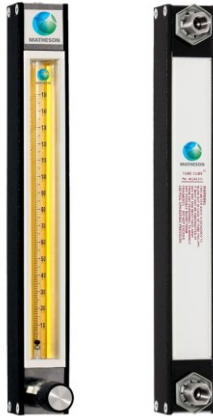




**MATHESON**

ask. . .The Gas Professionals™

# **FM-1000/FM-1050 FLOWMETERS**



## **Operation Instructions**

*READ AND COMPLY WITH THESE INSTRUCTIONS BEFORE  
INSTALLING, OPERATING, OR SERVICING*



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## I. SERVICE

### General Service

A unit which is not functioning in a normal manner should be removed from service until such time that repairs or replacement can be made. Upon completion of repair, full testing should be performed to assure the user that the unit has been returned to its original operating parameters. MATHESON can repair or replace equipment. To arrange for repair or replacement service, call 1-800-828-4313 and ask for the Warranty Administrator. **No product will be received by MATHESON without indication of gas service and without proper return material authorization provided by the warranty administrator. (All repairs must be made by MATHESON or an assigned and approved facility to maintain any warranties or guarantees).**

If the unit is under an applicable warranty, return the unit to MATHESON for repair or replacement. To arrange for warranty service, call 1-800-828-4313 and ask for the Warranty Administrator. **No product will be received by MATHESON without indication of gas service and without proper return material authorization provided by the warranty administrator.**

If advised by the Warranty Administrator to return the product to MATHESON, prepare the product for shipment and write, in large lettering the RMA Number assigned by the Warranty Administrator on the outside of the box. Also, if required by the Warranty Administrator, supply the completed RMA form with the product. Make sure that the product is adequately packaged, in the original shipping container if possible, and shipped prepaid (MATHESON will not accept COD freight) with a description of the observed deficiency to the attention of the:

Warranty Administrator  
MATHESON  
166 Keystone Drive  
Montgomeryville, PA 18936

The user is expected to periodically inspect the product for leaks, loose or worn parts, broken or non-functioning components and to address those situations immediately. If the user would require verbal assistance in ascertaining the potential of a problem with any MATHESON product, contact the local MATHESON branch for assistance or your MATHESON Sales Representative.

## II. LIMITED WARRANTY

This equipment is sold by MATHESON under the warranties set forth in the following paragraphs. Such warranties are extended only with respect to the purchase of this equipment directly from MATHESON or MATHESON's Authorized Agent as new merchandise and are extended to the first Buyer thereof other for than the purpose of resale.

For a period of one year from date of original delivery (ninety days in corrosive service) to Buyer or to Buyer's order, this equipment, is warranted to be free from functional defects in materials and workmanship and to conform to the description of this equipment contained in this manual and any accompanying labels and/or inserts, provided that this equipment is properly operated under the conditions of normal use and that regular and periodic maintenance and service is performed or replacements are made in accordance with the instructions provided. Expendable parts of this equipment are similarly warranted to be free from functional defects in materials and workmanship and to conform to the description of this equipment contained in this manual and any accompanying labels and/or inserts. The foregoing warranties shall not apply if the equipment has been repaired other than by MATHESON or a service facility designated by MATHESON, or if this equipment has not been operated and maintained in accordance with written instructions provided by MATHESON, or has been altered by anyone other than MATHESON, or if the equipment has been subject to abuse, misuse, negligence or accident.

MATHESON's sole and exclusive obligation and the Buyer's sole and exclusive remedy under the above warranties is limited to repairing or replacing, free of charge, at MATHESON's sole discretion, the equipment or part which is telephonically reported to be a problem to the local MATHESON Branch Location, and which if so advised, is returned with a written statement of the observed deficiency, not later than seven days after the expiration of the applicable warranty, to the MATHESON Gas Equipment Technology Center during normal business hours, transportation charges prepaid, and which, upon examination, is found to comply with the above warranties. The Buyer shall pay for return trip transportation charges for the equipment or part.

**MATHESON shall not be otherwise liable for any damages including but not limited to incidental damages, consequential damages, or special damages, whether such damages result from negligence, breach of warranty or otherwise.**

**There are no express or implied warranties that extend beyond the warranties hereinabove set forth. MATHESON makes no warranty of merchantability or fitness for a particular purpose with respect to the equipment or parts thereof.**

**Acceptance of the equipment by the final buyer indicates the final buyer's acceptance of all warranties and limitations set forth above.**

### **III. USER RESPONSIBILITY**

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically, with the frequency of such inspections depending upon the scope of use. Damaged, worn or contaminated equipment should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, MATHESON recommends that a telephonic or written request for service advice be made to the MATHESON Equipment Engineering Group in Montgomeryville Pennsylvania or to the nearest MATHESON branch location.

This equipment or any of its parts should not be altered without the prior written approval of MATHESON Equipment Engineering Group. The user of this equipment shall have the sole responsibility for any malfunction, which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than MATHESON or a service facility designated by MATHESON. Further, the ultimate user of the equipment is responsible for the training and safe operation of the equipment by personnel in his/her employ.

## IV. GENERAL

MATHESON flowmeters combine construction and performance features essential to accurate low flow measurement. This information is intended as a guide to efficient use; careful compliance should result in long and useful service.

## V. INSTALLATION

1. Immediately after unpacking, inspect unit for any damage incurred during shipment. Follow instructions on "Damage or Shortage" slip in packing container.
2. If a unit is supplied with an integral valve then ensure that the valve is open.
3. Check for free movement of float (s). Place meter horizontally on a flat surface with the ball float (s) at the maximum flow end of the tube (outlet). Incline this end of the meter approximately  $10^\circ$ . The float (s) should descend at a constant rate. As the float (s) approach the zero reference mark, they may slow down or hesitate. This is due to the close fit between the float and the tube. Foreign particles occasionally prevent the continuous motion of the float. Repeat the above operation several times. If the float sticks then see the "CLEANING PROCEDURE" shown below.
4. A 25 micron filter is recommended to be installed immediately upstream for meters where dirt can interfere with operation.



## VI. MOUNTING

1. The meter must be mounted in a vertical position with the inlet (lowest end of the scale reading) at the bottom. Attitude of more than 5° from the vertical will affect the accuracy of the meter. Panel mounted meters should be installed in position prior to connection to process piping. General good piping practice should be observed to prevent trapped fluid up or down stream of the meters. Connectors/adapters on the meter are supplied with wrench flats which must be held firmly when threading mating connections. Teflon tape should be used on pipe thread connections. NOTE: Care must be taken to avoid the shredding of Teflon tape which can foul meter operation.
2. Leak test final joints prior to operation. Leaks are often the cause of misleading flow indication.

## VII. OPERATION

1. START-UP CAUTION. Avoid sudden pressure surges. The impact of the float at the top of the tube can damage the meter if it is exposed directly to full line pressure. Avoid shock by closing the valve before start-up. Introduce pressure by slowly opening the valve.
2. FLOW READING. Flow indication is read at the center of the ball floats. Units of flow (SCCM, SCFH, etc.) are noted on the side of the tube. Tubes with millimeter, percent of maximum flow or linear scales require a calibration chart that corresponds to the metered fluid.

## VIII. DISASSEMBLY AND REASSEMBLY

- A. A 5/32" hex wrench fits the recessed seal screw located at one end of the meter. Turn the hex wrench counterclockwise until the seal screw is flush with the inside surface of the end fitting. NOTE: If the meter does not have a tube enclosure then the tube must be held to prevent it from falling from the meter frame.
- B. Remove the Tube Cube from the frame by sliding it forward.
- C. Remove the tube from the cube.
  1. Remove the center seals from the Tube Cube and inspect for damage. The flowmeter tube can be easily removed from the Tube Cube. NOTE: NO FURTHER DISASSEMBLY SHOULD BE NECESSARY FOR MAINTENANCE.
  2. Clean tube assembly (see CLEANING PROCEDURE).
- D. If complete disassembly is necessary, then continue as follows.
  1. Remove the retaining ring from the compression plug jack screw. (Do not over stretch the ring)
  2. Push the jack screw and compression plug through the end fitting.
  3. Complete the disassembly of the o-rings and parts.
  4. Remove piping connectors/adapters.
  5. Clean all parts (see CLEANING PROCEDURE).
  6. Lubricate left hand thread on the jack screw and reassemble.
  7. Examine the o-rings for damage, lubricate and reassemble.
  8. Replace connector into seal fitting.
  9. Replace compression plug assembly so that the milled flat is toward the piping connector.
  10. Replace retaining ring. NOTE: It is occasionally necessary to turn the jack screw clockwise to lift the retaining ring groove sufficiently to insert the retaining ring. Spread the retaining ring only enough to fit over the jack screw.
  11. Replace the Tube Cube into the frame until the rear of the Tube Cube is flush with the rear surface of the end fittings and tab stops.
  12. Tighten the compression plug. CAUTION: DO NOT OVER TIGHTEN. See torque specifications listed below.
  13. Check meter for leaks.

### Torque Specifications for compression plug:

<u>Seal</u>	<u>Torque</u>	<u>Min</u>	<u>Max</u>
Viton	18 in-lb	16 in-lb	20 in-lb
EPR	10 in-lb	8 in-lb	12 in-lb
Buna	16 in-lb	14 in-lb	18 in-lb
Teflon	24 in-lb	22 in-lb	26 in-lb

## IX. CLEANING PROCEDURE

(Please notify the factory if cleaning for oxygen service is required)

### A. TUBE AND FLOAT CLEANING

1. Remove the float stops. Take care to avoid chipping the inside edges of the tube.
2. Flush the inside of the tube with solvent (without wax or inhibitors, i.e. glycols). Isopropyl alcohol 90% is recommended. All parts should be ultrasonically cleaned if possible.
3. Clean the inside of the tube with a pipe cleaner, flush with solvent (see step A. 2.), and then blow dry.
4. Clean the float with a lint free cloth. Floats should always be handled using clean tweezers with soft holding surfaces.
5. Clean and replace the inlet float stop. Be sure that it is firm in the tube.
6. Replace the float with tweezers.
7. Replace the outlet float stop.
8. Invert the tube as described under INSTALLATION #3.
9. If the float sticks in the tube then repeat the cleaning procedure.
10. Reassemble the Tube Cube in reverse to DISASSEMBLY & REASSEMBLY step C. Note: position the scale behind the lens of the Tube Cube.

### B. METAL PARTS CLEANING

Ultrasonic immersion cleaning with Solvon PB is preferred; however, any industrial solvent which does not attack the metal or influence the process performance is acceptable.

### C. O-RINGS AND SEALS CLEANING

1. Wash thoroughly with detergent and rinse with water.
2. Lubricate and reapply to metal parts. Halocarbon grease is recommended.

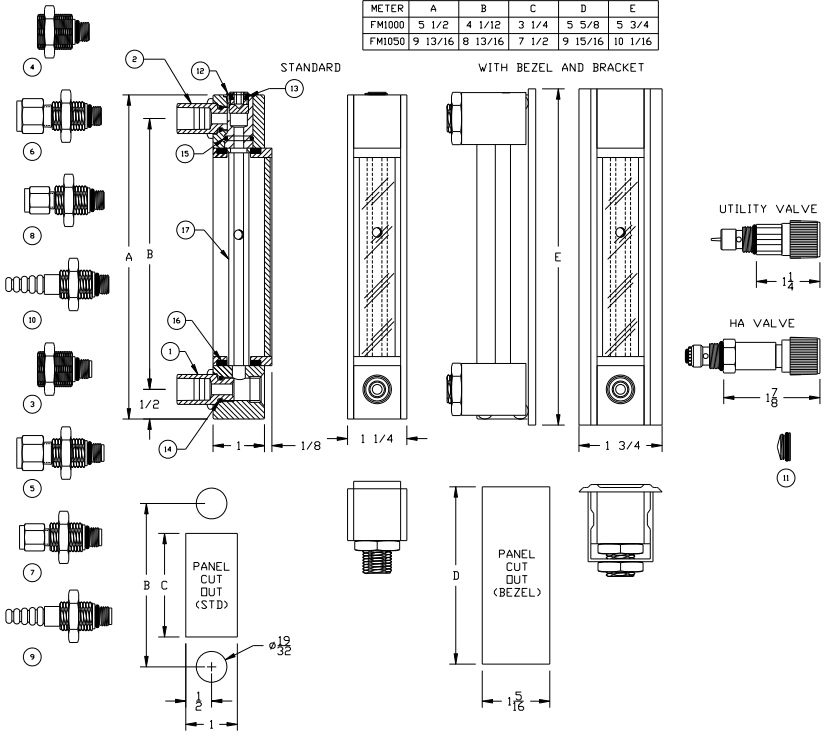
## X. VALVE REMOVAL AND INSTALLTION

1. Turn the valve handle clockwise so that the valve stem engages the orifice (about 3 turns from full open).
2. Remove the valve cartridge from the flowmeter by using a 9/16" open end wrench. The valve cartridge will screw completely out of the flowmeter body.
3. Take the replacement valve cartridge and screw it into the valve cartridge cavity and then tighten with the 9/16" wrench.

Note: Be certain that the orifice and the orifice o-ring have been removed prior to replacing the valve cartridge with another size.



METER	A	B	C	D	E
FM1000	5 1/2	4 1/12	3 1/4	5 5/8	5 3/4
FM1050	9 13/16	8 13/16	7 1/2	9 15/16	10 1/16





The parts listed below are applicable to MATHESON FM-1000 and FM-1050 flowmeters.  
Recommended spare parts are indicated by \*.

#	Qty	Part Number	Description
1	1	MAAT-0202-__	ADAPTOR, VALVE, 1/8" NPT**
2	1	MAAT-0201-__	ADAPTOR, SEAL, 1/8" NPT**
3	1	MAAT-0204-__	ADAPTOR, VALVE, 1/4" NPT**
4	1	MAAT-0203-__	ADAPTOR, SEAL, 1/4" NPT**
5	1	MATT-0202-__	ADAPTOR, VALVE, 1/4" TUBING**
6	1	MATT-0201-__	ADAPTOR, SEAL, 1/4" TUBING**
7	1	MATT-0204-__	ADAPTOR, VALVE, 1/8" TUBING**
8	1	MATT-0203-__	ADAPTOR, SEAL, 1/8" TUBING**
9	1	MAHA-0202-__	ADAPTOR, VALVE, HOSE**
10	1	MAHA-0201-__	ADAPTOR, SEAL, HOSE**
11	1	MPLU-0101-__	PLUG, VALVE WITH O-RING
12*	1	MRNS-0905-SD	RING, RETAINING
13*	1	MRNS-0009-__	O-RING
14*	2	MRNS-0011-__	O-RING
15*	1	MRNS-0013-__	O-RING
16*	2	MPAC-0011-__	SEAL, CENTERING, ID MARK B
	2	MPAC-0012-__	SEAL, CENTERING, ID MARK C
	2	MPAC-0013-__	SEAL, CENTERING, ID MARK ●●
	2	MPAC-0014-__	SEAL, CENTERING, ID MARK ●
17*	1	MHCJ-0XXX-XX	TUBE CUBE ASSY, 65MM***
	1	MHCE-0XXX-XX	TUBE CUBE ASSY, 150MM***

ID MARK	65 MM TUBES	150 MM TUBES
B	J000-J099	E100-E199
	J100-J199	E200-E299
	J200-J299	E300-E399
	J600-J649	E400-E499
	J700-J799	E500-E599
		E600-E699
		E910
C	J400-J499	
	J800-J899	
●●	J500-J599	E800-E899
●		E700-E799

\_\_ = MATERIAL CODES AA=ALUMINUM BA=BRASS SA=316 SS BU=BUNA N  
VA=VITON EB=EPR

\*\*Includes PAL nut and o-ring

\*\*\*Specify Flow Rate Required



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