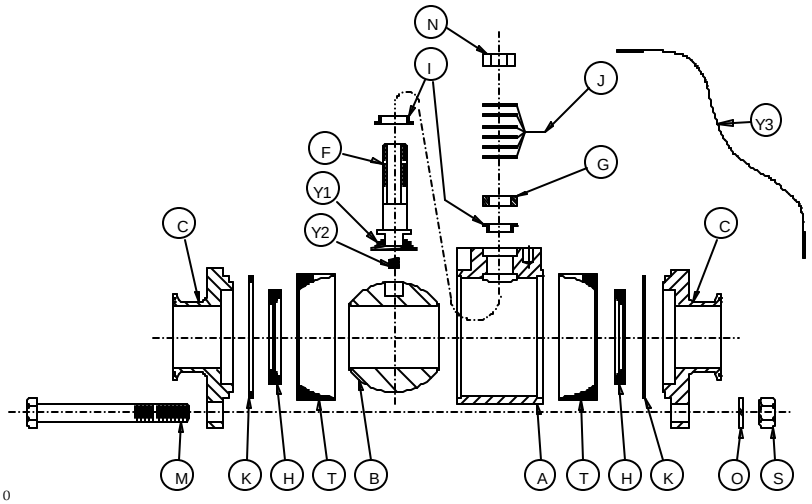
MAINTENANCE INSTRUCTIONS

2-Way, Clean Steam Ball Valves

CS Series 4, ½" - 6"

Factory-Actuated or Prepared for Actuation (Codes 02 or 03)

COMPONENT LIST	
Item	Description
A	Body
B	Ball
C	End Fitting
F	Stem
G	Follower
H	Seat
I	Stem Packing
J	Spring Washers
K	Body Gasket
M	End Fitting Fastener
N	Jam Nut
O	Lock Washer
S	Hex Nut
T	Cavity Filler (optional)
Y_1	Outer Ground Spring
Y_2	Inner Ground Spring
Y_3	Ground Wire



SK97010

Follow instructions to ensure optimum performance:

Adjusting for Normal Wear

1. 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 sequence shown in Table 3, until leakage stops and the valve operates smoothly:
   (a) Initially, there should be a space between end fittings and body. This space is key to the Adjust-O-Seal feature and allows in-line adjustment of the seats and gaskets.
   (b) End fitting fasteners should be tightened only until the valve stem breakaway torque is reached (Table 1).
2. If valve shows signs of leakage in stem area due to normal stem packing wear, tighten jam nut on stem to fully compress spring washers, then back off nut $^1/_8$ turn. Leakage should stop, and valve should continue to operate smoothly.
3. After adjustments have been made to seats, or if packing leakage cannot be stopped, a repair kit will be required.

Installing Replacement Parts

1. Isolate and depressurize piping system. Cycle valve to drain any trapped fluid from body cavity. Remove insulation, if any.
2. 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. For valves with Tri-Clamp end fittings, loosen and remove clamps, valve, and Tri-Clamp gasket. Remove hex nuts and lock washers from fasteners. Remove fasteners. Pull end fittings from body.
5. Turn the valve stem to position valve in the open position.
6. For valves with end fittings welded to connecting piping, loosen and remove the hex nuts and lock washers from the fasteners. Remove the fasteners. Pull end fittings free of body by springing the piping. Remove body subassembly.
7. Remove the seats, gaskets and O-rings, if any, from end fitting.
8. Remove the cavity fillers, if any, from the body.
9. Turn the stem to position the ball closed. Slide the ball out of the body, taking care not to scratch or nick the ball. Remove inner ground spring, if any, from stem underside.
10. For valves 1½" and larger with a handle (03 option), loosen and remove jam nut from handle. Remove handle. Loosen and remove second jam nut from stem. Slide spring washers, external ground wire, if any, stop disc, and follower from stem.
11. For valves 1" and smaller with a hanle, loosen and remove the jam nut from the stem. Remove the handle, spring washers, outer ground wire, if any, and follower.
12. For valves without a handle, loosen and remove the jam nut from the stem and remove the spring washers, outer ground wire, if any, and follower.
13. Push stem into body and out an open end of body. The bottom packing may come off with stem. If not, reach into the body counterbore and remove bottom packing.
14. Remove the top packing from the body.
15. Before reassembling valve, examine parts, and repair or replace damaged or worn parts. Clean metal parts, as necessary, using solvent compatible with process fluid and a non-abrasive cloth.
16. Insert packing on stem with the flange of packing resting against the flange on stem. Insert the stem into the body bore.
17. Install the second packing over stem with the packing's flange facing upward. Push the packing into the body counterbore.
18. Install follower over stem until resting on the upper packing.
19. For 1" and smaller valves with a handle (03 option) and for all valves that will be actuated (02 option), install spring washer, concave side facing upward, on the follower.
20. For 1½" and larger valves with a handle (03 option), install one spring washer, concave side facing upward, on the follower. Install the stop disc on top of the spring washer such that 90° clockwise stem rotation opens the valve.
21. Install remianing spring washers, alternating convex with concave curves and with convex side of lowest additional spring washer facing upward. Spring washers should not be "nested" (curving in same direction. The outer ground wire, if any, should be installed between any two spring washers.
22. For valves 1" and smaller with a handle (03 option), install handle with integral stop disc over spring washer.
23. Lubricate the stem threads with an anti-galling thread lubricant.
24. Thread jam nut onto stem, completely compressing spring washers. Back off jam nut $^1/_8$ turn.

25. For 1½" and larger valves that are handle operated (03 option), install handle and tighten second jam nut to secure handle.
26. Install seats in end fittings, with the flat end of seat against flat recess in the end fitting.
27. Insert the gaskets into the end fittings.
28. Lubricate O-rings, if any, and ¼" of body bore with lubricant compatible to process fluid. This helps prevent cutting O-rings during installation. Install O-rings on end fittings.
29. Position stem to close the valve. Install the outer and inner ground springs, if any, on the stem. Insert ball into body.
30. Insert ball, in the closed position, into body. Slide stem tang into slot in ball taking care not to scratch or nick the ball.
31. Position ball in open position. Install cavity fillers, if any.
32. Lubricate external threads of fasteners with anti-galling lubricant.
33. For valves with Tri-Clamp end fittings, insert the end fittings into the body, taking care not to cut O-rings, if any.
34. For valves with end fittings welded into piping, with valve open, spring end fittings outward and slide body between them. Release spring force from end fittings to allow ends of end fittings to enter body. Take care not to cut O-rings, if any.
35. Turn the stem and close the valve.
36. Install fasteners with lock washers.
37. Install and hand tighten hex nuts. Install the outer ground wire, if any, to any fastener when installing the hex nuts.
38. Wrench tighten hex nuts in sequence shown in Table 3, keeping gap between body and end fittings even and until valve stem breakaway torque (Table 1) is reached. The torque is the measured stem torque as valve leaves closed position. Measure stem breakaway torque for several cycles to verify repeatability.
39. If the valve has Tri-Clamp end fittings, reinstall the valve into the piping using appropriate Tri-Clamp gaskets and clamps.
40. Install the actuator, solenoid valve, and switch box, if any, and reconnect air and electrical power.
41. If practical, leak test the seats, gaskets, and packings.
42. Insulate valve, if applicable. Do not insulate actuator or bracket.

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

Valve Size	Size Code	Valve Stem Breakaway Torque by Seat & Seal Material		
		RT, PL	HT	VT
½"	C4	48	60	38
¾"	D4	60	75	48
1"	E4	72	90	58
1½"	G4	168	210	134
2"	H4	192	240	154
3"	K4	420	525	336
4"	L4	780	975	624
6"	M4	1200-1920	1500-2400	960-1536

TABLE 2: REPLACEMENT PARTS

Valve Size	Repair Kit	Replacement Parts				
		Seat	Body Gasket	Packing	Cavity Filler Kit*	O-Rings
½"	CSRTC4--x--z	CSRTC008	ANRTC013	SPRTC109	CSVTC113F-	N/A
¾"	CSRTD4--x--z	SPRTD008	ANRTD013	SPRTC109	CSVTD113F-	N/A
1"	CSRTE4--x--z	CSRTE008	ANRTE013	SPRTE109	CSVTE113F-	N/A
1½"	CSRTG4--x--z	ANRTG008	ANRTG013	SPRTH109	CSVTG113F-	N/A
2"	CSRTH4--x--z	SPRTH008	ANRTH013	SPRTH109	CSVTH113F-	N/A
3"	CSRTK4--x--z	ANRTK008	ANRTK013	SPRTK109	CSVTK113F-	N/A
4"	CF	CF	CF	CF	CF	N/A
6"	CF	CF	CF	CF	CF	CF

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 fasteners.

Material Definitions:

RT	RTFE	Glass Reinforced Polytetrafluoroethylene
VT	VTFE	Virgin Polytetrafluoroethylene
PL	PLUS	Glass & Carbon Reinforced Polytetrafluoroethylene
HT	S/STFE	Stainless Steel Reinforced Polytetrafluoroethylene

Notes for Table 2:

** When ordering a repair kit, substitute the following for x--z above:
x = Enter appropriate character from Seat/Seal column in PBM Part Number Manual (LT-PN98).
z = Enter "1" for Each or "2" for a Box.

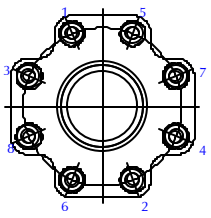
For example, the part number for a single repair kit for a 1" 2-way clean steam ball valve with RTFE seats and seals would be CSRTE4--A--1.

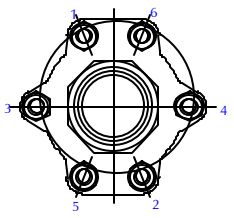
1. Standard repair kits and replacement parts are RTFE:
a. For VTFE, replace "RT" with "VT". Example: a 1" kit becomes CSVTE4--x--z.
b. For S/STFE, replace "RT" with "HT". Example: a 1" kit becomes CSHTE4--x--z.
c. For PLUS, replace "RT" with "PL". Example: a 1" kit becomes CSPLE4--x--z.
2. Repair kits include 2 seats, 2 gaskets, 2 O-rings, and 2 packings.
3. O-ring material is EDPM. Other matierals available.

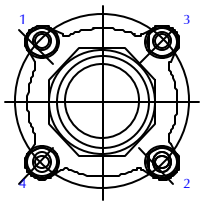
* Cavity filler kits include 2 fillers, 2 O-rings, and 2 gaskets.

TABLE 3: TIGHTENING PROCEDURE FOR END FITTINGS

1. Hand-tighten fasteners in the sequence illustrated, using the approproate end configuration.
2. Wrench-tighten each fastener in the sequence illustrated until lock 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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