



MODACT MOK	63	t.n. 52 325
MOK	125	t.n. 52 326
MOK	250	t.n. 52 327
MOK	500	t.n. 52 328
MOK	1000	t.n. 52 329

MODACT MOK CONTROL



MOUNTING INSTRUCTIONS

**Electric Part-turn (90°) Actuators
for Ball and Flap Valves**

MODACT MOK MODACT MOK CONTROL

Type Numbers 52 325 - 52 329

CERTIFICATE TÜV NORD

Management system as per
EN ISO 9001 : 2008

In accordance with TÜV NORD CERT procedures, it is hereby certified that

ZPA Pečky, a.s.
Třída 5. května 166
289 11 Pečky
Czech Republic



applies a management system in line with the above standard for the following scope

**Development and production of electric actuators,
switch boards and sheet metal working.**

Certificate Registration No. 04 100 950161
Audit Report No. 624 362/300

Valid until 2012-09-24
Initial certification 1995-03-01

Certification Body
at TÜV NORD CERT GmbH

Praha, 2009-09-25

This certification was conducted in accordance with the TÜV NORD CERT auditing and certification procedures and is subject to regular surveillance audits.

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TGA-ZM-07-06-00

APPLICATION

The actuators **MODACT MOK** are designed for shifting control elements by a reversible rotary motion with the turning angle of the output part 90° , including cases when tight closure in end positions is required. Typical example of using is control of ball and flap valves in similar installations in the regime of remote control as well as automatic regulation. The electric actuators **MODACT MOK** are mounted directly on the controlled element.

OPERATING CONDITIONS

The **MODACT MOK** actuators should withstand the effect of operating conditions and external influences of the classes AA7, AB7, AC1, AD5, AE5, AF2, AG2, AH2, AK2, AL2, AM2, AN2, AP3, BA4 and BC3, according to ČSN Standard 33 2000-3 (mod. IEC 364-3:1993).

When installed in free area, the actuator should be fitted with a light shelter as a protection against direct atmospheric effects. The shelter should overlap the actuator contour by at least 10 cm at the height of 20 – 30 cm.

If the actuator is used at a location with an ambient temperature under -10°C and/or relative humidity above 80 %, at a sheltered location, or in the tropical atmosphere, the anti-condensation heater which has been built in all actuators, should always be used.

Installation of the actuators at a location with incombustible and non-conducting dust is only possible if this has no adverse effect on their function. Herewith, the standard ČSN 34 3205 should strictly be observed. It is advisable to remove dust whenever its layer becomes as thick as about 1 mm.

Notes:

Areas under the shelter are considered those that prevent falling of atmospheric precipitations under an angle of up to 60° from the vertical.

The actuator should be installed in such a way that cooling air could freely circulate around it. Minimum distance from the wall for air access is 40 mm. Therefore, the space where the actuator is installed should be of sufficient size, clean, and well ventilated.

Classes of external effects

Basic characteristics - as extracted from ČSN Standard 33 2000-3 (mod. IEC 364-3:1993).

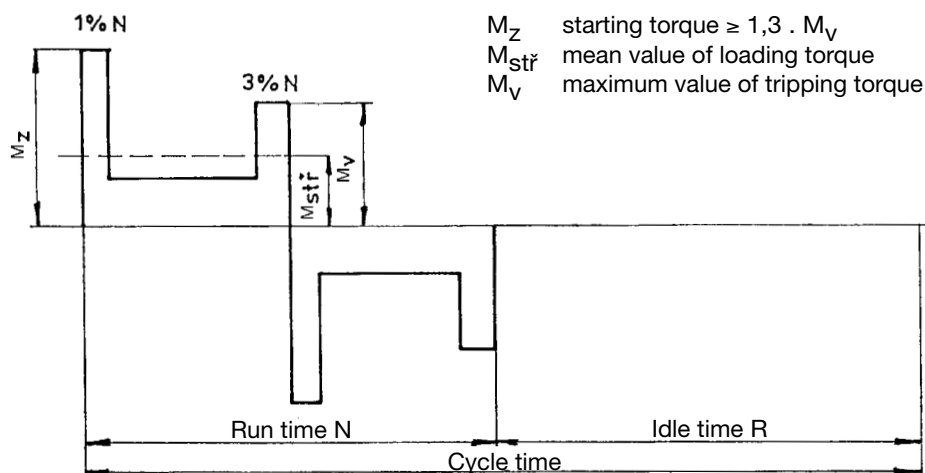
- 1) AA7 – Simultaneous effect of ambient temperature of -25°C to $+55^\circ\text{C}$
- 2) AB7 – Ambient temperature to Point 1); minimum relative humidity 10 %, maximum relative humidity 100 % with condensation
- 3) AC1 – Altitude $\leq 2,000$ m above sea level
- 4) AD5 – Splashing water in all directions
- 5) AE5 – Small dust content in air; medium layers of dust; daily dust fall more than 35 mg/m^2 , but not exceeding 350 mg/m^2
- 6) AF2 – Corroding atmosphere and pollutants; the presence of corroding pollutants is significant.
- 7) AG2 – Average mechanical stress; in usual industrial plants
- 8) AH2 – Medium vibrations; in usual industrial plants
- 9) AK2 – Serious risk of growth of vegetation and moulds
- 10) AL2 – Serious danger of the occurrence of animals (insects, birds, small animals)
- 11) AM2 – Harmful effect of escaping vagabond currents
- 12) AN2 – Medium solar radiation with intensities $> 500\text{ W/m}^2$ and $\leq 700\text{ W/m}^2$
- 13) AP3 – Medium seismic effects; acceleration $> 300\text{ Gal}$ $\leq 600\text{ Gal}$
- 14) BA4 – Personal abilities; instructed people
- 15) BC3 – Frequent contact with the earth potential; persons coming frequently into contact with „live“ parts or standing on a conducting base

WORKING REGIME

The actuators can be operated with the type of loading S2 according to ČSN EN 60 034-1. The run period at temperature $+50^\circ\text{C}$ is 10 minutes; the mean value of loading torque should not exceed 60 % of the value of maximum tripping torque M_V . The actuators can also work in the regime S4 (interrupted run with start-up) according to ČSN EN 60 034-1. Load factor $N/N+R$ is max. 25 %; the longest working cycle (N+R) is 10 minutes (course of working cycle is

shown in the figure). The highest number of closing operations in automatic regulation is 1200 cycles per hour. Mean value of loading torque with load factor 25 % and surrounding temperature +50 °C is not higher than 40 % of maximum tripping torque M_V .

The highest mean value of loading torque is equal to rated torque of the actuator.



Course of working cycle

Service life of actuators

Service life of actuators is 6 years, at the least.

The actuator intended for shut-off valves must be able to perform at least 10,000 operating cycles (C - O - C).

The actuator intended for regulating purposes must be able to perform at least 1 million cycles with operation time (during which the output shaft is moving) at least 250 hours. Service life in operating hours (h) depends on load and number of switching. Not always, high frequency of switching influences positively accuracy of regulation. For attaining the longest possible faultless period and service life, frequency of switching is recommended to be set to the lowest number of switching necessary for the given process. Orientation data of service life derived from the set regulation parameters are shown in the following table.

Service life of actuators for 1 million starts

Service life [h]	830	1 000	2 000	4 000
Number of starts [1/h]	Max. number of starts 1200	1 000	500	250

TECHNICAL REQUIREMENTS

Supply voltage

Supply voltages of the actuators are shown in Tab. 1.

- 1 x 230 V, +10 %, -15 %, 50 Hz ± 2 %;
- 3 x 230/400 V, +10 %, -15 %, 50 Hz ± 2 %
- 1 x 220 V, +10 %, -15 %, 50 Hz +3 % -5 %;
- 3 x 220/380 V, +10 %, -15 %, 50 Hz +3 % -5 %;
- (or as shown on the motor rating plate).

Other supply voltage for electric actuators should be discussed with the manufacturer.

Operating position

The actuators can be used in any operating position.

Working travel

The rated working travel of the actuator is 90°.

Self-locking

The actuators are self-locking. Self-locking facility of the actuators is provided by a mechanical or electromagnetic brake of the electric motor.

Manual control

The actuators are controlled by a handwheel providing for their direct control without clutch. On request, the actuators can be fitted with local control.

Local position indicator

The actuators are fitted with a local position indicator that has been adapted for the full working stroke of the actuator, i.e., 90°.

Anti-condensation heater

To prevent water steam condensation, the actuators are fitted with an anti-condensation heater; the latter can be connected to the AC or DC voltage of 230 V.

Switches

Each actuator is fitted with 6 quick-action one chamber microswitches having the following parameters:

6 A	250 V AC	resistance load
2 A	250 V AC	inductive load, $\cos \varphi = 0.6$
0.2 A	250 V DC	resistance load
0.1 A	220 V DC	inductive load, $\frac{L}{R} = 3 \text{ ms}$

The torque-limit switches are blocked.

Terminal board of the actuator

The terminal board of the actuator is fitted with terminals allowing one copper or aluminium conductor with a maximum cross-section of 2.5 mm² or two conductors with the same cross-sectional area up to 1 mm² to be connected.

Protective enclosure

Protective enclosure of the actuator corresponds to Type IP 65 or IP 67 according to ČSN EN 60529:1991 idt IEC 529:1989.

Insulation resistance

The insulation resistance of electric control circuits with respect to the chassis and to each other should be at least 20 Mohm. The insulation resistance of the electric motor should be at least 1.9 Mohm. After a damp test, the insulation resistance of control circuits should be at least 2 Mohm. The insulation resistance of the CPT 1/A current transmitter is 20 Mohm at 50 V DC (under dry condition).

Electric strength

Resistance position transmitter	500 V AC, 50 Hz
Current position transmitter CPT 1/A	50 V DC
Circuits of microswitches and anti-condensation heaters	1,500 V AC, 50 Hz
Electric motor	$U_n = 1 \times 230 \text{ V}$ 1,500 V AC, 50 Hz $U_n = 3 \times 400 \text{ V}$ 1,800 V AC, 50 Hz

Noise

Acoustic pressure level A	85 dB (A) max.
Acoustic power level A	95 dB (A) max.

Clearance of the input part

Actuators, Type Nos 52 325, 52 326, 52 328	1.5° max.
Actuators, Type Nos 52 327, 52 329	2.5° max.

Deviations of basic parameters

Tripping torque	±15 % of the maximum tripping torque
Operating time of the output shaft	-10 %, +15 % of the rated value
Hysteresis of position limit and signalling switches	≤4°
Adjustment of working travel	±1°
Nonlinearity of position transmitter	±2.5 % of the rated output signal value of position transmitter
Hysteresis of position transmitter	≤2.5 % of the rated output signal value of position transmitter

TECHNICAL DESCRIPTION

The MODACT MOK (MODACT MOK Control) actuators consist of the following two parts:

- **Power section** constituted of a one-phase or three-phase asynchronous motor (see Tab. 1), a countershaft gearbox, an epicyclic gear with the output shaft, a manual control mechanism with a handwheel and a floating worm and, in the actuators, Type Nos 52 327 and 52 329, an output gearbox (with adapter) with a 1:2 gear ratio.
- **Control section** which is identical for all MODACT MOK actuators, Types MOK 125 to MOK 1000 type no., with the only exception that, it differs in angular displacement of units on the base plate. In the actuator, Type No. 52 325, the unit of position-limit signalling switches is arranged as shown in Fig 1. The control section (Fig.1) consists of position-limit switching unit 1, residence position transmitter 2, torque-limit switching unit 3, terminal block 4 and anti condensation heater 8.

The position-limit switching unit uses 4 microswitches of which 2 are always used for either direction of rotation of the output shaft. The switching point of each microswitch can be adjusted independently within the working travel range of the actuator.

The torque-limit switching unit has independently adjustable microswitches, one for either direction of rotation. The torque-limit switches are not secured against opening at the startig torque.

The potentiometer is fitted with a slipping clutch to permit automatic adjustment along with the output shaft.

The anti-condensation heater 8 (Fig.1, 2) prevents water vapours from condensing under the cover of the control section. The position-limit switching unit and the position transmitter derive their movements from the output shaft of the actuator via a driving gear (or in the actuators, Type Nos 52 326 and 52 327, via driving segment 7, as shown in Fig 1). The torque-limit switching unit is driven by a „floating worm“ of the manual control mechanism where the worm displacement is directly proportional to the torque of the actuator output shaft. This enables the actuator to be switched off immediately the torque on the output shaft to which the torque-limit switching unit has been adjusted, is reached.

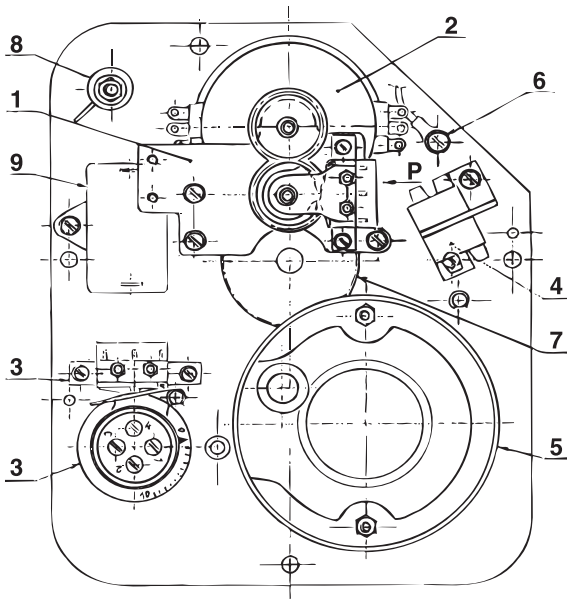


Fig. 1 - Control panel (type no. 52 325)

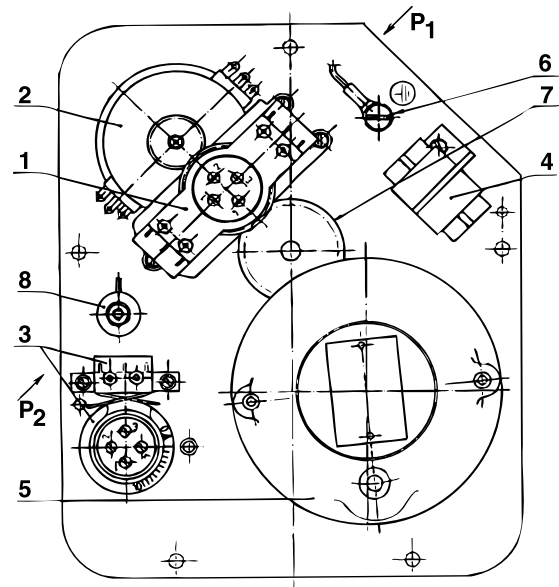
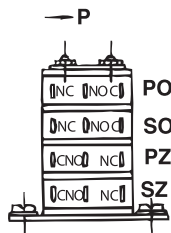
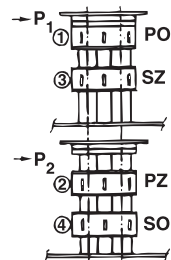


Fig. 1 - Control panel (type no. 52 326 - 52 329)



Legend:

- 1 - Position-limit switching unit
- 2 - Position transmitter (potentiometr)
- 3 - Torque-limit switching unit
- 4 - Terminal board
- 5 - Electric motor
- 6 - Internal protective terminal
- 7 - Drive gear (or segment)
- 8 - Anti-condensation heater
- 9 - Starting capacitor



Note:

The encircled numbers are identical to the numbers of the cam releasing screws of the position-limit switching unit.

Note: The microswitches used are of a single-chamber type, i.e., they can operate as a one-pole cut-out switch a contact maker or a change-over switch, whereas the torque-limit switches can be used as cut-out switches only (see the respective circuit layout).

ADJUSTMENT OF THE ACTUATOR

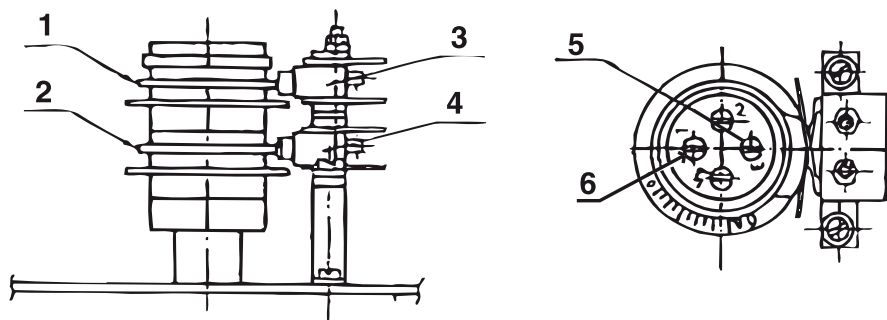
a) Stop screws

Stop screws are used to limit the actuator working travel to 90° in compliance with the CLOSED and OPEN end positions of the valves having no trip dogs of their own. The screw stops are mounted on the outside of the actuator along with the external protective terminal. When viewing the stop screws, the right-hand stop screw is designed for the CLOSED position, whereas the left-hand stop screw is designed for the OPEN position under the assumption that, when viewing the local position indicator, the output shaft rotates clockwise in the CLOSE direction of rotation. For adjustment of the stop screws, loosen the stop screws, move the actuator with valve into the CLOSED position, and turn the corresponding stop screw till an increased resistance is felt when the screw runs onto the stop face within the actuator. Secure the stop screw in position by retightening its lock nut. Then, rotate the output shaft of the actuator through a 90° angle to bring it into the OPEN position and set the OPEN-position stop screw by the same procedure.

When setting the stop screws in the actuators, Type Nos 52 326 and 52 327, care should be taken to ensure that, in the CLOSED or OPEN end position, the driving gear segment of the position-limit switching and auxiliary signalling units cannot strike the electric motor. In either end position of the output shaft of the actuator, the local position indicator should tally with the marks on the index plate.

If the valve is required to be tightly closed in the end position and thus the actuator is to be switched off by means of the torque-limit switches, the tripping torque should be transferred to the valve. In this case, set the corresponding stop screw so that the valve is properly sealed when the stops of the output shaft run against the stop screw at which the torque-limit switch operates.

In this case, the respective torque-limit switch is used for switching off the actuator. If stops are required to be used for protection of the actuator and the valve against damage in the case of a failure of the position-limit switch set the stop screws to such a position which ensures dependable operation of the position-limit switch and is still permissible for the valve. In this case, the position-limit switch and the torque-limit switch should be connected in series. Nevertheless, this can only be done when no tight closure of the valve is required.



Legend:

- | | |
|-----------------------------------|--|
| 1 – OPEN torque-limit switch cam | 5 – Releasing screw of CLOSE torque-limit switch cam |
| 2 – CLOSE torque-limit switch cam | 6 – Releasing screw of OPEN torque-limit switch cam |
| 3 – OPEN torque-limit switch | |
| 4 – CLOSE torque-limit switch | |

Fig. 3 - **Torque-limit switches**

b) Position-limit switches

Position-limit switches PO, PZ switch off an electric actuator when the output shaft reaches the position for which they are set. Signalling-limit switches SO, SZ signalise the position of electric actuator output shaft.

The setting of position-limit switches is carried out by positioning the output shaft into the position in which the set switch should switch off. Then, loosen the micro-switch cam using the releasing screw.

Loosening will be done by turning the releasing screw counter-clockwise. Turn the releasing screw only until the cam is released. By further turning of the releasing screw, you would tighten the cam again. Numbers of

relevant releasing screws are on a holder of position unit (Fig. 1) and they correspond to markings on a cam shaft.

When loosened, turn the cam in the opposite direction to the motion of an electric actuator output shaft while setting the position “open” or “closed” until the micro-switch switches over. In this position lock the cam by tightening the releasing screw (clock-wise direction).

A signalling switch must be set so that it switches over sooner than a relevant position-limit switches or torque-limit switches. When adjusting position-limit and signalling switches of electric actuators Type Nos. 52 326 and 52 327, ensure that a gear segment of position and signalling unit drive in the extreme position “open” or “closed” doesn’t hit the actuator case. A position unit of electric actuator Type No. 52 325 is not equipped with the locking of cams using screws (Fig. 2). The cam’s position on the shaft is ensured only by friction which has to be overcome when adjusting the cams. A design Type No. 52 325 has cams locked by friction and central milled nut with contra-nut which must be loosened before adjusting and tightened properly again after adjusting.

c) Position transmitter

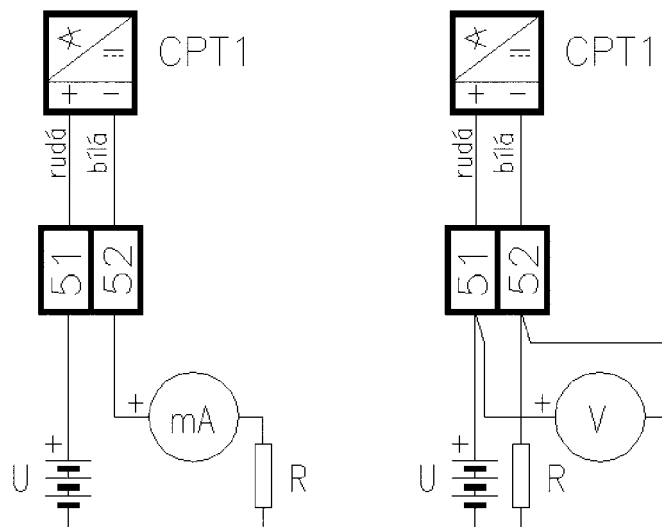
To adjust the potentiometer it is sufficient to set the actuator output shaft to any of the OPEN or CLOSED end positions. In this way, the potentiometer is automatically preset. The automatic adjustment of the potentiometer is usually provided already when the stop screws or the position-limit switches are adjusted.

Setting of current position transmitter CPT1.

Before starting setting the current transmitter it is necessary to set the end-limit positions (torque or position switches) of the actuator and connect them into the tripping circuit of the electric motor. In case of an external source of feeding voltage, verification must be carried out that it does not exceed the maximum value 30 V DC (limit value when CPT1 is still not damaged). Recommended value is 18 – 28 V DC.

Positive pole of the source is connected to the positive pole of the transmitter CPT1; a milli-ammeter of precision at least 0.5 % connected into the circuit. The current loop must be earthed in one point. The figure does not show the earthing that can be made at any point of the circuit.

1. Shift the output shaft into the position Closed. During closing, the current signal value should decrease. If it increases release the transmitter body and, by turning of about 180°, shift to the descending part of the output characteristics. Set 4 mA by fine turning. Tighten the shim plates to secure the transmitter against spontaneous turning.
2. Shift the output shaft to the position Open and set 20 mA using a potentiometer on the transmitter body. The potentiometer has a range of 12 revolutions and it has no stops so that it cannot be damaged by further turning.
3. Once again verify the current value in the position Closed. If it has changed too much repeat the points 1. and 2. If the required corrections are large this procedure should be repeated several times. After the setting, secure the transmitter against turning and drip the screws with varnish.
4. Use a voltmeter to check the voltage on the CPT1 terminals. In order to keep linearity of the output signal the voltage must not drop below 9 V, not even with off-take 20 mA. If this condition is not met it is necessary to increase the feeding voltage (within the range of recommend values) or to decrease total resistance of the current loop R.



Setting of current position transmitter DCPT.

1. Set of end-limit positions

Before starting the setting, verification must be carried out that the end-limit positions are within the range $60^\circ - 340^\circ$ of revolution DCPT. Otherwise, after setting, an error arises (LED 2x).

1.1. Position "4 mA"

Set the drive into the required position and press the push-button "4" until LED blinks (about 2 s).

1.2. Position "20 mA"

Set the drive into the required position and press the push-button "20" until LED blinks (about 2 s).

2. Setting of sense of rotation

The sense of rotation is specified by viewing from the side of the panel DCPT.

2.1. Rotating anti-clockwise

Press the push-button "20", then the push-button "4" and keep them depressed until LED blinks.

2.2. Rotating clockwise

Press the push-button "4", then the push-button "20" and keep them depressed until LED blinks.

When the sense of rotation is changed the end-limit positions "4 mA" and "20 mA" remain valid but the working range (track DCPT) between these points is changed to a complement of the original working range. In this way, the permitted working range can be exceeded (LED 2x) – it can be smaller than 60° .

3. Error messages

In case of an error the diode LED blinks an error code:

1x	Sensor position out of working range
2x	Working range incorrectly set
3x	Off the tolerance level of magnetic field
4x	Wrong parameters in EEPROM
5x	Wrong parameters in RAM

4. Calibration of currents 4 mA and 20 mA.

On switching-on the power supply, keep the push-buttons "4" and "20" depressed and release them after a single blink of LED. In this way the option menu 4.1 Calibration of current 4 mA is entered.

4.1. Calibration of current 4 mA

Connect the ammeter to testing terminals. Press the push-button "20". Keep depressed the push-button to evoke the auto-repeat of current decrease. Release the push-button to make record of the present value.

4.2. Calibration of current 20 mA

Connect the ammeter to testing terminals. Press the push-button "4". Keep depressed the push-button to evoke the auto-repeat of current increase. Release the push-button to make record of the present value.

4.3. Switching-over between option of calibration 4 mA and 20 mA

Entry of option of calibration 4 mA:

Press the push-button "4", then the push-button "20" and keep them depressed until LED blinks.

Entry of option of calibration 20 mA:

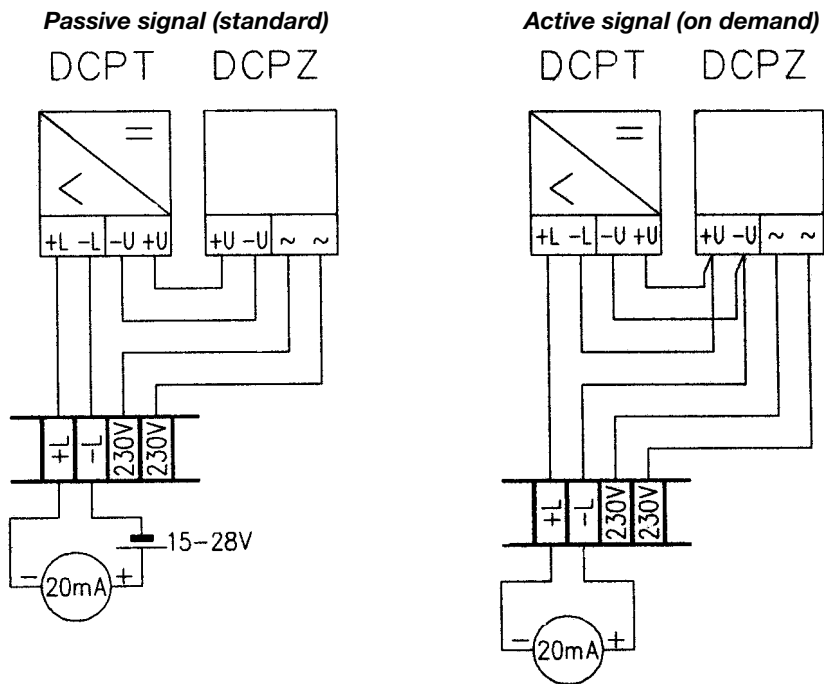
Press the push-button "20", then the push-button "4" and keep them depressed until LED blinks.

5. Record of standard parameters

On switching-on the power supply, keep the push-buttons "4" and "20" depressed and release them after a double blink of LED.

ATTENTION! With this record, the transmitter calibration is also overwritten and, therefore, it must be repeated!!

Wiring diagram



Note: DCPT - position transmitter, DCPZ – power supply source.

Parameter setting

<p>Position "4 mA"</p> <p>Set the actuator to required position (usually Closed) and keep the push-button 4 depressed until LED blinks.</p>	
<p>Position "20 mA"</p> <p>Set the actuator to a required position (usually Open) and keep the push-button 20 depressed until LED blinks.</p>	

d) Torque-limit switches

The torque-limit switches have been adjusted to the specified torque at the factory. If they are required to be readjusted to another torque, release the corresponding cam by means of the cam releasing screws whose numbers are given in the legend of Fig. 3. By the linear division of the respective scale section between the zero and the maximum switching torque as marked on the scale in colour, we obtain a point for the required switching torque with which the arrowhead on the cam should tally. Retighten the cam releasing screw. For manipulation of the releasing screws of the torque-limit switches, the same applies as to the releasing screws of the position-limit switching unit. After the torque-limit switches have been adjusted, check that they operate using a lamp tester.

Caution! Any manipulation of the releasing screws numbered 2 and 4 is forbidden.

POSITION REGULATOR ZP2.RE VERSION 4

Electric regulators of position of output shaft ZP2 are used in the actuators MODACT Control. They provide for controlling the actuator in which they are built in by analog input signal from the superior control system.

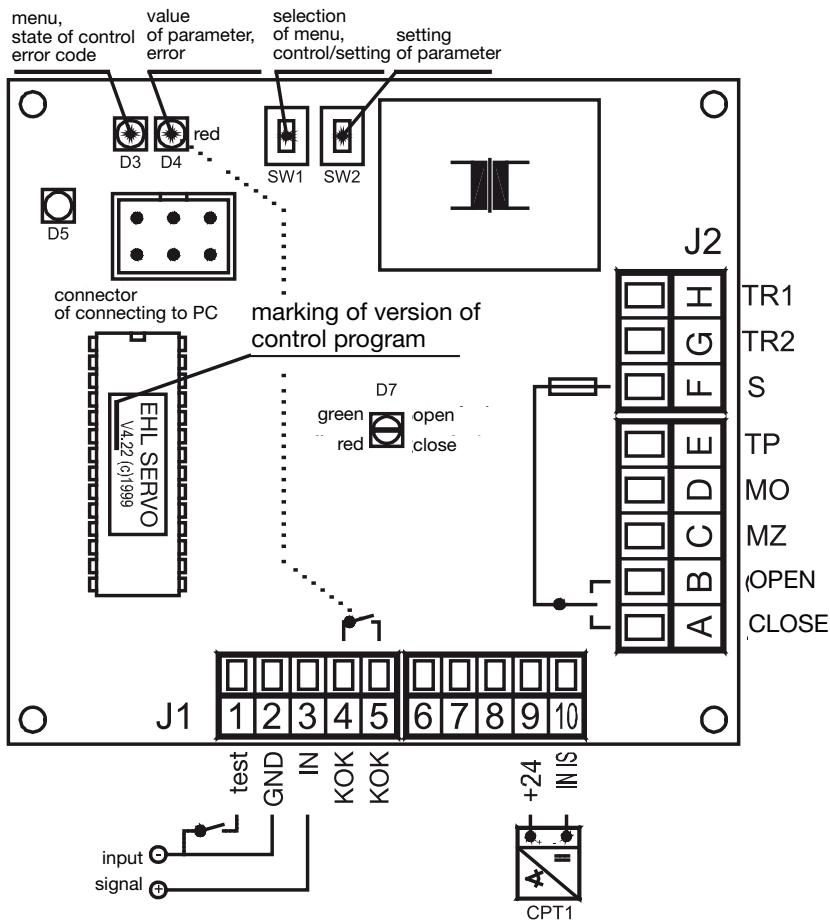
Basic component of the regulator is a microcomputer with control program in its internal memory.

The microcomputer includes:

- A/D converters for input and feedback signals processing.
- Memory of parameters.
- Power supply source with mains transformer.
- Output relays for controlling the actuator (they switch on the electric motor or power switches).
- Input circuits for connection of end micro-switches and contact of thermal relay.
- Circuits for input of analog signals.
- Push-buttons and signal lamps which can be used for entering parameters of regulation (the signal lamps serve also for indication of regulation state and type of errors).
- Connectors for connection of the regulator with the actuator.
- Connector for service connection of the regulator with PC.

REGULATOR ZP2.xx

Layout of indicator LEDs, push-buttons, terminals and connectors



J1 - signal terminal board

- | | | |
|----|-------|--|
| 1 | test | input of logic control signal |
| 2 | GND | control signal - negative pole |
| 3 | IN | control signal - positive pole |
| 4 | KOK | switching contact of error report |
| 5 | KOK | switching contact of error report |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | +24 V | feeding of current position transmitter |
| 10 | IN IS | signal from current position transmitter |

J2 - power terminal board

- | | | |
|---|-------|--------------------------|
| A | OPEN | power output "Open" |
| B | CLOSE | power output "Close" |
| C | MZ | limit switch "Closed" |
| D | MO | limit switch "Open" |
| E | TP | thermal fuse |
| F | S | feeding of power outputs |
| | | 1) MOK 63, 125, 250 L1 |
| | | 2) MOK 500, 1000 N |
| G | TR1 | feeding of regulator |
| H | TR2 | |

Note: The signals MO, MZ, TP and "Test" are input signals; neither the signal TP nor "Test" need to be connected. Active level (a level evaluated by the regulator as an error state) of the signals TP and "Test" different from that set by the regulator manufacturer or by ZPA Pečky a.s. can only be set by the computer.

The regulator has the following functions:

- Parameters of regulation can be entered by push-buttons on the regulator or from PC which is connected to the regulator via a communication module.
- After entering the parameters of regulation, auto-calibration is accomplished during which the regulator is finding parameters of the actuator and the valve.
- After auto-calibration has been completed, the regulator stores the entered and measured parameters into the memory of parameters.
- Input and feedback signals and state of end micro-switches are checked.
- The actuator is controlled according to the input and feedback signals, state of end micro-switches, regulation parameters and parameters of the actuator.
- It monitors and records into its memory of parameters total operation time and total number of closings of the output relays.
- It ascertains whether, during regulation or setting the regulator, any failure occurs; if so, the type of failure is evaluated and indicated; according to entered parameters, the regulator sets the actuator output shaft and stores the parameters of the found-out failure into its memory.
- It provides for connecting PC which can be used for entering parameters of regulation and monitoring the regulator operation.

The program memory is of ROM type, the memory of parameters of regulation and parameters of the actuator is of EEPROM type; consequently, the memory content is not damaged by switching off mains voltage.

Speed of rotation of the actuator output shaft is given by the actuator type and variant; it cannot be influenced by the regulator.

Connection of actuator with regulator and three-phase electric motor to mains voltage

The actuator with three-phase electric motor should be connected to mains voltage so that it is stable during operation with regulator; i.e. if the actuator is in a balanced position and is brought out of this position by an external intervention (e.g. by the hand wheel) it is automatically brought back to this balanced position by action of the regulator. Therefore, a correct sequence of phases of mains voltage should be observed.

Moreover, position and moment switches of the actuator should be correctly connected so that drive of the actuator is switched off by particular switch when either of the limit positions of the output shaft is reached (unless switching off has already been performed by the regulator).

Attention: *If the actuator is connected to three-phase voltage with opposite phase sequence than that one with which it has been set and tested, it starts to be unstable, i.e. the actuator output shaft is brought to one of its limit positions. When the limit position is reached, the actuator electric motor is not switched off as, in this case, the limit micro-switch acts on the contactor for motion in opposite direction. In this way, the actuator or the controlled valve can be damaged.*

The sequence of phases can also be changed during repairs and modifications in circuits of distribution of three-phase voltage for feeding actuators!

After the mains voltage is connected to the actuator, the actuator can spontaneously be started even if control signal has not yet been connected to the regulator as the regulator has evaluated this state as an error and the output shaft of the actuator is set according to the entered parameter.

In case that the connected mains voltage has opposite sequence of phases than that for which the actuator has been set in the factory, the actuator does not stop even if the limit switches have been opened.

Therefore, during installing and putting the actuator into operation, measures should be adopted that spontaneous starting of the actuator cannot happen even in case that mains voltage is accidentally switched on during connecting the actuator. The actuator can be switched off by the push-button "TEST" on the thermal relay. In the actuators MODACT Control MOK 500 and 1000 it is installed under the actuator cover. The push-button can be pressed e.g. by a small screwdriver. After the push-button has been pressed, feeding of coils of power relays is interrupted and the actuator stops.

The actuator feeding is restored by pressing the large red push-button on the thermal relay.

A longitudinal sight hole is provided on the upper side of the thermal relay which is used for monitoring the relay condition. If drive of the actuator is switched off by action of the thermal relay - by the push-button TEST or as a result of over-loaded electric motor, a yellow target is visible under the sight hole. By pressing the large red push-button the yellow target disappears.

Attention! *Even after this switching off the actuator circuits are under voltage. Before any works on the actuator, e.g. change of phase sequence in the actuator terminal board, the mains voltage should be disconnected.*

Note: In the auto-calibration regime the regulators ZP2 version 4 perform testing of the sense of rotation and report the incorrect direction as an error. The sense of rotation is not tested in the regulation regime.

TECHNICAL PARAMETERS OF REGULATOR

Supply voltage	230 V +10 % -15 %, 50 – 60 Hz	
Control signal	analog	0 – 20 mA, 4 – 20 mA, 0 – 10 V
	logical	– TEST, contact from the superior system (simulation of breakdown situation)
		– MO, MZ state of actuator limit switches *)
Output signal	power outputs	2x relay 8 A, 230 V, protected by a fuse F1, 8 A
	central breakdown (KOK contact)	– pilot-light switch 24 V, 2 W
	5x LED	power supply, breakdown, setting, opening, closing)
	brake	control signal 2 mA (signal for additional module)
	actuator position	PWM (signal for additional module)
Position transmitter	current transmitter 4 – 20 mA **)	
Regulator linearity	0.5 %	
Regulator in-sensitivity	1 – 10 % (adjustable)	
Error messages	TEST mode	
	reaction transmitter failure limit switches are transposed *)	
Respond to failure	missing control signal actuator has been switched off by a limit switch in the interposition *)	
	reaction transmitter failure	actuator to Test position, error message
	missing control signal	actuator to Test position, error message
Setting elements	TEST mode	actuator to Test position, error message
	communication connector (<i>for computer connection</i>)	
	2x button for setting parameters without a computer	
Range of operating temperatures	-25 °C – 75 °C	
Dimensions	75 x 75 x 25 mm	

*) A limit switch means a position switch or moment switch of actuator connected so that it can stop the actuator motion in given direction. During the auto-calibration, the regulator ZP2 measures the reaction signal at which limit switches switch off the actuator (for both motion directions) and stores it in the memory as the parameter. While regulating, the limit switch status is being permanently monitored. If the actuator is switched off by the limit switch in the position which does not correspond to the position ascertained during the auto-calibration, the regulator will analyze this state to be an error. Such a state can occur e.g. when the moment switch is used as the limit switch and valve seizes in the course of regulation.

**) If a two-wire current transmitter (e.g. CPT1 type) is used, the transmitter is supplied with the supply voltage of 24Vss if the signal is brought out from the actuator it is active.

Setting of regulator parameters by functional push-buttons

After fitting the actuator with the regulator on the valve, proper function of the regulator is to be ensured by setting parameters of the regulator and starting auto-calibration; this can be best carried out when the piping where the valve with actuator is fitted is filled with process medium.

The regulator parameters can be set by push-buttons on the regulator (the parameter being set is indicated by LED diodes D3, D4 on the regulator) or by PC connected to the regulator.

This manual serves as instructions for setting parameters of the regulator ZP2.RE version 4 (marking on the label of the case of the regulator single-chip computer, e.g. EHL SERVO V4.28"2004) by push-buttons. Special instructions are to be issued for setting the regulator by the computer (the computer can also be used for setting other parameters than those described in these instructions and various diagnostic data can be obtained).

Before setting the parameters, limit switches of the actuator must be connected and adjusted and the position transmitter must be set. If moment switches are used as limit switches it is necessary to ensure that the actuator or the valve can produce required tripping moment.

The parameters of the regulator cannot be set as long as the actuator shaft is in one of its extreme positions and if it is switched off by the limit switch; auto-calibration would not be performed and the regulator would report an error. Therefore,

before setting the parameters, the actuator must be adjusted - e.g. by the hand wheel - so that the output shaft is in an intermediate position (i.e. in a position when the actuator is normally not switched off by any of the limit switches).

Setting of parameters

In setting the parameters according to these instructions, change over to the setting regime by keeping the push-button **SW1** pressed until the yellow diode **D3** on the regulator is lit on (*about 2 s*). Then, release the push-button **SW1** and parameters on the regulator can be set (*list through the menu depicted by the yellow diode **D3** by short pressing **SW1**, set the parameters depicted by the red diode **D4** by short pressing the push-button **SW1***) - see the following Menu 1 - Menu 5. If, by pressing the push-button **SW2**, the latest value of the parameter in the particular menu is selected another pressing of the push-button **SW2** will bring you back again to the first value of this parameter. In this way you can select values of parameters in cycles according to the list for the given parameter. After particular value of the parameter has been selected, press the push-button **SW1** shortly. The selected value of the parameter is acknowledged and the following menu is chosen. If, by gradual pressing the push-button **SW1**, the MENU 5 is reached the following short pressing of the push-button **SW1** will return you again to the MENU 1 (*another pressing to MENU 2, etc.*). In this way, the set parameters can be checked and changed during setting).

Always when red diode **D4** is lit on - during regulation, auto-calibration and in setting parameters - the contact KOK (terminals J1-4, J1-50) is closed.

The diodes **D3** and **D4** give a signal by the number of flickering.

Menu 1: Setting control signal

D3 (yellow)	☀	
D 4 (red)	☀	0 – 20 mA
	☀☀	4 – 20 mA
	☀☀☀	0 – 10 V

Menu 2: Setting response to signal Test and in case of failure

D3 (yellow)	☀☀	
D 4 (red)	☀	opens
	☀☀	closes
	☀☀☀	no response

Menu 3: Setting mirroring (ascending/descending characteristics)

D3 (yellow)	☀☀☀	
D 4 (red)	☀	higher signal - CLOSED (descending characteristics - mirroring)
	☀☀	higher signal - OPEN (ascending characteristics - no mirroring)

Menu 4: Setting insensitivity of regulator

D3 (yellow)	☀☀☀☀	
D 4 (red)	☀	1 %
	☀☀	2 %

	☀☀☀☀☀☀☀☀☀☀☀☀	10 %

Menu 5: Setting way of regulation

D3 (yellow)	☀☀☀☀☀	
D 4 (red)	☀	narrow to moment
	☀☀	narrow to position
	☀☀☀	broad to moment
	☀☀☀☀	broad to position

By the regulation "to position" the actuator shaft is set to the position in which the input and feedback signals are equal. The regulation "to moment" means that, in setting the input signal close to limiting positions - for the signal 4 – 20 mA this is up to the value of about 4.2 mA and above 19.8 mA (these values are fix set and cannot be changed), the actuator shaft is not stopped when the input and feedback signals are equal but it goes on moving until it is stopped by action of the particular limit switch. Such setting is used in case that tight closing of the valve in the limit position is safely ensured.

"Narrow" regulation means that, during the regulation, the actuator shaft is set so that the signal from the position transmitter corresponds exactly to the input signal. In case, after the actuator is stopped, the feedback signal does not correspond to the input signal the actuator is switched over to the so-called step regime; it reaches an exact position by repeated switching on and off of the electric motor.

"Broad" regulation means that the actuator shaft is set so that, after the actuator stops, the difference between the input and feedback signal is smaller or equal to the set range of insensitivity.

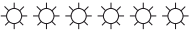

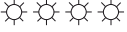

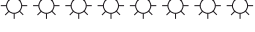
If the regulator need not be set otherwise it is recommended to set the way of regulation as "broad to position".

After setting, checking and possible correcting the parameters, the push-button SW1 should be kept pressed (this can be done in any menu) until the diode D3 is lit on. In this way, setting of parameters is completed and it is acknowledged that the set parameters are valid and can be stored in the regulator memory. After releasing the push-button SW1, the auto-calibration is automatically started.

Auto-calibration is an automatic process in which the regulator performs checking of the position transmitter, sense of rotation of the actuator output shaft, changes over the actuator into the position "Open" and "Closed", measures feedback signals in these positions, measures inertia in the direction "Opens" and "Closes", and stores the set and measured parameters into the regulator memory.

The auto-calibration should always be started in case of a change of conditions which can influence the regulator performance, e.g. in case of a change in setting the limit switches of the actuator or a change in mechanical properties of the valve, e.g. if the gland is tightened.

Menu 6: Auto-calibration (error messages)

D3 (yellow)		
D4 (red)	no flickering	auto-calibration in progress
		auto-calibration starts at the limit switch, failure of limit switch
		error in connecting limit switches
		position transmitter connected in wrong way or defective
		wrong sense of the shaft rotation

In case of wrong connection of the regulator (*limit switches or position transmitter wrongly connected*) the auto-calibration will be interrupted and the regulator will announce an error by means of the diodes **D3** and **D4**. If everything is OK then, after the auto-calibration is completed, the regulator is switched over to the regulation regime.

IMPORTANT!

In case the setting of parameters and auto-calibration have not been accomplished without an error the set parameters are not stored in the memory of the regulator. After the error is repaired, the setting of parameters and the auto-calibration can be repeated.

If the regulator parameters are set before the valve with the actuator have been installed on the piping, then, after their installation and filling the piping with the working medium, properties of the complete can be changed in such a way that the setting of the regulator and starting of auto-calibration should be repeated.

Program RESET of regulator

If the regulator is brought to a state which is to be cancelled (*RESET*), e.g. for returning from the setting menu without auto-calibration, this can be accomplished by pressing the push-button **SW1** and keeping it pressed down for at least 6 s.

Note:

If an error occurs in the auto-calibration this procedure does not function: the error conditions should be cancelled by switching off and on the feeding voltage of the regulator. If the new regulator or the regulator into which wrong parameters have erroneously been set cannot be started, they can be put into the initial state by switching off the feeding voltage for about 0.5 min (*to provide for discharging the filtering capacitors in the power supply source*); then, keep pressed both push-buttons on the regulator, with the push-buttons pressed down switch on feeding voltage to the regulator and keep the push-button pressed down for 6 s. In this way, data which allow putting the regulator into operation and carrying-out new setting of parameters are counted into the regulator memory

Important warning:

This procedure can be used in setting the parameters the setting of which cannot be changed without a connected computer (*e.g. voltage level on TP input in which the regulator changes over into an error state - this can cause problems in the actuators MODACT MOK 500 and 1000 where it is necessary to set an opposite active level*

than the one set by the regulator manufacturer). It is, therefore, not recommended to use the RESET function if the changed parameters cannot be newly set by the computer.

Process and error messages of regulator during regulation

Process messages:

D4 (red)	lit off	
D3 (yellow)	lit on	regulator regulates
	lit off	regulation deviation within the insensitivity range

Error messages:

If an error occurs which can be detected by the regulator the contact KOK connected to the terminals J1-4 and J1-5 is closed; the diode D4 is lit on permanently. The regulator response to the error is given by the set parameter "Response to signal TEST". The diode D3 reports the type of error by the flickering code:

D4 (red)	permanently	lit on
D3 (yellow)	☀	regime TEST
	☀ ☀	control signal in the range 0 – 10 V missing
	☀ ☀ ☀ ☀	actuator switched off in intermediate position by limit switches
	☀ ☀ ☀ ☀ ☀	failure of position transmitter
	☀ ☀ ☀ ☀ ☀ ☀	failure in thermal protection
	☀ ☀ ☀ ☀ ☀ ☀ ☀	control signal in range 4 – 20 mA is lower than 3 mA or missing.

After the cause of the error conditions has been repaired, the regulator is automatically switched over to the regulation regime.

INSTALLATION AND PUTTING INTO OPERATION

After unpacking the actuator, check that no visible damage was caused during the transport or storing. When no visible cause has been detected connect the actuator to external control and power supply circuits. At the midpoint of the working stroke, start the actuator for a short time to make sure that its output shaft rotates in the correct direction. For this check, depress the lever of the corresponding position-limit or torque-limit microswitch (depending on the control mode) while the actuator operates in a certain direction, using a rod of insulating materials. If the actuator fails to stop, but is arrested only on operation of the microswitch used for the opposite direction of rotation, the sense of rotation of the actuator output shaft should be changed. In the case of actuators with a one-phase motor, this can be done by simply interchanging the lead-in wires of terminals U2 and Z2 on the terminal board of the actuator.

In the actuators with a three-phase motor, any two wires connected to terminals U, V and W should be interchanged on the actuator terminal board. Then, repeat the check to make sure that the actuator has been correctly connected, attach it to the valve and adjust, according to the Operating Instructions, Chapter „Adjustment of the Actuator“. This adjustment can be best accomplished under manual control, the opening and closing operations of the microswitches being checked by means of a lamp or another suitable low-voltage tester up to 24 V.

Caution!

- 1) When adjusting, repairing or maintaining the actuators, safety precautions should be taken to prevent them from being inadvertently connected to the mains and thus to avert accidents that might be caused by electric current or gear rotation.
- 2) When reversing the actuators with a one-phase motor, care should be taken to ensure that, even for an instant, there is no phase voltage applied to the two outlets of the starting capacitor since, otherwise, the capacitor might discharge via contacts of the torque-limit switches and thus make them stuck.
- 3) When the thermal protection built in the electric motor (except for 120 W motors) fails to operate it is essential to consider that, as long as the supply voltage is present at the motor terminals, the actuator will automatically start after cooling down of the thermal protection.

At the end of the adjusting procedure, subject the actuator to a functional check by means of the control circuit, making sure particularly that the actuator starts correctly and is not „alive“ after tripping of the respective microswitch. If this is not the case, the actuator should be immediately disconnected from the mains to avoid a damage to the electric motor and to find out the failure.

ATTENDANCE AND MAINTENANCE

Both electrical remote control and manual local control of the actuators at the site of installation are provided. For manual control, the handwheel of the actuator can be used, no change-over switch being required. This control mode can be safely used by the operator even during operation of the electric motor.

Maintenance attention to the actuators involves only replacing some faulty parts and adjusting the electromagnetic brake of the electric motor using this brake.

The brake should be readjusted after 0.5×10^5 switching operations, the air gap between the armature and the electromagnet core being set to a value of 0.6 to 0.8 mm. Adjustment can be carried out by means of nuts on the brake pull rod. The nut nearer to the electric motor is used for adjusting the required air gap, whilst the other nut serves for locking. After adjustment, check the correct function of the brake and secure the nut in position by a drop of varnish. Grease filling is stable for the whole service life of electric actuator which is at least 6 years. If the actuator is capable of operating even after 6 years of operation old grease should be removed from the power unit to pack it with fresh grease.

The connection screws between the valve and the actuator should be retightened crosswise after 6 months from the date of commissioning of the actuator at the latest and then at least yearly.

Table 1 – MODACT MOK (Control) electric actuators
– basic technical parameters

Type	Type number		Shifting time [s/90°]	Tripping torque [Nm]	Electric motor					Weight [kg]
	basic 1 2 3 4 5	complem. 6 7 8 9			Type	Output [W]	Speed [1.min ⁻¹]	Voltage [V]	Current [A]	
MOK 63	52 325	x x 1 x	10	16 - 32	FCJ2B52D	15	2780	1 x 230	0,37	7,4
		x x 2 x	20			15	2780	1 x 230	0,37	7,4
		x x 3 x	40			15	2780	1 x 230	0,37	7,4
		x x 4 x	80	25 - 45	FCT2B54D	4	1270	1 x 230	0,25	7,4
		x x 5 x	10	16 - 32	FT2B52D	15	2680	3 x 400	0,10	7,4
		x x 6 x	20			15	2680	3 x 400	0,10	7,4
		x x 7 x	40			15	2680	3 x 400	0,10	7,4
MOK 125	52 326	x x 1 x	10	63 - 125	FCJ4C52N	60	2770	1 x 230	0,53	12,7
		x x 2 x	20			60	2770	1 x 230	0,53	12,7
		x x 3 x	40		FCT4C54N	20	1350	1 x 230	0,4	12,3
		x x 4 x	80			20	1350	1 x 230	0,4	12,3
		x x 5 x	10		FT4C52NA	90	2770	3 x 400	0,34	12,7
		x x 6 x	20			90	2770	3 x 400	0,34	12,7
		x x 7 x	40		EAMR56N04A	20	1440	3 x 400	0,20	12,7
		x x 8 x	80			20	1440	3 x 400	0,20	12,7
MOK 250	52 327	x x 2 x	20	125 - 250	FCJ4C52N	60	2770	1 x 230	0,53	21
		x x 3 x	40			60	2770	1 x 230	0,53	21
		x x 4 x	80		FCT4C54N	20	1350	1 x 230	0,4	20,5
		x x 5 x	160			20	1350	1 x 230	0,4	20,5
		x x 6 x	20		FT4C52NA	90	2770	3 x 400	0,34	21
		x x 7 x	40			90	2770	3 x 400	0,34	21
		x x 8 x	80		EAMR56N04A	20	1440	3 x 400	0,20	21
		x x 9 x	160			20	1440	3 x 400	0,20	21
MOK 500	52 328	x x 2 x	20	250 - 500	1 PK 7060-4AB	120	1350	3 x 400	0,42	27
		x x 3 x	40			120	1350	3 x 400	0,42	26
		x x 4 x	80			120	1350	3 x 400	0,42	26,3
		x x C x	40		EAMRB63L02	90	2780	1 x 230	0,90	27
MOK 1000	52 329	x x 3 x	40	500 - 1000	1 PK 7060-4AB	120	1350	3 x 400	0,42	45
		x x 4 x	80			120	1350	3 x 400	0,42	43
		x x 5 x	160			120	1350	3 x 400	0,42	43,3
		x x C x	80		EAMRB63L02	90	2780	1 x 230	0,90	45

*) Design variants with a greater tripping torque up to 80 Nm can be used at an ambient temperature of -20 °C to +55 °C.

In the type number, the following numeric symbol should be inserted:

- 6th position: 6 - design with potentiometer 2 x 100 ohm
7 - design with current transmitter - 4 – 20 mA without built-in power supply
8 - design without position transmitter
9 - design with current transmitter - 4 – 20 mA with built-in power supply
- 7th position: 0 - design without built-in position controller and without BMO (block of local control)
1 - design with built-in position controller without BMO - MODACT MOK Control
2 - design without built-in position controller with BMO
3 - design with position controller and BMO - MODACT MOK Control
- 9th position: Insert a number or letter, according to Table 2.

Notes: Actuators MODACT MOK 500, Type No. 52 328.xx2x, and MODACT MOK 1000, Type No. 52 329.xx3x are fitted with an electric motor 3x400V with a power output of 120 W without heat protection. Other actuators from Table 1 have self-acting thermal fuses integrated in the electric motors that cut off the power supply in case of overheating (after cooling down, the power supply is automatically switched on); they are not terminated at the servomotor terminal block.

The electric motor FT2B52D includes a built-in automatic thermal overload protection connected to the actuator terminal board (load capacity 250 V / 2.5 A).

In the electric motors EAMR, EAMRB a PK 7060-4AB, the thermal overload protection is not connected to the actuator terminal board.

Table 2 – MODACT MOK (Control)

– way of mechanical connection (specification of 9th place of type number)

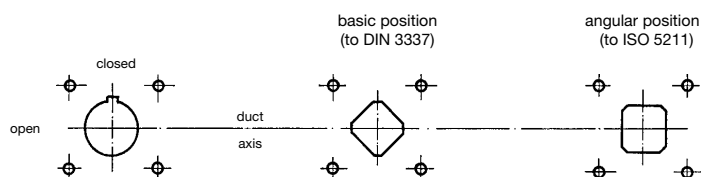
Flange size	Connection	Square sizes [mm]	Square position	Marking on the 9 th place of type number
Type Number 52 325				
F05	keyway			0
F05	square	14	basic	1
F04	keyway			2
F04	square	11	basic	3
F05		14	positioned at a 45°	4
F04		11	positioned at a 45°	5
F04		12	basic	6
F04		12	positioned at a 45°	7
F05		16	basic	8
F05		16	positioned at a 45°	9
Type Number 52 326				
F07	keyway			0
F07	square	17	basic	1
F05	keyway			2
F05	square	14	basic	3
F07		17	positioned at a 45°	4
F05		14	positioned at a 45°	5
F05		16	basic	6
F05		16	positioned at a 45°	7
F07		19	basic	8
F07		19	positioned at a 45°	9
Type Number 52 327				
F10	keyway			0
F10	square	22	basic	1
F07	keyway			2
F07	square	17	basic	3
F10		22	positioned at a 45°	4
F07		17	positioned at a 45°	5
F07		19	basic	6
F07		19	positioned at a 45°	7
F10		24	basic	8
F10		24	positioned at a 45°	9
F10		27	basic	A
F10		27	positioned at a 45°	B
Type Number 52 328				
F12	keyway			0
F12	square	27	basic	1
F10	keyway			2
F10	square	22	basic	3
F12		27	positioned at a 45°	4
F10		22	positioned at a 45°	5
F10		24	basic	6
F10		24	positioned at a 45°	7
F10		27	basic	8
F10		27	positioned at a 45°	9
F12		32	basic	A
F12		32	positioned at a 45°	B
Type Number 52 329				
F12	keyway			0
F12	square	27	basic	1
F12		27	positioned at a 45°	4
F12		32	basic	5
F12		32	positioned at a 45°	6

Servo-actuator output shaft

(when viewing towards the local position indicator).
The handwheel tallies with the CLOSED position

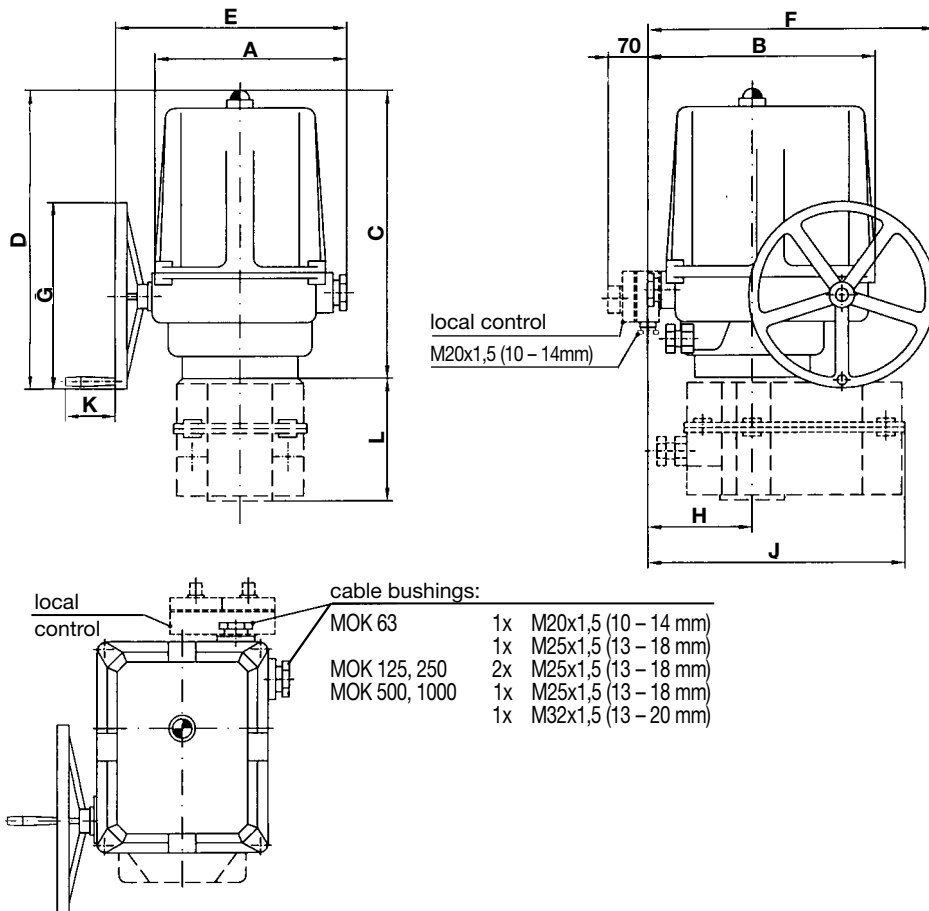
Keyway connection

Square



Other connection of the actuator upon special request.

Dimensional sketch of **MODACT MOK** electric actuators

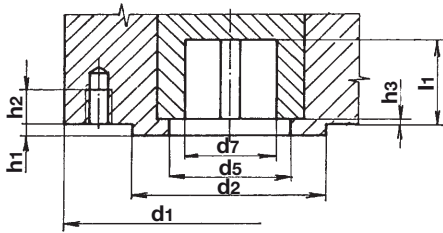


Type	A	B	C	D	E	F	G	H	J	K	L	Flange
MOK 63	173	203	247	244	213	245	160	98	-	73	-	F 05, F 04, F 07*
MOK 125	204	237	325	347	252	290	200	111	-	73	-	F 07, F 05, F 10*
MOK 250	204	237	325	347	252	290	200	111	263	73	128	F 10, F 07
MOK 500	250	290	386	398	325	362	250	128	-	73	-	F 12, F 10
MOK 1000	250	290	386	398	325	362	250	128	323	73	155	F 12

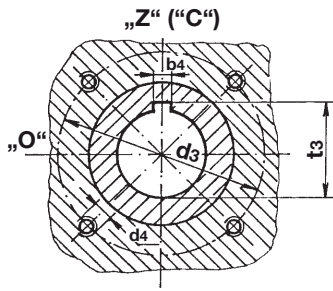
*) on request

Connection dimensions of MODACT MOK actuators

- for valves and control devices with spindles that are provided with a tight-fit keyway



Position of the keyway, according to ISO 5211 and DIN 3337
(The groove is in the CLOSE position whereas the OPEN position is on the left side when viewing the local position indicator)



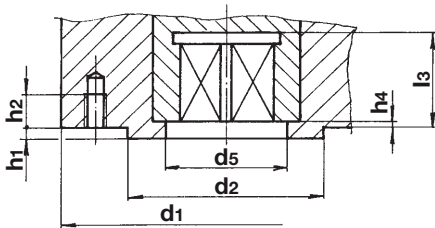
Flange	d ₁	d ₂ f8	d ₃	d ₄	d ₇ H9	h _{3max}	h _{2min}	h _{1max}	l _{1min}	b ₄ Js9	t ₃ ^{+0,4} +0,2	d ₅
F04	65	30	42	M6	18	3	12	3	26	6	20,5	25
F05	65	35	50	M6	22	3	12	3	30	6	24,5	28
F07	90	55	70	M8	28	3	13	3	35	8	30,9	40
F10	125	70	102	M10	42	3	16	3	45	12	45,1	50
F12	150	85	125	M12	50	3	20	3	53	14	53,5	70

Note: The CLOSE position „Z“ („C“) of the keyway is identical to the „Z“ „C“ position on the local position indicator.
Dimension d₁ is determined by a larger flange used by the actuator.

- for valves and control devices with spindles that are provided with a square hole

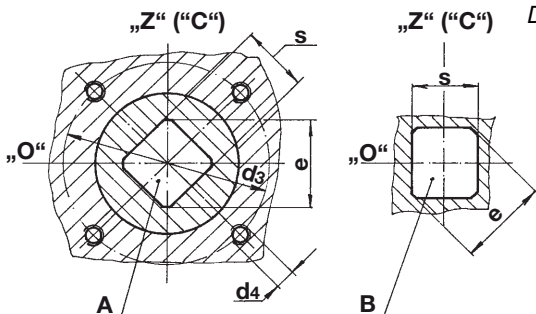
Position of the square hole in the end position of the actuator. The OPEN position is on the left of the CLOSE position, when viewing the local position indicator.

The square hole corresponds to DIN 79. The connecting dimensions comply with DIN 3337 or ISO 5211



Flange	d ₁	d ₂ f8	d ₃	d ₄	h ₄		h _{2min}	l _{3min}	s H11	e _{min}	d ₅	
					max							
F04	55	30	42	M6	1,5	0,5	12	3	15,1 16,1	11 12	14,1 16,1	25
F05	65	35	50	M6	3	0,5	12	3	19,1 22,1	14 16	18,1 21,2	28
F07	90	55	70	M8	3	0,5	13	3	23,1 26,1	17 19	22,2 25,2	40
F10	125	70	102	M10	3	1	16	3	30,1 33,1 37,1	22 24 27	28,2 32,2 36,2	50
F12	150	85	125	M12	3	1	20	3	37,1 44,1	27 32	36,2 42,2	70

Note: The CLOSE position „Z“ („C“) of the square hole for the spindle is identical to the „Z“ „C“ position on the local position indicator.
Dimension d₁ is determined by a larger flange used by the actuator.



A - Square-end joint in the basic position

B - Square-end joint positioned at an angle of 45°

Wiring diagrams of **MODACT MOK** electric actuators

Legend:

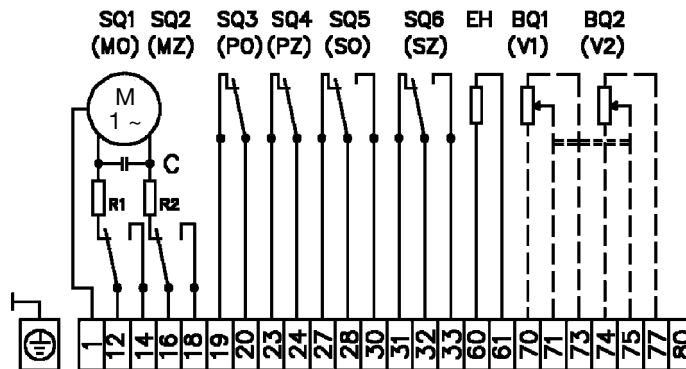
SQ1 (MO)	- OPEN torque-limit switch	M3 ~	- Three-phase motor
SQ2 (MZ)	- CLOSE torque-limit switch	YB	- Electromagnetic brake
SQ3 (PO)	- OPEN position-limit switch	CPT1	- Current position transmitter CPT
SQ4 (PZ)	- CLOSE position-limit switch	DCPT	- Current position transmitter DCPT
SQ5 (SO)	- OPEN signalling switch	DCPZ	- Power supply of current transmitter DCPT
SQ6 (SZ)	- CLOSE signalling switch	ZP2	- Microcomputer position regulator
BQ1, BQ2	- Dual potentiometer 2 x 100 ohm	KO	- Directional relay for the OPEN direction
EH	- Anti-condensation heater	KZ	- Directional relay for the CLOSE position
SA1	- LOCAL/REMOTE switch	F	- Thermal safety
SA2	- OPEN/CLOSE switch	F (⊙)	- Thermal relay
C	- Motor capacitor	R1, R2	- 2x resistance protection 10 ohm for single-phase motors
BMO	- Block of local control		
M1 ~	- One-phase motor		

Warning:

In the actuators with a single-phase electric motor, the control phase must not be connected to both outlets of the capacitor at the same time, not even for a moment; otherwise, there is a danger of the end-limit micro-switches being damaged.

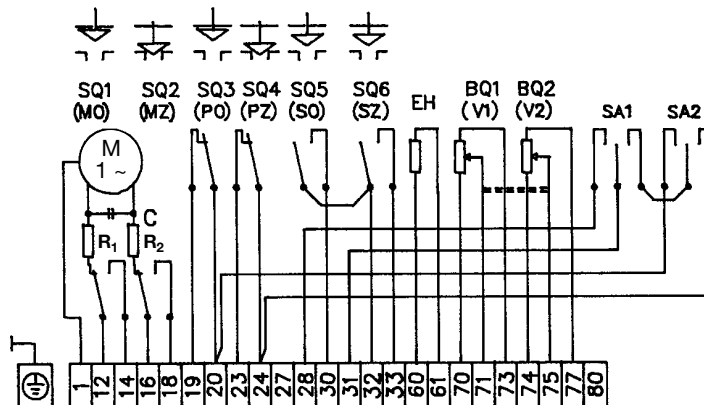
Wiring diagrams of **MODACT MOK 63** electric actuators - with the potentiometer

- with a one-phase motor



P-0648

- with a one-phase motor and local control

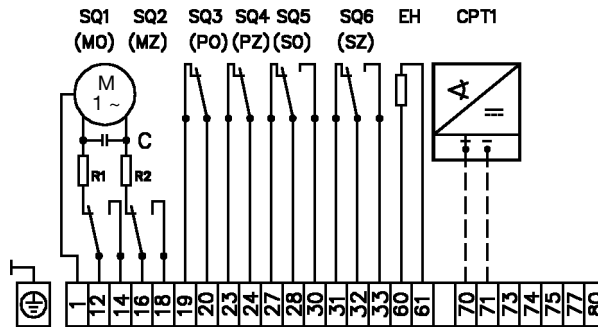


P-0650

Wiring diagram of MODACT MOK 63 electric actuators

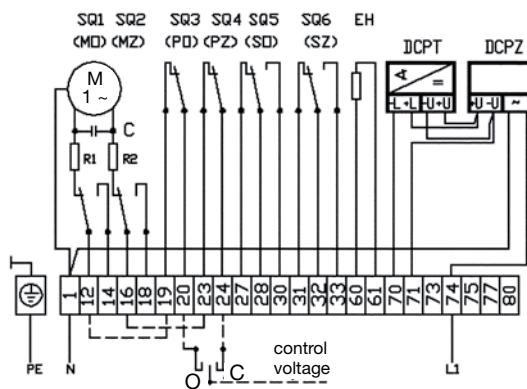
– with the current transmitter or without transmitter

– without built-in power supply



P-0693

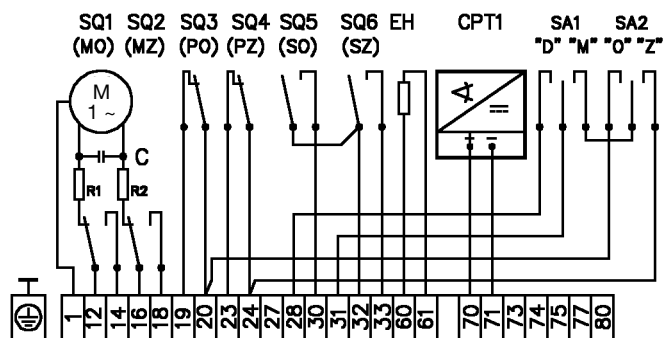
– with built-in power supply



P-0694-E

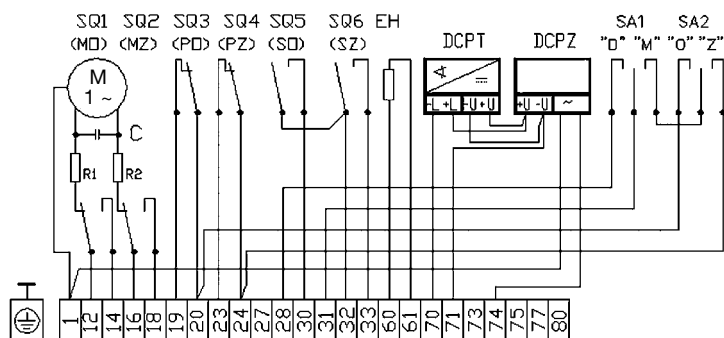
– with the current transmitter and local control

– without built-in power supply



P-0750

– with built-in power supply

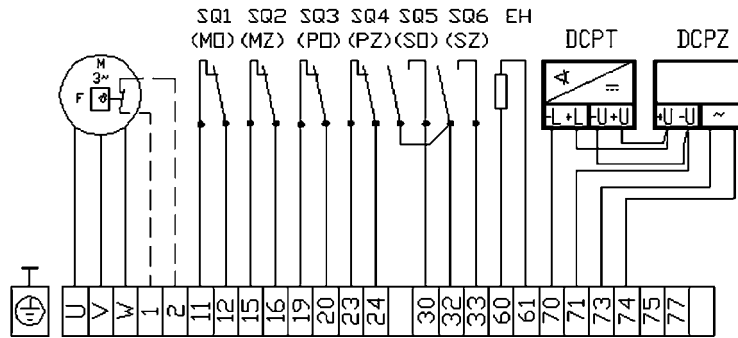


P-0751-E

Wiring diagram of MODACT MOK 63 electric actuators

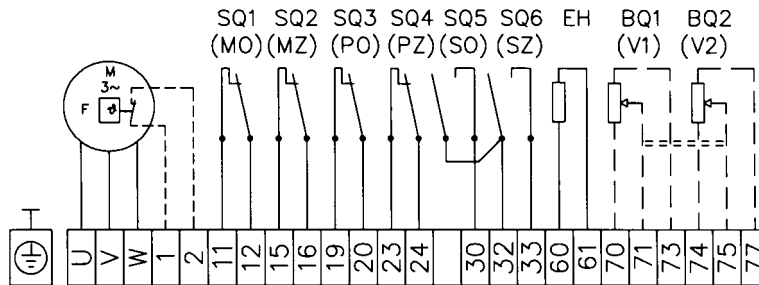
– with three-phase electric motor

– with current transmitter and built-in power supply



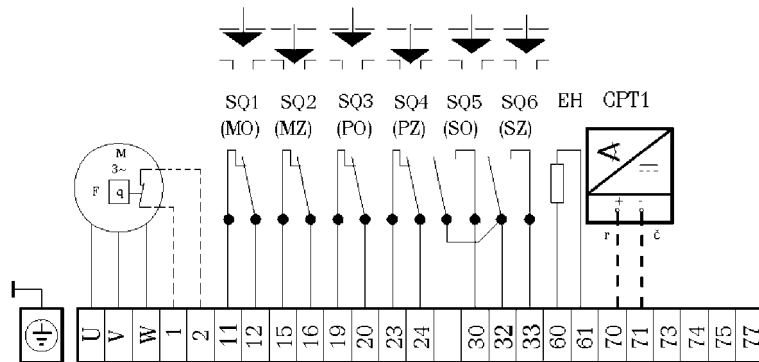
P-0872-E

– with resistance transmitter or without transmitter



P-0762

– with current transmitter without built-in power supply

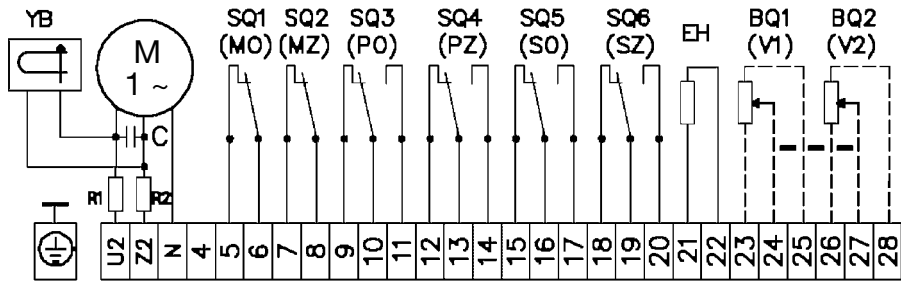


P-0834

Wiring diagrams of MODACT MOK 125 – 1000 electric actuators

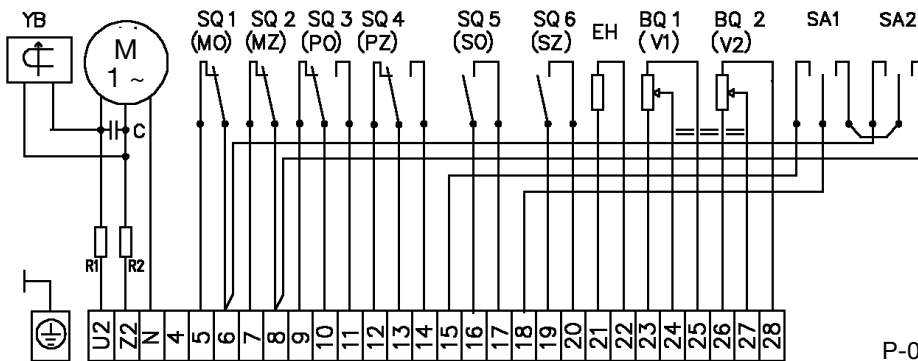
– with the potentiometer

– with a one-phase motor



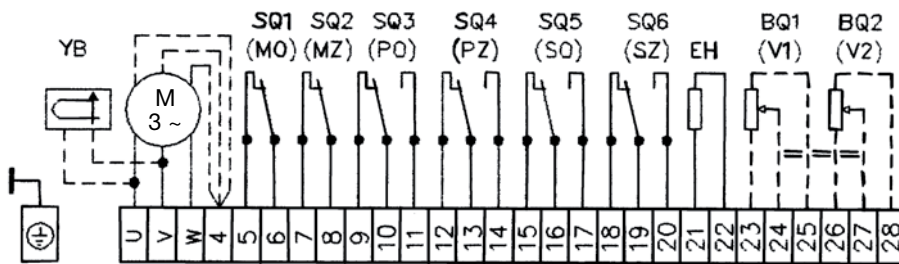
P-0619

– with a one-phase motor and local control



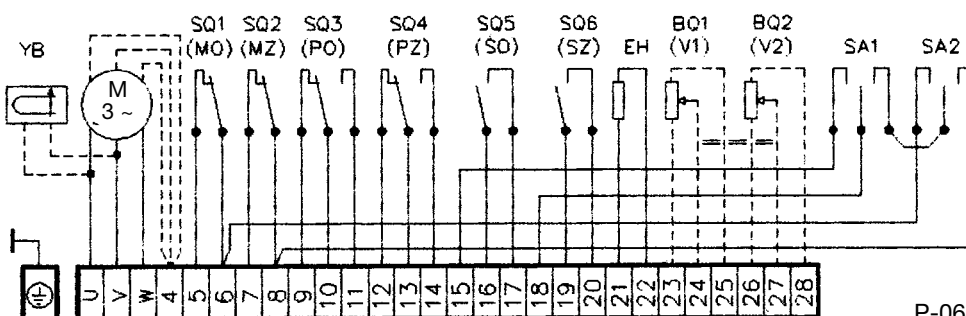
P-0632

– with a three-phase motor



P-0618

– with a three-phase motor and local control

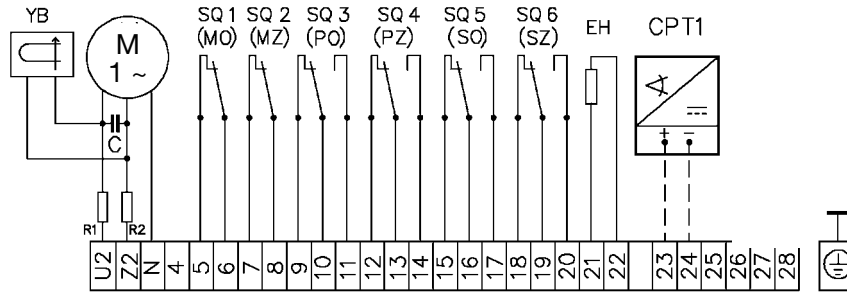


P-0633

Wiring diagrams of **MODACT MOK 125 – 1000** electric actuators

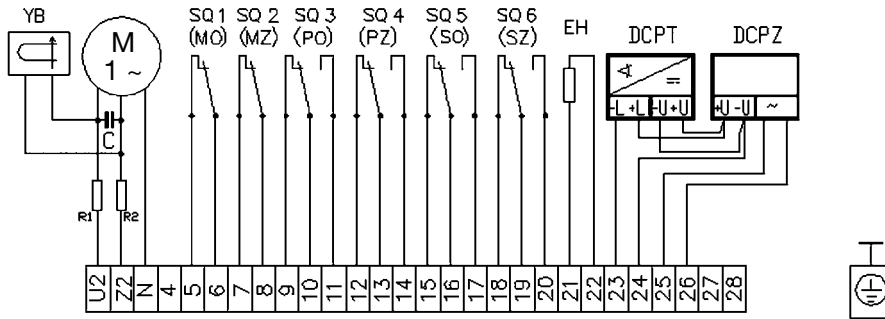
– with the current transmitter

– without built-in power supply



P-0695

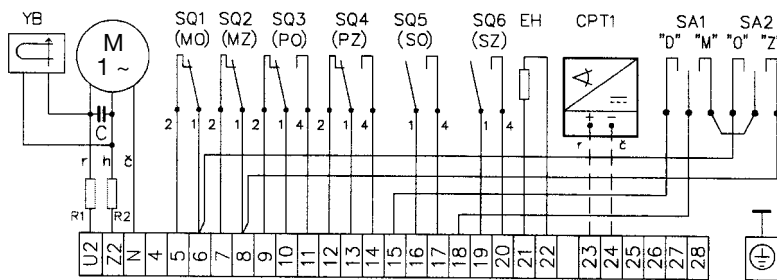
– with built-in power supply



P-0696-E

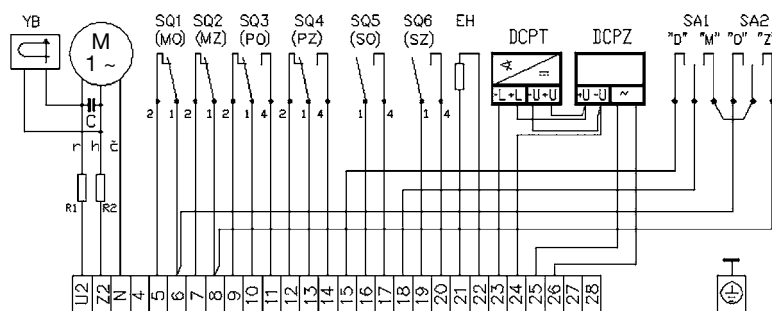
– with the current transmitter and local control

– without built-in power supply



P-0747

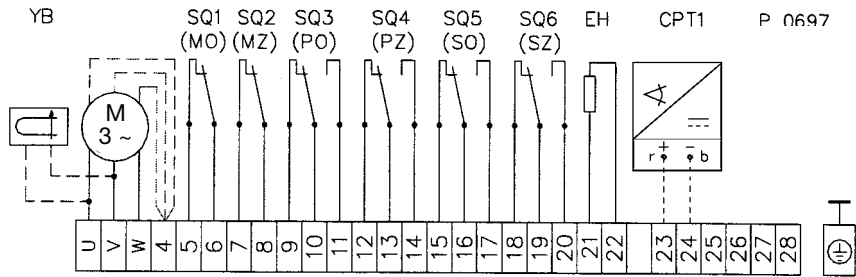
– with built-in power supply



P-0748-E

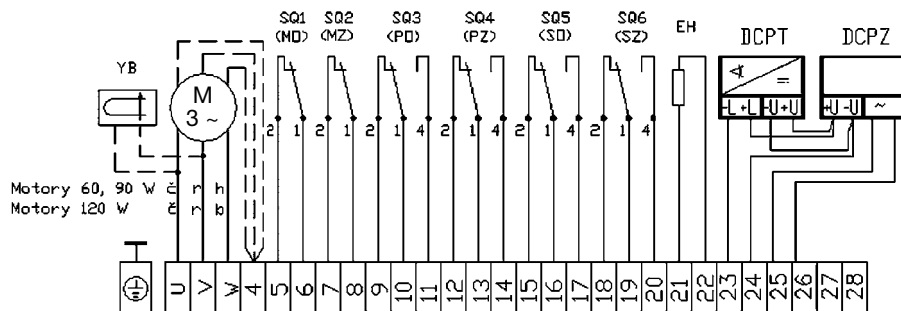
Wiring diagrams of **MODACT MOK 125 – 1000** electric actuators
 – with three-phase electric motor and current transmitter or without transmitter

– without built-in power supply



P-0697

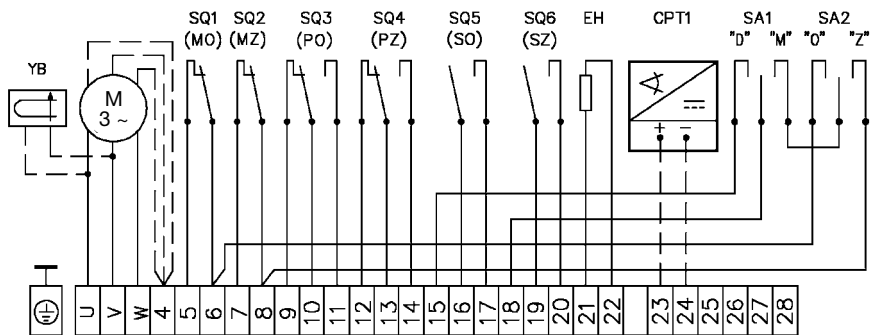
– with built-in power supply



P-0698-E

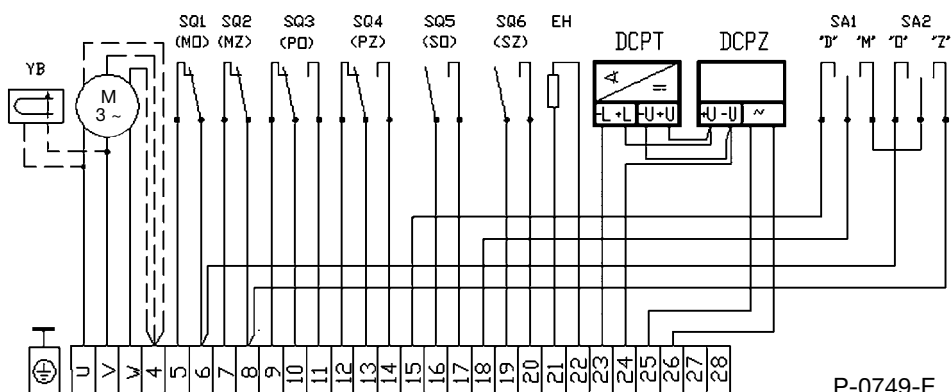
– with the current transmitter and local control

– without built-in power supply



P-0742

– with built-in power supply

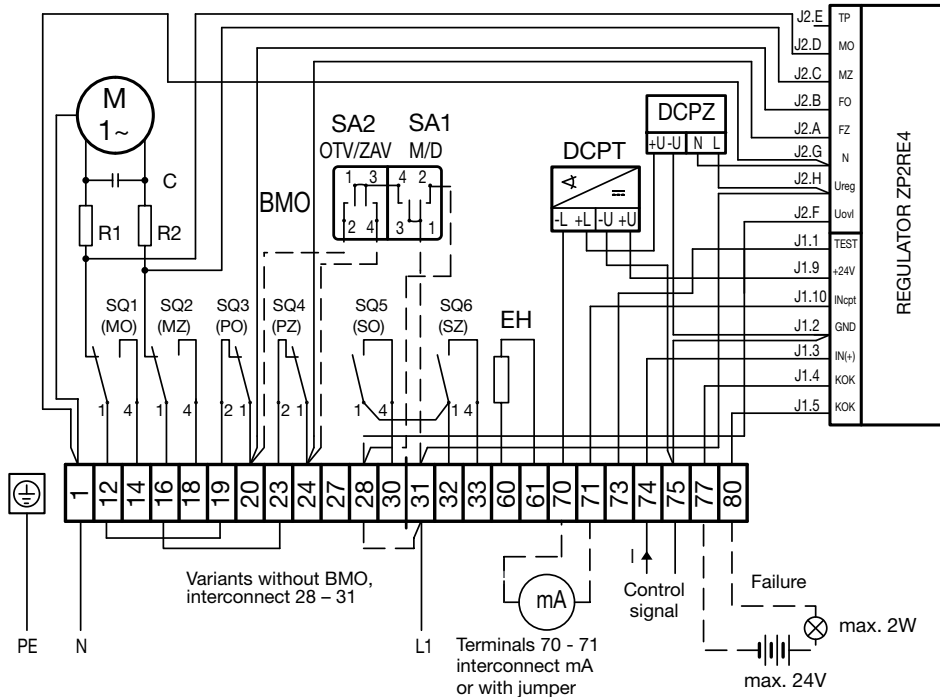


P-0749-E

Wiring diagram of MODACT MOK 63 Control

– with the one-phase motor and position regulator

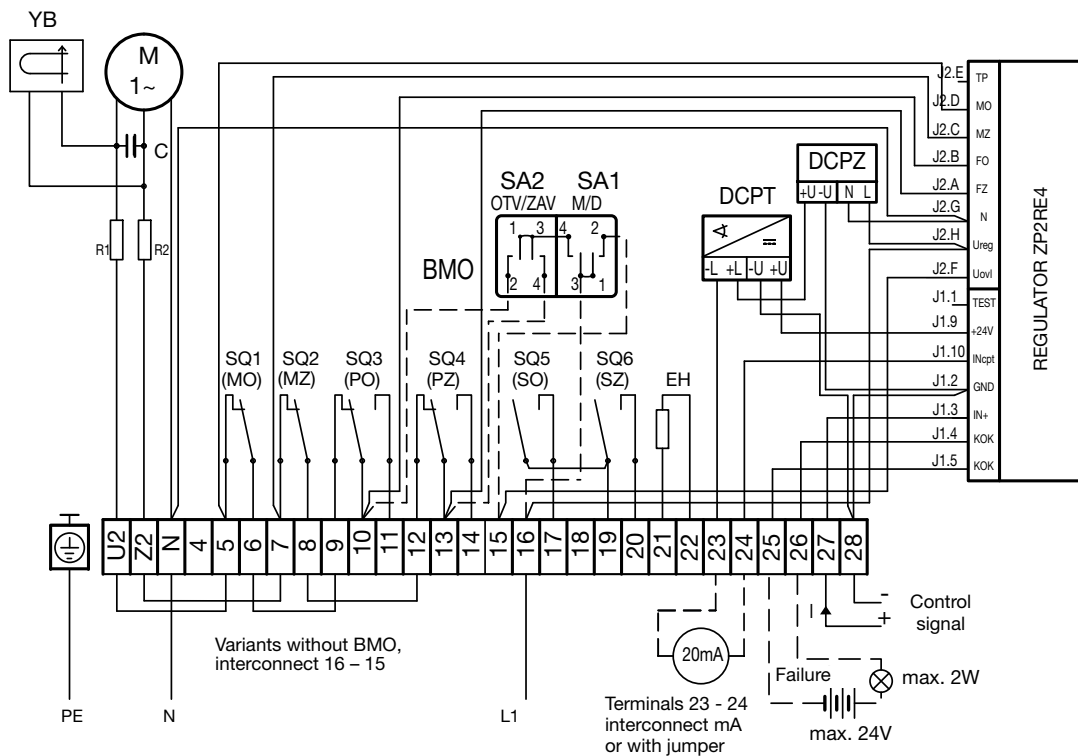
P-0785-EZ



Wiring diagram of MODACT MOK 125 – 1000 Control

– with the one-phase motor and position regulator

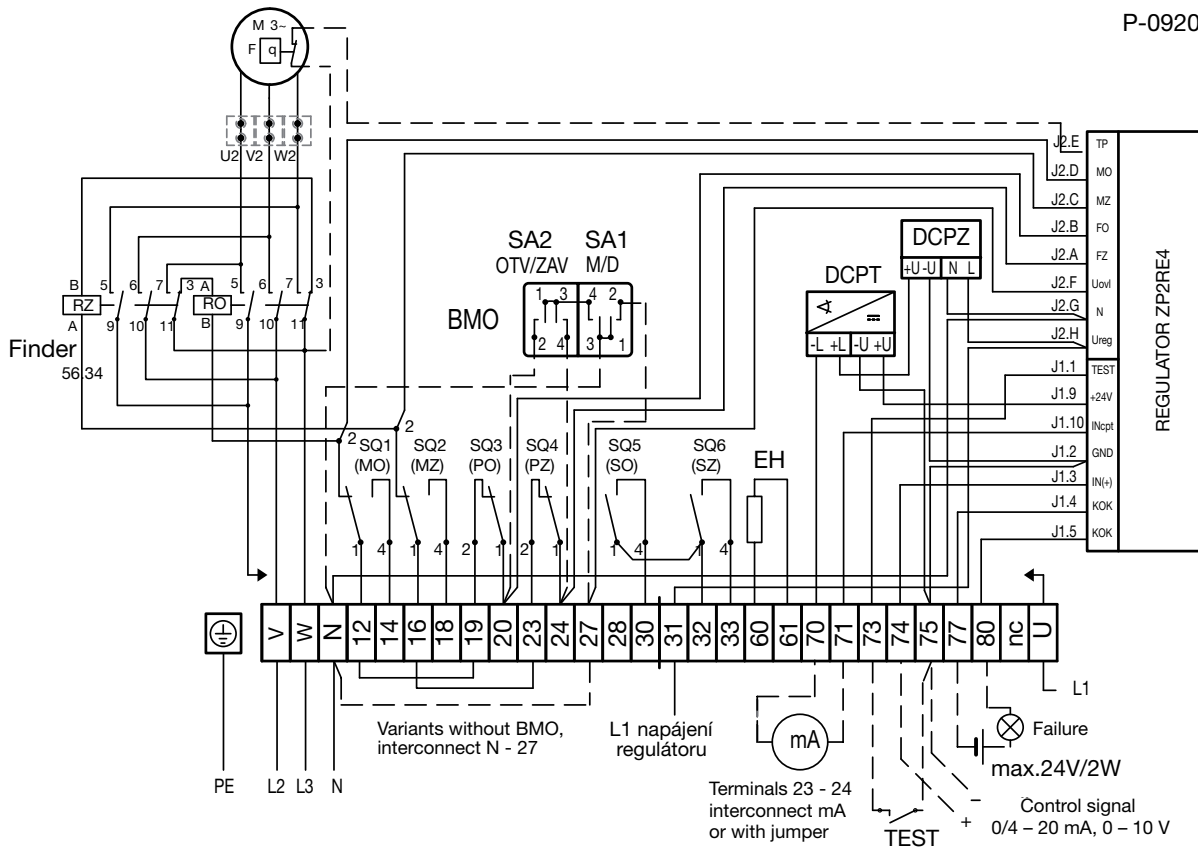
P-0780-EZ



Wiring diagram of MODACT MOK 63 Control

- with the three-phase motor and position regulator

P-0920-EZ



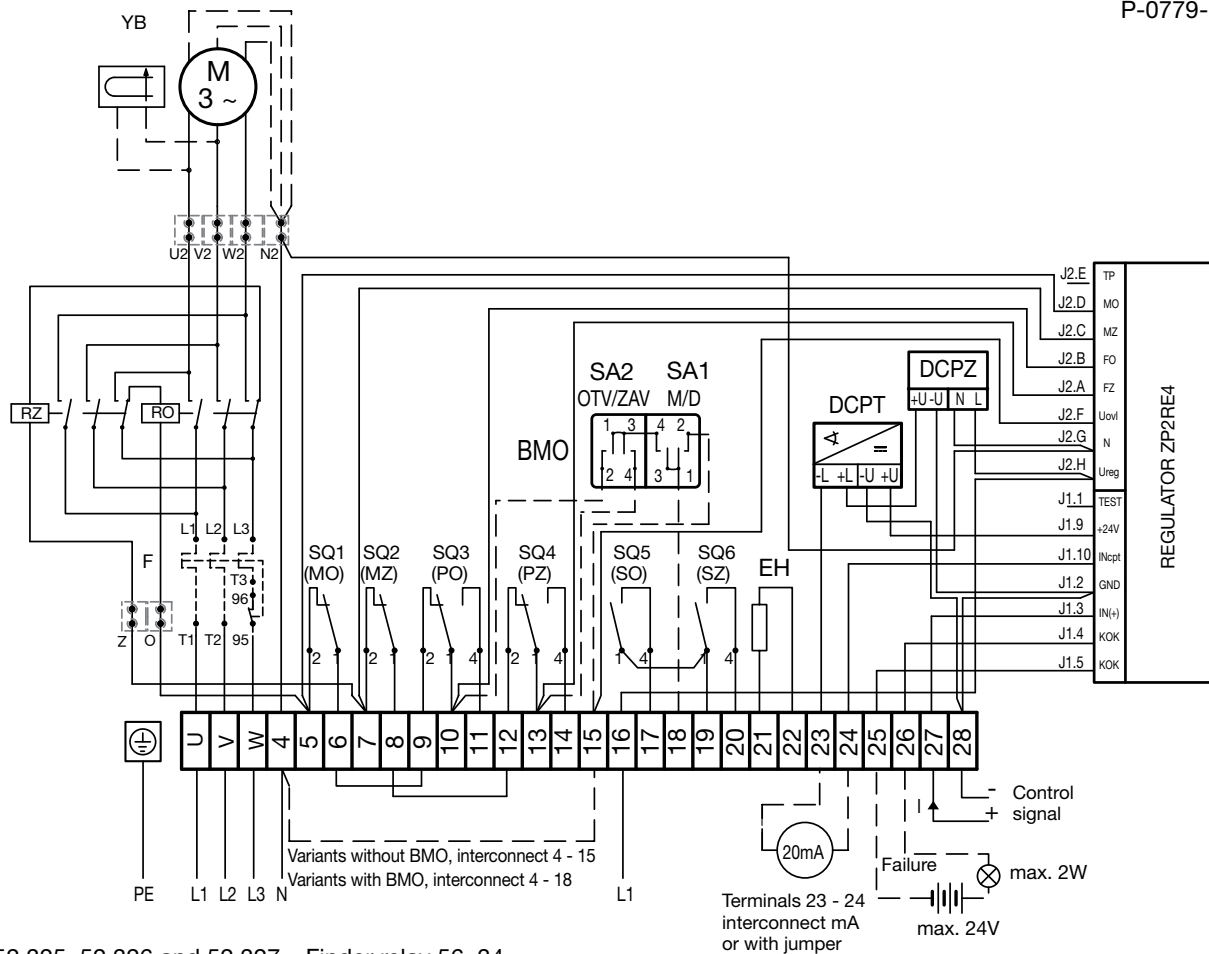
Spare parts

Designation	Application
Microswitch DB1G - A1LC available from ZPA Pečky a.s.	MO, MZ, PO, PZ, SO, SZ
Packing 224648300	Packing between the control section cover and the power unit box for actuators, Type Nos 52 325
Packing 224648301	Packing between the control section cover and the power unit box for actuators, Type Nos 52 326, 52 327
Packing 224648302	Packing between the control section cover and the power unit box for actuators, Type Nos 52 328, 52 329

Wiring diagram of MODACT MOK 125 – 1000 Control

– with the three-phase motor and position regulator

P-0779-EZ



52 325, 52 326 and 52 327 – Finder relay 56, 34

52 328 and 52 329 – Schrack RM735730 relay + thermal relay Lovato

Notes:

The feedback signal can be brought out provided that its galvanic separation from the input signal has been ensured.

The TEST signal can be activated by an external make contact. This signal need not be connected.

From the terminals 25 and 26 (for MODACT MOK 125, 250, 500 and 1000) or 77 and 80 (for MODACT MOK 63), a failure signal can be brought out. This signal is galvanically separated from the regulator circuits.

The maximum voltage which can be applied to these terminals, is 24 V.

In the design variant with the current transmitter, the user should provide for connection of the two-wire circuit of the current transmitter to the electric earth of the associated regulator, computer, etc. The connection should only be made at a single point in any section of the circuit outside the electric actuator. The voltage between electronics and the current transmitter case should not exceed 50 VDC.

Warning! In the ZP2.RE regulator, all circuits of the current transmitter are connected to the input signal circuits and the circuits connected to the regulator TEST terminal. The electric earth connection of these circuits should be made only at a single point of one of the three circuits, while other circuits should not be connected to the earth.

Analog signals should be transmitted via a screened conductor. At the signal source the screening should be connected to the common conductor.



Development, production and services of electric actuators and switchboards.
Top-quality sheet-metal processing (TRUMPF equipment), powder paint shop.

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KP MINI, KP MIDI

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MODACT MOK, MOKED, MOKP Ex

Electric rotary (90°) actuators for ball valves and flaps

MODACT MOKA

Electric rotary (90°) actuators for nuclear power stations
application outside containment

MODACT MONJ, MON, MOP, MONED, MONEDJ, MOPED

Electric rotary multi-turn actuators

MODACT MO EEx, MOED EEx

Explosion proof electric multi-turn actuators

MODACT MOA

Electric multi-turn actuators for nuclear power stations
application outside containment

MODACT MOA OC

Electric multi-turn actuators for nuclear power stations
application inside containment

MODACT MPR Variant

Electric rotary (160°) lever actuators with a variable output speed

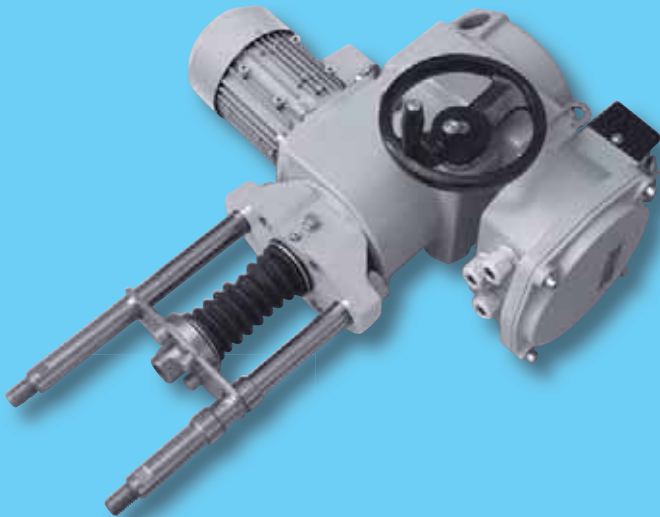
MODACT MPS Konstant, MPSED

Electric rotary (160°) lever actuators with a constant output speed

MODACT MTN, MTP, MTNED, MTPED

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Deliveries of assembled actuator + valve (or MASTERGEAR gearbox) combinations



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