ZPA PEČKY, a.s.

CATALOGUE

# Explosion - Proof Electric Rotary Multi-turn Actuators

# MODACT MO EEx

## Type numbers 52 120 - 52 125

10/18


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

# 1. APPLICATION

The **MODACT MO EEx** electric rotary multi-turn actuators are specially intended for controlling devices by a reversing rotary motion, e.g. slide valves and valves, and, in connection with an appropriate gearbox, also flap or ball valves, and other devices for which they are suitable due to their properties.

They can be operated in an environment with a danger of explosion of explosive gaseous atmosphere in zone 1 and zone 2 according to ČSN EN 60079-10-1. The actuators are designed as a device of group **II,** category **2G** in compliance with standards ČSN EN 60 079-0:2013, ČSN EN 60 079-1:2015 and ČSN EN 60079-7:2017 for explosive gaseous atmosphere.

The actuators **MODACT MO EEx** are available for surrounding temperature from -25 °C to +55 °C.

The actuators **MODACT MO EEx** are available for surrounding temperature from -50 °C to +55 °C *(in the version without position transmitter or with current transmitter CPT 1AF)*. In the type designation, there are letters F *(52 12x.xxxxF)* at the last places of their complementary type number.

**The actuators marked**

The actuators are marked with protection against explosion and symbols of the group and category of the device Ⓔx **II 2G** and according to version for surrounding temperature from -25 °C to +55 °C with marking **Ex db eb IIC T4 Gb** *(type No. 52 125 with marking Ex de IIB T4 Gb)* or for surrounding temperature from -50 °C to +55 °C or -60 °C to +55 °C with marking **Ex db eb IIB T4 Gb** *(see Data on actuators).*

## The actuators MODACT MO EEx of mining version

Electric actuators **MODACT MO EEx** can be supplied in mining version marked Ⓔx **I M2 Ex db eb I Mb.**

Another modification of actuators is design for use in spark-safe control circuits. Certification of **MO EEx** actuators was extended and the actuators defined as simple device according to Art. 5.7 ČSN EN 60079-11 with marking **"II M2 Ex db ib I Mb".**

With their design, the actuators meet basic conditions of the level of **spark safety protection "ib"**. The control part of the circuits *(control of actuators)* and the power part of the circuits *(electric motors)* are separated and each has its own switchboard.

**The actuators marked**

- label of protection against explosion and symbols of the group and category of the device Ⓔx **II 2G** or Ⓔx **I M2**
- and according to version for surrounding temperature

| | |
|---|---|
| from -25 °C to +55 °C | with marking **Ex db eb IIC T4 Gb** *(type No. 52125 marked Ex db eb IIB T4 Gb)* |
| from -50 °C to +55 °C or from -60 °C to +55 °C | with marking **Ex db eb IIB T4 Gb** |
| – as modification for use in mines in group **I,** category **M2** | with marking **Ex db eb I Mb** |
| – as modification for use in spark-safe control circuits in mines group **I,** category **M2** | with marking **Ex db ib I Mb** |

## Designation of explosion-proof properties

It consists of the following symbols:

**Ex** Electric device complies with the standard ČSN EN 60 079-0 and related standards for various types of protection against explosion.
**db** Designation of the type and level of protection against explosion, explosion-proof closure according to ČSN EN 60 079-1.
**eb** Designation of the type and level of protection against explosion, secured version according to ČSN EN 60 079-7.
**II** Designation of the group of explosion-proof electric device according to ČSN EN 60 079-0.
**B, C** Designation of the sub-group of the group of explosion-proof electric device according to ČSN EN 60 079-0.
**T4** Designation of temperature class of explosion-proof electric device of the Group II according to ČSN EN 60 079-0.
**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.
**ib** Designation of protection of spark safety according to ČSN EN 60 079-11.

## 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.

**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.

**Secured design "e"** – Type of protection against explosion with additional measures adopted for increased safety against non-permissible temperature increase and formation of sparks or arcs inside and on external parts of the electric device which, under normal operating conditions, does not form sparks or arcs.

**Spark safety "i"** – Type of protection against explosion based on limited electric energy in the device and the interconnecting line that is exposed to an environment with danger of explosion to a level lower than the level that could cause ignition by sparkling or thermal effects.

**Spark-safe circuit** – A circuit that, under testing conditions prescribed according to standard ČSN EN 60079-11, produces neither sparks nor thermal effects that would be able to cause ignition of a given explosive gaseous atmosphere.

**Simple device** – An electric component or combination of components of simple design with well defined electric parameters compatible with spark safety of the circuit in which they are used.

**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.

## Standards

The following basic standards apply to explosion-proof actuators:

| | |
|---|---|
| ČSN EN 60079-0 | Electrical devices for explosive gaseous atmosphere. General requirements. |
| ČSN EN 60079-1 | Electrical devices for explosive gaseous atmosphere. Explosion-proof closure "d". |
| ČSN EN 60079-7 | Electrical devices for explosive gaseous atmosphere. Secured version "e". |
| ČSN EN 60079-10 | Electrical devices for explosive gaseous atmosphere. Specification of dangerous areas. |
| ČSN EN 60079-14 | Regulations for electrical devices in areas with a danger of explosion of flammable gases and vapours. |
| ČSN IEC 60721 | Types of environment for electrical devices. |
| ČSN 33 0371 | Non-explosive mixtures. Classification and testing methods. |
| ČSN 34 3205 | Operation of electric rotating machines and work with them. |
| ČSN EN 60079-11 | Explosive atmospheres – Part 11: Protection of device by spark safety. |

# 2. OPERATING CONDITIONS, OPERATING POSITION

## Operating conditions

The **MODACT MO EEx** actuators should withstand the effect of operating conditions and external influences, Classes AA7, AB7, AC1, AD5, AE5, AF2, AG2, AH2, AK2, AL2, AM2, AN2, AP3, BA4, BC3 and BE3N2, according to ČSN Standard 33 2000-5-51 ed. 3.

When placed on an open area, the actuator is recommended to be fitted with a light shelter to protect it against direct action of atmospheric effects. The shelter should overhang 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 built-in 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 adhered to. It is advisable to remove dust whenever its layer becomes about 1 mm thick.

***Notes:***

*A sheltered location is considered a space where atmospheric precipitations are prevented from falling at an angle of up to 60° from the vertical.*

*The location of the electric motor should be such that cooling air has free access to the motor and no heated-up blown-out air is drawn in the motor again. For air inlet, the minimum distance from the wall is 40 mm. Therefore, the space in which the motor is located should be sufficiently large, clean and ventilated.*

## Classes of external influences – as extracted from ČSN Standard 33 2000-5-51 ed. 3.

**Class:**

1) Surrounding temperature from -25 to +55 °C or from -50 °C to +55 °C or from -60 °C to +55 °C
2) Surrounding temperature identical with point 1) and relative humidity from 10 % to 100 % with condensation
3) AC1 – elevation above sea level ≤ 2000 m
4) AD5 – splashing water in all directions
5) AE5 – small dust content in air; medium layers of dust; daily dust fall out more than 35 mg/m$^2$, but not exceeding 350 mg/m$^2$ per day
6) AF2 – occurrence of corrosive or polluting substances from atmosphere Presence of corrosive polluting substances is significant
7) AG2 – medium mechanical stress by impacts – common industrial processes
8) AH2 – medium mechanical stress by vibrations – common industrial processes
9) AK2 – serious risk of growth of vegetation and moulds
10) AL2 – Serious danger of occurance of animals *(insects, birds, small animals)*
11) AM2 – harmful effects of escaping stray currents
12) AN2 – medium sun radiation. Intensity from 500 to 700 W/m$^2$
13) AP3 – medium seismic effects. Acceleration from 300 to 600 Gal
14) BA4 – staff capability. Instructed persons.
15) BC3 – frequent contact of persons with earth potential. Persons often touch foreign conductive parts or stand on conductive base.
16) BE3N2 – danger of explosion of combustible gases and vapours. ČSN 33 2320 – ZONE 1.

## 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 correcponding to category of corrosion aggressiveness C4, C5-I and C5-M.

In following table is provided and 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

Working position of actuators **MODACT® MO EEx** actuators with plastic lubricant – any position.

The actuators with plastic lubricant are labelled *"Filled: solid grease"* on the power box at the side of the handwheel.

Actuators with oil charge – position limited only by slope of electric motor axis – max. 15° under the horizontal level. In this way, reducing of service life of rubber sealing of the electric motor shaft by possible fragments or impurities from the oil filling is prevented.

When the actuator is assembled with the electric motor above the horizontal plane the oil filling should be topped up so that reliable lubrication of the motor pinion is ensured.

The actuators with oil filling are not labeled.

### *Lubricants*

| Type number of actuator | Adjusting speed of output shaft [min$^{-1}$] | Surrounding temperature [°C] | |
|---|---|---|---|
| | | -25 +60 | -50 +60 |
| 52 120, 52 121, 52 122 52 123, 52 124 | up to 40 | M | M |
| | above 40 | O | O |
| 52 125 | applies to all speeds | O | O |

***Note:*** *M – plastic lubricant*
*O – gearbox oil*

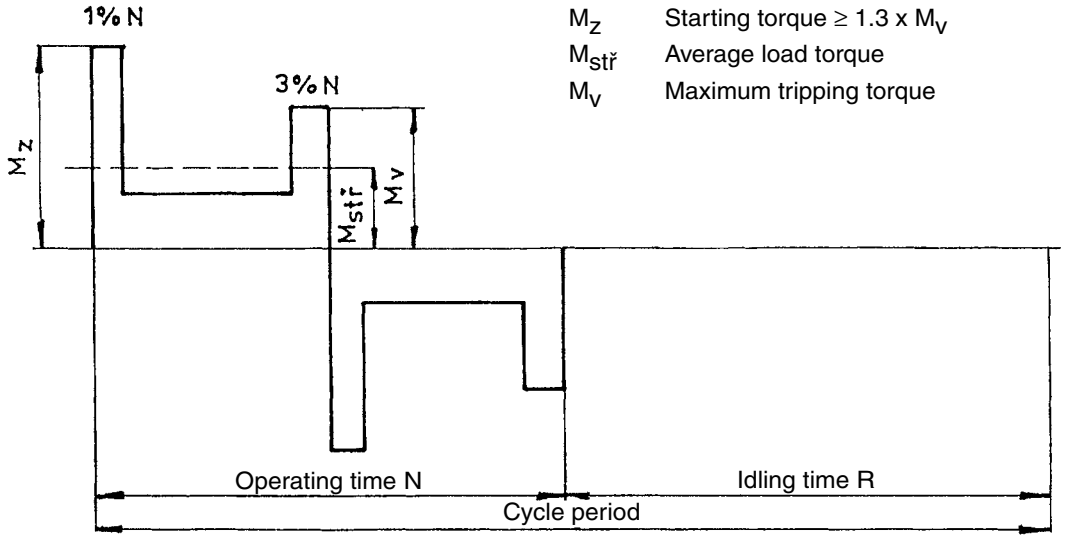
# 3. OPERATION MODE, SERVICE LIFE OF ACTUATORS

## Operation mode

According to ČSN EN 60 034-1, the electric actuators can be operated in the S2 load category. The run time at temperature +50 °C is 10 min, the mean load torque is max. 60 % of the value of the maximum tripping torque $M_V$.

According to ČSN EN 60 034-1, the electric actuators can also be operated in S4 load category *(interrupted operation with starting-up).* The load factor N/N+R is max. 25 %; the longest operating cycle N+R is 10 min *(the course of load is shown in the picture).*The maximum number of switching actions in automatic control mode is 1200 h$^{-1}$. The mean load torque with load factor 25 % and ambient temperature of 50 °C shall not exceed 40 % of the maximum tripping torque $M_V$.

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




$M_Z$ Starting torque ≥ 1.3 x $M_V$
$M_{stř}$ Average load torque
$M_V$ Maximum tripping torque

***Course of operating cycle***

## Service life

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 |

# 4. TECHNICAL DATA

## Supply voltage

The actuators **MODACT MO EEx** have been designed to operate at supply voltage of 3 AC 380 to 690 V, ±10 %, 50 Hz, ±2 %.

Within this supply voltage range, all parameters are kept up except the starting torque which varies with the square of the supply voltage deviation from the rated value. This dependence is directly proportional to the supply voltage variation; no larger supply voltage and frequency fluctuations are permitted.

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

## Protective enclosure

The type of protective enclosure **MODACT MO EEx** is IP 55, according to ČSN EN 60529.

## 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 or 2, according to the customer's requirements. If no tripping torque adjustment has been specified by the customer the maximum tripping torque is adjusted.

## Starting torque

The starting torque of the actuator is a calculated value determined by the starting torque of the electric motor and the total gear ratio and efficiency of the actuator. After run reversation, the actuator can produce a starting torque for the duration of 1 to 2 revolutions of the output shaft when torque-limit switching is locked. This can take place in either end position or in any intermediate position.

## Self-locking

The actuator is self-locking provided that the load is applied only in the opposite direction to the output shaft motion of the actuator. Self-locking is provided by an arresting roller that stops the electric motor even in the manual control mode.

For safety reasons, it is strictly prohibited to use the actuators for driving lifting appliances that may be used for the transport of persons or equipment in cases where people might be present under the lifted load.

## 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 ranges of working stroke are given in Table No. 1 or No. 2.

## Rising spindle

In the design variants with connecting dimensions, Shapes A and C, the actuators can be adapted for mounting to the valve with a rising spindle that projects over the upper end of the actuator output shaft in the end position of the valve. The space reserved for the rising spindle is clearly shown in the dimensional sketches. The user should mount a cylindrical guard of the rising spindle instead of the port cover at the control box top, if required. This guard has not been included in the delivery of the actuator.

## 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.**

# 5. 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 except the region in which they are locked *(see Starting torque).*

The tripping torque can be adjusted within the range shown in Table 1 or 2. 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 MO EEx** electric actuators can be supplied without position transmitter or can be fitted with position transmitter:

**a) Resistance transmitter MEGATRON 1 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 potentiometer 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 % *(for a maximum stroke of 120°)* |
| Hysteresis, including gears | | ≤ 5 % *(for a maximum stroke of 120°)* |
| (*The non-linearity and hysteresis are related to a signal value of 20 mA*). | | |
| Loading resistance | | 0 – 500 Ω |
| Output signal | | 4 – 20 mA or 20 – 4 mA |
| Supply voltage | for $R_{load}$ = 0 – 100 Ω | 10 to 20 V DC |
| | for $R_{load}$ = 400 – 500 Ω | 18 to 28 V DC |
| Maximum supply voltage ripple | | 5 % |
| Maximum transmitter power demand | | 560 mW |
| Insulation resistance | | 20 MΩ 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 *(additional on demand)* |
| Dimensions | | ø 40 x 25 mm |

For the transmitter CPT 1Az 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.

## 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”. The former change-over switch can be built-in as two-pole or four-pole. The change-over switches are installed in a terminal-board box and the control elements on the lid of this terminal-board box.

# 6. ELECTRIC PARAMETERS

## External electric connection

The electric actuator is equipped with a terminal board for connection to external circuits. This terminal board uses screw terminals allowing conductors with a maximum cross-section 4 $mm^2$ to be connected. Access to the terminal board is obtained after removal of the terminal box cover. All control circuits of the electric actuator are brought out to the terminal board. The terminal box is fitted with cable bushings for connecting the electric actuator. The electric motor is fitted with an independent box with a terminal board and a bushing. When connecting external conductors strip the end to length of 8 mm and to each terminal insert the conductors that the conductor insulation intervene to their metal parts. This will be observed surface and air insulation distances for increased safety “e”.

## Actuator internal wiring

The internal wiring diagrams of the **MODACT MO EEx** actuators with terminal designation are shown in this Mounting and operating instructions.

Each actuator is provided with its internal wiring diagram on the inner side of the terminal box. 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. Isolation resistance of the electric motor is min. 1.9 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 = 3 x 230/400 V | 1 800 V, 50 Hz |

## Deviations of basic parameters

| | |
|---|---|
| Tripping torque | ±12 % of the maximum range value |
| Adjusting speed | -10 % of the maximum range value<br>+15 % of the rated value *(in no-load operation)* |
| Setting of signalling switches | ±2.5 % of the maximum range value<br>*(for the ranges, refer to the Mounting instructions).* |
| Hysteresis of signalling switches | max. 4 % of the maximum range value |
| Setting of position-limit switches | ±25° of the angle of output shaft displacement *(without the influence of running-down)* |
| Hysteresis of position-limit switches | max. 45° of the angle of output shaft displacement |

## Protection

For protection against electric shock to ČSN 33 2000-4-41 the actuators are provided with an internal protective terminal in addition to an protective terminal, according to ČSN 18 6330. The electric motor is also fitted with a protective terminal. The protective terminals are provided with a mark, according to ČSN EN 60417-1 and 2 *(013 760).*

**If isn´t the actuator equipped with overcurrent protection when purchased is needed to ensure that the protection is secured externally.**

## Electric actuators MODACT MO EEx of mining version I M2 for spark-safe control circuits

The actuator ensures the level of protection of spark safety “ib” as a simple device according to ČSN EN 60079-11. Individual circuits of the actuator can be connected to various spark-safe circuits. However, no other than spark-safe circuits may be connected.

The electric motor has its own separate switchboard. The electric motor circuit is not spark-safe.

**Description of the electric control circuits**

Components used

1. Actuator switchboard

The switchboard is formed of certified row terminals MXK4. Conductors of maximum cross-section 4 $mm^2$ can be connected to the switchboard. The conductors must insulated to metal parts of the terminal so that spark-safe surface and air insulation distances would be observed.
   – rated voltage 400 V AC / DC
   – rated current 27 A
2. Torque micro-switches XGK 12-88-J21
   – rated voltage 250 V AC, 60 V DC
   – rated current 26 A
3. Position-limit and signalling micro-switches D 433-B8LA
   – rated voltage 250 V AC, 60 V DC
   – rated current 6*(2)* A
4. Bushing D41V21x0,75
   – rated voltage 300 V
   – maximum constant current 8 A
5. Anti-condensation heater TRA25
   – rated loading without cooling plate 12.5 W
   – maximum permitted voltage 550 V AC / DC
   – value of the anti-condensation heater is given by magnitude of control voltage stated by the customer in the order.

| ***For instance:*** *for voltage* | *12 V* | *24 V* | *48 V* |
|---|---|---|---|
| *Value of anti-condensation heater* | *12 Ω* | *56 Ω* | *220 Ω* |

6. Position transmitter

The position transmitter is an optional accessory. For spark-safe circuits, resistance transmitter of the following parameters is certified only:
   – rated power output 1 W
   – acceptable voltage 50 V DC
   – maximum current 100 mA
   – electric strength 500 V

Actuators intended for using in spark-safe control circuits cannot be fitted with:
   – current transmitter of position 4 – 20 mA
   – block *(change-over switches)* of local control

**Location of components**

The switchboard is installed in the switchboard box with protective enclosure IP 67. Other components are installed in the control box of the actuator in the version of firm closure “d”. The boxes are separated by certified bushing D41V21 x 0.75 *(thickness of insulation of bushing conductors is 0.5 – 0.6 mm).*

**Independent spark-safe circuits and their electric parameters.**

| Terminals | Connected part | Function | Parameters of spark-safe circuit |
|---|---|---|---|
| 10-11 | XGK 12-88-J21 | torque switch | Ui = 60V, Ii = 1A, Li = 0 mH, Ci = 0 µF |
| 12-13 | XGK 12-88-J21 | torque switch | Ui = 60V, Ii = 1A, Li = 0 mH, Ci = 0 µF |
| 14-15-16 | D 433-B8LA | position-limit switch | Ui = 60V, Ii = 1A, Li = 0 mH, Ci = 0 µF |
| 17-18-19 | D 433-B8LA | position-limit switch | Ui = 60V, Ii = 1A, Li = 0 mH, Ci = 0 µF |
| 20-21-22 | D 433-B8LA | signalling switch | Ui = 60V, Ii = 1A, Li = 0 mH, Ci = 0 µF |
| 23-24-25 | D 433-B8LA | signalling switch | Ui = 60V, Ii = 1A, Li = 0 mH, Ci = 0 µF |
| 50-51-52 | resistance transmitter | Position sensor 100 ohm | Pi=1W, Ui = 50V, Ii =100mA, Li=0 mH, Ci=0 µF |
| 60-61 | TRA25 | Anti-condensation heater | Pi=12,5W, Ui = 60V, Ii = 1A, Li = 0 mH, Ci = 0 µF |

# 7. DESCRIPTION

## MODACT MO EEx actuators

The **MODACT MO EEx** actuators have been designed for direct mounting on the control device. They can be connected by means of a flange and a clutch, according to ISO DIN 5210 and DIN 3338. Adapters are available for connecting the actuators to valves with different attachment dimensions.

An asynchronous motor drives, via a geared countershaft, the sun gear of a epicyclic gear unit enclosed in the supporting actuator box *(power transmission).* In the mechanical power control mode, the crown gear of a planet epicyclic gear unit is held in steady position by a self-locking worm gear drive. Alternatively, the handwheel, connected with the worm allows manual control to be accomplished even during motor operation without any risk of operator's injury.

The output shaft is fixedly coupled to the planet-gear carrier. It is extended to the control box in which all controls of the actuator are concentrated.

The operation of the position-limit switches, the signalling switches and the position transmitter is derived from the rotary motion of the output shaft via drive mechanisms. The operation of the torque-limit switches is derived from the axial displacement of the "floating" worm of the manual control unit, which is sensed and transferred to the control box by means of a lever.

All controls are accessible after removal of the cover of the control box.

# 8. ORDERING INFORMATION

## Technical specification of the order:

When ordering, please specify the following:

– Number of actuators required
– Actuator designation
– Type number according to the Tables of design variants Nos 1, 2 and 3
– Supply voltage and frequency of electric motor
– Tripping torque adjustment *(If another tripping torque than the maximum is required by the customer).*

## Example of the order:

In the order, the **MODACT MO EEx** explosion - proof rotary multi-turn actuator, Type No. 52 122, in an aluminium design variant with the tripping torque ranging from 160 to 250 Nm and the output shaft adjusting speed of 16 RPM, in standard design with Shape C connecting dimensions, fitted with all units and a potentiometer of 1 x 100 ohm, with the required tripping torque differing from the maximum one, designed to operate at the supply voltage of 3 x 230/400 V at 50 Hz, should be specified as follows:

*Actuator 52 122.7012, torque-limit switches set to 200 Nm, supply voltage of electric motor 3 x 230/400 V, 50 Hz, aluminium design.*

The delivery will include the required electric actuator as specified by the example in the order; no special tools or spare parts are supplied with the actuator. Spare parts should be ordered separately.

## Electric actuators MODACT MO EEx of mining version with designation I M2

In the order, the customer should state that the actuator is to be used in spark-safe control circuits and, if possible, specify their parameters. Based on this specification, the delivered actuator will be fitted with particular anti-condensation heater and labelled with corresponding data.

## Product certification on testing the type

The explosion-proof electric actuators have been certified and the test certificates issued by the Physical Technical Testing Institute *(PTTI),* Ostrava - Radvanice, State Testing Laboratory No. 210.

**Type verification ES certificates**

| | |
|---|---|
| MO EEx 52 120 | – number PTTI 02 ATEX 0043 X |
| MO EEx 52 121, MO EEx 52 122 | – number PTTI 02 ATEX 0044 X |
| MO EEx 52 123, MO EEx 52 124 | – number PTTI 02 ATEX 0107 X |
| MO EEx 52 125 | – number PTTI 02 ATEX 0108 X |

Označení servomotorů dle provedené certifikace:

⟨Ex⟩ **II 2G Ex db eb IIC T4 Gb -25 ≤ Ta ≤ 55 °C**
**II 2G Ex db eb IIB T4 Gb -50 ≤ Ta ≤ 55 °C**
**II 2G Ex db eb IIB T4 Gb -60 ≤ Ta ≤ 55 °C**
**I M2 Ex db eb I Mb**
**I M2 Ex db ib I Mb**

The Test *(Type)* Certificate numbers to which the certificates apply are always quoted on a label attached to the fixed enclosure *(control box)* of the electric actuator. The results of type tests and verifications have been included in the test reports by PTTI Ostrava - Radvanice.

## *Table 1 – MODACT MO EEx – supply voltage 3 x 400 / 230 V, 50 Hz*

*– basic technical parameters and designs (electric actuators with AVM motors)*

| Basic outfit: | 1 electric motor type AVM | 2 torque-limit switches *(OPEN and CLOSE)* |
|---|---|---|
| | 1 anti-condensation heater | 2 position-limit switches *(OPEN and CLOSE)* |

| Type designation | Torque [Nm] | | Speed | Working stroke [revolutions] | Type of lubricant | Electric motor | | | | | Weight [kg] | | Type number | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | tripping | starting | [RPM] | | | Type AVM | Power [kW] | Speed [1/min] | In (400 V) | Iz / In | Design | | basic | additional |
| | | | | | | | | | | | cast-iron | alumin. | 1 2 3 4 5 | 6 7 8 9 10 |
| MO EEx 40/130 – 8 | 20 – 40 | 130 | 8 | 2–250 (2–620) | | 71A8 | 0,09 | 680 | 0,35 | 1,8 | – | 45 | 52120 | x x H x |
| MO EEx 40/220 – 10 | | 220 | 10 | | | 71M06 | 0,18 | 900 | 0,74 | 1,8 | – | 47 | | x x I x |
| MO EEx 40/130 – 17 | | 130 | 17 | | | 71M06 | 0,18 | 900 | 0,74 | 1,8 | – | 47 | | x x J x |
| MO EEx 40/110 – 25 | | 110 | 25 | | | 71MK04 | 0,25 | 1360 | 0,75 | 3,4 | – | 47 | | x x 1 x |
| MO EEx 40/110 – 40 | | 110 | 40 | | | 71M04 | 0,37 | 1360 | 1,05 | 3,1 | – | 49 | | x x 2 x |
| MO EEx 40/130 – 50 | | 130 | 50 | | ♦ | 71MK02 | 0,37 | 2810 | 0,9 | 5,6 | – | 49 | | x x K x |
| MO EEx 40/80 – 80 | | 80 | 80 | | ♦ | 71MK02 | 0,37 | 2810 | 0,9 | 5,6 | – | 49 | | x x L x |
| MO EEx 40/130 – 8 | 40 – 80 | 130 | 8 | | | 71A8 | 0,09 | 680 | 0,35 | 1,8 | – | 45 | | x x M x |
| MO EEx 80/220 – 10 | | 220 | 10 | | | 71M06 | 0,18 | 900 | 0,74 | 1,8 | – | 47 | | x x N x |
| MO EEx 80/130 – 17 | | 130 | 17 | | | 71M06 | 0,18 | 900 | 0,74 | 1,8 | – | 47 | | x x P x |
| MO EEx 80/110 – 25 | | 110 | 25 | | | 71MK04 | 0,25 | 1360 | 0,75 | 3,4 | – | 47 | | x x 3 x |
| MO EEx 80/110 – 40 | | 110 | 40 | | | 71M04 | 0,37 | 1360 | 1,05 | 3,1 | – | 49 | | x x 4 x |
| MO EEx 80/200 – 50 | | 200 | 50 | | ♦ | 71M02 | 0,55 | 2810 | 1,3 | 5,9 | – | 49 | | x x R x |
| MO EEx 80/120 – 80 | | 120 | 80 | | ♦ | 71M02 | 0,55 | 2810 | 1,3 | 5,9 | – | 49 | | x x S x |
| MO EEx 125/170 – 8 | 80 – 125 | 170 | 8 | | | 71B8 | 0,12 | 660 | 0,46 | 1,8 | – | 45 | | x x T x |
| MO EEx 125/230 – 11 | | 230 | 11 | | | 71MK04 | 0,25 | 1360 | 0,75 | 3,4 | – | 47 | | x x 6 x |
| MO EEx 125/200 – 17 | | 200 | 17 | | | 71ML06 | 0,25 | 900 | 0,95 | 2,9 | – | 47 | | x x U x |
| MO EEx 125/170 – 25 | | 170 | 25 | | | 71M04 | 0,37 | 1360 | 1,05 | 3,1 | – | 49 | | x x 5 x |
| MO EEx 125/200 – 50 | | 200 | 50 | | ♦ | 71M02 | 0,55 | 2810 | 1,3 | 5,9 | – | 49 | | x x V x |
| MO EEx 100/130 – 8 | 63 – 100 | 130 | 8 | 2–250 (2–620) | | 71A8 | 0,09 | 680 | 0,35 | 1,8 | 70 | 45 | 52121 | x x M x |
| MO EEx 100/200 – 10 | | 200 | 10 | | | 71M06 | 0,18 | 900 | 0,74 | 1,8 | 70 | 47 | | x x N x |
| MO EEx 100/180 – 17 | | 180 | 17 | | | 71ML06 | 0,25 | 900 | 0,95 | 2,9 | 70 | 47 | | x x P x |
| MO EEx 100/180 – 25 | | 180 | 25 | | | 80MK06 | 0,37 | 910 | 1,1 | 3,3 | 70 | 57 | | x x 1 x |
| MO EEx 100/180 – 40 | | 180 | 40 | | | 80MK04 | 0,55 | 1390 | 1,45 | 4,2 | 71 | 58 | | x x 2 x |
| MO EEx 100/170 – 63 | | 170 | 63 | | ♦ | 80M04 | 0,75 | 1410 | 1,9 | 3,9 | 71 | 58 | | x x 3 x |
| MO EEx 100/230 – 80 | | 230 | 80 | | ♦ | 80M02 | 1,1 | 2940 | 3,0 | 6,8 | 78 | 58 | | x x R x |
| MO EEx 100/130 – 100 | | 130 | 100 | | ♦ | 90LK04 | 1,1 | 1410 | 2,7 | 4,6 | 71 | 65 | | x x 4 x |
| MO EEx 100/170 – 145 | | 170 | 145 | | ♦ | 90LK02 | 1,5 | 2870 | 3,2 | 6,8 | 78 | 65 | | x x S x |
| MO EEx 130/170 – 8 | 100 – 130 | 170 | 8 | | | 71B8 | 0,12 | 660 | 0,46 | 1,8 | 70 | 45 | | x x T x |
| MO EEx 160/300 – 10 | 100 – 160 | 300 | 10 | | | 71ML06 | 0,25 | 900 | 0,95 | 2,9 | 70 | 47 | | x x U x |
| MO EEx 160/220 – 16 | | 220 | 16 | | | 80MK06 | 0,37 | 910 | 1,1 | 3,3 | 70 | 57 | | x x 5 x |
| MO EEx 160/240 – 25 | | 240 | 25 | | | 80M06 | 0,55 | 910 | 1,6 | 3,4 | 71 | 57 | | x x 6 x |
| MO EEx 160/290 – 40 | | 290 | 40 | | | 80M04 | 0,75 | 1410 | 1,9 | 3,9 | 71 | 58 | | x x 7 x |
| MO EEx 160/210 – 65 | | 210 | 65 | | ♦ | 90LK04 | 1,1 | 1410 | 2,7 | 4,6 | 71 | 65 | | x x 8 x |
| MO EEx 160/320 – 80 | | 320 | 80 | | ♦ | 90LK02 | 1,5 | 2890 | 3,2 | 6,8 | 78 | 65 | | x x V x |
| MO EEx 160/210 – 100 | | 210 | 100 | | ♦ | 90L04 | 1,5 | 1410 | 3,4 | 4,8 | 71 | 66 | | x x 9 x |
| MO EEx 160/250 – 125 | | 250 | 125 | | ♦ | 90L02 | 2,2 | 2865 | 4,5 | 6,0 | 78 | 67 | | x x A x |
| MO EEx 250/400 – 8 | 160–250 | 400 | 8 | | | 71M8 | 0,25 | 680 | 0,85 | 2,0 | 70 | 57 | 52122 | x x H x |
| MO EEx 250/400 – 10 | | 400 | 10 | | | 80MK06 | 0,37 | 910 | 1,1 | 3,3 | 70 | 57 | | x x 0 x |
| MO EEx 250/400 – 16 | | 400 | 16 | | | 80M06 | 0,55 | 910 | 1,6 | 3,4 | 71 | 58 | | x x 1 x |
| MO EEx 250/330 – 25 | | 330 | 25 | | | 90LK06 | 0,75 | 930 | 2,1 | 3,9 | 81 | 68 | | x x 2 x |
| MO EEx 250/330 – 40 | | 330 | 40 | | | 90LK04 | 1,1 | 1410 | 2,7 | 4,6 | 78 | 65 | | x x 3 x |
| MO EEx 250/325 – 65 | | 325 | 65 | | ♦ | 90L04 | 1,5 | 1410 | 3,4 | 4,8 | 79 | 66 | | x x 4 x |
| MO EEx 250/400 – 80 | | 400 | 80 | | ♦ | 90L02 | 2,2 | 2865 | 4,5 | 6,0 | 80 | 67 | | x x 5 x |
| MO EEx 500/750 – 16 | 250–500 | 750 | 16 | 2–240 (2 –470) | | 100L08 | 1,1 | 690 | 3,1 | 3,6 | 126 | 113 | 52123 | x x 0 x |
| MO EEx 500/850 – 25 | | 850 | 25 | | | 100L06 | 1,5 | 940 | 3,9 | 4,9 | 125 | 112 | | x x 1 x |
| MO EEx 500/800 – 40 | | 800 | 40 | | | 112M06 | 2,2 | 945 | 5,4 | 5,0 | 146 | 126 | | x x 2 x |
| MO EEx 450/600 – 63 | 250–450 | 600 | 63 | | ♦ | 100L04 | 3,0 | 1435 | 6,5 | 5,9 | 132 | 112 | | x x 3 x |
| MO EEx 500/700 – 100 | 250–500 | 700 | 100 | | ♦ | 112M04 | 4,0 | 1430 | 8,5 | 6,5 | 150 | 130 | | x x 4 x |
| MO EEx 550/750 – 16 | 320–550 | 750 | 16 | | | 100L08 | 1,1 | 690 | 3,1 | 3,6 | 128 | 108 | 52124 | x x 0 x |
| MO EEx 630/820 – 25 | 320–630 | 820 | 25 | | | 100L06 | 1,5 | 940 | 3,9 | 4,9 | 128 | 108 | | x x 1 x |
| MO EEx 630/1000 – 63 | | 1000 | 63 | | ♦ | 112M04 | 4,0 | 1430 | 8,5 | 6,5 | 150 | 130 | | x x 2 x |
| MO EEx 960/1250 – 32 | 630–960 | 1250 | 32 | | | 132M08 | 3,0 | 725 | 7,3 | 5,5 | 239 | | 52125 | x x 1 x |
| MO EEx 1100/1400 – 45 | 630–1100 | 1400 | 45 | | ♦ | 132MK06 | 4,0 | 975 | 9,2 | 7,0 | 240 | | | x x 2 x |
| MO EEx 1100/1400 – 63 | 630–1100 | 1400 | 63 | | ♦ | 132M06 | 5,5 | 970 | 12,5 | 6,5 | 248 | | | x x 3 x |
| MO EEx 920/1200 – 100 | 630–920 | 1200 | 100 | | ♦ | 132M04 | 7,5 | 1455 | 15,5 | 6,8 | 243 | | | x x 4 x |

***Notes:*** *– The rated torque is 60 % of the maximum tripping torque in duty S2 and 40 % of the maximum tripping torque in duty S4.*

*– The 6th, 7th and 9th places of the type number should be completed with respective digit or letter from Table 3.*

*– Design variants operating at another supply voltage than that given in the table, are available upon special request.*

*– Electric motors designated in the table with + have built-in thermistors PTC connected to the terminal cover on two non-exposive bushings. This built-in heat protection, in combination with the control system, shall isolate the electric motor from the mains supply if temperature of the eletric motor winding exceeds 145 °C during thermal overloading caused by failures.*

♦ *– Mark of actuators filled with oil. Other actuators are filled with plastic lubricant.*

## *Table 3 – Specification of type number*

| Place in the type number | 1. | 2. | 3. | 4. | 5. | . | 6. | 7. | 8. | 9. | 10. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Type number | 5 | 2 | 1 | 2 | x | . | x | x | x | x | x |

6th place of type number

| **Connecting dimensions** | | |
|---|---|---|
| Connecting dimensions according ISO and DIN | Shape A | 5 |
| | Shape B | 6 |
| | Shape C | 7 |
| | Shape D | 8 |
| | Shape E | 9 |
| Connecting dimensions according OST *(Russia)* | Connection M | M |
| | Connection A | A |
| | Connection Б | B |
| | Connection B | V |
| | Connection Г | G |

According to the actuators size, the connection OST *(Russia)* is as follows:

| | |
|---|---|
| T. No. 52120 | Connection M, A, Б |
| T. No. 52121 and 52122 | Connection A, Б, B |
| T. No. 52123 and 52124 | Connection Б, B |
| T. No. 52125 | Connection B, Г |

7th place of type number

| **Working stroke (turn)** | |
|---|---|
| 2 – 250 *(2 – 240)* – basic design | 0 |
| 2 – 620 *(2 – 470)* – special design | A |
| 2 – 250 *(2 – 240)* – with block of local control, M-D two-pole | 1 |
| 2 – 250 *(2 – 240)* – with block of local control, M-D four-pole | 2 |
| 2 – 620 *(2 – 470)* – with block of local control, M-D two-pole | B |
| 2 – 620 *(2 – 470)* – with block of local control, M-D four-pole | C |

8th place of type number

Tripping torque, speed and other technical parameters, including designation, are given in Tables 1 or 2. At this place, the figure or letter corresponding to required parameters should be given.

9th place of type number

| **Signalling, position transmitter** | |
|---|---|
| Without signalling and position transmitter *(basic design)* | 0 |
| Without position transmitter, with signalling | 1 |
| With all units and potentiometer 1 x 100 Ω | 2 |
| With all units and current transmitter CPT 1A 4 – 20 mA | 3 |
| Without signalling, with potentiometer 1 x 100 Ω | 4 |
| Without signalling, with current transmitter CPT 1A 4 – 20 mA | 5 |
| Without signalling, with doubled position change-over switches, without position transmitter*) | 6 |
| Without signalling, with doubled position change-over switches, with resistance position transmitter 1 x 100 Ω*) | 7 |
| Without signalling, with doubled position change-over switches, with current transmitter CPT 1A*) | 8 |

*) *Design with this designation for working stroke 2 – 240 rev. – basic design.*

10th place of type number

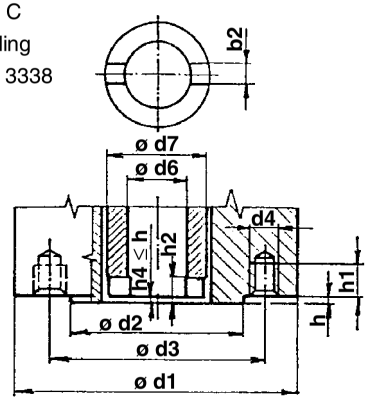
| **Surrounding temperature** | |
|---|---|
| For ambient temperature of -25 °C do +55 °C | without designation |
| For ambient temperature of -50 °C do +55 °C | F |
| For ambient temperature of -60 °C do +55 °C | FF |

# Attachment dimensions of **MODACT MO EEx** electric actuators
*(basic design without adapter)*

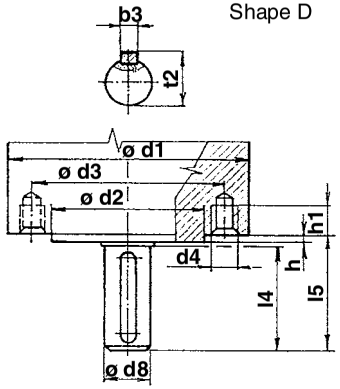
The electric actuators are designed for direct mounting onto the controlled device *(valve etc.)*. They are attached by means of a flange or clutch according to ČSN 186314. The flanges of the electric actuators also comply with ISO 5210. The clutches for transmission of motion to the valve are:

Shape A *(with adapter),* according to ČSN EN ISO 5210 *(13 3090)*
Shape B1 *(with adapter),* according to ČSN EN ISO 5210 *(13 3090)*
Shape B3 *(without adapter),* according to ČSN EN ISO 5210 *(13 3090)*
Shape D *(without adapter)*
Shape C *(without adapter),* according to DIN 3338

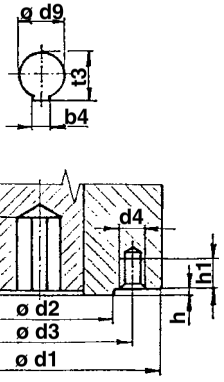
Shape C according to DIN 3338




Shape D

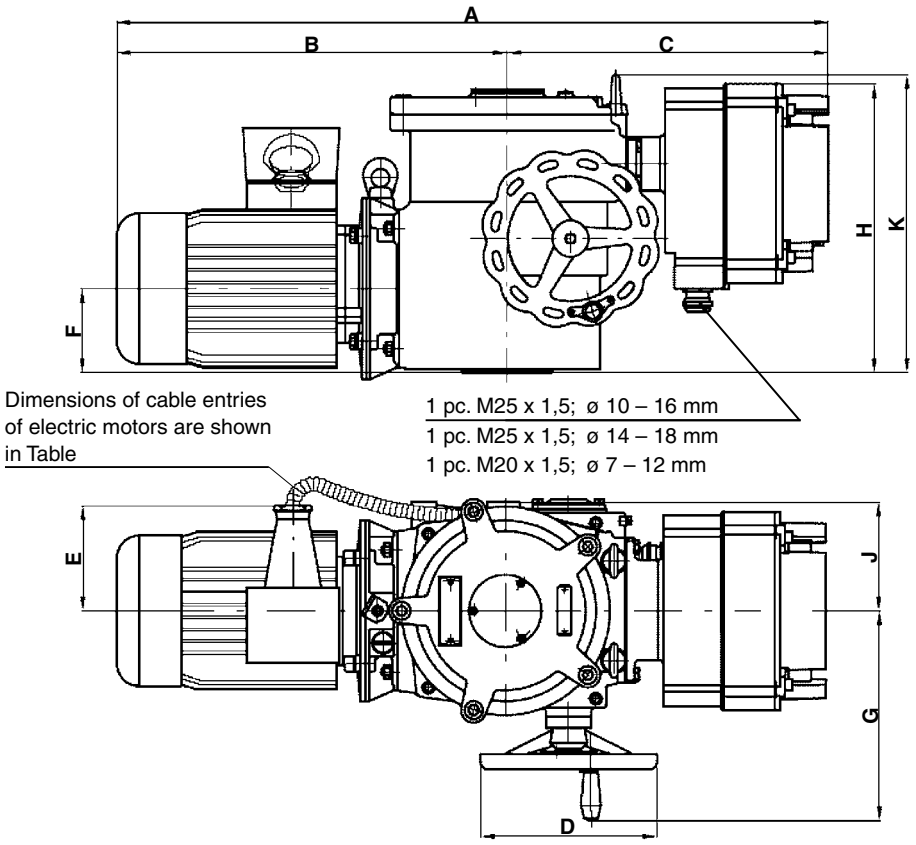



Shape B3 according to ČSN EN ISO 5210 *(13 3090)*




| Shape | Dimension | Type number / Flange | | | |
|---|---|---|---|---|---|
| | | **52 120** | **52 121, 2** | **52 123, 4** | **52 125** |
| C, D, B3 *(identical dimensions)* | ø d1 *(orientation value)* | 125 | 175 | 210 | 300 |
| | ø d2 f8 | 70 | 100 | 130 | 200 |
| | ø d3 | 102 | 140 | 165 | 254 |
| | d4 | M 10 | M 16 | M 20 | M 16 |
| | Number of tapped holes | 4 | 4 | 4 | 8 |
| | h $^{0}_{-0,2}$ | 3 | 4 | 5 | 5 |
| | h1 min. 1,25 d4 | 12,5 | 20 | 25 | 20 |
| C | ø d7 | 40 | 60 | 80 | 100 |
| | h2 min. | 10 | 12 | 15 | 16 |
| | b2 H11 | 14 | 20 | 24 | 30 |
| | ø d6 | 30 | 41,5 | 53 | 72 |
| D | ø d8 g6 | 20 | 30 | 40 | 50 |
| | l4 | 50 | 70 | 90 | 110 |
| | t2 max. | 22,5 | 33 | 43 | 53,5 |
| | b3 h9 | 6 | 8 | 12 | 14 |
| | ø l6 | 55 | 76 | 97 | 117 |
| B3 | ø d9 H8 | 20 | 30 | 40 | 50 |
| | l6 min. | 55 | 76 | 97 | 117 |
| | t3 | 22,8 | 33,3 | 43,3 | 53,8 |
| | b4 Js9 | 6 | 8 | 12 | 14 |

Dimensional sketch of **MODACT MO EEx** electric actuator



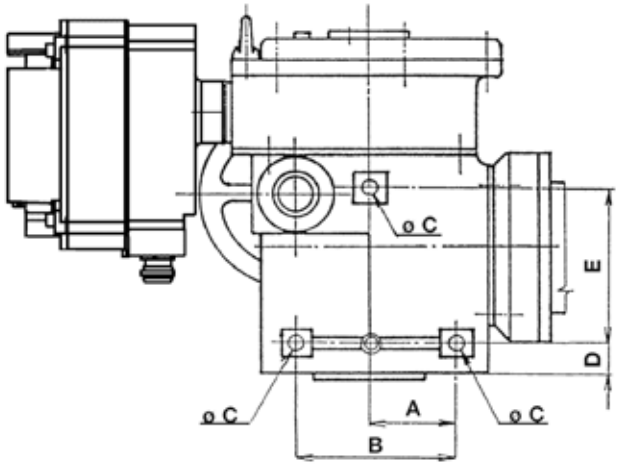

**Cable entries of electric motors used in multi-revolution actuators MODACT MO EEx**

| Type of electric motor | Axial height of motor | Number of entries x range of cable Ø *(thread size)* |
|---|---|---|
| AVM | 71, 80, 90, 100 | 1 x ø 13 to 16 mm |
| | 112, 132 | 2 x ø 17 to 20 mm |

*The above listed cable entries of electric motors (see the table) and the actuator are available as a standard. Requirement for other diameters of connecting cables should be specified in the order.*

| Dimension | Type number | | | |
|---|---|---|---|---|
| | 52 120 | 52 121, 2 | 52 123, 4 | 52 125 |
| A max. | 569 | 708 | 832 | 966 |
| B max. | 340 | 462 | 573 | 684 |
| C | 239 | 246 | 259 | 282 |
| D | ø 160 | ø 200 | ø 250 | ø 375 |
| E | 130 | 130 | 165 | 165 |
| F | 80 | 92 | 123 | 153 |
| G | 215 | 256 | 310 | 362 |
| H max. | 306 | 318 | 382 | 438 |
| J | 90 | 120 | 145 | 178 |
| K | 315 | 335 | 400 | 442 |

## Holes for additional attachment of **MODACT MO EEx** electric actuator

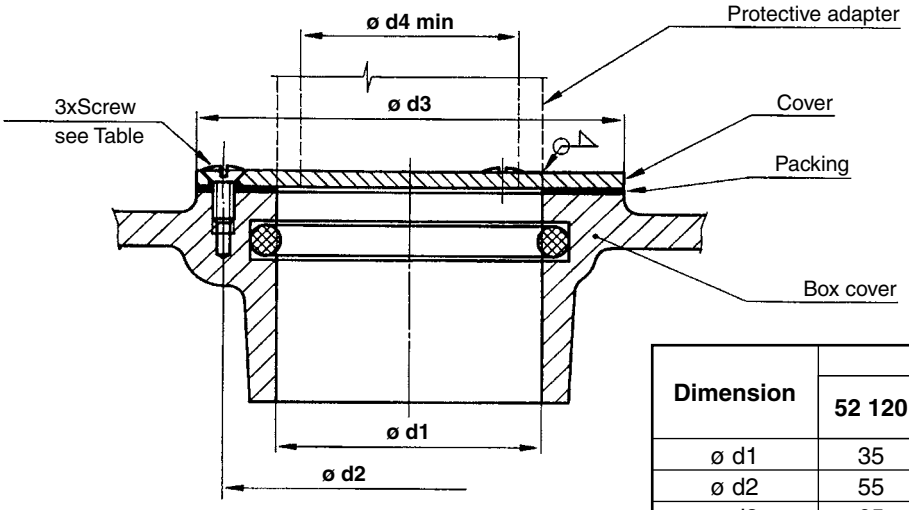



| Dimension | Type number | | | |
|---|---|---|---|---|
| | **52 120** | **52 121, 2** | **52 123, 4** | **52 125** |
| A | 61 | 90 | 110 | 120 |
| B | 110 | 160 | 210 | 240 |
| C | M 10 | M 12 | M 16 | M 20 |
| D | 16 | 21 | 23 | 47 |
| E | 120 | 140 | 200 | 220 |

***Note:***

*The holes intended for additional attachment of MODACT electric actuators only serve for supporting the actuator weight and may not be subjected to load with any additional force.*

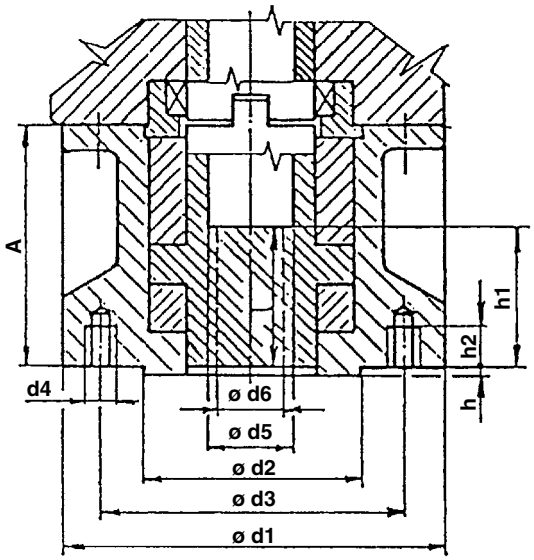
## Modification for rising spindle



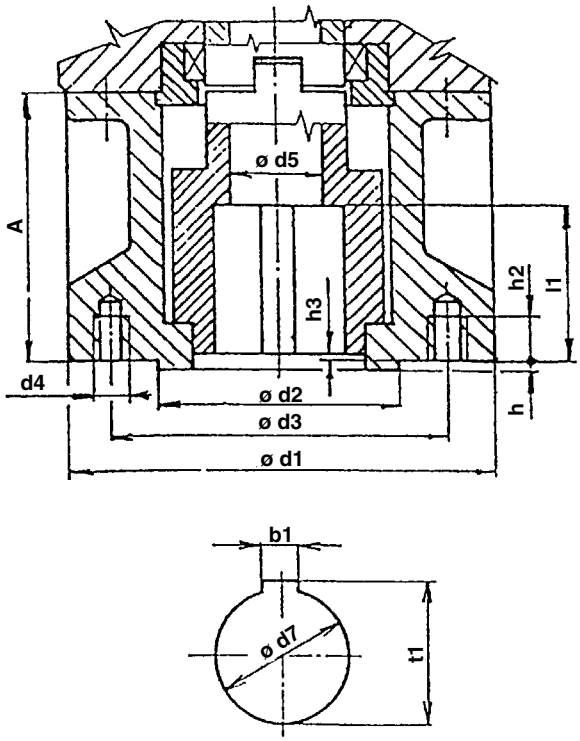

| Dimension | Type number | | | |
|---|---|---|---|---|
| | **52 120** | **52 121<br>52 122** | **52 123<br>52 124** | **52 125** |
| ø d1 | 35 | 50 | 75 | 80 |
| ø d2 | 55 | 70 | 100 | 100 |
| ø d3 | 65 | 80 | 112 | 112 |
| ø d4 | 30 | 41,5 | 53 | 72 |
| Screw<br>ČSN EN<br>ISO 2010 | M4x10 | M4x10 | M5x10 | M5x10 |

# Adapters to **MODACT MO EEx** electric actuators

Shape A
according to ČSN EN ISO 5210 *(13 3090)*




Shape B1
according to ČSN EN ISO 5210 *(13 3090)*




Assignment of adapters to electric actuators

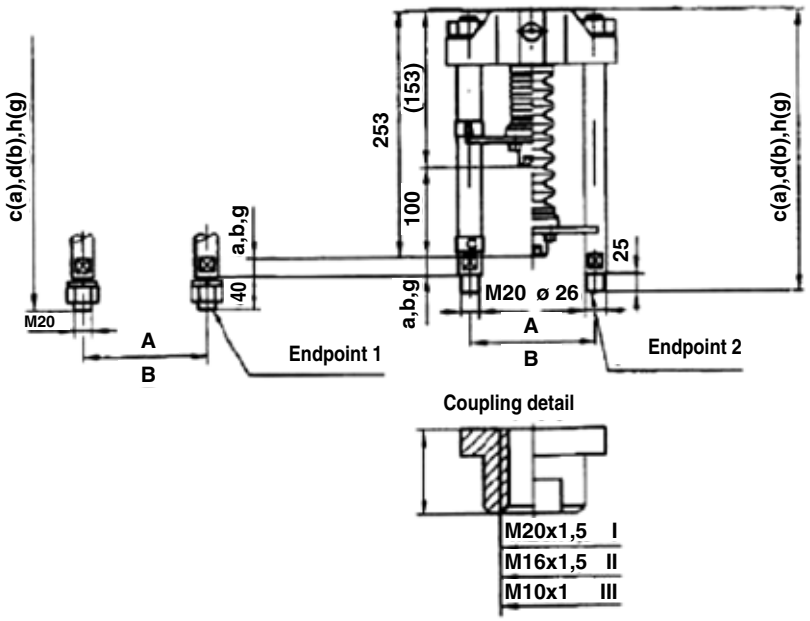
| Shape | Dimension | Type number | | | |
|---|---|---|---|---|---|
| | | **52 120** | **52 121, 2** | **52 123, 4** | **52 125** |
| A, B1 *(identical dimensions)* | ø d1 | 125 | 175 | 210 | 300 |
| | ø d2 f8 | 70 | 100 | 130 | 200 |
| | ø d3 | 102 | 140 | 165 | 254 |
| | d4 | M 10 | M 16 | M 20 | M 16 |
| | Number of holes d4 | 4 | 4 | 4 | 8 |
| | h | 3 | 4 | 5 | 5 |
| | h2 min. | 12,5 | 20 | 25 | 20 |
| A | A | 63,5 | 110 | 179 | 155 |
| | ø d5 | 30 | 38 | 53 | 63 |
| | ø d6 max. | 28 | 36 | 44 | 60 |
| | h1 max. | 43,5 | 65 | 92 | 110 |
| | l min. | 45 | 55 | 70 | 90 |
| B1 | A | 63,5 | 110 | 122 | 155 |
| | ø d5 | 30 | 40 | 50 | 65 |
| | l1 min. | 45 | 65 | 80 | 110 |
| | h3 max. | 3 | 4 | 5 | 5 |
| | b1 | 12 | 18 | 22 | 28 |
| | ø d7 H9 | 42 | 60 | 80 | 100 |
| | t1 | 45,3 | 64,4 | 85,4 | 106,4 |

## Technical parameters of explosion-proof **MODACT MO EEx** actuators in connection with linear thrust device

| MO EEx actuators | | | | | | | | | MO EEx actuators + linear thrust device | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type number | | Použitý elektromotor | | | | Moment (Nm) | | Ad-justing speed (RPM) | Linear thrust device | Thrust (kN) | | Speed (mm/min) | Working stroke (mm) |
| Basic | Comple-mentary | Power (W) | RPM 1/min | In (A) | Iz/I n | Tripping** | Starting | | | Tripping range* | Starting | | |
| 52120 | 7 x H x | | | | | 20 – 40 (23 – 30) | | 8 | MT15 | 10–20 (11,5–15) | | 40 | 10 – 100 |
| | 7 x I x | 180 | 900 | 0,74 | 1,8 | | 220 | 10 | | | 110 | 50 | |
| | 7 x J x | 180 | 900 | 0,74 | 1,8 | | 130 | 17 | | | 65 | 85 | |
| | 7 x 1 x | 250 | 1360 | 0,75 | 3,4 | | 100 | 25 | | | 50 | 125 | |
| | 7 x M x | | | | | 40 – 63 (30 – 50) | | 8 | MT25 | 20–31,5 (15–25) | | 40 | |
| | 7 x N x | 180 | 900 | 0,74 | 1,8 | | 220 | 10 | | | 110 | 50 | |
| | 7 x P x | 180 | 900 | 0,74 | 1,8 | | 130 | 17 | | | 65 | 85 | |
| | 7 x 3 x | 250 | 1360 | 0,75 | 3,4 | | 100 | 25 | | | 50 | 125 | |
| 52121 | 7 x M x | | | | | 63 – 100 (60 – 97) | | 8 | MT40 | 26-41,5 (25-40) | | 24 | 20 – 120 |
| | 7 x N x | 180 | 900 | 0,74 | 1,8 | | 200 | 10 | | | 83 | 30 | |
| | 7 x P x | 250 | 900 | 0,95 | 2,9 | | 180 | 17 | | | 75 | 51 | |
| | 7 x 1 x | 370 | 910 | 1,1 | 3,3 | | 140 | 25 | | | 58 | 75 | |
| | 7 x 2 x | 550 | 1390 | 1,45 | 4,2 | | 140 | 40 | | | 58 | 120 | |
| | 7 x T x | | | | | 100 – 160 (97 – 153) | | 7 | MT63 | 41,5-66,5 (40-63) | | 21 | |
| | 7 x U x | 250 | 900 | 0,95 | 2,9 | | 280 | 10 | | | 116 | 30 | |
| | 7 x 6 x | 550 | 910 | 2,6 | 3,4 | | 240 | 25 | | | 100 | 75 | |

** Stated tripping thrust range correspond with the tripping torque range ***

## Dimensional sketch of MT15 and MT25 linear thrust device

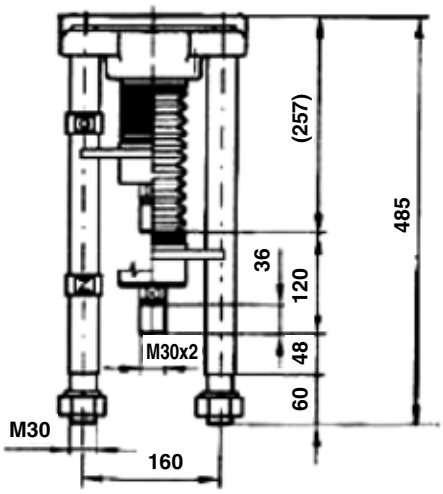


Specific embodiments of the linear thrust device is a combination of letters and numbers in the following order:

| Order of device designation code | Dimension of connection parameter | Code of dimension designation | Dimension | Device height | | Note |
|---|---|---|---|---|---|---|
| | | | | Endpoint 1 | Endpoint 2 | |
| 1 | Spacing of columns | A | 160 mm | | | |
| | | B | 150 mm | | | |
| 2 | Position “CLOSED” | a | 30 mm | c = 323 mm | c = 308 mm | a – Short columns |
| | | b | 74 mm | d = 367 mm | d = 352 mm | b – Long columns |
| | | g | 130 mm | h = 423 mm | h = 408 mm | c – Column length 130 mm |
| 3 | End of columns | 1 | Endpoint 1 | | | M20 thread 40 mm length with nut |
| | | 2 | Endpoint 2 | | | M20 thread 25 mm length |
| 4 | Thread in coupling | I | M20x1,5 | | | |
| | | II | M16x1,5 | | | |
| | | III | M10x1 | | | after agreement with the manufacturer |

*For example, design Aa1I indicates linear thrust device MT15 and MT25 with a spacing of columns 160 mm, distance of 30 mm from the end of the coupling to the end of the columns in the “closed” position, end of the columns in design 1 with thread in the coupling M20 x 1,5.*

Dimensional sketch of MT40 and MT63 linear thrust device



## Internal wiring diagrams of **MODACT MO EEx** electric actuators

**Legend:**

| | | | |
|---|---|---|---|
| BQ1 *(V1)* | – Position transmitter - resistance 1x100 Ω | SQ5 *(PZ)* | – CLOSE position-limit switch |
| CPT 1Az | – Current position transmitter | SQ4 *(SO)* | – OPEN signalling switch |
| SQ1 *(MO)* | – OPEN torque-limit switch | SQ6 *(SZ)* | – CLOSE signalling switch |
| SQ2 *(MZ)* | – CLOSE torque-limit switch | EH *(R)* | – Anti-condensation heaters |
| SQ3 *(PO)* | – OPEN position-limit switch | T1, T2 | – Thermistors |

**Positions of the switches:** L – Local; R – Remote; O – Open; C – Close

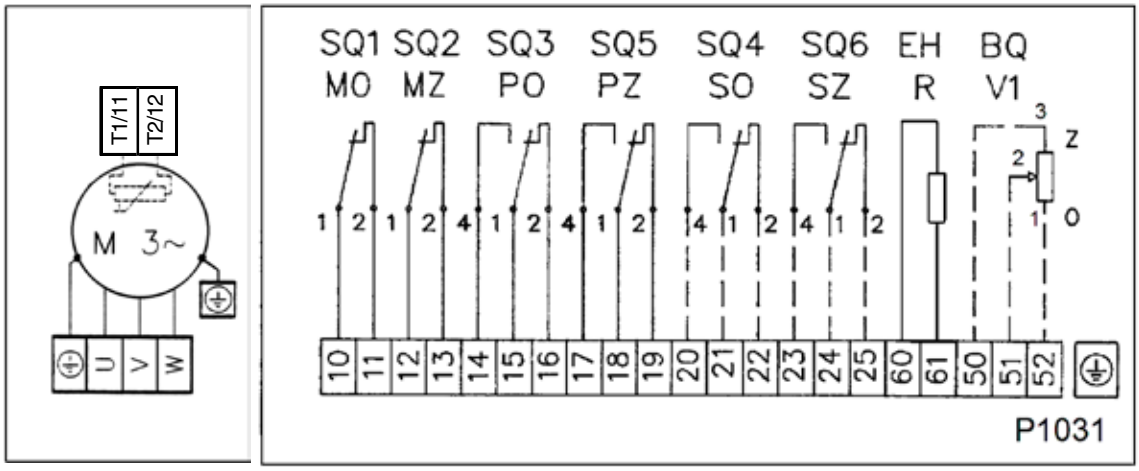
***Notes:***

*Some electric motors are fitted with thermistors (see Sheet 13, Note 4 of TP 12-02/92, dashed line here). The thermistors should be interconnected with the circuits of thermistor protection of motors (e.g. Siemens Sirius 3RN1). These circuits are not supplied by ZPA Pečky.*

*In the design version with the current transmitter CPT 1Az, the user shall provide for connection of the two-wire circuit of the current transmitter with electric earth of the associated regulator, computer etc. The connection should be realized only at a single point in any section of the circuit outside the electric actuator. Voltage between the electronics and the case of the current transmitter must not exceed 50 V DC.*

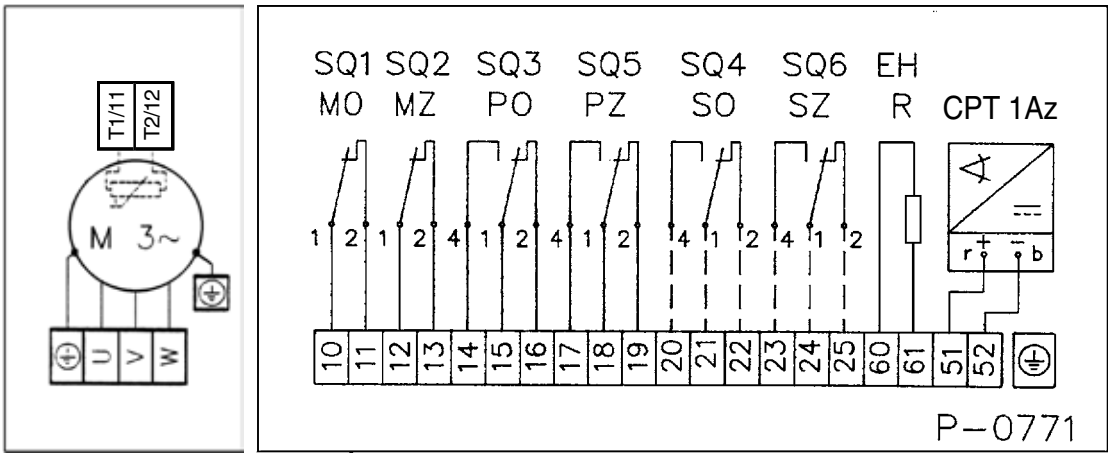
## Internal wiring diagrams of **MODACT MO EEx** electric actuators

*– Design with resistance position transmitter MEGATRON 1 x 100 Ω or without transmitter*




Electric motor Control box External protective terminal

*– Design with current position transmitter*



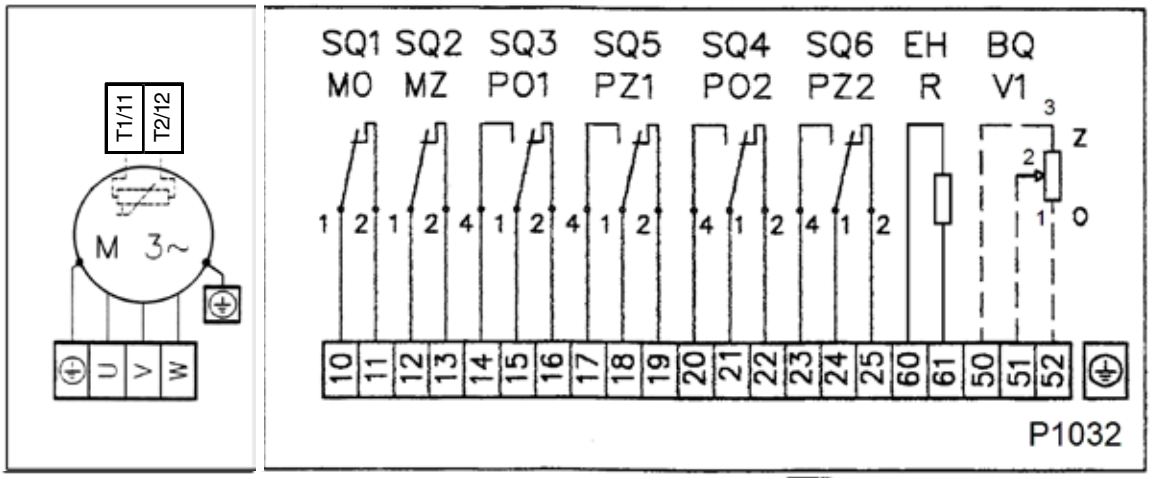

Electric motor Control box External protective terminal

Internal wiring diagrams of **MODACT MO EEx** electric actuators

version without signaling change-over switches with two doubled position change-over switches.

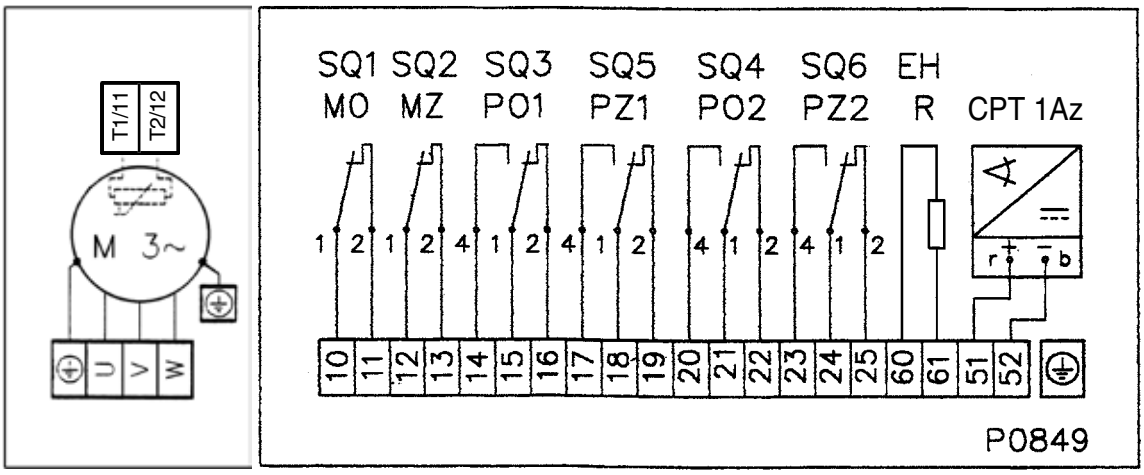
*The doubled position change-over switches (PO1, PO2, and PZ1, PZ2) always switch at the same time*

*– Design with resistance position transmitter MEGATRON 1 x 100 Ω or without transmitter*




Electric motor  Control box  External protective terminal

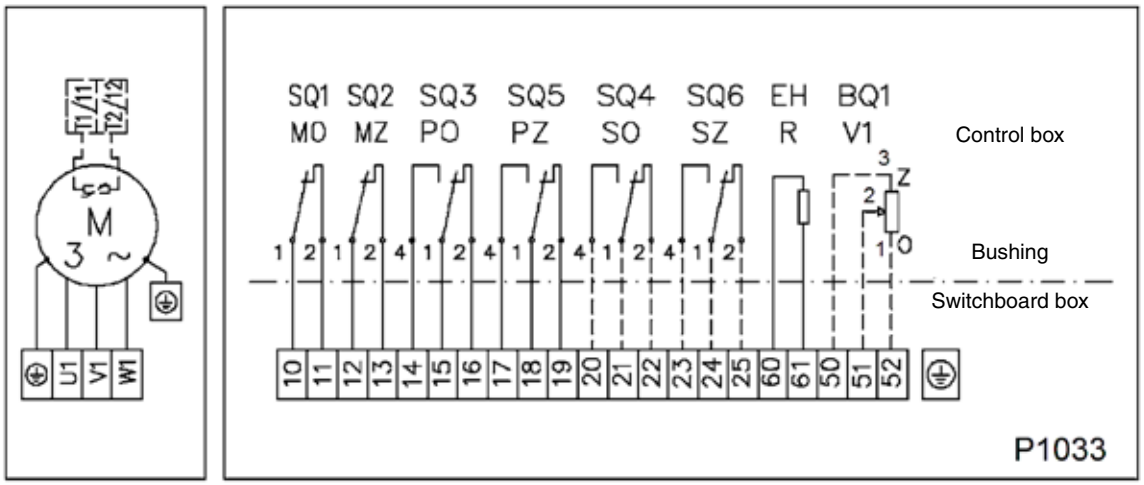
*– Design with current position transmitter*




Electric motor  Control box  External protective terminal

# Internal wiring diagram of **MODACT MO EEx** electric actuators of mining version I M2

Electric outfit and wiring according to wiring diagram P-0767 is certified for using actuators in spar-safe control circuits. The signalling switches, anti-condensation heater, and resistance transmitter are optional accessories.




Electric motor *(it does not ensure spark safety)*

Control and switchboard box *(spark safety is ensured provided that the elements are connected to spark-safe circuits only)*

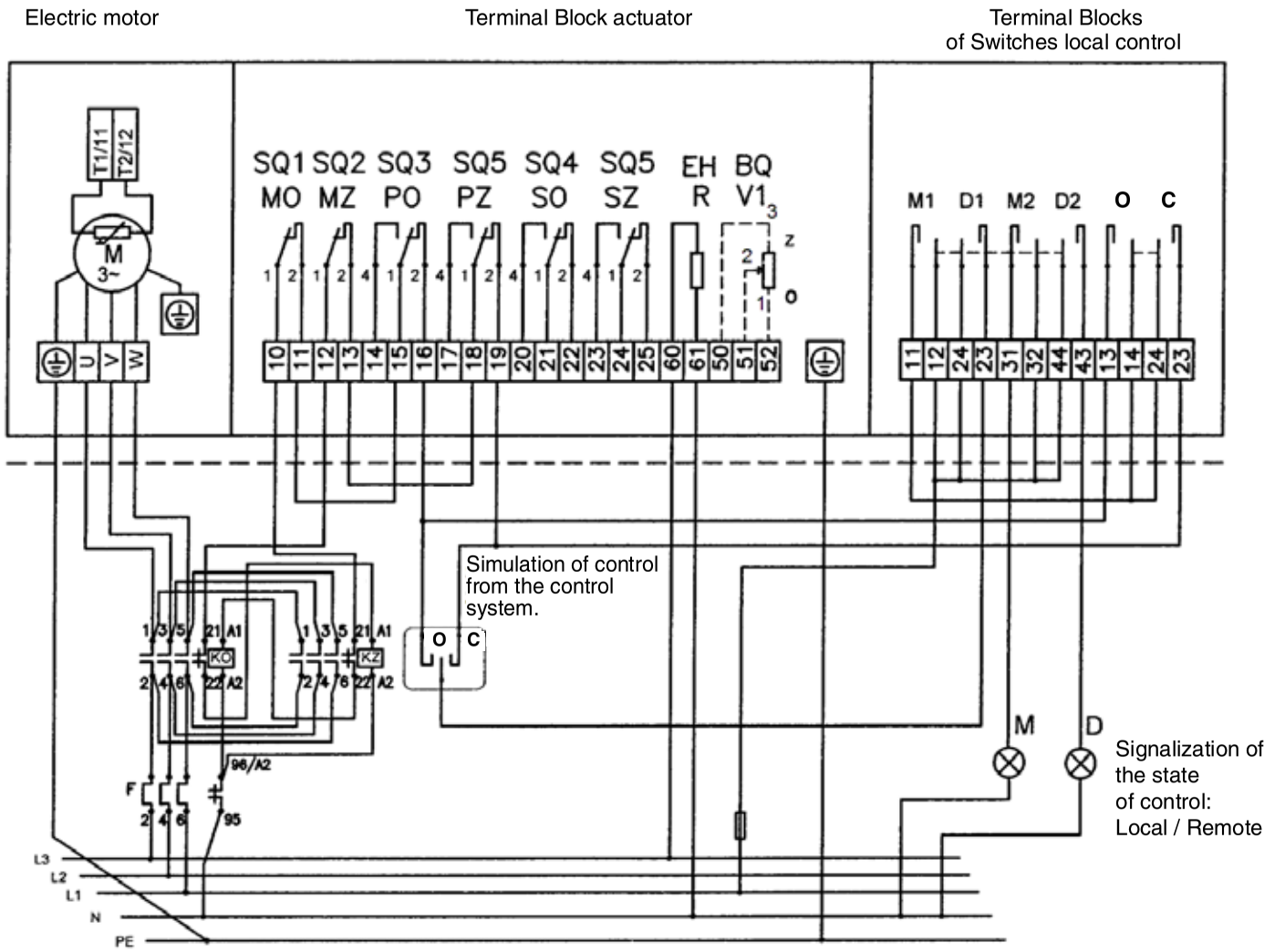
## Conditions of spark-safe protection

- Individual circuits of the actuator can be connected to independent spark-safe circuits provided that the above mentioned electric parameters are abided.
- No other than spark-safe circuits may be connected to the terminals.
- Connected conductors must be insulated to the metal part of the terminal so that spark-safe surface and air distances would be observed.

Under these conditions, the actuator provides for level of protection of spark safety “ib” as a simple device according to ČSN EN 60079-11.

Internal wiring diagram of **MODACT MO EEx** electric actuators
– design with potentiometer MEGATRON 1 x 100 Ω,
– design with four-pole change-over switch “local - remote”

P1034



Internal wiring diagram of **MODACT MO EEx** electric actuators
– design with potentiometer MEGATRON 1 x 100 Ω,
– design with two-pole change-over switch “local - remote”



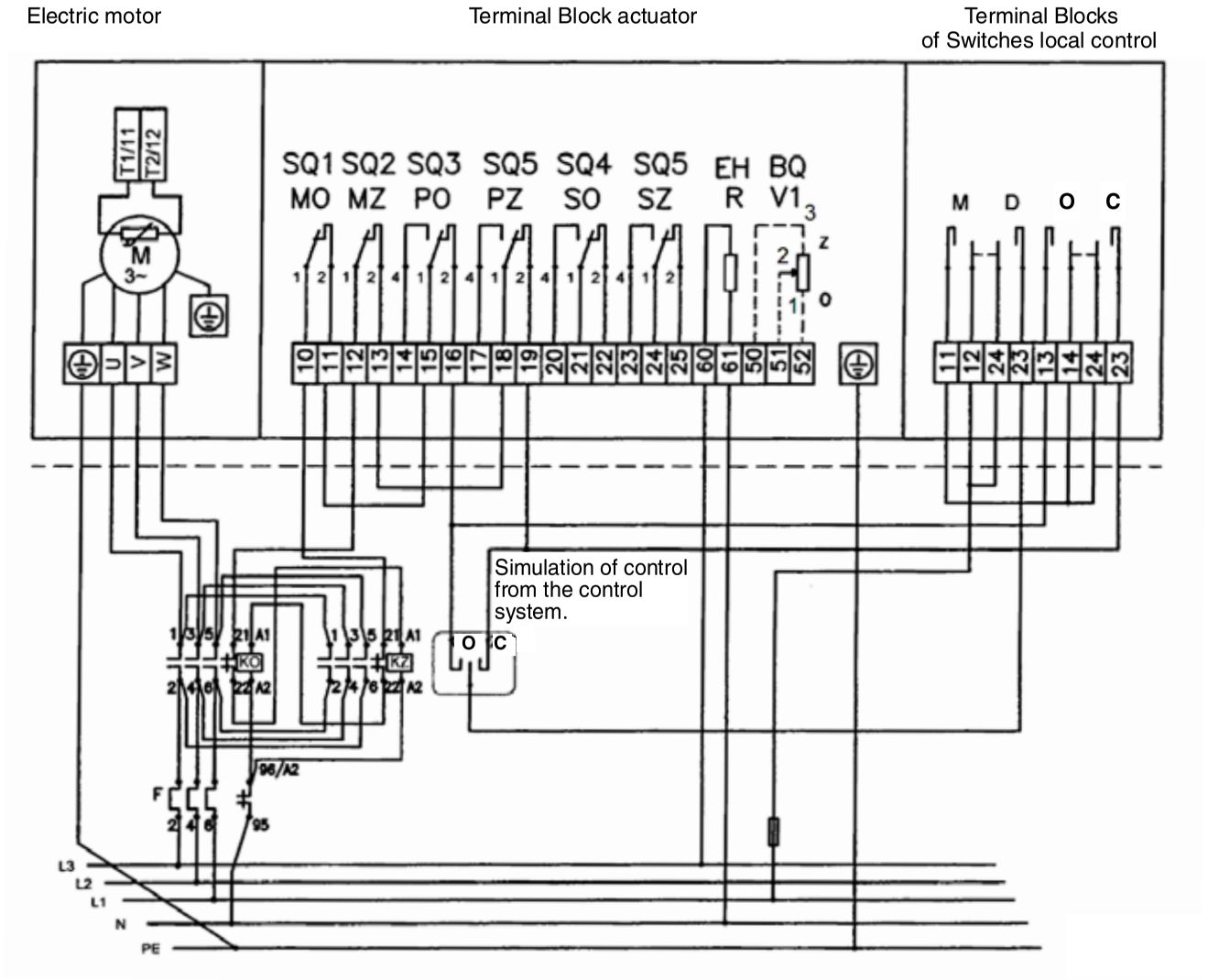
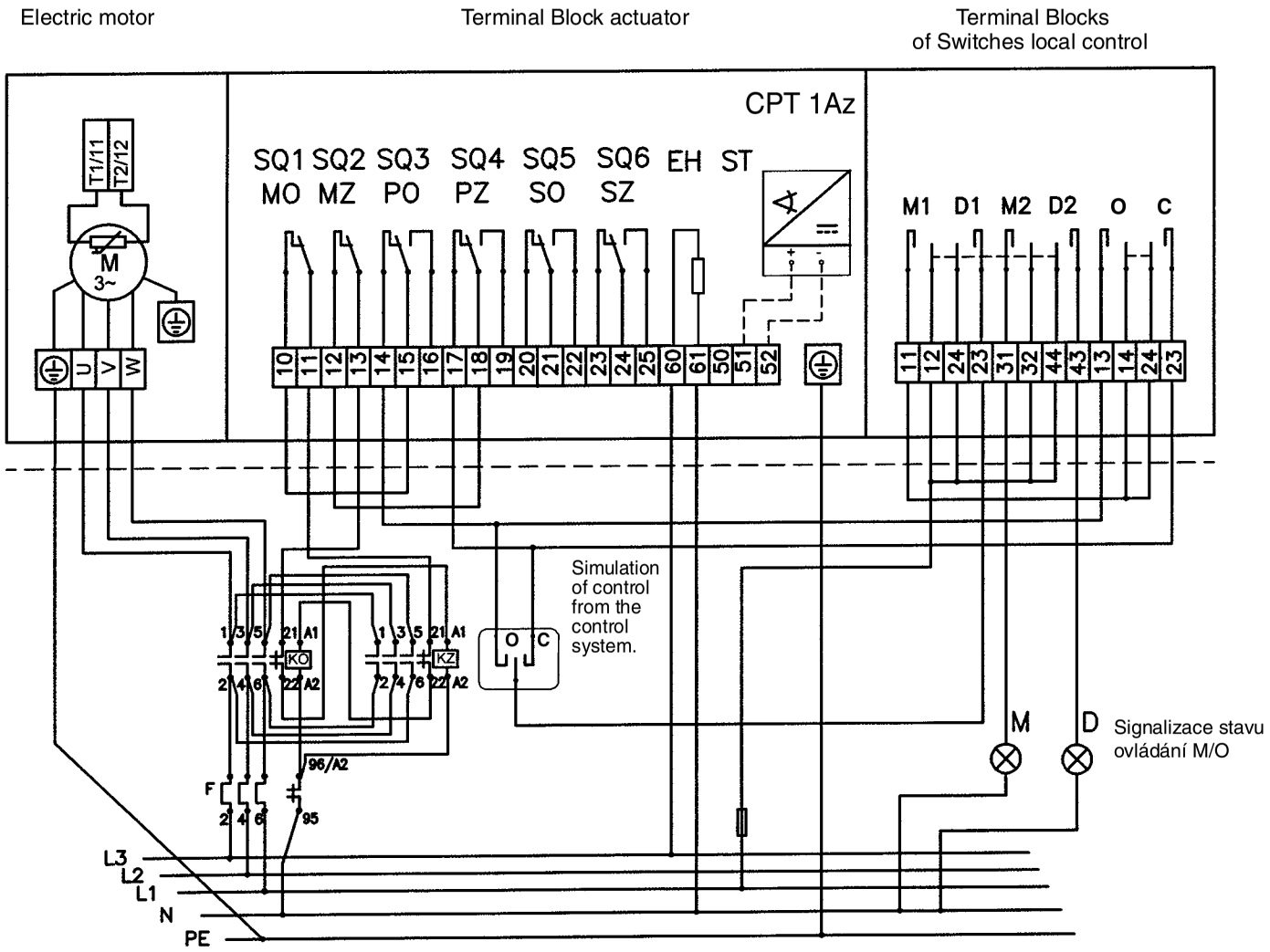


Schéma vnitřního elektrického zapojení servomotorů MODACT MO EEx
– provedení s proudovým vysílačem polohy,
– provedení s čtyřpólovým vypínačem „místní“ - „dálkové“

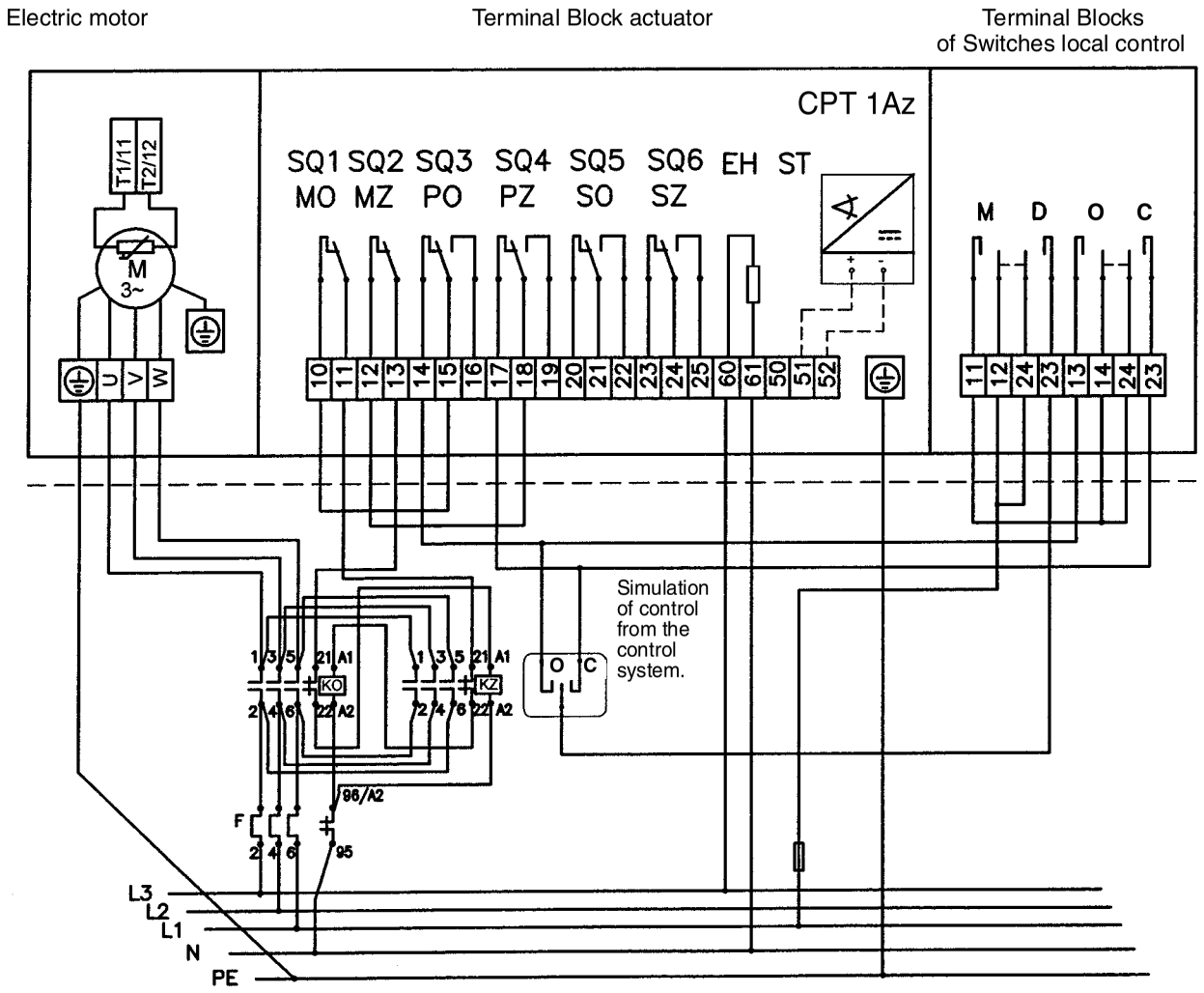
P-0911




*(Example of actuator wiring)*

Internal wiring diagram of **MODACT MO EEx** electric actuators
– design with current position transmitter
– design with two-pole change-over switch “local - remote”

P-0912




*(Example of actuator wiring)*

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

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Electric rotary (90°) actuators (up to 30 Nm)

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

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

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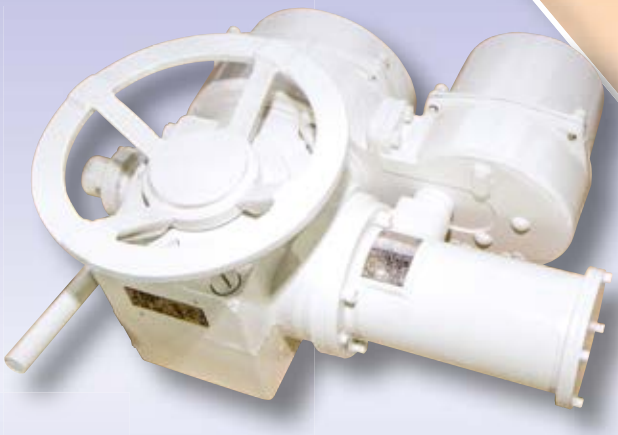

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