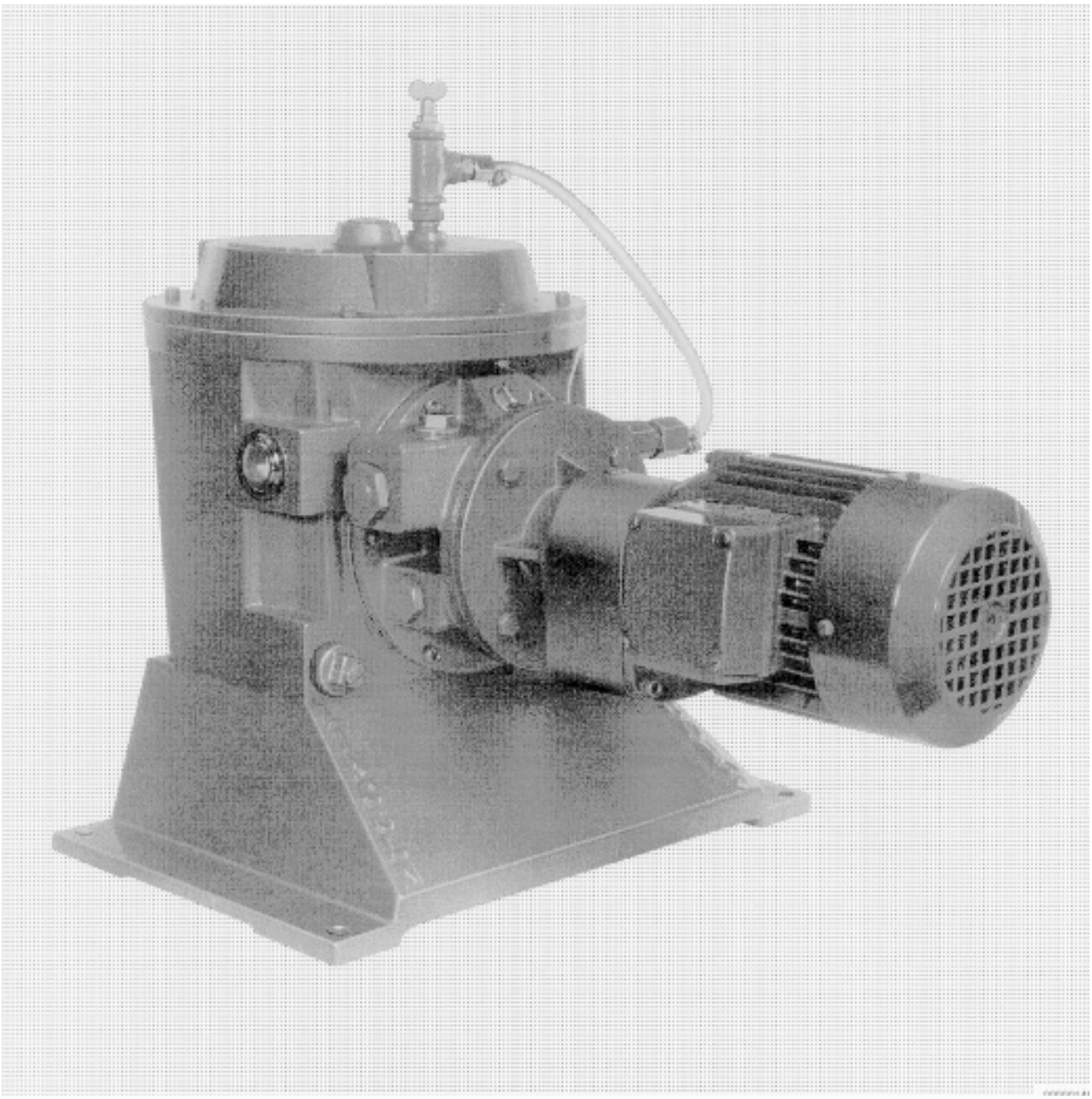
LINCOLN INDUSTRIAL®

6.5A-18001-A96

High-Pressure Central Lubrication pump ZPU09/09A



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Preface to the Owner Manual

This Owner Manual is intended to familiarize the user with the pump/lubrication system and to enable him to use its various features.
The Operating Instructions contain important information for 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.
These Operating Instructions must be completed to include the respective national regulations concerning the prevention of accidents and protection of the environment.
The Owner Manual must always be available on the site where the pump/lubrication system is in operation.

If persons who are charged with work with the pump/lubrication system do not have a good command of the German language, it is the user's responsibility to take the necessary action to make the Owner Manual, particularly the Operating Instructions, understandable to these persons.
The Owner Manual must be read and used by all persons who are charged with work 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)
- **Transport**

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1 Safety Instructions

The Operating Instructions include general instructions which must be followed when a pump/pump unit is installed, operated or serviced. Therefore, it is absolutely necessary for the fitter and the specialist/user to read the Operating Instructions before a unit is installed and commissioned. The Operating Instructions must always be available on the site where the machine/system is erected.

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 warnings in the Operating Instructions
The notes referring to safety contained in the Operating Instructions whose failure to observe may result in personal injury are marked by the following symbol

Safety symbol acc. to DIN 4844-W9

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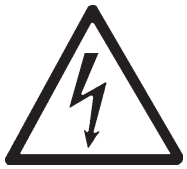
The symbol

Safety symbol acc. to DIN 4844-W8



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warns of an electrical hazard.

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 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
The safety instructions given in the Operating Instructions, the prevailing national regulations for the prevention of accidents and any internal working and shop regulations and accident prevention measures of the user must be observed.

Safety Instructions for the User/Operator
- If warm or cold machine parts may involve 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).

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Safety Instructions for Maintenance, Inspection and Installation Services
The user must make sure that all maintenance, inspection and installation work is executed by authorized and qualified experts who have throroughly 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. Decontaminate pumps and pump units delivering harmful materials.
Reassemble all safety and protection devices immediately after completion of the cleaning procedure.
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 „Commissioning“ are observed.

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 liability for the resulting consequences.

Inadmissible Operating Modes
The operational safety of the supplied product is only granted if the product is operated according to the instructions given in chapter 1 - General - of the Operating Instructions. The max. ratings listed in the Technical Data sheet must never be exceeded. Commissioning of the product (pump/pump unit) within the European Union is forbidden until it has been decided that the machine in question meets the requirements of the EU guidelines.

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2 Description

2.1 General

This Owner Manual only refers to high-pressure central lubrication pumps of the series ZPU 09/09A.
It is intended for the personnel in charge of the installation, operation and maintenance of the pump.
If faults should occur although the Operating Instructions have been followed, please contact our Service Department below:

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2.2 Appropriate Use

The high-pressure oil pump model ZPU 09 is designed for use in hydrostatic lubrication systems only.
Take care that the max. ratings mentioned in the Technical Data, particularly the max. operating pressure of 400 bar, ist not exceeded.
Any other use is not in accordance with the instructions and will result in the loss of claims for guarantee or liability .

2.3 Technical Data

Number of outlets	1 (ZPU09) 2 (ZPU09A)
Lubricant output	8 dm³/h (ZPU09)
	2x4 dm³ (ZPU09A)
Operating pressure	pmax = 400 bar
Drive speed	60 rpm
Direction of rotation of drive	optional
Reservoir capacity	8 dm³
Suitable lubricants	industrial lubrication oils with a viscosity of min. 20 to max. 460 mm²/s acc. to DIN 51519 (other viscosities on request)
Safety valve	fixed to 410 bar tamper-proof
Drive motor	refer to Motor Data Sheet
Sound level	< 70 dB(A)
Connection threads	pressure line 3/8"BSP filling line 3/4"BSP

Note: In the case of 60 Hz motors the speed and thus the lubricant output may be less then the theoretical value calculated.

2.4 Structure

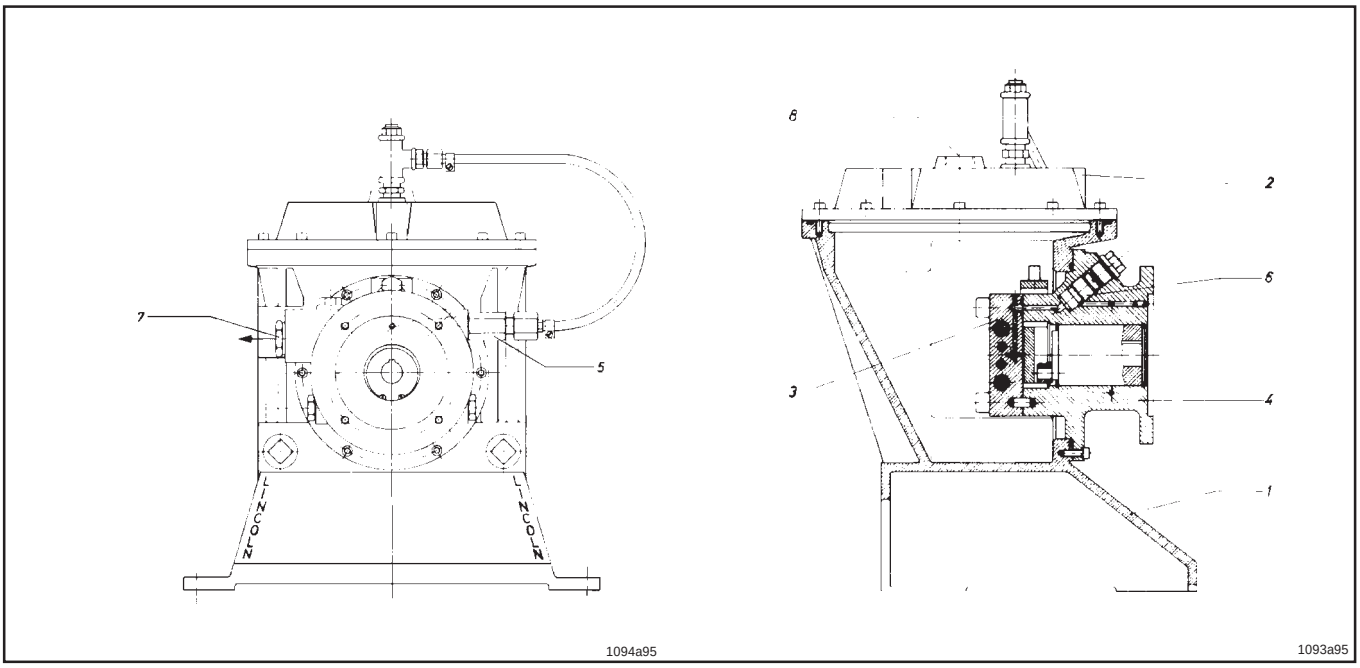

Abb. 2.4.1: Aufbau der Pumpe ZPU 09

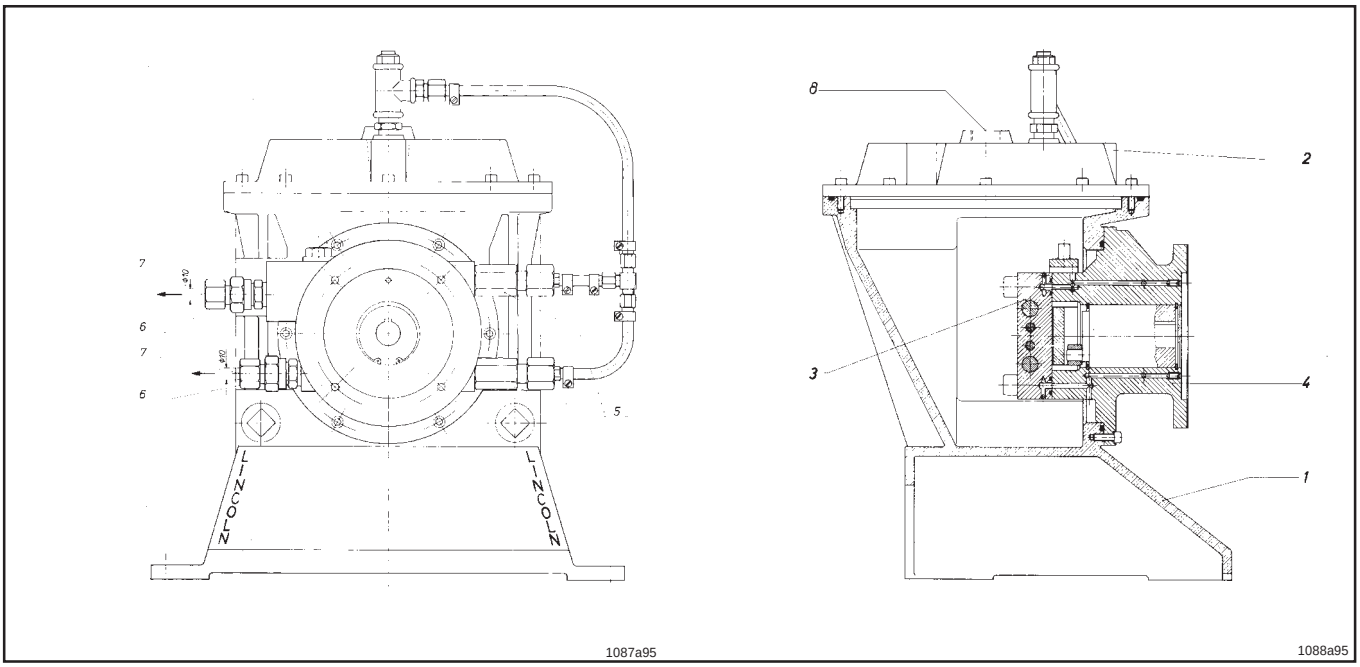

Abb. 2.4.2: Aufbau der Pumpe ZPU 09A

The pump ZPU09/09A mainly consists of:

Item	Designation	Item	Designation
1	pump housing	5	safety valve
2	cover	6	check valve
3	high pressure pump element	7	pressure line connection
4	bearing flange with drive	8	filling connection

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2.5 Electrical Equipment

Flanged gear motor: technical data mentioned in enclosed motor data sheet

2.6 Mode of Operation

The pump element operates as a piston pump with 2 pistons operating in opposite direction which suck in lubricant alternately and then feed it through the outlet hole to the pressure line.

The pump element is driven by a hollow shaft with eccentric pin and roller, by which the rotary movement of the driving shaft is converted into the oscillating movement of the pump pistons. With this kind of drive, the direction of rotation of the pump shaft is therefore optional.

The lubricant supplied by the pump element is fed via a check valve to the pressure line connection (item 7).
A safety valve (item 5)is also connected with the pressure line connection.

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Description of Operation of High-Pressure Pump Element for Pumps ZPU08, ZPU14, ZPU24

The pump element operates as a piston pump with two pistons operating in opposite direction which suck in lubricant alternately and feed it through the outlet hole to the pressure line. The outlet channels of the high-pressure pistons are controlled by a floating piston.

The pump element is driven by a hollow shaft with eccentric pin and roller, by which the rotary movement of the driving shaft is converted into the oscillating movement of the pump pistons

Legend:

1, 2 = delivery piston
3 = floating piston
I = suction hole for delivery piston 1
II = suction hole for delivery piston 2
III = outlet hole (pressure line connection)

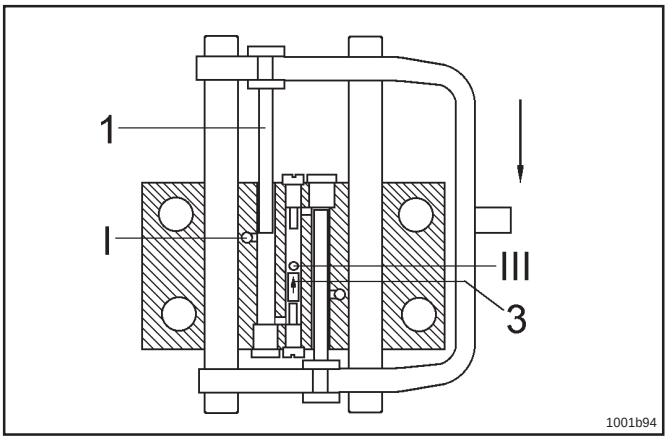
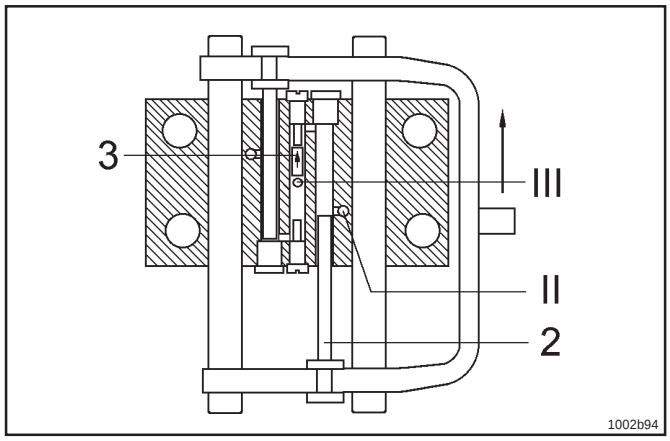


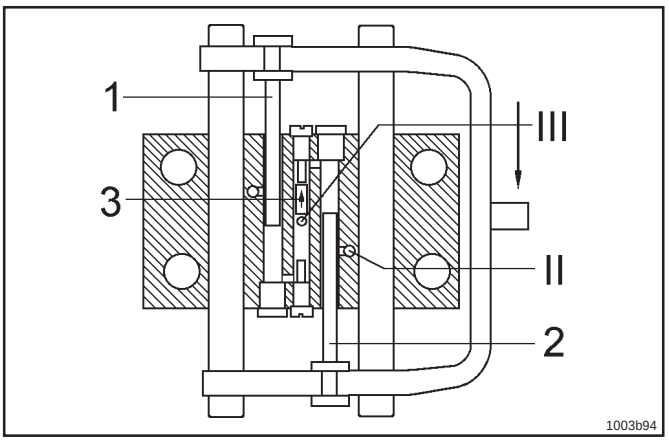
Fig. 2.6.1 Upper final position)

The piston begins to move downwards



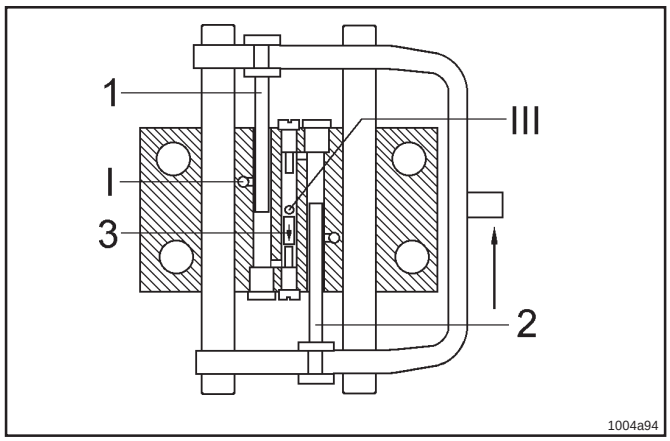
(Fig. 2.6.3 Lower final position)

The piston begins to move upwards



(Fig. 2.6.2 discharge stroke upwards)

Delivery piston 1 displaces floating piston 3 upwards, together with the lubricant stored from the preceding suction stroke.
Lubricant is delivered into the pressure line via the outlet hole which is now opened.
A vacuum is generated by delivery piston 2 with the result that lubricant is sucked in after hole II has been opened.



(Fig. 2.6.4 discharge stroke downwards)

Delivery piston 2 displaces the floating piston downwards, together with the lubricant stored from the preceding suction stroke.
The lubricant is fed into the pressure line.
Delivery piston 1 sucks in lubricant.
The pump element of pump ZPU09A operates in a simular way, the difference being however that the control piston alternately closes one of two outlet holes while it opens the other one.To each delivery piston, one seperate outlet hole is allotted which is led in the flange to the outside check valve.

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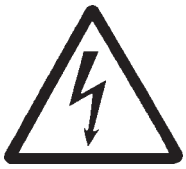
3 Erection and Assembly

3.1 Pump Erection

Requirements on the place of installation
- protected from dust and dirt
- safe against atmospheric influences
- enough space for connecting the tube lines and executing the maintenance work (the required space depends on the pump size)
- even, solid and vibration-free place of erection

3.2 Electrical Connection

All electrical work should be undertaken only by qualified personnel



Electrical connection of the drive motor:
- terminal diagramm in cover of terminal box
- fuse protection in conformity with the national regulations in force. Nominal current consumption mentioned in enclosed motor data sheet.

4 Operating Instructions

4.1 Commissioning

Connection of the tube lines and pump filling
Connect the pressure line and relief line to the pump by means of adequate fittings.

- Take care that no dirt or foreign particles enter the pump housing
- Clean the tube lines before connecting them
- Avoid dirt in the pump area

CAUTION

Then, fill pump with oil

Venting and Putting Into Operation
Open air release cock (item 35 spare parts list) until oil emerges without air bubbles.
Let pump run about 5 minutes without backpressure.
Then, vent pump housing by opening air release cock.

All system components connected downstream of the pump (tube lines, tube fittings, hoses) must be designed for the max. system pressure.

4.2 Maintenance and Repairs

Repair work should be undertaken only by qualified personnel using original spare parts

Before executing any repair on the pump, take care of the following:

1. **Switch drive motor off and secure it against inadvertent restart. Risk of injury by the stirring paddle**
2. **Close shut-off valve in pressure line and filling line.**
3. **Decrease the pressure in the pump and system down to 0 by loosening the pressure connection fitting. Risk of injury due to lubricant splashing**
4. **Let the oil flow from the pump housing (closure plug on the front side of the pump)**

Under the condition that the pump only supplies clean oil, it does not need any particular maintenance. The pump element lies in the oil which is supplied and it is lubricated automatically.
It is subject to natural wear which depends on the working time and adjusted pressure.

Maintenance work

- Replacement of the check valve (spare parts list item 24) about every 100 operating hours. For this, first remove closure plug item 25.

To ensure service life, the gears of the flanged motors are filled with oil in the factory.

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4.3 Troubleshooting

Note: The following only describes pump failures. Failures due to electrical malfunctioning or system malfunction are indicated in the System Description.

• **Fault: pump does not supply the lubricant**	
• **Cause:**	• **Remedy:**
• No oil in the system	• Check oil flow to the pump. Open venting valve and vent pump housing
• Eccentric shaft damaged or defective	• Replace damaged parts
• Suction borehole of pump element clogged	• Disassemble pump element, clean it and check whether foreign particles are lodged in the pump element
• **Fault: pump runs, but there is no pressure**	
• **Cause:**	• **Remedy:**
• Check valve (item 7) clogged or defective	• Replace check valve
• Pump element (item 4) damaged or worn	• Replace pump element *Note: The pump element cannot be repaired since its pistons are precision-fitted in our factory*
• **Fault: oil leaking from the safety valve**	
• **Cause:**	• **Remedy:**
• Blockage in the pressure line system	• Check tube lines. Eliminate blockage

All repairs which are beyond the knowledge of the user's personnel must be executed by Lincoln's specialists. For this, either send the defective pump back to the Repair Department of our Walldorf factory or call a specialist for the repair on site.

Service Address:

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5 Spare Parts Drawing and Spare Parts List

5.1 High-Pressure Central Lubrication pump ZPU09

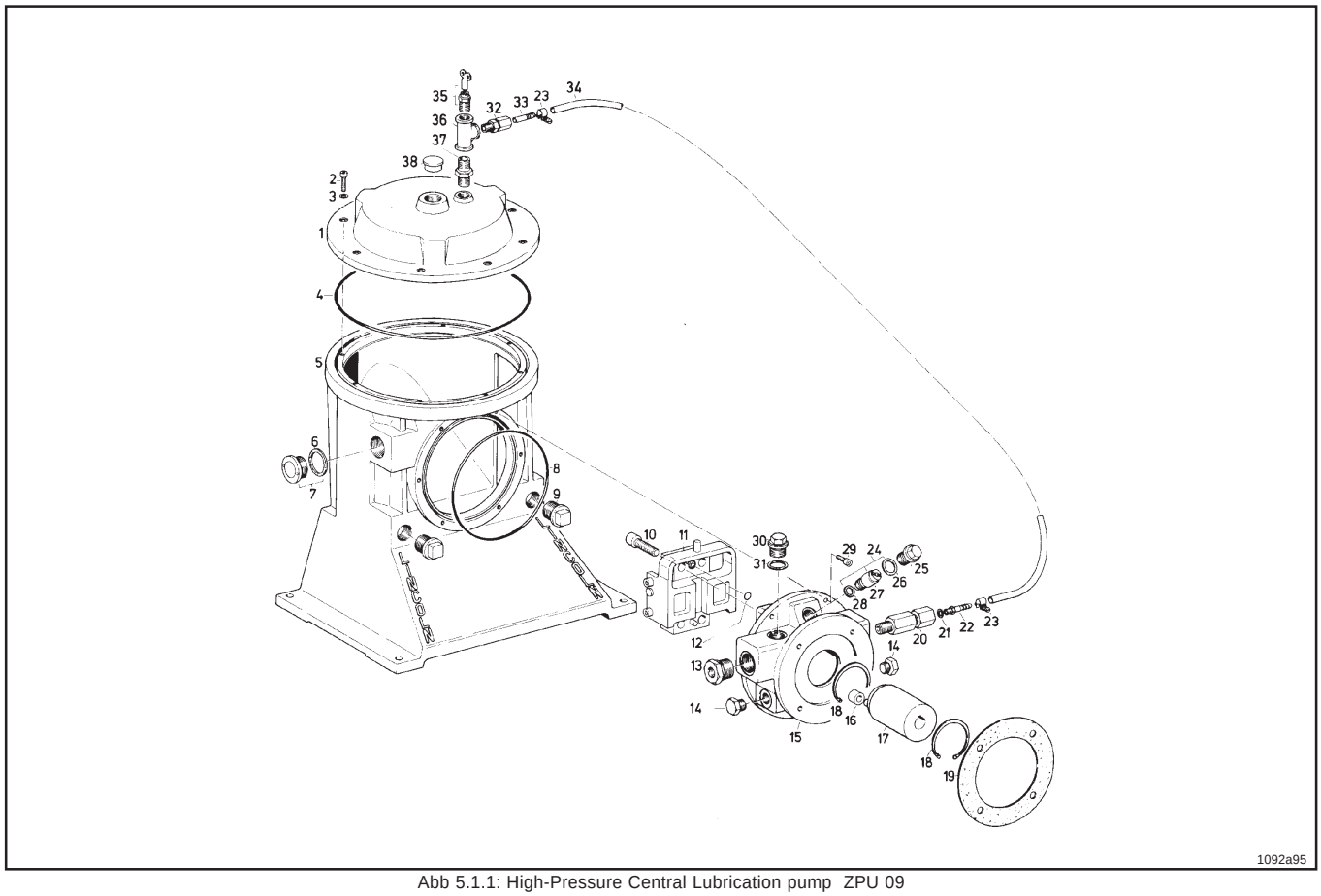

Abb 5.1.1: High-Pressure Central Lubrication pump ZPU 09

without driving assemblies

Item	Description	Quantity	Part No.	Item	Description	Quantity	Part No.
1	cover	1	314-18595-1	20	safety valve	1	624-27092-1
2	hexagon socket head screw	8	201-12018-5	21	sealing ring	1	226-12491-4
3	sealing ring	8	209-12158-1	22	pump connection	1	226-12491-6
4	O-ring	1	219-12227-1	23	hose clamp	2	226-12334-1
5	casing	1	314-19305-1	24	check valve, with items 26 + 28	1	505-36089-1
6	sealing ring	1	233-13005-6	25	closure plug	1	203-12077-3
7	oil level indicator, with item 6	1	233-13005-1	26	sealing ring	1	209-12158-4
8	O-ring	1	219-12226-5	27	check valve	1	524-30812-1
9	closure plug	2	203-12095-2	28	O-ring	1	219-13043-8
10	hexagon socket head screw	4	201-12028-4	29	hexagon socket head screw	6	201-12018-5
11	pump element with item 12	1	505-30405-3	30	closure plug	1	303-19310-1
12	O-ring	1	219-13043-7	31	sealing ring	1	209-12464-8
13	reducing bushing	1	222-12578-9	32	GERV6-SG 1/4A LC	1	223-12372-9
14	closure plug	1	303-17440-1	33	hose stud	1	405-20319-2
15	bearing flange	1	505-30853-1	34	plastic hose	1	111-35065-2
16	roller	1	405-23544-1	35	venting valve (with wrench)	1	233-13003-3
17	eccentric shaft	1	405-20316-2	36	reducing T-piece	1	222-12260-2
18	retaining ring	1	211-12165-6	37	equal nipple	1	222-12257-6
19	sealing ring	1	306-17856-1	38	protective plug	1	233-13100-6

5.2 High-Pressure Central Lubrication pump ZPU09A

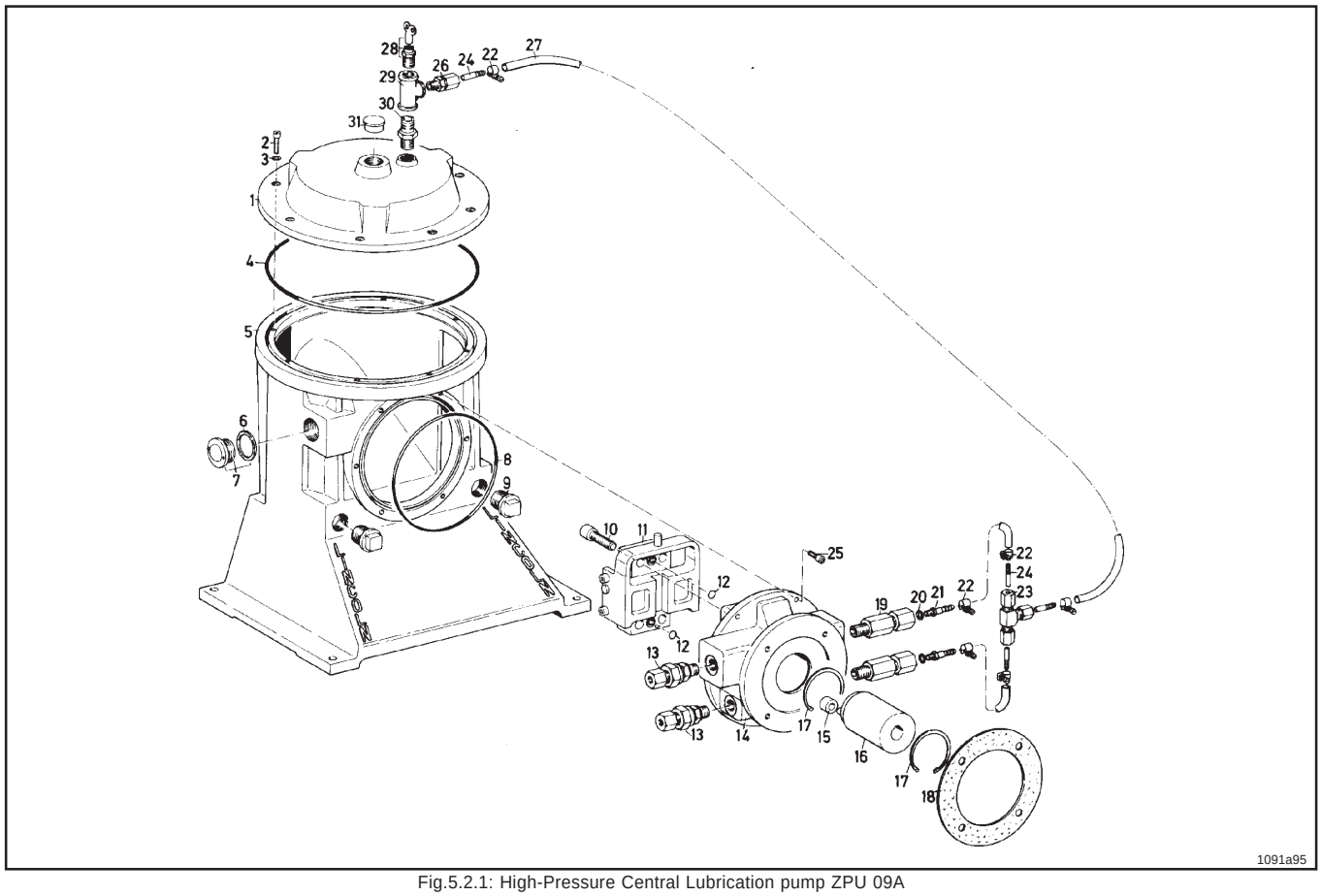

Fig.5.2.1: High-Pressure Central Lubrication pump ZPU 09A

without driving assemblies

Item	Description	Quantity	Part No.	Item	Description	Quantity	Part No.
1	cover	1	314-18595-1	17	retaining ring	2	211-12165-6
2	hexagon socket head screw	8	201-12018-5	18	sealing ring	1	306-17856-1
3	sealing ring	8	209-12158-1	19	safety valve	1	624-27092-1
4	O-ring	1	219-12227-1	20	sealing ring	2	226-12491-4
5	casing	1	314-19305-1	21	pump connection	1	226-12491-6
6	sealing ring	1	233-13005-6	22	hose clamp	1	226-12334-1
7	oil level indicator, with item 6	1	233-13005-1	23	T-union	1	223-12563-7
8	O-ring	1	219-12226-5	24	hose stud	1	405-20319-2
9	closure plug	2	203-12095-2	25	hexagon socket head screw	1	201-12018-5
10	hexagon socket head screw	4	201-12028-4	26	GERV6-SG 1/4 A LC	1	223-12372-9
11	pump element with item 12	1	505-30884-1	27	plastic hose	1	111-35065-2
12	O-ring	2	219-13043-7	28	venting valve (with wrench)	1	233-13003-3
13	check valve	2	505-30447-1	29	reducing T-piece	6	222-12260-2
14	bearing flange	1	505-30883-1	30	equal nipple	1	222-12257-6
15	roller	1	405-23544-1	31	protective plug	1	233-13100-6
16	eccentric shaft	1	405-20316-2				

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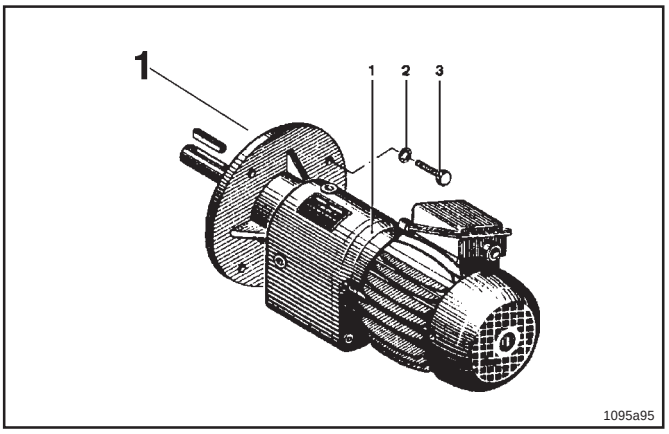
5.2 Driving assemblies for central lubrication pump ZPU 09/09A



Item	Designation	Qty.	PartNumber
	Drive assemblies for central lubrication pump ZPU 08 (1)		
	Assembly for drive with gear motor		
1	Flanged gear motor 0.37 kW, , 380-415V/50 Hz, 60 rpm 420-480V/60 Hz, 72 rpm	1	245-13575-1
	or		
	flanged gear motor 0.37 kW, 500 V 50 Hz, 60 rpm	1	245-13564-1
2	Tooth lock washer	4	210-12161-8
3	Hexagon head screw	4	200-12007-5

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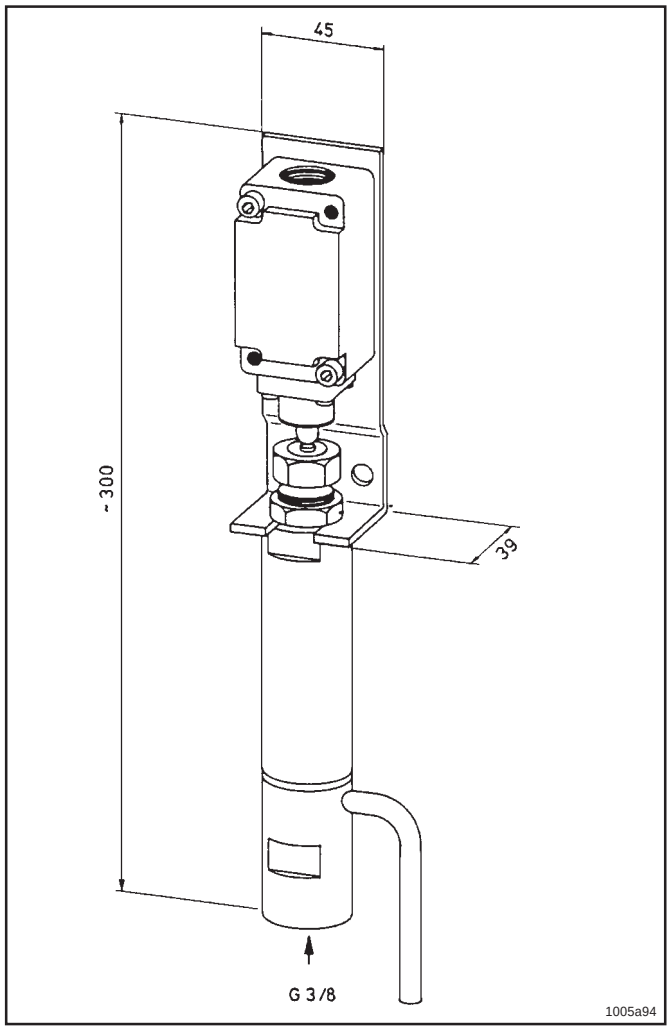
6 Appendix

6.1 Pressure Switch



Adjustment of pressure switch:

Before adjusting the pressure switch, switch off current supply to lubrication pump.

After loosening counter nut SW 27, re-adjust the spring tension.

On turning set screw SW 24 clockwise, the compression spring is tensed and the switching pressure is increased. Inverse procedure will result in a pressure decrease.

Scope of delivery:
As illustrated, please indicate the piston diameter when ordering

To be supplied by customer:
Wiring of limit switch to switch cabinet by means of oil-resisting cable 3 x 1.5 mm²

Pessure range	Pressure reducer Piston and cylinder DIA	Compression spring Wire DIA	Part Num.
160 - 400 bar	6 mm	4.0 mm	623-25461-2
50 - 115 bar	10 mm	4.0 mm	623-25456-2
* 0 - 15 bar	16 mm	3.0 mm	623-25801-2

*Connection thread 1/2" BSP, further types of presure range on request
Limit switch: 1 NC contact, 1 NO contact

6.2 Dimensional Drawing

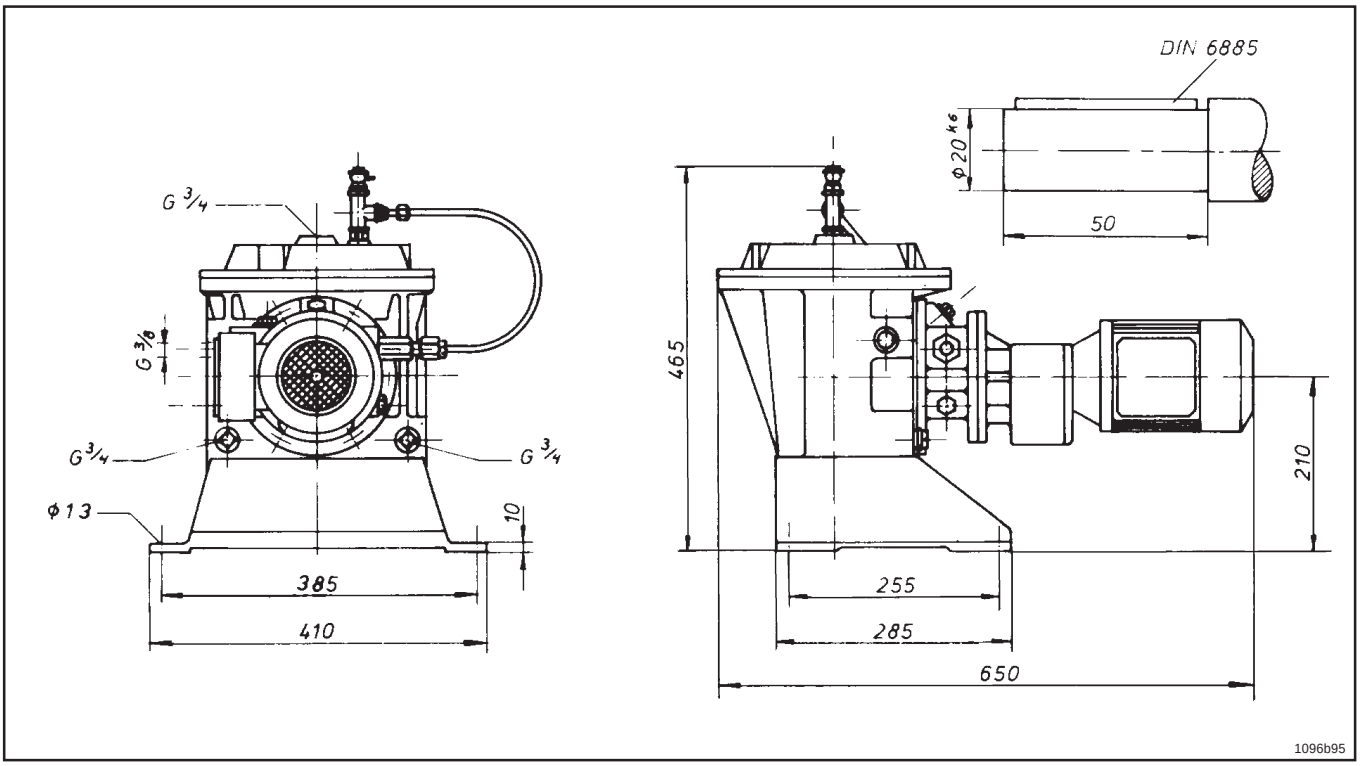


Fig. 6.2.1: Dimensional Drawing ZPU09

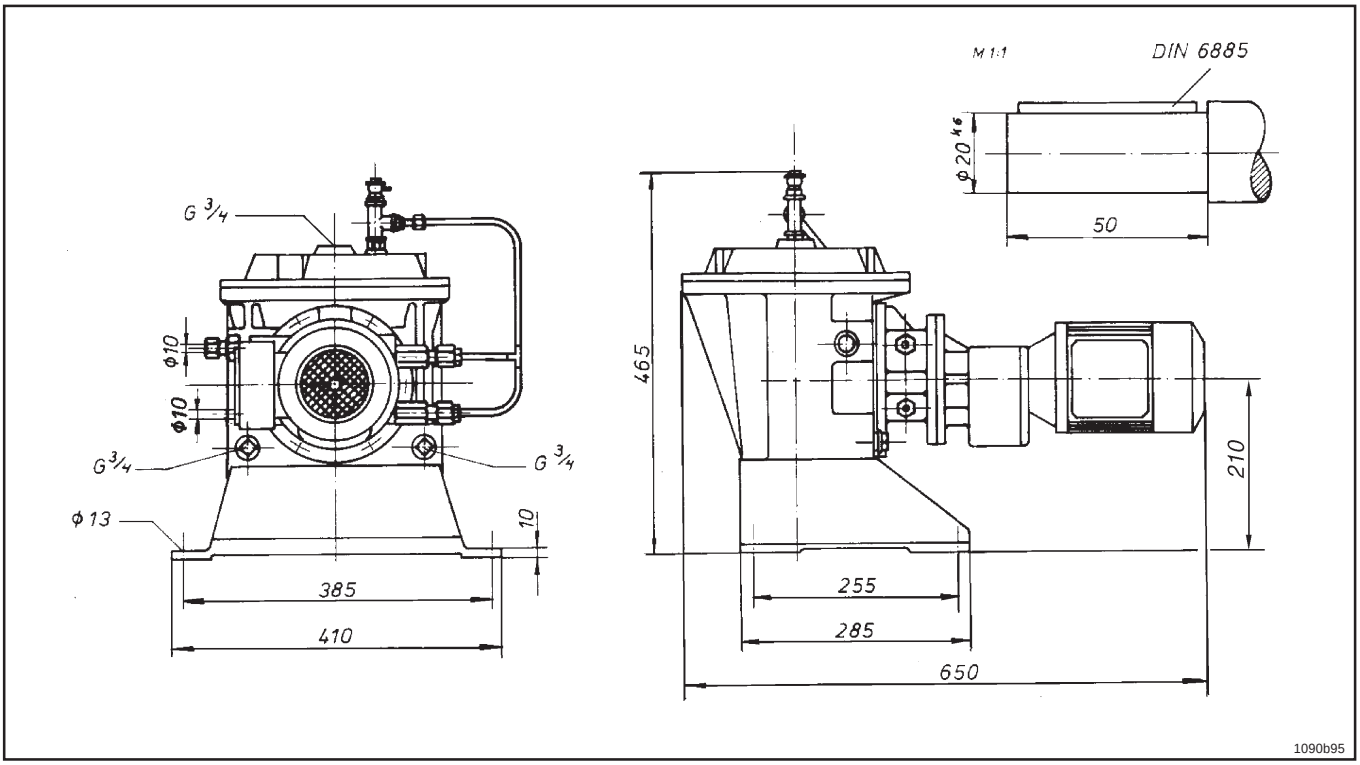


Fig. 6.2.1: Dimensional Drawing ZPU09A

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Motor Data Sheet

Standard Multi-Range Three-Phase AC Asynchronus Gear Motors

Pump model		**ZPU09**	**Units**
Motor manufacturer		ABM	
Motor type		G80F/D71B-4	
Part-No.		245-13575-1	
Frequency	f	50	[Hz]
Nominal power	P	0.37	[kW]
Nominal speed	n1/n2	1370/60	[min $^{-1}$]
Rated torque	M	59	[Nm]
Nominal current	I_N	1.80	[A] at 220-240 V
		1.05	[A] at 380-415 V
Starting current/ ratio	I_A/I_N	3.9	[A]
Power factor	cos φ	0.73	
Efficiency	η	0.72	[%]
Frame size		71S	
Type of construction		B5 A1/160	
Type of protection	IP	55	
Insulation class		F	
Weight		ca. 11	[kg]
Flange		∅160	[mm]
Shaft end		∅20X50	[mm]

The motor can be connected to the following networks:

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

Other voltages available on request.

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Motor Data Sheet

Three-Phase AC Asynchronus Gear Motors 290/500 V (50Hz)

Pump model		**ZPU 09**	**Units**
Motor manufacturer		ABM	
Motor type		G80F/D71B-4	
Part No.		245-13564-1	
Frequency	f	50	[Hz]
Nominal power	P	0.37	[kW]
Nominal speed	n1/n2	1370/60	[min $^{-1}$]
Rated torque	M	59	[Nm]
Nominal current	I_N	1.45	[A] at 290 V
		0.85	[A] at 500V
Starting current/ ratio	I_A/I_N	3.9	[A]
Power factor	cos φ	0.73	
Efficiency	η	0.72	[%]
Frame size		71	S
Type of construction		B5 A1/160	
Type of protection	IP	55	
Insulation class		F	
Weight		ca. 11	[kg]
Flange		∅160	[mm]
Shaft end		∅20X50	[mm]

The motor can bei connected to the following network:
290/500 V ± 10%, 50Hz

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