en

Technical documentation

Hydraulic excavator

R 900 C-Li - R 904 C-Li

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Document identification

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Issue: 01 / 2008

Valid for: R 900 C-Li from serial number 13860
R 904 C-Li from serial number 23072

Author: LFR - Technical documentation department

Product identification

Manufacturer: LIEBHERR France S.A.S.

Type: 971 / 981 / 982 for R 900 C-Li
983 / 984 / 985 / 993 / 1017 / 1018 for R 904 C-Li

Conformity: CE

LFR / en / Issue: 01 / 2008

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3.64: Maintenance and Inspection Chart

1 R 900 C Litronic onwards of serial no. 15329

Type 971 Std / 981 HDS / 982 HDSL

Customer: ..... Serial no.: ..... Date: .....
Machine type: ..... Operating hours: .....

Caution!
Thorough maintenance can only be achieved if the machine is clean. Visual inspections in particular, checking for cracks for example, are only possible on a clean machine.

▶ Clean the machine prior to commencing with any maintenance tasks (see also the chapter “Safe Maintenance of the Machine“, subchapters “Cleaning“ and “Checking for cracks“).

Note!
The daily maintenance tasks which must be undertaken by the excavator operator, comprising of a functional testing of the brakes (swing gear brake, operating brake and holding brake), steering, electrical system and hydraulic system.
Furthermore, a visual inspection of the hydraulic system, gears and track components must be undertaken every day and the engine must be inspected for leaks.

Maintenance / Inspection at Operating Hours						TASKS TO BE CARRIED OUT R 900 C-Li - R 904 C-Li		
Upon commissioning	every 8 - 10	every 10 - 50	at 500, 1500	at 1000, 3000	at 2000, 4000	**By maintenance personnel (persons responsible for the machine)** ■ First and only interval ● Repeat interval ♦ Special interval every 250 hours	**By authorised specialist personnel** ❑ First and only interval ❍ Repeat interval	**Note**
						DIESEL ENGINE		
❍	●		❍	❍	❍	Check oil level and oil pressure in the engine		
❍	●		❍	❍	❍	Check coolant level and coolant temperature		
❍	●		❍	❍	❍	Check the air filter via service indicator		
	●		❍	❍	❍	Check the water separator on the fuel filter and drain		
		●	❍	❍	❍	Drain water and any sediment from the fuel tank		
		●	❍	❍	❍	Empty the dust collection tank at the air filter (reduce or increase this interval as required)		

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The disc **5.1** is bolted with the flywheel **C** of the diesel engine. The hub **5.2** is axially guided by circular ring-shaped discs **5.3** riveted onto the hub **5.2**.

The hub **5.2** is free to move radially on the disc **5.1**. The force-fitted and yet elastic connection of discs **5.3** and hub **5.2** form the eight pressure springs applied to the pitch circle **5.4.**

The drive shaft **10.10** of the variable displacement pump **10** is force-fitted to the hub **5.2** of the torsion damper **5** via splined shaft toothing.

Power transmission from the diesel engine to the pump **10** is resulted via flywheel **C**, fastening screws **7**, disc **5.1**, pressure springs **5.4**, hub **5.2** with discs **5.3** and drive shaft **10.10** of the pump **10**.

Torque impulses resulted upon cranking of the diesel engine and in the event of load fluctuations are thus compensated, whereby the pressure springs **5.4** are pressed together at precisely this moment and are almost relieved of tension at the end of the impulse.

Additionally, torsional vibrations of the engine are heavily suppressed before being transferred to the pump **10**.

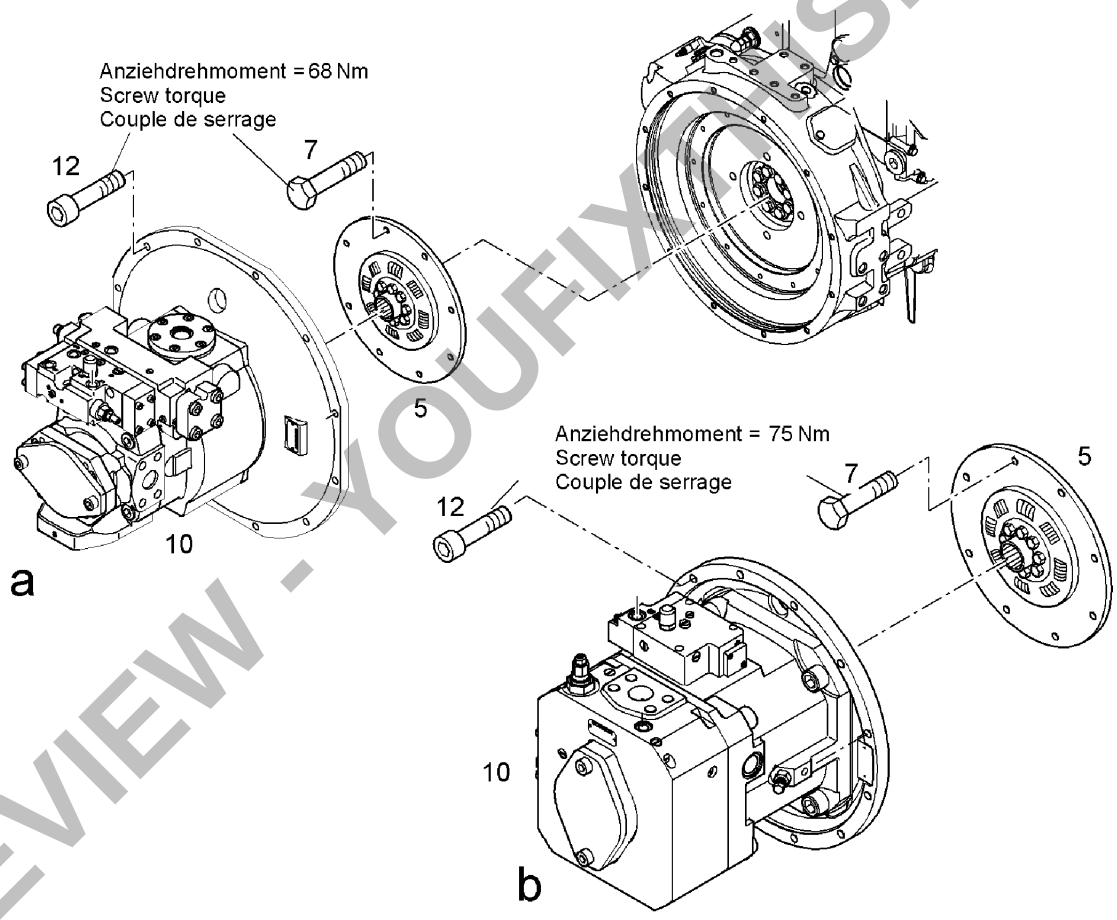


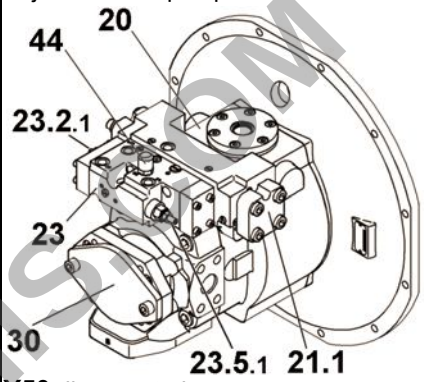
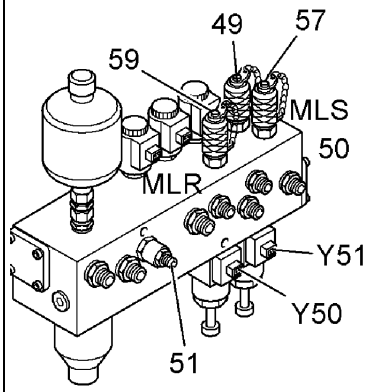
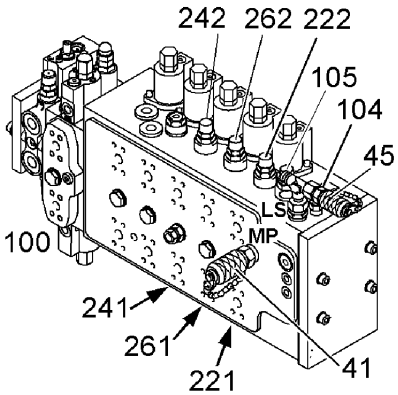
Fig. 2 *Installation position of coupling* ***5(a** = R 900 C, **b** = R 904 C)*

5	Coupling (torsion damper)	**10**	Variable displacement pump
7	Cylinder head screw or hexagon head screw	**12**	Cylinder head screw or hexagon head screw

3 Removal and installation of the coupling

see Fig. 3

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Test	Unit	Nominal value	Test point	Actual value	Value after adjust.	View Notes
6 Working pump **6.1 Pressure difference adjustment (△-pls)** Fully extend tilt cylinder to the top Turn out valve **262**, until pressure = 120 bar on test point 41 - MP	bar	19^{+1}	**41 / 45**			Mode P. RPM Step **10** Button **SF** not active (**Y51** diconnected) read between **MP** and **LS**. Adjustment via pump screw **23.5.1** 
6.2 Hydraulic regulation begin P_{rb} (Pmin) of pumps Sec. pressure limitation valve **262** (Extend tilt cylinder) Reduce under regulation begin **P_{rb} (Pmin)**, then increase slowly until positioning pressure drops on test point **44**. 	bar	50 ±2	**41**			**Y50** diconnected Adjustment via pump screw **23.2.1**  Connect **Y51**. Delete error messages **E 027 / 036**.

DANGER !

Only diconnect and connect the solenoïd valve **Y347** with diesel engine turned off and cooler fan stopped.

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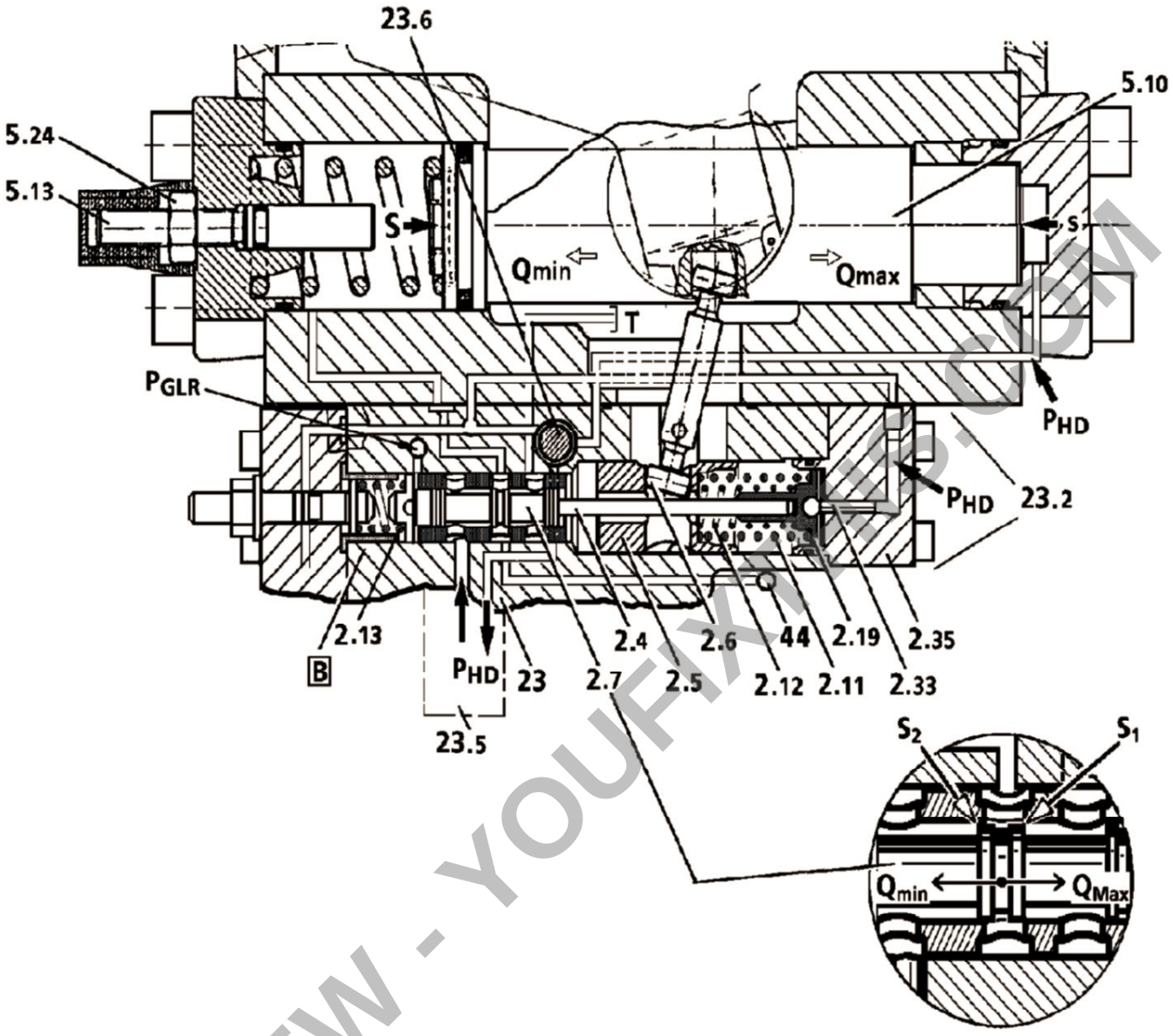


Fig. 3 *Sectional drawing of governor* **23.2**

23	Control valve	**2.19**	Spring retainer
23.2	Governor	**2.33**	Rod
2.4	Push rod	**2.35**	Cover
2.5	Follow-up piston	**23.5**	Load-Sensing-Control
2.6	Lever	**23.6**	2-way check valve
2.7	Regulating piston	**5.10**	Control piston
2.11	Governing spring	**5.13**	Adjusting screw
2.12	Governing spring	**5.24**	Hexagon nut
2.13	Pressure spring / regulation begin	**44**	Test point positioning pressure

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Group 8: Electrical System

8.55: Arrangement of Components

1 Operating and control elements

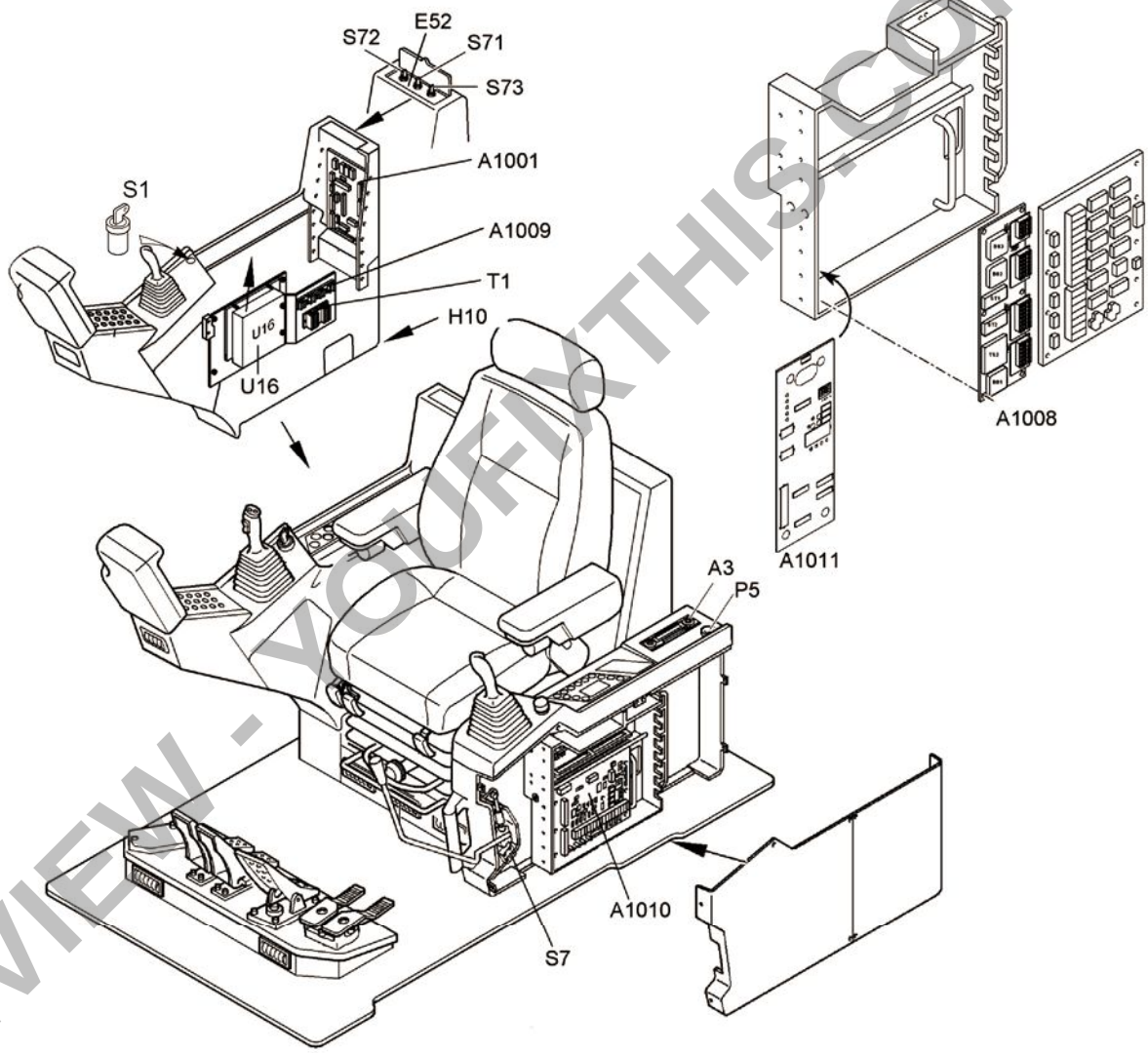


Fig. 1 *View of operator's station*

A3	Radio		
A1001	Printed circuit board ESP01	**S1**	Ignition switch
A1008	Auxiliary printed circuit board (for kits)	**S4**	Signal switch / Horn
A1009	Auxiliary printed circuit board (for kits)	**S7**	Safety switch
A1011	Auxiliary printed circuit board (for kits)	**S71**	Switch / speed adjustment Auto / Manu
A1010	Printed circuit board	**S72**	Switch / Speed High / Low

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7 Sealing around the drive motor

- ▶ Remove the respective lines which obstruct access to the gear
- ▶ It is possible that pressure lines, leak oil lines and control lines may be allowed to remain connected on the hydraulic motor
- ▶ Unscrew the screws **62** and lift the hydraulic motor out of the gear
- ▶ Replace the O-ring of the hydraulic motor
- ▶ Insert the hydraulic motor into the gear again
- ▶ Screw in the screws **62** - observe the prescribed tightening torque, see Tab. 2

Note!
The description for this sealing task can be obtained in the paragraph “Repairing the brake“ in Subgroup “Swing gear brake“. See Group 9.20 Repairing the brake

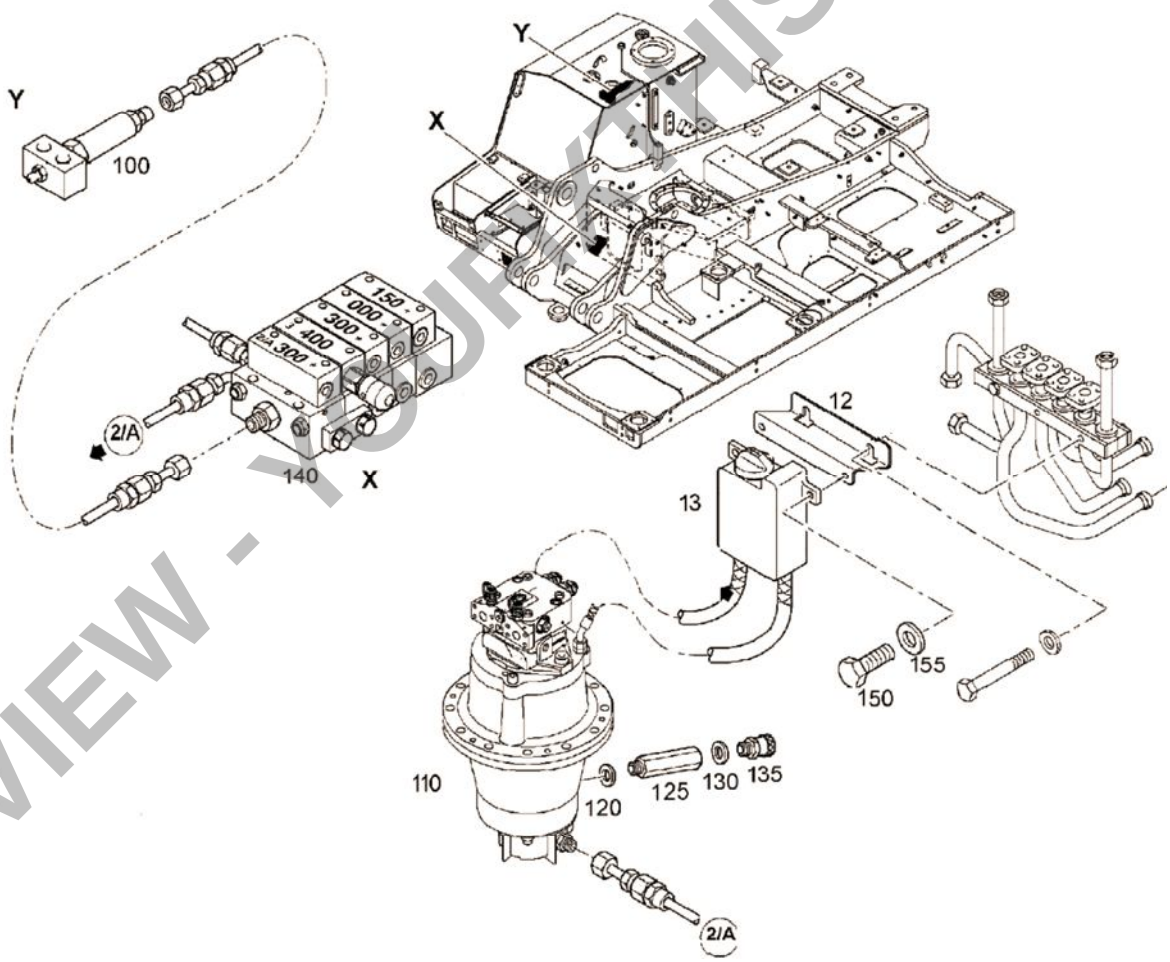


Fig. 5 *Installation position of swing gear and lubrication device*

12 Retainer
13 Oil reservoir
100 Grease nipple with grease filter
110 Swing gear
120 Sealing ring
125 Extension
130 Sealing ring
135 Valve
140 Distributor block
150 Hexagon head screw
155 Washer

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Group 10: Swing Ring

10.10: Ball swing ring

1 Job definition

The ball swing ring which allows the uppercarriage to be swung in any direction desired, is featured as a swing connection with bearing element between undercarriage and uppercarriage.

The swing ring is a single-row, large diameter axial roller bearing.

For rotary drive of the uppercarriage, the swing gear engages in the internal involute gear of the swing ring and manoeuvres the uppercarriage.

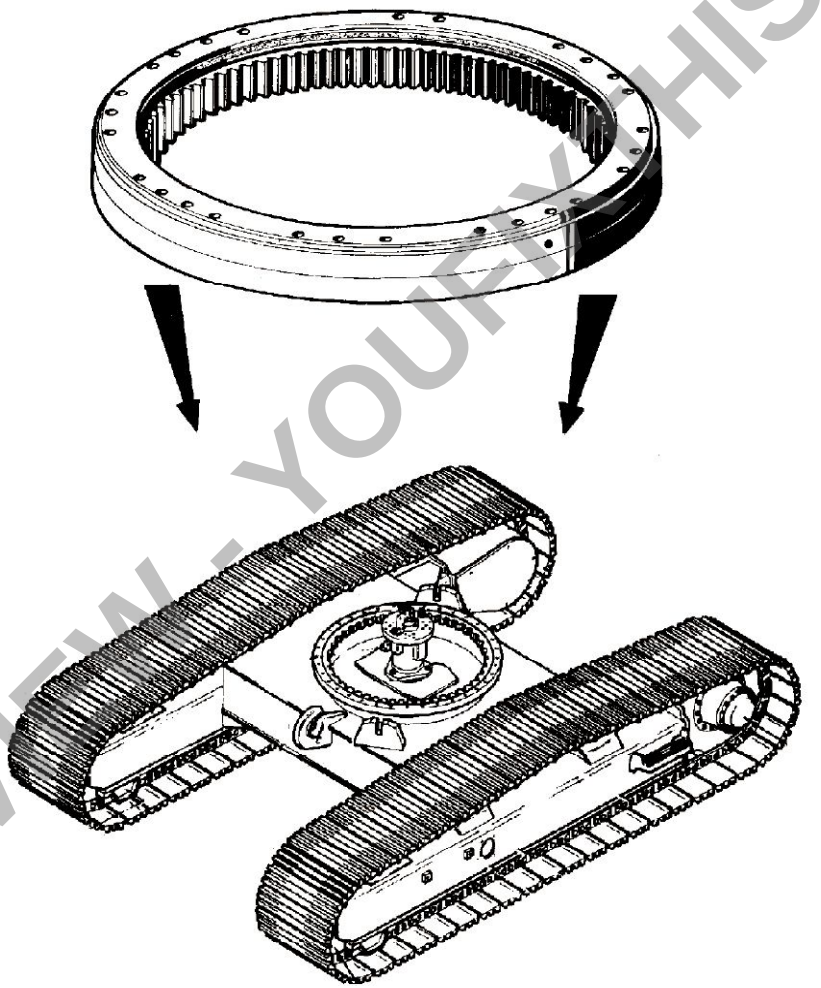


Fig. 1 *Installation position of the swing ring in the undercarriage*

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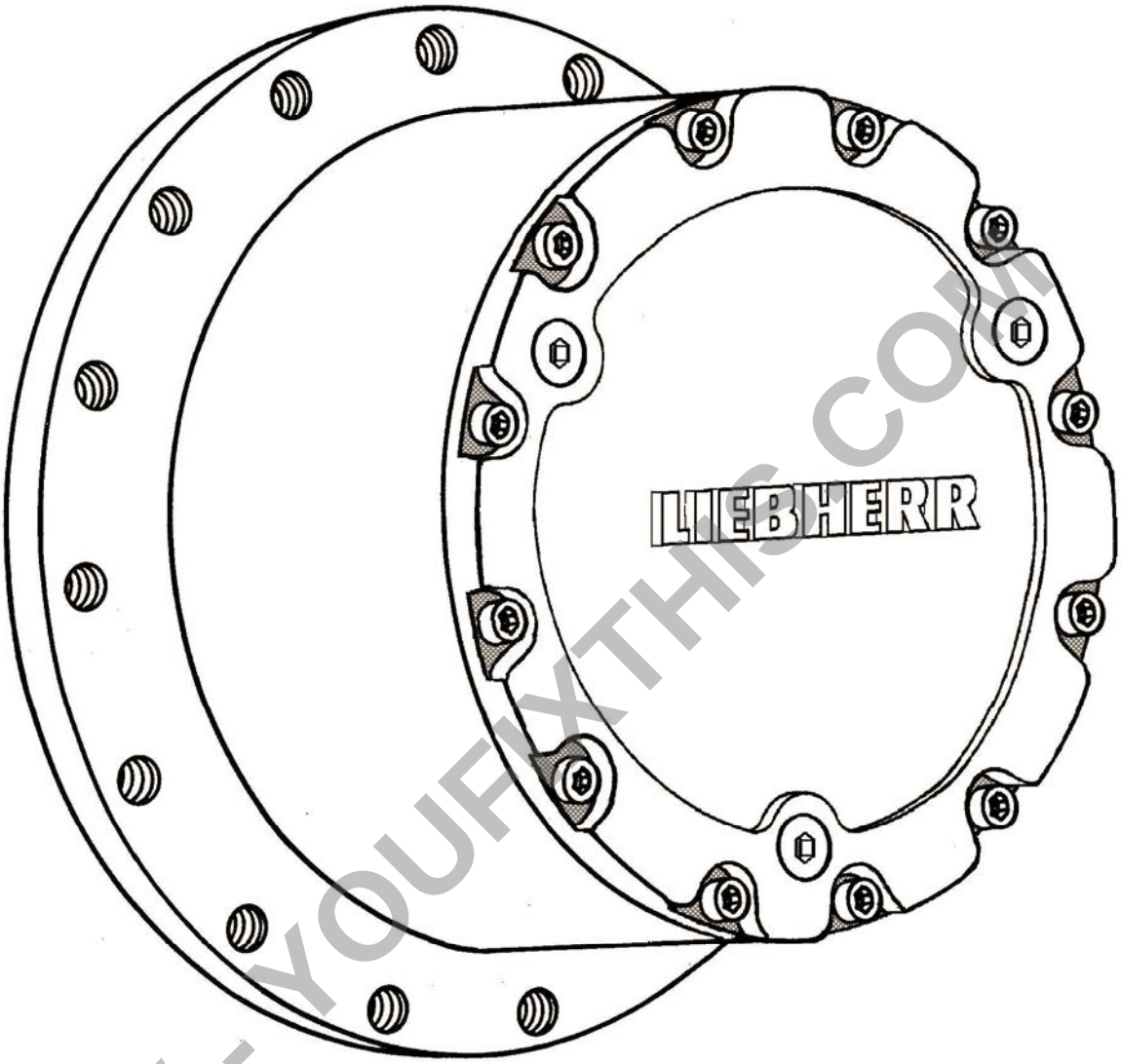


Fig. 1 *Travel gear transmission FAT*

3 Functioning and power transmission

See also the sectional drawing on page 11.67.07

The drive torque of the hydraulic motor **96** is transferred to the drive shaft **35** of the gear via the splined shaft toothing **36** of the plate carrier.

The drive shaft **35** drives the sun wheel **25** via the planetary wheels **32** and the planet carrier **30** with the drive speed reduced by planetary stage **1**.

Sun wheel **25** drives sun wheel **15** via planet wheels **22** and planet carrier **20** with the speed reduced by planetary stage II.

Sun wheel **15** drives the internal gear **10** via the planetary wheels **10** with the speed reduced by planetary stage III.

The sprocket **105** bolted to the internal gear **10** (fig. 2 on page 11.67.04) turns the travel gear chain and thus transfers the drive torque of the gear to the chain.

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12.62: Dismantling and installing track components

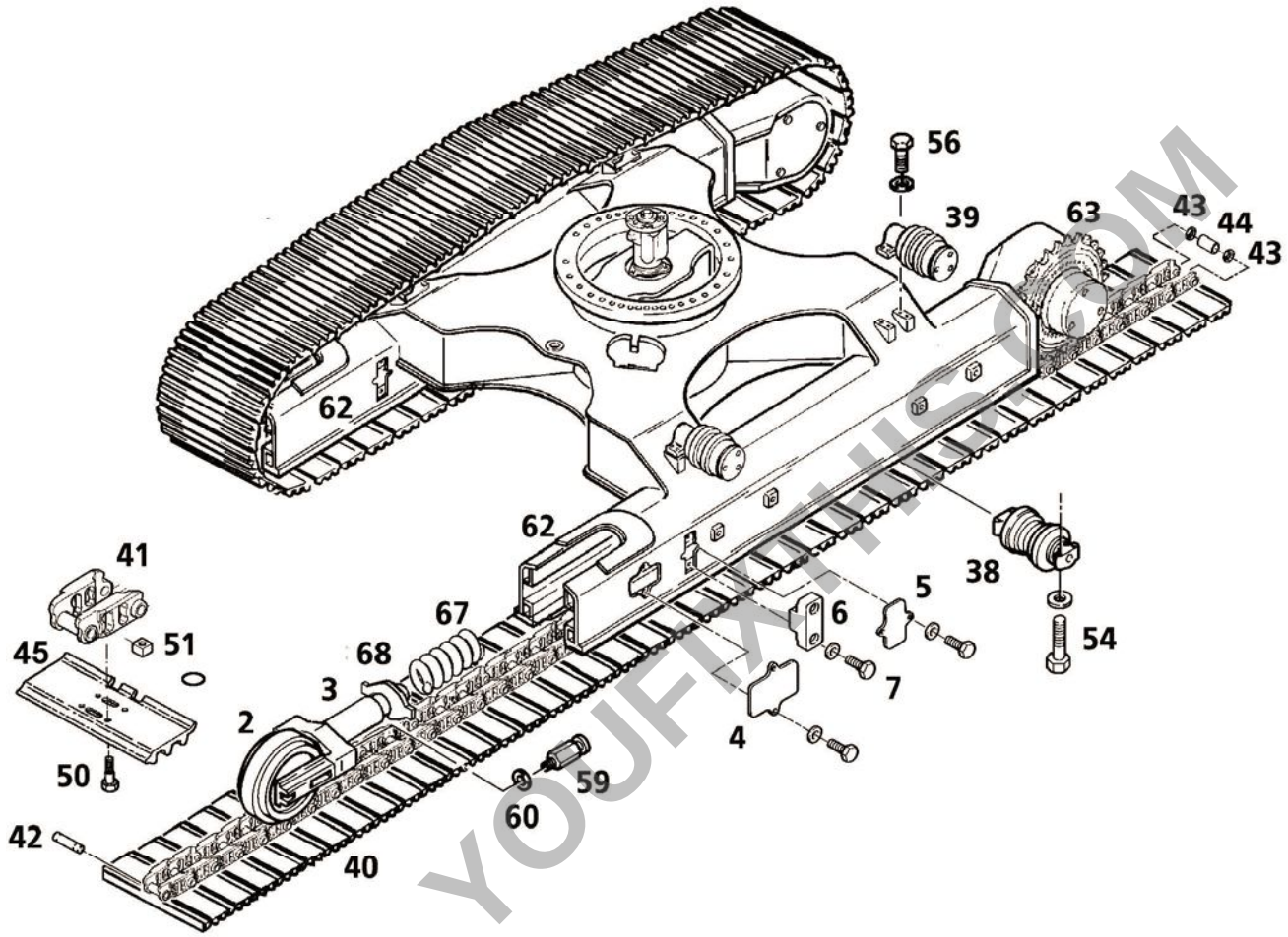


Fig. 1 Overview of travel gear parts

2	Idler unit	**40**	Caterpillar track	**54**	Hexagon head screw
3	Grease tensioner	**41**	Chain link	**56**	Hexagon head screw
4	Cover	**42**	End pin	**59**	Grease nipple
5	Cover	**43**	End ring	**60**	Seal
5	Locking block	**44**	End bushing	**62**	Complete side member
7	Hexagon head screw	**45**	Track pad	**63**	Travel gear transmission
38	Track roller	**50**	Cylinder head screw	**67**	Tensioning spring
39	Carrier roller	**51**	Square nut	**68**	Spring retainer

1 Dismantling and installing the carrier roller

- ▶ Relieve tension in the chain **40**, (see “Dismantling the complete chain” on page 3). Push up the chain using a piece of wood clamped between upper edge of side member and chain.
- ▶ Loosen the screws **56** and remove the carrier roller **39** from the side member.
- ▶ Place the carrier roller **39** on the threaded holes on the side member and fit the screws **56**. Remove the wood, align the carrier roller and tighten the screws **56**.
- ▶ Apply tension to the chain (see “Mounting the complete chain” on page 4).

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7.7. Additional oil now flows out of the cylinder crown side via **V2** to the control valve block **100** and secondary pressure relief valve **221** (extend hoist cylinder **235**). Valve **221** opens and allows the oil to flow back to the tank.

2.3 Actuate cylinder 235 in the lowering direction

The servo pressure at the control valve block **100** connectiol **b5** for actuation of control pistol **220** for working movement “lower attachment“ simultaneously pressurises the charging piston **3** via Pil connection and throttle check valve **23**.

The charging piston **3** pushes against the valve piston **7.7** and pushes it against the pressure spring **7.5**. Following a short stroke, the sleeve **42** firms up against the valve guide **7.1** and the leak oil-free shut-off is opened. The cylinders **235** are retracted.

The oil now flows out of the cylinder chamber via connections **C2** and **V2** to the control valve block and from there back into the hydraulic oil tank. At the same time oil flows from the pump **P2** via the respective connection of the control valve block to the control valve block **235** on the piston rod side.

3 Sectional drawing

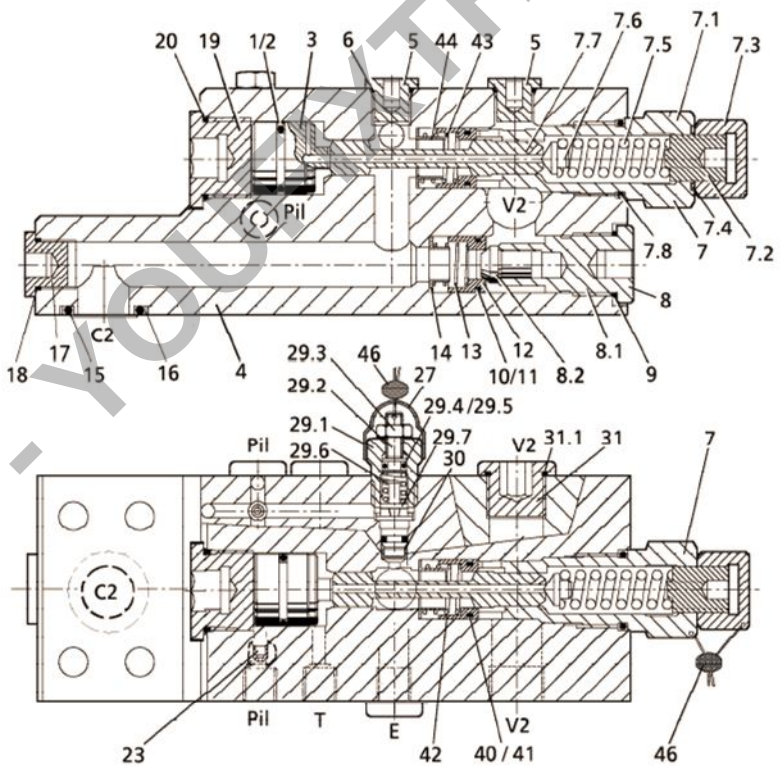


Fig. 2 *Sectional drawing of pipe anti-burst device*

1	O-ring	**12**	Valve seat (sleeve)	**44**	Spring guide
2	Slide ring	**8.1**	Valve guide	**29.2**	Adjusting screw
3	Pilot piston	**8.2**	Cone	**29.3**	Lock nut
4	Housing	**9**	O-ring	**29.4**	Spring guide
5	Screw plug	**10**	Slide ring	**29.5**	Sealing ring
6	O-ring	**13**	Pressure spring	**29.6**	Pressure spring
7	Charging piston complete	**14**	Spring guide	**29.7**	Valve cone
7.1	Valve guide	**15**	O-ring	**30**	Filter element

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resulted directly from the batching pump **14** mounted on the fuel tank, also activated upon start-up. The exhaust gasses are channelled out into the open air via the exhaust gas muffler **15** with exhaust hose.

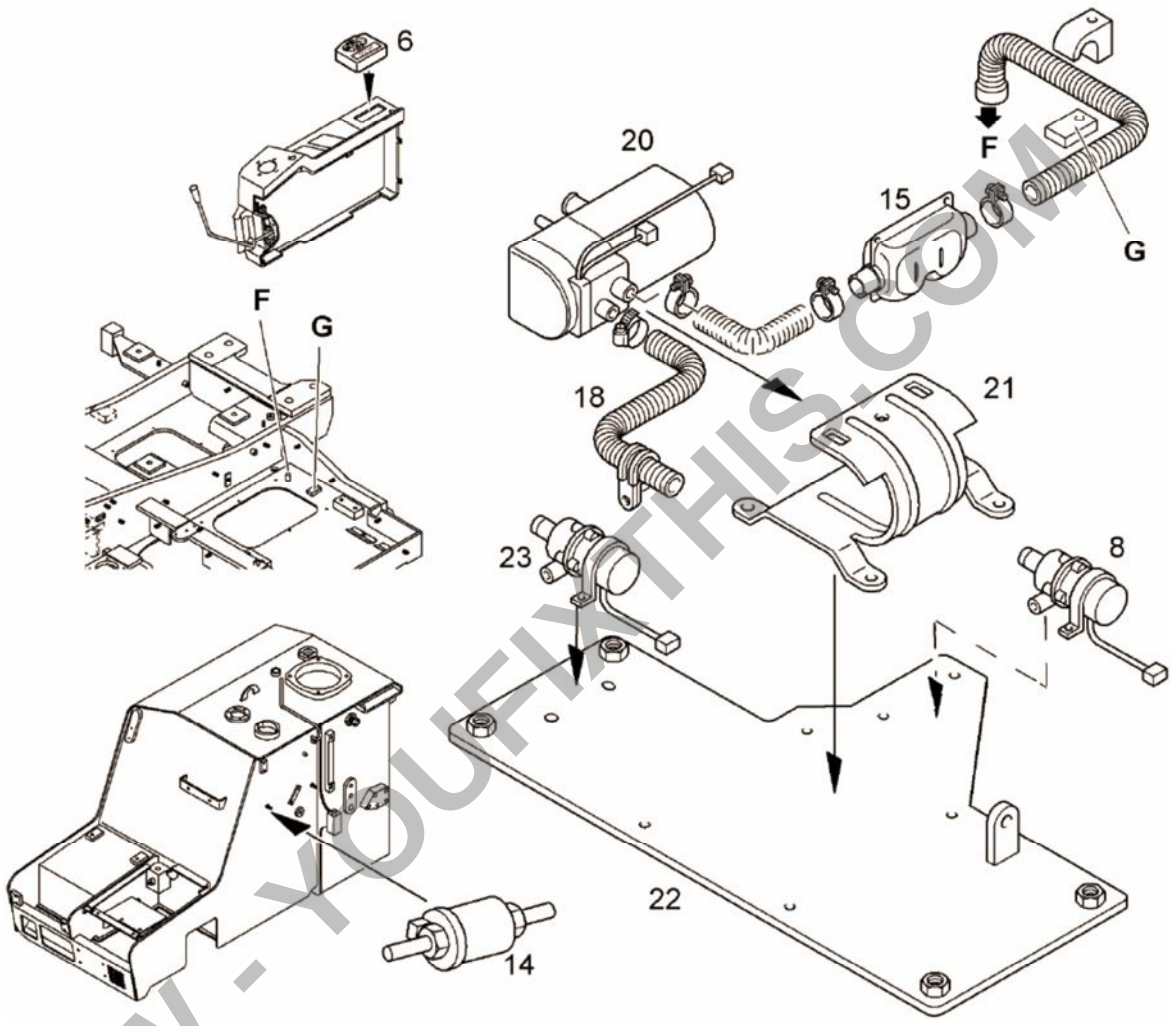


Fig. 2 *Main parts of the heater*

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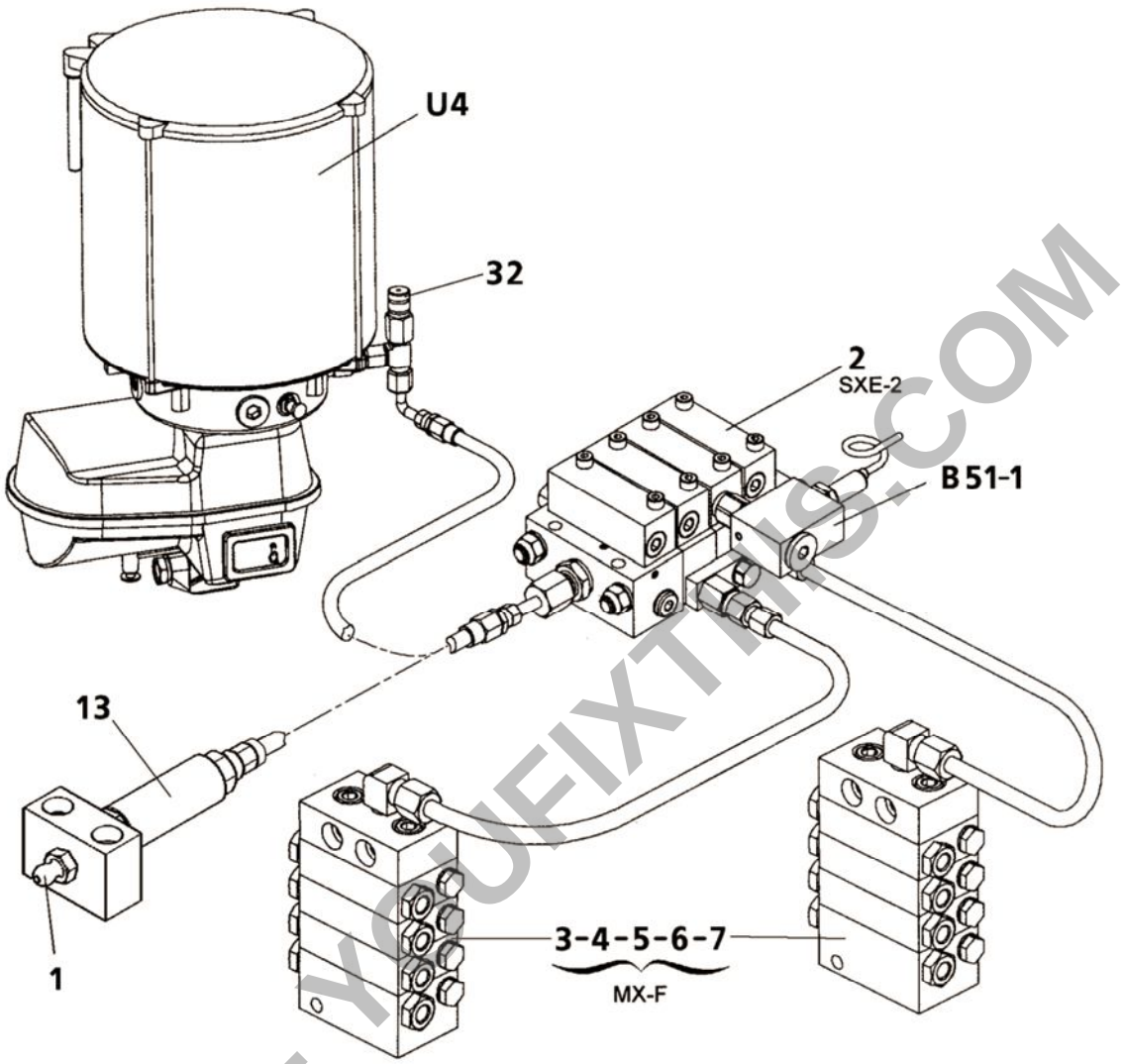


Fig. 1 *Centralized lubrication system*

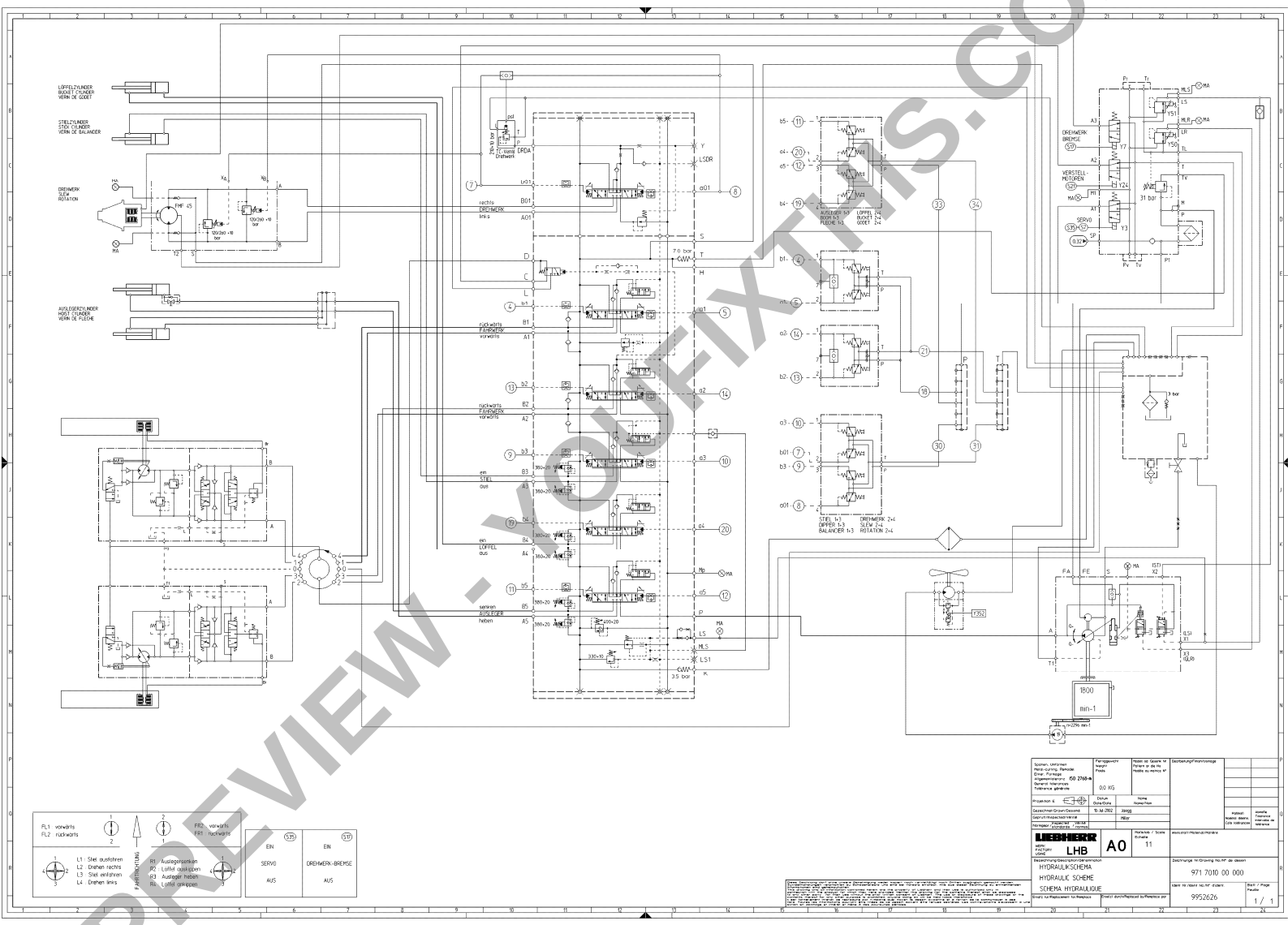
1	Centralized grease nipple	**32**	Relief valve
2	Main distributor (Type SXE-2)	**B51-1**	Proximity sensor (Option)
3-7	Secondary distributor (Typ MX-F)	**U4**	Lubrication pump (Option)
13	Grease filter		

2 Positions of lubrication points and distributors

The diagram below represents the disposition of the lubrication points and lubrication distributors for a standard excavator R 934 B (with gooseneck boom and backhoe bucket), as well as the number and the nominal dimension of the distributors and the grease quantity distributed by lubrication cycle corresponding to the standard adjustment (constructor setting).

On shovels provided with other facilities (adjustable boom, Industry equipment, demolition equipment, tunnel equipment,...), the elements of the progressive circuit can differ, see also the diagrams at the end of this subgroup.

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FL1 vorwärts
FL2 rückwärts

FR2 vorwärts
FR1 rückwärts

FAHRRICHTUNG

L1 Stiel ausfahren
L2 Drehen rechts
L3 Stiel einfahren
L4 Drehen links

R1 Ausleger senken
R2 Löffel ausspoen
R3 Ausleger heben
R4 Löffel anspoen

(S35)	(S17)
EIN	EIN
SERVO	DREHWERK-BREMSE
AUS	AUS

Spanen, Uniformen Metal-cutting, Remodel Enlar. Pumpage Allgemeintoleranz ISO 2768-m Toutes les cotes sans Tolérance générale	Eigengewicht Weight Poids	0.0 KG	Masse de Grosse Nr. Pattern or dia. No. Modèle ou numéro N°
Projektion nach	Datum Date/Data	Name Nom/Nombre	
Gezeichnet/Drawn/Dessiné	19.Jul.2002	JANSS	
Geprüft/Inspected/Vérifié		Alligy	
Normgerecht/Standard/Normalisé	Freigegeben/Released/Libéré		

LIEBHERR
WERK FACTORY USINE
LHB

A0

Marksheet / Scale
Richelle
11

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Bezeichnung/Description/Dénomination
HYDRAULIKSCHEMA
HYDRAULIC SCHEME
SCHEMA HYDRAULIQUE

Ersatz für/Replaces No./Remplace par

Zeichnungs Nr./Drawing No./N° de dessin
971 7010 00 000

Ident Nr./Ident No./N° d'ident.
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Introduction

This manual contains technical data, design and functional descriptions, as well as service and set up instructions. The documents include numbers of drawings, functional diagrams, as well as detailed views of units and assemblies of LIEBHERR hydraulic excavators.

This manual has been created in order to assist the customer support services, but does of course replace neither proper technical training and qualification of the user nor participation in LIEBHERR operator training courses.

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

For maintenance and reparation of the machine, follow conscientiously the safety instructions and warnings.

Symbols used in this manual

In this manual the description of tasks and procedures that are associated with specific dangers are accompanied by safety instructions mentioning the danger related to described work. The safety instructions are graded according to the severity of the risk, and are identified with the symbols «**Danger»** and «**Caution»**, which have the following significances:

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



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 machine damages, unless the prescribed safety measures are taken.

The symbol «**Note»** is destined to attract the attention of the persons having to intervene on the machine upon observations and comments concerning the procedure to be followed for operating as well for maintenance or repair works.



Note!
Comments and advices which will, if adhered to, help you to keep your excavator operating, to insure longlife to your machine and to facilitate certain procedures.

Signification of specific punctuation marks in descriptions

– This mark introduces «an entry in a list».

  • This mark introduces «an entry in a sublist».

❑ This mark indicates «a requirement that must be fulfilled», before going on with the procedure below.

▶ This mark identifies «an injunction to perform the mentioned action».

  ↳ This mark indicates «the normally expected result of a carried out action».

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7.31: Extension and retraction speeds

Determining the extension and retraction times using the diagram

$$Va = Q / Sa = \frac{Q}{\Pi/4 \times D^2}$$

$$T_{(s)} = \frac{60 \times \Pi \times \Delta H_{(dm)} \times D_{(dm)}^{\ 2}}{4 \times Q_{(l/min)}}$$

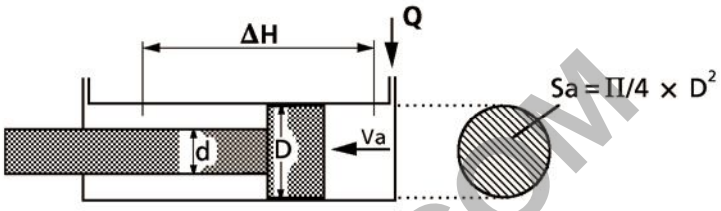


Fig. 1 *Extension time Va and speed T(s) of a hydraulic cylinder*

$$Ve = Q / Se = \frac{Q}{\Pi/4 \times (D^2 - d^2)} = \frac{Q}{\Pi/4 \times (D_{equiv}^{\ 2})}$$

$$T_{(s)} = \frac{60 \times \Pi \times \Delta H_{(dm)} \times (D_{(dm)}^{\ 2} - d_{(dm)}^{\ 2})}{4 \times Q_{(l/min)}}$$

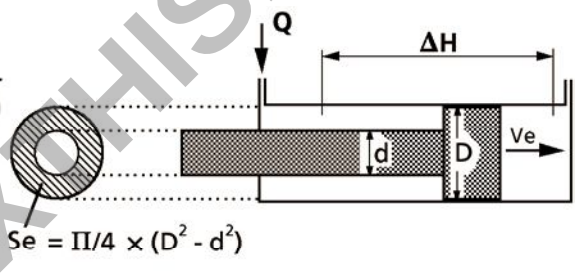


Fig. 2 *Retraction time Ve and speed T(s) of a hydraulic cylinder*

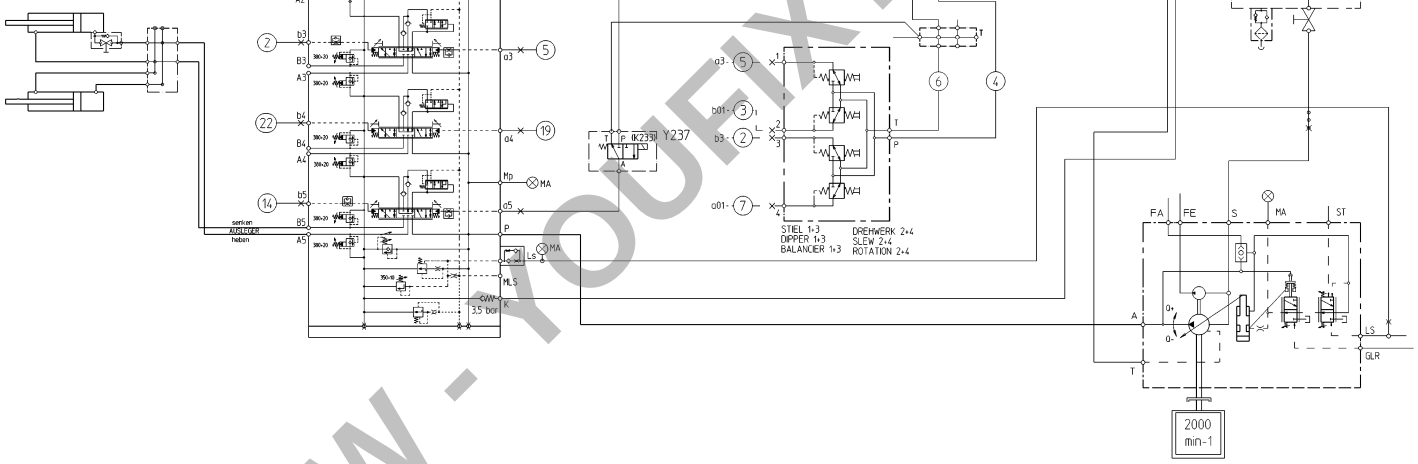
The diagram overleaf provides the extension and retraction times if the piston diameter **D**, the rod diameter **d**, the piston stroke **△H** and the delivery rate **Q** are known, see examples overleaf.

Note!

- For dimensions **D**, **d** and **△H** of the cylinder, see corresponding Subgroup «Assembly of hydraulic cylinders»
- To obtain dimension **Q** the flow rate of a working pump must be halved (one pump supplies two cylinders, e.g. the bucket tipping cylinder) or the flow rate of both working pumps added together (one cylinder is supplied by both pumps, e.g. the stick cylinder)
- Any flow rate which may be installed must be taken into account for the respective movements. For excavators featuring Load Sensing control, any nominal delivery rates of the piston rod in the spool valve must be taken into account.
- The flow rates specified in the «Hydraulic circuit» or «Pump aggregate» groups only apply with the diesel engine running at nominal speed and if the pumps are new.
- Moreover, the pressure must remain below the pressure for regulation begin during extension or retraction of the cylinder. Otherwise the flow rate is reduced via normal pump regulation (this occurs shortly before the stop position for cylinders featuring end-of-stroke dampers, for example).

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Geprüft/Inspected/Vérifié		GOEDE	
Norm/Standards / Normes	Inspected / Vérifié		

LIEBHERR
WERK FACTORY USINE LHB

A1

Maßstab / Scale Echelle 1:1

Bezeichnung/Description/Dénomination
HYDRAULIKSCHEMA
HYDRAULIC SCHEME
SCHEMA HYDRAULIQUE

Zeichnungs Nr/Drawing No./N° de dessin
@ 26 485 1000 12 000

Ident Nr/Ident No./N° d'ident.
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30 Button for activating the setting options
31 Button for setting the time forwards
32 Button for setting the time backwards
33 ON / OFF button for activating / deactivating preselection time
34 Display for time, preselection and heating time
35 Symbol for activated preselection time
36 Symbol for heating operation
37 Symbol for preselection time (1, 2 or 3)

Note!
– If no button is pressed within 15 seconds, the display switches back to its initial mode (= normal time display).
– When setting the time with buttons **31** and **32**, time adjustment will become quicker if the button is held pressed.

Initial start-up of the mini-clock

After shutting down the power supply, all symbols in the display **34 begin flashing. The heater can not be started in this condition. The actual time must first be set.**

Setting the time

▶ Push button **30** for longer than 3 seconds
↳ The time display starts flashing.

▶ Press buttons **31** and **32** until the actual time is displayed.

▶ Press button **30** shorter than 5 seconds.
↳ The time is displayed and the double point flashes.

Note!
If button **30** is not pressed within 5 seconds of setting the time, the clock switches to „Setting heating time“.

Setting the heating time

▶ Push button **30** for longer than 3 seconds
↳ The time is flashing.
↳ The mini-clock switches to „Setting heating time“.
↳ The heating symbol and the heating time start flashing in the display.

▶ Set the heating time with buttons **31** and **32** (from 10 to 120 minutes).

▶ Press button **30**
↳ The time is displayed and the double point flashes.

Setting preselection time

▶ Press button **30** once, twice or three times.
↳ Preselection time 1, 2 or 3 is called up and indicated in the display (**35** and **37**).

▶ Set the preselection time with buttons **31** and **32**.

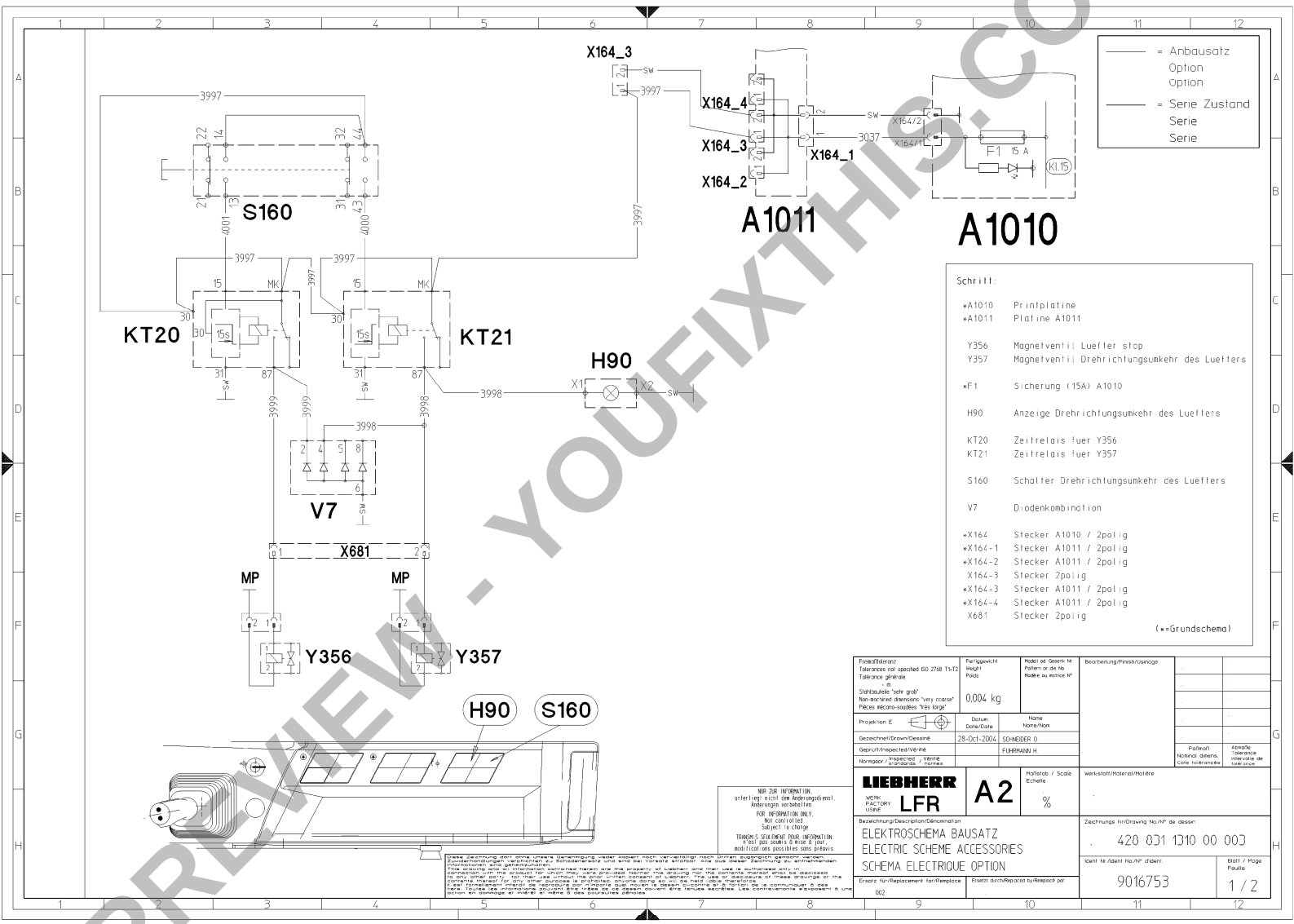
Switching on the heater

▶ Press button **33**.
↳ The remaining heating time and the symbol **36** are indicated on the display.

Switching off the heater

▶ Press button **33**.
↳ The heater continues to run for approx. 3 minutes, the actual time is indicated in the display.

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