



Electric rotary
multi-revolution actuator

MODACT MON

Type no. 52 039

CERTIFICATE



Management system as per
EN ISO 9001 : 2000

In accordance with TÜV CERT procedures, it is hereby certified that



ZPA Pečky, a.s.
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Czech Republic

applies a management system in line with the above standard for the following scope

**Development and production of electric actuators,
enclosures and sheet metal production.**

Certificate Registration No. 04 100 950161
Audit Report No. 624 362/200

Valid until 2009-09-28
Initial certification 1995-03-01

G. Bräutigam

TÜV CERT Certification Body
at TÜV NORD CERT GmbH

Praha, 2006-09-29

This certification was conducted in accordance with the TÜV CERT auditing and certification procedures and is subject to regular surveillance audits.
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TGA-ZM-30-96-00



www.zpa-pecky.cz

APPLICATION

The actuators are designed for shifting control organs by reversible rotary motion (e.g. sliding valves and other devices for which they are suitable due to their parameters). Typical example of using is remote two-position or multi-position control of these organs for which tight closure in end positions is also required. The actuators fitted with current position transmitter are also suitable for automatic regulation in regime S4 - see Working regime.

OPERATING CONDITIONS

The **MODACT MON** actuators should withstand the effect of operating conditions and external influences, Classes AA7, AB7, AC1, AD5, AE5, AF2, AG2, AH2, AK2, AL2, AM2, AN2, AP3, BA4 and BC3, according to SN Standard 33 2000-3 (mod. IEC 364-3:1993).

If the actuator is to be installed in the open-air space it should be provided with light roofing for protection against direct atmospheric effects. The shelter should overlap 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 $-10\text{ }^{\circ}\text{C}$ and/or relative humidity above 80%, at a sheltered location, or in the tropical atmosphere, the anti-condensation heater built in in all actuators should be always be used. One or two heater elements should be connected, as required.

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

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

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

Therefore, the space in which the motor is located should be sufficiently large, clean and ventilated.

Classes of external influences:

Basic characteristics - as extracted from SN Standard 33 2000-3 (mod. IEC 364-3:1993).

- 1) AA7 – Simultaneous effect of ambient temperature of $-25\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$ with relative humidity from 10 % upwards
- 2) AB7 – Ambient temperature to Point 1); minimum relative humidity 10%, maximum relative humidity 100% with condensation
- 3) AC1 – Altitude 2,000 m above sea level
- 4) AD5 – Splashing water in all directions
- 5) AE5 – Small dust content of air; mean layers of dust; daily dust fall more than 35 mg/m^2 , but not exceeding 350 mg/m^2
- 6) AF2 – Corroding atmosphere and pollutants; the presence of corroding pollutants is significant.
- 7) AG2 – Average mechanical stress; in common industrial plants
- 8) AH2 – Medium vibrations; in common industrial plants
- 9) AK2 – Serious risk of growth of vegetation and moulds
- 10) AL2 – Serious danger of the occurrence of animals (insects, birds, small animals)
- 11) AM2 – Harmful effect of escaping vagabond currents
- 12) AN2 – Medium solar radiation with intensities $> 500\text{ W/m}^2$ and 700 W/m^2
- 13) AP3 – Medium seismic effects; acceleration $> 300\text{ Gal}$ 600 Gal
- 14) BA4 – Personal abilities; instructed people
- 15) BC3 – Frequent contact with the earth potential; persons coming frequently into contact with „live“ parts or standing on a conducting base

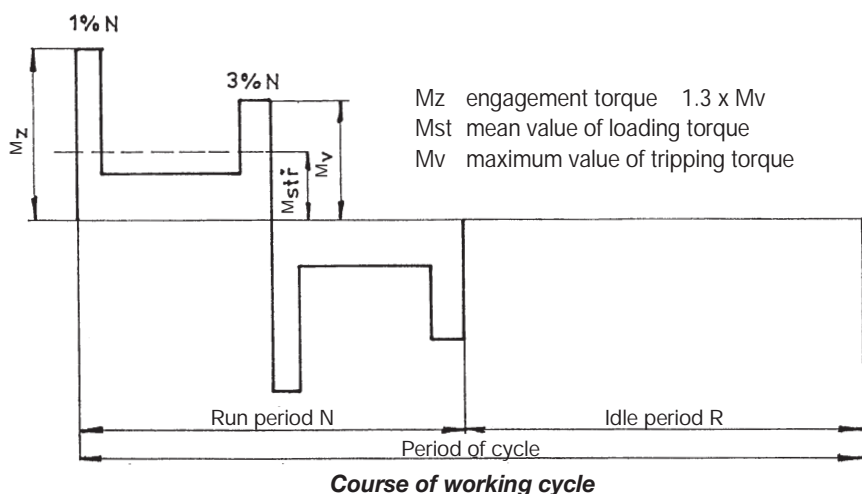
Working regime - frequency of switching

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

The actuators can also work in the regime of interrupted run with start-up S4 according to SN EN 60 034-1 (e.g. during gradual opening of valve etc.). The highest number of closing in automatic regulation is 1200 cycles per hour with load factor 25 % (the ratio of run/idle time is 1:3). Mean value of loading torque is not higher

than 40 % of maximum tripping torque. The longest working cycle (N+R) is 10 minutes; load factor (N/N+R) is max. 25 %.

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



Service life of actuators

Service life of actuators is 6 years, at the least.

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 |

TECHNICAL PARAMETERS

Basic technical parameters are listed in the design table.

Feeding voltage of electric motor: - 3 x 230/400 V, 50 Hz (or according to data on rating plate)

Type of protective enclosure of actuator: - IP 67, according to SN EN 60529.

Working position: - working position is arbitrary (position with motor heading down is not recommended)

Noise

Level of acoustic pressure A is max. 85 dB (A)

Level of acoustic power A is max. 95 dB (A)

DESCRIPTION AND FUNCTION

The actuators are designed for direct assembly on the control organ (valve, etc.). They are connected by means of a flange and a clutch according to SN 186314 (ST SEV 5448-85) or according to ISO DIN 5210 and DIN 3338.

Three-phase asynchronous motor drives, via a countershaft gear, the sun wheel of differential gearing installed on the supporting box of the actuator (power gearing). During the motor control, the crown wheel of the epicyclic differential is held in constant position by a self-locking worm gearing. The hand wheel connected with the worm provides for alternative manual control even when the electric motor is running, without any danger to the operator.

The output shaft is firmly connected with the carrier of the epicyclic gearing. The output shaft passes to the control box where all control elements of the actuator are installed (torque-limit switching unit, position-limit and signalling unit, heating resistance, and/or position transmitter).

Self-locking ability

According to these technical conditions, the actuator is self-locking provided that the load acts just in the direction against motion of the actuator output shaft. Self-locking ability is ensured by an arresting roller which will immobilize the rotor of the electric motor even in case of manual control.

In order to observe safety regulations, it is not permitted to use the actuators for driving transport lifting devices where persons can be transported or for devices where persons can be present under the lifted load.

Manual control

Manual control is directly accomplished by means of the hand wheel (without clutch) and is also possible when the electric motor is running (resulting motion of the output shaft is given by function of the differential). By rotating the hand wheel in the clockwise direction, the actuator output shaft also rotates in the clockwise direction (when viewing the shaft into the control box). Assuming the left thread of the valve nut, the actuator closes the valve.

Position transmitters

The MODACT MON electric actuators can be supplied without position transmitter, or can be equipped with a position transmitter.

a) Potentiometer of 1 x 100 ohm + max. 12 ohm between terminals 50, 52.

b) Passive current transmitter 4 – 20 mA, type CPT 1. 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 1 is set by a potentiometer on the transmitter body and its starting value by corresponding partial turning of the transmitter.

Technical parameters of CPT1:

| | |
|----------------------|---|
| Scanning of position | capacity |
| Working stroke | adjustable 0° – 40° to 0° – 120° |
| Linearity | 1 % |
| Loading resistance | 0 – 500 ohm |
| Output signal | 4 – 20 mA or 20 – 4 mA |
| Power supply | 18 – 28 V DC |
| Working temperature | -25 °C to +60 °C -25 °C to +70 °C (with feeding voltage max. 25 V DC and loading resistance 500 ohm permanently) |
| Dimensions | ø 40 x 25 mm |

c) Active current transmitter 4 – 20 mA, type DCPT. 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, discreteness 0.0879° |
| 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 (according to requirements of the customer, it should be specified in the order) |

Local position indicator

The actuators are fitted with a local position indicator that has been adapted for the full working stroke of the actuator, i. e., 90°.

Protective enclosure

Protective enclosure of the actuator is of type IP 67, according to SN EN 60529.

Table 1 – MODACT MON, t. no. 52 039, electric actuators - basic technical parameters
(electric motors ATAS Náchod are used)

| Type designation | Torque | | Shifting rate | Working stroke | Electric motor | | | | | | Weight | Type number | |
|------------------|----------|------------|---------------|----------------|----------------|---------|--------|---------|------------|---------|--------|-------------|---------------|
| | tripping | engagement | | | Type | Voltage | Output | Speed | In (400 V) | Iz / In | | Basic | Complementary |
| | [Nm] | [Nm] | | | | [V] | [kW] | [1/min] | [A] | | | 1 2 3 4 5 | 6 7 8 9 |
| MON 30/65 - 9 | 10-30 | 65 | 9 | 1,5-38 | T42RL... | 3x400 | 0,03 | 1395 | 0,24 | 2 | 17 | 52 039 | xx1x |
| MON 30/83 - 15 | | 83 | 15 | | T42RR... | 3x400 | 0,09 | 1300 | 0,34 | 2,5 | 17 | | xx2x |
| MON 30/58-25 | | 58 | 25 | | T42RX... | 3x400 | 0,15 | 1300 | 0,53 | 2,2 | 17 | | xx3x |
| MON 30/39-40 | | 39 | 40 | | T42RX... | 3x400 | 0,15 | 1300 | 0,53 | 2,2 | 17 | | xx4x |
| | | | | | | | | | | | | | |
| MON 30/54-9 | 10-20 | 54 | 9 | | NCT4C84 | 1x230 | 0,035 | 1390 | 0,52 | 1,5 | 17 | | xx5x |
| MON 30/56-15 | | 56 | 15 | | J42RT357 | 1x230 | 0,135 | 1320 | 1 | 1,7 | 17 | | xx6x |
| MON 20/27-25 | | 27 | 25 | | J42RT357 | 1x230 | 0,135 | 1320 | 1 | 1,7 | 17 | | xx7x |
| | | | | | | | | | | | | | |
| MON 60/140-9 | 30-60 | 140 | 9 | | T42RR... | 3x400 | 0,09 | 1300 | 0,34 | 2,5 | 17 | | xxAx |
| MON 60/83-15 | | 83 | 15 | | T42RR... | 3x400 | 0,09 | 1300 | 0,34 | 2,5 | 17 | | xxBx |
| MON 45/58-25 | 10-45 | 58 | 25 | | T42RX... | 3x400 | 0,15 | 1300 | 0,53 | 2,2 | 17 | | xxCx |

Meaning of complementary numbers in the actuator type number:

- 6th position – the way of mechanical connection:

- 1xxx - connection F07, shape C
- 2xxx - connection F07, shape D
- 3xxx - connection F07, shape E
- 4xxx - connection F10, shape C
- 5xxx - connection F10, shape D
- 6xxx - connection F10, shape E
- 7xxx - connection F10, shape A
- 8xxx - connection F10, shape B1

- 7th position – the required time of torque blocking:

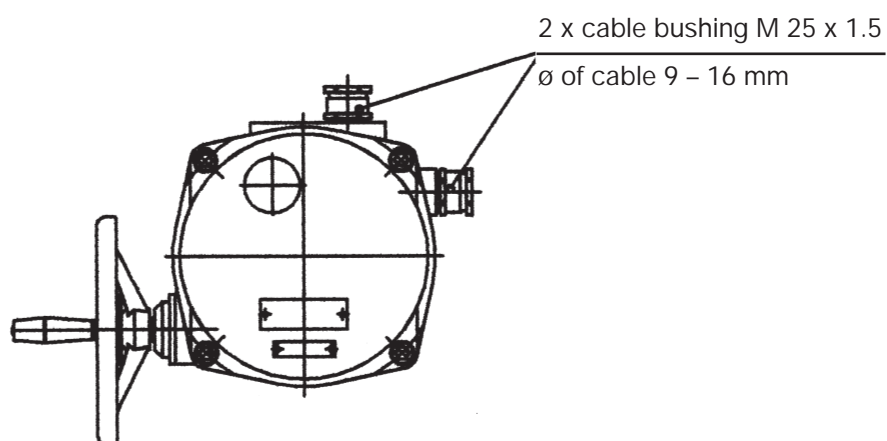
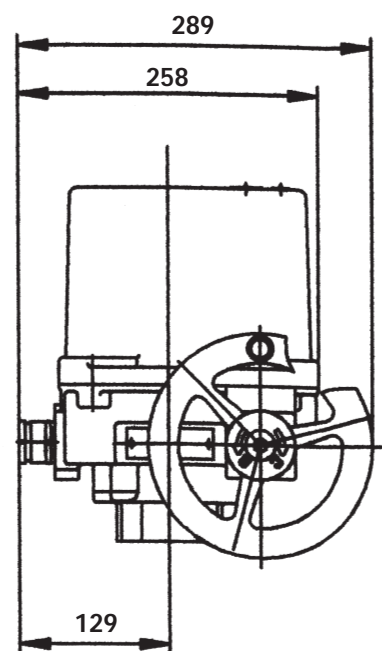
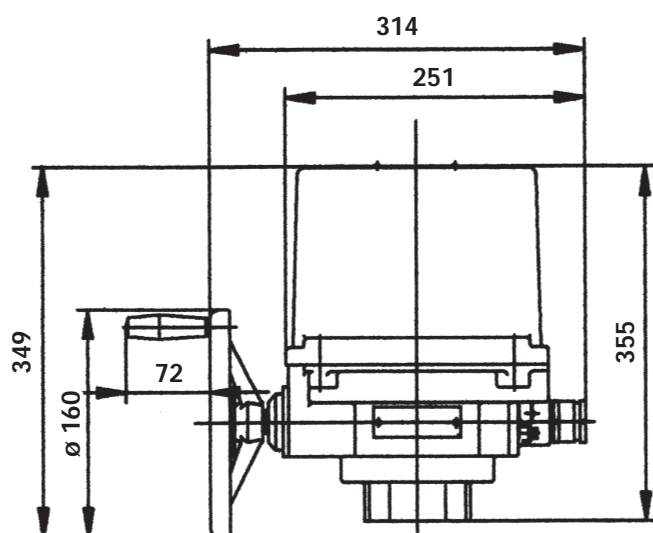
- x0xx - time of blocking between 1.5 and 3 revolutions of output shaft after reversing
- x1xx - time of blocking between 0.75 and 1.5 revolutions of output shaft after reversing
- x2xx - time of blocking between 0.4 and 0.75 revolutions of output shaft after reversing

- 8th position – resetting speed – see Table 1.

- 9th position – possible use of position transmitter:

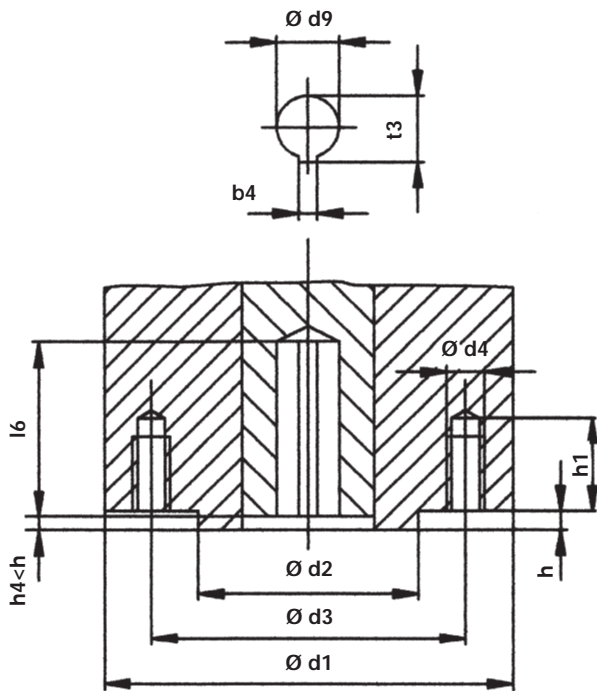
- xxx0 - without position transmitter
- xxx1 - resistance transmitter 1x 100 ohm
- xxx2 - current transmitter CPT 1/A
- xxx3 - current transmitter DCPT with feeding source

Dimensional sketch of actuator **MODACT MON**, type no. 52 039

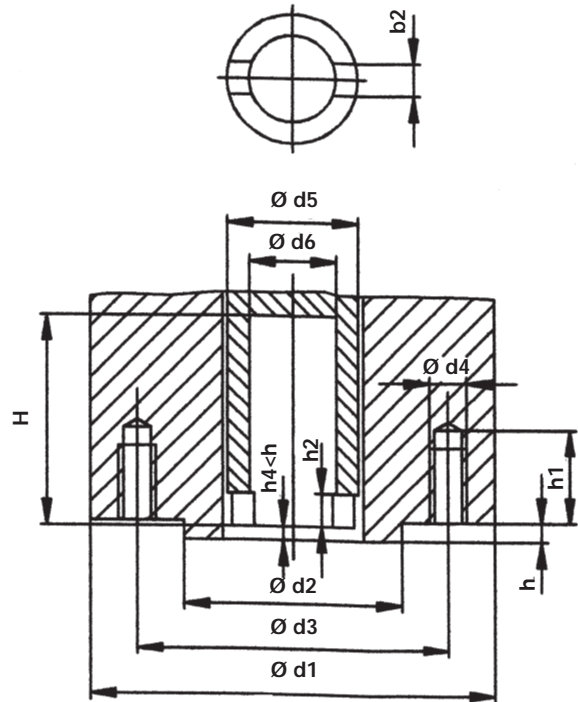


Mechanical connecting dimensions of actuator **MODACT MON**, type no. 52 039

Shape E



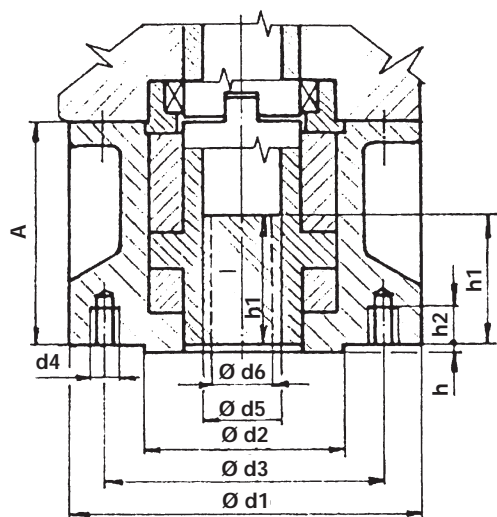
Shape C



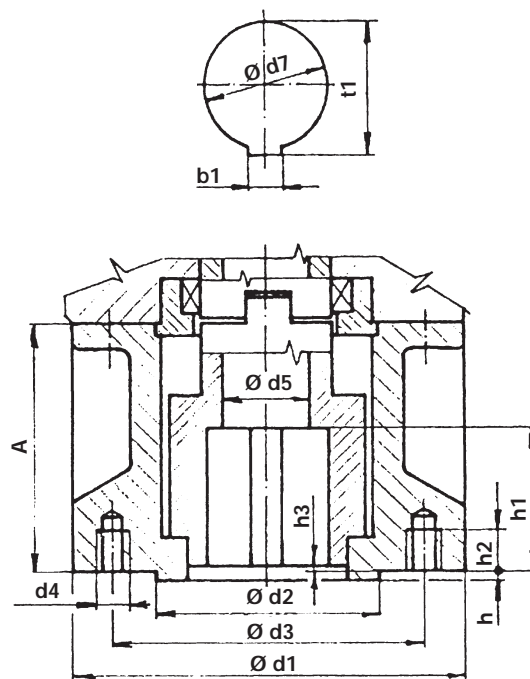
| Flange size | Common data for both shapes | | | | | | | Data for shape C | | | | | Data for shape E | | | |
|----------------|-----------------------------|--------|------|------|-----------------------------|----|---|------------------|----|-----|-------|------|------------------|--------|------|-------|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

Adapters to actuators **MODACT MON**, type no. 52 039

Shape A



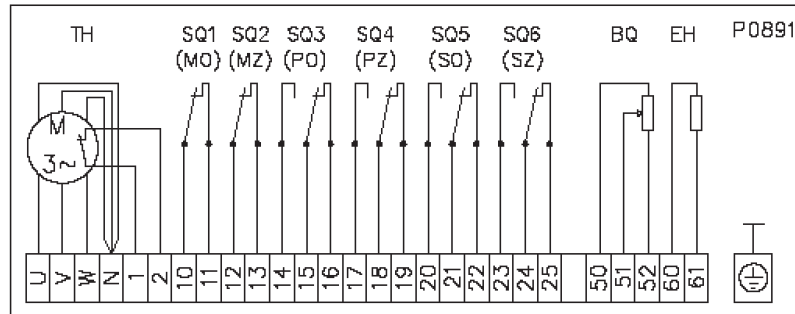
Shape B1



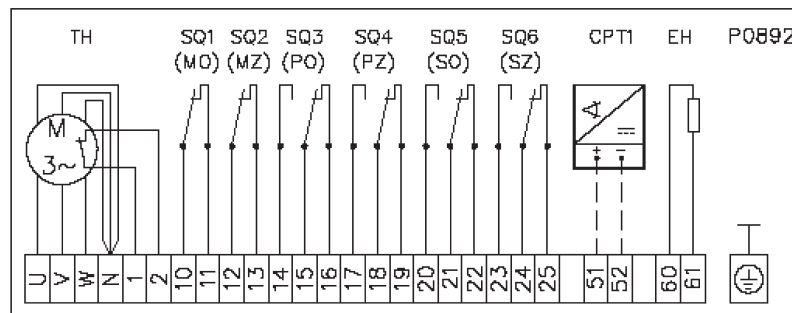
| | Dimension | 52 039 |
|------------------------------------|----------------------|--------|
| A, B1 (identical dimensions) | Ø d1 | 125 |
| | Ø d2 f8 | 70 |
| | Ø d3 | 102 |
| | Ø d4 | M10 |
| | number of holes Ø d4 | 4 |
| | h | 3 |
| | h2 min | 12,5 |
| A | A | 63,5 |
| | Ø d5 | 30 |
| | Ø d6 max | 26 |
| | h1 max | 43,5 |
| | l min | 45 |
| B1 | A | 63,5 |
| | Ø d5 | 30 |
| | l1 min | 45 |
| | h3 max | 3 |
| | b1 | 12 |
| | Ø d7 H9 | 42 |
| | t1 | 45,3 |

Wiring diagrams of **MODACT MON** electric actuators, type no. 52 039

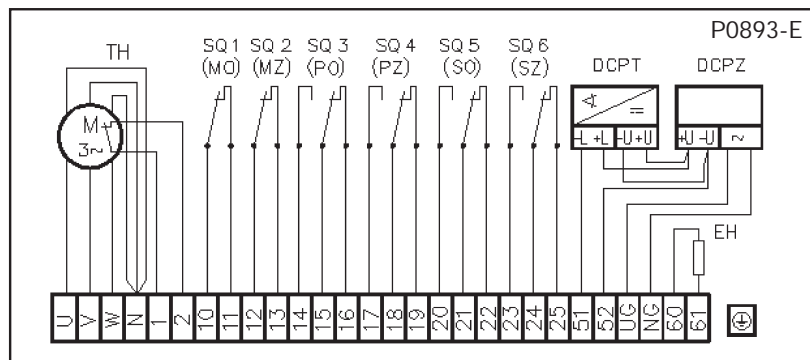
- Position transmitter: resistance 100 ohm



- Position transmitter: current 4 – 20 mA or without transmitter



- Position transmitter: current 4 – 20 mA with feeding source



LEGEND:

SQ1 (MO) - torque-limit switch „open“
 SQ2 (MZ) - torque-limit switch „close“
 SQ3 (PO) - position-limit switch „open“
 SQ4 (PZ) - position-limit switch „close“
 SQ5 (SO) - position signalling switch „open“
 SQ6 (SZ) - position signalling switch „close“

BQ - resistance transmitter 100 ohm
 CPT1 - current transmitter CPT 1/A
 DCPT - current transmitter DCPT
 DCPZ - feeding source for DCPT
 M3~ - three-phase asynchronous motor
 TH - thermo-contact
 EH - heating resistance

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

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



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

SURVEY OF PRODUCED ACTUATORS

KP MINI, KP MIDI

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

MODACT MOK, MOKED, MOKP Ex

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

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

Electric rotary multi-turn actuators

MODACT MO EEx

Explosion proof electric multi-turn actuators

MODACT MOA

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

MODACT MOA OC

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

MODACT MPR Variant

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

MODACT MPS Konstant, MPSED

Electric rotary (160°) lever actuators with a constant output speed

MODACT MTN, MTP, MTNED, MTPED

Electric linear thrust actuators with a constant output speed

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

