

# MAINTENANCE INSTRUCTIONS

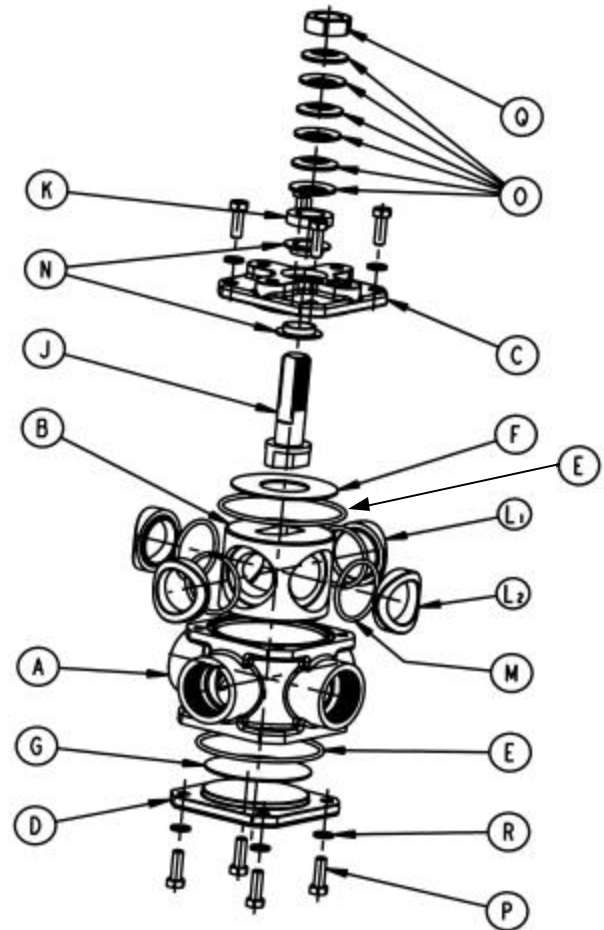


## Cavity Free Valves, MF Series

Factory-Actuated (Code 02) or

Prepared for Actuation with Handle (Code 03)

COMPONENT LIST	
Item	Description
A	Body
B	Rotor
C	Top Cap
D	Bottom Cap
E	Cap O-Ring
F	Top Spacer
G	Bottom Spacer
J	Stem
K	Follower
L <sub>1</sub>	Blank Seat
L <sub>2</sub>	Port Seat
M	Seat O-Ring
N	Stem Packing
O	Spring Washers
P	Cap Screws
Q	Jam Nut
R	Lock Washer



MF\_H6\_EX

Follow instructions to ensure optimum performance:

### Adjusting for Packing Wear

1. If the valve shows signs of leakage in the stem area due to normal stem packing wear, tighten the jam nut on the stem to fully compress the spring washers, then back off the nut 1/8 turn. For 3" and 4" valves, tighten this nut until the gap between adjacent spring washers is approximately 0.1". Leakage should stop, and the valve should continue to operate smoothly.
2. If packing leakage cannot be stopped, a repair kit will be required.

### Installing Replacement Parts

1. Isolate and depressurize associated piping system. Cycle the valve to depressurize any fluid trapped in the valve cavity. Remove the valve from the piping. (NOTE: Removing the valve from the piping is optional. Maintenance can be performed in-line if desired.)
2. If actuated, remove all air and electrical power from the actuator, solenoid valve, and switch box, if any.
3. Remove the actuator, solenoid valve, and switch box, if any.
4. Loosen and remove the top cap screws and lock washers. Pull the top cap and stem upward and out of the valve body.
5. Remove the O-ring and top spacer from top of valve body.
6. Loosen and remove the jam nut from the stem. Remove the port indicator (if applicable), handle (if applicable), spring washers, stop disc (if applicable), and follower.
7. Push the stem down and out of the top cap and remove the two packings from the cap or stem.
8. Loosen and remove the bottom cap screws and lock washers. Pull the bottom cap downward and out of the valve body.
9. Remove the O-ring and bottom spacer from the bottom of the valve body.
10. Tap the rotor with a soft hammer to push the rotor out of the valve body, taking care not to damage the rotor.
11. Remove the seats and O-rings from the rotor.
12. Before reassembling the valve, examine parts and repair or replace damaged or worn parts. Clean metal parts, as necessary, using a solvent compatible with the process fluid and a non-abrasive cloth.

13. Trial fit the stem into the rotor stem slot. Note the flow pattern stamped on the top of the stem. Install flow seats, with seat back O-rings, into the flow positions of the rotor. Install blank seats, with seat-back O-rings, into the non-flow positions of the rotor. Remove the stem from the rotor.
14. Align the seats in the rotor so that the convex curvature of the seats aligns with the cylindrical curvature of the rotor.
15. Set the body on a horizontal surface. Note that there is no top or bottom to the body, both ends are identical. Hold the seats in the rotor and set the rotor on the top of the body bore, such that the seats in the rotor are mis-aligned with the ports on the body by 45 degrees.
16. Realign the seats and ensure the bottoms of the seats are inside the chamfer on the body. Then, push the rotor and seats into the body. A soft hammer or, for 3- and 4-inch valves, a press may be needed for this installation.
17. Install the bottom spacer on the end of the rotor without the stem slot. Then, place the cap O-ring into the groove on the valve body, and install the bottom cap. Align the bolt holes of the cap with the tapped holes in the body.
18. Lubricate the threads of four cap screws with an anti-galling lubricant, and install the cap screws and lock washers. Tighten the cap screws to secure the bottom cap to the body.
19. Set the assembly on the bottom cap and install the top spacer and cap O-ring into the open end of the body.
20. Lubricate the threads of four cap screws with an anti-galling lubricant.

21. Place a new bottom packing over the stem with the flanged surface seated against the flange on the stem. Insert the stem into the top cap.
22. Place the top cap and stem into the body and allow the stem tang to engage the slot in the rotor. The stem tang and the rotor will engage in only one orientation. The port identification markings on the top of the stem will match the port orientation of the seats.
23. Rotate the top cap to align the bolt holes with the tapped holes in the body at the orientation that provides the proper flow pattern. Then, install the cap screws and lock washers and tighten.
  - a. For O3 valves, trial fit the stop disc on the stem and turn the stem, allowing the stop disc to contact the stop pin and verify that the proper flow pattern is achieved. If it isn't, the top cap is not positioned properly with the body. To correct this condition, remove the capscrews and rotate the top cap relative to the body until the proper position is obtained. Then, remove the stop disc from the stem.
  - b. For actuated valves (O2), rotate the stem to the "Fail" flow position. For the 1" valve (which has two actuator mounting holes), verify that the actuator will mount to the valve in this Fail position. If it will not, the mount to the valve in this Fail position. If it will not, rotate the top cap 90 degrees to the proper position.
24. Install a new top packing over the stem with the flanged surface facing upward. Push the packing into the top cap.
25. Install a follower over the stem until it seats on the packing. For O3 valves, install the stop disc. Use the port identification markings on top of the stem to verify that the stop disc is installed correctly (not 180 degrees off). Lubricate the stem threads with an anti-galling lubricant.
26. Install a spring washer, concave side facing upward, on top of the follower.
27. Install the remaining spring washers in series, alternating convex with concave curves, with the convex side of the lowest spring washer facing upward. Spring washers should not be "nested" (curving in the same direction).
28. Install the jam nut and tighten to fully compress the spring washers, then back off the nut 1/8 turn
29. For O3 valves, install the handle. Then, install the position indicator such that its port positions match the positions marked on the top of the stem. Secure these parts with a second jam nut.
30. Cycle the valve to verify freedom of operation. Then, leak check the assembly and reinstall the valve into the piping system, if appropriate.
31. If actuated, position the valve in the Fail position, then install the actuator, solenoid valve, and switch box, if any. Reconnect air and electrical power. If practical, cycle the valve using the actuator to verify proper assembly.

**TABLE 1: REPLACEMENT PARTS**

Valve Size	Size Code	Repair Kit**	Replacement Parts				
			Seat	Blank Seat	Body O-Ring	Seat O-Ring	Packing
1"	E4	MF RTE4--xyz	SF RTE408	SF RTE108Y-	ORVI--12---2147	ORVI--12---2123	SPRTH109
1½"	G4	MF RTG4--xyz	MF RTG408	MF RTG108Y-	ORVI--12---2240	ORVI--12---2225	SPR TK109
2"	H4	MF RTH4--xyz	MF RTH408	MF RTH108Y-	ORVI--12---2246	ORVI--12---2229	SPR TK109
3"	K4	MF RTK4--xyz	MF RTK408	MF RTK108Y-	ORVI--12---2259	ORVI--12---2238	ANR TL109
4"	L4	MF RTL4--xyz	MF RTL408	MF RTL108Y-	ORVI--12---2267	ORVI--12---2349	SPR TM109

**Notes:**

\*\* When ordering a repair kit, substitute the following for xyz above:  
 x = Enter appropriate character from Seat/Seal column in PBM Part Number Manual (LT-PN98).  
 yy = Enter flow pattern number from PBM Part Number Manual (LT-PN98). You must indicate a flow pattern to designate the number of blank or port seats required.  
 z = Enter "1" for Each or "2" for a Box.

For example, the part number for a single repair kit for a 1" 4-way, double T-port bottom entry ball valve with a 28 flow pattern and RTFE seats and seals would be MF RTE4--A281.

1. Standard repair kits and replacement parts are RTFE:
  - a. For VTFE, replace 'RT' with 'VT'. Example: a 1" kit would be MFVTE4--xyz.
  - b. For S/STFE, replace 'RT' with 'HT'. Example: a 1" kit would be MFHTE4--xyz.
  - c. For UHMWPE, replace 'RT' with 'UT'. Example: a 1" kit would be MFUTE4--xyz.
  - e. For PLUS, replace 'RT' with 'PL'. Example: a 1" kit would be MFPLE4--xyz.

2. The quantities of seats, O-rings, and packings per repair kits varies per flow pattern. Consult PBM.
3. In repair kits with TFE-based seats and packings, the top and bottom spacers are always VTFE.
4. In repair kits with UHMWPE seats and packings, the top and bottom spacers are UHMWPE.

**Material Definitions:**

RT	RTFE	Glass Reinforced Polytetrafluoroethylene
PL	PLUS	Glass & Carbon Reinforced Polytetrafluoroethylene
UT	UHMWPE	Ultra High Molecular Weight Polyethylene
HT	S/STFE	Stainless Steel Reinforced Polytetrafluoroethylene
VT	VTFE	Virgin Polytetrafluoroethylene



PBM, Inc.  
 1070 Sandy Hill Road, Irwin, PA 15642  
 Phone: 724.863.0550 or 800.967.4PBM  
 Fax: 724.864.9255  
 Web: www.pbmvalve.com E-mail: info@pbmvalve.com  
 © Copyright 1997-2000 PBM, Inc. LT-108B 11/00 Printed in USA