EQUILIBAR®
PRECISION FLUID CONTROL

EPC

High Resolution Electronic Pressure Controller

INSTALLATION & OPERATING INSTRUCTIONS

The EPC is a closed-loop pressure control valve system designed to maintain a steady and repeatable downstream pressure as demand or process changes occur. EPC comes with an IP65 rated enclosure for manufacturing and industrial environments.



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SAFETY PRECAUTIONS

Please read all of the following Safety Precautions before installing or operating this equipment or accessories. To confirm safety, be sure to observe 'ISO 4414: Pneumatic Fluid Power - General rules relating to systems' and other safety practices. Improper operation could result in serious injury to persons or loss of life!

1. OVERPRESSURIZATION

The EPC electronic pressure regulator is not a safety device and must not be relied upon to prevent dangerously high pressures. Where danger from overpressurization exists then an additional valve that is designed and marketed as a safety pressure relief valve must be used to protect the EPC against excess supply pressure and to protect the system should the EPC produce excess pressure on its outlet.

2. PRODUCT COMPATIBILITY

Equilibar EPC and accessories are for use in industrial pneumatic applications with clean compressed air or inert gas media. The compatibility of the equipment is the responsibility of the end user. Product performance and safety are the responsibility of the person who determined the compatibility of the system. Also, this person is responsible for continuously reviewing the suitability of the products specified for the system, referencing the latest catalog, installation manual, Safety Precautions and all materials related to the product.

3. EMERGENCY SHUTOFF

Equilibar products cannot be used as an emergency shutoff. A redundant safety system should be installed in the system to prevent serious injury or loss of life.

4. EXPLOSIVE ATMOSPHERES

The EPC Series should not be used where harmful, corrosive or explosive materials or gases are present. Unless specifically certified and indicated, Equilibar products cannot be used with flammable gases or in hazardous environments.

5. COMPRESSED GAS QUALITY

Clean, dry air is not required for this product. However, a 40 micron particulate filter is recommended to prevent solid contamination from entering the product. Only neutral gases should be used.

6. TEMPERATURE

Products should be used with a media and ambient environment inside of the specified temperature range of 32°F to 158°F. Consult factory for expanded temperature ranges.

7. OPERATION

Only trained and certified personnel should operate electronic and pneumatic machinery and equipment. Electronics and pneumatics are very dangerous when handled incorrectly. All industry standard safety guidelines should be observed.

8. SERVICE AND MAINTENANCE

Service and maintenance of machinery and equipment should only be handled by trained and experienced operators. Inspection should only be performed after safety has been confirmed. Ensure all supply pressure has been exhausted and residual energy (compressed gas, springs, gravity, etc.) has been released in the entire system prior to removing equipment for service or maintenance. Be sure to employ lock out / tag out procedures.

9. PNEUMATIC CONNECTION

All pipes, pneumatic hose and tubing should be free of all contamination, debris and chips prior to installation. Flush pipes with compressed air to remove any loose particles. Install a filter before the inlet with at least 40-micron filtration. The EPC is extremely sensitive to dirt and debris.

10. THREAD SEALANT

To prevent product contamination, thread tape is not recommended. Instead, a non- migrating thread sealant is recommended for installation. Preferred sealant for 1/8" NPT port is Loctite 545 or face seal. Apply sealant two threads from the end of the pipe thread to prevent contamination.

11. ELECTRICAL CONNECTIONS

To prevent electronic damage, all electrical specifications should be reviewed and all electrical connections should be verified prior to operation.

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EPC Electronic Pressure Controller

INSTALLATION AND MAINTENANCE INSTRUCTIONS

OPERATIONAL DESCRIPTION

The EPC is a high resolution electronic pressure regulator. It provides a regulated output pressure that is proportional to an electrical command signal input. The EPC is available in a wide range of calibrated pressure ranges 0 through 150 psig (10 bar(g)). The EPC is available in either 0 -10 VDC or 4-20 mA analog signal types or 3.3V serial digital.

The EPC is a complete closed loop control valve consisting of two internal solenoid valves, a manifold, an electronic control circuit board, and a pressure transducer all contained in a protective IP65 rated housing. Pressure is controlled by the use of two solenoid valves. One valve functions as inlet control and acts to allow supply media into the system to increase the controlled pressure. The other solenoid valve acts as the exhaust and will decrease the controlled pressure by venting to atmosphere. The inlet solenoid valve operates in a proportional manner to the current supplied by the EPC's electronic control circuit. This variable orifice effect allows precise control of pressure at low flow conditions and avoids the digital steps of traditional ON/OFF solenoids. The ability to vary the inlet solenoid valve orifice opening in an analog fashion allows the EPC to control pressure with extremely high resolution. The exhaust solenoid valve also opens proportional to the control circuit current output. This infinitely variable response allows the pressure to be decreased seamlessly in your system.

The regulated pressure output is measured by a pressure transducer internal to the EPC. This pressure transducer provides a feedback signal to the EPC's electronic control circuit. The control circuit compares the internal sensor feedback signal to the command signal input. Any difference between the two signals causes the appropriate solenoid valve to open, allowing flow in or out of the system. Accurate pressure is maintained by controlling these two valves.

The EPC is a relatively low flow regulator. This makes it a great choice any time low flow rates or small volumes require precise pressure control. The EPC can be used to provide the pilot pressure signal to the dome of an Equilibar® back pressure regulator allowing electronic control of back pressure in line sizes from 1/8 inch through 4 inch by pilot operating the appropriately sized regulator.



SPECIFICATIONS

ELECTRICAL	
SUPPLY VOLTAGE	15-24 VDC
SUPPLY CURRENT	<250 mA max.
COMMAND SIGNAL OPTIONS	0-10 VDC 4-20 mA (differential) 3.3 V Serial Digital
PERFORMANCE	
ACCURACY	<±0.25% of Full Scale
RESOLUTION	≤ 5 mV
LINEARITY	±0.05% BFSL
MAX HYSTERESIS	±0.05% of Full Scale
RESPONSE TIME	< 20 ms typical (application dependent)
OPERATING CONDITIONS	
PRESSURE RANGE	full vac - 150 psig (10.3 barg)
MEDIUM	Clean, dry, non-corrosive gases
OPERATING TEMPERATURE	32 to 120 °F (0 to 49°C)
RECOMMENDED FILTRATION	40 micron nominal
MOUNTING ORIENTATION	ANY
PHYSICAL	
PORT SIZE	1/8" NPT
WETTED PARTS	**Elastomers** - Nitrile **Manifold** - Anodized aluminum **Valves** - Nickel plated brass Pressure sensor - High Temp polyamide, alumina ceramic, silicone epoxy, glass
HOUSING	Polycarbonate/ABS blend
PROTECTION RATING	IP65

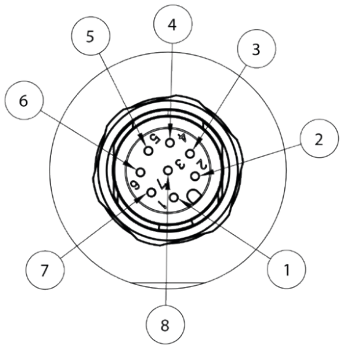
Equipment used for test and calibration is NIST traceable

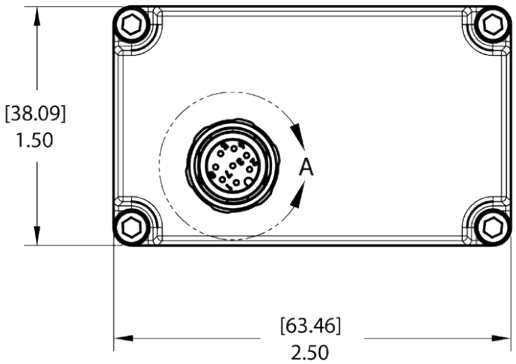
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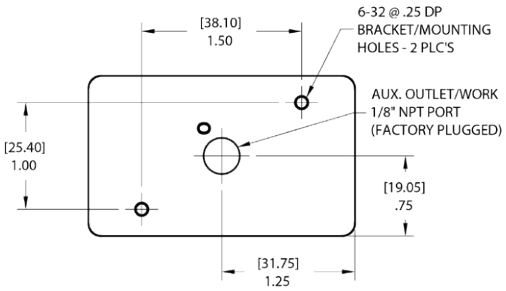
EPC Electronic Pressure Controller

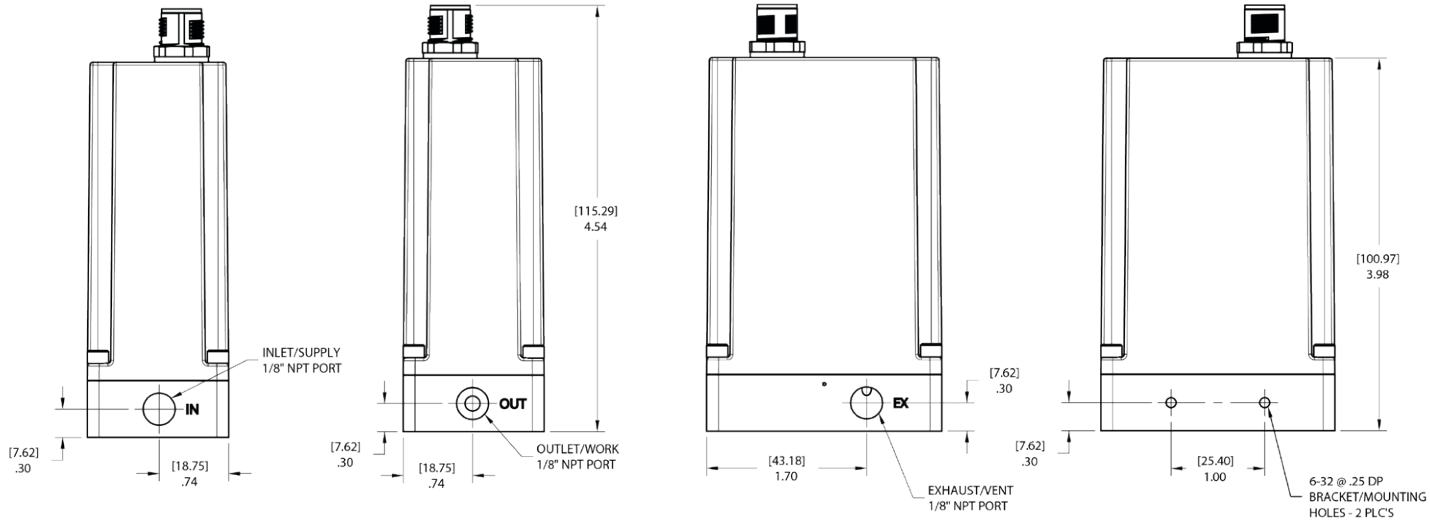
EPC DIMENSIONS





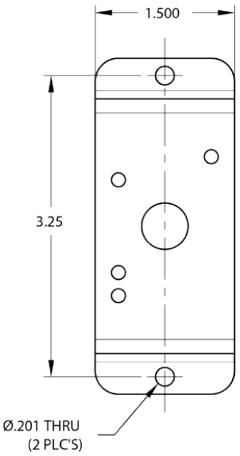




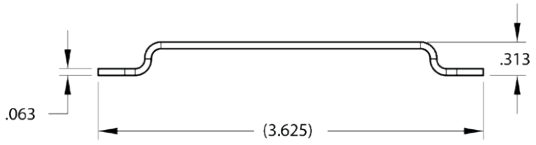


MOUNTING

The EPC is not sensitive to position and may be mounted in any orientation. It comes standard with convenient (top-down) mounting holes for easy mounting to most flat surfaces. An optional sheet metal bracket is available that allows the EPC to be base mounted or foot mounted. See page 12 for bracket ordering information.



Mounting Bracket (optional)



EPC Electronic Pressure Controller

PNEUMATIC PLUMBING CONNECTIONS

- All ports are 1/8” NPT.
- It is recommended to install a filter before the inlet with at least 40-micron filtration. The EPC is extremely sensitive to dirt and debris.
- The maximum supply pressure depends on the calibrated range and is listed in Table 2 below.
- For best stability, the tubing between the outlet and the controlled process requires a minimum volume of 2 cubic inches.
- When used as a pilot pressure controller for an Equilibar fluid control valve, the EPC outlet connects to the pilot port of the Equilibar back pressure regulator, vacuum regulator or flow control valve.

Referring to Fig. 1 and Fig. 2

The inlet (IN) port connects to 1. The supply pressure for positive pressure applications; 2. Atmosphere for vacuum applications or supply pressure for vacuum to positive applications.

The outlet (OUT) port connects to the process to be controlled in all cases.

The exhaust port (EXH) connects to 1. Process exhaust for positive pressure applications; or 2. Vacuum supply for vacuum applications or vacuum to positive applications.

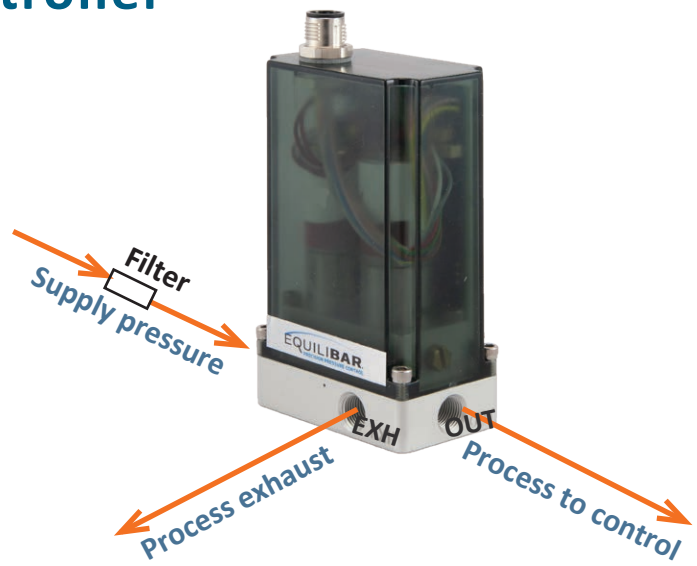


Fig. 1-EPC Plumbing Diagram for positive pressure

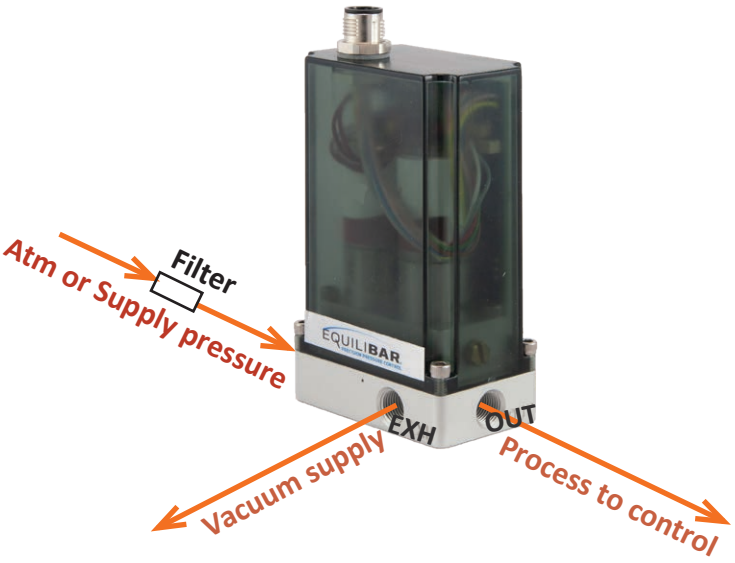


Fig. 2-EPC Plumbing Diagram for vacuum pressure

CALIBRATION / RECALIBRATION

All EPC control valves come calibrated from the factory by trained personnel using precision calibration equipment. The calibration and operation of each EPC valve is checked by two different operators using independent test equipment. The EPC valve is a closed loop control valve using a precision electronic pressure sensor. Typical drift is less than 1% over the life of the product.

The EPC is calibrated to NIST standards when manufactured and the PID values are set to the EPC standard tuning. If specific application details are known prior to manufacture (recommended), the PID values may be tuned in accordance with the known specifications to provide the most stable and repeatable control.

If your EPC valve appears to be out of calibration by more than 1%, it is not likely to be the EPC. Check the system for adequate supply pressure, wiring and electronic signal levels. Verify the accuracy of your measuring equipment before re-calibrating. Consult factory if you have any questions or require assistance. If the calibration needs to be changed or modified, the unit must be returned to Equilibar. Any attempt to recalibrate in the field without prior authorization will void the warranty.

Table 2

Rated Inlet Pressure for each Calibrated Range

CALIBRATED RANGE	MAX INLET PRESSURE
0 to 1 psig	10 psig
0 to 5 psig	30 psig
0 to 15 psig	30 psig
0 to 30 psig	60 psig
0 to 60 psig	100 psig
0 to 100 psig	115 psig
0 to 150 psig	165 psig
0 to 30 inHg	full vacuum
0 to 760 torr	full vacuum

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EPC Electronic Pressure Controller

ANALOG ELECTRICAL CONNECTION FOR 0-10 VDC INPUT COMMAND SIGNAL

Make sure AC power is disconnected before DC connections are made

The EPC requires 15 to 24 VDC on **Pin 8** of the electrical connector. It uses 0 to 10 VDC command signal on **Pin 1** of the electrical connector. The power supply ground, command source ground and **Pin 3** must be tied together. If the analog monitor signal is being used, utilize **Pin 5** to send the 0 to 10 VDC signal to a measuring device like a volt meter, panel meter or acquisition device.

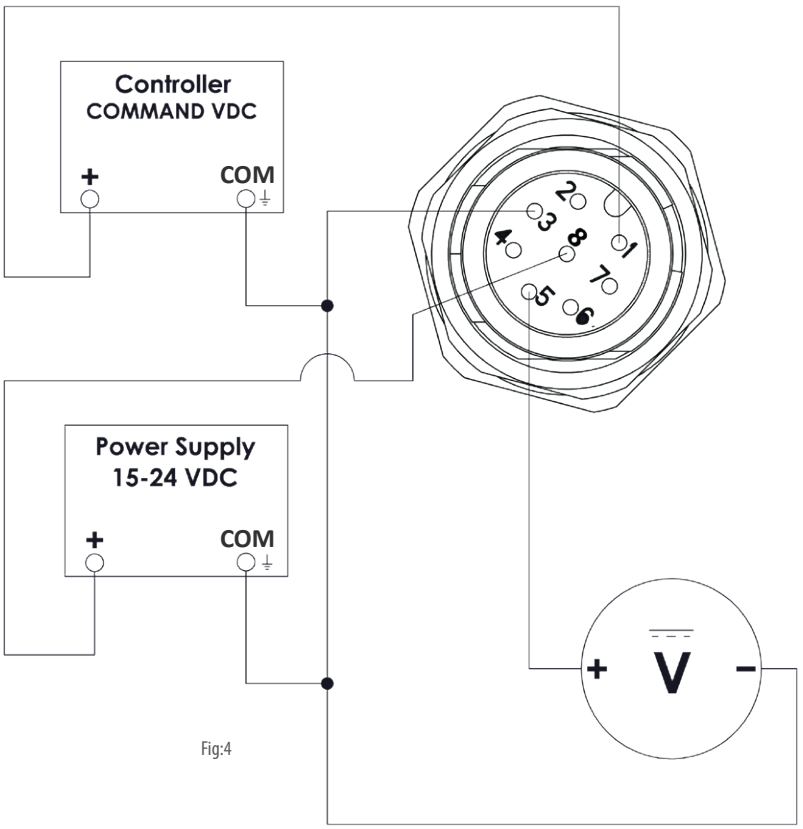


Fig:4

Table 3 EPC Electrical Pin-out for 0-10V Command

PIN NUMBER	FUNCTION	COLOR
1	+Command Input	White
2	3.3 V Serial TX	Brown
3	DC Common/Ground	Green
4	Not Used	Yellow
5	Analog VDC Output	Gray
6	Not Used	Pink
7	3.3 V Serial RX	Blue
8	Power, 15-24 VDC	Red

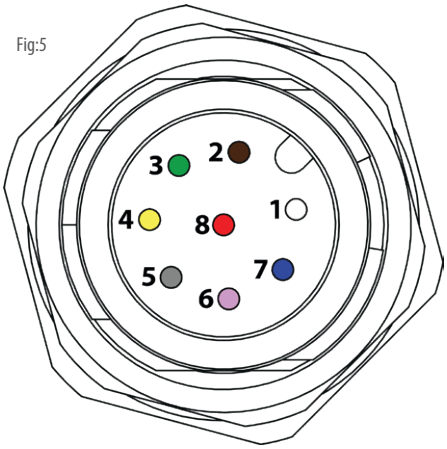


Fig:5

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ANALOG ELECTRICAL CONNECTION FOR 4-20 MA COMMAND SIGNAL

Make sure AC power is disconnected before DC connections are made

The EPC requires 15 to 24 VDC on **Pin 8** of the electrical connector. An EPC configured for Current Command uses a differential current loop scheme (not isolated), meaning current flow is from **Pin 6** to **Pin 4.** The signal from the internal pressure sensor is available as a monitor signal on **Pin 5**.

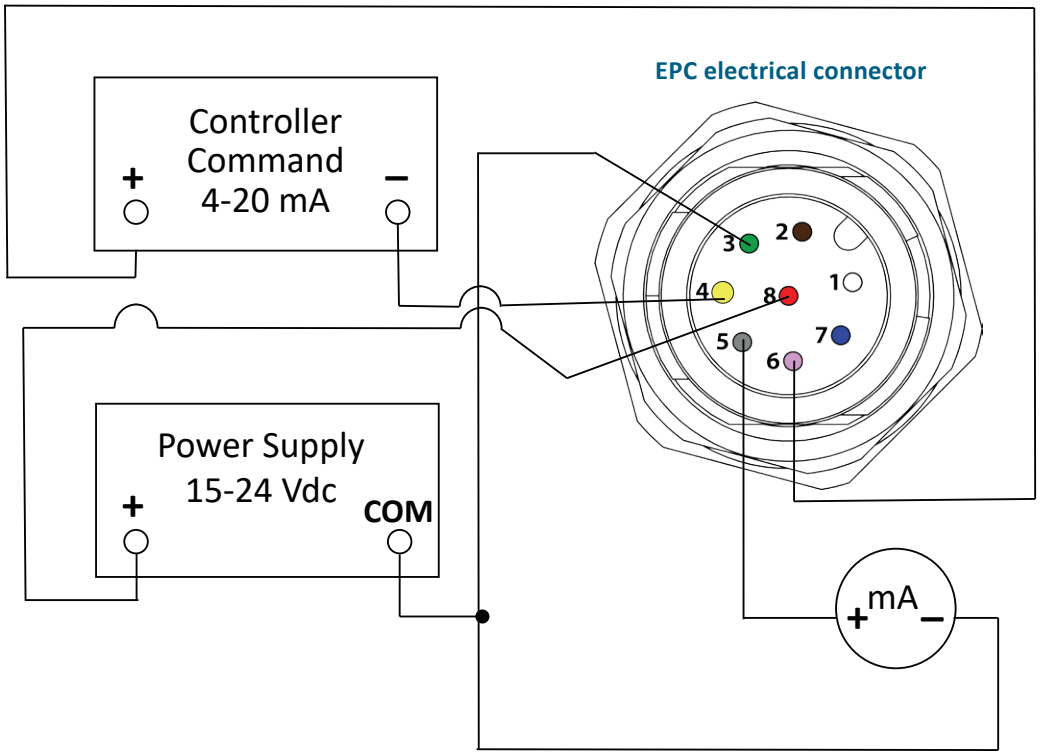
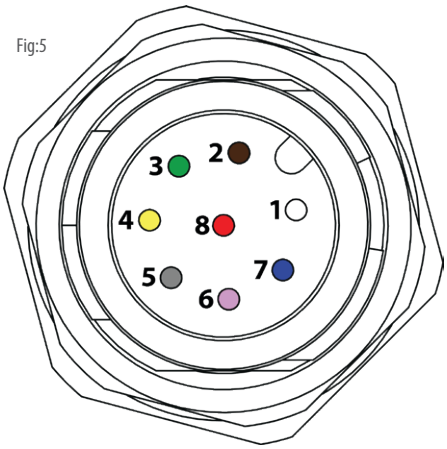


Table 4 EPC Electrical Pin-out for 4-20mA Command

PIN NUMBER	FUNCTION	COLOR
1	Not Used	White
2	3.3 V Serial TX	Brown
3	DC Common/Ground	Green
4	-4 to 20 mA Command Re-turn	Yellow
5	4 to 20 mA Output	Gray
6	+4 to 20 mA Command Input	Pink
7	3.3 V Serial RX	Blue
8	Power, 15-24 VDC	Red

Fig:5



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EPC Electronic Pressure Controller

SERIAL CONFIGURATION

EPC serial command version utilizes a 3.3 V Serial Digital communication signal

Software is required in order to communicate via 3.3V serial with the EPC. Many serial software communication solutions are available; If you already have a software solution, please ensure it is configured with the specifications listed in Table 6 prior to making the electrical connections to EPC. The commands can be found in Table 7 on Page 11.

If you do not already have a serial software solution, we recommend PuTTY as a free and open-source solution. PuTTY is one of the most common software packages used for serial communication and can be downloaded here: https://putty.org/

Once downloaded and installed on your windows-based machine, please follow the steps on the following pages to configure the software prior to making the electrical connections to the EPC. The specifications to configure and/or confirm within PuTTY are listed in Table 6.

Table 6 **Serial Software Configuration (PuTTY)**

SETTING LABEL	SPECIFICATION
Speed (baud)	57600
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	None
Serial Line	See Steps 1&2

Recommended Proportional Adjustment Values

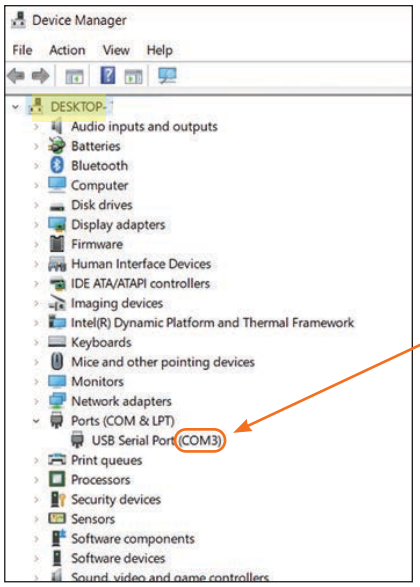
ORIFICE SIZE	ADJUSTMENT
0.009”	25
0.013”	10
0.026”	5
0.052”	1

Recommended Integral Adjustment Values

ORIFICE SIZE	ADJUSTMENT
0.009”	0.1
0.013”	0.05
0.026”	0.05
0.052”	0.05

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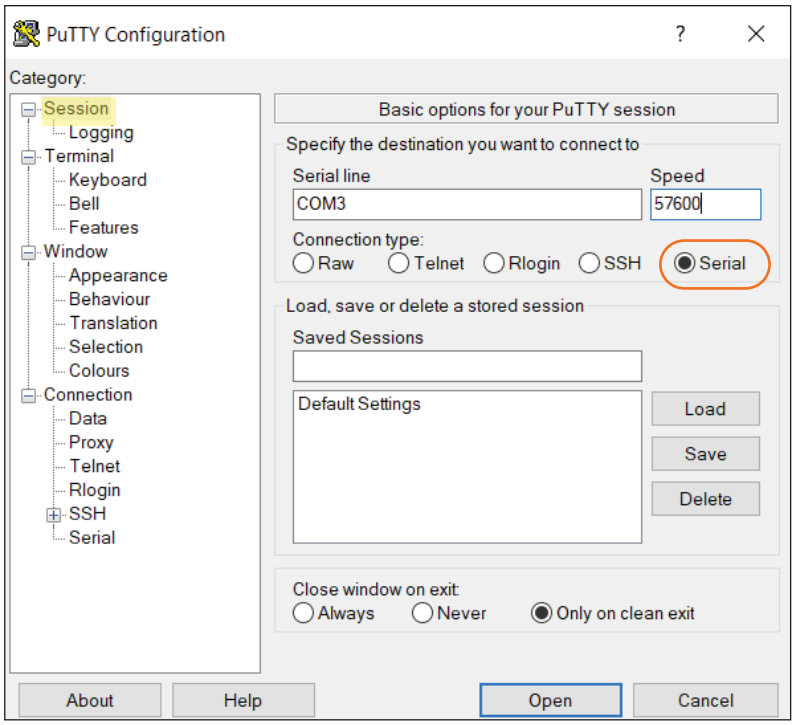
STEP - 1



1. Ensure proper serial connection to EPC unit and then connect 3.3 V serial to the control device. The wiring schematics can be found on page 11.
2. Open Device Manager and identify the serial port assigned to the serial cable.

>>> Website: Many ways to open Device Manager
https://www.digitalcitizen.life/ways-open-device-manager-windows

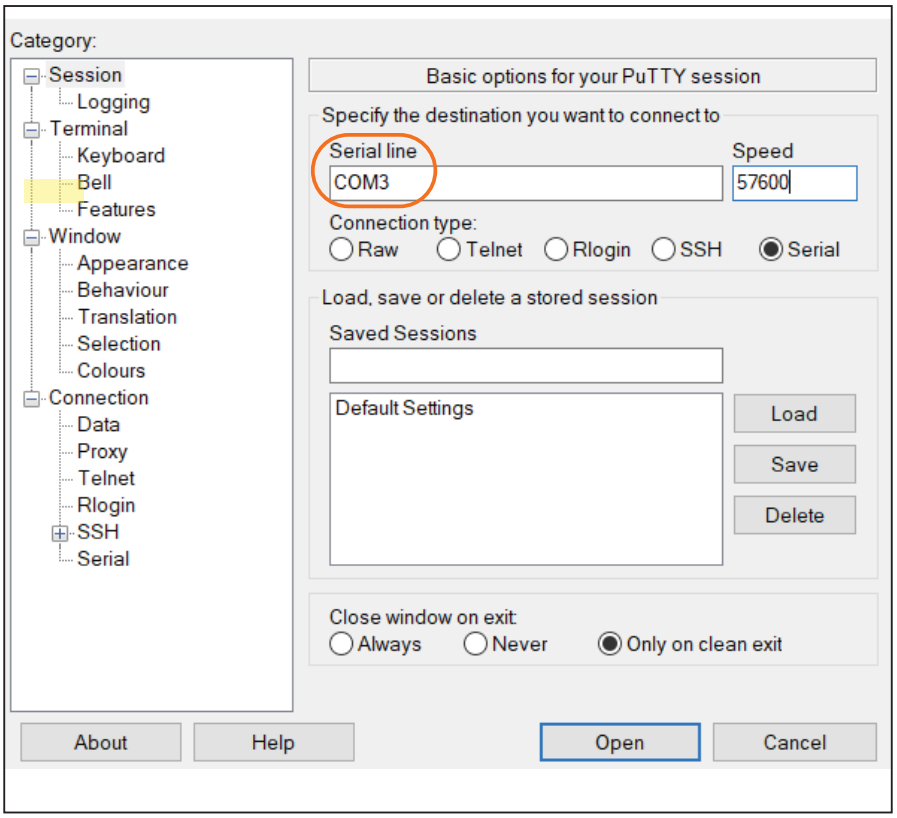
STEP - 2



1. Open installed Putty program
2. Ensure ‘Serial’ is selected

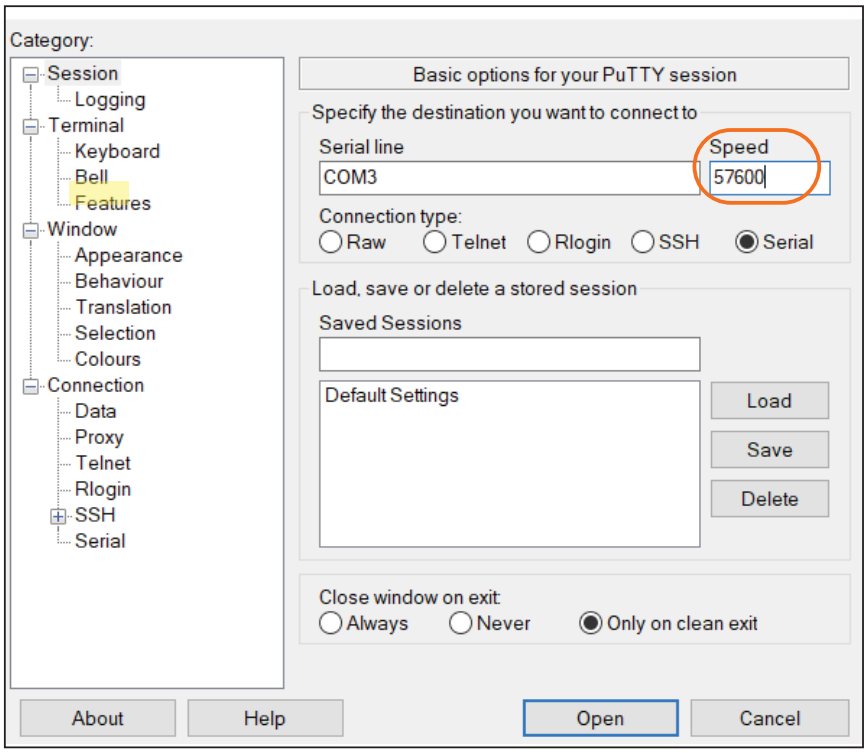
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STEP - 3



Input the port identified in Step-1 into the Serial line, as shown

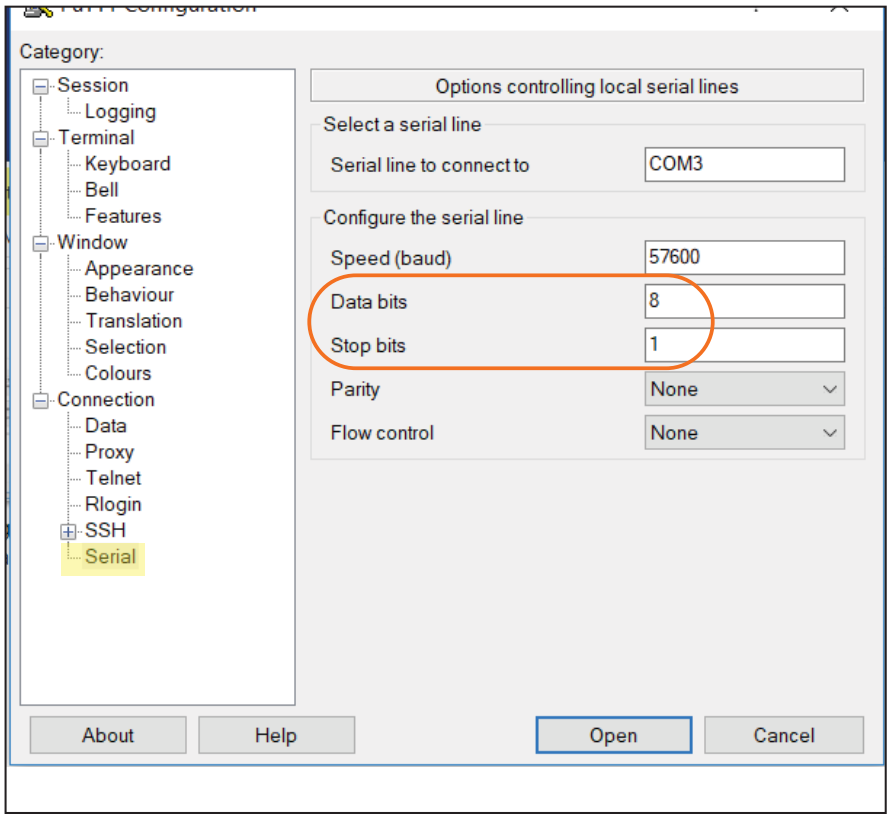
STEP - 4



Change the speed (baud) setting to: **57600**

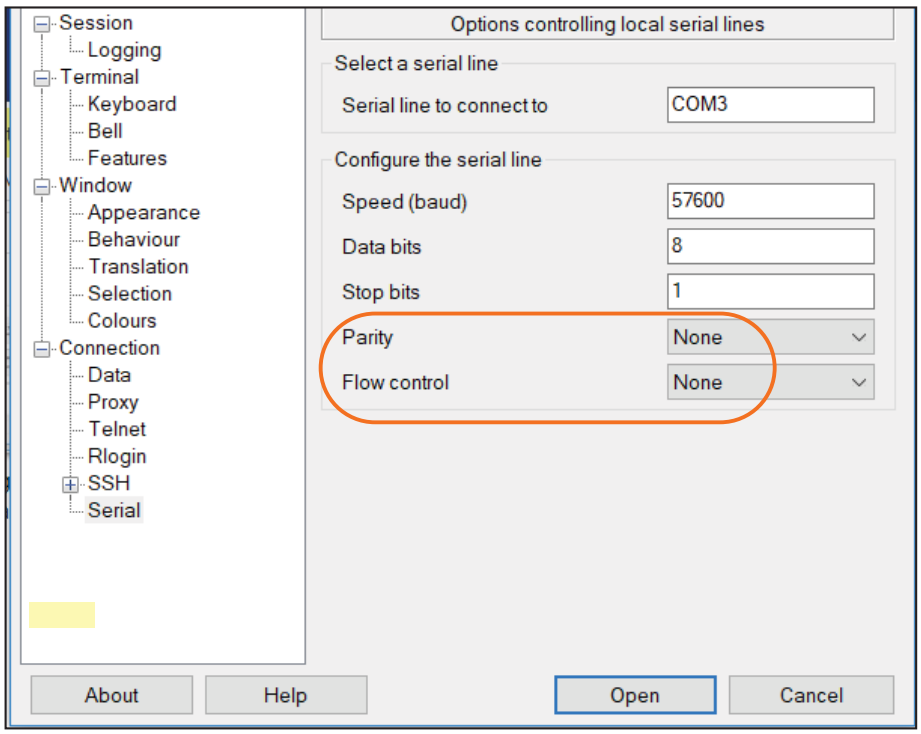
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STEP - 5



Change **Data Bits** to **8** and **Stop Bits** to **1**

STEP - 6



Ensure both **Parity** and **Flow Control** are set to **None**

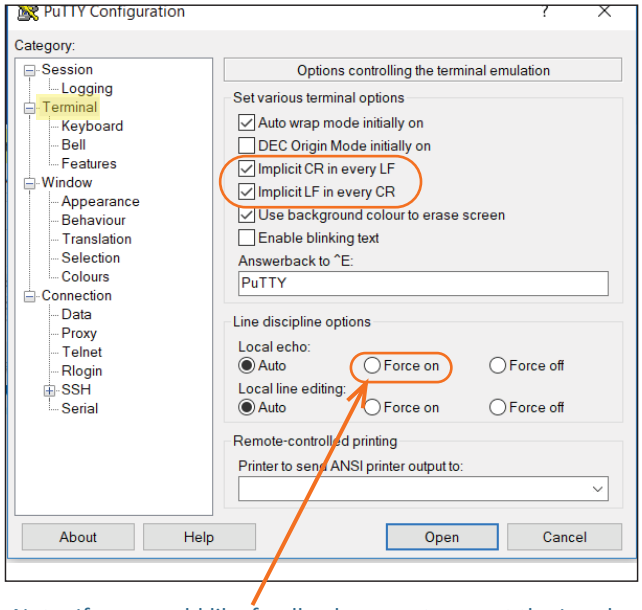
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EPC Electronic Pressure Controller

SERIAL CONFIGURATION | CONTINUED

STEP - 7

In Terminal settings, check the boxes for:
Implicit CR in every LF & Implicit LF in every CR



Note: If you would like feedback as you type, set the Local Echo to "**Force On**"

STEP - 8

Proceed to making the electrical connections for the EPC following the wiring schematics on the next page.

Once the EPC is connected and the software is configured, the commands in Table 7 below can be used to change settings, request feedback and control the device.

SERIAL COMMANDS

Table 7 — **EPC | Serial Commands**

DESCRIPTION	COMMAND ABBREVIA-TION	INSERT TO SEE CURRENT VALUES1	INSERTED EXAMPLE CHANGES2	READABLE	WRITABLE
Model No.	ID	?ID	n/a	Y	N
Serial Number	SN	?SN	n/a	Y	N
Proportional "P" Value	PIDP	?PIDP	PIDP: 100	Y	Y
Integral "I" Value	PIDI	?PIDI	PIDI: 0.75	Y	Y
Command Type (0=Analog, 1=Digital)	CT	?CT	CT: 1	Y	Y
Current Command (0 - 100% of Full Scale)	CC	?CC	CC: 50	Y	Y
Monitor Output Signal from Internal Sensor	MON	?MON	n/a	Y	N
Save Settings to ROM	SAVE	n/a	SAVE	N	Y

1When entering any reading command, always prefix with "?". **Example- ?PIDP**
2Be sure to leave one space between the colon and the value when making changes. **Example- PIDP: 100**

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EPC Electronic Pressure Controller

SERIAL CONNECTIONS

Make sure AC power is disconnected before DC connections are made

The EPC requires 15 to 24 VDC on **Pin 8** of the electrical connector. It uses serial communication on **Pin 7** to receive and **Pin 2** to send digital responses. The power supply ground, command source ground and **Pin 3** must be tied together.

EPC-C2 Cable

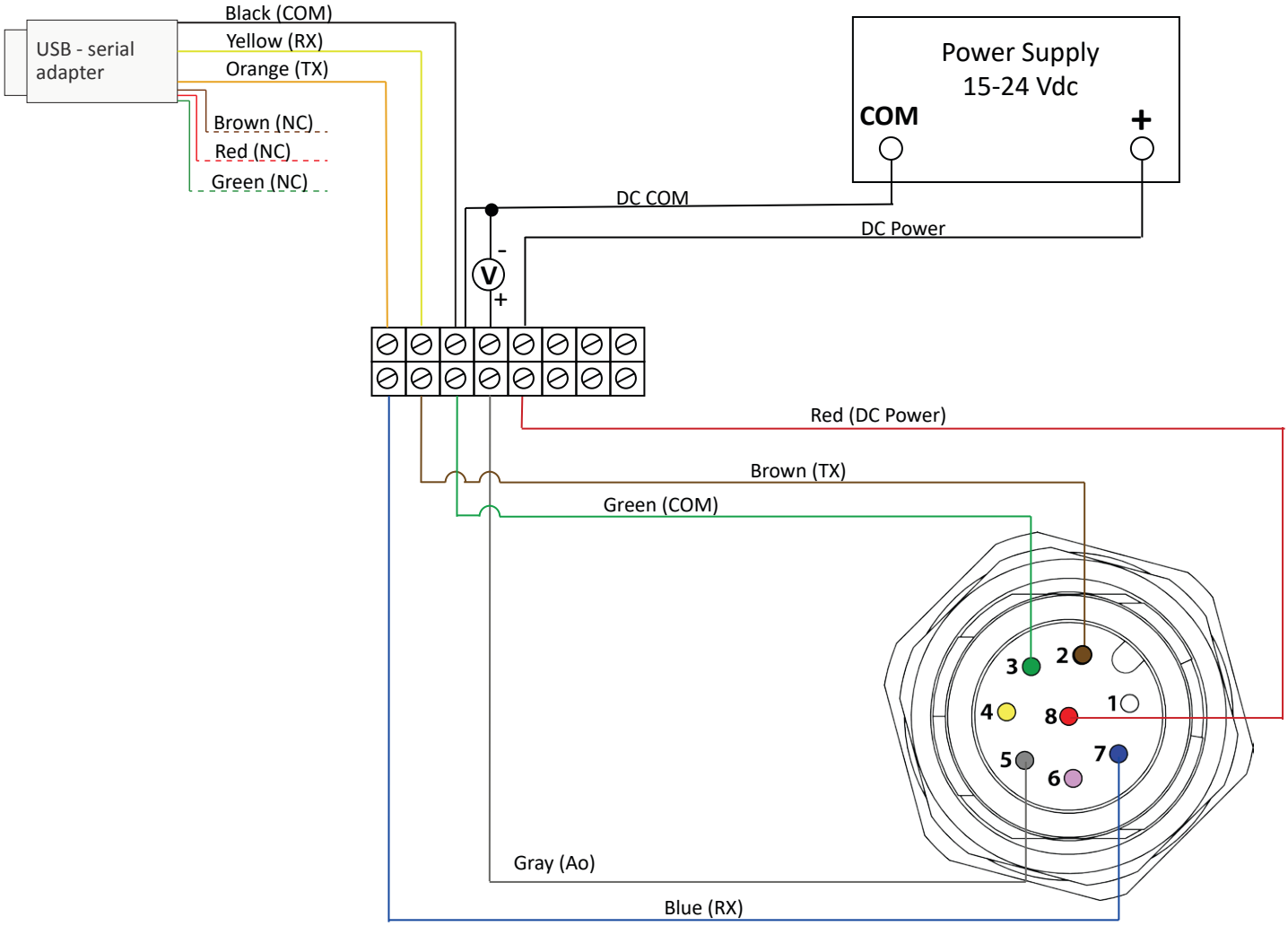
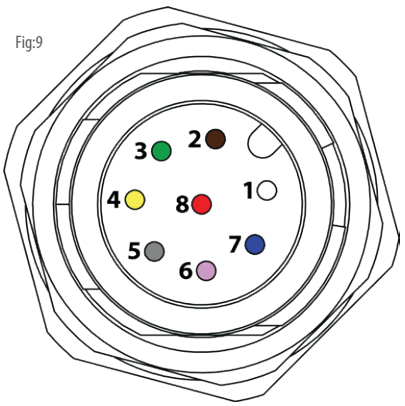


Table 9 EPC Electrical Pin-out for Serial Connection

PIN NUMBER	FUNCTION	COLOR
1	+Command Input	White
2	3.3 V Serial Digital TX	Brown
3	DC Common/Ground	Green
4	Not Used	Yellow
5	Analog VDC Output	Gray
6	Not Used	Pink
7	3.3 V Serial Digital RX	Blue
8	Power, 15-24 VDC	Red

Fig:9



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EPC Electronic Pressure Controller

FLOW & ORIFICE SPECIFICATIONS

Table 10 **EPC Internal Valve Flow & Limitations**

PN REF.	ORIFICE SIZE1	FLOW @ MAX PRESSURE	MAX PRESSURE (P2)	MIN CRITICAL VOLUME
A	0.009” EVP	2.7 l/min (5.72 scfh)	150 psig (10,34 bar)	≥ 0.25 in^3
B	0.013” EVP	6.7 l/min (14.2 scfh)	100 psig (6,89 bar)	≥ 0.50 in^3
C	0.026” EVP	25.0 l/min (53.0 scfh)	100 psig (6,89 bar)	≥ 1.00 in^3
D	0.052” EVP	65.0 l/min (137.7scfh)	100 psig (6,89 bar)	≥ 2.00 in^3

1 Factory selected based on application parameters

Flow & Valve Selection Notes

- Max flow assumes a P1 value of at least 10% above max pressure listed. Ex: a max pressure out of 50 psig assumes a min P1 value of 55 psig.
- Min Critical Volume is the minimum required downstream volume for EPC to provide stable, accurate and repeatable pressure control.
- If the process requires constant inflow due to leaks or other air consumption, then there is no minimum volume requirement to maintain stability.

EPC Part Number Key

	1	2	3	4	5	6
EXAMPLE PART NUMBER	**EPC**	**H**	**F**	**E**	**G**	**A**
Your Part Number:	EPC	H				

1 MODEL

EPC Electronic Pressure Controller

2 TYPE

H IP65 Housing

3 PORT THREAD TYPE

F 1/8" NPT

G G1/8 (option available)

4 INPUT SIGNAL COMMAND

E 0 to 10 VDC

I 4 to 20 mA (differential)

R 3.3V Serial Digital

5 PRESSURE RANGE

A 0 to 1 psig

B 0 to 5 psig

C 0 to 15 psig

D 0 to 30 psig

E 0 to 60 psig

F 0 to 100 psig

G 0 to 150 psig

H 0-30 in Hg (vacuum)

I 0-760 Torr (absolute)

6 MIN VOLUME / MAX FLOW RATE

A ≥0.25 in3 / 2.7 lpm

B ≥0.50 in3 / 6.7 lpm

C ≥1.00 in3 / 25.0 lpm

D ≥2.00 in3 / 65.0 lpm

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EPC Electronic Pressure Controller

ORDERING INFORMATION CONTINUED

Accessories | Cables



EPC-C1

Molded Actuation Cable, 8-Pin, 6’

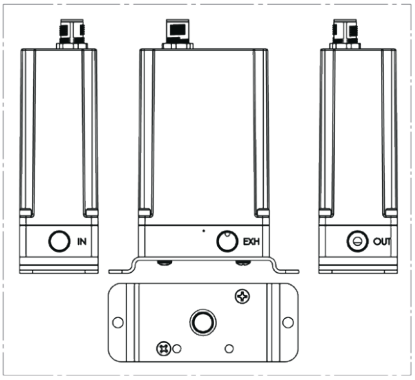


EPC-C2

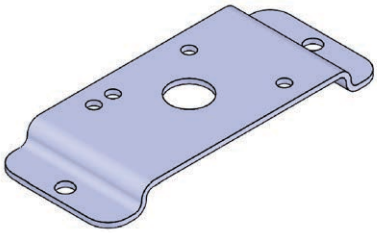
3.3 V Serial Cable, 3’

Accessories | Mounting Bracket

Bracket: Same bracket can be used for foot mounting or rear mounting.
Part Number: EPC-B1



<<Foot Mount Rear Mount >>



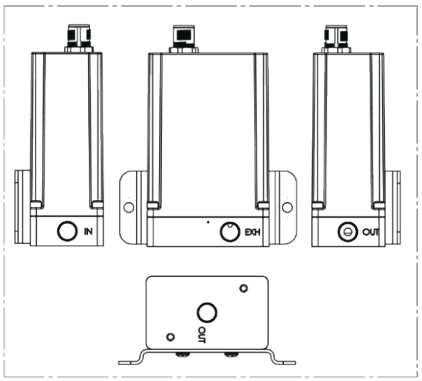


Fig. 11 EPC Mounting Bracket

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