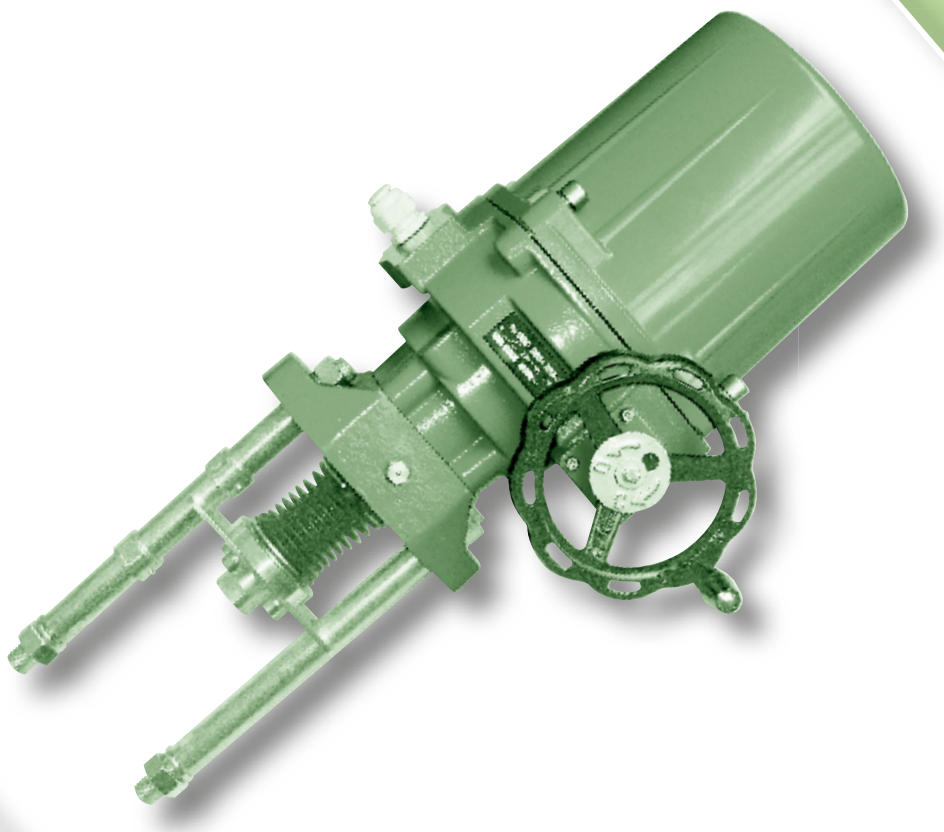
ZPA PEČKY, a.s.

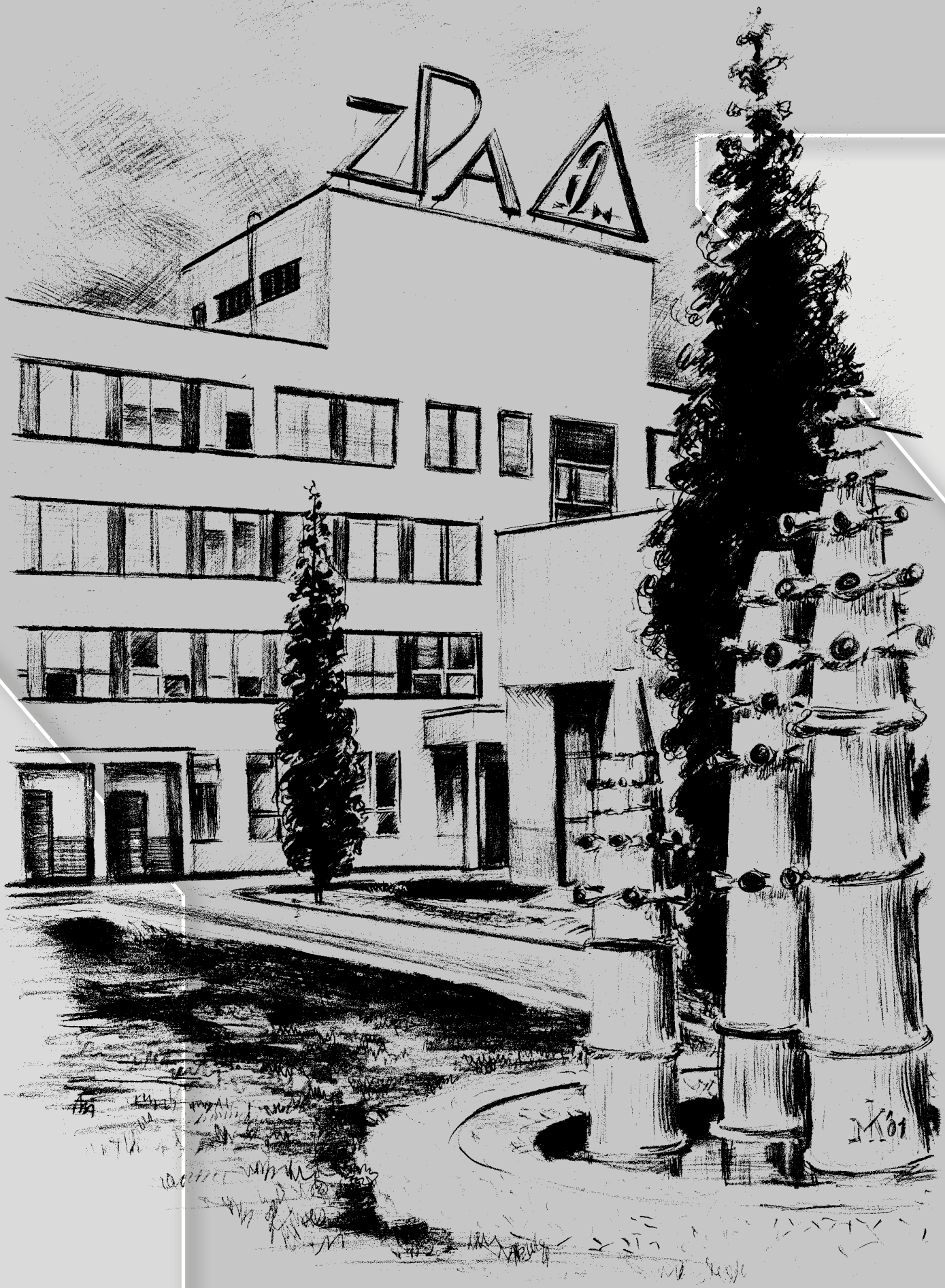


MOUNTING INSTRUCTIONS

Electric Linear (Pull-rod) actuators

MODACT MTP

Type number 52 441



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OBSAH

1. APPLICATION

The **MODACT MTP** actuators are desigPED for shifting of valves by reversible linear motion in circuits of remote control and automatic regulation. They can also be used for other devices for which they are suitable due to their parameters. Their using in special cases should be discussed with the manufacturer.

2. OPERATING CONDITIONS, OPERATING POSITION

Operating conditions

The actuators **MODACT MTP** are resistant against effect of operating conditions and external effects of 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 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 actuators are to be installed in the working environment with temperature below -10 °C and in the environment with relative humidity above 80 %, it is always necessary to use an anti-condensation heater fitted to the actuator.

The electric actuators can be installed in areas with non-flammable and non-conductive dust, provided that this does not adversely influence their function. Here, it is necessary to strictly observe ČSN 34 3205. It is recommended to remove dust as soon as its layer is about 1 mm thick.

Notes:

The area under a shelter means the one where falling of atmospheric precipitations under and angle up to 60° from the vertical is prevented.

The electric actuator must be installed in a place where cooling air has a free access. Minimum distance from a wall for access of air is 40 mm. Therefore, the area where the electric actuator is installed must be sufficiently large, clean and ventilated.

Temperature

Operating temperatures for **MODACT MTP** electric actuators ranges from -25 °C to +60 °C. Relative humidity from 10 % to 100 % with condensation.

Classes of external effects – excerpt from ČSN 33 2000-5-51 ed. 3.

Class:

1) AC1 – altitude ≤ 2 000 m a.s.l.
2) AD7 – occurrence of water - shallow immersion - short-term
3) AE6 – occurrence of foreign solid particles - strong dustiness. Thick layers of dust. Fall-out of dust higher than 350 and not more than 1000 mg/m^2 daily.

4) AF2 – occurrence of corrosive or polluting substances is atmospheric. Presence of corrosive polluting substances is significant.
5) AG2 – medium mechanical stress. In common industrial processes.
6) AH2 – medium vibrations. In common industrial processes.
7) AK2 – serious danger of growth of plants or moulds.
8) AL2 – serious danger of occurrence of animals *(insects, birds, small animals)*
9) AM-2-2 – harmful effects of released stray currents
10) AN2 – medium solar radiation. Intensity > 500 and ≤ 700 W/m^2.
11) AP3 – medium seismic effects. Acceleration > 300 Gal ≤ 600 Gal
12) BA4 – personal qualification. Instructed staff.
13) BC3 – frequent contact of persons with earth potential. Persons are in frequent contact with foreign conductive parts or stand on and conductive support.

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

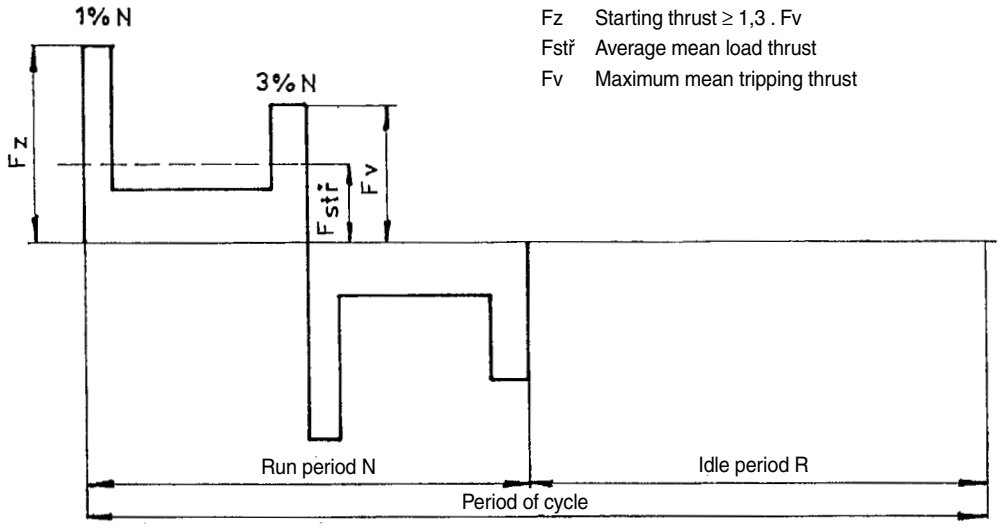
The actuators can be operated in any operating position.

3. OPERATION MODE, SERVICE LIFE OF ACTUATORS

Operation mode

According to ČSN EN 60 034-1, actuators can be operated in S2 load category *(the course of load is shown in the picture).* The operation time at +50 °C shall be 10 minutes, the average mean load thrust value shall be below or equal to 60 per cent of the maximum tripping thrust Fv. According to ČSN EN 60 034-1, the actuators can also be operated in the S4 mode *(interrupted operation with acceleration intervals).* The load factor N/N+R shall be maximum 25 per cent, the longest operation cycle N + R is 10 minutes. The maximum number of switching actions in automatic control mode is 1200 actions per hour. The average mean load thrust at load factor of 25 per cent and 50 °C shall not exceed 40 per cent of the maximum tripping thrust Fv.

The maximum average mean of the load thrust equals the rated thrust of the actuator.



Fz Starting thrust ≥ 1,3 . Fv
Fstř Average mean load thrust
Fv Maximum mean tripping thrust

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 DATA

Basic technical parameters

Feeding voltage of electric motor: 1 x 230 V, +10 %, -15 %, 50 Hz ±2 %
3 x 230/400V, +10 %, -15 %, 50 Hz ±2 % *(or according to data on rating plate)*

Protective enclosure

Protection of the actuators IP 67 according to ČSN EN 60 529

Noise

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

Tripping thrust

At the factory, the tripping thrust has been adjusted within the min./max. range giving in Table 1, according to the customer's requirements. If no tripping thrust adjustment is required the actuator is adjusted to its maximum tripping thrust.

Starting thrust

The starting thrust of the actuator is a calculated value determiPED by the starting torque of the electric motor and the total gear ratio and efficiency of the actuator. After run reversation, the actuator can produce a starting thrust 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.

Working stroke

The ranges of working stroke are given in Table No. 1.

Manual control

Manual control is performed by a hand wheel directly *(without a clutch)* and it is also possible when the electric motor is running. By rotating the hand wheel in the clock-wise direction the actuator output pull rod is thrown out *(closes).*

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

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

5. ACTUATOR OUTFIT

Torque-limit switches

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

The tripping torque can be adjusted within the range shown in Table No. 1. The torque-limit switches are locked if the load torque is lost after they have been brought into the OFF-position. This feature secures the actuator against the so-called “pumping”.

Position-limit switches

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

Position signalling

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

Position transmitters

The **MODACT MTP** electric actuators can be supplied without position transmitter can be fitted with position transmitter:

a) Resistance transmitter 1 x 100 ohm.

Technical parameters:

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

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

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

Technical parameters of CPT 1Az:

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

Maximum transmitter power demand	560 mW
Insulation resistance	20 Mohm at 50 V DC
Insulation strength	50 V DC
Operational environment temperature	-25 °C to +60 °C
Operational environment temperature - extended range	-25 °C to +70 °C *(additional on demand)*
Dimensions	ø 40 x 25 mm

c) Type DCPT active current transmitter. Power supply to the current loop is not a part of the actuator. Maximum loading resistance of the loop is 500 ohm.

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

Technical parameters of DCPT:

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

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

Position indicator

The actuator is fitted with a local position indicator.

Anti-condensation heater

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

6. ELECTRIC PARAMETERS

External electric connection

The terminal board of the actuator is fitted with terminals allowing one conductor with a maximum cross-section of 2.5 mm^2 or two conductors with the same cross-sectional area up to 1 mm^2 to be connected.

Actuator internal wiring

The internal wiring diagrams of the **MODACT MTP** 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 rating and maximum voltage of microswitches

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

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

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

Isolation resistance

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

Electric strength of electric circuits isolation

Circuit of the resistance transmitter		500 V, 50 Hz
Circuit of the current transmitter		50 V DC
Circuits of microswitches and anti-condensation heater		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 of basic parameters

Tripping thrust	±12 % of the maximum value of the range
Adjusting speed	+10 % of the rated value -15 % of the rated value *(in no-load operation)*
Hysteresis of position-limit and signalling switches	max. 1 mm of the output pull-rod displacement
Setting of position-limit and signalling switches	±0.2 mm of the output pull-rod displacement *(without the influence of running-down)*
Clearance of output part	max. 1 mm

Protection

The electric actuators are fitted with external and internal protecting terminal for securing protection against dangerous shock voltage.

The protecting terminals are marked according to ČSN IEC 417 *(34 5550).*

If isn´t the actuator equipment with overcurrent protection when purchased is needed to ensure that the protection is added externally.

7. DESCRIPTION

Design of MODACT MTP type number 52 441 actuators is based on MODACT MON type number 52 039 actuators. In addition, they have a mechanism transforming rotary motion into rectilinear.

In terms of basic installation dimensions they are desigPED for direct mounting onto a fitting. Connection with the fitting is provided by means of columns as per ČSN 16 6314 art. 1.3. The motors are fitted with a coupling which imparts servo motor´s output rod motion to the fitting – see dimensional sketches and table No. 2.

The asynchronous motor drives via countershaft gearing the sun gear of a differential gear unit enclosed in the supporting actuator box *(power gear transmission).* In the mechanical power control mode, the crown gear of the planet

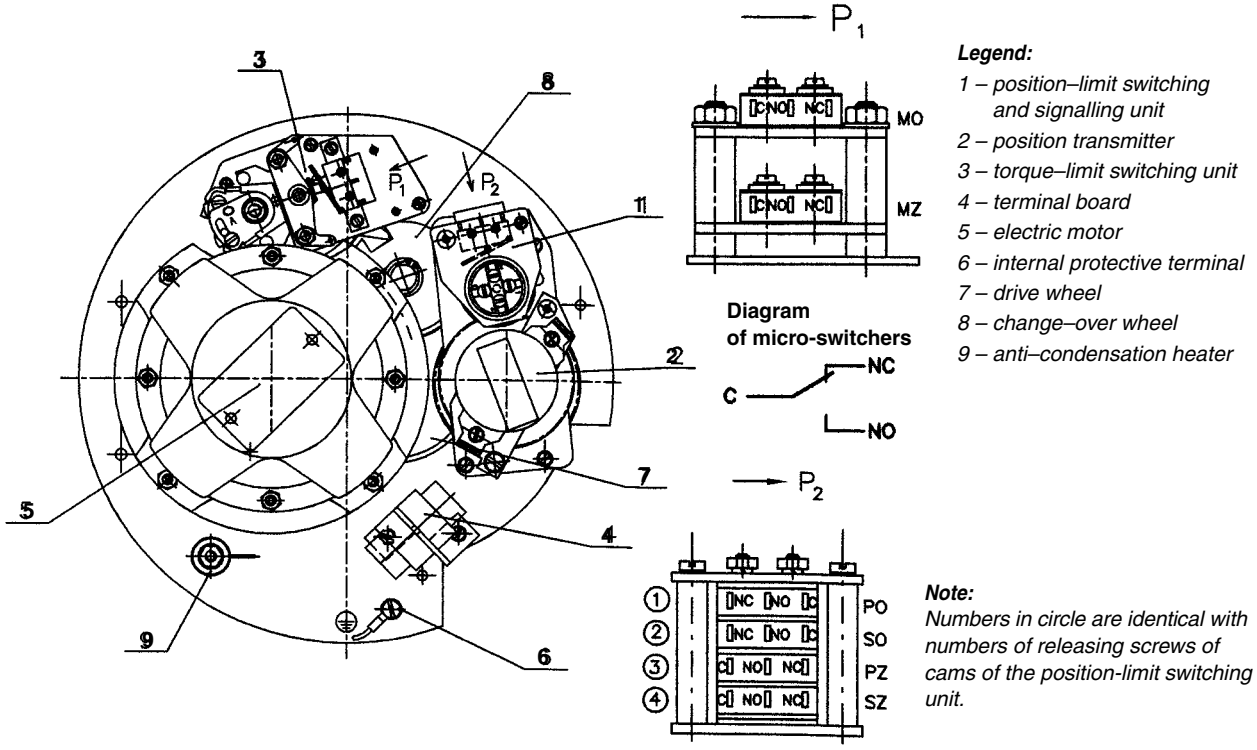


Fig. 1 - ***Control board***

differential unit is held in a steady position by a self-locking worm gear drive. The handwheel, which is connected with the worm, allows manual control to be accomplished even during motor operation.

The output shaft is firmly connected with the catch driver of a planet gear and goes into the control box accommodating a control unit with position sensor, torque sensor and heating resistor.

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.

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.

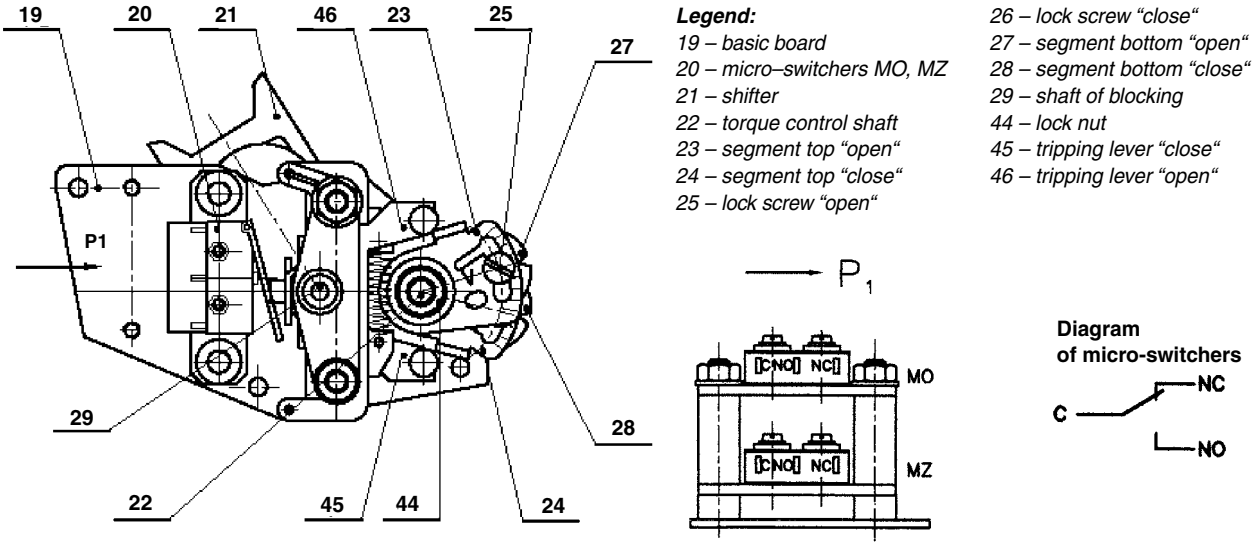


Fig. 2 - ***Torque-limit switching unit***

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”.

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 determiPED 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 retightePED.

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 desigPED 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 and for current transmitter CPT 1Az)*

Working stroke of actuator *(mm)*	7,5-13	13-26	26-50	50-97	97-190
Gear stage of unit	I	II	III	IV	V

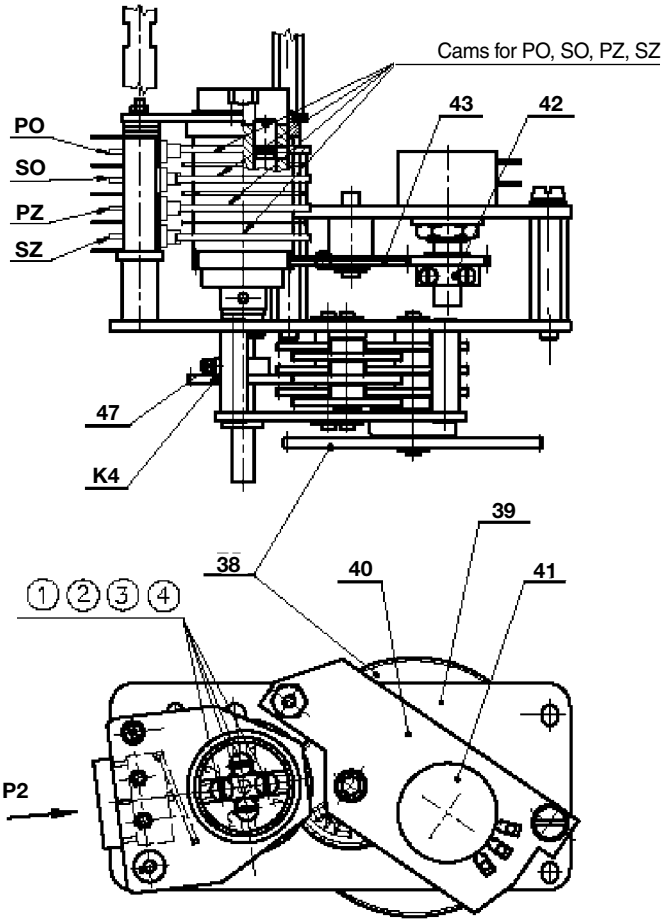
Setting of position-limit switching and signalling unit

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 retightePED 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.

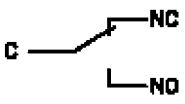
In setting of the position-limit switching units the procedure is as follows: first, set the output shaft to its limit position in which the set micro-switch should trip. Then, release the cam of the micro-switch *(PO, PZ, SO, SZ)* by particular releasing screw *(1, 2, 3, 4)*. Releasing is carried out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



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

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

Diagram of micro-switchers



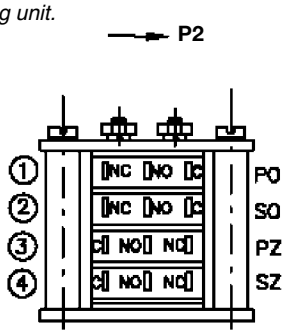
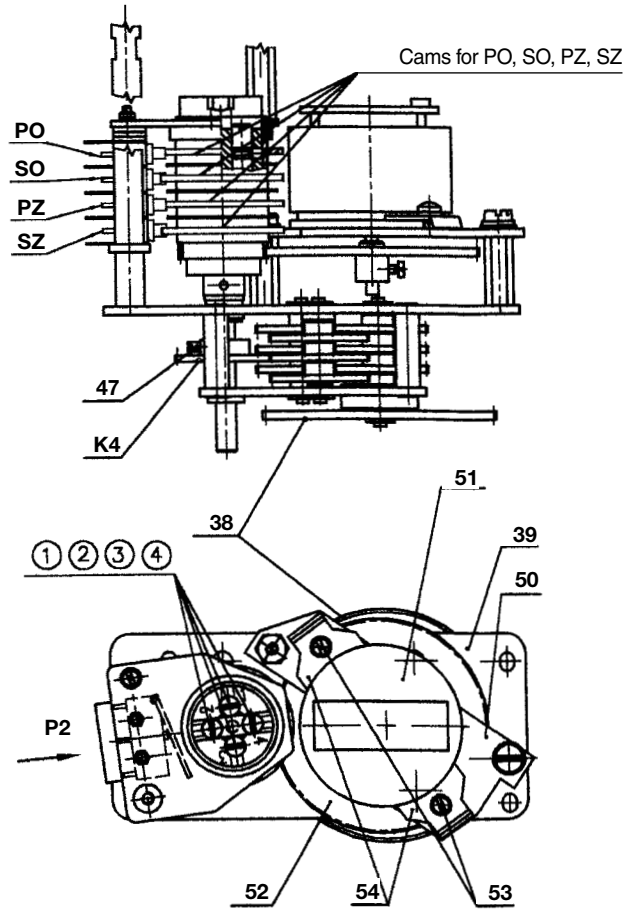
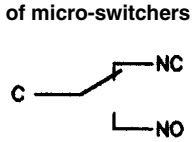


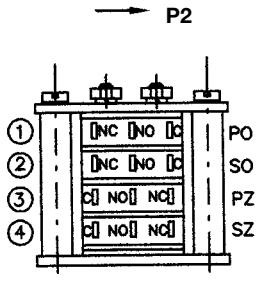
Fig. 3 - ***Position-limit switching and signalling unit with resistance transmitter***



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 1Az
53 – lock screw
54 – shim plate
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. 4 - ***Position-limit switching and signalling unit with current transmitter***

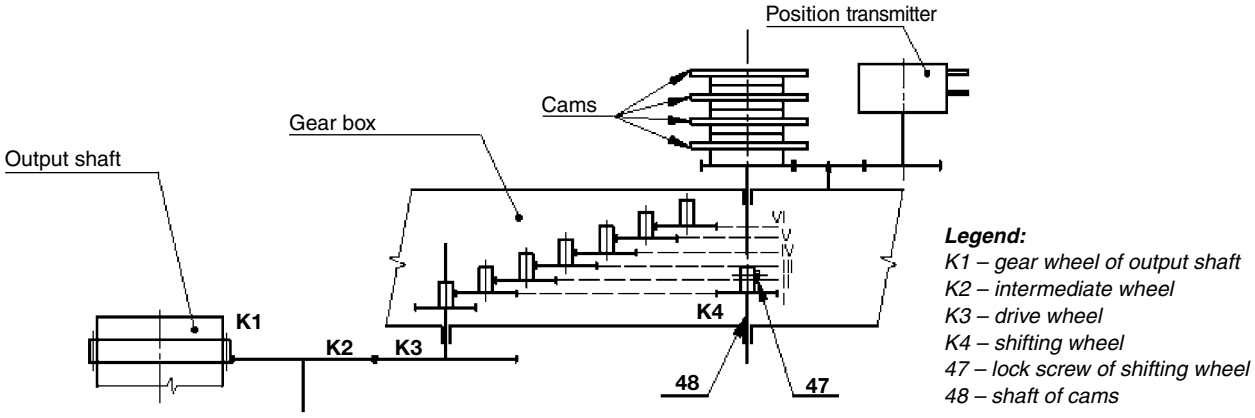


Fig. 5 - ***Kinematic diagram of gearings***

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.

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.

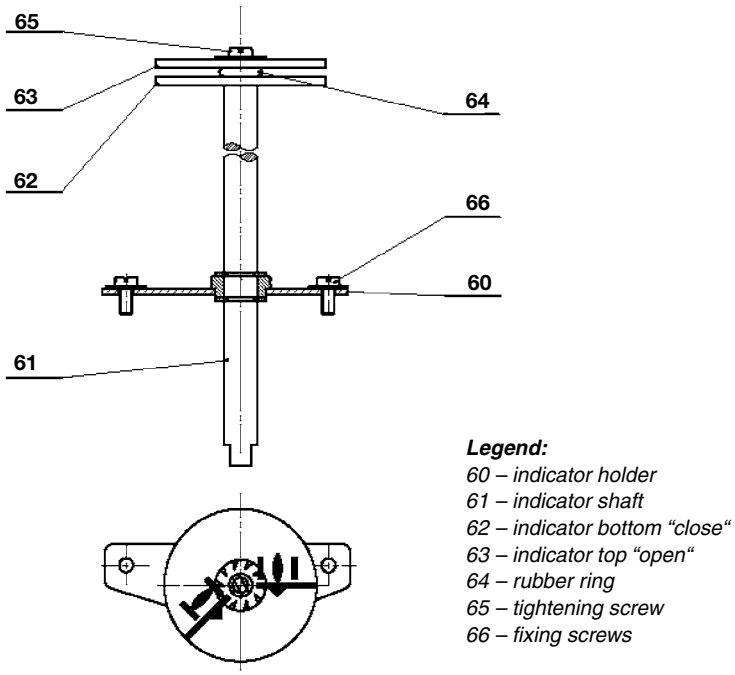


Fig. 6 - ***Indicator assembly***

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.

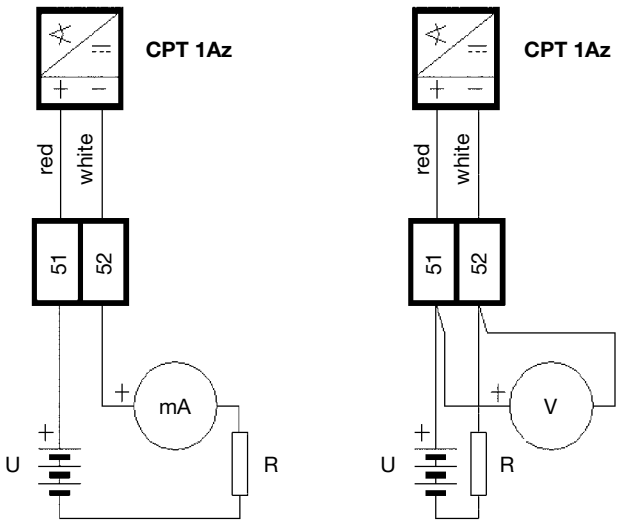
This automatic setting can be changed as required by the following procedure:

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 mentioPED 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 1Az - 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 1Az 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 1Az; 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 1Az 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 1Az 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 turPED 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 turPED. 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).*

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:

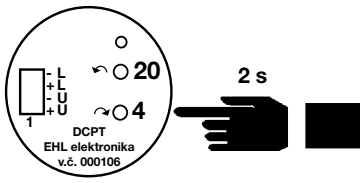
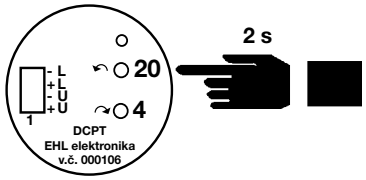
Press the push-button **"20",** then the push-button **"4"** and keep them depressed until LED blinks.

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.

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 AC mains and check the correct sense of output pull-rod movement. When viewing into the control box, the output shaft should rotate clockwise while the pull-rod is moving in the CLOSE direction and shifting out.
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 5b.
4) Shift the output shaft into the position in which the signalling switch SZ should change over. Adjust the switch SZ according to point 5b.
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 5b.
6) Shift the output shaft to the position in which the signalling switch SO should change over. Adjust the switch SO according to point 5b.

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 tightePED 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 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 tightePED 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 – Electric actuators MODACT MTP

– basic technical parameters, version

Basic electric outfit:
- 2 torque-limit switches MO, MZ
- 2 position-limit switches PO, PZ
- 2 signalling switches SO, SZ
- 1 anti-condensation heaters
- 1 three-phase asynchronous electric motor

Auxiliary electric outfit: *(according to customer's wish)*
- 1 resistance transmitter 1 x 100 ohm
- 1 current transmitter CPT 1Az
- 1 current transmitter DCPT with supply source
- 1 block of local control

BASIC TECHNICAL PARAMETERS:

Type	Range of tripping torque [kN]	Engagement force [kN]	Shifting speed [mm/min]	Stroke [mm]	Electric motor: Type	Output [W]	Speed [1/min]	I_n (400 V) [A]	$\frac{I_z}{I_n}$	Voltage [V]	Weight [kg]	Type number: basic 1 2 3 4 5	Type number: additional 6 7 8 9
MTP 15	5 – 15	19	45	10 – 100	T42RL477	50	1350	0,24	2	3x400	22	52 441	x x 0 x P
			75		T42RR478	90	1300	0,34	2,5	3x400			x x 1 x P
			125		T42RX479	150	1270	0,53	2,2	3x400			x x 2 x P
			200		T42RX479	150	1270	0,53	2,2	3x400			x x 3 x P
			45		J42RT502	100	1370	0,8	1,7	1x230			x x 5 x P
			75		J42RT502	100	1370	0,8	1,7	1x230			x x 6 x P
	5 – 10	13	125		J42RT502	100	1370	0,8	1,7	1x230			x x 7 x P
MTP 25	15 – 25	33	45		T42RR478	90	1300	0,34	2,5	3x400			x x 8 x P
			75		T42RR478	90	1300	0,34	2,5	3x400			x x 9 x P
			45		J42RT502	100	1370	0,8	1,7	1x230			x x A x P
Mechanical connection – with terminal board for the pillar pitch A = 160 mm or B = 150 mm *(+ designation at 7th place acc. Table 2)*													6 x x x P
Mechanical connection – with terminal board for the pillar pitch A = 132 mm or B = 100 mm *(+ designation at 7th place acc. Table 2)*													1 x x x P
Mechanical connection – with connector for the pillar pitch A = 160 mm or B = 150 mm *(+ designation at 7th place acc. Table 2)*													7 x x x P
Mechanical connection – with connector for the pillar pitch A = 132 mm or B = 100 mm *(+ designation at 7th place acc. Table 2)*													2 x x x P

CONNECTING DIMENSIONS

T. No. 52 441.xxxxP *(Table No. 2)*

Position transmitter *(without block of local control and position regulator)*	current transmitter CPT 1Az	x x x 0 P
	current transmitter DCPT with source	x x x 1 P
	resistance transmitter 1 x 100 ohm	x x x 2 P
	without position transmitter	x x x 3 P

		Transmitter 1 x 100 Ω	Current transmitter
Block of local control	with block of local control	x x x 4 P	x x x A P
	with block of local control with DCPT + source		x x x D P
	with block of local control without transmitter	x x x 5 P	

Note::

1) In case the customer requires version without torque blocking the last position of the type number shall contain the letter M, e.g. 52 441.6211M (actuators in design with convertor are not at disposal).

Table 2 – Connecting dimensions

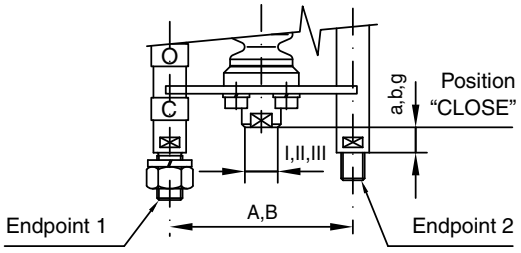
– specification of the 7th place of the Type No. 52 441.xxxx

Design spacing of columns A (160 or 132 mm)	Character on 7th place
Aa1I	0
Aa1II	1
Aa1III	2
Aa2I	3
Aa2II	4
Aa2III	5
Ab1I	6
Ab1II	7
Ab1III	8
Ab2I	9
Ab2II	A
Ab2III	B

Spacing of columns
Thread of coupling
Ending of columns
Position “Closed“

Design spacing of columns B (150 or 100 mm)	Character on 7th place
Ba1I	C
Ba1II	D
Ba1III	E
Ba2I	F
Ba2II	G
Ba2III	H
Bb1I	I
Bb1II	J
Bb1III	K
Bb2I	L
Bb2II	M
Bb2III	P
Bg2I	R

Deliveries in design III with coupling M 10 x 1 upon special request only.



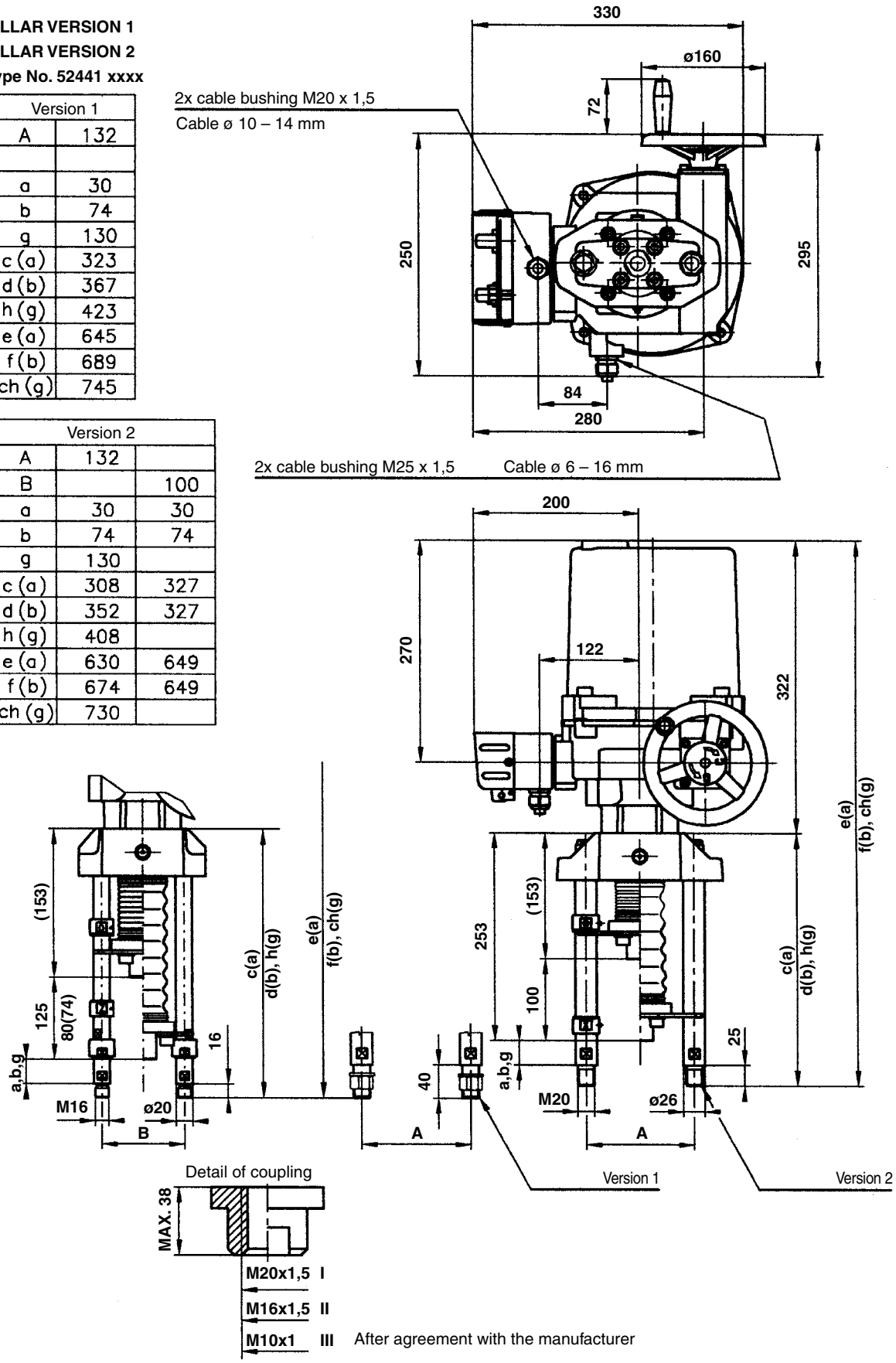
Spacing of columns	A	160 or 132 mm		
	B	150 or 100 mm		
Position “Closed“	a	30 mm	Long columns c	see table
	b	74 mm	Long columns d	“Design variants“
	g	130 mm	Long columns h	Fig. 1 and 2
Thread of coupling	I	M20 x 1,5		
	II	M16 x 1,5		
	III	M10 x 1		

Dimensional sketch of **MODACT MTP 15** electric actuator,
Type No. 52 441 *(the pillar pitch 132 and 100 mm)*

PILLAR VERSION 1
PILLAR VERSION 2
Type No. 52441 xxxx

Version 1	
A	132
a	30
b	74
g	130
c (a)	323
d (b)	367
h (g)	423
e (a)	645
f (b)	689
ch (g)	745

Version 2		
A	132	
B		100
a	30	30
b	74	74
g	130	
c (a)	308	327
d (b)	352	327
h (g)	408	
e (a)	630	649
f (b)	674	649
ch (g)	730	

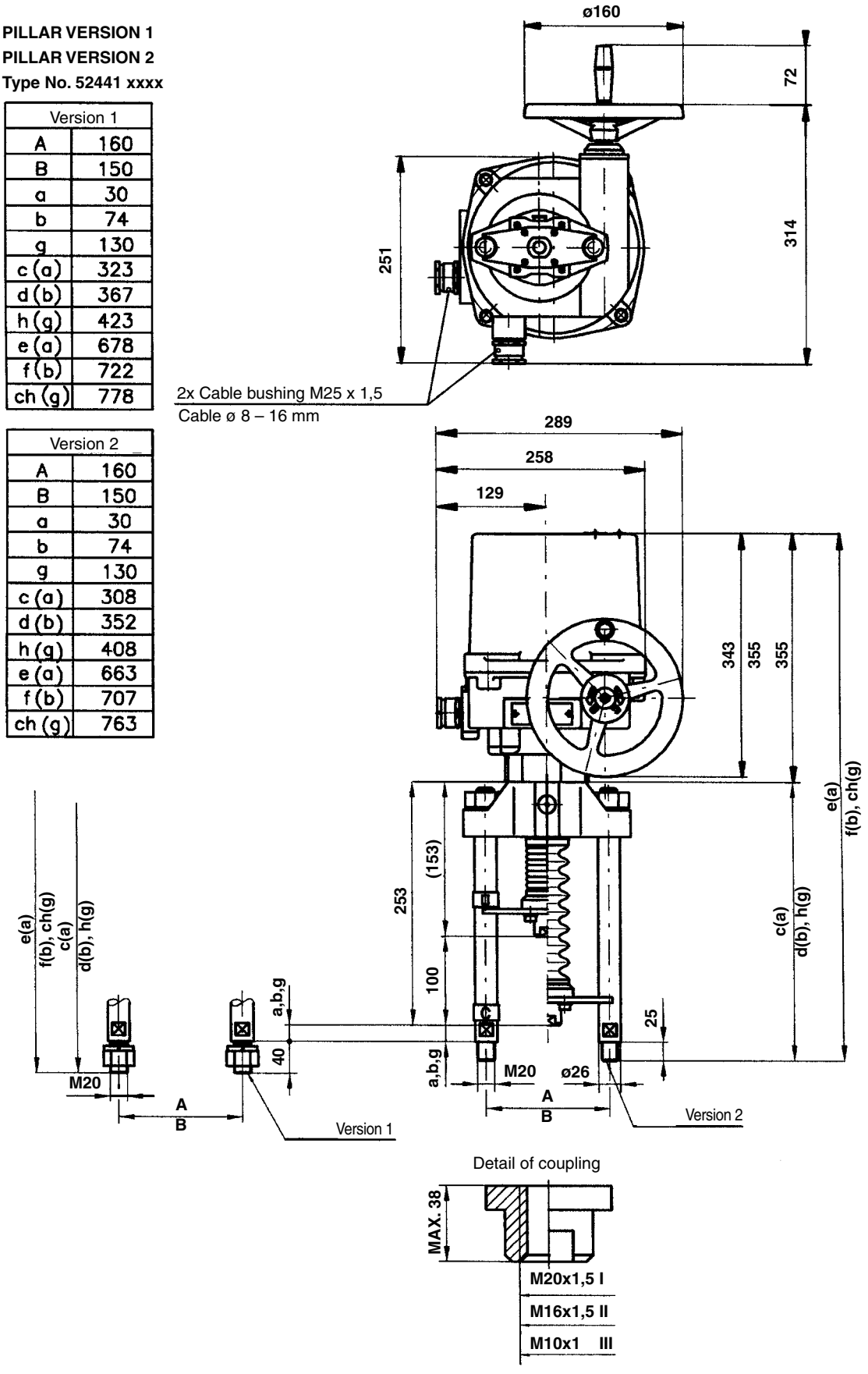


Dimensional sketch of **MODACT MTP 15** electric actuator,
Type No. 52 441 *(the pillar pitch 160 and 150 mm)*

PILLAR VERSION 1
PILLAR VERSION 2
Type No. 52441 xxxx

Version 1	
A	160
B	150
a	30
b	74
g	130
c (a)	323
d (b)	367
h (g)	423
e (a)	678
f (b)	722
ch (g)	778

Version 2	
A	160
B	150
a	30
b	74
g	130
c (a)	308
d (b)	352
h (g)	408
e (a)	663
f (b)	707
ch (g)	763

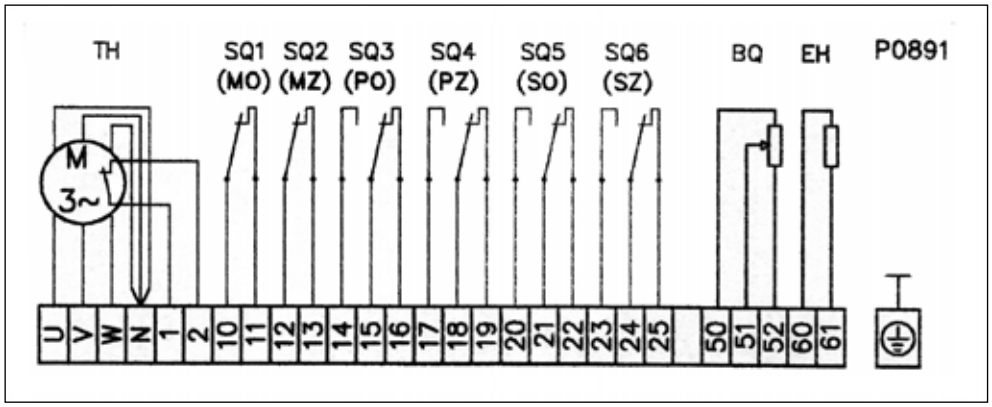


Diagrams of internal electric wiring of actuators **MODACT MTP, Type No. 52 441**

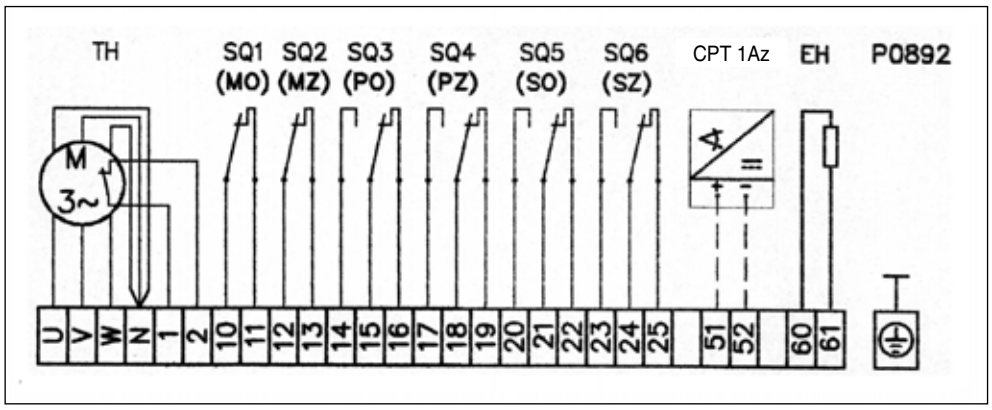
Legend:

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“
EH – heating resistance
C – motor capacitor
BQ – resistance transmitter 1 x 100 ohm
CPT 1Az – current transmitter CPT 1Az
DCPT – current transmitter DCPT
DCPZ – supply source for DCPT
M1 ~ – one-phase asynchronous motor
M3 ~ – three-phase asynchronous motor
TH – thermo-contact

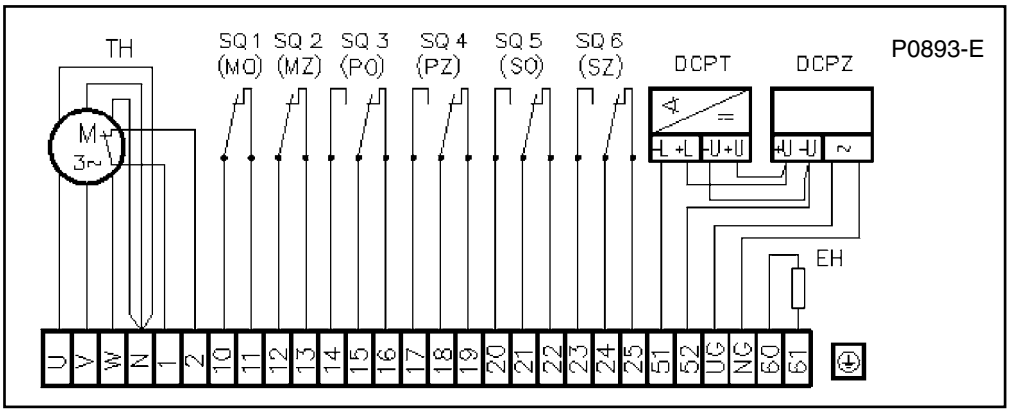
Position transmitter: potentiometer 100 ohm



Position transmitter: current CPT 1Az or without transmitter

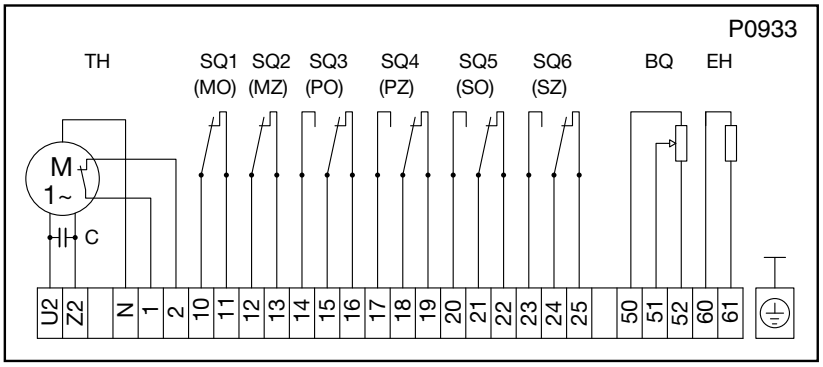


Position transmitter: current DCPT with feeding source

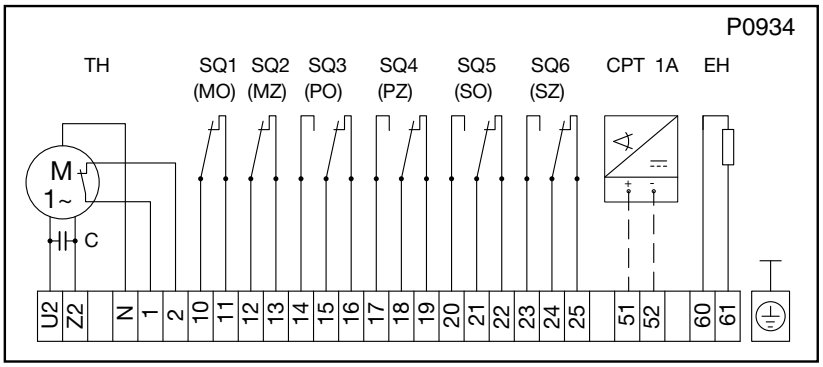


The micro-switches can only be used as single-circuit. Two voltages of different magnitudes or phases must not be connected to contacts of the same micro-switch. The contacts of micro-switches are drawn in the intermediate position. In the version with current transmitter, the user should ensure connection 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.

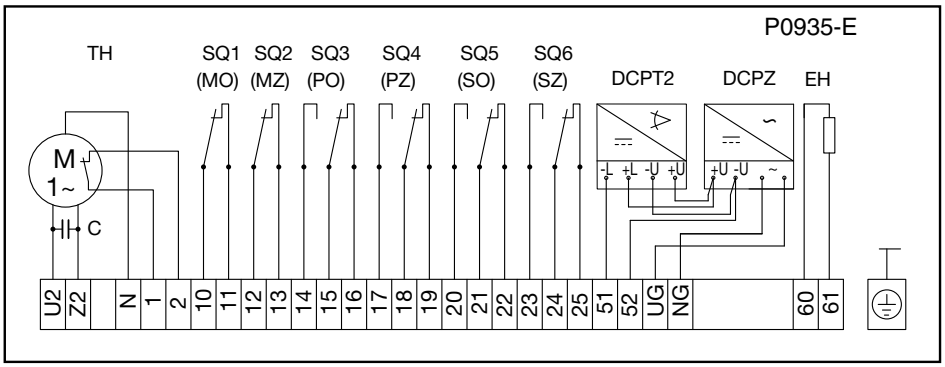
Position transmitter: potentiometer 100 ohm



Position transmitter: current CPT 1Az or without transmitter



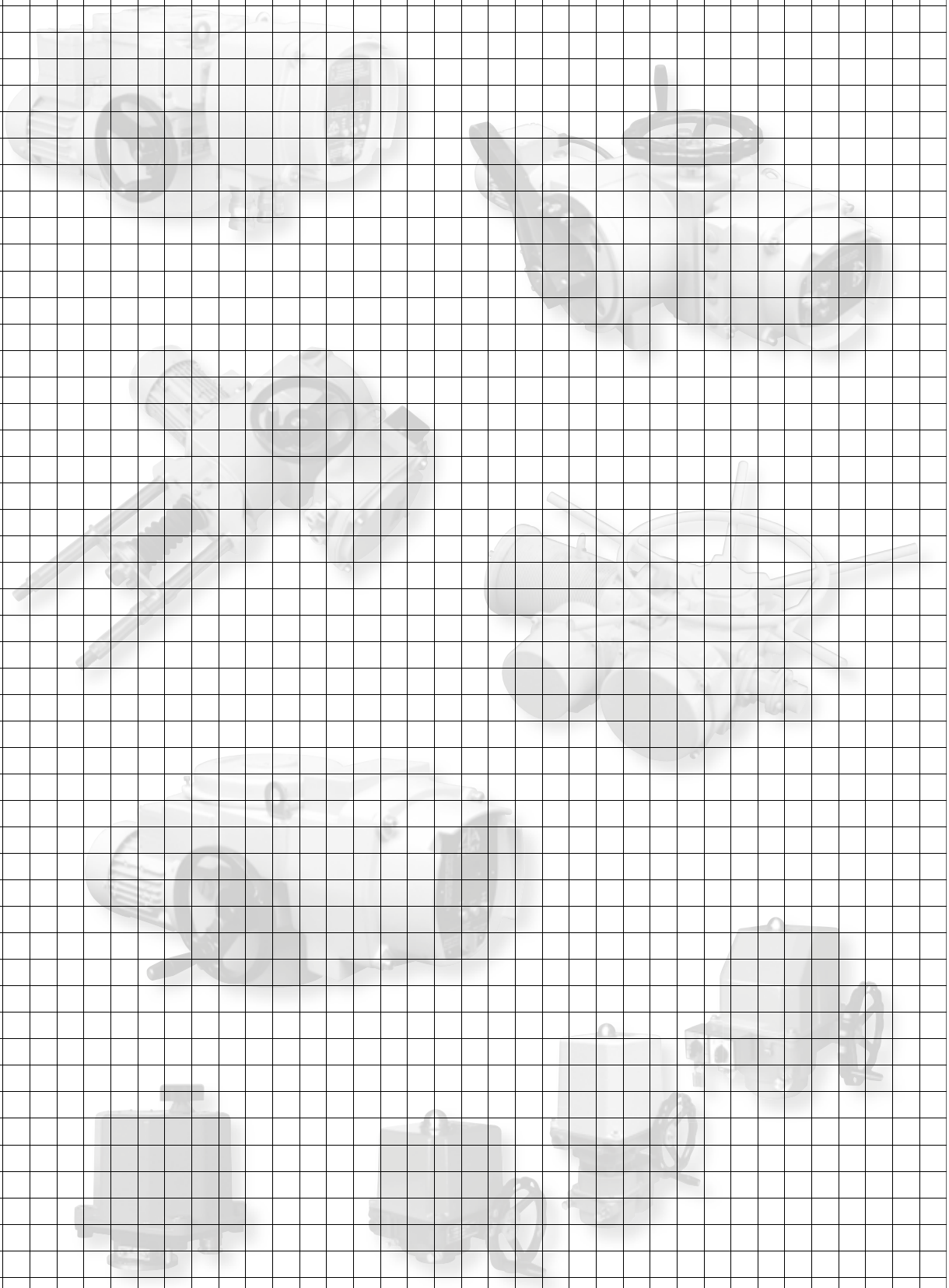
Position transmitter: current DCPT with feeding source

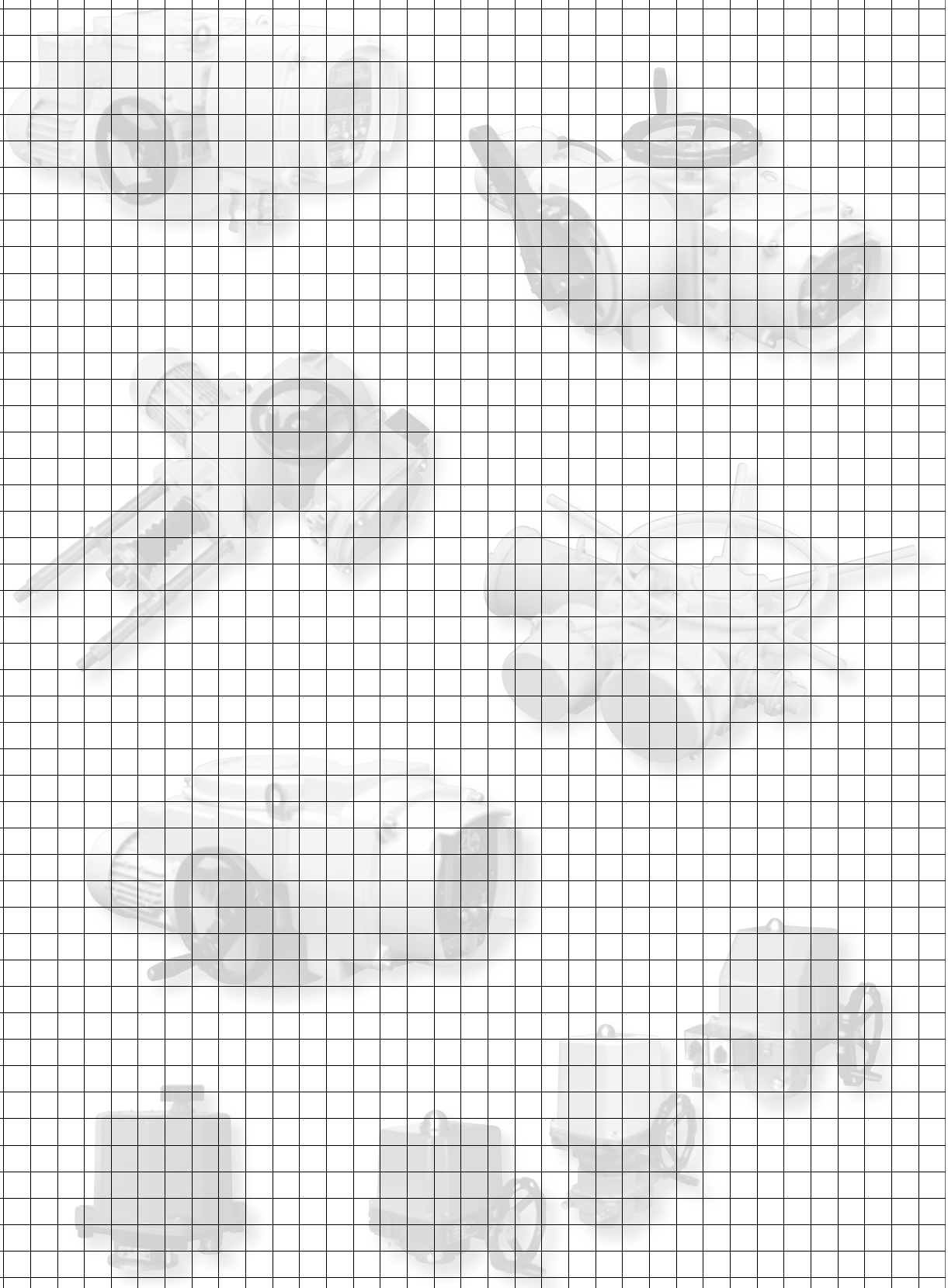


The micro-switches can only be used as single-circuit. Two voltages of different magnitudes or phases must not be connected to contacts of the same micro-switch. The contacts of micro-switches are drawn in the intermediate position. In the version with current transmitter, the user should ensure connection 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 MTP**, **Type No. 52 441**

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 1Az	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 single turn rotary actuators (up to 30 Nm)

MODACT MOK, MOKED, MOKP Ex, MOKPED Ex
Electric rotary single turn actuators for ball valves and flaps

MODACT MOKA
Electric rotary single turn actuators for nuclear power stations
application outside containmen

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

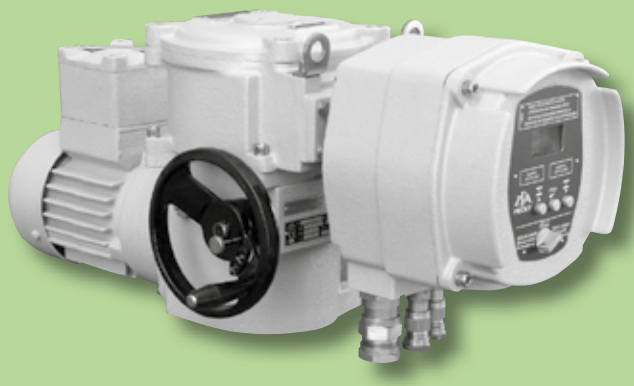
MODACT MPR Variant
Electric rotary (160°) lever actuators with a variable output speed

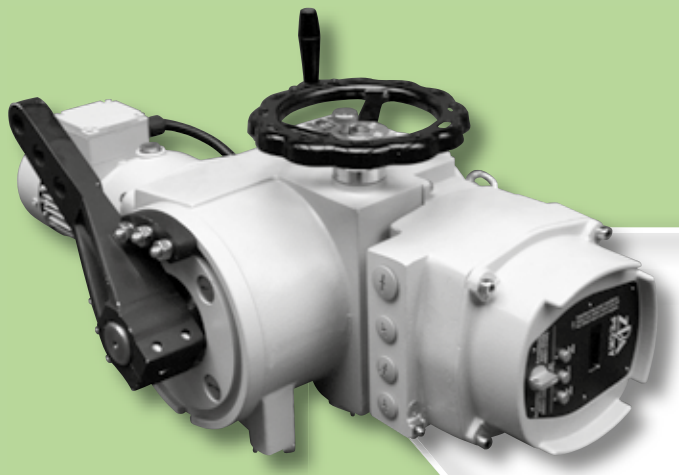
MODACT MPS, MPSP, MPSED, MPSPED
Electric rotary single turn lever actuators with a constant output speed

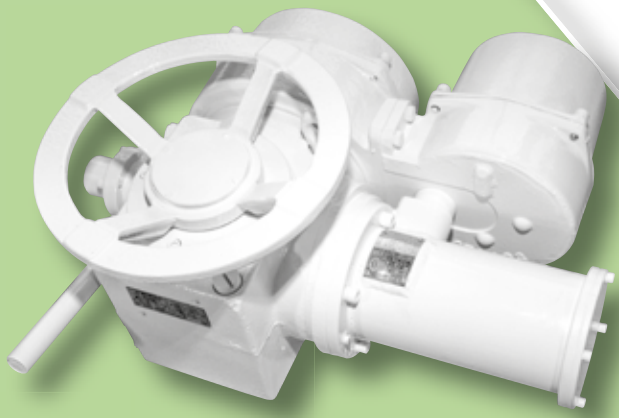
MODACT MTN, MTP, MTNED, MTPED
Electric linear thrust actuators with a constant output speed

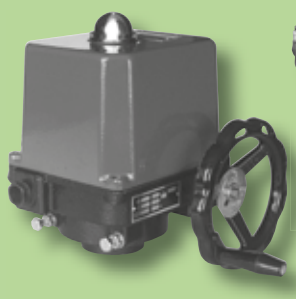
Deliveries of assembled actuator + valve (or MASTERGEAR gearbox) combinations

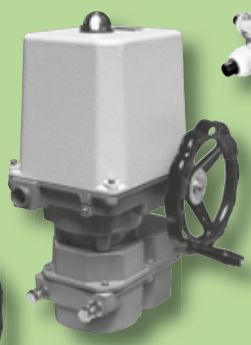
TRADITION • QUALITY • RELIABILITY











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