

Sentronic^D

Digital Electronic Pressure Regulator

Installation Manual



numatics[®]


EMERSON[™]
Industrial Automation

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Sentronic^D

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CAUTION

OBSERVE PRECAUTIONS
FOR HANDLING

ELECTROSTATIC SENSITIVE DEVICES

This product contains electronic components sensitive to electrostatic discharge. An electrostatic discharge generated by a person or object coming in contact with the electrical components can damage or destroy the product. To avoid the risk of electrostatic discharge, please observe the handling precautions and recommendations contained in standard EN 100015-1. Do not connect or disconnect the device while it is energised.



CAUTION! Dangerous operating conditions may occur when using the programming interface on the valve as the valve may possibly not react to the analog setpoint any more. Provide for protection against uncontrolled movement of equipment when putting the valve into operation and before making any modifications to the valve settings.

DECLARATION OF INCORPORATION

according to Machinery Directive 89/392/EEC, Annex II B

We herewith declare that the version of the product described in this installation manual is intended to be incorporated into or assembled with other machinery and that it must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of Council Directive 89/392/EEC, Annex IIB.

Handling, assembly and putting into service and all settings and adjustments must be done by qualified, authorised personnel only.



This product complies with the essential requirements of the EMC Directive 89/336/EEC and its amendments. It is **CE**-approved. A separate Declaration of Conformity is available on request. A separate Declaration of Incorporation relating to the EU Directive 89/392/EEC Annex II B is available on request. Please provide ordering code and serial numbers of products concerned.

NOTICE

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1. Description

SENTRONIC^D is a new generation of electronic pressure regulators designed on the basis of an enhanced digital control.

SENTRONIC^D stands for:

- Digital communication and control
- Display (incorporated)
- Direct operated valve
- Dynamic behaviour (high speed)

Digital control offers many advantages during installation and start-up of the **SENTRONIC^D** valve and extended possibilities to adapt it to various applications.

The four following standard versions are available:

- With display and pushbuttons: Pressure display, manual pressure setting and diagnostic LEDs.
- Without display and pushbuttons: The economic solution.
- Nominal diameter DN 4mm: with a flow rate of 470 l/min (SRA).
- Nominal diameter DN 8mm: with a flow rate of 1300 l/min (SRA).

Various pneumatic connections: integral connections, back panel connection and subbase mount.

- All pressure and exhaust ports are the same size, which allows for short response times when the pressure is increased or decreased.
- Digital pressure control in a closed loop: An internal pressure sensor compares the setpoint at the inlet to the outlet pressure. The outlet pressure is adjusted in real time.
- The control parameters can be changed with the additional software called *DaS*. The **DaS program** (Data Acquisition Software) ensures that all parameters used by the valve can be changed. This flexibility allows the valve to be adapted to the application and enables the optimization of its response time, overshoot and precision.
- After having set the optimum parameters you can save them in a project file for your personal use or send them to our Product Support for future production.

1.1 How to Order

608 6 C 0 1 1 1

Nominal diameter
608 = DN 4mm
609 = DN 8mm

Version (ports), body
0 = G 1/8 (DN4), G 1/4 (DN 8)
1 = G 1/4 (DN 4), G 3/8 (DN 8)
2 = Manifold version¹⁾
G 1/8 (DN 4), G 1/4 (DN 8)
6 = NPT 1/4 (DN 4), NPT 3/8 (DN 8)

Pressure range

Maximum pressure		Maximum pressure	
A = 0 - 50 psi	90 psi	1 = 0 - 10 bar	13 bar
B = 0 -100 psi	140 psi	2 = 0 - 12 bar	15 bar
C = 0 -150 psi	190 psi	3 = 0 - 3 bar	6 bar
		4 = 0 - 1 bar	4 bar
		5 = 0 - 15 bar	18 bar
		6 = 0 - 6 bar	9 bar

Notes:
¹⁾ See Accessories section for required manifold sub-base
²⁾ Feedback input is needed for dual loop units

Options
A00 = Dual loop control
211 = Oxygen clean

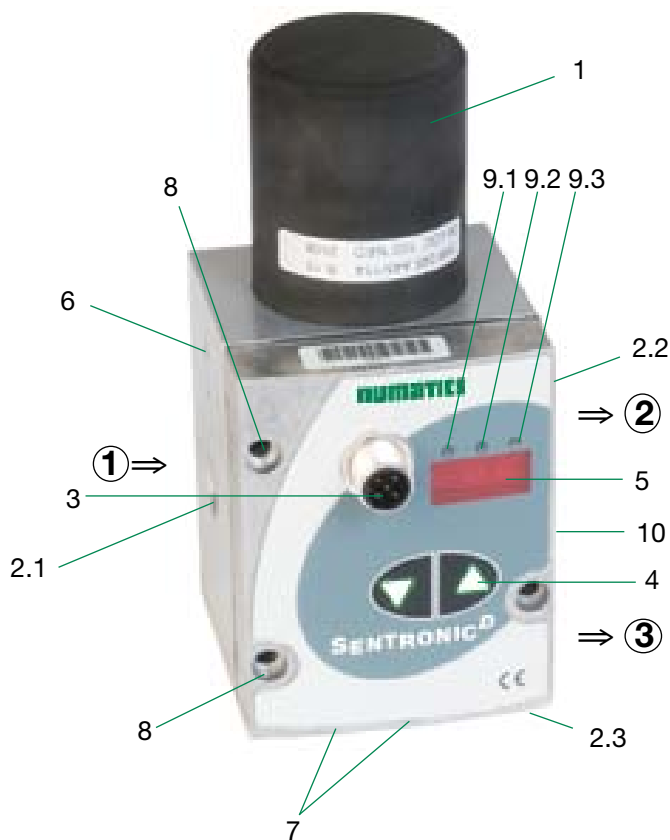
Display
0 = without display
1 = with display

Digital output
1 = Pressure switch output
PNP ± 5 %

Feedback
1 = Feedback output 0 -10 V
2 = Feedback output 0 - 20 mA
3 = Feedback output 4 - 20 mA
4 = Feedback input 0 ... 10 Volt²⁾
5 = Feedback input 0 ... 20 mA²⁾
6 = Feedback input 4 ... 20 mA²⁾

Command signal
0 = 0 - 10 V
1 = 0 - 20 mA
2 = 4 - 20 mA

1.2 Operating Elements



- 1 Proportional solenoid coil
- 2.1 Pressure supply
- 2.2 Pressure outlet
- 2.3 Exhaust
- 3 Power supply, M12 connector
- 4 Operator buttons
- 5 3-digit display of outlet pressure
- 6 Ground connection, M4
- 7 Threaded mounting holes M4/6 mm
- 8 Mounting holes for M4 screws
- 9.1 Green LED
OFF: Setpoint \neq feedback
ON: Setpoint = feedback
Flashing: Overtemperature
- 9.2 Yellow LED
OFF: Normal
ON: Manual operation
Flashing: AUTOSAFE enabled
- 9.3 Red LED
OFF: Normal
ON: Low voltage
Flashing: Overvoltage
- 10 Serial communication (PC connection)

1.3 Manual Pressure Regulation (Hand)

After an interruption in the power supply, press both arrow buttons located beneath the display during power up to switch to the manual mode. The operating mode is indicated by the letters "H n d" in the display.

The "H n d" display disappears when the arrow buttons are released.

Press the left arrow button or DOWN arrow to reduce the outlet pressure, press the right arrow button or UP arrow to increase the outlet pressure. The yellow LED is on permanently during manual mode.

Exit this operating mode by pressing both arrow buttons simultaneously or by turning off the power supply for a short time.

1.4 Operating Modes

Shut-off:

If the command signal falls below 0.5 %, the coil current is switched off and the valve is fully exhausted.

Overtemperature:

If the temperature of the internal control electronics exceeds 100°C, the operating mode is switched to AUTOSAFE and the green LED starts to flash.

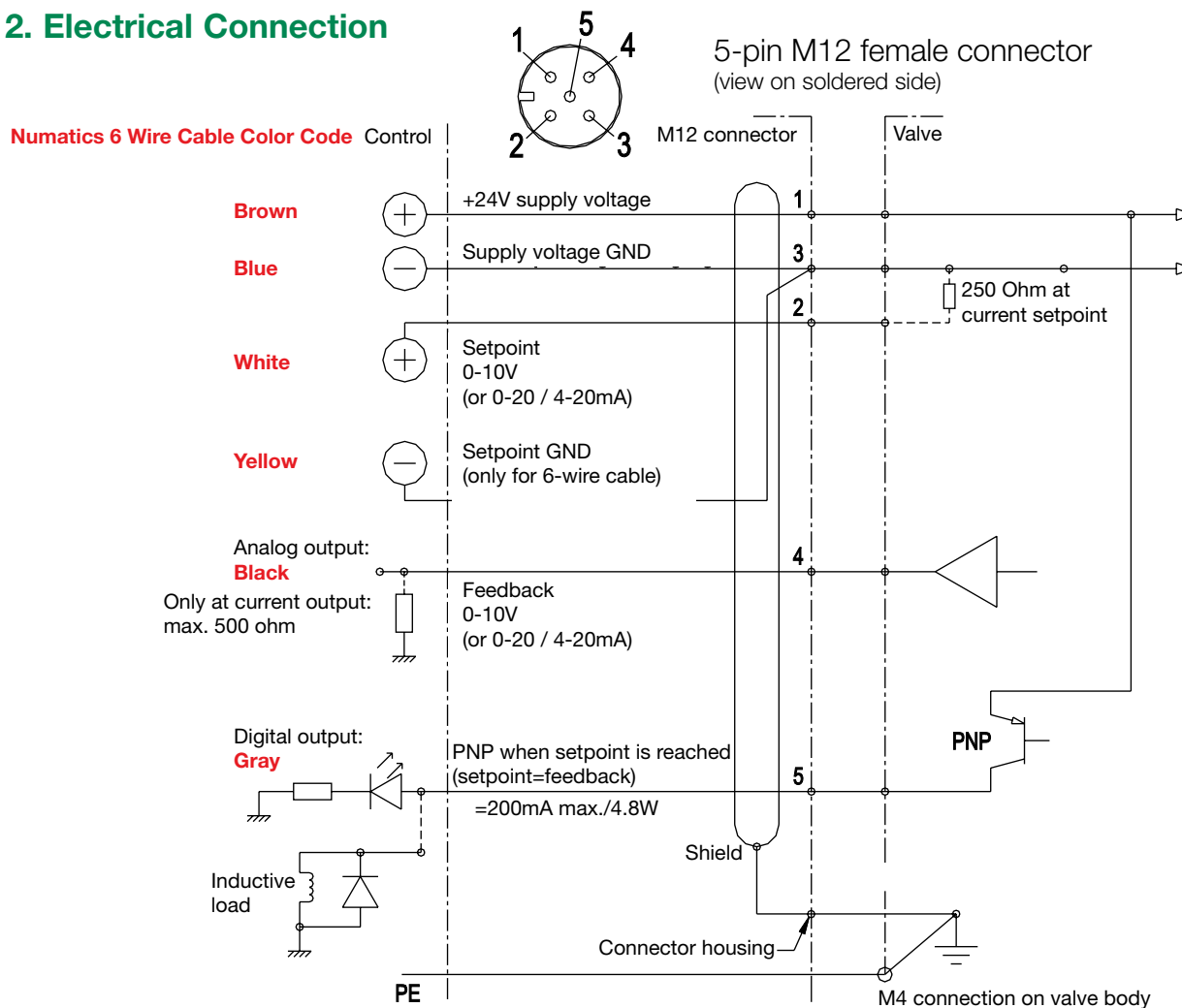
Undervoltage / overvoltage:

If the supply voltage is less than 20 V or more than 30 V, the coil current is switched off and the valve is fully exhausted. The red LED lights up constantly to indicate undervoltage or flashes to indicate overvoltage.

Autosafe:

If the coil current exceeds 1000 mA (DN8) or 560 mA (DN4) for more than 20 seconds, the output current is limited to max. 70% every 4 seconds to prevent the valve from overheating. The yellow LED flashes.

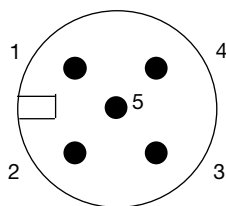
2. Electrical Connection



- 1) The valve must only be supplied with 24V DC at a tolerance of +15%/-10% and a max. ripple of 10% (no supply via diode bridge). Overvoltage or a ripple rate exceeding these tolerances can damage the electronics.
- 2) The max. current at the digital output is 200 mA/4.8W (PNP output). The output is protected against short circuit and overload.
- 3) If a relay (inductive load) is connected to the digital output, a freewheel diode or a varistor must be used.
- 4) A shielded cable must be used for protection against interference and EMC.
- 5) The valve body must be grounded with the earthing terminal PE (dia. M4)

Connector Pin Out

Command signal: View on soldered side of female connector



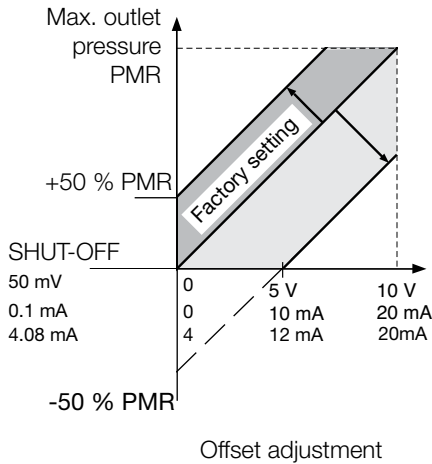
PIN	Description
1	+24 VDC Supply
2	Command Signal
3	+0 VDC Common (Supply)
	+0 VDC Common (Command Signal)*
4	Analog output (feedback)
5	Digital output (pressure switch)
Body	EMC shield

*A 6-wire cable with separate common for the command signal is used for cable lengths over 2 m to minimize the voltage drop for the command signal.

3. Analog Setpoint - Outlet Pressure

Setpoint offset

The pressure setpoint zero can be changed via the DaS program. Switch to "Custom" in the "Setpoint setting" section. The zero range is max. $\pm 50\%$.



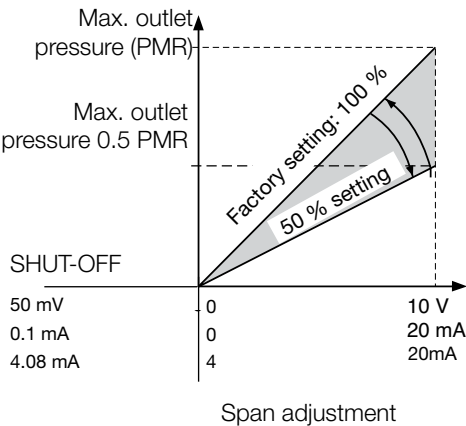
Max. Outlet Pressure PMR	Max. Inlet Pressure
50 psi	90 psi
100 psi	140 psi
150 psi	190 psi
1 bar	4 bar
3 bar	6 bar
6 bar	9 bar
10 bar	13 bar
12 bar	15 bar
15 bar	18 bar

CAUTION: Outlet pressures above the maximum outlet pressure (PMR) are not controlled by the valve, i.e. the max. outlet pressure is limited to the PMR.

In order to avoid damaging the sensor, **the supply pressure must always be less than the maximum inlet pressure defined above** (see table).

Setpoint span

The span of the output pressure can be changed via the DaS program. Switch to "Custom" in the "Setpoint setting" section. The span is between 10 and 100%.



The span can be set to max. 100% of the maximum outlet pressure (PMR). It can only be decreased.

4. Pneumatic Connection

The air flow is from port 1 to port 2.



Inch screw connections (pipe threads) must be used.

Each screw connections must be lined with a fitting synthetic sealing disc.

Do not use Teflon sealing tape or hemp as they may get inside the valve and damage it.

Use an appropriate silencer at port (3). The exhaust time may vary depending on the type of silencer used.

The diameter of the pneumatic lines must be adjusted to the nominal diameter of the valve. The diameter of outlet line (2) must be larger or equal to that of inlet line (1).

The supply pressure must always be less than the value given in the table in section 3 and must always be above the desired outlet pressure.

5. Factory Settings for a Standard Valve

- 0 psi outlet pressure at a setpoint of 0 V / 0 mA / 4 mA.
- Span: 50 psi device: = 50 psi at 10 V / 20 mA 3 bar device: = 3 bar at 10 V / 20 mA
 100 psi device: = 100 psi at 10 V / 20 mA 6 bar device: = 6 bar at 10 V / 20 mA
 150 psi device: = 150 psi at 10 V / 20 mA 10 bar device: = 10 bar at 10 V / 20 mA
- Minimum hysteresis.
- The control parameters, setpoint offset, setpoint span and window size of the digital output (pressure switch) are factory-programmed.

Parameter set: factory settings

Offset: 0 %

Span: 100 %

Ramp: no ramp

Shut-off: ON; the valve is exhausted at a command signal below 0.5%

Controller structure: PID

Proportional gain: 4.0

Integration time: 0.1 sec

Derivation time: 8 msec

6 Field-Programmable Settings

Display/Pressure Readings

The actual outlet pressure is displayed during normal operation. See "Parameters/Display" section. Other displays:

Hnd indicates that the Manual mode has been selected.

SOF Internal error of pressure control. Replace valve or contact our Product Support.

Err Internal overflow.

AEr Autozero overflow. Contact our Product Support.

Push Buttons

To enter the Manual mode, press and hold both pushbuttons simultaneously during power up. "Hnd" appears in the display.

Use the UP button to increase the outlet pressure and the DOWN button to decrease it. The actual outlet pressure is displayed.

Quick presses on the buttons allow you to make slight changes in the pressure rating.

Longer presses allow you to make quick pressure changes.

Press both pushbuttons simultaneously to exit the manual mode.

7. Technical Characteristics

Construction

Directly operated valve

Body: Aluminium

Internal parts: POM

Seals: NBR (nitrile), FPM (fluoroelastomer)

Installation

Assembly position: any; for optimum performance vertically with solenoid at the top.

Air: filtered at 50 µm, free of condensate

Connections: Hemp or Teflon tape must not be used.

Electrical connection: Select a wire section that will give a voltage drop of less than 2 volts at 2A.

7.1 Fluid Characteristics

Fluids:

Air or neutral gas, filtered at 50 µm, free of condensate, lubricated or not

Ports:

1/8-1/4-3/8 NPT or GTap, see section 3

Max. Inlet Pressure:

see section 3

Temperature / Fluid:

32°F - 140°F (0°C - 60°C)

Temperature / Ambient:

32°F - 122°F (0°C - 50°C)

Hysteresis:

<1% of span

Linearity:

<0.5% of span

Repeatability:

<0.5% of span

Minimum Setpoint:

100mV (0.2 mA/4.2mA) with shut-off function

Minimum Outlet Pressure:

<1% of span

7.2 Specifications

Nominal diameter dn (mm)	Supply voltage (stabilised)*	Max. Power (W)	Max. Current (mA)	Insulation Class	Degree of Protection	Flow		Electrical Connection
						Kv Nm³/h	l/min (SRA)	
4	24 V = +15%/-10%	21	850	H	IP 65	0.25	470	5-pin female M12 connector
8	24 V = +15%/-10%	40	1650	H	IP 65	0.7	1300	5-pin female M12 connector

* Residual ripple: 10 %

Test conditions according to ISO 8778: temperature: 20 °C, relative inlet pressure: 6 bar, relative outlet pressure: 5 bar

Command signal: 0 ... 10 V (100 kOhm input resistance)

0 ... 20 mA / 4 ... 20 mA (250 Ohm input resistance)

Feedback output: 0 ... 10 V (max. 10 mA), short-circuit protected

0 ... 20 mA / 4 ... 20 mA (max. 24 VDC)

Digital output: pnp; open collector; max. 200 mA/4.8W, short-circuit protected







HIGH (24 VDC) if feedback=setpoint

LOW (open) if feedback≠setpoint

Overvoltage: Shut-off at a voltage level higher than 30 volts (+10%).

Low voltage: Shut-off at a voltage level lower than 19.5 volts (-10 %).

8. Accessories

	5 Pin 12mm FEMALE Straight Field Attachable Connectors		Model Number
	PG 9 Cable Gland		TC05F20000000000
	5 Pin 12mm FEMALE 90 DEGREE Field Attachable Connectors		
	PG 9 Cable Gland		TD05F20000000000
	Micro Female 5 Pole Straight 6 Wire 22 AWG, Shielded		
	3 Meter		TC0503MMS000671Y
	5 Meter		TC0505MMS000671Y
	Micro Female 5 Pole 90 Degree 6 Wire 22 AWG Euro Color Code, Shielded		
	3 Meter		TD0503MMS000671Y
	5 Meter		TD0505MMS000671Y
	Micro F/M 4 Pole Straight 22 AWG Euro Color Code		
	Unshielded	Shielded	
	2 Meter - TC0403MIETA04000	3 Meter - TC0403MMETA04000	
	5 Meter - TC0405MIETA04000	5 Meter - TC0405MMETA04000	
	Micro F 90°/M Straight 22 AWG Euro Color Code		
	Unshielded	Shielded	
	2 Meter - TD0403MIETA04000	3 Meter - TD0403MMETA04000	
	5 Meter - TD0405MIETA04000	5 Meter - TD0405MMETA04000	
Manifold		Model Number	
Manifold for 608 (DN 4mm) with G3/8; common supply and exhaust ¹⁾		35500558	
Manifold for 609 (DN 8mm) with G1/2; common supply and exhaust ¹⁾		35500559	
PC Software & Cable Connectors		Model Number	
DaS Light: Data Acquisition Software for SENTRONIC ^D - basic parameters - free download at Numatics.com		99100110	
DaS Expert: Data Acquisition Software for SENTRONIC ^D - full parameters - CD-ROM		99100111	
RS 232 cable converter; 2m cable with 9-pin Sub-D (plug connector)		88100732	
RS 232 cable converter; 2m cable with 9-pin Sub-D (screw connector)		833-993708	

¹⁾ Manifold ships with required hardware and gaskets for connecting manifolds together.

9. Maintenance and Care

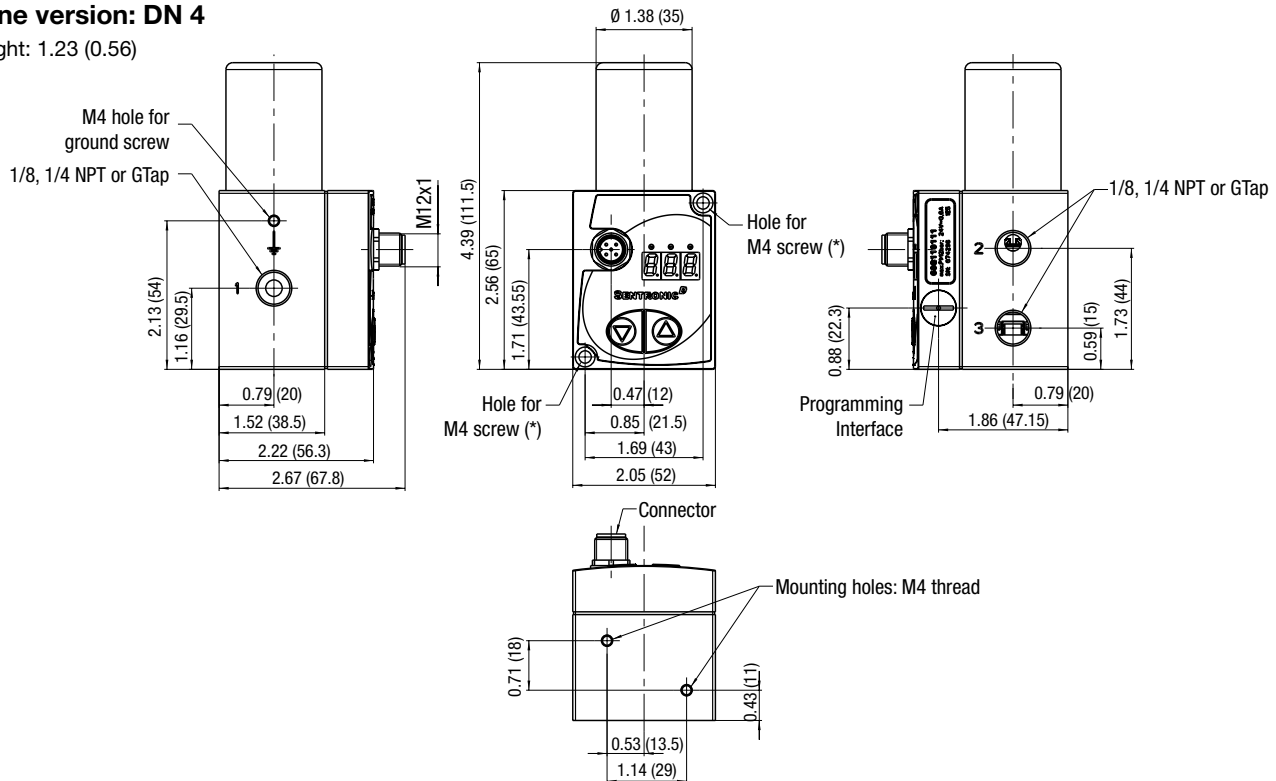
No special maintenance or care required.

10. Dimensions in inches (mm), Weight in lbs (kg)

Dimensions: Inches (mm), Weight in lbs (kg)

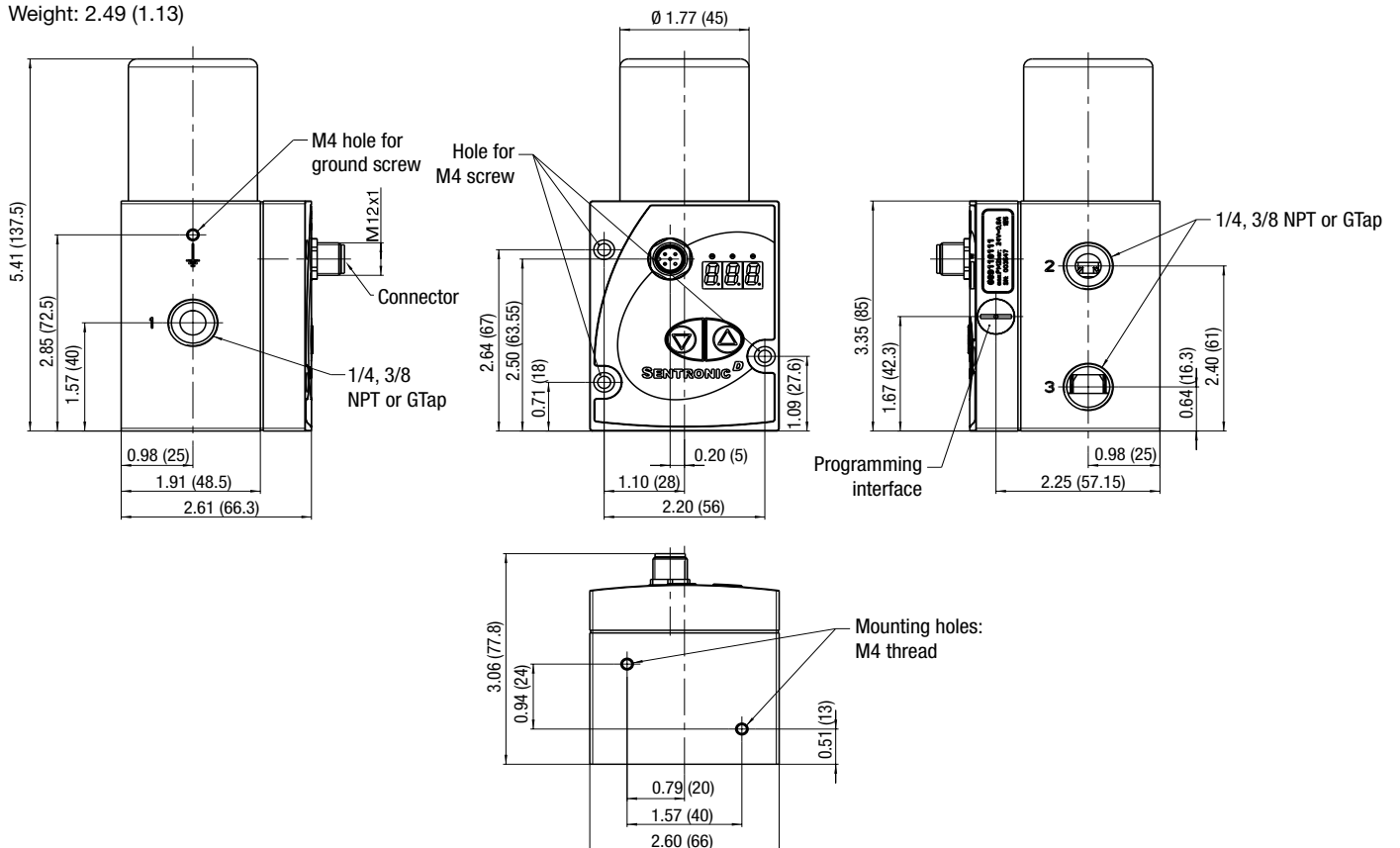
Inline version: DN 4

Weight: 1.23 (0.56)



Inline version: DN 8

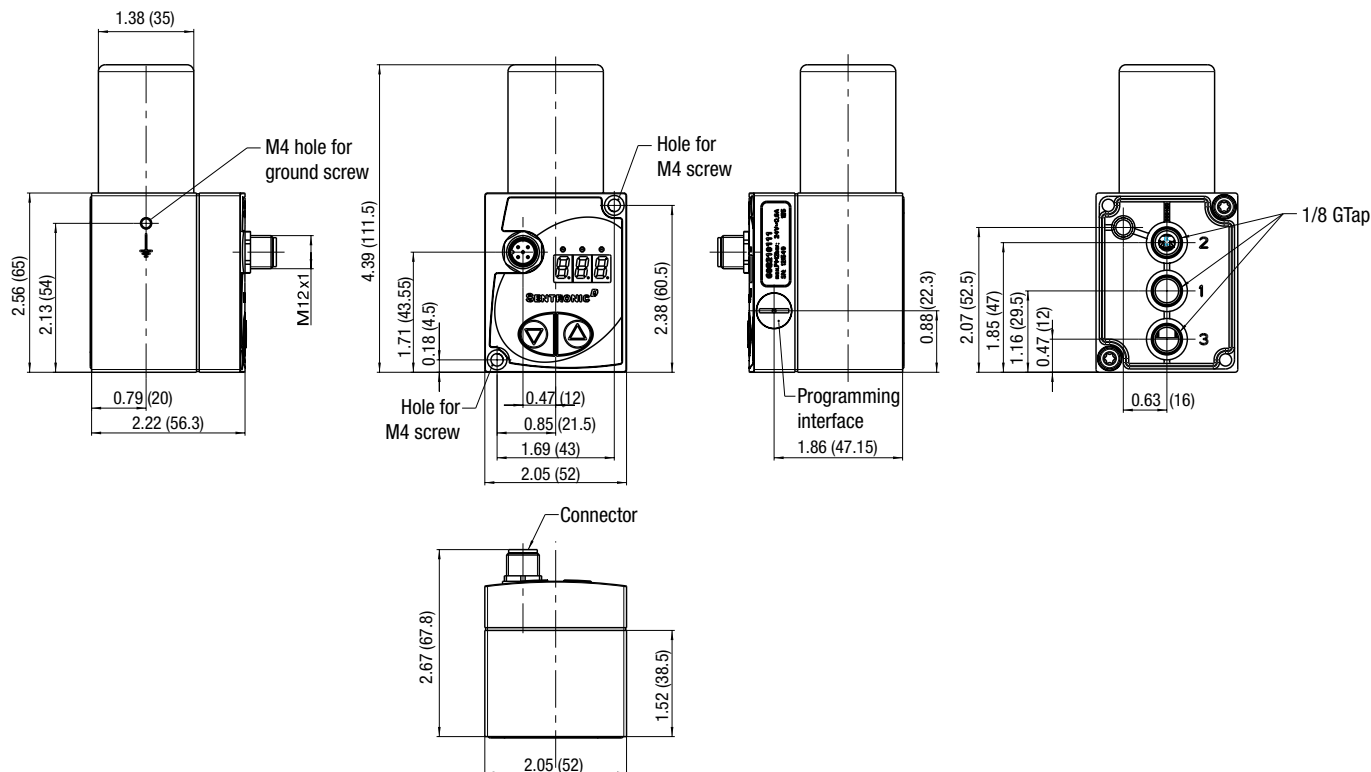
Weight: 2.49 (1.13)



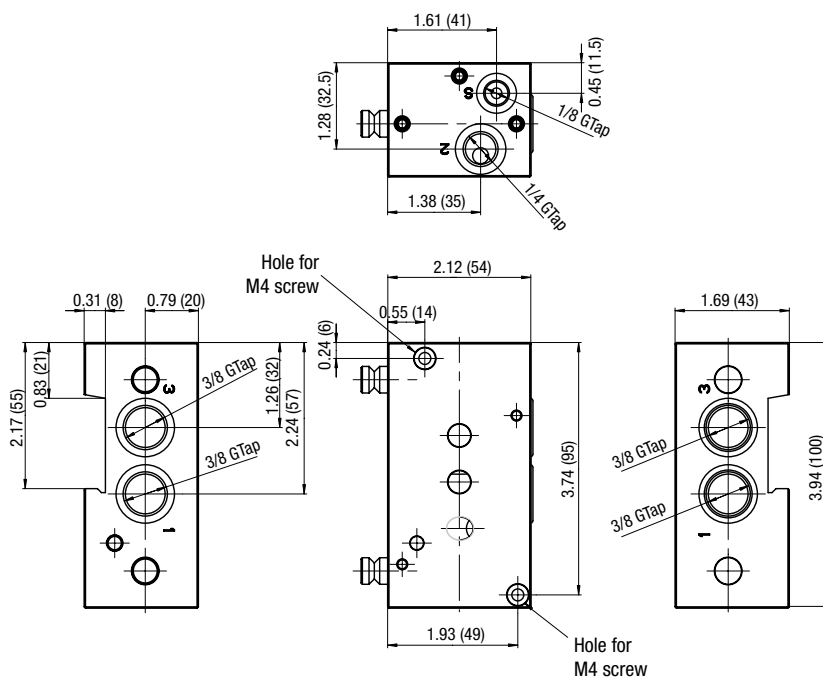
Dimensions: Inches (mm), Weight in lbs (kg)

Manifold version: DN 4

Weight: 1.23 (0.56)



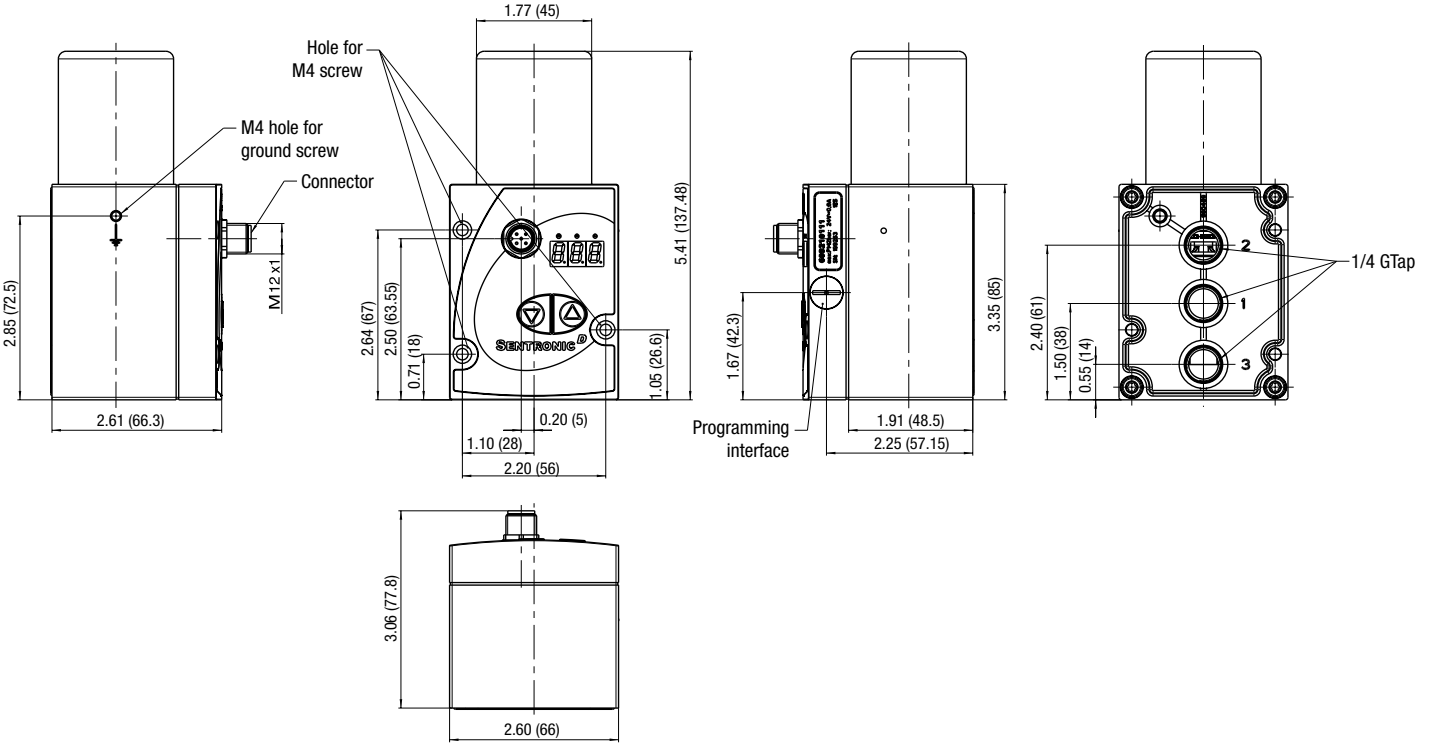
Manifold: DN 4



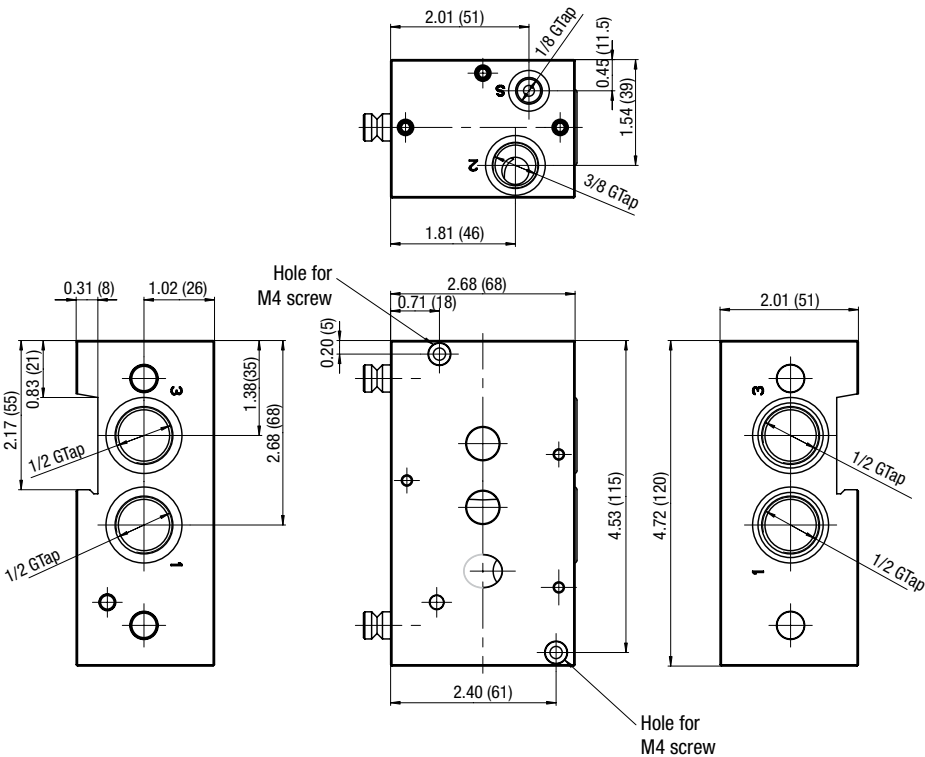
Dimensions: Inches (mm), Weight in lbs (kg)

Manifold version: DN 8

Weight: 2.49 (1.13)



Manifold: DN 8





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