QB1T & QB2T

PROPORTION-AIR
Electro-Pneumatic Pressure Regulators & Flow Controllers

INSTALLATION & MAINTENANCE INSTRUCTIONS

DESCRIPTION / IDENTIFICATION

The QB series valve uses Proportion- Air closed loop technology for Pressure control. It gives an output pressure proportional to an electrical command signal input.

The QB1 is a complete closed loop servo system consisting of valves, manifold, housing and electronic controls. Pressure is controlled by the use of two solenoid valves. One valve functions as inlet control, the other as exhaust. The pressure output is measured by a pressure transducer internal to the QB1 and provides a feedback signal to the electronic controls. This feedback signal is compared with the command signal input. A difference between the two signals causes one of the solenoid valves to open, allowing flow in or out of the system. Accurate pressure is maintained by controlling these two valves.

The QB2 is similar to the QB1 but uses a double loop control scheme. In addition to the internal pressure transducer, the QB2 receives an electrical signal from an external sensing device. This primary feedback signal is compared against the command signal input. This comparison is then summed with the internal pressure transducer signal. The gain of the circuit is such that priority is given to the external feedback signal. A difference between the command signal and the feedback signal causes one of the solenoid valves to be activated.

A monitor output is provided for the system measurement. All QB valves come standard with an analog voltage monitor output.

QB1 monitor output is an amplified signal from the internal pressure transducer. QB2 monitor output is a buffered signal from the primary external transducer connected to the QB2.

For QB valves with model number TFEE or TFIE the monitor output is voltage. The monitor output is analog current, if the valve model number is TFEC or TFIC. See ordering information for further details.

INSTALLATION

1. Apply a small amount of anaerobic sealant (provided) to the male threads of the in-line filter supplied with valve.

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

2. Install the in-line filter into the port labeled IN on QB valve.
3. Connect supply line to the in-line filter port. Connect device being controlled to port labeled OUT on QB valve.
3. For vacuum units, the vacuum supply should be connected into the bottom exhaust port.
4. Mount valve accordingly.
5. 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.
6. Proceed with electrical connections.

QB1T



QB2T
with Digital Display



SPECIFICATIONS

ELECTRICAL

SUPPLY VOLTAGE	15-24 VDC
SUPPLY CURRENT	250 mA
COMMAND SIGNAL	0-10 VDC | 4-20 mA
COMMAND SIGNAL IMPEDANCE	VDC=10 KΩ | Current=100 Ω
ANALOG VOLTAGE MONITOR	0-10 VDC
ANALOG CURRENT MONITOR	4-20 mA Sinking (sourcing opt)

MECHANICAL

PRESSURE RANGES	Vacuum - 175 psig
	(760 mmHg (Vac) - 12 Bar)
OUTPUT PRESSURE†	0-100% of range
FLOW RATE	1.2 SCFM @ 100 psig inlet
	(34 L/min @ 6.89 Bar)
Cv CAPACITY	0.04
Min CLOSED END VOLUME	1 in^3
PORT SIZE	1/8" NPT
FILTRATION RECOMMENDED	40 Micron *(included)*
LINEARITY/HYSTERESIS	<±0.15% F.S. BFSL
REPEATABILITY	<±0.02% F.S.
ACCURACY	<±0.2% F.S.

WETTED PARTS ‡

ELASTOMERS	Fluorocarbon
MANIFOLD	Brass
VALVES	Nickel Plated Brass
PRESSURE TRANSDUCER	Silicon, Aluminum

PHYSICAL

OPERATING TEMERPATURE	32-158°F *(0-70°C)*
WEIGHT	1.02 lb. *(0.50 Kg)*
PROTECTION RATING	IP65
HOUSING	Aluminum
FINISH	Black Anodized

† Pressure ranges are customer specified. Output pressures other than 100% are available. ‡ Others available

RE-CALIBRATION PROCEDURE

All QB control valves come calibrated from the factory by trained personnel using precision calibration equipment. The QB 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. If your QB valve appears to be out of calibration by more than 1%, it is not likely to be QB. Check the system for plumbing leakage, 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 QB valve needs re-calibration, use the procedure described below:

QB1 VALVES

1. Identify the inputs and outputs of the valve using the model number of the valve, calibration card included with the valve, and the information provided in this sheet.
2. Connect a precision measuring gage or pressure transducer to the OUT port of the QB.
   NOTE: THERE MUST BE A CLOSED VOLUME OF AT LEAST 1 CU. IN. (17 CC) BETWEEN THE VALVE OUTLET AND THE MEASURING DEVICE FOR THE VALVE TO BE STABLE.
3. Connect the correct supply source to the IN port of the QB, making sure the pressure does not exceed the rating for the valve (See Table 1).
4. Locate the plastic calibration access cap on top of the QB valve and completely remove it. Located underneath are two adjustment trim pots, Zero "Z" and Span "S". See figure 1 for pots location.
5. 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 6. Using a small screwdriver, turn both trim pots 15 turns clockwise. Then turn both trim pots 7 turns counterclockwise. This will put the QB roughly at mid-scale.
6. Make correct electrical connections as noted. Make sure there is a proper meter in place to measure the command input to the QB.
7. Set the electrical command input to MAXIMUM value.
8. Adjust the SPAN pot until MAXIMUM desired pressure is reached (clockwise *increases* pressure).
9. Set the electrical command input to MINIMUM value.
10. Adjust the ZERO pot until MINIMUM desired pressure is reached (clockwise *increases* pressure).
11. Repeat ZERO and SPAN adjustments, which interact slightly, until QB1 valve is calibrated back to proper range. Step 6 - 9.
12. Replace calibration access cap.

QB2 VALVES

This section assumes there is a properly scaled and calibrated transducer for use as 2nd loop feedback signal.

1. Follow, in order, steps 1-5 as noted in the section titled QB1 VALVES .
2. Make correct electrical connections as noted. Make sure there is a proper meter in place to measure the command input to the QB2. Make sure the 2nd loop signal is connected.
3. Set the electrical command input to MAXIMUM value.
4. Adjust the SPAN pot until MAXIMUM desired pressure is reached (clockwise *increases* pressure).
5. Set the electrical command input to MINIMUM value.
6. Adjust the ZERO pot until MINIMUM desired pressure is reached (clockwise *increases* pressure).
7. Repeat ZERO and SPAN adjustments, which interact slightly, until QB2 valve is calibrated back to proper range. Steps 3 - 6.
8. Replace calibration access cap.

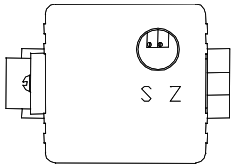


Figure 1

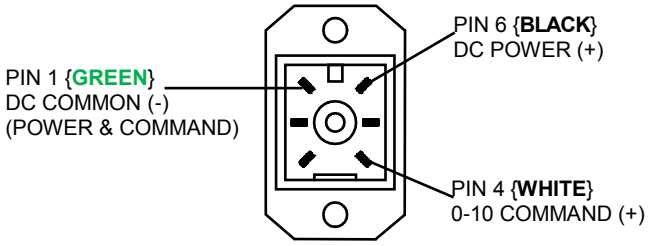
ELECTRICAL CONNECTIONS

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.

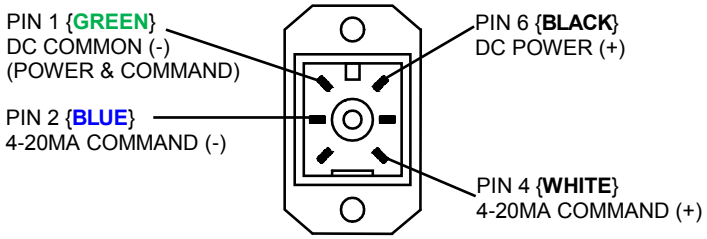
VOLTAGE COMMAND VALVES

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.



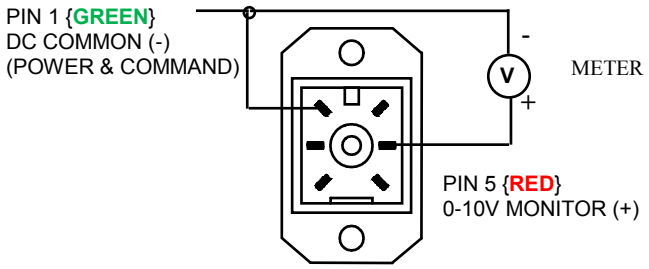
CURRENT COMMAND VALVES

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.



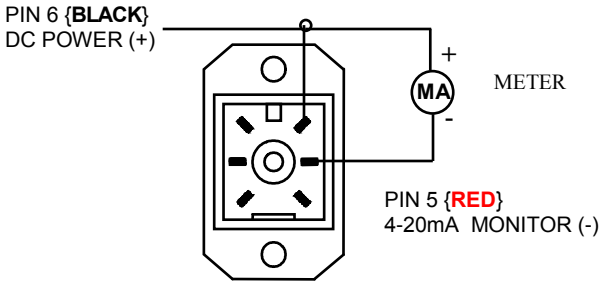
VOLTAGE MONITOR (EE OR IE)

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

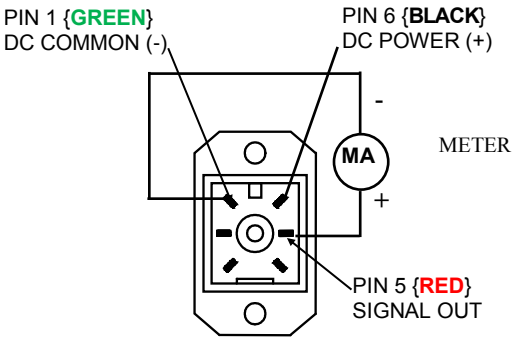


CURRENT MONITOR SINKING(EC OR IC)

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



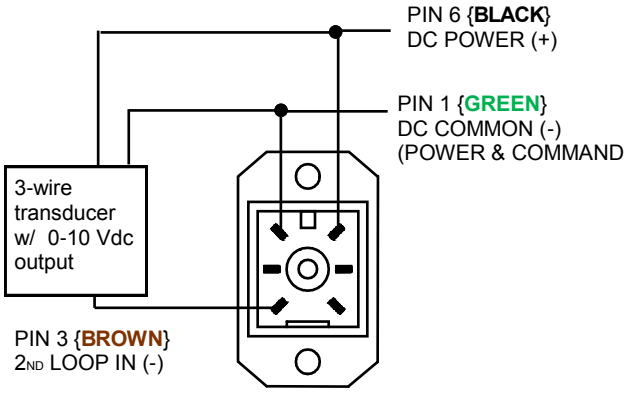
CURRENT SOURCING MONITOR (ES OR TS)



QB2 SECOND LOOP CONNECTIONS

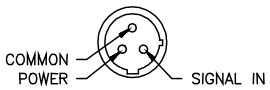
All QB2 valves are *designed to accept a 0-10 volt* second loop input signal, unless ordered with special option C2 *(4-20 mA second loop input)*. Reference the following wiring diagrams for details.

Standard QB2 valves
Second loop signal is wired into the main electrical connector.



QB2-3D OPTION VALVES

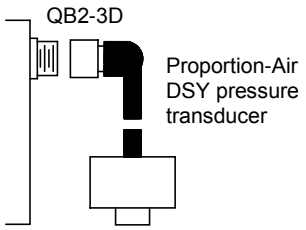
Second loop signal is plugged into auxiliary receptacle on opposite side.



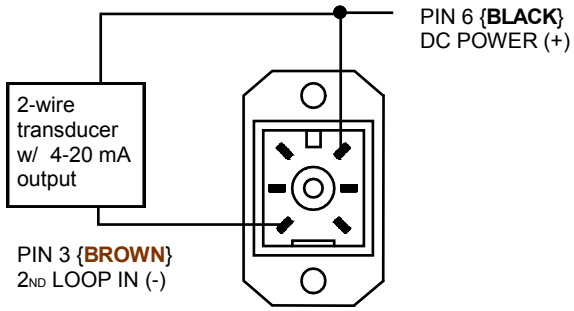
RECEPTACLE

H23 COLOR CODE

WHITE	SIGNAL IN
BLACK	DC POWER
GREEN	DC COMMON



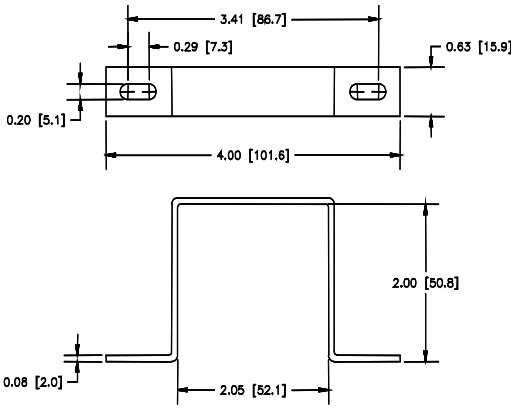
QB2-C2 option valves



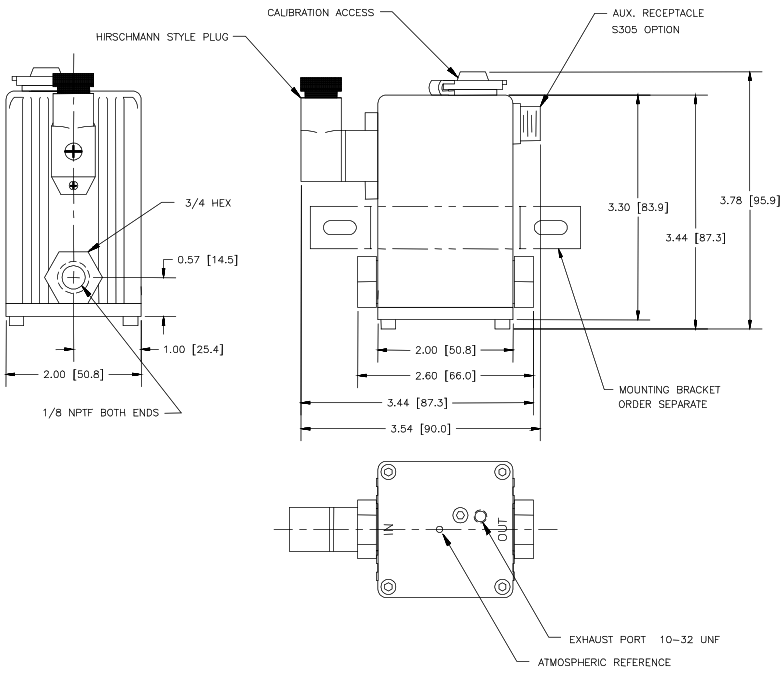
RATED INLET PRESSURE FOR STANDARD QBS VALVES

TABLE 1	
MAX. calibrated pressure:	**Max. inlet pressure:**
Vacuum only	5 PSIG
Vacuum up to 10 PSIG	15 PSIG
10.1 up to 30 PSIG	35 PSIG
31 up to 100 PSIG	110 PSIG
101 up to 150 PSIG	165 PSIG

DIMENSIONS in [mm]



MOUNTING BRACKET



QBT

ACCURACY	±0.2% F.S.	PRESSURE	Full Vac to 175 PSIG *(12 Bar)*
PORT SIZE	1/8"	MAX FLOW	1.2 SCFM *(34 SLPM)*

Example Part Number

QB	2	T	B	N	E	E	N	1	P	10	BR	G	3D	TF
	1		2	3	4	5	6	7	8	9	10	11	OPTIONS	

Section Reference

1	Type
1	Single Loop
2	Dual Loop

2	Manifold Material
B	Brass *(standard)*
A	Anodized Aluminum

3	Thread Type
N	NPT
P	BSPP

4	Input Signal Range
E	0 to 10 VDC
I	4 to 20 mADC
K	0 to 5 VDC
V	1 to 5 VDC
A	RS232 Serial Input*
B	RS485 Serial Input*

*Requires **X** for Monitor Signal (#5)

5	Output Signal Range
X	No Monitor
E	0 to 10 VDC
K	0 to 5 VDC*
V	1 to 5 VDC*[1]
C	4 to 20 mADC *(Sinking)*
S	4 to 20 mADC *(Sourcing)*

*Requires **E**, **I** or **K** for Input Signal Range (#4)

*[1]Requires **V** for Input Signal Range (#4)

6	Zero Offset
N	0% Pressure is Below Zero
P	0% Pressure is Above Zero
Z	0% Pressure is Zero *(Typical)*

7	Zero Offset Pressure
	Typical is 0* - If greater than 30% of full scale pressure *(#9 below)*, please consult factory.

*If **Z** for Zero Offset, Please Leave this Section (#7) Blank

8	Full Scale Pressure Type
N	100% Pressure is Below Zero
P	100% Pressure is Above Zero
Z	100% Pressure is Zero

9	Full Scale Pressure
	Must be less than or equal to 175 psig*

10	Pressure Unit *(no additional fee - all)*		
PS	PSI	Inches Hg	IH
MB	Millibars	Inches H_2O	IW
BR	Bar	Millimeters H_2O	MW
KP	Kilo-pascal	Kilograms/cm^2	KG
MP	Mega-pascal	Torr *(Requires A for Unit of Measure #11)*	TR
MH	Millimeters Hg	Centimeters H_2O	CW
PA	Pascal		

11	Pressure Unit of Measure
A	Absolute Pressure
D	Differential Pressure
G	Gauge Pressure

Safety Precautions

Please read all of the following Safety Precautions before installing or operating any Proportion-Air, Inc. equipment or accessories. To confirm safety, be sure to observe 'ISO 4414: Pneumatic Fluid Power - General rules relating to systems' and other safety practices.

Warning

Improper operation could result in serious injury to persons or loss of life!

1. **PRODUCT COMPATIBILITY**
   Proportion-Air, Inc. products and accessories are for use in industrial pneumatic applications with compressed air 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.
2. **EMERGENCY SHUTOFF**
   Proportion-Air, Inc. 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.
3. **EXPLOSIVE ATMOSPHERES**
   Products and equipment should not be used where harmful, corrosive or explosive materials or gases are present. Unless certified, Proportion-Air, Inc. products cannot be used with flammable gases or in hazardous environments.
4. **AIR QUALITY**
   Clean, dry air is not required for Proportion-Air, Inc. products. However, a 40 micron particulate filter is recommended to prevent solid contamination from entering the product.
5. **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.
6. **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.
7. **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.

Caution

Improper operation could result in serious injury to persons or damages to equipment!

1. **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.
2. **THREAD SEALANT**
   To prevent product contamination, thread tape is not recommended. Instead, a non-migrating thread sealant is recommended for installation. Apply sealant a couple threads from the end of the pipe thread to prevent contamination.
3. **ELECTRICAL CONNECTION**
   To prevent electronic damage, all electrical specifications should be reviewed and all electrical connections should be verified prior to operation.

Exemption from Liability

1. **Proportion-Air, Inc.** is exempted from any damages resulting from any operations not contained within the catalogs and/or instruction manuals and operations outside the range of its product specifications.
2. **Proportion-Air, Inc.** is exempted from any damage or loss whatsoever caused by malfunctions of its products when combined with other devices or software.
3. **Proportion-Air, Inc.** and its employees shall be exempted from any damage or loss resulting from earthquakes, fire, third person actions, accidents, intentional or unintentional operator error, product misapplication or irregular operating conditions.
4. **Proportion-Air, Inc.** and its employees shall be exempted from any damage or loss, either direct or indirect, including consequential damage or loss, claims, proceedings, demands, costs, expenses, judgments, awards, loss of profits or loss of chance and any other liability whatsoever including legal expenses and costs, which may be suffered or incurred, whether in tort (including negligence), contract, breach of statutory duty, equity or otherwise.

Warranty

Proportion-Air, Inc. 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.