

## INSTALLATION & MAINTENANCE INSTRUCTIONS

### High Resolution Electro-Pneumatic Pressure Regulator

#### DESCRIPTION / IDENTIFICATION

The QPV1 series valve uses closed loop technology for pressure control. It gives an output pressure proportional to an electrical command signal input.

The QPV1 is a complete closed loop control valve 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 inlet valve operates proportionally to the command supplied by the 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 exhaust solenoid is a standard ON/OFF solenoid and allows excess media to be vented from the system.

The pressure output is measured by an internal pressure transducer and provides a feedback signal to the electronic controls. The QPV2 uses an external pressure transducer to maintain pressure downstream should the application need to be further downstream from the QPV. This external feedback is sent to the electronic controls. This feedback signal is compared with the command signal input. A difference between the two signals causes one of the valves to open, allowing flow in or out of the system. Accurate pressure is maintained by controlling these two valves.

A monitor output is provided for the system measurement. All QPV1 valves come standard with an analog voltage monitor output. QPV1 monitor output is an amplified signal from the internal pressure transducer.

#### 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 BLOCKAGES AND FAILURES.**

2. Install the in-line filter into the port labeled IN on QPV1 valve.
3. Connect supply line to the in-line filter port. See
4. TABLE 1 for rated inlet pressure.
5. Connect device being controlled to port labeled OUT on QPV1 valve.
6. 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.
7. Proceed with electrical connections.

#### VACUUM UNITS

1. Connect vacuum supply to the "1/8" nipple" in the exhaust port at the bottom of the unit.
2. Leave inlet "IN" port open to atmosphere.
3. Connect the outlet "OUT" port to the device being controlled.
4. Proceed with electrical connection.



**QPV1M**  
Electronic Pressure Regulator

#### SPECIFICATIONS

##### ELECTRICAL

SUPPLY VOLTAGE	15-24 VDC
SUPPLY CURRENT	350 mA
COMMAND SIGNAL VOLTAGE	0-10 VDC
COMMAND SIGNAL IMPEDANCE	10 KΩ
ANALOG MONITOR SIGNAL VDC	0-10 VDC

##### MECHANICAL

PRESSURE RANGES	Full Vacuum - 150 psig (760 mmHg (vac) - 10.34 Bar)
OUTPUT PRESSURE†	0-100% of range
FLOW RATE	Based on inlet valve orifice size SEE ORDERING INFORMATION
Min CLOSED END VOLUME	1 in <sup>3</sup>
PORT SIZE	1/8" NPT
FILTRATION RECOMMENDED	40 Micron (included)
LINEARITY/HYSTERESIS	<±0.02% F.S. BFSL
REPEATABILITY	<±0.02% F.S.
ACCURACY	<±0.2% F.S.
RESOLUTION	Up to ±0.005% F.S.

##### WETTED PARTS ‡

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

##### PHYSICAL

OPERATING TEMPERATURE	32-158°F (0-70°C)
WEIGHT	1.02 lb. (0.50 Kg)
TEMPERATURE EFFECT	±25°C = ±0.7%
PROTECTION RATING	IP65
HOUSING	Aluminum
FINISH	Black Anodized

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

# QPV1

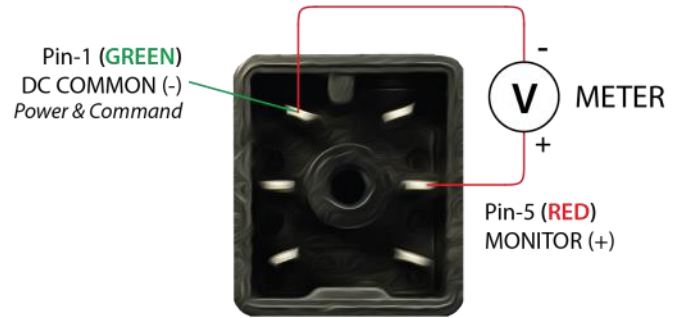
## ELECTRICAL CONNECTIONS

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 THE FACTORY WIRED QBT POWER CORD.**

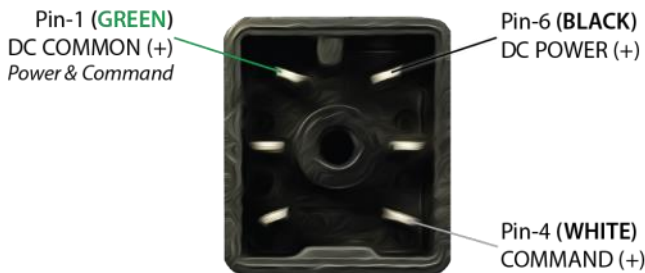
## MONITOR SIGNAL CONFIGURATIONS

### Voltage Monitor (IE or EE)

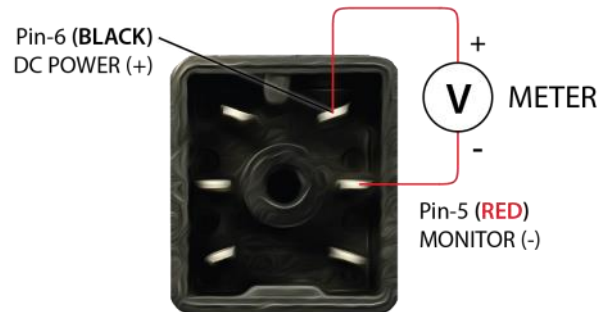


## COMMAND SIGNAL CONFIGURATIONS

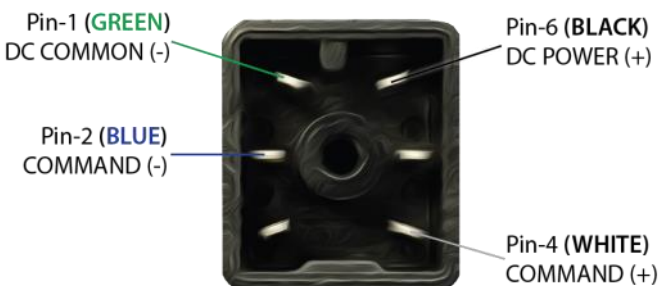
### VOLTAGE COMMAND VALVES (E, K, V)



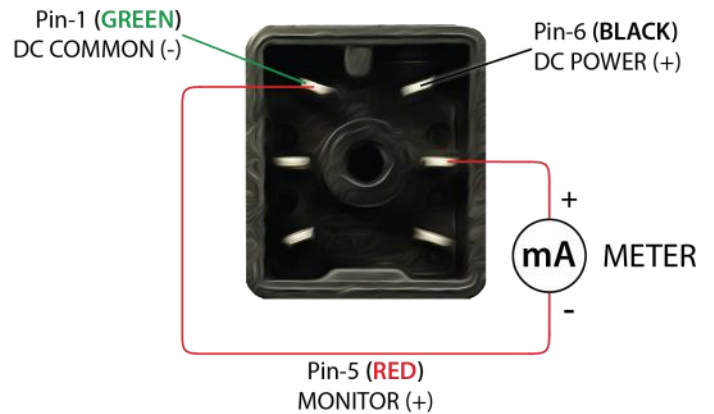
### CURRENT Sinking Monitor (EC or IC)



### CURRENT COMMAND VALVES (I)



### CURRENT Sourcing Monitor (ES or IS)



# QPV2

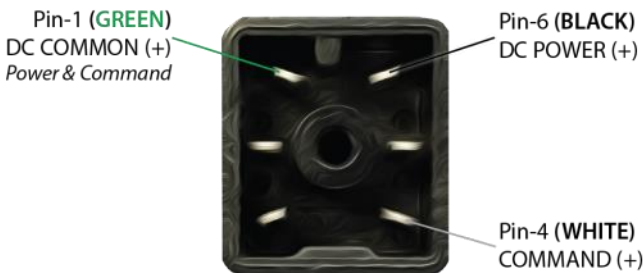
## ELECTRICAL CONNECTIONS

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.

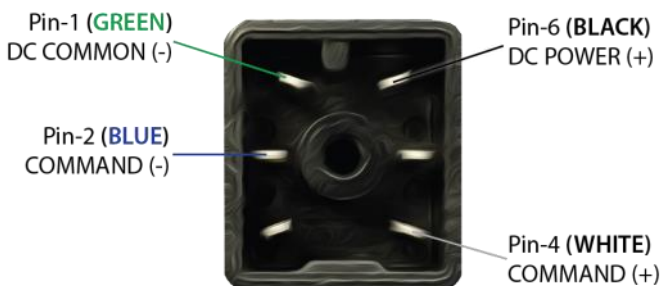
**NOTE: ALL COLOR CODES RELATE TO THE FACTORY WIRED QBT POWER CORD.**

## COMMAND SIGNAL CONFIGURATIONS

### VOLTAGE COMMAND VALVES (E, K, V)



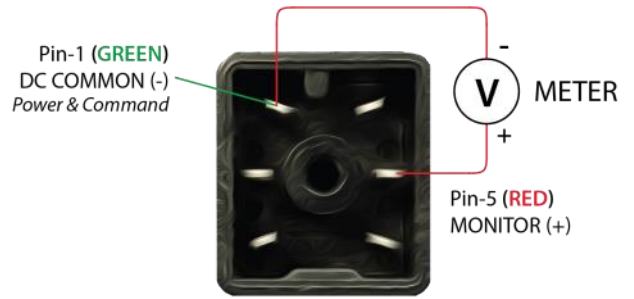
### CURRENT COMMAND VALVES (I)



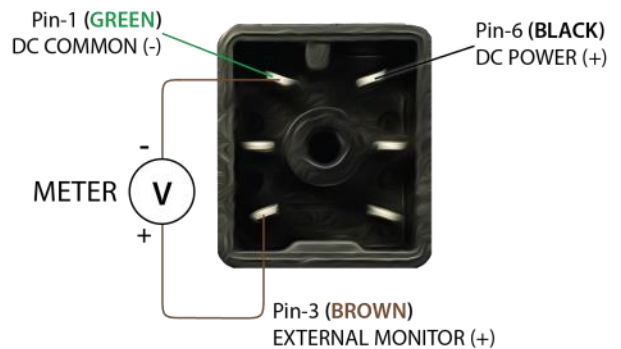
## MONITOR SIGNAL CONFIGURATIONS

### Voltage Monitor (E, K, V)

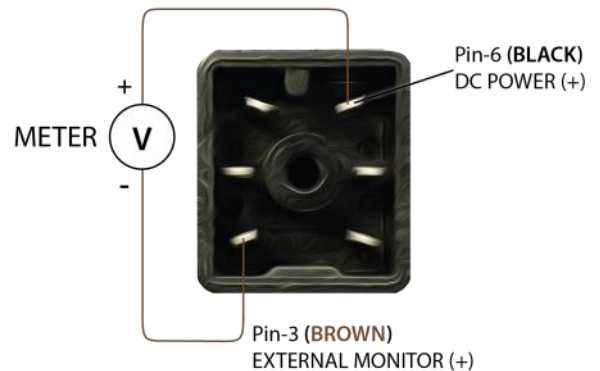
#### Monitoring the Internal Sensor



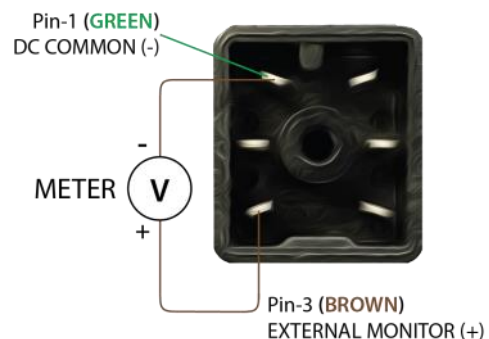
#### Monitoring the External Sensor



### Current Sinking Monitor (C)



### Current Sourcing Monitor (S)



## RE-CALIBRATION PROCEDURE - QPV1 - call factory for QPV2

All QPV1 control valves come calibrated from the factory by trained personnel using precision calibration equipment. The QPV 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 QPV1 valve appears to be out of calibration by more than 1%, it is not likely to be the QPV1. 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 QPV1 valve needs re-calibration, use the procedure described below:

### QPV1 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 QPV1.
3. Connect the correct supply source to the IN port of the QPV1, making sure the pressure does not exceed the rating for the valve.
4. Locate the plastic calibration access cap on top of the QPV1 valve and completely remove it. Located underneath are two adjustment trim pots, Zero "Z" and Span "S". See figure 1 for pots location.

NOTE: The QPV1 uses an advanced analog PID circuit to modulate the internal solenoid valves. These four potentiometers (Proportional, Integral, Bias and Exhaust Trip Point) are set at the factory and should not require adjustment. These settings are based on the specific parameters of your application. If the response of the QPV1 requires adjustment, contact the factory for special instructions.

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 QPV1 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 QPV1.
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 QPV1 valve is calibrated back to proper range. Step 7 - 10.
12. Replace calibration access cap.
13. Set the electrical command input to MAXIMUM value.
14. Adjust the SPAN pot until MAXIMUM desired pressure is reached (clockwise *increases* pressure).
15. Set the electrical command input to MINIMUM value.
16. Adjust the ZERO pot until MINIMUM desired pressure is reached (clockwise *increases* pressure).
17. Repeat ZERO and SPAN adjustments, which interact slightly, until QPV1 valve is calibrated back to proper range. Step 7 - 10.
18. Replace calibration access cap.

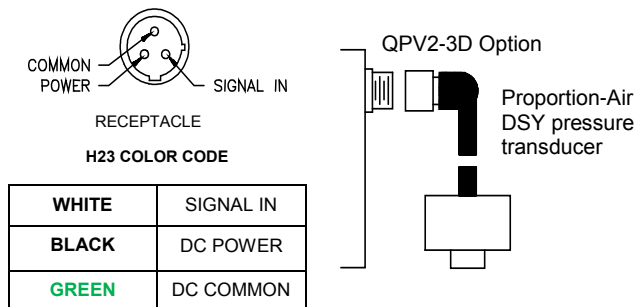
**TABLE 1**

**RATED INLET PRESSURE FOR STANDARD QPV VALVES**

For valves ordered with Max. calibrated pressure of:	Max. inlet pressure is:
Vacuum up to 10 psig (0.69 bar)	Consult factory
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 (6.96 up to 10.3 bar)	160 psig (11 bar)

### QPV2 SECOND LOOP CONNECTIONS

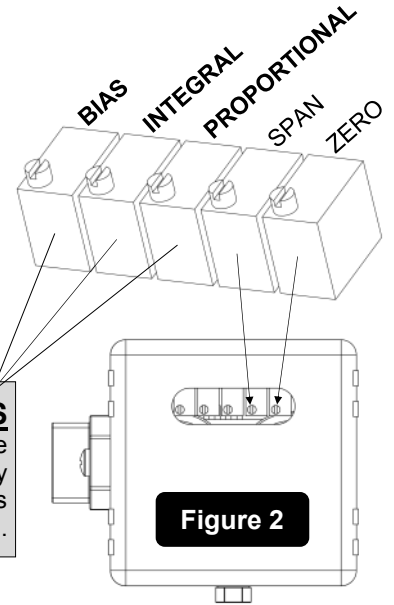
Second loop signal is plugged into auxiliary receptacle on opposite side.



**PROPORTIONAL:** This is the actual difference between the command and pressure transducer feedback. This POT controls the amount of that error signal that gets to the control circuit. Like a volume on a radio, the higher the POT setting the more the 'real time' error signal affects the output.

**BIAS:** Opens up the resistance window to allow the valves to adjust a little slower. The higher the Bias, the less pressure is needed to open the inlet valve. The Bias provides a steady state current to the valve to get it closer to opening with zero command. Clockwise increases the current to the valve and counterclockwise decreases the current. A setting of Zero is often acceptable. Less bias generally does not negatively impact the operation of the unit unless the system flow rates are relatively high compared with the full flow capability of the valve.

**INTEGRAL:** Any steady state error signal present between the command signals versus the feedback signal, is integrated over time until a control action balances it. In essence, it reaches equilibrium with the system which allows the inlet valve to be slightly open to maintain pressure in the system due to a leak or a system process. The integral sets the amount of this signal that is fed to the valve control. If this signal is too high it will cause the unit to slowly oscillate (loping sound from the unit).

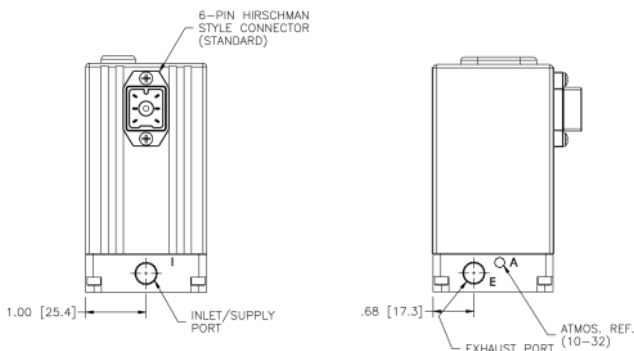


**PID SETTINGS**  
 PID pots Should not require adjustment. Set at the factory based on specific parameters of your Application.

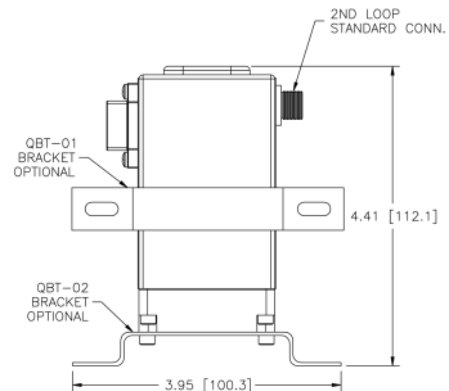
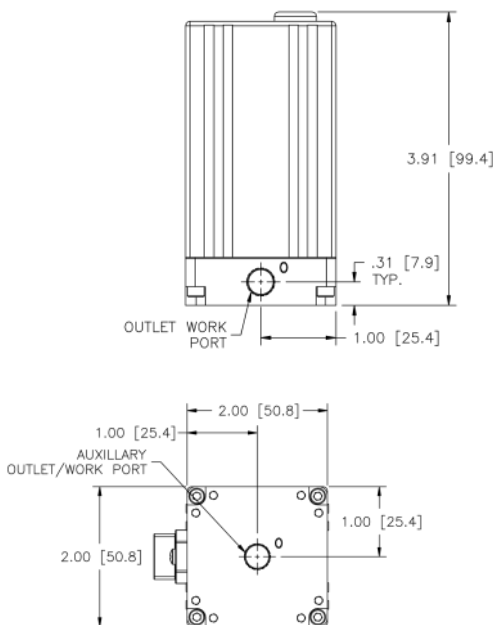
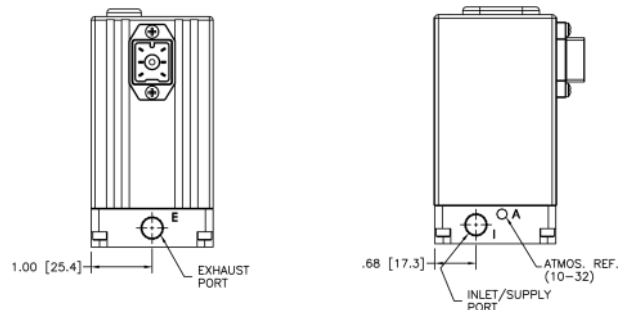
Figure 2

QPV DIMENSIONS in [mm]

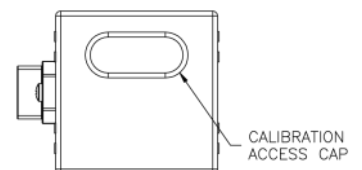
Pressures up to 100 PSIG



Pressures above 100 PSIG



Only for QPV1T\_\_EE without digital display  
 And for QPV1M\_\_EE without digital display



ACCURACY	±0.2% F.S.	PRESSURE	Full Vac to 150 PSIG (10 Bar)													
PORT SIZE	1/8"	MAX FLOW	1 SCFM (28 SLPM)													
QPV	2	M	B	N	E	E	Z	P	10	BR	G	A	X	L	3D	TF
	1		2	3	4	5	6	7	8	9	10	11	12	13	14	OPTIONS

**QPV<sup>M</sup> Utilizes the new style manifold with dual output ports and threaded manifold.**

Section Reference

1 Type	
1 Single Loop	
2 Dual Loop	
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* <sup>1</sup>	
B RS485 Serial Input* <sup>1</sup>	
N Ethernet (TCP/IP)* <sup>2</sup>	
P P2 Profiler (Integrated)	
*Requires V for Monitor Signal (#5)	
*Requires X for Monitor Signal (#5)	

2 Manifold Material	
B Brass	
A Anodized Aluminum	
5 Output Signal Range	
X No Monitor	
E 0 to 10 VDC	
K 0 to 5 VDC*	
V 1 to 5 VDC* <sup>1</sup>	
C 4 to 20 mADC (Sinking)* <sup>2</sup>	
S 4 to 20 mADC (Sourcing)* <sup>2</sup>	
*Requires E, I or K for Input Signal Range (#4)	
*Requires V for Input Signal Range (#4)	

3 Thread Type
N NPT
P BSPP

6 Zero Offset
N 0% Pressure is Below Zero (Requires L Option #14)
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 150 psig

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

11 Pressure Unit of Measure
A Absolute Pressure (Requires L Option #14)
D Differential Pressure
G Gauge Pressure

12 Inlet Valve	
A 0.013" (proportional valve)	
B 0.025" (proportional valve)	
C 0.040" (proportional valve)	
D 0.060" (proportional valve)	
E 0.089" (proportional valve)	
N No Inlet Valve*	
X 0.040"* (digital valve)	
*Vacuum Pressure Units Only	

13 Outlet Valve	
A 0.013"* (proportional valve)	
B 0.025"* (proportional valve)	
C 0.040"* (proportional valve)	
D 0.060"* (proportional valve)	
E 0.089"* (proportional valve)	
N No Exhaust Valve	
X 0.040"* (digital valve)	
*Vacuum Pressure Units Only	

**PLEASE CONTACT FACTORY FOR VALVE & ORIFICE SELECTION**

Inlet valve orifice size and the exhaust valve are factory determined based on the application's flow and pressure specs. Bleed orifice is required when the QPV is used in an application that is static (no flow). Dynamic applications (under flow) do not require a bleed orifice to function properly. Please consult our Application Engineering Department for your specific application needs. We are here to help you.

Recommended Accessories	
QBT-C-6	6 ft. Power/Command/Monitor Cable
QBT-01	Wrap-Around Mounting Bracket
QBT-02	Foot-Mount Bracket (Use Option BR to Have Installed)

14 Bleed Orifice
N No Bleed Orifice
L Factory Standard Bleed Orifice (0.004")
2 Non-Standard Bleed Orifice (0.002")



**QPV1M**  
Electronic Pressure Regulator  
- Shown with optional Digital Display  
- Use Option 'DD' at end of part number





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

- 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.
- Proportion-Air, Inc.** is exempted from any damage or loss whatsoever caused by malfunctions of its products when combined with other devices or software.
- 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.
- 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.

#### PROPORTION-AIR, INC.

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