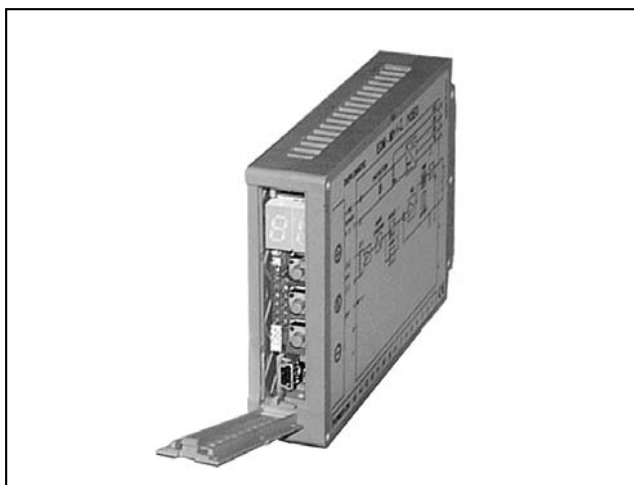




**DIPLOMATIC  
HYDRAULICS**

**89 250/208 ED**



# EDM-M\*

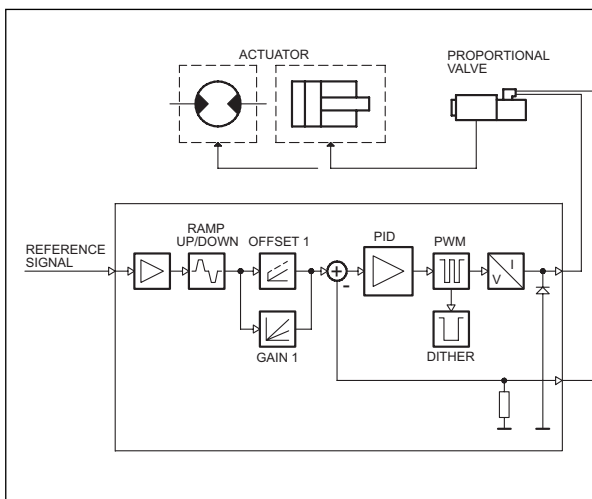
## DIGITAL AMPLIFIER FOR OPEN LOOP PROPORTIONAL VALVES

### SERIE 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 (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 uncorrect power supply connection
Available reference signals (selectable from the jumper)	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): - EMISSIONS EN 50081-1 - IMMUNITY EN 50082-2		according to 89/336 CEE standards (see paragraph 6 - <b>NOTE 1</b> )
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





### 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  $V \times I$ .

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  $0 \div 10$  V and  $\pm 10$  V, current reference signal  $4 \div 20$  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.

### 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

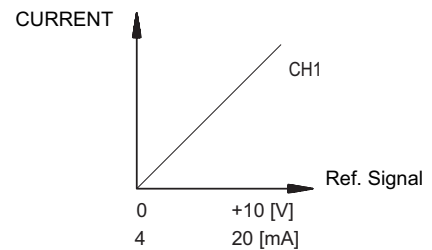
The state of the card can be checked by means of the output "card ok OUTPUT", located on pin 9 (referred to zero power supply, pin 15) with load resistance of 220 K $\Omega$  and max current 100 mA. When the card works normally, on this pin there is the same voltage as the power supply; when there is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

The anomalies could be:

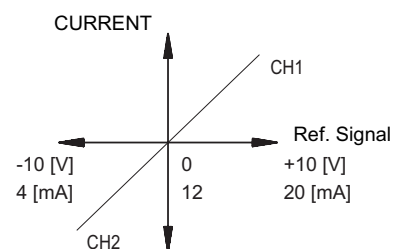
- low voltage (lower than 10V)
- short circuit
- unconnected coil

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.

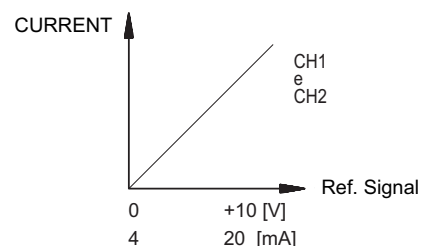
#### EDM-M1 VERSION



#### EDM-M2 VERSION



#### EDM-M3 VERSION



### 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:

<b>U1:</b>	Reference signal to channel 1:	
	$0 \div 9,9$ V	for single solenoid
	$4 \div 20$ mA	
	$-9,9 / 0 / +9,9$ V	for double solenoid
	$4 / 12 / 20$ mA	



- 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		DISPLAY U1		DISPLAY C1/E1	
(V)	(mA)	(V)			
0	4	00		40.	(mA)
5	12	50		13	(A)
10	20	10		26	(A)

#### 4.2 - 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  
 Range = 50 + 100% of IMax

- 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  
 Range = 50 + 100% of Imax
- 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 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.
- 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

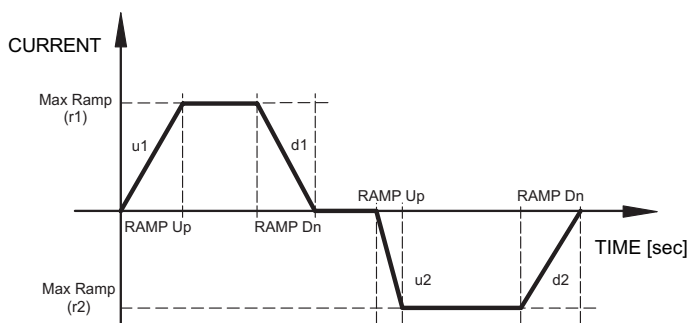
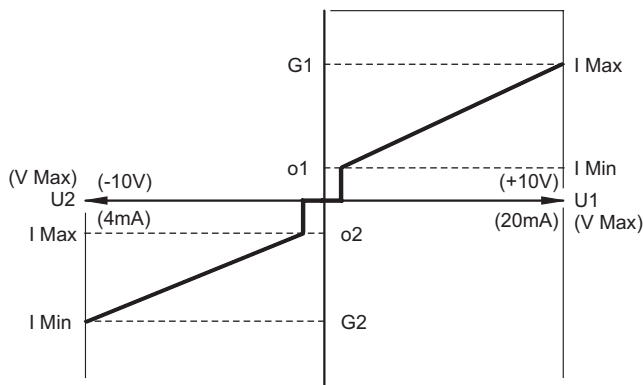
**U1 and U2:** They represent the set point full scale.

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 mm<sup>2</sup> up to 20 m length and of 1.00 mm<sup>2</sup> 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)

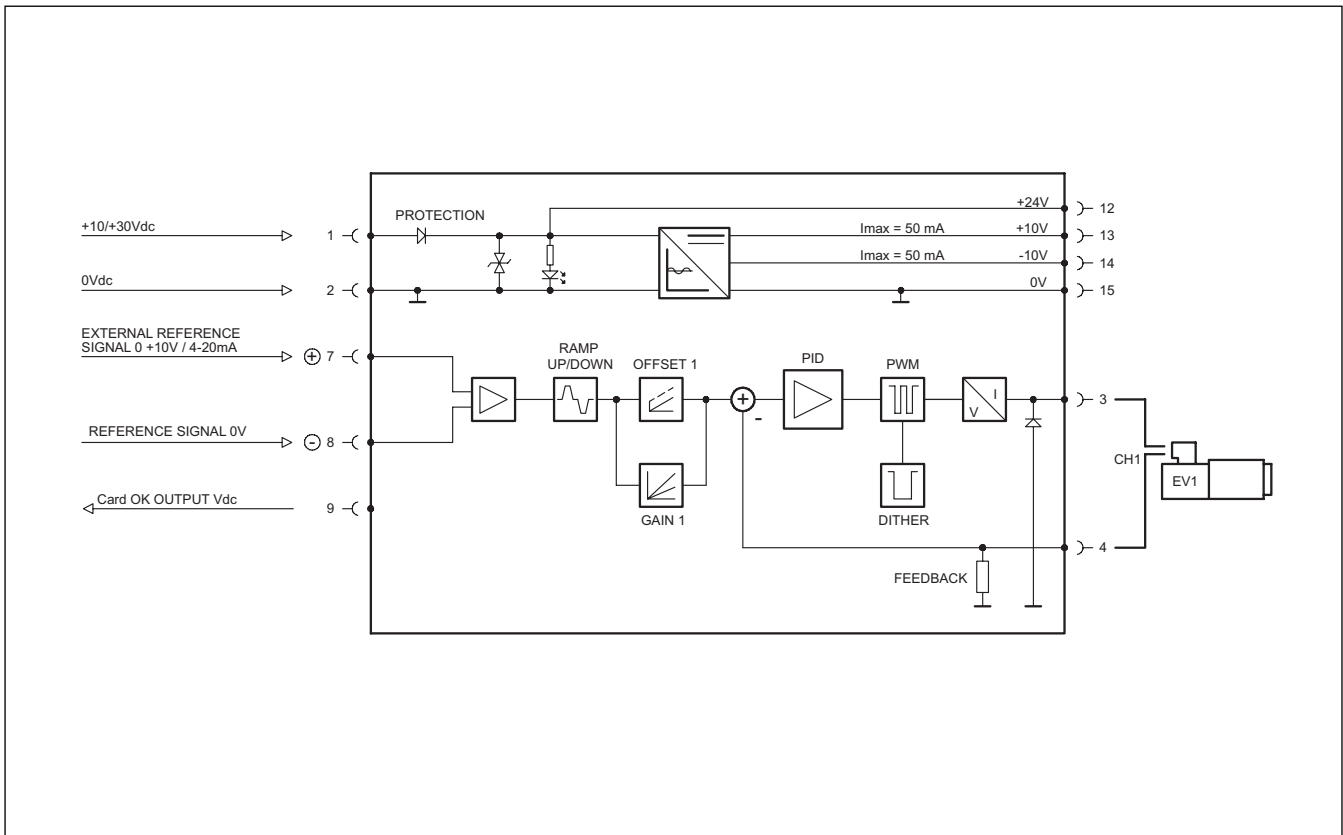
The relevant hardware and software kit (to be ordered separately) enables the signals measurement and the card operations.

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.

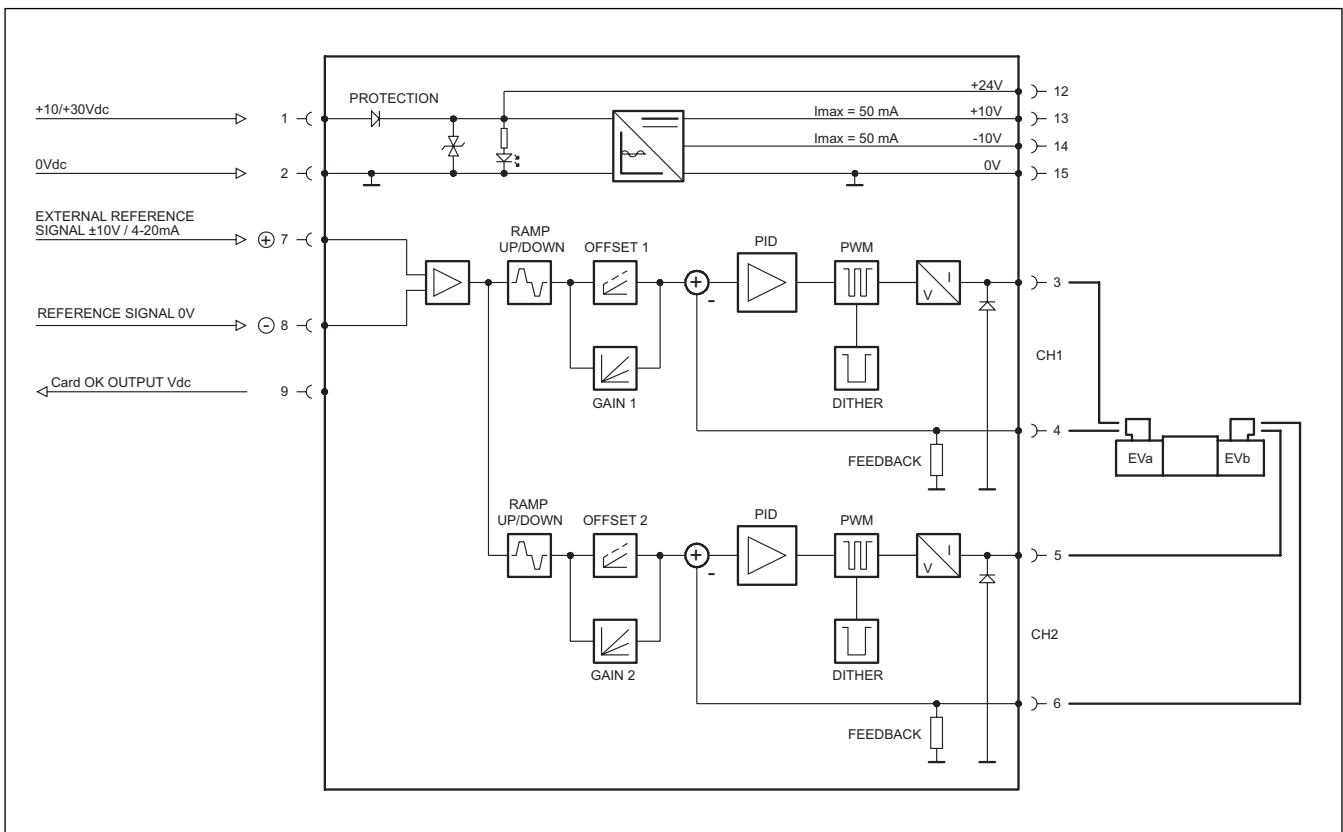
The EDM-PC software compatibility is guaranteed only on Windows 2000 and Windows XP operating systems.



## 8 - EDM-M1 CARD CIRCUIT AND WIRING DIAGRAM

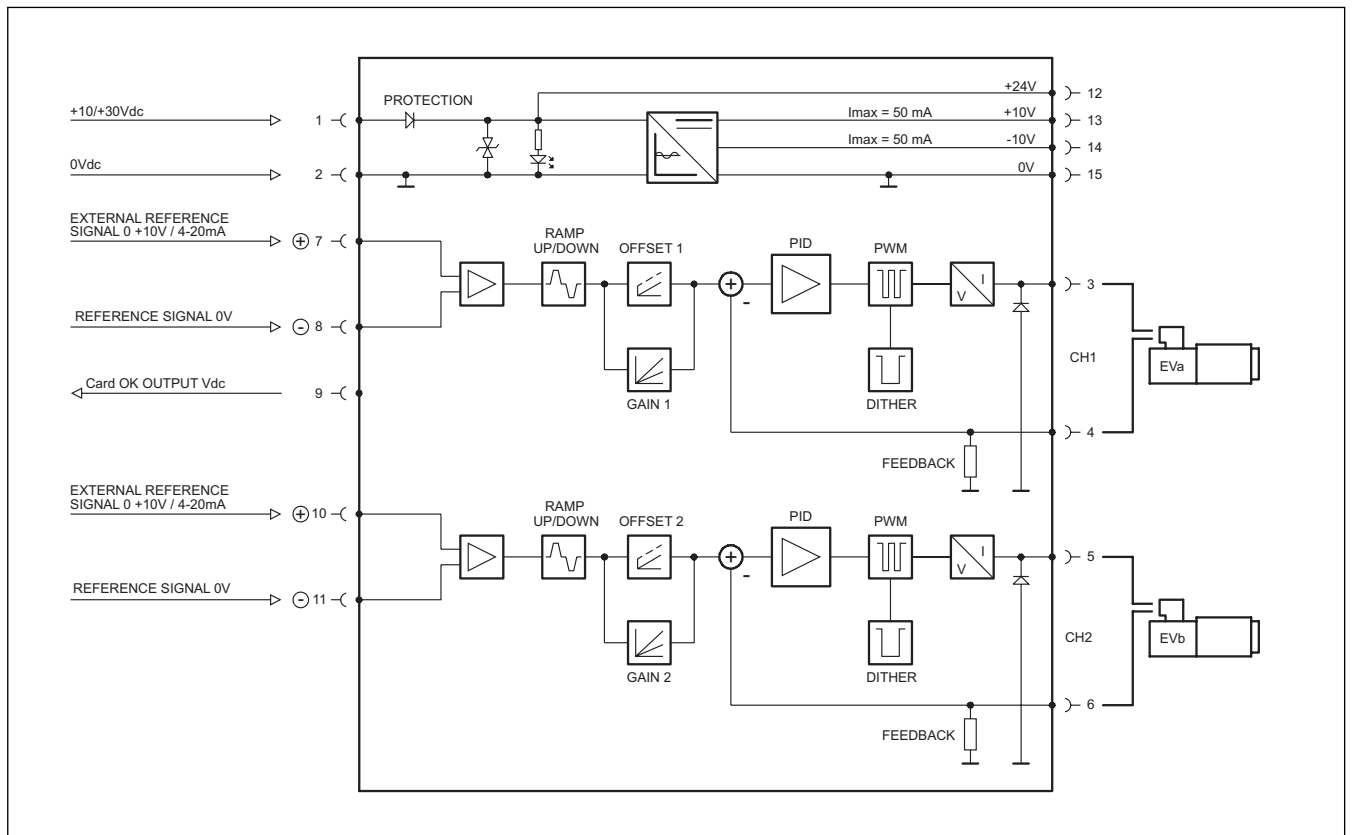


## 9 - EDM-M2 CARD CIRCUIT AND WIRING DIAGRAM

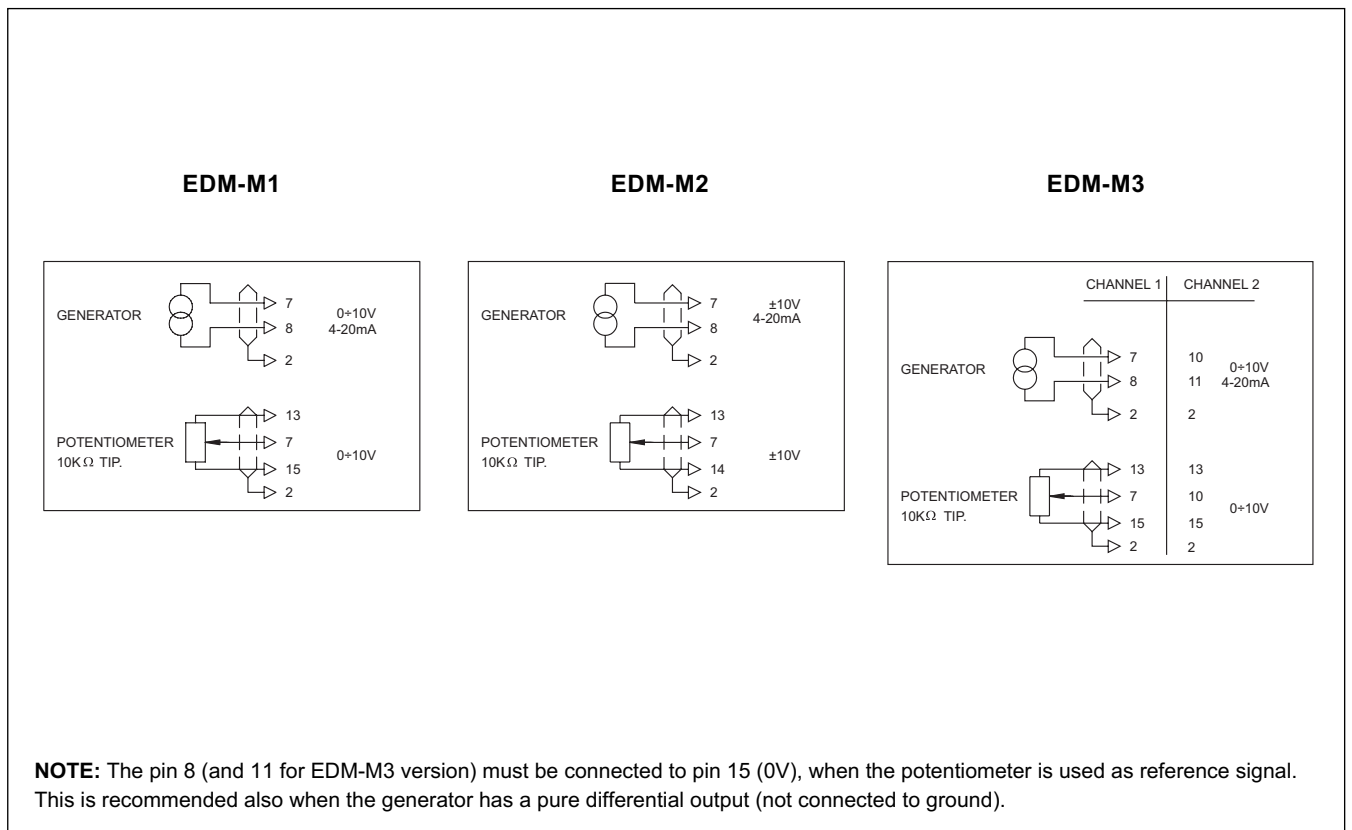




## 10 - EDM-M3 CARD CIRCUIT AND WIRING DIAGRAM



## 11 - WIRING DIAGRAM FOR REFERENCE SIGNAL





## 11 - OVERALL AND MOUNTING DIMENSIONS

