

PRESSURE PROPORTIONAL VALVES



SERIES EPR

User manual



Power and precision in the air

Pressure proportional valves

User manual

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DESCRIPTION

Proportional valves allow to adjust the output pressure by means of an electric signal. Depending on the set pressure, there's an output electrical signal, called "feedback signal". These valves have a display that, besides indicating the regulated pressure, facilitates the configuration thanks to the user panel at the valveside. These valves are available in G1/8", G1/4" and G1/2" sizes.

TECHNICAL DATA

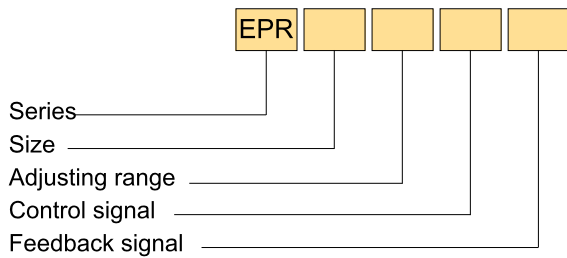
| | | |
|---------------------------------|---|-------------------|
| Minimum pressure | Maximum regulating pressure + 1 bar | |
| Maximum pressure | 10 bar for the models with adjusting range: 0 ÷ 5 and 0 ÷ 9 bar 2 bar for the models with adjusting range: 0 ÷ 1 bar | |
| Working temperature | 0 ÷ 50 °C | |
| Fluid | Filtered, un lubricated or continuous lubricated compressed air | |
| Port size | G1/8 - G1/4 - G1/2 | |
| Pressure gauge port size | G1/8 | |
| Pressure with Pa=6 bar and Δp=1 | G1/8: 290 NI/min | G1/4: 1440 NI/min |
| | G1/2: 4800 NI/min | |
| Supply voltage | 24 VDC | |
| Apparent power | < 6W | |
| Voltage tolerance | ±10% | |
| Protection class | IP65 | |
| Electric connector | M12A 4 PIN see on page 8 | |
| Sensitivity | ≤ ± 0.5% F.S. | |
| Linearity | ≤ 1.0% F.S. | |
| Ripeatability | ≤ ± 0.5 F.S. | |
| Hysteresis | ≤ 0.5% F.S. | |



MATERIALS

| | |
|---------|-----------------|
| End cap | Techno-polymer |
| Body | Aluminium |
| Springs | Stainless steel |
| Seals | NBR |

ORDER KEY



SIZE

| | |
|----------------|----------------|
| 8 G1/8" | 4 G1/4" |
| 2 G1/2" | |

ADJUSTING RANGE

| | |
|--|---------------------|
| /1 0 ÷ 1 bar ($P_n=2$ bar max) | /5 0 ÷ 5 bar |
| /9 0 ÷ 9 bar | |

CONTROL SIGNAL

| |
|---|
| T Voltage: 0 ÷ 5 VDC / 0 ÷ 10 VDC (can be set up by the user) |
| A Current: 0 ÷ 20 mA DC / 4 ÷ 20 mA DC (can be set up by the user) |
| 4S Four control signal ON/OFF |

FEEDBACK SIGNAL

| | |
|----------------------|--------------------------|
| F15 1 ÷ 5 VDC | F420 4 ÷ 20 mA DC |
| FP 24VDC PNP | FN 24VDC NPN |

ORDER EXAMPLES

Proportional valve size G1/2, adjusting range from 0 to 5 bar, control signal in voltage, feedback signal in voltage (from 1 to 5 VDC): **EPR2/5TF15**.

Proportional valve size G1/4, adjusting range from 0 to 1 bar, control signal in current, feedback signal (PNP24 VDC): **EPR4/1AFP**.

CONNECTOR AND USER INTERFACE

| N° PIN | Correspondant cable color | Disposition with control signal in VDC or mA | Disposition with four control signals |
|--------|---------------------------|--|---------------------------------------|
| 1 | Red/Brown | +24 VDC | +24 VDC |
| 2 | White | Control signal | Switch 1 |
| 3 | Blue | GND | GND |
| 4 | Black | Feedback signal | Switch 2 |

CONNECTOR M12A 4 PIN

Enter / set up value

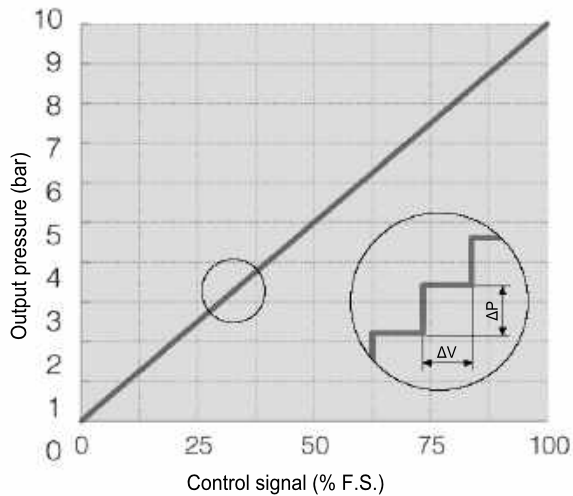
Scroll down / to decrease value

Scroll up / to increase value

LED status indicator

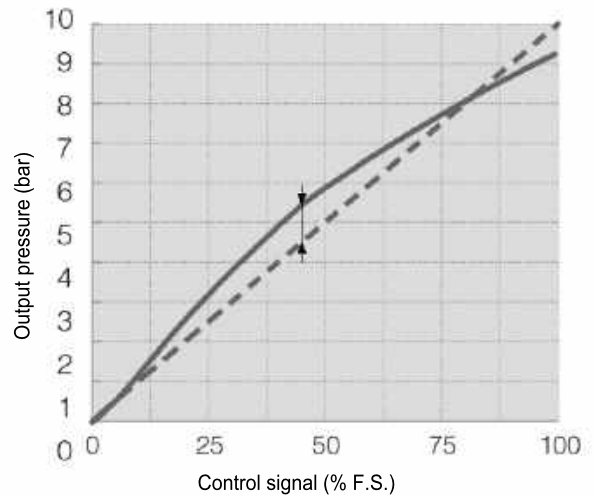
Display

SENSITIVITY



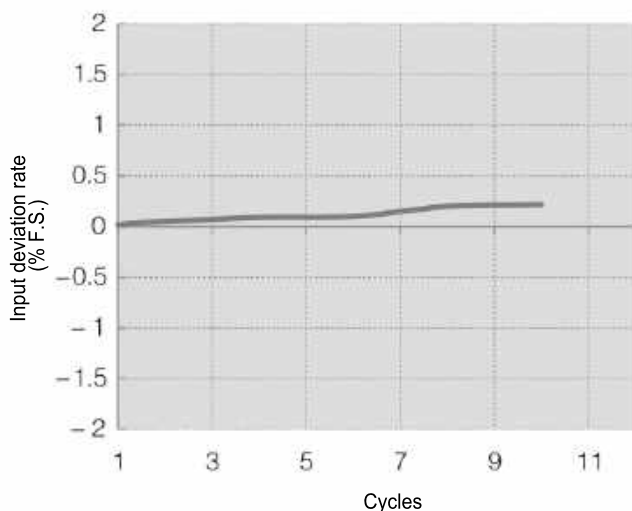
Percentage value referring to the operating bottom scale that defines the the minimum variation of the reference signal to which a variation in the pressure value downstream corresponds. Example: as the regulator has sensitivity that is $\pm 0.5\%$ of the bottom scale (F.S.) and the bottom scale is 10 bar, the pressure variation downstream will occur for each variation in the reference signal above 0.05 V

LINEARITY



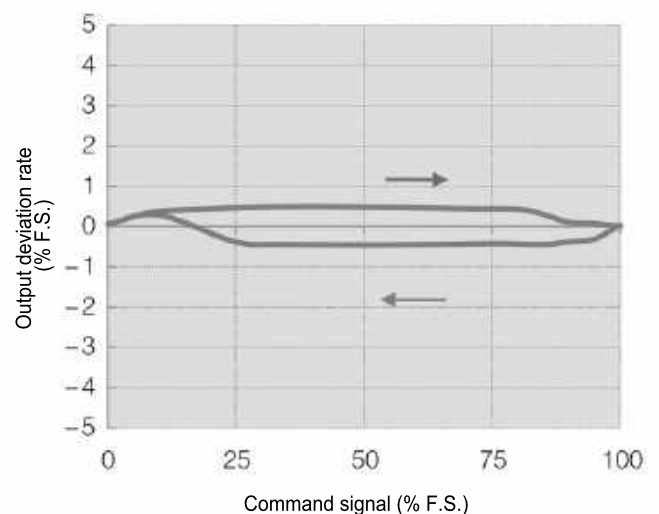
This is a percentage value referring to the operating bottom scale that defines the maximum deviation that is possible between the ideal curve and the actual curve. Example: as the linearity of the regulator is defined as being $\pm 1\%$ of the bottom scale (F.S.) and the bottom scale is defined as 10 bar, maximum error will be ± 0.1 bar.

REPEATABILITY



This is the percentage value referring to the operating bottom scale that defines the maximum error detected during several readings taken consecutively in the same operating conditions (this error is normally generated by the hysteresis of the internal components). Example: as the hysteresis of the regulator is $\pm 0.5\%$ of the bottom scale (F.S.) and the bottom scale is 10 bar, maximum error will be ± 0.05 bar.

HYSTERESIS

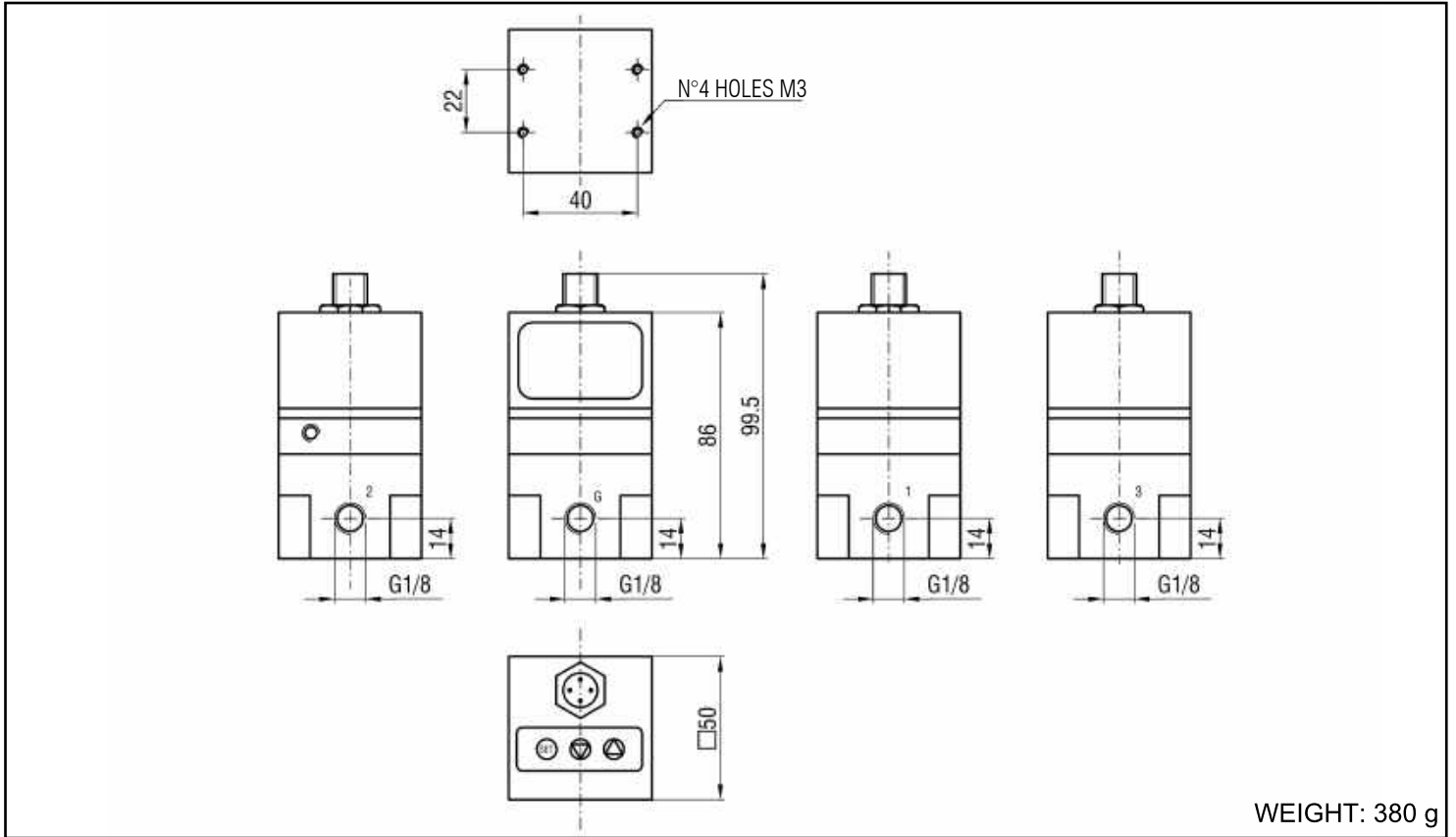


This is the percentage value referring to the operating bottom scale that defines the maximum deviation that is obtained on the outlet pressure with the same reference value. This deviation is due to friction between the mechanical components that make up the regulator and depends on whether the original values a smaller or larger. Example: as the hysteresis of the regulator is $\pm 0.5\%$ of the bottom scale (F.S.) and the bottom scale is 10 bar, maximum error will be ± 0.05 bar.

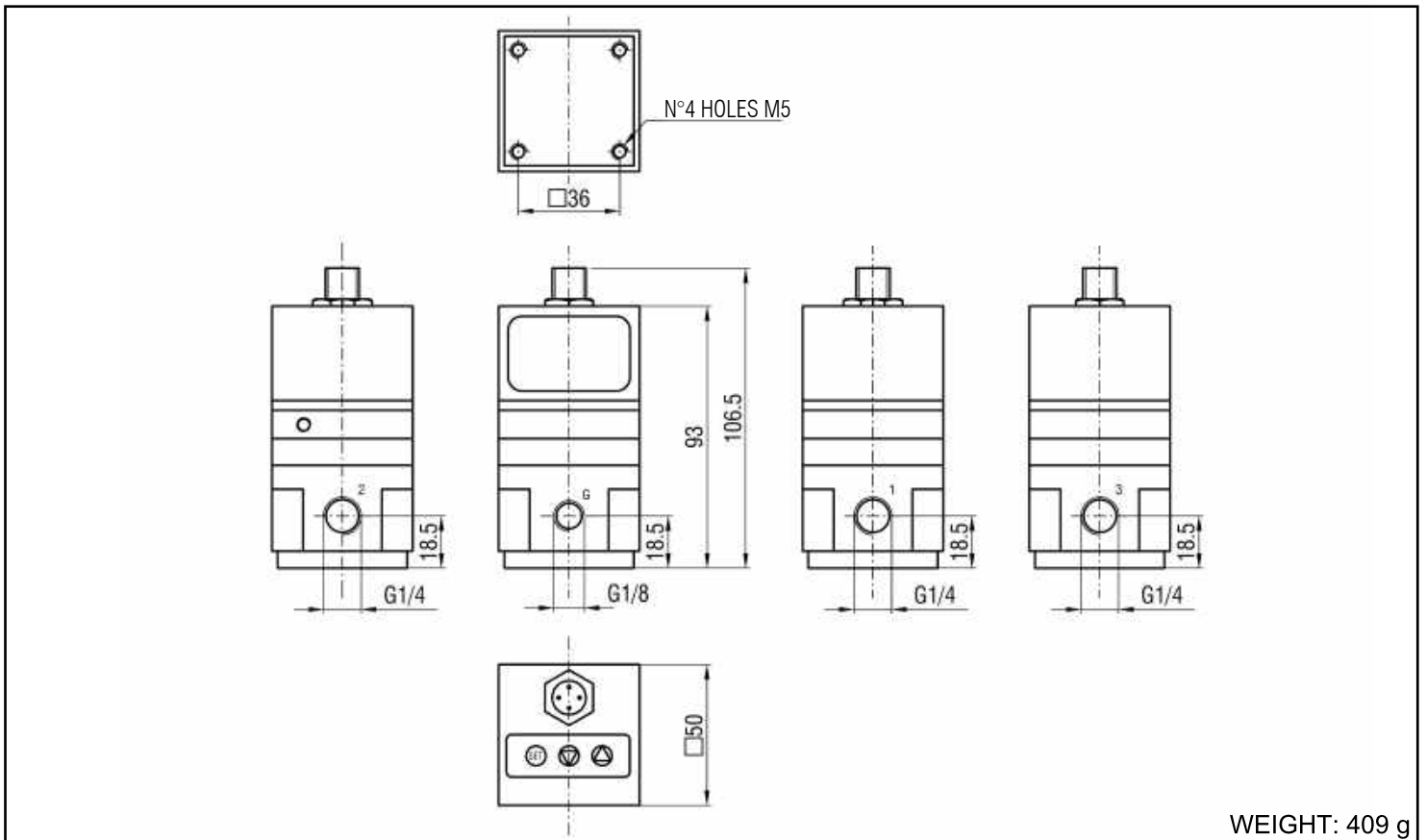
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DIMENSIONS SIZE G1/8



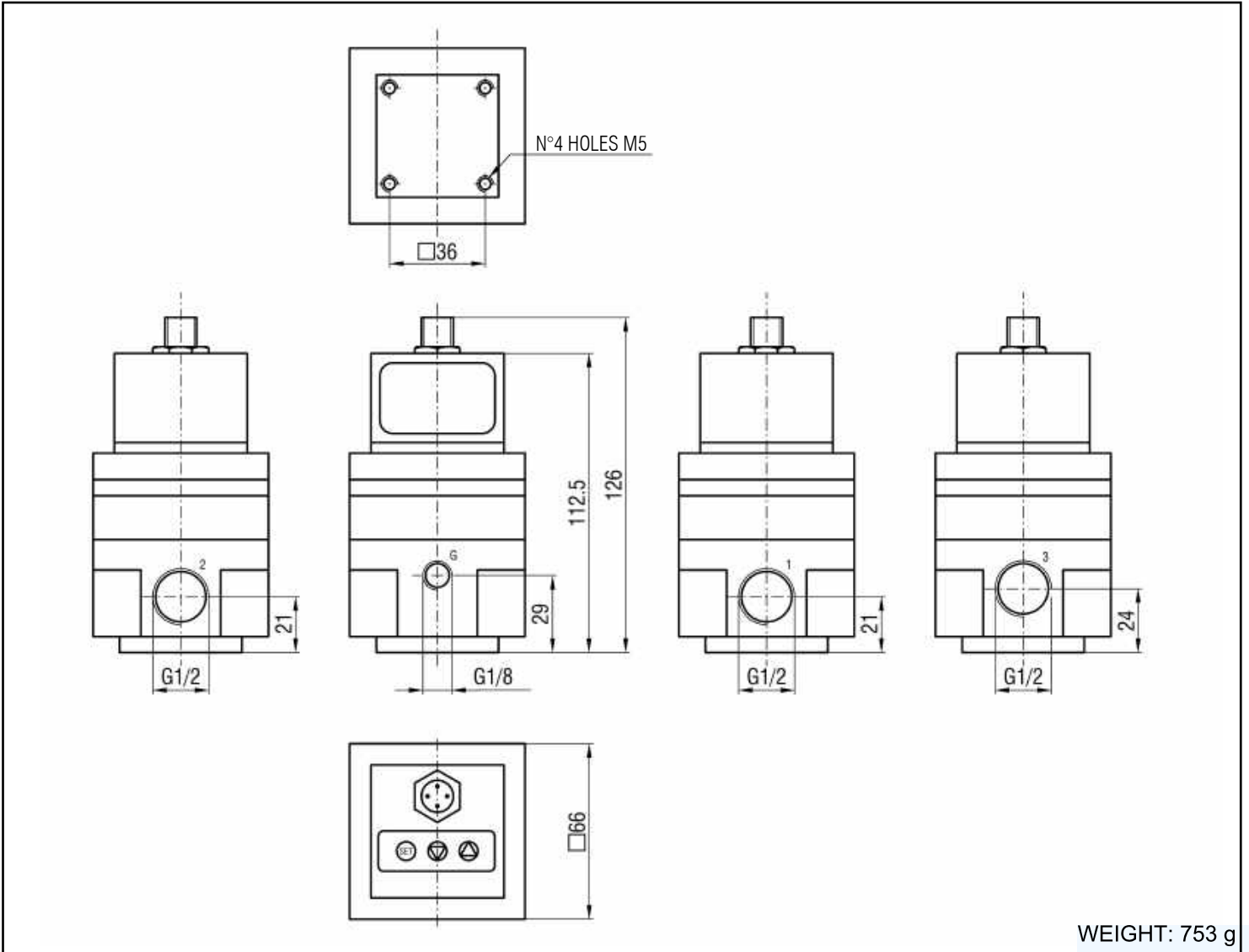
DIMENSIONS SIZE G1/4



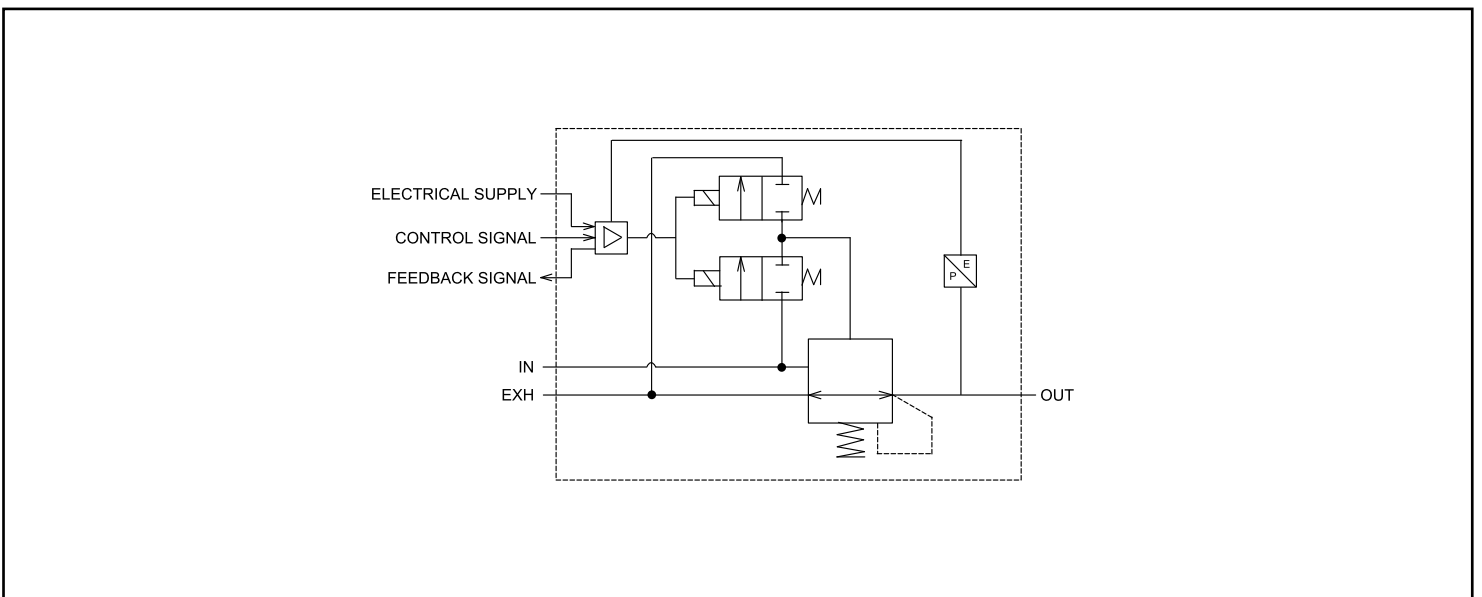
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DIMENSIONS SIZE G1/2



FUNCTIONAL DIAGRAM



USER INTERFACE MANUAL

1. UNLOCK THE KEYBOARD

After use, if the user does not press any button for at least one minute, the display shows the adjusted output pressure. This value can be displayed in three different units of measurement (psi, bar, MPa), user-configurable. If the buttons are not pressed for a further minute, the keyboard will be automatically locked and the display keeps showing the adjusted output pressure. When you press a button in this state, the display notifies the keyboard as locked with the indication "LoC" and in this mode no changes can be performed in the settings. To unlock the keyboard and access the settings menu, you have to press the "SET" button for 3 seconds.

2. SETTINGS

Once the keyboard is unlocked the writing "P00" will appear indicating the page 0 of the menu. So you can scroll through the menu pages pressing "▲" or "▼" buttons. Each page contains the respective options described in section 3. Once the target page has been reached, you can access the different options by pressing the "SET" button and then to increase / lower values or to select the available options, you have to press the buttons "▲" or "▼" and again the "SET" button to set the selected option and return to the menu pages.

3. DISPLAY AND RELATED FUNCTIONS

| Menu page No. | Page options | Description |
|---------------|--------------|---|
| P00 | 0 b | Return to the main screen that shows the adjusted output pressure |
| | U P | Shows on the display the pressure expressed in "psi". On the main screen the value in "psi" precedes the symbol P |
| P01 | U b | Shows on the display the pressure expressed in "bar". On the main screen the value in "bar" precedes the symbol b |
| | U o | Shows on the display the pressure expressed in "kPa". On the main screen the value in "kPa" precedes the symbol o |
| P02 | d000 | Shows on the display the units of measurement of the integral or decimal pressure |
| | F 1 | Set the control signal: 4÷20 mA or 0÷10 VDC (tension or voltage depending on the model) |
| P03 | F 2 | Set the control signal: 0÷20 mA or 0÷5 VDC (tension or voltage depending on the model) |
| | F 3 | Set the control signal: four control signals (depending on the model) |
| P04 | 1.00 | * Set pressure P1 (for models with High / Low Active as output signal) |
| P05 | 2.00 | * Set pressure P2 (for models with High / Low Active as output signal) |
| P06 | 1.00 | * Set the four outlet pressures (for models with four control signals) |
| P07 | 0000 | Set the minimum outlet pressure (set the minimum pressure before the maximum one) It's possible to set the minimum command voltage in regulators with voltage command. |
| P08 | r 100 | Set the maximum outlet pressure (set the maximum pressure after the minimum one) |
| P09 | | Restricted |
| P10 | 2.00 | * Manually set the outlet pressure (temporary function) |
| P11 | | Restricted |
| P12 | | Restricted |
| P13 | n EC | "n EC" = Reset all the settings |
| | nrEC | "nrEC" = Quit this option without changing |

* WARNING: The min and max pressure values that can be set in these options, depend on the set values of Pmin and Pmax in the pages "P07" and "P08"

SETTING SAMPLES

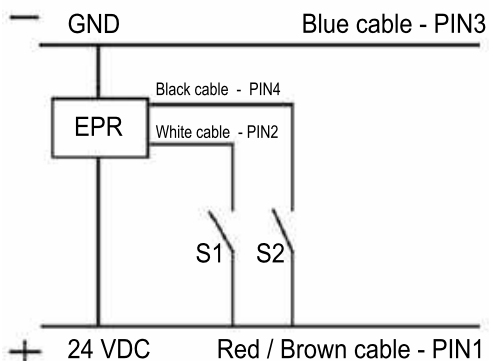
How to set the minimum outlet pressure with the locked keyboard:

| Phase | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-------------|--|--|------------------|---|--|---|---|---------------------------|--|
| Button | Keyboard locked | SET 3 sec | ▲ 0 ▼ | SET | ▲ 0 ▼ | SET | ▲ 0 ▼ | SET | |
| Display | 0 b | P00 | P07 | P07 | 0000 | 0000 | P07 | P00 | 0 b |
| Description | Measurement of the pressure expressed in "bar" | Unlock the keyboard and I see the first page of menu | Scroll to page 7 | Go into the settings of page 7. The display flashes 3 times | Choose the value of the minimum pressure | Set the chosen value. The display flashes three times | Go back to page 7 of the menu where it's possible to select other pages | Return to the main screen | Measurement of the pressure expressed in "bar" |

How to set the the control signal from 0÷5 to 0÷10 VDC, with the locked keyboard:

| Phase | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-------------|--|--|------------------|---|--|--|---|---------------------------|--|
| Button | Keyboard locked | SET 3 sec | ▲ 0 ▼ | SET | ▲ 0 ▼ | SET | ▲ 0 ▼ | SET | |
| Display | 0 P | P00 | P03 | P03 | F 2 | F 1 | P03 | P00 | 0 P |
| Description | Measurement of the pressure expressed in "psi" | Unlock the keyboard and I see the first page of menu | Scroll to page 3 | Go into the settings of page 3. The display flashes 3 times | Scroll among the options: "set the control signal" | Set the chosen value (F1). The display flashes three times | Go back to page 3 of the menu where it's possible to select other pages | Return to the main screen | Measurement of the pressure expressed in "psi" |

VALVE WITH FOUR CONTROL SIGNALS



This valve model uses the the status "ON / OFF" of one or two switches to create up to four combinations to which corresponds a certain output pressure, configured by the user. Below there's a table showing the obtainable combinations.

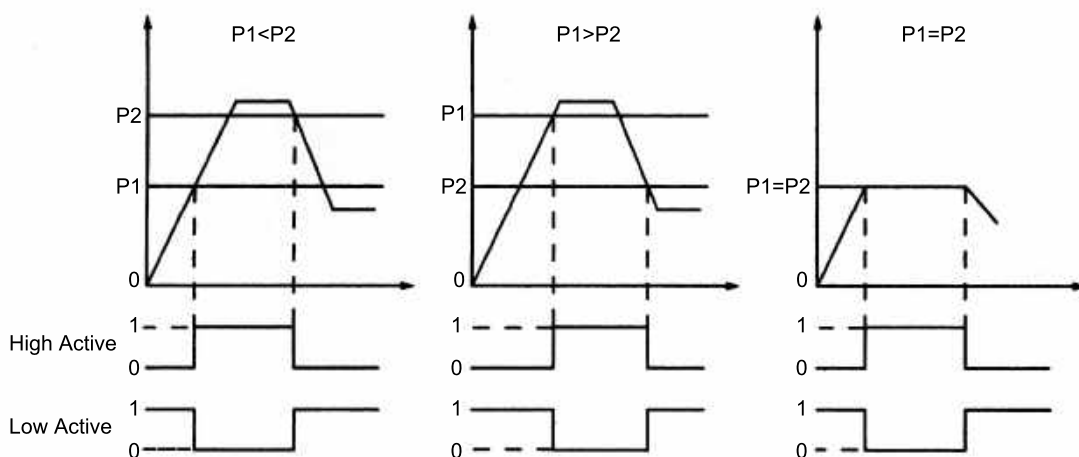
In this valve model "F3" option, of the menu page "P03", is already set as standard and is not necessary to change it in the other two options "F1" or "F2". If this option is mistakenly set, the display notifies an error "ERR1" and the valve doesn't work until you re-set the option to "F3".

It's possible configure the four output pressures "P1, P2, P3, P4" from the menu page "P06".

From an electrical point of view, you have to connect one or two switches of type "ON / OFF" in series with the respective black or white cables and the "+ 24VDC", as shown in the diagram to the left.

| Combinations | | | | |
|--------------|------|-------|-------|-------|
| Switch "S1" | Open | Close | Open | Close |
| Switch "S2" | Open | Open | Close | Close |
| Pressure | P1 | P2 | P3 | P4 |

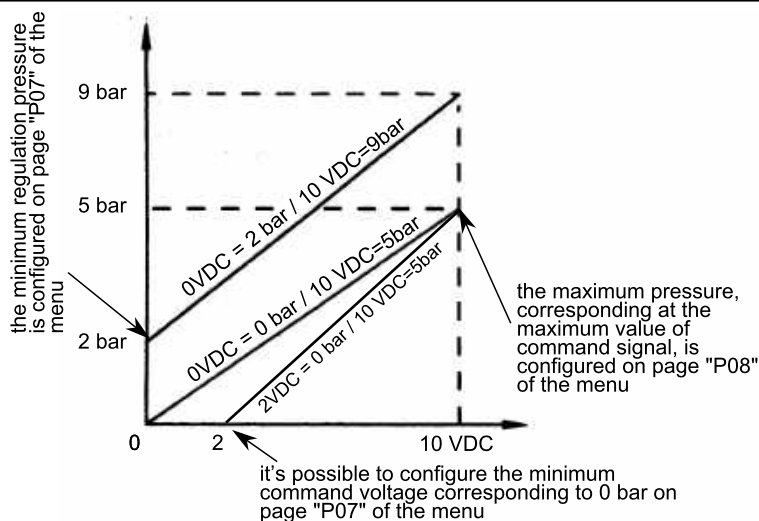
VALVE WITH "LOW" / "HIGH" FEEDBACK SIGNAL



This type of output signal feeds (or doesn't feed) the PIN4 with 24VDC depending on the type "High" or "Low" and on configured pressures.

In "P04" and "P05" menu pages you can respectively set "P1" and "P2" pressures to manage the output signal as shown in the diagrams to the left.

CONTROL SIGNAL - PRESSURE SETTING - MINIMUM COMMAND VOLTAGE SETTING



It's possible to configure the minimum regulation pressure on page "P07". It's also possible to change the minimum control voltage on the same page "P07", in models with voltage command:

- to configure the minimum pressure at the outlet of the regulator (corresponding to the minimum value of the command signal), it's necessary to set the pressure value equal to or greater than 0;
- to configure the minimum voltage of the command signal (corresponding to 0 bar), the voltage value must be set with a negative value between "-01" and "-20" corresponding to 0.1 ÷ 2.0 VDC.

For example, to distribute the 0 ÷ 9 bar regulation on a 1.5 ÷ 10 VDC command signal, the value on page "P07" must be set equal to "-15".

On page "P08" of the menu it's possible to configure the maximum pressure at the valve outlet which corresponds to the maximum value of the command signal. These options are not configurable in the version with four command signals.

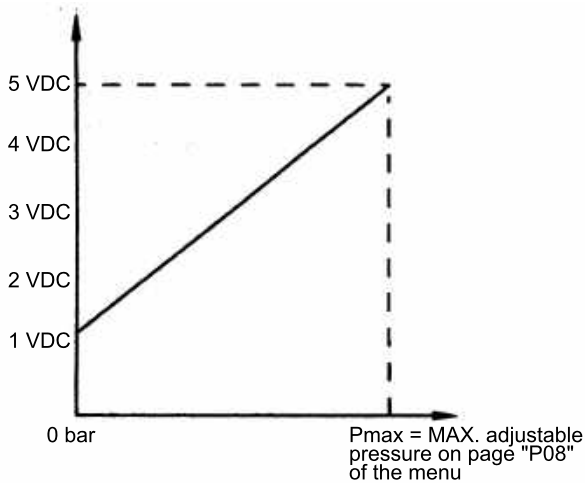
Example: if in the valve with 0 ÷ 5VDC command signal, the minimum pressure is set to 0 bar and the maximum pressure is set to 5 bars, we will have:

- Command = 0 VDC -> 0 bar (minimum pressure)
- Command = 1 VDC -> 1 bar
- [...]
- Command = 5 VDC -> 5 bar (maximum pressure)

Examples

The graph above shows two configurations on Pmin and Pmax performed on a valve with 0 ÷ 10 VDC command signal and one configuration performed on a valve with 2 ÷ 10 VDC command signal.

FEEDBACK SIGNAL



The feedback (or output) signal can be expressed in voltage or current, and it changes depending on the changing of the pressure detected downstream of the regulator. The minimum value of the feedback signal corresponds to the pressure of 0 bar and the maximum one corresponds to the maximum adjustable pressure set by the user in the "P08" page of the menu.

EXAMPLE: if in the valve with feedback signal from 1÷5VDC, you set the minimum pressure at 0 bar and the maximum pressure at 6 bar, we have:

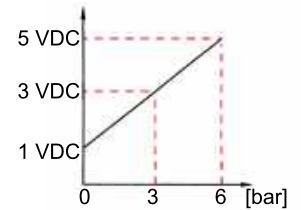
Feedback = 1 VDC -> 0 bar

....

Feedback = 3 VDC -> 3 bar

...

Feedback = 5 VDC -> 6 bar



EXAMPLE: if in the valve with feedback signal from 1÷5VDC, you set the minimum pressure at 2 bar and the maximum pressure at 7 bar, we have:

Feedback = 2,14 VDC -> 2 bar

[...]

Feedback = 2,71 VDC -> 3 bar

[...]

Feedback = 5 VDC -> 7 bar

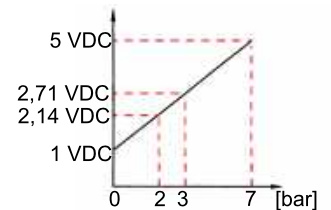


TABLE OF ERROR CODES

The display could show a message like "Err 1" that indicates an error code corresponding to a possible problem.

Below the list of errors and their descriptions:

| Error code | Error description |
|------------|---|
| Err 1 | Control signal over range |
| Err 2 | Valve can not reach the target set pressure |
| Err 3 | EEPROM memory reading/writing error |
| Err 4 | Flash memory reading/writing error; |
| Err 5 | EEPROM & flash memory reading/writing error |

- If the valve control signal is 0÷10 VDC and given voltage is 10.5 VDC, the display will show the error "Err 1". Adjust the control voltage containing it in the indicated range.

- If the valve control signal is 4÷20 mA DC and the given current is <4 or >20 mA, the display will show the error "Err 1". Adjust the control current inside the mentioned range.

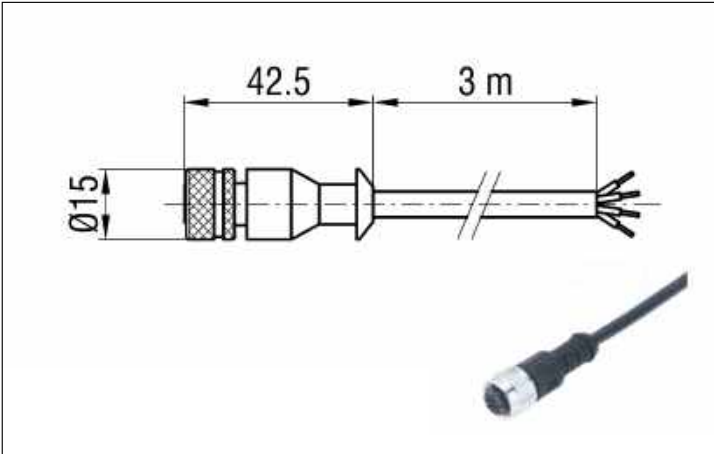
- If the display shows the error "Err 2", the valve stops working for 10 seconds, and then it tries again to reach the set pressure. In this case, make sure there is pressure in power and that is at least +1 bar than the pressure to be adjusted.

- When the display shows the error "Err 5", the valve stops working.

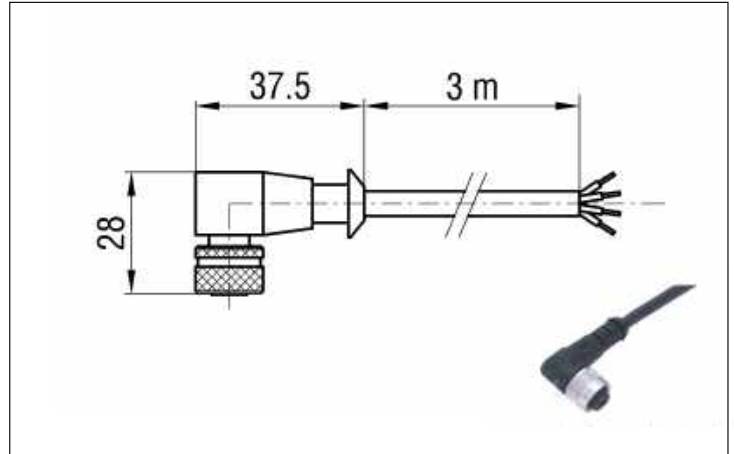
- When the errors "Err 3", "Err 4", "Err 5" appear, please contact our sales office.

CONNECTORS

M12 CONNECTOR WITH IN-LINE CABLE - M12L

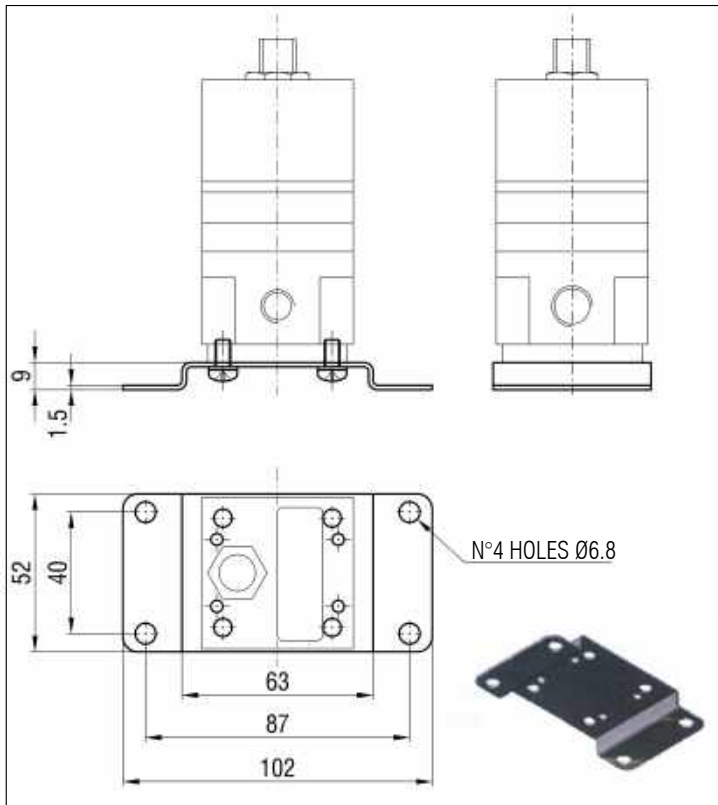


M12 CONNECTOR WITH 90° CABLE - M12G



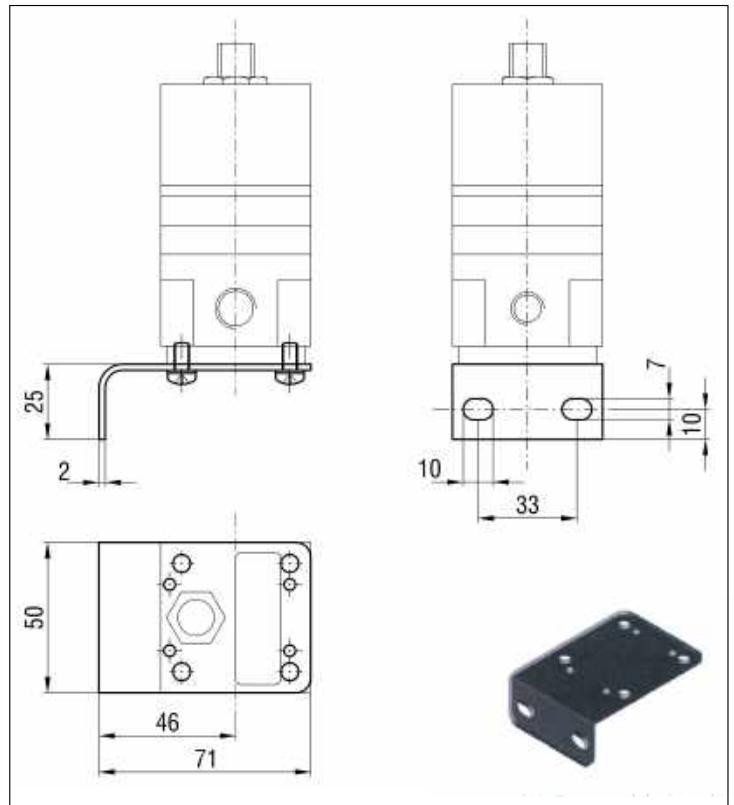
ACCESSORIES

HORIZONTAL FLANGE - FO



Supplied complete with screws

90° FLANGE - F90



Supplied complete with screws



SERIES **EPR**



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