ZPA PEČKY, a.s.

**Electric Linear
(Pull-rod) actuators**

MODACT MTPED

Type number 52 441
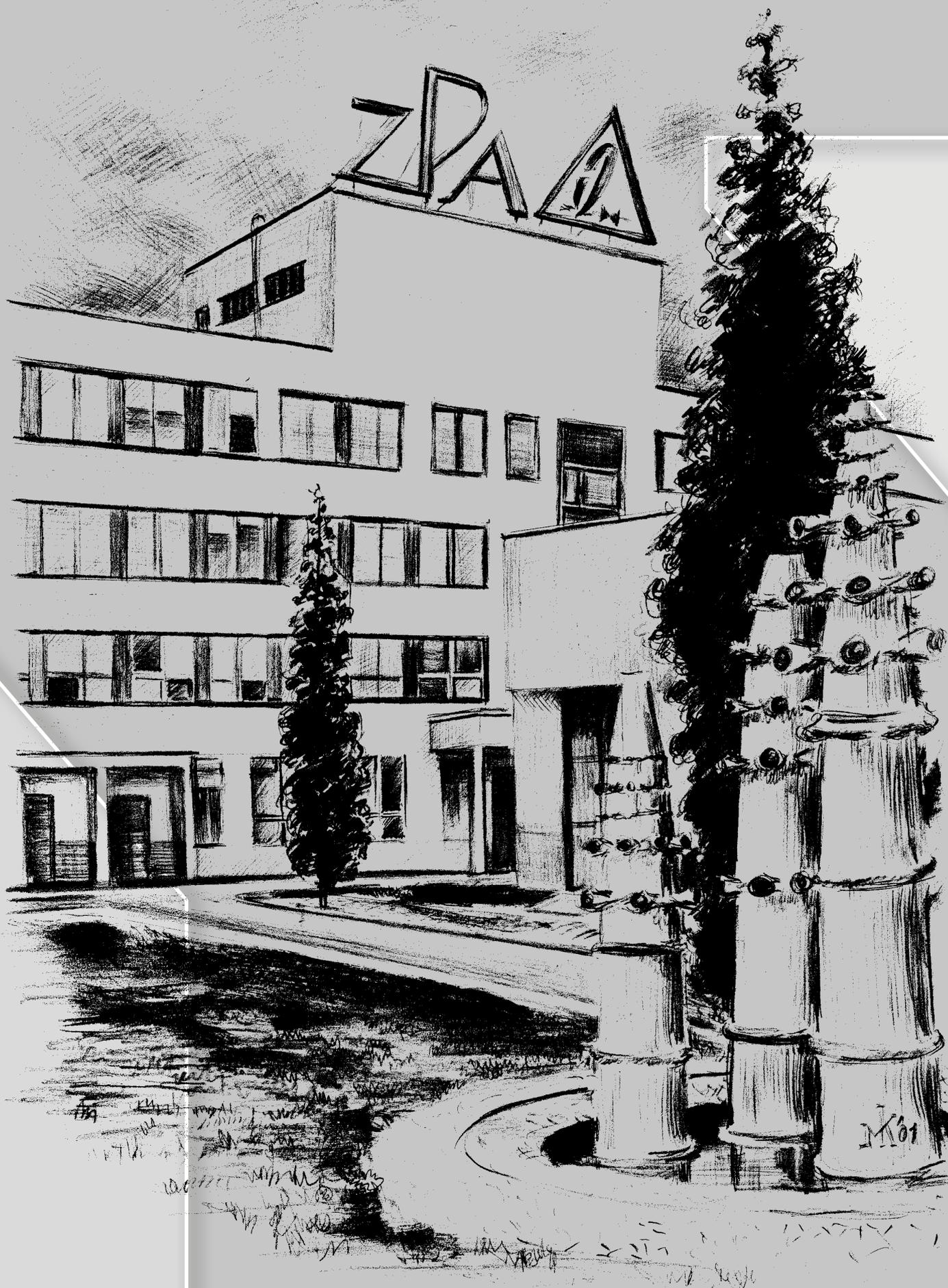
CONTENS

1. APPLICATION

The electric actuators **MODACT MTPED** t. no. 2 441 are designed for shifting valves by a reversible linear motion in circuits of remote control as well as automatic regulation. They can also be used for other devices for which they are suitable with their properties and parameters. Use in special cases should be discussed with the manufacturer.

2. WORK ENVIRONMENT, WORKING POSITION

Work environment

The actuators **MODACT MTPED** are resistant against influence 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 % or in an open area, it is always necessary to use a heating element fitted to all actuators.

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 becomes 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 MTPED** electric actuators ranges from -25 °C to +60 °C. Relative humidity from 10 % to 100 % with condensation.

Classes of external effects – extract from ČSN 33 2000-5-51 ed. 3:
Class:
1) AC1 – Altitude ≤ 2 000 m a.s.l.
2) AD7 – occurrence of water – shallow dipping – short-time
3) AE6 – intense dust content.
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 – normal level of signal voltage. No additional requirements.
10) AN2 – Medium solar radiation. Intensity > 500 and 700 W/m^2.
13) AP3 – Medium seismic effects. Acceleration > 300 Gal ≤ 600 Gal.

14) BA4   – Personal qualification. Instructed staff.

15) 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. WORKING MODE, SERVICE LIFE OF ACTUATORS

Working 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.

The maximum duty cycle is determined by the run time at a full stroke of the actuator.

F_Z Starting thrust $\geq 1,3 . F_V$
$F_{stř}$ Average mean load thrust
F_V Maximum mean tripping thrust

Course of working cycle
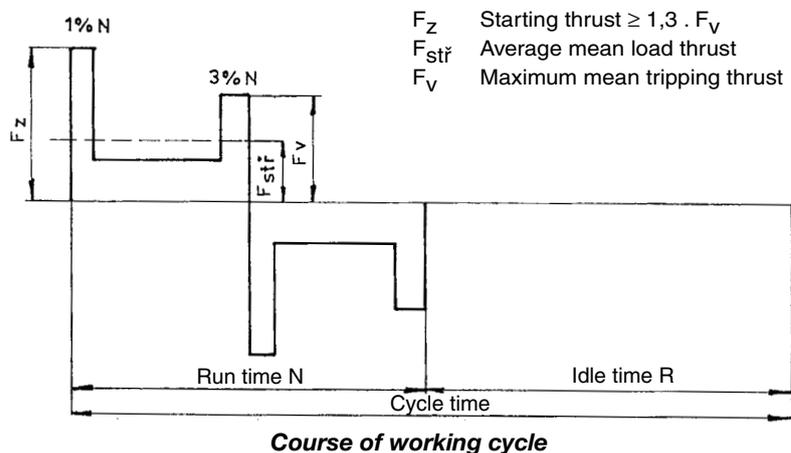
Service life of actuators

The actuator designed for shut-off valves must be able to perform at least 10,000 working cycles *(Close-Open-Close).* The actuator designed for regulation purposes must be able to perform at least 1 million cycles with running time *(when the output shaft is moving)* at least 250 hours. Service life in operating hours *(h)* depends on loading and number of switching actions. High frequency of switching is not always beneficial for precision of regulation. For reaching the longest possible faultless period and service life, it is recommended to set frequency of switching to the lowest possible number of switching actions necessary for the given process. Indicative data of service life derived from the set regulation parameters are shown in the following table.

Service life of electric actuators for 1 million starts

Service life [h]	830	1000	2000	4000
Number of starts [1/h]	Max. number of starts 1200	1000	500	250

4. TECHNICAL DATA

Supply voltage

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

Protection

Degree of protection of actuator – IP 67

Noise

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

Tripping thrust

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

Breakaway force

Breakaway force is a calculated value, determined by electric motor's breakaway torque, actuator's total ratio and by its effectiveness. Actuator can produce breakaway force after run reversing operation for 1 to 2 revolutions of the output shaft, while torque tripping is interlocked. Torque tripping is blocked only in the end positions. Blocking time is adjustable in the range from 0 to 20 s.

Self-locking

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

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

Working stroke

Working stroke is specified in Table 1.

Manual control

The actuators are controlled by a hand wheel directly *(without a clutch)* and control is possible even during operation of the electric motor. By turning the hand wheel clockwise, the output pull rod of the actuator rod extends *(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 FEATURES

Position indicator

The actuator can be equipped with a display as an option of the DMS2 ED electronics. In DMS2 electronics the actuator is equipped with a multi-line display.

Heating element

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. ELECTRICAL PARAMETERS

External electrical connection

The actuator is fitted with a terminal board providing connection to external circuits. Terminal board is provided with bolt terminals for connection of supply conductors of the electric motors with a maximum section of 4 mm². Connecting of signal conductors to the terminals of control circuits uses conductors with a cross section fo 1.5 mm². Terminal board is accessible upon removal of terminal box cover. All electrical control circuits of actuator are led to the terminal board. Terminal box is provided with cable bushings for electric connection of actuator. Electric motor is equipped with a separate terminal box. Alternatively, actuators with connector can be supplied with a connector.

Internal electrical connection of actuators

Internal electrical wiring diagrams of **MODACT MTPED** actuators including identification of terminals are included in the present Installation Manual.

In the actuator, the internal wiring diagram is depicted on the inner side of the electric actuator. The terminals are marked with labels on a selfe-adhesive sticker.

Isolation resistance

Isolation resistance of electric control circuits against the frame and against each other at normal conditions is min. 20 Mohm, after a dump test, isolation resistance of control circuits is min. 2 Mohm. Detailed data are in the technical conditions.

Electric strength of electric circuit isolation

Control circuits and circuit of anti-condensation heater		1 500 V, 50 Hz
Electric motor	U_n = 1 x 230 V	1 500 V, 50 Hz
	U_n = 3 x 230/400 V	1 800 V, 50 Hz

Deviations of basic parameters

Tripping thrust	±12 % of max. tripping thrust
Shifting speed	-10 % to +15 % of rated value
Output part clearance	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).*

7. DESCRIPTION AND FUNCTION

Design of the actuators **MODACT MTPED** Type No. 52 441 is based on a kit series of the actuators **MODACT MOPED** Type No. 52 039. In addition, they are fitted with a linear-thrust device converting rotation to linear motion.

The asynchronous electric motor drives, via a drive gearing, the central wheel of the differential gear located in the load-bearing box of the electric actuator *(force gear).* In motor control, the crown wheel of the epicyclic differential is held in constant position by a self-locking screw gear. The hand wheel connect- ed with the screw provides for alternative manual control even when the electric motor is running, without any danger to the operator.

The output shaft is fixedly connected with the epicyclic gear carrier and passes on to the control box where the control unit with the position sensor, torque sensor, and heating resistor are installed.

Actuators are composed of the following parts:

- Power part: It exports and transfers torque to the actuator output shaft; it includes single- or three-phase asynchronous electric motor, counter-shaft gearbox, planetary gearbox with output shaft, manual control mechanism with hand wheel, and floating worm. The output shaft is connected with a nut of the straight mechanism that converts rotary motion of the shaft to linear motion of the pulling rod.

- Control part: It ensured respective operating functions of the actuator, such as tripping from torque, tripping from position, signalling, and remote reporting on position. The anti-condensation heater 9 prevents condensation of water vapour under the lid of the control part. Cables are led in through two cable bushings M25x1.5. The cable bushings are tight for cable diameter 9 to 16 mm.

8. ELECTRONIC OUTFIT

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

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

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

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

DMS2 ED

Basic outfit:

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

Optional outfit:

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

Parameters:

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

Realization:

Replacement of electric-	The provided relay contacts substitute position, torque and signalling micro-switches, current feed-back signal 4 – 20 mA can also be brought out; the actuator is controlled by the superior control system with signals *"open"* and *"close".*
CONTROL	The electronics covers also function of the regulator; the output shaft position is controlled by analog input signal.

Function and setting of output relays

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

Relay MO, MZ, PO, PZ

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

In the version Control, the **function of relay MO/MZ** is same as that of motor relays.
Their operation is controlled by: **– regulation loop** *(deviation of required and actual position)*
                                              – active errors

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

Relays SZ, SO, READY

Relay **3/SZ** *- It usually signalizes position closed,* it can be chan-ged-over to any offered signalization Relay **4/SO** *- It usually signalizes position open,* it can be chan-ged-over to any offered signalization	Relay **READY** *- It usually signalizes errors + warning + not remote,* it can be changed-over to any offered signalization

	Relay 3/SZ Relay 4/SO		Ready Relay
Relé 3 / SZ Relé 4 / SO vypnuto poloha O poloha Z moment O moment Z moment a poloha O moment a poloha Z otevírání zavírání pohyb poloha poloha negovaná ovládání-místní ovládání-dálkové ovládání-vypnuto moment O nebo Z pohyb-blikač	OFF position O position Z torque O torque Z torque + position O torque + position Z opening closing motion position negated position local control remote control control OFF torgue O or Z motion - blinker	Relé Ready ▼ vypnuto varování chyby varování nebo chyby chyby nebo není dálkové chyby nebo var. nebo není dál. moment O nebo Z	OFF warning errors warning or errors errors or no remote errors or warning or no remote torgue O or Z

Setting program

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

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

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

Parametr – Parameter
Změna – Change
Chyba – Error
Přístup – Access
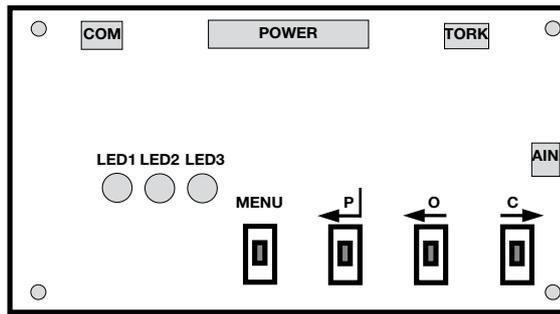Setrvačnost *(0,1 %)* – Inertia [0.1 %]
Setr. Doběh *(0,1 s)* – Inertial run-out [0.1 s]
Necitlivost *(%)* – Insensitivity [%]
NE – NO

PROCEDURE OF SETTING PARAMETERS BY MEANS OF PUSH-BUTTONS

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

Tlačítka a signálky LED na řídicí jednotce DMS2.ED.S a DMS2.ED.S90

Yellow	Red	Green	State
-	-	-	System without feeding
-	-	lit on	Everything OK – working regime *(remote, local or switched off control)*
-	blinking	lit on	Error or warning – working regime *(remote, local or switched off control)*
lit on	-	lit on	Input or output for setting parameters with push-buttons or setting parameters by means of PC
blinking	-	lit on	
blinking	blinking	lit on	Setting parameters with push-buttons
blinking	blinking	lit on	

When adjusting, we follow the paragraph *"VERIFICATION OF INSTRUMENT FUNCTION AND ITS LOCATION," "MOUNTING TO VALVE"* and *"ADJUSTING OF ACTUATOR WITH VALVE"* in this manual.

For safety reasons, the system is delivered in the state due to a Calibration error when functions are limited in order to reduce the risk of damaging the actuator by incorrect connection.

Entry of position CLOSED, OPEN and AUTO-CALIBRATION

– The servomotor must be adjusted so that the recorded position turns off the actuator before reaching the shutdown by torque. For a tight enclosure the control circuit is fitted only with torque relays for closed torque. Reset the actuator manually or electrically. The actuator in CONTROL version can be started from the menu MOTOR in the program DMS2. In this case, the actuator is not responding to the preset position and is stopped only by torque relays. When controlling from the MOTOR menu no torque can be invoked. It is necessary to leave the torque manually.

If during adjustment torque in the end position is achieved, it is necessary to exit the torque using the handwheel.

– Set the actuator to the closed position and using C button write the closed position by long pressing *(without entering the menu)*

– Set the actuator to the closed position and using C button write the open position by long pressing.

– Press P button to run the calibration routine *(in the remote control)* which, in three-position regulation measures the actual inertial mass of the system and stores it in the memory of the control unit. In two-position control the pressing of the P button only cancels the Calibration error.

– Entering end positions will at the same time set the signaling relays and the position transmitter.

– In the event that it is necessary to increase the stroke of the actuator and tripping is set to *"from position"* the actuator switches off during the adjustment at the position O or 100%. To further change of position press C or O, and while holding permanently the actuator can further be adjusted. After achieving her desired position pressing C or O will write the data in memory.

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

1. Tripping torques: 100% or set point value *(it is not recommended to change values without consulting the supplier of valves, etc.)*.

2. Relay 3 and relay 4:   signalling SZ 1 % and SO 99 % of the stroke

3. Blocking time: 2 – 8 s accordign to the actuator adjustment speed

4. Blocking position: 5 % of torque from end positions *(it is not recommended to change the value to more than 10 %)*

5. Position transmitter characteristics: Closed 4 mA, open 20 mA
6. Relay READY: Errors + warning + not remote

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

Overview of MENU

LISTING THROUGH MENU
–   The setting regime is opened by keeping depressed the push-button **MENU** for at least 2 s; the LED1 is then lit up.
–   By short pressing of   **MENU,** select basic MENU – menu M1 through M8 *(LED1 signalizes the menu number);* by short pressing of P, O, C you will open them *(LED2 signalizes particular parameter).*
–   By short pressing of P, select required value of the parameter. If the parameter can be set to several values they will be changed by short pressing of P *(number of LED2 blinking indicates its value).* By long pressing of P, the selected parameter is entered; the entry is confirmed by lit-up LED2.
–   By short pressing of MENU, gradually set the required menu and parameters.
–   After setting all required parameters, the setting menu is left by keeping depressed the push-button MENU for at least 2 s. The setting Menu will also be terminated in case that no push-button is depressed within one minute.

MENU 1 – Setting of tripping torques
–   After opening the menu by means of the push-button C or O, select the torque to be set.
–   By short pressing of P, select the value of the parameter 50 – 100 % to be set *(5 – 10 blinking of LED2)* and by long pressing of the push-button P the parameter is stored into the memory.

MENU 2 –Setting of function of signalling relays
–   Basic setting of the signalling relays is SZ 1 % and SO 99 % of the stroke.
–   In case that a different setting is required, it can be changed after shifting the actuator to the required position by means of the push-button C or O.
–   By means of the push-button P, basic setting SZ 1 % and SO 99 % of the stroke is performed.

MENU 3 – Setting of torque blocking in limit positions
–   By short pressing of P, select the value of blocking time 0 – 20 s to be set *(0 – 20x blinking of LED2)* and by long pressing of the push-button P the parameter is stored into the memory.
–   By long pressing of the push-button C, store the actual position for torque blocking on the Closed side into the memory.
–   By long pressing of the push-button O, store the actual position for torque blocking on the on the Open side.

MENU 4 – Setting of transducer characteristics
–   By short pressing of P, select the value 4 – 20 mA – 1 blinking of LED2 or 20 – 4 mA – 2x blinking of LED2 and by long pressing of the push-button P, store the parameter into the memory.

The menus below serve only for setting the board in the version Control
MENU 5 – Setting of control signal in 3P regulation
–   By short pressing of P, select the value   4 – 20 mA   - 1x blinking of LED2,
                                                       or 20 – 4 mA   - 2x blinking of LED2,
                                                       or 0 – 20 mA   - 3x blinking of LED2,
                                                       or 20 – 0 mA   - 4x blinking of LED2
    and by long pressing of the push-button P, store the parameter into the memory.

MENU 6 – Setting of insensitivity in three-position regulation
–   By short pressing of P, select the value 1 – 10 % *(1 – 10x blinking of LED2)* and by long pressing of the P push-button, store the parameter into the memory.

MENU 7 – Response to lost control signal in three-position regulation
–   By short pressing P, select the value   OPEN   - 1x blinking of LED2,
                                                    or CLOSE   - 2x blinking of LED2,
                                                    or STOP   - 3x blinking of LED2,
    and by long pressing of the push-button P, store the parameter into the memory.

MENU 8 – Way of tripping in limit positions in 3P regulation

– By short pressing of P, select the value   TORQUE   - 1x blinking of LED2,
                                                or TORQUE + PO   - 2x blinking of LED2,
                                                or TORQUE + PZ   - 3x blinking of LED2,
                                                TORQUE + PO + PZ - 4x blinking of LED2,

and by long pressing of the push-button P, store the parameter into the memory.

PROCEDURE OF SETTING PARAMETERS BY PROGRAM DMS2

– Before putting the actuator into operation, it is necessary to set some parameters of the system by means of the program DMS2 on PC.
– For safety reasons, the system is delivered in the state of an induced error of Calibration when its functions are limited in order to reduce the risk of damaging the actuator by incorrect connection. When the actuator is controlled by the program DMS2 its operation is stopped if any torque is induced.

Main window of setting program   **Selection of electronics**

Working torque

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

Writing of OPEN, CLOSED and AUTO-CALIBRATION position

The servomotor must be adjusted so that the recorded position stops the actuator before reaching the shutdown by torque. Reset the actuator manually or electrically. The actuator in CONTROL version can be started from the menu MOTOR in the program DMS2. In this case, the actuator is not responding to the preset position and is stopped only by torque. When controlling from the MOTOR menu no torque can be invoked. It is necessary to leave the torque manually.

CLOSED position write:
– In the desired position, press Z in the program and confirm consent with writing.

OPEN position write:
– In the desired position, press O in the program and confirm consent with writing.

Confirm the values entered by pressing the START button in DMS2 program. For actuator in version CONTROL switch the actuator into the remote control and press the START button to start auto-calibration. The actuator by briefly starting the motor in both directions measures inertia and switches to control mode. Information about the course of the auto-calibration is indicated next to the START button. Auto-calibration can not be started if the torque relay is off. It is necessary to leave the torque manually.

Other parameters

Check and, if necessary, change other parameters:

Control signal	4 – 20 mA, 20 – 4 mA, 0 – 20 mA, 20 – 0 mA
Insensitivity	1 – 10 %
Function in case of error	Open, Close, Stop, To position
Time of torque blocking in limit positions	0 – 20 s
Position of torque blocking in limit	1 – 10 %
Output of position signal	4 – 20 mA, 20 – 4 mA
Function READY	Combined error

Note: Signal READY is brought out as the relay contact on the terminal board. If an error or warning state has not been detected (setting is possible of what should be evaluated as an error or warning) the contact is closed; in case of an error, warning or if the power supply is electronically cut out the contact is opened. The state of the relay READY is indicated by the LED diode on the source board.

AUTO-DIAGNOSTICS

DMS2.ED performs continuously its diagnostics and, in case a problem is found, it signalizes warning or error. Warning or error are signalized by LED, display, and/or relay Ready. The warning has no influence on the system operation; the error stops the drive.

Assignment or switching-off of the warning and error is set in the window "Warnings and errors" of the setting program *(it is opened by clicking on one of the parameters Warning 1 – 4 or Error 1 – 4 in the window "Parameters").*

Error or warnings are reported by opening the READY relay and flashing red LED on the control unit. Specification of the particular error can be achieved by DMS2 program or found on the screen.

RESTORING PARAMETERS FROM BACKUP

When power is off simultaneously press O and C buttons. Then, turn on the power and wait for the red and yellow LEDs be lit. This will load backed up parameters.
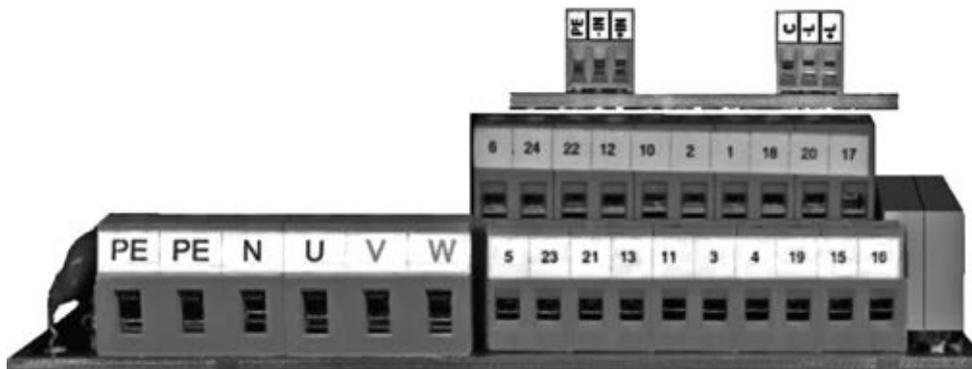
Terminal board of actuator with electronics DMS2ED.

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

List of warnings and errors

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

[1]*) The assignment can changed depending on version of firmware of the sensor control unit.*

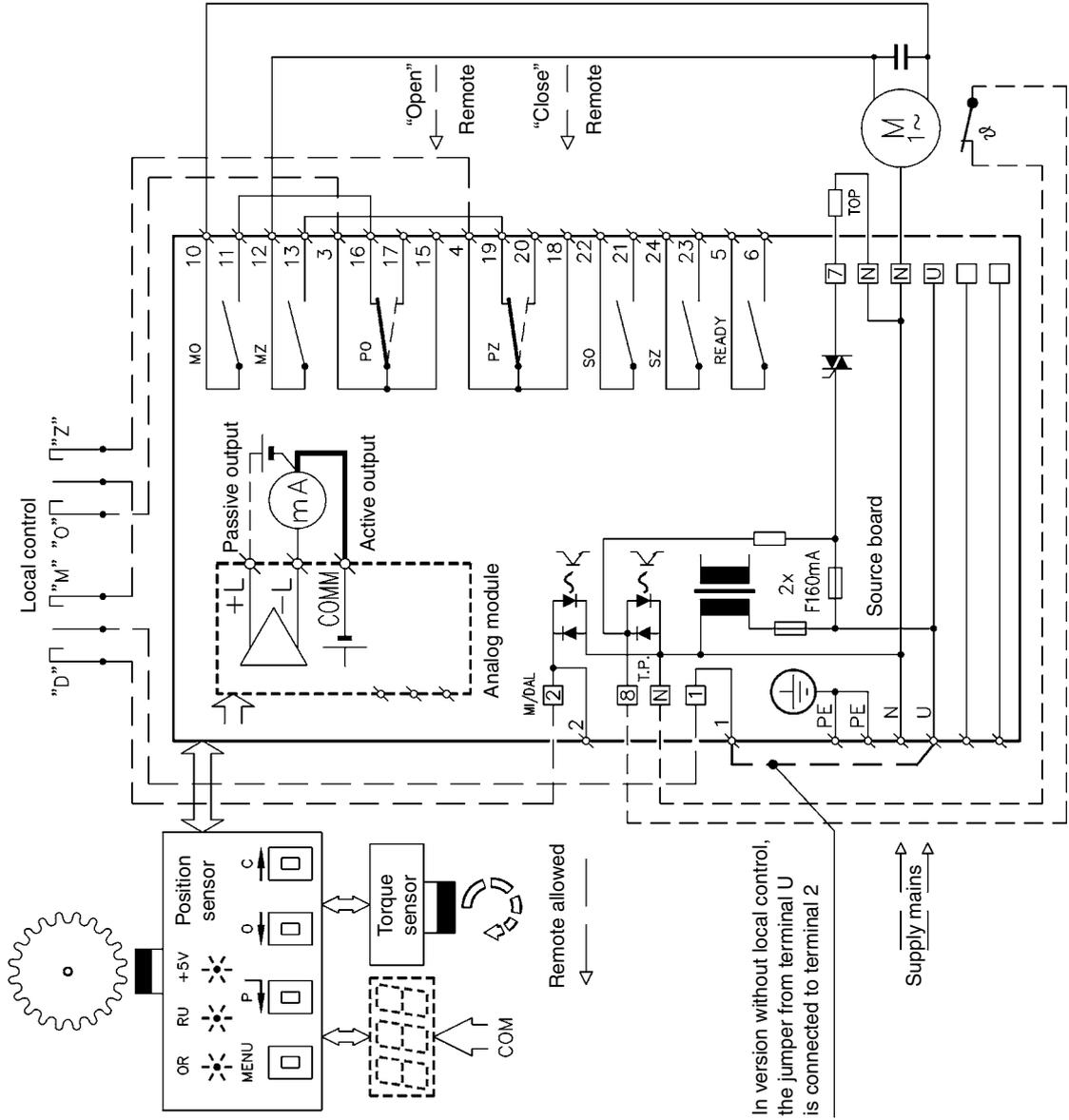** Valid for DMS2 only.*

Memory of number of induced errors

– For all detected warnings and errors, DMS2.ED uses a counter of occurrence of these warnings and errors during the system operation.

– Values of the counters are stored into the EEPROM memory and are preserved even in case of the mains supply fall-out.

– The error counters can be read and erased by means of a program for PC.

– The counters can be erased by a PC program with the authorization level "SERVICE".

Memory of recently induced warnings and errors

– DMS2.ED stores three recently induced warnings and errors in the EEPROM memory.

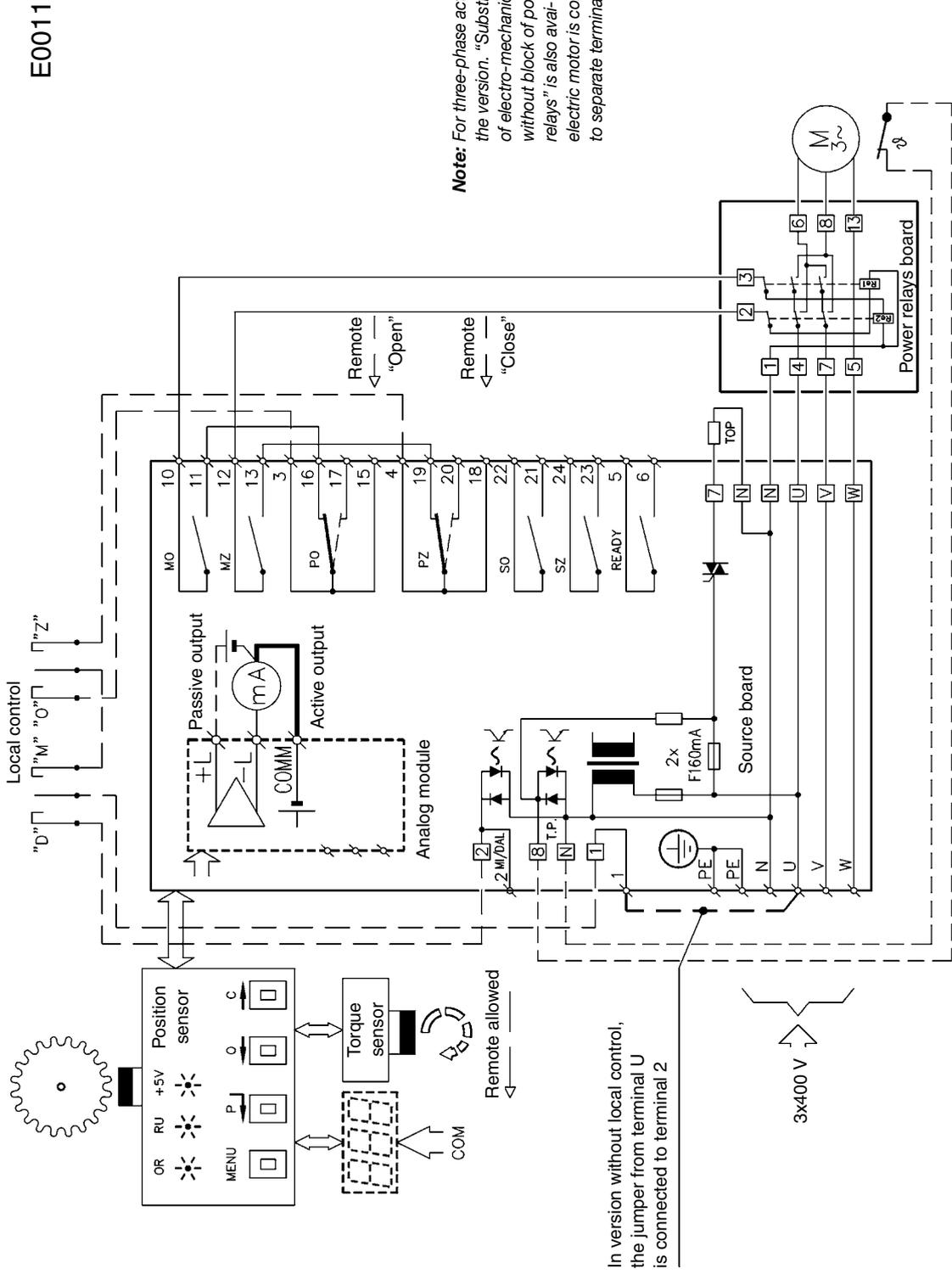– Recent warnings and errors can be displayed and erased by means of the PC program.

Example of wiring diagram of electronics **DMS2 ED** in version **Replacement of electro-mechanical board** with single-phase electric motor

E0010

Local control

"Z"   "M" "O"   "D"

Position sensor

OR   RU   +5v
MENU   P   C   O

Torque sensor

COM

Remote allowed

Passive output

Active output

+L   -L   COMM   mA

Analog module

MI/DAL   2   8   T.P.   N   1

"Open" Remote
"Close" Remote

10   MO
11   MZ
12
13
3
16   PO
17
15
4
19   PZ
20
18
22   SO
21   SZ
24
23
5   READY
6

7   TOP
N   N   U

M 1~

ϑ

Source board

2x F160mA

PE   PE   N   U

In version without local control, the jumper from terminal U is connected to terminal 2

Supply mains

14

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

Example of wiring diagram of electronics **DMS2 ED** in version **Replacement of electro-mechanical board** with three-phase electric motor

E0011

Note: *For three-phase actuator, the version. "Substitution of electro-mechanical board without block of power relays" is also avai- lable; electric motor is connected to separate terminal board.*

In version without local control, the jumper from terminal U is connected to terminal 2

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

Example of wiring diagram of electronics **DMS2 ED** in version **Control** with single-phase electric motor

E0012
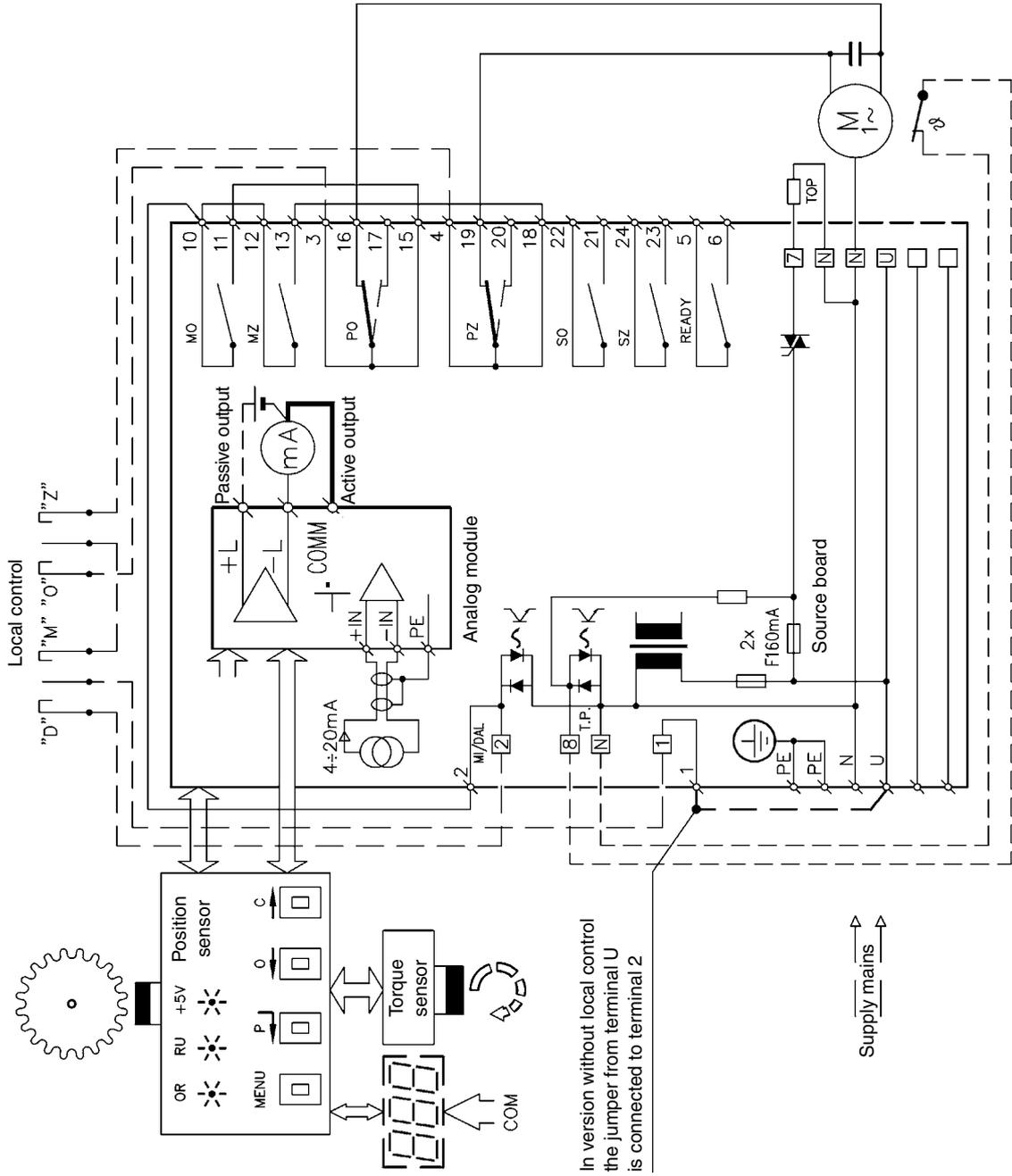
Note: *Here, contacts of relays MO, MZ, SO, SZ are shown with power supply switched off, with power supply switched off contacts PO, PZ are shifted to the position drawn in dashed line.*

Example of wiring diagram of electronics **DMS2 ED** in version **Control** with three-phase electric motor
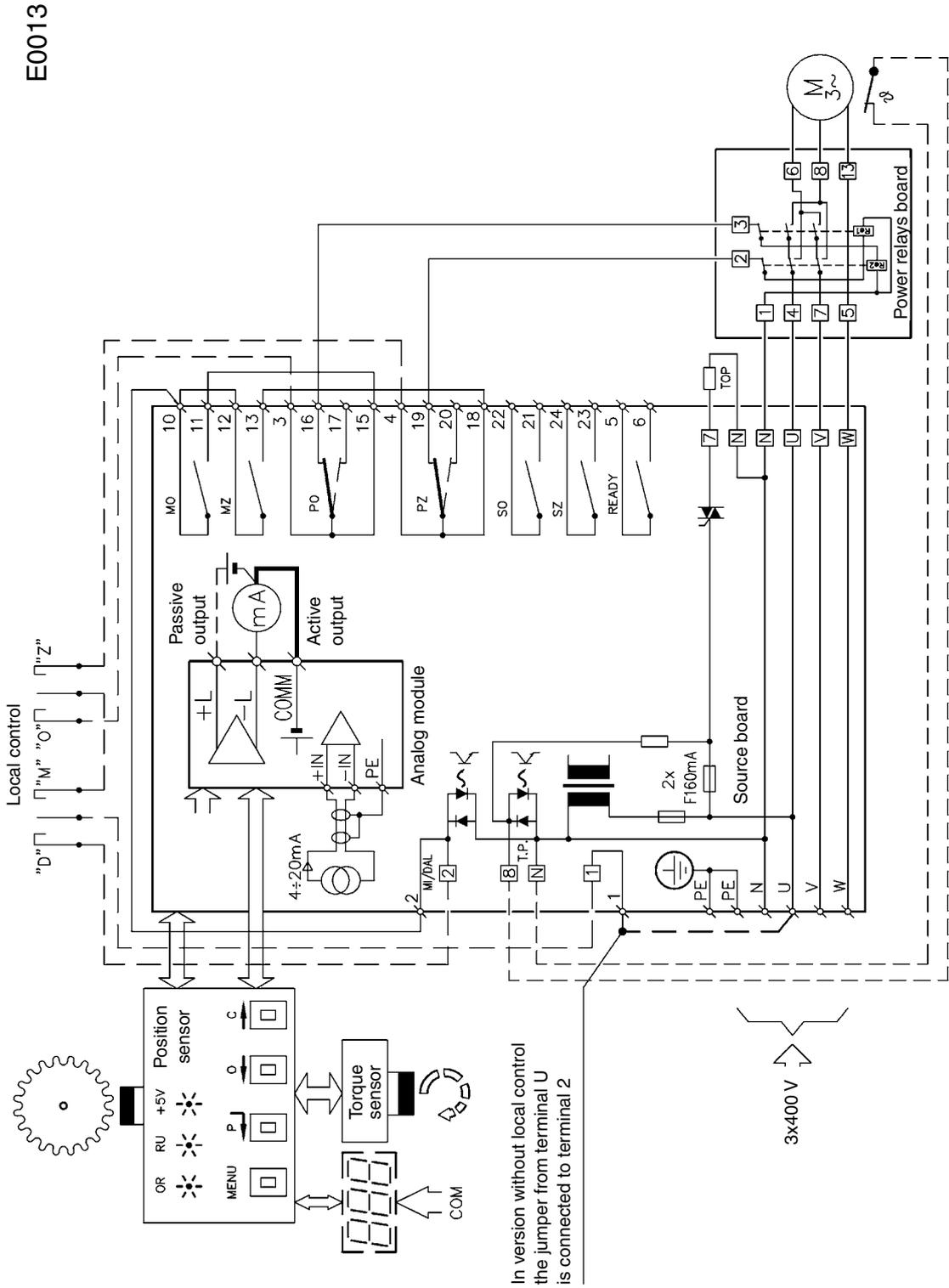
E0013

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

DMS2

Main features of DMS2:
– Complete control of the actuator operation by two and three-position regulation or connection to an industrial busbar Profibus.
– Well-arranged signalization of operating and service data on a character-type LCD display 2 x 12.
– Auto-diagnostics of error messages on an LCD display, memory of recent failure and number of occurrences of re- spective failures.
– Parameter setting by means of PC program or local control in case the actuator is fitted with the local control.

Basic outfit:
The control unit is a main part of the system DMS2; it includes:
– Micro-computer and memory of parameters
– Position sensors
– 2 signalling LED
– Connectors for connecting torque sensor, boards of relays and two-position inputs, source boards, communication adapter, LCD display, and local control.

The torque unit provides for scanning torque by a contact-less sensor.

Source unit – there are two types:
DMS2.ZAN for two- or three-position control of actuator with *"Open"* and *"Close"* binary signals or analog 0(4) – 20 mA signal.
DMS2.ZPR for controlling the actuator by PROFIBUS.
Both units contain a power supply for electronics, two relays for controlling power switches (contactors or contactless switches) electric motor monitoring of phase sequence (when the actuator is supplied with three-phase voltage) circuits for connection to a heating resistor and input terminals for connection of the electric motor thermal contact. On the units, there is a power terminal board for the mains supply. On the units there is a connector for display and local control.

DMS2.ZAN unit further comprises the following:
– input circuits for two-position and three-position control of the actuator and terminals to connect external control signals;
– SAFE signal Input – information on external fault;
– Relays – five in total, four *(signal)* can be set as a reporting position, torque or other operating states of the actuator, the fifth one *(Ready)* is used to report errors, warnings, and other conditions where the actuator can perfectly fulfil its function and terminals to which the relay contacts are outlet;
– The circuits of the current feedback signal – information on the position of the actuator output shaft.

DMS2.ZPR unit further comprises the following:
– circuits for communication with the master controller system via Profibus DP fieldbus, input and output terminals for connecting the bus and terminating resistors with switch

Display unit – two-line display, 2 x 12 alphanumeric characters
The key unit – sensors of **"open", "close", "stop"** buttons and the rotary switch **"Local, Remote, Stop".**
The actuator can be fitted with contactors or contactless switching of the electric motor, it can be equipped with electronic brake.

PROCEDURE OF SETTING PARAMETERS BY PROGRAM DMS2

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

Warning:
For safety reasons (to reduce the risk of damaging the actuator by incorrect connection), the system is delivered in the state of an induced error of Calibration when its functions are limited. When the actuator is controlled by the program DMS2 its operation is stopped if any torque is induced.

Note:
The setting program is same for the electronics DMS2ED. Main window and window Electronics selection – see figure on page 9.

Working torque

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

Tripping in limit positions

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

Limit positions – working stroke

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

Auto-calibration

– The auto-calibration can only be started by means of the program if no torque is induced. The torque must be left manually.
– The auto-calibration is started by the push-button Start in the program DMS2.
– Wait until the auto-calibration ends; the information on its course is signalized next to the push-button Start.

Other parameters

Check and, if necessary, change other parameters:

Control signal	4 – 20 mA	20 – 4mA	0 – 20 mA	20 – 0 mA
	2 position	Bus		
Insensitivity	1 – 1 0 %			
SAFE function	Open	Close	Stop	To position
SAFE active	O V	230 V		
Time of torque lock in the end positions	0 – 20 s			
Position of torque lock in the end positions	1 – 10 %			
Position signal output	4 – 20 mA	20 – 4 mA		
READY function - Combined error	Switched off	Warning	Errors	Warning or errors
	Errors or not remote	Errors or warnings or not remote	Torque "O" or "Z"	
Relay 1 – 4	Switched off	Position O	Position Z	
	Torque O	Torque Z	Torque and position O	Torque and position Z
	Opening	Closing	Motion	Position
	N position	Local control	Remote control	Control off
	Torque O/Z	Motion - flash lamp		
Relay 1 – 4 positions	0 – 100 %			

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

Auto-diagnostics

Table List of errors – same as for the electronics DMS2 ED *(page 10)*

Memory of number of induced errors

– For all detected errors, DMS2 uses a counter of occurrence of these errors during the system operation.
– Values of the counters are stored into the EEPROM memory and are preserved even in case of the mains supply failure.
– The error counters can be read and erased by means of the program for PC.

Memory of recently induced error

– DMS2 stores 3 recently induced errors into the memory EEPROM.
– DMS2 allows for errors can be displayed and erased by means of the program on PC or by switches of local/remote control.
– On display in the MENU 22 INFORMATION keys scroll ERROR 1, ERROR 2, ERROR 3, ERROR 1is the last error.

Setting parameters using the local control buttons

Signalling of the modes of operation using LEDs onboard the position encoder:

Red	Green	Status
-	-	System without power
-	lit on	Everything OK – working mode *(control remote, local or off)*
blinking	lit on	Error or warning – operating mode *(control remote, local or off)*
lit on	lit on	Setting parameters using the buttons or PC

Signalling modes of operation using the display:
The display shows the position of the actuator in %, status of local control or torque achieved. During an error this state alternates with the number of actual error. With multiple errors, these errors are repeated cyclically.

Overview of the MENU

	Name	Parameter value	Meaning
1	JAZ/LANGUAGE	CESKY	Menu Language
		ENGLISH	
2	POSITION O, Z	OPEN POSITION	End position open or closed
		CLOSED POSITION	
3	CALIBRATION	RUN	Starting of the auto-calibration
4	END POSITION	TORQUE	Tripping in the end positions
		TORQUE+POSITION O	
		TORQUE+POSITION Z	
		TORQUE+POSITION O+Z	
5	TORQUE PR. O	50 – 100 %	Torque working open *(selection 50-69% depends on the Min. torque parameter)*
6	TORQUE PR. Z	50 – 100 %	Torque working closed *(selection 50-69% depends on the Min. torque parameter)*
7	TIME BLOCK. TORQUE	0 – 20 s	Torque blocking time
8	POSITION BL. O	0 – 50 %	Torque blocking position open
9	POSITION BL. Z	0 – 50 %	Torque blocking position closed
10	CPT	4 – 20 mA	Characteristics of the current transmitter
		20 – 4 mA	
11	CONTROL SIGN.	4 – 20 mA	Analogue control signal
		20 – 4 mA	
		0 – 20 mA	
		20 – 0 mA	
12	INSENSITIVITY	1 – 10 %	Deadband
13	SAFE	OPEN	Response signal Safe and loss of control signal
		CLOSE	
		STOP	
		TORQUE	

	Name	Parameter value	Meaning
14	SAFE ACTIVE	0 V	Active signal Safe
		230 V	
15	TP SAFE	SAFE blocks	Reaction upon activation of thermal fuse
		SAFE active	
16	TP RESET	AUTOMATICALLY	Resetting thermal fuse
		LOCAL CONTROL	
17	RELAY READY	SWITCHED OFF	Relay function Ready
		WARNING	
		ERRORS	
		VAR. + ERRORS	
		ERRORS + NOT D	
		VAR + ERRORS + ND	
		TORQUE O/Z	
18	RELAY 1	SWITCHED OFF	Function Relay 1
		POS. OPEN	
		POS. CLOSED	
		TOR. OPEN	
		TOR. CLOSED	
		POS. O + TOR. O	
		POS. Z + TOR. Z	
		OPENS	
		CLOSES	
		MOVEMENT	
		POSITION	
		POS. N.	
		CNTRL. LOCAL	
		CNTRL. REMOTE	
		CNTRL. SWITCHED OFF	
		TORQUE O/Z	
		MOTION-FLASH LAMP	
19	RELAY 2	same as RELAY 1	Function Relay 2
20	RELAY 3	same as RELAY 1	Function Relay 3
21	RELAY 4	same as RELAY 1	Function Relay 4
22	INFORMATION	SENSOR	System Information
		DISP I	
		DISP E	
		DISP ED	
		FLDBUS	
		ERROR 1	
		ERROR 2	
		ERROR 3	
		TORQUE	
		TEMPERATURE	
23	PAR BACKUP	RESTORE PAR	Creating backup of parameters, restoring from backup parameters
		CREATE BACK	
24	ADDRESS	1 – 125	Actuator address on fieldbus
25	CLOCK MOD	SWITCHED OFF	Clock mode
		DIRECTION O	
		DIRECTION Z	
		DIRECTION O+Z	
26	CLOCK RUN	1 – 250 s	Motor runtime in clock mode
27	PAUSE CLOCK	1 – 250 s	Motor pause time in clock mode

Setting the actuator using buttons:

– Set the local control switch to the OFF position

– Long press the STOP button to enter the menu. Using the O or Z button to list through the menu *(MENU1 – MENU27).* In the selected menu briefly press the STOP button to enter this menu and press O or Z to select parameter. Long press the STOP button to write the parameter to memory. Shortly press the STOP to exit the setting of parameters and you can browse to the next menu.

Exist the setup menu by long pressing the STOP button or behind the last MENU 27 there is the item END, in which a long press of STOP button end the setting mode.

Setting the end positions using the local control buttons

Set the LOCAL – REMOTE control switch to the OFF position. Long press the STOP button to enter the setting menu. Use the *"Z"* button to lis the MENU2. Briefly press the STOP button to select *"O"* position setting. Set the switch in the "LOCAL" and run the actuator. After achieving the desired position switch the switch to *"OFF"* position and long press the "STOP" to write the position in the memory.

Briefly press the *"Z"* button to select *"Z"* position setting. Switch the switch again in the *"LOCAL"* position and run the actuator in the *"Z"* direction. After achieving the desired position switch the switch to *"OFF"* position and long press the "STOP" to write the position in the memory.

By briefly pressing the *"STOP"* button exit MENU 2. Long press the *"STOP"* button to leave setting mode. By switching local control to OFF position and entering the menu *(by long pressing the STOP button)* and switching to *"LOCAL"* position it is possible to adjust the actuator with the *"O"* and *"Z"* button over the set end position. In this case the actuator trips only when the set tripping torque is achieved.

Autocalibration

In the setting mode navigate to MENU 3. Shortly press the *"STOP"* button to enter the MENU 3, and long press the *"STOP"* to run the auto-calibration. The actuator by briefly starting the motor in both directions measures inertia. Completion of auto-calibration is announced by AUTOCALIBRATION OK message.

By briefly pressing the *"STOP"* return to MENU 3 and long press the *"STOP"* button to leave the setting mode.

Terminal board of actuator with electronics **DMS2**
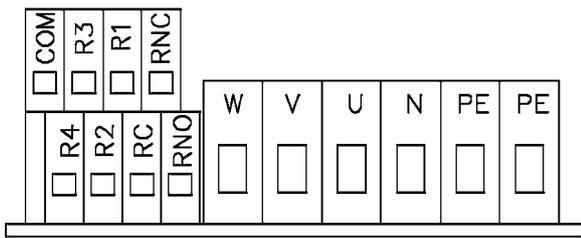
**Terminals on source board**
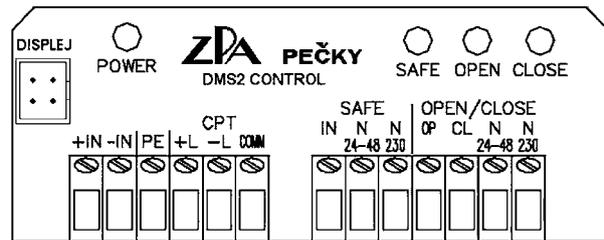
Terminals in local control box

If the actuator is of the single-phase version the power supply is connected to terminals **PE, N, U** only. Terminals **V, W** remain unconnected.


Local control with two-line display

Note:
   The setting program enables data to be copied from the memory of parameters of the electronics DMS2 and DMS2ED into the computer as a file with suffix „par" (in the example in the figure the file 52 030.par is created in the directory Flash). The file can serve as a back-up for the case that it will be necessary to replace the position sensor in the given actuator and to set it in the same way as the replaced one; or it can be sent as an enclosure to e-mail to the manufacturing or service firm in solving possible problems.
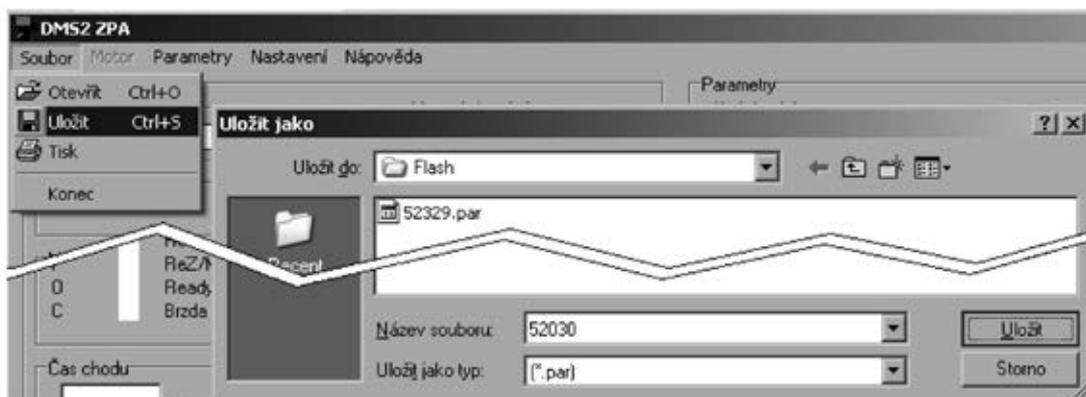
Example of wiring diagram of system **DMS2** in version for control with signals "open" and "close" or in version for control with analog current signal with single-phase electric motor

E0014
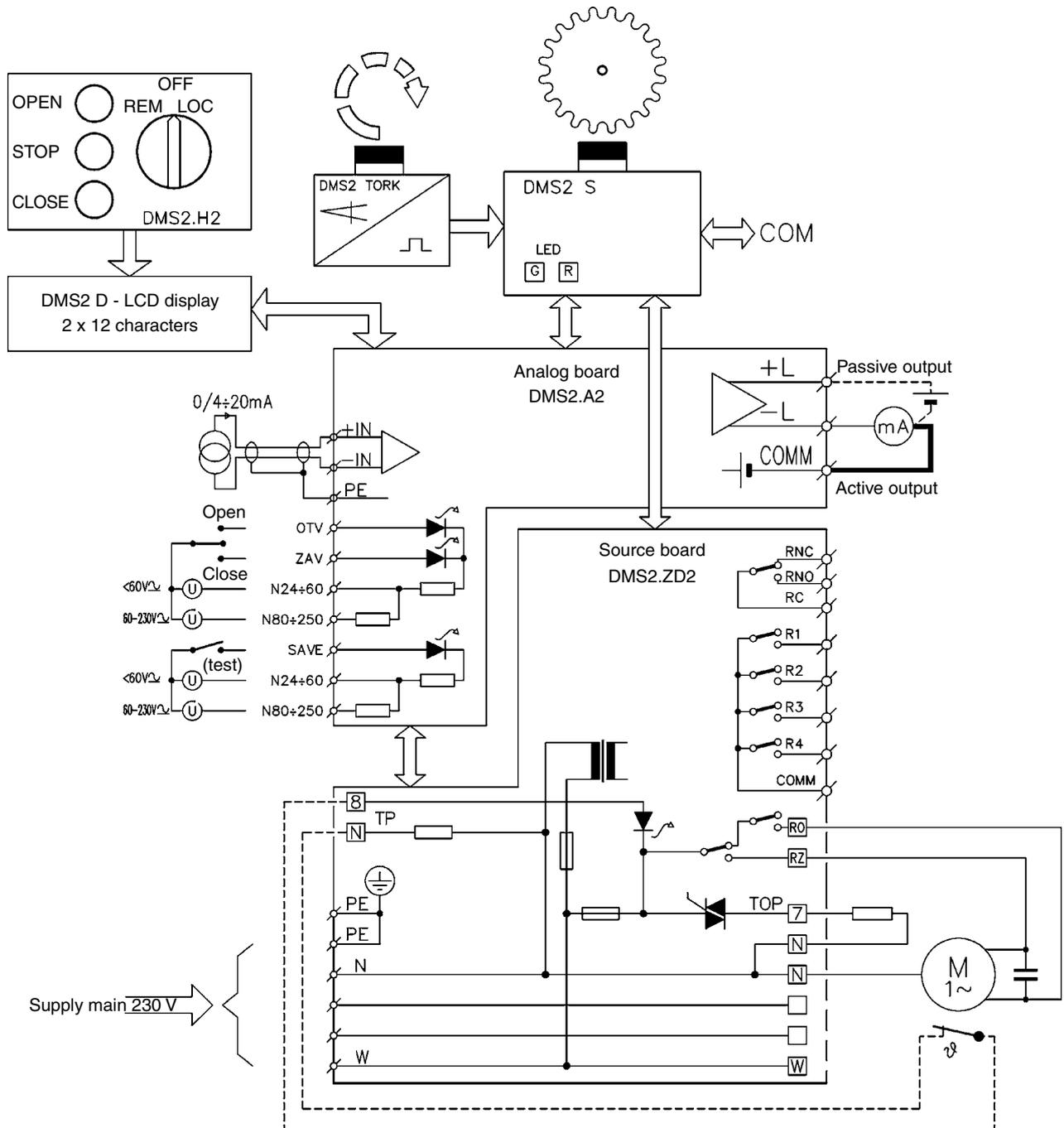
Example of wiring diagram of system **DMS2** in version Profibus
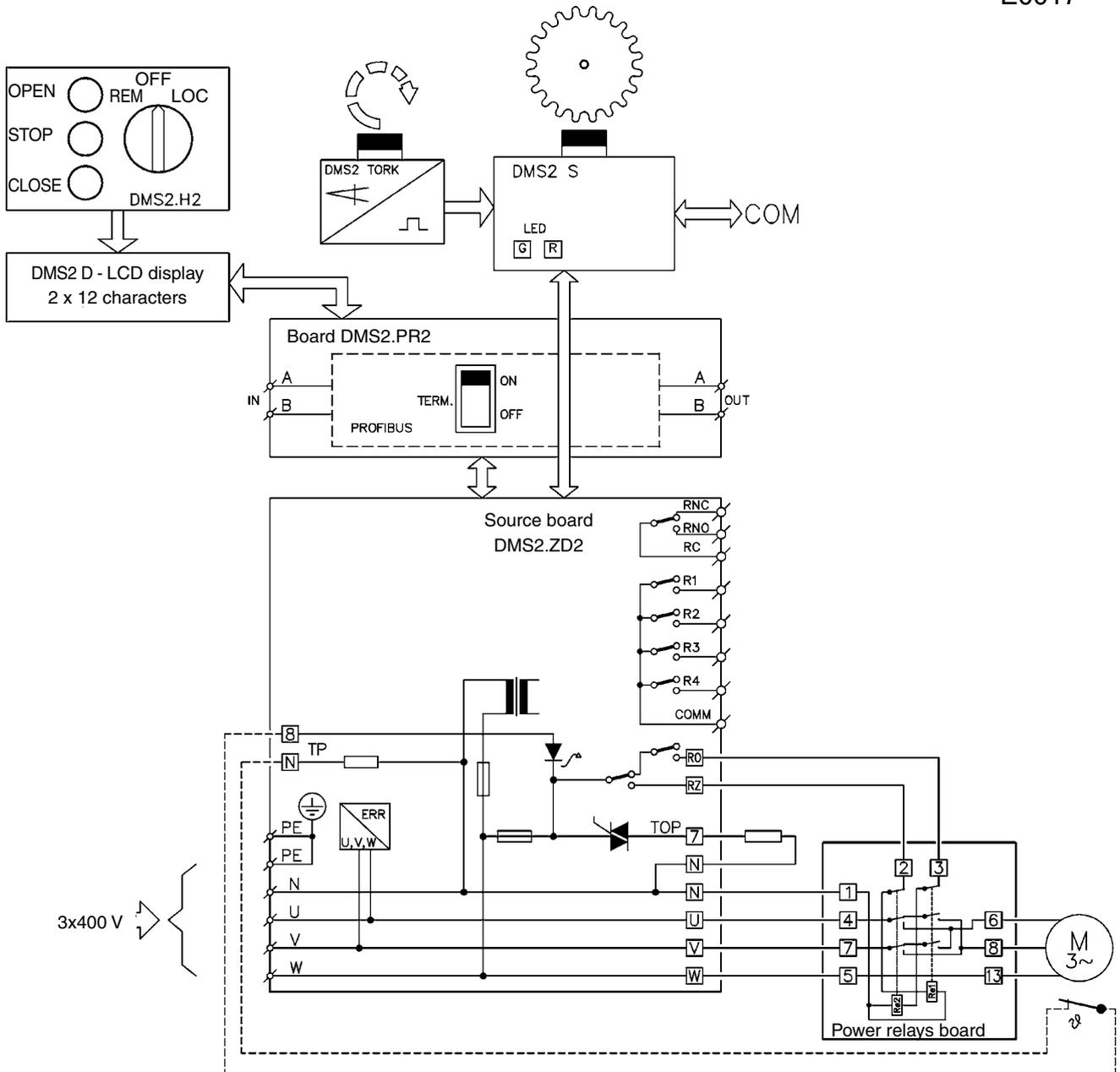## with single-phase electric motor

E0015
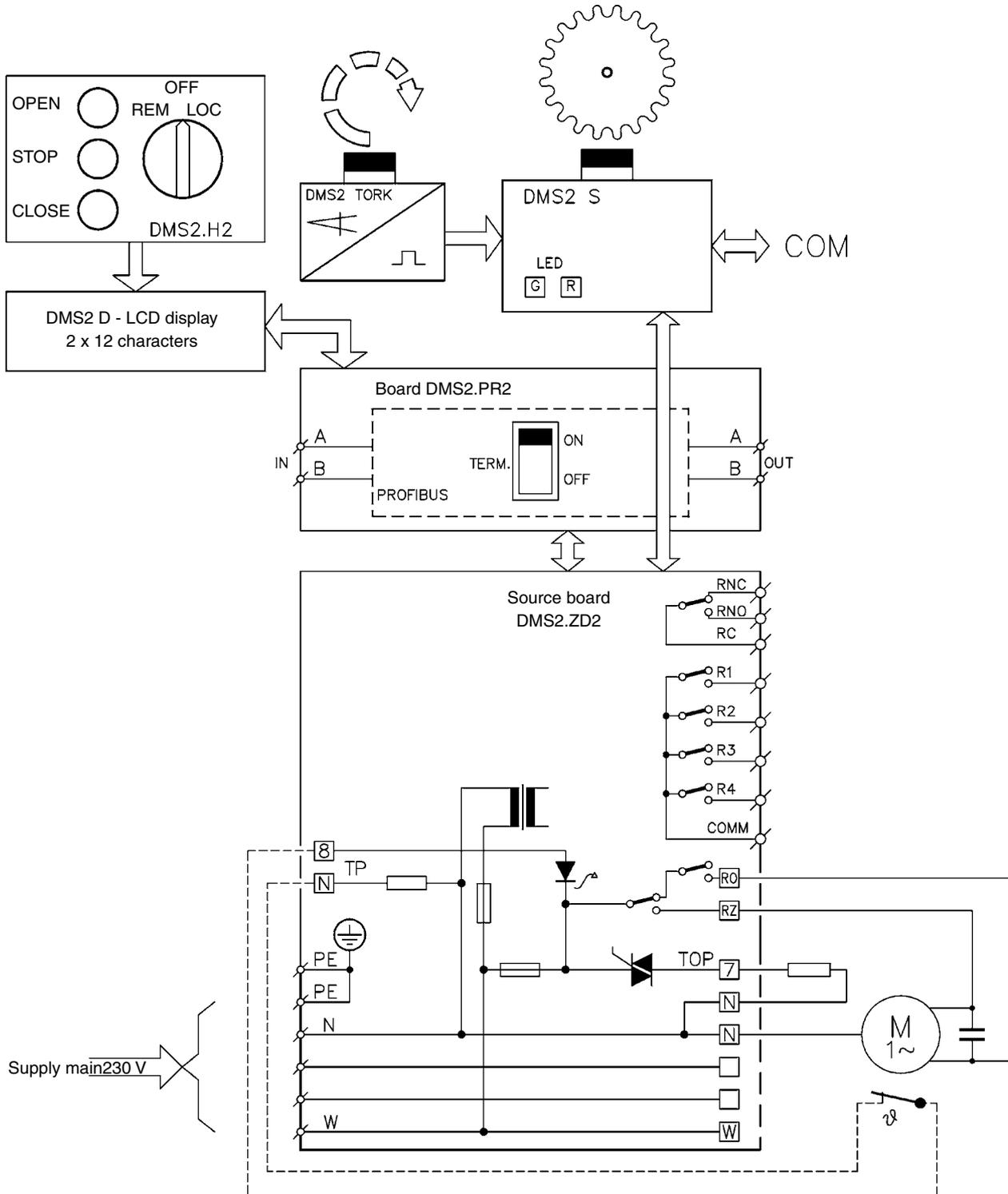
Example of wiring diagram of system **DMS2** in version for control with signals "open" and "close" or in version for control with analog current signal with three-phase electric motor

E0016
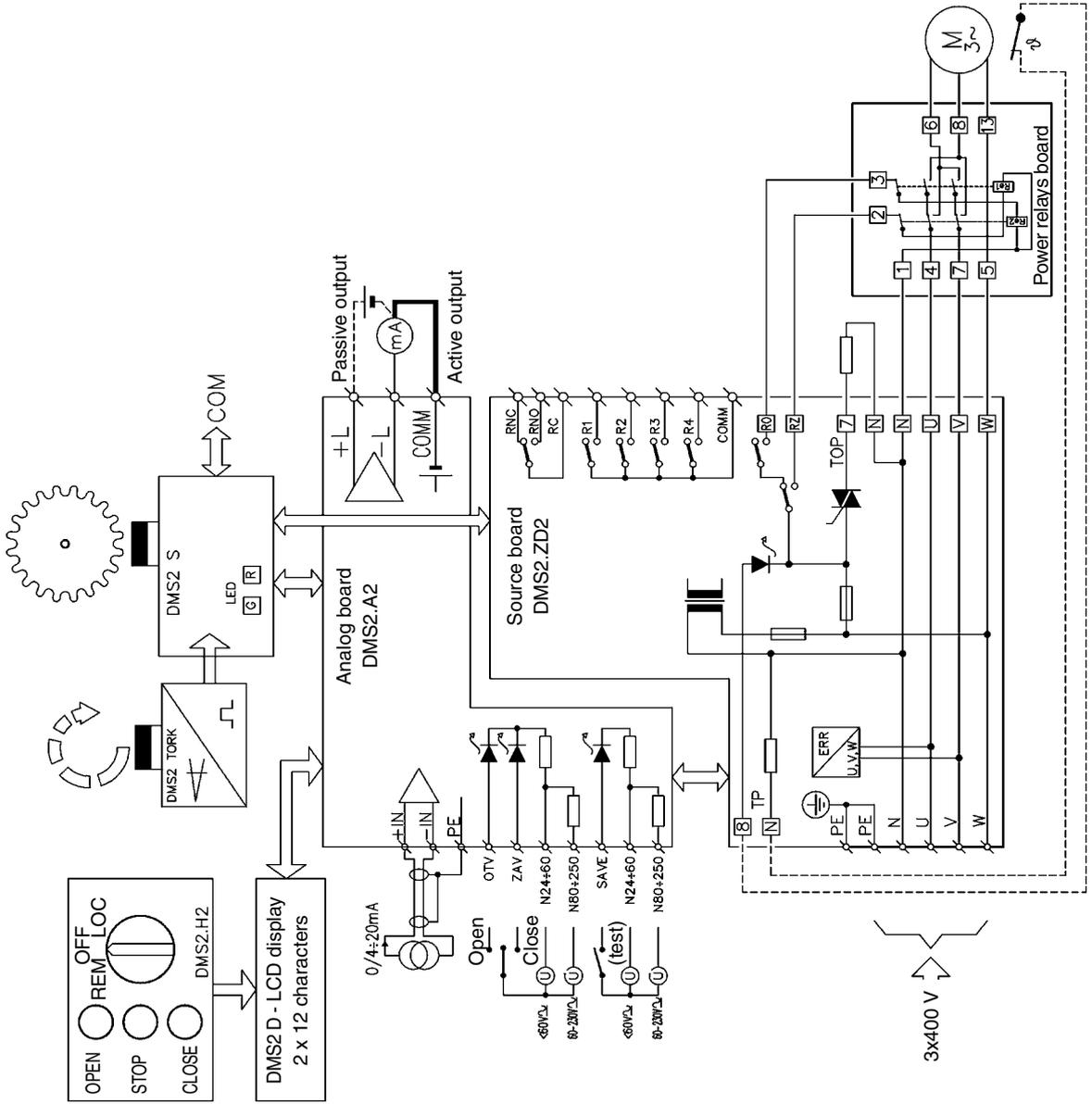
Example of wiring diagram of system **DMS2** in version Profibus with tree-phase electric motor

E0017

Table 1 – Electric actuators MODACT MTPED, Type No. 52 441
– basic technical parameters

Type	Range of tripping force setting [kN]	Control	Tripping 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]	Basic 1 2 3 4 5	Complementary 6 7 8 9 10 11
MTPED 15	5 - 15	C	19	45	10 - 100	T42RL477	50	1350	0,24	2	3x400	22	5 2 4 4 1	x x 0 x PED
		C		75		T42RR478	90	1300	0,34	2,5	3x400			x x 1 x PED
		C		125		T42RX479	150	1270	0,53	2,2	3x400			x x 2 x PED
		C		200		T42RX479	150	1270	0,53	2,2	3x400			x x 3 x PED
		C		45		J42RT502	100	1370	0,8	1,7	1x230			x x 5 x PED
		C		75		J42RT502	100	1370	0,8	1,7	1x230			x x 6 x PED
	5 - 10	C	13	125		J42RT502	100	1370	0,8	1,7	1x230			x x 7 x PED
MTPED 25	15 - 25	C	33	45		T42RR478	90	1300	0,34	2,5	3x400			x x 8 x PED
		C		75		T42RR478	90	1300	0,34	2,5	3x400			x x 9 x PED
		C		45		J42RT502	100	1370	0,8	1,7	1x230			x x A x PED
Mechanical connection – pitch A = 160 mm or B = 150 mm *(+ designation at 7th place acc. Table 3)*														6 x x x PED
Mechanical connection – pitch A = 132 mm or B = 100 mm *(+ designation at 7th place acc. Table 3)*														1 x x x PED
With connector for the pitchs A = 160 mm or B = 150 mm *(+ designation at 7th place acc. Table 3)*														7 x x x PED
With connector for the pitchs A = 132 mm nebo B = 100 mm *(+ designation at 7th place acc. Table 3)*														2 x x x PED

Meaning of respective places of type number:

6th place – specifies pitch of pillars *(Table 1)*

7th place – specifies parameters of mechanical connection *(Table 3)*

8th place – specifies range of setting of tripping force and shifting speed *(Table 1)*

9th place – specifies control electronics outfit
the letter **"U"**, if the letter **C, P, R** or **S** is on the 10th place *(electric actuator is fitted with electronics DMS2)*
character from Table 2, if the letter **E** is on the 10th place

Table 2 – Outfit of control electronics DMS2 ED

Outfit		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	H	J	K	L	M	N	P	R
Local control			x		x		x		x		x		x		x		x		x		x		x		x
Display				x	x			x	x			x	x			x	x			x	x			x	x
Power relays						x	x	x	x					x	x	x	x					x	x	x	x
Analog module	transmitter								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	controller																x	x	x	x	x	x	x	x	x

Note: *The actuators with three-phase electric motor and electronics DMS2 or with three-phase electric motor and electronics DMS2ED and regulator must also be fitted with a block of power relays. The actuators with single-phase electric motors are not available with power relays.*

10th place – specifies type of electronics:
E – actuator is fitted with electronics DMS2 ED
P – actuator is fitted with electronics DMS2 for connection to Profibus, power relays
S – actuator is fitted with electronics DMS2 for connection to Profibus
R – actuator is fitted with electronics DMS2 for two- or three-position control, power relays *)
C – actuator is fitted with electronics DMS2 for two- or three-position control *)

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

Table 3 – Connecting dimensions
– specification of the 7th place of t. no. 52 441.xxxx

Column A spacing (160 or 132 mm)	Sign 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 posts
Thread of joint
Post terminatino
"Closed" Position

Column B spacing (150 or 100 mm)	Sign 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

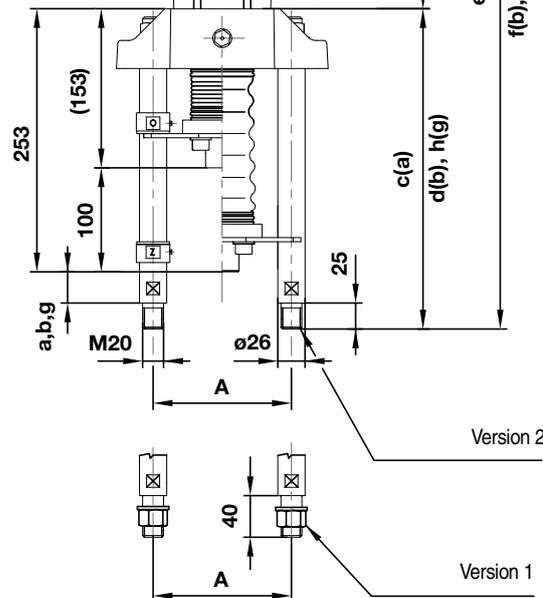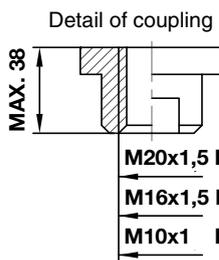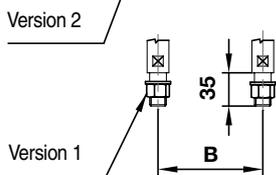*Supplies of design III with M joint 10x1 only upon agreement with the manufacturer*
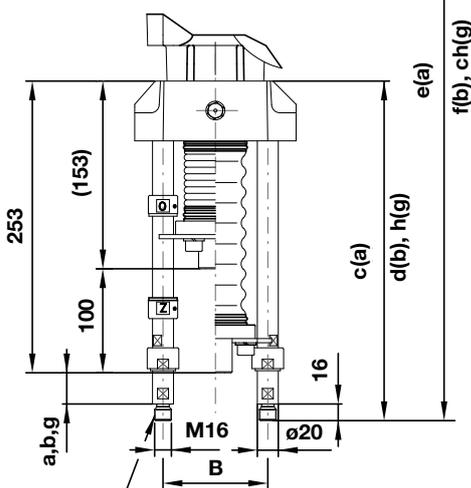

"CLOSE" Position

Termination 1   A,B   Termination 2
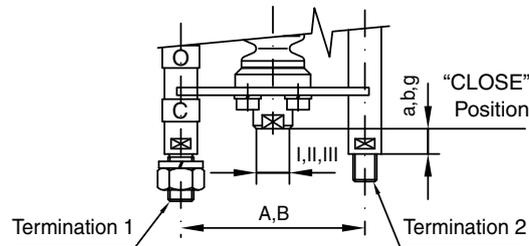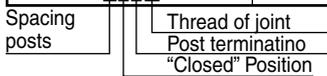
Column spacing	A	160 or 132 mm		
	B	150 or 100 mm		
"Closed" Position	a	30 mm	c post length	by „Design"
	b	74 mm	d post length	tables
	g	130 mm	h post length	– fig. 1 a 2
Thread in link	I	M20 x 1,5		
	II	M16 x 1,5		
	III	M10 x 1		

Dimensional sketch of **MODACT MTPED 15** electric actuator,
Type No. 52 441 *(the pillar pitch 132 and 100 mm)*
(actuator in version with local control unit)

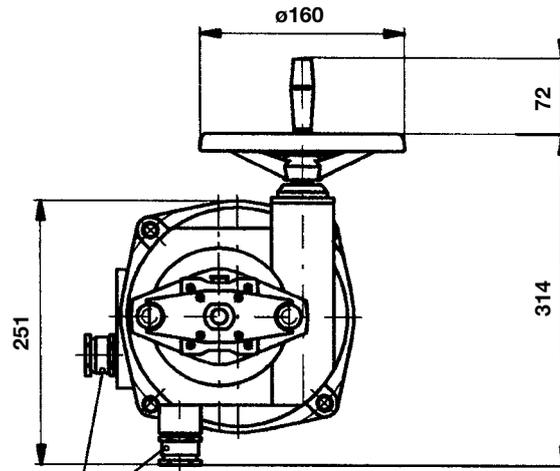| Version 1		
A	132	
B		100
a	30	30
b	74	74
g	130	130
c (a)	323	318
d (b)	367	362
h (g)	423	418
e (a)	678	673
f (b)	722	717
ch (g)	778	773

Version 2		
A	132	
B		100
a	30	30
b	74	74
g	130	130
c (a)	308	299
d (b)	352	343
h (g)	408	399
e (a)	663	654
f (b)	707	698
ch (g)	763	754

Cable bushing M20 x 1,5

Cable ø 10 – 14 mm

(DMS2 ED)

330

ø160

72

251

314

84

280

Cable bushing M25 x 1,5

Cable ø 9 – 16 mm

200

270

122

355

253

(153)

100

16

M16

ø20

B

a,b,g

e(a)

f(b), ch(g)

c(a)

d(b), h(g)

Version 2

35

B

Version 1

Detail of coupling

MAX. 38

M20x1,5 I

M16x1,5 II

M10x1 III After agreement with the manufacturer

253

(153)

100

25

a,b,g

M20

ø26

A

e(a)

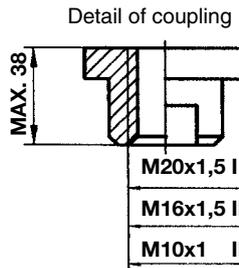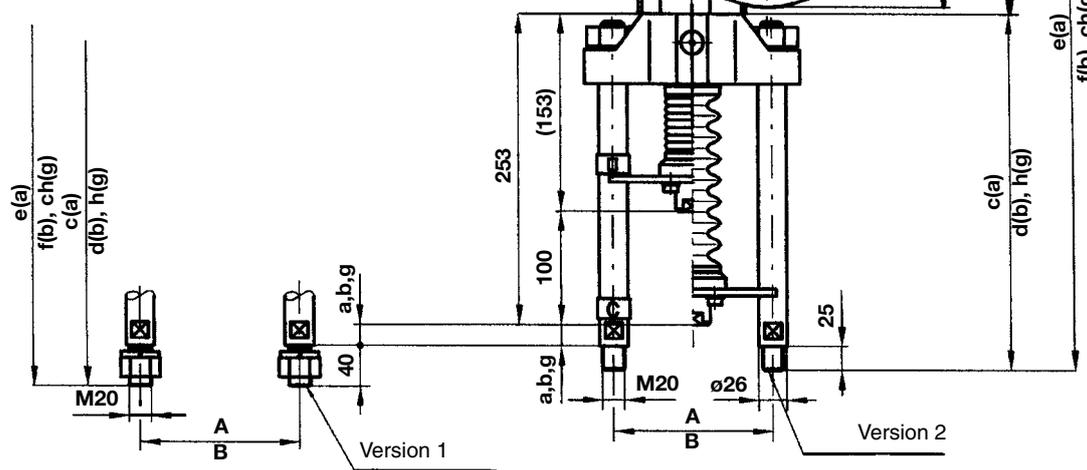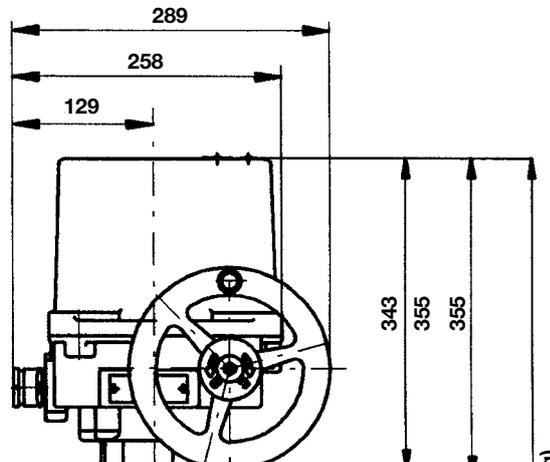f(b), ch(g)

c(a)

d(b), h(g)

Version 2

40

A
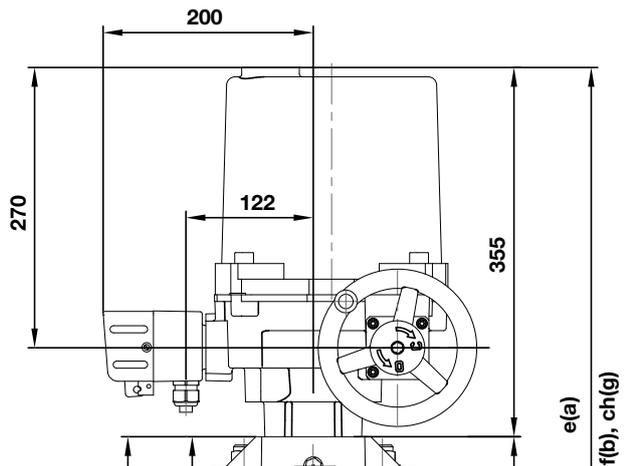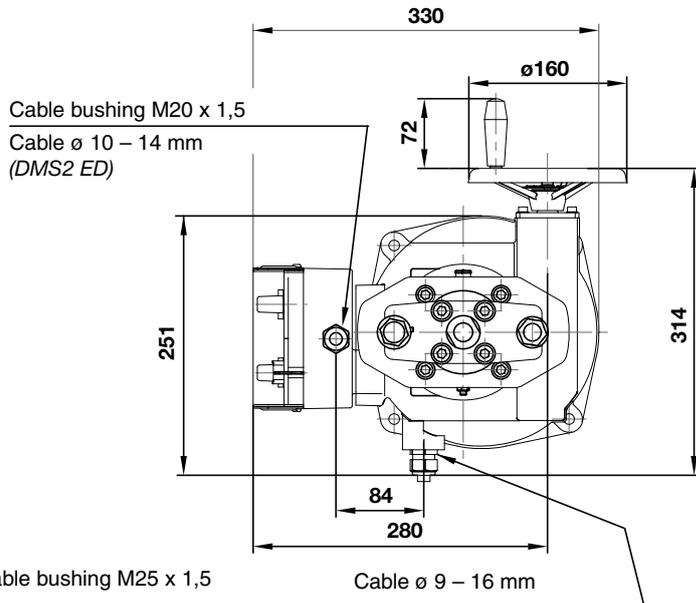
Version 1

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

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

ø160

72

314

251

2x Cable bushing M25 x 1,5
Cable ø 9 – 16 mm

289

258

129

343

355

355

e(a)
f(b), ch(g)

c(a)
d(b), h(g)

253

(153)

100

25

a,b,g

M20

ø26

a,b,g

M20

40

e(a)
f(b), ch(g)
c(a)
d(b), h(g)

A
B

Version 1

A
B

Version 2

Detail of coupling

MAX. 38

M20x1,5 I

M16x1,5 II

M10x1　III　After agreement with the manufacturer

9. PACKAGING AND STORAGE

When shipping to domestic customers, actuators are shipped unpacked. Covered means of transport or transport cabinets are used for actuators shipping.

When shipping actuators to foreign customers, actuators must be provided with packing. Type and version of packing must be adapted to the transport conditions and distance to place of destination.

Upon receipt of the actuator from the factory, it is essential to check that no damage was caused during transport and to compare the data on the actuator rating plates with those contained in the order and accompanying documenta- tion. Any discrepancy, defect or damage should be immediately reported to the supplier.

When the unpacked actuator is not immediately installed it should be stored at a dust-free location with a temperature within the range of - 25 °C to + 50 °C and relative humidity up to 80% where there are neither aggressive gases nor vapours and which is secured against the harmful effects of climatic conditions.

If the actuator is to be stored for a longer period than 3 years then, prior to commissioning, oil refilling should be made. Any manipulation of the equipment at a temperature below - 25 °C is forbidden. Storing the actuator out of doors or at a location that is not protected against the effects of rain, snow or ice accretion should be avoided. Before putting the actuator into operation, excessive slush should be removed. When unpacked actuators are to be stored longer than 3 months it is advisable to place a bag with silica gel or another suitable dessicant in the terminal box.

10. CHECKING OF THE INSTRUMENT FUNCTION AND ITS LOCATION

Prior to installation, be sure that the actuator was not damaged during storing. A functional check of the electric-motor can be made so that it is connected to the AC mains via a circuit breaker and started for short-time operation. In this case, it is sufficient to check that the electric motor starts and turns the output shaft.

The actuator should be installed so that easy access to the handwheel, the terminal box and the control box is provided. It is also imperative to check that the installation complies with the Clause *"Operating Conditions".* If another method of installation is required due to local conditions, please consult the manufacturer.

11. ATTACHMENT TO A VALVE

Place the actuator on the valve so that its output pull-rod can be connected to the output pull-rod of the valve. Attach the actuator to the valve and check the attachment by rotating the handwheel. Remove the terminal box cover and wire the actuator, according to the internal and external circuit layouts.

12. ADJUSTMENT OF THE ACTUATOR WITH A VALVE

After fitting the actuator on the valve and checking mechanical connection, the assembly is set up and adjusted. Setting-up and adjustment can only be carried out by a person with prescribed qualification. These works may

not be carried out without properly studying these assembly instructions. Adjustment is accomplished according to instructions for the given type of electronics *(DMS2, DMS2 ED)* and outfit *(manual, program).*

13. 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

Maintenance of the actuators consists in potential replacement of defective parts. Grease charge is stable for the entire service life of the actuator.

Once in two years, it is recommended to lightly smear the gearing of the position sensor drive. Lubricant CIATIM 201 or PM MOGUL LV 2-3 should be used.

Once a year, the rectilinear mechanism is also lubricated. Approximately 50 g of grease MOGUL LV 2-EP is pressed into the lubricator. The threads of the nut and spindle are also lubricated with grease MOGUL LV 2-EP after the top clasping strap of the dust cover is released. The dust cover is removed and the thread is lubricated through the opened hole. This procedure is carried out in the „*closed*" position of the pull rod.

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

FAILURES AND THEIR REMOVAL

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.

Cleaning – general inspection

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

List of spare parts for actuators **MODACT MTPED**, Type No. 52 441

Spare part name	Order number	Use
Sealing ring 24x20 PN 029280.2	2327311500	Sealing hand wheel shaft
Sealing ring 40x2 PN 029281.2	2327311032	Sealing vista indicators
Sealing ring 50x2 PN 029281.2	2327311028	Sealing flanges hand wheel
Sealing ring 50x40 PN 029280.2	2327311007	Sealing of the output shaft
Sealing ring 210x3 PN 029281.2	2327311401	Sealing cover
Supply board DMS2.ED.ZT	2339620300	DMS2.ED
Monitoring position MS2.ED.S	2339620001	DMS2.ED
Monitoring moment DMS2.TORK	2339620003	Common for DMS2.ED and DMS2
Analog modulE DMS.ED.CPTT	2339620304	DMS2.ED
Board of power relay DMS2.FIN	2339620031	Common for DMS2.ED and DMS2, only 3-phase
Relay Finder 62.33.8.230.0040	2334513109	Common for DMS2.ED and DMS2, only 3-phase
Display DMS2.ED.DT	2339620305	DMS2.ED
Supply board DMS2.ZD2	2339620024	DMS2 for analog and profibus
Analog board DMS2.A22	2339620042	DMS2 analog
Profibus board DMS2.PR2	2339620026	DMS2 profibus
Monitoring position DMS2.S	2339620016	DMS2
Display DMS2.DP	2339620018	DMS2
Board local control DMS2.H3	2339620041	DMS2

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

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

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

ZPA PEČKY, a.s.

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

SURVEY OF PRODUCED ACTUATORS

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

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

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

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

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

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

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

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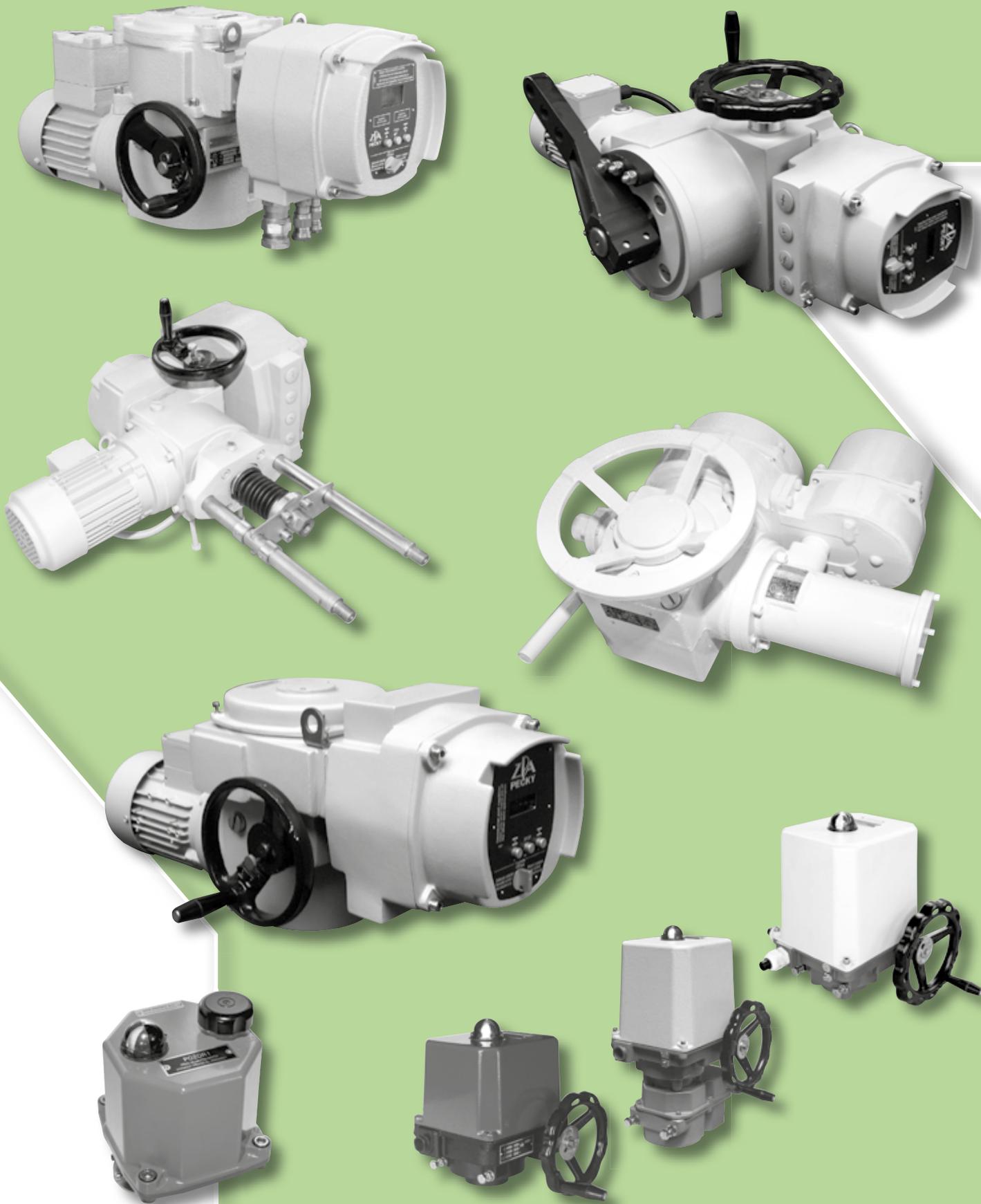Electric rotary (160°) lever actuators with a variable output speed

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

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

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

TRADITION · QUALITY · RELIABILITY