# EVDA Series

## Technical specification

| | |
|---|---|
| Application: | Digital amplifier for open loop proportional valves |
| Rail mounting type: | DIN EN 50022 |
| Power supply: | 10/30 V DC (ripple included) |
| Required power: | min. 20 W to max. 40 W |
| Output current: | min. 800 mA to max. 2600 mA |
| Power supply protection: | overload over 330 V polarity inversion |
| Output protection: | short-circuit |
| Analogue protection: | up to 30 V for incorrect power supply connection |
| Reference signals: | 0 to 10 V input impedance 10 to 100 kΩ<br>± 10 V input impedance 10 to 100 kΩ<br>4 to 20 mA input impedance max. 500 Ω |
| Additional output ports: | ± 10 V DC to supply 50 + 50 mA to external potentiometer |
| Connector: | plug-in terminal block with tightening screws, 15 poles |
| Electromagnetic compatibility (EMC): | according to 2004/108/CE standards |
| Housing material: | thermoplastic polyamide |
| Operating temperature: | -20°C to 70°C |
| Dimensions: | 120 x 93 x 23 mm |
| Weight: | 0.15 kg |

# Order information

## Valve assembly part number

| Digital amplifier features | | | | | |
|---|---|---|---|---|---|
| Type | Control | Current | | PWM | Reference Signal |
| EVDA | Table 1 | Table 2 | Table 3 | Table 4 | Table 5 |
| Example EVDA - | 2 | 5 | | 1 | E0 |

## Tables

| Table 1 | |
|---|---|
| Code | Type |
| 1 | Single solenoid valve |
| 2 | Double solenoid valve |
| 3 | Two single solenoid valves, independent channels |

| Table 2 | |
|---|---|
| Code | Max. current |
| 1 | 860 mA |
| 2 | 1200 mA |
| 3 | 1600 mA |
| 4 | 1880 mA |
| 5 | 2600 mA |

| Table 3 | | |
|---|---|---|
| Second channel for EVDA-3 only | Code | Max. current |
| | 1 | 860 mA |
| | 2 | 1200 mA |
| | 3 | 1600 mA |
| | 4 | 1880 mA |

| Table 4 | |
|---|---|
| Code | Switching frequency |
| 1 | 100 Hz |
| 2 | 200 Hz |
| 3 | 300 Hz |
| 4 | 400 Hz |

| Table 5 | |
|---|---|
| Code | Reference signal |
| E0 | Voltage 0 / ± 10 V (standard) |
| E1 | Current 4 / 20 mA |

## Card circuit
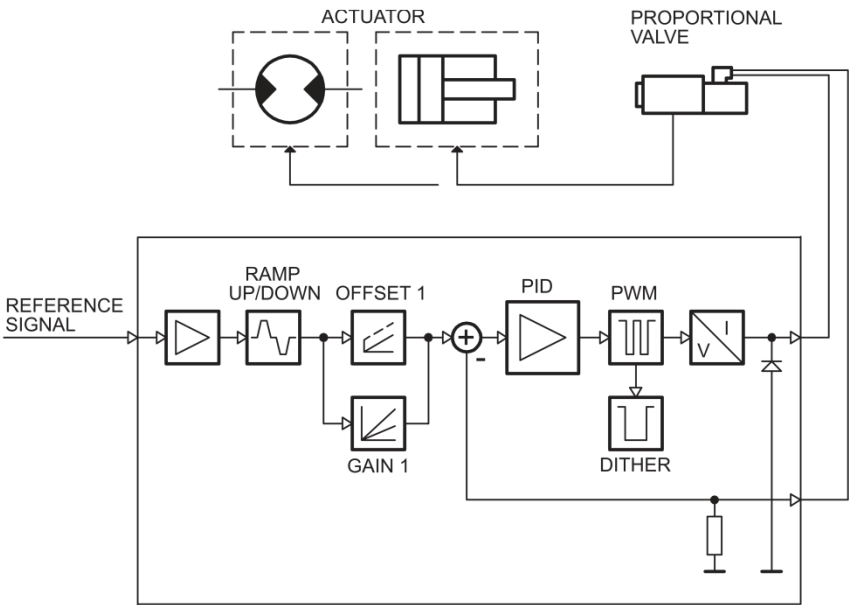
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## Card factory setting

The following table shows the factory setting of our cards in combination with EVOTEK proportional valves to be used with.

### Cards for 24V valves

| Card | | | | | Corresponding EVOTEK valve | | |
|---|---|---|---|---|---|---|---|
| Name | I min. (mA) | I max. (mA) | I lim. (mA) | PWM (Hz) | Name | Single coil | Double coil |
| EVDA-111 | 200 | 860 | 1350 | 100 | EVRDP | • | |
| EVDA-112 | 200 | 860 | 1350 | 200 | EVRD-03 | • | |
| EVDA-131 | 200 | 1600 | 2350 | 100 | EVRD-05 | • | |
| EVDA-211 | 200 | 860 | 1350 | 100 | EVRDP | | • |
| EVDA-212 | 200 | 860 | 1350 | 200 | EVRD-03 | | • |
| EVDA-231 | 200 | 1600 | 2350 | 100 | EVRD-05 | | • |

### Cards for 12V cards

| Card | | | | | Corresponding EVOTEK valve | | |
|---|---|---|---|---|---|---|---|
| Name | I min. (mA) | I max. (mA) | I lim. (mA) | PWM (Hz) | Name | Single coil | Double coil |
| EVDA-111 | 300 | 1880 | 2700 | 100 | EVRDP | • | |
| EVDA-112 | 300 | 1880 | 2700 | 200 | EVRD-03 | • | |
| EVDA-131 | 500 | 2600 | 4000 | 100 | EVRD-05 | • | |
| EVDA-211 | 300 | 1880 | 2700 | 100 | EVRDP | | • |
| EVDA-212 | 300 | 1880 | 2700 | 200 | EVRD-03 | | • |
| EVDA-231 | 500 | 2600 | 4000 | 100 | EVRD-05 | | • |

## Specification

### Power supply

The card requires a power supply of between 10 and 30V DC including ripple (terminals 1 & 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 x I.

Example: a card with a maximum current of 860 mA and a power supply voltage of 24V DC requires a power of about 20W. With a card with a maximum current of 1600 mA and a power supply voltage of 24V DC the used power is equal to 38.5W.

### Electrical protection

The card is protected against overvoltage and polarity inversion. On the output a protection against any short circuit is foreseen.

## Reference signal

The card accepts voltage reference signals from 0 to 10 V and ±10 V, current reference signal from 4 to 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 below.

Refer to the wiring diagrams for electric connection of the different card types.
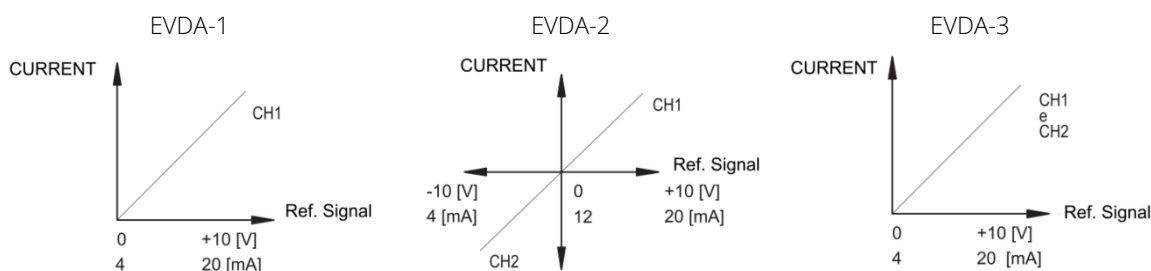


## Signals

**Power ON** (power supply)
The two red displays indicate the cards' power supply:
ON            normal power supply
OFF           no power supply
FLASHING    refer to the codes under "Overall and mounting dimensions"

### 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 kΩ and max. current 100 mA. When the card works normally, the voltage on this pin is the same as the power supply; when there is an anormaly, the output voltage is zero. Anomalies could be low voltage (<10V), short circuit or unconnected coil.
If the output pin 9 is low, the control logic forbids the power output towards the solenoids. When the anomaly is settled, the card resets automatically.

## Adjustment

There are two adjustment modes: variable view and parameter editing.
Variable view enables real time monitoring of the control values for both the required and the real current on both channels.
Parameter editing enables the operating parameter view and editing.

### Variable view

The card in variable view mode by standard and shows the first variable value – the reference signal to channel 1.
The different variables can be selected with the + and – buttons (short name is displayed for a second). By pressing the E button briefly, the currently displayed variables' short name appears.

Variables:

**U1**    Reference signal to channel 1
          0 to 9.9 V, 4 to 20 mA for single solenoid
          -9.9/0/9.9 V, 4/12/20 mA for double solenoid

**C1** Current required for channel 1
(according to the applied reference signal, expressed in ampere between a range of 0 and 3.0 A)

**E1** Actually supplied current by channel 1
(expressed in ampere between a range of 0 and 3.0 A)

**U2** Reference signal to channel 2
0 to 9.9 V, 4 to 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 between a range of 0 and 3.0 A)

**E2** Actually supplied current by channel 2
(expressed in ampere between a range of 0 and 3.0 A)

Variables of channel 1 (U1, C1, E1) are displayed only, if card is set for single solenoid valve.

All mentioned parameters can be viewed on the two digit display located on the front panel of the card. The values are read as shown in the table below (example for EVDA-15*):

| REFERENCE (V) | (mA) | VAR. U1 (V) | VAR. C1/E1 | VAR. U2 (V) | VAR. C2/E2 |
|---|---|---|---|---|---|
| +10 | 20 | 10. | 18. (A) | | |
| +5 | 16 | 5.0 | 1.0 (A) | | |
| 0 | 12 | 00 | 40.(mA) | | |
| 0 | 12 | | | 0.0 | 40.(mA) |
| -5 | 8 | | | 5.0 | 1.0 (A) |
| -10 | 4 | | | 10. | 1.8 (A) |

## Parameter editing

By pressing and holding the – button the card switches from variable view to parameter editing and vice versa.

In the parameter editing mode, the different parameters can be selected as previously described by pressing the + or – button. By pressing the E button briefly, the currently displayed parameters' short name appears.

By pressing and holding the E button for about 1.5 seconds the selected parameter flashes and can be edited with the + and – button. The edited value can then be saved into the EEPROM by pressing the E button again. The + and – buttons resume to their function for choosing the parameters.

After all parameters have been edited to the desired level, pressing and holding the + button for about 2 seconds saves all values in EEPROM and returns the device into variables view mode.

For editable values please refer to next page.

Editable variables in parameter editing:

**G1** "I Max." current in mA.
Sets maximum current to the solenoid of channel 1 when reference signal is at its maximum value of +10V (or 20mA).
Used to limit maximum value of hydraulic size controlled by the valve.

**o1** "I Min." current in mA.
Sets the offset current to the solenoid of channel 1 when reference signal exceeds the limit of 0.1V (or 0.1mA).
Used to null the insensitiveness area of the valve (dead band).
Range 0 to 50% of I Max.

**r1** "Max Ramp" ramp time expressed in seconds.
Sets the time it takes to the current supplied by channel 1 to go from zero to maximum value in the case of a reference signal variation from zero to 100% and vice versa. Used to slow down the valve response time in case of a sudden variation of the reference signal
Range 00 to 20 seconds

**u1** "Ramp up" increasing time expressed in percent of r1 ramp time.
It sets the current increasing time on channel 1 for a variation from 0 to 100% of the input reference.
Range 00 to 99%

**d1** "Ramp Dn" decreasing time expressed in percent of r1.
It sets the current decreasing time on channel 1 for a variation from 100% to 0 of the input reference.
Range 00 to 99%

**G2** "I Max." current expressed in mA.
Sets maximum current to the solenoid of channel 2 when reference signal is at its maximum value.

**o2** "I Min." current in mA.
Sets the offset current to the solenoid of channel 2.
Range 0 to 50% of I Max.

**r2** "Max Ramp" ramp time expressed in seconds.
Sets the time it takes to the current supplied by channel 2 to go from zero to maximum value in the case of a reference signal variation from zero to 100% and vice versa. Used to slow down the valve response time in case of a sudden variation of the reference signal
Range 00 to 20 seconds

**u2** "Ramp up" increasing time expressed in percent of r2 ramp time.
It sets the current increasing time on channel 2 for a variation from 0 to 100% of the input reference.
Range 00 to 99%

**d2** "Ramp Dn" decreasing time expressed in percent of r2.
It sets the current decreasing time on channel 2 for a variation from 100% to 0 of the input reference.
Range 00 to 99%

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**Fr** "PWM Freq" PWM frequency expressed in Hertz.
Sets the pulsating frequency of the control current. Decreasing the PWM frequency improves the valves' accuracy , but decreases the regulation stability. Increasing the PWM frequency improves the regulation stability, but causes a higher hysteresis.
Range 50 to 400 Hz

**U1&U2** Represent the set point full scale.
With this parameter it is possible to keep the same resolution even if the set point is lower than 10V (modifiable with software only).
For example, card EVDA-121 with a command of 10V and standard parameters, the output current charge is 1200 mA. If "U" is set to 500, the output current charge will be 600 mA.

If the card is set for single solenoid valve operation, only channel 1 parameters are being displayed.

### Editable parameters EVDA-2
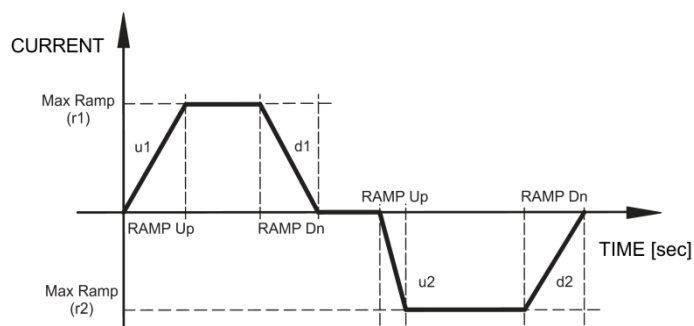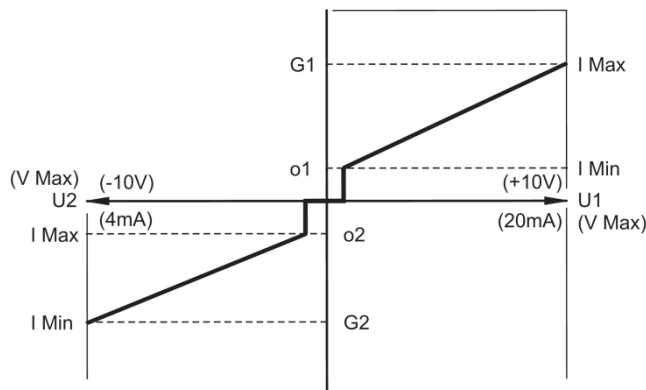
## Installation

The cards are designed for rail mounting 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 mm², up to 20 m length and of 1.00 mm² 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:** It is important that the electric connection is in strict compliance with the wiring diagram below. Generally the valve and wires must be kept away from interference sources as far as possible (e.g. power wires, electric motors, inverters, electric switches, etc.). In environments with critical electromagnetic interference, a full protection of the connection wires may become necessary and is available on request.
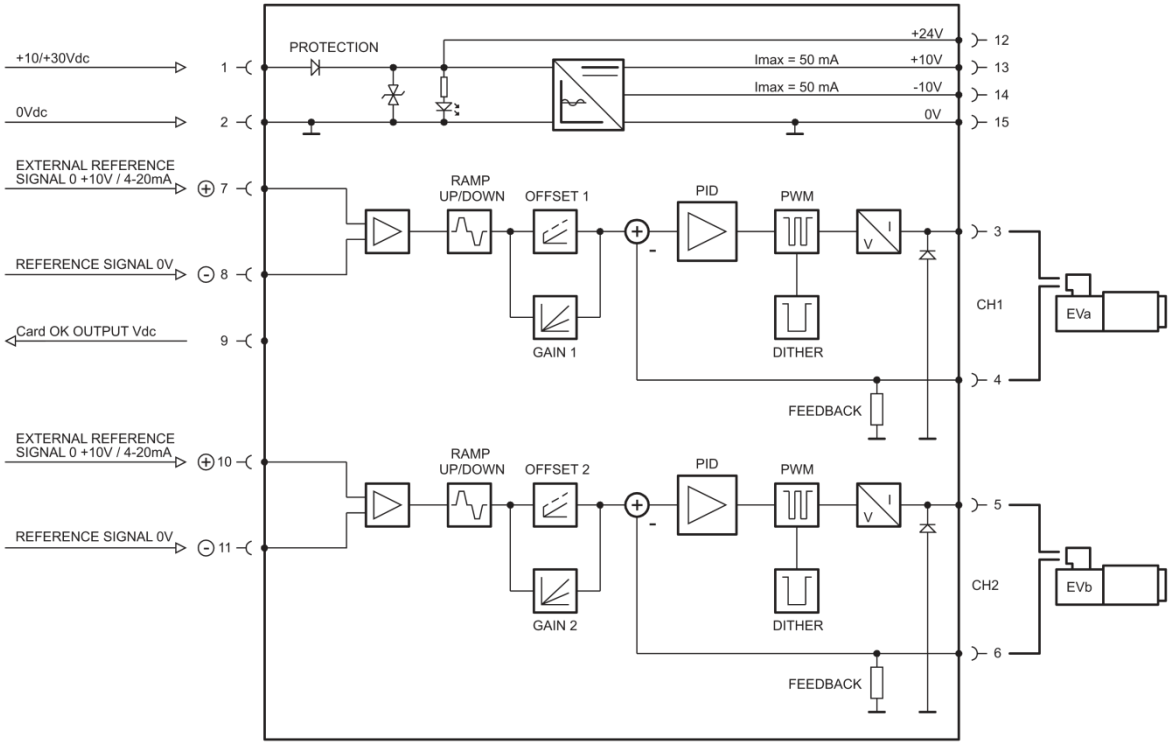
### EVDA-1 circuit and wiring
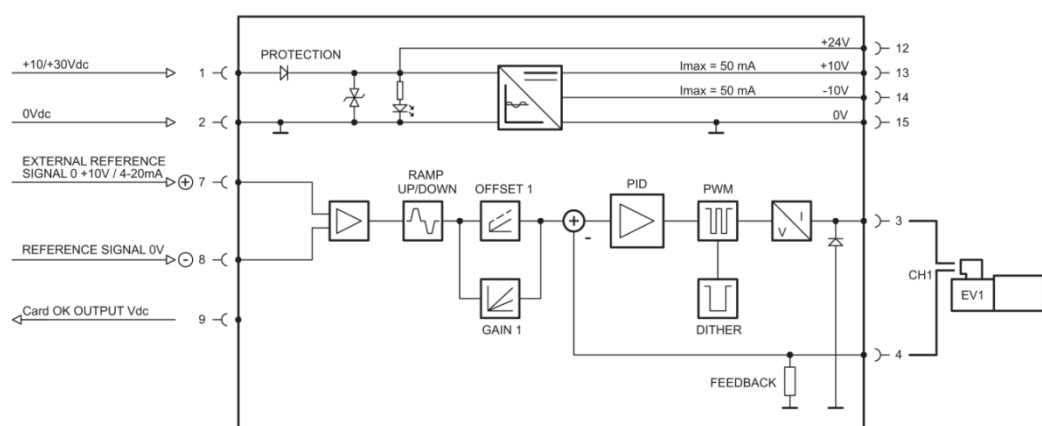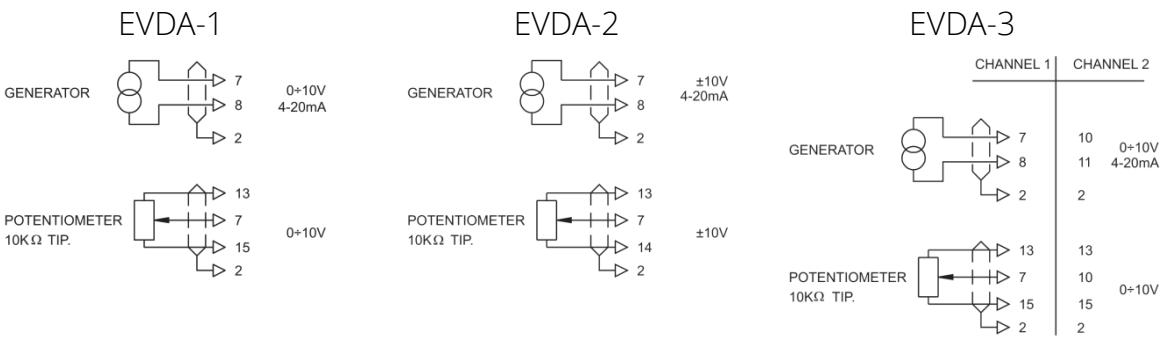


### EVDA-2 circuit and wiring
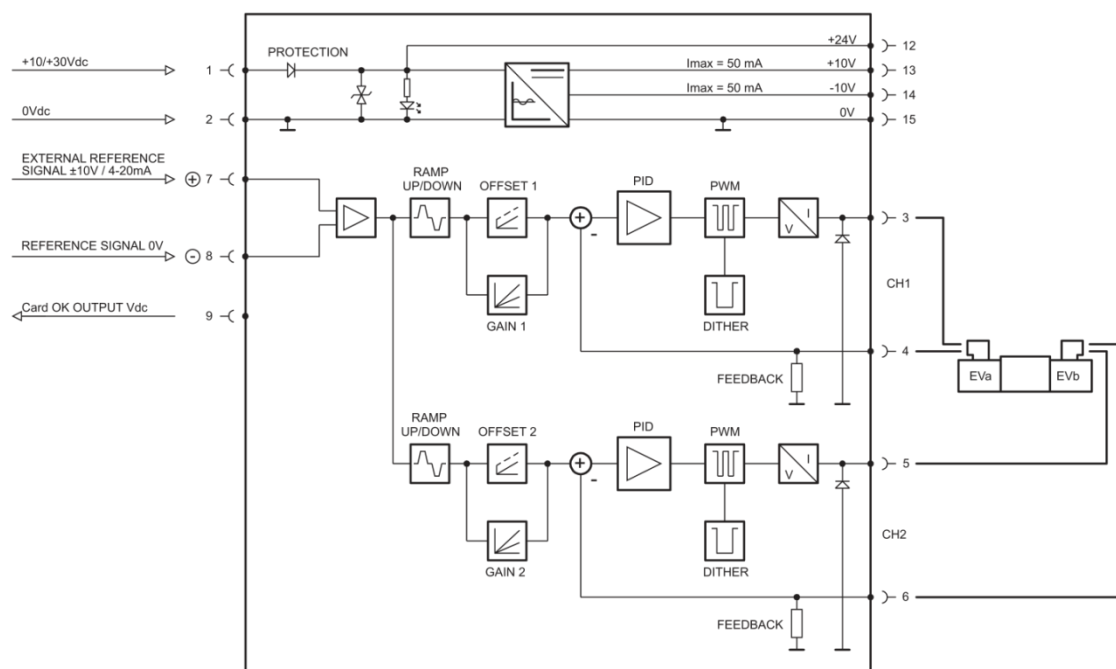
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# EVDA-3 circuit and wiring

## Wiring diagram for reference signal

### EVDA-1



### EVDA-2



### EVDA-3
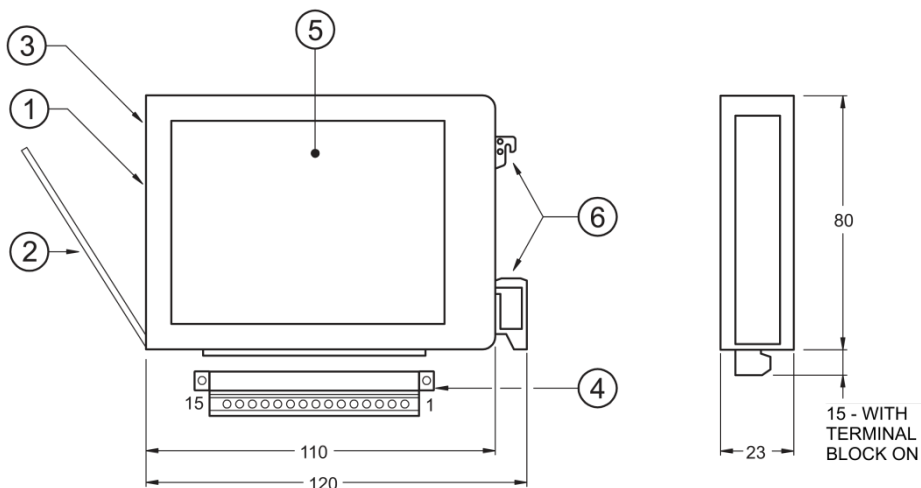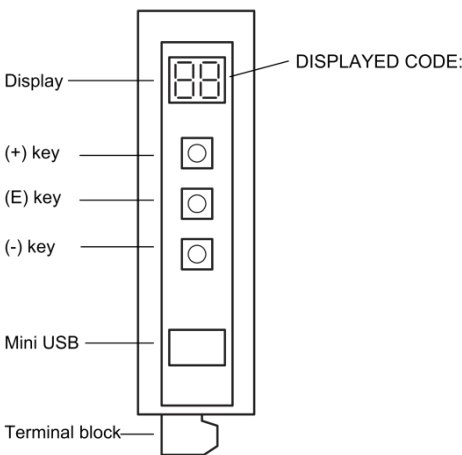


**NOTE:** pin 8 (and 11 for EVDA-3) must be connected to pin 15 (0V) when the potentiometer is used as reference signal. This is recommended also when the generator has a pure differential output (not connected to ground).

## Dimensions



## Front panel



| Error codes | |
|---|---|
| **Code** | **Description** |
| A1 | Current lower than 3.5 mA on input 1 |
| A2 | Current lower than 3.5 mA on input 2 |
| A3 | Output 1 in short circuit |
| A4 | Output 2 in short circuit |
| A5 | Output 1 solenoid disconnected |
| A6 | Output 2 solenoid disconnected |
| A7 | Power supply voltage lower than 10V |

| Legend | |
|---|---|
| **No.** | **Description** |
| 1 | Front panel |
| 2 | Button protection cover |
| 3 | Display |
| 4 | Plug-in 15 pole terminal strip with downwards cables output and fastening bolts |
| 5 | Screen printing with card circuit and wiring diagram |
| 6 | Connection for rails DIN EN 50022 |

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