

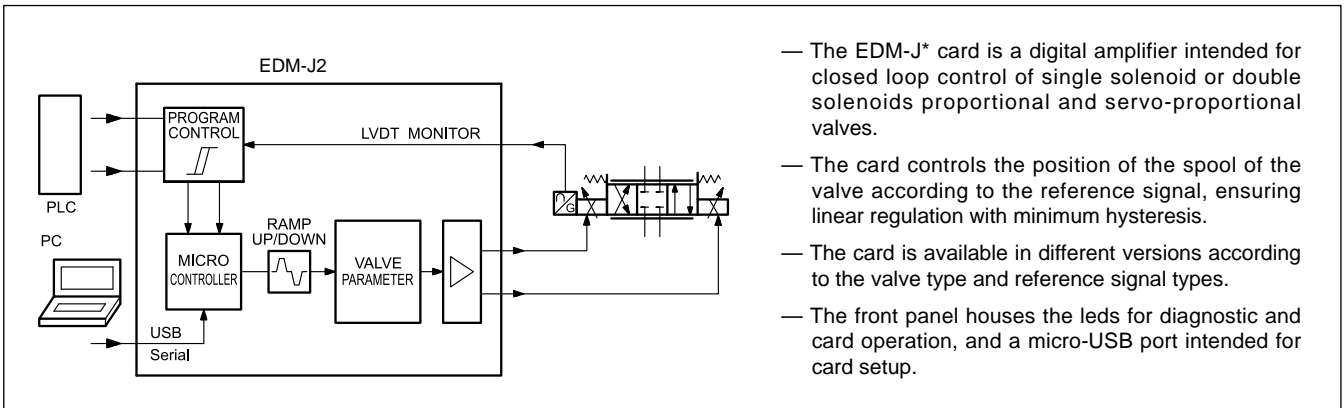


# EDM-J\*

## DIGITAL AMPLIFIER FOR CLOSED LOOP CONTINUOUS CONTROL VALVES SERIES 30

**RAIL MOUNTING: DIN EN 50022**

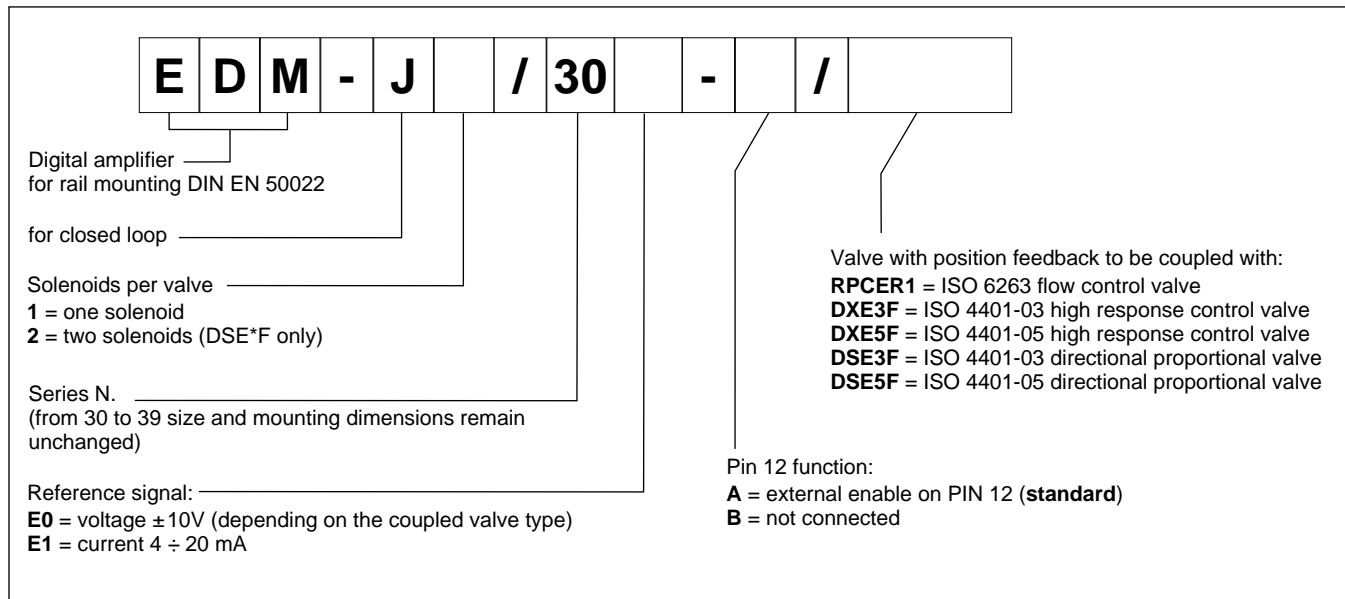
### OPERATING PRINCIPLE



### TECHNICAL CHARACTERISTICS

Power supply	V DC	19 - 30 ripple included
Required power	W	50
Max input current	A	4
Output current	mA	430 ÷ 4000
Analogue inputs: reference signal and LVDT (the signal type depends on the coupled valve)	V mA	±10 or 0 ÷ 10 (Impedance Ri = 11 kohm) 4 ÷ 20 (Impedance Ri = 56 ohm)
Digital input		ON > 8 to U <sub>b</sub> OFF < 5V (resistance 17 kohm)
Digital output		Low level < 2 V, high level > max U <sub>b</sub> (U <sub>b</sub> = power supply)
Monitor	V mA	±10 or 0 ÷ 10 4 ÷ 20
Fuse, external	A	6 (medium time lag)
Electromagnetic compatibility (EMC)		according to 2014/30/EU standards
Housing material		ABS
Housing dimensions	mm	23x98x122
Connections		Plug-in terminal block with tightening screws: 15 poles - micro USB
Operating temperature range	°C	-20 / +70
Protection degree		IP20
Mass	kg	0.13

### 1 - IDENTIFICATION CODE



### 2 - CHARACTERISTICS

#### Controller functions

Power amplifier with current controlled by analogue input signal for valves with feedback:

RPCER1: two-ports flow control valve, with pressure and temperature compensation - catalogue 82 250

DXE\*F: continuous control valves, high response - catalogues 85 130 and 85 230

DSE\*F: directional valve - catalogue 83 240 and 83 290

- The spool position closed loop controlled, so is independent from supply and solenoid resistance.
- Parameters programmable via software: ramps, offset, gain, dither.

#### Adaptation of the valve characteristic curve

- Deadband compensation
- Max pressure / flow value adjustment (DSE\*F, RPCER1)

#### 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, through on-board micro USB port
- Diagnostic

### 3 - FUNCTIONAL SPECIFICATIONS

#### 3.1 - Power supply

This card is designed for 24 VDC ( $19 \div 30$  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.

**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 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 - Output values

Output values are in current, between  $430 \div 4000$  mA, comprehensive of curve adaptation.

A feedback monitor signal is available on pin 14. All cables which lead outside must be screened.

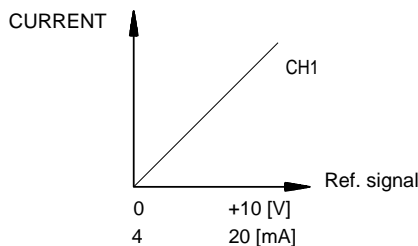
### 3.6 - Reference signals

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).

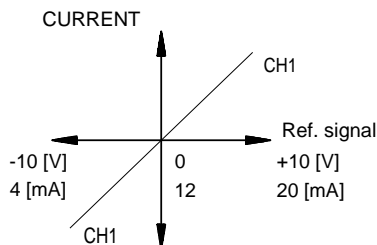
Reference value depends both on the card version and on the coupled valve, as stated in diagrams here below.

Card	Signal ref.	Valve
EDM-J1	$0 \div 10$	RPCER1
		DSE*F-*SA
	$\pm 10$	DXE*F
EDM-J2	$\pm 10$	DSE*F

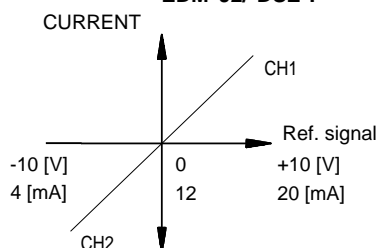
EDM-J1/\*RPCER1



EDM-J1/\*DXE\*F



EDM-J2/\*DSE\*F



### 3.7 - Monitor output

The spool position is monitored on pin 14. The monitor signal complies with the value of the reference signal, in voltage or in current.

## 4 - EDM-J\*, DIPLOMATIC VALVES AND DEFAULT SETTINGS

These cards are set at factory depending on the ordering code, in order to optimize the performance according to the valve they are paired with.

RPCER1 and DSE3F valves do not require a unique parameter set and can be connected to any EDM-J\* card corresponding to the related model.

DXE3F valves instead require a unique and customized parameter set for each valve; therefore, each valve is paired with its own control card. Please make sure that the serial numbers on the respective identification labels match. If the card is not paired with its own valve, major malfunctions may occur.

It is recommended to keep a copy of the original parameter set of the card. In case the original settings are lost or if working conditions require a higher level of customization than the default settings, please contact our Service department.

## 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 [mm<sup>2</sup>]**

Valve	Coil type	Cable length		
		< 10 m	10 to 25 m	25 to 50 m
RPCER1	860 mA - 24V	0.5	0.75	1
DXE3F	2600 mA - 12V	0.75	1.5	2.5
DXE5F	3700 mA - 12V	1	1.5	2.5
DSE3F	1880 mA - 12V	0.5	1	2
DSE5F	2800 mA - 12V	0.75	1.5	2.5

Power supply cable must be tailored according to the rules above, taking into account the number of connected coils.

- We suggest a cross section of 0.25 mm<sup>2</sup>, up to 50 meter length for signal cables.
- The 15-poles terminal strip accepts connection of a 1.5 mm<sup>2</sup> conductor with terminal ferrule. Applications that require larger cross sections require mandatorily a junction box.

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  $V \times I$ .

Valve	Card power consumption [W]
RPCER1	25
DXE3F	33
DXE5F	46
DSE3F	25
DSE5F	26

### 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 leds: functions as in table below.

LED	ON (function ok)	FLASHING (failure)		OFF
		slow	fast	
L1	Reference	out of range	-	-
L2	Solenoids	open coil	short circuit	-
L3	LVDT	out of range	-	-
L4	Ready	fault	-	missing external enable
L5	-	-	-	-
L6	-	-	-	-

- 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.

### 7 - DEVICE SETUP

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

Card configuration is possible only by EBC software version 3.2.0.8 or later, connecting the card to a PC by a standard cable type USB cable type A male - USB male micro B (not supplied).

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

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

Please refer to 89255 ETM Technical Manual for details.

### 8 - MAIN FEATURES

#### 8.1 - Diagnostics

Activates / deactivates the error detection. Deactivate the error detection can be useful during some troubleshooting tasks.

parameter DIAGNOSTICS (ENABLE | DISABLE | AUTO)

default for EDM-J\*/30\*-A: ENABLE

default for EDM-J\*/30\*-B: AUTO

#### 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 PIN 12.

### 8.3 - Input signal scaling

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

#### EDM-J1

SIGNAL\_OFFSET

range: E0: -3 ... 3V  
E1: -4 ... +4 mA  
default: 0.00

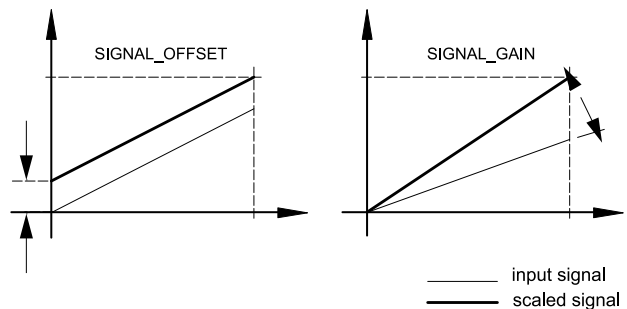
SIGNAL\_GAIN

range: 0.40 ... 10.00  
default: 1.00

#### EDM-J2

SIGNAL\_OFFSET

SIGNAL\_GAIN



### 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.

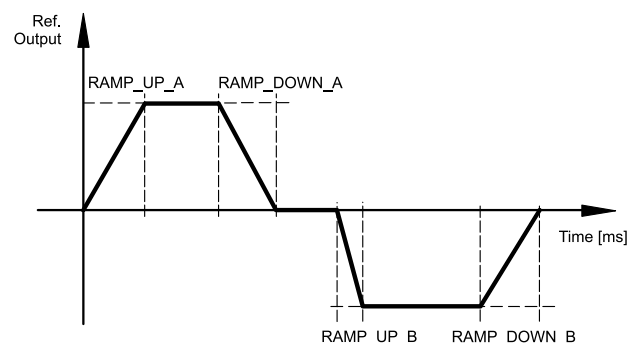
#### EDM-J1

RAMP\_UP  
RAMP\_DOWN

#### EDM-J2

RAMP\_UP\_A  
RAMP\_DOWN\_A  
RAMP\_UP\_B  
RAMP\_DOWN\_B

range: 0 ... 20000 ms  
default: 0



### 8.5 - Curve optimization

Deadband compensation and current input scaling are customizable. Some parameters may appear as 'non-editable' by the user during the configuration of the card, because they are automatically set by the EBC configuration software depending on the type of valve.

Values in percent.

#### EDM-J1

ADJ\_MIN

range: 0 ... 50% of the nominal current

default: according to the card version

ADJ\_MAX

range: ADJ\_min ... 120% of the nominal current

default: 100%

ADJ\_TRIGGER

range: 0... 20%

default: 1.5%

#### EDM-J2

ADJ\_MIN\_A

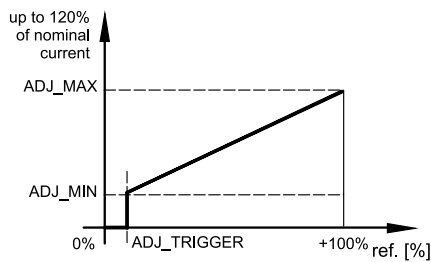
ADJ\_MIN\_B

ADJ\_MAX\_A

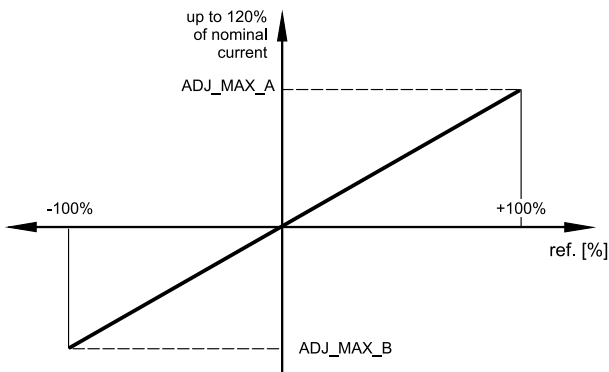
ADJ\_MAX\_B

ADJ\_TRIGGER

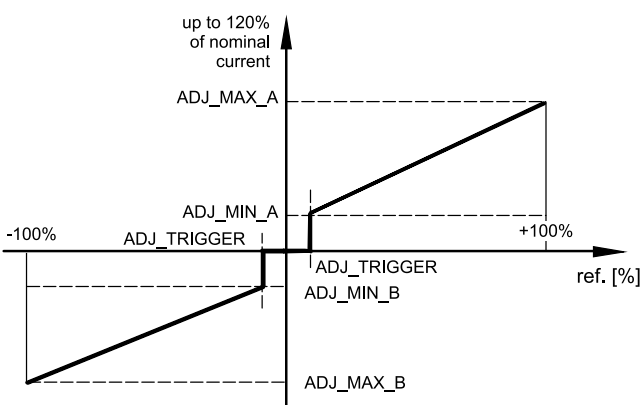
EDM-J1/\*RPCER1



EDM-J1/\*DXE\*F



EDM-J2/\*DSE\*F



### 8.6 - Dither

Amplitude and frequency values for the dither are customizable.

amplitude range: 0...40% of nominal current

frequency range: 0... 500 Hz

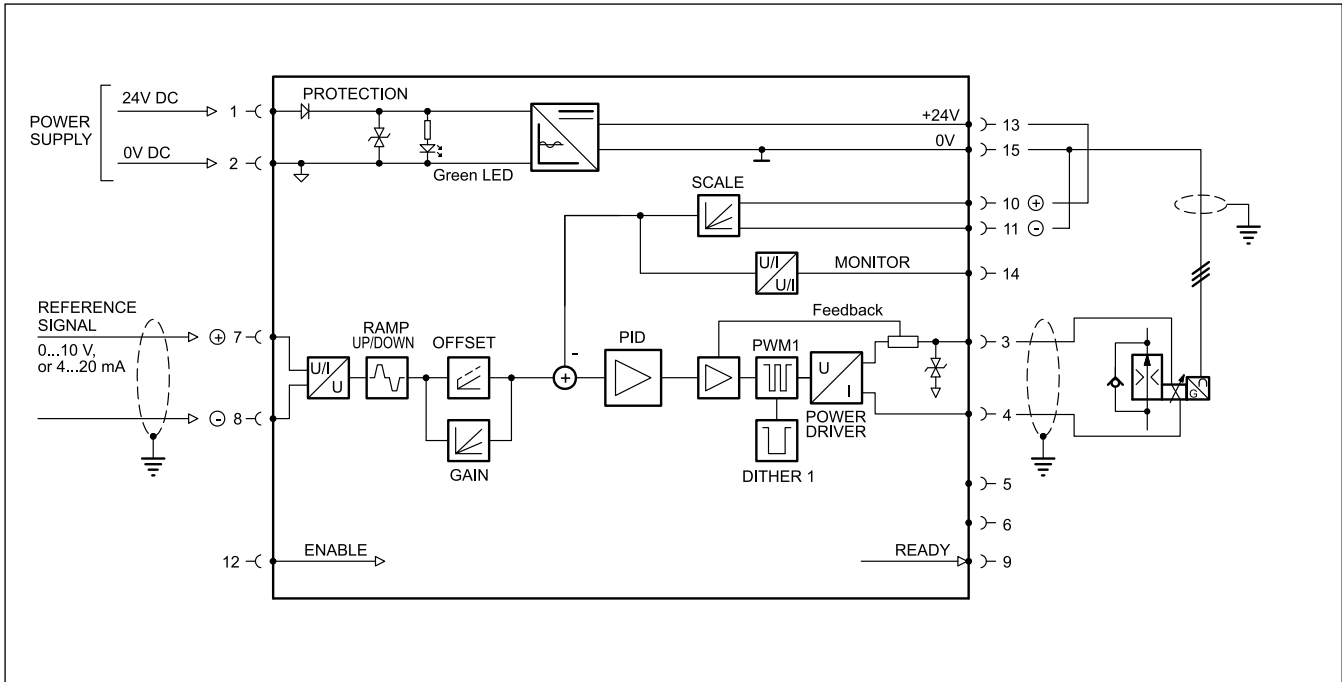
## 9 - CARDS BLOCK DIAGRAMS

The function of the PIN12 varies depending on the card version. It can be 'ENABLE input' (A version) or it can be 'not connected'.

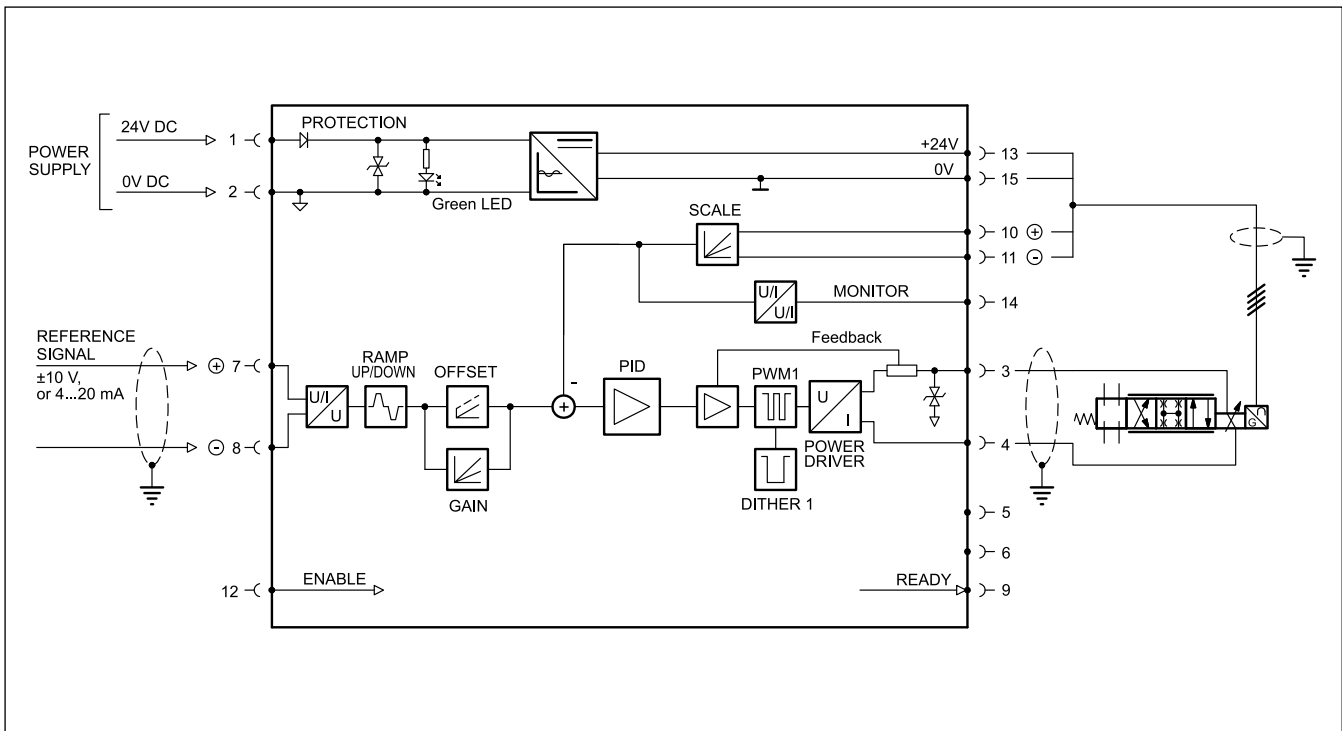
### NOTES:

1. The shield of the cable must be connected on valve side (with valve body connected to GND)
2. 0 V DC of power supply must be connected on the star point GND in the electrical cabinet to observe EMC requirements,

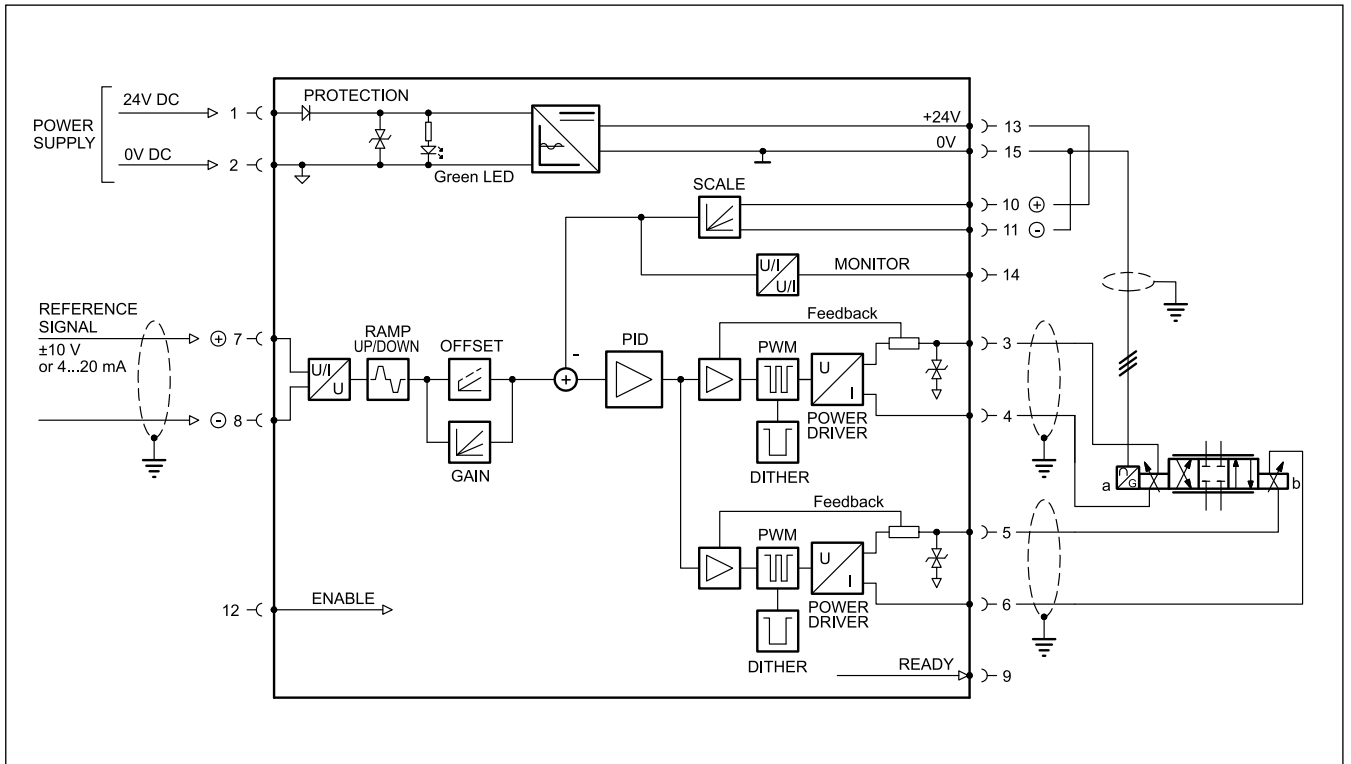
### 9.1 - EDM-J1 for RPCER1 and DSE3F-\*SA



### 9.2 - EDM-J1 for DXE\*F



### 9.3 - EDM-J2



### 10 - OVERALL AND MOUNTING DIMENSIONS

