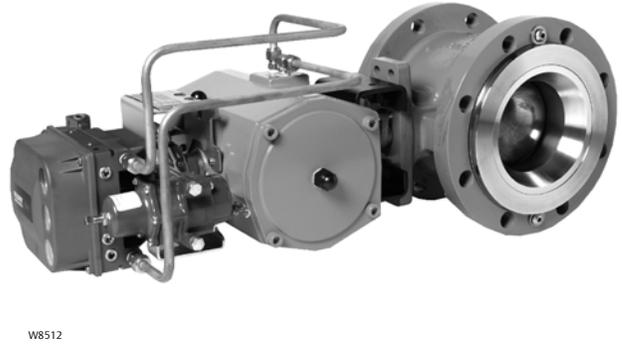


Fisher® V150S Slurry Vee-Ball™ Control Valve NPS 3 through 12

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Figure 1. Fisher V150S Slurry Vee-Ball Control Valve



Introduction

Scope of Manual

This instruction manual provides installation, operation, maintenance, and parts information for Fisher Vee-Ball V150S (NPS 3 through 12) rotary control valves (see figure 1).

Refer to separate manuals for information concerning the actuator, positioner and accessories.

Do not install, operate, or maintain V150S valves without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. **To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings.** If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.

Description

The V150S Slurry Vee-Ball valve shown in figure 1 mates with CL150 raised face flanges. Rugged construction, highly wear-resistant trim materials, and an unrestricted straight through flow path make the design ideal for controlling the most abrasive of slurries.

A shaft with a choice of drive connections will allow a variety of power operated actuators and valve positioners or controllers to be used.

The design is particularly effective in minimizing erosive damage to the adjoining pipework, thereby providing greater operational safety and service life when compared with other valve types.



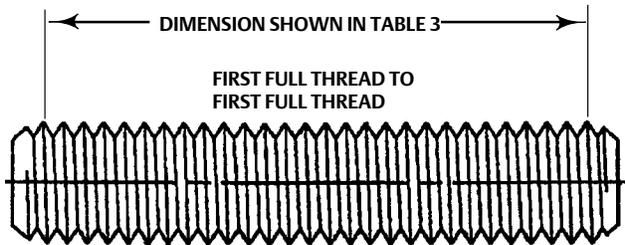
Table 1. Specifications

| | |
|---|--|
| <p>Valve Sizes and End Connection Styles NPS ■ 3, ■ 4, ■ 6, ■ 8, ■ 10, and ■ 12 with CL150 raised-face flanges</p> <p>Shutoff Classification Construction does not provide tight shutoff. Nominal gap between ball and flow ring seat is 0.035 inch for high chrome iron construction and 0.015 inch for ceramic insert construction.</p> <p>Construction Materials Standard Construction: See table 2</p> <p>Flow Direction Reverse flow recommended (into concave face of ball, out through the flow ring)</p> | <p>Valve Installation Shaft axis shall be horizontal</p> <p>Actuator Mounting Right-hand or left-hand, as viewed from upstream end of valve</p> <p>Maximum Ball Rotation 90 degrees</p> <p>Valve/Actuator Action With diaphragm or piston rotary actuator and splined shaft, the valve is field-reversible between PDTC or PDT0: ■ push-down-to-close (extending actuator rod closes valve) and ■ push-down-to-open (extending actuator rod opens valve)</p> |
|---|--|

Table 2. Standard Construction Materials

| Part | Material |
|----------------------------------|---|
| Valve Body | Carbon Steel ASTM A216 WCC |
| Body Liner | High Chrome Iron ASTM A532 Class III Type A |
| V-notch Ball | High Chrome Iron ASTM A532 Class III Type A |
| Flow Ring | High Chrome Iron ASTM A532 Class III Type A |
| Flow Ring Insert type (optional) | High Chrome Iron ASTM A532 Class III Type A |
| Flow Ring Retainer | Carbon Steel ASTM A105 |
| Bearing Shroud | High Chrome Iron ASTM A532 Class III Type A |
| Bearing | 440C 58Rc |
| Drive Shaft | 17-4PH Cond. H1025 |
| Follower Shaft | 17-4PH Cond. H1025 |
| Shaft Pins | Carbon Steel, zinc plated |
| Spring | Carbon Steel |
| Gaskets | Graphite SST Laminate. |
| Packing Set | PTFE, Carbon Filled |
| Packing Set (optional) | Graphite |
| Packing Box Ring and Follower | 316 SST |
| Studs | SA-193-B7 |
| Nuts | SA-194-2H |
| Retainer Screws and Clips | 316 SST |
| Flow Ring Insert (optional) | PSZ Ceramic |
| V-notch Ball (optional) | PSZ ceramic |

Figure 2. Flange Stud Length for Seal Protector End



1A4520

Table 3. Flange Stud Lengths Required for Flow Ring End of Fisher V150S Valves

| VALVE SIZE, NPS | V150S | |
|--------------------|-------|--------|
| | mm | Inches |
| 3 | 95 | 3.75 |
| 4 | 108 | 4.25 |
| 6 | 114 | 4.50 |
| 8 | 183 | 7.19 |
| 10 | 222 | 8.72 |
| 12 | 256 | 10.10 |

Specifications

Specifications for these valves are shown in table 1 and in bulletin 51.3:V150S.

Installation

⚠ WARNING

Safe work practices should be followed when handling the valve and actuator.

Some types of ceramic trim, including PSZ, can create a spark under certain conditions when an edge of one ceramic part is struck against a second ceramic part with enough force. Do not use ceramic trim where the process fluid has volatile or combustible properties.

The valve drive shaft is not necessarily grounded to the pipeline when installed. Personal injury or property damage could result from an explosion caused by a discharge of static electricity from valve components if the process fluid or the atmosphere around the valve is flammable. If the valve is installed in a hazardous area, electrically bond the drive shaft to the valve.

⚠ WARNING

Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.

Personal injury or equipment damage caused by sudden release of pressure may result if the valve assembly is installed where service conditions could exceed either the valve body rating or the mating pipe flange joint rating. To avoid such injury or damage, provide a relief valve for overpressure protection as required by government or accepted industry codes and good engineering practices.

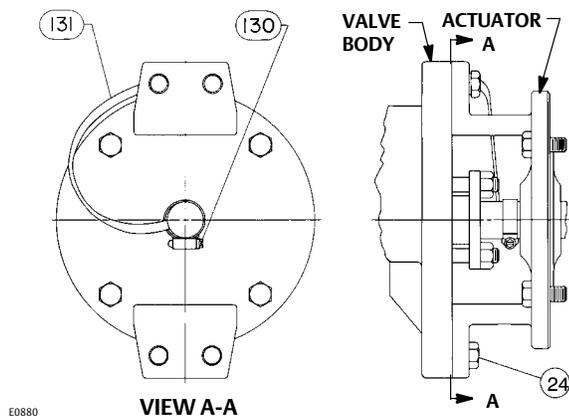
Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

CAUTION

When ordered, the valve configuration and construction materials were selected to meet particular pressure, temperature, pressure drop, and controlled fluid conditions. Responsibility for the safety of process media and compatibility of valve materials with process media rests solely with the purchaser and end-user. Because some valve/trim material combinations are limited in their pressure drop and temperature ranges, do not apply any other conditions to the valve without first contacting your Emerson Process Management sales office.

Figure 3. Optional Shaft-to-Body Bonding Strap Assembly



1. Install the valve in the direction of the flow arrow fitted to the valve body.
2. Install the valve with the shaft axis in the horizontal position.
3. If required, fit a bonding strap assembly (key 131) to the drive shaft (key 8) with the clamp, (key 130, figure 3) and connect the other end of the bonding strap assembly to the valve body with actuator mounting cap screw.
4. If the valve and actuator have been purchased separately or if the actuator has been removed, mount the actuator according to the Actuator Mounting section and the appropriate actuator instruction manual.
5. The actuator can be right- or left-hand mounted with the shaft in a horizontal orientation as shown in figure 1. If necessary, refer to the appropriate actuator instruction manual for actuator installation and adjustment procedures.

Table 4. Fisher V150S Dimensions

| VALVE SIZE | V150S DIMENSIONS ⁽¹⁾ | | | | | | | | | | |
|------------|---------------------------------|-------|------|-------|-------|------------------|------------------|------------|------|------|------|
| | A | B | D | G | K | M ⁽²⁾ | N ⁽²⁾ | S Diameter | T | U | W |
| DN | mm | | | | | | | | | | |
| 80 | 165 | 80.0 | 235 | 140 | 130 | 104 | 98.0 | 19.1 | 152 | 31.8 | 14.2 |
| 100 | 194 | 102 | 214 | 152 | 140 | 117 | 98.0 | 19.1 | 152 | 31.8 | 14.2 |
| 150 | 230 | 111 | 214 | 175 | 164 | 124 | 112 | 25.4 | 152 | 31.8 | 14.2 |
| 200 | 304 | 184 | 208 | 220 | 231 | 195 | 124 | 31.8 | 235 | 46.0 | 17.5 |
| 250 | 385 | 235 | 208 | 250 | 261 | 235 | 132 | 31.8 | 235 | 46.0 | 17.5 |
| 300 | 455 | 291 | 208 | 300 | 304 | 270 | 132 | 38.1 | 235 | 46.0 | 17.5 |
| NPS | Inch | | | | | | | | | | |
| 3 | 6.49 | 3.15 | 9.26 | 5.51 | 5.12 | 4.11 | 3.86 | 0.75 | 6.00 | 1.25 | 0.56 |
| 4 | 7.62 | 4.02 | 8.44 | 5.98 | 5.53 | 4.61 | 3.86 | 0.75 | 6.00 | 1.25 | 0.56 |
| 6 | 9.06 | 4.38 | 8.44 | 6.89 | 6.45 | 4.90 | 4.40 | 1.00 | 6.00 | 1.25 | 0.56 |
| 8 | 11.96 | 7.25 | 8.19 | 8.66 | 9.11 | 7.68 | 4.90 | 1.25 | 9.25 | 1.81 | 0.69 |
| 10 | 15.16 | 9.26 | 8.18 | 9.84 | 10.26 | 9.25 | 5.19 | 1.25 | 9.25 | 1.81 | 0.69 |
| 12 | 17.91 | 11.47 | 8.18 | 11.81 | 11.97 | 10.63 | 5.19 | 1.50 | 9.25 | 1.81 | 0.69 |

1. Stud length associated with clearance dimension "M" is longer than standard length specified in ANSI B16.5.
2. Clearance necessary to remove flange bolts.

Figure 4. Fisher V150S Dimensions (see table 4)

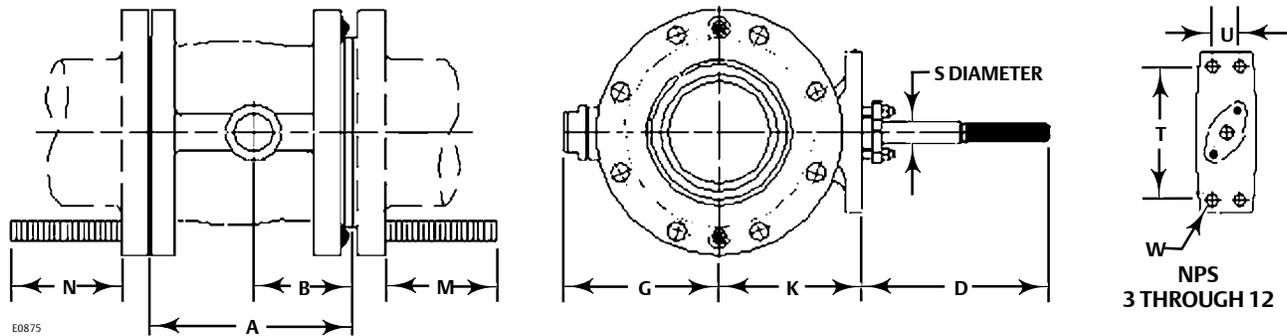
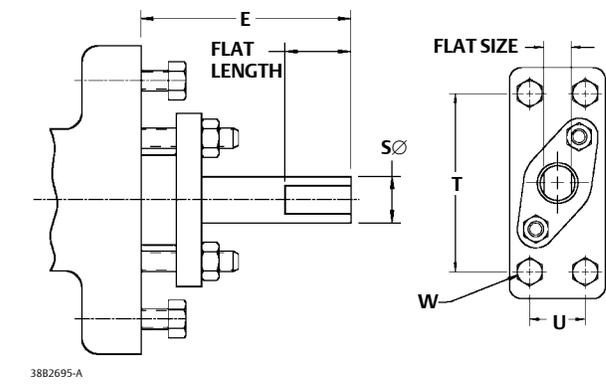


Table 5. Fisher V150S Dimensions for Double D Shaft Drive

| VALVE SIZE | E | S ⁽¹⁾ | FLAT LENGTH | T | U | W |
|------------|-------------|------------------|-------------|------|-----|-----------|
| DN | mm | | | | | |
| 80 | 83 | 19.0 | 25.4 | 95 | 25 | see below |
| 100 | 83 | 19.0 | 25.4 | 95 | 25 | |
| 150 | 83 | 25.4 | 25.4 | 95 | 25 | |
| 200 | 83 | 31.8 | 25.4 | 133 | 38 | |
| 250 | 89 | 31.8 | 25.4 | 133 | 38 | |
| 300 | 89 | 38.1 | 38.1 | 133 | 38 | |
| NPS | Inch | | | | | |
| 3 | 3.25 | 3/4 | 1.0 | 3.75 | 1.0 | 1/2-13 |
| 4 | 3.25 | 3/4 | 1.0 | 3.75 | 1.0 | 1/2-13 |
| 6 | 3.25 | 1 | 1.0 | 3.75 | 1.0 | 1/2-13 |
| 8 | 3.25 | 1-1/4 | 1.0 | 5.25 | 1.5 | 5/8-11 |
| 10 | 3.5 | 1-1/4 | 1.0 | 5.25 | 1.5 | 5/8-11 |
| 12 | 3.5 | 1-1/2 | 1.5 | 5.25 | 1.5 | 5/8-11 |

1. This nominal valve shaft diameter is the shaft diameter through the packing box. Use this diameter when selecting Fisher actuators.

Figure 5. Fisher V150S Dimensions for Double D Shaft Drive (see table 5)



Maintenance

▲ WARNING

The V-notch ball closes with a shearing, cutting motion, which could result in personal injury. To avoid injury, keep hands, tools, and other objects away from the V-notch ball while stroking the valve.

Avoid personal injury from sudden release of process pressure. Before performing any maintenance operations:

- Do not remove the actuator from the valve while the valve is still pressurized.
- Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
- Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.
- Vent the power actuator loading pressure and relieve any actuator spring precompression.
- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.
- The valve packing area may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline*. Process fluids may spray out under pressure when removing the packing hardware or packing rings.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

Packing Maintenance

1. It is recommended that the valve be removed from the line when replacing packing to allow correct set up of the actuator after actuator removal.
2. Remove the packing follower nuts and packing follower (keys 18 and 16).
3. Remove the packing parts (see figure 4 and keys 15 and 14) using a purposed designed packing extraction tool to avoid damaging the packing box bore and shaft surfaces.
4. Install the new packing parts using the sequence shown in figure 4. Fit the packing follower (key 16). Fit nuts (key 18).
5. Tighten the packing nuts to compress the packing to seal for operating conditions. At the same time push the ball and shroud on the drive end against the valve body inside location face to center the ball. This can be done by using a lever (wood) against the inside ball lug face and the valve body liner inlet.

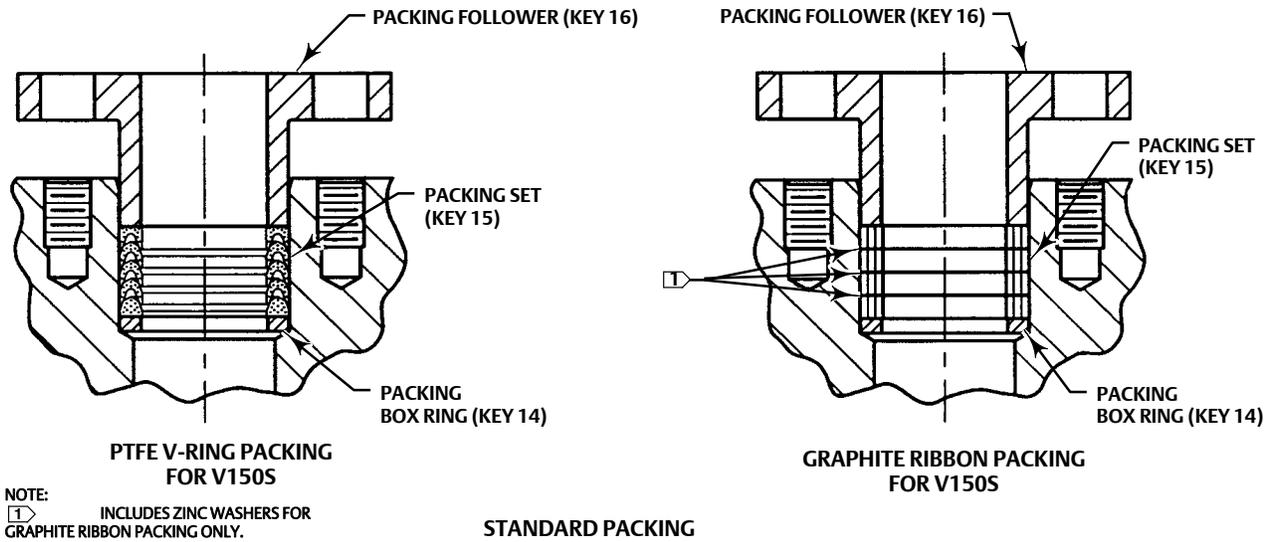
Disassembly

▲ WARNING

Observe the steps in the **WARNING** at the beginning of the Maintenance section.

Reference figures 9 and 10.

Figure 6. Packing Arrangements



CAUTION

Trim parts are made from brittle material, handle with care to avoid chipping or breakage.

1. Remove the actuator cover (where applicable). Take note of the orientation of the actuator with respect to the valve body and the lever orientation with respect to the valve drive shaft.
2. Remove the actuator.
3. Remove the flow ring retainer screws, clips and flow ring retainer (keys 22, 23, and 5).
4. Knock or press out the flow ring (key 4).
5. Position the ball to allow access to the shaft pins. Use a modified parallel pin punch (figure 7) to knock out the shaft pins, (key 10) through the shaft and ball lugs.

Note

The punch dimensions should be as per table 6 to avoid damaging the ball and shaft. The hole diameter in the ball is larger than the hole in the shaft and the punch needs to be centrally located with the pin.

6. Remove packing follower (key 16). Remove plug (key 20) and spring, (key 19).
7. Knock or press each shaft (key 9) out through the ball and the bearings (key 7).
8. Remove ball (key 3) and shrouds (key 6).
9. Knock, press or pull out bearings (key 7).
10. Knock or press out body liner (key 2).
11. Remove packing (key 15).

For service applications involving scale formation that sets up and “freezes” mating parts, supplementary recommendations for disassembly can be provided by your Emerson Process Management sales office.

Assembly

⚠ WARNING

Observe the steps in the WARNING at the beginning of the Maintenance section.

Reference figures 9 and 10.

CAUTION

Trim parts are made from brittle material, handle with care to avoid chipping or breakage.

1. Clean all surfaces of the parts to be used. Ensure all mating surfaces are in good condition and free from scratches and dents. Replace worn parts. Fit new gaskets (key 13 and 21) and packing (key 15).
2. Position the valve body with flow arrow uppermost.
3. Fit the valve body liner (key 2) into the valve body, aligning cross-holes with shaft bore axis.
4. Fit the bearings (key 7) through the valve body liner into the valve body.
5. Place bearing shrouds (key 6) over the bearings and through the valve body liner to contact faces in the valve body bore.
6. Orientate the ball (key 3) so that the lug with the location slot will be on the non-drive side of the valve body, that is opposite from the actuator. Place the ball on a wad of rag to rest in the bottom of the valve body with the lugs uppermost. Fit the drive shaft (key 8) through the bearing on the drive side and into the hexagon hole of the ball, aligning the holes for the shaft pins. With a splined shaft, the indicator line on the splined shaft end should be on the ball side to indicate the ball “seat location”. Fit the follower shaft (key 9).
7. Fit the shaft pins (key 10) through the ball and into the shaft using a pin punch (figure 7). Position the pins approximately centrally about the shaft axis.
8. Next install the packing. Fit the studs (key 17), packing box ring (key 14), packing set (key 15), packing follower (key 16), and nuts (key 18). Adjust the packing tightness for use.
9. Before fitting the flow ring, tap the end of the bearing on the drive end to ensure that the ball/shroud assembly is hard against the valve body inner recess location on the drive end.
10. Next fit the flow ring.
 - a. **For one piece High Chrome Iron flow ring (key 4)**, fit into the valve body and valve body liner. Fit the gasket, (key 13) and flow ring retainer (key 5). Secure with retainer screws (key 22) and clips (key 23). Check that the ball rotates freely.
 - b. **For flow ring with ceramic insert**, position the valve body on the valve body liner flange face with the ball secured and facing upwards. Make sure the flow ring insert type (key 28) and flow ring insert (key 29) are clean and free of grease and oil. Apply a bead of Loctite™ 620 around the smaller outside diameter of the ceramic insert and push the insert into the flow ring. Place shims on the upper ball face (recommended thickness 0.015 inch) and lower the flow ring assembly into place. Secure with retainer, screws and clips. Push the insert down onto the shims and allow the adhesive to set.

11. Fit the spring (key 19), gasket (key 21), and plug (key 20).

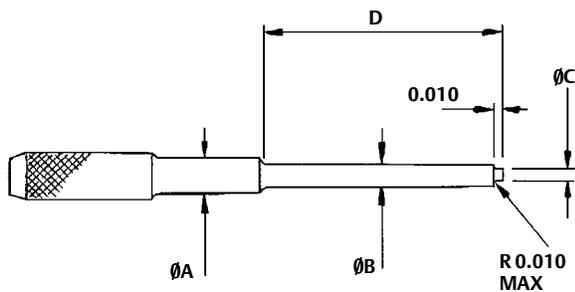
For service applications involving scale formation that sets up and “freezes” mating parts, supplementary recommendations for assembly can be provided by your Emerson Process Management sales office.

Actuator Mounting

Use the appropriate actuator instruction manual, this section of this manual, and figure 8 of this manual when mounting the actuator or changing actuator styles and positions.

1. To help ensure correct centering of the V-notch ball (key 3) on the flow ring (key 4 or 28/29), be sure the ball is closed when mounting the actuator (for applications other than Spring Return Fail-Open).

Figure 7. Pin Punch



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Table 6. Pin Punch Dimensions

| Valve Size, NPS | Ball Pin Hole Ø | Shaft Pin Hole Ø | A Min | B Max | C Max | D Min |
|-----------------|-----------------|------------------|-------|-------|-------|-------|
| 3 and 4 | 0.19 | 0.16 | 0.25 | 0.15 | 0.085 | 1.45 |
| 6 | 0.22 | 0.19 | 0.25 | 0.18 | 0.105 | 1.85 |
| 8 and 10 | 0.28 | 0.25 | 0.38 | 0.24 | 0.135 | 2.2 |
| 12 | 0.28 | 0.25 | 0.38 | 0.24 | 0.135 | 2.6 |

2. Clean the valve shaft and actuator lever splines to be sure the actuator lever will slide on easily. Only drive the lever in if absolutely necessary.
3. Carefully wedge the ball solidly against the actuator-side bearing to center the ball.
4. Keep the wedge in place while installing the lever, if necessary. Remove the wedge after you have clamped the actuator lever on the valve shaft and have connected the lever to the actuator piston rod or diaphragm rod.

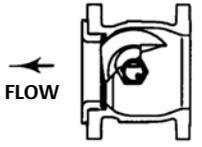
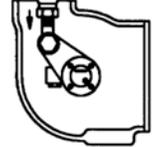
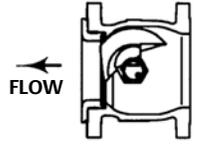
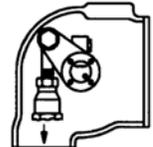
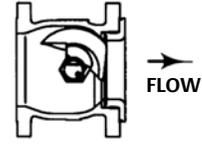
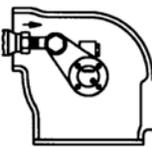
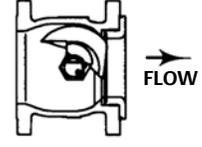
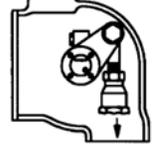
Determining Mounting Position for Spline Shaft/Lever Type

The actuator can be either right or left-hand mounted, with the actuator on the right or left side when viewed from upstream (see figure 8).

For right-hand mounting (standard), the ball will be in the top of the valve body when the valve is open and the shaft is horizontal. In this position the ball rotates CW to Close.

For left-hand mounting, the ball will be in the top of the valve body when the valve is open and the shaft is horizontal. In this position the ball rotates CCW to Close.

Figure 8. Index Marks for Actuator Lever Orientation for NPS 3 through 12 Valves

| ACTUATOR | | VALVE OPEN | ACTUATOR POSITION | | | |
|---|---|--|--|---|--|--|
| MOUNTING | STYLE | | 1 | 2 | 3 | 4 |
| (OPTIONAL) LEFT-HAND | STYLE D PUSH DOWN TO CLOSE |  |  |  |  |  |
| | BALL ROTATES COUNTER-CLOCKWISE TO CLOSE |  |  |  |  |  |
| (STANDARD) RIGHT-HAND | STYLE B PUSH DOWN TO CLOSE |  |  |  |  |  |
| | BALL ROTATES CLOCKWISE TO CLOSE |  |  |  |  |  |
| NOTE: 1. ARROW ON LEVER INDICATES DIRECTION OF ACTUATOR THRUST TO CLOSE VALVE. | | | | | | |

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Determining Closed Position

1. The valve must be removed from the line to check the position of the ball.

⚠ WARNING

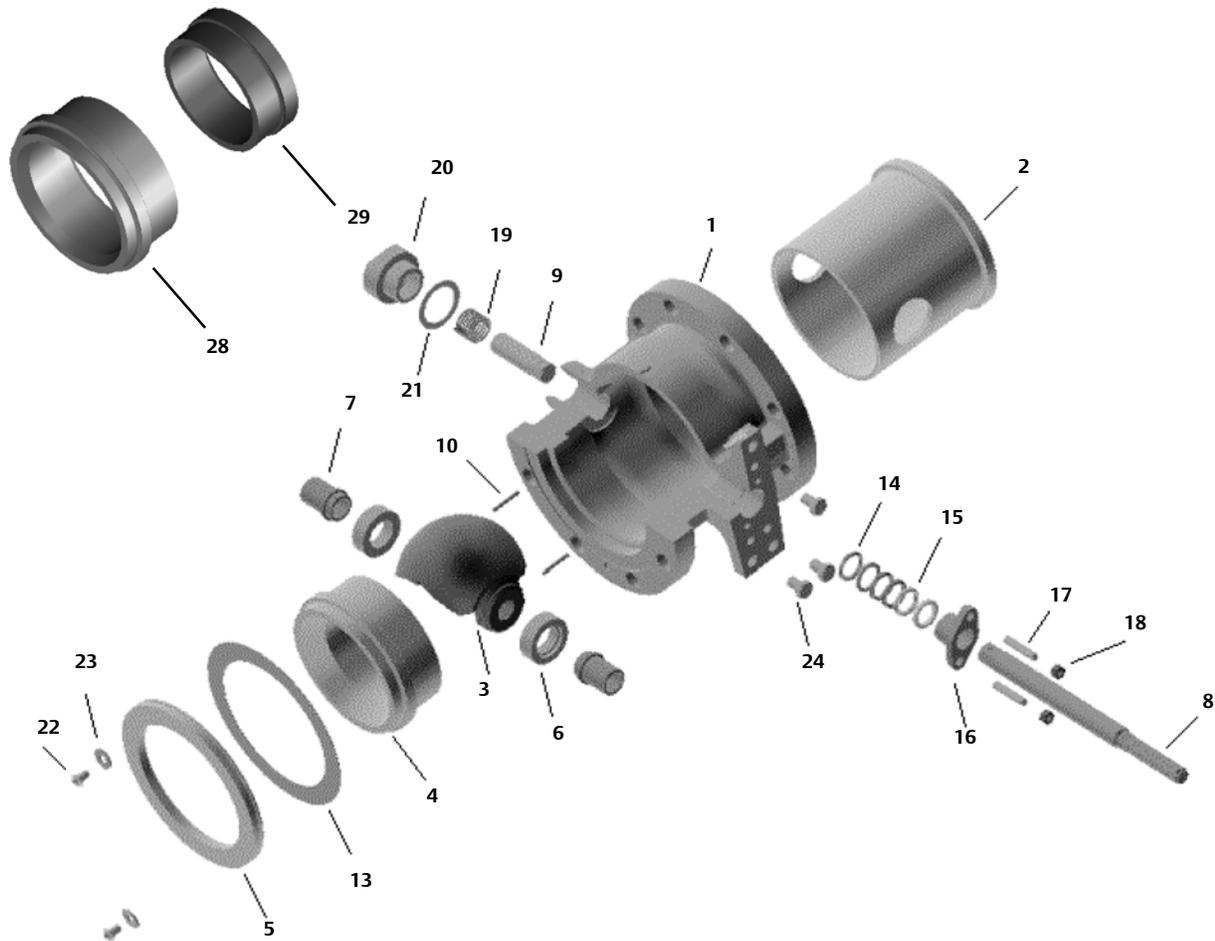
The V-notch ball closes with a shearing, cutting motion. To avoid personal injury, keep hands, tools, and other objects away from the ball while stroking the valve.

2. Rotate the ball to the closed position.
3. Position the ball in the proper location.
4. The ball is in its closed position when the Vee plane of the ball, (opposite the convex side) is parallel to the liner end flange face of the valve body. Measure to check. Adjust the actuator linkage or travel stops to position.

CAUTION

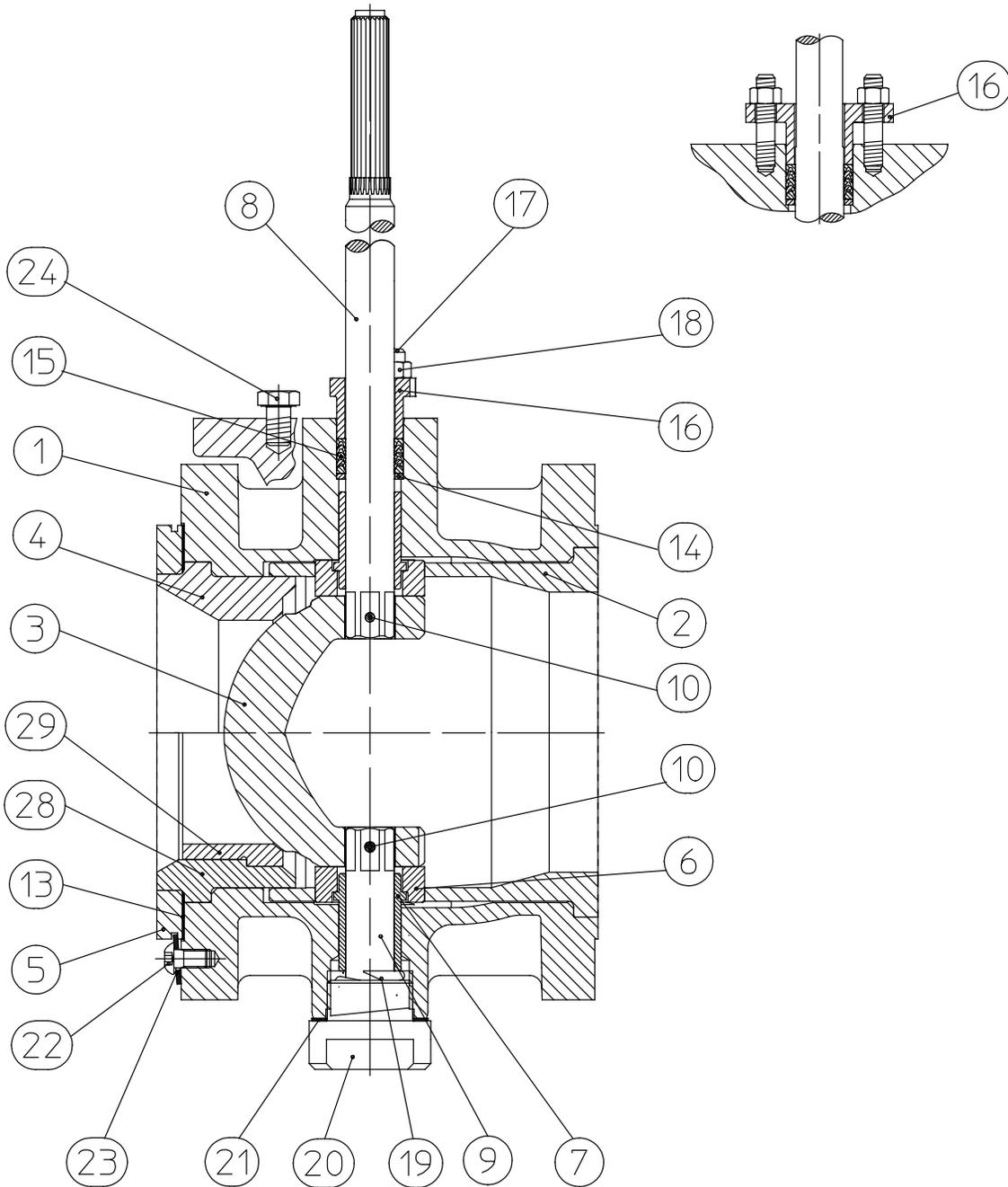
To extend operating life of the V-notch ball, always ensure the V-notch ball rotates into the top of the valve body to open.

Figure 9. Exploded View, Fisher V150S NPS 3 through 12 (Including Alternative Ceramic Insert Construction, Keys 28 and 29)



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Figure 10. Fisher V150S Assembly



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Parts Ordering

A serial number is assigned to each valve and stamped on the nameplate. Always refer to the valve serial number when corresponding with your Emerson Process Management sales office regarding spare parts or technical information. When ordering replacement parts, also specify the complete 11-character part number from the parts kits or parts list information.

⚠ WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson Process Management should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.

Parts List

Note

Part numbers are shown for recommended spares only. For other part numbers, contact your Emerson Process Management sales office.

Common Parts (figures 9 and 10)

| Key | Description | Part Number | Key | Description | Part Number |
|-----|---|-------------|-----|--|-------------|
| | | | | NPS 12 | 3B12222U012 |
| | | | | PSZ Ceramic | |
| | | | | NPS 3 | 3B12276U012 |
| | | | | NPS 4 | 3B12277U012 |
| | | | | NPS 6 | 3B12278U012 |
| | | | | NPS 8 | 3B12279U012 |
| | | | | NPS 10 | 3B12280U012 |
| | | | | NPS 12 | 3B12281U012 |
| | | | 4* | Flow Ring, High Chrome Iron Schedule 40 | |
| | | | | NPS 3 | 1B12086U012 |
| | | | | NPS 4 | 1B12110U012 |
| | | | | NPS 6 | 2B12082U012 |
| | | | | NPS 8 | 2B12183U012 |
| | | | | NPS 10 | 2B12185U012 |
| | | | | NPS 12 | 3B12213U012 |
| | | | | Schedule 80 | |
| | | | | NPS 3 | 1B12085U012 |
| | | | | NPS 4 | 1B12111U012 |
| | | | | NPS 6 | 2B12019U012 |
| | | | | NPS 8 | 2B12184U012 |
| | | | | NPS 10 | 2B12186U012 |
| | | | | NPS 12 | 3B12215U012 |
| | | | 5 | Flow Ring Retainer | |
| | | | 6* | Bearing Shroud, High Chrome Iron (2 req'd) | |
| | | | | NPS 3 | 1B12100U012 |
| | | | | NPS 4 | 1B12100U012 |
| | | | | NPS 6 | 1B12062U012 |
| | | | | NPS 8 | 1B12170U012 |
| | | | | NPS 10 | 1B12170U012 |
| | | | | NPS 12 | 1B12201U012 |
| | | | 7* | Bearing, 440C (2 req'd) | |
| | | | | NPS 3 | 1B12119U012 |
| | | | | NPS 4 | 1B12119U012 |
| | | | | NPS 6 | 1B12031U012 |
| | | | | NPS 8 | 1B12191U012 |
| | | | | NPS 10 | 1B12191U012 |
| | | | | NPS 12 | 1B12217U012 |
| 1 | If you need a valve body as a replacement part, order by valve size, serial number, and desired valve body material. Contact your Emerson Process Management sales office for assistance. | | | | |
| 2* | Valve Body Liner, High Chrome Iron Schedule 40 | | | | |
| | NPS 3 | 1B12124U012 | | | |
| | NPS 4 | 1B12125U012 | | | |
| | NPS 6 | 2B12083U012 | | | |
| | NPS 8 | 2B12193U012 | | | |
| | NPS 10 | 2B12194U012 | | | |
| | NPS 12 | 3B12220U012 | | | |
| | Schedule 80 | | | | |
| | NPS 3 | 2B12127U012 | | | |
| | NPS 4 | 2B12156U012 | | | |
| | NPS 6 | 2B12021U012 | | | |
| | NPS 8 | 2B12196U012 | | | |
| | NPS 10 | 2B12197U012 | | | |
| | NPS 12 | 3B12219U012 | | | |
| 3* | V-notch Ball Standard, High Chrome Iron | | | | |
| | NPS 3 | 3B12121U012 | | | |
| | NPS 4 | 3B12077U012 | | | |
| | NPS 6 | 3B12017U012 | | | |
| | NPS 8 | 3B12079U012 | | | |
| | NPS 10 | 3B12192U012 | | | |

*Recommended spare parts

| Key | Description | Part Number | Key | Description | Part Number |
|-----|--|-------------|-----|---|-------------|
| 8 | Drive Shaft Spline | | 19 | Spring | |
| 8 | Drive Shaft, DD | | 20 | Plug | |
| 9 | Follower Shaft | | 21* | Gasket, graphite/laminate | |
| 10* | Shaft Pin, carbon steel, zinc plated (2 req'd) | | | NPS 3 and 4 | 1B12098U012 |
| | NPS 3 | 1B12096U012 | | NPS 6 | 1B12044U012 |
| | NPS 4 | 1B12096U012 | | NPS 8 | 1B12168U012 |
| | NPS 6 | 1B12034U012 | | NPS 10 | 1B12168U012 |
| | NPS 8 | 1B12166U012 | | NPS 12 | 1B12204U012 |
| | NPS 10 | 1B12166U012 | 22 | Retainer Screw, 2 req'd | |
| | NPS 12 | 1B12206U012 | 23 | Retainer Clip, 2 req'd | |
| 13* | Gasket, graphite/laminate | | 24 | Actuator Mounting Screw, 4 req'd | |
| | NPS 3 | 1B12133U012 | 25 | Nameplate | |
| | NPS 4 | 1B12108U012 | 26 | Drive Screw, 4 req'd | |
| | NPS 6 | 1B12036U012 | 27 | Flow Arrow | |
| | NPS 8 | 1B12162U012 | 28 | Flow Ring Insert type, High Chrome Iron | |
| | NPS 10 | 1B12177U012 | | Schedule 40 | |
| | NPS 12 | 1B12203U012 | | NPS 3 | 1B12088U012 |
| 14* | Packing Box Ring, 316 SST | | | NPS 4 | 1B12112U012 |
| | NPS 3 and 4 | 16A6084X012 | | NPS 6 | 2B12084U012 |
| | NPS 6 | 16A6085X012 | | NPS 8 | 2B12181U012 |
| | NPS 8 | 16A6086X012 | | NPS 10 | 2B12187U012 |
| | NPS 10 | 16A6086X012 | | NPS 12 | 3B12214U012 |
| | NPS 12 | 16A6087X012 | | Schedule 80 | |
| 15* | Packing Set | | | NPS 3 | 1B12087U012 |
| | PTFE | | | NPS 4 | 1B12113U012 |
| | NPS 3 and 4 | 12A8995X022 | | NPS 6 | 2B12050U012 |
| | NPS 6 | 12A8832X022 | | NPS 8 | 2B12182U012 |
| | NPS 8 | 12A8951X022 | | NPS 10 | 2B12188U012 |
| | NPS 10 | 12A8951X022 | | NPS 12 | 3B12216U012 |
| | NPS 12 | 12A8935X022 | 29 | Flow Ring Insert PSZ Ceramic | |
| | Graphite/laminate | | | NPS 3 | 1B12134U012 |
| | NPS 3 and 4 | 12A9136X012 | | NPS 4 | 1B12109U012 |
| | NPS 6 | 12A9137X012 | | NPS 6 | 2B12046U012 |
| | NPS 8 | 12A9138X012 | | NPS 8 | 2B12157U012 |
| | NPS 10 | 12A9138X012 | | NPS 10 | 2B12172U012 |
| | NPS 12 | 12A9139X012 | | NPS 12 | 2B12210U012 |
| 16 | Packing Follower | | 130 | Clamp | |
| 17 | Stud, 2 req'd | | 131 | Bearing Clamp Assembly | |
| 18 | Nut, 2 req'd | | | | |

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