

# MAINTENANCE INSTRUCTIONS



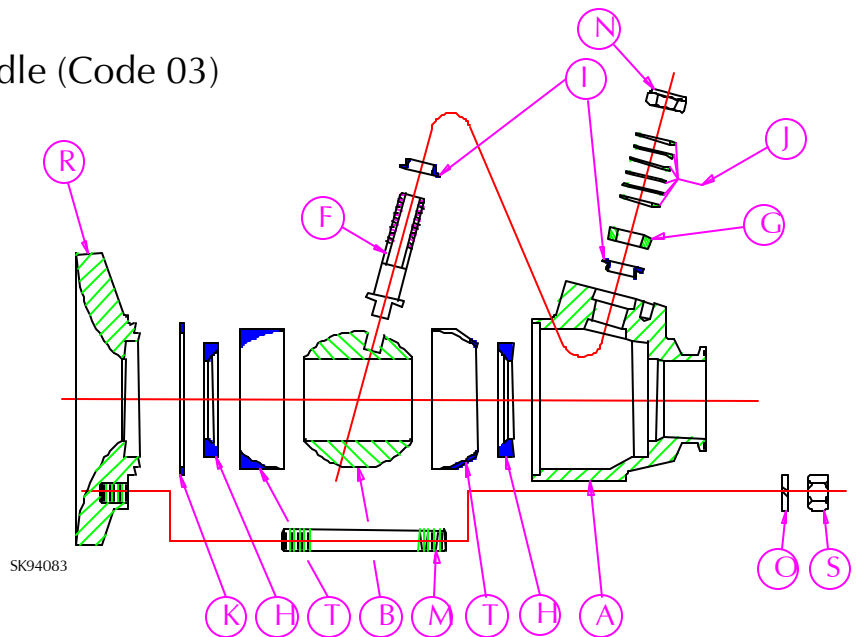
## Angle Stem Flush Tank Ball Valves

### AF Series 1

Factory-Actuated (Code 02) or

Prepared for Actuation with Handle (Code 03)

| COMPONENT LIST |                          |
|----------------|--------------------------|
| Item           | Description              |
| A              | Body                     |
| B              | Ball                     |
| F              | Stem                     |
| G              | Follower                 |
| H              | Seat                     |
| I              | Stem Packing             |
| J              | Spring Washers           |
| K              | Body Gasket              |
| M              | Body Fasteners           |
| N              | Locking Hex Nut          |
| O              | Lock Washer              |
| R              | Tank Pad                 |
| S              | Hex Nut                  |
| T              | Cavity Filler (optional) |



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 body 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 flush tank pad and the body. This space is key to the Adjust-O-Seal feature, and allows in-line adjustment of seats and gaskets.
  - Body fasteners should be tightened only until the ball valve 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 jam nut on the stem to fully compress spring washers, then back off the nut 1/8 turn. For 4" and 6" valves, tighten this nut until the gap between adjacent spring washers is approximately 0.1". 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 the associated piping system. Cycle the valve to drain any trapped fluid from the body cavity.
- 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.
- Loosen and remove the hex nuts and lock washers. Remove the body assembly from the flush tank pad.
- Remove seat, gasket and O-ring, if any, from flush tank pad.
- Remove the outer cavity filler, if any, from the body.
- Turn the stem to close the valve. Slide the ball out of the body, taking care not to scratch or nick the ball. Remove the inner seat and cavity filler, if any.
- Loosen and remove the locking hex nut from the stem. Remove the spring washers, and follower.
- Push the stem down and out an open end of the body.
- Remove the lower packing from the body or stem and remove the upper packing from the body.

- Before reassembling the valve, examine parts and repair/ replace damaged or worn parts. Clean metal parts using a solvent compatible with the process fluid and a non-abrasive cloth.
- Place a new lower packing over the stem with the flanged surface seated against the flange on the stem.
- Insert inner seat into the body. Insert inner cavity filler, if any.
- Insert the stem into the body bore. Install a new upper top packing on the stem with the flanged surface facing upward. Push the packing into the body counterbore.
- Install the follower over the stem. Lubricate stem threads with an anti-galling lubricant.
- Insert the ball in the closed position, into the body. Slide stem tang into the ball slot, taking care not to scratch or nick ball. The stem tang and ball slot are indexed such that they fit together in one position only.
- Install a spring washer over the stem with its concave side facing upward. For 03 valves 1 1/2" and larger, install the stop disc such that that clockwise rotation of the stem closes the valve with the ports aligned, and counter-clockwise rotation opens the valve. Ensure stop disc will contact the stop pin. If the ports do not align in the open position, remove the stop disc, rotate the stem 180 degrees, then reinstall the stop disc.
- Install remaining spring washers, alternating convex and concave curves, and with the convex side of the lowest additional spring washer facing upward. Spring washers should not be "nested" (curving in same direction).
- Install the handle over the stem such that the handle is over the stop pin when the valve is in the open position. For 1" valves, open the valve and observe whether the ports of the ball align with the seats in the open position. If the ports do not align, remove the handle and rotate the stem 180 degrees, then reinstall the handle to achieve alignment.
- Install the locking hex nut with the nylon lock facing away from the valve body. Tighten the nut to fully compress the spring washers, then back off the nut 1/8 turn. For 4" and 6" valves, tighten this nut until the gap between adjacent spring washers is approximately 0.1".

21. Insert the outer cavity filler, if any, into the valve body.
22. Install seat, gasket and O-ring, if any, into the flush tank pad. In vertical installations, it may be necessary to apply a lubricant to the back of the seat and gasket to hold parts in place.
23. Install the body fasteners into the tapped holes in the flush tank pad until they reach the bottom. Lubricate the fastener threads with an anti-galling lubricant before assembly.
24. For 6" valves, lubricate the first 1-1/2" of the body bore with a lubricant compatible with the process fluid to prevent cutting of the O-rings.
25. To assemble the body to the flush tank pad, push body against the pad allowing fasteners to enter the holes in the body.
26. Install hex nuts and lock washers and hand-tighten.
27. With the valve closed, wrench-tighten the body fasteners in the sequence shown in Table 3, leaving a gap between the body and

flush tank pad, until the valve stem breakaway torque (Table 1) is achieved. Then, remeasure the stem breakaway torque for several cycles to verify repeatability.

28. Position the valve in the "Fail" position, then install the actuator, solenoid valve, and switch box, if any, and reconnect air and electrical power. Cycle the valve open and recheck the ball port alignment in the open position.
29. If practical, leak test the seats, gaskets and packings.

**Notes:**

1. Instructions apply to valves with actuation operating clockwise to close valve. If actuation operates counterclockwise, all references to "clockwise" and "counter-clockwise" must be reversed.
2. 6" valves have one O-ring. Smaller sizes have none.
3. PBM recommends using new seats and seals at each assembly.

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

| Valve Size | Size Code | Ball Valve Breakaway Torque by Seat & Seal Material |           |          |
|------------|-----------|---|-----------|----------|
|            |           | RTFE, PLUS, UHMWPE                                  | S/STFE    | VTFE     |
| 1"         | E         | 72  | 90        | 58       |
| 1½"        | G         | 168   | 210       | 134      |
| 2"         | H         | 192   | 240       | 153      |
| 3"         | K         | 420   | 525       | 336      |
| 4"         | L         | 540   | 675       | 432      |
| 6"         | M         | 1200-1920   | 1500-2400 | 960-1536 |

**TABLE 2: REPLACEMENT PARTS**

| Repair Kit   | Replacement Parts |          |          |                   |                 |
|--------------|-------------------|----------|----------|-------------------|-----------------|
|              | Seat              | Gasket   | Packing  | Cavity Filler Kit | Body O-Ring     |
| AFRTE1--A--1 | SPRTE008          | SPRTE013 | SPRTE109 | AFRTE1--B--3      | N/A             |
| AFRTG1--A--1 | SPRTG008          | SPRTG013 | SPRTG109 | AFRTG1--B--3      | N/A             |
| AFRTH1--A--1 | SPRTH008          | SPRTH013 | SPRTH109 | AFRTH1--B--3      | N/A             |
| AFRTK1--A--1 | SPRTK008          | SPRTK013 | SPRTK109 | AFRTK1--B--3      | N/A             |
| AFRTL1--A--1 | SPRTL008          | SPRTL013 | SPRTL109 | AFRTL1--B--3      | N/A             |
| AFRTM1--A--1 | SPRTM008          | SPRTM013 | SPRTM109 | AFRTM1--B--3      | ORV1--12---2372 |

**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.

**Material Definitions:**

|    |        |  |
|----|--------|--|
| HT | S/STFE | Stainless Steel Reinforced Polytetrafluoroethylene |
| KY | KYNAR® | Polyvinylidene Fluoride                            |
| PK | PEEK   | Polyetheretherketone                               |
| PL | PLUS   | Glass & Carbon Reinforced Polytetrafluoroethylene  |
| RT | RTFE   | Glass Reinforced Polytetrafluoroethylene           |
| UT | UHMWPE | Ultra High Molecular Weight Polyethylene           |
| VT | VTFE   | Virgin Polytetrafluoroethylene                     |

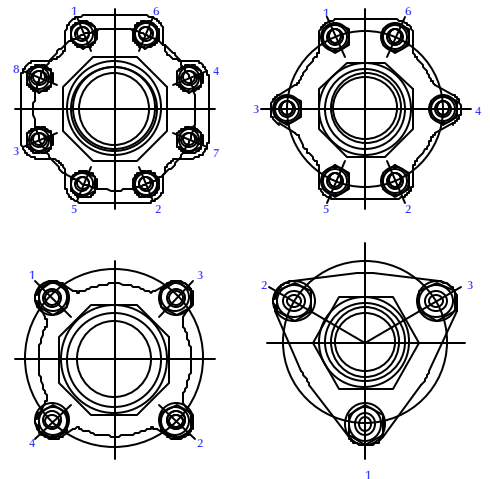
**Notes for Table 2:**

1. Standard Repair Kits are RTFE. To order a Repair Kit with a different material, replace "RT" with the appropriate 2-letter material definition. Be sure to also replace the "A" with the appropriate seat and seal designator from the Seat/Seal column in the PBM Part Number manual (LT-PN98).
  - a. For VTFE, replace "RT" with "VT" and add "C" to the code. Example: a 1" kit would become AFVTE1--C--1.
2. Repair kits include 2 seats, 1 gasket, 2 packings and, if applicable, 1 Viton O-ring. (EPR O-rings and other materials are also available.)
3. Cavity filler kits include 2 cavity fillers and 1 gasket.

**TABLE 3: TIGHTENING PROCEDURE FOR BODY FASTENERS**

1. Hand-tighten in the sequence illustrated.
2. Wrench-tighten each fastener in the sequence illustrated until lock washers begin to compress.
3. Continue tightening each bolt 1/8 turn until recommended torque value (Table 1) is achieved when measuring at valve stem.

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