

# MAINTENANCE INSTRUCTIONS

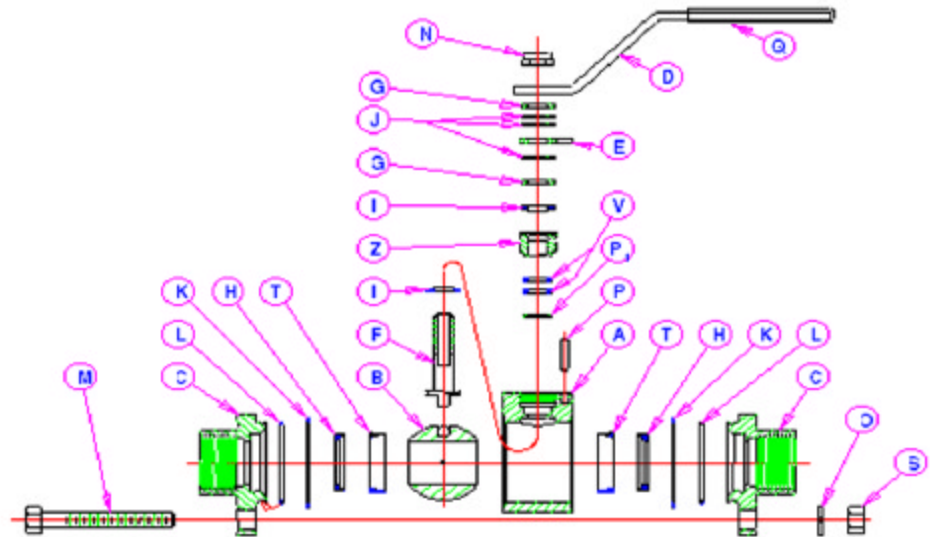


## 2-Way and Flush Tank Ball Valves

### SP/SI & FT/FI, Series 2, API 607, Edition 3

#### Manually Operated, Fire Test Design

COMPONENT LIST	
Item	Description
A	Body
B	Ball
C	End Fitting
D	Handle
E	Stop Disc
F	Stem
G	Follower
H	Seat
I	Stem Packing
J	Spring Washers
K	Graphite Body Gasket
L	O-Ring
M	End Fitting Fastener
N	Locking Hex Nut
O	Lock Washer
P	Stop Pin
Q	Handle Cover
P <sub>1</sub>	Stop Ring
S	Hex Nut
T	Cavity Filler (optional)
V	Graphite Packing
Z	Gland



SK-94086A

Follow instructions to ensure optimum performance:

#### Installing Replacement Parts

- Depressurize the piping at the valve. Then cycle the valve to drain any trapped fluid from the body cavity. The valve should be left fully open or fully closed.
- Remove the valve from the piping. For F valves, disconnect the connecting piping.
- Loosen and remove the end fitting fasteners.
- Pull the end fittings free from the body. Remove the seats, gaskets, O-rings, and cavity fillers, if any.
- Turn the stem to close the ball. Then, slide the ball out of the body, taking care not to nick or scratch the ball.
- Loosen and remove the locking hex nut from the stem. Remove the handle, upper follower, if any, spring washers, stop disc, lower follower, and the upper packing.
- Unscrew and remove the gland.
- 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 the bottom packing.
- Remove the graphite packings.
- Remove the stop ring, if any, from the body.
- Before reassembling 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.
- Place a new PTFE packing on the stem such that the flanged surface of the packing seats on top of the ledge on the stem.
- Insert the stem into the body bore and through the stem bore in the body. While supporting the stem, install the stop ring over the stem until it rests on the ledge of the body bore.
- Install graphite packings over the stem and into the body bore.
- Lubricate the gland threads with appropriate lubricant. Install and tighten the gland to compress the graphite packings. The gland should be tightened just until snug. (Over-tightening significantly raises stem torque.)
- Place a second PTFE packing over the stem with the flanged surface facing upward, and into the gland.
- Install a follower over the stem until it seats on the packing.
- Install a spring washer such that its concave side is facing upward.
- Install the stop disc such that clockwise rotation of the stem opens the valve and counterclockwise rotation closes the valve. Ensure that the stop disc clears the top of the body.
- Install remaining spring washers, alternating convex with concave curves and with the convex side of the highest spring washer facing upward. Spring washers should not be "nested" (curving in the same direction).
- Lubricate the stem threads with an anti-galling lubricant.
- Install the second follower, if any, over the stem and atop the highest spring washer.
- Install the handle on the stem such that the handle is over the stop pin when the valve is in the open position.
- Install the locking hex nut with the nylon lock facing away from the valve body. Tighten to completely compress the spring washers, then back off  $\frac{1}{8}$  turn.
- Position the stem to close the valve. Insert the ball into the body. Slide the stem tang into the ball slot, being careful not to nick or scratch the ball. Ensure that the small hole in the ball is facing the upstream end of the valve when the valve is in the closed position. For F valves, this hole should face the tank side of the valve. For S valves, this hole should face the "feather" end of the flow direction arrow stamped on the body.
- Rotate the stem until the ball is in the open position.
- Install cavity fillers, if any, in the body.

28. Lubricate O-rings and the first inch of the body bore with a lubricant compatible with the process fluid. Place a new seat, graphite gasket, and O-ring in their mating cavities in the downstream end fitting. Insert the downstream end fitting into the body bore on the side of the body where the stop pin is located, making sure the seats, gaskets and O-rings remain in position.
29. Lubricate the external threads of the body bolting with an anti-galling lubricant.
30. Install a seat, graphite gasket, and O-ring in the upstream end fitting. For F valves, the upstream end fitting is the tank pad. In vertical installations, a lubricant, applied to the seat back and gasket, may be necessary to hold the seat and gasket in place.
31. For F valves, install the studs into the tapped holes in the flush tank pad until they bottom.

32. Assemble the body/end fitting and the upstream end fitting. For F valves allow studs to enter holes in the end fitting.
33. Install and hand-tighten the end fitting fasteners.
34. Wrench-tighten the bolting, according to the procedure shown in Table 2, to draw the end fitting tightly against the body. Cycle the valve to verify freedom of operation.
35. If practical, check the valve seats and seals for leaks.
36. Install the valve into the piping, ensuring that the small hole in the body is facing upstream when the valve is in the closed position.

**Notes:**

1. Sizes 1/4" - 1" do not have a stop ring, and have only one follower.
2. Sizes 1/4" - 1" have a PTFE lower packing and a PEEK upper packing.
3. 1" valve has one graphite packing.
4. PBM recommends replacement of any valve exposed to fire.

Valve Size	Size Code	Valve Stem Breakaway Torque by Seat & Seal Material		
		RT, PL, UT	HT	VT
1/4"	A1	53	66	42
3/8"	B1	53	66	42
1/2"	C1	53	66	42
3/4"	D1	66	83	53
1"	E1	79	99	64
1-1/2"	G1	185	231	147
2"	H1	211	264	169
2-1/2"	J1	330	413	264
3"	K1	462	578	370
4"	L1	594	743	475

<ol style="list-style-type: none"> <li>1. Hand-tighten fasteners.</li> <li>2. Wrench-tighten each fastener in the sequence illustrated until lock washers begin to compress.</li> <li>3. Continue tightening bolts 1/8 turn until recommended torque value (Table 1) is achieved when measuring at valve stem.</li> </ol>	
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Valve Size	Repair Kit	Replacement Parts									
		Ball	Stem	Seat	Teflon Packing	PEEK Stem Packing	Graphite Packing	Graphite Gasket	O-Rings	Cavity Filler Kit	
1/4"	SPRTC2--A--1	SPH-C202	SPHLC205	SPRTC208	SPRTC209	SPPKC109	SPGRC209A	SPGRC213	ORVI--12--2025	SPRTC2--B--3	
3/8"	SPRTC2--A--1	SPH-C202	SPHLC205	SPRTC208	SPRTC209	SPPKC109	SPGRC209A	SPGRC213	ORVI--12--2025	SPRTC2--B--3	
1/2"	SPRTC2--A--1	SPH-C202	SPHLC205	SPRTC208	SPRTC209	SPPKC109	SPGRC209A	SPGRC213	ORVI--12--2025	SPRTC2--B--3	
3/4"	SPRTD2--A--1	SPH-D202	SPHLC205	SPRTD208	SPRTC209	SPPKC109	SPGRC209A	SPGRD213	ORVI--12--2029	SPRTD2--B--3	
1"	SPRTE2--A--1	SPH-E202	SPHLE105	SPRTE208	SPRTE209	SPPKE209	SPGRE209A	SPGRE213	ORVI--12--2031	SPRTE2--B--3	
1-1/2"	SPRTG2--A--1	SPH-G202	SPHLH105	SPRTG208	SPRTH209	N/A	SPGRH209A	SPGRG213	ORVI--12--2145	SPRTG2--B--3	
2"	SPRTH2--A--1	SPH-H202	SPHLH105	SPRTH208	SPRTH209	N/A	SPGRH209A	SPGRH213	ORVI--12--2152	SPRTH2--B--3	
2-1/2"	SPRTJ2--A--1	SPH-J202	SPHLJ105	SPRTJ208	SPRTJ109	N/A	SPGRK209	SPGRJ213	ORVI--12--2156	SPRTJ2--B--3	
3"	SPRTK2--A--1	SPH-K202	SPHLK105	SPRTK208	SPRTK109	N/A	SPGRK209	SPGRK213	ORVI--12--2246	SPRTK2--B--3	
4"	SPRTL2--A--1	SPH-L202	SPHLK105	SPRTL208	SPRTK109	N/A	SPGRK209	SPGRL213	ORVI--12--2255	SPRTL2--B--3	

**Notes for Table 1:**

1. Stem torque values shown are nominal 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 body bolts.**
3. For PEEK or KYNAR seat and seal material torque values, consult PBM.

**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

**Notes for Table 3:**

1. Standard repair kits and replacement parts are RTFE:
  - a. For VTFE, replace 'RT' with 'VT'. Example: a 1" kit would be SPVTE2--C--1.
  - b. For UHMWPE, replace 'RT' with 'UT'. Example: a 1" kit would be SPUTE2--A--1.

**Note:** The character in position nine of the Repair Kit part number represents the appropriate single character designation from the Seat/Seal column of the PBM Part Number Manual (LT-PN98). It identifies the proper material for seats and seals or cavity fillers. Please consult the Part Number Manual to obtain the proper letter code for position nine, or consult PM directly for assistance.
2. Repair kits include 2 seats, 2 gaskets, 2 packings, 2 graphite packings, and 2 Viton O-rings.
3. Cavity filler kits include 2 cavity fillers and 2 graphite gaskets.
4. Replacement parts are one each per part number. Order appropriate quantity for repair/replacement.

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