



## PRODUCT MANUAL

# Electric lever servomotor to 35 Nm ZEPAROT 1 type 674

### APPLICATION

Servomotors are designed for adjusting control elements (e.g. mixing valves with revolving movement, ball valves, flangeless stop flanges, flanges of pneumatic equipment, etc.), for which their properties are suitable.

For the environment, where mechanical resistance is required pursuant to EN 60068-2-6 (class AH2) and seismic capability of the electrical equipment of the safety system of the nuclear power stations pursuant to IEC 980 (MVZ level SL-2)

The servomotors are rated products pursuant to the Directive 2014/35EU, 2014/30/EU of the European Parliament and the Council and EU Declaration of Conformity **EU-674000** is issued for them.

### DESCRIPTION

Servomotors are revolving, single-revolution, with constant control speed. The motor and the self-locking gear mechanism are stored in a box from steel sheet. Various connecting parts and couplings required for the connection with the controlled equipment are attached to this box and the output shaft. Wires are brought in through sealing outlets.

The control can be ensured either with a three-point connection or a position control, signal 0 to 1V, 0 to 10 V, 0 to 20 mA and 4 to 20 mA. It transfers the input analogue signal to the corresponding position of the servomotor. The position is sensed by the resistance transmitter. If the controlled equipment is stopped forcefully during the revolving movement, the drive is disconnected and failure signalling is activated. This period can be adjusted.

It can be completed with a sensor for checking maximum temperature of the motor, which trips it and activates signalling after the maximum pre-set value has been exceeded. The inlet signal can be changed with interconnected pieces, limit positions can be adjusted by means of push-buttons or by means of a computer. It can also be used for adjusting the upper and the lower insensitivity zones, changing the course of movement of the servomotor with respect to the inlet signal (e.g. linear, quadratic, logarithmic or user-defined in 100 points), type of operation of the actuators in case of exceeding the adjusted range by 5 % (open, close, without response, movement to the end position in the direction of the signal).

In addition to position switches and manual control, they can be equipped with:

- Two signalling switches, adjustable within the whole range of the working lift;
- Resistance position transmitter 100  $\Omega$  (one or two);
- Converter with signal 4 to 20 mA for two-wire connection to measuring loop (power supply directly from measured signal);
- Fuse that will ensure, in case of a forced stop of the controlled equipment during the revolving movement, disconnecting the drive and signalling failure for the period exceeding the pre-set time. The initial status is switching the control signal on or off and the period for switching off is calculated from the initial status (it applies to the three-point control).

### PRINCIPLE

The servomotor is controlled with reversing synchronous motor revolving in both directions, depending on signal, connected to the drive. The starting moment is transferred to the output shaft directly by the gearing. The working lift is adjusted by cams that control position switches.

### TECHNICAL DATA

#### Device design:

- with AC 230 V supply pursuant to EN 61140 as an electrical protection class I, for use in networks with overvoltage category II and pollution level 2 pursuant to EN 61010-1
- with AC 24 V supply pursuant to EN 61140 as an electrical protection class I, for use in networks with overvoltage category III and pollution level 2 pursuant to EN 61010-1

The servomotor has internal and external protective clamps, which are mutually interconnected.

The servomotor has no fuse of mains power supply and it shall be secured with an external fuse pursuant to EN 60127-2.

#### Electric strength

Servomotor with supply voltage AC 230 V:

- Circuit of power supply and signalling switches against protective clamp: AC 1500 V
- Circuit of power supply and signalling switches against transmitter circuit: AC 2300 V
- Circuit of transmitter against protective clamp: AC 500 V

Servomotor with supply voltage AC 24 V:

- Circuit of power supply and signalling switches against transmitter circuit: AC 740 V
- Circuit of power supply and signalling switches against protective clamp: AC 500 V
- Circuit of transmitter against protective clamp: AC 500 V

**Electric insulation resistance** min. 20 M $\Omega$

#### Power supply

Design with mains power supply AC 230 V:

- Type of supply mains: 1/N/PE AC 230 V 50 Hz
- Tolerance of supply voltage:  $\pm 10\%$
- Tolerance of mains frequency: 48  $\div$  52 Hz

Design with power supply AC 24 V:

- Type of supply mains: AC 24 V
- Tolerance of supply voltage:  $\pm 10\%$
- Tolerance of mains frequency: 48  $\div$  52 Hz

The motor is protected against overload with a thermal fuse, which trips after the temperature of approx. 130  $\pm$  5  $^{\circ}$ C is reached.

**Power input:** max. 10 VA

**Ingress protection** pursuant to EN 60529: IP 65

#### Operation position:

Discretionary, the position with vertical axis of the outlet shaft is considered the basic one. However, positioning below the controlled equipment is not recommended.

**Weight:** approx. 3 kg

**Type of operation:** continuous

#### Applied materials:

Panel steel metal sheet

#### Electrical connection:

- Terminals screw type for wire cross-section to 1.5 mm<sup>2</sup>
- Grommets BP9x7 pursuant to ČSN 37 0181.61 for cable diameter 4.5 to 7 mm

### OPERATION CONDITIONS

The environment is defined by the group of parameters and their severity grades IE 36 pursuant to EN 60721-3-3 and the following operation conditions.

**Ambient temperature:** - 25 to + 55  $^{\circ}$ C

In the operation at temperatures below -15 $^{\circ}$ C and decreased voltage within the tolerance, nominal moment may be decreased. The manufacturer shall be notified of such operation; it will ensure required modifications for a trouble-free operation of the device.

#### Relative ambient humidity:

10 to 100 % with condensation, with upper level of water content 29 g H<sub>2</sub>O/kg of dry air

**Atmospheric pressure:** 70 to 106 kPa

#### Vibrations:

- Frequency range [Hz] 10 to 150
- Drift amplitude [mm] 0.15
- Acceleration amplitude [m.s<sup>-2</sup>] 20

#### Electromagnetic compatibility pursuant to EN 61326-1:

Values of interference voltage, on the network terminals in the band pursuant to EN 55011: class A, group 1

Electrostatic discharges, EN 61000-4-2:

4 kV contact, 8 kV by air, functional criterion B

External electromagnetic field, EN 61000-4-3 ed.2:

10 V/m 80-1000 MHz, 80% AM 1kHz, functional criterion A

- Fast transient phenomena, EN 61000-4-4:  
2 kV power supply, 1 kV Sig. I/O, functional criterion B
- Surge impulse EN 61000-4-5:  
1 kV power supply symmetrical and signal I/O, functional criterion B  
2 kV power supply non-symmetrical, functional criterion B
- Induced high-frequency field EN 61000-4-6:  
3 V, 0.15 – 80 MHz, functional criterion A
- Magnetic field of mains frequency, EN 61000-4-8:  
30 A / m, functional criterion A
- Voltage drop of power supply pursuant to EN 61000-4-11:  
30 %, operating period 10 ms functional criterion A  
60 %, operating period 100 ms functional criterion C  
0 %, operating period 1000 ms functional criterion C  
>95 %, operating period 5000 ms functional criterion C

## METROLOGICAL DATA

**Nominal strength and adjustment time:** refer to table 1

**Accuracy of nominal strength and adjustment time:**

± 10 %.

**Travel of shaft with load:** max. 0.5°

**Shaft tolerance at max. 10 % load:** max. 1.5°

**Time interval for reversing (without load):** min 50 ms

**Load factor** pursuant to EN 60034-1:

- Interrupted operation S4 - 80 %, 100 to 1200 cycles / hour

**Hysteresis of signalling switches:** max. 3°

**Rating of position switches and signalling switches:**

AC 250 V / 5A resistance load

3A inductive load

**Resistance transmitter parameters** (related to max. lift):

- Total resistance 100 Ω ± 3 Ω
- Residue resistance in position "C" max. 5 Ω
- Residue resistance in position "O" max. 5 Ω
- Non-linearity max. ± 1 %
- Hysteresis max. ± 1 %
- Rating max. 120 mA
- Power supply max. 12 V

**Resistance transmitter parameters with converter 4 to 20 mA** (related to max. lift):

- Power supply: DC 12 to 45 V from safe source PELV or SELV
- Load resistance:  $R_z = (U-12)/0.02$  [Ω]
- Settlement period after switching power supply: 30 min.
- Output signal: DC 4 to 20 mA  
DC 20 to 4 mA
- Ripple: max. 5 %
- Non-linearity: max. ± 1 %
- Hysteresis: max. ± 1 %

**Parameters of position control:**

- Power supply AC 230 V  
AC 24 V
  - Input signal - with maximum tolerance ± 5 %
- It can be changed by means of interconnecting pieces, refer to Article INSTALLATION AND CONNECTION, *ADJUSTMENT OF POSITION CONTROL*
- Outlet Contact relay 250V/1A,  
it signals exceeding moment, signal failure
  - Action in case of failure  
It goes to the end position in the direction of the signal (other possibilities: open, close, without response)
  - Switch-off time 150 s ± 10 % (2.5 min.)  
(possible adjustment 5 to 250 s)
  - Operation restart after switching the device on and off
  - Upper insensitivity zone 2 % [possible adjustment 2 to 5 %]
  - Lower insensitivity zone 2 % [possible adjustment 2 to 5 %]
  - Course of movement linear

Possible modifications of parameters - refer to Article INSTALLATION AND CONNECTION, *ADJUSTMENT OF POSITION CONTROL*

**Moment fuse parameters** (for three-point control)

- Input signal for open or closed  
AC 230 V or AC 24 V
- Output relay for failure signalling  
 $I_{max}$  1 A
- Response time delay of switch on/off max. 65 ms
- Failure time time without signal,  
when motor is not switched off,  
max. 65 ms
- Switch-off time 150 s ± 10 % (2.5 min.)
- Operation restart change of status of input signal  
for period exceeding 65 ms

## DESIGNATION

**Data on the servomotor label:**

- Trade mark of the manufacturer
- Made in Czech Republic
- Product number
- Serial number
- Type of power supply
- Maximum power input
- Adjustment time
- Nominal moment Nm
- Nominal voltage and current of switches
- Ingress protection
- Weight
- CE mark
- Other data pursuant to design

The servomotor lid includes the connection scheme.

## DELIVERY

The servomotors are delivered with installed lever in the interim position. The position switches are adjusted to 90° or 120° pursuant to the working lift with limit positions O and C pursuant to Figure 1, 2, 3. Signalling switches are adjusted to approx. 5° before limit positions.

The design for ball valves GIACOMINI and flange-less stop flaps with coupling in position "O".

Every delivery includes, unless agreed otherwise with the customer:

- Delivery note
- Products pursuant to the purchase order
- Accessories:
  - o Pursuant to table 3
- Accompanying technical documentation in Czech:
  - o Product manual
  - o Product quality and completeness certificate, which also serves as the warranty certificate
  - o Test report

If it is established in the purchase contract or agreed otherwise, the following documentation can be also delivered with the product:

- EU Declaration of Conformity
- Test report about the seismic and the vibration qualification

## ORDERING

The purchase order shall specify

- Name
- Product ordering number
- Specifications (if any)
- Special design after an agreement with the manufacturer
- Number of pieces

## PURCHASE ORDER EXAMPLE

1. Electric lever servomotor ZEPAROT 1  
674 14 / OP1, S1, R1  
spec. connection  
(drawing and description are included in the delivery)  
5 pcs
2. Electric lever servomotor with increased moment  
ZEPAROT 1674 11 Z / S1, P2  
5 pcs

**TABLE 1 DESIGN OF LEVER ELECTRIC SERVOMOTOR – TYPE 674**

| SPECIFICATIONS  |                   |                       | ORDERING NUMBER |    |
|-----------------|-------------------|-----------------------|-----------------|----|
| Supply voltage  | Nominal moment Nm | Changeover time s/90° | 674             | xx |
| AC 230V<br>50Hz | 6                 | 15                    |                 | 11 |
|                 | 12                | 30                    |                 | 12 |
|                 | 20                | 60                    |                 | 13 |
|                 | 35                | 90                    |                 | 14 |
| AC 24V<br>50Hz  | 6                 | 15                    |                 | 21 |
|                 | 12                | 30                    |                 | 22 |
|                 | 20                | 60                    |                 | 23 |
|                 | 35                | 90                    |                 | 24 |

Basic design: three-point position control, manual control, end position switches KPO and KPZ, working angle 90 ° without transmitter and connecting elements (on the basis of an agreement, the working angle may be up to 300 °).

**TABLE 2 ADDITIONAL ACCESSORIES OF ELECTRIC LEVER SERVOMOTOR**

| CODE | NAME  | EQUIPMENT COMBINATIONS |                  | CONNECTION PURSUANT TO |
|------|---|------------------------|------------------|------------------------|
|      |   | possible with          | can not with     |                        |
| MP1  | Moment fuse   | R1 or R2               | OP1 or I1        |                        |
| OP1  | Position control 0 to 1 V, 0 to 10 V, 0(4) to 20 mA       | R1                     | MP1 or R2 or I1  |                        |
| R1   | 1 resistance transmitter 100 Ω                            | MP1 or OP1 or I1       | OP1 + I1         |                        |
| R2   | 2 resistance transmitters 100 Ω                           | MP1                    | OP1 or I1        |                        |
| I1   | Converter 4 to 20 mA - without MP1, OP1 and R2            | R1                     | MP1 or OP1 or R2 |                        |
| ANP1 | Adapter with adjusting programme for servomotors with OP1 |                        |                  |                        |
| S1   | Signalling switches SO and SC                             |                        |                  |                        |
| U12  | Working angle 120 °                                       |                        |                  |                        |
| P2   | Angle bar, 2 joints                                       |                        |                  | Figure1                |
| P3   | Support for KOMEXTERM                                     |                        |                  | Figure2                |
| P4   | With flange for ball valve                                |                        |                  | Figure3                |
| P51  | Ball valve GIACOMINI < DN 32                              |                        |                  | Figure4                |
| P52  | Ball valve GIACOMINI > DN 32                              |                        |                  | Figure5                |
| P71  | Stop flaps ABO 14 x 17, Ø 50                              |                        |                  | Figure6                |
| P72  | Stop flaps EBRO 10, Ø 50                                  |                        |                  | Figure6                |
| P73  | Stop flaps FL 12, Ø 70                                    |                        |                  | Figure6                |
| P74  | Stop flaps IBC 13, Ø 70                                   |                        |                  | Figure6                |
| P75  | Stop flaps SCA 14, Ø 50                                   |                        |                  | Figure6                |
| P76  | Stop flaps 14 direct, Ø 70                                |                        |                  | Figure6                |

The code shall be specified behind the ordering number.

**TABLE 3 ACCESSORIES**

| DESIGN PURSUANT TO             | NAME   | NUMBER OF PIECES |
|--------------------------------|--|------------------|
| All designs                    | Manual control wrench, drawing number 240669     | 1 pc             |
| Figure 1                       | Complete connecting lever, drawing number 130801 | 1 pc             |
| Figure 2                       | Screw with plug, drawing number 131406           | 1 pc             |
|                                | Screw EN ISO 4762 - M6 x 14                      | 2 pcs            |
|                                | Washer 6 ČSN 02 1740                             | 2 pcs            |
| Figure 3                       | Screw EN ISO 4762 - M6 x 14                      | 4 pcs            |
|                                | Washer 6 ČSN 02 1740                             | 4 pcs            |
| Figure 6<br>code P71, P72, P75 | Label, drawing number 152064                     | 1 pc             |
|                                | Screw EN ISO 4762 - M6 x 25                      | 4 pcs            |
|                                | Nut EN ISO 4034 - M6                             | 4 pcs            |
|                                | Washer 6 ČSN 02 1740                             | 4 pcs            |
| Figure 6<br>code P73, P74, P76 | Label, drawing number 152053                     | 1 pc             |
|                                | Screw EN ISO 4762 - M8 x 25                      | 4 pcs            |
|                                | Nut EN ISO 4034 - M8                             | 4 pcs            |
|                                | Washer 8 ČSN 02 1740                             | 4 pcs            |

**RELIABILITY**

The life expectancy is 6 years, however 3,000 operation cycles as a maximum for servomotors for remote control and 250,000 cycles of servomotors for automatic control with service time specified in technical documentation for any specific product.

**PACKING**

The products and accessories are delivered in a packing ensuring resistance against the impact of thermal effects and mechanical effects pursuant to controlled packing regulations.

**TRANSPORT**

The products may be transported on conditions corresponding to the set of combinations of the classes IE 21 pursuant to EN 60721-3-2 (i.e. by planes and tucks, in premise that are ventilated and protected against climatic effects, heated overpressure cargo areas of airplanes).

**STORAGE**

The servomotors may be stored on conditions corresponding to the set of combinations of classes IE 11/1K3 pursuant to EN 60721-3-1. (i.e. in places with temperature from -5 to 45 °C and humidity from 5 to 95%, without a special threat of an attack with biological agents, with vibrations of small significance and not situated close to sources of dust and sand.)

**INSTALLATION AND CONNECTION**

The servomotor shall be connected to the controlled equipment by means of an angle bar or a support. The type of connection is evident from the dimensional drawing in figures 1 to 6.

**CONNECTION OF SERVOMOTOR TO THE CONTROLLED EQUIPMENT**

**Design P2** pursuant to Figure 1:

Connect the servomotor by means of the angle bar to the controlled flap with two screws. Then adjust the lever of the servomotor and

flap to the same position C (closed). Further release the nut on ball pivots of the connecting lever (a part of accessories) and put the ball pivots on the lever of the servomotor and flap. The ball pivots are turned by 180° towards each other. Now connect the position of the connecting lever and secure with nuts.

**Design P3** pursuant to Figure 2:

Connect the servomotor by means of a support to the controlled valve with two screws M 6x14 (a part of accessories), which are screwed into the bolts on the valve. Then adjust the lever of the servomotor and the lever of the valve to the same position C (closed) and screw the screw (a part of accessories) into the lever of the valve so that the pin in the screw gets into the hole in the lever of the servomotor.

**Design P4** pursuant to Figure 3:

Connect the servomotor to the ball valve as follows: put the servomotor on the square on the valve so that the square on the lever of the valve falls into the square on the lever of the servomotor and, at the same time, the flange of the servomotor gets into the recess in the valve. Connect this flange with four screws M6x14 (a part of accessories).

**Design P51** pursuant to Figure 4 and **design P52** pursuant to Figure 5:

The servomotor is adjusted by the manufacturer to the position OPEN. Put it on the open valve so that the spindle of the valve gets into the recess in the coupling. Connect the flange of the drive by tightening the screw M6.

**Design P71, P72, P73, P74, P75, P76** pursuant to Figure 6:

The servomotor is adjusted by the manufacturer to the position OPEN. Put it on the open flap so that the square of the spindle falls into the recess in the coupling. With the use of four screws with nuts and washers, connect the label marking the position, together with the drive, to the flap (screws, nuts, washers and label form a part of accessories).

**ELECTRICAL CONNECTION**

The electrical connection may be only realized by qualified workers.

The lid of the servomotor is removed after releasing two nuts. After the removal of the lid, the terminal board for the connection of supply voltage, signalling switches and resistance position transmitter or converter 4 to 20 mA is accessible.

Connect the servomotor with a cable with max. Ø 7 mm to supply voltage after mechanical connection to the controlled equipment and after adjustment. Realize the connection with insulated Cu wires with total insulation resistance of min. 10 MΩ, dimensioned pursuant to ČSN 33 2000-4-43 with cross section of max. 1.5 mm<sup>2</sup>. The installation at the servomotor shall include a switch or a circuit-breaker enabling the disconnection of the device from supply mains. After the connection of wires of the outlet, seal it duly with a suitable material (e.g. Colorplast).

The connection scheme is illustrated in Figures 7, 8, 9.

**OUTPUT SHAFT** is adjusted by means of manual control after removing the cover or tilting the cap on the cover as follows:

On the shaft with a pin apply the wrench of manual control from the accessories and push in the direction into the cover, which results in disconnecting the gear from the motor. During the adjustment, the toothed wheel shall be pressed. After the start of operation of the machine, the wheel returns into gear automatically.

**ADJUSTMENT OF END SWITCHES**

When changing the position "CLOSED" and "OPEN", the cams controlling these switches shall be adjusted as follows:

Release the nut M8 and the screws securing the position of the cams. Now adjust the cams controlling these switches so as the switches switch in the required position "CLOSED" and "OPEN" (working angle 90° or 120°).

Tighten the nut and the screws again.

**ADJUSTMENT OF SIGNALLING SWITCHES**

The servomotor is adjusted gradually to the positions to be signalled. Release the nut M8 and the screws securing the position of the cams, adjust the cams controlling these switches so as the switches switch in the required position. Tighten the nut and the screws again.

**ADJUSTMENT OF TRANSMITTER**

The transmitter is adjusted by the manufacturer to the working angle 90° or 120° pursuant to the purchase order, including values of residue resistance in end limits positions. When changing the positions "CLOSED" and "OPEN", the transmitter shall be adjusted as follows:

Adjust the servomotor to the required position e.g. "CLOSED" and check the value of residue resistance in this position. It shall comply with the parameters of the resistance transmitter- refer to Article METROLOGICAL DATA.

Then adjust the servomotor by 90° or 120° to the position "OPEN" and check the value of residue resistance again. It shall comply with the parameters of the resistance transmitter - refer to article METROLOGICAL DATA.

**ADJUSTMENT OF RESISTANCE TRANSMITTER WITH CONVERTER 4 to 20 mA**

The converter is adjusted by the manufacturer to the working angle pursuant to the purchase order. When changing the positions "C" and "O", the procedure described below shall be followed:

Connect milliammeter with accuracy 0.2 to the outlet from the sensor. After connecting supply voltage, you need to allow temperature settlement of the sensor. After the settlement, the outlet current shall be 4 mA ± 80µA at the beginning of the shaft position and 20 mA ± 80µA at the end. Otherwise, adjust the initial and end positions of the shaft gradually and the corresponding currents 4 and 20 mA with the use of trimmers; it is necessary to consider the fact that values influence each other. Repeat the adjustment until current at the beginning of the shaft position is 4 mA ± 80 µA and 20 mA ± 80 µA at the end or measure the current value at initial (I<sub>LO</sub>) and end (I<sub>HO</sub>) rotations of the shaft and calculate the new value I<sub>H1</sub> for the end adjustment with the use of the formula (\*). After the adjustment of this value with a trimmer "20 mA", turn the shaft to the initial position and adjust the value 4 mA with a trimmer "4 mA". Check the adjustment afterwards.

Unless the current is 4m A ± 80µA at the beginning of the shaft position and 20 mA ± 80µA at the end, repeat the adjustment.

$I_{H1} = 16 \times I_{HO} / (I_{HO} - I_{LO})$

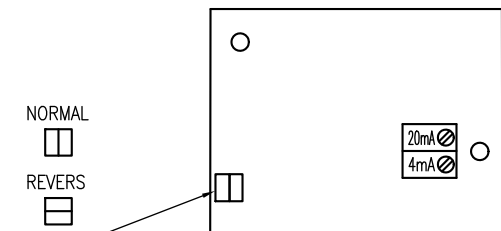
I<sub>LO</sub>.. Value of current at the initial rotation of shaft

I<sub>HO</sub>.. Value of current at the end rotation of shaft

I<sub>H1</sub>.. Calculated value of current for end rotation of shaft

**ADJUSTMENT OF REVERSING**

Normal direction of travel is set-up at the factory, i.e. that current is decreased with revolving clockwise when the device is viewed from the side of electronics. When adjusting the opposite direction, remove the interconnecting pieces, turn them by 90° and insert them back, refer to the figure. Then inspect or, as the case may be, adjust output current in both positions.



**ADJUSTMENT OF POSITION CONTROL**

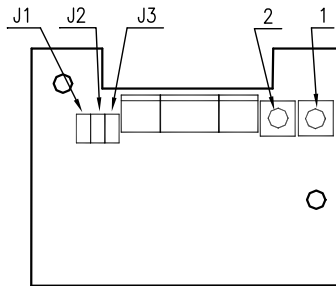
The control is adjusted by the manufacturer to the nominal lift and input signal pursuant to the purchase order, (if not specified, 4 to 20 mA) and movement to the end position in the direction of the signal in case of its loss.

In case of changes of these parameters, proceed as follows:

**A change of the input signal for ranges starting with zero** shall be realized by changing the location of interconnecting pieces pursuant to the table 5:

**TABLE 4 INSTALLATION OF INTERCONNECTING PIECES**

| INPUT SIGNAL | Installed interconnecting pieces |
|--------------|----------------------------------|
| 0 to 1 V     | J1, J2                           |
| 0 to 10 V    | J2                               |
| 0 to 20 mA   | J1, J3                           |
| 4 to 20 mA   | J1, J3                           |

**LOCATION OF INTERCONNECTING PIECES AND PUSH-BUTTONS**

A change of the input signal to 4 to 20 mA or from 4 to 20 mA to signals starting with zero is realized by changing the location of interconnecting pieces pursuant to the table and follow-up calibration:

- Connect an adjustable source of current or voltage signals;
- Connect power supply;
- Press push-buttons 1 and 2 for 5 sec., after their releasing LED diodes will start flashing concurrently (ADJUSTMENT mode);
- Adjust the lower value of voltage or current on the source;
- Move the servomotor by manual control to the lower position; both LEDs shall be flashing; flashing of only one LED signals reaching the end stop and a danger of overturning the position sensor; resistance value shall be increased by turning the potentiometer (the diode will stop flashing);
- Press push-button 1 till the diode flashes (saving this position in memory);
- Adjust the upper value of voltage or current on the source;
- Move the servomotor by manual control to the upper position; both LEDs shall be flashing; flashing of only one LED signals reaching the end stop and a danger of overturning the position sensor; resistance value shall be decreased by turning the potentiometer (both LEDs shall be flashing);
- Press push-button 2 till the diode flashes (saving this position in memory);
- Press push-buttons 1 and 2 for 5 sec. (confirmation of adjusted values to EEPROM memory);
- Switch off and on power supply of the servomotor;
- Adjust the lower value of voltage or current on the source, connect power supply and the servomotor shall move to the lower position;
- Adjust the upper value of voltage or current on the source, connect power supply and the servomotor shall move to the upper position.

**WARNING !**

During the adjustment, power supply may not be interrupted; otherwise the whole procedure shall be repeated!

A change of the operation angle or a change of the range of the input signal within 30% of the applicable nominal range shall be realized with the use of the procedure described above, with the required values of the input signal and lift.

In case of a change of the operation angle exceeding 30% it is necessary to adjust the transmitter pursuant to the paragraph about transmitter adjustment and the inspection of adjustment of the end positions shall be pursuant to flashing diodes. The input signal is adjusted by the computer with the use of the adjustment programme.

With the application of the adjustment programme, the computer, which is connected to the actuator by means of an adapter, can be used for the adjustment of:

- End position
- Lower insensitivity zone                     2 to 5 %
- Upper insensitivity zone                    2 to 5 %
- Switch-off time                             5 to 250 s
- Temperature protection of motor
- Type of action of the actuator in case the pre-set range is exceeded by 5 % (open, close, without response, movement to the end position in the direction of the signal).

It is secured by the service of the manufacturing plant or the adjustment programme and an adapter to the computer (code ANP1) can be purchased.

**COMMISSIONING**

After the installation on the controlled equipment, adjustment and connection to the supply voltage and terminals PE, the servomotor is prepared for operation.

**WARNING!**

A failure to comply with the instructions specified in this manual can result in a faulty function, decreased reliability or a possible failure or even damage to the device without any claim for warranty repairs whatsoever.

**OPERATION AND MAINTENANCE**

Manual control of the servomotor can be realized according to the article INSTALLATION AND CONNECTION, OUTPUT SHAFT.

Toothed wheels and bearings are lubricated with plastic grease MOGUL LV2 M (addition of molybdenum disulphide). After one year of permanent operation, it is recommended greasing the required places with the aforesaid grease, which is delivered by the manufacturer of the servomotor. More complex maintenance (e.g. decreased self-locking etc.) shall be ensured by the manufacturer.

**SPARE PARTS**

Spare parts shall be delivered by the manufacturer on the basis of a previous agreement.

**WARRANTY**

The warranty period is 24 months from the receiving of the product by the customer, unless established otherwise in the contract. The rejection of defects shall be enforced in writing at the manufacturer within the warranty period. The rejecting side shall identify the product name, ordering and manufacturing numbers, date of issue and number of the delivery note, clear description of the occurring defect and the subject of the claim. If the rejecting side is invited to send the device for repair, it shall do so in the original package of the manufacturer and/or in another package ensuring safe transport.

The warranty shall not apply to defects caused by unauthorized intervention into the device, its forced mechanical damage or failure to comply with operation conditions of the product and the product manual.

**REPAIRS**

The repairs shall be realized by the manufacturer.

The device shall be sent for repair in the original or equal package without accessories.

**DISABLING AND LIQUIDATION**

Both the product and its package do not include any parts that could impact the environment.

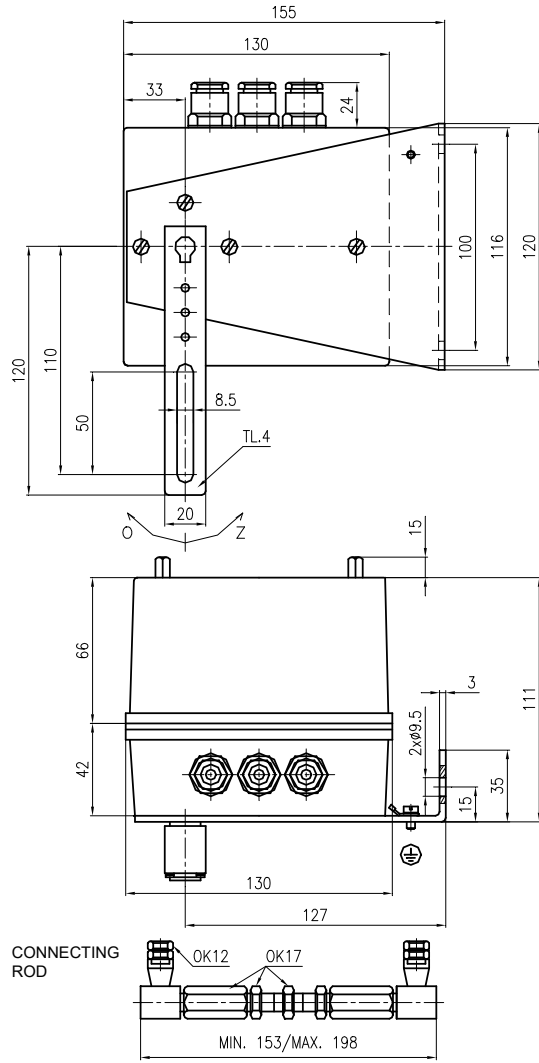
Products that are withdrawn from operation, including their packages (with the exception of products marked as electrical equipment for the purposes of return withdrawal and selected salvage of electrical waste), can be disposed of to sorted or unsorted waste pursuant to the type of waste.

The manufacturer realizes free return withdrawal of marked electrical equipment (from 13.8.2005) from the consumer and points out the danger connected with their illegal disposal.

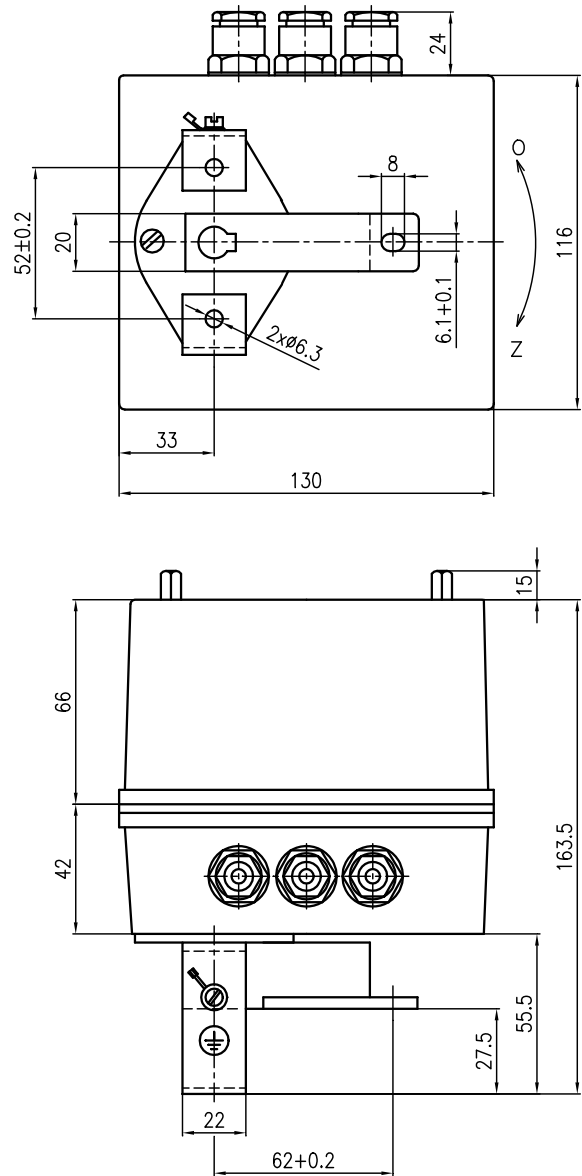
The package of the sensor can be recycled completely.

Metal parts of the products are recycled, non-recyclable plastic materials, electrical waste and batteries shall be disposed of in accordance with applicable legislation.

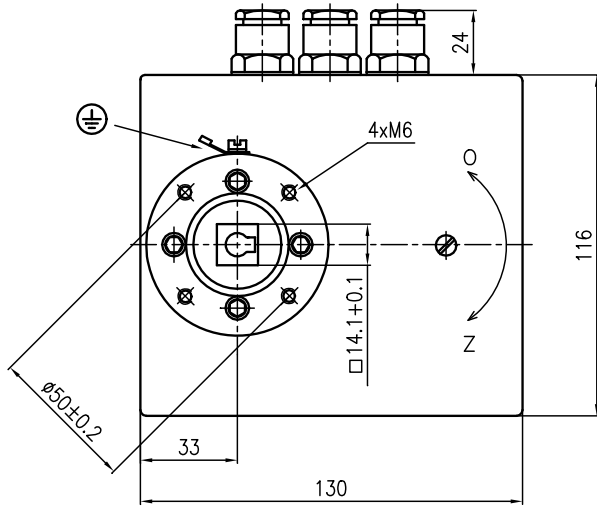
**FIGURE 1 - DIMENSIONAL DRAWING – CONNECTION P2 (WITH ANGLE BAR AND TWO JOINTS)**



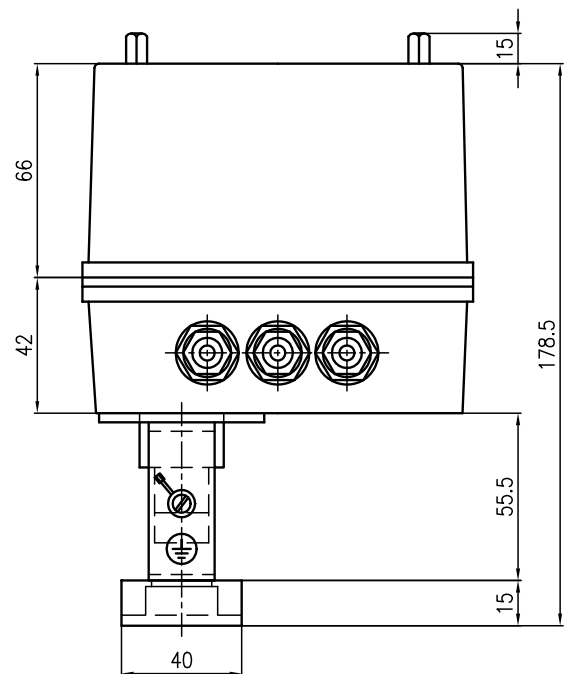
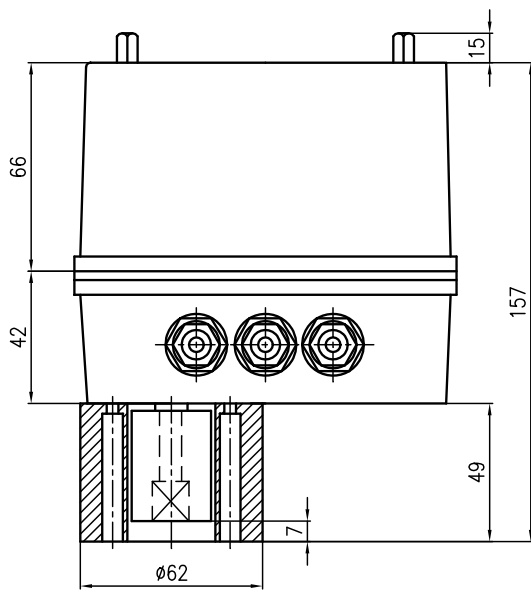
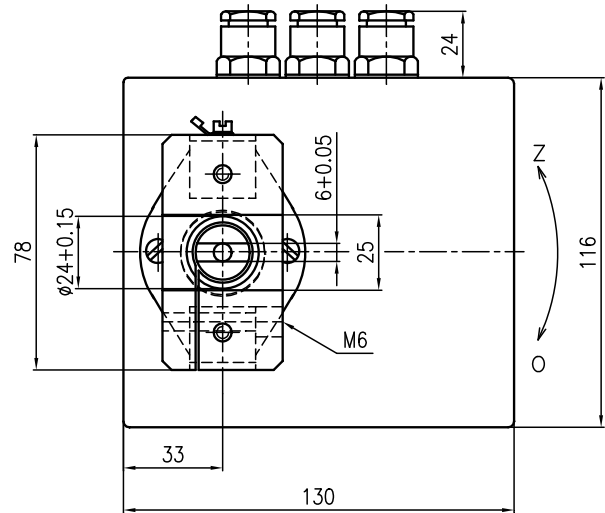
**FIGURE 2 - DIMENSIONAL DRAWING – CONNECTION P3 (WITH SUPPORT FOR KOMEXTHERM AO)**



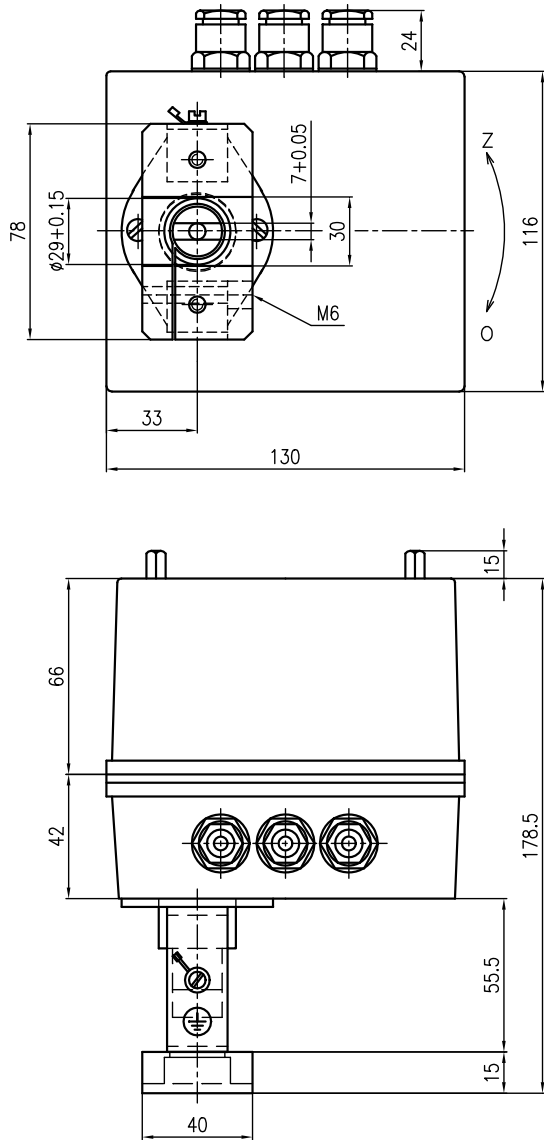
**FIGURE 3 - DIMENSIONAL DRAWING - CONNECTION P4 (WITH FLANGE FOR BALL VALVE)**



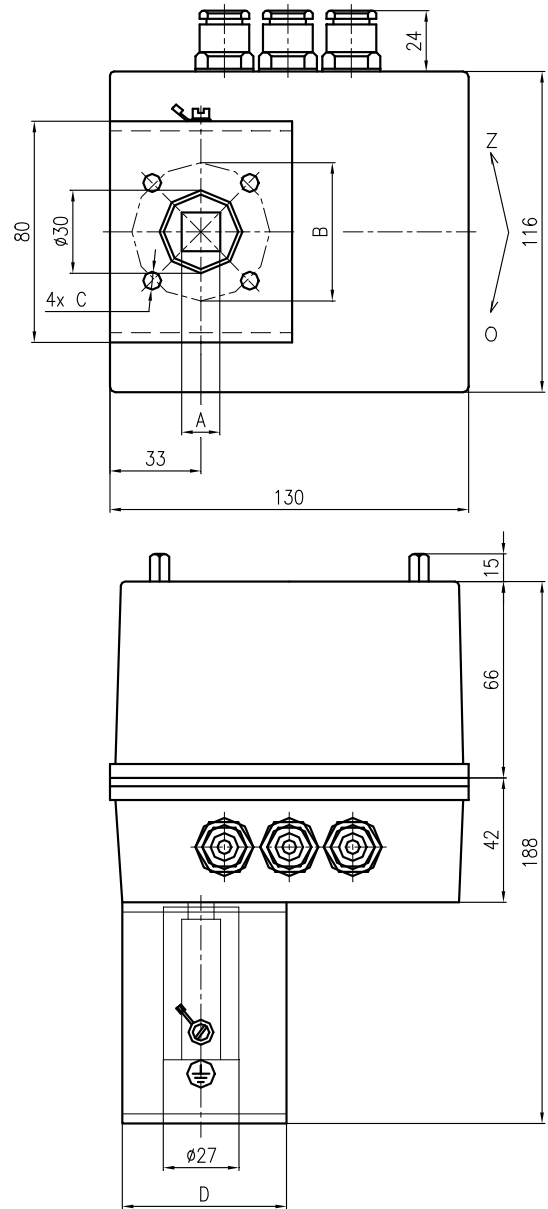
**FIGURE 4 - DIMENSIONAL DRAWING - CONNECTION P51 (WITH FLANGE FOR BALL VALVE GIACOMINI TO DN 32)**



**FIGURE 5 - DIMENSIONAL DRAWING – CONNECTION P52 (WITH FLANGE FOR BALL VALVE GIACOMINI > DN 32)**



**FIGURE 6 - DIMENSIONAL DRAWING – CONNECTION P71 TO 76 (FOR FLANGE-LESS STOP FLAPS)**









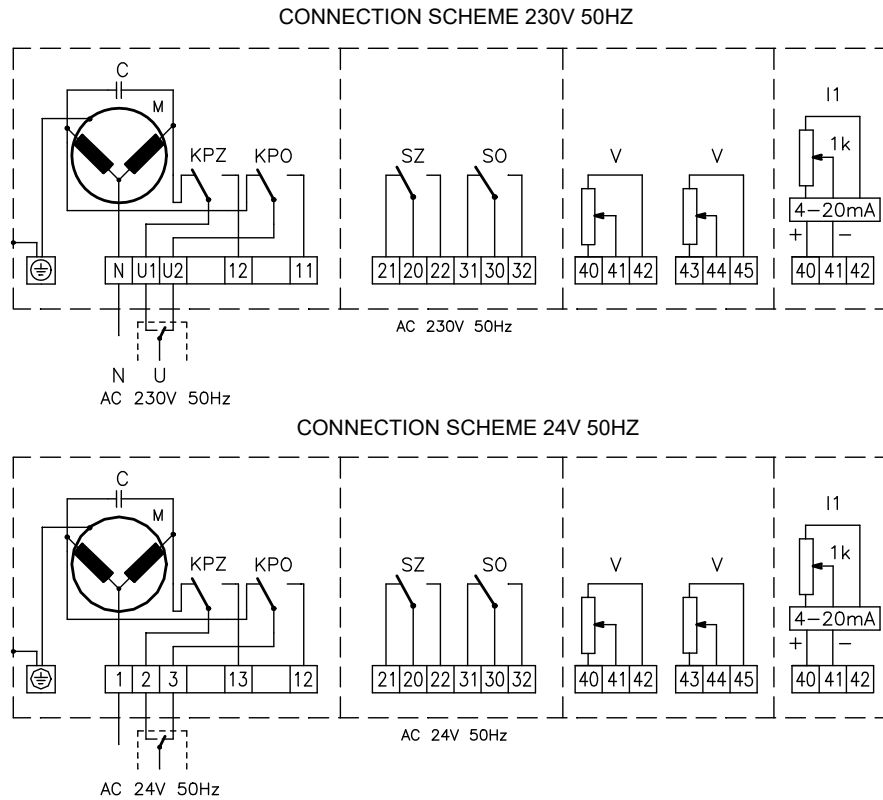
| Code | A [mm] | Orientation A   | B [mm] | C [mm] | D [mm] |
|------|--------|---|--------|--------|--------|
| P71  | 14x17  |  | 50     | 6.5    | 70     |
| P72  | 10     |  | 50     | 6.5    | 70     |
| P73  | 12     |  | 70     | 9      | 90     |
| P74  | 13     |  | 70     | 9      | 90     |
| P75  | 14     |  | 50     | 6.5    | 70     |
| P76  | 14     |  | 70     | 9      | 90     |



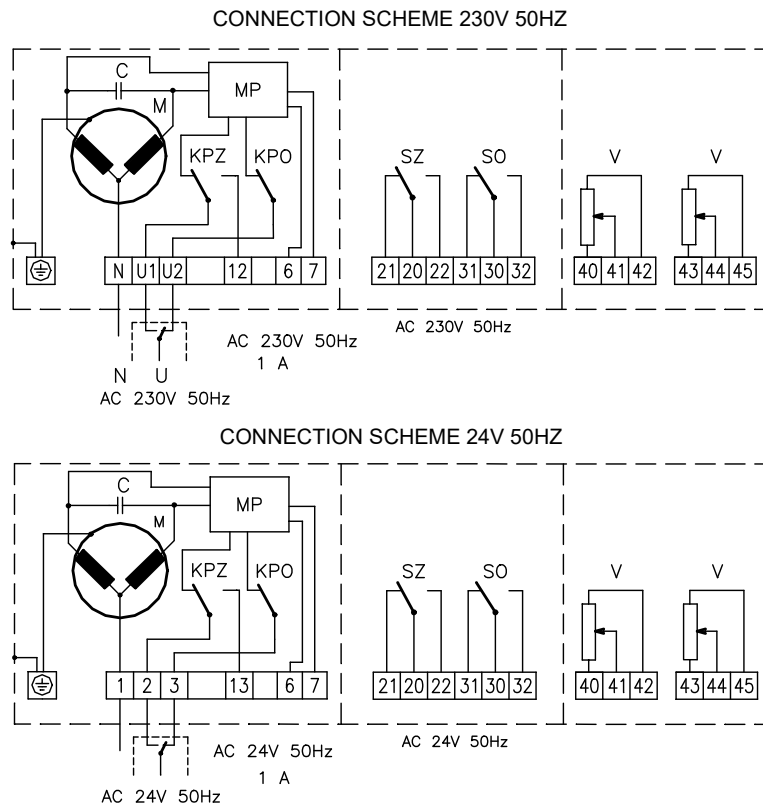
FIGURE 7 - CONNECTION SCHEME AND DRAWING OF TERMINAL BOARD - THREE-POINT CONTROL



- KPO - End position switch for servomotor position O
- KPZ - End position switch for servomotor position C
- SO - Signalling switch for servomotor position O
- SZ - Signalling switch for servomotor position C
- M - Small motor

- C - Condenser
- V - Transmitter 100Ω
- I1 - Converter 4-20mA for two-wire connection to measuring loop (power supply directly from measured signal)

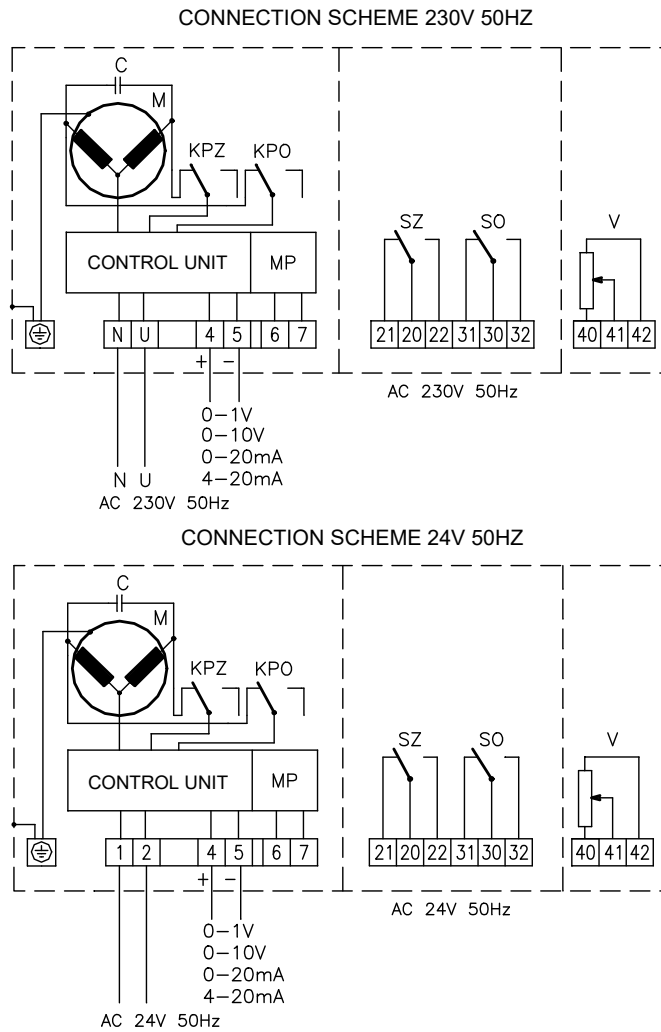
FIGURE 8 - CONNECTION SCHEME AND DRAWING OF TERMINAL BOARD - THREE-POINT CONTROL WITH MOMENT FUSE



- KPO - End position switch for servomotor position O
- KPZ - End position switch for servomotor position C
- SO - Signalling switch for servomotor position O
- SZ - Signalling switch for servomotor position C

- M - Small motor
- C - Condenser
- V - Transmitter 100Ω
- MP - Moment fuse

**FIGURE 9 - CONNECTION SCHEME AND DRAWING OF TERMINAL BOARD - CONTROL 0 TO 1V, 0 TO 10V, 0 TO 20mA, 4 TO 20mA**



- KPO - End position switch for servomotor position O
- KPZ - End position switch for servomotor position C
- SO - Signalling switch for servomotor position O
- SZ - Signalling switch for servomotor position C
- M - Small motor
- C - Condenser
- V - Transmitter 100Ω
- MP - Output with galvanic separation – contact relay 250V, 1A

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