PROPORTION-AIR

INSTALLATION, OPERATION AND MAINTENANCE GUIDE

MM Electro-Pneumatic Pressure Regulator

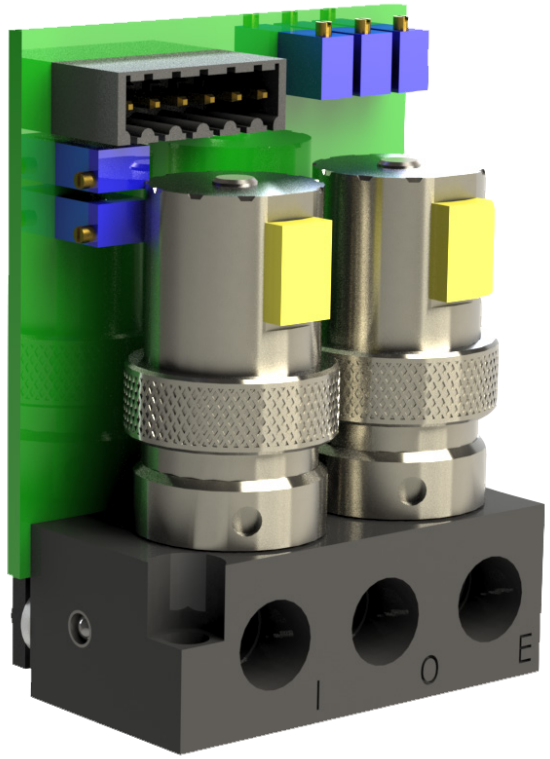
The MM series proportional control valves use Proportion-Air's closed loop technology to deliver pressure control that is linear and proportional to an electrical command signal.

The MM1 uses two solenoid valves to control system pressure. One valve functions as an inlet control, the other as an exhaust control. A pressure sensor measures system pressure and provides a feedback signal to the electronic controls, which is compared to the command signal. Difference between the two signals causes the valves to open or close allowing pressure in or out of the system.

The MM2 is similar to the MM1 but uses a double loop control scheme. In addition to the internal pressure transducer, the MM2 also receives a feedback signal (0-10 VDC standard) from an external sensing device. The external signal functions as the primary feedback and is compared to the command signal. Since the secondary feedback is a transduced signal, many types of transducers may be used as feedback such as pressure, force, position, flow, etc.

A 0-10 VDC monitor output is standard on both the MM1 and MM2 and can be used for tracking pressure.

The MM is designed to have "universal mounting" capabilities, which include DIN rail, panel mount, or manifold mounting for use on a sub-base for multiple unit applications. Sub-base configurations are available from 2-12 units (consult factory for more units). The sub-base offers a common supply and exhaust port with individually controlled outlet ports to minimize plumbing connections and maximize installation/maintenance efficiency.



Panel mount shown; manifold and DIN rail mounting available.

SPECIFICATIONS

Electrical

Supply voltage	15-24 VDC
Supply current	250 mA max
Command signal	0-10 VDC | 4-20 mA
Command signal impedance:	VDC = 4.75 Ω | Current = 100 Ω
Monitor signal	0-10 VDC @ 20 mA max

Physical

Operating temperature	32-158°F *(0-70°C)*
Weight:	
Brass	0.7 lbs (0.32 Kg)
Aluminum	0.45 lbs (0.21 Kg)
Overall dimensions	2.1" x 2.8" x 1.06"

Mechanical

Pressure ranges †	Vacuum-175 psig
Output pressure	0-100% of range
Flow rate	1.2 SCFM @ 100 psig output
Port size	1/8" NPT
Min closed end volume	1 in^3
Filtration recommended	40 Micron *(included)*
Linearity/Hysteresis	±0.15% F.S. BFSL
Repeatability	±0.02% F.S.
Accuracy	±0.2% F.S.

Wetted Parts ‡

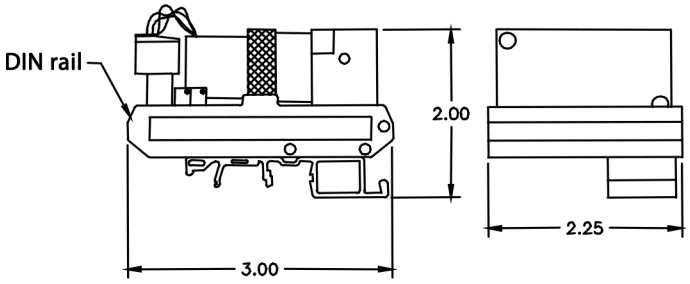
Elastomers	Fluorocarbon
Manifold	Brass or anodized aluminum
Solenoid valves	Nickel plated brass
Pressure transducer	Silicon, aluminum

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

INSTALLATION & DIMENSIONS

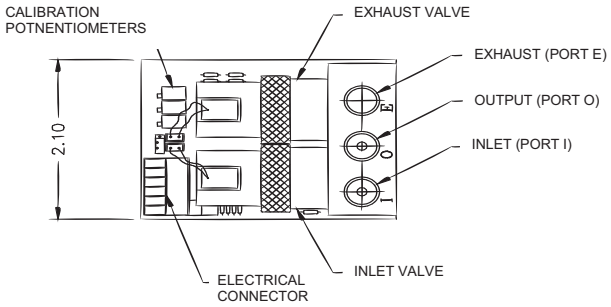
DIN RAIL MOUNTING

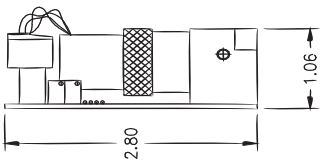
The DIN rail MM valve comes assembled to a DIN rail with a universal foot to allow all modules to be snapped onto all available DIN footprints.

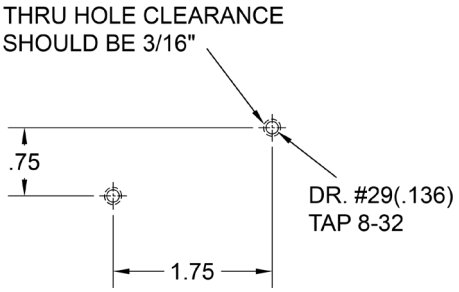


PANEL MOUNT

The panel mount MM valve can be assembled to a panel by inserting two 8-32 socket head cap screws into the manifold and torquing each screw into the panel.

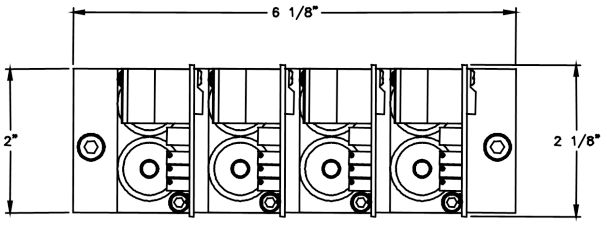


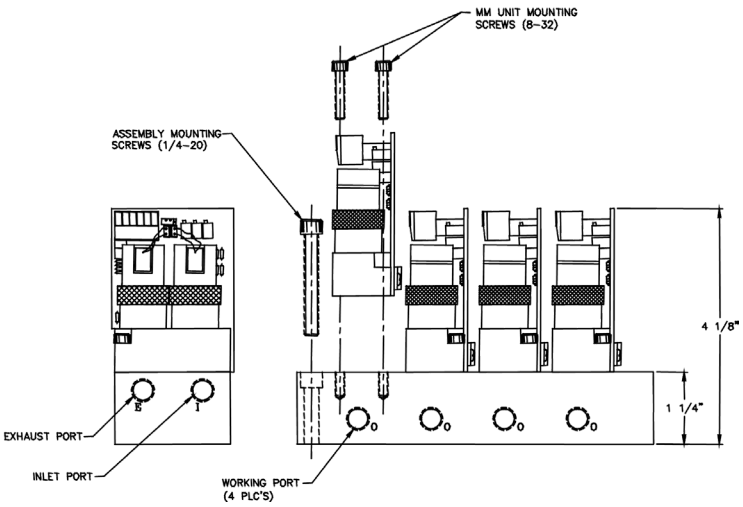




MAINFOLD MOUNT

1. Install the three O-rings in the O-ring grooves of the sub-base manifold.
2. Align the MM control valve over the three O-rings. Orientation of the MM unit should be the same for all MMs on the manifold and can be determined by the "I" and "E" marks on the MM brass manifold and the aluminum sub-base manifold.
3. Insert the two cap screws that hold the valve to the sub-base manifold. Torque each screw to 8 in-lbs. and then torque each cap screw to 13-15 in-lbs.
4. To install the sub-base manifold to a panel, use 1/4-20 socket head mounting screws.





PNEUMATIC CONNECTIONS

1. *THIS STEP ONLY APPLIES TO UNITS THAT ARE NOT MANIFOLD MOUNTED TO A SUB-BASE.* Apply a small amount of anaerobic sealant to the male threads of the in-line filter supplied with the MM. Units with HQ option are not shipped with in-line filter.
2. Connect supply pressure to port labeled I; not to exceed rated supply pressure (Table 1). For units with High Flow options HE, HI, HQ, the supply and exhaust ports are reversed; connect as stamped on manifold.
3. If this is a vacuum or vacuum through positive pressure unit, connect vacuum supply to E exhaust port. Positive pressure is not required on the inlet with vacuum only units. FOR ANY QUESTIONS, CALL THE FACTORY.
4. Connect the outlet O port to the device being controlled.

Table 1
Rated Inlet Pressure for Standard MM Valves

Max Calibrated Pressure	Max Inlet Pressure
-1 up to 1 psig	Consult factory
Vacuum to 30 psig (0.70 to 2 bar)	35 psig (2.4 bar)
31 to 100 psig (2.1 to 7 bar)	110 psig (7.6 bar)
101 to 175 psig (7 to 12.1 bar)	190 psig (13.1 bar)

ELECTRICAL CONNECTIONS

1. Turn off all power to valve.
2. See chart below for a list of the connector pins.
3. Identify the valve's command input and monitor output by referring to the calibration card.
4. Proceed to the section that relates to electrical connections as found on calibration card. PLEASE REFER TO THIS GUIDE TO IDENTIFY COMMAND AND MONITOR SIGNAL.

Connector Label	Function
GND	DC Common
P+	DC Power
C+	Command +
C-	Command -
M	Monitor
L2	2nd Loop In

Input Signal Selection

To change the MM input signal, remove the jumper and place it on the type of command required for your application.

Jumper **E** is 0-10 VDC
Jumper **I** is 4-20mA

Input Signal: E, K or V

All voltage command MMs use common mode voltage, meaning the DC common pin is the common reference for both power and command.

GND	P+	C+	C-	M	L2
DC Common (Power and Command)	DC Power	0-10 VDC Command +			

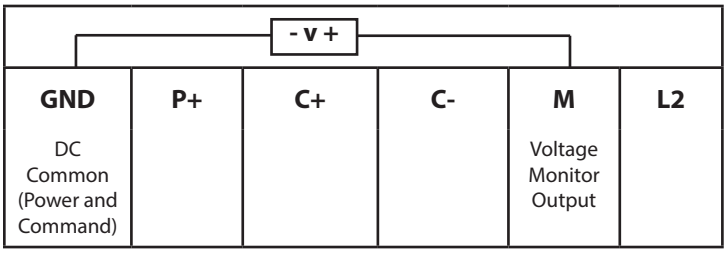
Input Signal: I

All current command MMs use a differential current loop scheme, meaning current flow is from C+ to C- on the MM valves.

GND	P+	C+	C-	M	L2
DC Common (Power and Command)	DC Power	4-20mA Command +	4-20mA Command -		

Monitor Signal: E, K or V

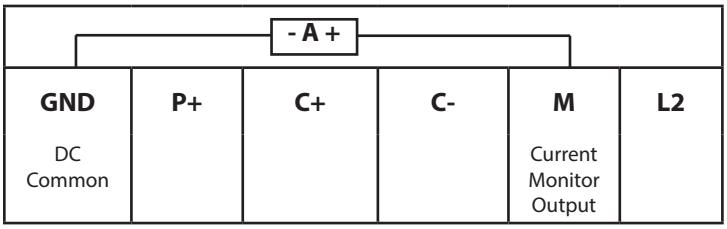
Use the following wiring diagram for MM units with voltage monitor feedback



Monitor Signal: S

Use the following wiring diagram for MM units with current monitor feedback

CURRENT SOURCING

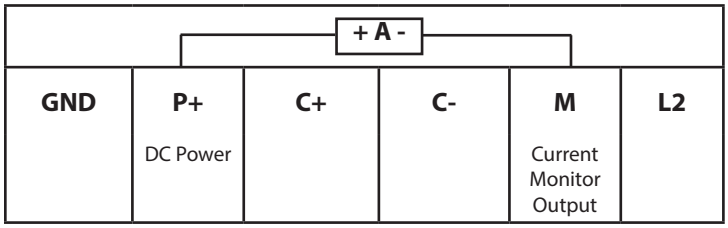


ELECTRICAL CONNECTIONS

Monitor Signal: C

Use the following wiring diagram for MM units with current monitor feedback

CURRENT SINKING



RE-CALIBRATION PROCEDURE

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

MM1 VALVES

1. Wire control valve according to the "Electrical Connections" section.
2. Connect a precision measuring gauge or transducer to the outlet port of the MM. **NOTE: THERE MUST BE A CLOSED VOLUME OF AT LEAST 1 CU. IN BETWEEN THE VALVE OUTLET AND THE MEASURING DEVICE FOR VALVE TO BE STABLE.**
3. Plumb control valve according to "Pneumatic Connections" section. Make sure supply pressure does not exceed the rating for the valve (Table 1).
4. On the printed circuit board, locate the two adjustment potentiometers labeled S (span adjust) and Z (zero adjust). See Figure 1.
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 MM 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 to increase 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 labeled H 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.

MM2 SECOND LOOP

All MM2 valves are designed to accept a 0-10VDC second loop input signal. Wire the external feedback signal to pin L2 on the electrical connector.

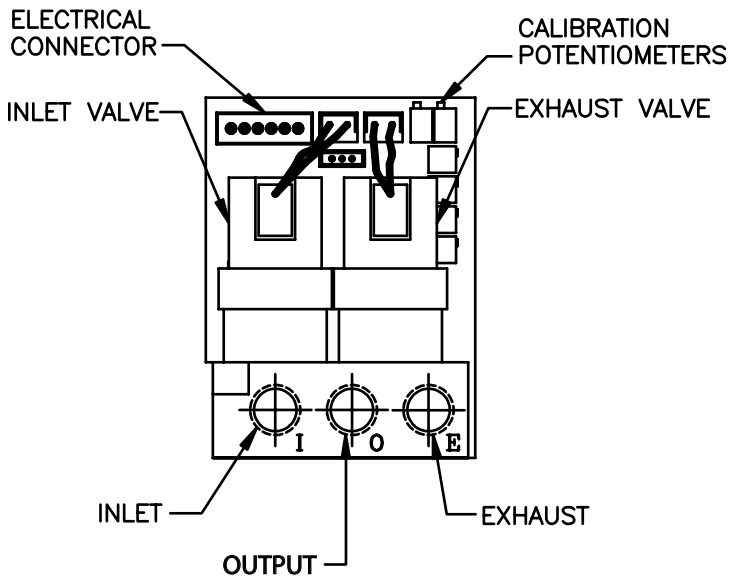


Figure 1

CONFIGURATION

MM

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	MM	2	P	B	N	E	E	Z		P	7	BR	G	3D	TF
Section Reference ->		1	2	3	4	5	6	7	8	9	10	11	12	OPTIONS	

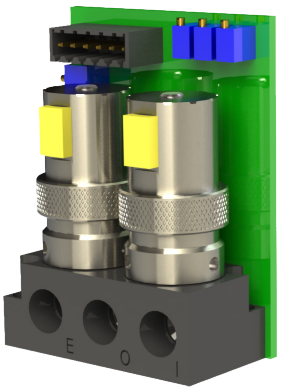
1	Type
1	Single Loop
2	Dual Loop

2	Mounting Type
D	DIN Rail (Ports on Face)
M	Manifold (Ports on Bottom)
P	Panel (Ports on Face)

3	Manifold Material
A	Anodized Aluminum
B	Brass (typical)

4	Thread Type
N	NPT
P	BSPP
H	Manifold Mount (no threads)

5	Command Signal Range
E	0 to 10 VDC
I	4 to 20 mADC
K	0 to 5 VDC
V	1 to 5 VDC *(Requires* **V** *for Monitor Signal #6)*



Please consult the factory for manifold options and pricing

6	Monitor Signal Range
X	No Monitor
E	0 to 10 VDC
K	0 to 5 VDC *(Requires* **E, I** *or* **K** *for Command Signal Range #5)*
V	1 to 5 VDC *(Requires* **V** *for Command Signal Range #5)*
C	4 to 20 mADC *(Sinking)*
S	4 to 20 mADC *(Sourcing)*

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

8	Zero Offset Pressure
Typical is 0* - If greater than 30% of full scale pressure *(#9)*, please consult factory.	
*If **Z** for Zero Offset, Please Leave this Section (#8) Blank	

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

10	Full Scale Pressure
Must be between less than or equal to 175 psig*	
*Adder if Full Scale Pressure is <13.5" H2O	

11	Pressure Unit		
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 #12)*	TR
MH	Millimeters Hg	Centimeters H_2O	CW
PA	Pascal		

12	Pressure Unit of Measure
A	Absolute Pressure
G	Gauge Pressure
D	Differential Pressure (Consult Factory)

Options	
DR	Install DIN Rail Mounting Kit
O2*	Oxygen Cleaned
O3	Oxygen Cleaned No O2
P1	12-VDC Power

*O2 cleaning only available on brass manifold.
Many other options are available. Please consult factory for more information.

Recommended Accessories	
H14612	Extra Power Connector *(Included with MM)*
DRKMT-01	DIN Rail Mounting Kit
PMK-MM	Panel Mounting Kit

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 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 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.

ProportionAir.com

8250 N 600 W

P.O. Box 218

McCordsville, IN 46055

info@proportionair.com

Handcrafted in the USA

ISO 9001-2015 Certified