



**Electric rotary multi-revolution
actuator**

MODACT MONED

Type number 52 039

CERTIFICATE **TUV NORD**

Management system as per
EN ISO 9001 : 2008

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

ZPA Pečky, a.s.
Třída 5. května 166
289 11 Pečky
Czech Republic



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

**Development and production of electric actuators,
switch boards and sheet metal working.**

Certificate Registration No. 04 100 950161
Audit Report No. 624 362/300

Valid until 2012-09-24
Initial certification 1995-03-01

Certification Body
at TÜV NORD CERT GmbH

Praha, 2009-09-25

This certification was conducted in accordance with the TÜV NORD CERT auditing and certification procedures and is subject to regular surveillance audits.

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APPLICATION

The electric actuators **MODACT MONED** are designed for shifting control elements by a reversible rotary motion (e.g. slide valve and other elements) for which they are suitable with their properties. Typical example of using is remote two-position or multi-position control of elements where tight closure in end positions is required.

The electric actuators are also suitable for automatic regulation in the regime S4 - see Working regime.

OPERATING CONDITIONS

The actuators **MODACT MONED** are resistant against influence of operating conditions and external effects of classes AA7, AB7, AC1, AD5, AD7, AE5, AE6, AF2, AG2, AH2, AK2, AL2, AM2, AN2, AP3, BA4 and BC3 according to ČSN 33 2000-3.

When the actuator is installed on a free area it is recommended to fit it with a light shelter against direct impact of atmospheric effects. The shelter should overlap the actuator contour by at least 10 cm at the height of 20 – 30 cm.

When actuators are to be installed in the working environment with temperature below -10 °C and in the environment with relative humidity above 80 %, it is always necessary to use an anti-condensation heater fitted to 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 is about 1 mm thick.

Notes:

The area under a shelter means the one where falling of atmospheric precipitations under an 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.

Classes of external effects

Basic characteristics – excerpt from ČSN 33 2000-3:

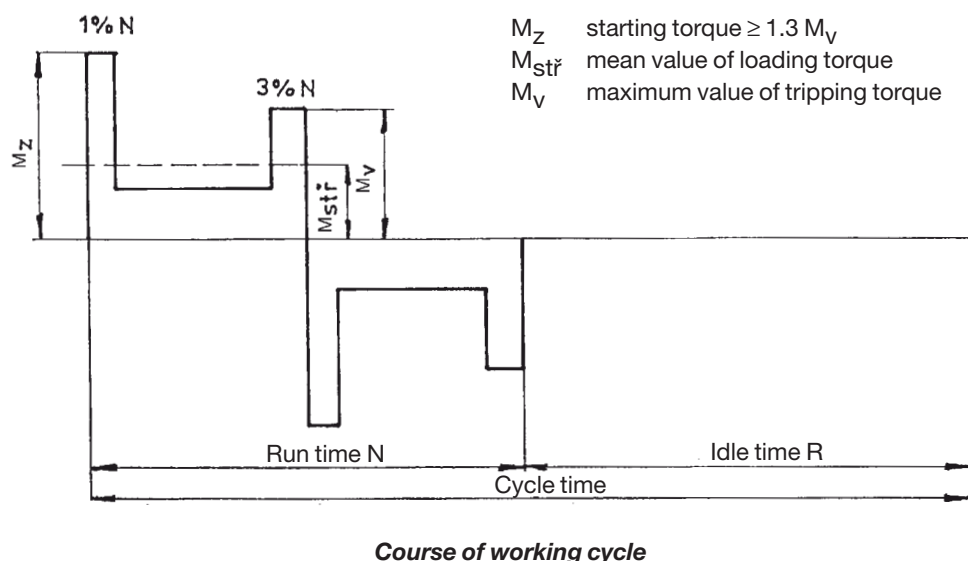
- 1) AA7 – Combined effect of surrounding temperature from -25 °C to +55 °C and relative humidity from 10 %.
- 2) AB7 – Surrounding temperature identical with point 1. The lowest relative humidity 10 %; the highest relative humidity 100 % with condensation.
- 3) AC1 – Altitude ≤ 2 000 m a.s.l.
- 4) AD7 – occurrence of water – shallow dipping – short-time
- 5) AE6 – Occurrence of foreign solid particles - strong dustiness. Thick dust layers. Dust fall-out higher than 350 and not exceeding 1000 mg/m² per day.
- 6) AF2 – Occurrence of corrosive or polluting substances is atmospheric. Presence of corrosive polluting substances is significant.
- 7) AG2 – Medium mechanical stress. In common industrial processes.
- 8) AH2 – Medium vibrations. In common industrial processes.
- 9) AK2 – Serious danger of growth of plants or moulds.
- 10) AL2 – Serious danger of occurrence of animals (insects, birds, small animals).
- 11) AM2 – Harmful effects of released stray currents
- 12) AN2 – Medium solar radiation. Intensity > 500 and 700 W/m².
- 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.

WORKING REGIME

The actuators can be operated with the type of loading S2 according to ČSN EN 60 034-1. The run period at temperature +50 °C is 10 minutes; the mean value of loading torque should not exceed 60 % of the value of maximum tripping torque M_{tr} . The actuators can also work in the regime S4 (interrupted run with start-up)

according to ČSN EN 60 034-1. Load factor $N/N+R$ is max. 25 %; the longest working cycle ($N+R$) is 10 minutes (course of working cycle is shown in the figure). The highest number of closing operations in automatic regulation is 1200 cycles per hour. Mean value of loading torque with load factor 25 % and surrounding temperature $+50\text{ }^{\circ}\text{C}$ is not higher than 40 % of maximum tripping torque M_V .

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



Service life of actuators

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

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

TECHNICAL DATA

Supply voltage

Supply voltage of electric motor:

1 x 230 V, +10 %, -15 %, 50 Hz $\pm 2\%$;
 3 x 230/400V, +10 %, -15 %, 50 Hz $\pm 2\%$;
 1 x 220 V, +10 %, -15 %, 50 Hz +3 % - 5 %;
 3 x 220/380 V, +10 %, -15 %, 50 Hz +3 % - 5 %;
 (or as shown on the motor rating plate).

Working position

The actuators can be operated in any working position.

Tripping torque

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

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.

Manual control

Manual control is performed by a hand wheel directly (without a clutch) and is also possible when the electric motor is running (resulting motion of the output shaft is given by the differential gear function). By rotating the hand wheel in the clock-wise direction the actuator output shaft rotates also in the clock-wise direction (when viewing the shaft into the control box). Provided that the valve nut has a left thread, the electric actuator closes the valve.

Anti-condensation heater

The actuators are fitted with an anti-condensation heater preventing condensation of water vapour.

Terminal board of electric actuator

The electric actuator is fitted with a terminal board for connecting the actuators to external circuits. The terminal board is fitted with terminals for connecting one conductor of cross-section 2.5 mm² or two conductors of identical cross-section up to 1 mm².

Isolation resistance

Isolation resistance of electric control circuits against the frame and against each other is min. 20 Mohm. Isolation resistance of the electric motor is min. 1.9 Mohm. After a dump test, isolation resistance of control circuits is min. 2 Mohm.

Electric strength of electric circuit isolation

Control circuits and circuit of anti-condensation heater	1 500 V, 50 Hz
Electric motor	Un = 1x230 V 1 500 V, 50 Hz
	Un = 3x230/400 V 1 800 V, 50 Hz

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).

Noise

Average level of acoustic pressure A of electric actuators according to ČSN ISO 3746 (01 1606) must not exceed the value 85 dB (A).

Level of acoustic output A must not exceed 95 dB (A).

Deviations of basic parameters

Tripping torque	±10 % of max. tripping torque
Shifting speed	+10 % to -15 % of rated value (idle run)

Protective enclosure

The protective enclosure of the electric actuator is IP 67 according to ČSN EN 60529.

DESCRIPTION AND FUNCTION

The electric actuators are designed for direct mounting on the controlled element. They are connected by a flange and a clutch according to ČSN 18 6314. The actuator flanges also comply with ISO 5210. The clutches for transmitting motion to the valve are:

- shape A (with adapter), according to ISO 5210 and DIN 3210;
- shape B1 (with adapter), according to ISO 5210 (shape B according to DIN 3210);
- shape B3 (without adapter), according to ISO 5210 (shape E according to DIN 3210);
- shape D (without adapter, according to DIN 3210);
- shape C (without adapter), according to DIN 3338.

The adapters are fitted between the electric actuator and the valve.

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 connected 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 fix-connected with the epicyclic gear catch driver and passes on to the control box where the control unit with the position sensor, torque sensor, and heating resistor are installed.

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. 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 programme or manually without a computer.

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

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	It also contains the sensor of position of the output shaft, 4 push-buttons and 3 signal LEDs for setting and checking the actuator.
Torque-limit unit	
Source unit	Contacts of seven relays (MO, MZ, PO, PZ, SO, SZ, READY) are connected to the terminal board; state of each relay is signalized by LED. The unit enables the heating resistor to be connected and controlled by the thermostat.

Optional outfit:

Feedback signal 4 – 20 mA	
Analog regulator	
Position Indicator - LED display	on request
Local control	
Reversing relay	for version Control

Main merits:

- Absolute scanning of position independent of backup power supply.
- Simple setting by 4 push-buttons, computer PC or PDA.
- Possibility of back-up making of set parameters on PC.
- Intended for direct substitution of electromechanical components of the electric actuator.

Parameters:

Scanning of position	Contact-less magnetic
Scanning of torque	Contact-less, magnetic
Working stroke	2 – 1700 rev.
Blocking of torque	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 ohms, active/passive, galvanic - isolated, LED display (optional)
Power supply	230 V AC, 50 Hz, 4 W, over-voltage category II

DMS2

Basic outfit:

Control unit	It also includes a sensor of the output shaft position, 2 signal LED.
Torque-limit unit	
Source unit	It contains: 2 relays for electric motor control; Relay Ready with change-over contact connected to the terminal board; Signalling relays 1 – 4 with one pole of the switching contact connected to the terminal board; Second poles of the switching contacts of relays 1 – 4 are interconnected and brought out to the terminal COM. Heating resistor switched by a thermostat is connected to the unit. The unit controls power switches of the electric motor (reversing relay). Two-row display, 2 x 12 alpha-numeric characters. Push-buttons “Open”, “Close”, “Stop”, selector switch “Local”, “Remote”, “Stop” .
Unit of display	
Unit of push-buttons	

Optional outfit *(the electric actuator must be fitted with one of these units):*

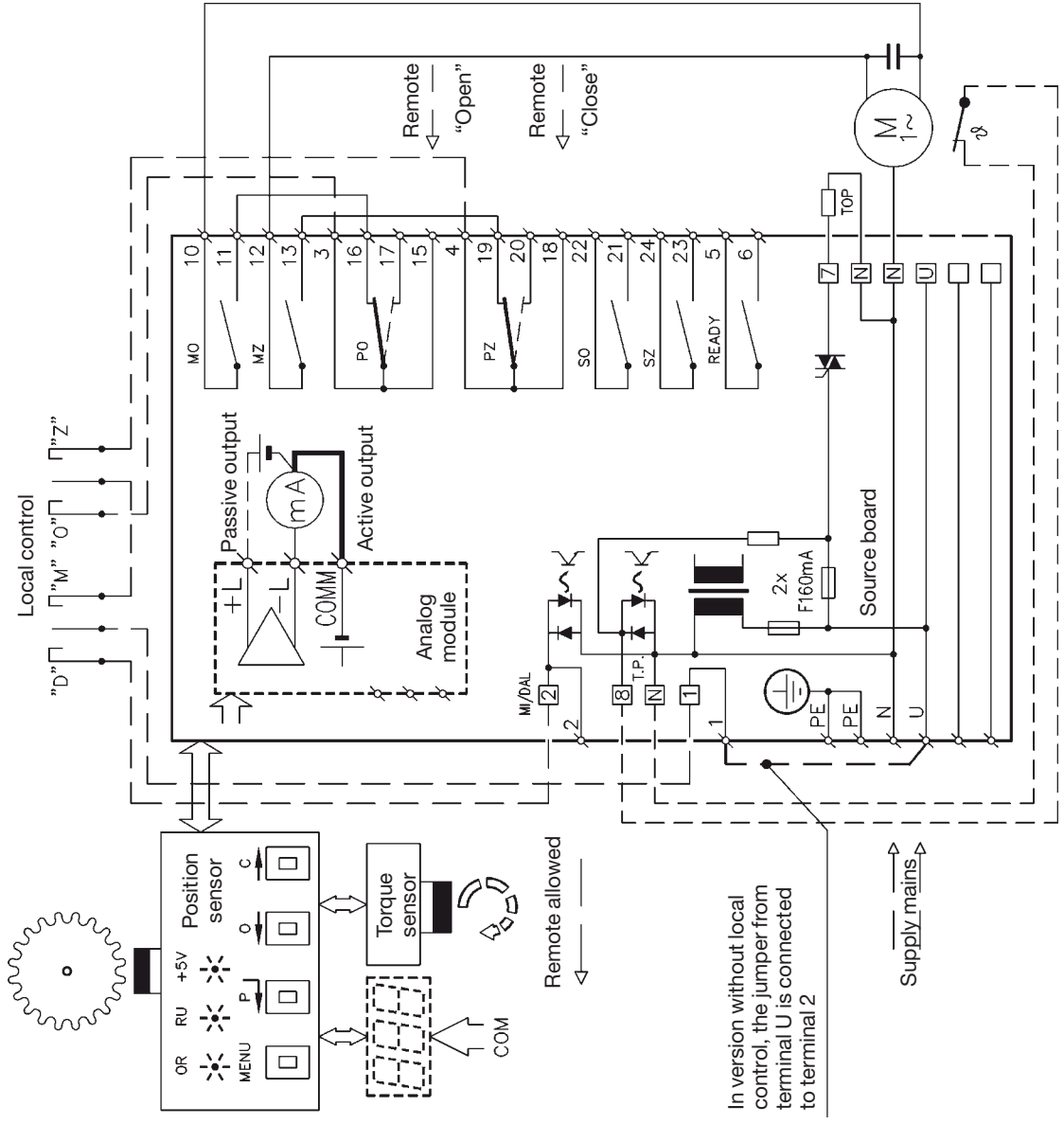
Unit of two- and three-position control	Control of the electric actuator by shifting to position “Open” and “Close” or by analog signal 0(4) – 20 mA.
Unit of connection Profibus	Control of the electric actuator by industrial bus bar Profibus.

The electronic control DMS2 checks, within its function, sequence and fall-out of phases of supply voltage.

Example of wiring diagram of electronics **DMS2 ED** in version **Substitution of electro-mechanical board**

with single-phase electric motor

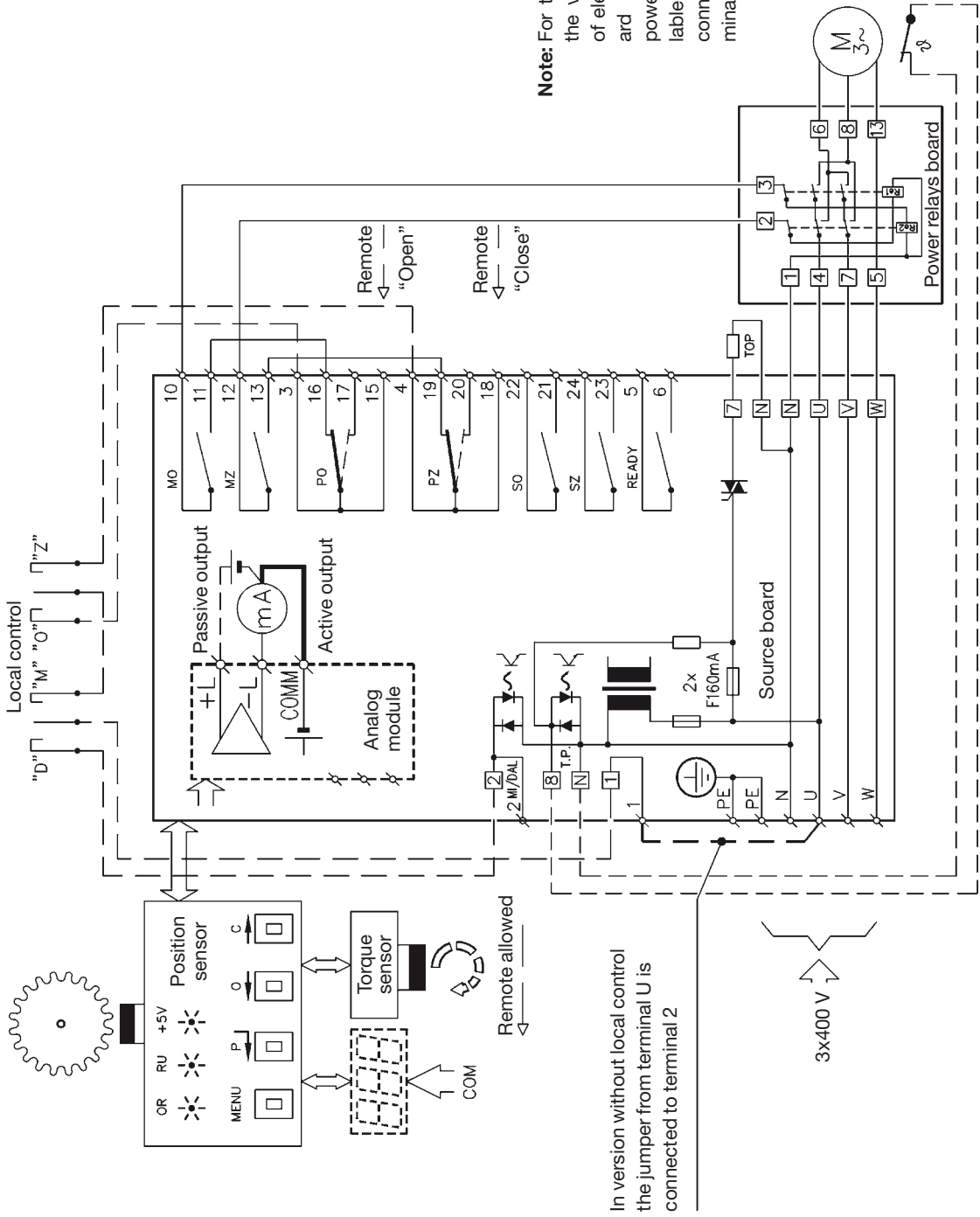
E-0010



Note: Here, contacts of relay 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 **Substitution of electro-mechanical board** with three-phase electric motor

E-0011

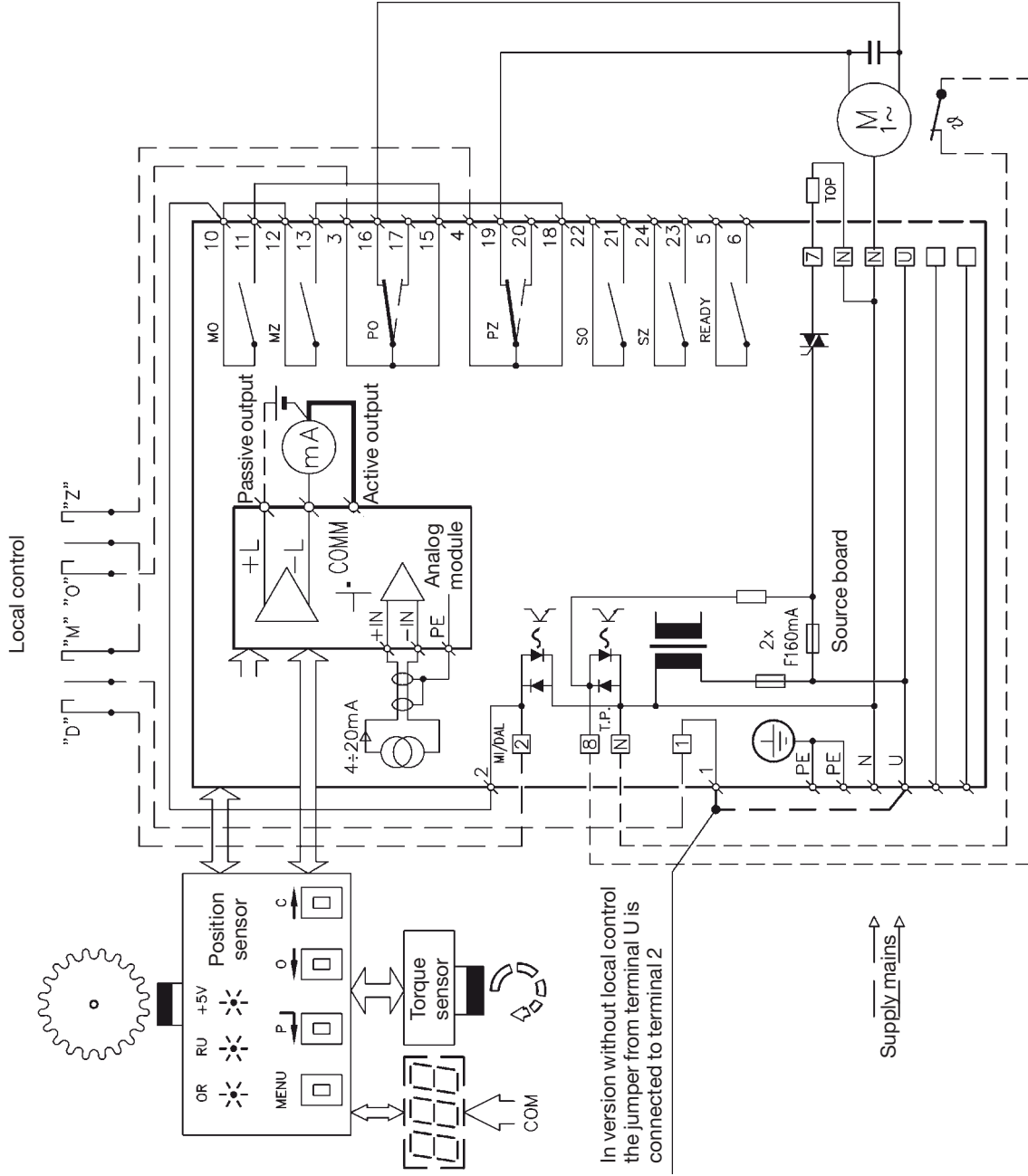


In version without local control the jumper from terminal U is connected to terminal 2

Note: Here, contacts of relay MO, MZ, SO, SZ are shown with power supply switched off; with power supply switched on, 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

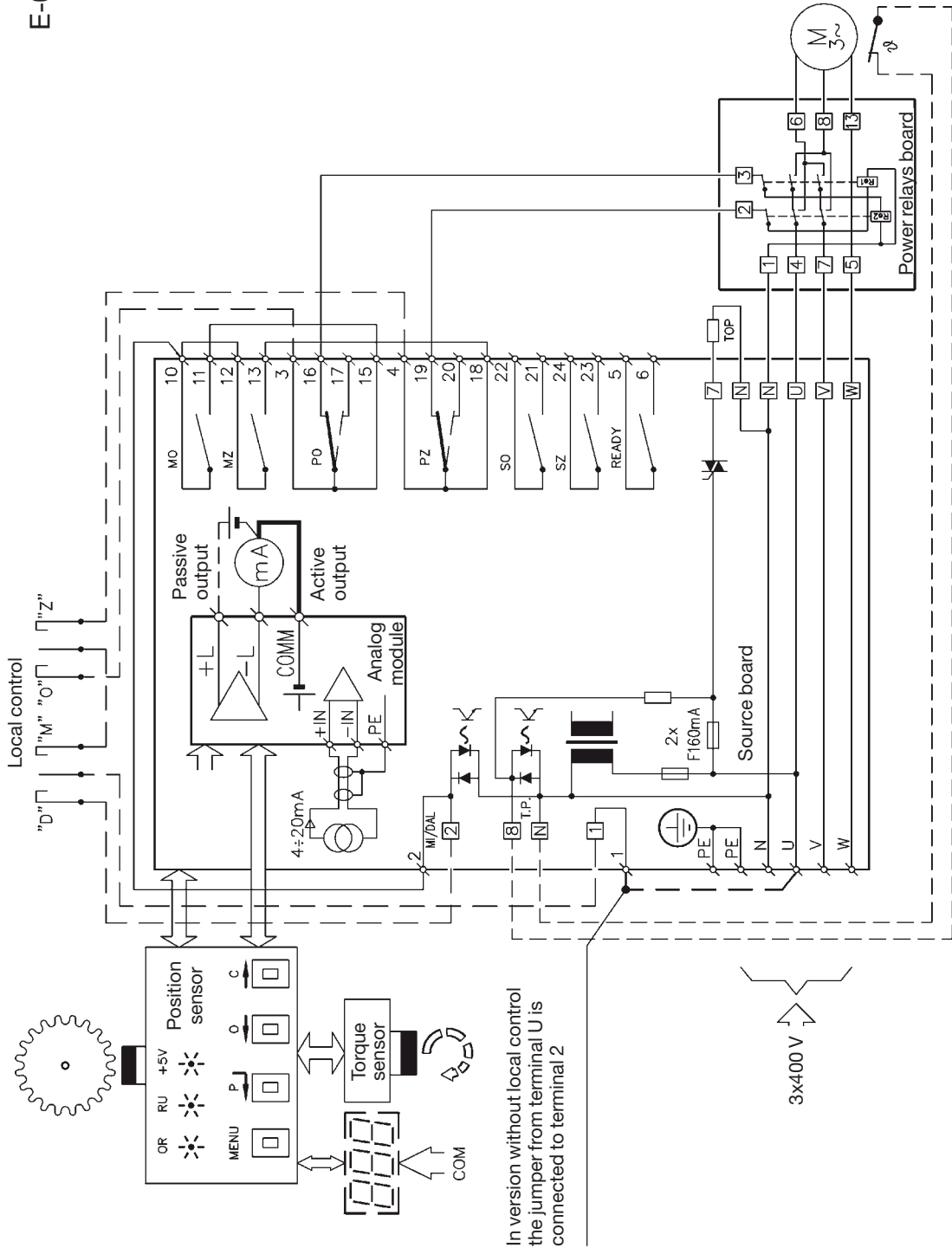
E-0012



Note: Here, contacts of relay 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

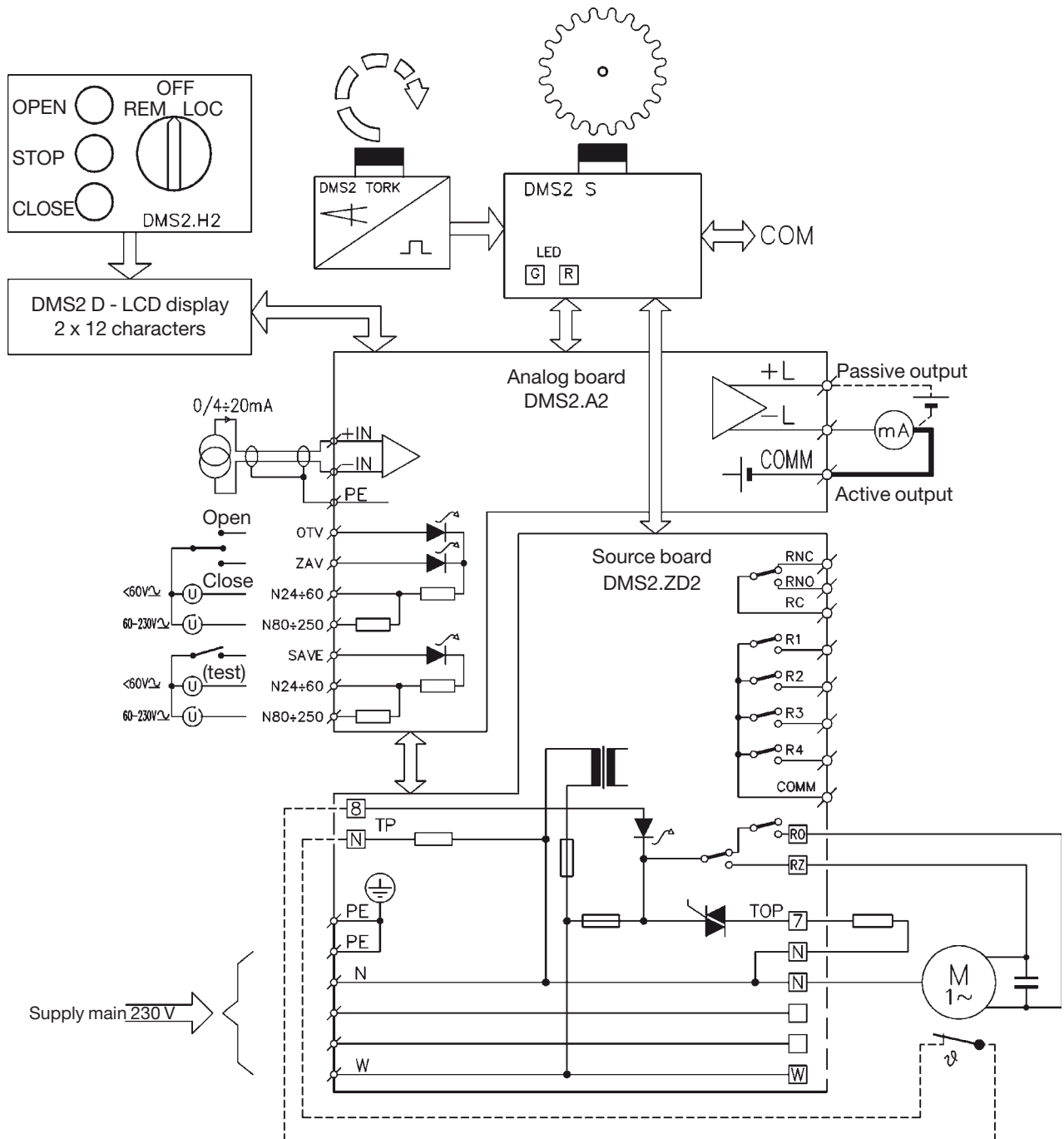
E-0013



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

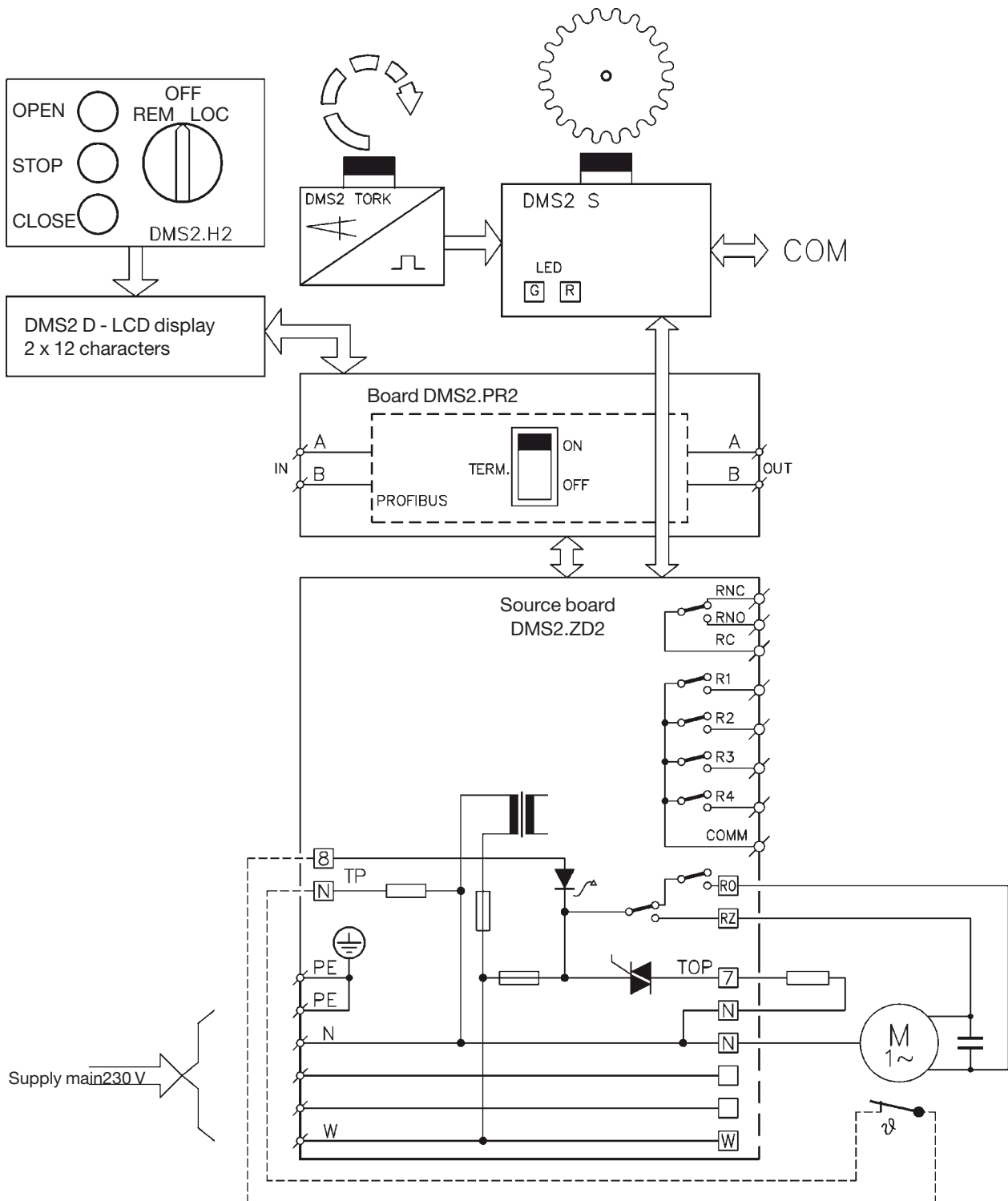
Example of wiring diagram of system **DMS2** in version for control with signals “open” and “close” or in version for control with analog current signal with single-phase electric motor

E-0014

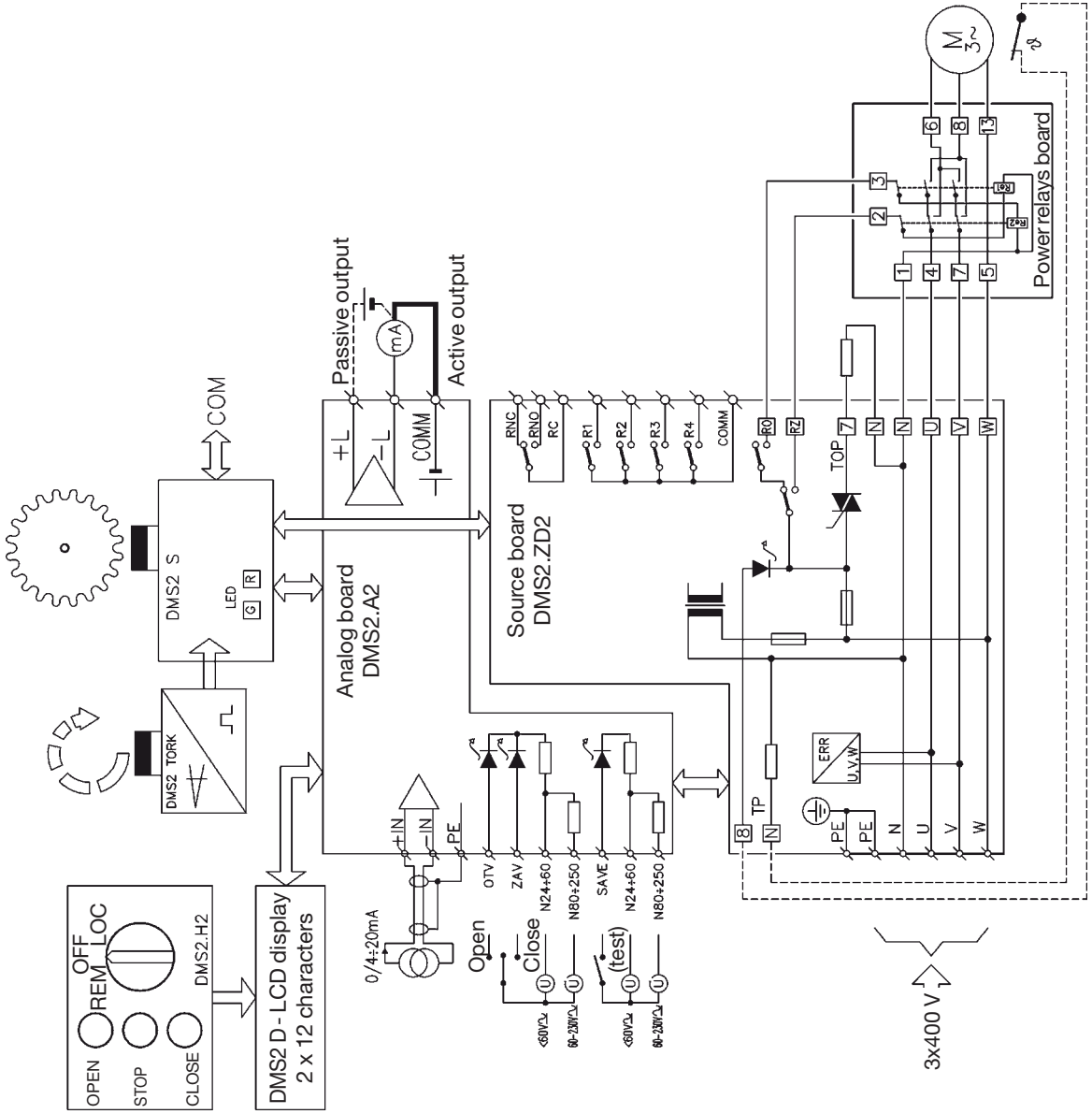


Example of wiring diagram of system **DMS2** in version Profibus with single-phase electric motor

E-0015



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



E-0016

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

E-0017

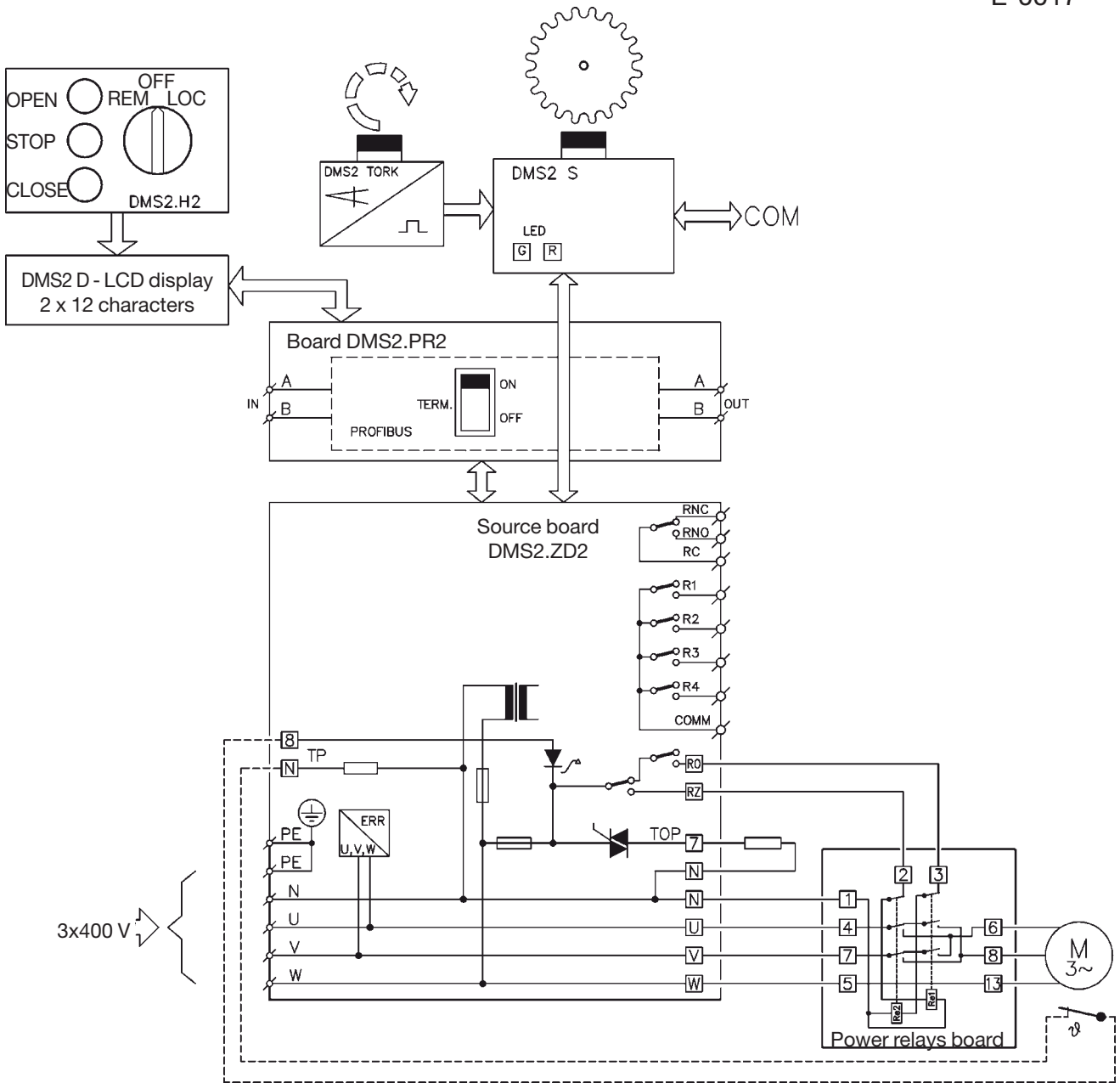


Table 1 – MODACT MONED electric actuators, type number 52 039
– basic technical parameters

Type of designation	Torque		Shifting speed	Working stroke	Electric motor						Weight	Type number										
	Tripping	Starting			Type	Voltage	Output	Speed	In (400 V)	Iz / In		Basic					Complem.					
												[Nm]	[Nm]	[1/min]	[rev.]	[V]	[kW]	[1/min]	[A]	[kg]	1	2
MONED 30/65-9	10-30	65	9	2-2830	T42RL477	3x400	0,05	1350	0,24	2	17	52 039	xx1xNED									
MONED 30/83-15		83	15		T42RR478	3x400	0,09	1300	0,34	2,5	17		xx2xNED									
MONED 30/58-25		58	25		T42RX479	3x400	0,15	1270	0,53	2,2	17		xx3xNED									
MONED 30/39-40		39	40		T42RX479	3x400	0,15	1270	0,53	2,2	17		xx4xNED									
MONED 30/54-9		54	9		FCT4C84A	1x230	0,035	1390	0,57	1,5	17		xx5xNED									
MONED 30/56-15		56	15		J42RT502	1x230	0,100	1370	0,8	1,7	17		xx6xNED									
MONED 20/27-25		10-20	27		25	J42RT502	1x230	0,100	1370	0,8	1,7		17	xx7xNED								
MONED 60/140-9	30-60	140	9		T42RR478	3x400	0,09	1300	0,34	2,5	17		xxAxNED									
MONED 60/83-15		83	15		T42RR478	3x400	0,09	1300	0,34	2,5	17		xxBxNED									
MONED 45/58-25	10-45	58	25		T42RX479	3x400	0,15	1270	0,53	2,2	17		xxCxNED									

Meaning of respective places in type numbers of electric actuator:

6th place – designates 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
- 0xxx - connection F07, shape A

7th place – designates type of control electronics:

- xExx - actuator fitted with electronics DMS2 ED
- xPxx - actuator fitted with electronics DMS2 for connection to Profibus
- xRxx - actuator fitted with electronics DMS2 for two- or three-position control

8th place – designates shifting speed (Table 1)

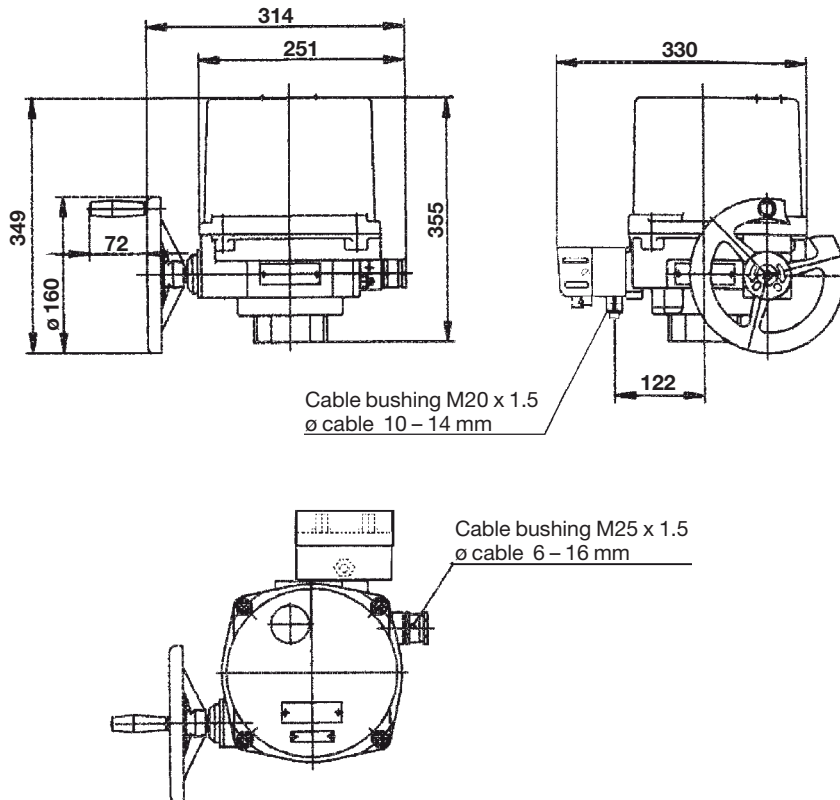
9th place – designates control electronics outfit

The letter „**U**“, if the letter **P** or **R** is on the 7th place (electric actuator is fitted with electronics DMS2)
character from Table 2, if the letter **E** is on the 7th place (electronics DMS2 ED)

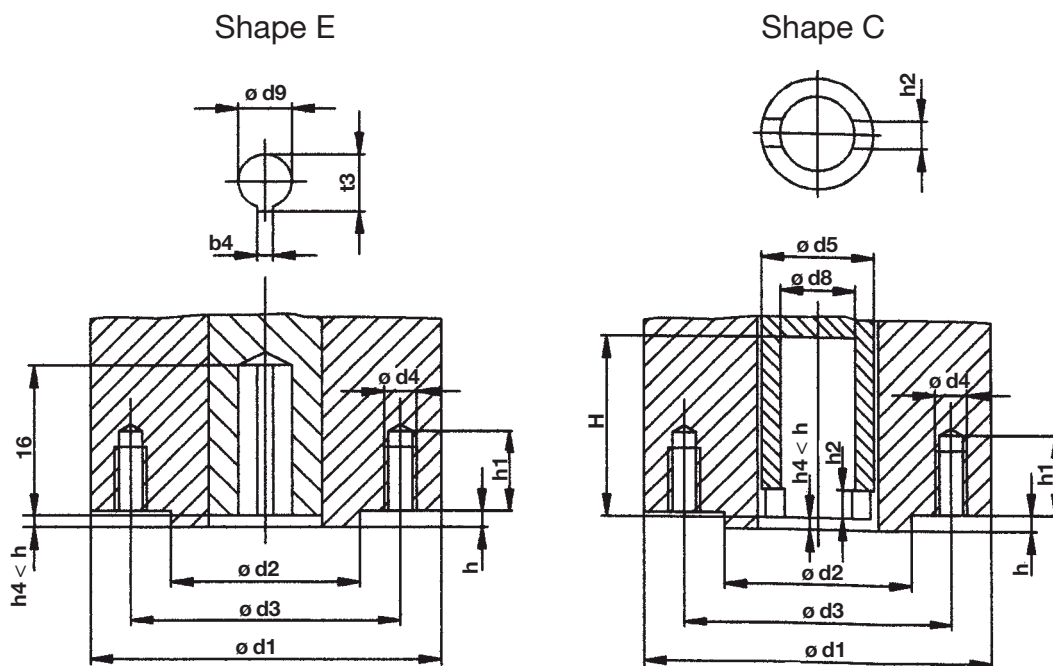
Table 2 – Outfit of control electronics DMS2 ED

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
Relay					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
	regulator																x	x	x	x	x	x	x	x

Dimensional sketch of **MODACT MONED** electric actuators, type number 52 039

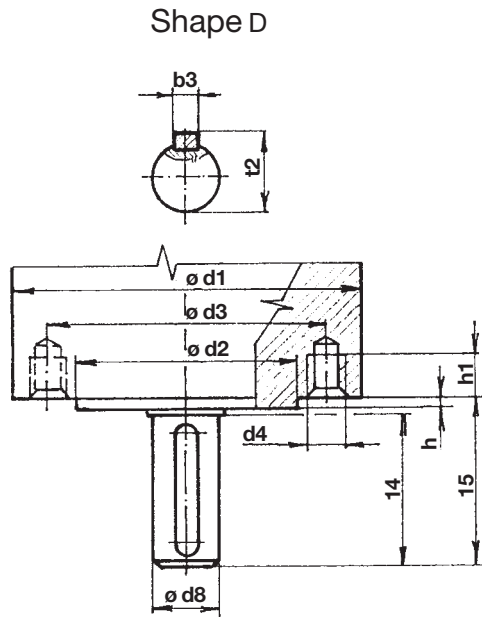


Mechanical connecting dimensions of **MODACT MONED** electric actuator, type no. 52 039



Flange size	Common data for both shapes							Data for shape C					Data for shape E				
	$\varnothing d1$	$\varnothing d2f8$	$\varnothing d3$	$\varnothing d4$	Number of threaded holes	$h1$	h	$\varnothing d5$	$h2$	H	$b2H11$	$\varnothing d8$	$\varnothing d9H8$	l16 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	

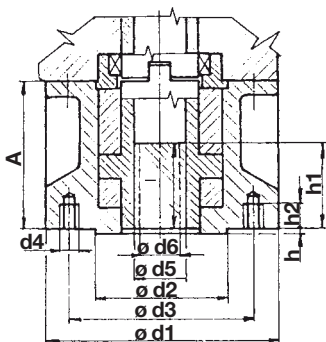
Connecting dimensions of **MODACT MONED** electric actuator, type no. 52 039
basic version (without adapter)



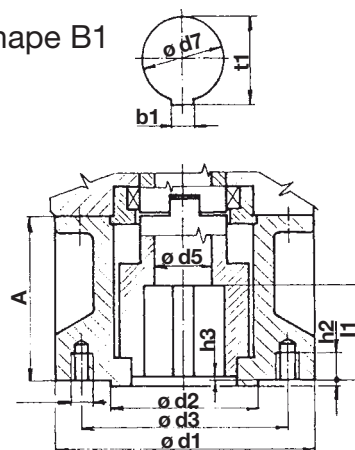
Shape	Dimension (mm)	
D	$\varnothing d1$ orientational value	125
	$\varnothing d2$ f8	70
	$\varnothing d3$	102
	d4	M 10
	number of threaded holes	4
	hmax	3
	h1 min. 1,25d4	12,5
	$\varnothing d8$ g6	20
	l _k	50
	t2max	22,5
	b3 h9	6
l _s	55	

Adapters for **MODACT MONED** electric actuator, type no. 52 039

Shape A



Shape B1



	Dimension	52 039
Common data for both shapes of adapters	$\varnothing d1$	125
	$\varnothing d2$ f8	70
	$\varnothing d3$	102
	$\varnothing d4$	M10
	number of holes $\varnothing d4$	4
	h	3
	h2 min	12,5
Data for shape A	A	63,5
	$\varnothing d5$	30
	$\varnothing d6$ max	26
	h1 max	43,5
	l min	45
Data for shape B1	A	63,5
	$\varnothing d5$	30
	l1 min	45
	h3 max	3
	b1	12
	$\varnothing d7$ H9	42
t1	45,3	



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 MOKA

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

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

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

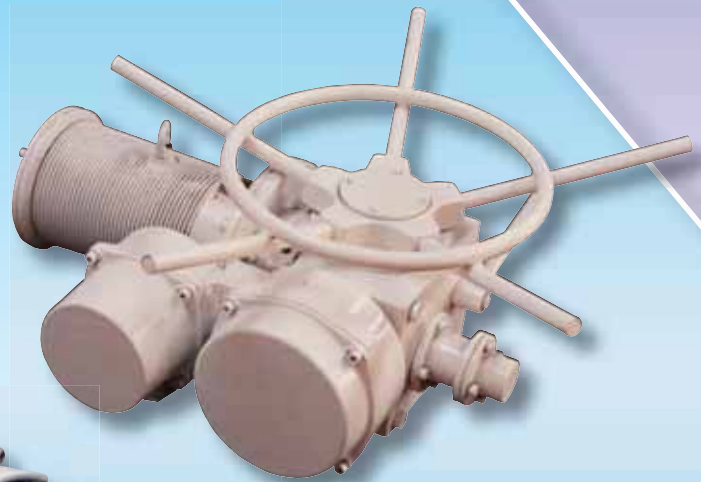
MODACT MPS KONSTANT, MPSED

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



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