

High-Pressure Centralized Lubrication Pump Model ZPU 01/02



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Preface to the Owner`s Manual

• The Owner's Manual

- is intended to familiarize the user with the pump/lubrication system and to be enable him to use it adequately
- must always be available on the site where the pump/ lubrication system is in operation
- must be read and used by all persons who are charged with working with the pump/lubrication system, e. g.

• **Operation**, including adjustment, troubleshooting during operation, elimination of production waste, maintenance, disposal of process materials

• **Maintenance** (inspection, repairs) and/or

• **Transport**

- Persons who **do not have a good command of the English language** must be informed by the user of the pump/lubrication system on the **contents of the Owner's Manual, particularly the Safety Instructions, before they carry out the work.**

• The Operating Instructions

- contain important information for the safe, correct and economic operation of the pump/lubrication system. Their observance will help avoid hazards,
- reduce repair costs and downtime,
- increase the reliability and prolong the service life of the pump/lubrication system.
- must be supplemented by the respective national regulations concerning the prevention of accidents and protection of the environment.

Safety Instructions

- The Operating Instructions include general instructions which must be followed when a pump/lubricating unit is installed, operated or serviced. Therefore, it is absolutely necessary for the fitter and specialist/user to read the Operating Instructions before a unit is installed and put into operation. The Operating Instructions must always be available on the site where the machine/system is installed.
- All general safety instructions contained in this main chapter on safety must be observed as well as all special safety instructions given in other main chapters.

Hazard Marking in the Operating Instructions



Safety symbol acc.
to DIN 4844-W9

- The notes referring to safety contained in the Operating Instructions whose failure to observe them may result in personal injury are marked by the symbol above.



Safety symbol
acc.to DIN 4844-W8

- This symbol warns of an electrical current.

CAUTION

- If ignoring the safety note might result in machine damages and malfunction, the word **CAUTION** is added.
- Warnings directly fixed to the machine must always be observed and must be kept in completely legible condition.

Staff Qualification and Training

- The staff responsible for operation, maintenance, inspection and installation must be adequately qualified for these jobs.
- The user must properly regulate the field of responsibility and supervision of the personnel.
- If the **personnel** is not in command of the necessary expertise, they must receive the appropriate **training and instructions**. If necessary, this can be done by the manufacturer/supplier on behalf of the machine user.
- Furthermore, the user must ensure that the contents of the Operating Instructions are fully understood by the personnel.

Hazards Resulting from Failure to Observe the Safety Instructions

- Failure to heed the safety warnings may result in damage to equipment and the environment and/or personal injury.
- Failure to observe the safety notes may result in the loss of all claims for damage.
As an example, in the following we list some dangers which may result from failure to observe the warnings:
 - failure of machine/system to fulfill important functions
 - failure of specified methods for maintenance and repair
 - personal injury due to electrical, mechanical and chemical influences
 - danger to the environment due to leakage of harmful materials

Safety-Conscious Working

- Observe
- the safety instructions given in the Operating Instructions,
 - the prevailing national regulations for the prevention of accidents
 - any working and shop regulations and accident prevention measures of the user

Safety Instructions for the User/Operator

- If warm or cold machine parts present hazards, the customer must protect them against accidental contact.
- Do not remove protection devices for moving parts while the machine is in operation.
- Leakages of harmful materials must be disposed of so as to jeopardize neither persons nor the environment. The requirements of the law must be satisfied.
- Danger caused by electrical current must be excluded (for details refer to the applicable specifications of VDE and the local power supply companies).
- The user must make sure that all maintenance, inspection and installation work is executed by authorized and qualified experts who have thoroughly read the Operating Instructions.
- On no account may work be done on the machine while the machine is in operation. Follow all instructions for shutting down the machine as described in the Operating Instructions.
- Reassemble all safety and protection devices immediately after completion of the cleaning procedure.
 - Decontaminate pumps and pump units delivering harmful materials.
 - Dispose of material harmful to the environment in accordance with the applicable official regulations.
 - Before putting the pump/pump unit into operation, ensure that all points given in the chapter "Putting into Operation" are fulfilled.

Unauthorized Modification and Spare Parts Production

- Alteration and modifications of the machine are only allowed if approved by the manufacturer. Original spare parts and accessories authorized by the manufacturer ensure safe operation.
- If other parts are used, the manufacturer may be released from its liability for the resulting consequences.

Inadmissible Operating Modes

- The operational safety of the supplied products is only granted if the product is operated according to the instructions given in chapter 3.2 of the Owner's Manual. The maximum ratings listed in the Technical Data must never be exceeded.

Appropriate Use

- The pump model ZPU 01/02 is exclusively designed for use in **centralized lubrication systems** for dispensing lubricants.
- The maximum ratings mentioned in the Technical Data, particularly the maximum operating pressure of 300 bar, must not be exceeded.
- Depending on its number of pump elements the central lubrication pump model ZPU 01/02 can be used for two ranges of application:
 1. As a supply pump for small two-line systems ("F" version with filter block, safety valve and pressure gauge) within a radius of approx. 50 m of the pump in conjunction with a pressure-controlled change-over valve.
 2. As a supply pump for progressive systems ("E" or "V" version). In the "V" version the lubricant output is combined via a bracket.
- The pump is available with 1 or 2 pump elements, depending on the desired lubricant output.
- **Any other use is not in accordance with the instructions and will result in the loss of claims for guarantee and liability.**

Description

Type identification code

Examples:	ZPU02	-	M	100	-	030	XY	BU	-	F	380-420/440-480
	ZPU01	-	M	100	-	010	XY	N	-	E	380-420/440-480

Basic type of central lubrication pump:

ZPU01 : Pump with 1 element
 ZPU02 : Pump with 2 elements

Drive assemblies:

M : Three-phase flanged motor
 Motor designation with extension, e. g. for voltages
 frequencies, explosion-proof design is added to the
 pump type code

100 : Gear ratio = 1 : 100

Reservoir assemblies:

010 : Reservoir capacity 10 l
 030 : Reservoir capacity 30 l

XY : Reservoir for grease and oil
 N : Reservoir without level monitoring
 BU : Reservoir with low and high level control (ultrasonic sensor)

Note: The ultrasonic sensor is equipped with 2 switching points. If only one low level control is desired, the corresponding contacts must be connected. A 24VDC supply voltage is required for the sensor.

Pump elements:

E : Element(s)
 V : Bracket with element(s) and pressure gauge
 F : Bracket with element(s), filter block, pressure gauge and safety valve

Extension for motor designation

380-420/440-480 : Standard multi-range motor für 380-420 V/50 Hz und 440-480 V/60 Hz
 000 : Pump without motor, however with connecting flange

Operation

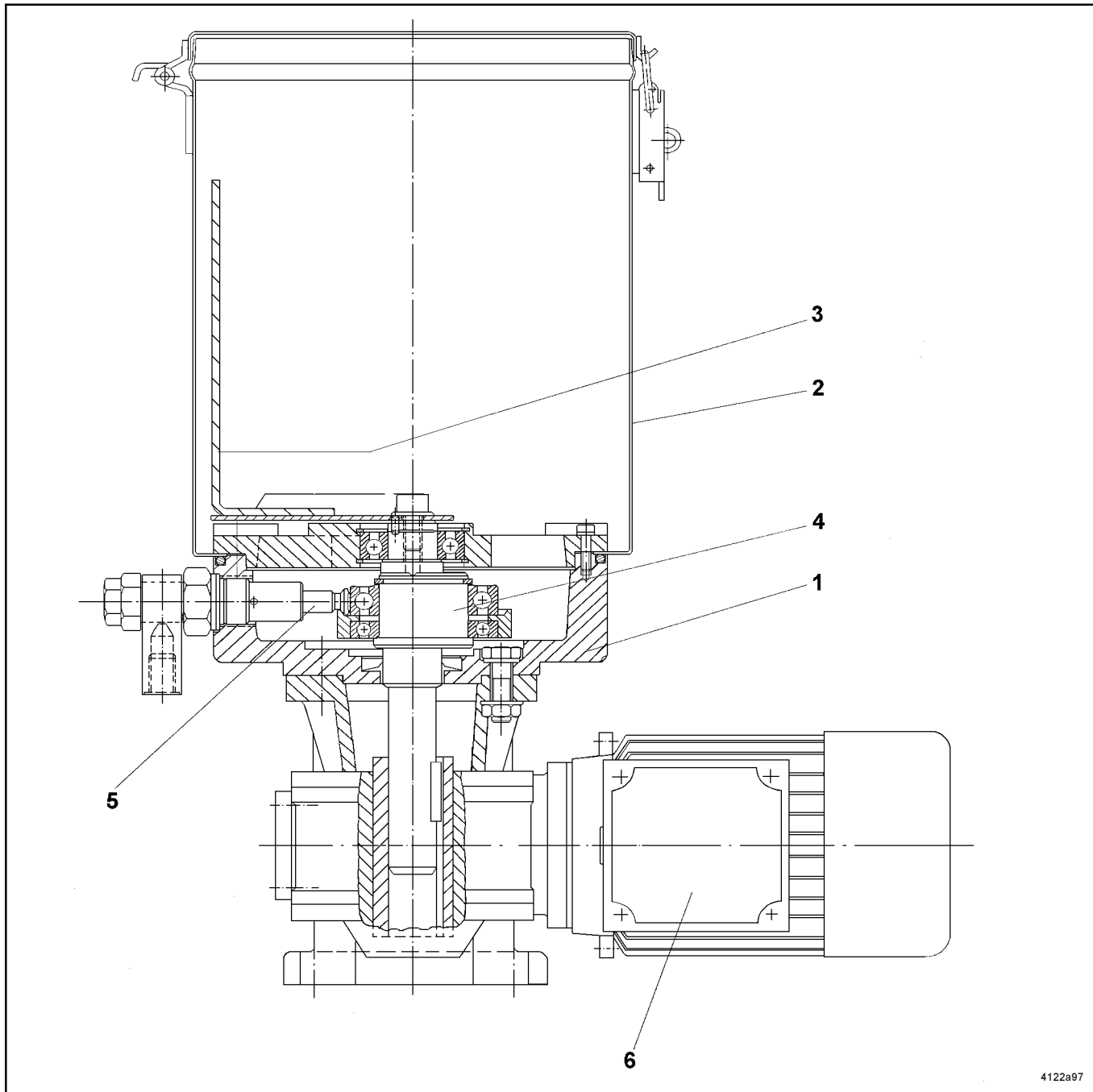


Fig. 1- Sectional drawing of pump model ZPU 01/02

The pump essentially consist of the following components:

1. Housing
2. Lubricant reservoir
3. Stirring paddle with scraper
4. Eccentric shaft
5. Pump element
6. Worm gear motor

- The worm gear (6, Fig. 1) reduces the speed of the drive motor down to the speed of the eccentric shaft.
- The eccentric shaft (4) causes the piston in the pump element (5) to be moved forward and backward, with the result that the lubricant is sucked in and dispensed to the outlet via a check valve.
- At the same time, the eccentric shaft also drives the stirring paddle (3). The rotation of the stirring paddle causes the lubricant to be homogenized and dispensed to the suction boreholes of the pump element.

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Operation of the low-level for grease reservoir "...XYBU"

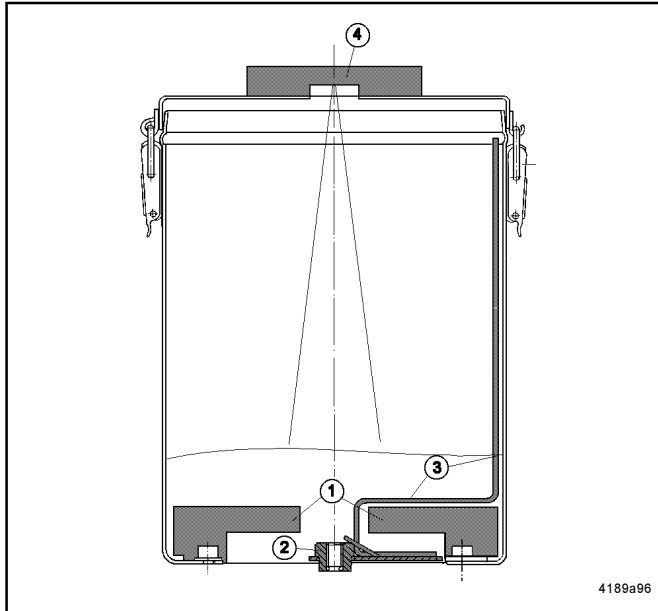


Fig. 2- Operation of the low-level control (grease reservoir "...XYBU")

- | | |
|---------------------|-----------------------|
| 1 - Fixed paddle | 3 - Scraper |
| 2 - Stirring paddle | 4 - Ultrasonic sensor |

ATTENTION

Observe the direction of rotation of the pump drive (clockwise)

- The „empty“ signal (as well as the „full“ signal) are obtained via an ultrasonic sensor (4) installed in the middle of the reservoir lid.
- Two fixed paddles (1) are arranged 144° opposite the reservoir bottom. Thus, they form an obstruction to the grease pushed forward by the stirring paddle.
- The stirring paddle (2) turns below these fixed paddles, thus smoothing the grease level and producing a useful echo for the ultrasonic sensor.
- The low level signal takes place, as soon as the grease has dropped to a minimum.

Technical Data

Numbers of pump elements:	1 or 2
Threaded connection:	"E" version: G 1/4" i version „V or F“: for tube Ø 10 mm or. G 3/8 " i
Filling connection:	
max. operating pressure:	300 bar (The pumps of the "E" version must be protected by an adequate safety valve)
Suitable lubricants:	Lubricating grease up to NLGI grade 2 NLGI grade 3 on request, Mineral oil with a viscosity of min. 20 mm ² / s
Lubricant output:	800 cm ³ per pump element and per hour <i>Note: In the case of 60 Hz motors lubricant output is increased by 20 %</i>
Ratios:	1: 100
Rated speed of drive::	1370 rpm at 50 Hz 1640 rpm at 60 HZ
Reservoir sizes:	10 or 30 dm ³
Deliverable on request:	low-level control or low- and high-level control
Weight of pump:	approx. 19 kg
Sound level:	< 70 dB(A)

Electric Equipment

Three-phase flanged motor:	see technical data on enclosed motor data sheet (enclosure)
Accessories:	(depending on the grade of equipment of the pump)
Low-level control and high-level sensor :	technical data sheets see enclosed data sheet

Erection and Installation

Erection of the Pump

Requirements on the installation site:

- Protected from dust and dirt
- Safe against atmospheric influences (note the type of protection of the electric motor)
- Sufficient space for opening the reservoir cover and executing the maintenance work (the required space depends on the pump size)
- Even, solide and vibration-free site.

Electric Connection



All electrical works be carried out only by qualified personnel.

Elektric connection of the drive motor:

- Terminal wiring diagram under the cover of the terminal box.
- Fuse protection in accordance with the national regulations in force; rated current consupcion, see motor data sheet in annex
- Direction of rotation: motor and stirring paddle, clockwise

Electric connection of the level controls:

- Refer to the respective terminal diagrams in the annex and to the electrical wiring diagram.

Owner's Manual

Putting into Operation

- Before putting the pump into operation fill the reservoir with lubricant.

CAUTION

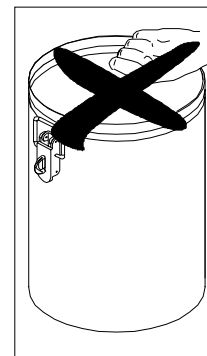
- Before the pump is put into operation for the first time take care that all pump elements are adjusted on the zero output.
- When filling the reservoir pay attention that no dirt or foreign particles enter the reservoir.
- Always refill the reservoir in time.
- Avoid contamination in the pump area.



- Do not touch internal parts of the reservoir while the pump is in operation.
- Risk of injury due to the stirring paddle.
- All system components which are connected downstream of the pump and onwhich the hydraulic pump pressure has an influence (e. g. change-over valve, metering devices, tube lines, tube fittings, hoses) must be designed for max. system pressure.
- For the pumps of the "E" and "V" version protect each pump element against overpressure by means of an adequate safety valve (max. opening pressure: 300 bar)

- * Switch the pump on
- * pLet the pump run until the lubricant emerges from the pressure line connection without air bubbles.
- * Switch the pump off.
- * Screw the tube line which is filled with grease in at the pressure line connection.
- * The system is ready for operating.

Note: When stiff greases are dispensed unscrew the closure plug (filling connection) from the pump housing, let the pump run until grease emerges and then screw the closure plug in again.



Maintenance and Repair

Before undertaking any repair on the pump observe the following instructions:



- Switch the drive motor off and protect it from inadvertent restart. Risk of injury by the stirring paddle.
- Loosen the pressure connection fittings in order to decrease the pressure in the pump and inthe system . Risk of injury due to lubricant splashing under high pressure.
- Repairs may only be carried out by qualified, skilled personnel using original replacement parts.
- Provided that the pump dispenses only clean lubricant, it does not need any particular maintenance. Since the eccentric shaft and the pump elements are covered by lubricant which is fed by the pump they are lubricated automatically.
- They are subject to a natural wear which depends on the operating time and operating pressure and must therefore be replaced.

Assembly and Disassembly of Pump Elements

Preliminary works:

- * Switch the pump off and clean it on the outside.
- * If the pump is filled with grease, the grease can remain in the pump. Fluid lubricants must be drained (unscrew the closure plug or the pump element)
- * If the stirring paddle stays ahead of a pump element which must be disassembled, turn it until it is on the opposite side

Attention: The delivery pistons cannot be changed! When assembling or disassembling two pump elements take care that each delivery piston remains in the pump cylinder. The delivery pistons are adjusted in the pump cylinder with a clearance of only few micrometers .

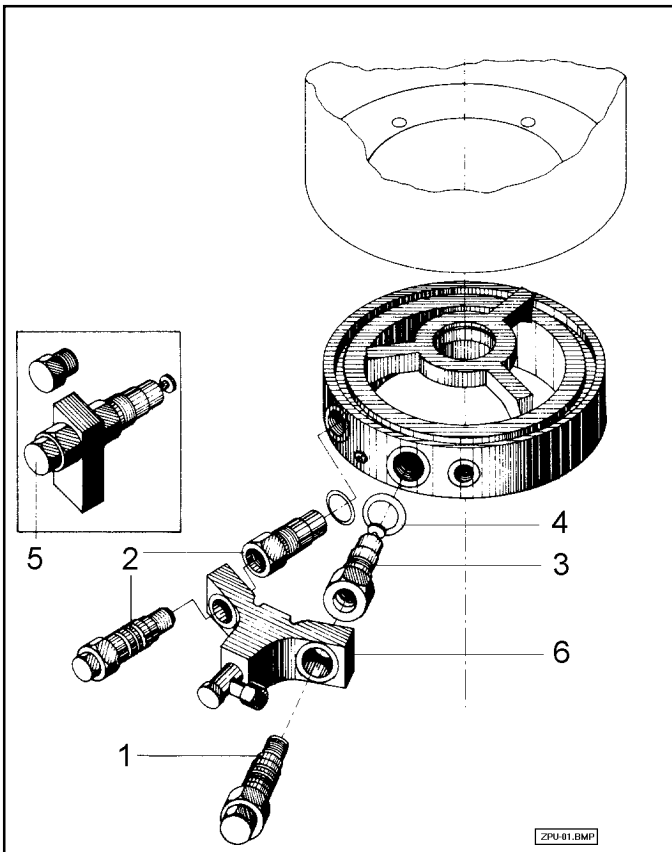


Fig. 3 - Changing of pump elements

- | | |
|-------------------------------|--|
| 1 - Check valve | 4 - Sealing ring |
| 2 - Dummy cylinder | 5 - Single -pump element with closure plug |
| 3 - Pump cylinder with piston | 6 - Bracket |

Replace E1 or E1 (without bracket) single elements

- * Unscrew the element at the screwed end by means of a fork wrench (SW 32).
- * Direct the element upwards (see fig. no. 5) and remove the delivery piston from the groove of the eccentric ring.
- * Take care that the delivery piston does not remain in the grease.

Replacing F... or V... (with brackets) elements

- * Unscrew the valves (item 1) by means of a fork key (SW 24).
- * Also remove the dummy element item 2 (V1 and F1 versions).
- * Remove the bracket.
- * Carefully unscrew the pump cylinder with the delivery piston (item 3).
- * Direct the element upwards (see fig. no. 5) and remove the delivery piston from the groove of the eccentric ring.
- * Take care that the delivery piston does not remain in the grease.

Assembly of the Elements

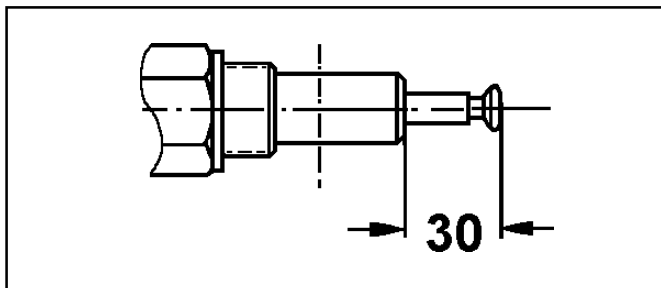


Fig. 4 - Pulling out of delivery piston

- On inserting the pump element hold it in such a way that the delivery piston which has been previously pulled out of the pump cylinder by about 30 mm is directed slightly upwards. This will prevent it from falling down since it is not fixed within the pump cylinder.

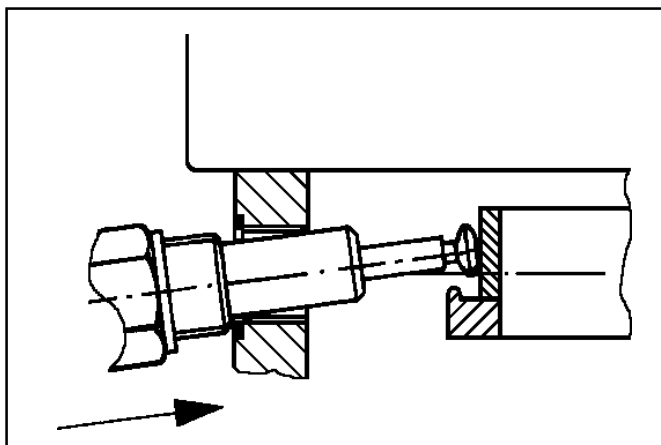


Fig. 5 - Inserting the pump element

- Pay attention that the pump element is equipped with a sealing ring 306-17814-1.

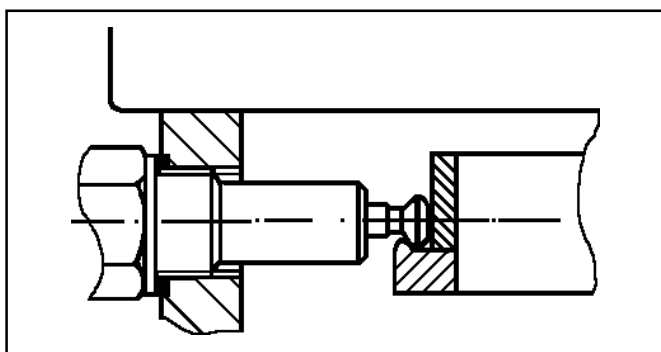


Fig. 6 - Pump element installed correctly

- Put the pump element in horizontal position and at the same time hang the head of the delivery piston into the groove of the eccentric ring.
- First screw the pump element in by hand and then tighten it at the screwed plug using a fork wrench (SW 27). Tightening torque: 30 - 35 Nm

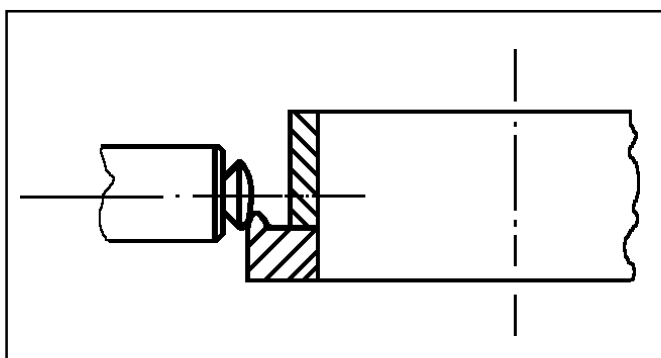


Fig. 7 - Incorrect assembly, lubricant output impossible

- Attention:** If the pump element is not installed correctly the lubricant cannot be dispensed and the pump may be damaged!

Troubleshooting

• Fault: The pump does not supply the lubricant	
• Cause:	• Remedy:
• Reservoir empty	• Fill up the reservoir with lubricant and let the pump operate until the lubricant emerges from the pressure line connection without air bubbles.
• Suction borehole of the pump elements clogged	• Disassemble the pump element and check whether foreign particles are lodged in the suction borehole. remove them, if there are any.
• Check valve defective or clogged	• Replace check valve
• Filter clogged ("F" version) <i>Note: If the filter is clogged, this will be indicated by short, strong deflections on the pressure gauge.</i>	• Check the filter and clean it. If it is damaged, replace it.
• Pump piston worn	• Replace the pump element.

• Fault: Lubricant leaking from the safety valve	
• Cause:	• Remedy:
• Bearing, lines or progressive metering device clogged	• Find out the cause of the blockage and eliminate it. See "Progressive metering device malfunctioning"
• Change-over valve malfunctioning	• See "Change-over valve malfunctioning or description of system"

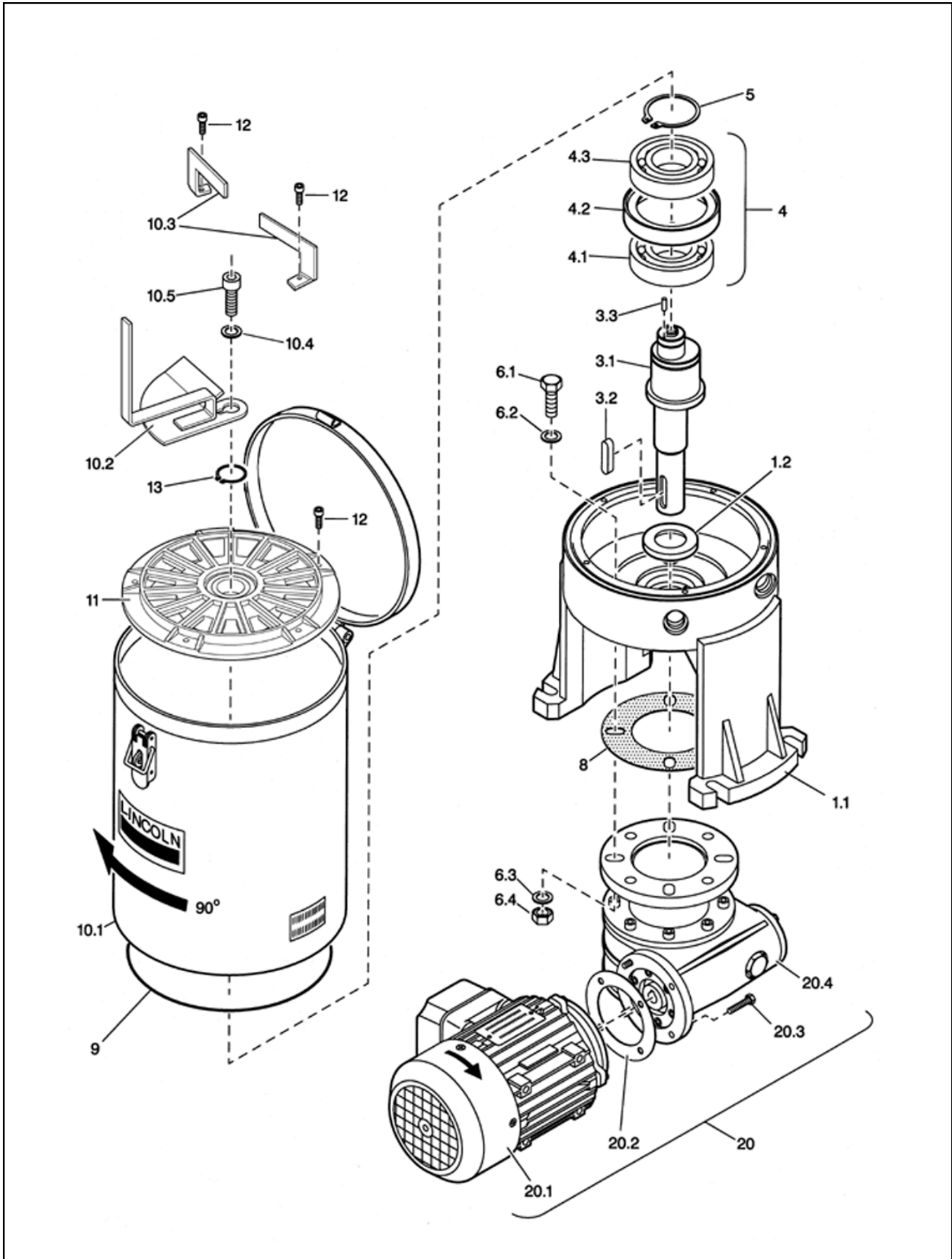
All repairs which are beyond the knowledge of the user's personnel must be carried out by LINCOLN experts. For this, return the defective pump to the repair department of the Walldorf works or call for a specialist who will carry out the repair on site.

Service adress:

LINCOLN GmbH
 Abt. Zentraler Kundendienst
 Postfach 1263
 D-69183 Walldorf

Component Parts of Pump Model ZPU 01/02

Component Parts of the Pump without Pump Elements



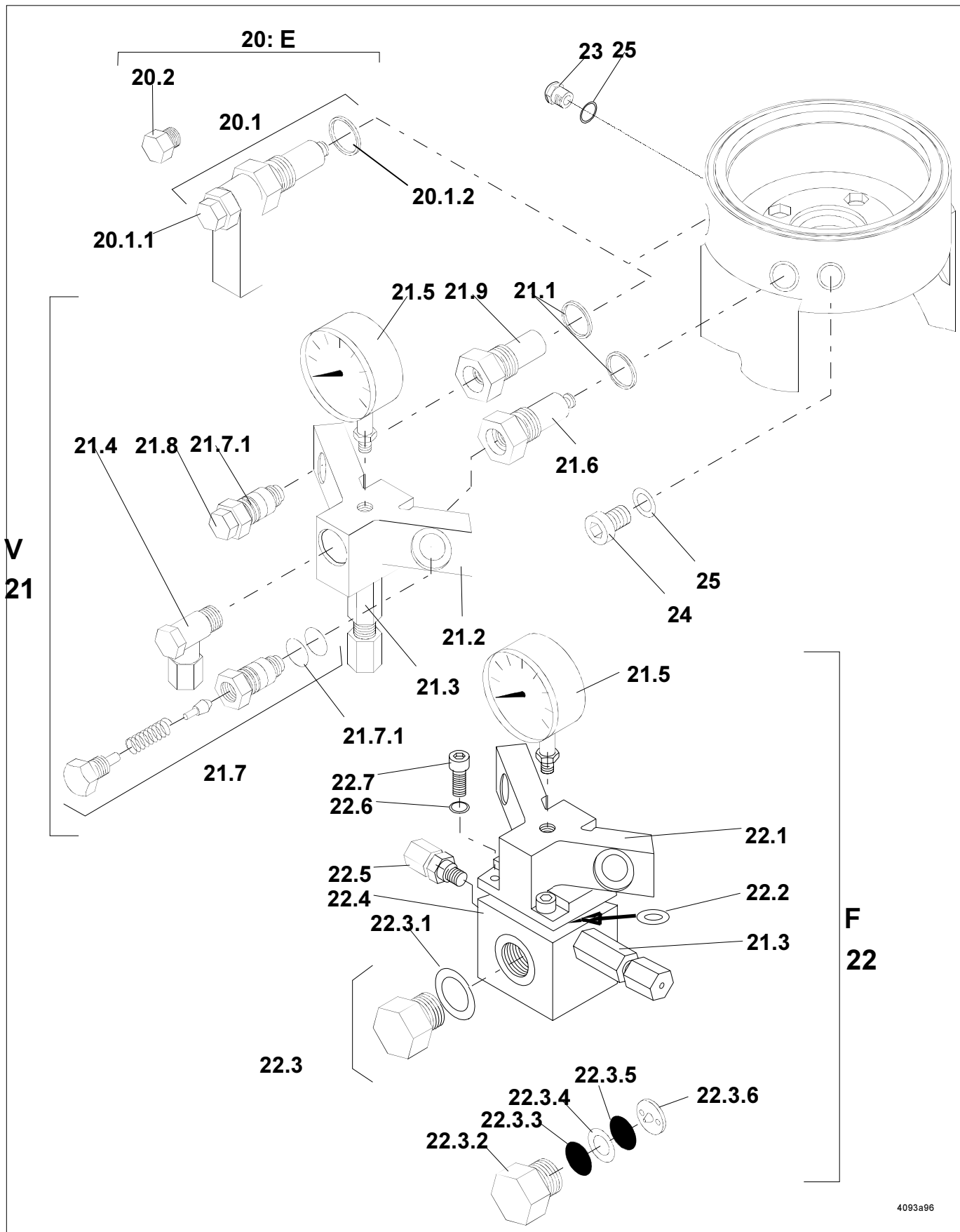
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Spare Parts List

Item	Designation	Qty	Part no.
1.1	Housing	1	313-19670-1
1.2	Radial seal 30 x 50 x 7	1	220-12231-4
3.1	Eccentric shaft	1	460-24302-1
3.2	Feather key A 8 x 7 x 32	1	214-12176-3
3.3	Grooved pin D4 x 10	1	206-12498-3
4	Catch ring assy.	1	560-36903-3
4.1	Grooved ball bearing D45 / 75 x 10	1	250-14064-3
4.2	Catch ring	1	460-24301-1
4.3	Grooved ball bearing D45 / 75 x 16	1	250-14064-4
5	Retaining ring A 45 x 1.75	1	211-12164-9
6.1	Hexagon head screw 10 x 35C	4	200-12008-6
6.2	Washer A 10,5C	4	209-13077-2
6.3	Sealing ring M 10	4	220-13653-7
6.4	Hexagon nut M 10C	4	207-12136-1
8	Sealing ring Ø 70 x 126 x 0.5	1	306-19640-1
7	O-ring Ø 186 x 3.5	1	219-12226-8
10.1	Reservoir with cover		
	10 l	1	560-32012-1
	30 l	1	560-32010-1
10.2	Stirring paddle for 10 l-reservoir	1	500-32128-1
	Stirring paddle for 30 l-reservoir	1	500-32129-1
10.3	Fixed paddle	1	460-24566-1
10.4	Washer A 10,5C	1	209-13077-2
10.5	Hex. socket head screw M 10 x 25 C	1	201-12027-6
11	Intermediate bottom assy.	1	460-24568-1
12	Hex. socket head screw M 5 x 20C	5	201-12016-8
13	Retaining ring A 25	1	211-12164-6
20	Drive assy., consisting of: Gear 100:1 and motor 0,18 kW 380-420/440-480 V, 50/60 Hz	1	245-13915-1
20.1	Three-phase flanged motor 0,18 kW 380-420/440-480 V, 50/60 Hz	1	245-13913-1
20.2	Sealing ring, Abil	1	306-19415-1
20.3	Hexagon head screw M 5 x 16C	4	200-13017-9
20.4	Gear: i = 100: 1	1	246-14145-1
	Set of packings consisting of item: 1.2, 6.3, 8, 9, 20.1.2, 21.1, 21.7.1, 22.2, 25, 20.2	1	561-36929-1

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**Component Parts of Pump Element Assemblies and Mounting Parts
for the Housing Assemblies**



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Spare Parts list

Item.	Designation	Qty.		Part no.
20	<i>Pump elements E1 und E2</i>	<i>E1</i>	<i>E2</i>	
20.1	Pump element assyl.	1	2	500 - 30018 - 3
20.1.1	Outlet stud	1	2	400 - 20029 - 2
20.1.2	Sealing ring	2	2	306 - 17814 - 1
20.2	Closure plug	1	-	303 - 17431 - 1
	<i>Pump elements V1 und V2</i>	<i>V1</i>	<i>V2</i>	
21	Bracket with safety valve and pressure gauge	1	1	500 - 30014 - 1
21.1	Sealing ring	2	2	306 - 17814 - 1
21.2	Bracket	1	1	500 - 30807 - 1
21.3	Safety valve 350 bar	1	1	624 - 25294 - 1
21.4	Banjo connector SWVE 10-SG 3/8"	1	1	223 - 12285 - 5
21.5	Gauge 0 - 600 bar	1	1	500 - 30017 - 1
21.6	Pump cylinder with piston	1	2	500 - 30011 - 1
21.7	Valve assy.	1	2	500 - 30012 - 3
21.7.1	O - ring 18 x 2	2	4	219 - 12451 - 3
21.8	Holding screw	1	-	400 - 20026 - 4
21.9	Dummy cylinder	1	-	400 - 20024 - 2
	<i>Pump elements F1 und F2</i>	<i>F1</i>	<i>F2</i>	
22	Bracket with safety valve, filter block and gauge	1	1	500 - 30015 - 1
22.1	Bracket	1	1	500 - 30808 - 1
22.2	O-ring 7,5 x 2	1	1	219 - 12222 - 6
22.3	Strainer assy.	1	1	628 - 25463 - 1
22.3.1	Usit - ring 34,4x43x2	1	1	220 - 12238 - 3
22.3.2	Hollow screw	1	1	428 - 21543 - 2
22.3.3	Coarse strainer	1	1	428 - 21544 - 1
22.3.4	Spacer ring	1	1	428 - 21546 - 1
22.3.5	Fine strainer	1	1	428 - 21545 - 1
22.3.6	Srew ring R 3 / 8	1	1	303 - 17546 - 1
22.4	Filter block	1	1	428 - 21553 - 2
22.5	Straight connector GE 10-SG 3/8"	1	1	223 - 13016 - 4
22.6	Hex. socket head screw M 6 x 16	2	2	201 - 12019 - 9
22.7	Tooth lock washer	2	2	210 - 12162 - 4
21.1	Sealing ring	2	2	306 - 17814 - 1
21.3	Safety valve 350 bar	1	1	624 - 25294 - 1
21.5	Gauge 0 - 600 bar	1	1	500 - 30017 - 1
21.6	Pump cylinder with piston	1	2	500 - 30011 - 1
21.7	Valve assy..	1	2	500 - 30012 - 3
21.7.1	O - ring 18 x 2	2	4	219 - 12451 - 3
21.8	Holding screw	1	-	400 - 20026 - 4
21.9	Dummy cylinder	1	-	400 - 20024 - 2
	<i>Mounting parts for housing</i>			
23	Button head fitting	1	1	251 - 14040 - 3
24	Closure plug	1	1	203 - 12075 - 3
25	Copper washer	2	2	209 - 12464 - 1

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Data Sheets

Motor Data Sheet

Standard-Motors for Pump Model ZPU 01/02/Three-Phase a.c.-Asynchronous Motors (multi-range)

Pump model		ZPU 01/02 - M 100 - M 490	Units
Motor manufacturer		Halter	
Motor type		DIC 63 B 4	
Frequency	f	50	[Hz]
Nominal power	P	0.18	[KW]
Nominal speed	n	1370	[min ⁻¹]
Rated torque	M	1.26	[Nm]
Nominal current	I_N	1.38	[A] bei 220 -240 V
		0.57	[A] bei 380 -420 V
Starting current/ ratio	I_A/I_N	3	[A]
Power factor	cos φ	0,67	
Efficiency	η	61	[%]
Frame size		63	
Type of construction		B 14	
Type of protection	IP	55	
Insulation class		F	
Weight		4,4	[kg]
Flange		ø 90	[mm]
Shaft end		ø 11x23	[mm]

The motors can be connected to the following networks:

220/380 V ± 5%, 50Hz
 230/400 V ± 10%, 50Hz
 240/415 V ± 5%, 50Hz
 265/460 V ± 5%, 60Hz
 254/440 V ± 5%, 60Hz
 480 V ± 5 %, 60 Hz

Other voltages and/or special designs as well as other manufacturers available on request

Standard-Motors for Pump Model ZPU 01/02/Three-Phase a.c.-Asynchronous Motors

Pump model		ZPU 01/02 - M 100 - M 490	Units
Motor manufacturer		Halter	
Motor type		DIM 63 B 4	
Frequency	f	50	[Hz]
Nominal power	P	0,18	[kW]
Nominal speed	n	1370	[min ⁻¹]
Rated torque	M	1,25	[Nm]
Nominal current	I _N	1,11	[A] bei 290 V
		0,64	[A] bei 500 V
Starting current/ ratio	I _A /I _N	2,5	[A]
Power factor	cos φ	0,7	
Efficiency	η	47	[%]
Frame seize		63	
Type of construction		B 14	
Type of protection	IP	55	
Insulation class		F	
Weight		4,4	[kg]
Flange		ø 90	[mm]
Shaft end		ø 11x23	[mm]

The motors can be connected to the following networks :

290/500 V ± 10%, 50Hz

Other voltages and/or special designs as well as other manufacturers available on request

CAUTION

For motors exposed to strong temperature changes, especially when operated in humid environments, we recommend providing condensate bores or installing an auxiliary heating system for stationary periods.

Data Sheet for Ultrasonic Sensor

Description of operation

This remote sensor is a solid state proximity type for 24 VDC which uses the echo delay-time method for distance sensing . It senses a sound-reflecting object which enters the sound cone from any direction. The objects to be sensed may be solid or liquid.

Installation

Figure I (dimensions in mm)

Any mounting position

Keep a free space around the sound cone of a distance "x" (x = 60 mm) from reflecting objects (figure I).

Connection

By means of cable socket (figure III) part no. 237-13442-2

Pin		
1	L+	DC 20 ... 30 V
2	S	Switching output "High level" (NO)
3	L-	Ground (GND)
4	S2	Switching input "Low level" (NC)

The connections are polarized, short-circuit proof and overload-proof. In the case of electrical faults it is recommended to use shielded lines.

Operation

Switching range (figure IV)

- a Unusable blind zone
- b Sensing range
- c Overfill range

HV	Hysteresis	„High level“
HL	Hysteresis	„Low level“

The objects are sensed reliably in the set switching range within an opening angle of the sound cone of 5°. If the reflecting conditions are good, the objects can also be sensed outside the sound of cone. Keep the blind zone "a" free from objects. These would lead to undefined switching states. Take care that the surface of the transducer is clean.

Display:

Reservoir empty	H2 is lit
Filling level O.K.	H2 is non lit
Reservoir full	H1 is lit
Supply voltage	H3 is lit: green
Overfill signal	H3 is lit: red

Technical data

Ambient temperature:	-25...70°C
Sensing range:	50...500 mm*
Sensing distance „High level“ S1:	60 mm*
Sensing distance „Low level“ S2:	depends on the reservoir size
Hysteresis „High level“ HV:	20 mm
Hysteresis „Low level“ HL:	50 mm
Switching point fault :	0.17% / K
* measured on the housing surface	

Supply	
Rated operational voltage:	U _E 24 V DC
Operating voltage range:	U _B 20...30VDC
Admissible residual ripple:	10%
Open-circuit power consumption:	<60 mA

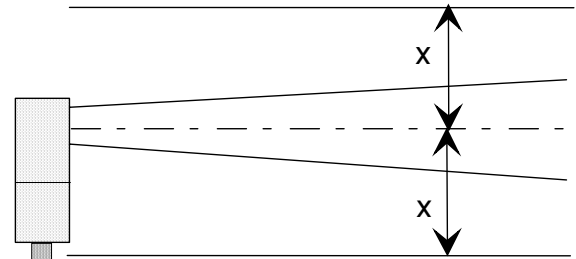
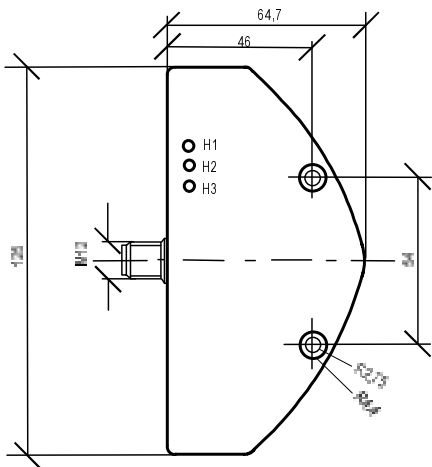
Switching output:	
Rated normal current:	I _E <200 mA
Voltage drop:	U _D <3 V
Spurious switch-on pulse:	suppressed
Switching function „High level“:	NO contact switching on "plus"
„Low level“:	NC contact switching on "plus"

Typical values:	
Availability delay:	250 ms
Reflection area:	10 x 10 mm ²
Ultrasonic frequency:	400 kHz
Switching frequency :	8 Hz
Resolution:	1 mm
Protection:	IP 65

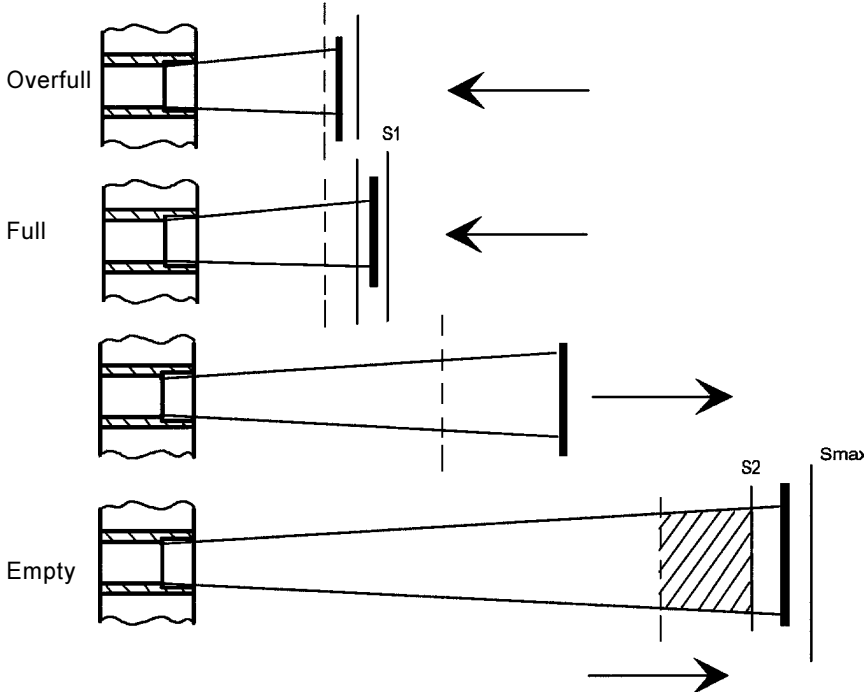
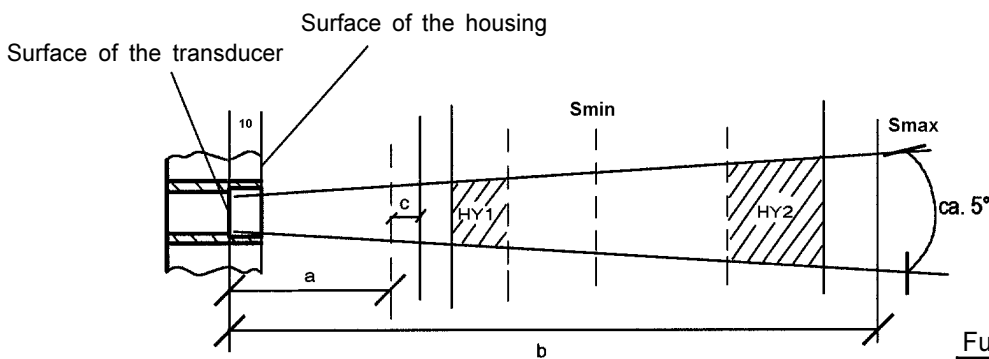
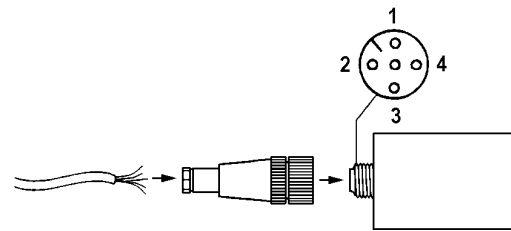
Part-Numbers:

Ultrasonic-Sensor adjusted for reservoir sizes:

10 L	Part-No.: 664-36939-4
30 L	664-36939-5



III



Full	Empty	
S1	S2	
1	1	
H1	H2	H3
on	off	red

S1	S2	
1	1	
H1	H2	H3
on	off	green

S1	S2	
0	1	
H1	H2	H3
off	off	green

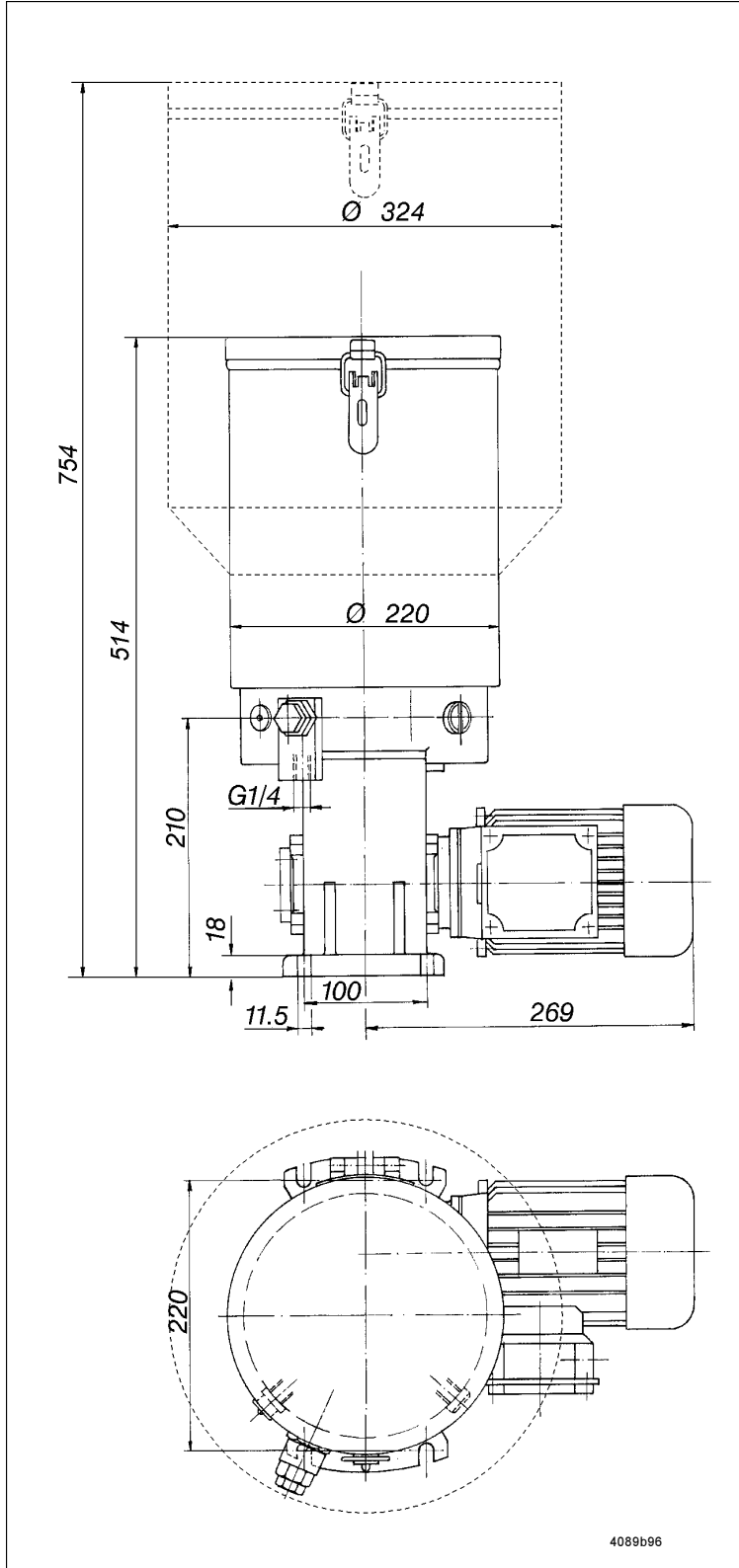
S1	S2	
0	0	
H1	H2	H3
off	on	green

Subject to change without notice

← Rising level
→ Falling level

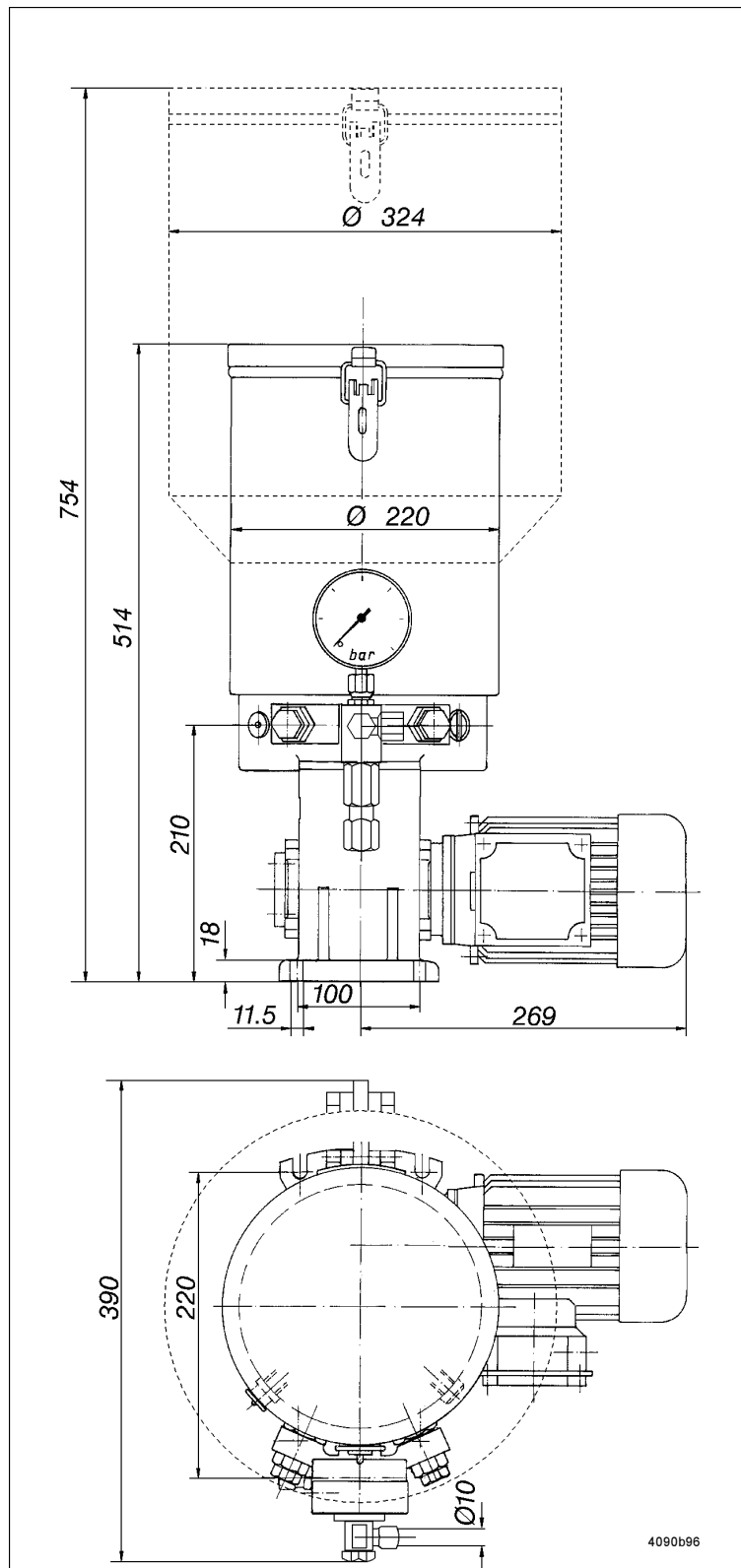
Dimensions

Pump ZPU 01/02-M100-10XYN/30XYN-E



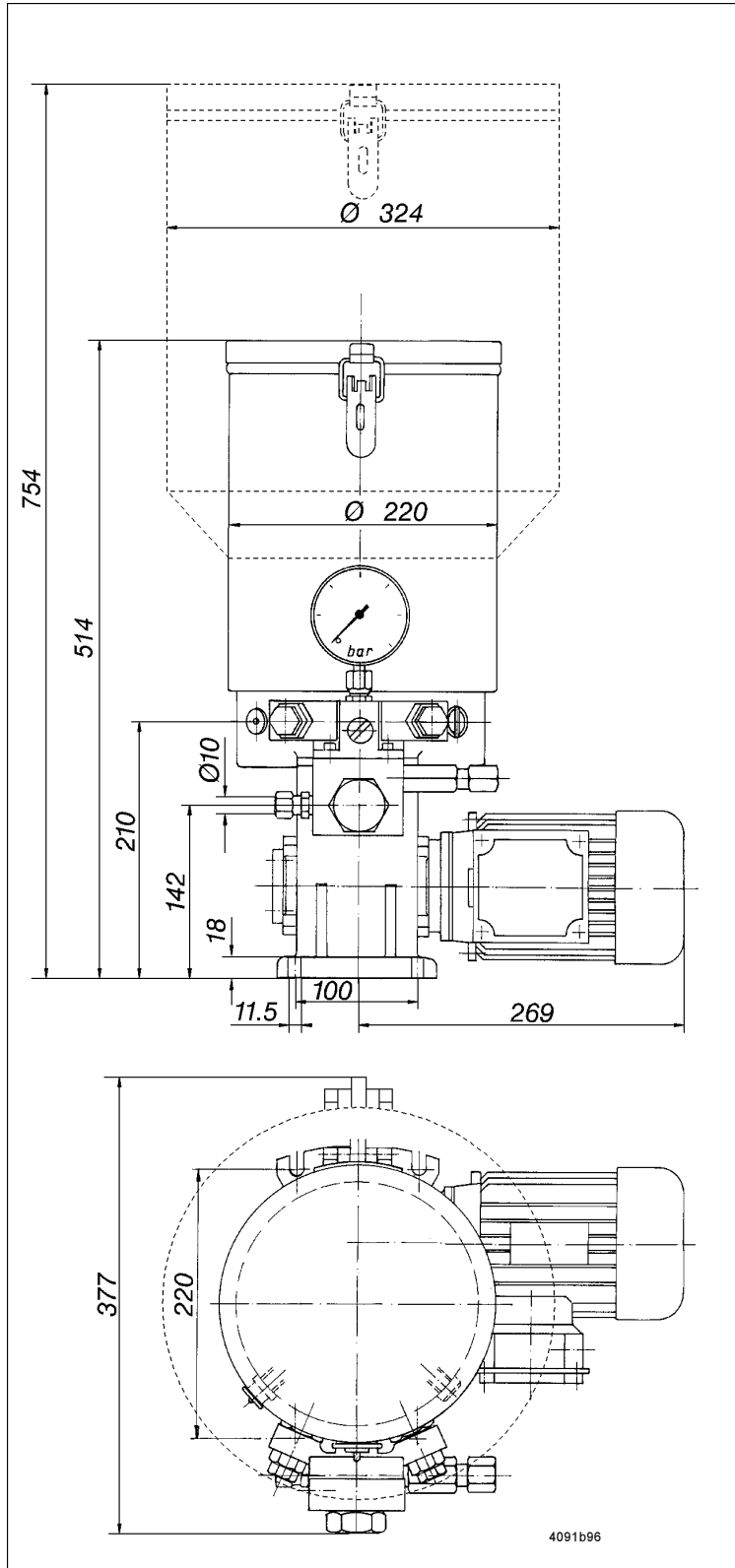
Subject to change without notice

Pump ZPU 01/02-M100-10XYN/30XYN-V



Subject to change without notice

Pump ZPU 01/02-M100-10XYN/30XYN-F



Subject to change without notice

**Declaration by the manufacturer as defined by
machinery directive 89/392/EEC Annex II B**

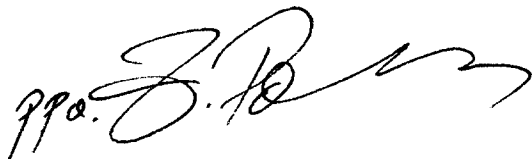
Herewith we declare that the supplied model of

Pump Typ ZPU 01/02

is intended to be incorporated into machinery covered by this directive and must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the directive.

Applied harmonized standards in particular

EN 292 T1/T2
prEN 809
EN 563



Walldorf, 21.10.1996 , ppa. Z.Paluncic