



QB3 CONTROL VALVE INSTALLATION & MAINTENANCE INSTRUCTIONS

DESCRIPTION

The QB3 is a closed loop pressure regulator consisting of two solenoid valves, internal pressure transducer, and electronic controls, integrally mounted to our unique volume booster. The output “work” pressure is proportional to an electrical input or “command signal”. The pressure is controlled by activating the solenoid valves, which apply pressure to the “dome” side of the booster. One valve functions as inlet control, the other as exhaust. The unit output pressure is measured by a pressure transducer, which is internally mounted to sense pressure in the work port of the QB3 and provides a feedback signal to the electronic control circuit. This feedback signal is compared against the command signal input. Any differences between the command signal and the actual pressure feedback signal causes one of the solenoid valves to open to adjust the pressure in the “dome” cavity of the booster/regulator. Dome pressure is adjusted so that desired down stream operating pressure is achieved and maintained. Since it is the actual desired work pressure that is being sensed, and fed back to the control circuit, any mechanical hysteresis of the air piloted regulator is automatically compensated for. This allows for our extraordinary accuracy and repeatability.

Command inputs come in a choice of either a differential 0-10 Vdc or 4-20 mA. The unit also provides an electrical monitor signal for output to a panel meter or controller for data acquisition or quality assurance needs. The monitor signal comes from the internal pressure transducer. All QB3’s come standard with a 0-10 volt monitor signal. Providing this monitor signal as part of our standard package eliminates the need for the customer to purchase a separate transducer.

The uniqueness of the booster design is that it has no stamped gaskets or special molded diaphragm or seal parts. All of the parts related to normal maintenance are standard o-rings. Complete repair kits are available, but in case emergency repair is needed parts should be available from any fluid power distributor or even most neighborhood hardware stores. Since all sealing parts are o-rings a large variety of chemical compounds are readily available. You can select the compounds, which are most ideally suited to your process and environment.

SPECIFICATIONS

ELECTRICAL

SUPPLY VOLTAGE.....	15-24 VDC
SUPPLY CURRENT.....	250mA max.
COMMAND SIGNAL	
VOLTAGE.....	0-10 VDC
CURRENT.....	4-20mA differential
COMMAND SIGNAL IMPEDANCE	
VOLTAGE.....	10 K Ω
CURRENT.....	100 Ω
ANALOG MONITOR SIGNAL	
VOLTAGE.....	0-10 VDC @ 20mA max
CURRENT.....	4-20MA Sinking or Sourcing

MECHANICAL

PRESSURE RANGES ¹	29.9 in. Hg (vac) - 150 psig (760 mmHg (vac) - 10.34 BAR)
OUTPUT PRESSURE ¹	0-100% of range
FLOW RATE	
FORWARD & EXHAUST25 SCFM max @ 120 psig inlet & 100 psig outlet (708L/min @ 8.27 BAR inlet & 6.89 Bar outlet)
MIN. CLOSED END VOLUME.....	5 in ³
FILTRATION RECOMMENDED...	40 micron actual
LINEARITY/HYSTERESIS.....	< \pm 0.3% F.S. BFSL ²
ACCURACY	< \pm 0.4% F.S. ²
WETTED PARTS‡	Elastomers - Buna N ³ Manifold - Aluminum Nickel Plated Valves - Nickel plate brass or 400 Series Stainless Steel (opt) P.Transducer - Utem 1000, Aluminum

PHYSICAL

OPERATING TEMPERATURE.....	32-158°F [0-70°C]
DIMENSIONS	2in.X2 in.X4.4 IN (51mmX51mmX111mm)
WEIGHT.....	1.06 lb [0.50 Kg]
PROTECTION RATING.....	NEMA 4
HOUSING.....	Aluminum (Anodized)
BOOSTER.....	Electroless Nicke Plate

¹ Pressure ranges are customer specified. Output pressures other than 100% are available. Vacuum through positive pressure units, positive pressure must be equal to greater than vacuum level.

² Others available. Consult factory for pressure range below 10 psig.

³ Dependent on response adjustments. Valve can be field adjusted for best response for the actual application

Before you get started, please read these warnings:

- ◆ Examine the product. Ensure that you received what you ordered.
- ◆ Read this guide first before you start and save it for later use.
- ◆ You must have a good understanding of what the adjustments are on this product before using them.
- ◆ All compressed air and power should be shut off before installing, removing or performing maintenance on this product.
- ◆ Installation and use of this product should be under the supervision and control of properly qualified personnel in order to avoid the risk of injury or death.

CONNECTION PROCEDURE

Pneumatic Connections

CAUTION: USE ONLY THE THREAD SEALANT PROVIDED. OTHER SEALANTS SUCH AS PTFE TAPE AND PIPE DOPE CAN MIGRATE INTO THE FLUID SYSTEM CAUSING FAILURES.

1. The valve can be mounted in any position without affecting performance. Mounting bracket QBT-01 (ordered separately) can be used to attach valve to a panel or wall surface.
2. A typical 40 micron in-line filter is recommended on the inlet of the QB3 valve.
3. A 1/16" plug is supplied with the valve. It can be used to plug the "Alternate Exhaust Port" if the exhaust media should be captured or when the valve is used for vacuum or vacuum through positive pressure control. See Figure 1 for port location.

Positive Pressure Units

1. Connect supply pressure to the "I" port (Figure 1) not to exceed rated supply pressure. (See TABLE 1)
2. Connect the "O" port (Figure 1) to the device being controlled.
3. The "E" exhaust port can be plumbed to a point outside the work area, fitted with a muffler or left open to atmosphere as the application dictates.
4. Proceed with electrical connection.

Vacuum only & Vacuum Through Positive Pressure Units

1. Apply a small amount of anaerobic sealant to the male threads of the in-line filter supplied with the QB.
2. Connect vacuum supply to the "E" port (Figure 1).
3. Connect supply pressure to the "I" port (Figure 1) not to exceed rated supply pressure (See TABLE 1). Supply pressure is required on vacuum and vacuum to positive pressure QB3 units.
4. Connect the outlet "O" port (Figure 1) to the device being controlled.
5. Proceed with "Electrical Connections" section.

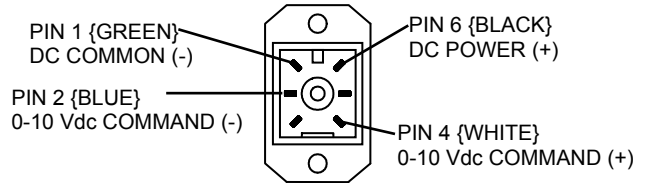
Electrical Connections

1. Turn off all power to valve.
2. Identify the valve's command input and analog output using the calibration card included in the package and the ordering information section on the last page of this sheet.
3. Proceed to the appropriate section corresponding to the type of valve being installed.

NOTE: ALL COLOR CODES RELATE TO QB'S ORDERED FROM THE FACTORY WITH WIRE LEADS.

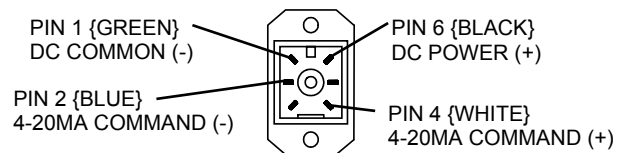
Voltage Command Valves (TFEE)

All voltage command QB's use common mode voltage, meaning the DC Common pin (Pin 1) is the common reference for both power and command. Pin 1 is used as both the command signal common and power supply common. The following diagram shows the proper connections. If the command to the QB is a generated from a single ended output voltage source, tie pin 2 (blue wire) to the DC common on the power supply.



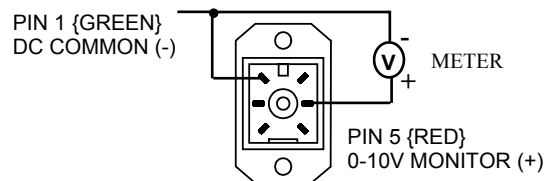
Current Command Valves (TFIE)

All current command QB's use a differential current loop scheme (not isolated), meaning current flow is from Pin 4 to Pin 2 on the QB valve. Some applications may require the common of the power supply that provides loop power for the 4-20mA command to be tied to power supply common. The following diagram shows the correct connection for conventional current flow.



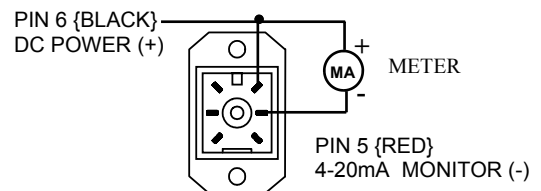
Voltage Monitor Valves (TFEE or TFIE)

Use the following wiring diagram for QB valves with a voltage monitor output.



Current Monitor Valves (TFEC or TFIC)

Use the following wiring diagram for QB valves with a current sinking monitor output.



Current Monitor Valves (TFES or TFIS)

Use the following wiring diagram for QB valves with a current sourcing monitor output.

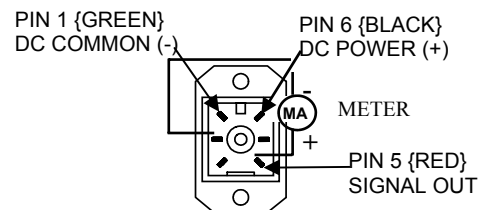


TABLE 1

RATED INLET PRESSURE FOR STANDARD QB3 VALVES

For valves ordered with MAX. calibrated pressure	Max. inlet pressure
Vacuum only	5 psig (0.35 bar)
Vacuum up to 10 psig (0.69 bar)	15 psig (1 bar)
10.1 up to 30 psig (0.70 up to 2 bar)	35 psig (2.4 bar)
31 up to 100 psig (2.1 up to 7 bar)	110 psig (7.6 bar)
101 up to 150 psig (7 up to 10.3 bar)	165 psig (11.4 bar)

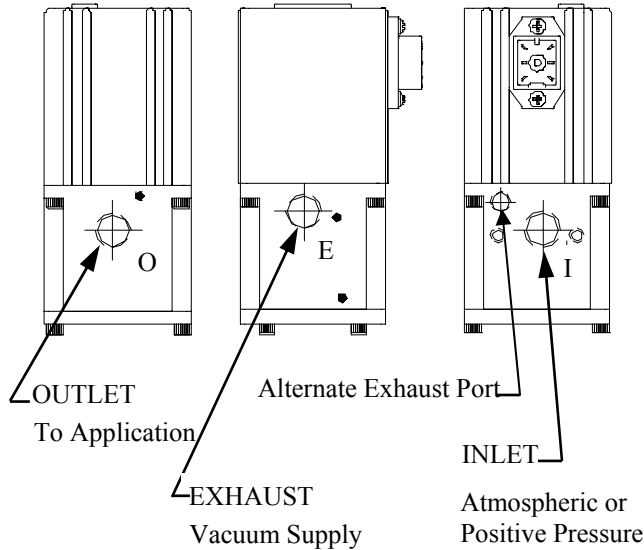


Figure 1

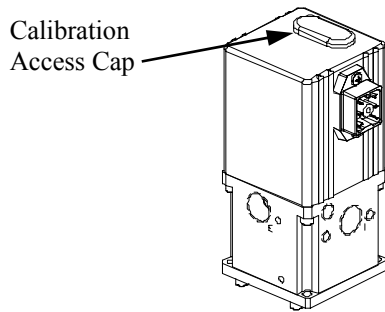


Figure 2

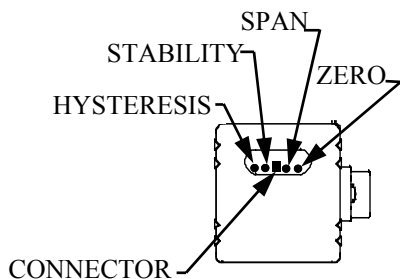


Figure 3

RE-CALIBRATION PROCEDURE :

All QB3 valves come pre-calibrated from the factory using precision calibration equipment. If the QB3 valve needs re-calibration, use the procedure described below:

1. Wire control valve according to the section titled “Electrical Connections.”
2. Connect a precision measuring gauge or transducer to the outlet port of the QB3 (Figure 1).

NOTE: There must be a closed volume of at least 5cu.in (82 cc) between the valve outlet and the measuring device for the valve to be stable.

3. Plumb control valve according to section titled “Pneumatic Connections”.
4. Locate the plastic oblong Calibration Access Cap on top of the QB3 valve and remove it (Figure 2)
5. Underneath access cap, locate the two adjustment potentiometers SPAN adjust ZERO adjust. (See Figure 3 for location)
6. Set the electrical command input to MAXIMUM value.

NOTE: Only use this step if your device is totally out of calibration. If it is slightly out of calibration, omit this step and move on to paragraph 7. Using a small screwdriver, turn both potentiometers 15 turns clockwise. Then turn them 7 turns counter clockwise. This will put the QB3 roughly at mid scale.

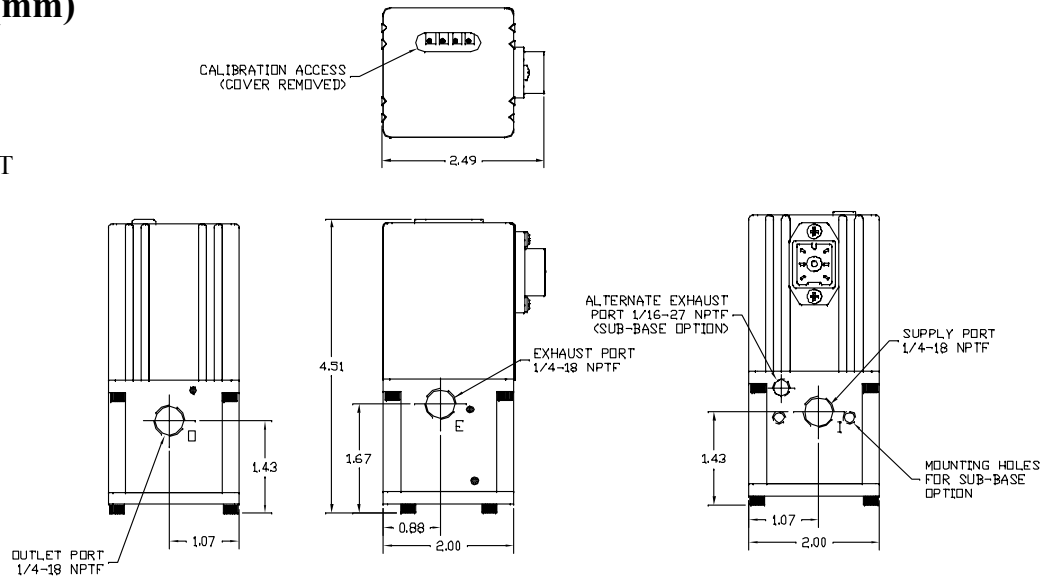
7. Adjust the SPAN potentiometer until MAXIMUM desired pressure or vacuum is reached.
8. Set the electrical command input to 10 percent of full value (1Vdc for 0-10Vdc unit or 5.6mA for 4-20mA unit).
9. Adjust the ZERO potentiometer until 10 percent of maximum desired pressure or vacuum is reached.
10. If at any time during the calibration procedure the servo oscillates or becomes unstable for more than one second, turn the HYSTERESIS potentiometer (see Figure 3 for location) counter-clockwise until the oscillation stops, then turn it one more complete turn (same direction).
11. The ZERO and SPAN potentiometers interact slightly. Repeat steps 6-10 until no error exists.
12. Verify unit shuts off by going to zero command. Check linearity by going to at least six set points throughout the full range.

DIMENSIONS in (mm)

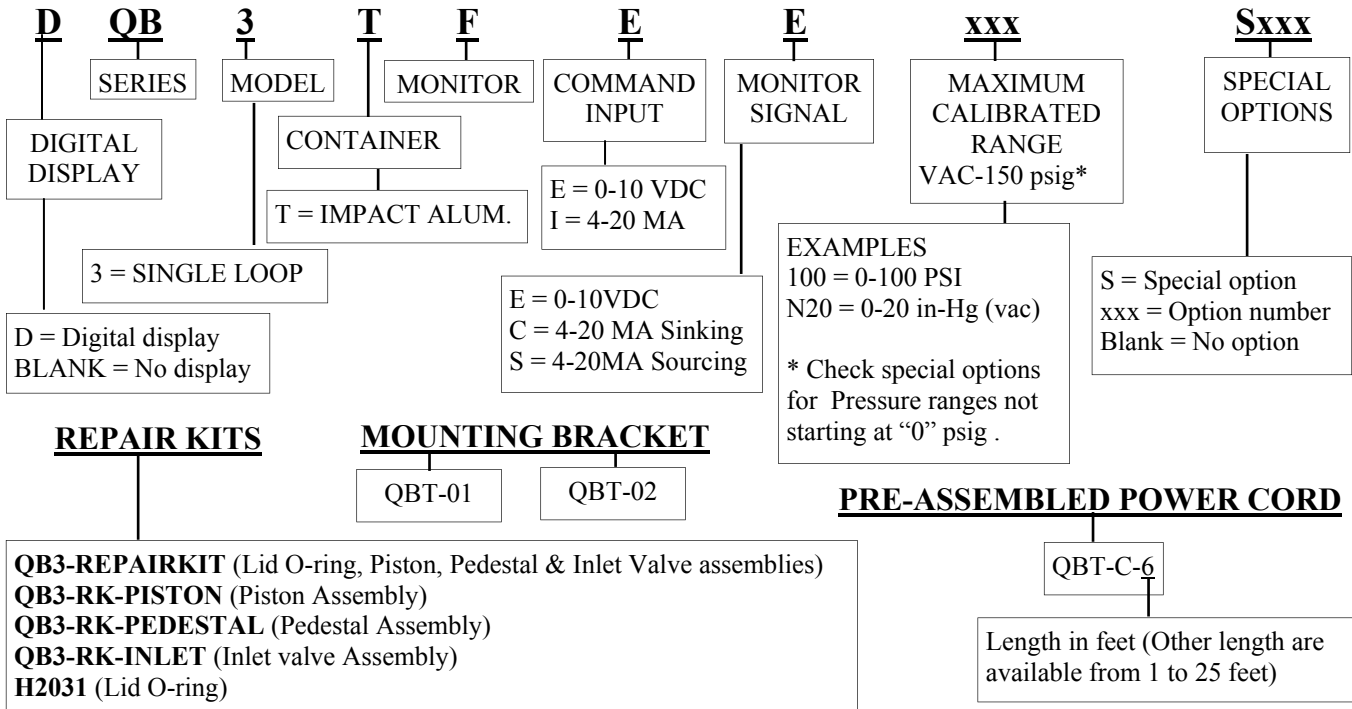
QB3 CONTROL VALVE

NOTES:

1.) ALL PORTS 1/4-18 NPT



ORDERING INFORMATION



Proportion-Air products are warranted to the original purchaser only against defects in material or workmanship for one (1) year from the date of manufacture. The extent of Proportion-Air's liability under this warranty is limited to repair or replacement of the defective unit at Proportion-Air's option. Proportion-Air shall have no liability under this warranty where improper installation or filtration occurred.

All specifications are subject to change without notice. **THIS WARRANTY IS GIVEN IN LIEU OF, AND BUYER HEREBY EXPRESSLY WAIVES, WARRANTIES OR LIABILITIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION ANY OBLIGATION OF PROPORTION-AIR WITH REGARD TO CONSEQUENTIAL DAMAGES, WARRANTIES OF MERCHANTABILITY, DESCRIPTION, AND FITNESS FOR A PARTICULAR PURPOSE.**

WARNING: Installation and use of this product should be under the supervision and control of properly qualified personnel in order to avoid the risk of injury or death.

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