

## Installation & Operation Manual

### 3-Piece carbon steel and stainless steel ball valves

### ISO 5211 direct-mount 3-piece full port threaded ball valves

Applicable model no.: TF-3ET / SF-3ET, TF-3T / SF-3T, SF-3SW and SF-3BW;  
TF-3T-D / SF-3T-D

#### PRECAUTIONS

1. Before installation, user should consult pressure / temperature rating and ensure the valve is of the correct type and working pressure for intended applications. These pressure ratings must not be exceeded.
2. Check the valve, pipe threads and flanges to make sure there are no scratches or foreign materials.
3. Ensure the line is depressurized, drained and vented. Cycle the valve to relieve pressure in the body cavity.
4. Do not leave the valve for any period of time on a halfway position between “open” and “closed”, or it could deform the valve seats and result in internal leakage. Valves are designed for use in the full open or full closed position only.

#### INSTALLATION

1. Two-piece and three-piece valves are bi-directional, and can be installed in vertical or horizontal position.
2. **Threaded ends (TF-3ET, TF-3T and TF-3T-D):** To prevent damage to the valve when tightening valve to pipe, apply one wrench to the valve end closest to the pipe being tightened, and the other to the pipe. The Teflon tape is recommended to be used as sealant for threaded valves. It is also suggested to apply proper lubrication to the stainless steel threads to prevent pipe galling.
3. **SW and BW ends (SF-3SW and SF-3BW):** The high temperatures during welding could affect the functionality of valve seating and sealing. Valves with SW and BW ends must be partially disassembled before installing.

#### MAINTENANCE

1. Routine maintenance consists of tightening the adjustable gland nut  $\frac{1}{4}$  turn periodically to compensate for the wear caused by the stem's turning against the resilient Teflon packing. Tightening the gland nut is easiest with the valve in the closed position. If leakage is observed from the gland area, retighten the gland nut clockwise in  $\frac{1}{8}$  turn increments until it stops.
2. Overall maintenance consists of replacing seats, packings, thrust washer and gaskets. Contact distributor to obtain a standard repair kit.

#### DISASSEMBLY

1. Depressurize the line and cycle the valve. Leave the valve in the open position. Do not remove the valve body from the line in the closed position, or it will damage the ball.
2. **For automated valves only:** Remove all air and electrical power from the actuator or other automation equipment. Disassemble automation assembly but retain coupling and mounting bracket / pad.
3. Loosen the bolts and hex nuts. Remove all but one body bolt so the valve body can swing out from the

valve. Be careful not to damage the sealing surfaces.

4. Remove the seats and gaskets (or body seals) from the body. Gaskets may be tightly compressed in their groove. Use extreme care when prying them out. Damage such as scratches to the bottom of the groove will cause leaks.
5. Rotate stem so that the valve is in the fully closed position. Slide the ball out from the valve body.
6. **For manual valves only:** Remove the handle nut, stem washer, handle and gland nut from the stem.
7. Press the stem down into the cavity and remove it from inside the body.
8. Pry out the packing, stem O-ring and thrust washer from the stem or the body.

#### REASSEMBLY

1. Clean all metal parts for reuse and prepare new soft parts (seats, packings, thrust washer and gaskets / body seals).
2. Place the thrust washer on the stem and assemble the stem into the body. Ensure the stem shoulder is securely seated in the bore.
3. Take the first packing concave face up and the second packing convex side down and place the combination onto the stem. Use sleeve to press the packings down to the stem. Thread the gland nut onto the stem and use an impact wrench to tighten it to the torque figures. Refer to the following chart for gland nut torques.

| Valve size | Gland nut thread | Torque (in-lb) |
|------------|------------------|----------------|
| ¼" – ½"    | M14 x 1.0        | 35             |
| ¾" & 1"    | M18 x 1.0        | 80             |
| 1¼" & 1½"  | M22 x 1.25       | 135            |
| 2"         | M24 x 1.5        | 200            |
| 2½" & 3"   | M28 x 1.5        | 400            |

4. **For manual valves only:** Assemble the handle, stem washer to the stem, and then tighten the handle nut.
5. Rotate the stem to the closed position. Orient the ball to the closed position and insert it into the body.
6. Open the valve and assemble the seats and gaskets / body seals on the body. Make sure the concave face of seat fits against the valve ball.
7. Align the body with caps then install and hand-tighten bolts, bolt washers and hex nuts. Bolts and nuts should be wrench-tightened evenly and gradually in a diagonal pattern. Recommendations for flange bolt torque are as follows:

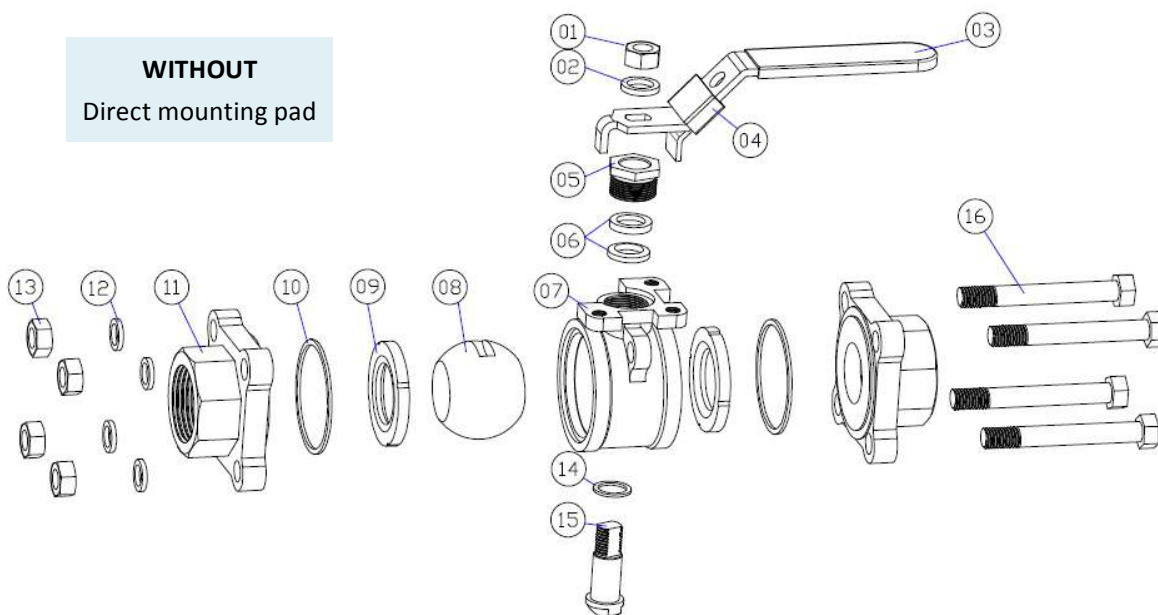
| Valve size | Bolt thread | Torque (in-lb) |
|------------|-------------|----------------|
| ¼" & ⅜"    | M6 x 1.0    | 80             |
| ½" – 1"    | M8 x 1.25   | 160            |
| 1¼" & 1½"  | M10 x 1.5   | 280            |
| 2"         | M12 x 1.75  | 600            |
| 2½"        | M14 x 2.0   | 900            |
| 3"         | M16 x 2.0   | 1320           |

8. Adjust the gland nut and handle nut if necessary. It is recommended that the rebuilt valve be pressure tested prior to re-installation.
9. **For automated valves only:** Reinstall automation assembly with coupling and mounting bracket / pad and then reconnect power. Consult the following operating torque data for torque requirements.

| Valve size                        | Torque (in-lb) |
|-----------------------------------|----------------|
| $\frac{1}{4}$ " & $\frac{3}{8}$ " | 35             |
| $\frac{1}{2}$ "                   | 50             |
| $\frac{3}{4}$ "                   | 90             |
| 1"                                | 120            |
| 1 $\frac{1}{4}$ "                 | 200            |
| 1 $\frac{1}{2}$ "                 | 250            |
| 2"                                | 450            |
| 2 $\frac{1}{2}$ "                 | 600            |
| 3"                                | 750            |

**PARTS LIST (1)**

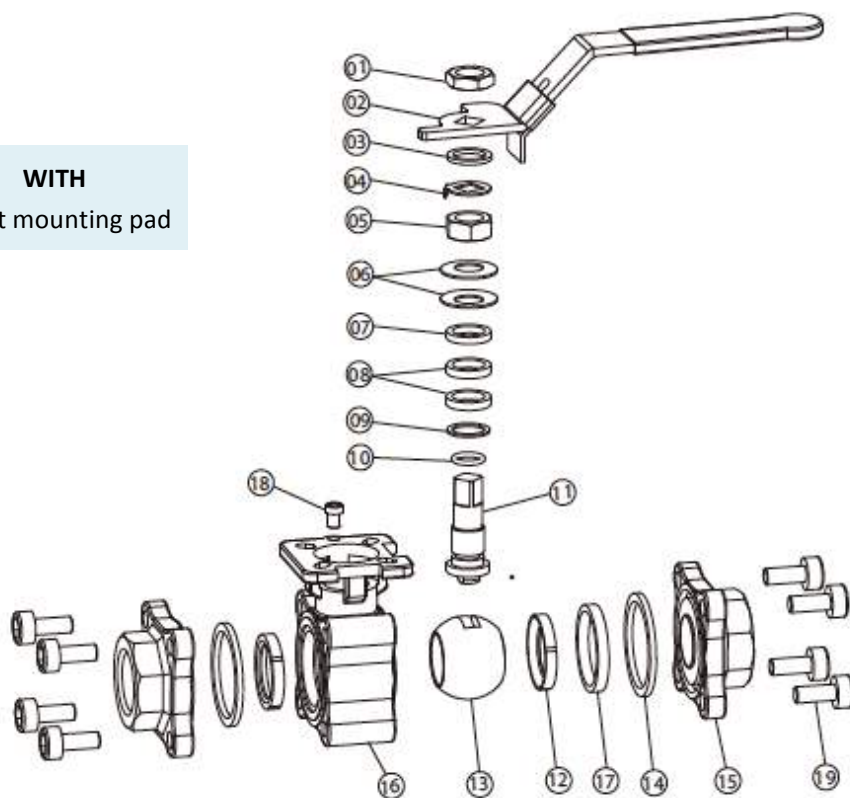
**WITHOUT**  
Direct mounting pad



| Item | Part name     | Qty |
|------|---------------|-----|
| 1    | Handle nut    | 1   |
| 2    | Stem washer   | 1   |
| 3    | Handle grip   | 1   |
| 4    | Handle        | 1   |
| 5    | Gland nut     | 1   |
| 6    | Packing       | 2   |
| 7    | Body          | 1   |
| 8    | Ball          | 1   |
| 9    | Seat          | 2   |
| 10   | Gasket        | 2   |
| 11   | Cap           | 2   |
| 12   | Bolt washer   | 4   |
| 13   | Hex nut       | 4   |
| 14   | Thrust washer | 1   |
| 15   | Stem          | 1   |
| 16   | Bolt          | 4   |

**PARTS LIST (2)**

**WITH**  
Direct mounting pad



| Item | Part name         | Qty |
|------|-------------------|-----|
| 1    | Handle nut        | 1   |
| 2    | Handle            | 1   |
| 3    | Stem washer       | 1   |
| 4    | Lock washer       | 1   |
| 5    | Gland nut         | 1   |
| 6    | Belleville washer | 2   |
| 7    | Gland             | 1   |
| 8    | Packing           | 2   |
| 9    | Stem O-ring       | 1   |
| 10   | Thrust washer     | 1   |
| 11   | Stem              | 1   |
| 12   | Seat              | 2   |
| 13   | Ball              | 1   |
| 14   | Body seal         | 2   |
| 15   | Cap               | 2   |
| 16   | Body              | 1   |
| 17   | Body gland        | 1   |
| 18   | Stopper pin       | 1   |
| 19   | Body bolt         | 8   |