



Electric Linear
Thrust Actuators

MODACT MTN, MTP
MODACT MTN, MTP CONTROL

Type numbers 52 442, 52 443



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

1. APPLICATION

The **MODACT MTN, MTP** actuators are used for remote two-position or three-position control of the valves by a reverse rectilinear motion.

The **MODACT MTN, MTP Control** actuators are fitted with an electronic position controller. In association with the valve exhibiting a suitable control characteristic, they form a position servo-loop. The output pull-rod of these actuators is automatically brought into a position corresponding to the input signal value of the controller.

The actuators can be used even for other devices for which they are in respect of their characteristics and parameters suitable. In some special cases, the contemplated use of the actuators should be consulted with the manufacturer.

2. OPERATING CONDITIONS, OPERATING POSITION

Operating conditions

The **MODACT MTN, MTP (MODACT MTN, MTP Control)** actuators should withstand the effect of operating conditions and external influences, Classes AC1, AD5, AD7, AE4, 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 which has been built in all actuators, should be always 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 their function. It is advisable to remove dust whenever the layer of dust 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 in the motor again. For air inlet, the minimum distance from the wall is 40 mm. Therefore, the space in which the motor is located should be sufficiently large, clean and ventilated.

Surrounding temperature

Operating temperature for **MODACT MTN** actuators is from -25 °C to +70 °C or from -40 °C to +60 °C, for **MODACT MTP** actuators from -25 °C to +60 °C.

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

Class:

- 1) AC1 – Altitude ≤ 2,000 m above sea level
- 2) AD5 – Spouting water; water can spout in any direction
AD7 – Shallow dipping; possibility of occasional partial or complete covering (*for the type MTP only*)
- 3) AE4 – Light dustiness
AE6 – Heavy dustiness, (*MTP only*)
- 4) AF2 – Corroding atmosphere and pollutants; the presence of corroding pollutants is significant
- 5) AG2 – Average mechanical stress; in current industrial plants
- 6) AH2 – Medium vibrations; in current industrial plants
- 7) AK2 – Serious risk of growth of vegetation and moulds
- 8) AL2 – Serious danger of the occurrence of animals (*insects, birds, small animals*)
- 9) AM2-2 – Normal level of signal voltage. No additional requirements.
- 10) AN2 – Medium solar radiation with intensities > 500 W/m² and ≤ 700 W/m²
- 11) AP3 – Medium seismic effects; acceleration > 300 Gal ≤ 600 Gal
- 12) BA4 – Personal abilities; instructed people
- 13) BC3 – Frequent contact with the earth potential; persons coming frequently into contact with “live” parts or standing on a conducting base

Corrosion protection

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

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

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

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

Operating position

The actuators **MODACT MTN, MTP**, type no. 52 442, 52 443 can be used in any operating position.

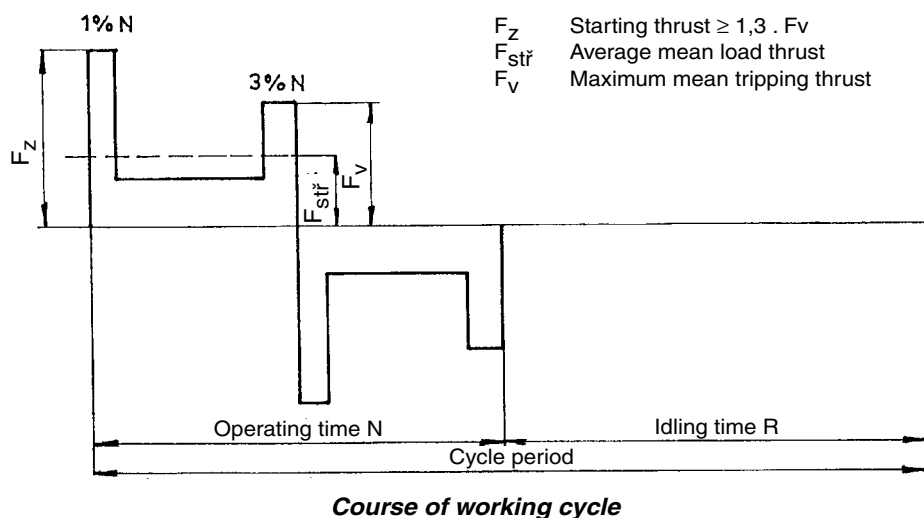
3. OPERATION MODE, SERVICE LIFE OF ACTUATORS

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 F_V . 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 F_V .

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



Service life of actuators

The actuator intended for shut-off valves must be able to perform at least 10,000 operating cycles (*C - O - C*).

The actuator intended for regulating purposes must be able to perform at least 1 million cycles with operation time (*during which the output shaft is moving*) at least 250 hours. Service life in operating hours (*h*) depends on load and number of switching. Not always, high frequency of switching influences positively accuracy of regulation. For attaining the longest possible faultless period and service life, frequency of switching is recommended to be set to the lowest number of switching necessary for the given process. Orientation data of service life derived from the set regulation parameters are shown in the following table.

Service life of actuators for 1 million starts

Service life [h]	830	1 000	2 000	4 000
Number of starts [1/h]	Max. number of starts 1200	1 000	500	250

4. TECHNICAL DATA

Supply voltage

The rated supply voltage of the actuators is 3 x 230 / 400 V, 50 Hz with permissible line voltage fluctuations between +10 % and -15 % and frequency shift within ± 2 %.

Protective enclosure

Protection of the actuators

MODACT MTN (*MODACT MTN Control*) – IP 55
MODACT MTP (*MODACT MTP Control*) – IP 67

Noise

Acoustic pressure level A
Acoustic power level A

max. 85 dB (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 determined by the starting torque of the electric motor and the total gear ratio and efficiency of the actuator. After run reversion, the actuator can produce a starting 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 provided that the load only acts in the direction against motion of the actuator output shaft. Self-locking is ensured by a roller arrest immobilizing the electric motor rotor even in the case of manual control.

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

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 MTN, MTP** electric actuators can be supplied without position transmitter can be fitted with position transmitter:

a) Resistance transmitter 1 x 100 Ω.

Technical parameters:

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

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

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

Technical parameters of CPT 1Az:

Scanning of position	capacity
Working stroke	adjustable 0° – 40° to 0° – 120°
Non-linearity	≤ 1 %
Non-linearity, including gears	≤ 2.5 % (for a maximum stroke of 120°)
Hysteresis, including gears	≤ 5 % (for a maximum stroke of 120°)
<i>(The non-linearity and hysteresis are related to a signal value of 20 mA).</i>	
Loading resistance	0 – 500 Ω
Output signal	4 – 20 mA or 20 – 4 mA
Supply voltage	for $R_{load} = 0 – 100 \Omega$ 10 to 20 V DC
	for $R_{load} = 400 – 500 \Omega$ 18 to 28 V DC
Maximum supply voltage ripple	5 %
Maximum transmitter power demand	560 mW
Insulation resistance	20 MΩ at 50 V DC
Insulation strength	50 V DC
Operational environment temperature	-25 °C to +60 °C
Operational environment temperature - extended range	-25 °C to +70 °C (additional on demand)
Dimensions	∅ 40 x 25 mm

c) **Type DCPT3 active current transmitter.** Power supply to the current loop is not a part of the actuator. Maximum loading resistance of the loop is 500 Ω . For variants **MODACT MTN, MTP Control** with the regulator ZP2.RE5, it is used as a position sensor.

DCPT3 can be easily set by two push-buttons with LED diode on the transmitter body.

Technical parameters of DCPT3:

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

For the transmitters CPT 1Az as well as DCPT3, a two-wire connection is used, i.e., the transmitter, the power supply and the load are connected in series. The user should secure that the two-wire circuit of the current transmitter is connected to the electric earth of the associated regulator, computer, etc. This connection should only be made at a single point in any section of the circuit, outside the actuator.

Position indicator

The actuator is fitted with a local position indicator.

Anti-condensation heater

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

Local control

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

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

Position regulator

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

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

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

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

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

Dynamic brake

The brake is an optional accessory to the actuators **MTN, MTP Control**. After opening the contactor, it induces dynamic braking moment in the electric motor lasting for several tenths of second. It reduces dramatically the run-down time and regulation is thus more precise. When the actuator is in a standstill no braking moment is exerted.

The actuators without regulator are fitted with autonomous brake **BAM-002**. For its function, it requires auxiliary contacts of the contactors and auxiliary contact of the over-current relay. It is dimensioned for electric motors 3 x 230 / 400 V, output up to 550 W.

The actuators with regulator ZP2RE5 are fitted with simpler controlled brakes **BR2**. They are interconnected with the regulator that provides impulse for action.

According to the electric motor output, corresponding variant is chosen: **BR2 550** of output up to 550 W,
BR 2.2 of output up to 2.2 kW.

If outputs higher than 2.2 kW are to be braked, electric motors of special version with an electromagnetic brake should be used.

Switching of electric motor, contactor unit

The actuators in variants Control are fitted with built-in reversing contactor combinations. These are assembled of two contactors and an over-current relay. The combination also includes mechanical blocking that prevents both contactors from being closed at the same time. This could, for instance, happen in case of wrong connection of jumpers on the terminal board. The blocking is not dimensioned for long-term action. The over-current relays protects the electric motor against over-loading and is dimensioned with respect to its output.

According to the actuator version, the contactors are controlled by the regulator, change-over switch of local control or external input. Control voltage is 230 V / 50 Hz as a standard; it is supplied via contacts of position and/or moment micro-switches. Thus, these micro-switches need not be led out of the actuator.

The contactors used have a long mechanical service life and great reserve in switching ability; consequently, the electric service life is also sufficient for particular use. The thermal relay is chosen so that it would reliably protect the electric motor against overload. Set-up and outfit of the actuators provide for simple connection to power-supply and control circuits.

The power-supply circuits can be common for the whole group of actuators, which will save the cabling.

6. ELECTRIC PARAMETERS

External electric connection

a) Terminal board

The electric actuator is equipped with a terminal board for connection to external circuits. This terminal board uses screw terminals allowing conductors with a maximum cross-section 4 mm² to be connected. Access to the terminal board is obtained after removal of the terminal box cover. All control circuits of the electric actuator are brought out to the terminal board. The terminal box is fitted with cable bushings for connecting the electric actuator. The electric motor is fitted with an independent box with a terminal board and a bushing.

b) Connector

According to the customer's requirements the **MODACT MTN, MTP** actuators can be fitted with the connector to provide for connection of control circuits. This connector uses screw terminals allowing conductors with a maximum cross-section 4 mm² to be connected. ZPA Pečky, a.s. also supplies a counterpart for the cable. In order to connect the cable to this counterpart it is necessary to use special crimping pliers.

Actuator internal wiring

The internal wiring diagrams of the **MODACT MTN, 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 terminal box. The terminals are marked on a self-adhesive label attached to a carrying strip under the terminal block.

Current rating and maximum voltage of microswitches

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

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

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

Isolation resistance

Isolation resistance of electric control circuits against the frame and against each other is min. 20 MΩ. After a dump test, isolation resistance of control circuits is min. 2 MΩ. Isolation resistance of the electric motor is min. 1.9 MΩ. See Technical specifications for more details.

Electric strength of electric circuits isolation

Circuit of 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 = 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 maximum value of the range +15 % of the rated value (<i>in no-load operation</i>)
Setting of signalling switches	±2.5 % of the maximum value of the range (<i>for the ranges, refer to the Mounting instructions</i>).
Hysteresis of signalling switches	max. 4 % of the maximum value of the range
Setting of position-limit switches	±0.2 mm of the output pull-rod displacement (<i>without the influence of running-down</i>)
Hysteresis of position-limit switches	max. 1.2 mm of the output pull-rod displacement
Clearance of output part	max. 1 mm

Protection

The actuators are fitted with one internal and one external protection terminal for ensuring protection against electric shock injury according to ČSN 33 2000-4-41. One protection terminal is also installed on the electric motor. The protection terminals are marked according to ČSN EN 60 417-1 and 2 (013760).

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

7. DESCRIPTION

A) MODACT MTN, MTP electric actuators

The **MTN, MTP** actuators are based on MODACT MON actuator series. Moreover, they are designed with linear transmission unit for converting rotary motion into linear motion.

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

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

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

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

B) MODACT MTN, MTP Control electric actuators

The **MODACT MTN, MTP Control** electric actuators can be fitted with an electronic position controller. In association with a fitting having a suitable regulating characteristic, they create a position servo-loop. The output shaft of these actuators is automatically brought into the position which corresponds to the input signal value of the controller.

For application, operating conditions, technical parameters and functional description, refer to the part dealing with the **MODACT MTN, MTP** electric actuators. All provisions therein also apply to the **MODACT MTN, MTP Control** electric actuators. A list of the types of **MODACT MTN, MTP Control** electric actuators now in production can be found in Table 1.

In addition, the **MODACT MTN, MTP Control** electric actuators can be fitted with a position controller of the output shaft, a reversing contactor combination of the output shaft, a thermal relay providing for overload protection of the electric motor and an electronic brake of asynchronous motors (*BAM-002 – actuators fitted with contactors only; BR2 - actuators fitted with ZP2.RE5 position controller*).

All these units are enclosed in the contactor box which is installed instead of the terminal box of the **MODACT MTN, MTP** actuators. These electric actuators can be supplied without position controller and BR2 brake.

Connection of electric circuits from the control box to external circuitry is made via a terminal block; the latter has added terminals for connecting the supply voltage of 3 x 230/400 V, 50 Hz.

8. REGULATOR ZP2.RE5

The basic part of the regulator ZP2.RE5 is a microcomputer with control program, programmed in its internal memory. The microcomputer includes A/D converters for processing the control and feedback signal. The regulator provides for automatic setting of the actuator output shaft depending on the value of the current control signal. The regulator compares the value of the control signal with the value of the feedback signal from the position transmitter. In case a regulating deviation is found, the regulator activates the output signals FO or FZ controlling the actuator run until the output shaft is set into the position corresponding to the control signal value.

Note: *The regulator sets the position, however, it does not influence the rate of resetting. This is given by the type and version of the actuator.*

The regulator also monitors some process states and signalizes detected failures.

The regulator parameters can be set by the push-buttons SW1 and SW2, and/or by the computer with service program. The computer is connected via a communication module to the connector J7. The set parameters are stored in the memory of the EEPROM type, so that switching off of the feeding voltage does not damage the memory content.

The following parameters can be set by the regulator push-buttons:

- type of control signal
- response to the TEST signal and to an error detected by the regulator
- mirroring
- regulator insensitivity
- type of control

Other parameters can be set by PC. The computer can also be used for ascertaining diagnostic data on the regulator operation, e.g. the time for which the regulator has been in operation.

After setting the control parameters, during the so-called auto-calibration, the regulator is adjusted to the actuator and the valve it should control. The type of the feedback transmitter, end positions and inertia of the actuator output shaft are automatically detected and recorded into the regulator as parameters.

Error conditions detected by the regulator are signalized by LED diodes on the regulator. The regulator has an OK change-over contact, from which it is possible to lead out an error status signal. During a faultless operation and with the switched-off regulator, this contact is opened; during an error condition it is closed.

If PC is connected to the regulator the detected error is displayed on the computer. In case of an error, the regulator responds according to the set parameter “response to the signal TEST”.

Technical parameters of regulator

Feeding voltage:	230 V + 10 % -15 %, 50 – 60 Hz
Regulator linearity:	0,5 %
Regulator insensitivity:	1 – 10 % (<i>adjustable</i>)

Input signals – double-value (N/230 V):

U _{DRIVE}	Control phase for outlets FO, FZ, protected by fuse F 1.6 A
TEST1,2	Activation of regime TEST
MO, MZ	States of actuator limit switches
TP	Condition of motor thermal protection

Input signals - analog:

Control signal:	0/4 – 20 mA
Feedback signal:	Current transmitter 4 – 20 mA

Output signals - double-value:

FO, FZ	Control phase, closing contacts of relay 5A / 230V
Relay OK	Signalization of failure, change-over contact 5A / 230V
BRAKE	Control signal for brake module ZP3-BR (2 mA)

Output signal - analog:

Signalization of position	Galvanically isolated passive transmitter 0/4 – 20 mA, external feeding 15 – 30 V, load impedance max 500 ohm
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Signalization:

D1 (yellow)	setting / failure message
D2 (red)	setting / failure message
D3 (green)	feeding
D4 (green)	actuator opens
D4 (red)	actuator closes
Error messages:	Regime TEST
	Control signal missing (<i>only when signal 4 – 20 mA is used</i>)
	Actuator was switched off by limit switch in other than limit position
	Error of position sensor
	Thermal protection of motor TP activated
	Actuator is under local control

Response to failure:

Regime TEST	Error message + actuator into position according to setting P2
Error in control signal	Error message + actuator into position according to setting P2
Error in position sensor	Error message + actuator stop
Failure of thermal protection	Error message + actuator stop

Adjustable elements:

communication connector (*for connection to PC*)
2x push-button for setting parameter without computer

Range of working temperatures:

-25 °C – +75 °C

Dimensions:

75 x 81 x 25 mm

9. ORDERING INFORMATION

When ordering, please specify the following:

- number of actuators required
- actuator designation and type number
- working stroke of output part (*if the working stroke has not been specified the equipment will be adjusted to the maximum working stroke of the output part*)
- tripping thrust (*if the tripping thrust has not been specified the equipment will be adjusted to the maximum tripping thrust*)
- supply voltage of electric motor (*another supply voltage than that given above, should be agreed upon beforehand with the manufacturer*)

Example:

MODACT MTN 40 electric actuator, Type no. 52 443, with working stroke 100 mm, adjusting speed 125 mm.min⁻¹, maximum adjusted tripping thrust 40 kN, 3 x 230 / 400 V, 50 Hz, version according to ČSN 186314, clutch B, without moment blocking, resistance transmitter, without local controller and position regulator should be specified in the order as the type number 52 443.6124N. The version without moment blocking and without transmitter should be specified in words.

The meaning of the 6th, 8th and 9th digits of the Type No. is given in the Table 1.

The meaning of the 7th digit: Type No.52 442 - in the Table 2
 Type No.52 443 - the Figs 4, 5, 6 and 7

Table 1 – MODACT MTN, MTP (Control) electric actuators
– basic technical parameters, design

Basic electrical equipment: 2 thrust-limit switches (<i>OPEN - MO, CLOSE - MZ</i>) 2 position-limit switches (<i>OPEN - PO, CLOSE - PZ</i>) 2 signalling switches (<i>OPEN - SO, CLOSE - SZ</i>) 1 anti-condensation heater 1 three-phase asynchronous motor																	
Basic technical parameters: (8th place of t. no.):																	
Type	MTN Control, MTP Control	Adjustment range of tripping thrust [kN]	Starting thrust [kN]	Adjusting speed [mm/min]	Working stroke [mm]	Electric motor					Weight [kg]	Type Number					
						Type	Power [W]	Revolutions per minute [1/min]	I _n (400 V) [A]	I _z I _n		basic		additional			
												12	345	6	7	8	9
MTN 15 MTP 15	C	11,5 – 15	17	50	10 – 100	1TZ9002-0CC2	180	875	0,85	2	33	5 2 4 4 2	x x 0 x x				
	C			80		1TZ9002-0CC2	180	875	0,85	2			x x 1 x x				
	C			125		1TZ9002-0CB2	250	1365	0,8	3			x x 3 x x				
	C			36		1TZ9002-0CD3	120	625	0,82	2			x x 2 x x				
	C			27		1TZ9002-0CD3	120	625	0,82	2			x x A x x				
MTN 25 MTP 25	C	15 – 25	32,5	50	10 – 100	1TZ9002-0CC2	180	875	0,85	2	60	5 2 4 4 3	x x 4 x x				
	C			80		1TZ9002-0CC2	180	875	0,85	2			x x 5 x x				
	C			125		1TZ9002-0CB2	250	1365	0,8	3			x x 6 x x				
	C			36		1TZ9002-0CD3	120	625	0,82	2			x x 7 x x				
	C			27		1TZ9002-0CD3	120	625	0,82	2			x x 8 x x				
MTN 40 MTP 40 ¹⁾	C	25 – 40	52	80	20 – 120	1TZ9002-0DC3	550	900	1,68	2,7	60	5 2 4 4 3	x x 1 x x				
	C			125		1TZ9002-0DB2	550	1385	1,44	3,7			x x 2 x x				
MTN 63 MTP 63	C	40 – 63	82	80	20 – 120	1TZ9002-0EC0	750	940	2,3	3,8	63	5 2 4 4 3	x x 4 x x				
	C			125		1TZ9002-0EB0	1,1	1405	2,5	4,5			x x 5 x x				
Electrical connection (6th place of t. no.)																	
with block of terminals											6 x x x x						
with connector											7 x x x x						
Connecting dimensions (7th place of t. no.)					Type No. 52 442 - Table No. 2, Figs. 1, 2, 3												
					Type No. 52 443 - Figs. 4, 5, 6							x 1 x x x					
					Type No. 52 443 - Figs. 7							x 2 x x x					
Position transmitter, block of local control – MODACT MTN, MTP actuators (9th place of t. no.)					current transmitter 4 – 20 mA				CPT 1Az without power supply		x x x 0 x						
									DCPT3 with power supply		x x x R x						
					current transmitter 4 – 20 mA with BMO				CPT 1Az without power supply		x x x 1 x						
									DCPT3 with power supply		x x x S x						
					resistance transmitter 100 Ω, without BMO				x x x 2 x								
					resistance transmitter 100 Ω, with BMO				x x x 3 x								
					without transmitter, with BMO				x x x P x								
without transmitter, without BMO				x x x Z x													
Additional electric outfit – MODACT MTN, MTP Control actuators with built-in contactor combination (9th place of t. no.)								potentiometer 100 Ω	current transmitter CPT 1Az without power supply	current transmitter DCPT3 with power supply							
without BMO	without brake and position regulator							x x x 4 x	x x x A x	x x x K x							
	with brake, without position regulator							x x x 5 x	x x x B x	x x x L x							
	with brake and position regulator									x x x C x							
with BMO	without brake and position regulator							x x x 7 x	x x x D x	x x x M x							
	with brake, without position regulator							x x x 8 x	x x x E x	x x x N x							
	with brake and position regulator									x x x F x							
Protective enclosure (10th place of t. no.)										IP 55	x x x x N						
										IP 67	x x x x P						

Notes:

- ¹⁾ Design with clutch internal threads and a flange (non-standard) is available only in the design variants, Type No. 52 443.x21xxN and 52 443.x22xxN (Type MTN 40) and Type No. 52 443.x21xxP and 52 443.x22xxP (Type MTP 40).
- ²⁾ The design variant with BR2 brake is available only in case of actuators without regulator (with contactors) with up to 550 W of electric motor power, inclusive. The design variant with BR2 brake is available in case with ZP2.RE5 regulator.
- ³⁾ If a design variant with flashing indication is required this should be specified in words: Design with flashing indication.
- ⁴⁾ Design without thrust locking after reversion have at end position capital letter M (for example 52 442.6211NM).
- ⁵⁾ The MODACT MTN, MTP Control actuators with ZP2.RE5 regulator - the digit "5" is put on the 11th place.

Table 2 – Connecting dimensions

– specification of the 7th place of Type No. 52 442.xxxxx

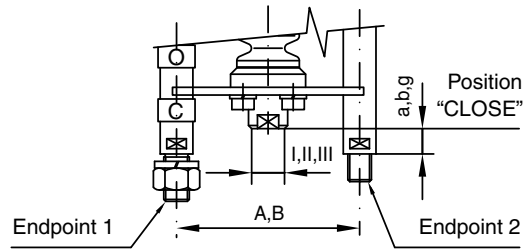
Design spacing of columns A (160 mm)	Character on 7th place
Aa1I	0
Aa1II	1
Aa1III	2
Aa2I	3
Aa2II	4
Aa2III	5
Ab1I	6
Ab1II	7
Ab1III	8
Ab2I	9
Ab2II	A
Ab2III	B

Design spacing of columns B (150 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

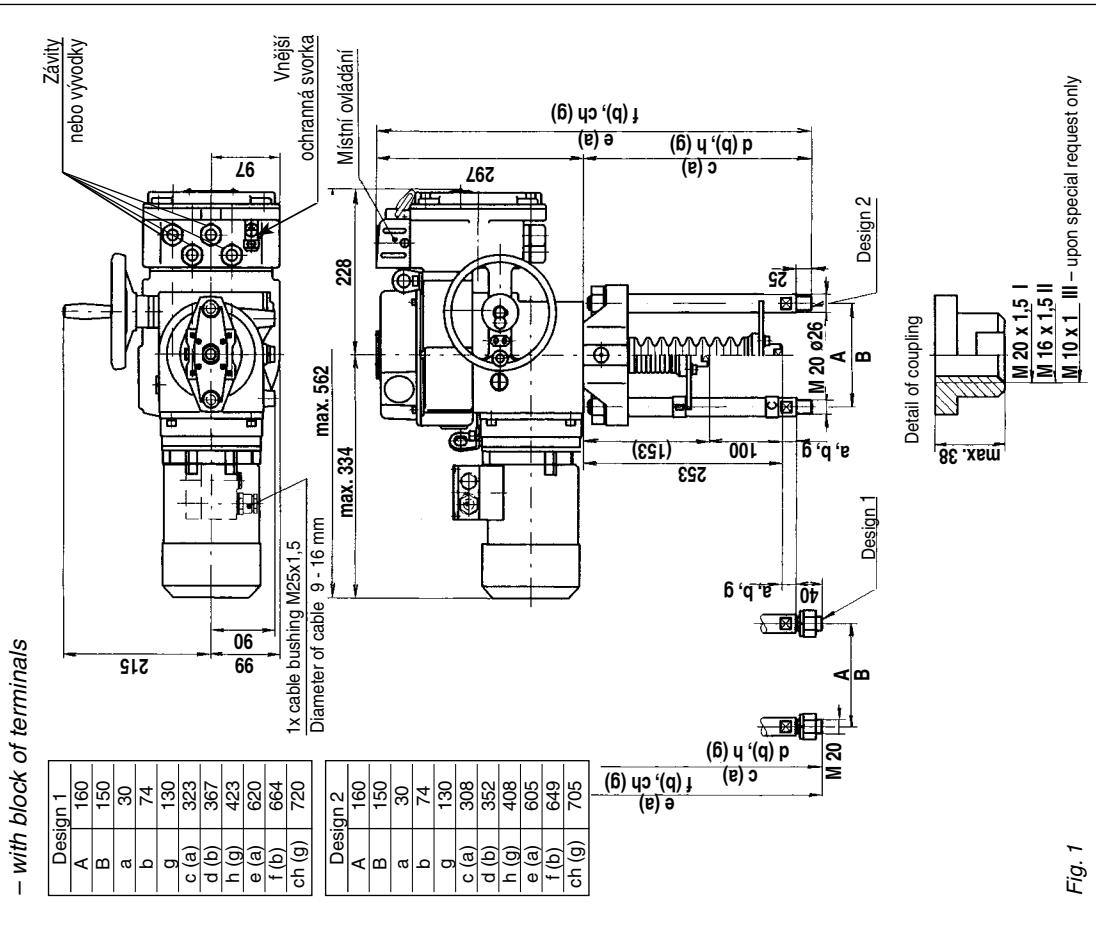
*Deliveries in design III
with coupling M 10 x 1
upon special request only.*

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

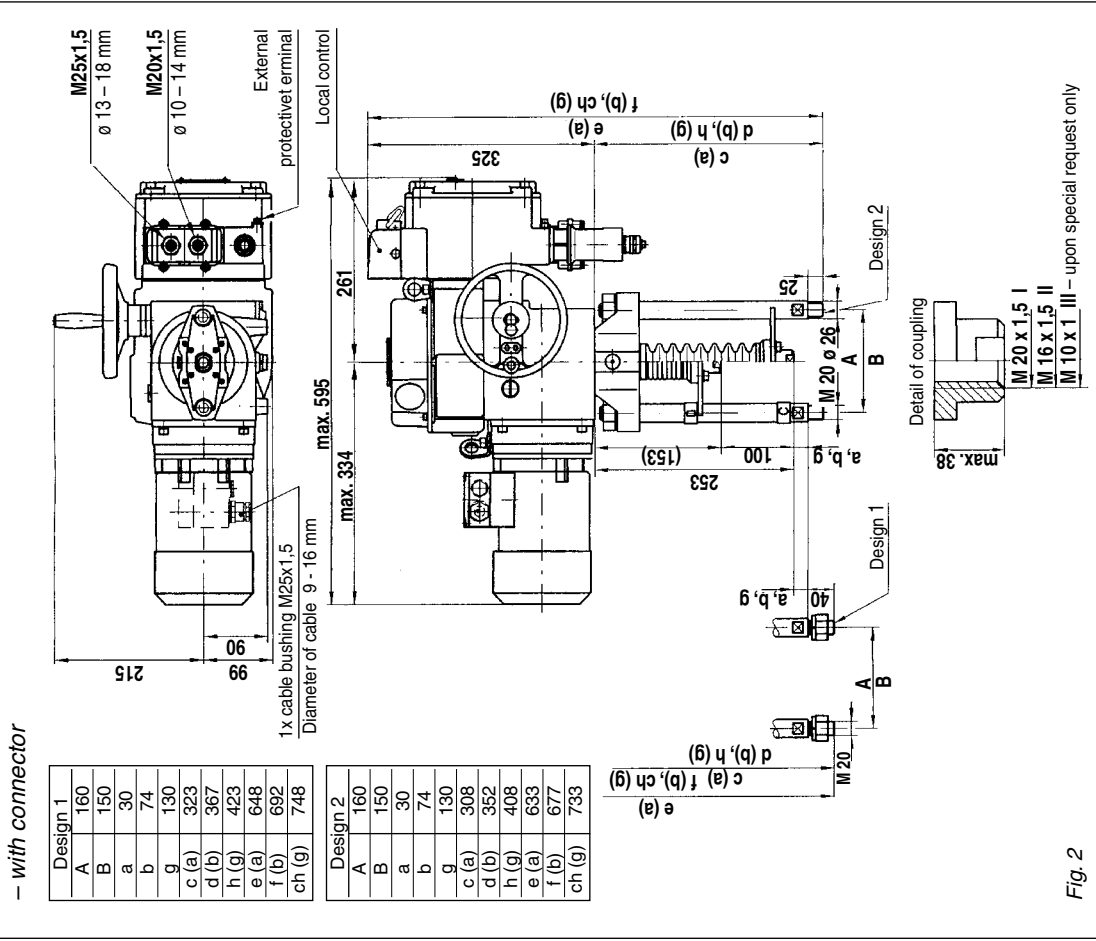
Spacing of columns	A	160 mm		
	B	150 mm		
Position "Closed"	a	30 mm	Long columns c	see table "Design variants" - Fig. 1 and 2
	b	74 mm	Long columns d	
	g	130 mm	Long columns h	
Thread of coupling	I	M20 x 1,5		
	II	M16 x 1,5		
	III	M10 x 1		



Dimensional sketch of
MODACT MTN, MTP 15
MODACT MTN, MTP 25
 electric actuators, Type No. 52 442.xxxxx



Dimensional sketch of
MODACT MTN, MTP 15; MODACT MTN, MTP 15 Control
MODACT MTN, MTP 25; MODACT MTN, MTP 25 Control
 electric actuators, Type No. 52 442.xxxxx



Note: For actuators MODACT MTN, the switchboard box has threads for bushings: 3 x thread M20 x 1,5; 1 x thread M25 x 1,5; 1 x thread M25 x 1,5 (the bushings are included in the delivery - wrapped-together part).
 For actuators MODACT MTP, the switchboard box has bushings: 1 x M25 x 1,5, range of Ø 13 - 18 mm; 2 x M20 x 1,5 range of Ø 10 - 14 mm; 1 x M20 x 1,5 range of Ø 6 - 12 mm.
 The electric motor (except for the actuator version with the motor interconnected with the switchboard box) is always delivered with cable bushing. Connector Harting is always fitted with cable bushings.

Dimensional sketch of
MODACT MTN, MTP 15 Control
MODACT MTN, MTP 25 Control
 electric actuators, Type No. 52 442.xxxxx

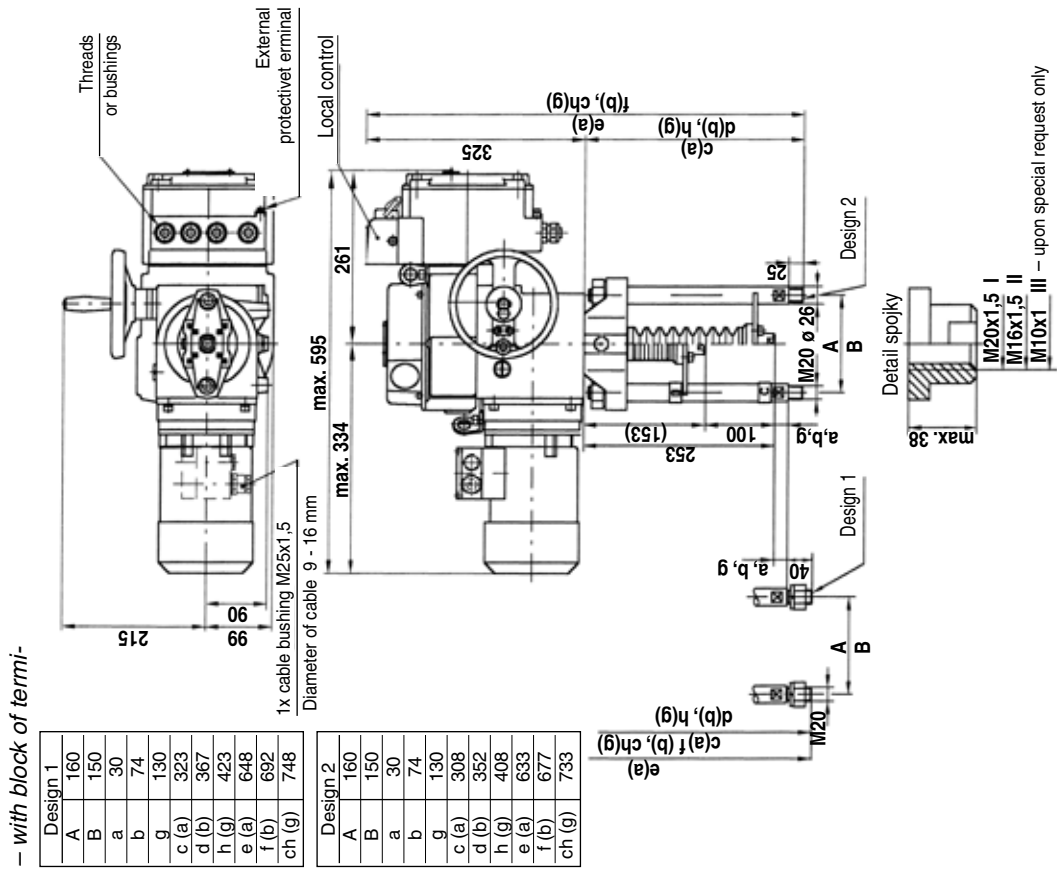


Fig. 3

Dimensional sketch of
MODACT MTN, MTP 40
MODACT MTN, MTP 63
 electric actuators, Type No. 52 443.x1xxx

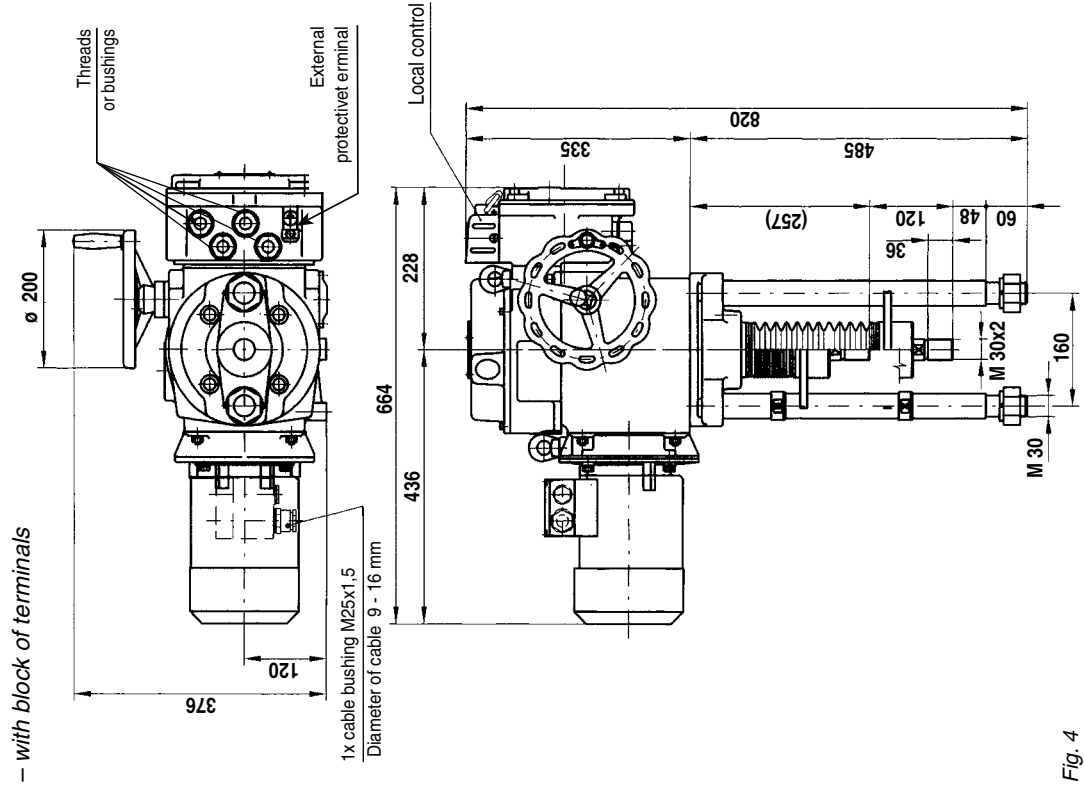


Fig. 4

Dimensional sketch of
MODACT MTN, MTP 40; MODACT MTN, MTP 40 Control
MODACT MTN, MTP 63; MODACT MTN, MTP 63 Control
 electric actuators, Type No. 52 443.x1xxx

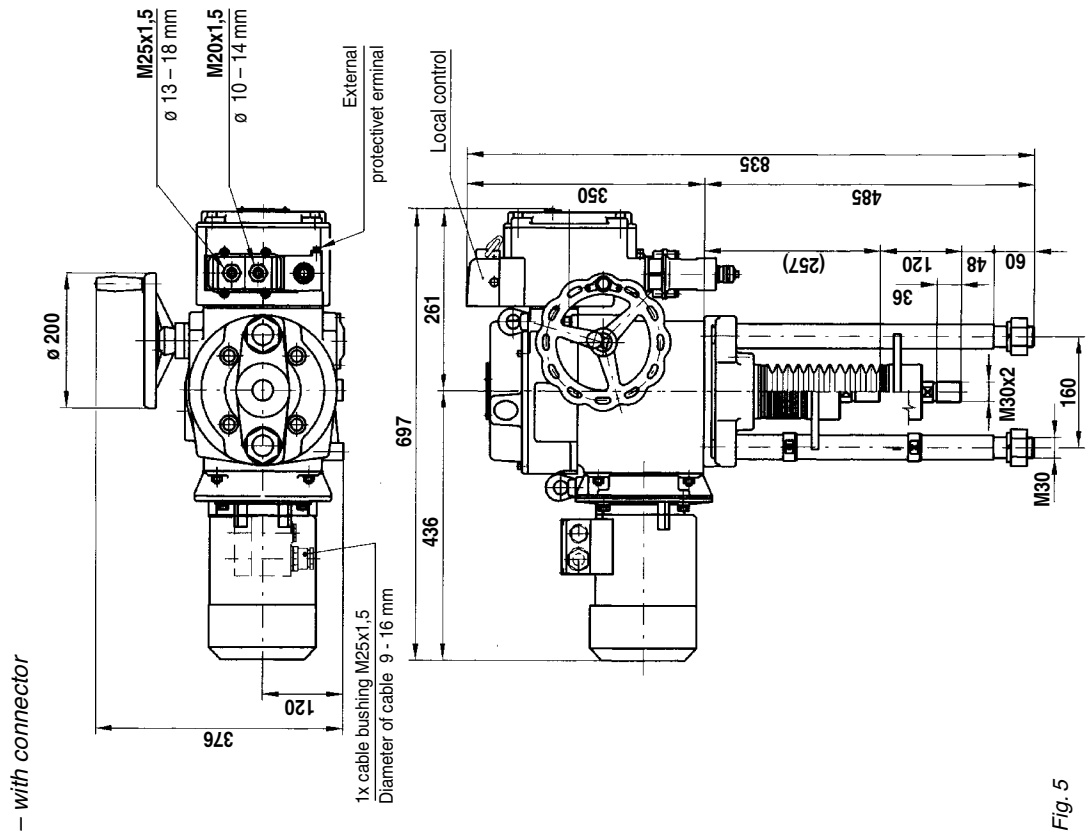


Fig. 5

Dimensional sketch of
MODACT MTN, MTP 40 Control
MODACT MTN, MTP 63 Control
 electric actuators, Type No. 52 443.x1xxx

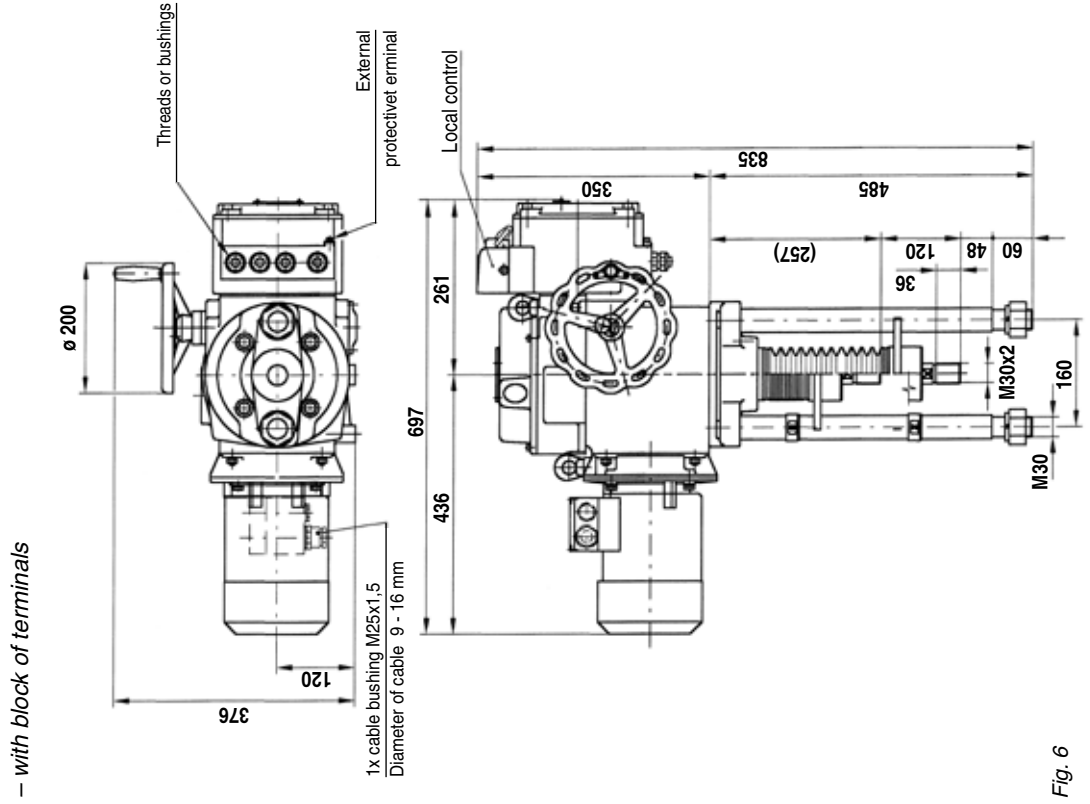


Fig. 6

Dimensional sketch of linear transmission unit for **MODACT MTN, MTP 40** electric actuators,
 Type No. 52 443.x2xxx
 – design with flange – non standard
 (other dimensions and designs of actuators are according to fig. 14, 15, 16)

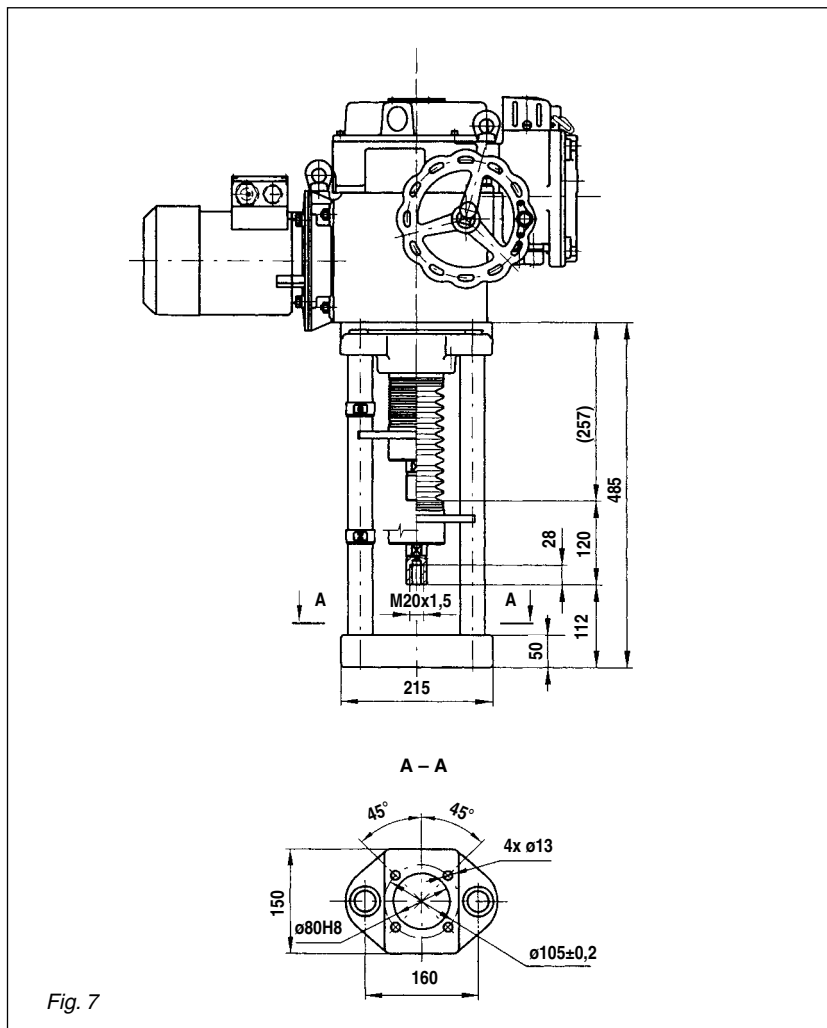


Fig. 7

Wiring diagrams of **MODACT MTN, MTP** electric actuators

Legend:

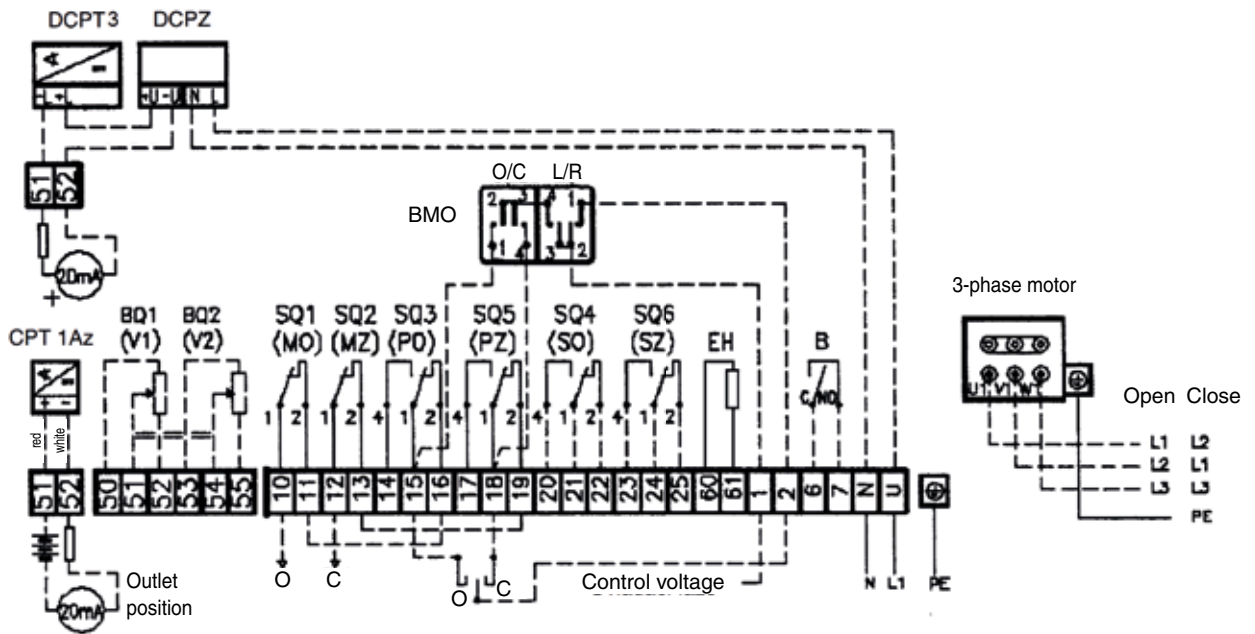
SQ1 (MO) – OPEN torque-limit switch	CPT 1Az – Analog adjustable current position transmitter
SQ2 (MZ) – CLOSE torque-limit switch	DCPT3 – Digitally adjustable current position transmitter
SQ3 (PO) – OPEN position-limit switch	DCPZ – Power source of DCPT3 transmitter
SQ5 (PZ) – CLOSE position-limit switch	ZP2.RE5 – Elektronik position regulator
SQ4 (SO) – OPEN signalling switch	BAM-002 – Elektronik brake
SQ6 (SZ) – CLOSE signalling switch	BR2 – Elektronik brake
SA1 – LOCAL-REMOTE control switch	EH – Anti-condensation heaters
SA2 – OPEN-CLOSE control switch	M3~ – Three-phase motor
KO – OPEN-direction contactor	B – Blinker
KZ – CLOSE-direction contactor	F – Thermal relay
BQ1, BQ2 – Resistance position transmitter	FT – Supply mains filter
BMO – Block of local control	SSR – Contact-less switches

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

Wiring diagram of MODACT MTN, MTP electric actuators

– with terminal board

P3M-0938E

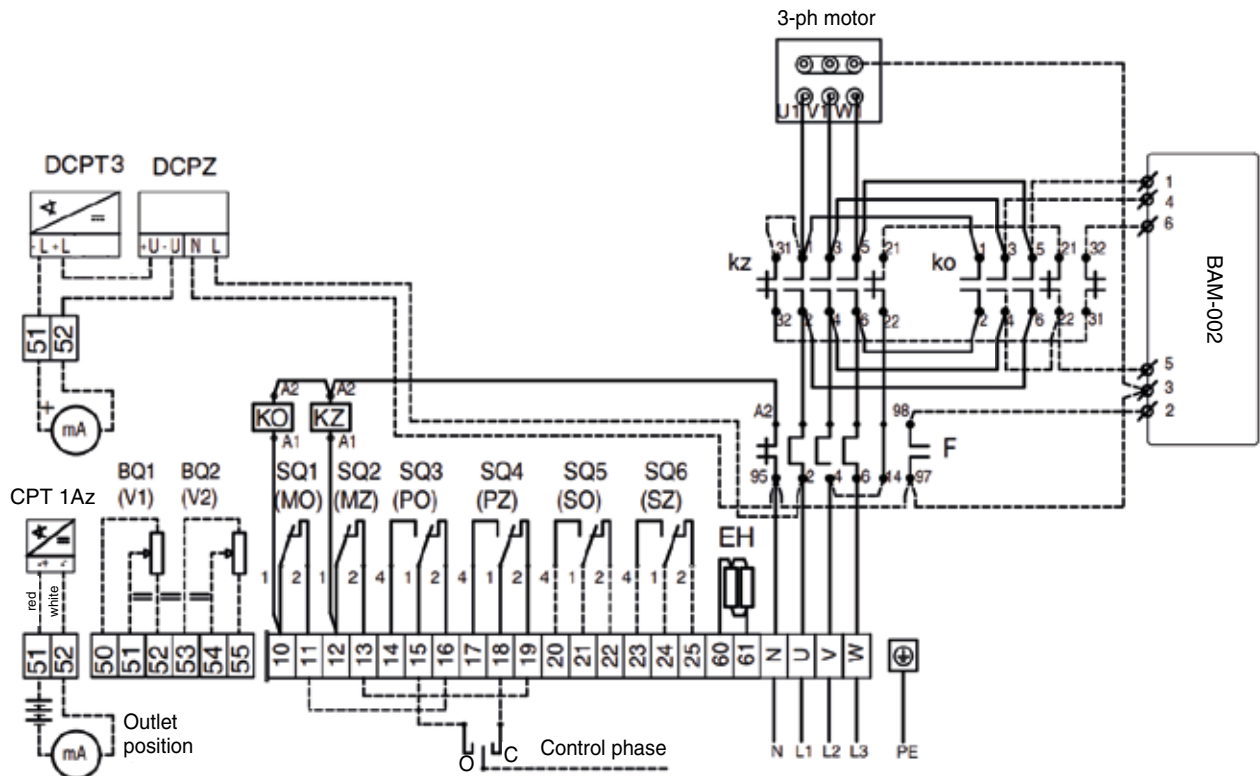


Wiring diagram of MODACT MTN, MTP Control electric actuators

– with contactors

– with terminal board

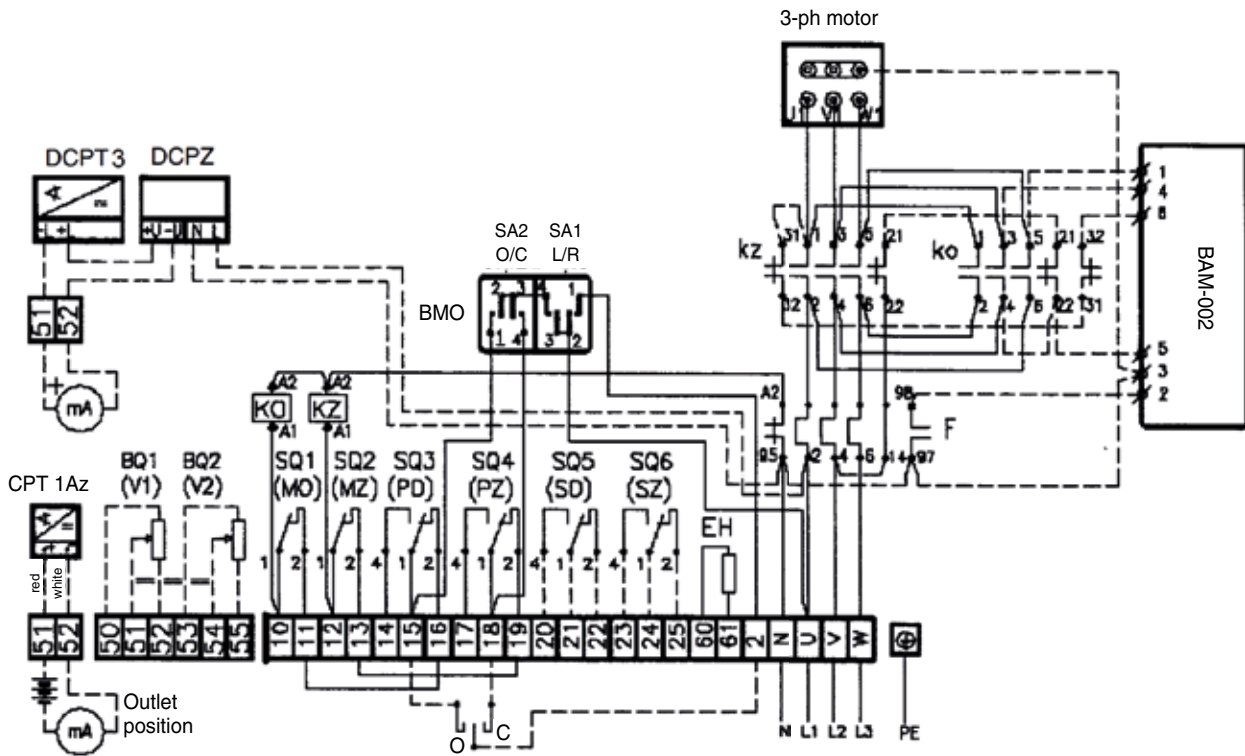
P3-0947



Wiring diagram of **MODACT MTN, MTP Control** electric actuators
 – with contactors and BMO

– with terminal board

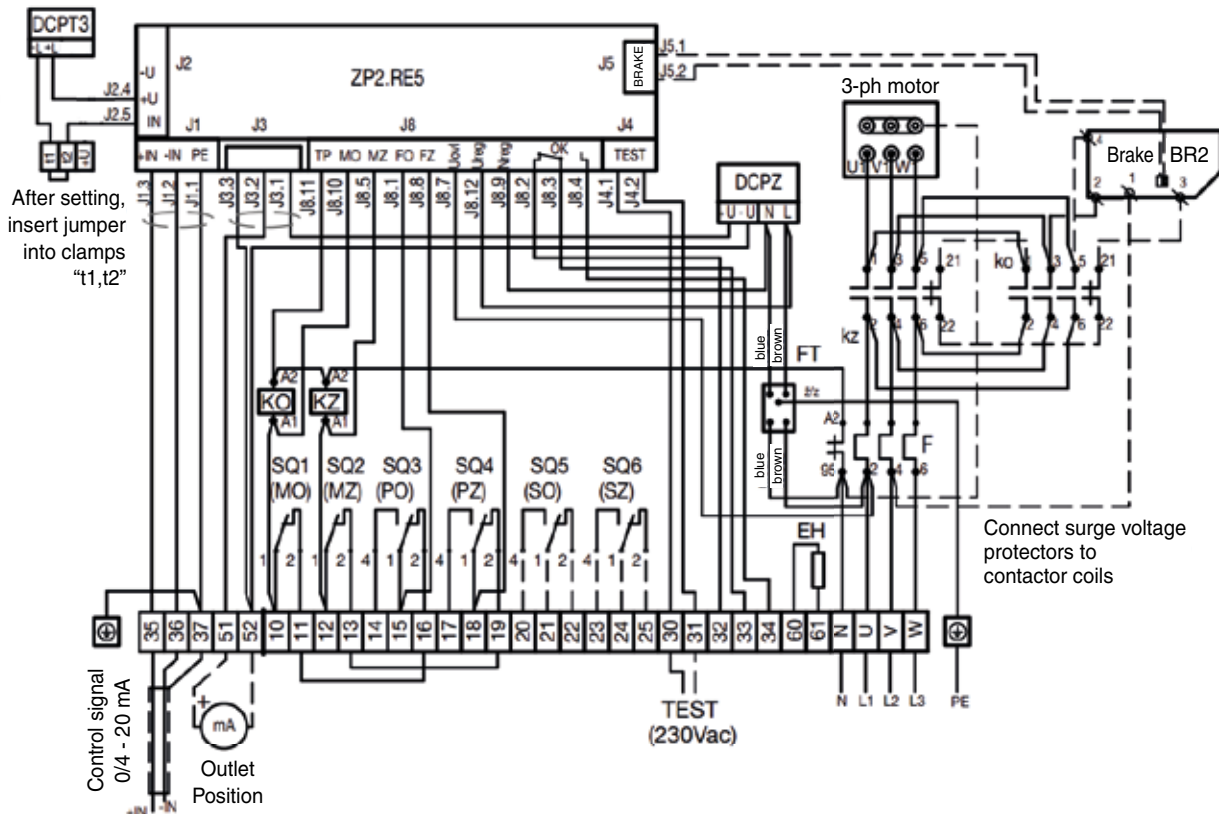
P3M-0948



Wiring diagram of **MODACT MTN, MTP Control** electric actuators
 – with contactors and ZP2.RE5 regulator

– with terminal board

P3-0949

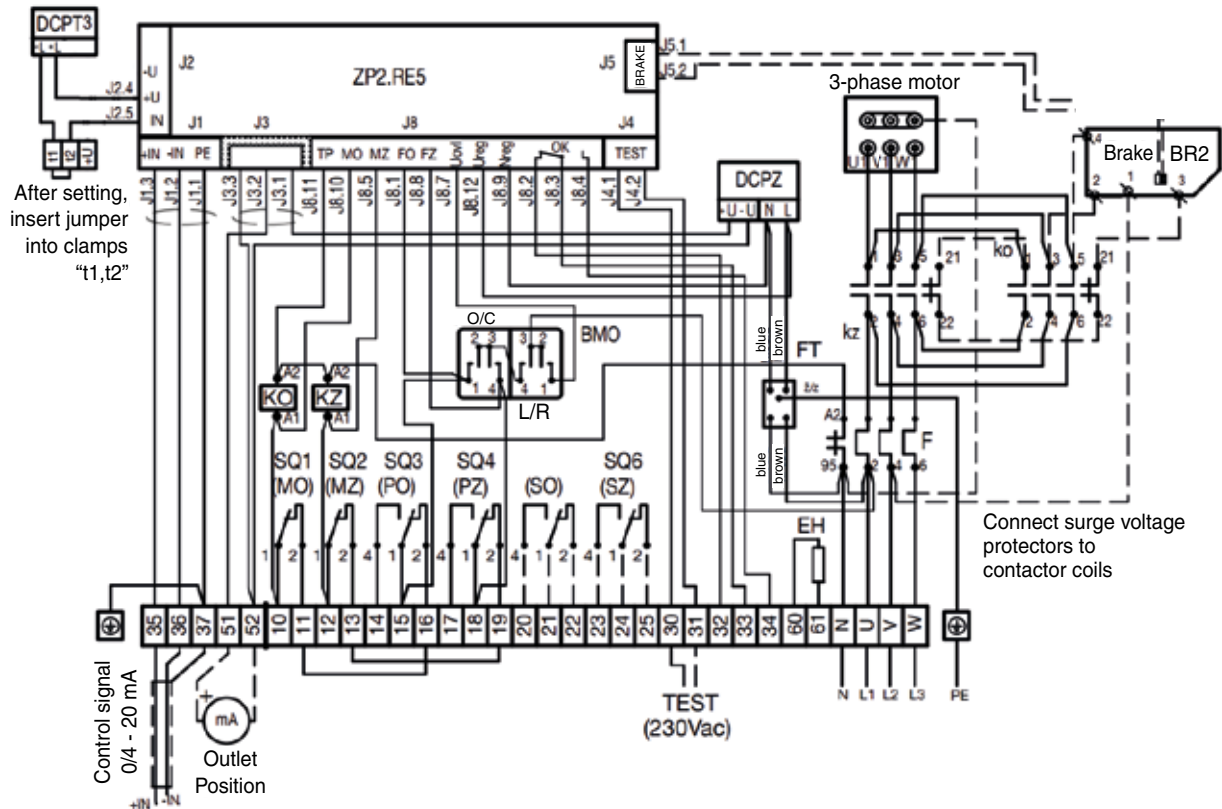


Wiring diagram of MODACT MTN, MTP Control electric actuators

– with contactors, ZP2.RE5 regulator and BMO

– with terminal board

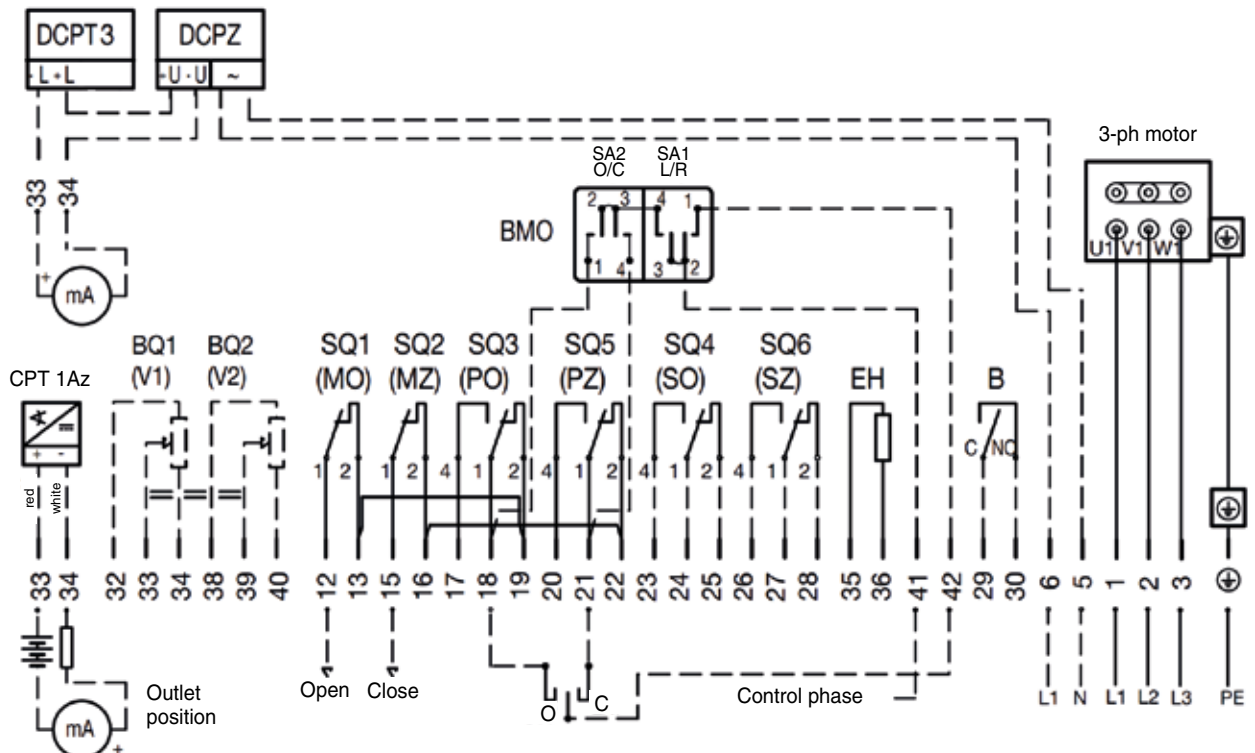
P3M-0950



Wiring diagram of MODACT MTN, MTP electric actuators

– with connector

P3M-0940E

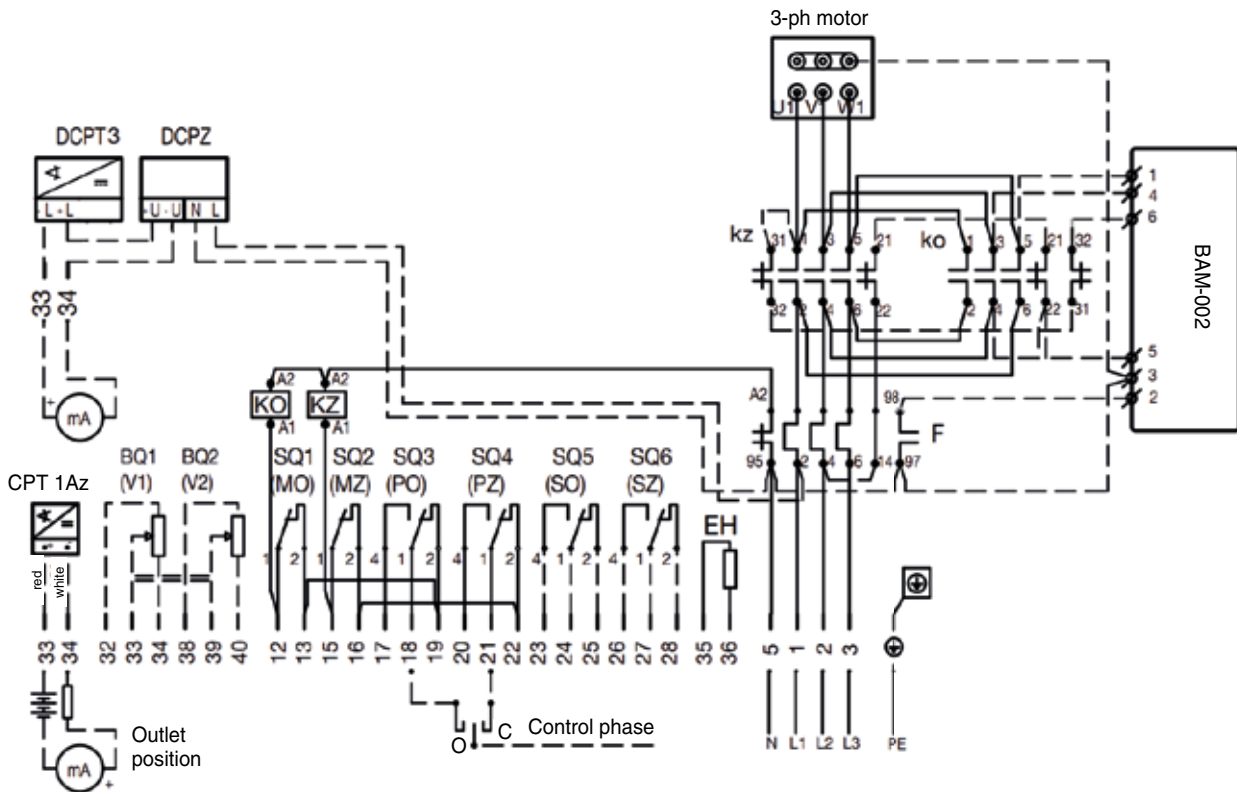


Wiring diagram of MODACT MTN, MTP Control electric actuators

– with contactors

– with connector

P3-0953

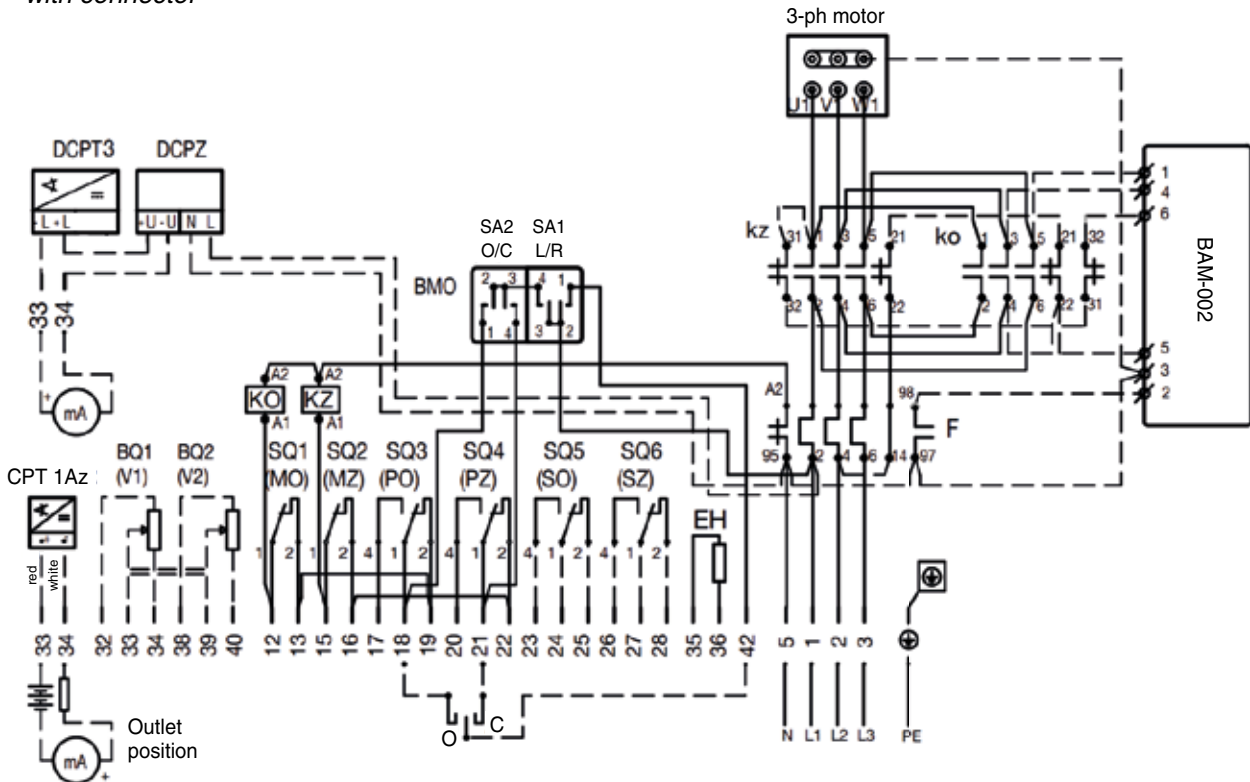


Wiring diagram of MODACT MTN, MTP Control electric actuators

– with contactors and BMO

– with connector

P3M-0954

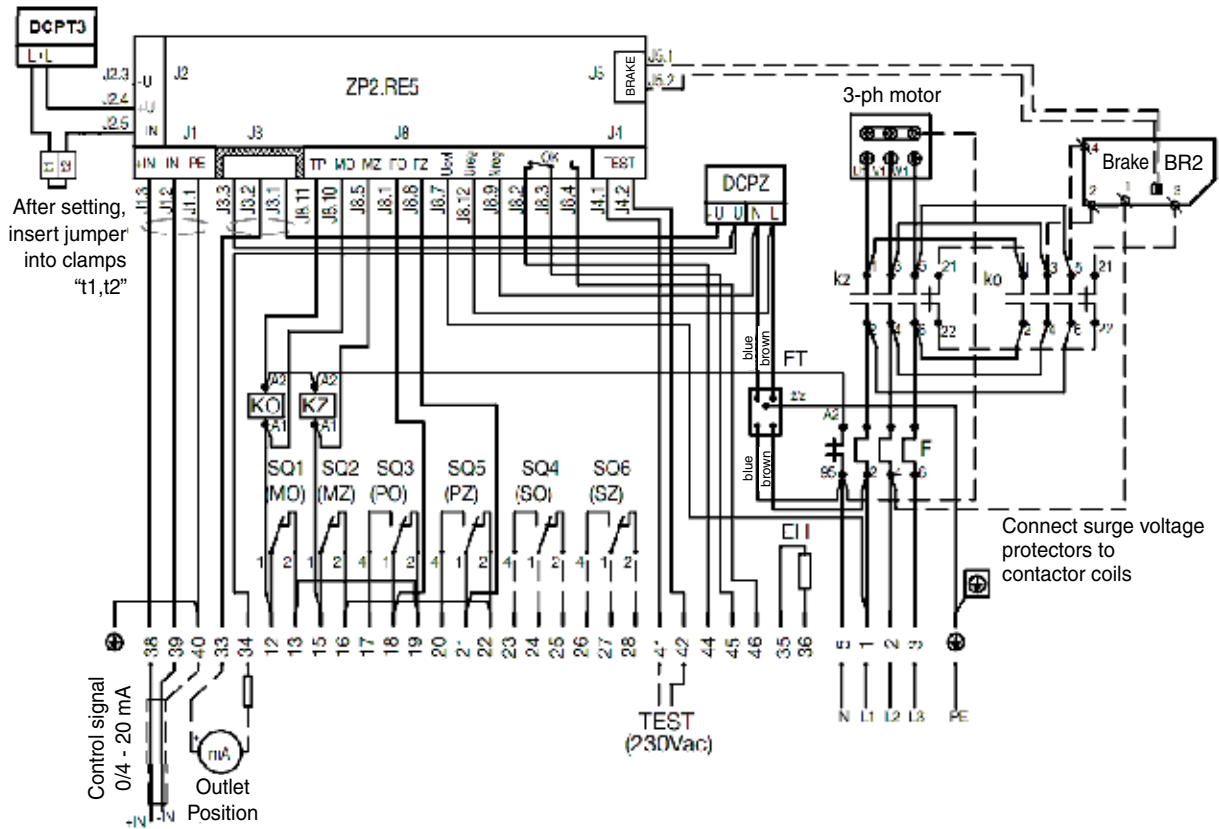


Wiring diagram of MODACT MTN, MTP Control electric actuators

– with contactors and ZP2.RE5 regulator

– with connector

P3-0955

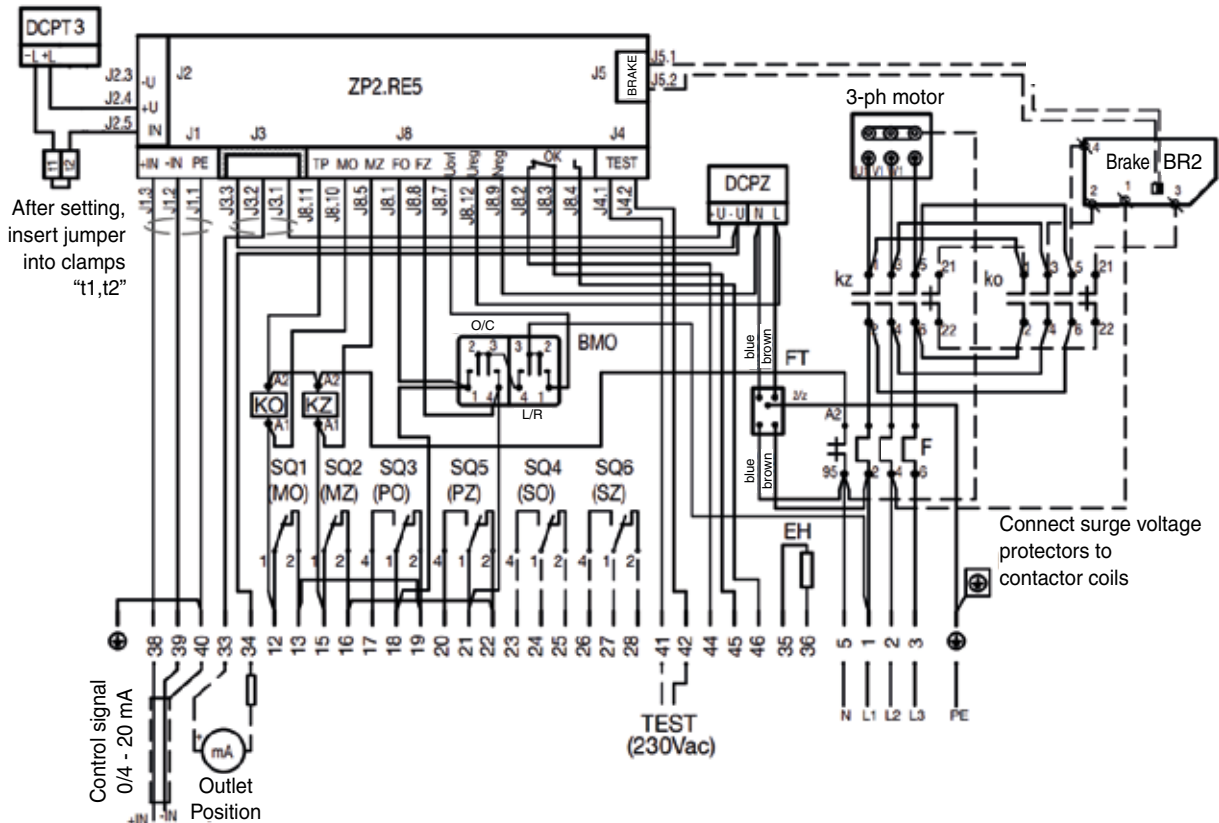


Wiring diagram of MODACT MTN, MTP Control electric actuators

– with contactors, ZP2.RE5 regulator and BMO

– with connector

P3M-0956





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