



## Instruments

INSTRUCTIONS  
FM-1000/FM-1050

## 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.

## INSTALLATION

1. Immediately after unpacking, inspect unit for any damage incurred during shipment. Follow instructions on "Damage or Shortage" slip in packing container.
2. Before installation, remove dust caps from connection fittings; if unit is supplied with an integral valve be sure valve is open.
3. CHECK FOR FREE MOVEMENT OF FLOAT. Place meter horizontally on a flat surface with ball float(s) at maximum flow end of tube (outlet). Incline this end of meter approximately 10°. 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. Occasionally, foreign particles prevent the continuous motion of the float. Repeat the above operation several times. If float sticks, see "TUBE CLEANING PROCEDURE" below.
4. A 25 micron filter is recommended immediately upstream of meters where dirt can interfere with operation.

## MOUNTING

1. The meter is mounted in a vertical position, the inlet (lowest end of scale reading) at the bottom. Attitude of more than 5 degrees from 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 (referred herein as adapters) on the meter are supplied with wrench flats which must be held firmly when threading mating connections. Paste sealants are generally preferred. However, applications which are sensitive to contamination and require inert sealants, Teflon tape is recommended.  
NOTE: Care must be taken to avoid shredding of Teflon tape which can foul meter operation.
2. Leak test final joints prior to operation. Leaks are often cause of misleading flow indication.

## 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 exposed directly to full line pressure. Avoid shock by closing inlet valve before start-up. Introduce pressure by slowly opening valve.
2. FLOW READING Flow indication is read at the center of ball floats. Units of flow (SCCM, SCFH et cetera) are noted on the side of tube. Tubes with millimeter, percent of maximum flow or linear scales require a corresponding calibration curve to apply to the fluid metered.

1. DISASSEMBLY

- A. A 5/32" hex wrench fits the recess in seal screw located at one end of the meter. Turn the hex wrench counter-clockwise until the compression plug is flush with the inside surface of the end fitting.

NOTE: If meter has no tube enclosure, tube must be held to prevent it from falling from meter frame.

- B. Remove Tube Cube from frame by sliding it forward.

- C. Remove tube from cube.
  1. Remove center seals from Tube Cube and inspect for damage. Flowmeter tube can be easily removed from Tube Cube.

NOTE: UNDER NORMAL CONDITIONS, NO FURTHER DISASSEMBLY SHOULD BE NECESSARY FOR MAINTENANCE.

2. Clean tube assembly (see cleaning of parts) and reassemble into Tube Cube as above in reverse.

- D. If complete disassembly is necessary, continue as follows.

1. Remove the retaining ring from the compression plug jack screw. (Do not over stretch the ring.)
2. Push jack screw and compression plug through the end fitting.
3. Complete disassembly of "O" rings and parts.
4. Remove piping connectors (adapters).
5. Clean all parts thoroughly.

6. Lubricate left hand thread on jack screw and reassemble.
7. Examine "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: Occasionally it is necessary to turn jack screw clockwise to lift retaining ring groove sufficiently to insert retaining ring. Spread retaining ring only enough to fit over the jack screw.

11. Replace the Tube Cube into frame until the rear of the Tube Cube is flush with the rear surface of end fittings and tab stops.
12. Tighten compression plug.
13. Check meter for leaks.

CAUTION: DO NOT OVER TIGHTEN.

2. CLEANING PROCEDURE

General cleanliness conditions are noted here. If oxygen cleaning procedure is required, contact the factory.

A. TUBE AND FLOAT CLEANING

1. Remove float stops; take care to avoid chipping inside edges of tube.
2. Flush inside of tube with solvent (without wax or inhibitors, i.e. Glycols). Isopropyl alcohol 90% is recommended. All parts should be ultrasonically cleaned if possible.

3. Blow dry and with a lint-free tissue, clean the inside of tube.
4. Clean float in the same manner. Floats should always be handled using tweezers with soft holding surfaces.
5. Clean and replace inlet float stop. Be sure it is firm in tube. Crimp fins of "Y" section if necessary.
6. Replace float with clean tweezers.
7. Replace outlet float stop.
8. Invert tube as described under Installation #3.
9. If float sticks in tube, repeat cleaning procedure.
10. Reassemble Tube Cube in reverse to disassembly step taking care to position scale behind lens of Tube Cube.

B. METAL PARTS CLEANING

1. Ultrasonic immersion cleaning in trichloroethane 1,1,1 is preferred, however, any industrial solvent which does not attack the metal or influence the process performance is acceptable.

C. "O" RINGS AND SEALS

1. Wash thoroughly with detergent.
2. Rinse and sponge with Trichloroethane 1,1,1. Sponge dry.
3. Lubricate and reapply to metal parts. Halocarbon grease is recommended.



**GENERAL**

Matheson Instruments flowmeters combine construction and performance features essential to accurate low flow measurement described on Customer Engineering Information Sheets. Information herein is intended as a guide to efficient use and care; careful compliance should result in long and useful service.

**INSTALLATION**

1. Immediately after unpacking, inspect unit for any damage which may have been incurred during shipment.
2. Before installation, remove dust caps from the inlet and outlet fittings; if unit is supplied with an integral valve, be sure valve is open. Invert unit and check that float in flow tube moves freely. Occasionally, especially in very low flow rate tubes, foreign particles prevent continuous motion of float. (See section on service.)
3. It is recommended that a 25 micron filter be installed upstream of meters where dirt can interfere with the operation of flowmeters.

**MOUNTING**

4. The meter is mounted in a vertical position, the inlet (lowest end of a scale reading) at the bottom. Inclination of meter more than 5 degrees on any axis will affect the accuracy of the meter. Panel mounted meters should be installed in position before connecting to process piping. Care must be taken when pipe or tube fittings are joined to the connectors on the meter. General good piping practice should be observed to prevent trapped fluid up or down stream of the meter. Connectors on the meter are supplied with wrench flats which must be held firmly when threading mating connections. Paste sealants are preferred. Tape sealants are prone to shred.
5. Leak test final joints prior to operation. Leaks are often the cause of misleading flow indication and inaccuracy of operation.

**ACCESSORIES**

Valves, controller, base plates, etc., may be furnished with unit. See appropriate instructions.

**OPERATION**

1. **START-UP** CAUTION. Avoid sudden pressure surges. The impact of the float at the top of the flow tube can damage the meter if exposed directly to full line pressure. Shock can be avoided by closing the inlet valve before start-up, the pressure can then be introduced into the meter by slowly opening the valve.
2. **FLOW READING** Flow indication is read at the center of ball floats. Units of flow (SCGM, SCFH, etc.) are noted on the side of the tube. Tubes with millimeter, percent of maximum flow, or linear scales require a corresponding calibration curve to apply to the fluid metered.

**SERVICE**

The meter, as furnished, is ready for use. It is tested and checked at the factory. Occasionally, service is required to maintain satisfactory performance. The following steps should be taken in order to insure trouble-free operation.

**1. DISASSEMBLY (PM)**

Units with valve on inlet: The meter is housed in the channel by means of a slotted plug at the top end and the valve bonnet at the bottom end.

- \* 1. Loosen piping connector at the plug end one turn.
2. Remove top plug with a screwdriver. Remove valve bonnet with a 1/2" hex wrench. The plastic body should slide forward in the channel until free. Note: Occasionally the piping connectors must be loosened in the channel.
3. With tweezers remove float stop; invert meter to remove ball float.
4. Cleaning, use mild detergent with water. Care must be exercised to protect scale from strong agents which could affect acrylic.
5. Replace o-rings where required, clean hardware and lubricate with inert grease, or halocarbon grease
6. Reassemble: Steps 1 through 4 reversed.
7. Check for leaks before start-up.

Units with valve on outlet: Disassemble as above except remove the retainer set screw at bottom of channel.

Units with plug in lieu of valve: Follow steps 1 through 5 except use 5/32" "Allen" wrench to remove plug.

Units without plug or valve: Disassemble per steps 1 through 5 except remove retainer set screw at bottom of channel.

**2. DISASSEMBLY (PG)**

The procedure is the same as for PM with the following exceptions:

1. After removal of plug, remove pressure spring, flow tube and o-ring seal.
2. Clean the flow tube as follows: Remove float stops and float, flush tube and float with detergents using pipe cleaners to dry thoroughly. Replace float and float stops - be certain float stops are secure in tube, crimp if necessary. The top float stop should protrude 3/16" above tube to prevent pressure surge blow-out. Replace o-ring in plastic housing and repeat steps 1 through 5 under PM meters above.

**\*IMPORTANT:**

THE PIPING CONNECTOR AT THE PLUG END SHOULD BE LOOSENED AT THE TIME OF REASSEMBLY TO INSURE PROPER ALIGNMENT OF THE PLUG, CHANNEL, AND BLOCK. AFTER PLUG IS ENGAGED INTO CHANNEL, THE PIPING CONNECTOR SHOULD BE TIGHTENED. AFTER THE METER IS REASSEMBLED, ALL JOINTS SHOULD BE CHECKED FOR LEAKS.

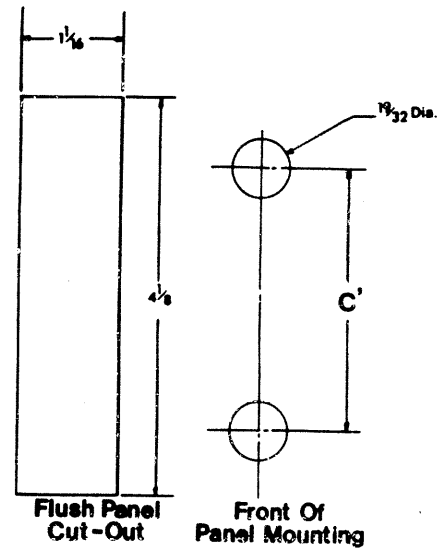
# RECOMMENDED SPARE PARTS

## FLOWMETER SERIES PM

The below listed parts and prices are applicable to Matheson Instruments PM meters described on Engineering Data Sheet PM-1000 and Information Drawings G-PM-1220 through G-PM-1235; recommended spare parts indicated by \*.

Part numbers and prices are with materials of construction. Care must be taken to select part numbers applicable.

METER	PART NUMBER	QTY.	MATERIAL	DESCRIPTION	PRICE/LOT
Aluminum	A-RNS-011-BU	4	Buna-N	"O" ring seals	\$
	A-VLV-001-AA	1	Aluminum	Valve assembly	
Brass	A-RNS-011-BU	4	Buna-N	"O" ring seals	
	A-VLV-001-BA	1	Brass	Valve assembly	
316 SS	A-RNS-011-VA	4	Viton	"O" ring seals	
	A-VLV-001-SA	1	316 SS	Valve assembly	
All Meters  (PG)	A-STO-001-PB	2	TFE	Float stop (2½")	
	A-STO-002-PB	2	TFE	Float stop (3")	
	A-BAL-	2	Specify size	Ball float	
	Tube Assembly	1		Glass	
				Specify size & range	
OPTIONAL EQUIPMENT - CONSTANT DIFFERENTIAL RELAY					
CDR VI	H21XT	1	Brass	Regulator	\$
CDR VI	H21XTXXXX	1	316 SS	Regulator	
CDR VO	H31XT	1	Brass	Regulator	
CDR VO	H31XTXXXX	1	316 SS	Regulator	



METER	A	B	C
PG & PM	2-1/2	3/4	2-1/2
	3	1/2	3

Note: Minimum order \$50.00

