Contents: SERIES FME IOM

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 charts.

2. GENERAL INFORMATION FOR INSTALLATION:

2.1 Valves are designed with a preferred flow direction; a flow arrow on the valve indicates the preferred flow. The valve should be installed with the arrow pointing toward the low-pressure side when the valve is in the closed position. See Figure 1 below:

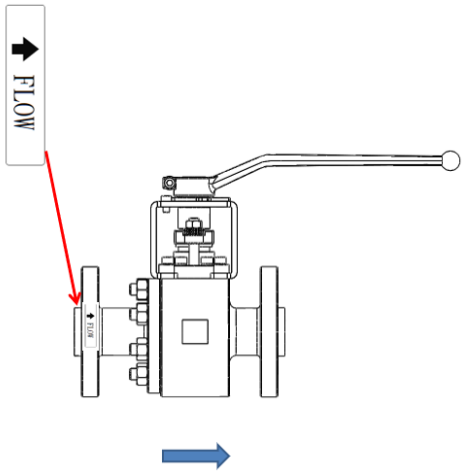


Figure 1: Flow Arrow Location

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 free from tension and in proper alignment.
2.4 Before installing, check to ensure that all valves, end connections, and gasket surfaces are free from defects.
2.5 Valves should be installed in pipeline completely assembled. Do not disassemble the valves to install.
2.6 **For flanged valves:** Install the valve to the pipeline and tighten bolts properly.
2.7 **For weld-end valves:**
2.7a Tack weld the valve on the pipe in four points on both ends.
2.7b With the valve in the open position, finish welding the valve in the pipeline.
2.7c When valve has cooled to room temperature, check for proper operation.
2.7d Recheck body bolt torques.

3. MANUAL OPERATION:

3.1 Opening and closing the valve is done by turning the valve a ¼ turn (90 degrees) counterclockwise to open and 90 degrees clockwise to close. This can be done by operating the valve with a handle or gear.
CAUTION: If the Handle Stop is no longer installed on the valve, be careful not to overturn the valve or turn the valve in the incorrect direction.
A. To **Open** Valve with handle assembly – rotate the handle counterclockwise 90 degrees until the Handle Stop is contacted. The valve can be locked in the fully open position using the Handle Lock plate and compatible lock. See Figure 2 below.

B. To **Close** Valve with handle assembly – rotate the handle clockwise 90 degrees until the Handle Stop is contacted. The valve can be locked in the fully closed position using the Handle Lock plate and compatible lock. See Figure 2 below.

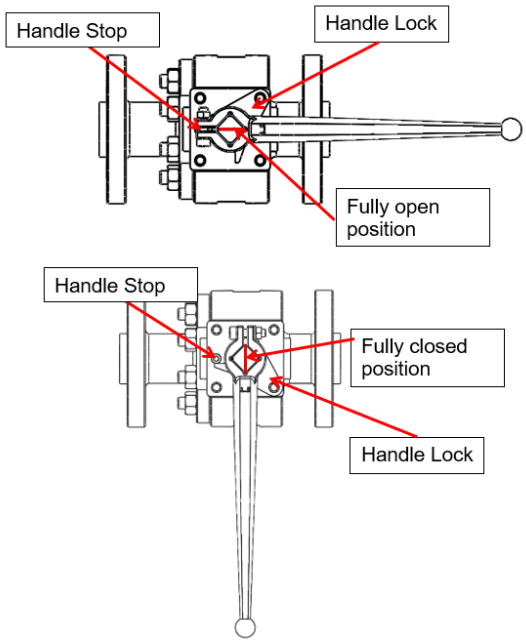


Figure 2: Manual Operation with Handle

When using a gear operator, the travel stops must be set prior to operation. Perform the following steps to adjust the travel stops.

1. Loosen the hex nuts and back out both set screws.
2. Rotate handwheel to move the ball to the fully closed position.
3. With the ball closed, rotate the set screw that is to limit the valve closing until this set screw hits the drive sleeve gear. Lock the set screw with the hex nut.
4. Rotate the handwheel until the open position is achieved by the indicator. Rotate the remaining travel stop set screw until it hits the drive sleeve gear. Lock the set screw with the hex nut.

Once travel stops are set, the gear can be operated to open and close the valve.

A. To **Open** Valve with gear operator – Rotate the handwheel counterclockwise for multiple turns until the position indicator has rotated 90 degrees to the fully open position.

B. To **Close** Valve with gear operator – Rotate the handwheel clockwise for multiple turns until the position indicator has rotated 90 degrees to the fully closed position.

4. AUTOMATED OPERATION:

WARNING: Do not put hands or fingers inside the valve bore at any time. Valve may close unexpectedly.

4.1 Valves with actuators should be checked for proper valve stem alignment. To ensure the couplers are properly aligned on the valve stem, it is recommended to install the actuator with the valve in horizontal position. Angular or linear misalignment may result in high operational torque and unnecessary wear on the valve stem.

4.2 When setting the open stop, the stop should be set so that the hole in the ball is visually aligned with the waterway.

4.3 When setting the closed stop, the stop should be set so that the center of the ball is in the center of the seats. The center point is the equal distance between both openings of the ball. This is imperative for metal seated valves to get the best seal between the ball and the seat. If the valve is tested after setting the stops and leakage is found, it is recommended to adjust the stops slightly in the open or closed direction to get the valve to seal properly.

5. CLEANING PROCEDURE BEFORE DISASSEMBLY:

Caution: Ball valve can trap fluids in the ball cavity when closed.

5.1 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 reassembly:

A. Relieve the line pressure.
B. Place valve in half-open position and flush the line to remove any hazardous material. However, it is possible that all media will not be able to be removed and all necessary precautions must be taken.
C. All persons involved in the removal and disassembly of the valve should wear the proper personal protective equipment, such as a face shield, gloves, etc.

5.2 DISASSEMBLY:

See Bill of Materials section for part callouts:

NOTE: The upstream and downstream seats should be identified as the valve is disassembled. The orientation of the ball is also important as the downstream side of the ball should be kept next to the downstream seat. Taking these steps are recommended for better sealing.

1. Turn the valve to closed position.
   1.1 For manual valves: remove the Handle Set following steps in “Handle Set Assembly Instructions” in reverse.
   1.2 For automated valves: remove air (pneumatic actuators and pneumatic accessories) or power (electric actuators and electric accessories) from actuator and accessories. Then remove actuator/accessories and mounting hardware from valve.
2. Loosen Body bolt nuts (8B) and remove End cap (2) from Body (1).
3. Remove Upstream seat (4A) with Anti jam (19) and Spring (5A) from End Cap (2).
4. Remove Body Bolts (8A) from Body (1).
5. Remove Body Gasket (7) from End Cap (2).
6. Remove Stem System:
   5.1 Remove Packing Gland Nuts (17C). Remove Belleville Washers (17B) and Gland (12).
   5.2 Remove Gland Follower (13).
   5.3 Loosen Body Gland Screw with Spring Washer (18A/18B) from Body Gland (9).
   5.5 Remove Stem(11), Ring(10), and Body Gland. Remove Gland Gasket (15) and Seal (16).
   5.6 Remove Gland Packing (14).
6. Remove Ball(3) and Downstream Seat (4B) with Anti Jam (19) from Body (1).
7. Remove Seat Gasket (5B), Seat Retainer (6), and Spring (5A) from Body(1).

6. ASSEMBLY:

See Bill of Materials section for part callouts:

NOTE: The upstream and downstream seats should be identified as the valve is disassembled. The orientation of the ball is also important as the downstream side of the ball should be kept next to the downstream seat. Taking these steps are recommended for better sealing.
NOTE: All graphite components should be replaced after being disassembled.

1. Install Spring (5A), Seat Retainer (6), and Seat Gasket (5B) into Body (1).
2. Carefully install Downstream Seat (4B) with Anti Jam (19) installed into Body (1).

3. Install Ball (3) into Body (1) in the closed position.
4. Assemble Stem System:
   4.1 Place Ring (10) and Seal (16) onto Stem (11). Add stem assembly (parts 10,11, and 16) to Ball (3).
   4.2 Install Gland Gasket (15).
   4.3 Install Body Gland (9) to Body (1). Install Body Gland Screw with Spring Washer (18A/18B) and tighten according to torques in Table 2 (*Class 150/300*) or Table 3 (*Class 600*) (Page 6).
   4.4 Assemble Gland Packing (14) onto Stem (11). Then, install Gland Follower (13) and Gland (12) onto Stem (11).
   4.5 Install Gland Bolt (17A) through the holes of Gland (12), threading into Body Gland (9).
   4.6 Install Belleville Washers (17B), Packing Gland Nut (17C), and Gland Bolt (17A).
5. Install Spring (5A) into End Cap (2). Then install Upstream Seat (4A) with Anti Jam (19) installed into End Cap (2).
6. Install Body Bolts (8A) into Body (1) ensuring they are fully seated. Then assemble End Cap (2) to Body (1). Install Body Bolt NUTS (8B) onto Body Bolts (8A) and hand tighten.
7. Cycle the valve open and closed a few times to ensure that all parts are properly aligned. Then close the valve.
8. Tighten Body Bolt Nuts (8B) to the torques in Table 1 (*Class 150/300*) or Table 3 (*Class 600*) (Page 6) in a diagonal pattern.
9. Tighten Packing Gland Nuts (17C) to the torques in Table 2 (*Class 150/300*) or Table 3 (*Class 600*) (Page 6).

10. Install actuator or Handle Set to valve. See Handle Set Assembly for Instructions if Handle Set was provided with valve.

6.1 HANDLE SET ASSEMBLY INSTRUCTIONS:

1. Install Handle Adapter (26) onto Stem (1). Install Handle Bracket (20) onto Bodu (1) using Handle Bracket Bolts (21). Tighten Handle Bracket Bolts (21) until snug.
2. If Handle Stop (25) is not already installed onto Handle Bracket (20), install Handle Stop (25).
3. Install Handle Lock (22) onto Handle Adapter (26).
4. Install Retainer Ring (23) onto Handle Lock (22).
5. Install Handle (24) onto Handle Adapter (26) ensuring the Handle (24) is in correct orientation (see Manual Operation section).
6. Tighten bolt on Handle (24) to ensure Handle (24) will stay affixed to Handle Adapter (26).

7. BOLT TIGHTENING SPECIFICATIONS:

The body bolts of the valve should be tightened evenly.
Tighten one finger tight first, snugly, then the one diagonally across.
Repeat for the other bolts, bringing them all down equally. Then begin to tighten each bolt diagonally to the half of the required torque value. Then, diagonally tighten the bolts to the required torque value.

Table 1: Class 150/300 Body Bolt Torques

Rating	Class 150			Class 300		
Size	Body Bolt Nut	Torques for B7/7 (in*lbs)	Torques for B8M/8M (in*lbs)	Body Bolt Nut	Torques for B7/7 (in*lbs)	Torques for B8M/8M (in*lbs)
1/2"	3/8-16 UNC	434	124	3/8-16 UNC	434	124
3/4"	3/8-16 UNC	434	124	3/8-16 UNC	434	124
1"	3/8-16 UNC	434	124	3/8-16 UNC	434	124
1-1/2"	1/2-13 UNC	1053	301	1/2-13 UNC	1053	301
2"	1/2-13 UNC	1053	301	1/2-13 UNC	1053	301
3"	1/2-13 UNC	1053	301	5/8"-11 UNC	2089	593
4"	1/2-13 UNC	1053	301	5/8"-11 UNC	2089	593
6"	3/4-10 UNC	3709	1053	1"-8 UNC	8948	2549
8"	7/8-9 UNC	5966	1699	1-1/4"-8 UN	18419	5240

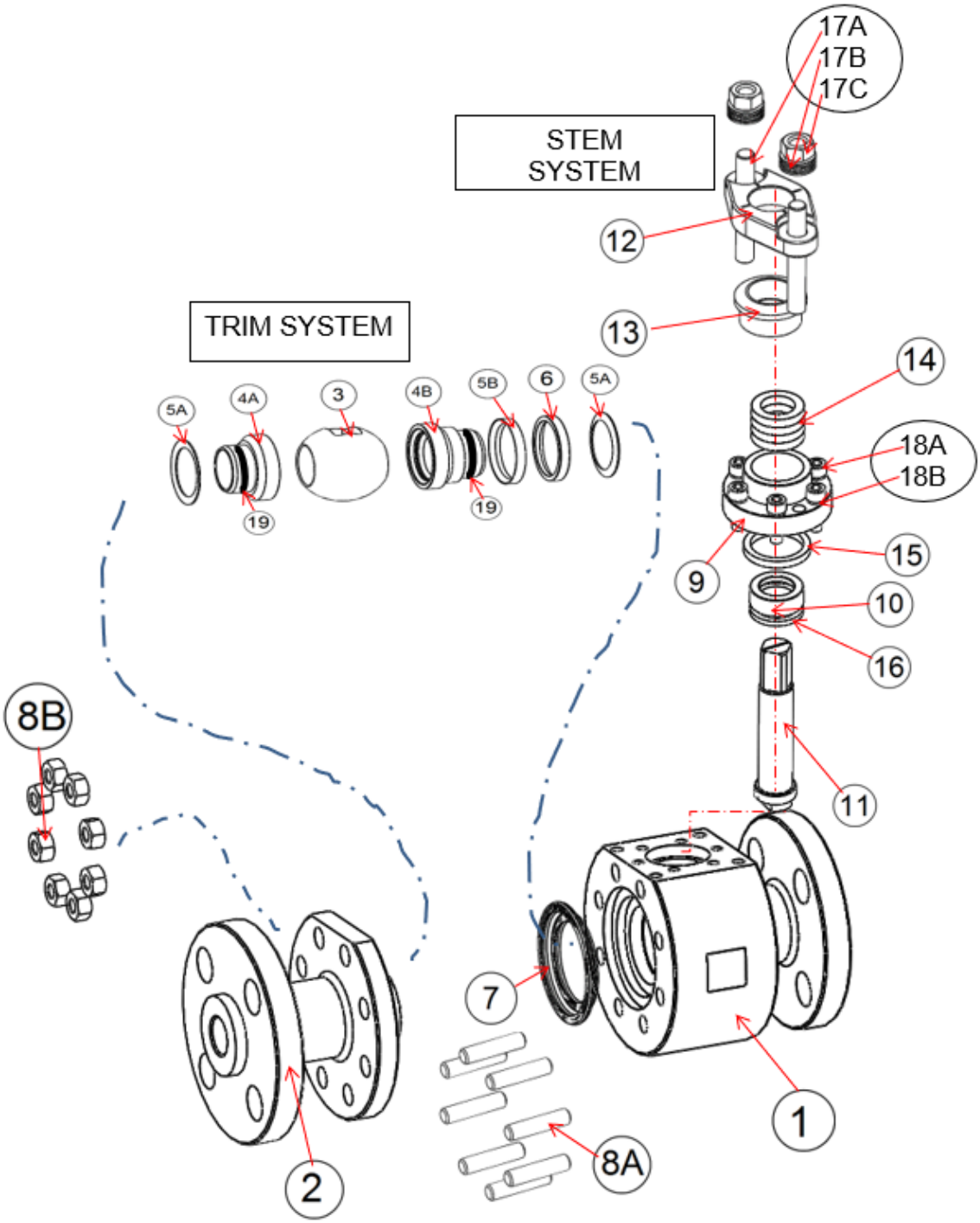
Table 2: Class 150/300 Packing and Gland Torques

Rating	Class 150 / 300			
Size	Packing Gland Nut A2-70	Torques (in*lbs)	Body Gland Screw A2-70	Torques (in*lbs)
1/2"	M6	53	M6	71
3/4"	M6	53	M6	71
1"	M8	106	M8	159
1-1/2"	M8	133	M8	159
2"	M8	133	M8	159
3"	M10	266	M10	328
4"	M12	398	M12	567
6"	M16	885	M12	567
8"	M20	1947	M16	1398

Table 3: Class 600 Body Bolt, Packing and Gland Torques

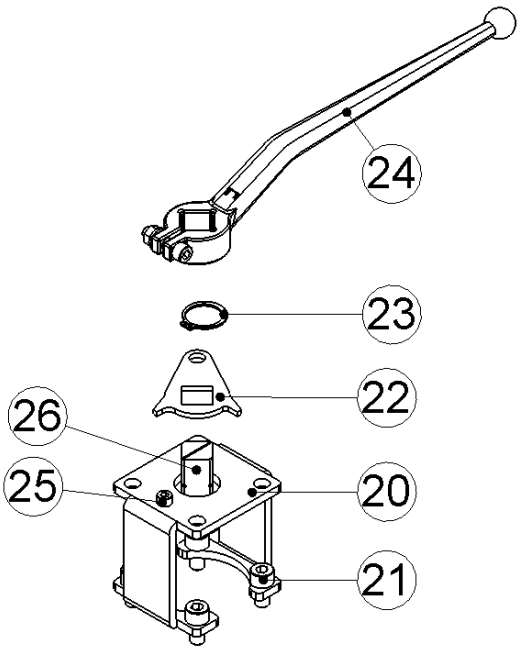
Rating	Class 600					
Size	Body Bolt Nut B7/B8M CL2	Torques (in*lbs)	Packing Gland Nut B7/B8M CL2	Torques (in*lbs)	Body Gland Screw A4-70	Torques (in*lbs)
1/2"	3/8-16 UNC	265	M8	142	M6	89
3/4"	3/8-16 UNC	265	M8	142	M6	89
1"	1/2-13 UNC	443	M8	142	M8	178
1-1/2"	9/16-12 UNC	620	M8	177	M8	178
2"	5/8-11 UNC	797	M10	301	M10	354

8. BILL OF MATERIALS:



ITEM		PART NAME
1		Body
2		End Cap
TRIM SYSTEM	3	Ball
	4A	Upstream Seat
	4B	Downstream Seat
	5A	Seat Spring
	5B*	Seat Gasket
	6	Seat Retainer
7*		Body Gasket
8A /8B		Body Bolt & Body Bolt Nut
9		Body Gland
10		Ring
11		Stem
12		Gland
13		Gland Follower
14*		Gland Packing
15*		Gland Gasket
16*		Seal
17A		Packing Gland Bolt
17B		Belleville Washers
17C		Packing Gland Nut
18A /18B		Body Gland Screw with Spring Washer

*Repair kit components



ITEM		PART NAME
HANDLE SET	19	Anti Jam
	20	Handle Bracket
	21	Handle Bracket Bolt
	22	Handle Lock
	23	Retaining Ring
	24	Handle
	25	Travel Stop
	26	Handle Adapter

9. TROUBLESHOOTING:

Area	Description	Solution
Inner	Internal Seat Leakage	1. Make sure the ball is accurately positioned. 2. Check if there is any damage on the contact surface of ball (3) and seats (4A and 4B). 3. If parts are damaged, replace the damaged ball & seats, and seat gasket (5). 4. If Ball & Seats are ok, replace Seat Gasket (5B). 5. Body Gasket (7) must be replaced with a new one every time the valve is disassembled.
Outer	Stem Leakage	1. Tighten packing gland nut (17c) to the torque values in Table 2 (*Class 150/300*) or Table 3 (*Class 600*) (Page 6). 2. If step 1 does not stop leakage, disassemble the valve to replace gland packing (14). 3. Body Gasket (7) must be replaced with a new one every time the valve is disassembled.
	Body Gasket Leakage	1. Tighten body stud nuts (8B) to the torque values in Table 1 (*Class 150/300*) or Table 3 (*Class 600*) (Page 6). Do not over torque nuts. 2. If step 1 does not stop leakage, disassemble body (1) and end cap (2) to replace body gasket (7).

For product specifications go to https://a-tcontrols.com/valves/ball-valves/metal-seated-ball-valves/

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