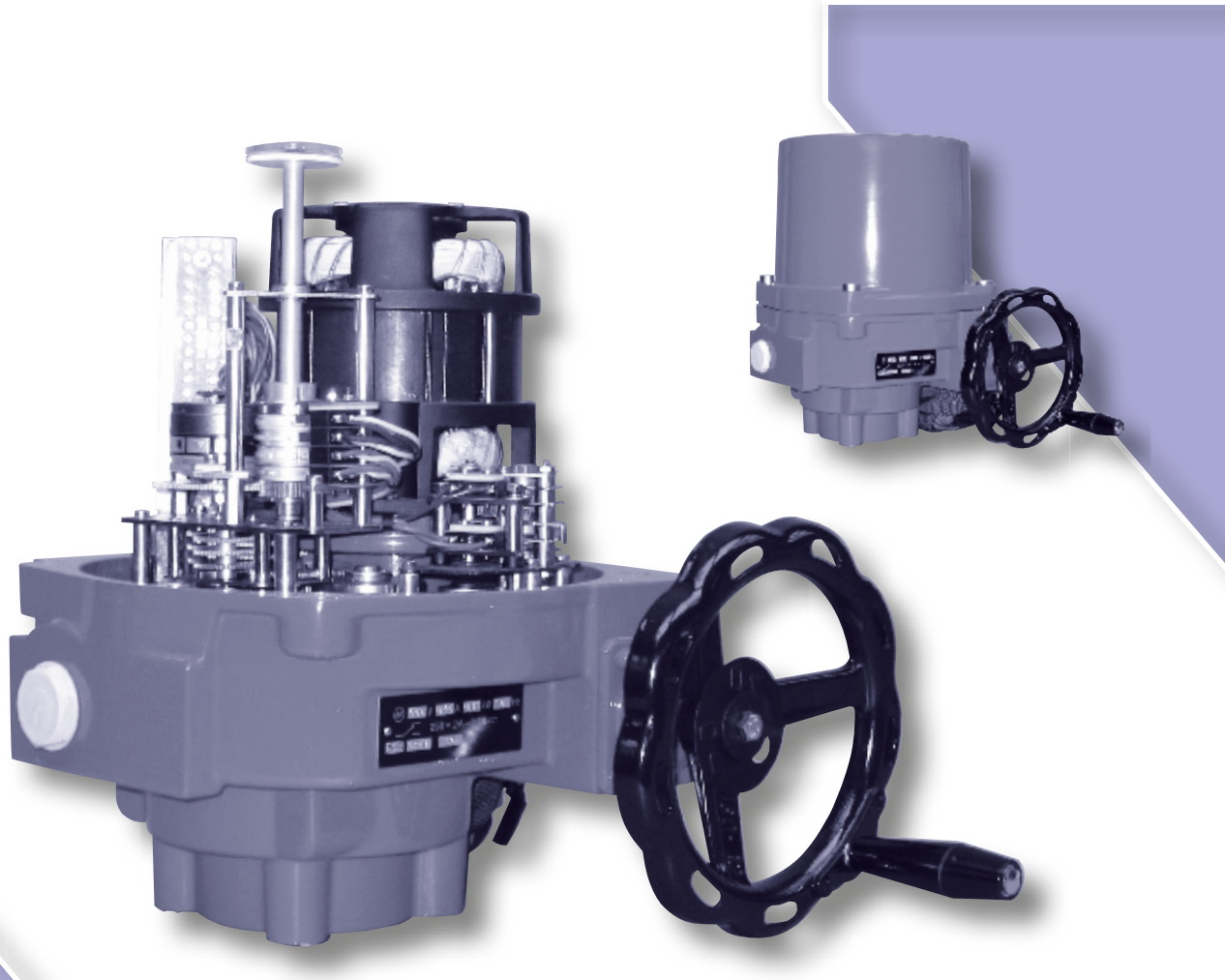
ZPA PEČKY, a.s.

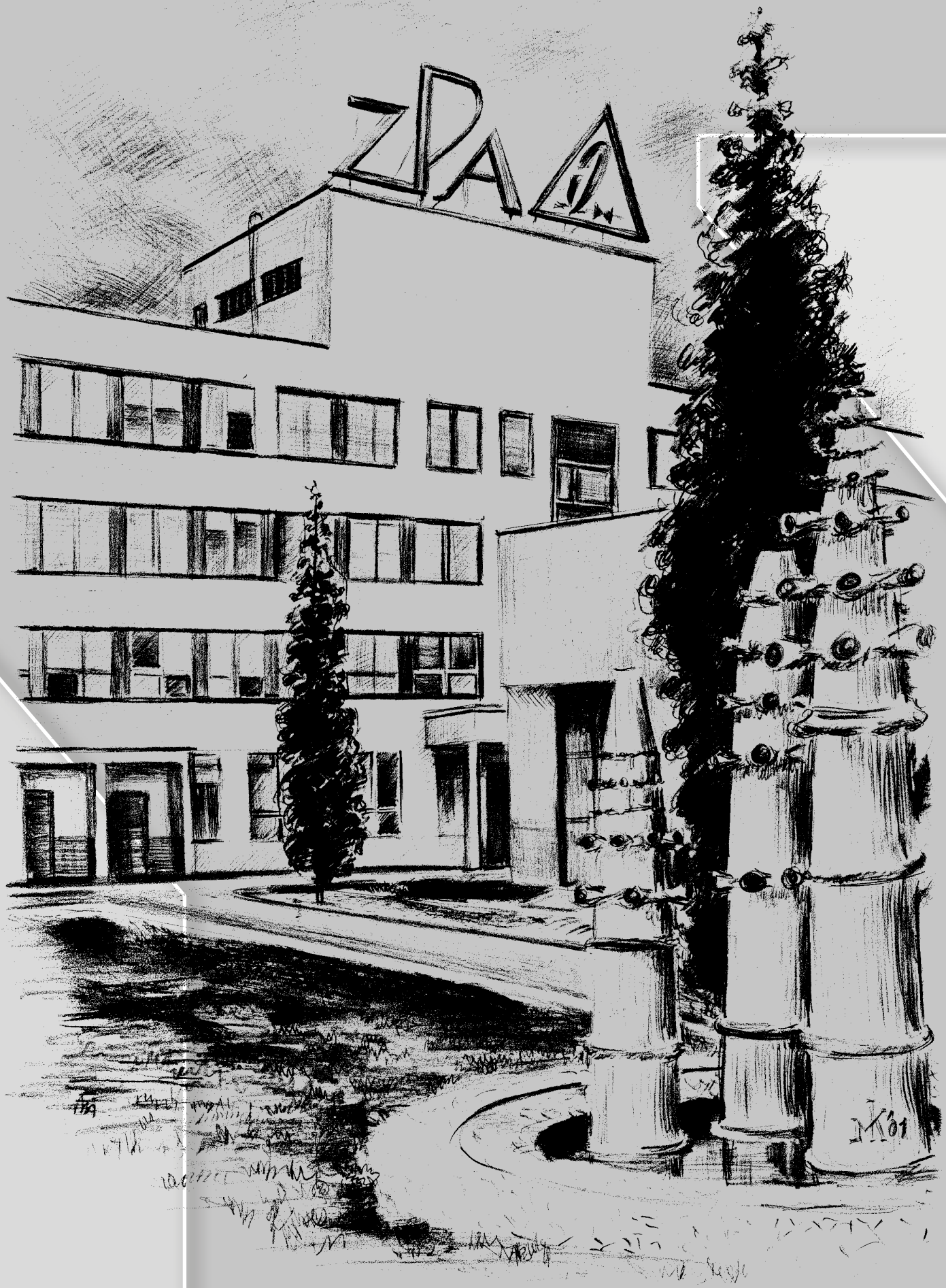


Electric rotary
multi-revolution actuator

MODACT MOP

INSTALLATION INSTRUCTIONS

Type number 52 039



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

CONTENS

1. APPLICATION

Electric rotary multi-revolution actuators **MODACT MOP** are designed for shifting, by reversible rotary motion, valves and/or other devices for which they are suitable due to their parameters. The actuators can work in circuits of remote control. The actuators fitted with current transmitter can also work in circuits of automatic regulation with regime S4 – 25 %; 1200 h^{-1}.

2. OPERATING CONDITIONS, OPERATING POSITION

Operating conditions

The **MODACT MOP** actuators should withstand the effect of operating conditions and external influences, Classes AC1, AD7,AE6, AF2, AG2, AH2, AK2, AL2, AM-2-2, AN2, AP3, BA4 and BC3, according to ČSN 33 2000-5-51 ed. 3.

When placed on an open area, the actuator is recommended to be fitted with a light shelter to protect it against direct action of atmospheric effects. The shelter should overhang the actuator contour by at least 10 cm at the height of 20 – 30 cm.

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

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

Notes:

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

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

Surrounding temperature

Operating temperature for the **MODACT MOP** 52 039 is from -25 °C to +60 °C.

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

Class:

1) AC1 – above-sea level ≤ 2000 m
2) AD7 – shallow immersion, possible sporadic partial or full coverage
3) AE6 – strong dust formation
4) AF2 – occurrence of corrosive or polluting agents is atmospheric; presence of corrosive pollutants is significant

5) AG2 – mean mechanical strain; in normal industrial operations
6) AH2 – mean vibrations; in normal industrial operations
7) AK2 – serious risk of plant and moulds growth
8) AL2 – serious risk of occurrence of animals *(insects, birds, small animals)*
9) AM-2-2 – normal level of signal voltage. No additional requirements.
10) AN2 – mean solar radiation. Intensity > 500 and ≤ 700 W / m^2
11) AP3 – mean seismic impacts; acceleration > 300 Gal ≤ 600 Gal
12) BA4 – capability of persons; instructed persons
13) BC3 – frequent contact of persons with ground potential; persons often touch foreign conductive parts or stand on conductive substrate

Corrosion protection

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

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

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

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

Operating position

The actuators can be operated in any operating position.

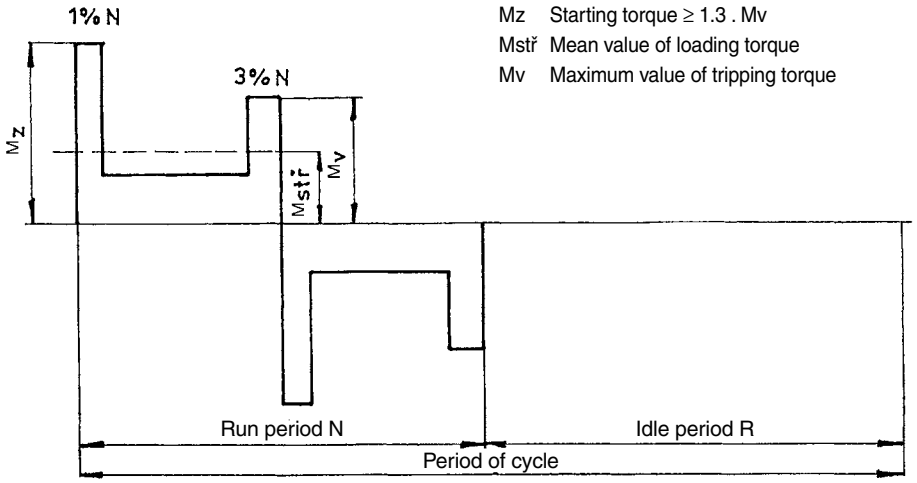
3. WORKING REGIME, SERVICE LIFE OF ACTUATORS

Operation mode

The actuators can work with the type of loading S2 according to ČSN EN 60 034-1, wherein the course of loading is shown in the figure. The run period at temperature +50 °C is 10 minutes and the mean value of loading torque does not exceed 60 % of the value of maximum tripping torque.

The actuators can also work in the regime of interrupted run with start-up S4 according to ČSN EN 60 034-1 *(e.g. during gradual opening of valve etc.)*. The highest number of closing in automatic regulation is 1200 cycles per hour with load factor 25 % *(the ratio of run/idle time is 1:3)*. Mean value of loading torque is not higher than 40 % of maximum tripping torque. The longest working cycle *(N+R)* is 10 minutes; load factor *(N/N+R)* is max. 25 %.

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



Mz Starting torque ≥ 1.3 . Mv
Mstř Mean value of loading torque
Mv Maximum value of tripping torque

Course of working cycle

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

4. TECHNICAL PARAMETERS

Supply voltage

Supply voltage of electric motor
– 1 x 230 V +10 %, -15 %, 50 Hz ±2 %
– 3 x 230/400 V, +10 %, -15 %, 50 Hz ±2 %
(or as shown on the motor rating plate)

Protective enclosure

Protective enclosure of actuators – IP 67 according to ČSN EN 60529.

Noise

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

Tripping torque

Tripping torque is set at the manufacturer according to the customer's requirements within the range given in Table No. 1.

If setting of tripping torque is not required maximum tripping torque of the required type number of the electric actuator is set.

Breakaway torque

Breakaway torque is a calculated value, determined by electric motor’s breakaway torque, actuator's total ratio and effectiveness. Actuator can produce breakaway torque after run reversing operation for 1 to 2 revolutions of the output shaft, while torque tripping is interlocked. This may occur either in end position or in any optional intermediate position.

Self-locking

Actuator is self-locking provided that load acts against the motion of the actuator's output shaft. Self-locking function is provided by a roller lock, which immobilizes actuator's rotor even in case of manual operation.

With respect to safety regulations, it is unacceptable to apply actuators for operating transport lifting equipment with possible transport of persons, or for equipment where persons may be present below 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

According to Table No. 1.

Manual control

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

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

When using the manual control, ie. actuator is controlled mechanically, the torque-limit switches doesn´t work and the valve can be damaged.

5. ACTUATOR OUTFIT

Torque-limit switches

Actuators are fitted with two torque switches *(MO, MZ),* each for one direction of actuator output shaft motion.

Torque switches may work in any point of the operating stroke except where they are interlocked *(Breakaway torque).*

Tripping torque value can be set up within the range specified in Table 1. Torque switches are interlocked in the event that once switched off they lose load torque. This provides protection of actuator against so-called "pulsing".

Position-limit switches

Position switches PO, PZ delimit the working stroke of the actuator *(one switch for each limit position).*

Position signalling

Actuator's output shaft position is signalled by two signal switches SO, SZ – each for one output shaft motion direction. Switching point of micro switches can be set up in the entire range of working stroke, except a tight range before micro switch tripping point, which deactivates the electric motor.

Position transmitters

The **MODACT MOP, 52 039** electric actuators can be supplied without position transmitter or can be fitted with position transmitter:

a) Resistance transmitter 1 x 100 Ω

Technical parameters:

Position scanning	resistance
Turning angle	0° – 160°
Non-linearity	≤ 1 %
Transition resistance	max. 1.4 Ω
Permitted voltage	50 V DC
Maximum current	100 mA

b) Passive current transmitter type CPT 1A. Current loop feeding is not part of the actuator. Recommended feeding voltage is 18 to 28 V DC, with maximum loop load resistance of 500 Ω. Current loop must be earthed in one point. Feeding voltage does not need to be stabilized, however, it must not exceed 30 V, otherwise the transmitter may be destructed.

Range of CPT 1A is adjusted using potentiometer on the transmitter's body, and output value is adjusted by rotating the transmitter accordingly.

Technical parameters of CPT 1A:

Position sensing by		capacity
Working stroke		adjustable 0° – 40° to 0° – 120°
Non-linearity		≤ 1 %
Non-linearity, including gears		≤ 2.5 % *(for max. stroke 120°)*
Hysteresis, including gears		≤ 5 % *(for max. stroke 120°)*
(Non-linearity and hysteresis relate to signal value of 20 mA.)		
Loading resistance		0 – 500 Ω
Output signal		4 – 20 mA or 20 – 4 mA
Feeding voltage	for R_z = 0 – 100 Ω	10 – 20 V DC
	for R_z = 400 – 500 Ω	18 – 28 V DC
Maximum feeding voltage ripple		5 %
Maximum power input of transmitter		560 mW
Insulation resistance		20 MΩ at 50 V DC
Electrical resistance of insulation		50 V DC
Temperature of working environment		-25 °C to +60 °C
Temperature of working environment – extended range		-25 °C to +70 °C *(other ranges upon request)*
Dimensions		ø 40 x 25 mm

c) Active current transmitter type DCPT. Current loop feeding is part of the actuator. Maximum load resistance of loop is 500 Ω.

DCPT is easy to adjust by means of two pushbuttons with LED on the transmitter body.

Technical parameters of DCPT:

Position sensing	contactless, magnetoresistant
Working stroke	adjustable from 60° to 340°
Non-linearity	max. ±1 %
Loading resistance	0 – 500 Ω
Output signal	4 – 20 mA or 20 – 4 mA
Feeding	15 – 28 V DC, < 42 mA
Working temperature	-25 °C to +70 °C
Dimensions	ø 40 x 25 mm

Transmitters CPT 1A and DCPT are connected by two-wires, i.e. transmitter, power supply and load are connected in series. User must provide connection of two-wire circuit of current transmitter to ground of the adjacent regulator, computer etc. Connection must be provided only in one point in any part of the circuit, outside the electric actuator.

Position indicator

Actuator can be equipped with local position indicator.

Heating element

Actuators are equipped with a heating element to prevent water vapour condensation. Heating element is to be connected to 230 V power supply.

6. ELECTRIC PARAMETERS

External electric connection

Actuator is fitted with a terminal board providing connection to external circuits. Terminal board is provided with screw terminals for connection of conductors with a maximum section of 4 mm2. Terminal board is accessible upon removal of terminal box cover. All electrical control circuits of actuator are led to the terminal board. Terminal box is provided with cable bushings for electric connection of actuator. Electric motor is provided with separate box including terminal board and bushing.

Connecting of actuators with connector – on special request.

Actuator internal wiring

The internal wiring diagrams of the **MODACT MOP, 52 039** 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 actuator cover. The terminals are marked on a self-adhesive label attached to a carrying strip under the terminal block.

Current-carrying capacity and maximum voltage of micro switches

Micro switches maximum voltage is 250 V AC and DC at the following maximum current values:

MO, MZ	250 V AC / 2 A; 250 V DC / 0.2 A
SO, SZ	250 V AC / 2 A; 250 V DC / 0.2 A
PO, PZ	250 V AC / 2 A; 250 V DC / 0.2 A

Micro switches can be used only as single-circuit micro switches. Two voltages of varying values or phases must not be connected to the terminals of one micro switches.

Isolation resistance

Insulation resistance of electrical circuits against the ground or against each other at normal conditions must be at least 20 MΩ, after humidity test at least 2 MΩ. Insulation resistance of electric motor must be at least 1.9 MΩ. More details can be found in Technical Conditions.

Electric strength of electrical circuits' insulation

Circuit of position resistance transmitter		500 V, 50 Hz
Circuit of current transmitter		50 V DC
Circuits of micro switches and heat resistor		1 500 V, 50 Hz
Electric motor	Un = 1 x 230 V	1 500 V, 50 Hz
	Un = 3 x 230/400 V	1 800 V, 50 Hz

Deviations from basic parameters

Tripping torque	±10 % of maximum value of range
Setting speed	-10 % of maximum value of range
	+15 % of rated value *(in idle run)*
Signal switches setting	± 2,5 % of maximum value of range
	(ranges are specified in Installation Manual)
Signal switches hysteresis	max. 4 % of maximum value of range
Position switches setting	±2,5 % of maximum value of range
Position switches hysteresis	max. 4 % of maximum value of range

Protection

Actuators are provided with one internal and one external protective terminal serving as protection from electric shock.

Protective terminals are identified with a sign complying with ČSN IEC 417 (34 5555).

If actuator is not provided with over-current protection when purchased, such protection must be provided externally.

7. DESCRIPTION

The actuators are designed for direct assembly on a valve and connection is realized by means of a flange according to ISO 5210 and a clutch according to DIN 3210, shape C or E or D.

The actuators consist of two parts:

– **Power part –** It generates and transmits torque to the output shaft of the actuator – It includes three-phase asynchronous electric motor, countershaft gearbox, epicyclic gearbox with output shaft, mechanism for manual control with hand wheel and floating worm.

– **Control part –** It ensures respective working functions of the actuator, such as torque-limit switching, position-limit switching, signalization, and remote reporting on position; it is composed of the following mechanical groups *(units)* installed on the control board according to Fig. no. 1 - position-limit switching and signalling unit 1, position transmitter 2, torque-limit switching unit 3, terminal board 4, and anti-condensation heater 9. The position-limit switching and signalling unit is fitted with four micro-switches, always two for each direction of rotation of the output shaft. The point of changing-over of each micro-switch can be separately adjusted within the working stroke of the actuator. The torque-limit switching unit is fitted with micro-switches – one for each direction of rotation.

The torque-limit switches are blocked against tripping at engagement torque. The resistance position transmitter is fitted with a skidding clutch providing for its adjustment with the output shaft. The anti-condensation heater 9 prevents condensation of steam under the control part cover. The position-limit switching unit and the position transmitter derive their motion from the output shaft of the actuator via the drive wheel 7. The torque-limit switching unit is driven by the “floating worm” of manual control where displacement of the worm is directly proportional to the torque on the output shaft of the actuator. This allows the electric motor to be switched off when the value of torque is reached to which the torque-limit switching unit is set.

Cable inlets are realized through two cable bushings M 25 x 1.5. The cable bushings will seal the cable diameter 9 to 16 mm.

Important warning:

The micro-switches used in respective units do not allow connecting two voltages of different values or phases to contacts of the same micro-switch.

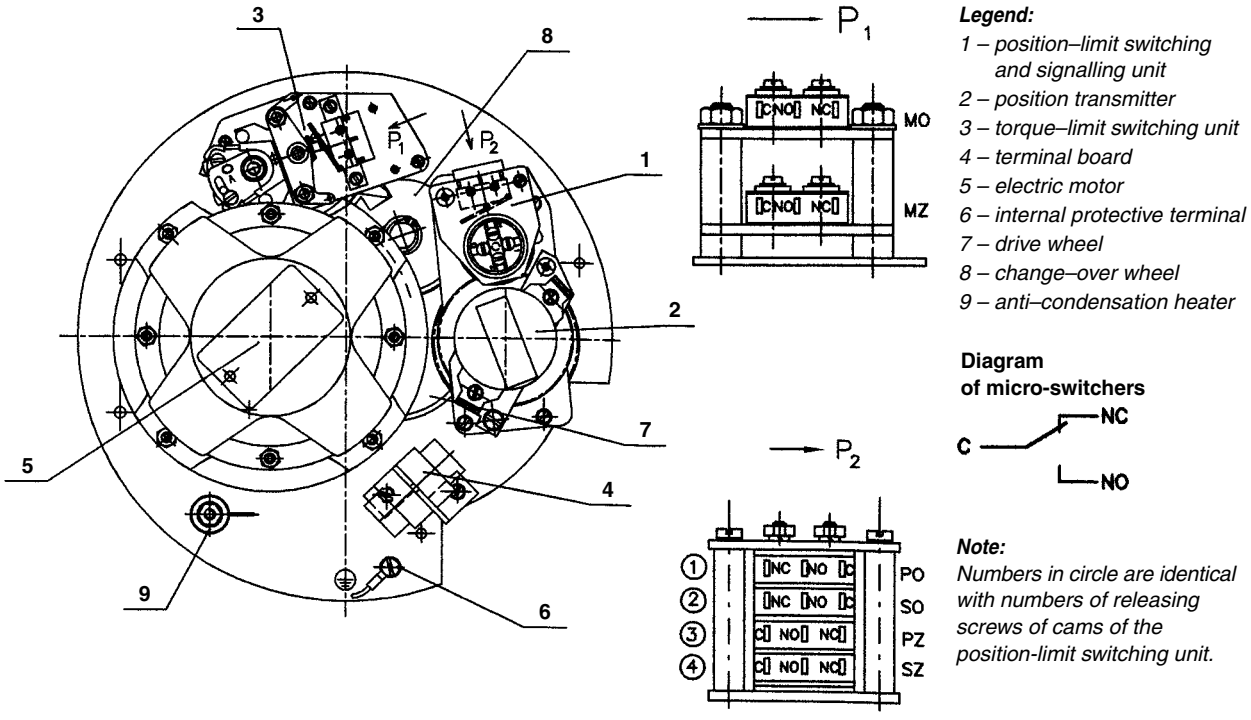


Fig. 1 - ***Control board***

Description and function of control units

a) Torque-limit switching unit – Fig. 2 is, as an independent assembly unit, composed of basic board 19 carrying micro-switches 20 and, at the same time, forms bearings for the shaft of torque control 22 and the shaft of blocking 29.

The shaft of torque control transmits motion of the floating worm from power gearing by means of segments 23 or 24 and levers 45 or 46 to micro-switches MO or MZ. By moving round the segments against the tripping levers magnitude of tripping torque is set. For shifting the tripping torque outside the factory, segments 23, 24 are fitted with a scale on which points for setting maximum and minimum torque are individually marked with index lines on each piece of actuator. The set torque is then shown by slots in segments 27 and 28.

The numbers on this scale do not show setting of tripping torque directly. Divisions on this scale serve just for more precise dividing of the range of points of maximum and minimum tripping torque and, thus, more precise resetting of tripping torque out of the factory in case a loading bench is not at disposal. Segment 28 is intended for direction “close”, segment 27 for direction “open”.

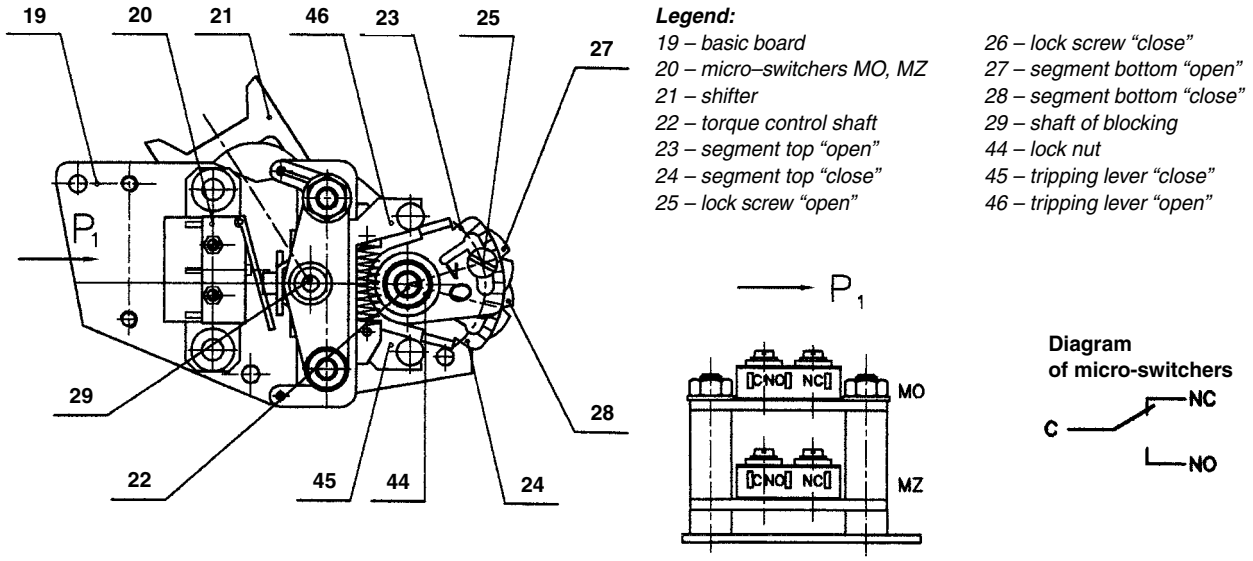


Fig. 2 - ***Torque-limit switching unit***

The unit of torque control is also fitted with a blocking mechanism. After tripping of the torque-limit switch, the blocking mechanism will ensure its blocking and thus prevent its re-closing and pulsing of the actuator. Moreover, the blocking mechanism prevents tripping of the torque-limit switch after reversing the actuator run and, thus, it provides for full utilization of engagement torque of the electric motor. The blocking mechanism operates with both motion directions of the output shaft of the actuator in limit positions as well as in intermediate position for the time specified by the second complementary number of the actuator in revolutions of the output shaft after reversing its motion.

When the output shaft of the actuator is loaded with anti-torque, the shaft of the torque control 22 and also segments 23 and 24 are partially moved round; motion is thus transferred to tripping lever 45 or 46. After the torque on the output shaft of the actuator reaches a value to which the torque-limit switching unit is set, the tripping lever presses down the push-button of the particular micro-switch; the electric motor is thus disconnected from the supply mains and the actuator stops.

Procedure of setting torque-limit switching unit

In setting different tripping torque than that to which the unit was set in the factory, the procedure is as follows: release lock nut 44 *(see Fig. 2)* and particular lock screw -26- *(for direction “close”)* or 25 *(for direction “open”)*. Then, insert a screwdriver into the slot in top segment -24- or -23- and turn the segment until the slot in segment 28 or 27 matches with particular point on the scale. This point is determined by dividing the difference between the maximum and minimum adjustable torque in Nm by the number of divisions between the mark of the maximum and minimum torque. The result shows which part of the tripping torque *(in Nm)* corresponds to one division of the scale; interpolation is used for determining the point on the scale which the slot in segment 28 or 27 should telly with.

The mark > on top segments 23 and 24 indicates direction in which the torque is increased or decreased, and which coloured index line on the scale indicates the point of setting maximum tripping torque and the point of setting minimum

torque. The unit of torque control must never be set so that the slot in the bottom segment would fall beyond the range demarcated by the coloured index lines on the scale.

After setting the tripping torque, lock screw 26 or 25 and lock nut 44 are retightened.

Tripping torque must not be set to higher values than those corresponding to respective type designations in Table no. 1.

b) Position-limit switching and signalling unit - Figs. 3 and 4 – provides for tripping of the position-limit switching units PO or PZ after the set number of revolutions of the output shaft has been reached and, by means of signalling switches SO and SZ, sending electric signal for signalization of position of the output shaft of the actuator. The unit drive is realized by gearwheel 38 from the output shaft via the multi-speed gearbox to cams controlling micro-switches PO, PZ, SO, SZ. The moment of closing of the signalling switches can be chosen at any point of the working stroke of the actuator except for a narrow range around the limit positions *(the signalling switch must close before the position-limit switching unit when the output shaft is still in motion).*

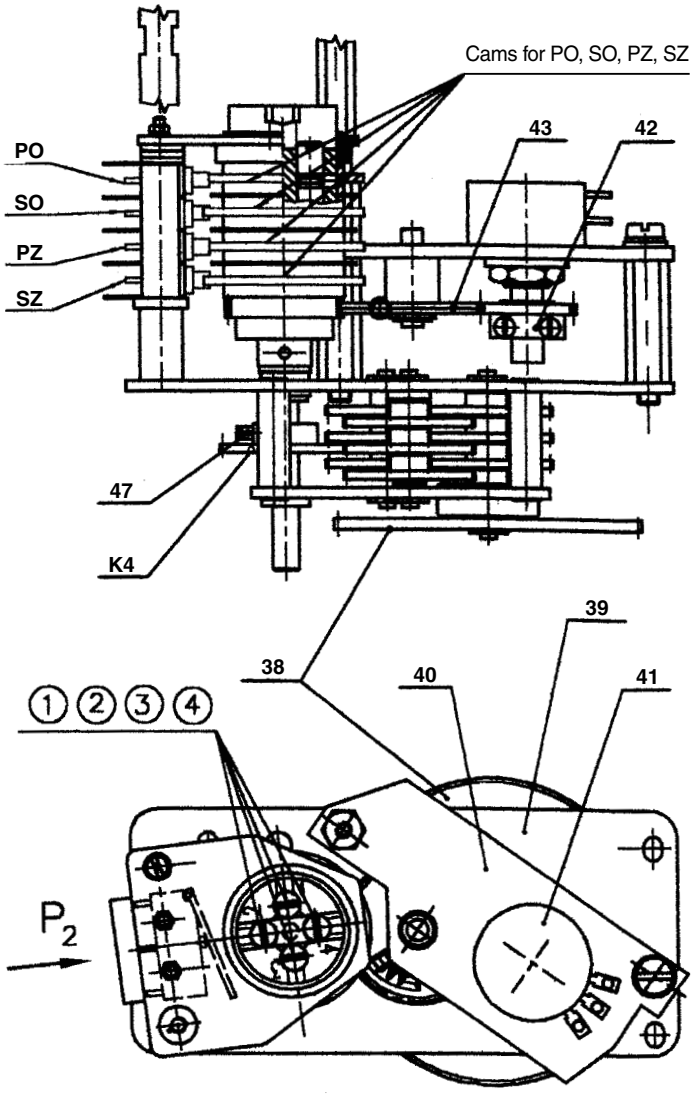
The signalling and position-limit switching unit is designed as an independent assembly unit. It is assembled on the supporting plate 39 under which the gearings arranged according to the kinematic diagram Fig. 5 are fitted. The gearing is assembled so that the shifting wheel K4 can be shifted to various levels *(I, II, III, IV, V,)* after releasing lock screw 47. Shifting of wheel K4 changes the range of setting of the position-limit switching and signalling units according to working stroke of the actuator – see the tables below.

Range of setting of working stroke
(for resistance position transmitter)

Working stroke of actuator *(rev.)*	1.5-2.6	2.6-5.2	5.2-10	10-19.5	19.5-38.1
Gear stage of unit	I	II	III	IV	V

Range of setting of working stroke
(for current transmitter CPT)

Working stroke of actuator *(rev.)*	1.5-2.6	2.6-5.2	5.2-10	10-19.5	19.5-38.1
Gear stage of unit	I	II	III	IV	V



Legend:
PO – position–limit microswitch "open"
SO – signalling micro–switch "open"
PZ – position–limit micro–switch "close"
SZ – signalling micro–switch "close"
① – screw for cam of micro–switch PO
② – screw for cam of micro–switch SO
③ – screw for cam of micro–switch PZ
④ – screw for cam of micro–switch SZ

38 – gear (drive) wheel
39 – supporting plate of unit
40 – supporting plate of transmitter
41 – resistance position transmitter
42 – pinion with friction clutch
43 – sprung drive wheel of transmitter
47 – lock screw of shifting wheel
K4 – shifting wheel

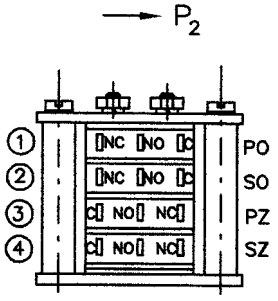
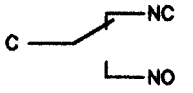


Diagram of micro-switchers



Note:
Numbers in circle are identical with numbers of releasing screws of cams of the position-limit switching unit.

Fig. 3 - ***Position-limit switching and signalling unit with resistance transmitter***

Setting of position-limit switching and signalling unit

Before setting the position-limit switching and signalling unit, the assembly of the position indicator *(Fig. 6)* should be removed by loosening the screws 66 to allow for access to the screws of cams 1, 2, 3, 4. After setting the unit, the indicator assembly is re-screwed and adjusted according to point d.

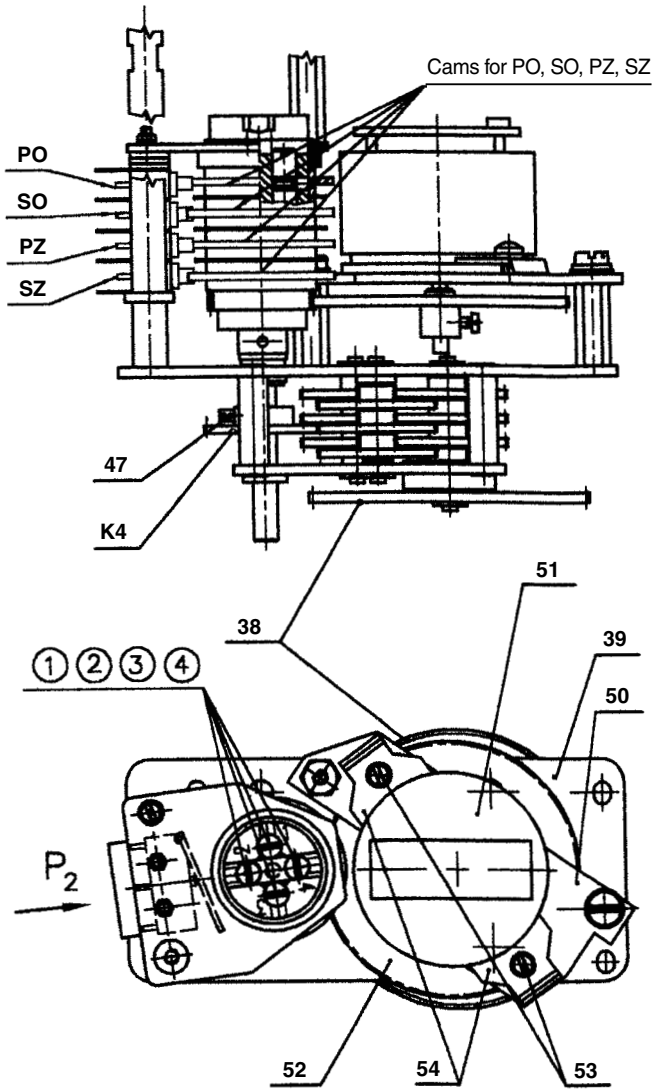
If it is necessary to change the range of setting the position-limit switching and signalling units, and the position transmitter, position of the shifting wheel K4 should be changed. After shifting, the lock screw 47 should be properly retightened and secured.

Layout of cams and micro-switches of the position-limit switching and signalling unit is shown in Figs. 3 and 4. Shoulders of cams control the micro-switches PO, PZ, SO and SZ.

In setting of the position-limit switching units the procedure is as follows: first, set the output shaft to its limit position in which the set micro-switch should trip. Then, release the cam of the micro-switch *(PO, PZ, SO, SZ)* by particular releasing screw *(1, 2, 3, 4)*. Releasing is carried out by rotating the releasing screw counter-clockwise. The releasing screw is rotated just to release the cam - further rotation of the releasing screw would result in retightening the cam.

Numbers of particular releasing screws *(1, 2, 3, 4)* are given on the shaft of cams of the position-limit switching unit *(Fig. 3 and 4)*. After releasing, rotate the cam in the direction opposite to motion of the output shaft of the actuator during setting the position “close” or “open” until the micro-switch changes over. In this position, secure the cam by tightening the releasing screw *(in the clockwise direction)*.

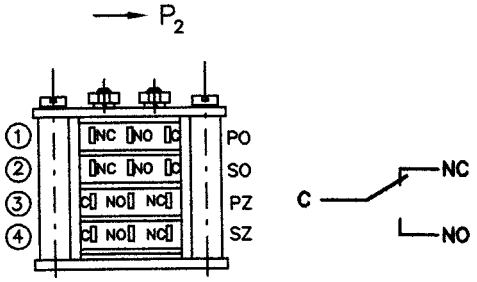
The signalling switch must be set so that it changes over before the particular position limit or torque-limit switch or at the same time with it.



Legend:

PO – position–limit microswitch “open”
SO – signalling micro–switch “open”
PZ – position–limit micro–switch “close”
SZ – signalling micro–switch “close”
① – screw for cam of micro–switch PO
② – screw for cam of micro–switch SO
③ – screw for cam of micro–switch PZ
④ – screw for cam of micro–switch SZ

38 – gear (drive) wheel
39 – supporting plate of unit
50 – supporting plate of current transmitter
51 – current position transmitter CPT 1M
52 – drive wheel of transmitter CPT 1AA
53 – lock screw
54 – shim plate
K4 – shifting wheel



Note:

Numbers in circle are identical with numbers of releasing screws of cams of the position-limit switching unit.

Fig. 4 - ***Position-limit switching and signalling unit with current transmitter***

K1 – gear wheel of output shaft
K2 – intermediate wheel
K3 – drive wheel
K4 – shifting wheel
47 – lock screw of shifting wheel
48 – shaft of cams

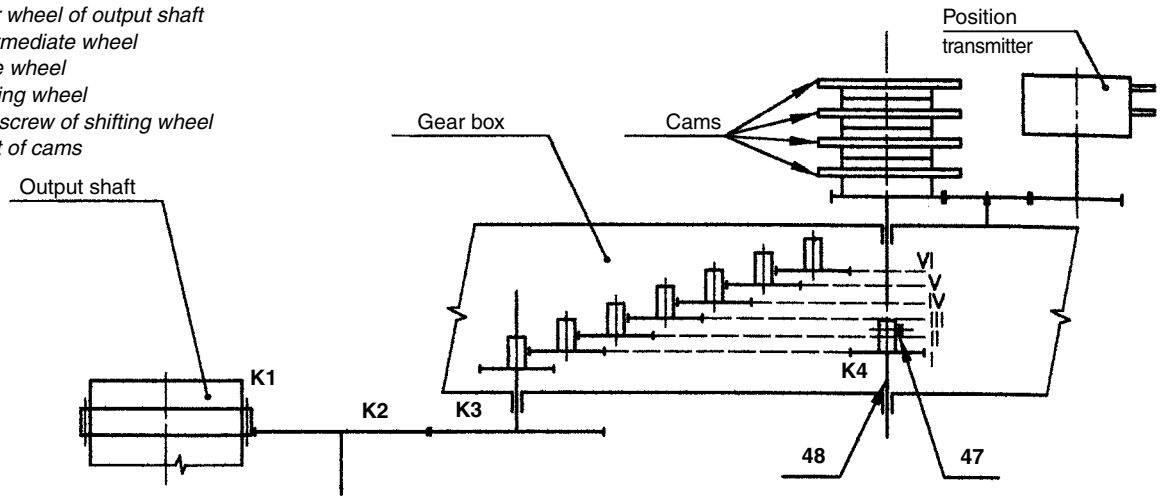


Fig. 5 - ***Kinematic diagram of gearings***

Warning

After each manipulation with the lock screws in the control part of the actuator, these screws should be secured against releasing through vibration by a drop of quick-drying varnish. In case these screws were already secured with varnish, the rests of old varnish should be removed during adjustment and the area under them properly degreased.

c) Position transmitters

Resistance position transmitter 1x100 ohm

First, suitable gearing stage from the output shaft of the actuator to the transmitter shaft should be set according to required working stroke of the actuator *(see the table).*

Setting is carried out by means of shifting wheel K4 in the gearbox of the position-limit switching and signalling unit according to point b).

The resistance transmitter has the rated value of resistance signal 100 ohm. The transmitter shaft sticks out on one side. Pushed on the shaft end is the pinion with the friction clutch pos. 42 which can skid on the shaft in both limit positions of the transmitter, which can be utilized in adjustment.

Setting of resistance transmitter

Due to multi-speed gear ratio of the position-limit switching and signalling unit, the sliding contact of the potentiometer does not move in the whole range of the resistance travel but just in its certain part.

In setting the position-limit switching and signalling unit to the limit positions “open” and “close” according to point b), certain setting of the resistance transmitter is automatically made by skidding of the friction clutch pos. 42 in the limit position of the transmitter.

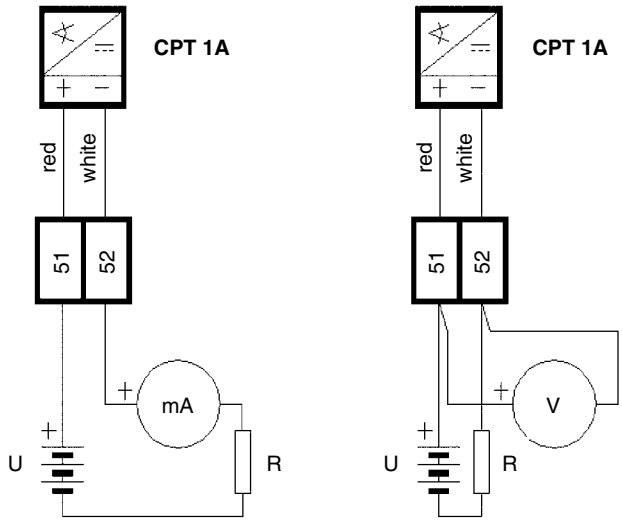
This automatic setting can be changed as required by the following procedure:

Decisive aspect in setting is whether in the position “close” resistance should be low *(lower limit of the resistance travel)* or high *(upper limit of the resistance travel)*. If low resistance is chosen for the position “close”, terminals 30, 31 must be connected on the terminal board; for high resistance, terminals 31, 32 should be connected. In setting the resistance transmitter, loosen the screw and bolt for the position indicator holding the transmitter supporting plate pos. 40 *(Fig. 3)* two revolutions of the hand wheel before the position “close” and shift the transmitter wheel out from engagement. Then, set the transmitter by rotating the shaft to the lowest value of resistance *(less than 4 ohm)*, bring it back to engagement, and retighten the bolt and screw. Finally set the minimum resistance value of the transmitter by rotating the hand wheel to the position “close”. On starting the actuator or rotating the hand wheel to “open”, resistance will begin increasing until the value of resistance is reached which corresponds to the limit position “open” *(max. 96 ohm).*

In case that high resistance is required in the position “close”, connect the terminals 31, 32 and set the transmitter to the highest value of resistance *(more than 96 ohm)* two revolutions of the hand wheel before the position “close” following the above mentioned procedure. On starting the actuator or rotating the hand wheel to “open”, resistance will begin decreasing until the value of resistance is reached which corresponds to the limit position “open” *(max. 4 ohm).* The transmitter is now adjusted.

Current position transmitter CPT 1A – setting

Before starting setting the current transmitter it is necessary to set the end-limit positions *(torque or position switches)* of the actuator and connect them into the tripping circuit of the electric motor. In case of an external source of feeding voltage, verification must be carried out that it does not exceed the maximum value 30 V DC *(limit value when CPT 1A is still not damaged).* Recommended value is 18 – 28 V DC.



Positive pole of the source is connected to the positive pole of the transmitter CPT 1A; a milli-ammeter of precision at least 0.5 % connected into the circuit. The current loop must be earthed in one point. The figure does not show the earthing that can be made at any point of the circuit.

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

Caution!

The transmitter CPT 1A must not be connected without checking the supply voltage. The transmitter outlet conductors must neither be connected to the electric actuator frame nor to the earth, not even accidentally.

Before the supply voltage is checked, it is first necessary to disconnect the transmitter from the supply mains. Measure the voltage on terminals of the electric actuator to which the transmitter is connected – this can best be done using a digital voltmeter of input resistance at least 1 Mohm. This voltage should fall within the range of 18 – 25 V DC; in no case may it exceed 30 V *(otherwise the transmitter can be damaged).* Then, connect the transmitter so that the positive pole of the power source is connected to the positive pole of the transmitter, i.e. to the pin with red insulator *(r)* + *(nearer to the transmitter centre).* The terminal with white coating *(wired to the terminal 52)* is connected to the negative pole of the transmitter *(white insulator).* In the latest design variants the red conductor is plus and the black one is minus.

A milli-ammeter, preferentially a digital one with accuracy at least 0.5 %, is temporarily connected in series with the transmitter. The output shaft is moved to the position CLOSE. The signal value should decrease. If this is not the case, the output shaft should be rotated in the CLOSE direction until the signal starts decreasing and the output shaft reaches the CLOSE position.

Then, loosen the screws of the transmitter shim plates so that the whole transmitter can be turned to set the current to 4 mA, and retighten the screws of the shim plates. Thereafter, move the output shaft of the electric actuator to the position OPEN. Using the resistance trimmer on the transmitter face *(nearer to the edge)* set the current to 20 mA. The trimmer has 12 turn and no stops. Hence, it cannot be damaged.

In case the correction of the current 20 mA was considerable repeat adjustment for 4 mA and 20 mA once again. Disconnect the milli-ammeter. The screw secured by a drop of varnish situated nearer to the centre must not be turned. Retighten the countershafts fixing the transmitter shim plates and secure with a drop of varnish against loosening.

After completing the adjusting procedure, check voltage on the transmitter terminals using a voltmeter. The voltage should fall within the range of 9 – 16 V with current 20 mA.

Note:

The transmitter characteristics has two branches: the descending one and the ascending one with respect to the CLOSE position. The characteristics is selected by turning the transmitter body.

Current position transmitter DCPT – setting

1. Set of end-limit positions

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

1.1. Position "4 mA"

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

1.2. Position "20 mA"

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

2. Setting of sense of rotation

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

2.1. Rotating anti-clockwise

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

2.2. Rotating clockwise

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

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

3. Error messages

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

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

4. Calibration of currents 4 mA and 20 mA.

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

4.1. Calibration of current 4 mA

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

4.2. Calibration of current 20 mA

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

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

Entry of option of calibration 4 mA:

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

Entry of option of calibration 20 mA:

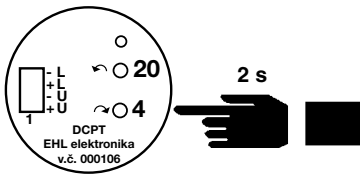
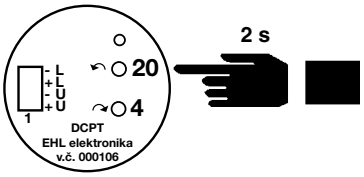
Press the push-button **"20",** then the push-button **"4"** and keep them depressed until LED blinks.

5. Record of standard parameters

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

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

Parameter setting

Position “4 mA” Set the actuator to required position *(usually Closed)* and keep the push-button 4 depressed until LED blinks.	
Position “20 mA” Set the actuator to a required position *(usually Open)* and keep the push-button 20 depressed until LED blinks.	

d) Position indicator

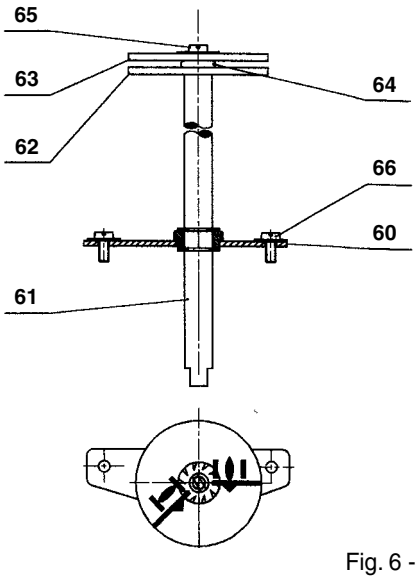
The local position indicator serves for orientational determination of position of the output shaft. It is connected in a detachable mechanical way to pillars of the position-limit switching and signalling unit and dragged by the groove in the shaft of cams of this unit. In adjustment of the cams of the position-limit switching and signalling unit, the complete assembly of the indicator *(Fig. 6)* should be dismounted by loosening the fixing screws pos. 66.

Adjustment of position indicator

First, set the position-limit switching and signalling unit according to point b).

After setting this unit, fix the indicator assembly, and adjust the indicator according to the following procedure:

First, set the output shaft of the actuator to the position “close” and detect position of the mark “close” in the sight hole of the fitted cover with respect to the mark on the sight hole. Remove the cover and set the mark “close” of the bottom indicator pos. 62 to this point according to Fig. 6 after loosening the screw pos. 65. After re-fitting the cover, check accuracy of setting the marks against each other and, if necessary, correct the position. Then, move the output shaft of the actuator to the position “open” and detect position of the mark “open” with respect to the mark on the sight hole. Remove the cover and set the mark “open” of the top indicator pos. 63 to this point and retighten the screw pos. 65. Care should be paid not to change the already set position of the bottom indicator “close”. After fitting the cover, check once again accuracy of setting the marks against each other and, if necessary, correct the position. The indicator is now set for both limit positions.



Legend:

60 – indicator holder
61 – indicator shaft
62 – indicator bottom “close”
63 – indicator top “open”
64 – rubber ring
65 – tightening screw
66 – fixing screws

Fig. 6 - ***Indicator assembly***

8. PACKING AND STORING

During deliveries to domestic customers, the actuators are transported unpacked. The actuators are then forwarded using sheltered vehicles or transport boxes.

In case of deliveries of actuators to foreign customers, the actuators must be packed. Type of packing and its design must be adapted to conditions of transport and distance to the place of destination.

After receiving the actuators from the manufacturer, the customer should check whether they have not been damaged during transportation. Check should be made whether data on the rating plates of the actuator agree with the order and with the accompanying documentation. Possible discrepancies, defects and damages should be immediately reported to the supplier. In this case, the actuator cannot be put into operation.

If the unpacked actuator is not mounted immediately, it must be stored in a dust-free room with temperature ranging between -25°C and +50 °C and relative humidity up to 80 %; the room should be free of caustic gases and vapours and protected against harmful climatic effects. If actuators have been stored for a period longer than 3 years it is necessary, before putting it into operation, to replace the lubricant. Any manipulation at temperatures below -25 °C is prohibited. The actuators must not be stored in the open area or in rooms not protected against rain, snow and frost. Surplus conserving grease should be removed just before putting the actuator into operation. When unpacked actuators are to be stored for a period longer than 3 months, it is recommended to insert a sachet with silicagel or another suitable desiccant under the actuator cover.

9. CHECKING OF INSTRUMENT FUNCTION AND ITS COMMISSIONING

Before commencing the assembly, inspect the actuator once again for possible damage during storage. Functionality of the electric motor can be verified by connecting it to the supply mains via a switch and short-time starting. It is sufficient to verify whether the electric motor starts running and the output shaft moves round. The actuators must be located so that easy access is provided to the wheel of manual control and to the control board. It is also necessary to verify once again whether location corresponds to provisions of par. “Working conditions”. If different way of assembly is required by local conditions agreement with the manufacturer is necessary.

10. ATTACHMENT TO VALVE

The actuator is fitted onto the valve so that the output shaft snaps reliably into the valve clutch; the actuator is connected with the valve by four screws. By rotating the hand wheel check correct connection of the actuator with the valve. Remove the actuator cover and carry out electric connection of the actuator according to the internal and external wiring diagram.

11. ADJUSTMENT OF ELECTRIC ACTUATOR WITH VALVE

After fitting the actuator onto the valve and verifying mechanical connection, setting and adjustment takes place.

1) Shift the actuator manually into intermediate position.
2) Connect the actuator to the supply mains and, by short starting in the middle of the working stroke, verify correct direction of rotation of the output shaft. When viewing into the control box the output shaft rotates in the clockwise direction during motion in the direction “close”.
3) Shift the actuator electrically into the vicinity of the position “close”; remaining shifting into the position “close” is carried out by means of the hand wheel. In this position “close” set the position-limit switching unit *(micro-switch PZ)* according to point 4b.
4) Shift the output shaft into the position in which the signalling switch SZ should change over. Adjust the switch SZ according to point 4b.
5) Shift the output shaft of the actuator by a required number of revolutions and set the switch of the position PO “open” according to point 4b.
6) Shift the output shaft to the position in which the signalling switch SO should change over. Adjust the switch SO according to point 4b.

Warning:

When assembling the valve to the piping, the valve should be set into intermediate position using the hand wheel of the actuator. Short starting of the electric motor is used for checking whether the actuator rotates in the correct direction. If this is not the case, two phase conductors of the electric motor feeding should be interchanged.

12. OPERATION AND MAINTENANCE

Operation of rotary actuators results from process conditions and is usually limited to passing-on impulses to respective functional tasks. In case of the electric current black-out, the controlled unit is shifted using the hand wheel. If the actuator is connected in the automatic circuit it is recommended to install in the circuit components for manual remote control that would provide for controlling the actuator even in case of the automatics failure.

The operator should pay attention to carrying out prescribed maintenance, the actuator being protected from harmful influence of the surroundings and atmospheric effects which are not stated in the paragraph “Working conditions”. Another duty is to ensure that excessive heating of the actuator surface does not occur, rating values are not exceeded and excessive vibrations of the actuator are prevented.

Maintenance

Once in two years, it is necessary to lightly smear the gearing teeth in the gearbox, the bearings in which these gearings are seated, and the gearwheels of the transmitter drive.

Lubrication is made using the lubricating grease CIATIM 201. To increase resistance against corrosion, all springs and metal strips in the control part are also smeared with the lubricating grease.

Within half a year at the latest after putting the actuator into operation and then at least once a year, retighten the screws connecting the valve with the actuator. The screws are to be tightened in a cross-wise manner.

13. FAILURES AND THEIR REMOVAL

1) The actuator is in its limit position and does not start; the motor hums. Make a check for possible interrupted phase. If the valve is wedged and cannot be moved using the hand wheel or motor, dismount the actuator and release the closure mechanically.
2) If, after starting the actuator from the limit position of the output shaft of the actuator, it stops spontaneously it is necessary to ensure that the slot in the change-over wheel *(Fig. 1)* stops in the limit position of the output shaft of the actuator *(after tripping of the torque-limit switch)* before it runs on the shifter 21 Fig. 2. This is achieved by suitable moving-round the actuator output shaft when connecting the actuator with the valve or by suitable moving-round the change-over wheel with respect to the output shaft. To allow for this, the change-over wheel is fitted with additional two holes.

Cleaning - general inspection

The electric actuators should be kept clean and attention should be paid to prevent their clogging with dirt and dust. Cleaning should be carried out regularly and as often as required by operation conditions. Occasionally, it is necessary to make sure that all connecting and earthing terminals are properly tightened in order to prevent their heating during operation. The general inspection of the actuator is recommended once in 4 operating years unless otherwise specified in the revision regulations of electric devices.

Table 1 – MODACT MOP, Type No. 52 039, electricc actuators

– basic technical parameters (electric motors ATAS Náchod are used)

Type designation	Torque		Adjusting speed	Working stroke	Electric motor						Weight	Type number	
	Tripping	Enga-gement			Type	Voltage	Output	Speed	In (400 V)	Iz / In		Basic	Comple-mentary
	[Nm]	[Nm]	[min^{-1}]	[rev.]		[V]	[kW]	[1/min]	[A]		[kg]	1 2 3 4 5	6 7 8 9 10
MOP 30/65-9		65	9		T42RL477	3x400	0,05	1350	0,24	2	17		x x 1 x P
MOP 30/83-15		83	15		T42RR478	3x400	0,09	1300	0,34	2,5	17		x x 2 x P
MOP 30/58-25		58	25		T42RX479	3x400	0,15	1270	0,53	2,2	17		x x 3 x P
MOP 30/39-40	10-30	39	40		T42RX479	3x400	0,15	1270	0,53	2,2	17		x x 4 x P
MOP 30/84-9		84	9	1,5-38	J42RT502	1x230	0,100	1370	0,8	1,7	17	52 039	x x 5 x P
MOP 30/56-15		56	15		J42RT502	1x230	0,100	1370	0,8	1,7	17		x x 6 x P
MOP 20/27-25	10-20	27	25		J42RT502	1x230	0,100	1370	0,8	1,7	17		x x 7 x P
MOP 60/84-9		84	9		J42RT502	1x230	0,100	1370	0,8	1,7	17		x x D x P
MOP 60/140-9	30-60	140	9		T42RR478	3x400	0,09	1300	0,34	2,5	17		x x A x P
MOP 60/83-15		83	15		T42RR478	3x400	0,09	1300	0,34	2,5	17		x x B x P
MOP 45/58-25	10-45	58	25		T42RX479	3x400	0,15	1270	0,53	2,2	17		x x C x P

Meaning of complementary numbers in the actuator type number:

6th position – the way of mechanical and electrical connection:

Electrical and mechanical connection	terminal board	connector
connection F07, shape C	1 x x x P	C x x x P
connection F07, shape D	2 x x x P	D x x x P
connection F07, shape E	3 x x x P	E x x x P
connection F10, shape C	4 x x x P	J x x x P
connection F10, shape D	5 x x x P	K x x x P
connection F10, shape E	6 x x x P	L x x x P
connection F10, shape A	7 x x x P	F x x x P
connection F10, shape B1	8 x x x P	H x x x P
connection F07, shape B1	9 x x x P	B x x x P
connection F07, shape A	0 x x x P	A x x x P

7th position – the required time of torque blocking:

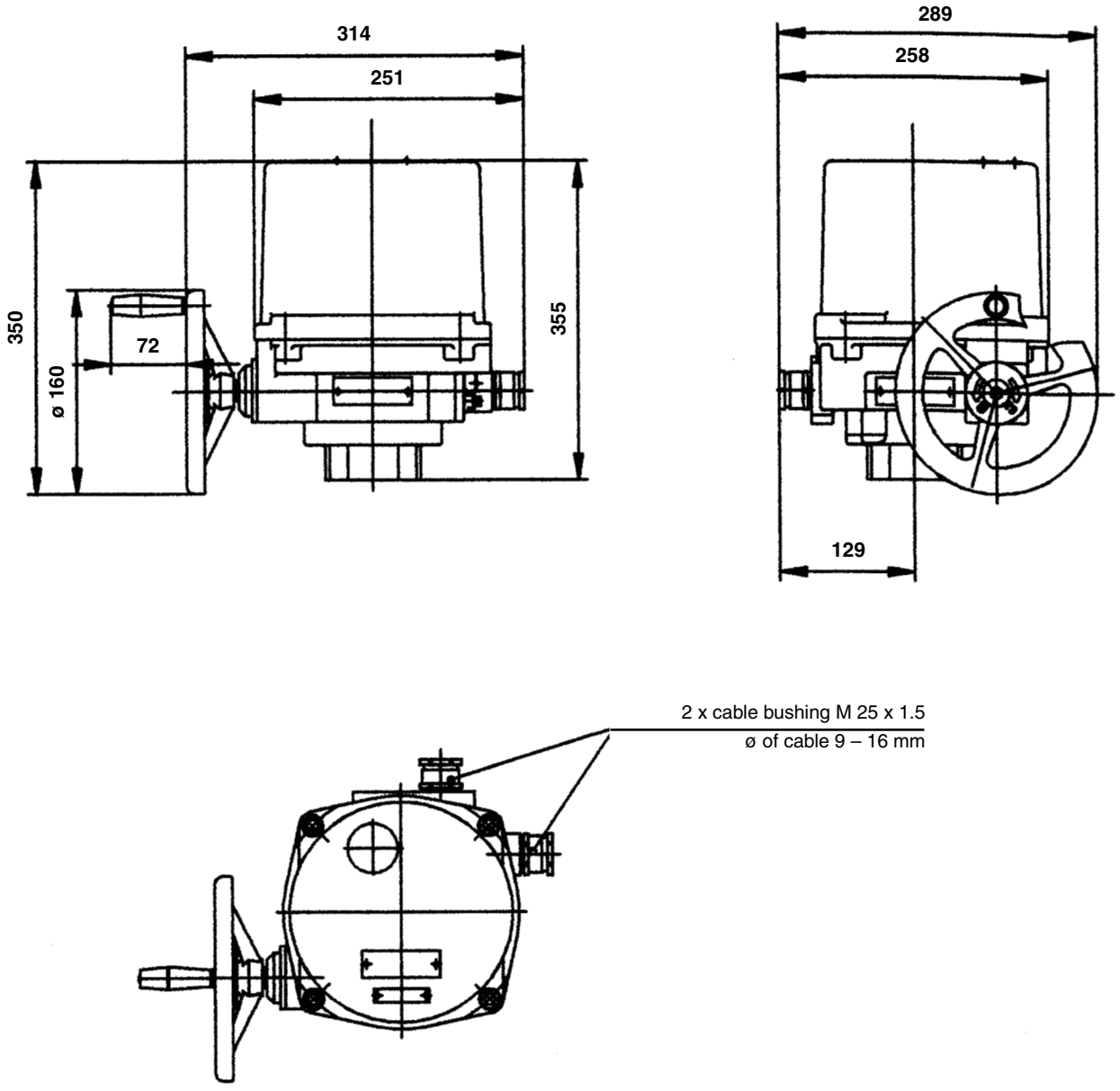
x 0 x x	time of blocking between 1.5 and 3 revolutions of output shaft after reversing
x 1 x x	time of blocking between 0.75 and 1.5 revolutions of output shaft after reversing
x 2 x x	time of blocking between 0.4 and 0.75 revolutions of output shaft after reversing

8th position – adjusting speed – see Table 1.

9th position – possible use of position transmitter:

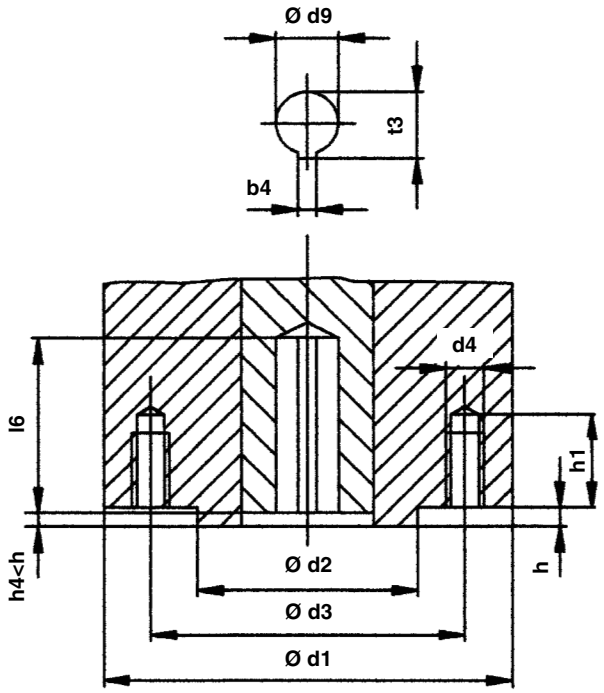
	without BMO	with BMO
without position transmitter	x x x 0 P	x x x 4 P
resistance transmitter 1x 100 Ω	x x x 1 P	x x x 5 P
current transmitter CPT 1A	x x x 2 P	x x x 6 P
current transmitter DCPT with feeding source	x x x 3 P	x x x 7 P

Dimensional sketch of actuator **MODACT MOP, Type No. 52 039**

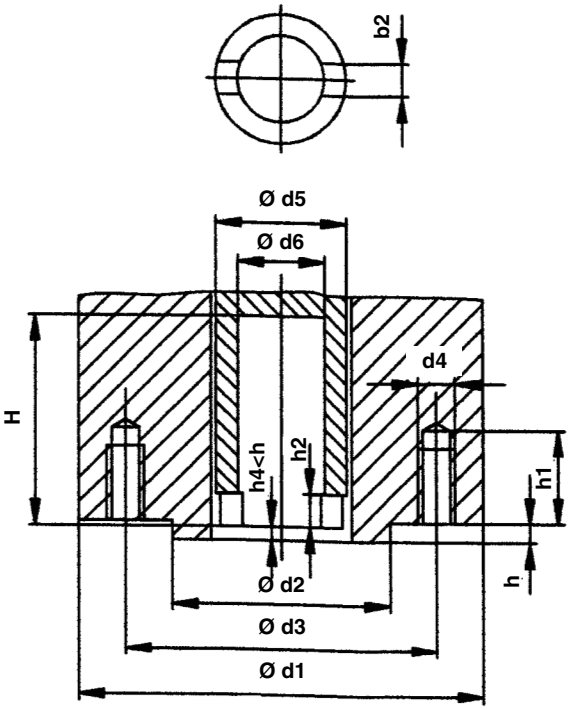


Mechanical connecting dimensions of actuator **MODACT MOP, Type No. 52 039**

Shape E



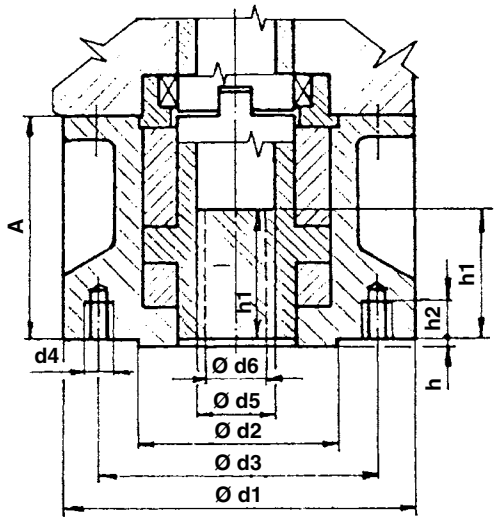
Shape C



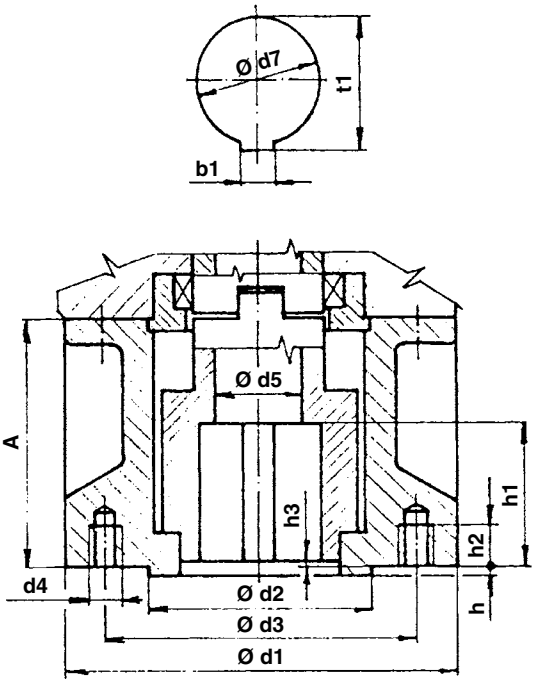
Flange size	Common data for both shapes							Data for shape C					Data for shape E			
	ø d1	ø d2f8	ø d3	d4	Number of threated holes	h1	h	ø d5	h2	H	b2H11	ø d8	ø d9H8	l6 min	t3	b4Js9
F 07	125	55	70	M8	4	16	3	40	10	125	14	28	16	40	18.1	5
F 10	125	70	102	M10	4	20	3	40	10	125	14	28	20	55	22.5	6

Adapters to actuators **MODACT MOP, Type No. 52 039**

Shape A



Shape B1



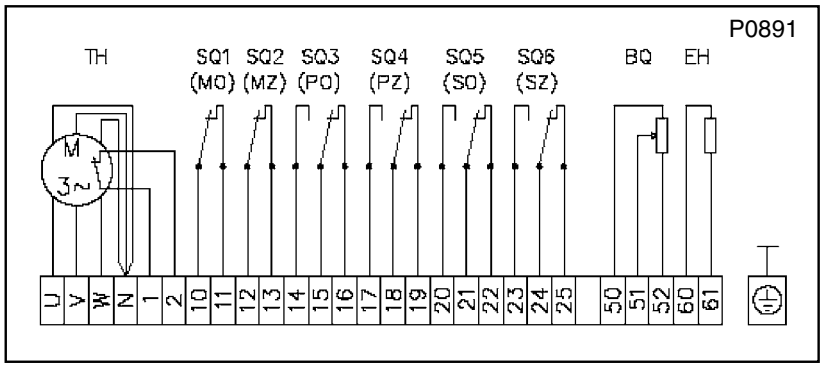
	Dimension	F10	F7
A, B1 *(identical dimensions)*	ø d1	125	125
	ø d2 f8	70	55
	ø d3	102	70
	d4	M10	M8
	number of holes d4	4	4
	h	3	3
	h2 min	12,5	15
A	A	63,5	63,5
	ø d5	30	22
	ø d6 max	26	20
	h1 max	43,5	43,5
	l min	45	25
B1	A	63,5	63,5
	ø d5	30	22
	l1 min	45	35
	h3 max	3	3
	b1	12	8
	ø d7 H9	42	28
	t1	45,3	30,9

Wiring diagrams of **MODACT MOP** electric actuators, **Type No. 52 039**

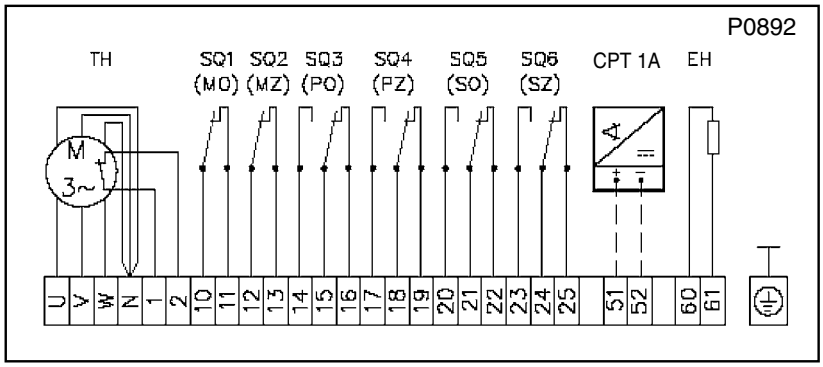
Legend:

SQ1 *(MO)* – torque-limit switch “open”
SQ2 *(MZ)* – torque-limit switch “close”
SQ3 *(PO)* – position-limit switch “open”
SQ4 *(PZ)* – position-limit switch “close”
SQ5 *(SO)* – position signalling switch “open”
SQ6 *(SZ)* – position signalling switch “close”
BQ – resistance transmitter 100 ohm
CPT 1A – current transmitter CPT 1A
DCPT – current transmitter DCPT
DCPZ – feeding source for DCPT
M1~ – one-phase asynchronous motor
M3~ – three-phase asynchronous motor
TH – thermo-contact
EH – heating resistance

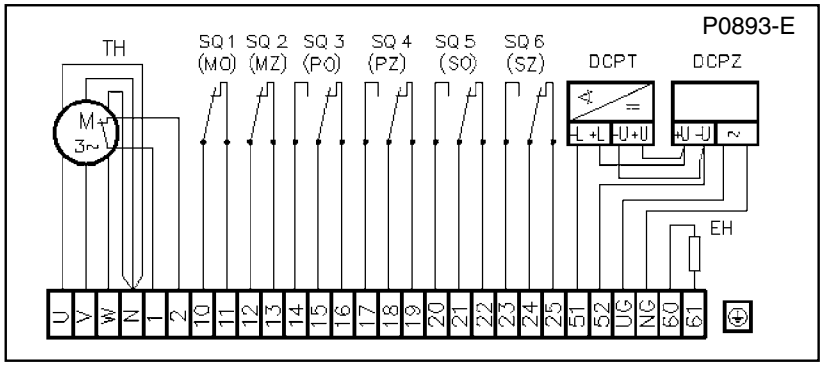
Position transmitter: resistance 100 ohm



Position transmitter: current 4 – 20 mA or without transmitter



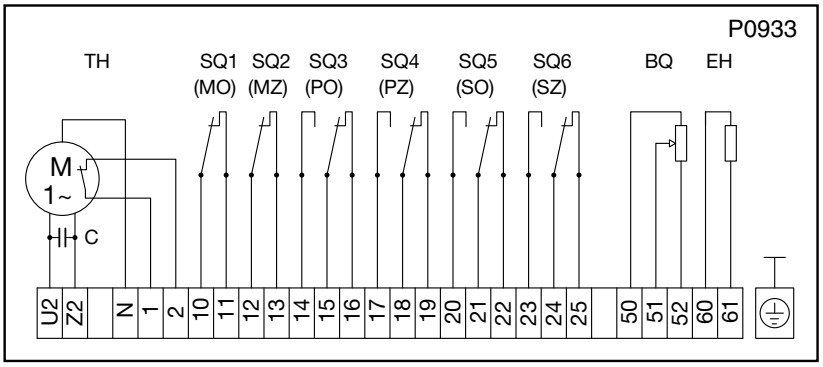
Position transmitter: current 4 – 20 mA with feeding source



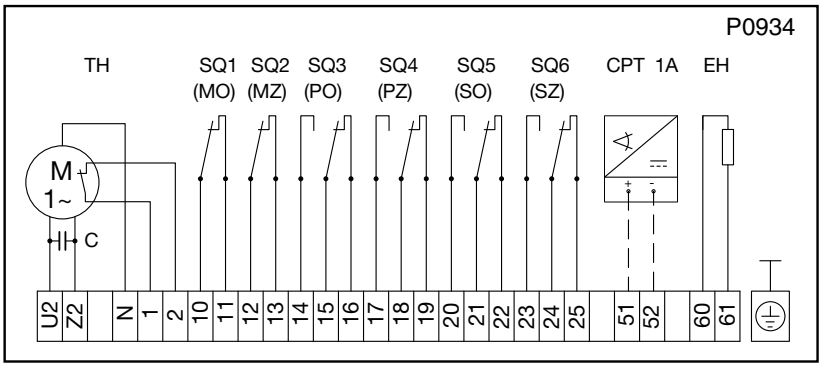
The micro-switches can be used as single-circuit only. Two voltages of different magnitudes or phases must not be connected to contacts of the same micro-switch. The contacts of micro-switches are drawn in the intermediate position.

In the version with current transmitter, the user should ensure connection of two-wire circuit of the current transmitter to electric earth of the linked-up regulator, computer, etc. Connection must be realized just in one point in any part of the circuit outside the electric actuator.

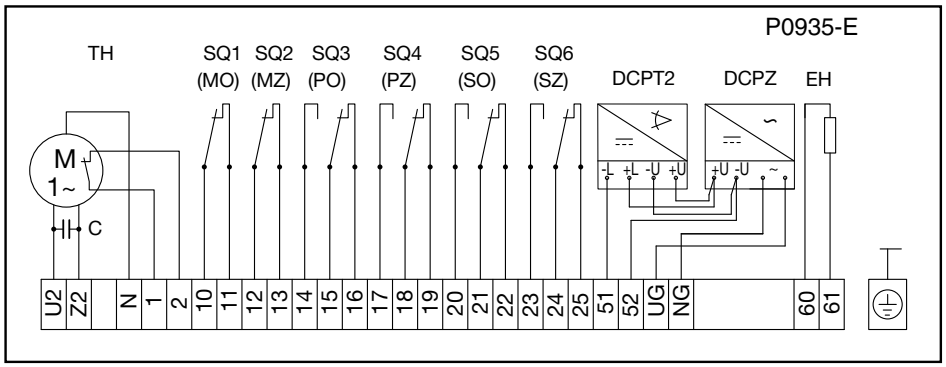
Position transmitter: resistance 100 ohm



Position transmitter: current 4 – 20 mA or without transmitter



Position transmitter: current 4 – 20 mA with feeding source



The micro-switches can be used as single-circuit only. Two voltages of different magnitudes or phases must not be connected to contacts of the same micro-switch. The contacts of micro-switches are drawn in the intermediate position.

In the version with current transmitter, the user should ensure connection of two-wire circuit of the current transmitter to electric earth of the linked-up regulator, computer, etc. Connection must be realized just in one point in any part of the circuit outside the electric actuator.

List of spare parts for actuators **MODACT MOP, Type No. 52 039**

Spare part name	Order number	Use
Sealing Ring 24x20 PN 029280.2	2327311500	Packing of hand wheel shaft
Sealing Ring 40x2 PN 029281.2	2327311032	Packing of indicator sight hole
Sealing Ring 50x2 PN 029281.2	2327311028	Packing of hand wheel flange
Sealing Ring 50x40 PN 029280.2	2327311007	Packing of output shaft
Sealing Ring 210x3 PN 029281.2	2327311401	Packing of cover
Micro-switch DB1G-A1LC CHERRY	2337441092	Torque-, position-limit and signalling micro-switchers
Transmitter Megatron RP19	2340510210	Mounting on the control board
Current transmitter CPT 1A	2340510393	Mounting on the control board
Current transmitter DCPT	214652060	Mounting on the control board
Supply source DCPZ for transmitter DCPT	40510368	Mounting in the terminal box

ZPA PEČKY, a.s.

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

SURVEY OF PRODUCED ACTUATORS

KP MINI, KP MIDI
Electric rotary (90°) actuators (up to 30 Nm)

MODACT MOK, MOKED, MOKP Ex, MOKPED Ex
Electric rotary (90°) actuators for ball valves and flaps

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

MODACT MON, MOP, MONJ, MONED, MOPED, MONEDJ
Electric rotary multi-turn actuators

MODACT MO EEx, MOED EEx
Explosion proof electric multi-turn actuators

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

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

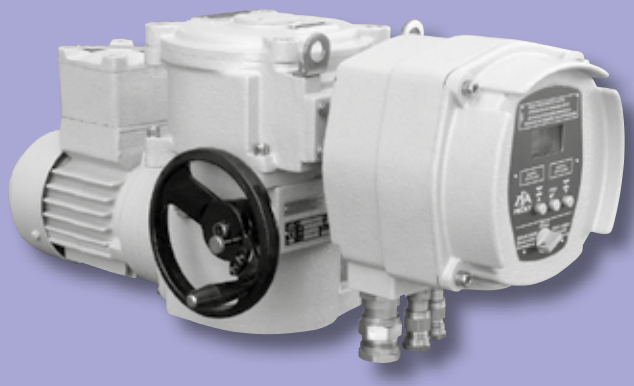
MODACT MPR Variant
Electric rotary (160°) lever actuators with a variable output speed

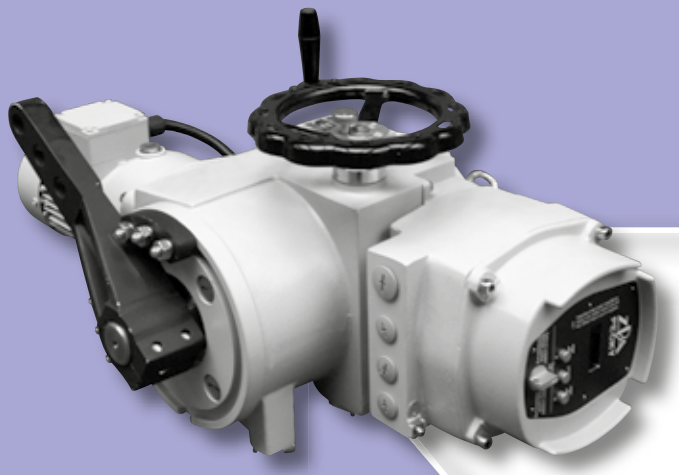
MODACT MPS, MPSP, MPSED, MPSPED
Electric rotary (160°) lever actuators with a constant output speed

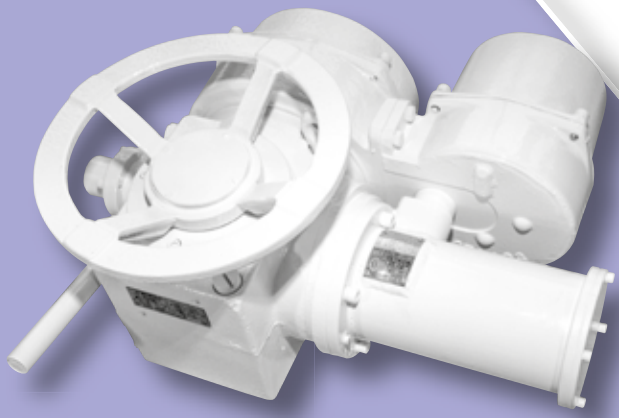
MODACT MTN, MTP, MTNED, MTPED
Electric linear thrust actuators with a constant output speed

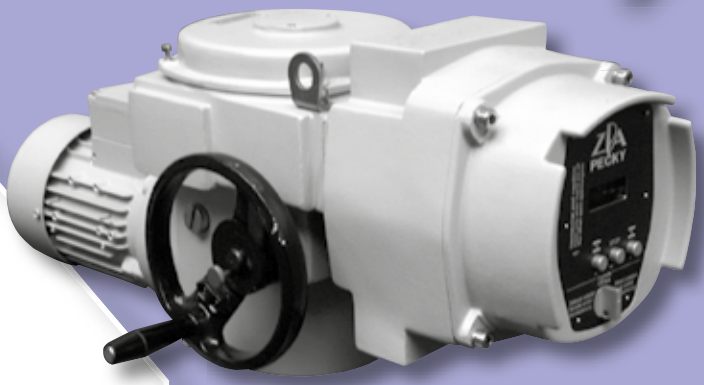
Deliveries of assembled actuator + valve (or MASTERGEAR gearbox) combinations

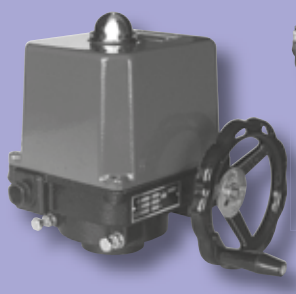
TRADITION • QUALITY • RELIABILITY

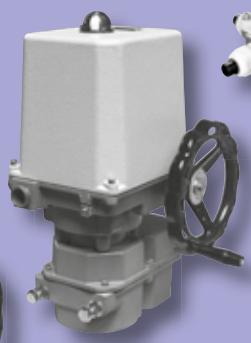












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