![Duplomatic Oleodinamica logo] **DUPLOMATiC OLEODiNAMiCA**
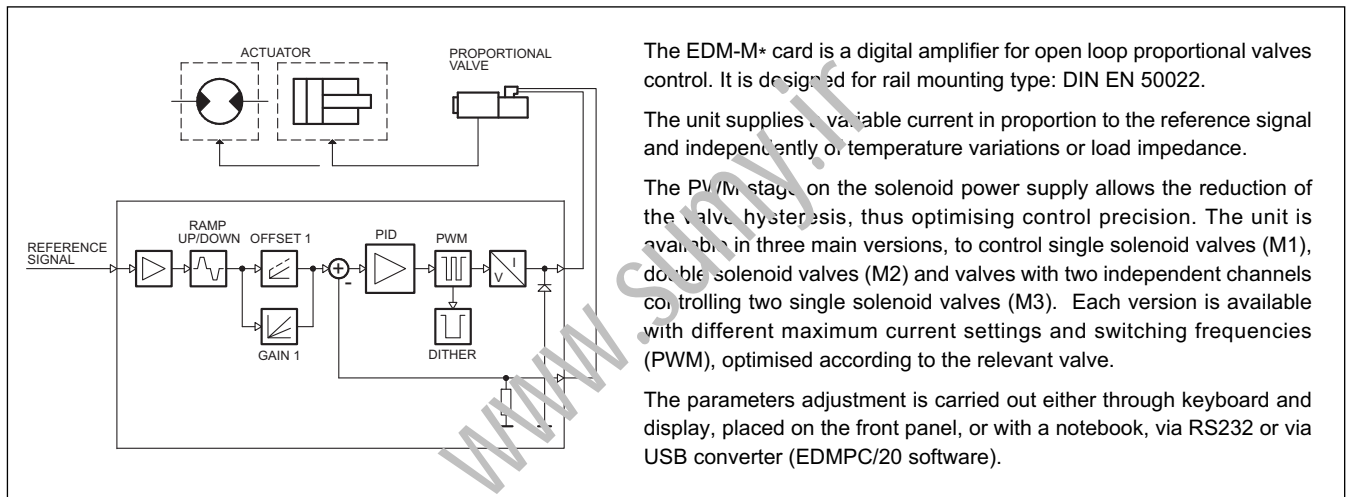

EDM-M*
DIGITAL AMPLIFIER FOR OPEN LOOP PROPORTIONAL VALVES
SERIES 20

EDM-M1 single solenoid
EDM-M2 double solenoid
EDM-M3 two single solenoids
independent channels

RAIL MOUNTING TYPE: DIN EN 50022

OPERATING PRINCIPLE

The EDM-M* card is a digital amplifier for open loop proportional valves control. It is designed for rail mounting type: DIN EN 50022.

The unit supplies a variable current in proportion to the reference signal and independently of temperature variations or load impedance.

The PWM stage on the solenoid power supply allows the reduction of the valve hysteresis, thus optimising control precision. The unit is available in three main versions, to control single solenoid valves (M1), double solenoid valves (M2) and valves with two independent channels controlling two single solenoid valves (M3). Each version is available with different maximum current settings and switching frequencies (PWM), optimised according to the relevant valve.

The parameters adjustment is carried out either through keyboard and display, placed on the front panel, or with a notebook, via RS232 or via USB converter (EDMPC/20 software).

TECHNICAL CHARACTERISTICS

Power supply	V DC	10 ÷ 30 ripple included
Required power	W	min 20 - max 40 (see paragraph 3.1)
Output current	mA	min 800 - max 2600 (see paragraph 1)
Power supply electrical protections		over load over 33V polarity inversion
Output electrical protections		short-circuit
Analogue electrical protections		up to 30V DC due to incorrect power supply connection
Available reference signals	0 ÷ 10V ±10V 4 ÷ 20 mA	input impedance 10-100 kΩ input impedance 10-100 kΩ input impedance max 500 Ω
Additional output ports		±10V DC to supply 50 + 50 mA to external potentiometer
Electromagnetic compatibility (EMC)		according to 2004/108/CE standards (see paragraph 6 - **NOTE 1**)
Housing material		thermoplastic polyamide
Housing dimensions	mm	120 x 93 x 23
Connector		Plug-in terminal block with tightening screws: 15 poles
Operating temperature range	°C	-20 / +70
Mass	kg	0,15

1 - IDENTIFICATION CODE

| E | D | M | - | M | | | / 20 | |

Digital amplifier
for rail mounting DIN EN 50022

for open loop

Versions:
1 = for single solenoid proportional valves
2 = for double solenoid proportional valves
3 = 2 channels for an independent control of two single solenoid valves

Max current (I Max):
(first channel for EDM - M3 version)
1 = 860 mA   **3** = 1600 mA   **5** = 2600 mA
2 = 1200 mA   **4** = 1880 mA

Only for EDM-M3 version, omit for other versions
Max current (I Max) second channel:
1 = 860 mA   **3** = 1600 mA
2 = 1200 mA   **4** = 1880 mA

Reference signal:
E0 = voltage 0 ÷ ±10V (standard)
E1 = current 4 ÷ 20 mA

Series N. (from 20 to 29 sizes and
mounting dimensions remain
unchanged)

Switching frequency (PWM):
1 = 100 Hz
2 = 200 Hz
3 = 300 Hz
4 = 400 Hz

2 - EDM-M, DUPLOMATIC VALVES AND DEFAULT SETTINGS

The card is preset at factory. The following table shows the default settings for the standard EDM versions and the Duplomatic valve to be coupled to. As shown at par. 1 different settings are possible. Apply for them at our Technical Dept.

CARDS FOR 24V VALVES

CARD					COUPLING VALVES (you can find the matches between valves names and catalogue numbers in the group 8 index)		
Name	I Min [mA]	I Max [mA]	I Lim [mA]	PWM [Hz]	Name	single coil	double coil
EDM-M111	200	860	1350	100	DSPE*, RPCED1, RPCED1-T3, RPCE2, RPCE3, BLS6, ZDE3, QDE3	▪	
EDM-M112	200	860	1350	200	DSE3, CRE, PRE*, PRE3, PRED3, MZE, DZCE*	▪	
EDM-M131	200	1600	2350	100	DSE5, QDE5	▪	
EDM-M211	200	860	1350	100	DSPE*, ZDE3, BLS6		▪
EDM-M212	200	860	1350	200	DSE3		▪
EDM-M231	200	1600	2350	100	DSE5		▪
EDM-M3312	200 200	1600 860	2350 1350	200	VPPM-*PQCE regulator	▪ ▪	

CARDS FOR 12V VALVES

CARD					COUPLING VALVES (you can find the matches between valves names and catalogue numbers in the group 8 index)		
Name	I Min [mA]	I Max [mA]	I Lim (#) [mA]	PWM [Hz]	Name	single coil	double coil
EDM-M141	300	1880	2700	100	DSPE*, BLS6	▪	
EDM-M142	300	1880	2700	200	DSE3, CRE, PRE*, PRE3, PRED3, MZE, DZCE*, ZDE3, QDE3	▪	
EDM-M151	500	2600	4000	100	DSE5, QDE5	▪	
EDM-M241	300	1880	2700	100	DSPE*, BLS6		▪
EDM-M242	300	1880	2700	200	DSE3, ZDE3		▪
EDM-M251	500	2600	4000	100	DSE5		▪

 I Lim: Max output current from the card.

3 - FUNCTIONAL SPECIFICATIONS

3.1 - Power supply

The card requires a power supply of between 10 and 30V DC ripple included (terminals 1 and 2).

NOTE: The value of the power supply voltage on the card must not be lower than the rated working voltage of the solenoid to be controlled.

The power supply voltage must be rectified and filtered, with maximum admissible ripple within the above voltage range.
The power required by the card depends on the power supply voltage and on the maximum value of the supplied current (it is determined by the card version).
In general a conservative value of the required power can be considered as the product of V x I.
Example: a card with a maximum current = 860 mA and a power supply voltage of 24V DC requires a power of about 20W. With a card with a maximum current =1600 mA and a power supply voltage of 24V DC, the used power is equal to 38,5W.

3.2 - Electrical protections

The card is protected against overvoltage and polarity inversion.
On the output a protection against any short circuit is foreseen.

3.3 - Reference signal

The card accepts voltage reference signals 0 ÷ 10 V and ± 10 V, current reference signal 4 ÷ 20 mA, coming from an external generator (PLC, CNC) or from an external potentiometer powered by the card itself. The reference value depends on the card version as stated in the diagrams along side.
See paragraph 12 for the electric connections referring to the different card versions.

EDM-M1 VERSION

EDM-M2 VERSION

EDM-M3 VERSION

4 - SIGNALS

4.1 - Power ON (Power supply)
The two red displays indicates the card power supply:

ON - normal power supply

OFF - no power supply

FLASHING - see table at paragraph 12.
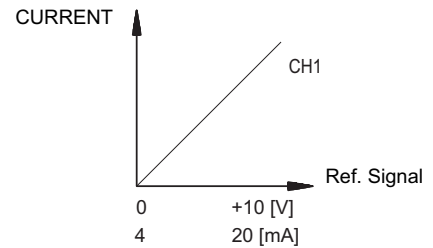
4.2 - Card ok output

The state of the card can be checked by means of the output "card ok OUTPUT", located on pin 9 (referred to zero power supply, pin 15) with load resistance of 220 KΩ and max current 100 mA . When the card works normally, on this pin there is the same voltage as the power supply; when there is an anomaly, the output voltage is zero.
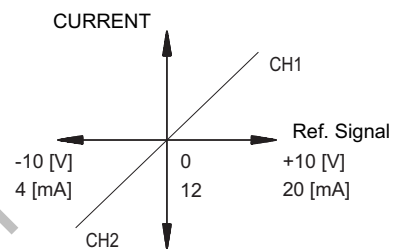
The anomalies could be:

- low voltage (lower than 10V)

- short circuit

- unconnected coil

If the output pin 9 is low, the control logic forbids the power outputs towards the solenoids. When the anomaly is settled, the card resets automatically.
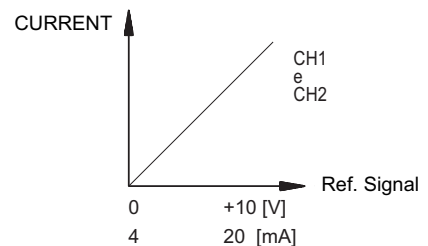
5 - ADJUSTMENTS

There are two adjustments modalities: variables view and parameters editing. The first one enables the real time monitoring of the control values, for both the required and the read current, on both channels. The second modality enables the operating parameters view and editing.

5.1 - Variables view

The card is switched on at the variables view modality, and it shows the first variable value, that is the reference signal to channel 1.
By means of (+) and (-) keys, the different variables can be selected. Each time a variable is selected, its short name appears for approximately one second.
By briefly pressing the (E) key, the current variable name appears for approximately one second.

The variables that can be selected are:

U1:	Reference signal to channel 1:	
	0 + 9,9 V 4 ÷ 20 mA	for single solenoid
	- 9,9 / 0 / +9,9 V 4 / 12 / 20 mA	for double solenoid

C1: current required for channel 1, according to the applied reference signal, expressed in ampere, ranging between 0 and 3.0 A

E1: current actually supplied by channel 1, expressed in ampere, ranging between 0 and 3.0 A

U2: Reference signal to channel 2:

| 0 + 9,9 V 4 ÷ 20 mA | for single solenoid |
| - 9,9 / 0 / +9,9 V 4 / 12 / 20 mA | for double solenoid |

C2: current required for channel 2, according to the applied reference signal, expressed in ampere, ranging between 0 and 3.0 A

E2: current actually supplied by channel 1, expressed in ampere, ranging between 0 and 3.0 A

Only the variables of channel 1 (U1, C1 ed E1) will be viewed, if the card is set for a single solenoid valve.

All the mentioned parameters can be viewed on the display located on the card front panel. It is a two digits display.
The selected value has to be read as follows (example for EDM-M15*/20E* card):

REFERENCE (V)	(mA)	VAR. U1 (V)	VAR. C1/E1	VAR. U2 (V)	VAR. C2/E2
+10	20	10.	18. (A)		
+5	16	5.0	1.0 (A)		
0	12	00	40.(mA)		
0	12			0.0	40.(mA)
-5	8			5.0	1.0 (A)
-10	4			10.	18 (A)

5.2 - Parameters editing

By pressing the (-) key for longer than 1,5 seconds, it is possible to switch from the variables view modality to the parameters editing modality, and vice versa.
In the parameters editing modality, the different parameters can be selected, as in the previous modality, by briefly pressing (+) and (-) keys. Each time a parameter is selected, its short name appears for approximately one second.
By briefly pressing the (E) key, the current parameter name appears for approximately one second.

By pressing the (E) key for longer than 1,5 seconds, the parameters name flashes for approximately one second: by means of (+) and (-) keys, the parameter value can be edited. Each time one of these keys is pressed, the value is either increased or decreased of one unit; by holding the key pressed, the value is continuously increased.
Once the desired value is edited, exit by pressing the (E) key. The value is recorded in the EEPROM, the (+) and (-) keys resume their parameters selection function.
Once the parametrization cycle is completed, by pressing the (+) key more than 2 seconds and until displays blinking, all parameters are saved in EEPROM and the visualization goes back to variables view modality.

The parameters that can be selected are:

G1: "I Max" current, expressed in milliampere.
It sets the maximum current to the solenoid of channel 1, when the reference signal is at the maximum value of +10 V (or 20 mA). It is used to limit the maximum value of the hydraulic size controlled by the valve.
Default value = see paragraph 2

o1: "I Min" current, expressed in milliampere.
It sets the offset current to the solenoid of channel 1, when the reference signal exceeds the limit of 0,1 V (or 0,1 mA). It is used to null the insensitiveness area of the valve (dead band).
Default value = see paragraph 2
Range = 0 ÷ 50% of I Max

r1 "Max Ramp" - Ramp time, expressed in seconds.
It sets the time it takes to the current supplied by channel 1 to go from zero to the maximum value, in the case of a reference signal variation from zero to 100% and vice versa. It is used to slow down the valve response time in the case of a sudden variation of the reference signal.
Default value = see paragraph 2
Range = 00 ÷ 20 sec.

u1: "Ramp Up" increasing time, expressed in % of the r1 ramp time. It sets the current increasing time on channel 1, for a variation from 0 to 100% of the input reference.
Default value = 99%
Range = 00 ÷ 99%

d1: "Ramp Dn" - decreasing time, expressed in % of the ramp time. It sets the current decreasing time on channel 1, for a variation from 100% to 0 of the input reference.
Default value = 99%
Range = 00 ÷ 99%

G2: "I Max" - current, expressed in milliampere.
It sets the maximum current to the solenoid of channel 2, when the reference signal is at the maximum value.
Default time = see paragraph 2

o2: "I Min" - current, expressed in milliampere.
It sets the offset current to the solenoid of channel 2.
Default value = see paragraph 2
Range = 0 ÷ 50% of Imax

r2: "Max Ramp" - Ramp time, expressed in seconds.
It sets the time it takes to the current supplied by channel 1 to go from zero to the max value, in the case of a reference signal variation from zero to 100% and vice versa. It is used to slow down the valve response time in the case of a sudden variation of the reference signal.
Default value = see paragraph 2
Range = 00 ÷ 20 sec.

u2: "Ramp Up" increasing time, expressed in % of the r2 ramp time. It sets the current increasing time on channel 2, for a variation from 0 to 100% of the input reference.
Default value = 99%
Range = 00 ÷ 99%

d2: "Ramp Dn" decreasing time, expressed in % of the r2 ramp time. It sets the current decreasing time on channel 2, for a variation from 100% to 0 of the input reference.
Default value = 99%
Range = 00 ÷ 99%

Fr: "PWM Freq" - PWM expressed in Hertz.
It sets the PWM frequency, which is the pulsating frequency of the control current. The PWM decrease improves the valve accuracy, decreasing the regulation stability. The PWM increase improves the regulation stability, causing a higher hysteresis.
Default value = PWM (according to card version)
Range = 50 ÷ 400Hz

U1 and **U2**: They represent the set point full scale.
By means of this parameter (that is modifiable only via software) it is possible to keep the same resolution, even if the set point is lower than 10V.
Example: with a card EDM-M121 with command 10V and with parameter set as standard, the output current charge is 1200 mA. If "U" is set with a value of 500, the output current charge will be 600 mA.

If the card is set for a single solenoid valve, only the channel 1 parameters will be viewed.
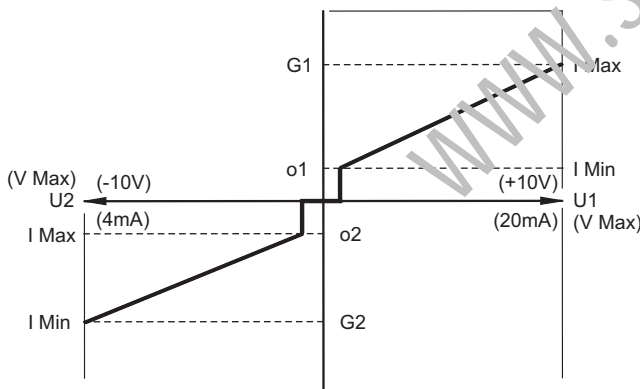
Parameters that can be modified in EDM-M2 version

6 - INSTALLATION

The card is designed for rail mounting type DIN EN 50022.
The wiring connections are on the terminal strip located on the bottom of the electronic control unit.
It is recommended to use cable sections of 0.75 mm², up to 20 m length and of 1.00 mm² up to 40m length, for power supply and solenoid connections. For other connections it is recommended to use cables with a screened sheath connected to earth only on the card side.

NOTE 1

To observe EMC requirements it is important that the control unit electrical connection is in strict compliance with the wiring diagram of paragraphs 8 - 9 - 10 and 11 of this catalogue.
As a general rule, the valve and the electronic unit connection wires must be kept as far as possible from interference sources (e.g. power wires, electric motors, inverters and electrical switches). In environments that are critical from the electromagnetic interference point of view, a complete protection of the connection wires can be requested.

7 - CONTROL SETTINGS AND SIGNAL MEASUREMENT

7.1 - Setting device

Settings can be changed by either acting on the (+) (E) (-) keys located on the card front panel, or by means of the EDMPC/20 hardware and software kit.

7.2 - EDMPC/20 hardware and software kit (code 3898201010)

The relevant hardware and software kit (to be ordered separately) enables the signals measurement and the card operations.
The software communicates, through a flat cable, to the relevant mini USB connector on the EDM card front panel, behind the protecting gate.
The supply includes:
- a communication cable (L=1 meter) for connecting the EDM card to the PC RS232 port;
- a converter from RS232 to USB.
The EDM-PC software compatibility is guaranteed only on Windows 2000 and Windows XP operating systems.
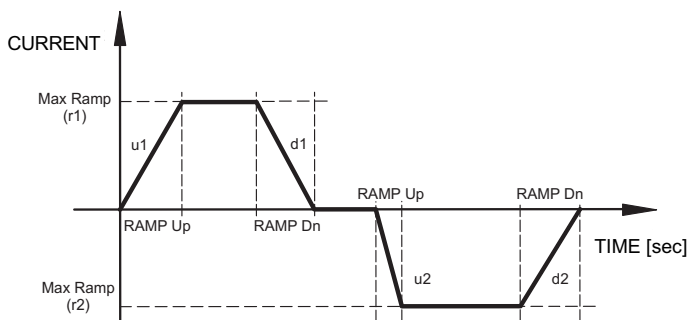
8 - EDM-M1 CARD CIRCUIT AND WIRING DIAGRAM
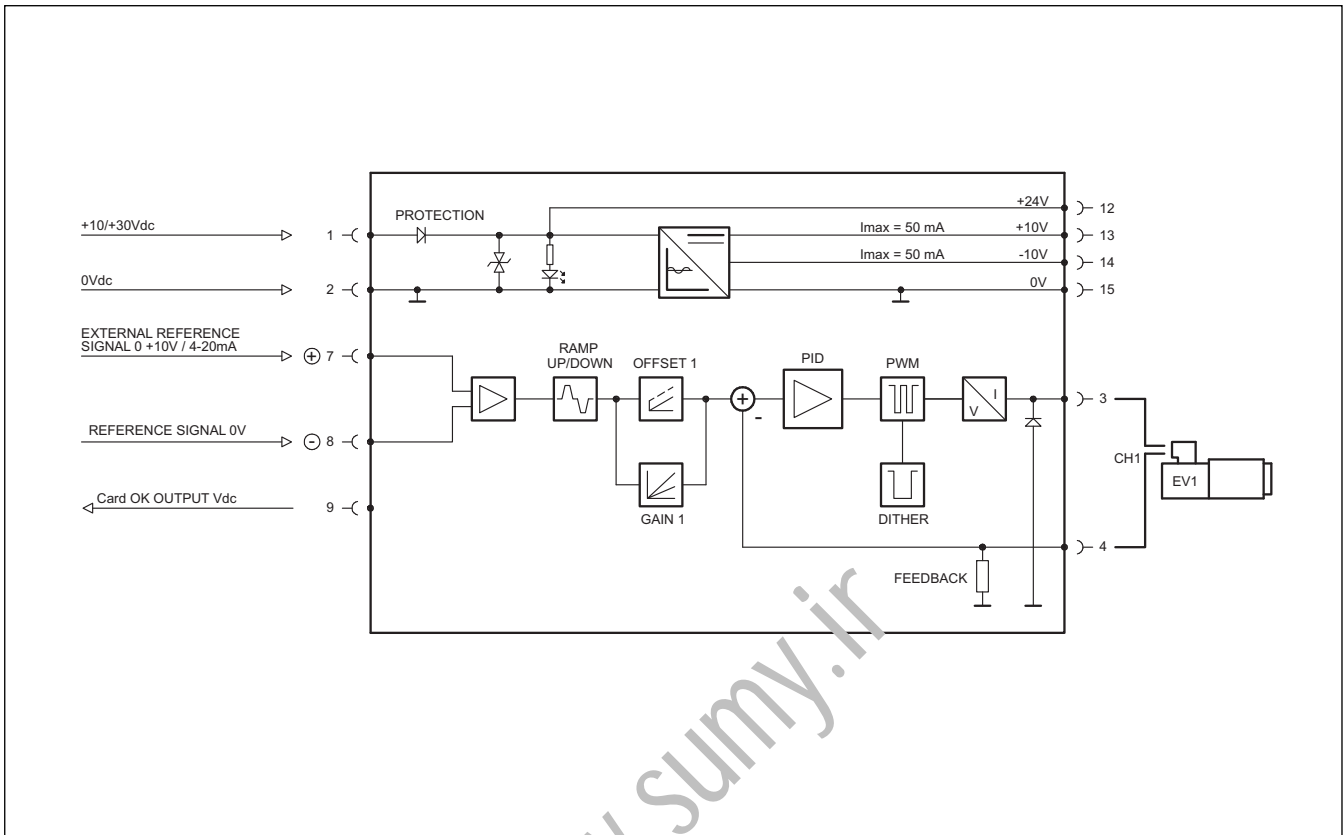
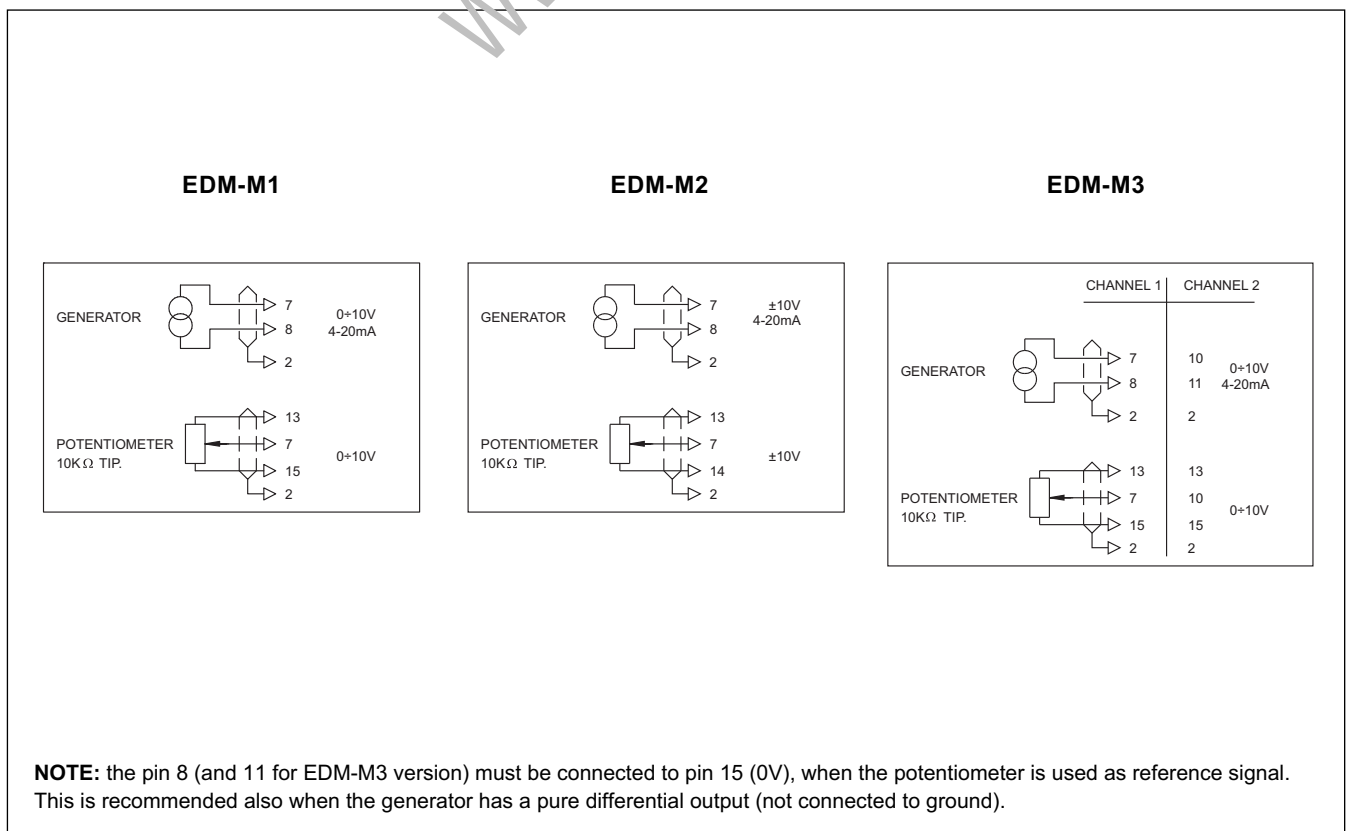## 9 - EDM-M2 CARD CIRCUIT AND WIRING DIAGRAM
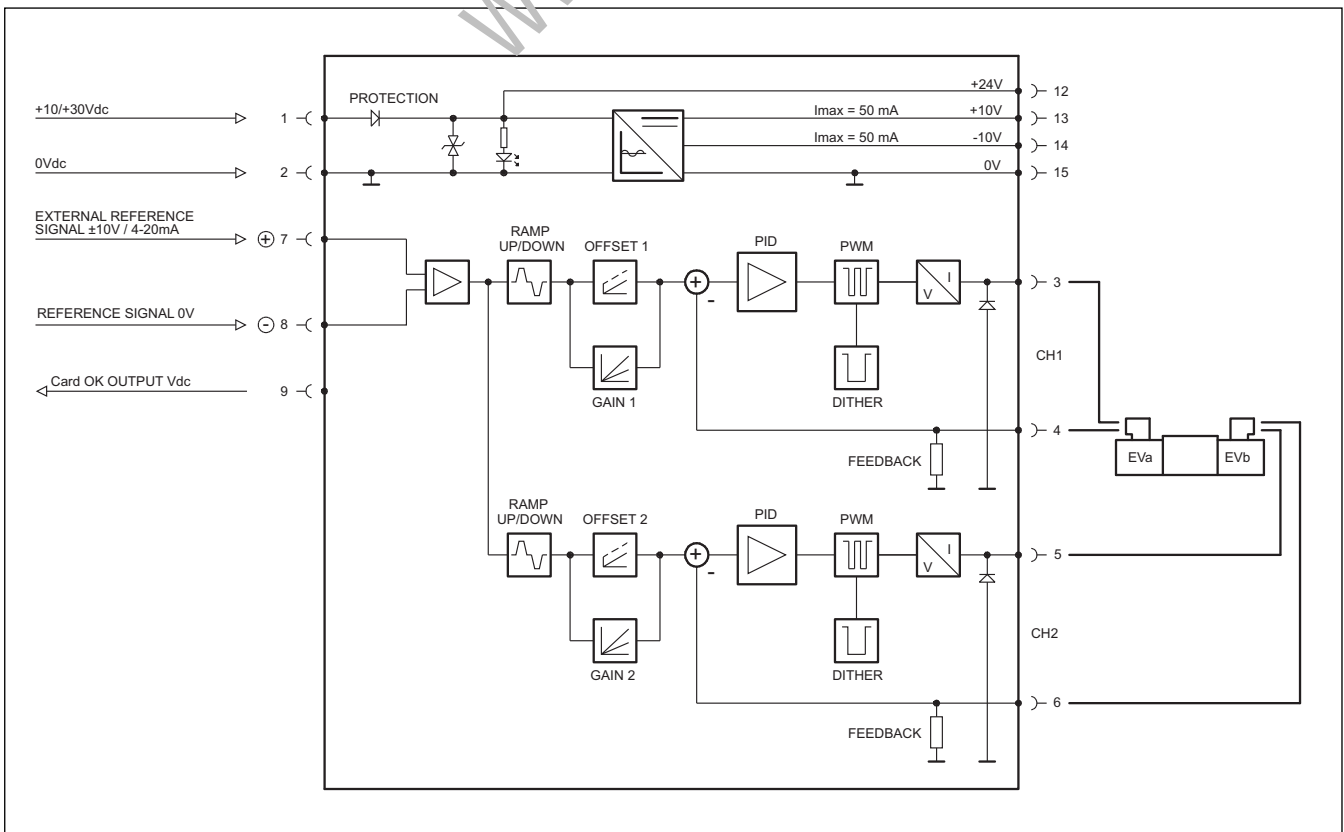
10 - EDM-M3 CARD CIRCUIT AND WIRING DIAGRAM
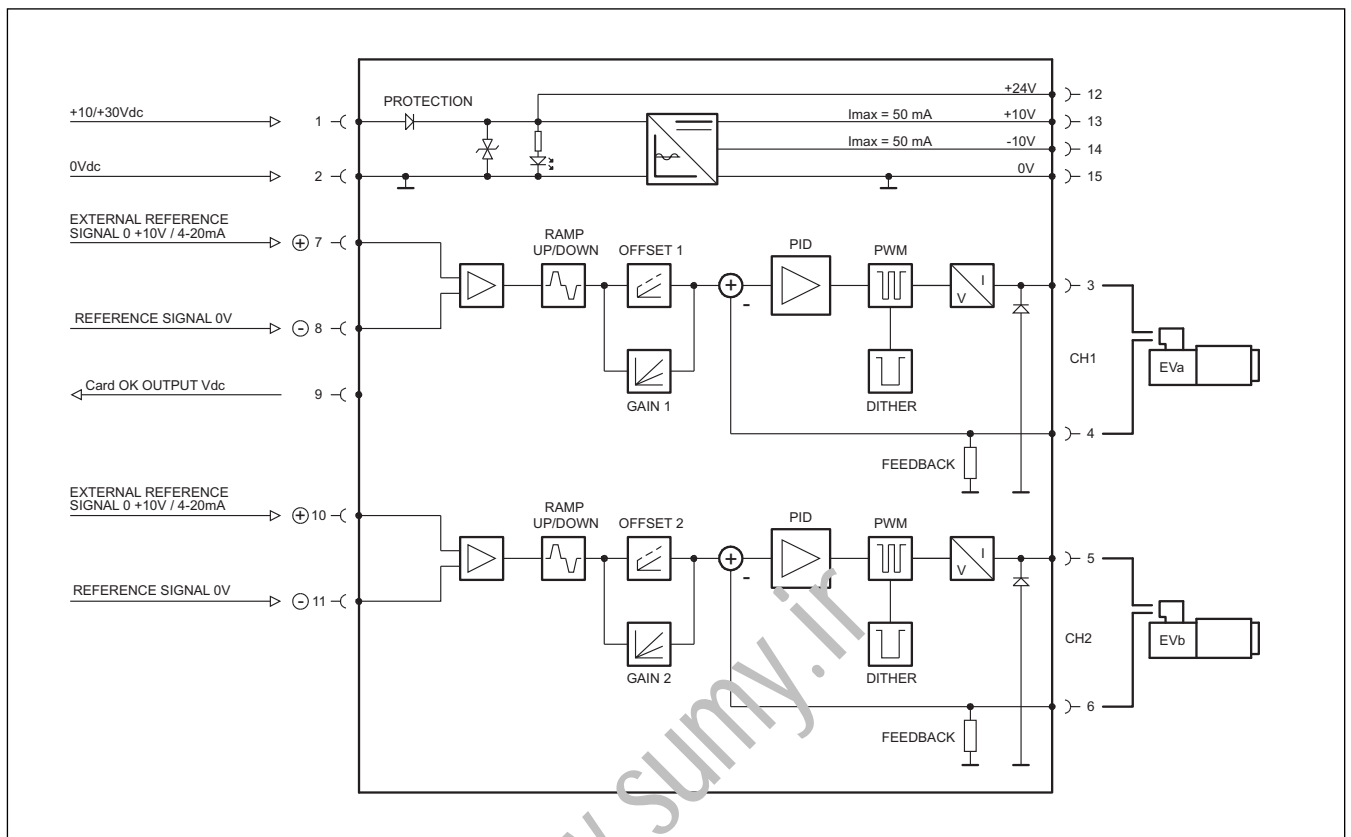
11 - WIRING DIAGRAM FOR REFERENCE SIGNAL

EDM-M1

EDM-M2

EDM-M3

NOTE: the pin 8 (and 11 for EDM-M3 version) must be connected to pin 15 (0V), when the potentiometer is used as reference signal. This is recommended also when the generator has a pure differential output (not connected to ground).

12 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

80

23

15 - WITH
TERMINAL
BLOCK ON

110

120

15   1

FRONT PANEL

Display

(+) key

(E) key

(-) key

Mini USB

Terminal block

DISPLAYED CODE:

A1   current lower than 3,5 mA
       on input 1

A2   current lower than 3,5 mA
       on input 2

A3   output 1 in short circuit

A4   output 2 in short circuit

A5   output 1 solenoid
       disconnected

A6   output 2 solenoid
       disconnected

A7   power supply voltage lower
       than 10V

NOTE: the displayed code is
eliminated removing the cause.

1	Display and mini USB side
2	Buttons protecting gate
3	Display - for card power supply and faults displaying
4	Plug-in 15-pole terminal strip with downwards cables output and fastening bolts
5	Screen printing with card circuit and wiring diagram
6	Connection for rails DIN EN 50022