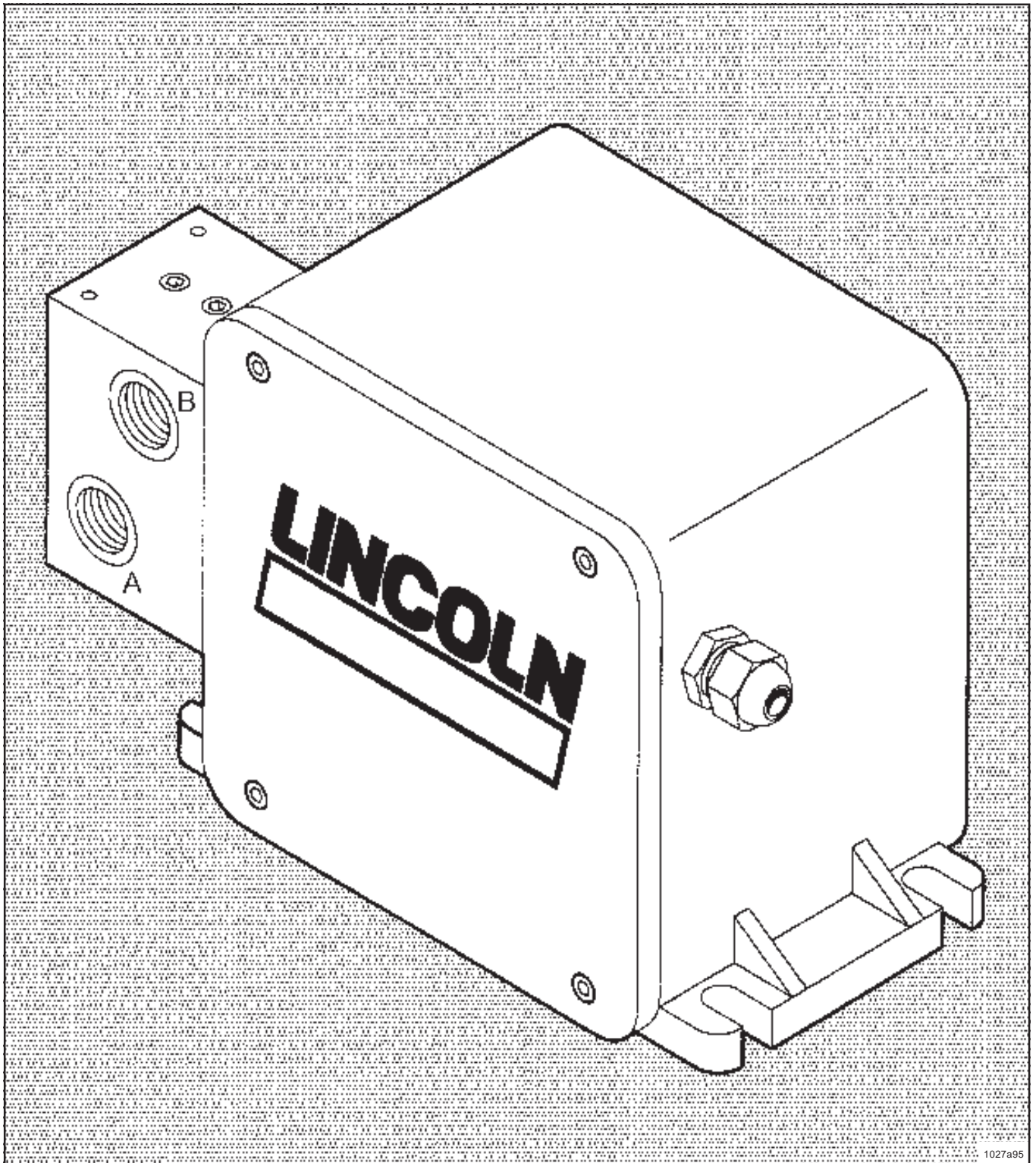


Electric Motor-Operated Change-Over Valve EM-U2 and Electric Motor-Operated 2/2-Way Valve and 3/2-Way Valve



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Preface of 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 English language, it is the user's responsibility to take the necessary action to make the Owner Manual, particularly the Safety Notes, 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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Safety Notes

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 markings in Operating Instructions

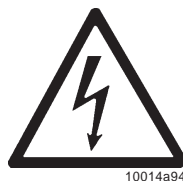
The notes referring to safety contained in the Operating Instructions whose failure to observe them may result in personal injury are marked by the following symbol

Safety symbol acc. to DIN 4844-W9



This symbol warns of an electrical hazard.

Safety symbol acc. to DIN 4844-W8



If ignoring the safety notes 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 notes

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 claim 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 notes 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).

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 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. 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 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 his liability for the resulting consequences.

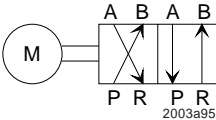
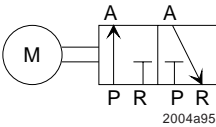
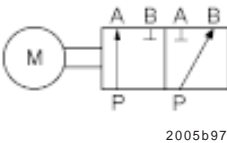
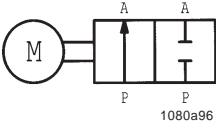
Inadmissible Operating Modes

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.

Description

Model Variants

The different model possibilities are represented on following chart:

Variants		Part number	
		model with 24 VDC	model with 230 VAC
Change-over valve (4/2-way valve)	 2003a95	618-28387-1	618-28388-1
3/2 -way valve	Connection B closed  2004a95	625-28448-1	625-28450-1
3/2 -way valve	Connection R closed  2005b97	625-28449-1	625-28451-1
2/2 -way valve	Connection B + R closed  1080a96	625-28590-1	625-28591-1

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Examples of application

The examples of application are represented on following figures.

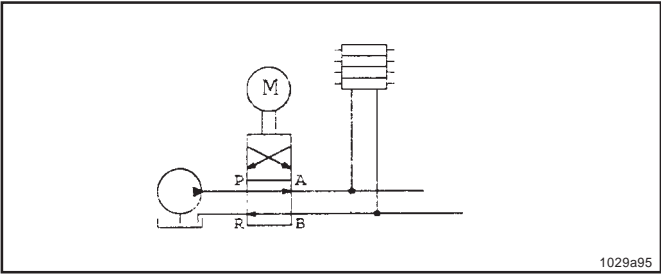


Fig. 1 EM-U2 used as a changing-over unit for two-line lubrication systems

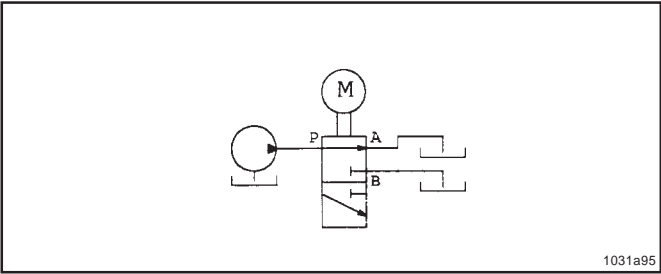


Fig. 3 EM-U2 used as a 3/2-way valve for filling systems

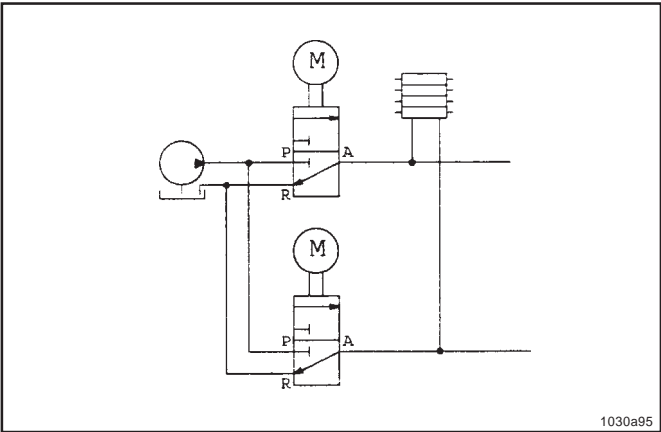


Fig. 2 EM-U2 used as a 3/2-way valve for two-line lubrication systems, with the possibility to relieve both lines simultaneously

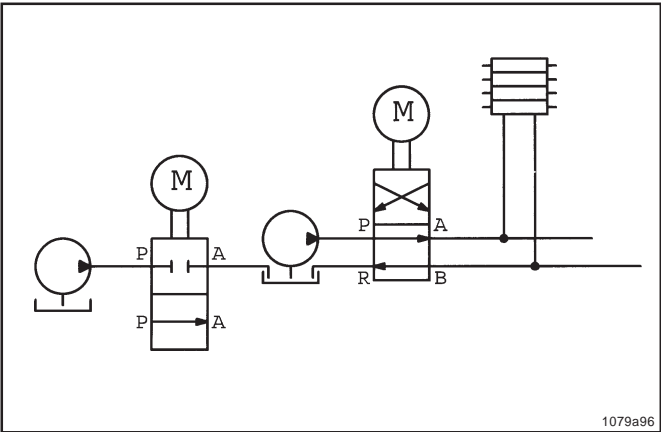


Fig. 4 EM-U2 used as a 2/2-way valve for filling systems

Features

- available with 24 V DC and 230 V AC;
- the respective valve position is always reached , irrespective of the voltage fluctuations, temperature and lubricant consistency;
- can easily be integrated into electrical control units due to the electric motor-operation;
- robust and compact construction;
- insensitive to humidity and dirt;
- insensitive to mechanical influences.

Technical Data

Connection thread:	3/4" BSP
Flow rate:	Qmax = 65 dm³/h
Operating pressure:	pmax = 400 bar
Operating temperature:	-20°C to 80°C
Switching time:	0,5 sec.
Sound level:	< 70 dBA
Supply voltage:	24 V DC or 230 V AC
Power consumption	Pmax = 80 W
Degree of protection:	IP54
Weight:	24 V DC version: 11 kg 230 V AC version: 12.8 kg
fitting position:	optional

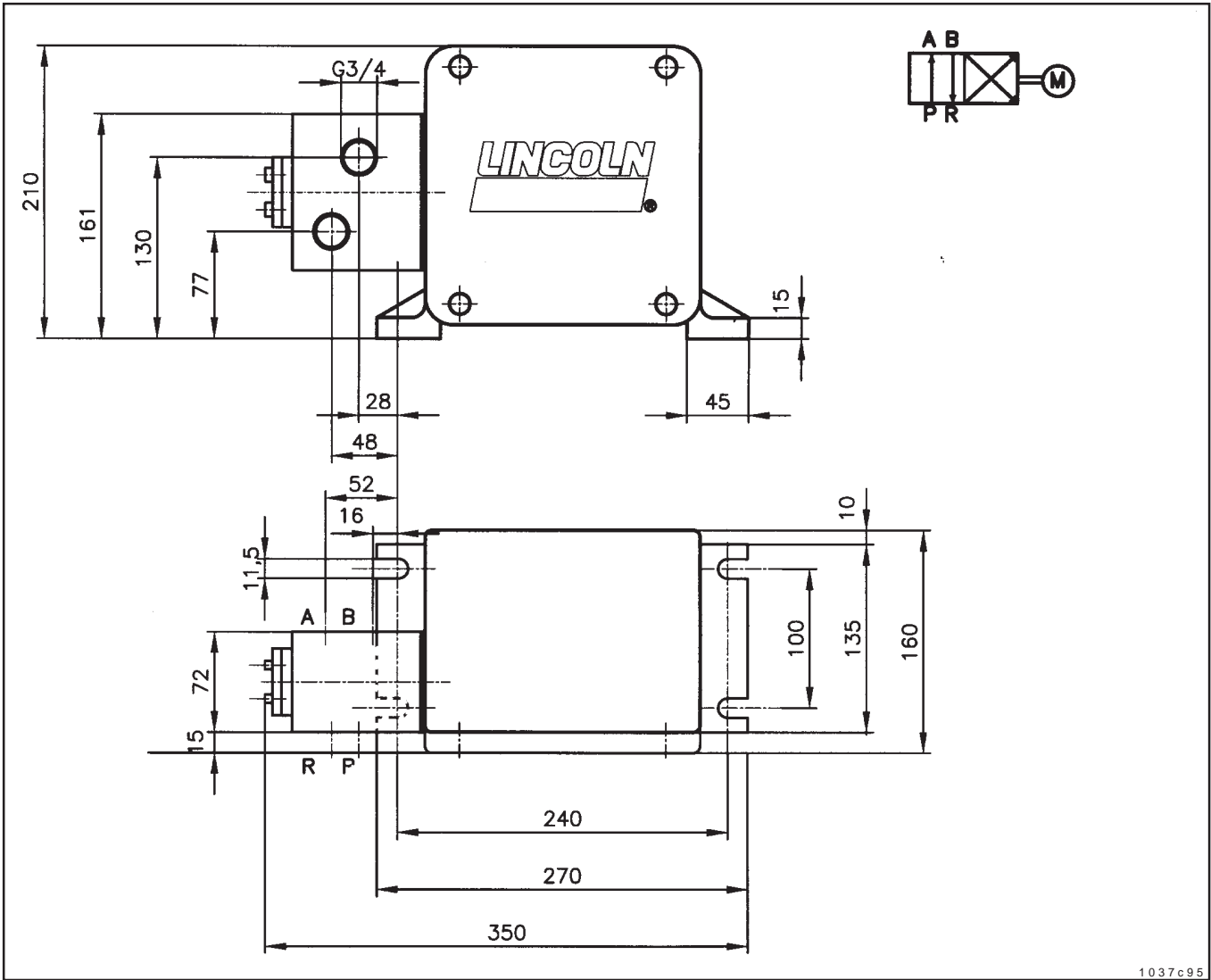


Fig. 5: mounting dimensions of the EM-U2

item description

- A main line 1
- B main line 2
- P pressure line
- R relief line

Important:
The change-over valve housing is sluable by 180°

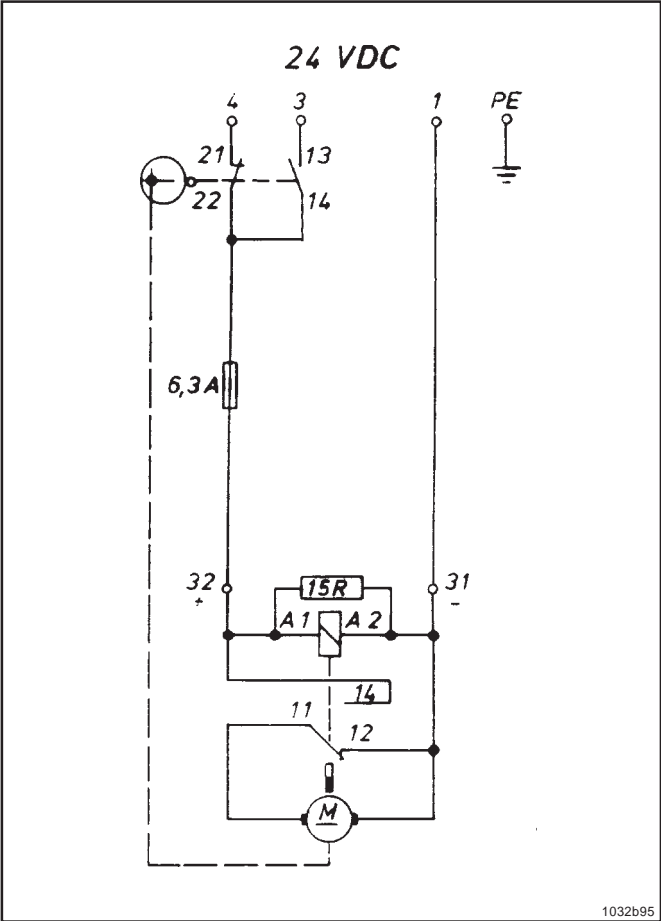


Fig. 6: circuit diagram 24 V DC version

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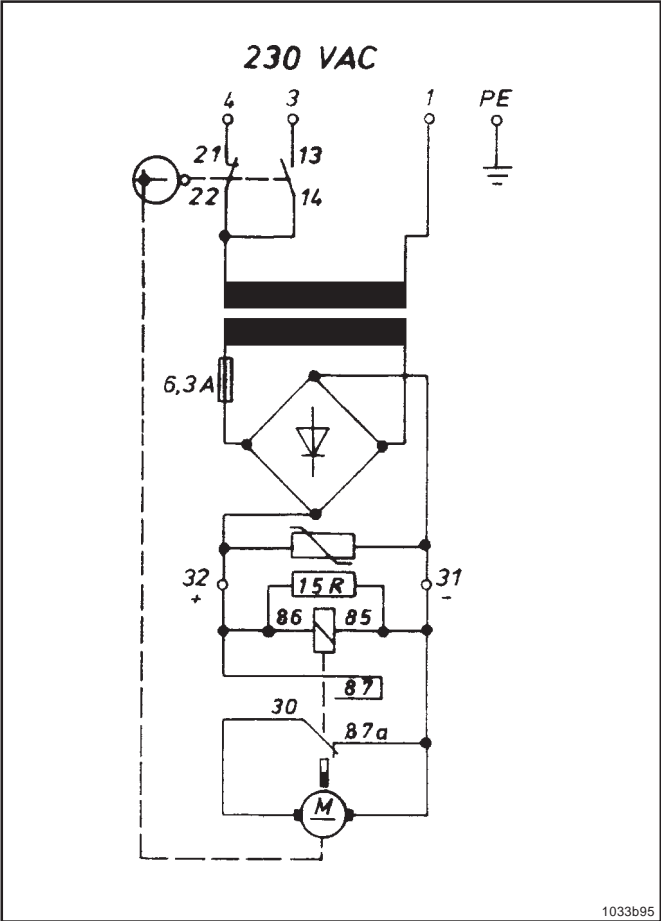
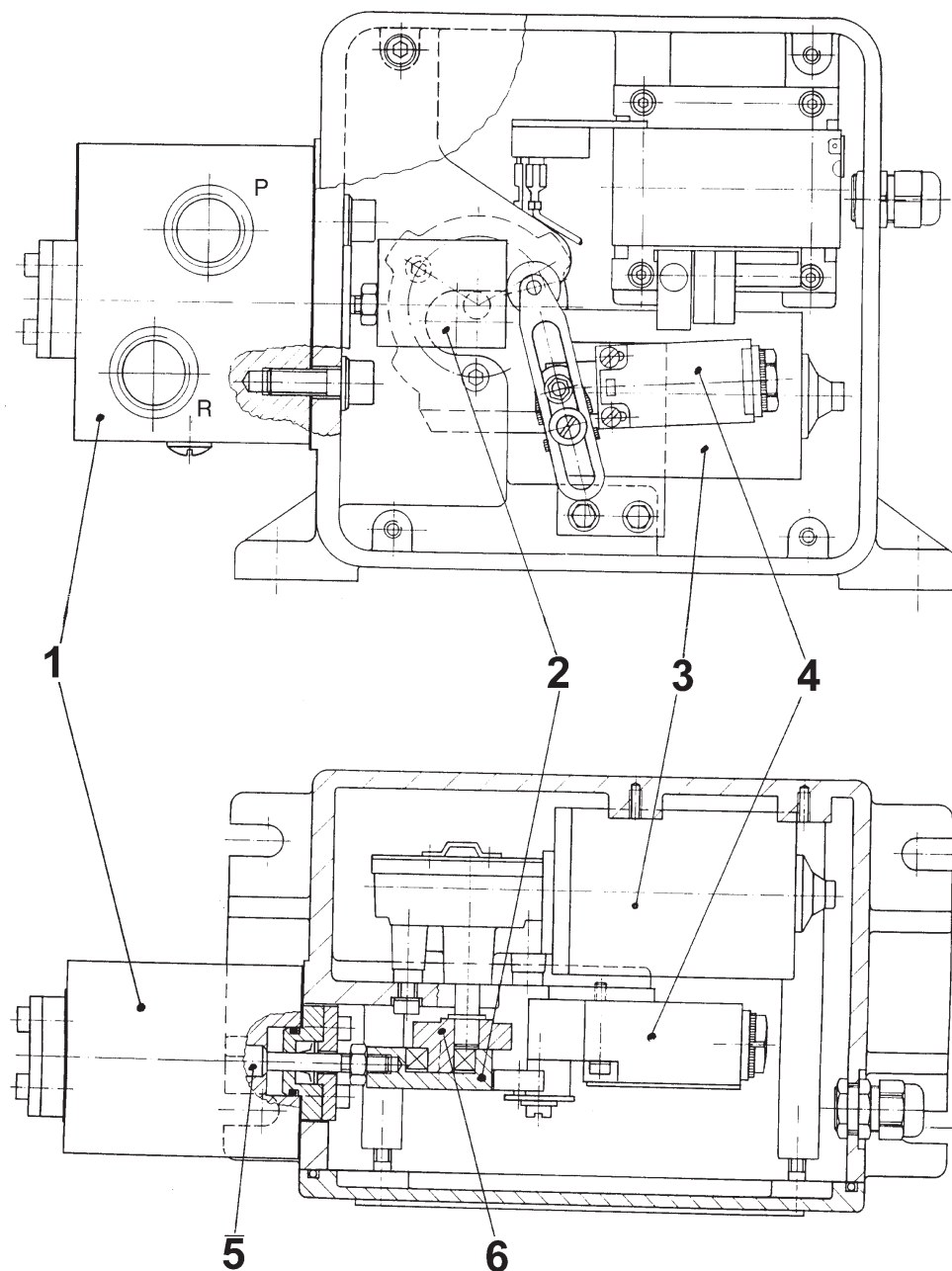


Fig. 7: circuit diagram 230 V AC version

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Mode of Operation

- Change-over valve housing (1) operates as a 4/2- or 3/2 way valve and is actuated by the DC gear motor (3).
- The motor (3) is started by the signal of the end-of-line pressure switch.
- The rotating motion of the motor (3) is converted by the eccentric (6) and the connecting link (2) into a stroke of the piston (5) which performs the reversing process.
- Once the piston has reached its opposite position the position switch (4) switches the motor (3) off. The piston (5) remains in its position until the motor starts again.



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Fig. 8: electric motor-operated change-over valve: principle of operation

Erection and Assembly of the EM-U2

Mechanical Installation

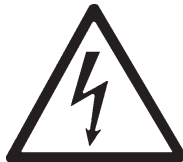
- When installing the change-over valve, pay attention to the mounting dimensions shown on Fig. 5
- The change-over valve can be installed in any position.
- Fix it to the housing feet by means of 4 screws M 10.
- Connect the tube lines in accordance with the instructions given by the fitting manufacturer.

NOTE: Do not screw fittings with conical thread into the connections of the change-over valve housing (refer to Fig. 8 A)

Electrical Installation

- Perform the electrical connection of the change-over valve EM-U2 according to Fig. 6

- All electrical work should be undertaken only by qualified personnel.



Operating Instructions

Commissioning

- Put the change-over valve into operation in accordance with the instructions mentioned in the description of the whole system.
- After the first pressure build-up in the main lines check the fittings for leakage. Retighten them if necessary.

Factory Setting

The factory settings are shown on following figures.

In the case of resettings, please refer to Item 4.3: remedy to the fault „change-over valve operates continuously“.

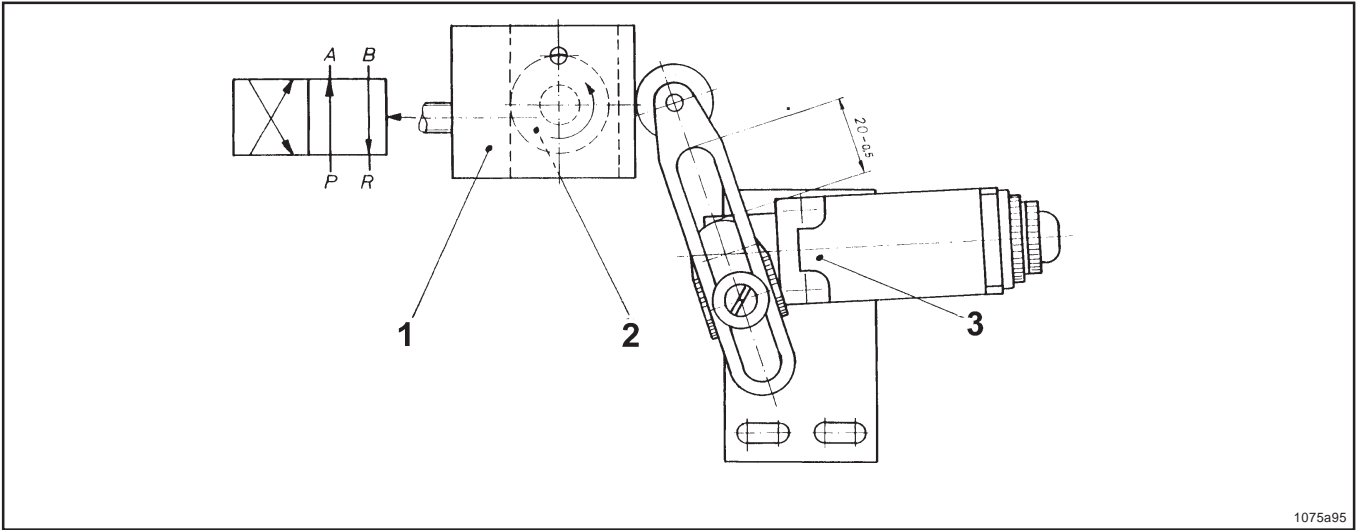


Fig. 9: piston final position 1

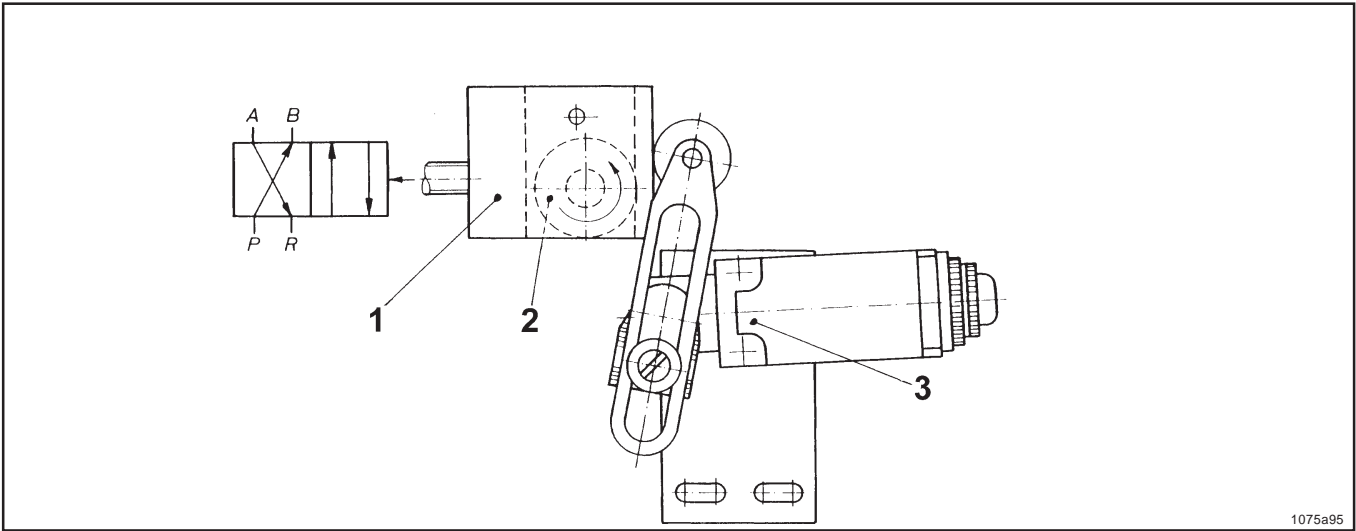


Fig. 10: Piston final position 2

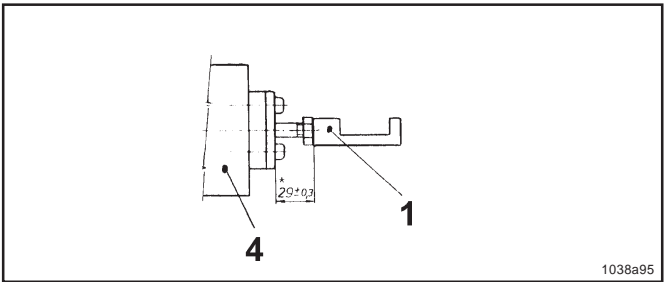


Fig. 11: adjustment in position 2 at disassembled change-over valve housing

item	description
1	connecting link
2	bearing
3	limit switch
4	change-over valve

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Troubleshooting

Do not touch anything between the connecting link (Fig.8, item B) and the change-over valve housing (Fig. 8, item A) if the housing cover is opened and the EM-U2 is ready for operation.



• Fault: no pressure build-up or pressure build-up too slow

- | | |
|--|--|
| <ul style="list-style-type: none"> • Cause: • Line system or two-line metering devices leaking • Piston and/or change-over valve housing worn | <ul style="list-style-type: none"> • Remedy: • Check the lines and metering devices • Replace the complete change-over valve housing (refer to Fig. 12, item 1) |
|--|--|

• Fault: no changing over is released

- | | |
|--|---|
| <ul style="list-style-type: none"> • Cause: • Line interruption between the units of the change-over valve • End-of-line pressure switch does not give any signal | <ul style="list-style-type: none"> • Remedy: • Check the electric lines and the fuse of the change-over valve • Check whether the change-over valve operates by actuating it manually
Check the adjustment of the change-over valve
Check the electric lines between the end-of-line pressure switch and the change-over valve |
|--|---|

• Fault: the change-over valve operates continuously

- | | |
|---|--|
| <ul style="list-style-type: none"> • Cause: • The switching point of the position switch is not reached | <ul style="list-style-type: none"> • Remedy: • Check the adjusted value of 20_{-0.5} and re-adjust it, if necessary. • Check the adjustments shown on Fig. 9 - 11 see remedy at following fault: "The line which has been charged after the reversing process is not relieved " |
|---|--|

**Fault: The line which has been charged after the reversing process is not relieved or
No pressure build-up in the respective line after the reversing process although the
pressure between the pump and change-over valve increases rapidly.**

- Cause:
 - The reversing piston does not reach its final position
- Remedy:
 - The eccentric continues to operate for a short moment after the impulse of the position switch. Check internal wiring of the terminal strip (for the 24 V DC version refer to Fig. 12, item 27) and that of the rectifier (for the 230 V AC version refer to Fig. 12, item 26)
Replace the terminal block assembly and/or the power supply assembly, if necessary.
 - Check adjustment shown on Fig. 9:
Piston final position 1: the outer edge of the ball bearing must be centered in the borehole of the connecting link and must be visible (in the case of old models without borehole in the connecting link, the distance between the upper outer edges of the ball bearing as shown on Fig. 9 and the connecting link must be 8^{+1} mm).
Piston final position 2: acc. to Fig. 10: the lower outer edges of the ball bearing and the connecting link must be aligned (tolerance: the outer edge of the ball bearing may lie up to 1 mm under the connecting link).
If both ball bearing positions are overrun or if the ball bearing stops before it has reached the positions: check the value of $20_{-0.5}$ and re-adjust it, if necessary.
The ball bearing stops before it has reached its position in piston final position 1 and overruns the position of piston final position 2: push the position switch towards the connecting link.
The ball bearing overruns its position in piston final position 1 and stops before it has reached the position of piston final position 2: push the position switch away from the connecting link.

Spare Parts Drawing and Spare Parts List

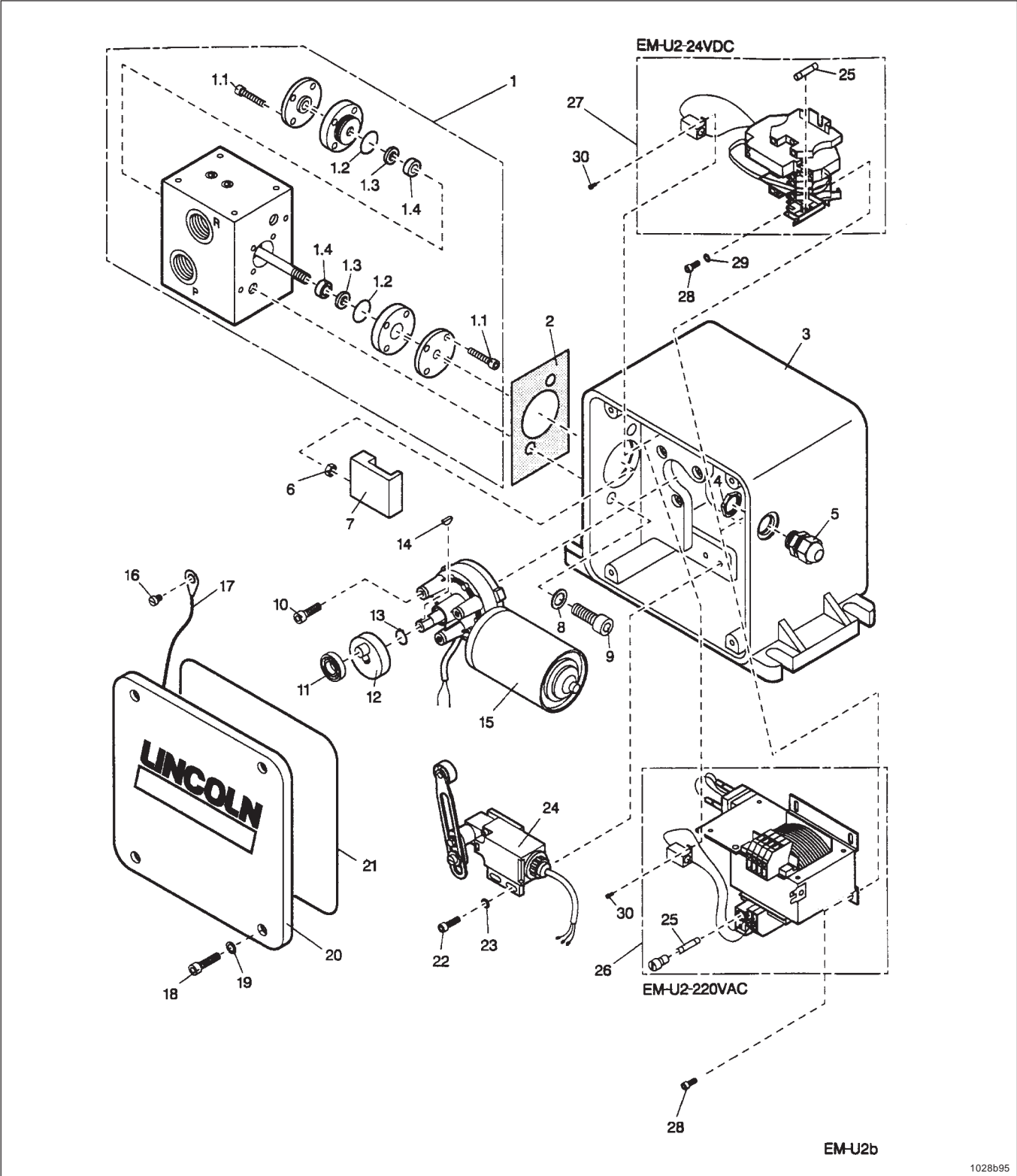


Fig 12: spare parts

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Spare Part List EM-U2

Item	Designation	Quantity	Part Number
1	change-over valve housing assembly	1	518-31801-1
1.1	screw DIN 912 M5	8	201-12017-8
1.2	o-ring	2	219-12224-1
1.3	supporting washer	2	306-17805-1
1.4	u-cup sealing ring	2	220-12234-5
2	gasket	1	306-19592-1
3	housing	1	314-19593-1
4	lock nut	1	237-13352-2
5	cable gland	1	237-13345-7
6	nut DIN 934 M 8	1	207-12135-8
7	connecting link	1	418-23998-1
8	washer DIN 125 10,5	2	209-13077-2
9	screw DIN 912 M 10	2	201-12027-4
10	screw DIN 912 M 6	3	201-12018-5
11	grooved ball bearing DIN 625	1	250-14009-7
12	eccentric	1	418-23996-1
13	retaining ring DIN 471	1	211-12164-1
14	key DIN 6888	1	214-13123-2
15	DC-gear motor	1	245-13599-1
16	screw DIN 84 M 5	2	201-12037-5
17	ground wire	1	664-36878-2
18	screw DIN 912 M 6	4	201-13608-3
19	washer DIN 7603	4	209-13065-2
20	cover	1	314-19594-1
21	sealing ring	0,75 m	113-35214-2
22	screw DIN 912 M 5	2	201-12016-6
23	washer DIN 125	2	209-13077-3
24	limit switch assembly	1	518-31895-1
25	fuse 6,3 A	1	237-13426-2
30	tapping screw DIN 7981 - ST 2,2	2	206-13725-8
for 24VDC-version			
27	terminal block assembly	1	518-31903-1
28	self-tapping screw DIN 7513 M 4	2	201-12015-2
29	washer DIN 125	2	209-12146-2
for 220VAC-version			
26	power supply assembly	1	518-31901-1
28	screw DIN 912 M4	2	201-12015-2
29	washer DIN 125	2	209-12146-2

not shown

**for all 3/2-way valves for
closing outlet B or R**

way valve	625-28448-1
way valve	625-28450-1
way valve	625-28449-1
way valve	625-28451-1

closure plug G 3/4	1	303-17448-2
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Declaration by the manufacturer as defined by machinery directive 89/392/EEC Annex II B

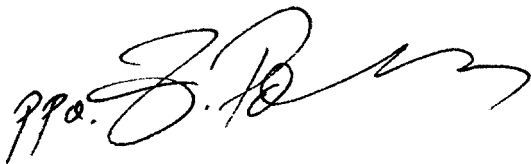
Herewith we declare that the supplied model of

Electric Motor-Operated Change-Over Valve EM-U2 and Electric Motor-Operated 2/2-Way Valve and 3/2-Way Valve

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, 11.03.1997 , ppa. Z.Paluncic