



**Electric part - turn actuators
in non-explosive version, with constant
velocity of changing-over the output part
- coverage IP 67**

MODACT MOKP EEx MODACT MOKP Ex CONTROL

Type numbers 52 320 - 52 322



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ZPA Pečky, a.s. is certified company in accordance with ISO 90001 as amended.

1. USE

MODACT MOKP Ex electric actuators in non-explosive version are intended for control and operation in an environment with danger of explosion of explosive gaseous atmosphere in zone 1 and zone 2 according to ČSN EN 60079-10-1, and for areas with flammable dust in zone 21 and zone 22 according to ČSN EN 60079-10-2. The actuators are designed in compliance with the standards ČSN EN 60079-0:2013 a ČSN EN 60079-1:2015 for explosive gaseous atmosphere and with the standard ČSN EN 60079-31:2014 for areas with flammable dust.

The actuators are used for control of fittings by reverse rotation movement in remote control and automatic control circuits. They can be used for other appropriate units as well. Special applications should be discussed with the manufacturer.

Actuators **MODACT MOKP Ex Control** are fitted with an electronic position controller and, in case of the three-phase version, also with a built-in reversing contactor and a protecting thermal relay. They serve as power terminal elements of control circuits in regulating physical variables.

Whole actuator is designed as hard closure "d" with marked with certification as follows:

⊕ II 2GD	Ex db IIC T6 Gb	-25 ≤ Ta ≤ 55 °C
	Ex db IIB T6 Gb	-50 ≤ Ta ≤ 55 °C
	Ex tb IIIC T80°C Db	-50 ≤ Ta ≤ 55 °C

Electric actuator must not be exposed strong charging e.g. intensive flow dust-air mixture to prevent generating of electrostatic discharges.

Nomenclature

- Environment with explosion danger** – Environment in which an explosive atmosphere can be created.
- Explosive gaseous atmosphere** – A mixture of flammable substances (*in the form of gases, vapours or mist*) with air under atmospheric conditions in which, after initialization, burning spreads out to non-consumed mixture.
- Explosive dust atmosphere** – mixture of flammable substances in the form of gas, vapour, mist and dust with air, under atmospheric conditions, in which, after ignition, combustion spreads to the entire unburned mixture.
- Maximum surface temperature** – The highest temperature created during operation under the most unfavourable conditions (*however within approved limits*) on any surface part of the electric device, which could induce ignition of surrounding atmosphere.
- Closure** – All walls, doors, covers, cable bushings, shafts, rods, pull-rods, etc. which contribute to the type of protection against explosion and/or to the level of protection (*IP*) of the electric device.
- Explosion-proof closure „d“** – Type of protection in which the parts capable of causing ignition of an explosive atmosphere are installed inside the closure; in case of internal explosion this closure should withstand pressure of the explosion and prevent spreading of the explosion into the surrounding atmosphere.
- Zone 1** – A space where probability of occurrence of an explosive atmosphere of a mixture of flammable substances in the form of gas, vapour or mist with the air is occasional under normal operation.
- Zone 2** – A space where occurrence of an explosive gaseous atmosphere formed of a mixture of flammable substances in the form of gas, vapour or mist with the air is improbable under normal operation; however, if this atmosphere is formed it will only persist for a short period of time.
- Zone 21** – An area in which the explosive atmosphere is created by a cloud of whirled flammable dust in air formed in normal operation is occasional.
- Zone 22** – An area in which an explosive mixture is not likely to occur in normal operation and if it occurs it will exist only for a short time.

Standards

The following basic standards are related to the explosion-proof actuators:

ČSN EN 60 079-14	Regulations for electric devices in areas with a risk of explosion of flammable gases and vapours.
ČSN IEC 60 721	Types of environment for electric devices.
ČSN EN 60 079-0	Electric devices for explosive gaseous atmosphere. General requirements.
ČSN EN 60 079-1	Electric devices for explosive gaseous atmosphere. Explosion-proof closure “d”.
ČSN EN 60 079-10	Electric devices for explosive gaseous atmosphere. Specification of dangerous areas.
ČSN 33 0371	Non-explosive mixtures. Classification and testing methods.
ČSN 34 3205	Operation of electric rotating machines and work with them.
ČSN EN 1127-1	Explosive environments – prevention of and protection against explosion.
ČSN EN 60079-31	Explosive atmospheres. Equipment dust ignition protection by enclosure “t”

Marking of explosion-proof properties

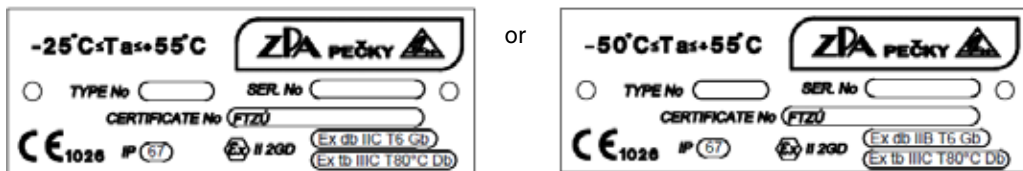
It includes the following marks:

- Ex** The electric device corresponds to the standard ČSN EN 60079-0 and associated standards for various types of protection against explosion.
- db** Marking of type and level of protection against explosion, explosion-proof closure, according to the standard ČSN EN 60 79-1
- tb** Protection by enclosure "t" according to ČSN EN 60079-31.
- IIC, IIB** Designation of the group of explosion-proof electric device for explosive gaseous atmosphere, according to ČSN EN 60 079-0.
- IIIC** Designation of the group of explosion-proof electric device for areas with flammable dust, according to ČSN EN 60 079-0.
- T6** Designation of temperature class of explosion-proof electric device of the Group II, according to ČSN EN 60 079-0.
- T 80 °C** Maximum surface temperature T of an explosion-proof electric device of group III, according to ČSN EN 60079-0.
- Gb** Designation of an explosion-proof electric device for explosive gas atmospheres with a "high" level of protection and is not a source of ignition in normal operation or during expected malfunctions, according to ČSN EN 60079-0.
- Db** Designation of an explosion-proof electric device for areas with flammable dust with a "high" level of protection and is not a source of ignition in normal operation or during expected malfunctions, according to ČSN EN 60079-0.
- IP 67** Designation of protective enclosure, according to ČSN EN 60079-0 and ČSN EN 60529.

Data on actuators

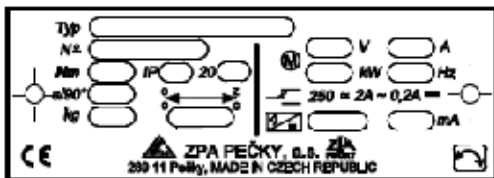
The actuators are fitted with the following plates:

1) Plate with data of non-explosive closures



2) Rating and instrument plate contains:

- manufacture's name and address
- type designation of product (*type number*)
- serial number
- year of production
- rated value of tripping torque Nm
- rated speed of shifting s/90°
- rated working stroke 90°
- designation of protective enclosure of actuator IP
- weight of actuator kg
- mark of conformity CE
- electrical data of power circuits (*voltage and frequency, current and output of electric motor*);
- electrical data of control circuit of micro-switches (*voltage, current*);
- position transmitter (*resistance, voltage and/or current*)



3) Warning plate



4) Plates on covers with marking of used protection against explosion



or



2. OPERATING CONDITIONS, OPERATING POSITION

Operating conditions

The **MODACT MOKP Ex (MODACT MOKP EX Control)** actuators should withstand the effect of operating conditions and external influences, classes AC1, AD7, AE6, AF2, AG2, AH2, AK2, AL2, AM-2-2, AN2, AP3, BA4, BC3 a BE3, according to ČSN 33 2000-5-51 ed. 3.

Surrounding temperature

Operating temperature for the **MODACT MOKP Ex** is from -25 °C to +55 °C or from -50 °C to +55 °C.

Classes of external influences

Basic characteristics – as extracted from ČSN 33 2000-5-51 ed. 3.

- 1) AC1 – elevation above sea level ≤ 2000 m
- 2) AD7 – water occurrence – shallow dipping
- 3) AE6 – occurrence of foreign solid bodies – strong dustiness. Thick dust layers.
- 4) AF2 – occurrence of corrosive or polluting substances from atmosphere. Presence of corrosive polluting substances is significant
- 5) AG2 – medium mechanical stress by impacts – common industrial processes
- 6) AH2 – medium mechanical stress by vibrations – common industrial processes
- 7) AK2 – serious risk of growth of vegetation and moulds
- 8) AL2 – serious danger of the occurrence of animals (*insects, birds, small animals*)
- 9) AM-2-2 – normal level of the signal voltage. No additional requirements
- 10) AN2 – medium solar radiation with intensities > 500 W/m² and ≤ 700 W/m²
- 11) AP3 – medium seismic effects; acceleration > 300 Gal ≤ 600 Gal
- 12) BA4 – personal abilities. Instructed people.
- 13) BC3 – frequent contact with the earth potential. Persons coming frequently into contact with “live” parts or standing on a conducting base.
- 14) BE3 – danger of explosion, production and storage of explosive substances

Electric actuators **MOKP Ex** in version for surrounding temperature from -50 °C do +55 °C must be resistant against effect of process conditions characterized by surrounding temperature ranging between -50 °C and +55 °C.

This version of actuators is fitted with three-phase motors and outfit without a transmitter or with the current transmitter CPT 1AF. The above mentioned actuators will be marked with letter F at the last place of the complementary type number, i.e. 5232x.xxxxF.

In all markings of non-explosiveness of the actuators type no. 5232x.xxxxF, the marking of sub-group of the group II of a non-explosive electric device according to the standard ČSN EN 60079-0 will be changed from IIC to IIB, i.e. to Ex db IIB T6 Gb.

When placed on a free area, the actuator should be fitted with a light roofing against direct action of atmospheric effects. The roof should overlap the contour of the actuator by at least 10 cm at the height 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 be always used.

The anti-condensation heater is a resistor of rating 10 W and resistance 6.8 k Ω . The feeding circuit of the anti-condensation heater includes the thermal switch type 228 – 2563 (*series 2455R*) that opens at temperature 25 °C ± 3 °C and closes again when temperature drops to 15 °C ± 4 °C.

Note: A space is considered sheltered if it prevents falling of atmospheric precipitations under angles up to 60° from the vertical.

Corrosion protection

Actuators are standardly delivered with surface treatment corresponding to category of corrosion aggressiveness C1, C2 and C3 according to ČSN EN ISO 12944-2.

On customer's request is possible to do surface treatment corresponding to category of corrosion aggressiveness C4, C5-I and C5-M.

In following table is provided an overview of environment for each categories of corrosion aggressiveness according to ČSN EN ISO 12944-2.

Corrosion aggressiveness level	Example of typical environment	
	Outdoor	Indoor
C1 (very low)		Heated buildings with clean atmosphere e.g. offices, shops, schools, hotels.
C2 (low)	Atmosphere with low level of pollution. Mostly outdoor areas.	Unheated buildings, in which may occur condensation, e.g. stocks, sports halls.
C3 (middle)	Urban industrial atmospheres, mild pollution of sulfur dioxide. Seaside areas with middle salinity.	Production areas with high humidity and low air pollution, e.g. food industry, processing factories, breweries.
C4 (high)	Industrial areas and seaside areas with middle salinity.	Chemical plants, swimming pools, seaside shipyard.
C5-I (very high – industrial)	Industrial areas with high humidity and aggressive atmosphere.	Buildings or areas with predominantly continuous condensation and high air pollution.
C5-M (very high – seaside)	Seaside areas with high salinity.	Buildings or areas with predominantly continuous condensation and high air pollution.

Operating position

The actuators can operate in any operating position.

3. DESCRIPTION AND FUNCTION

The actuators consist of power and control systems.

The power system includes electric engine, spur epicyclic gearbox and worm gear unit for manual control.

Control unit configuration depends on actuator design. It includes:

- a) MODAC MOKP Ex type:**
- positioning and signalization switches with position transmitter
 - moment switch unit
- b) MODAC MOKP Ex Control type:**
- positioning and signalization switches
 - moment switches
 - ZP2.RE4 electronic regulator
 - power reversing relay and thermal relay
- (for the version with three-phase electric motor only)*

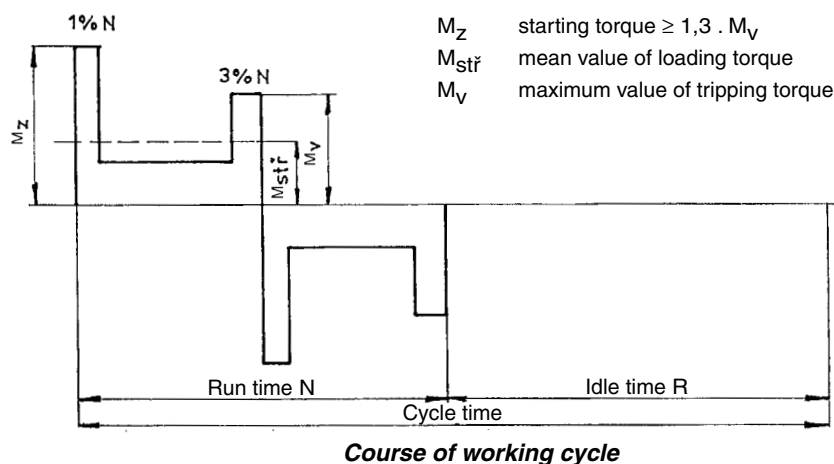
The actuator has a heating resistor for microclimate control of the control system. The connection to external circuits is made via terminal board. The actuator output section movement is transmitted to position and signalization switches and position transmitter. The worm movement depending on the actuator load is transmitted to moment switches.

4. OPERATION MODE, SERVICE LIFE OF ACTUATORS

Operation mode

The actuators can be operated with the type of loading S2 according to ČSN EN 60 034-1. The run period at temperature +50 °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.



Service life of actuators

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

5. TECHNICAL DATA

Supply voltage

- rated value of alternating electric voltage is 1 x 230 V or 3 x 230/400 V (according to version);
- permitted deviation of feeding voltage is -10 % to + 6 % of rated value;
- rated frequency of feeding voltage is 50 Hz;
- permitted deviation of frequency of feeding voltage is ± 2 % of rated value.

In this range of feeding voltage, rated values of all parameters are maintained, except for starting torque that changes with the second power of deviation of feeding voltage from its rated value. The change is directly proportional to the change in feeding voltage. Larger deviations of feeding voltage and frequency are not permitted.

Protective enclosure

Protective enclosure of actuators **MODACT MOKP Ex** IP 67 according to ČSN EN 60 529 (33 0330).

Noise

Level of acoustic pressure A	max. 85 dB (A)
Level of acoustic output A	max. 95 dB (A)

Tripping torque

At the factory, the tripping torque has been adjusted as shown in Table 1, according to the customer's requirements. If no tripping torque adjustment has been specified by the customer the maximum tripping torque is adjusted.

Self-locking

Actuator self-locking capacity is provided by mechanical electric motor brake, at actuator type no. 52 320 by mechanic gearbox brake.

Sense of rotation

When looking at the output shaft in the direction towards the control box, the CLOSE direction of rotation is identical with the clockwise sense.

Working stroke

The working stroke of **MODACT MOKP Ex** actuators is 90°.

Manual control

Manual control is performed directly by a handwheel (*without clutch*). It can be used even when the electric motor is running (*the resulting motion of the output shaft is determined by the function of the differential gear*). When the handwheel is rotated clockwise the output shaft of the actuator also rotates clockwise (*when looking at the shaft towards the control box*). On condition that the valve nut is provided with left-hand thread, the actuator closes the valve.

Torque-limit switches in the actuator are set and work when the actuator is under voltage.

When using the manual control, ie. actuator is controlled mechanically, the torque-limit switches doesn't work and the valve can be damaged.

6. ACTUATOR OUTFIT

Torque-limit switches

The actuator is fitted with two torque-limit switches (*MO – OPEN, MZ – CLOSE*) each of which acts only in one direction of motion of the actuator output shaft. The torque-limit switches can be set to operate at any point of the working stroke.

The tripping torque can be adjusted within the range shown in Table 1. The torque-limit switches are locked if the load torque is lost after they have been brought into the OFF-position. This feature secures the actuator against the so-called "pumping".

Position-limit switches

The PO – OPEN and PZ – CLOSE position-limit switches limit the actuator working stroke, each being adjusted to operate in either end position.

Position signalling

For signalling position of the actuator output shaft, two signalling switches, i.e. the SO – OPEN signalling switch and the SZ – CLOSE signalling switch, are used. Each of these switches acts only in one direction of output shaft rotation. The operating point of the microswitches can be set within the whole working stroke range except the narrow band before the operating point of the microswitch used to switch off the electric motor.

Position transmitters

The **MODACT MOKP Ex** electric actuators can be supplied without position transmitter or can be fitted with position transmitter:

a) Resistance transmitter 2 x 100 Ω.

Technical parameters:

Position scanning	resistance
Turning angle	0° – 320°
Non-linearity	≤ 1 %
Transition resistance	max. 1.4 Ω
Permitted voltage	50 V DC
Maximum current	100 mA

b) Type CPT 1Az passive current transmitter. Power supply to the current loop is not a part of the actuator. Recommended feeding voltage is 18 – 28 V DC, at maximum loading resistance of the loop 500 Ω. The current loop should be earthed in one point. Feeding voltage need not be stabilized; however, it must not exceed 30 V or else the transmitter could be damaged.

Range of CPT 1Az is set by a resistance transmitter on the transmitter body and its starting value by corresponding partial turning of the transmitter.

Technical parameters of CPT 1Az:

Scanning of position	capacity
Working stroke	adjustable 0° – 40° to 0° – 120°
Non-linearity	≤ 1 %
Non-linearity, including gears	≤ 2.5 % (<i>for a maximum stroke of 120°</i>)
Hysteresis, including gears	≤ 5 % (<i>for a maximum stroke of 120°</i>)
<i>(The non-linearity and hysteresis are related to a signal value of 20 mA).</i>	
Loading resistance	0 – 500 Ω
Output signal	4 – 20 mA or 20 – 4 mA
Supply voltage	for $R_{load} = 0 – 100 \Omega$ 10 to 20 V DC
	for $R_{load} = 400 – 500 \Omega$ 18 to 28 V DC

Maximum supply voltage ripple	5 %
Maximum transmitter power demand	560 mW
Insulation resistance	20 M Ω at 50 V DC
Insulation strength	50 V DC
Operational environment temperature	-25 °C to +60 °C
Operational environment temperature – extended range	-25 °C to +70 °C (<i>additional on demand</i>)
Dimensions	\varnothing 40 x 25 mm

c) **Type DCPT active current transmitter.** Power supply to the current loop is not a part of the actuator. Maximum loading resistance of the loop is 500 Ω . For variants **MODACT MOKP Ex Control** with the regulator ZP2.RE4, it is used as a position sensor.

DCPT can be easily set by two push-buttons with LED diode on the transmitter body.

Technical parameters of DCPT:

Scanning of position	contact-less magneto-resistant
Working stroke	adjustable 60° – 340°
Non-linearity	max. \pm 1 %
Loading resistance	0 – 500 Ω
Output signal	4 – 20 mA or 20 – 4 mA
Power supply	15 – 28 V DC, < 42 mA
Working temperature	-25 °C to +70 °C
Dimensions	\varnothing 40 x 25 mm

For the transmitters CPT 1Az as well as DCPT, a two-wire connection is used, i.e., the transmitter, the power supply and the load are connected in series. The user should secure that the two-wire circuit of the current transmitter is connected to the electric earth of the associated regulator, computer, etc. This connection should only be made at a single point in any section of the circuit, outside the actuator.

Position indicator

The actuator is fitted with a local position indicator.

Anti-condensation heater

The actuators are fitted with an anti-condensation heater preventing condensation of water vapour. It is connected to the AC mains of voltage 230 V.

Local control

Local control serves for controlling the actuator from the site of its installation. It includes two change-over switches: one with positions “Remote control - Off - Local control”, the other “Open - Stop - Close”.

Position regulator

The position regulator built-in in the actuator enables to control position of the output shaft of the actuator and thus also the valve by the input analog signal.

The control unit is microprocessor-based programmed for regulating the actuator, ascertaining and repairing error conditions, and for simple setting of regulation parameters.

The regulator design enables to switch off the regulator feeding. If the regulator is not under voltage it does not regulate but, after its feeding is switched on, the regulator function is automatically restored; the parameters and diagnostic data stored in the regulator memory are retained.

The regulator circuits compare the input signal with the feedback signal from the position transmitter of the actuator output shaft. If there is a difference between the input and feedback signals the regulator closes one of the built-in contactors in the actuator so that the actuator shaft is reset to the position corresponding to magnitude of the input signal. When the feedback signal is equal to the input signal the actuator stops.

The control parameters are set by functional push-buttons on the regulator or by PC connected to the regulator via a serial interface for the period of setting the parameters or during the communication module.

7. ELECTRIC PARAMETERS

External electric connection

The actuators have terminal boards for external connection. The terminal board has terminals for connection of one 1,5 mm² conductor or two conductors with the same cross-section 0,5 mm² each.

Connecting of actuators with connector – on special request.

Actuator internal wiring

The internal wiring diagrams of the **MODACT MOKP Ex** actuators with terminal designation are shown in this catalogue.

Each actuator is provided with its internal wiring diagram on the inner side of the actuator cover. The terminals are marked on a self-adhesive label attached to a carrying strip under the terminal block.

Current rating and maximum voltage of microswitches

Maximum voltage of mikroswitches is 250 V AC as well as DC, at these maximum levels of currents.

MO, MZ	250 V AC / 2 A; 250 V DC / 0,2 A
SO, SZ	250 V AC / 2 A; 250 V DC / 0,2 A
PO, PZ	250 V AC / 2 A; 250 V DC / 0,2 A

The microswitches can only be used as single-circuit devices. Two voltages of different values and phases cannot be connected to the terminals of the same microswitch.

Isolation resistance

Isolation resistance of electric control circuits against the frame and against each other is min. 20 MΩ. After a dump test, isolation resistance of control circuits is min. 2 MΩ. See Technical specifications for more details.

Electric strength of electric circuits isolation

Circuit of resistance transmitter	500 V, 50 Hz	
Circuit of current transmitter	50 V DC	
Circuits of microswitches and anti-condensation heater	1 500 V, 50 Hz	
Electric motor	Un = 1 x 230 V Un = 3 x 230/400 V	1 500 V, 50 Hz 1 800 V, 50 Hz

Deviations of basic parameters

Tripping torque	±15 % of the maximum tripping torque
Operating time of the output shaft	+10 % -15 % of the rated value (<i>in no-load operation</i>)
Hysteresis of position limit and signalling switches (<i>working travel</i>)	≤4°
Adjustment of position limit and signalling switches	±1°
Clearance of the output part	max. 1,5°

Protection

The actuators have external and internal protection terminal against electric shock voltage.

The terminals are identified in compliance with ČSN IEC 417 (34 5550).

If isn't the actuator equipped with overcurrent protection when purchased is needed to ensure that the protection is secured externally.

8. POSITION REGULATOR

A built-in position regulator allows automatic positioning of the actuator output shaft to be performed, depending on the analog input signal. At the regulator input, the input control signal is compared with the feedback signal of the position transmitter. The resulting control deviation, if any, is used for actuator run control, the actuator output shaft being brought into the position corresponding to the input control signal value.

9. ADDITIONAL POSSIBILITIES OF REGULATOR

The regulator can be set and its activity monitored in two ways:

1) By means of functional push-button and signal lamps on the regulator.

The following parameter can be set:

- Control signal;
- Response to the signal TEST and to error conditions (*reaction of the regulator according to programmed requirements*);
- Mirroring (*ascending or descending characteristics of the control signal*);
- Insensitivity of the regulator;
- Regulation method (*wide, narrow – to position or torque each*).

The signal lamps on the regulator indicate direction in which the actuator output shaft should rotate and errors detectable by the regulator.

- Presence of the signal TEST;
- Control signal error;
- Premature tripping of the end limit sensor;
- Position sensor failure;
- Thermal protection failure.

In case of an error detected by the regulator, the contact KOK connected to the regulator terminal board is opened; this can be used in monitoring the regulator conditions by a superior control system; the regulator controls the actuator according to the set parameter “**Response to signal TEST**”.

Further errors, e.g. wrong sense of the electric motor rotation, are indicated by the regulator in the regime of setting parameters.

2) By means of PC connected to the regulator by a serial port via the Module KOM ZP2 (to be ordered at ZPA Pečky). The computer can also be used for setting other parameters than by the push-buttons, reading and resetting the error counter in the regulator memory, total time of switching-on, number of closing operations, and other diagnostic data (for setting the regulator with the computer).

The computer is only connected to the regulator during maintenance and checking of the regulator.

10. TECHNICAL PARAMETERS OF REGULATOR

Alternative supply voltages:	A. 230 V	+10%, -15%	50 – 60 Hz
	B. 120 V	+10%, -15%	50 – 60 Hz
	C. 24 V	+10%, -15%	50 – 60 Hz
Control signal	0 to 20 mA, 4 to 20 mA, 0 to 10 V		
Position sensor	Current transmitter of 4 to 20 mA		
Regulator linearity	0.5 %		
Regulator insensitivity	1 to 10 % (<i>adjustable</i>)		
Operating temperature range	-25 °C to + 75 °C		
LED error messages	– TEST mode		
	– Control signal is missing		
	– Reversed position switches		
	– Failure of position sensor		
	– Failure of thermal protection		
Response to failure:	Failure of sensor	– Actuator in the TEST position, LED error message	
	Control signal is missing	– Actuator in the TEST position, LED error message	
	TEST mode	– Actuator in the TEST position, LED error message	
Output signal:	Power outputs	– 2x relay of 5 A, 230 V	
	Central failure	– Switching contact of 24 V, 2 W	
	5x LED (<i>power supply, failure, adjustment, opens, closes</i>)		
Adjusting devices:	– 2x calibrating and parameter adjusting push-button		
	– Communication connector		
Dimensions:	– 75 x 75 x 25 mm		

11. ORDERING DATA

Following data must be given in purchasing orders:

- quantity of units
- actuator designation
- full type number in accordance with chart no. 1 (*9 digits*)
- setting of tripping torque (*if the setting is not specified the manufacturer will set the electric actuator to the maximum tripping torque*)
- setting of working stroke of output part (*if the stroke is not specified the manufacturer will set the working stroke of the output part of the electric actuator to 90°*).

Table No. 1 – MODACT MOKP Ex electric actuators
 – basic technical parameters

Type	Type number		Adjusting time s/90 °	Tripping torque range Nm	Electric motor					Weight kg	
	Basic	Complem.			Power W	Type	Rpm 1.min ⁻¹	Voltage V	Current A		Capacity μF
	1 2 3 4 5	6 7 8 9									
MOKP 100 Ex	5 2 3 2 0	x x 1 x	10	25 – 100	74	ES 7150-2AL	2750	1 x 230	0.67	7	9.7
		x x 2 x	20		74	ES 7150-2AL	2750	1 x 230	0.67	7	
		x x 3 x	40	25 – 85	15	FCJ2B52VA	2780	1 x 230	0.37	3.5	
		x x 4 x	80	25 – 100	17	ES 7130-4AY	1300	1 x 230	0.27	3.5	
		x x 5 x	10	16 – 32	15	FT2B52C	2680	3 x 400	0.10	-	
		x x 6 x	20	25 – 90	15	FT2B52C	2680	3 x 400	0.10	-	
		x x 7 x	40	25 – 100	15	FT2B52C	2680	3 x 400	0.10	-	
MOKP 250 Ex	5 2 3 2 1	x x 1 x	10	63 – 125	90	EAMRB56N02	2780	1 x 230	0.9	8	18.5
		x x 2 x	20	100 – 250	90	EAMRB56N02	2780	1 x 230	0.9	8	
		x x 3 x	40		40	EAMRB56N04A	1380	1 x 230	0.55	5	
		x x 4 x	80	40	EAMRB56N04A	1380	1 x 230	0.55	5		
		x x 5 x	10	63 – 200	90	EAMR56N02L	2790	3 x 400	0.25	-	
		x x 6 x	20	100 – 250	90	EAMR56N02L	2790	3 x 400	0.25	-	
		x x 7 x	40		60	EAMR56N02A	2790	3 x 400	0.20	-	
		x x 8 x	80	20	EAMR56N04A	1440	3 x 400	0.20	-		
MOKP 600 Ex	5 2 3 2 2	x x 1 x	10	250 – 510	180	EAMR63N04	1370	3 x 400	0.6	-	31
		x x 2 x	20	250 – 600	120	EAMR63N04L	1390	3 x 400	0.45	-	
		x x 3 x	40		60	EAMR63L02A	2790	3 x 400	0.20	-	
		x x 4 x	80		20	EAMR63L04A	1440	3 x 400	0.20	-	
		x x 5 x	160		20	EAMR63L04A	1440	3 x 400	0.20	-	
		x x 6 x	20	250 – 450	180	EAMRB63N04	1320	1 x 230	1.35	10	
		x x 7 x	40	250 – 550	90	EAMRB63L02	2780	1 x 230	0.90	8	
		x x 8 x	80	250 – 600	40	EAMRB63L04A	1380	1 x 230	0.55	5	
		x x 9 x	160		40	EAMRB63L04A	1380	1 x 230	0.55	5	

The type number indicates

Place 6:

Stroke 90°	Stroke 60°	Stroke 120°	Stroke 160°	Using transmitter
6	-	-	-	with resistance transmitter 1 x 100 Ω
7	B	F	J	with CPT 1Az 4 – 20 mA without built-in feeding source
8	C	G	K	without transmitter
9	D	H	L	with DCPT 4 – 20 mA with built-in feeding source

- Place 7:
- 0 version without built-in regulator of position and without BMO (*block of local control*)
 - 1 version with built-in regulator of position and without BMO (*Note 1*)
 - 2 version without built-in regulator of position and with BMO
 - 3 version with built-in regulator of position and with BMO (*Note 1*)
 - 4 version with power relays, without regulator of position and without BMO (*Note 2*)
 - 5 version with power relays, with regulator of position and without BMO (*Note 2*)
 - 6 version with power relays, without regulator of position and with BMO (*Note 2*)
 - 7 version with power relays, with regulator of position and with BMO (*Note 2*)

Place 8: adjusting time, tripping torque (*digit according to Table 1*)

Place 9: way of connecting (*digit or letter according to Table 2*)

The actuators for surrounding temperature -50 °C to +55 °C will be marked with letter F at the last place of the complementary type number: namely 52 32x.xxxxF.

In all markings of explosion-proofness of actuators type no. 52 32x.xxxxF, the marking of sub-groups of group II of an explosion-proof electric device according to standard ČSN EN 60079-0 will be changed from IIC to IIB, namely Ex db IIB T6 Gb.

Notes:

- 1) This version is delivered with single-phase electric motor only
- 2) This version is delivered with three-phase electric motor only
- 3) Electric actuators type no. 52 320 are not delivered in version with built-in contactors for three-phase type
- 4) The version 52 32x.xxxxF is only available with three-phase electric motors and without transmitter or with current transmitter CPT 1AF.

Table 2 – Way of connecting MODACT MOKP Ex electric actuators
 – specifying of the 9th place in type number

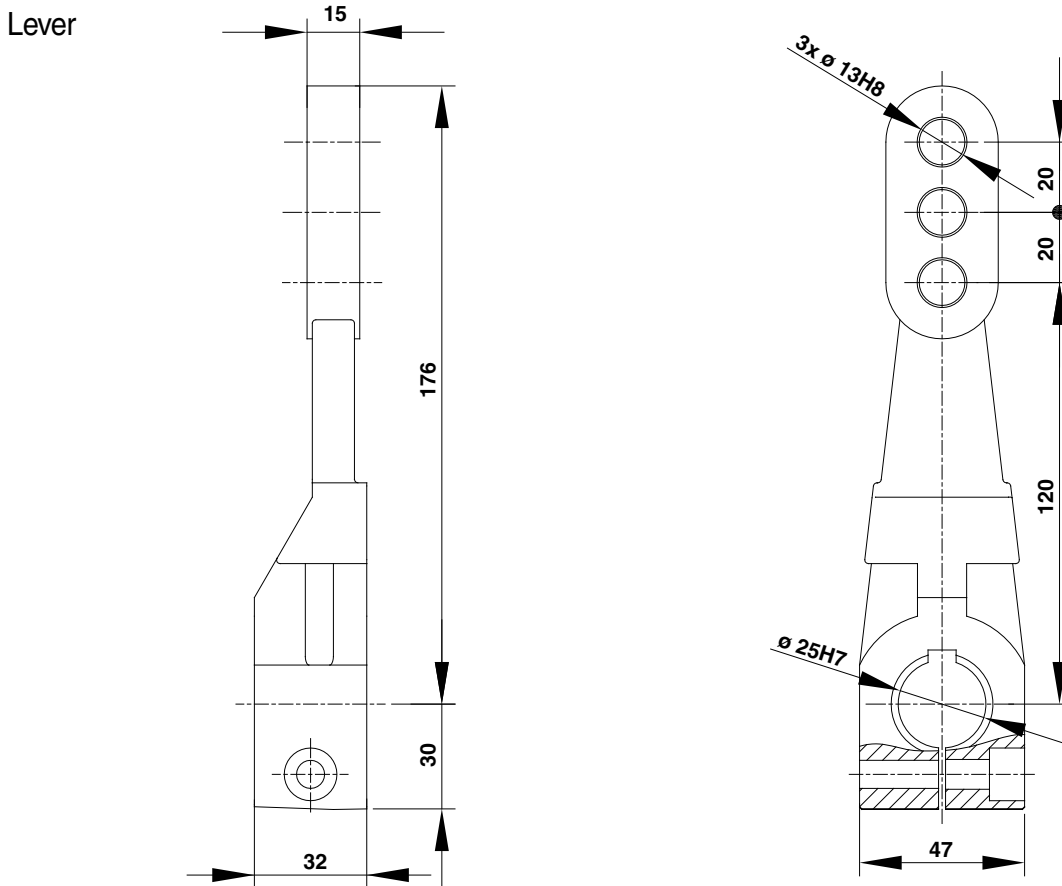
Flange size	Connection	Square size s [mm]	Square position	Marking of the 9th position in the type number	Structural design of output
Type number 52 320					
F05	keyway	∅ 22		0	collar
F05	square	14	basic	1	exchangeable inserts
F04	keyway	∅ 18		2	
F04	square	11	basic	3	
F05		14	positioned at a 45°	4	
F04		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 52 321					
F10	square	22	basic	1	exchangeable inserts
F07	keyway	∅ 28		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 52 322					
F12	keyway	∅ 50		0	collar
F12	square	27	basic	1	exchangeable inserts
F10	keyway	∅ 42		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	
<p>Actuator output shaft position (when viewing towards the local position indicator). The handwheel tallies with the CLOSED position</p> <p style="text-align: center;">Keyway connection Square</p> <p style="text-align: center;">close basic position (to DIN 3337) positioned at a 45° (to ISO 5211)</p> <p style="text-align: center;">open duct axis</p>					

Another connection of electric actuators on demand.
 Another connection of electric actuators on demand.

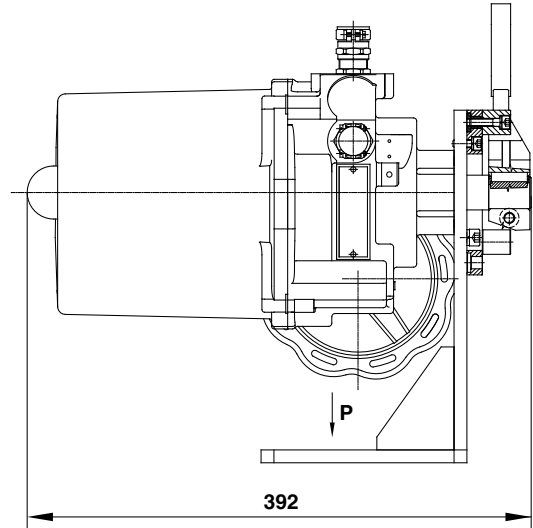
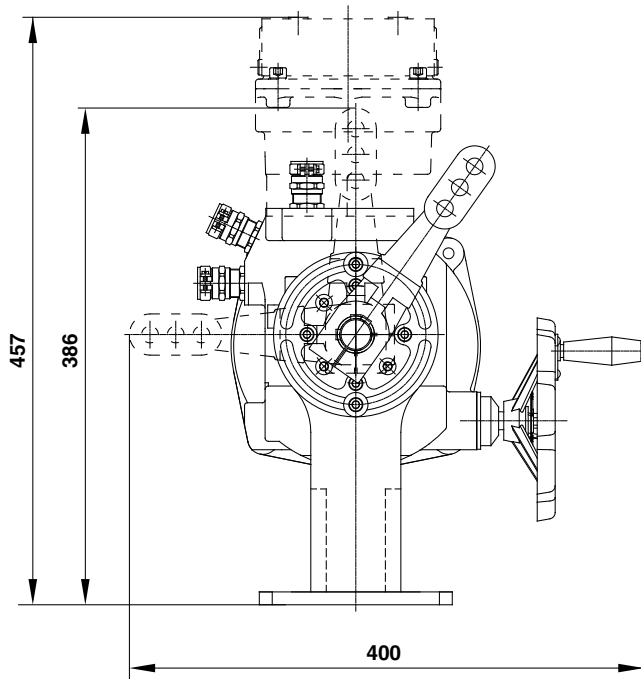
Addition to table 2 – MODACT MOKP Ex electric actuators with lever adapter
 – mechanical connection (designation of the 9th place of the type number)

Flange size	Connection	Square size s [mm]	Square position	Marking of the 9th position in the type number	Structural design of output
Type number 52 320					
F05	keyway	∅ 22		0	collar
F05	square	14	basic	1	exchangeable inserts
F04	keyway	∅ 18		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	ppositioned at a 45°	7	
F05		16	basic	8	
F05		16	positioned at a 45°	9	
Actuator with lever adapter				W	
Type number 52 321					
F07	keyway	∅ 28		0	not available
F07	square	17	basic	1	exchangeable inserts
F05	keyway	∅ 22		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	
Actuator with lever adapter				W	

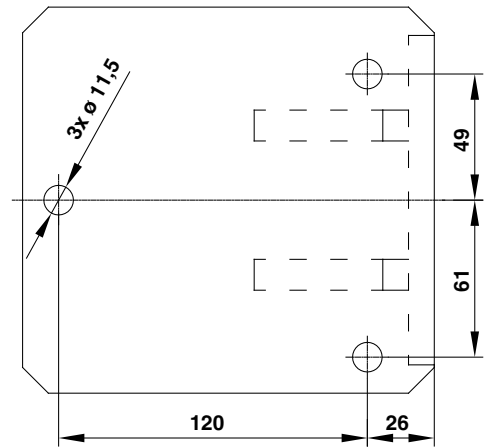
Dimensional sketch of MODACT MOKP Ex electric actuator with lever adapter



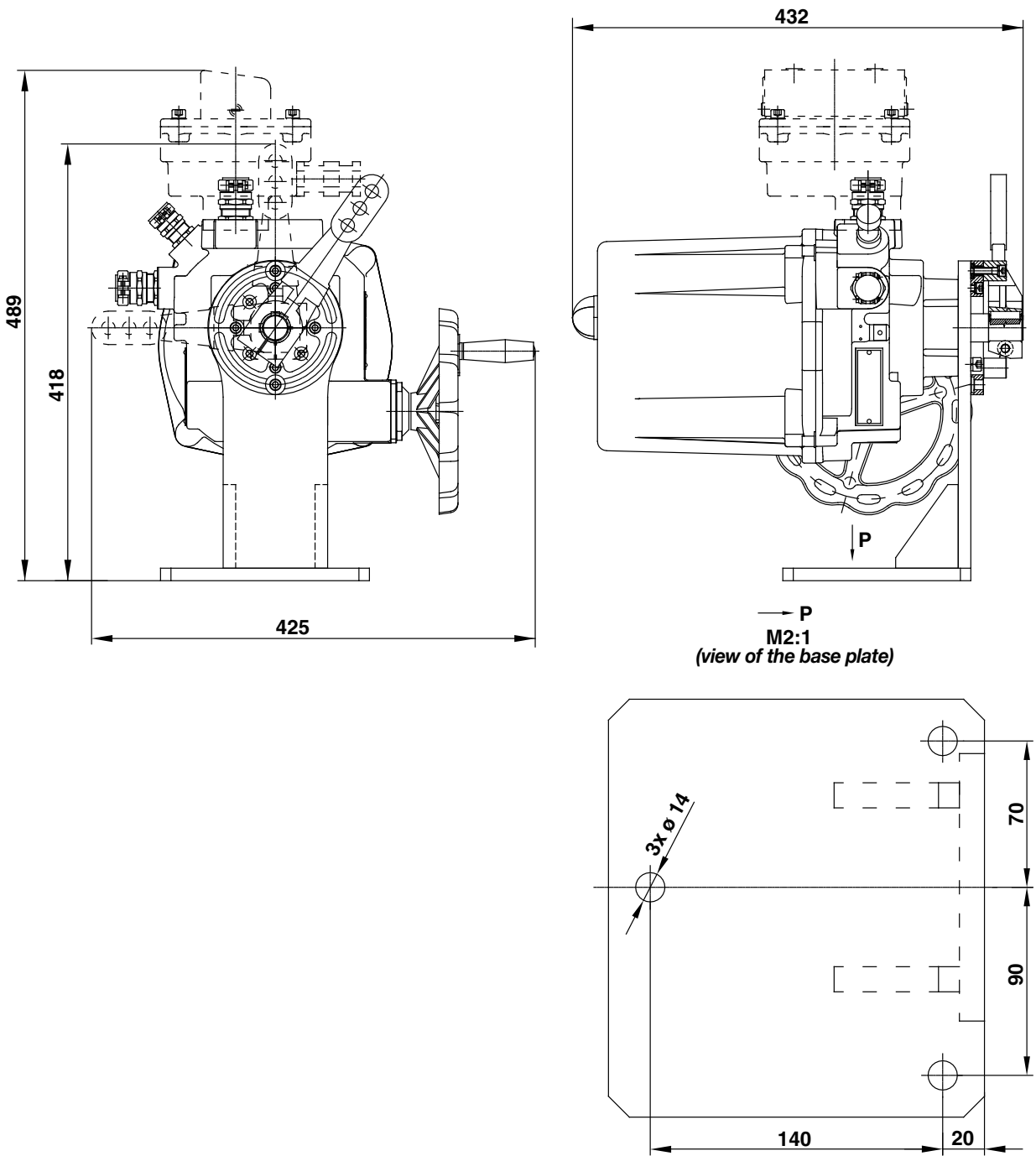
Lever adapter with Type No. 52 320 actuator



→ P
M2:1
(view of the base plate)

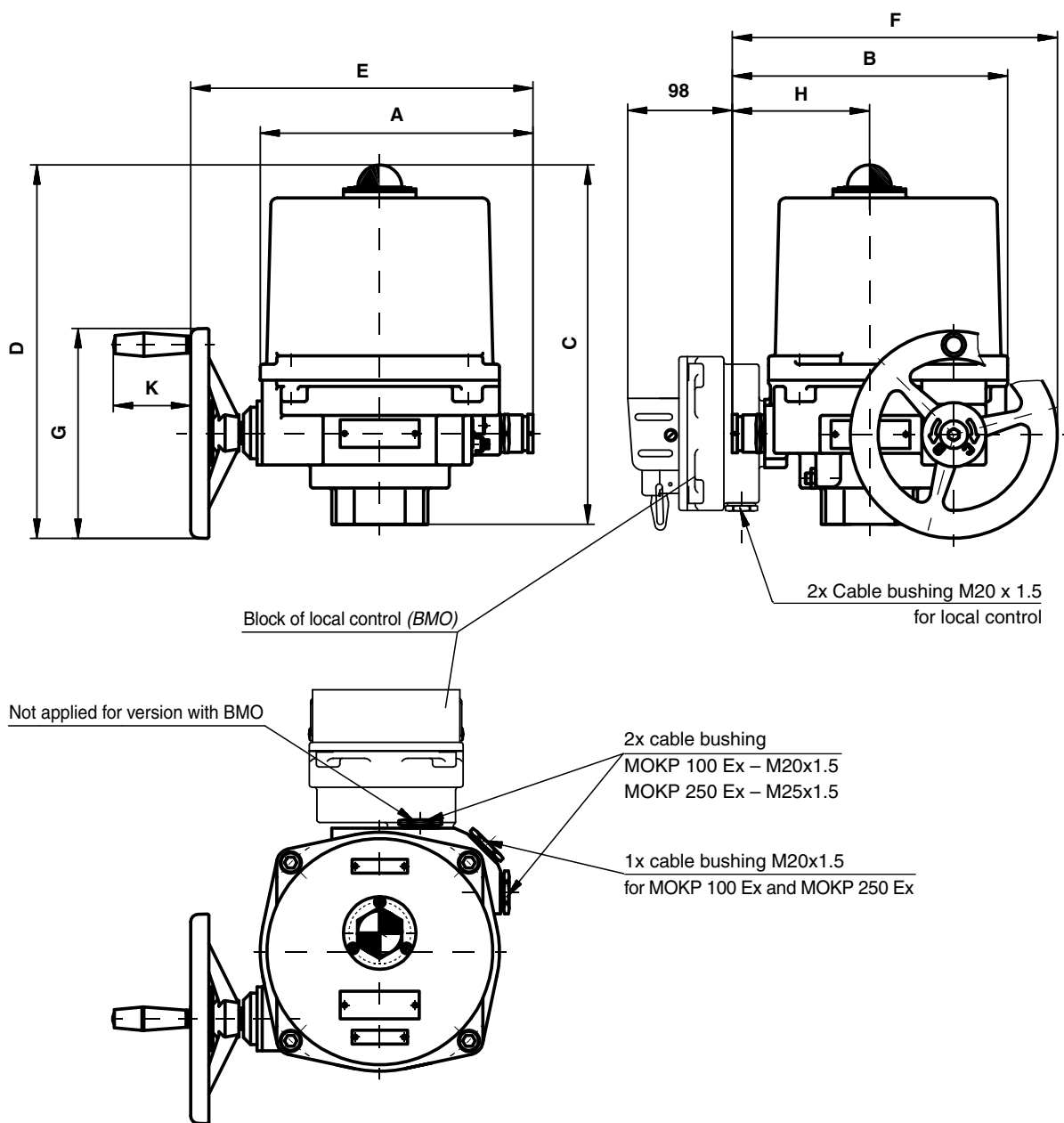


Lever adapter with **Type No. 52 321** actuator



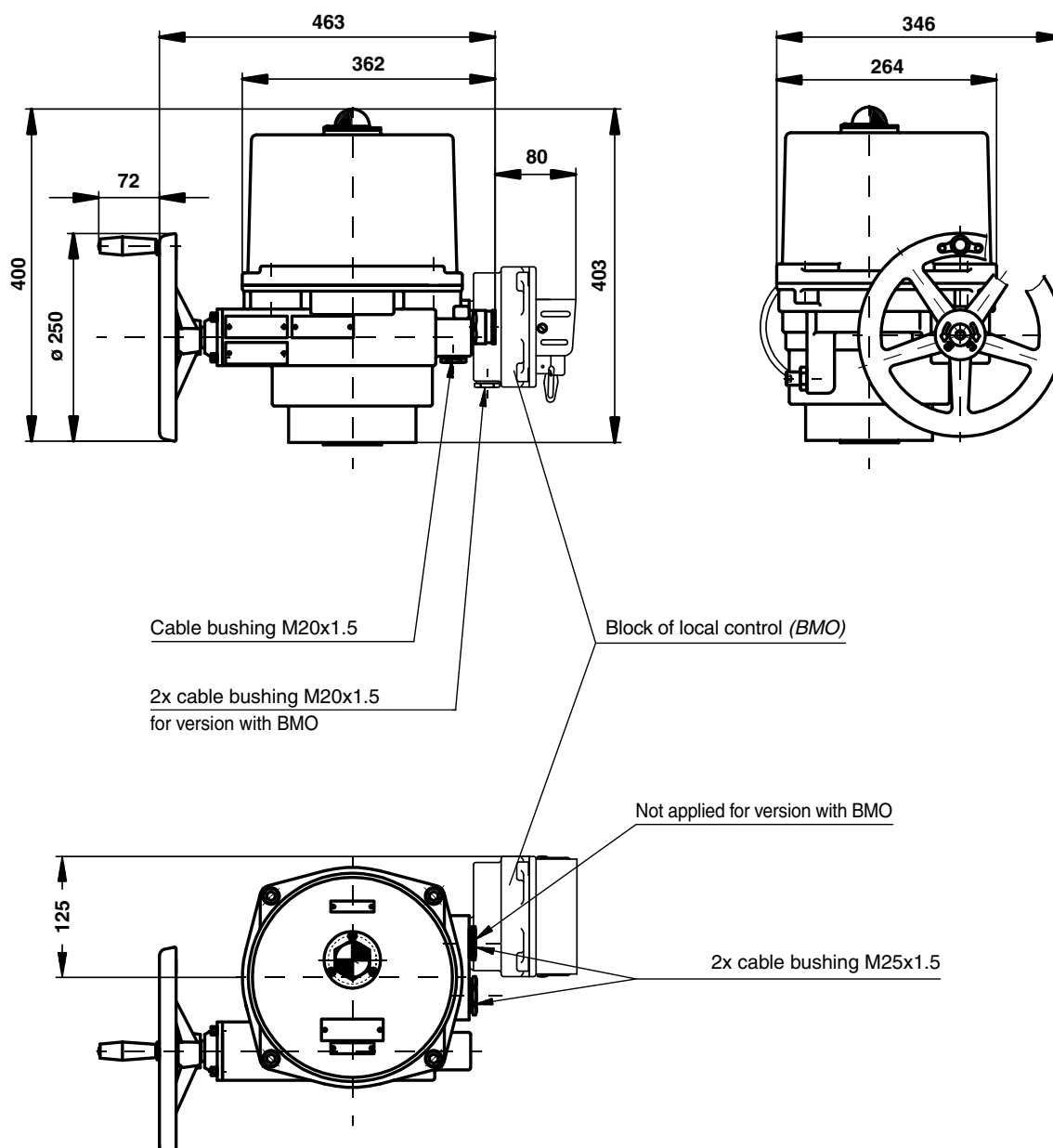
Note: Other dimensions are listed in the dimension table.

Dimensional sketch of **MODACT MOKP 100 Ex and 250 Ex** electric actuators



Type	A	B	C	D	E	F	G	H	K
MOKP 100 Ex	253	276	297	308	311	316	160	170	72
MOKP 250 Ex	306	312	368	385	376	363	200	183	72

Dimensional sketch of MODACT MOKP 600 Ex electric actuators



Threaded holes for cable entries are marked M20x1.5 or M25x1.5 in accordance with article 13 of ČSN EN 60079-1. These entries are sealed by plugs M20x1.5 or M25x1.5.

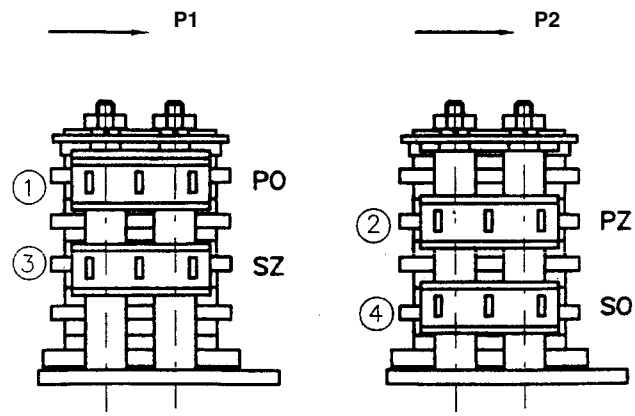
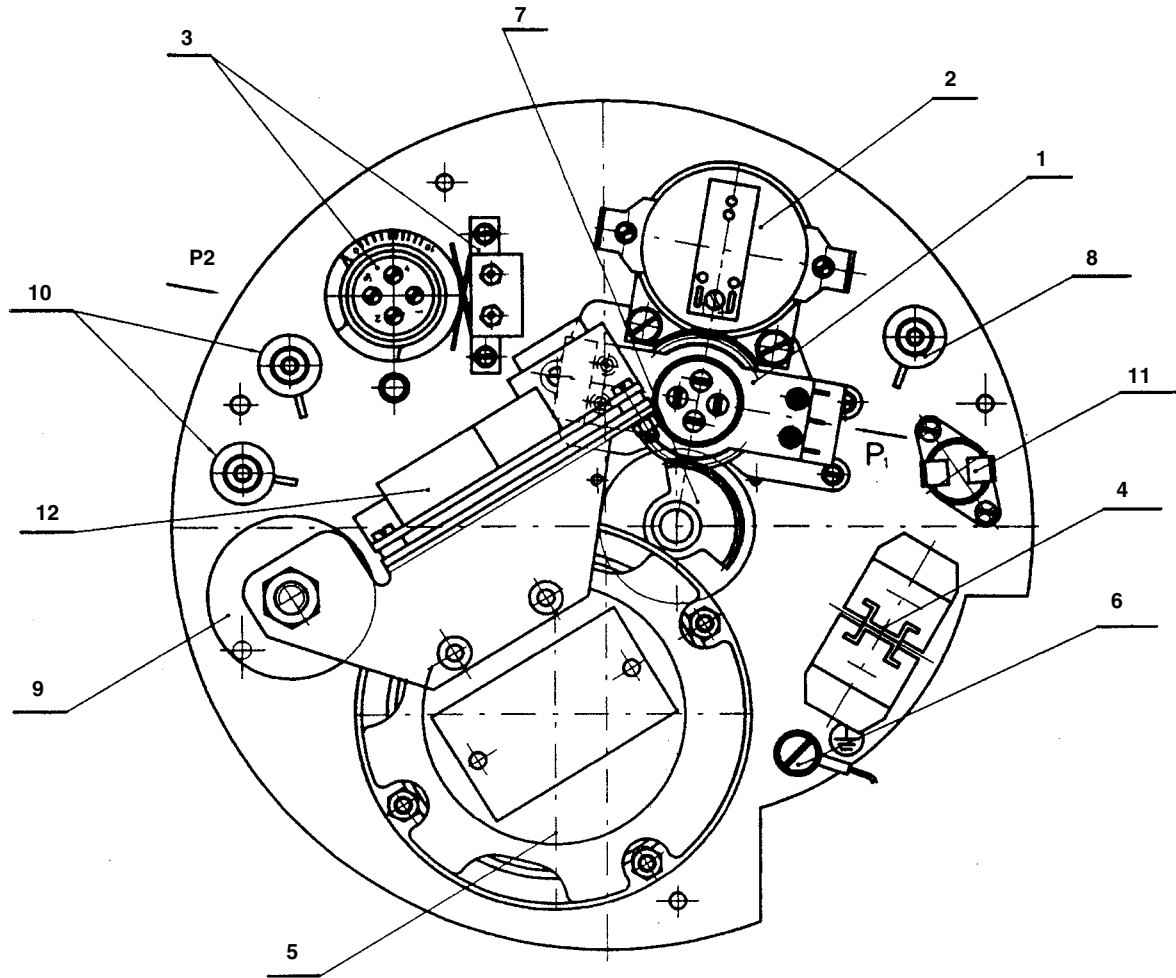
The customer is obliged to establish electrical connection for direct entry to the flameproof enclosure, that corresponds to the requirements of ČSN EN 60079-14 and the protective enclosure is at least IP67.

At the customer's request, the manufacturer can supply motors with cable bushing system that meets the requirements of ČSN EN 60079-14 Article 10.4.2.d for direct entry into flameproof enclosure of group IIC. For entry into actuators flameproof enclosure are used certified sealed bushings appropriate sizes.

For entry into actuators flameproof enclosure are used Peppers glands (type CR-U) or HAWKE glands (type ICG 623) according to following table:

Cable diameter	Gland	Threaded entry
CR-U/25	M25x1,5	11.7 – 20.0 mm
ICG 623/B	M25x1,5	13.0 – 20.2 mm
CR-U/20	M20x1,5	9.5 – 14.0 mm
ICG 623/A	M20x1,5	11.0 – 14.3 mm

Fig. 1: Control plate (Type No. 52 321)



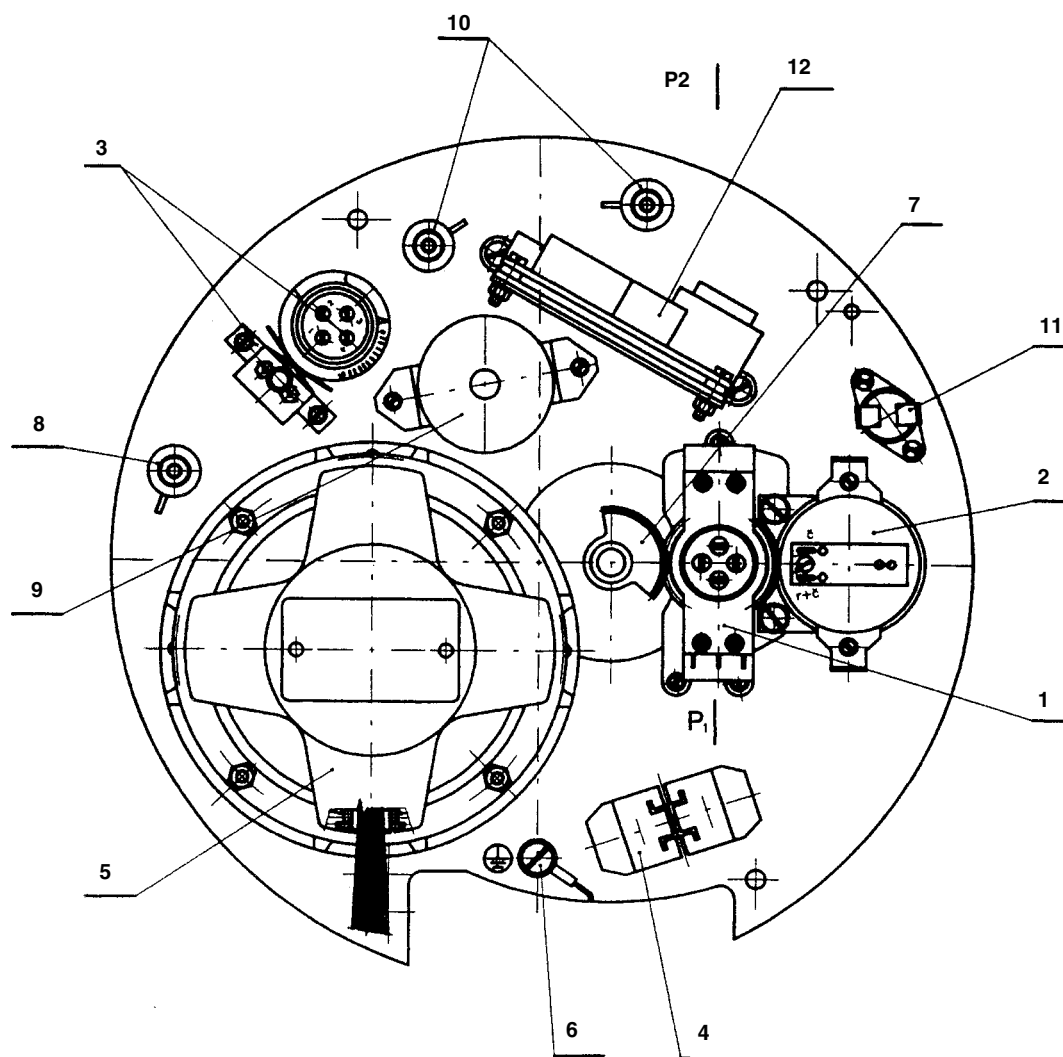
Legend:

- 1 – position unit
- 2 – position transmitter
- 3 – moment unit
- 4 – terminal board
- 5 – electric motor
- 6 – internal protective connector
- 7 – drive wheel (or segment)
- 8 – heating element
- 9 – starting capacitor
- 10 – protective resistance
- 11 – thermal switch
- 12 – regulator

Note:

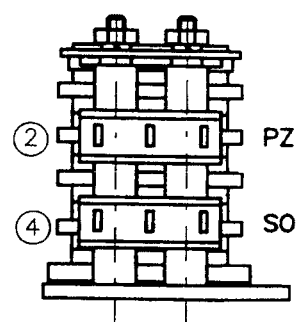
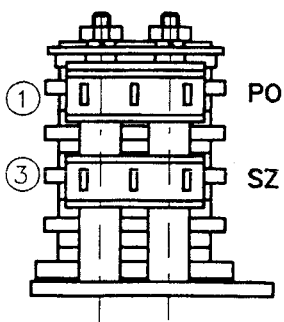
The numbers in circles are identical with the numbers of releasing screws of cams of the position unit.

Fig. 1a: Control plate (Type No. 52 322)



→ P1

→ P2



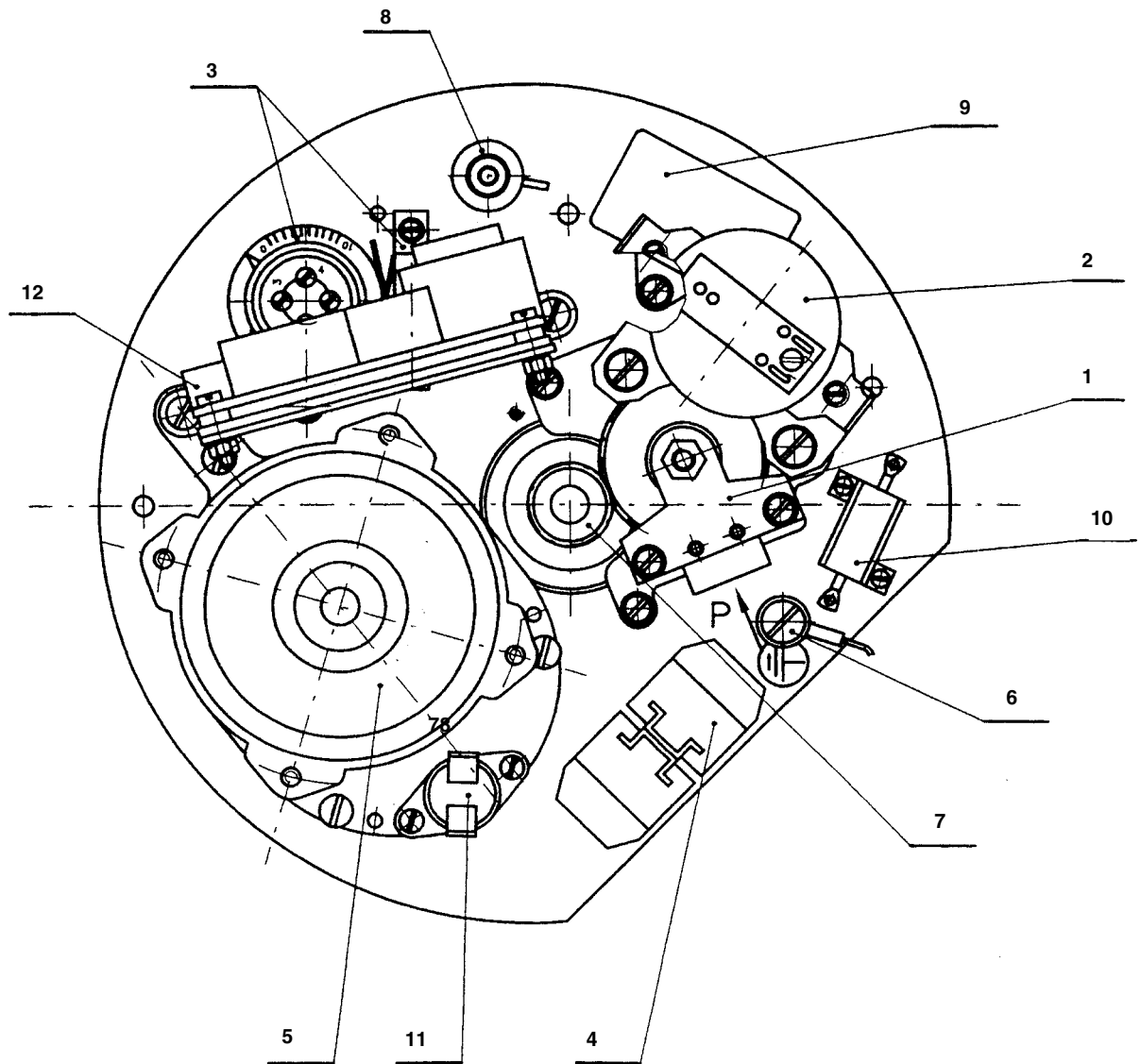
Legend:

- 1 – position unit
- 2 – position transmitter
- 3 – moment unit
- 4 – terminal board
- 5 – electric motor
- 6 – internal protective connector
- 7 – drive wheel (or segment)
- 8 – heating element
- 9 – starting capacitor
- 10 – protective resistance
- 11 – thermal switch
- 12 – regulator

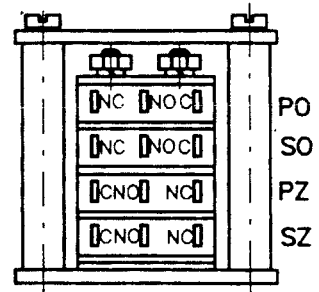
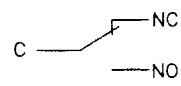
Note:

The numbers in circles are identical with the numbers of releasing screws of cams of the position unit.

Fig.2: Control plate (Type No. 52 320)



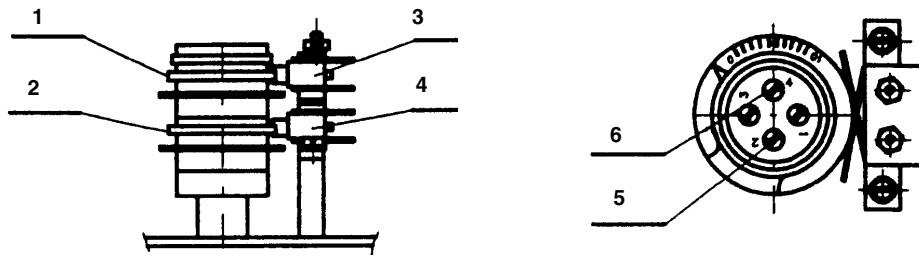
→ P



Legend:

- 1 – position unit
- 2 – position transmitter
- 3 – moment unit
- 4 – terminal board
- 5 – electric motor
- 6 – internal protective connector
- 7 – drive wheel (or segment)
- 8 – heating element
- 9 – starting capacitor
- 10 – protective resistance
- 11 – thermal switch
- 12 – regulator

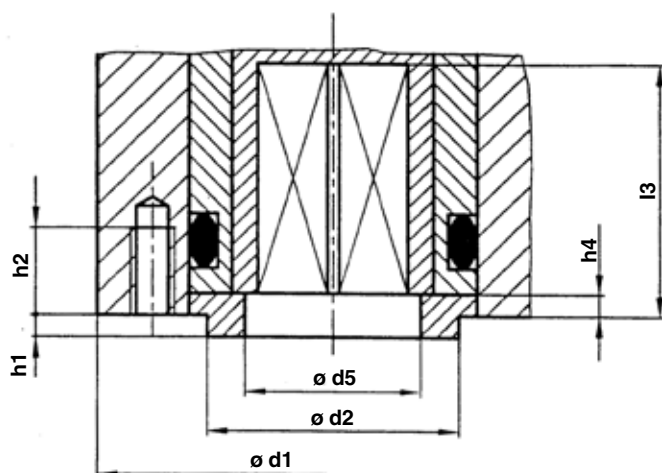
Fig 3: Moment switches



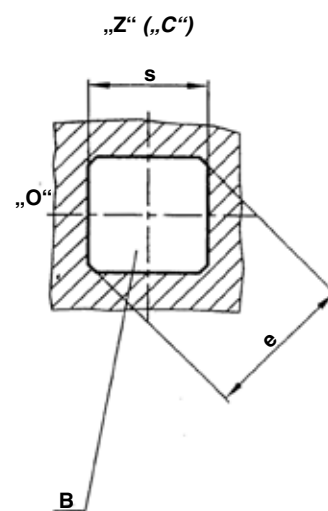
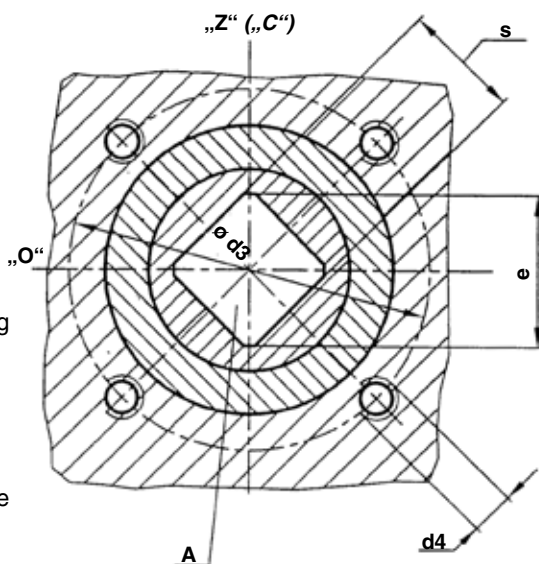
Legend:

- 1 – cam of switch MO
- 2 – cam of switch MZ
- 3 – moment switch MO
- 4 – moment switch MZ
- 5 – releasing screw of cam switch MZ
- 6 – releasing screw of cam switch MO

Connecting dimensions of **MODACT MOKP Ex** electric actuators
 – connecting with square



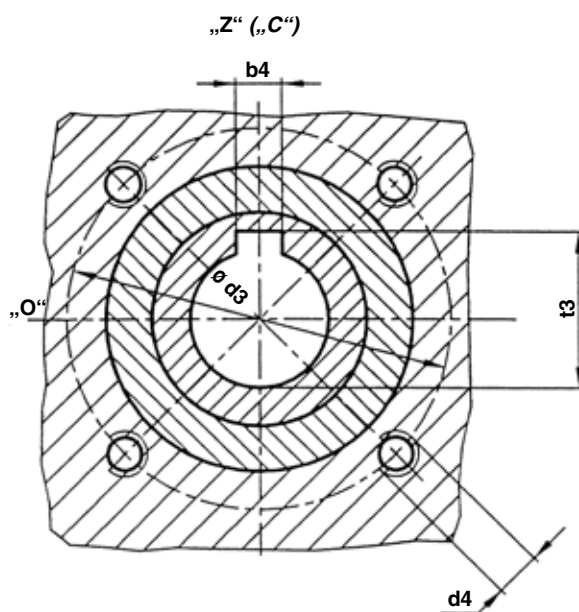
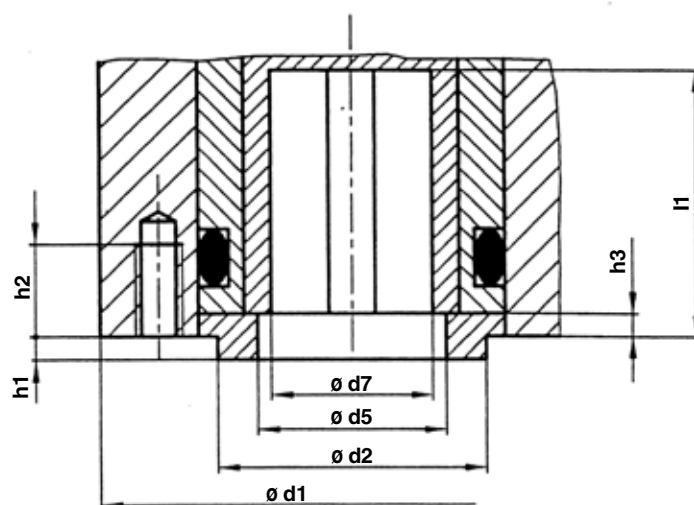
The position of the square hole in end position of electric actuator. The position "Opened" is to the left of the position "Closed" when viewing in the direction to the local indicator of position. The square hole is according to DIN 79:2013-02. Connecting dimensions are according to DIN 3337 or ISO 5211. The position "Z" ("C") of the square hole for spindle is identical with the position "Z" ("C") on the local indicator of position.



A – connection by square in basic position
 B – connection by square turned by 45 °

Flange	$\varnothing d1$	$\varnothing d2$ f8	$\varnothing d3$	d4	h4		h2 min.	h1 max.	l3 min.	s H 11	e min.	$\varnothing d5$
					min.	max.						
F04	65	30	42	M6	1,5	0,5	12	3	15.1	11	14.1	25
										16.1	16.1	
F05	65	35	50	M6	3	0,5	12	3	19.1	14	18.1	28
									22.1	16	21.2	
F07	90	55	70	M8	3	0,5	13	3	23.1	17	22.2	40
									26.1	19	25.2	
F10	125	70	102	M10	3	1	16	3	30.1	22	28.2	50
									33.1	24	32.2	
									37.1	27	36.2	
F12	150	85	125	M12	3	1	20	3	37.1	27	36.2	70
									44.1	32	42.2	

Connecting dimensions of **MODACT MOKP Ex** electric actuators
 – connecting with keyway



The position of groove for keyway according to ISO 5211 and DIN 3337 is in the position "Closed". The position "Opened" is to the left of the position "Closed" when viewing in the direction to the local indicator of position.

The position "Z" ("C") of the groove for keyway is identical with the position "Z" ("C") on the local indicator of position.

Flange	ø d1	ø d2 f8	ø d3	d4	d7 H9	h3 max.	h2 min.	h1 max.	l1 min.	b4 Js 9	t3 ^{+0.4} _{+0.2}	ø d5
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	55	14	53.5	70

Wiring diagrams of MODACT MOKP Ex electric actuators

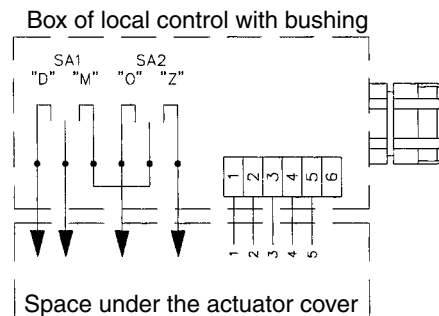
Legend:

SQ1 (MO) – moment switch for direction “opens”
 SQ2 (MZ) – moment switch for direction “closes”
 SQ3 (PO) – position switch for direction “opens”
 SQ4 (PZ) – position switch for direction “closes”
 SQ5 (SO) – signalling switch for direction “opens”
 SQ6 (SZ) – signalling switch for direction “closes”
 EH, ST – heating element with thermal switch
 BQ1, BQ2 – double resistance transmitter of position
 1 x 100 Ω
 CPT1 – current position transmitter CPT 1Az
 DCPT – current position transmitter DCPT
 DCPZ – feeding source for DCPT

M1 ~, TH – electric motor, single-phase,
 with thermal protection
 C – motor capacitor
 M3~, TH – electric motor, three-phase, with thermal
 protection
 SA1 – change-over switch “local” – “remote”
 SA2 – change-over switch “opens” – “closes”
 ZP2 – electronic position regulator
 KO – power relay for direction “opens”
 KZ – power relay for direction “closes”
 F – thermal relay
 BMO – block of local control
 R1, R2 – 2x resistance protection 10 Ω
 for single-phase motors

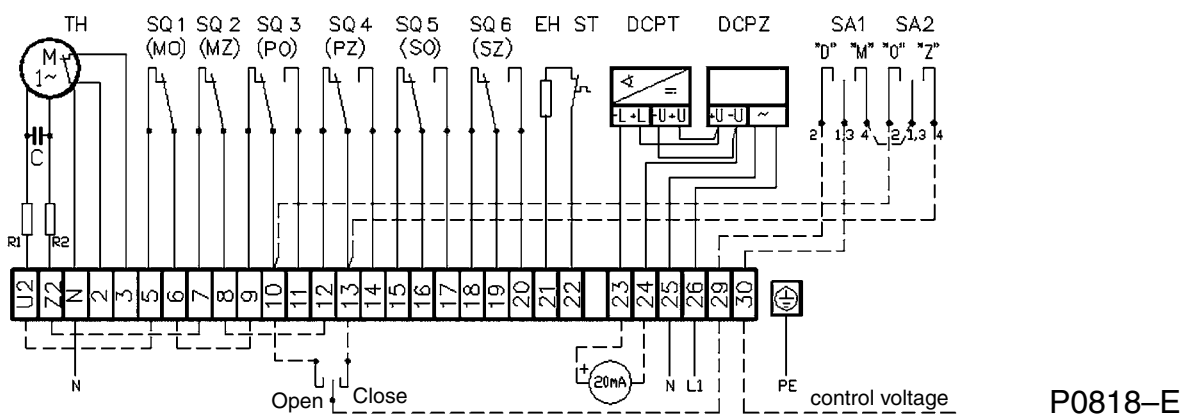
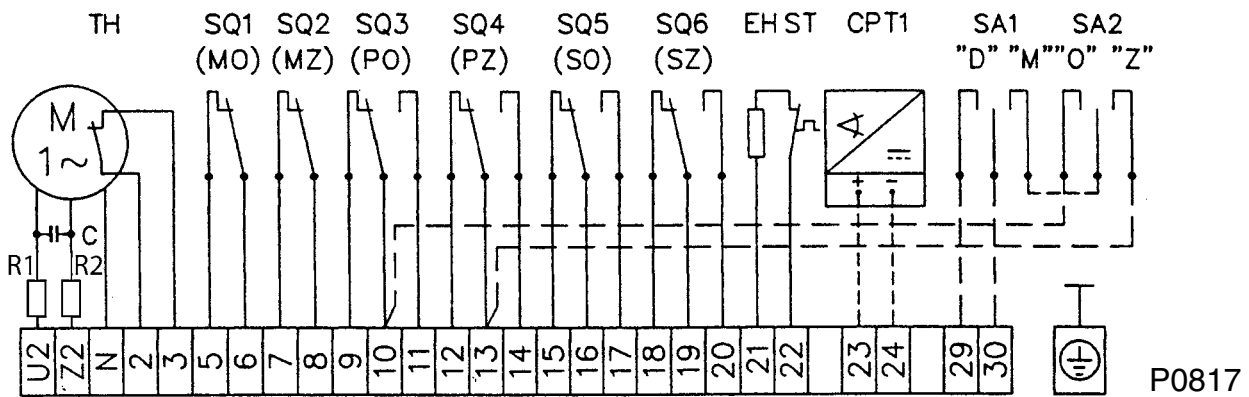
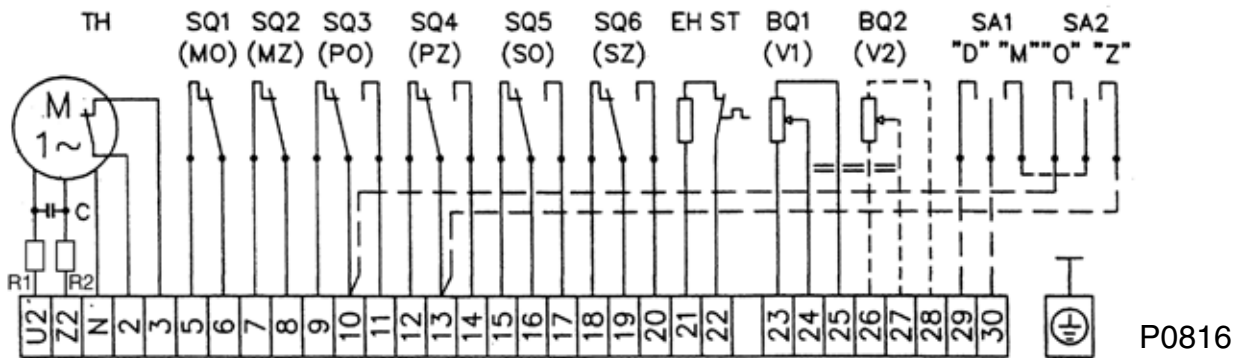
Wiring diagram:

Number of diagram	Elektric motor	Feed-back transmitter	Others
P0816	single-phase	1 x 100 Ω	
P0817	single-phase	CPT 1Az or without transmitter	
P0818 E	single-phase	DCPT + source	
P0819	three-phase	1 x 100 Ω	
P0820	three-phase	CPT 1Az or without transmitter	
P0821 E	three-phase	DCPT + source	
P0822 E	single-phase	DCPT	regulator ZP2
P0823 E	three-phase	DCPT	regulator ZP2, thermal relay, reversing power relay



The actuators can be fitted with the block of local control (*dashed lined in the diagrams*). The actuator **MOKP Ex** has two cable bushings. **If the actuator is in the version with the block of local control**, one bushing is on the actuator body, the other on the body of local control. In order that the actuator can meet requirements for the version Ex, the conductors between the actuator and the local control are imbedded into an insulation material. In addition to conductors for connection of the local control, the insulation material also imbeds additional five conductors which are at disposal to the customer. In the actuator these conductors are designated with the numbers 1 - 5 and their ends are insulated. In the block of local control they are connected to the row terminal board on the terminals 1 - 5, (*the terminal no. 6 is free*).

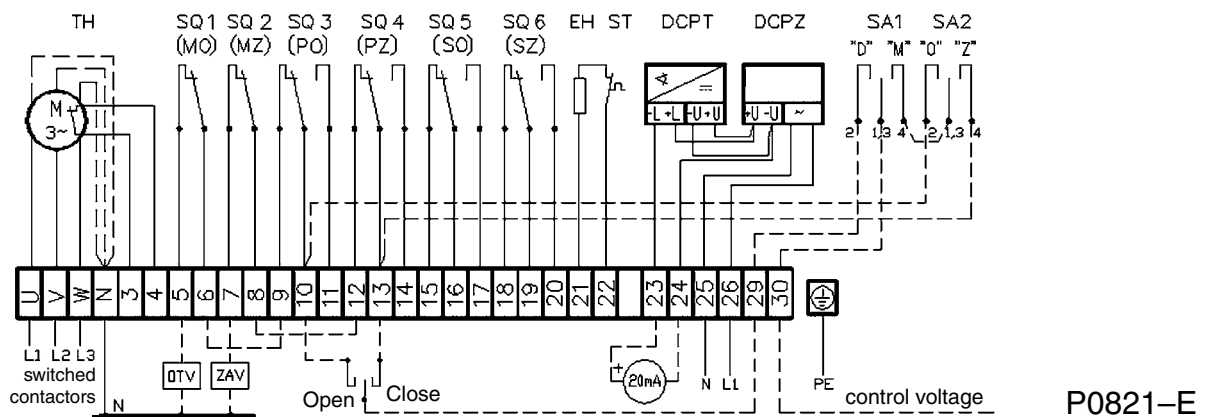
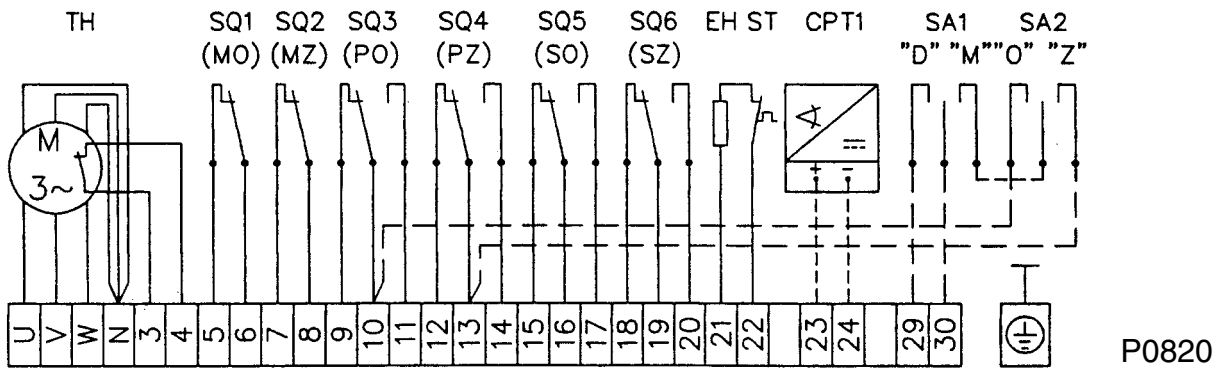
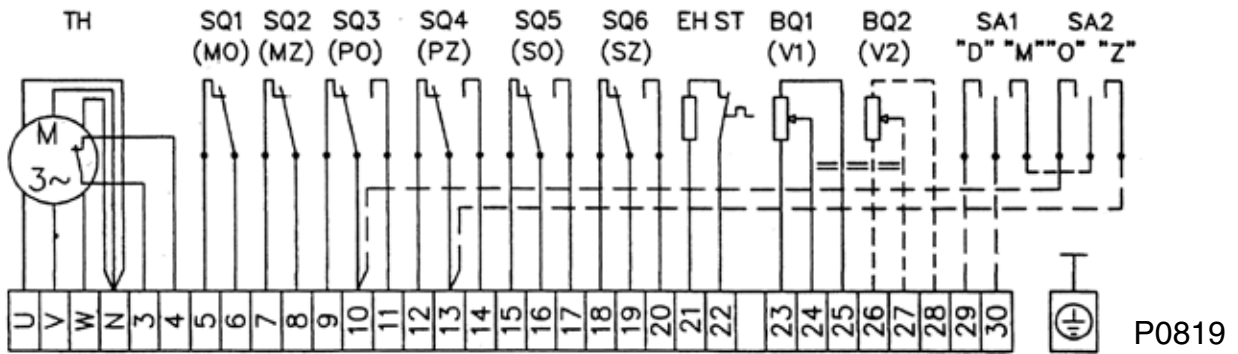
Wiring diagrams of **MODACT MOKP Ex** electric actuators,
Type No. 52 320 - 52 322



Note:

The position and signalling switches can work as a single-circuit type. State of contacts in the scheme is valid for the intermediate position.

In the version with the current transmitter the user shall ensure connection of the double-wire circuit of the current transmitter to electric earth of the linked-up regulator, computer, etc. The connection should only be realized at one point in any part of the circuit outside of the electric actuator. The voltage between the electronics and the transmitter case must not exceed 50 V DC.

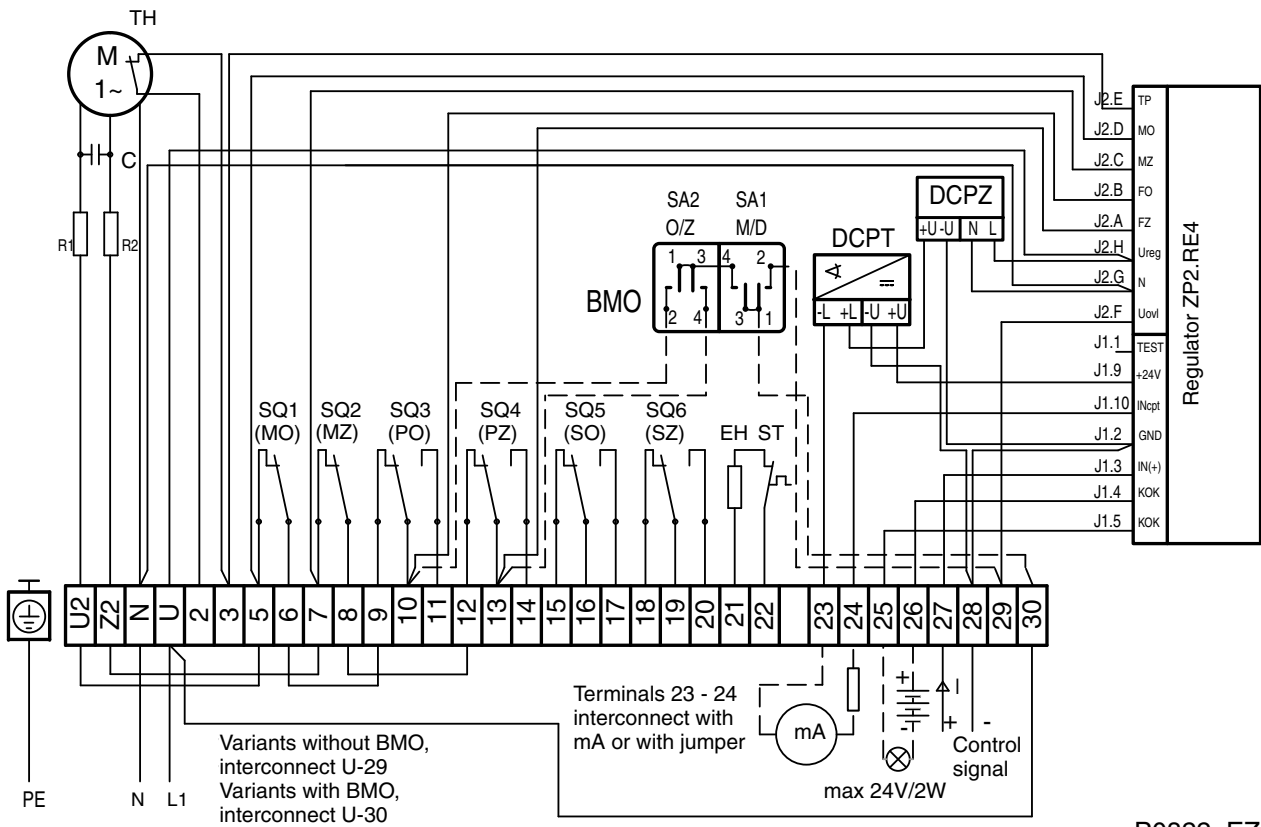


Note:

The position and signalling switches can work as a single-circuit type. State of contacts in the scheme is valid for the intermediate position.

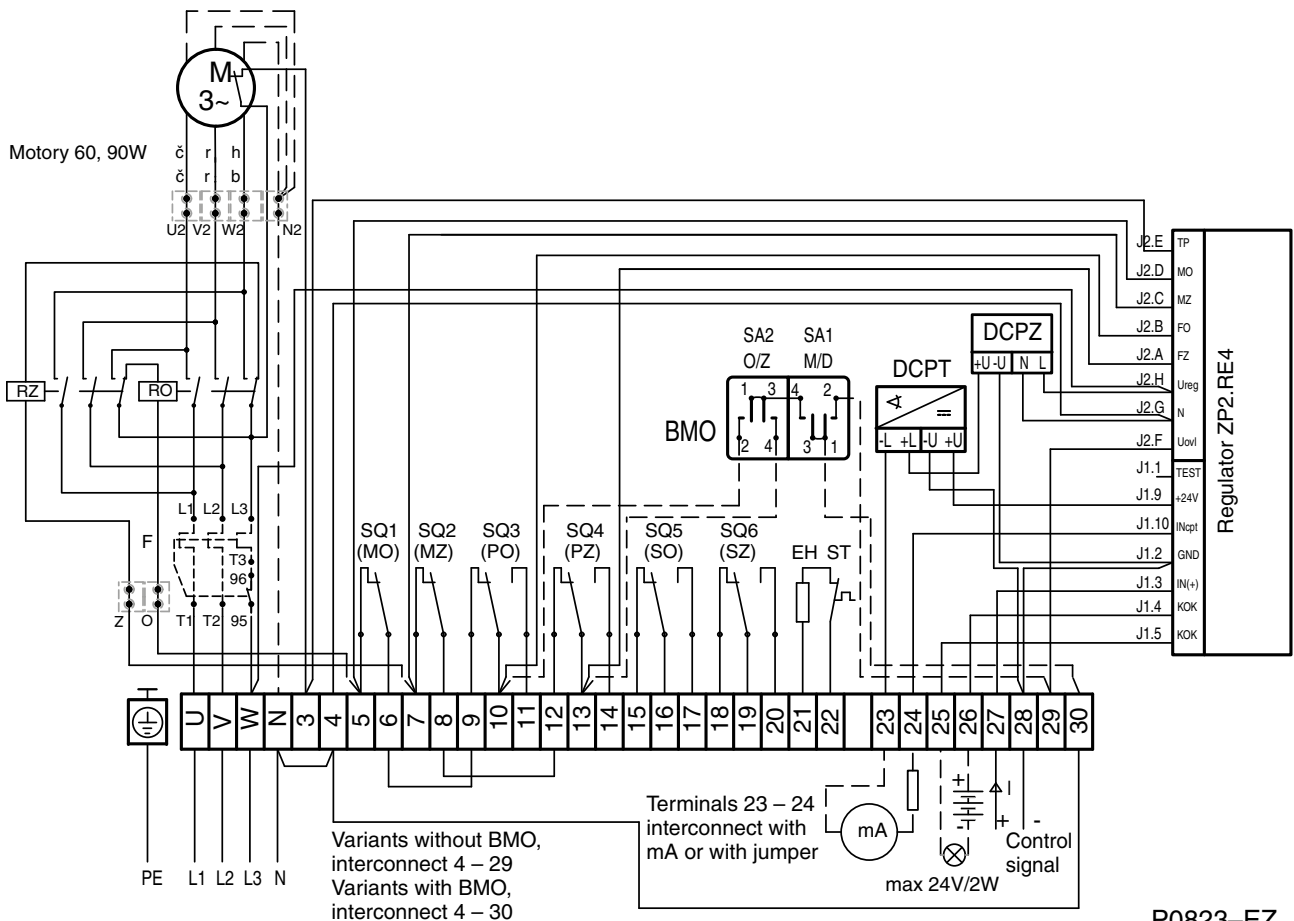
In the version with the current transmitter the user shall ensure connection of the double-wire circuit of the current transmitter to electric earth of the linked-up regulator, computer, etc. The connection should only be realized at one point in any part of the circuit outside of the electric actuator. The voltage between the electronics and the transmitter case must not exceed 50 V DC.

Wiring diagram of **MODACT MOKP Ex** Control electric actuators,
Type No. 52 320 - 52 322



P0822-EZ

Wiring diagram of **MODACT MOKP Ex** Control electric actuators,
Type No. 52 320 - 52 322



52 320 – relay Finder 56.34

52 321 a 52 322 – relay Schrack RM735730 + thermal relay Lovato

P0823-EZ

Note:

Analog input signal and analog feedback signal (if brought out of the actuator) must be conducted by shielded cables. The shielding must be connected to the signal source frame.



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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

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