

**CAUTION:**

1. For your safety read this manual before installation or servicing.
2. Before installing or servicing, please ensure the line pressure has been relieved, and any hazardous fluids have been drained or purged from the system.
3. Ensure that all Lockout and Tagout procedures for the system have been properly implemented.

**1. USE:**

1.1 Maximum results and optimum valve life can be maintained under normal service conditions and in accordance with pressure/temperature ratings and corrosion data chart.

**2. GENERAL INFORMATION FOR INSTALLATION:**

- 2.1 Valves are designed with a preferred flow direction, a flow arrow on the valve body indicates preferred flow.
- 2.2 Before installation of the valves, the pipe must be flushed clean of dirt, burrs and welding residues, or the seats and ball surface may be damaged.
- 2.3 The pipe must be tension free and in proper alignment.
- 2.4 Before installing, check to ensure that all valves and end connections are free from defects.
- 2.5 Valves should be installed in pipeline completely assembled. Do not disassemble the valves to install.

**3. INSTALLATION OF THREADED VALVES:**

- 3.1 Use of proper thread seal material, compatible with service conditions, is paramount in preventing thread leakage.
- 3.2 Make sure thread specification of the pipe matches the valve thread specifications.
- 3.3 Apply wrench only on the hexagon of the valve ends to secure the valve to the pipeline. Tightening by using the valve body or lever can seriously damage the valve.
- 3.4 Valve is ready to be pressure tested and put into service.

**4. INSTALLATION OF WELD-END VALVES**

- 4.1 Tack weld the valve on the pipe in four points on both end caps.
- 4.2 With the valve in the open position (lever parallel to the axis of the pipe), finish welding the valve in the pipeline.
- 4.3 When valve has cooled to room temperature check for proper operation.
- 4.4 Recheck body bolt torques to ensure proper torque value per Figure 1.
- 4.5 Valve is ready to be pressure tested and put into service.

**5. MANUAL OPERATION:**

- 5.1 Opening and closing the valve is done by turning the handle a ¼ turn (90 degrees); counter-clockwise to open and clockwise to close.
  - A. Valve in Open Position – the lever is in line (parallel) with the valve or pipeline.
  - B. Valve in Closed Position – the lever is at a right angle (perpendicular) to the valve or pipeline.

**6. AUTOMATED OPERATION**

- 6.1 Valves with actuators should be checked for proper valve stem alignment. Angular or linear misalignment may result in high operational torque and unnecessary wear on the valve stem.

**7. DISASSEMBLY & CLEANING PROCEDURE:****Caution: Ball valve can trap fluids in the ball cavity when closed.**

- 7.1 If the valve has been used to control hazardous media, it must be decontaminated before disassembly. It is recommended that the following steps are taken for safe removal and disassembly.
- Relieve the line pressure.
  - Place valve in half-open position and flush the line to remove any hazardous material.
  - All persons involved in the removal and disassembly of the valve should wear the proper personal protective equipment, such as face shield, gloves, etc.

**\*\*NOTE:** If *in line maintenance* is required, please follow these instructions to prevent valve damage. Loosen all four body bolts evenly in a star pattern. Completely remove three of the four body bolts from the valve leaving one of the bottom bolts. A pipe spreader must then be used to approximately acquire a 3/8" gap between each end cap and the valve body. This will facilitate the ability to swing the valve body out of the pipeline. Note that without the 3/8" gap on each end cap the valve body will not swing out of the pipeline. The necessary maintenance can now be performed without disturbing pipe alignment.

**7.2 DISASSEMBLY**

**CAUTION: On Uni-Directional valves the upstream and downstream seats must be identified as the valve is disassembled. The orientation of the ball is also critical as the downstream side of the ball must be kept next to the downstream seat.**

- Turn the valve to the closed position.
- Loosen Nuts (10) on the body studs.
- Remove 3 sets of nuts and studs from valve.
- Then carefully rotate valve body out of the pipe line (refer to *in line maintenance* procedure above) taking extreme care not to drop a seat from either side of the valve or the ball.
- Downstream Side. Remove Gasket (9), Seat Gasket (5), Seat (4) and Ball (3). Be careful not to drop any of the above parts when the valve body is rotated. (See Figure 2)
- Upstream Side: Remove Gasket (9), Seat Spring Seal (7), Seat Spring Retainer (6), Seat Spring (8) and Seat (4) (See Figure 2)
- Loosen the Handle Nut (19) and remove the Handle (18). Remove the Lock Saddle (17), Nut (16), Belleville Spring Washer (15) and Ring (14) (See Figure 2).
- Press the stem toward the valve body and remove it from the body side. (See Figure 2)
- The Gland Packing (12) must be carefully removed to prevent scratching the packing.
- Use an approved solvent to clean the body, cap, ball, and other parts.
- Before reassembly, thoroughly inspect the valve for defects such as scoring of the valve stem in the packing gland area and ball/seat damage.

**8. ASSEMBLY**

- Slide the thrust washer (11) down onto the stem (13).
- Insert the stem (11) into the stem hole from the inside body (1), and then slide the stem packing (10) down the stem and into the valve body. Use extreme care not to damage the stem packing. A sleeve may be required to guide the stem packing into the bore without damaging the seal.
- Put Ring (14) and Belleville Spring Washer (15) on Stem (13), and tighten the Nut (16) per the torque value in Figure 1. Adjust nut slightly so that the Lock Saddle can be installed (17) and Handle (18) on stem, and then tighten Handle Nut (19).
- Turn the Handle (18) to the closed position and install Ball (3) into the body (1).
- Upstream side: Install Gasket (9) into Cap Then install Seat (4), and Seat Gasket (5) into Body (1).
- Downstream side: Put Gasket (9), into Cap then install Seat (4) into Body (1), then install Seat Spring (8). Put the flat side of Seat Spring Retainer (6) toward Seat Spring Seal (7).
- Swing Body assembly into place between the end caps (2). Lightly tighten Nuts (10) with wrench. Then Open and Close valve to check for smooth operation. Close the valve and then tighten the nuts in a diagonal sequence according to the torque listed in Figure 1.

**TROUBLESHOOTING**

Area	Description	Solution
Inner	Internal Leakage	<ol style="list-style-type: none"> <li>1. Check if there is any damage on the contact surface of ball (3) and seats (4).</li> <li>2. If parts are damaged, replace damaged ball &amp; seats, and seat gasket (5).</li> <li>3. If Ball &amp; Seats are ok replace Seat Gasket (5)</li> <li>4. Body Gasket (9) must be replaced with a new one every time the valve is disassembled.</li> </ol>
Outer	Stem Leakage	<ol style="list-style-type: none"> <li>1. Tighten gland nut (12) to the torque values in Figure 1.</li> <li>2. If step 1 does not stop leakage, disassemble the valve to replace gland packing (12).</li> <li>3. Gasket (9) must be replaced with a new one every time the valve is disassembled.</li> </ol>
	Body Gasket Leakage.	<ol style="list-style-type: none"> <li>1. Tighten body studs &amp; nuts (10) to the torque values in Figure 1 per valve rating. Do not over torque studs &amp; nuts</li> <li>2. If step 1 does not stop leakage, disassemble body (1) and cap (2) to replace gasket (9).</li> </ol>

**BOLT TIGHTENING SPECIFICATIONS**

The body bolts of the valve should be tightened evenly.  
Tighten one-side snugly, then the one diagonal across.  
Repeat for the other bolts, bringing them all down equally to the required torque value.

**Figure 1**

Torque Values				
600LB				
Size	Body Bolts		Packing Gland Bolts	
	Nm	In-Lbs	Nm	In-Lbs
1/2"	20	177	5	44
3/4"	20	177	5	44
1"	40	354	8	71
1-1/2"	70	620	8	71
1-1/4"	80	708	10	89
2"	80	708	10	89





M SERIES  
3-PC High Performance Metal Seat Ball Valve  
Installation & Maintenance Manual

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