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Operating manual

Hydraulic excavator
R 916 Classic

from serial number 31055

Document identification

	ORIGINAL OPERATING MANUAL
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Product identification

Manufacturer:	Liebherr-France SAS
Type:	R 916 Classic
Type no.:	1021 / 1086 / 1306 / 1344
Conformity:	EAC

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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

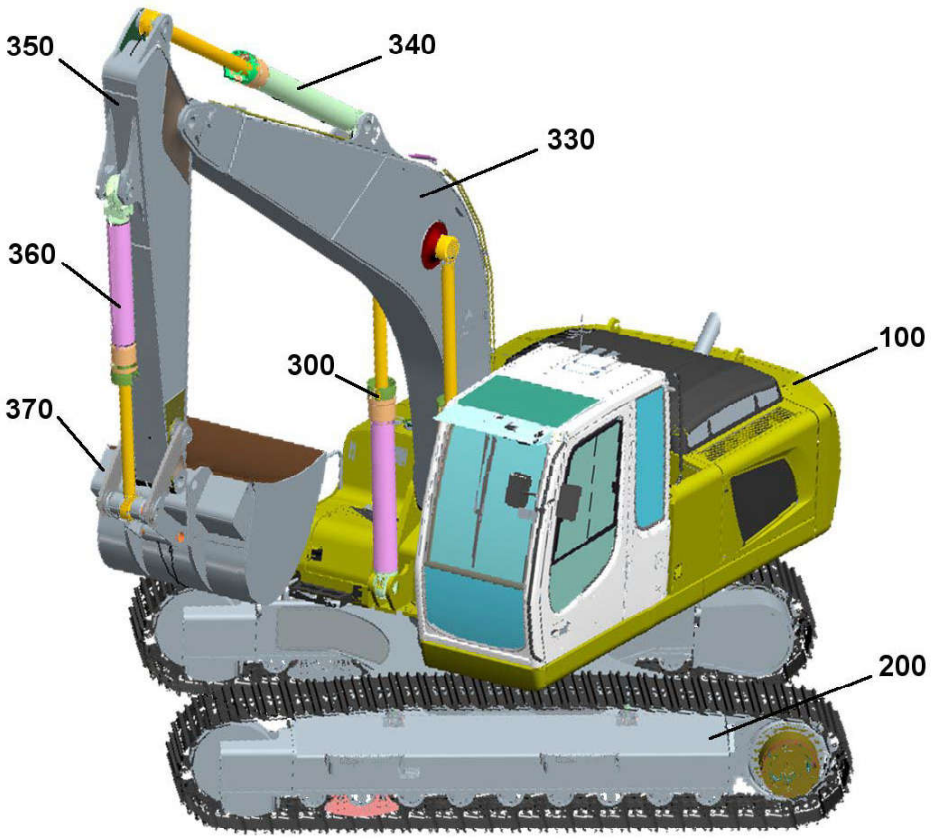

Fig. 1-1 *Machine with construction equipment*

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

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Performance

Thanks to its innovative Advanced excavator system technology, the R 916 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 916 Advanced (ahead)
R 916 Classic (background)

Engine

Rating per ISO 9249	115 kW (157 HP) at 1,800 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	365 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
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

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	ROPS safety cab structure (capable of sweeping over), 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) = 72 dB(A)
2000/14/EC	L_{WA} (surround noise) = 102 dB(A)

Undercarriage

Versions	
NLC	gauge (2,000 mm)
SLC	gauge (2,250 mm)
LC	standard gauge (2,380 mm)
WLC	gauge (2,590 mm)
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	190 kN
Track components	B 60, maintenance-free
Track rollers/Carrier rollers	NLC/SLC/LC: 8/2 WLC: 9/2
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	fitted as standard with Liebherr tooth system

Lift Capacities

with Adjustable Offset Boom 5.70 m

Advanced

Stick 2.20 m

m	Undercarriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m				m
10.5	NLC[1]													
	SLC													
	LC													
	WLC													
9.0	NLC[1]													
	SLC													
	LC													
	WLC													
7.5	NLC[1]											3.9*	3.9*	5.56
	SLC											3.9*	3.9*	
	LC											3.9*	3.9*	
	WLC											3.9*	3.9*	
6.0	NLC[1]					4.9	5.7*					3.7*	3.7*	6.80
	SLC					5.0	5.7*					3.7*	3.7*	
	LC					5.3	5.7*					3.7*	3.7*	
	WLC					5.7*	5.7*					3.7*	3.7*	
4.5	NLC[1]			7.4*	7.4*	4.7	6.1*	3.2	4.0*			3.1	3.7*	7.54
	SLC			7.4*	7.4*	4.7	6.1*	3.2	4.0*			3.2	3.7*	
	LC			7.4*	7.4*	5.1	6.1*	3.4	4.0*			3.4	3.7*	
	WLC			7.4*	7.4*	5.7	6.1*	3.9	4.0*			3.7*	3.7*	
3.0	NLC[1]			6.6	8.9*	4.3	6.7*	3.0	5.6*			2.7	4.0*	7.92
	SLC			6.7	8.9*	4.4	6.7*	3.0	5.2			2.7	4.0*	
	LC			7.2	8.9*	4.7	6.7*	3.2	5.3			2.9	4.0*	
	WLC			8.2	8.9*	5.3	6.7*	3.7	5.6*			3.4	4.0*	
1.5	NLC[1]			5.8	10.0*	3.9	7.3*	2.8	5.5			2.6	4.4*	8.00
	SLC			5.9	10.0*	4.0	7.1	2.8	5.0			2.6	4.4*	
	LC			6.4	10.0*	4.3	7.1	3.1	5.1			2.8	4.4*	
	WLC			7.4	10.0*	4.9	7.3*	3.5	5.6			3.2	4.4*	
0	NLC[1]	8.2*	8.2*	5.5	10.3*	3.7	7.5*	2.7	5.4			2.6	5.1	7.80
	SLC	8.2*	8.2*	5.6	10.3*	3.7	6.9	2.7	4.9			2.6	4.6	
	LC	8.2*	8.2*	6.1	10.3*	4.0	6.9	2.9	4.9			2.8	4.6	
	WLC	8.2*	8.2*	7.1	10.3*	4.7	7.5*	3.4	5.4			3.2	5.1	
-1.5	NLC[1]	10.3	13.2*	5.4	9.7*	3.6	7.2*					2.8	5.6	7.27
	SLC	10.8	13.2*	5.5	9.7*	3.7	6.8					2.8	5.1	
	LC	11.9	13.2*	6.0	9.7*	4.0	6.8					3.0	5.1	
	WLC	13.2*	13.2*	7.0	9.7*	4.6	7.2*					3.5	5.7*	
-3.0	NLC[1]	10.6	10.9*	5.5	8.3*	3.7	6.1*					3.5	5.6*	6.35
	SLC	10.9*	10.9*	5.7	8.3*	3.7	6.1*					3.5	5.6*	
	LC	10.9*	10.9*	6.1	8.3*	4.1	6.1*					3.8	5.6*	
	WLC	10.9*	10.9*	7.1	8.3*	4.7	6.1*					4.3	5.6*	
-4.5	NLC[1]			5.4*	5.4*							5.0*	5.0*	4.79
	SLC			5.4*	5.4*							5.0*	5.0*	
	LC			5.4*	5.4*							5.0*	5.0*	
	WLC			5.4*	5.4*							5.0*	5.0*	

Stick 2.40 m

m	Undercarriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m				m
10.5	NLC[1]													
	SLC													
	LC													
	WLC													
9.0	NLC[1]													
	SLC													
	LC													
	WLC													
7.5	NLC[1]											3.5*	3.5*	5.83
	SLC											3.5*	3.5*	
	LC											3.5*	3.5*	
	WLC											3.5*	3.5*	
6.0	NLC[1]					5.0	5.5*					3.4*	3.4*	7.02
	SLC					5.1	5.5*					3.4*	3.4*	
	LC					5.4	5.5*					3.4*	3.4*	
	WLC					5.5*	5.5*					3.4*	3.4*	
4.5	NLC[1]			7.1*	7.1*	4.7	5.9*	3.2	4.7*			3.0	3.4*	7.74
	SLC			7.1*	7.1*	4.8	5.9*	3.2	4.7*			3.0	3.4*	
	LC			7.1*	7.1*	5.1	5.9*	3.4	4.7*			3.2	3.4*	
	WLC			7.1*	7.1*	5.7	5.9*	3.9	4.7*			3.4*	3.4*	
3.0	NLC[1]	11.3*	11.3*	6.6	8.6*	4.3	6.6*	3.0	5.5*			2.6	3.6*	8.11
	SLC	11.3*	11.3*	6.8	8.6*	4.4	6.6*	3.0	5.3			2.6	3.6*	
	LC	11.3*	11.3*	7.3	8.6*	4.7	6.6*	3.3	5.3			2.8	3.6*	
	WLC	11.3*	11.3*	8.3	8.6*	5.3	6.6*	3.7	5.5*			3.2	3.6*	
1.5	NLC[1]			5.9	9.9*	3.9	7.2*	2.8	5.5			2.5	4.0*	8.19
	SLC			6.0	9.9*	4.0	7.2	2.8	5.0			2.5	4.0*	
	LC			6.5	9.9*	4.3	7.2*	3.1	5.1			2.7	4.0*	
	WLC			7.5	9.9*	4.9	7.2*	3.5	5.6			3.1	4.0*	
0	NLC[1]	8.4*	8.4*	5.4	10.2*	3.7	7.4*	2.7	5.4			2.5	4.6*	7.99
	SLC	8.4*	8.4*	5.6	10.2*	3.7	6.8	2.7	4.9			2.5	4.5	
	LC	8.4*	8.4*	6.1	10.2*	4.0	6.9	2.9	4.9			2.7	4.5	
	WLC	8.4*	8.4*	7.0	10.2*	4.6	7.4*	3.4	5.4			3.1	4.6*	
-1.5	NLC[1]	10.1	13.0*	5.4	9.8*	3.6	7.2*					2.7	5.4	7.48
	SLC	10.7	13.0*	5.5	9.8*	3.6	6.7					2.7	4.9	
	LC	11.8	13.0*	6.0	9.8*	3.9	6.7					2.9	4.9	
	WLC	13.0*	13.0*	6.9	9.8*	4.5	7.2*					3.3	5.4	
-3.0	NLC[1]	10.4	11.4*	5.5	8.5*	3.6	6.3*					3.2	5.5*	6.59
	SLC	11.0	11.4*	5.6	8.5*	3.7	6.3*					3.3	5.5*	
	LC	11.4*	11.4*	6.1	8.5*	4.0	6.3*					3.5	5.5*	
	WLC	11.4*	11.4*	7.1	8.5*	4.6	6.3*					4.1	5.5*	
-4.5	NLC[1]			5.8	5.9*							4.9	5.0*	5.11
	SLC			5.9*	5.9*							5.0	5.0*	
	LC			5.9*	5.9*							5.0*	5.0*	
	WLC			5.9*	5.9*							5.0*	5.0*	

Stick 2.70 m

m	Undercarriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m				m
10.5	NLC[1]													
	SLC													
	LC													
	WLC													
9.0	NLC[1]													
	SLC													
	LC													
	WLC													
7.5	NLC[1]					3.9*	3.9*					3.1*	3.1*	6.23
	SLC					3.9*	3.9*					3.1*	3.1*	
	LC					3.9*	3.9*					3.1*	3.1*	
	WLC					3.9*	3.9*					3.1*	3.1*	
6.0	NLC[1]					5.1	5.2*					2.9*	2.9*	7.35
	SLC					5.1	5.2*					2.9*	2.9*	
	LC					5.2*	5.2*					2.9*	2.9*	
	WLC					5.2*	5.2*					2.9*	2.9*	
4.5	NLC[1]					4.8	5.7*	3.2	5.1*			2.8	3.0*	8.04
	SLC					4.8	5.7*	3.2	5.1*			2.8	3.0*	
	LC					5.2	5.7*	3.5	5.1*			3.0*	3.0*	
	WLC					5.7*	5.7*	3.9	5.1*			3.0*	3.0*	
3.0	NLC[1]	12.2	13.3*	6.8	8.3*	4.4	6.3*	3.0	5.3*			2.5	3.1*	8.40
	SLC	13.0	13.3*	6.9	8.3*	4.4	6.3*	3.1	5.3			2.5	3.1*	
	LC	13.3*	13.3*	7.5	8.3*	4.7	6.3*	3.3	5.3			2.7	3.1*	
	WLC	13.3*	13.3*	8.3*	8.3*	5.4	6.3*	3.7	5.3*			3.1	3.1*	
1.5	NLC[1]	6.8*	6.8*	5.9	9.6*	4.0	7.0*	2.8	5.6			2.3	3.4*	8.48
	SLC	6.8*	6.8*	6.1	9.6*	4.0	7.0*	2.8	5.1			2.3	3.4*	
	LC	6.8*	6.8*	6.6	9.6*	4.3	7.0*	3.1	5.1			2.5	3.4*	
	WLC	6.8*	6.8*	7.6	9.6*	5.0	7.0*	3.5	5.6			2.9	3.4*	
0	NLC[1]	8.6*	8.6*	5.5	10.2*	3.7	7.4*	2.7	5.4			2.3	3.9*	8.28
	SLC	8.6*	8.6*	5.6	10.2*	3.7	6.9	2.7	4.9			2.3	3.9*	
	LC	8.6*	8.6*	6.1	10.2*	4.0	6.9	2.9	4.9			2.5	3.9*	
	WLC	8.6*	8.6*	7.1	10.2*	4.6	7.4*	3.4	5.4			2.9	3.9*	
-1.5	NLC[1]	10.0	12.3*	5.3	9.9*	3.5	7.3*	2.6	5.3			2.5	4.9*	7.79
	SLC	10.6	12.3*	5.4	9.9*	3.6	6.7	2.6	4.8			2.5	4.5	
	LC	11.6	12.3*	5.9	9.9*	3.9	6.7	2.8	4.8			2.7	4.6	
	WLC	12.3*	12.3*	6.9	9.9*	4.5	7.3*	3.3	5.3			3.1	4.9*	
-3.0	NLC[1]	10.3	12.1*	5.4	8.8*	3.6	6.5*					3.0	5.3*	6.94
	SLC	10.8	12.1*	5.5	8.8*	3.6	6.5*					3.0	5.3*	
	LC	11.9	12.1*	6.0	8.8*	3.9	6.5*					3.2	5.3*	
	WLC	12.1*	12.1*	7.0	8.8*	4.5	6.5*					3.7	5.3*	
-4.5	NLC[1]	8.7*	8.7*	5.7	6.5*							4.2	5.0*	5.56
	SLC	8.7*	8.7*	5.8	6.5*							4.3	5.0*	
	LC	8.7*	8.7*	6.3	6.5*							4.6	5.0*	
	WLC	8.7*	8.7*	6.5*	6.5*							5.0*	5.0*	

Stick 3.00 m

m	Undercarriage	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m				m
10.5	NLC[1]													
	SLC													
	LC													
	WLC													
9.0	NLC[1]													
	SLC													
	LC													
	WLC													
7.5	NLC[1]											2.7*	2.7*	6.61
	SLC											2.7*	2.7*	
	LC											2.7*	2.7*	
	WLC											2.7*	2.7*	
6.0	NLC[1]					4.9*	4.9*	3.3*	3.3*			2.6*	2.6*	7.68
	SLC					4.9*	4.9*	3.3*	3.3*			2.6*	2.6*	
	LC					4.9*	4.9*	3.3*	3.3*			2.6*	2.6*	
	WLC					4.9*	4.9*	3.3*	3.3*			2.6*	2.6*	
4.5	NLC[1]					4.8	5.4*	3.3	4.9*			2.6*	2.6*	8.34
	SLC					4.9	5.4*	3.3	4.9*			2.6*	2.6*	
	LC					5.2	5.4*	3.5	4.9*			2.6*	2.6*	
	WLC					5.4*	5.4*	4.0	4.9*			2.6*	2.6*	
3.0	NLC[1]	12.3*	12.3*	6.9	7.9*	4.4	6.1*	3.1	5.2*			2.3	2.7*	8.69
	SLC	12.3*	12.3*	7.1	7.9*	4.5	6.1*	3.1	5.2*			2.3	2.7*	
	LC	12.3*	12.3*	7.6	7.9*	4.8	6.1*	3.3	5.2*			2.5	2.7*	
	WLC	12.3*	12.3*	7.9*	7.9*	5.4	6.1*	3.8	5.2*			2.7*	2.7*	
1.5	NLC[1]	8.4*	8.4*	6.0	9.4*	4.0	6.8*	2.8	5.5*			2.2	3.0*	8.76
	SLC	8.4*	8.4*	6.2	9.4*	4.1	6.8*	2.9	5.1			2.2	3.0*	
	LC	8.4*	8.4*	6.7	9.4*	4.4	6.8*	3.1	5.1			2.4	3.0*	
	WLC	8.4*	8.4*	7.7	9.4*	5.0	6.8*	3.5	5.5*			2.7	3.0*	
0	NLC[1]	8.9*	8.9*	5.5	10.1*	3.7	7.3*	2.7	5.4			2.2	3.4*	8.57
	SLC	8.9*	8.9*	5.6	10.1*	3.7	6.9	2.7	4.9			2.2	3.4*	
	LC	8.9*	8.9*	6.1	10.1*	4.0	6.9	2.9	4.9			2.3	3.4*	
	WLC	8.9*	8.9*	7.1	10.1*	4.7	7.3*	3.3	5.4			2.7	3.4*	
-1.5	NLC[1]	9.9	11.8*	5.3	10.0*	3.5	7.3*	2.6	5.3			2.3	4.2*	8.10
	SLC	10.4	11.8*	5.4	10.0*	3.6	6.7	2.6	4.8			2.3	4.2*	
	LC	11.5	11.8*	5.9	10.0*	3.9	6.7	2.8	4.8			2.5	4.2*	
	WLC	11.8*	11.8*	6.9	10.0*	4.5	7.3*	3.2	5.3			2.9	4.2*	
-3.0	NLC[1]	10.1	12.8*	5.3	9.0*	3.5	6.7*					2.7	5.1*	7.29
	SLC	10.7	12.8*	5.4	9.0*	3.5	6.7					2.7	5.0	
	LC	11.8	12.8*	5.9	9.0*	3.8	6.7					2.9	5.0	
	WLC	12.8*	12.8*	6.9	9.0*	4.5	6.7*					3.4	5.1*	
-4.5	NLC[1]	9.6*	9.6*	5.5	7.1*							3.7	5.0*	5.99
	SLC	9.6*	9.6*	5.7	7.1*							3.8	5.0*	
	LC	9.6*	9.6*	6.2	7.1*							4.1	5.0*	
	WLC	9.6*	9.6*	7.1*	7.1*							4.7	5.0*	

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 370 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 and heavy counterweight 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	+	+
Tractive force increase	+	+
NLC-Undercarriage	+	+
SLC-Undercarriage	+	+
LC-Undercarriage	+	+
WLC-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	+	+
Automatic engine shut-down (adjustable time-period)	+	+

Operator's Cab

	Advanced	Classic
Fire extinguisher	+	+
Lower windscreen with wiper	–	+
Foot support	+	+
Electric cool box	+	+
Cab with bullet-proof glass (front and roof windows) and roof window wipers	+	+
LIDAT Standard (Liebherr data transfer system)	+	+
LIDAT Plus (extended Liebherr data transfer system)	+	+
Air pressure operator seat	•	+
Premium operator seat	+	–
Engine shut-down (via push-button) in cab	+	+
Bullet-proof roof glass panel with wiper	+	+
Radio with SD-/MMC-card, Aux-in	+	+
Rear space monitoring with camera	+	+
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	+	+
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	+	+
12 t lifting hook on bucket	+	+
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	+	+
Hose-protecting lubrication system (stick rear)	+	+
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

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.
– Check that the equipment is operating correctly.
– Move the machine carefully to an open area and then check the function of the running and slewing gear brakes, the steering and the signalling and lighting devices.

Stopping the machine safely

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

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.

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Protective goggles, safety helmets, safety shoes and gloves, reflective vests and ear protection etc. are required for specific jobs.

– Do not remain in direct proximity of the diesel engine while the diesel engine is running.
  Persons with pacemakers should not approach within 20 cm of the running diesel engine.
  Do not touch voltage-carrying parts on the electrical connection of the individual solenoid injection pumps (Unit Pumps UP) while the diesel engine is running.
– Do not permit unauthorised persons to approach the machine during maintenance work.
– Cordon off a wide maintenance area if required.
– Inform operational personnel before starting to carry out any special work and repair work. Designate persons in charge of supervision.
– In the absence of any other information in the operating instructions, carry out all maintenance work on the machine on level, firm ground with the working equipment set aside and the engine switched off.
– For some machines, the only one position which enables a secured access to every maintenance locations on the uppercarriage, is when the uppercarriage is aligned with the undercarriage so that the sprockets locate at the back-end. The ladder situated on the undercarriage only corresponds with the uppercarriage's access when the excavator is in this configuration.
– Pull out the ignition key and shut off the main battery switch.
– Always tighten any loose screw connections during maintenance and repair work.
– The mounting bolts of the main components, of the hydraulic hoses and of the counterweight must be replaced after every removal.
– If safety devices have to be dismantled during set-up, maintenance and repair work, they must be immediately reinstalled and checked at the end of the work.
– When carrying out repair work, particularly when working under the machine, hang a "Do not start" warning sign in a clearly visible position on the starting lock. Pull out the start key and shut off the main battery switch.
– Operate combustion motors and fuel operated heaters only in well ventilated areas. Before operating these units, check ventilation.
– In addition, always follow applicable local regulations.

Cleaning

– Clean oil, fuel or care products off the machine before starting maintenance or repair work and pay particular attention to connections and screw fittings.
  Do not use aggressive cleaning products and use lint-free cleaning cloths.
– Do not use aggressive cleaning products or steam jet devices to clean the machine for the first two months after initial set-up of the machine (or after repainting).
– Do not use combustible liquids to clean the machine.
– Before cleaning the machine with water or steam jets (high pressure cleaner) or other cleaning materials:
  • lubricate all bearing points, bolt connections and the rim bearing to prevent water or steam entering the bearing points.
  • cover or glue shut all openings into which for safety or functional reasons water or steam may not be permitted to enter.
    Electric motors, electrical components, control boxes, plug connections and air filters are particularly at risk.
– Ensure that the fire warning systems and fire extinguishers of the engine compartment's temperature sensor do not come into contact with hot cleaning

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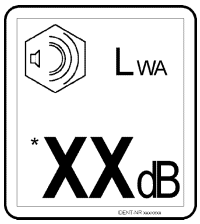
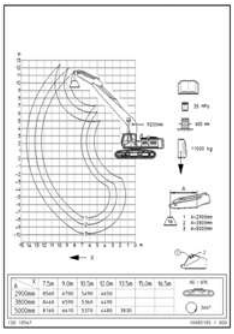
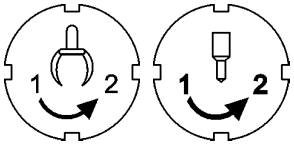
	Sign	Explanation
54		**Accident prevention** The accident prevention regulations given in the operating instructions must be carefully followed.
55		**Safety lever** Raise the safety lever before leaving the operator's seat.
56		**Attachment collision hazard** The attachment reaches as far as the cab! Use caution when retracting the attachment.
60		**Sound power level** Indicates the sound power level generated by the machine in dB(A). ***XX** = The applicable value for the machine is provided in the operator's cab.
65		**Load chart*** Indicates the permissible loads at the end of the stick depending on the working radius.
76		**Burn hazard** Hazard due to hot machine parts, especially in the area of exhaust silencer.
80		**Safety belt** The safety belt must be fastened before starting the machine.



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. (see chapter , "Warning symbols for operating faults in the SY field" on page 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. (see chapter , "Information symbols in the INF field" on page 21).

TI field

The machine operating hours and the daily operating hours counter are displayed in this field at the bottom right of 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 (see "Menu "Info In/Outputs"- Status of hydraulic pumps and of electrical inputs and outputs" on page 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 (see chapter , "Menu "Set option" - selection of the flow and pressure limitations" on page 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.

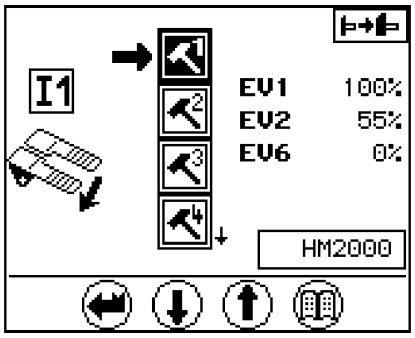


Fig. 3-13 *Menu "Set option"*

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.

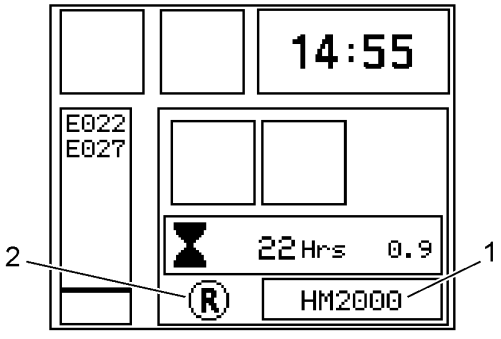


Fig. 3-14 *Main screen, the chosen option is displayed*

1 Denomination of the active option

2 The symbol "R" indicates that an external flow limitation is active

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3.1.6 Controls and instrumentation for optional equipments

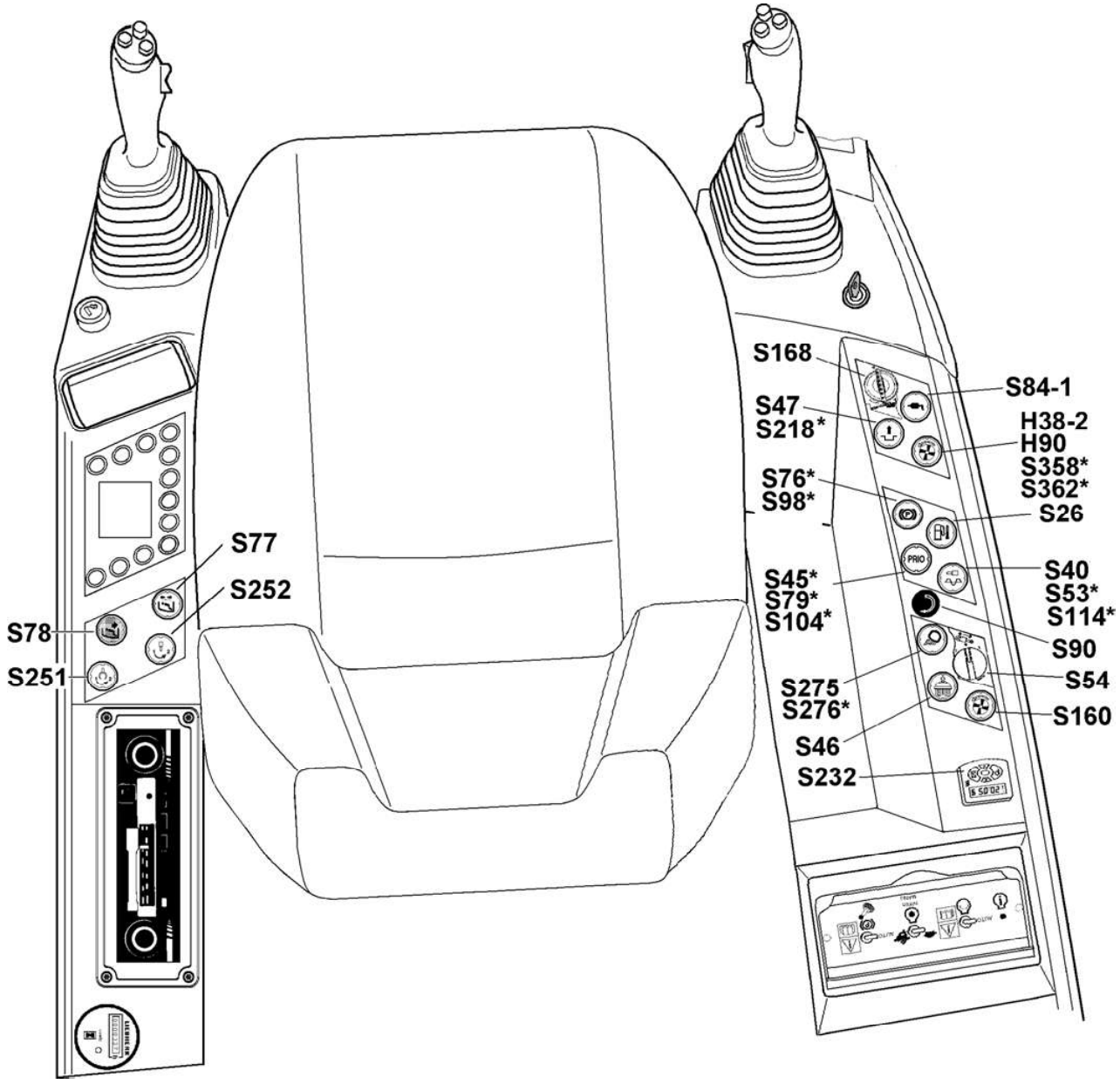

Fig. 3-28 *Controls for optional equipments*

* 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.

▶ Sit down on the seat.

▶ Pull the lever **9** briefly upwards.
  ↳ The seat is automatically adjusted to suit the body weight of the operator.

Adjusting seat height (in models with automatic adjusting mechanism)*:

▶ Before adjusting the height, set the shock absorber to "soft".

Caution!
Risk of damage to compressor.

▶ Do not run the compressor continuously for more than 1 minute.

▶ Adjust the seat height by pulling or pushing the lever **9** to the stop.

Adjusting seat depth:

▶ Lift the button **12**.

▶ Sit on the seat and move it horizontally to the desired position.

▶ To adjust the angle of inclination of the seat, press the button **13**.
  ↳ Sit on the seat and move it to the desired angle.

Horizontal adjustment:

▶ Pull up the lever **11**.

▶ Adjust the operator seat in horizontal direction.

▶ Release the lever. Ensure that the lever engages properly in the desired position (audible click).

▶ Carry out the following check: After locking, it must be impossible to move the operator seat to a different position.

Horizontal adjustment with control consoles:

▶ Pull up the lever **7**.

▶ Adjust the operator seat together with the control consoles in horizontal direction.

▶ Release the lever. Ensure that the lever engages properly in the desired position (audible click).

▶ Carry out the following check: After locking, it must be impossible to move the operator seat to a different position.

Adjusting backrest:

▶ Pull up the lever **3**.

▶ Sit on the seat and move the backrest to the desired position.

▶ Release the lever. Ensure that the locking lever engages in the desired position.

▶ Carry out the following check: After locking, it must be impossible to move the backrest to a different position.

Adjusting lumbar support (in models with mechanical adjusting mechanism):

▶ Adjust the height and curve of the lumbar pad by turning the hand wheel **2** at the back of the seat.

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Turning the control unit on

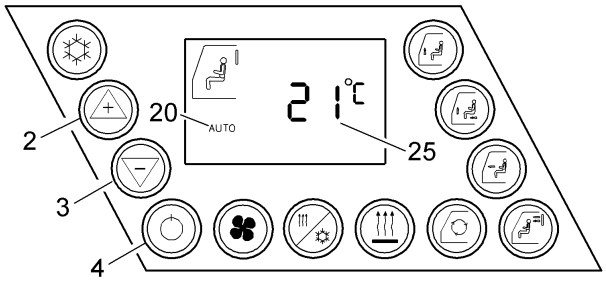

Fig. 3-44 *Turning the control unit on and setting the cab temperature*

▶ Turn the system on using the key **4**.
  ↳ The software version will be displayed for approx. 12 seconds 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 3 is made.

Manual setting of the heating output

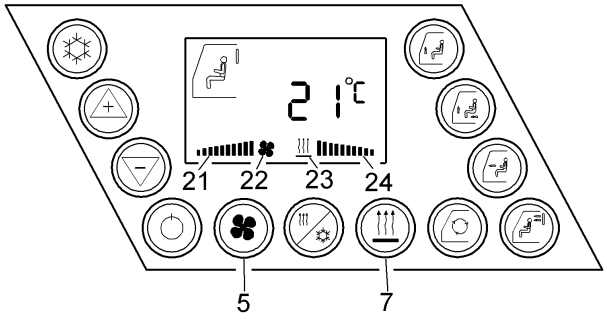

Fig. 3-45 *Setting of the heating output and of the fan speed*

▶ Press the key **7** to adjust the heating output manually.
  ↳ the heating symbol 23 is displayed and will flash for 5 seconds.
  ↳ the bar graph 24, showing the adjusted heating output, is displayed.

▶ As long as the heating symbol 23 is flashing, the heating output can be increased or reduced manually using the keys **2** or **3**.

▶ Press the key **7** again, to return to automatic operation.
  ↳ the symbols 23 and 24 will go off, the symbol 20 is displayed again.

Manual setting of the fan speed

▶ Press the key 5 to adjust the fan speed manually.
  ↳ the fan symbol 22 is displayed and will flash for 5 seconds.
  ↳ the bar graph 21, showing the adjusted fan speed, is displayed.

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Main and safety filter element :

The air flow in the heating / air-conditioning system is reduced when the filters are dirty.

– Remove and clean the filter elements **2** and **3** every 500 operating hours.
– Shorten cleaning intervals when working in heavy dust conditions.

To clean and change the main and safety filter element :

▶ Open the clip **5**.

▶ Remove the end cover **4**.

▶ Remove the main filter element **2**.

▶ Remove the safety filter element **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 **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 (see chapter 0.1.2, "ESP02 board" on page 1).

▶ Check out / remplace plate A1008 into the left control panel.

3.3 Setting the machine into operation

3.3.1 Starting / stopping the machine

General information

Note!
When using the machine at a specific height above sea level and in connection with coolant and boost air temperatures, the performance and service life of the diesel engine with turbocharging is decisively affected.
Under these conditions, there is also an increased risk of the coolant circuit and the hydraulic oil overheating.

The power electronic regulator **LIDEC DC 5-00** is used for regulation, surveillance and protection of LIEBHERR diesel engines.

In the following environmental conditions (sea level and athmospheric pressure) the engine power is automaticaly reduced :

– 4.850 m and an atmospheric pressure up to 550 mbar
– 3.950 m and an atmospheric pressure up to 620 mbar

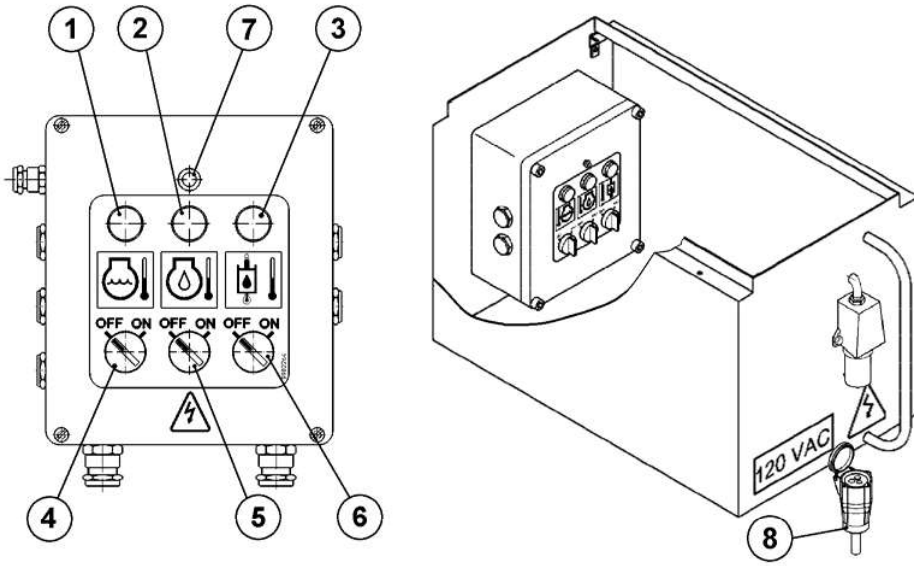


Fig. 3-58 *Coolant / motor oil / hydraulic oil preheating*

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.

▶ Tip toggle switch **6** hydraulic oil preheating.
  ↳ The hydraulic oil preheating is switched on.
  ↳ Indicator light **3** illuminates

▶ After starting the engine, disconnect the power cable **8** on the machine.

Braking the uppercarriage

The machine is equipped as well with an hydraulic as with a mechanical swing brake.

The hydraulic swing brake

▶ Let the left joystick **4** move back to neutral position.
  ↳ The hydraulically swing braking of the uppercarriage takes place. In normal working conditions, the braking efficiency is sufficient to bring the uppercarriage to a standstill rapidly.

▶ Move the left joystick **4** in the opposite direction.
  ↳ The maximum hydraulic braking action of the uppercarriage is achieved.

The mechanical swing brake

The mechanical brake is a negatively acting multidisc brake which is integrated in the swing gear. It allows to stop the uppercarriage in any desired position (for parking, when working on a slope, ...).

Caution!
Damage to the machine.

▶ Only lock the mechanical swing gear brake when the upper carriage is stationary.

▶ Press the touch **S17**.
  ↳ the red LED beside the touch is lighting.
  ↳ the swing brake is applied.

▶ Press the touch **S17** again.

❑ 1st case: when there is no positioning brake or when there is a positioning brake until BBT software version 4.58.
  ↳ the red LED beside the touch goes out.
  ↳ The swing gear brake is in automatic operating mode:
    ↳the swing brake releases as soon as a swing hydraulic control is actuated.
    ↳the swing brake is applied as soon as the uppercarriage speed gets lower than a limit value and no swing hydraulic control is actuated.

❑ 2nd case: when there is a positioning brake, from BBT software version 4.58.1.
  ↳ the red LED beside the touch goes out.
  ↳ the swing brake releases.

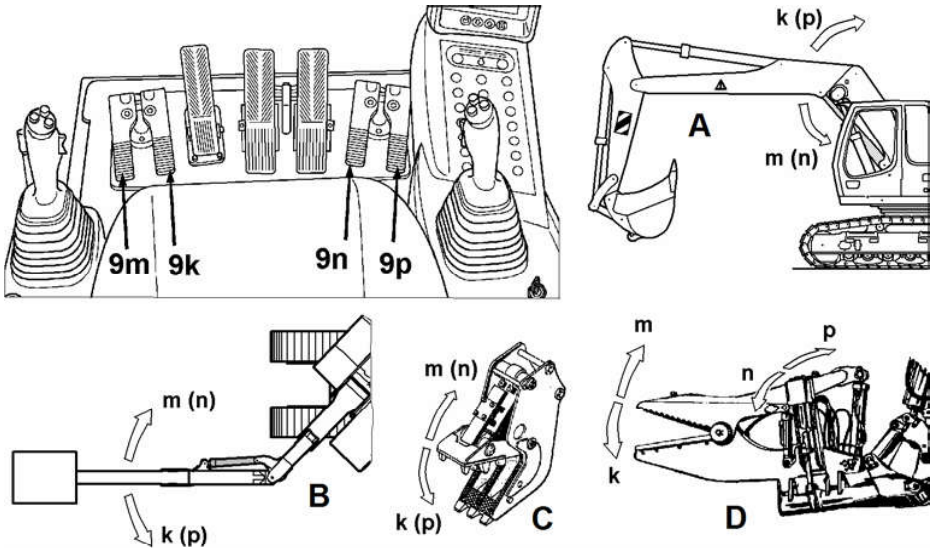
Note!
If the red LED beside the touch **S17** is lighting, the brake remains applied, whatever happens.

Caution!
The brake only applies when the uppercarriage is near standstill and if no swing motion is actuated via the joystick!
In order to stop the uppercarriage when working on a slope, reduce the uppercarriage speed by braking with joystick **4**.
Move the joystick **4** back to «0» position only after the brake has applied.

Emergency stop of the uppercarriage swing motion

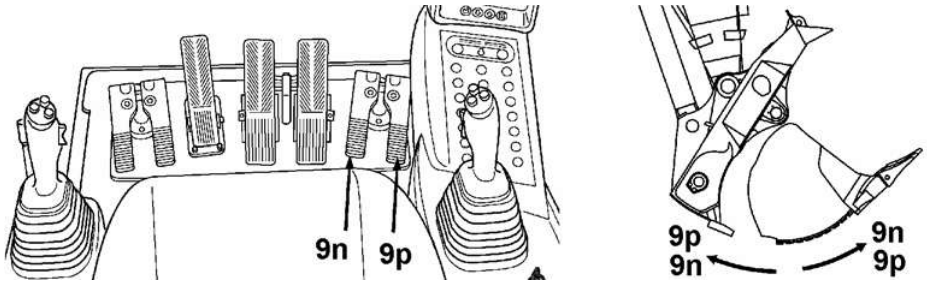
The swing brake can be applied independently of the uppercarriage RPM by switching the button **S17** from position «automatic» into position «applied».

When two of these additional attachments are mounted simultaneously on the machine, the first is controlled by the left double pedal **9m**/**9k**, and the second is controlled by the right double pedal **9n**/**9p**.



- ▶ Push down the foot pedal **9m** (or **9n**).
  - ↳ The cylinder of the additional user is retracted.
- ▶ Push down the foot pedal **9k** (or **9p**).
  - ↳ The cylinder of the additional user is extended.

Control of a bottom dump shovel



For the excavators R934C - R944C - R954:

- ▶ Push down the foot pedal **9p**.
  - ↳ The shovel flap closes.
- ▶ Push down the foot pedal **9n**.
  - ↳ The shovel flap opens.

For the excavators R964C - R974C:

- ▶ Push down the foot pedal **9n**.
  - ↳ The shovel flap closes.
- ▶ Push down the foot pedal **9p**.
  - ↳ The shovel flap opens.

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Danger!
An hydraulic excavator may only be operated for lifting loads overhead if all the prescribed safety devices are present and functioning correctly.

In accordance with European standard EN 474-5, and so to guarantee the protections of the persons attaching or removing the loads during lifting operations, the machines used for lifting loads overhead must be equipped with the following safety devices:

– **a load hooking system ensuring the safe attaching and removing of the loads (optional equipment)**
Safe hooking systems include for example lifting hooks which are mounted in place of the bucket. Safety lifting hooks welded directly to the bucket are also allowed.
– **an overload warning device (optional extra)**
The overload warning device must alert the machine operator visually or acoustically if the permitted load value has been reached or exceeded, according to the rated lift capacity chart.
– **a boom lowering control device** (such as load check valves) to prevent unintentional lowering or dropping of the boom because of the weight of the load, which could happen if a line in this hydraulic circuit suddenly develops a leak (for example, should a hydraulic line break or a hose burst,...).
This boom lowering control device must correspond with the requirements of ISO 8643.
Such a boom lowering device can be installed as an option on all models up to R924C, it is serially installed on all models R934C and above.
– **a rated lift capacity chart** (commonly called load chart), attached inside the cab and within the view of the operator..

If the points referred to above are not or are only partially fulfilled, the machine may not be used for lifting loads overhead**.**

Every LIEBHERR hydraulic excavator can be fitted with all the safety devices required for lifting loads operation.

Danger!

- ▶ Only employ sling ropes and accessories which are permitted for lifting operation, regularly checked and in good condition.
- ▶ No person may fasten or unfasten a load without approval of the operator and this person may only approach the load from one side. The operator may only approve this action when the excavator has stopped and the attachment is not moving.
- ▶ Never lift loads over people.

3.4.18 Overload warning system (option)

Description

The overload warning system indicates to the machine operator when the maximum permitted load capacity is reached or exceeded.

The permitted load capacity depends on the configuration of the machine (undercarriage, working attachment). The maximum load capacity can be found on the load capacity chart in the operator's cab.

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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 grooves which allow the installation of the pin bearing sealing.
- Before insertion of the complete pin bearing sealing **25** between the facing bearing limbs, the lips of the seal ring **25.2** must be fold together and inserted in the grooves of the installation ring in an angular sector of approx. 120°.
- Fill the interspace between installation ring and lips with grease before installation.
- The assembly screw **25.5** is only designed to hold the sealing lips together on the lip seal ring during basic assembly of the pin bearing sealing.
- The assembly screw must be removed after assembly.

Note!

After installation of a new digging bucket, the restrictor check valves **222** and **232** for stick, respectively bucket tilt cylinders must be eventually readjusted so to have the correct velocity of the working attachment (due to weight differences of the digging bucket).If necessary, consult a LIEBHERR mechanic.

In particular on machines, which are delivered without digging bucket or grapple, this restrictor check valves must be (if mounted) adjusted after installation of the digging tool, so to avoid uneven or jerky movements of the attachment parts.

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Note!

After installation of a new stick and digging bucket combination, the restrictor check valve **222** for stick cylinder must be eventually readjusted so to have the correct velocity of the working attachment (due to weight difference of the attachment parts).

If necessary, consult a LIEBHERR mechanic.

3.7.6 Mechanical quick-change adapter (option)

Safety instructions

- Ensure that nobody is located in the working area of the equipment when attaching and dismounting work tools. Move the work equipment as slowly as possible when attaching and dismounting a work tool.
  Get to know the mode of operation of the quick-change adapter before attaching or dismounting work tools.
- Always keep the work tool as close to the ground as possible when locking and unlocking to avoid creating conditions which may lead to danger.
- If necessary, use a platform to reach the locking pins and connections. Never stand on the work tool.
- Each time a work tool is changed, the machine's operator must ensure that the locking pin for the quick-change adapter inserts in the bore holes on the work tool which are designed for the purpose and that the work tool raises correctly. A direct visual check must be made to ensure that the work tool is correctly positioned.
- A working cycle should also be carried out with the work tool, where the work tool is only raised to the point where the correct position of, for example, the pin in the pin eye can be tested by tilting in and out.
- The correct positioning of the locking screw must be checked daily.
- The load carrying capacity of the quick-change adapter or the integrated lifting hook can exceed or fall short of the load carrying capacity of the carrier device. When operating, it should be ensured that the values provided in the load chart and the technical data for the carrier device are adhered to.

Overview

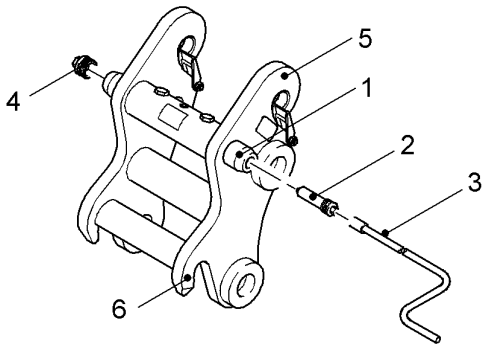

Fig. 3-98 *Mechanical quick-change adapter*

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.

To put down the work tool:

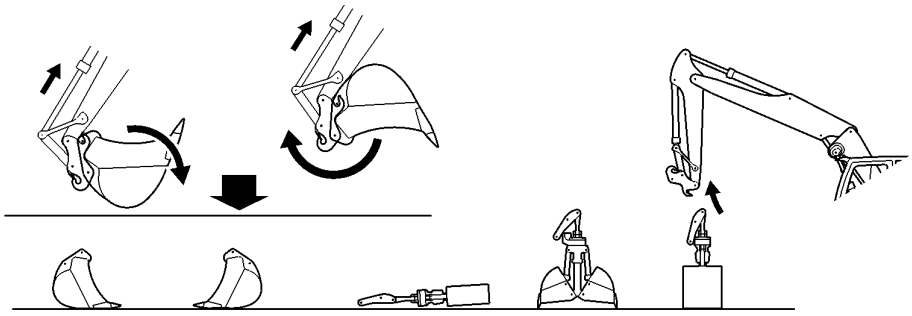

Fig. 3-112 *Putting down the work tool*

▶ Slowly insert the shovel tilting cylinder and lay the work tool on the ground.

▶ The new work tool can be taken up.

Using the quick-change adapter for lifting work

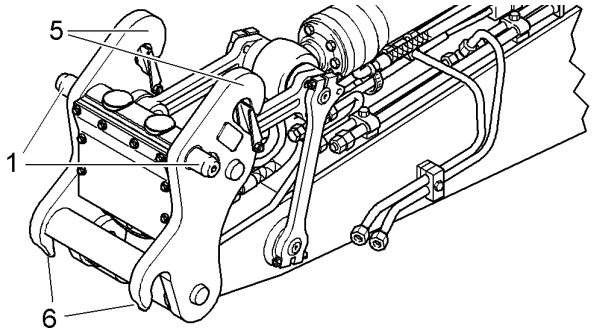

Fig. 3-113 *Hydraulic quick-change adapter*

The quick-change adapter has two integrated lifting hooks. The machine may only be used for hoisting work if the safety devices required for the purpose are present and functioning correctly (see chapter “Hoisting work” or “Overload warning device”).

The maximum load carrying capacity of each individual lifting hook is given on the quick-change adapter. The load carrying capacity of the quick-change adapter or the

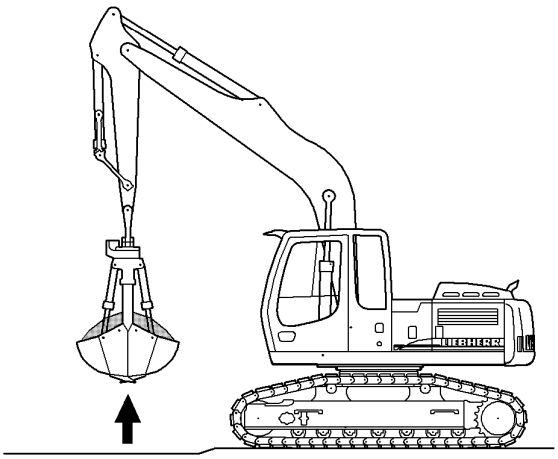

Fig. 3-126 *Raising grab material*

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

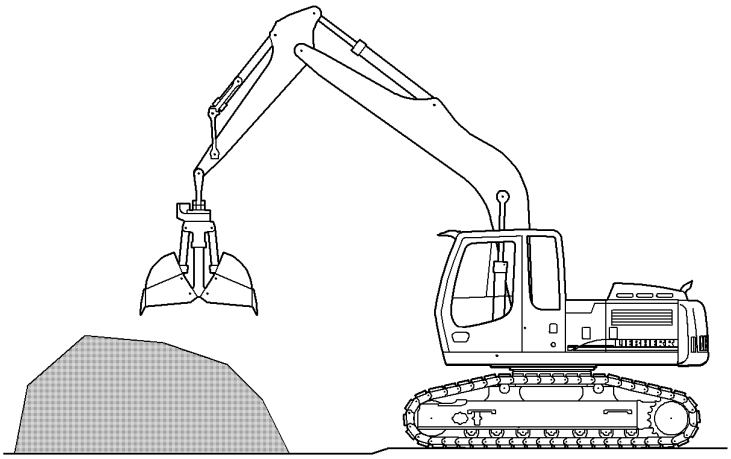

Fig. 3-127 *Emptying grab material*

- ▶ 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.

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4 Troubleshooting

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 contact the LIEBHERR customer service.

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Fault / error	Cause	Solution
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

4.2.3 Transmission

Fault / error	Cause	Solution
Oil flowing out on track rollers, support rollers or leading wheel	Seal defective	Replace seal
Insufficient crawler tracking on leading wheel	Leading wheel tracking on track roller mounting has too much play	Adjust the leading wheel tracking play
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

4.2.4 Electrical system

Fault / error	Cause	Solution
Battery charge telltale light does not goes out	Drive belt for alternator loose or torn	Tension or replace drive belt
	Alternator defective	Replace alternator
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
Telltale 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

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5 Maintenance

5.1 Maintenance access doors

5.1.1 Overview of access doors

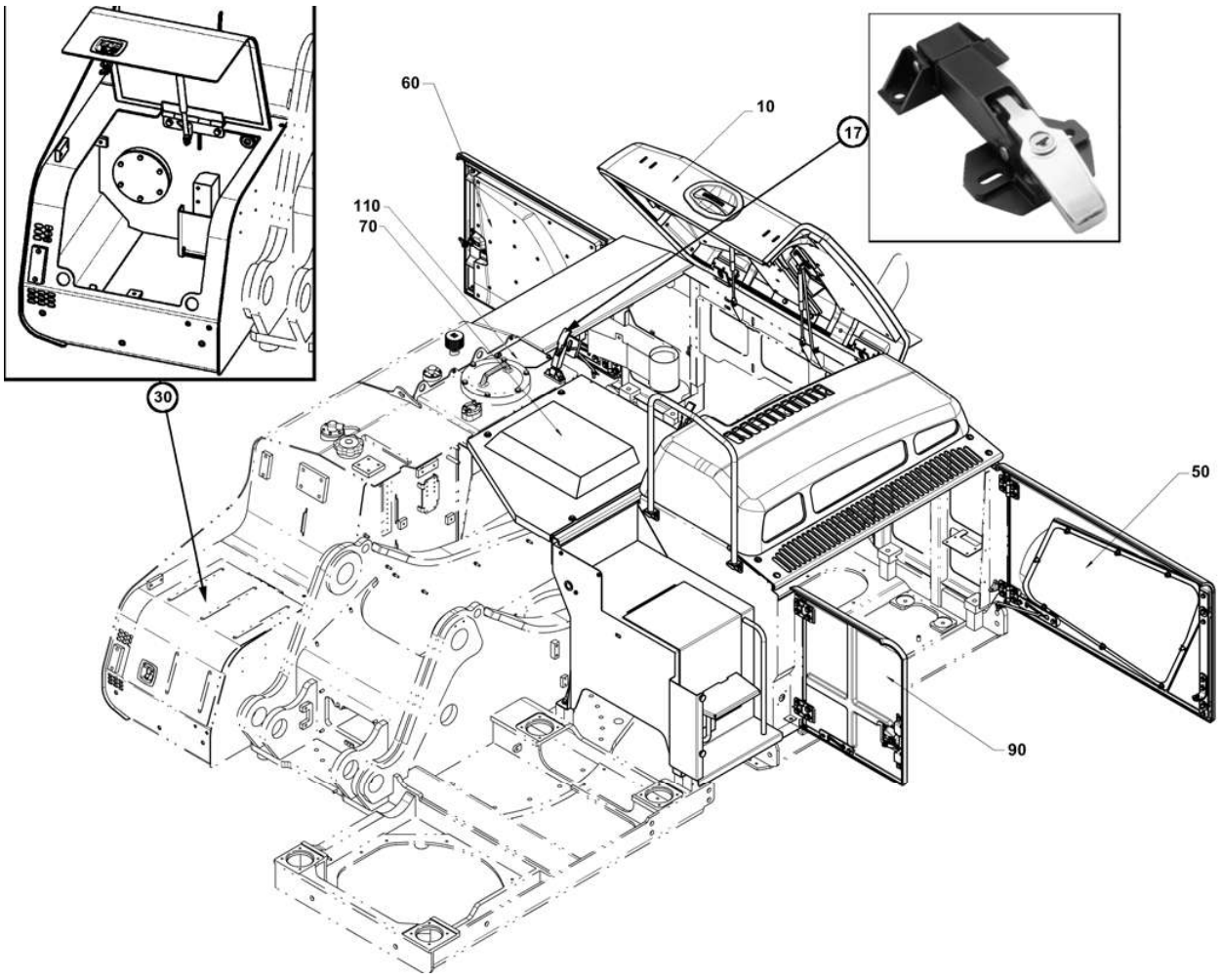

Fig. 5-1 *Access doors on the machine*

10	Engine hood	**70**	Cover control valves
30	Fuel hood	**90.**	Side door, front left
50	Side door, left	**110**	Cover hydraulic filter
60	Side door, right		

The machine has several accesses for maintenance as hoods, doors and covers. The locks integrated in the handles must be unlocked before any operation with the machine.

Water (fresh water)

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

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

Designation	Value / unit
Total alkaline earth metals (water hardness)	0.6 to 3.6 mmol/l (4 to 25 °e)
pH at 20 °C	6.5 to 8.5
Chloride ion concentration	max. 80 mg/l
Sulphate ion concentration	max. 100 mg/l

Tab. 5-3 *Fresh water quality*

Designation	Value / unit
Total alkaline earth metals (water hardness)	0.6 to 2.7 mmol/l (4 to 19 °e)
pH at 20 °C	6.5 to 8.0
Chloride ion concentration	max. 80 mg/l
Sulphate ion concentration	max. 80 mg/l

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

* = Diesel Coolant Additives

Water analysis results are available from the local authorities.

Mixing ratio for coolant

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

Outdoor temperature to	Mixing ratio	
	Water %	Corrosion inhibitor/antifreeze agent %
-37 °C	50 %	50 %
-50 °C	40 %	60 %

Tab. 5-5 *Permissible mixing ratio (for all seasons)*

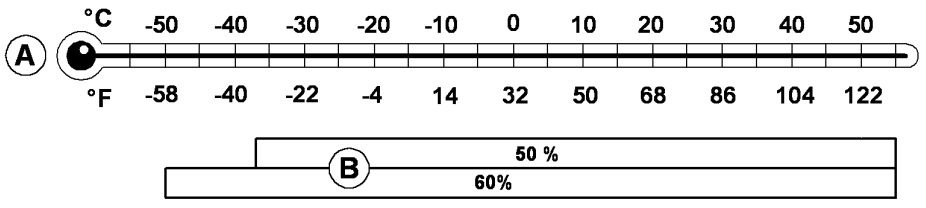

Fig. 5-5 *Temperature-based mixing ratio of water + corrosion inhibitor / antifreeze agent*

A Grease temperature

***** The grease is not suitable for the temperature range (shaded), if used in a central lubrication system.

****** The grease may only be within the temperature range (shaded) for short periods of time. Peak temperatures of max. 200 °C (392 °F) are possible.

5.5.7 Lubricants and care products for electrical and mechanical components

Medium, purpose	Product (manufacturer)
Contact spray for slip rings	Cramolin
Lubricant for pistons, piston nuts and for the mounting of piston rod bearings at hydraulic cylinders	Gleitmo 800
Special corrosion inhibitor for mounting recesses of sealing elements at hydraulic cylinders	Rostilo Tarp CFX

5.6 Diesel engine

Danger!
Before carrying out diverse maintenance tasks, the diesel engine, unless otherwise expressly specified in the description, must be brought into the maintenance position:

– the diesel engine is positioned horizontally,
– the diesel engine is switched off,
– the diesel engine is cooled,
– the battery main switch is switched off.

5.6.1 Checking the oil level in the diesel engine

Danger!
Risk of burning.
The engine oil is hot when it is at operating temperature.

▶ Do not allow the hot oil or oil-bearing parts to touch the skin.

❑ The machine must be standing level.

▶ Switch off the engine.

▶ Wait until the oil has collected in the oil sump.

- ▶ Remove the filter components **101 to 104**, and wash or replace the metallic screen **130**.
- ▶ Reassemble the filter components **101 to 104** in the right sense and in the right order,reinstall and then retighten the nut **105**.
- ▶ Reinstall the filter housing **201** complete with the O-ring **202**.

For replacement, repair and other maintenance works on the particles filter, see the service manual or consult the LIEBHERR after sales service.

5.8 Cooling system

5.8.1 Checking and cleaning the cooling system

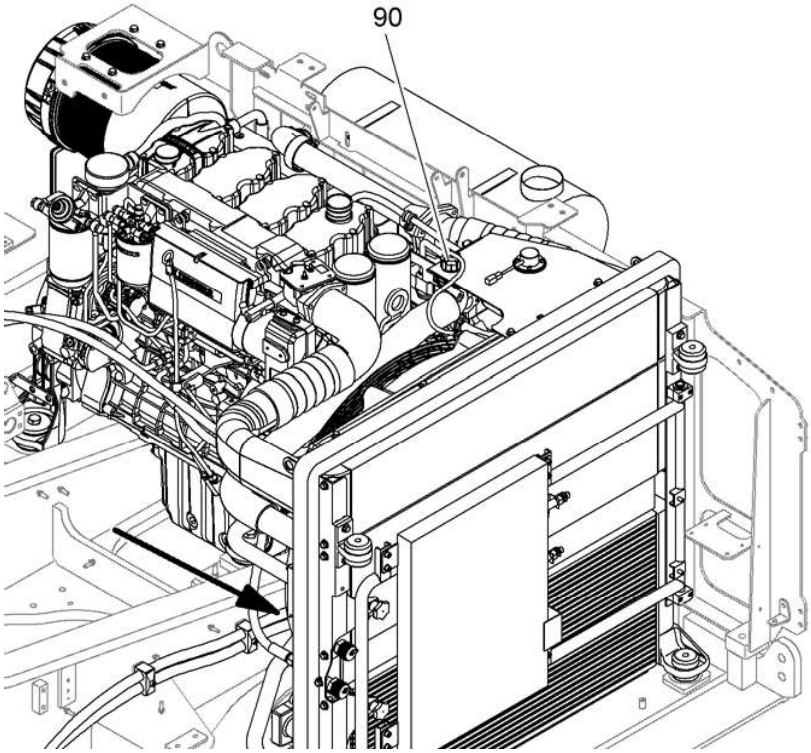

Fig. 5-22 *Cooling system*

The machine has a combined air-water cooler.

Optimal cooling can only be achieved when the cooler is kept clean.

- ▶ Check the engine, fan and cooler for damage and clean if necessary.
- ▶ If required, clean the cooling fins with compressed air or a steam jet (from inside out, see arrow).
- ▶ In case of leaks, change the pressure relief valve **90** (cap of expansion reservoir).
- ▶ Check the condition and seals on the connecting clips between the coolant cooler and engine as well as on the coolant hoses regularly.

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Caution !

- Refuel only with clean diesel.
- Ensure that the filter (at the end of the intake hose) is not damaged or plugged in order to protect the pump against foreign bodies.
- The pump must not be permitted to run dry.
  - Ensure that the fuel level does not drop below the intake level of the intake hose.
  - Ensure that the valve **2** is open before the pump is working.
- Make sure refuelling is going smoothly.

Refuelling pump switch off and stowing the hoses

- The pump is stopped.
- Close stop cock **2** (position **A**).
- Ensure that no fuel remains in the intake hose **1** before stowing.
- Roll up the intake hose **1** and place it in the stowing compartment.
- Close the hatch again.
- Screw the fuel filler cap **15**.

Caution !

- After a refuelling, the pump body has to stay full of gasoil to avoid the jamming of it.
- Only close the stop cock when the pump is stopped.
- Do not change intake hose’s length or/and diameter.

Note !

- To avoid watercondensation in the tank, refuel at the end of the workingshift.

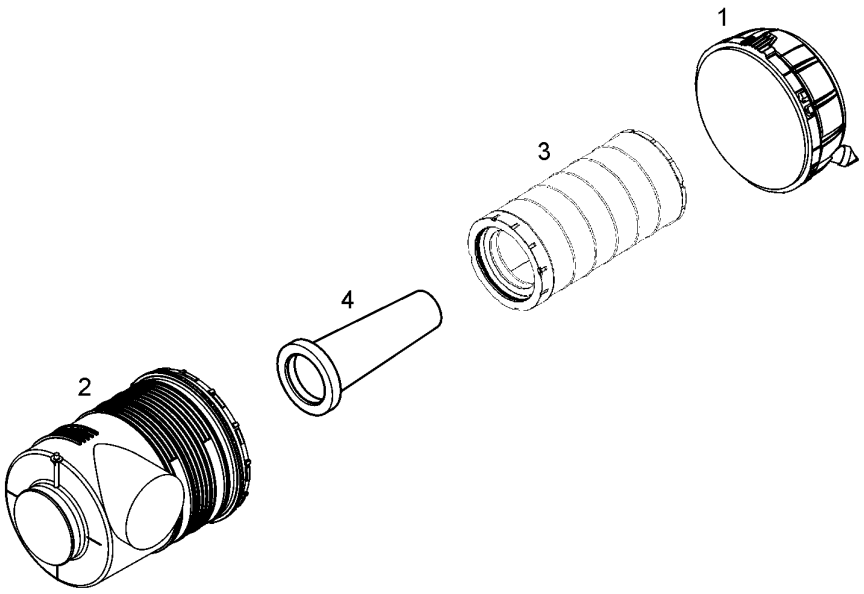

Fig. 5-39 *Changing the filter cartridges*

1 Filter housing cover
2 Filter housing
3 Main element
4 Safety element

- ▶ Remove the cover **1** with the engine switched off.
- ▶ Remove the contaminated main element **3**.
- ▶ Clean the interior of the air filter housing and the sealing surface in the housing using a damp cloth.
- ▶ Insert the new main element and ensure that it is sealed and positioned correctly.
- ▶ Close the filter housing **2** with cover **1**.

5.10.2 Changing the safety element

Note!
Replace the safety element after replacing the main filter cartridge three times or at least once a year.
Replace the safety element immediately in the event that a visual check has shown that the safety element is very dirty.

- ▶ Remove the main element **3**.
- ▶ Remove the safety element **4**.
- ▶ Clean the interior of the air filter housing carefully using a damp cloth.
- ▶ Clean sealing surfaces in the housing and inspect for any damage.

Caution!
Dirt could enter the engine intake!

- ▶ Do not clean the housing by blasting out with compressed air.

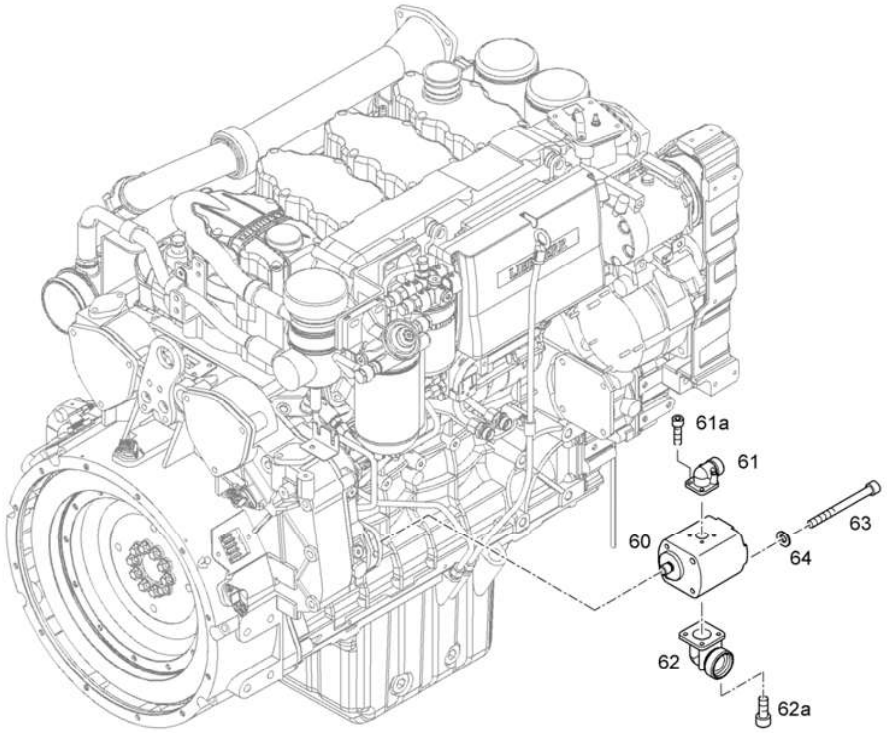

Fig. 5-48 *Fan pump*

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**.

5.11.8 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.

❑ Before draining or adding oil, actuate the travel drive until the plug 2 for oil draining is situated straight below the central axle of the gear.
Preferably drain the oil when it is at operating temperature.

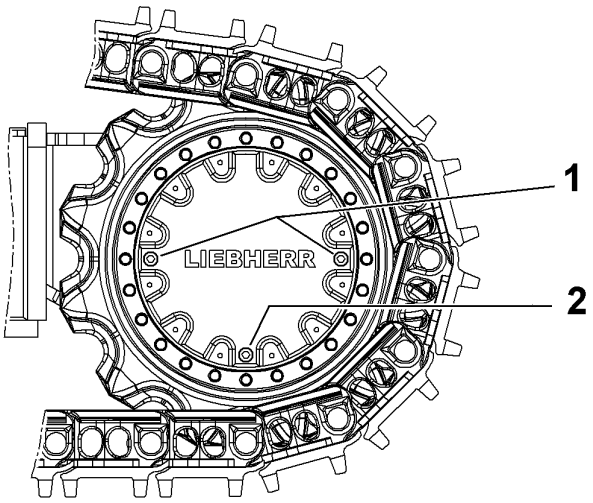

Fig. 5-58 *Travel gear - Oil level plugs 1 and oil drain plug 2*

To drain the oil

❑ Ensure that you have a suitable oil drainage container to hand.

▶ Place the container beneath the travel gear.

▶ Remove one oil level plug **1**.

▶ Remove the oil drain plug **2**.
↳ The oil drains into the container.

To add the oil

▶ Screw in the oil drain plug **2**.

▶ Fill in oil until the level reaches the bore hole **1**.

▶ Screw in the oil level plug **1**.

Note!
The track components of the machines working with their undercarriage the most of time underwater, are exposed to increased rust and premature wear.
On these machines the oil in the travel gears must be changed every 100 working hours and an oil analysis (water content of the oil) must be performed weekly.

– Do not operate the machine without these filters, even briefly, because the heat exchanger **6** will quickly get blocked (see Fig. 5-70).

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 with a steam jet.

▶ Replace the filter elements, if they are damaged or in bad condition.

▶ Clean the filter elements **1** and **3** using compressed air or cold or luke-warm water.

5.15.2 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.

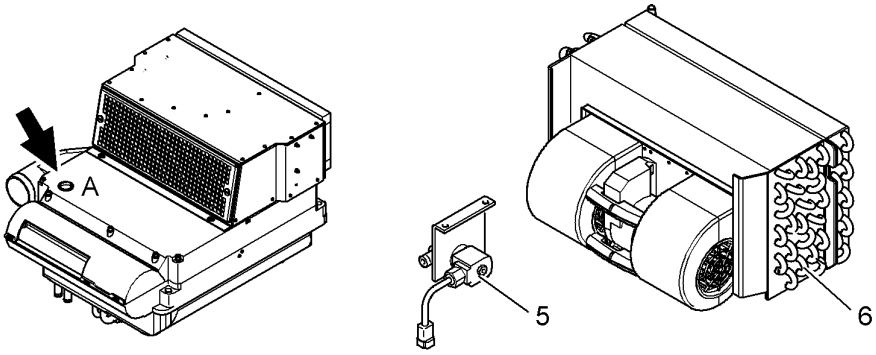

Fig. 5-70 *Heating system with solenoid valve*

To bleed the heating system:

▶ Unscrew the red cap of the vent valve over opening **A** (see arrow).

▶ Push in the valve to let escape the air.

To clean the solenoid valve 5:

▶ Annually, before the start of the heating period, remove and clean solenoid valve **5** (Y46) for the hot water inlet.

▶ Clean also the solenoid valve if heating performance is not sufficient.

▶ Rinse out the solenoid valve membrane with water.

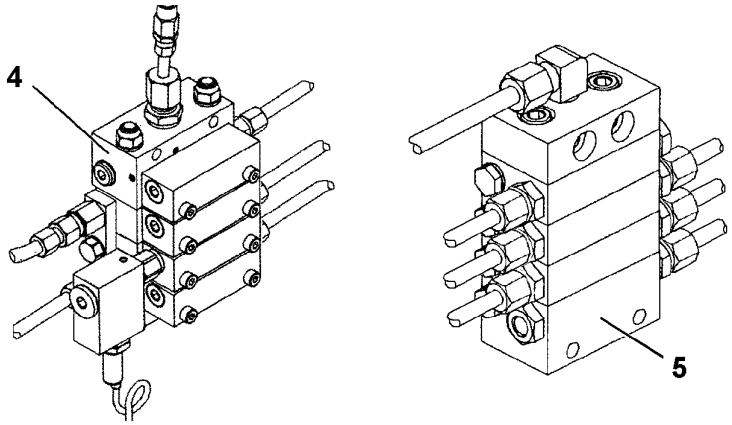

Fig. 5-80 *Main and secondary distributor*

5.16.8 Greasing the grab (optional extra)

The grab is not lubricated via the central greasing system. It must be regularly greased manually. The relevant oiling points are marked in red.

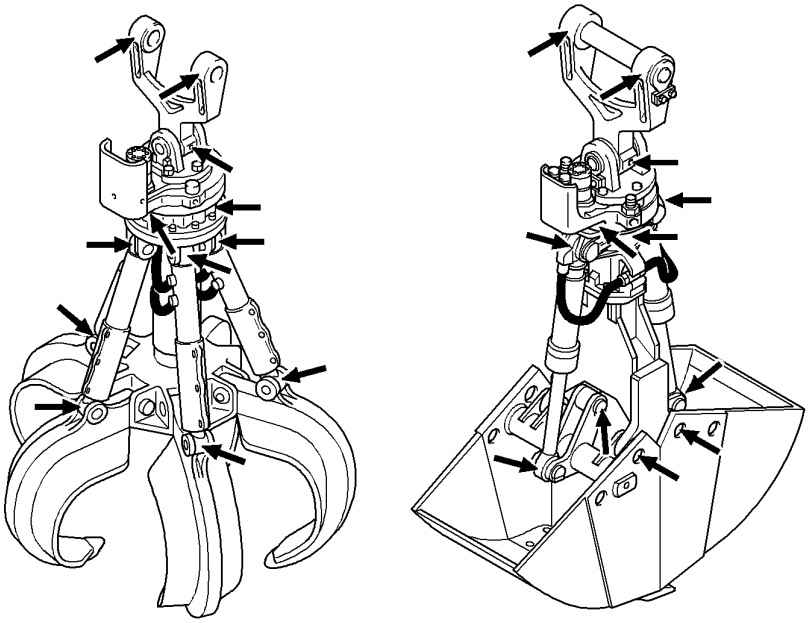

Fig. 5-81 *Greasing the grab*

In normal use, each oiling point must be greased daily or per shift until clean grease flows out at the relevant bearing point.

When the machine is working hard, the greasing interval should be shortened accordingly.

Grease quality: see lubrication chart

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