PROPORTION-AIR

INSTALLATION, OPERATION AND MAINTENANCE GUIDE

QB3 Electro-Pneumatic Pressure Regulator

Specifications

Electrical

Supply voltage	15-24 VDC
Supply current	100-250 mA*
Command signal	0-10 VDC | 4-20 mA
Command signal impedance	VDC=10 KΩ | Current = 100 Ω
Monitor voltage	0-10 VDC @ 20 mA max
Monitor current	4-20 mADC sinking or sourcing

Mechanical

Inlet pressure	Vacuum-165 psig
Pressure ranges†	Vacuum-150 psig (10.3 bar)
Output pressure	0-100% of range
Flow rate	30 SCFM (850 LPM)
Min closed end volume	3 in^3
Port size	1/4" NPT (BSPP available)
Filtration recommended	100 micron (ordered separately)
Linearity/Hysteresis	±0.5% F.S.
Accuracy (Pressure)	±0.25 to ±0.5% F.S.
Accuracy (Monitor)	±0.3% F.S.

Wetted Parts

Elastomers‡	Viton and Buna-N
Manifold	Nickel-Plated Aluminum or Nickel-Plated Brass
Valves	430FR SS, Nickel-Plated Brass
Pressure transducer	High temp polyamide, alumina ceramic, epoxy, RTV and silicon

Physical

Operating temperature	32-158° F (0-70° C)
Weight	1.5 lbs (0.68 Kg)
Housing	Anodized aluminum
Connector‡	6-pin Hirschmann

Approvals

CE compliant, except for models with Modbus TCP, Ethernet/Proportion-Air, Modbus RS232, Modbus RS485, P2 Profiler and digital display.

**Some options require more current.*
†Pressure ranges are customer-specified.
‡Others available.
Please consult factory with questions.

INSTALLATION

1. Apply a small amount of anaerobic sealant to the male threads of the in-line filter. A typical 100 micron in-line filter (ordered separately) is recommended.
2. Install the in-line filter into the port labeled I on QB3 valve.
3. Connect device being controlled to port labeled O on QB3 valve.
4. For vacuum or vacuum through positive pressure units, the vacuum supply should be connected to the E exhaust port of the QB3. Positive pressure is required on the inlet with vacuum units. FOR ANY QUESTIONS, PLEASE CALL THE FACTORY.
5. For positive pressure only units, 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. CAUTION: USE ONLY THE THREAD SEALANT PROVIDED IF USING THE PIPE PLUG. OTHER SEALANTS, SUCH AS PTFE TAPE AND PIPE DOPE, CAN MIGRATE INTO THE FLUID SYSTEM CAUSING FAILURES.
6. For QB3, there is one outlet port on the side of the unit. An alternative exhaust port can be plugged with 1/16 NPT pipe plug (provided) when not using manifold mount.
7. Mount the valve accordingly. For low-pressure QB3 units (<30 psi), mount upright to ensure proper functionality. For all other scenarios, 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. The QB3 also can be manifold mounted.
8. Proceed with electrical connections.

WARNING

These products are intended for use in industrial compressed gas systems only. Do not use these products where pressures and temperatures exceed the specifications listed.

ELECTRICAL CONNECTIONS

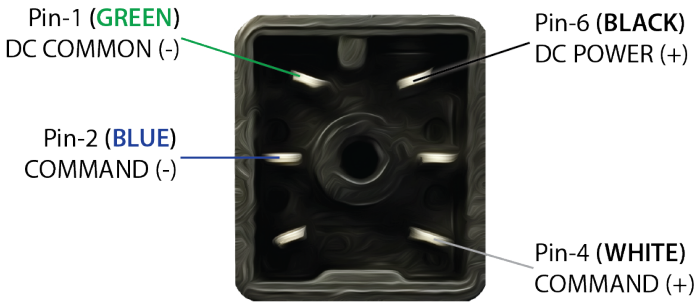
1. Turn off all power to valve.
2. Identify the valve's command input and analog output using the calibration card included in the package and the ordering information section later in this booklet.
3. Proceed to the appropriate section corresponding to the type of valve being installed.

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

Command Signal Configurations

Voltage and Current Command (E, I, K, V)

All voltage command QB3's use a differential command. If a single ended voltage will be used, tie the command return wire to DC common. Current command also uses a differential loop where the command flow is from Pin 4 to Pin 2. Some applications may require the common of the device that provides loop power for the 4-20mA command to be tied to power supply common.



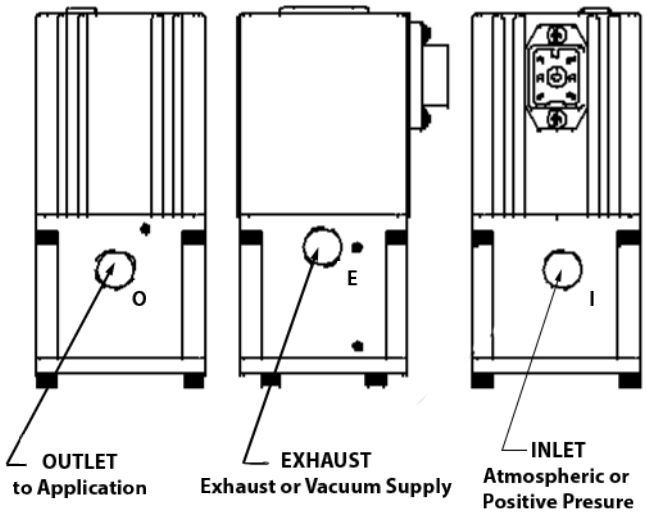
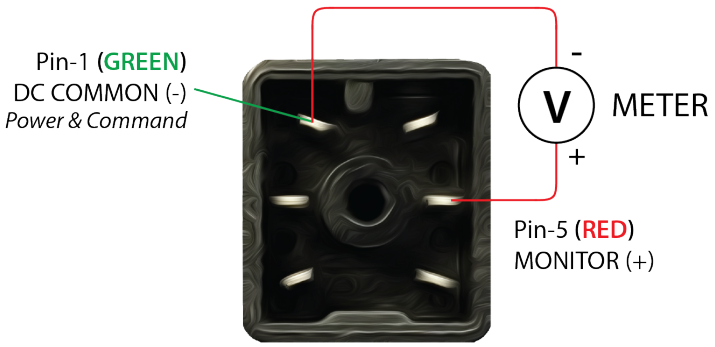


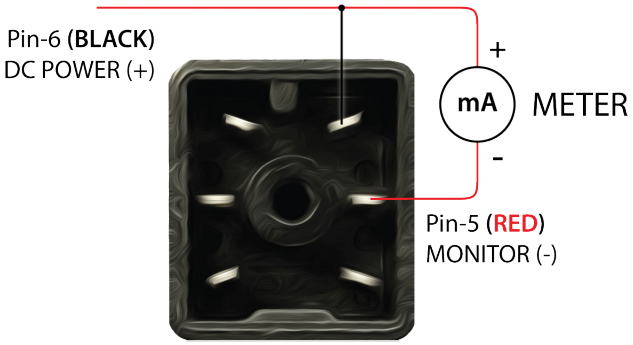
Figure 1

Monitor Signal Configurations

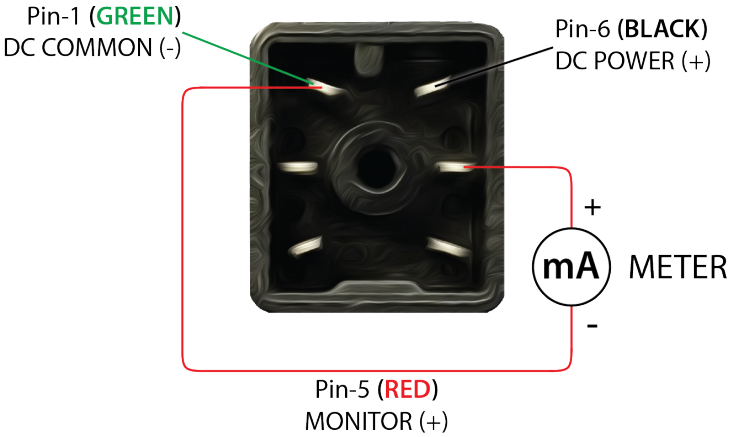
Voltage Monitor (E, K, V)



Current Sinking Monitor (C)



Current Sourcing Monitor (S)



RE-CALIBRATION PROCEDURE

All QB3 control valves come calibrated from the factory by trained personnel using precision calibration equipment. The QB3 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 QB3 valve appears to be out of calibration by more than 1%, it is not likely to be the QB3. 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 QB3 valve needs re-calibration, use the following procedure and information.

Table 1
Rated Inlet Pressure for Standard QB3 Valves

Max Calibrated Pressure	Max Inlet Pressure
Vacuum only	20 psig (0.34 bar)
Vacuum to 10 psig	30 psig (1.0 bar)
10.1 to 30 psig (0.70 to 2 bar)	50 psig (2.4 bar)
31 to 100 psig (2.1 to 7 bar)	110 psig (7.6 bar)
101 to 150 psig (7 to 10.3 bar)	165 psig (11.4 bar)

1. Wire control valve according to the "Electrical Connections" section.
2. Connect a precision measuring gauge or transducer to the outlet port of the QB3. NOTE: THERE MUST BE A CLOSED VOLUME OF AT LEAST 3 CU. IN BETWEEN THE VALVE OUTLET AND THE MEASURING DEVICE FOR VALVE TO BE STABLE.
3. Plumb control valve according to "Installation" section. Make sure supply pressure does not exceed the rating for the valve (see table 1).
4. On the printed circuit board, locate the two adjustment potentiometers SPAN and ZERO. (See figure 2)
5. ONLY USE THIS STEP IF DEVICE IS COMPLETELY OUT OF CALIBRATION. IF IT IS SLIGHTLY OUT OF CALIBRATION, PROCEED TO STEP 6. With 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.
6. Set the electrical command input to MAXIMUM value.
7. Adjust the SPAN potentiometer until MAXIMUM desired pressure or vacuum is reached (clockwise to increase pressure).
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. (clockwise increases pressure).
10. If at any time during the calibration procedure the control valve oscillates or becomes unstable for more than one second, turn the HYSTERESIS potentiometer 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 5-10 until no error exists.
12. Verify unit shuts off by going to zero command. Check linearity by going to at least six pressure points throughout the full range.

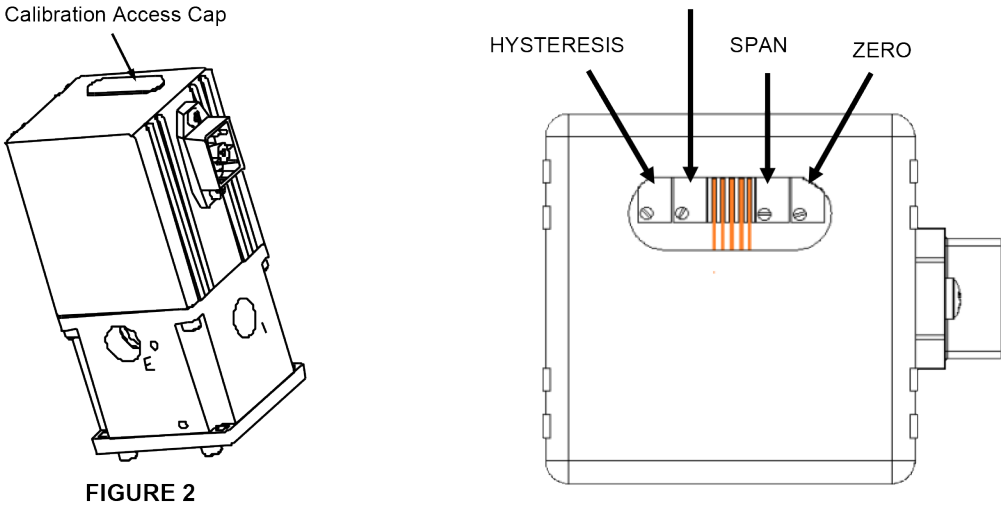
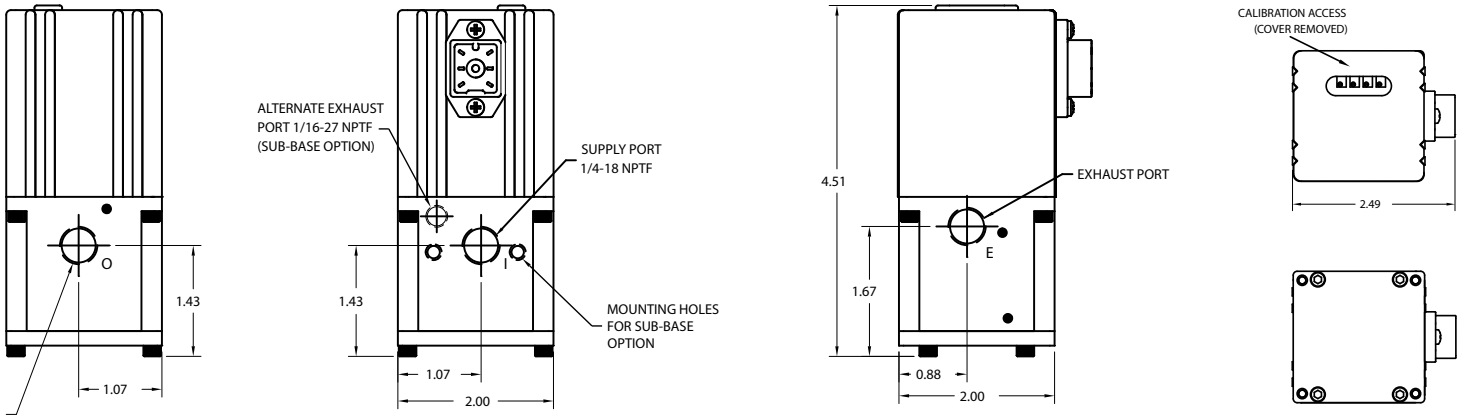


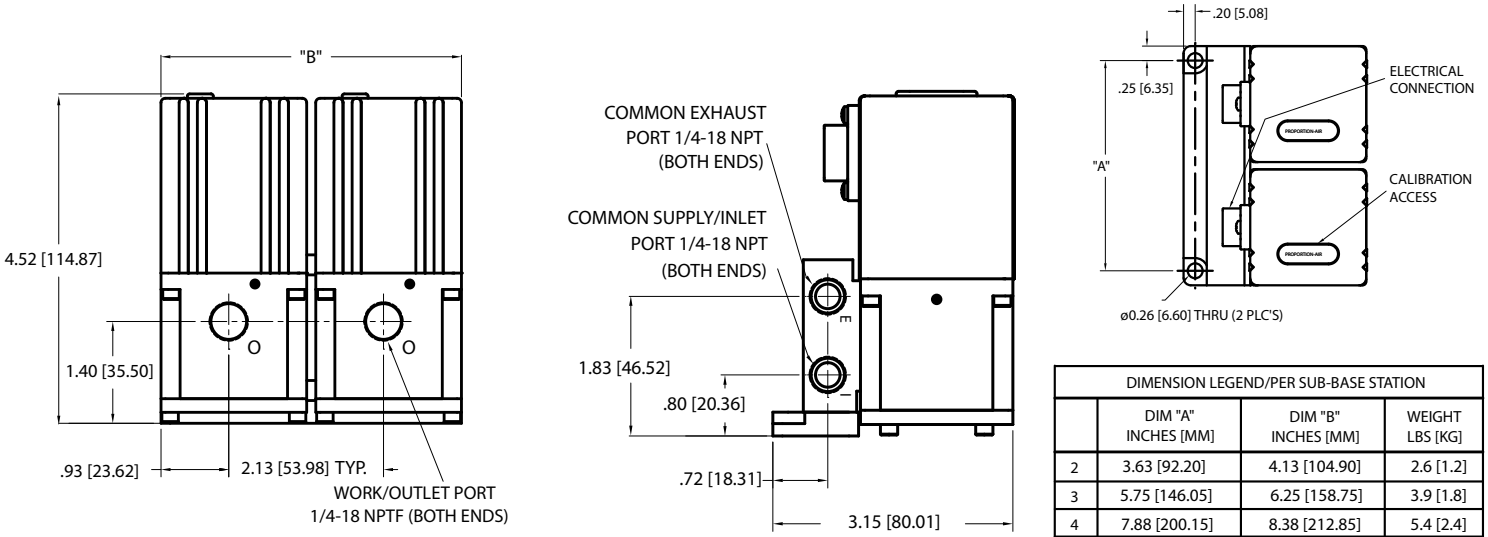
FIGURE 2

DIMENSIONS

Single Valve



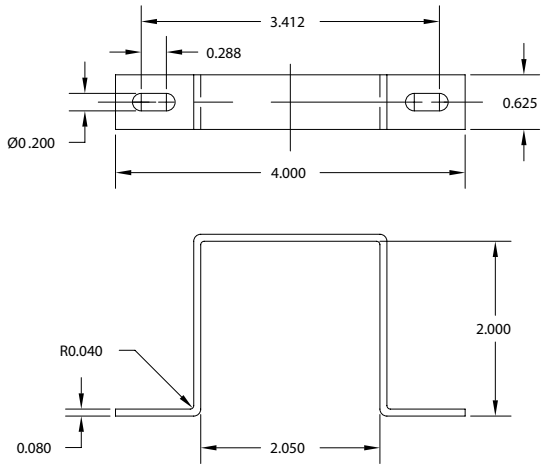
Manifold Mounting



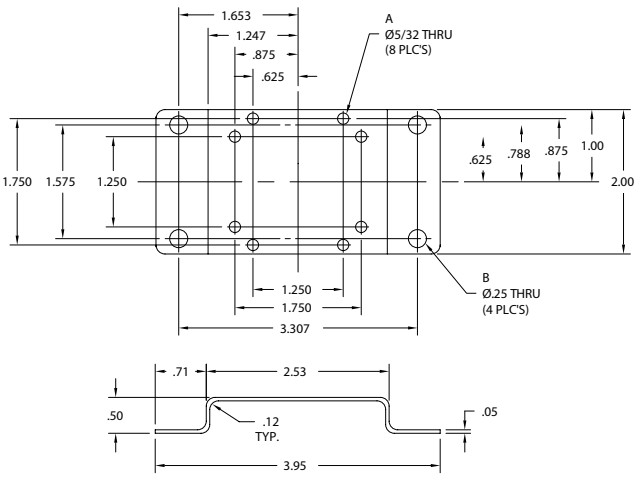
DIMENSION LEGEND/PER SUB-BASE STATION			
	DIM "A" INCHES [MM]	DIM "B" INCHES [MM]	WEIGHT LBS [KG]
2	3.63 [92.20]	4.13 [104.90]	2.6 [1.2]
3	5.75 [146.05]	6.25 [158.75]	3.9 [1.8]
4	7.88 [200.15]	8.38 [212.85]	5.4 [2.4]
5	10.00 [254.00]	10.50 [266.70]	6.5 [2.9]
6	12.13 [308.10]	12.63 [320.80]	7.8 [3.5]

Mounting Brackets

QBT-01 Wrap-Around



QBT-03 Foot Mount



CONFIGURATION

QB3

Example Part Number

ACCURACY	±0.5% F.S.	PRESSURE	Full Vac to 150 PSIG *(10 Bar)*
PORT SIZE	1/4"	MAX FLOW	30 SCFM *(850 SLPM)*

Section ->	1	2	3	4	5	6	7	8	9	10	11	OPTIONS
QB	3	T	A	N	E	E	Z		P	90	PS	G	TF

1 Type

T	-14.7 to 150 psi

2 Manifold Material

A	Nickel-Plated Aluminum
B	Nickel-Plated Brass*

*Includes O2 Cleaning

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*
N	Ethernet/Proportion-Air*[1]
A	Modbus RS232 Input*[1]
B	Modbus RS485 Input*[1]
P	P2 Profiler *(Integrated)*

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

*[1]Requires **X** for Monitor Signal (#5)

5 Output Signal Range

X	No Analog 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 150 psig*

*If Full Scale Pressure is ≤ 15" H_2O. Please add $150

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
G	Gauge Pressure

SAFETY PRECAUTIONS

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

WARNING

Improper operation could result in serious injury 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, 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 100 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 people or damage 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 eighteen (18) months 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.

THE WARRANTY IS GIVEN IN-LIEU OF, AND BUYER HERBY EXPRESSLY WAIVES, WARRANTIES OR LIABILITIES, EXPRESS, 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.

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Handcrafted in the USA

ISO 9001-2015 Certified