en

Operating Manual

Hydraulic excavator
R 9150 E

from serial number 38120

Document identification

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LIEBHERR

1.1.2 Uppercarriage

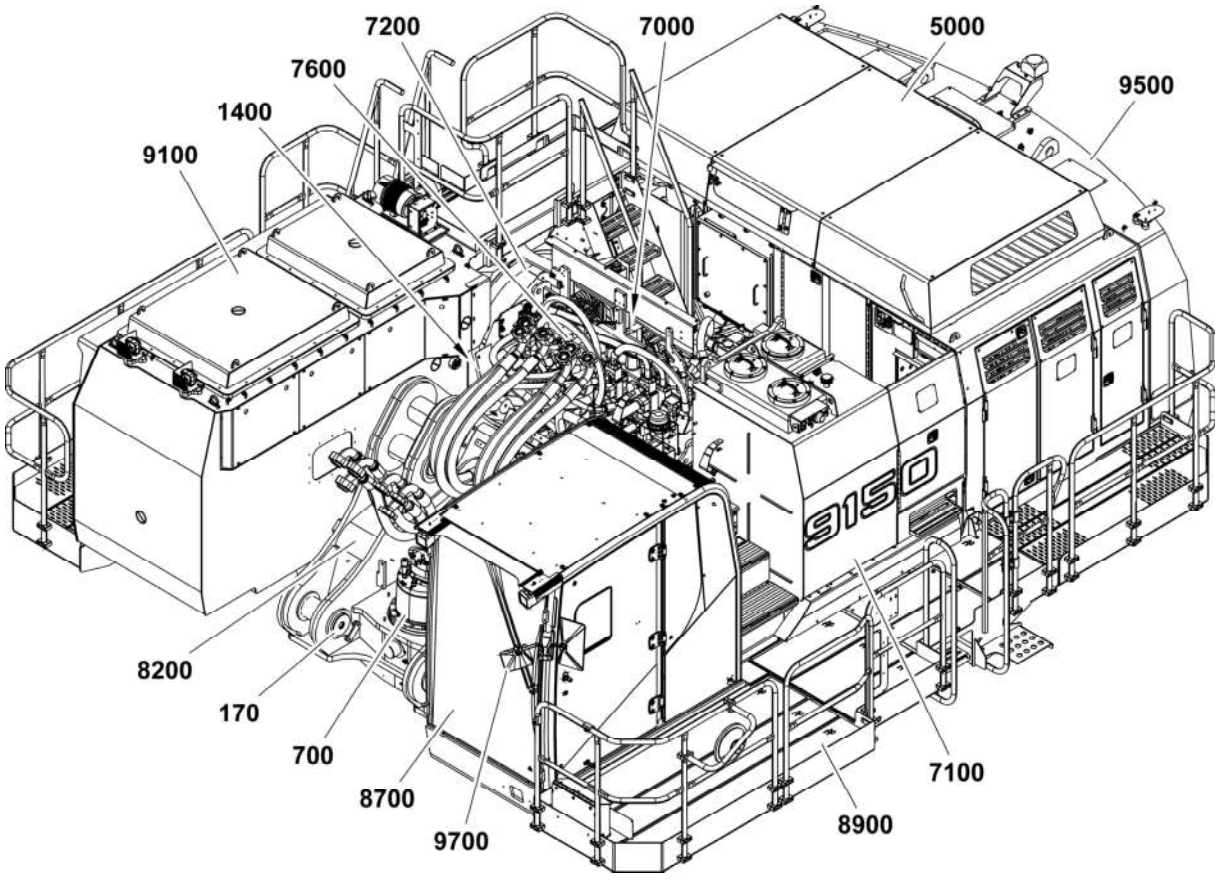

Fig. 1-3 *Uppercarriage*

170	Attachment mounting parts	**7600**	Control valve installation
700	Swing gear installation	**8200**	Rotating deck
1400	Centralized lubrication	**8700**	Cab
5000	Electric motor installation	**8900**	Catwalk and handrail
7000	Hydraulic installation	**9100**	Electric box installation
7100	Hydraulic tank installation	**9500**	Counterweight installation
7200	Oil cooler installation	**9700**	Outside mirror arrangement

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Built for Maximum Profitability

Electro-Hydraulic System Efficiency
Liebherr hydraulic technology in combination with the precision of electronic control contributes to the R 9150 B's efficient use of energy. The high-pressure hydraulic system and the optimized pipe and hose layout maximize usable power transmission. Hydraulic pumps are electronically managed to provide optimal pressure compensation and oil flow management. The hydraulic system is independently regulated over the engine circuit for the best operational efficiency.

Closed Loop Swing Circuit
All Liebherr Mining excavators are equipped with a closed loop swing circuit. Kinematic energy is recovered when the swing motion is used during deceleration, to drive the main and auxiliary pumps, reducing fuel consumption and allowing faster boom lift motion.

Independent Cooling System
Oil and water cooling fans are independent and electronically managed. The on-demand cooling control enables to maximize available power for the working process. This technology contributes to maintaining sustainable temperature of all hydraulic components extending their life.

Comfortable Cab for Efficient Work

Superior Operator Comfort
The modern large cab provides ideal working conditions and optimal operator's comfort. Mounted on silent blocks, the R 9150 B's cab design reduces vibrations. The new headliner limits noise pollution to provide a quiet working environment.

Extended Components Lifetime

The R 9150 B's high pressure hydraulic oil filtration systems remove contaminants from the fluid to offer the highest rate of hydraulic system efficiency. To maintain the oil quality, all return hydraulic oil flow goes through a 15/5 µm fine filtration system, while the grease and fuel tanks are sized to considerably extend the time between service intervals.

Advanced Machine Monitoring
- 10.5" LCD color screen
- Information interface to operator
- On-board diagnostics to service staff
- Real text information
- Long term data storage for maintenance

First-Class Service Arrangements
Service friendly design allows for easy and fast maintenance for maximum uptime:
- Service from one-side
- Large catwalks and walkways
- Refillable grease tanks instead of drums to be changed
- Centralized lubrication system
- Enhanced single-line lubrication system

Comfort-Oriented Cab Design
An array of features:
- Tinted laminated safety glass
- Armored front window
- Adjustable air suspended seat
- A/C with dust filter in fresh/recirculated air
- Pressurization to prevent dust penetration (optional)
- Operator Comfort Kit (optional): sun blinds, bottle cooler, reading light, automatic operator's seat weight adjustment
- Pre-heating system (optional)

Electric System

Electric isolation	easy accessible battery isolators
Working lights	high brightness LED lights: – 2 on working attachment – 2 on cabin – 2 on RHS of uppercarriage – 3 on LHS of uppercarriage
Emergency stop switches	in the cab and in engine compartment
Electrical wiring	heavy duty execution in IP 65 standard for operating conditions of –50 °C to 100 °C/ –58 °F to 212 °F

Uppercarriage

Design	torque resistant modular design upper frame
Attachment mounting	parallel length girders
Catwalks	large catwalk on the left-hand side with ladder

Operator's Cab

Design	sound insulated, tinted windows, front window armored glass, door with sliding window
Operator's seat	air suspended, body-contoured with shock absorber, adjustable to operator's weight
Joysticks	joystick levers integrated into armrest of seat, armrest adjusted to seat position
Condition monitoring	machine condition monitoring system with error reporting and operational information
Display	color LCD-display with low and high brightness settings, 1 additional fixation for supplementary customer device
Vision system	camera installation on counterweight and right-hand side of the uppercarriage, displayed over the LCD-display
Heating system/ Air conditioning	standard automatic air conditioning, contains fluorinated greenhouse gases HFC 134a with a Global Warming Potential (GWP) of 1430, the AC circuit contains 1.7 kg/3.8 lb of HFC-134 representing an equivalent of 2.4 tonnes/ 2.7 tons of CO_2, combined cooler/heater, additional dust filter in fresh air/recirculated
Noise level (ISO 6396)	Diesel: L_{pA} (inside cab) = 74 dB(A)

Undercarriage

Version HD	heavy duty
Drive	Liebherr swashplate motors
Travel gear	Liebherr planetary reduction gears
Travel speed	0 – 2.9 km/h/0 – 1.80 mph
Track components	track pitch 280 mm/11.02 in, maintenance-free
Track rollers/ Carrier rollers	9/2 per side frame
Track pads	double grouser
Track tensioner	spring with grease tensioner
Parking brake	wet multi-discs (spring applied, pressure released)
Brake valves	integrated in main valve block

Central Lubrication System

Type	single line lubrification system, for the entire attachment/swing ring bearing and teeth
Grease pumps	1 hydraulic pump for attachment/swing ring bearing lubrification, 1 electric pump for swing teeth lubrification
Capacity	80 l/21.1 gal bulk container for attachment/ swing ring bearing, separated 8 l/2.1 gal container for swing ring teeth
Refill	via quick connections and grease filters for both containers

Attachment

Design	box-type, combination of resistant steel plates and cast steel components
Hydraulic cylinders	Liebherr design
Hydraulic connections	pipes and hoses equipped with SAE flange connections
Pivots	sealed, low maintenance
Pivots bucket-to-stick **Pivots bucket-to-link**	O-ring sealed and completely enclosed

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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holes 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 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.

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- Skilled electricians are expected to make a power lock and tag out according to all local electric requirements and procedures.
- The purpose of a lock and tag out it to prevent injuries caused by the presence of voltage, and by the machine starting up or moving unexpectedly. These procedures must be followed every time a machine is going to be cleaned, maintained, or repaired.
- Whether you are cleaning dust inside an electrical box / leakage in hydraulic rotary connection, replacing tracks or making repairs, or any other maintenance task on electric plant or at proximity, safe and effective lockout practices will protect your life. Always follow the exact procedure for the voltage level you are working on and do not take chances!
- People must be in any case instructed about the safe and effective lockout procedures. This will protect their life.

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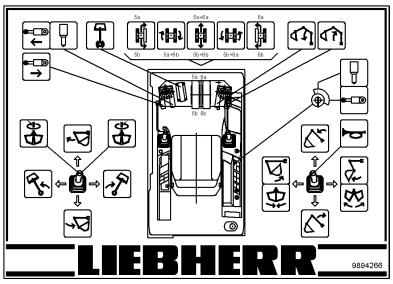


Plate 26: Information about control symbols

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

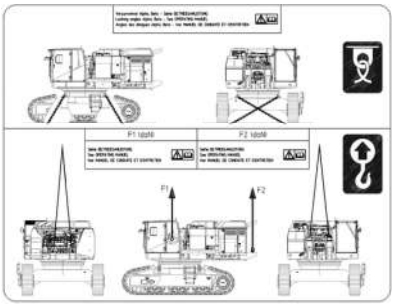


Plate 35: Latch points and lifting points

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

Plate 36: Emergency exit label

Indicates the emergency window.

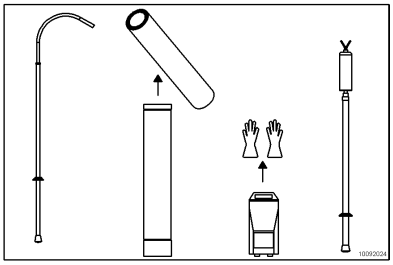


Plate 82: Security kit for high voltage label

Indicates the elements which compose the security kit for high voltage.

Plate 101: Lashing point label

Indicates the location of lashing points on the excavator.

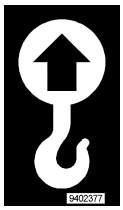
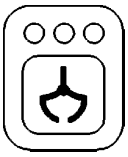


Plate 102: Lifting point label

Indicates the location of lifting points on the excavator.



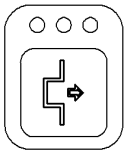
Turn of the grapple / shear (optional)

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

High speed gear

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

No function



Quick coupler (optional)

- ▶ Refer to the Operator's Manual of the quick coupler manufacturer.

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Steering

This submenu shows the inputs status of:

- the primary electronic control of the machine
- optional electronic controls

Tool control (optional)

This submenu is used to select the parameters of the optional tools that you can install on the machine.

Auxiliary hydraulic outlet (optional)

This submenu is used to directly supply hydraulic power to an external device.

Submenu "Electric motor"

This submenu shows the information that follows:

Motor Bearing overtemperature

Motor overload

Motor Start Inhibition

Current Imbalance

Windings temperature

Ground Fault Current Residual

Motor Start Time

Motor voltage error

Motor temperature error

Motor Error Multiple

If a measured value goes out of the possible range:

- The related dial needle goes over the exceeded value.

If a measured value is missing:

- The related dial needle goes below the minimum value.
- The specified values below are shown:

To use this submenu, you must before select the manual mode.

▶ Push the "**AUTO**" button.

Automatic mode

Manual mode

↳ Each time you push this button, the status light related to the selected mode comes on.

Indicator and error warning symbols

The symbols which are shown on the main screen give information about the conditions, the setting and the possible malfunctions of the machine.

There are two types of symbols:

– The **indicator** symbols which are shown in the field **1**.
– The **error warning** symbols which are divided into two groups:
  • the **electric motor error** symbols shown in the field **3**
  • the **other error** symbols shown in the field **2**

Fig. 3-17 *Indicators and error warnings on the main screen*

1 General indicator symbols

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.

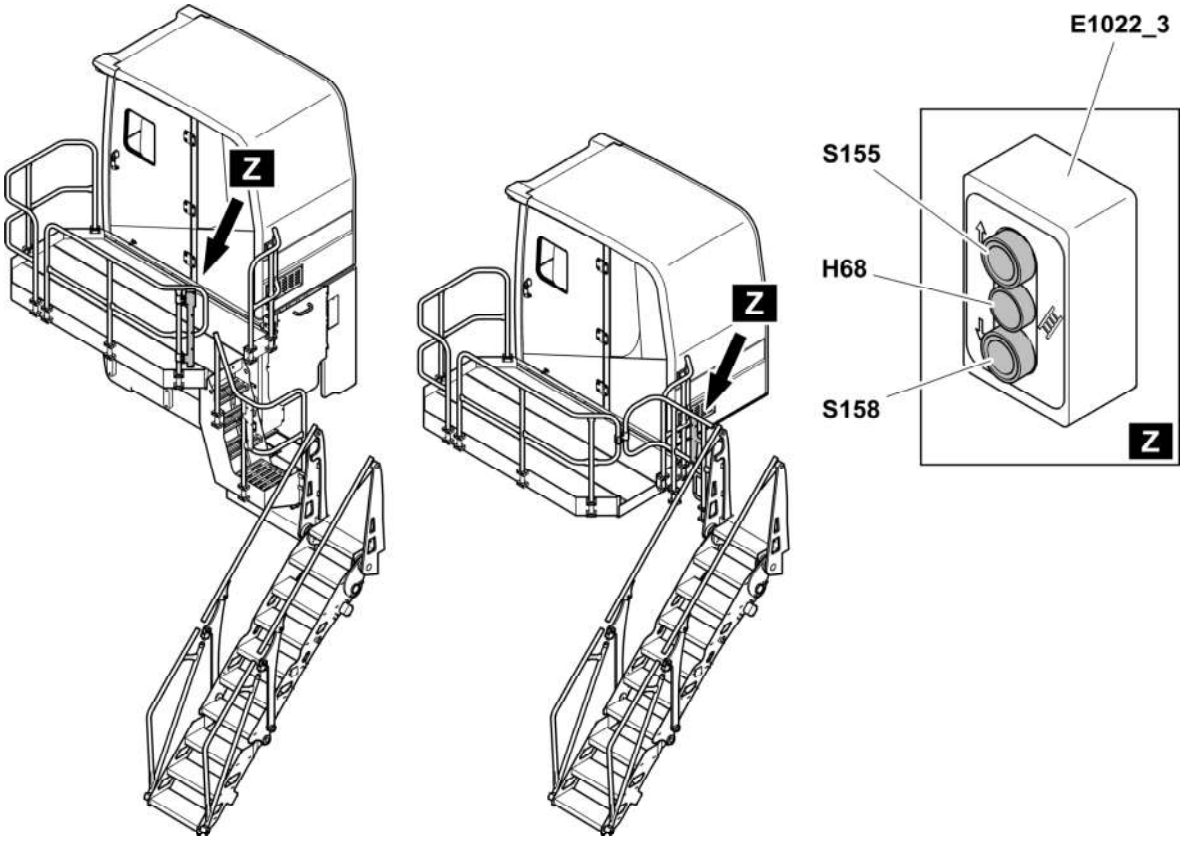

Fig. 3-21 *45° access ladder and control box E1022_3*

H68 Warning light
S155 Push-button / access ladder up
S158 Push-button / access ladder down

If the control box **E1022_4** is installed as an additional option, you can also move the ladder from the ground.

To adjust the angle of the seat:

- ▶ Pull lever **4** up.
- ▶ By applying pressure on the seat, move it to the correct position.

Setting the backrest

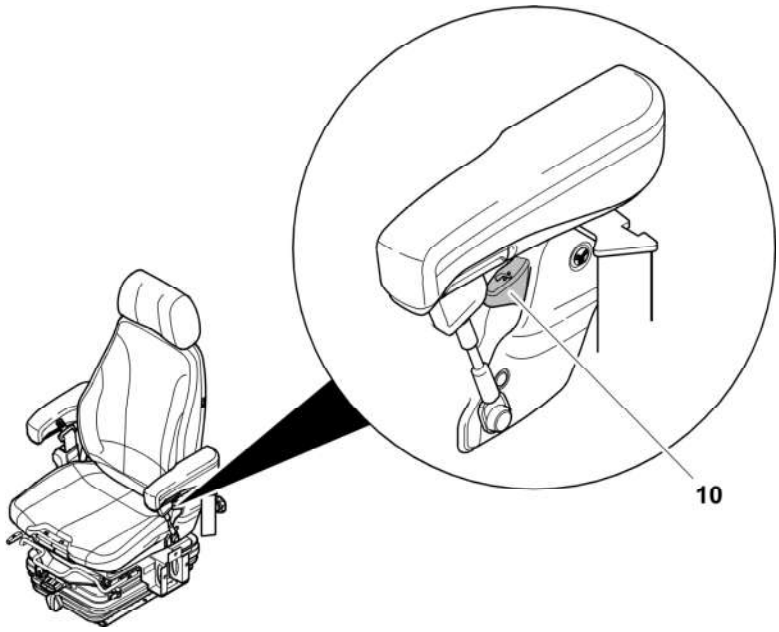

Fig. 3-32 *Setting the backrest*

To set the backrests:

- ▶ Pull lever **10** up to release the backrest.
- ▶ By applying pressure on the seat, move it to the correct position.
- ▶ Release the lever **10** to lock the backrest.

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E1 Front working light / Uppercarriage
E6 Front working light / Electrical boxes S1 and S2
E18_1/2 Rear working lights / Counterweight (if installed)
E60 Front working light / Electrical boxes S1 and S2 (if installed)
E61_1 Camera lighting / Electrical boxes S1 and S2
E61_2 Camera lighting / Counterweight

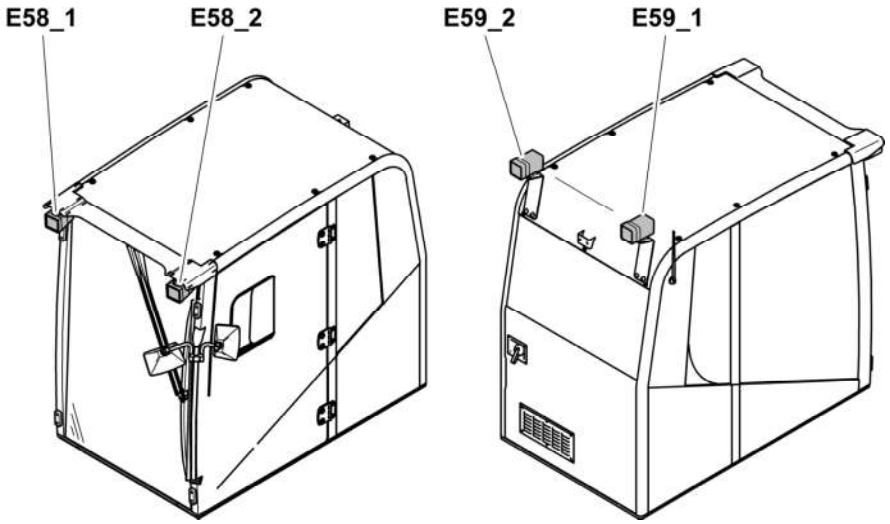

Fig. 3-42 *Cab lighting configuration*

E58_1/2 Front working lights / Top of cab (if installed)
E59_1/2 Rear working lights / Top of cab (if installed)

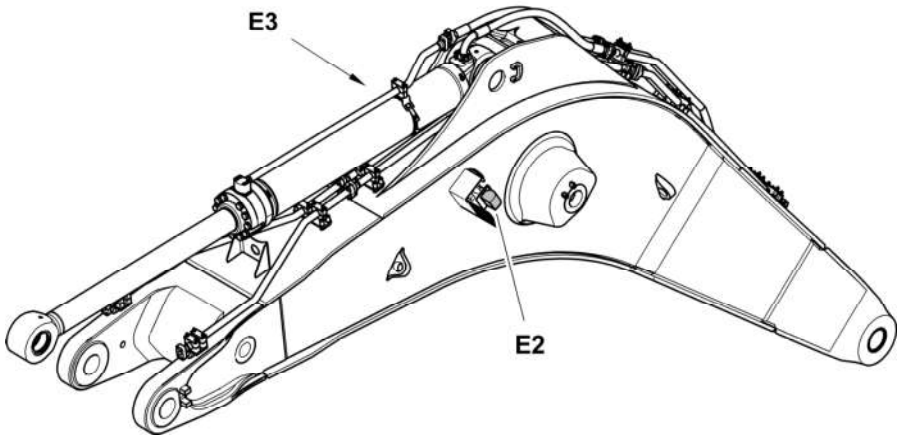

Fig. 3-43 *Attachment lighting configuration*

E2 Headlight / Attachment
E3 Headlight / Attachment

3.3 Setting the machine into 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.

Adjusting the operator's standing position

- Before starting the machine, adjust the seat, mirrors, armrests and operator's controls in such a way that you are able to work comfortably and safely.
- Acoustic insulation devices on the machine must be set to the insulation position throughout operation.

Protection from vibration - seat adjusting

- 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.

Utilisation in confined spaces

- Only operate combustion engines and fuel-operated heaters in adequately ventilated spaces. Before starting in closed areas, ensure adequate ventilation. Follow the regulations which apply for the particular area of use.

Starting the machine safely

- Before starting, check all control lamps and instruments for correct function, place all operator's controls in Neutral and tilt the safety lever up.
- Before starting, sound the horn briefly to alert people in the vicinity of the machine.
- Only start the machine from the driver's seat.
- In the absence of any other instructions, start the engine in accordance with the regulations given in the operating instructions.
- Tilt the safety lever down and then test all display and checking devices.
- In enclosed spaces, only allow the engine to run when there is adequate ventilation. If necessary, open doors and windows to ensure sufficient fresh air supplies.
- Bring the engine and hydraulic oil to operating temperature. Low oil temperatures make the control unit react sluggishly.

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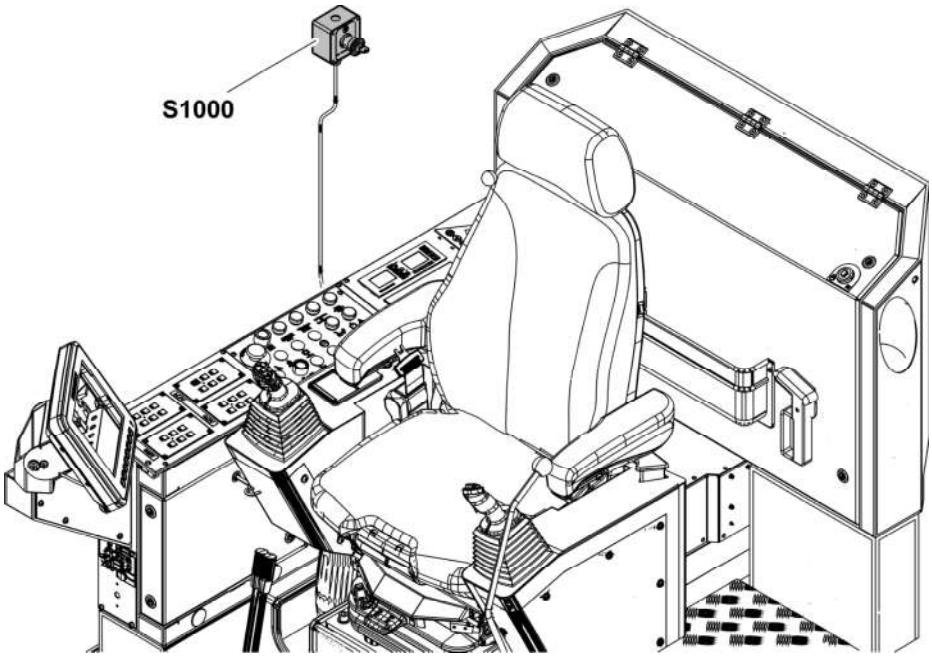

Fig. 3-61 *Cab emergency stop **S1000** of high voltage*

If you push emergency stop **S1000 of** high voltage, the button is locked in activated position.

After a shutdown with an emergency stop button, you must unlock the button before you try to start again.

In order to unlock **S1000**:

- ▶ Use the key of **S1000** on the button.
- ▶ Pull the button.
  - ↳ Emergency stop **S1000** of high voltage is deactivated.

Caution!
Only use this shutdown method in case of emergency.
Other electric machines connected to the same high voltage source are also shut-down.

- Depending on the attachment combination, there is a risk of collision between the work tool and the machine (uppercarriage and undercarriage). The greatest degree of care must be taken to avoid damage.
- Depending on the attachment combination, there is a risk of collision between the work tool and the cab, the cab protection or the boom cylinders. The greatest degree of care must be taken to avoid damage when the hoe teeth come within this area.
- Depending on the attachment combination, there is a risk of collision between the work tool and the attachment parts. The greatest degree of care must be taken to avoid damage.
- Depending on the attachment combination, there is a risk of collision between the lift ring of the attachment and the cab or the cab protection. Before operating, ensure that there is no risk of collision, especially on excavator with cab elevation. If necessary remove the lift ring.
- In case of a thunderstorm:
  - lower the attachment to the ground and if possible anchor the digging tool into the soil.
  - leave the cab and move away from the machine before the storm breaks out. Otherwise, you must stop the excavator, turn off the radio and keep inside the closed cab until the end of the storm.
- Auxiliary control units can have various functions. Always check their functions when starting up the machine.
- Stop the swinging motion of the uppercarriage when lowering the attachment into a ditch without striking the attachment on the ditch walls.
- Inspect the machine for damage if the attachment has been swung into a wall or any other obstacles.
- Applications in which the attachment is to be used to strike the material being extracted are not permitted, even when working in a longitudinal direction.
- Repeated strikes against an object leads to damage to the steel structures and machine components.
- Please refer to your Liebherr dealer if special teeth for heavy-duty or special applications are required.
- Do not attach too large bucket or bucket with side cutters or that are during operations with rocky material. This would prolong the work cycles and may lead to damage to the bucket as well as further machine components.
- With the 2x45° offset articulation, the offset position may only be employed if the working tool or the attachment does not touch the material.
- Operation of the offset articulation to drill into the material is not permitted.
- Do not lift the machine during operation. Should this happen, lower the machine slowly back to the ground.
- Do not let the machine fall heavily on the ground and do not hold it back with the hydraulics. This would damage the machine.
- During operation with the attachment it is forbidden to raise the machine with the dozing blade (e.g. carving at the ceiling when tunnelling).
- Do not dig under the undercarriage. Take all necessary measures to prevent ground collapse under the machine.
- The operation of Liebherr Mining machines in the following Mining applications is not approved or condoned by Liebherr:
  - Batter pulling (also known as Scaling), without exception.
  - Double benching (also known as Split benching or Double flitching) when the material is un-blasted and non-fragmented material which requires the boom down (rod side) pressure to exceed 50 bar.

  The use of these Mining methods will result in increased fatigue levels to steel

▶ Push the button **S6R** right on top of the right handle at the same time you actuate the joystick.
  ↳ The boom is lowered with pressure.

Float position of boom cylinder (with shovel attachment only)

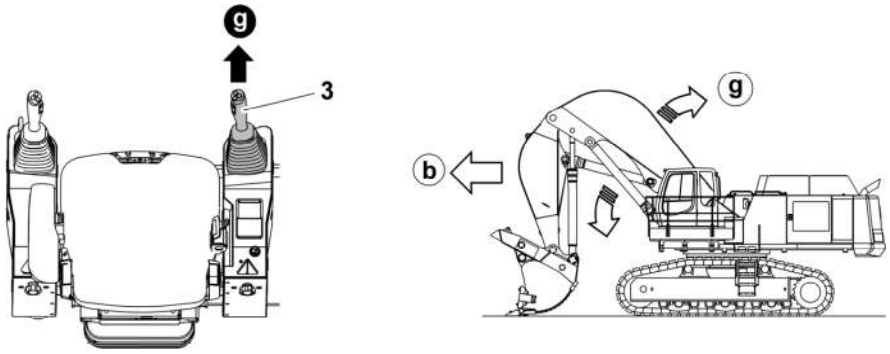

Fig. 3-76 *Float position*

▶ Move the right joystick **3** forward **g**.
  ↳ Now the bucket can be used for grabbing work while moving the joystick **4** forward to extend the crowd cylinders.
  ↳ The attachment can then move freely up or down depending on grade and the bucket will automatically follow the ground contour.

Operating the bucket

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

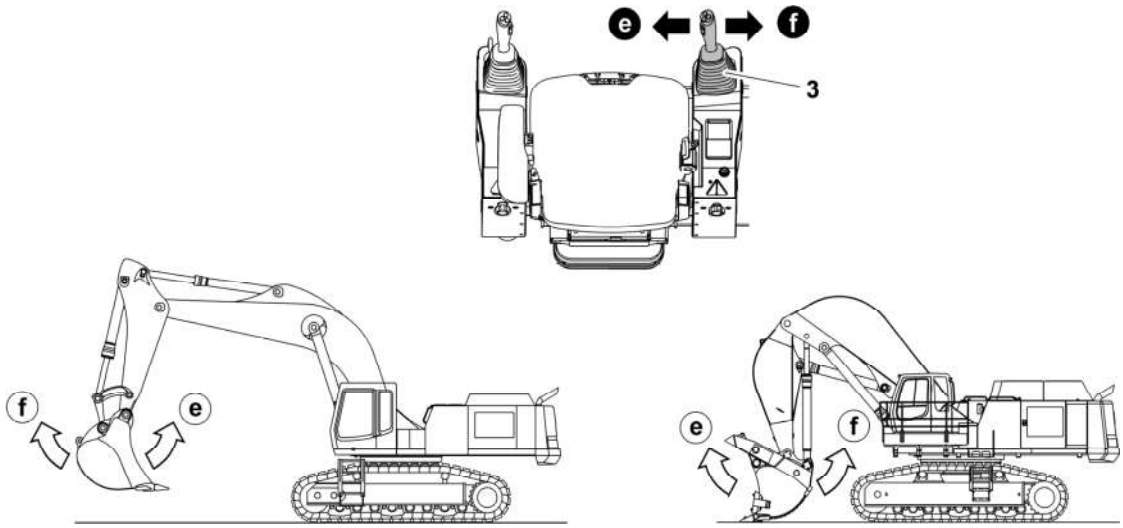

Fig. 3-77 *Operating the bucket cylinder*

▶ Move the joystick to the left **e**.
  ↳ Bucket will be tilted inwards.

▶ Move the joystick to the right **f**.
  ↳ Bucket will be tilted outwards.

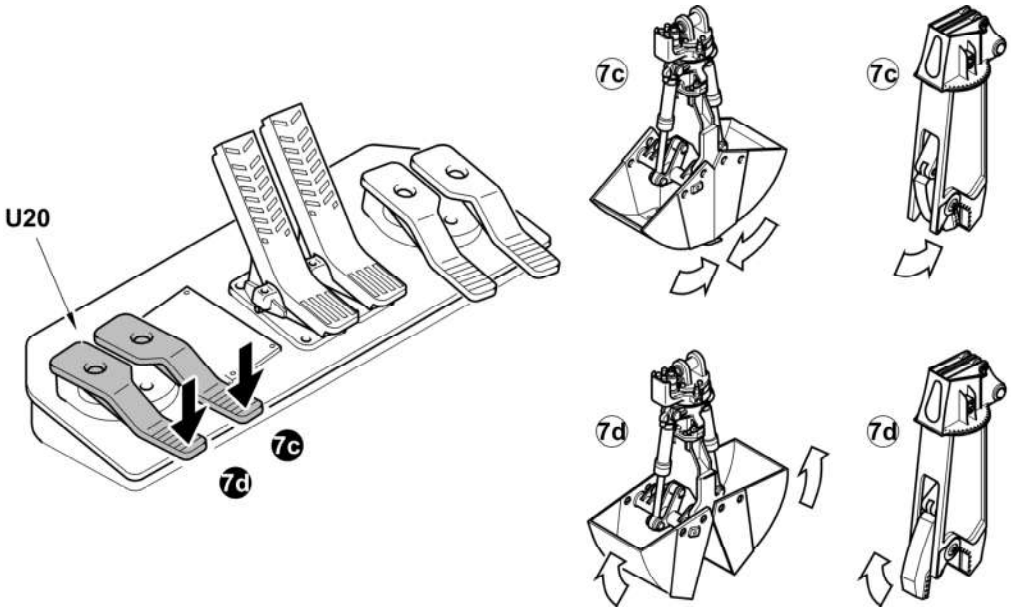

Fig. 3-89 *Grapple / shear opening with the pedal U20*

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

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

Open and close the grapple / shear with the analog stick

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

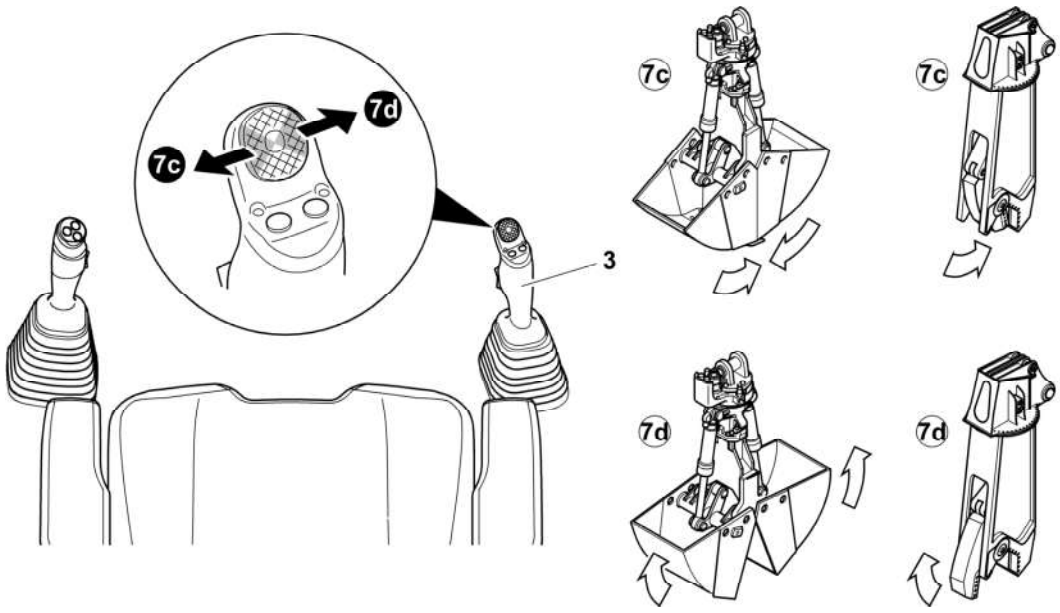

Fig. 3-90 *Grapple / shear opening with the analog stick*

▶ Push the analog stick on the right joystick **3** to the right **7d**.
↳ Grapple / shear is opened.

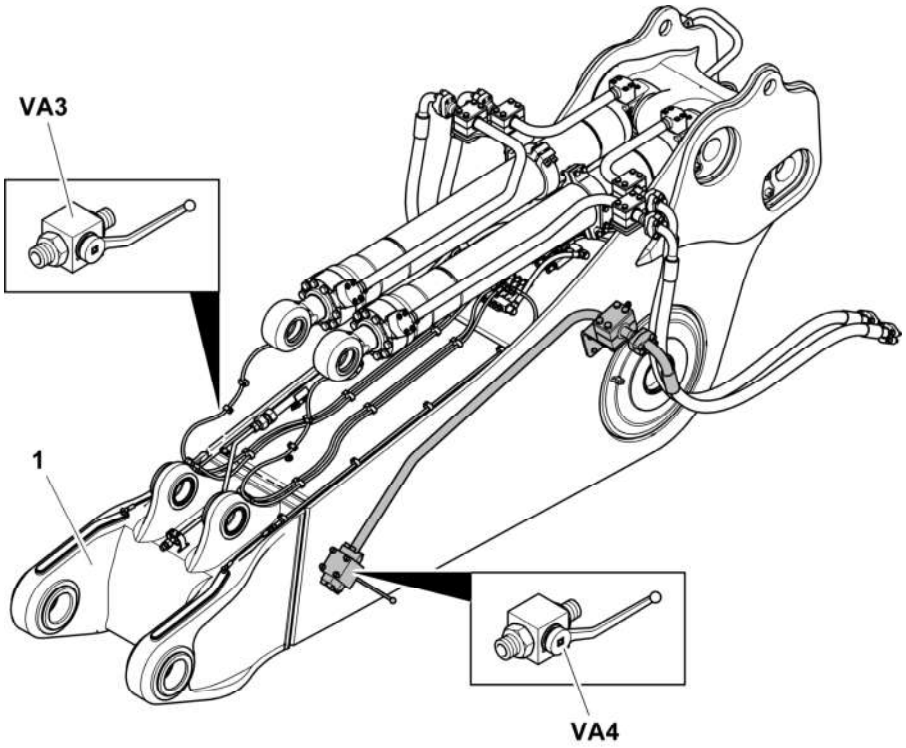

Fig. 3-98 *Manual valves for the grapple / shear opening and closing*

1 Stick
VA3/4 Manual valves for the grapple / shear opening and closing

▶ Connect the manual valves **VA3** and **VA4** to the tool cylinder as follows:
– **VA3** (grapple / shear opening) to the rod side chamber
– **VA4** (grapple / shear closing) to the piston side chamber

▶ Open the manual valves **VA3** and **VA4**.

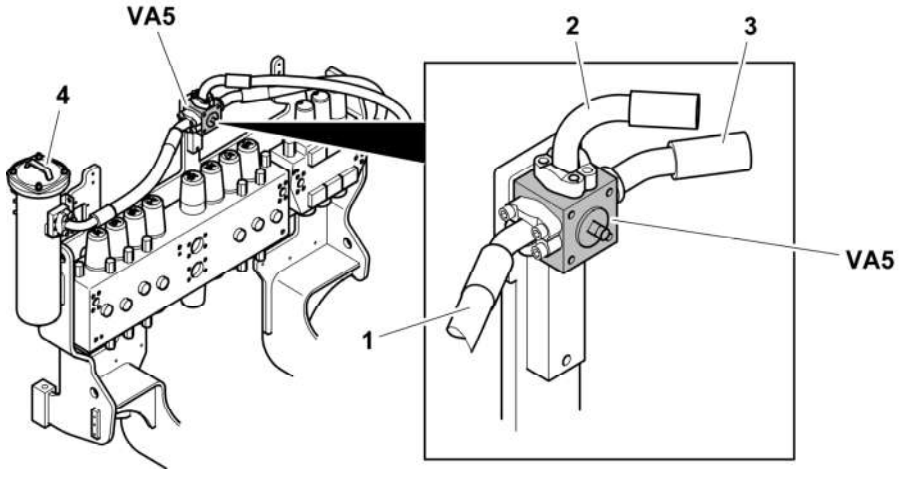

Fig. 3-99 *Three-way valve VA5*

Unload the shovel type bucket

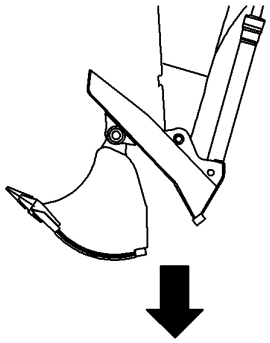

Fig. 3-110 *Unloading of the bucket*

When dumping the load, tip the bucket forward slightly as the clam opens. This helps direct the material to fall centrally into the tray and avoids spillage.

The position of the bucket backboard when the clam opens, directly affects the position of the load in the tray.

Bucket in ideal position resulting in material falling straight down. Loading centre of the haul truck.

3.6.6 Working with the clamshell bucket (construction equipment)

Danger!
Risk of fatal injury and damage to the machine due to a swinging shell type bucket.

- ▶ Ensure that the shell bucket does not swing too close to the cab.
  - ↳ The shell bucket could damage the cab when swinging and injure the machine's operator.
- ▶ Ensure that the shell bucket does not swing towards anyone in the working area.
  - ↳ The shell bucket could injure people standing in the vicinity when swinging.
- ▶ Move the joystick slowly and evenly to prevent the shell bucket swinging.
- ▶ Hold the stick in such a way that the shell bucket cannot swing towards the machine when driving or braking.
- ▶ Do not lift a load with the boom and stick extended too far and do not slew a heavy load too far to the left or right.
  - ↳ The stability of the machine could be affected.

❑ The machine must be in the working position.

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Caution!
The machine configuration for the crane loading depends on the excavator type.

▶ Refer to the transport drawings that follow for machine configuration (parts installed or not) and mass of components.

Caution!
The lifting operations depend on the excavator type.

▶ Refer to "Excavator lifting and lashing operations" section and transport drawings that follow for lifting precautions, lifting points location, angles, etc.

Note!
For more information, refer to "Excavator lifting and lashing operations" that follow in this manual.

Lifting the machine:

❑ Only use lifting devices which are sufficiently dimensioned or which have been specially developed by LIEBHERR for this purpose.

▶ Set the machine in the configuration described on the transport drawings that follow.

▶ Stop the electric motor.

▶ Turn the ignition key to the contact position and release pressure lines by moving the joystick carefully some times.

▶ Remove the ignition key and move the safety lever up.

▶ Close and lock all doors, covers and panels on the machine.

▶ Attach the lifting devices to the correct points indicated in the transport drawings that follow.

Danger!
Standing under the lifted machine is not permitted!

▶ Lift the machine carefully with the crane and load.

▶ When restarting the machine, proceed only in accordance with the operating and maintenance manual.

3.7.3 Travelling procedures for mining machine

The life expectancy of undercarriage components is based on standard working conditions with a maximum travel ratio of 5% per service meter unit. Working and / or travelling on uneven ground and / or abrasive material will influence the lifetime of the components and attract additional cost for the undercarriage components.

Downhill or uphill travel on a slope has also an effect on the life expectancy of undercarriage components and on their wear rate. Indeed, even if the slope angle is below the maximum permitted travelling angle, the increase of the slope angle causes the increase of the force and of the contact pressures applied on all track components (track pad assembly, sprocket, ...). On an indicative basis, the travel force applied on

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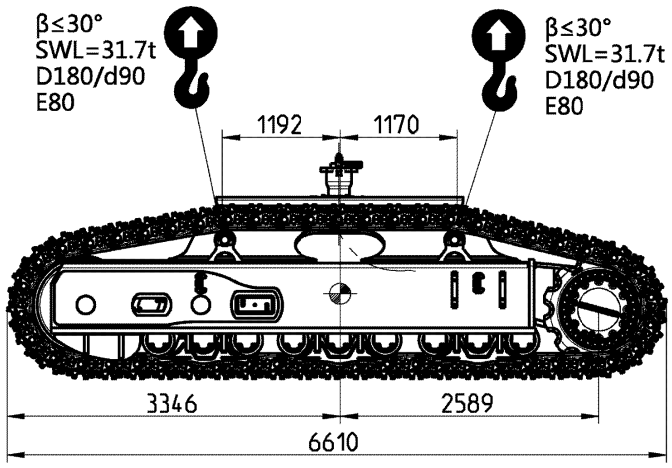
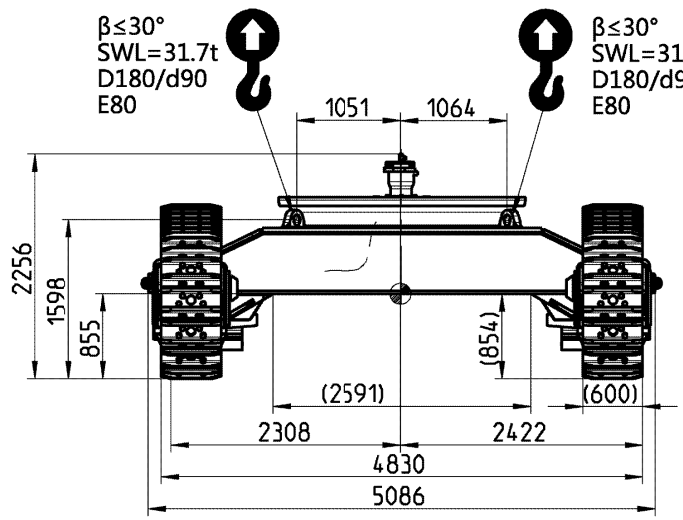
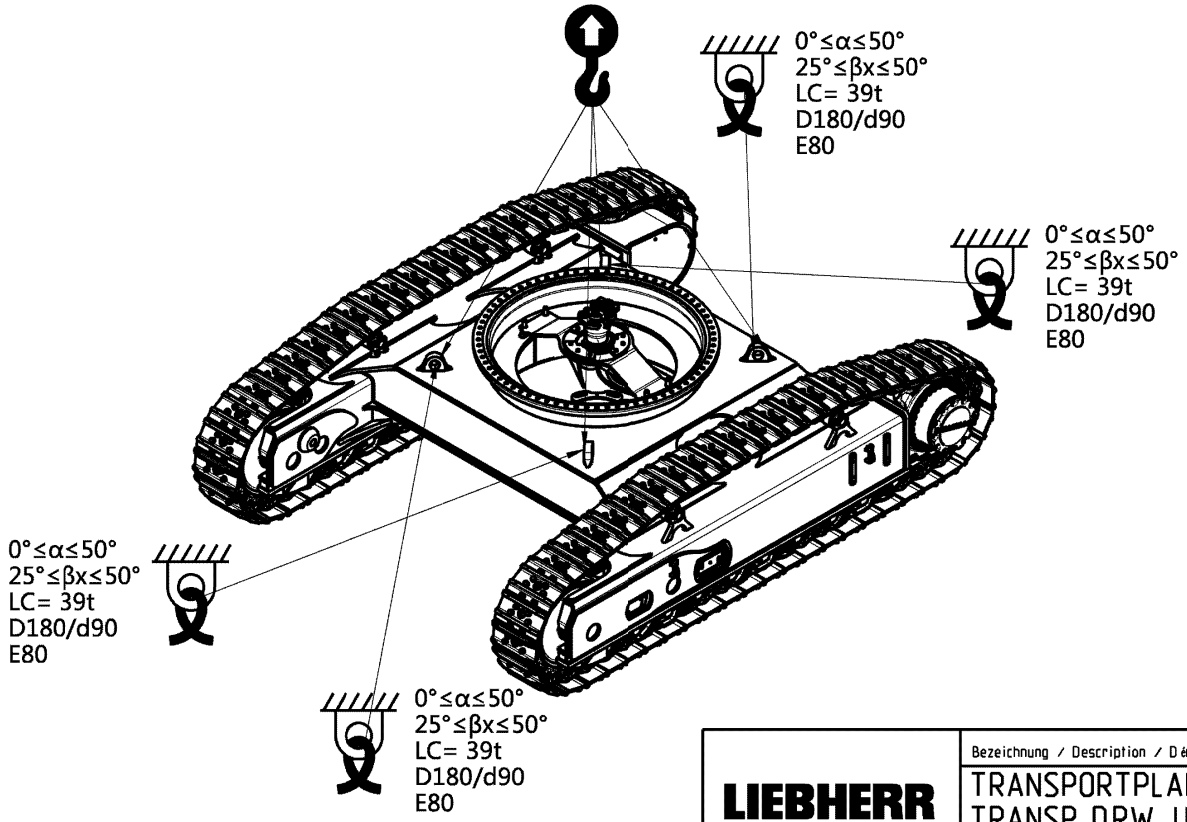
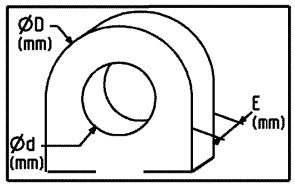






Mit 750mm Schakenketten With 750mm pad-links track chains Avec chaines à maillons de 750mm	+2825 Kg



SCHWERPUNKT
CENTER OF GRAVITY
CENTRE DE GRAVITE

	Gerechnet Calculated Calculé	Gewogen Weighed Pesé
Gewicht ohne Werkzeug und Verpackung Weight without tooling and packaging Poids sans outillage et emballage	43050 kg	
Gewicht mit Werkzeug und Verpackung Weight with tooling and packaging Poids avec outillage et emballage	43050 kg	

LIEBHERR

Bezeichnung / Description / Dénomination	Ident-Nr. / Ident No. N° d'ident	Index / Index Index	Blatt / Page Feuille
TRANSPORTPLAN UNTERWAGEN TRANSP.DRW.UNDERCARRIAGE R9150 PLAN DE TRANSP.CHASSIS	11073377	001	1/1

4.1.2 Transmission

Fault / error	Cause	Solution
Oil flowing out on track rollers, support rollers or leading wheel	Seal defective	Replace seal
The idler does not guide the track chain correctly	There is too much play in the assembly of the idler in the side frame	Check the assembly of the idler to find and correct the cause of the problem
Crawler jumps off or over	Crawler tension too low / crawler wheel worn	Adjust crawler tension
Correctly tensioned crawler losing tension quickly during use	Crawler tensioning cylinder defective	Check crawler tensioning cylinder, change if required or seal (only authorized specialist personnel)
Track roller or support roller sticking	Running gear extremely dirty	Clean running gear

4.1.3 Electrical system

Fault / error	Cause	Solution
Batteries do not charge or charge poorly	Batteries defective	Replace batteries
	Battery connections dirty / oxidised	Clean battery connections
	Cable loose or damaged	Connect or replace cable
Warning light or display instrument not functioning or functioning incorrectly	Bulb burnt out, display instrument defective	Replace defective part
Some or all functions on instrument panel drop out	Plug connector separated or damaged, earth lead interrupted, short circuit fuse defective	Mount plug connector correctly or change, rectify short circuit, replace fuse or activate overload cut-outs
Servo control cannot be activated using switch	Excavator electrics defective	Switch on emergency function using switch S73 on the electric plate A1002. Caution: Servo circuit and brake circuit can only be switched off using the safety lever. Keypad not functioning. Consult customer service.
Parking brake cannot be released using switch		
Slewing gear brake cannot be released using switch		

4.1.4 Work equipment

Fault / error	Cause	Solution
Cylinder stretches when loaded	Piston seal in cylinder defective	Overhaul cylinder
Bearing clearance too high on equipment	Bearing points worn out	Replace bearing parts
Grab / bucket does not move	Valve block on tilting cylinder incorrectly switched	Switch over valve block

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F57 Fuse 5 A / **H92** fire alarm
F58 Fuse 15 A
F59 Fuse 15 A
F60 Fuse 15 A
F61 Fuse 15 A
F62 Fuse 15 A
F63 Fuse 15 A
F64 Fuse 15 A
F65 Fuse 15 A
F66 Fuse 15 A
F67 Fuse 15 A
F68 Fuse 15 A

K22 Relay
K24 Relay
K25 Relay
K26 Relay / **Y10.1** and **Y10.2**
K32 Relay 15 A / **P5**
K34 Relay timer
K35_1 Relay / Safety start
K35_2 Relay / Start CAN
K36 Relay / Buzzer
K37 Relay
S73 Switch safety brake
X072 Connector 36 poles

Electrical plate A1004

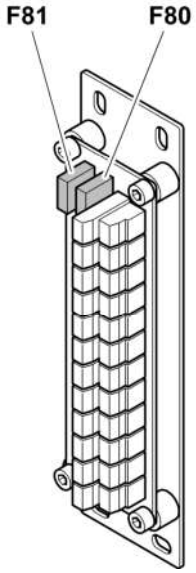

Fig. 4-8 *Fuses of electrical plate A1004*

F80 Fuse 10 A / Supply greasing
F81 Fuse 10 A / Supply centralized hydraulic lubrication (optional)

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Caution!
For oil coolers access, use an external safety device (e.g. a ladder or stepladder).

Caution!
Access doors can close accidentally and trap the operator or maintenance personnel.

▶ When you have opened the access doors, latch them using the retainer.

Access door	Lock	Access to:
Electric motor cover	Gas pressure spring, auxiliary mechanical retainer	– electric motor
Radiator cover	Gas pressure spring	– Radiator
Side door, left	Mechanical retainer	– Hydraulic pumps – Control oil unit – Electric box E50 – Dry air filter
Side door, right	Mechanical retainer	– Radiator – Batteries – Main battery switch

Tab. 5-1 *Access doors*

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5.4.3 Lubricant chart

Designation	Medium	Symbol	Classification	Viscosity	Quantity*
Hydraulic tank	Hydraulic oil		See section "Lubricating and operating material specifications".		1631 L in whole circuit 949 L in hydraulic tank
Swing gear	Transmission oil		See section "Lubricating and operating material specifications".		2 x 20 L
Travel gear	Transmission oil		See section "Lubricating and operating material specifications".		2 x 24 L
Splitterbox	Transmission oil		API-GL-5 MIL-L 2105 B, C or D	SAE 90 SAE 80W-90	10 L
Swing ring roller bearing races and general lubrication points	Lubricating grease		See section "Lubricating and operating material specifications".		80 L
Swing ring teeth	Lubricating grease		See section "Lubricating and operating material specifications".		8 L
Track roller			Agip Rotra MP 85W-140		18/22 x 0,966 kg (1080 cc)
			Cold climate conditions (optional): Agip Rotra LSX 75W90 90% + Rocol ASO 10%		
Carrier roller			SAE 40		4 x 0,5 kg
			Cold climate conditions (optional): 90% Agip Rotra LSX + 10% Agip Rocol ASO R		
Idler wheel			SAE 40 RLC		2 x 1,3 kg
			Cold climate conditions (optional): 90% Agip Rotra LSX + 10% Agip Rocol ASO R		
Hinges, joints, locks	Engine oil	-	-	-	-
Rubber seal on doors and trim panels	Silicon spray or talc	-	-	-	-

Tab. 5-3 *Lubricant chart*

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

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A Mineral oils and PAO oils
h Operating hours

▶ Liebherr recommends that you sample the hydraulic oil every 500 operating hours (refer to the section "Condition monitoring with oil analysis").

▶ Change the hydraulic oil every 2000 operating hours.

Oil changes at optimized intervals

This procedure is applicable for mineral oils, PAO oils and HEES biodegradable oils.

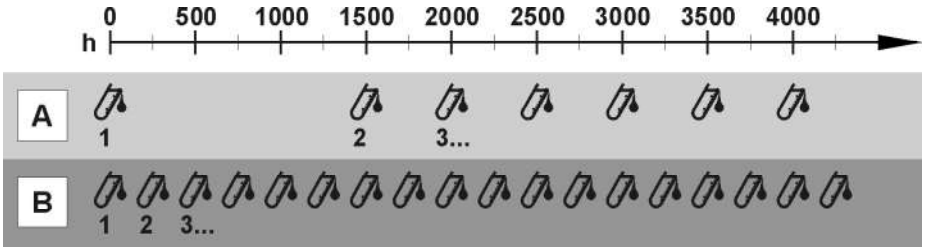

Fig. 5-16 *Oil changes at optimized intervals*

A Mineral oils and PAO oils
B HEES biodegradable oils
h Operating hours
1 First oil sample
2 Second oil sample
3 Next oil samples at regular intervals

You can extend the oil change intervals (up to 6000 operating hours and possibly even more) as long as the properties of the oil are satisfactory.

▶ Get a sample of the new hydraulic oil.

▶ If you use mineral oil or PAO oil, you must sample the hydraulic oil every 500 operating hours after the first 1500 operating hours.

▶ If you use HEES biodegradable oil, you must sample the hydraulic oil every 250 operating hours.

▶ Change the hydraulic oil immediately if the results of the analysis are not satisfactory (refer to the section "Condition monitoring with oil analysis").

5.5.3 Swing and travel gear oils

Note!
For a given machine operating temperature range, and if different viscosity grades are approved according to the following specifications, always choose the lubricant with the highest viscosity grade.

Caution!
Gears flushing is necessary when switching from mineral oil to synthetic oil.

▶ Use new oil to flush the gear when switching from mineral oil to synthetic oil.

Flushing with cleaning fluid or Diesel fuel is not permitted.

Oil sampling points

Splitterbox

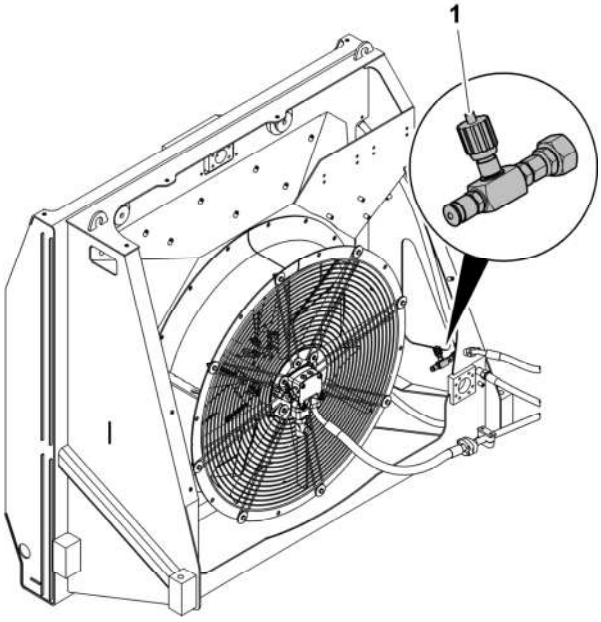

Fig. 5-20 *Sampling valve **1** for splitterbox oil*

To get a sample of the splitterbox oil:

Note!
Two sampling procedures are applicable for this component.

- ▶ Always use the same sampling point and the same sampling procedure for this component to make sure that the analysis records stay relevant.

- ▶ Use the sampling valve **1** which is installed next to the hydraulic oil cooler.

or

- ▶ Use a sampling pump and get the oil sample through the dipstick tube of the splitterbox.

5.8.3 Breather filter

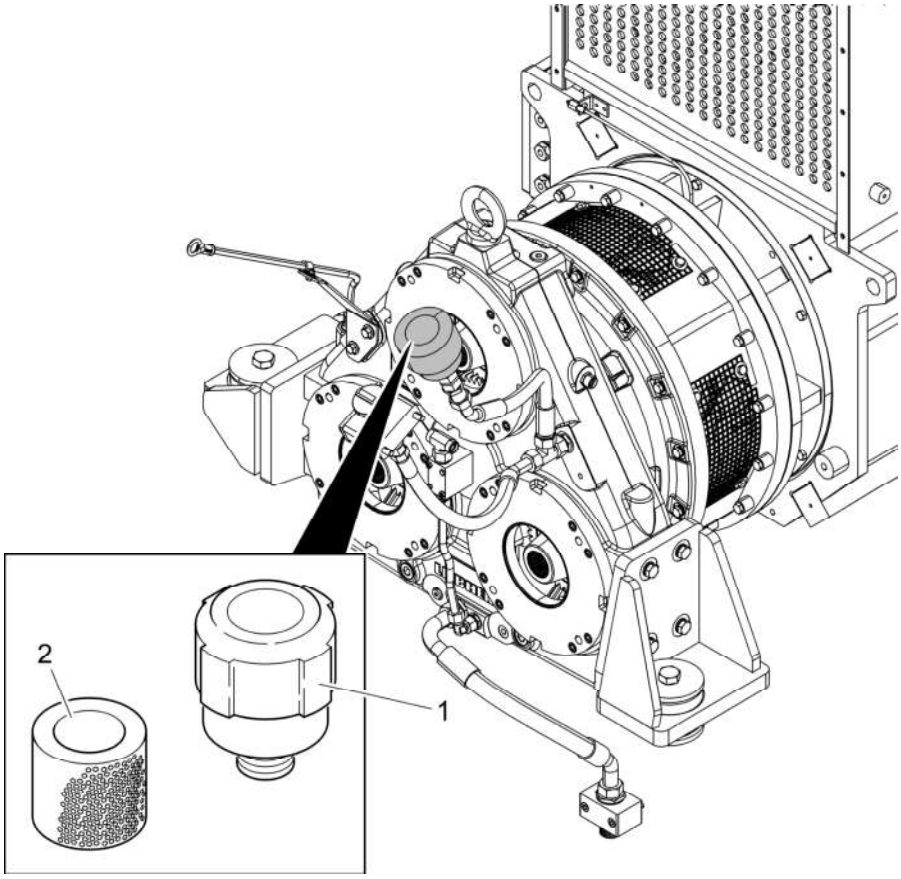

Fig. 5-27 *Breather filter on splitterbox*

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, refer to Control and maintenance chart.

5.9 Compressed air system (optional)

5.9.1 Pressurised attachment (optional)

When the machine works in a water environment, this optional system helps prevent

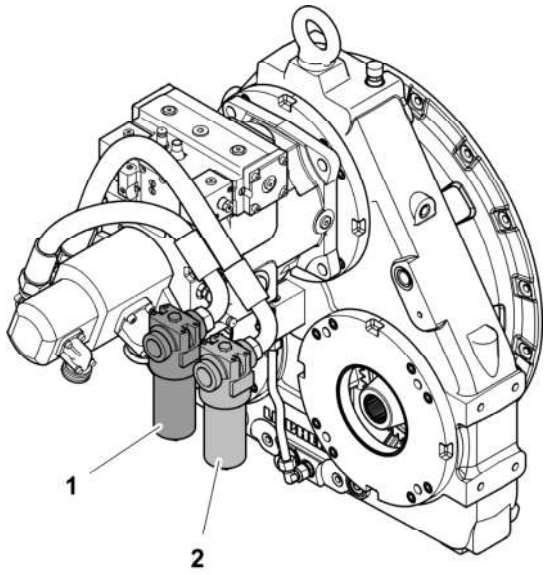

Fig. 5-36 *Piloting and replenishing oil filter location*

1 Piloting oil filter
2 Replenishing oil filter

They are located in the pumps box, near the pumps.

▶ Replace the filter elements at fixed intervals.

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

It is not permitted to clean the filter element.

▶ Replace the filter element each time you open the filter housing.

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The filter element **4** must also be replaced regularly.

Replace the filter element

- ▶ Loosen nuts **1**.
- ▶ Remove the cover **2**.
- ▶ 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**.

Hammer return-line filter

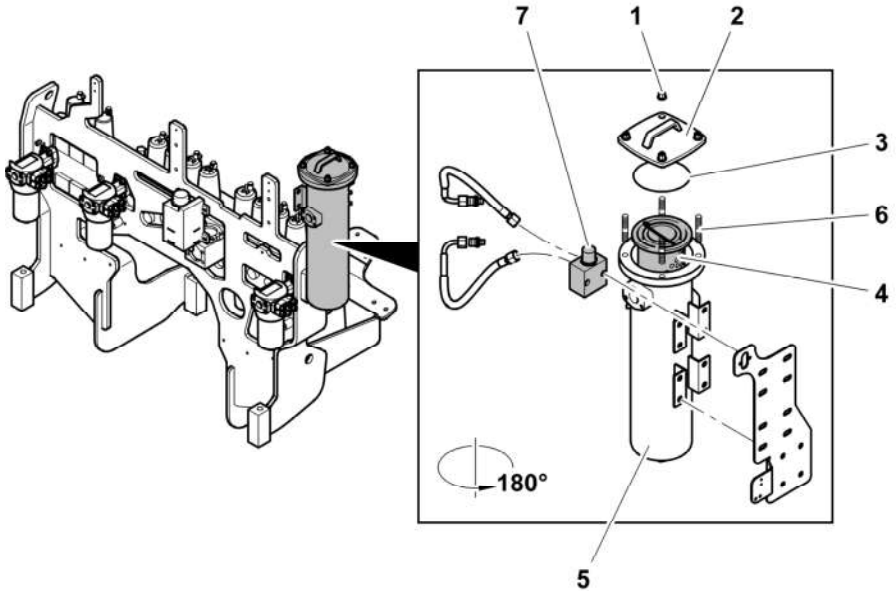

Fig. 5-47 *Hammer return-line filter*

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

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

The filter element **4** must also be replaced regularly.

Replace the filter element

- ▶ Loosen nuts **1**.
- ▶ Remove the cover **2**.

5.11 Oil changes on components

5.11.1 General information

- ❑ The machine must be standing level.
- ▶ Stop the electric motor.
- ▶ Wait briefly until the oil has collected in the oil sump.
- ▶ Drain off the oil (preferably when oil is at operating temperature)
- ▶ Add the oil.
- ▶ Check the oil level.
- ▶ For oil quality and quantity, refer to the lubricant chart.
- ▶ For change intervals, refer to the lubrication chart and to the control and maintenance chart.

5.11.2 Swing gear - Oil change

Two swing gears are on the machine.

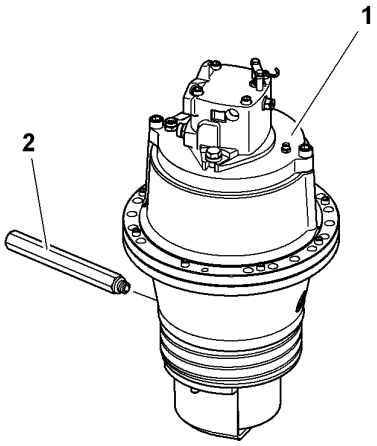

Fig. 5-55 *Oil change in swing gear*

1 Swing gear
2 Grease filler tube

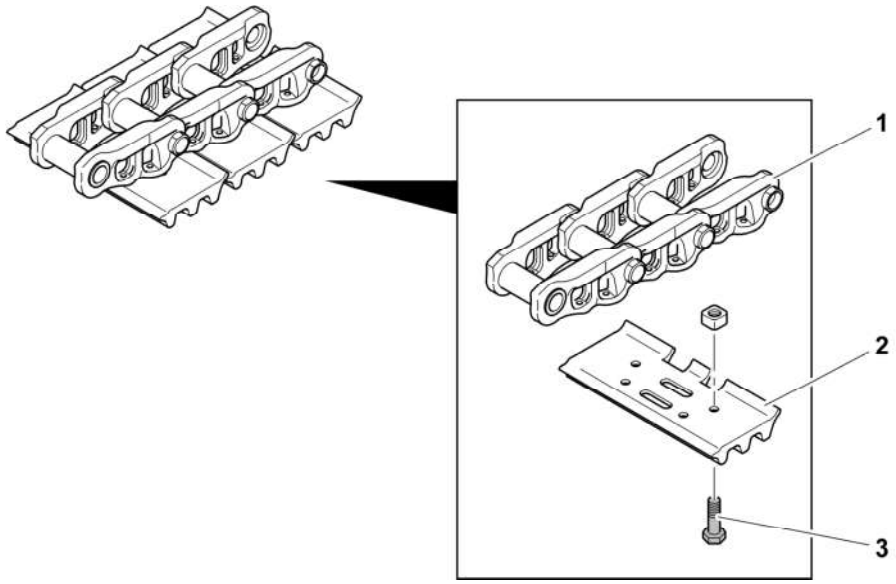

Fig. 5-64 *Track pad*

		Tightening
1	Track link	-
2	Track pad	-
3	Screw	**Do a check:** – 3100 Nm **Install a new screw:** – first 1370 ± 140 Nm – then 150° ± 10°

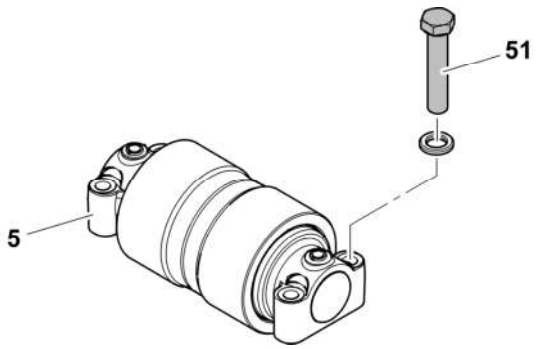

Fig. 5-65 *Carrier roller*

Depending on the machines, the length of the screw **51** can be different.

		Torque
5	Carrier roller	-
51	Screw M20x100/110 x quantity 4 for each carrier roller	560 Nm

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5.16.4 Electrical components location

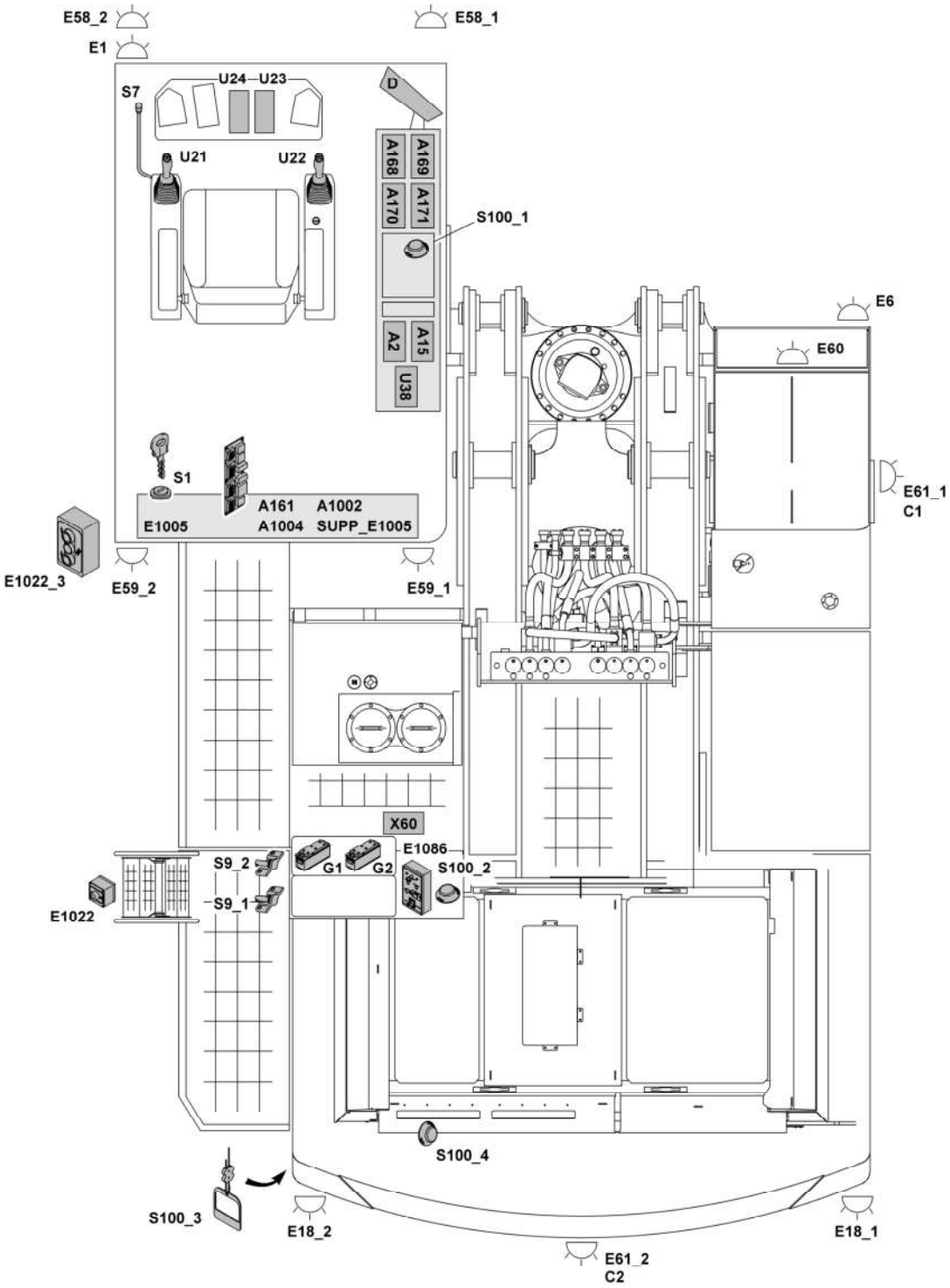

Fig. 5-76 *Electrical components location*

A2	Radio	**E61_2**	Camera lighting / Counter-weight
A15	Greasing module	**E50**	Electrical box

5.20.1 Counterweight mounting bolts

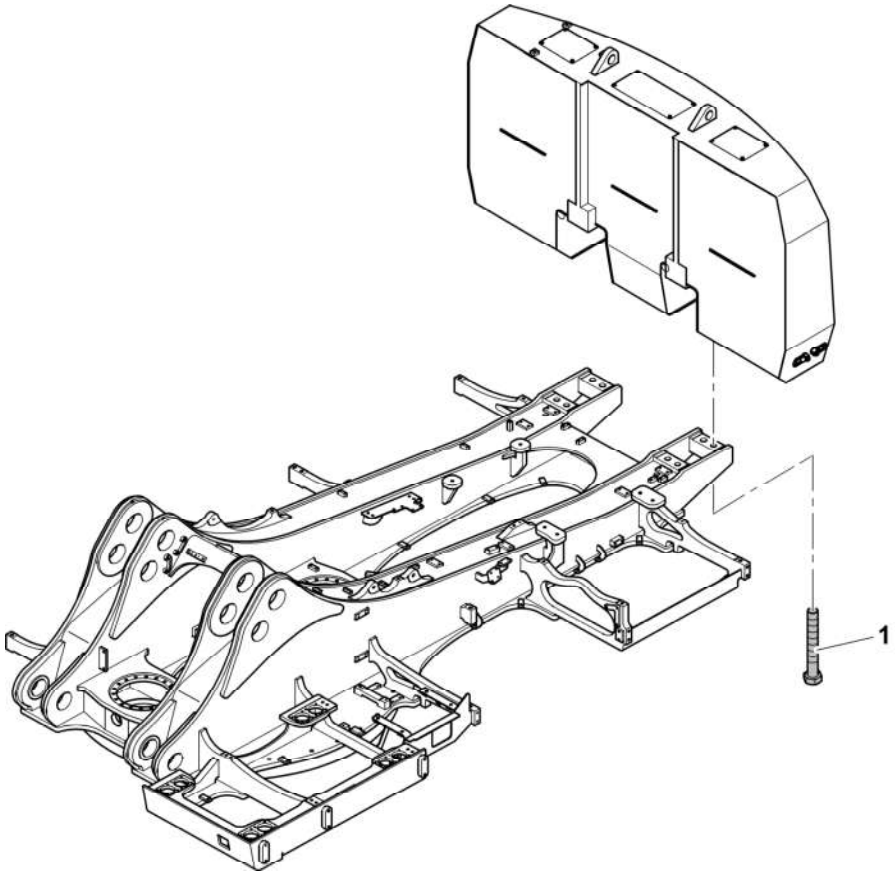

Fig. 5-86 *Counterweight bolts*

		Torque	Quantity
1	Screw M42x300	4975 Nm	6

5.25 Control and maintenance chart

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

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

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

Note!
If you find damage(s) on structural components (boom, stick, bucket, central part, side frames, rotating deck, hydraulic tank, fuel tank or cabin) please fill out the "Structural Inspection" form in Service Manual - Chapter **4**.
In addition:
- a visual inspection is required every 500 hours,
- a detailed inspection is required every year or at least every 7500 hours.

5.25.1 General information

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

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

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

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

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

Two types of inspection

Visual Check

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

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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
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)	❑		
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	❍		
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	❍		
UPPERCARRIAGE			
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 visual check if the fan guards are in place and secured	❍		
Do a visual check of the non-slip surfaces for wear and damage	❍		
SWING GEAR			
Do a visual check of the swing gears for leaks and oil level in expansion tanks	❍		
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)	❑		
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	❍		

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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
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.	❍		
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	❍		
Cabin: Check the heater function (before the cold season)	❍		

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6 Appendix

6.1 Visual check of the hydraulic hoses

6.1.1 Preface

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

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

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

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

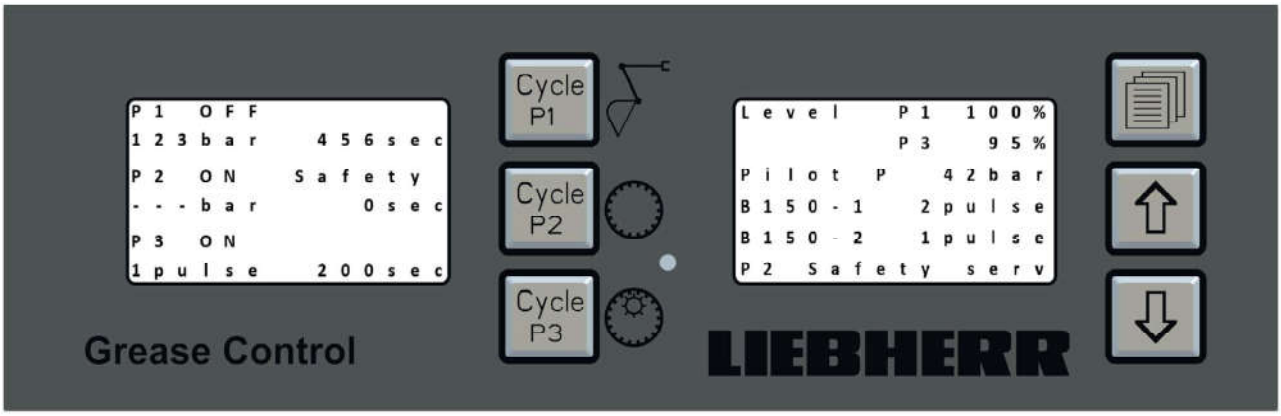
However, should you require any further explanations or information, LIEBHERR technical documentation, sales school and customer service departments are available for your convenience.

Danger!
Fluid injection injuries have to be treated immediately!

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

LEC/en/Edition: 06 / 2020

1. Main Screens and Control Buttons



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

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

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

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

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

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

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

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

Cycle P1 Cycle P2 Cycle P3 **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.

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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;

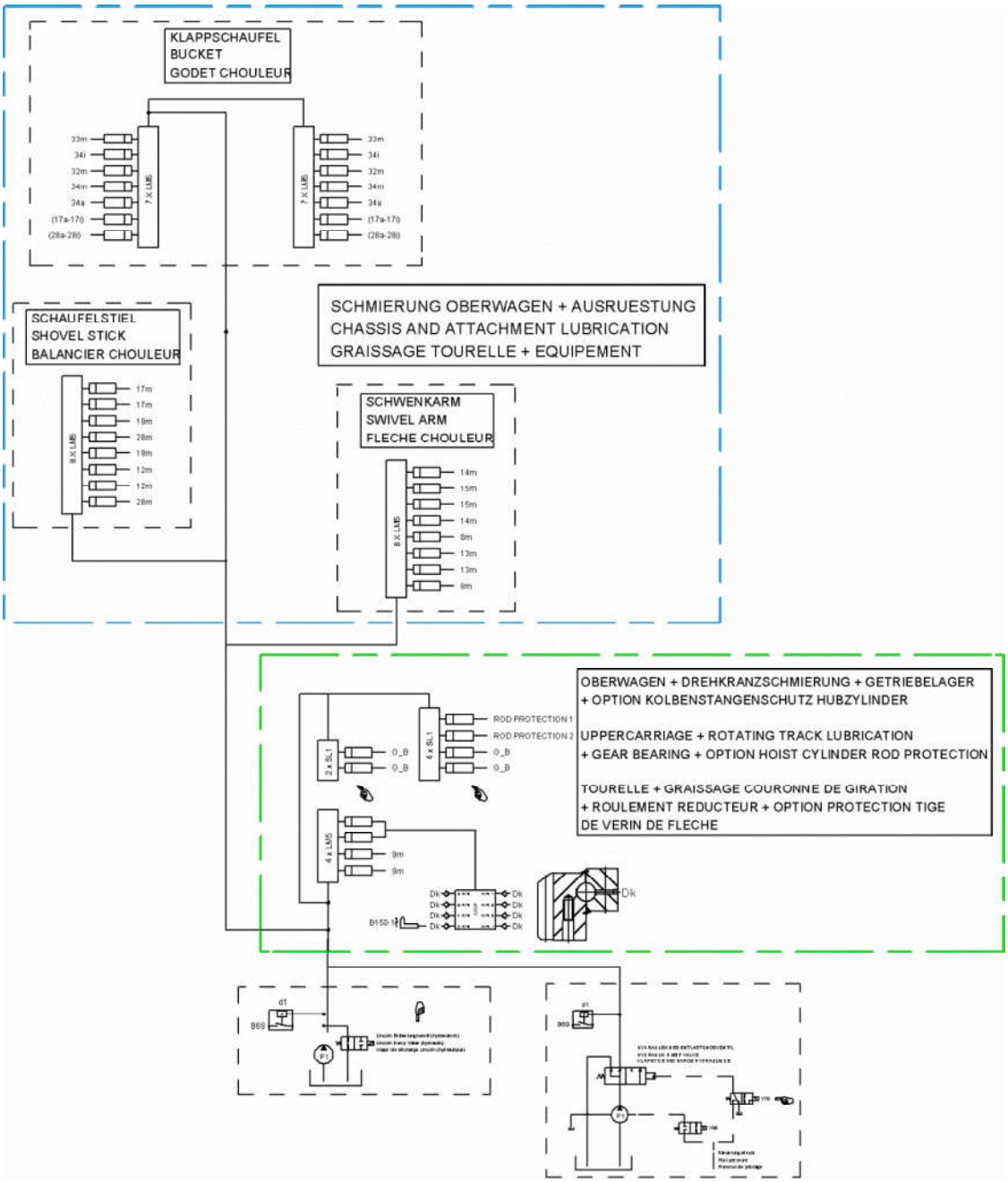
	Do not burden / this side up!
	Protect against moisture!
	Handle with care! Fragile, do not throw!

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)

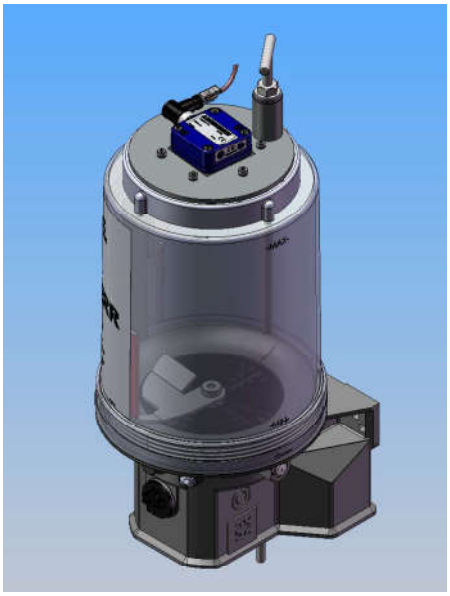


Fig. 12 Option P203- 8XYBAU-1K6-24-1A8.XX

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.