

MAINTENANCE INSTRUCTIONS



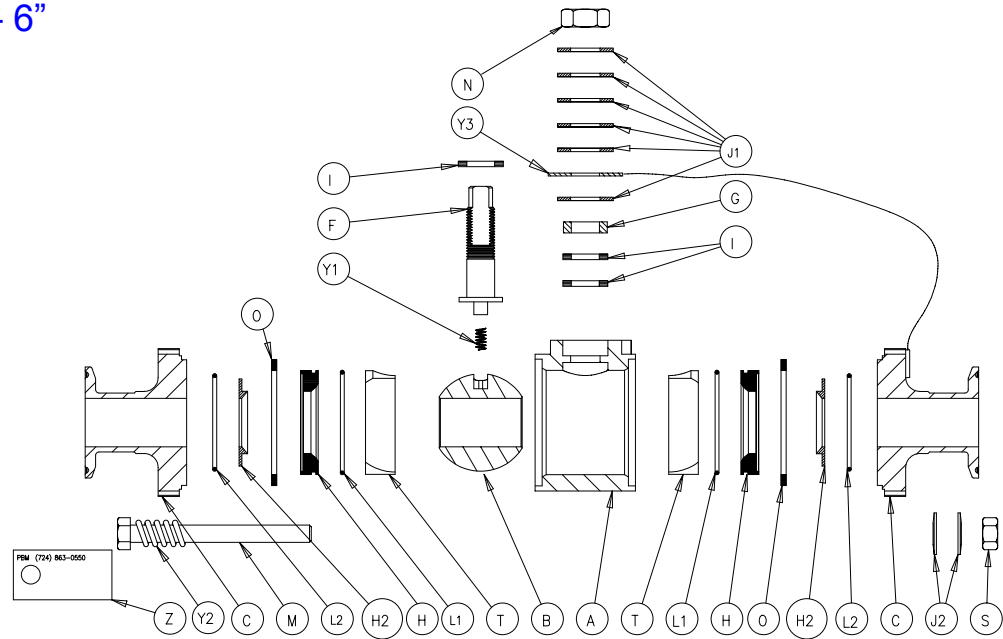
2-Way and Flush Tank Clean Steam Ball Valves

CS/SD/SJ/SK Series 5, 1/2" – 6"

FC/FD/FJ/FK Series 5, 1/2" – 6"

Prepared for Actuation

Component List	
Item	Description
A	Body
B	Ball
C	End Fitting
F	Stem
G	Follower
H	Seat
H ₂	Metal Encapsulated Ring
I	Stem Packing
J ₁	Large Spring Washer
J ₂	Small Spring Washer
L ₁	Large O-Ring
L ₂	Small O-Ring
M	End Fitting Fastener
N	Jam Nut
O	Gasket
S	Hex Nut
T	Cavity Filler
Y ₁	Internal Ground Spring
Y ₂	Coil Ground Spring
Y ₃	External Ground Wire
Z	Tag



SK98005

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 fitting fasteners evenly, in the staggered 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. This space is key to the Adjust-O-Seal feature, and allows in-line adjustment of the seats and gaskets.
 - End fitting fasteners should be tightened only until the valve stem breakaway torque is reached (Table 1).
- If the valve shows signs of leakage in stem area due to normal stem packing wear, tighten the locking jam nut as follows:
 - For valves 2" and smaller, tighten the nut to completely compress the spring washers, then loosen nut 3/4 turn.
 - For valves 2 1/2" and 3", tighten the nut until a gap of about 0.05" (1.3 mm) exists between the adjacent spring washers.
 - For valves 4" and larger, tighten the nut until a gap of about 0.1" (2.5 mm) exists between the adjacent spring washers.

Leakage should stop, and the valve continues to operate smoothly. If leakage cannot be stopped, a repair kit will be required.

- After adjustments have been made to the seats, or if packing leakage

Installing Replacement Parts

- Isolate and depressurize the associated piping system. Cycle the valve to depressurize and drain any trapped fluid from the body cavity. Remove insulation, if any.
- Remove all air and electrical power from the actuator, solenoid valve, and switch box, if any.
- Remove the actuator, solenoid valve, and switch box, if any.
- For valves with Tri-Clamp end connections:
 - Loosen and remove the clamps connecting the valve to the piping. Then remove the valve and Tri-Clamp gaskets.
 - Loosen and remove the hex nuts and spring washers from the end fitting fasteners.
 - Pull the end fittings free from the body.
- For valves with welded end connections, the valve can be disassembled with the body subassembly swung out from the end fittings, or it can be disassembled with the body subassembly completely removed from the end fittings.

- To swing out the body subassembly from the end fittings:
 - Open the valve.
 - Loosen the hex nuts on the end fitting fasteners.
 - Remove the fasteners, nuts, and lock washers between the body swing out ring and the stem.
 - Spring the connecting piping 1/8" (3.2 mm) to remove the compression on the body from the end fittings.
 - Swing the body out from the end fittings until the body completely clears the end fittings. The body's swing out ring will rotate about its fastener.
 - The spring piping can now be returned to its original compression, if desired.
 - To remove the entire body subassembly from the piping:
 - Open the valve.
 - Loosen all end fitting fasteners. Then, remove the fasteners, including the nuts and spring washers, between the body swing out ring and the stem. Remove the fastener, including tag, nut, spring washers, and external ground spring, if any, that passes through the body swing out ring.
 - Spring the connecting piping 1/8" (3.2 mm) to remove the compression on the body from the end fittings.
 - Slide the body subassembly out from between the end fittings. The sprung piping can now be returned to its original compression, if desired.
- Remove the seats, metal encapsulated rings, gaskets, O-rings and cavity fillers, if any, from the body.
 - Turn the stem to close the ball. Slide the ball out of the body, taking care not to nick or scratch the ball.
 - Remove the internal ground spring, if any from under the stem.
 - Loosen and remove the jam nut from the stem. Remove the spring washers and follower.
 - Push the stem into the body and out an open end of the body. The bottom packing may come off with the stem. If not, reach into the body counterbore and remove.
 - Remove the top packings from the body.
 - Before re-assembling the valve, examine the 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. PBM recommends using new seats and seals at each assembly.

13. Insert a new packing on the stem such that the packing seats on top of the ledge on the stem.
14. Insert the stem into the body bore and through the stem bore in body.
15. Install the two additional packings over the stem. (S/S TFE (gray) packing on top) Push the packings into the body counterbore.
16. Install the follower over the stem until it rests on the top packing.
17. Install a large spring washer concave side facing upward. Install the external ground wire terminal on top of this spring washer, if applicable.
18. Install remaining large spring washers, alternating convex with concave curves. Spring washers should not be "nested" (curving in same direction).
19. Lubricate the stem threads with an anti-galling lubricant.
20. Thread a jam nut onto the stem. For valves 2" and smaller, tighten to completely compress the spring washers, then back off 3/4 turn. For valves 2-1/2" and 3", tighten the nut until a gap of about 0.05" (1.3 mm) exists between the adjacent spring washers. For valves 4" and larger, tighten the nut until a gap of about 0.1" (2.5 mm) exists between the adjacent spring washers.
21. Position the stem to close the valve. Install the internal ground spring, if any, on the bottom of the stem.
22. Insert the ball into the body. Slide the stem tang into the ball slot, careful not to nick or scratch the ball.
23. Rotate the stem until the ball is in the open position.
24. Install cavity fillers, if any, into the body.
25. Lubricate the O-rings and 1/2"-inch (12 mm) of each end of the body bore with a lubricant compatible with the process fluid.
26. Install the large O-rings onto the groove on the outer diameter of the seats and then carefully force the seats into the body bore until they contact the ball.
27. Insert the metal seat encapsulating rings into the bores of the seats.
28. Install the gaskets onto the body bore and install the small O-rings between the metal encapsulating rings and the gaskets.
29. Lubricate the external threads of the body bolting with an anti-galling lubricant.
30. For valves with Tri-Clamp end fittings, place the end fittings against the body.
31. For valves with end fittings welded or fixed to the piping, with the valve open, spring the end fittings outward and slide the body between them. Release spring force from end fittings to allow the end fittings to enter the body, taking care not to cut the O-rings.
32. Install fasteners, external ground spring (if any) and external ground wire (if any), and tag. Place spring washers, concave side facing each other. If the valve is electrically grounded, install the external ground spring around the bolt that passes through the swing out ring. This spring should ground that ring to the end fitting.
33. Install and hand-tighten hex nuts. Then, close the valve.
34. Wrench-tighten the bolting according to the procedure shown in Table 3, keeping an even gap between the body and end fittings, and until the stem torque, as shown in Table 1, is reached. The torque is the measured stem torque as the valve leaves the closed position. Cycle the valve to verify freedom of operation and torque.
35. If the valve has Tri-Clamp end fittings, reinstall the valve into the piping using appropriate Tri-Clamp gaskets and clamps.
36. Install the actuator, solenoid valve, and switch box, if any, and reconnect air and electrical power.
37. If practical, check the valve seats and seals for leaks.
38. Insulate the valve, if applicable. Do not insulate the actuator or bracket.

Valve Size	Size Code	Valve Stem Nominal Breakaway Torque for TFM® & VTFE seats	
		in-lb	N-m
1/2"	C5	32	3.6
3/4"	D5	40	4.5
1"	E5	58	6.5
1 1/2"	G5	156	17.6
2"	H5	180	20.4
2 1/2"	J5	288	32.5
3"	K5	384	43.4
4"	L5	792	89.5
6"	M5	1920	216.9

Valve Size	Repair Kit	Replacement Parts		Cavity Filler Kit*
		Large O-ring	Small O-ring	
1/2"	CSTFC5--Z--1	OREP--12---2021	OREP--12---2019	CSTFC5--J--3
3/4"	CSTFD5--Z--1	OREP--12---2026	OREP--12---2024	CSTFD5--J--3
1"	CSTFE5--Z--1	OREP--12---2031	OREP--12---2030	CSTFE5--J--3
1 1/2"	CSTFG5--Z--1	OREP--12---2144	OREP--12---2138	CSTFG5--J--3
2"	CSTFH5--Z--1	OREP--12---2235	OREP--12---2146	CSTFH5--J--3
2 1/2"	CSTFJ5--Z--1	OREP--12---2243	OREP--12---2236	CSTFJ5--J--3
3"	CSTFK5--Z--1	OREP--12---2247	OREP--12---2240	CSTFK5--J--3
4"	CSTFL5--Z--1	OREP--12---2363	OREP--12---2352	CSTFL5--J--3
6"	CSTFM5--Z--1	OREP--12---2377	OREP--12---2365	CSTFM5--J--3

Notes for Table 1:

1. Stem torque values shown are nominal values and represent ideal conditions (100 psig/6.9 bar or less, ambient temperature, with fluid free of suspended solids and comparable in viscosity to water).
2. For RTFE, UHMWPE seats multiply by 1.25
For S/S TFE, Kynar seats multiply by 1.56
Consult factory for PEEK seat torques
2. **Torque values are measured at the stem, NOT at the fasteners.**

Material Definitions:

TF	TFM®	Virgin TFM-PTFE
RT	RTFE	Glass Reinforced Polytetrafluoroethylene
UT	UHMWPE	Ultra High Molecular Weight Polyethylene
HT	S/STFE	Stainless Steel Reinforced Polytetrafluoroethylene
VT	VTFE	Virgin Polytetrafluoroethylene
KY	Kynar	Polyvinylidene fluoride

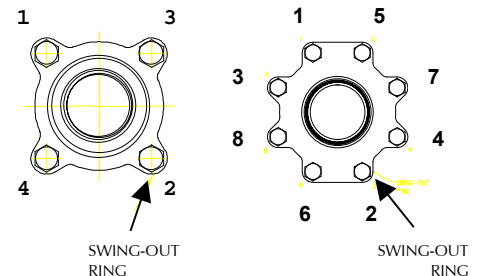
Notes for Table 2:

1. Standard repair kits and replacement parts are TFM®:
 - a. For VTFE, replace "TF" with "VT". Example: a 1" kit becomes CSVTE5--T--1.
 - b. For S/STFE, replace "TF" with "HT". Example: a 1" kit becomes CSHTE5--V--1.
 - c. For RTFE, replace "TF" with "RT". Example: a 1" kit becomes CS RTE5--V--1.
 - d. For UHMWPE, replace "TF" with "UT". Example: a 1" kit becomes CSUTE5--3--1.

Note that if you are changing the seat and seal code in positions 3 and 4 of the part number (as shown above), you must also replace the letter designator in position 9 with the appropriate code from the Seat & Seal column in the PBM Part Number Manual (LT-PLO 10/04).

2. Repair kits include 2 seats, 2 gaskets, 4 O-rings, and 3 packings
- * Cavity filler kits include 2 fillers, and 2 gaskets.

Adjust-O-Seal® is a registered trademark of PBM, Inc.



<ol style="list-style-type: none"> 1. Hand-tighten fasteners. 2. Wrench-tighten each fastener in the sequence illustrated until spring washers begin to compress. 3. Continue tightening bolts 1/8 turn until recommended torque value (Table 1) is achieved when measuring at valve stem.



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