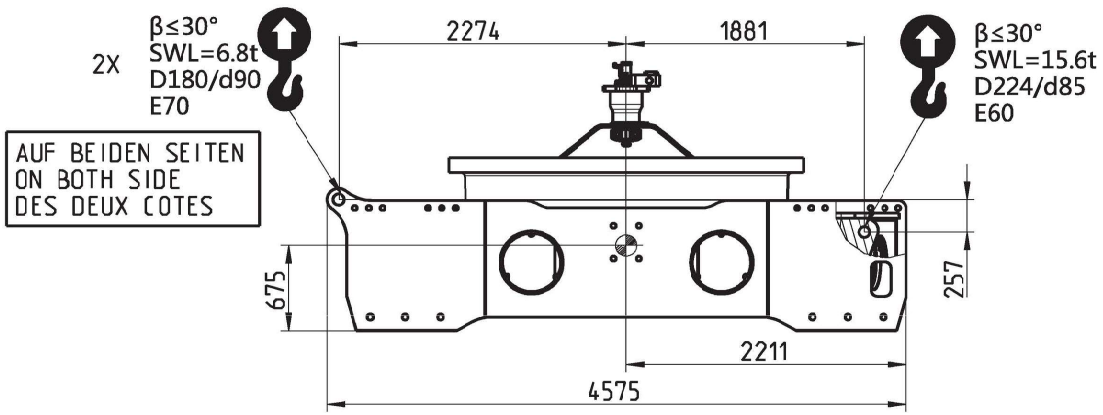

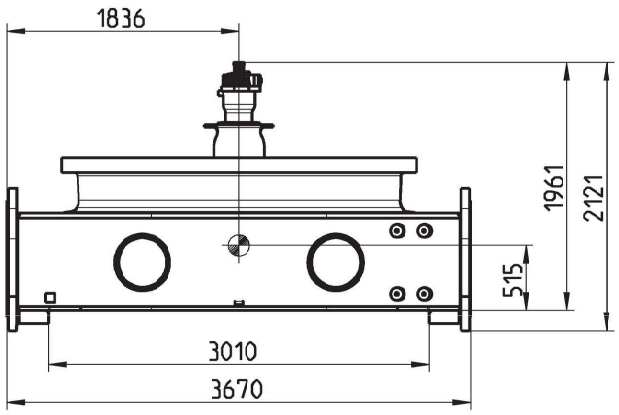

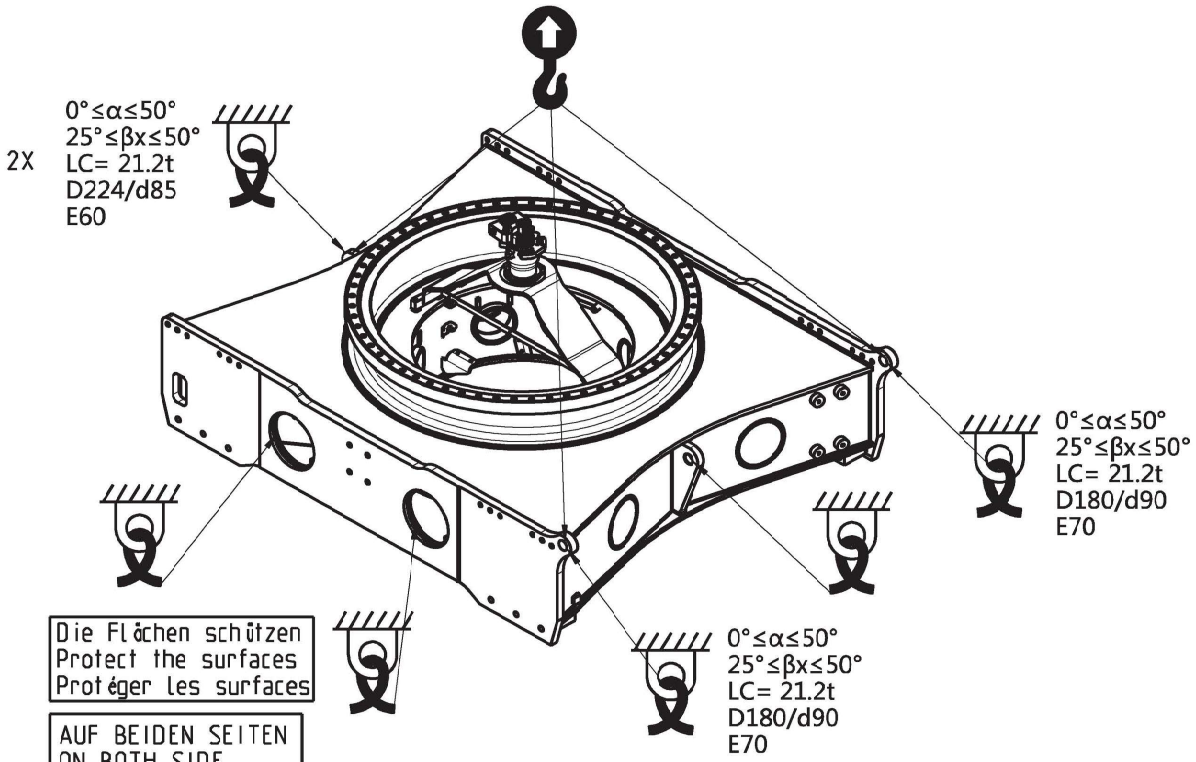

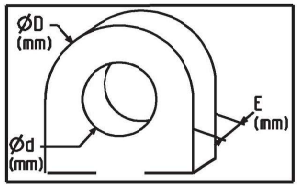

SCHWERPUNKT
CENTER OF GRAVITY
CENTRE DE GRAVITE

	Gerechnet Calculated Calculé	Gewogen Weighed Pesé
Gewicht ohne Werkzeug und Verpackung Weight without tool and packaging Poids sans outillage et emballage	20 202 kg	
Gewicht mit Werkzeug und Verpackung Weight with tool and packaging Poids avec outillage et emballage	20 202 kg	

LIEBHERR

Bezeichnung / Description / Dénomination	Ident-Nr. / Ident No. N° d'ident	Index / Index Index	Blatt / Page Feuille
TRANSPORTPLAN MITTELSTUECK TRANSP.DRW.CENTRAL PART R9250 PLAN DE TRANSP.PIECE CENTRALE	10408171	002	1/1

4.1.3 Regulating circuit

Error code	Effect	Cause	Measure / remedy
E 027	Solenoid valve for power control Y4 LR not being monitoring	Cable defect	Consult LIEBHERR customer service.
E 030	Output ventilator oil Y10.2 not being monitoring	Cable defect	Consult LIEBHERR customer service.
E 033	Output ventilator water Y10.1 not being monitoring	Cable defect	Consult LIEBHERR customer service.
E 036	Output Y3.1 not being monitoring	Cable defect	Consult LIEBHERR customer service.
E 039	Output Y3.2 not being monitoring	Cable defect	Consult LIEBHERR customer service.
E 045	Solenoid valve for power control Y4.2 LR2 not being monitoring	Cable defect	Consult LIEBHERR customer service.

4.1.4 CAN BUS

Error code	Effect	Cause	Measure / remedy
E 300	CAN1 hardware error		Consult LIEBHERR customer service.
E 302	Coding plug missed in keyboard	No coding plug	Consult LIEBHERR customer service.
E 303	No CAN 1 connection between control unit S2 and circuit board BST	Error detected also if BST is not operative: no power supply, ...)	Consult LIEBHERR customer service.
E 305	No CAN 2 connection between control unit S2 and circuit board ESP01	Error detected also if ESP01 is not operative	Consult LIEBHERR customer service.
E 308	No CAN 2 connection between control unit S2 and display or no function of the control unit	No CAN bus connection	Consult LIEBHERR customer service.
E 311	No CAN 1 connection on E1036 (connection box pump transmitters)	No CAN bus connection	Consult LIEBHERR customer service.
E 312	No CAN 1 connection between control unit S2 and E1036 (connection box pump transmitters)	No CAN bus connection	Consult LIEBHERR customer service.
E 313	No CAN 1 connection between control unit S2 and A1020 (FSG plate)	No CAN bus connection	Consult LIEBHERR customer service.
E 319	Coding BST not compatible with coding control unit S2	Coding error	Consult LIEBHERR customer service.

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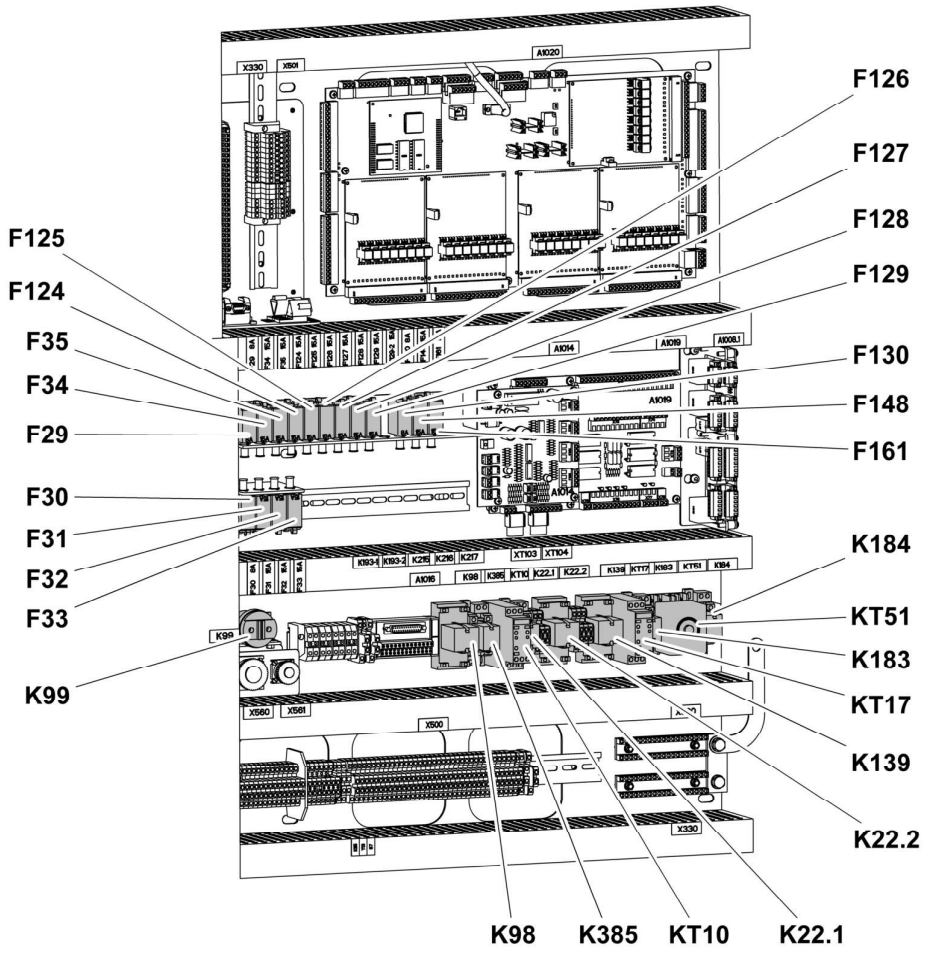

Fig. 4-3 *Fuses and relays of cab connection box E1005*

F29	8A Fuse / reserve cameras	F161	15A Fuse / A1036
F30	8A Fuse / attenuation plate supply reserve	K22_1	Relay option windshield wiper
F31	15A Fuse / A1020 boom / shovel tilt	K22_2	Relay option windshield wiper
F32	15A Fuse / A1020 stick / swing	K23	Relay second air conditioned
F33	15A Fuse / A1020 travel / trap door	K98	Relay travel alarm
F34	15A Fuse / A1020 FSG	K99	Relay supply A1020
F35	15A Fuse / A1020 controller FSG	K139	Relay fire alarm
F124	15A Fuse / S7, A1001	K183	Relay engine stop
F125	15A Fuse / A1019, U16	K184	Relay power reduced
F126	15A Fuse / A1001	K193	Relay / reserve
F127	15A Fuse / greasing	K385	Relay / Horn right
F128	15A Fuse / board	KT10	Relay timer emergency stop
F129	15A Fuse / cabin	KT17	Relay timer fire alarm
F130	8A Fuse / A1001	KT51	Relay timer engine stop

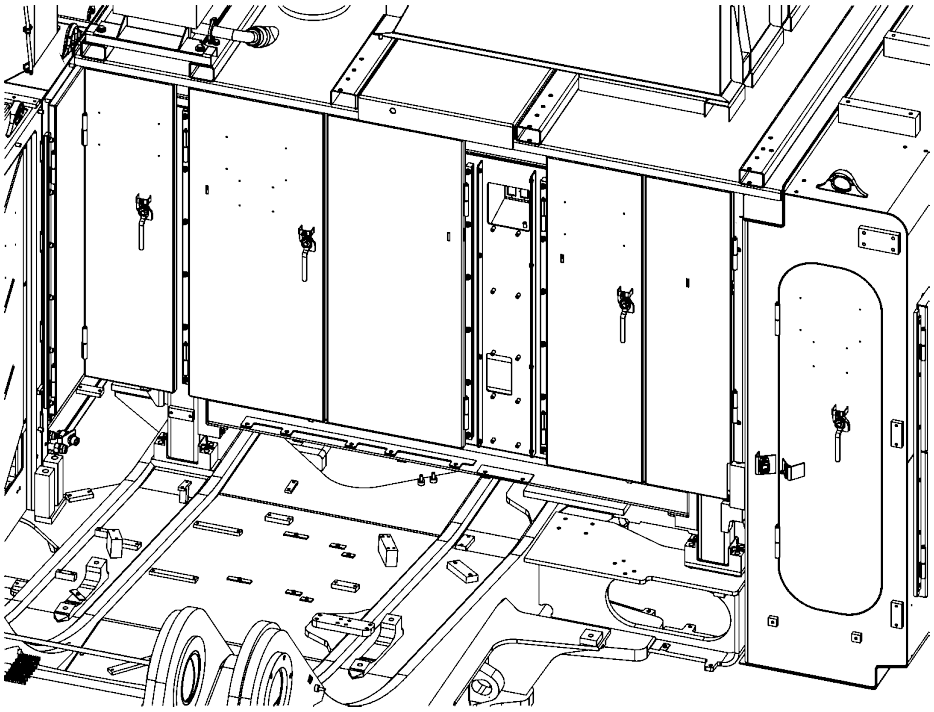

Fig. 5-1 Access doors for the engine room

These doors permit to accede to the engine room.

Cab elevation and hydraulic tank installation

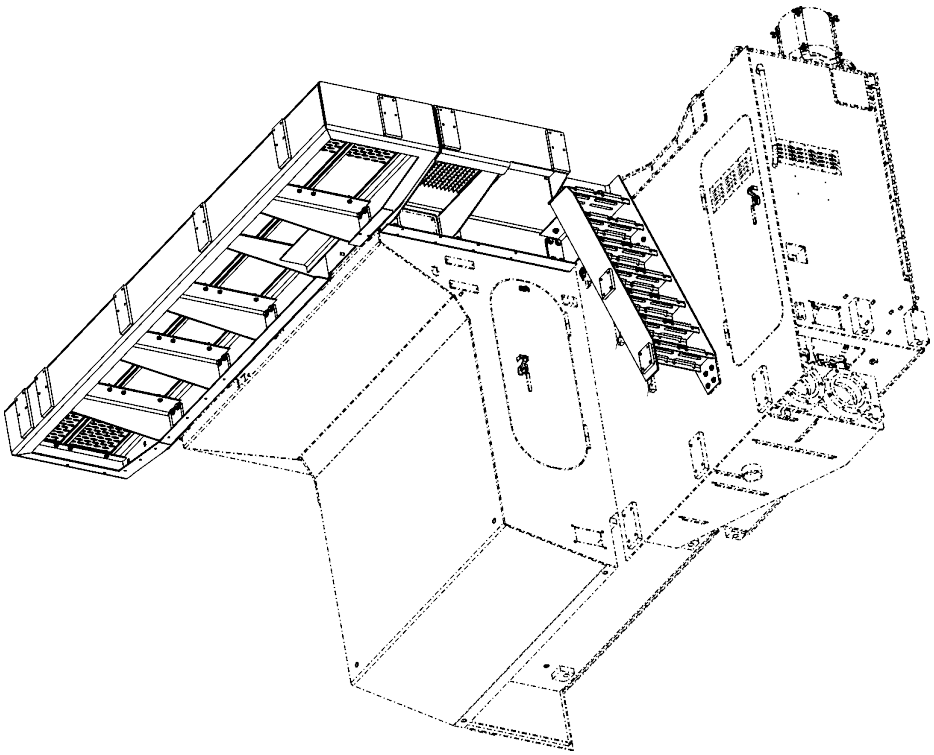

Fig. 5-2 Access doors for the cab elevation and for the hydraulic tank installation

5.4.2 Lubrication chart

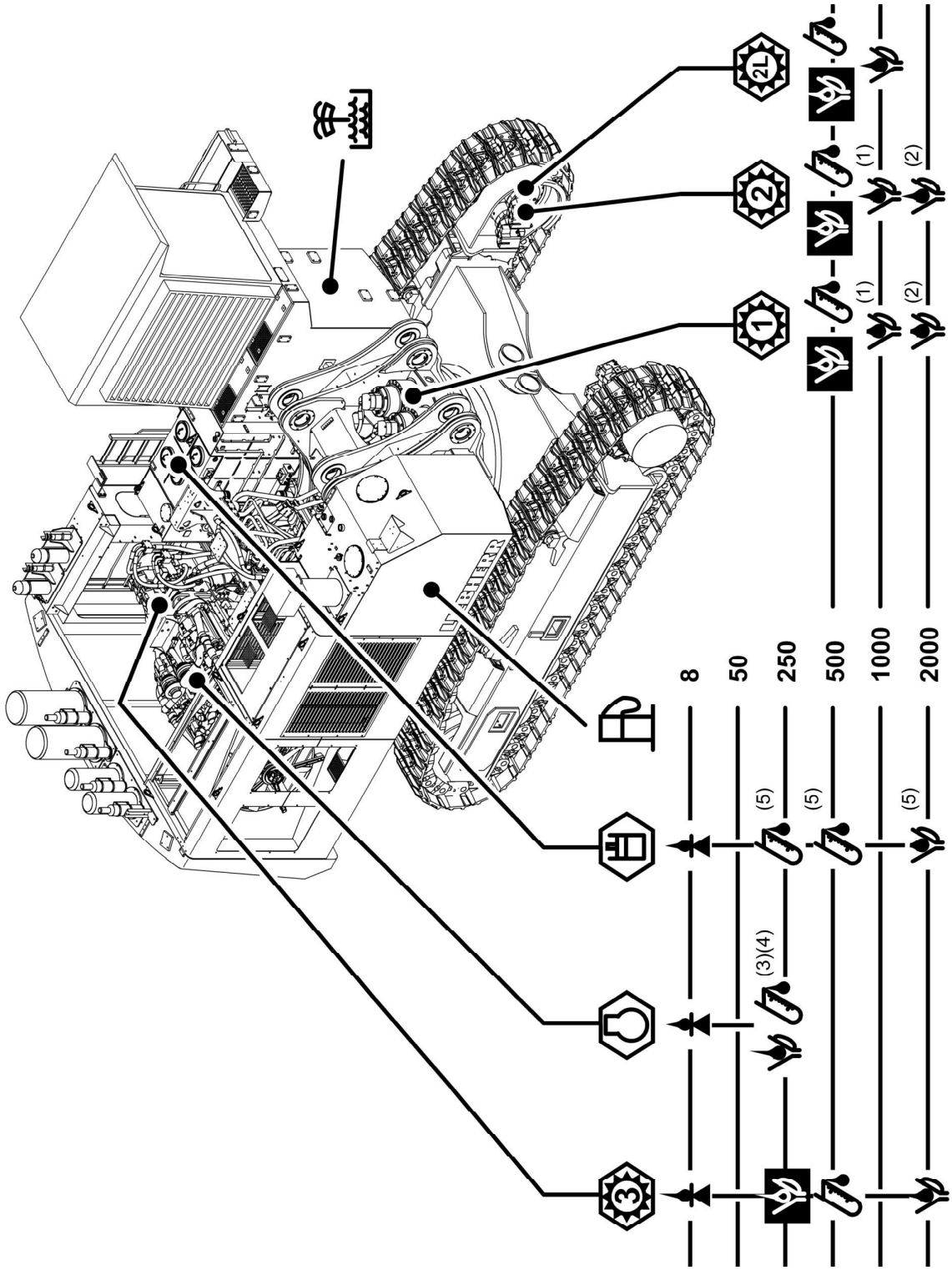

Fig. 5-9 *Lubrication chart - R9250*

Fans speed regulation settings

Engine oil	fans speed regulation setting
SAE10W30	"**STANDARD**"
SAE10W40	"**STANDARD**"
SAE20W-20 *(ISO VG68)*	"**STANDARD**"
SAE15W40	"**STANDARD**"
SAE30 *(ISO VG100)*	"**STANDARD**"
SAE 10W *(ISO VG46)*	"**EXTRA-COLD**" or "**COLD**"

Hydraulic oils for hydraulic system

Requirements

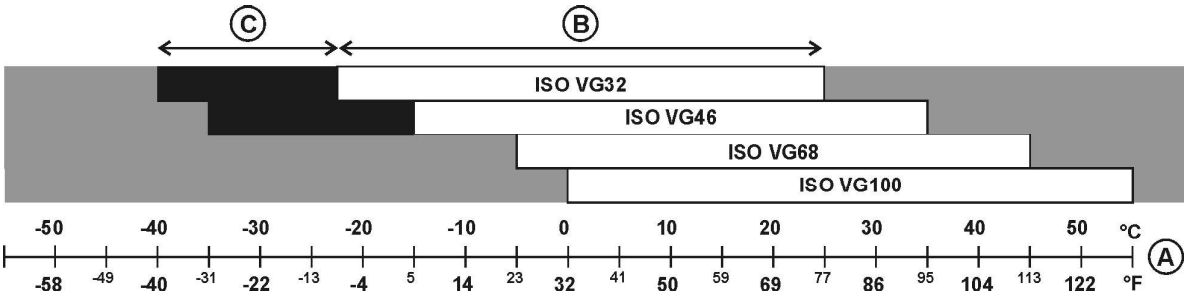

Fig. 5-14 *Hydraulic oil for hydraulic system*

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)

- machine type and serial number
- machine hours
- sampled component name:
  - splitterbox (front/rear)
  - swing gear (front/rear and left/right)
  - travel gear (left/right)
  - hydraulic oil
  - Diesel engine (front/rear)
- sampled components hours
- sampled oil hours
- top-up oil quantity since last sample
- sampled oil type

▶ Send the sample in oil-proof adapted material.

▶ Check for the required sample delivery time and for sample export licence (if the laboratory is located out of the country, make sure that the export of the sample is authorized from your location to the laboratory).

▶ Do not wait before sending the sample to the laboratory.

▶ Record and save sampling operations and results.

If you get the oil sample with a sampling pump:

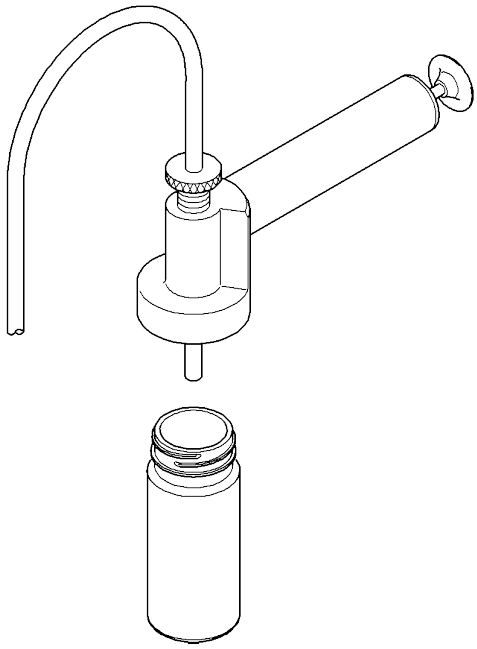

Fig. 5-19 *Sampling pump*

▶ 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.

5.7.2 Diesel engine oil change

Note !
Only carry out the oil change when the engine is warm.

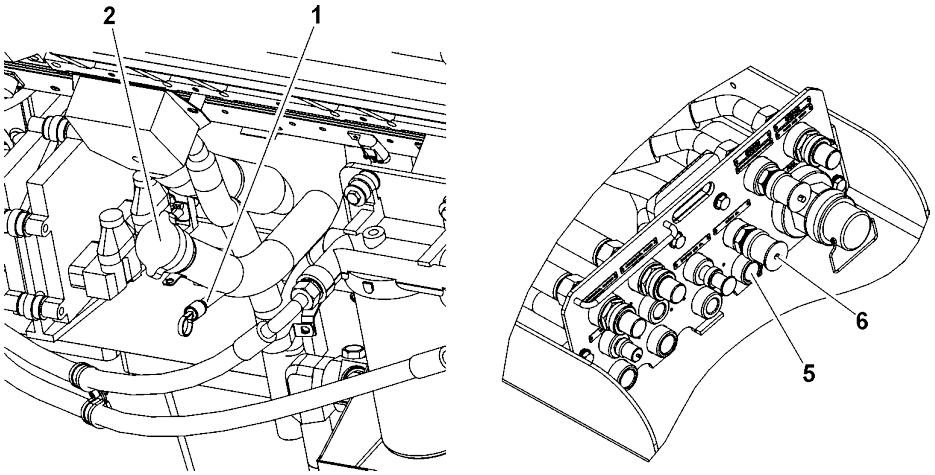

Fig. 5-25 *Filler neck and service trap*

To drain the oil:

- ▶ Drain the engine oil sump.
- ▶ Bring the engine to operating temperature.
- ▶ Drain the oil via the quick change coupling in the service center (pos. **6**).
- ▶ As a help way, the oil can also be drained via the drain valve on the oil pan of the Diesel engine.
- ▶ To do so, remove the cap of the drain valve, attach the drain hose (supplied in the toolbox) to the drain valve and drain the oil into a suitable container.
- ▶ Remove the hose, reinstall the cap on the drain valve and add oil via the filler neck **2**.

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Check the coolant level in the remote expansion tank

- ▶ Make sure the engine coolant is cold and the radiator is sufficiently cool to touch.
- ▶ Check the coolant level.

The coolant level must be at the middle of the level indicator **5**.

5.9.3 Coolant antifreeze and anti-corrosion fluid

The system must be filled with antifreeze all year round.

Depending on the type of coolant that you use, corrosion-inhibiting additives and coolant filters which contain corrosion inhibitor can be necessary.

It can be necessary to flush the full coolant circuit if you change from one type of coolant to another.

- ▶ For volume, see operating material chart.
- ▶ For specifications, refer to the section "Lubricating and operating material specifications".
- ▶ If you use a coolant which requires corrosion inhibitor, you must check the concentration of the corrosion inhibitor in the coolant circuit regularly.

5.9.4 Change the coolant

Danger!
Risk of burning due to hot coolant.

- ▶ Only change the coolant when the engine is cold.
- ▶ For coolant change interval, see Cummins operation and maintenance manual.
- ▶ For the detailed procedure to drain and fill the engine cooling system, refer to the Cummins engine operation and maintenance manual.

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5.11.2 Air dryer

The air dryer in the air pressure circuit dries and filters the pressurised air.

Depending on the machine, there are two types of air dryer:

– the air dryer with filter element
– the cartridge-type air dryer

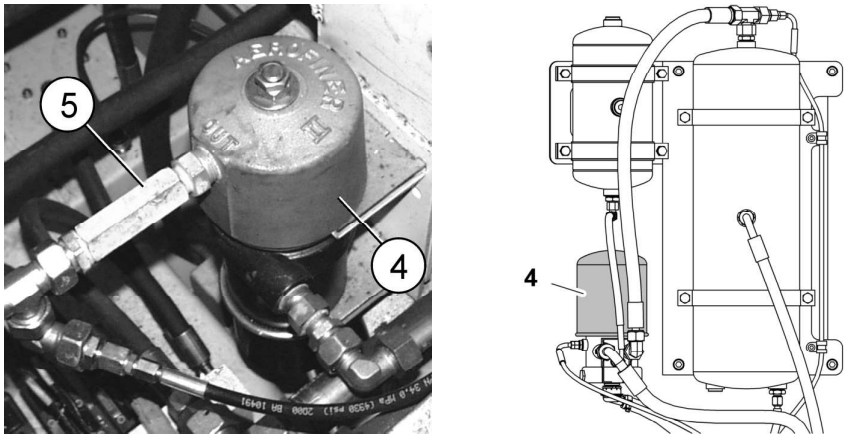

Fig. 5-46 *Air dryer with filter element (left) and cartridge-type air dryer (right)*

4 Air dryer
5 Air pressure line outlet

The filter element or the cartridge must be replaced at regular intervals.

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

Replace the filter element

Caution!
Open the air dryer only when the air pressure system is out of pressure.

▶ If necessary, empty the air pressure tank.

Drain the oil

- ▶ Lay down the attachment in order to have a maximum quantity of oil in the hydraulic tank: stick and bucket cylinders fully retracted, bucket down.
- ▶ Release the hydraulic pressure.
- ▶ Use the quick change coupling **2** of the service trap.

Add manually small quantities of oil

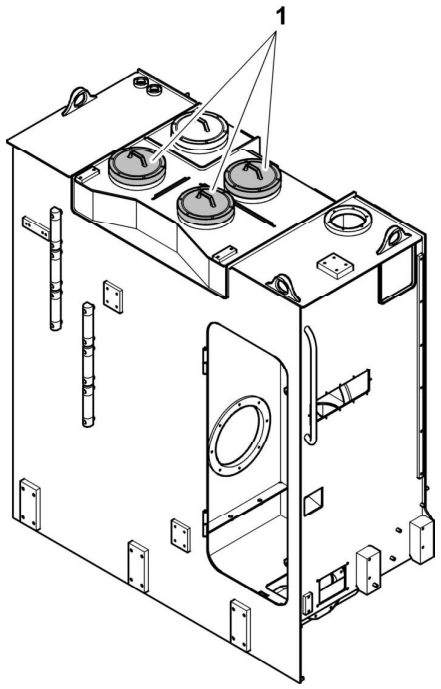

Fig. 5-57 *Return filter on the hydraulic tank*

1 Return filter

As a help way, or for small quantities, hydraulic oil can be added manually.

- ▶ Release the hydraulic pressure.
- ▶ Remove the cover of the return filter **1**.

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

- ▶ Make sure that the return filter is installed.

- ▶ Add oil through the return filter until you get the correct oil level.
- ▶ Install the cover again.

5.13.5 Hydraulic oil coolers

Cleaning hydraulic oil coolers is necessary to get optimum hydraulic oil cooling.

Bleeding of cooling pumps

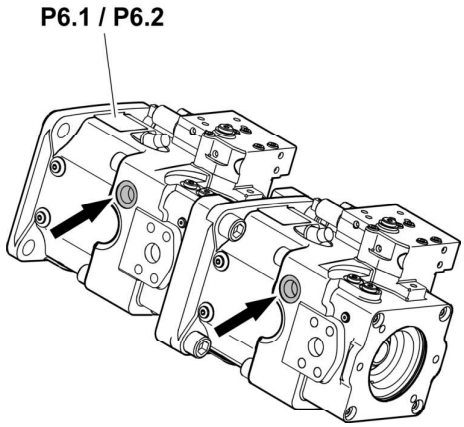

Fig. 5-68 *Bleeding points of the cooling pumps*

P6.x Cooling pump

5.13.12 Bleeding the hydraulic cylinders

The cylinders must be bled after each cylinder replacement and after work carried out on the cylinders (replacement of seals, etc.) or the hydraulic circuits (replacement of hose, etc.).

- ▶ Operate the engine run at low idle.
- ▶ If possible, move the attachment to put the side to be bled (**not-supplied side**) in the upper position.
- ▶ Slowly extend the cylinder to the extreme position and then slowly fully retract it again. Make sure that all movements are slow and smooth. Do this process a minimum of 5 minutes.

Danger!
If the cylinder is not correctly bled, gas bubbles can form in the system (mixture of air and hydrocarbon). At high operating pressures in the cylinder, these gases can explode (Diesel effect).

Drain the oil

- ▶ Make sure that the oil is at operating temperature.
- ▶ Remove the sealing cap **6** of the expansion tank located on the hydraulic tank **12**.
- ▶ Remove the oil drain device **1** of the swing gear **3**.
- ▶ Attach a drain hose or the related adapter.
- ▶ Drain the oil into an applicable container.
- ▶ Remove the hose or the related adapter.
- ▶ Install the oil drain device **1** back.
- ▶ Install the sealing cap **6** of the expansion tank back.

Fill the oil

For small quantities

- ▶ You can fill the oil through the filler tubes **7** on the top on the expansion tank.

Caution!
Risk of damage.
Too much oil in the swing gear can cause damages to the components.

- ▶ Make sure that you fill the correct related expansion tank chamber.

For large quantities

- ▶ Remove the hoses connected to the ports **4** and **5** of the swing gear.
- ▶ Fill the swing gear with oil through these ports.
- ▶ When the oil level is correct, install the hoses back.

5.14.3 Travel gear and Lifetime travel gear (optional) - Oil change

Caution!

- ▶ The following travel gear elements are filled with protective oil on delivery. They have to be drained and refilled with the same oil as used for the hydraulic tank before first start of the excavator:
- – four travel brakes (two on each travel gear)
- – two Lifetime sealing interspaces (one on each travel gear)
- ▶ The following travel gear elements have to be filled with the same oil as used for the hydraulic tank before first start of the excavator as well:
- – expansion tank chamber connected to the Lifetime sealing interspaces (see § "Oil change on Lifetime sealing interspace" below)
- – hydraulic lines between interspaces oil expansion tank and the interspaces themselves

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

- ▶ Before draining the oil, carefully loosen the oil filling plugs to allow the internal pressure to escape.

		Torque
1	Grease nipple	140 - 180 Nm
2	Screw M30x160 x quantity 4 for each idler wheel	1920 Nm

5.15.2 Check the track tension

With normal wear on the sprocket and on the track chain, it is necessary to check the track tension regularly and to tension the track again if necessary.

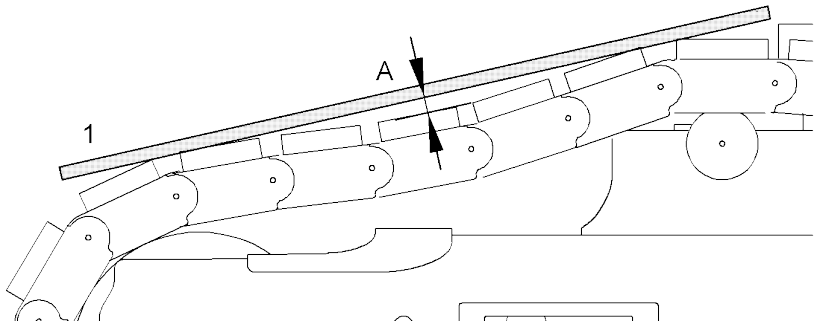

Fig. 5-85 *Check the track tension*

- ▶ Release the tracks by driving the machine forward and rearward. Stop the machine after a forward movement.
- ▶ Place the measuring rod **1** in the area between the idler wheel and the carrier roller.
- ▶ Measure distance **A** between the measuring rod and the track.

The distance **A** must be **between 25 and 30 mm** under operating conditions.

- ▶ If necessary, tighten the track chains again.

5.15.3 Increase the track tension

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

- ▶ When adjusting the tension of the track chain, keep your head away from the opening **1** in the track side frame.
- ▶ Grease is under high pressure and might squirt out. Also make sure that the track tension cylinder is out!

Filter/drier/receiver unit check:

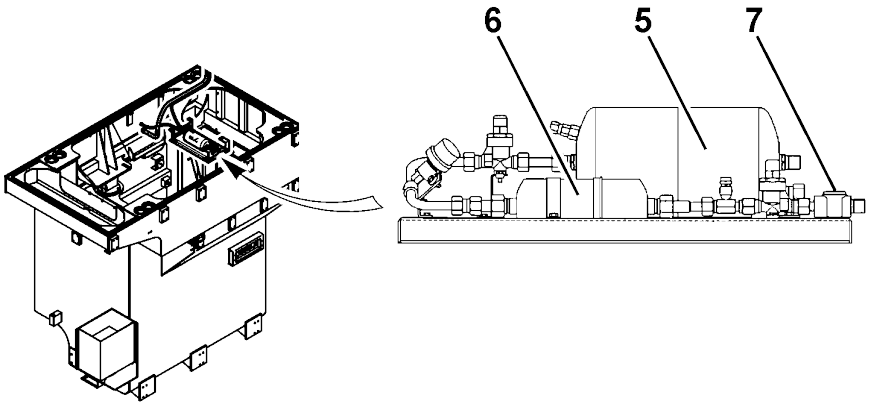

Fig. 5-95 *Filter/dryer/receiver unit*

5 Receiver bottle
6 Filter/drier
7 Sight glass

- ▶ Check condition of receiver bottle **5** and filter/drier **6**.
- ▶ Should corrosion, rust or mechanical damage be observed, the receiver bottle has to be replaced by reasons of explosion. While replacing, take care of the mounting direction. The exit is marked with an "A" and the top side is marked with "OBEN".
- ▶ Change the filter/drier **6** in air conditioning unit at regular intervals, at least once a year. The filter/drier **6** also have to be changed after each opening of the refrigerant circuit. The arrow symbols on the filter/drier have to be placed in the direction of the expansion valve.
- ▶ In addition, the refrigerant charge of the system must be checked at regular intervals, by observing the sight glass **7** of the receiver/filter/drier unit while the air conditioning system is operating.
  Bubbles or foam in the sight glas **7** indicate an insufficient refrigerant charge.
- ▶ In this case, the system must be checked and refilled by a trained specialist.
- ▶ Check the color of the indicator in the sight glass **7**. If the indicator becomes yellow, it means that there is too much humidity in the system. The filter/drier **6** must be changed immediatly by a trained specialist.

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		Torque	Quantity
5	Screw M30x340	1920 Nm	32 (2x16)
21	Screw M24x70	965 Nm	4 (2x2)

5.19.7 Mounting bolts of hydraulic pumps

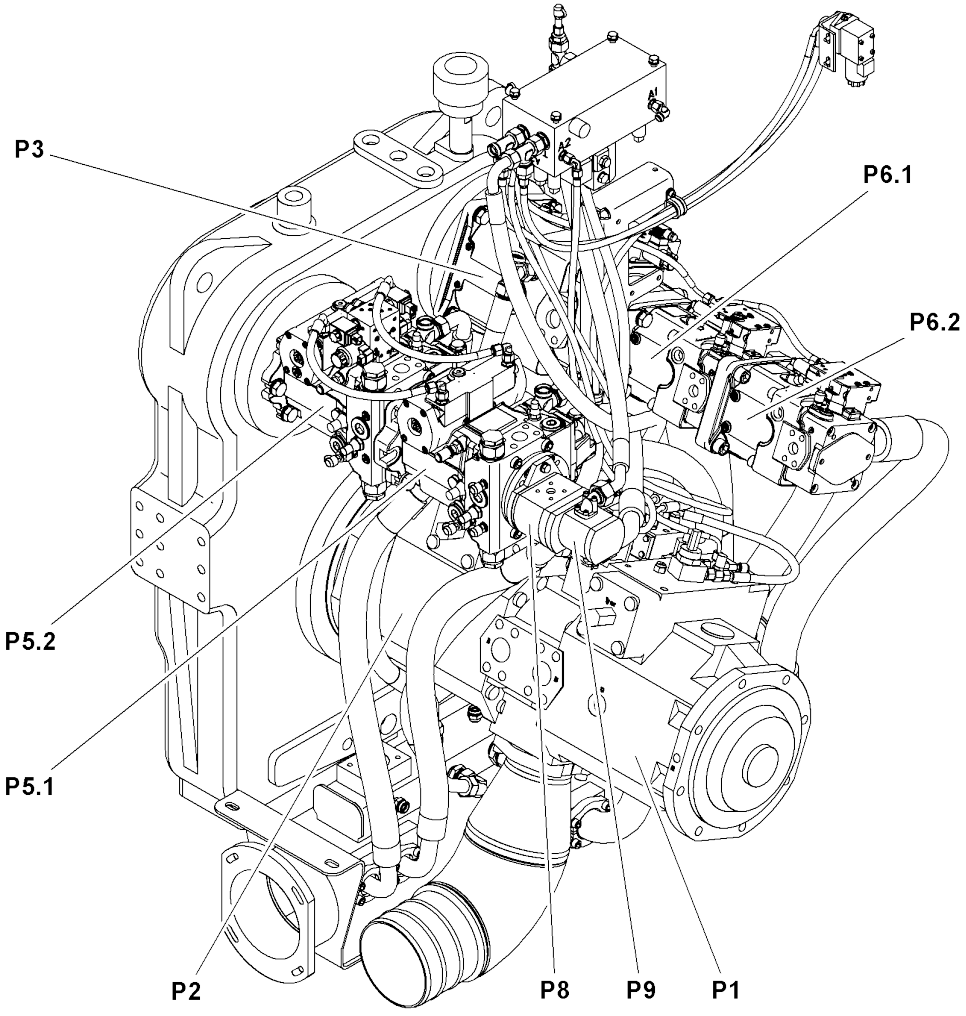

Fig. 5-107 *Hydraulic pumps bolts*

		Torque	Quantity
P1/P2	Screw M20x70	395 Nm	8
P3	Screw M20x100	395 Nm	4
P5.x	Screw M20x60	395 Nm	6
P6.x	Screw M20x40/45	560 Nm	2/2
P8/P9	Screw M12x30	110 Nm	2

▶ Apply Loctite nr. 243 on the mounting screws of **P1/P2**, **P3** and **P5.x**.

WORK TO BE PERFORMED DAILY Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
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	❍		
Electrical system: Check for warning and fault messages on display (monitoring, grease, air conditioning, ...). If necessary refer to chapter 4 in the Operating Manual to identify and rectify faults and errors.	❍		
Air pressure system: Do a visual check of cut in and cut out pressure of air pressure regulator	❍		
Cabin: Check if the safety lever is working properly	❍		
Cabin: Check the horn	❍		
Cabin: Check for green flash light on control module if fire fighting system is installed	❍		

WEEKLY CHECK THESE STEPS IN ADDITION TO THE DAILY REQUIREMENTS			
UPPERCARRIAGE			
Check level in reservoir for windshield washer, refill if necessary	❍		
CENTRALIZED LUBRICATION SYSTEM			
Perform the complete weekly maintenance given in the LINCOLN Operating Instructions Manual	❍		
DIESEL ENGINE AND SPLITTERBOX			
Do a visual check of the air channels in precleaner, clean if necessary	❍		
Do a visual check of the air intake hose for condition and leaks	❍		
Do a visual check and clean the radiator core and fan	❍		
Do a visual check of the radiator cap for leaks, replace if necessary	❍		
Drain off water and sediment at fuel tank	❍		
HYDRAULIC SYSTEM			
Clean magnetic rods of all return filters (weekly during the first 250 hours)	❑		

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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
Do a visual check of the tensioning cylinders, idler, carrier and track rollers for leaks	❍		
Do a visual check of the track chains tension	❍		
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)	❑		
Change gear oil (if filled with COB-2, COB-3 or COB-4 gear oil)	❑		
Sample and analyse lifetime sealing interspace oil, change oil if necessary (optional equipment)	❍		
Change lifetime sealing interspace oil (optional equipment)	❑		
UNDERCARRIAGE			
Do a visual check of all parts for damages and cracks If necessary fill out the "Structural Inspection" form in Service Manual - Chapter 4	❍		
ATTACHMENT			
Do a visual check of the bucket teeth and wear kit for wear	❍		
Do a visual check of the grease supply at each lube point	❍		
If installed, grease the piston rod protection	❍		
Do a visual check of cable harness and sensors for damage	❍		
Do a visual check of all parts for damages and cracks If necessary fill out the "Structural Inspection" form in Service Manual - Chapter 4	❍		
Do a visual check of the fastening of pin covers	❍		
Do a visual check of the non-slip surfaces for wear and damage	❍		
UPPERCARRIAGE			
Do a visual check of the service trap for leaks or damage	❍		
Do a visual check of oil, grease or fuel for leaks	❍		
Do a visual check of mirrors and cameras, clean and adjust if necessary	❍		
Do a detailed check of all structural parts for damages and cracks If necessary fill out the "Structural Inspection" form in Service Manual - Chapter 4	❍		
Do a detailed check of the dust separator on air filter (cyclone) and hoses for damage	❍		
Do a visual check if the fan guards are in place and secured	❍		
Do a visual check of the non-slip surfaces for wear and damage	❍		

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WORK TO BE PERFORMED AT 1000, 3000, 5000 HOURS, ... Check ❑ for first and only interval *or* Check ❍ for repeat interval	Check	Initials	Comments
HYDRAULIC SYSTEM			
Drain water sediment from hydraulic tank	❍		
Check oil level in hydraulic tank	❍		
Sample and analyse hydraulic oil and change oil if necessary	❍		
Clean magnetic rods of the leak oil filter	❍		
Clean magnetic rods of all return filters	❍		
Replace filter element of the return filters	❍		
Replace filter element of the leak oil filter	❍		
Replace the hydraulic tank air filter	❍		
Replace control oil filter element	❍		
Replace swing pumps replenishing oil filter elements	❍		
Do a visual check of the oil cooler protection filters, clean or replace if necessary (optional equipment)	❍		
Check and adjust primary and secondary pressure relief valves	❍		
ELECTRICAL SYSTEM			
Press to open dust discharge valve on aeration devices for cabin and electrical boxes	❍		
Replace main element on aeration devices for cabin and electrical boxes (at least once a year)	❍		
Replace safety element on aeration devices for cabin and electrical boxes, after 3 services of main element	❍		
Do a visual check of the head and floodlights, clean and adjust if necessary	❍		
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	❍		
AIR PRESSURE SYSTEM			
Drain air tanks	❍		
Replace filter cartridge of air dryers	❍		
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	❍		

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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
AIR PRESSURE SYSTEM			
Drain air tanks	❍		
Replace filter cartridge of air dryers	❍		
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	❍		
Do a visual check of the condenser unit and evaporator filter	❍		
Do a visual check of the refrigerant level, if necessary refill circuit	❍		
Replace if necessary the air conditioner filter/dryer (at least once a year)	❍		
Yearly check condition of the refrigerant receiver, if necessary replace it	❍		
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 rubber mounts	❍		
Do a detailed check of the heater exchanger and filter for leaks	❍		
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	❍		
Uppercarriage: Check that the swing movement of the uppercarriage is locked when the access ladder is lowered	❍		

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



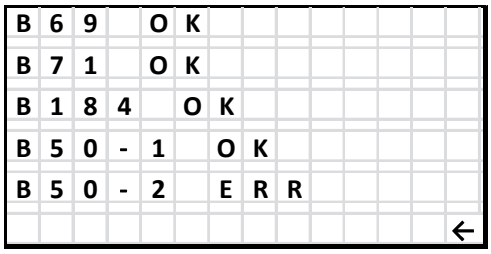
Rubber cover is rubbed - Reinforcement layer is uncovered but not corroded - No sign of oil

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.

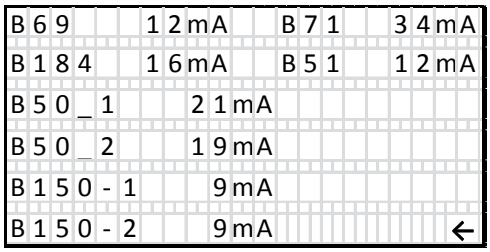


- **Check :**

Upon entering the Check menu, the statuses of the analogue sensors are shown.



To represent Sensor values in mA, press and hold both "Up" and "Down" arrow buttons for more than three seconds. This will only apply when a service or inspector dongle is plugged.



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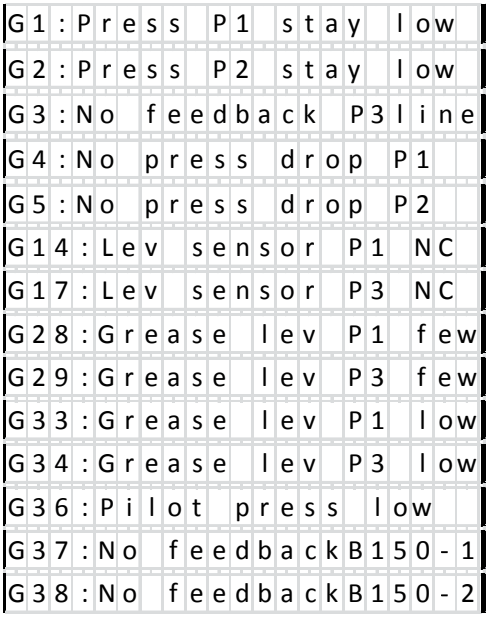
6. Appendix

- **Error List :**



2 Safety information

Safety information is to be read and observed by any persons entrusted with works on the centralized lubrication system or by those persons who supervise or instruct the before-mentioned group of persons.

It is prohibited to commission or operate the machine, the centralized lubrication system or single components prior to reading the installation instructions. The installation instructions must be kept at an accessible location for further use.

2.1 Disclaimer

Observation of these installation instructions is the prerequisite for safe operation and the achievement of product characteristics and performance levels.

The manufacturer shall not be held responsible for damages caused by:
- non appropriate use, faulty assembly, operation, setting, maintenance, repair or accidents
- improper or late response to malfunctions
- unauthorized modifications of the product
- intent or negligence
- Use of non-original SKF spare parts.

Liability for loss or damage resulting from the use of our products is limited to the maximum purchase price. Liability for consequential damages of whatever kind is excluded.

2.2 Emergency stopping of the centralized lubrication system

In case of an emergency stop the centralized lubrication system by:

- switching off the machine, system or vehicle, into which the SKF centralized lubrication system or its components have been integrated.
- separating the supply of power, compressed air or hydraulic pressure (depending on the system) to the centralized lubrication system or the corresponding components.
- actuating the emergency-off switch, if any, of the machine, system or vehicle.

2.3 Intended use

ATTENTION
All products may be used only for their intended purpose and in accordance with the instructions.

Intended use is the use of the products to lubricate bearings and friction points with lubricants within the physical limits that can be found in the relevant product documentation, e. g. operating instructions and product descriptions, e. g. technical drawings and catalogues.

2.4 Operation of the lubrication system or single components of it

Operation is permitted only, if in compliance with:

- All information given in these installation instructions or stated in the referenced documents.
- All laws and regulations to be complied with by the user.
- Properly and appropriately conducted installation of the system.

2.5 Foreseeable misuse

Any other use and purpose of the centralized lubrication system or its components than the ones described before are strictly prohibited.

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- Repairs or modifications to machines which are protected against explosions may be carried out only by the manufacturer or by a workshop recognized by a named institution and confirmed in writing.

  If the work is not carried out by the manufacturer, the repairs must be approved by a named expert and confirmed in writing. The repairs are to be marked by a repair sign on the machine, stating the following:

  - Date
  - Executing company
  - Type of repair
  - If applicable, expert's code

- Transport damages can result in the loss of the explosion protection. If transport damages can be seen, do not assemble the machine or put it into operation
- All parts of the earthing concept must be correctly available and connected with the superordinate machine.
- If transport lugs are dismantled after set-up, the threaded bores must be permanently sealed in accordance with the protection class.
- Handle the materials so that no sparks are generated by tilting, falling, sliding, rubbing, impacting, etc. If needed, cover materials with suitable means.
- Never disconnect plug-in connections when energized. Secure plug-in connections against inadvertent manual disconnection with the safety clips included in the delivery.
- The operator must check critically whether operation without a low-level signal might lead to a new risk potential (e.g. through heat-up of bearing points on the machine in the area of ignition temperature, poor lubrication or bearing damage). If this cannot be ascertained, provide a low-level signal or suitable organisational measures for monitoring of the bearing point temperature.
- Avoid dust accumulation and remove dust immediately. Dust accumulations have a thermally insulating effect and, if whirled up, generate the formation of a potentially explosive atmosphere.
- The pump should be integrated into the operator's lightning protection concept.
- All parts are to be checked regularly for corrosion. Replace the affected parts.
- Terminal boxes must be firmly closed and the cable breakthroughs correctly sealed.
- Additional electrical monitoring devices must be firmly connected and correctly adjusted.
- Protect the motor with a motor circuit breaker against inadmissible heating up. When reaching their nominal life, the motor bearings have to be replaced or inspected to ensure their suitability for further utilisation.

3.3 Transport / installation / maintenance / repairs / servicing

- All relevant persons (e.g., operating personnel, supervisors) must be informed of the respective activity prior to starting any work. Observe the precautionary operational measures and work instructions.
- If protective and safety equipment has to be dismantled, it must be reassembled immediately after finishing the work, and then checked for correct function.
- Ensure through suitable measures that movable or detached parts are immobilized during the work and that no limbs can be caught in between by inadvertent movements.
- Carry out transport using only suitable hoisting equipment.

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7 Maintenance and repairs

7.1 Safety instructions for maintenance and repairs

WARNING

Electric shock
Make sure to disconnect the pump from the power supply before carrying out works on electrical parts.

Risk of injury
Before carrying out any maintenance or repair work, take at least the following safety measures:

- Keep unauthorized persons away.
- Mark and secure work area.
- Depressurize the product.
- Disconnect the product from the power supply and secure it against being switched on.
- Verify that no power is being applied.
- Earth and short-circuit the product.
- Where needed, cover neighbouring units that are live.

7.2 Maintenance of the system

Depending on the version our centralized lubrication systems require virtually no maintenance.

However, the following parts should be inspected and, if necessary, replaced by new parts at regular intervals:

- Pressure relief valves
- Check valves
- Pump elements

Pressure relief valve tolerance +5 %/ -10 %
If this tolerance is exceeded, the pressure relief valves must be replaced.

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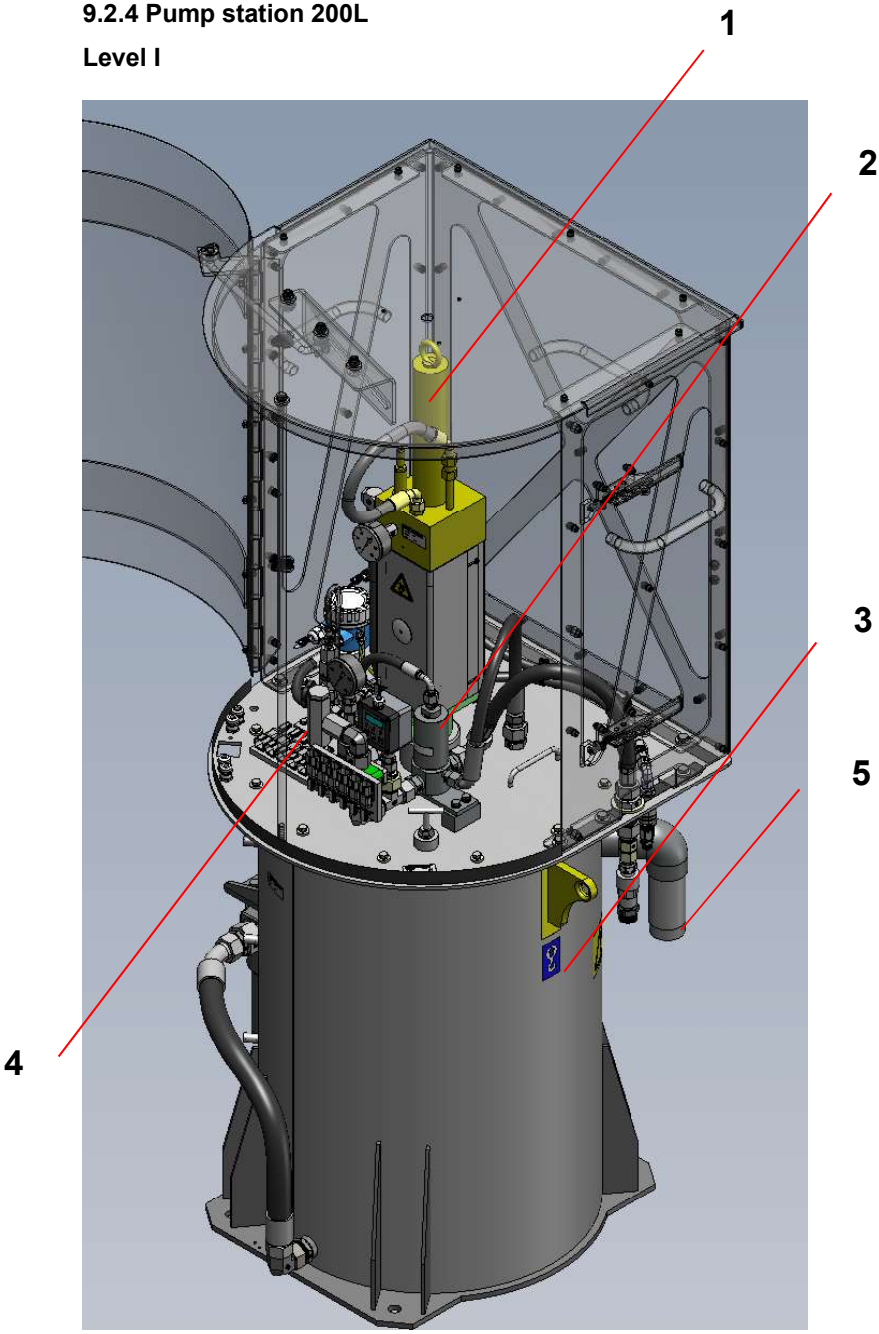
9.2.4 Pump station 200L

Level I



1 ContiMaster pump
2 Hydaulic relief (vent) valve
3 Grease reservoir 200L for FlowMaster II-pump
4 Filtering unit
5 Overflow pipe

Central lubrication pump 200L Level I (hood transparent)

10 Operation

10.1 Greasing system – Cabin Location

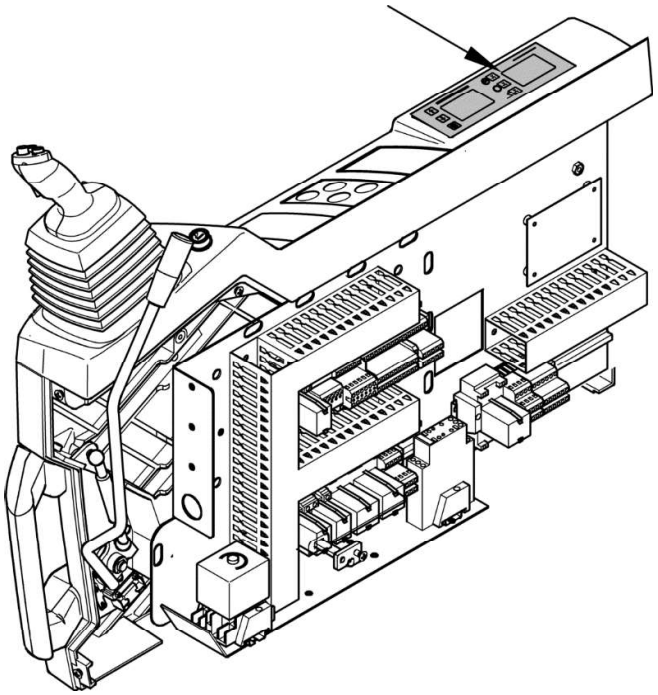


Fig. 9 Cabin location

For more details:

- Information regarding the operation of the control unit are available in the respective manual.

Refer to Data Sheet 93EN-98002-xxx for the Electronic Controller