



**Electric rotary multi-revolution
actuator**

MODACT MOPED

Type number 52 039



www.zpa-pecky.cz

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

1. APPLICATION

The electric actuators **MODACT MOPED, t. n. 52 039** 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.

2. OPERATING CONDITIONS, OPERATING POSITION

Operating conditions

The actuators **MODACT MOPED** 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 %, 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 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.

Surrounding temperature

Operating temperature for the **MODACT MOPED 52 039** is from -25 °C to +60 °C.

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

Class:

- 1) AC1 – above-sea level ≤ 2000 m
- 2) AD7 – shallow immersion, possible sporadic partial or full coverage
- 3) AE6 – strong dust formation
- 4) AF2 – occurrence of corrosive or polluting agents is atmospheric; presence of corrosive pollutants is significant
- 5) AG2 – mean mechanical strain; in normal industrial operations
- 6) AH2 – mean vibrations; in normal industrial operations
- 7) AK2 – serious risk of plant and moulds growth
- 8) AL2 – serious risk of occurrence of animals (*insects, birds, small animals*)
- 9) AM-2-2 – normal level of signal voltage. No additional requirements.
- 10) AN2 – mean solar radiation. Intensity > 500 and ≤ 700 W / m²
- 11) AP3 – mean seismic impacts; acceleration > 300 Gal ≤ 600 Gal
- 12) BA4 – capability of persons; instructed persons
- 13) BC3 – frequent contact of persons with ground potential; persons often touch foreign conductive parts or stand on conductive substrate

Corrosion protection

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

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

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

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

Operating position

The actuators can be operated in any operating position.

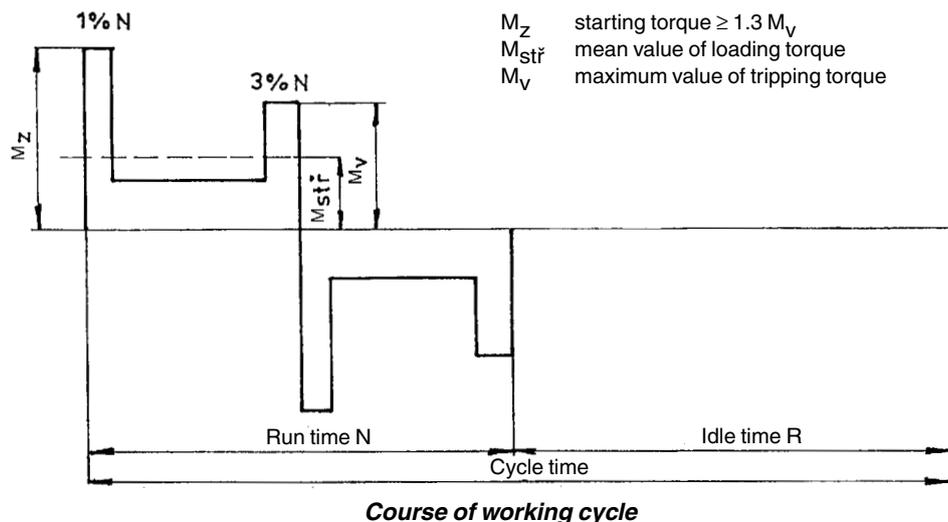
3. OPERATION MODE, SERVICE LIFE OF ACTUATORS

Operation mode

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_V . 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 °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

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

4. TECHNICAL DATA

Supply voltage

Supply voltage of electric motor – 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)

Protective enclosure

Protective enclosure of actuators – IP 67 according to ČSN EN 60529.

Noise

Level of acoustic pressure A max. 85 dB (A)
 Level of acoustic output A max. 95 dB (A)

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.

Breakaway torque

Breakaway torque is a calculated value, determined by electric motor's breakaway torque, actuator's total ratio and effectiveness. Actuator can produce breakaway torque after run reversing operation for 1 to 2 revolutions of the output shaft, while torque tripping is interlocked. This may occur either in end position or in any optional intermediate position.

Self-locking

Actuator is self-locking provided that load acts 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.

Sense of rotation

When looking at the output shaft in the direction towards the control box, the CLOSE direction of rotation is identical with the clockwise sense.

Working stroke

According to Table No. 1.

Manual control

Manual control is performed directly by a handwheel (without clutch). It can be used even when the electric motor is running (the resulting motion of the output shaft is determined by the function of the differential gear). When the handwheel is rotated clockwise the output shaft of the actuator also rotates clockwise (when looking at the shaft towards the control box). On condition that the valve nut is provided with left-hand thread, the actuator closes the valve.

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

When using the manual control, ie. actuator is controlled mechanically, the torque-limit switches doesn't work and the valve can be damaged.

5. ACTUATOR OUTFIT

Position indicator

The actuator can be fitted with a display as an option for electronic system DMS2 ED. Actuator with electronic system DMS2 is equipped with two-line display.

Anti-condensation heater

Anti-condensation heater is connected to **DMS** and **DMS ED** electronic circuit. Switching of the anti-condensation heater is controlled by a thermostat. From the factory is the switching temperature set to 10 °C. The temperature is adjustable by adjusting software **DMS2**. Input power of the anti-condensation heater is 10W / 230V.

6. ELECTRIC PARAMETERS

External electric connection

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

Connecting of actuators with connector – on special request.

Actuator internal wiring

The internal wiring diagrams of the **MODACT MOPED, 52 039** actuators with terminal designation are shown in this Mounting and operating instructions.

Each actuator is provided with its internal wiring diagram on the inner side of the actuator cover. The terminals are marked on a self-adhesive label attached to a carrying strip under the terminal block.

Isolation resistance

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

Current-carrying capacity and maximum voltage of micro switches

Micro switches maximum voltage is 250 V AC and DC at the following maximum current values:

MO, MZ	250 V AC / 2 A; 250 V DC / 0.2 A
SO, SZ	250 V AC / 2 A; 250 V DC / 0.2 A
PO, PZ	250 V AC / 2 A; 250 V DC / 0.2 A

Micro switches can be used only as single-circuit micro switches. Two voltages of varying values or phases must not be connected to the terminals of one micro switches.

Electric strength of electrical circuits isolation

Circuits of anti-condensation heater	1 500 V, 50 Hz	
Electric motor	Un = 1 x 230 V Un = 3 x 230/400 V	1 500 V, 50 Hz 1 800 V, 50 Hz

Deviations of basic parameters

Tripping torque	±10 % of max. value of range
Adjusting speed	-10 % of max. value of range +15 % of rated value (<i>in idle run</i>)

Protection

Actuators are provided with one internal and one external protective terminal serving as protection from electric shock. Protective terminals are identified with a sign complying with ČSN IEC 417 (34 5555).

If actuator is not provided with over-current protection when purchased, such protection must be provided externally.

7. 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.

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. 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 MOPitored 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

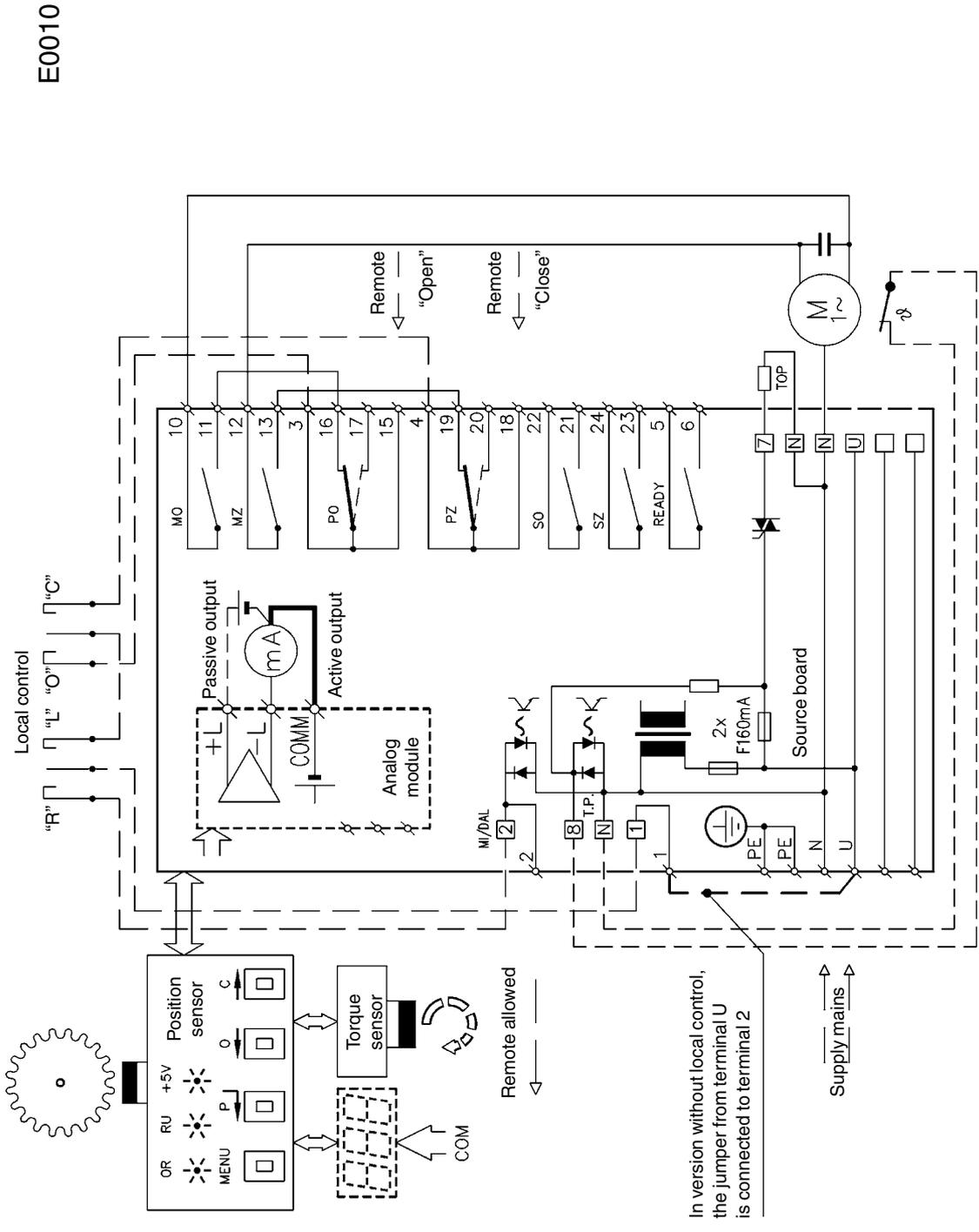
Optional outfit (*the electric actuator must be fitted with one of these units*):

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

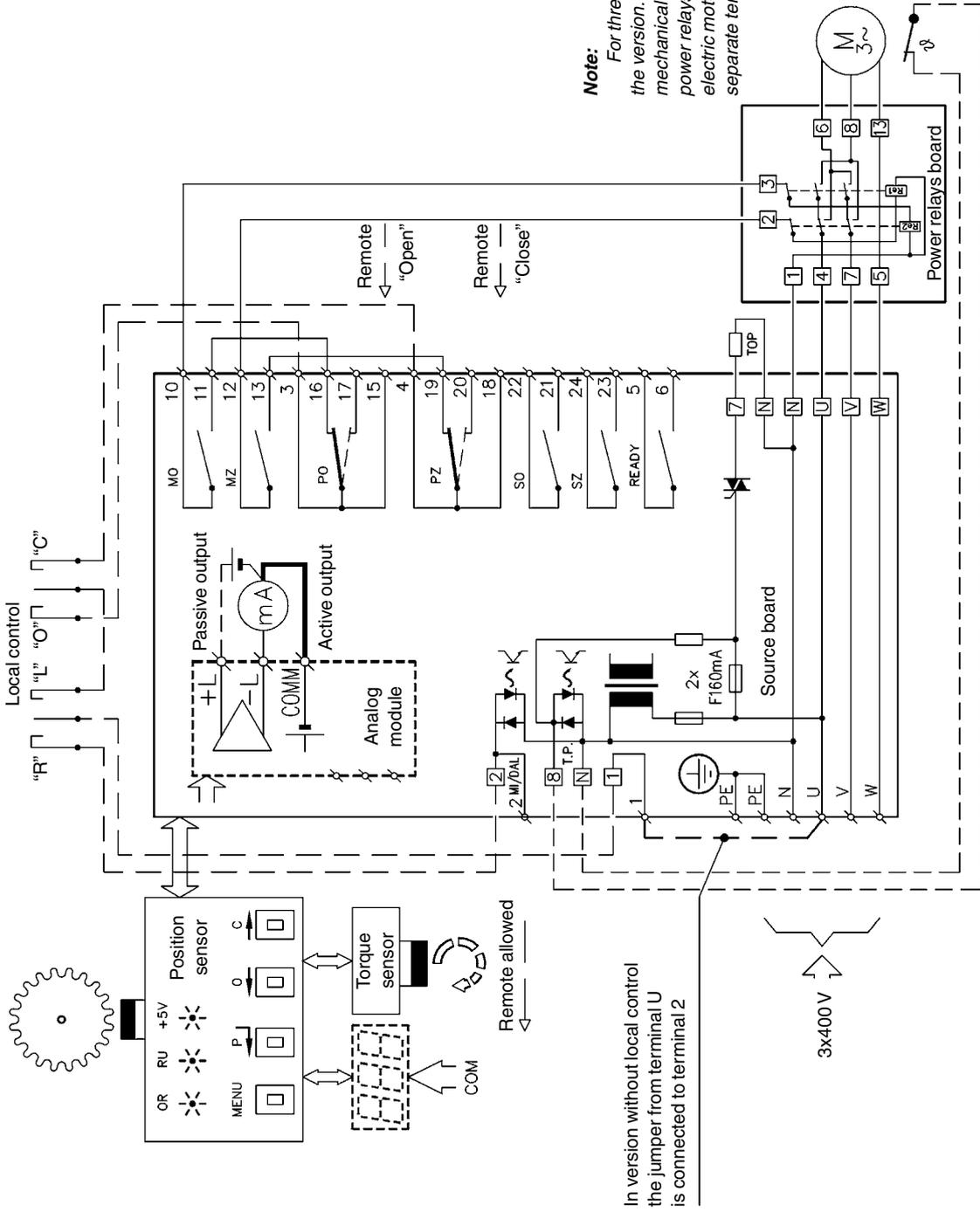


Note: Here, contacts of relay MO, MZ, SO, SZ are shown with power supply switched off; with power supply switched off contacts PO, PZ are shifted to the position drawn in dashed line.

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

with three-phase electric motor

E0011

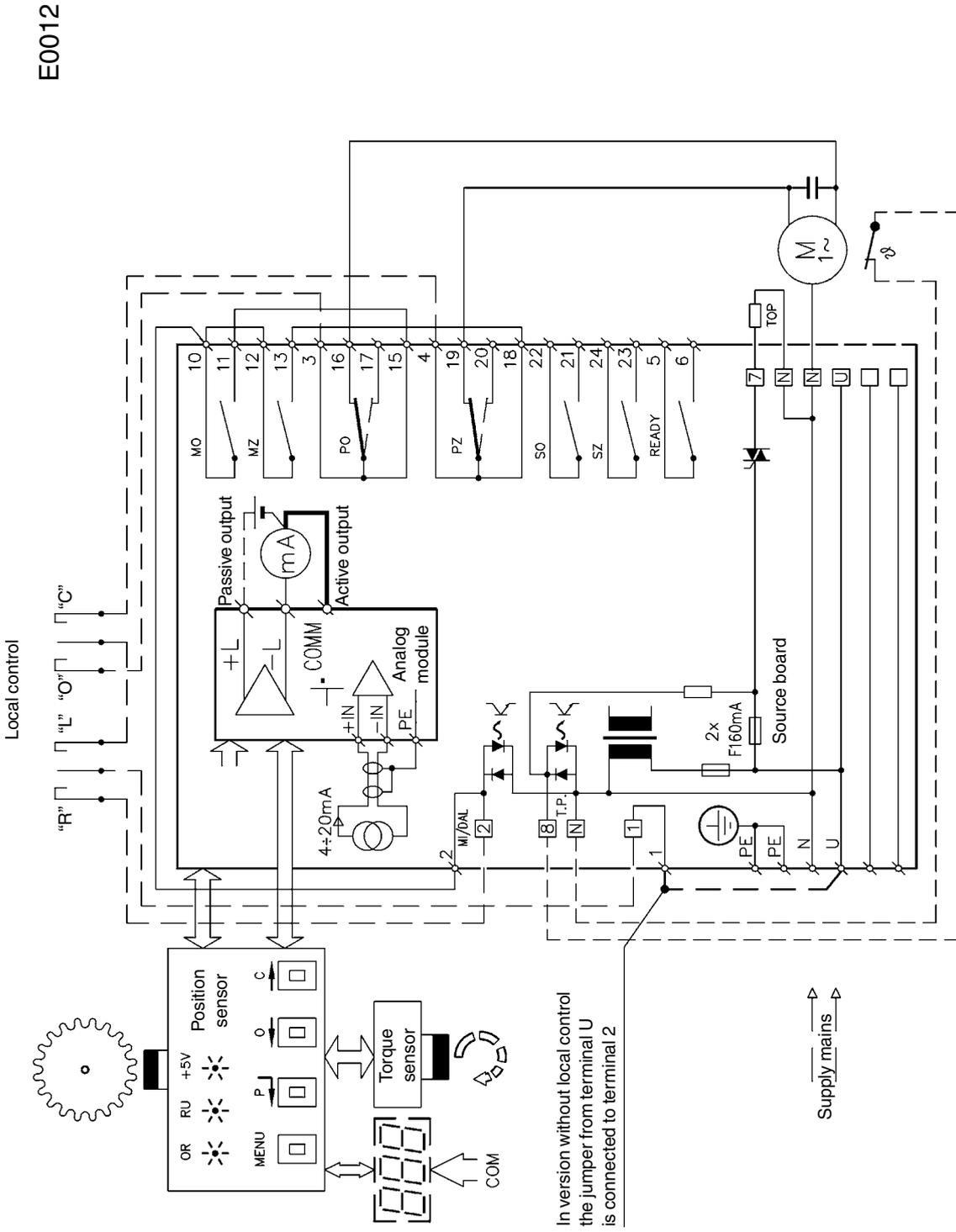


Note: For three-phase actuator, the version "Substitution of electro-mechanical board without block of power relays" is also available; electric motor is connected to separate terminal board.

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

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

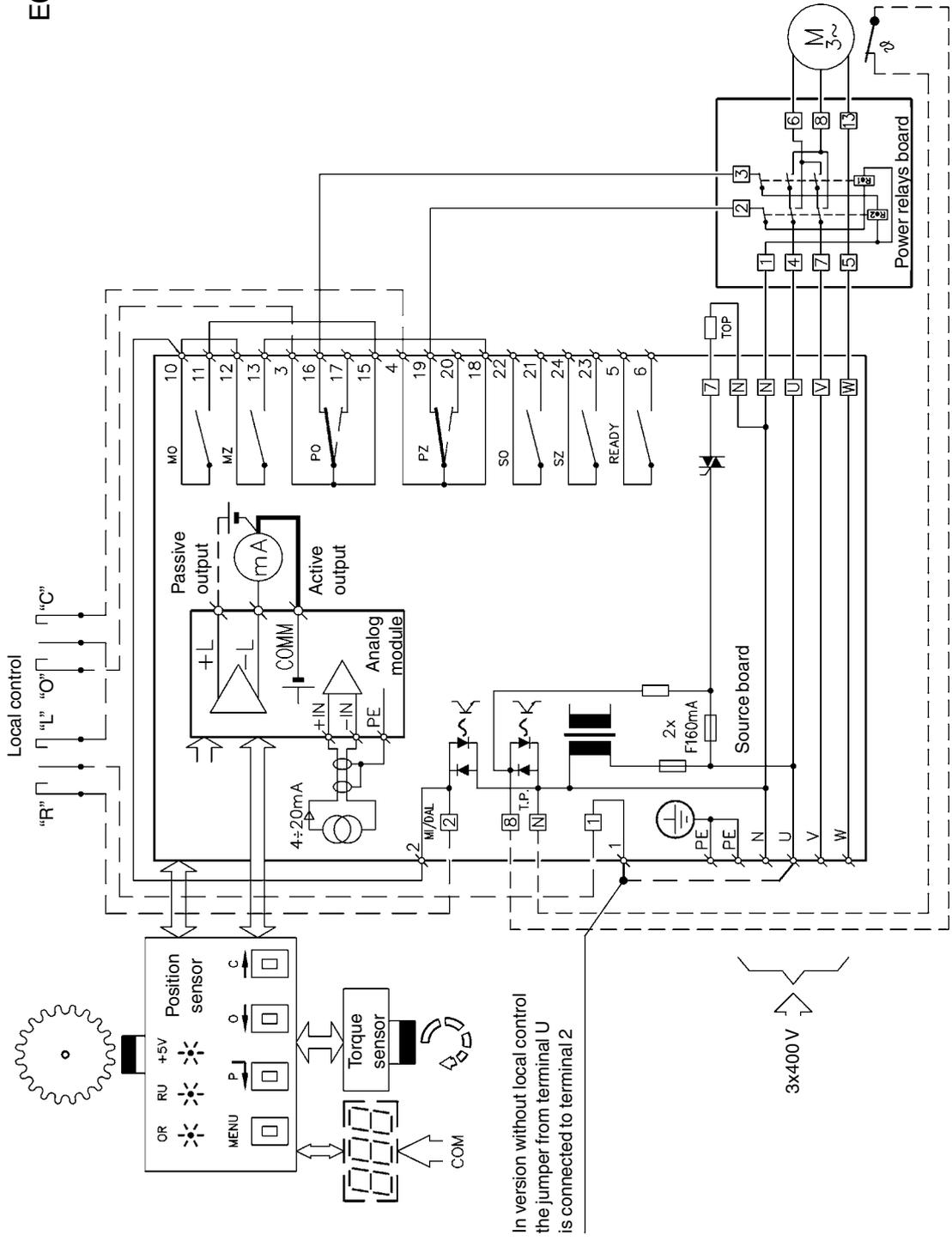
Example of wiring diagram of electronics DMS2 ED in version Control with single-phase electric motor



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

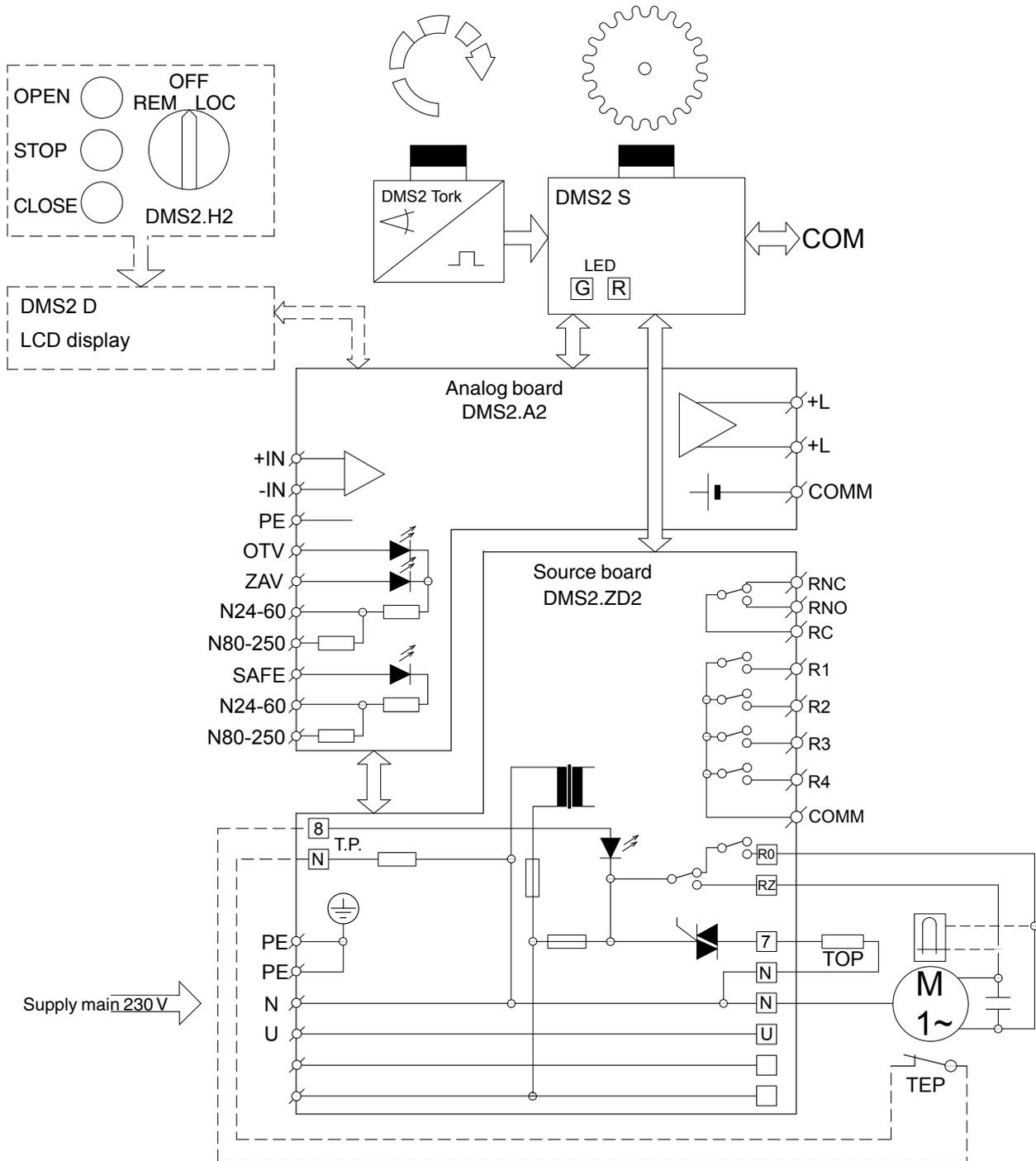
E0013



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.

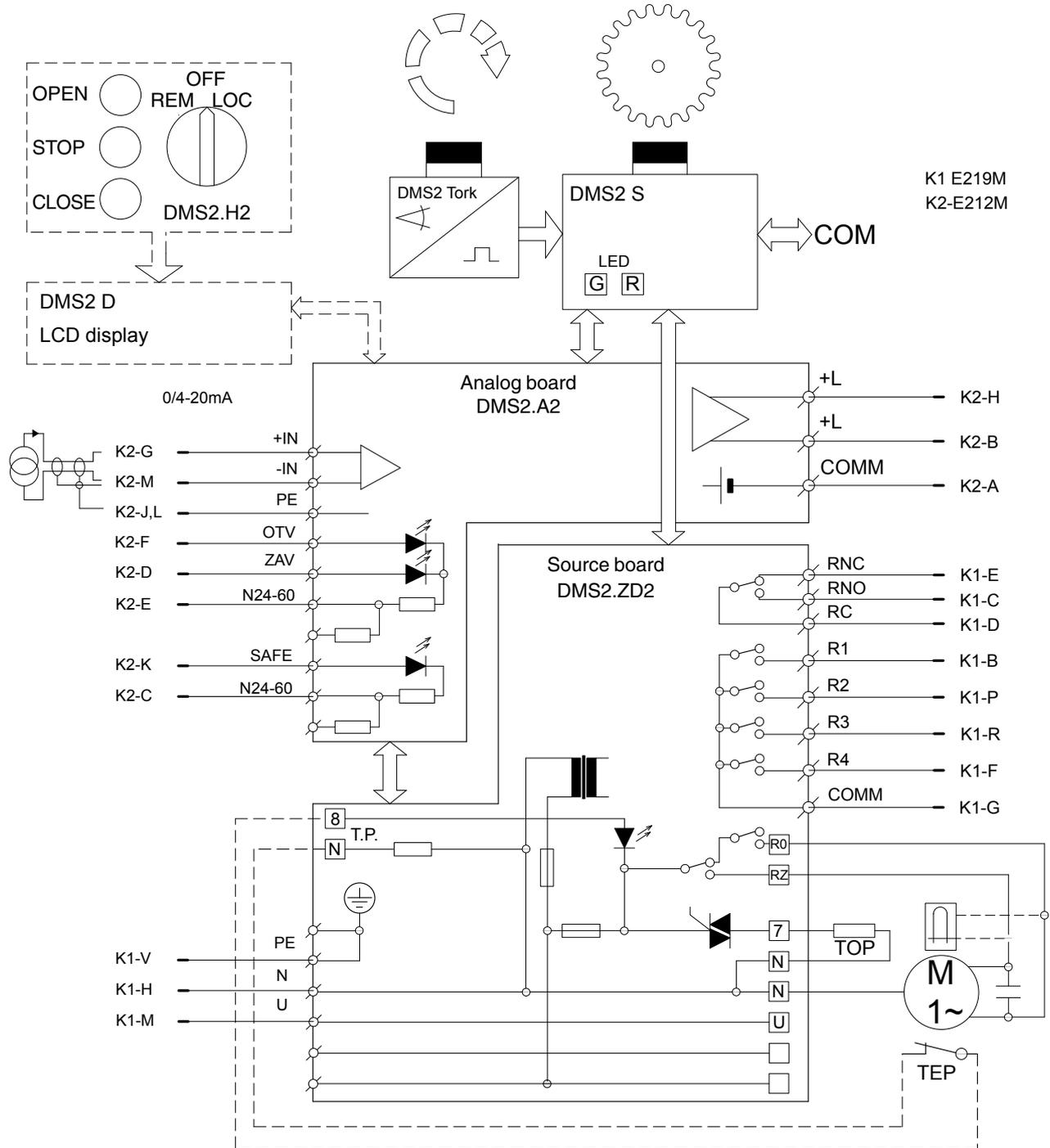
Example of wiring diagram of system **DMS2** in version for control with signals “open” and “close” or in version for control with analog current signal with single-phase electric motor

E-0014



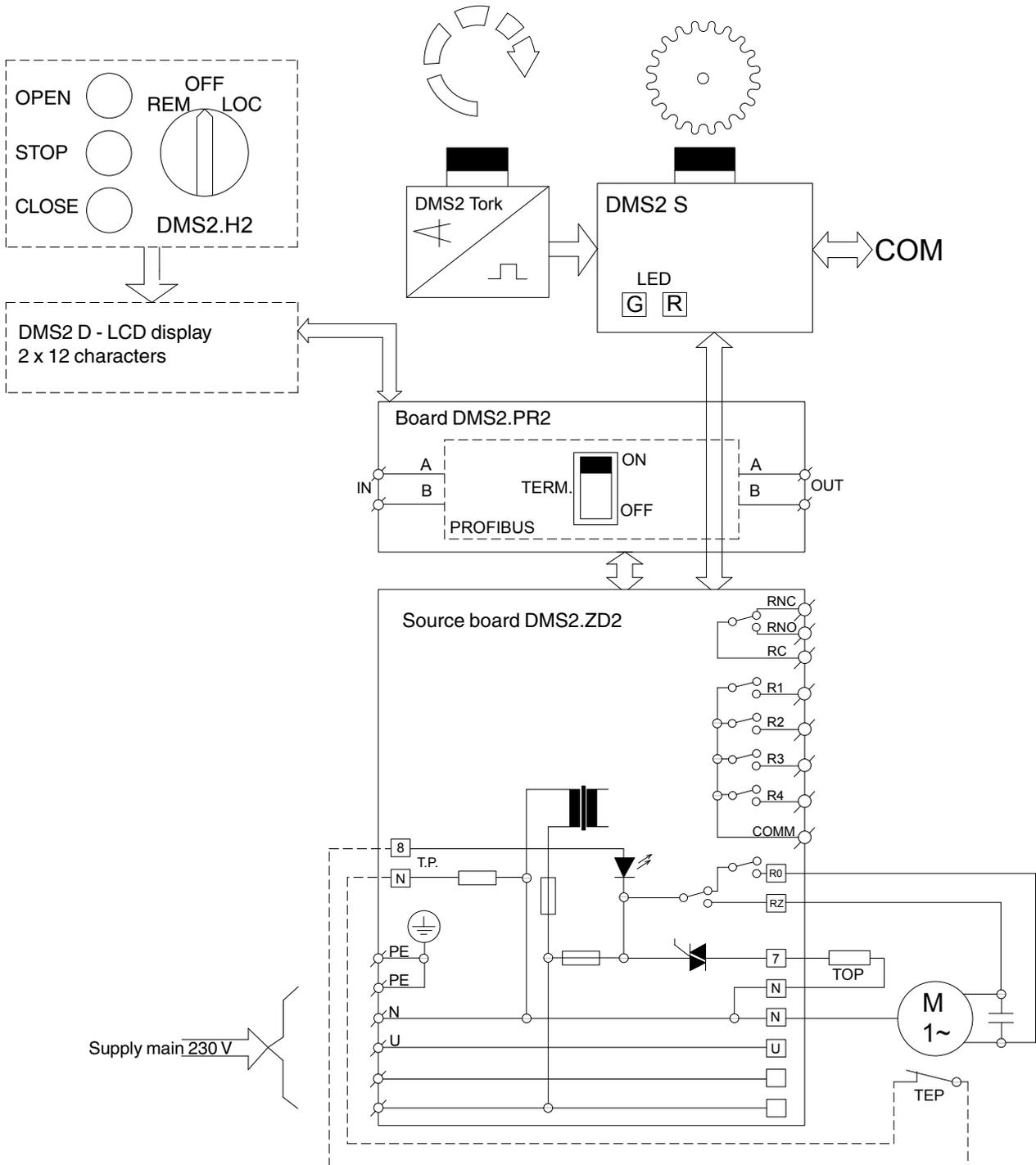
Example of wiring diagram of system **DMS2** in version for control with signals “open” and “close” or in version for control with analog current signal with single-phase electric motor – connection with connector ECTA

E-0014-K



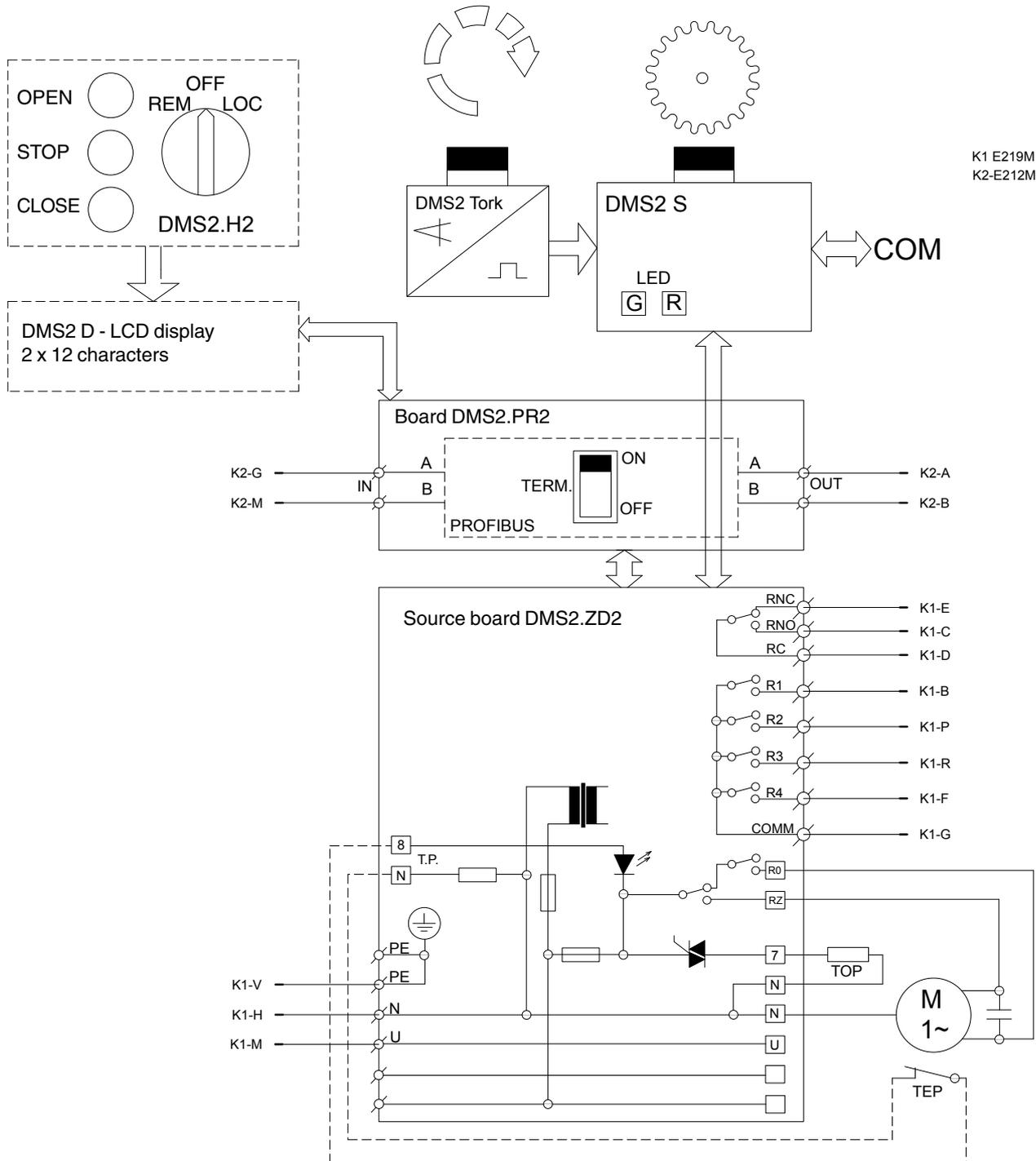
Example of wiring diagram of system **DMS2** in version Profibus
with single-phase electric motor

E-0015



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

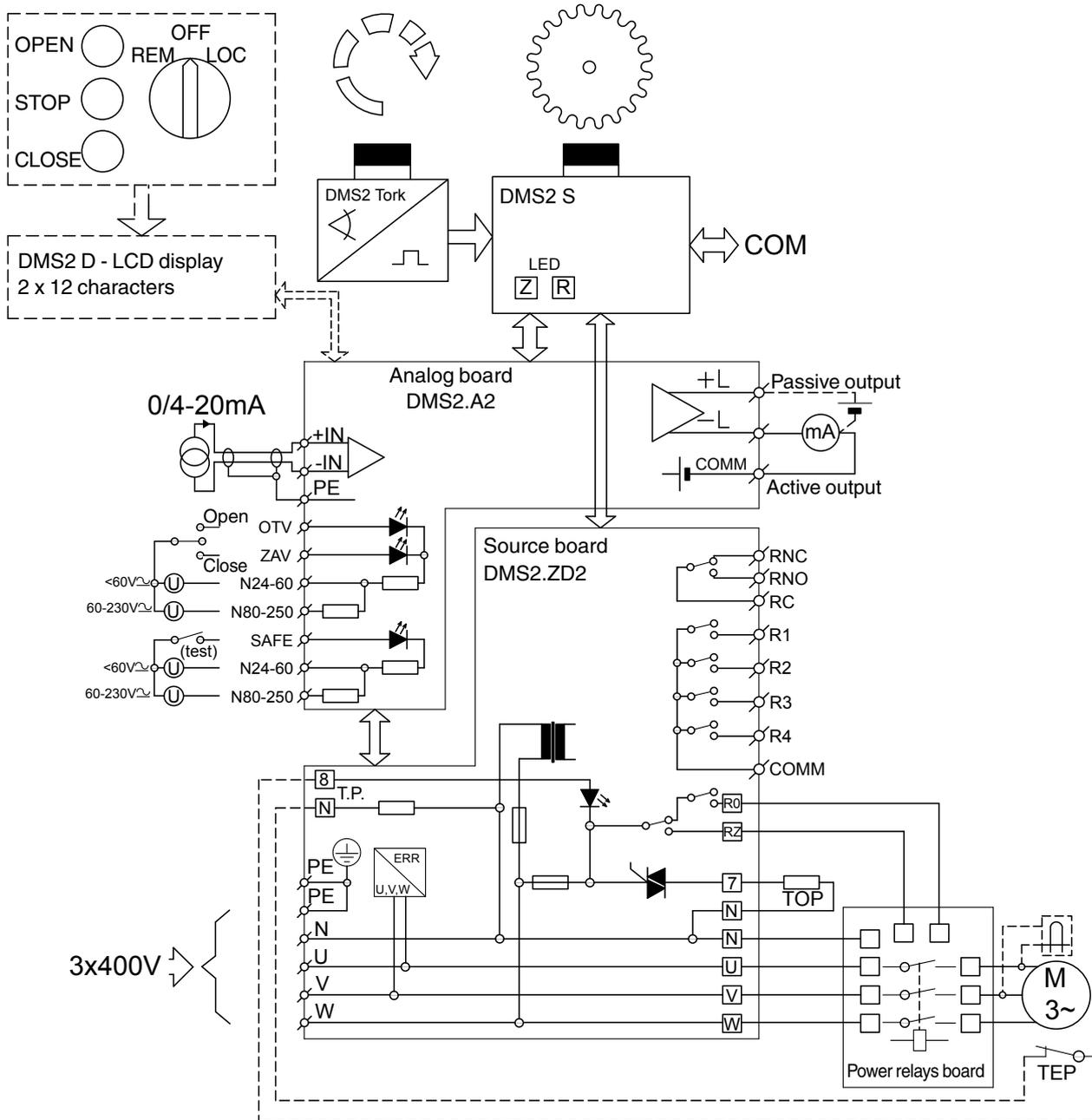
E-0015-K



K1 E219M
 K2-E212M

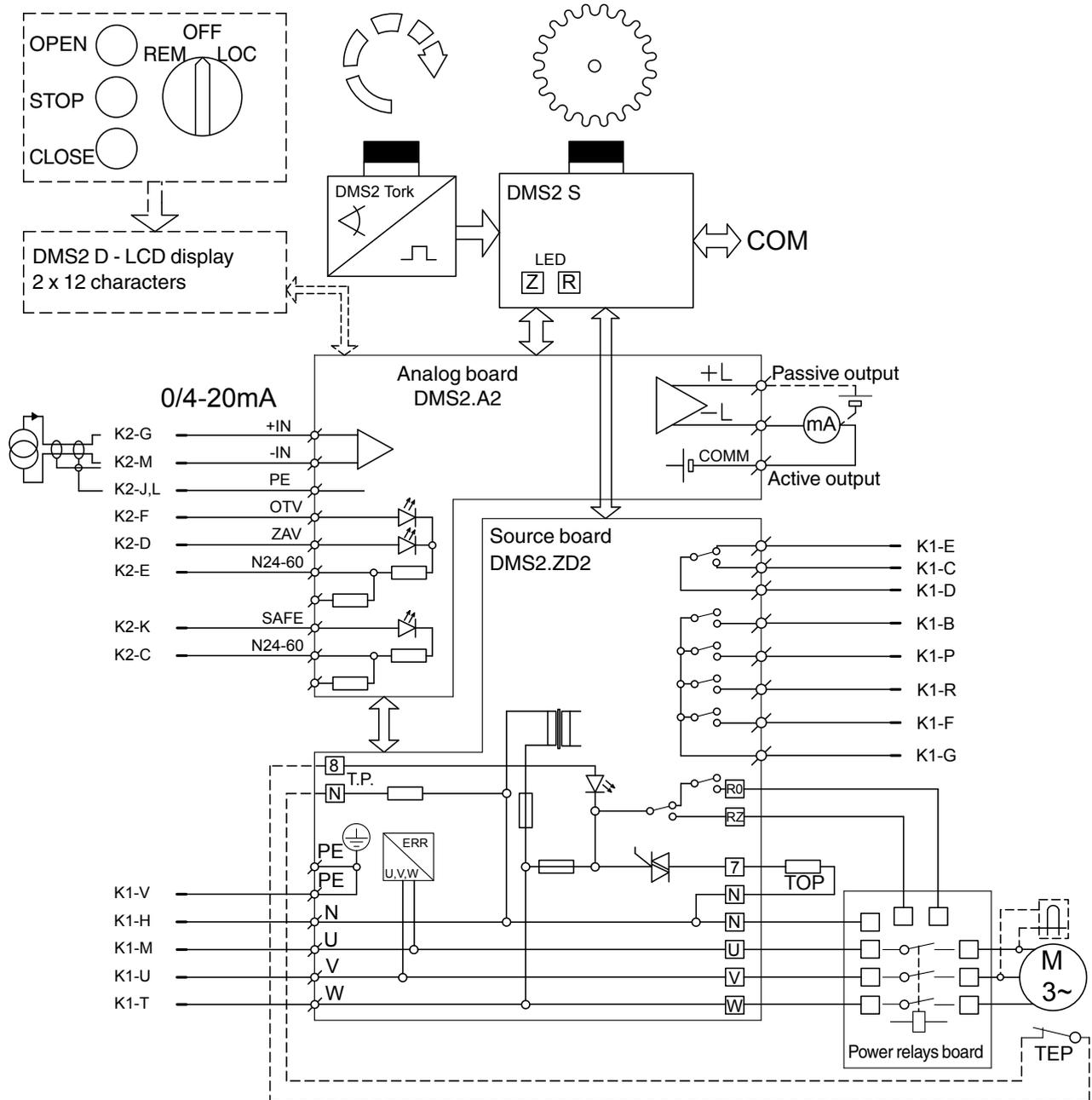
Example of wiring diagram of system **DMS2**
in version for control with signals "open" and "close" or in version for control
with analog current signal with three-phase electric motor

E-0016



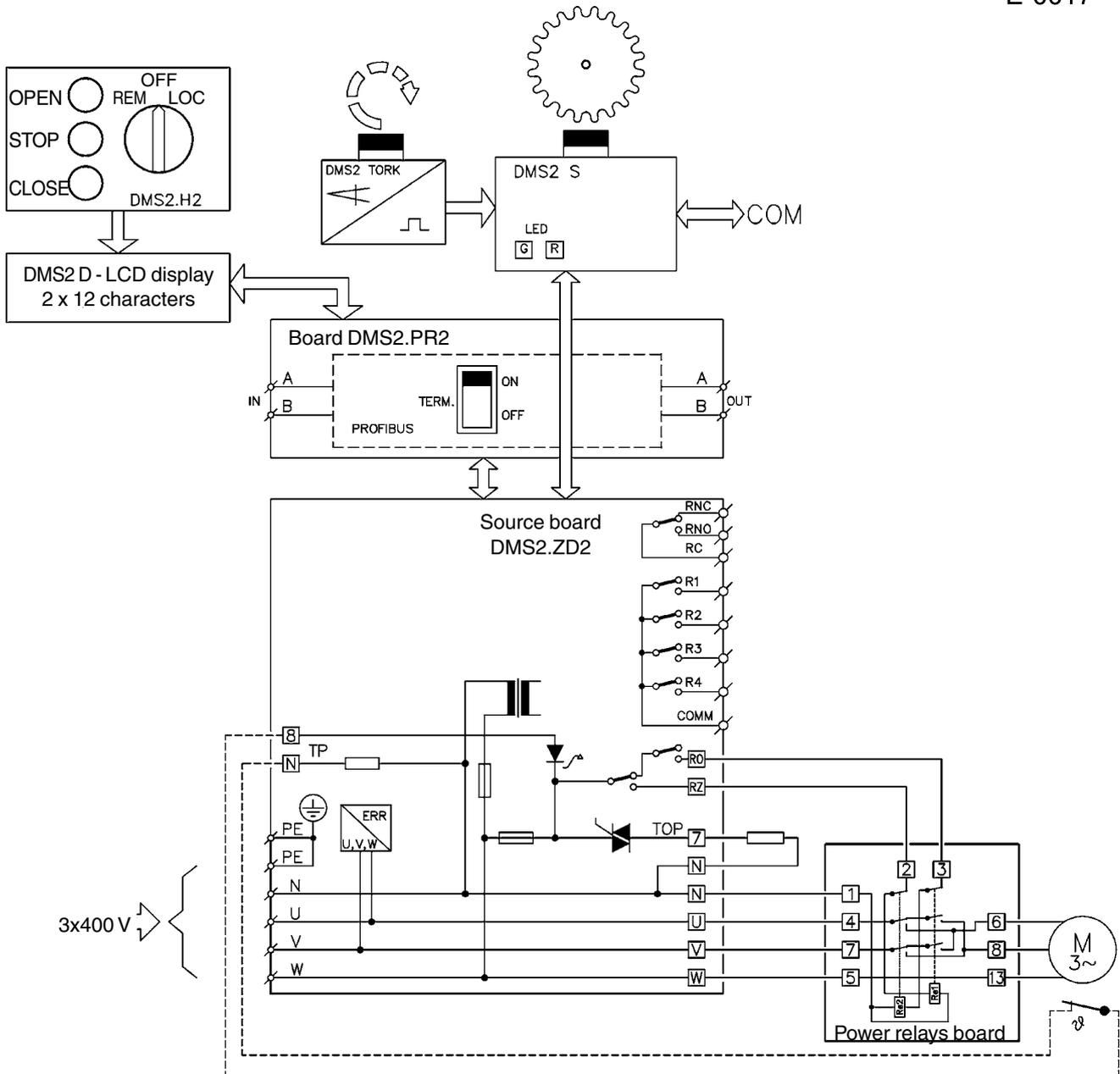
Example of wiring diagram of system DMS2
in version for control with signals "open" and "close" or in version for control
with analog current signal with three-phase electric motor
– connection with connector ECTA

E-0016-K



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

E-0017



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

E-0017-K

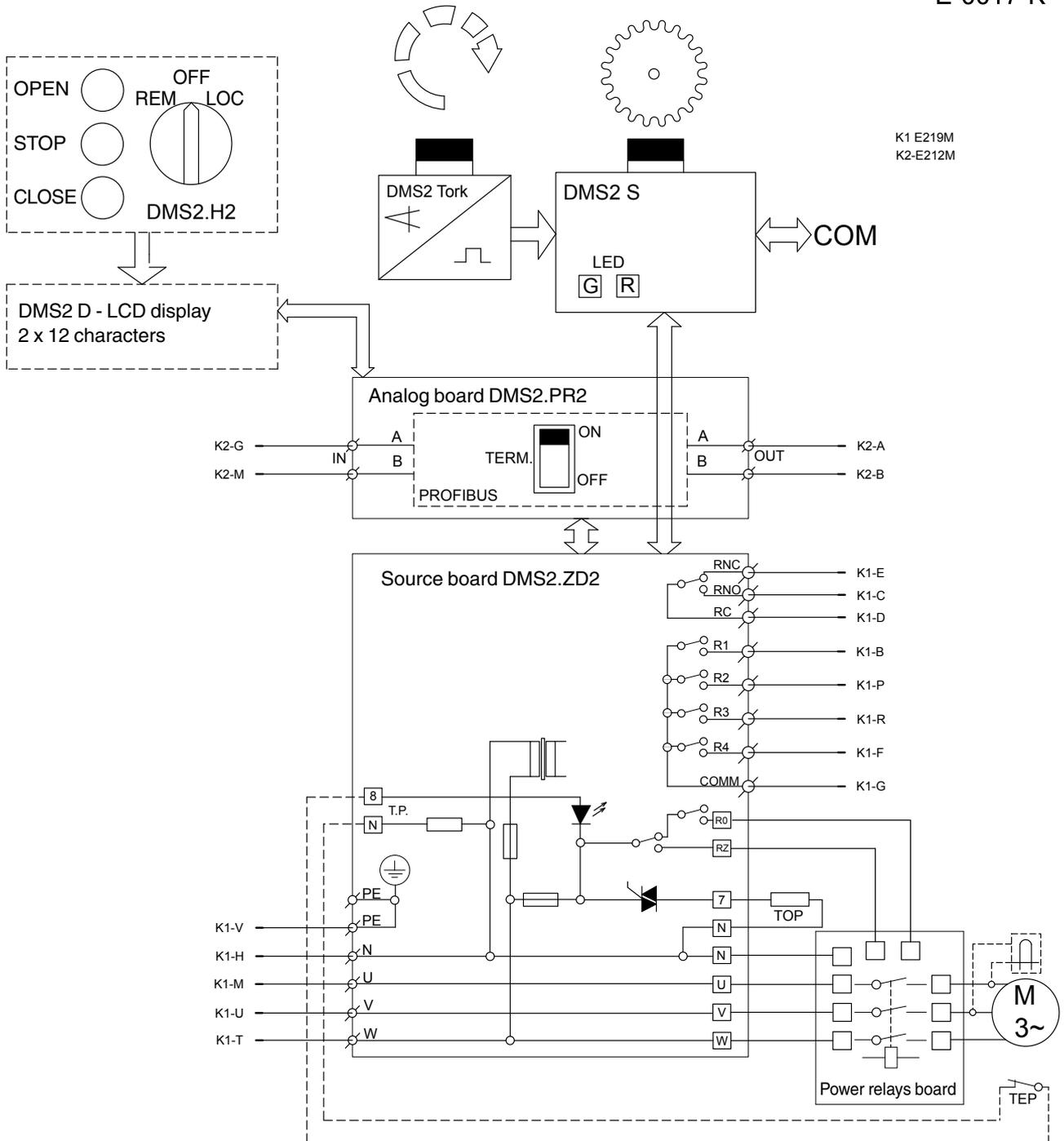


Table 1 – MODACT MOPED electric actuators, type number 52 039
 – basic technical parameters

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 3 4 5	6 7 8 9 1 0
MOPED 30/65-9	10-30	65	9	2-2830	T42RL477	3x400	0,05	1350	0,24	2	17	52 039	xx1xPED
MOPED 30/83-15		83	15		T42RR478	3x400	0,09	1300	0,34	2,5	17		xx2xPED
MOPED 30/58-25		58	25		T42RX479	3x400	0,15	1270	0,53	2,2	17		xx3xPED
MOPED 30/39-40		39	40		T42RX479	3x400	0,15	1270	0,53	2,2	17		xx4xPED
MOPED 30/84-9		84	9		J42RT502	1x230	0,100	1370	0,8	1,7	17		xx5xPED
MOPED 30/56-15		56	15		J42RT502	1x230	0,100	1370	0,8	1,7	17		xx6xPED
MOPED 20/27-25	10-20	27	25		J42RT502	1x230	0,100	1370	0,8	1,7	17		xx7xPED
MOPED 60/84-9		84	9		J42RT502	1x230	0,100	1370	0,8	1,7	17		xxDxPED
MOPED 60/140-9	30-60	140	9		T42RR478	3x400	0,09	1300	0,34	2,5	17		xxAxPED
MOPED 60/83-15		83	15	T42RR478	3x400	0,09	1300	0,34	2,5	17	xxBxPED		
MOPED 45/58-25	10-45	58	25	T42RX479	3x400	0,15	1270	0,53	2,2	17	xxCxPED		

Meaning of respective places in type numbers of electric actuator:

6th place – 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 – 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 – adjusting speed (*Table 1*)

9th place – 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*)

11th place – surrounding temperatures

Surrounding temperatures

Temperature [°C]	Type of actuator	Code
	MOPED 52 039	
-25 +60	✓	–
-30 +60	✓	F1
-50 +60	✓	F
-60 +60	✓	FF
-25 +80	✓*	T
-30 +80	✓*	F1T
-50 +80	✓*	FT

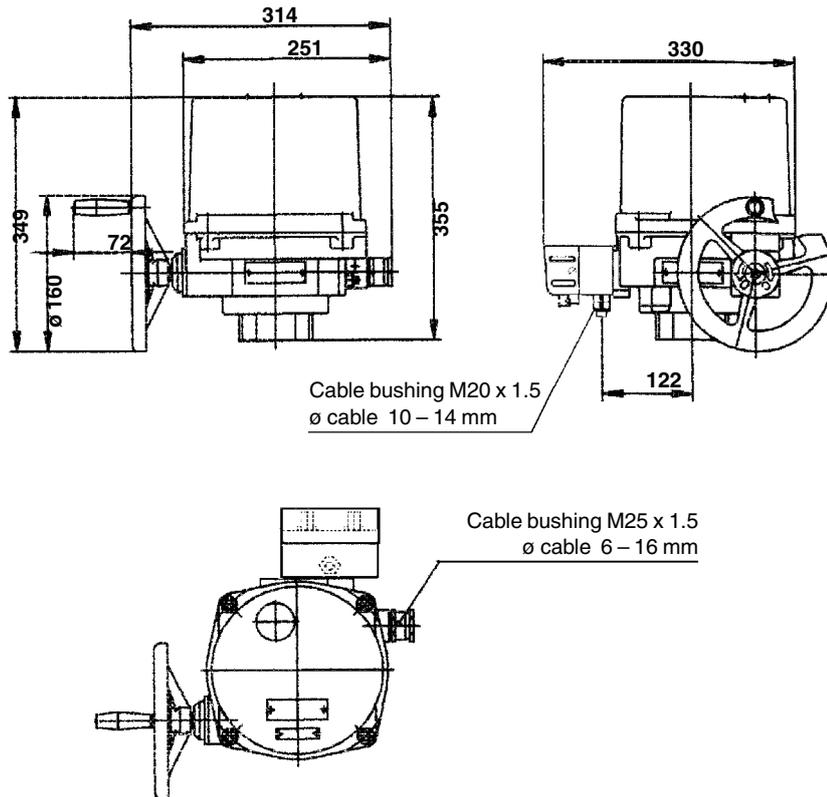
Note:

- ✓ – available version
- ✓* – the electronic outfit should be discussed with the manufacturer

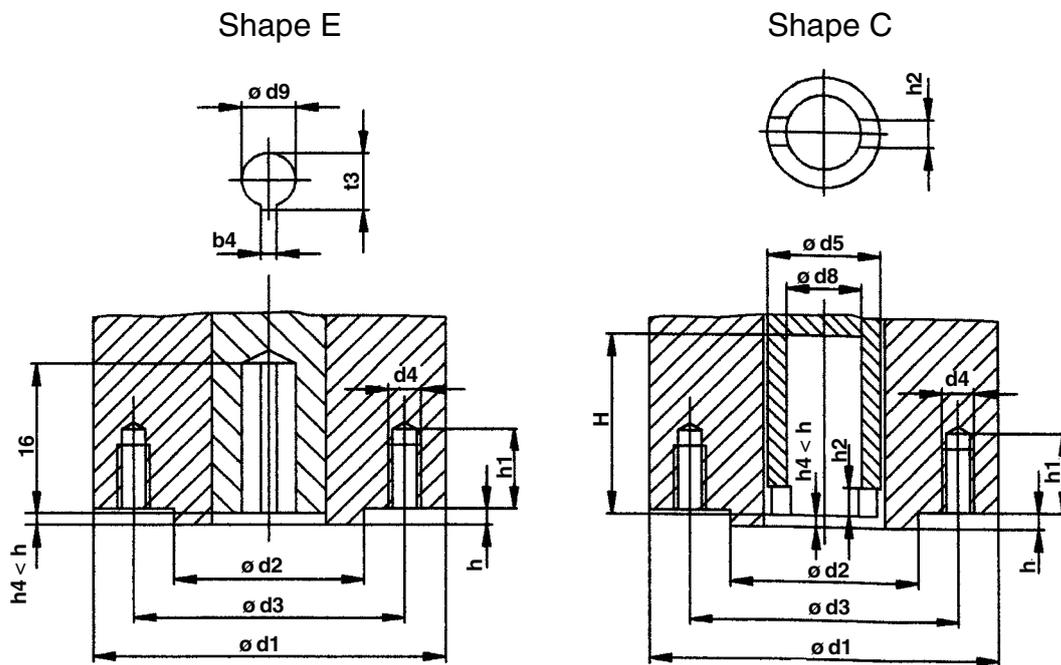
Table 2 – Outfit of control electronics DMS2 ED

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	x	
	regulator																x	x	x	x	x	x	x	x	

Dimensional sketch of **MODACT MOPED** electric actuators, type no. 52 039

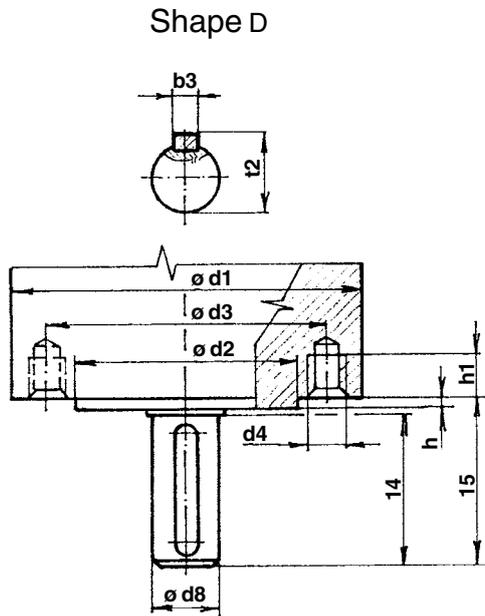


Mechanical connecting dimensions of **MODACT MOPED** electric actuator, type no. 52 039



Flange size	ComMOP data for both shapes							Data for shape C					Data for shape E				
	ø d1	ø d2f8	ø d3	d4	Number of threaded holes	h1	h	ø d5	h2	H	b2H11	ø d8	ø 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	

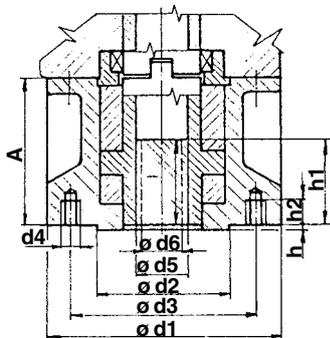
Connecting dimensions of **MODACT MOPED** electric actuator, type no. 52 039
basic version (*without adapter*)



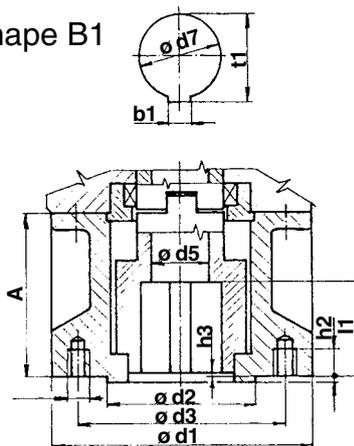
Shape	Dimension (mm)	
D	ø d1 orientational value	125
	ø d2 f8	70
	ø d3	102
	d4	M 10
	number of threaded holes	4
	h max	3
	h1 min. 1,25d4	12,5
	ø d8 g6	20
	l4	50
	t2max	22,5
b3 h9	6	
l5	55	

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

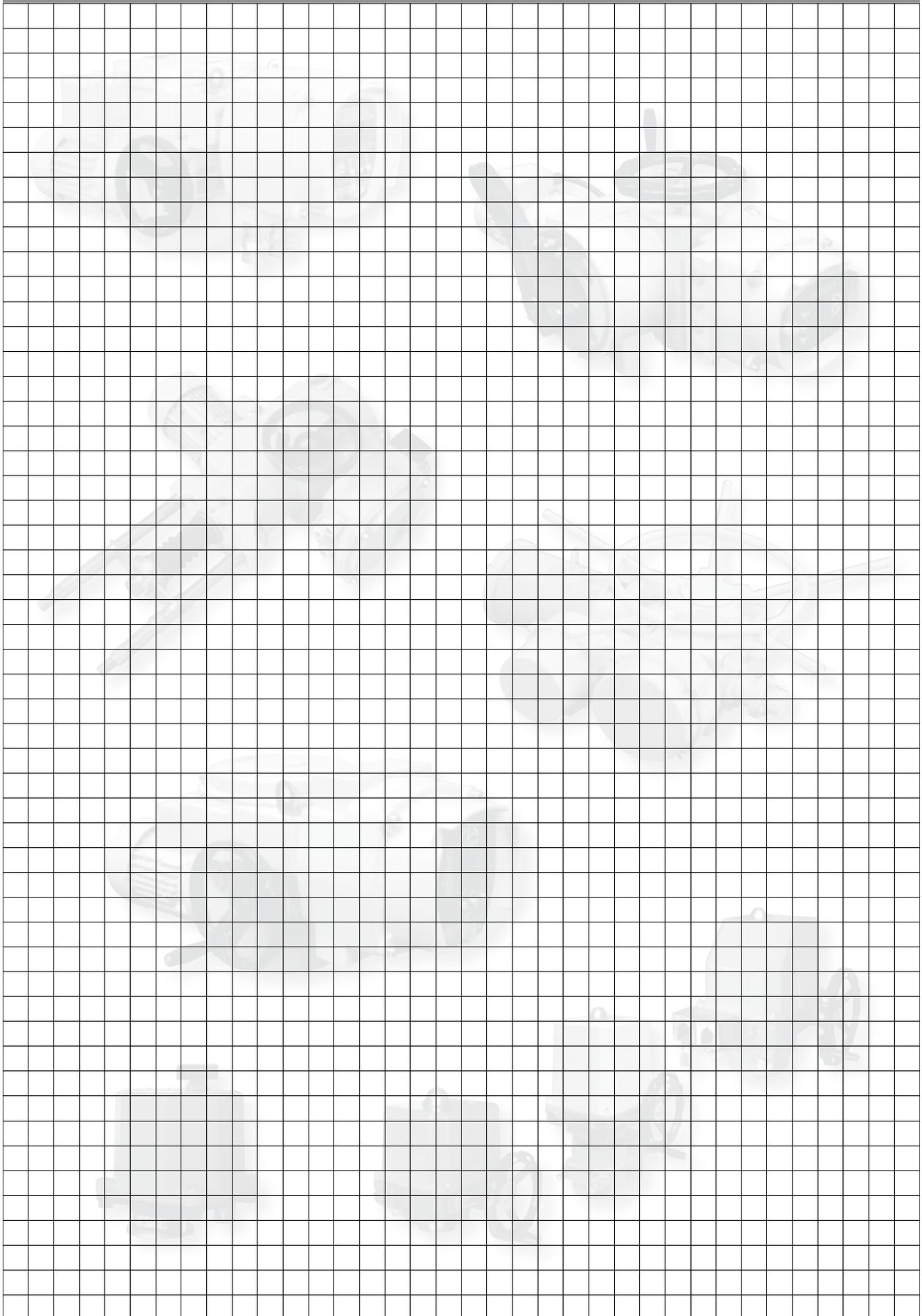
Shape A

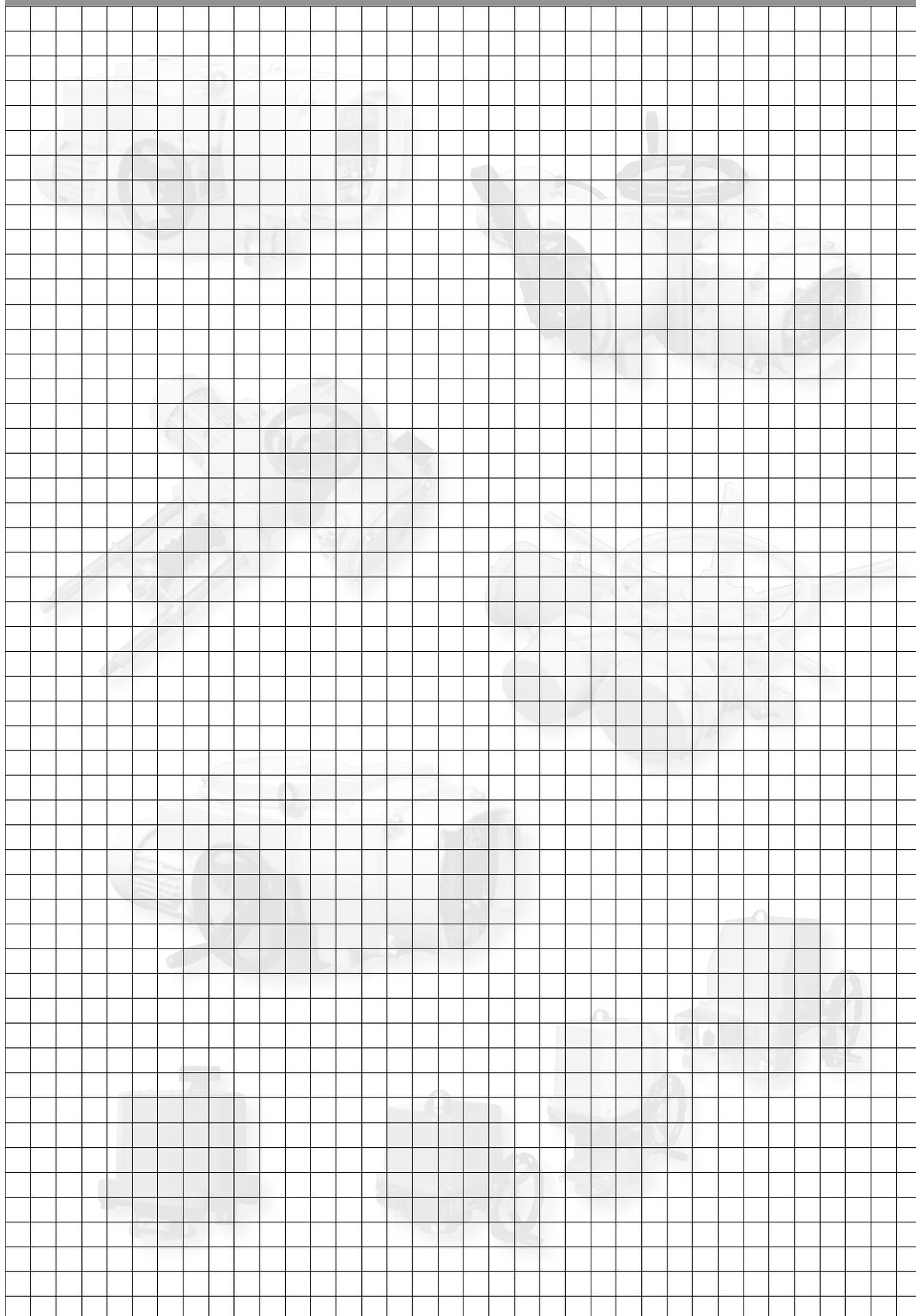


Shape B1



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







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