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Operating manual

Hydraulic excavator
R 906 Classic

from serial number 27415

Document identification

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Product identification

Manufacturer:	LIEBHERR France S.A.S.
Type:	R 906 Classic
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Conformity:	CE

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1 Product description

1.1 Assembly - overview

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

1.1.1 Machine and construction equipment

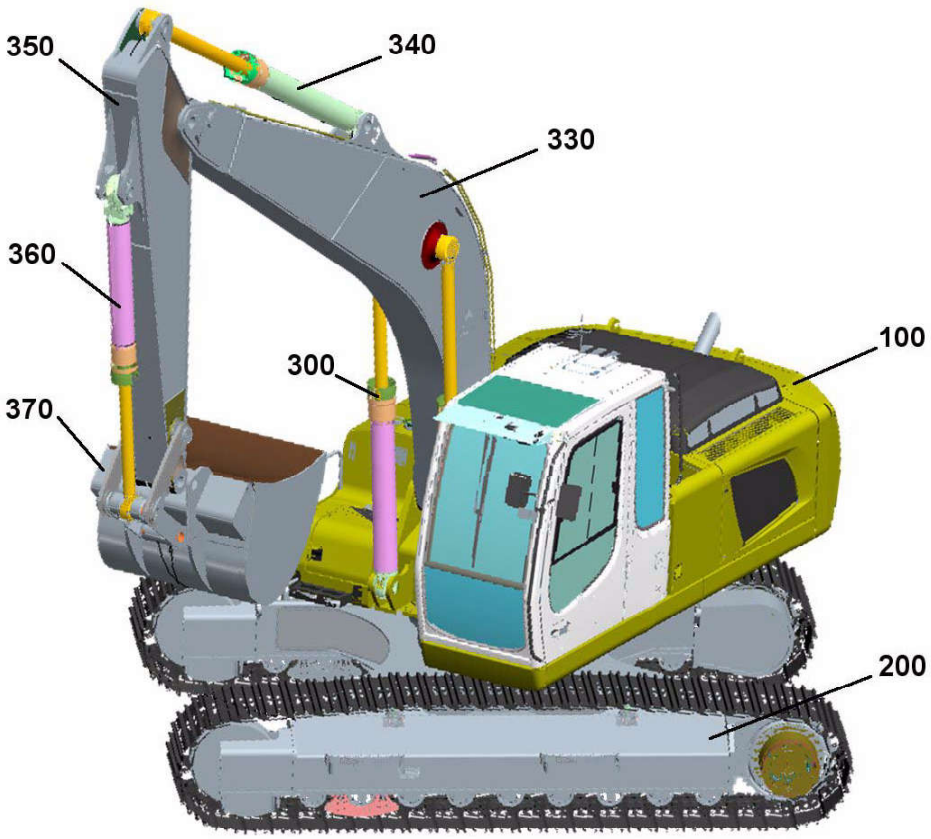

Fig. 1-1 *Machine with construction equipment*

100	Upper carriage	**330**	Boom	**360**	Tilt cylinder
200	Chassis	**340**	Stanchion cylinder	**370**	Bucket
300	Hydraulic jack	**350**	Shovel arm		

Performance

Thanks to its innovative Advanced excavator system technology, the R 906 Advanced crawler excavator has performance features that are truly unique. Characteristic elements of this system technology include the particularly effective and energy-efficient Positive Control twin-circuit hydraulic system, which was specifically designed for machines with a high level of superimposed functions and operational movements. The electronic pump control arrangement sets this technology apart, creating a new standard for performance and quantity control that entirely matches the operator's needs.

Reliability

Liebherr provides customers with solutions that lead the way for the future, solutions for maximum equipment reliability and availability, solutions which satisfy the most extreme demands for performance and quality. With more than 50 years experience in the construction of hydraulic excavators, we have an advantage in design and consultation that clearly sets us apart.

Comfort

In the cab the driver can look forward to a workplace designed in accordance with the very latest findings in ergonomic science, with emphasis on comfort and ease of operation. The optimised arrangement of the hydraulic hoses means that the driver has en even wider field of vision, and the heating and climate control system fitted as standard means pleasant working conditions inside, whatever the weather. Liebherr crawler excavators are also particularly easy to service – maintenance tasks can be carried out easily and rapidly at readily accessible service points.

Economy

Crawler excavators from Liebherr guarantee maximum productivity. The optimum interplay of hydraulics and electronics means that individual movements and superimposed movements alike can be carried out particularly efficiently. And, perhaps last but by no means least, the perfect harmonisation of all the components means that energy expenditure during operation can be kept to an absolute minimum.

Fig. R 906 Advanced (ahead)
R 906 Classic (background)

Technical Data Classic

Engine

Rating per ISO 9249	105 kW (143 HP) at 1800 RPM
Model	Liebherr D 934 S
Type	4 cylinder in-line
Bore/Stroke	122/136 mm
Displacement	6,36 l
Engine operation	4-stroke diesel unit pump system turbo-charged after-cooled and fuel cooled reduced emissions
Cooling	water-cooled and integrated motor oil cooler
Air cleaner	dry-type air cleaner with pre-cleaner, primary and safety elements
Fuel tank	380 l
Electrical system	
Voltage	24 V
Batteries	2 x 135 Ah/12 V
Starter	24 V/6,6 kW
Alternator	three phase current 28 V/80 A
Engine idling	sensor-controlled

Hydraulic System

Hydraulic system	Positive Control Classic. Dual circuit hydraulic system for independent and need-based quantity allotment via the hydraulic pumps
Hydraulic pump	Liebherr variable displacement pump built in transversal plate style, in parallel arrangement with integrated transfer box
Max. flow	2 x 214 l/min.
Max. pressure	350 bar
Pump regulation	electro-hydraulic with electronic engine speed sensing regulation, pressure compensation, flow compensation, automatic oil flow optimizer, swing circuit with priority and torque control. 2 independent circuits with hydraulic pump summation for individual equipment movements
Hydraulic tank	290 l
Hydraulic system	max. 500 l
Hydraulic oil filter	1 full flow filter (20 µm) in return line with integrated fine filter area (5 µm)
Hydraulic oil cooler	compact cooler, consisting of a water cooler, sandwiched with hydraulic oil cooler, fuel cooler and after-cooler cores and hydrostatically driven fan
MODE selection	adjustment of engine and hydraulic performance via amode pre-selector to match application, e.g. for especially economical and environmentally friendly operation or for maximum digging performance and heavy-duty jobs
Super-Finish	adjustable working speed for precision work
RPM adjustment	stepless adjustment of engine output via RPM at each selected mode
Liebherr Tool Control	10 preadjustable pump flows and pressures for add-on tools
Liebherr Tool Management	automatic tool recognition (unlimited number) and setting of the discharge and pressure; the operating hours of the attachment tool are recorded

Hydraulic Controls

The control of movements steered by joysticks demand are regulated by a hydraulic valve block.

Power distribution	via control valve with integrated safety valves
Servo circuit	
Attachment and swing	proportional via joystick levers
Travel	– with proportionally functioning foot pedals or adjusted with a plugable lever – speed pre-selection
Additional functions	via foot pedals or buttons

Swing Drive

Drive by	Liebherr swash plate motor
Transmission	Liebherr compact planetary reduction gear
Swing ring	Liebherr, sealed single race ball bearing swing ring, internal teeth
Swing speed	0 – 11 RPM stepless
Swing torque	71,1 kNm
Holding brake	wet multi-disc (spring applied, pressure released)

Operator's Cab

Cab	built from deep-drawn components, resiliently-mounted, sound-insulated, tinted windows, front window stores overhead, door with sliding window
Operator's seat	shock-absorbing suspension, adjustable to operator's weight, 6-way adjustable seat
Control system	integrated into the adjustable console panel in the operator's seat
Monitoring	menu driven query of current operating conditions via the display. Automatic monitoring, display, warning (acoustical and optical signal) and saving machine malfunction data, for example; engine overheating, low engine oil pressure or low hydraulic oil level
Air-conditioning	standard air conditioning, combined cooler/heater, additional dust filter in fresh air/recirculated
Noise emission	
ISO 6396	L_{pA} (inside cab) = 71 dB(A)
2000/14/EC	L_{WA} (surround noise) = 101 dB(A)

Undercarriage

Versions	
NLC	heavy duty, narrow gauge (2000 mm) with longer crawler length
LC	heavy duty, standard gauge (2250 mm) with longer crawler length
Drive	Liebherr swash plate motors with integrated brake valves on both sides
Transmission	Liebherr planetary reduction gears
Travel speed	low range – 3,7 km/h high range – 6,1 km/h
Net drawbar pull on crawler	184 kN
Track components	B 60, maintenance-free
Track rollers/Carrier rollers	8/2
Tracks	sealed and greased
Track pads	triple-grouser
Digging locks	wet multi-discs (spring applied, pressure released)
Brake valves	integrated into travel motor
Lashing eyes	integrated

Attachment

Type	combination of resistant steel plates and forged components
Hydraulic cylinders	Liebherr cylinders with special seal-system, shock absorbed
Pivots	sealed, low maintenance
Lubrication	semi-automatic central lubrication system (except link and tilt geometry)
Hydraulic connections	pipes and hoses equipped with SAE splitflange connections
Bucket	standard-equipped with 12 t safety hook for lifting and Liebherr tooth system

Lift capacities Advanced

with Adjustable Offset Boom 5,70 m and Heavy Counterweight

Stick 2,20 m

m	Undercarriage	3,0 m		4,5 m		6,0 m		7,5 m				m
9,0	NLC[1)]											
	LC											
7,5	NLC[1)]									3,7*	3,7*	5,56
	LC									3,7*	3,7*	
6,0	NLC[1)]					4,4	5,4*			3,4	3,5*	6,80
	LC					5,0	5,4*			3,5*	3,5*	
4,5	NLC[1)]			6,6	7,0*	4,1	5,8*	2,7	3,8*	2,7	3,6*	7,54
	LC			7,0*	7,0*	4,7	5,8*	3,2	3,8*	3,1	3,6*	
3,0	NLC[1)]			5,7	8,4*	3,7	6,3*	2,6	5,1	2,3	3,8*	7,92
	LC			6,7	8,4*	4,3	6,3*	3,0	5,2	2,7	3,8*	
1,5	NLC[1)]			5,0	9,5*	3,4	6,9*	2,4	4,9	2,1	4,2*	8,00
	LC			5,9	9,5*	4,0	6,9*	2,8	5,0	2,6	4,2*	
0	NLC[1)]	7,8*	7,8*	4,6	9,7*	3,1	6,7	2,3	4,8	2,1	4,5	7,80
	LC	7,8*	7,8*	5,6	9,7*	3,7	6,8	2,7	4,9	2,6	4,6	
-1,5	NLC[1)]	8,8	12,5*	4,6	9,2*	3,0	6,6			2,3	5,0	7,27
	LC	10,8	12,5*	5,5	9,2*	3,6	6,7			2,8	5,1	
-3,0	NLC[1)]	9,1	10,3*	4,7	7,8*	3,1	5,8*			2,9	5,3*	6,35
	LC	10,3*	10,3*	5,6	7,8*	3,7	5,8*			3,5	5,3*	
-4,5	NLC[1)]			5,0*	5,0*					4,7	4,7*	4,79
	LC			5,0*	5,0*					4,7*	4,7*	

Stick 2,40 m

m	Undercarriage	3,0 m		4,5 m		6,0 m		7,5 m				m
9,0	NLC[1)]											
	LC											
7,5	NLC[1)]									3,4*	3,4*	5,83
	LC									3,4*	3,4*	
6,0	NLC[1)]					4,4	5,2*			3,2*	3,2*	7,02
	LC					5,1	5,2*			3,2*	3,2*	
4,5	NLC[1)]			6,7	6,8*	4,1	5,6*	2,7	4,5*	2,6	3,2*	7,74
	LC			6,8*	6,8*	4,8	5,6*	3,2	4,5*	3,0	3,2*	
3,0	NLC[1)]	10,1	10,8*	5,8	8,2*	3,7	6,2*	2,6	5,2	2,2	3,4*	8,11
	LC	10,8*	10,8*	6,8	8,2*	4,4	6,2*	3,0	5,2*	2,6	3,4*	
1,5	NLC[1)]			5,0	9,4*	3,4	6,8*	2,4	4,9	2,1	3,8*	8,19
	LC			6,0	9,4*	4,0	6,8*	2,8	5,0	2,5	3,8*	
0	NLC[1)]	8,1*	8,1*	4,6	9,7*	3,1	6,7	2,2	4,8	2,0	4,4	7,99
	LC	8,1*	8,1*	5,6	9,7*	3,7	6,8	2,7	4,9	2,5	4,4*	
-1,5	NLC[1)]	8,6	12,4*	4,5	9,2*	3,0	6,6			2,2	4,8	7,48
	LC	10,7	12,4*	5,5	9,2*	3,6	6,7			2,7	4,9	
-3,0	NLC[1)]	8,9	10,7*	4,6	8,0*	3,1	5,9*			2,7	5,2*	6,59
	LC	10,7*	10,7*	5,6	8,0*	3,7	5,9*			3,3	5,2*	
-4,5	NLC[1)]			5,0	5,5*					4,2	4,7*	5,11
	LC			5,5*	5,5*					4,7*	4,7*	

Stick 2,70 m

m	Undercarriage	3,0 m		4,5 m		6,0 m		7,5 m				m
9,0	NLC[1)]											
	LC											
7,5	NLC[1)]					3,7*	3,7*			3,0*	3,0*	6,23
	LC					3,7*	3,7*			3,0*	3,0*	
6,0	NLC[1)]					4,5	5,0*			2,8*	2,8*	7,35
	LC					5,0*	5,0*			2,8*	2,8*	
4,5	NLC[1)]					4,2	5,4*	2,8	4,8*	2,4	2,8*	8,04
	LC					4,8	5,4*	3,2	4,8*	2,8	2,8*	
3,0	NLC[1)]	10,8	12,7*	5,9	7,9*	3,8	6,0*	2,6	5,1*	2,1	3,0*	8,40
	LC	12,7*	12,7*	6,9	7,9*	4,4	6,0*	3,0	5,1*	2,5	3,0*	
1,5	NLC[1)]	6,5*	6,5*	5,1	9,1*	3,4	6,6*	2,4	4,9	1,9	3,3*	8,48
	LC	6,5*	6,5*	6,1	9,1*	4,0	6,6*	2,8	5,0	2,3	3,3*	
0	NLC[1)]	8,3*	8,3*	4,6	9,6*	3,1	6,7	2,2	4,8	1,9	3,8*	8,28
	LC	8,3*	8,3*	5,6	9,6*	3,7	6,8	2,7	4,9	2,3	3,8*	
-1,5	NLC[1)]	8,5	11,8*	4,5	9,4*	3,0	6,5	2,2	4,7	2,1	4,4	7,79
	LC	10,5	11,8*	5,4	9,4*	3,6	6,7	2,6	4,8	2,5	4,5	
-3,0	NLC[1)]	8,8	11,5*	4,5	8,3*	3,0	6,1*			2,5	5,0*	6,94
	LC	10,8	11,5*	5,5	8,3*	3,6	6,1*			3,0	5,0*	
-4,5	NLC[1)]	8,1*	8,1*	4,8	6,1*					3,6	4,7*	5,56
	LC	8,1*	8,1*	5,8	6,1*					4,3	4,7*	

Height | Can be slewed though 360° | In longitudinal position of undercarriage | Max. reach | * Limited by hydr. capacity

The lift capacities on the load hook of the Liebherr quick change adapter 48 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Adjacent values are valid for the undercarriage when in the longitudinal position. Capacities are valid for 600 mm wide triple-grouser pads. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated by *) or are limited through the allowed lift capacity of the load hook on the quick change adapter (12 t). Without quick change adapter the lift capacities will increase by 250 kg, without bucket cylinder, link and lever they increase by an additional 365 kg.
According to European Standard, EN 474-5: In the European Union excavators have to be equipped with an overload warning device, a load diagram and automatic check valves on the hoist cylinders, when they are used for lifting operations which require the use of lifting accessories.
[1)] Values are calculated with 500 mm wide triple-grouser pads for the NLC-Undercarriage

Individual Options Advanced/Classic

Undercarriage

	Advanced	Classic
Wide step	+	+
Reinforced base panel	+	–
Reinforced cover and base panel	+	+
Three-piece track guide	+	+
Straight track guide	+	–
D6C conversion kit with 3-piece track guide	+	+
NLC-Undercarriage	+	+
LC-Undercarriage	+	+

Uppercarriage

	Advanced	Classic
Heavy counterweight	+	+
Electric refuel pump	+	+
Reversible fan drive	+	+
Positioning slewing brake	–	+
Customized colors	+	–
Extended tool kit	+	+

Hydraulics

	Advanced	Classic
Add-on kit rotary drive (including routing)	+	+
Bio-degradable hydr. oil	+	+
Grapple operation (including routing)	+	+
Liebherr proportional control system	+	–
Liebherr Tool Control	+	+
Bypass filter	+	+
Return filter for hammer	+	+

Engine

	Advanced	Classic
Fuel pre-heating	+	+
Liebherr particle filter	+	+
Air pre-filter with dust trap	+	–

Operator's Cab

	Advanced	Classic
Fire extinguisher	+	+
Lower windscreen with wiper	–	+
Foot support	+	+
Electric cool box	+	+
Cab with armored glass windscreen and sunroof	+	+
LIDAT Plus	+	–
Air pressure operator seat	•	+
Premium operator seat	+	–
Bullet-proof roof glass panel with wiper	+	+
Radio with SD-/MMC-card	+	+
Beacon	+	+
Wiper for sunroof	+	+
Xenon headlights	+	–
Protective grid up FOPS	+	+
Protective grid front FGPS	+	+
Sun visor	+	+
Roof sun screen	+	+
Auxiliary heating with clock timer	+	+
Change over controls for clamshell bucket/grapple	+	+
Rear-view camera	+	+
Electronic drive away lock	+	+
Additional halogen headlights behind cab	+	+
Additional halogen headlights front cab	+	+

Attachment

	Advanced	Classic
Adjustable boom	+	+
Adjustable offset boom	+	+
Hoist cylinder depth limitation	+	+
Security for hoist cylinders	+	+
Piston rod cover bucket cylinder	+	–
Liebherr semi-automatic central lubrication system (except connecting link for bucket kinematics)	–	•
Liebherr full-automatic central lubrication system (except connecting link for bucket kinematics)	•	+
Likufix	+	+
Liebherr line of buckets	+	+
Straight gooseneck boom	+	–
Safety check valves hoist cylinder	+	+
Safety check valves stick cylinder	+	+
Hydr. or mechanical quick change coupler	+	+
Overload warning device	+	+
Central lubrication of the connecting link for bucket kinematics	+	+
Working headlight on boom (left)	+	+

• = Standard, + = Option, – = not available

– Stop the engine in accordance with the operating instructions and tilt the safety lever up before leaving the cab.
– Lock the machine, included hoods and compartments, retire every keys and secure the machine against unpermited use and vandalis.

Safely getting down

– Proceed with the the same precautions to climb up or down onto the machine, as to instal yourself.
– Stop the machine on level, horizontal ground. The upper structure should be positioned with the undercarriage in such a way that the steps and ladders are aligned with each other.
– Open and lock the door. Be sure of it's locking. Take care of weather conditions ! Unfasten the safety belt.
– Position yourself with your face toward the machine when getting out and use three-point support, i.e. two hands and one foot or two feet and one hand must always be in contact with the access system at the same time. Climb down until you can close the doors safely. Always use your hand for control when closing the doors. Lock the door.
– Now climb down to the ground.

Working safely with the machine

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

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Welding, drilling, firing and grinding work

- Any welding on structural parts (as undercarriage, uppercarriage, equipment parts,...) may only be done the manufacturer, or authorized official dealer. If this rule is neglected, the warranty is voided.
- Only carry out welding, drilling, firing and grinding work on the machine with express authorization. Clean dust and combustible materials off the machine and its surrounding areas before welding, drilling, firing or grinding.
  Ensure adequate ventilation. Risk of fire or explosion.
- Before welding repairs on other parts, always disconnect the battery. Always remove the negative terminal first and reconnect it last.
- Nevertheless if welding repair should be done on components which may contain inflammable gases (welded counterweight, hydraulic tank, fuel tank, ...), these components must be previously and sufficiently ventilated with pressurized air to avoid all fire or explosion hazard
- Before welding, connect the ground cable as close as possible to the welding point, so the welding current will not run through the swing ring, joints, gears, bushings, rubber parts and seals

Process materials

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

Repair work

- Do not attempt to lift heavy parts. Use devices which are suitable for this purpose and which have sufficient load capacity. When replacing single parts and larger subassemblies, carefully secure them on lifting devices them so that they do not present a risk. Only use suitable and correctly functioning lifting devices and load take-up devices with adequate load capacity.
  Do not stand or work under swinging loads.
- Do not use lifting devices which are damaged or do not have sufficient load carrying capacity.
  Wear work gloves when working with wire cables.
- Only permit experienced personnel to attach loads and give signals to the crane operator. The spotter must be positioned within the visual range of the operator or be in voice contact with him.
- When working above body height, use safe climbing devices and working platforms which are appropriate for the job.
  Do not use machine parts as climbing devices if they are not designed for this purpose.
  When working at height, wear a harness to prevent falling.
  Ensure that all grips, steps, rails, platforms and ladders are free of dirt, snow and ice.
- Pneumatic cylinders do not have to be used as handles. Open doors and covers carefully, so that pneumatic cylinders do not hit their stops, because this could cause mechanical dammages.
- Be sure to support yourself safely when working on the equipment (e.g. replacing teeth). Prevent metal touching metal when doing this.

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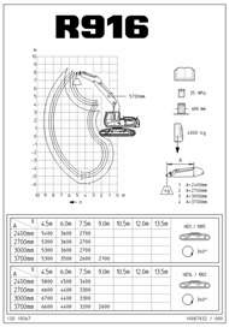
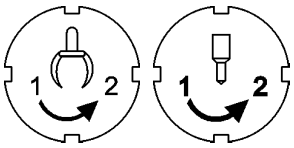
"mociw"	"NA"	
		**Plate 65: Load chart** Shows the permissible loads dependent on the working radius. Notice: This plate is not sticked on in every case. The machines are fitted with a load chart only at customer's wish or if they are destined for lifting applications.
		**Plate 71: Explosion hazard** The sign indicates that it is vorbidden to smoke or to use an open flame. Explosion hazard is especially important near the batteries when they are being charged.
		**Plate 73: High voltage hazard** Inform that any part of the machine and of the working attachment must be kept at at least 50 feet from high voltage electrical lines.
		**Plate 74: Hazard of injury due to fluid under high pressure** This sign warns that a jet of fluid under high pressure (especially the oil in the hydraulic circuit) can penetrate the skin and cause serious injury. To avoid the risk, the pressure in the hydraulic circuit must be relieved as explained in this manual for service works, and protective glasses and gloves are necessary when testing the circuits for leaks.
		**Plate 75: Hazard of an impact by moving attachment parts** These signs are sticked to the attachment. They alert persons standing near the excavator of the risk of being hit by a moving attachment part during machine operation.
		**Plate 76: Burning hazard due to hot machine parts** Risk is important especially in the area of exhaust silencer.
		**Plate 77: Risk of burning due to hot fluids** Risk is important especially checking the coolant level with the engine at operating temperatures.



The operator can select an other characteristic for the proportional function of the left joystick, using the touch **S251**.

As well for the right joystick, the operator can select an other characteristic using the touch **S252**.

See also "Controls and instrumentation for optional equipments" in this chapter.

Caution!
On machines destined to the North American market, and which are fitted with a lifting magnet, the functions of the push buttons and switches in the joysticks differ from those described above.
Also with some specific combinations of optional equipments and/or at customer's wish, the functions may be different.
Always check the functions of special equipments before beginning to work with the machine.

Function of push buttons and switches on US version with lifting magnet

For machines destined to the North American market, and which are fitted with a lifting magnet, the functions are as follows:

Left joystick	Right joystick
Push button **S5L** : Horn	Push button **S6L** : For optional equipment See in this chapter "Float position of the boom with shovel attachment" in the part "Working attachment control".
Push button **S5R** For optional equipment See in this chapter "Cut off by end switches of attachment movements (option)".	Push button **S6R** : For optional equipment See in this chapter "Drive warning device (optional extra)".
Push switch **S55** : For optional equipment See in this chapter "Lifting magnet control system (optional equipment)".	Rocker switch **S57** : Reserve
X(-) : AHS11 See in this chapter "AHS11 proportional control (in option)" and "AHS11 proportional control commutation on bucket control (in option)".	**X(-)** : Rotating device left See in this chapter "Turning, rotating, bolting and unbolting the add-on unit".
X(+) : Hammer / AHS11 See in this chapter "AHS11 proportional control (in option)" and "AHS11 proportional control commutation on bucket control (in option)".	**X(+)** : Rotating device right See in this chapter " Turning, rotating, bolting and unbolting the add-on unit".
Y(-) : Reserve	**Y(-)** : Reserve
Y(+) : Reserve	**Y(+)** : Reserve

Tab. 3-4 *Functions of the joysticks with proportional function for US version with lifting magnet*

If more than 4 symbols must be shown, then every 10 seconds, the symbols move to the left by one symbol. (siehe Kap. , "Warning symbols for operating faults in the SY field" auf Seite 18).

EC field

The EC window displays the error codes for electrical faults which occur in the excavator's electronics system (line errors, sensor errors etc.). A maximum of 7 error codes are displayed simultaneously. If there are more than these 7 errors present, an arrow which points to where the other error codes are located will be displayed next to the error code window.

▶ Press the **Up** or **Down** button.
  ↳ The error code list is shifted in the selected direction.

INF field

The INF field displays temporary information in graphic form.

If more than 3 symbols are to be displayed, the symbols will shift one symbol to the left approx. every 10 seconds.

The information is displayed in graphic or text form and indicates specific operating states on the machine. (siehe Kap. , "Information symbols in the INF field" auf Seite 21).

TI field

The machine operating hours and the daily operating hours counter are displayed in this field at the bottom rightof the screen. During the start-up phase, the operator will be alerted about a possible up-coming service time, by a graphic symbol and an hour indication displayed instead of the machine hour-meter. during about 8 seconds

The symbol ® is displayed when an external flow limitation is activated (siehe "Menu "Info In/Outputs"- Status of hydraulic pumps and of electrical inputs and outputs" auf Seite 29).

The symbol "●" indicates that no external flow limitation is actually activated. But an internal flow limitation (travel, swing,...) may be activated.

In this field can also be indicated the denomination (for example HM2000) of the option which is actually assigned to the external flow limitation input I1 (siehe Kap. , "Menu "Set option" - selection of the flow and pressure limitations" auf Seite 26).

Control of the screen at error recognition

In case a new operating fault displayed in the field SY is recognized, the presentation will return to the main screen, and the relevant symbol is displayed.

Depending on the fault (level of urgency), the buzzer will sound either continuously or in short consecutive bursts. At the same time the symbol "acknowledge error" will be displayed in the INF field.

Danger!
If the displayed fault is not remedied immediately, this could lead to persons sustaining injury or the machine being damaged.

▶ Immediately remedy the occured error or get it remedied.

▶ Press the **Back** key.
  ↳ The error will be acknowledged, this means that the buzzer signal alerting to the upcoming of this fault is stopped.

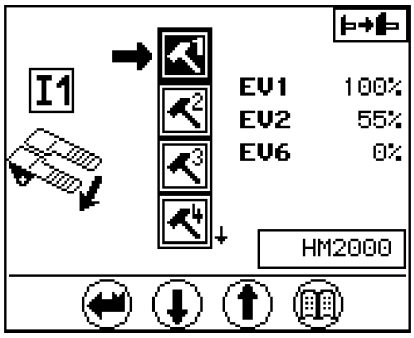


Fig. 3-13 Menu "Set option"

EV1 = Solenoid valve for oil flow limitation 1

EV2 = Solenoid valve for oil flow limitation 2

EV6 = Solenoid valve for pressure limitation

The black field represents the active option.

▶ Press the **Up** or **Down** key.
  ↳ Another predefined option (1-10) can be assigned (e g. when work equipment is changed).

▶ Press the **Menu** key.
  ↳ The selection is confirmed. The new active option is displayed on a black background (in this example Option 1).
  ↳ At the same time the denomination that has been assigned to the option is displayed in the bottom right corner of the screen (in this example "HM2000").

To exit the menu:

▶ Press the **Back** key.
  ↳ The sub-menu will be aborted.
  ↳ In the main screen the denomination of the chosen option (HM200) is also displayed.
  ↳ The tool will be supplied with the reduced pressure and the reduced flow predefined for the option 1.

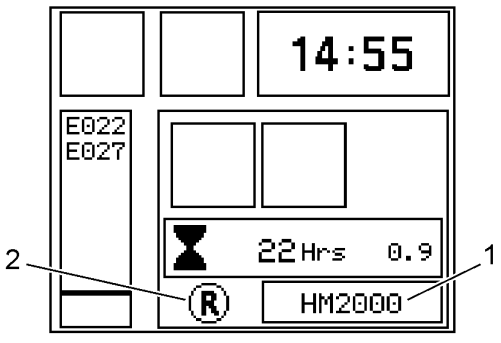


Fig. 3-14 Main screen, the chosen option is displayed

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3.1.6 Controls and instrumentation for optional equipments

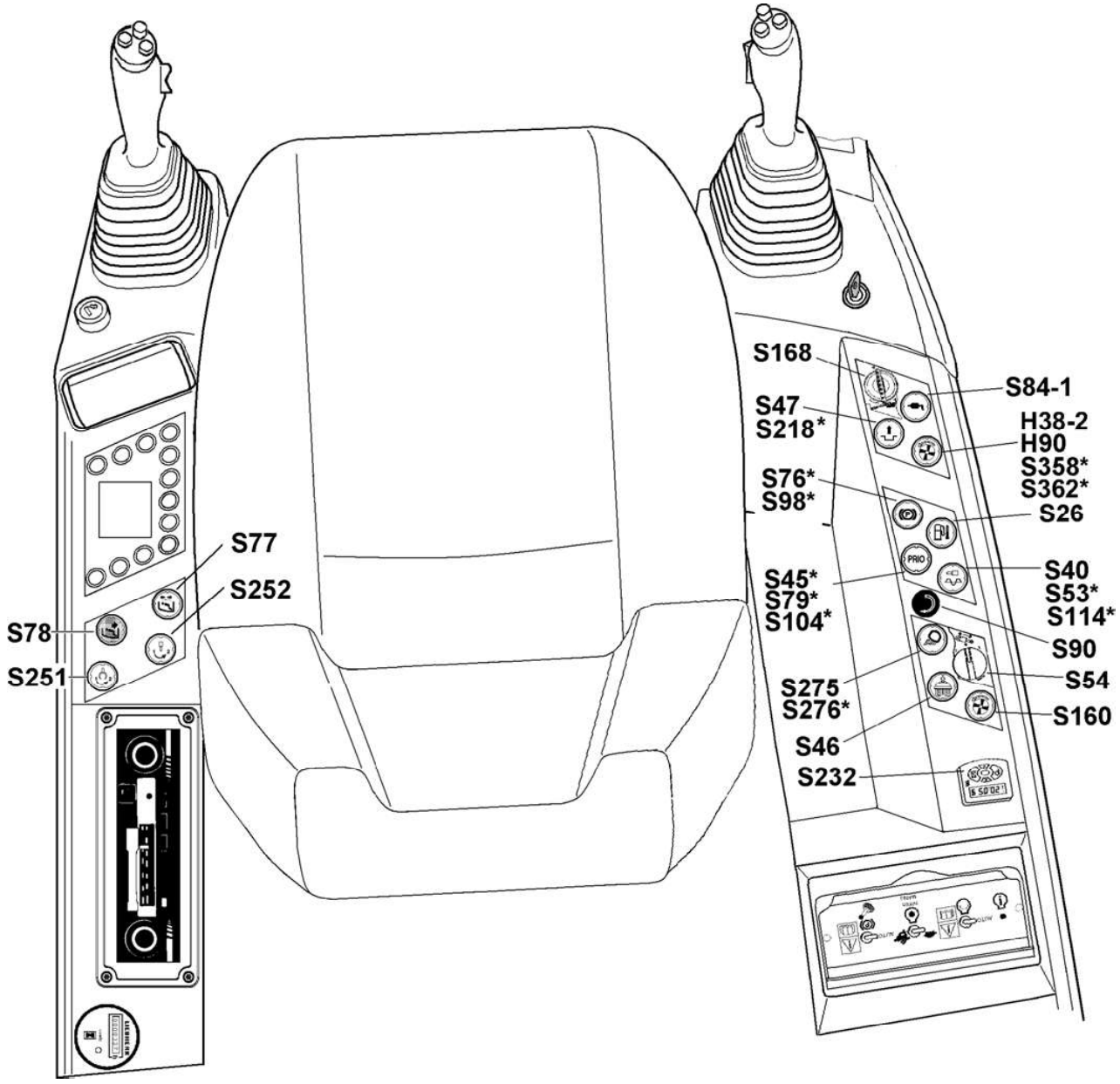

Fig. 3-28 *Controls for optional equipments*

* The location of these controls may be different, depending on the type of the other installed optional equipments.

H38-2 – Control light / empty report of centralised greasing system

This control light lights up if the grease level into the grease container of the centralised lubrication system is located on lowest level. Refill up the grease container, see also the section "To refill a grease container" into chapter 5.

3.2.3 Operator's seat

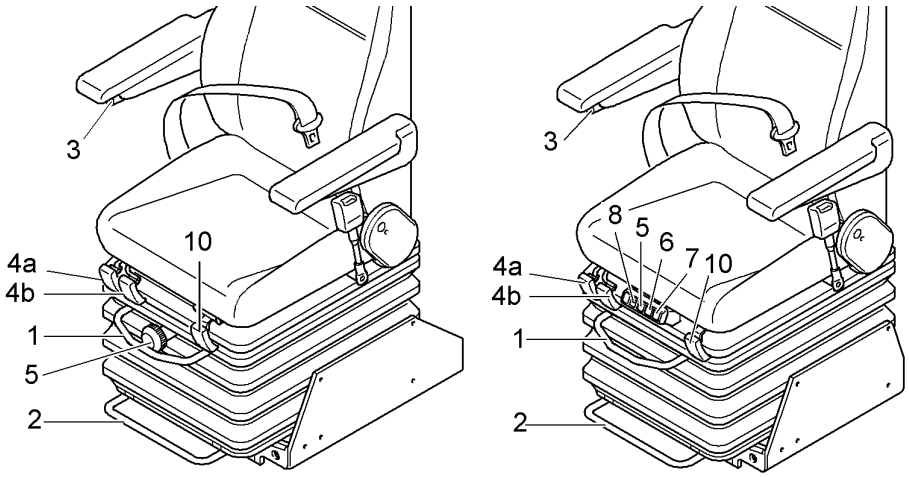

Fig. 3-34 *Standard operator' seat (Fig. left) and air-cushioned (Fig. right, optional extra)*

1	Set horizontal, upper	**4b**	Set seat inclination, rear	**7**	Set lumbar support
2	Set horizontal, lower	**5**	Set seat springs	**8**	Seat heating
3	Adjust armrests	**6**	Set lumbar support	**10**	Set backrest
4a	Set seat inclination, front				

The operator's seat should be set up before starting the machine; this means that:

– The diesel engine may not be started.
– The safety lever must be pushed up.

This will avoid unexpected movement of the machine.

Setting the armrests

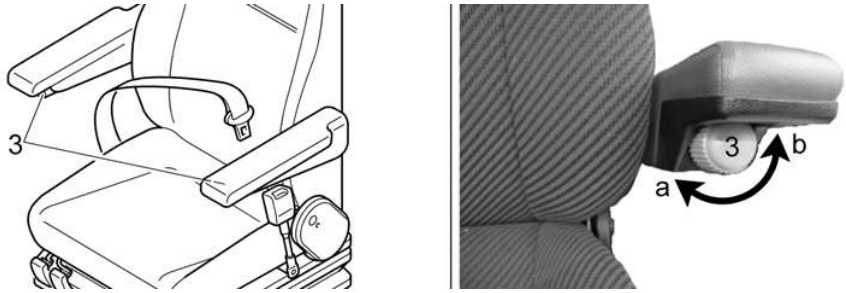

Fig. 3-35 *Setting the armrests*

▶ Turn the knurled head screw **3** on the armrest in direction **a**.
  ↳ The armrests incline upwards.

▶ Turn the knurled head screw **3** on the armrest in direction **b**.
  ↳ The armrests incline downwards.

Control keys

1 – Air conditioning (cooling)
2 – Increase cab temperature
3 – Decrease cab temperature
4 – Control ON / OFF
5 – Evaporator fan speed – manual / automatic
6 – REHEAT operation
7 – Heating – manual / automatic
8 – Fresh air / recirculated air
9 – Air flap to rear wall vent OPEN / CLOSED
10 – Air flap to right control panel (8b) OPEN / CLOSED
11 – Air flap to front window, legroom CENTER / CLOSED
12 – Air flap tofront windshield, legroom CENTER / OPEN

Indications at the LCD display

13 – Air circulation
14 – REHEAT operation
15 – Air conditioning (cooling)
16 – Air flap to rear wall OPEN
17 – Air flap to right control panel (8b) OPEN
18 – Air flap to front windshield, legroom CENTER
19 – Air flap to front windshield, legroom OPEN
20 – Automatic operation
21 – Bar graph indicator for fan speed
22 – Symbol, fan speed (in manual operation)
23 – Symbol, heater operation (in manual operation)
24 – Bar graph indicator for heating output
25 – Temperature value or error code
26 – Temperature unit (°)

Note!

▶ If the control unit recognizes a sytem error in the air conditioning circuit, a flashing error code number **F1-F5** is displayed, see the section "faults and remedies", further in this manual.

Turning the control unit on

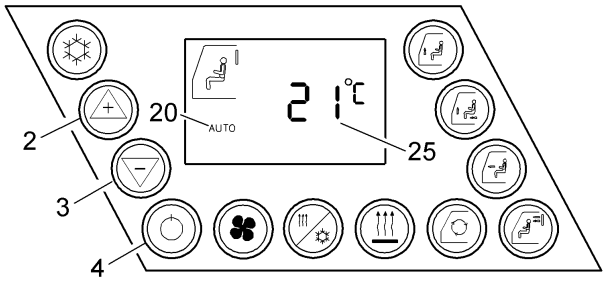

Fig. 3-49 *Turning the control unit on and setting the cab temperature*

▶ Turn the system on using the key **4**.
↳ The software version will bedisplayed for approx. 12seconds while the control unit carries out a self test.

The heating and the ventilation of the cab are operating. The heating output and the fan speed will be controlled automatically if the **AUTO** symbol **(20)** is displayed.

Setting the desired cab temperature

The four-digit segment indicator **25** shows the desired cab temperature.

▶ Use the key **2** to increase the temperature.

▶ Use the key **3** to reduce the temperature.

The adjusted temperature will remain until the next change via keys 2 and 3is made.

Note!

- ▶ Never wash the filter elements with hot water or a steam jet.
- ▶ If damaged or in a bad condition, replace the filter elements.

- ▶ Blow out the filter elements **2** and **3** using compressed air or clean in cold or lukewarm water.

Notes :

In case of failures :

- ▶ Check out / remplace fuse **F1** (15 A) on plate A1010 into the left control panel (siehe Kap. 0.1.2, "ESP02 board" auf Seite 1).
- ▶ Check out / remplace plate A1008 into the left control panel.

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.

❑ Fuel preheating should be activated at least 5 minutes before starting in conditions of low outside temperatures.

▶ Press switch **S26** on the right control panel before starting and with the ignition switched on.
  ↳ The fuel filter will be heated electrically.
  ↳ LED in switch illuminates.
  ↳ This will prevent the fuel filter salting up at low temperatures.

Coolant / engine oil / hydraulic oil preheating (optional extra)

The coolant, the engine oil and the hydraulic oil can be preheated before starting using coolant / engine oil / hydraulic oil preheating. In particular, this will considerably shorten the diesel engine's cold running phase at low temperatures. This will protect the diesel engine and reduce fuel consumption.

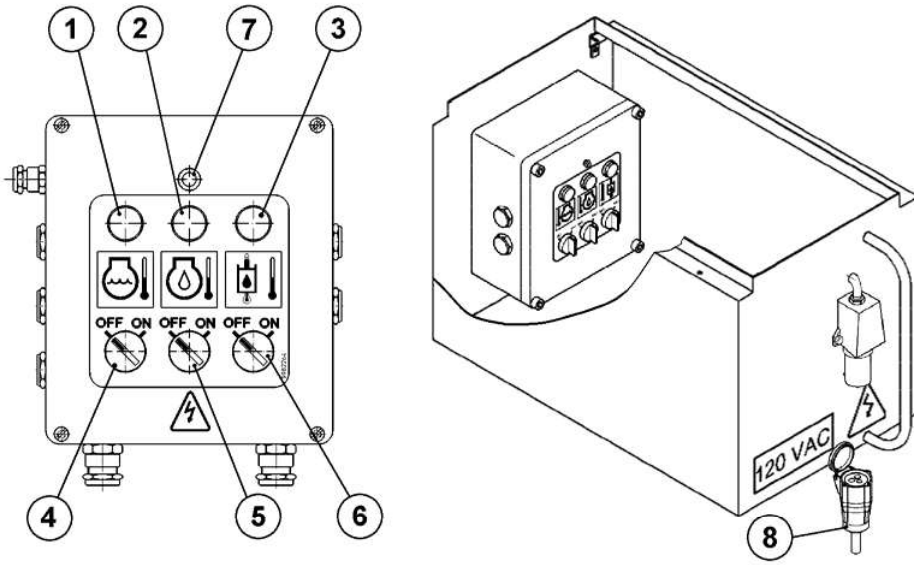

Fig. 3-62 *Coolant / motor oil / hydraulic oil preheating*

1	Coolant preheating indicator light	**5**	On / off toggle switch for engine oil preheating
2	Engine oil preheating indicator light	**6**	On / off toggle switch for hydraulic oil preheating
3	Hydraulic oil preheating indicator light	**7**	fuse
4	On / off toggle switch for coolant preheating	**8**	Power cable

The electrical box for the coolant / engine oil / hydraulic oil preheating is located behind the right-hand side door.

▶ Connect power cable **8** to stationary connection (110 - 120 V / 220 - 240 V AC).

▶ Tip toggle switch **4**, Coolant / preheating.
  ↳ The coolant preheating is switched on.
  ↳ Indicator light **1** illuminates.

▶ Tip toggle switch **5**, engine oil preheating.
  ↳ The engine oil preheating is switched on.
  ↳ Indicator light **2** illuminates.

▶ Turn the ignition key in start position and at the same time push the safety start switch S71 to the right.

▶ Keep the switch pushed to the right until the engine starts
  ↳ The warning light **H11** turns on.
  ↳ The symbol **S71a** is displayed on the screen.
  ↳ The engine is now operating in safety mode.

Safety operation of the Diesel engine

The engine can also be switched into safety operation automatically, as an example consecutively to a communication default in the control system.

In safety operation, the engine works with reduced output in comparison with the normal operation.

In safety operation the stop of the Diesel engine is achieved just like in normal operation, while turning back the ignition key to the "off" position.

It is not possible to return to normal operation when the engine is running, the rocker switch S71 must be tilted back from safety operation into normal operation (position AUTO) only when the excavator is turned off.

Notice !

In safety operation, the communication between the electronic control box of the engine and the main circuit of the excavator may be no longer possible.
The engine operating error codes are in this case no longer displayed on the screen.

The occurence of an operating error of the engine is then indicated as follows:

- the red warning light H60 lights on,
- a buzzer in the cab beginns to sound.
- the error code E525 appears on the monitoring display.

Caution!
In case the warning light H60 lights up, the operator must shut the engine down as soon as possible and recognize which error has occurred.
It's the operator's own responsibility to decide if the machine can be maintained operating or not!

In safety operation the following functionss remain available:

- the automatic engine power reduction in case of overheating of the engine coolant or of the charge air.
- the memorization of the occurring engine faults into the inner error memory of the control box of the engine.

At the opposite, the following functions are no longer operative:

- the automatic engine shutdown in case of low lube oil pressure.
- the automatic engine shutdown when the maximum permitted coolant or charging air temperature has been exceeded.

Diesel engine RPM adjustment in safety mode

In normal operation, the desired value for the engine RPM is entered via the buttons 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

- 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 equipment jerkily.
- To reduce vibrational load, adjust the machine speed to suit the route as follows:
  - Reduce speed when driving on difficult terrain;
  - Drive around obstacles and avoid driving on very difficult terrain.
- Keep the terrain on which the machine is working and driving in good condition:
  - Remove large stones and obstacles;
  - Fill in ruts and holes;
  - Have machines ready to prepare and maintain suitable ground conditions and calculate in sufficient time to carry out any work required.
- Drive longer distances (e.g. on public roads) at an appropriate (medium) speed.
- Use special auxiliary systems (if available) which reduce vibration for machines that are driven frequently.
  If such auxiliary systems are not available, regulate speed to avoid "oscillating" the machine.

3.6.1 Low idle automatic

This device automatically reduces the engine speed to idle after several seconds if no hydraulic functions are activated by the joystick or the pedals. This saves fuel and reduces the amount of noise. Touching the joystick or operating the pedals takes the engine speed back to its original level.

Automatic idling is started by pressing switch **S20**.

▶ Press switch.
  ↳ Low idle automatic is activated.
  ↳ LED in switch illuminates.

▶ Press switch again.
  ↳ Low idle automatic is deactivated.
  ↳ LED in the switch goes out.

To set the time within which the engine is set back to idle after the joystick has been released:

▶ Press and hold switch.
  ↳ LED in the switch flashes.

❑ Desired time span is reached.

▶ Release the switch.
  ↳ LED in switch illuminates.
  ↳ Low idle automatic is activated.

In each case, when a hydraulic function is activated, the speed which was previously set using the electrical speed adjustment function will be reset automatically.

Caution!
Low idle automatic must be switched off when starting the diesel engine and when driving on gradients. The LED in the switch must not illuminate.

3.6.8 Control of the swivel rotator (option)

Rotation, swivel, locking and unlocking of the swivel rotator :

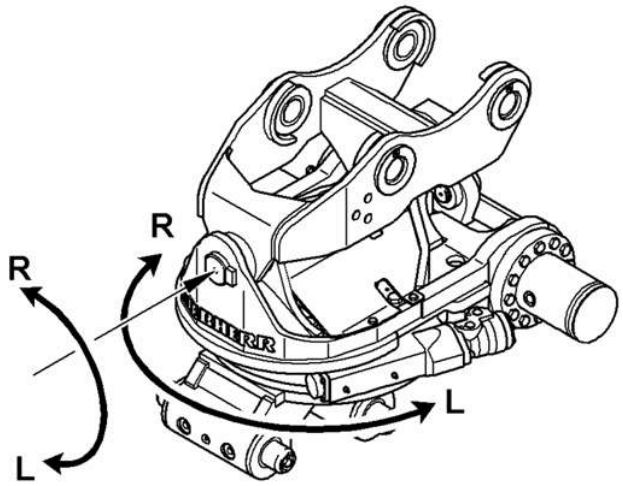

Fig. 3-88 *Swivel rotator*

The push buttons on the right and left manipulators controls the swivel rotator.

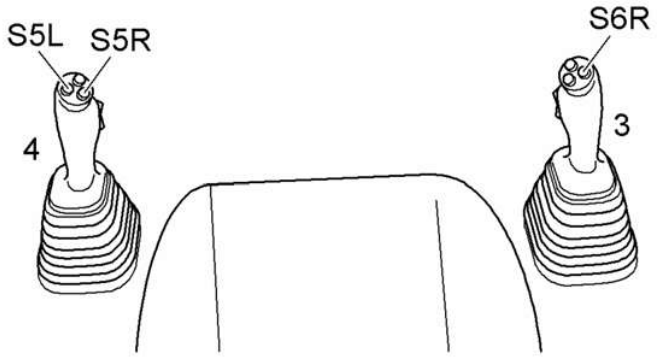

Fig. 3-89 *Push buttons on maniopulators 3 and 4*

▶ Press siwtch **S19**.
  ↳ the swivel rotator is activated.
  ↳ LED in switch illuminates.

Swivel the rotator :

▶ Press push button **S5L** and hold it.
  ↳ rotator swivels to the left.

▶ Press push button **S5R** and hold it.
  ↳ rotator swivels to the rightr.

Turn the rotator :

Permutate between those modes using push button **S6R**.

▶ Press push button **S6R** and hold it.
  ↳ Swivel mode permutates into rotation mode.

▶ Press push button **S5L**.
  ↳ rotator turns to the left.

3.6.14 Option oil flow reduction for long working attachment.

While using a long working attachment (long bank attachment, ...), the key switch **S168** allows to limit the speed of the whole working attachment.

Note :
To limit all the excavator movements, not just the movements of the working attachment, use the push button S354 of the control unit.

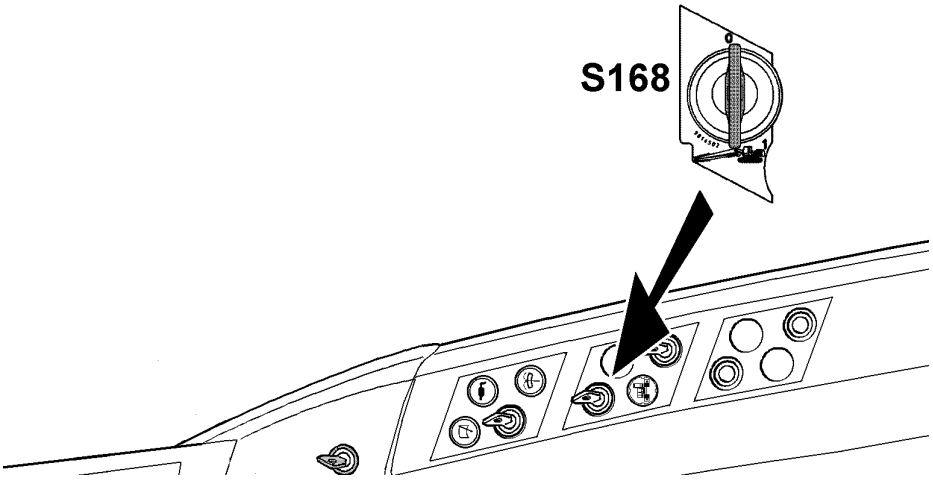

Fig. 3-99 *Oil flow reduction for long working equipement*

Using working equipment with oil flow reduction :

- ▶ Turn key switch **S168** into position 1.
  - ⇘ Value EV1 on display is at 50%.
  - ⇘ Oil flow reduction is available.
- ▶ Use the equipment.

Using working equipment with normal oil flow :

- ▶ Turn key switch **S168** into position 0.
  - ⇘ Value EV1 on display is at 100%.
  - ⇘ Normal oil flow is available.

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for example, hoe type buckets, ditcher buckets or breaker teeth.

Dismounting a bucket

- ▶ Position the attachment in such a way that the entire lower part of the bucket is laying on the ground.
- ▶ Unscrew locking plate **5** and locking plate **6**.
- ▶ Knock out pin **3** and pin **4** and remove the complete pin bearing sealing **25**.
- ▶ If necessary, raise the equipment slightly when knocking out pin **4** to relieve it.

Attaching a new bucket

- ▶ Position the bucket to be attached in such a way that its entire lower part is laying on the ground.
- ▶ Start the engine and move the equipment until the stick mount and the bearing points **A** of the bucket are squared.
- ▶ Engage the pin **4** in its bore and push it in the complete bearing sealing rings **25** with protection ring, between bucket and stick while pressing in the pin.
- ▶ Secure the pin **4** with the locking plate **6**.
- ▶ Extend the shovel cylinder slowly until the bore hole in connecting clip **7** is located precisely between the bearing points **B**.
- ▶ Engage the pin **3** in its bore and push it in the complete bearing sealing rings **25** with protection ring, between bucket and stick while pressing in the pin.
- ▶ Secure the pin **3** with the locking plate **5**.
- ▶ Lubricate all greasing points of pins **3** and **4** directly or with the automatic grease system (if mounted) until clean grease comes out of the greasing points.

Description and installation of a pin bearing sealing

Function description

A pin bearing sealing **25** is loosely mounted on each side between the bearing limbs of the digging bucket **1**, facing the stick **2** and the connecting link **7**, in such a way that an axial play is produced.

The pin bearing sealings **25** are held in place by the bearing pins **3** and **4**.

The pin bearing sealing **25** protects the bearing from the penetration of dirt, water and corrosive media.

The pin bearing sealing **25** is a pre-assembled delivery component.

The lip seal ring **25.2** is vulcanised onto the sealing ring **25.1**.

The sealing lips on the lip seal ring **25.2** have a V-form profile.

The lip seal ring **25.2** is housed in a protection and installation ring **25.4**.

The protection and installation ring, which houses the sealing lips radially, is made of plastic and protects the sealing lips from external mechanical damage.

The metallic sealing ring **25.1** is able to absorb the forces acting on the rotating part, so that these cannot destroy the lip seal ring.

Installation of a pin bearing sealing

- ▶ The inner face of the protection and installation ring **25.4** comprises two circular

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- ▶ Release the pressure in the hydraulic tank.
- ▶ Attach the lower part of the stick cylinder **16** to the lift with a strap.
- ▶ Position a wooden block under the stick cylinder, remove the plate of pin **17**, lightly lift the the cylinder, drive out the pin **17**and position the stick cylinder **16** on wooden blocks.

Figure B

- ▶ Insert the pin **17 in the rear bearing of the stick and secure it with the plate, then** attach the pin **17** to the lifting device with a strap.
- ▶ Attach the head of the bucket cylinder **18** (or to the hook of the bucket, if the stick is removed with the bucket in place), to the lift with a strap.
- ▶ Disconnect both hoses **21** from the tilt cylinder **18** and close them off to prevent contamination.
- ▶ Remove the cotter pin and the castle nut on pin **20** and drive the pin out. If necessary, start the engine and slightly lift the attachment to reduce the weight of the boom on pin **20**.
- ▶ Raise the stick (or the stick with the bucket) with a lift, pull the stick from the boom and position it on the ground, supported by wooden blocks and remove the lift.

Attaching the stick (or stick with bucket)

Figure B

- ▶ Insert the pin **17 in the rear bearing of the stick and secure it with the plate, then** attach the pin **17** to the lifting device with a strap.
- ▶ Attach the top of the bucket cylinder **18** (or the hook of the bucket, if the stick is removed with the bucket in place), to the lifting device with a strap.
- ▶ Raise the stick (or the stick with the bucket) with a lift inside the bore holes of the boom so that the pin **20** can be inserted.
- ▶ Insert pin **20 and** fix the castle nut and the cotter pin to the pin **20**.
- ▶ Remove the pin **17**.
- ▶ Reconnect both hoses **21** to the tilt cylinder **18**.

Figure A

- ▶ Attach the lower part of the stick cylinder **16** to the lift.
- ▶ Slightly lift the stick cylinder and if necessary run engine to extend or retract cylinder so that cylinder head fits between the bore holes of the stick.
- ▶ Insert the pin **17** and secure it with the plate.
- ▶ If necessary, install the bucket.
- ▶ Lubricate all greasing points between stick and boom and between bucket and stick directly or with the automatic grease system (if mounted) until clean grease comes out of the greasing points.
- ▶ Lift the attachment and tilt the bucket out and in several times to release the air from the hydraulic system.

Danger!
The electronic monitoring system for the quick-change adapter displays defective functions. These could be caused by an unmonitored position change of the locking pins or by mechanical or hydraulic damage. A defect may also be present in the electrical system (eg. proximity switch or buzzer).

- ▶ If the buzzer and telltale light are activated without a deliberate locking or unlocking procedure being carried out, stop all work at once.
- ▶ If the buzzer and telltale light are not activated while a deliberate locking or unlocking procedure is being carried out, stop all work at once.
- ▶ Only resume working once defective parts have been repaired or replaced.

- ▶ Performing the working cycle
- ▶ Before starting to use the work tool (eg. grab, ditcher bucket), the special installation information in the chapter “Attaching and dismounting equipment parts” is also to be noted.

Detaching a work tool

To move the equipment into position:

Caution!
Hydraulic lines are pressurized!

- ▶ Remove the pressure using the joystick before removing the hydraulic lines (switch off the diesel engine, turn the ignition key into the contact position, operate the joystick).

- ▶ Disconnect hydraulic lines or electrical lines, if necessary (eg. when dismounting a grab).
- ▶ Extend the shovel tilting cylinder fully.

To unlock the quick-change adapter:

Danger!
Risk of injury!
Once unlocked, there is no fixed connection between the adapter and the work tool. The work tool could work itself out independently.

- ▶ Always keep the work tool as close to the ground as possible when unlocking to avoid creating conditions which may lead to danger.

- ▶ Press switch **S19**.
  - ↳ Quick-change adapter is activated.
  - ↳ LED in switch illuminates.
- ▶ Press and hold button **S47**.
  - ↳ Quick-change adapter is activated.
- ▶ Press and hold pushbutton **R** until the locking pins are fully inserted.
  - ↳ The buzzer sounds.
  - ↳ The symbol “Quick changer” appears on screen.
  - ↳ The quick-change adapter is unlocked.

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

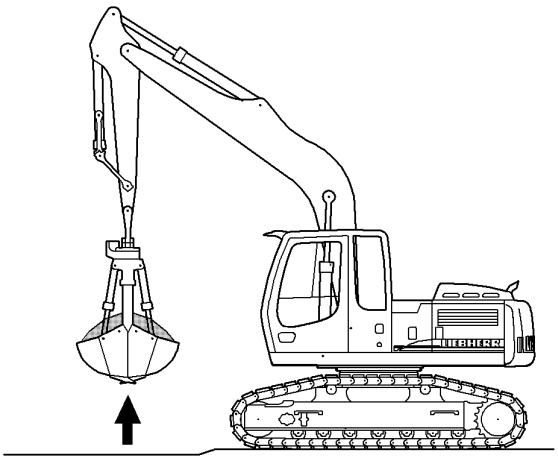

Fig. 3-135 *Raising grab material*

- ▶ Close the grab shells fully.
- ▶ Raise the boom.
- ▶ Move the machine to the unloading area (eg. transport vehicle).

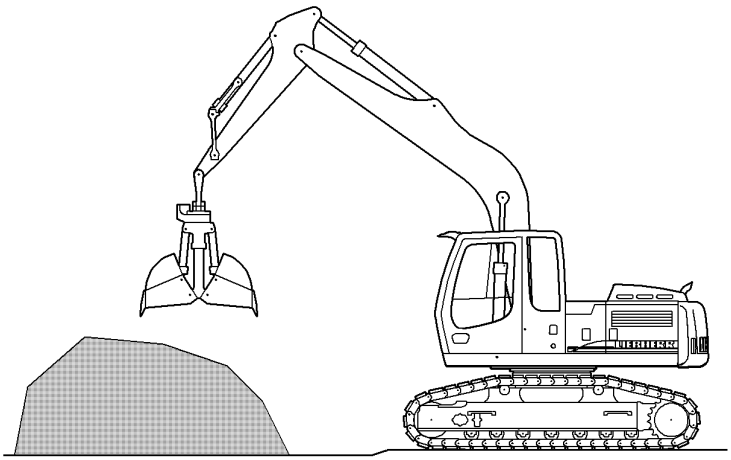

Fig. 3-136 *Emptying grab material*

- ▶ Slew the stick out as far as possible to prevent any risk due to the swinging grab.
- ▶ Open the grab shells, empty the grab material.

4 Malfunctions

Warning messages and fault messages:

- Various faults are displayed on screen in the form of indicator lights or symbols (see chapter “Control and operating elements”).
- Warning functions can also be supported acoustically (buzzer).

Identifying and rectifying faults and errors:

- Faults can very often be traced back to incorrect operating or maintenance of the machine.
  For each fault, therefore, read the relevant chapter in the operating instructions carefully once more.
- Analyse the cause of the fault and rectify it immediately.
- Describe the fault and all accompanying circumstances as precisely as possible if you contact LIEBHERR customer service.
  Precise information makes it possible to find and rectify the cause of the fault quickly. Additionally, therefore, precise information on the type and serial number of the machine is also required.
- Do not carry out any work which you have not been trained to do.

Fig. 4-1 *LIEBHERR service*

If the cause of the fault cannot be recognised or rectified using the error codes and fault charts, please consult LIEBHERR customer service.

Fault / error	Cause	Solution
Diesel engine consumes too much oil	External leak on diesel engine	Retighten screws, replace seals if required
Oil in coolant or coolant in oil		Consult customer service
Unusual noise / sounddevelopment on exhaust side	Exhaust system leaking	Check exhaust system / repair

4.2.2 Hydraulic system

Fault / error	Cause	Solution
Unusual noise / sounddevelopment at hydraulic pumps **Note!** Switch off diesel engine immediately	Shutoff valve on hydraulic tank closed	Open stop cock
	Hydraulic pumps taking in air	Check oil level in hydraulic tank, check intake lines for leaks
Modes E and P showing lack of power	No power adjustment via proportional solenoid valve Y50	Unplug cable of Y50 connection, remove safety cotter pin, move lever to emergency setting
Hydraulic oil temperature too high	Radiator cores dirty	Clean radiator cores
	Fan or fan control defective	Rectify error / consult customer service
Hydraulic oil level too low	Oil loss	Repair leaks, exchange hoses, refill oil via return-line filter
Cannot drive	Push the safety lever up	Push the safety lever down
	No direction of travel preselected	Use drive selection switch in right joystick to determine direction of travel
	Parking brake pressure switch defective	Consult customer service
	Parking brake not released	Release parking brake using switch
	Parking brake will not releasedespite switch being operated	Servo pressure present: Operate emergency function Y6
		Servo pressure not present: Consult customer service
	Service brake engaged	Release service brake
Slewing gear not functioning	No servo control	Push the safety lever down
		Switch on servo control
	Slewing gear brake activated	Push the safety lever down
		Release slewing gear brake
No working movement	No servo control	Push the safety lever down
		Switch on servo control
	No servo pressure present	Consult customer service
	No pump high pressure present	Consult customer service

4.3.3 A1001 Plate

These relays are located in the right control panel of the operator's standing position, behind.

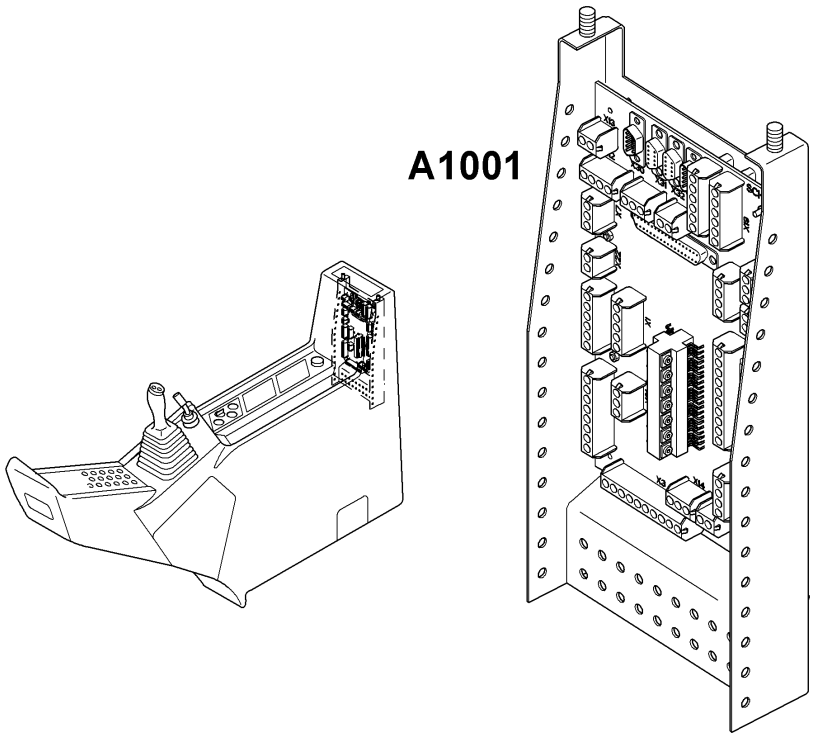

Fig. 4-4 *Relays, A1001 plate*

K1	Relay windscreen
K2	Additional relay
K3	Additional relay
K4	Additional relay
K5 / **A1001**	Relay safety mode

LFR/en/Edition: 07 / 2010

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:
Engine hood	Gas pressure spring, auxiliary mechanical retainer	– Diesel engine – Radiator
Side door, left	Mechanical retainer	– Radiator – Electrics box E50
Side door, right	Mechanical retainer	– Dry air filter – Control oil unit – Hydraulic pump
Side door, front left	Mechanical retainer	– Toolbox – Stowing compartment
Hood on fuel tank	Gas pressure spring	– Horn – Batteries – Main battery switch – Fuses for main and starter circuit.
Cover control valves		– Control valves
Cover hydraulic filter		– Hydraulic return filter.

Tab. 5-1 *Access doors*

5.2.2 Door lock

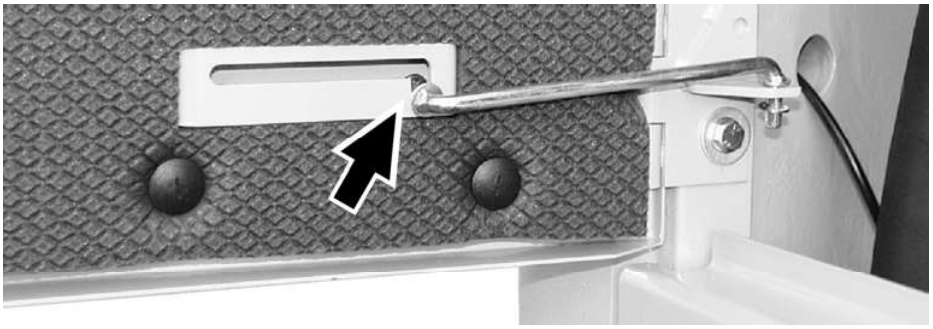

Fig. 5-2 *Door lock*

▶ To stop the access doors from moving unintentionally (eg. due to wind), open them fully and allow the door lock (see arrow) to latch in.

Note!
The use of emulsifiable corrosion inhibitor oils is not permitted.

Water quality

Clear and clean water free of particles that meets the following chemical requirements is suitable as coolant.

Do not use sea water, brackish water, brine or industrial wastewater.

Contents	Quantity
Total earth alkaline content (water hardness)	0.6 to 3.6 mmol / l (3 to 20 °d)
pH value at 20 °C	6.5 to 8.5
Chloride ion content	max. 80 mg / l
Sulphate ion content	max. 100 mg / l

Tab. 5-7 *Fresh water quality*

Fresh water quality when using coolant with DCA 4

Contents	Quantity
Total earth alkaline content (water hardness)	0.6 bis 2.7 mmol/l (3 to 15 °d)
ph value at 20 °C	6.5 to 8.0
Chloride-ion content	max. 80 mg / l
Sulphate ion content	max. 80 mg / l

Tab. 5-8 *Fresh water quality with use of DCA 4*

Water analysis results are available from the local authorities.

Mixting ratio for coolant

The coolant must contain min 50% corrosion inhibitor and antifreeze agent at **all times of the year**.

Outside temperature up to		Mixing ratio	
°C	°F	Water %	A %
-37	-34	50	50
-50	-58	40	60

Tab. 5-9 *Mixture ratio (for all seasons)*

In order to prevent premature wear of the hydraulic components, shorten the intervals between the oil changes (or oil samples respectively) and observe the following instructions:

- The filter cartridge(s) in the return filter must be replaced every 500 operating hours and after every hydraulic oil change.
- Use 10-µm filter cartridges instead of the standard 20 / 5-µm cartridges.
- The 2-µm breather filter must be replaced every 500 operating hours and after every hydraulic oil change.

Note!
The machines delivered with hydraulic hammer attachment, as well the machines retrofitted with an original LIEBHERR hydraulic hammer kits are already fitted with 10-µm filter cartridges in the return filter.

5.4.5 Lubricating grease and other lubricants

Lubricant	Description / manufacturer
Grease for swing ring and general lubrication points 	The grease must correspond with the specification **KP2k**, consistency 2 or NLGI grade in accordance with DIN 51818 and DIN 51825 or EP 2 in accordance with NF-T-60 132. The grease must consist of a lithium complex and have a four ball tester value of at least 2300 N in accordance with DIN 51350 and ASTM D 2596. ***For use in central lubrication systems*** • **for the temperature range +60° C to -10° C** (140° F to -50° F) LIEBHERR recommends: **Multi service grease RPL** LIEBHERR order nb: 8501565 (1 pack with 5 cartridges of 400 grams). • **if ambient temperatures are expected to remain under -10° C**, it is recommended to make an early change of the grease type to a specific "LOW TEMPERATURE" grade This grease must have the necessary pumpability and "WORKED PENETRATION" consistency between 265 - 295 at -10° C temperature.
Contact spray for slip rings	Cramolin
Lubricant for pistons, piston nuts and piston bearing installations on the hydraulic cylinders	Gleitmo 800
Special anti-corrosive material for installation areas of sealingelements on hydraulic cylinders	Castrol-Tarp
Anti-corrosion grease for open piston rods (cylinders that do not move often or transportation)	Liebherr special grease CTK

Tab. 5-12 *Grease and other process chemicals*

5.6 LIEBHERR particles filter (In option)

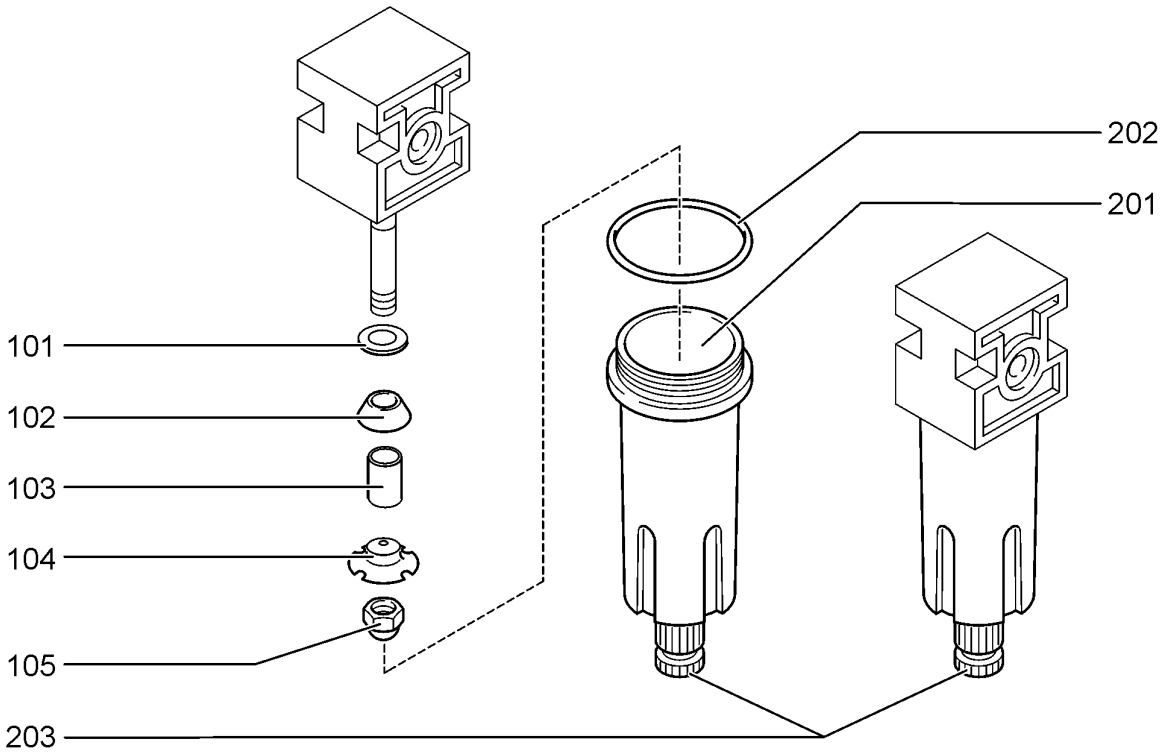

Fig. 5-25 *Water separator*

The exhaust back pressure is mesured in the pressure line connecting the control unit A175 to the particles filter housing.
A water separator filter is integrated in this pressure line. The periodic maintenance works for the particles filter system are limited to this component.

5.6.1 Drain the condensation water:

- ▶ The water separator must be drained regularly.
- ▶ Turn the screw **203** counterclockwise for 90° and collect the condensation water into an adapted container.
- ▶ Retighten the screw **203** by turning clockwise.

5.6.2 Water separator maintenance:

- ▶ Drain the water separator.
- ▶ Unscew and remove the filter housing **201**.
- ▶ Unscrew the nut **105**.

Notice!

The metallic screen **103** must be checked for good condition every 500 operating hours and cleaned if necessary. It must be changed every 1000 operating hours.

5.8.3 Draining the fuel tank

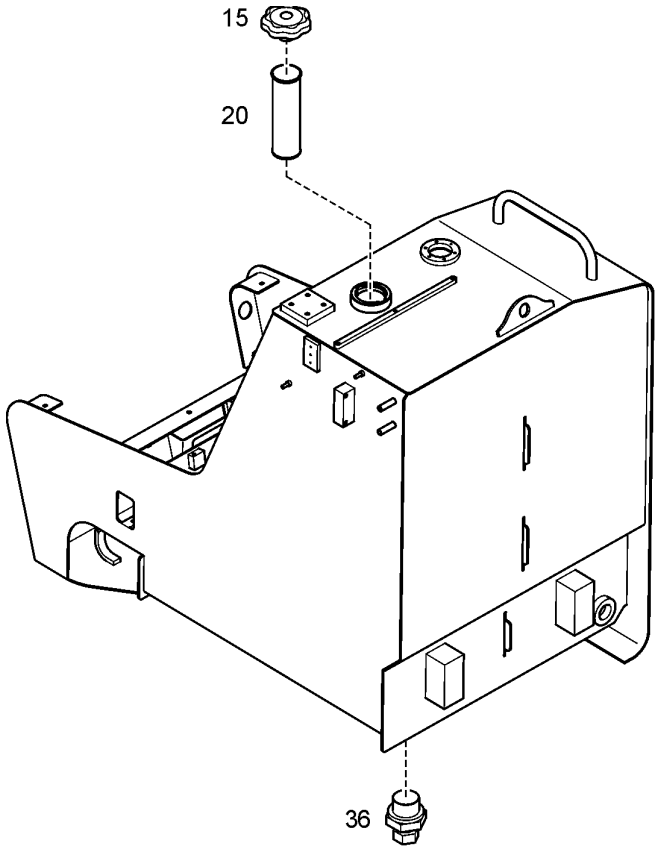

Fig. 5-33 *Draining the fuel tank*

15 Filler cap **20** Fill strainer **36** Drain valve

To drain the fuel tank and the fuel system daily:

- ▶ Place a suitable container underneath.
- ▶ Unscrew the drain valve **36** found on the underside of the fuel tank.
- ▶ Drain off the water until fuel starts to come out.
- ▶ Screw drain valve **36** closed again.

If conditions of use and fuel quality permit, the maintenance interval can be increased to one week.

Note!
To reduce the formation of condensate in the tank, keep the fuel level as high as possible.

Display **P3** indicates the fuel level.

When the red bar **P3.1** illuminates, a low reserve quantity is still in the tank.

In the event of a low fuel level, refill the tank before starting to work.

- ▶ Insert the new safety element **4** carefully.
- ▶ Insert the main filter cartridge**3** and ensure that it is sealed and positioned correctly.
- ▶ Close the filter housing **2** with cover **1**.

5.9.3 Monitoring the filtered air line

- ▶ Monitor the filtered air line between the filter outlet and the engine intake pipe **20** for damage and leaks each time the filter element is replaced.
- ▶ If necessary, retighten the tensioning clamp screws **21** and **22**.

5.9.4 Spark catcher (option)

A spark-catcher can, if required, be added to the machine. This spark catcher minimises the spark quantity coming out from the exhaust muffler.

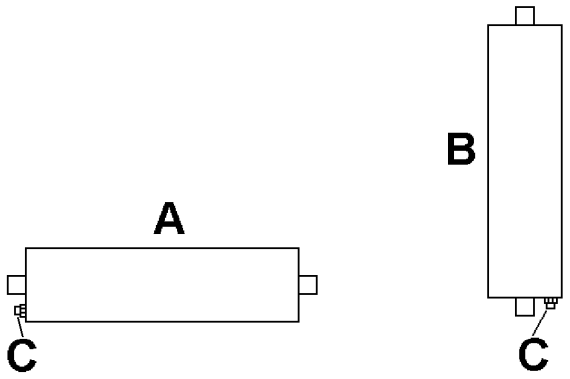

Fig. 5-42 *Spark catcher with evacuation cap **C***

A Horizontal spark catcher
B Vertical spark catcher

Note !
The diesel engine projekts spark which are recoved by a collector.

- ▶ Unscrew the evacuation cap **C** every 500 operating hours in order to evacuate the collector.

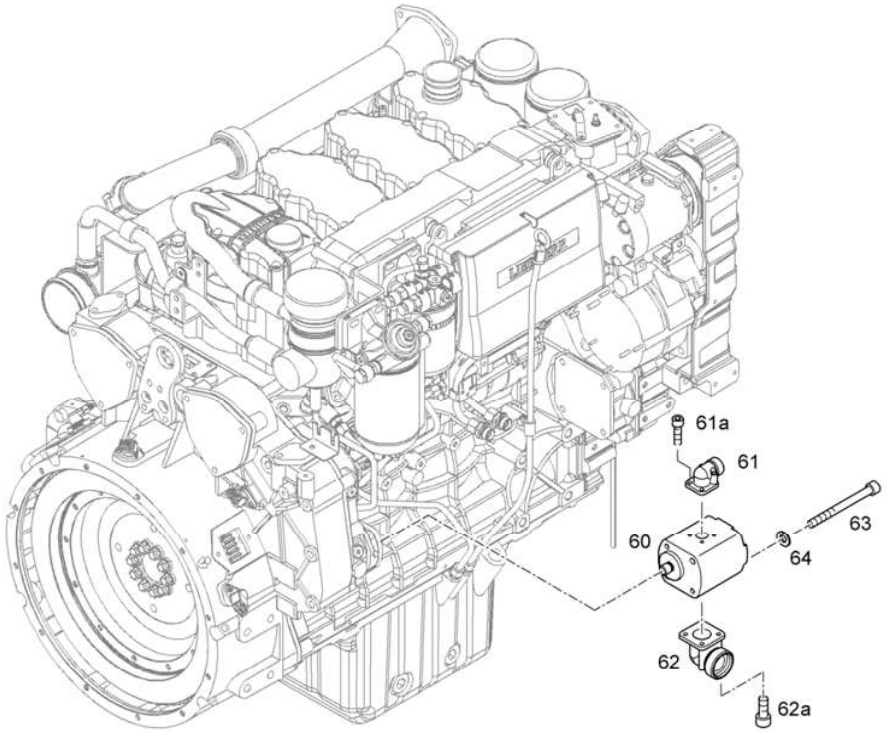

Fig. 5-51 *Pompe d'entrainement du ventilateur*

60 fan pump
61 nozzle
61a screw
62 flange
62a screw

▶ To bleed the fan pump **60**, loosen the screws **61a** of nozzle **61** and let the air escape. As soon as oil flows without air, retighten the screws **61a** of nozzle **61**.

5.10.8 Removing the intake hose to the pumps

For maintenance reason (change of a supply hose, pump dismount), the intake hose to the pumps can be isolated from the hydraulic tank thanks to a shut off valve.

5.11.3 Splitterbox - Oil change

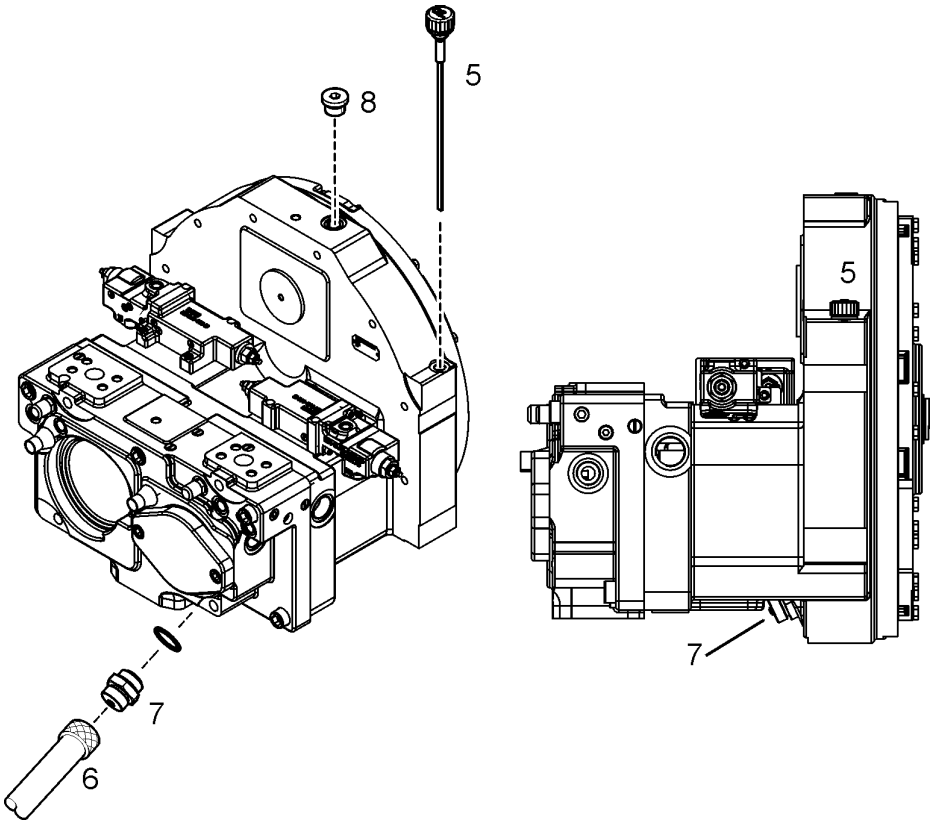

Fig. 5-61 *Changing oil in splitterbox*

5 Dipstick
6 Drain hose
7 Drain valve
8 Plug

Oil draining :

- ▶ Unscrew the dipstick **5**.
- ▶ Screw the drain hose provided **6** to the drain valve **7** and let the oil flow out into a suitable container.
- ▶ Remove the hose **6**.
- ▶ Screw the cover of the drain valve **7** back on.

Oil fulling :

- ▶ Unscrew the plug **8**, when existing.
- ▶ Add the oil via the dipstick **5** drilling until thelevel reaches the mark on the dipstick **5**.
- ▶ Screw the plug **8**, when existing.
- ▶ Screw in the dipstick **5**.
- ▶ Run the engine for a few minutes, stop it and recheck the oil level.

Check oil level :

- ❑ Run the engine for a few minutes, stop it.

changer **6** will otherwise quickly become blocked (see Fig. 5-73).

To clean and change the recirculated and fresh air filters:

- ▶ Push the backrest of the operator's seat forwards to remove the recirculated air filter **1**.
- ▶ Open the quick-release fasteners **2** by a quarter turn.
- ▶ Remove the recirculated air filter **1**.
- ▶ Remove the deflector **4**.
- ▶ Remove the fresh air filter **3**.

Note!

- ▶ Never wash the filter elements with hot water or a steam jet.
- ▶ If damaged or in a bad condition, replace the filter elements.

- ▶ Blow out the filter elements **1** and **3** using compressed air or clean in cold or lukewarm water.

5.14.2 Heating system

Carry out the following maintenance work on the heating system each year before the start of the heating period:

- – Check the entire coolant circuit for leaks.
- – Retighten the connection points for the coolant circuit, the hose connections on the heat exchanger, the seals on the shutoff valves and the hose clamps.
- – Only operate the system with DCA 4 anti-corrosion fluid / antifreeze in the coolant.

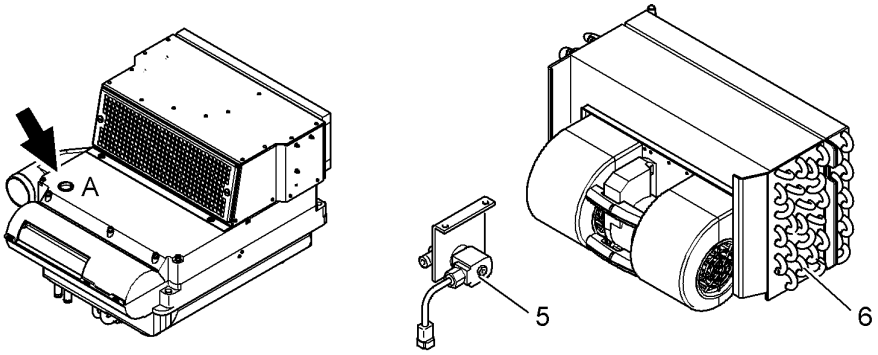

Fig. 5-73 *Heating unit with solenoid valve*

To vent the heating system:

- ▶ To vent, unscrew the red cap of the vent valve over opening **A** (see arrow).
- ▶ Push in the valve to allow the air to escape.

To clean solenoid valve 5:

- ▶ Annually, before the start of the heating period, remove and clean solenoid valve **5** (Y46) for the hot water supply.
- ▶ Also clean the solenoid valve if heating performance is not sufficient.
- ▶ Rinse out the solenoid valve membrane with water.

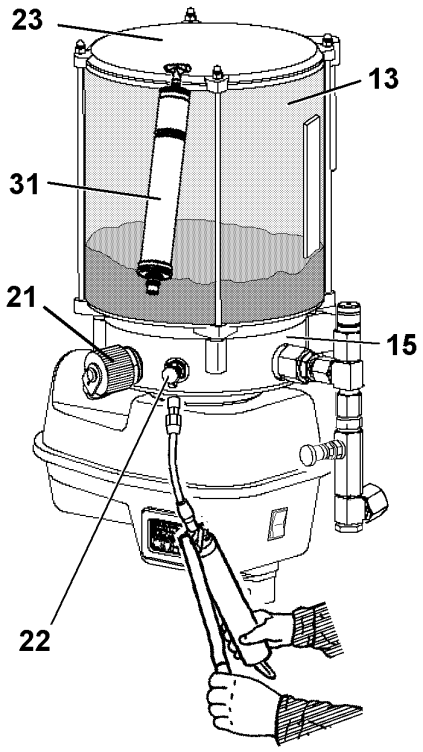

Fig. 5-82 *Refilling the grease container*

13	Grease container	**15**	Grease pump
21	Fitting for filling pump	**22**	Grease fitting
23	Cover	**31**	Filling pump

5.15.7 Changes in the lubrication circuit

Before you make any changes to the lubrication system (for example when changing the attachment configuration), always check with a LIEBHERR mechanic first.

Never remove a line and close off an outlet, which is not being used, or the whole lubrication system would be blocked.

Only plug an outlet after the line has been removed from the distributor and the necessary changes have been achieved at the corresponding distribution elements.

This applies as well for main distributor 4 as for secondary distributors 5.