

Part number:

HYDROMA
HYDRAULICKÉ SYSTÉMY

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HYDROMA
ГИДРАВЛИЧЕСКИЕ СИСТЕМЫ



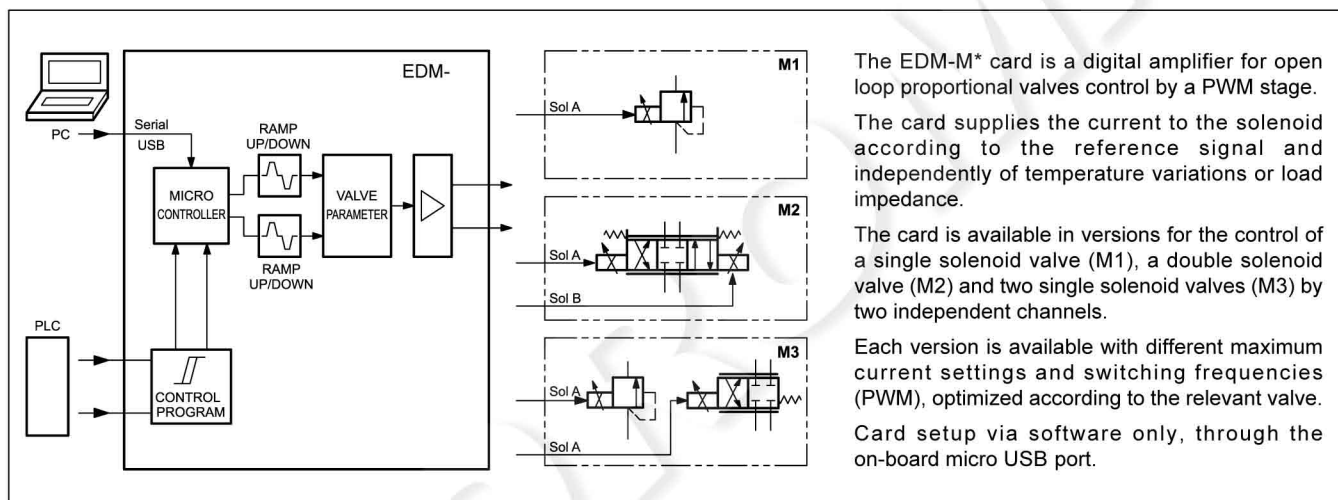
EDM-M*

DIGITAL AMPLIFIER FOR OPEN LOOP PROPORTIONAL VALVES SERIES 40

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

RAIL MOUNTING TYPE: DIN EN 50022

OPERATING PRINCIPLE



TECHNICAL CHARACTERISTICS

Power supply (U_b)	V DC	9 ÷ 32 ripple included
Required power	W	min 20 - max 70 (see point 5.2)
Max input current	A	5.5
Max output current	A	5.5 (see point 5.2)
Available reference signals	V mA	± 10 , $0 \div 10$ (input resistance <100 kohm) $4 \div 20$ (input resistance 499 ohm)
Additional output aux voltages to external potentiometer	V	+10V DC (50 mA) -10V DC (50 mA)
Digital input (Enable)		ON > 10 to U_b OFF < 5V (resistance <100 kohm)
Digital output		Low level < 2 V, high level > max U_b (U_b = power supply)
Fuse, external	A	6A, medium time lag
Electromagnetic compatibility (EMC)		according to 2014/30/EU standards
Housing material		ABS
Housing dimensions	mm	23x98x122
Connector		Plug-in terminal block with tightening screws: 15 poles - micro USB
Operating temperature range	°C	-20 / +70
Protection degree		IP20
Mass	kg	0.15

1 - IDENTIFICATION CODE

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Digital amplifier _____
for rail mounting DIN EN 50022

For open loop _____

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

Max current (I Max): _____
 (first channel for EDM-M3 version)
0 = 780 mA **3** = 1600 mA **6** = 1530 mA
1 = 860 mA **4** = 1880 mA
2 = 1200 mA **5** = 2600 mA

Only for EDM-M3 version: omit for other versions _____
 Max current (I Max) second channel:
0 = 780 mA **3** = 1600 mA
1 = 860 mA **4** = 1880 mA
2 = 1200 mA **6** = 1530 mA

NOTE: other setting available upon request. Please contact our technical dept.

Pin 12 function:
A = external enable on PIN 12
B = 24 V aux on PIN 12 (internal enable) (**standard**)

Reference signal:
E0 = voltage $\pm 10V$ (**standard**)
E1 = current $4 \div 20$ mA

Series N.
 (from 40 to 49 sizes and mounting dimensions remain unchanged)

Only for EDM-M3 version: omit for other versions
 Switching frequency (PWM) of the second channel:
1 = 100 Hz **3** = 300 Hz
2 = 200 Hz **4** = 400 Hz

Switching frequency (PWM):
 (first channel for EDM-M3 version)
1 = 100 Hz **3** = 300 Hz
2 = 200 Hz **4** = 400 Hz

2 - FEATURES

Card with analogue reference signal: version A and version B

The versions differ for pin 12 function.

EDM-M*/40*-A is configured for external enable: the amplifier is powered but not operational, and will supply current to the valve only if an enabling signal received from the outside (PLC) is present. The enable signal is expected on pin 12.

This version offers faster response times as it eliminates initialization times at power up. The external enable can be deactivate by parameter.

On EDM-M*/40*-B the pin 12 duplicates the power supply signal $9 \div 32V$ from pin 1 so it operates as an auxiliary power supply.

The enable is internal. This is a non-editable and backward-compatible setting with outdated cards EDM-M series 20.

Controller functions

Power amplifier with current controlled by analogue input signal for three different applications:

M1: control of 1 single solenoid proportional valve (e.g. throttle, pressure, directional.)

M2: control of 1 dual solenoid proportional valve (e.g. directional)

M3: control of 2 single solenoid proportional valves, via 2 independent channels.

- The current to solenoid is closed loop controlled, so is independent from supply and solenoid resistance.
- Parameters programmable via software: ramps, PWM frequency, dither.

Adaptation of the valve characteristic curve

- Deadband compensation

Monitoring functions

- The output stage is monitored for cable breakdown, is short circuit proof and disables the power stage in case of an error
- Failure monitoring for current analogue inputs

Other characteristics

- Scaling of analogue inputs
- Card configuration via software
- Diagnostic

3 - FUNCTIONAL SPECIFICATIONS

3.1 - Power supply

This card is designed for 9 to 32 VDC (typical 24 V) of a power supply. This power supply must correspond to the current EMC standards. All inductivities at the same power supply (relays, valves) must be provided with an over-voltage protection (varistors or freewheeling diodes).

It is recommended using a regulated power supply (linear or switching mode) for the card supply and for the sensors.

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

For EMC requirements the 0 V DC of the power supply must be connected to GND on electrical cabinet.

3.2 - Electrical protections

All inputs and outputs are protected with suppressor diodes and RC-filters against transient overshoots.

3.3 - Digital Input (Enable)

The digital input must have a voltage from 12 to 24 V;

ON > 10 to U_b

OFF < 5V. Input resistance >100 kohm.

See block diagrams and wiring for connections.

3.4 - Digital Output PIN 9 - Card OK

This output permits to check the state of the card: when the card works normally, there is the same voltage as for the power supply on this pin, referred to the 0V, pin 2; when there is an anomaly, the control logic forbids the power output to the solenoids and switch this output to zero.

Max current 50 mA.

Low level < 2 V

High level > max U_b , where U_b = power supply

3.5 - Auxiliary voltages

PIN 13 - Voltage equals to +10 V - Max current 50 mA

PIN 14 - Voltage equals to -10 V - Max current 50 mA.

NOTE: By powering the EDM-M card with less than 11.5 V, the auxiliary voltage at pin 13 is not guaranteed.

On EDM-M B version only:

PIN 12 - Voltage equals to power supply voltage (pin 1 - referred to pin 2) - Max current 100 mA

3.6 - Output value

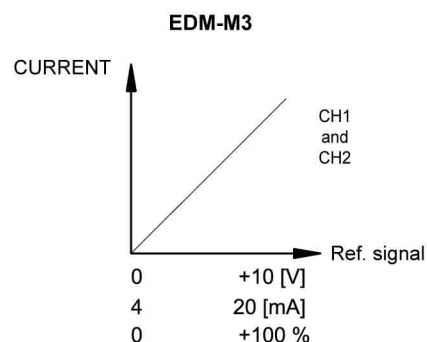
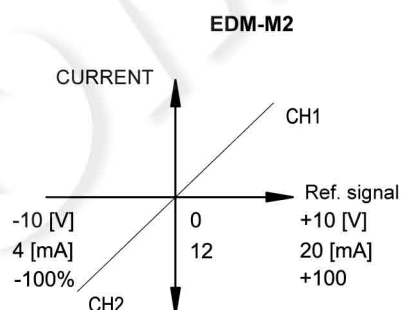
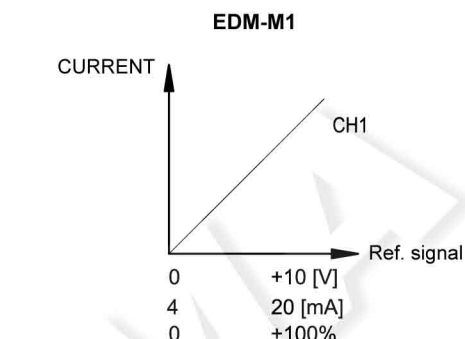
The output value is current, maximum range 200 ÷ 4000 mA, according to the configuration of the ordered card.

All cables which lead outside must be screened.

3.7 - Reference signals

The EDM-M* cards accept 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.

Reference value depends on the card version as stated in diagrams here below.



4 - EDM-M, DUPLOMATIC VALVES AND DEFAULT SETTINGS

EDM-M card is pre-set at factory. The following table shows the default settings of EDM-M standard versions and the current Duplomatic valves to be coupled with. Different settings are available upon request.

Curve adaption parameters (point 8.3) permit to scale the current up to 120% of the nominal CURRENT value set.

Cards are tuned by the manufacturer to optimize the performance in accordance with the reference coil selected. Working conditions far from nominal settings could require advanced tuning. Apply for them at our technical dept.

NOTE about EDM-M3: Combinations shown here below are just few examples of possible matches. All combinations provided in the ordering code are possible.

CARDS FOR 24V SOLENOIDS

CARD					VALVES TO MATCH		
Name	I Min [mA]	I Max [mA]	I Lim [mA]	PWM [Hz]	Name	single coil	double coil
EDM-M101	200	780	1100	100	DSE2	▪	
EDM-M102	100	780	1100	200	PLKE08, PZME3, PZME5	▪	
EDM-M111	200	860	1125	100	DSPE*, RPCED1, RPCED1-T3, RPCE2, RPCE3, BLS6, ZDE3, QDE3	▪	
EDM-M112	200	860	1125	200	DSE3, DSE3B, PRE*, PRE3, PDE3, DZCE*, PZE3	▪	
EDM-M131	200	1600	1958	100	DSE5, QDE5	▪	
EDM-M201	200	780	1100	100	DSE2		▪
EDM-M211	200	860	1125	100	DSPE*, ZDE3, BLS6		▪
EDM-M212	200	860	1125	200	DSE3, DSE3B		▪
EDM-M231	200	1600	1958	100	DSE5		▪
EDM-M31111	200 200	860 860	1125 1125	100 100	DSPE*, RPCED1, RPCED1-T3, RPCE2, RPCE3, BLS6, ZDE3, QDE3	▪ ▪	
EDM-M31122	200 200	860 860	1125 1125	200 200	DSE3, DSE3B, PRE*, PRE3, PDE3, DZCE*, PZE3	▪ ▪	
EDM-M33012	200 100	1600 780	1958 100	100 200	VPPM-*PQCE, regulator (DSE5 + PLKE08)	▪ ▪	

CARDS FOR 12V SOLENOIDS

CARD					VALVES TO MATCH		
Name	I Min [mA]	I Max [mA]	I Lim [mA]	PWM [Hz]	Name	single coil	double coil
EDM-M141	300	1880	2250	100	DSPE*, BLS6, QDE3	▪	
EDM-M142	300	1880	2250	200	DSE3, DSE3B, PRE*, PRE3, PDE3, DZCE*, ZDE3, PZE3	▪	
EDM-M151	500	2600	3333	100	DSE5, QDE5	▪	
EDM-M162	400	1530	1900	200	DSE2	▪	
EDM-M163	200	1530	1900	300	PLKE08, PZME3, PZME5	▪	
EDM-M241	300	1880	2250	100	DSPE*, BLS6		▪
EDM-M242	300	1880	2250	200	DSE3, DSE3B, ZDE3		▪
EDM-M251	500	2600	3333	100	DSE5		▪
EDM-M262	200	1530	1900	200	DSE2		▪
EDM-M34411	300 300	1880 1880	2250 2250	100 100	DSPE*, BLS6, ZDE3, QDE3	▪ ▪	
EDM-M34422	300 300	1880 1880	2250 2250	200 200	DSE3, DSE3B, PRE*, PRE3, PDE3, DZCE*, PZE3	▪ ▪	
EDM-M35412	500 300	2600 1880	3333 2250	100 200	DSE5+ DSE3	▪ ▪	

5 - INSTALLATION

5.1 - Wires sizing

Suggested cable cross sections for solenoid supply are shown in the table below. However, the sizing has to ensure a voltage to the coil of not less than 90% of its nominal value.

The voltage drop through the card is 0.5 V.

Suggested cable cross sections for solenoid supply [mm²]

Card supply voltage	Coil type	Cable length		
		< 10 m	10 to 25 m	25 to 50 m
24V	780 mA - 24V	0.5	0.5	1
	860 mA - 24V	0.5	0.5	1
	1600 mA - 24V	0.5	1	2.5
	1530 mA - 12V	0.5	0.5	0.5
	1880 mA - 12V	0.5	0.5	0.5
	2600 mA - 12V	0.5	0.5	0.5
12V	1530 mA - 12V	1	2.5	4
	1880 mA - 12V	1	2.5	6
	2600 mA - 12V	1.5	4	6

Power supply cable must be tailored in accordance with the rules above, taking into account the number of coils connected.

- The 15-poles terminal strip accepts connection of a 1.5 mm² conductor with terminal. Applications that require larger cross sections require mandatorily a junction box.
- We suggest a cross section of 0.25 mm², up to 10-meter length for signal cables.

As a general rule, the valve and the electronic card connection wires must be kept as far as possible from interference sources (e.g. power wires, electric motors, inverters and electrical switches).

Complete protection of the connection wires can be requested in environments with critical electromagnetic interferences.

5.2 - Card power consumption

The power required by the card depends on output current to be supplied (determined by the card version) and on the nominal voltage of the coil to be feed.

An indicative value of the required power can be considered as the product of V x I.

Examples:

- an EDM-M111 card with maximum current 860 mA coupled with a coil with nominal voltage 24 V requires 20 W power.
- an EDM-M35411 card with maximum current 5500 mA coupled with a coil with nominal voltage 12 V requires 66 W power.

The maximum power consumption of the card is 70 W.

6 - LED KEY

The card is equipped with LEDs on the front panel. L1 to L4 led are for a fast check of the card operation.

- ALL LEDS BLINKING: low voltage on power supply. This state is also showed when the USB communication is active but the card is not powered.

- GREEN led: power (ON: card powered, OFF no power supply)
- YELLOW led: functions as in tables below, according to the card version.

EDM-M1			
LED	ON (function ok)	FLASHING (failure)	OFF
L1	Reference	signal missing	-
L2	Solenoid	open coil	-
L3	not in use		
L4	Ready	-	fault

EDM-M2			
LED	ON (function ok)	FLASHING (failure)	OFF
L1	Reference	signal missing	-
L2	Solenoid 1	open coil	-
L3	Solenoid 2		
L4	Ready	-	fault

EDM-M3			
LED	ON (function ok)	FLASHING (failure)	OFF
L1	Reference 1	signal missing	-
L2	Solenoid 1	open coil	-
L3	Reference 2	signal missing	-
L4	Solenoid 2	open coil	-

7 - DEVICE SETUP



Please note that the USB port is not galvanically isolated. We strongly recommend the use of a galvanic isolator.

The EDM-M* card can only be configured via software, from a PC with USB port, with a standard micro USB cable.

The *EDM40-SmartManager* configuration software can be downloaded from the Duplomatic MS website. The software is compatible with Microsoft OS Windows only.

Detailed information about parameters operation, settings and commissioning are in the *Start-up manual 89252 ETM*. The technical literature is downloadable from our website upon request for access credentials.

8 - MAIN FEATURES

8.1 - Enable (version A only)

Activates / deactivates the external enable.

parameter ENABLE (INT|EXT)

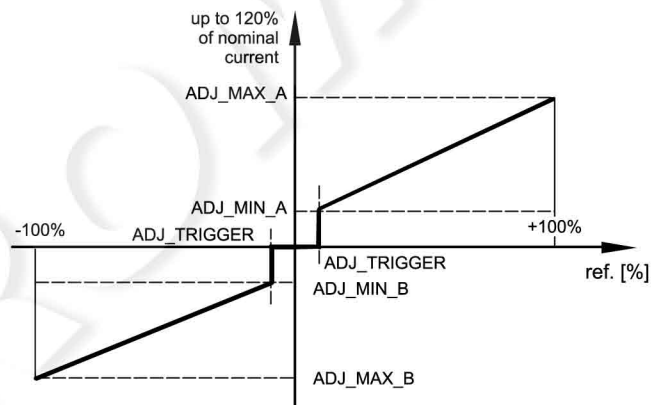
default: EXT

NOTE: if switched to INT, the PIN 12 still not used. No other functions are possible on this PIN.

8.2 - Curve adaption

Deadband compensation and current input scaling are customizable. Values in percent.

EDM-M1	EDM-M2	EDM-M3
ADJ_MIN	ADJ_MIN_A ADJ_MIN_B	ADJ1_MIN ADJ2_MIN
range: 0 ... 50%		
default: according to the card version		
ADJ_MAX	ADJ_MAX_A ADJ_MAX_B	ADJ1_MAX ADJ2_MAX
range: ADJ_min ... 120%		
default: 100%		
ADJ_TRIGGER	ADJ_TRIGGER	ADJ1_TRIGGER ADJ2_TRIGGER
range: 0... 20%		
default: 1.5%		



8.3 - PWM

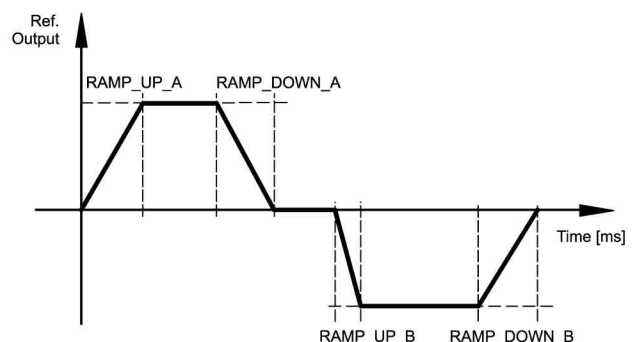
Pwm frequencies for current output.

EDM-M1	EDM-M2	EDM-M3
PWM	PWM	PWM1 PWM2
available values: 100, 200, 300, 400 Hz		
default: according to the card version.		

8.4 - Ramps

Parameters for ramp up and ramp down can be set in milliseconds. A and B tag the quadrants. These values set the amount of time that the command signal will take to follow a step change in the reference signal 0 ÷ 100.

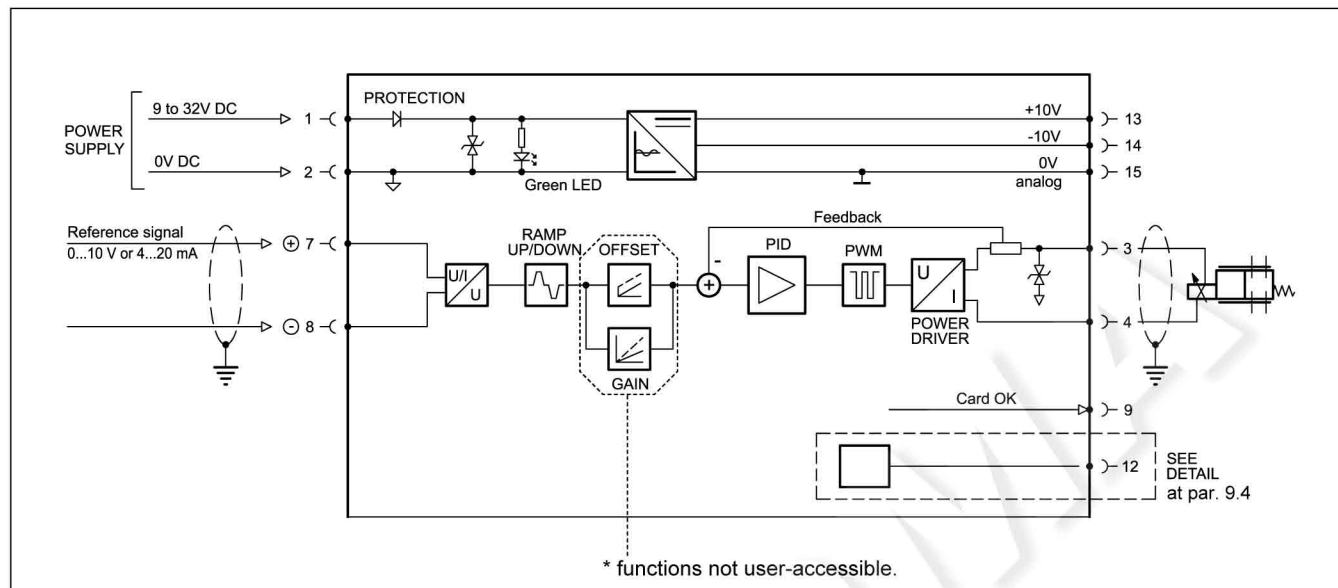
EDM-M1	EDM-M2	EDM-M3
RAMP_UP RAMP_DOWN	RAMP_UP_A RAMP_DOWN_A RAMP_UP_B RAMP_DOWN_B	RAMP1_UP RAMP1_DOWN RAMP2_UP RAMP2_DOWN
range: 0 ... 20000 ms		
default: 0		



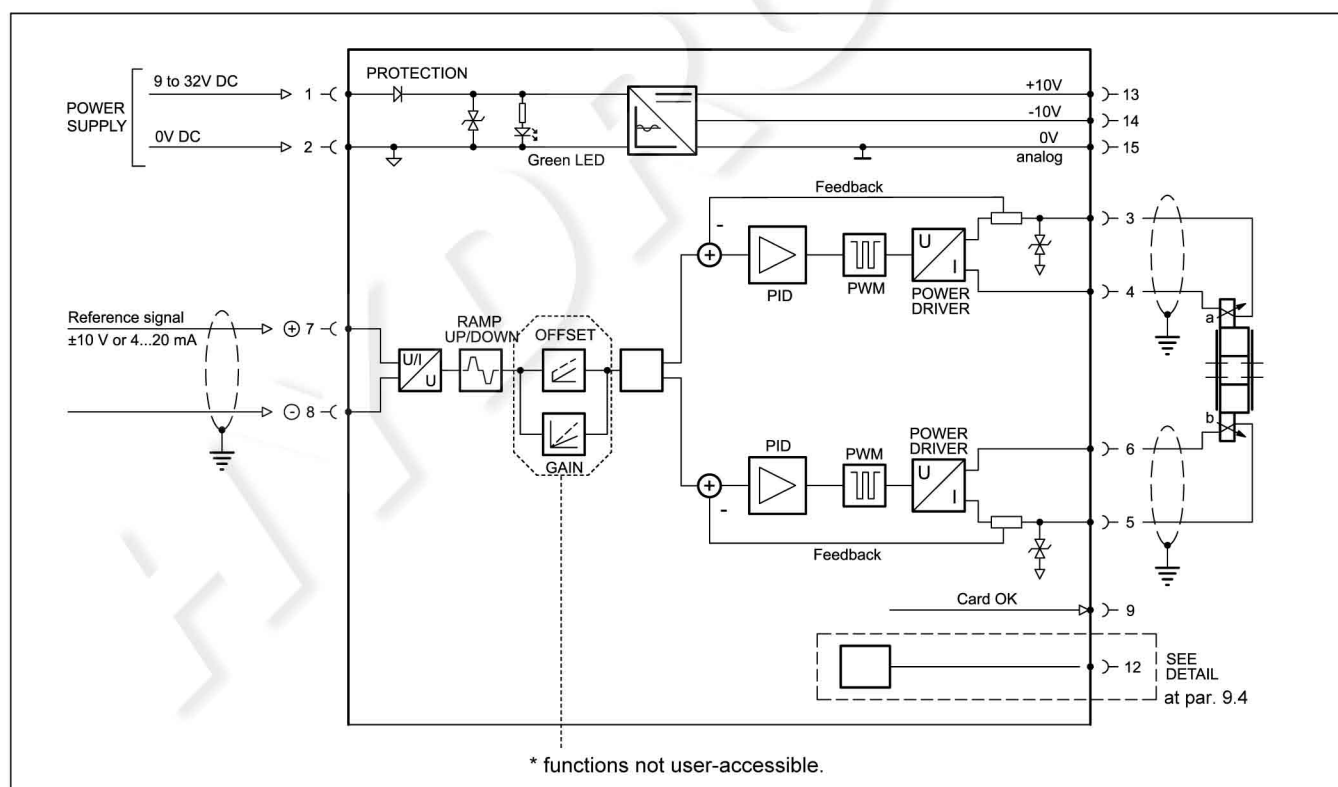
9 - BLOCK DIAGRAMS

The function of PIN 12 varies depending on the card version. The reference signal can be either ENABLE input (A version) or an auxiliary voltage output (B version).

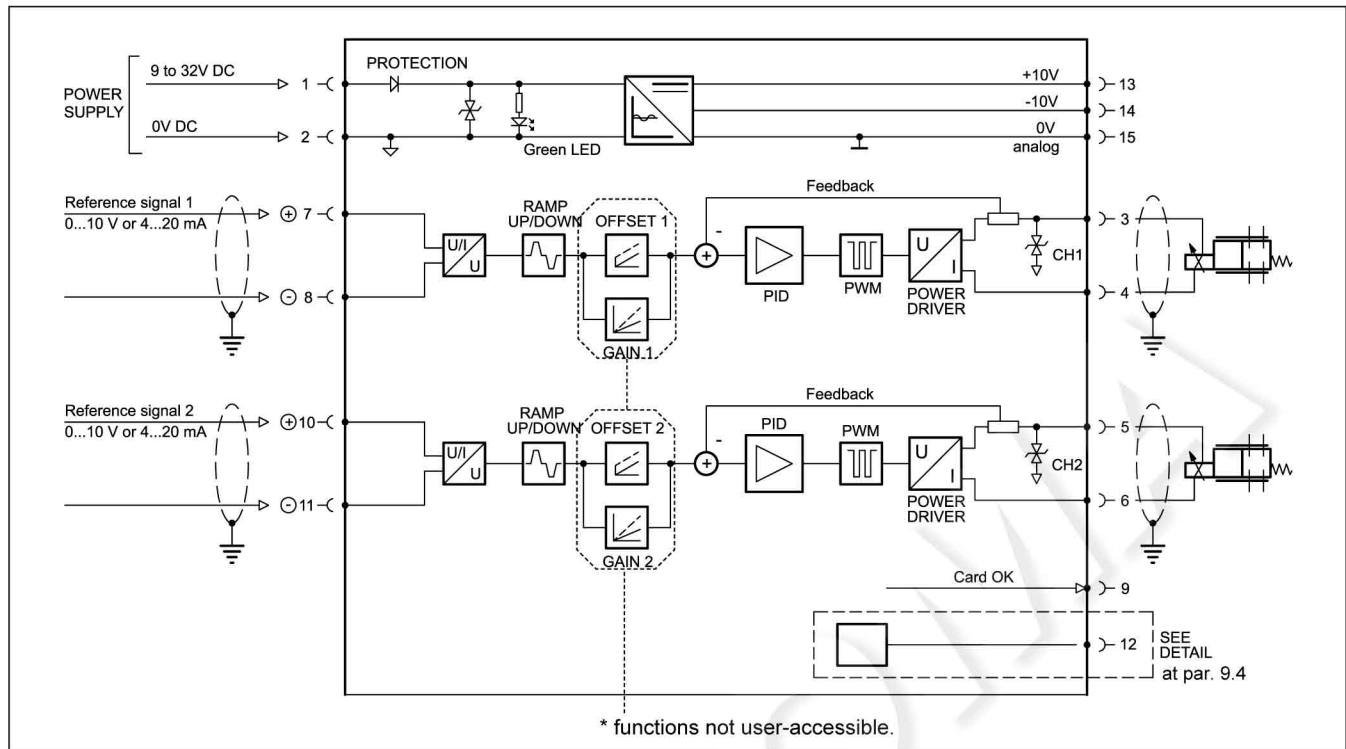
9.1 - EDM-M1



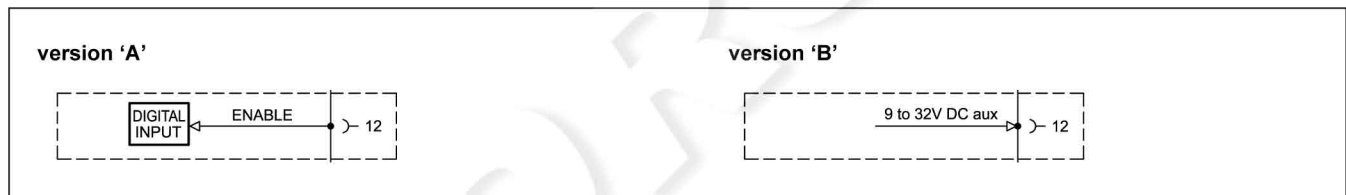
9.2 - EDM-M2



9.3 - EDM-M3

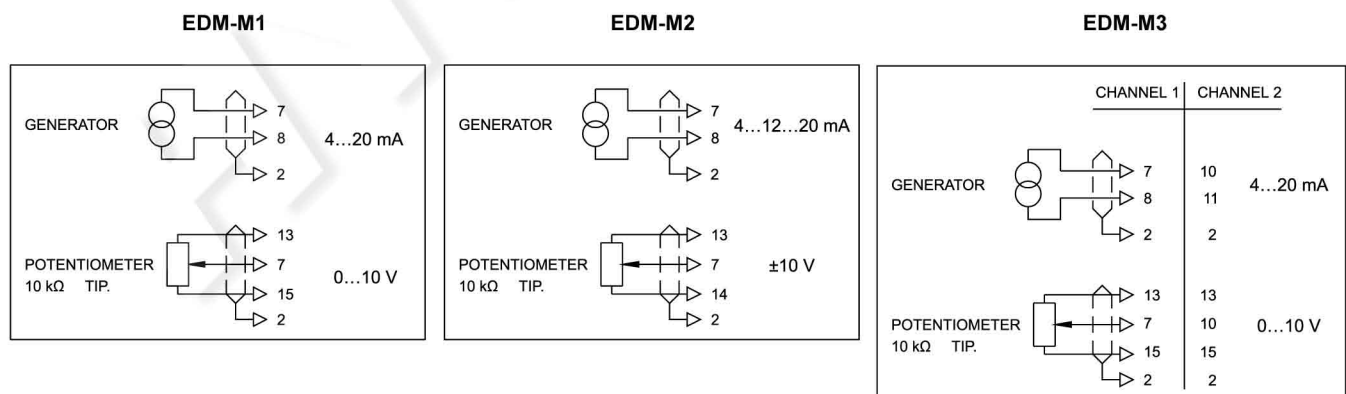


9.4 - Function of PIN 12



10 - WIRING

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



11 - OVERALL AND MOUNTING DIMENSIONS

