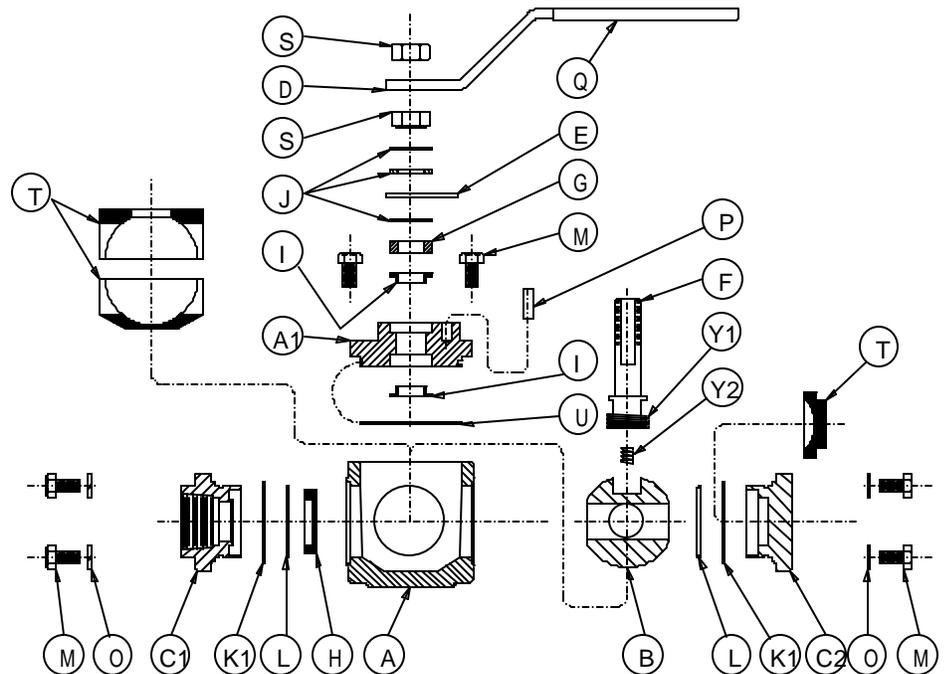


# MAINTENANCE INSTRUCTIONS



## Multi-Port Ball Valves MP/MI Series 4, 1/2" - 4" Manually Operated

COMPONENT LIST	
Item	Description
A	Body
A <sub>1</sub>	Bonnet
B	Ball
C <sub>1</sub>	End Fitting
C <sub>2</sub>	Blank Fitting
D	Handle
E	Stop Disc
F	Stem
G	Follower
H	Seat
I	Stem Packing
J	Spring Washers
K <sub>1</sub>	End Body Gasket
L	End Fitting O-Ring
M	End Fitting Fasteners
O	Lock Washers
P	Stop Pin
Q	Handle Cover
S	Jam Nut
T	Cavity Filler (Option)
U	Bonnet O-Ring
Y <sub>1</sub>	Outer Ground Spring
Y <sub>2</sub>	Inner Ground Spring



SK97054

Follow instructions to ensure optimum performance:

### Adjusting for Normal Wear

- PBM Ball Valves are designed with the Adjust-O-Seal® feature. If the valve shows signs of leakage due to normal seat wear, tighten the end and blank fitting fasteners evenly, in the sequence shown in Table 3, until leakage stops and the valve operates smoothly:
  - Initially, there should be a space between the end fittings and the body, and the blank fittings and the body. This space is key to the Adjust-O-Seal feature, and allows in-line adjustment of the seats and gaskets.
  - End and blank fitting fasteners should be tightened only until the valve stem breakaway torque is reached (Table 1).
- If the valve shows signs of leakage in the stem area due to normal stem packing wear, tighten the lower jam nut on the stem to fully compress the spring washers, then back off the nut 1/8 turn. Then, tighten the top jam nut. Leakage should stop, and the valve should continue to operate smoothly.
- After adjustments have been made to the seats, or if packing leakage cannot be stopped, a repair kit will be required.

### Installing Replacement Parts

- Isolate and depressurize associated piping system. Cycle the valve to drain any trapped fluid from the body cavity. Remove the valve from the piping.
- Loosen and remove the end and blank fitting fasteners and lock washers. Pull the end and blank fittings from the valve body.
- Remove the seats, gaskets, and O-rings from the end and blank fittings.
- Loosen and remove the bonnet fasteners and lock washers. Pull the bonnet and stem upward and out of the valve body. Remove the O-ring from the bonnet.
- Loosen and remove the top jam nut from the stem. Remove the handle, second jam nut, spring washers, stop disc, spring washer, and follower.
- Push the stem down and out of the bonnet and remove the packing from the bonnet or stem.
- Remove the top cavity filler, if any.
- Pull the ball up through the top of the valve and out of the body, taking care not to nick or scratch the ball.
- Remove the bottom cavity filler, if any.
- For 3" and 4" side entry valves without cavity fillers, remove the teflon ball holder.

- 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.
- Insert the bottom cavity filler, if any, concave side facing upward, into the bottom of the valve body.
- For 3" and 4" side entry valves without cavity fillers, insert the teflon ball holder, concave side facing upward, into the bottom of the valve body.
- Insert the ball into the valve through the bore in the top of the body. Insert the top cavity filler, if any, concave side facing downward.
- Place new bottom packing over the stem with the flanged surface seated against the flange on the stem. Insert the stem into the bonnet bore and up through the bonnet. While supporting the stem, install new top packing over the stem with the flanged surface facing upward. Push the packing into the bonnet.
- Lubricate the bonnet O-ring and 1/4" of the top body bore with lubricant compatible to process fluid. Place the O-ring in the bonnet groove.
- Insert the stem tang into the ball slot, taking care not to scratch or nick the ball, and insert the bonnet into the body, taking care not to cut the O-ring. The stem tang and ball will fit in only one orientation. The port identification markings on the top surface of the stem should match the port orientation of the ball.
- Lubricate the threads of the bonnet fasteners with an anti-galling lubricant. Install the bonnet fasteners and lock washers and tighten in a staggered sequence.
- Install the follower over the stem until it seats on the packing. Lubricate the stem threads with an anti-galling lubricant.
- Install one spring washer, concave side facing upward, on top of the follower. Install the stop disc. Ensure correct flow pattern is obtained.
- Install the two remaining spring washers, 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).
- Install the first jam nut, and tighten the nut to fully compress the spring washers, then back off the nut 1/8 turn.
- Install the handle, and the second jam nut. Tighten the jam nut against the handle.

24. Place new seats into the end and blank fittings with the flat end of the seat against the flat recess in each fitting. Place gaskets onto the end and blank fittings.
25. Lubricate O-rings and 1/4" of the end and blank fitting body bores with a lubricant compatible with the process fluid. Place the O-rings in the groove on the end and blank fittings.
26. Insert the end and blank fittings into the body, taking care not to cut the O-rings.
27. Lubricate the threads of the end and blank fitting fasteners with an anti-galling lubricant. Install the end and blank fitting fasteners and lock washers and hand-tighten.
28. Fully position the ball in one of the standard flow positions. Align the ball port up and down. Do not mid-position the ball.

29. Wrench-tighten the end fitting and blank fitting fasteners in the sequence shown in Table 3, leaving a gap between the body and the end and blank fittings, until the valve stem breakaway torque (Table 1) is achieved. Then, remeasure stem breakaway torque for several cycles to verify repeatability.
30. Reinstall the valve into the piping.
31. If practical, leak test the seats, gaskets, and packings.

Notes:

1. A Teflon ball holder is standard on 3" and 4" MP/MI Series 4 side entry valves without cavity fillers.

TABLE 1: STEM TORQUE VALUES (IN.-LB.)

Valve Size	Size Code	Valve Stem Breakaway Torque by Seat & Seal Material		
		RT, PL, UT	HT	VT
1/2"	C4	96	120	77
3/4"	D4	96	120	77
1"	E4	240	300	192
1 1/4"	F4	240	300	192
1 1/2"	G4	480	600	384
2"	H4	540	675	432
3"	K4	1080	1350	864
4"	L4	2400	3000	1920

TABLE 2: REPLACEMENT PARTS

Valve Size	Repair Kit**	Replacement Parts				
		Seat	Body Gasket	Packing	O-Rings	Blank Seat
1/2"	MPRTC4--xyz	MPRTC408	MPRTC114	ANRTE109	ORVI--12--2125 ORVI--12--2137	MPRTC408Y-
3/4"	MPRTD4--xyz	MPRTC408	MPRTC114	ANRTE109	ORVI--12--2125 ORVI--12--2137	MPRTC408Y-
1"	MPRTE4--xyz	MPRTE408	MPRTE014	SPRTH109	ORVI--12--2129 ORVI--12--2140	MPRTE408Y-
1 1/4"	MPRTF4--xyz	MPRTE408	MPRTE014	SPRTH109	ORVI--12--2129 ORVI--12--2140	MPRTE408Y-
1 1/2"	MPRTG4--xyz	MPRTG408	MPRTG014	SPRTH109	ORVI--12--2229 ORVI--12--2152	MPRTG408Y-
2"	MPRTH4--xyz	MPRTH408	MPRTH014	SPRTH109	ORVI--12--2234 ORVI--12--2242	MPRTH408Y-
3"	MPRTK4--xyz	MPRTK408	MPRTK414	ANRTL109	ORVI--12--2242 ORVI--12--2255	MPRTK408Y-
4"	MPRTL4--xyz	MPRTL408	MPRTL414	SPRTH109	ORVI--12--2251 ORVI--12--2366	MPRTL408Y-

Notes for Table 1:

1. Stem torque values shown are minimum values and represent ideal conditions (100 psig or less, ambient temperature, with fluid free of suspended solids and comparable in viscosity to water).
  2. Torque values are measured at the stem, NOT at the body bolts.
  3. For PEEK and KYNAR® seat and seal material torque values, consult PBM.
- \* 1 1/4" size available in MP only.

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
PK	PEEK	Polyetheretherketone
KY	KYNAR	Polyvinylidene Fluoride

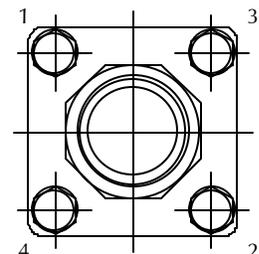
Adjust-O-Seal® is a registered trademark of PBM, Inc.  
KYNAR® is a registered trademark of Elf Atochem North America, Inc.

Notes for Table 2:

- \*\* 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).  
z = Enter "1" for Each, "2" for a Box, or "3" for Filler Kit.
- 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 MPRTE4--A281.
- \* 1 1/4" size available in MP only.
1. Standard repair kits and replacement parts are RTFE for MP Series valves and VTFE for MI Series valves. Repair kits for MP and MI Series valves are not interchangeable. Repair kit examples in Table 2 are for MP Series valves. Be sure to specify either MP or MI to indicate the type of valve for which you are ordering parts. Examples below are for MP valves:
    - a. For VTFE, replace 'RT' with 'VT'. Example: a 1" kit would be MPVTE4--xyz.
    - b. For S/STFE, replace 'RT' with 'HT'. Example: a 1" kit would be MPHTE4--xyz.
    - c. For UHMWPE, replace 'RT' with 'UT'. Example: a 1" kit would be MPUTE4--xyz.
    - d. For PEEK, replace 'RT' with 'PK'. Example: a 1" kit would be MPPKE4--xyz.
    - e. For PLUS, replace 'RT' with 'PL'. Example: a 1" kit would be MPPLTE4--xyz.
    - f. For KYNAR, replace 'RT' with 'KY'. Example: a 1" kit would be MPKYE4--xyz.
  2. The contents of each repair kit vary per flow pattern. Below are examples of flow pattern numbers and kit contents. Consult PBM before ordering.
    - 01 3 seats, 1 blank seat, 4 gaskets, 4 O-rings, 1 bonnet O-ring, and 2 stem packings
    - 14 3 seats, 2 blank seats, 5 gaskets, 5 O-rings, 1 bonnet O-ring, and 2 stem packings
    - 37 4 seats, 4 gaskets, 4 O-rings, 1 bonnet O-ring, and 2 stem packings
    - 20 4 seats, 1 blank seat, 5 gaskets, 5 O-rings, 1 bonnet O-ring, and 2 stem packings
    - 44 5 seats, 5 gaskets, 5 O-rings, 1 bonnet O-ring, and 2 stem packings
  3. Cavity filler kits include one top filler and one bottom filler (or bottom entry filler). Please indicate whether valve is side entry or bottom entry when ordering.

TABLE 3: TIGHTENING PROCEDURE FOR END AND BLANK FITTING FASTENERS

1. Hand-tighten in the sequence illustrated below, alternating fittings from ends and, if appropriate, bottom.
2. Wrench-tighten each fastener in the sequence illustrated until the lock washer begins to compress.
3. Continue tightening each bolt 1/8 turn until the recommended torque value (Table 1) is achieved when measuring the torque at the valve stem.



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