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Operating instructions

Hydraulic excavator
R 934 C-Litronic

from serial number 18215

Document identification

Order number: 10070206

Edition: 07 / 2006

Valid for: R 934 C-Litronic from serial number 18215

Author: LFR - Technical documentation department

Product identification

Manufacturer: LIEBHERR France S.A.S.

Type: R 934 C-Litronic

Type no.: 016 / 023 / 027 / 033 / 918

Conformity: CE

Address

Liebherr France S.A.S.

2 avenue Joseph Rey

B.P 287 F - 68005 Colmar Cedex

LFR/en/Edition: 07 / 2006

Machine data

Please fill in the following data when you receive your machine.

This will also be of use to you when ordering replacement parts.

Vehicle ident. number:

WLHZ . . . . . ZK . . . . . .

Construction year:

. . . .

First start-up date:

. . / . . / . .

LFR/en/Edition: 07 / 2006

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Preface

These operating instructions have been written for the **machine operator** and for the **maintenance personnel** of the machine.

They contain:

– the technical data.
– the safety requirements.
– the operating instructions.
– the maintenance instructions.

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

Work with or on the machine includes, for example:

– **Operation** including setting up and equipping, rectifying malfunctions during the course of work, resolving production dropouts, care, disposal of operating and process materials.
– **Maintenance**, including maintenance, inspection and repair work.
– **Transportation** or loading the machine.

The operating instructions allow the machine operator to familiarize himself with the machine more easily and prevent malfunctions occurring due to improper operation.

The observance of the operating and maintenance instructions by maintenance personnel:

– increases reliability in use.
– extends the service life of your machine.
– reduces repair costs and downtime.

The operating instructions belong with the machine. Place a copy in an easily reached position on the cab storage shelf.

The operating and maintenance instructions should also incorporate information on current national regulations for accident prevention and protection. In addition to the operating instructions and legally binding regulations on accident prevention which apply in the user country and at point of use, authorized specialist rules for safe and correct working procedures are also to be observed.

These operating and maintenance instructions contain all the information required for operating and maintaining your machine.

– Some illustrations in these operating instructions may depict details and working devices which differ to your machine.
– In some illustrations, protective devices and covers have been removed in the interests of better presentation.
– Improvements, which are always being incorporated into our machines, may result in changes to your machine which are not yet indicated in these operating instructions.

However, should you require any further explanations or information, LIEBHERR's technical documentation, sales school and customer service departments are avail-

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able for your convenience.

You will appreciate that LIEBHERR warranty claims made on the basis of improper operation, unsatisfactory maintenance, use of unauthorized operating materials or non-adherence to safety regulations cannot be recognized.

LIEBHERR will annul any and all obligations incurred by LIEBHERR and / or its dealerships, such as guarantee commitments, service contracts etc. without prior notice in the event that replacement parts other than original LIEBHERR parts or parts purchased from LIEBHERR are used for maintenance or repair work.

Modifications, conditions, copyright

We reserve the right to make modifications without prior notice in the course of technical developments.

The information and illustrations contained in these operating instructions may neither be copied and distributed, nor used for the purposes of competition. All rights are expressly reserved in accordance with copyright laws.

The warranty and liability conditions of LIEBHERR's general business conditions will not be enlarged upon through the above information.

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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 with backhoe attachment

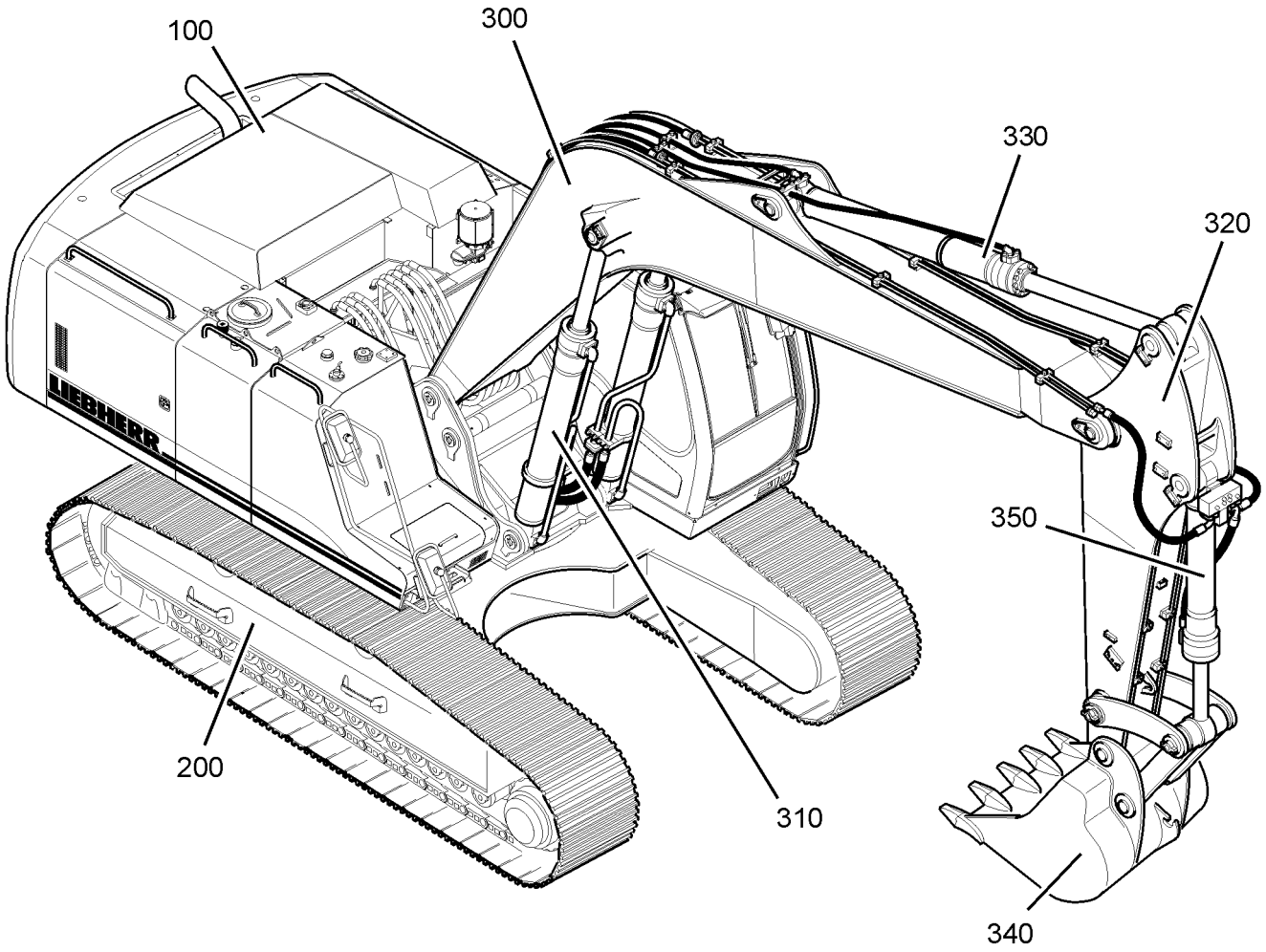

Fig. 1-1 *Machine with backhoe attachment*

100	Uppercarriage	**310**	Boom cylinder	**340**	Bucket
200	Undercarriage	**320**	Stiel	**350**	Bucket cylinder
300	Boom	**330**	Stiel cylinder		

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1.1.2 Machine with industrial attachment

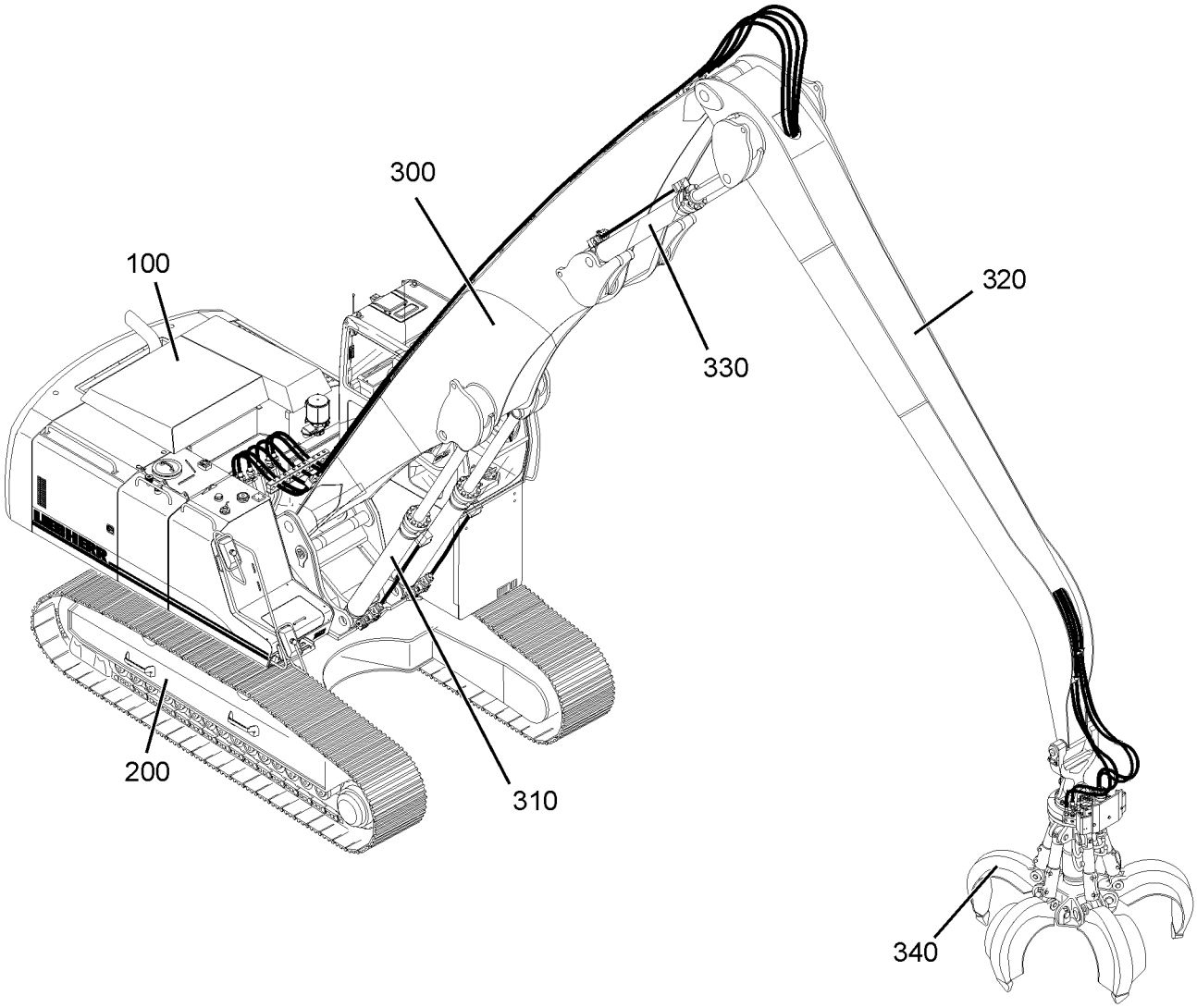

Fig. 1-2 *Machine with industrial attachment*

100	Uppercarriage	**310**	Boom cylinder	**340**	Grapple
200	Undercarriage	**320**	Industrial stiel		
300	Industrial boom	**330**	Stiel cylinder		

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1.1.3 Uppercarriage

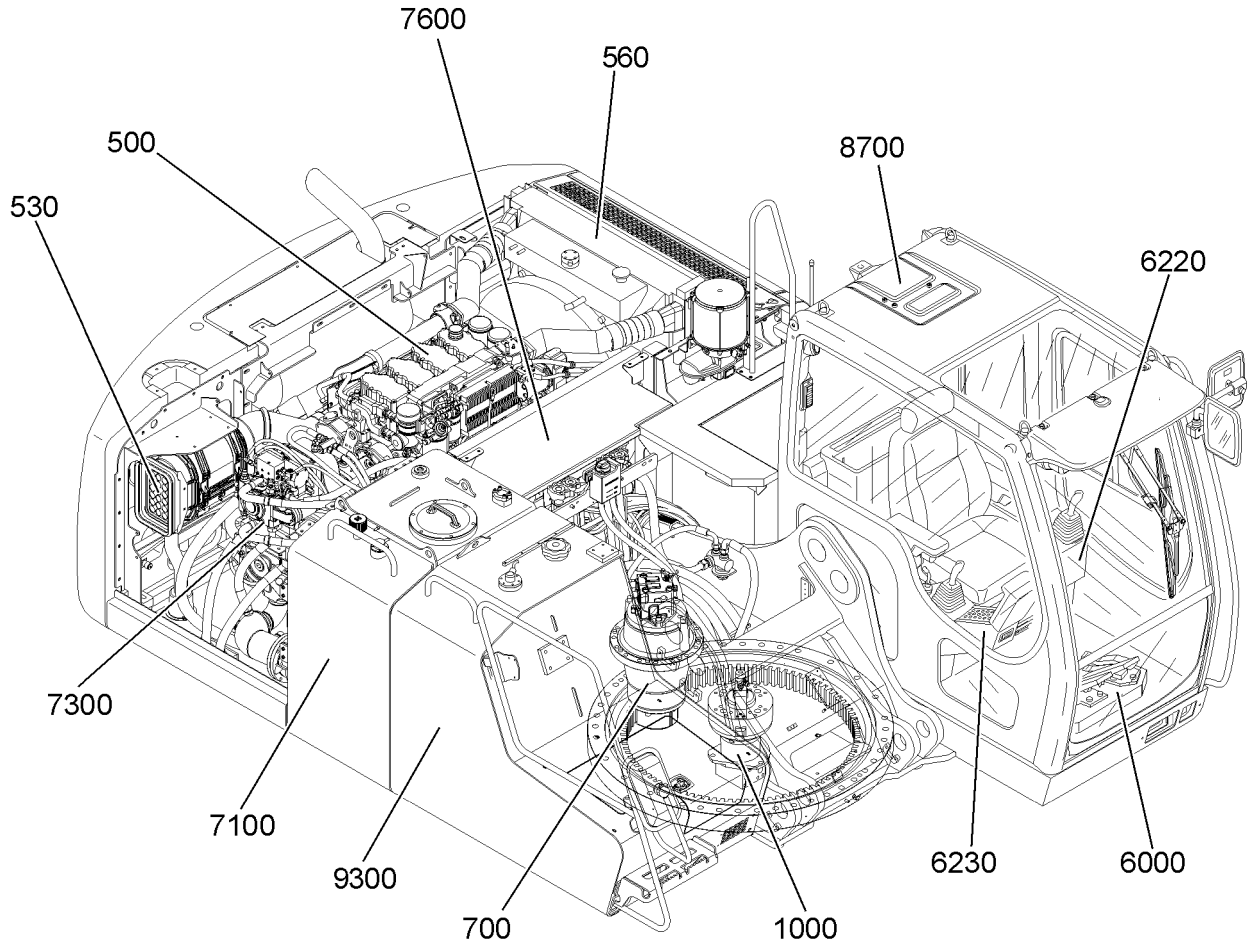

Fig. 1-3 *Uppercarriage*

500 Diesel engine
530 Dry air filter
560 Radiator
700 Swing gear
1000 Rotary connection
6000 Control cab
6220 Control panel, left
6230 Control panel, right
7100 Fuel tank
7300 Hydraulic pump
7600 Control valve block
8700 Cab
9300 Hydraulic oil tank

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1.1.4 Undercarriage

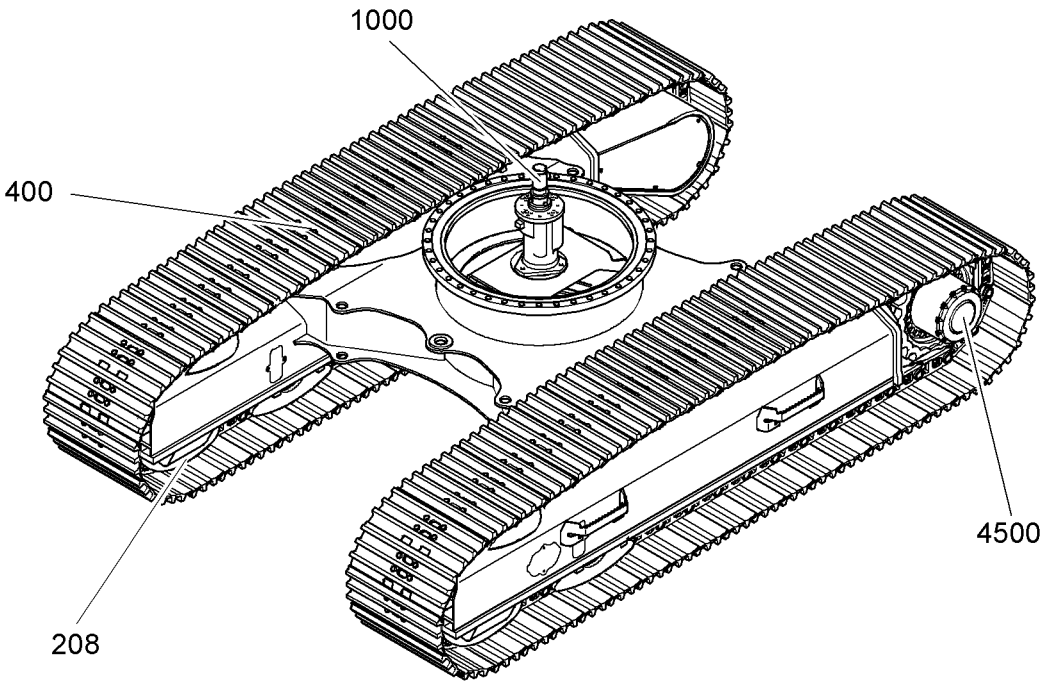

Fig. 1-4 *Undercarriage*

208 Idler
400 Track
1000 Rotary connection
4500 Travel gear and sprocket

1.2 Technical data

This should be taken from the accompanying technical description.

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Technical Description
Hydraulic Excavator

R 934 C
Litronic®

Operating Weight 31,0 – 33,8 t
Engine Output 150 kW (203 HP)
Bucket Capacity 0,95 – 1,95 m³

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Technical Data

Engine

Rating per ISO 9249	150 kW (203 HP) at 1800 RPM
Model	Liebherr D 934 L
Type	4 cylinder in-line
Bore/Stroke	122/150 mm
Displacement	7,01 l
Engine operation	4-stroke diesel direct injection turbo-charged after-cooled reduced emissions
Cooling	water-cooled and integrated motor oil cooler
Fuel tank	580 l
Standard	sensor controlled engine idling
Electrical system	
Voltage	24 V
Batteries	2 x 170 Ah/12 V
Starter	three phase current 24 V/6,6 kW
Alternator	28 V/80 A

Hydraulic System

Hydraulic pump for attachment and travel drive	Liebherr variable flow, swash plate double pump
Max. flow	2 x 245 l/min.
Max. pressure	350 bar
Pump regulation	electro-hydraulic with electronic engine speed sensing regulation, pressure compensation, flow compensation, automatic oil flow optimizer
Hydraulic pump for swing drive	reversible, variable flow, swash plate pump, closed-loop circuit
Max. flow	149 l/min.
Max. pressure	350 bar
Hydraulic tank	340 l
Hydraulic system	550 l
Hydraulic oil filter	1 full flow filter 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 and fuel and after-cooler cores and hydrostatically driven fan
MODE selection	adjustment of machine performance and the hydraulics via a mode selector to match application
ECO	for especially economical and environmentally friendly operation
POWER	for maximum digging power and heavy duty jobs
LIFT	for lifting
FINE	for precision work and lifting through very sensitive movements
R.P.M. adjustment	stepless adjustment of engine output via the r.p.m. at each selected mode

Hydraulic Controls

Power distribution	via monoblock control valve with integrated safety valves
Flow summation	to boom and stick
Closed-loop circuit	for uppercarriage swing drive
Servo circuit	
Attachment and swing	proportional via joystick levers
Travel	– proportional via foot pedals or removable hand levers – speed pre-selection
Additional functions	via foot pedals or joystick toggle switch

Swing Drive

Drive by	Liebherr swash plate motor with integrated brake valves
Transmission	Liebherr compact planetary reduction gear
Swing ring	Liebherr, sealed single race ball bearing swing ring, internal teeth. Lubrication via a grease distributor and a grease nipple
Swing speed	0 – 8,2 RPM stepless
Swing torque	84 kNm
Holding brake	wet multi-disc (spring applied, pressure released)
Option	pedal controlled positioning brake

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
Joysticks	integrated into adjustable seat consoles
Monitoring	menu driven query of current operating conditions via the LCD 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
Heating system	standard air conditioning, combined cooler/heater, additional dust filter in fresh air/recirculated
Noise emission	
ISO 6396	L_{pA} (inside cab) = 76 dB(A)
2000/14/EC	L_{wA} (surround noise) = 104 dB(A)

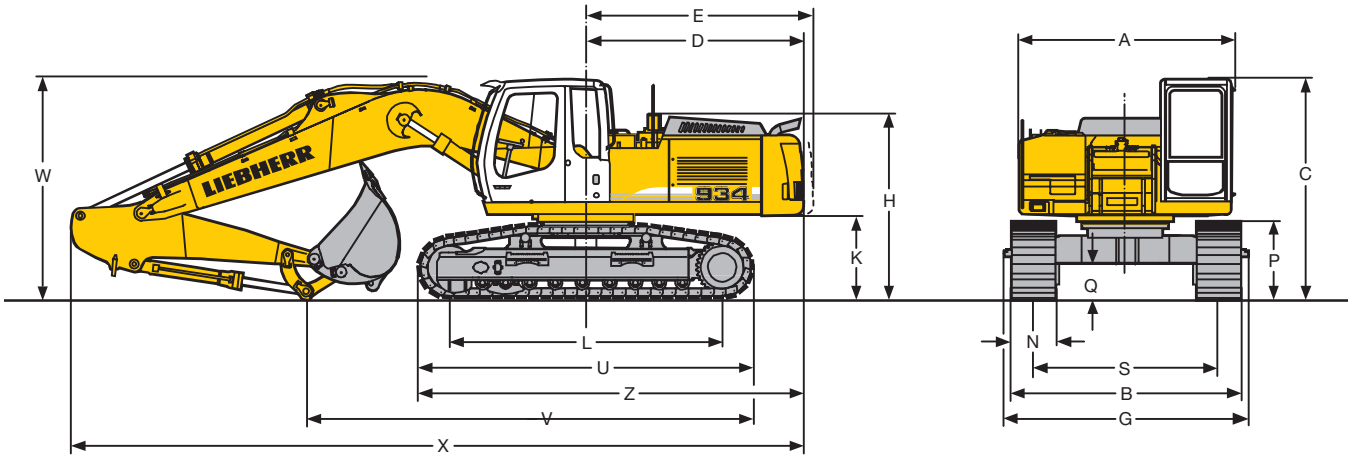
Undercarriage

Versions	
HD-S	heavy duty, narrow gauge
HD-SL	heavy duty, wide gauge
Drive	Liebherr swash plate motors with integrated brake valves on both sides
Transmission	Liebherr planetary reduction gears
Travel speed	low range – 2,8 km/h high range – 5,1 km/h
Drawbar pull max.	323 kN
Track components	B 60, maintenance-free
Track rollers/ Carrier rollers	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

Attachment

Type	combination of resistant steel plates and cast steel components
Hydraulic cylinders	Liebherr cylinders with special seal-system, shock absorbed
Pivots	sealed, low maintenance
Lubrication	lubrication semi automatic
Hydraulic connections	pipes and hoses equipped with SAE split-flange connections
Bucket	standard equipped with 12 t safety hook for lifting

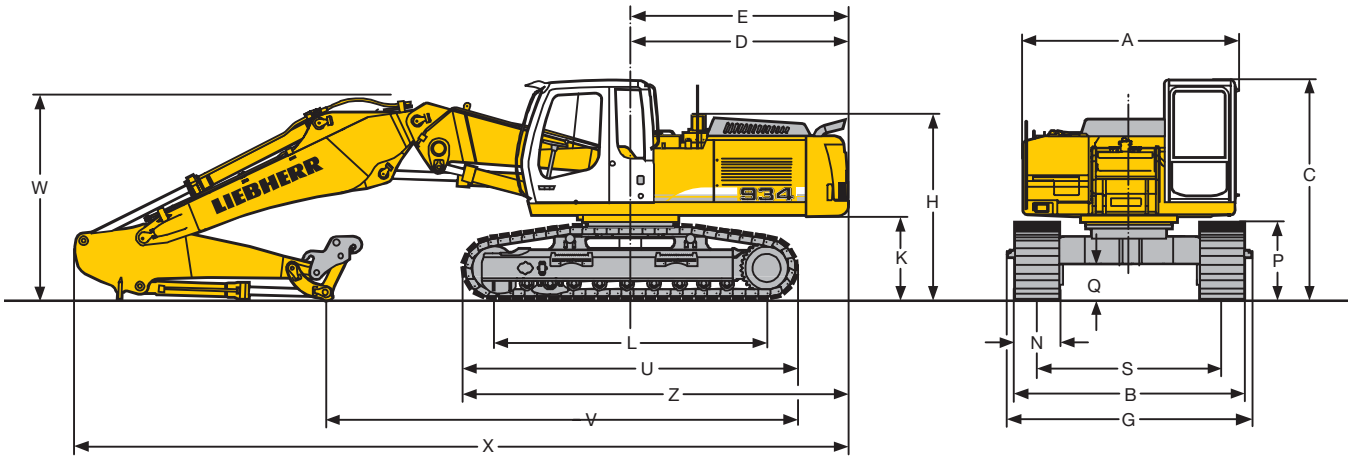
Dimensions



	HD-S	mm	HD-SL	mm
A		3050		3050
C		3125		3125
D		3075		3075
E		3075		3075
H		2650		2650
K		1160		1160
L		3848		3848
P		1016		1016

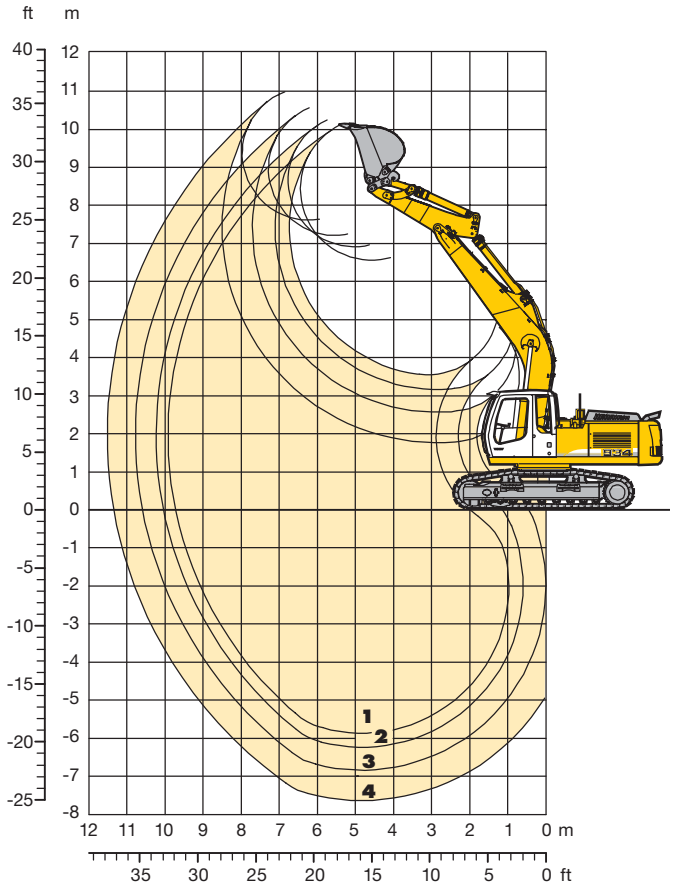
	HD-S		mm	HD-SL		mm
Q			493			493
U			4720			4720
S			2400			2600
N	500	600	750	500	600	750
B	2998	3000	3150	3198	3200	3350
G	3195	3195	3195	3395	3395	3395
Z			5440			5440

	Stick Length	Gooseneck Boom 6,05 m		Hydraulically Adjustable Boom 4,20 m		Straight Gooseneck Boom 6,50 m	
		Backhoe	Quick Change Adapter	Backhoe	Quick Change Adapter	Backhoe	Quick Change Adapter
	m	mm	mm	mm	mm	mm	mm
V	2,00	7150	6850	6900	7600	6900	7550
	2,50	6300	6000	6200	6650	6950	6550
	3,10	5650	5400	6450	6150	6400	6200
	3,90	4900	4750	5500	5500	5650	5650
W	2,00	3300	3250	3400	3250	3250	3100
	2,50	3150	3050	3150	2950	3050	2900
	3,10	3150	3050	3200	3000	3100	3000
	3,90	3250	3150	3250	3200	3350	3300
X	2,00	10500	10500	11200	11150	11000	11000
	2,50	10350	10350	11050	11000	10900	10900
	3,10	10400	10350	11050	11000	10950	10950
	3,90	10450	10400	11050	11050	10950	10950



Backhoe Attachment

with Gooseneck Boom 6,05 m



Digging Envelope
with Quick Change Adapter

		1	2	3	4
Stick lengths	m	2,00	2,50	3,10	3,90
Max. digging depth	m	5,90	6,30	6,90	7,70
Max. reach at ground level	m	9,70	10,05	10,60	11,35
Max. dump height	m	6,55	6,90	7,20	7,60
Max. teeth height	m	10,10	10,20	10,55	11,00

Digging Forces
without Quick Change Adapter

		1	2	3	4
Digging force ISO	kN	170	146	126	106
	t	17,3	14,9	12,8	10,8
Breakout force ISO	kN	213	184	184	184
	t	22,1	18,8	18,8	18,8
with Quick Change Adapter					
Digging force ISO	kN	161	137	119	102
	t	16,4	13,9	12,1	10,4
Breakout force ISO	kN	187	155	155	155
	t	19,1	15,8	15,8	15,8

Max. breakout force with ripper bucket 264 kN (27,9 t)

Operating Weight and Ground Pressure

Operating weight includes basic machine with gooseneck boom 6,05 m, stick 2,50 m, quick change adapter 66 and bucket 0,95 m³ (860 kg).

Undercarriage		HD-S			HD-SL		
Pad width	mm	500	600	750	500	600	750
Weight	kg	30950	31290	31800	31060	31400	31910
Ground pressure	kg/cm²	0,75	0,63	0,51	0,75	0,63	0,51

Optional: heavy duty counterweight
(Heavy duty counterweight increases the operating weight by 1000 kg and ground pressure by 0,02 kg/cm²)

Buckets

		without Quick Change Adapter										with Quick Change Adapter									
Cutting width	mm	1050	1250	1400	1550	1550	1050[1]	1200[1]	1350[1]	1500[1]	1650[1]	1050	1250	1400	1550	1050[1]	1200[1]	1350[1]	1500[1]	1650[1]
Capacity ISO 7451	m³	0,95	1,15	1,35	1,50	1,80	1,10	1,30	1,50	1,75	1,95	0,95	1,15	1,35	1,50	1,10	1,30	1,50	1,75	1,95
Max. possible material weight HD-S	t/m³	1,8	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,5	1,2
Max. possible material weight HD-SL	t/m³	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,5
Weight with Liebherr teeth Z 16 C[2]	kg	860	960	1020	1080	1160	1210	1290	1380	1470	1600	860	940	1050	1130	1190	1280	1370	1450	1580
Weight with Liebherr teeth Z 20 C[3]	kg	1060	1160	1270	1340	–	1250	1350	1440	1520	1660	1100	1210	1320	1410	1280	1360	1480	1560	1710
Max. stick length for machine stability per ISO 10567:																				
HD-S-Undercarriage	m	3,90	3,90	3,10	2,50	2,50	2,00	2,00	2,00	2,00	2,00	3,90	3,90	3,10	2,50	2,00	2,00	2,00	2,00	2,00
HD-SL-Undercarriage	m	3,90	3,90	3,90	3,10	2,50	2,00	2,00	2,00	2,00	2,00	3,90	3,90	3,90	3,10	2,00	2,00	2,00	2,00	2,00

[1] Backhoe with machine R 944 B Litronic®
[2] Liebherr teeth Z 16 (for applications up to surface class 5, according to VOB, part C, DIN 18300)
[3] Liebherr teeth Z 20 (for applications over surface class 6, according to VOB, part C, DIN 18300)

Lift Capacities

with Gooseneck Boom 6,05 m

Stick 2,00 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S						
	HD-SL						
6,0	HD-S			7,4 (7,8#)			
	HD-SL			7,8# (7,8#)			
4,5	HD-S		10,8# (10,8#)	7,0 (8,6#)	4,9 (7,5#)		
	HD-SL		10,8# (10,8#)	7,6 (8,6#)	5,3 (7,5#)		
3,0	HD-S		9,7 (13,1#)	6,5 (9,6#)	4,6 (7,7)		
	HD-SL		10,8 (13,1#)	7,1 (9,6#)	5,1 (7,7)		
1,5	HD-S		9,0 (14,6#)	6,1 (10,4#)	4,4 (7,5)		
	HD-SL		10,0 (14,6#)	6,7 (10,4#)	4,9 (7,5)		
0	HD-S		8,8 (14,6#)	5,8 (10,2)	4,3 (7,3)		
	HD-SL		9,8 (14,6#)	6,5 (10,3)	4,8 (7,4)		
-1,5	HD-S	13,0# (13,0#)	8,8 (13,6#)	5,8 (10,2)			
	HD-SL	13,0# (13,0#)	9,8 (13,6#)	6,4 (10,2)			
-3,0	HD-S	15,0# (15,0#)	9,0 (11,8#)	5,9 (8,9#)			
	HD-SL	15,0# (15,0#)	10,0 (11,8#)	6,6 (8,9#)			
-4,5	HD-S						
	HD-SL						
-6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			6,2# (6,2#)			
	HD-SL			6,2# (6,2#)			
6,0	HD-S			7,4# (7,4#)	5,1# (5,1#)		
	HD-SL			7,4# (7,4#)	5,1# (5,1#)		
4,5	HD-S		10,1# (10,1#)	7,2 (8,2#)	5,1 (7,3#)		
	HD-SL		10,1# (10,1#)	7,9 (8,2#)	5,5 (7,3#)		
3,0	HD-S		10,3 (12,6#)	6,8 (9,3#)	4,9 (7,8#)		
	HD-SL		11,3 (12,6#)	7,4 (9,3#)	5,3 (7,8#)		
1,5	HD-S		9,4 (14,5#)	6,3 (10,3#)	4,6 (7,7)		
	HD-SL		10,5 (14,5#)	7,0 (10,3#)	5,1 (7,7)		
0	HD-S	6,7# (6,7#)	9,1 (15,0#)	6,1 (10,5)	4,5 (7,5)		
	HD-SL	6,7# (6,7#)	10,1 (15,0#)	6,7 (10,5)	4,9 (7,5)		
-1,5	HD-S	12,0# (12,0#)	9,0 (14,4#)	6,0 (10,3)	4,4 (7,4)		
	HD-SL	12,0# (12,0#)	10,0 (14,4#)	6,6 (10,4)	4,9 (7,5)		
-3,0	HD-S	17,3# (17,3#)	9,1 (12,8#)	6,0 (9,7#)			
	HD-SL	17,3# (17,3#)	10,2 (12,8#)	6,6 (9,7#)			
-4,5	HD-S		9,5 (9,9#)				
	HD-SL		9,9# (9,9#)				
-6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S						
	HD-SL						
6,0	HD-S				5,3 (5,4#)		
	HD-SL				5,4# (5,4#)		
4,5	HD-S			7,4 (7,5#)	5,1 (6,7#)		
	HD-SL			7,5# (7,5#)	5,6 (6,7#)		
3,0	HD-S	14,0# (14,0#)	10,6 (11,4#)	6,9 (8,7#)	4,9 (7,3#)	3,6 (4,6#)	
	HD-SL	14,0# (14,0#)	11,4# (11,4#)	7,5 (8,7#)	5,4 (7,3#)	4,0 (4,6#)	
1,5	HD-S	5,4# (5,4#)	9,6 (13,7#)	6,4 (9,9#)	4,6 (7,7)	3,5 (5,4#)	
	HD-SL	5,4# (5,4#)	10,7 (13,7#)	7,0 (9,9#)	5,1 (7,7)	3,9 (5,4#)	
0	HD-S	7,4# (7,4#)	9,1 (14,8#)	6,1 (10,5)	4,4 (7,5)	3,4 (5,0#)	
	HD-SL	7,4# (7,4#)	10,1 (14,8#)	6,7 (10,5)	4,9 (7,5)	3,7 (5,0#)	
-1,5	HD-S	10,8# (10,8#)	8,9 (14,7#)	5,9 (10,3)	4,3 (7,3)		
	HD-SL	10,8# (10,8#)	9,9 (14,7#)	6,5 (10,3)	4,8 (7,4)		
-3,0	HD-S	15,2# (15,2#)	8,9 (13,6#)	5,9 (10,1#)	4,3 (7,4)		
	HD-SL	15,2# (15,2#)	10,0 (13,6#)	6,5 (10,1#)	4,8 (7,4)		
-4,5	HD-S	15,4# (15,4#)	9,2 (11,3#)	6,0 (8,4#)			
	HD-SL	15,4# (15,4#)	10,2 (11,3#)	6,7 (8,4#)			
-6,0	HD-S						
	HD-SL						

Stick 3,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S				4,0# (4,0#)		
	HD-SL				4,0# (4,0#)		
6,0	HD-S				4,7# (4,7#)	3,0# (3,0#)	
	HD-SL				4,7# (4,7#)	3,0# (3,0#)	
4,5	HD-S				5,3 (5,6#)	3,8 (4,2#)	
	HD-SL				5,6# (5,6#)	4,2 (4,2#)	
3,0	HD-S	14,7# (14,7#)	9,8# (9,8#)	7,1 (7,8#)	5,0 (6,7#)	3,7 (5,1#)	
	HD-SL	14,7# (14,7#)	9,8# (9,8#)	7,8 (7,8#)	5,5 (6,7#)	4,0 (5,1#)	
1,5	HD-S	9,5# (9,5#)	10,0 (12,5#)	6,6 (9,1#)	4,7 (7,4#)	3,5 (5,8)	
	HD-SL	9,5# (9,5#)	11,1 (12,5#)	7,2 (9,1#)	5,1 (7,4#)	3,9 (5,8)	
0	HD-S	8,0# (8,0#)	9,2 (14,2#)	6,1 (10,2#)	4,4 (7,5)	3,4 (5,7)	
	HD-SL	8,0# (8,0#)	10,3 (14,2#)	6,8 (10,2#)	4,9 (7,5)	3,7 (5,7)	
-1,5	HD-S	9,9# (9,9#)	8,9 (14,7#)	5,9 (10,2)	4,3 (7,3)	3,3 (5,6)	
	HD-SL	9,9# (9,9#)	9,9 (14,7#)	6,5 (10,3)	4,7 (7,3)	3,6 (5,6)	
-3,0	HD-S	13,0# (13,0#)	8,8 (14,2#)	5,8 (10,1)	4,2 (7,2)		
	HD-SL	13,0# (13,0#)	9,8 (14,2#)	6,4 (10,2)	4,7 (7,2)		
-4,5	HD-S	17,4# (17,4#)	8,9 (12,6#)	5,8 (9,4#)	4,3 (7,0#)		
	HD-SL	17,4# (17,4#)	9,9 (12,6#)	6,5 (9,4#)	4,7 (7,0#)		
-6,0	HD-S	13,2# (13,2#)	9,3 (9,5#)	6,1 (6,7#)			
	HD-SL	13,2# (13,2#)	9,5# (9,5#)	6,7# (6,7#)			

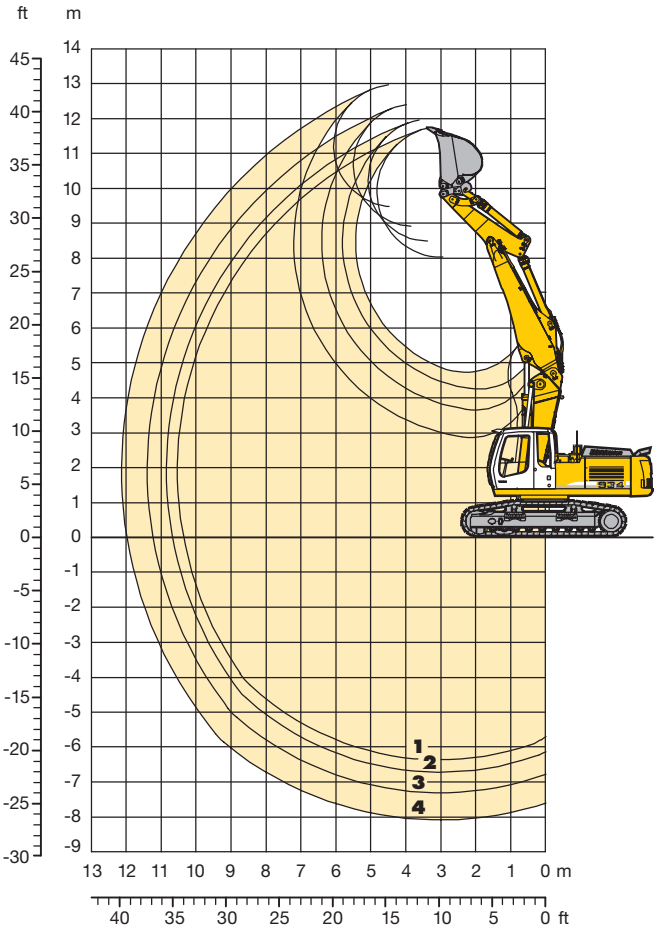
The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in longitudinal position. Capacities are valid for 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 via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.

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.

* capacities only for stick 2,00 m

Backhoe Attachment

with Hydr. Adjustable Boom 4,20 m



Digging Envelope
with Quick Change Adapter

		1	2	3	4
Stick lengths	m	2,00	2,50	3,10	3,90
Max. digging depth	m	6,36	6,70	7,30	8,10
Max. reach at ground level	m	10,40	10,70	11,25	12,00
Max. dump height	m	8,50	8,50	8,95	9,50
Max. teeth height	m	11,75	12,00	12,40	13,00

Digging Forces
without Quick Change Adapter

		1	2	3	4
Digging force ISO	kN	170	146	126	106
	t	17,3	14,9	12,8	10,8
Breakout force ISO	kN	213	184	184	184
	t	22,1	18,8	18,8	18,8
with Quick Change Adapter					
Digging force ISO	kN	161	137	119	102
	t	16,4	13,9	12,1	10,4
Breakout force ISO	kN	187	155	155	155
	t	19,1	15,8	15,8	15,8

Max. breakout force with ripper bucket 264 kN (27,9 t)

Operating Weight and Ground Pressure

Operating weight includes basic machine with hydraulically adjustable boom 4,20 m, stick 2,50 m, quick change adapter 66 and bucket 0,95 m³ (860 kg).

Undercarriage		HD-S			HD-SL		
Pad width	mm	500	600	750	500	600	750
Weight	kg	32850	33190	33700	32960	33300	33810
Ground pressure	kg/cm²	0,79	0,67	0,54	0,79	0,67	0,54

Optional: heavy duty counterweight
(Heavy duty counterweight increases the operating weight by 1000 kg and ground pressure by 0,02 kg/cm²)

Buckets

		without Quick Change Adapter										with Quick Change Adapter									
Cutting width	mm	1050	1250	1400	1550	1550	1050[1]	1200[1]	1350[1]	1500[1]	1650[1]	1050	1250	1400	1550	1050[1]	1200[1]	1350[1]	1500[1]	1650[1]
Capacity ISO 7451	m³	0,95	1,15	1,35	1,50	1,80	1,10	1,30	1,50	1,75	1,95	0,95	1,15	1,35	1,50	1,10	1,30	1,50	1,75	1,95
Max. possible material weight HD-S	t/m³	1,8	1,8	1,8	1,5	1,2	1,8	1,8	1,5	1,2	–	1,8	1,8	1,5	1,2	1,8	1,5	1,2	–	–
Max. possible material weight HD-SL	t/m³	1,8	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,5	1,2	1,8	1,8	1,8	1,5	1,8	1,8	1,5	1,2	–
Weight with Liebherr teeth Z 16 C[2]	kg	860	960	1020	1080	1160	1210	1290	1380	1470	1600	860	940	1050	1130	1190	1280	1370	1450	1580
Weight with Liebherr teeth Z 20 C[3]	kg	1060	1160	1270	1340	–	1250	1350	1440	1520	1660	1100	1210	1320	1410	1280	1360	1480	1560	1710
Max. stick length for machine stability per ISO 10567:																				
HD-S-Undercarriage	m	3,90	3,10	2,50	2,50	2,50	2,00	2,00	2,00	2,00	–	3,10	2,50	2,50	2,50	2,00	2,00	2,00	2,00	–
HD-SL-Undercarriage	m	3,90	3,90	3,10	2,50	2,50	2,00	2,00	2,00	2,00	2,00	3,90	3,10	2,50	3,10	2,00	2,00	2,00	2,00	2,00

[1] Backhoe with machine R 944 B Litronic®
[2] Liebherr teeth Z 16 (for applications up to surface class 5, according to VOB, part C, DIN 18300)
[3] Liebherr teeth Z 20 (for applications over surface class 6, according to VOB, part C, DIN 18300)

Lift Capacities

with Hydr. Adjustable Boom 4,20 m

Stick 2,00 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S		9,0# (9,0#)				
	HD-SL		9,0# (9,0#)				
7,5	HD-S		10,4# (10,4#)	7,7 (8,8#)			
	HD-SL		10,4# (10,4#)	8,3# (8,8#)			
6,0	HD-S	16,8# (16,8#)	11,5 (11,6#)	7,5# (9,1#)	4,9 (7,6#)		
	HD-SL	16,8# (16,8#)	11,6# (11,6#)	8,1 (9,1#)	5,4 (7,6#)		
4,5	HD-S	16,9# (16,9#)	10,9# (12,9#)	7,4 (9,6#)	4,9 (7,7#)		
	HD-SL	16,9# (16,9#)	11,7 (12,9#)	7,8 (9,6#)	5,4 (7,7#)		
3,0	HD-S	16,6# (16,6#)	10,5 (13,7#)	7,2# (10,0#)	4,8 (7,6)		
	HD-SL	16,6# (16,6#)	11,3# (13,7#)	7,7 (10,0#)	5,2 (7,6)		
1,5	HD-S	18,9# (18,9#)	10,6 (13,8#)	6,9 (10,0#)	4,5 (7,6)		
	HD-SL	18,9# (18,9#)	11,3 (13,8#)	7,6 (10,0#)	4,9 (7,7)		
0	HD-S	18,2 (21,0#)	9,7 (14,0#)	6,4 (10,1#)	4,1 (7,3)		
	HD-SL	20,8 (21,0#)	10,8 (14,0#)	7,1 (10,1#)	4,6 (7,3)		
-1,5	HD-S	17,8 (23,0#)	9,3 (14,4#)	5,9 (10,4#)	3,9 (7,0)		
	HD-SL	20,4 (23,0#)	10,4 (14,4#)	6,5 (10,4#)	4,4 (7,0)		
-3,0	HD-S	17,9 (22,3#)	9,0 (13,9#)	5,6 (8,8#)			
	HD-SL	20,5 (22,3#)	10,0 (13,9#)	6,2 (8,8#)			
-4,5	HD-S	14,9# (14,9#)	7,7# (7,7#)				
	HD-SL	14,9# (14,9#)	7,7# (7,7#)				
-6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S		7,2# (7,2#)	4,9# (4,9#)			
	HD-SL		7,2# (7,2#)	4,9# (4,9#)			
7,5	HD-S		7,9# (7,9#)	7,5# (7,5#)			
	HD-SL		7,9# (7,9#)	7,5# (7,5#)			
6,0	HD-S		10,3# (10,3#)	7,7 (8,9#)	5,3 (7,5#)		
	HD-SL		10,3# (10,3#)	8,3# (8,9#)	5,7 (7,5#)		
4,5	HD-S	18,6# (18,6#)	11,2 (12,6#)	7,5 (9,5#)	5,3 (7,7#)		
	HD-SL	18,6# (18,6#)	12,0# (12,6#)	8,0 (9,5#)	5,7 (7,7#)		
3,0	HD-S	17,4# (17,4#)	10,8 (13,9#)	7,4 (10,1#)	5,1 (7,8)	3,4 (5,8)	
	HD-SL	17,4# (17,4#)	11,6 (13,9#)	7,9 (10,1#)	5,6 (7,8#)	3,8 (5,8)	
1,5	HD-S	18,1# (18,1#)	10,8 (14,0#)	7,2 (10,2#)	4,8 (7,7#)	3,2 (5,6)	
	HD-SL	18,1# (18,1#)	11,5 (14,0#)	7,8# (10,2#)	5,3 (7,7)	3,6 (5,6)	
0	HD-S	18,9 (20,4#)	10,2 (14,1#)	6,7 (10,2#)	4,5 (7,7)	3,1 (5,4)	
	HD-SL	20,4# (20,4#)	11,3 (14,1#)	7,4 (10,2#)	5,0 (7,7)	3,4 (5,5)	
-1,5	HD-S	18,2 (23,1#)	9,6 (14,4#)	6,3 (10,5#)	4,2 (7,3)		
	HD-SL	20,9 (23,1#)	10,7 (14,4#)	7,0 (10,5#)	4,7 (7,3)		
-3,0	HD-S	18,1 (23,1#)	9,4 (14,8#)	5,8 (10,0#)	4,0 (5,9#)		
	HD-SL	20,7 (23,1#)	10,5 (14,8#)	6,5 (10,0#)	4,5 (5,9#)		
-4,5	HD-S	18,2 (19,1#)	9,0 (11,0#)	5,5# (5,5#)			
	HD-SL	19,1# (19,1#)	10,1 (11,0#)	5,5# (5,5#)			
-6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S			5,4# (5,4#)			
	HD-SL			5,4# (5,4#)			
7,5	HD-S			6,3# (6,3#)	5,2# (5,2#)		
	HD-SL			6,3# (6,3#)	5,2# (5,2#)		
6,0	HD-S		7,2# (7,2#)	7,3# (7,3#)	5,4# (6,6#)	3,7 (3,8#)	
	HD-SL		7,2# (7,2#)	7,3# (7,3#)	5,9 (6,6#)	3,8# (3,8#)	
4,5	HD-S	18,0# (18,0#)	11,4 (11,8#)	7,5# (9,0#)	5,4 (7,4#)	3,7 (5,7#)	
	HD-SL	18,0# (18,0#)	11,8# (11,8#)	8,1 (9,0#)	5,9 (7,4#)	4,0 (5,7#)	
3,0	HD-S	17,7# (17,7#)	10,8 (13,4#)	7,3 (9,7#)	5,3# (7,7)	3,6 (5,9)	
	HD-SL	17,7# (17,7#)	11,6 (13,4#)	7,8 (9,7#)	5,8 (7,7#)	3,9 (5,9)	
1,5	HD-S	17,9# (17,9#)	10,6 (13,9#)	7,2 (10,1#)	5,1 (7,6)	3,4 (5,7)	
	HD-SL	17,9# (17,9#)	11,4 (13,9#)	7,7 (10,1#)	5,5 (7,6)	3,7 (5,7)	
0	HD-S	19,5 (19,6#)	10,4 (14,0#)	6,8 (10,1#)	4,7 (7,7#)	3,2 (5,5)	
	HD-SL	19,6# (19,6#)	11,5 (14,0#)	7,5 (10,1#)	5,2 (7,7)	3,5 (5,6)	
-1,5	HD-S	18,4 (22,2#)	9,7 (14,2#)	6,4 (10,2#)	4,3 (7,5)	3,0 (5,4)	
	HD-SL	21,0 (22,2#)	10,8 (14,2#)	7,1 (10,2#)	4,8 (7,5)	3,4 (5,4)	
-3,0	HD-S	18,0 (23,2#)	9,3 (14,7#)	6,0 (10,5#)	4,0 (7,1)		
	HD-SL	20,6 (23,2#)	10,4 (14,7#)	6,6 (10,5#)	4,5 (7,1)		
-4,5	HD-S	18,2 (22,0#)	9,0 (13,3#)	5,6 (8,1#)			
	HD-SL	20,8 (22,0#)	10,1 (13,3#)	6,3 (8,1#)			
-6,0	HD-S						
	HD-SL						

Stick 3,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S			3,7# (3,7#)			
	HD-SL			3,7# (3,7#)			
9,0	HD-S			4,6# (4,6#)	3,7# (3,7#)		
	HD-SL			4,6# (4,6#)	3,7# (3,7#)		
7,5	HD-S			4,8# (4,8#)	4,6# (4,6#)	3,0# (3,0#)	
	HD-SL			4,8# (4,8#)	4,6# (4,6#)	3,0# (3,0#)	
6,0	HD-S			5,4# (5,4#)	5,3# (5,3#)	3,9 (4,4#)	
	HD-SL			5,4# (5,4#)	5,3# (5,3#)	4,2 (4,4#)	
4,5	HD-S		7,3# (7,3#)	7,0# (7,0#)	5,5 (6,4#)	3,9 (5,4#)	
	HD-SL		7,3# (7,3#)	7,0# (7,0#)	5,9 (6,4#)	4,2 (5,4#)	
3,0	HD-S	18,5# (18,5#)	10,9 (12,5#)	7,3 (9,2#)	5,4 (7,4#)	3,8# (5,9#)	2,5 (3,5#)
	HD-SL	18,5# (18,5#)	11,8 (12,5#)	7,8 (9,2#)	5,8 (7,4#)	4,1 (5,9)	2,8 (3,5#)
1,5	HD-S	17,7# (17,7#)	10,6# (13,7#)	7,1# (9,8#)	5,3 (7,5)	3,6 (5,8)	2,4 (3,9#)
	HD-SL	17,7# (17,7#)	11,3# (13,7#)	7,7# (9,8#)	5,7# (7,6)	4,0 (5,9)	2,7 (3,9#)
0	HD-S	18,5# (18,5#)	10,5 (13,8#)	7,0 (10,0#)	5,0 (7,5#)	3,4 (5,6)	2,3 (3,6#)
	HD-SL	18,5# (18,5#)	11,3 (13,8#)	7,6 (10,0#)	5,4 (7,5#)	3,7 (5,7)	2,6 (3,6#)
-1,5	HD-S	18,8 (20,8#)	9,9 (13,9#)	6,5 (10,0#)	4,6 (7,6#)	3,1 (5,4)	
	HD-SL	20,8# (20,8#)	11,0 (13,9#)	7,2 (10,0#)	5,1 (7,6#)	3,5 (5,5)	
-3,0	HD-S	18,0 (22,7#)	9,4 (14,2#)	6,2 (10,3#)	4,2 (7,3)	2,9 (5,3)	
	HD-SL	20,7 (22,7#)	10,5 (14,2#)	6,8 (10,3#)	4,6 (7,3)	3,3 (5,3)	
-4,5	HD-S	17,9 (22,8#)	9,2 (14,6#)	5,7 (10,0#)	3,9 (6,4#)		
	HD-SL	20,5 (22,8#)	10,3 (14,6#)	6,4 (10,0#)	4,4 (6,4#)		
-6,0	HD-S	17,8 (18,2#)	8,8 (10,6#)	5,6 (5,7#)			
	HD-SL	18,2# (18,2#)	9,9 (10,6#)	5,7# (5,7#)			

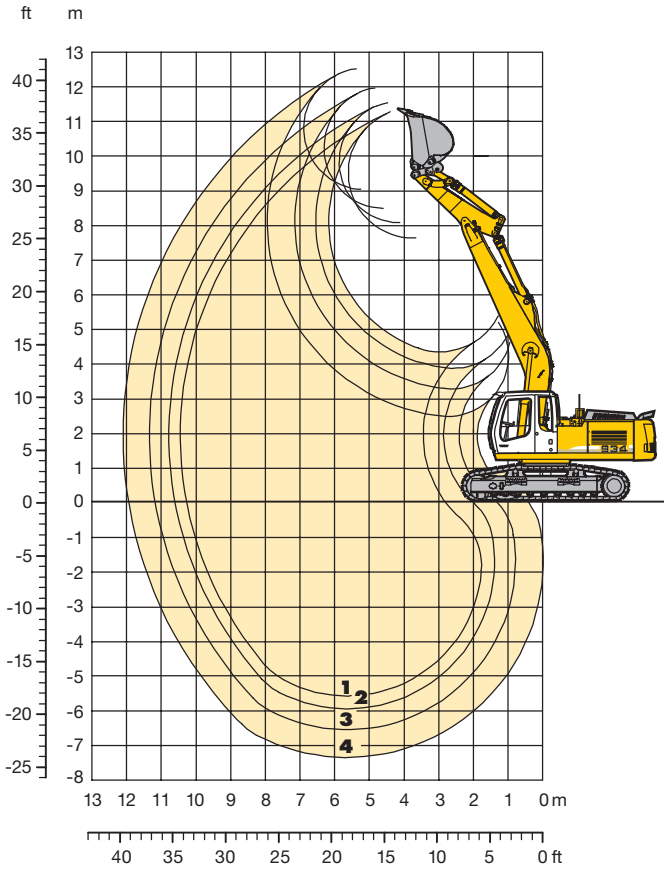
The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in longitudinal position. Capacities are valid for 600 mm wide triple grouser pads with adjusting cylinder in optimal position. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.

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.

* capacities only for stick 2,00 m

Backhoe Attachment

with Straight Gooseneck Boom 6,50 m



Digging Envelope
with Quick Change Adapter

		1	2	3	4
Stick lengths	m	2,00	2,50	3,10	3,90
Max. digging depth	m	5,60	5,95	6,55	7,35
Max. reach at ground level	m	10,25	10,60	11,15	11,95
Max. dump height	m	7,60	8,05	8,45	9,00
Max. teeth height	m	11,30	11,50	11,90	12,50

Digging Forces
without Quick Change Adapter

		1	2	3	4
Digging force ISO	kN	170	146	126	106
	t	17,3	14,9	12,8	10,8
Breakout force ISO	kN	213	184	184	184
	t	22,1	18,8	18,8	18,8
with Quick Change Adapter					
Digging force ISO	kN	161	137	119	102
	t	16,4	13,9	12,1	10,4
Breakout force ISO	kN	187	155	155	155
	t	19,1	15,8	15,8	15,8

Max. breakout force with ripper bucket 264 kN (27,9 t)

Operating Weight and Ground Pressure

Operating weight includes basic machine with gooseneck boom 6,50 m, stick 2,50 m, quick change adapter 66 and bucket 0,95 m³ (860 kg).

Undercarriage		HD-S			HD-SL		
Pad width	mm	500	600	750	500	600	750
Weight	kg	31050	31390	31900	31160	31500	32010
Ground pressure	kg/cm²	0,75	0,63	0,51	0,75	0,63	0,51

Optional: heavy duty counterweight
(Heavy duty counterweight increases the operating weight by 1000 kg and ground pressure by 0,02 kg/cm²)

Buckets

		without Quick Change Adapter										with Quick Change Adapter									
Cutting width	mm	1050	1250	1400	1550	1550	1050[1)]	1200[1)]	1350[1)]	1500[1)]	1650[1)]	1050	1250	1400	1550	1050[1)]	1200[1)]	1350[1)]	1500[1)]	1650[1)]
Capacity ISO 7451	m³	0,95	1,15	1,35	1,50	1,80	1,10	1,30	1,50	1,75	1,95	0,95	1,15	1,35	1,50	1,10	1,30	1,50	1,75	1,95
Max. possible material weight HD-S	t/m³	1,8	1,8	1,8	1,5	1,2	1,8	1,8	1,8	1,5	1,2	1,8	1,8	1,5	1,5	1,8	1,8	1,5	1,2	–
Max. possible material weight HD-SL	t/m³	1,8	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,5	1,2	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,5	1,2
Weight with Liebherr teeth Z 16 C[2)]	kg	860	960	1020	1080	1160	1210	1290	1380	1470	1600	860	940	1050	1130	1190	1280	1370	1450	1580
Weight with Liebherr teeth Z 20 C[3)]	kg	1060	1160	1270	1340	–	1250	1350	1440	1520	1660	1100	1210	1320	1410	1280	1360	1480	1560	1710
Max. stick length for machine stability per ISO 10567:																				
HD-S-Undercarriage	m	3,90	3,10	2,50	2,50	2,50	2,00	2,00	2,00	2,00	2,00	3,90	3,10	2,50	2,50	2,00	2,00	2,00	2,00	2,00
HD-SL-Undercarriage	m	3,90	3,90	3,10	2,50	2,50	2,00	2,00	2,00	2,00	2,00	3,90	3,10	2,50	2,50	2,00	2,00	2,00	2,00	2,00

[1)] Backhoe with machine R 944 B Litronic®
2) Liebherr teeth Z 16 (for applications up to surface class 5, according to VOB, part C, DIN 18300)
3) Liebherr teeth Z 20 (for applications over surface class 6, according to VOB, part C, DIN 18300)

Lift Capacities

with Straight Gooseneck Boom 6,50 m

Stick 2,00 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			7,4 (8,2#)			
	HD-SL			8,1 (8,2#)			
6,0	HD-S		10,3# (10,3#)	7,1 (8,5#)	4,9 (7,5#)		
	HD-SL		10,3# (10,3#)	7,8 (8,5#)	5,4 (7,5#)		
4,5	HD-S		10,3 (12,2#)	6,7 (9,2#)	4,7 (7,7#)		
	HD-SL		11,4 (12,2#)	7,3 (9,2#)	5,2 (7,7#)		
3,0	HD-S			6,2 (10,0#)	4,5 (7,5)		
	HD-SL			6,8 (10,0#)	4,9 (7,5)		
1,5	HD-S			5,8 (10,1)	4,2 (7,3)		
	HD-SL			6,4 (10,2)	4,7 (7,3)		
0	HD-S		8,4 (12,1#)	5,6 (9,9)	4,1 (7,1)		
	HD-SL		9,5 (12,1#)	6,2 (10,0)	4,6 (7,1)		
-1,5	HD-S		8,5 (11,9#)	5,6 (9,5#)	4,1 (7,1)		
	HD-SL		9,5 (11,9#)	6,2 (9,5#)	4,5 (7,1)		
-3,0	HD-S		8,8 (9,6#)	5,7 (7,8#)			
	HD-SL		9,6# (9,6#)	6,3 (7,8#)			
-4,5	HD-S						
	HD-SL						
-6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			7,3# (7,3#)			
	HD-SL			7,3# (7,3#)			
6,0	HD-S		9,1# (9,1#)	7,4 (8,2#)	5,1 (7,1#)		
	HD-SL		9,1# (9,1#)	8,1 (8,2#)	5,6 (7,1#)		
4,5	HD-S	18,5# (18,5#)	10,8 (11,6#)	7,0 (9,0#)	4,9 (7,6#)		
	HD-SL	18,5# (18,5#)	11,6# (11,6#)	7,6 (9,0#)	5,4 (7,6#)		
3,0	HD-S		9,7 (13,8#)	6,5 (10,0#)	4,7 (7,7)	3,5 (5,8)	
	HD-SL		10,7 (13,8#)	7,1 (10,0#)	5,1 (7,8)	3,9 (5,8)	
1,5	HD-S		8,9 (12,5#)	6,0 (10,4)	4,4 (7,5)	3,4 (5,7)	
	HD-SL		9,9 (12,5#)	6,7 (10,5)	4,9 (7,5)	3,7 (5,7)	
0	HD-S		8,7 (13,2#)	5,8 (10,2)	4,3 (7,3)	3,3 (5,6)	
	HD-SL		9,7 (13,2#)	6,4 (10,2)	4,7 (7,3)	3,7 (5,6)	
-1,5	HD-S	8,8# (8,8#)	8,7 (13,0#)	5,7 (10,1#)	4,2 (7,2)		
	HD-SL	8,8# (8,8#)	9,7 (13,0#)	6,4 (10,1#)	4,7 (7,3)		
-3,0	HD-S	12,9# (12,9#)	8,9 (11,0#)	5,8 (8,7#)	4,3 (6,6#)		
	HD-SL	12,9# (12,9#)	9,9 (11,0#)	6,4 (8,7#)	4,8 (6,6#)		
-4,5	HD-S			6,1 (6,1#)			
	HD-SL			6,1 (6,1#)			
-6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S			5,3# (5,3#)			
	HD-SL			5,3# (5,3#)			
7,5	HD-S			6,1# (6,1#)	5,0# (5,0#)		
	HD-SL			6,1# (6,1#)	5,0# (5,0#)		
6,0	HD-S			6,8# (6,8#)	5,2 (6,3#)		
	HD-SL			6,8# (6,8#)	5,7 (6,3#)		
4,5	HD-S	15,5# (15,5#)	10,6# (10,6#)	7,1 (8,4#)	5,0 (7,2#)	3,6 (5,3#)	
	HD-SL	15,5# (15,5#)	10,6# (10,6#)	7,8 (8,4#)	5,4 (7,2#)	4,0 (5,3#)	
3,0	HD-S		10,0 (12,8#)	6,6 (9,4#)	4,7 (7,7#)	3,5 (5,8)	
	HD-SL		11,1 (12,8#)	7,2 (9,4#)	5,2 (7,7#)	3,9 (5,8)	
1,5	HD-S		9,1 (14,4#)	6,1 (10,3#)	4,4 (7,5)	3,4 (5,7)	
	HD-SL		10,1 (14,4#)	6,7 (10,3#)	4,9 (7,5)	3,7 (5,7)	
0	HD-S	4,4# (4,4#)	8,7 (13,9#)	5,8 (10,1)	4,2 (7,3)	3,3 (5,5)	
	HD-SL	4,4# (4,4#)	9,7 (13,9#)	6,4 (10,2)	4,7 (7,3)	3,6 (5,6)	
-1,5	HD-S	8,1# (8,1#)	8,6 (13,7#)	5,6 (10,0)	4,1 (7,1)	3,2 (5,5)	
	HD-SL	8,1# (8,1#)	9,6 (13,7#)	6,3 (10,0)	4,6 (7,2)	3,6 (5,5)	
-3,0	HD-S	12,3# (12,3#)	8,7 (12,0#)	5,7 (9,3#)	4,2 (7,1#)		
	HD-SL	12,3# (12,3#)	9,7 (12,0#)	6,3 (9,3#)	4,6 (7,1#)		
-4,5	HD-S		8,9 (9,3#)	5,8 (7,3#)			
	HD-SL		9,3# (9,3#)	6,5 (7,3#)			
-6,0	HD-S						
	HD-SL						

Stick 3,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S			3,7# (3,7#)			
	HD-SL			3,7# (3,7#)			
9,0	HD-S				3,6# (3,6#)		
	HD-SL				3,6# (3,6#)		
7,5	HD-S				4,5# (4,5#)	2,8# (2,8#)	
	HD-SL				4,5# (4,5#)	2,8# (2,8#)	
6,0	HD-S				5,0# (5,0#)	3,8 (4,2#)	
	HD-SL				5,0# (5,0#)	4,2# (4,2#)	
4,5	HD-S			6,2# (6,2#)	5,1 (5,9#)	3,7 (5,0#)	
	HD-SL			6,2# (6,2#)	5,6 (5,9#)	4,1 (5,0#)	
3,0	HD-S	18,4# (18,4#)	10,6 (11,5#)	6,8 (8,7#)	4,8 (7,2#)	3,5 (5,9)	2,7 (3,0#)
	HD-SL	18,4# (18,4#)	11,5# (11,5#)	7,5 (8,7#)	5,3 (7,2#)	3,9 (5,9)	3,0 (3,0#)
1,5	HD-S	4,5# (4,5#)	9,4 (13,6#)	6,2 (9,8#)	4,5 (7,5)	3,4 (5,7)	2,6 (3,4#)
	HD-SL	4,5# (4,5#)	10,5 (13,6#)	6,9 (9,8#)	4,9 (7,6)	3,7 (5,7)	2,9 (3,4#)
0	HD-S	5,2# (5,2#)	8,8 (14,5#)	5,8 (10,2)	4,2 (7,3)	3,2 (5,5)	
	HD-SL	5,2# (5,2#)	9,8 (14,5#)	6,5 (10,3)	4,7 (7,3)	3,6 (5,5)	
-1,5	HD-S	7,4# (7,4#)	8,5 (14,2#)	5,6 (9,9)	4,1 (7,1)	3,1 (5,4)	
	HD-SL	7,4# (7,4#)	9,5 (14,2#)	6,2 (10,0)	4,5 (7,1)	3,5 (5,4)	
-3,0	HD-S	10,4# (10,4#)	8,5 (13,0#)	5,5 (9,8#)	4,0 (7,0)	3,1 (5,4)	
	HD-SL	10,4# (10,4#)	9,5 (13,0#)	6,1 (9,8#)	4,5 (7,1)	3,5 (5,4)	
-4,5	HD-S	14,4# (14,4#)	8,6 (10,9#)	5,6 (8,4#)	4,1 (6,3#)		
	HD-SL	14,4# (14,4#)	9,7 (10,9#)	6,2 (8,4#)	4,6 (6,3#)		
-6,0	HD-S			5,7# (5,7#)			
	HD-SL			5,7# (5,7#)			

The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in 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 via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.

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.

* capacities only for stick 2,00 m

Lift Capacities

with Gooseneck Boom 6,05 m and Heavy Counterweight

Stick 2,00 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S						
	HD-SL						
6,0	HD-S			7,8# (7,8#)			
	HD-SL			7,8# (7,8#)			
4,5	HD-S		10,8# (10,8#)	7,6 (8,6#)	5,4 (7,5#)		
	HD-SL		10,8# (10,8#)	8,3 (8,6#)	5,9 (7,5#)		
3,0	HD-S		10,7 (13,1#)	7,1 (9,6#)	5,2 (7,9#)		
	HD-SL		11,8 (13,1#)	7,8 (9,6#)	5,6 (7,9#)		
1,5	HD-S		10,0 (14,6#)	6,7 (10,4#)	4,9 (8,1)		
	HD-SL		11,1 (14,6#)	7,4 (10,4#)	5,4 (8,2)		
0	HD-S		9,8 (14,6#)	6,5 (10,7#)	4,8 (8,0)		
	HD-SL		10,8 (14,6#)	7,2 (10,7#)	5,3 (8,0)		
-1,5	HD-S	13,0# (13,0#)	9,8 (13,6#)	6,5 (10,3#)			
	HD-SL	13,0# (13,0#)	10,9 (13,6#)	7,1 (10,3#)			
-3,0	HD-S	15,0# (15,0#)	10,0 (11,8#)	6,6 (8,9#)			
	HD-SL	15,0# (15,0#)	11,1 (11,8#)	7,3 (8,9#)			
-4,5	HD-S						
	HD-SL						
-6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			6,2# (6,2#)			
	HD-SL			6,2# (6,2#)			
6,0	HD-S			7,4# (7,4#)	5,1# (5,1#)		
	HD-SL			7,4# (7,4#)	5,1# (5,1#)		
4,5	HD-S		10,1# (10,1#)	7,9 (8,2#)	5,6 (7,3#)		
	HD-SL		10,1# (10,1#)	8,2# (8,2#)	6,1 (7,3#)		
3,0	HD-S		11,3 (12,6#)	7,4 (9,3#)	5,4 (7,8#)		
	HD-SL		12,4 (12,6#)	8,1 (9,3#)	5,8 (7,8#)		
1,5	HD-S		10,4 (14,5#)	7,0 (10,3#)	5,1 (8,3#)		
	HD-SL		11,5 (14,5#)	7,7 (10,3#)	5,6 (8,3#)		
0	HD-S	6,7# (6,7#)	10,0 (15,0#)	6,7 (10,9#)	5,0 (8,1)		
	HD-SL	6,7# (6,7#)	11,1 (15,0#)	7,4 (10,9#)	5,4 (8,2)		
-1,5	HD-S	12,0# (12,0#)	10,0 (14,4#)	6,6 (10,7#)	4,9 (8,1)		
	HD-SL	12,0# (12,0#)	11,1 (14,4#)	7,3 (10,7#)	5,4 (8,1)		
-3,0	HD-S	17,3# (17,3#)	10,1 (12,8#)	6,7 (9,7#)			
	HD-SL	17,3# (17,3#)	11,2 (12,8#)	7,3 (9,7#)			
-4,5	HD-S		9,9# (9,9#)				
	HD-SL		9,9# (9,9#)				
-6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S						
	HD-SL						
6,0	HD-S				5,4# (5,4#)		
	HD-SL				5,4# (5,4#)		
4,5	HD-S			7,5# (7,5#)	5,7 (6,7#)		
	HD-SL			7,5# (7,5#)	6,1 (6,7#)		
3,0	HD-S	14,0# (14,0#)	11,4# (11,4#)	7,6 (8,7#)	5,4 (7,3#)	4,0 (4,6#)	
	HD-SL	14,0# (14,0#)	11,4# (11,4#)	8,2 (8,7#)	5,9 (7,3#)	4,4 (4,6#)	
1,5	HD-S	5,4# (5,4#)	10,6 (13,7#)	7,1 (9,9#)	5,1 (7,9#)	3,9 (5,4#)	
	HD-SL	5,4# (5,4#)	11,7 (13,7#)	7,7 (9,9#)	5,6 (7,9#)	4,3 (5,4#)	
0	HD-S	7,4# (7,4#)	10,1 (14,8#)	6,7 (10,6#)	4,9 (8,1)	3,8 (5,0#)	
	HD-SL	7,4# (7,4#)	11,2 (14,8#)	7,4 (10,6#)	5,4 (8,1)	4,2 (5,0#)	
-1,5	HD-S	10,8# (10,8#)	9,9 (14,7#)	6,6 (10,7#)	4,8 (8,0)		
	HD-SL	10,8# (10,8#)	11,0 (14,7#)	7,2 (10,7#)	5,3 (8,0)		
-3,0	HD-S	15,2# (15,2#)	9,9 (13,6#)	6,5 (10,1#)	4,8 (7,7#)		
	HD-SL	15,2# (15,2#)	11,0 (13,6#)	7,2 (10,1#)	5,3 (7,7#)		
-4,5	HD-S	15,4# (15,4#)	10,2 (11,3#)	6,7 (8,4#)			
	HD-SL	15,4# (15,4#)	11,3 (11,3#)	7,4 (8,4#)			
-6,0	HD-S						
	HD-SL						

Stick 3,90 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S				4,0# (4,0#)		
	HD-SL				4,0# (4,0#)		
6,0	HD-S				4,7# (4,7#)	3,0# (3,0#)	
	HD-SL				4,7# (4,7#)	3,0# (3,0#)	
4,5	HD-S				5,6# (5,6#)	4,2# (4,2#)	
	HD-SL				5,6# (5,6#)	4,2# (4,2#)	
3,0	HD-S	14,7# (14,7#)	9,8# (9,8#)	7,8 (7,8#)	5,5 (6,7#)	4,1 (5,1#)	
	HD-SL	14,7# (14,7#)	9,8# (9,8#)	7,8# (7,8#)	6,0 (6,7#)	4,5 (5,1#)	
1,5	HD-S	9,5# (9,5#)	11,0 (12,5#)	7,2 (9,1#)	5,2 (7,4#)	3,9 (6,0#)	
	HD-SL	9,5# (9,5#)	12,1 (12,5#)	7,9 (9,1#)	5,7 (7,4#)	4,3 (6,0#)	
0	HD-S	8,0# (8,0#)	10,2 (14,2#)	6,8 (10,2#)	4,9 (8,0#)	3,8 (6,2)	
	HD-SL	8,0# (8,0#)	11,3 (14,2#)	7,5 (10,2#)	5,4 (8,0#)	4,1 (6,2)	
-1,5	HD-S	9,9# (9,9#)	9,8 (14,7#)	6,5 (10,6#)	4,8 (7,9)	3,7 (6,1#)	
	HD-SL	9,9# (9,9#)	10,9 (14,7#)	7,2 (10,6#)	5,2 (8,0)	4,0 (6,1#)	
-3,0	HD-S	13,0# (13,0#)	9,8 (14,2#)	6,4 (10,4#)	4,7 (7,9)		
	HD-SL	13,0# (13,0#)	10,8 (14,2#)	7,1 (10,4#)	5,2 (7,9)		
-4,5	HD-S	17,4# (17,4#)	9,9 (12,6#)	6,5 (9,4#)	4,8 (7,0#)		
	HD-SL	17,4# (17,4#)	11,0 (12,6#)	7,2 (9,4#)	5,3 (7,0#)		
-6,0	HD-S	13,2# (13,2#)	9,5# (9,5#)	6,7# (6,7#)			
	HD-SL	13,2# (13,2#)	9,5# (9,5#)	6,7# (6,7#)			

The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in 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 via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.
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.
* capacities only for stick 2,00 m

Lift Capacities

with Hydr. Adjustable Boom 4,20 m and Heavy Counterweight

Stick 2,00 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S		9,0# (9,0#)				
	HD-SL		9,0# (9,0#)				
7,5	HD-S		10,4# (10,4#)	8,3 (8,8#)			
	HD-SL		10,4# (10,4#)	8,8# (8,8#)			
6,0	HD-S	16,8# (16,8#)	11,6# (11,6#)	8,1 (9,1#)	5,4 (7,6#)		
	HD-SL	16,8# (16,8#)	11,6# (11,6#)	8,6 (9,1#)	5,9 (7,6#)		
4,5	HD-S	16,9# (16,9#)	11,5 (12,9#)	7,8 (9,6#)	5,4 (7,7#)		
	HD-SL	16,9# (16,9#)	12,4# (12,9#)	8,4 (9,6#)	5,9 (7,7#)		
3,0	HD-S	16,6# (16,6#)	11,3# (13,7#)	7,7 (10,0#)	5,3 (7,8#)		
	HD-SL	16,6# (16,6#)	12,0# (13,7#)	8,3 (10,0#)	5,8 (7,8#)		
1,5	HD-S	18,9# (18,9#)	11,2 (13,8#)	7,6 (10,0#)	5,0 (7,8#)		
	HD-SL	18,9# (18,9#)	12,0 (13,8#)	8,3 (10,0#)	5,5 (7,8#)		
0	HD-S	20,0 (21,0#)	10,7 (14,0#)	7,1 (10,1#)	4,6 (7,9#)		
	HD-SL	21,0# (21,0#)	11,9 (14,0#)	7,8 (10,1#)	5,1 (7,9#)		
-1,5	HD-S	19,7 (23,0#)	10,3 (14,4#)	6,5 (10,4#)	4,4 (7,2#)		
	HD-SL	22,4 (23,0#)	11,4 (14,4#)	7,2 (10,4#)	4,9 (7,2#)		
-3,0	HD-S	19,8 (22,3#)	9,9 (13,9#)	6,2 (8,8#)			
	HD-SL	22,3# (22,3#)	11,1 (13,9#)	6,9 (8,8#)			
-4,5	HD-S	14,9# (14,9#)	7,7# (7,7#)				
	HD-SL	14,9# (14,9#)	7,7# (7,7#)				
-6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S		7,2# (7,2#)	4,9# (4,9#)			
	HD-SL		7,2# (7,2#)	4,9# (4,9#)			
7,5	HD-S		7,9# (7,9#)	7,5# (7,5#)			
	HD-SL		7,9# (7,9#)	7,5# (7,5#)			
6,0	HD-S		10,3# (10,3#)	8,3# (8,9#)	5,8 (7,5#)		
	HD-SL		10,3# (10,3#)	8,9 (8,9#)	6,2 (7,5#)		
4,5	HD-S	18,6# (18,6#)	11,9 (12,6#)	8,0 (9,5#)	5,8 (7,7#)		
	HD-SL	18,6# (18,6#)	12,6# (12,6#)	8,6# (9,5#)	6,2 (7,7#)		
3,0	HD-S	17,4# (17,4#)	11,5 (13,9#)	7,9 (10,1#)	5,6 (7,9#)	3,8 (6,2)	
	HD-SL	17,4# (17,4#)	12,3 (13,9#)	8,4# (10,1#)	6,1 (7,9#)	4,2 (6,3)	
1,5	HD-S	18,1# (18,1#)	11,4 (14,0#)	7,8# (10,2#)	5,3 (8,0#)	3,6 (6,1)	
	HD-SL	18,1# (18,1#)	12,2 (14,0#)	8,3 (10,2#)	5,8 (8,0#)	4,0 (6,2)	
0	HD-S	20,4# (20,4#)	11,1 (14,1#)	7,4 (10,2#)	5,0 (8,0#)	3,5 (6,0)	
	HD-SL	20,4# (20,4#)	12,3 (14,1#)	8,1 (10,2#)	5,5 (8,0#)	3,9 (6,0)	
-1,5	HD-S	20,1 (23,1#)	10,6 (14,4#)	7,0 (10,5#)	4,7 (7,9#)		
	HD-SL	22,9 (23,1#)	11,7 (14,4#)	7,7 (10,5#)	5,2 (7,9#)		
-3,0	HD-S	20,0 (23,1#)	10,4 (14,8#)	6,5 (10,0#)	4,5 (5,9#)		
	HD-SL	22,7 (23,1#)	11,5 (14,8#)	7,2 (10,0#)	5,0 (5,9#)		
-4,5	HD-S	19,1# (19,1#)	10,0 (11,0#)	5,5# (5,5#)			
	HD-SL	19,1# (19,1#)	11,0# (11,0#)	5,5# (5,5#)			
-6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S			5,4# (5,4#)			
	HD-SL			5,4# (5,4#)			
7,5	HD-S			6,3# (6,3#)	5,2# (5,2#)		
	HD-SL			6,3# (6,3#)	5,2# (5,2#)		
6,0	HD-S		7,2# (7,2#)	7,3# (7,3#)	5,9# (6,6#)	3,8# (3,8#)	
	HD-SL		7,2# (7,2#)	7,3# (7,3#)	6,3 (6,6#)	3,8# (3,8#)	
4,5	HD-S	18,0# (18,0#)	11,8# (11,8#)	8,0 (9,0#)	5,9 (7,4#)	4,1 (5,7#)	
	HD-SL	18,0# (18,0#)	11,8# (11,8#)	8,6 (9,0#)	6,3 (7,4#)	4,4 (5,7#)	
3,0	HD-S	17,7# (17,7#)	11,5 (13,4#)	7,8 (9,7#)	5,8 (7,7#)	4,0 (6,3)	
	HD-SL	17,7# (17,7#)	12,4 (13,4#)	8,4 (9,7#)	6,2 (7,7#)	4,3 (6,3#)	
1,5	HD-S	17,9# (17,9#)	11,3# (13,9#)	7,7 (10,1#)	5,6 (7,9#)	3,8 (6,2)	
	HD-SL	17,9# (17,9#)	12,1 (13,9#)	8,2 (10,1#)	6,0 (7,9#)	4,2 (6,2#)	
0	HD-S	19,6# (19,6#)	11,4 (14,0#)	7,5 (10,1#)	5,2 (7,9#)	3,6 (6,0)	
	HD-SL	19,6# (19,6#)	12,2 (14,0#)	8,2 (10,1#)	5,7 (7,9#)	4,0 (6,1)	
-1,5	HD-S	20,2 (22,2#)	10,7 (14,2#)	7,1 (10,2#)	4,8 (8,1#)	3,4 (5,8#)	
	HD-SL	22,2# (22,2#)	11,8 (14,2#)	7,8 (10,2#)	5,3 (8,1#)	3,8 (5,8#)	
-3,0	HD-S	19,8 (23,2#)	10,3 (14,7#)	6,6 (10,5#)	4,5 (7,2#)		
	HD-SL	22,6 (23,2#)	11,5 (14,7#)	7,3 (10,5#)	5,0 (7,2#)		
-4,5	HD-S	20,0 (22,0#)	10,0 (13,3#)	6,3 (8,1#)			
	HD-SL	22,0# (22,0#)	11,1 (13,3#)	7,0 (8,1#)			
-6,0	HD-S						
	HD-SL						

Stick 3,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S			3,7# (3,7#)			
	HD-SL			3,7# (3,7#)			
9,0	HD-S			4,6# (4,6#)	3,7# (3,7#)		
	HD-SL			4,6# (4,6#)	3,7# (3,7#)		
7,5	HD-S			4,8# (4,8#)	4,6# (4,6#)	3,0# (3,0#)	
	HD-SL			4,8# (4,8#)	4,6# (4,6#)	3,0# (3,0#)	
6,0	HD-S			5,4# (5,4#)	5,3# (5,3#)	4,2 (4,4#)	
	HD-SL			5,4# (5,4#)	5,3# (5,3#)	4,4# (4,4#)	
4,5	HD-S		7,3# (7,3#)	7,0# (7,0#)	5,9 (6,4#)	4,2# (5,4#)	
	HD-SL		7,3# (7,3#)	7,0# (7,0#)	6,2 (6,4#)	4,6 (5,4#)	
3,0	HD-S	18,5# (18,5#)	11,7 (12,5#)	7,8 (9,2#)	5,8# (7,4#)	4,1 (6,2#)	2,9 (3,5#)
	HD-SL	18,5# (18,5#)	12,5# (12,5#)	8,4 (9,2#)	6,1 (7,4#)	4,5 (6,2#)	3,2 (3,5#)
1,5	HD-S	17,7# (17,7#)	11,3 (13,7#)	7,7# (9,8#)	5,7# (7,7#)	4,0# (6,2#)	2,8 (3,9#)
	HD-SL	17,7# (17,7#)	12,0 (13,7#)	8,1 (9,8#)	6,1 (7,7#)	4,4 (6,2#)	3,1 (3,9#)
0	HD-S	18,5# (18,5#)	11,2# (13,8#)	7,6 (10,0#)	5,5 (7,7#)	3,8 (6,1)	2,7 (3,6#)
	HD-SL	18,5# (18,5#)	12,0 (13,8#)	8,1 (10,0#)	6,0 (7,7#)	4,1 (6,2)	3,0 (3,6#)
-1,5	HD-S	20,7 (20,8#)	10,9 (13,9#)	7,2 (10,0#)	5,1 (7,8#)	3,5 (5,9)	
	HD-SL	20,8# (20,8#)	12,0 (13,9#)	7,9 (10,0#)	5,6 (7,8#)	3,9 (6,0)	
-3,0	HD-S	19,9 (22,7#)	10,4 (14,2#)	6,8 (10,3#)	4,7 (7,9)	3,3 (5,4#)	
	HD-SL	22,7 (22,7#)	11,5 (14,2#)	7,5 (10,3#)	5,2 (7,9#)	3,7 (5,4#)	
-4,5	HD-S	19,7 (22,8#)	10,2 (14,6#)	6,4 (10,0#)	4,4 (6,4#)		
	HD-SL	22,5 (22,8#)	11,3 (14,6#)	7,1 (10,0#)	4,9 (6,4#)		
-6,0	HD-S	18,2# (18,2#)	9,8 (10,6#)	5,7# (5,7#)			
	HD-SL	18,2# (18,2#)	10,6# (10,6#)	5,7# (5,7#)			

The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in longitudinal position. Capacities are valid for 600 mm wide triple grouser pads with adjusting cylinder in optimal position. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.

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.

* capacities only for stick 2,00 m

Lift Capacities

with Straight Gooseneck Boom 6,50 m and Heavy Counterweight

Stick 2,00 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			8,1 (8,2#)			
	HD-SL			8,2# (8,2#)			
6,0	HD-S		10,3# (10,3#)	7,8 (8,5#)	5,4 (7,5#)		
	HD-SL		10,3# (10,3#)	8,5# (8,5#)	5,9 (7,5#)		
4,5	HD-S		11,3 (12,2#)	7,4 (9,2#)	5,2 (7,7#)		
	HD-SL		12,2# (12,2#)	8,0 (9,2#)	5,7 (7,7#)		
3,0	HD-S			6,8 (10,0#)	5,0 (8,0#)		
	HD-SL			7,5 (10,0#)	5,4 (8,0#)		
1,5	HD-S			6,4 (10,5#)	4,7 (7,9)		
	HD-SL			7,1 (10,5#)	5,2 (7,9)		
0	HD-S		9,4 (12,1#)	6,2 (10,3#)	4,6 (7,8)		
	HD-SL		10,5 (12,1#)	6,9 (10,3#)	5,1 (7,8)		
-1,5	HD-S		9,5 (11,9#)	6,2 (9,5#)	4,6 (7,4#)		
	HD-SL		10,6 (11,9#)	6,9 (9,5#)	5,1 (7,4#)		
-3,0	HD-S		9,6# (9,6#)	6,4 (7,8#)			
	HD-SL		9,6# (9,6#)	7,0 (7,8#)			
-4,5	HD-S						
	HD-SL						
-6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			7,3# (7,3#)			
	HD-SL			7,3# (7,3#)			
6,0	HD-S		9,1# (9,1#)	8,1 (8,2#)	5,6 (7,1#)		
	HD-SL		9,1# (9,1#)	8,2# (8,2#)	6,1 (7,1#)		
4,5	HD-S	18,5# (18,5#)	11,6# (11,6#)	7,7 (9,0#)	5,4 (7,6#)		
	HD-SL	18,5# (18,5#)	11,6# (11,6#)	8,3 (9,0#)	5,9 (7,6#)		
3,0	HD-S		10,7 (13,8#)	7,1 (10,0#)	5,2 (8,0#)	3,9 (6,0#)	
	HD-SL		11,8 (13,8#)	7,8 (10,0#)	5,7 (8,0#)	4,3 (6,0#)	
1,5	HD-S		9,9 (12,5#)	6,7 (10,6#)	4,9 (8,1)	3,8 (6,2)	
	HD-SL		11,0 (12,5#)	7,4 (10,6#)	5,4 (8,1)	4,2 (6,2)	
0	HD-S		9,7 (13,2#)	6,5 (10,7#)	4,8 (7,9)	3,7 (6,1)	
	HD-SL		10,7 (13,2#)	7,1 (10,7#)	5,3 (8,0)	4,1 (6,2)	
-1,5	HD-S	8,8# (8,8#)	9,7 (13,0#)	6,4 (10,1#)	4,7 (7,9#)		
	HD-SL	8,8# (8,8#)	10,8 (13,0#)	7,1 (10,1#)	5,2 (7,9#)		
-3,0	HD-S	12,9# (12,9#)	9,9 (11,0#)	6,5 (8,7#)	4,8 (6,6#)		
	HD-SL	12,9# (12,9#)	10,9 (11,0#)	7,1 (8,7#)	5,3 (6,6#)		
-4,5	HD-S			6,1# (6,1#)			
	HD-SL			6,1# (6,1#)			
-6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S			5,3# (5,3#)			
	HD-SL			5,3# (5,3#)			
7,5	HD-S			6,1# (6,1#)	5,0# (5,0#)		
	HD-SL			6,1# (6,1#)	5,0# (5,0#)		
6,0	HD-S			6,8# (6,8#)	5,7 (6,3#)		
	HD-SL			6,8# (6,8#)	6,2 (6,3#)		
4,5	HD-S	15,5# (15,5#)	10,6# (10,6#)	7,8 (8,4#)	5,5 (7,2#)	4,1 (5,3#)	
	HD-SL	15,5# (15,5#)	10,6# (10,6#)	8,4# (8,4#)	6,0 (7,2#)	4,4 (5,3#)	
3,0	HD-S		11,0 (12,8#)	7,3 (9,4#)	5,2 (7,7#)	3,9 (6,3)	
	HD-SL		12,1 (12,8#)	7,9 (9,4#)	5,7 (7,7#)	4,3 (6,4)	
1,5	HD-S		10,1 (14,4#)	6,8 (10,3#)	4,9 (8,1#)	3,8 (6,2)	
	HD-SL		11,2 (14,4#)	7,4 (10,3#)	5,4 (8,1#)	4,1 (6,2)	
0	HD-S	4,4# (4,4#)	9,6 (13,9#)	6,4 (10,6#)	4,7 (7,9)	3,7 (6,1)	
	HD-SL	4,4# (4,4#)	10,7 (13,9#)	7,1 (10,6#)	5,2 (7,9)	4,0 (6,1)	
-1,5	HD-S	8,1# (8,1#)	9,5 (13,7#)	6,3 (10,3#)	4,6 (7,8)	3,6 (6,0)	
	HD-SL	8,1# (8,1#)	10,6 (13,7#)	7,0 (10,3#)	5,1 (7,8)	4,0 (6,0)	
-3,0	HD-S	12,3# (12,3#)	9,6 (12,0#)	6,3 (9,3#)	4,7 (7,1#)		
	HD-SL	12,3# (12,3#)	10,7 (12,0#)	7,0 (9,3#)	5,1 (7,1#)		
-4,5	HD-S		9,3# (9,3#)	6,5 (7,3#)			
	HD-SL		9,3# (9,3#)	7,2 (7,3#)			
-6,0	HD-S						
	HD-SL						

Stick 3,90 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S			3,7# (3,7#)			
	HD-SL			3,7# (3,7#)			
9,0	HD-S				3,6# (3,6#)		
	HD-SL				3,6# (3,6#)		
7,5	HD-S				4,5# (4,5#)	2,8# (2,8#)	
	HD-SL				4,5# (4,5#)	2,8# (2,8#)	
6,0	HD-S				5,0# (5,0#)	4,2# (4,2#)	
	HD-SL				5,0# (5,0#)	4,2# (4,2#)	
4,5	HD-S			6,2# (6,2#)	5,6 (5,9#)	4,1 (5,0#)	
	HD-SL			6,2# (6,2#)	5,9# (5,9#)	4,5 (5,0#)	
3,0	HD-S	18,4# (18,4#)	11,5# (11,5#)	7,5 (8,7#)	5,3 (7,2#)	4,0 (6,0#)	3,0 (3,0#)
	HD-SL	18,4# (18,4#)	11,5# (11,5#)	8,2 (8,7#)	5,8 (7,2#)	4,3 (6,0#)	3,0# (3,0#)
1,5	HD-S	4,5# (4,5#)	10,4 (13,6#)	6,9 (9,8#)	5,0 (7,7#)	3,8 (6,2)	2,9 (3,4#)
	HD-SL	4,5# (4,5#)	11,5 (13,6#)	7,6 (9,8#)	5,5 (7,7#)	4,1 (6,2)	3,2 (3,4#)
0	HD-S	5,2# (5,2#)	9,7 (14,5#)	6,5 (10,4#)	4,7 (7,9)	3,6 (6,0)	
	HD-SL	5,2# (5,2#)	10,8 (14,5#)	7,2 (10,4#)	5,2 (7,9)	4,0 (6,1)	
-1,5	HD-S	7,4# (7,4#)	9,5 (14,2#)	6,3 (10,4#)	4,6 (7,7)	3,5 (5,9)	
	HD-SL	7,4# (7,4#)	10,5 (14,2#)	6,9 (10,4#)	5,1 (7,8)	3,9 (6,0)	
-3,0	HD-S	10,4# (10,4#)	9,4 (13,0#)	6,2 (9,8#)	4,5 (7,6#)	3,5 (5,8#)	
	HD-SL	10,4# (10,4#)	10,5 (13,0#)	6,9 (9,8#)	5,0 (7,6#)	3,9 (5,8#)	
-4,5	HD-S	14,4# (14,4#)	9,6 (10,9#)	6,3 (8,4#)	4,6 (6,3#)		
	HD-SL	14,4# (14,4#)	10,7 (10,9#)	6,9 (8,4#)	5,1 (6,3#)		
-6,0	HD-S			5,7# (5,7#)			
	HD-SL			5,7# (5,7#)			

The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in 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 via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.

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.

* capacities only for stick 2,00 m

Equipment

Undercarriage

	s	o
Two-stage travel motors	•	
Idler protection	•	
Lifetime lubricated track rollers	•	
Track guide at each track frame	•	
Tracks sealed and greased	•	
Track guides at sprocket and in center		•
B 60 or D 6 C sprocket with material ejector		•
Reinforced bottom plate of center-piece		•
Change kit track B 60 into D 6 C		•

Uppercarriage

	s	o
Engine hood with lift help and mechanical locking	•	
Lockable tool box	•	
Handrails, non slip surfaces	•	
Tool kit	•	
Maintenance-free swing brake lock	•	
Maintenance-free HD-batteries	•	
Sound insulation	•	
Electric fuel tank filler pump		•
Foot pedal swing positioning brake		•
Extended tool kit		•
Customized colors		•

Hydraulics

	s	o
Electronic pump regulation	•	
Stepless work mode selector	•	
Pressure storage for controlled lowering of attachments with engine turned off	•	
Hydraulic tank shut-off valve	•	
Pressure compensation	•	
Flow compensation	•	
Filter with integrated fine filter area (5 µm)	•	
Pressure test ports	•	
Additional hydraulic circuits		•
Bio-degradable hydr. oil		•
Filter for secondary circuit		•

Engine

	s	o
Direct injection	•	
Turbo charger	•	
Dry-type air cleaner w/pre-cleaner, main and safety element	•	
Sensor controlled engine idling	•	
Engine cold starting aid		•

Operator's Cab

	s	o
Deep drawn cab shell components	•	
All tinted windows	•	
Door with sliding window	•	
All-round adjustable roof flap	•	
Rain protective shade for front window	•	
Washer and wiper	•	
6-way adjustable cloth suspension seat	•	
Seat and consoles independently adjustable	•	
Removable handle for travel pedals	•	
Air conditioner	•	
Coat hook	•	
Dome light	•	
Sun visor	•	
Inside rear mirrors	•	
Radio installation prep-kit	•	
Cigar lighter and ashtray	•	
Removable custom floor mat	•	
Storage and literature tray	•	
Digital instrumentation for oil temp. engine RPM and oil pressure	•	
Hour meter visible from outside	•	
Emergency exit-rear window	•	
Removable lower section of front window		•
AM/FM stereo radio w/cassette		•
Air power seat adjustment with mountable head rest and heating		•
Warning beacon		•
Additional flood lights		•
Armored glass		•

Attachment

	s	o
Cylinders with shock absorber	•	
Sealed pivots	•	
Lubrication semi automatic	•	
SAE split flanges on all high pressure lines	•	
Safety hook on bucket	•	
Y sealant between bucket and stick	•	
Work light on boom	•	
Safety check valves for hoist cylinder, high mounted	•	
Protective plate for lubrication lines and distributor on the connecting plate		•
Hydr. lines, on stick, for clam operation with two-way selector valves for bucket/clam		•
Bucket link holder f'/clam application		•
Liebherr automatic lubrication system for attachment and swing ring		•
Overload warning device		•
Hydr. or mechanical quick change coupler		•
Liebherr line of clams and grapples		•
Quick disconnect hose couplers		•
Special application buckets		•
Customized colors		•

S = Standard, O = Option

Options and/or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr to retain warranty.

Technical Description
Hydraulic Excavator

R 934 C
Litronic®

Operating Weight 31,0 – 33,8 t
Engine Output 150 kW (203 HP)
Bucket Capacity 0,95 – 1,95 m³

LIEBHERR

Technical Data

Engine

Rating per ISO 9249	150 kW (203 HP) at 1800 RPM
Model	Liebherr D 934 L
Type	4 cylinder in-line
Bore/Stroke	122/150 mm
Displacement	7,01 l
Engine operation	4-stroke diesel direct injection turbo-charged after-cooled reduced emissions
Cooling	water-cooled and integrated motor oil cooler
Fuel tank	580 l
Standard	sensor controlled engine idling
Electrical system	
Voltage	24 V
Batteries	2 x 170 Ah/12 V
Starter	three phase current 24 V/6,6 kW
Alternator	28 V/80 A

Hydraulic System

Hydraulic pump for attachment and travel drive	Liebherr variable flow, swash plate double pump
Max. flow	2 x 245 l/min.
Max. pressure	350 bar
Pump regulation	electro-hydraulic with electronic engine speed sensing regulation, pressure compensation, flow compensation, automatic oil flow optimizer
Hydraulic pump for swing drive	reversible, variable flow, swash plate pump, closed-loop circuit
Max. flow	149 l/min.
Max. pressure	350 bar
Hydraulic tank	340 l
Hydraulic system	550 l
Hydraulic oil filter	1 full flow filter 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 and fuel and after-cooler cores and hydrostatically driven fan
MODE selection	adjustment of machine performance and the hydraulics via a mode selector to match application
ECO	for especially economical and environmentally friendly operation
POWER	for maximum digging power and heavy duty jobs
LIFT	for lifting
FINE	for precision work and lifting through very sensitive movements
R.P.M. adjustment	stepless adjustment of engine output via the r.p.m. at each selected mode

Hydraulic Controls

Power distribution	via monoblock control valve with integrated safety valves
Flow summation	to boom and stick
Closed-loop circuit	for uppercarriage swing drive
Servo circuit	
Attachment and swing	proportional via joystick levers
Travel	– proportional via foot pedals or removable hand levers – speed pre-selection
Additional functions	via foot pedals or joystick toggle switch

Swing Drive

Drive by	Liebherr swash plate motor with integrated brake valves
Transmission	Liebherr compact planetary reduction gear
Swing ring	Liebherr, sealed single race ball bearing swing ring, internal teeth. Lubrication via a grease distributor and a grease nipple
Swing speed	0–8,2 RPM stepless
Swing torque	84 kNm
Holding brake	wet multi-disc (spring applied, pressure released)
Option	pedal controlled positioning brake

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
Joysticks	integrated into adjustable seat consoles
Monitoring	menu driven query of current operating conditions via the LCD 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
Heating system	standard air conditioning, combined cooler/heater, additional dust filter in fresh air/recirculated
Noise emission	
ISO 6396	L_{pA} (inside cab) = 76 dB(A)
2000/14/EC	L_{wA} (surround noise) = 104 dB(A)

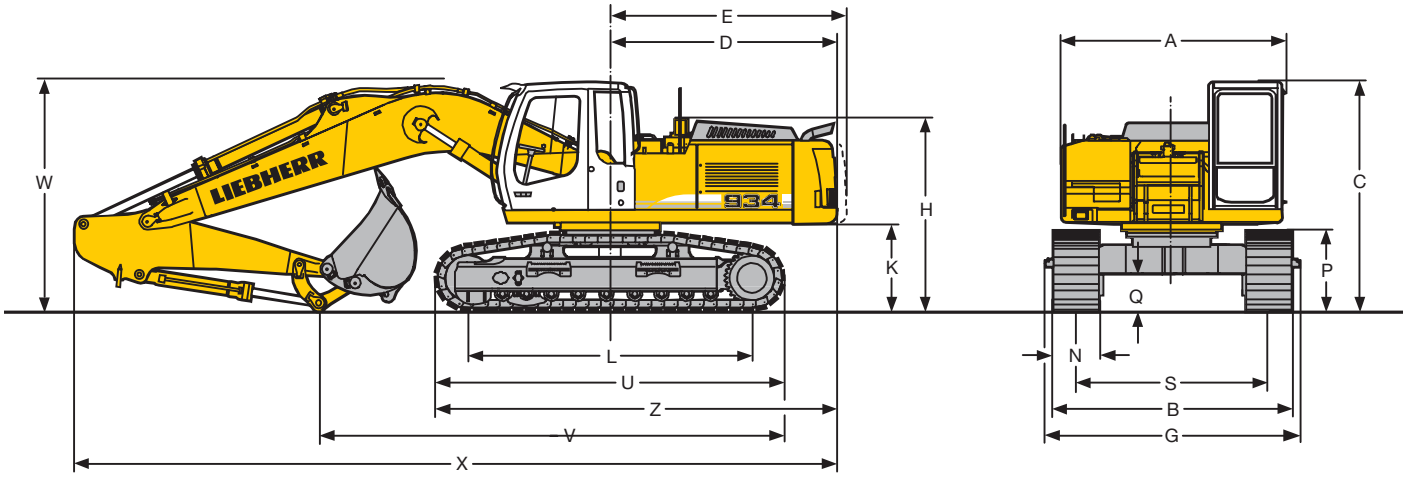
Undercarriage

Versions	
HD-S	heavy duty, narrow gauge
HD-SL	heavy duty, wide gauge
Drive	Liebherr swash plate motors with integrated brake valves on both sides
Transmission	Liebherr planetary reduction gears
Travel speed	low range –2,8 km/h high range –5,1 km/h
Drawbar pull max.	323 kN
Track components	B 60, maintenance-free
Track rollers/ Carrier rollers	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

Attachment

Type	combination of resistant steel plates and cast steel components
Hydraulic cylinders	Liebherr cylinders with special seal-system, shock absorbed
Pivots	sealed, low maintenance
Lubrication	lubrication semi automatic
Hydraulic connections	pipes and hoses equipped with SAE split-flange connections
Bucket	standard equipped with 12 t safety hook for lifting

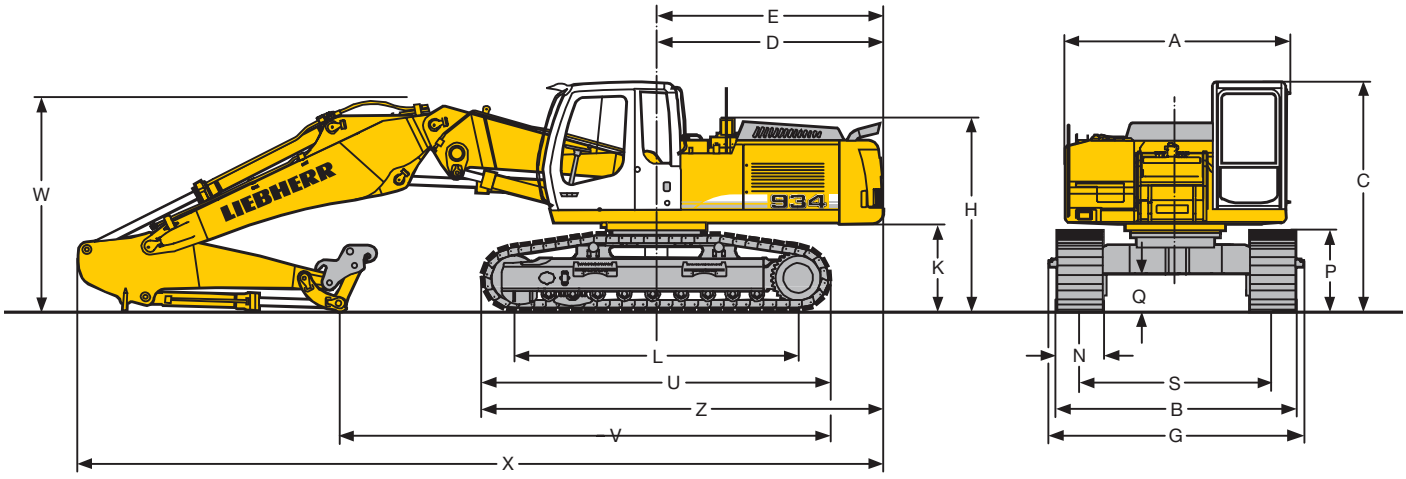
Dimensions



	HD-S	mm	HD-SL	mm
A		3050		3050
C		3125		3125
D		3075		3075
E		3075		3075
H		2650		2650
K		1160		1160
L		3848		3848
P		1016		1016

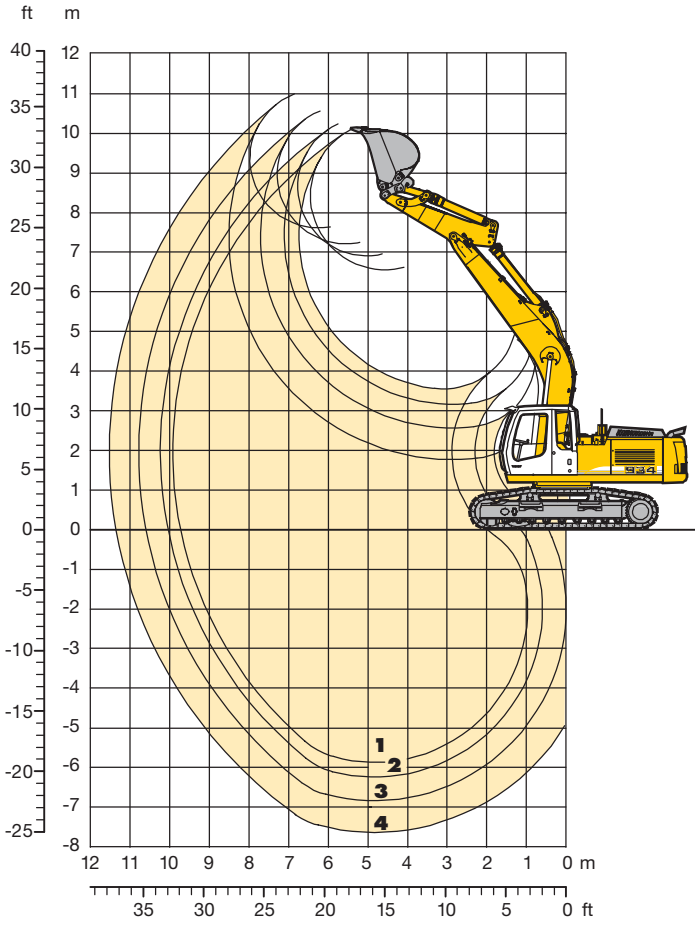
	HD-S	mm		HD-SL	mm	
Q		493			493	
U		4720			4720	
S		2400			2600	
N	500	600	750	500	600	750
B	2998	3000	3150	3198	3200	3350
G	3195	3195	3195	3395	3395	3395
Z		5440			5440	

	Stick Length	Gooseneck Boom 6,05 m		Hydraulically Adjustable Boom 4,20 m		Straight Gooseneck Boom 6,50 m	
		Backhoe	Quick Change Adapter	Backhoe	Quick Change Adapter	Backhoe	Quick Change Adapter
	m	mm	mm	mm	mm	mm	mm
V	2,00	7150	6850	6900	7600	6900	7550
	2,50	6300	6000	6200	6650	6950	6550
	3,10	5650	5400	6450	6150	6400	6200
	3,90	4900	4750	5500	5500	5650	5650
W	2,00	3300	3250	3400	3250	3250	3100
	2,50	3150	3050	3150	2950	3050	2900
	3,10	3150	3050	3200	3000	3100	3000
	3,90	3250	3150	3250	3200	3350	3300
X	2,00	10500	10500	11200	11150	11000	11000
	2,50	10350	10350	11050	11000	10900	10900
	3,10	10400	10350	11050	11000	10950	10950
	3,90	10450	10400	11050	11050	10950	10950



Backhoe Attachment

with Gooseneck Boom 6,05 m



Digging Envelope
with Quick Change Adapter

		1	2	3	4
Stick lengths	m	2,00	2,50	3,10	3,90
Max. digging depth	m	5,90	6,30	6,90	7,70
Max. reach at ground level	m	9,70	10,05	10,60	11,35
Max. dump height	m	6,55	6,90	7,20	7,60
Max. teeth height	m	10,10	10,20	10,55	11,00

Digging Forces
without Quick Change Adapter

		1	2	3	4
Digging force ISO	kN	170	146	126	106
	t	17,3	14,9	12,8	10,8
Breakout force ISO	kN	213	184	184	184
	t	22,1	18,8	18,8	18,8
with Quick Change Adapter					
Digging force ISO	kN	161	137	119	102
	t	16,4	13,9	12,1	10,4
Breakout force ISO	kN	187	155	155	155
	t	19,1	15,8	15,8	15,8

Max. breakout force with ripper bucket 264 kN (27,9 t)

Operating Weight and Ground Pressure

Operating weight includes basic machine with gooseneck boom 6,05 m, stick 2,50 m, quick change adapter 66 and bucket 0,95 m³ (860 kg).

Undercarriage		HD-S			HD-SL		
Pad width	mm	500	600	750	500	600	750
Weight	kg	30950	31290	31800	31060	31400	31910
Ground pressure	kg/cm²	0,75	0,63	0,51	0,75	0,63	0,51

Optional: heavy duty counterweight
(Heavy duty counterweight increases the operating weight by 1000 kg and ground pressure by 0,02 kg/cm²)

Buckets

		without Quick Change Adapter										with Quick Change Adapter									
Cutting width	mm	1050	1250	1400	1550	1550	1050[1]	1200[1]	1350[1]	1500[1]	1650[1]	1050	1250	1400	1550	1050[1]	1200[1]	1350[1]	1500[1]	1650[1]
Capacity ISO 7451	m³	0,95	1,15	1,35	1,50	1,80	1,10	1,30	1,50	1,75	1,95	0,95	1,15	1,35	1,50	1,10	1,30	1,50	1,75	1,95
Max. possible material weight HD-S	t/m³	1,8	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,5	1,2
Max. possible material weight HD-SL	t/m³	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,8	1,5
Weight with Liebherr teeth Z 16 C[2]	kg	860	960	1020	1080	1160	1210	1290	1380	1470	1600	860	940	1050	1130	1190	1280	1370	1450	1580
Weight with Liebherr teeth Z 20 C[3]	kg	1060	1160	1270	1340	–	1250	1350	1440	1520	1660	1100	1210	1320	1410	1280	1360	1480	1560	1710
Max. stick length for machine stability per ISO 10567:																				
HD-S-Undercarriage	m	3,90	3,90	3,10	2,50	2,50	2,00	2,00	2,00	2,00	2,00	3,90	3,90	3,10	2,50	2,00	2,00	2,00	2,00	2,00
HD-SL-Undercarriage	m	3,90	3,90	3,90	3,10	2,50	2,00	2,00	2,00	2,00	2,00	3,90	3,90	3,90	3,10	2,00	2,00	2,00	2,00	2,00

[1] Backhoe with machine R 944 B Litronic®
[2] Liebherr teeth Z 16 (for applications up to surface class 5, according to VOB, part C, DIN 18300)
[3] Liebherr teeth Z 20 (for applications over surface class 6, according to VOB, part C, DIN 18300)

Lift Capacities

with Gooseneck Boom 6,05 m

Stick 2,00 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S						
	HD-SL						
6,0	HD-S			7,4 (7,8#)			
	HD-SL			7,8# (7,8#)			
4,5	HD-S		10,8# (10,8#)	7,0 (8,6#)	4,9 (7,5#)		
	HD-SL		10,8# (10,8#)	7,6 (8,6#)	5,3 (7,5#)		
3,0	HD-S		9,7 (13,1#)	6,5 (9,6#)	4,6 (7,7)		
	HD-SL		10,8 (13,1#)	7,1 (9,6#)	5,1 (7,7)		
1,5	HD-S		9,0 (14,6#)	6,1 (10,4#)	4,4 (7,5)		
	HD-SL		10,0 (14,6#)	6,7 (10,4#)	4,9 (7,5)		
0	HD-S		8,8 (14,6#)	5,8 (10,2)	4,3 (7,3)		
	HD-SL		9,8 (14,6#)	6,5 (10,3)	4,8 (7,4)		
-1,5	HD-S	13,0# (13,0#)	8,8 (13,6#)	5,8 (10,2)			
	HD-SL	13,0# (13,0#)	9,8 (13,6#)	6,4 (10,2)			
-3,0	HD-S	15,0# (15,0#)	9,0 (11,8#)	5,9 (8,9#)			
	HD-SL	15,0# (15,0#)	10,0 (11,8#)	6,6 (8,9#)			
-4,5	HD-S						
	HD-SL						
-6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			6,2# (6,2#)			
	HD-SL			6,2# (6,2#)			
6,0	HD-S			7,4# (7,4#)	5,1# (5,1#)		
	HD-SL			7,4# (7,4#)	5,1# (5,1#)		
4,5	HD-S		10,1# (10,1#)	7,2 (8,2#)	5,1 (7,3#)		
	HD-SL		10,1# (10,1#)	7,9 (8,2#)	5,5 (7,3#)		
3,0	HD-S		10,3 (12,6#)	6,8 (9,3#)	4,9 (7,8#)		
	HD-SL		11,3 (12,6#)	7,4 (9,3#)	5,3 (7,8#)		
1,5	HD-S		9,4 (14,5#)	6,3 (10,3#)	4,6 (7,7)		
	HD-SL		10,5 (14,5#)	7,0 (10,3#)	5,1 (7,7)		
0	HD-S	6,7# (6,7#)	9,1 (15,0#)	6,1 (10,5)	4,5 (7,5)		
	HD-SL	6,7# (6,7#)	10,1 (15,0#)	6,7 (10,5)	4,9 (7,5)		
-1,5	HD-S	12,0# (12,0#)	9,0 (14,4#)	6,0 (10,3)	4,4 (7,4)		
	HD-SL	12,0# (12,0#)	10,0 (14,4#)	6,6 (10,4)	4,9 (7,5)		
-3,0	HD-S	17,3# (17,3#)	9,1 (12,8#)	6,0 (9,7#)			
	HD-SL	17,3# (17,3#)	10,2 (12,8#)	6,6 (9,7#)			
-4,5	HD-S		9,5 (9,9#)				
	HD-SL		9,9# (9,9#)				
-6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S						
	HD-SL						
6,0	HD-S				5,3 (5,4#)		
	HD-SL				5,4# (5,4#)		
4,5	HD-S			7,4 (7,5#)	5,1 (6,7#)		
	HD-SL			7,5# (7,5#)	5,6 (6,7#)		
3,0	HD-S	14,0# (14,0#)	10,6 (11,4#)	6,9 (8,7#)	4,9 (7,3#)	3,6 (4,6#)	
	HD-SL	14,0# (14,0#)	11,4# (11,4#)	7,5 (8,7#)	5,4 (7,3#)	4,0 (4,6#)	
1,5	HD-S	5,4# (5,4#)	9,6 (13,7#)	6,4 (9,9#)	4,6 (7,7)	3,5 (5,4#)	
	HD-SL	5,4# (5,4#)	10,7 (13,7#)	7,0 (9,9#)	5,1 (7,7)	3,9 (5,4#)	
0	HD-S	7,4# (7,4#)	9,1 (14,8#)	6,1 (10,5)	4,4 (7,5)	3,4 (5,0#)	
	HD-SL	7,4# (7,4#)	10,1 (14,8#)	6,7 (10,5)	4,9 (7,5)	3,7 (5,0#)	
-1,5	HD-S	10,8# (10,8#)	8,9 (14,7#)	5,9 (10,3)	4,3 (7,3)		
	HD-SL	10,8# (10,8#)	9,9 (14,7#)	6,5 (10,3)	4,8 (7,4)		
-3,0	HD-S	15,2# (15,2#)	8,9 (13,6#)	5,9 (10,1#)	4,3 (7,4)		
	HD-SL	15,2# (15,2#)	10,0 (13,6#)	6,5 (10,1#)	4,8 (7,4)		
-4,5	HD-S	15,4# (15,4#)	9,2 (11,3#)	6,0 (8,4#)			
	HD-SL	15,4# (15,4#)	10,2 (11,3#)	6,7 (8,4#)			
-6,0	HD-S						
	HD-SL						

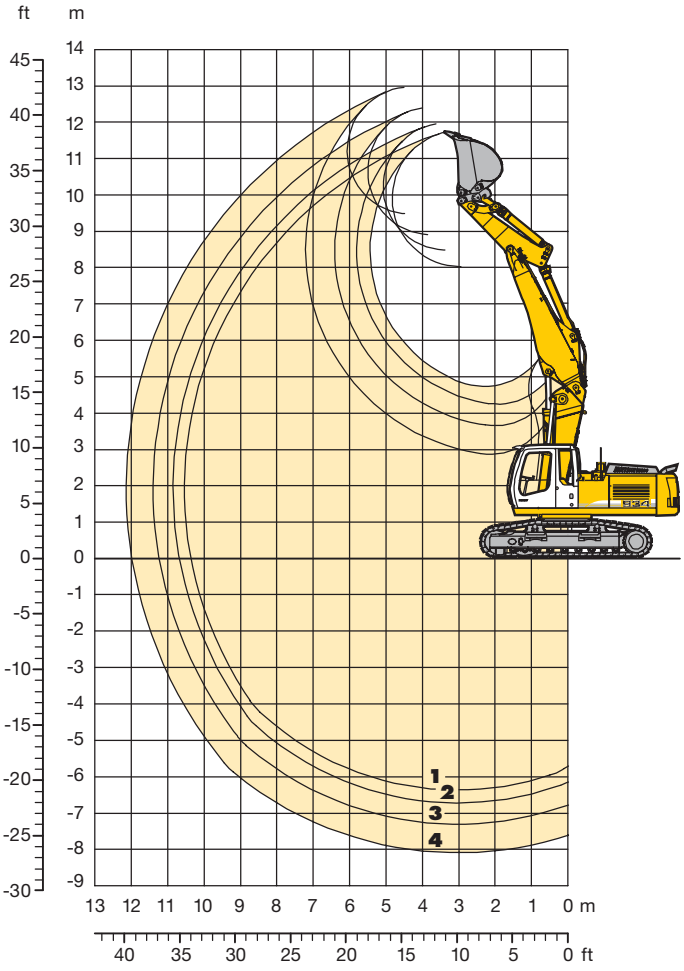
Stick 3,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S				4,0# (4,0#)		
	HD-SL				4,0# (4,0#)		
6,0	HD-S				4,7# (4,7#)	3,0# (3,0#)	
	HD-SL				4,7# (4,7#)	3,0# (3,0#)	
4,5	HD-S				5,3 (5,6#)	3,8 (4,2#)	
	HD-SL				5,6# (5,6#)	4,2 (4,2#)	
3,0	HD-S	14,7# (14,7#)	9,8# (9,8#)	7,1 (7,8#)	5,0 (6,7#)	3,7 (5,1#)	
	HD-SL	14,7# (14,7#)	9,8# (9,8#)	7,8 (7,8#)	5,5 (6,7#)	4,0 (5,1#)	
1,5	HD-S	9,5# (9,5#)	10,0 (12,5#)	6,6 (9,1#)	4,7 (7,4#)	3,5 (5,8)	
	HD-SL	9,5# (9,5#)	11,1 (12,5#)	7,2 (9,1#)	5,1 (7,4#)	3,9 (5,8)	
0	HD-S	8,0# (8,0#)	9,2 (14,2#)	6,1 (10,2#)	4,4 (7,5)	3,4 (5,7)	
	HD-SL	8,0# (8,0#)	10,3 (14,2#)	6,8 (10,2#)	4,9 (7,5)	3,7 (5,7)	
-1,5	HD-S	9,9# (9,9#)	8,9 (14,7#)	5,9 (10,2)	4,3 (7,3)	3,3 (5,6)	
	HD-SL	9,9# (9,9#)	9,9 (14,7#)	6,5 (10,3)	4,7 (7,3)	3,6 (5,6)	
-3,0	HD-S	13,0# (13,0#)	8,8 (14,2#)	5,8 (10,1)	4,2 (7,2)		
	HD-SL	13,0# (13,0#)	9,8 (14,2#)	6,4 (10,2)	4,7 (7,2)		
-4,5	HD-S	17,4# (17,4#)	8,9 (12,6#)	5,8 (9,4#)	4,3 (7,0#)		
	HD-SL	17,4# (17,4#)	9,9 (12,6#)	6,5 (9,4#)	4,7 (7,0#)		
-6,0	HD-S	13,2# (13,2#)	9,3 (9,5#)	6,1 (6,7#)			
	HD-SL	13,2# (13,2#)	9,5# (9,5#)	6,7# (6,7#)			

The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in 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 via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.
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.
* capacities only for stick 2,00 m

Backhoe Attachment

with Hydr. Adjustable Boom 4,20 m



Digging Envelope
with Quick Change Adapter

		1	2	3	4
Stick lengths	m	2,00	2,50	3,10	3,90
Max. digging depth	m	6,36	6,70	7,30	8,10
Max. reach at ground level	m	10,40	10,70	11,25	12,00
Max. dump height	m	8,50	8,50	8,95	9,50
Max. teeth height	m	11,75	12,00	12,40	13,00

Digging Forces
without Quick Change Adapter

		1	2	3	4
Digging force ISO	kN	170	146	126	106
	t	17,3	14,9	12,8	10,8
Breakout force ISO	kN	213	184	184	184
	t	22,1	18,8	18,8	18,8
with Quick Change Adapter					
Digging force ISO	kN	161	137	119	102
	t	16,4	13,9	12,1	10,4
Breakout force ISO	kN	187	155	155	155
	t	19,1	15,8	15,8	15,8

Max. breakout force with ripper bucket 264 kN (27,9 t)

Operating Weight and Ground Pressure

Operating weight includes basic machine with hydraulically adjustable boom 4,20 m, stick 2,50 m, quick change adapter 66 and bucket 0,95 m³ (860 kg).

Undercarriage		HD-S			HD-SL		
Pad width	mm	500	600	750	500	600	750
Weight	kg	32850	33190	33700	32960	33300	33810
Ground pressure	kg/cm²	0,79	0,67	0,54	0,79	0,67	0,54

Optional: heavy duty counterweight
(Heavy duty counterweight increases the operating weight by 1000 kg and ground pressure by 0,02 kg/cm²)

Buckets

		without Quick Change Adapter										with Quick Change Adapter									
Cutting width	mm	1050	1250	1400	1550	1550	1050[1]	1200[1]	1350[1]	1500[1]	1650[1]	1050	1250	1400	1550	1050[1]	1200[1]	1350[1]	1500[1]	1650[1]
Capacity ISO 7451	m³	0,95	1,15	1,35	1,50	1,80	1,10	1,30	1,50	1,75	1,95	0,95	1,15	1,35	1,50	1,10	1,30	1,50	1,75	1,95
Max. possible material weight HD-S	t/m³	1,8	1,8	1,8	1,5	1,2	1,8	1,8	1,5	1,2	–	1,8	1,8	1,5	1,2	1,8	1,5	1,2	–	–
Max. possible material weight HD-SL	t/m³	1,8	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,5	1,2	1,8	1,8	1,8	1,5	1,8	1,8	1,5	1,2	–
Weight with Liebherr teeth Z 16 C[2]	kg	860	960	1020	1080	1160	1210	1290	1380	1470	1600	860	940	1050	1130	1190	1280	1370	1450	1580
Weight with Liebherr teeth Z 20 C[3]	kg	1060	1160	1270	1340	–	1250	1350	1440	1520	1660	1100	1210	1320	1410	1280	1360	1480	1560	1710
Max. stick length for machine stability per ISO 10567:																				
HD-S-Undercarriage	m	3,90	3,10	2,50	2,50	2,50	2,00	2,00	2,00	2,00	–	3,10	2,50	2,50	2,50	2,00	2,00	2,00	2,00	–
HD-SL-Undercarriage	m	3,90	3,90	3,10	2,50	2,50	2,00	2,00	2,00	2,00	2,00	3,90	3,10	2,50	3,10	2,00	2,00	2,00	2,00	2,00

[1] Backhoe with machine R 944 B Litronic®
[2] Liebherr teeth Z 16 (for applications up to surface class 5, according to VOB, part C, DIN 18300)
[3] Liebherr teeth Z 20 (for applications over surface class 6, according to VOB, part C, DIN 18300)

Lift Capacities

with Hydr. Adjustable Boom 4,20 m

Stick 2,00 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S		9,0# (9,0#)				
	HD-SL		9,0# (9,0#)				
7,5	HD-S		10,4# (10,4#)	7,7 (8,8#)			
	HD-SL		10,4# (10,4#)	8,3# (8,8#)			
6,0	HD-S	16,8# (16,8#)	11,5 (11,6#)	7,5# (9,1#)	4,9 (7,6#)		
	HD-SL	16,8# (16,8#)	11,6# (11,6#)	8,1 (9,1#)	5,4 (7,6#)		
4,5	HD-S	16,9# (16,9#)	10,9# (12,9#)	7,4 (9,6#)	4,9 (7,7#)		
	HD-SL	16,9# (16,9#)	11,7 (12,9#)	7,8 (9,6#)	5,4 (7,7#)		
3,0	HD-S	16,6# (16,6#)	10,5 (13,7#)	7,2# (10,0#)	4,8 (7,6)		
	HD-SL	16,6# (16,6#)	11,3# (13,7#)	7,7 (10,0#)	5,2 (7,6)		
1,5	HD-S	18,9# (18,9#)	10,6 (13,8#)	6,9 (10,0#)	4,5 (7,6)		
	HD-SL	18,9# (18,9#)	11,3 (13,8#)	7,6 (10,0#)	4,9 (7,7)		
0	HD-S	18,2 (21,0#)	9,7 (14,0#)	6,4 (10,1#)	4,1 (7,3)		
	HD-SL	20,8 (21,0#)	10,8 (14,0#)	7,1 (10,1#)	4,6 (7,3)		
-1,5	HD-S	17,8 (23,0#)	9,3 (14,4#)	5,9 (10,4#)	3,9 (7,0)		
	HD-SL	20,4 (23,0#)	10,4 (14,4#)	6,5 (10,4#)	4,4 (7,0)		
-3,0	HD-S	17,9 (22,3#)	9,0 (13,9#)	5,6 (8,8#)			
	HD-SL	20,5 (22,3#)	10,0 (13,9#)	6,2 (8,8#)			
-4,5	HD-S	14,9# (14,9#)	7,7# (7,7#)				
	HD-SL	14,9# (14,9#)	7,7# (7,7#)				
-6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S		7,2# (7,2#)	4,9# (4,9#)			
	HD-SL		7,2# (7,2#)	4,9# (4,9#)			
7,5	HD-S		7,9# (7,9#)	7,5# (7,5#)			
	HD-SL		7,9# (7,9#)	7,5# (7,5#)			
6,0	HD-S		10,3# (10,3#)	7,7 (8,9#)	5,3 (7,5#)		
	HD-SL		10,3# (10,3#)	8,3# (8,9#)	5,7 (7,5#)		
4,5	HD-S	18,6# (18,6#)	11,2 (12,6#)	7,5 (9,5#)	5,3 (7,7#)		
	HD-SL	18,6# (18,6#)	12,0# (12,6#)	8,0 (9,5#)	5,7 (7,7#)		
3,0	HD-S	17,4# (17,4#)	10,8 (13,9#)	7,4 (10,1#)	5,1 (7,8)	3,4 (5,8)	
	HD-SL	17,4# (17,4#)	11,6 (13,9#)	7,9 (10,1#)	5,6 (7,8#)	3,8 (5,8)	
1,5	HD-S	18,1# (18,1#)	10,8 (14,0#)	7,2 (10,2#)	4,8 (7,7#)	3,2 (5,6)	
	HD-SL	18,1# (18,1#)	11,5 (14,0#)	7,8# (10,2#)	5,3 (7,7)	3,6 (5,6)	
0	HD-S	18,9 (20,4#)	10,2 (14,1#)	6,7 (10,2#)	4,5 (7,7)	3,1 (5,4)	
	HD-SL	20,4# (20,4#)	11,3 (14,1#)	7,4 (10,2#)	5,0 (7,7)	3,4 (5,5)	
-1,5	HD-S	18,2 (23,1#)	9,6 (14,4#)	6,3 (10,5#)	4,2 (7,3)		
	HD-SL	20,9 (23,1#)	10,7 (14,4#)	7,0 (10,5#)	4,7 (7,3)		
-3,0	HD-S	18,1 (23,1#)	9,4 (14,8#)	5,8 (10,0#)	4,0 (5,9#)		
	HD-SL	20,7 (23,1#)	10,5 (14,8#)	6,5 (10,0#)	4,5 (5,9#)		
-4,5	HD-S	18,2 (19,1#)	9,0 (11,0#)	5,5# (5,5#)			
	HD-SL	19,1# (19,1#)	10,1 (11,0#)	5,5# (5,5#)			
-6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S			5,4# (5,4#)			
	HD-SL			5,4# (5,4#)			
7,5	HD-S			6,3# (6,3#)	5,2# (5,2#)		
	HD-SL			6,3# (6,3#)	5,2# (5,2#)		
6,0	HD-S		7,2# (7,2#)	7,3# (7,3#)	5,4# (6,6#)	3,7 (3,8#)	
	HD-SL		7,2# (7,2#)	7,3# (7,3#)	5,9 (6,6#)	3,8# (3,8#)	
4,5	HD-S	18,0# (18,0#)	11,4 (11,8#)	7,5# (9,0#)	5,4 (7,4#)	3,7 (5,7#)	
	HD-SL	18,0# (18,0#)	11,8# (11,8#)	8,1 (9,0#)	5,9 (7,4#)	4,0 (5,7#)	
3,0	HD-S	17,7# (17,7#)	10,8 (13,4#)	7,3 (9,7#)	5,3# (7,7)	3,6 (5,9)	
	HD-SL	17,7# (17,7#)	11,6 (13,4#)	7,8 (9,7#)	5,8 (7,7#)	3,9 (5,9)	
1,5	HD-S	17,9# (17,9#)	10,6 (13,9#)	7,2 (10,1#)	5,1 (7,6)	3,4 (5,7)	
	HD-SL	17,9# (17,9#)	11,4 (13,9#)	7,7 (10,1#)	5,5 (7,6)	3,7 (5,7)	
0	HD-S	19,5 (19,6#)	10,4 (14,0#)	6,8 (10,1#)	4,7 (7,7#)	3,2 (5,5)	
	HD-SL	19,6# (19,6#)	11,5 (14,0#)	7,5 (10,1#)	5,2 (7,7)	3,5 (5,6)	
-1,5	HD-S	18,4 (22,2#)	9,7 (14,2#)	6,4 (10,2#)	4,3 (7,5)	3,0 (5,4)	
	HD-SL	21,0 (22,2#)	10,8 (14,2#)	7,1 (10,2#)	4,8 (7,5)	3,4 (5,4)	
-3,0	HD-S	18,0 (23,2#)	9,3 (14,7#)	6,0 (10,5#)	4,0 (7,1)		
	HD-SL	20,6 (23,2#)	10,4 (14,7#)	6,6 (10,5#)	4,5 (7,1)		
-4,5	HD-S	18,2 (22,0#)	9,0 (13,3#)	5,6 (8,1#)			
	HD-SL	20,8 (22,0#)	10,1 (13,3#)	6,3 (8,1#)			
-6,0	HD-S						
	HD-SL						

Stick 3,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S			3,7# (3,7#)			
	HD-SL			3,7# (3,7#)			
9,0	HD-S			4,6# (4,6#)	3,7# (3,7#)		
	HD-SL			4,6# (4,6#)	3,7# (3,7#)		
7,5	HD-S			4,8# (4,8#)	4,6# (4,6#)	3,0# (3,0#)	
	HD-SL			4,8# (4,8#)	4,6# (4,6#)	3,0# (3,0#)	
6,0	HD-S			5,4# (5,4#)	5,3# (5,3#)	3,9 (4,4#)	
	HD-SL			5,4# (5,4#)	5,3# (5,3#)	4,2 (4,4#)	
4,5	HD-S		7,3# (7,3#)	7,0# (7,0#)	5,5 (6,4#)	3,9 (5,4#)	
	HD-SL		7,3# (7,3#)	7,0# (7,0#)	5,9 (6,4#)	4,2 (5,4#)	
3,0	HD-S	18,5# (18,5#)	10,9 (12,5#)	7,3 (9,2#)	5,4 (7,4#)	3,8# (5,9#)	2,5 (3,5#)
	HD-SL	18,5# (18,5#)	11,8 (12,5#)	7,8 (9,2#)	5,8 (7,4#)	4,1 (5,9)	2,8 (3,5#)
1,5	HD-S	17,7# (17,7#)	10,6# (13,7#)	7,1# (9,8#)	5,3 (7,5)	3,6 (5,8)	2,4 (3,9#)
	HD-SL	17,7# (17,7#)	11,3# (13,7#)	7,7# (9,8#)	5,7# (7,6)	4,0 (5,9)	2,7 (3,9#)
0	HD-S	18,5# (18,5#)	10,5 (13,8#)	7,0 (10,0#)	5,0 (7,5#)	3,4 (5,6)	2,3 (3,6#)
	HD-SL	18,5# (18,5#)	11,3 (13,8#)	7,6 (10,0#)	5,4 (7,5#)	3,7 (5,7)	2,6 (3,6#)
-1,5	HD-S	18,8 (20,8#)	9,9 (13,9#)	6,5 (10,0#)	4,6 (7,6#)	3,1 (5,4)	
	HD-SL	20,8# (20,8#)	11,0 (13,9#)	7,2 (10,0#)	5,1 (7,6#)	3,5 (5,5)	
-3,0	HD-S	18,0 (22,7#)	9,4 (14,2#)	6,2 (10,3#)	4,2 (7,3)	2,9 (5,3)	
	HD-SL	20,7 (22,7#)	10,5 (14,2#)	6,8 (10,3#)	4,6 (7,3)	3,3 (5,3)	
-4,5	HD-S	17,9 (22,8#)	9,2 (14,6#)	5,7 (10,0#)	3,9 (6,4#)		
	HD-SL	20,5 (22,8#)	10,3 (14,6#)	6,4 (10,0#)	4,4 (6,4#)		
-6,0	HD-S	17,8 (18,2#)	8,8 (10,6#)	5,6 (5,7#)			
	HD-SL	18,2# (18,2#)	9,9 (10,6#)	5,7# (5,7#)			

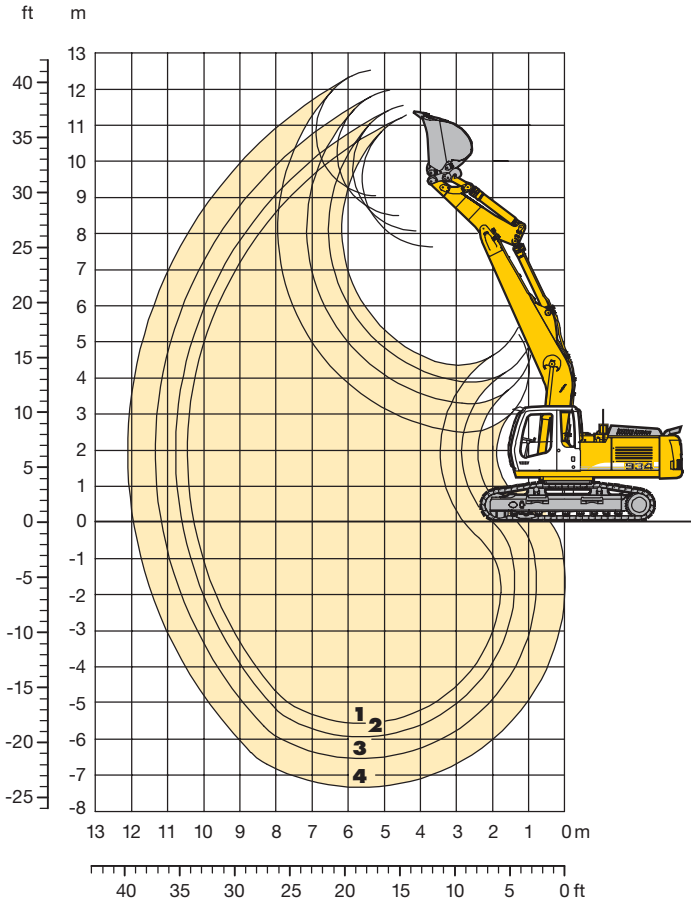
The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in longitudinal position. Capacities are valid for 600 mm wide triple grouser pads with adjusting cylinder in optimal position. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.

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.

* capacities only for stick 2,00 m

Backhoe Attachment

with Straight Gooseneck Boom 6,50 m



Digging Envelope
with Quick Change Adapter

		1	2	3	4
Stick lengths	m	2,00	2,50	3,10	3,90
Max. digging depth	m	5,60	5,95	6,55	7,35
Max. reach at ground level	m	10,25	10,60	11,15	11,95
Max. dump height	m	7,60	8,05	8,45	9,00
Max. teeth height	m	11,30	11,50	11,90	12,50

Digging Forces
without Quick Change Adapter

		1	2	3	4
Digging force ISO	kN	170	146	126	106
	t	17,3	14,9	12,8	10,8
Breakout force ISO	kN	213	184	184	184
	t	22,1	18,8	18,8	18,8
with Quick Change Adapter					
Digging force ISO	kN	161	137	119	102
	t	16,4	13,9	12,1	10,4
Breakout force ISO	kN	187	155	155	155
	t	19,1	15,8	15,8	15,8

Max. breakout force with ripper bucket 264 kN (27,9 t)

Operating Weight and Ground Pressure

Operating weight includes basic machine with gooseneck boom 6,50 m, stick 2,50 m, quick change adapter 66 and bucket 0,95 m³ (860 kg).

Undercarriage		HD-S			HD-SL		
Pad width	mm	500	600	750	500	600	750
Weight	kg	31050	31390	31900	31160	31500	32010
Ground pressure	kg/cm²	0,75	0,63	0,51	0,75	0,63	0,51

Optional: heavy duty counterweight
(Heavy duty counterweight increases the operating weight by 1000 kg and ground pressure by 0,02 kg/cm²)

Buckets

		without Quick Change Adapter										with Quick Change Adapter									
Cutting width	mm	1050	1250	1400	1550	1550	1050[1]	1200[1]	1350[1]	1500[1]	1650[1]	1050	1250	1400	1550	1050[1]	1200[1]	1350[1]	1500[1]	1650[1]
Capacity ISO 7451	m³	0,95	1,15	1,35	1,50	1,80	1,10	1,30	1,50	1,75	1,95	0,95	1,15	1,35	1,50	1,10	1,30	1,50	1,75	1,95
Max. possible material weight HD-S	t/m³	1,8	1,8	1,8	1,5	1,2	1,8	1,8	1,8	1,5	1,2	1,8	1,8	1,5	1,5	1,8	1,8	1,5	1,2	–
Max. possible material weight HD-SL	t/m³	1,8	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,5	1,2	1,8	1,8	1,8	1,5	1,8	1,8	1,8	1,5	1,2
Weight with Liebherr teeth Z 16 C[2]	kg	860	960	1020	1080	1160	1210	1290	1380	1470	1600	860	940	1050	1130	1190	1280	1370	1450	1580
Weight with Liebherr teeth Z 20 C[3]	kg	1060	1160	1270	1340	–	1250	1350	1440	1520	1660	1100	1210	1320	1410	1280	1360	1480	1560	1710
Max. stick length for machine stability per ISO 10567:																				
HD-S-Undercarriage	m	3,90	3,10	2,50	2,50	2,50	2,00	2,00	2,00	2,00	2,00	3,90	3,10	2,50	2,50	2,00	2,00	2,00	2,00	2,00
HD-SL-Undercarriage	m	3,90	3,90	3,10	2,50	2,50	2,00	2,00	2,00	2,00	2,00	3,90	3,10	2,50	2,50	2,00	2,00	2,00	2,00	2,00

[1] Backhoe with machine R 944 B Litronic®
2) Liebherr teeth Z 16 (for applications up to surface class 5, according to VOB, part C, DIN 18300)
3) Liebherr teeth Z 20 (for applications over surface class 6, according to VOB, part C, DIN 18300)

Lift Capacities

with Straight Gooseneck Boom 6,50 m

Stick 2,00 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			7,4 (8,2#)			
	HD-SL			8,1 (8,2#)			
6,0	HD-S		10,3# (10,3#)	7,1 (8,5#)	4,9 (7,5#)		
	HD-SL		10,3# (10,3#)	7,8 (8,5#)	5,4 (7,5#)		
4,5	HD-S		10,3 (12,2#)	6,7 (9,2#)	4,7 (7,7#)		
	HD-SL		11,4 (12,2#)	7,3 (9,2#)	5,2 (7,7#)		
3,0	HD-S			6,2 (10,0#)	4,5 (7,5)		
	HD-SL			6,8 (10,0#)	4,9 (7,5)		
1,5	HD-S			5,8 (10,1)	4,2 (7,3)		
	HD-SL			6,4 (10,2)	4,7 (7,3)		
0	HD-S		8,4 (12,1#)	5,6 (9,9)	4,1 (7,1)		
	HD-SL		9,5 (12,1#)	6,2 (10,0)	4,6 (7,1)		
-1,5	HD-S		8,5 (11,9#)	5,6 (9,5#)	4,1 (7,1)		
	HD-SL		9,5 (11,9#)	6,2 (9,5#)	4,5 (7,1)		
-3,0	HD-S		8,8 (9,6#)	5,7 (7,8#)			
	HD-SL		9,6# (9,6#)	6,3 (7,8#)			
-4,5	HD-S						
	HD-SL						
-6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			7,3# (7,3#)			
	HD-SL			7,3# (7,3#)			
6,0	HD-S		9,1# (9,1#)	7,4 (8,2#)	5,1 (7,1#)		
	HD-SL		9,1# (9,1#)	8,1 (8,2#)	5,6 (7,1#)		
4,5	HD-S	18,5# (18,5#)	10,8 (11,6#)	7,0 (9,0#)	4,9 (7,6#)		
	HD-SL	18,5# (18,5#)	11,6# (11,6#)	7,6 (9,0#)	5,4 (7,6#)		
3,0	HD-S		9,7 (13,8#)	6,5 (10,0#)	4,7 (7,7)	3,5 (5,8)	
	HD-SL		10,7 (13,8#)	7,1 (10,0#)	5,1 (7,8)	3,9 (5,8)	
1,5	HD-S		8,9 (12,5#)	6,0 (10,4)	4,4 (7,5)	3,4 (5,7)	
	HD-SL		9,9 (12,5#)	6,7 (10,5)	4,9 (7,5)	3,7 (5,7)	
0	HD-S		8,7 (13,2#)	5,8 (10,2)	4,3 (7,3)	3,3 (5,6)	
	HD-SL		9,7 (13,2#)	6,4 (10,2)	4,7 (7,3)	3,7 (5,6)	
-1,5	HD-S	8,8# (8,8#)	8,7 (13,0#)	5,7 (10,1#)	4,2 (7,2)		
	HD-SL	8,8# (8,8#)	9,7 (13,0#)	6,4 (10,1#)	4,7 (7,3)		
-3,0	HD-S	12,9# (12,9#)	8,9 (11,0#)	5,8 (8,7#)	4,3 (6,6#)		
	HD-SL	12,9# (12,9#)	9,9 (11,0#)	6,4 (8,7#)	4,8 (6,6#)		
-4,5	HD-S			6,1 (6,1#)			
	HD-SL			6,1 (6,1#)			
-6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S			5,3# (5,3#)			
	HD-SL			5,3# (5,3#)			
7,5	HD-S			6,1# (6,1#)	5,0# (5,0#)		
	HD-SL			6,1# (6,1#)	5,0# (5,0#)		
6,0	HD-S			6,8# (6,8#)	5,2 (6,3#)		
	HD-SL			6,8# (6,8#)	5,7 (6,3#)		
4,5	HD-S	15,5# (15,5#)	10,6# (10,6#)	7,1 (8,4#)	5,0 (7,2#)	3,6 (5,3#)	
	HD-SL	15,5# (15,5#)	10,6# (10,6#)	7,8 (8,4#)	5,4 (7,2#)	4,0 (5,3#)	
3,0	HD-S		10,0 (12,8#)	6,6 (9,4#)	4,7 (7,7#)	3,5 (5,8)	
	HD-SL		11,1 (12,8#)	7,2 (9,4#)	5,2 (7,7#)	3,9 (5,8)	
1,5	HD-S		9,1 (14,4#)	6,1 (10,3#)	4,4 (7,5)	3,4 (5,7)	
	HD-SL		10,1 (14,4#)	6,7 (10,3#)	4,9 (7,5)	3,7 (5,7)	
0	HD-S	4,4# (4,4#)	8,7 (13,9#)	5,8 (10,1)	4,2 (7,3)	3,3 (5,5)	
	HD-SL	4,4# (4,4#)	9,7 (13,9#)	6,4 (10,2)	4,7 (7,3)	3,6 (5,6)	
-1,5	HD-S	8,1# (8,1#)	8,6 (13,7#)	5,6 (10,0)	4,1 (7,1)	3,2 (5,5)	
	HD-SL	8,1# (8,1#)	9,6 (13,7#)	6,3 (10,0)	4,6 (7,2)	3,6 (5,5)	
-3,0	HD-S	12,3# (12,3#)	8,7 (12,0#)	5,7 (9,3#)	4,2 (7,1#)		
	HD-SL	12,3# (12,3#)	9,7 (12,0#)	6,3 (9,3#)	4,6 (7,1#)		
-4,5	HD-S		8,9 (9,3#)	5,8 (7,3#)			
	HD-SL		9,3# (9,3#)	6,5 (7,3#)			
-6,0	HD-S						
	HD-SL						

Stick 3,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S			3,7# (3,7#)			
	HD-SL			3,7# (3,7#)			
9,0	HD-S				3,6# (3,6#)		
	HD-SL				3,6# (3,6#)		
7,5	HD-S				4,5# (4,5#)	2,8# (2,8#)	
	HD-SL				4,5# (4,5#)	2,8# (2,8#)	
6,0	HD-S				5,0# (5,0#)	3,8 (4,2#)	
	HD-SL				5,0# (5,0#)	4,2# (4,2#)	
4,5	HD-S			6,2# (6,2#)	5,1 (5,9#)	3,7 (5,0#)	
	HD-SL			6,2# (6,2#)	5,6 (5,9#)	4,1 (5,0#)	
3,0	HD-S	18,4# (18,4#)	10,6 (11,5#)	6,8 (8,7#)	4,8 (7,2#)	3,5 (5,9)	2,7 (3,0#)
	HD-SL	18,4# (18,4#)	11,5# (11,5#)	7,5 (8,7#)	5,3 (7,2#)	3,9 (5,9)	3,0 (3,0#)
1,5	HD-S	4,5# (4,5#)	9,4 (13,6#)	6,2 (9,8#)	4,5 (7,5)	3,4 (5,7)	2,6 (3,4#)
	HD-SL	4,5# (4,5#)	10,5 (13,6#)	6,9 (9,8#)	4,9 (7,6)	3,7 (5,7)	2,9 (3,4#)
0	HD-S	5,2# (5,2#)	8,8 (14,5#)	5,8 (10,2)	4,2 (7,3)	3,2 (5,5)	
	HD-SL	5,2# (5,2#)	9,8 (14,5#)	6,5 (10,3)	4,7 (7,3)	3,6 (5,5)	
-1,5	HD-S	7,4# (7,4#)	8,5 (14,2#)	5,6 (9,9)	4,1 (7,1)	3,1 (5,4)	
	HD-SL	7,4# (7,4#)	9,5 (14,2#)	6,2 (10,0)	4,5 (7,1)	3,5 (5,4)	
-3,0	HD-S	10,4# (10,4#)	8,5 (13,0#)	5,5 (9,8#)	4,0 (7,0)	3,1 (5,4)	
	HD-SL	10,4# (10,4#)	9,5 (13,0#)	6,1 (9,8#)	4,5 (7,1)	3,5 (5,4)	
-4,5	HD-S	14,4# (14,4#)	8,6 (10,9#)	5,6 (8,4#)	4,1 (6,3#)		
	HD-SL	14,4# (14,4#)	9,7 (10,9#)	6,2 (8,4#)	4,6 (6,3#)		
-6,0	HD-S			5,7# (5,7#)			
	HD-SL			5,7# (5,7#)			

The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in 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 via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.
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.
* capacities only for stick 2,00 m

Lift Capacities

with Gooseneck Boom 6,05 m and Heavy Counterweight

Stick 2,00 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S						
	HD-SL						
6,0	HD-S			7,8# (7,8#)			
	HD-SL			7,8# (7,8#)			
4,5	HD-S		10,8# (10,8#)	7,6 (8,6#)	5,4 (7,5#)		
	HD-SL		10,8# (10,8#)	8,3 (8,6#)	5,9 (7,5#)		
3,0	HD-S		10,7 (13,1#)	7,1 (9,6#)	5,2 (7,9#)		
	HD-SL		11,8 (13,1#)	7,8 (9,6#)	5,6 (7,9#)		
1,5	HD-S		10,0 (14,6#)	6,7 (10,4#)	4,9 (8,1)		
	HD-SL		11,1 (14,6#)	7,4 (10,4#)	5,4 (8,2)		
0	HD-S		9,8 (14,6#)	6,5 (10,7#)	4,8 (8,0)		
	HD-SL		10,8 (14,6#)	7,2 (10,7#)	5,3 (8,0)		
-1,5	HD-S	13,0# (13,0#)	9,8 (13,6#)	6,5 (10,3#)			
	HD-SL	13,0# (13,0#)	10,9 (13,6#)	7,1 (10,3#)			
-3,0	HD-S	15,0# (15,0#)	10,0 (11,8#)	6,6 (8,9#)			
	HD-SL	15,0# (15,0#)	11,1 (11,8#)	7,3 (8,9#)			
-4,5	HD-S						
	HD-SL						
-6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			6,2# (6,2#)			
	HD-SL			6,2# (6,2#)			
6,0	HD-S			7,4# (7,4#)	5,1# (5,1#)		
	HD-SL			7,4# (7,4#)	5,1# (5,1#)		
4,5	HD-S		10,1# (10,1#)	7,9 (8,2#)	5,6 (7,3#)		
	HD-SL		10,1# (10,1#)	8,2# (8,2#)	6,1 (7,3#)		
3,0	HD-S		11,3 (12,6#)	7,4 (9,3#)	5,4 (7,8#)		
	HD-SL		12,4 (12,6#)	8,1 (9,3#)	5,8 (7,8#)		
1,5	HD-S		10,4 (14,5#)	7,0 (10,3#)	5,1 (8,3#)		
	HD-SL		11,5 (14,5#)	7,7 (10,3#)	5,6 (8,3#)		
0	HD-S	6,7# (6,7#)	10,0 (15,0#)	6,7 (10,9#)	5,0 (8,1)		
	HD-SL	6,7# (6,7#)	11,1 (15,0#)	7,4 (10,9#)	5,4 (8,2)		
-1,5	HD-S	12,0# (12,0#)	10,0 (14,4#)	6,6 (10,7#)	4,9 (8,1)		
	HD-SL	12,0# (12,0#)	11,1 (14,4#)	7,3 (10,7#)	5,4 (8,1)		
-3,0	HD-S	17,3# (17,3#)	10,1 (12,8#)	6,7 (9,7#)			
	HD-SL	17,3# (17,3#)	11,2 (12,8#)	7,3 (9,7#)			
-4,5	HD-S		9,9# (9,9#)				
	HD-SL		9,9# (9,9#)				
-6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S						
	HD-SL						
6,0	HD-S				5,4# (5,4#)		
	HD-SL				5,4# (5,4#)		
4,5	HD-S			7,5# (7,5#)	5,7 (6,7#)		
	HD-SL			7,5# (7,5#)	6,1 (6,7#)		
3,0	HD-S	14,0# (14,0#)	11,4# (11,4#)	7,6 (8,7#)	5,4 (7,3#)	4,0 (4,6#)	
	HD-SL	14,0# (14,0#)	11,4# (11,4#)	8,2 (8,7#)	5,9 (7,3#)	4,4 (4,6#)	
1,5	HD-S	5,4# (5,4#)	10,6 (13,7#)	7,1 (9,9#)	5,1 (7,9#)	3,9 (5,4#)	
	HD-SL	5,4# (5,4#)	11,7 (13,7#)	7,7 (9,9#)	5,6 (7,9#)	4,3 (5,4#)	
0	HD-S	7,4# (7,4#)	10,1 (14,8#)	6,7 (10,6#)	4,9 (8,1)	3,8 (5,0#)	
	HD-SL	7,4# (7,4#)	11,2 (14,8#)	7,4 (10,6#)	5,4 (8,1)	4,2 (5,0#)	
-1,5	HD-S	10,8# (10,8#)	9,9 (14,7#)	6,6 (10,7#)	4,8 (8,0)		
	HD-SL	10,8# (10,8#)	11,0 (14,7#)	7,2 (10,7#)	5,3 (8,0)		
-3,0	HD-S	15,2# (15,2#)	9,9 (13,6#)	6,5 (10,1#)	4,8 (7,7#)		
	HD-SL	15,2# (15,2#)	11,0 (13,6#)	7,2 (10,1#)	5,3 (7,7#)		
-4,5	HD-S	15,4# (15,4#)	10,2 (11,3#)	6,7 (8,4#)			
	HD-SL	15,4# (15,4#)	11,3 (11,3#)	7,4 (8,4#)			
-6,0	HD-S						
	HD-SL						

Stick 3,90 m

Height (m)	Undercarriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S				4,0# (4,0#)		
	HD-SL				4,0# (4,0#)		
6,0	HD-S				4,7# (4,7#)	3,0# (3,0#)	
	HD-SL				4,7# (4,7#)	3,0# (3,0#)	
4,5	HD-S				5,6# (5,6#)	4,2# (4,2#)	
	HD-SL				5,6# (5,6#)	4,2# (4,2#)	
3,0	HD-S	14,7# (14,7#)	9,8# (9,8#)	7,8 (7,8#)	5,5 (6,7#)	4,1 (5,1#)	
	HD-SL	14,7# (14,7#)	9,8# (9,8#)	7,8# (7,8#)	6,0 (6,7#)	4,5 (5,1#)	
1,5	HD-S	9,5# (9,5#)	11,0 (12,5#)	7,2 (9,1#)	5,2 (7,4#)	3,9 (6,0#)	
	HD-SL	9,5# (9,5#)	12,1 (12,5#)	7,9 (9,1#)	5,7 (7,4#)	4,3 (6,0#)	
0	HD-S	8,0# (8,0#)	10,2 (14,2#)	6,8 (10,2#)	4,9 (8,0#)	3,8 (6,2)	
	HD-SL	8,0# (8,0#)	11,3 (14,2#)	7,5 (10,2#)	5,4 (8,0#)	4,1 (6,2)	
-1,5	HD-S	9,9# (9,9#)	9,8 (14,7#)	6,5 (10,6#)	4,8 (7,9)	3,7 (6,1#)	
	HD-SL	9,9# (9,9#)	10,9 (14,7#)	7,2 (10,6#)	5,2 (8,0)	4,0 (6,1#)	
-3,0	HD-S	13,0# (13,0#)	9,8 (14,2#)	6,4 (10,4#)	4,7 (7,9)		
	HD-SL	13,0# (13,0#)	10,8 (14,2#)	7,1 (10,4#)	5,2 (7,9)		
-4,5	HD-S	17,4# (17,4#)	9,9 (12,6#)	6,5 (9,4#)	4,8 (7,0#)		
	HD-SL	17,4# (17,4#)	11,0 (12,6#)	7,2 (9,4#)	5,3 (7,0#)		
-6,0	HD-S	13,2# (13,2#)	9,5# (9,5#)	6,7# (6,7#)			
	HD-SL	13,2# (13,2#)	9,5# (9,5#)	6,7# (6,7#)			

The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in 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 via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.

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.

* capacities only for stick 2,00 m

Lift Capacities

with Hydr. Adjustable Boom 4,20 m and Heavy Counterweight

Stick 2,00 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S		9,0# (9,0#)				
	HD-SL		9,0# (9,0#)				
7,5	HD-S		10,4# (10,4#)	8,3 (8,8#)			
	HD-SL		10,4# (10,4#)	8,8# (8,8#)			
6,0	HD-S	16,8# (16,8#)	11,6# (11,6#)	8,1 (9,1#)	5,4 (7,6#)		
	HD-SL	16,8# (16,8#)	11,6# (11,6#)	8,6 (9,1#)	5,9 (7,6#)		
4,5	HD-S	16,9# (16,9#)	11,5 (12,9#)	7,8 (9,6#)	5,4 (7,7#)		
	HD-SL	16,9# (16,9#)	12,4# (12,9#)	8,4 (9,6#)	5,9 (7,7#)		
3,0	HD-S	16,6# (16,6#)	11,3# (13,7#)	7,7 (10,0#)	5,3 (7,8#)		
	HD-SL	16,6# (16,6#)	12,0# (13,7#)	8,3 (10,0#)	5,8 (7,8#)		
1,5	HD-S	18,9# (18,9#)	11,2 (13,8#)	7,6 (10,0#)	5,0 (7,8#)		
	HD-SL	18,9# (18,9#)	12,0 (13,8#)	8,3 (10,0#)	5,5 (7,8#)		
0	HD-S	20,0 (21,0#)	10,7 (14,0#)	7,1 (10,1#)	4,6 (7,9#)		
	HD-SL	21,0# (21,0#)	11,9 (14,0#)	7,8 (10,1#)	5,1 (7,9#)		
- 1,5	HD-S	19,7 (23,0#)	10,3 (14,4#)	6,5 (10,4#)	4,4 (7,2#)		
	HD-SL	22,4 (23,0#)	11,4 (14,4#)	7,2 (10,4#)	4,9 (7,2#)		
- 3,0	HD-S	19,8 (22,3#)	9,9 (13,9#)	6,2 (8,8#)			
	HD-SL	22,3# (22,3#)	11,1 (13,9#)	6,9 (8,8#)			
- 4,5	HD-S	14,9# (14,9#)	7,7# (7,7#)				
	HD-SL	14,9# (14,9#)	7,7# (7,7#)				
- 6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S		7,2# (7,2#)	4,9# (4,9#)			
	HD-SL		7,2# (7,2#)	4,9# (4,9#)			
7,5	HD-S		7,9# (7,9#)	7,5# (7,5#)			
	HD-SL		7,9# (7,9#)	7,5# (7,5#)			
6,0	HD-S		10,3# (10,3#)	8,3# (8,9#)	5,8 (7,5#)		
	HD-SL		10,3# (10,3#)	8,9 (8,9#)	6,2 (7,5#)		
4,5	HD-S	18,6# (18,6#)	11,9 (12,6#)	8,0 (9,5#)	5,8 (7,7#)		
	HD-SL	18,6# (18,6#)	12,6# (12,6#)	8,6# (9,5#)	6,2 (7,7#)		
3,0	HD-S	17,4# (17,4#)	11,5 (13,9#)	7,9 (10,1#)	5,6 (7,9#)	3,8 (6,2)	
	HD-SL	17,4# (17,4#)	12,3 (13,9#)	8,4# (10,1#)	6,1 (7,9#)	4,2 (6,3)	
1,5	HD-S	18,1# (18,1#)	11,4 (14,0#)	7,6# (10,2#)	5,3 (8,0#)	3,6 (6,1)	
	HD-SL	18,1# (18,1#)	12,2 (14,0#)	8,3 (10,2#)	5,8 (8,0#)	4,0 (6,2)	
0	HD-S	20,4# (20,4#)	11,1 (14,1#)	7,4 (10,2#)	5,0 (8,0#)	3,5 (6,0)	
	HD-SL	20,4# (20,4#)	12,3 (14,1#)	8,1 (10,2#)	5,5 (8,0#)	3,9 (6,0)	
- 1,5	HD-S	20,1 (23,1#)	10,6 (14,4#)	7,0 (10,5#)	4,7 (7,9#)		
	HD-SL	22,9 (23,1#)	11,7 (14,4#)	7,7 (10,5#)	5,2 (7,9#)		
- 3,0	HD-S	20,0 (23,1#)	10,4 (14,8#)	6,5 (10,0#)	4,5 (5,9#)		
	HD-SL	22,7 (23,1#)	11,5 (14,8#)	7,2 (10,0#)	5,0 (5,9#)		
- 4,5	HD-S	19,1# (19,1#)	10,0 (11,0#)	5,5# (5,5#)			
	HD-SL	19,1# (19,1#)	11,0# (11,0#)	5,5# (5,5#)			
- 6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S			5,4# (5,4#)			
	HD-SL			5,4# (5,4#)			
7,5	HD-S			6,3# (6,3#)	5,2# (5,2#)		
	HD-SL			6,3# (6,3#)	5,2# (5,2#)		
6,0	HD-S		7,2# (7,2#)	7,3# (7,3#)	5,9# (6,6#)	3,8# (3,8#)	
	HD-SL		7,2# (7,2#)	7,3# (7,3#)	6,3 (6,6#)	3,8# (3,8#)	
4,5	HD-S	18,0# (18,0#)	11,8# (11,8#)	8,0 (9,0#)	5,9 (7,4#)	4,1 (5,7#)	
	HD-SL	18,0# (18,0#)	11,8# (11,8#)	8,6 (9,0#)	6,3 (7,4#)	4,4 (5,7#)	
3,0	HD-S	17,7# (17,7#)	11,5 (13,4#)	7,8 (9,7#)	5,8 (7,7#)	4,0 (6,3)	
	HD-SL	17,7# (17,7#)	12,4 (13,4#)	8,4 (9,7#)	6,2 (7,7#)	4,3 (6,3#)	
1,5	HD-S	17,9# (17,9#)	11,3# (13,9#)	7,7 (10,1#)	5,6 (7,9#)	3,8 (6,2)	
	HD-SL	17,9# (17,9#)	12,1 (13,9#)	8,2 (10,1#)	6,0 (7,9#)	4,2 (6,2#)	
0	HD-S	19,6# (19,6#)	11,4 (14,0#)	7,5 (10,1#)	5,2 (7,9#)	3,6 (6,0)	
	HD-SL	19,6# (19,6#)	12,2 (14,0#)	8,2 (10,1#)	5,7 (7,9#)	4,0 (6,1)	
- 1,5	HD-S	20,2 (22,2#)	10,7 (14,2#)	7,1 (10,2#)	4,8 (8,1#)	3,4 (5,8#)	
	HD-SL	22,2# (22,2#)	11,8 (14,2#)	7,8 (10,2#)	5,3 (8,1#)	3,8 (5,8#)	
- 3,0	HD-S	19,8 (23,2#)	10,3 (14,7#)	6,6 (10,5#)	4,5 (7,2#)		
	HD-SL	22,6 (23,2#)	11,5 (14,7#)	7,3 (10,5#)	5,0 (7,2#)		
- 4,5	HD-S	20,0 (22,0#)	10,0 (13,3#)	6,3 (8,1#)			
	HD-SL	22,0# (22,0#)	11,1 (13,3#)	7,0 (8,1#)			
- 6,0	HD-S						
	HD-SL						

Stick 3,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S			3,7# (3,7#)			
	HD-SL			3,7# (3,7#)			
9,0	HD-S			4,6# (4,6#)	3,7# (3,7#)		
	HD-SL			4,6# (4,6#)	3,7# (3,7#)		
7,5	HD-S			4,8# (4,8#)	4,6# (4,6#)	3,0# (3,0#)	
	HD-SL			4,8# (4,8#)	4,6# (4,6#)	3,0# (3,0#)	
6,0	HD-S			5,4# (5,4#)	5,3# (5,3#)	4,2 (4,4#)	
	HD-SL			5,4# (5,4#)	5,3# (5,3#)	4,4# (4,4#)	
4,5	HD-S		7,3# (7,3#)	7,0# (7,0#)	5,9 (6,4#)	4,2# (5,4#)	
	HD-SL		7,3# (7,3#)	7,0# (7,0#)	6,2 (6,4#)	4,6 (5,4#)	
3,0	HD-S	18,5# (18,5#)	11,7 (12,5#)	7,8 (9,2#)	5,8# (7,4#)	4,1 (6,2#)	2,9 (3,5#)
	HD-SL	18,5# (18,5#)	12,5# (12,5#)	8,4 (9,2#)	6,1 (7,4#)	4,5 (6,2#)	3,2 (3,5#)
1,5	HD-S	17,7# (17,7#)	11,3 (13,7#)	7,7# (9,8#)	5,7# (7,7#)	4,0# (6,2#)	2,8 (3,9#)
	HD-SL	17,7# (17,7#)	12,0 (13,7#)	8,1 (9,8#)	6,1 (7,7#)	4,4 (6,2#)	3,1 (3,9#)
0	HD-S	18,5# (18,5#)	11,2# (13,8#)	7,6 (10,0#)	5,5 (7,7#)	3,8 (6,1)	2,7 (3,6#)
	HD-SL	18,5# (18,5#)	12,0 (13,8#)	8,1 (10,0#)	6,0 (7,7#)	4,1 (6,2)	3,0 (3,6#)
- 1,5	HD-S	20,7 (20,8#)	10,9 (13,9#)	7,2 (10,0#)	5,1 (7,8#)	3,5 (5,9)	
	HD-SL	20,8# (20,8#)	12,0 (13,9#)	7,9 (10,0#)	5,6 (7,8#)	3,9 (6,0)	
- 3,0	HD-S	19,9 (22,7#)	10,4 (14,2#)	6,8 (10,3#)	4,7 (7,9)	3,3 (5,4#)	
	HD-SL	22,7 (22,7#)	11,5 (14,2#)	7,5 (10,3#)	5,2 (7,9#)	3,7 (5,4#)	
- 4,5	HD-S	19,7 (22,8#)	10,2 (14,6#)	6,4 (10,0#)	4,4 (6,4#)		
	HD-SL	22,5 (22,8#)	11,3 (14,6#)	7,1 (10,0#)	4,9 (6,4#)		
- 6,0	HD-S	18,2# (18,2#)	9,8 (10,6#)	5,7# (5,7#)			
	HD-SL	18,2# (18,2#)	10,6# (10,6#)	5,7# (5,7#)			

The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in longitudinal position. Capacities are valid for 600 mm wide triple grouser pads with adjusting cylinder in optimal position. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.

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.

* capacities only for stick 2,00 m

Lift Capacities

with Straight Gooseneck Boom 6,50 m and Heavy Counterweight

Stick 2,00 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			8,1 (8,2#)			
	HD-SL			8,2# (8,2#)			
6,0	HD-S		10,3# (10,3#)	7,8 (8,5#)	5,4 (7,5#)		
	HD-SL		10,3# (10,3#)	8,5# (8,5#)	5,9 (7,5#)		
4,5	HD-S		11,3 (12,2#)	7,4 (9,2#)	5,2 (7,7#)		
	HD-SL		12,2# (12,2#)	8,0 (9,2#)	5,7 (7,7#)		
3,0	HD-S			6,8 (10,0#)	5,0 (8,0#)		
	HD-SL			7,5 (10,0#)	5,4 (8,0#)		
1,5	HD-S			6,4 (10,5#)	4,7 (7,9)		
	HD-SL			7,1 (10,5#)	5,2 (7,9)		
0	HD-S		9,4 (12,1#)	6,2 (10,3#)	4,6 (7,8)		
	HD-SL		10,5 (12,1#)	6,9 (10,3#)	5,1 (7,8)		
-1,5	HD-S		9,5 (11,9#)	6,2 (9,5#)	4,6 (7,4#)		
	HD-SL		10,6 (11,9#)	6,9 (9,5#)	5,1 (7,4#)		
-3,0	HD-S		9,6# (9,6#)	6,4 (7,8#)			
	HD-SL		9,6# (9,6#)	7,0 (7,8#)			
-4,5	HD-S						
	HD-SL						
-6,0	HD-S						
	HD-SL						

Stick 2,50 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S						
	HD-SL						
7,5	HD-S			7,3# (7,3#)			
	HD-SL			7,3# (7,3#)			
6,0	HD-S		9,1# (9,1#)	8,1 (8,2#)	5,6 (7,1#)		
	HD-SL		9,1# (9,1#)	8,2# (8,2#)	6,1 (7,1#)		
4,5	HD-S	18,5# (18,5#)	11,6# (11,6#)	7,7 (9,0#)	5,4 (7,6#)		
	HD-SL	18,5# (18,5#)	11,6# (11,6#)	8,3 (9,0#)	5,9 (7,6#)		
3,0	HD-S		10,7 (13,8#)	7,1 (10,0#)	5,2 (8,0#)	3,9 (6,0#)	
	HD-SL		11,8 (13,8#)	7,8 (10,0#)	5,7 (8,0#)	4,3 (6,0#)	
1,5	HD-S		9,9 (12,5#)	6,7 (10,6#)	4,9 (8,1)	3,8 (6,2)	
	HD-SL		11,0 (12,5#)	7,4 (10,6#)	5,4 (8,1)	4,2 (6,2)	
0	HD-S		9,7 (13,2#)	6,5 (10,7#)	4,8 (7,9)	3,7 (6,1)	
	HD-SL		10,7 (13,2#)	7,1 (10,7#)	5,3 (8,0)	4,1 (6,2)	
-1,5	HD-S	8,8# (8,8#)	9,7 (13,0#)	6,4 (10,1#)	4,7 (7,9#)		
	HD-SL	8,8# (8,8#)	10,8 (13,0#)	7,1 (10,1#)	5,2 (7,9#)		
-3,0	HD-S	12,9# (12,9#)	9,9 (11,0#)	6,5 (8,7#)	4,8 (6,6#)		
	HD-SL	12,9# (12,9#)	10,9 (11,0#)	7,1 (8,7#)	5,3 (6,6#)		
-4,5	HD-S			6,1# (6,1#)			
	HD-SL			6,1# (6,1#)			
-6,0	HD-S						
	HD-SL						

Stick 3,10 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S						
	HD-SL						
9,0	HD-S			5,3# (5,3#)			
	HD-SL			5,3# (5,3#)			
7,5	HD-S			6,1# (6,1#)	5,0# (5,0#)		
	HD-SL			6,1# (6,1#)	5,0# (5,0#)		
6,0	HD-S			6,8# (6,8#)	5,7 (6,3#)		
	HD-SL			6,8# (6,8#)	6,2 (6,3#)		
4,5	HD-S	15,5# (15,5#)	10,6# (10,6#)	7,8 (8,4#)	5,5 (7,2#)	4,1 (5,3#)	
	HD-SL	15,5# (15,5#)	10,6# (10,6#)	8,4# (8,4#)	6,0 (7,2#)	4,4 (5,3#)	
3,0	HD-S		11,0 (12,8#)	7,3 (9,4#)	5,2 (7,7#)	3,9 (6,3)	
	HD-SL		12,1 (12,8#)	7,9 (9,4#)	5,7 (7,7#)	4,3 (6,4)	
1,5	HD-S		10,1 (14,4#)	6,8 (10,3#)	4,9 (8,1#)	3,8 (6,2)	
	HD-SL		11,2 (14,4#)	7,4 (10,3#)	5,4 (8,1#)	4,1 (6,2)	
0	HD-S	4,4# (4,4#)	9,6 (13,9#)	6,4 (10,6#)	4,7 (7,9)	3,7 (6,1)	
	HD-SL	4,4# (4,4#)	10,7 (13,9#)	7,1 (10,6#)	5,2 (7,9)	4,0 (6,1)	
-1,5	HD-S	8,1# (8,1#)	9,5 (13,7#)	6,3 (10,3#)	4,6 (7,8)	3,6 (6,0)	
	HD-SL	8,1# (8,1#)	10,6 (13,7#)	7,0 (10,3#)	5,1 (7,8)	4,0 (6,0)	
-3,0	HD-S	12,3# (12,3#)	9,6 (12,0#)	6,3 (9,3#)	4,7 (7,1#)		
	HD-SL	12,3# (12,3#)	10,7 (12,0#)	7,0 (9,3#)	5,1 (7,1#)		
-4,5	HD-S		9,3# (9,3#)	6,5 (7,3#)			
	HD-SL		9,3# (9,3#)	7,2 (7,3#)			
-6,0	HD-S						
	HD-SL						

Stick 3,90 m

Height (m)	Under-carriage	Radius of load from centerline of machine (m) 3,0	4,5	6,0	7,5	9,0	10,5
10,5	HD-S			3,7# (3,7#)			
	HD-SL			3,7# (3,7#)			
9,0	HD-S				3,6# (3,6#)		
	HD-SL				3,6# (3,6#)		
7,5	HD-S				4,5# (4,5#)	2,8# (2,8#)	
	HD-SL				4,5# (4,5#)	2,8# (2,8#)	
6,0	HD-S				5,0# (5,0#)	4,2# (4,2#)	
	HD-SL				5,0# (5,0#)	4,2# (4,2#)	
4,5	HD-S			6,2# (6,2#)	5,6 (5,9#)	4,1 (5,0#)	
	HD-SL			6,2# (6,2#)	5,9# (5,9#)	4,5 (5,0#)	
3,0	HD-S	18,4# (18,4#)	11,5# (11,5#)	7,5 (8,7#)	5,3 (7,2#)	4,0 (6,0#)	3,0 (3,0#)
	HD-SL	18,4# (18,4#)	11,5# (11,5#)	8,2 (8,7#)	5,8 (7,2#)	4,3 (6,0#)	3,0# (3,0#)
1,5	HD-S	4,5# (4,5#)	10,4 (13,6#)	6,9 (9,8#)	5,0 (7,7#)	3,8 (6,2)	2,9 (3,4#)
	HD-SL	4,5# (4,5#)	11,5 (13,6#)	7,6 (9,8#)	5,5 (7,7#)	4,1 (6,2)	3,2 (3,4#)
0	HD-S	5,2# (5,2#)	9,7 (14,5#)	6,5 (10,4#)	4,7 (7,9)	3,6 (6,0)	
	HD-SL	5,2# (5,2#)	10,8 (14,5#)	7,2 (10,4#)	5,2 (7,9)	4,0 (6,1)	
-1,5	HD-S	7,4# (7,4#)	9,5 (14,2#)	6,3 (10,4#)	4,6 (7,7)	3,5 (5,9)	
	HD-SL	7,4# (7,4#)	10,5 (14,2#)	6,9 (10,4#)	5,1 (7,8)	3,9 (6,0)	
-3,0	HD-S	10,4# (10,4#)	9,4 (13,0#)	6,2 (9,8#)	4,5 (7,6#)	3,5 (5,8#)	
	HD-SL	10,4# (10,4#)	10,5 (13,0#)	6,9 (9,8#)	5,0 (7,6#)	3,9 (5,8#)	
-4,5	HD-S	14,4# (14,4#)	9,6 (10,9#)	6,3 (8,4#)	4,6 (6,3#)		
	HD-SL	14,4# (14,4#)	10,7 (10,9#)	6,9 (8,4#)	5,1 (6,3#)		
-6,0	HD-S			5,7# (5,7#)			
	HD-SL			5,7# (5,7#)			

The lift capacities on the load hook of the Liebherr quick change adapter 66 without attachment are stated in metric tonnes (t), and can be lifted 360° on firm, level supporting surface. Values quoted in brackets are valid for the undercarriage when in 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 via #). Maximum load for the quick change adapter's load hook is 12 t. Without quick change adapter the lift capacities will increase by 420 kg/560 kg*, without bucket cylinder, link and lever they increase by an additional 315 kg/410 kg*. Lifting capacity of the excavator is limited by machine stability, hydraulic capacity and maximum permissible load of the load hook.
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.
* capacities only for stick 2,00 m

Equipment

Undercarriage

	s	o
Two-stage travel motors	•	
Idler protection	•	
Lifetime lubricated track rollers	•	
Track guide at each track frame	•	
Tracks sealed and greased	•	
Track guides at sprocket and in center		•
B 60 or D 6 C sprocket with material ejector		•
Reinforced bottom plate of center-piece		•
Change kit track B 60 into D 6 C		•

Uppercarriage

	s	o
Engine hood with lift help and mechanical locking	•	
Lockable tool box	•	
Handrails, non slip surfaces	•	
Tool kit	•	
Maintenance-free swing brake lock	•	
Maintenance-free HD-batteries	•	
Sound insulation	•	
Electric fuel tank filler pump		•
Foot pedal swing positioning brake		•
Extended tool kit		•
Customized colors		•

Hydraulics

	s	o
Electronic pump regulation	•	
Stepless work mode selector	•	
Pressure storage for controlled lowering of attachments with engine turned off	•	
Hydraulic tank shut-off valve	•	
Pressure compensation	•	
Flow compensation	•	
Filter with integrated fine filter area (5 µm)	•	
Pressure test ports	•	
Additional hydraulic circuits		•
Bio-degradable hydr. oil		•
Filter for secondary circuit		•

Engine

	s	o
Direct injection	•	
Turbo charger	•	
Dry-type air cleaner w/pre-cleaner, main and safety element	•	
Sensor controlled engine idling	•	
Engine cold starting aid		•

Operator's Cab

	s	o
Deep drawn cab shell components	•	
All tinted windows	•	
Door with sliding window	•	
All-round adjustable roof flap	•	
Rain protective shade for front window	•	
Washer and wiper	•	
6-way adjustable cloth suspension seat	•	
Seat and consoles independently adjustable	•	
Removable handle for travel pedals	•	
Air conditioner	•	
Coat hook	•	
Dome light	•	
Sun visor	•	
Inside rear mirrors	•	
Radio installation prep-kit	•	
Cigar lighter and ashtray	•	
Removable custom floor mat	•	
Storage and literature tray	•	
Digital instrumentation for oil temp. engine RPM and oil pressure	•	
Hour meter visible from outside	•	
Emergency exit-rear window	•	
Removable lower section of front window		•
AM/FM stereo radio w/cassette		•
Air power seat adjustment with mountable head rest and heating		•
Warning beacon		•
Additional flood lights		•
Armored glass		•

Attachment

	s	o
Cylinders with shock absorber	•	
Sealed pivots	•	
Lubrication semi automatic	•	
SAE split flanges on all high pressure lines	•	
Safety hook on bucket	•	
Y sealant between bucket and stick	•	
Work light on boom	•	
Safety check valves for hoist cylinder, high mounted	•	
Protective plate for lubrication lines and distributor on the connecting plate		•
Hydr. lines, on stick, for clam operation with two-way selector valves for bucket/clam		•
Bucket link holder f'/clam application		•
Liebherr automatic lubrication system for attachment and swing ring		•
Overload warning device		•
Hydr. or mechanical quick change coupler		•
Liebherr line of clams and grapples		•
Quick disconnect hose couplers		•
Special application buckets		•
Customized colors		•

S = Standard, O = Option

Options and/or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr to retain warranty.

2 Safety information, signs

Working with the machine holds dangers to which you as the owner, machine operator or maintenance expert could be exposed. If you regularly read and note the safety information, however, you can prevent danger and accidents. This is particularly true for those who are only occasionally in contact with the machine, eg. for maintenance work. The following information comprises safety regulations which, if followed conscientiously, will guarantee your safety and that of other persons, as well as avoiding damage to the machine.

Following these precautions does not release you from the responsibility to take note of safety regulations which apply on site or of guidelines given by legal bodies or professional associations.

For EU countries, guideline 89 / 655 / EEC contains the minimum safety information applicable to the owner.

2.1 Symbols in the operating instructions

Work processes and actions that could cause danger are accompanied by safety information in these operating instructions. This safety information describes various dangers which are emphasized by the terms **Danger**, **Caution** and **Note**.

These terms are identified by symbols in the operating instructions and have the following significance:

Danger!
Warning relating to a danger that carries with it a high risk of death or serious injury if the appropriate preventative measures are not taken.

Caution!
Warning relating to dangers that could result in physical injury and/or damage to the machine if the appropriate preventative measures are not taken.

Note!
This symbol identifies user tips and operating and maintenance procedures whose use will guarantee a high degree of user-friendliness and longevity to the machine or which will considerably simplify working procedures.

– This symbol identifies a listing.
  • This symbol identifies a sub-listing.

❑ This symbol signifies the following: “The precondition must be fulfilled”.
The machine operator or the maintenance personnel must first fulfil the precondition described, i e. the machine must be brought into a particular work position in order to be able to carry out the actions subsequently described.

▶ This symbol identifies an action.
The machine operator or the maintenance personnel should be active at this location and carry out the action described.

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↳ This symbol means “Carry out an activity".
If the machine operator or maintenance personnel have carried out the activities described in an action, the result of this action will be described here.

Following these notes does not relieve you of responsibility for following additional rules and guidelines!

Additional points that should be noted are:

– the safety regulations which apply on site,
– statutory road traffic regulations,
– the guidelines provided by professional associations.

2.2 Use in accordance with the regulations

– The hydraulic excavator is a machine with work equipment (eg. hoe type bucket, grab, bucket attachment) designed to detach, lift, transport and shake off earth, stones and other materials, while the transportation of the load itself usually takes place without moving the machine. Moving the machine when it is carrying a load must be carried out while observing the appropriate safety measures (see section "Notes for safe working").
– Machines used for hoisting are subject to specific conditions and must be fitted with the stipulated safety devices (see section “Hoisting work”).
– Other or additional usage, eg. for demolition work or transfer work, requires special equipment and may also require special safety devices. These devices (eg. tree grab, demolition hammer, concrete cutter etc.) may only be attached and used with approval and in accordance with the original manufacturer of the device.
– Transporting persons is not deemed to be in accordance with regulations. The manufacturer is not liable for damage resulting from this action. The user is solely responsible for the risk incurred.
– Observing the operating instructions and the inspection / maintenance instructions is also deemed to be appropriate use in accordance with regulations.

2.3 Safety instructions

2.3.1 General safety instructions

– Please familiarize yourself with the operating instructions before starting up the machine.
– Ensure that you have obtained, read and understood any additional instructions relating to special accessories for the machine.
– Only specifically authorized persons may operate, maintain or repair the machine. The legal minimum age is to be adhered to.
– Only employ trained or appropriately instructed personnel. Clearly establish which personnel are responsible for operating, setting up, maintaining and repairing the machine. Give personnel the power to refuse to carry out unsafe instructions by third parties. This also applies in relation to traffic regulations.
– Only permit apprentices and personnel who are in training or who have only general training to operate on the machine under the constant supervision of an ex-

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perienced member of staff.

- As far as possible, monitor personnel to ensure that they are adhering to safe working practices, are aware of risks and are observing the operating instructions.
- Wear safe work clothes when you are working on or with the machine. Avoid wearing rings, watches, ties, scarves, open jackets and loose clothing. There is a risk of injury from, for example, becoming stuck or being drawn in.
- Protective goggles, safety helmets, safety shoes and gloves, reflective vests and ear protection etc. are required for specific jobs.
- Ensure that you obtain information on any special safety regulations for the job site from the site foreman.
- Always tilt up the safety lever before leaving the operator's seat.
- When getting in and out, do not hold on to the steering column, control panel or joystick. Doing this could cause unintentional movement, which could result in an accident.
- Never jump from the machine; use the steps, ladders, gangplanks and supporting straps provided for this purpose.
- Face the machine when getting in or out and always use three-point support, i.e. two hands and one foot or two feet and one hand must always be in contact with the access system at the same time.
- Familiarize yourself with the location of the emergency exit through the front window.
- In the absence of any other instructions, proceed as follows for all maintenance and repair work:
  - switch off the machine on firm, level ground and anchor the grab in the ground.
  - place all operating levers into neutral and tilt the safety lever up.
  - switch off the engine and remove the start key.
- Before touching any parts of the hydraulic circuits, you must also operate all pilot control devices (joystick and pedals) in all directions with the start key in contact position in order to reduce the actuating and dynamic pressures in the work circuits. You must then reduce the internal tank pressure as described in these operating instructions.
- Secure all loose parts on the machine.
- Never operate a machine before carrying out a careful inspection tour and checking whether any warning signs are missing or illegible.
- Respect all danger and safety instructions.
- For special applications the machine must be equiped with specific safety equipments. Work only if they are mounted and functional.
- Do not carry out any modifications, alterations or conversions to the machine which may affect safety without the express permission of the manufacturer. This also applies for the installation of safety devices and valves and for welding work on load-bearing parts.
- It is forbiden to repair the cab.
- Not original equipment and component parts or such kind, wich has generaly not been validated by LIEBHERR for installation or extension, has not to be installed or added onto the excavator without previous written agreement of LIEBHERR. Wherefore the necessary technical documentations has to be at LIEBHERR's disposal.

2.3.2 Avoidance of crushing and burns

- Do not work beneath the equipment if it is not safely positioned on the ground or supported.

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- Do not use any damaged or insufficient load-bearing take-up materials, such as ropes or chains.
- Wear work gloves when working with wire cables.
- When working on the equipment, never use your fingers to locate bores; use the correct punch for the procedure.
- Ensure that no objects enter the fan when the engine is on. The fan will eject or destroy these objects and will itself be damaged.
- The engine cooling system is hot and pressurized when near operating temperature. Avoid coming into contact with coolant carrying parts. There is a risk of sustaining burns.
- Only check the coolant when the sealing cap of the expansion container has cooled to a point where it is possible to touch it. Then turn the cap carefully to let off the overpressure.
- Engine and hydraulic oil are hot when near operating temperature. Avoid coming into contact with hot oil or oil-bearing parts.
- Wear protective goggles and gloves when working on the battery. Avoid sparks and naked flames.
- Never permit the grab to be guided by hand by auxiliary personnel.
- When reaching into the engine compartment, always secure the side doors against unintentional closing by positioning the supports provided for this purpose.
- Never lay under the machine if it is raised with work equipment and has not been correctly and securely supported with hardwood beams.

2.3.3 Avoidance of fire and explosions

- Switch off the engine when refuelling.
- Do not smoke or use a naked flame when refuelling and charging the batteries.
- Always start the engine in accordance with the operating instructions.
- Check the electrical system regularly.
- Have all faults, such as loose connections, blown fuses and lamps and clogged or abraded cables rectified by personnel.
- Do not transport any combustible liquids anywhere on the machine other than in the tanks provided for this purpose.
- Check all lines, hoses and screwed joints regularly for leakage and damage.
- Rectify leakages immediately and replace damaged components.
- Oil spraying out of leaking areas can easily cause a fire.
- Ensure that all holds and shields are correctly installed to guard against vibration, abrasion and heat accumulation.
- Do not use cold start materials (ether) in the vicinity of heat sources, naked flames or in inadequately ventilated areas.
- Do not use any starting aids containing ether to start diesel engines with preheating or flame glow systems. There is a risk of EXPLOSION.
- Familiarize yourself with the location and operation of fire extinguishers on the machine and with local fire warning and fire abatement options.
- The possibility exists to install an extinguisher into the driver’s cab.
- Covers and boxes locks have to be unlocked, to facilitate the fight against fire in case of.

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2.4 Signs on the machine

2.4.1 Arrangement of signage

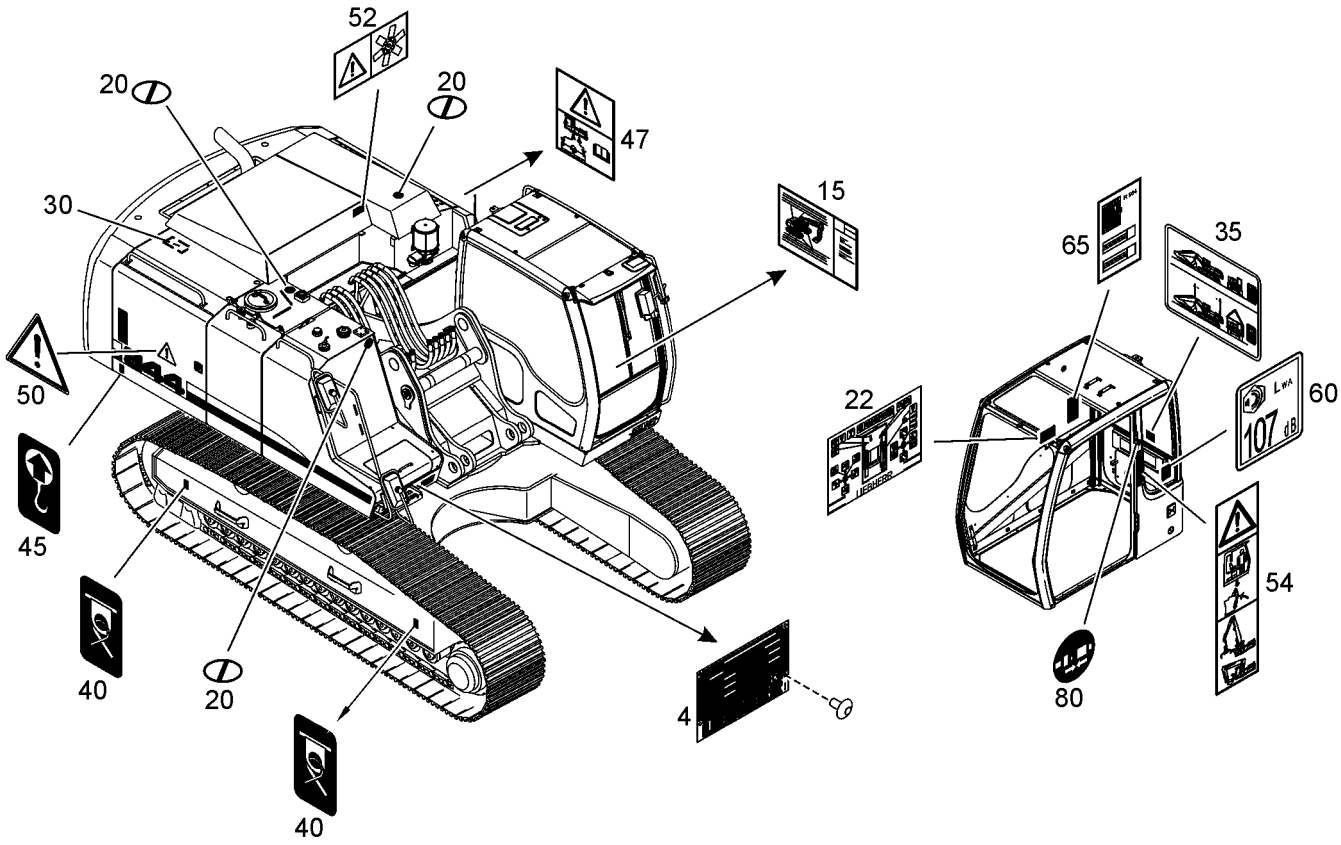

Fig. 2-1 *Arrangement of signage on the machine*

4	Nameplate	**47**	Safety plate, external start
15	Lubrication chart	**50**	Obstruction safety plate
20	Prohibiting sign	**52**	Engine-off safety plate
22	Operating symbols plate	**54, 1**	Accident prevention safety plate
30	Lubrication chart, engine	**54, 2**	Safety lever
35	Information plate, load and anchoring points	**54, 3**	Safety plate work equipment
40	Information plate, lashing points	**60**	Information plate – sound / power level [truck]
45	Information plate, stop-lift point	**65**	Load chart
		80	Information plate, safety belt

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2.4.2 Explanation of signage

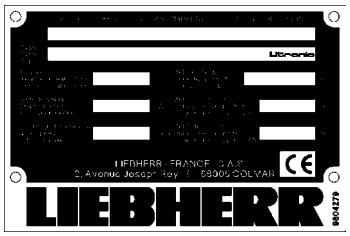

Plate 4: Machine nameplate LFR (Liebherr France) "CE"

The nameplate displays the following information:

- Vehicle identification number
- Type
- Construction year
- Engine output
- Top speed
- Permissible overall weight
- Permissible axle load, front
- Permissible axle load, rear

Plate 4: Machine nameplate LAM (Liebherr America)

The nameplate displays the following information:

- Type
- Vehicle identification number

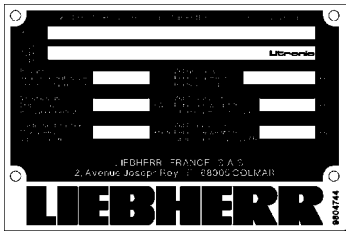

Plate 4: Machine nameplate LFR (Liebherr France)

The nameplate displays the following information:

- Vehicle identification number
- Type
- Construction year
- Engine output
- Top speed
- Permissible overall weight
- Permissible axle load, front
- Permissible axle load, rear

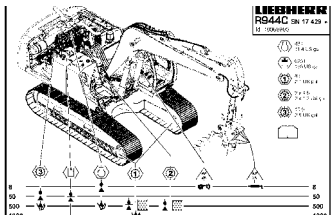

Plate 15: Lubrication chart

Displays the relevant capacities and the change intervals, grease quality, fill and lubrication positions.

Plate 20: Prohibiting sign

Entering the marked area is forbidden.

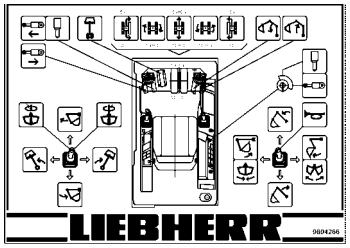

Plate 22: Operating symbols

Describes the functions of the operating devices which are not labelled.

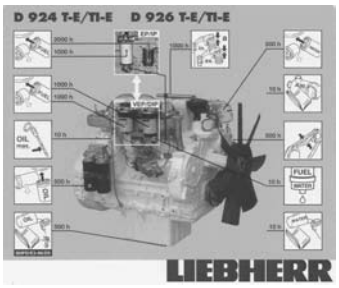

Plate 30: Lubrication chart, engine

Indicates the maintenance intervals for the diesel engine.

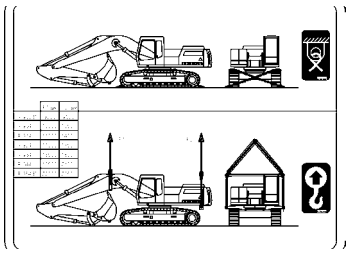

Plate 35: Loading and anchoring points

Identifies the positions of the loading and anchoring points, as well as the relevant weight of the machine.

Plate 40: Lashing point

Indicates the machine's lashing points.

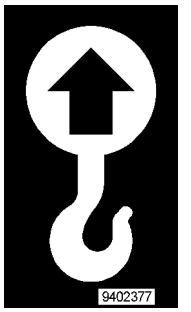

Plate 45: Stop-lift point

Indicates the machine's stop-lift points.

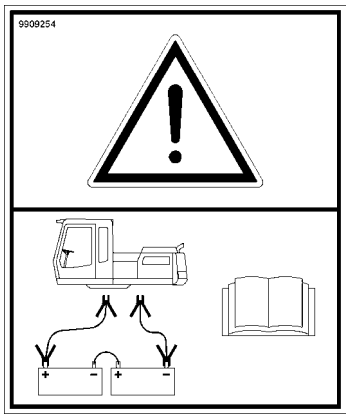

Plate 47: External starting

The information in the operating instructions must be carefully noted when starting externally.

Plate 50: Obstruction

It is forbidden to stand in the danger zone.

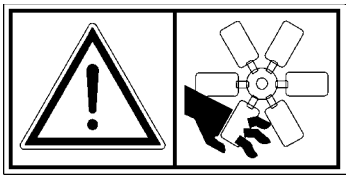

Plate 52: Engine-off

The engine hood may only be opened when the engine is switched off.

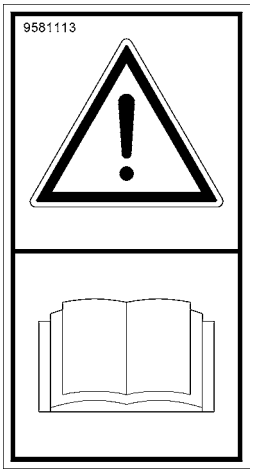

Plate 54, Part 1: Accident prevention

The accident prevention regulations given in the operating instructions must be carefully noted when operating the machine.

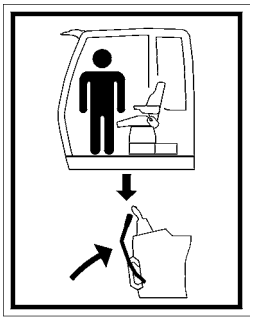

Plate 54, Part 2: Safety lever

Pull safety lever up fully before leaving the operator's seat.

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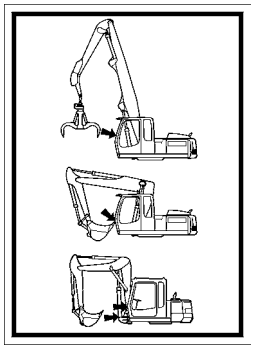

Plate 54, Part 3: Equipment

Work equipment reaches as far as the cab! Caution – work equipment retracted.

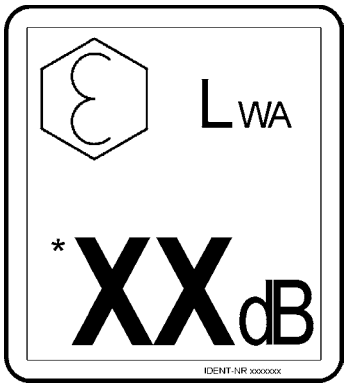

Plate 60: Sound/power level [truck]

Indicates the sound/power level of the machine to the environment in dB(A).

***XX =** The applicable weight for the machine is provided on the operator's cab.

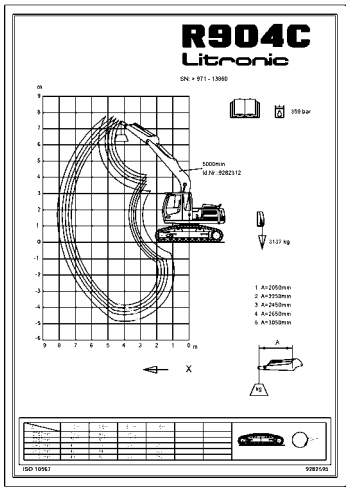

Plate 65: Load chart

Shows the permissible loads dependent on the working radius.

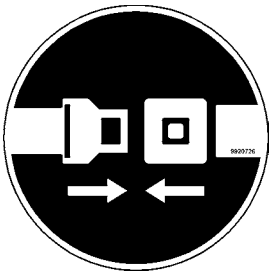

Plate 80: Safety belt

The safety belt must be fastened before starting the machine.

2.4.3 Nameplates on the machine

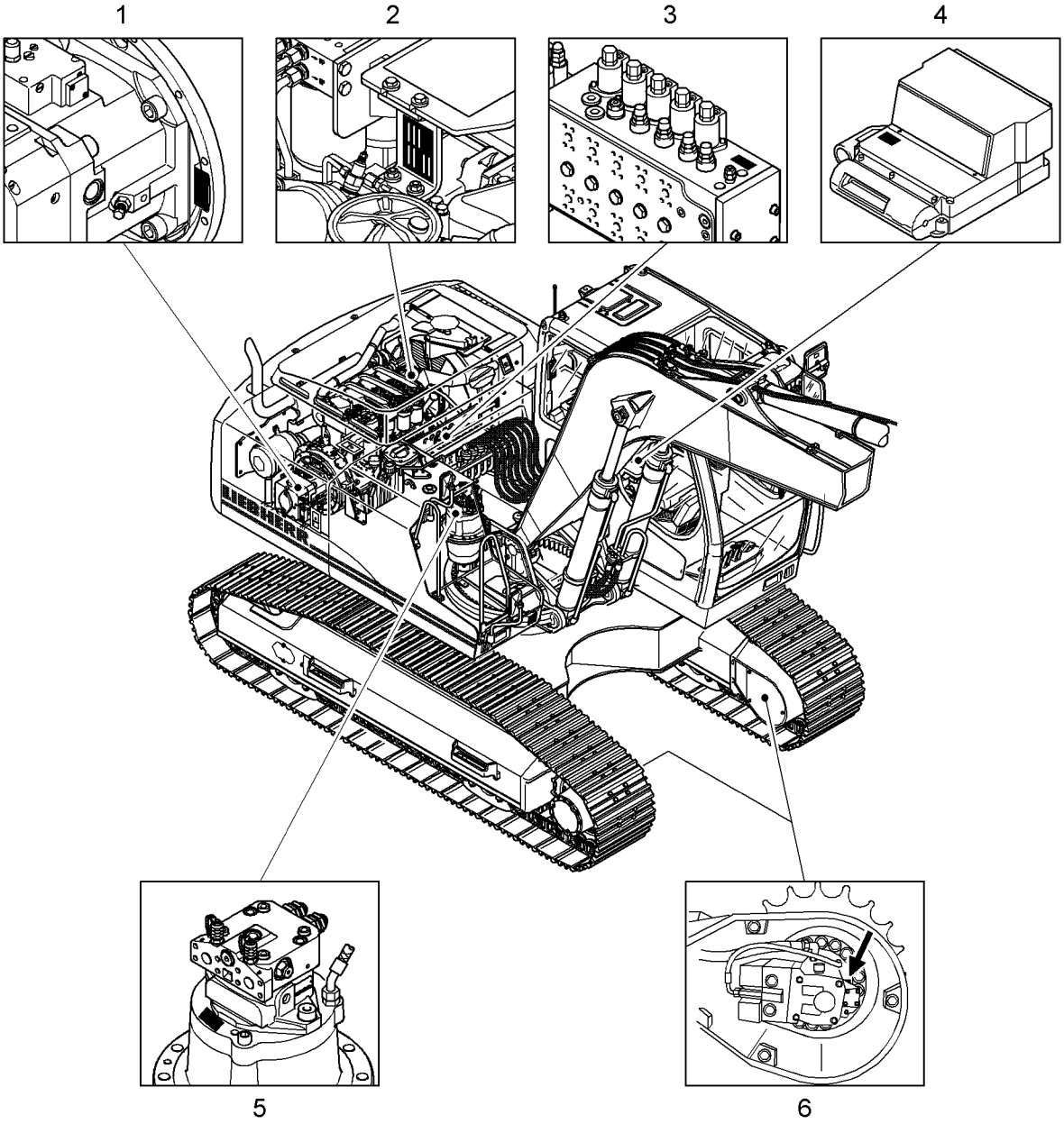

Fig. 2-2 *Important nameplates on the machine*

1 Hydraulic pump
2 Diesel engine
3 Control block
4 Heating/air conditioning device
5 Slewing gear transmission
6 Drive transmission with oil motor

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3 Control and operation

3.1 Operating and control elements

3.1.1 Overview of the operator's standing position

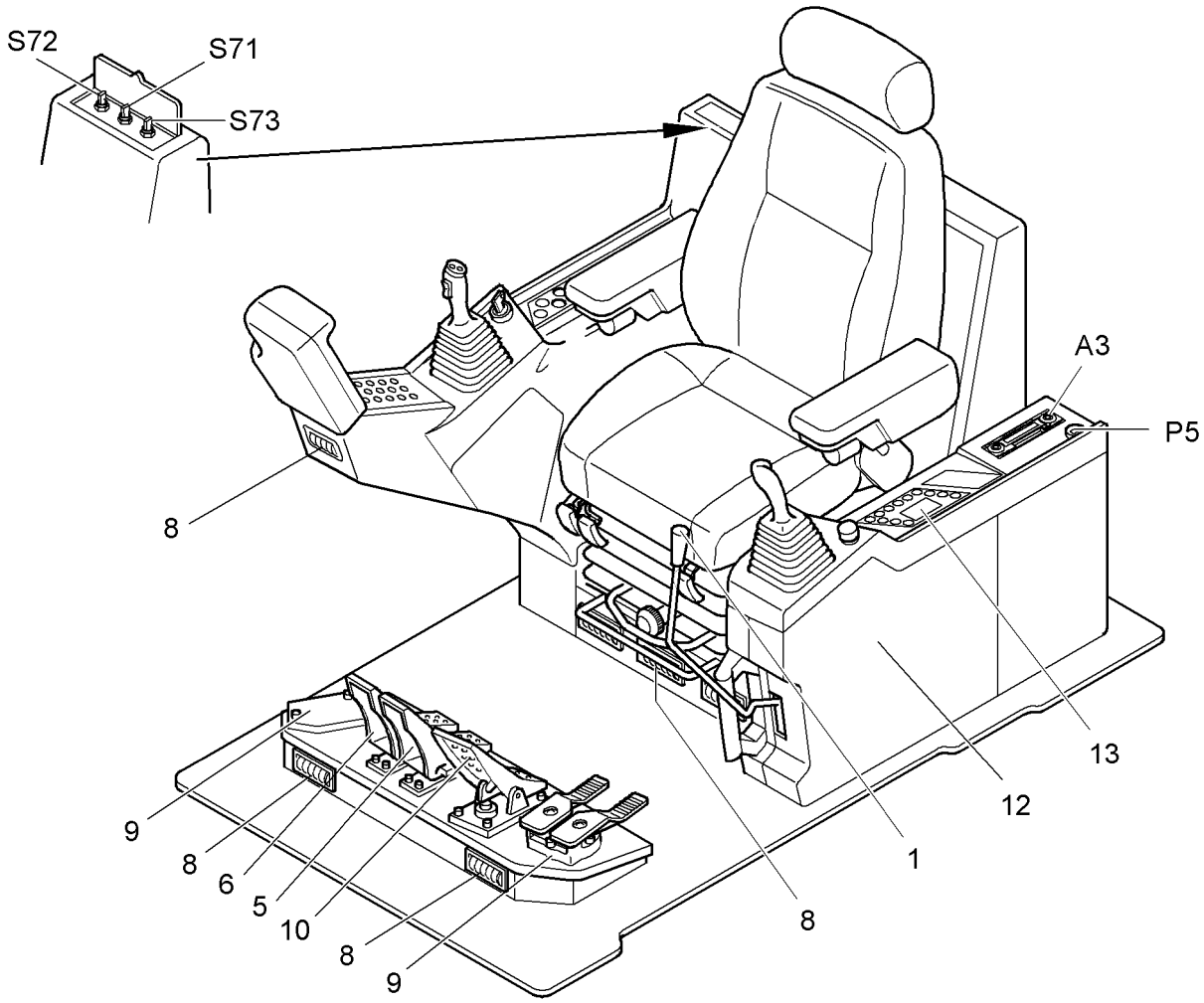

Fig. 3-1 *Operator's standing position*

1	Servo control safety lever	**13**	Heating/air-conditioning system
5	Pedal for left drive unit	**A3**	Radio (optional extras)
6	Pedal for right drive unit	**P5**	Operating hours counter
8	Air vent, heating	**S71**	Automatic / manual speed adjustment switch
9	Equipment operation (optional extras)	**S72**	+ / - speed switch
10	Positioning swing brake (optional extras)	**S73**	Emergency operation switch
12	Fuse box		

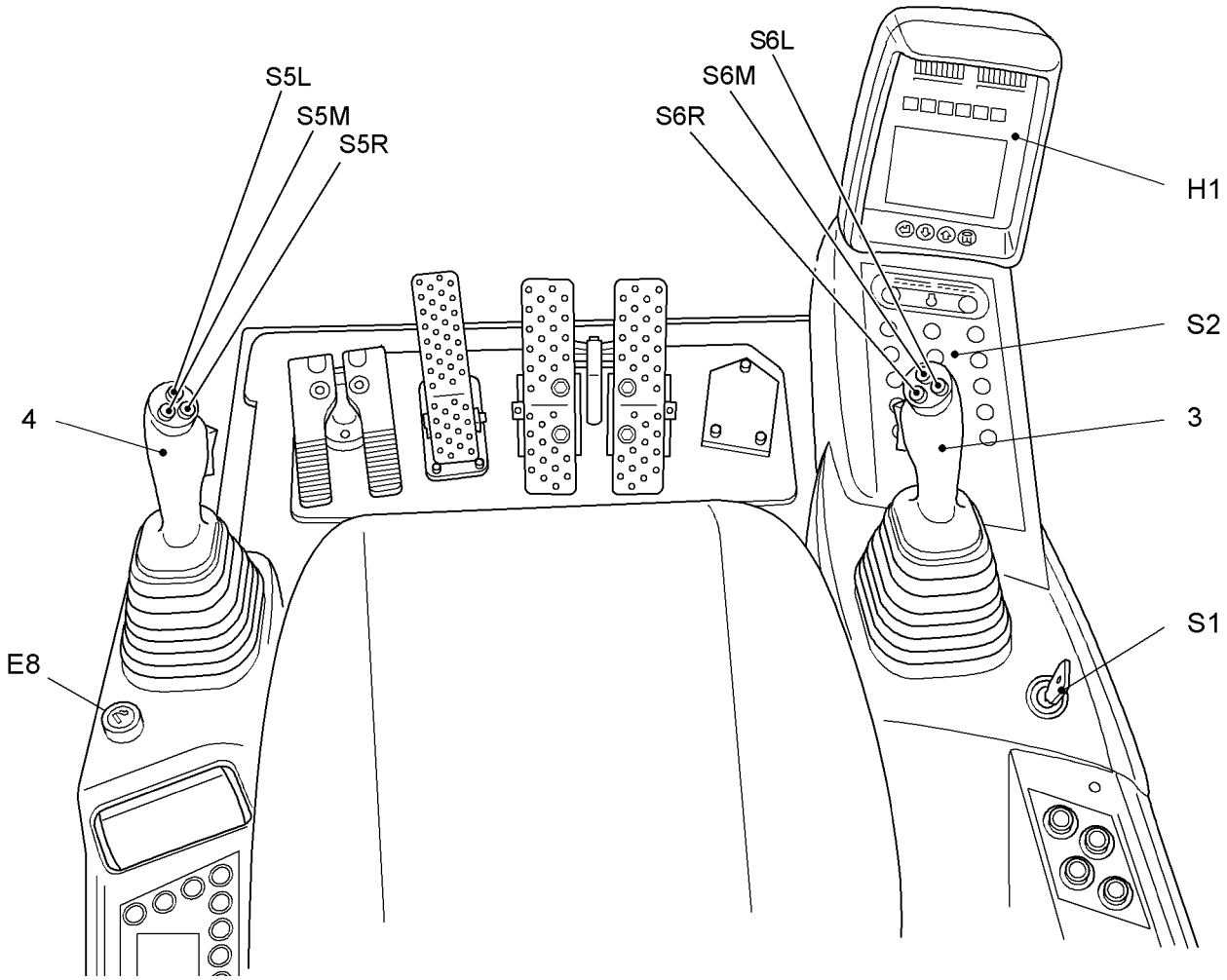

Fig. 3-2 *Operator's standing position, seen from the operator's point of view*

3	Joystick, right	**S5L**	Push button / rotating device left (grapple,...)
4	Joystick, left	**S5M**	Push button / horn
E8	Cigarette lighter	**S5R**	Push button / rotating device right (grapple,...)
H1	Monitoring display	**S6L**	Push button / lifting magnet
S1	Ignition switch	**S6M**	Push button / reserve
S2	Keypad	**S6R**	Push button / travel alarm

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3.1.2 Arrangement of joystick

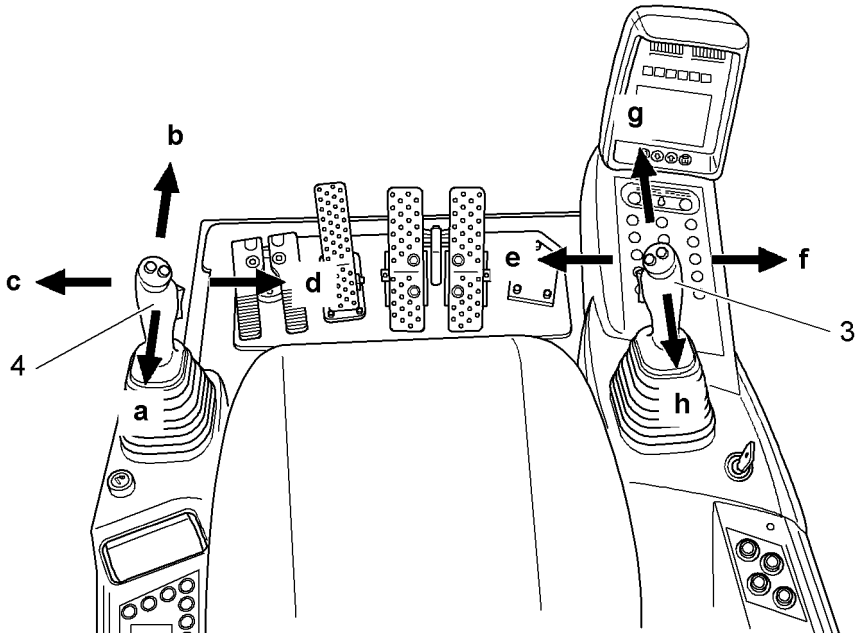

Fig. 3-3 *Joystick, right (**3**) and left (**4**)*

Standard control

The left joystick (**4**) controls the stick and slewing movements.

– Direction of movement **a** and **b**: Stick is drawn in or out.
– Direction of movement **c** and **d**: Upper carriage is rotated to the left or to the right.

The right joystick (**3**) controls the boom or bucket and grab movements.

– Direction of movement **e** and **f**: Bucket will be tilted up or down, grab will close or open.
– Direction of movement **g** and **h**: Boom will be raised or lowered.

Note !
From delivery, the machine is equipped with the standard control system correponding to the norm ISO. Nevertheless, the machine can be equipped with a commutation circuit allowing the use of a special control system (for example LIEBHERR control system).

3.1.3 Keyboard

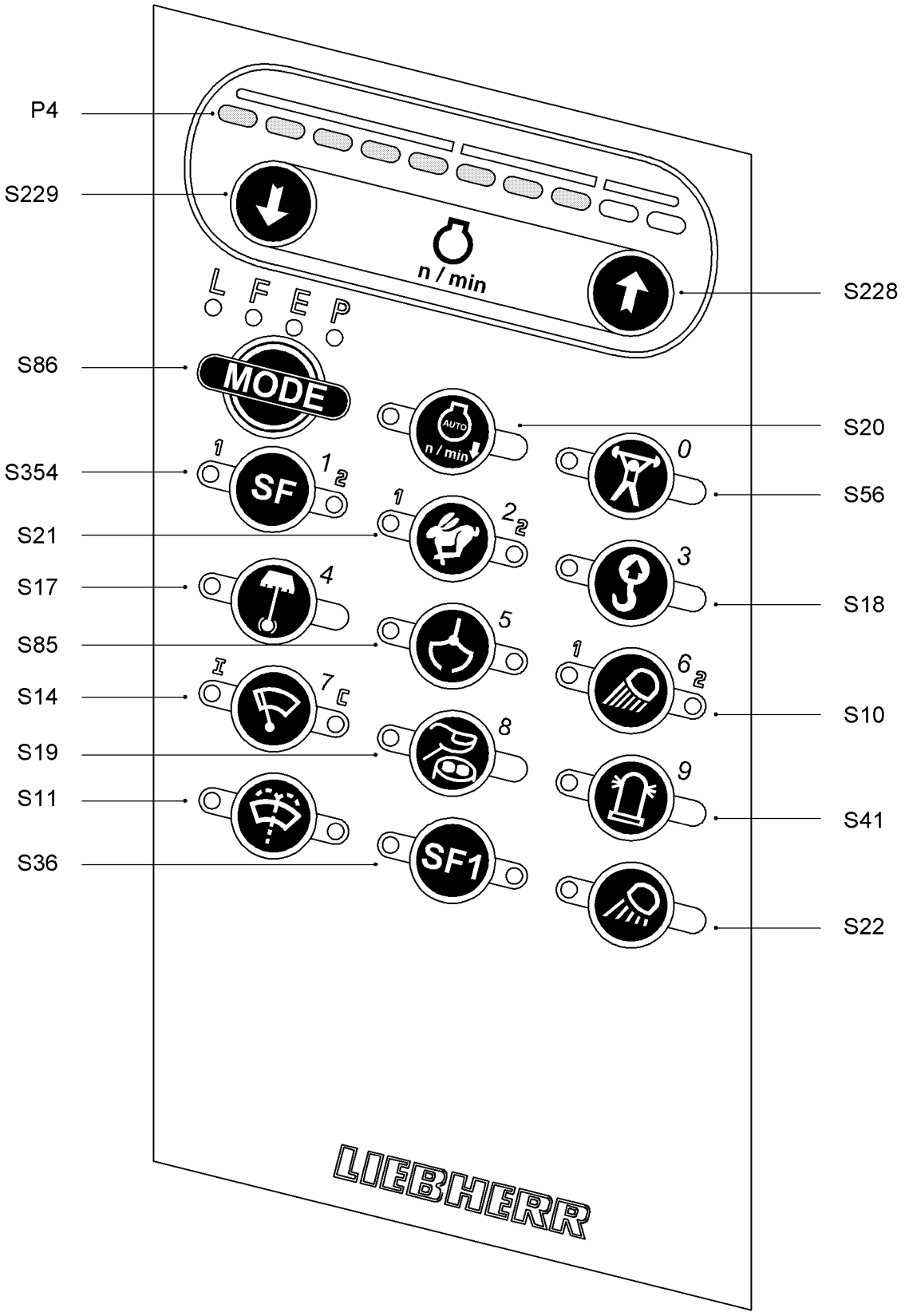

Fig. 3-4 *Excavator keypad*

(M) These functions are memorized when stopping the excavator

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S10 - **Attachment and uppercarriage headlights**

- ▶ Press the switch.
  - ↳ Uppercarriage headlight is activated.
  - ↳ LED 1 in the switch illuminates.
- ▶ Press switch again.
  - ↳ Uppercarriage headlight is deactivated.
  - ↳ LED 1 in the switch goes out.
  - ↳ Attachment headlight is activated.
  - ↳ LED 2 in the switch illuminates.
- ▶ Press switch again.
  - ↳ Driving light and equipment headlight are switched on.
  - ↳ LEDs 1 and 2 in the switch illuminate.
- ▶ Press switch again.
  - ↳ Attachment and uppercarriage headlights are switched off.
  - ↳ LEDs 1 and 2 in the switch go out.

S11 – **Windscreen washing unit**

- ▶ Press and hold button.
  - ↳ Washing water will be sprayed onto the windscreen through the outlet nozzles.
  - ↳ The windscreen washer runs continuously.
- ▶ Release the button.
  - ↳ Washing water will be stopped.
  - ↳ Windscreen washer will run continuously for approx. another 3 seconds.

S14 – **Windscreen washer**

- ▶ Press switch.
  - ↳ Intermittent setting is activated.
  - ↳ LED I in the switch illuminates.
- ▶ Press switch again.
  - ↳ Continuous operation is activated.
  - ↳ LED C in the switch illuminates.
  - ↳ LED I in the switch goes out.
- ▶ Press switch again.
  - ↳ Windscreen washer is switched off.
  - ↳ LED C in the switch goes out.

In addition the pause time for the intermittent mode can be adjusted as follows using push button S14.

- ▶ Select the intermittent mode and keep the button S14 depressed
  - ↳ After a few seconds the light diode I will start blinking rapidly
- ▶ Release the push button when the blinking duration has reached the desired pause time. Adjustment is possible between 2 and 9 seconds.

S17 – **Slewing gear brake**

- ▶ Press switch.
  - ↳ Slewing gear brake is blocked.
  - ↳ Upper carriage is locked.
  - ↳ LED in the switch illuminates.
- ▶ Press switch again.
  - ↳ Slewing gear brake is in position semi-automatic.
  - ↳ LED in the switch goes out.

S18 – Overload warning device (optional extra)

▶ Press switch.
  ↳ Overload warning device is activated.
  ↳ LED in the switch illuminates.

▶ Press switch again.
  ↳ Overload warning device is deactivated.
  ↳ LED in the switch goes out.

❑ If no overload warning device is built in.

▶ Press switch.
  ↳ The symbol for "No overload warning device is present" appears on the monitoring screen.

  ↳ LED in the switch illuminates.

▶ Press switch again.
  ↳ The symbol for "No overload warning device is present" goes out.
  ↳ LED in the button goes out.

S19 – Activation of rotating device

▶ Press switch.
  ↳ The function rotating device (eg. rotating grapple) is activated.
  ↳ LED in the switch illuminates.

▶ Press switch again.
  ↳ The function rotating device is deactivated.
  ↳ LED in the switch goes out.

S20 – Automatic low idling

▶ Press switch.
  ↳ Automatic low idling is activated.
  ↳ LED in the switch illuminates.

▶ Press switch again.
  ↳ Automatic low idling is deactivated.
  ↳ LED in the switch goes out.

The timing set of automatic low idling can be done as follows using push button S20.

▶ Activate the automatic low idling and keep the button S20 depressed.
  ↳ After a few seconds the light diode will start blinking rapidly.

▶ Release the push button when the blinking duration has reached the desired time. Adjustment is possible between 2 and 9 seconds.

S21 - High speed gear

▶ Press the switch.
  ↳ Transfer from slow drive to fast drive is activated.
  ↳ LED 1 in the switch illuminates.

While driving, the machine will automatically transfer from slow drive to fast drive. LED 2 illuminates after transfer to fast drive.

▶ Press switch again.
  ↳ Transfer from slow drive to fast drive is deactivated.
  ↳ LED 1 in the switch goes out.

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S22 - Additional headlight (optional extra)

- ▶ Press the switch.
  - ↳ Additional headlight is switched on.
  - ↳ LED in switch illuminates.
- ▶ Press switch again.
  - ↳ Additional headlight is switched off.
  - ↳ LED in the switch goes out.

S36 – No function

S41 – Rotating beacon (optional extra)

- ▶ Press switch.
  - ↳ Rotating beacon is switched on.
  - ↳ LED in the switch illuminates.
- ▶ Press switch again.
  - ↳ Rotating beacon is switched off.
  - ↳ LED in the switch goes out.

S56– Primary pressure increase (optional extra)

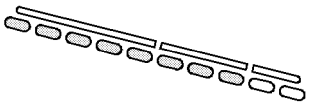
- ▶ Press switch.
  - ↳ The opening pressure of the primary relief valve is higher.
  - ↳ The force on the working attachment is increased and simultaneously, the movements of the machine become slow.
  - ↳ LED in the switch illuminates.
- ▶ Press switch again.
  - ↳ The opening pressure of the primary relief valve is set back at its initial value.
  - ↳ LED in the switch goes out.

S85 – No function

S86– Selection of the function mode

Four different modes can be selected by pressing the switch. The currently active mode will be displayed under the letter on the LED.

- **L**: LIFT mode (speed level 5)
- **F**: FINE mode (speed level 10)
- **E**: ECO mode (speed level 8)
- **P**: POWER mode (speed level 10)



P4– Engine speed display

The speed range of the diesel engine is displayed in 10 levels.

S228 – Engine RPM increase

- ▶ Press switch.
  - ↳ RPM will be increased by one level.
  - ↳ A second LED to the right illuminates in display P4.

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S229 – Engine RPM decrease

▶ Press switch.
↳ RPM will be decreased by one level.
↳ A second LED from the right goes out in display P4.

S354– No function

3.1.4 Monitoring display

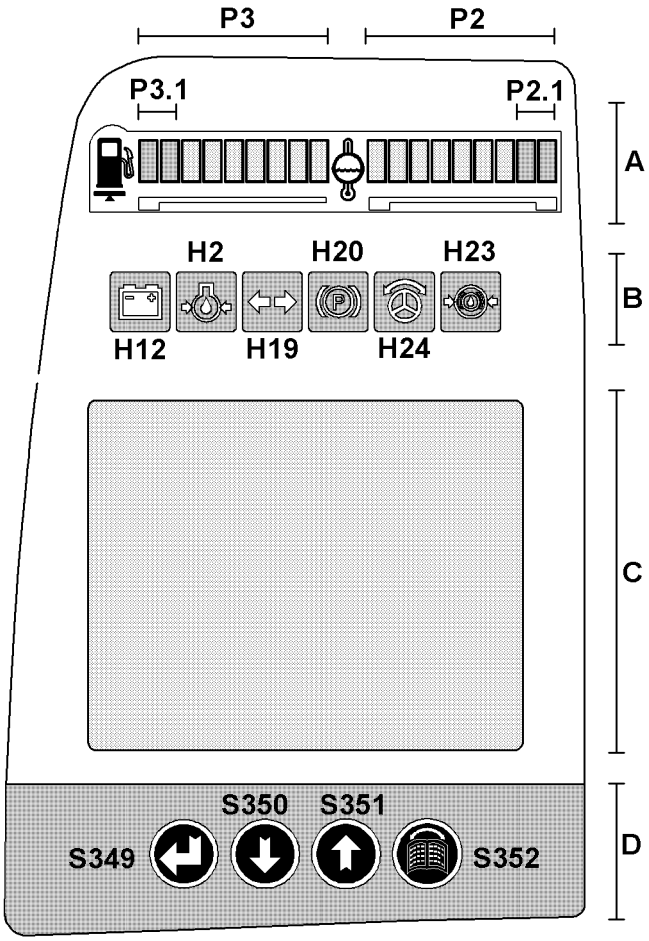

Fig. 3-5 *Monitoring display*

A	Analog-value display	**H24**	No function
B	Indicator lights	**P2**	Coolant temperature display
C	LCD screen	**P2.1**	Coolant temperature display red area
D	Menu control buttons	**P3**	Fuel level display
H2	Indicator light, engine oil pressure	**P3.1**	Fuel level display red area
H12	Indicator light, battery	**S349**	Back button
H19	No function	**S350**	Down button

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H20 No function
H23 No function
S351 Up button
S352 Menu button

Area A : Analog-value display

P2 –Diesel engine coolant temperature display

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

In the event of overheating (over 100 °C / 212 °F during more as 3 seconds), the red LEDs **P2.1** at the end of indicator **P2** light up.

Simultaneously, the buzzer in the cab also sounds and the error will be saved as error code **E 503**.

The engine power is automatically reduced.

▶ Stop working as soon as possible.

▶ Allow the engine to continue to idle high.

❑ If the alarm warning exceeds 60 seconds.

▶ Allow the engine to low idle for another 3 to 5 minutes.

▶ Switch off the engine.

▶ Find and correct the cause of the problem.

❑ If the overheating is stronger (over 104 °C / 219 °F during more as 7 seconds), the corresponding symbol is displayed on the main screen and the error will be saved as error code **E 523**.

▶ Switch off the engine immediately.

P3 – Fuel level display

The display's illuminating LEDs indicate the amount of fuel remaining in the tank.

When the red LEDs **P3.1** illuminate, a reserve quantity of 10-20% is still in the tank, depending on the type of machine.

Area B :Indicator lights

H2 – Indicator light, low engine oil pressure

The indicator light illuminates if the engine oil pressure drops below a given value during more than 3 seconds when the machine is operating.

The buzzer in the cab also sounds.

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

▶ Bring the engine to a low idle immediately.

▶ Switch off the engine immediately.

❑ If the pressure remains too low for 5 other seconds, the corresponding symbol is displayed on the main screen and the error will be saved as error code **E 522**.

▶ Find and correct the cause of the problem.

H12 –Indicator light, battery charge

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

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

When the machine is operating, this indicator light illuminates if the alternator belt or the electrical charging system are defective.

- ▶ Bring the engine to a low idle immediately.
- ▶ Allow the engine to idle for approximately 5 seconds.
- ▶ Switch off the engine.
- ▶ Find and correct the cause of the problem.

H19 – No function

H20 –No function

H23 – No function

H24 – No function

Area D : Menu control buttons

Fig. 3-6 *Menu control buttons*

The screen can be operated using the following 4 buttons:

– **S349**: **Back** button
– **S350**: **Down** button
– **S351**: **Up** button
– **S352**: **Menu*** button

* = Change from main to submenus

These buttons can be used to jump from the main menu to the submenus or to move from page to page.

Area C: LCD Screen

To change the screen contrast:

- ▶ Press button **Menu** and arrow button **Up** (higher contrast) or **Down** (lower contrast) simultaneously.
  ↳ The value set will be saved.

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To alter the brightness of the main screen:

▶ Press button **Back** and arrow button **Up** (brighter) or **Down** (darker) simultaneously.
↳ The value set will be saved.

Note!
A light sensor built in to the top left of the monitoring screen adapts the illumination on the main screen to the brightness of the environment. The adaptation is done from saved set value. Illumination will be automatically reduced in conditions of low environmental brightness and inversely.

To change the brightness and the contrast setting to the initial setting:

▶ Turn off the ignition.

▶ Press and hold the **Up** and **Down** buttons simultaneously.

▶ Turn on the ignition again.

▶ Release the buttons once the automatic check is completed.

3.1.5 Main screen (DISP02 R5.2 Software V4.4)

The main screen appears when the machine has been switched on and remains on display until the screen is changed over to the menu selection screen using the **Menu** button.

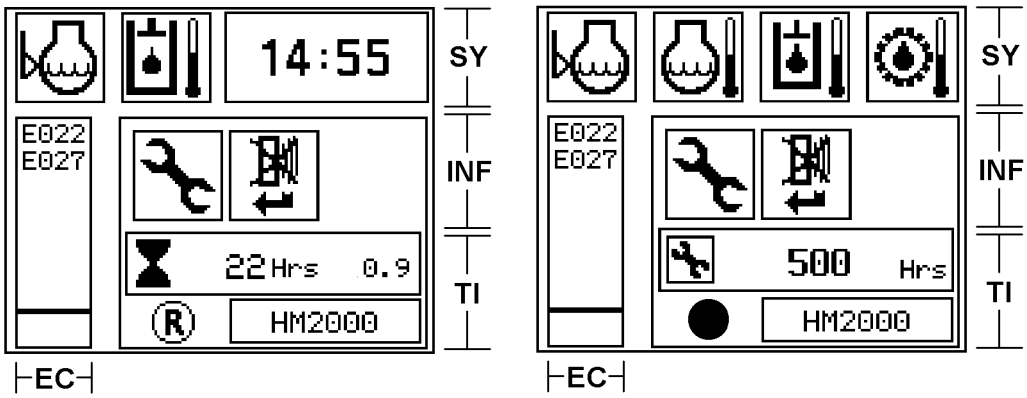

Fig. 3-7 *Main screen*

EC	Error codes of electrical errors	**SY**	Symbols of operating faults, clock
INF	Information symbols	**TI**	Display of hour meters, flow limitations, ...

Main screen design

SY field

The upper field of the screen shows the warning symbols for the actual operating faults and also the clock.

Should more than two symbols be shown, so the clock is not displayed any more and up to four symbols can be shown at the same time in the field SY.

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 13).

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 16).

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 (siehe “Menu "Info In/Outputs"- Status of hydraulic pumps and of electrical inputs and outputs” auf Seite 23).

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 20).

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.

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Warning symbols for operating faults in the SY field

Each of the following symbols will be assigned an error code in the form “E 5xx”. Each occuring error will be stored via the relevant error code.

E 502–Coolant low

This symbol appears if the coolant level drops below the water sensor level.

The buzzer sounds simultaneously.

- ▶ Bring the engine to a low idle immediately.
- ▶ Switch the engine off as quickly as possible.
- ▶ Localise the leak and carry out repairs.

Caution!

This coolant level monitoring device achieves an increased security for the engine in case of larger amounts of water loss (e.g. hose rupture). It does not relieve the operator or maintenance personnel from the responsibility of regularly checking the coolant level in the expansion reservoir.

E 503 –Coolant overheat - Warning stage

This symbol appears simultaneously with the two red leds on the coolant temperature gauge **P2** if the coolant temperature exceeds 100°C during at least 3 seconds. The buzzer sounds simultaneously and the engine power is reduced.

If the temperature increases some more, the symbol E523 will also be displayed.

E 504–Hydraulic oil level low

This symbol appears if the oil level in the hydraulic tank drops below the minimum level.

The buzzer sounds simultaneously.

- ▶ Bring the engine to a low idle immediately.
- ▶ Switch the engine off as quickly as possible.
- ▶ Find the leak.
- ▶ Depressurize the hydraulic tank.
- ▶ Carry out repairs.
- ▶ Only refill the hydraulic oil using the return-line filter.

E 505 –Hydraulic oil overheat

This symbol appears if the hydraulic oil temperature in the tank exceeds 99 °C.

- ▶ Bring the engine to a low idle immediately.
- ▶ Switch the engine off after a few seconds.
- ▶ Localise and rectify the error (radiator dirty etc.).

E 506 – Splitterbox oil overheat

This symbol appears if the oil temperature in the splitterbox exceeds 100 °C. (This temperature monitoring is connected only on modells R954C and above).

- ▶ Bring the engine to a low idle immediately.
- ▶ Switch the engine off after a few seconds.
- ▶ Localise and rectify the error.

E 511 – Over voltage for the BBT

This symbol appears if the operating voltage for the BBT exceeds 30 volts for at least 0.5 seconds.

E 512 – Under voltage for the Diesel control system

This symbol appears if the operating voltage for the Diesel control system is lower than the minimum permissible value.

E 513 – Over voltage for the Diesel control system

This symbol appears if the operating voltage for the Diesel control system exceeds the maximum permissible value.

E 516 – Safety shut off for EDC default

This symbol appears if an EDC default is detected. The engine shut off automatically.

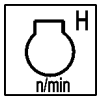
E 517 – Safety shut off for injector default

This symbol appears if an injector default is detected. The engine shut off automatically.

E 518 – Safety shut off for startsynchronisation default

This symbol appears if a **startsynchronisation** default is detected. The engine shut off automatically.

E 519 – Overspeed of Diesel engine - Warning stage

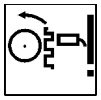


This symbol appears if the RPM of the Diesel engine is too high.

E 520 – Overspeed of Diesel engine - Safety stage

This symbol appears if the RPM of the Diesel engine is too high. The engine shut off automatically.

E 521 – Defect of both engine RPM sensors



This symbol appears if **both engine RPM sensors are simultaneously defective**. The engine shut off automatically.

For machine equipped with a lifting magnet, the symbol appears if one only of the both sensor is defective. In this case, the engine does not shut off automatically.

E 522 – Low engine oil pressure - Safety stage

This symbol appears if the engine oil pressure is, during at least 7 seconds, below a programmed value depending on the engine RPM. The buzzer sounds simultaneously.

E 523 – Coolant overheat - Safety stage

This symbol appears if the coolant temperature exceeds 104°C during at least 7 seconds. The buzzer sounds simultaneously and the engine power is reduced.

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E 524 – Boost air overheat - Safety stage

This symbol appears if the boost air temperature exceeds 80°C during at least 7 seconds. The buzzer sounds simultaneously and the engine power is reduced.

E 525 – Engine in safety mode

This symbol appears if, when the engine is in safety mode, one of the following engine error is detected: E501, E503, E597, E522, E523 or E524.
Simultaneously the buzzer sounds and the LED H60 is on.

▶ Bring the engine to a low idle and turn it off as soon as possible.

E 526 – Fuel overheat - Warning stage

This symbol appears if the fuel temperature is above the warning limit.

E 527 – Fuel overheat - Safety stage

This symbol appears if the fuel temperature is above the safety limit.

E 528 – Water in the fuel filter

This symbol appears if the water level in the fuel filter is too high.

E 530 – Centralized symbol - safety limit exceeded

This symbol appears simultaneously with the one of the safety stage errors : E522, E523, E524, E527, E533, E535, E537 or E539.

E 532 – Low fuel pressure - Warning stage

This symbol appears if the fuel pressure is under the warning limit.

E 533 – Low fuel pressure - Safety stage

This symbol appears if the fuel pressure is under the **safety** limit.

E 534 – High fuel pressure - Warning stage

This symbol appears if the fuel pressure is above the warning limit.

E 535 – High fuel pressure - Safety stage

This symbol appears if the fuel pressure is above the **safety** limit.

E 597 – Boost air overheat - Warning stage

This symbol appears if the boost air temperature exceeds 75°C during at least 3 seconds. The buzzer sounds simultaneously and the engine power is reduced.

If the temperature increases some more, the symbol E524 will also be displayed

Quick change adapter (optional equipment)

This symbol appears during the unlocking procedure or when the locking pins of the quick change adapter are not completely out.
No error code is corresponding to this symbol.

Information symbols in the INF field

Preheating

This symbol appears as long as the preheating of the air in the intake manifold is activated (preglow process).

End of preheating

Preheating will stop automatically after about 20 seconds and the symbol **End of preheating** is displayed for approx. 2 seconds on the main screen.

Manual Diesel speed adjustment

This symbol informs the excavator's operator that the Diesel engine is actually operated in safety mode, either after starting the engine using the switch S71, or due to an automatic commutation consecutive to a communication default in the control system.

Service due

This symbol indicates that the moment for carrying out the next recurring service work is due.

▶ Get the the service work carried out within the prescribed delay,or report the falling due to your supervisor .

When the electrical system of the machine is turned on again, this symbol and the hours for the next service falling due are displayed for approx. 10 seconds in place of the current operating hours.

The symbol will go out after the execution of the programmed service work has been confirmed, see the menu "set service" thereafter.

Acknowledge error

This symbol appears if an operating fault of the machine (**E5xx type error code**) has occurred and the buzzer sounds simultaneously.

It informs the operator that he can, after having recognised the occured fault, press the **back** key to stop the buzzer.

“Increased care required” - servo-control circuit in safety mode

This symbol alerts the operator that the servo-pressure circuits have been turned into safety mode (switch **S73** is tilted in safety position).

Swing brake not operative

This symbol alerts the operator that the swing brake control circuit is out of function due to the turning into safety mode of the servo-control via switch S73.

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Servo control operation changed

This symbol appears if switch **S73** is tilted into the safety mode position.

Overload warning device (optional equipment)

For a machine fitted with the optional equipment "overload warning device", and if this equipment has been turned on via the switch S18, this symbol alerts the operator that the load limit of the machine has been reached

At the same time the buzzer sounds to alert the operator to this fact.

No overload warning device recognized

This symbol appears if switching on the overload warning device via switch **S18** though no overload warning device has been installed and/or correctly initialised on the machine.

Warm up procedure

This symbol appears during a warm up procedure of the Diesel engine or of the hydraulic oil.

Display on the screen of the information provided in menus

Menu selection from main screen

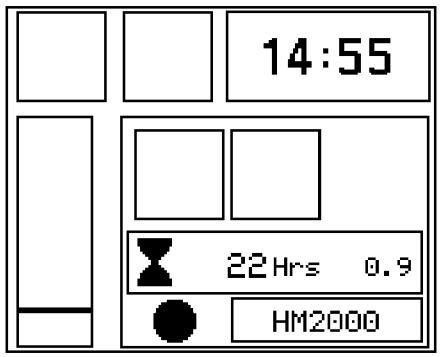


Fig. 3-8 *Main screen*

❑ To change to the list of menus, the main screen must be visible.

▶ With the main screen visible, press the **Menu** key of the display.
↳ The list of accessible menus is displayed.

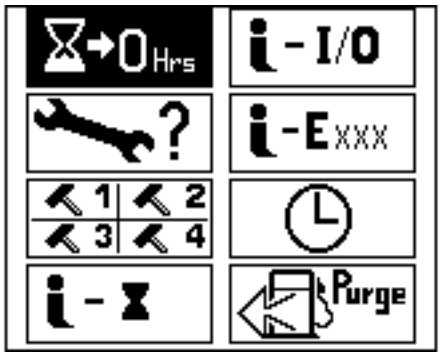


Fig. 3-9 *List of menus.*

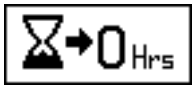
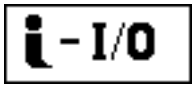
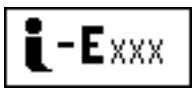
To select a menu:

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

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

▶ Press the **Menu** key again.
  ↳ The sub-menu for the function selected is displayed.

▶ Press the **Back** key again.
  ↳ The sub-menu will be aborted.

Symbol of menu	Denomination of menu	Role of the menu
	Reset Data	Reset of daily operating hours counter
	Set Service	Confirmation of the execution of a recurring service work
	Set Option	Selection of the flow and pressure limitations relating to the mounted working tool (e.g. hammer)
	Info - Hours	Display of the operating hours of the machine components and general machine data.
	Info - In/Outputs	Information about the status of the hydraulic pumps and of the electrical inputs and outputs
	Info - Errors	Memory of the stored operating faults and electrical system errors
	Set Clock	Setting of the clock

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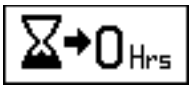
Symbol of menu	Denomination of menu	Role of the menu
	Purge	Bleeding of the high pressure fuel system

Tab. 3-1 Overview of the possible menus



Menu "Reset Data" - reset of daily operating hours counter

The daily operating hours counter can be reset to 0 using this menu.

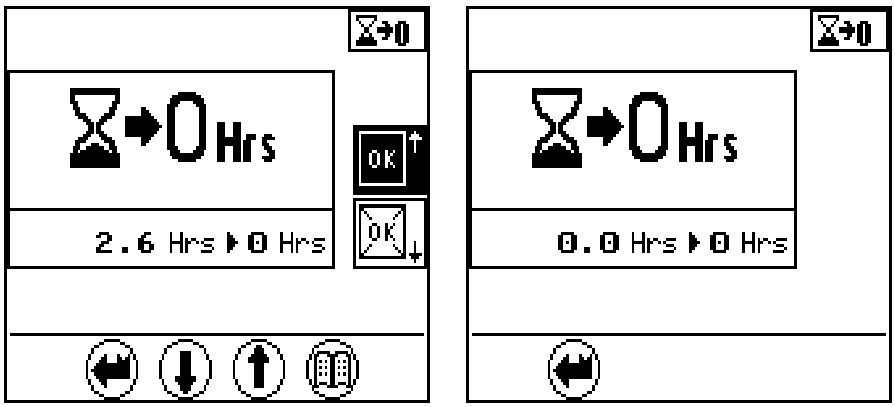


Fig. 3-10 Resetting the daily operating hours counter

- ▶ Press the **Up** arrow key.
  - ↳ The OK which is not crossed out will be displayed with a black background.
- ▶ Press the **Menu** key.
  - ↳ The operating hours will be reset to 0.
  - ↳ The arrow key symbols **Up** and **Down** and the **Menu** symbol will no longer be displayed.

To exit the menu:

- ▶ Press the **Back** key.
  - ↳ The sub-menu will be aborted.

Menu "Set Service" - confirmation of the execution of a recurring service work

This menu gives information about the falling due of the next service work and allows to confirm the execution of the service work after it just has been carried out.

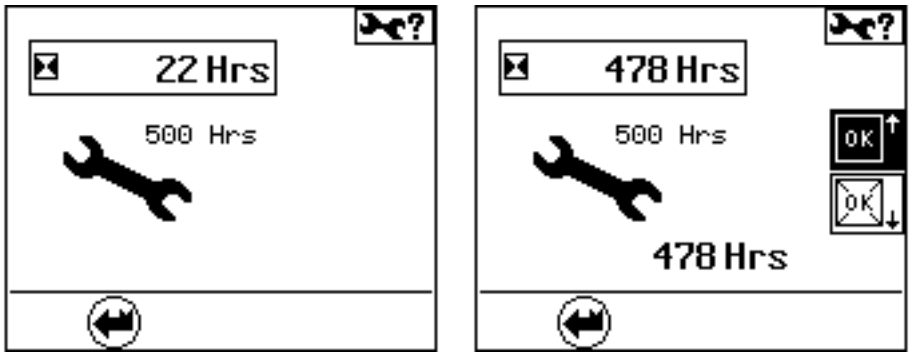


Fig. 3-11 *Menu "Set Service"*

The operating hours of the next service due (in this example, “500 Hrs”) and the current operating hours (“478 Hrs”) are displayed in the menu.

An upcoming service work can be confirmed a maximum of 50 operating hours before the service interval is due.

When this time period has been reached a query will appear to ask whether the service work has been carried out.

❑ If the service work has been carried out.

▶ Press the **Up** arrow key.
↳ The choice "OK not crossed out" will be displayed with a black background.

▶ Press the **Menu** key.
↳ The current operating hour will be stored as the time for the last carrying out of a recurring service work.
↳ The operating hours indicating the next service due will be increased by the duration of a service interval (as an example they augment from 500 to 1000 working hours).

❑ If the service work has not been carried out.

▶ Press the **Back** key.
↳ The sub-menu will be aborted.

Menu "Set option" - selection of the flow and pressure limitations

This menu allows to allocate flow and pressure limitation options to external input I1 (choice of the maximum oil flows and system pressure depending on the mounted working tool).

In this menu, the operator can choose between 10 predefined options. For each option a pressure limitation and a flow limitation is assigned. When an option is chosen, the limitation values assigned to this option are effective as soon as the command of the optional tool is actuated (actuation of the foot pedal for hammer or grapple for example).

Caution!
Selecting a wrong option for a tool can damage it (for example: hydraulic hammer) or cause its restricted operation (for example: milling tool).

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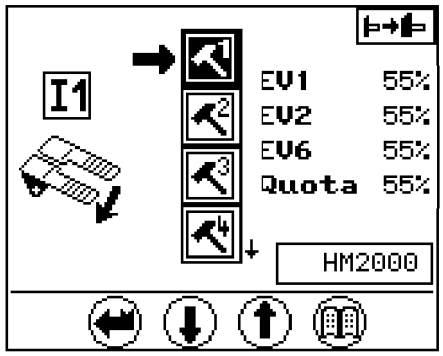

Fig. 3-12 *Menu "Set option"*

EV1 = Solenoid valve for oil flow limitation 1

EV2 = Solenoid valve for oil flow limitation 2

EV6 = Solenoid valve for pressure limitation

Quota = not used

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.

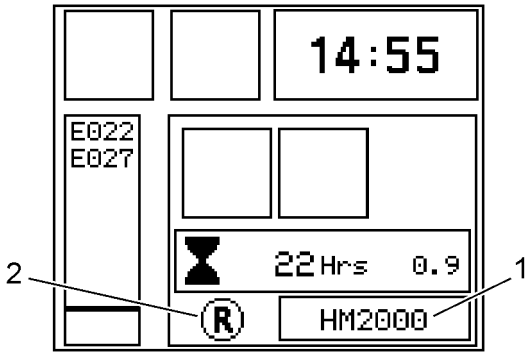

Fig. 3-13 *Main screen, the chosen option is displayed*

1 Denomination of the active option

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

Note!
The standard denomination of the options are "Option 1", "Option 2"...
Liebherr or its customer department can assign a more concrete name to each option, for example "HM2000" or "Grapple", ...

Menu "Info Hours" - operating hours of machine components

In this menu the screens 1/4 to 3/4 provide an overview of the operating hours of specific components, of duration of processes and operating types.

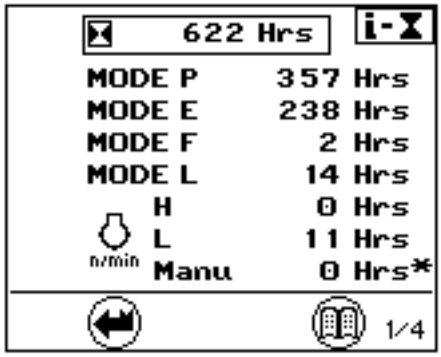

Fig. 3-14 *Menu "Info Hours" - operating hours of Diesel engine*

The screen 1/4 indicates the operating hours for:

– Diesel engine in P mode
– Diesel engine in E mode
– Diesel engine in F mode
– Diesel engine in L mode
– Diesel engine at maximum RPM
– Diesel engine at low idle
– Diesel engine with RPM adjustment in manual control

▶ Press the **Menu** key.
↳ the screen 2/4 is displayed.

The screen 2/4 provides the operating hours for:

– Working attachment movements using the joystick
– Travelling motion with normal and increased travel speed.

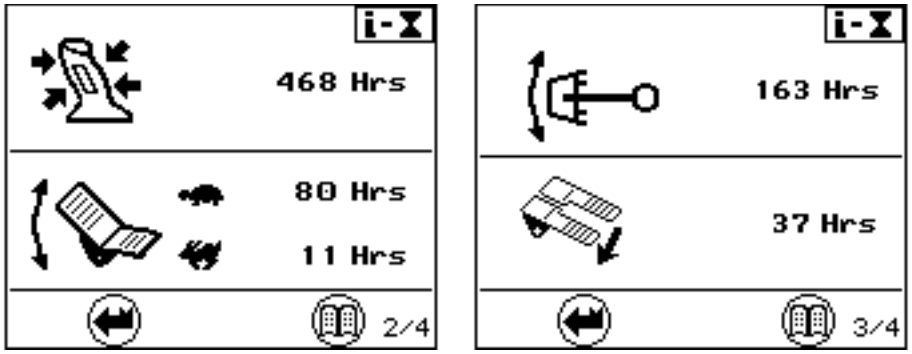

Fig. 3-15 *Menu "Info Hours" - duration of the various movements*

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▶ Press the **Menu** key again.
↳ the screen 3/4 is displayed.

The screen 3/4 provides the operating hours for:

– the swing movements.
– the movements of the optional equipment (operated via the foot pedals)

▶ Press the **Menu** key again.
↳ the screen 4/4 is displayed.

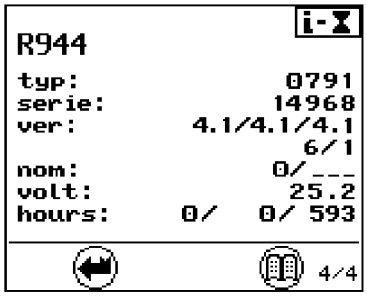


Fig. 3-16 *Menu "Info Hours" General Data*

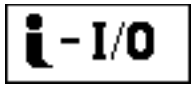
The menu General Data, provides information on:

– The model of the excavator
– "typ" : the type of the excavator
– "serie" : the serial number of the excavator
– "ver" : the installed Software-Versions for, respectively, the monitoring display, the control unit BBT, the pump regulator BST, and, on the second line, the SPF nb. (specification number) of the engine regulator unit and the engine type.
  • 1 : 6 cylinders PLD engine (Pump line nozzle injection system)
  • 2 : 4 cylinders PLD engine (Pump line nozzle injection system)
  • 3 : 6 cylinders common rail engine
  • 4 : 8 cylinders common rail engine
– Example : 6/2 : SPF 06 / 4 cylinders engine with pump line nozzle injection system
– "nom" : the both indications beside "nom" are not used
– "volt" : indication for the momentary operating voltage.
– "hours" : this last line indicates respectively:
  • the operation with the input X2.8 activated (special equipment – not used actually),
  • the operation with the input X2.14 activated (special equipment – not used actually),
  • the operation with the input X2.13 activated (special equipment – not used actually),

▶ Press the **Menu** key again.
↳ The screen 1/4 is displayed.

To exit the menu:

▶ Press the **Back** key.
↳ The sub-menu will be aborted.



Menu "Info In/Outputs"- Status of hydraulic pumps and of electrical inputs and outputs

The screens 1 to 3 provide information on the regulation parameters for the hydraulic pumps.

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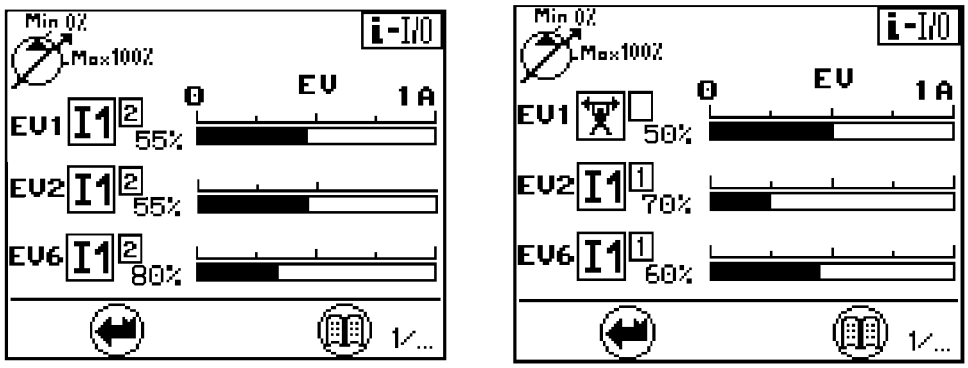

Fig. 3-17 *Menu "Info In/Outputs"- flow and pressure limitations*

The screen 1/8 displays

– for each of the both working pumps the active flow limitation option and which percentage of the maximum flow is set (solenoid valves EV1 and EV2).
– which is the active pressure limitation for the hydraulic system and which percentage of the maximum pressure is set (solenoid valve EV6).
– graphic bars indicating the momentary electric current flowing to the different regulation solenoid valves..

On the left picture, an external limitation (Hardware input I1, option 2) is activated. The currents supplying the flow limitation solenoid valves limit these flows to 55% of their maximal values. The current supplying the pressure limitation solenoid valve limits the pressure to 80% of its maximal value.

On the right picture, an internal limitation (Pressure increase) and an internal limitation (Hardware input I1, option 1) are activated at the same time.
Due to the internal limitation, the flow of the pump P1 is limited to 50% of its maximum value via the solenoid valve EV1.
Due to the external limitation, the flow of the pump P2 is limited to 70% of its maximum value via the solenoid valve EV2 and the pressure in the hydraulic system to 60% of its maximal value via the solenoid valve EV6.

When several limitations are activated at the same time, only the one with the smallest percentage value is decisive for each regulating solenoid valve.

Note!
An external limitation is activated as soon as the option pedals are actuated.
The three internal limitations which are the most currently used are the followings:

– The internal limitation M1 is activated when travelling.
– The internal limitation M2 is activated when the pressure increase is actuated (button S56 on the control unit).
– The internal limitation M3 is activated when actuating the shovel flap on machines with shovel attachment.

▶ Press the **Menu** key again.
↳ The screen 2/8 is displayed.

The screen 2 shows the instantaneous LR current (current flowing to the solenoid valve for power regulation).

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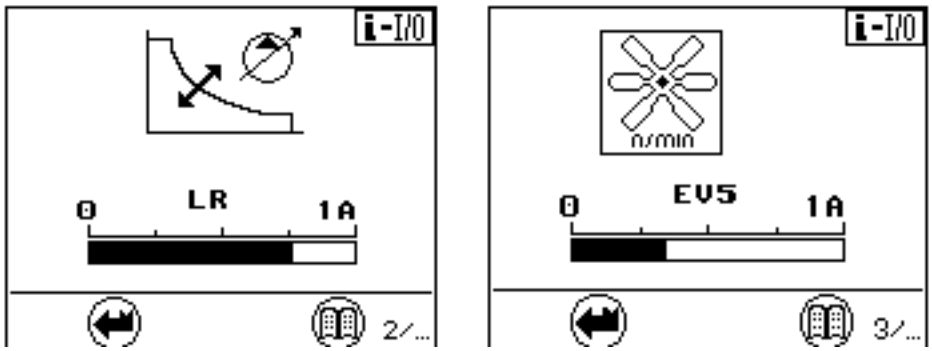

Fig. 3-18 *Menu "Info In/Outputs"- Currents to the solenoid valves LR and EV5*

▶ Press the **Menu** key again.
↳ The screen 3/8 is displayed.

This screen shows the instantaneous current flowing to the regulation solenoid valve EV5 which determines the RPMs of the hydrostatic driven cooler fan.

▶ Press the **Menu** key again.
↳ The screen 4/8 is displayed.

This screen shows the instantaneous current flowing to the regulation solenoid valve EV3, which determines the reduction power for the swing movement.

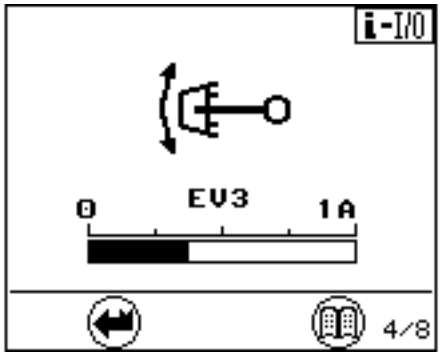

Fig. 3-19 *Menu "Info In/Outputs"- Current to the solenoid valve EV3*

▶ Press the **Menu** key again.
↳ The screens 5, 6,7 and 8/8 are successively displayed.

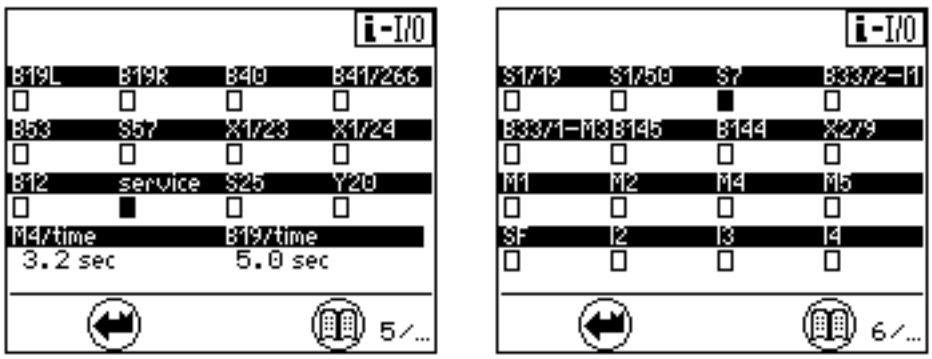

Fig. 3-20 *Menu "Info In/Outputs"- Status of electrical inputs and outputs*

The screens 5/8 to 8/8 provide an overview of the status of the different electrical inputs and outputs.

A "□" means "Input not active".

A "■"means "Input active".

An “NC” beneath the terminal designation means that the corresponding input has been deactivated in the software.

The durations indicated in the last line of the screen 5/8, under M4/Time repectively B19/Time correspond to the pause time for the windshield wiper in intermittent mode, respectively to the delay time for the engine low idle automatic system.

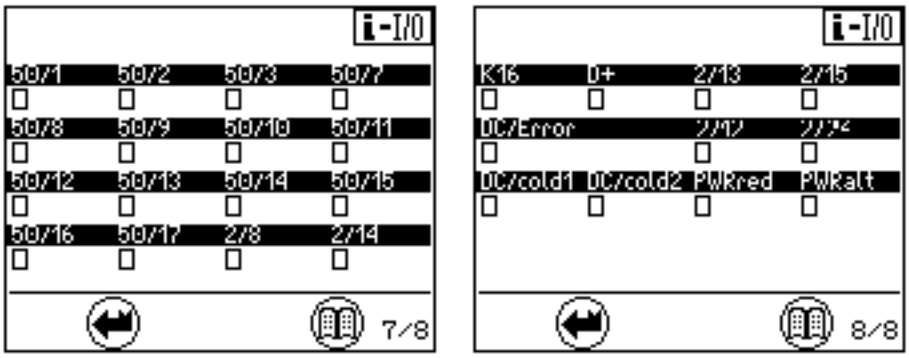

Fig. 3-21 *Menu "Info In/Outputs"- Status of electrical inputs and outputs*

The screen 8/8 gives information concerning the PLD control system of the Diesel engine (Pump line nozzle injection system):

– Input K16 controls the starter operation.
– Input D+ indicates if the generator delivers current.
– Input X2/13 refers to operation of the Diesel engine with standard power curve.
– Input X2/15 refers to external commutation of hydraulic power.
– Input DC/Error indicates if an error is detected in the function of the Diesel engine monitoring system.
– PWRred refers to power reduction of the Diesel engine in case of an intake air, engine coolant or fuel overheating.
– Input PWRalt control the Diesel engine power limitation in accordance with the atmosphéric pressure.
– Input DC/cold1 controls the function of the preglow of the Diesel engine.
– Input DC/cold2 controls the function of the postglow of the Diesel engine.
– Input X2/24 indicates if the engine control is in safety mode.
– Input X2/12 indicates if an operating fault is detected in the engine monitoring circuit when the engine is in safety mode.

To exit the menu:

▶ Press the **Back** key.
↳ The sub-menu will be aborted.

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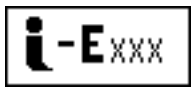

Menu "i-errors" - operating faults and electrical system errors

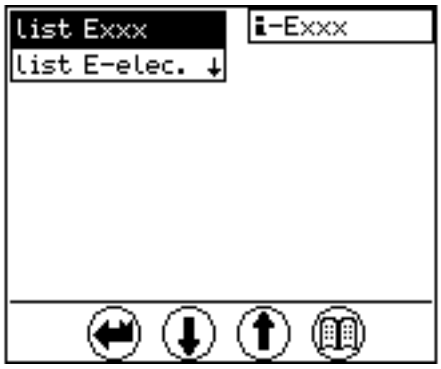

Fig. 3-22 *Menu "i-errors" - operating faults and electrical system errors*

There are 3 possible choices in this menu:

– By selecting **list Exxx**, all the operating faults detected by the switches and sensors monitoring the machine parameters are listed.
– By selecting **list E-elec**, all the electrical system errors (cable errors, sensor errors, ...) detected during the operation of the machine are listed.
– With **list S-Exxx**, all the operating faults are listed, just as with the selection **list Exxx**, but this time only faults which appeared when the service connector was connected .

To select the desired error type:

▶ Press the **Down** or **Up** arrow key to preselect desired type

▶ Press the **Menu** key.
↳ The sub-menu on a black background will be displayed.
↳ If more than 6 error codes are listed, use the arrow keys **Down** or **Up** to scroll in the list.

"list Exxx": Operating faults

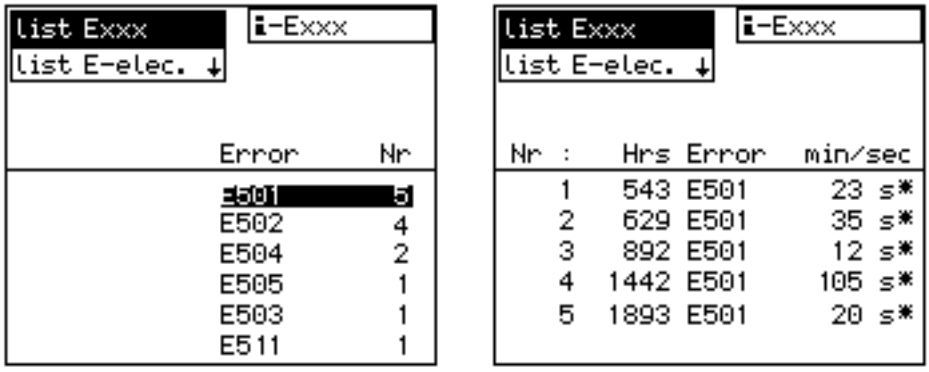

Fig. 3-23 *List of the operating faults (fig. left) and occurrences of a fault (fig. right)*

▶ Select **list Exxx**.

▶ Press the **Menu** button.
↳ The first page of the sub-menu appears.

All the operating faults are listed with their error code and number of occurences.

▶ Select the desired error code using the **Down** or **Up** arrow key and press the **Menu** key.

A screen appears with the operating hours and the duration for the ten first and the ten last occurrences of the selected error.

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The asterisk "*" shows that the error was also indicated by the buzzer and then acknowledged using the **Back** key. .

– s*: signals that the duration is given in seconds.
– m*: signals that the duration is given in minutes.

Notice!
Only operating faults with an error code **E 5xx** are displayed in the **list Exxx** menu.

▶ Press the **Back** key.
↳ The first page of the sub-menu appears.

▶ Press the **Down** or **Up** key to select a new error code or press the **Back** key again to select another error type .

"list E-elec." : Errors of the electrical system

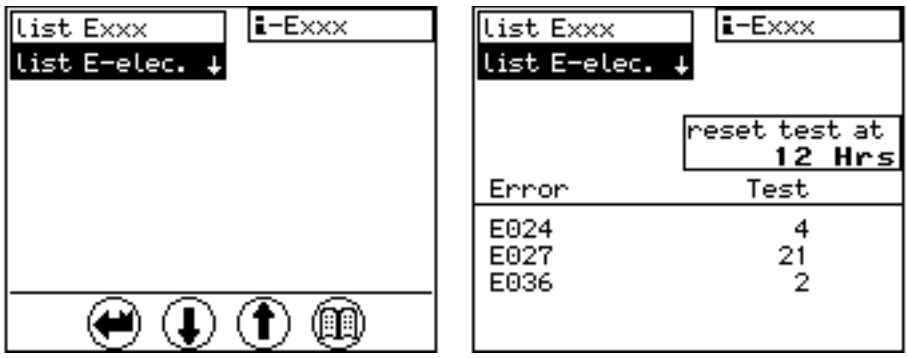

Fig. 3-24 *List of the electrical errors*

▶ Select "**list E-elec.**" and press the **Menu** key to enter the sub-menu.

The screen displays the list of all electrical errors with their error code.

The “Test” column displays the number of errors which have occurred since the last deletion.

The hour information "reset test at x Hrs" (e g. 12 Hrs) indicates the operating hour in which the "Test" column was the last time deleted.

▶ Press the **Back** key to return to the first page of the sub-menu.

▶ Press the **Down** key and then the **Menu** key to confirm the new choice.

"list S-Exxx" : Operating faults in service mode

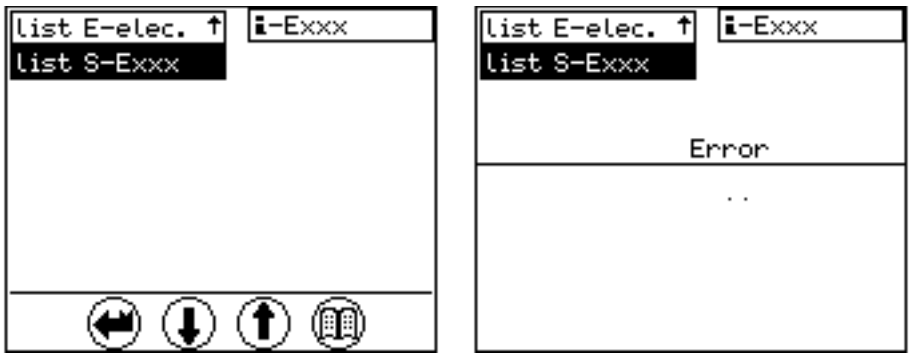

Fig. 3-25 *List of operating faults appeared in service mode*

No information will be displayed in this menu if the service connector is not connec-

ted.

❑ When a service connector is pluged in:

The submenu **list S-Exxx** lists all the operating faults, just like the submenu **list Exxx**, but this time only faults appeared in service mode, i. e. when a service connector was connected.

The sub-menu allows to separate the faults occuring during maintenance works,in particular during the troubleshootings.

For each error, an overview is shown and can be paged in just like for the "list Exxx" selection.

When exiting the service mode, the memory "list S-Exxx" is reset, the service mode operating faults are not stored.

Menu "set clock"

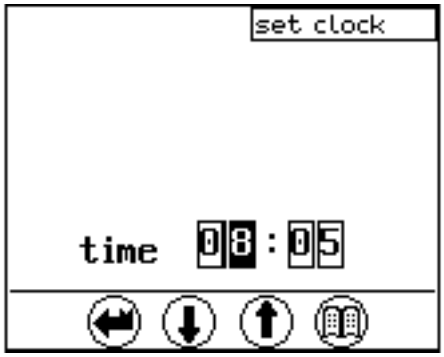

Fig. 3-26 *Clock setting*

▶ After selection of the function the digit completely right is inversely displayed.

▶ Press key **UP** or **DOWN** to adjust the selected digit.

▶ Press **MENU key to select the next digit.**

▶ Press the **Enter** key to store the set number.
↳ The message "update xx: xx" appears shortly on screen to confirm the new setting and the display automatically returns to main screen.

Menu "Purge" - Bleeding of the high pressure fuel system

When starting the machine, the operator can activate the bleeding mode.

To start in bleeding mode allows to bleed the high pressure fuel system (see the chapter concerning the maintenance of fuel system).

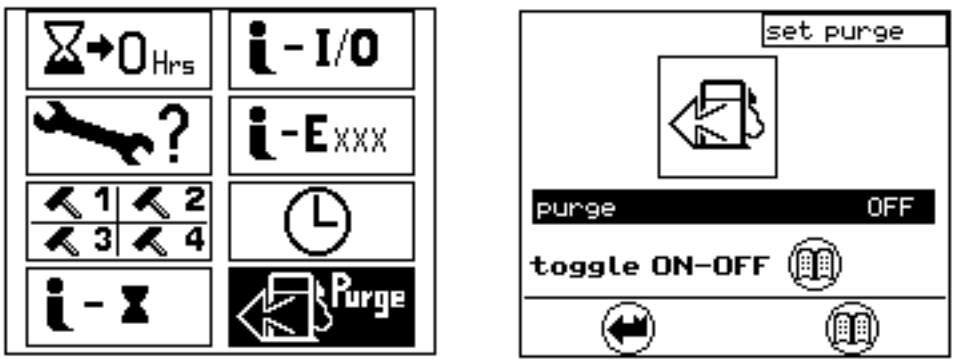

Fig. 3-27 *Menu "Purge"*

Note !
To start in bleeding mode is preconised only in case of running with fuel tank empty or in case of emptying of the fuel system.
When starting in mode "Purge", the engine will emit black smoke.
As soon as the engine rpm reaches 800 rpm, the menu "purge" is not accessible any more.

3.2 Access and equipment of the cab

3.2.1 Entering or leaving the cab

Climbing up

Caution!
Entering or leaving the cab incorrectly could lead to injury.

- ▶ Ensure that the safety lever is always in its highest position when entering or leaving the cab.
- ▶ Always use the handholds provided for the purpose when entering or leaving the machine.
- ▶ Never use the control elements as handles.
- ▶ Never jump from the machine.

Cab:

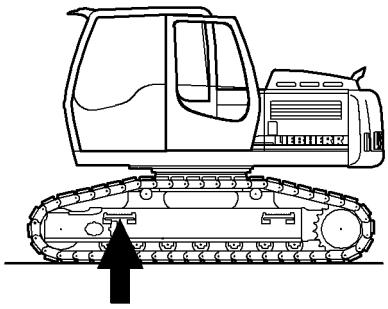

Fig. 3-28 *Climb up using the handholds*

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Getting in

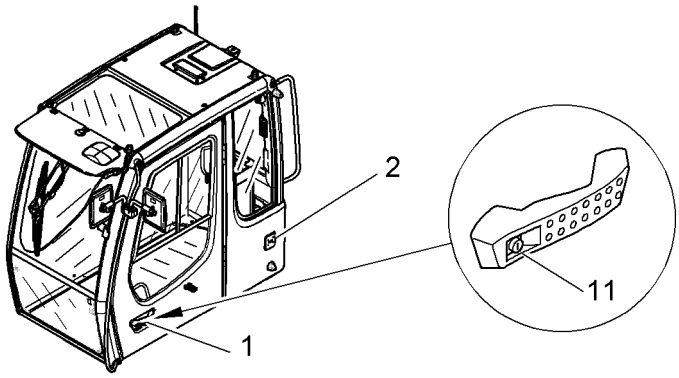

Fig. 3-29 *Door - exterior*

1 Door handle **2** Latch **11** Door lock

- ▶ Press the door lock **11** on the door handle **1** and open the door.
- ▶ If the door is to remain open during operations, swing the door back 180° and secure in the latch **2**.
- ▶ Climb in with your face towards the machine and sit in the operator's seat.
- ▶ Adjust the seat and steering column if necessary.

Getting out

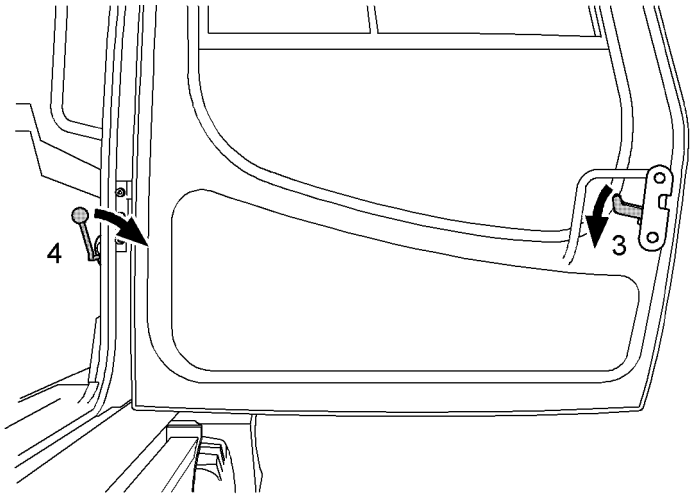

Fig. 3-30 *Door - interior*

3 Door handle on door lock **4** Lever for the latch

- ▶ Switch off the machine and push the safety lever up.
- ▶ Push the door handle **3** on the lock down.
- ▶ Open the door fully and secure it in the latch **2**.
- ▶ Climb out with your face towards the machine.

To release the door latch:

- ❑ The door is secured in latch 2.

▶ Move the lever **4** next to the cab frame outwards.
↳ The door is now unlocked.

▶ Close the door.

3.2.2 Safety lever

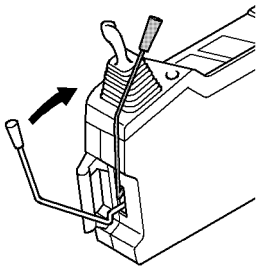

Fig. 3-31 *Safety lever*

For safety purposes, the left control panel is provided with a safety lever.

Caution!
The safety lever must always be pushed up into its highest position (see arrow) when entering or exiting the cab.

When the safety lever is pushed up, the pilot control circuit is disconnected. This means that:

– No work movements can be carried out when pilot control devices, e g. the joystick or foot pedals, are operated.
– The slewing gear brake is locked (LED in switch **S17** illuminates).
– It is not possible to release the slewing gear brake using switch **S17**.

When the safety lever is pushed (push up / push down) to its lowest position, the slewing gear brake and the LED in switch **S17** will return to their original states and the pilot control devices will be active.

▶ Before the operator starts working, he must push the safety lever down into its lowest position while seated in the operator's seat.

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3.2.3 Operator's seat

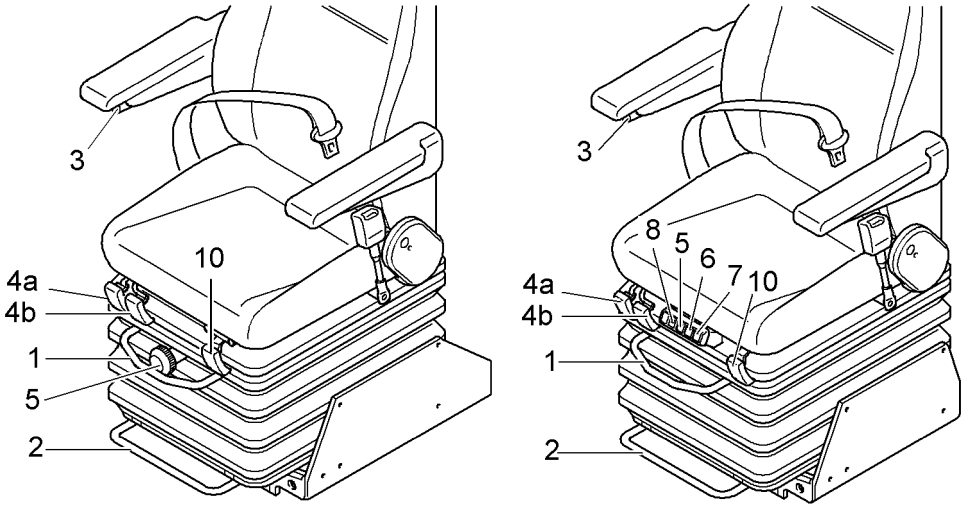

Fig. 3-32 *Standard operator' seat (Fig. left) and air-cushioned (Fig. right, optional extra)*

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

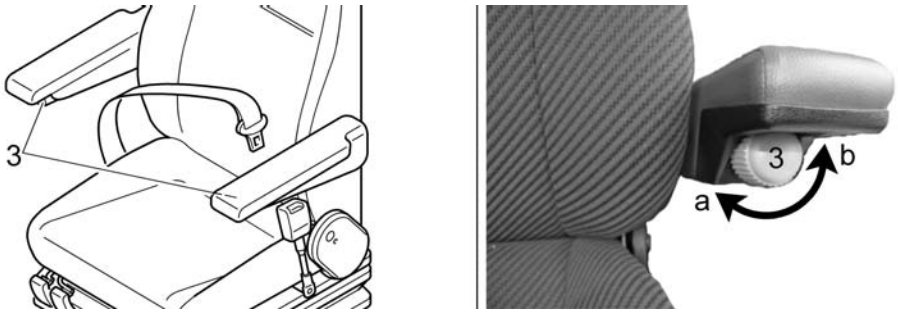

Fig. 3-33 *Setting the armrests*

▶ 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.

Setting the seat and backrest

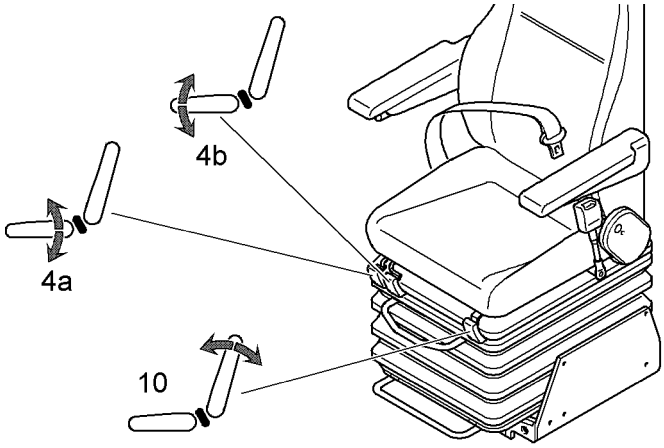

Fig. 3-34 *Setting the seat and backrest*

- ▶ Rear seat inclination: Pull lever **4a** up, set the inclination and release the lever.
- ▶ Front seat inclination: Pull lever **4b** up, set the inclination and release the lever.
- ▶ Backrest: Pull lever **10** up, set the inclination and release the lever.

Setting the horizontal seat position

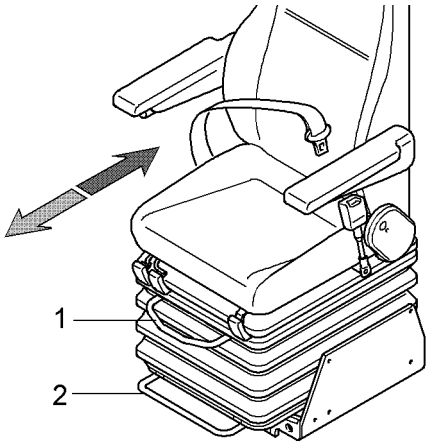

Fig. 3-35 *Setting the horizontal*

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

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Setting the seat springs

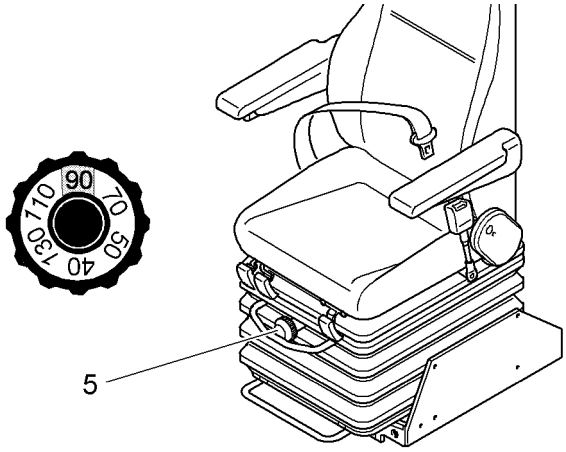

Fig. 3-36 *Setting the seat springs*

▶ Use the rotary knob **5** to set the seat springs to match the body weight.

Options setting (optional extras)

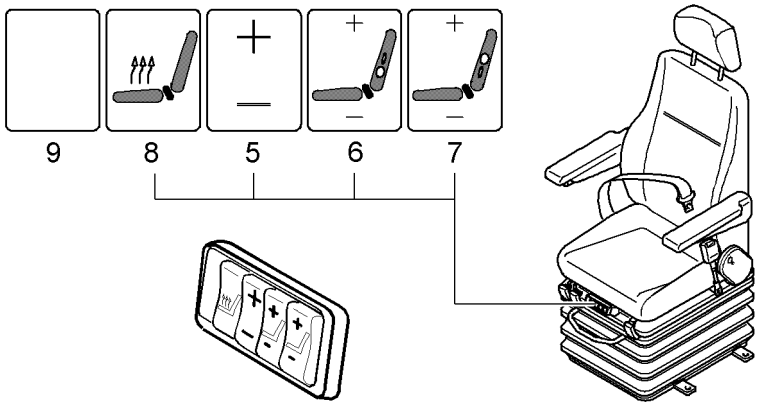

Fig. 3-37 *Switch bar on the air-cushioned operator's seat*

To set the vibration damping:

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

To set the lumbar support:

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

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

To set the seat heating:

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

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

Putting on / releasing the safety belt

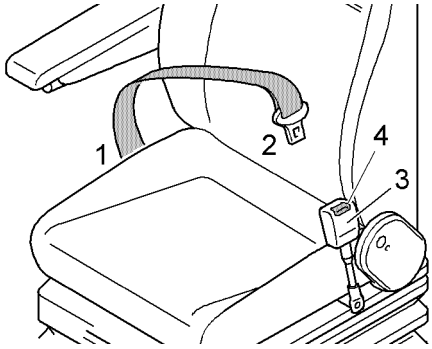

Fig. 3-38 *Safety belt*

The safety belt is automatic. It is not necessary to adjust the length of the belt.

- ▶ Pull the belt and buckle **2** out of the roller mount **1**.
  - ↳ If pulled out of the roller mount sharply, the belt may lock.
- ▶ Push the buckle into the belt lock **3** until it fastens.

Danger!
The safety belt is designed to protect the operator.

- ▶ Before starting the machine, always fasten the safety belt.
- ▶ Ensure that the safety belt is not twisted when it is fastened.
- ▶ To ensure your safety, check the condition, function and fastening of the belt regularly and replace any damaged parts without delay.

- ▶ To open lock **4**, push down on the belt lock using your thumbs.
  - ↳ The safety belt will slide automatically back into the roller mount **1**.

Vibration damping

The seat complies with ISO 7096.

If the machine is used in accordance with regulations, the values of the vibration damping transferred by the operator's seat are less than or equal to the tested excitation vibration for the relevant machine class in accordance with ISO 7096.

The values for vibration accelerations a_{zw}, measured in accordance with ISO 2631-1, therefore comply with the requirements for protection against whole body vibration set out in EN 474-1 («acceleration» a_{zw} between 0,5 and 2,5 ms^{-2}).

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3.2.4 Windscreen

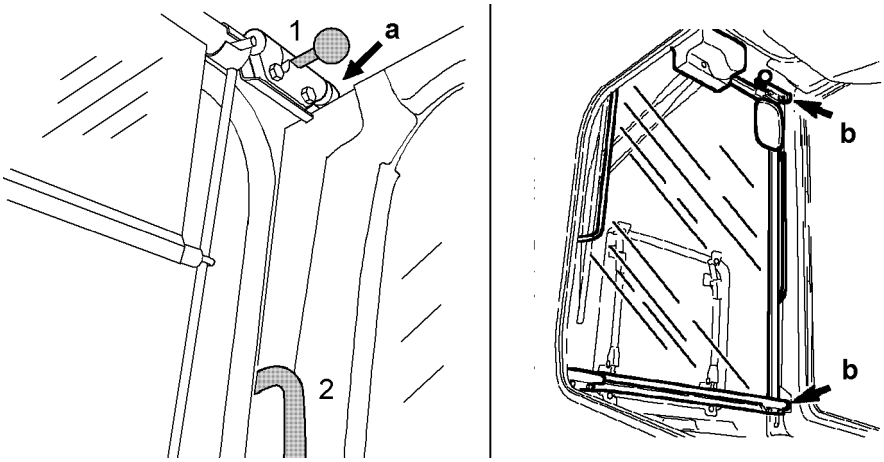

Fig. 3-39 *Windscreen*

The windscreen can be positioned in two ways.

– Position **a**: Window closed.
– Position **b**: Window fully opened (locked in place on the roof of the cab).

▶ Pull bar **1** in and down.
↳ The window is unlocked.

▶ Move the windscreen with the bracket **2**, secure in one of the two window positions (**a** or **b**) and relock using bar **1**.

3.2.5 Sunshade

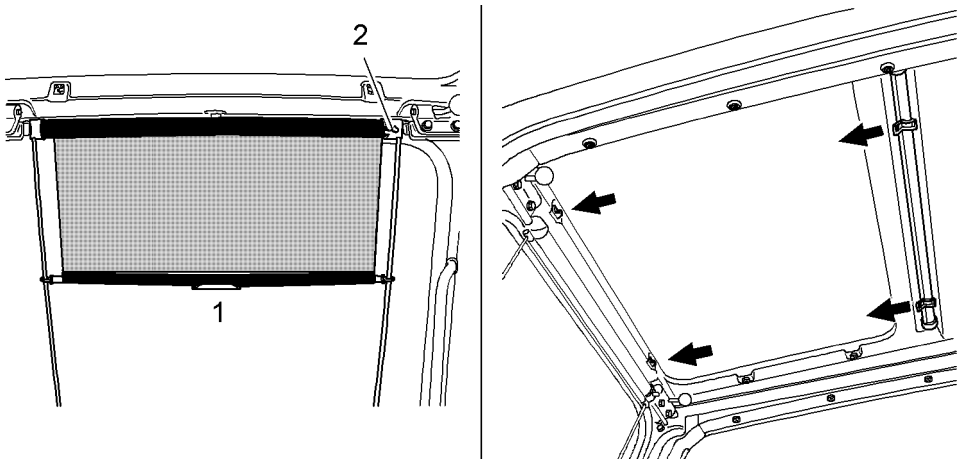

Fig. 3-40 *Windscreen and cab roof sunshade*

The cab is provided with two sunshades, located on the windscreen and on the glass window in the cab roof.

Windscreen

▶ Pull the sunshade down using the cross strut **1**.
↳ The sunshade can be set for individual use.

▶ Press button **2** (red).
↳ The sunshade rolls itself up.

Cab roof

- ▶ Pull out the sunshade and secure it in the holders designed for the purpose.
- ▶ To retract the sunshade, take it out of the holders and let it roll up slowly.

3.2.6 Emergency exit – rear window

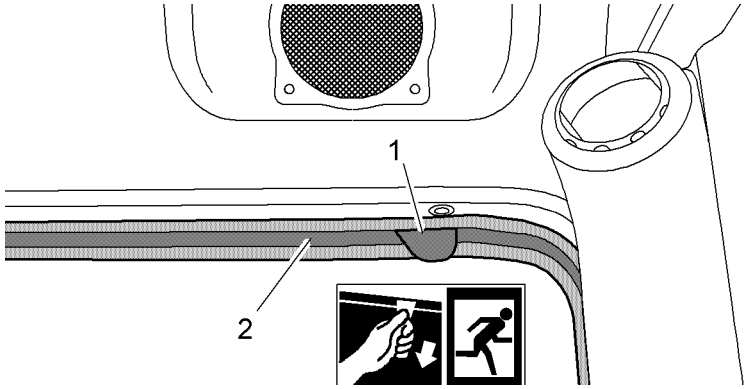

Fig. 3-41 *Emergency exit – rear window*

By pulling the clip **1** on the interior of the rear window, the rubber weatherstrip **2** can be released and removed.

- ▶ In case of emergency, pull the rubber weatherstrip **2** out of the entire area of the window and push out the window.

3.2.7 Interior lighting

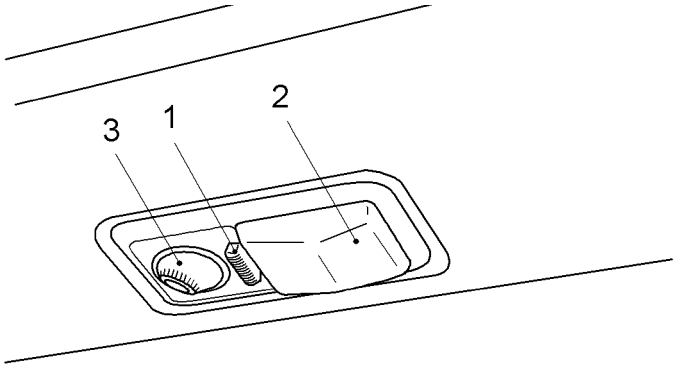

Fig. 3-42 *Interior lighting*

The interior lighting is switched on using the slide regulator **1**.

- ▶ Push the slide regulator to the right.
  ↳ The light **2** is switched on.
- ▶ Push the slide regulator to the left.
  ↳ The spot **3** is switched on.
- ▶ Push the sliding regulator into the central position.
  ↳ Interior lighting is switched off.

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3.2.8 Fire extinguisher*

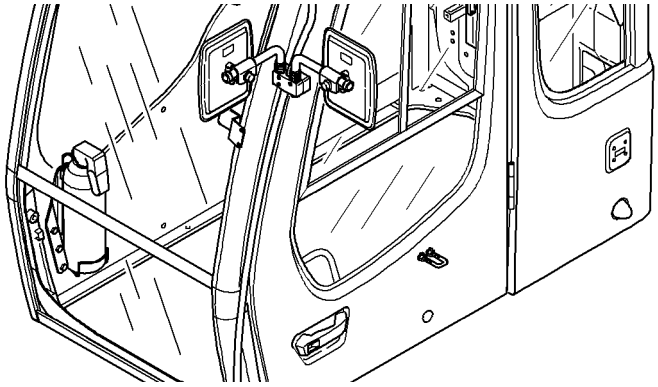


Fig. 3-43 *Fire extinguisher / First-aid box*

The stowing compartment for the fire extinguisher is located on the lower right in the cab.

*Owner regulations

3.2.9 Windscreen wiper

Windscreen wiper

When the ignition is switched on, pressing switch **S14** will activate the windscreen wiper.

- ▶ Press switch.
  - ↳ Intermittent switching
  - ↳ LED I in the switch illuminates.
- ▶ Press switch again.
  - ↳ Continuous operation.
  - ↳ LED C in the switch illuminates.
  - ↳ LED I in the switch goes out.
- ▶ Press switch again.
  - ↳ Windscreen wiper is switched off.
  - ↳ LED C in the switch goes out.

Setting the interval time for the intermittent switching

The interval time can be set when the ignition is on by pressing switch **S14**.

- ❑ Press the switch until the windscreen wiper is switched off (LED I in switch goes out)
- ▶ Press and hold switch.
  - ↳ LED I in the switch flashes.
- ▶ Release the switch when the desired interval time has been reached.
  - ↳ The interval time can be set to between 2 and 10 seconds.

Windscreen washing system

When the ignition is switched on, pressing button **S11** will activate the electric windscreen washing system.

- ▶ Press and hold button.
  - ↳ Washing water will be sprayed onto the windscreen through the outlet nozzles.

↳ The windscreen washer runs continuously.

▶ Release the button.
↳ Washing water will be stopped.
↳ Windscreen washer will run continuously for approx. another 3 seconds.

Windscreen washing fluid container

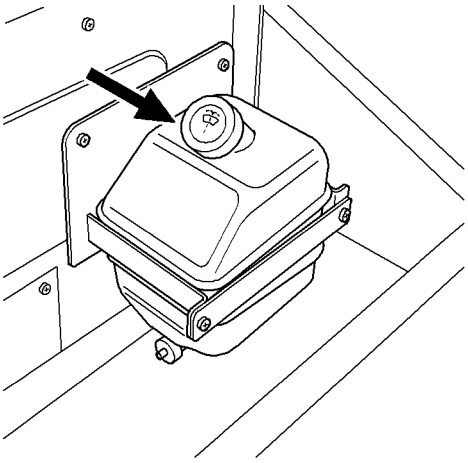


Fig. 3-44 *Windscreen washing fluid container*

The container for the windscreen washing fluid is located at the rear of the cab.

Once the cover (see arrow) has been opened, the container can be refilled with ordinary windscreen washing fluid.

Volume: see lubricant chart

Window washer on the cab roof (optional extra)

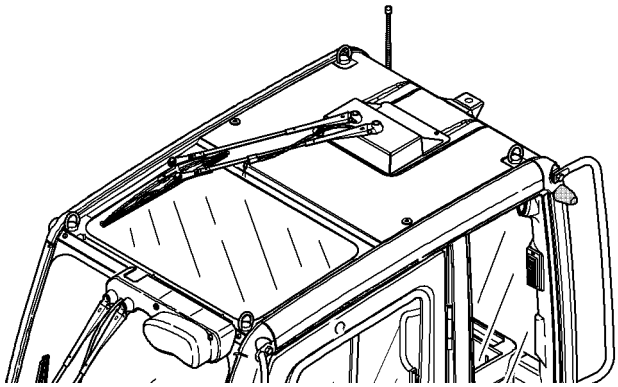
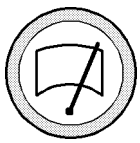


Fig. 3-45 *Window washer on cab roof*

Pressing switch **S218** on the right control panel when the ignition is switched on activates the cab roof window washer.

▶ Press switch **S218**.
↳ Cab roof window washer runs continuously.



▶ Press switch **S218**.
↳ Cab roof window washer is switched off.

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3.2.10 Lighting

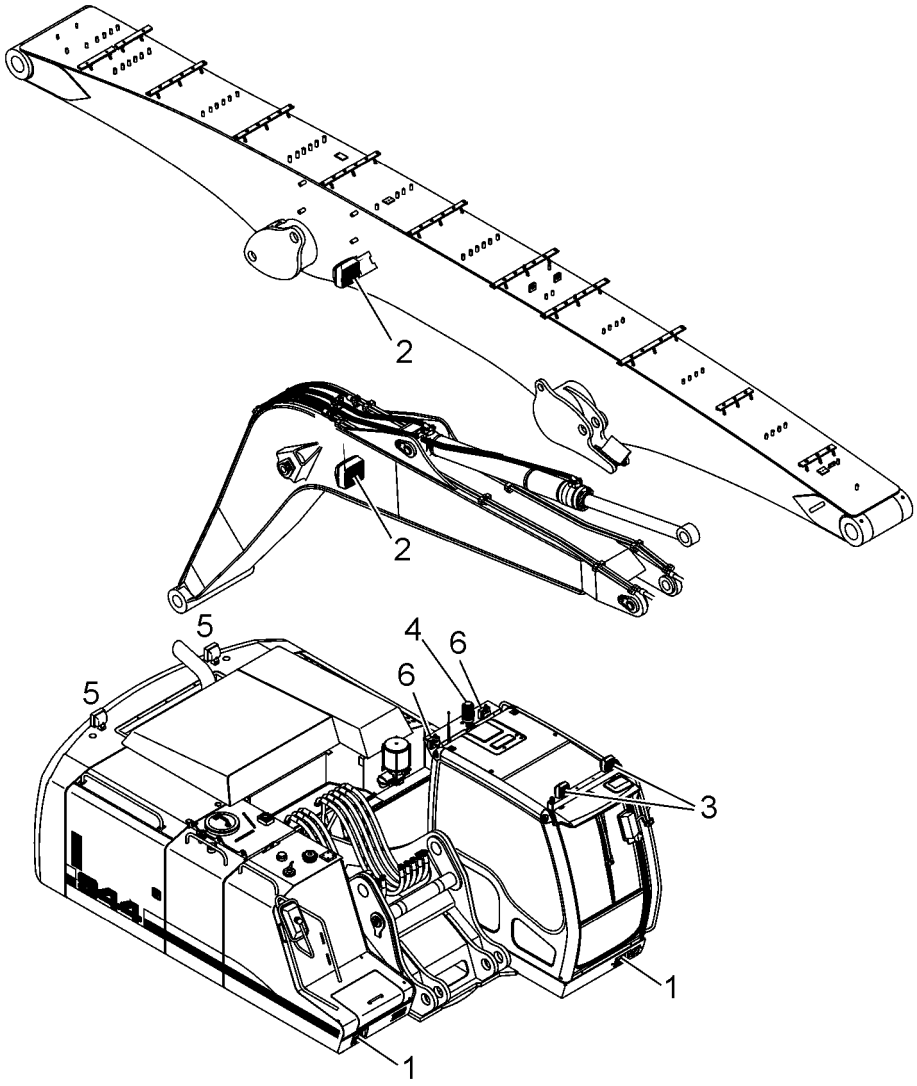
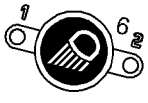


Fig. 3-46 *Arrangement of lighting*

1 Rotating deck floodlights
2 Attachment floodlights
3 Front roof floodlights (optional extra)
4 Rotating beacon (optional extra)
5 Floodlights on Counterweight (optional extras)
6 Roof floodlights, rear (optional extra)

Rotating deck and attachment floodlights



The rotating deck and attachment floodlights are switched on by pressing switch **S10**.

▶ Press the switch.
  ↳ Rotating deck floodlights are activated.
  ↳ LED 1 in the switch illuminates.

▶ Press switch again.
  ↳ Rotating deck floodlights are deactivated.
  ↳ LED 1 in the switch goes out.
  ↳ Attachment floodlights are activated.

↳ LED 2 in the switch illuminates.

▶ Press switch again.
↳ Rotating deck and attachment floodlights are switched on.
↳ LEDs 1 and 2 in the switch illuminate.

▶ Press switch again.
↳ Rotating deck and attachment floodlights are switched off.
↳ LEDs 1 and 2 in the switch go out.

Additional headlight (optional extra)

Pressing switch **S22** when the ignition is on switches on the additional floodlights.

▶ Press the switch.
↳ Additional floodlights are switched on.
↳ LED in switch illuminates.

▶ Press switch again.
↳ Additional floodlights are switched off.
↳ LED in the switch goes out.

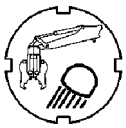
Rotating beacon (optional extras)

Pressing switch **S41** switches on the rotating beacon when the ignition is on.

▶ Press switch.
↳ Rotating beacon flashes.
↳ LED in switch illuminates.

▶ Press switch again.
↳ Rotating beacon is switched off.
↳ LED in the switch goes out.

Floodlights for demolition attachment (optional extras)



Pressing switch **S276** on the right control panel switches on the floodlights for the the demolition attachment when the ignition is on.

▶ Press switch.
↳ Floodlights for the the demolition attachment are switched on.
↳ LED in switch illuminates.

▶ Press switch again.
↳ Floodlights for the the demolition attachment are switched off.
↳ LED in the switch goes out.

Roof floodlights, rear (optional extras)

Pressing switch **S275** on the right control panel switches on the roof floodlights at the rear on the cab.

▶ Press switch.
↳ Rear floodlights on roof cab are switched on.
↳ LED in switch illuminates.

▶ Press switch again.
↳ Rear floodlights on roof cab are switched off.
↳ LED in the switch goes out.

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3.2.11 Heating and Air conditioning system

Overview

The cab is equipped with a heating and air conditioning system as standard. The heating and air conditioning system is used to heat, cool and ventilate the cab.

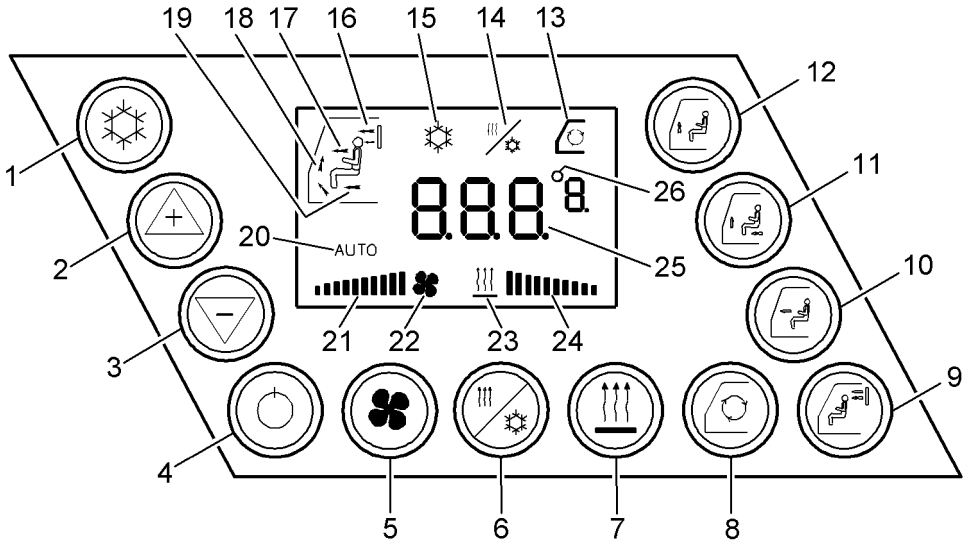

Fig. 3-47 *Control panel of Air conditioning system*

Control buttons

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 / air circulation
9 – Rear wall vent OPEN / CLOSED
10 – Vent, right control panel (8b) OPEN / CLOSED
11 – Vent, front window, legroom CENTER / CLOSED
12 – Vent, front windshield, legroom CENTER / OPEN

Main screen displays

13 – Air circulation
14 – REHEAT operation
15 – Air conditioning (cooling)
16 – Vent, rear wall OPEN
17 – Vent, right control panel (8b) OPEN
18 – Vent, front windshield, legroom CENTER
19 – Vent, front windshield, legroom OPEN
20 – Automatic operation
21 – Indicator, fan speed in manual operation
22 – Symbol, fan speed in manual operation
23 – Symbol, heater operation in manual operation
24 – Indicator, heat output in manual operation
25 – Nominal value / error code
26 – Temperature unit (°)

If the control panel identifies an error, a blinking error number **F1 – F5** will be dis-

played.

Note!

▶ In the event of an error, please contact LIEBHERR Service.

Turning the control panel on

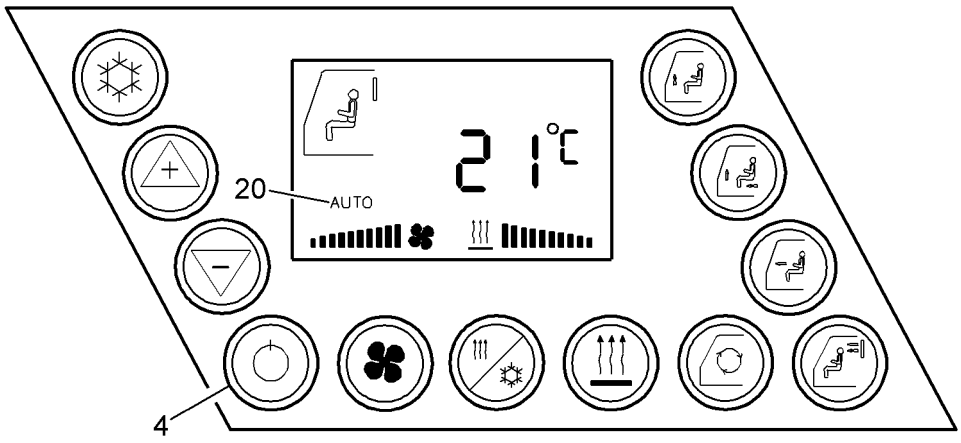

Fig. 3-48 *Turning the control panel on*

▶ Turn the system on using button **4**.
  ↳ The software version will be displayed for approx. 12 seconds while the control panel carries out a self test.

The heating and air-conditioning in the cab is operating. The heat output or the fan speed will be controlled automatically if the **AUTO (20)** symbol is activated.

Setting the desired cab temperature

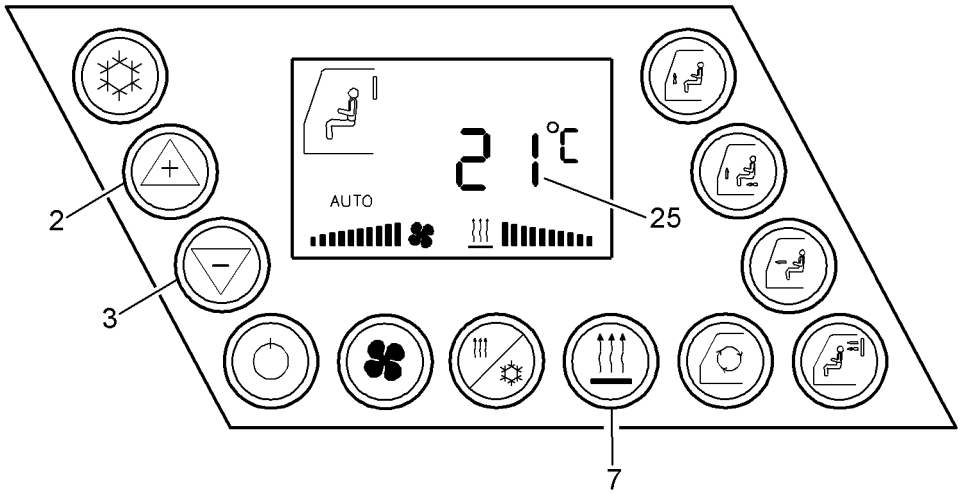

Fig. 3-49 *Setting the desired cab temperature*

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

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

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

The adjusted temperature will remain until the next change is made.

Turn on the air conditioner to cool the cab.

▶ Press button **7** to adjust the heat output manually.
  ↳ The heater symbol will blink for 5 seconds.

▶ As long as the heater symbol is blinking, use button **2** or **3** to increase or decrease the heat output manually.

▶ Press button **7** to return to automatic operation.

Air conditioning

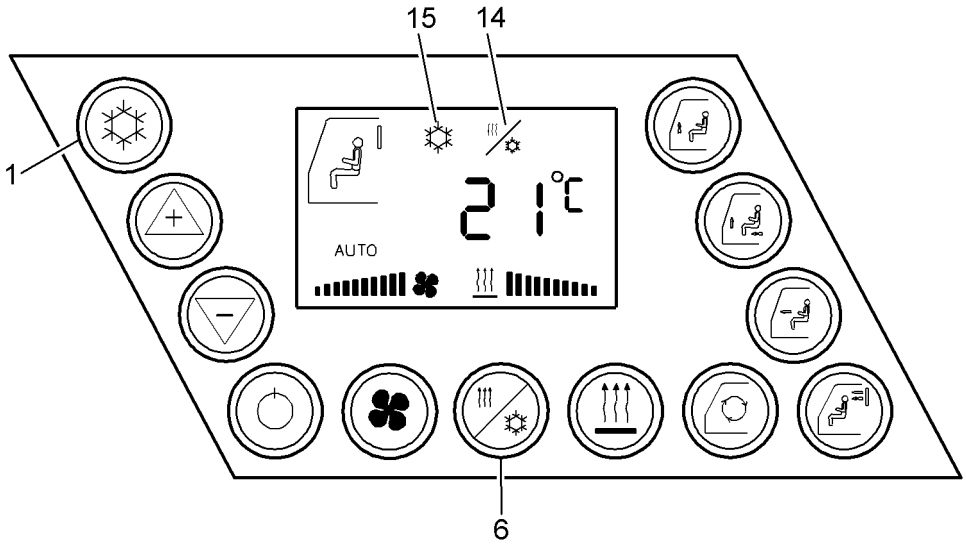

Fig. 3-50 *Air conditioning*

▶ Turn on the air conditioner using button **1**.
  ↳ The symbol **15** will be activated.
  ↳ The compressor will now be turned on by the control unit, if required, and automatically controls the heater and air conditioner RPM.

▶ To dehumidify the cab, turn on the air conditioning system when heating the cab.

▶ Press the REHEAT button **6**.
  ↳ Symbol **14** is activated.

▶ In this case, turn on the air conditioner until the windows are no longer fogged.

After 10 minutes, the REHEAT function turns off automatically.

Air circulation and fresh air

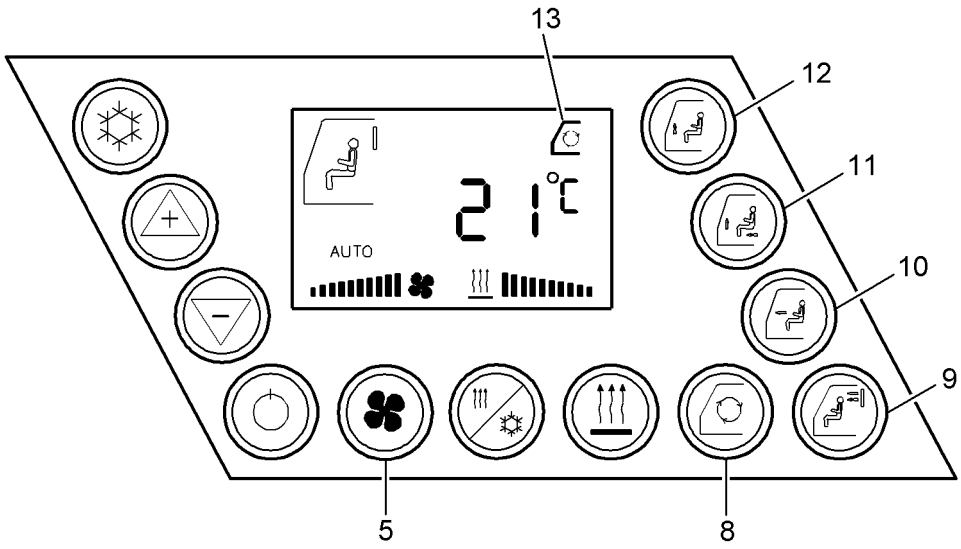

Fig. 3-51 *Air circulation and fresh air*

The heating and air conditioning system can be switched on to air circulation or fresh air operation.

- ▶ Press button **8** to open / close the fresh air vent.
  - ↳ Symbol **13** indicates that the fresh air vent is closed.
- ▶ Press button **5** to set the fan speed manually.
  - ↳ The fan symbol blinks for 5 seconds.
- ▶ As long as the fan symbol is blinking, use button **2** or **3** to increase or decrease the fan output manually.
- ▶ Press button **5** to return to automatic operation.

Air duct

Regulation of the air flow is made by using buttons **9** - **12** (siehe Fig. 3-51) and via rotating and closable air vents.

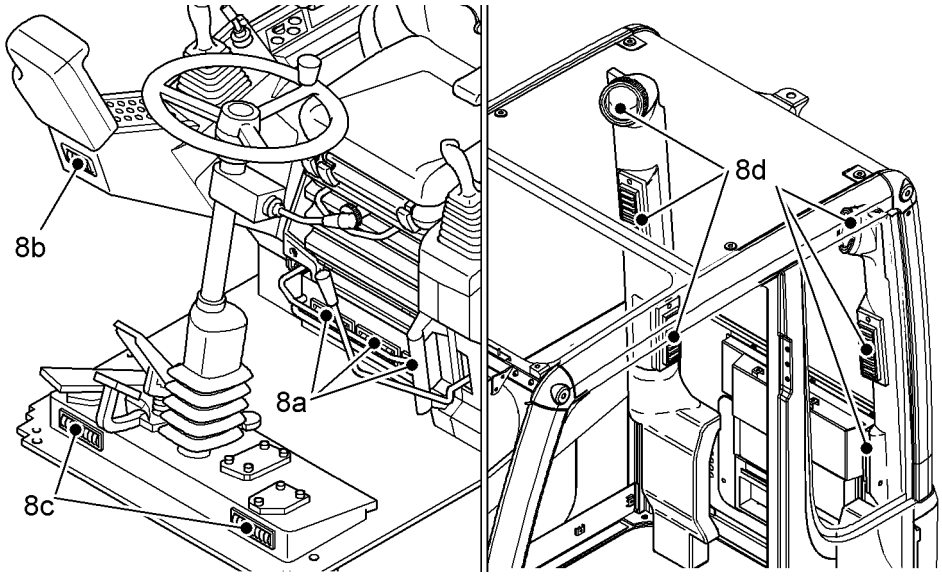

Fig. 3-52 *Position of front air vents (left view) and vents on the rear cab wall (right*

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view)

The air vents are located on the seat console **8a**, on the right control panel **8b**, on the front windshield **8c** and on the rear wall of the cab **8d**. The open position of the corresponding vent is shown by an arrow in the display.

To obtain optimal comfort:

- In **heater operation**, open the air vents in the legroom area **8a**, the right control panel **8b** and possibly the front windshield **8c**.
- In **air conditioner operation**, open the air vents in the rear wall of the cab **8d** and the right control panel **8b**.

The best heating or cooling effect is achieved when using the air circulation function.

Note!
To prevent the starter motor and the battery from overloading, turn on the air conditioner only after the Diesel engine is running.

- If the machine is used for a longer period of time without using the air conditioner, operate the compressor every 2 weeks by pressing the REHEAT button **6** (siehe Fig. 3-50) .

Operation with auxiliary heater (option)

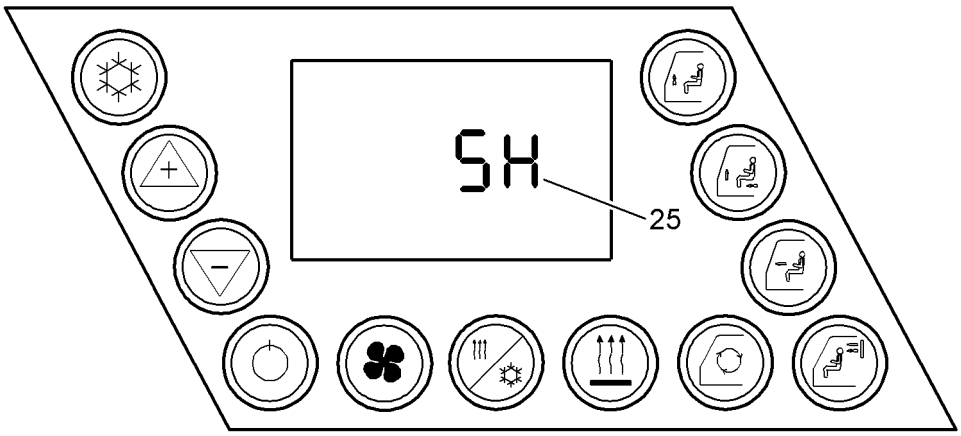

Fig. 3-53 *Operation with auxiliary heater*

Note!
The auxiliary heater can only be operated when the ignition is turned off.
It is not possible to make manual adjustments in auxiliary heater operation.

- Turn on the auxiliary heater.

When the Diesel engine is running, the auxiliary heater is turned off automatically.

3.3 Operation

3.3.1 Safety instructions

Bringing the machine safely into service

- Carry out a careful inspection tour around the machine each time before starting it.
- 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.
- 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.
- 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.
- 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 signaling and lighting devices.

3.3.2 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.
- Use the stop bolts to secure the upper structure facing the chassis.

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– Lower the equipment and anchor the grab lightly in the ground.
– 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, remove all keys and secure it against unauthorized use.

Towing the machine safely

– Always follow the correct procedure: see chapter “Towing the machine” in these operating instructions.
– The machine may only be towed in exceptional circumstances, e.g. in order to move the machine away from an area where it is at risk.
– Before towing, check all attachments and towing devices for safety and stability.
– Towing devices such as bars must have adequate tensile strength and should be secured on the towing hook provided on the undercarriage chassis.
Any damage or accidents which occur while towing the machine are not covered by the manufacturer’s guarantee.
– Ensure that there is no one in the vicinity of the towing devices when towing.
– When towing, maintain the correct transport position, permitted speed and route.
– After towing, return the machine to correct operational status.
– When restarting the machine, be sure only to proceed in accordance with the operating instructions.

3.3.3 Starting / stopping the machine

General information

Note!
When using the machine at a specific height above sea level and in connection with certain outside 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.

To avoid damaging LIEBHERR diesel engines, the engine’s power must be reduced when operating in the following environmental conditions (sea level and exterior temperature):

– 3,000 m generally
– 2,700 m and exterior temperature up to 30 °C
– 2,000 m and exterior temperature up to 40 °C
– 1,200 m and exterior temperature up to 50 °C

Pay attention to both the coolant circuit and the hydraulic oil cooling simultaneously.

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Activities before starting

Caution!
It is only possible to extinguish a source of fire if it is accessible.

▶ Before starting, unlock all locks on the panelling of the hydraulic excavator.
  ↳ In the event of fire, the doors can be opened immediately and the fire extinguished.

Arrangement of locks: see Maintenance chapter

Caution!
With the activities referred to below, a machine that is already warm from operating, there is a risk of scalding or burning from hot coolant or oil.

▶ Please ensure that you read the information provided in the Maintenance chapter on carrying out these activities.

Before starting the machine, the following activities should be carried out on a daily basis:

– Check the oil level in the engine*.
– Check the coolant level in the diesel engine*.
– Check the oil level in the hydraulic tank*.
– Drain the fuel system, if required*.
– If required, remove any ice and snow from the engine hood in the area of the cooling and combustion air intake.

* For how to carry out the activities, see the Maintenance chapter.

Starting the diesel engine

Ignition key switching positions

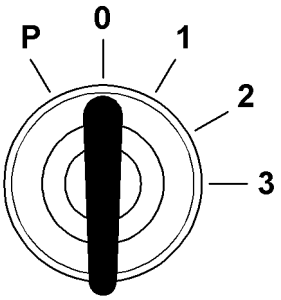

Fig. 3-54 *Ignition switch*

0 Neutral
1 Contact position
2 not used
3 Start position
P Park position

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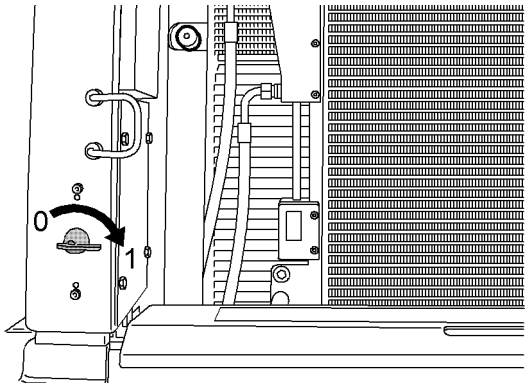
Switching on the electrical system



❑ The main battery switch must be in position **1** (on).

▶ Turn the ignition key to contact position **1**.
↳ As soon as the ignition is switched on, an automatic check of the keypad and the monitoring display takes place.

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

▶ Check the function of display and indicator lights when you switch on the ignition.
↳ All control lights must illuminate for a brief period with the exception of the LED of switch **S22** (Additional headlight).
↳ The LIEBHERR logo appears on the LCD screen.

Service interval display

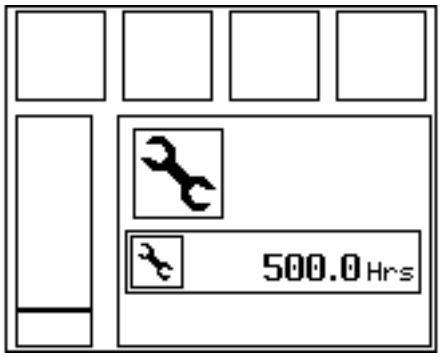


Fig. 3-55 *Service interval request*

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

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

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

Electronic anti-theft device(optional extra)

The machine can be equipped with an electronic anti-theft device.

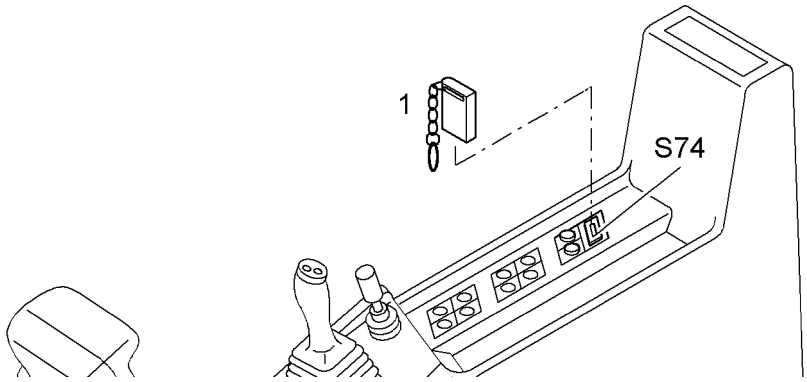


Fig. 3-56 *Electronic anti-theft device*

- ▶ Insert the code key **1** in the code lock **S74** and then remove.
  - ↳ The LED goes out.
  - ↳ A signal tone sounds.
- ▶ The anti-theft device is activated.
- ▶ You have 9 seconds to start the electrical system with the ignition key.

If the ignition is not switched on within 9 seconds, the code key will have to be reinserted in the code lock.

When the ignition is switched off, the anti-theft device activates itself automatically after 30 seconds.

- ▶ To reorder the code key, give the code number entered on the accompanying code card (credit card format).

Starting the engine

Note !
A wrong start can cause damages for the diesel engine !

- ▶ Only operate the starter motor when the Diesel engine is off.
- ▶ Do not operate the starter more than 20 seconds.
- ▶ If the engine does not start after 20 seconds, wait at least 1 minute before attempting to restart.
- ▶ First turn the ignition key back to position **0** before restarting the engine.
- ▶ If the engine does not start after three attempts, find the problem and correct it.

Starting procedure

- ▶ Turn the ignition key to start position **3**.
- ▶ Release the ignition key as soon as the engine starts.
  - ↳ Control lamps H2 and H12 must go out.
  - ↳ The buzzer will sound briefly when the engine starts until the engine oil pressure builds up.

Starting procedure for low temperatures

For low temperatures, the intake air is preheated automaticaly by flame glow plugs situated in the intake manifolds so, to improve the starting of the engine.

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When the symbol "**Preheating ON**" appears on the screen, the ignition key must be maintained in position **1** until the symbol "**Preheating END**" appears. Then the diesel engine can be started.

- ▶ Turn the ignition key to position **1** and let it in this position.
  - ↳ The symbol "**Preheating ON**" appears on the screen during 20 seconds.
- ▶ After symbol "**Preheating END**" has appeared (about 2 seconds), turn the ignition key to start position **3**.
- ▶ Release the ignition key as soon as the engine starts.

Starting procedure for exterior temperature below -18 °C (0 °F).

So to improve the starting ability of the engine at temperatures below -18 °C, we recommend to equip the machine with one or several of the original LIEBHERR cold starting kits (see Starting aids).

Speed adjustment and operating modes

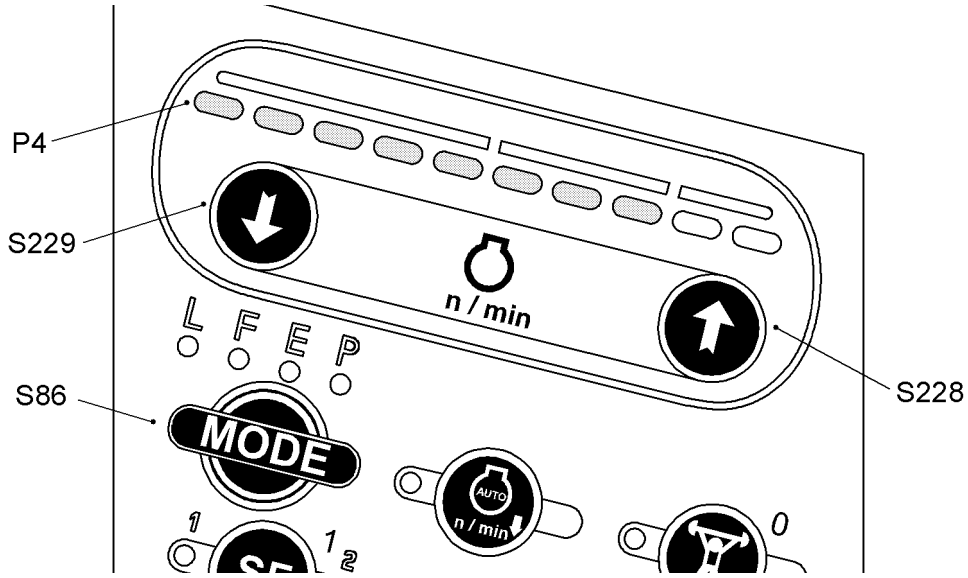

Fig. 3-57 *Speed adjustment and operating modes selection*

The LED chain **P4**, divided into 10 speed levels, displays the actual engine speed.

- ▶ There are two differents ways to adjust the engine RPM.
  - press the mode switch **S86**.
  - **- or-**
  - press arrow keys **S228** or **S229**.

Engine speed and operating mode selection via the mode switch

Four different modes can be selected by pressing the switch **S86**.

- **L** : LIFT mode (speed level 5 – sensitive lifting of loads).
- **F** : FINE mode (speed level 10 – levelling works).
- **E** : ECO mode (speed level 8 – economical work).
- **P** : POWER mode (speed level 10 - working at rated power).

- ▶ Press the mode switch **S86**.
  - ↳ The mode selected will be used, with the corresponding speed and power.
  - ↳ The appropriate LED will illuminate permanently.

In mode E and P, the engine is running at its rated power curve, in mode L and F it

works at a power reduced by approx. 20%.

The speed level 8 corresponds to the range where the specific fuel consumption of the engine is optimal ("ECO" range).

Engine speed adjustment using the arrow keys

To increase the speed:

▶ Press switch **S228**.
  ↳ Speed will be increased by one level.
  ↳ One more LED to the right illuminates on the indicator **P4** at the display.

To decrease the speed:

▶ Press switch **S229**.
  ↳ Speed will be decreased by one level.
  ↳ The most right LED goes out on the indicator **P4** at the display.

The following picture shows the modifications of the speed level and of the engine power by pressing the arrow keys **S228** and **S229.**

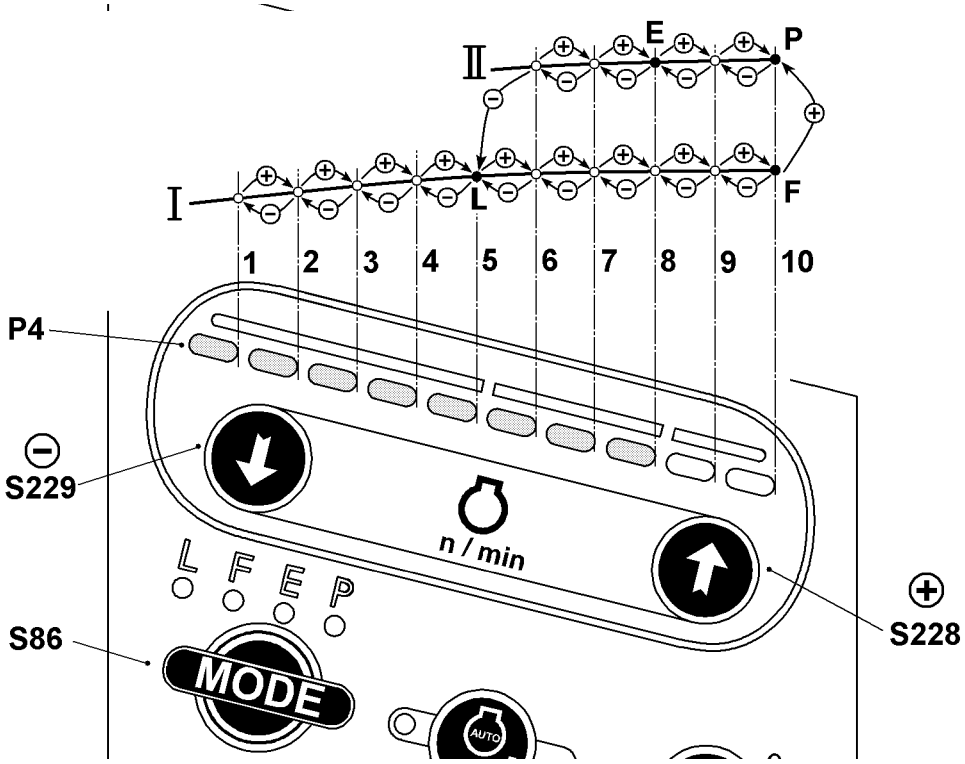

Fig. 3-58 *Engine speed adjustment via the arrow keys S228 and S229*

The lighting LED under the letters next to the mode key S86 shows which is the currently active mode. The selected mode will be memorized when the engine is switched off and will be displayed by a flashing LED above switch **S86** the next time the engine is started.

The mode indicating LED will flash also each time the engine RPM does not any more correspond to the speed lever of the currently selected operating mode (as an example if the speed has been adjusted via the arrow keys or if it has been decreased by the low idle automatic).

Immediately after the Diesel engine has been started, the speed will either be at level 1 (low idle of the Diesel engine) or at level 3, if a warm-up phase is required for the

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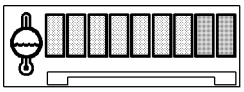
Diesel engine.

Warm-up phase for Diesel engine and hydraulic circuit

Diesel engine



In cold condition, the engine speed will automatically be increased above the low idle speed. The RPM increase is depending on the coolant temperature.

▶ Increase the engine load slowly until the second green LED (from left) goes on at the temperature gauge **P2**.

Note !
Low idling for an extended period of time damages the engine.

▶ Switch off the Diesel engine if the machine is not being used.

Hydraulic oil

The power of the main pumps is automatically limited when the hydraulic oil is cold (temperature below 8 °C).

As soon the hydraulic oil temperature rises above 8 °C, the full power of the machine is available.

Note !

The warm up phase for the hydraulic circuit can be activated and deactivated while programming the display.

During a warm up phase for Diesel engine or hydraulic oil, the symbol "current warm up phase" will be displayed on the screen.

Notes after starting the engine

Danger!
Danger of suffocation.

▶ When operating in enclosed spaces, only run the engine in areas with sufficient ventilation.

▶ Open doors and windows to ensure sufficient supplies of fresh air.

Caution!

▶ Bring the engine and hydraulic oil up to operating temperature. The controls operate sluggishly at low oil temperatures.

▶ Move the machine carefully in an open space to test the function of the chassis and slewing gear brakes.

▶ Check that the equipment is operating perfectly.

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Switching off the diesel engine

Caution!
The engine could be damaged.

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

▶ First use arrow key **S229** to set the engine speed to low idle.
  ↳ Only the LED on the furthest left is now lit on display **P4** (engine speed).

▶ Allow the diesel engine to run continuously in low idle for another 30 seconds.

▶ Now turn the ignition key to position **0** in order to switch off the engine.

▶ Remove the ignition key.

3.3.4 Starting aids

Fuel preheating S26 (optional extra)

The fuel filter will be electrically heated using fuel preheating. This will prevent the fuel filter salting up at low temperatures.

❑ 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.

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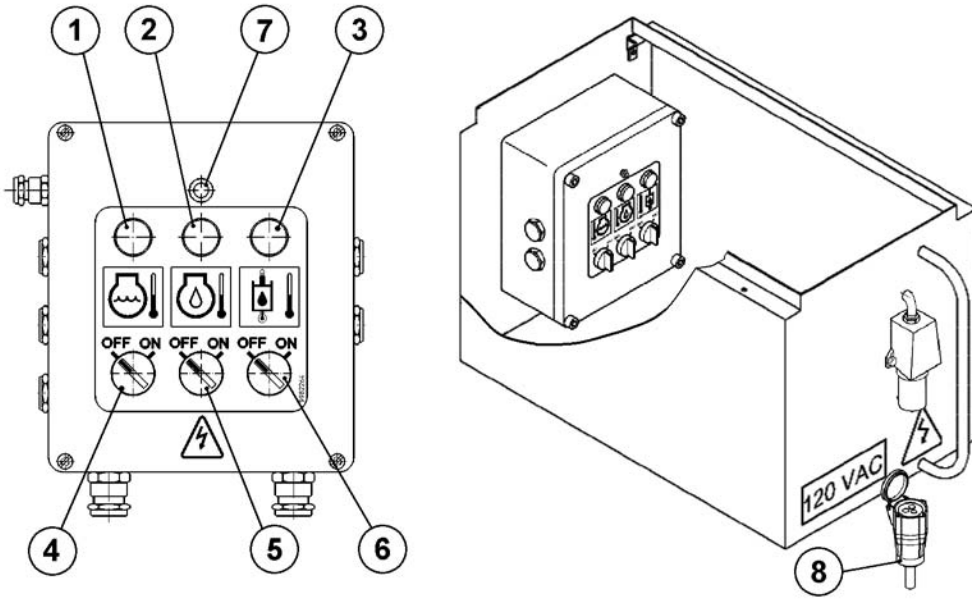

Fig. 3-59 *Coolant / motor oil / hydraulic oil preheating*

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.

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3.3.5 Jump start procedure

Danger!
When connecting to exterior batteries, old batteries can be subject to increased gas formation.

- ▶ Wear protective goggles and gloves whenever jump starting, avoid naked flame and creating any sparks in the vicinity of the flat vehicle battery. RISK OF EXPLOSION!
- ▶ Only use jump starting cables with a sufficient cross section. Always follow the established jump starting procedure.

Connecting the batteries

- ▶ First connect the cable to the positive terminal (+) of the flat battery and then to the positive terminal (+) of the exterior battery.
- ▶ Connect the second cable to the negative terminal (-) of the flat battery and then to the negative terminal (-) of the exterior battery.
- ▶ Start the engine as described above.

Caution!

- ▶ Before removing the jump start cable, be sure to place the diesel engine of the jump started machine into low idle.
- ▶ For safety reasons, switch on large consumers such as work headlights, upper carriage lighting etc. to avoid overvoltage. The electronics could otherwise be damaged.

Disconnecting the batteries

- ▶ First remove the cable from the negative terminal (-) of the exterior battery and then from the negative terminal (-) of the flat battery.
- ▶ Remove the second cable from the positive terminal (+) of the exterior battery and then from the positive terminal (+) of the flat battery.
- ▶ Check the electrical function of the machine.

For battery care and maintenance, see the chapter “Battery care”.

3.3.6 Emergency operations

Emergency control speed adjustment

In normal operation, the desired speed is entered using arrow keys **S228** and **S229** or using mode switch **S86** and the engine speed is controlled correspondingly using the excavator electronics.

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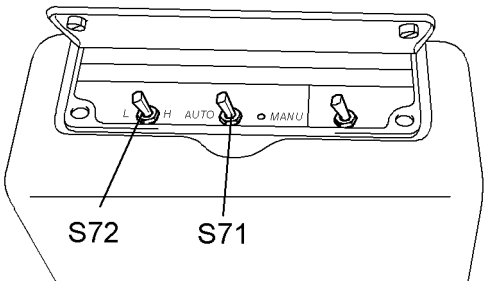

Fig. 3-60 *Emergency control speed adjustment*

This automatic system can be switched off in problem cases.

▶ Move toggle switch **S71** to the **MANU** position.
  ↳ The telltale light illuminates.
  ↳ The symbol **MANU** appears on the display.

▶ Control the speed manually.

The speed will be controlled using toggle switch **S72**:

– Pos. **L** signifies: Speed reduction
– Pos. **H** signifies: Speed increase

Emergency operation

If the function of the servo control and of the parking and slewing gear brakes can no longer be activated due to a defect in the electronics, it is possible to bypass the electronics.

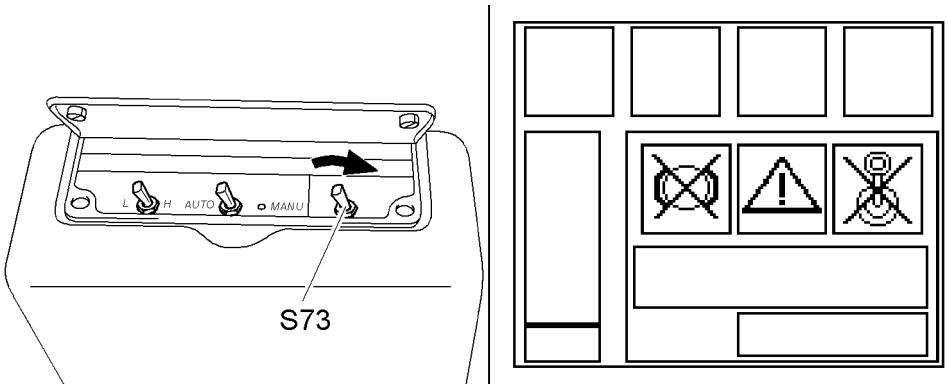

Fig. 3-61 *Emergency operation (Fig. left) and emergency switching screen display (Fig. right)*

▶ Push the safety lever down.

▶ Move the toggle switch **S73** into the emergency position.
  ↳ The symbols appear on screen.
  ↳ The servo control will be activated when the slewing gear motor is running.
  ↳ When the hydraulics are ready to operate, the slewing gear motor runs and the parking and slewing gear brakes are released.

Danger!
In this toggle switch position, **S73**, the servo control and slewing gear brakes can no longer be activated using the switches for this purpose on the keypad.

All three functions can only be activated or deactivated using the safety lever.

- ▶ Inform all personnel who are involved in the operation or maintenance of the machine about the emergency switching and of the changed operation.
- ▶ Rectify the damage to the machine which caused the emergency functions to be used as quickly as possible.

Emergency operation of operating pumps

When a fault occurs in the electrical power or regulating circuits, pump efficiency is reduced to a minimum.

In this case, however, it is still possible to continue to work with reduced pump efficiency.

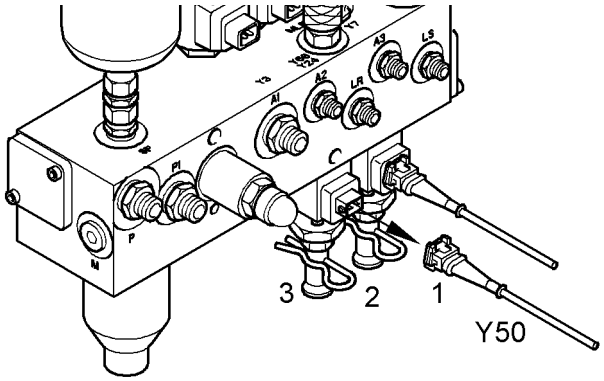

Fig. 3-62 *Preparing emergency operation of operating pumps*

- ❑ Toggle the lever **3** on the control oil unit on the back of the hydraulic tank and:
- ▶ pull out the plug connector **1 (Y50)**.
- ▶ pull out the cotter pin **2**.
- ▶ toggle the lever **3** to a horizontal position (emergency position).
  ↳ Emergency operation is prepared.

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3.3.7 Driving

Driving straight ahead

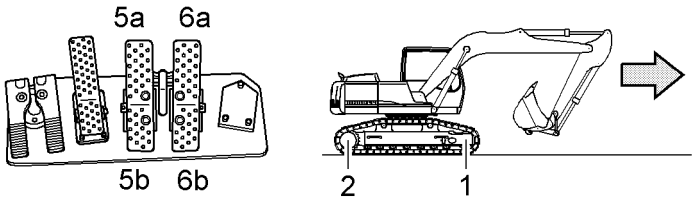

Fig. 3-63 *Driving straight ahead*

1 Leading wheel
2 Tumbler wheel
5a / 5b Pedal for left drive unit
6a / 6b Pedal for right drive unit

Caution!
When driving, the upper carriage must be rotated to the chassis in such a way that when driving forwards, the leading wheel **1** is in front and the tumbler wheel **2** is at the rear.

Driving forwards:

▶ Push both pedals forward (**5a** and **6a**).

Reversing:

Caution!
Before reversing, ensure that the area behind you can be safely entered.

▶ Push both pedals down (**5b** and **6b**).

Turning on the spot

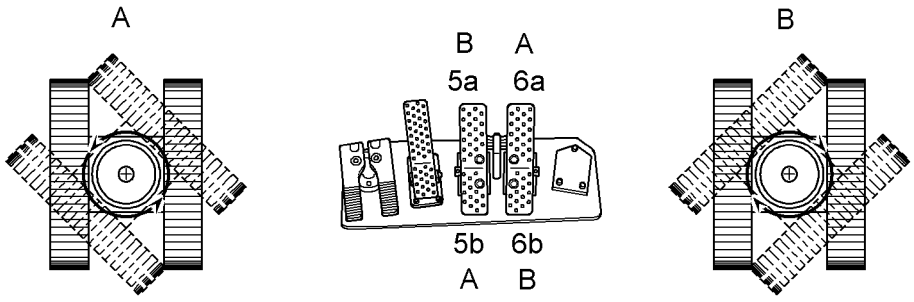

Fig. 3-64 *Turning on the spot*

Turning left (A):

- ▶ Push the left pedal down (**5b**).
- ▶ Push the right pedal forwards at the same time (**6a**).

Turning right (B):

- ▶ Push the right pedal down (**6b**).
- ▶ Push the left pedal forwards at the same time (**5a**).

Turning with a crawler

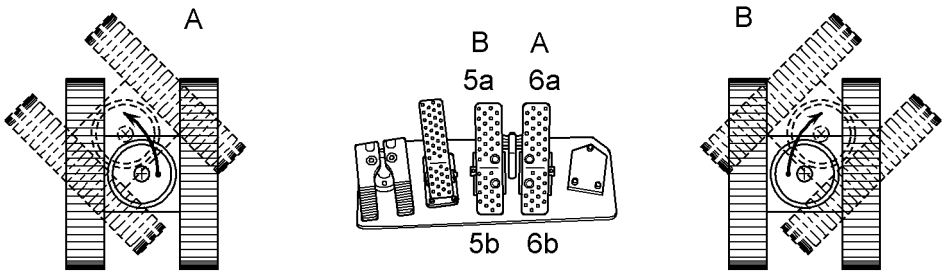

Fig. 3-65 *Turning with a crawler*

Turning to the left (A):

Push the right pedal forwards (**6a**).

Turning to the right (B):

Push the left pedal forwards (**5a**).

Note!
If possible, avoid turning backwards in order to preserve the running gear parts.

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Controlling the drive unit manually

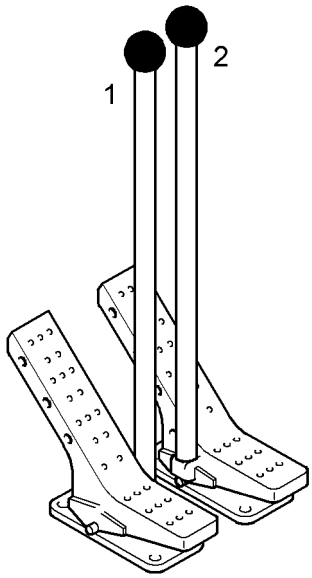

Fig. 3-66 *Manual drive unit control*

❑ Particularly careful driving is required here.

▶ Insert the hand levers (**1** and **2**) available in the tool kit into the pedals for the drive units.
  ↳ The drive units can be operated manually.

Note!
When driving the machine onto or off a low loader, the drive unit must be controlled manually for safety reasons.

Controlling the speed

The driving speed is influenced by switch **S21**. The travel motors can be operated in two different positions:

– **Normal drive** (position 1):
  Maximum tensile force of both drive units at moderate speed.
– **Fast drive** (position 2):
  Reduced tensile force of both drive units at maximum speed.

▶ Press switch **S21**.
  ↳ Transfer from normal drive to fast drive is activated.
  ↳ LED 1 in the switch illuminates.

While driving, the machine will automatically switch from normal drive to fast drive as the ground conditions permit. After transferring to fast drive, LED 2 illuminates. If the ground conditions become more difficult again, the system will automatically switch from fast drive to normal drive. LED 1 illuminates.

▶ Press switch **S21**.
  ↳ Transfer from normal drive to fast drive is deactivated.
  ↳ LED 1 in the switch goes out.

When switch **S21** is switched off, the travel motors remain continually in position 1.

Braking the machine

The hydrostatic travelling mechanism of the machine also functions as a service brake.

▶ Disengage the pedals for the drive units.
  ↳ The pedals will return to the neutral position.
  ↳ The travelling mechanism will be stopped.
  ↳ The machine will be braked.

When the pedals for the drive units are in the neutral position, the hydrostatic drive prevents the machine from rolling off.

In the neutral position, the parking brake will be applied automatically after approx. 5 seconds. The work equipment can, however, still be moved.

Caution!
Disengaging the pedals quickly causes the machine to halt abruptly.

▶ Before starting the machine, always fasten the safety belt.

3.3.8 Drive warning device (optional extra)

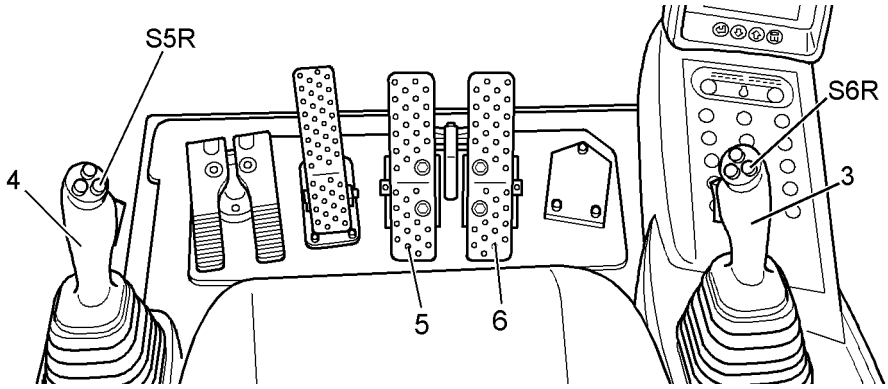

Fig. 3-67 *Drive warning device*

▶ Press drive pedal **5** or **6**.
  ↳ The drive warning device switches on automatically.
  ↳ An acoustic signal (warning tone) will be emitted.

Deactivating the drive warning device:

▶ Press and hold press button **S6R** on right-hand joystick **3**.
  ↳ The drive warning device will switch off.

Caution!
If a magnetic system LIEBHERR AMERICA (LAM) is mounted, the drive warning device is controlled by the button **S5R** on left-hand joystick **4** instead of the button **S6R**.

Note!
The drive warning device can only be switched off 10 seconds after starting to drive. If the accelerator pedal is engaged once more, the drive warning device will reactivate.

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3.3.9 Towing the machine

Towing the machine is problematic and is always carried out at the owner's risk.

The machine may only be towed in exceptional circumstances, eg. in order to move the machine away from a dangerous place for repair.

Damage or accidents which occur during towing of the machine cannot be covered by the manufacturer's guarantee under any circumstances.

Danger!
Danger of injury due to a torn rope. Staying near the rope is vorbiden

▶ When towing the machine, only use a tow-bar that has the correct dimensions.

Caution!
When towing the machine, the multi-plate brake in the drive transmissions must be released.
This means that the engine will have to be started so that the pressure in the hydraulic lines can be removed.
If the engine cannot be restarted or if there is a defect in the hydraulic system, the drive transmissions can also be manually depressurized. For more information on this, consult LIEBHERR customer service.

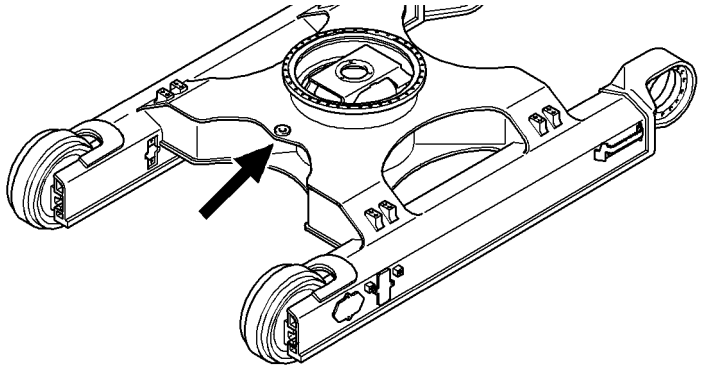

Fig. 3-68 *Towing the machine*

❑ The tow-bar for towing the machine must have sufficient tensile strength.

▶ Fasten the tow-bar to the clevis type eyelet on the chassis.

▶ Tight the rope / bar carefully and hold it. Avoid kinks

▶ Tow the machine without shocks. Risks of breaches.

3.3.10 Height and inclination adjustable cab (optional extra)

A hydraulically adjustable cab is an auxiliary device enabling the cab to be variably height and/or inclination adjusted.

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Danger!
When the cab is raised, the route the machine will be travelling must be even, free of all obstructions and must not have a gradient that could affect the stability of the machine.

- ▶ Only adjust the cab when the machine is stationary.
- ▶ Ensure that no persons are within the machine's danger area when carrying out the cab adjustment.

Danger!
The safety belt is designed to protect the operator.

- ▶ Before starting the machine, always put on the safety belt.
- ▶ Ensure that the safety belt is not twisted when it is secured.
- ▶ To ensure your safety, check the condition, function and fastening of the belt regularly and replace any damaged parts without delay.

Adjusting the height of the cab

The height of the cab is controlled using the switches **S200**, **S201** and **S78** in the left control panel.

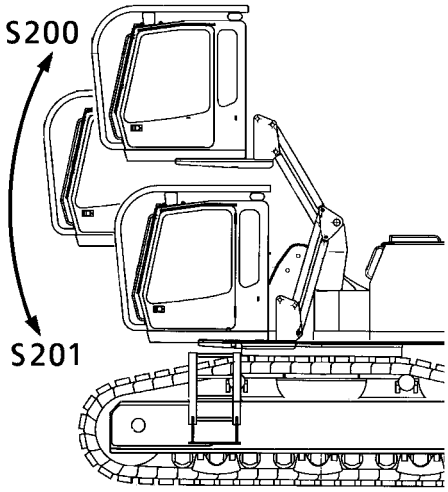

Fig. 3-69 *Adjusting the height of the cab*

- ❑ The machine is ready to operate.
  - ↳ The safety lever is pushed up.
  - ↳ The engine is running.

To raise the cab:

- ▶ Press and hold switch **S200**.
  - ↳ The cab travels upwards as long as switch **S200** is being pressed.

To lower the cab:

- ▶ Press and hold switch **S201**.
  - ↳ The cab travels downwards as long as switch **S201** is being pressed.

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Emergency operations

If control of the height adjustable cab should be lost due to a fault in the diesel engine or another defect, there is an emergency cab lowering function.

There are two ways to lower the cab in an emergency:

Emergency cab lowering inside the cab:

- ▶ Press and hold switch **S78**.
  - ↳ The cab travels downwards as long as switch **S78** is being pressed.

Emergency cab lowering from outside the cab:

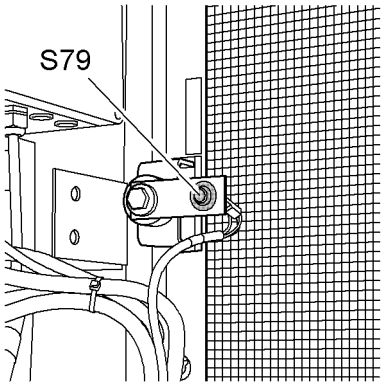

Fig. 3-70 *Emergency cab lowering button in the battery room.*

It is possible to lower the cab using an emergency lowering button on the outside of the machine.

Danger!
Danger of crushing.

- ▶ Ensure that no one is standing in the vicinity of the lifting frame when lowering the cab from the outside in an emergency.

Ensure that you do not place any part of the body in the area of the moving parts when lowering the cab in an emergency.

- ▶ Open the rear left side door (battery room).
- ▶ Press and hold emergency lowering button **S79**.
  - ↳ The cab travels downwards as long as switch **S79** is being pressed.

Adjusting the inclination of the cab

With a cab tiltable to 30° for demolition machines **(3)**, the buttons S200, S201, S78

and S79 allow to tilt the cab to the rear or to the front.

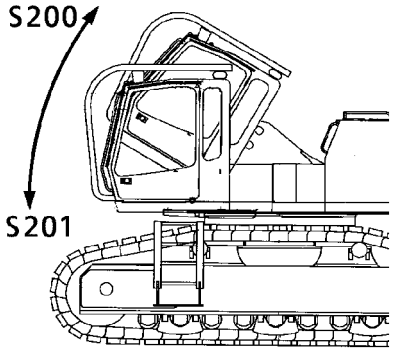

Fig. 3-71 *Adjusting the inclination of the cab*

Repair and maintenance

Danger!
Repair and maintenance work on the cab, lifting frame or on the related hydraulics system should be carried out – as far as possible – with the cab lowered.

▶ For repair and maintenance work which can only be carried out when the cab is raised, the cab should be supported by equipment which is suitable for this purpose.

3.4 Working with the machine

3.4.1 Safely getting up or down.

– When getting up or down, position the machine on even, horizontal ground. The upper structure should be positioned with the chassis in such a way that the steps and ladders are aligned with each other.
– Ensure that steps, ladders and hand-rails (grips) are in good condition. In particular, you should ensure that they are free of dirt, oil, ice and snow.
NOTE: To ensure that the doors open properly in all weather conditions, the door seals must be dusted with talc or silicon at least every two months or more often if required. The door hinges and locks should be greased regularly.
– Face the machine when getting in or out and always use three-point support, i.e. two hands and one foot or two feet and one hand must always be in contact with the access system at the same time.
– If you are able to reach the door handle with your free hand, open the doors before you climb any higher. External influences, such as wind, can make it more difficult to open doors. Because of this, always use your hand for control when opening doors. Ensure that the door is latched open to prevent it slamming open and shut.
– Now continue to climb up and sit down in the operator's seat as soon as you enter the cab. Close the doors and fasten the safety belt.
– When getting out of the machine, proceed as carefully as when you climbed into the machine.
– Stop the machine on level, horizontal ground. The upper structure should be positioned with the chassis in such a way that the steps and ladders are aligned with

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each other.

– Unfasten the safety belt. Position yourself with your face toward the machine when getting out and use three-point support. Climb down until you can close the doors safely. Always use your hand for control when closing the doors.
– Now climb down to the ground.

3.4.2 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.
– Only work when seated properly and with the safety belt securely fastened (if available).
– Report all function faults and ensure that all necessary repairs are carried out immediately.
– Assure yourself that no one is endangered when you start the machine moving.
– Before you start working, test the brake system in accordance with the regulations given in the operating instructions.
– Never leave the driver's seat while the machine is moving.
– Never leave the machine unattended while the engine is running.
– The machine must be positioned, moved and operated in such a way that it is stable and that there is no danger of overturning. Only known loads may be moved with the equipment; this applies particularly when using the grab.
– Position the upper structure in the longitudinal direction when moving and hold the load as close to the ground as possible.

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EXCEPTION: see USE WHEN LOADING AND UNLOADING

– Adjust your driving speed to suit local conditions.
– Avoid any working movements which may tip the machine. Should the machine start to tip or slide sideways, however, turn the upper structure to face downhill and lower the equipment at the same time.
– As far as possible, work downhill or uphill and not side on to the slope.
– Drive safely on stony, sleepery or inclined ground
– Only drive downhill at the permitted speed or you could lose control of the machine.
– Always shift down to a lower running step before a slope. When doing this, the diesel engine must run at nominal speed and the speed may only be reduced using the accelerator pedals.
– Load an occupied truck only if all safety requirements are fulfilled, notably in order to protect the truck operator.
– For demolition work, digging and crane operations etc., always use protective devices specifically designed for the purpose.
– For terrain which is difficult to gain an overview of and whenever necessary, ask for the assistance of a spotter. Only permit one person to give you signals.
– Only permit experienced personnel to attach loads and give signals to the machine operator. The spotter must be positioned within the visual range of the operator or be in voice contact with him.
– Depending on the equipment combination, there is a risk of collision between the work tool and the cab, the cab protection or the boom cylinders. The greatest degree of care must be taken to avoid damage when the hoe teeth come within this area.
– In case of a thunderstorm :
  • lower the attachment to the ground and if possible anchor the digging tool into the soil.
  • leave the cab and move away from the machine before the storm breaks out. Otherwise, you must stop the excavator, turn off the radio and keep inside the closed cab until the end of the storm.
– Auxiliary control units can have various functions. Always check their functions when starting up the machine.
– Stop the swinging motion of the uppercarriage when lowering the attachment into a ditch without striking the attachment on the ditch walls.
– Inspect the machine for damage if the attachment has been swung into a wall or any other obstacles.
– Applications in which the attachment is to be used to strike the material being extracted are not permitted, even when working in a longitudinal direction.
– Repeated strikes against an object leads to damage to the steel structures and machine components.
– Please refer to your LIEBHERR dealer if special teeth for heavy-duty or special applications are required.
– Do not attach too large bucket or bucket with side cutters or that are during operations with rocky material. This would prolong the work cycles and may lead to damage to the bucket as well as further machine components.
– With the 2x45° offset articulation, the offset position may only be employed if the working tool or the attachment does not touch the material.
– Operation of the offset articulation to drill into the material is not permitted.
– Do not lift the machine during operation. Should this happen, lower the machine slowly back to the ground.
– Do not let the machine fall heavily on the ground and do not hold it back with the

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hydraulics. This would damage the machine.

– During operation with the attachment it is forbidden to raise the machine with the dozing blade (e.g. carving at the ceiling when tunnelling).

Safe use white a hydraulic hammer

– The hydraulic hammer must be selected with particular care. When using a hydraulic hammer not permitted by LIEBHERR, steel structures or the other machine components can become damaged.
– Before beginning breaking tasks, position the machine on firm and level ground.
– Use a hydraulic hammer designed exclusively for breaking stone, concrete and other breakable materials.
– Only operate the hydraulic hammer in the longitudinal direction of the machine and with the windshield closed or with a front protective grid.
– Ensure during hammer operation that no cylinder is entirely extended or retracted and that the stick is not in the vertical position.
– In order to avoid damages to the machine, try not to break stone or concrete while performing retraction and extension motions of the hydraulic hammer.
– Do not apply the hydraulic hammer uninterrupted for more than 15 secs. at a time to the same place. Change the breaking point. Too long uninterrupted operation of the hydraulic hammer leads to an unnecessary overheating of the hydraulic oil.
– Do not use the drop force of the hydraulic hammer to break stone or other materials. Do not move obstacles with the hydraulic hammer. Misuse of this nature would damage both the hammer and the machine.
– Do not use the hydraulic hammer to lift objects.

Safe use when loading and unloading (particularly when loading and unloading wood)

– According to use, it can be necessary when working with a grab to move with the equipment raised and the load lifted up; this applies, for example, when loading and unloading wood.
– Here, the centre of gravity of the machine will be displaced upwards in the vertical direction. The driving characteristics of the machine will thus be influenced persistently, e.g. through reduction of the dynamic stability.
  The following instructions are therefore to be observed at all times:
  • Adjust vehicle handling to suit the altered machine characteristics and environmental conditions.
  • Reduce your speed to prevent the need for sudden braking and steering manoeuvres.
  • Avoid sudden speed changes, such as braking, accelerating and changing direction.
  • Only rotate the upper structure when the chassis is stationary.
  • Only rotate the upper structure after you have picked up the load.
  • Only move the machine when you have picked up and lifted the load and rotated the upper structure to the driving position.
  • There is a danger of possible swinging movement and dropping of the load when the equipment is raised.
  • A protective grid (FOPS) in accordance with ISO 10262 must be attached to the cab.
  • A protective roof (FOPS) in accordance with ISO 10262 must be attached if there is a risk of objects falling from above.
  • Only the maximum permissible load may be taken up using the grab.
– NOTE: The weight of absorbent materials, such as logs, is dependent on length, diameter and specific weight. The influencing variables present in a natural pro-

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duct, such as moisture, must be noted.

– Working procedures when using machines with grabs require the machine operator to receive special instruction and training.
– Use as part of the work process is only permitted when the machine operator has sufficient training and practical experience.

Safe use of machines with tower elevation

– Due to the tower elevation, the centre of gravity of the machine will be displaced upwards in the vertical direction. The driving and work characteristics of the machine will thus be influenced persistently, e.g. through reduction of the dynamic stability.
– Due to the heightened centre of gravity, the machine must be aligned horizontally before use. In horizontal alignment, the centre of gravity of the upper structure is over the centre of the chassis, which reduces the risk of tilting.
– The machine can still sway and tilt despite being aligned!
The following instructions are therefore to be observed at all times:

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

When loading and unloading:
- The machine must be supported and aligned horizontally before moving (slewing) the upper structure out of the transport position.
- It is imperative that you check the contact surface of the support (load carrying capacity of the substrate). A support subsiding would have disastrous consequences!
- Carry out all movements with increased care.
- To slew the load, move the equipment as close as possible to the machine **(Caution! swinging grab)**and hold the load close to the chassis and above the substrate.
- Avoid braking or accelerating the equipment or upper structure abruptly.
- Do not lift any loads which are heavier than those given in the load chart.

Protection from vibration

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

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

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

– Select suitable machines, equipment parts and auxiliary devices for each part of the job.
– Use a machine that has a suitable seat (i.e. for earth-moving machinery such as hydraulic excavators, this should be a seat which corresponds with EN ISO 7096).
– Keep the seat in good condition and adjust it as follows:
  • The seat and its damping action should be adjusted depending on the weight and height of the operator.
  • Check the seat's damping action and adjustment mechanisms regularly and ensure that these seat characteristics remain as per the seat manufacturer's instructions.
– Check the maintenance status of the machine, particularly with respect to: tyre pressure, brakes, steering, mechanical connections etc.
– Do not steer, brake, accelerate, shift gears, move or load the machine's 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.

3.4.3 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.

3.4.4 Operating the swing gear

Caution!
The machine is dispatched as standard with **normal control**.
On request, the machine can be equipped with a control system that deviates from the norm (eg. with LIEBHERR control). The additional operating instructions for this control system apply in this case.

The joystick functions described here refer exclusively to **normal control**.

Rotating the uppercarriage

The uppercarriage is rotated using the left joystick.

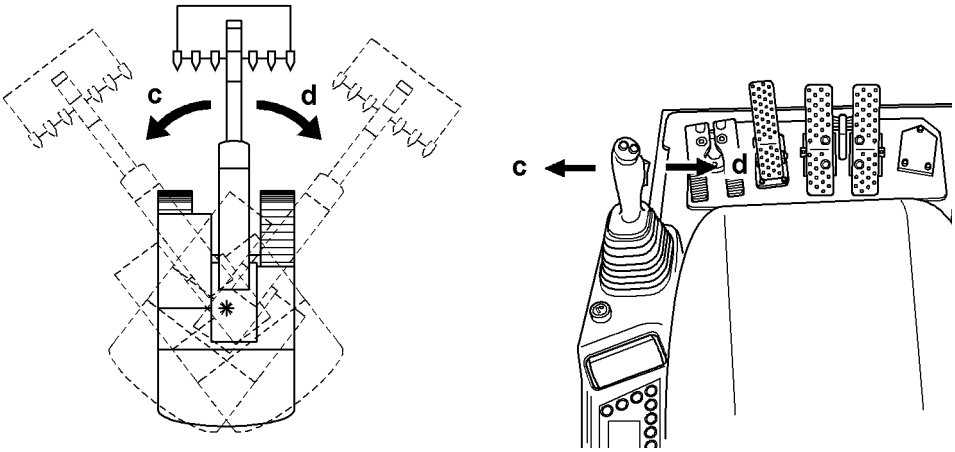

Fig. 3-72 *Rotating the uppercarriage*

▶ Push the joystick to the left **c**.
↳ Upper carriage rotates to the left.

▶ Push the joystick to the right **d**.
↳ Upper carriage rotates to the right.

Braking the uppercarriage

The machine is equipped with a hydraulic and a mechanical swing gear brake.

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Hydraulic swing gear brake

▶ Move the left joystick **4** to neutral.
↳ Uppercarriage will be adequately hydraulically braked.

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

Mechanical swing gear brake

The uppercarriage can be locked in any position using this brake

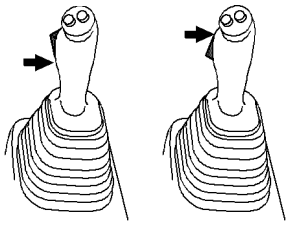
The brake is negatively acting, hydraulically actuated and serves as a holding or parking brake.

Caution!
Damage to the machine.

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

▶ Press switch **S17**.
↳ Swing gear brake is engaged.
↳ LED in switch illuminates.

▶ Press switch **S17** again.
↳ Swing gear brake is in mode semi-automatic.
↳ LED in the switch goes out.



▶Tilt down the rocker switch **S57**.
↳Slewing gear brake is applied as soon as the uppercarriage speed gets lower than a limit value.

▶Tilt up the rocker switch **S57**.
↳Swing gear brake remains released.

Note!
The red control light in the button S17 lights up each time the brake is applied.
If this light does not go out when the rocker switch S57 is tilted up, the button S17 must first be pushed to pre-select the semi-automatic mode.

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, tilt the switch S57 down and reduce the uppercarriage speed by braking with joystick 4.
Move the joystick 4 back to «0» position only when the uppercarriage is quite immobile, the brake will apply.

Ermergency stop of the uppercarriage swing motion

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

Caution
Perform this braking via button S17 only in emergency cases, since it causes fast abrasion of the brake discs.

To check the mechanical swing gear brake:

❑ Upper carriage must be stationary.

▶ Press switch **S17**.
  ↳ Swing gear brake is engaged.
  ↳ LED in switch illuminates.

▶ Push the left joystick **4** to the right and then to the left as far as the stop.
  ↳ Upper carriage may not rotate.
  ↳ Slewing gear brake function is OK.

Positioning swing brake (optional extras)

The positioning swing brake is used for progressive and sensitive braking of the upper carriage.

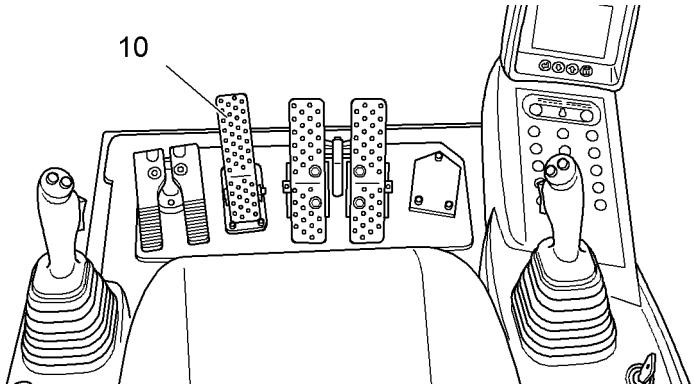


Fig. 3-73 *Positioning swing brake*

Note!
Increased wear.

▶ Do not use the positioning swing brake purely as a service brake, but only as a stop and parking brake for the swing gear.

▶ Brake the upper carriage hydraulically for preference (by countering).

▶ Engage pedal **10**.
  ↳ Upper carriage is located in the desired position after sensitive braking.

3.4.5 Working position

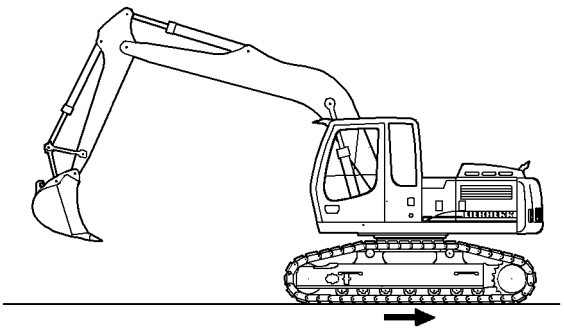


Fig. 3-74 *Working position – machine*

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❑ Work with the machine is generally to be carried out over the leading wheel.

Note

▶ Drive backwards when you are working lengthwise with the hoe type bucket.

3.4.6 Joystick functions when setting up the machine

Caution!
The machine is dispatched as standard with **normal control**.
On request, the machine can be equipped with a control system that deviates from the norm (eg. with LIEBHERR control). The additional operating instructions for this control system apply in this case.

The joystick functions described here refer exclusively to **normal control**.

Operating the stanchion cylinder

The stanchion cylinder is operated using the left joystick **4**.

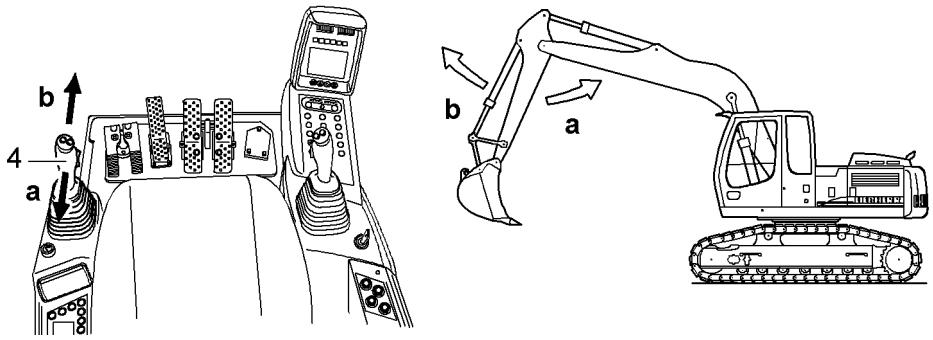

Fig. 3-75 *Operating the stanchion cylinder*

▶ Push the joystick back **a**.
↳ Stanchion will be drawn in.

▶ Push the joystick forwards **b**.
↳ Stanchion will be extended.

Operating the boom cylinder

The boom cylinder is operated using the right joystick **3**.

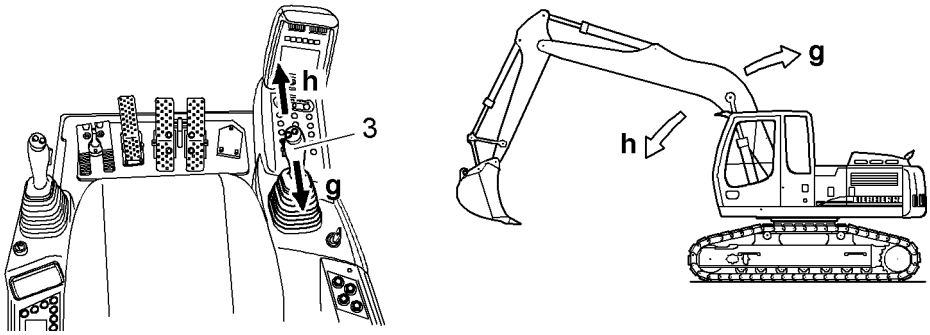

Fig. 3-76 *Operating the boom cylinder*

- ▶ Push the joystick back **g**.
  - ↳ Equipment will be raised.
- ▶ Push the joystick forwards **h**.
  - ↳ Equipment will be lowered.

Operating the shovel cylinder

The shovel cylinder is operated using the right joystick **3**.

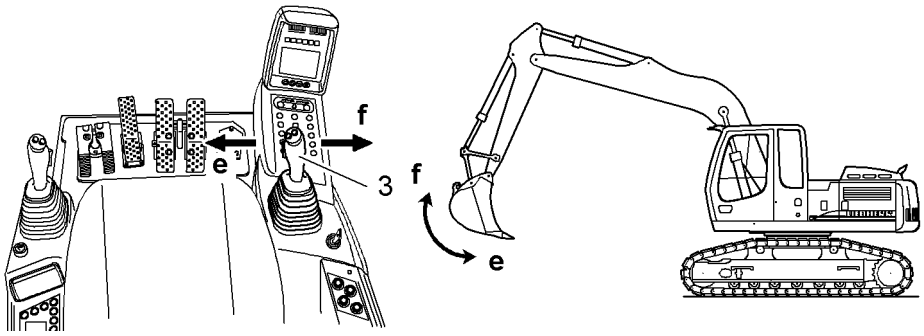

Fig. 3-77 *Operating the shovel cylinder*

- ▶ Push the joystick to the left **e**.
  - ↳ Shovel will be tilted inwards.
- ▶ Push the joystick to the right **f**.
  - ↳ Shovel will be tilted outwards.

Operating the grab cylinder

The grab cylinder is operated using the right joystick **3**.

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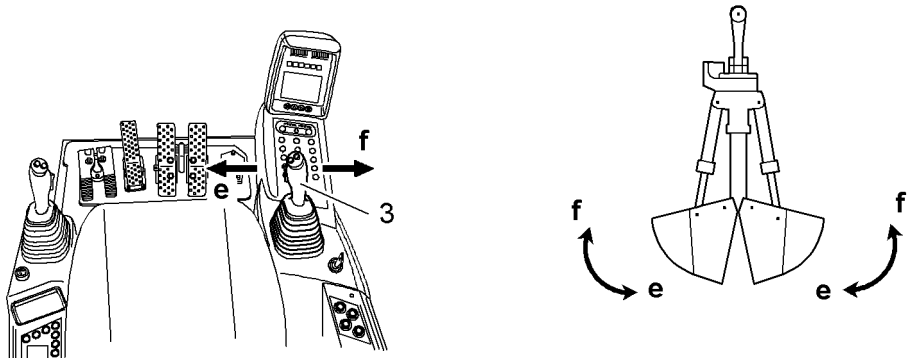

Fig. 3-78 *Operating the grab cylinder*

Danger!
The grab must never be guided by hand by auxiliary staff!

- ▶ Push the joystick to the left **e**.
  ↳ Grab will close.
- ▶ Push the joystick to the right **f**.
  ↳ Grab will open.

Combined movements

Moving a joystick diagonally results in the work functions concerned being combined. This allows different equipment movements to be activated at the same time.

3.4.7 Lowering the work equipment when the engine is not running

In an emergency, the equipment can be lowered when the diesel engine is not running.

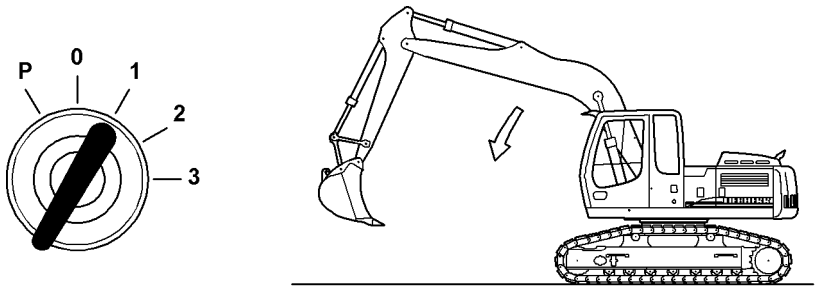

Fig. 3-79 *Lowering the equipment when engine is not running*

- ▶ Turn the ignition key to contact position **1**.
- ▶ Operate the joystick or the foot pedals until the equipment has lowered.

Note
The equipment can be lowered because of the control oil unit's pressure reserve. This reserve is limited and is only sufficient for small movements of the pilot control devices.

▶ Only operate the joystick in the directions for lowering the equipment.

3.4.8 Turning, rotating, bolting and unbolting the add-on unit

Switch **S19** is used to activate an additional function:
– rotating grab (A)
– slewing ditcher bucket (B)
– locking pin of a hydraulic quick change adapter (C)

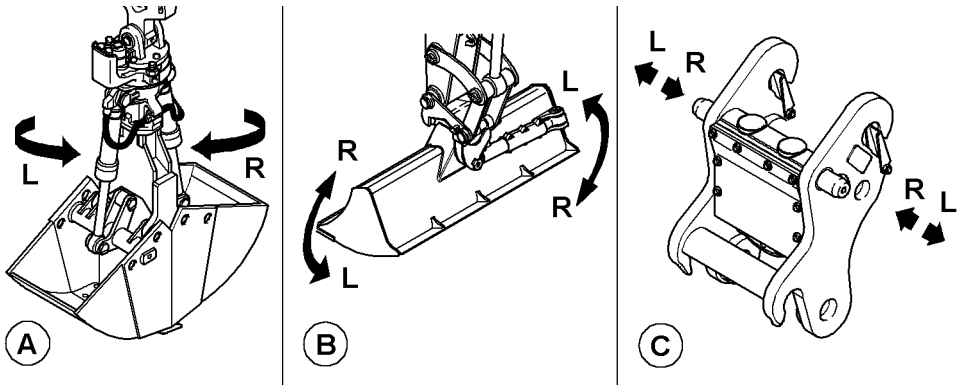

Fig. 3-80 *Add-on units example*

To operate, press the pushbutton. The pushbutton is located on the right and/or left joystick (depending on the machine's equipment):

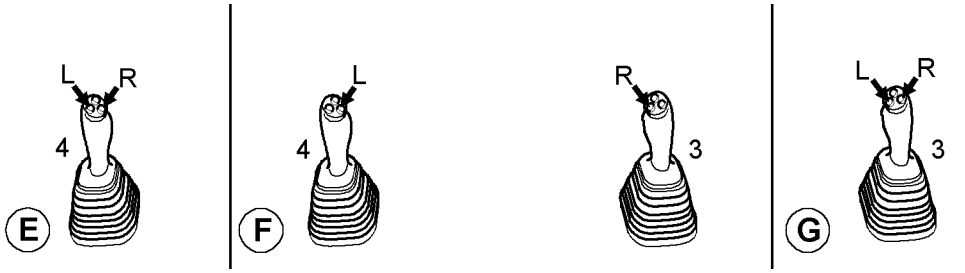

Fig. 3-81 *Pushbutton on the joystick*

E Operation with left joystick (standard)

F Operation with left and right joystick (optional extras)

G Operation with right joystick (optional extras - magnetic system LIEBHERR America (LAM))

Danger!
The grab must never be guided by hand by auxiliary staff!

▶ Press switch **S19**.

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↳ Additional function (eg. rotating grab) is activated.

▶ LED in switch illuminates.

▶ Press and hold left pushbutton **L**.
↳ Grab will rotate left (anticlockwise).
- or -
↳ Slewing bucket will slew left (anticlockwise), i e. it moves down to the left.
- or -
↳ Locking pins will be drawn out.

▶ Press and hold right pushbutton **R**.
↳ Grab will rotate right (clockwise).
- or -
↳ Slewing bucket will slew right (clockwise), i e. it moves down to the right.
- or -
↳ Locking pins will be inserted.

3.4.9 Magnetic system (optional extra)

Special equipment such as magnets for transferring scrap are operated using a magnetic system. The magnetic system is switched on by pressing switch **S46** on the right-hand control panel and is operated electronically using a pushbutton in the right-hand joystick.

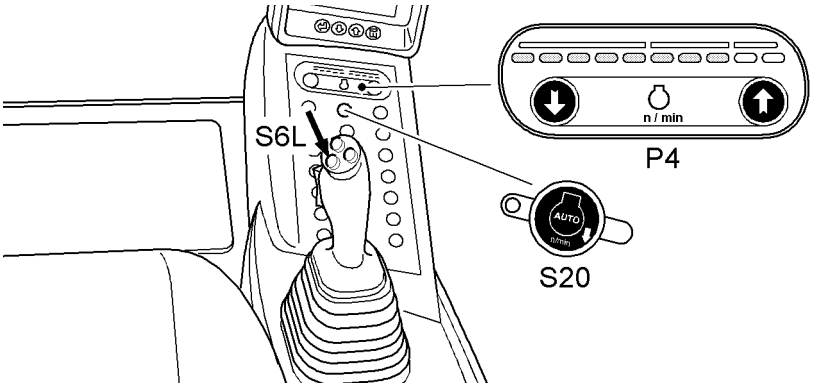


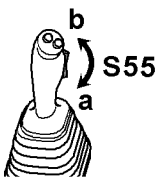
Fig. 3-82 *Activating the magnetic system*

▶ Press switch **S46**.
↳ The magnetic system starts to function.
↳ The engine speed **P4** increases to level 8.
↳ Automatic idling **S20** no longer functions.

Danger!
The magnet can lose its load in the event of a loss of current.

▶ Always ensure that noone is standing beneath the load.

▶ Do not press pushbutton **S6L** unintentionally.



▶ Press left-hand pushbutton **S6L**.
↳ The magnet is activated.

▶ Press left-hand pushbutton **S6L**again.
↳ The magnet is no longer activated.

Caution!
If a magnetic system LIEBHERR AMERICA (LAM) is mounted, the magnetic system device is controlled by the button **S55** on left-hand joystick **4** instead of the button **S6L**.

3.4.10 Add-on kits AHS 1, AHS 11 and AHS 12 (optional extra)

Using add-on kits AHS 1, AHS 11 and AHS 12, additional loads can also be operated with different pressure and quantity settings.

Caution!
Incorrect preselection of the pressure and quantity setting can result in damage to the work tool (eg. hydraulic hammer) or to limited function (eg. boom adjustment cylinder).

Danger!
If a large or wide work tool (eg. grab) is made to vibrate in the vicinity of the cab, the cab could be knocked or buckled, which would expose the operator of the machine to danger.

Note!
If the machine is generally being used for hammer work, there is a risk that the hydraulic oil may be dirtier than usual.

▶ Adjust maintenance intervals for hydraulic oil and filter cartridge changes to suit heavy dust usage.

The add-on kit is activated using two foot pedals.

Add-on kit AHS 1 (Tool Control)

Add-on kit AHS 1 is used to operate the boom adjustment cylinder for a hydraulic boom adjustment or for a side adjustable gooseneck boom.

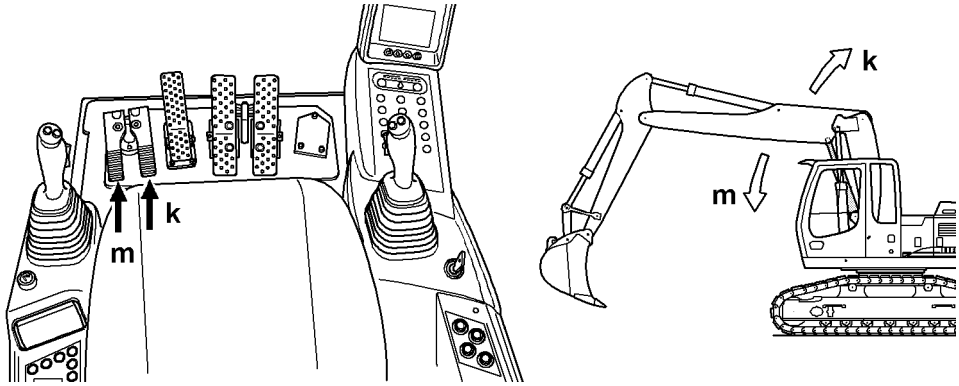


Fig. 3-83 *Add-on kit AHS 1*

To operate the boom adjustment cylinder:

▶ Push down foot pedal **k**.

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↳ Boom adjustment cylinder will be extended, ie. the equipment moves up.

▶ Push down foot pedal **m**.
↳ Boom adjustment cylinder will be drawn in, ie. the equipment moves down.

Add-on kit AHS 11 (Tool Control)

Using add-on kit AHS 11 allows to actuate **one** additional distirbution spool valve;It allows to supply with oil one additional hydraulic cylinder or and an hydraulic hammer.

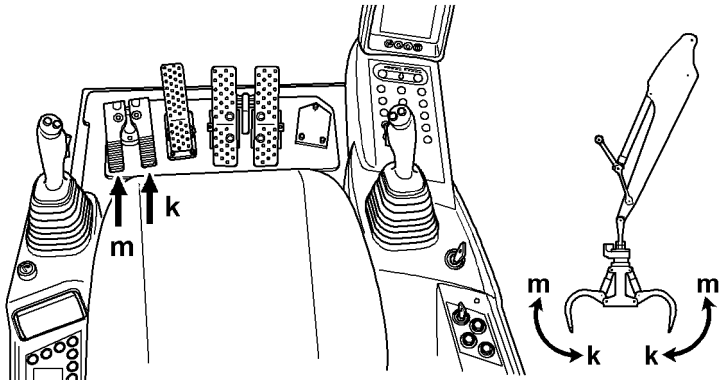

Fig. 3-84 *Add-on kit AHS 11*

To operate a work tool :

▶ Choose the predefined pressure and flow limitations assigned to the work tool in the operator's menu (see chapter "Tool Control")

Example: Hydraulic hammer

▶ Push down foot pedal **m**.
↳ Hydraulic hammer is activated.

Example: Scrap cutter

▶ Turn the key switch to the **Cylinder** position.

▶ Push down foot pedal **k**.
↳ Cylinder will be extended, i e. the scrap cutter will close.

▶ Push down foot pedal **m**.
↳ Cylinder will be drawn in, i e. the scrap cutter will open.

Add-on kit AHS 12 (Tool Control)

Using add-on kit AHS 12 allows to actuate **two** additional distirbution spool valves;It allows to supply with oil two additional hydraulic cylinders or one hydraulic cylinder and an hydraulic hammer.

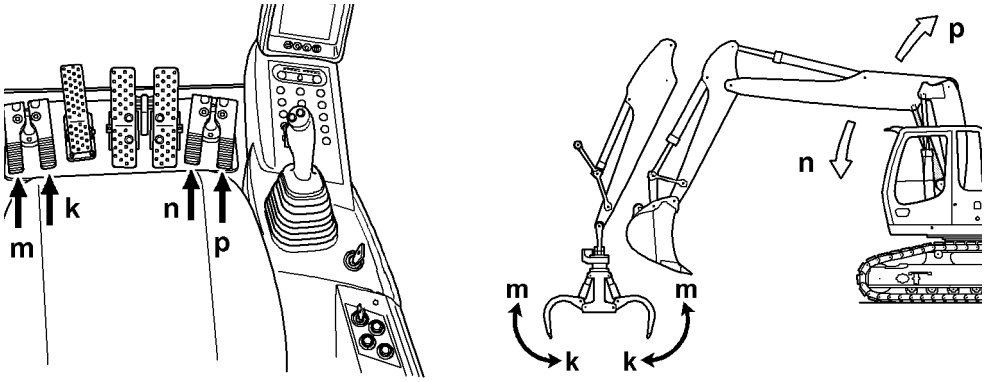

Fig. 3-85 *Multi-function kit AHS 12*

- ▶ Push down foot pedal **n**.
  - ↳ Boom adjustment cylinder will be drawn in, ie. the equipment moves down.
- ▶ Push down foot pedal **p**.
  - ↳ Boom adjustment cylinder will be extended, ie. the equipment moves up.

To operate a work tool :

- ▶ Choose the predefined pressure and flow limitations assigned to the work tool in the operator's menu (see chapter "Tool Control")

Example: Hydraulic hammer

- ▶ Push down foot pedal **m**.
  - ↳ Hydraulic hammer is activated.

Example: Scrap cutter

- ▶ Push down foot pedal **k**.
  - ↳ Cylinder will be extended, i e. the scrap cutter will close.
- ▶ Push down foot pedal **m**.
  - ↳ Cylinder will be drawn in, i e. the scrap cutter will open.

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3.4.11 Transferring controls PCSA - LH (optional extra)

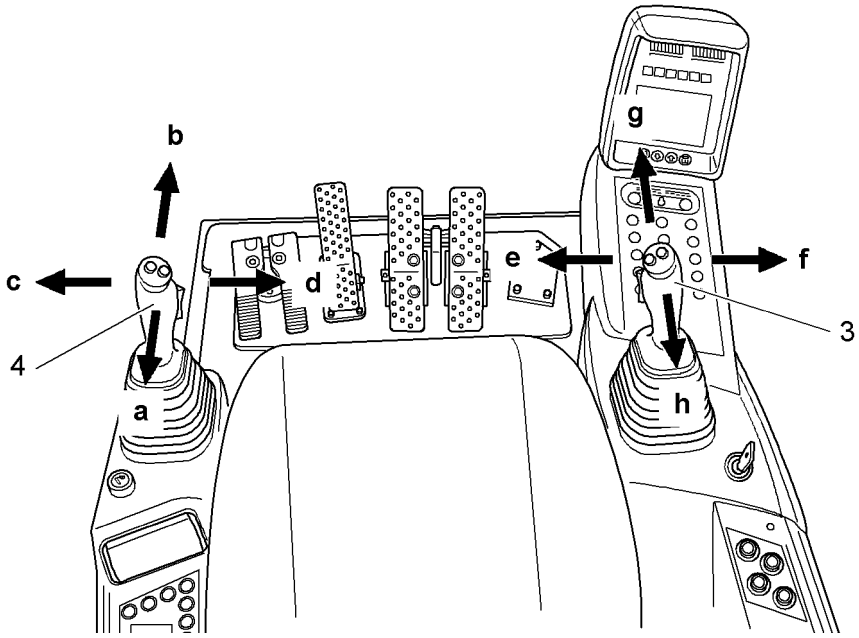
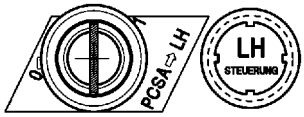


Fig. 3-86 *Transferring controls between joystick right (**3**) and left (**4**)*

On request, the machine can be equipped with the “Transfer controls” kit. This enables the operator to transfer the functions of the right joystick **3** and the left joystick **4**

Control is transferred using key switch **S247** on the right control panel.



▶ Turn the key switch **S247** to position 1.
  ↳ Telltale light **H292** on the right control panel illuminates.
  ↳ The control functions are transferred.

The left joystick (**3**) controls the stanchion and slewing movements.

– Direction of movement **h** and **g**: Stanchion is drawn in or out.
– Direction of movement **e** and **f**: Upper carriage is rotated to the left or to the right.

The right joystick (**4**) controls the boom or bucket and grab movements.

– Direction of movement **c** and **d**: Bucket will be tilted up or down, grab will close or open.
– Direction of movement **a** and **b**: Boom will be raised or lowered.

Caution!
The machine is dispatched as standard with **normal control**.
On request, the machine can be equipped with a control system that deviates from the norm (eg. with LIEBHERR control). The additional operating instructions for this control system apply in this case.

3.4.12 Transferring controls PCSA - J.Deere (optional extra)

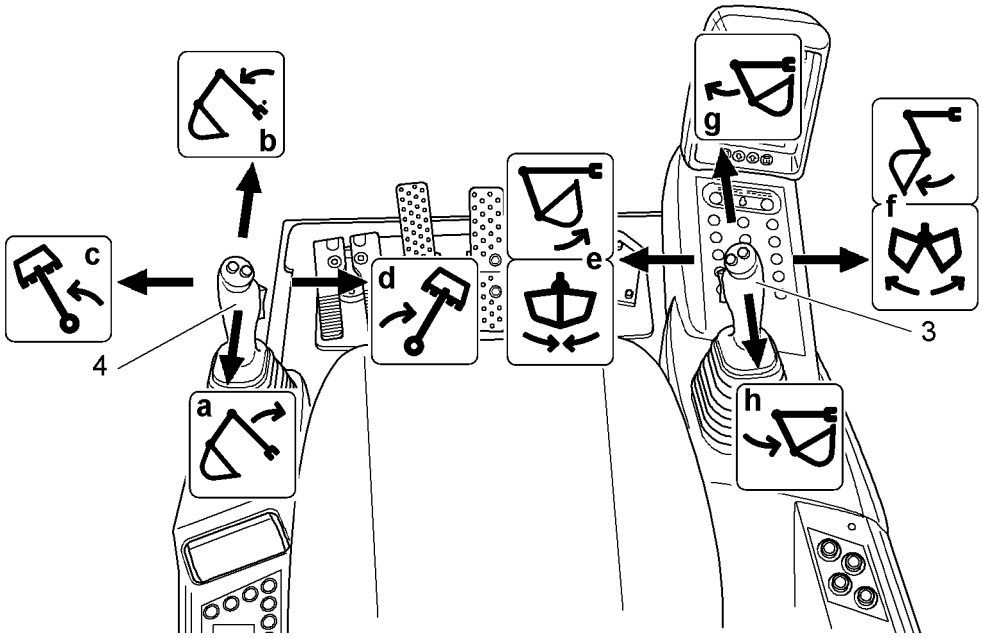
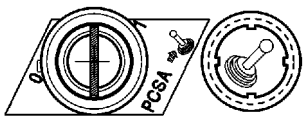


Fig. 3-87 *Transferring controls PCSA - J.Deere*

On request, the machine can be equipped with the “Transfer controls” kit. This enables the operator to transfer the functions of the right joystick (**3**) directions of movement **g** and **h** and the left joystick (**4**) directions of movement **a** and **b**.

Control is transferred using key switch **S247** on the right control panel.



▶ Turn the key switch **S247** to position 1.
  ↳ Telltale light **H292** on the right control panel illuminates.
  ↳ The control functions are transferred.

The right joystick (**4**) controls the boom or slewing movements.

– Direction of movement **a** and **b**: Boom will be raised or lowered
– Direction of movement **c** and **d**: Upper carriage is rotated to the left or to the right.

The left joystick (**3**) controls the stanchion or bucket and grab movements.

– Direction of movement **e** and **f** : Bucket will be tilted up or down, grab will close or open.
– Direction of movement **g** and **h** : Stanchion is drawn in or out.

Caution!
The machine is dispatched as standard with **normal control**.
On request, the machine can be equipped with a control system that deviates from the norm (eg. with LIEBHERR control). The additional operating instructions for this control system apply in this case.

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3.4.13 Transferring AHS controls (optional extra)

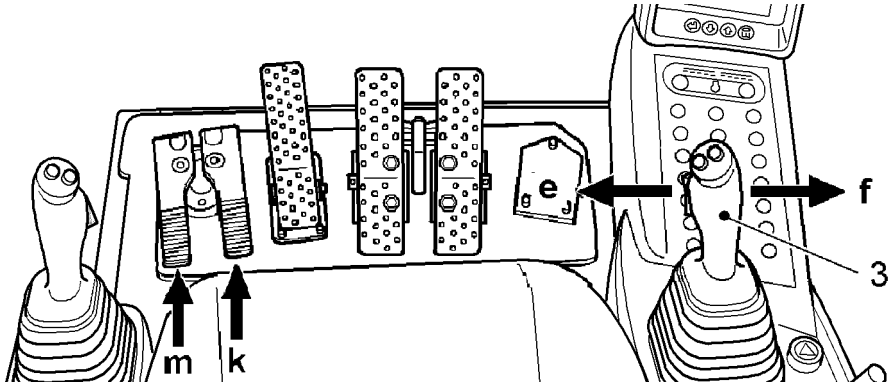


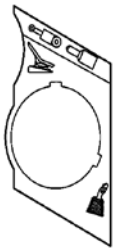
Fig. 3-88 *Transferring AHS controls*

On request, the machine can be equipped with the “Transfer controls” kit. This enables the operator to transfer the function “Tilt bucket” (directions of movement **e** and **f**) on the right joystick **3** to the additional load’s operation **m** and **k**.

Note
Requisite : Option AHS 1, AHS11 or AHS12 must be available, and being adjustate. See corresponding chapter.

Caution!
Additional equipment can have several functions. Always check out its functions on each machine starting
Incorrect preselection of the pressure and quantity setting can result in damage to the work tool (eg. hydraulic hammer) or to limited function (eg. boom adjustment cylinder).

Control is transferred using key switch **S114** on the right control panel.



- ▶ Turn the key switch **S114** to **position foot pedal**.
- ▶ Operate foot pedal **k**.
  - ↳ The additional equipment / cylinder will be extended.
- ▶ Operate foot pedal **m**.
  - ↳ The additional equipment / cylinder will be drawn in.
- ▶ Turn the key switch **S114** to **position joystick**.
- ▶ Push the right joystick **3** to the left **e**.
  - ↳ The same function will be carried out as if the right foot pedal **k** were being operated.
- ▶ Push the right joystick **3** to the right **f**.
  - ↳ The same function will be carried out as if the left foot pedal **m** were being operated.

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3.4.14 Special control (option)

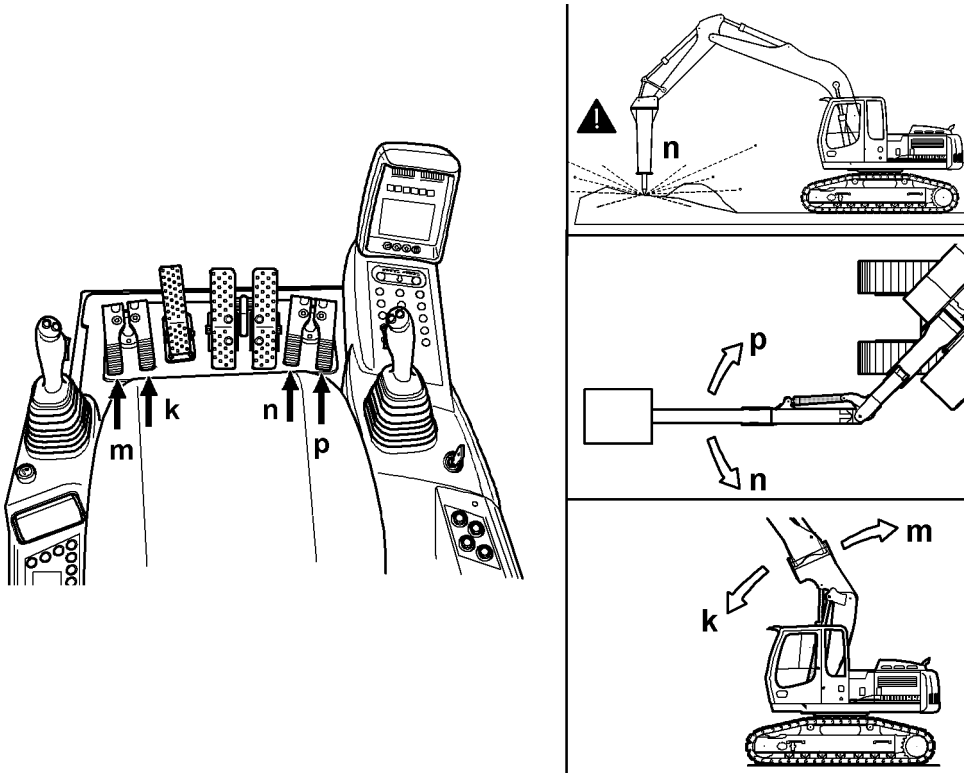

Fig. 3-89 *Special control*

On request, the machine can be equipped with the “Special control” kit. This declare the function “Hydraulic adjusted boom ” to the additional load’s operation **m** and **k**, and the function "Activating additional equipment" to the additional load’s operation **n** and **p**.

The function "Activating hydraulic hammer" is activated using foot pedale **n**.

Note
Requisite : Option AHS12 must be available, and being adjustate. See corresponding chapter.

Caution!
Additional equipment can have several functions. Always check out its functions on each machine starting
Incorrect preselection of the pressure and quantity setting can result in damage to the work tool (eg. hydraulic hammer) or to limited function (eg. boom adjustment cylinder).

3.4.15 Overload warning device (Option)

General

The overload warning device shows the machine operator when the permissible load carrying capacity has been reached both optically, via the warning symbol and

acoustically, via a buzzer.

The overload warning device is designed to prevent the permissible load torque being exceeded unintentionally. In this event, the working radius will have to be reduced or the load set down without enlarging the working radius.

The overload warning device does not relieve the operator of the responsibility of lifting loads which are either known or are permitted on the basis of the load carrying capacity of the machine.

The permissible load carrying capacity is dependent on the condition of the machine (chassis, equipment) and should be taken from the load chart in the cab.

The load carrying capacity values attain a maximum of 75% of the tipping capacity or 87 % of the hydraulic lifting power in accordance with ISO 10567.

Note!
The load values are subject to change if equipment parts and work tools are attached or dismounted.

For hoe type bucket equipment (including shovel cylinder, reversing lever and connecting clip) the values on the stanchion tip apply. The machine can be rotated 360° on solid, level subsoil when the full floating axle is engaged.
If the shovel cylinder, reversing lever and connecting clip are dismounted, the values increase by the weight of the dismounted parts (as an example, see the indicated values in the rubric "lift capacities" in the chapter "Technical data").

When the machine is equipped with a quick-change adapter, the values decrease by the weight of the quick-change adapter.

For industrial equipment, the values on the lifting hook apply. The machine can be rotated 360° on solid, level subsoil when the full floating axle is engaged.

Using the overload warning device

Danger!
When carrying out load hoisting work with the machine, the relevant accident prevention precautions are to be observed.
The overload warning device does not shut down the machine if the permissible load torque is exceeded. The operator of the machine will only be informed of the situation.

Mode of operation

The overload warning device comprises a constant pressure switch which is connected to the piston of the boom hydraulic cylinders.

If the load pressure in the boom hydraulic cylinders reaches the level of the shift pressure, the pressure switch emits a signal, the warning symbol appears on screen and the buzzer sounds.

The shift pressure in the pressure switch is selected in such a way that the stability factors can be maintained even if in an unsupported state (small stationary torque).

Starting

Danger!
No load hoisting work may be carried out if the overload warning device is defective.

▶ Have the overload warning device repaired by a professional.

▶ Press switch **S18**.
  ↳ Overload warning device is activated.
  ↳ LED in switch illuminates.

Note!
The overload warning device must be checked before first use and annually by a professional in accordance with the testing and setting information provided in the service manual.

The operator must check the function of the overload warning device before each work shift.

▶ To check the overload warning device, extend the boom hydraulic cylinders to the stop.

▶ Push the joystick further in the direction Raise boom.
  ↳ The warning symbol must illuminate.
  ↳ The buzzer must sound.

Note!
For work using a bucket, deactivate the overload warning device, since the increased effort of the machine will cause the overload warning device to be permanently active.

▶ Press switch **S18** again.
  ↳ Overload warning device is deactivated.
  ↳ LED in the switch goes out.

3.5 Attaching and dismounting equipment parts

3.5.1 Attaching and removing equipment parts safely

– Equipment or attachments made by other manufacturers or those which do not have general approval from LIEBHERR for installation or attachment may not be installed or attached to the machine without LIEBHERR's prior written consent.
– LIEBHERR must be provided with the appropriate technical documentation necessary for this purpose.
– Before carrying out any major repair work on the equipment, position the machine on level, firm ground.
– Do not work beneath the equipment if it is not safely positioned on the ground or supported with wooden blocks.
– Before loosening lines or unscrewing bolts, you must store the equipment, switch off the engine and press the start key to the contact position and both joysticks and the pushbuttons to "Turn grab" in order to reduce the pressure in the hydraulic system.
– Do not attempt to lift heavy parts. Use devices which are suitable for this purpose and which have sufficient load carrying capacity.
– Do not use cable which is damaged or does not have sufficient load carrying capacity. Wear work gloves when working with wire cables.
– When working on the equipment: switch off the engine and keep the safety lever tilted up. Never use your fingers to locate bores; use the correct punch for the procedure.
– During repair work: ensure that the hydraulic lines are secured correctly and that

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all bolts and connections are tight.

– When you have removed and chocked an equipment part, close open areas of the hydraulic circuit to stop dirt entering. Only allow authorized persons in the vicinity of the machine or the lifting device used.

3.5.2 Removing and installing equipment bolts safely

– If possible, always use a hydraulic bolt press to press out the equipment’s bolts.
– If you have to remove a bolt using a sledge-hammer, a driving punch and a bore hole conductor held by another person must be used.
– To drive in a bolt, screw the drive screws provided in the toolbox into the bolt's threaded hole and only hammer these screws.
– When installing bolts locked by means of castle nuts and cotter pins, first drive the bolt to the stop, then screw the castle nut by hand until contact and then only pull it far enough to push in the cotter pin.

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3.5.3 Attaching and dismounting the bucket

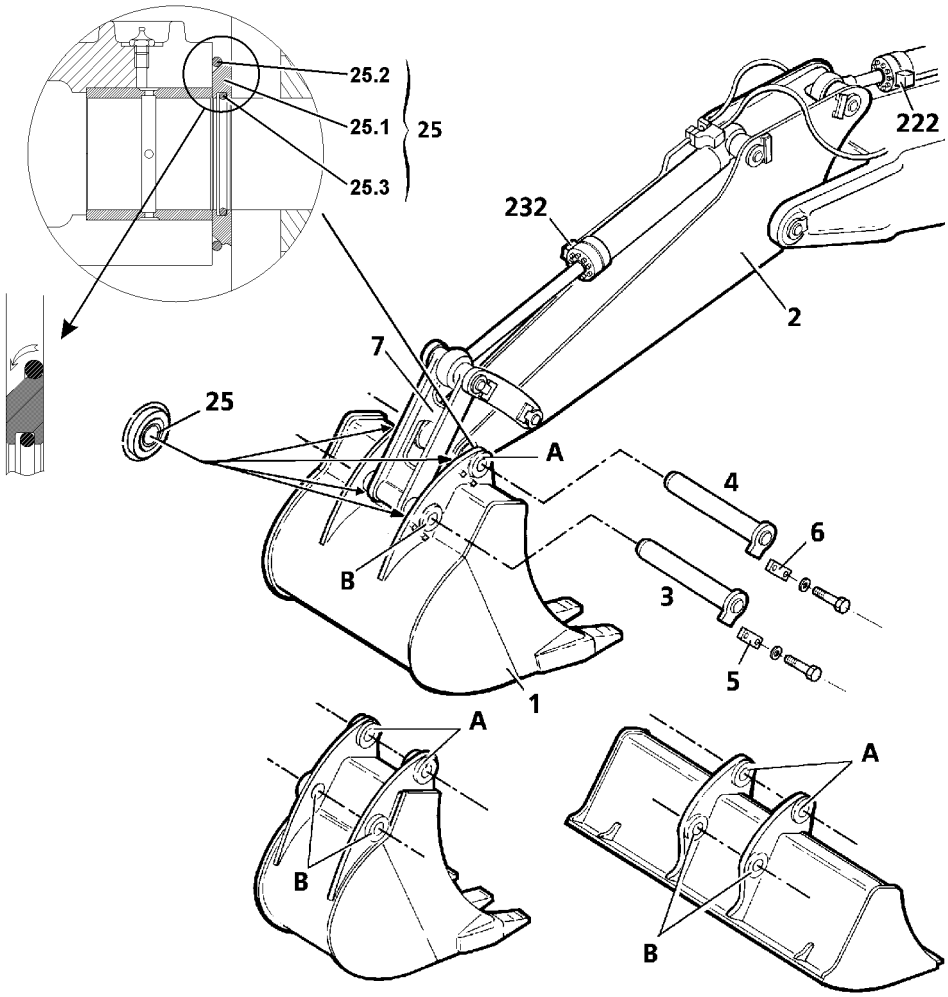

Fig. 3-90 *Attaching and dismounting the bucket*

1	Digging bucket	**222**	Restrictor check valve
2	Stick	**232**	Restrictor check valve
3-4	Pin	**25**	Complete pin bearing sealing
5-6	Locking plate	**25.1**	Sealing ring
7	Connecting link	**25.2**	O-Ring
		25.3	O-Ring

The following is a description of how to attach and dismount buckets. Buckets are, 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**.

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▶ 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 pin bearing sealings **25** between bucket and stick while pressing in the pin. Observe the correct installation direction of the complete pin bearing sealings **25** (siehe Fig. 3-90).

▶ Make the O-rings **25.1** slide to the interior (siehe Fig. 3-90).

▶ 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 pin bearing sealings **25** between bucket and stick while pressing in the pin. Observe the correct installation direction of the complete pin bearing sealings **25** (siehe Fig. 3-90).

▶ Make the O-rings **25.1** slide to the interior (siehe Fig. 3-90).

▶ 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.

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.

3.5.4 Attaching and dismounting the bucket with improved sea-

ling

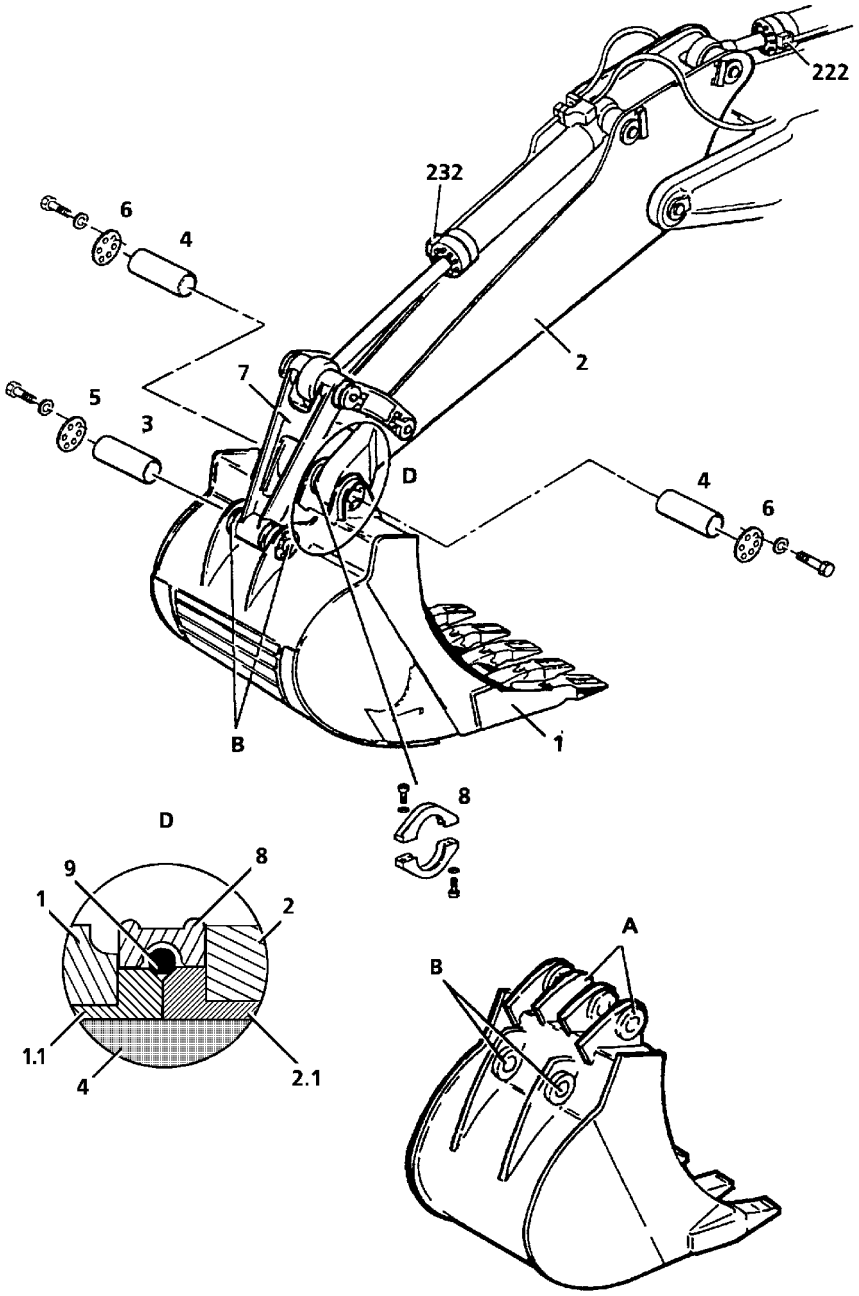

Fig. 3-91 *Attaching and dismounting the bucket*

1	Digging bucket	**7**	Connecting link
2	Stick	**8**	Protection ring
1.1	Bushing	**9**	O-ring
2.1	Bushing	**222**	Restrictor check valve
3-4	Pin	**232**	Restrictor check valve
5-6	Cover		

The following is a description of how to attach and dismount buckets with improved sealing.

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Dismounting a bucket

- Position the bucket to be attached in such a way that its entire lower part is laying on the ground.
- Remove the covers **5** and **6**.
- Remove the protection rings **8** of all the bearing points and draw the O-rings **9** up onto the bushing **1.1** on the bucket side.
- Drive out the pins **3** and **4**.
- If necessary, lift the attachment slightly to remove the pin **4**.
- Take off the O-rings **9** and if necessary replace them.

Attaching a new bucket

- Position the bucket **1** so that the flat part of the bucket rests on the ground.
- Draw the O-rings **9** up onto the bushing **1.1** of the digging bucket, as well on bearings bucket to stick as on bearings bucket to connecting link **7**.
- Start the engine and move the attachments until the stick and bucket bore holes **A** align.
- Insert pin **4** and reinstall the covers **6** with O-rings.
- Slowly extend the stick cylinder until the bore of the connecting link **7** is exactly between bore holes **B**.
- Insert pin **3** and reinstall the covers **5** with O-rings.
- Slip the O-rings **9** laterally until they are in the grooves between bushings **1.1** and **2.1** (see detail **D**) and install the two piece protection rings **8**.
- 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.

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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3.5.5 Attaching and dismounting the grab on stick

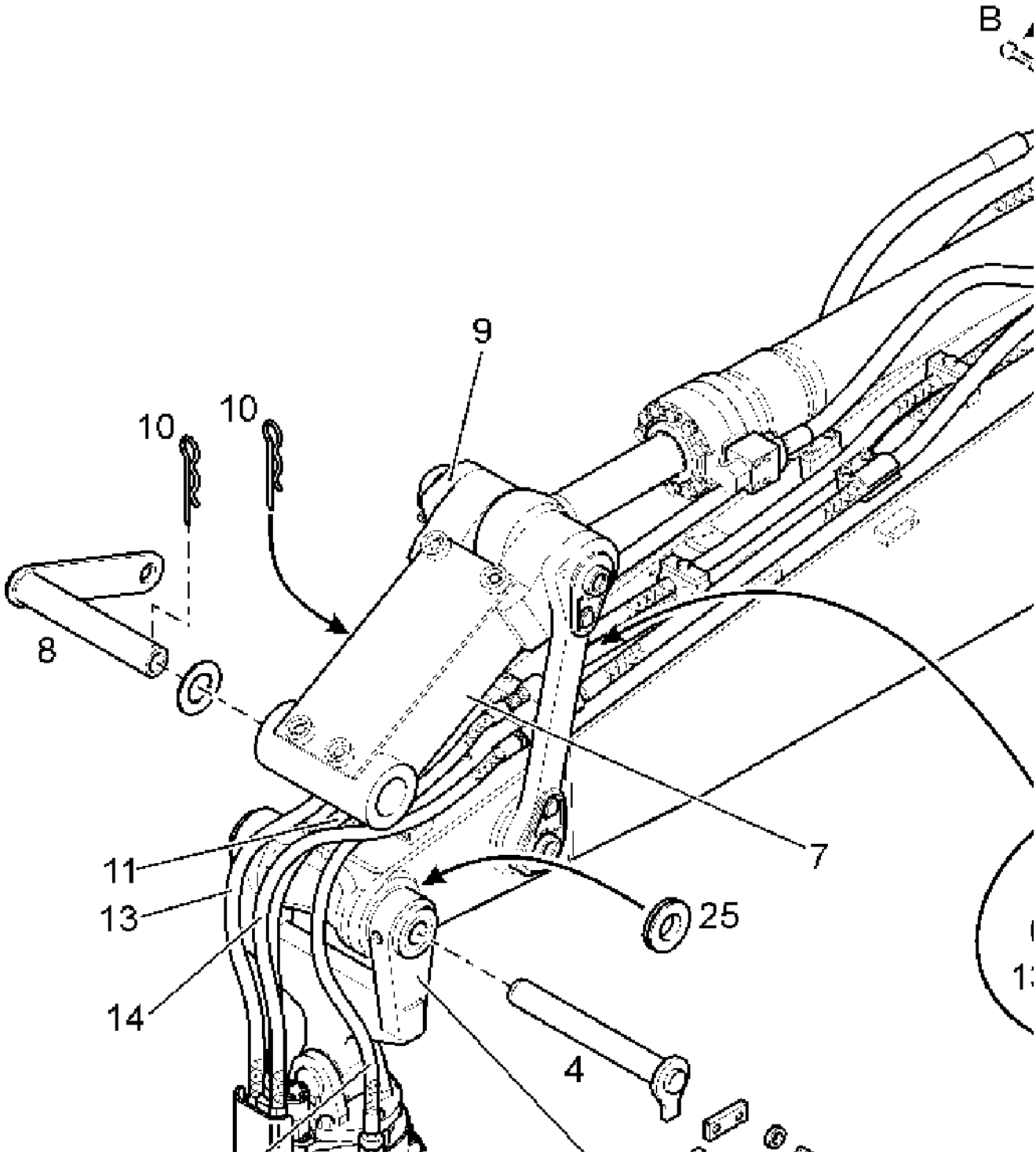

Fig. 3-92 *Attaching and dismounting the grab on the stick*

1	Grab mounting	**11**	Hose
4	Pin	**12**	Hose
6	Locking plate	**13**	Hose
7	Connecting link	**14**	Hose
8	Carrier bracket	**15**	Valve blocks
9	Reversing lever	**25**	Pin bearing sealing
10	Cotter pin		

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- ❑ Before attaching a clamshell bucket or grapple, ensure that the required hydraulic lines for operating the grab are built into the stick.
- ❑ Attaching and dismounting a grab should be carried out by two people.

Danger!
Risk of injury.

▶ Ensure that the machine's operator follows the signaller's hand signals when moving the attachment.

Attaching the grab

▶ If necessary, dismount the bucket.

▶ Retract the bucket cylinder as far as the stop.

▶ Fix the connecting link **7** to the right reversing lever **9** with carrier bracket **8**. Secure with cotter pin **10**.

▶ Position the grapple with the shells fully opened.

▶ Move the equipment until the lower mount of the stick is between the bearing points of the grab mounting **1**.

▶ Guide in the pin **4** in its bore and push in the pin bearing sealings **25** complete with protection ring while pressing in the pin (see also the corresponding section on page "Installation of a digging tool").

▶ Secure the pin **4** with plate **6**.

▶ Connect the hydraulic hoses **11** and **12** for the shell cylinder to the hydraulic lines of the bucket cylinder circuit.

▶ For grapple with hydraulic rotator, hoses **13** and **14** must be connected to the hydraulic lines for added functions on the stick.

Operating the grab

Two hydraulic lines on the shovel arm are set in for operating either the tilting cylinder or the grab.

The lines are reversible via two valve blocks **15**:

– **A** - Tilting cylinder operation (for buckets)
– **B** - grab operation (for grab, scrap cutter etc.)

▶ Turn the lever of the valve blocks **15** in position **B** (Position **B**, Grab operation).

Note
If the machine is equipped with a hydraulic quick-change adapter and LIKUFIX, there is no need to switch between tilt cylinder operation and grab operation. There is no valve block **15**.

▶ Lubricate all greasing points of the pin **4** and of the grab directly or with the automatic grease system (if mounted) until clean grease comes out of the greasing points.

▶ Carry out all work movements several times without a load (open and close the shell or move the grab to the left and to the right) so that any air that may be present in the hydraulic circuits can escape.

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Dismounting the grab

- Set the grab down onto level ground with the shells fully opened.
- Turn off the engine and, with the ignition key in the contact position, push the right joystick briefly to the left and then to the right in order to remove the pressure in the hydraulic circuits.
- To relieve the grab's torsional mechanism, press the two push buttons in the left (or left and right – optional extras) joystick for "Turn grab".
- Turn the lever of each valve block **15** in position **A** (Position **A**, bucket operation) and push the right joystick briefly to the left and then to the right in order to remove the pressure in the hydraulic circuits.
- Push the safety lever up.
- Separate hydraulic hose **11**, hydraulic hose **12** and, if present, hydraulic hoses **13** and **14** from the pipes on the stick.
- Close open lines immediately to prevent any dirt entering.
- Support the grab so that it is stable.
- Remove the plate **6**. Drive out the pin **4** and remove the pin bearing sealings **25**. If necessary, start the engine and lift the attachment slightly to remove the pin **4**.

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3.5.6 Attaching and dismounting the stick to the boom

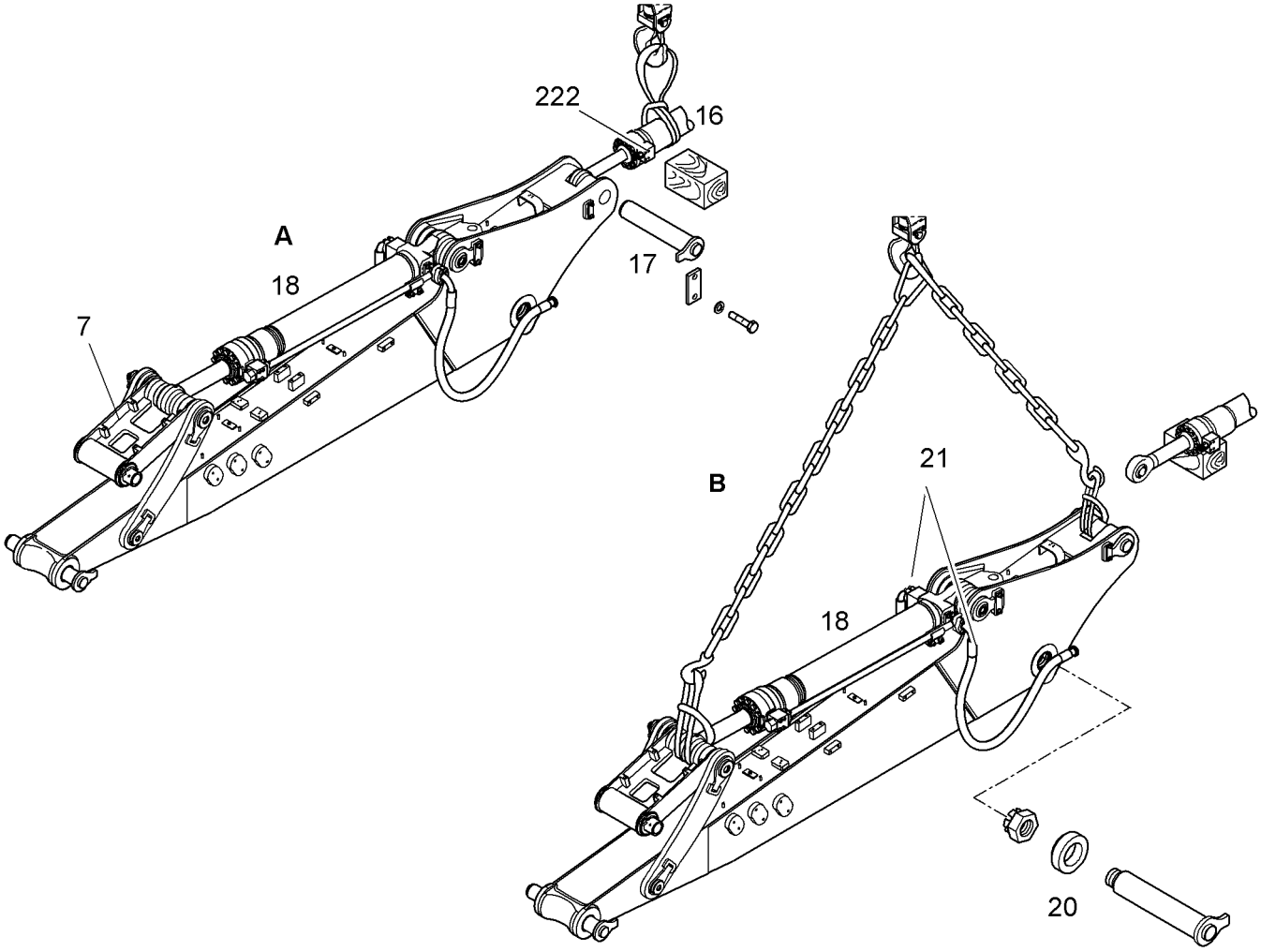

Fig. 3-93 *Attaching and dismounting the stick to the boom*

7	Connecting link	**20**	Pin
16	Stick cylinder	**21**	Hoses
17	Pin	**222**	Restrictor check valve
18	Bucket cylinder		

Dismounting the stick

Figure A

- ▶ If necessary, remove the bucket.
- ▶ Retract the bucket and stick cylinder as far as the stop, position the attachment on the ground.
- ▶ If necessary, tie the connector bracket **7** to the bucket cylinder so it can not slip out.
- ▶ Turn the engine off.
- ▶ Release the pressure in bucket and stick cylinder circuit by turning the ignition

key to contact position, tilting the safety lever down, and moving the right joystick to the left and right, the left joystick forward and backward.

- 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.

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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.

3.5.7 Mechanical quick-change adapter (optional extra)

Safety information

- 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

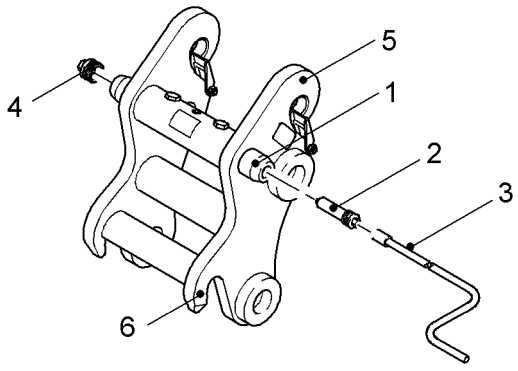

Fig. 3-94 *Mechanical quick-change adapter*

1 Locking pin (removed)
2 Locking screw
3 Crank
4 Sealing plug
5 Lifting hook
6 Take-up hook for work tool

Attaching the work tool

To move the equipment into position:

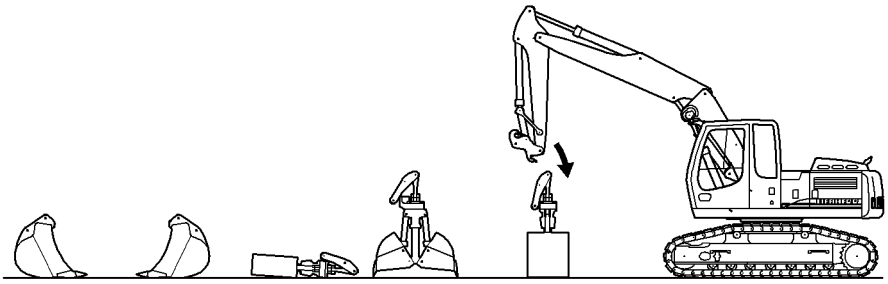

Fig. 3-95 *Positioning the equipment*

- ❑ The equipment must be standing stable or lay loose on the ground.
- ▶ Move the stanchion and work tool into position.
- ▶ Insert the shovel tilting cylinder fully.

To unlock the quick-change adapter:

Danger!
Risk of injury.

- ▶ Ensure that the work equipment cannot be moved by others when this action is being carried out.

- ▶ Approach the quick-change adapter from the side and unscrew the locking screw **2** using the crank **3** from the locking pin **1** (siehe Fig. 3-94).
- ▶ Insert the crank **3** in the locking pin **1** and turn to the left (anti-clockwise), until both locking pins **1** are inserted as far at the stop.

Taking up the work tool:

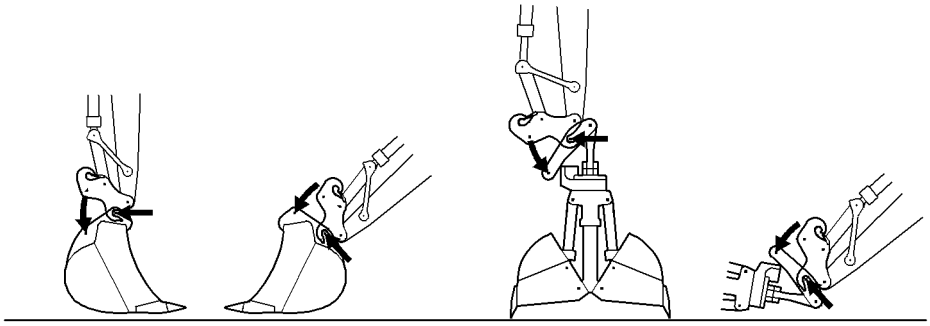

Fig. 3-96 *Taking up the work tool*

- ▶ Move the quick-change adapter into a position that allows the work tool to be picked up using the take-up hook.
- ▶ Raise the work tool from the ground and extend the shovel tilting cylinder fully until the bearing panel for the work tool is laying on the quick-change adapter stop.
  - ↳ The bore holes of the work tool and the locking pins of the quick-change adapter must form a row.

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To lock the quick-change adapter:

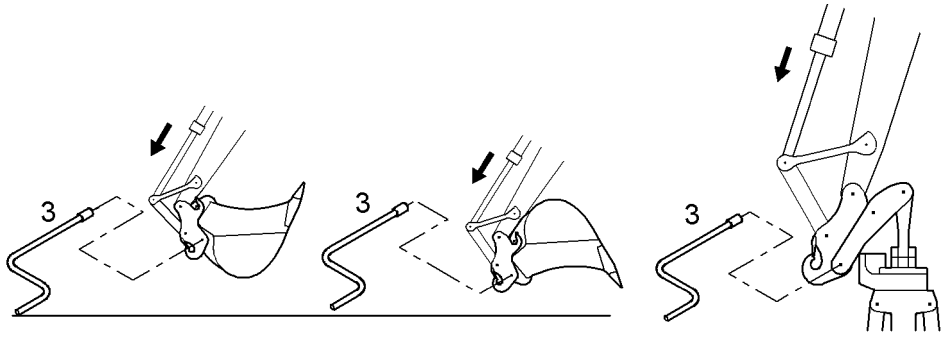

Fig. 3-97 *Locking the quick-change adapter*

Danger!
Before locking, there is no fixed connection between the work tool and the quick-change adapter. The work tool could under certain circumstances fall out and injure people.

- ▶ Approach the quick-change adapter with the utmost care.
- ▶ Push the safety lever up to secure the work equipment against unintentional movement.
  - ↳ No work movements can be carried out when pilot control devices, eg. the joystick or foot pedals, are operated.

- ▶ Insert the crank **3** in the locking pin **1** and turn to the right (clockwise), until both locking pins **1** are extended as far as the stop.
  - ↳ The work tool is bolted on when taking up normally.
- ▶ Screw the locking screw **2** into the locking pin.

Danger!
An incorrectly locked quick-change adapter could open when operating!

- ▶ Ensure that the locking pins are always locked by the sealing plug **4** on the one side and by the locking screw **2** on the other side.
- ▶ Check daily to ensure that the locking screw **2** is correctly positioned.

Caution!
Hydraulic lines are pressurized!

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

- ▶ Connect hydraulic lines or electrical lines, if necessary (eg. when attaching a grab).

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:

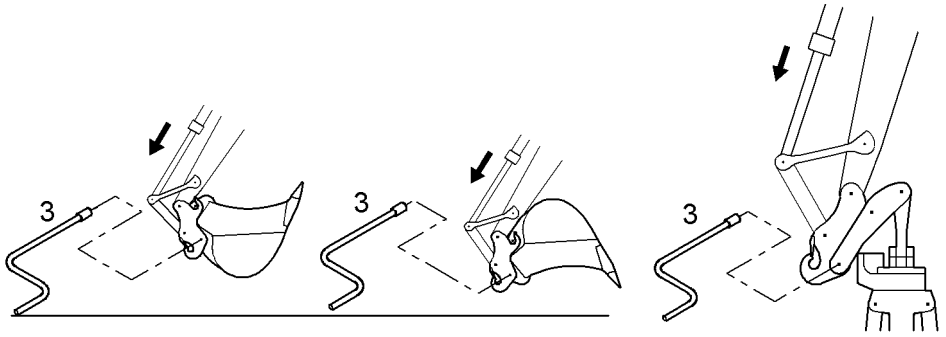

Fig. 3-98 *Unlocking the quick-change adapter*

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.

- ▶ Ensure that the work equipment cannot be moved by others when this action is being carried out.
- ▶ Always keep the work tool as close to the ground as possible when unlocking to avoid creating conditions which may lead to danger.

- ▶ Approach the quick-change adapter from the side and unscrew the locking screw **2** using the crank **3** from the locking pin **1**.
- ▶ Insert the crank **3** in the locking pin **1** and turn to the left (anti-clockwise), until both locking pins **1** are inserted as far at the stop.

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To put down the work tool:

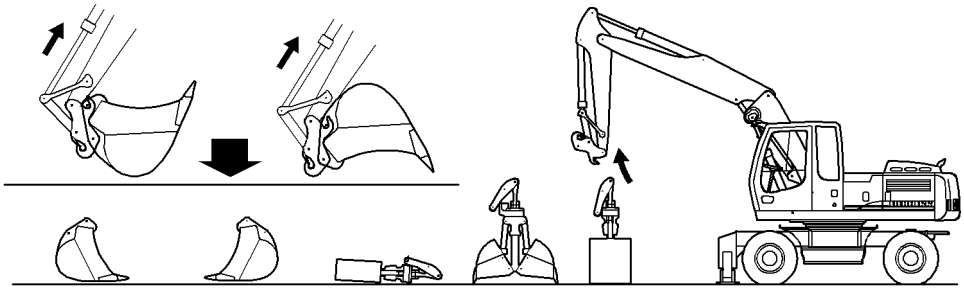

Fig. 3-99 *Putting down the work tool*

- ▶ 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 hoisting work

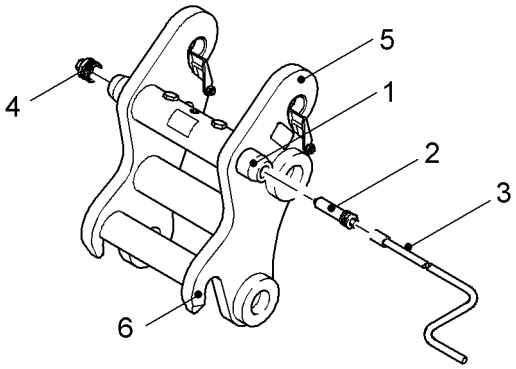

Fig. 3-100 *Mechanical quick-change adapter*

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 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 for the carrier device / quick-change adapter given in the load chart and the technical data are adhered to.

Load hoisting work can be carried out with attached or dismounted work tools. With dismounted work tools, it is sensible to fully insert the locking pins when carrying out hoisting work. This prevents the load take-up device being turned round too strongly by the locking pins and damaged.

Danger!

- ▶ Never use the take-up hook **6** to fasten a load because there is no secure hold for the load take-up device, eg. rope or chains, in the take-up hook.

- ▶ Fasten the load on the lifting hook as described in the chapter "Hoisting work".

3.5.8 Hydraulic quick-change adapter (optional extra)

Safety information

– Ensure that nobody is standing in the working area of the equipment when attaching or dismounting work tools. Move the work equipment as slowly as possible when attaching and dismounting a work tool.
Familiarize yourself with the mode of operation of the quick-change adapter without attached work tools if possible.
– The proper functioning of the quick-change adapter is monitored by a visual and acoustic warning device (buzzer and telltale light). The function of the warning device should be checked daily by operating the quick-change adapter.
– 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.
This 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).
Only resume working once defective parts have been repaired or replaced.
– The quick-change adapter unlocks as soon as the switch / button designed for the purpose is pressed.
Always keep the work tool as close to the ground as possible when unlocking to avoid creating conditions which may lead to danger. Only activate the quick-change adapter to carry out a deliberate locking or unlocking procedure.
– Each time a work tool is changed, the machine's operator must ensure that the locking pins for the quick-change adapter insert 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 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

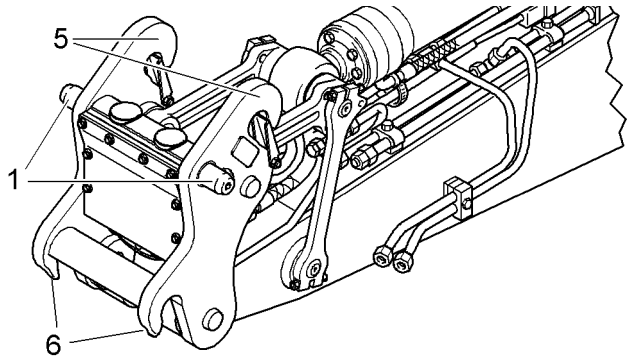

Fig. 3-101 *Hydraulic quick-change adapter*

1 Locking pin (extended)
5 Lifting hook
6 Take-up hook for work tool

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Operating elements

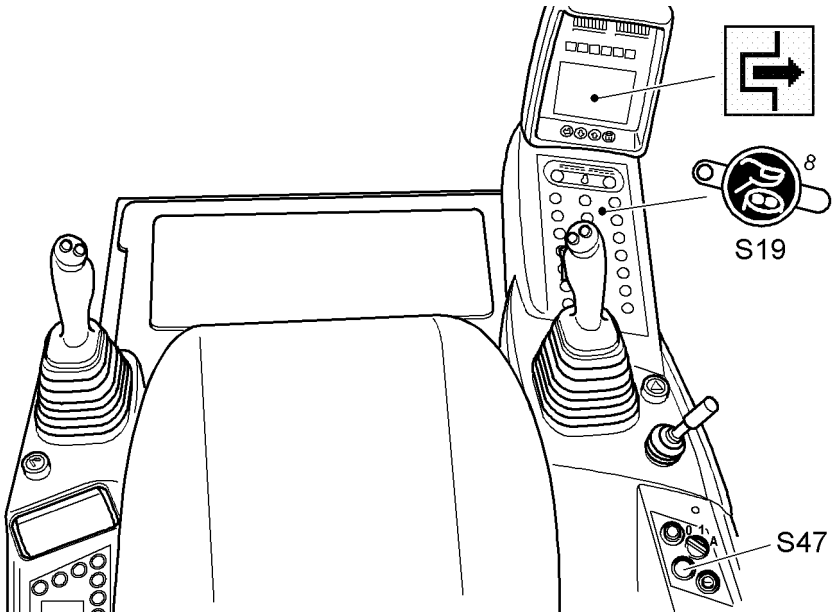
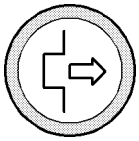


Fig. 3-102 *Operating elements for the hydraulic quick-change adapter*

Switch S19

Use switch **S19** to activate the auxiliary hydraulic device for the grab torsional mechanism and quick-change adapter.

- ▶ Press switch.
  - ↳ Auxiliary device is activated.
  - ↳ LED in switch illuminates.
- ▶ Press switch again
  - ↳ Auxiliary device is deactivated.
  - ↳ LED in the switch goes out.



Key switch S47:

Pressing the button activates the quick-change adapter – it is possible to operate the locking pins.

Pushbuttons L and R

Pushbutton **L** = extend locking pin (lock)
Pushbutton **R** = retract locking pin (unlock)

The pushbuttons are located on the left and/or right joystick (depending on the machine's equipment):

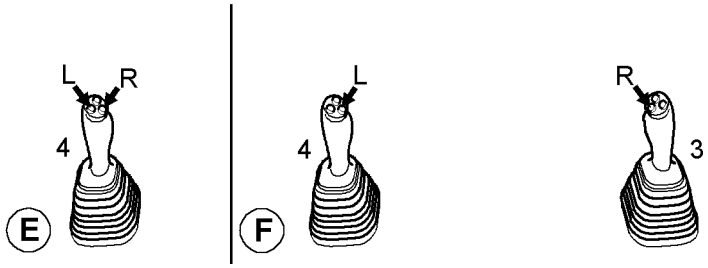


Fig. 3-103 *Pushbutton on the joystick*

E Operation with left joystick (standard)

F Operation with left and right joystick (optional extras)

Symbol "Quick change adapter"

The symbol appears:

– during the locking process or

– when the locking pins are retracted.

Two-hand operation

The quick-change adapter is activated using two-hand operation. The locking pins can only be moved at first if button **S47** and one of the pushbuttons **L** or **R** are pressed.

The control has a hold function which allows both joysticks to be operated simultaneously when attaching and dismounting work tools. If one of the pushbuttons, **L** or **R** is continued to be pressed, button **S47** can be released and the direction of movement of the locking pins is retained.

If the direction of movement is to be changed, button **S47** and the relevant pushbutton **L** or **R** must be pressed.

Caution !
The extension of the locking pins (locking of the coupler) is possible even without depressing **S47**.
However this must be absolutely avoided since it causes a quick wear of the sealing rings in the LIKUFIX hydraulic coupling system.

Attaching the work tool

To move the equipment into position:

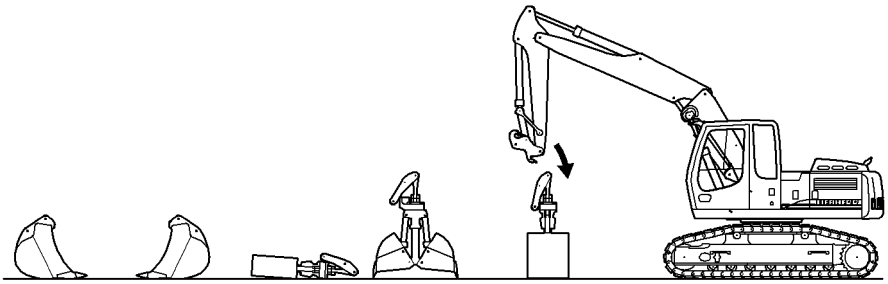


Fig. 3-104 *Positioning the equipment*

❑ The equipment must be standing stable or lay loose on the ground.

▶ Move the stanchion and work tool into position.

▶ Insert the shovel tilting cylinder fully.

To unlock the quick-change adapter:

▶ 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.

Taking up the work tool:

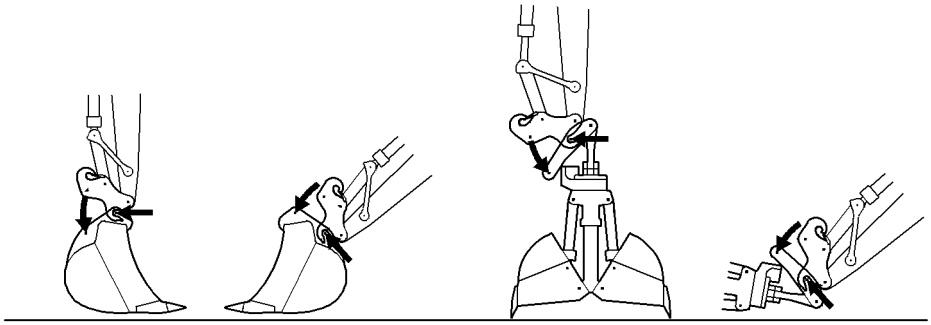


Fig. 3-105 *Taking up the work tool*

▶ Move the quick-change adapter into a position that allows the work tool to be picked up using the take-up hook.

▶ Raise the work tool from the ground and extend the shovel tilting cylinder fully until the bearing panel for the work tool is laying on the quick-change adapter stop.
↳ The bore holes of the work tool and the locking pins of the quick-change adapter must align.

To lock the quick-change adapter:

▶ 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 **L** until the locking pins are fully removed.
↳ The buzzer goes off.
↳ The symbol “Quick changer” disappears from the screen.
↳ The quick-change adapter is locked.
↳ The work tool is bolted on when taking up correctly.

▶ Release button **S47**.

▶ Press switch **S19**.
↳ Quick-change adapter is deactivated.
↳ LED in the switch goes out.

Caution!
Hydraulic lines are pressurized!

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

▶ Connect hydraulic lines or electrical lines, if necessary. (eg. when attaching a grab).

▶ A direct visual check must be made to ensure that the work tool is correctly positioned.

A “working cycle” should also be performed with the work tool.
This means that the work tool should be raised before use to the point at which the correct positioning of, for example, the pin in the pin eye, can be checked by tilting in and out.

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.

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↳ The quick-change adapter is unlocked.

To put down the work tool:

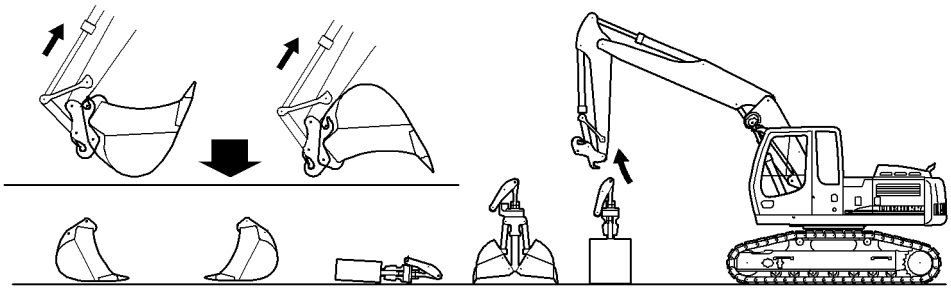

Fig. 3-106 *Putting down the work tool*

▶ 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

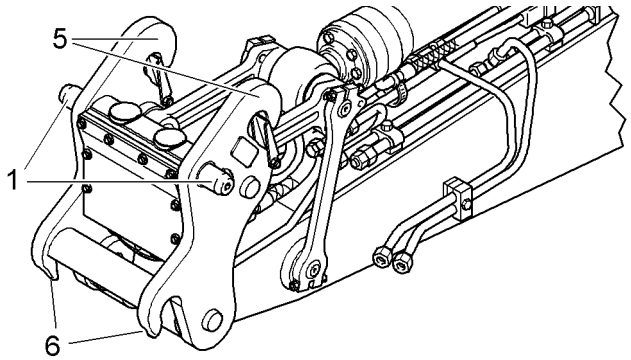

Fig. 3-107 *Hydraulic quick-change adapter*

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 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 for the carrier device / quick-change adapter given in the load chart and the technical data are adhered to.

Load hoisting work can be carried out with attached or dismounted work tools. With dismounted work tools, it is sensible to fully insert the locking pins when carrying out hoisting work. This prevents the load take-up device being turned round too strongly by the locking pins and damaged.

Danger!

- Never use the take-up hook **6** to fasten a load because there is no secure hold for the load take-up device, eg. rope or chains, in the take-up hook.
- Before using for hoisting work, deactivate the quick-change adapter.
  - LED in switch **S19** has gone out.
  - Release button **S47**.

To cancel the buzzer (warning tone)

The symbol “Quick changer” on screen and the buzzer (warning tone) indicate that the quick-change adapter is not locked or is incorrectly locked.

After putting down the work tool, the buzzer (warning tone) continues to sound if the locking pins are not removed.

When the overload warning device is switched on, the warning tone for the quick-change adapter can be cancelled.

If no new work tool is to be taken up, it is sensible to switch off the warning tone so avoid constant noise disturbance. Also, another buzzer (overload warning device) can be heard more easily.

- Press switch **S349**.
  - The buzzer will switch off.
  - The symbol “Quick changer” on screen will continue to be displayed.
  - The acoustic warning device will only activate automatically once the locking pins have been removed again.
- To reactivate the warning tone for the quick-change adapter, remove the locking pins fully once until the “Quick changer” symbol goes out on screen.
  - The buzzer (warning tone) for monitoring the quick-change adapter is reactivated.

3.5.9 LIKUFIX – hydraulic coupling system (optional extra)

LIKUFIX enables automatic coupling of hydraulic lines in connection with the hydraulic quick-change adapter. The machine operator does not have to connect or separate hydraulic lines for work tools himself.

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Overview

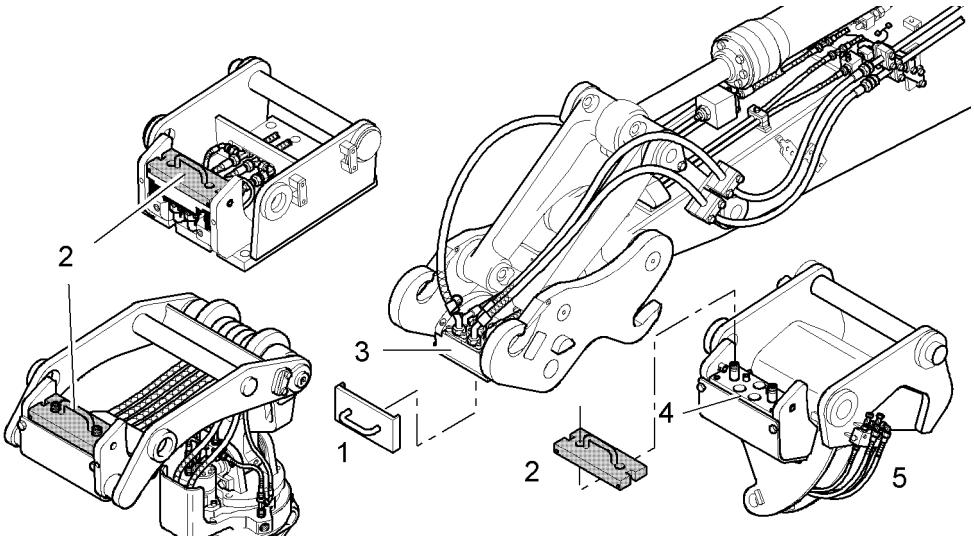

Fig. 3-108 *LIKUFIX*

1 Protective cover on quick-change adapter

2 Protective covering on work tool

3 LIKUFIX hydraulic coupling on quick-change adapter

4 LIKUFIX hydraulic coupling on work tool

5 Alternative hydraulic coupling on work tool

Attaching and dismounting work tools

Attaching and dismounting is carried out as described in the chapter “Hydraulic quick-change adapter”.

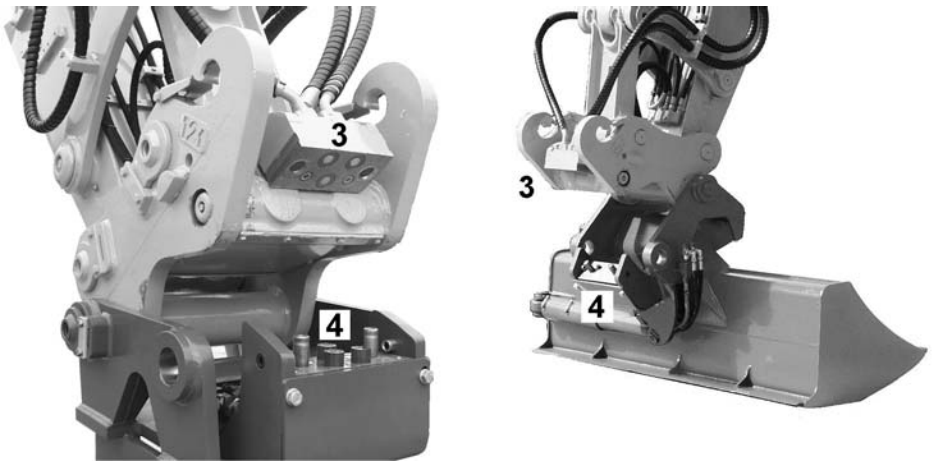

Fig. 3-109 *Connecting LIKUFIX*

Please also note:

- ▶ Before attaching, remove the protective coverings on the quick-change adapter **1** and the work tool **2**.
- ▶ Always keep hydraulic couplings **3** and **4** clean.
- ▶ Perform a visual check for cleanliness before attaching. If necessary, clean all coupling parts and the sealing surfaces with a clean, oil-soaked cloth.

- ▶ Connect or separate the hydraulic coupling slowly as with any change of work tool.
- ▶ When attaching the quick-change adapter, tilt until the coupling disks are connected as a result of the self weight of the work tool.
- ▶ Remove the locking pins.
- ▶ If the disks do not connect as a result of self weight, foreign matter (such as stones) may be the cause. In this case, clean all coupling parts to prevent damage occurring when connecting.
- ▶ Oil quantity and pressure must be adapted to suit the work device concerned.
- ▶ When the work is completed, and particularly before transportation, put the protective coverings **1** and **2** back on.

Attaching LIKUFIX work tools to a quick-change adapter without LIKUFIX

It is possible to attach a work tool with a LIKUFIX hydraulic coupling to a machine with a quick-change adapter (mechanical or hydraulic) at any time.

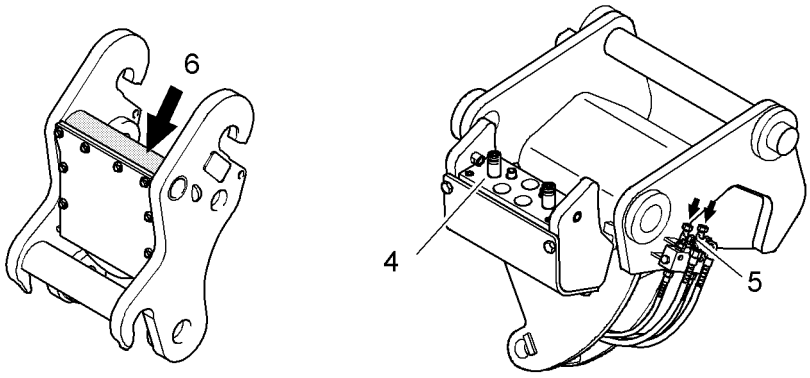

Fig. 3-110 *LIKUFIX work tool on quick-change adapter without LIKUFIX*

Caution!
The LIKUFIX hydraulic coupling could be damaged.

- ▶ Do not use a quick-change adapter with a reinforcement kit since the reinforced steel part **6** could damage the LIKUFIX hydraulic coupling on the work tool.
- ▶ In this case, ensure that you have the quick-change adapter reworked at the LIEBHERR customer service centre.

For attachment without LIKUFIX hydraulic coupling, LIEBHERR work tools usually have an alternative connection option.

Example:

On the ditcher bucket, hydraulic lines are either connected using LIKUFIX **4** or using an auxiliary hydraulic connection **5**.

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3.6 General working methods

3.6.1 Minimum impact working methods for your machine

To increase the service life of the machine and avoid unnecessary damage and the resulting repairs, please note the following points:

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

3.6.2 Preparatory activities

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

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

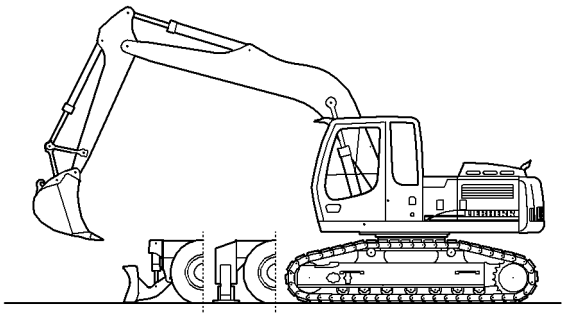

Fig. 3-111 *Working position – machine*

▶ Position the machine so that the load or grab material can be taken up above the rigid axle or the leading wheel.

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▶ For mobile devices, lower the support when possible and lock the full floating axle.

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

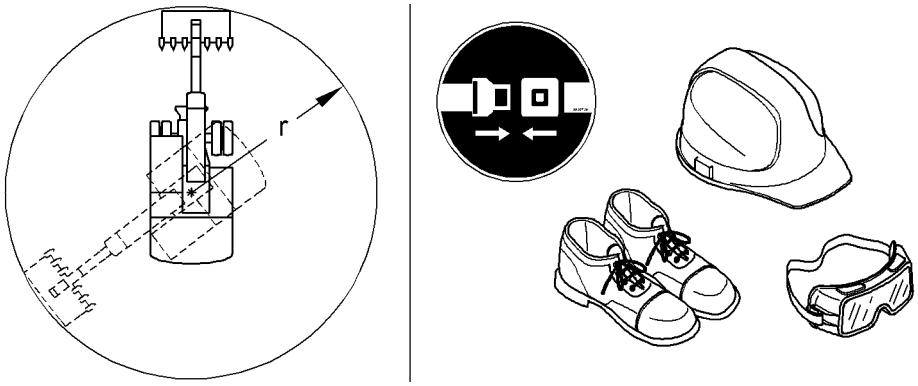

Fig. 3-112 *Safe working*

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

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

Caution!
Risk of injury when working.

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

▶ Always wear the seat belt.

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

3.6.3 Working with the backhoe bucket

Danger!
Risk of fatal injury and damage to the machine when moving the backhoe bucket.

▶ Ensure that the backhoe bucket is not slewed too close to the cab.
↳ The backhoe bucket could damage the cab and injure the machine's operator.

▶ Ensure that nobody is standing within the danger area of the backhoe bucket.

❑ The machine must be in the working position.

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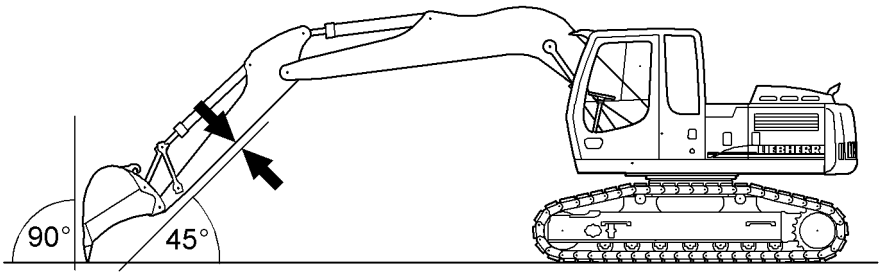

Fig. 3-113 *Aligning the stick and backhoe bucket*

- Align the stick in such a way that its underside is at an angle of approx. 45° to the ground.
- Align the backhoe backhoebucket in such a way that its ground side can enter the ground at an angle of approx. 90°.

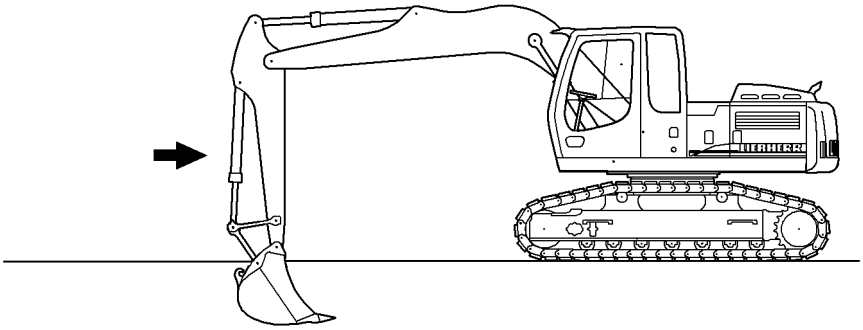

Fig. 3-114 *Taking up grab material*

- To lift out the grab material, slowly and evenly slew in the stick and slowly and evenly slew in the backhoe bucket simultaneously.
- As soon as the stick is perpendicular to the ground, raise the boom slowly and evenly in addition to slewing in the stick and the backhoe bucket. Stopping suddenly will result in impact loads and vibrations.

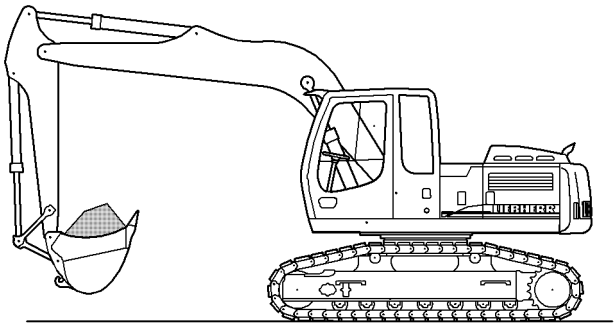

Fig. 3-115 *Raising grab material*

- When the backhoe bucket is full or the stick can no longer be slewed in, raise the boom and backhoe bucket until the filled surface is parallel to the ground.

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3.6.4 Loading the transport vehicle

Danger!
Risk of fatal injury due to falling grab material.

- ▶ Do not load the transport vehicle so high that the grab material could drop out over the walls of the vehicle.
- ▶ Ensure that nobody is standing in the danger area or in the transport vehicle when loading.
- ▶ Do not slew the equipment over the driver's cab.

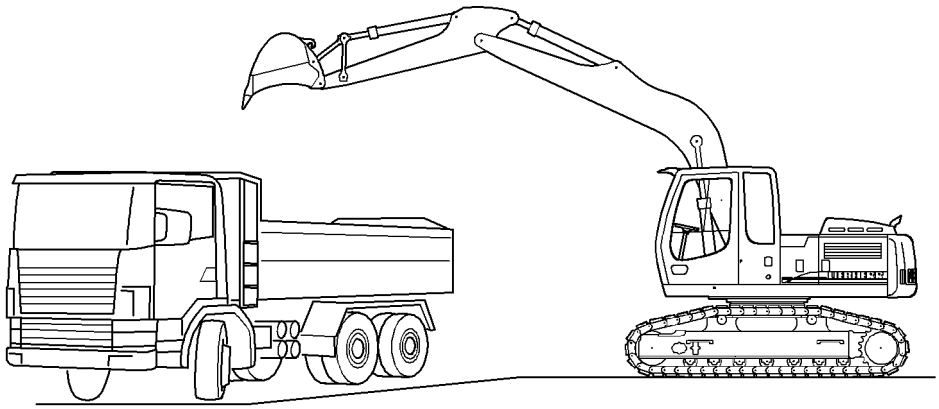

Fig. 3-116 *Emptying grab material*

- ❑ If possible, the machine should stand higher than the transport vehicle to avoid having to lift the grab material unnecessarily.
- ▶ Stop the transport vehicle in a position that allows it to be loaded from the rear or the side.
- ▶ Slew the machine's equipment above the loading area of the transport vehicle.
- ▶ Distribute the grab material evenly over the loading area of the transport vehicle by slewing the backhoe bucket and the stick out, slewing the upper carriage and possibly also moving the boom.
- ▶ If the backhoe bucket is not sufficiently emptied or there is still grab material in the backhoe bucket, slew the backhoe bucket in and out several times to loosen the grab material.

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3.6.5 Working with the clamshell bucket (construction equipment)

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

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

❑ The machine must be in the working position.

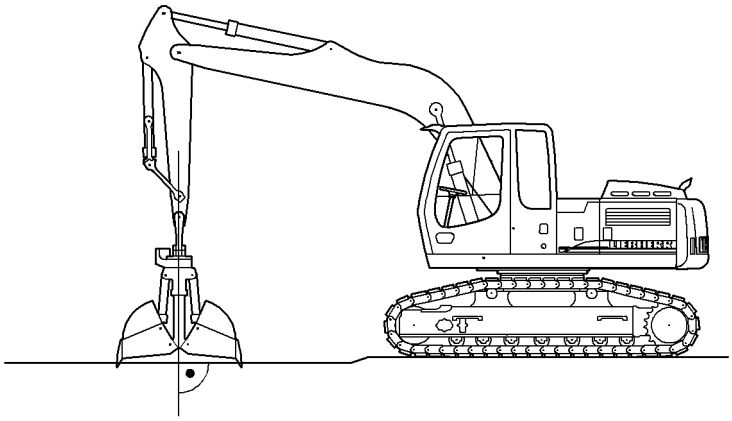

Fig. 3-117 *Straightening the stick*

- ▶ Open the grab shells fully.
- ▶ Lower the stick perpendicular to the excavation area.

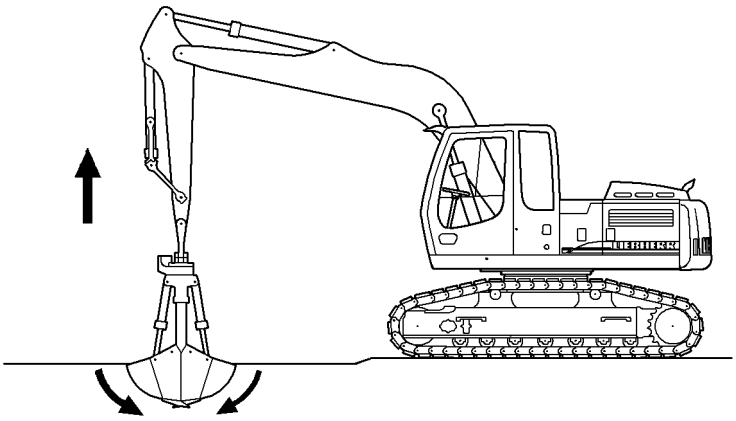

Fig. 3-118 *Closing the grab shells*

- ▶ Close the grab shells.
- ▶ Raise the stick slightly when doing this in order to reduce ground pressure.

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

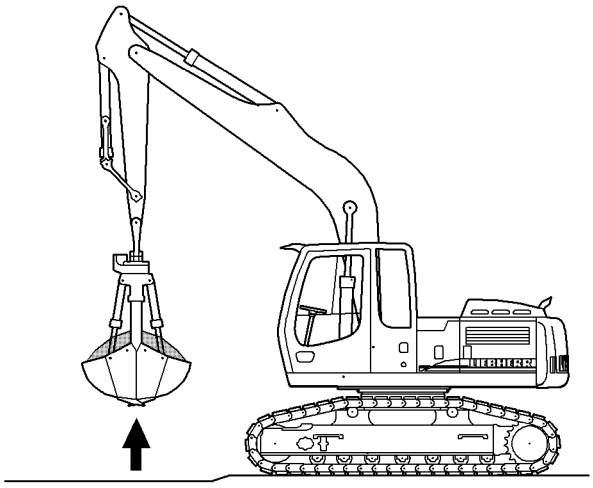

Fig. 3-119 *Raising grab material*

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

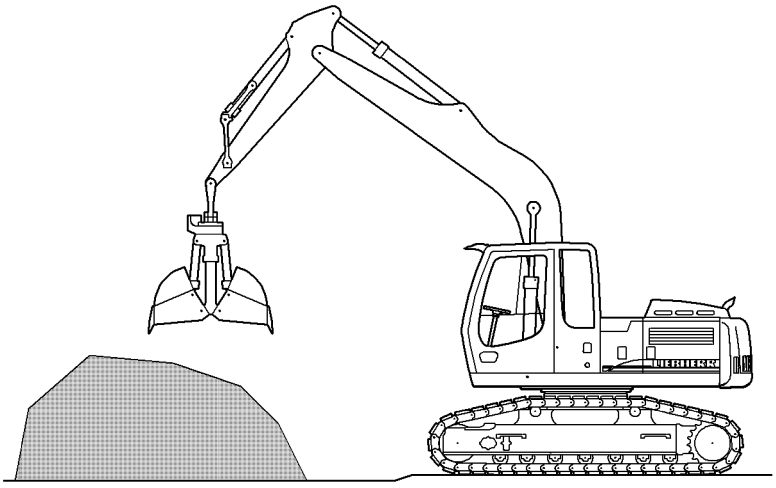

Fig. 3-120 *Emptying grab material*

- ▶ 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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3.6.6 Hoisting work

Hoisting work is understood as being lifting, transporting and unloading loads using a securing method (rope, chain etc.) and where personnel are required to assist in securing and unloading the load. This includes, for example, the lifting and unloading of pipes, shaft-top supporting rings or containers.

Danger!
The machine may only be operated for hoisting work if the prescribed safety devices are present and functioning correctly.

Machines used for hoisting work must be equipped with the following safety devices, in accordance with European standard EN 474-5:

- **Load take-up device for safe securing of a load (optional extra)**
  Safe take-up devices include for example lifting hooks which are mounted in place of the bucket. Lifting hooks can also be replaced with safety hooks welded to the bucket.
- **Overload warning device (optional extra)**
  The overload warning device must alert the machine operator visually or acoustically if the permitted load value according to the load chart has been reached or exceeded.
- **Line break fuse on the hydraulic jacks (optional extra)**
  The line break fuse must correspond with the requirements of ISO 8643.
- **Load chart inside the cab**.

If the points referred to above are not or are only partially fulfilled, the machine may not be used for hoisting work.

3.6.7 Working with the hydraulic hammer

Please also refer to the operating instructions provided by the manufacturer of the hydraulic hammer.

Danger!
The hydraulic hammer must be selected very carefully. Operating requires increased care and attention.

- ▶ Only use hydraulic hammers approved by LIEBHERR.
  - ↳ The use of a hydraulic hammer not approved by LIEBHERR could damage steel parts or other machine components.
- ▶ Only use the hydraulic hammer to break up rocks, concrete and other breakable objects.
- ▶ To avoid damaging the machine, do not try to break up rocks or concrete by moving the lever on the work equipment or by the hydraulic hammer.
- ▶ Do not use the drop power of the hydraulic hammer to break up rocks or other objects. Do not move objects with the hydraulic hammer. Do not lift the machine when using the hydraulic hammer.
  - ↳ This could damage both the hydraulic hammer and the machine.
- ▶ Do not use the hydraulic hammer to lift objects.
- ▶ Only use the hydraulic hammer in the machine's longitudinal direction.
- ▶ Do not operate the hydraulic hammer in the direction of the machine, since exploding rocks or concrete could damage the machine and / or injure the driver.
- ▶ Close all windows in the cab before working.

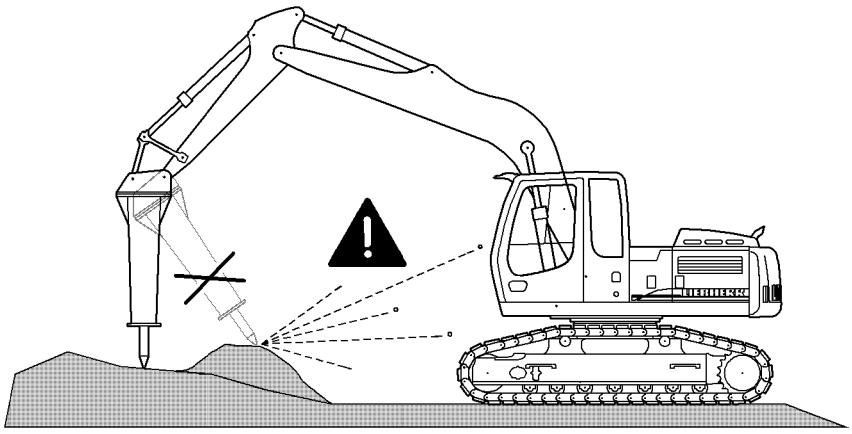

Fig. 3-121 *Hydraulic hammer*

- ❑ The machine must be positioned in the working position on level, solid ground.
- ❑ The stick may not stand vertically.
- ❑ No cylinder may be fully taken in or extended.
- ▶ Do not operate the hydraulic hammer on the same spot continually or for longer than 15 seconds.
  - ↳ Overly continual operation of the hydraulic hammer leads to the hydraulic oil overheating unnecessarily.
- ▶ Change the position of the machine and resume hammering work.

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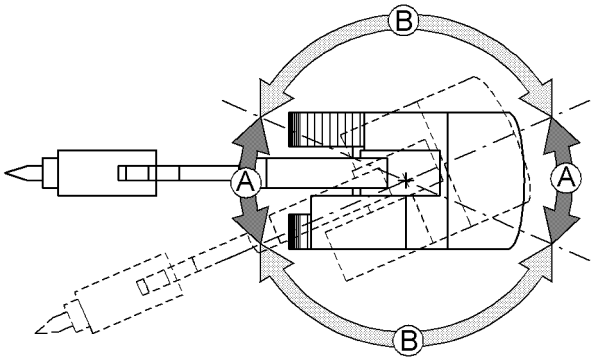

Fig. 3-122 *Permissible **A** and not permissible **B** work areas of the machine with hydraulic hammer*

Danger!
The stability of the machine could be affected.
When using a hydraulic hammer, only work with the machine in area **A**.

3.6.8 Working with the grapple (industrial equipment)

❑ The machine must be in the working position.

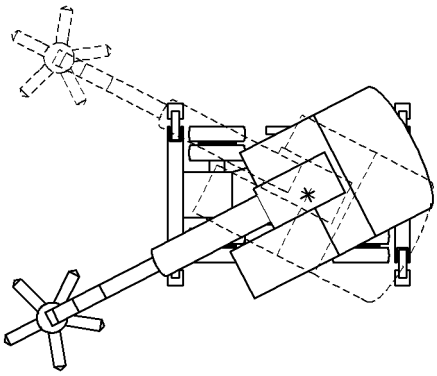

Fig. 3-123 *Taking up the load*

▶ Take the load up above the supported corners of the machine to attain maximum stability.

▶ The maximum lifting capacity is attained when the load is taken up as close to the chassis as possible.

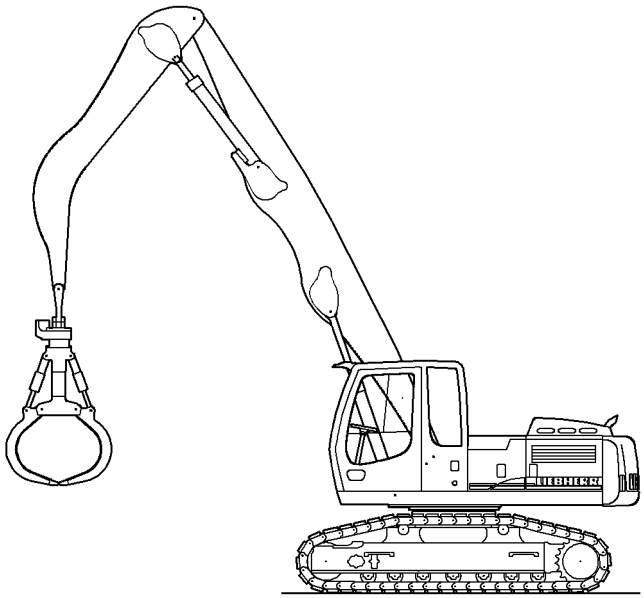

Fig. 3-124 *Transporting a load*

▶ Transport the load close to the chassis, but with sufficient safety distance to the cab (swinging grab!) and as close to the ground as possible.

Caution!
Particularly when loading wood, it can be necessary when working with a grab to move with the working equipment raised and the load taken up. This will shift the centre of gravity of the machine upwards. The way the machine drives will be negatively affected because of this.

▶ Please note the safety information “Use for loading work” at the beginning of these operating instructions.

3.6.9 Skimming

Skimming work can either be carried out using the bucket or with a skimming shield (optional extra).

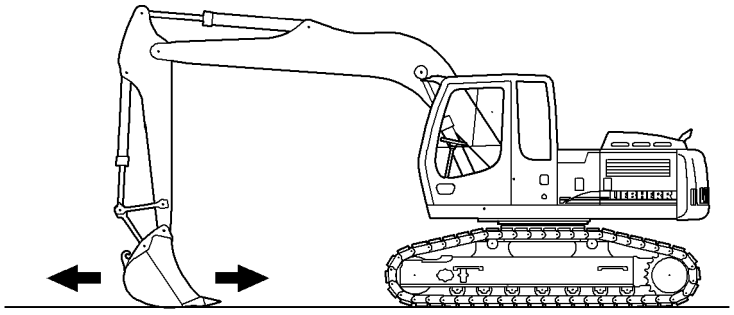

Fig. 3-125 *Skimming*

❑ The machine must be in the working position.

❑ The support should be raised.

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Danger!
Serious risk of injury when moving the machine.

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

Caution!
The machine could be damaged.

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

▶ To skim with a backhoestick bucket, lay this on the ground (siehe Fig. 3-125) and move the stick slowly forwards and backwards. Move the boom steadily up and down while the stick is moving.

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

3.7 Transport

3.7.1 Transporting the machine safely

– Due to transport restrictions, use only suitable means of transport and lifting devices with sufficient load-carrying capacity.
– Park the machine on a flat surface and wedge the crawler or wheels securely.
– If required, detach a part of the machine's working equipment during transportation.
– The ramp used to drive the machine up onto the flatbed trailer should not exceed an inclination of 30° and should have a wooden cover to prevent sliding back.
– The undercarriage chassis should be swept clean, i.e. before driving up the ramp, clean any snow, ice and mud from the crawler / wheels of the machine.
– Align the machine precisely with the loading ramp.
– Attach the hand lever for fine-tune driving (crawler excavator) onto the accelerator pedals.
– Ensure that a spotter gives the machine operator the required signal.
– Prepare the placing block to ensure against rolling back when the machine is driving up onto the flatbed.
– Tilt the equipment up and drive up the loading ramp. While doing this, always hold the equipment securely over the loading area, drive very carefully up the ramp and onto the transportation vehicle.
– Rotate the upper structure carefully to the rear and lower the equipment. Due to restrictions during transport on hoe equipment, tilt the arm in and dismantle the bucket during transportation.
– After loading the machine onto the flatbed trailer, the upper structure must be secured facing the chassis using the stop bolts (only A devices).
– Secure the chassis and the remaining individual parts using chains and blocks to prevent slipping.
– Before you leave the machine, reduce pressure on all pressure lines, remove the ignition key and tilt up the safety lever.
– Lock all cab and panel doors.

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– Before transportation, find out all details about the route to be travelled, particularly as they relate to width, height and weight restrictions.
– Pay particular attention when driving under electrical lines and bridges and through tunnels.
– When unloading the machine, take the same amount of care as was taken when it was loaded. Remove all chains and blocks. Start the engine as per the operating instructions. Drive carefully off the trailer's loading area and down the ramp. Hold the working equipment as securely as possible over the ground while doing this. Have a spotter guide you.

3.7.2 Transporting the machine on a low loader

Hinweis
Respect the respective local legal circulation rules and safety instructions of profession corporations and in case adapt the machine, its transportation means, loading and fasten materials befor into the local legal permitted state.

Preparatory activities

Before driving onto the low loader, the following arrangements must be made:

Fig. 3-126 *Loading ramp*

- ❑ The ramp inclination must be flatter than the machine's given hill climbing ability. Ramp inclination angle **W** < = 30°.
- ❑ Have the chocks ready.
- ▶ Lay down and secure wooden planks carefully on the steel surface of the ramp.
- ▶ Clean any ice, snow or mud off the crawlers before starting to drive up the ramp.

Loading the machine onto the low loader

To drive the machine up onto the low loader:

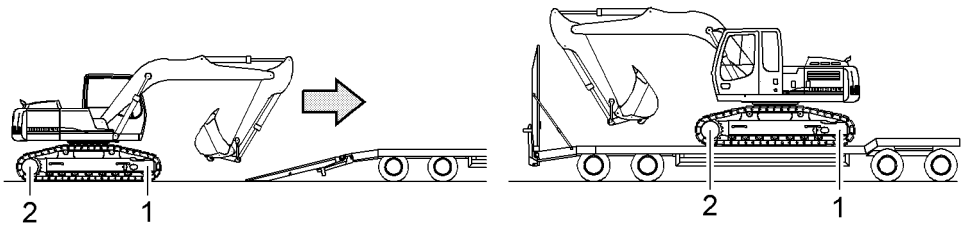

Fig. 3-127 *Driving up onto the low loader*

1 Leading wheel **2** Tumbler wheel

- ▶ The machine must be driven up on to the low loader with the leading wheel **1** leading. For this, the upper carriage must be rotated 180°.

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Danger!
If the upper carriage is rotated 180° to the chassis, the driving and steering directions are reversed.

▶ Drive and steer with increased caution.

▶ For sensitive driving, insert the lever which is found in the tool kit into the pedals for the drive units.

▶ Align the machine precisely to the loading ramp.

▶ Drive the machine onto the low loader.

Note
Have a signaller provide the necessary signs.

▶ Rotate the upper carriage carefully 180° (direction of travel over leading wheel) and lower the equipment (siehe Fig. 3-128).

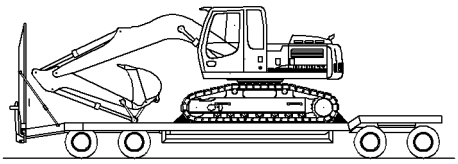

Fig. 3-128 *Transport position - machine*

▶ Switch off the engine.

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

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

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

To secure the machine:

The machine must be secured against slipping before starting the journey.

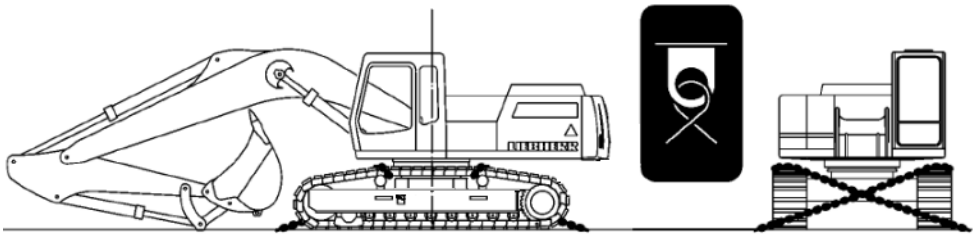

Fig. 3-129 *To secure the machine*

Danger!
Serious accidents can happen if the machine is allowed to slip on the loading ramp.

▶ Secure the machine against slipping.

▶ To do this, use chocks and a tension cable or tension chains.

▶ Secure the machine at the points provided for the purpose using tension cables or tension chains (siehe Fig. 3-129). The loading points are identified on plate 45

on the chassis.

▶ Secure tension cables and tension chains on the low loader according to type.

Transport route

Danger

Danger!
Driving beneath obstacles which are too low can cause serious accidents.

▶ Drive under obstacles, particularly electrical lines, with increased caution.

▶ Find out about the route to be travelled before starting the journey.

3.7.3 Loading the machine with a crane

If the machine is to be loaded using a crane (eg. onto ships or rail freight cars), the type of suspension should be selected according to the equipment.

Danger!
The load could slip or fall if incorrectly loaded.

▶ Only permit experienced personnel to secure loads and signal the crane driver.

▶ The signaller must position himself within the view of the operator or be in voice contact with him.

▶ Ensure that the length of the suspension gear is sufficient.

Loading a machine with a gooseneck boom:

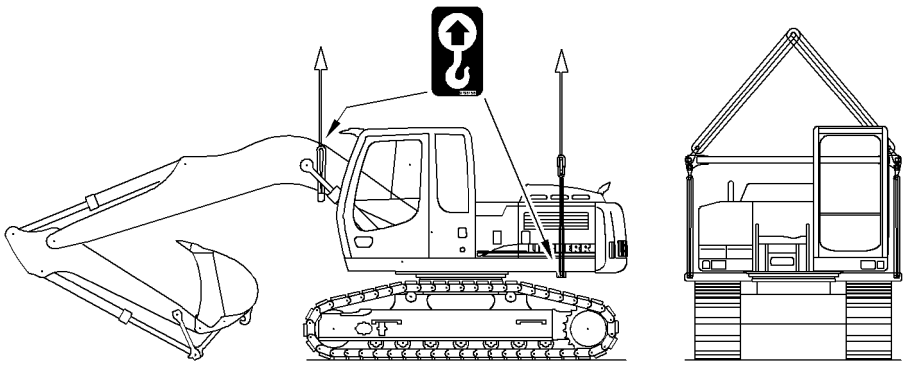

Fig. 3-130 *Suspending the machine with gooseneck boom*

❑ Only use cargo handling gear which is sufficiently dimensioned or which has been specially developed by LIEBHERR for this purpose.

▶ Lower the equipment, draw in the stanchion and tip the bucket as far as the stop.

▶ Switch off the engine.

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

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

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

▶ Attach the cargo handling gear to the points provided for the purpose.

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Danger!
Standing under the raised machine is not permitted!

- ▶ Raise the machine carefully with the crane and load.
- ▶ When restarting the machine, proceed only in accordance with the operating and maintenance instructions.

Loading a machine with adjusting equipment:

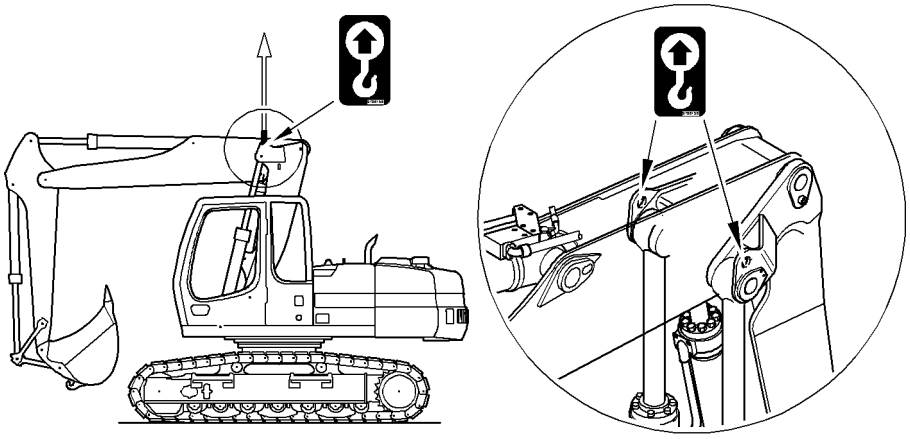

Fig. 3-131 *Loading a machine with adjusting equipment*

- ❑ Only use cargo handling gear which is sufficiently dimensioned or which has been specially developed by LIEBHERR for this purpose.
- ▶ Extend the hydraulic jack, draw the boom adjusting cylinder in and position the shovel arm more or less vertically.
- ▶ Switch off the engine.
- ▶ Turn the ignition key to the contact position and relieve pressure lines by moving the joystick carefully several times.
- ▶ Remove the ignition key and push the safety lever up.
- ▶ Close and lock all doors, covers and panels on the machine.
- ▶ Attach the cargo handling gear to the points provided for the purpose.
- ❑ The machine must be suspended in as horizontal a position as possible on the crane.

Danger!
Standing under the raised machine is not permitted!

- ▶ Raise the machine carefully with the crane and load.
- ▶ When restarting the machine, proceed only in accordance with the operating and maintenance instructions.

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.

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4.1 Error code charts

Danger!
When switching over to emergency operation, the speed can no longer be changed using the arrow keys on the monitoring screen. The servo control, parking brake and swing gear brake can no longer be activated.

▶ Please also note the subheading “Emergency operations” in the chapter “Operating the machine” in this regard.

4.1.1 Machine Control system (BST)

Error code	Effect	Cause	Measure / remedy
E 004	Coolant level not being monitored.	Short circuit to earth	Check coolant level, consult LIEBHERR customer service.
E 005		Short circuit + 24 V	
E 006		Cable break	
E 010	Hydraulic oil level not being monitored.	Short circuit to earth	Check hydraulic oil level, consult LIEBHERR customer service.
E 011		Short circuit + 24 V	
E 012		Cable break	
E 013	Hydraulic oil temperature not being monitored.	Short circuit to earth	Check that the radiator is not dirty, consult LIEBHERR customer service.
E 014		Short circuit + 24 V	
E 015		Cable break	
E 016	Splitterbox oil temperature not being monitored. (from R954)	Short circuit to earth	Check oil level, consult LIEBHERR customer service.
E 017		Short circuit + 24 V	
E 018		Cable break	
E 022	Diesel engine speed not being monitored, diesel engine speed cannot be adjusted using keypad, reduced hydraulic power.	Short circuit to earth	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 023		Short circuit + 24 V	
E 024		Cable break	
E 027	Faulty hydraulic power	LR cable error at output stage for power control of hydraulic pump	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 033	Maximum fan speed	EV 5 cable error at output stage of electric valve for hydraulic fan control	Consult LIEBHERR customer service.
E 036	Flow reduction for hydraulic equipment not being carried out.	EV 1 cable error at the output stage for flow regulation of hydraulic pump	Do not operate flow reduced equipment, consult LIEBHERR customer service.
E 039	Flow reduction for hydraulic equipment not being carried out (from R934, optional extra).	EV 2 cable error at the output stage for flow regulation of second hydraulic pump	Do not operate flow reduced equipment, consult LIEBHERR customer service.

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Error code	Effect	Cause	Measure / remedy
E 042	Power reduction for swing movement not being carried out (for R934C and R944C). Attachment movements are slowed down.	EV 3 cable error at the output stage for power reduction for swing movement	Consult LIEBHERR customer service.
E 045	Pressure reduction for hydraulic equipment not being carried out.	EV6 cable error at the output stage for pressure regulation of the hydraulic circuit.	Do not operate pressure reduced equipment, consult LIEBHERR customer service.

4.1.2 Engine control system (PLD-CR)

Error code	Effect	Cause	Measure / remedy
E 002	Engine oil not being monitored.	Short circuit + 24 V	Check engine oil level, consult LIEBHERR customer service.
E 003		Short circuit to earth or Cable break	
E 007	Coolant temperature not being monitored.	Short circuit + 24 V	Check that the radiator is not dirty, consult LIEBHERR customer service.
E 009		Short circuit to earth or Cable break	
E 063	Turbocharged air temperature not being monitored.	Short circuit + 24 V	Check that the radiator is not dirty, consult LIEBHERR customer service.
E 065		Short circuit to earth or Cable break	
E 070	Engine RPM not being monitored.	Transmitter output default	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 072	Turbocharged air pressure not being monitored.	Short circuit + 24 V	Check the turbocharged air circuit, consult LIEBHERR customer service.
E 073		Short circuit to earth or Cable break	
E 074	Engine does not start	Start time out	Consult LIEBHERR customer service.
E 075		Starter default	
E 078		Défaut hardware	Consult LIEBHERR customer service.
E 079		Défaut software	
E 081	Engine RPM not being monitored.	Transmitter B12-1 default	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 082		Transmitter B12-2 default	
E 084	Cold start command default	Unit 1 of cold start command over current	Consult LIEBHERR customer service.
E 085		Unit 1 of cold start command default	
E 086		Open load for Unit 1 of cold start command	

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Error code	Effect	Cause	Measure / remedy
E 087	Engine RPM not being monitored.	The values registered by the transmitters B12-1 and B12-2 are different.	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 088	Atmospheric pressure not being monitored.	Short circuit + 24 V or short circuit to earth or cable break	Consult LIEBHERR customer service.
E 089	Water in fuel filter not being monitored. Engine does not start	Short circuit + 24 V or short circuit to earth or cable break	Consult LIEBHERR customer service.
E 090	Fuel temperature not being monitored.	Short circuit to earth	Consult LIEBHERR customer service.
E 091		Short circuit + 24 V or cable break	
E 092	Fuel pressure not being monitored.	Short circuit + 24 V	Consult LIEBHERR customer service.
E 093		Short circuit to earth or cable break	
E 094	Fuel pressure in rail 1 not being monitored.	Short circuit + 24 V	Consult LIEBHERR customer service.
E 095		Short circuit to earth or cable break	
E 096	Fuel pressure in rail 2 not being monitored.	Short circuit + 24 V	Consult LIEBHERR customer service.
E 097		Short circuit to earth or cable break	
E 098		D+ default on the alternator	Consult LIEBHERR customer service.
E 099		Alternator default	
E 100	Engine RPM not being monitored.	The value registered by the transmitter B12-1 is impossible.	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 101	Engine RPM not being monitored.	The value registered by the transmitter B12-2 is impossible.	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 102	Engine can not be started.	Cranckshaft synchronisation default	Consult LIEBHERR customer service.
E 103		Camshaft transmitter default	Consult LIEBHERR customer service.
E 104		The value registered by the camshaft transmitter is impossible.	Consult LIEBHERR customer service.
E 105	Engine can not be started.	Camshaft synchronisation	Consult LIEBHERR customer service.

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Error code	Effect	Cause	Measure / remedy
E 106	Cold start command default	Unit 2 of cold start command over current	Consult LIEBHERR customer service.
E 107		Unit 2 of cold start command default	
E 108		Open load for Unit 2 of cold start command	
E 109		Hardware CAN1 default	Consult LIEBHERR customer service.
E 110		CAN1 data impossible or time out	
E 111		Injector A1 default	Consult LIEBHERR customer service.
E 112		Injector A1 error BIP / FZM	
E 113		Injector A2 default	Consult LIEBHERR customer service.
E 114		Injector A2 error BIP / FZM	
E 115		Injector A3 default	Consult LIEBHERR customer service.
E 116		Injector A3 error BIP / FZM	
E 117		Injector A4 default	Consult LIEBHERR customer service.
E 118		Injector A4 error BIP / FZM	
E 119		Injector B1 default	Consult LIEBHERR customer service.
E 120		Injector B1 error BIP / FZM	
E 121		Injector B2 default	Consult LIEBHERR customer service.
E 122		Injector B2 error BIP / FZM	
E 123		Injector B3 default	Consult LIEBHERR customer service.
E 124		Injector B3 error BIP / FZM	
E 125		Injector B4 default	Consult LIEBHERR customer service.
E 126		Injector B4 error BIP / FZM	
E 127		Parameter default bank A	Consult LIEBHERR customer service.
E 128		Parameter default bank B	
E 129	Fuel pressure in rail 1 not being monitored.	Short circuit to earth or cable break	Consult LIEBHERR customer service.
E 130		Short circuit + 24 V	
E 131		Incoherent signal	
E 132	Fuel pressure in rail 2 not being monitored.	Short circuit to earth or cable break	Consult LIEBHERR customer service.
E 133		Short circuit + 24 V	
E 134		Incoherent signal	

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Error code	Effect	Cause	Measure / remedy
E 135		Circuit 5 Volt - REF1	Consult LIEBHERR customer service.
E 136		Circuit 5 Volt - REF2	
E 137		Circuit 5 Volt - REF3	
E 138		Circuit 5 Volt - REF4	

4.1.3 Keypad

Error code	Effect	Cause	Measure / remedy
E 302	No entry possible using keypad	No coding plug	Consult LIEBHERR customer service.
E 303	Diesel engine speed cannot be adjusted using keypad, hydraulic power is reduced.	No CAN bus connection between keypad and BST plate (message also appears if bus arbiter not operating, e g. if no power supply is present).	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 305	Malfunctions, e g. swing gear brake, servo control	No CAN bus connection between keypad and ESP01 board (message also appears if ESP01 not operating).	Switch to emergency switching of servo pressure circuits **S73**, consult LIEBHERR customer service.
E 307		No CAN bus connection between keypad and engine control system PLD	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 310		For boring excavators, Hardware coding and software coding are not in concordance.	Consult LIEBHERR customer service.
E 314		Time out for CAN bus connection between keypad and engine control system PLD	Consult LIEBHERR customer service.

4.1.4 Display

Error code	Effect	Cause	Measure / remedy
E 308	No display or incorrect display on screen	No connection keypad / screen or keypad not operating	Consult LIEBHERR customer service.
E 309		No Software compatibility between screen and keypad	

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4.1.5 Coding error

Error code	Effect	Cause	Measure / remedy
E 319	Diesel engine speed cannot be adjusted using keypad, reduced hydraulic power.	Hardware coding not suited to software coding	Switch to emergency control speed adjustment **S71** and **S72** and emergency operation work pumps **Y50**, consult LIEBHERR customer service.
E 321		Keypad has not received a recognised machine type.	
E 322		Unknown hardware coding	

4.1.6 Other errors

Error code	Effect	Cause	Measure / remedy
E 442	Automatic idling on left joystick does not function, i.e. the engine remains at low speed.	Short circuit + 24 V	Deactivate automatic idling **S20**, consult LIEBHERR customer service.
E 443		Short circuit to earth or cable break	
E 445	Automatic idling on right joystick does not function, i.e. the engine remains at low speed.	Short circuit + 24 V	Deactivate automatic idling **S20**, consult LIEBHERR customer service.
E 446		Short circuit to earth or cable break	
E 450	The pressure for pressureless boom down movement not being monitored.	Wiring default; Current < 3mA or > 21 mA	Consult LIEBHERR customer service.
E 454	Swing use cannot be recorded	Short circuit + 24 V	Consult LIEBHERR customer service.
E 455		Short circuit to earth or cable break	
E 456	Incorrect fuel gauge.	Short circuit + 24 V	Check fuel level visually, consult LIEBHERR customer service.
E 458		Short circuit to earth or cable break	
E 601		Connection default for plate ESP01	Consult LIEBHERR customer service.

4.1.7 Error due to warning symbols in SY field

These error codes will not be displayed in the EC field of the operator's menu. They can only be read off the S-Exxx menu list.

Error code	Effect	Cause	Measure / remedy
E 501	H2 telltale light illuminates Buzzer sounds	Diesel engine pressure too low - warning level	See telltale light description.
E 502	Symbol appears Buzzer sounds	Coolant level low	See symbol description
E 503	Symbol appears Engine power reduction Buzzer sounds	Coolant overheating - warning level	See symbol description
E 504	Symbol appears	Hydraulic oil level low	See symbol description
E 505	Symbol appears	Hydraulic oil overheating	See symbol description

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Error code	Effect	Cause	Measure / remedy
E 506	Symbol appears	Splitterbox oil temperature too high (from R954)	See symbol description
E 511	Symbol appears	Overvoltage	See symbol description
E 512	Symbol appears	Undervoltage for system DC (Diesel control)	Voir la description des symboles
E 513	Symbol appears	Overvoltage for system DC (Diesel control)	See symbol description
E 516	Symbol appears Engine safety shut off	Safety shut off for EDC default	See symbol description
E 517	Symbol appears Engine safety shut off	Safety shut off for injector default	See symbol description
E 518	Symbol appears Engine safety shut off	Safety shut off for synchronisation default	See symbol description
E 519	Symbol appears	RPM too high - Warning level	See symbol description
E 520	Symbol appears Engine safety shut off	RPM too high - Safety level	See symbol description
E 521	Symbol appears Engine safety shut off	Both RPM transmitters default	See symbol description
E 522	Symbol appears Buzzer sounds	Engine oil pressure too low - Safety level	See symbol description
E 523	Symbol appears Buzzer sounds	Coolant temperature too high - Safety level	See symbol description
E 524	Symbol appears Buzzer sounds	Turbocharged air temperature too high - Safety level	See symbol description
E 525	Symbol appears Buzzer sounds LED H60 illuminates	Engine in safety mode	See symbol description
E 526	Symbol appears	Fuel temperature too high - Warning level	See symbol description
E 527	Symbol appears	Fuel temperature too high - Safety level	See symbol description
E 528	Symbol appears	Water in fuel filter	See symbol description
E 530	Symbol appears	Synchronised safety shut off	See symbol description
E 532	Symbol appears	Fuel pressure too low - Warning level	See symbol description
E 533	Symbol appears	Fuel pressure too low - Safety level	See symbol description
E 534	Symbol appears	Fuel pressure too high - Warning level	See symbol description
E 535	Symbol appears	Fuel pressure too high - Safety level	See symbol description
E 536	Symbol appears	Fuel pressure too low in rail 1 - Warning level	See symbol description
E 537	Symbol appears	Fuel pressure too low in rail 1 - Safety level	See symbol description
E 538	Symbol appears	Fuel pressure too low in rail 2 - Warning level	See symbol description

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Error code	Effect	Cause	Measure / remedy
E 539	Symbol appears	Fuel pressure too low in rail 2 - Safety level	See symbol description
E 597	Symbol appears Engine power reduction Buzzer sounds	Turbocharged air temperature too high - Warning level	See symbol description

4.2 Faults and remedies

4.2.1 Diesel engine and fuel system

Fault / error	Cause	Solution
Diesel engine does not start	Fuel tank almost or completely empty	Fill tank and vent fuel system
	Low pressure in tank	Remove fuel filler cap
	Fuel filter dirty	Clean or change filter and vent fuel system, drain fuel / clean tank
	Outside temperature below 0°C	For operation under specific climatic conditions, see operating instructions
	Starter motor not drawing through	Check line connections, overhaul starter motor
	Batteries have no power	Charge / replace
Engine starts but stops immediately after or runs irregularly	Fuel tank empty (low pressure in tank)	Fill tank and vent fuel system
	Fuel filter dirty	Clean or change filter and vent fuel system (tank)
	Particularly in winter: too viscous engine oil used	Use engine oil suitable for the outside temperature
	Dry-air filter dirty	Clean or change main filter element
	Air in fuel system	Vent fuel system
	Ventilation in fuel tank obstructed	Clean
	Fuel line bent	Check line and repair if required
Diesel engine emitting grey or black smoke	Dry-air filter dirty	Clean or change filter
Diesel engine continually emitting while smoke (steam)	Water in combustion chamber	Consult customer service
Diesel engine does not reach full speed	Speed adjustment not set to maximum value	Set speed adjustment to maximum value
	Injection system is set incorrectly	Consult customer service
	Dry-air filter dirty	Clean or replace filter
	Bad fuel supply	Clean or change fuel filter, check lines, drain water from tank

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Fault / error	Cause	Solution
Diesel engine becomes too hot	Too little coolant	Fill coolant, check for leaks
	Water pump defective	Repair
	Thermostats do not work	Change thermostats
	Coolant contaminated	Clean coolant
Diesel engine has insufficient oil pressure **Note!** Switch off diesel engine immediately	Oil level too low	Correct oil level
	Oil pressure display faulty	Change oil pressure switch
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 release despite switch being operated	Servo pressure present: Operate emergency function Y6
		Servo pressure not present: Consult customer service
	Service brake engaged	Release service brake

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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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Fault / error	Cause	Solution
Diesel speed adjustment via operating keypad (mode and arrow keys) not functioning	Automatic idling switch S20 is activated	Touch the joystick or deactivate automatic idling switch S20.
	Excavator speed adjustment electronics do not function	Switch the emergency function over from “AUTO” to “MANU” using switch S71 in the right control panel. Set speed using switch S72. Emergency function display appears on monitoring screen. Consult customer service.
	No signal emits from speed sensor B12	
Automatic idling not functioning, speed does not reduce	Permanent sensor signal	Consult customer service
	Switch S20 is deactivated	Activate switch S20
Servo control cannot be activated using switch	Excavator electrics faulty	Switch on emergency function using switch S73 in the right control panel Caution: Servo circuit and brake circuit can only be switched off using the safety lever. Keypad not functioning. Consult customer service.
Parking brake cannot be released using switch		
Slewing gear brake cannot be released using switch		

4.2.5 Heating/air-conditioning system

Fault / error	Cause	Solution
Heating not giving out warm air	Shutoff valves for coolant line on diesel engine closed	Open shutoff valve
	Engine not at operating temperature	Bring engine to operating temperature
Heating fan does not operate	No power supply	Check fuse and wiring / repair
	Fan motor defective	Change fan motor
Only low air flow in cab	Outside air filter / recirculated air filter dirty	Clean air intake opening, replace outside air filter
	Air vent closed	Open air vent

4.2.6 Work equipment

Fault / error	Cause	Solution
Cylinder stretches when loaded	Piston seal in cylinder defective	Overhaul cylinder
Bearing clearance too high on equipment	Bearing points worn out	Replace bearing parts
Grab / bucket does not move	Valve block on tilting cylinder incorrectly switched	Switch over valve block
Add-on unit cannot be turned / rotated / operated	Auxiliary function has not been released	Release auxiliary function using switch S19
	Lines are not connected	Connect lines

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4.3 Fuses and relays

4.3.1 Fuse box E50

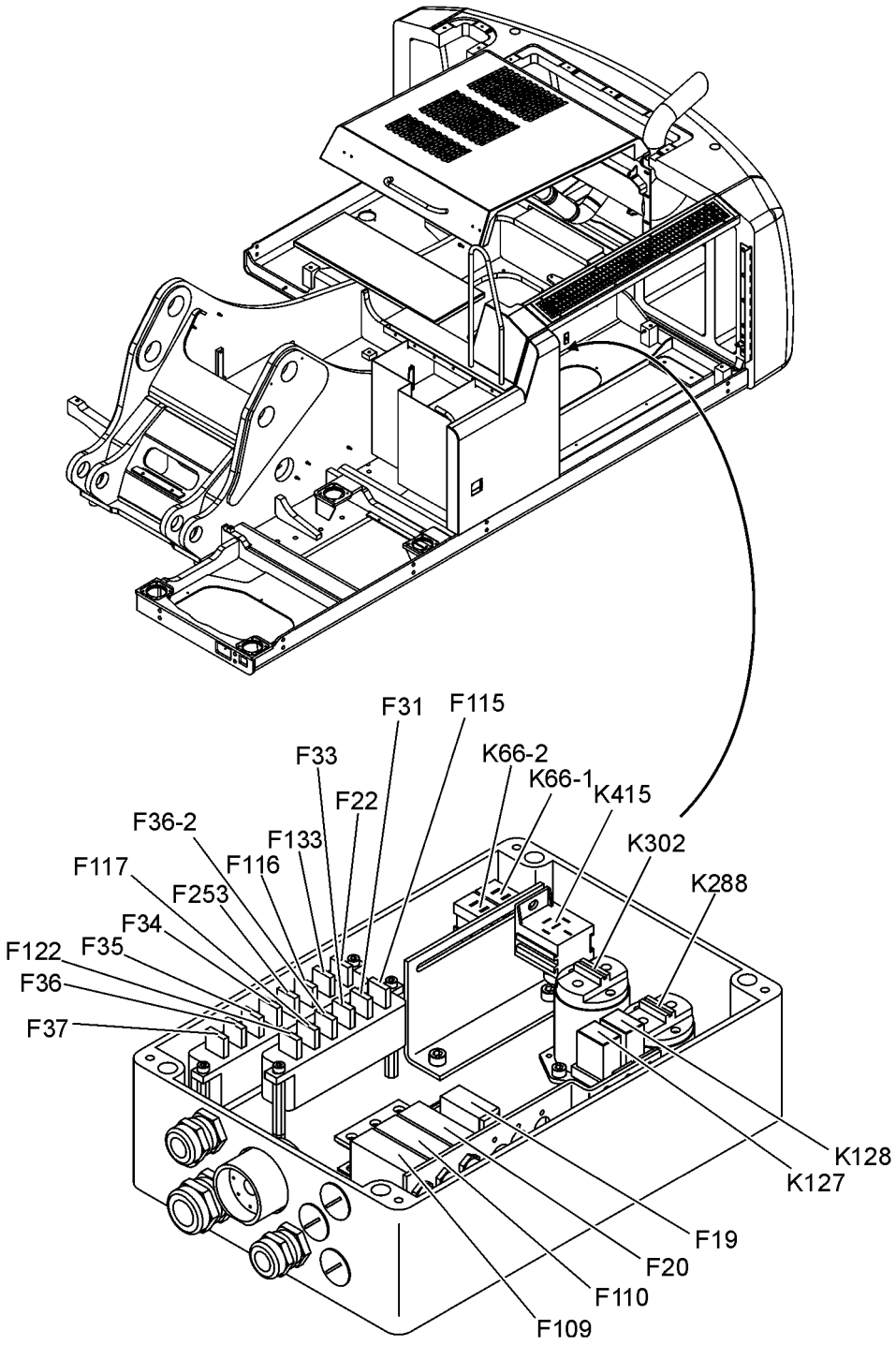

Fig. 4-2 *Fuse box E50*

Fuse box E50 is located behind the left side door, above the batteries.

F19	100 A	Circuit breaker preheating

F20	50 A	Main circuit breaker
F22	7,5 A	Fuse for hazard warning system (auto excavator)
F31	7,5 A	Fuse for air conditioning system, terminal 15
F33	7,5 A	Fuse for refuelling pump (optional extra)
F34		Reserve
F35		Reserve
F36	20 A	Fuse for refuelling pump (optional extra)
F36-2	15 A	Fuse for cylinder control stop (optional extra)
F37	20 A	Fuse for air conditioning system, terminal 30
F109	50 A	Head lights circuit breaker
F110	50 A	PLD system circuit breaker , terminal 15 and 30
F115	7,5 A	Fuse for safety mode
F116	7,5 A	Fuse for PLD system, PS2
F117	7,5 A	Fuse for PLD system, terminal 15
F122	7,5 A	Fuse for preheating signal
F133		Fuse for hydr. adjustable cab (optional extra)
F253	25 A	Fuse for attachment headlights (optional extra)
K66-1		Relay for option cylinder control stop
K66-2		Relay for option cylinder control stop
K127		Relay for engine rpm in safety mode
K128		Relay for engine start in safety mode
K288		Main relay terminal 15
K302		Preheating relay
K415	20 A	Relay for attachment headlights (optional extra)

4.3.2 A1010 Plate

All other fuses are situated in the left control panel of the operator's standing position.

Danger
Incorrect or bypassed fuses do not offer the machine's operator or the electrical system the required degree of protection.

- ▶ Only use original fuses.
- ▶ Never bypass electrical fuses.

If required, order replacement fuses from LIEBHERR.

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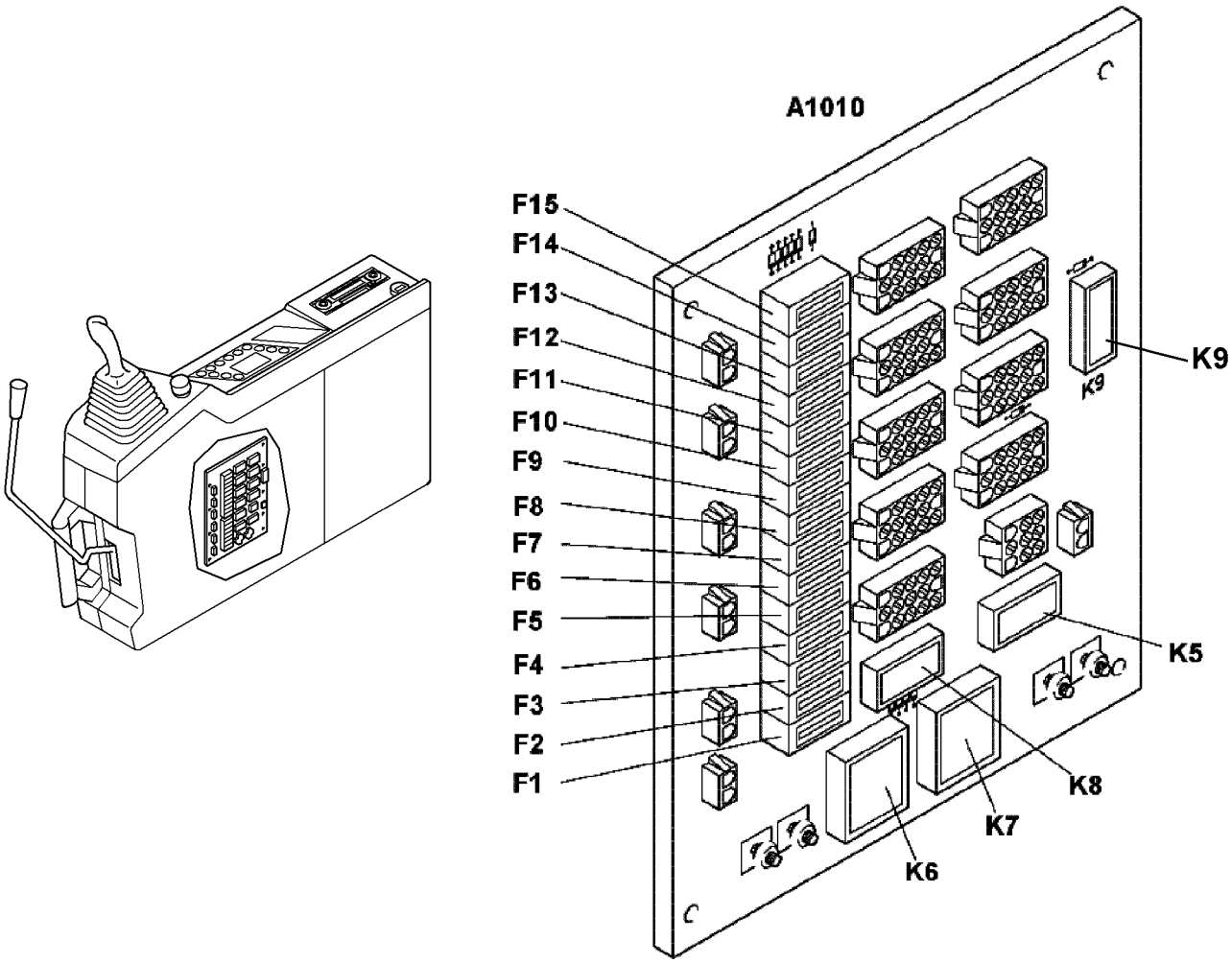

Fig. 4-3 *Fuses and relays, A1010 plate*

F1	15 A	Reserve
F2	15 A	Reserve
F3	15 A	Reserve
F4	15 A	Windscreen washing system, windscreen wiper system, preheating system control circuit, rotating beacon*, slewing grab*
F5	7,5 A	Windscreen wiper motor
F6	7,5 A	Speed adjustment in “MANU” control
F7	7,5 A	Control unit and display
F8	15 A	Safety lever, solenoid valve for servo control, swing gear brake, fast drive, pressure cut in stage boom
F9	15 A	Engine throttle control, BST power supply
F10	25 A	Working headlight, Rotating deck headlights, additional headlights*
F11	15 A	Reserve

F12	15 A	Reserve
F13	7,5 A	Contact key, starting circuit, voltage transformer, Radio*, loudspeaker*, engine stop* (for engine oil low pressure or low coolant level)
F14	15 A	Interior lighting, cigarette lighter, signal horn
F15	15 A	Reserve
K5		Relay emergency control servo function, engine stop* (for engine oil low pressure or low coolant level)
K6		Horn relay
K7		Relay for additional headlights on cab roof
K8		Floating position relay

* en option

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5 Maintenance

5.1 Servicing the machine safely

5.1.1 General safety instructions

- Maintenance and repair work may only be carried out by specially trained personnel.
- Observe statutory timetables or intervals given in the operating instructions for repeat tests / inspections. It is imperative that a suitably equipped workshop is available in order to carry out maintenance work.
- The inspection and maintenance schedule given at the end of these operating instructions defines precisely who is required / permitted to carry out what work. Jobs listed as daily / weekly work may be carried out by the machine's driver or maintenance personnel when they have received appropriate instruction.
  The remaining work may only be carried out by specialist personnel with appropriate training.
- Replacement parts must correspond to the technical requirements determined by the manufacturer. Original replacement parts are always guaranteed to meet these criteria.
- Wear safe work clothes when carrying out maintenance work. Protective glasses and gloves are required in addition to a hardhat and safety shoes for some work.
- 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.
- Pull out the ignition key and shut off the main battery switch.
- Always tighten any loose screw connections during maintenance and repair work.
- 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.

5.1.2 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).

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– 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 products during cleaning work.
  The fire extinguisher could start.
– If you use a high pressure cleaner with steam or hot water to clean the machine, observe following recommendations :
– the distance between the nozzle and the surface to be cleaned must be no lower than 20 inches
– the water temperature should not exceed 60°c (140°F)
– limit the water pressure to 80 bar maximum (11500 PSI)
– if you employ cleaning fluid, only use neutral cleaning agents such as customary car shampoos diluted to 2 or 3 percent maximum
– After cleaning:
  • remove all covers completely.
  • check all fuel, engine oil and hydraulic lines for leakage, loosened connections, chafing and damage.
  • rectify any defects found immediately.
  • lubricate all bearing points, bolt connections and the rim bearing to displace any water or cleaning products that may have entered.

5.1.3 Crack testing

– Even when the machine is operated carefully, there is a possibility of individual cases of overloading occurring, which could lead to cracks or loose connections. The machine should therefore be checked regularly for cracks, loose connections or other visible damage to maintain operational safety.
– In order to be able to check for cracks, it is essential that the machine is kept clean and cleaned regularly.
– The tests should be carried out in accordance with the monitoring and maintenance plan:
  • every 250 operating hours by the machine owner's maintenance personnel.
  • every 500 operating hours by authorised specialist personnel.
– It is advisable to carry out these tests: supported, on firm, horizontal substrate, with the equipment in longitudinal and cross direction for variable loads. Current accident prevention regulations must be adhered to.
– Special care must be taken when testing load-bearing components, particularly:
  • the steel chassis members and axle and transmission mountings, the support, the lower rim bearing support and tower and ball rim bearing.
  • the steel upper structure members and bearing block for boom and boom cylinder, the upper rim bearing support, the cab mount and the mount for swing gear and ballast.
  • the steel components of the working equipment, e. g. the boom, stay, quick change adaptor, and bucket.
  • hydraulic cylinders, axles, steering, bolts and bolt connections, steps, ladders and mounting elements.

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- The crack test should be carried out visually. If a crack is suspected, the dye penetration test should be carried out as a crack test on areas which do not have good visibility, such as the rim bearing support, in order to increase testing safety.
- Any damage found must be rectified immediately. Welding work on load-bearing parts of the earth-moving machinery, loading devices and transport devices may only be carried out by trained specialist personnel and only in accordance with the accepted rules of welding engineering. In case of doubt, contact the LIEBHERR customer support service to discuss suitable remedies.

5.1.4 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

5.1.5 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).

5.1.6 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.

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– 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.
– Be sure to support yourself safely when working on the equipment (e.g. replacing teeth). Prevent metal touching metal when doing this.
– For safety reasons, never open and remove a track chain unless having previously totally released the pretension of the chain tensioning unit.
– Never lay under the machine if it is raised with work equipment and has not been securely supported with wooden beams.
– Always jack the machine up in such a way that any weight displacement does not jeopardize stability and prevent metal touching metal while doing this.
– Work on the suspension, brake and steering systems may only be carried out by trained specialist personnel.
– If the machine has to be repaired on a slope, secure the crawler with chocks and connect the upper structure to the chassis using stop bolts.
– Only personnel with special training and experience may work on hydraulic equipment.
– When searching for leakage, wear protective gloves. A fine jet of liquid under pressure can penetrate the skin.
– Do not unscrew any lines or connections before you have set aside the equipment, switched off the engine and depressurized the hydraulic system. After switching off the engine, you must operate all pilot control devices (joystick and pedals) in all directions with the start key in contact position in order to reduce the actuating and dynamic pressures in the work circuits. You must then reduce the internal tank pressure as described in these operating instructions.

5.1.7 Electrical system

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

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First disconnect the negative, then the positive pole. When reconnecting, proceed in the reverse order.

5.1.8 Hydraulic accumulator

- All work on the hydraulic accumulators must be carried out by trained specialist personnel.
- Inexpert assembly and handling of hydraulic accumulators can cause serious accidents.
- Do not operate damaged hydraulic accumulators.
- Before working on a hydraulic accumulator, you must reduce the pressure in the hydraulic system (hydraulic system including hydraulic tank), as described in these operating instructions.
- Do not carry out welding or soldering or do any mechanical work on the hydraulic accumulator.
  The hydraulic accumulator can be damaged by heat penetration and can be made to rupture by mechanical working. RISK OF EXPLOSION!
- Only charge the hydraulic accumulator with nitrogen. There is a RISK OF EXPLOSION if oxygen or air is used.
- The accumulator body can become hot during operation; there is a risk of burning.
- New hydraulic accumulators must be charged with the pressure required for the purpose of use before installation.
- The operating data (minimum and maximum pressure) are marked permanently on hydraulic accumulators. Ensure that this marking remains visible.

5.1.9 Hydraulic hoses and sheathed cables.

- It is forbidden to carry out repair work on hydraulic hoses and sheathed cables!
- All hoses, sheathed cables and bolt connections must be checked regularly every 2 weeks for externally visible damage and any possible damage must be immediately checked for leakage.
  Never check for leaks with your bare hands, use a sheet of paper or something else.
  Any damaged parts must be removed immediately! Spurting oil can lead to injury and burns.
- Even with correct storage and permitted load, hoses and sheathed cables are subject to the natural aging process. This restricts their duration of use.
  - Incorrect storage, mechanical damage and unauthorized load are the most common causes of failure.
  - In relation to duration of use, current norms, regulations and guidelines pertaining to hoses and sheathed cables at place of use must be adhered to.
  - Use at the limit range of permissible load can shorten duration of use (e.g. high temperatures, frequent movement cycles, extremely high pulse frequencies, multiple shift usage).
- Hoses and sheathed cables should be replaced if the following are found during inspection:
  - Damage to the outer sheath as far as the liner (e.g. chafing, cuts and cracks);
  - Brittleness of the outer sheath (fracture formation in hose material);
  - Deformations which do not correspond to the natural form of the hose or sheathed cable, whether in a unpressurized or pressurized state or on bends e.g. sheath separation, blistering;
  - Unsealed areas;

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- Non-adherence to requirements during installation;
- Damage or deformations to the hose fittings which reduce the tightness of the fittings or the hose / fitting connection;
- Hoses working themselves out of the fittings;
- Corrosion of the fittings which reduces function and tightness;

– When replacing hoses and sheathed cables, use only original replacement parts.

– Install and mount hoses and sheathed cables correctly. Do not mix up the connections.

– The following is to be noted when replacing hoses and sheathed cables:
  - Always ensure that the hoses and sheathed cables are installed free of torsion. For high-pressure hoses, the screws from the half-clamps or full flange must always be attached to both hose ends and should only be tightened afterwards.
  - When tightening the flange on high-pressure hoses and sheathed cables with bent fittings, the side with the bent fitting must always be tightened first and then the side with the straight fitting tightened afterwards.
  - Any mounting clamps which are located in the centre of the hose may only be attached and tightened subsequently.
  - Check daily to ensure that all clamps, covers and protective devices are properly fastened. Doing this will prevent vibration and damage during operation.
  - Install the hoses and sheathed cables in such a way that they cannot chafe on other hoses, sheathed cables or parts.
  - A minimum distance from other parts of approx. half the exterior diameter of the hose is recommended. The distance should not, however, be less than 10 to 15 mm.
  - When replacing the hoses or sheathed cables on moving parts (e.g. from the boom to the stay), check before initial start-up that there are no chafing areas in the entire area of movement.

5.2 Maintenance access doors

5.2.1 Overview of access doors

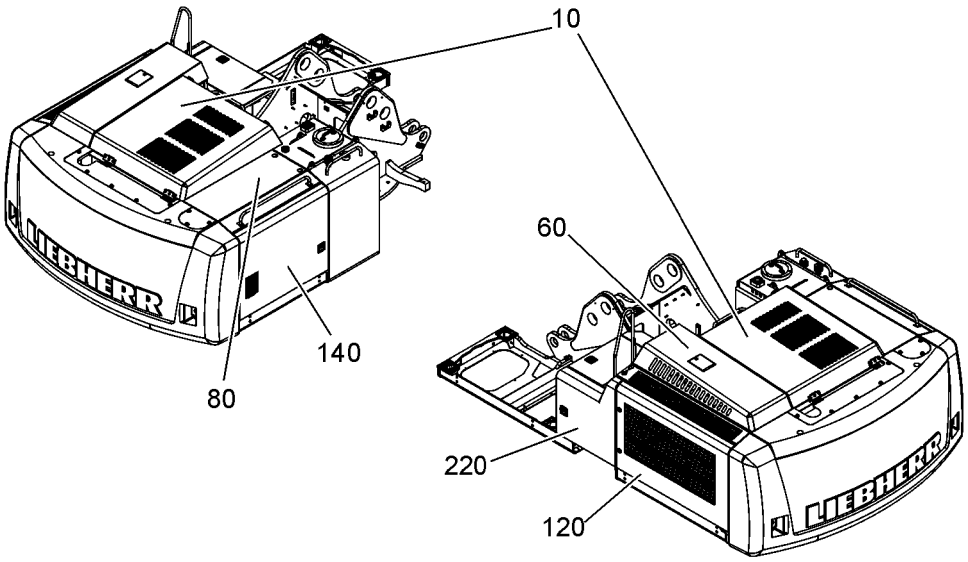

Fig. 5-1 *Access doors on the machine*

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10 Engine cover
60 Radiator cover
80 Right cover
120 Side door, left
140 Side door, right
220 Side door, front left

The machine has 6 access doors for maintenance. The locks integrated in the handles must be unlocked before starting to drive.

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 cover	Gas pressure spring, auxiliary mechanical retainer	– Diesel engine
Radiator cover	Gas pressure spring	– Radiator
Right cover	Gas pressure spring	– Dry air filter – Control oil unit – Hydraulic pump
Side door, left	Mechanical retainer	– Radiator – Electrics box E50 – Batteries – Main battery switch
Side door, right	Mechanical retainer	– Dry air filter – Control oil unit – Hydraulic pump
Side door, front left	Mechanical retainer	– Toolbox – Stowing compartment

Tab. 5-1

Tab. 5-2 *Access doors*

5.2.2 Door lock

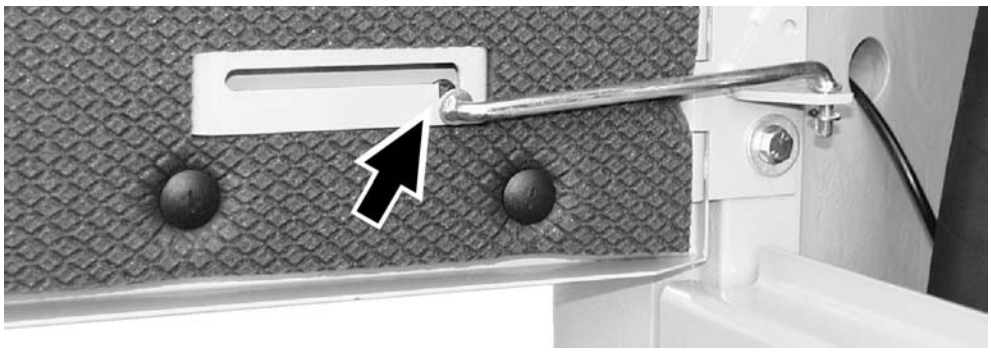

Fig. 5-2 Door lock

▶ 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.

5.3 Lubricating and operating materials

5.3.1 General information on changing lubricating and operating materials

Note
The quantities given in the lubrication and operating material chart and on the lubrication chart in the cab are only guide values.

▶ After each oil change or refill, check the level in the relevant unit.

Note!
Adhering to regulations for lubrication, level checks and operating material changes guarantees a high degree of reliability and a long service life for the machine.
It is particularly important to adhere to the intervals for oil changes and use the lubricant quality indicated.

Note!
Cleanliness is of the utmost importance when changing oil.

▶ Clean all filler plugs, filler covers and drain plugs and their surroundings before opening.

▶ For preference, drain off oil when it is at operating temperature.

▶ Ensure that old oils are collected and disposed of in an environmentally acceptable manner using the removable oil filter cartridges.

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Danger!
When checking and changing lubrication and operating materials, ensure that the following precautions are adhered to:

- Unless otherwise indicated, carry out all work on the machine on level, solid ground and with the engine switched off.
- Whenever you reach into the engine compartment, always secure the cover and side doors against accidentally falling back or closing.
- Only refuel the machine when the engine is switched off, do not smoke and avoid naked flame.
- Turn the main battery switch to position **0** (off) and remove the ignition key.

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5.3.2 Lubrication chart

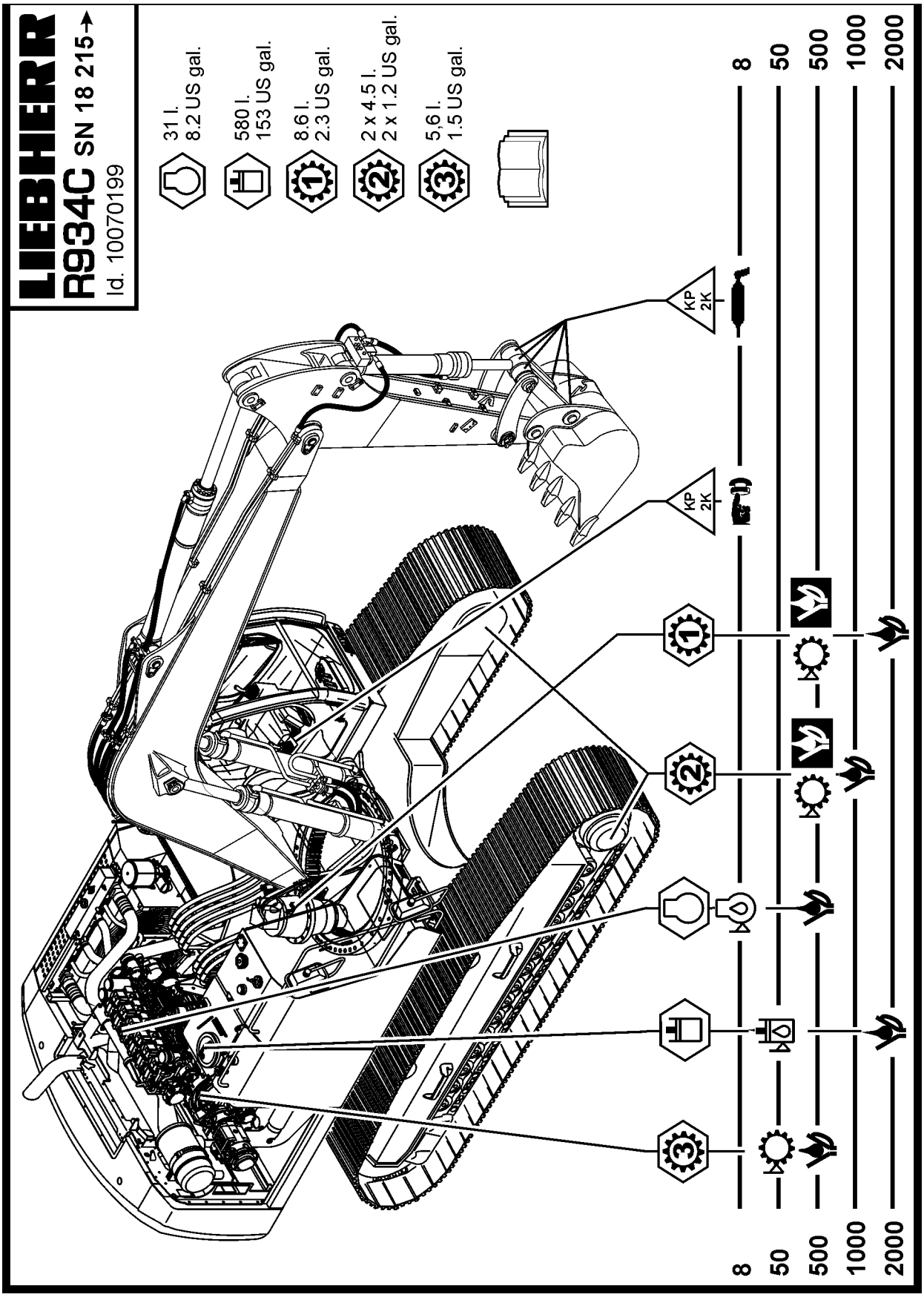
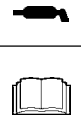


Fig. 5-3 *Lubrication chart - R 934 C-Litronic*

Symbol	Display	Quantity (litres)*
	Diesel engine	31,0
	Hydraulic tank	580
	Slewing gear transmission	8,6
	Travelling gear transmission	2 x 4,5
	Splitterbox	5,6
	General oiling points	
	Check gear oil level	
	Check engine oil level	
	Check hydraulic oil level	
	Oil change	
	First oil change	
	Semi-automatic lubrication	
	Manual lubrication	
	Operating instructions	

Tab. 5-3 *Lubrication chart key*

*Guide values

5.3.3 Lubricant chart

Designation	Medium	Symbol	Classification	Viscosity	CI *	Quantity (litres)**
Diesel engine	Engine oil		API-CI-4, CH-4, ACEA E4, E5, E7	SAE 5W40 SAE 10W30 SAE 10W40 SAE 15W30 SAE 15W40	EO 0540 EO 1030 EO 1040 EO 1540	31,0
Hydraulic tank	Engine oil		API-CD, CD + SF ACEA E1, E3 Mercedes Benz 226 and 227 227.5, 228.1 and 228.3	SAE 10W SAE 10W-30 SAE 10W-40 SAE 15W-40 SAE 20W-20 SAE 30W	EO 10 EO 1030 EO 1040 EO 1540 EO 20 EO 30	580
Swing gear (as parking brake)	Transmission oil	1	API-GL-5 MIL-L 2105 B, C or D	SAE 90	GO 90	8,6
Swing gear (as positioning swing brake)	Transmission oil	1	API-GL-5 MIL-L 2104 C or D MIL-L 2105 B	SAE 90 LS	GO 90 LS	8,6
Travel gear	Transmission oil	2	API-GL-5 MIL-L 2105 B, C or D	SAE 90	GO 90	2 x 4,5
Splitterbox	Transmission oil	3	API-GL-5 MIL-L 2105 B, C or D	SAE 90	GO 90	5,6
Tracks and corresponding gearing of swing ring, equipment mounting	Lubricating grease	KP 2K	High pressure grease KP2k or EP2	Consistency 2 NLGI Class	MPG-A	-
Hinges, joints, locks	Engine oil	-	-	-	-	-
Rubber seal on doors and trim panels	Silicon spray or talc	-	-	-	-	-

Tab. 5-4

Tab. 5-5 *Lubricant chart*

*CI = regulation lubricant for construction machines and vehicles according to the national German construction industry federation (see brochures in Bauverlag GmbH – Wiesbaden and Berlin, Notes on lubrication and operating materials charts).

** = Guide values

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5.3.4 Operating material chart

Designation	Medium	Symbol	Quantity (litres)*
Fuel tank	Commercially available diesel fuel with sulphur content between 0,05 % and 0.5 %		610
Coolant	Anti-corrosion fluid and antifreeze Fill with DCA 4 CI = SP-C		38,8
Windscreen washing system	Commercially available windscreen washing fluid or methylated alcohol	-	5,0
Air conditioning system refrigerant	R 134 a	-	1,6 kg
Refrigerant oil in A/C compressor	PLANETELF PAG SP 20	-	0,21

Tab. 5-6 *Operating material chart*

* = Guide values

5.4 Lubricating and operating material specifications

5.4.1 Lubrication oil for the diesel engine

Lubricating oil requirements for diesel engines are based on the following classifications :

Classification	Specification
API classification (American Petrol Institute)	CI-4, CH-4, oil change interval reduced
ACEA (CCMC) - classification (Association des Constructeurs Européens de l´Automobile)	E4, E5, E6, E7

Tab. 5-7 *Lubricating oil for the diesel engine*

Caution !
The use of a particle filter necessitates oil E6.

Viscosity of lubricating oil

Excessive viscosity can lead to starting problems, insufficient viscosity endangers the lubrication function.

Refer to the SAE classification (Society of Automotive Engineers) when selecting a lubricating oil in terms of its viscosity. The ambient temperature is a decisive factor when selecting the SAE class.

Note

Note!
A selection based on the SAE class does not provide any indication on the quality of the lubricating oil.

The engine oil for the diesel engine can be selected according to the following figure.

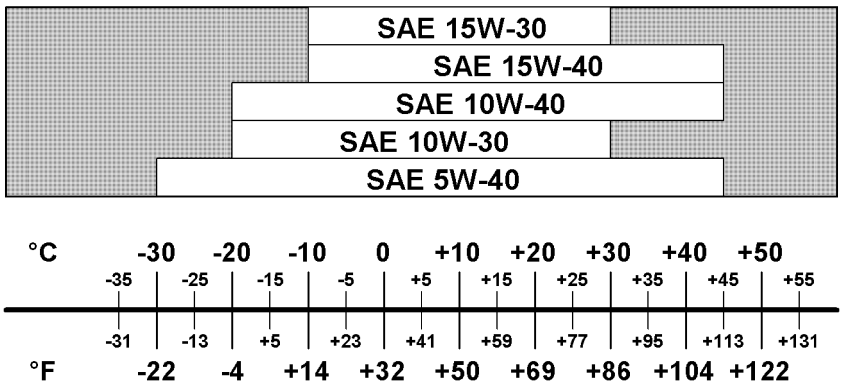

Fig. 5-4 *Engine oil for use as lubricating oil for the diesel engine*

Oil change intervals for the turbocharged engine

Conditions of use	Sulphur content in fuel	Oil change interval dependent on oil quality:	
		CI-4, CH-4	E4,E5, E7
Climate normal to -10 °C	up to 0.5 % above 0.5 %	250 h 125 h	500 h 250 h
below -10 °C	up to 0.5 % above 0.5 %	125 h -	250 h 125 h

Tab. 5-8 *Oil change intervals for the turbocharged engine*

Oil change intervals for the diesel engine depend on the following criteria:

– First oil and filter change at 500 operating hours if engine initially filled up with oil of quality E4 or E5.
– Further filter changes every 500 operating hours.
– Further oil changes dependent on climatic zone, sulphur content in fuel and oil quality(siehe Tab. 5-8)
– If the operating hours given are not attained within one year, the engine oil and oil filter must be changed at least once a year.

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5.4.2 Fuel

Diesel fuels should comply with the minimum requirements of the permitted fuel specifications given below.

The sulphur content should not exceed 0.5 weight percent. A higher sulphur content will affect the oil change intervals and engine life.

Diesel fuels with a sulphur content > 1 % are not permitted.

Permitted fuel specifications

DIN EN 590

ASTM D 975 - 89a 1 D and 2 D

Diesel fuels acc. to DIN EN 590 with up to 5% Vol. FAME

Only use other fuel specifications after consulting LIEBHERR diesel engine development.

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Lubricating value

The reduction of sulphur content has raised the problem of diesel fuel lubrication characteristics. It has been shown that diesel fuels containing the maximum permitted European sulphur limit of 0.05 weight per cent can cause the fuel injection system to wear (particularly applicable to distributor-type injection pumps).

'Branded' fuels in Germany contain lubrication additives in their additive package. The fuel lubricating value must be 460 µm according to the HFFR(60°) test.

Suppliers should supply the additives as they are responsible for ensuring fuel quality. It is not recommended that clients add secondary lubrication additives.

A cetane number of at least 45 is required for fuels in accordance with ASTM D 975. A cetane number above 50 is preferred, particularly at temperatures below 0 °C.

Diesel fuels at low temperatures

When outside temperatures are below approx. 0 °C, the flow characteristics of summer diesel fuels may become insufficient due to the effects of paraffin dissipation.

The same effect occurs with winter diesel fuels at below approx. -15 °C. Frequently, diesel fuel is also available with additives that allows operation at temperatures down to -20 °C.

The use of a fuel filter heating system is recommended when the cold flow characteristics of the fuel are inadequate or temperatures are below -20 °C.

Caution!
Flow improvement additives will damage the engine as they provide insufficient lubrication.

- ▶ Never add petroleum or normal petrol.
- ▶ Never use generally available flow improvement additives.

5.4.3 Hydraulic oil

Oils meeting the following requirements may be used as hydraulic fluids:

optimum viscosity	6 - 36 mm²/s
minimum viscosity	> 8 mm²/s
maximum viscosity	< 1600 mm²/s
maximum water content	< 0,1 %

The guarantee and warranty conditions are void when the operating conditions do not comply with these requirements.

Engine oil

Engine oils corresponding to the following specifications and regulations are stipulated:

Single-grade oils:	API - CD / ACEA - E1 Mercedes-Benz regulations, sheet no. 226.0 and 227.0

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Multigrade oils	API - CD + SF / ACEA - E3 Mercedes-Benz regulations, sheet no. 227.5, 228.1 and 228.3

Tab. 5-9 *Stipulated engine oils for use as hydraulic oil*

The engine oil for use as a hydraulic oil can be selected according to the following graphic.

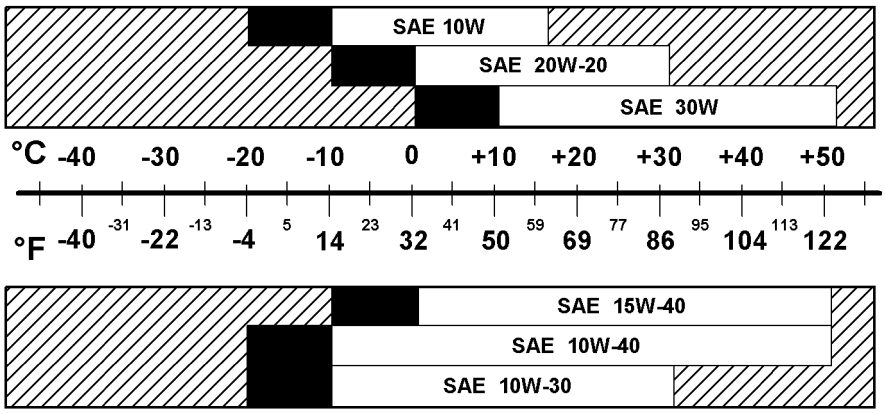

Fig. 5-5 *Engine oils for use as hydraulic oil*

Warm-up specification

At temperatures up to 10 °C below the given limit (black bar), the following warm-up specification applies:

Only adjust the diesel engine after starting to approx. 1 / 2 rated speed. Operate the hydraulic cylinder and motors, move cylinder briefly to the stop. Warm-up duration approx. 10 minutes.

At even lower temperatures: Prewarm the oil reservoir before starting the engine.

Environmentally-friendly hydraulic oils

Note!
Never mix environmentally-friendly hydraulic oils from different manufacturers and do not mix in any mineral oils.

The environmentally acceptable hydraulic oils recommended by LIEBHERR are limited to oils with a synthetic ester basis with a viscosity equivalent to ISO VG 46.

The initial oil fill is carried out at the works using an approved list. Any use of an environmentally acceptable hydraulic oil must first be agreed with LIEBHERR.

Plant-based oils are not to be used due to their insufficient temperature properties.

The use of partial flow filters is required.

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Hydraulic oil monitoring

Note!
Environmentally acceptable hydraulic fluids should generally **be checked** at regular intervals by oil analysis.
Oil analysis is recommended for mineral oils.

▶ Machines in normal use: at least every 500 operating hours

▶ Machines in heavy dust use: at least every 250 operating hours
LIEBHERR recommends that oil analyses be carried out by the company WEAR CHECK and that oil changes are performed on the basis of the lab report (see also customer service and product information).

Hydraulic oil monitoring in normal use

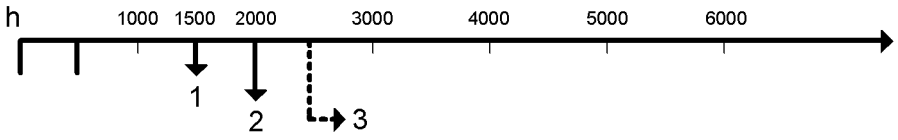

Fig. 5-6 *Taking oil samples and changing filters under normal operating conditions*

---	Taking oil samples	1	First oil sample
-	Filter change	2	Second oil sample
h	Operating hours	3	Further oil samples every 500 operating hours

Oil change according to analysis and lab report.

Change intervals for hydraulic oil return-line filter (20.5 µm): initially after 500 operating hours, further changes every 1000 operating hours.

Hydraulic oil monitoring in heavy dust use

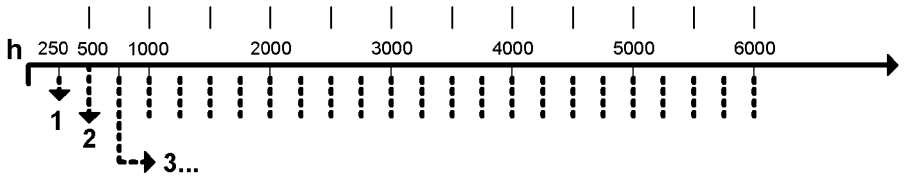

Fig. 5-7 *Taking oil samples and changing filters in heavy dust environments*

---	Taking oil samples	1	First oil sample
-	Filter change	2	Second oil sample
h	Operating hours	3	Further oil samples every 250 operating hours

Oil change according to analysis and lab report.

Change intervals for hydraulic oil return-line filter (10 µm): initially after 500 operating hours, further changes every 500 operating hours.

Notes on reducing hydraulic oil contamination in heavy dust

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use

If the machine is generally operated with the hydraulic hammer, or is used under similar circumstances (heavy dust occurrence), there is a risk that the hydraulic oil will become more than usually contaminated.

To prevent early wear of hydraulic components, the oil change intervals (and intervals between oil samples) should be reduced and the following regulations should also be noted:

– The filter cartridge(s) must be replaced every 500 operating hours.
– For the return-line filter, 10 µm filter cartridges must be used instead of the usual 20 / 5 µm filter cartridges.
– The vent filter on the hydraulic tank is to be replaced with a 2 µm fine filter (fineness of standard filter is 7 µm).
– The 2 µm vent filter must be replaced each time the hydraulic oil is changed (every 500 operating hours).

Note!
Machines fitted with a hydraulic hammer at the works and retrofitted hydraulic hammer kits possess these 10-µm filter cartridges and 2-µm vent filters.

5.4.4 Transmission oil

Transmission oils must correspond to the specifications
– API-GL-5 and MIL-L-2105 B or C or D for viscosity class SAE 90

.

For viscosity classes SAE 80 and SAE 90 in accordance with MIL-L-2105 D, an oil of viscosity class SAE 80W90 can be used.

5.4.5 Lubricating grease and other lubricants

Lubricant	Description / manufacturer
Lubricating grease for the slewing ring / general oiling points KP 2K	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 LIEBHERR recommends:* ***Multi service grease RPL*** *LIEBHERR order nb: 8501565 (1 pack with 5 cartridges of 400 grams.*
Contact spray for slip rings	Cramolin
Lubricant for pistons, piston nuts and piston bearing installations on the hydraulic cylinders	Gleitmo 800

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Lubricant	Description / manufacturer
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. 5-10 *Lubricating grease and other lubricants*

5.4.6 Coolant

Coolants which contain inadequate anti-corrosion/anti-frost additives or which have been inadequately or incorrectly prepared may cause cavity or corrosion damage . This could result in the failure of cooling circuit equipment or components. Furthermore heat-insulating deposits may accumulate on components which are designed to transfer heat. This could lead to overheating and ultimately engine failure.

Mixture ratio water : anti-corrosion / anti-freeze fluid

Outside temperature up to	Water content in %	Anti-corrosion /anti-freeze fluid content in %
-37 °C / -34 °F	50	50
-50 °C / -58 °F	40	60

Tab. 5-11 *Mixture ratio water / anti-corrosion fluid / antifreeze*

The coolant must contain a minimum of 50 percent by volume of anti-corrosion /anti-freeze fluid all year round. This provides anti-freeze protection up to -37 °C and also ensures sufficient anti-corrosion protection.

If some coolant has been lost, ensure that the 50 Vol-% level is maintained when refilling.

In certain cases it is possible to use anti-corrosion products (inhibitors). The use of emulsible corrosion protection oils is not permitted.

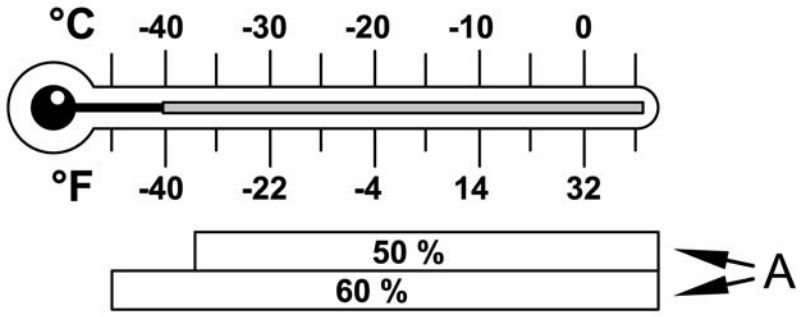

Fig. 5-8 *Temperature-dependent selection of the mixture ratio*

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A Anti-corrosion /anti-freeze fluid content in %

Note!
Do not use more than 60% anti-corrosion / anti-freeze fluid!
The cooling properties and frost protection will reduce at higher content levels.

Checking and replacing the coolant

Note!
Always replace any lost coolant with a mixture of water and min. 50 Vol.% anti-corrosion/anti-freeze fluid.
Never let the anti-corrosion/anti-freeze content drop below 50 Vol.%.

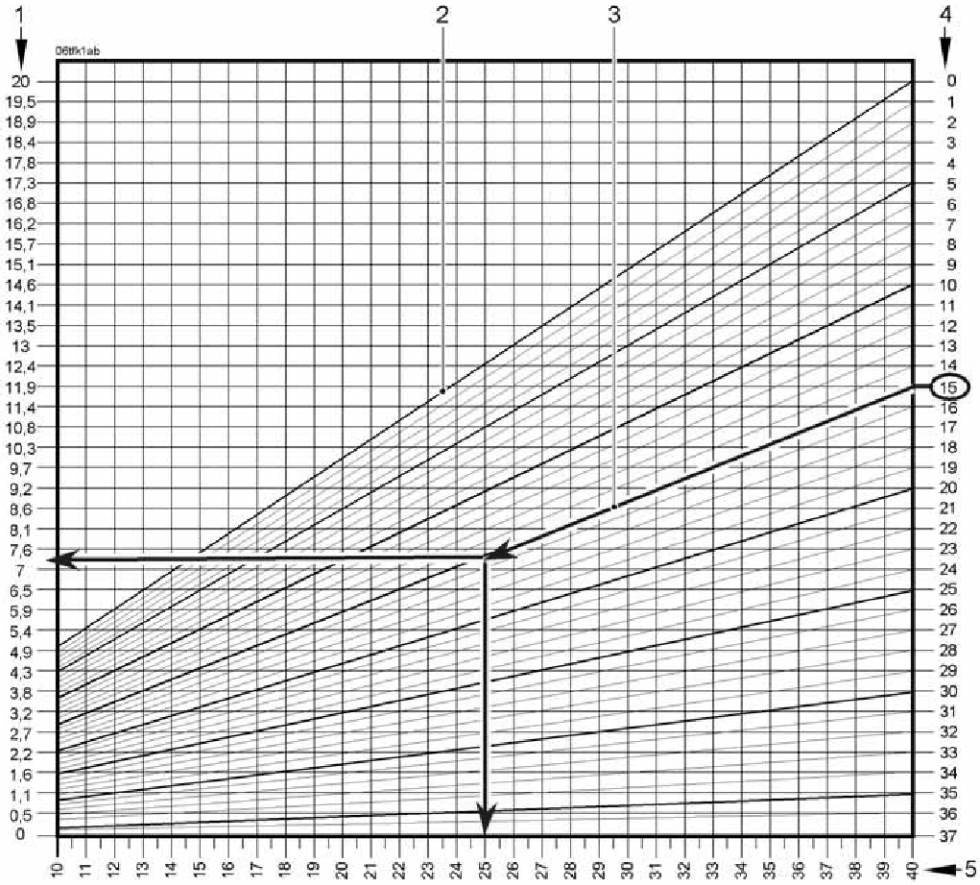

Fig. 5-9 *Select the anti-freeze concentration level*

Determining the top-up quantity - example -15 °C:

Refer to the diagram in (siehe Fig. 5-9) to determine the anti-corrosion/anti-freeze top-up quantity required for protection down to -37 °C.

The measured anti-freeze protection provided by the coolant was -15 °C:

– Determine the intersection point between the auxiliary line for the measured temperature (**3**) and the vertical line representing the fill capacity of the cooling system.

– Read off the required top-up quantity on the left scale at the height of the intersection point.

Correct the mixing ratio

❑ Required top up quantity has been determined.

▶ Drain the same amount of coolant as required for the top up.

▶ Top up with the required amount of anti-corrosion/anti-freeze.

▶ Adjust the coolant level with the previously drained coolant.

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Anti-corrosion products

In **exceptional circumstances** and **at temperatures which are continually above freezing**, e g. in tropical areas, where there is clearly **no anti-corrosion / anti-freeze fluid available**, a mixture of **water and water soluble anti-corrosion fluid** may be used as **coolant**.

Note!
Completely drain the coolant when changing from anti-corrosion / anti-freeze fluids to anti-corrosion products or vice-versa.

Using DCA 4 without anti-corrosion / anti-freeze fluid

Check and (if necessary) correct the DCA 4 concentration level during maintenance.

Note!
- The coolant must be changed **annually**.
- The DCA 4 concentration must be between **0.6** and **1.06** units per litre.
- It is recommended that testing kit CC 2602 M by Fleetguard is used.

Using other water soluble anti-corrosion fluids

IWhen using Caltex / Chevron Texaco /Havoline / Total, check and (if necessary) correct the mixing ratio as part of the regular maintenance.

Note!
- The coolant must be changed **annually**.
- The mixture ratio must consist of **7.5 %** anti-corrosion fluid and **92.5 %** water.
- It is recommended that refractometer type Gefo 2710 is used for testing.

Use a refractometer to check the mixing ratio

Fig. 5-10 *Refractometer Gefo 2710*

Refractometer:

- Adjustment screw for setting the 0-line (water line)
- Adjust the focus by turning the eyepiece
- soft eye guard on eyepiece
- rigid metal housing
- good grip provided by rubber casing

Measurement procedure:

▶ Carefully clean the cover and prism

▶ Apply 1 or 2 drops of testing fluid to the prism

▶ Close the flap
↳ The fluid will distribute itself.

▶ Look at a light background through the eyepiece.

▶ Focus the scale and read off the value on the blue line.

Conversion diagram:

Note!
Concentration measured using a Brix refractometer for Caltex / Chevron Texaco / Havoline / Total.

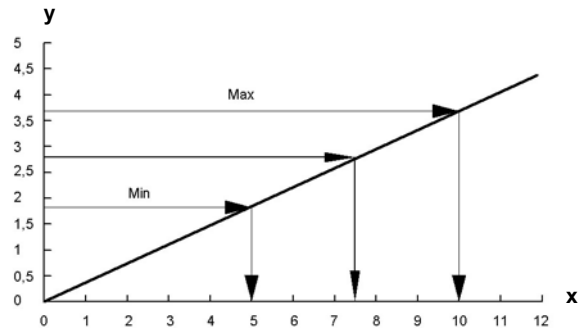

Fig. 5-11 *Conversion diagram*

x Concentration (vol%)
y Read off refractometer in 0-10% Brix

Overview of approved water soluble anti-corrosion fluids

Product description	Manufacturer
DCA 4 Diesel Coolant Additives	Fleetguard
Caltex CL Corrosion Inhibitor Concentrate	Caltex
Chevron Texaco Heavy Duty Extended Life Corrosion Inhibitor Nitrite Free	Chevron Texaco
Havoline Extended Life Corrosion Inhibitor (XLI)	Arteco
Total WT Supra	Total

Tab. 5-12 *approved water-soluble anti-corrosion fluids*

Disposal

Undiluted anit-corrosion/anti-freeze fluids should be treated as special waste. Observe the local regulations when disposing of used coolant.

Regulations on fresh water quality

To prepare the coolant, use clean and not overly hard water. Usually, although not always, drinking water fulfils these requirements. Sea water, brackish water, brine and industrial wastewater are not suitable.

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Fresh water quality when using anti-corrosion / anti-freeze fluid

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
Total chloride + sulphate	max. 100 mg / l

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
Total chloride + sulphate	max. 80 mg / l

Approved anti-corrosion fluid / antifreeze

Concentrate, undiluted

Product description	Manufacturer	Country
Agip Antifreeze Plus	Agip Petrol S.p.A., Rome	I
Agip long-term anti-freeze protection	Autol-Werke GmbH, Würzburg	D
Antigel DB 486	Sotragal S.A., St. Priest	F
Aral radiator anti-freeze protection A	Aral AG, Bochum	D
Avia anti-freeze protection APN (G48-00)	Deutsche Avia-Mineralöl GmbH, Munich	D
BP Antifrost X 2270 A	Deutsche BP AG, Hamburg	D
BP Napgel C 2270 / 1	BP Chemicals LTD., London	GB
Caltex Engine Coolant DB	Caltex UK Ltd, London	GB
Caltex Extended Life Coolant	Caltex UK Ltd, London	GB
Castrol Anti-Freeze O	Deutsche Castrol Vertriebs GmbH, Hamburg	D
Century F.L. Anti-Freeze	Century Oils, Hanley, Stoke-on-Tent	GB
Chevron DEX-COOL Extended Life Anti-Freeze / Coolant	Chevron Texaco, San Ramon, CA	USA
DEUTZ anti-freeze protection 0101 1490	Deutz Service International GmbH, Cologne	D
Esso anti-freeze protection	Esso AG, Hamburg	D
Fircofin	Fuchs Mineralölwerke GmbH, Mannheim	D
Frostschutz Motorex (G48-00)	Bucher & Cie, Langenthal	CH
Anti-freeze 500	Mobil Oil AG, Hamburg	D

Product description	Manufacturer	Country
Glacelf Auto Supra	Total Nederland N.V., Den Haag	NL
Glycoshell AF 405	Shell Deutschland GmbH, Hamburg	D
Glycoshell N	Shell Deutschland GmbH, Hamburg	D
Glysantin (G 48-00)	BASF AG, Ludwigshafen	D
Havoline XLC	Arteco, Gent	B
Havoline DEX-COOL Extended Life Anti-Freeze/ Coolant	Chevron Texaco, San Ramon, CA	USA
Igol Antigel Type DB	Igol France, Paris	F
Labo FP 100	Labo Industrie, Nanterre	F
Motul Anti-Freeze	Motul SA, Aubervilles	F
OMV anti-freeze protection	OMV AG, Schwechat	A
Organifreeze	Total Deutschland GmbH, Düsseldorf	D
OZO anti-freeze protection S	Total Deutschland GmbH, Düsseldorf	D
Total Antigel S-MB 486	Total Deutschland GmbH, Düsseldorf	D
Total Frostfrei	Total Deutschland GmbH, Düsseldorf	D
Veedol Anti-Freeze O	Deutsche Veedol GmbH, Düsseldorf	D
Wintershall anti-freeze	Wintershall Mineralöl GmbH, Düsseldorf	D

Tab. 5-13 *Approved anti-corrosion / antifreeze fluid (concentrate, undiluted)*

50:50 premix (water:anti-corrosion / anti-freeze fluid)

Product description	Manufacturer	Country
Liebherr Anti-Freeze APN Mix Ident. No. 8611045	Liebherr	D
Caltex Extended Life Coolant Pre-Mixed 50/50 (ready-to-use-version)	Caltex UK Ltd, London	GB
Chevron DEX-COOL Extended Life Prediluted 50/50 Anti-Freeze/Coolant	Chevron Texaco, San Ramon, CA	USA
Havoline XLC, 50/50	Arteco, Gent	B
Havoline DEX-COOL Extended Life Prediluted 50/50 Anti-Freeze/Coolant	Chevron Texaco, San Ramon, CA	USA
Organicool 50/50	Total Deutschland GmbH, Düsseldorf	D

Tab. 5-14 *Approved anti-corrosion / anti-freeze fluid / 50:50 premix*

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5.5 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.

5.5.1 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.

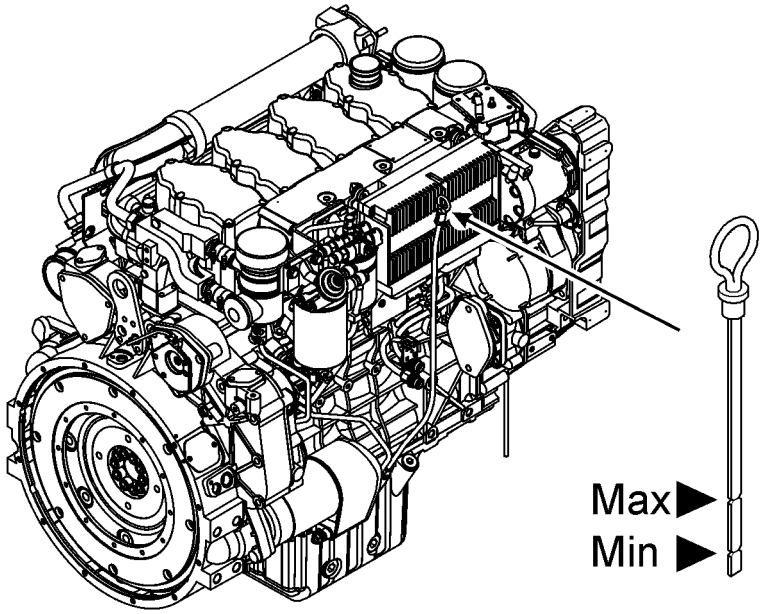

Fig. 5-12 *Oil level markings on the dipstick*

▶ Check the oil level in the engine.
↳ The oil must leave a mark between the **min** and **max** marks on the dipstick.

5.5.2 Changing the diesel engine oil

Note !

- Only carry out the oil change when the engine is warm.

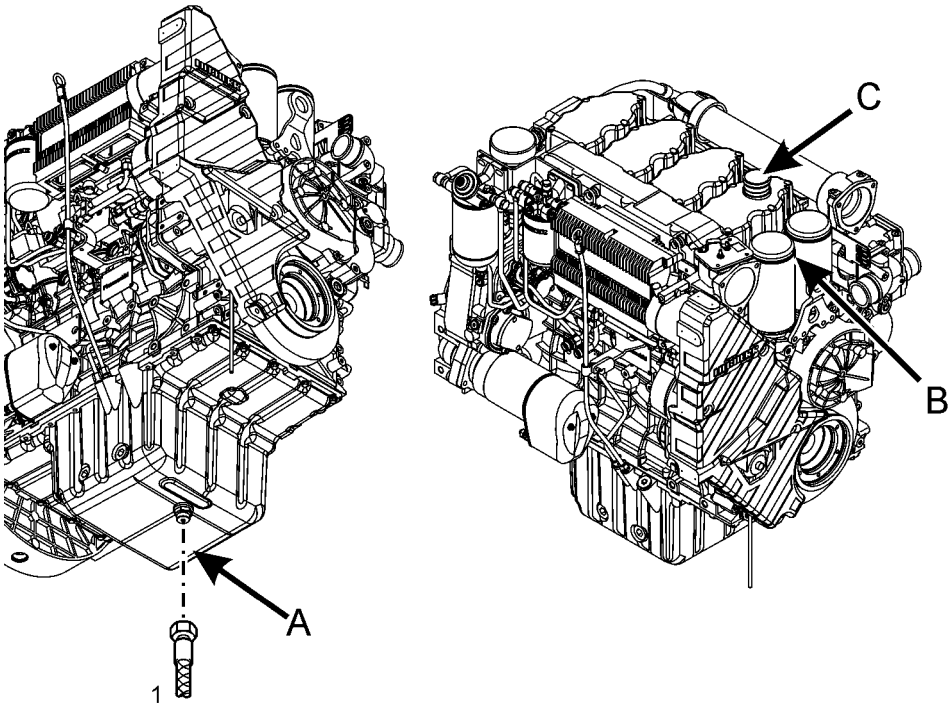

Fig. 5-13 *Drain valve on the oil sump, oil filter cartridges, oil filler cap*

To drain the oil (A):

- Screw the oil drain hose supplied **1** onto the oil sump's drain valve.
- Collect the oil in a suitable container.

To change the oil filter cartridges (B):

- Unscrew the oil filter cartridges with a strap spanner.
- Clean the sealing surface on the filter bracket.

Danger !

- Be careful when removing the filter cartridge to avoid contact with hot oil.
- Protect the ribbed V-belt against escaping oil when replacing the oil filter cartridge!
- After replacing the oil filter, remove all traces of oil on the Diesel engine, as well as behind the vibration damper in order that this will not be later diagnosed as leaks in the rotary shaft seal.

- Oil the rubber sealing ring on the new oil filter cartridges.
- Screw the new filter element on until the sealing ring is laying on the filter head.
- Tighten the oil filter cartridges by 1/2 - 3/4 turn **by hand**.

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To add the oil (C):

- ▶ Add the oil to the oil filler cap until the level reaches the upper marking of the dipstick.
- ▶ Start the Diesel engine.
- ▶ Check the oil pressure on the monitoring display of the machine and check the oil filters for tightness.
- ▶ Switch off the Diesel engine.
- ▶ Check the oil level after 2 - 3 minutes on the dipstick.

Quantity, oil quality and oil change intervals: see lubrication and maintenance chart.

5.5.3 Belt for the A/C compressor and alternator installation

The diesel engine is fitted with a tensioning device for the belt. This is self-tensioning and is therefore maintenance-free. The belt should be checked regularly for damage and wear and replaced if necessary.

Damages to the belt include:

– Rib fractures
– Transversal fractures in several ribs
– Rubber nodules in between the ribs
– Deposition of dirt or stones
– Ribs becoming loosened at the base of the ribs
– Transversal fractures on the belt exterior

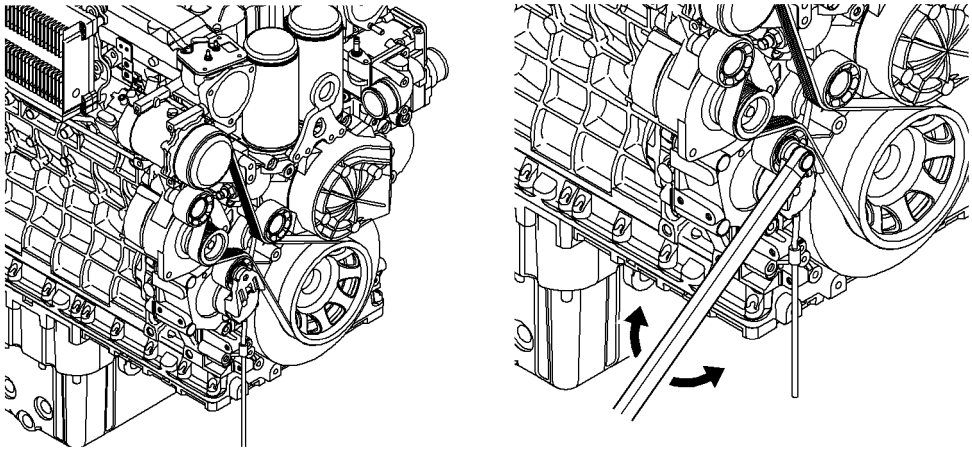

Fig. 5-14 *Replacing the belt*

To replace the belt:

- ❑ To replace the belt, you will need a ratchet equivalent to DIN 3122 D12.5 (1/2").
- ▶ Rotate the tensioning device back counter-clockwise against the spring force as far as the stop.
- ▶ Remove the belt.
- ▶ Check tension pulley and belt pulley for sound condition (e.g. worn bearing of tension pulley, as well as wear of the belt pulley profile).
- ▶ If parts are damaged, replace the parts.
- ▶ Lay the new belt on the belt pulleys for the crankshaft, A/C compressor, alternator

and deflection pulley with the tensioning device rotated back.

▶ Move the tensioning device clockwise back into the tensioned position.

5.5.4 Lubricating starter ring gear

The starter ring gear must be lubricated following the intervall given in the maintenance chart.

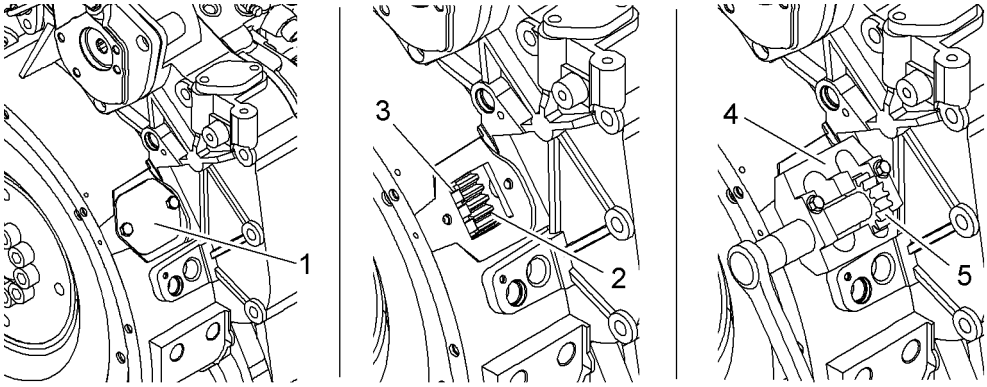

Fig. 5-15 *Starte ring gear*

1 Maintenance cover
2 Starter ring gear
3 Sensor ring gear
4 Manual engine barring device
3 Gear

Note!
When greasing, the sensor ring gear **3** must keep free of grease.

The maintenance cover is mounted on the right-hand side of the diesel engine on flywheel housing.

❑ It must be ensured that the diesel engine is in the maintenance position.

▶ Unscrew the maintenance cover **1** from the flywheel housing.

▶ Mount the manual engine barring device **4** on the flywheel housing.

▶ Make the flywheel turn with the manual engine barring device **4** and grease the starter ring gear **2** thanks to the gear **5**.

▶ Dismount the manual engine barring device **4** of the flywheel housing.

▶ Screw on the maintenance cover **1** again.

5.5.5 Vibration damper

The vibration damper must be checked for leaks and distorsion following the interval given in the maintenance chart.

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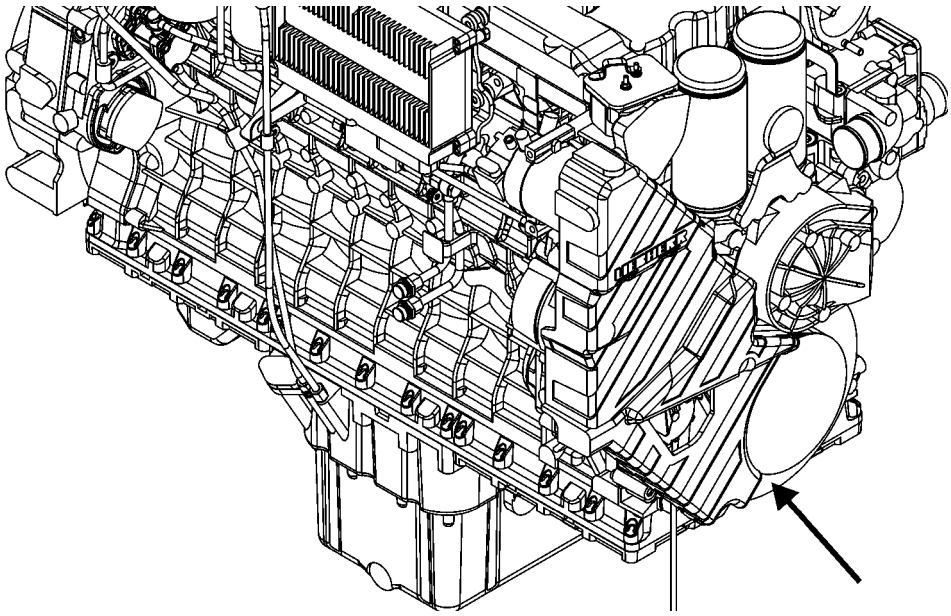

Fig. 5-16 *Vibration damper*

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5.5.6 Checking mounting screws

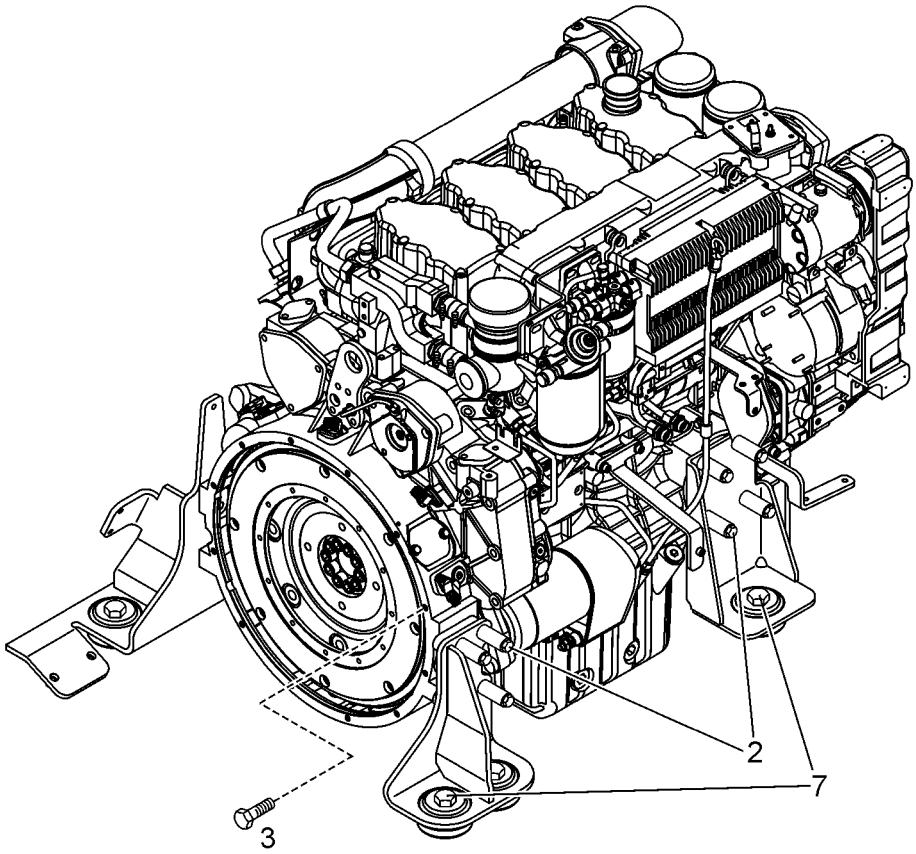

Fig. 5-17 *Checking mounting screws*

2 Mounting screws of engine supporting brackets mounts
3 Mounting screws of splitterbox on diesel engine SAE housing
7 Mounting screws of engine rubber mounts

– Check the Mounting screws 2 of engine supporting brackets mounts and retighten them necessary.

Tightening torque of screws 2 : 280 Nm (207 ft. lbs).

– Check the Mounting screws 3 of splitterbox on diesel engine SAE housing and retighten them necessary.

Tightening torque of screws 3 : 68 Nm (50 ft. lbs).

– Check the Mounting screws 7 of engine rubber mounts and retighten them necessary.

Tightening torque of screws 7 : 390 Nm (290 ft. lbs).

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5.5.7 Oil separator

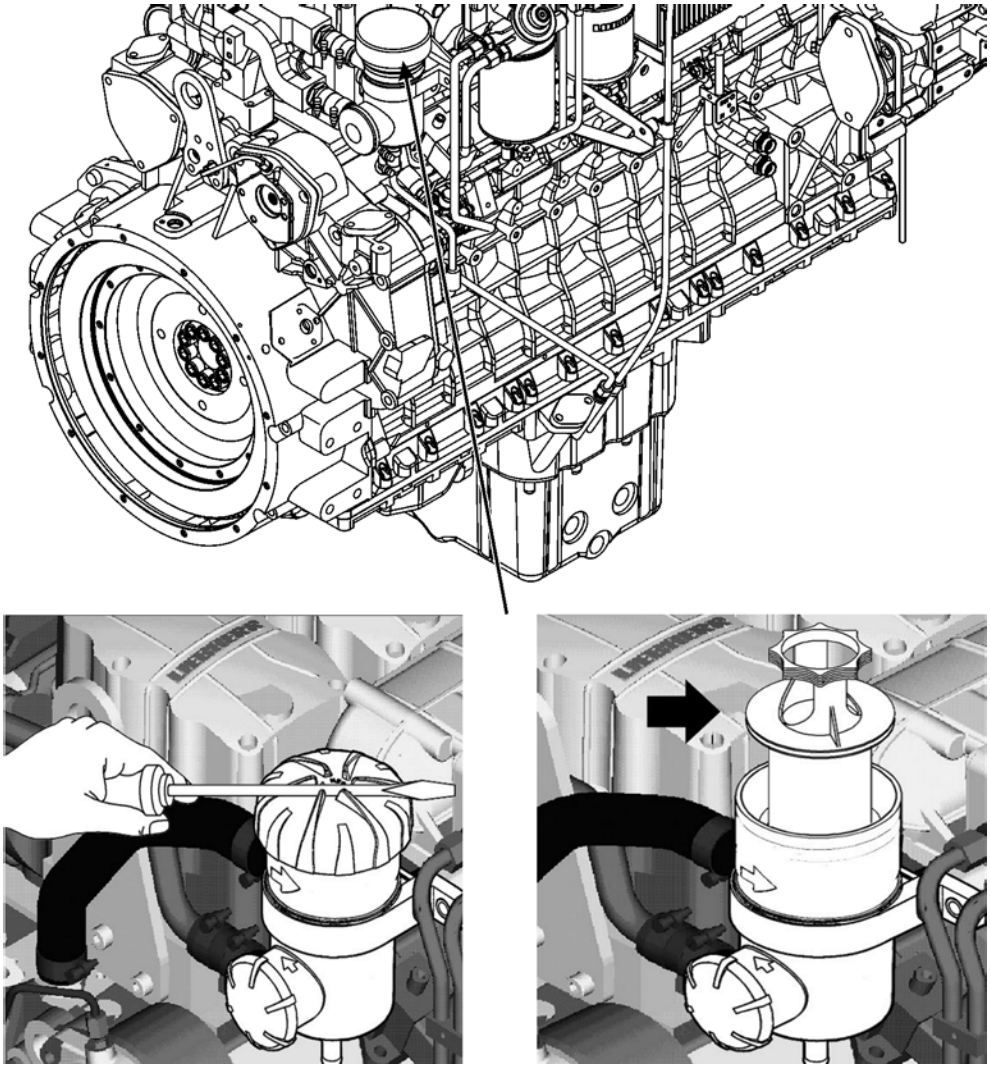

Fig. 5-18 Replacing the oil separator

The oil separator is mounted on the right-hand side of the Diesel engine on the same side of the flywheel.

The oil separator filter element must be replaced every 1000 working hours.

To replace the oil separator filter element:

- ▶ Ensure that an original LIEBHERR oil separator filter element is on-hand.
- ▶ Clean the oil separator and the surrounding area thoroughly.
- ▶ Unscrew and remove the oil separator sealing cap, if required use a screwdriver.
- ▶ Pull out the oil separator filter element and dispose of in an environmentally-friendly manner.
- ▶ Insert new oil separator filter element and push in up to the stop.
- ▶ Mount the oil separator sealing cap and tighten by hand to the stop.

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5.5.8 Heater flange

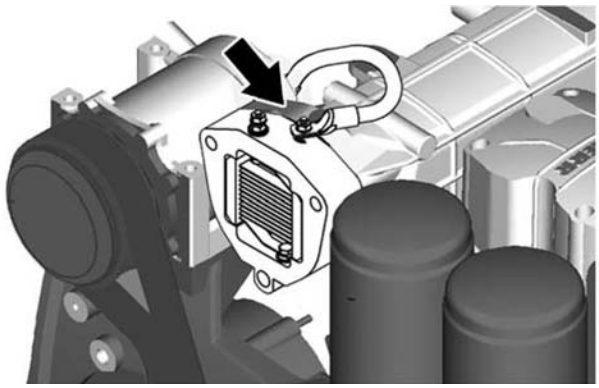

Fig. 5-19 *Heater flange*

- ▶ Switch off battery main switch and disconnect the negative cable from the battery.
- ▶ Disconnect the electrical cable on the heater flange.
- ▶ Connect the ohmmeter to the terminals and check the resistance.
- ▶ If a resistance value of $250^{\pm 10}$ mOhms at 20°C is not reached, the heater flange must be replaced.
- ▶ Reconnect the electrical cable on the heater flange, as well as the negative cable on the battery.

5.5.9 Checking and adjustment of valve clearance

Preparation

- ❑ It must be ensured that :
- – the diesel engine is in the maintenance position,
- – the diesel engine is cooled,
- – a manual engine barring device is on-hand,
- – new seals for the cylinder head cover are on-hand.

Note !

- – Cylinder 1on the flywheel side.
- – Rotational direction on the left-hand side looking at he flywheel.
- – Exhaust valve of the respective cylinder on the flywheeel side.

- ▶ Dismount the cylinder head cover.
- ▶ Mount the manual engine barring device.
- ▶ Turn the crankshaft in the direction of rotation until the cylinder to be adjusted overlaps the opposite valve.

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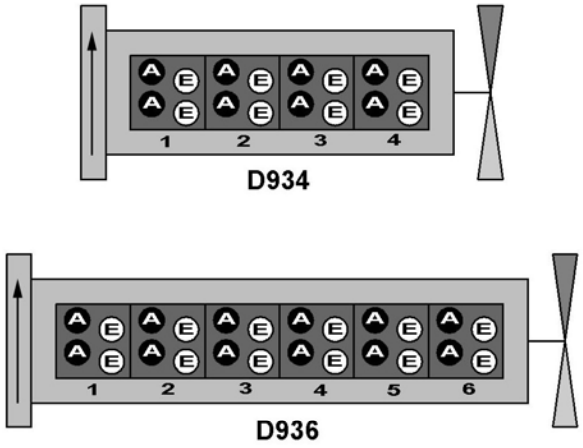

Fig. 5-20 *Valves location*

A = Exhaust valve

E = Intake valve

Valves - cylinder for engine D934						
Overlap	4	2	1	3		
To be adjust	1	3	4	2		
Valves - cylinder for engine D936						
Overlap	6	2	4	1	5	3
To be adjust	1	5	3	6	2	4

Checking and adjustment of valve clearance

The clearance value for intake valves is indicated on the engine type identification plate.

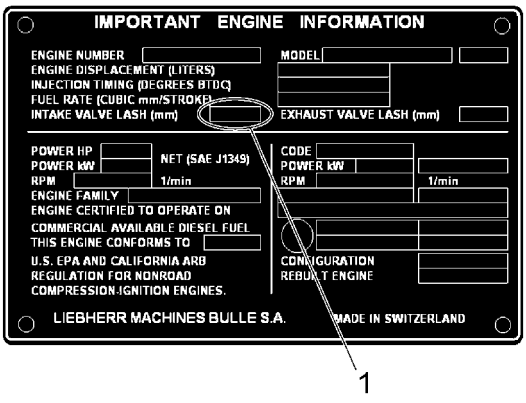

Fig. 5-21 *Clearance value for intake valves on the engine type identification plate.*

1 Clearance value for intake valves _ cold

▶ Insert feeler gauge **4** betwwen crosshead **3** and rocker arm **2** and check the valve clearance.

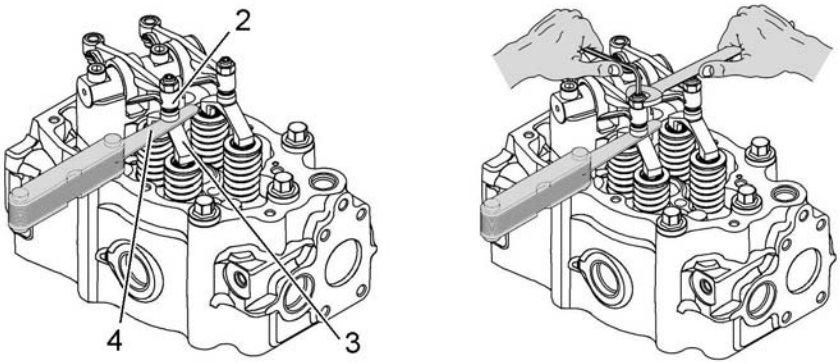

Fig. 5-22 *Check and adjust intake valve clearance - cold*

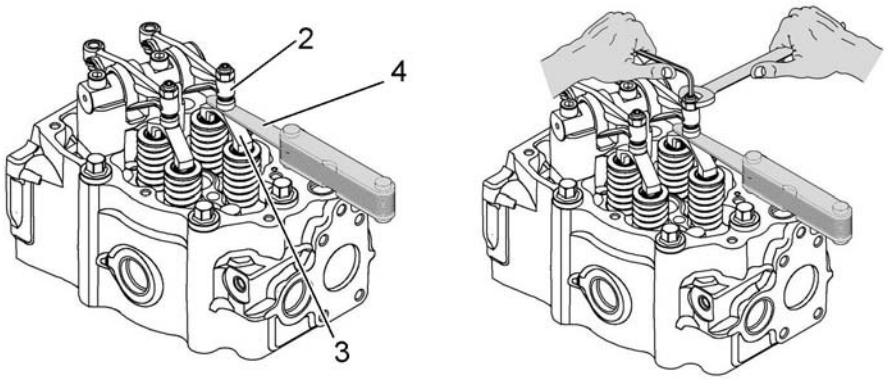

Fig. 5-23 *Check and adjust exhaust valve clearance of 0,40 mm - cold*

2 Rocker arm **3** Crosshead **4** *F*eeler gauge

- ❑ If the measured clearance does not correlate with the recomended adjustment values,
- ▶ Loosen the lock nut on the adjusting screw of the respective rocker arm and adjust the setting.
- ▶ Retighten the lock nut.
- ▶ Check clearance again.
- ▶ After checking or adjusting all valves, mount the cylinder head cover with new seals.
- ▶ Dismount the manual engine barring device.

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5.6 Cooling system

5.6.1 Checking and cleaning the cooling system

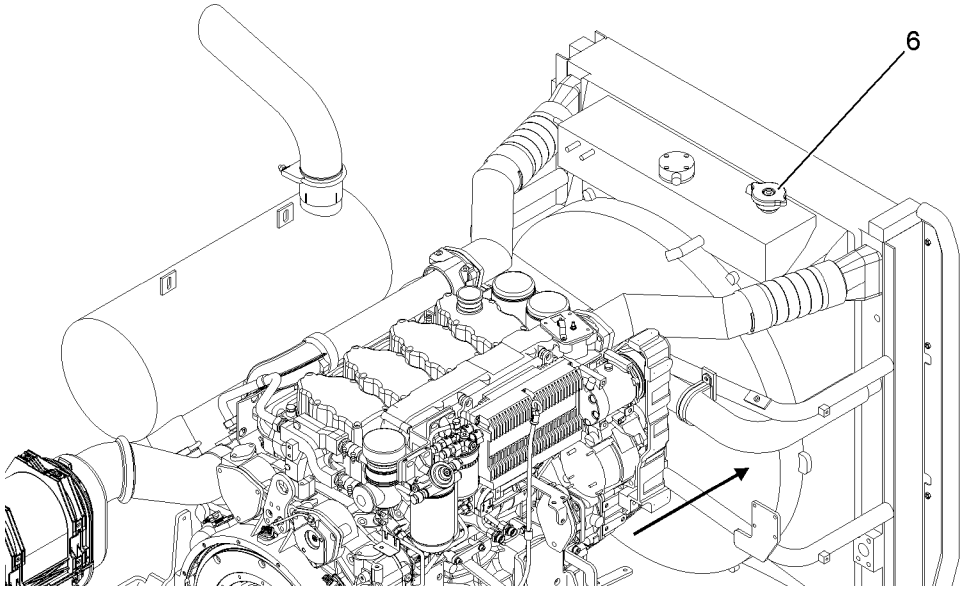

Fig. 5-24 *Cooling system*

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 **6** (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.

5.6.2 Checking the coolant level

Danger!
Risk of burning due to hot coolant.
The engine cooling system is hot and pressurized when at operating temperature.

- ▶ Avoid touching coolant or coolant-bearing parts.
- ▶ Only check the coolant level when the cap of the expansion reservoir has cooled sufficiently.

- ▶ Turn the cap a half turn.
- ▶ Relieve any pressure that may be present in this position. After balancing the pressure, slowly turn the cap fully.

When engine is cooled, the coolant must reach the end of the refilling pipe located under the cap of the expansion reservoir.

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- ▶ Add coolant if necessary.
- ▶ Close the cap.
- ▶ After adding coolant, allow the engine to run for a short time with the heating switched on and monitor the coolant level once again.

5.6.3 Coolant antifreeze and anti-corrosion fluid

The system must be filled with antifreeze all year round.

Upon dispatch, the coolant contains antifreeze for temperatures up to -37 °C (this is equal to approx. 50 % antifreeze).

Volume: see lubricant chart

- ▶ Keep the concentration of anti-corrosion additive contained in the cooling system constant, particularly when refilling.
- ▶ Check this concentration each time larger amounts of coolant are lost or at regular intervals. If necessary, add anti-corrosion additives to the coolant.

5.6.4 Changing the coolant

Danger!
Risk of burning due to hot coolant.

- ▶ Only change the coolant when the engine is cold.

The following points should be noted when changing the coolant:

– Change the coolant in the entire coolant circuit at least every two years.
– For preference, change the coolant with the shutoff valves **1** for the heating circuit closed.
– Bleed the coolant circuit when refilled.

Note!
If the coolant has been changed without closing the shutoff valves for the heating circuit, the heating circuit must be bled, see chapter "maintenance of heating circuit".
To be sure that the coolant flows threw the heating system, the startkey must be in contact position and the heating system of the cab must be adjusted at maximal temperature.

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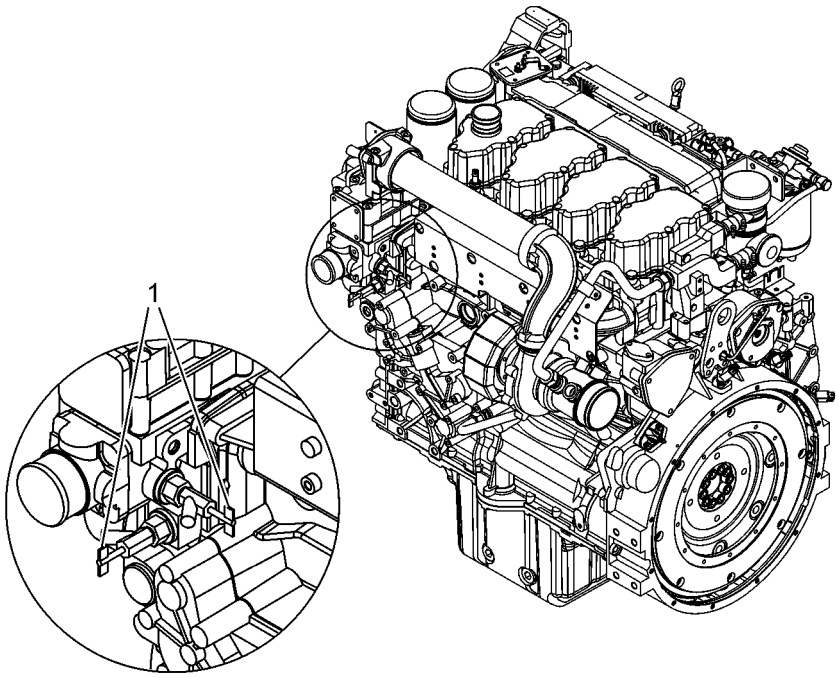

Fig. 5-25 *Shutoff valves for the heating circuit*

Draining the coolant

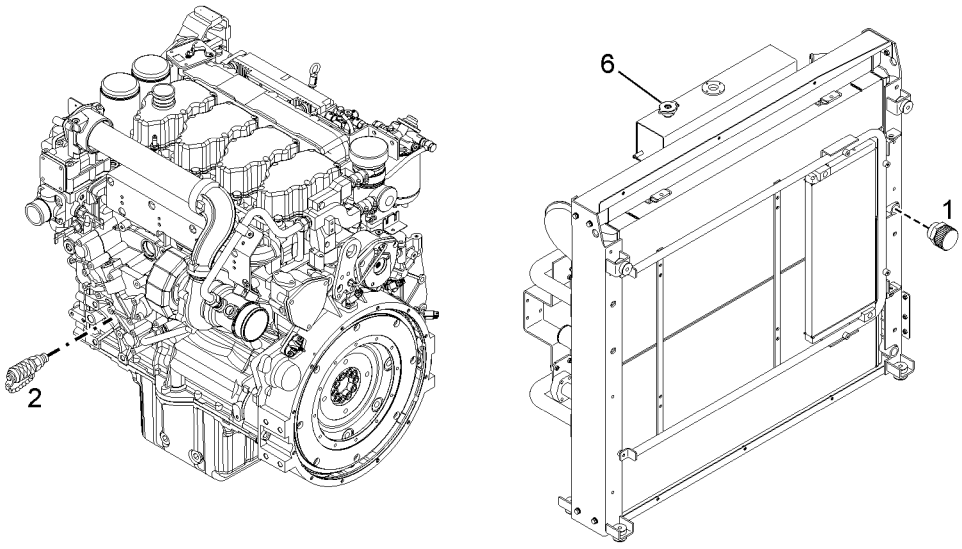

Fig. 5-26 *Draining the coolant*

1 Drain valve on the coolant cooler 2 Drain valve on the diesel engine
6 Cap

❑ Shutoff valves for the heating circuit must be closed.

To drain the coolant at the cooler:

▶ Open cap **6** and unscrew the protection cap of the drain valve **1** on the coolant cooler.

▶ Screw the drain hose supplied to the drain valve.

▶ Let the coolant drain into a suitable container.

To drain the coolant at the diesel engine:

▶ Unscrew the protection cap of the drain valve **2** on the engine's oil cooler plate.

▶ Screw the drain hose supplied to the drain valve.

▶ Let the coolant drain into a suitable container.

Refilling the coolant and bleeding the coolant circuit

❑ Shutoff valves for the heating circuit must be closed.

▶ Close drain valve **1** on the coolant cooler.

▶ Close drain valve **2** on the engine.

▶ Add coolant up to the upper edge of the filler neck of expansion reservoir.

▶ Close the cap again.

▶ Open the valve for heating circuit and adjust the heating system of the cab at maximal temperature.

▶ Let the engine run at a low idle for approx. one minute.

▶ Open the cap.

▶ If necessary, add coolant up to the upper edge of the filler neck of expansion reservoir.

▶ Close the cap again.

If the coolant level sensor actuates, check the coolant level (refill if necessary).

Caution!
The engine could be damaged.

▶ If the temperature or level display for the coolant level illuminates, bring the engine to a low idle immediately.

▶ Switch off the engine.

▶ Check the coolant level and refill with coolant if necessary.

5.6.5 Reversible fan (optional extra)

General

The option "reversible fan" allows an easy cleaning of the cooler cores by inverting the way of rotation of the fan.

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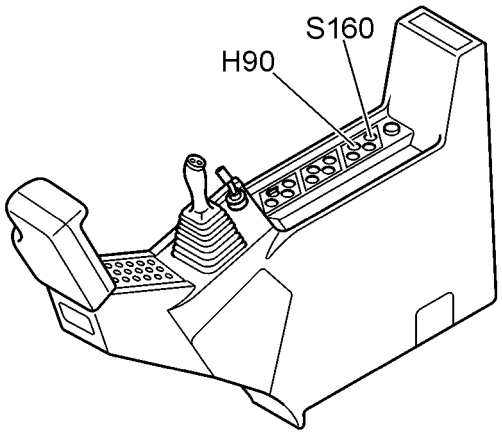

Fig. 5-27 *Push button and control light for option reversible fan*

H90 Control light **S160** Push button

Cleaning the cooler

Danger !

Before checking the condition of the cooler, you must absolute shut off the engine and wait until the fan does not turn any more.

- ▶ With running diesel engine, depress the push button **S160** and keep it depressed.
  - ↳ The fan stops progressively (approx. 15 seconds), then the control light **H90** lights up and the fan starts rotating in the opposite way.
- ▶ While keeping the push button **S160** depressed, bring the diesel engine to high idle.
- ▶ Let the engine run at high idle for approx. 1 minute (max. 3 minutes).
- ▶ Release the push button **S160**.
  - ↳ The control light **H90** goes out, the fan stops progressively (approx. 15 seconds), then the fan rotates in the normal way again.
- ▶ Shut off the engine.
- ▶ Wait until the fan does not turn any more.
- ▶ Check the condition of the cooler.
- ▶ If necessary, repeat the cleaning procedure.

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5.7 Fuel system

Danger!
Risk of explosion!

- ▶ Avoid naked flame when working on the fuel system and when refuelling.
- ▶ Do not smoke.
- ▶ Only work on the diesel engine when it is switched off.

5.7.1 Refuelling

Fuel filler cap

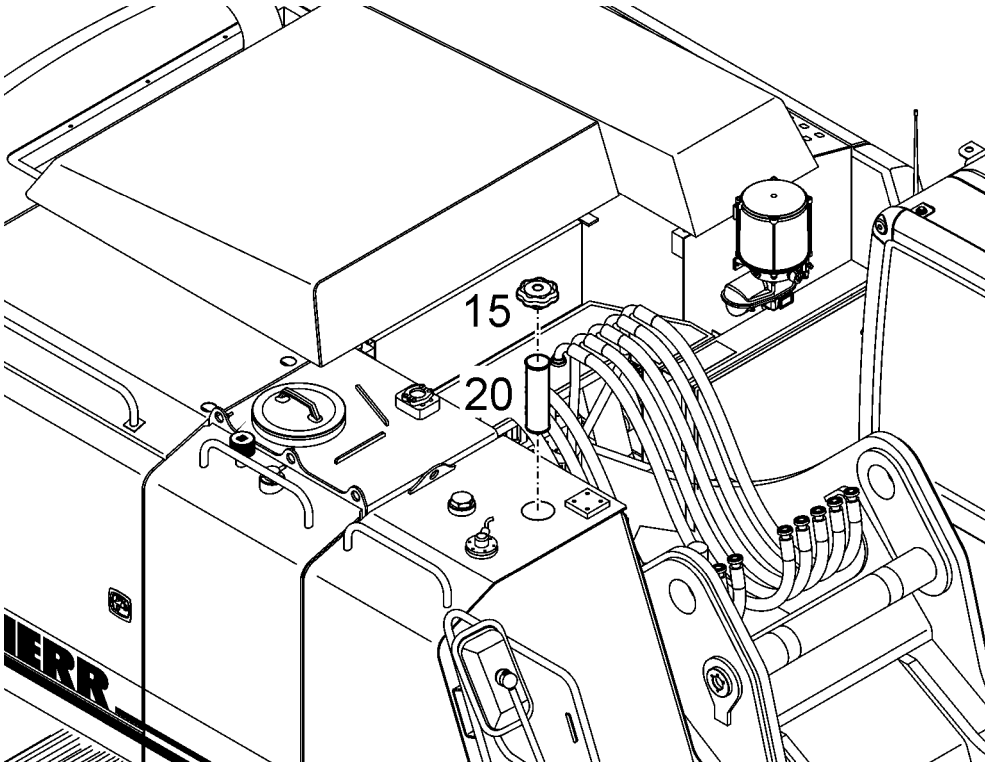

Fig. 5-28 *Fuel filler cap*

- ▶ Unscrew fuel filler cap **15**.
- ▶ Add fuel via the filler sieve **20**.

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5.7.2 Electrical refuelling pump (optional extra)

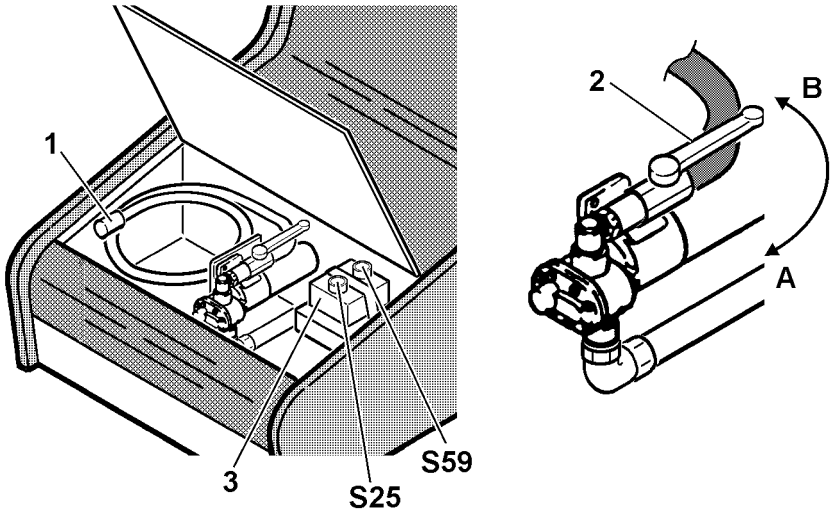

Fig. 5-29 *Electrical refuelling pump*

1	Intake hose	**S25**	Button ON
2	Shut off valve	**S59**	Button OFF
3	Operating unit		

The electrical refuelling pump is used to put fuel into the machine's fuel tank.

It is located under the hatch on the front end of the hydraulic oil and fuel tank. The operating unit **3** is removable.

Proceed as follows when refuelling and stowing the hoses :

- ▶ Unscrew the fuel filler cap **15**.
- ▶ Insert the free end of the intake hose **1** in the fuel supply tank.
- ▶ Open the shut off valve **2** (position **B**).
- ▶ Use switch **S25** (green) to switch on the refuelling pump in order to pump fuel into the machine's tank.
  - ↳ The pump switches off automatically as soon as the maximum fill level is reached.
  - ↳ The refuelling pump can be switched off at any time using switch **S59** (red).

Caution!
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.

- ▶ 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**.

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5.7.3 Draining the fuel tank

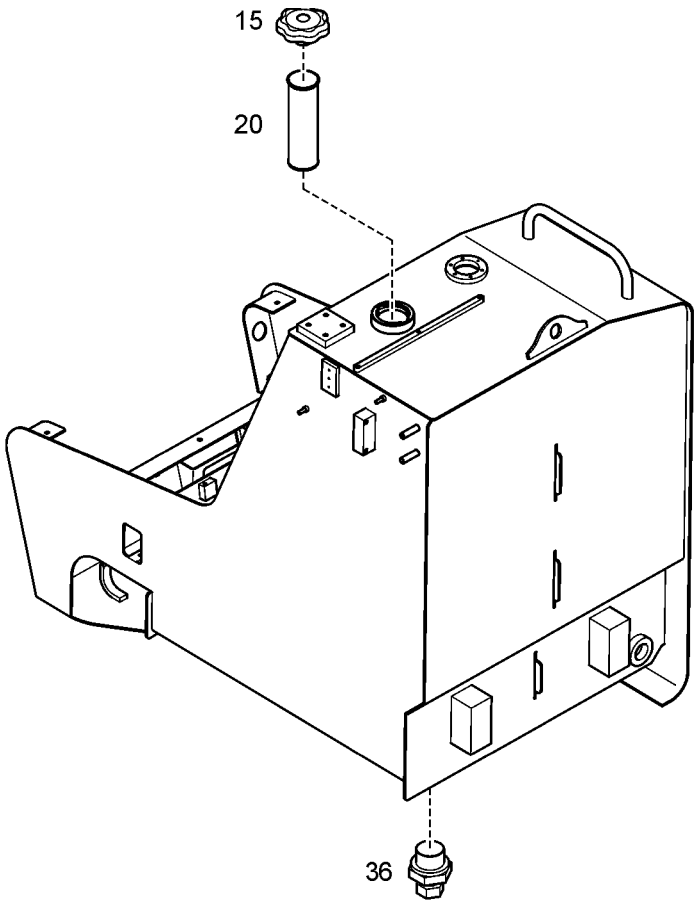


Fig. 5-30 *Draining the fuel tank*

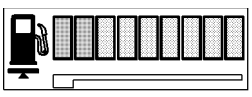
15 Filler cap **20** Fill strainer **36** Drain valve

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.

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5.7.4 Emptying and cleaning the fuel tank

The tank floor is fitted with a drain valve **36**.

- ▶ Place a suitable container underneath.
- ▶ To drain off the water, unscrew the drain plug on the drain valve **36** by two turns until fuel which contains no water comes out.
- ▶ Retighten the plug.
- ▶ To empty, remove the fuel filler cap **15** and the drain valve **36** and collect the fuel in a suitable container.
- ▶ Check the fuel tank and fill strainer **20** regularly for contamination.
- ▶ If necessary, replace the fill strainer **20** and / or wash out the fuel tank.

5.7.5 Draining the fuel prefilter

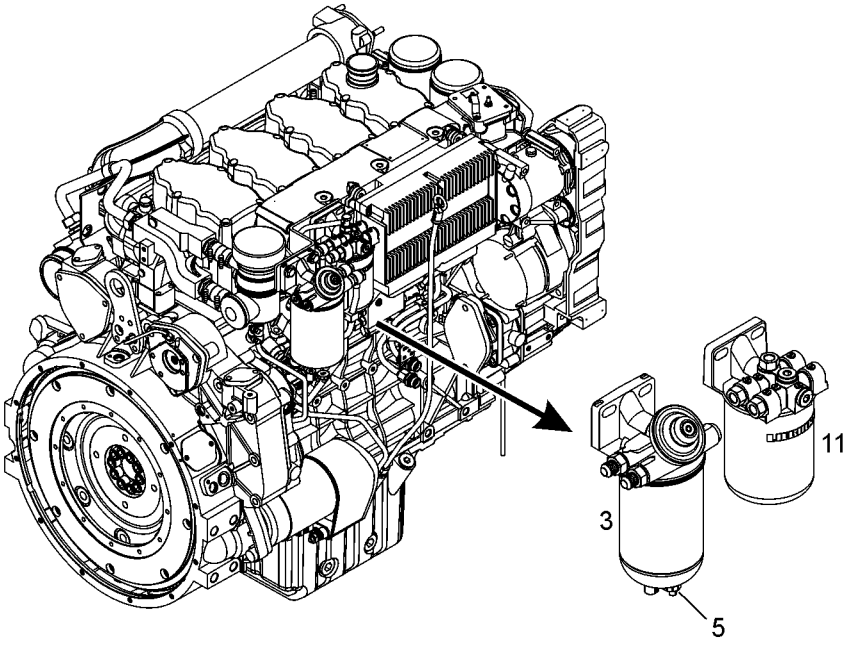

Fig. 5-31 *Fuel filter cartridges*

3 Fuel pre-filter **5** Drain plug **11** Fuel fine filter

The water separator of the fuel pre-filter must be drained each time the symbol E528 appears in the display:

- ▶ Position a collecting container.
- ▶ Daily, open drain plug **5** of the fuel pre-filter **3**.
- ▶ Drain the water until fuel emerges.
- ▶ Retighten the drain plug.

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5.7.6 Changing fuel filter cartridges

Danger !
Risk of fire and explosion!
No smoking !
Avoid naked flame !
Only work on the diesel engine when it is switched off.

Changing the fuel pre-filter

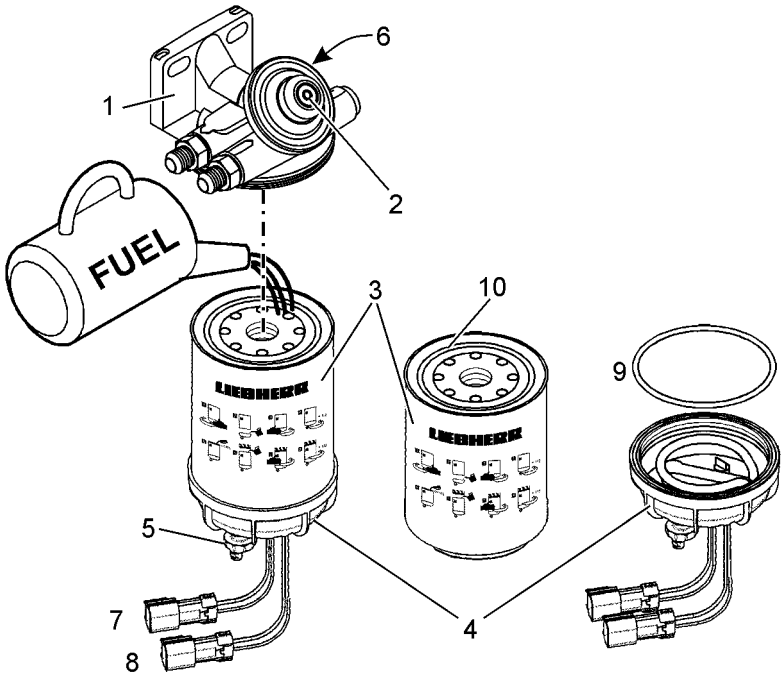

Fig. 5-32 *Changing the fuel pre-filter*

1 Filter head
2 Fuel manual delivery pump
3 Fuel pre-filter cartridge
4 Water separator reservoir
5 Drain plug
6 Bleed screw
7 Fuel pre-heating plug
8 Water level sensor plug
9 O-ring
10 O-ring

- ▶ Position a collecting container under the fuel pre-filter **3**.
- ▶ Clean fuel pre-filter and the surrounding area thoroughly.
- ▶ Disconnect electrical connections of water level sensor and fuel pre-heating.
- ▶ Drain fuel: Unscrew bleeder screw **6** and drain plug **5**.
- ▶ Loosen filter cartridge **3** with strap spanner or similar tool and unscrew.
- ▶ Unscrew the water separator reservoir **4** from the filter cartridge **3**.
- ▶ Dispose of the old filter cartridge.
- ▶ Clean the water separator reservoir **4** with water and dry with compressed air.
- ▶ Apply a little oil to the O-ring **9** of the water separator reservoir.
- ▶ Screw the water separator reservoir onto the new filter cartridge **3** until the O-ring

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9 is resting on the filter cartridge.

- ▶ Tighten the water separator reservoir **4** by hand from half a turn.
- ▶ Tighten the drain plug **5**.
- ▶ Check cleanliness of filter head **1** and ensure that the thread adapter is sitting securely in the filter head.
- ▶ Clean the filter head if necessary.
- ▶ Lubricate O-ring **10** of the new filter cartridge **3** with clean fuel.
- ▶ Fill new filter cartridge **3** with clean fuel and screw on until the O-ring **10** is resting on the filter head **1**.
- ▶ Tighten the filter cartridge **3** by hand from half a turn.
- ▶ Reconnect the electrical connections a and b and close the bleeder screw **6**.
- ▶ Bleed the low pressure fuel system.

Changing the fuel fine filter

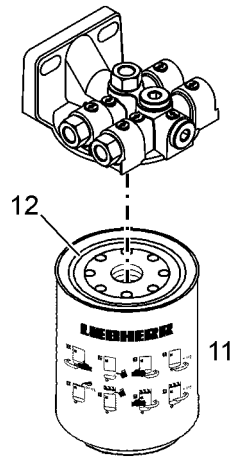

Fig. 5-33 *Changing the fuel fine filter*

11 Fuel fine filter **12** O-ring

- ▶ Position a collecting container under the fuel fine filter **11**.
- ▶ Clean fuel fine filter **11** and the surrounding area thoroughly.
- ▶ Loosen filter cartridge **11** with strap spanner or similar tool and unscrew.
- ▶ Dispose of the old filter cartridge **11**.
- ▶ Check cleanliness of filter head and ensure that the thread adapter is sitting securely in the filter head.
- ▶ Clean the filter head if necessary.
- ▶ Lubricate O-ring **12** of the new filter cartridge **11** with clean fuel.
- ▶ Fill new filter cartridge **11** with clean fuel and screw on until the sealing ring **12** is resting on the filter head.
- ▶ Tighten the filter cartridge **11** by hand from half a turn.
- ▶ Bleed the low pressure fuel system.

Intervals: see control and maintenance chart.

5.7.7 Bleeding the fuel system

It is necessary to bleed the fuel system following running the fuel tank empty and at initial start up of the diesel engine.

A complete bleeding operation consists in bleeding the low pressure fuel system (fuel pre-filter, the fuel fine filter and at the fuel canal on the crankcase) and the high pressure fuel system (injection lines).

Bleeding the low pressure fuel system

A bleeding operation of the low pressure fuel system consists in bleeding the fuel pre-filter, then the fuel fine filter and at the end the crankcase.

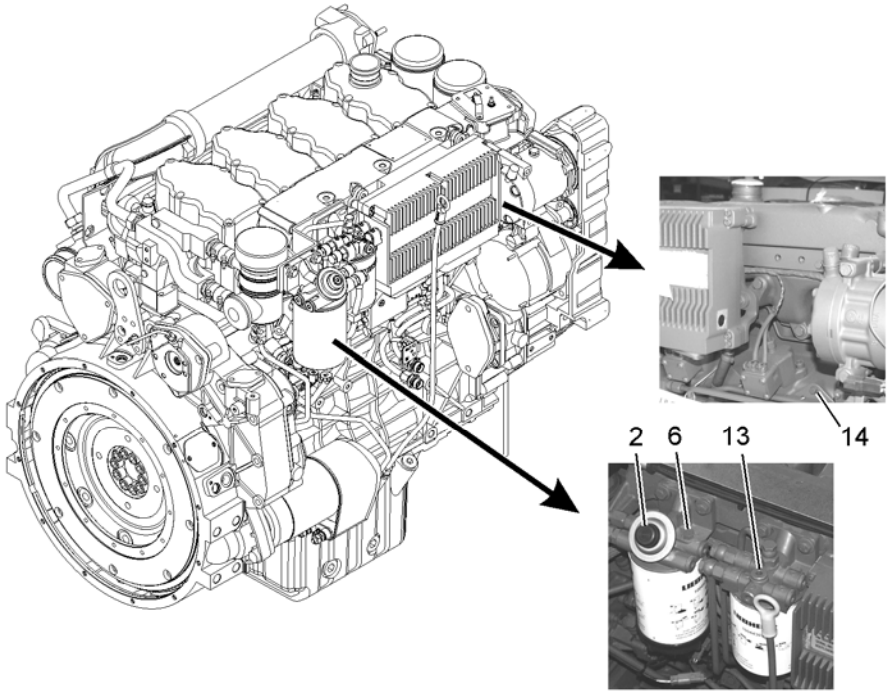

Fig. 5-34 *Bleeding the low pressure fuel system*

2 Hand pump
6 Bleeder screw - pre-filter
13 Bleeder screw - fine filter
14 Bleeder screw - fuel canal on crankcase
15 Bleeder screw nozzle side - Cylinder 1
16 Bleeder screw nozzle side - Cylinder 6

To bleed the fuel pre-filter

- ▶ Loosen the bleeder screw **6** on the filter head and unscrew 2 to 3 turns of thread.
- ▶ Actuate the hand pump **2**.
- ▶ When bubble-free fuel flows out of the bleed screw tighten bleeder screw **6** again.
- ▶ Continue to actuate the hand pump **2** until resistance becomes intense.

To bleed the fuel fine filter

- ▶ Loosen the bleeder screw **13** on the filter head and unscrew 2 to 3 turns of thread.
- ▶ Actuate the hand pump **2**.
- ▶ When bubble-free fuel flows out of the bleed screw tighten bleeder screw **13** again.

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▶ Continue to actuate the hand pump **2** until resistance becomes intense.

To bleed the fuel canal on the crankcase

▶ Loosen the bleeder screw **14** on the filter head and unscrew 2 to 3 turns of thread.

▶ Actuate the hand pump **2**.

▶ When bubble-free fuel flows out of the bleed screw tighten bleeder screw **14** again.

▶ Continue to actuate the hand pump **2** until resistance becomes intense.

Bleeding the high pressure fuel system

A bleeding operation of the high pressure fuel system consists in bleeding the injection lines.

This bleeding is automatically realised by starting the engine in mode "Purge".

When the key is in contact position, the list of the menus is displayed on the screen

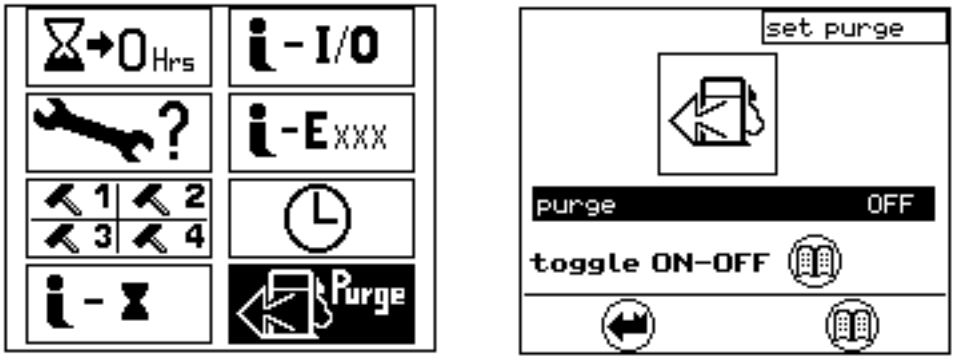

Fig. 5-35 *Menu purge*

▶ Select the menu "Purge".

▶ Activate the bleeding by selecting ON.

▶ Start the engine
  ↳ The fuel injection time will be increased until the engine runs in low idle or until a predefined time is over.

Note !
When starting in mode "Purge", the engine will emit black smoke.
As soon as the engine rpm reaches 800 rpm, the menu "purge" is not accessible any more.
If the motor does not start, wait at least 1 minute before attempting to restart in mode "Purge".

5.8 Dry air filter

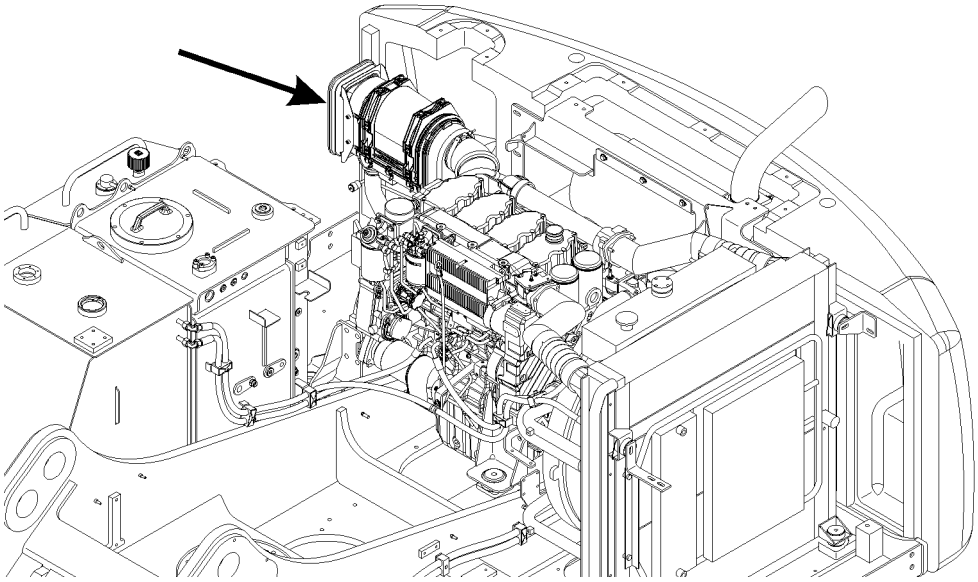

Fig. 5-36 *Dry air filter*

Maximum engine protection against early wear due to dust is only possible if the air filter is serviced at regular intervals.

The dry air filter is designed in such a way that it offers maximum protection and long maintenance intervals.

The maintenance consists in changing the filter elements **3** and **4**. It is not recommended that filter elements be washed out for safety reasons.

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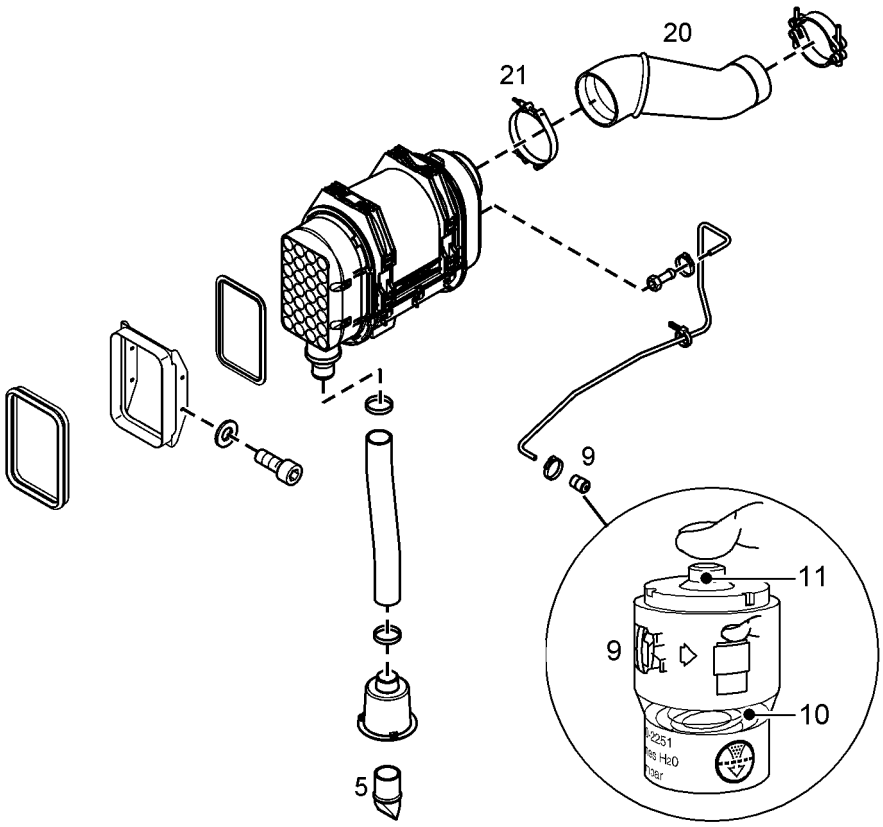

Fig. 5-37 Vacuum gauge, dust discharge valve, engine intake pipe

5 Dust discharge valve
9 Vacuum gauge
10 Alarm window
11 Reset button
20 Engine intake pipe
21 Tensioning clamp
22 Tensioning clamp

The vacuum gauge **9** monitores intake low pressure reached on the filter outlet while the diesel engine is operating.

The appearance of the red display strip in alarm window **10** indicates that the maximum permissible low pressure of 5 kPa (50 mbar) has been reached. The red display strip keep visable after turning off the engine

▶ Replace the main element.

▶ Press the reset button **11** to clear the stored low pressure reading.

▶ Push the extractor slot on the dust discharge valve up by hand once a week to ensure that it does not stick due to humidity and dust.

5.8.1 Changing the main element

Caution!
Only replace the main element when the maximum permissible intake low pressure has been reached, or at least once a year.

Installing and removing the main element too often could damage the seals between

the filter element and the filter housing.

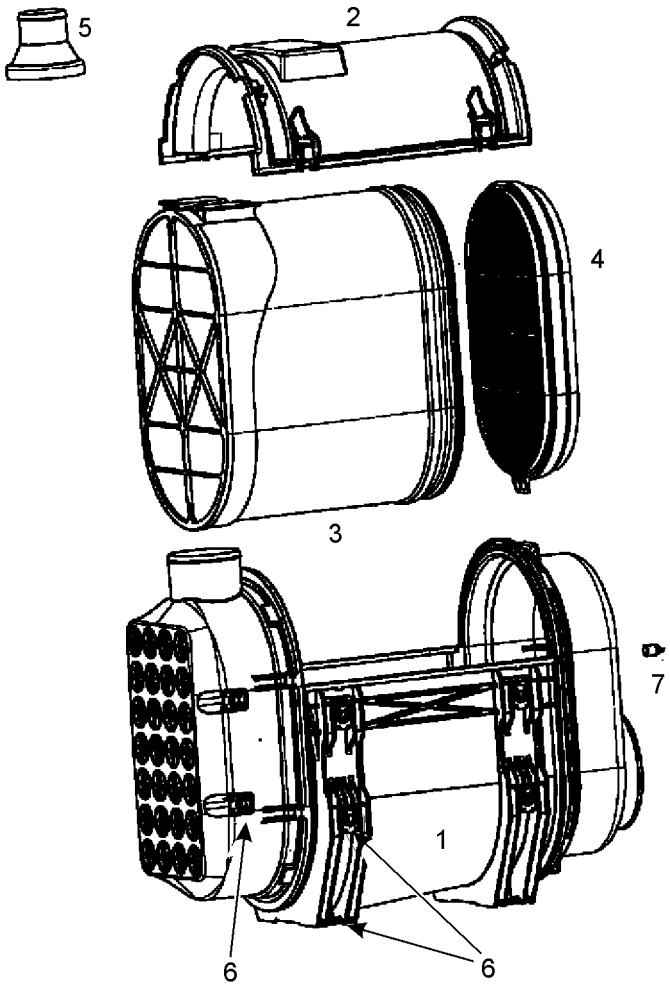

Fig. 5-38 *Changing the filter cartridges*

1 Filter housing
2 Filter housing cover
3 Main element
4 Safety element
5 Adapter
6 Clamp
7 Protecting cap

- ▶ With the engine switched off, open the clamps **6** remove the cover **2**.
- ▶ 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 **1** with cover **2**.

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5.8.2 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.

- ▶ 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 **1** with cover **2** and close the clamps **6**.

5.8.3 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 Hydraulic system

Maintenance work on the hydraulic system is restricted mainly to the hydraulic tank.

All other units on the system do not require any special maintenance.

The pipe and hose network should be checked at regular intervals for leaks.

Note!
Strict cleanliness is of particular importance for the hydraulic system.

For this reason, the intervals given
– for changing the return-line filters
– for cleaning the oil cooler and
– for changing the oil must be adhered to.

5.9.1 Depressurizing the hydraulic system

Before any intervention on any hydraulic component, you have to depressurize the

hydraulic system.

Danger!
Do not inspect leaks with bare hands.
A fine stream of liquid can penetrate the skin when under high pressure and cause serious injury.

Note the following points:

- ❑ The machine must stand level and the attachment must be laid down on even ground.

To depressurize the high pressure system

- ▶ Switch off the engine.
- ▶ Move the pilot control devices (joystick and pedals) briefly in all directions (with the ignition key in the contact position).

To depressurize the servo oil system

- ▶ Move the pilot control devices (joystick and pedals) in all directions (with the ignition key in the contact position).

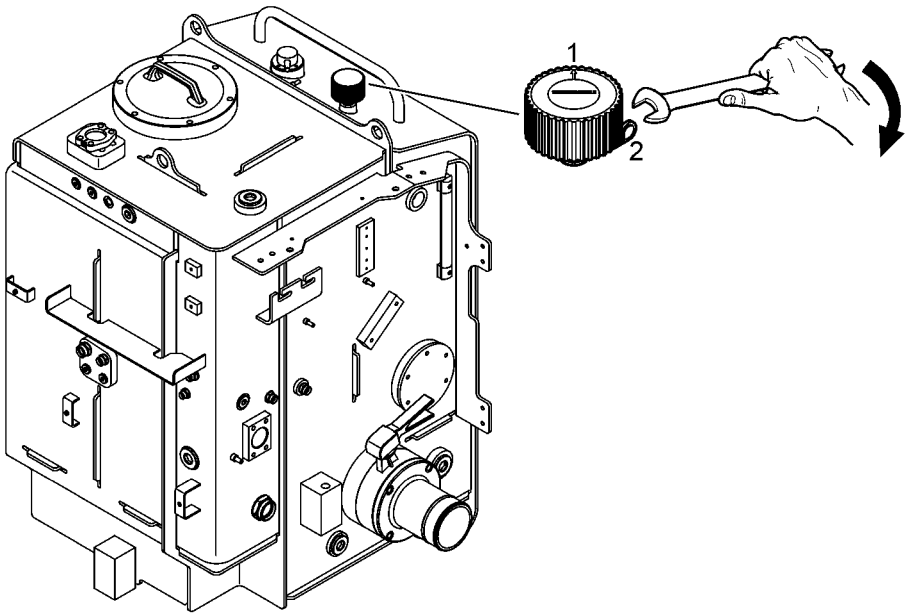

Fig. 5-39 *Depressurizing the hydraulic system*

To depressurize the hydraulic tank

- ▶ Unscrew the vent filter **1** by a **maximum** of one turn.
  ↳ The hydraulic system will depressurize.

The vent filter **1** can be turned manually if safety stud **2** is inserted. An open-ended spanner can be used if the filter does not open easily..

Note!

- ▶ The retaining pin **2** (or key anti vandalism) must be systematically dismounted of the the filter and hung with the contact key.

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Danger!
The hydraulic oil is hot when at operating temperature and could be pressurized.

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

5.9.2 Checking the oil level, emptying and refilling the hydraulic tank

Machine position

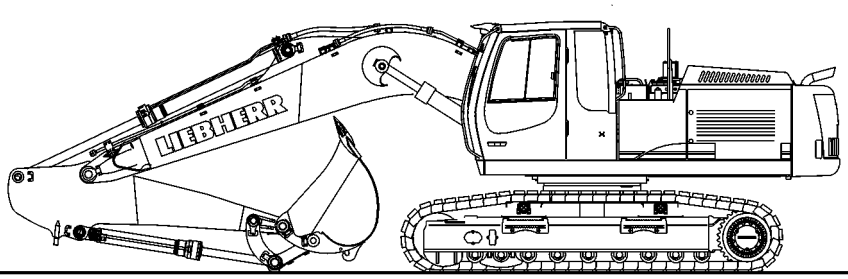

Fig. 5-40 *Machine position for checking the oil level of the hydraulic system*

When checking the oil level or refilling the oil:

– the machine must stand level,
– the attachment be laid down on even ground with the stick and bucket cylinder fully extended (bucket and stick fully tilted in),
– Switch off the engine.
– the support (shield or claw support if mounted) must also be extended.

Checking the oil level in the hydraulic tank

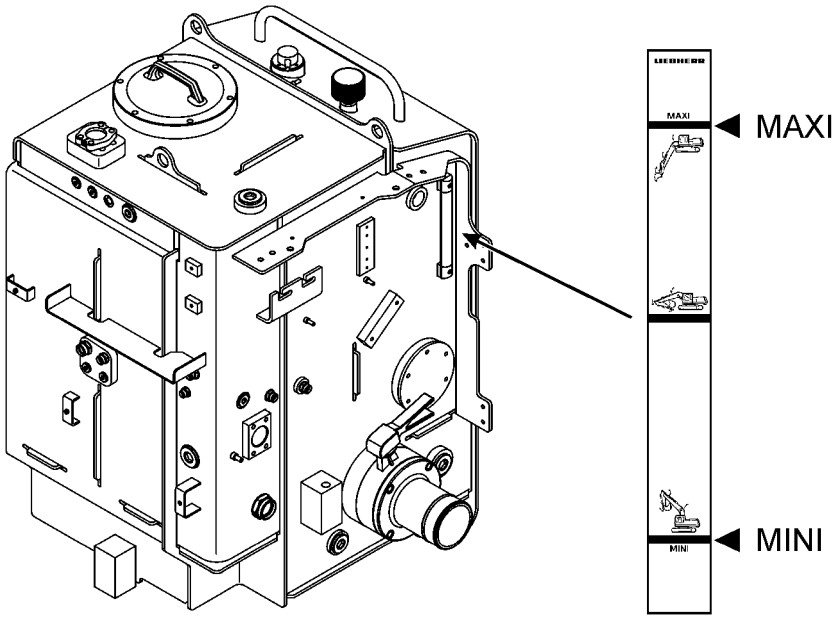

Fig. 5-41 *Hydraulic tank oil level*

When the machine is in the check position, the level must not lie below the central marking on the inspection window.

▶ If this is not the case, fill oil via the return-line filter until the level reaches the central marking.

The upper marking **MAXI** shows the maximum oil level if all cylinders are fully drawn in.

The lower marking **MINI** shows the minimum oil level if all cylinders are fully extended.

If the oil level drops below the lower marking **MINI**, the symbol appears on screen when the lowest quantity is reached.

Emptying and refilling the hydraulic tank

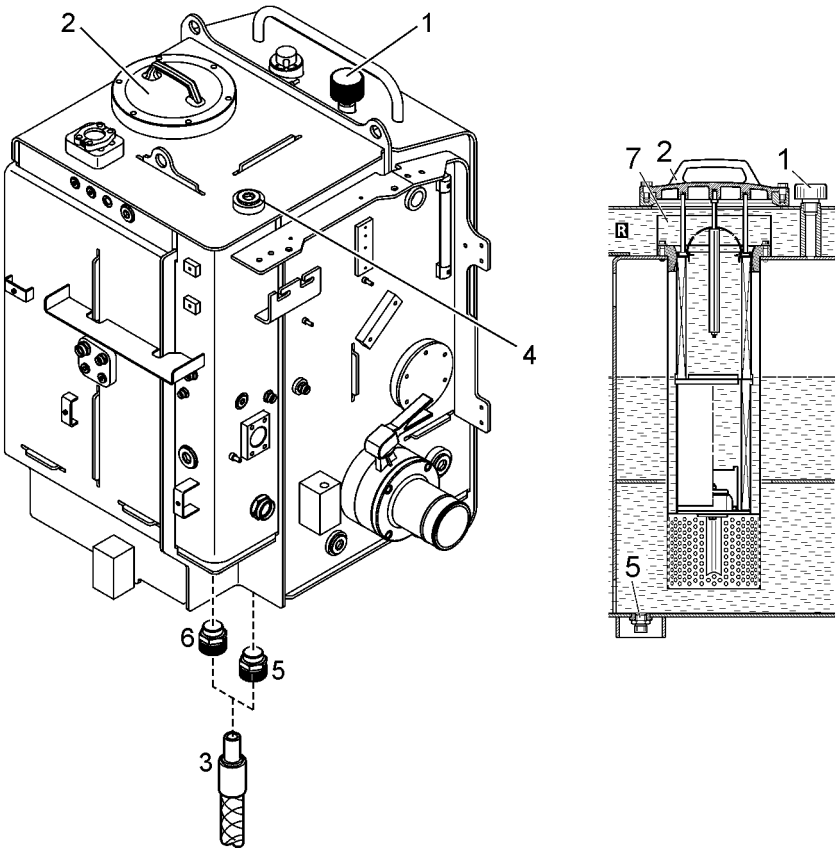

Fig. 5-42 *Draining and refilling the hydraulic oil*

)

1	Vent filter	**2**	Return-line filter
3	Drain hose	**4**	Screw cap on collecting compartment
5	Drain valve on hydraulic tank	**6**	Drain valve on collecting compartment
7	Filter centering tube	**R**	Collecting compartment

▶ If possible, always fill and empty the hydraulic system using a filler unit.

To drain the oil:

❑ The hydraulic system must be depressurized.

▶ Unscrew the vent filter **1** by a maximum of one turn.
↳ The hydraulic system will depressurize.

▶ Remove the cover of the return-line filter **2**.

▶ Screw the drain hose to the drain valve **5** and **6** on the collecting compartment and on the hydraulic tank.

▶ Let the oil flow out into a suitable container..

To refill the hydraulic oil:

▶ Unscrew the vent filter **1** by a maximum of one turn.
↳ The hydraulic system will depressurize.

- ▶ Remove the cover of the return-line filter **2**.
- ▶ Refill the oil through the filter cartridge 2 or threw the screw cap 4 on collecting compartment until the level reaches precisely the central marking on the inspection window (siehe Fig. 5-41).
- ▶ Tighten the vent filter **1**.
- ▶ Refill the tank up to the top. If refilling through the filter cartridge **2**, be sure to refill also completely the collecting compartment **R** around the filter centering tube **7**.
- ▶ Screw on the cover of return-line filter **2** or the screw cap **4**.

Caution!

- ▶ After each hydraulic oil change, vent the hydraulic pumps.

To drain off condensate water

Drain off the condensate regularly following the interval specified in the maintenance chart.

- ▶ Place a suitable container underneath.
- ▶ Keep the drain hose on the drain valves **5** and **6** (siehe Fig. 5-42) until oil without water flows.

Intervals: see maintenance chart

Note!

When using "environmentally friendly hydraulics fluids" and after machine diwn time (after about 24 hours), we recommend to drain off any moisture in the hydraulic tank before operating the machine.

5.9.3 Return-line filter

The return-line filter is located on the top of the hydraulic tank.

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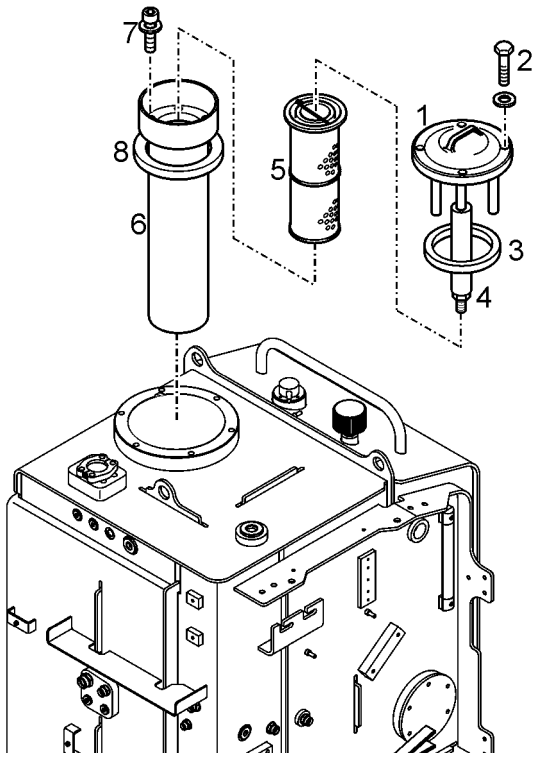

Fig. 5-43 *Return-line filter*

1 Cover
2 Screw
3 Sealing
4 Magnetic rod
5 Filter unit

The magnetic rod **4** of the return-line filter must be cleaned at fixed intervals (see maintenance chart) and the glass fibre filter unit **5** replaced.

Note

▶ When working in heavy dust conditions, please note the special regulations for changing the filter.

To clean the magnetic rod and replace the filter element:

❑ The hydraulic system must be depressurized.

▶ Unscrew the four screws on the filter cover and lift out cover **1** and magnetic rod **4**.

▶ Carefully clean off any dirt sticking to the magnetic rod.

▶ Remove the used filter cartridge **5** on the bracket.

▶ Insert the new filter cartridge on the bracket vertically into the tank and press down lightly. Then lay the clamp to the side on the tank ring.

Caution!

▶ Ensure that the filter cartridge is standing vertical in the tank and that the O-ring **8** is not damaged.

▶ Centre the cover unit on the filter unit **5** and position. When doing this, ensure that the sealing **3** is positioned correctly and is in good condition.

5.9.4 Leak oil filter

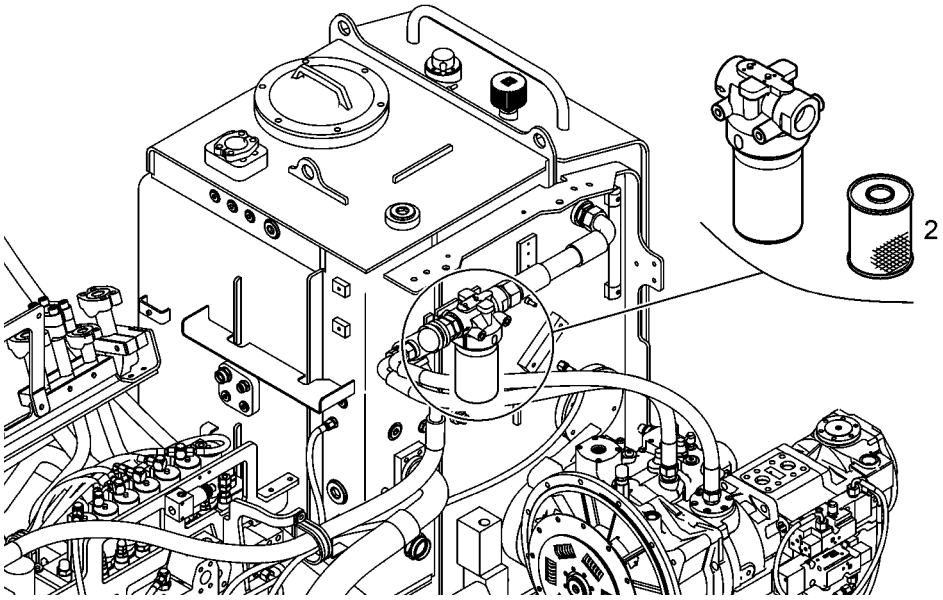

Fig. 5-44 *Leak oil filter*

The filter **2** collecting the leakage oil of various hydraulic components is mounted to the rear side of the hydraulic tank and must be maintained at regular intervals.

Interval, see maintenance chart.

During maintenance, the filter element must be replaced or cleaned with fuel or gasoline.

Note!
The filter element can be cleaned up to maximum 3 times. After 3 cleanings it must be replaced.

To clean the filter:

- ▶ Remove the filter housing
- ▶ Pull out the filter element
- ▶ Clean the filter element and the housing.

To install the new or cleaned filter element

- ▶ Coat with hydraulic oil the O-rings, the threads and the sealing faces on the filter head and on the housing.
- ▶ Insert with care the new element onto the centring pin.
- ▶ Reattach the filter housing, screw it by hand to the stop and than tighten it with a wrench using the hexagon head at the bottom of the housing (tightening torque: 40^{+10} N.m).

5.9.5 Control oil filter

The pressure filter **11** is part of the control oil unit **1** which is located on the rear of the hydraulic tank.

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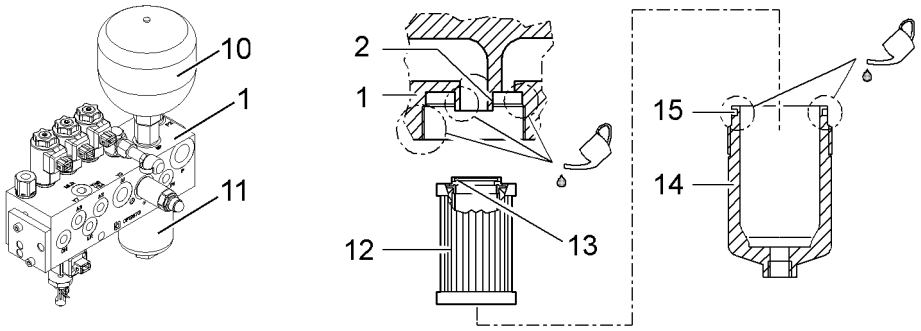

Fig. 5-45 *Control oil unit*

1	Control oil unit	**12**	Filter unit
2	Centering pivot	**13**	Filter unit sealing ring
10	Pressure accumulator	**14**	Filter housing
11	Pressure filter	**15**	Filter housing sealing ring

Note!
It is not permitted to clean the filter unit.

▶ Change the filter unit each time you open the filter housing.

To replace the filter element:

❑ The hydraulic system must be depressurized.

▶ Unscrew the filter housing **14** from pressure filter **11** and remove filter element **12**.

▶ Clean the filter housing **14**.

▶ Oil the thread and sealing surfaces on filter housing **14** and on control oil unit **1** as well as sealing rings **13** and **15** with hydraulic oil.

▶ Push the new filter element **12** carefully onto the centering pivot **2**.

▶ Screw filter housing **14** as far as the stop and turn it back by hand with a **1/4** turn (approx. 90°).

5.9.6 Replenishing oil filter in swing circuit

The replenishing oil filter is mounted on the swing pump.

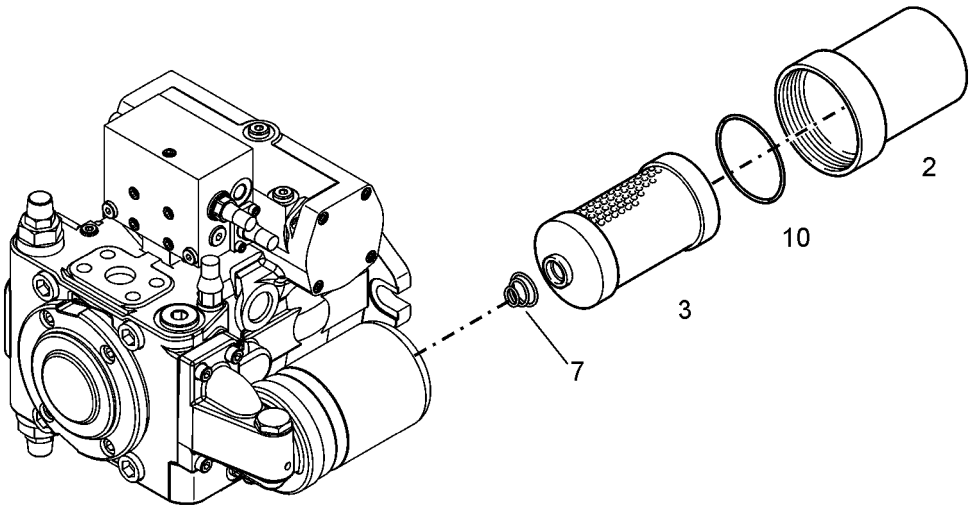

Fig. 5-46 *Replenishing oil filter in swing circuit*

2	Filter housing	**7**	Coil
3	Filter unit	**10**	O-ring

- ▶ Unscrew filter housing **2** and remove filter unit **3** and O-ring **10**.
- ▶ Clean the filter housing **2**.
- ▶ Oil the thread and sealing surfaces on filter housing **2** and on control oil unit.
- ▶ Install the new filter unit **3** carefully with the a new O-ring **10** and the coil **7**.
- ▶ Screw filter housing **2**.

5.9.7 Control circuit

The control circuit does not require any special maintenance.

- ▶ Inspect the pipe network and connections on all units (pressure accumulator, pressure limiting valve, pressure filter etc.) regularly for leaks.

Danger!
The pressure accumulator **10** (siehe Fig. 5-45) keeps the control circuit under pressure for certain operations which also take place after the diesel engine has been switched off.
Before working on the control circuit, the control pressure must be depressurized as follows:

- ▶ Lay the work equipment on the ground.
- ▶ Switch off the engine.
- ▶ Operate both joysticks (with ignition key in contact position).

5.9.8 Bleeding the hydraulic pumps

After working on the pumps or after changing oil in the hydraulic system, the hydraulic pumps must be bled.

Note!
To bleed the pumps, it is advised to use the special kit (n° id. 7408148) to put the hydraulic tank under pressure.

It is possible to bleed the pumps without this kit. Then the engine must run at low idle (800-900 tr/mn).

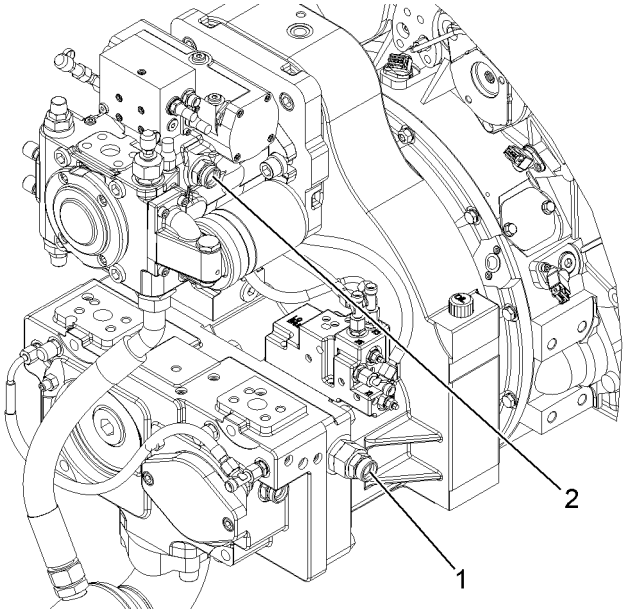

Fig. 5-47 *Hydraulic pumps*

1 Bleeding screw / working pumps **2** Bleeding screw / swing pump

- ▶ To bleed the working pumps, loosen the screw **1** and let the air escape. As soon as oil flows without air, retighten the screw **1**.
- ▶ To bleed the swing pump, loosen the screw **2** and let the air escape. As soon as oil flows without air, retighten the screw **2**.

Before starting the pump for the first time after repairing or replacing the pump, the pump housing must be filled with hydraulic oil via the same connection.

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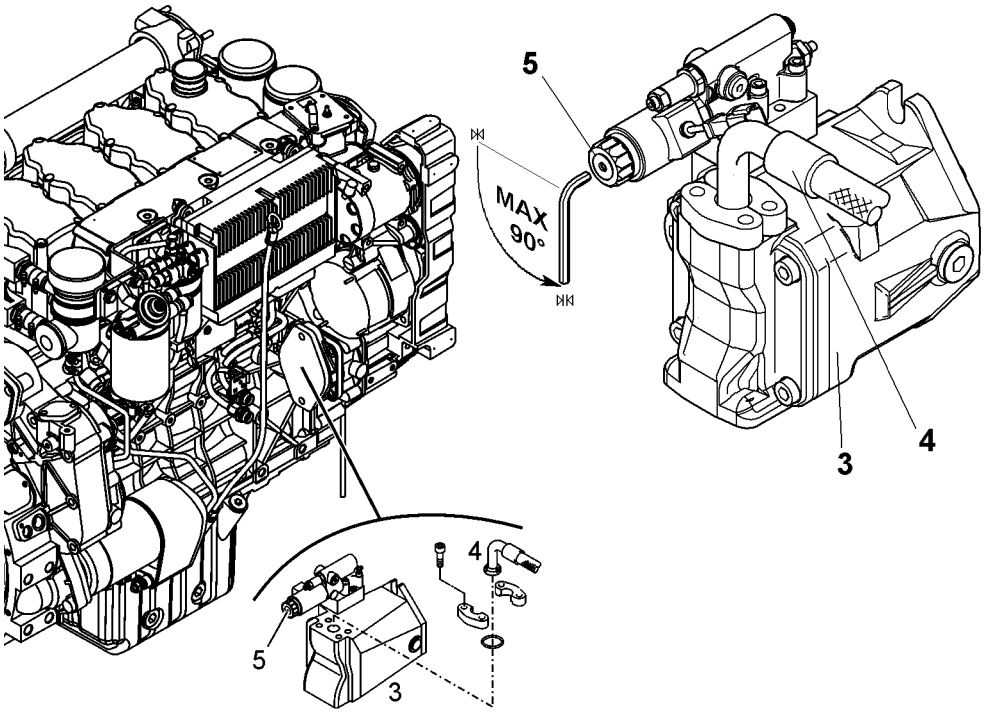

Fig. 5-48 *Cooling pump*

3 Cooling pump **4** Hose **5** Knurled screw

- ▶ To bleed the cooling pump **3**, loosen the hose **4** and let the air escape. As soon as oil flows without air, retighten the hose **4**.
- ▶ Lightly turn down the little screw in the middle of the knurled screw **5** with an Alen key (max 1/4 turn).
- ▶ As soon as oil flows without air, retighten the little screw to 1 Nm.

5.9.9 Bleeding the hydraulic cylinders

A cylinder must be bled after having changed the cylinder or after having worked on the cylinder (Sealing change,...) or after having worked on the cylinder hydraulic circuit (Hose change, ...).

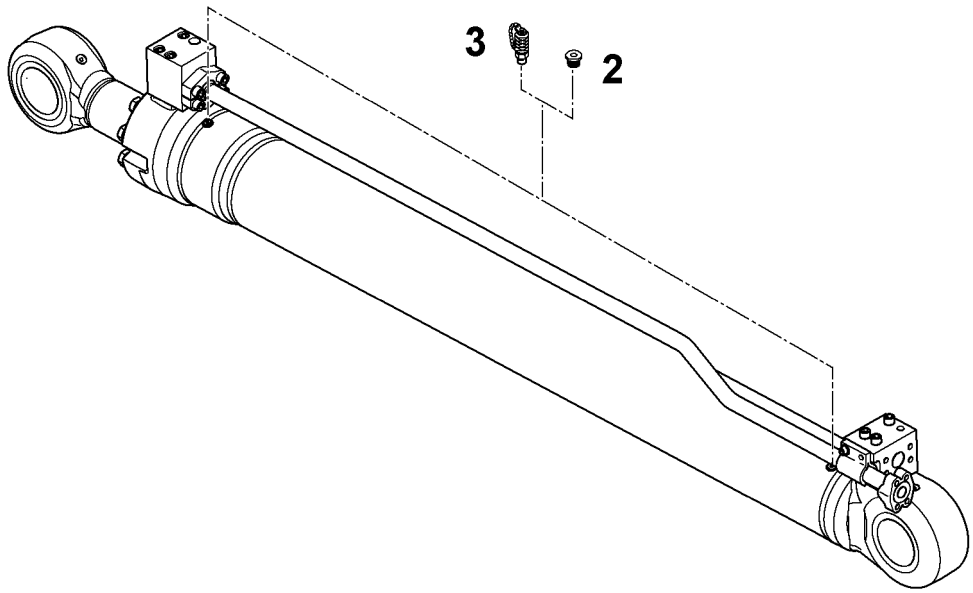

Fig. 5-49 *Hydraulic cylinder*

2 Locking screw for bleeding **3** Test point

Hydraulic cylinders equipped with locking screws for bleeding **2** must be bled following the procedure 1 and Hydraulic cylinders, which are not equipped with these locking screws for bleeding must be bled following the procedure 2.

Procedure 1

- ▶ Unscrew the locking screws for bleeding **2** both side.
- ▶ Screw two test points **3** instead of the locking screws and attach an test hose on each test point.
- ▶ Make the the engine run at low idle (800-900 tr/mn).
- ▶ If possible, make the attachment move in order to have the side to be bled in the higher position.
- ▶ Lightly actuate the cylinder. It is recommended to bleed first the side, which does not necessitate a displacement of the cylinder (for example, if the cylinder is already retracted, first actuate the cylinder retractation in order to bleed the cylinder rod side).
- ▶ Redo this action until oil without air flows out of the test hose.
- ▶ Supply the other side of the cylinder and bleed it.
- ▶ Switch off the engine, remove the test hoses and replace the test points **3** by the locking screws **2**.
- ▶ Perform the procedure 2.

Procedure 2

- ▶ Make the the engine run at low idle (800-900 tr/mn).
- ▶ Retract slowly the cylinder until stop and do not actuate the movement any more. Then extend slowly the cylinder until stop and do not actuate the movement any

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more. Repeat the operation 5 times.

Danger!
If you do not follow this procedure, it can cause diesel effect (explosion of air bubbles) in the cylinder.

5.9.10 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.

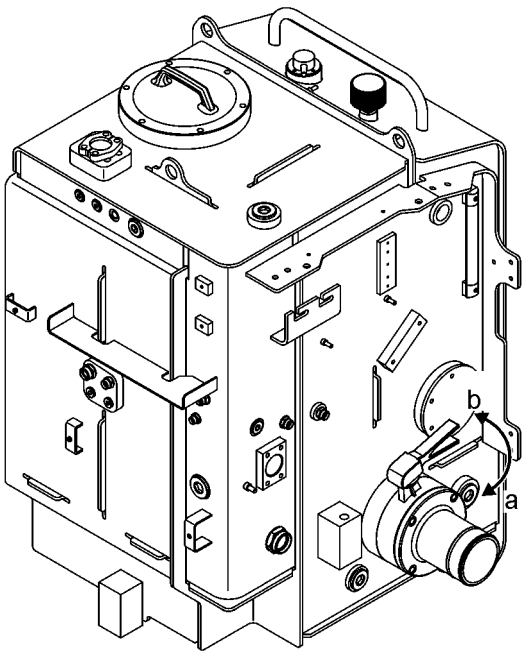

Fig. 5-50 *Shut off valve on the hydraulic tank*

The shut off valve on the hydraulic tank to the intake hose has two positions :

– **a** open
– **b** closed

▶ Depressurize the hydraulic system.

▶ Close the shut off valve on the hydraulic tank **b**.

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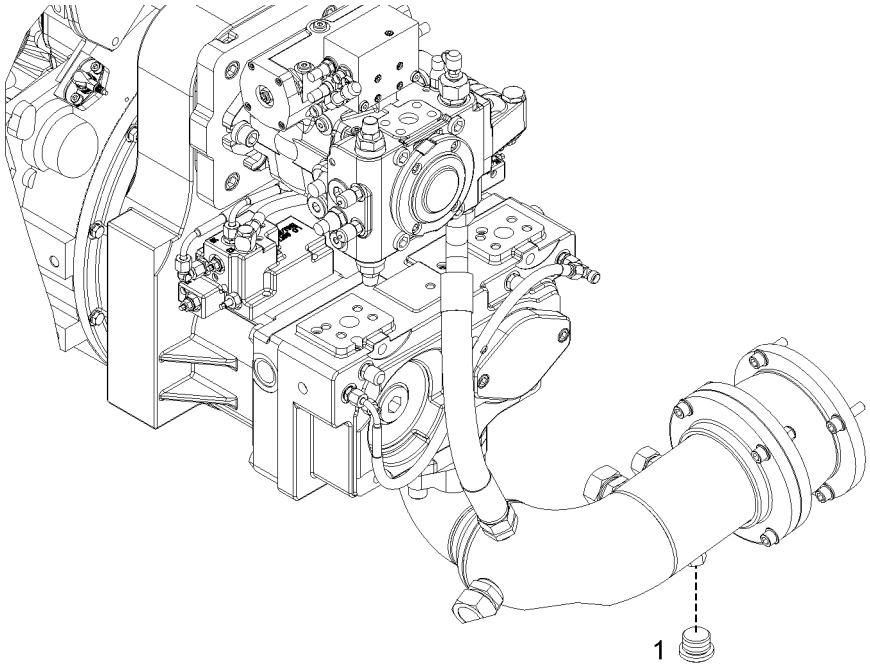

Fig. 5-51 *Drain of the working pumps*

- ▶ Unscrew sealing rod **1** at the pump-end neck of the intake hose.
- ▶ Drain the hydraulic oil out of the pump and intake hose.
- ▶ Once the repair work is completed, turn the shut off valve back to its starting position **a** and engage.
- ▶ Retighten the vent filter on the hydraulic tank.

5.9.11 Vent filter on the hydraulic tank

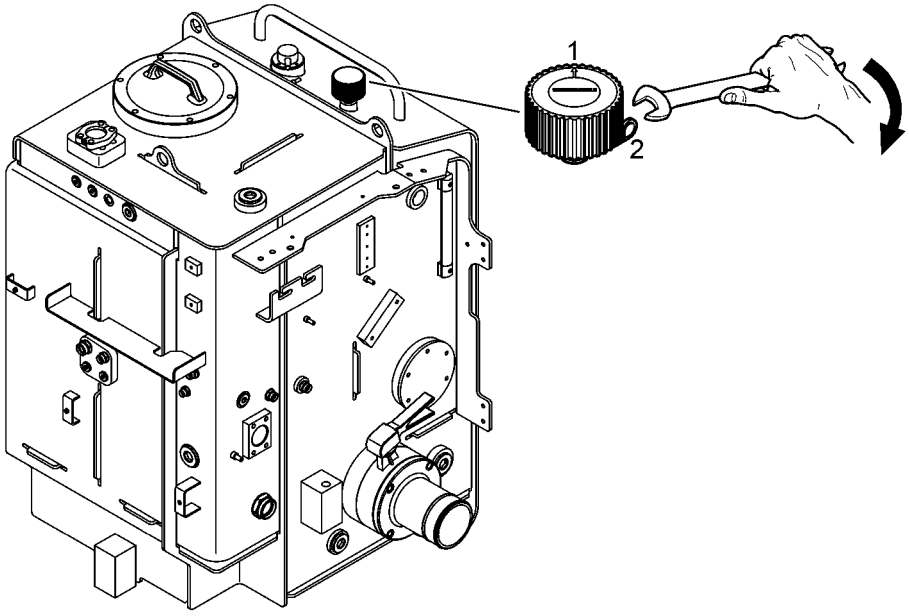

Fig. 5-52 *Hydraulic tank vent filter*

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❑ The hydraulic system must be depressurized.

▶ Replace the filter **1** and retaining pin **2** (see “Control and maintenance chart”).

Note!

▶ When working in heavy dust conditions, please note the special regulations for changing the filter.

▶ The retaining pin **2** (or key anti vandalism) must be systematically dismounted of the the filter and hung with the contact key.

5.9.12 Bypass oil filter (option)

This filter is designed to drain water by absorbing the water contained in the oil.

The filter element must be replaced every time the return filter element is changed. , but at least every six months

Remarque!
LIEBHERR recommends to mount bypass oil filter especially when using environmentally acceptable hydraulic fluids

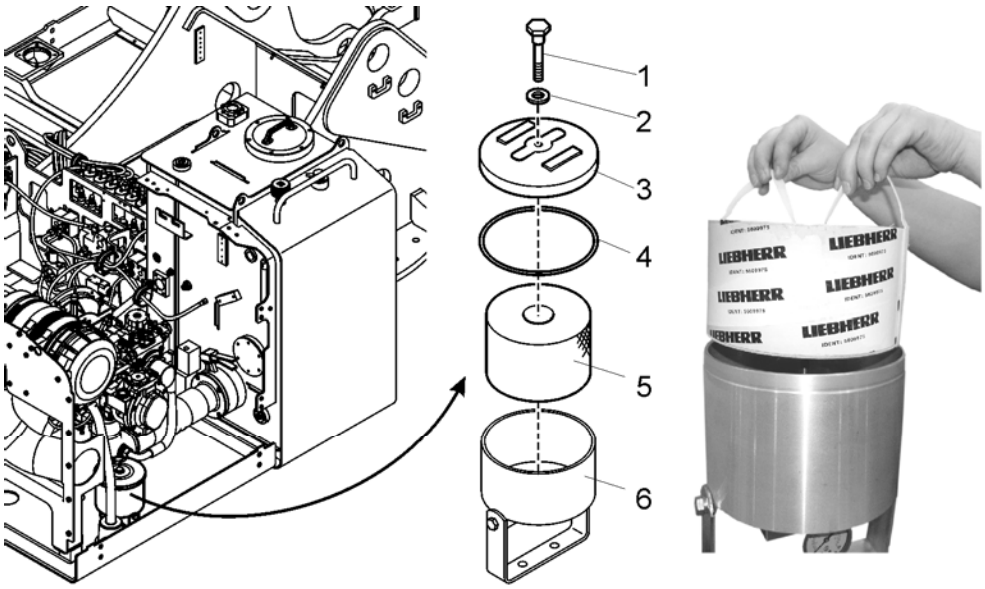

Fig. 5-53 *Bypass oil filter*

1 Screw
2 Washer
3 Cover
4 O-ring
5 Filter cartridge
6 Filter housing

Replacing the filter cartridge :

The by pass oil filter is located under the working pumps.

▶ Switch off the engine.

▶ Depressurize the hydraulic system.

▶ Unscrew the screw **1** and remove the cover **3**.

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- ▶ Remove the used filter cartridge **5** with a strap spanner by turning it clockwise and lifting it up lightly
- ▶ Wait that the oil flows out before removing the filter cartridge **5** and let it flow out into a suitable container.
- ▶ Check the input and the output of the filter housing **6** for deposits and clean up if necessary.
- ▶ Remove the new filter cartridge **5** from its packaging. Take care not to remove the cover of carboard on the filter cartridge **5**.

Note!
If the packaging has been damaged, some moisture could have penetrated in the filter cartridge and reduce its lifetime.

- ▶ Be careful that the packaging of the filter cartridge has not been damaged.

- ▶ Install the new filter cartridge **5**.
- ▶ Fill the filter housing **6** with the same oil as, which used int hydraulic circuit.
- ▶ Clean the cover **3** and install a new O-ring **4**.
- ▶ Install the cover **3** and tighten the screw **1** with a torque of 50 Nm.
- ▶ Start the machine and check the bypass oil filter for leaks.

5.9.13 Return oil filter for hydraulic hammer (option)

In case of use of an hydraulic hammer, it is strongly advised to install an extra return oil filter.

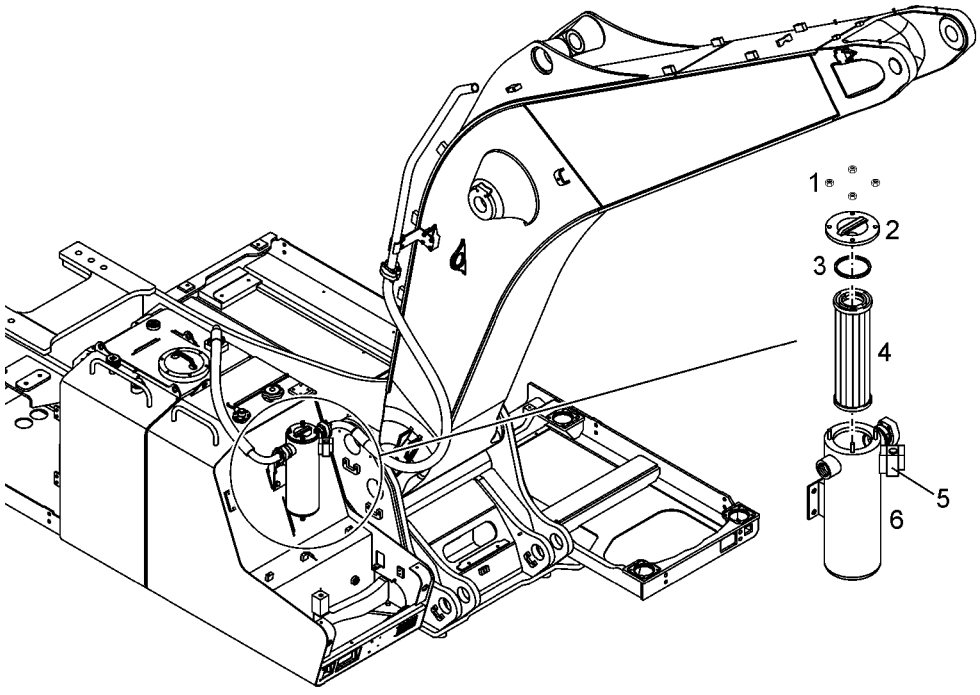

Fig. 5-54 *Return oil filter for hydraulic hammer*

1	Nuts	**3**	Seal kit	**5**	Contamination indicator
2	complete cover	**4**	Filter cartridge	**6**	Filter housing

The return oil filter for hydraulic hammer is mounted on the fuel tank. The intervall of maintenance depends on the indication given by the contamination indicator **5**.

If the indicator is green, the filter works correctly.

If the indicator is red, the filter is clogged and the filter unit has to be replaced.

Replacement of the filter cartridge

- ❑ The hydraulic system must be depressurized.
- ▶ Unscrew the four nuts **1** on the filter cover and lift out cover **2**.
- ▶ Remove the used filter cartridge **4**.
- ▶ Check the seal **3** and replace it if necessary.
- ▶ Carefully clean off any dirt sticking to the magnetic plug.
- ▶ Insert a new filter cartridge **4**.
- ▶ Put the seal **3** and the cover **2**.
- ▶ Coat the stud bolts of the filter housing **6** with anti-corrosion grease and tighten the nuts **1**.

5.9.14 Servicing the hydraulic cylinder

Checking the condition of the piston rod mount

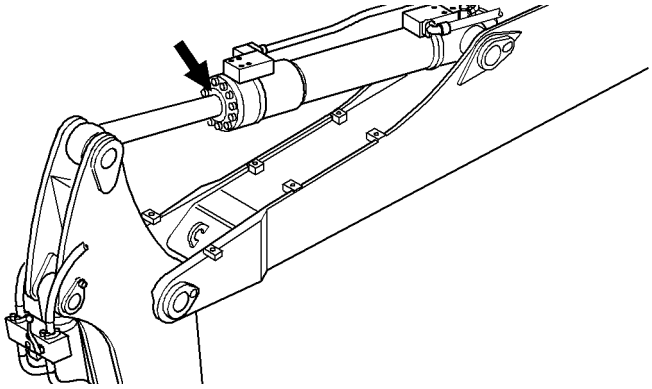

Fig. 5-55 *Piston rod mount*

Note
When a leak appears on the piston rod mount of a hydraulic cylinder (see arrow), the sealing kit must be replaced by a LIEBHERR fitter.

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Protecting the piston rods

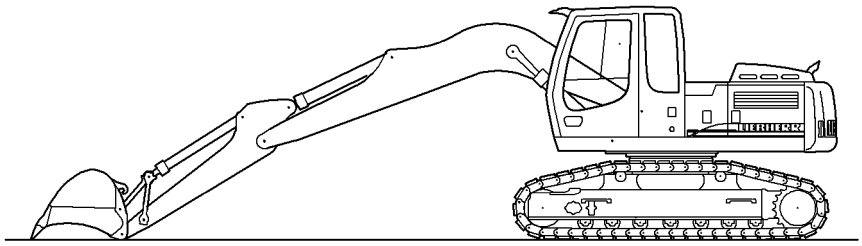

Fig. 5-56 *Machine with piston rods drawn in*

When the machine is out of service for more than 4 weeks and particularly for transportation by sea, the following measures must be taken:

- Position or transport the machine in such a way that the piston rods are fully drawn into the cylinders.
- Cover any loose piston rods with a thick layer of non-corrosive anti-corrosion fluid.

Grease quality: see “Lubricating and operating materials”

- For sea transportation, check the condition of the piston rods once more after loading.
- Additionally, cover piston rods with anti-corrosion fluid if a cylinder only has a low stroke for certain work, meaning that the piston rod is not regularly moistened with hydraulic oil (eg. cylinder on slewing arm when working over ground).
- Check the condition of hydraulic cylinders which are not moved a great deal regularly.

5.9.15 Replacing hydraulic hoses

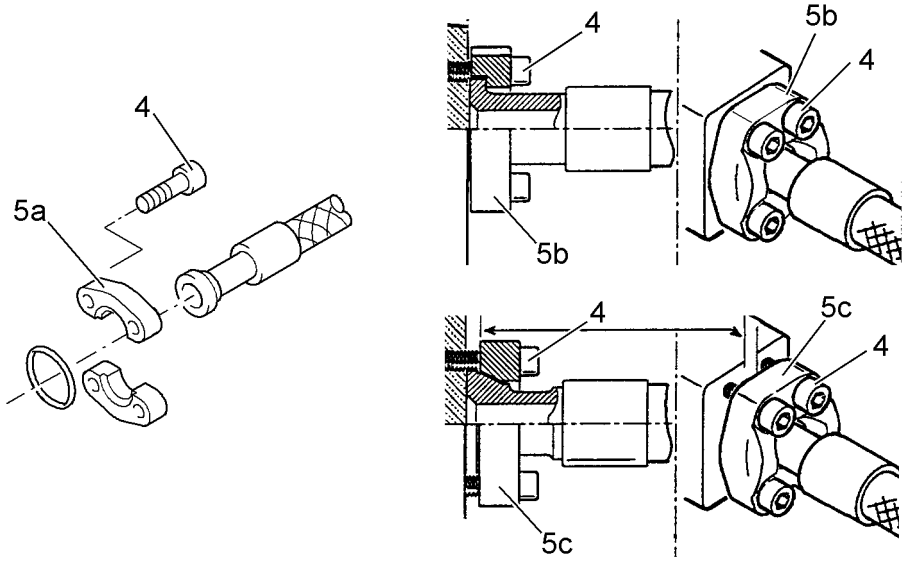

Fig. 5-57 *High pressure hose with SAE fitting*

Danger!
A defective hydraulic hose can cause accidents and injuries.

- ▶ Replace defective hydraulic hoses (bubbles, moisture, damaged top edge etc.) immediately.
- ▶ Install new hoses in such a way that torsion loading is avoided.
- ▶ Ensure that the hydraulic hose is not twisted when mounting.

Installed high pressure hoses with SAE connections have a nominal diameter of 16, 20, 25, 32 or 40 (5/8", 3/4", 1", 1"1/4, or 1"1/2).

You must tighten the mounting screws of the SAE fittings with the following tightening torques.:

Size of screw 4	**Torque value in Nm - Quality 10.9**		
	Half flanges 5a	**Flat flange 5b**	**Conical flange 5c**
M8	31	/	/
M10	62	45	65
M12	108	70	110
M14	172	120	180
M16	264	170	250
M20	350	250	450

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Tab. 5-15 *Tightening torques for SAE fittings - Quality 10.9*

Size of screw 4	Torque value in Nm - Quality 8.8
	Half flanges 5a
M8	22
M10	44
M12	76
M14	122
M16	187

Tab. 5-16 *Tightening torques for SAE fittings - Quality 8.8*

5.10 Oil changes on components

5.10.1 General information

- ❑ The machine must be standing level.
- ▶ Switch off the engine.
- ▶ Wait briefly until the oil has collected in the oil sump.
- ▶ Drain off the oil (preferably when oil is at operating temperature)
- ▶ Add the oil.
- ▶ Check the oil level.

Oil quality and quantity: see lubricant chart.

Change intervals: see lubrication and maintenance chart.

5.10.2 Swing gear - Oil level check and oil change

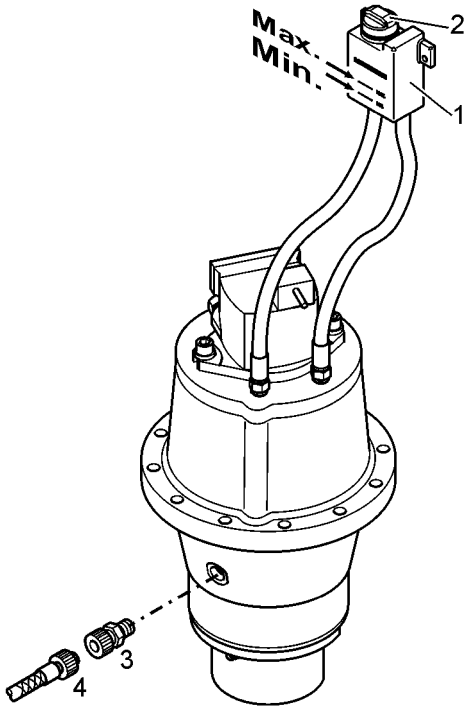

Fig. 5-58 *Checking oil level and changing oil in swing gear*

1 Oil reservoir
2 Cover
3 Drain valve
4 Drain hose

To check the oil level:

When the gear oil is cold, the level in the expansion reservoir **1** should not be below the marking **Min.**

▶ Otherwise add oil until the level reaches the marking **Max.**

To drain the oil:

▶ Remove the cover **2**.

▶ Unscrew the cover of the drain valve **3** via the opening on the upperdeck.

▶ Screw the drain hose provided **4** to the drain valve **3** and let the oil flow out into a suitable container.

▶ Remove the hose **4**.

▶ Screw the cover of the drain valve **3** back on.

To add the oil:

▶ Add the oil in the reservoir until the level reaches the **Max.** marking.

▶ Screw the cover **2** back on.

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5.10.3 Travelling gear - changing the oil

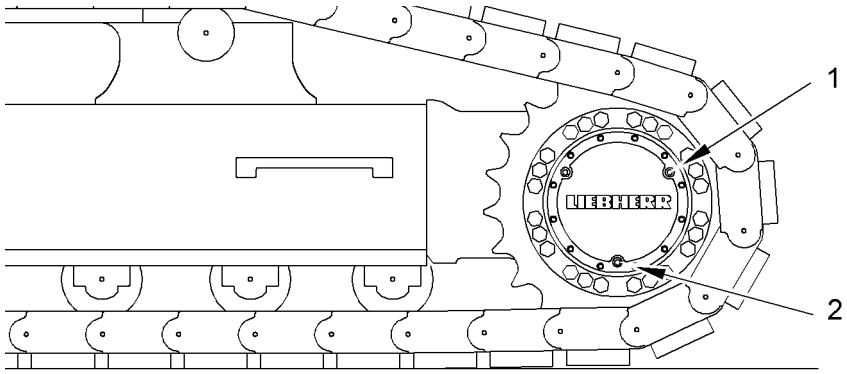

Fig. 5-59 *Travelling gear - adding and draining oil*

❑ Before draining the oil, the drive unit must be operated until one sealing plug is positioned exactly vertical to the centre axle of the transmission (position **2**).

To drain the oil:

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

▶ Place the container beneath the drive unit.

▶ Remove sealing plug **1**.

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

To add the oil:

▶ Screw in sealing plug **2**.

▶ Add the oil until the level reaches the bore hole **1**.

▶ Screw in sealing plug **1**.

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5.10.4 Splitterbox - Oil change

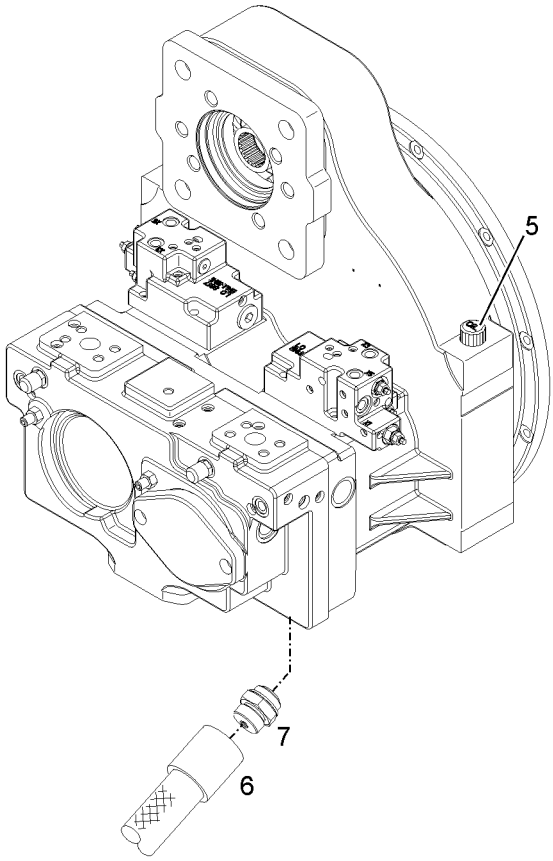

Fig. 5-60 *Changing oil in splitterbox*

5 Dipstick

6 Drain hose

7 Drain valve

Oil draining :

- ▶ Remove 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.

Remplissage en huile :

- ▶ Add the oil via the dipstick drilling until the level reaches the mark on the dipstick **5**.
- ▶ Run the engine for a few minutes, stop it and recheck the oil level.

5.11 Travel gear

The travel gear is maintenance-free until the regeneration of the treads or the cylin-

der or until all running gear parts are completely worn.

The lifetime design of the support rollers, track rollers and idlers increases the running gear's lifetime and metal sealings make it insensitive to dirt.

5.11.1 Checking the travel gear component mountings

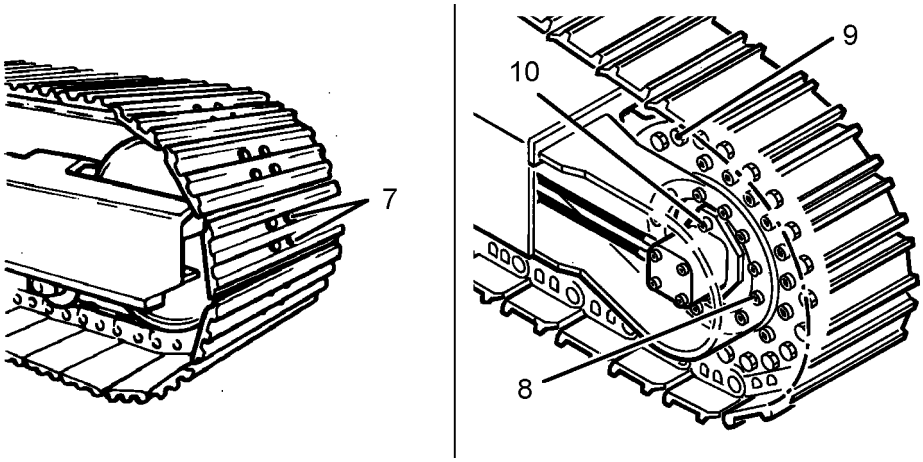

Fig. 5-61 *Travel gear component mountings*

▶ Carry out regular checks for loose mounting screws on the base plates and travel gears.

▶ Monitor tightening torques.

– Mounting screws **7** on track pads:
  • For the track typ B60 (machine type 016, 918, 027) :
    Screw - M20 x 1.5 - 12.9 : **640-760 Nm** (screw lightly lubricated).
  • For the track typ D7 (machine type 023, 169, 033) :
    Screw - 3/4'' x 16 - 12.9 : **680-750 Nm** (screw lightly lubricated).
– Mounting screws **8** on the travel gear : **560 Nm**
– Mounting screws **9** on the sprocket : **560 Nm**
– Mounting screws **10** on the hydraulic motor: **560 Nm**

5.11.2 Monitoring the track tension

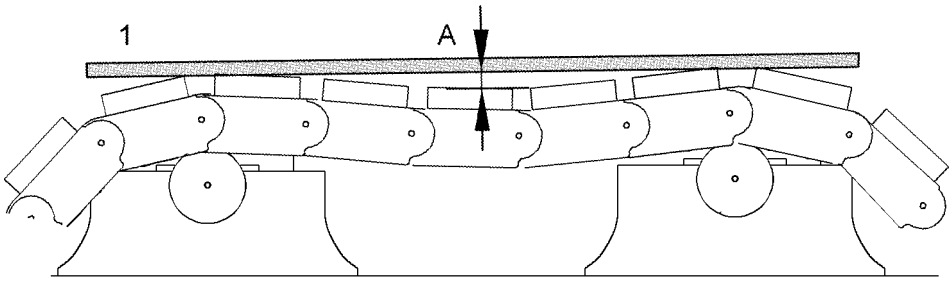

Fig. 5-62 *Monitoring the track tension*

▶ Relieve the track by driving the machine forwards and backwards.

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- ▶ Place the measuring rod **1** in the area between the carrier rollers.
- ▶ Measure distance **A** between the measuring rod lower edge.
  - ↳ The track should, under operating conditions, sag **15 to 20 mm** between the carrier rollers.
  - ↳ Retension the track if necessary.

5.11.3 Retensioning the track

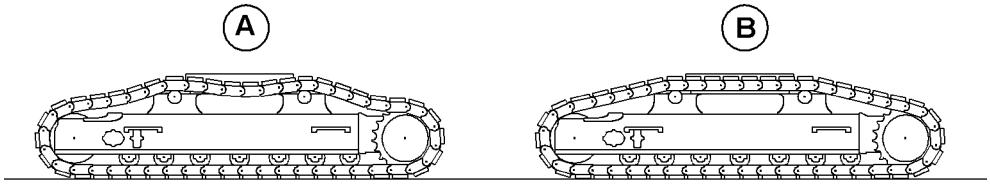

Fig. 5-63 *track when insufficiently (A) and correctly (B) tensioned.*

With normal wear on the travel gear, it is necessary to check the track tension regularly and retension the track if necessary.

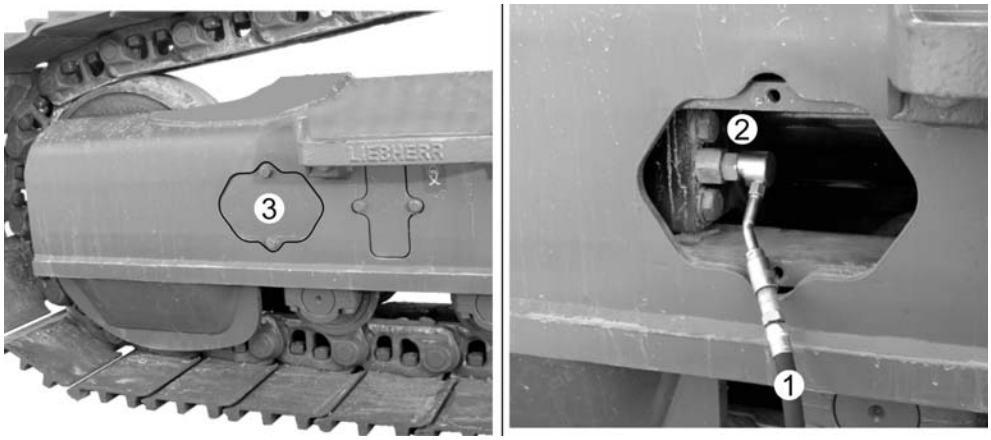

Fig. 5-64 *Retensioning the track*

- ▶ Remove the cover **3** on the side frameundercarriage of the undercarriage.
- ▶ Screw high pressure hose **1** onto the manual grease gun.
- ▶ Through the opening, connect the high pressure hose **1** with the lubricating nipple **2** of the grease tension jack.
- ▶ Inject grease until the track is sufficiently tensioned.
- ▶ Monitoring the track tension

5.11.4 Releasing the track tension

Danger!
Risk of injury due to sudden dropping of the track and spraying grease.

- ▶ When releasing the tension on the track, keep your head away from the track roller frame.

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- ▶ Carefully unscrew lubricating nipple **2** (siehe Fig. 5-64) by several thread pitches until the grease oozes out of the nipple's annular groove.
- ▶ Tighten lubricating nipple **2** as soon as the desired track tension is attained.
- ▶ After the adjustment procedure, drive the machine forwards and backwards and monitor the track tension once again.

5.11.5 Cleaning the travel gear

Do not operate the machine if larger stones, pieces of wood or metal, wires or cables are trapped in the running gear.

Dried or frozen mud and stones or other foreign bodies in the travel gear parts could result in considerable damage to the machine if the machine is operated or an attempt is made to free the machine using engine power.

- ▶ In sub zero temperatures, set the machine on boards to prevent the tracks becoming frozen to the subsoil.

Caution!
To avoid causing considerable damage to the frozen machine, never use force to tear it free.

- ▶ A frozen track can be freed by carefully heating the base plates.

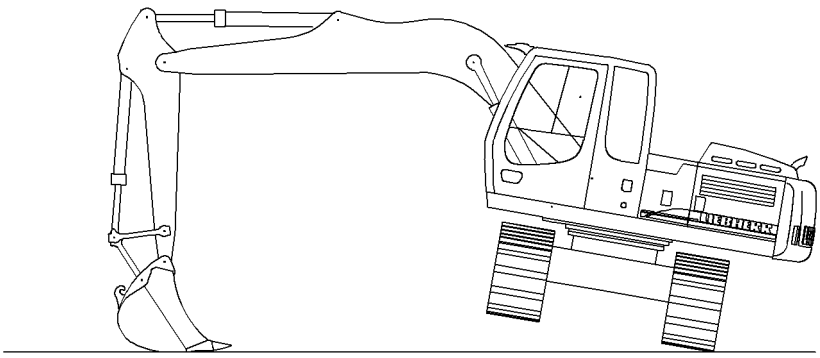

Fig. 5-65 *Raising the machine*

Caution!
The machine could slide away or back.

- ▶ Once you have supported the machine, prop it securely with wooden beams.

- ▶ Before setting down the machine, clean any very dirty parts of the running gear.
- ▶ Clean sand and dirt off the sliding surfaces on the tensioning units and grease.
- ▶ By using the work equipment to support the machine at the side, one side of the undercarriage can be raised to clean the travel gear (siehe Fig. 5-65).

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5.12 Electrical system

5.12.1 Notes on the electrical system

Danger!
Risk of injury due to formation of sparks.

- ▶ Avoid sparks and naked flame when charging batteries or working on the batteries.
- ▶ Always wear protective goggles and gloves.

- ▶ Check that the machine's electrical system is functioning correctly at regular intervals.
- ▶ Burnt-out fuses and bulbs should be replaced immediately once the cause of the defect has been rectified.
- ▶ Rectify defects such as loose connections, abraded cables or badly fastened clamps immediately.
- ▶ Disconnect the batteries when working on the electrical system or when carrying out electric arc welding on the machine.

Danger!
Risk of injury due to formation of sparks.

- ▶ Disconnect the negative terminal (-) first and connect it last.

5.12.2 Main battery switch

Caution!
Take particular care with machines with built-in independent heating.

- ▶ Only switch off the main battery switch when the independent heating's run-on is over.

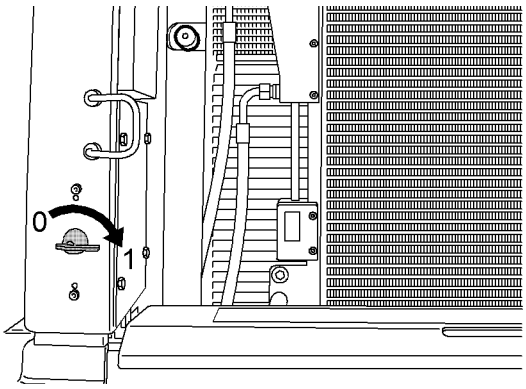

Fig. 5-66 *Main battery switch*

- ▶ Before starting any work on the electrical system, including welding work on the machine, switch the main battery switch to position **0**.
- ▶ When washing the machine, cover the electrical units (particularly the alternator,

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generator, cabling, electronic components and measured value sensor) to prevent water penetrating.

▶ When cleaning the engine with a water / steam jet, do not subject electrical measured value sensors such as oil pressure switches to any direct jets.
  ↳ If this happens, moisture could penetrate and lead to contact corrosion and the failure of the measuring function.
  ↳ Oil pressure switches are not watertight due to the necessary presence of membrane ventilation.

Note!
Batteries can become flat if the machine is out of service for longer periods.

▶ Before laying up the machine for longer periods, switch the main battery switch to position **0** (off).

5.12.3 Battery care

The battery must always be kept clean to ensure that it is able to function perfectly.

▶ Particular care should be taken to clean the pole ends and cable terminals **A** regularly and to then cover them with a thick layer of acidproof grease (siehe Fig. 5-67).

Danger!
Bent rubber hoses on the central gas outlet increase the risk of explosion!
The hydrogen contained in the batteries should not be allowed to build up in the accumulator box and must be able to escape via the rubber hoses. The central gas outlet hoses must be routed without kinks.

▶ Check the condition of the hoses **B** regularly, particularly after installing a battery (siehe Fig. 5-67).

The fluid level in the cells should be 10 to 15 mm above the top of the plate. Only distilled water is to be used for any refilling.

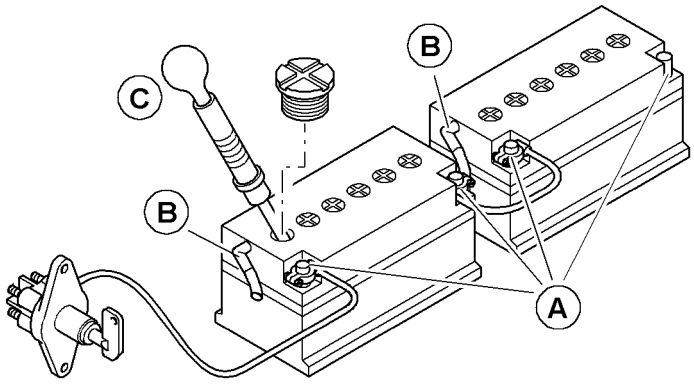

Fig. 5-67 *Battery care*

▶ From time to time, measure the acid concentration **C** using an acid tester.

When the battery is fully charged, the **unit weight is 1.28 kg/l (31.5° Bé)**.

▶ If the acid tester displays a lower value, the batteries is virtually flat and should be charged if necessary.

5.12.4 Slip ring assembly (optional extra)

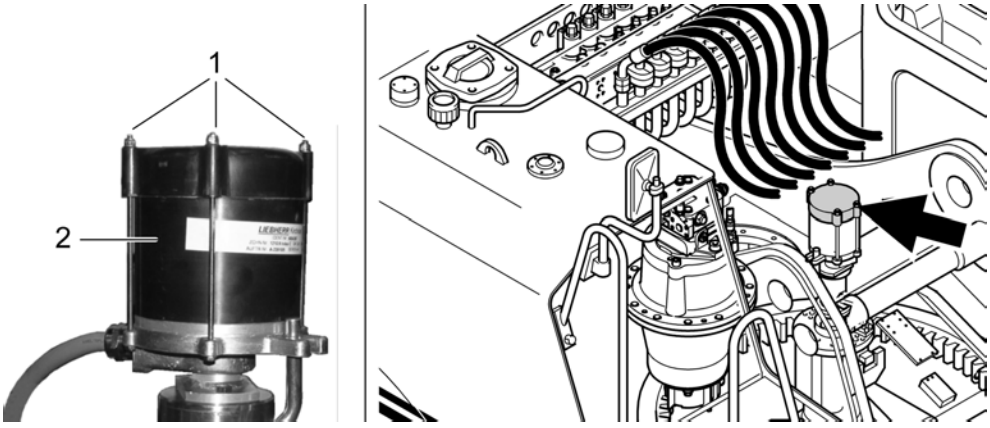

Fig. 5-68 *Slip ring assembly*

Slip ring assemblies are sensitive to moisture. An oxide layer can form on the conductive surfaces, which restricts the flow of current. Electrical consumers in the chassis will no longer be supplied with sufficient current, which can lead to malfunctions.

To prevent this, it is recommended that the following work is carried out every 500 operating hours.

- ▶ Unscrew the lock nuts **1**.
- ▶ Remove the housing **2** of the slip ring.
- ▶ Clean the oxidation off the slip ring assembly (use cleaning spray if necessary).
- ▶ Replace the damaged (corroded) cable lugs.
- ▶ Spray “Cramolin” contact spray on all slip ring elements.
- ▶ Replace the housing **1**.
- ▶ Fasten the housing **1** evenly using lock nuts **2**.

5.13 Heating/air-conditioning system

The machine has a combined heating / air-conditioning system as standard.

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5.13.1 Recirculated and fresh air filters

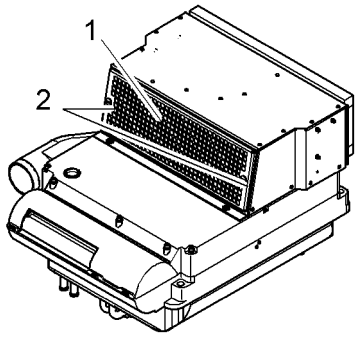

Fig. 5-69 *Recirculated air filter*

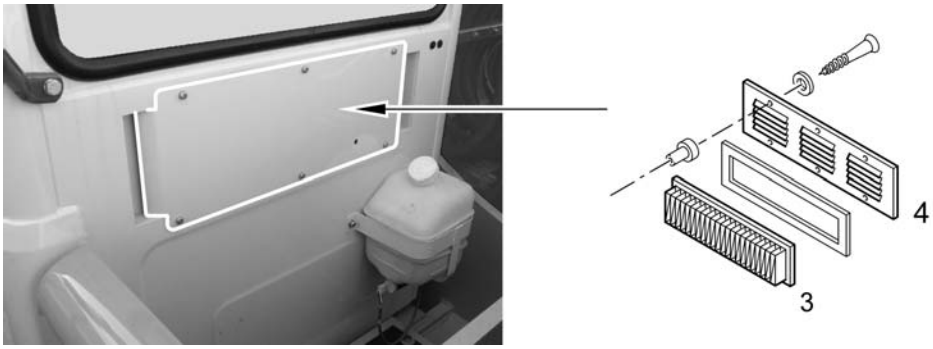

Fig. 5-70 *Fresh air filter*

The air flow in the heating / air-conditioning system is reduced when the filters are dirty and this frequently results in the system icing up or shutting down.

– Remove and clean the recirculated and fresh air filter **1**and**3** every 500 operating hours.
– Shorten cleaning intervals when working in heavy dust conditions.
– Do not operate the machine, even briefly, without these filters, since the heat exchanger **6** will otherwise quickly become blocked (siehe Fig. 5-71).

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.

5.13.2 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.

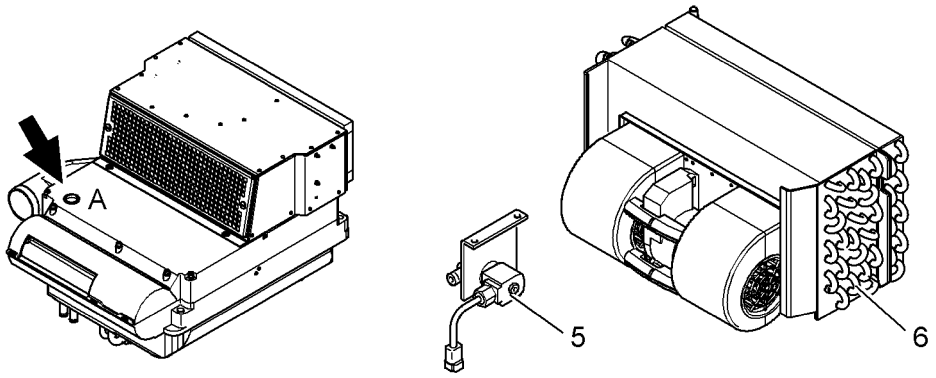

Fig. 5-71 *Heating unit with solenoid valve*

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.

▶ Also ensure that the equalizing hole on the membrane is not blocked with dirt.

To check the heat exchanger:

▶ Check the heat exchanger plates **6** annually for damage.

▶ Blow out with compressed air if dirty.

▶ Align the plates if necessary.

5.13.3 Air-conditioning system

Switch on the air-conditioning system for approx. 10 minutes every 2 or 3 weeks, regardless of the season.

During the operating period, the following maintenance work is to be carried out every 500 operating hours:

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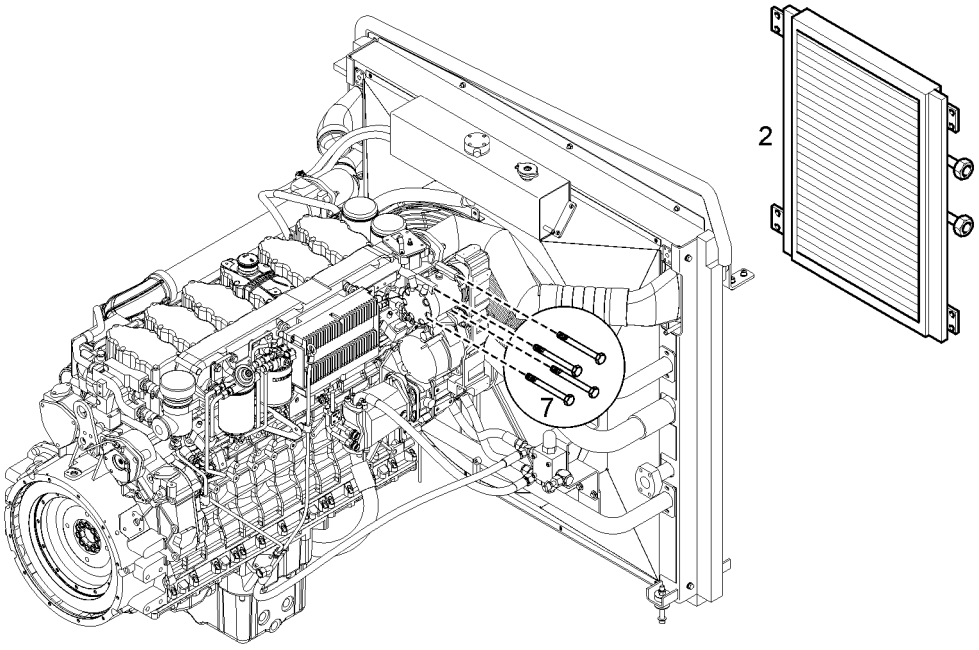

Fig. 5-72 *A/C compressor and capacitor*

2 Capacitor

7 Mounting screws of the compressor

To check the capacitor:

- ▶ Check the capacitor **2** for contamination.
- ▶ If necessary, fold down the capacitor **2** and blow out with compressed air from the inside (blower end) out.
- ▶ Ensure that the capacitor plates are clean.

If heavily contaminated, overpressure forms in the chiller circuit and the air-conditioning system switches off automatically.

To check the A/C compressor:

- ▶ Tighten the mounting screws **7** on the A/C compressor and the bracket on the engine.

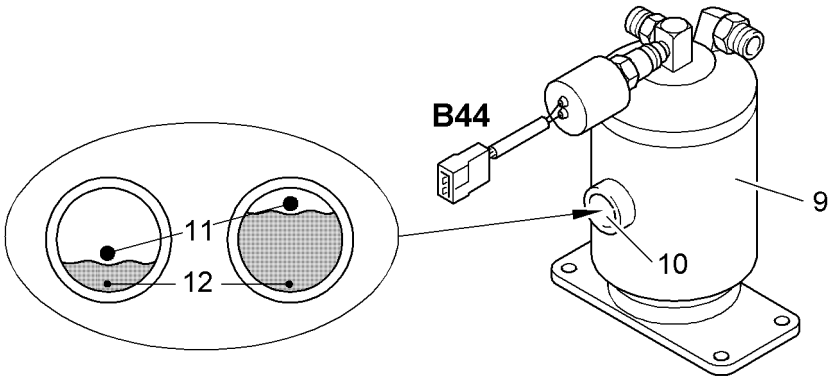

Fig. 5-73 *Dryer-accumulator unit*

To check the dryer-accumulator unit:

- ▶ With the diesel engine running and the air-conditioning system switched on,

check the refrigerant level in the inspection glass **10** of dryer-accumulator unit **9**.

Note!
If there is insufficient refrigerant, the white float **11** lays at the bottom of the inspection glass.

▶ If the cooling effect is diminishing, have the system refilled by a refrigeration engineer.

▶ Determine the degree of moisture of the desiccant in dryer-accumulator unit **9**.

▶ To do this, observe the colour of the indicator pearl **12** in the inspection glass.

If the pearl is orange, the degree of moisture in the coolant circuit is OK. If, however, the pearl is not coloured, the dryer-accumulator unit is saturated with moisture.

▶ Change dryer-accumulator unit **9** immediately.

▶ Perform a visual check on the condition of dryer-accumulator unit **9**.

▶ If it is observed that dryer-accumulator unit **9** is rusted or damaged (e g. on the panel fastening or on the hose connection), replace dryer-accumulator unit **9** (pressure tank).

In the two cases referred to above and at least once a year, have the dryer-accumulator unit **9** replaced by a fitter trained in refrigeration engineering.

The coolant circuit must be emptied, checked for leaks and refilled. Check for abrasion, replace and if necessary retighten the hose connections on the hoses.

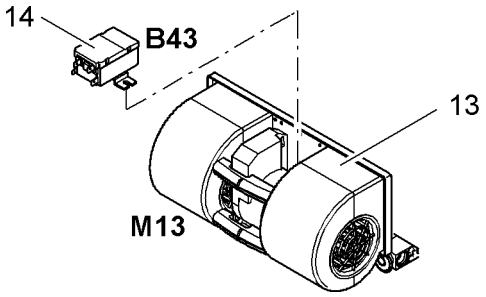

Fig. 5-74 *Fan motor on the heating/air-conditioning device*

Additional maintenance work:

The following maintenance work must also be carried out at least once a year by a fitter trained in refrigeration engineering:

▶ Check the function of the fan motor **13** (M13).

▶ Check the function of the ventilation flaps on the heating / air-conditioning system.

▶ Check the electrical connections for correct positioning (good contact).

▶ Check the electrical lines for abrasions.

▶ Check the defrost thermostat **14** (B43) in the evaporator (function, correct positioning and for damage).

▶ Check the function of the pressure switch **B44** on the dryer-accumulator unit **9** (siehe Fig. 5-73).

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5.14 Greasing the machine

5.14.1 Semi-automatic greasing

The machine is equipped with a semi-automatic central greasing system supplied by an electrical pump. This system saves considerable time during daily greasing and allows an almost complete greasing of the machine.

On standard backhoe attachments, the bearing points located in the area of the connector bracket and bucket cylinder are not connected to the semi-automatic central greasing system.

With special attachments (Telescopic stick, hydraulic offset boom, demolition stick...) some bearing points at the attachment or at the working tool are also possibly not connected to the semi-automatic lubrication system.

All these bearing points not connected to the semi-automatic lubrication system have to be lubricated daily via separately mounted, red marked lubricating nipples.

Operating the greasing system

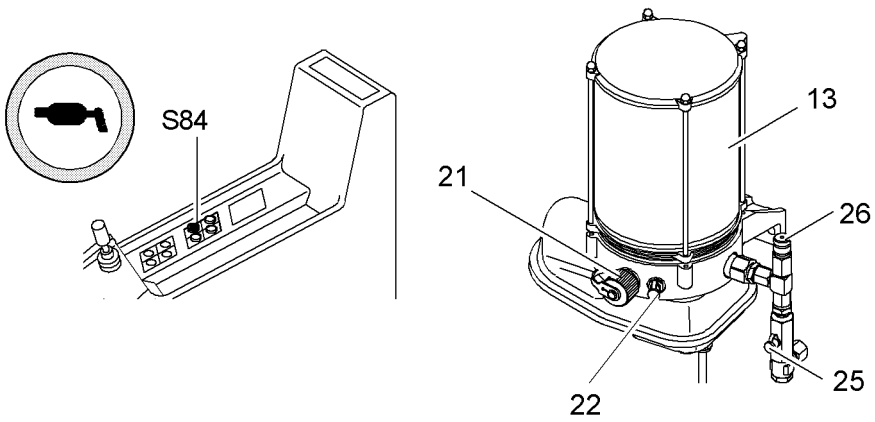
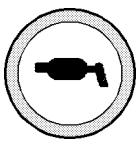


Fig. 5-75 *Central greasing pump*

13	Grease container	**21**	Adapter
22	Lubricating nipple – fill grease container	**25**	Lubricating nipple - fill central greasing system
S84	Greasing	**26**	Safety valve



❑ After switching on the machine,

▶ Press button **S84**
- ↳ the telltale light in button blinks.
- ↳ The greasing operation starts.

▶ By formation of grease bulges on bearings of boomcylinders **9** and **9 bis**, on piston's frontal surface side, press button **S84**.
- ↳ the telltale light in button lights off.
- ↳ The greasing operation is finished.

Warning !
Be sure to lubricate daily with a hand greasing pump all the bearing points that are not connected to the to the semi-automatic lubrication system (siehe “Greasing with the hand greasing pump” auf Seite 88)

The following defects are possible:

– Blockage or pinching of a supply line (grease flows out of safety valve **26**) or blockage in an oiling point.
– Defective proximity switch or defect in its supply cable.
– When very cold, the use of a grease which is too viscous.
– Lack of lubricant in the grease container.
– Breakdown in drive motor's supply circuit.

▶ Find and rectify the cause of the problem immediately.

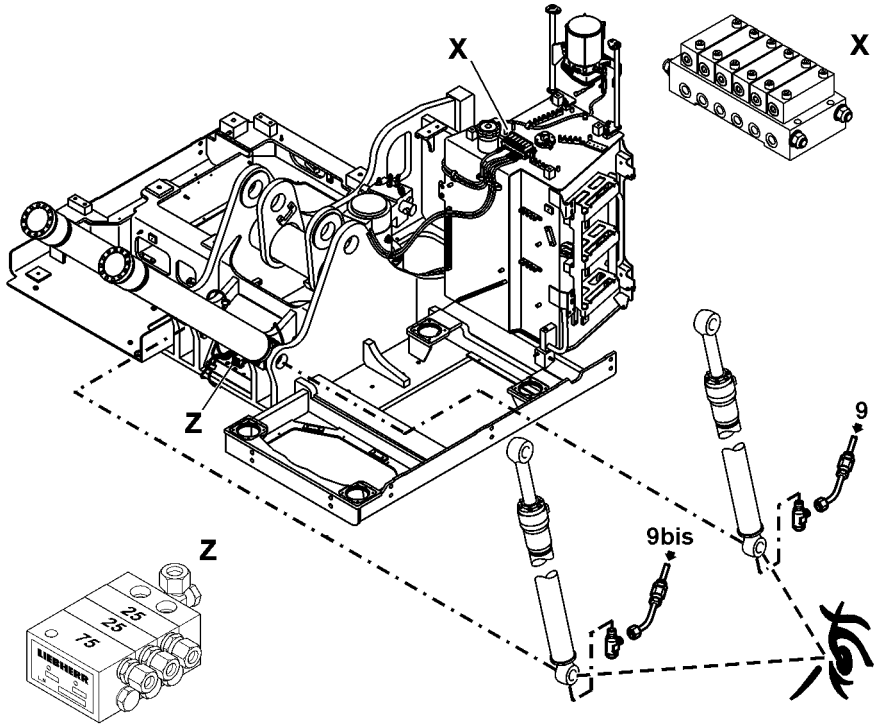


Fig. 5-76 *Semi-automatic greasing system*

When the greasing system is functioning, additional greasing with the greasing pump can be carried out at any time by pressing button **S84** on the right control panel.

If the greasing pump is defective, the attached greasing points can be greased centrally with a greasing pump via lubricating nipple **25**.

▶ Press grease in on the central lubricating nipple using the manual grease gun provided in the toolbox until formation of grease bulges on bearings of boomcylinders **9** and **9 bis**.

Grease quality: see lubrication chart

Greasing with the hand greasing pump

On standard backhoe attachments, the bearing points located in the area of the connector bracket and bucket cylinder are not connected to the semi-automatic central greasing system. The lubrication of these bearing points must be done via the 5 lubricating nipples **3** with the hand greasing pump.

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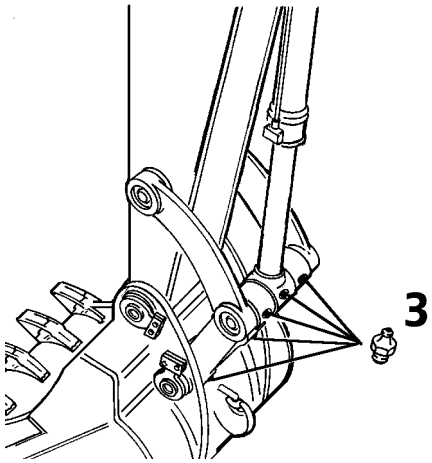

Fig. 5-77 *Grasing of the connector bracket and bucket cylinder*

With special attachments (Telescopic stick, hydraulic offset boom, demolition stick...) some bearing points at the attachment or at the working tool are also possibly not connected to the semi-automatic lubrication system.

All these bearing points not connected to the semi-automatic lubrication system have to be lubricated daily via separately mounted, red marked lubricating nipples.

Refilling the grease container

The level of grease in the grease container is to be checked once weekly and refilled if necessary. Refilling the grease container is usually carried out via the special adapter **21**.

▶ Insert a grease cartridge in the hand pump supplied, connect the pump to the adapter **21** and press the contents of the grease cartridge into the container.

If the hand pump or grease cartridge are not available, a grease pump can be used to fill the grease container using lubricating nipple **22**.

After filling the grease container, intermediate greasing must be started using button **S84** in the armrest.

5.14.2 Automatic greasing (optional extra)

On request, the semi-automatic central greasing system of the machine can be replaced by the automatic central greasing system.

This system equipped with a pump of bigger capacity and with an electronical modul. This modul allows a complete automatic greasing.

On standard backhoe attachments, the bearing points located in the area of the connector bracket and bucket cylinder are not connected to the automatic central greasing system. Nevertheless, an option allows to connect the bearing points to the automatic greasing system.

With special attachments (Telescopic stick, hydraulic offset boom, demolition stick...) some bearing points at the attachment or at the working tool are also possibly not connected to the semi-automatic lubrication system.

All these bearing points not connected to the semi-automatic lubrication system have to be lubricated daily via separately mounted, red marked lubricating nipples.

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Operating the greasing system

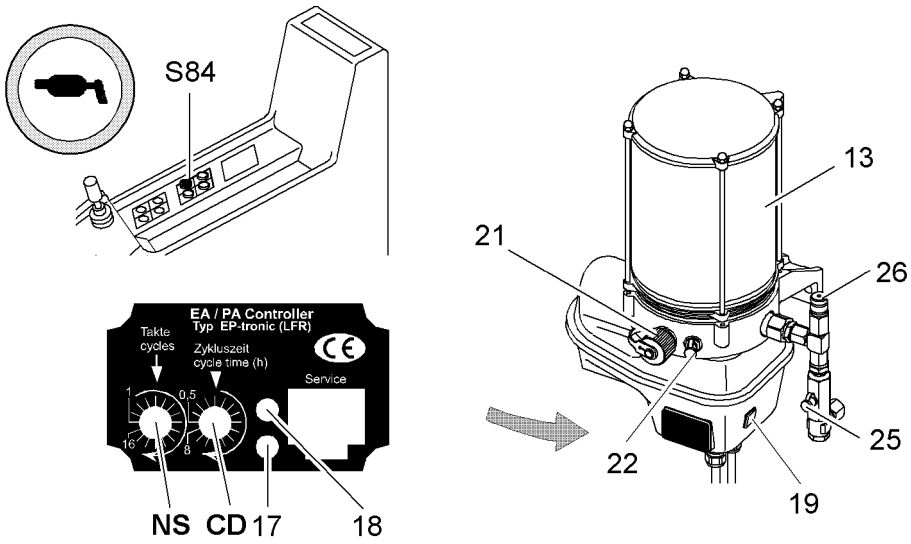

Fig. 5-78 *Central greasing pump*

13	Grease container	**21**	Adapter
17	LED, green	**22**	Lubricating nipple – fill grease container
18	LED, red	**25**	Lubricating nipple - fill central greasing system
19 / S84	Reset button and Intermediate greasing	**26**	Safety valve
NS /	Number of Strokes	**CD**	Cycle duration

After switching on the machine, the telltale light in button **S84** illuminates on the right control panel and the green LED **17** illuminates on the greasing pump for approx. 1.5 seconds. This indicates that the electrical pump is ready to operate.

The greasing process begins automatically after a pause and stops when all bearing points have been greased without the operator having to become involved.

Warning !
Be sure to lubricate daily with a hand greasing pump all the bearing points that are not connected to the to the semi-automatic lubrication system (siehe “Greasing with the hand greasing pump” auf Seite 88)

Throughout the greasing process, button **S84** and green LED **17** are continuously illuminated. If there is a malfunction, both button **S84** and LEDs **17** and **18** flash simultaneously. The following defects are possible:

– Blockage or pinching of a supply line (grease flows out of safety valve **26**) or blockage in an oiling point.
– Defective proximity switch or defect in its supply cable.
– When very cold, the use of a grease which is too viscous.
– Lack of lubricant in the grease container.
– Breakdown in drive motor's supply circuit.
– Grease filter on the central lubricating nipple is contaminated.

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▶ Find and rectify the cause of the problem immediately.

When the greasing system is functioning, additional greasing with the greasing pump can be carried out at any time by pressing button **S84** on the right control panel or by pressing button **19** on the greasing pump.

If the greasing pump is defective, the attached oiling points can be greased centrally with a greasing pump via lubricating nipple **25**.

In this case, press daily or per working shift approx. 80 cm3 grease into the fitting **25**

Adjustement and grease consumption

The Cycle Duration can be adjusted between 0,5 and 8 hours via the rotary switch **CD** (Cycle Duration) after removal of the transparent protection cover.

From factory, the Cycle Duration is adjusted to 1 hour.

The Number of Strokes to be carried out at main distributor for a complete lubricating procedure can be adjusted between 1 and 16 via the rotary switch **NS** (Number of Strokes) after removal of the transparent protection cover.

From factory, the number of strokes is adjusted to 6.

The factory adjusted values for cycle duration and number of strokes determine a lubricant consumption of approx. 20 cm3 grease per lubrication cycle, it equals approx. 2 kg (10.2 lbs) grease every 100 working hours.

Refilling the grease container

The level of grease in the grease container is to be checked once weekly and refilled if necessary. Refilling the grease container is usually carried out via the special adapter **21**.

▶ Insert a grease cartridge in the hand pump supplied, connect the pump to the adapter **21** and press the contents of the grease cartridge into the container.

If the hand pump or grease cartridge are not available, a grease pump can be used to fill the grease container using lubricating nipple **22**.

After filling the grease container, intermediate greasing must be started using button **19** on the greasing pump or button **S84** in the armrest.

5.14.3 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.

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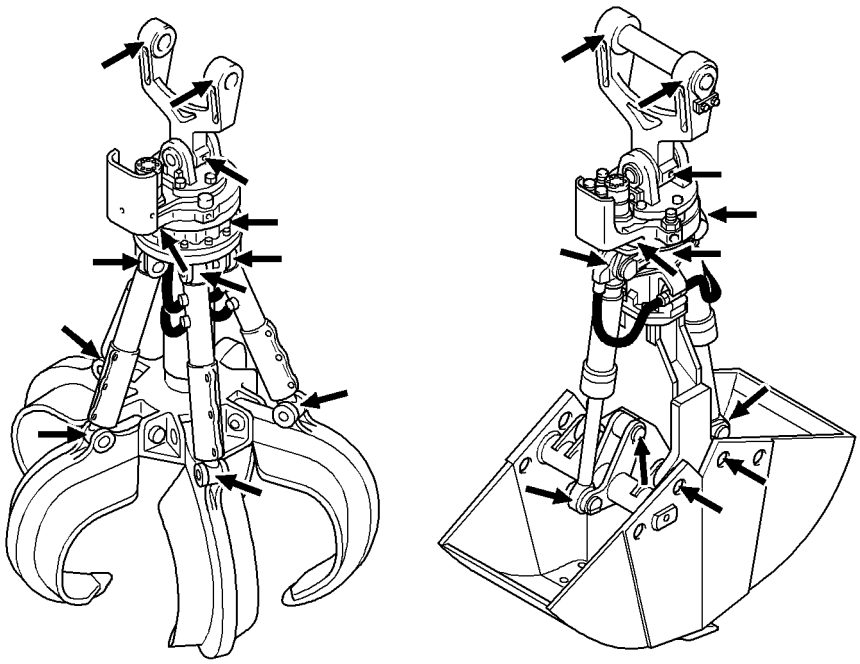

Fig. 5-79 *Greasing the grab*

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

5.15 Quick-change systems

5.15.1 Greasing the mechanical quick-change adapter (optional extra)

The mechanical quick-change adapter is not lubricated via the central greasing system. The bearing points must be greased using the grease gun.

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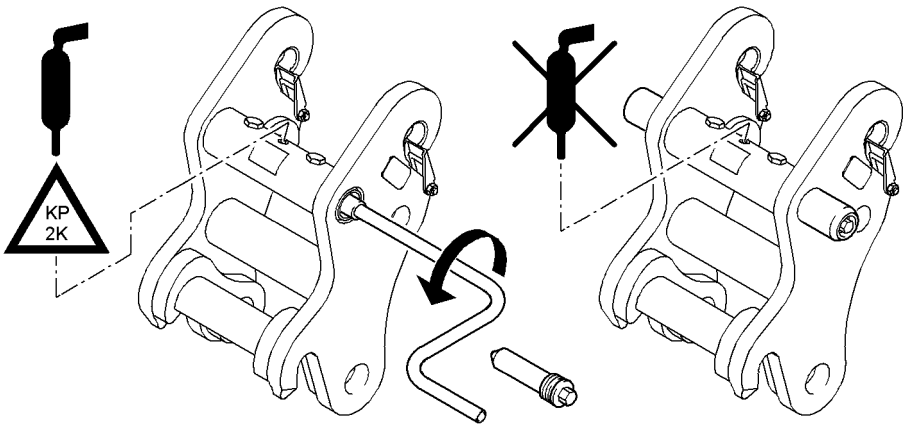

Fig. 5-80 *Greasing the mechanical quick-change adapter*

▶ Grease the bearing points via the lubricating nipple using a grease gun.

Grease quality: see “Lubricating and operating materials”

Note!
If the mechanical quick-change adapter is greased when the pin is drawn out, the hollow area between the locking pins fills with grease and the pins can no longer be reinserted.

▶ Ensure that the locking pins are inserted when greasing.

5.15.2 Hydraulic quick-change adapter (optional extra)

Greasing the quick-change adapter

The hydraulic quick-change adapter is not lubricated via the central greasing system. The bearing points must be greased using the grease gun.

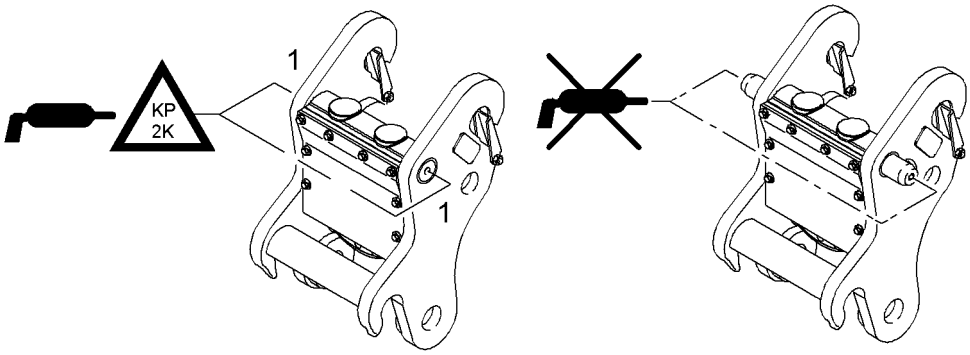

Fig. 5-81 *Greasing the quick-change adapter*

▶ Grease the locking pins **1** via the lubricating nipple using a grease gun.

Note!
The hydraulic quick-change adapter cannot be sufficiently greased if the locking pins are drawn out.

▶ Ensure that the locking pins are inserted when greasing.

Cleaning the sieve filter

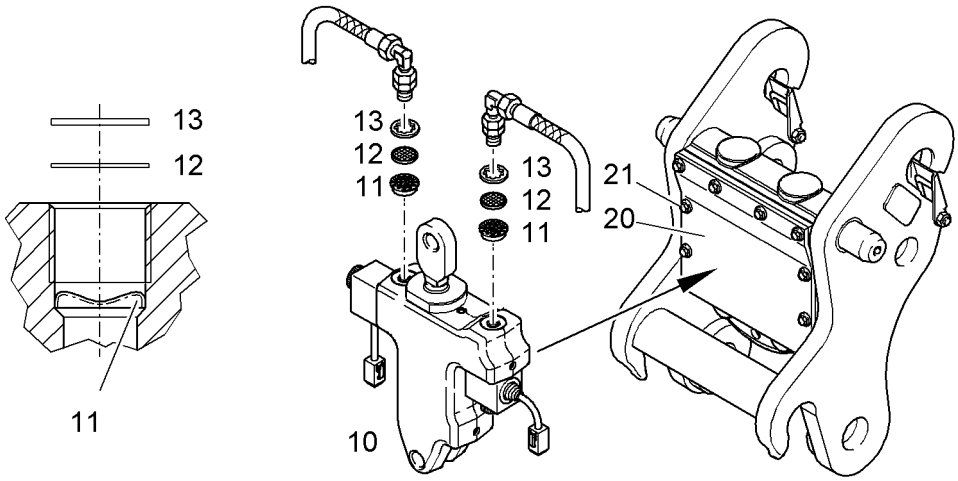

Fig. 5-82 *Cleaning the sieve filter*

The filter disc **12** in the bolt connections between the connecting hoses and the hydraulic cylinder must be checked for blockages and, if necessary, cleaned every 2000 operating hours.

- ▶ Remove the cover **20** and the screws **21** from the quick-change adapter.
- ▶ Remove bolt connections and hydraulic hoses from the hydraulic cylinder **10**.
- ▶ Screw out the outer mounting assembly **13** using a suitable tool (e g. a scribe).
- ▶ Remove the filter disc **12** , check and if necessary clean or replace it.
- ▶ Place the filter disc **12** on the inner mounting assembly **11** and mount the outer mounting assembly **13**.
- ▶ Connect bolt connections and hydraulic hoses to hydraulic cylinder 10.
- ▶ Fasten the cover **20** with the screws **21** on the quick-change adapter.

5.15.3 LIKUFIX (optional extra)

Cleaning LIKUFIX

The LIKUFIX hydraulic coupling system is mostly maintenance-free.

It is recommended that the system is cleaned at regular intervals and sprayed with lubricating varnish (see Workshop manual). This will prevent dirt adhering and icing up.

If the system is kept properly clean, the seals are very durable.

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Replacing the sealing ring

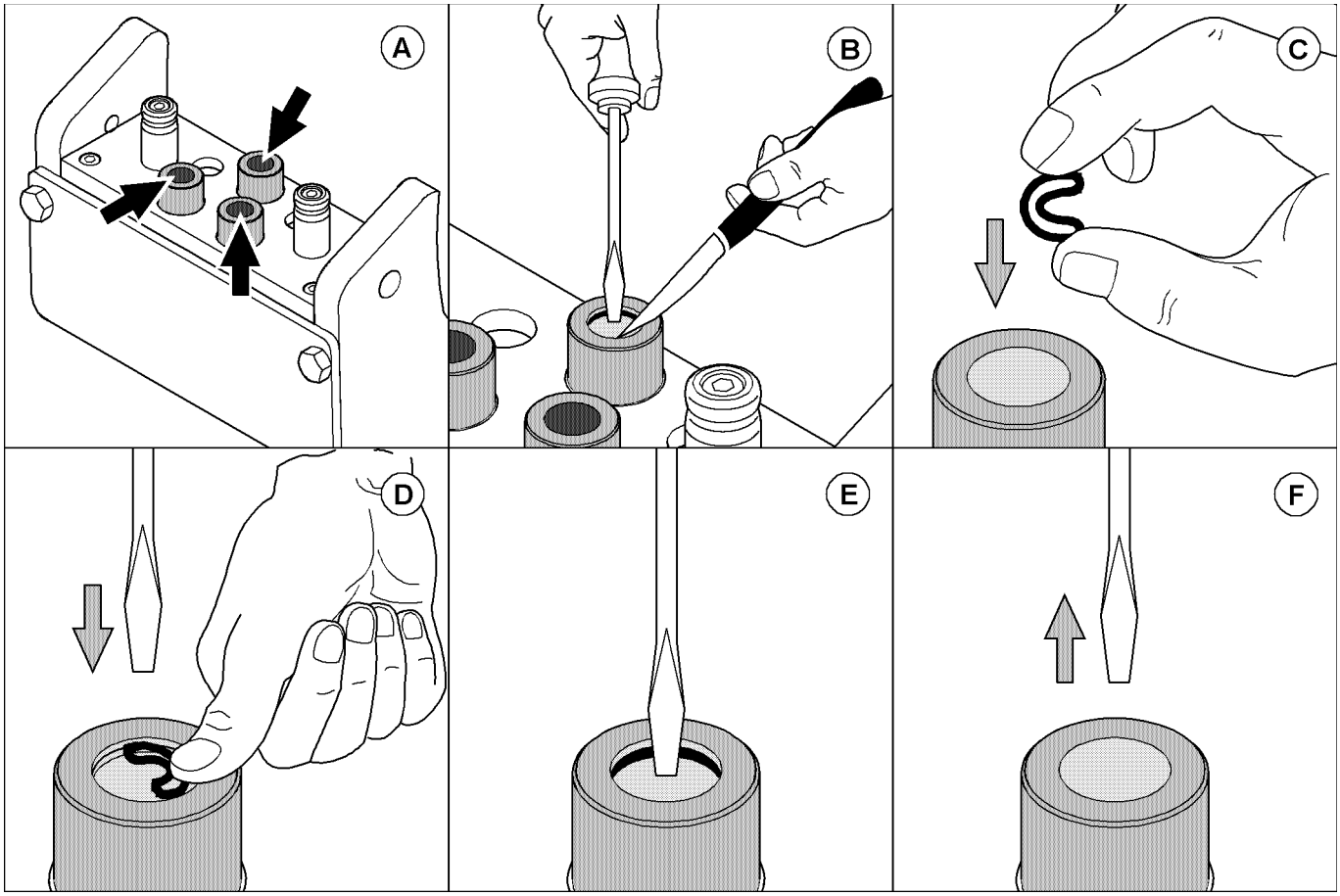

Fig. 5-83 *Replacing the sealing ring*

If leaks occur at the coupler plugs (**A** , see arrows), the sealing rings should be replaced.

- ▶ Use a screwdriver to push down the sealing washer and lever out the defective sealing ring using a pointed object (**B**).
- ▶ Press the new sealing ring together and place it on the sealing washer with the open side down (**C**).
- ▶ Press down the washer as far as the groove, place the screwdriver in the middle of the sealing ring and move your hand away (**D**).
- ▶ Allow the sealing ring to jump into the groove (**E**).
- ▶ Remove the screwdriver (**F**).
  - ↳ The sealing washer must move upwards. If necessary, press the sealingring again until the sealing washer is flexible.

5.16 Drive unit brakes and swing gear brakes

Both the drive unit brakes and the swing gear brakes are spring-applied, pressure-released multi-plate brakes. They are ventilated hydraulically and are fully sealed and integrated in the travel gear or swing gear transmission.

Their usage purely as parking brakes makes them wear-free and therefore mainte-

nance free.

5.17 General maintenance points

5.17.1 Replacing working parts

In addition to the normal maintenance and repair work that is to be carried out at the given intervals, the machine operator and maintenance personnel can also carry out the repairs referred to below:

– Replacing worn teeth on the bucket.
– Replacing defective sealing material on the pipe and hose system and on the hydraulic unit connections (not, however, on pressure relief valves which are lead sealed at the works).
– In addition, high pressure hoses, hydraulic lines and bolt connections on the hydraulic system can be replaced.

It should be noted that only original LIEBHERR replacement parts are to be used.

This is particularly relevant for hoses and hydraulic lines, which must be preassembled at the works. For all other repairs, particularly when dismounting the ballast weight, works and dealership fitters are to be consulted.

5.17.2 Replacing the teeth on the bucket

Determine the degree of wear of the teeth visually.

With heavily worn teeth, considerably greater force will be required when using the bucket to penetrate the material to be excavated. The teeth must be replaced in good time to prevent any damage occurring to the tooth fitting piece.

Do not work with the machine if teeth on the bucket are missing or are heavily worn.

To attach and dismount the teeth:

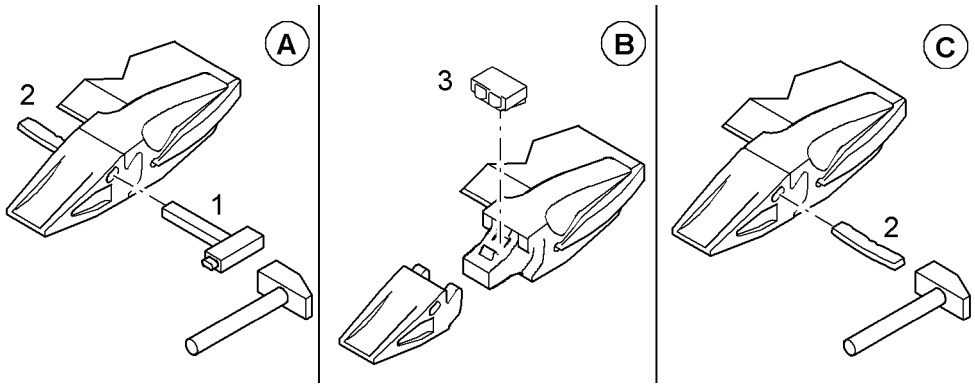

Fig. 5-84 *Replacing the teeth*

▶ Use a hammer and ejector drift **1** to knock out the wedge **2** (**A**).

▶ Remove the old tooth.

▶ Place a new rubber wedge holder **3** onto the tooth holder (**B**).

▶ Push the new tooth onto the fitting piece.

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▶ Use the hammer to knock in the wedge **2** (**C**).

Teeth system sizes : Machine :	**ST 13 914 - 934**	**ST 16 914 - 944**	**ST 20 934 - 944**	**ST 25 944 - 964**
Wedge K	K13 3001157	K16 3001114	K20 3001158	K25 3001159
Wedge holder G	G13 9335853	G16 9329709	G20 9351304	G25 9351306
Tooth C	Z13C 3001288	Z16C 3001318	Z20C 3001319	Z25C 3001130
Tooth CL	Z13CL 3001579	Z16CL 3001132	Z20CL 3001588	Z25CL 3001589
Tooth L	Z13L 3001262	Z16L 3001216	Z20L 3001232	Z25L 3001235
Tooth SL	Z13SL 3001554	Z16SL 3001556	Z20SL 3001556	
Tooth R	Z13R 3001263	Z16R 3001217	Z20R 3001233	Z25R 3001236
Tooth P	Z13P 3001264	Z16P 3001218	Z20P 3001234	Z25P 3001237
Tooth PF	Z13PF	Z16PF 3001440	Z20PF 3001443	Z25PF

Tab. 5-17 *Designation and ordering n° of elements*

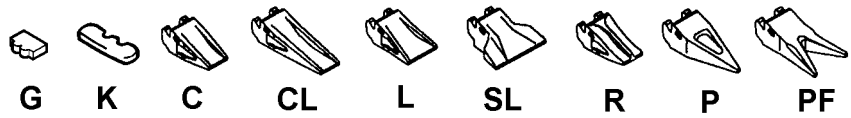

Fig. 5-85 *Thooth types*

5.17.3 Welding work on the machine

Welding work on all main components serving the power transmission (such as the chassis frame, rotating platform, equipment parts etc.) may only be carried out by the manufacturer or by an authorized workshop.

▶ Disconnect the batteries before starting any electric arc welding work on the machine.

▶ Always disconnect the negative terminal (-) first and reconnect it last.

▶ Switch off the main battery switch!

Caution!
If high currents flow through the bearings or sealing elements, these could be burnt.

▶ Move the earthing cable of the welding tool as close as possible to the welding surface so that the welding current cannot flow over parts like the slewing ring, hinges, bearings, sockets, rubber elements or seals.

5.18 Control and maintenance chart

Caution!
Careful maintenance can only be carried out when the machine is clean. In particular, visual checks such as crack testing are only possible on a clean machine.

▶ Clean the machine before you start maintenance work (see also the chapter “Safe maintenance of the machine”, subheading “Cleaning and crack testing”).

Note
The daily maintenance work of the driver include the check of the proper function of hydraulic, electric and brakes systems before starting operation.
He must alos perform daily a visual check of engine, hydraulic system, gears and track parts for leaks.

Maintenance / inspection at operating hours						**WORK TO BE CARRIED OUT R 934 C-Litronic**		
On delivery	Every 8 - 10	Every 10 -50	At 500, 1500	At 1000, 3000	At 2000, 4000	**By maintenance personnel (machine owner)** ■ First and only interval ● Repeat interval ♦ Special interval every 250 hours	**By authorized specialist personnel** ❑ First and only interval ❍ Repeat interval	**Note**
						DIESEL ENGINE AND SPLITTERBOX		
❍	●	●	❍	❍	❍	Check oil level in engine		
❍	●	●	❍	❍	❍	Check oil pressure and coolant temperature during operation		
❍	●	●	❍	❍	❍	Check air filter on maintenance display		
	●	●	❍	❍	❍	Check and drain water separator on fuel filter (or when the corresponding symbol appears on the display)		
		●	❍	❍	❍	Check coolant level		
		●	❍	❍	❍	Drain off water and sediment at fuel tank		
		●	❍	❍	❍	Empty dust discharge valve on air filter (shorten or extend interval as required)		
		●	❍	❍	❍	Check oil level in splitterbox		
			❍	❍	❍	Check and clean cooler and ventilator		
			❍	❍	❍	Check condition of belt for A/C compressor and alternator installation		
			❍	❍	❍	Replace lubricating oil filter cartridge (at least 1 x yearly)		
			❍	❍	❍	Replace engine oil (at least 1 x yearly)		1)
			❍	❍	❍	Replace splitterbox oil		
			❍	❍	❍	Check oil, cooling and fuel system for leaks and condition		

Tab. 5-18

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Maintenance / inspection at operating hours						WORK TO BE CARRIED OUT R 934 C-Litronic		
On delivery	Every 8 - 10	Every 10 -50	At 500, 1500	At 1000, 3000	At 2000, 4000	**By maintenance personnel (machine owner)** ■ First and only interval ● Repeat interval ♦ Special interval every 250 hours	**By authorized specialist personnel** ❑ First and only interval ❍ Repeat interval	**Note**
			❍	❍	❍	Check anti-corrosion fluid / antifreeze in coolant, if necessary rectify the mixture concentration		
			❍	❍	❍	Check electronic control unit mounting		
			❍	❍	❍	Check sensor and cable connections for sound condition		
			❍	❍	❍	If mounted, carry out the maintenance of the diesel particulate filter Engelhard		
			❑	❍	❍	Check intake and emission system for leaks and condition (first time at 500 op. hours)		
			❑	❍	❍	If mounted, replace bypass oil filter element (first 500 hours, and at least every 6 months)		
				❍	❍	Check / adjust valve clearance		
				❍	❍	Check engine console, oil sump and splitterbox mounts		
				❍	❍	Grease flywheel tooth		
				❍	❍	Replace fuel fine filter cartridge (or if powerloss)		4)
				❍	❍	Replace fuel preliminary filter cartridge (or if powerloss)		4)
				❍	❍	Replace oil separator fliter		
						Check heat flange (before start of winter)		
						Replace air filter main element (according to maintenance display / at least annually)		
						Replace air filter safety element (every third change of main element / at least annually)		Never clean!
						Check air hoses between air filter and engine (at filter maintenance)		
						Replace antifreeze and anticorrosive coolant mixture (every 2 years or every 3000 hours) (only for authorized specialist personnel)		
						Check vibration damper for distortion (every 3000 op. hours)		
HYDRAULIC SYSTEM								
❍	●	●	❍	❍	❍	Check oil level in hydraulic tank		
❍	■	●	❍	❍	❍	Clean magnetic bar in return-line filter (daily during first 300 op. hours)		
			❍	❍	❍	Replace filter unit on control oil unit		
			❍	❍	❍	Replace replenishing oil filter on swing pump		

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Maintenance / inspection at operating hours						WORK TO BE CARRIED OUT R 934 C-Litronic		
On delivery	Every 8 - 10	Every 10 -50	At 500, 1500	At 1000, 3000	At 2000, 4000	**By maintenance personnel (machine owner)** ■ First and only interval ● Repeat interval ♦ Special interval every 250 hours	**By authorized specialist personnel** ❑ First and only interval ❍ Repeat interval	**Note**
			❍	❍	❍	Check unit mounts		
			❍	❍	❍	Check and clean hydraulic oil cooler and ventilator		4)
			❍	❍	❍	Drain off water in hydraulic tank (when using environmentally acceptable fluids, max. 0.1 % water proportion permissible, insert partial flow filter, take oil sample)		
			❍	❍	❍	If mounted check return filter for hydraulic hammer for cleanliness, replace element if necessary		
			❑	❍	❍	Replace filter unit in return-line filter (first time at 500 op. hours)		2)
			❑	❍	❍	Clean or replace filter unit of leak oil filter (first time at 500 op. hours) Replacement necessary after max. 3 cleanings		2)
			❑	❍	❍	If mounted, replace bypass oil filter element (first time at 500 op. hours)		2)
				❍	❍	Check hydraulic system for leaks and function		
				❍	❍	Check / adjust servo, primary and secondary pressures		
					❍	Replace hydraulic oil in tank (or optimise interval with oil analyses)		2), 3)
					❍	Bleed hydraulic pumps (when replacing oil)		
					❍	Replace ventilation and vent filters on hydraulic tank		2)
ELECTRICAL SYSTEM								
❍	●	●	❍	❍	❍	Check indicator lights and display devices		
❍				❍	❍	Check lighting		
			❍	❍	❍	Check acid concentration and level on batteries		
			❍	❍	❍	Check cable terminals and pole ends on batteries		
			❍	❍	❍	Spray slip rings on swing connection (if present) with Cramolin contact spray		
❍				❍	❍	Check function of entire system and units		
SWING GEAR TRANSMISSION								
❍			❍	❍	❍	Check oil level and look for leaks		
			❑	❍	❍	Replace transmission oil (first time at 500 op. hours).		
				❍	❍	Check function and operation of slewing gear brake		
				❍	❍	Check transmission and oil motor mounts		

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Maintenance / inspection at operating hours						WORK TO BE CARRIED OUT R 934 C-Litronic		
On delivery	Every 8 - 10	Every 10 -50	At 500, 1500	At 1000, 3000	At 2000, 4000	**By maintenance personnel (machine owner)** ■ First and only interval ● Repeat interval ♦ Special interval every 250 hours	**By authorized specialist personnel** ❑ First and only interval ❍ Repeat interval	**Note**
			❑	❍	❍	Replace transmission oil (first time at 500 op. hours).		
						BALL SWING RING		
				❍	❍	Check mounting screws for correct positioning and slewing gear pinion contact		
				❍	❍	Check pinion gear mesh		
						TRAVEL GEAR		
❍			❍	❍	❍	Check for leaks		
				❍	❍	Check transmission and oil motor mounts		
			❑		❍	Replace transmission oil (first time at 500 op. hours)		
						TRACKS		
❍	●	●	❍	❍	❍	Visual check on track tension, retension if necessary		
	●	●				Clean track (when work is finished)		
		●	❍	❍	❍	Check mounts on track pads and sprockets		
			❍	❍	❍	Clean and grease sliding surfaces of tensioning device		
			❍	❍	❍	Check for leaks on idlers, carrier rollers and track rollers		
						CAB + HEATING		
		●	❍	❍	❍	Check / refill washing fluid in windscreen washer system container		
❑				❍	❍	Check heating function (before start of winter)		
				❍	❍	Check heating system for leaks		
				❍	❍	Check door and window hinges and locks		
					❍	Check water inlet valve for function and dirt, clean if necessary		
						AIR-CONDITIONING SYSTEM		
		●	❍	❍	❍	Switch on air-conditioning system regularly (at least 1 x every 14 days)		
			❍	❍	❍	Check capacitor for contamination, blow out if required		

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Maintenance / inspection at operating hours						WORK TO BE CARRIED OUT R 934 C-Litronic		
On delivery	Every 8 - 10	Every 10 -50	At 500, 1500	At 1000, 3000	At 2000, 4000	**By maintenance personnel (machine owner)** ■ First and only interval ● Repeat interval ♦ Special interval every 250 hours	**By authorized specialist personnel** ❑ First and only interval ❍ Repeat interval	**Note**
			❍	❍	❍	Clean recirculated / fresh air filter, replace if required, shorten maintenance interval for heavy dust use		
			❍	❍	❍	Check mounting screws and compressor drive belt		
			❍	❍	❍	Check dryer-collector unit (moisture, fill and condition), replace if required		
					❍	Check evaporator unit, clean if required		
					❍	Check electrical lines for abrasions and plug connections for correct positioning		
					❍	Check overpressure switch for function		
					❍	Check refrigerating capacity after opening or repair, or as required		
						Replace dryer-collector unit annually, check coolant circuit for leaks and replace refrigerant and refrigerant oil		
						Have function of ventilation flaps and defrost thermostat checked annually by a refrigeration engineer		
UNDERCARRIAGE + UPPERCARRIAGE + ATTACHMENT								
	●	●	❍	❍	❍	Grease bearing points (undercarriage and attachment) via centralised lubrication system or direct on bearing points if itis not connected to the centralised lubrication system		
		●	❍	❍	❍	Visually check wear condition of teeth		
		♦	❍	❍	❍	Check parts for cracks		
		♦	❍	❍	❍	Check ballast weight and tanks mounts		
			❍	❍	❍	Check line and screw connections for correct positioning		
				❍	❍	Check trim panel hinges, quick-release fasteners and gas pressure springs of hatches. Lubricate or change the components if necessary.		
❍				❍	❍	Check the lowering speed of the attachment		~4 sec.
❍						Indicate appropriate use of attachment		
❍						Have device lubricated according to lubrication chart by device operator and indicate any operating errors.		
HYDRAULIC QUICK-CHANGE ADAPTER								
❍	●	●	❍	❍	❍	Check function of visual and acoustic warning devices		

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Maintenance / inspection at operating hours						WORK TO BE CARRIED OUT R 934 C-Litronic		
On delivery	Every 8 - 10	Every 10 -50	At 500, 1500	At 1000, 3000	At 2000, 4000	**By maintenance personnel (machine owner)** ■ First and only interval ● Repeat interval ♦ Special interval every 250 hours	**By authorized specialist personnel** ❑ First and only interval ❍ Repeat interval	**Note**
	●	●	❍	❍	❍	Visually check drawn out position of locking pins		
	●	●	❍	❍	❍	Check condition of hydraulic hoses and of cable kit		
		●	❍	❍	❍	Lubricate locking pins		
					❍	Clean sieve filter in bolt connections of hydraulic hoses		
MECHANICAL QUICK-CHANGE ADAPTER								
	●	●	❍	❍	❍	Visually check drawn out position of locking pins		
		●	❍	❍	❍	Lubricate locking pins		

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Tab. 5-19 *Control and maintenance chart*

1 Engine oil change intervals can be shortened dependent on temperature, fuel and oil quality.

2 Note shortened maintenance intervals for heavy dust use.

3 When using environmentally acceptable hydraulic fluids, the maintenance interval is to be determined by regular analyses.

4 Shorten the maintenance interval dependent on conditions of use (eg. heavy dust use, barrel refuelling).