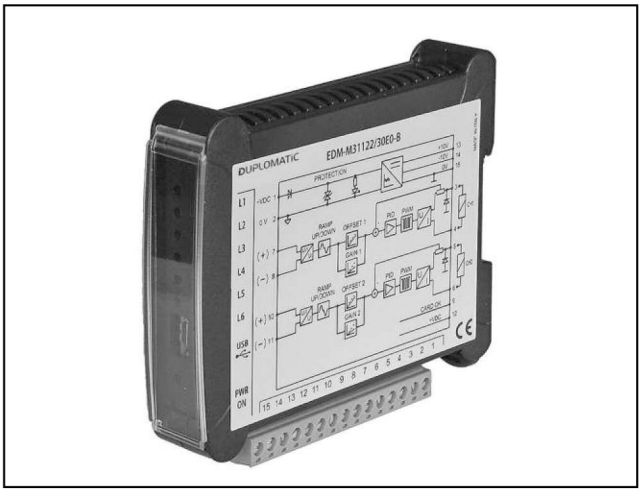
Part number:

HYDROMA HYDRAULICKÉ SYSTÉMY

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HYDROMA ГИДРАВЛИЧЕСКИЕ СИСТЕМЫ



EDM-M*

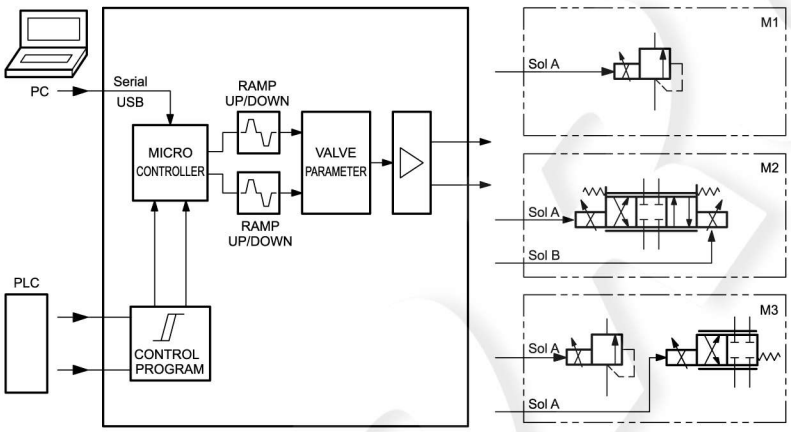
DIGITAL AMPLIFIER FOR OPEN LOOP PROPORTIONAL VALVES

SERIES 30

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 by a PWM stage.

The card supplies the current to the solenoid according to the reference signal and independently of temperature variations or load impedance.

The card is available in three versions, for the control of a single solenoid valve (M1), a double solenoid valve (M2) and two single solenoid valves (M3) by two independent channels.

Each version is available with different maximum current settings and switching frequencies (PWM), optimized according to the relevant valve.

Card setup via software only, through on-board micro USB port.

TECHNICAL CHARACTERISTICS

Operating voltage (U_b)	V DC	9 ÷ 36 ripple included
Fuse, external	A	6A, medium time lag
Power consumption	W	min 20 - max 60 (see paragraph 5.2)
Output current	A	maximum 4.5 (see paragraph 5.2)
Power supply electrical protections		overload, polarity inversion
Output electrical protections		short-circuit
Available reference signals	V mA	±10, 0 ÷ 10 (input resistance 11 kohm) 4 ÷ 20 (input resistance 56 ohm)
Additional output aux voltages to external potentiometer	V	+10V DC (50 mA) -10V DC (50 mA)
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
Operating temperature range	°C	-20 / +70
Mass	kg	0,15
Protection degree		IP 20

1 - IDENTIFICATION CODE



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)
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

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

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

Series N.
(from 30 to 39 sizes and mounting dimensions remain unchanged)

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

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

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

2 - FEATURES

Version A and version B

The versions differ for pin 12 function.

EDM-M*/30*-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*/30*-B the pin 12 duplicates the power supply signal 9÷36 V 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 20 series.

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, offset, gain, 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 is made via software, through on-board USB
- Diagnostic

3 - FUNCTIONAL SPECIFICATIONS

3.1 - Power supply

This card is designed for 9 to 36 V DC (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 0V 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

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

ON > 8 to U_b
OFF < 5V. Input resistance 17 kohm.

See block diagrams and wiring for connections.

3.4 - Digital Output PIN 9 - Card OK

This ouput 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 Ub, where Ub = 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

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 card ordered.

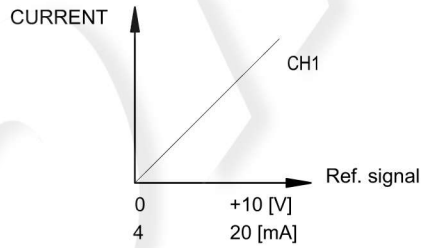
All cables which lead outside must be screened.

3.7 - Reference signals

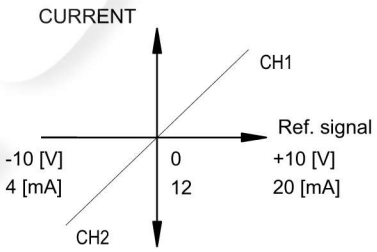
The card accepts voltage reference signals 0 ÷ 10 V and ± 10 V, current reference signal 4 ÷ 20 mA, coming from an external generator (PLC, CNC) or from an external potentiometer powered by the card itself.

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

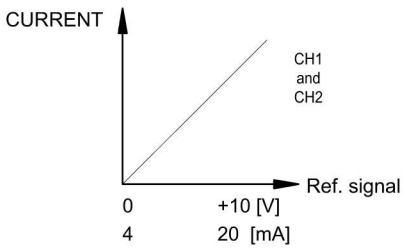
EDM-M1



EDM-M2



EDM-M3



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 (par. 8.4) permit to scale the current up to 120% of the nominal CURRENT value set

Cards are tuned by the producer 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-M111	200	860	1125	100	DSPE*, RPCED1, RPCED1-T3, RPCE2, RPCE3, BLS6, ZDE3, QDE3	▪	
EDM-M112	200	860	1125	200	DSE3, DSE3B, CRE, PRE*, PRE3, PDE3, MZE, DZCE*, PZE3	▪	
EDM-M131	200	1600	1958	100	DSE5, QDE5	▪	
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, CRE, PRE*, PRE3, PDE3, MZE, DZCE*, PZE3	▪ ▪	
EDM-M33112	200 200	1600 860	1958 1125	100 200	VPPM-*PQCE, regulator (DSE5 + CRE)	▪ ▪	

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, CRE, PRE*, PRE3, PDE3, MZE, DZCE*, ZDE3, PZE3	▪	
EDM-M151	500	2600	3333	100	DSE5, QDE5	▪	
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-M34411	300 300	1880 1880	2250 2250	100 100	DSPE*, RPCED1, RPCED1-T3, RPCE2, RPCE3, BLS6, ZDE3, QDE3	▪ ▪	
EDM-M34422	300 300	1880 1880	2250 2250	200 200	DSE3, DSE3B, CRE, PRE*, PRE3, PDE3, MZE, 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.

Suggested cable cross sections for solenoid supply [mm²]

Card supply voltage	Coil type	Cable length < 10 m	10 to 20 m	20 to 30 m
24V	860 mA - 24V	0,5	0,75	1
	1600 mA - 24V	0,5	1	1,5
	1880 mA - 12V	0,5	1	2
	2600 mA - 12V	0,75	1,5	2,5
12V	1880 mA - 12V	0,75	1,5	2
	2600 mA - 12V	1	2	2,5

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 ferrule. Applications that require larger cross sections require mandatorily a junction box.
- We suggest a cross section of 0.25 mm², up to 10 meter lenght 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.

A conservative 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 24V requires 20W power.
- an EDM-M35411 card with maximum current 4500 mA coupled with a coil with nominal voltage 12V requires 54W power.

The maximum power consumption of the card is 60 W.

6 - LED KEY

The card is equipped with LEDs on the front panel, for a fast check of the card operation.

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

EDM-M1

LED	ON (function ok)	FLASHING (failure) slow	fast
L1	Reference	signal missing	-
L2	Solenoid	coil open	short circuit
L3	not used		
L4	Ready	fault	

EDM-M2

LED	ON (function ok)	FLASHING (failure) slow	fast
L1	Reference	signal missing	-
L2	Solenoid	coil open	short circuit
L3	not used		
L4	Ready	fault	

EDM-M3

LED	ON (function ok)	FLASHING (failure) slow	fast
L1	Reference	signal missing	-
L2	Solenoid	coil open	short circuit
L3	not used		
L4	Ready	fault	

7 - DEVICE SETUP

Card configuration occurs only by EBC software from a PC or by EBC app. Anyway, cable connection with the card is always necessary.

All the ancillary equipment is available as a separate kit.

7.1 - EDMPC / 30 kit (code 3898201020)

The kit includes:

- USB communication cable (micro USB-B male - USB A male), length = 3 m
- USB key with software to be installed on a PC
- Adapter cable for OTG USB2.0 smartphone (USB A female - USB Micro-B male)
- Adapter cable for OTG USB3.0 smartphone (USB A female - USB-C male)

The applicable adapter cable depends on the device being used.

Latest released version of EBC software can be downloaded from Duplomatic MS website, from the SOFTWARE DOWNLOAD page.

The software is compatible with Microsoft OS Windows 7, 8 and 10.

7.2 - EBC app

The app requires Android devices that support OTG function (Usb On-The-Go), and can be downloaded from the Play Store.

On-line registration is required at first access. Once registered the app can even work off-line.

The EBC app allows diagnostic and configuration activities of USER level parameters. To apply changes requires a password.

Please refer to *89251 ETM Technical Manual.*

8 - MAIN FEATURES

8.1 - Diagnostics

Activates / deactivates the error detection. Off is useful in troubleshooting tasks.

parameter DIAGNOSTICS (ENABLE | DISABLE | AUTO)
default for EDM-M*/30*-A: ENABLE
default for EDM-M*/30*-B: AUTO

8.3 - Input signal scaling

Set the coefficients for offset and gain of the input signal.

EDM-M1	EDM-M2	EDM-M3
SIGNAL_OFFSET	SIGNAL_OFFSET	SIGNAL1_OFFSET SIGNAL2_OFFSET
range: E0: -3 … 3V default: 0.00	E1: -4 … +4 mA	
SIGNAL_GAIN	SIGNAL_GAIN	SIGNAL1_GAIN SIGNAL2_GAIN
range: 0.40 …10.00 default: 1.00		

8.4 - 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%		

8.5 - 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		

8.6 - PWM

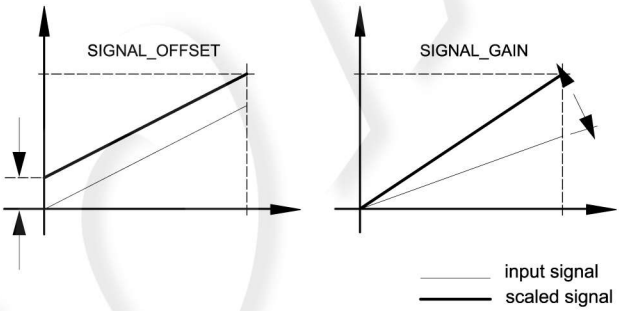
Pwm frequencies for current output.

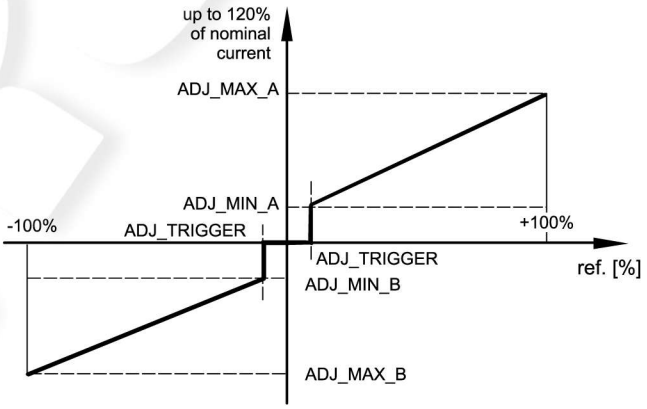
EDM-M1	EDM-M2	EDM-M3
PWM	PWM	PWM1 PWM2
range: 70 … 500 Hz default: preset value, according to the card version		

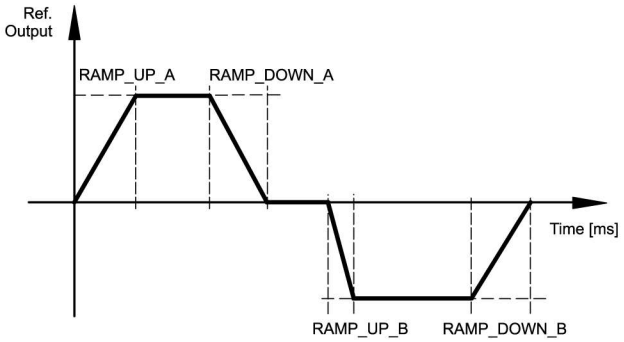
8.2 - Enable (version A only)

Activates / deactivates the external enable.
parameter ENABLE (INT|EXT)
default: EXT

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



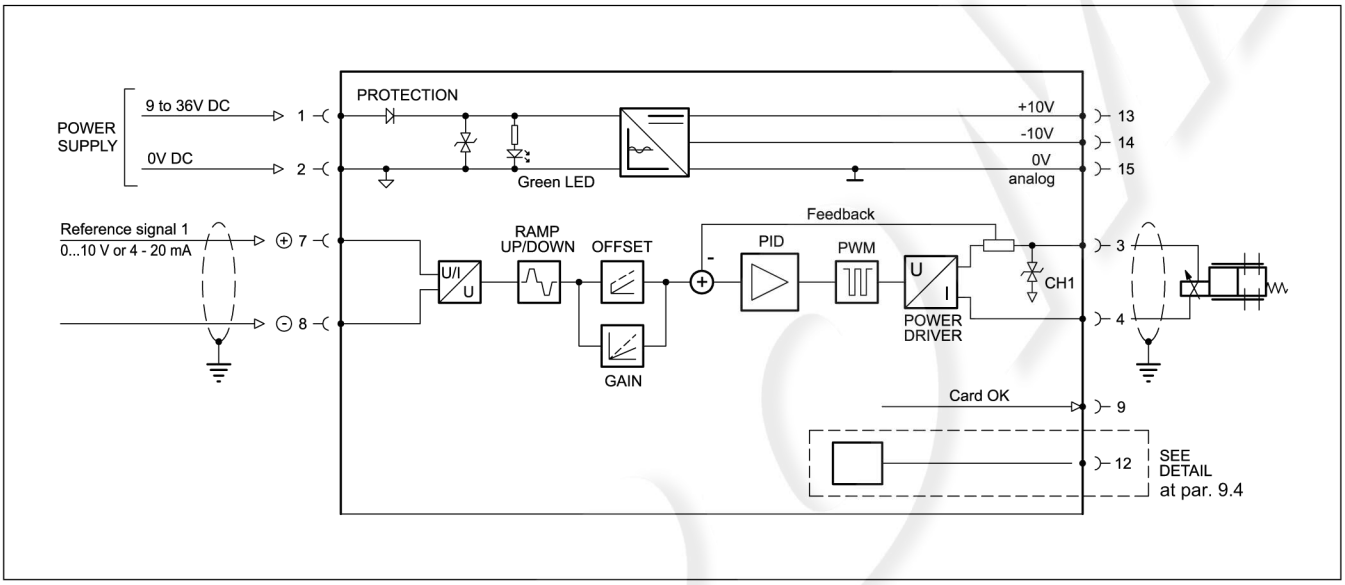




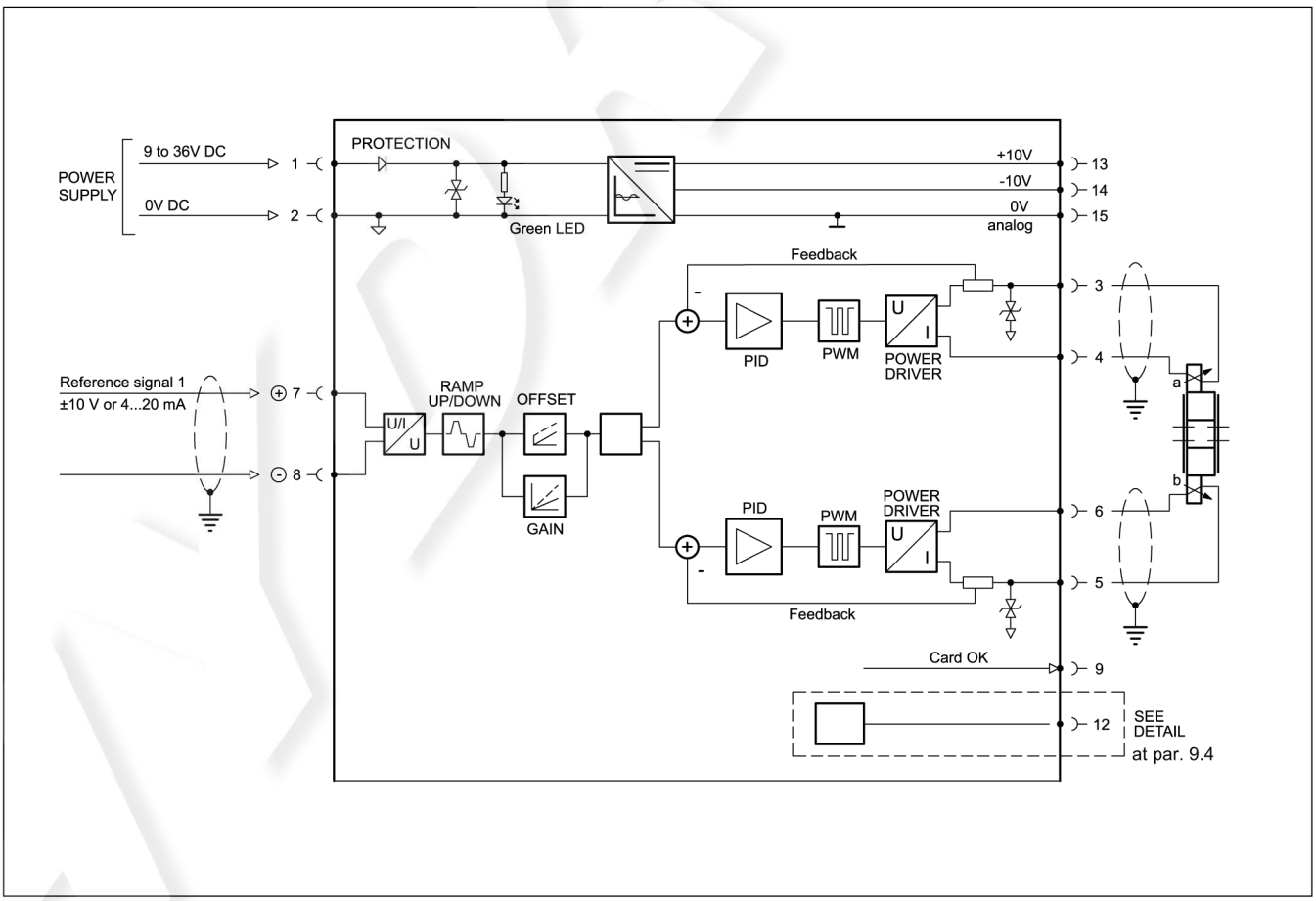
9 - CARDS BLOCK DIAGRAMS

The function of PIN12 varies depending on the card version. It can be either ENABLE input (A version) or an auxiliary voltage output (B version).

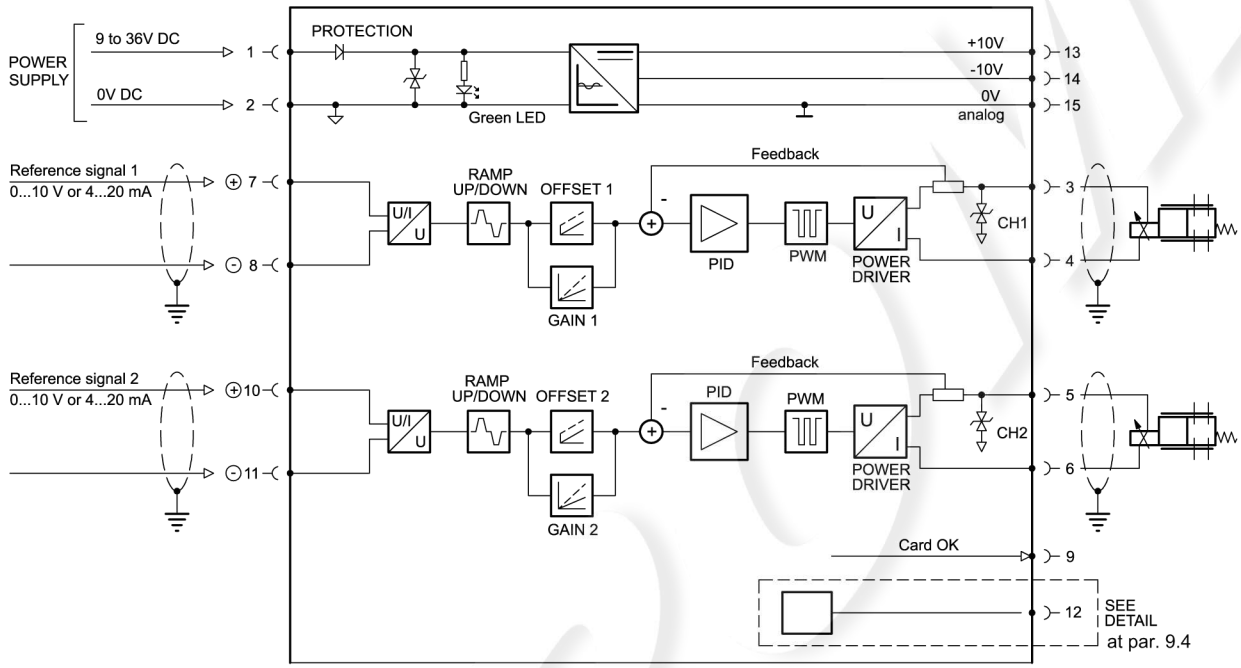
9.1 - EDM-M1



9.2 - EDM-M2



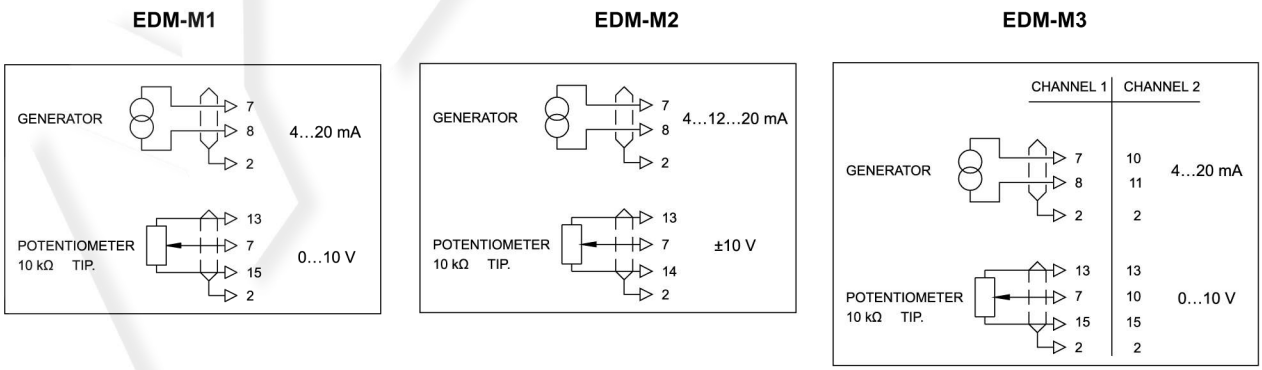
9.3 - EDM-M3



9.4 - Function of PIN 12



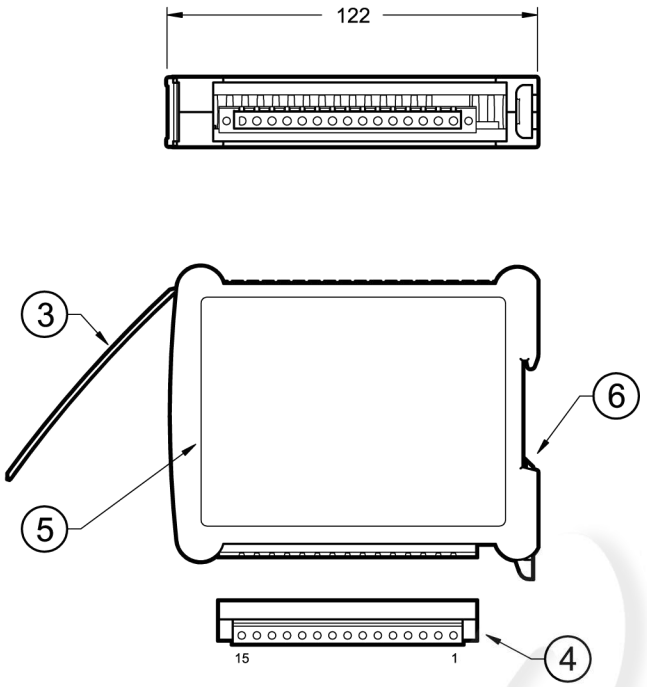
10 - WIRING

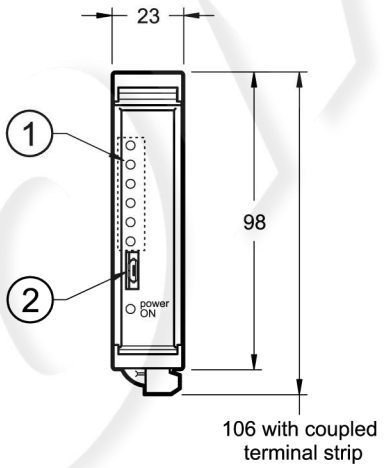


NOTE: pin 8 (and 11 for EDM-M3 version) must be connected to pin 15 (0V), when the potentiometer is used as reference signal. This is recommended also when the generator has a pure differential output (not connected to ground).

11 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm





1	LED interface
2	Micro USB socket
3	Protection flap
4	Terminal strip, plug-in, 15-pole with downwards cables output and fastening bolts
5	Label with circuit and wiring
6	DIN rail clip