



89 252/322 ED

EDM-M*

DIGITAL AMPLIFIER FOR OPEN LOOP PROPORTIONAL VALVES

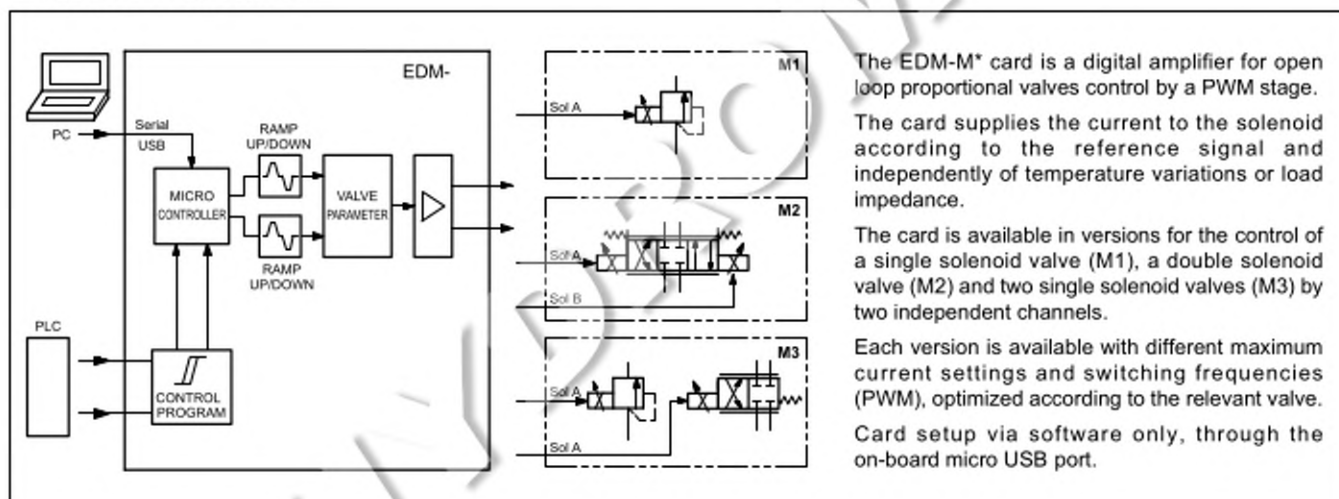
SERIES 40



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

RAIL MOUNTING TYPE: DIN EN 50022

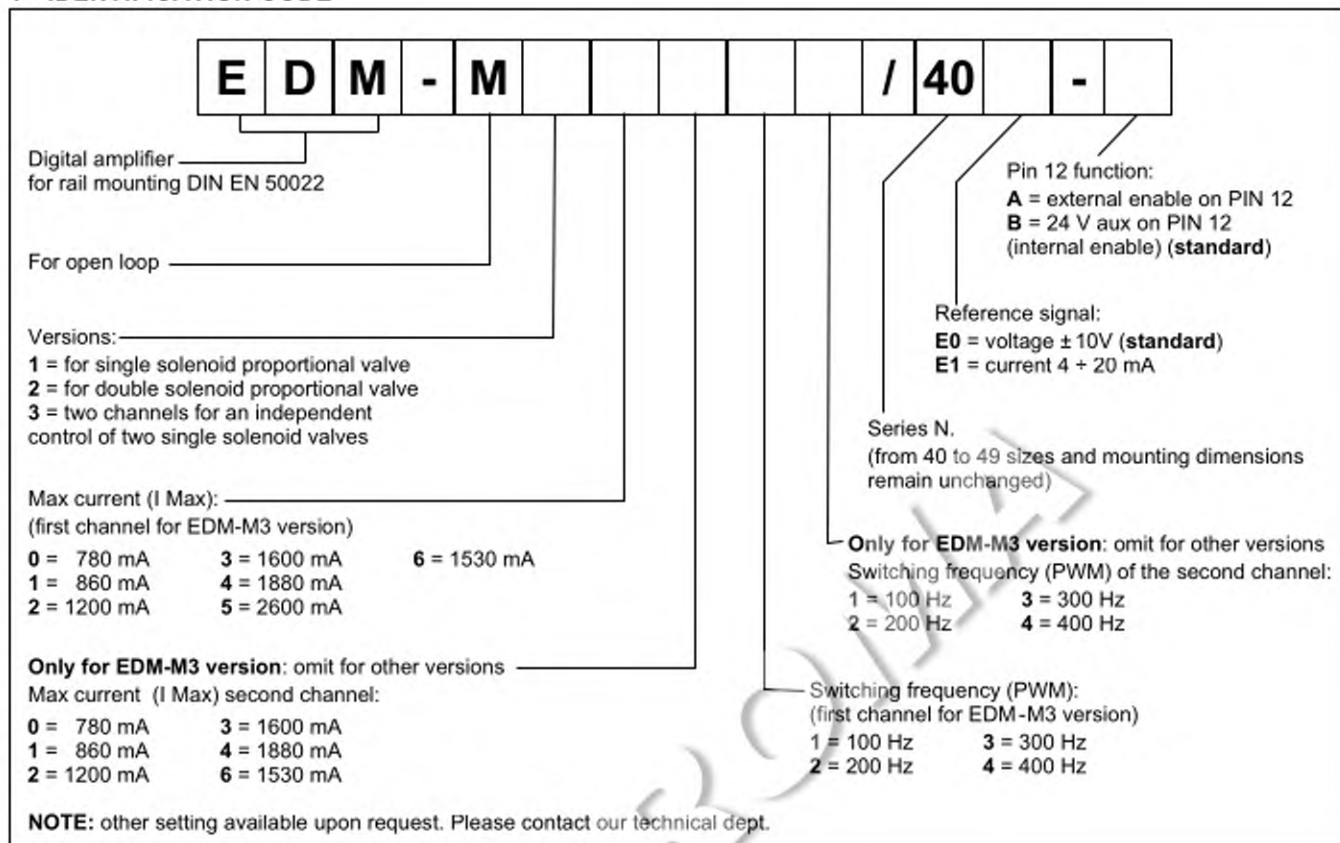
OPERATING PRINCIPLE



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 | $\pm 10, 0 + 10$ (input resistance <100 kohm) 4 + 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



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 $9+32V$ 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 This is a non-editable and backward-compatible setting with outdated cards EDM-M series 20.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 24V) 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

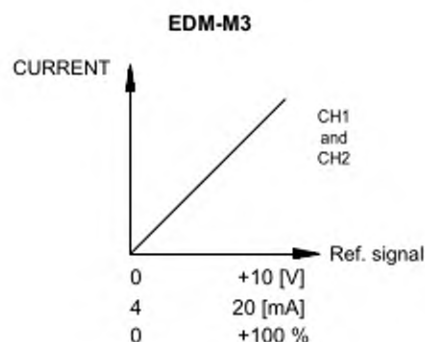
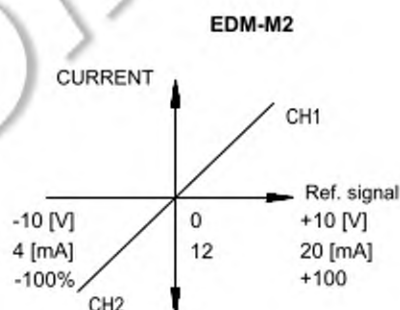
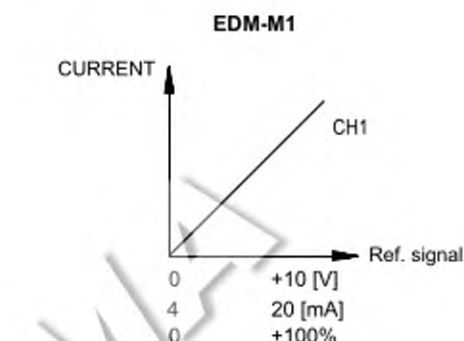
The output value is current, maximum range 200 + 4000 mA, according to the configuration of the ordered card.

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)

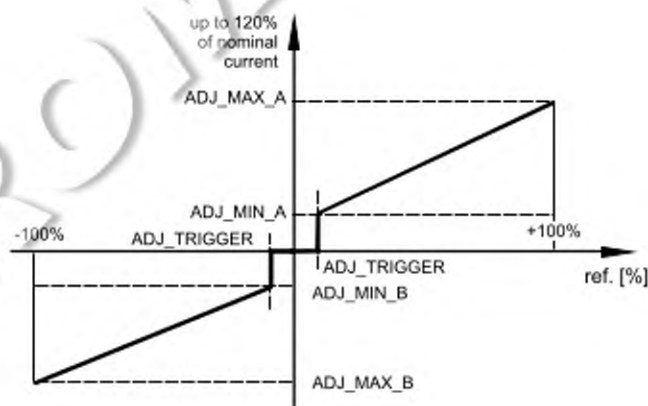
default: EXT

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

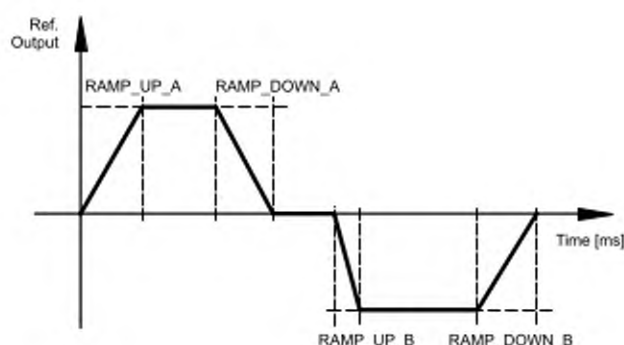
Pwm frequencies for current output.

| 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.

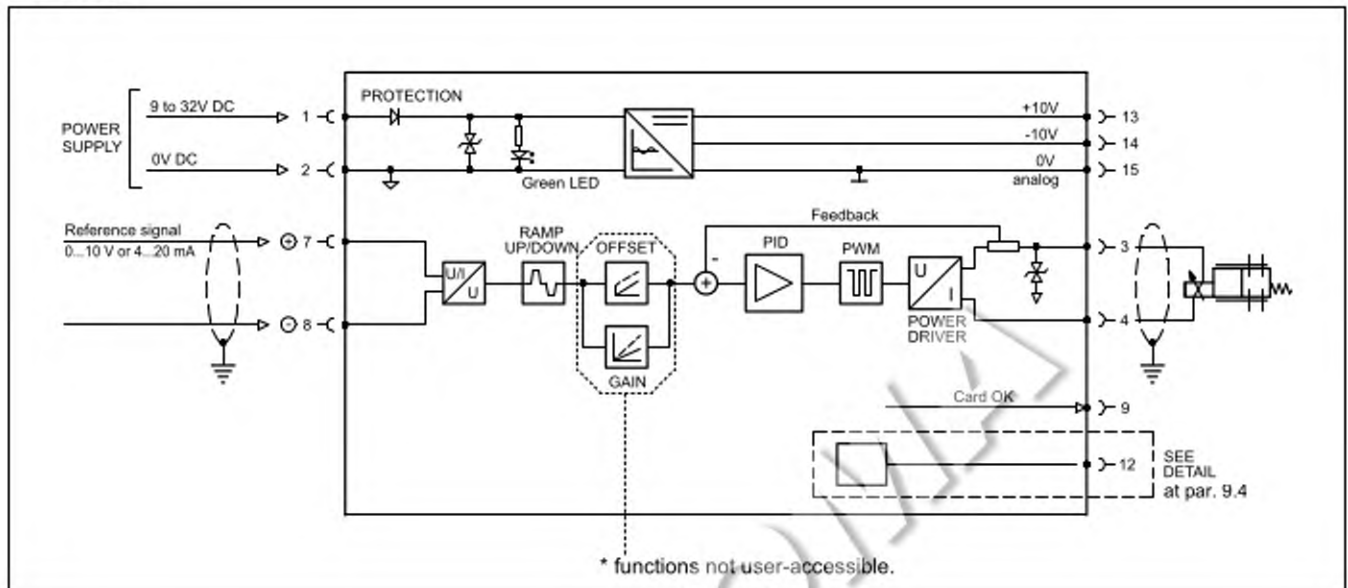
| EDM-M1 | EDM-M2 | EDM-M3 |
|-----------------------|-------------|------------|
| RAMP_UP | RAMP_UP_A | RAMP1_UP |
| RAMP_DOWN | RAMP_DOWN_A | RAMP1_DOWN |
| | RAMP_UP_B | RAMP2_UP |
| | RAMP_DOWN_B | RAMP2_DOWN |
| range: 0 ... 20000 ms | | |
| default: 0 | | |



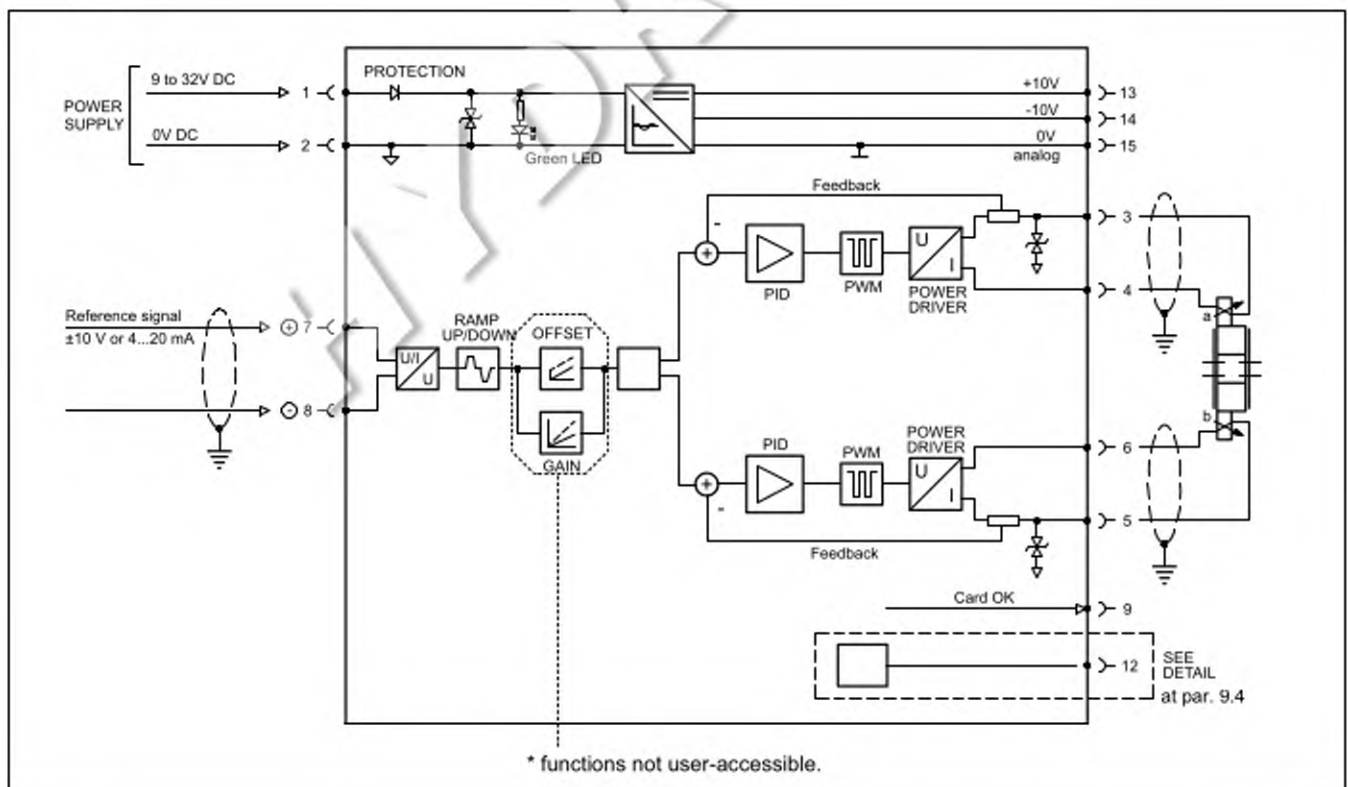
9 - BLOCK DIAGRAMS

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).

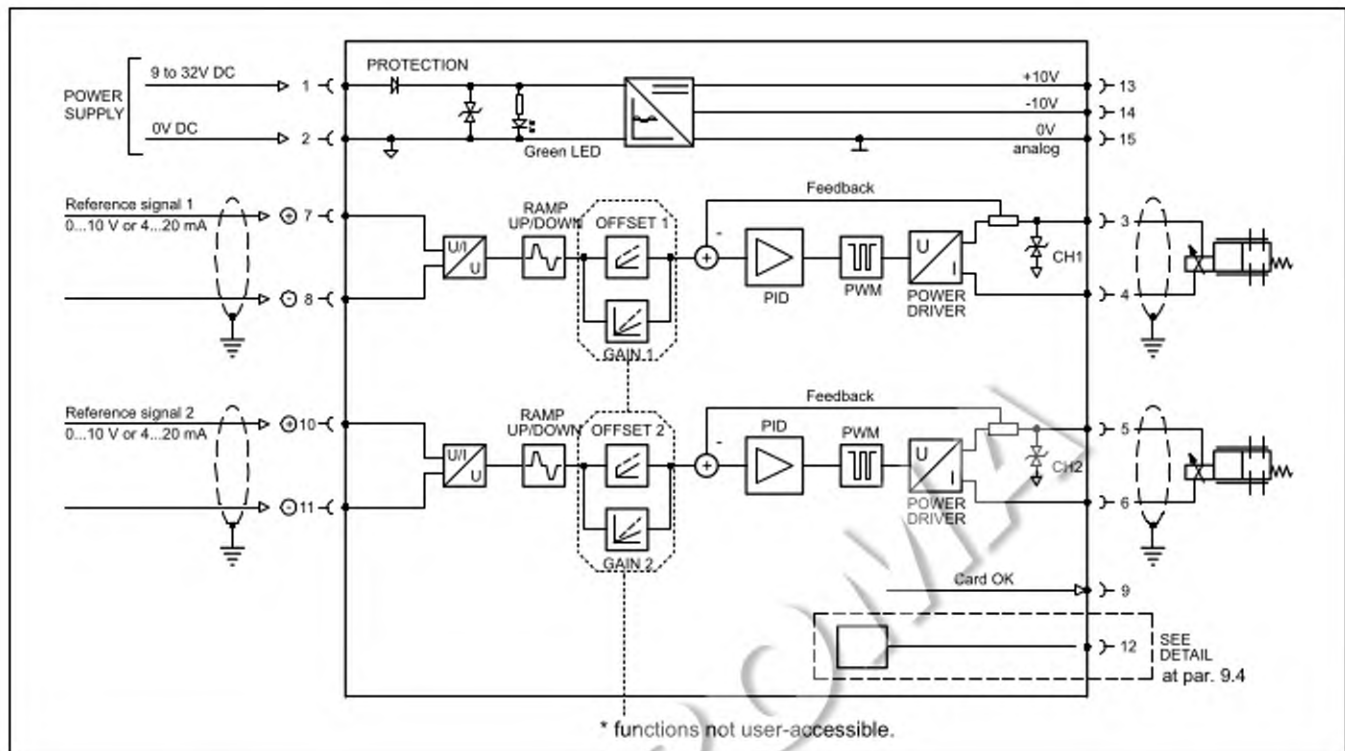
9.1 - EDM-M1



9.2 - EDM-M2



9.3 - EDM-M3

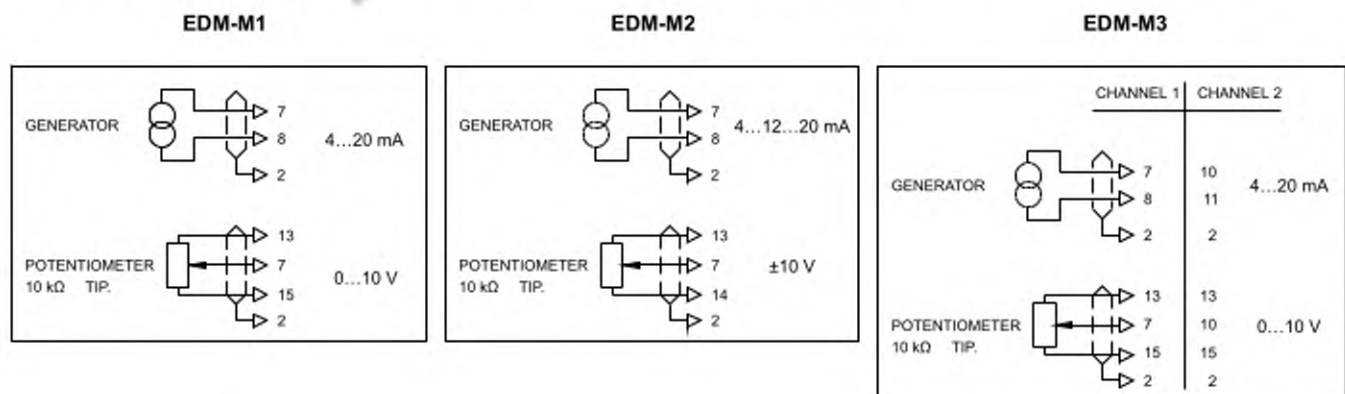


9.4 - Function of PIN 12



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

