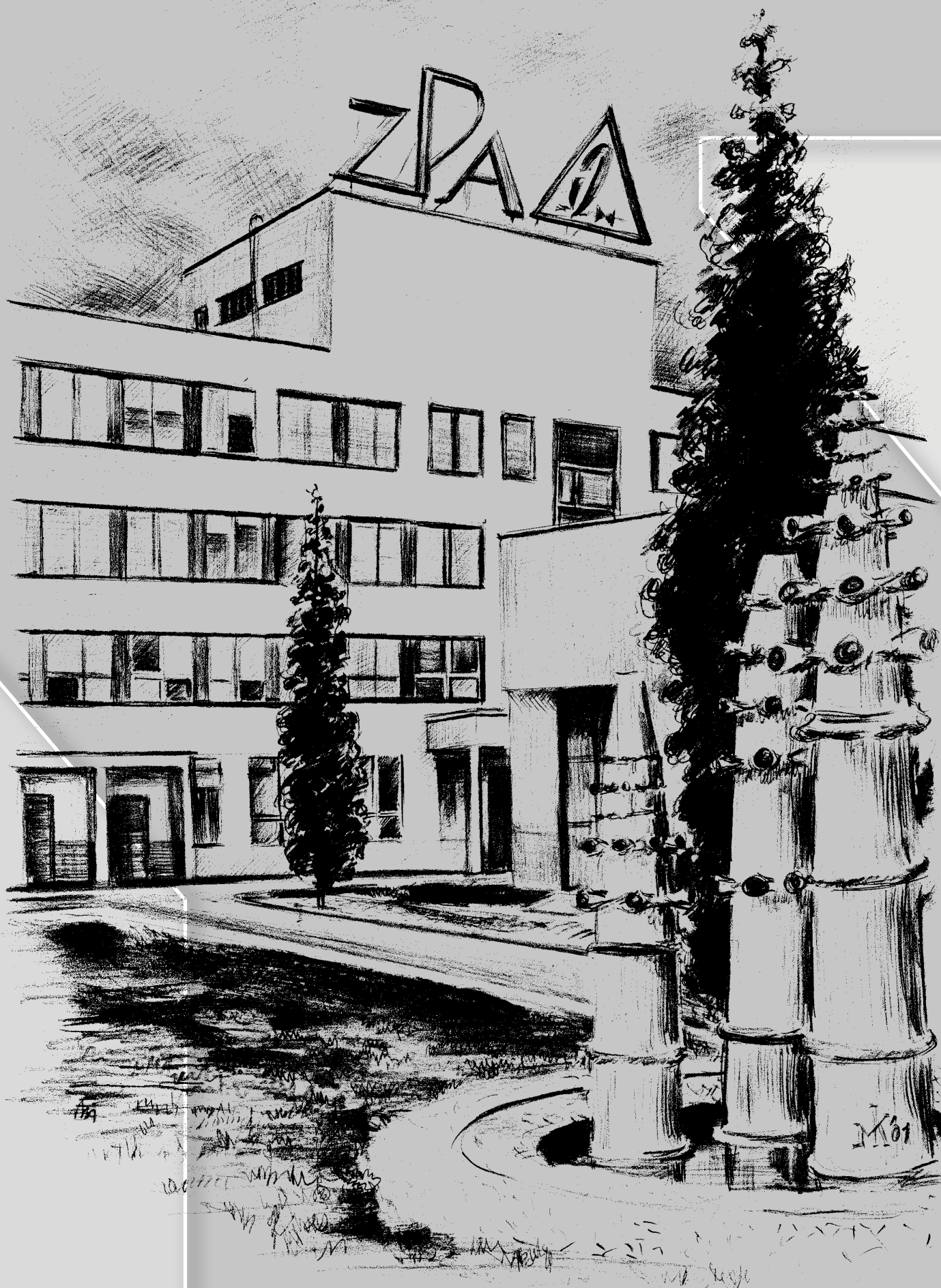


**MOUNTING AND OPERATING  
INSTRUCTIONS**

**Electric rotary multi-turn actuators  
Explosion-proof design**

## **MODACT MOED EEx**

**Type numbers 52 120 - 51 125**



ZPA Pečky, a.s. is certified company in accordance with ISO 9001 as amended.

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The Mounting and Operating Instructions specify basic principles for mounting, connection, adjustment, operation, maintenance, and repairs of electric explosion-proof actuators. A fundamental prerequisite is that assembly, operation, maintenance, and revisions are performed by skilled technicians qualified for operation and works on explosion-proof electric devices and the works are supervised by a professionally qualified expert instructed in a demonstrable way.

## 1. APPLICATION

The **MODACT MOED 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 60079-0:2013 and ČSN EN 60079-1:2015 for explosive gaseous atmosphere.

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

Marking of actuators for surrounding temperature -50 °C to +55 °C is with the letter F at the 11<sup>th</sup> place of the type number, i.e. 52 120.xxxxEDF. The electronic outfit of the version **Ex db IIB T4** should be discussed with the manufacturer.

### 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.
- 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 60079-10 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.

## Designation of explosion-proof properties

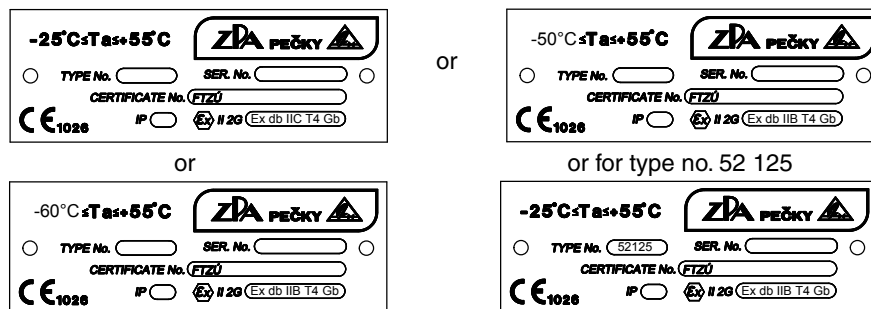
It consists of the following symbols:

- 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.
- 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.

## Data on actuators

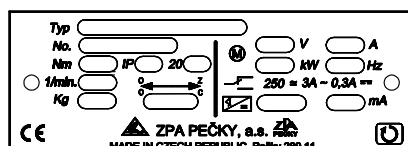
The actuators are fitted with the following plates:

### 1) Plate with data of non-explosive closures:

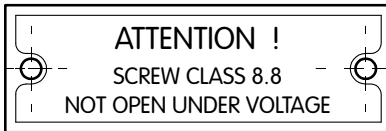


### 2) Rating and instrument plate contains:

- electric power circuit data (*voltage and frequency, current and electric motor power*)
- electric data of electronics control circuit (*voltage, current*)
- position transmitter (*current*)
- 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 1/min
- rated working stroke rev
- designation of protective enclosure of actuator IP
- weight of actuator kg
- mark of conformity CE



### 3) Warning plate

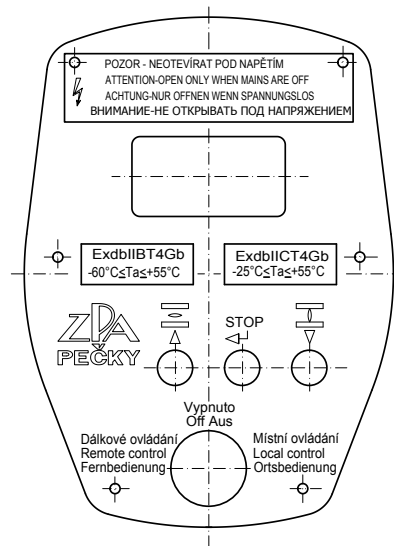


### 4) Plates on covers with marking of used protection against explosion

- a) explosion-proof closure "d" of control box and terminal box without local control and display



- b) explosion-proof closure "d" of terminal box with local control and display



## 2. OPERATING CONDITIONS, OPERATING POSITION

### Operating conditions

The **MODACT MOED EEx** actuators should withstand the effect of operating conditions and external influences, Classes AC1, AD5, AE4, AE5, AF2, AG2, AH2, AK2, AL2, AM-2-2, AN2, AP3, BA4, BC3 and BE3, according to ČSN Standard 33 2000-3.

When the actuator is installed on a free area it is recommended to fit it with a light shelter against direct impact of atmospheric effects. The shelter should overlap the actuator contour by at least 10 cm at the height of 20 – 30 cm.

When the actuators are to be installed in a working environment with temperature below +10 °C and in an environment with relative humidity above 80 %, it is always necessary to use an anti-condensation heater fitted to all actuators.

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

#### Class:

- 1) AC1 – elevation above sea level ≤ 2000 m
- 2) AD5 – splashing water in all directions
- 3) AE4 – small dustiness  
AE5 – medium dustiness
- 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 occurrence of animals (*insects, birds, small animals*)
- 9) AM-2-2 – harmful effects of escaping stray currents
- 10) AN2 – medium sun radiation. Intensity from 500 to 700 W/m<sup>2</sup>
- 11) AP3 – medium seismic effects. Acceleration from 300 to 600 Gal
- 12) BA4 – staff capability. Instructed persons.
- 13) BC3 – frequent contact of persons with earth potential. Persons often touch foreign conductive parts or stand on conductive base.
- 14) BE3 – danger of explosion, production and storage of explosive substances

### 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 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
<b>C1</b> (very low)		Heated buildings with clean atmosphere e.g. offices, shops, schools, hotels.
<b>C2</b> (low)	Atmosphere with low level of pollution. Mostly outdoor areas.	Unheated buildings, in which may occur condensation, e.g. stocks, sports halls.
<b>C3</b> (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.
<b>C4</b> (high)	Industrial areas and seaside areas with middle salinity.	Chemical plants, swimming pools, seaside shipyard.
<b>C5-I</b> (very high – industrial)	Industrial areas with high humidity and aggressive atmosphere.	Buildings or areas with predominantly continuous condensation and high air pollution.
<b>C5-M</b> (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® MOED 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 hand-wheel. 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.

## 3. OPERATION MODE, SERVICE LIFE OF ACTUATORS

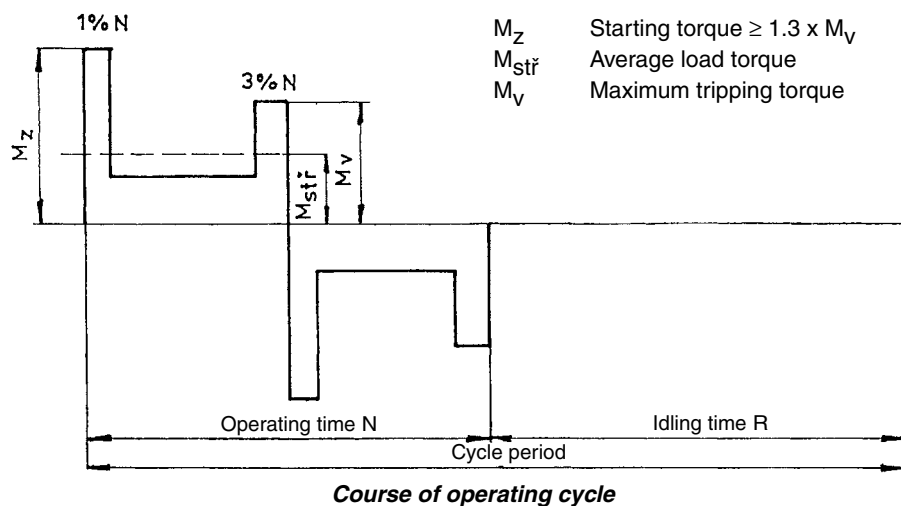
### Operation mode

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<sup>-1</sup>. 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.



## 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

When using reversing contactless unit the service life of actuator is 3 million starts

Service life [h]	2490	3000	6000	12000
Number of starts [1/h]	1200	1 000	500	250

## 4. TECHNICAL DATA

### Supply voltage

The actuators have been designed to operate at supply voltage of 3 AC 400 V / 50 Hz. However, they are available in design variants operating at another three-phase AC supply voltage, upon special request. The supply voltage of the electric motor should be within the tolerance limits of  $\pm 10\%$  of the rated value and the supply voltage frequency should be within  $\pm 2\%$  of the rated value. 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.

### Protective enclosure

Protective enclosure of actuators **MODACT MOED EEx** IP54, IP55, IP65 (*according to the plate and it is in accordance with the order*)

### Noise

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

### Tripping torque

Tripping torque is set at the manufacturer according to the customer's requirements within the range given in Table No. 1, 2. If setting of tripping torque is not required maximum tripping torque of the required type number of the electric actuator is set.

### 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 reversion, 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 only acts in the direction against motion of the actuator output shaft. Self-locking is ensured by a roller arrest immobilizing the electric motor rotor even in the case of manual control.

In order to observe safety regulations, the actuators cannot be used for driving transportation lifting devices with possible transport of persons or for installations where persons can stand 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

### 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.

Local control of **MOED EEx** actuators with DMS2 electronics consists from magnetic switches and buttons that allow you to control and adjust the actuator from the site.

## 6. ELECTRIC PARAMETERS

### External electric connection

Electrical equipment of **MOED EEx** actuator with DMS2 electronics consists of electronics power supply circuit and motor control circuit. Connection of power grid is realized by terminal box mounted on the source unit. The terminal block is designed that the total connection don't need any other terminals. This terminal board uses screw terminals allowing copper and aluminum conductors with a maximum cross-section 2,5 mm<sup>2</sup> to be connected. Arrangement and identification of terminals (*except actuator's terminal board*) is on the another page of this mounting instructions.

### Actuator internal wiring

The internal wiring diagrams of the **MODACT MOED 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.

### 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

Circuits of anti-condensation heater + DMS2 ED and DM2 output relay contacts circuits	1 500 V, 50 Hz
Circuits of electric motor Un = 3x230 / 400 V	1 800 V, 50 Hz
Circuits of CPT 1 transmitter + DMS2 ED and DMS2 outgoing and control signal circuits	50 V DC

### Deviations of basic parameters

Tripping torque	±12 % of max. value of range
Adjusting speed	- 10 % of max. value of range
	+15 % of rated value ( <i>idle run</i> )



## Protection

The actuators are fitted with one internal and one external protective terminals ensuring protection against electric shock according to ČSN 33 2000-4-41. One protective terminal is also fitted to the electric motor. The protective terminals are labelled with a mark according to ČSN EN 60417-1a2 (013760).

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

## 7. DESCRIPTION

The electric actuators are designed for direct attachment on the controlled device. (*valve etc.*). The actuators are connected by means of a flange and a clutch according to ČSN 18 6314. The actuator flanges also comply with ISO 5210. The following clutches are available for transmission of the output shaft motion to the valve:

- Shape A (with adapter), according to ISO 5210 and DIN 3210
- Shape B1 (with adapter), according to ISO 5210 (*shape B according to DIN 3210*)
- Shape B3 (without adapter), according to ISO 5210 (*shape E according to DIN 3210*)
- Shape D (without adapter), according to DIN 3210
- Shape C (without adapter), according to DIN 3338

The adapters are mounted between the actuator and the valve.

Moreover, the actuators can be delivered with connection according to Russian standards OCT (*connection M, A, Б, В, Г*), see the version in table no. 3.

The electric actuator configuration is shown in Fig. 1. The three-phase asynchronous motor 1 drives, via the countershaft gearing 2, the sun gear of the differential gear unit installed in the actuator supporting box (*power gearing*) 3.

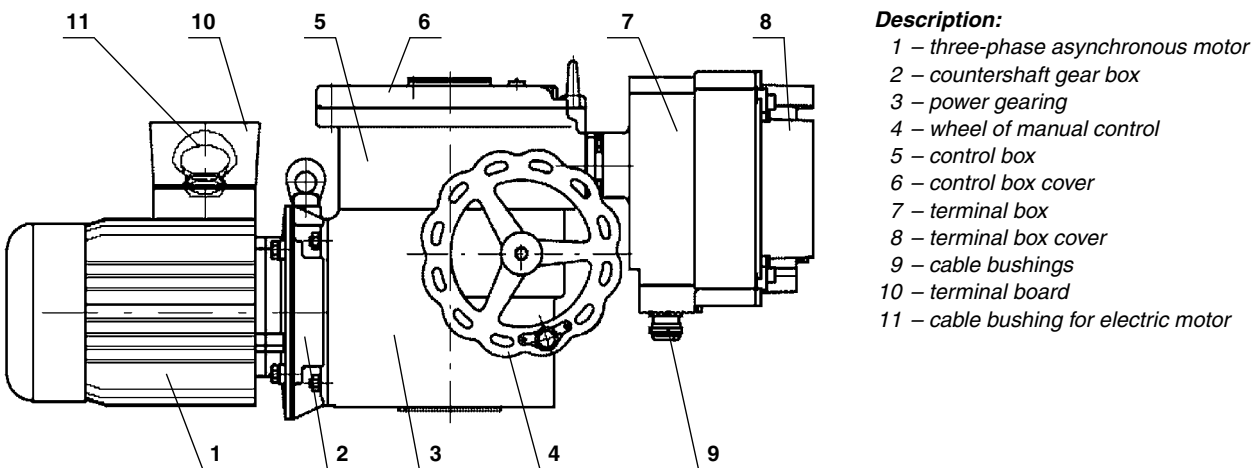


Fig. 1 – Actuator set-up (actuators with DMS2 ED electronic system)

In the motor control mode, the crown gear of the planet differential unit is held in fixed position by a self-locking worm gearing. The handwheel 4 connected with the worm allows manual control even when the motor is running. The output hollow shaft is fix-connected to the driver of the planet gear and passes to the control box -5- where scanning and control elements of the actuator are installed.

Operation of the torque-limit switching is derived from axial displacement of the “floating worm” of the manual control unit which is scanned and transferred to the control box by means of a lever. The control box forms an explosion-proof closure “d” with designation Ex d IIC T4. The control elements are accessible after removing the cover 6 of this box. Access to the terminal box is possible after removing the cover 8.

The terminal board box also includes a firm closure “d” marked Ex d IIC T4. The cable inlets are secured by certified cable bushings HAWKE, type ICG 623, with a certificate; they can be used within the temperature range from -60 °C to +80 °C. The bushings of the following sizes are used in the terminal board box:

Quantity	Glands type	Threaded hole	Cable diameter	Application
2 pieces	CR-U/25	M25x1,5	11,7 – 20,0 mm	Both cliental
	ICG 623/B		13,0 – 20,2 mm	
2 pieces	CR-U/20	M20x1,5	9,5 – 14,0 mm	One serves for interconnection with the electric motor, the other is cliental.
	ICG 623/A		11,0 – 14,3 mm	

The cable outlet system should meet the requirement of ČSN EN 60079-14 art. 10.3.2.d for direct inlet to the firm closure of class IIC.

Therefore, in connecting the actuator, the client should provide for a non-explosive sealing (*filling-in individual cable wires*) by means of the enclosed two-component filling-in putty according to the instructions.

## 8. ELECTRONIC OUTFIT

Electro-mechanical control board is replaced with the electronic system **DMS2** or **DMS2 ED**. Both systems scan position of the output shaft and torque of the electric actuator by contact-free magnetic sensors. Long service life is guaranteed for the contact-free sensors that do not get mechanically worn.

The sensor of the output shaft position is absolute and does not require any backup power supply in case supply voltage is disconnected during operation of the electric actuator. Both systems can be set and monitored by a computer with controlling program (*set parameter can be backed up on a computer*) or manually without a computer (*for the electronics DMS2, parameters can be manually set and it can be checked without computer only if the system is equipped with a display and local control*). They contain diagnostic functions – error messages on the display, memory of recent failures and number of occurrences of respective failures.

The more simple system **DMS2 ED** substitutes the electro-mechanical board and/or provides for controlling the electric actuator by input analog signal as in the version Control.

The system **DMS2** enables the electric actuator to be used for two-position and three-position regulation or to be connected to the industrial bus bar Profibus.

### DMS2 ED

#### Basic outfit:

Control unit	main part of the system DMS2.ED - includes microcomputer, position sensor, 3 signal lamps LED, 4 push-buttons for simple setting and checking the actuator, connectors for connecting the torque sensor, source board, and interface RS 232 ( <i>connection of computer for setting and diagnostics</i> ).
Torque unit	
Source unit	electronic power supply, user's terminal board ( <i>connection of power supply and control signals</i> ), 2 torque relays, 2 position relays, 2 signalling relays, 1 relay for signalling errors ( <i>READY</i> ), switch of resistance anti-condensation heater, connectors for connecting electronic brake, resistance heater of analog module, and connector for interconnection with the control unit.

#### Optional outfit:

Analog module	output of feed-back signal 4 – 20 mA, in version CONTROL input of control signal 0/4 – 20 mA
Position indicator	LED display
Local control	
Contactors or contact-less block	
Electronic brake	

#### Parameters:

Scanning of position	contact-less, magnetic
Scanning of torque	contact-less, magnetic
Working stroke	see Tables 1, 2, 3
Torque blocking	0 – 20 s at reversing in limit positions
Input signal	0 (4) – 20 mA with switched on regulator function Local/Remote control, Local open/close
Output signal	7 x relay 250 V AC, 3 A ( <i>MO, MZ, PO, PZ, SO, SZ, READY</i> ) Position signal 4 – 20 mA max. 500 Ω, active/passive, galvanic-isolated, LED display, electronic brake control
Power supply of electronic	230 V AC, 50 Hz, 4 W, over-voltage category II

#### Realization:

**Replacement of electric-mechanical board** the provided relay contacts substitute position, torque and signalling micro-switches; **me**-current feed-back signal 4 – 20 mA can also be brought out; the actuator is controlled by the superior control system with signals “*open*” and “*close*”.

**CONTROL** The electronics covers also function of the regulator; the output shaft position is controlled by analog input signal.

#### Function and setting of output relays

The output relays replace end-limit micro-switches; to some extent, function of the output relays differs according to chosen mode of electronics or it can be selected, preferably by the setting program.

## Relay MO, MZ, PO, PZ

Relay	DMS2 ED	DMS2 ED Control
MO	<b>torque open</b> (also changes-over to errors)	<b>motor open</b>
MZ	<b>torque closed</b> (also changes-over to errors)	<b>motor close</b>
PO	<b>position open</b>	<b>torque open</b> (also changes-over to errors ) + optional tripping in position open (parameter Tripping)
PZ	<b>position closed</b>	<b>torque closed</b> (also changes-over to errors ) + optional tripping in position closed (parameter Tripping)

In the version Control, the **function of relay MO/MZ** is same as that of motor relays.

Their operation is controlled by:

- **regulation loop** (deviation of required and actual position)
- **active errors**

Any induced active error will change over both relays to a standstill position (coils not energized). In case of errors, the relays with a function of torque relays (in both versions DMS2 ED and DMS2 ED Control) are also controlled.

## Relays SZ, SO, READY

<p>Relay 3/SZ - <b>It usually signalizes position closed</b>, it can be changed-over to any offered signalization</p> <p>Relay 4/SO - <b>It usually signalizes position open</b>, it can be changed-over to any offered signalization</p>	<p>Relay <b>READY</b> - <b>It usually signalizes errors + warning + not remote</b>, it can be changed-over to any offered signalization</p>																																																																																								
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## Setting program

The setting program is same for communication with the electronics DMS2 ED and DMS2. The users' version can be freely downloaded.

**Note:** In the window "Parameters" of the setting program, column "Access", the word "NO" designates parameters that cannot be changed by the user (change of these parameters is blocked).

Parametr	Změna	Chyba	Přístup
Setrvačnost [0.1%]			NE 5
Setr. Doběh [0.1s]			NE 6
Necitlivost [%]			1

Parametr – Parameter

Změna – Change

Chyba – Error

Přístup – Access

Setrvačnost (0,1 %) – Inertia [0.1 %]

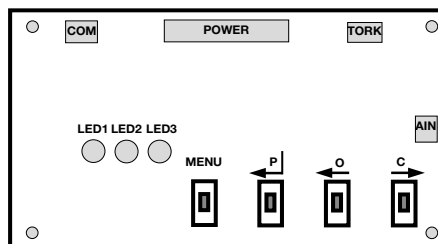
Setr. Doběh (0,1 s) – Inertial run-out [0.1 s]

Necitlivost (%) – Insensitivity [%]

NE – NO

## PROCEDURE OF SETTING PARAMETERS BY MEANS OF PUSH-BUTTONS

For simple programming of required operating parameters, the control unit is fitted with four push-buttons: MENU, P, O, C and three signal lamps.



### Colours of diodes:

LED1 – yellow (*menu number*)  
 LED2 – red (*parameter value*)  
 LED3 – green

**Push-buttons and signal lamps LED on control unit DMS2.ED.S and DMS2.ED.S90**

Yellow	Red	Green	State
-	-	-	System without feeding
-	-	lit on	Everything OK – working regime ( <i>remote, local or switched off control</i> )
-	blinking	lit on	Error or warning – working regime ( <i>remote, local or switched off control</i> )
lit on	-	lit on	Enter or exit of Setting of parameters by means of push-buttons or Setting of parameters by means of PC
blinking	-	lit on	Setting of parameters by means of push-buttons
blinking	blinking	lit on	
blinking	blinking	lit on	

In adjustment, follow the paragraphs “VERIFICATION of APPARATUS FUNCTION And its LOCATION”, “fitting on VALVE” and “ADJUSTMENT of ACTUATOR with VALVE” of these instructions.

For safety reasons, the system is delivered in the state of induced error of Calibration when the functions are limited in order to reduce the risk of damage to the actuator by wrong wiring.

### Record of position CLOSED, OPEN and AUTOCALIBRATION

- The actuator must be adjusted in such a way that the recorded position would switch off the actuator before it is switched off by torque. For tight closure, the torque relay for torque Closed is only connected into the control circuit. The actuator can be shifted either manually or electrically. The actuator in version CONTROL can be started from menu MOTOR in program DMS2. In this case, the actuator does not react to the set position and can only be stopped by the torque relay. In controlling from menu MOTOR, no torque may be induced. The torque must be left manually.

If, during adjustment, the torque is reached in the end-limit position, the torque must be left by means of a hand wheel.

- The actuator is set to position Closed and position Closed is stored by long pressing of push-button C (*without entering the Menu*).
- The actuator is set to position Open and position Open is stored by long pressing of push-button O.
- The calibration routine is started by means of push-button P (*in remote control*) that, in the three-position regulation, will measure actual inertial masses of the system and store them into the memory of the control unit. In the two-position regulation, pressing of push-button P only cancels the error of Calibration.
- In recording the end-limit positions, signalling relays and the position transducer are also set.
- In case the actuator stroke is to be increased and the switching off is set to “from position”, the actuator will switch off during shifting in position O or 100 %. To further change the position, press C or O, and, while keeping it depressed, the actuator can be further shifted. After required position is reached, it is stored to memory by pressing push-button C or O.

### Parameters that can be changed by user are set by manufacturer as follows:

1. Tripping torques: 100 % or required value (*it is not recommended to change the value without consulting the supplier of the valve, etc.*)
2. Relay 3 and relay 4: signalization SZ 1 % and SO 99 % of stroke
3. Time of blocking: 2 – 8 s according to rate of actuator shifting
4. Position of blocking: 5 % of stroke from end-limit positions (*it is not recommend to change the value by more than 10 %*)
5. Characteristics of position transducer: closed 4 mA, open 20 mA
6. Relay READY: errors + warning + not remote

In version CONTROL:

1. Setting of control signal: closed 4 mA, open 20 mA
2. Insensitivity of actuator in regulation: 1 % *(it is not recommended to set insensitivity higher than 3 %)*
3. Response in case of loss of control signal: stop
4. Way of switch off in end-limit positions: torque + PO + PZ

## Overview of MENU

### BROWSING THROUGH MENU

- The setting regime is entered by pressing and keeping depressed push-button **MENU** for at least 2 s; LED1 is then lit on.
- Shortly press **MENU** to select the basic MENU – menu M1 to M8 (*LED1 signalizes the menu number*); by short pressing of P, O, C they are entered (*LED2 signalizes particular parameter*).
- Shortly press P to select required value of the parameter. In case the parameter can be set to several values, they are changed by short pressing of P (*number of blinking of LED2 indicates its value*). Keep pressing of P to record the chosen parameter; the record is confirmed by lighting on of LED2.
- Shortly press **MENU** to gradually set the required menu and parameters.
- After setting all required parameters, exit the setting menu by pressing and keeping depressed push-button **MENU** for at least 2 s. The setting menu will also be left in case that no push-button is pressed within 1 minute.

### MENU 1 – Setting of tripping torques

- After entering the menu by means of push-button C or O, select required torque.
- Shortly press P to select the set value of the parameter 50 – 100 % (*5 – 10 blinking of LED2*) and keep pressing push-button P to store the parameter to memory.

### MENU 2 – Setting function of signalling relays

- Basic setting of the signalling relays is SZ 1 % and SO 99 % of stroke.
- In case different setting is required, it can be changed after shifting the actuator to required position by means of push-button C or O.
- Using push-button P, perform basic setting SZ 1 % and SO 99 % of stroke.

### MENU 3 – Setting of blocking of torque in end-limit positions

- Shortly press P to select the set value of blocking time 0 – 20 s (*0 - 20 blinking of LED2*) and keep pressing push-button P to store the parameter to memory.
- Keep pressing push-button C to store actual position for blocking torque on the side Closed to memory.
- Keep pressing push-button O to store actual position for blocking torque on the side Open to memory.

### MENU 4 – Setting transducer characteristics

- Shortly press P to select the value 4 – 20 mA – 1x blinking of LED2 or 20 – 4 mA – 2x blinking of LED2, and keep pressing push-button P to store the parameter to memory.

## Other menus only serve for board setting in version Control

### MENU 5 – Setting control signal in 3P regulation

- Shortly press P to select value  
4 – 20 mA                    - 1x blinking of LED2,  
or 20 – 4 mA                - 2x blinking of LED2,  
or 0 – 20 mA                - 3x blinking of LED2,  
or 20 – 0 mA                - 4x blinking of LED2

and keep pressing push-button P to store the parameter to memory.

### MENU 6 – Setting insensitivity in three-position regulation

- Shortly press P to select value 1 – 10 % (*1 – 10x blinking of LED2*) and keep pressing push-button P to store the parameter to memory.

### MENU 7 – Response in case of losing control signal in three-position regulation

- Shortly press P to select value  
OPEN                         - 1x blinking of LED2,  
or CLOSE                    - 2x blinking of LED2,  
or STOP                      - 3x blinking of LED2,

and keep pressing push-button P to store the parameter to memory.

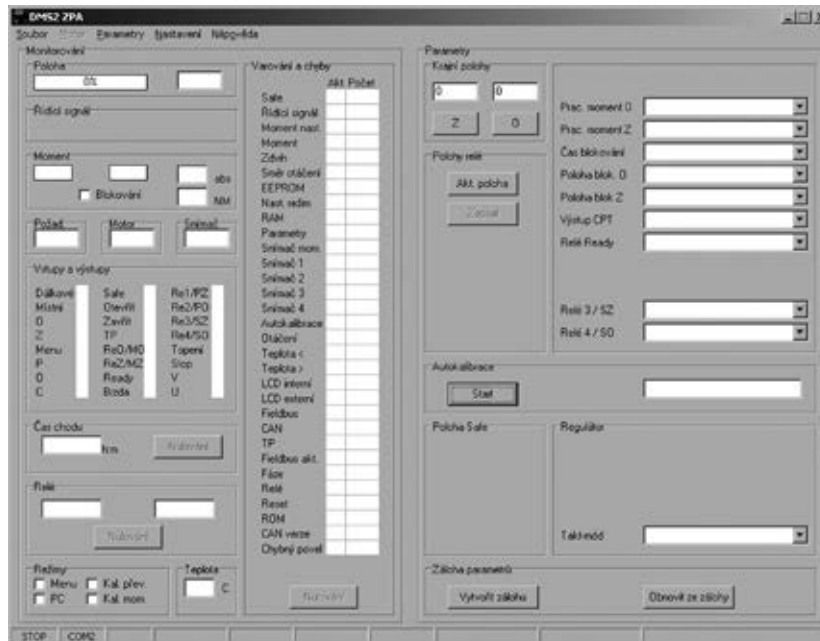
### MENU 8 – Way of switching off in end-limit positions in 3P regulation

- Shortly press P to select value  
TORQUE                      - 1x blinking of LED2,  
or TORQUE + PO            - 2x blinking of LED2,  
or TORQUE + PZ            - 3x blinking of LED2,  
TORQUE + PO + PZ        - 4x blinking of LED2,

And keep pressing push-button P to store the parameter to memory.

## PROCEDURE OF SETTING PARAMETERS BY PROGRAM DMS2

- Before starting the actuator, it is necessary to set some parameters of the system by means of program DMS2 on PC.
- For safety reasons, the system is delivered in the state of induced error of Calibration when the functions are limited in order to reduce the risk of damaging the actuator by wrong wiring. In controlling the actuator from program DMS2, its run is stopped when any torque is induced.



*Main window of setting program*

### Working torque

- Check and, if necessary, set the value of working torque 50 – 100 % in program DMS2.

### Record of positions OPEN, CLOSED and AUTOCALIBRATION

The actuator should be adjusted so that the recorded position would stop the actuator before it is switched off by torque. The actuator is shifted manually or electrically. The actuator in version CONTROL can be started from menu MOTOR in program DMS2. In this case, the actuator does not respond to the set position and is switched off by torque. In controlling from menu MOTOR, no torque may be induced. The torque should be left manually.

Record of position CLOSED:

- In the required position, press push-button Z in the program and confirm the approved record.

Record of position OPEN:

- In the required position, press push-button O in the program and confirm the approved record.

The recorded values are confirmed by pressing push-button START in program DMS2. For the actuator in version CONTROL, change over the actuator to remote control and, by pressing push-button START, start the autocalibration. By short starting of the motor in both directions, the actuator measures inertia and changes over to the regulating regime. Information on the course of autocalibration is signaled next to push-button START. The autocalibration cannot be started in case the torque relay is switched off. The torque should be left manually.

### Other parameters

Check and, if necessary, change other parameters:

Control signal	4 – 20 mA, 20 – 4 mA, 0 – 20 mA, 20 – 0 mA
Insensitivity	1 – 10 %
Function in case of error	open, close, stop, to position
Time of torque blocking in end-limit positions	0 – 20 s

Position of torque blocking in end-limit positions	1 – 10 %
Output of position signal	4 – 20 mA, 20 – 4 mA
Function READY	combined error

**Note:** Signal *READY* is brought out as contact of the relay on the terminal board. If the state *ERROR* or *WARNING* is not detected (setting can be made of what is to be evaluated as error or warning), the contact is closed; in case of error, warning, or if feeding of electronics is interrupted, the contact is opened. The state of the relay *READY* is indicated by the LED diode on the source board.

## AUTODIAGNOSTICS

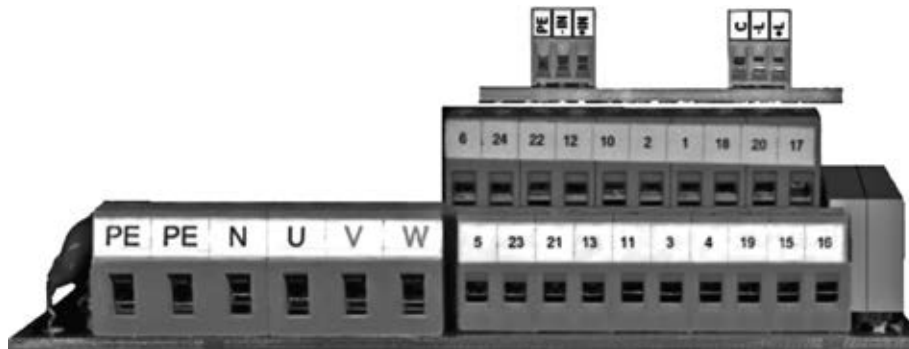
DMS2.ED performs continuously its diagnostics and, if a problem is detected, it reports warning or error. The warning or error is signaled by LED of the display and, possibly, by relay Ready. The warning has no effect on operation of the system, the error stops the actuator.

Assigning or switching off of warnings and errors is set in window “Warning and error” of the setting program (*it is opened by clicking one of parameters Warning 1 – 4 or Error 1 – 4 in window “Parameters”*).

The error or warning are reported by opening the relay *READY* and by blinking of the red LED diode on the control unit. Particular error is specified by program DMS2 or on the display.

## RESTORING PARAMETERS FROM BACKUP

With the feeding switched off, press push-buttons *O* and *C* at the same time. Then, switch on feeding and wait until red and yellow LED diodes light on. The backup parameters are read.



**Terminal board of actuator with electronics DMS2ED.**

If the actuator is of the single-phase version the power supply is connected only to terminals **PE, N, U**. The terminals **V, W** remain non-connected. If the actuator is of the version “Replacement of electric-mechanical board” with three-phase electric motor without power relays, the electric motor is connected to a separate terminal board (*not shown here*).

## List of warnings and errors

No.	Name	Warning <sup>1</sup>	Error <sup>1</sup>	Description
1	Safe *	X		Input Safe activated
2	Control signal	X		Value of control signal $\leq 3$ mA ( <i>it applies to ranges 4 – 20/20 – 4 mA</i> )
4	Torque	X		Induced torque beyond end-limit positions or disconnected torque sensor
6	Thermal protection		X	Thermal protection input activated
7	Sense of rotation		X	Reverse sense of rotation ( <i>for CONTROL only</i> )
8	EEPROM	X		Wrong control sum of parameters in EEPROM
9	RAM		X	Wrong control sum of parameters in RAM
10	Parameters		X	Wrong parameters in EEPROM
11	Setting regimes	X		Setting regime from push-buttons or PC
12	Torque sensor		X	Disconnected or defective torque sensor
13	Sensor 1		X	Error of sensor of position 1 ( <i>lowest stage</i> )
14	Sensor 2		X	Error of sensor of position 2
15	Sensor 3		X	Error of sensor of position 3
16	Sensor 4		X	Error of sensor of position 4 ( <i>highest stage</i> )
17	Calibration	X		Autocalibration not carried out
18	Torque setting		X	Wrong setting of torques ( <i>parameters Torque O/Z 50/100 %</i> )
19	Stroke		X	Wrong setting of stroke ( <i>parameters Position O/Z</i> )
20	Rotation error		X	The actuator does not rotate
21	High temperature	X		Permitted max. temperature exceeded ( <i>parameter Temperature max.</i> )
22	Low temperature	X		Permitted min. temperature exceeded ( <i>parameter Temperature min.</i> )
23	LCD internal *	X		Display of LCD internal does not communicate or not added in parameter CAN of configuration
24	LCD external *	X		Display of LCD external does not communicate or not added in parameter CAN of configuration
25	Fieldbus *	X		Module of industrial bus does not communicate or not added in parameter CAN of configuration
26	CAN *	X		Error of bus CAN ( <i>short circuit, interruption, only sensor communicates</i> )
27	Fieldbus activity*	X		Connection to industrial bus not active
28	Phase *		X	Inverse order of phases or some phase missing
29	Relay of service life	X		Service life of relay MO/MZ at CONTROL exceeded ( <i>parameter Relay of service life</i> )
30	Reset	X		Non-standard Reset of unit induced ( <i>watchdog etc.</i> )
31	ROM		X	Wrong control sum of program in ROM
32	CAN version *	X		Sensor, LCD display or module Fieldbus have incompatible versions of firmware
33	Wrong command *		X	Commands Open and Close entered at the same time
34	Wrong inertia	-	-	Wrong inertia measured by autocalibration ( <i>for autocalibration only</i> )
35	Wrong run-down	-	-	Wrong run-down measured by autocalibration ( <i>for autocalibration only</i> )
41	Wrong position		X	Servo-drive is in position 25 % behind working stroke

<sup>1</sup>) Assignment can vary depending on the version of firmware of the sensor control unit.

\* Applies to DMS2 only.

## Memory of number of induced warnings and errors

- For all ascertained warnings and errors, DMS2.ED uses counters of occurrence of these warnings and errors during operation of the system.
- Values of the counters are stored to the EEPROM memory and are preserved even in case of the power supply fall-out.
- Reading of the counters is possible by means of the program for PC
- Clearing of the counters is possible by means of the program for PC with the level of authorization “SERVICE”.

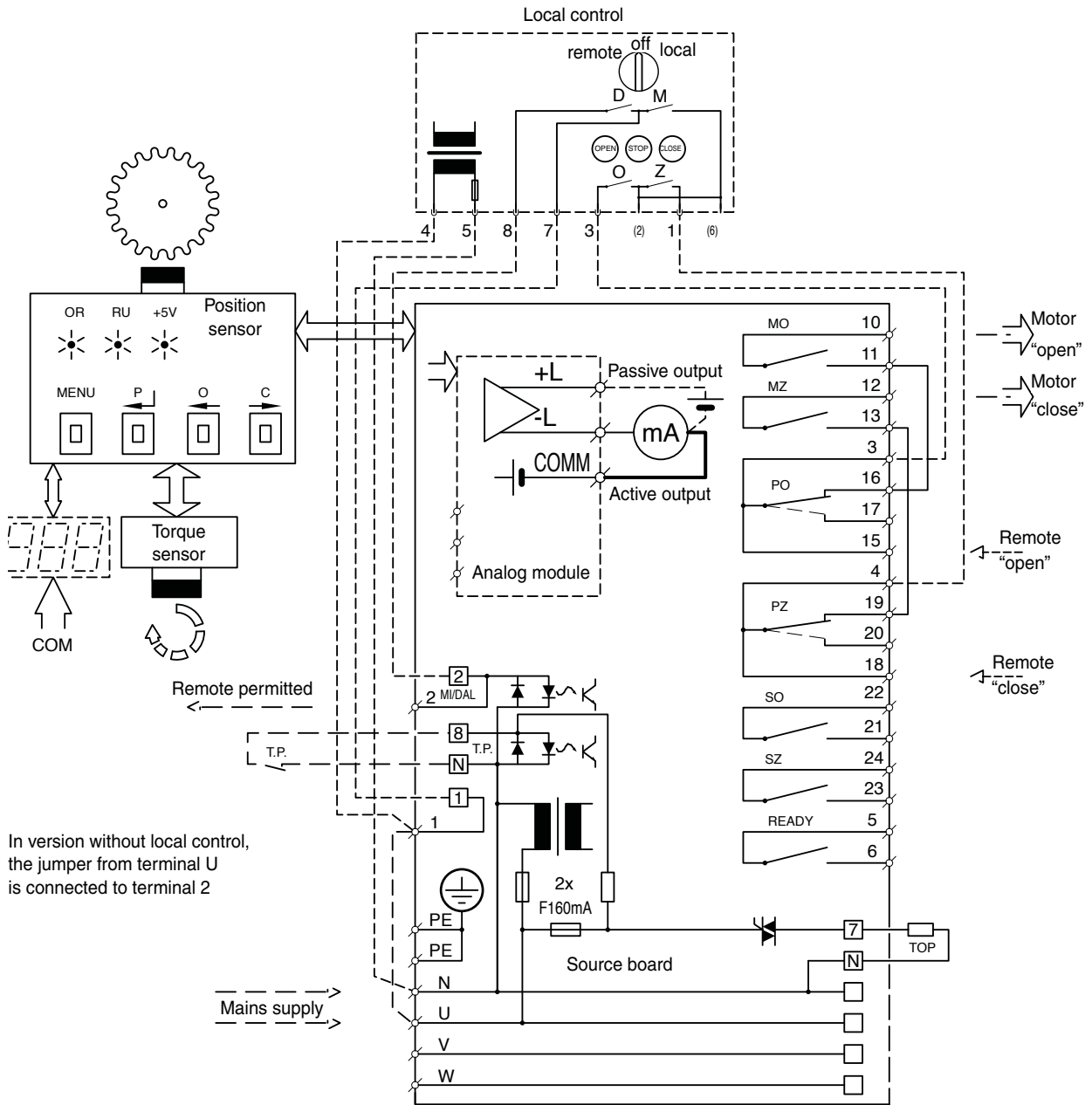
## Memory of recently induced warnings and errors

- DMS2.ED stores three recently induced warnings and errors to the EEPROM memory.
- Recent warnings and errors can be displayed and erased by means of the program for PC.



# Wiring diagram of electronics **DMS2 ED** in version Substitution of electro-mechanical board

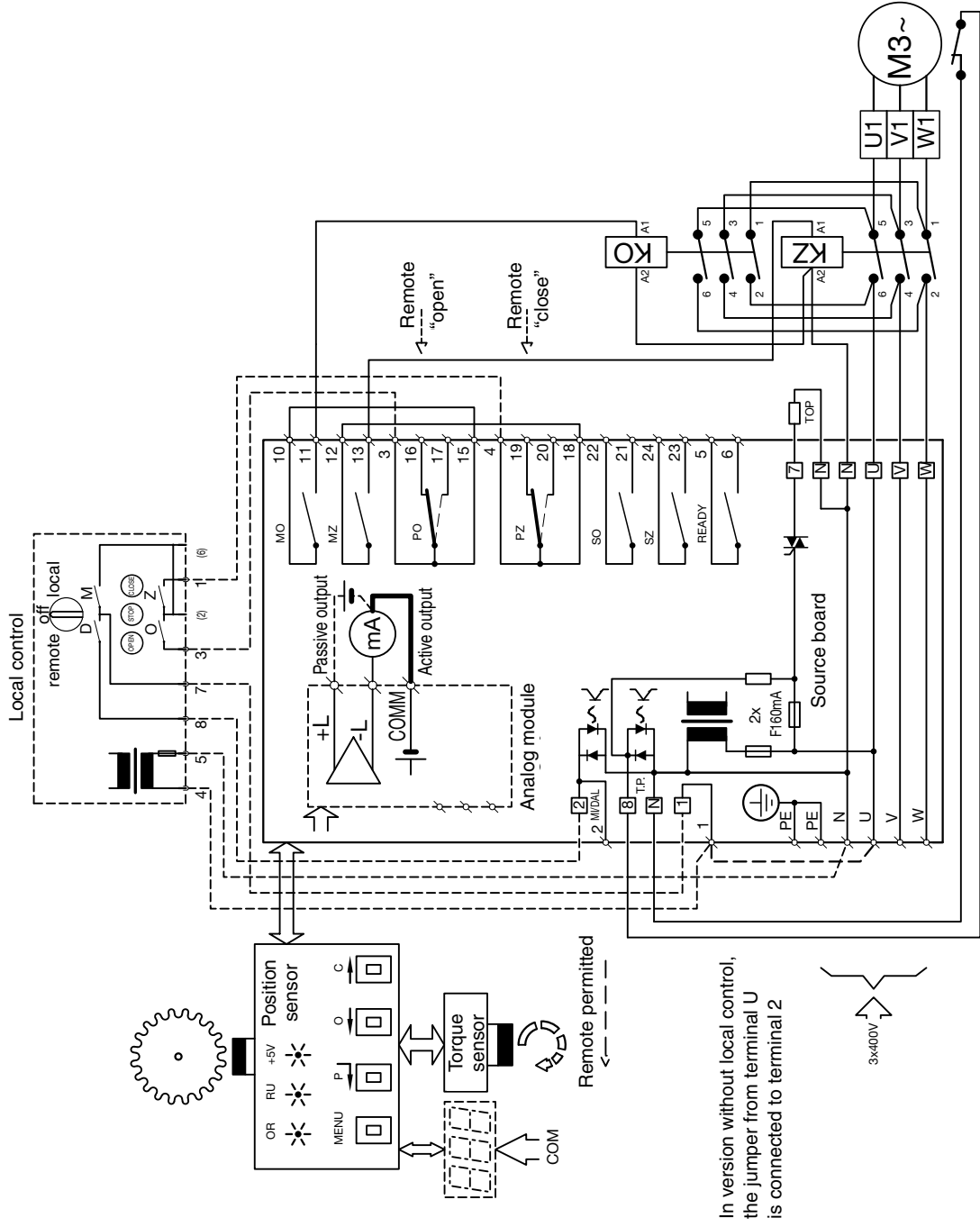
E0021



**Note:** Here, contacts of relays MO, MZ, SO, SZ are shown with power supply switched off; with power supply switched on contacts PO, PZ are shifted to the position drawn in dashed line.

Wiring diagram of electronics **DMS2 ED** in version Substitution of electro-mechanical board with block of contactors

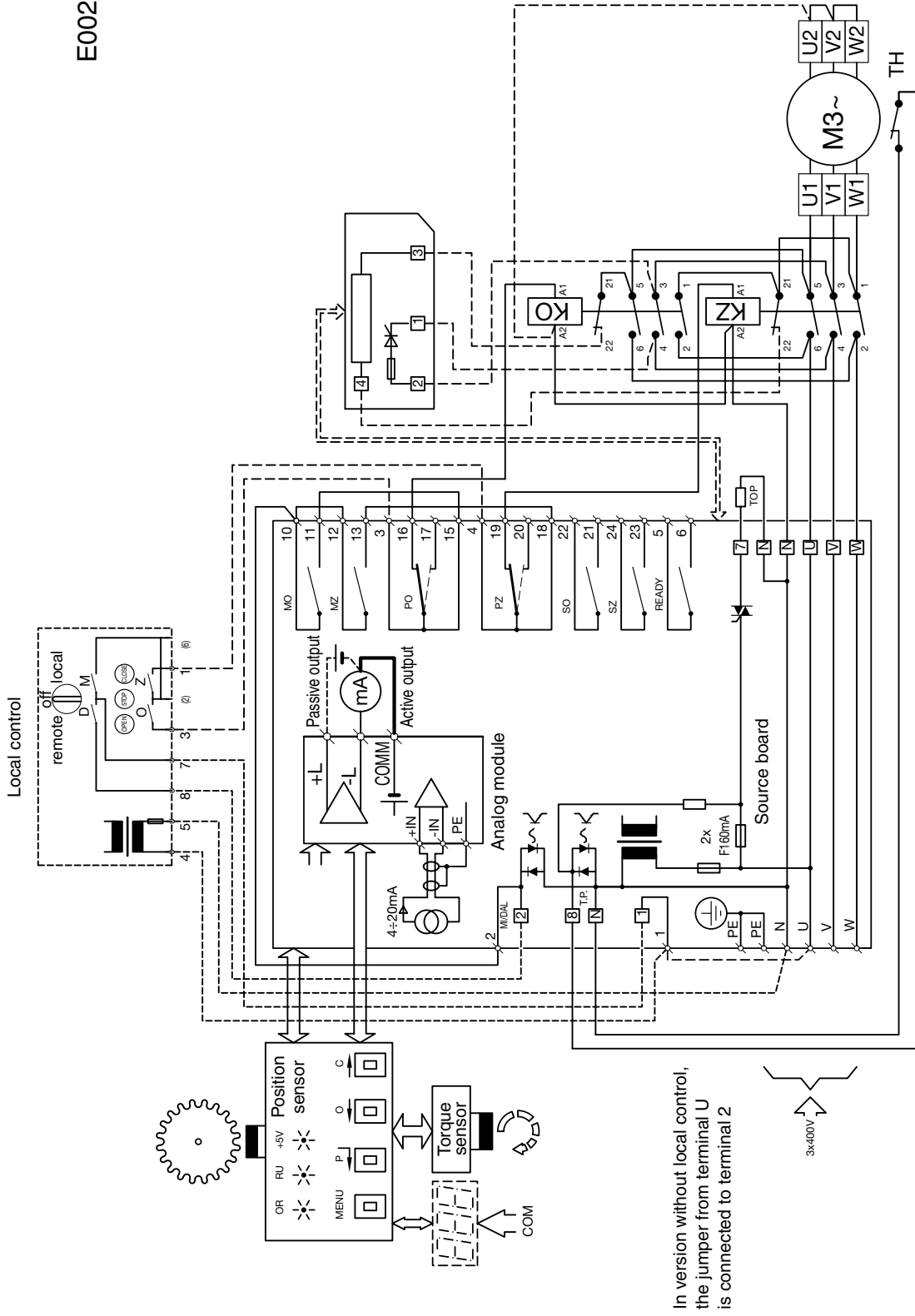
E0022



**Note:** Here, contacts of relays MO, MZ, SO, SZ are shown with power supply switched off; with power supply switched on contacts PO, PZ are shifted to the position drawn in dashed line.

# Wiring diagram of electronics DMS2 ED in version Control with three-phase electric motor

E0023



**Note:** Here, contacts of relays MO, MZ, SO, SZ are shown with power supply switched off; with power supply switched on, PO, PZ are shifted to the position drawn in dashed line.

## DMS2

### Main properties of DMS2:

- Complete control of the actuator run of the two- and three-position regulation or connection to the industrial bus Profibus.
- Synoptic signalization of operation and service data on the character LCD display 2 x 12.
- Autodiagnosics of error reports on the LCD display, memory of recent failures and number of occurrences of respective failures.
- Setting of parameters by the PC program and by local control provided that the actuator is fitted with local control.

### Basic outfit:

The control unit is the main part of the system DMS2; it comprises:

- Microcomputer and memory of parameters
- Position sensors
- 2 signalling LED
- Connectors for connecting the torque sensor, relay board, and two-position inputs, source board, communication adapter, LCD display, and local control

**Torque unit** provides for scanning torque by the contactless sensor

**Source unit** - two types exist:

DMS2.ZAN for the two-position or three-position control of the actuator by binary signals "Open" and "Close" or by analog signal 0 (4) – 20 mA.

DMS2.ZPR for controlling the actuator by the industrial bus Profibus.

Both units include the feeding source for electronics, two relays for controlling the power switches (*contactors or contactless switches*) of the electric motor, guarding of sequence of phases (*in case the actuator is fed by three-phase voltage*), circuits for connecting the anticondensation heater, and input terminals for connecting the thermo-contact from the electric motor. The units are fitted with the power terminal board for connecting the power supply. The units are fitted with a connector for the display and local control.

### Unit DMS2ZAN also contains:

- input circuits for the two-position and three-position control of the actuator and terminals for connecting external control signals
- input of signal SAFE – information on external failure
- relay – total of five; four (*signalling*) can be set for reporting of position, torque, or other operation states of the actuator; the fifth (*Ready*) is used for reporting of errors, warnings, and other states when the actuator cannot faultlessly perform its function, and the terminals to which contacts of the relay are connected
- circuits of the feedback current signal – information on position of the actuator output shaft

### Unit DMS2.ZPR also contains:

- circuits for communication with the superior control system through the industrial bus Profibus DP, input and output terminals for connecting the bus, and termination resistors with a switch.

**Display unit** – two-row display, 2 x 12 alpha-numeric characters

**Unit of push-buttons** – sensors of push-buttons "open", "close", "stop" and the rotary switch "local, remote, stop".

*The actuator can be fitted with contactors or contactless switching of the electric motor; it can be fitted with an electronic brake.*

## PROCEDURE OF SETTING PARAMETERS BY PROGRAM DMS2

Before putting the actuator into operation, it is necessary to set some parameters of the system by means of program DMS2 on PC.

Before adjustment, check the actuator according to the paragraph ASSEMBLING And putting the ACTUATOR into operation.

### Warning:

*For safety reasons (reduced risk of damage to the actuator by wrong wiring), the system is delivered in the state of the induced error of CALIBRATION when the functions are limited and, during controlling the actuator from program DMS2, its run is stopped if any torque is induced.*

### Note:

*The setting program is the same for electronics DMS2 ED. See the figure on page 14 for the main window and the window of Selection of electronics.*

## Working torque

- Check and, if necessary, set the value of the working torque 50 – 100 % in program DMS2.

## Tripping in end-limit positions

- Check and, if necessary, set the way of tripping in the end-limit positions::
- Torque
- Torque + position O
- Torque + position Z
- Torque + position O + Z

## End-limit positions - working stroke

- Position Z
  - Shift to position Closed either manually or by means of menu Motor in program DMS2.
  - The actuator can only be controlled by means of the program if no torque is induced. The torque should be left manually.
  - Press push-button Z to confirm consent with the record.
- Position O
  - Shift to position Open either manually or by means of menu Motor in program DMS2.
  - The actuator can only be controlled by means of the program if no torque is induced. The torque should be left manually.
  - Press push-button O to confirm consent with the record.

## Autocalibration

- The autocalibration can only be started by means of the program if no torque is induced. The torque should be left manually.
- The autocalibration is started by push-button Start in program DMS2.
- Wait until the autocalibration is completed; information on its course is signaled next to push-button Start.

## Other parameters

Check and, if necessary, change other parameters:

Control signal	4 – 20 mA	20 – 4mA	0 – 20 mA	20 – 0 mA
	2 position	Bus		
Insensitivity	1 – 10 %			
Function SAFE	Open	Close	Stop	To position
Active SAFE	0 V	230 V		
Time of blocking torque in end-limit positions	0 – 20 s			
Position of blocking torque in end-limit positions	1 – 10 %			
Output of position signal	4 – 20 mA	20 – 4 mA		
Function READY - Combined error	Switched off	Warning	Errors	Warning or error
	Errors or not remote	Errors or warning or not remote	Torque "O" or "Z"	
Relay 1 – 4	Switched off	Position O	Position Z	
	Torque O	Torque Z	Torque and position O	Torque and position Z
	Opening position N	Closing	Motion	Position
	Torque O/Z	Local control	Emote control	Control switched off
Position Relay 1 – 4	0 – 100 %			

**Note:** SAFE - input information on the error of an external device can be set so that the actuator would respond as to its own error.

## Autodiagnostics

The table List of errors – same as for electronics DMS2 ED (page 16)

### Memory of number of induced errors

- For all detected errors, DMS2 uses the counter of occurrence of these errors during operation of the system.
- Values of the counters are stored to the EEPROM memory and are preserved even in case of the power supply fall-out.
- Reading and clearing of the counters is possible by means of the program for PC.

### Memory of recently induced errors

- DMS2 stores 3 recently induced errors to the memory EEPROM.
- DMS2 provides for displaying the errors by means of the PC program or the switches of the local/ remote control.
- The display in MENU 22 INFORMATION shows ERROR 1, ERROR 2, ERROR 3. ERROR 1 is the latest error.

### Setting parameters by means of push-buttons of local control

Signalization of operation regimes by means of diodes LED on the position sensor board:

Red	Green	State
-	-	System without feeding
-	lit on	Everything OK – working regime ( <i>remote, local, or switched off control</i> )
blinking	lit on	Error or warning – working regime ( <i>remote, local, or switched off control</i> )
lit on	lit on	Setting parameters by means of push-buttons or PC

Signalization of operation regimes by means of the display:

*The display shows the actuator position in %, the state of local control and/or reaching of torque. In case of an error, blinking of this state alternates with number of actual error. In case of more errors, these errors repeat cyclically.*

### Overview of MENU

	Name	Parameter value	Meaning
1	JAZ/LANGUAGE	CESKY	Menu LANGUAGE
		ENGLISH	
2	POLOHA O, Z	POL.OTEVR.	End-limit position Open or Closed
		POL.ZAVRENO	
3	KALIBRACE	SPUSTIT	Starting of autocalibration
4	KONCOVA POL.	MOMENT	Tripping in end-limit positions
		MOMENT+POL.O	
		MOMENT+POL.Z	
		MOMENT+P.O+Z	
5	MOMENT PR. O	50 – 100 %	Working torque Open ( <i>selection 50 – 69 % depends on parameter Torque min.</i> )
6	MOMENT PR. Z	50 – 100 %	Working torque Closed ( <i>selection 50 – 69 % depends on parameter Torque min.</i> )
7	CAS BLOK.MOM	0 – 20 s	Time of torque blocking
8	POLOHA BL. O	0 – 50 %	Position of torque blocking Open
9	POLOHA BL. Z	0 – 50 %	Position of torque blocking Closed
10	CPT	4 – 20 mA	Characteristics of current transducer
		20 – 4 mA	
11	RIDICI SIGN.	4 – 20 mA	Analog control signal
		20 – 4 mA	
		0 – 20 mA	
		20 – 0 mA	
12	NECITLIVOST	1 – 10 %	Range of insensitivity
13	SAFE	OTEVIRAT	Response to signal Safe and loss of control signal
		ZAVIRAT	
		ZASTAVIT	
		POLOHA	

	Name	Parameter value	Meaning
14	SAFE AKTIV.	0 V 230 V	Active signal Safe
15	TP SAFE	blokuje SAFE SAFE aktivni	Response with thermal protection activated
16	TP NULOVANI	AUTOMATICKY MISTNIM OVL.	Zeroing of thermal protection
17	RELE READY	VYPNUTO VAROVANI CHYBY VAR.+CHYBY CHYBY+NENÍ D VAR+CHYBY+ND MOMENT O/Z	Function of Relay Ready
18	RELE 1	VYPNUTO POL.OTEVRENO POL. ZAVRENO MOM.OTEVRENO MOM. ZAVRENO POL.O.+MOM.O POL.Z.+MOM.Z OTEVIRA ZAVIRA POHYB POLOHA POL. N. OVL. MISTNI OVL. DALKOVE OVL. VYPNUTO MOMENT O/Z POHYB-BLIKAC	Function of Relay 1
19	RELE 2	same as RELE 1	Function of Relay 2
20	RELE 3	same as RELE 1	Function of Relay 3
21	RELE 4	same as RELE 1	Function of Relay 4
22	INFORMACE	SNIMAC DISP I DISP E DISP ED FLDBUS CHYBA 1 CHYBA 2 CHYBA 3 MOMENT TEPLOTA	Information on the system
23	ZALOHA PAR	OBNOVIT PAR VYTVORIT ZAL	Creation of backup parameters, restoring from backup parameters
24	ADRESA	1 – 125	Address of actuator on industrial bus
25	TAKT MOD	VYPNUTO SMER O SMER Z SMĚR O+Z	Mode of cycle regime
26	TAKT BEH	1 – 250 s	Time of motor run down in cycle regime
27	TAKT PAUSA	1 – 250 s	Time of motor pause in cycle regime

Setting actuator by means of push-buttons:

- Shift the change-over switch of local control to position OFF
- Keep pressing push-button STOP to enter the MENU. Using push-buttons O or Z, browse through the MENU (*MENU1 – MENU27*). Shortly press push-button STOP in a selected menu to enter this menu and, using push-buttons O or Z, select the parameter. Keep pressing push-button STOP to store the parameter to memory. Shortly press push-button STOP to exit the setting of parameters and proceed with browsing through another menu.

Keep pressing push-button STOP to exit the set menu; or keep pressing push-button STOP in the item END after the last MENU 27 to terminate the setting regime.

## **Setting end-limit positions by means of push-buttons of local control**

Shift the change-over switch LOCAL – REMOTE to position OFF. Keep pressing push-button STOP to enter the setting regime. Using push-button “Z”, choose MENU2. Shortly press push-button STOP to select setting of position “O”. Shift the change-over switch to position “LOCAL” and start the actuator. After the required position is reached, shift the switch to position “OFF” and keep pressing of push-button “STOP” to store the position to memory.

Shortly press push-button “Z” to select setting of position “Z”. Shift the change-over switch again to position “LOCAL” and start the actuator in direction “Z”. After the required position is reached, shift the switch to position “OFF” and keep pressing push-button “STOP” to store the position to memory.

Shortly press push-button “STOP” to exit MENU 2. Keep pressing push-button “STOP” to exit the setting regime.

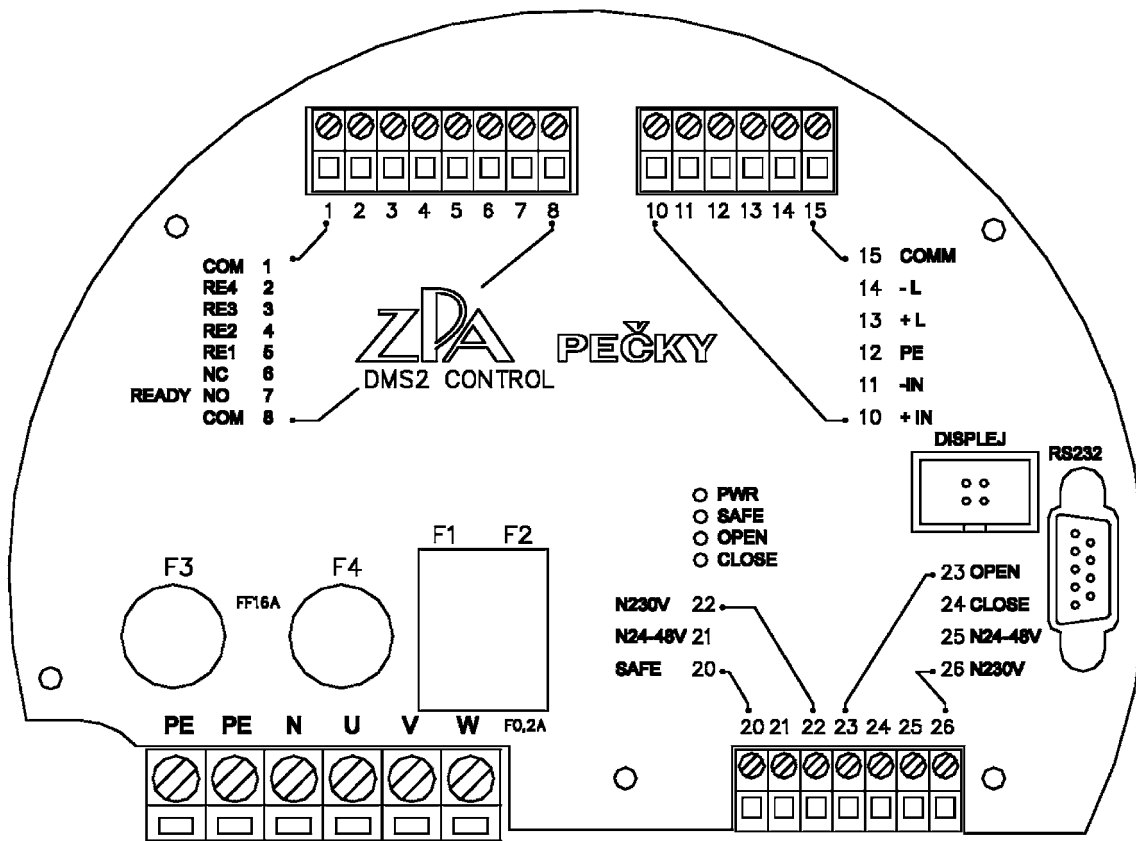
Change over the local control to position OFF, enter the menu (*by long pressing of push-button STOP*), and change over to position “LOCAL”; the actuator can now be shifted by means of push-buttons “O” and “Z” beyond the set end-limit positions. In this case, the actuator will trip after the set tripping torque is reached.

## **Autocalibration**

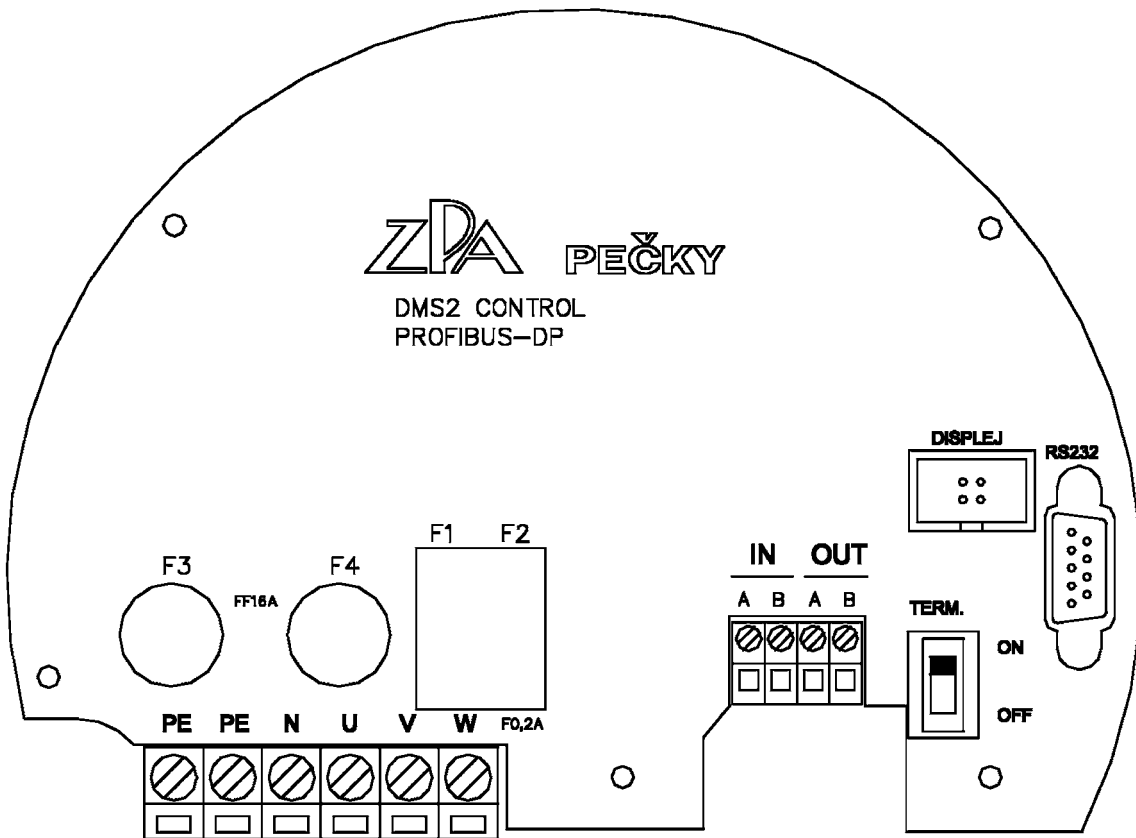
In the setting regime choose MENU 3. Shortly press push-button “STOP” to enter MENU 3 and keep pressing push-button “STOP” to start autocalibration. By short starting of the motor in both directions, the actuator will measure inertia. Completion of the autocalibration is announced by the message AUTOCALIBRATION OK.

Shortly press push-button “STOP” to return to MENU 3 and keep pressing of push-button “STOP” to exit the setting regime.

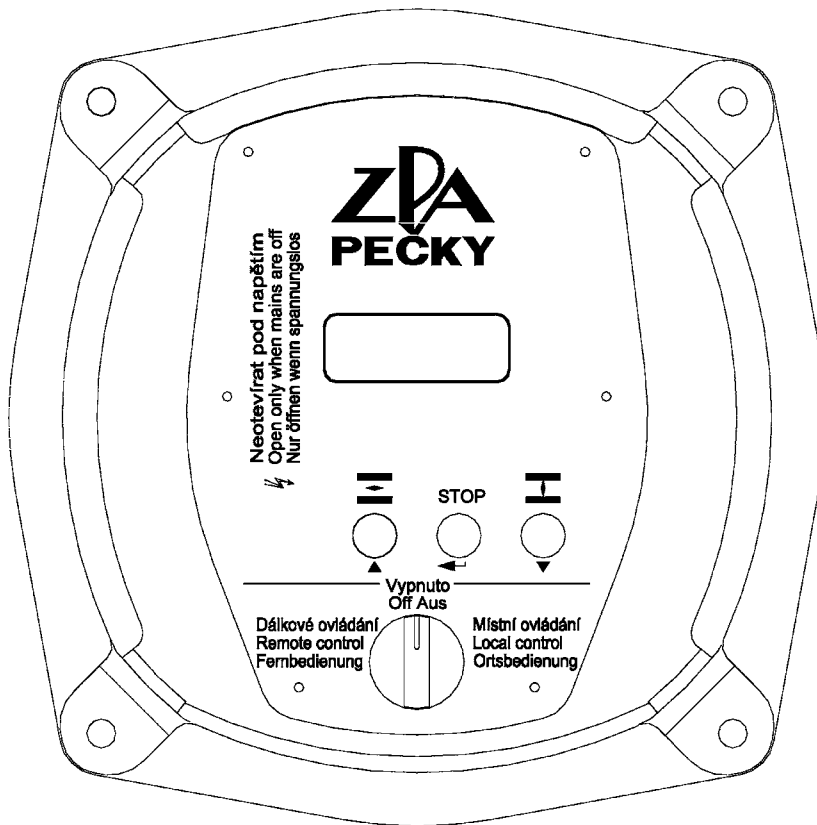




Terminal board of DMS2 Analog



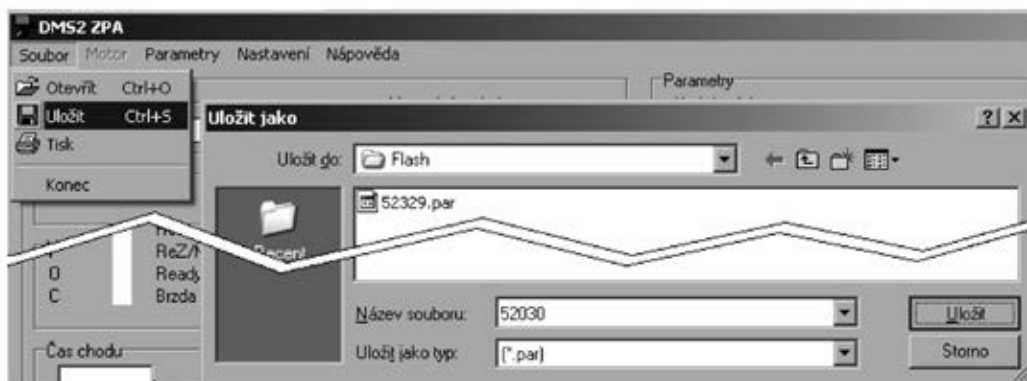
Terminal board of DMS2 Profibus



**DMS2 - local control and display**

**Note:**

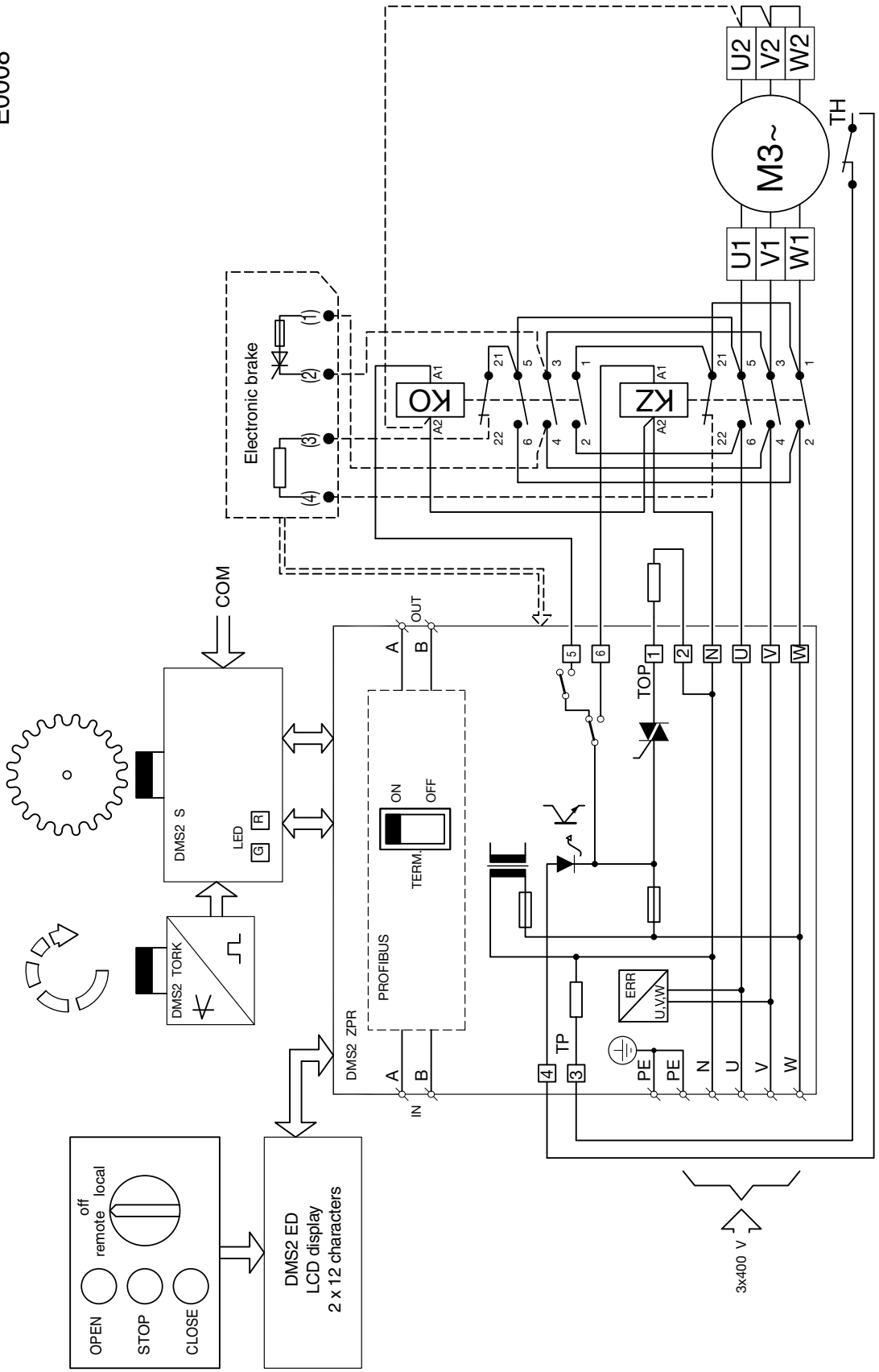
The setting program enables data to be copied from the memory of parameters of the electronics DMS2 and DMS2 ED into the computer as a file with suffix "par" (in the example in the figure the file 52 030.par is created in the directory Flash). The file can serve as a back-up for the case that it will be necessary to replace the position sensor in the given actuator and to set it in the same way as the replaced one; or it can be sent as an enclosure to e-mail to the manufacturing or service firm in solving possible problems..





Wiring diagram of electronics **DMS2 Profibus** with three-phase electric motor

E0008



**Table 1 – MODACT MOED EEx – power supply 3 x 400 V / 230 V, 50 Hz  
– basic technical parameters and designs (electric motors AVM)**

Basic outfit:		1 electric motor type AVM 1 anti-condensation heater																				
Type designation	Torque [Nm]		Adjusting speed [RPM]	Working stroke [rev.]	Type of lubricant	Electric motor					Weight [kg]		Type number									
	tripping	starting				Type AVM	Power [kW]	Speed [1/min]	In (400 V)	Iz In	Design		basic					supplementary				
			cast-iron	alumin.	1						2	3	4	5	6	7	8	9	10			
MOED EEx 40/130 – 8	20 – 40	130	8	2-1980		71A8	0,09	680	0,35	1,8	70	45	52120	x	x	H	x	E	D			
MOED EEx 40/220 – 10		220	10			71M06	0,18	900	0,74	1,8	–	47		x	x	I	x	E	D			
MOED EEx 40/130 – 17		130	17			71M06	0,18	900	0,74	1,8	–	47		x	x	J	x	E	D			
MOED EEx 40/110 – 25		110	25			71MK04	0,25	1360	0,75	3,4	–	47		x	x	I	x	E	D			
MOED EEx 40/110 – 40		110	40			71M04	0,37	1360	1,05	3,1	–	49		x	x	2	x	E	D			
MOED EEx 40/130 – 50		130	50			71MK02	0,37	2810	0,9	5,6	–	49		x	x	K	x	E	D			
MOED EEx 40/80 – 80	80	80		71MK02	0,37	2810	0,9	5,6	–	49	x	x	L	x	E	D						
MOED EEx 40/130 – 8	40 – 80	130	8	2-1980		71A8	0,09	680	0,35	1,8	70	45	52120	x	x	M	x	E	D			
MOED EEx 80/220 – 10		220	10			71M06	0,18	900	0,74	1,8	–	47		x	x	N	x	E	D			
MOED EEx 80/130 – 17		130	17			71M06	0,18	900	0,74	1,8	–	47		x	x	P	x	E	D			
MOED EEx 80/110 – 25		110	25			71MK04	0,25	1360	0,75	3,4	–	47		x	x	3	x	E	D			
MOED EEx 80/110 – 40		110	40			71M04	0,37	1360	1,05	3,1	–	49		x	x	4	x	E	D			
MOED EEx 80/200 – 50		200	50			71M02	0,55	2810	1,3	5,9	–	49		x	x	R	x	E	D			
MOED EEx 80/120 – 80	120	80		71M02	0,55	2810	1,3	5,9	–	49	x	x	S	x	E	D						
MOED EEx 125/170 – 8	80 – 125	170	8	2-1980		71B8	0,12	660	0,46	1,8	70	45	52121	x	x	T	x	E	D			
MOED EEx 125/230 – 11		230	11			71MK04	0,25	1360	0,75	3,4	–	47		x	x	6	x	E	D			
MOED EEx 125/200 – 17		200	17			71ML06	0,25	900	0,95	2,9	–	47		x	x	U	x	E	D			
MOED EEx 125/170 – 25		170	25			71M04	0,37	1360	1,05	3,1	–	49		x	x	5	x	E	D			
MOED EEx 125/200 – 50		200	50			71M02	0,55	2810	1,3	5,9	–	49		x	x	V	x	E	D			
MOED EEx 100/130 – 8		63 – 100	130		8	2-1400		71A8	0,09	680	0,35	1,8		70	45	52121	x	x	M	x	E	D
MOED EEx 100/200 – 10	200		10		71M06		0,18	900	0,74	1,8	70	47	x	x	N		x	E	D			
MOED EEx 100/180 – 17	180		17		71ML06		0,25	900	0,95	2,9	70	47	x	x	P		x	E	D			
MOED EEx 100/180 – 25	180		25		80MK06		0,37	910	1,1	3,3	70	57	x	x	I		x	E	D			
MOED EEx 100/180 – 40	180		40		80MK04		0,55	1390	1,45	4,2	71	58	x	x	2		x	E	D			
MOED EEx 100/170 – 63	170		63		◆ 80M04		0,75	1410	1,9	3,9	71	58	x	x	3		x	E	D			
MOED EEx 100/230 – 80	230	80		◆ 80M02	1,1	2940	3,0	6,8	78	58	x	x	R	x	E	D						
MOED EEx 100/130 – 100	100 – 130	130	100	2-1400	◆	90LK04	1,1	1410	2,7	4,6	71	65	52121	x	x	4	x	E	D			
MOED EEx 100/170 – 145		170	145			90LK02	1,5	2870	3,2	6,8	78	65		x	x	S	x	E	D			
MOED EEx 130/170 – 8		170	8			71B8	0,12	660	0,46	1,8	70	45		x	x	T	x	E	D			
MOED EEx 160/300 – 10		100 – 160	300		10	2-1400		71ML06	0,25	900	0,95	2,9		70	47	52122	x	x	U	x	E	D
MOED EEx 160/220 – 16			220		16			80MK06	0,37	910	1,1	3,3		70	57		x	x	5	x	E	D
MOED EEx 160/240 – 25			240		25			80M06	0,55	910	1,6	3,4		71	57		x	x	6	x	E	D
MOED EEx 160/290 – 40	290		40		80M04		0,75	1410	1,9	3,9	71	58	x	x	7		x	E	D			
MOED EEx 160/210 – 65	210		65		◆ 90LK04		1,1	1410	2,7	4,6	71	65	x	x	8		x	E	D			
MOED EEx 160/320 – 80	320		80		90LK02		1,5	2870	3,2	6,8	78	65	x	x	V		x	E	D			
MOED EEx 160/210 – 100	210	100		◆ 90L04	1,5	1410	3,4	4,8	71	66	x	x	9	x	E	D						
MOED EEx 160/250 – 125	250	125		◆ 90L02	2,2	2865	4,5	6,0	78	67	x	x	A	x	E	D						
MOED EEx 250/400 – 8	160–250	400	8	2-1080		71M8	0,25	680	0,85	2,0	70	57	52122	x	x	H	x	E	D			
MOED EEx 250/400 – 10		400	10			80MK06	0,37	910	1,1	3,3	70	57		x	x	0	x	E	D			
MOED EEx 250/400 – 16		400	16			80M06	0,55	910	1,6	3,4	71	58		x	x	1	x	E	D			
MOED EEx 250/330 – 25		330	25			90LK06	0,75	930	2,1	3,9	81	68		x	x	2	x	E	D			
MOED EEx 250/330 – 40		330	40			90LK04	1,1	1410	2,7	4,6	78	65		x	x	3	x	E	D			
MOED EEx 250/325 – 65		325	65			◆ 90L04	1,5	1410	3,4	4,8	79	66		x	x	4	x	E	D			
MOED EEx 250/400 – 80	400	80		◆ 90L02	2,2	2865	4,5	6,0	80	67	x	x	5	x	E	D						
MOED EEx 500/750 – 16	250–500	750	16	2-1080		100L08	1,1	690	3,1	3,6	126	113	52123	x	x	0	x	E	D			
MOED EEx 500/850 – 25		850	25			100L06	1,5	940	3,9	4,9	125	112		x	x	1	x	E	D			
MOED EEx 500/800 – 40		800	40			112M06	2,2	945	5,4	5,0	146	126		x	x	2	x	E	D			
MOED EEx 450/600 – 63	250–450	600	63	2-1080	◆	100L04	3,0	1435	6,5	5,9	132	112	52123	x	x	3	x	E	D			
MOED EEx 500/700 – 100	250–500	700	100		◆	112M04	4,0	1430	8,5	6,5	150	130		x	x	4	x	E	D			
MOED EEx 550/750 – 16	320–550	750	16			100L08	1,1	690	3,1	3,6	128	108		52124	x	x	0	x	E	D		
MOED EEx 630/820 – 25	320–630	820	25		100L06	1,5	940	3,9	4,9	128	108	x	x		1	x	E	D				
MOED EEx 630/1000 – 63		1000	63		◆ 112M04	4,0	1430	8,5	6,5	150	130	x	x		2	x	E	D				
MOED EEx 960/1250-32		630–960	1250	32	◆	132M08	3,0	725	7,3	5,5	239		52125	x	x	1	x	E	D			
MOED EEx 1100/1400-45	630–1100	1400	45	◆	132MK06	4,0	975	9,2	7,0	240		x		x	2	x	E	D				
MOED EEx 1100/1400-63	630–1100	1400	63	◆	132M06	5,5	970	12,5	6,5	248		x		x	3	x	E	D				
MOED EEx 920/1200-100	630–920	1200	100	◆	132M04	7,5	1455	15,5	6,8	243		x		x	4	x	E	D				

**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 6<sup>th</sup> – 11<sup>th</sup> places of the type number should be completed with respective digit or letter from Tables 3 – 6.  
– Rated currents for different feeding voltages than those given in the table are available on request at the manufacturer.  
◆ – Mark of actuators filled with oil. Other actuators are filled with plastic lubricant.

## Explosion – proof electric rotary multi-turn actuators MODACT MOED EEx

Place in the type number	1	2	3	4	5		6	7	8	9	10	11
Type number	5	2	1	2	x	.	x	x	x	x	ED	x

6<sup>th</sup> place of type number:

**Table 3 – 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:

Type number 52 120	Connection M, A, Б
Type number 52 121 and 52 122	Connection A, Б, B
Type number 52 123 and 52 124	Connection Б, B
Type number 52 125	Connection B, Г

7<sup>th</sup> place of type number:

If one of numerals 1, 3, 5, 7 or 9 is on the 9<sup>th</sup> place of the type number the character from Table 4 is on the 7<sup>th</sup> place.

If one of numerals 2, 4, 6 or 8 is on the 9<sup>th</sup> place of the type number the character from Table 5 is on the 7<sup>th</sup> place.

**Table 4 – Actuator fitted with electronics DMS2 ED**

Outfit	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	M	N	V	W	
Local control		x		x		x		x		x		x		x		x		x		x	
Display			x	x			x	x			x	x			x	x				x	x
Contactors or contact-less switching					x	x	x	x					x	x	x	x	x	x	x	x	x
Analog module	transmitter									x	x	x	x	x	x	x	x	x	x	x	
	regulator																x	x	x	x	

**Table 5 – Actuator fitted with electronics DMS2**

Two-position or three-position control *)	R
Profibus	P

\*) Two- or three-position regulation of the actuator is set at the manufacturer. Unless otherwise specified in the order, the actuator will be set for three-position regulation (control by signal 4 – 20 mA).

8<sup>th</sup> place of type number:

Tripping torque, adjusting speed – Table 1 or 2

9<sup>th</sup> place of type number:

**Table 6 – Type of electronics, power switches, brake**

Electronics DMS2 ED – without contactors	1
Electronics DMS2 – with contactors	2
Electronics DMS2 ED – with contact-less switches	3
Electronics DMS2 – with contact-less switches	4
Electronics DMS2 ED – with contactors and brake	5
Electronics DMS2 – with contactors and brake	6
Electronics DMS2 ED – with contact-less switches and brake	7
Electronics DMS2 – with contact-less switches and brake	8
Electronics DMS2 ED – with contactors	9

10<sup>th</sup> place of type number:

ED – actuators with electronics DMS2 or DMS2 ED

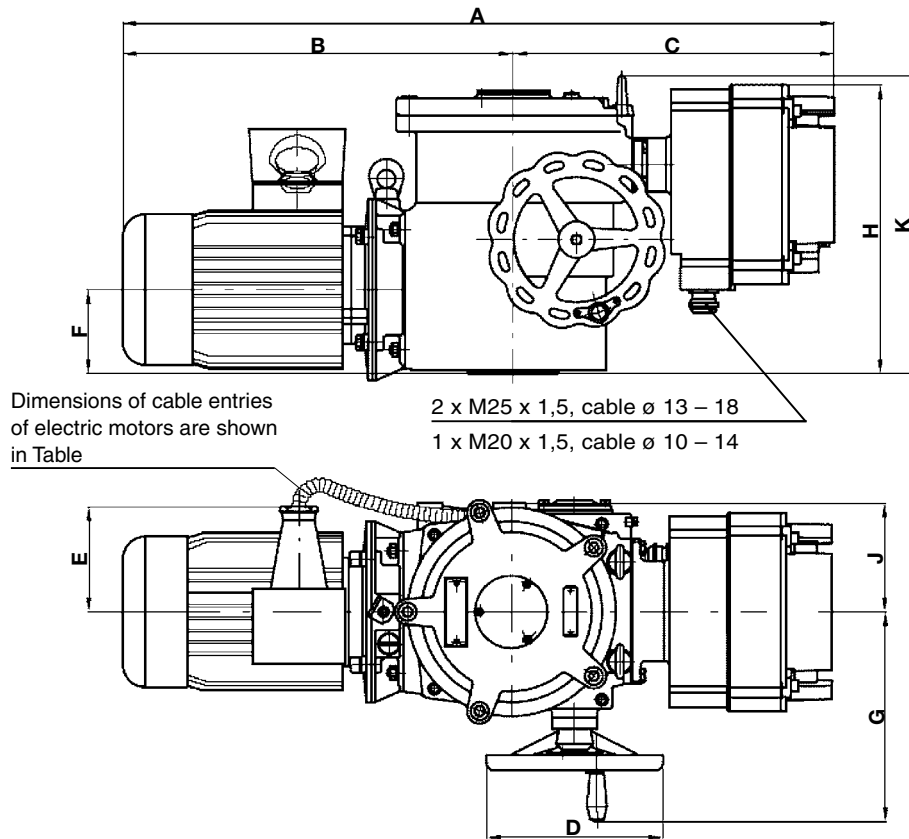
11<sup>th</sup> place of type number:

**Table 7 – Ambient temperatures**

For surrounding temperature from -25 °C to +55 °C	without designation
For surrounding temperature from -50 °C to +55 °C *)	F
For surrounding temperature from -60 °C to +55 °C	FF

\*) *The electronic outfit should be discussed with the manufacturer.*

## Dimensional sketch of MODACT MOED EEx electric actuator



### Cable entries of electric motors used in multi-revolution actuators MODACT MOED EEx

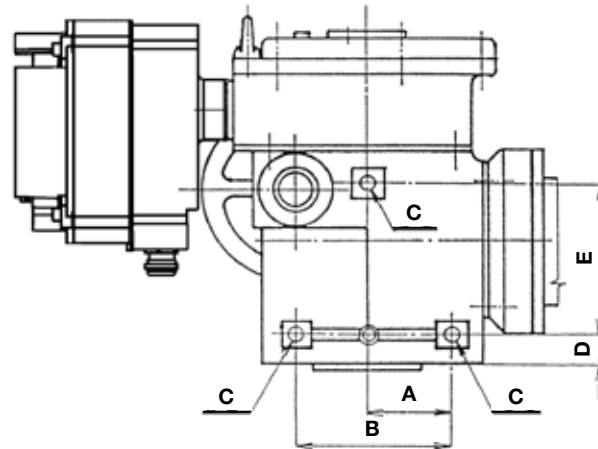
Type of electric motor	Axial height of motor	Number of entries x range of cable Ø (thread size)
AVM	71, 80, 90, 100	1 x ø 13 to 16 mm
	112, 132	2 x ø 17 to 20 mm

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.	662	791	915	1049
B max.	340	462	573	684
C	322	329	342	365
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.	336	348	412	468
J	90	120	145	178
K	315	335	400	442



Holes for additional attachment of **MODACT MOED EEx** electric actuator

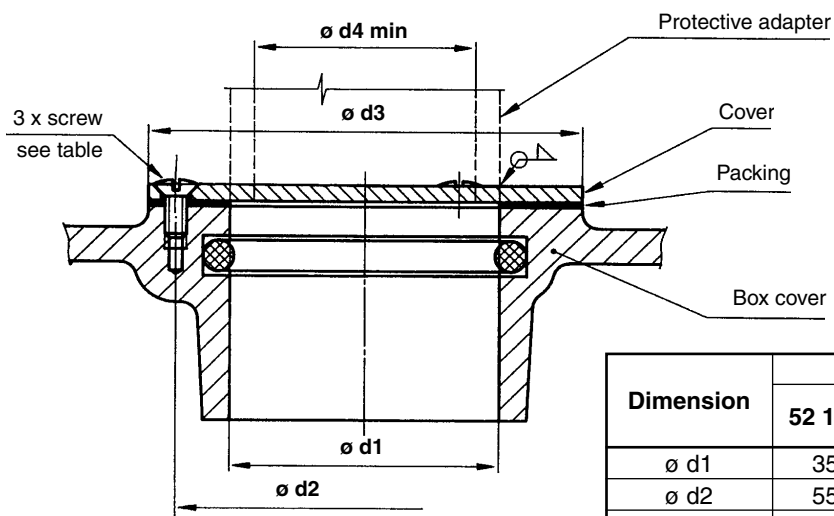


Dimension	Type number			
	52 120	52 121, 2	52 123, 4	52 125
A	61	90	110	120
B	110	160	210	240
C	M 10	M 12	M 16	M 20
D	16	21	23	47
E	120	140	200	220

**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



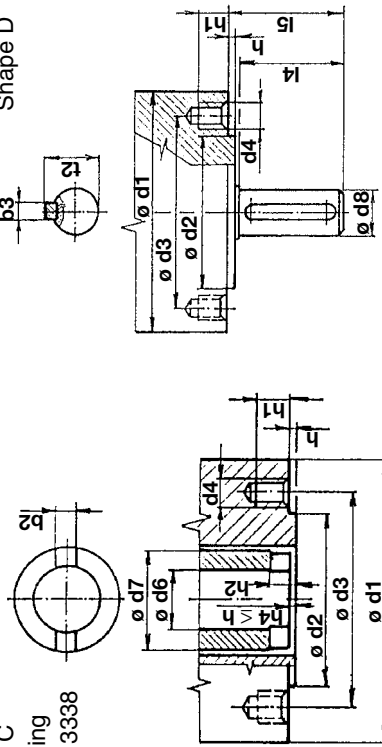
Dimension	Type number			
	52 120	52 121 52 122	52 123 52 124	52 125
$\varnothing d1$	35	50	75	80
$\varnothing d2$	55	70	100	100
$\varnothing d3$	65	80	112	112
$\varnothing d4$	30	41.5	53	72
Screw ISO 2010 (ČSN 021155)	M4x10	M4x10	M5x10	M5x10

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

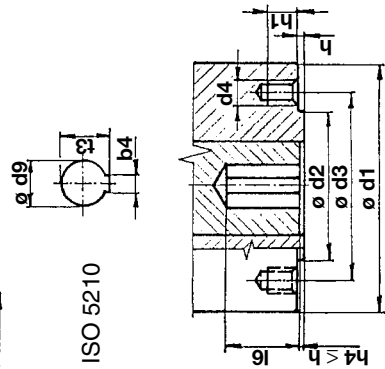
The electric actuators are designed for direct mounting onto the controlled device (valve etc.). They are attached by means of a flange or clutch according to ČSN 18631 4. The flanges of the electric actuators also comply with ISO 5210. The clutches for transmission of motion to the valve are:

- 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



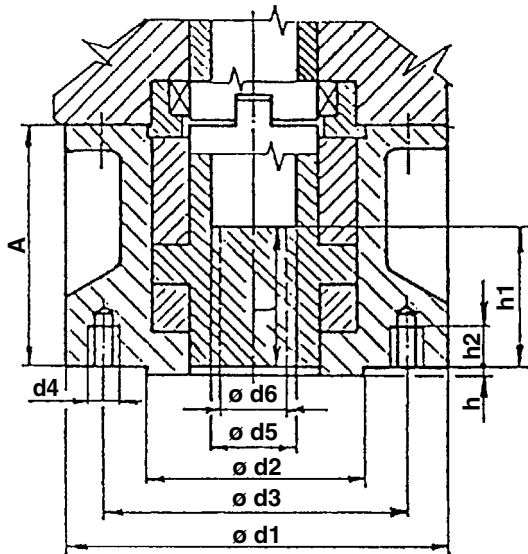
Shape B3  
according to ČSN EN ISO 5210  
(13 3090)



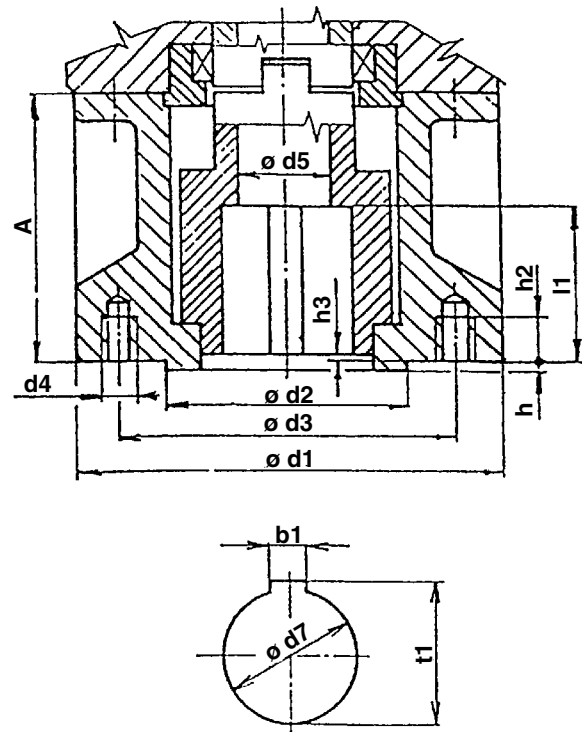
Shape	Dimension	Type number / Flange			
		52 120	52 121, 2	52 123, 4	52 125
C, D, B3	$\varnothing d1$ (orientation value)	125	175	210	300
	$\varnothing d2 f8$	70	100	130	200
	$\varnothing d3$	102	140	165	254
	d4	M 10	M 16	M 20	M 16
C	Number of tapped holes	4	4	4	8
	$h_{-0,2}^0$	3	4	5	5
	h1 min. 1,25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

## Adapters to MODACT MOED 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

## 8. ASSEMBLING AND PUTTING THE ELECTRIC ACTUATOR INTO OPERATION

Upon receipt of the actuator from the factory, it is essential to check that no damage was caused during transport and to compare the data on the actuator rating plates with those contained in the order and accompanying documentation. Any discrepancy, defect or damage should be immediately reported to the supplier. Putting into operation is excluded in this case. Upon receipt of the actuator from the factory, it is essential to check that no damage was caused during transport and to compare the data on the actuator rating plates with those contained in the order and accompanying documentation. Any discrepancy, defect or damage should be immediately reported to the supplier. Any discrepancy, defect or damage should be immediately reported to the supplier. If the actuator is to be stored for a longer period than 3 years then, prior to commissioning, oil refilling should be made. Any manipulation of the equipment at a temperature below - 25°C is forbidden. Storing the actuator out of doors or at a location that is not protected against the effects of rain, snow or ice accretion should be avoided. Before putting the actuator into operation, slush should be removed. When unpacked actuators are to be stored longer than 3 months it is advisable to place a bag with silica gel or another suitable desiccant in the terminal box.

The user can only put into operation electric installations with compliance documented by a report of the initial revision. Before fitting in place, the actuator should be carefully inspected, particularly in case that it has been stored for a prolonged period; the following should be checked:

- condition of parts and connections forming explosion-proof closure;
- insulation resistance of the motor winding;
- possible damage during storage;

It should also be checked that location corresponds to provisions of the par. "Working conditions". If different way of assembly is required by local conditions the manufacturer should be contacted.

The protective conductor must be connected to a protective terminal marked according to ČSN IEC 417. On the actuator, the protective terminals are located on the body and inside the actuator, on the control board at the terminal board.

**Note:** Before connecting and adjusting the actuators MODACT MOED EEx in an environment with danger of explosion of an explosive gaseous atmosphere, the space where the actuator is to be installed should be ventilated.

### Connection

The actuator should be connected according to the wiring diagram placed inside the cover in such a way that power supply wires have permanent good contact with the connecting terminals. The supply voltage must correspond to the voltage stated on the rating plate of the actuator. Internal space of the cover should be clean and dry. No free wires may stick out of the connected conductors.

### Insulation resistance

Before putting the actuator into operation or restarting it after a longer idle time, it is necessary to check that insulation conditions have not been worsened and that there is no danger of the winding damage or electric shock. Insulation conditions should also be checked during inspections in compliance with provisions of ČSN 34 3205 and standards valid for non-explosive electric installations. Insulation resistance of electric control circuits against the frame and against each other should be min. 20 MΩ. Insulation resistance of the electric motor should be min 1.9 MΩ. Insulation resistance of the current transducer is 20 MΩ at 50 V DC.

The actuators with a lower insulation resistance must not be put into operation. The cause can lie in a damaged winding or excess humidity. Damp motors with insulation resistance lower than the stated value must be carefully dried before being put into operation. By drying the winding, moisture is removed from the insulation and insulation resistance is thus increased to the prescribed value. Drying can be carried out in different ways. Drying directives are given by the standard ČSN 35 0010 or local recommended methods can be applied.

### Inlet and connection

Before the assembly, check completeness and functionality of the bushings. A qualified technician using proper tools can only carry out the installation. The bushing should be fitted without any modifications in the state it was delivered. Use safety nuts or a glue to prevent incidental loosening. In any case, tightening moments depending on cables used are at the full user's responsibility. Both parts – the sealing connection and the nut – should be properly tightened. Insufficient or excess tightening can influence protection type, tightness or power properties of the bushing.

### Direct input to explosion-proof closure (*imbedding of individual cable conductors*)

The cable bushing system should meet requirements of ČSN EN 60079-14 art. 10.3.2.d for direct input to the explosion-proof closure of group IIC. Therefore, in connecting the actuator, the client should create a non-explosive sealing according to the following procedure.

## CR-U\* Compound-Filled Cable Gland - ASSEMBLY INSTRUCTIONS FOR SAFE USE

Where cable gland CR-U\* is used customer is obliged to follow the following instructions  
with sealing individual cable cores when connecting the actuator.

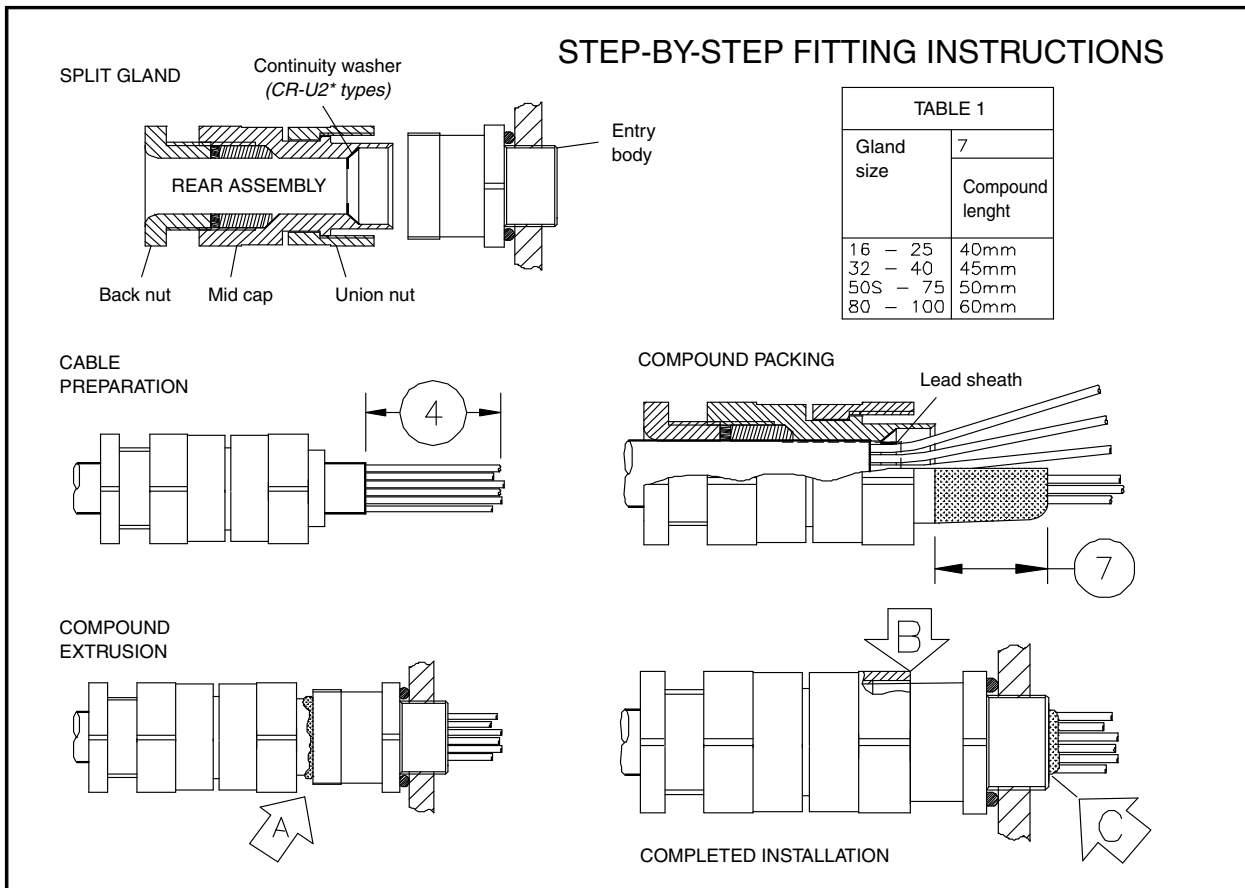
### Brief Description

The Peppers CR-U\* type Compound-filled cable gland is for outdoor use in the appropriate Hazardous Areas with unarmoured cable of any construction, with or without braids or screens, where the braids or screens pass through the compound.

A variant giving electrical continuity to a lead sheath is available. It gives environmental protection to IP 66, IP 68 and Deluge.

### Warning:

*PLEASE STUDY CAREFULLY THESE INSTRUCTIONS BEFORE INSTALLATION. These glands should not be used in any application other than those mentioned here or in Peppers Data Sheets, unless Peppers states in writing that the product is suitable for such application. Peppers can take no responsibility for any damage, injury or other consequential loss caused where the glands are not installed or used according to these instructions. This leaflet is not intended to advise on the selection of cable glands. Further guidance can be found in the standards listed below.*



### STEP-BY-STEP FITTING INSTRUCTIONS

1. Split gland as shown.
2. Fit Entry Body. Hand-tighten, then using wrench tighten a further 1/2 turn. **DO NOT EXCEED MAX TORQUE FOR ENCLOSURE.**
3. Slide Rear Assembly (*Back Nut, Mid Cap and Union Nut*) onto cable as shown.
4. **CABLE PREPARATION**

Strip jacket so that cores are fully exposed in the compound chamber, length to suit installation. Lead sheath must be cut to push through the continuity washer. Remove protective foils, and any cords/fillers from around and between the cores. Take care not to cut the insulating sleeves of the cores. Pigtail and sleeve any screens to be passed through compound.

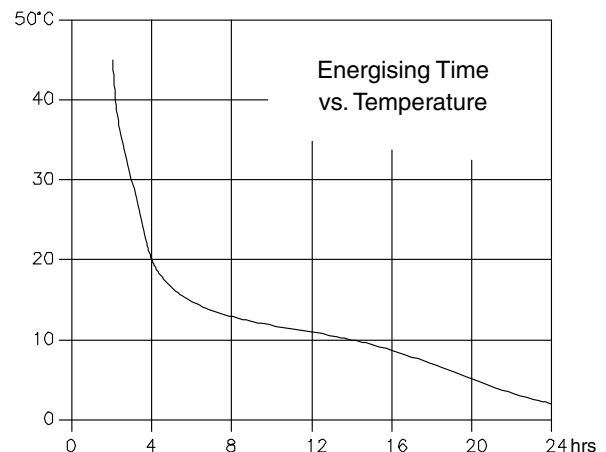
**HEALTH AND SAFETY WARNING** The resin used in the compound can cause eye and skin irritation. For your personal protection, wear the gloves supplied while mixing and applying. The uncured compound should not be allowed to come into contact with foodstuffs.

**A COMPREHENSIVE SAFETY DATA SHEET PROVIDED BY THE COMPOUND MANUFACTURER IS AVAILABLE ON REQUEST.**

5. Check compound has not passed its "Use By" date. Installation at temperatures below 10 °C should be avoided if possible.
6. Trim any hardened pieces from ends of stick. Mix the compound by rolling, folding and breaking. Ease mixing by cutting large sticks in half. Fully mixed compound has a uniform yellow colour with no streaks.
7. Support the cable and Rear Assembly, holding them roughly concentric. Any lead sheath should be pushed through the continuity washer - ensure that contact has been made. Splay out the cores. Starting at the middle, pack small amounts of rolled-out compound between the cores. Restraighten each core and work outwards until all gaps are filled. Bundle the cores with cord or tape so they are not disturbed. Pack around the outside of the outer cores to completely fill the Rear Assembly cup. Build up compound around the outside of the cores, with a slight taper & to approximate compound length shown in diagram & Table 1 column 7.
8. Pass cores through & push compound into Entry Body until Rear Assembly engages. Remove squeezed out compound at arrow A. Screw Union Nut 7 full turns onto Entry Body (*arrow B*). Ensure that compound emerges at entry thread (*arrow C*).
9. Clean off excess compound from Entry Body to allow withdrawal when cured (*arrow C*). Cores may be disturbed after 1 hour. Leave to cure for 4 hours when working at 21 °C.
10. To release and pull back joint for inspection, unscrew Union Nut. Ensure that the compound is uniform and full form to fit into the entry body.
11. Hand-tighten Union Nut to remake joint. Then refer to table below table and tighten Union Nut using wrench to the given amount.
12. Hold Mid Cap with wrench and tighten Back Nut onto cable. Ensure seal makes full contact with cable sheath, then tighten 1 extra turn.
13. The equipment should not be energised until the compound has been left to cure for at least 4 hours when working at 21 °C. See chart 'Energising Time vs. Temperature' for further guidance.

### Wrench tightening information (*Instruction 11*), cable sizes (mm) & permitted cores

Gland size	Tighten Union Nut using wrench up to	Max Diameter over Cores	Max No of Cores	Outher sheath	
				Min.	Max.
16	½ -turn	8,4	7	3,4	8,4
20S	½ -turn	10,4	8	4,8	11,7
20	½ -turn	12,5	14	9,5	14,0
25	½ -turn	17,8	25	11,7	20,0
32	¼ -turn	23,5	50	18,1	26,3
40	¼ -turn	28,8	80	22,6	32,2
50S	½ -turn	34,2	100	28,2	38,2
50	½ -turn	39,4	100	33,1	44,1
63S	½ -turn	44,8	120	39,3	50,1
63	½ -turn	50,0	120	46,7	56,0
75S	½ -turn	55,4	140	52,3	62,0
75	½ -turn	60,8	140	58,0	68,0
80	½ -turn	64,4	160	61,9	72,0
85	¾ -turn	69,8	180	69,1	78,0
90	¾ -turn	75,1	200	74,1	84,0
100	¾ -turn	80,5	220	81,8	90,0



### Installation Guidance

#### Point Advice

1. BS EN 60079-10:2003 Classification of Hazardous areas  
BS EN 60079-14:1997 Electrical Installations in hazardous areas (*other than mines*)  
BS 6121, Part 5 Selection, Installation and Maintenance of Cable Glands  
IEC 60079-31:2008 Ignitable dust - Protection by enclosure
2. Installation should only be carried out by a competent electrician, skilled in cable gland installation.
3. NO INSTALLATION SHOULD BE CARRIED OUT UNDER LIVE CONDITIONS.
4. To maintain Ingress Protection ratings above IP64, use IP washers or O-rings for parallel threads. For taper threads use thread sealant. Also see page 1 diagram and Hole Data above.

5. To ensure the stated IP rating is maintained, at the point of interface the surface of the enclosure should be flat, free from debris and rigid with the hole drilled straight and to an appropriate diameter.
6. Where an earth contact is required the surface of the enclosure should be sufficiently flat and rigid. With painted enclosures a serrated star washer should be fitted to break through the paint and make a satisfactory earth contact.
7. Once installed do not dismantle except for routine inspection. A detailed inspection should be conducted as per IEC/EN 60079-17. After inspection the gland should be re-assembled as detailed in points 11 and 12, ensuring the Mid Cap is fully tightened.
8. Parts are not interchangeable with any other design. If manufacturers parts are mixed, certification will be invalidated. The gland is not serviceable and spare parts are not supplied.

**Limitations on Usage.** Be sure your installation complies with the following:

Feature	Comment
Enclosure entry thread	The female thread in the entry enclosure must comply with clause 5.3 of IEC/EN 60079-1. Do not damage threads on assembly . Check that the number of fully engaged threads is at least 5.

**Interpretation of Markings.** Markings on the outside of this gland carry the following meanings:

Cable Gland Type and Size		CENELEC certification marks	
<b>CR</b>	Product range	<b>E</b>	Conformity with European standard
<b>U</b>	Gland over the counter for unarmoured cable Seal type: epoxy resin-based sealant (temperature -60 °C to +85 °C)	<b>Ex</b>	Symbol of protection against explosion
<b>2</b>	Continuity washer option for lead sheathed cable	<b>d</b>	Type of protection: d=flameproof
<b>B</b>	Main component material, B=brass, S=stainless steel	<b>I &amp; IIC</b>	Code for group of gases suitable for group I (for example Methane) and group IIC (for example hydrogen) flammable gases/ air mixtures and also groups IIA and IIB
<b>20S</b>	Gland size	<b>03</b>	Year of certifications
<b>PG16</b>	Entry thread type and size Year code: XX	<b>ATEX</b>	Certified conformity with standard ATEX 94/9/ES
<b>ATEX marking (directive 94/9/ES)</b>		<b>1479</b>	Serial number of certification
<b>Ex</b>	European explosive atmosphere symbol	<b>X</b>	These glands must not be used with enclosures where the temperature at the point of mounting exceeds -60 °C to +85 °C
<b>I M2</b>	Mining equipment, category 2		
<b>II 2</b>	Non-mining equipment, suitable for use in category 2, zone 1, 2, 21, 22		
<b>G</b>	Type of explosive atmosphere - gas		
<b>D</b>	Type of explosive atmosphere - dust		

The supply line to the actuator and connection with its switching, protective, and securing instruments can only be installed by technicians with a required qualification; herewith, particular standards should be observed and wiring diagrams followed as they are referred to in these Instructions for assembly and operation. After connecting the supply cables, all screws of connecting terminals should be checked for tightness so that they are not heated up during operation due to higher transition resistance. The connected conductors must not exert either tensile or bending stress on the connecting terminals. The following measures should be adopted when connecting aluminium conductors. Immediately before connection of an aluminium conductor, the oxidized layer should be removed from the conductor and new oxidation should be prevented by conserving the connection with a neutral vaseline.

After connection, start the actuator in an intermediate position of the working stroke for a short time to make sure that the output shaft of the actuator is rotated in a correct direction. For the actuators with single-phase electric motor, the sense of rotation of the actuator output shaft is changed by mutual exchanging the inlet conductors on the terminal board of the electric motor.

For the actuators with three-phase electric motor, any two conductors are mutually exchanged on the terminals U, V, W of the actuator terminal board. Checking of function is then repeated. After correct electric connection of the actuator has been verified, fit it onto the valve and adjust according to the paragraph Actuator Setting. The adjustment is best carried out in the manual control mode.

**Important warning!**

1. During adjustment, repair, and maintenance, the actuator should be secured in a prescribed way in order to prevent its connection to the mains supply and, thus, risk of injury by electric shock voltage or rotating actuator.

2. During reversing rotation of the actuators with single-phase electric motor, phase must not, even for a moment, be present on both outlets of the starting capacitor; otherwise, the capacitor can be discharged via the contacts of the torque-limit switches which can be baked together.

After adjustment of the actuator, check its function by means of the control circuit. Particular attention should be paid to checking whether the actuator starts in a correct sense of rotation and whether, after tripping of the particular microswitch, the electric motor is without voltage. If this is not the case, switch off the supply mains to the actuator immediately in order to prevent damaging the electric motor; the failure should then be detected.



# Instruction for Use no. N740052 – issue no.1

## Non-explosive cable bushings, type ICG 623

**Assembly Instructions for cable gland: ICG 623 Exd IIC/Exe II**

Certificate BASEEFA No. BAS 01 ATEX 2079X (Ex) II 2 GD IP66 CE 623 EExd I/EEExe I

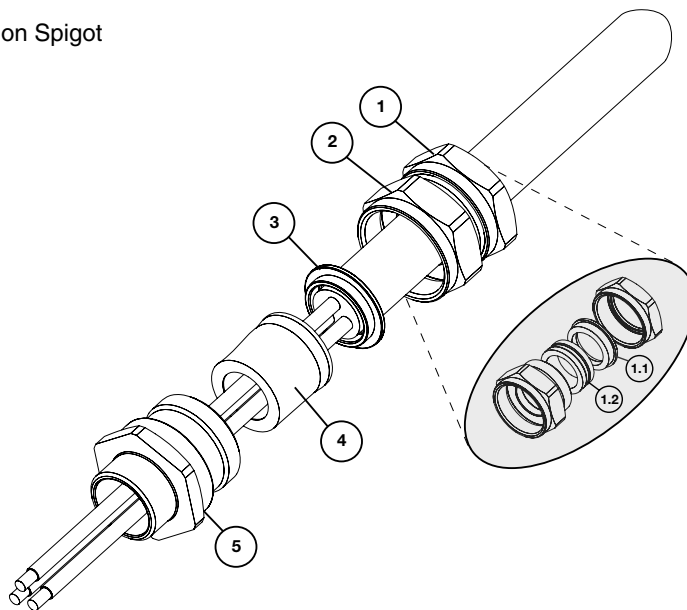
Certificate BASEEFxA No. BAS 02 ATEX 0177X (Ex) IM 2 IP66 CE

Operating temperature range -60 °C +80 °C

Assembly Instructions AI 305 / Issue L - 08/06
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HAWKE International
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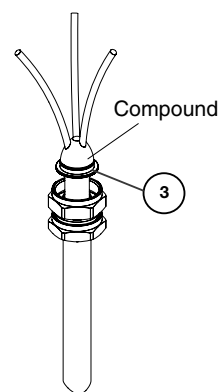
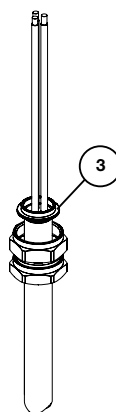
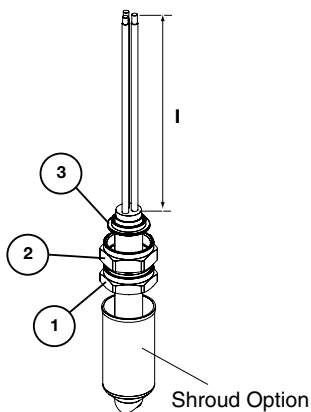
- 1. Backnut
  - 1.1 Rear Compression Spigot
  - 1.2 Rear Seal
- 2. Middle Nut
- 3. Pot Cap
- 4. Rubber Pot
- 5. Entry



Detail for specification.  
The parts 1 and 2 should not be dismounted.

**Cable Preparation**

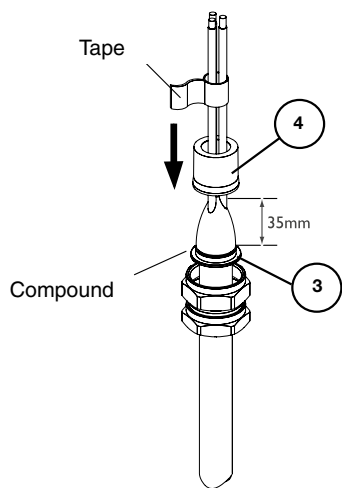
**Gland Preparation**



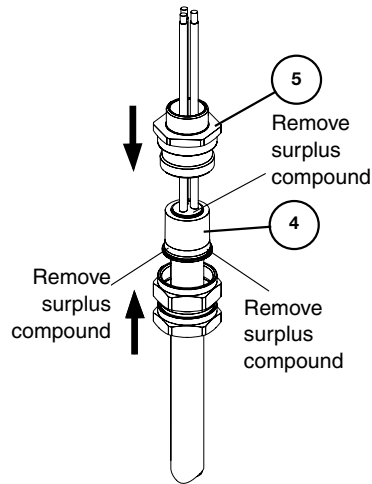
**A**  
Strip Cable to suit equipment as shown above, removing all cable fillers. Length l to suit equipment. If required, fit shroud. See Notes re. Drain Wires.

**B**  
Position rear of pot cap (3) level with prepared face of cable insulation, ensuring that the cap remains concentric to cable at all times.

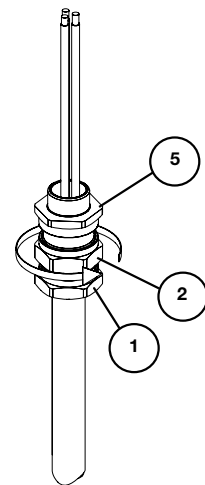
**C**  
Spread the cable cores out for the compound packing. Pack the compound between the cores as shown. See notes overleaf and Fig. 7 for compound preparation.



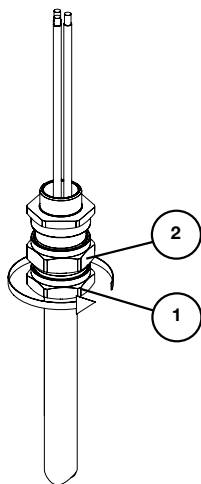
**D**  
With all gaps and voids filled, bring the conductors back together and pack more compound around the outside of the conductors. Tape the conductors together to prevent disturbance of the compound seal. Pass the rubber pot (4) over pot cap (3) and remove any surplus compound from the top of rubber pot (4) and joint faces as indicated.



**E**  
Replace the entry (5) over the rubber pot (4) ensuring that compound does not cover end of rubber pot (4).

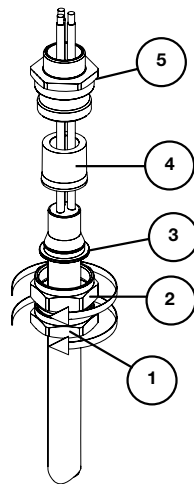


**F**  
Locate and hand tighten the sub-assembly (1) and (2) to the entry (5).

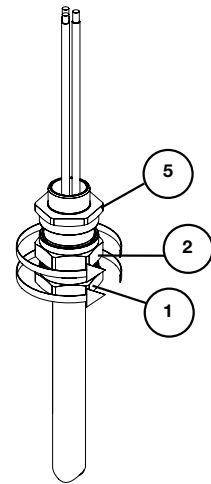


**G**  
To further locate and support the compound and rubber pot assembly, while holding the middle nut (2) with a spanner/wrench, tighten the backnut (1) until the seal grips the cable to prevent movement of the cable gland.

**Important note:**  
*The conductors must not be moved for a minimum of four hours.*



**H**  
Allow the compound to cure. (See Fig. 7 for Curing Times). Untighten firstly the backnut (1) from (2) and secondly the middle nut (2) from the entry (5). The rubber pot (4) may be removed for inspection to ensure that the packing is satisfactory. Add further compound if necessary.



**I**  
Re-assemble rubber pot (4) and the entry (5). Hand tighten the sub-assembly (1) and (2) to the entry (5) and add half a turn to (2) with a spanner/wrench. Tighten the backnut (1) to form a seal around the cable, then tighten a further half to full turn using a spanner/wrench. Ensure that the middle nut (2) does not rotate when tightening the backnut (1). Locate the shroud over the cable gland if applicable.

# EPOXY COMPOUND PREPARATION

When handling this material, the gloves supplied must be worn. The epoxy compound is supplied in the form of a two part package. These should be mixed into the ratio of 1:1 until both colours have blended into one, without any streaks. Rolling and folding is the most satisfactory method of obtaining an even blend. Once mixed, the compound must be used within 30 minutes. After this time it will begin to stiffen. The compound should be kept at an ambient temperature of no less than 20 °C prior to using. At lower temperatures it becomes difficult to mix. Should any compound come into contact with the skin it should be cleaned off with skin cleaner and not allowed to dry on the skin. Only compound for immediate terminations should be mixed.

The mixing and installation of the compound at an ambient temperature below 4 °C is not recommended due to extended curing period.

The following instructions are the various BASEEFA approved methods of passing drain wires etc. through the compound barrier and should be followed if permitted by cable installation specifications.

## Drain wire preparation

### 1.0. Insulating drain wires with heat shrink or cold shrink tubing

- 1.1. Fold back the armour / braid and bend it to right angles from the inner sheath.
- 1.2. Remove foils and tape level with the outer sheath. exposing the drain wires and insulated conductors. Cut back a further 10 mm of inner sheath.
- 1.3. Pass 100 mm length of heat shrink or cold shrink tubing over the drain wire until it comes into contact with the foils, then shrink the tubing evenly down onto the drain wire so that no air pockets occur.
- 1.4. To insulate the joint between the foils and the tubing a suitable piece of 10 mm long shrink tubing or neoprene stretch tubing or a 10 mm wide lap of PVC tape may be used.
- 1.5. After completing 1.1 to 1.4 on each drain wire, lay the armour / braid parallel to the cable, if applicable, then carry out instruction B.

### 2.0. Insulating drain wires i screens with separate insulated crimped conductors or soldered connection

- 2.1. Fold back the armour / braid and bend to right angles from the inner sheath.
  - 2.2. Remove a further 15 mm of inner sheath (See Fig. 1).
  - 2.3. Unravel one or two groups of wires from the screen wires, then remove the remainder of the screen wires (See Fig. 2).
  - 2.4. Twist the group of screen wires into a pigtail and cut to 15 mm long.
  - 2.5. Crimp an insulated conductor to the pigtail with a suitable insulated butt ferrule (or soldered connection), leaving enough length of the insulated conductor to enable the remote end to be connected to the earth terminal in the equipment. (See Fig. 3).
- Note:** There shall be a minimum of 10mm of compound on both ends of the crimped / soldered joint.
- 2.6. To insulate the joint between the screen wires and the insulated conductor, place one lap of PVC insulating tape over the exposed metallic joint.
  - 2.7. After completing 2.1 to 2.6 on each drain wire. lay the armour / braid parallel to the cable. Then carry out instruction B.

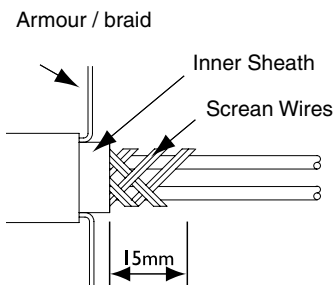


Fig. 1

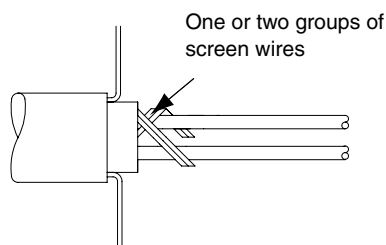


Fig. 2

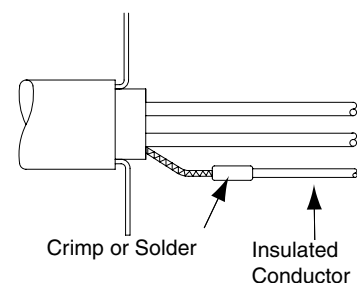


Fig. 3

### 3.0. Insulating drainwires with insulating varnish or paint

- 3.1. Fold back the armour I braid and bend it at right angles from the inner sheath.
- 3.2. Remove the foil and tape level with the inner sheath exposing the drain wires and conductor pairs.
- 3.3. Cut back a further 10 mm of inner sheath (See Fig. 4).
- 3.4. Spray or paint the drain wires with insulating varnish or paint, then leave to dry (See Fig. 5)
- 3.5. To insulate the foil ends a suitable piece of 10 mm long shrink tubing or neoprene stretch tubing or a 10 mm wide lap of PVC tape may be used (See Fig. 6).
- 3.6. After completing 3.1 to 3.5 on each drain wire, lay the armour I braid parallel to the cable. Then carry out instruction B.

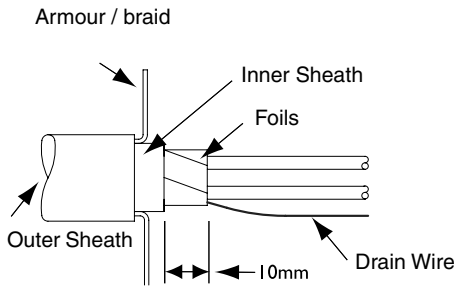


Fig. 4

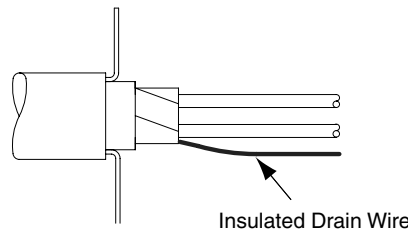


Fig. 5

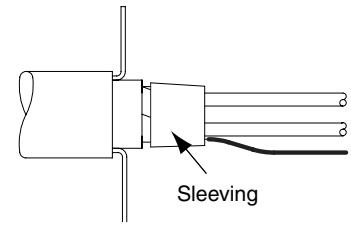


Fig. 6

### Epoxy Compound Cure Time Vs. Temperature

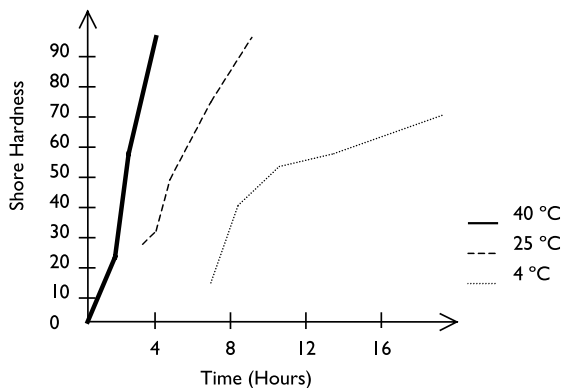


Fig. 7

- The compound may be adversely affected by some solvent vapours. If such vapours are likely to be present in the vicinity of the cable gland in service, suitable precautions may be necessary. (Contact Hawke's Technical Dept).

- The compound cures at a Shore D hardness of 85, when it can be handled. The compound when fully cured is suitable for use at a temperature range of -60 °C to +80 °C.

CABLE GLAND SELECTION TABLE												
Size Ref.	Entry Thread Size		Cable Acceptance Details							Max. Length	Hexagon Dimensions	
			Inner Sheath/Cores			Outer Sheath						
	Metric	NPT	Max. Over Cores	Max. Inner Sheath	Max. No. of Cores	Standard Seal		Alternative Seal (5)				
						Min.	Max.	Min.	Max.			
Os	M20	½"	8.0	8.0	6	3.0	8.0	-	-	66	24.0	27.7
O	M20	½"	8.9	10.0	6	7.5	11.9	-	-	66	24.0	27.7
A	M20	½" – ¾"	11.0	12.5	10	11.0	14.3	8.5	13.4	63	30.0	34.6
B	M25	¾" – 1"	16.2	18.4	21	13.0	20.2	9.5	15.4	68	36.0	41.6
C	M32	1" – 1¼"	21.9	24.7	42	19.0	26.5	15.5	21.2	70	46.0	53.1
C2	M40	1¼" – 1½"	26.3	29.7	60	25.0	32.5	22.0	28.0	72	55.0	63.5
D	M50	1½" – 2"	37.1	41.7	80	31.5	44.4	27.5	34.8	87	65.0	75.1
E	M63	2" – 2½"	48.8	53.5	100	42.5	56.3	39.0	46.5	90	80.0	92.4
F	M75	2½" – 3"	59.0	65,3/66,2	120	54.5	68.2	48.5	58.3	92	95.0	109.6

**Limiting conditions:**

1. Cable bushings OS and O can only be used for braided cables and firm instruments; the cable should be properly fixed to prevent its possible pulling out or twisting.
2. Operating temperature of the cable bushing is -60 °C to +80 °C.
3. The space between the equipment and the cable bushing should be sealed in order to preserve particular degree of protection against penetration of dust, solid particles, and water.

**Accessories:**

Before assembling or dismounting the cable bushing, become familiar with accessories of the cable bushing which include, for instance:

- coat providing additional protection against corrosion;
- safety nut securing position of the cable bushing;
- sealing washer under the additional protection of the cover of the cable bushing front part against penetration;
- knurled washer damping vibrations that could loosen the safety nut or the cable bushing assembly

The inlet to the actuator and connection to its switching, protection and securing instruments can only be installed by technicians with particular qualification who must follow pertaining standards and wiring diagrams as provided in these Instructions for Use. After connecting the inlet cables, all screws of the connecting terminals should be checked for tightness so that they do not get warm during operation due to increased transition resistance. The connecting terminals must not be under tension or bending stress from the connected conductors. In case of connection with aluminium conductors the following measures are recommended. One-step before connecting the conductor, the oxidized layer should be removed from the conductor and new oxidation should be prevented by smearing the connection with a neutral vaseline.

After the connection, make sure, by short starting of the actuator in the intermediate position of the working stroke, that the output shaft of the actuator rotates in a proper direction. If this is not the case, reconnect any two conductors on the terminals U, V, W of the motor (*actuator*) terminal board. Then, repeat the functional check. After verifying correct electric connection, the actuator is fitted to the valve and adjusted according to the paragraph Actuator Setting. The adjustment is best carried out using the manual control regime.

**Important warning!**

1) *During adjusting, repair, and maintenance, secure the actuator in the prescribed way in order to rule out its connection to the power supply and thus to prevent possibility of an injury due to electric shock or the actuator rotation.*

After adjusting the actuator, check its function using the control circuit. In particular, make a check that the actuator is correctly starting and that there is no voltage on the electric motor after particular relays has been switched off. If this is not the case, switch the actuator power supply immediately so that damage to the electric motor is prevented, and seek for the failure.

## 9. OPERATION AND MAINTENANCE

Depending on the operating conditions, the operation of rotary actuators usually involves only the transmission of pulses, as required for the individual functions. In the event of a power supply failure, readjust the controlled device by the handwheel. If the actuator has been connected in the circuit of automatic equipment (*which does not imply the control mode*) it is advisable that manual remote control units are connected in the circuit so that the actuator can be controlled even if a failure of the automatic equipment occurs.

It is the operator's duty to ensure that the actuator is given the prescribed maintenance attention and is protected against the harmful effects of ambient and climatic conditions not included in the Clause "Operating conditions". Moreover, care should be taken to ensure that excessive heating-up of the surface of the explosion-proof closure of the motor and control box is prevented. It is necessary to make sure that rated values are not exceeded and excessive actuator vibrations are prevented.

**Lubrication**

The actuators are lubricated with plastic consistent lubricants or gearbox oil PP 80 (*Table 1 or 2*).

## Lubricants

Type number of actuator	Adjusting speed of output shaft [min <sup>-1</sup> ]	Surrounding temperature [°C]			
		-25 +60	-40 +60	-50 +60	-60 +60
52 120, 52 121, 52 122	up to 40	M	M	M	M
52 123, 52 124	above 40	O	O	–	–
52 125	applies to all speeds	O	O	O	O

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

## Actuators with plastic lubricant

The types of lubricant and amounts are listed in the table.

For lubrication of drive units use plastic consistent lubricants.

Lubricants in the drive units supplied are designed to last the entire useful life of the unit.

During the time when the drive units are in use, it is not necessary to change or monitor the amount of the lubricant.

The actuators with plastic lubricant are labelled “Filled: solid grease” on the power box at the side of the hand-wheel.

Type number of drive unit	Amount of lubricant (kg)	Type of lubricant for specific climatic conditions and temperature			
		T1 (-25 – +75 °C)	U1 (-40 – +55 °C)	UCL1 (-50 – +55 °C)	CHL1 (-60 – +40 °C)
52 120	0,30	CIATIM – 201 GOST 6267-74 CIATIM – 221 GOST 9433-80			CIATIM – 221 GOST 9433-80
52 121, 52 122	0,50				
52 123, 52 124	0,70				

**Note:** The Ciatim 221 lubricant is designed for the friction points of rubber bushings against metal surfaces, roller brake, the hub of an outer cogged wheel of a planetary-gear differential of actuators 52 120 (for locations of friction between the shaft and other surfaces).

## Actuators with oil charge

Check the level of oil at least yearly and refill, if required. Oil change should be made after 500 operating hours of the actuator, but not later than after 2 years of operation. The level of oil should be as high as the filling hole. For the actuator, Grade PP 80 motor-car gearbox oil or an equivalent oil with the same properties (*viscosity class 80 W, according to SAE/J306a*) should be used.

The quantity of oil required is tabulated below:

Type No.	Quantity of oil (in l)
52 120	1,8
52 121, 52 122	3
52 123, 52 124	6,1
52 125	13

Once in two years, it is recommended to lightly smear the driving wheel gearing on the output shaft and the gear wheel of the position sensor in the control box. Use the lubricant CIATIM 201 or PM MOGUL LU 2-3.

## Cleaning – Overhaul

The electric actuators modact EEx should be kept clean and care should be taken that they are not fouled with dirt and dust. Cleaning of the cooling fins of the motor frame should be carried out at regular intervals and as frequently as required by the operating conditions. From time to time, it is necessary to make sure that all connecting and earthing terminals are properly tightened to prevent overheating during operation. It is recommended that the electric actuator be subjected to the overhaul once a year unless otherwise specified in the inspection instructions of electric devices.

## Checking of parts of explosion-proof closure

All actuator parts forming the explosion-proof closure (*cover and control box*) should be checked to ensure that they are not broken or otherwise damaged (*corroded, worn out etc.*). With the electric actuator disconnected, the sealing ring of cable bushings (*of electric motor and terminal box*) should be checked. Material of the sealing rings is aging and, if its hardness exceeds 65° IRHD, the sealing rings should be replaced during reassembly. Defective parts of the closure must not be used again in reassembling the electric actuator.

During all major repairs of the explosion-proof closure that might affect its safety, it is recommended that the electric actuator Ex be forwarded to the manufacturer for repair. The manufacturer can, according to approved documentation and with prescribed tests, bring the closure back to the state corresponding to ČSN EN 60079-0:2013 and ČSN EN 60079-1:2015.

## LIST OF SPARE PARTS

(for 5 years of operation)

Type No. 1	Designation 2	Drawing or Standard No. 3	Pcs. 4	Application 5
52 120	Sealing ring 125x3 2327311049	PN 029281.2	2	Packing between the power gear box and the flange with gears
	Sealing ring 170x3 2327311054	PN 029281.2	1	Gasket of terminal box cover
	Sealing ring 130x3 2327311041	PN 029281.2	2	Packing between the control box and flange Packing between the control box and the power gear box
	Sealing ring 43x35 2327311008	PN 029280.2	1	Sealing of output shaft in the control box
	Sealing ring 10x6 2327311001	PN 029280.2	2	Sealing of torque - tripping shaft
	Sealing ring 180x3 2327311043	PN 029281.2	1	Sealing of control box cover
	Rubber-copper 40x52x7 2327352066	ČSN 029401.0	1	Sealing of output shaft in the control box
	Sealing ring 16x12 2327311025	PN 029280.2	1	Sealing of handwheel shaft
	Packing	224612280	1	Hole cover gasket for the rising spindle of the fitting
	Rubber-copper 40x52x7 2327352066	ČSN 029401.0	2	Sealing of output shaft in the power gear box
	Rubber-copper 16x28x7 2327352022	ČSN 029401.0	1	Sealing of handwheel shaft
	Packing 16x22	224580840	2	Gasket of threaded oil filling plug
	Packing	224635220	1	Packing between the control box and the terminal box
Packing	23459187	1	Packing between the electric motor and the flange with gears	
52 121 + 52 122	Rubber-copper 2327352090 60x75x8	ČSN 029401.0	2	Sealing of output shaft of the power gear box
	Rubber-copper 2327352027 20x32x7	ČSN 029401.0	1	Sealing of handwheel shaft
	Sealing ring 95x85 2327311029	PN 029280.2	1	Packing piece with "rubber-copper" rings in the power gear box
	Sealing ring 50x2 2327311028	PN 029281.2	1	Packing of the torque spring cover
	Sealing ring 16x22	224580840	2	Sealing of threaded oil filling plug
	Packing	23354394	1	Packing between the electric motor and the flange with gears

1	2	3	4	5
	Sealing ring 160x3 2327311048	PN 029281.2	1	Packaging between the power gear box and the flange with gears
	Sealing ring 170x3 2327311054	PN 029281.2	1	Gasket of terminal box cover
	Sealing ring 190x3 2327311056	PN 029281.2	1	Packing between the control box and the power gear box
	Rubber-copper 55x70x8 2327352083	ČSN 029401.0	1	Sealing of output shaft in the power gear box
	Sealing ring 10x6 2327311001	PN 029280.2	2	Sealing of torque-tripping shaft
	Sealing ring 200x3 2327311044	PN 029281.2	2	Packing of control box cover
	Packing, size 3	224610741	1	Hole cover gasket for the rising spindle of fitting
	Sealing ring 60x50 2327311090	PN 029280.2	1	Sealing of output shaft in the control box cover
52 123 +	Sealing ring 220x3 2327311045	PN 029281.2	1	Packing of control box cover
52 124	Rubber-copper 80x100x10 2327352096	ČSN 029401.0	1	Sealing of output shaft in the power gear box
	Sealing ring 10x6 2327311001	PN 029280.2	2	Sealing of torque-tripping shaft
	Sealing ring 85x75 2327311087	PN 029280.2	1	Sealing of output shaft in the control box cover
	Sealing ring 25x21 2327310999	PN 029280.2	1	Sealing of handwheel shaft
	Packing	224637080	1	Hole cover gasket for the rising spindle of fitting
	Rubber-copper 80x100x10 2327352096	ČSN 029401.0	1	Sealing of output shaft in the power gear box
	Rubber-copper 27x40x10 2327352044	ČSN 029401.0	1	Sealing of handwheel shaft
	Sealing ring 70x2 2327311058	PN 029281.2	1	Sealing of torque spring cover
	Sealing ring 200x3 2327311044	PN 029281.2	1	Packing between the power gear box and the flange with gears
	Packing 16x22	224580840	2	Gasket of threaded oil filling plug
	Packing	224635220	1	Packing between the control box and the terminal box
	Packing	23354395	1	Packing between the electric motor and the flange with gears



1	2	3	4	5
	Sealing ring 200x3 2327311044	PN 029281.2	1	Packing between the power gear box and the control box
	Sealing ring 170x3 2327311054	PN 029281.2	1	Sealing of output shaft in the power gear box
52 125	Sealing ring 16x22	224580840	2	Gasket of threaded oil filling plug
	Packing	22459337	1	Packing between the electric motor and the flange with gears
	Sealing ring 280x3 2327311078	PN 029281.2	1	Packing between the power gear box and the flange with gears
	Rubber-copper 105x130x13 2327352109	ČSN 029401.0	2	Sealing of output shaft in the power gear box
	Rubber-copper 30x50x12 2327352054	ČSN 029401.0	1	Sealing of handwheel shaft
	Sealing ring 30x22 2327311026	PN 029280.2	1	Sealing of handwheel shaft
	Sealing ring 90x2 2327311081	PN 029281.2	1	Packing of the torque spring cover
	Rubber-copper 85x110x12 2327352099	ČSN 029401.0	1	Sealing of output shaft in the control box
	Sealing ring 260x5 2327311046	PN 029281.2	1	Packing between the power gear box and the control box
	Sealing ring 220x3 2327311045	PN 029281.2	1	Sealing of control box cover
	Sealing ring 10x6 2327311001	PN 029280.2	2	Sealing of torque-tripping shaft
	Sealing ring 90x80 2327311011	PN 029280.2	1	Sealing of output shaft in the control box cover
	Packing	224637080	1	Hole cover gasket for the rising spindle of fitting
	Packing	224635220	1	Packing between the control box and the terminal box
	Sealing ring 170x3 2327311054	PN 029281.2	1	Gasket of terminal box cover

<b>Actuators fitted with electronics DMS2 ED</b>			
<b>Part name</b>	<b>Part designation</b>	<b>Stock item</b>	<b>Note</b>
Source board	DMS2.ED.Z	39620000	
Position sensor multi-revolution	DMS2.ED.S	39620001	
Torque sensor	DMS2.TORK	39620003	common for DMS2.ED and DMS2
Analog module	DMS.ED.CPT	39620004	back signal 4 – 20 mA and software blocked regulator
Display	DMS2.ED.D	39620005	
<b>Actuators fitted with electronics DMS2</b>			
Source board analog	DMS2.ZAN	39620014	only for analog
Source board Profibus	DMS2.ZPR	39620015	only for Profibus version
Position sensor multi-revolution	DMS2.S	39620016	
Torque sensor	DMS2.TORK	39620003	common for DMS2.ED and DMS2
Display	DMS2.DP	39620018	
Board of local control block	DMS2.H1	39620019	
<b>Dynamic brakes (for actuators with electronics DMS2 ED a DMS2)</b>			
Brake	BR2 550	2339610124	
Brake	BR2 BK 550	2339610128	
Brake	BR 2,2	2339610142	
Brake	BR BK 2,2	2339610141	
Braking resistance	TR342 68R	2337110355	

A setting program is available for the actuators (it is described in these Mounting and operating Instructions); it enables the parameters of the electronic outfit of the actuators to be set and checked by a computer.

The electronics is connected to the serial port of the computer by a cable (it is available e.g. under the name "Extending cable for mouse 9F-9M").

In case the computer is not fitted with a serial port the converter USB-RS 232, can be ordered.



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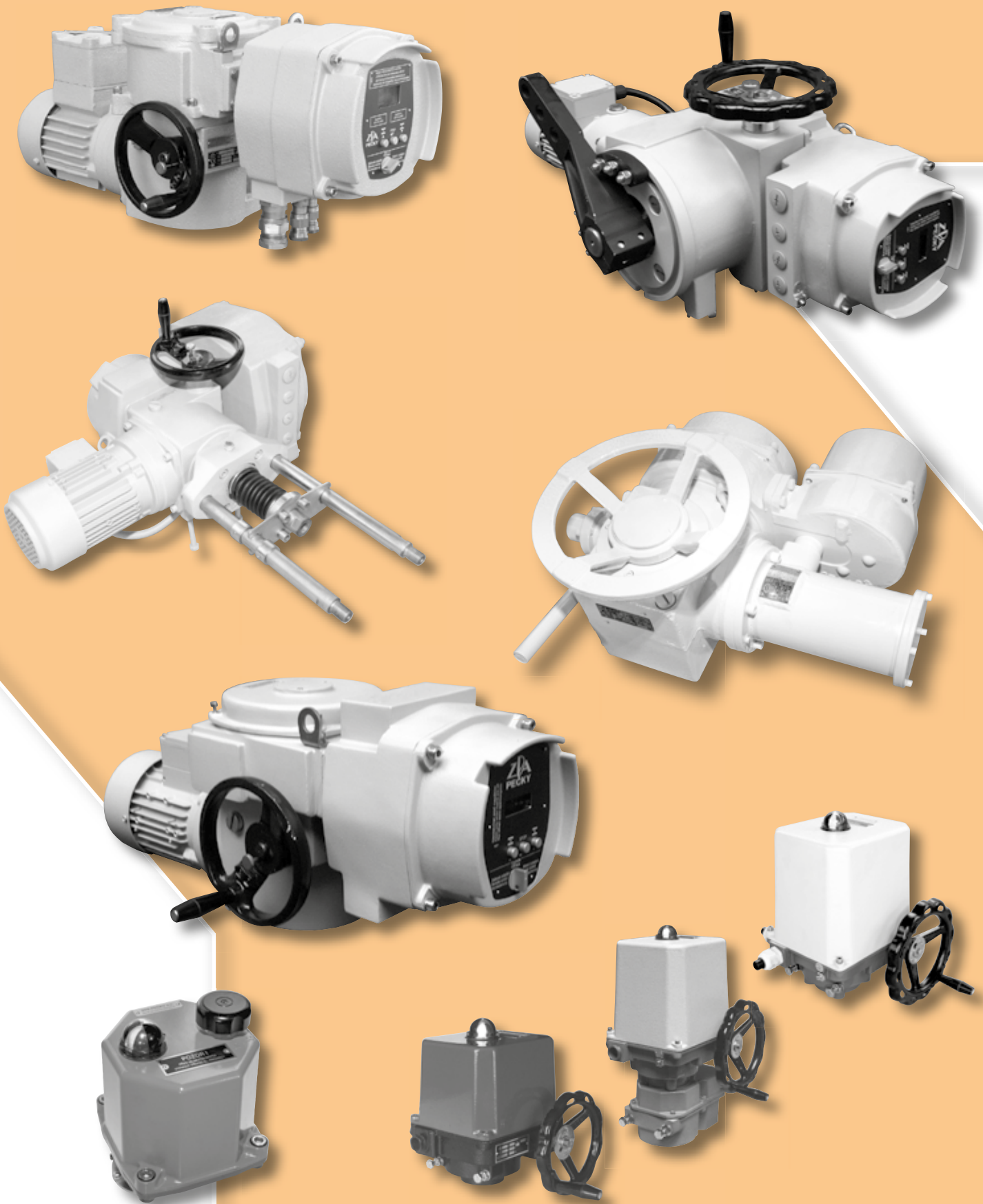
### **MODACT MTN, MTP, MTNED, MTPED**

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

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