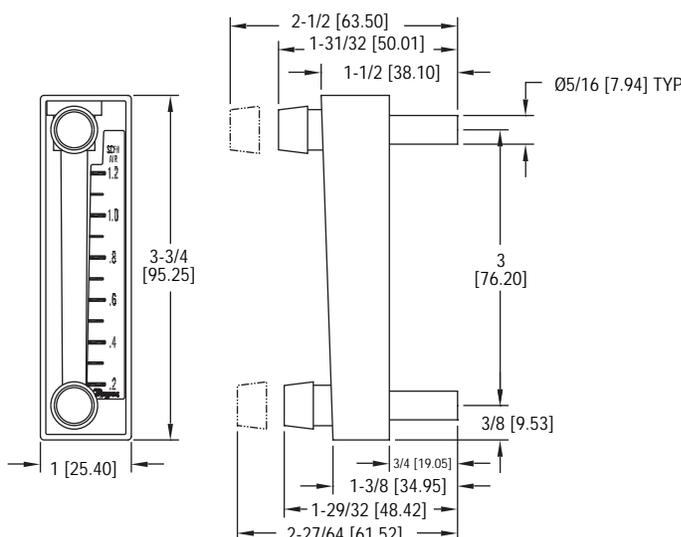




MMA Series Mini-Master® Flowmeter

Specifications - Installation and Operating Instructions



SPECIFICATIONS

Meter Body: Molded transparent nylon.

Floats: Stainless steel, black glass, K-Monel, Tungsten carbide, Aluminum.

Connections: Molded with body, 5/16" OD for push-on tubing, push-on tubing with clamp, or compression union.

"O" rings: Buna-N (Fluoroelastomer available).

Scale: Brushed aluminum with clear epoxy coating.

Pressure Rating: 100 psi maximum.

Accuracy: ±4% of full scale.

The Series MMA Mini-Master® flowmeters are available with a wide variety of direct reading scales for air or water. Installation, operation, and maintenance are simple and require only a few common sense precautions to assure long, accurate, trouble-free service.

CALIBRATION

All flowmeters are calibrated at the factory and normally will remain within their accuracy tolerance for the life of the device. If at any time you wish to recheck its calibration, do so only with instruments or equipment of certified accuracy. Do not attempt to check the Mini-Master® flowmeter with a similar flowmeter as even minor variations in piping and back pressure can cause significant differences between the indicated and actual readings.

LOCATION

Select a location where the flowmeter can be easily read and where the temperature will not exceed 130°F (54°C). The mounting surface and piping to the flowmeter should be free from vibration which could cause fatigue of fittings. Piping must be carefully arranged and installed to avoid placing stress on fittings and/or flowmeter body. For maximum flowmeter life, avoid direct exposure to weathering. Avoid locations or applications with questionable atmospheres or solvents. Damage due to contact with incompatible gases or liquids is not covered by warranty. Compatibility should be carefully determined before placing in service.

PIPING

Inlet Piping:

It is good practice to approach the flowmeter inlet with as few elbows, restrictions and size changes as possible. Inlet piping should be as close to the flowmeter connection size as practical to avoid turbulence which can occur with drastic size changes. The length of inlet piping has little effect on normal pressure fed flowmeters.

For vacuum service, the inlet piping should be as short and open as possible to allow operation at or near atmospheric pressure and maintain the accuracy of the device. Note that for vacuum service, any flow control valve used must be installed on the discharge side of the flowmeter.

Discharge Piping

Piping on the discharge side should be at least as large as the flowmeter connection. For pressure fed flowmeters on air or gas service, the piping should be as short and open as possible. This allows operation at or near atmospheric pressure and assures the accuracy of the device. This is less important on water or liquid flowmeters since the flowing medium is generally incompressible and back pressure will not affect the calibration of the instrument.

CAUTION: Meter may rupture if temperature or pressure ratings are exceeded. Read all specifications and instructions carefully before use. Do not remove caution label from flowmeter.

Series MMA Mini-Master® flowmeters are supplied in two basic configurations: Fully assembled for OEM quantity applications or with necessary components to allow assembly by the user in the required configuration. The three possible options for field assembly are:

PRESSURE FED OR VACUUM WITHOUT VALVE - Both upper and lower openings in front are plugged. (Standard configuration supplied from factory.)

PRESSURE FED WITH VALVE - Upper opening is plugged and valve is installed in lower opening.

VACUUM OPERATION WITH VALVE - Lower opening is plugged and valve is installed in upper opening.

ASSEMBLY INSTRUCTIONS

Refer to Figures A and B.

1. For Operation without Valve: Flowmeter is factory-configured with the front upper and lower valve plugs assembled for operation without a valve.

2. For Operation with Lower Valve: Using the black circular installation tool provided, remove the lower valve plug. Turn the valve plug COUNTERCLOCKWISE to remove.

Knead the bag containing the "O" rings and lubricant until the rings are completely coated. Be careful not to overstretch or nick them. Install two "O" rings on the valve stem. Apply small amount of remaining lubricant onto the threads of the valve stem. Screw mating plug onto valve stem in clockwise direction up to stop. Using installation tool, thread the valve assembly into body turning COUNTERCLOCKWISE until snug. Limit torque to 3 in/lb. Snap knob onto hex end of valve stem to complete assembly.

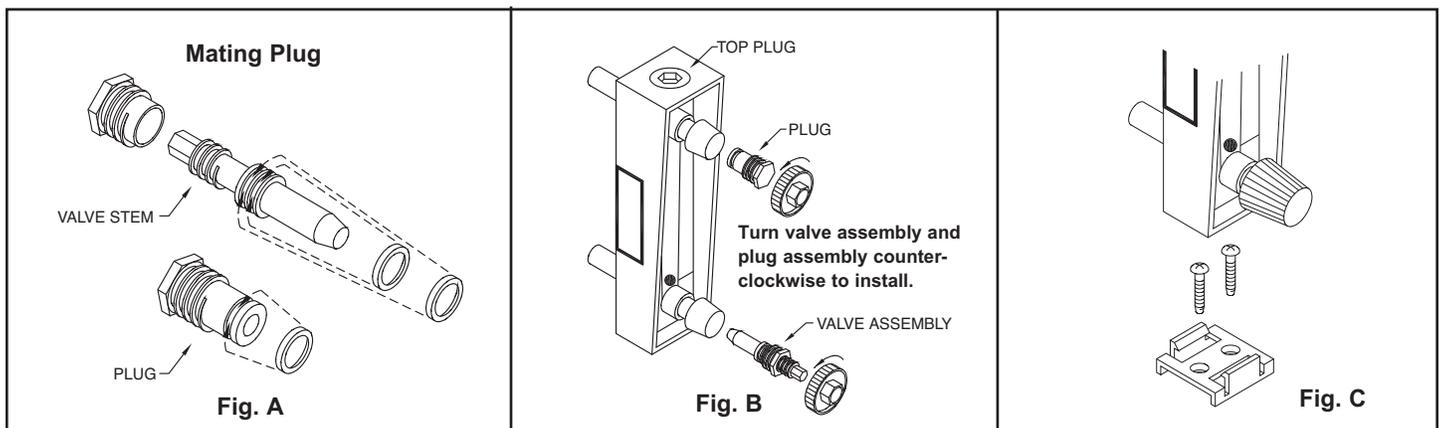
3. For Operation with Upper Valve (Vacuum Systems):

Remove the top plug from the flowmeter using the black circular installation tool provided. Turn the plug COUNTERCLOCKWISE to remove. Take care not to lose the float (ball) from the flow tube.

Cut off protruding ball stop leaving no more than 1/32" stub. This is necessary to allow free passage of the valve assembly.

Re-assemble the top plug.

Replace the upper valve plug with the valve assembly as in No. 2 above.



INSTALLATION AND MOUNTING

(Flowmeter must be installed in vertical position)

PANEL MOUNTING - (Recommended) Drill two $11/32$ " diameter holes on 3" centers on a vertical line. Insert flowmeter from front and push on spring retainer clips from rear.

PANEL MOUNTING - (Alternative method for .045/.036" thick panels) Drill two $11/32$ " diameter holes on 3" centers on a vertical line. Insert spring retainer clips in panel from front. Push flowmeter into clips.

SURFACE MOUNTING - Attach plastic mounting clip to a horizontal surface using #4 Phillips head B-type self-tapping screws provided. See figure C. Clip will bow downward slightly when properly tightened. Snap flowmeter into clip. Be sure flowmeter is vertical after mounting.

CONNECTIONS

CAUTION: Select tubing rating higher than supply pressure to flowmeter.

25 PSI MAXIMUM. Use $1/4$ " ID x $3/8$ " OD plastic tubing. Slip tubing onto connections a minimum of $3/8$ ".

50 PSI MAXIMUM. Use $1/4$ " ID x $3/8$ " OD plastic tubing. Slip tubing onto connections a minimum of $3/8$ ". Use pliers to expand spring type tubing clamps and install on both connections.

100 PSI MAXIMUM. Use suitable $5/16$ " compression union with metal or semi-rigid plastic tubing.

OPERATION

Once all connections are complete, introduce flow as slowly as possible to avoid possible damage due to shock. With liquids, make sure all air has been purged before taking readings.

The performance of low range units used in air or gas applications may be affected by static electricity. Excessive static charge may cause the ball float to behave erratically or provide a false reading. To ensure the proper function of the unit, the application should be designed to minimize or dispel static electricity.

The standard technique for reading a Variable Area Flowmeter is to locate the highest point of greatest diameter on the float, and then align that with the theoretical center of the scale graduation. In the event that the float is not aligned with a grad, an extrapolation of the float location must be made by the operator as to its location between the two closest grads. The following are some sample floats shown with reference to the proper location to read the float.



Variable Area Flowmeters used for gases are typically labeled with the prefix "S" or "N", which represents "Standard" for English units or "Normal" for metric units. Use of this prefix designates that the flowmeter is calibrated to operate at a specific set of conditions, and deviation from those standard conditions will require correction for the calibration to be valid. In practice, the reading taken from the flowmeter scale must be corrected back to standard conditions to be used with the scale units.

The correct location to measure the actual pressure and temperature is at the exit of the flowmeter, except under vacuum applications where they should be measured at the flowmeter inlet. The equation to correct for nonstandard operating conditions is as follows:

$$Q_2 = Q_1 \times \sqrt{\frac{P_1 \times T_2}{P_2 \times T_1}}$$

Where: Q_1 = Actual or Observed Flowmeter Reading
 Q_2 = Standard Flow Corrected for Pressure and Temperature
 P_1 = Actual Pressure (14.7 psia + Gage Pressure)
 P_2 = Standard Pressure (14.7 psia, which is 0 psig)
 T_1 = Actual Temperature (460 R + Temp °F)
 T_2 = Standard Temperature (530 R, which is 70°F)

Example: A flowmeter with a scale of 10-100 SCFH Air. The float is sitting at the 60 grad on the flowmeter scale. Actual Pressure is measured at the exit of the meter as 5 psig. Actual Temperature is measured at the exit of the meter as 85°F.

$$Q_2 = 60.0 \times \sqrt{\frac{(14.7 + 5) \times 530}{14.7 \times (460 + 85)}}$$

$Q_2 = 68.5$ SCFH Air

MAINTENANCE

The only maintenance normally required is occasional cleaning to assure proper operation and good float visibility.

DISASSEMBLY: Use the circular black installation tool to remove valve (when used) and plugs. Fittings on front turned CLOCKWISE to remove and top plug is turned COUNTER-CLOCKWISE. Take care to prevent loss of float.

CLEANING: The flowmeter body and other parts can be washed in a mild soap and water solution. A cotton swab or soft bristle brush will help when cleaning flow tube. Avoid solvents and liquid soaps and avoid prolonged immersion.

RE-ASSEMBLY: Coat "O" rings and valve stem threads with silicone stop cock grease or petroleum jelly. Check "O" rings after assembly to make sure they are properly seated.

ADDITIONAL INFORMATION

For additional flowmeter information, conversion curves, correction factors and other details on the entire line of Dwyer® flowmeters, please request a Dwyer Instruments, Inc. full-line catalog.