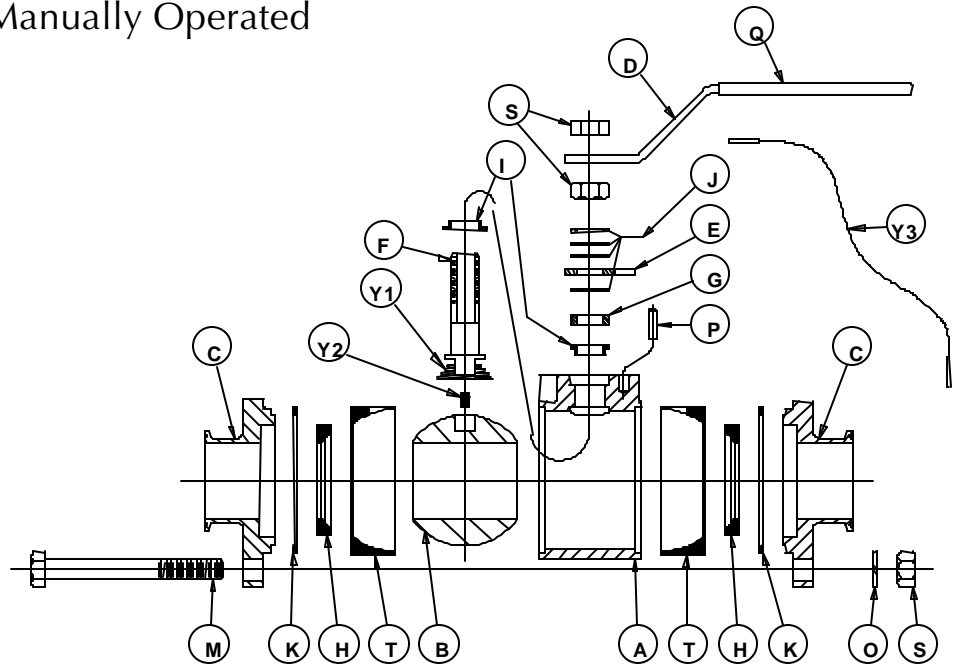


MAINTENANCE INSTRUCTIONS

2-Way, Igenix[®], True-Bore[®] Ball Valves SI Series 4, 1/2" - 6", Manually Operated



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	Body Gasket
M	End Fitting Fastener
O	Lock Washer
P	Stop Pin
Q	Handle Cover
S	Hex Nut
T	Cavity Filler (optional)
Y ₁	Outer Ground Spring
Y ₂	Inner Ground Spring
Y ₃	Ground Wire



SK95117B

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 sequence shown in Table 3, until leakage stops and the valve operates smoothly:
 - 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.
 - End fitting fasteners should be tightened only until the valve stem breakaway torque is reached (Table 1).
- 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.
- After adjustments have been made to seats, or if packing leakage cannot be stopped, a repair kit will be required.

Installing Replacement Parts

- Isolate and depressurize piping system. Cycle valve to drain any trapped fluid from body cavity. Remove insulation, if any.
- Turn the valve stem to position valve in the open position.
- 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.
- 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.
- Remove the seats, gaskets and O-rings, if any, from end fitting.
- Remove the cavity fillers, if any, from the body.
- 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 ground springs, if any, from stem.
- Loosen and remove the jam nut from handle. Remove handle.
- If an extended stem is installed, loosen jam nut under base. Unscrew and remove small fastener extending through extended stem. Remove extended stem, spring washer and jam nut.
- Loosen and remove remaining jam nut, if any. Remove spring washers, external ground wire, if any, stop disc, and follower(s) from stem.
- 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.
- Remove the top packing from the body.

- 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.
- Insert a packing over stem with the flange bearing against the flange on the stem. Insert the stem into the body bore.
- Install the second packing over stem with the packing's flange facing upward. Push the packing into the body counterbore.
- Install follower over stem until resting on the upper packing.
- For 1" and smaller valves:
 - For valves with extended stems, install a stop disc on follower such that the valve rotates 90° clockwise to open. Install a spring washer, concave side facing upward, on stop disc. For valves without stem extended stems, install a spring washer, concave side facing upward on follower.
 - Install second spring washer, concave side facing downward. Install third spring washer, concave side facing upward. Install external ground wire, if any, between any two spring washers.
 - For valves that do not have extended stems, install a second follower on top of the spring washers. Install the integral handle/stop disc on top of the follower such that the handle is over the stop pin when the valve is in the open position.
 - Lubricate the stem threads with an anti-galling lubricant.
 - Thread jam nut onto stem and tighten nut to fully compress spring washers, then back off the nut 1/8 turn.
 - For valves with extended stems, thread a second jam nut on the stem until it bottoms on the first nut. Do not tighten this nut. Install a fourth spring washer, concave side facing upward, on top of the second nut. Slide stem extension onto the stem. Install and tighten the small fastener to secure stem extension to stem. Turn second nut to compress the top spring washer against stem extension.
- For valves with extended stems, install handle on stem extension so that the handle is over the stop pin when the valve is in the open position. Install and tighten jam nut to secure the handle to the stem extension.
- For 1 1/2" and larger valves:
 - Install a spring washer, concave side facing upward on follower. Install the stop disc such that the valve rotates 90° clockwise to open the valve.
 - Install three more spring washers, alternating direction and starting with concave side facing downward. If external ground wire is used, install between two spring washers.
 - Lubricate the stem threads with an anti-galling lubricant.
 - Thread jam nut onto stem and tighten nut to fully compress spring washers, then back off the nut 1/8 turn.
 - For valves with extended stems, thread a second jam nut on the stem until it bottoms on the first nut. Do not tighten this nut. Install a fifth

spring washer, concave side facing upward, on top of the second nut. Slide stem extension onto the stem. Install and tighten the small fastener to secure stem extension to stem. Turn second nut to compress the top spring washer against stem extension.

- (f) Install handle over stem or stem extension, such that the handle is over stop pin when valve is in open position.
- (g) Install a jam nut on top of handle and tighten to secure.
- 20. Install seats in end fittings with the flat end of seat against flat recess in the end fittings. Insert the gaskets into the end fittings.
- 21. Lubricate O-rings, if any, and 1/4" of body bore with lubricant compatible to process fluid. This helps prevent cutting O-rings during installation. Install O-rings, if any, on end fittings.
- 22. Position stem to close valve. Install the outer and inner ground springs, if any, on the stem. Insert ball into body. Slide stem tang into ball slot, taking care to scratch or nick ball.
- 23. Position ball in open position. Install cavity fillers, if any.
- 24. Lubricate external threads of fasteners with anti-galling lubricant.
- 25. For valves with Tri-Clamp end fittings, insert the end fittings into the body, taking care not to cut O-rings, if any.

- 26. 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.
- 27. Turn the stem and close the valve.
- 28. Install fasteners with lock washers. Install and hand-tighten hex nuts. Install the external ground wire, if any, to any fastener.
- 29. 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 measured stem torque as valve leaves closed position. Measure stem breakaway torque for several cycles to verify repeatability.
- 30. If the valve has Tri-Clamp end fittings, reinstall the valve into the piping using appropriate Tri-Clamp gaskets and clamps.
- 31. If practical, leak test the seats, gaskets, and packings.
- 32. Insulate valve, if applicable.

Note: 6" valves have O-rings. 1/2" - 4" do not.

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

Valve Size	Size Code	Valve Stem Breakaway Torque by Seat & Seal Material		
		RT, PL UT	HT	VT
1/2"	C4	48	60	36
3/4"	D4	48	60	48
1"	E4	72	90	60
1 1/2"	G4	168	210	132
2"	H4	192	240	156
2 1/2"	J4	300	375	240
3"	K4	420	525	336
4"	L4	540	675	432
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*
1/2"	SIVTC4--x--z	SIVTC408	SPVTC013	SPVTC109	SPVTC013F-
3/4"	SIVTD4--x--z	SPVTC008	SPVTC013	SPVTC109	SPVTC013F-
1"	SIVTE4--x--z	SIVTE408	SPVTE013	SPVTE109	SPVTE013F-
1 1/2"	SIVTG4--x--z	SIVTG408	SPVTG013	SPVTH109	SPVTG013F-
2"	SIVTH4--x--z	SIVTH408	SPVTH013	SPVTH109	SPVTH013F-
2 1/2"	SIVTJ4--x--z	SIVTJ408	SPVTJ013	SPVTJ109	SPVTJ013F-
3"	SIVTK4--x--z	SIVTK408	SPVTK013	SPVTK109	SPVTK013F-
4"	CF	CF	CF	CF	CF
6"	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.
- 3. If PEEK or KYNAR® material, contact PBM for correct torque values.

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 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 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, ball valve with RTFE seats and seals would be SIRTE4--A--1.

- 1. Standard repair kits and replacement parts are VTFE:
 - a. For RTFE, replace "VT" with "RT". Example: a 1" kit becomes SIRTE4--x--z.
 - b. For S/STFE, replace "VT" with "HT". Example: a 1" kit becomes SIHTE4--x--z.
 - c. For PLUS, replace "VT" with "PL". Example: a 1" kit becomes SIPLE4--x--z.
 - d. For PEEK, replace "VT" with "PK". Example: a 1" kit becomes SIPKE4--x--z.
 - e. For UHMWPE, replace "VT" with "UT". Example: a 1" kit becomes SIUTE4--x--z.
 - f. For KYNAR, replace "VT" with "KY". Example: a 1" kit becomes SIKYE4--x--z.

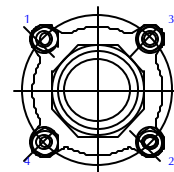
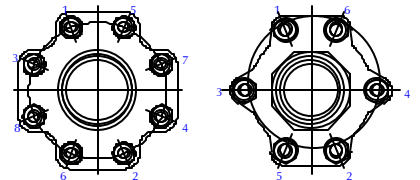
- 2. Repair kits include 2 seats, 2 gaskets, and 2 packings.
- 3. To order O-rings for 6" valves, consult PBM.

* Cavity filler kits include 2 fillers and 2 gaskets.

CF = Consult Factory.

TABLE 3: TIGHTENING PROCEDURE FOR END FITTINGS

- 1. Hand-tighten fasteners.
- 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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