



OPERATION AND MAINTENANCE MANUAL

NUTRON TRUNNION BALL VALVE

MODEL TT

2" FP – 16" RP 150# - 900#

For technical questions, please contact the following:

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GENERAL

The Nutron Model TT Ball Valve is a trunnion mounted, quarter turn ball valve designed for shut off service. The valve is bi-directional and factory tested to maintain bubble-tight shut off from either direction. The ball valve construction is a three piece bolted non-welded design.

Due to the critical nature of pressurized piping systems it is recommended that the compatibility to the service of the metallic and non-metallic components be confirmed prior to installation.

CAUTION

READ CAREFULLY BEFORE INSTALLING OR OPERATING THE VALVE

Hazards are inherent with the construction, operation and maintenance of high pressure piping systems. The following information and precautions are provided to minimize these hazards:

- 1. The valve's nameplate indicates maximum operating pressure, as well as minimum and maximum operating temperatures. The valve may be safely operated within these limits.*
- 2. The valve's end connections are provided in accordance with ASME flanged end or butt welded end requirements.*
- 3. TT valves are firesafe, and are in accordance with API 607 requirements.*
- 4. The valve has been factory pressure tested based on the nameplate maximum operating pressure.*
- 5. Valves 6" FP are provided with integral lifting lugs, otherwise the valves may be lifted using slings. Fittings and other devices, which may be attached to the valve, are not intended to be used as lifting points. Always follow local safety regulations when lifting heavy valves.*
- 6. Nutron valves are designed, manufactured and tested under a certified quality system. Only quality parts and materials are used in the assembly of Nutron valves. Pressure containing components are suitable for the minimum temperature marked on the nameplate. Factory certification is available.*
- 7. If the valve, in service, is exposed to hazards such as traffic, wind or earthquake loading contact the factory, if it is necessary, to confirm that the valve design is suitable for the application. The factory requires a complete description of the hazard before making any recommendations.*
- 8. If the valve, in service, is exposed to hazards such as excessive piping system reaction forces and moments contact the factory, if it is necessary, to confirm that the valve design is suitable for the application. The factory requires a complete description of the hazard before making any recommendations.*
- 9. If the valve, in service, is exposed to hazards such as corrosive or abrasive fluids or atmospheric conditions contact the factory, if it is necessary, to confirm that the valve design is suitable for the application. The factory requires a complete description of the hazard before making any recommendations.*
- 10. The valve has been designed and manufactured so that under normal operation conditions hazards such as material fatigue, brittle fracture, creep rupture or buckling will not occur. Do not operate the valve beyond the pressures and temperatures marked on the nameplate. The factory requires a complete description of the hazard before making any recommendations.*
- 11. The user is responsible for minimizing other hazards associated with the construction, operation and maintenance of high pressure piping systems, such as:*

- a. *Possibility of decomposition of unstable fluids*
 - b. *Provisions for the release or blow off of pressure*
 - c. *Prevention of physical access to system under pressure*
 - d. *Prevention of physical access to surfaces at extreme temperature*
 - e. *Provisions for inspection*
 - f. *Provisions for draining and venting*
 - g. *Provisions for filling*
 - h. *Provision for equipment access*
 - i. *Prevention of over-pressurization, over-heating and over-filling*
 - j. *Provision for fault indication*
12. *The user is responsible for meeting applicable local safety regulations.*

INSTALLATION

All valves are shipped in the open position with protective covers on the flange ends to prevent contaminants from entering the valve cavity and potentially damaging the ball or resilient seat surfaces during storage. The covers should be repaired or replaced if damaged and not removed until the valve is to be installed.

For handling the valve, proper slings and rigging procedures must be employed. Attached fittings, gearboxes, actuators, handles and pipe handles are not to be used as lifting points. Lifting lugs are provided on 6" FP models and larger. The valves should be rigged such that the slings safely clear fittings, gearboxes, actuators, handles and pipe handles.

When installing the valve, it must remain in the fully open position to protect the seal surface of the ball from damage. Leave the valve in the open position and do not operate until the line has been thoroughly cleaned and flushed. Valves can be locked in either fully opened or fully closed position with optional locking device.

The valve may be installed with flow in either direction. It may be positioned horizontally, vertically, or at a gradient without impairing the operation of the valve.

Valves installed at the end of a line require that all appropriate and necessary safety practices be followed.

For actuated valves, the orientation of the valve should be as specified by the actuator manufacturer to assure proper function.

Flanged Connections

Care must be taken not to damage the seal faces and that they are clean for assembly. The end-user must provide gaskets and mating flanges of equal ratings to that of the valve for proper installation. When bolting the flanges together, threads should be lubricated to obtain the maximum loading on the bolts. The bolts should be tightened using a criss-cross pattern for even loading. When ring type joints are supplied the ring number is marked on the rim of the RTJ flange.

If system hydrostatic tests are to be performed at pressures exceeding the rated working pressure of the valve, the ball should be left in the partially opened position. This prevents seats from experiencing these pressures while the body cavity can accept up to 150% rated working pressure.

After pressure tests, with the valve in the half open position and all test pressure relieved, the body cavity should be completely drained through the bleeder valve, or via the attached piping system to prevent corrosion. The bleeder valve port is located on the side of the valve body. The valve may then be placed in the required operating position.

OPERATION

The Nutron Model TT Ball Valve opens and closes with a 90° rotation of the stem.

When used the lever handle aligns with the valve axis when open and 90° to the valve axis when closed. When viewed from above, the valve stem rotates clockwise to close and counter-clockwise to open.

When a gear operator is used, it will have an indicator showing the open and closed positions. The handwheel rotates clockwise to close the valve.

For gear operated and actuated valves, refer to the appropriate manufacturer's manual for proper operation and maintenance.

Ball valves are designed to be operated fully open and fully closed. Leaving the ball in an intermediate position will cause severe damage to the ball and seats resulting in leakage.

PREVENTATIVE MAINTENANCE

CAUTION: *Safety practices for pressurized equipment must be followed and address hazards inherent in pressurized systems. Extreme caution and safety procedures are to be exercised whenever a valve, or fitting on a valve, are serviced or maintained.*

Due to design, the Model TT ball valve requires low maintenance. It requires no internal lubrication for normal operation.

Ball valves should not be immobilized for long periods of time. If at all possible, the valve should be cycled at periodic intervals to insure continued reliable operation.

To enhance the life of the valve, the body cavity should be drained through the bleeder valve whenever the valve is operated.

Stem injection is provided on 4" FP models and larger. Seat injection is provided on 6" FP models, and larger.

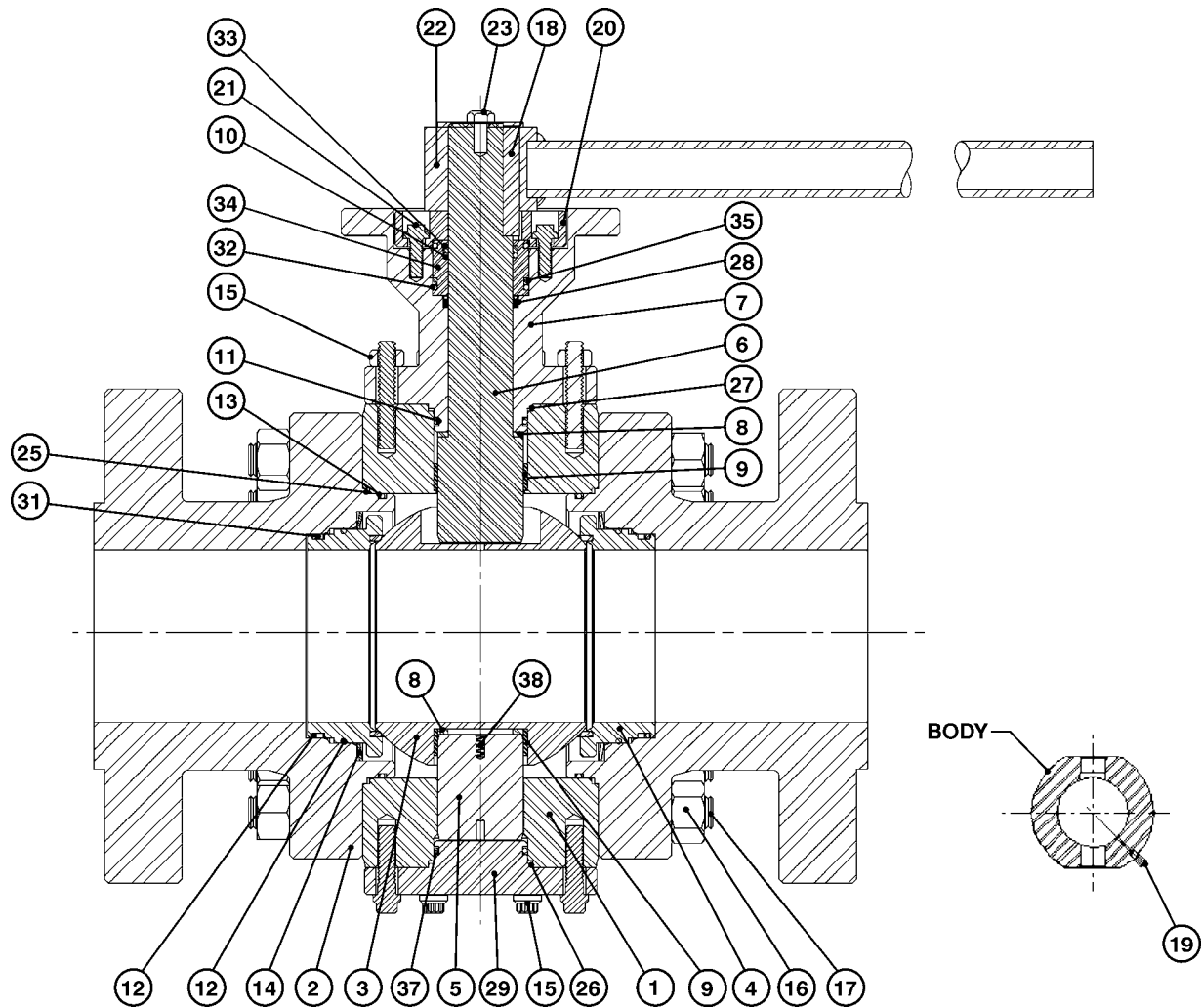
DISASSEMBLY

1. **CAUTION:** Before removal from the line and before disassembly isolate the valve from line pressure. With the valve in the half open position ensure all pressure is bled from the valve body through the bleeder valve (Key 19), or via the attached piping system. If line pressure still exists then there will be discharge from the bleeder valve.
2. Remove the valve from the piping system.
3. Place the valve in the closed position. Mark the end caps (Key 2), the body (Key 1) and the bonnet (Key 7), actuator or operator and it's mounting to indicate correct orientation of these components at reassembly.
4. Remove the valve actuator or operator from the valve or, for lever operated valves, remove cap screw (Key 23) and handle (Key 22).
5. Secure the valve in a vertical position with the cap bolting facing up.
6. Remove the key (Key 18) from the stem (Key 6). Then remove the mounting plates (Key 20).
7. Remove capscrews (Key 21) and the stem cover (Key 20).
8. Remove the stem bushing (Key 34), pulling it over the stem (Key 6). A groove is provided at the top of the stem bushing to enable gently prying the stem bushing off.
9. Remove the bonnet nuts (Key 15). Pull out the stem (Key 6) and thrust washer (Key 8) together with the bonnet (Key 7) from the body (Key 1). A 3/8-16 UNC tapped hole is located on the end of the stem as a provision to assist in this pulling. (The nuts (Key 15) and studs may be supplied as capscrews.)
10. Remove the capscrews (Key 15), trunnion flange (Key 29), trunnion (Key 5), spring (Key 38) and lower thrust bearing (Key 8) through the bottom of the body. Note: The 2" FP and 3" FP do not have a lower thrust bearing installed.
11. From the upper adapter remove nuts (Key 16) and then one adapter (Key 2) from the assembly, being careful not to allow seat carrier (Key 4) to fall and damage ball (Key 3).
12. Lift ball (Key 3) out of body (key 1) being careful not to scar surface.
13. Remove seat carrier assemblies (Key 4) from both the loose end cap and the end cap still attached to the body. Remove the wave springs (Key 14) from behind the seat carriers.
14. Remove the other nuts (Key 16) and then the other cap/flange (Key 2) to complete disassembly.
15. Clean and inspect all components for wear and/or damage.
 - ~ replace ball if it has nicks, pits, or scars in the sealing areas or if damage has occurred where the stem inserts into the ball.
 - ~ replace seat carrier assemblies if there are nicks, cuts or deformation of the sealing surface.
 - ~ inspect thrust bearings (Key 8) and bushings (Key 9) for wear or damage, and replace if worn.
 - ~ remove all o-rings and replace if broken, nicked, stretched, swollen, hard, brittle or sticky.
 - ~ if frayed or damaged, remove the braided rope and replace.

ASSEMBLY

1. Assure all components for assembly are clean of dirt and contaminants.
2. Install all o-rings onto mating components. Important: When installing components, apply compatible light grease to the o-ring or braided rope, the leading edge of component, and it's mating bore.
 - End Cap (Key 2): o-ring (Key 13) and braided rope (Key 25)
 - Seat carrier assembly (Key 4): o-ring (Key 12) and braided rope (Key 31)
 - Stem bushing (Key 34): o-ring (Key 10,32) and braided rope (Key 35,33)
 - Bonnet (Key 7): o-ring (Key 11), lip seal (Key 28) and braided rope (Key 27)
 - Trunnion flange (Key 29): o-ring (Key 37) and braided rope (Key 26)
3. Apply compatible grease to the internal counterbores of body (Key 1) and end cap (Key 2) where seat carrier assembly (Key 4) locates. Caution: Before applying grease, assure bores are clean, and free of damage that could prevent free travel of carrier.
4. Attach adapter (Key 2) to one end of body (Key 1). Align the markings previously made during disassembly to assure that the bolt holes of the end connection straddle the common centerline of valve. Leave the nuts (Key 16) loose.
5. Place the body/end cap assembly (Key 1/2) vertically with the flanged end down, being careful to protect the flange sealing face from damage.
6. Place wave springs (Key 14) in each cap/flange assembly (Key 2) counterbores. Install seat carriers (Key 4) into cap/flange assembly (Key 2) bores, assuring that the wave springs do not become jammed. After installing, check that the seat carrier assemblies are free to travel in the bores.
7. Install lower thrust bearing (Key 8) into the bottom of the ball (Key 3). Note: The 2" FP and 3" FP do not have a thrust bearing installed in the bottom of the ball.
8. Place ball (Key 3) in body cavity in the fully closed position with rectangular pocket of ball towards the bonnet side of the body.
9. Apply Jetlube KOPR-KOTE or equivalent to trunnion stem (Key 6). Install trunnion stem (Key 6) into body (Key 1) and partially into ball's mating counterbore to position ball. Do not attempt to completely engage the ball with the trunnion stem at this time.
10. Apply compatible light grease and install the trunnion (Key 5) with spring (Key 38) into the body. Move and position the body (Key 1), in order to align the trunnion bore with the bore in the bottom of the ball. Gently push the trunnion (Key 5) into it's mating bore in the ball (key 3).
11. Install capscrews (Key 15) and trunnion flange (Key 29) into the body. Assure that the trunnion (Key 5) or stem (Key 6) are not binding against the body or ball before fully tightening the capscrews in a crossing pattern.
12. Install the remaining end cap (Key 2) onto the body/end cap assembly (Key 1/ 2). Align the markings previously made during disassembly to assure that the bolt holes of the end connection straddle the common centerline of valve. Assure that the stem does not bind against the body or ball, or interfere with the installation of the second end cap. Fully tighten nuts on both end caps in a crossing pattern.
13. Apply compatible light grease and install the thrust washer (Key 8) against the stem shoulder.
14. Align the markings previously made and install the bonnet (Key 7) onto the body (Key 1), to assure that the bonnet is installed in its original orientation on the valve. Install and fully tighten nuts or capscrews (Key 15) in a crossing pattern.

15. Apply compatible light grease and gently push the stem bushing (Key 34) over the stem (Key 6) and into the bonnet (Key 7). Assure that the stem bushing does not bind against the stem.
16. Apply compatible light grease and install the capscrews (Key 21) and stem cover (Key 20) against the stem shoulder. Fully tighten capscrews in a crossing pattern
17. Finish installing all mounting plates and any operators on packing carrier being sure to align all markings previously made at disassembly.
18. Assure valve operates properly and leave in the full open position.
19. Valve should be tested to the appropriate specifications.



Nutron - TT Ball Valve