

FLANGED MULTI-PORT BALL VALVES

INTRODUCTION

This instruction manual includes installation, operation and maintenance information for flanged multi-port ball valves. This manual addresses lever operated ball valves only. Please refer to other FNW manuals for other ball valves, actuated valves, modifications, or accessories.

CAUTION

1. Valve pressure ratings are based on many variables, including valve series and size, as well as body, seat, and bolt material. Verify that the application does not exceed the pressure or temperature rating of the valves.
2. Always depressurize the line with the valve in the open position before disassembly.
3. Wear protective equipment and take appropriate precautions to safeguard against injury caused by the discharge of trapped fluids.
4. Use only FNW recommended spare parts for maintenance.
5. To ensure safety and to maintain warranty, never modify the valve in any way without prior approval from FNW.

STORAGE

ATTENTION: If the valves are not destined for immediate use, the following precautions should be taken:

1. If possible, leave the valves in their packaging cases during the period of storage.
2. Ball valves must remain in the open position while being stored.
3. In order to prevent damage, protective plastic covers on valve ends should not be removed until immediately prior to installation.
4. It is advisable to store valves in waterproof conditions. Ball valves should be protected to safeguard against humidity, moisture, dust, dirt, sand, mud, salt spray, sea water, or other forms of corrosive and erosive environments.
5. Valves with actuators are to be stored in dry conditions.
6. Valves to be stored for long periods of time should be checked by the quality control personnel or designee every six months; every three months when valves are automated. Maintenance during this storage period can include:
 - Internal surface should be inspected to check for dust or other foreign objects.
 - Rust or dust must be removed by cleaning with proper solvent.
 - After cleaning, ball valves must be lubricated with adequate lubricant.
 - Ball valves should be operated for at least two complete cycles before installing or returning to storage.

INSTALLATION

WARNING: To avoid personal injury to your self, fellow workers, or damage to property from release of process fluid, before installation:

- a. Shut off all operating lines to the valve site.
 - b. Isolate the valve site completely from the process.
 - c. Release process pressure.
 - d. Drain the process fluid from the valve site.
1. Note:
 - The ball valves may be installed in any position using standard pipe fitting practices.
 - Pipe must be free of tension (supported) both during and after installation to avoid undue stress on the valve.
 - The ball valves are shipped in a full position to prevent damage of seat and ball surfaces. The valve should be kept in a full position during installation.

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- The ball valves are supplied with end caps for protecting the flange connections and the interior space of the valves. Remove the protective covers only just prior to installation of the valve.
 - There may be residual water from testing trapped between the ball and body. This can be removed by partially stroking the valve, exposing the cavity to the through port of the ball.
 - If the valve was supplied with an actuator, secondary support may be necessary. Contact FNW for recommendations.
 - FNW flanged ball valves are designed for mounting between ANSI flanges. It should be taken into account that a valve which is designed for a particular flange standard cannot, under normal situations, be used with flanges from another standard. If pipeline flanges are to be used that are not in accordance with the specifications of the order, the manufacturer should be consulted. All standard flange seals can be used.
 - **ATTENTION:** Do not perform welding near an installed valve. Welding in the vicinity of an installed valve can damage the valve and cause leakage.
 - **CAUTION:** The rotating ball can cause injury. Keep body parts away from the space between ball and body (valve interior).
2. Before installation:
- Inspect the valve body port and associated equipment for any damage that may have occurred and for any foreign matter that may have collected in shipping or storage. Make certain the body interior is clean.
 - Inspect the pipe line and mating flanges, making sure the pipe is free of foreign material that could damage the ball or seat and the flanges are clean and have no burrs or pits that could cause leakage.
 - Cycle the valve at least twice to ensure proper operation.
3. Installing:
- Prior to mounting the valve, flush the pipeline to remove soiling and weld residue.
 - Make sure the protective end caps from the valve are removed.
 - Ensure that the pipe flanges are spread sufficiently to clear valve flanges.
 - Be sure that the valve port arrangement matches the desired flow pattern. With the valve in a full position, insert it, along with appropriate flange gaskets (not included), between the pipeline flanges.
 - Insert appropriate size bolts and heavy hex nuts (not included) as recommended for the flange size and class.
 - Verify proper alignment of all components and then tighten the flange bolts according to gasket manufacturer's recommended practices or standard piping practices of stipulated torque.
 - **ATTENTION:** Do not operate the valve before flushing the pipeline. Keep the valve in the open position until flushing is complete. Residue in the line could cause damage to the seats.

OPERATION

1. Note: this manual only covers the operation of manually operated valves. For operation of automated valves, consult the manufacturer's manual for the actuator.
2. Ensure that the valve materials are compatible with the service and that the operating characteristics are below the valves maximum.
3. The manual operation for the proper flow plan is completed by turning the handle one-quarter turn (90°).
4. Markings on the top of the stem provide a visual indication of the flow plan (port position).

MAINTENANCE

Before starting maintenance, please read information contained in the **CAUTION** section of this manual.

1. Open and close the ball valve at least once to release the pressure completely from the valve body.
2. Ball valves, if correctly used, normally do not need any internal lubrication and maintenance. However, when necessary, ball, seat, or seals can be replaced by qualified personnel following the instructions of this manual.
3. For further information, refer to the **PARTS LIST** section.
4. Valve Disassembly:

Note: Some models of FNW flanged multi-port ball valves may be configured differently than what is indicated below. Specific model number drawings can be obtained at www.fnwvalve.com.

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- a. For complete disassembly
 - i. Reference parts list for part identification.
 - ii. Valve should be in a full position.
 - iii. Remove valve from line.
 - iv. Remove body nuts (18) securing end cap (3) and separate end cap from body (1). Remove body studs (17) from valve body (1). Repeat for all three end caps.
 - v. Remove seats (4) nestled in the end caps (3).
 - vi. Remove the body seals (5) which are either on the end caps (3) or in the body (1).
 - vii. Remove the handle (8), retainer ring (9A), and stopper plate (9) from the top of the valve.
 - viii. Loosen the packing gland bolts (11) and remove them and the packing gland (11A).
 - ix. Remove the stem packing (7). If the packing is difficult to get to, it can be removed after the ball/stem (2) is removed from the cover (12).
 - x. Remove the cover bolts (13) and lift the cover (12) off of the ball/stem (assuming the packing has been removed, be sure to support the ball/stem). If the packing has not been removed, lift the cover (12) and ball/stem (2) together, slide the ball/stem out, and then remove the packing (7).
 - xi. Remove the cover seal (14) from the cover (12).
 - xii. Remove the stem sleeve (15) from the lower shaft of the ball/stem (2). Note that the stem sleeve may still be in the valve body (1).
- b. Inspection and replacement
 - i. With the valve completely disassembled, clean and examine all components.
 - ii. The surface of the ball should be free from any defect, pitting, or scratches. If any are found, the ball should be replaced. Using a defective ball will be detrimental to valve performance.
 - iii. It is recommended that the seats and seals be replaced whenever the valve is disassembled.
 - iv. After cleaning, carefully examine all remaining components for wear, corrosion, erosion, and mechanical damage. Replace all defective parts.
 - v. Clean inside of body and stem housing. Light grease, compatible with line fluid, can be used on the ball, seals, and stem surfaces.

Note: Please refer to parts list for part identification. When ordering parts, please specify the specific valve number and size to ensure proper parts are received. FNW does not take responsibility for incorrectly ordered parts.

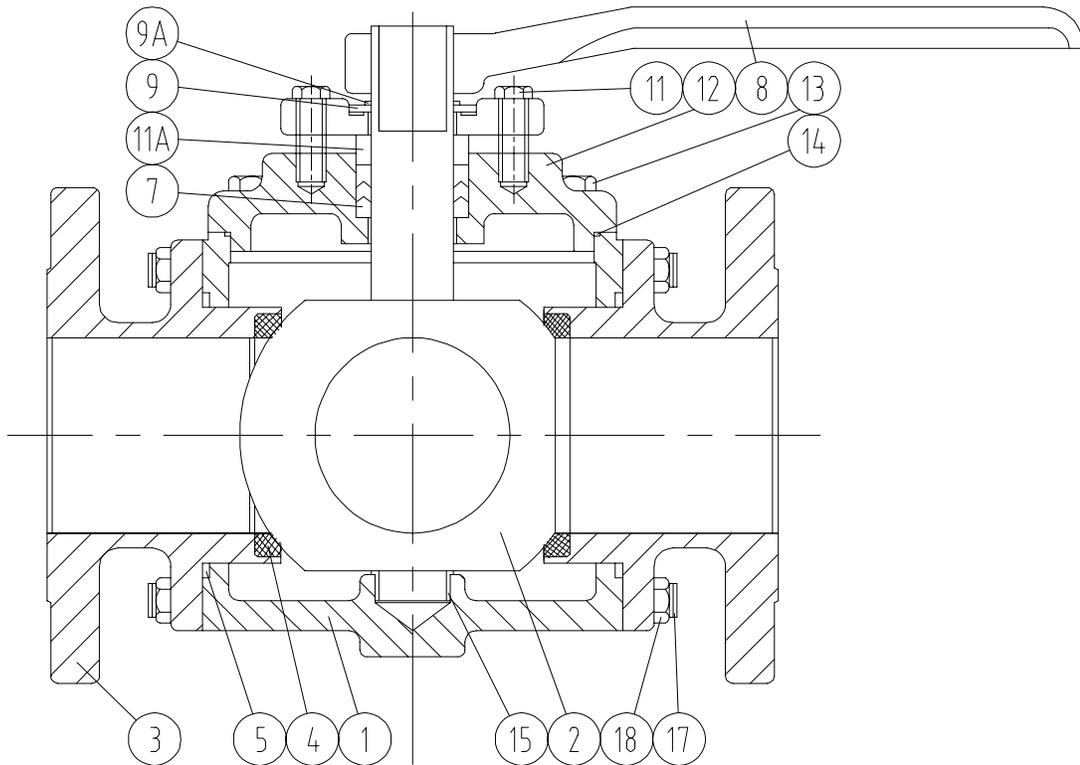
5. Valve Re-Assembly:

- a. For complete assembly
 - i. Install the body studs (17) into the body (1).
 - ii. Install the stem sleeve (15) onto the lower shaft of the ball/stem (2).
 - iii. Install the ball/stem (2) into the center of the valve body (1). Make sure the lower shaft and stem sleeve are inserted in the recess at the bottom center of the body. Also ensure that the port configuration is correctly aligned with the flange ends. The port configuration can be visualized by the markings on the top of the stem (2).
 - iv. Install the body seal (5) onto the end cap (3), and then slide the end cap over the body studs (17). Be sure the body seal rests in the matching groove in the body (1).
 - v. While supporting the end cap (3), install the body nuts (18) onto the body studs (17) and hand tighten.
 - vi. Repeat steps iii and iv for the remaining end caps.
 - vii. Install the cover seal (14) onto the cover (12).
 - viii. Lower the cover (12) over the valve stem (2) and loosely install the cover bolts (13). Be sure that the cover seal (14) rests in the matching groove in the body (1).
 - ix. Install the packing (7) over the valve stem and into the packing well.
 - x. Install the packing gland (11A) over the valve stem, and then install the packing gland bolts (11). Hand tighten only.
 - xi. Install the stopper plate (9) over the stem. Make sure it is in the correct position for the position of the ball port.
 - xii. Install the retainer ring (9A) over the stem.

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- xiii. Install the handle (8)
 - xiv. Tighten all body and cover bolts.
 - xv. Tighten the packing bolts initially by 2 to 3 turns. Be sure the packing gland is tightened evenly over the stem. Further adjustment may be necessary when the valve is in service (see section 7.a on stem leakage).
6. Testing
- o After completing the re-assembly, check that the valve operates smoothly by opening and closing the valve several times.
 - o If the entire valve was removed from the pipeline and if facilities are available, test the ball valve to appropriate specifications.
7. Troubleshooting
- a. Stem Leakage
 - i. Stem leakage in the packing area may be eliminated by increasing the torque on the packing gland (11A). Adjust packing gland bolts (11) in one-quarter turn increments. **Note: Be sure not to tighten only one side of the gland. Doing so can lock the gland to the stem, making it difficult to operate the valve.** If leakage persists, replace stem packing (7).
 - b. Body Seal Leakage
 - i. Check the tightness of the body nuts (18). Tighten if necessary. If leakage persists, replace the body seal (5).
 - c. In Line or Seat Leakage
 - i. Verify that the valve is in the full position and that the port configuration is as desired. Port configuration can be visualized by the markings on the top of the stem (2). If leakage persists, the valve should be disassembled and damaged parts replaced.

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Ref. No.	Description	Material	Qty
1	Body	ASTM A351 Gr. CF8M	1
2	Ball & Stem	ASTM A351 Gr. CF8M	1
3	Flanged End Cap	ASTM A351 Gr. CF8M	3
4	Seat	RTFE (PTFE+15% G.F.)	3
5	Body Seal	PTFE	3
7	Stem Packing	PTFE	1 Set
8	Handle	FCD45	1
9	Stopper	304SS	1
9A	Retainer Ring	S45C	1
11	Gland Bolt	304SS	2
11A	Gland	CF8	1
12	Cover	ASTM A351 Gr. CF8M	1
13	Cover Bolt	304SS	1 Set
14	Cover Seal	PTFE	1
15	Stem Sleeve	PTFE	1
17	Body Stud	304SS	3 Sets
18	Body Nut	304SS	3 Sets

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WARRANTY

- 1. LIMITED WARRANTY:** Subject to the limitations expressed herein, Seller warrants that products manufactured by Seller shall be free from defects in design, material and workmanship under normal use for a period of one (1) year from installation but in no case shall the warranty period extend longer than eighteen months from the date of sale. This warranty is void for any damage caused by misuse, abuse, neglect, acts of God, or improper installation. For the purpose of this section, "Normal Use" means in strict accordance with the installation, operation and maintenance manual. The warranty for all other products is provided by the original equipment manufacturer.
- 2. REMEDIES:** Seller shall repair or replace, at its option, any non-conforming or otherwise defective product, upon receipt of notice from Buyer during the Manufacturer's warranty period at no additional charge. SELLER HEREBY DISCLAIMS ALL OTHER EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OR FITNESS FOR A PARTICULAR PURPOSE.
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