

**Servicemanual
Hydraulic Excavator
R 914 Rail**

1 Document identification

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Manual no.

User:

Preface

1 General

This manual contains technical data, design and functional descriptions, as well as instructions as regards the operation and the adjustment of machine settings. The document includes a number of drawings, functional diagrams, as well as detailed views of units and assemblies of **LIEBHERR hydraulic excavators**.

The documentation has been designed to support customer support services, but does of course not replace proper technical training and qualification of the user, and participation in LIEBHERR operator training courses.

General basic technical information is not included in the manual. For operating instructions and information on spare parts, please refer to the separate documentation.

During all work on the machine, strictly adhere to the relevant accident prevention and safety regulations.

2 Symbols used in this manual

Tasks and procedures that are associated with specific dangers are accompanied by safety instructions. The safety instructions are graded according to the severity of the risk and are identified with the terms **DANGER**, **CAUTION** and **NOTE** and the respective danger symbol.

These terms are used in combination with the following symbols:



Danger!

Warning referring to a danger where there is a high probability of death or serious injury to operators, unless the prescribed safety measures are taken.



Caution!

Warning relating to dangers that might lead to injury or damage to the machine, unless the prescribed safety measures are taken.



Note!

This symbol accompanies instructions and tips regarding the operation, maintenance and repair of the equipment. If adhered to, the service life of the machine can be prolonged and/or procedures are made easier.

- This symbol precedes entries in a list.
 - This symbol precedes entries in a sub-list.
- ☐ This symbol identifies "Pre-condition MUST be fulfilled"
- ▶ This symbol indicates a single procedure in a sequence of procedures.
 - ↪ This symbol indicates a result of an action.

3 Regulations

This manual has been exclusively compiled for internal use by the registered machine owner.

It may not be reproduced or made available to third parties without the explicit written consent of

Document layout

LIEBHERR, who retains all rights in this document.

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This service manual shall be amended without prior notice to reflect new technical developments and machine series. LIEBHERR reserves the right to make minor technical changes to the machines that might not be reflected in the accompanying documentation.

Depending on the series development, the service manual shall be revised in electronic format. Changes and amendments are listed in group 010.010.

This manual might be complemented by additional service information sheets issued by LIEBHERR.

Created by: Technical Documentation Department

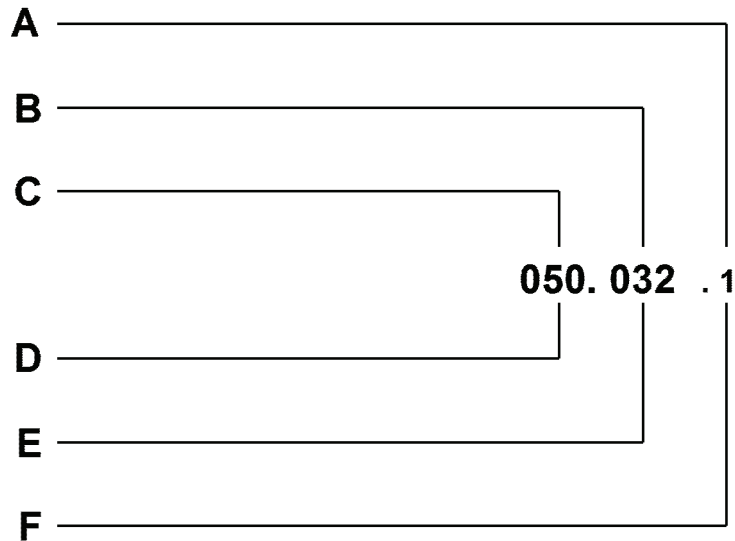
Published by: Customer Service Training Group

of **LIEBHERR-HYDRAULIKBAGGER GMBH 88457 Kirchdorf / Iller, Germany.**

We hope that the information in this documentation aimed at improving the service of LIEBHERR excavators is of use to you.

4 Document layout

In order to make it easy for users to find specific information regarding revised or amended documents, each page is identified as follows:



- A Page number
- B Subgroup
- C Main group

- D Hydraulic components
- E Slewing gear pump
- F Page

The main groups are listed in the main group directory.

The subgroups are listed on the first page of each main group section. The subgroup list also includes the machines and serial numbers to which the subgroup is relevant.

In the event of minor changes, we will send you the amended page showing the current date.

If an existing subgroup is completely revised and re-edited, the new version will be assigned a new subgroup number.

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Standards and regulations

The maintenance manual supplements the service manual.
(see 010 standards and regulations in maintenance manual)

Alternatively:

Current standards and regulations can be found at the following path:

- **Liebherr service documentation \ General \ Liebherr standards.**

The following tightening torques and installation instructions are saved there:

- Tightening torques for screws.
- Angle-controlled screw tightening method.
- Tightening torques for countersunk screws.
- Tightening torques for flange connections.
- Tightening torques for piston rod bearing.
- Installation instruction for hydraulic cylinder.
- Installation instruction for piston rod bearing.

New features and changes

1 Updated 10/2020

	Change to group	Type of modification/change	Affected models
Revised	030.	Check and adjustment tasks	R 914 Rail
New	030.030	Emergency operations	R 914 Rail
Revised	080.059	Check for leak oil at control blocks	R 914 Rail
Revised	110.030	Electrical system: uppercarriage	R 914 Rail
New	130.001	Service accessories	R 914 Rail
New	130.002	Control coupling box	R 914 Rail
New	130.003	Functional diagram of electrical system	R 914 Rail
New	130.004	Undercarriage lighting system	R 914 Rail
New	130.010	Rail mode attachments, version 1	R 914 Rail
New	130.011	Rail mode attachments 2	R 914 Rail
New	130.012	Rail mode attachments 3	R 914 Rail
New	130.013	Rail mode attachments 4	R 914 Rail
Revised	130.050	Workspace limitations	R 914 Rail
Revised	140.010	Repair welding guideline	R 914 Rail
New	170.001	Repair of lubrication hose	R 914 Rail
Revised	170.005	Automatic central lubrication system	R 914 Rail
New	170.025	Progressive distributor	R 914 Rail
Revised	190.004	Check template for LIKUFIX	R 914 Rail
New	190.010	Tool control	R 914 Rail
Revised	200.020	Software update	R 914 Rail
Revised	200.030	Master 4: Reset on master module	R 914 Rail
Revised	200.036	Master 4: Master module	R 914 Rail
New	200.100	Master 5: Reset to factory settings	R 914 Rail
New	200.102	Master 5: Connect LIFT function	R 914 Rail
New	200.104	Master 5: Software update	R 914 Rail
New	200.106	Master 5: Connect SCULI diagnostic software	R 914 Rail
New	200.108	Master 5: Create service file	R 914 Rail

1.1 Updated 01/2020

	Change to group	Type of modification/change	Affected models
Revised	010.050	Added special tools, general	R 914 Rail
New	060.004	Added bleeding the hydraulic system	R 914 Rail
Revised	060.070	Updated hydraulic schematic	R 914 Rail
Revised	080.059	Added leak oil check of control blocks	R 914 Rail

Updated 10/2020

	Change to group	Type of modification/change	Affected models
Revised	110.050	Circuit diagram: operator's platform	R 914 Rail
New	110.052	Circuit diagram: operator's platform	R 914 Rail
Revised	110.060	Circuit diagram: basic machine	R 914 Rail
Revised	130.010	Added rail guide system	R 914 Rail
New	130.015	Rail guide system: setting parameters	R 914 Rail
Revised	150.020	Added limitations	R 914 Rail
Revised	190.004	Check template LIKUFIX 77 added	R 914 Rail
Revised	200.010	Testing and adjustment software wizard added	R 914 Rail
Revised	200.016	SCR system check added	R 914 Rail
Revised	200.020	Software update added	R 914 Rail

Safety instructions

Maintenance manual supplements the service manual.

- ▶ See Chapter 010 in the maintenance manual.

Installation instructions: Mounting clamping nuts

1 Purpose

The mounting instructions have been devised to ensure standardised and correction installation of the clamping nuts.

2 Description

Clamping nuts are used to secure pins with pin tabs and anti-torsion elements.

Pins secured in this way prevent bending of the bearing covers (e.g. bearing covers at the swivelling arm, the boom and the stick), improve the stability of the machine and can withstand higher loads.

If clamping nuts are tightened too much, the following might result:

- Bearing covers might become bent backwards
- Welded seams might break
- Excessive friction between the connected steel components
- Increased wear
- Damage to bearing



Note!

The axial play between the connected components must not be compensated by excessive tightening of the clamping nuts.

3 Mounting clamping nut

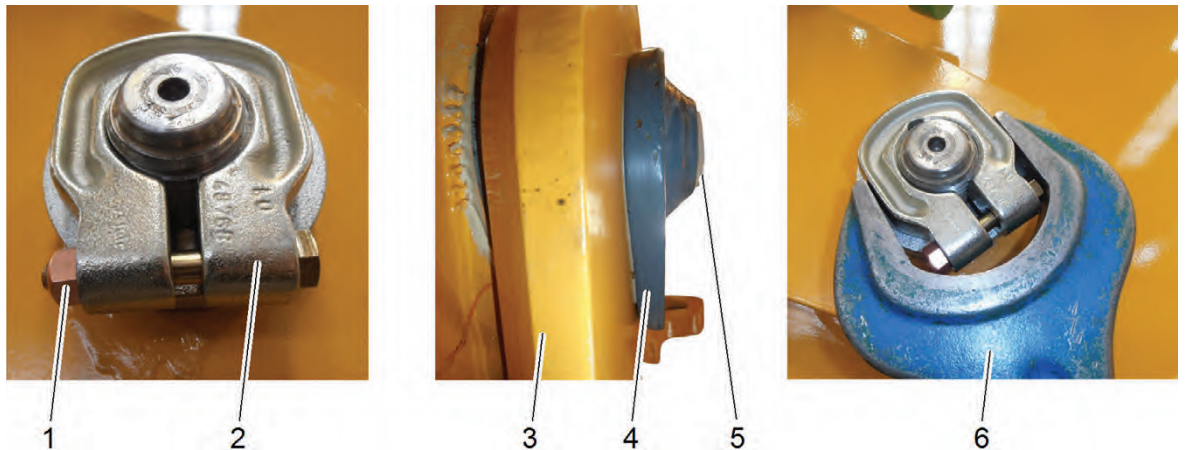


Fig. 1 Mounting of standard clamping nut

- | | |
|-------------------|----------------------|
| 1 Lock nut | 4 Pin tab |
| 2 Clamping nut | 5 Pin |
| 3 Steel component | 6 Open-ended spanner |

Exceptional cases

**Note!**

First tightening of the clamping nut prevents seizing at a later stage (protruding paint is levelled).

- ▶ Position the components to be connected so that the pin **5** can be driven through the bores.
- ▶ Drive in the pin **5**. When driving in the pin **5**, ensure that the anti-torsion element of the pin **5** engages.
 - ↳ The pin tab **4** is flush with the steel component **3**.
- ▶ Mount the clamping nut **2** on the pin **5** and tighten it with a suitable spanner **6** until there is significant resistance.
- ▶ Loosen the clamping nut **2** and retighten it by hand.

**Caution!**

The bearing covers might become bent and welds might break!
Risk of damage to bearing.

- ▶ The axial play between the connected components must not be compensated by excessive tightening of the clamping nut.
 - ▶ Do not over-tighten clamping nut.
-
- ▶ Turn the clamping nut **2** with a suitable spanner **6** by 10°.
 - ▶ Tighten the lock nut **1** at the clamping nut **2**.

4 Exceptional cases

4.1 Mounting clamping nut with fine thread

Clamping nuts with fine threads **10** are able to withstand greater forces and are used at point where very high forces occur (e.g. at bearing cover on the revolving deck).

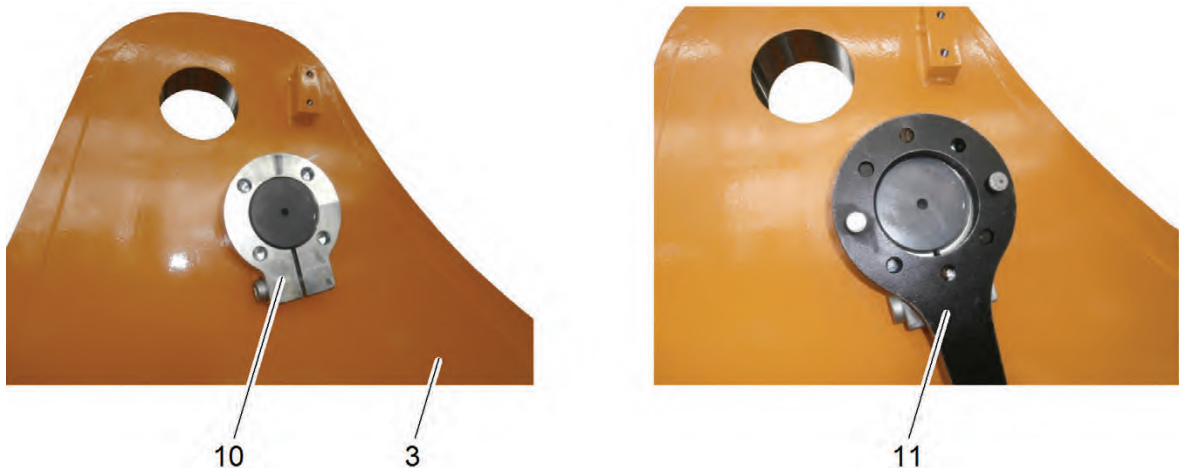


Fig. 2 Mounting clamping nut with fine thread

3 Steel component

11 Piston assembly wrench

10 Clamping nut with fine thread

- ▶ Mount the clamping nut **10** with the piston assembly wrench **11**, (see "Mounting clamping nut" on page 1).

4.2 Mounting clamping nut at suspension with swing brake

The clamping nut **2** is used to adjust the brake effect of the swing brake **21** at the suspension **22** of the grapple.



Note!

The tightening angle depends on the size and length of the suspension **22** and on the number, type and arrangement of the disc springs **20**.

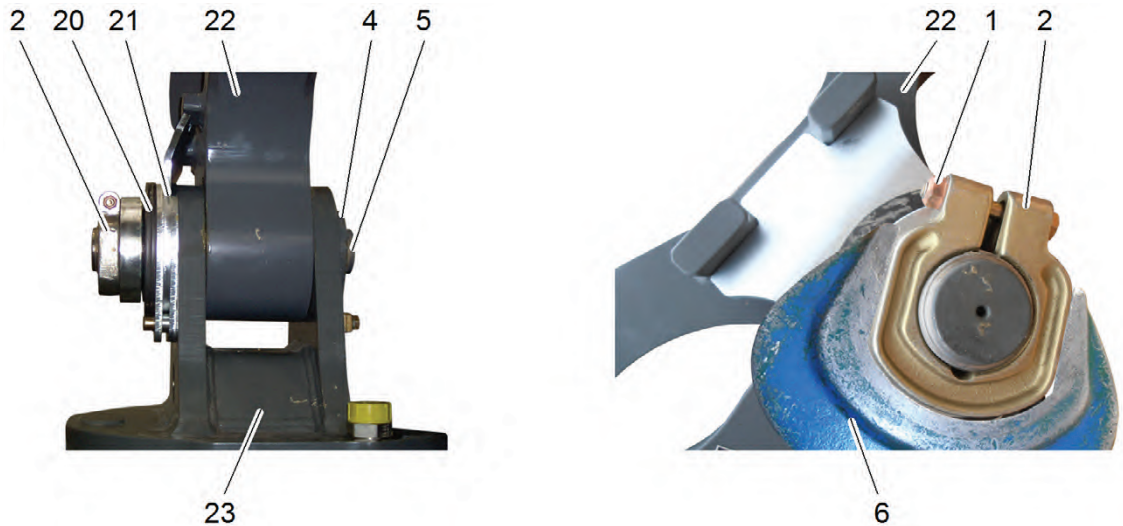


Fig. 3 Mounting clamping nut at suspension with swing brake

- | | |
|----------------------|--------------------|
| 1 Lock nut | 20 Disc spring |
| 2 Clamping nut | 21 Swing brake |
| 4 Pin tab | 22 Suspension |
| 5 Pin | 23 Grapple fixture |
| 6 Open-ended spanner | |

- ▶ Position the components to be connected so that the pin **5** can be driven through the bores.
- ▶ Drive in the pin **5**. When driving in the pin **5**, ensure that the anti-torsion element of the pin **5** engages.
 - ↙ The pin tab **4** is flush with the steel component.
- ▶ Mount the clamping nut **2** on the bolt **5** and tighten it with a suitable spanner **6**.



Warning!

Dropping suspension!
Risk of injury

- ▶ To adjust the swing brake **21**, work in teams of two or use suitable lifting gear.

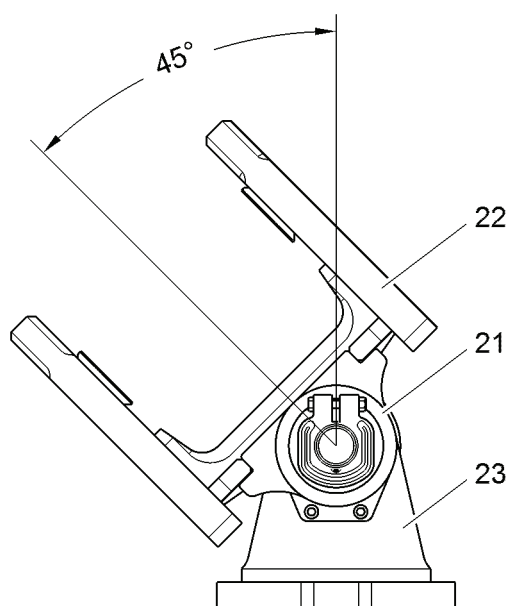


Fig. 4 Adjusting swing brake

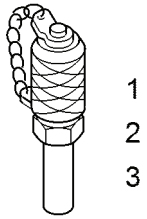
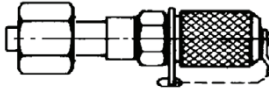
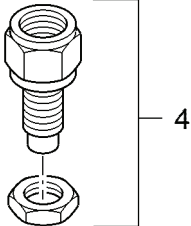
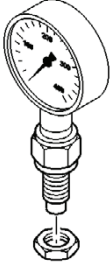
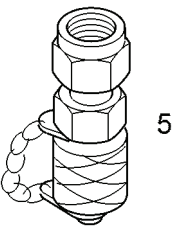
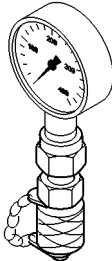
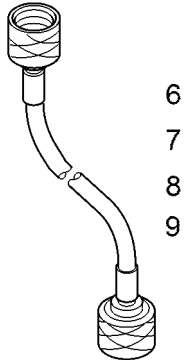
22 Suspension

23 Grapple fixture

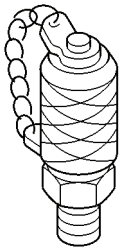
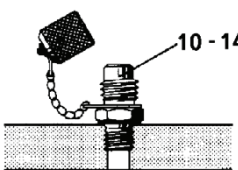
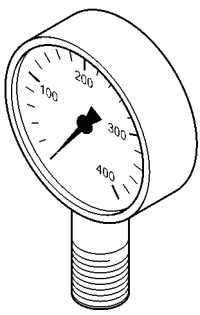
21 Swing brake

- ▶ Hold the suspension **22** at an angle of 45°.
- ▶ Tighten the clamping nut **2** with a suitable spanner **6** so that the suspension **22** is held at an angle of 45° by the swing brake **21**.
- ▶ Fully tighten the lock nut **1** at the clamping nut **2**.

Special tools, general




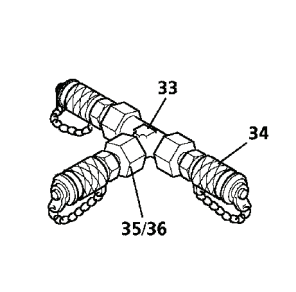
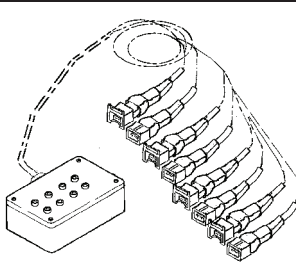
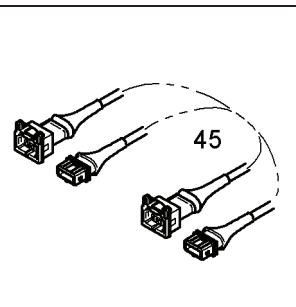
Representation	No.	Description	Size	Item code	Machine	Application
	1	Measuring neck	NW 8	7019906	All types	
			NW 8S	5607605		
	2		NW 10	7002404		
			NW 10 L	7406864		
	3		NW 12	7008688		
		NW 12L	7409918			
	4	Pressure gauge connection	R 1/2"	7002436	All types	
	5	Pressure gauge direct connection	R 1/2"	7002435	All types	
	6	High-pressure hose	1000 mm	7002437	All types	For connecting pressure gauges to all measuring points
	7		1500 mm	7002475		
	8		4000 mm	7009134		
	9		5000 mm	7363732		

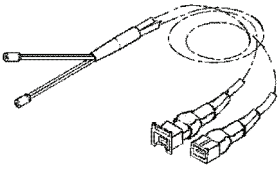

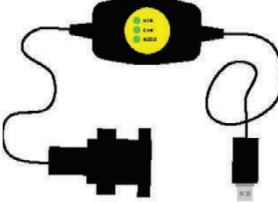


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Representation	No.	Description	Size	Item code	Machine	Application
 <p>10 11 12 13 14</p>	10	Screw coupling, complete	M10X1	5005180	All types	
	11		M12X1.5	7402580		
	12		M14X1.5	5004002		
	13		M16X1.5	7361345		
	14		R 1/4"	7362579		
 <p>16 17 18 19 20 21 22 23</p>	16	Pressure gauge/ pressure measuring instrument Glycerine dampened	0 - 1.6 bar	8042577	All types	For checking the operating pressures of one or more hydraulic circuits
	17		0 - 1.6 bar	8042578		
	18		0 - 10 bar	5002865		
	19		0 - 40 bar	7361288		
	20		0 - 60 bar	5002867		
	21		0 - 250 bar	7361285		
	22		0 - 400 bar	7500002		
	23		0 - 600 bar	7361294		






Representation	No.	Description	Size	Item code	Machine	Application	
	30	Liebherr measuring system Multihandy MH 3020 Consisting of:		11000678	All types	Used to measure pressures, flow rates and speeds	
	30.1	Hand-held measuring device 3020		10814168			
	30.2	1 plug-type power adapter		7025279			
	30.3	1 data cable		10814169			
	30.4	2 measuring cables, 12 m		10288154			
	30.5	2 direct connections		614062601			
	30.6	2 pressure sensors 0 to 600 bar, 0-20 mA		10288153			
	30.7	Transport case		10664392			
		Alternative equipment: to be ordered separately (see "Scope of delivery for the Litronic measuring system MH 3020" on page 12)					
	30.9	Pressure sensor					
	30.10	Direct connections					
	30.11	Measuring turbines					
	30.12	Speed sensor					
	30.13	Inductive rev counter					
	30.14	Magnetic holder					
	30.15	Reflective foil					
		Other accessories:					
	30.16	Transport case					
	30.17	Measuring cable					
30.18	Analysis software						
30.19	Spare battery						
	31	Belt tension gauge		12227248	LH22-LH26	Measuring the belt tension of generator drive	


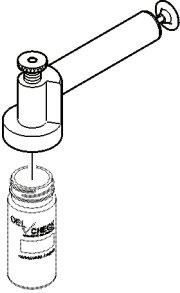
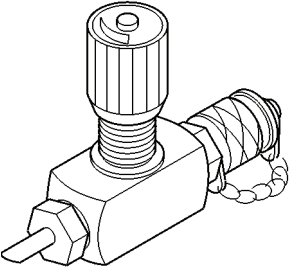
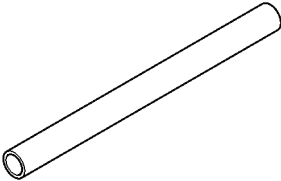

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Representation	No.	Description	Size	Item code	Machine	Application
	32	Liebherr multi-measurement system LMMS 2010 Scope of delivery, see page 11/12 (items 1.1.0 to 1.3.2)		11210083	All types	Used to measure pressures, flow rates and speeds
						
						
	33	Fitting		4901372	All types	For pressure compensation in combination with tool no. 30
	34	Measuring neck with metal cap		7002404		
	35	Union nut		4774002		
	36	Cutting ring		4771001		
	44	Measuring adapter		8504231	All types	For measuring current on the pump regulator
	45	Adapter		9956422	All types	For measuring inductive transducer B12 from 3-pin (LH) to 2-pin (Deutz) in combination with tool no. 44

Representation	No.	Description	Size	Item code	Machine	Application
	46	Measuring cable		9956436	All types	For measuring and testing solenoid valves
	50	Ethernet diagnostic cable	1.5 m	10225579	All types	Connection between notebook and interface of machine
			3.0 m	10513200		
			10.0 m	11656214		
	57	Adapter cable	1.75 m	11482727	All types	For Liebherr diagnosis tool LIDIA Connection between notebook and interface AGS 4
	60	Gemalto dongle		11494535		The order form is available at: Liebherr Service documentation Earth moving / General / Order forms
	61	CANFox cable		12206369		For the connection between: LiDA and LiDEC2 SCULi and LiDEC1

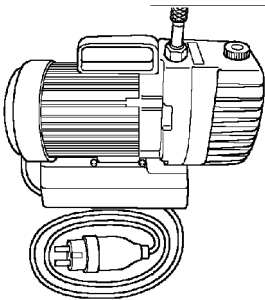
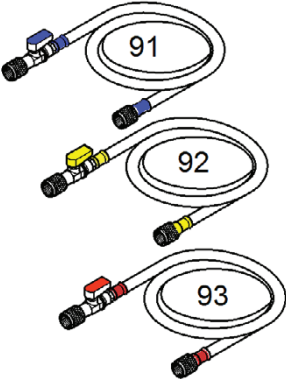
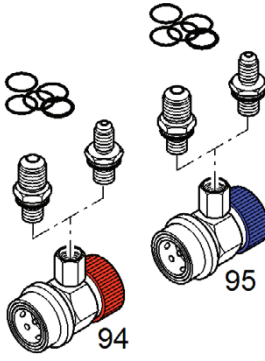
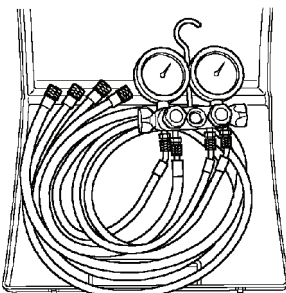
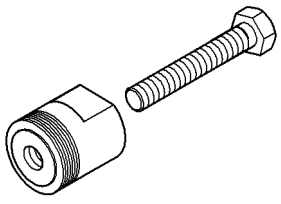
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Representation	No.	Description	Size	Item code	Machine	Application
	75	Dismantling tool		11621284	All types	For connections on diesel exhaust fluid pump Machine Stage 4
	76	Rev counter Piezo	A 2106	10286429	All types	For measuring engine speed via pulse frequency of injection line
		Clamp-on transducer	5.0 mm	10492920		
		Clamp-on transducer	7.0 mm	10492922		
		Clamp-on transducer	8.0 mm	10492925		
	77	Hornel speed meter	HT 460	7006974	All types	For measuring speed with reflective strips
	78	Rev counter Shimpo	DT 205	7364284		
	79	Shimpo strips		614063201		
	80	Multimeter with digital display	Chauvin Arnoux	10018500	All types	For voltage, current and resistance measurements of electrical systems and electric valves
	81	GTS Generator System Tester		12222166	All types	For fault diagnosis for GTS generator systems

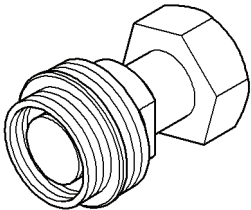
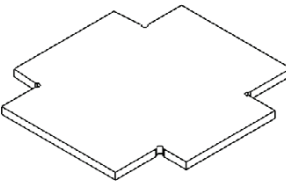
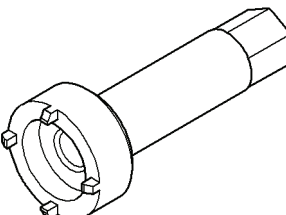
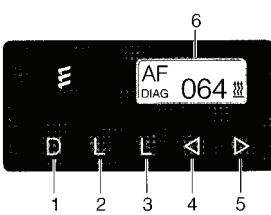


Representation	No.	Description	Size	Item code	Machine	Application
	82	Thermometer Contactless (Infrared)		12202593	All types	For monitoring the temperature of a medium or the outside temperature of a component
	83	Hand pump		8145666		For removing an oil sample for oil analysis
	84	Sampling valve		7019068		
	85	Suction hose Material by the metre		10219500		
	86	Oil accident bag		7023359		For immediate help in the event of oil accidents

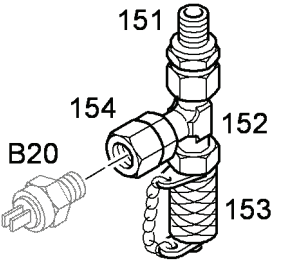

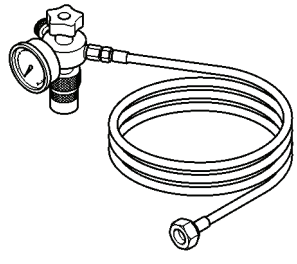
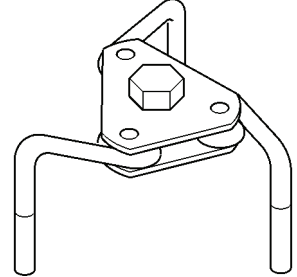
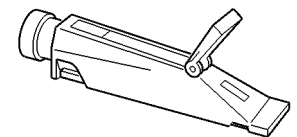
LHB/en/Edition: 11/2020

Representation	No.	Description	Size	Item code	Machine	Application
	87	Analysis kit green	1-piece 6-piece	8145660 7018368		See maintenance manual
	88	Analysis kit yellow	1-piece 6-piece	7026817 7026088		See maintenance manual
	89	Analysis kit blue	1-piece 6-piece	12208230 10191453		See maintenance manual
	90	Analysis kit grey		12693519		See maintenance manual

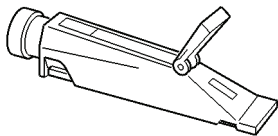



Representation	No.	Description	Size	Item code	Machine	Application
	95	REFCO vacuum pump	RD-4	7027552	All types	For maintenance and repair of air conditioning unit
	96	ITE filling hose, blue	1500 mm	7027553		
	97	ITE filling hose, yellow	1500 mm	7027554		
	98	ITE filling hose, red	1500 mm	7027555		
	99	Quick coupling, red	253a	7027556		
	100	Quick coupling, blue	254 a	7027557		
	101	4-valve test fitting	M4WS5C	7027558	All types	For maintenance and repair of air conditioning unit
	105	Dismantling tool	M37X1	9583459	All types	For dismantling grapple bolts
	106		M42X1.5	9583521		
	107		M48X1.5	9583522		

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Representation	No.	Description	Size	Item code	Machine	Application
	110	Universal Passfix stripper	M42X1.5 & M48X1.5 & M58X1.5	9584738	All types	For disassembling Passfix bolts
	111	Check template for Likufix	Likufix 33	94093547	All types	For detecting incorrectly positioned components for Likufix coupling system.
			Likufix 48	94003945		
			Likufix 66	94048581		
			Likufix 77	12944765		
	112	Slotted nut wrench	SW30	9594666	All types	For tightening slotted nuts of grapples
	120	Diagnostic instrument		5010474	All types	For error diagnosis of auxiliary heater D5 WS.
	121	Adapter cable		9614382		For connection in cable harness, right console
	122	Adapter cable		10025620		For inserting directly into heater
	130	Test tool for cooling system		11839289	All types	For pushing off the engine cooling system (leak test)
	140	Torque wrench	4 to 20 Nm	10045464	All types	For tightening the hose clamps

Representation	No.	Description	Size	Item code	Machine	Application
	150	B20 pressure switch conversion kit Consisting of:		9645488	All types	For checking the shifting pressure (dropping) of pressure switch B20
	151	Screw-in stud		7617216		
	152	T-connection fitting		7405617		
	153	Measuring neck		7409919		
	154	Screw-on fitting		7368150		
	160	Hand pump with pressure gauge		10454803	All types	For leak test of backpressure line if particulate filter installed
	170	Filling and testing device, complete with adapter and filling hose		8145359	All types	For checking and filling nitrogen in the accumulators
	180	Oil filter claw spanner		8145274	All types	For maintenance of diesel engine
	190	Refractometer Coolant and Battery acid		7408922	All types	For checking anti-freeze concentration in coolant and acid density in the battery

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Representation	No.	Description	Size	Item code	Machine	Application
	191	Refractometer Diesel exhaust fluid		11830573	All types	For checking the mixing ratio of the diesel exhaust fluid Machine Stage 4
	200	Easy laser		11821020	All types	For aligning v-belt pulleys for magnet systems
	210	Hand-held pliers D=13 mm to 18 mm		11825915	All types	For assembling spring clamps
	211	Hand-held pliers D=13 mm to 50 mm		11825916		
	212	Jaw insert		11825917		
	220	Ring bolt	M12	4026006	All types	For lifting various excavator components
			M30	4000656		
			M42	4001313		
			M48	4900835		
			M56	4901609		
			M64	4902031		
			M72	402610814		

Scope of delivery for the Litronic measuring system MH 3020

Depending on requirements, different adapters and cables are required that must be ordered separately.

Item	Sensors	ID number
2	OEM pressure sensor, measuring range 0 bar to 1000 bar, output 0 mA to 20 mA	1001 8329
3	OEM pressure sensor, measuring range 0 bar to 600 bar, output 0 mA to 20 mA	6* 6140 624 01
4	OEM pressure sensor, measuring range 0 bar to 60 bar, output 0 mA to 20 mA	3* 6140 625 01
5	OEM pressure sensor, measuring range 0 bar to 10 bar, output 0 mA to 20 mA	1002 7591

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Item	Sensors		ID number
6	OEM pressure sensor, measuring range -1 bar to +6 bar, output 4 mA to 20 mA (LWE)		5718 886 08
7	Minimess direct connection pressure sensor, screws 1620	6*	6140 626 01
8	Minimess direct connection pressure sensor, 1620 screws, 90° angled	3*	6140 647 01
9	Pt 100 temperature sensor, measuring range -50 °C to +200 °C	1*	6140 627 01
10	Minimess P/T measuring coupling, screw series 1620, G 1/4"	1*	6140 628 01
11	Minimess P/T measuring coupling, screw series 1620, M10 x 1.5	1*	1004 1274
12	RE 4-10 measuring turbine, measuring range 1 l/min to 10 l/min	1*	5010 031
13	RE 3-75 measuring turbine, measuring range 7.5 l/min to 75 l/min	1*	6410 629 01
14	RE 3-300 measuring turbine, measuring range 15 l/min to 300 l/min	0*	6140 630 01
15	RE 3-600 measuring turbine, measuring range 25 l/min to 600 l/min	2*	5009 492
16	DS 03 speed sensor, measuring range 1 rpm to 9999 rpm	1*	6140 631 01
17	Spare reflector foil set	1*	6140 632 01
18	Magnet holder, for DS 03 speed sensor	1*	6140 633 01
19	Inductive transducer for speed measurement	1*	6140 634 01

Item	Accessory		ID number
20	Transport case for storing RE 3 measuring turbines	1*	6140 635 01
21	MK 12 measuring cable for connecting of sensors, 6 metres long	12*	6140 636 01
22	MK 12 measuring cable for connecting of sensors, 12 metres long	4*	6140 637 01
23	MK 12 measuring cable for connecting of sensors, 18 metres long	1*	6140 638 01
24	Power supply cable for connecting to on-board power system, 6 metres long	1*	6140 639 01
25	Power supply cable for connecting to on-board power system, 12 metres long	0*	6140 640 01
26	DPU 411 thermal printer with power adapter	0*	6140 641 01
27	Thermal paper rolls for DPU 411	0*	6140 642 01
28	Centronics data transmission cable, 2 metres long (for DPU 411)	0*	6140 643 01
29	RS 232 data transmission cable, 2 metres long (connection to PC)	1*	9684 327
30	AK 12 adapter cable (for speed measurement with GLR testing instrument)	1*	6140 648 01
31	Litronic service program, German version (DOS operating system)	0*	6140 646 01
32	Analysis software (de/en/fr) on CD-ROM (for Windows, 16-bit)	1*	6004 401
33	Analysis software (de/en/fr) on CD-ROM (for Windows, 32-bit)		
36	Y-adapter for current measuring junior timer plug	1*	9956 436
37	Adapter for 3-pin to 2-pin plug	1*	9956 422

* Quantity for recommended basic equipment

Scope of delivery for Liebherr multi-measuring system LMMS 2020

Depending on requirements, different adapters and cables are required that must be ordered separately.

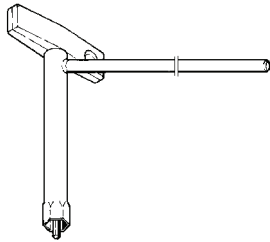
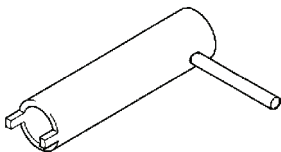
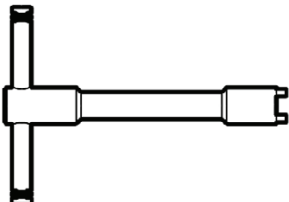
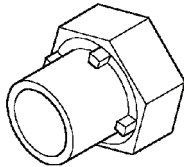
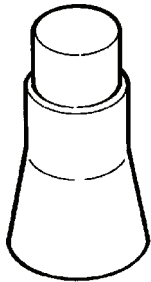
Item	Designation	Quantity	ID number
	Measuring instrument		
1	LMMS 2020 measuring kit, complete with transport case, consisting of:		1224 6864
1.1	Measuring equipment case	1	1140 2662

Item	Designation	Quantity	ID number
1.1.1	LMMS 2020 measuring device	1	1224 6820
1.1.2	Power adapter	1	1224 6821
1.1.3	USB cable	1	1081 4169
1.2	Sensors case	1	1140 2662
1.2.1	HySense PR100, measuring range 0 to 60 bar, 4-20 mA, ISDS	2	1220 9288
1.2.2	HySense PR100, measuring range 0 to 600 bar, 4-20 mA, ISDS	4	1220 9290
1.2.3	Straight direct connector	3	6 1406 2601
1.2.4	Direct connector, 90° angled	3	6 1406 4701
1.3	Cable case	1	1140 2662
1.3.1	High-end measuring cable 6 m	3	1121 0096
1.3.2	High-end measuring cable 12 m	3	1121 0097
	Alternative pressure sensor		
2	HySense PR 100 pressure sensor, measuring range 0 bar to 1000 bar, 4-20 mA, ISDS		1220 9376
3	Pressure sensor, measuring range 0 bar to 10 bar 0-20 mA, without ISDS		1002 7591
4	HySense PR 100 pressure sensor, measuring range -1 bar to +6 bar, 4-20 mA, ISDS		1220 9286
5	Pressure sensor, measuring range 0 bar to 60 bar with frequency output, 0.2 to 1.6 kHz		1183 0599
6	Pressure sensor, measuring range 0 bar to 600 bar with frequency output, 0.2 to 1.6 kHz		1183 0601
	Measuring turbines		
7	Measurement turbine QT100, 1-10 l/min		1224 6827
8	Measurement turbine QT500, 2-75 l/min		1224 6829
9	Measurement turbine QT500, 9-300 l/min		1224 6830
10	Measurement turbine QT500, 16-600 l/min		1224 6831
11	Measurement turbine QT400, 16-600 l/min		1224 6828
12	Measurement turbine QT200, 16-600 l/min with integrated pressure relief valve, ISDS		1224 6826
	Rev counter		
13	DS 03 optical speed sensor, measuring range 1 rpm to 9999 rpm		6 1406 3101
14	Spare reflective foil kit		6 1406 3201
15	Magnet holder, for DS 03 speed sensor		6 1406 3301
16	Inductive transducer RS500		1224 6832
	Other accessories		
17	Impact protection for LMMS 2020		1183 0486
18	Multi-Xtend U/I, 30 V/2 A		1165 2087
19	CAN connecting cable with 8-pin SUB-D plug, screwable		1220 7737
20	Temperature sensor -50 °C to +200 °C		1224 6833
21	Combined sensor (p/T) 0 bar - 600 bar / -50 °C to +200 °C (ERC cylinder)		1149 2522
22	Distributor cable for combination sensor position 21		1149 2523
23	High-end measuring cable, 7/7-pin, 15 m (extension cable)		1169 9160
24	Connecting cable LMMS 2010/LMMS 2020 (connecting two measuring devices)		1182 4990
25	High-end adapter cable, 0.3 m (5-pin socket, 6-pin plug connection)		1224 6819
26	Inductive transducer with amplifier for measurement turbines up to 600 l		1121 2550
27	EU power cable		1224 6823
28	UK power cable		1224 6824

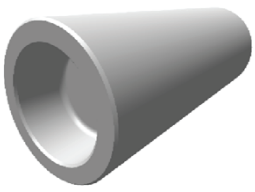
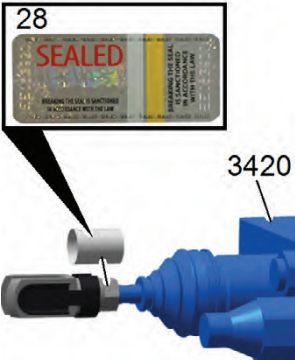
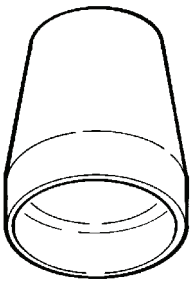
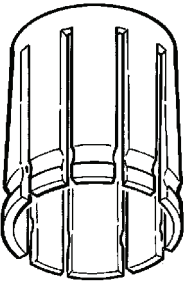
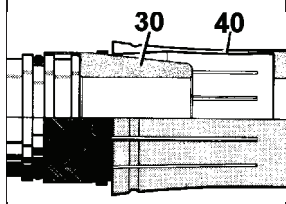
Item	Designation	Quantity	ID number
29	USA/China power cable		1224 6825
30	Australia power cable		1224 6822

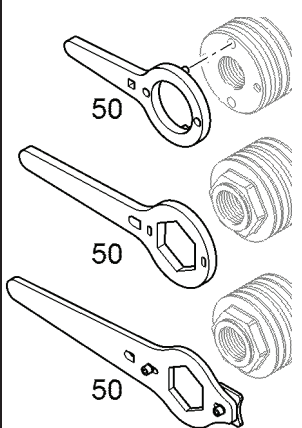
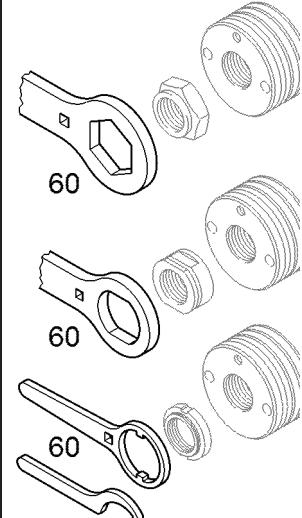
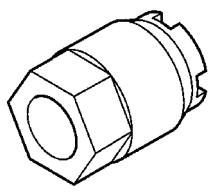
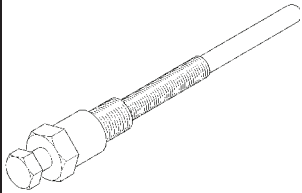
Special tools for hydraulic system

For maintenance, repair and adjustment of the hydraulic system

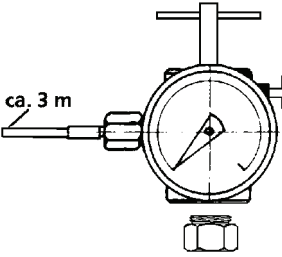
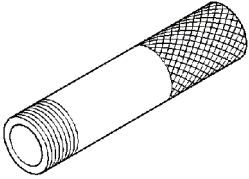
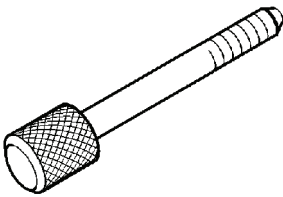
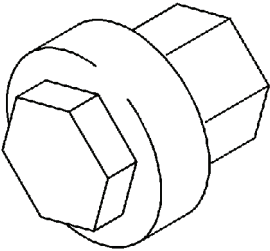
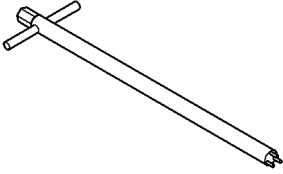
Display	No.	Description	Size	Item code	Machine	Application
	10	Special key for pressure relief valve	SW 16	11367374	All types	Used to adjust the primary and secondary valves in the control valve block
	11		SW 17	9359414		
	12		SW 19	9210371		
	15	Special spanner for pressure relief valves		8042837		Used to adjust 2-stage valves in auxiliary directional valve (Linde)
	16	Special key for line break safety of height adjustable cab		12224499		For adjusting the line break safety of the height adjustable cab
	18	Special spanner for pressure relief valves		9211987		Used to adjust high limitation valves on slewing gear oil motor (Linde)
	20	Safety cap primary	SW 10	7009315	All types	Used to secure the adjusting screws on hydraulic components
	21	short	SW 13	7023492		
	22	long	SW 13 I	7615515		
	23		SW 17	7380629		
	24	short	SW 19	7009316		
	25	long	SW 19 I	7009317		
	26	Secondary safety cap				

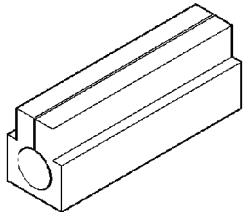
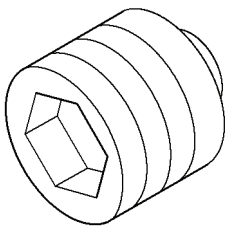
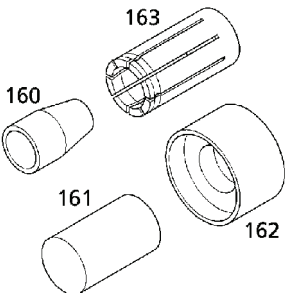
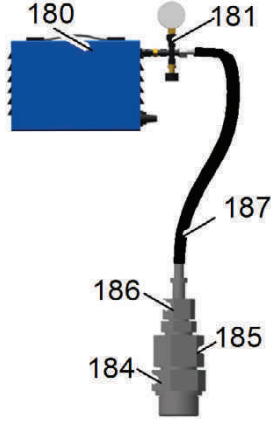
LHB/en/Edition: 11/2018

Display	No.	Description	Size	Item code	Machine	Application
	27	Assembly tool		94067035	All types	For assembly of no. 26
	28	Lead seal, self-adhesive		12201431	All types	For securing the adjusting screw on the actuating linkage of compact brake block 3420
	30	Mounting sleeve	ID number See item 990, spare parts catalogue		All types	Used to mount O-rings and Stepseal rings on pistons of hydraulic cylinders and positioning pistons of variable-displacement pumps and regulating motors.
	40	Expanding sleeve	ID number See item 991, spare parts catalogue		All types	For use, see tool no. 40 

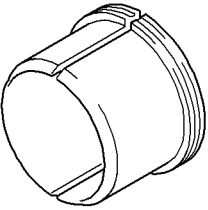
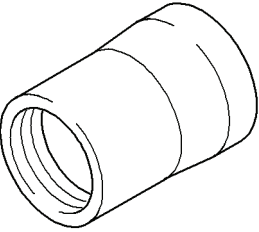
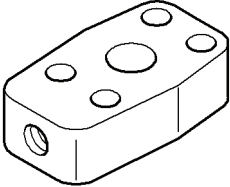
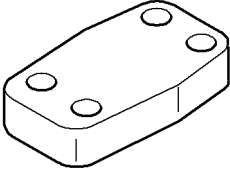
Display	No.	Description	Size	Item code	Machine	Application
	50	Assembly wrench for piston	ID number See item 985/989, spare parts catalogue		All types	Used to loosen and tighten piston
	60	Assembly wrench for piston nut	Item code See item 985, spare parts catalogue		All types	Used to loosen and tighten piston nut
	70	Socket wrench for threaded bushing	SW 41	9245656	All types	Used to dismantle and assemble cushioning pins for two-side end-of-travel cushioning of hydraulic cylinders.
	80	Removal tool for piston rod bearing	M16	9951120	All types	Used to push off piston rod bearing on hydraulic cylinder
			M20	9959261		
			M24	9959262		

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Display	No.	Description	Size	Item code	Machine	Application
	90	Filling device, complete with adapter and filling hose	W 24x 1-1/4" 3.0m W 32x 1-1/4" 3.0m	8145359	All types	Used to check and fill gas accumulators as well as pistons and membrane accumulators
	100	Mounting sleeve		9280580		Used to mount and dismantle sealing ring in pump safety valve (Linde control valve block)
	110	Removal rod	M 6	9288234	A918	Used to mount and dismantle the pressure balance piston in the LSC control valve block
	130	Hex wrench		9922976	A918	Used to mount and dismantle check valves in connection T (without radiator bypass valve).
	135	Screw-out device	Ø 10 mm	10114826	A918	Used to dismantle check valve in LUDV system

Display	No.	Description	Size	Item code	Machine	Application
	140	Clamping device for control spool	Ø 20 mm	10017281	All types	Used to clamp control spools during dismantling and mounting of piston elements
			Ø 25 mm	10017282		
			Ø 32 mm	10017283		
	150	Threaded stud with hexagon socket	M6	4901114	R914 LH22 C LH30 C LH40 C LH80 C-HR LH110 C	Used to check secondary pressure relief valves on travel motor
	160	Mounting sleeve	Ø 25 mm	9951457	All types	Used to mount Glyd rings and scraper rings on plunger piston of LIKUFIX couplings.
	161		Ø 22 mm	9951508		
	162		Ø 45 mm	9966421		
	163		Ø 25 mm	9951458		
	180	Vacuum pump, complete Consisting of: Pump no. 180, vacuum control valve no. 181 with seal, hose with filter no. 187.	00A7. 300	7405073	All types	Used to hold back hydraulic tank content
	181	Vacuum control valve, complete		10097130		
	184	Screw-in stud		7002240		
	185	Cone RED connection 16/8S		7407155		
	186	Straight nipple		7407985		
	187	Suction hose		12222275		

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Display	No.	Description	Size	Item code	Machine	Application
	200	Mounting sleeve	ID number See item 950, spare parts catalogue		All types	Used to calibrate seal rings during installation of piston in cylinder
	210	Mounting sleeve	ID number See item 960, spare parts catalogue		All types	Used to install piston rod bearings on specially shaped piston rods
	220	Intermediate flange/ intermediate block	1/2" with connection R1/4"	9916093	All types	Used to measure load pressures and leak oil volumes in line to consumer
	221		3/4"	9765104		
	222		1"	9759353		
	223		1 1/4"	9309326		
	225	Closing plate	1/2" - 1 1/2"	List, see Tab. 1	All types	Used to seal hoses and SAE connections

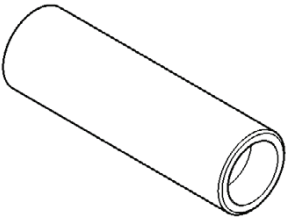
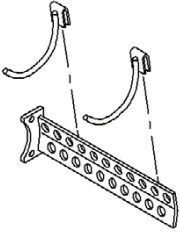
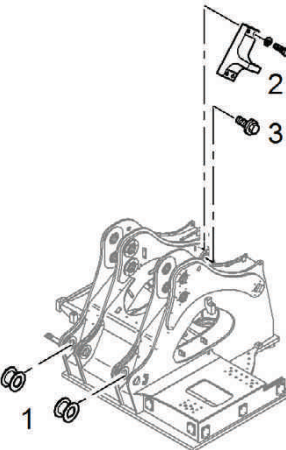
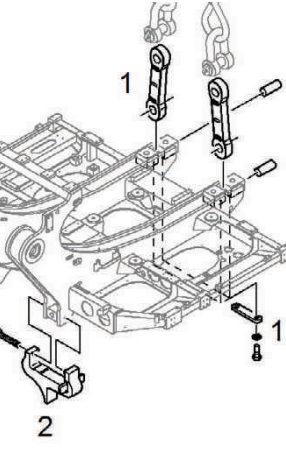
Closing plates for sealing hose connections and SAE flanges

Size	Plate without puncture	Plate without puncture, with thread	Plate with puncture	O-ring	Kantsil ring
1/2"	9107878				
3/4"		9174264			
1"		9174263	9170178	7264508	7367611
1 1/4"	9413318		9420882	7264687	7367612
1 1/2"			9465987	7360048	7367613
1/2"		9327330			
3/4"		9327331			
1"		9327332			


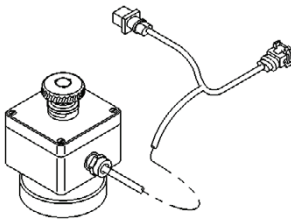
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Size	Plate without puncture	Plate without puncture, with thread	Plate with puncture	O-ring	Kantsil ring
1 1/4"		9327333			
1 1/2"		9327334			

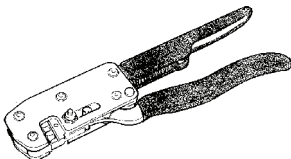
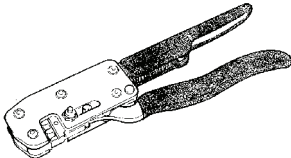

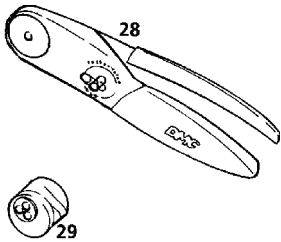
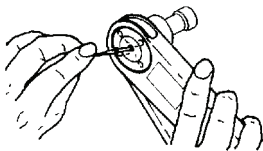
Tab. 1 Overview of closing plates

Display	No.	Description	Size	Item code	Machine	Application
	230	Assembly tool		94067035	All types	Used to mount lead seals on Rexroth components
		Assembly tool		94063198	LH 120 LH 150	Bolt-in tool used to assemble the mono bolt
	1	Protective cover		94031306	LH 120 LH 150	Assembly aids used to assemble front rotary stage
	2	Torque support		94007738		
	3	Stripping tool		94009227		
	1	Lifting accessory		9637122	LH 120 LH 150	Assembly aids used to assemble rear rotary stage
	2	Torque support		94009332		






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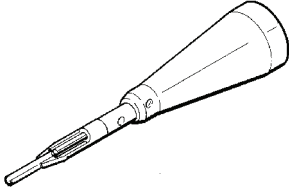
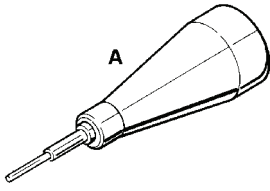
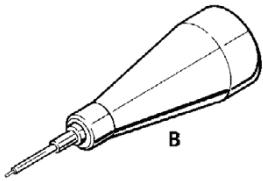
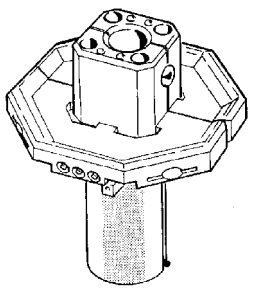
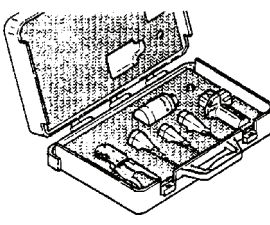
		<p>Corrosion protection spray</p>		<p>10411487</p>	<p>All types</p>	<p>Protects against corrosion</p>
		<p>Servo control shutdown button</p>		<p>94064624</p>	<p>All types</p>	<p>Deactivation of the servo control function</p>

Special tools for electrical equipment


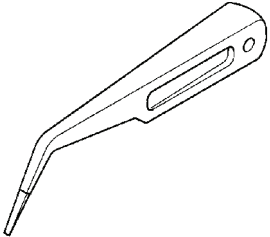

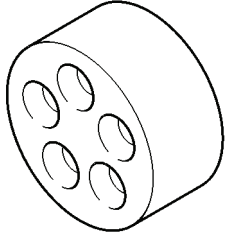

Representation	No.	Description	Size	Item code	Machine	Application
	10	Crimping tool		7367025	All types	For crimping contacts for 1.5 mm ² wires for MATE-N-LOK plug connections
	12	Hand-held pliers		7366314	All types	For crimping contacts for 2.5 mm ² wires for MATE-N-LOK plug connections
	15	Contact removal tool		7015179	All types	For removing crimped contacts from MATE-N-LOK plug connections
	20	Bushing		6202619	All types	Bushing contact for 1.5 mm ² wires of MATE-N-LOCK plug connections
	21	Contact pin		6202620		Pin contact for 1.5 mm ² wires of MATE-N-LOCK plug connections
	22	Bushing		6202591	All types	Bushing contact for 2.5 mm ² wires of MATE-N-LOCK plug connections
	23	Contact pin		6202592		Pin contact for 2.5 mm ² wires of MATE-N-LOCK plug connections
	28	Crimping pliers (according to MIL-C5015, VG 95234, VG 955342)		7367086	All types	
	29	Crimping insert for crimping DEUTSCH plug connections with no. 28 pliers		7409779	All types	

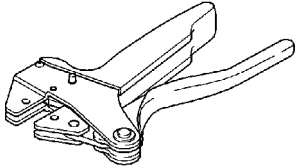
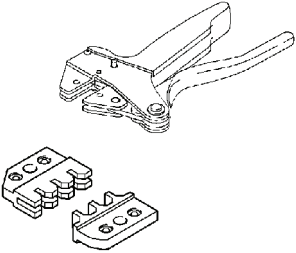
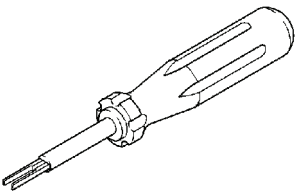
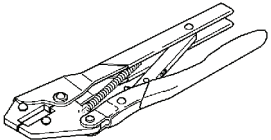
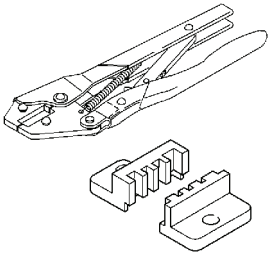
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Representation	No.	Description	Size	Item code	Machine	Application
	30	Crimping pliers for crimping contacts of DEUTSCH plug connections		8503647	All types	
	31	Pulling tool		7026267	All types	For disassembly of DEUTSCH plugs
	32	Pulling tool	Size 4	8503633	All types	For removing wired crimping contacts from DEUTSCH plug connections
	33		Size 8	8503632		
	34		Size 12	8145674		
	35		Size 16	8145673		
	36		Size 20	8503630		
	37	Pulling tool	Size 12	10114733	All types	For removing pin and bushing contacts from DEUTSCH plug connections
	38		Size 16	885563714		
	39		Size 20	10114732		
	40	Pin contact for wires of DT plug connections	Ø 0.8-1.0	7368251	All types	German contact for conductors
			Ø 1.0-2.0	7368406		
			Ø 2.0-3.0	6905271		
	41	Bushing	Ø 0.8-1.0	7368252	All types	
			Ø 1.0-2.0	7368405		
			Ø 2.0-3.0	6905272		
	42	Dummy plug		7368253	All types	
	43	Crimping tool		7367025	All types	For crimping punched contacts of SURE-SEAL plug connections








Representation	No.	Description	Size	Item code	Machine	Application
	44	Mounting tool for inserting wired crimped contacts into SURE-SEAL CT 31 plug connections		7367023	All types	
	45	A: Removal tool for pin contacts from SURE-SEAL plug connections		7367020	All types	
	46	B: Removal tool for socket contacts		7367022	All types	
	47	Installation tubes for tool no. 45	CT 31	7022464	All types	
	48	Auxiliary tool		7367021	All types	to hold the SURE-SEAL 2, 3 and 4-pin plug connections during installation and removal of the crimped contacts.
	49	Auxiliary tool		7367085	All types	to hold the SURE-SEAL 5, 6 and 7-pin plug connections during installation and removal of the crimped contacts.
	50	Repair kit Contains special tools 43, 44, 45, 46, 48 and 49 as well as operator's manual and lubricant.		7015073	All types	
	51	Bushing contact for 1.5 mm ² wires of SURE-SEAL plug connections		6202434	All types	
	52	Pin contact for 1.5 mm ² wires of SURE-SEAL plug connections		6202444	All types	

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Representation	No.	Description	Size	Item code	Machine	Application
	53	Push-out kit for assembly tool		7026266	All types	Removal tool for contacts of MICROTIMER plug connections
	55	Unlocking tool for WAGO plug elements	777-310	7022773	All types	
	60	Clip for assembly		10356764	All types	For removing and installing Eproms
	65	Mounting sleeve		9629620	All types	For assembling o-rings for Likufix signal contacts
	66	Tool box Cable harness repair and diagnosis kits		11113798	All types	For performing measurements, diagnosis and repairs on electrical system

Representation	No.	Description	Size	Item code	Machine	Application
	70	Hand-held pliers Ergocrimp		6004391	All types	For crimping contacts for JPT (Tyco) plug connections
	72	Matrix for crimping wire end sleeves	0.5 to 2.5 mm ²	10016253	All types	Junior power timer no. 927777-3 / no. 927779-3 / 927846-2
	73		0.2 to 2.5 mm ²	10016255		Junior power timer/ EDS no. 929938-3/ double-spring contact no. 929940-3
	74		0.5 to 2.5 mm ²	10016256		Flat adapter no. 963745-1 / no. 963746-1
	80	Push-out tool		7415334	All types	For removing wired crimp contacts from JPT (Tyco) plug connections
	90	Crimping tool		10016251	All types	For crimping Littlefuse contacts for JPT (Tyco) plug connections, see also no. 92.
	92	Ergocrimp die	0.5 to 5.37 mm ²	10016252	All types	For crimping contacts in conjunction with no. 90 Pin bushing no. 913053 / no. 913065 / no. 913066 / no. 913067 / no. 913069 / no. 913079 Double-spring contact no. 913071 / no. 913072

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Representation	No.	Description	Size	Item code	Machine	Application
	95	Crimper for wire end sleeves	0.08 to 10 mm ²	10011168	All types	For crimping wire end sleeves
	96	Crimper for wire end sleeves	0.25 to 16 mm ²	8033014	All types	For crimping Wire end sleeves
	98	Crimper	0.5 to 6.0 mm ²	8004713	All types	For crimping insulated fork terminals
	100	Crimping pliers with compression insert R 10	10 to 70 mm ²		All types	For crimping uninsulated fork terminals
	101	Inserts for tool no. 100	R 16		All types	
	102		R 25			
	103		R 35			
	104		R 50			
	105		R 70			
	108	Crimper	0.5 to 6.0 mm ²	8033015	All types	For crimping uninsulated plug connections
	109	Crimper	0.5 to 2.5 mm ²	6003491	All types	For crimping uninsulated plug connections

Representation	No.	Description	Size	Item code	Machine	Application
	110	Crimping tool	0.5 to 2.5 mm ²		All types	For crimping uninsulated plug connections
	111	Crimping tool	0.03 to 0.6 mm ²		All types	For crimping D-Sub contacts
	112	Pin remover for D-Sub contacts			All types	
	120	Abrasion protection and corrosion inhibitor spray Cramolin-Schutz		11647568	All types	Contact care agent for electric contacts
	121	Moisture protection Liqui-tech Basic		10488334	All types	Moisture protection spray for electric plug connections

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