

Magnetic Pump PMA - 1

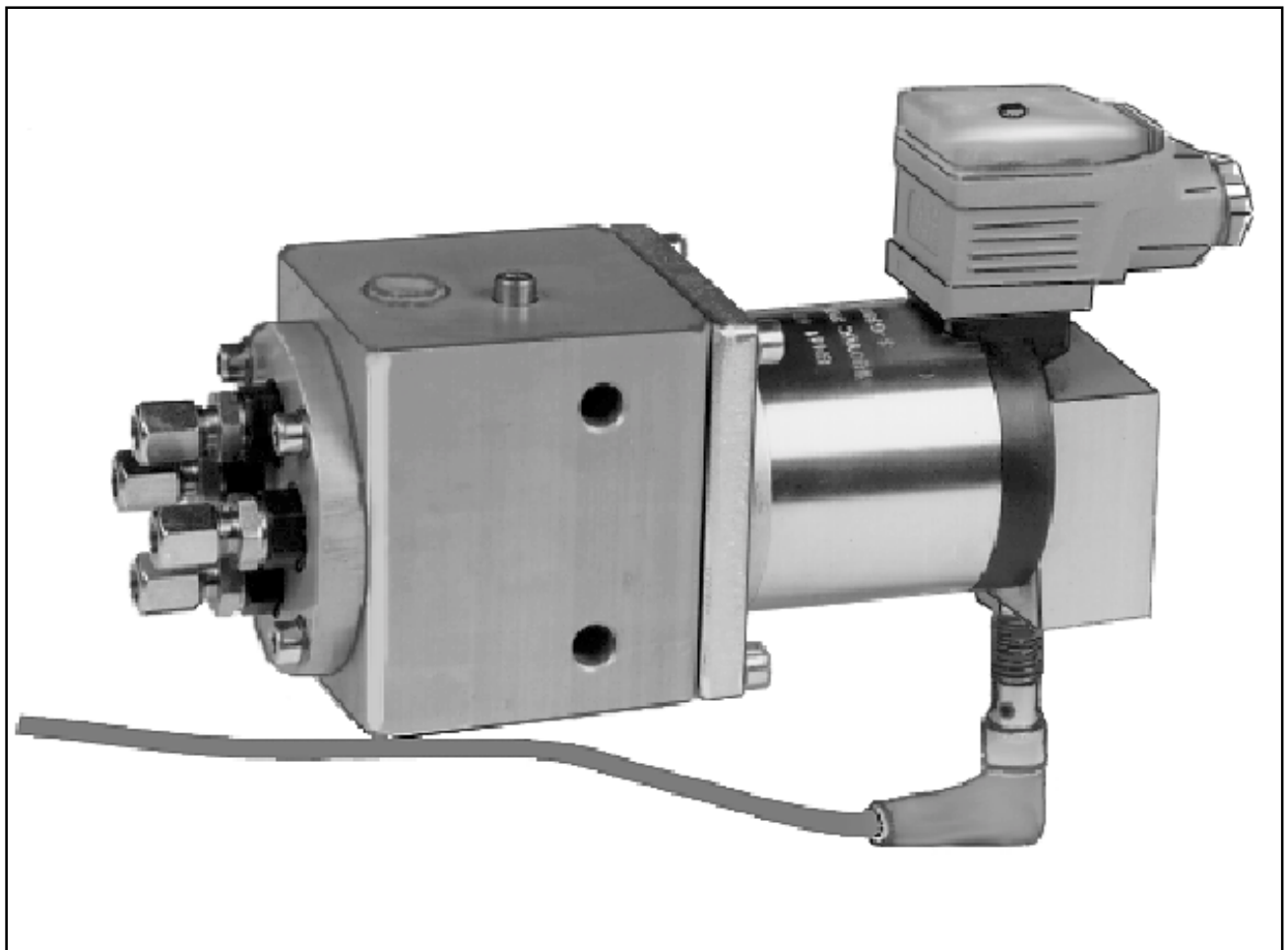


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Safety Instructions

Appropriate Use

- The PMA-1 magnetic pump is exclusively designed for use in centralized oil lubrication systems.
- The limiting values specified in the Technical Data, particularly the maximum operating pressure and the maximum frequency, must on no account be exceeded.
- Any other use is not in accordance with the specified instructions.
- The manufacturer is not liable for damages resulting from improper use.

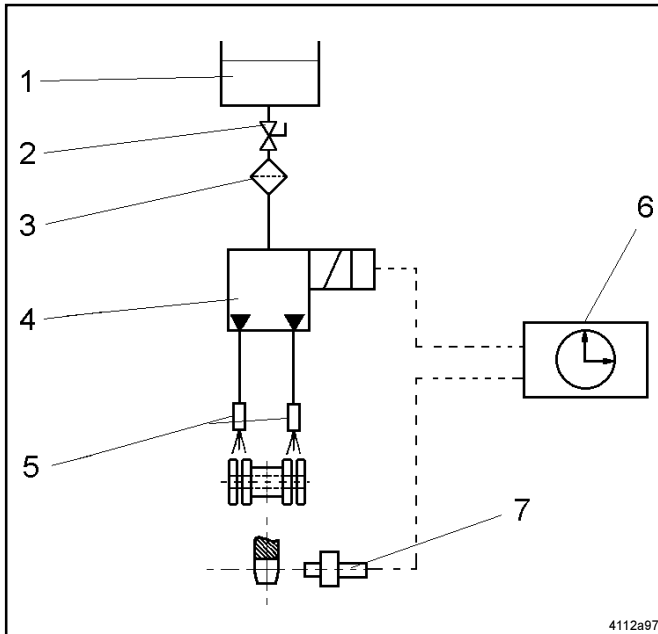
Maintenance and Repairs

- Before any maintenance or repair on the magnetic pump is done the Owner Manual and the Safety Instructions must be read.
- The Owner Manual must be available on the site where the pump is in operation.
- Alteration or modifications of the magnetic pump are only allowed if approved by the manufacturer.
- For repairs use only original spare parts.
- If other spare parts are used, the manufacturer may be released from its liability for the resulting consequences.

Operation of the Magnetic Pump

- The magnetic pump should only be used if it is in good technical condition.
- Defects and faults which may impair its operation and safety must be remedied immediately.
- The reservoir must be refilled in due time with clean oil.
- If you need more information than is given in this Owner Manual, please contact our company (see address below).

Fields of Application



- The magnetic pump is designed to be used as an oil supply pump, preferably in chain lubrication systems.
- It can be used in a centralised lubrication system either
 - as a **splash lubrication device** for the accurate lubrication of chain studs and rollers, if used in connection with nozzles,
 - or
 - as a **drop lubrication or brush lubrication device**, if used with progressive divider valves.
- Due to the high frequency of 3 / s the pump is also suitable for high-speed chains.
- The pump is driven by an electromagnet.
- The movement of the drive pinion (teeth or chain) is sensed by the proximity switch (7, fig. 1) which, in this way, controls the electromagnet for splash lubrication.

- | | |
|--------------------|-------------------------------------|
| 1 - Oil reservoir | 5 - Spray nozzles |
| 2 - Shut-off valve | 6 - Control unit |
| 3 - Filter | 7 - Proximity switch on drive wheel |
| 4 - Magnetic pump | |

Fig. 1 - Magnetic pump for chain lubrication via spray nozzles

Structure

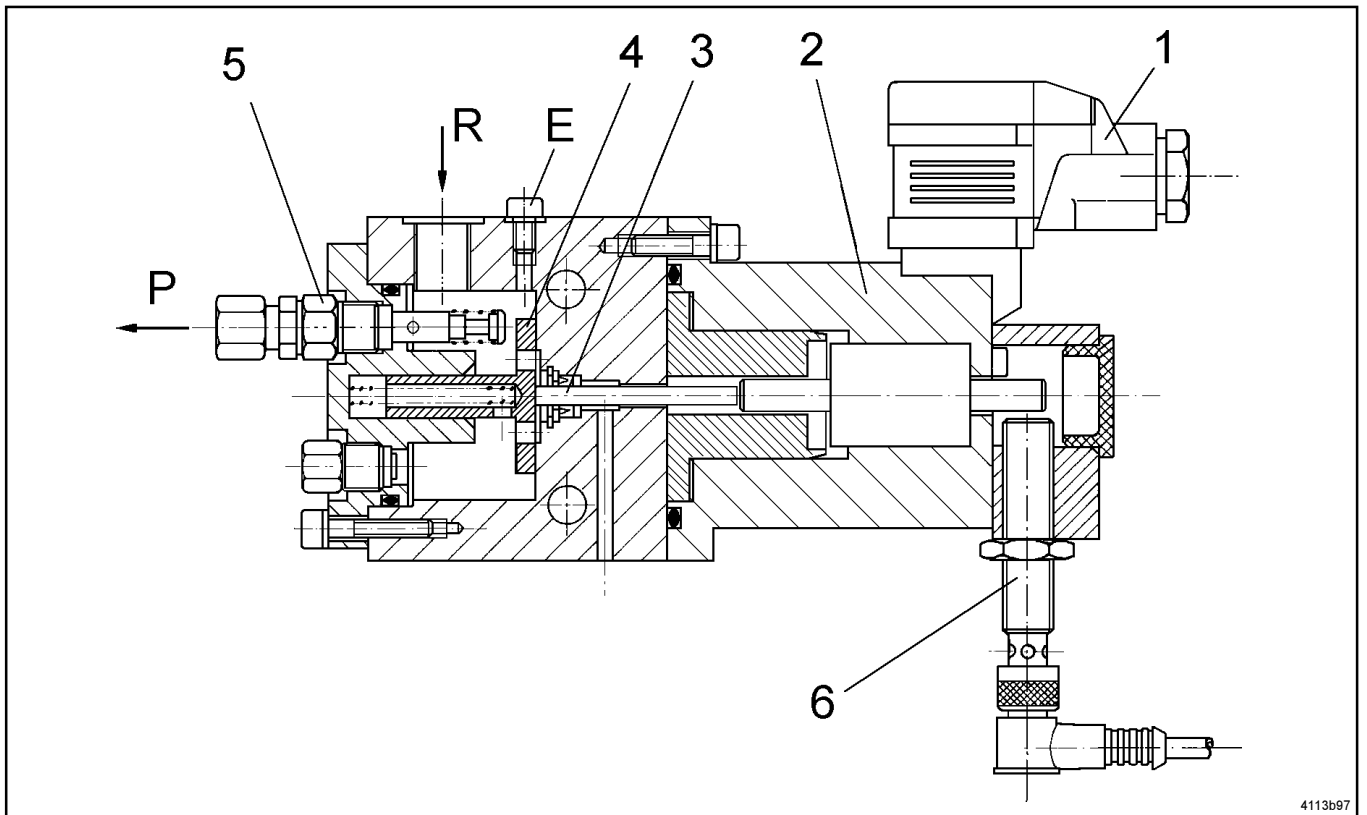


Fig. 2 - Sectional drawing of the PMA-1 magnetic pump

- | | |
|------------------------------------------|-------------------------------|
| R - Oil from the reservoir | 3 - Tappet |
| P - Pressure connection | 4 - Pressure plate |
| E - Venting screw | 5 - Pump element with piston |
| 1 - Plug (with rectifier for AC version) | 6 - Proximity switch (option) |
| 2 - Electric solenoid | |

Subject to modifications

Operation

- The armature of the electromagnet (2, Fig. 2) receives an electrical pulse (energizing) from the proximity switch (7 Fig. 1;). It contacts the pressure plate (4, Fig. 2) via a tappet (3). The pressure plate causes the movement of the pistons in the pump elements (5) to move.
- The pistons eject a dosed quantity of oil to the pressure connection (P). The return stroke of the pump pistons and that of the armature are spring activated. During the return stroke the pistons suck fresh oil from the storage chamber. The pump is ready for the next lubrication pulse.
- The movement of the magnet and thus the operation of the pump are monitored via the proximity switch (6, fig.2 optional version).

Erection and Installation

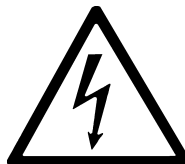
Specifications of the installation site

- even, solid and vibration - free installation surface
- protected from dust and dirt
- safe from atmospheric influences
- Installation position: horizontal, venting screw upward
- Oil supply: free oil supply from the reservoir

Max. length of tube line to the nozzles:

- | | |
|-----------------------------|--------------------------------------|
| Output 60 mm ³ : | steel tube 6 m
plastic tube 3 m |
| Output 30 mm ³ : | steel tube 3 m
plastic tube 1,5 m |

Electrical connection



Before connecting the device, disconnect the system from the power supply.

The installation and connection of electric devices must be carried out only by qualified personnel! Observe the relevant rules of technology and the respective protection legislation (instructions, standards).

Electric connection of the electrical solenoid

- in accordance with the electrical wiring diagram and the switching diagram.

Electric connection of the proximity switch

- in accordance with the electrical wiring diagram and the switching diagram.

Operating Instructions

Start-up

Connection of the tube lines and filling of the pump

- * Connect the pressure line(s) and the filling line to the corresponding connections on the pump.

CAUTION Take care that no dirt or other foreign particles enter the pump housing.

- * Clean the tube lines before connecting them.
- * Avoid contamination of the environment.
- * Fill the reservoir with clean oil.
- * Open the shut-off valve in the oil supply line to the pump.

Venting

- * Unscrew the venting screw (E, Fig. 2), until oil emerges. Then re-tighten the venting screw.
- * Let the pump run, until the oil flows out of all outlets without air bubbles.
- * Connect and vent tube lines.

Maintenance and Repair



Before undertaking any repair on the pump:

- * Disconnect the system from the power supply and make sure that it cannot be restarted inadvertently
- * Close the shut-off valve in the oil supply line
- * Reduce the pump and system pressure to zero. Danger due to splashing oil.
- Repair work may be carried out only by qualified personnel using original spare parts.
- Provided that the pump dispenses only clean oil, it does not need any particular maintenance.
- The piston of each pump element lies directly in the oil which is dispensed and is therefore lubricated automatically.

- The pump element is subject to natural wear and tear which depends on the cycle time and pressure setting.
- The pump elements are screwed in on the outside and can, therefore, be replaced without difficulty. When replacing pump elements, observe the instructions given above.
- After any replacement or repair the pump must be vented.

Troubleshooting

NOTE: The following items only describe faults occurring at the pump itself. Faults due to an electric failure or system malfunction are mentioned in the system description.

• Fault: Pump does not supply	
• Cause:	• Remedy:
• Electromagnet defective	* Check the supply voltage, replace the defective electromagnet.
• Fault: Pump does not supply, magnet receives pulses	
• Cause:	• Remedy:
• No oil in the system	* Check the oil supply to the pump. Refill the reservoir. Check the filter.
• Pump element damaged or defective	* Replace pump element
• Suction borehole of the pump element is clogged	* Remove pump element, clean it and check for foreign particles
• Air in the system	* Vent the pump and the tube lines (see „Start-up“)

- All the 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 address: LINCOLN GmbH
Abt. Kundendienst
Postfach 1263
D-69183 Walldorf

Technical Data

Pump

Number of outlets: 1 to 4 (Pump elements)
Note: If progressive metering devices are installed downstream of the pump, do not use more than two pump elements

Lubricant output per stroke and outlet: 60 mm³ or 30 mm³

Dispensed media: Oils on mineral oil or synthetic basis, purity: 30 µm

Viscosity: 30 to 240 mm²/s (at 40° C)

Operating temperature: - 15° C to 70° C (depending on the operating viscosity)

Installation position: preferably horizontal

Suction connection: G 1/4" f

Pressure connection: for tube Ø 6 mm

Pressure: max. 50 bar

Magnet: Single-stroke control magnet

Type of protection: IP 6K 9K

Insulation class: B

Cyclic duration factor (c. d. f.): 25%

Supply voltage: 24 VDC / 230 VAC

Magnet voltage: 24 VDC / 180 VDC (rectifier in plug)

Current consumption: 4,3 A / 0.55 A

Subject to modifications

Switch times for maximum pulse frequency

If shorter pulse times shall be achieved, the following switch times have to be observed:

1. for magnet with 24VDC

Voltage on: 0.1 s
Voltage off: 0.2 s

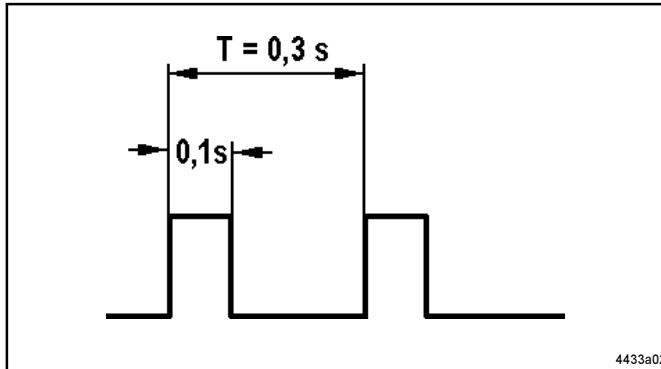


Fig. 3: Switch times for maximum pulse frequency at 24VDC

$f_{\max} = 1/T = 3.3 \text{ Hz}$

2. for magnet with 230VAC (180VDC)

Voltage on: 0.1 s
Voltage off: 0.3 s in case of 4 pump elements
0.35 s in case of 1 to 3 pump elements

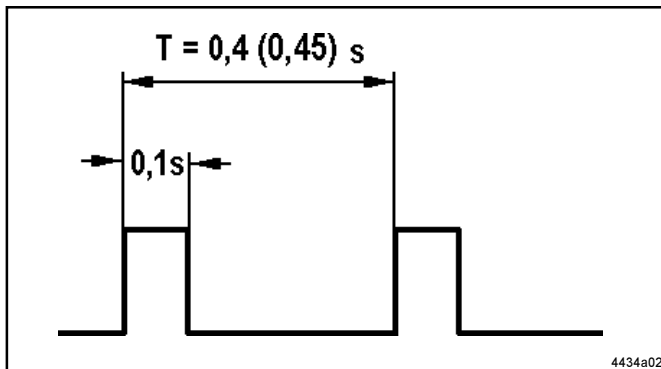


Fig. 4: Switch times for maximum pulse frequency at 230 VAC

$f_{\max} = 1/T = 2.5 \text{ Hz}$ in case of 4 pump elements
 $f_{\max} = 1/T = 2.2 \text{ Hz}$ in case of 1 to 3 pump elements

Note:
The indicated pulse frequencies were achieved at ambient temperature of 25°C with ÖI OPTIMOL VISCOGEN KL 23.
Operating viscosity: 650 cSt.
For higher operating viscosities the On and Off switch times have to be prolonged whereby the relation from On-time to Off-time must be in accordance with the above diagrams.

Electric Equipment

Magnetic plug 24VDC:
with integrally extruded cable and LED status display
3-pole, contact arrangement acc. to DIN 43650
Type of protection: IP 67

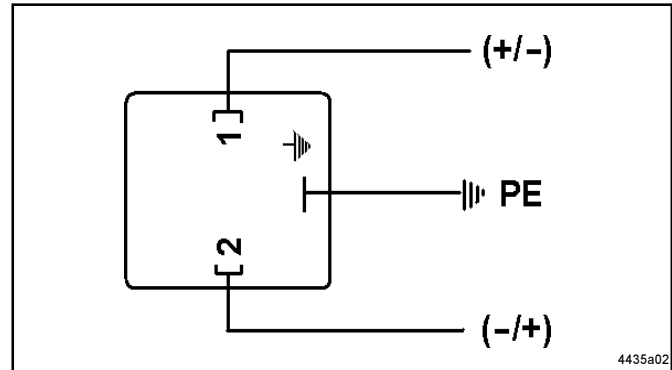


Fig. 5: Connecting diagram/ magnetic plug 24 VDC

Magnetic plug 230VAC(180 VDC):
line receptacle with bridge rectifier and signal lamp
3-pole, contact arrangement acc. DIN 43650-A, PG 11
Input voltage : 150...230 V AC
Output voltage: 135...250 V DC
Current voltage: 2 A

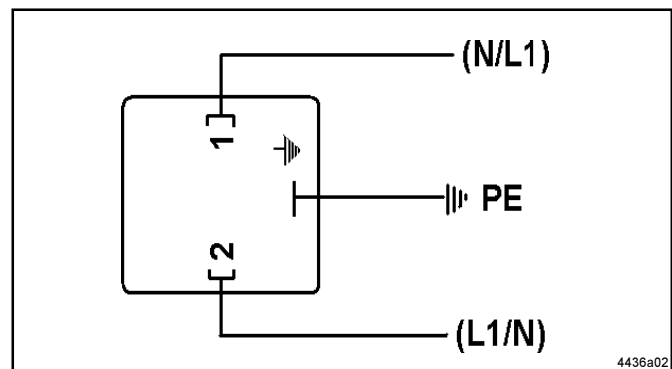


Fig. 6: Connecting diagram/ magnetic plug 230 VAC (180 VDC)

Proximity switch:
Three-core, NO-contact, PNP, appliance inlet with LED
Operating distance: 2 mm
Operating voltage: 10 ...30 V
Operating current: 200 mA
Operating frequency: 1000 Hz
Voltage drop: 3 V
Type of protection: IP 67

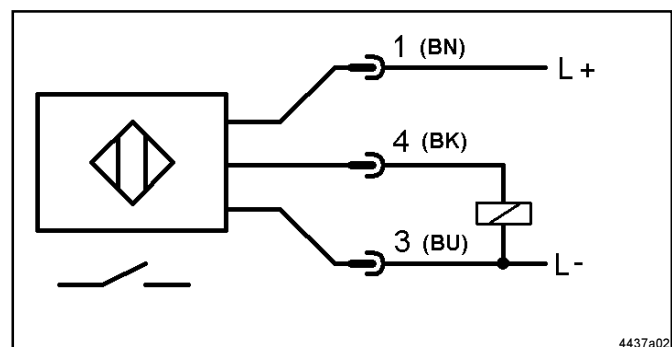


Fig. 7: Connecting diagram/ proximity switch (option)

Subject to modifications

Float magnetic switch:
 (Part no. 444-24283-1):

Switching capacity: max. 60VA
 Switching voltage: max. 230V
 Switching current: 1 A

The maximum switching capacities refer to pure resistive loads.
 In case of deviating loads, contact protective measures are necessary.

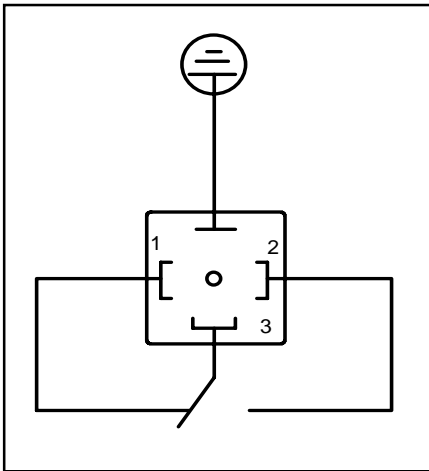


Fig. 8 - Connecting diagram/ float magnetic switch

Contact Protection Measures

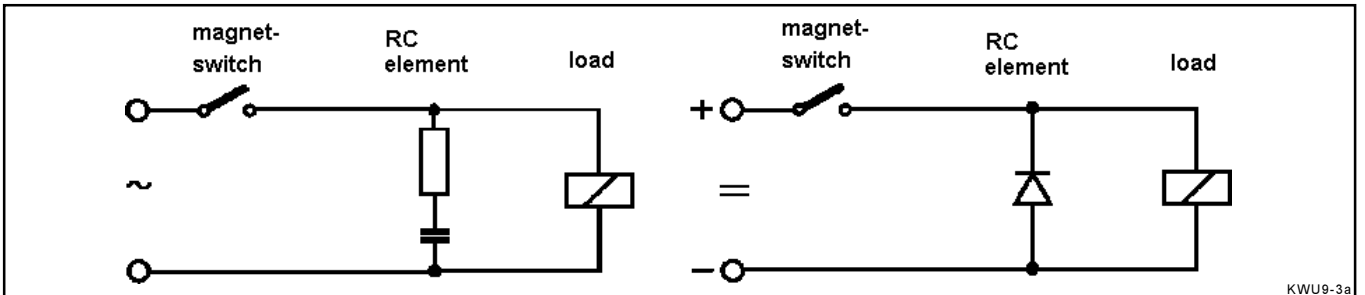


Fig. 9: Contact protection measures

Spray nozzle, part no. 615-28660-2

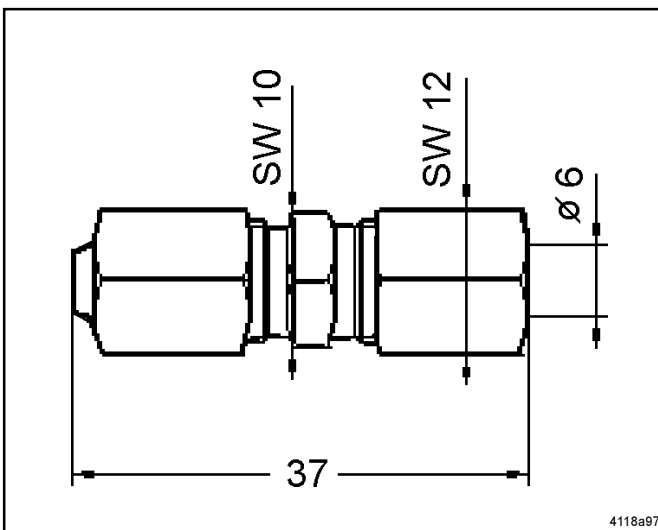


Fig. 10 - Spray nozzle 615-28660-2

Opening pressure: approx. 5 - 8 bar
 Connection: for tube ø 6mm

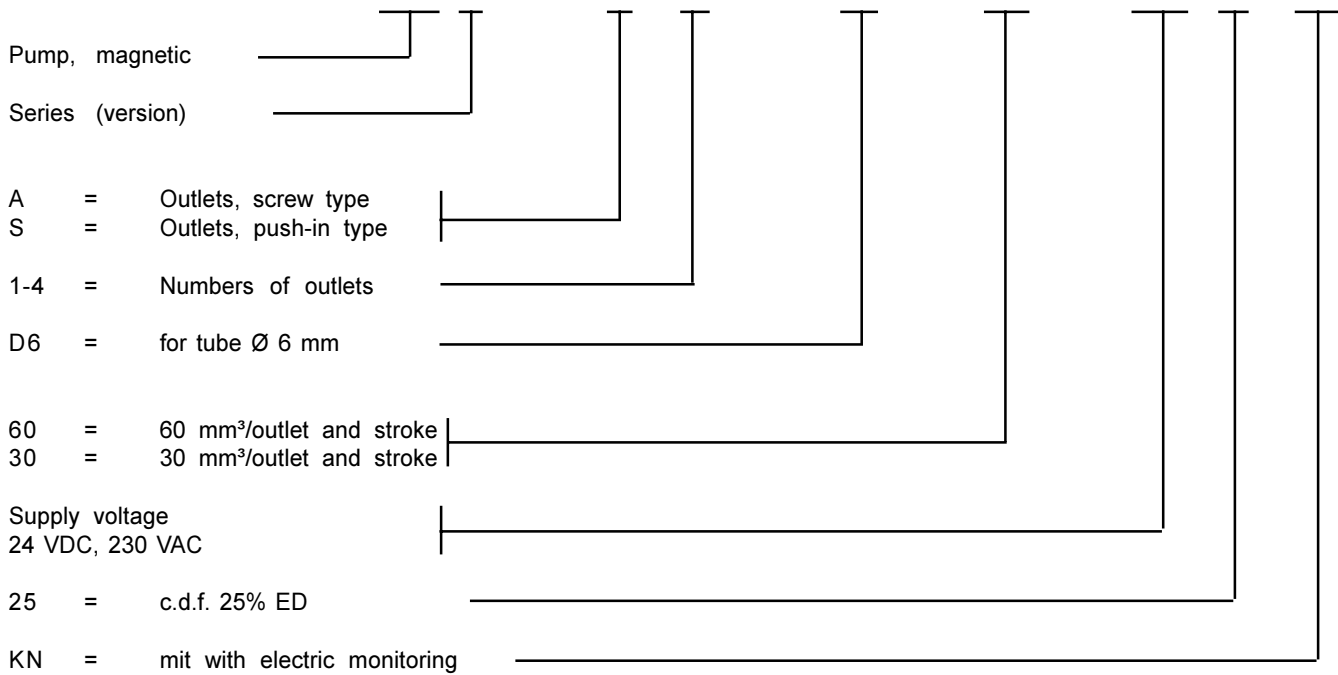
Subject to modifications

Identification Code

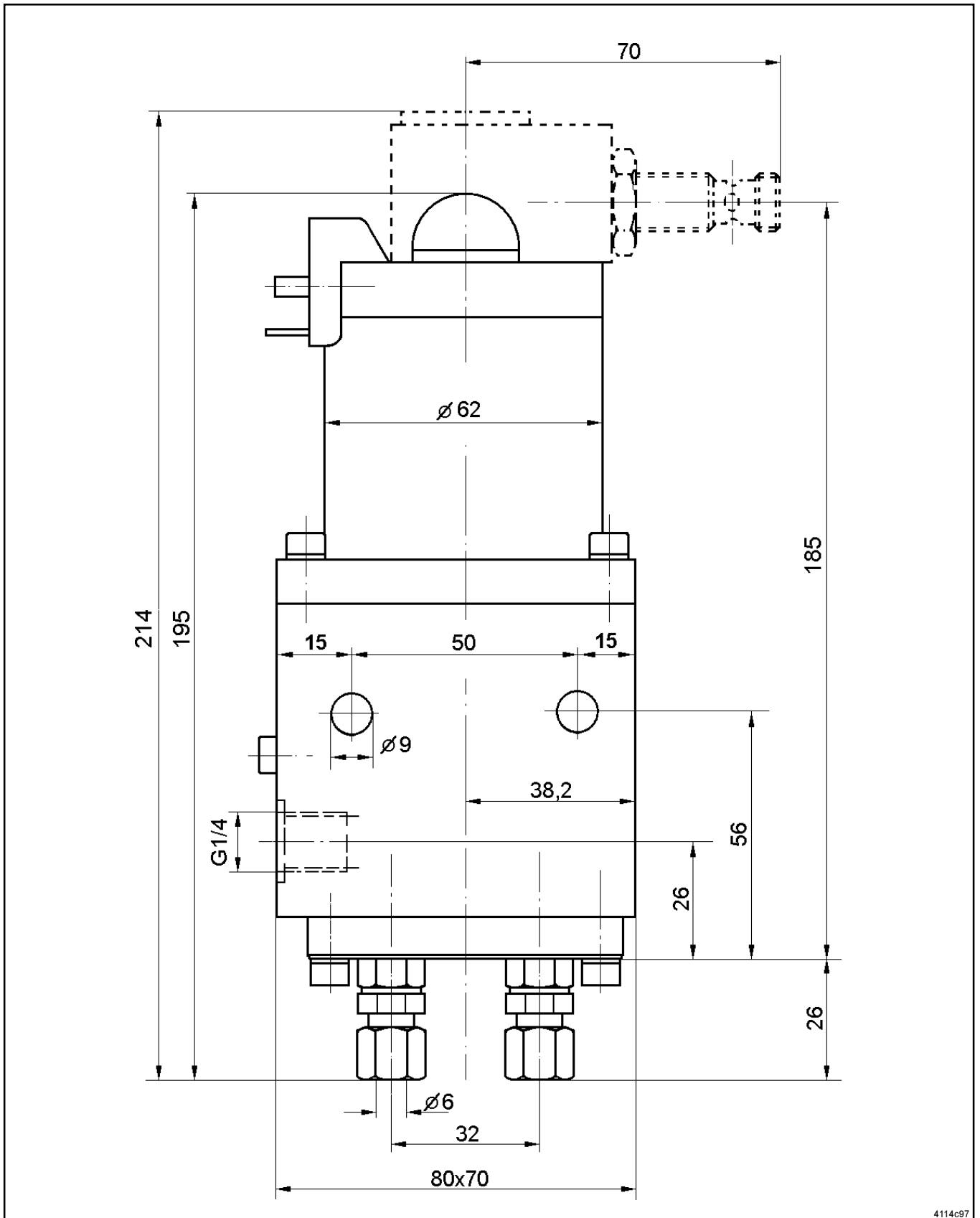
The different models of the magnetic pump can be ordered in accordance with the following type code:

Ordering examples:

PMA 1 - A 2 - D6 - 60 - 230VAC/25- KN
 PMA 1 - S 4 - D6 - 30 - 24VDC/25



Dimensions
Magnetic pump PMA - 1 (KN)



Subject to modifications

Fig. 5 - Dimensions of pump PMA - 1 (KN) without magnetic plug

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Accessories

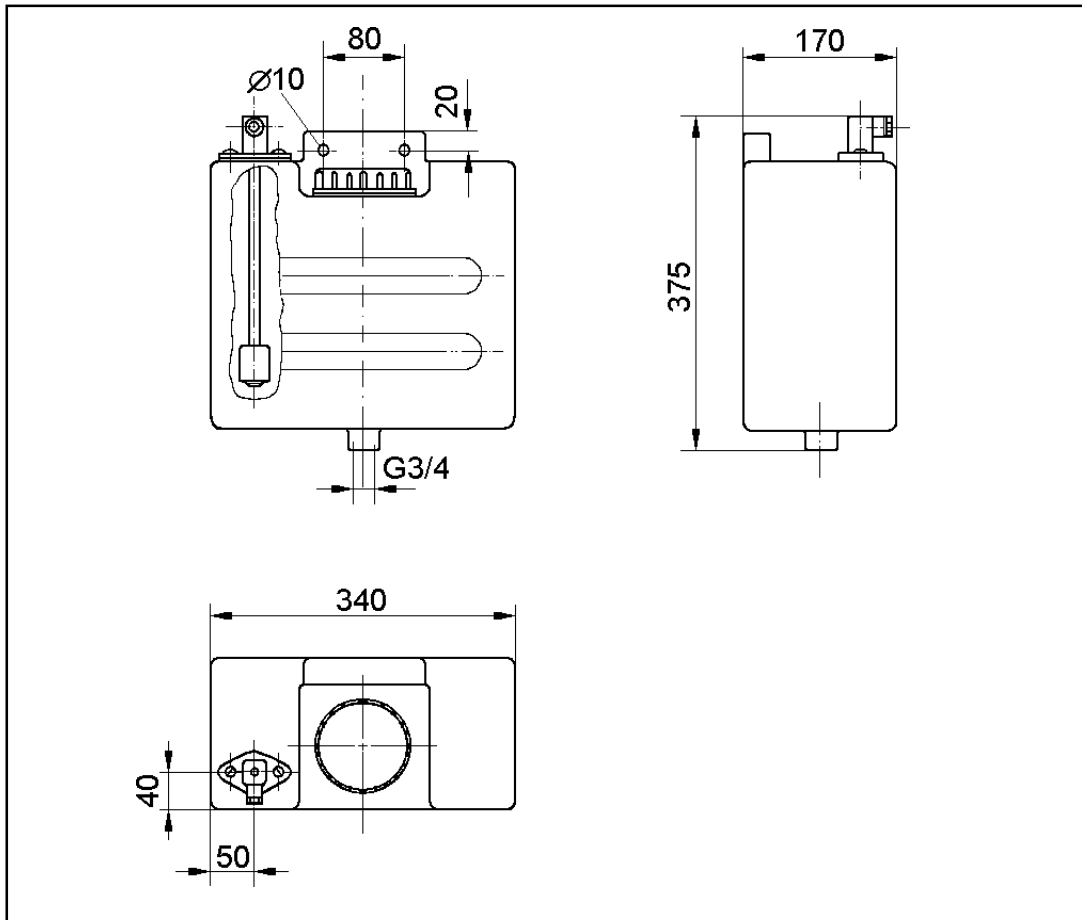


Fig. 6 - Reservoir 13 I, part no. 651-28691-1 with electric low-level control (float magnetic switch)

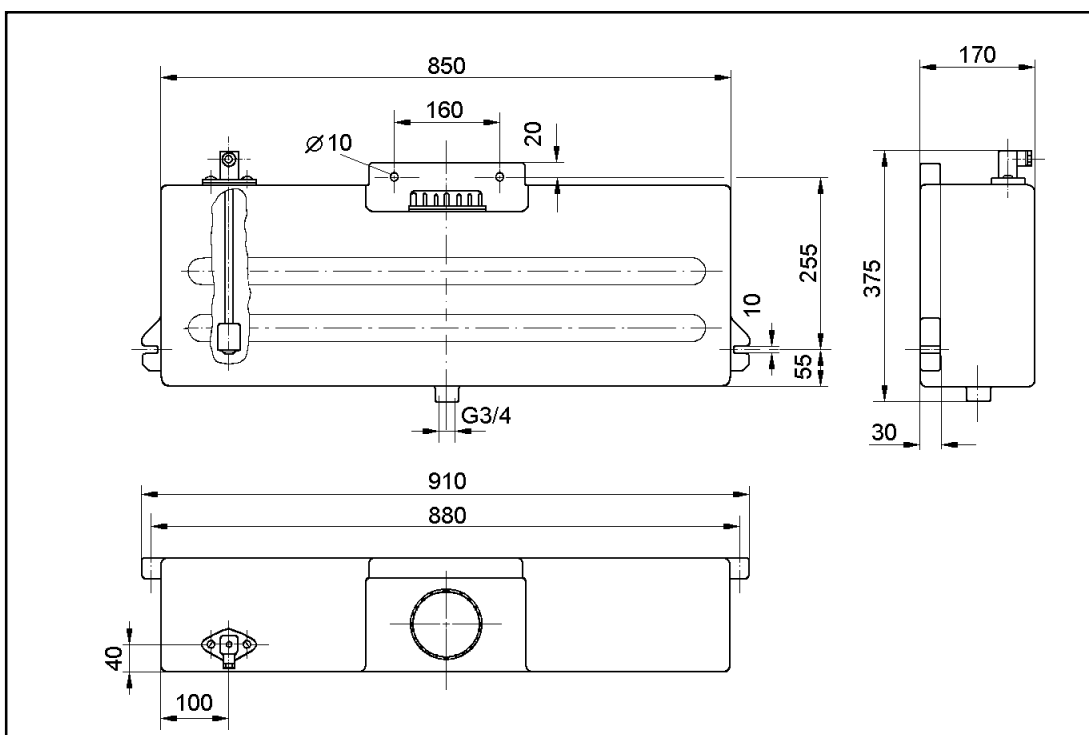
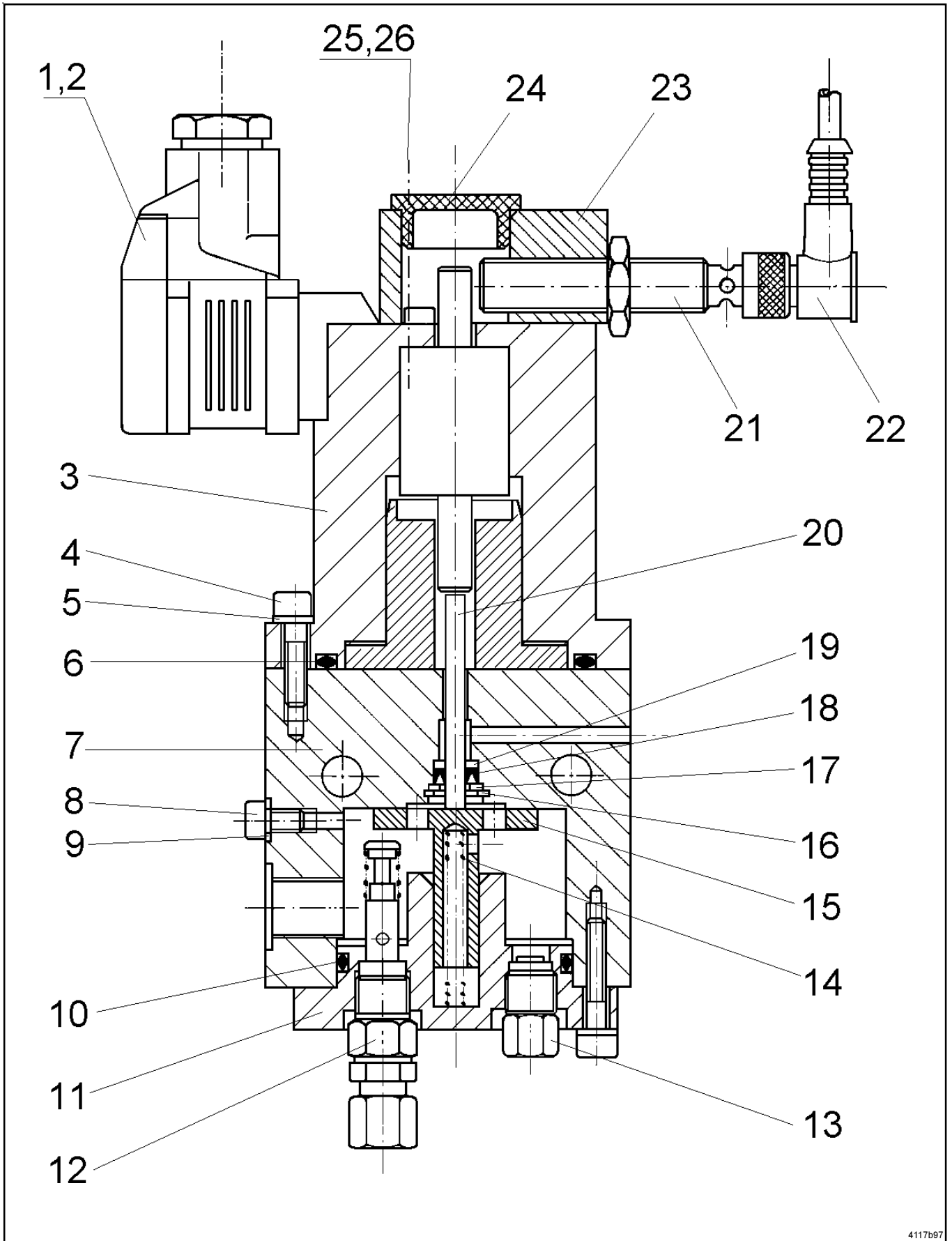


Fig. 7 - Reservoir 36 I, part no. 651-28685-1 with electric low-level control (float magnetic switch)

Components of the Magnetic Pump PMA - 1



Subject to modifications

Fig. 8 - Sectional drawing with spare parts

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Spare Parts List

Item	Designation	Qty.	Part N°.
1,2	Plug (230VAC)	1	236-13828-8
	Bridge rectifier (only at 230 VAC)	1	236-13884-4
	Plug (24 VDC)	1	236-13869-1
3	Solenoid 25 % ED, 180 VDC	1	451-70191-1
	Solenoid 25 % ED, 24 VDC	1	235-13171-2
	Solenoid 25 % ED, 180 VDC, type KN	1	451-24405-1
	Solenoid 25 % ED, 24 VDC, type KN	1	451-24408-1
4	Hexagon socket head screw M 5 x 20	8	201-12016-8
5	Washer Ø 5,3	8	209-13077-3
6	O-Ring	1	219-13798-2
7	Housing	1	451-70038-1
8	Hex. socket head screw M 5 x 8	1	201-12017-6
9	Copper washer Ø9 x Ø5 x 1	1	209-12158-8
10	O-Ring 48 x 2	1	219-14138-5
11	Housing cover	1	451-24404-1
12	Pump element 6 K4,5; 60 mm ³	1-4	651-28651-1
	Pump element 3 K4,0; 30 mm ³	1-4	651-29045-1
13	Closure plug	0-3	303-19257-1
14	Compression spring for 24 VDC models	1	218-13787-5
	Compression spring for 180 VDC models	1	218-10141-3
15	Pressure piece	1	451-24403-1
16	Locking ring J 12 x 1	1	211-12448-6
17	Feather key 6 x 12 x 1,2	1	209-13047-6
18	U-cup sealing ring	1	220-13735-2
19	Support ring	1	420-24127-1
20	Tappet	1	451-70037-1
21	Proximity switch	1	234-13153-7
22	Connection plug with LED	1	236-13294-9
23	Support	1	451-24402-1
24	Closure plug	1	233-13100-6
25	Hex. socket head screw M 4 x 35	2	201-12594-8
26	Tooth lock washer A 4,3	2	210-12162-2

**Declaration of conformity as defined by machinery
directive 98/37/EG, Annex II B**

This is to declare that the supplied model of the

Magnetic Pump Model PMA ...

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 con-
formity with the provisions of the directive in force.

Applied harmonized standards in particular:

EN 292-1	Safety of machinery, part 1 Basic terminology, methodology
EN 292-2	Safety of machinery, part 2 Technical principles and specifications
EN 809	Pumps and pump units for liquids Safety requirements
EN 60204-1	Safety of machinery Electrical equipment of machines Part 1: General requirements



Walldorf, 11. 06. 2002 , Dr. Ing. Z. Paluncic