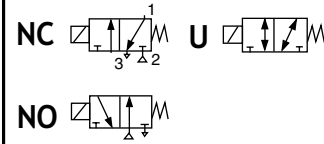




Direct Acting
General Service Solenoid Valves
 Brass or Stainless Steel Bodies
 1/8" to 1/4" NPT



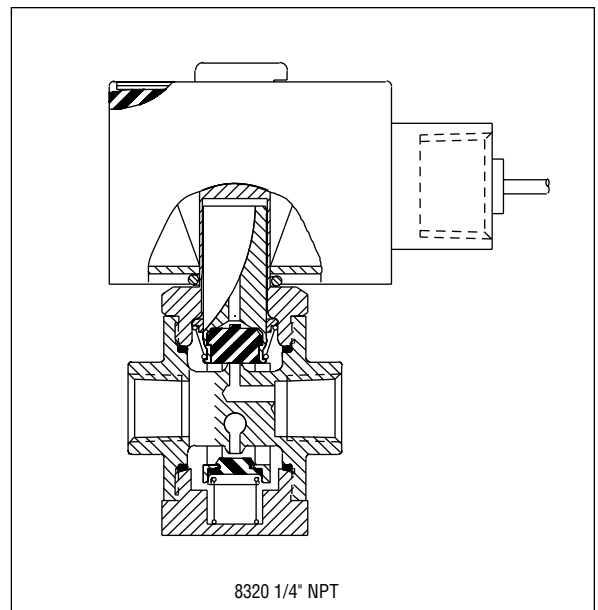
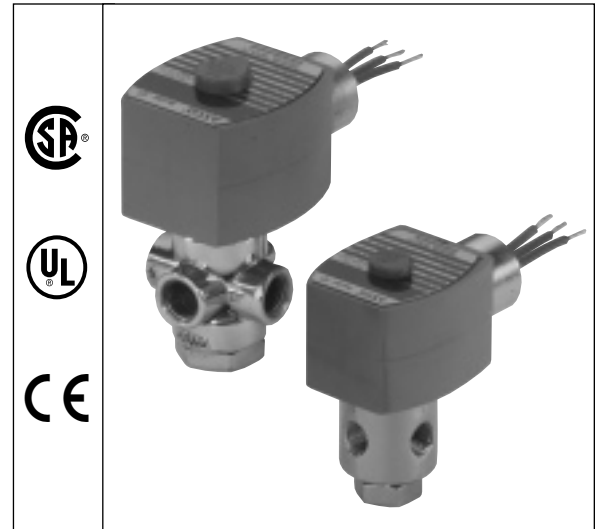
3/2
 SERIES
8320

Features

- All NPT connections are in the valve body to allow in-line piping.
- No Minimum Operating Pressure Differential required.
- Sturdy design for long years of reliable service.
- Broadest range of applications.
- Mountable in any position.

Construction

| Valve Parts in Contact with Fluids | | |
|------------------------------------|------------------------------|---------------------|
| Body | Brass | 303 Stainless Steel |
| Seals and Discs | NBR | |
| Core Tube | 305 Stainless Steel | |
| Core and Plugnut | 430F Stainless Steel | |
| Core Springs | 302 Stainless Steel | |
| Shading Coil | Copper | Silver |
| Disc-Holder | CA | |
| Core Guide | CA (10.1 and 17.1 Watt only) | |



Electrical

| Standard Coil and Class of Insulation | Watt Rating and Power Consumption | | | | Spare Coil Part No. | | | |
|---------------------------------------|-----------------------------------|-------|------------|-----------|---------------------|--------|----------------|--------|
| | DC Watts | AC | | | General Purpose | | Explosionproof | |
| | | Watts | VA Holding | VA Inrush | AC | DC | AC | DC |
| F | 11.6 | 10.1 | 25 | 50 | 238610 | 238710 | 238614 | 238714 |
| F | 22.6 | 17.1 | 40 | 70 | 238610 | 238710 | 238614 | 238714 |

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220, volts AC, 50 Hz). 6, 12, 24, 120, 240 volts DC. Must be specified when ordering. Other voltages are available when required.

Solenoid Enclosures

Standard: Watertight, Types 1, 2, 3, 3S, 4, and 4X.
Optional: Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9. (To order, add prefix "EF" to the catalog number.)
 See *Optional Features Section* for other available options.

Nominal Ambient Temperature Ranges:

AC: 32°F to 125°F (0°C to 52°C)
 DC: 32°F to 104°F (0°C to 40°C)

Refer to Engineering Section for details.

Approvals:

CSA certified. UL listed General Purpose Valves.
 Meets applicable CE directives.

Refer to Engineering Section for details.

Specifications (English units)

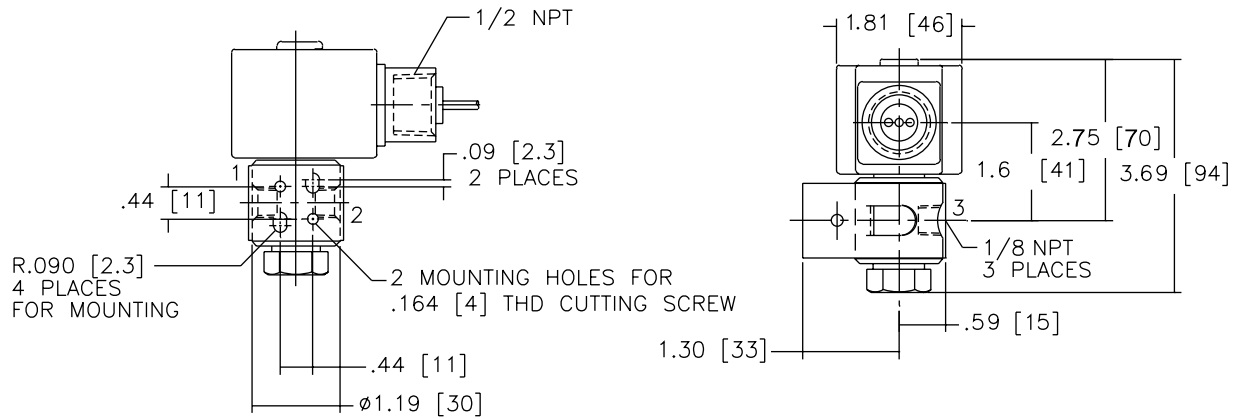
| Pipe Size (ins.) | Orifice Size (ins.) | Cv Flow Factor | Operating Pressure Differential (psi) | | | | | | Max. Fluid Temp. °F | | Brass Body | | Stainless Steel Body | | Watt Rating/ Class of Coil Insulation | |
|---|---------------------|----------------|---------------------------------------|-------|-------------------|---------------|-------|-------------------|---------------------|-----|----------------|------------------|----------------------|------------------|---------------------------------------|--------|
| | | | Max. AC | | | Max. DC | | | AC | DC | Catalog Number | Constr. Ref. No. | Catalog Number | Constr. Ref. No. | AC | DC |
| | | | Air-Inert Gas | Water | Lt. Oil @ 300 SSU | Air-Inert Gas | Water | Lt. Oil @ 300 SSU | | | | | | | | |
| UNIVERSAL OPERATION (Pressure at any port) | | | | | | | | | | | | | | | | |
| 1/8 | 1/16 | .09 | 175 | 175 | 175 | 125 | 125 | 125 | 180 | 120 | 8320G212 | 1 | 8320G221 | 1 | 17.1/F | 22.6/F |
| 1/8 | 3/32 | .12 | 100 | 100 | 100 | 60 | 60 | 60 | 180 | 120 | 8320G213 | 1 | 8320G222 | 1 | 17.1/F | 11.6/F |
| 1/8 | 1/8 | .21 | 50 | 50 | 50 | 25 | 25 | 25 | 180 | 120 | 8320G214 | 1 | 8320G223 | 1 | 17.1/F | 11.6/F |
| 1/4 | 1/16 | .09 | 125 | 130 | 130 | 75 | 75 | 75 | 200 | 150 | 8320G172 | 2 | -- | -- | 10.1/F | 11.6/F |
| 1/4 | 1/16 | .09 | 175 | 175 | 175 | 125 | 125 | 125 | 200 | 150 | - | - | 8320G230 | 3 | 17.1/F | 22.6/F |
| 1/4 | 3/32 | .12 | 100 | 100 | 100 | 60 | 60 | 60 | 200 | 150 | 8320G174 | 2 | 8320G200 | 3 | 17.1/F | 11.6/F |
| 1/4 | 1/8 | .25 | 50 | 50 | 50 | 25 | 25 | 25 | 200 | 150 | 8320G176 | 2 | 8320G201 | 3 | 17.1/F | 11.6/F |
| 1/4 | 11/64 | .35 | 20 | 20 | 20 | 12 | 12 | 12 | 200 | 150 | 8320G178 | 2 | -- | -- | 10.1/F | 11.6/F |
| NORMALLY CLOSED (Closed when de-energized) | | | | | | | | | | | | | | | | |
| 1/8 | 1/16 | .09 | 210 | 225 | 225 | 160 | 160 | 160 | 180 | 120 | 8320G215 | 1 | 8320G224 | 1 | 17.1/F | 11.6/F |
| 1/8 | 3/32 | .12 | 150 | 150 | 150 | 115 | 115 | 115 | 180 | 120 | 8320G216 | 1 | 8320G225 | 1 | 10.1/F | 11.6/F |
| 1/8 | 1/8 | .21 | 85 | 85 | 85 | 60 | 60 | 60 | 180 | 120 | 8320G217 | 1 | 8320G226 | 1 | 10.1/F | 11.6/F |
| 1/4 | 1/16 | .09 | 210 | 225 | 225 | 160 | 160 | 160 | 200 | 150 | 8320G182 | 2 | 8320G231 | 3 | 17.1/F | 11.6/F |
| 1/4 | 3/32 | .12 | 150 | 150 | 150 | 115 | 115 | 115 | 200 | 150 | 8320G184 | 2 | 8320G202 | 3 | 10.1/F | 11.6/F |
| 1/4 | 1/8 | .25 | 85 | 85 | 85 | 60 | 60 | 60 | 200 | 150 | 8320G186 | 2 | 8320G203 | 3 | 10.1/F | 11.6/F |
| 1/4 | 11/64 | .35 | 45 | 45 | 45 | 25 | 25 | 25 | 200 | 150 | 8320G188 | 2 | -- | -- | 10.1/F | 11.6/F |
| NORMALLY OPEN (Open when de-energized) | | | | | | | | | | | | | | | | |
| 1/8 | 1/16 | .09 | 235 | 250 | 250 | 160 | 160 | 160 | 180 | 120 | 8320G218 | 1 | 8320G227 | 1 | 17.1/F | 11.6/F |
| 1/8 | 3/32 | .12 | 150 | 150 | 150 | 100 | 100 | 100 | 180 | 120 | 8320G219 | 1 | 8320G228 | 1 | 10.1/F | 11.6/F |
| 1/8 | 1/8 | .21 | 70 | 70 | 70 | 55 | 55 | 55 | 180 | 120 | 8320G220 | 1 | 8320G229 | 1 | 10.1/F | 11.6/F |
| 1/4 | 1/16 | .09 | 250 | 250 | 250 | 160 | 160 | 160 | 200 | 150 | 8320G192 | 2 | 8320G232 | 3 | 17.1/F | 11.6/F |
| 1/4 | 3/32 | .12 | 150 | 140 | 140 | 100 | 100 | 100 | 200 | 150 | 8320G194 | 2 | 8320G204 | 3 | 10.1/F | 11.6/F |
| 1/4 | 1/8 | .25 | 70 | 70 | 70 | 55 | 55 | 55 | 200 | 150 | 8320G196 | 2 | 8320G205 | 3 | 10.1/F | 11.6/F |
| 1/4 | 11/64 | .35 | 40 | 40 | 40 | 30 | 30 | 30 | 200 | 150 | 8320G198 | 2 | -- | -- | 10.1/F | 11.6/F |

Specifications (Metric units)

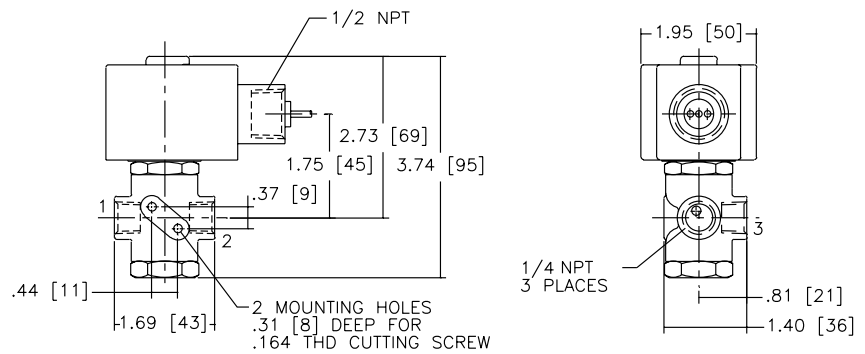
| Pipe Size (ins.) | Orifice Size (mm) | Kv Flow Factor (m3/h) | Operating Pressure Differential (bar) | | | | | | Max. Fluid Temp. °C | | Brass Body | | Stainless Steel Body | | Watt Rating/ Class of Coil Insulation | |
|---|-------------------|-----------------------|---------------------------------------|-------|-------------------|---------------|-------|-------------------|---------------------|------|----------------|------------------|----------------------|------------------|---------------------------------------|--------|
| | | | Max. AC | | | Max. DC | | | AC | DC | Catalog Number | Constr. Ref. No. | Catalog Number | Constr. Ref. No. | AC | DC |
| | | | Air-Inert Gas | Water | Lt. Oil @ 300 SSU | Air-Inert Gas | Water | Lt. Oil @ 300 SSU | | | | | | | | |
| UNIVERSAL OPERATION (Pressure at any port) | | | | | | | | | | | | | | | | |
| 1/8 | 1.6 | .08 | 12 | 12 | 12 | 9 | 9 | 9 | 81 | 48.4 | 8320G212 | 1 | 8320G221 | 1 | 17.1/F | 22.6/F |
| 1/8 | 2.4 | .10 | 7 | 7 | 7 | 4 | 4 | 4 | 81 | 48.4 | 8320G213 | 1 | 8320G222 | 1 | 17.1/F | 11.6/F |
| 1/8 | 3.2 | .18 | 3 | 3 | 3 | 2 | 2 | 2 | 81 | 48.4 | 8320G214 | 1 | 8320G223 | 1 | 17.1/F | 11.6/F |
| 1/4 | 1.6 | .08 | 9 | 9 | 9 | 5 | 5 | 5 | 92 | 64.9 | 8320G172 | 2 | -- | -- | 10.1/F | 11.6/F |
| 1/4 | 1.6 | .08 | 12 | 12 | 12 | 9 | 9 | 9 | 92 | 64.9 | - | - | 8320G230 | 3 | 17.1/F | 22.6/F |
| 1/4 | 2.4 | .10 | 7 | 7 | 7 | 4 | 4 | 4 | 92 | 64.9 | 8320G174 | 2 | 8320G200 | 3 | 17.1/F | 11.6/F |
| 1/4 | 3.2 | .21 | 3 | 3 | 3 | 2 | 2 | 2 | 92 | 64.9 | 8320G176 | 2 | 8320G201 | 3 | 17.1/F | 11.6/F |
| 1/4 | 4.4 | .30 | 1 | 1 | 1 | 1 | 1 | 1 | 92 | 64.9 | 8320G178 | 2 | -- | -- | 10.1/F | 11.6/F |
| NORMALLY CLOSED (Closed when de-energized) | | | | | | | | | | | | | | | | |
| 1/8 | 1.6 | .08 | 14 | 16 | 16 | 11 | 11 | 11 | 81 | 48.4 | 8320G215 | 1 | 8320G224 | 1 | 17.1/F | 11.6/F |
| 1/8 | 2.4 | .10 | 10 | 10 | 10 | 8 | 8 | 8 | 81 | 48.4 | 8320G216 | 1 | 8320G225 | 1 | 10.1/F | 11.6/F |
| 1/8 | 3.2 | .18 | 6 | 6 | 6 | 4 | 4 | 4 | 81 | 48.4 | 8320G217 | 1 | 8320G226 | 1 | 10.1/F | 11.6/F |
| 1/4 | 1.6 | .08 | 14 | 16 | 16 | 11 | 11 | 11 | 92 | 64.9 | 8320G182 | 2 | 8320G231 | 3 | 17.1/F | 11.6/F |
| 1/4 | 2.4 | .10 | 10 | 10 | 10 | 8 | 8 | 8 | 92 | 64.9 | 8320G184 | 2 | 8320G202 | 3 | 10.1/F | 11.6/F |
| 1/4 | 3.2 | .21 | 6 | 6 | 6 | 4 | 4 | 4 | 92 | 64.9 | 8320G186 | 2 | 8320G203 | 3 | 10.1/F | 11.6/F |
| 1/4 | 4.4 | .30 | 3 | 3 | 3 | 2 | 2 | 2 | 92 | 64.9 | 8320G188 | 2 | -- | -- | 10.1/F | 11.6/F |
| NORMALLY OPEN (Open when de-energized) | | | | | | | | | | | | | | | | |
| 1/8 | 1.6 | .08 | 16 | 17 | 17 | 11 | 11 | 11 | 81 | 48.4 | 8320G218 | 1 | 8320G227 | 1 | 17.1/F | 11.6/F |
| 1/8 | 2.4 | .01 | 10 | 10 | 10 | 7 | 7 | 7 | 81 | 48.4 | 8320G219 | 1 | 8320G228 | 1 | 10.1/F | 11.6/F |
| 1/8 | 3.2 | .18 | 5 | 5 | 5 | 4 | 4 | 4 | 81 | 48.4 | 8320G220 | 1 | 8320G229 | 1 | 10.1/F | 11.6/F |
| 1/4 | 1.6 | .08 | 17 | 17 | 17 | 11 | 11 | 11 | 92 | 64.9 | 8320G192 | 2 | 8320G232 | 3 | 17.1/F | 11.6/F |
| 1/4 | 2.4 | .10 | 10 | 10 | 10 | 7 | 7 | 7 | 92 | 64.9 | 8320G194 | 2 | 8320G204 | 3 | 10.1/F | 11.6/F |
| 1/4 | 3.2 | .21 | 5 | 5 | 5 | 4 | 4 | 4 | 92 | 64.9 | 8320G196 | 2 | 8320G205 | 3 | 10.1/F | 11.6/F |
| 1/4 | 4.4 | .30 | 3 | 3 | 3 | 2 | 2 | 2 | 92 | 64.9 | 8320G198 | 2 | -- | -- | 10.1/F | 11.6/F |

Dimensions: inches (mm)

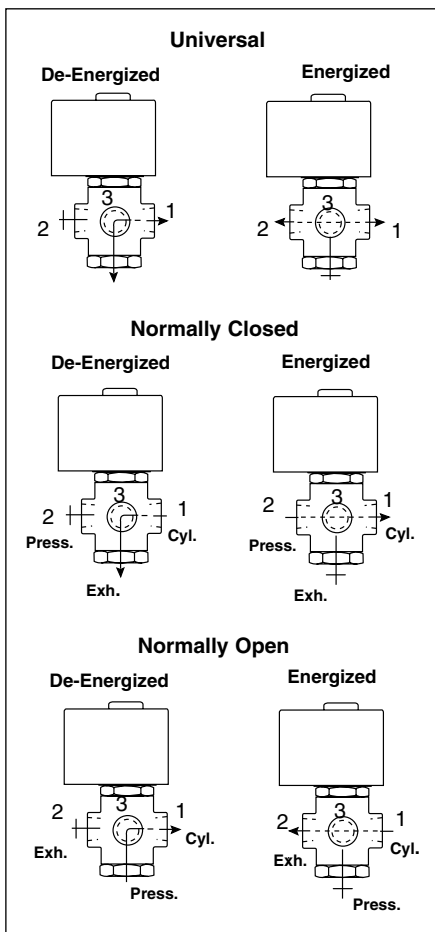
Constr. Ref. 1



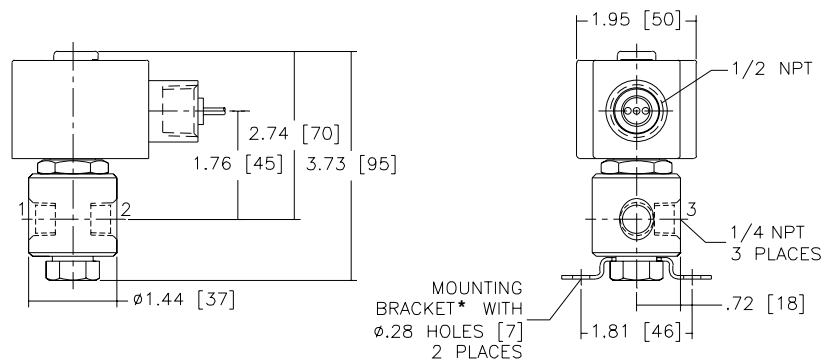
Constr. Ref. 2



FLOW DIAGRAMS



Constr. Ref. 3



* MOUNTING BRACKET IS STANDARD ON THIS CONSTRUCTION

Fisher Controls

Instruction Manual

Type 119 Control Valve

June 1990

Form 5204

Introduction**Scope of Manual**

This instruction manual provides installation, spring adjustment, maintenance, and parts information for the Type 119 control valve.

Description

The Type 119 control valve (figure 1) is used for on-off or throttling control of noncorrosive or mildly corrosive liquids and gases. It is designed to meet the low-pressure liquid and gas application requirements in many varied industries.

As loading pressure is applied to the Type 119 control valve diaphragm, the disk holder is pulled off the orifice. As loading pressure is reduced, the opposing spring force moves the disk holder toward the closed position, resulting in spring-close action should a loss of supply pressure occur.



Figure 1. Type 119 Control Valve

Specifications

Table 1 lists specifications for the Type 119 control valve. Some of the specifications for a given control valve as it originally comes from the factory are stamped on a nameplate (figure 2) located on the spring case flange.

the service conditions do not exceed the limits shown in table 1. The leak-off and spring case vents must be kept open. To avoid danger of fire or explosion from venting of flammable or otherwise hazardous fluid into a closed or poorly vented location, pipe the vents to a well-ventilated location, away from any buildings or windows so as not to create a further hazard.

Installation

To avoid personal injury or property damage caused by controlled process fluid or bursting of pressure-retaining parts, be certain

1. Before installing the valve, be sure the valve body and associated equipment are free of damage and foreign material.

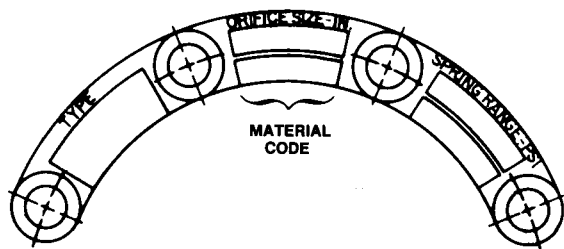
2. The control valve can be installed in any position, but the normal orientation is with the actuator portion vertical above the body. If installing the control valve at an outside location, point the spring case and bonnet vents in the downward direction to protect them from moisture or foreign materials.

Table 1. Specifications

| | |
|--|--|
| <p>Maximum Inlet Pressure⁽¹⁾ 150 psig (10.3 bar)</p> <p>Spring Ranges See table 2</p> <p>Maximum Control Pressure to Diaphragm 150 psig (10.3 bar)</p> <p>Maximum Pressure Drop⁽¹⁾ 150 psi (10.3 bar) for all port diameters</p> <p><small>1. The pressure and temperature limitations in this manual, and any applicable code limitation, should not be exceeded.</small></p> | <p>Material Temperature Capabilities⁽¹⁾ With Nitrile Elastomers: -20 to 170°F (-29 to 77°C) With Fluoroelastomers: 0 to 250°F (-18 to 121°C) Note: Not for use with hot water or ammonia.</p> <p>Flow Direction Up through the seat ring</p> <p>Spring Case Vent and Bonnet Leak-Off Connection 1/4-inch NPT female</p> <p>Approximate Weight 6 lb (2.7 kg)</p> |
|--|--|

Table 2. Spring Selection

| SPRING RANGE | | SPRING PART NUMBER | SPRING COLOR CODE |
|--------------|---------|--------------------|-------------------|
| Psig | Bar | | |
| 3-15 | 0.2-1.0 | 1D8923 27022 | Red |
| 5-20 | 0.3-1.4 | 1D7515 27022 | Cadmium |
| 5-35 | 0.3-2.4 | 1D6659 27022 | Blue |
| 30-60 | 2.1-4.1 | 1D7455 27142 | Green |



1E5427-F

| Material Code | Orifice Seat Disk Material |
|---------------|---------------------------------|
| AI/N | Aluminum/Nitrile |
| SST/N | Stainless steel/Nitrile |
| SST/V | Stainless steel/Fluoroelastomer |

Figure 2. Type 119 Nameplate

3. Install the valve using accepted piping practices. Make sure that the valve is oriented so that flow through the body will match the flow direction arrow on the body.

4. If continuous operation is required during maintenance and inspection, install a three-valve bypass around the control valve.

5. Connect the control pressure line to the 1/4-inch NPT connection in the valve body bonnet marked PILOT.

Spring Adjustment

The control valve spring has been selected to meet the pressure condition requirements of the application as specified on the order. This pressure condition is stamped on the actuator nameplate.

The spring has a fixed pressure span over which loading pressure will stroke the valve. Adjustment of the spring compression shifts the span so that more or less loading pressure is required to start travel. Since the span does not change, there will be a corresponding increase or decrease in the pressure requirements at the end of the valve stroke.

If the control valve has been disassembled or pressure conditions have changed, the spring may need adjustment to make the valve travel coincide with the diaphragm pressure range. Make the adjustment in the following manner. Key numbers refer to figure 3.

1. Loosen the locknut (key 13) on the spring case.

2. Turn the adjusting screw (key 12) clockwise to compress the spring (key 16) or counterclockwise to decrease spring compression. Increased spring compression results in increased loading pressure necessary to start travel. Decreased spring compression results in less loading pressure required to start travel.

3. After adjustment, tighten the locknut. Note that the spring can be identified by the color code. Depending on how much conditions are changed, it may be necessary to install a new spring, using appropriate steps in the Maintenance section. After changing the spring, adjust the valve using the above steps in this section, and indicate the new spring range on the nameplate.

Maintenance

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance depends on the severity of the service conditions.



WARNING

To avoid personal injury or property damage caused by sudden release of pressure or uncontrolled process fluid, isolate the control valve from the pressure system, and release all pressure from the valve body and actuator before performing maintenance operations.

The following describes the procedure for complete disassembly and assembly of the actuator-valve body combination. When inspection or repairs are required, disassemble only those parts necessary to accomplish the job. Key numbers refer to figure 3.

Disassembly

1. Isolate the control valve from all pressure, and release pressure from the valve body and actuator. Loosen the locknut (key 13), and remove all spring compression from the control valve by turning the adjusting screw (key 12) out of the spring case.

2. Remove the two bonnet cap screws (key 15, not shown) that secure the bonnet to the body, and lift the spring case, bonnet, and trim assembly from the body.

3. Examine the seating edge of the orifice (key 3). If it is nicked or rough, unscrew it from the body with a thinwall

7/8-inch socket wrench, and replace it with a new seat ring of the proper size.

4. Remove the bonnet O-ring (key 11), and inspect it for wear and damage.

5. Unscrew and remove the spring case cap screws (key 14). Remove the spring case, upper spring seat, and spring (keys 2, 17 and 16). Do not lose the nameplate (key 20) when removing the spring case.

6. Pull the hair pin clip (key 6) from the stem and remove the disk holder assembly (key 4).

7. Pull the diaphragm/stem assembly (key 5) out of the bonnet (key 9), and inspect for damage or deterioration. If necessary, replace the entire diaphragm assembly.

8. Without removing the O-rings and bushing spacers (keys 8 and 7) inspect their inside diameter surfaces for damage or deterioration.

Note

The following step should be performed only when there is an indication of O-ring or bushing spacer failure.

9. Remove the internal retaining rings, stem wipers, O-rings, and bushing spacers (keys 10, 19, 8 and 7). Inspect these parts for wear or deterioration, and replace if necessary.

Assembly

This procedure assumes that the control valve has been completely disassembled. If the control valve has been only partially disassembled, start these instructions at the appropriate step.

1. If the orifice (key 3) was removed during disassembly, lubricate the threads with Never-Seez⁽¹⁾ lubricant (key 21) or equivalent, and screw it into the valve body using a thin-wall 7/8-inch socket wrench.

2. Lubricate the bushing spacers, O-rings, stem wipers, and internal retaining rings (keys 7, 8, 19 and 10) with Dow Corning⁽²⁾ No. 111 silicon-base lubricant (key 22) or equivalent, and install as shown in figure 3.

3. Carefully slide the diaphragm assembly (key 5) into and through the O-rings and bushing cavity. Turn the diaphragm assembly to line up the diaphragm holes with the bonnet holes.

4. Slide the disk holder assembly (key 4) all the way into the stem. Connect the disk holder assembly with the hair pin clip (key 6).

5. Coat the bonnet O-ring (key 11) with Dow Corning No. 111 lubricant (key 22) or equivalent. Install the O-ring in the recessed notch in the bonnet (key 9).

1. Trademark of Never-Seez Corp.

2. Trademark of Tretolite Div. of Petrolite Corp.

6. Mount the bonnet (key 9) on the valve body (key 1), insert two cap screws (key 15, not shown), and tighten to 7 foot-pounds (9 newton-meters).
7. Put the spring (key 16) on the diaphragm assembly (key 5), and place the upper spring seat (key 17) in the end of the spring.
8. Lubricate the point and threads of the adjusting screw (key 12) with Never Seez lubricant (key 21) or equivalent.
9. Position the spring case (key 2) and nameplate (key 20) on the diaphragm assembly (key 5). Insert the cap screws (key 14).
10. Tighten all cap screws until finger tight. Then, following a crisscross pattern, tighten each cap screw.
11. Connect the control piping to the control connection in the bonnet.
12. Adjust the spring by following the procedures in the Spring Adjustment section, and remark the nameplate if necessary.

Parts Ordering

When contacting your Fisher sales office or sales representative for technical assistance or ordering replacement parts, include the type number and all other pertinent information stamped on the nameplate attached to the spring case.

When ordering replacement parts, also be sure to include the 11-character part number for each part required from the following parts list.

Parts List

| Key | Description | Part Number |
|-----|-------------|-------------|
|-----|-------------|-------------|

Note

In this parts list, parts marked NACE are intended for corrosion-resistant service as detailed in the National Association of Corrosion Engineers (NACE) standard MR-01-75.

| Key | Description | Part Number |
|-----|--|--|
| | Part Kits | |
| | Kits include keys 4, 5, 6, 8, 10, 11, and 19. | |
| | For 1/8 (3.2 mm), 3/16 (4.8 mm), 1/4 (6.4 mm), 5/16 (7.9 mm), & 3/8 (9.5 mm) inch orifices w/aluminum disk holder nitrile diaphragm, and nitrile disk & O-rings | R119X 000A12 |
| | For 1/2 (12.7 mm) & 9/16 (14.3 mm) inch orifices w/aluminum disk holder, nitrile diaphragm and nitrile disk & O-rings | R119X 000A22 |
| | For 1/8 (3.2 mm), 3/16 (4.8 mm), 1/4 (6.4 mm), 5/16 (7.9 mm), & 3/8 (9.5 mm) inch orifices w/stainless steel disk holder, nitrile diaphragm and nitrile disk & O-rings | R119X 00SN12 |
| | For 1/2 (12.7 mm) & 9/16 (14.3 mm) inch orifices w/stainless steel disk holder, nitrile diaphragm and nitrile disk & O-rings | R119X 00SN22 |
| | For 1/8 (3.2 mm), 3/16 (4.8 mm), 1/4 (6.4 mm), 5/16 (7.9 mm), & 3/8 (9.5 mm) inch orifices w/stainless steel disk holder and fluoroelastomer diaphragm, disk, & O-rings and stainless steel disk holder | R119X 00SV12 |
| | For 1/2 (12.7 mm) & 9/16 (14.3 mm) inch orifices w/stainless steel disk holder and fluoroelastomer diaphragm, disk & O-rings | R119X 00SV22 |
| | NACE Construction | |
| | For 1/8 (3.2 mm), 3/16 (4.8 mm), 1/4 (6.4 mm), 5/16 (7.9 mm), and 3/8 (9.5 mm) inch orifices w/aluminum disk holder, fluoroelastomer diaphragm, disk and O-rings | R119X N0SV32 |
| | For 1/2 (12.7 mm) and 9/16 (14.3 mm) inch orifices w/aluminum disk holder, fluoroelastomer diaphragm, disk and O-rings | R119X N0SV42 |
| 1 | Valve Body Cast iron 3/4-inch 1-inch 1-1/4-inch Steel 3/4-inch 1-inch | 1E9871 19012 1E9873 19012 1E9875 19012 1E9871 X0012 1E9873 X0012 |
| 2 | Spring Case Aluminum | 2P9015 08012 |
| 3* | Orifice Aluminum 1/8-inch (3.2 mm) diameter 3/16-inch (4.8 mm) diameter 1/4-inch (6.4 mm) diameter 5/16-inch (7.9 mm) diameter 3/8-inch (9.5 mm) diameter 1/2-inch (12.7 mm) diameter 9/16-inch (14.3 mm) diameter Stainless steel 1/8-inch (3.2 mm) diameter 3/16-inch (4.8 mm) diameter 1/4-inch (6.4 mm) diameter 5/16-inch (7.9 mm) diameter 3/8-inch (9.5 mm) diameter 1/2-inch (12.7 mm) diameter 9/16-inch (14.3 mm) diameter | 1A9367 09012 009912 09012 0B0420 09012 0B0421 09012 0B0422 09012 1A9288 09012 1E9852 09022 1A9367 35032 009912 35032 0B0420 35032 0B0421 35032 0B0422 35032 1A9288 35032 1C4252 35032 |

*Recommended spare parts

| Key | Description | Part Number | Key | Description | Part Number |
|-----|---|--------------|-----|---|--------------|
| 4* | Disk Holder Assembly ⁽¹⁾ | | 8* | O-Ring ⁽¹⁾ (2 req d) | |
| | Aluminum/nitrile | | | Nitrile | 18A7019 X012 |
| | 1/2 and 9/16-inch | 1C4248 000B2 | | Fluoroelastomer (high-temperature, corrosion) | 18A7019 X022 |
| | Stainless steel/nitrile | | | Nace MR-01-75, fluoroelastomer | 18A7019 X022 |
| | 1/8 (3.2 mm), 3/16 (4.8 mm), 1/4 (6.4 mm), 5/16 (7.9 mm) & 3/8 (9.5 mm) inch orifices | 1A8328 000A2 | 9 | Bonnet, aluminum | 48A7025 X012 |
| | 1/2 (12.7 mm) & 9/16 (14.3 mm) inch orifices | 1C4248 000A2 | 10 | Internal Retaining Ring ⁽¹⁾ (2 req d) | |
| | Stainless steel/fluoroelastomer | | | Nitrile & fluoroelastomer | 18A7020 X022 |
| | 1/8 (3.2 mm), 3/16 (4.8 mm), 1/4 (6.4 mm) 5/16 (7.9 mm) & 3/8 (9.5 mm) inch orifices | 1A8328 000M2 | | Nace MR-01-75, fluoroelastomer | 18A7020 X032 |
| | 1/2 (12.7 mm) & 9/16 (14.3 mm) inch orifices | 1C4248 X0052 | 11* | Bonnet O-Ring ⁽¹⁾ | |
| | Nace MR-01-75, aluminum/fluoroelastomer | | | Nitrile | 1K5949 06562 |
| | 1/8 (3.2 mm), 3/16 (4.8 mm), 1/4 (6.4 mm) 5/16 (7.9 mm) & 3/8 (9.5 mm) inch orifices | 1A8328 X0122 | | Fluoroelastomer (high-temperature, corrosion) & Nace MR-01-75 | 13A5559 X012 |
| | 1/2 (12.7 mm) & 9/16 (14.3 mm) inch orifices | 1C4248 X0182 | 12 | Adjusting Screw, zinc plated steel | 1D9954 48702 |
| | | | 13 | Locknut, zinc plated steel | 1A3537 24122 |
| | | | 14 | Cap Screw, zinc plated steel (8 req d) | 1A3917 24052 |
| 5* | Diaphragm/Stem Assembly ⁽¹⁾ | | 15 | Cap Screw, zinc plated steel (2 req d) (not shown) | 1B7877 24052 |
| | Aluminum/nitrile | 17A8080 X032 | 16 | Actuator Spring, zinc plated steel | See table 2 |
| | Stainless steel/nitrile | 17A8080 X022 | 17 | Upper Spring Seat, zinc plated steel | 1D6671 25072 |
| | Stainless steel/fluoroelastomer | 17A8080 X012 | 18 | Type Y602-12 Vent (not shown) | 27A5516 X012 |
| | Nace MR-01-75, Aluminum/fluoroelastomer | 19A0348 X022 | 19 | Stem Wiper ⁽¹⁾ , TFE (2 req d) | 18A7024 X012 |
| 6 | Hair Pin Clip ⁽¹⁾ | | 20 | Nameplate, aluminum | 1E5427 11992 |
| | All except NACE | 19A0347 X012 | 21 | Never-Seez Lubricant, 1 gal (3.81 L) can (not furnished with valve) | 1M5239 06992 |
| | NACE MR-01-75 | 19A0347 X022 | 22 | Dow Corning 111 Lubricant, 10 lb (4.53 kg) can (not furnished with valve) | 1M5283 06992 |
| 7 | Bushing Spacer, Delrin 500 ⁽²⁾ (2 req d) | 18A7021 X012 | 23 | Vent Screen, stainless steel (not shown) | 0L0783 43062 |
| | | | 24 | Nace Tag | 19A6034 X012 |
| | | | 25 | Tag Wire | 1U7581 X0022 |

*Recommended spare part.
 1. Included in repair kit.
 2. Trademark of DuPont Co.

Design D2 FloPro Control Valve

Contents

| | |
|---|----|
| Introduction | 1 |
| Scope of Manual | 1 |
| Description | 1 |
| Specifications | 1 |
| Installation | 3 |
| Setting Valve FloPro Flow Adjuster | 3 |
| Changing Actuator Action from (Air-to-Open) to (Air-to-Close) | 4 |
| Maintenance | 5 |
| Valve Trim Maintenance | 5 |
| Packing, Valve Trim, and Actuator Maintenance | 7 |
| Parts Kits | 12 |
| Parts List | 12 |
| Appendix A (Packing Constructions with Lot Numbers Less Than 0410-xxxx) .. | 16 |



W9235-1

Figure 1. Design D2 FloPro Control Valve

Introduction

Scope of Manual

This instruction manual provides installation, maintenance, and parts information for the NPS 1 Design D2 FloPro control valve and actuator **manufactured with lot numbers equal to and greater than 0410-xxxx.**

See Appendix A for information on packing constructions **manufactured with lot numbers less than 0410-xxxx.**

Do not install, operate, or maintain a Design D2 FloPro control valve without first • being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance, and • carefully reading and understanding the contents of this manual. If you have any questions about these instructions, contact your Emerson Process Management™ sales office before proceeding.

Description

The Design D2 FloPro control valve (figure 1) is a compact, rugged valve designed for on-off control of a variety of fluids at pressures up to 155 bar (2250 psig). This valve is ideal for use as a dump valve on gas separators and scrubbers. It is also well suited for other high pressure applications in natural gas production, compression, and processing. The Design D2 FloPro valve has threaded end connections and is available in an NPS 1 globe style valve body.

Specifications

Table 1 lists specifications for the Design D2 FloPro control valve. Some of the specifications for a given control valve as it originally comes from the factory are stamped on a nameplate located on the upper diaphragm casing flange.



Table 1. Specifications

| | |
|---|--|
| <p>Valve Assembly Pressure Class ASME B16.34 CL900</p> <p>Maximum Inlet Pressure and Temperature⁽¹⁾ 155 bar from -46 to 93°C, and 150 bar at 149°C. (2250 psig from -50 to 200°F, and 2185 psig at 300°F)</p> <p>Maximum Allowable Pressure Drop⁽¹⁾</p> <p>Flow Down⁽²⁾ <i>Maximum Inlet Pressure:</i> 155 bar (2250 psig) <i>Maximum Outlet Pressure:</i> 103 bar (1500 psig)</p> <p>Flow Up <i>Maximum Inlet Pressure:</i> 103 bar (1500 psig) <i>Maximum Outlet Pressure:</i> 103 bar (1500 psig)</p> <p>Shutoff Classification Class IV ANSI/FCI 70-2 and IEC 60534-4</p> <p>Construction Materials</p> <p>Valve Body and Bonnet: ASME SA 352 LCC Valve Plug and Seat: ■ R30006 (Alloy 6) or ■ S17400 double H1150 Valve Stem: S31600 O-Rings: HNBR (Hydrogenated Nitrile) Packing: PTFE/Carbon PTFE Packing Springs: N07718 Stem Bushing: PPS (polyphenylene sulfide) Actuator Diaphragm: Nitrile/Polyester Actuator Springs: Zinc-plated steel</p> <p>Flow Characteristic <i>FloPro</i> Characterized</p> | <p>Port Diameter 13 mm (0.5 inch)</p> <p>Maximum Travel 13 mm (0.5 inch)</p> <p>Approximate Weight 7.7 kg (17 lb)</p> <p>Material Temperature Capabilities</p> <p>Valve Body Assembly: -46 to 149°C (-50 to 300°F) Actuator Assembly: -46 to 93°C (-50 to 200°F)</p> <p>Bonnet/Body Connection Threaded with leakoff bleed</p> <p>Standard Actuator Configuration The <i>D2 FloPro</i> actuator is an on-off spring-and-diaphragm. Globe Valve Body: Supplied as either Air-to-Open or Air-to-Close.</p> <p>Maximum Actuator Casing Pressure 2.8 bar (40 psig)</p> <p>Minimum Required Actuator Casing Pressure 2.1 to 2.4 bar (30 to 35 psig)</p> <p>Actuator Diaphragm Effective Area 194 cm² (30 square inches)</p> <p>Actuator Pressure Connections 1/4 NPT internal</p> |
|---|--|

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. Standard flow direction.

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

sure what these conditions are, you should contact your Emerson Process Management sales office for more complete specifications.

1. Before installing the valve, inspect it to be certain that the valve body cavity is free of foreign material. Clean out all pipelines to remove scale, welding slag, and other foreign materials.
2. The control valve assembly may be installed in any orientation unless limited by seismic criteria.
The standard flow direction is indicated by the arrow on the valve body.
3. Use accepted piping practices when installing the valve in the pipeline.
4. If continuous operation is required during inspection or maintenance, install a three-valve bypass around the control valve assembly.

Installation

 **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 the limits given in table 1 or on the appropriate nameplates. To avoid such injury or damage, provide a relief valve for overpressure protection as required by accepted industry or local, state, and Federal 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

This valve is intended for a specific range of pressures, temperatures, and other service conditions (see table 1). Applying different pressure, temperature, and other conditions to the valve could result in parts damage, malfunction of the valve, or loss of control of the process. *Do not expose this valve to service conditions or variables other than those for which this valve is intended.* If you are not

Note

The NPS 1 Design D2 FloPro valve is equipped with ENVIRO-SEAL® D2 packing.

The actuator is available from the factory as either air-to-open or air-to-close.

Additionally, the actuator as shipped from the factory, has the FloPro flow adjuster set at a 0.375 inch port flow rate position. If some other flow rate is desired, see the Setting Valve FloPro Flow Adjuster section in this manual.

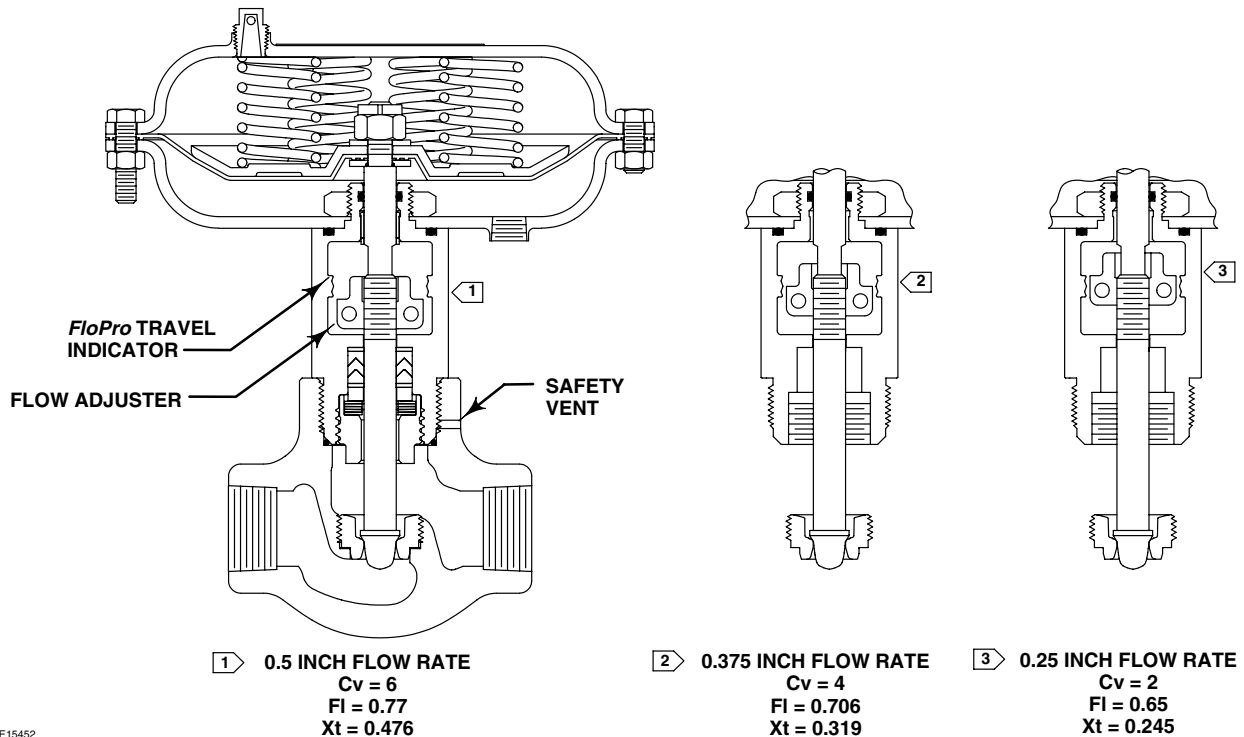
Setting Valve FloPro Flow Adjuster

Air-to-Open Actuator Action

1. To change the valve flow rate, loosen the flow adjuster socket head cap screws (key 29), and reposition the flow adjuster halves (key 14 and 15) to the desired flow rate position. See figure 2 for flow rate settings.

Air-to-Close Actuator Action

1. Attach a pressure line to the actuator. Supply pressure to the actuator to seat the plug in the seat ring.
2. To change the valve flow rate, loosen the flow adjuster socket head cap screws (key 29), and reposition the flow adjuster halves (key 14 and 15) to the desired flow rate position. See figure 2 for flow rate settings.



GE15452

Figure 2. Flow Rate Adjustments

Changing Actuator Action from (Air-to-Open) to (Air-to-Close)

Key numbers are referenced in figures 6 and 7.

WARNING

To prevent possible personal injury or property damage from removing the casing cap screws in the wrong sequence, follow the procedure as outlined below for removing the upper casing.

1. Remove the six **short** actuator casing cap screws (key 22) first. Once these have been removed from the actuator assembly, remove the two **long** actuator cap screws (key 30) by alternating between them as you loosen them, to keep the upper casing (key 21) level during this procedure.

Note

Be aware as you loosen and remove the actuator cap screws that the

actuator springs are under compression.

2. Remove the upper casing (key 21) and the springs (key 27).
3. Do not turn the valve stem (key 4) while removing the diaphragm hex nut (key 26). Keep the stem from turning by using an open end wrench on the machined flats located on the valve stem above the flow adjuster for this procedure. Continue the actuator disassembly by removing the washer (key 24) diaphragm plate (key 25), diaphragm (key 19), washer (key 36), and O-ring (key 37). Inspect the diaphragm for any wear or damage. Replace with a new one if necessary.
4. Unscrew the socket head cap screws (key 29), and remove the flow adjuster halves (key 14 and 15). Position the stem (key 4) to its most upward position.
5. Place 2 of the springs (key 27) from the actuator into the bottom casing (key 20), equally spaced, 180 degrees apart. Place the washer (key 36) over the valve stem, as shown in view A of figure 7. Then place the O-ring (key 37) over the valve stem. Next install the diaphragm plate (key 25) and, using the

diaphragm plate, correctly position the actuator springs.

6. Place the diaphragm (key 19) over the stem, along with washer (key 24). Position the diaphragm so the holes in the diaphragm align with the holes in the bottom casing.
7. Insert a 1/8 inch diameter drift punch, or other suitable device through the 5/32 inch diameter hole in the valve stem located below the bottom of the previously removed flow adjuster. Install hex nut (key 26) and tighten to 10 N•m (90 lbf•in). Use the 1/8 inch drift punch or other holding device to turn the stem to align the holes of the diaphragm (key 19) to the lower casing (key 20).
8. Position the upper casing and install the two **long** cap screws (key 30) opposite one another. Install the six shorter cap screws (key 22) and the hex nuts, tightening the actuator casing cap screws evenly using a cross-tightening procedure. Torque to 10 N•m (8 lbf•ft).
9. Connect a pressure line to the top actuator pressure connection, and apply pressure to the actuator. Stroke the actuator until the valve plug is seated on the seat ring. Install the flow adjuster, positioning it to the desired travel. Tighten the flow adjuster socket head cap screws to 3 N•m (26 lbf•in).
10. Release the actuator pressure, and install the vent plug (key 28) into the bottom casing pressure connection.

Maintenance

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of service conditions. This section includes instructions for packing and trim maintenance, and replacing actuator parts.

All maintenance operations can be performed with the valve in the line.

Note

Whenever a gasket seal or O-ring is disturbed by removing or shifting gasketed parts, a new gasket should be installed upon reassembly. This is necessary to ensure a good gasket seal, since the used gasket or O-ring will not seal properly.

WARNING

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

- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.**
- **Disconnect any operating lines providing air pressure 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 on both sides of the valve. Drain the process media from both sides of the valve.**
- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
- **The valve packing box 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.**

Valve Trim Maintenance

Note

The following maintenance procedures apply to both air-to-open and air-to-close actuator configurations, except for steps 2 and 8 as noted.

Key numbers are referenced in figures 6 and 7.

1. Isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve.

D2 FloPro Valve

2. **For air-to-open actuator action only**, apply pressure to the actuator to fully stroke it open. This will raise the plug off its seat so that the valve stem serrations are visible inside the flow adjuster window (see figure 3). Loosen the socket head screws (key 29) and lower the flow adjuster (key 14 and 15) to its lowest position on the valve stem. Retighten the socket head screws (key 29) to 3 N•m (26 lbf•in). Relieve pressure to the actuator, shut off all pressure lines to the actuator, and disconnect. Use lockout procedures to be sure that the above measures stay in effect while you work on the equipment.

CAUTION

The preceding step is intended to prevent damage to the valve plug (key 3) and seat ring (key 5) during the removal of the bonnet and actuator.

3. Unscrew the bonnet from the valve body.



WARNING

Avoid personal injury from sudden release of process pressure. If the process media starts to escape from the safety vent (see figure 2) located in the bonnet neck of the valve body,

STOP DISASSEMBLY IMMEDIATELY!

The escape of process media indicates that the valve has NOT been isolated from the process media, or process pressure is trapped in the valve body.

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

4. Once the bonnet has been removed from the valve body, inspect the seat ring (key 5) for wear or damage. If the seating surface has been damaged, remove it from the valve body. Also remove the seat ring gasket (key 6). Clean and inspect the valve body gasket surface for damage. Visually inspect the

valve body interior below the seat ring for erosion. Replace the valve body if necessary.

To replace the seat ring, first install a new seat ring gasket. Install the new seat ring and tighten to 230 N•m (170 lbf•ft).

Cover the opening in the valve body to prevent foreign material from getting into the valve body cavity.

5. Inspect the valve stem for scratches or wear, and valve plug for wear or damage. Replace if necessary.

6. If the valve plug requires replacement, use an open end wrench on the machined flats located on the valve stem above the flow adjuster and unscrew the valve plug from the valve stem. Replace it with a new valve plug. Screw the valve plug into the valve stem, being careful not to damage the plug seat or plug contour. Tighten to 18 N•m (13 lbf•ft).



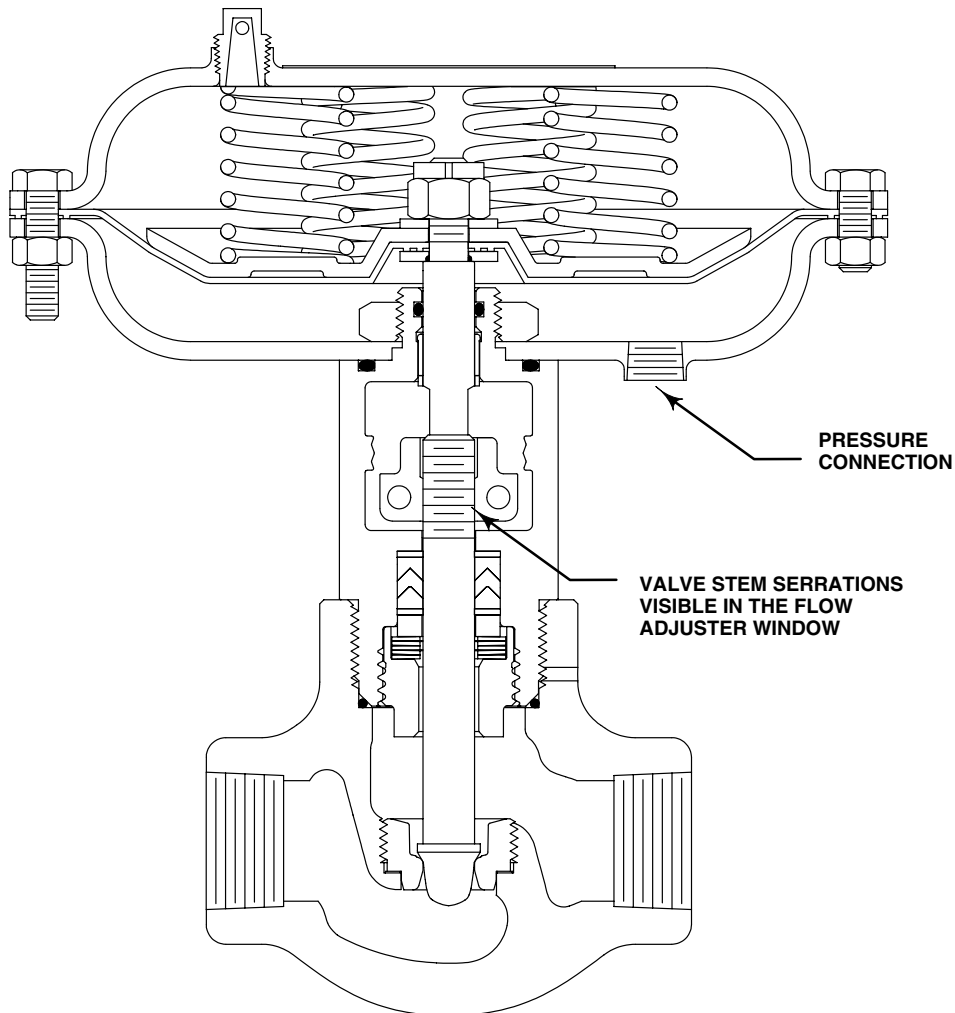
WARNING

Upon reassembly, ensure that no foreign material blocks the safety vent hole as shown in figure 2. If the safety vent hole is blocked or plugged, possible personal injury from the sudden release of process pressure during maintenance disassembly may occur.

7. Lubricate a new O-ring (key 13) with lithium grease and place it into the valve body as shown in figure 6 or 7. Ensure that no foreign material blocks the safety vent hole. Screw the bonnet into the valve body, and torque to a range of 542 to 678 N•m (400 to 500 lbf•ft).

8. **For air-to-open actuator action only**, attach the pressure line to the actuator, and supply pressure to the actuator. Loosen the socket head screws (key 29) and remove the flow adjuster (keys 14 and 15). Release the pressure to the actuator. This allows the plug to find its seated position.

9. Set the flow adjuster to the desired travel position (see figure 2), and tighten the flow adjuster socket head cap screws to 3 N•m (26 lbf•in).



W9005-1

GLOBE STYLE AIR-TO-OPEN

Figure 3. Design D2 FloPro Construction

Packing, Valve Trim, and Actuator Maintenance

Note

The following maintenance procedures apply to both air-to-open and air-to-close actuator configurations, except as noted.

Key numbers are referenced in figures 6 and 7.

Disassembly

1. Isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve.

2. **For air-to-open actuator action only**, apply pressure to the actuator to fully stroke it open. This will raise the plug off its seat so that the valve stem serrations are visible inside the flow adjuster window (see figure 3). Loosen the socket head screws (key 29) and lower the flow adjuster (key 14 and 15) to its lowest position on the valve stem. Retighten the socket head screws (key 29) to 3 N•m (26 lbf•in). Relieve pressure to the actuator, shut off all pressure lines to actuator, and disconnect. Use

lockout procedures to be sure that the above measures stay in effect while you work on the equipment.

CAUTION

The preceding step is intended to prevent damage to the valve plug (key 3) and seat ring (key 5) during the removal of the bonnet and actuator.

3. Unscrew the bonnet from the valve body.

WARNING

Avoid personal injury from sudden release of process pressure. If the process media starts to escape from the safety vent (see figure 2) located in the bonnet neck of the valve body,

STOP DISASSEMBLY IMMEDIATELY!

The escape of process media indicates that the valve has NOT been isolated from the process media, or process pressure is trapped in the valve body.

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

4. Once the bonnet has been removed from the valve body, inspect the valve seat (key 5) for wear or damage. If the seating surface has been damaged, remove it from the valve body. Also remove the seat ring gasket (key 6). Clean and inspect the valve body gasket surface for damage. Visually inspect the valve body interior below the seat ring for erosion. Replace the valve body if necessary.

To replace the seat ring, first install a new seat ring gasket. Install the new seat ring and tighten to 230 N•m (170 lbf•ft).

Cover the opening in the valve body to prevent foreign material from getting into the valve body cavity.

WARNING

To prevent possible personal injury or property damage from removing the casing cap screws in the wrong sequence, follow the procedure as outlined below for removing the upper casing.

5. Remove the six **short** actuator casing cap screws (key 22) first. Once these have been removed from the actuator assembly, remove the two **long** actuator cap screws (key 30) by alternating between them as you loosen them, to keep the upper casing (key 21) level during this procedure..

Note

Be aware as you loosen and remove the actuator cap screws that the actuator springs are under compression for the air-to-open configuration.

6. Remove the upper casing (key 21) and the springs (key 27).
7. Do not turn the valve stem (key 4) while removing the diaphragm hex nut (key 26). Keep the stem from turning by using an open end wrench on the machined flats located on the valve stem above the flow adjuster for this procedure. Continue the actuator disassembly by removing these parts: washer (key 24) diaphragm plate (key 25), diaphragm (key 19), washer (key 36), and O-ring (key 37). Inspect the diaphragm for any wear or damage. Replace with a new one if necessary.

If you wish to inspect/replace the bonnet to actuator casing O-ring (key 16), mark the orientation of the actuator pressure connection to the bonnet for later reference (see figure 3). Unscrew the hex nut (key 18) from the bonnet. Remove the bottom casing (key 20).

8. Unscrew the flow adjuster socket head cap screws (key 29), and remove the flow adjuster halves.
9. Unscrew the packing retainer (key 7) from the bonnet (key 2). After the packing retainer has been unscrewed from the bonnet, pull the valve stem and plug out of the bonnet.
10. Remove the five Belleville springs (key 9), packing spacer (key 10), packing (key 11), and two anti-extrusion rings (key 12) from the bonnet. See figure 4.

11. Clean and inspect the packing box wall to ensure that the packing surfaces are not damaged. If the surface condition is damaged, and cannot be improved by light sanding, replace the bonnet by contacting your Emerson Process Management sales office.

12. Inspect the valve stem for scratches or wear, and valve plug for wear or damage. Replace if necessary.

13. If the valve plug requires replacement, use an appropriate tool on the machined flats located on the valve stem above the flow adjuster and unscrew the valve plug from the valve stem. Replace it with a new valve plug. Screw the valve plug into the valve stem, being careful not to damage the plug seat or plug contour. Tighten to 18 N•m (13 lbf•ft).

14. Inspect the valve stem bushing (key 8) located in the upper end of the bonnet. If damaged, remove and replace it with new bushing (key 8). Replace the valve stem bushing by inserting the bushing, flange end first, into the bore located at the top of the bonnet flow adjuster window. Insert until the flange snaps into the groove provided for it.

15. Remove the O-ring (key 17) from the upper end of the bonnet. Replace it with a new one, and lubricate it with lithium grease.

Assembly

1. Use the packing spacer (key 10) and a tube to push the upper anti-extrusion washer (key 12) into place. Using the packing spacer in this manner will ensure the upper anti-extrusion washer is fully seated and flat when installed in the packing bore.

2. Remove the packing spacer from the packing bore.

CAUTION

All D2 FloPro packing kits include a single use packet of high performance fluorinated grease. This is the only acceptable D2 packing lubricant.

Note

In the following procedure, carefully install each packing ring individually over the valve stem and push completely into the packing box with a non-marring tube. A 12-inch length of 1/2 inch PVC pipe works well for this. It is recommended that the lubricated packing rings be installed individually rather than pushed in as a set.

3. Apply a 3mm (1/8 inch) bead of the supplied high performance fluorinated grease (key 38) around the groove of the female packing adaptor as shown in figure 5 and install over the valve stem.

4. Apply a 3mm (1/8 inch) bead of the supplied high performance fluorinated grease (key 38) around the groove of the packing ring as shown in figure 5 and install over the valve stem.

5. Install the male packing adaptor, lower anti-extrusion washer (key 12), and packing spacer over the valve stem as shown in figure 4.

6. Firmly press all packing parts into the packing bore with a tube.

7. Install the five Belleville springs (key 9) over the valve stem as shown in figure 4.

8. Lubricate the threads of the packing retainer with anti-seize and install into the bonnet using a 1-1/8 inch wrench. Make sure the Belleville springs are completely enclosed by the packing retainer as shown in figure 4.

9. Torque the packing retainer to 81 N•m (60 lbf•ft). The packing retainer has been installed correctly when a metal-to-metal contact has been made between the packing retainer end and the bonnet (key 2). The packing retainer threads should be flush with the bottom of the bonnet as shown in figure 4.

10. If the bottom casing (key 20) has been removed, place O-ring (key 16) into the groove provided in the top of the bonnet. Place the bottom casing on the bonnet, oriented in the same position as marked in step 7 on page 8. Screw the hex nut (key 18) onto the bonnet, and tighten to 203 N•m (150 lbf•ft).

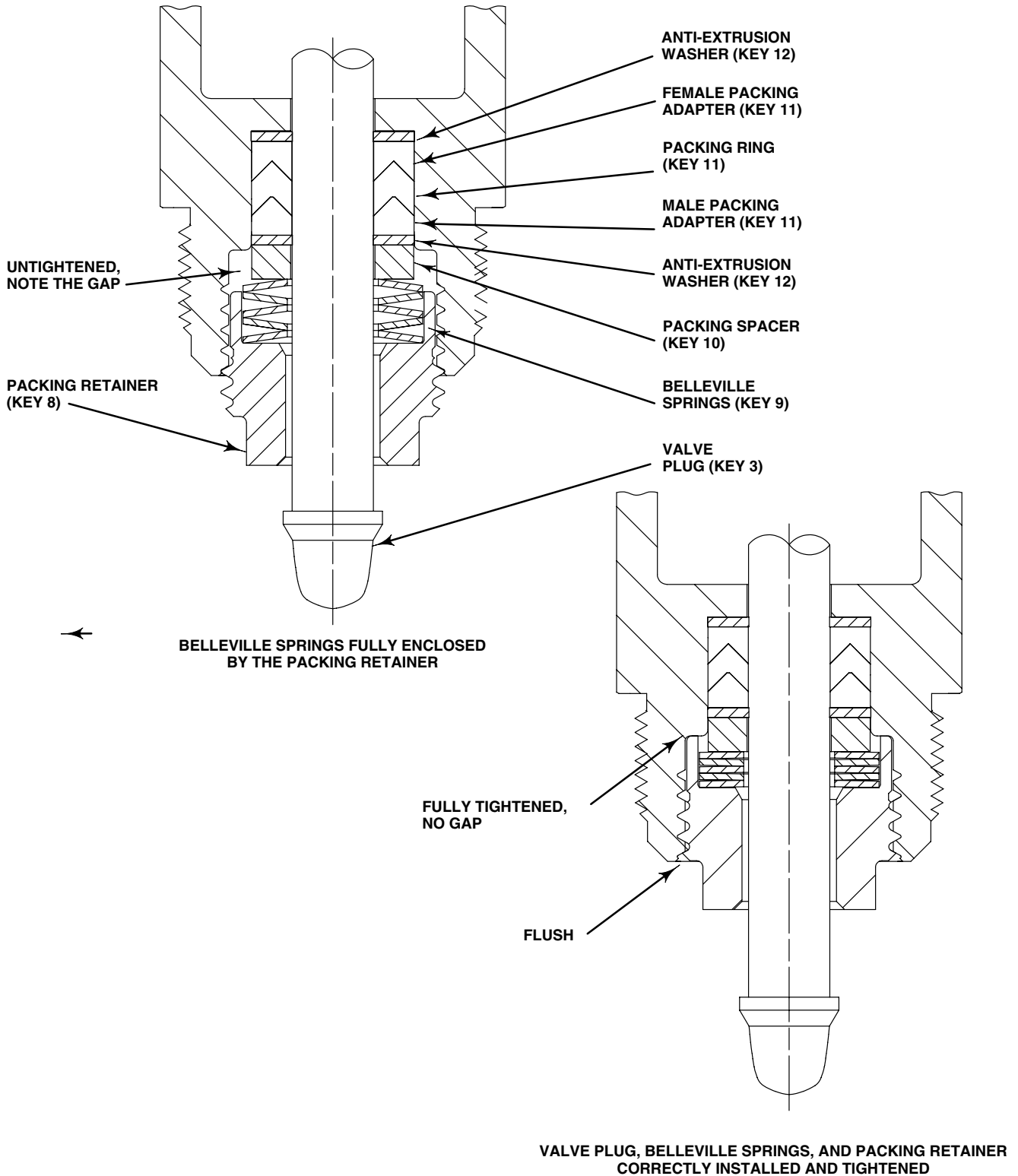


Figure 4. Packing and Belleville Spring Stacking Order

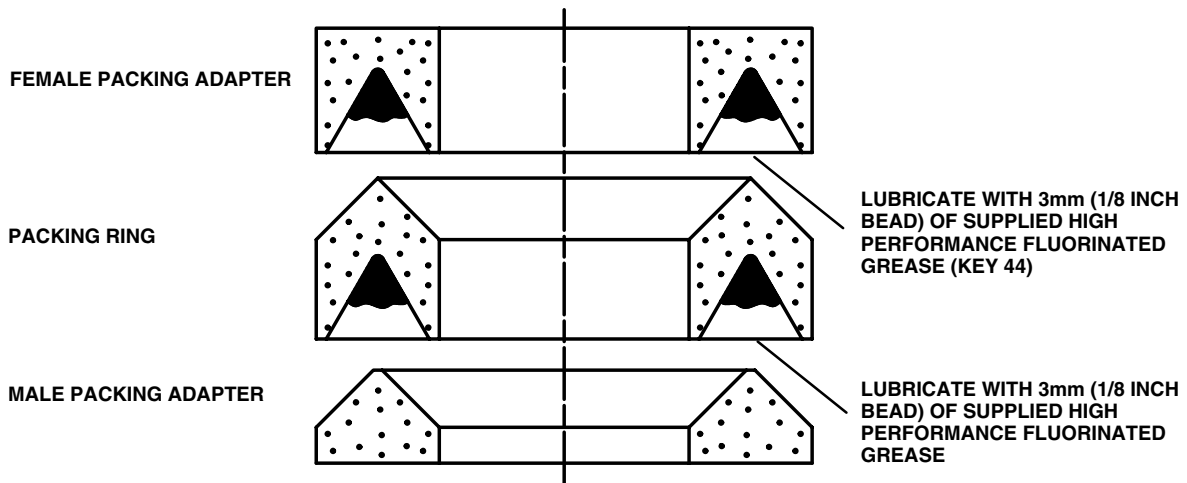


Figure 5. Lubrication Locations on Packing

11. **For air-to-open actuator action only (see figure 6)**, assemble the actuator by first placing the O-ring (key 37) over the valve stem. Then place the washer (key 36) over the valve stem. Place the diaphragm (key 19) over the valve stem, and position it so the holes in the diaphragm match the holes in the casing. Place the diaphragm plate (key 25) over the valve stem. Install the washer (key 24) and the diaphragm hex nut (key 26). Tighten the diaphragm hex nut to 10 N•m (90 lbf•in), while holding the stem by the flats. Install six springs (key 27) and attach the upper casing (key 21) by first installing the two **long** cap screws (key 30) opposite one another.

12. **For air-to-close actuator action only (see figure 7)**, assemble the actuator by first placing 2 of the springs (key 27) from the actuator into the bottom casing (key 20), equally spaced, 180 degrees apart. Place the washer (key 36) over the valve stem, as shown in view A of figure 7. Then place the O-ring (key 37) over the valve stem. Next install the diaphragm plate (key 25) and, using the diaphragm plate, correctly position the actuator springs.

a. Place the diaphragm (key 19) over the stem, along with the washer (key 24). Position the diaphragm so the holes in the diaphragm align with the holes in the bottom casing.

b. Insert a 1/8 inch diameter drift punch, or other suitable device through the 5/32 inch diameter hole in the valve stem located below the bottom of the previously removed flow adjuster. Install the hex nut (key 26) and tighten to 10 N•m (90

lbf•in). Use the 1/8 inch drift punch or other holding device to turn the stem to align the holes of the diaphragm (key 19) to the lower casing (key 20).

13. Position the upper casing and install the two **long** cap screws (key 30) opposite one another. Install the six shorter cap screws (key 22) and the hex nuts, tightening the actuator casing cap screws evenly using a cross-tightening procedure. Torque to 10 N•m (8 lbf•ft).

WARNING

Upon reassembly, ensure that no foreign material blocks the safety vent hole as shown in figure 2. If the safety vent hole is blocked or plugged, possible personal injury from the sudden release of process pressure during maintenance disassembly may occur.

14. Lubricate a new O-ring (key 13) with lithium grease and place it into the valve body as shown in figure 6 or 7. Ensure that no foreign material blocks the safety vent hole. Screw the bonnet into the valve body, and torque to a range of 542 to 678 N•m (400 to 500 lbf•ft).

15. **For air-to-open actuator action only**, attach the pressure line to the actuator, and supply pressure to the actuator. Loosen the socket head screws (key 29) and remove the flow adjuster (keys 14 and 15). Release the pressure to the actuator. This allows the plug to find its seated position.

D2 FloPro Valve

16. Set the flow adjuster to the desired travel position (see figure 2), and tighten the flow adjuster socket head cap screws to 3 N•m (26 lbf•in).

17. **For air-to-close actuator action only**, attach a pressure line to the actuator. Supply pressure to the actuator to seat the plug in the seat ring.

18. Set the flow adjuster to the desired travel position (see figure 2), and tighten the flow adjuster socket head cap screws to 3 N•m (26 lbf•in).

Parts Ordering



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 will void your warranty, might adversely affect the performance of the valve, and could give rise to personal injury and property damage.

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

Parts Kits

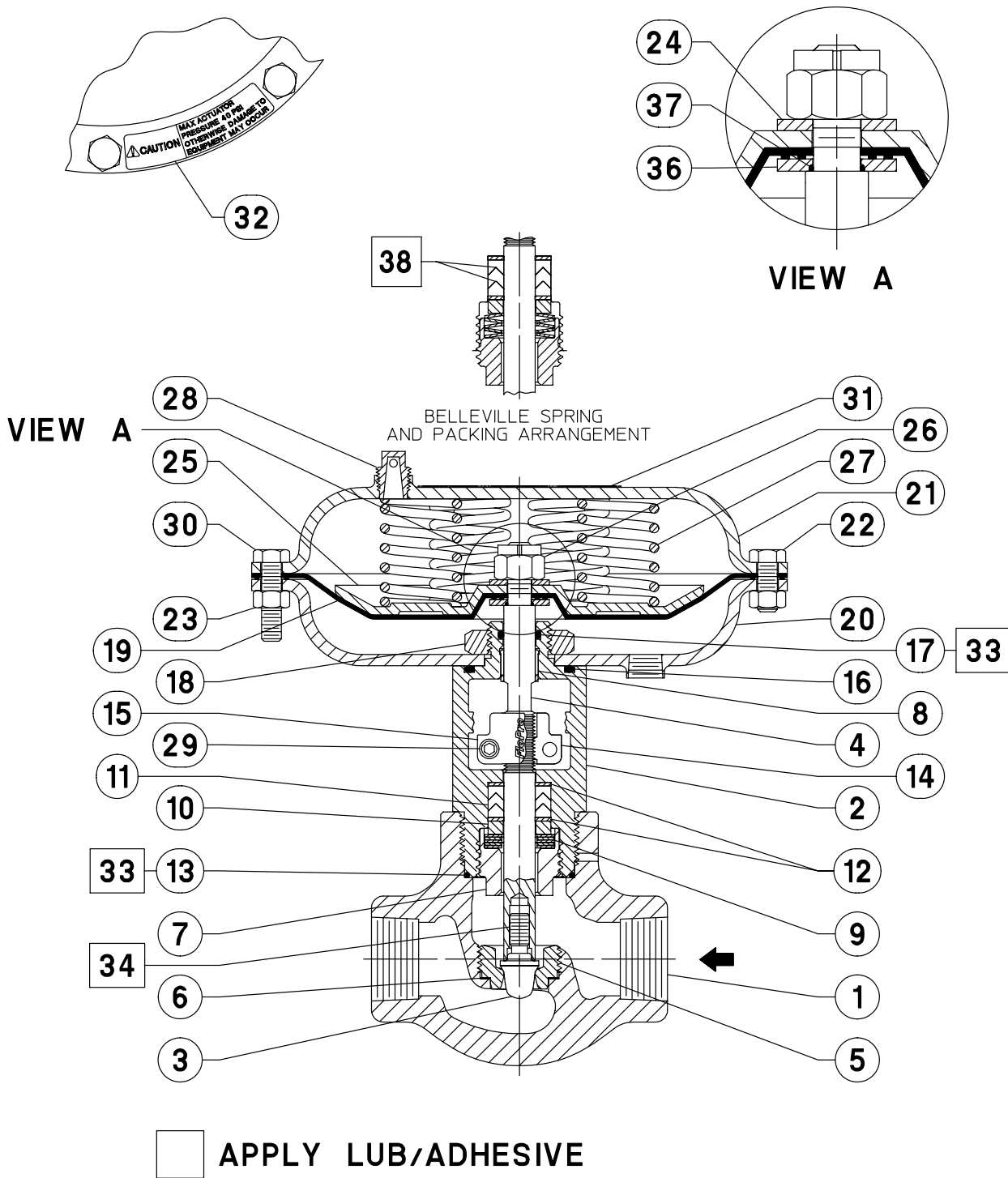
| | Description | Part Number |
|---|--|-------------|
| * | Valve Trim Kit | |
| | R30006 Valve Plug and Seat | |
| | Includes key numbers 3, 5, 6, and 13 | 19B8485X012 |
| | S17400 double H1150 Valve Plug and Seat | |
| | Includes key numbers 3, 5, 6, and 13 | 19B8485X022 |
| * | Valve Packing Kit | |
| | Includes key numbers 8, 11, 12 (2 req'd), 13, 16, 17, and 38 | 19B8486X012 |

Parts List

Note

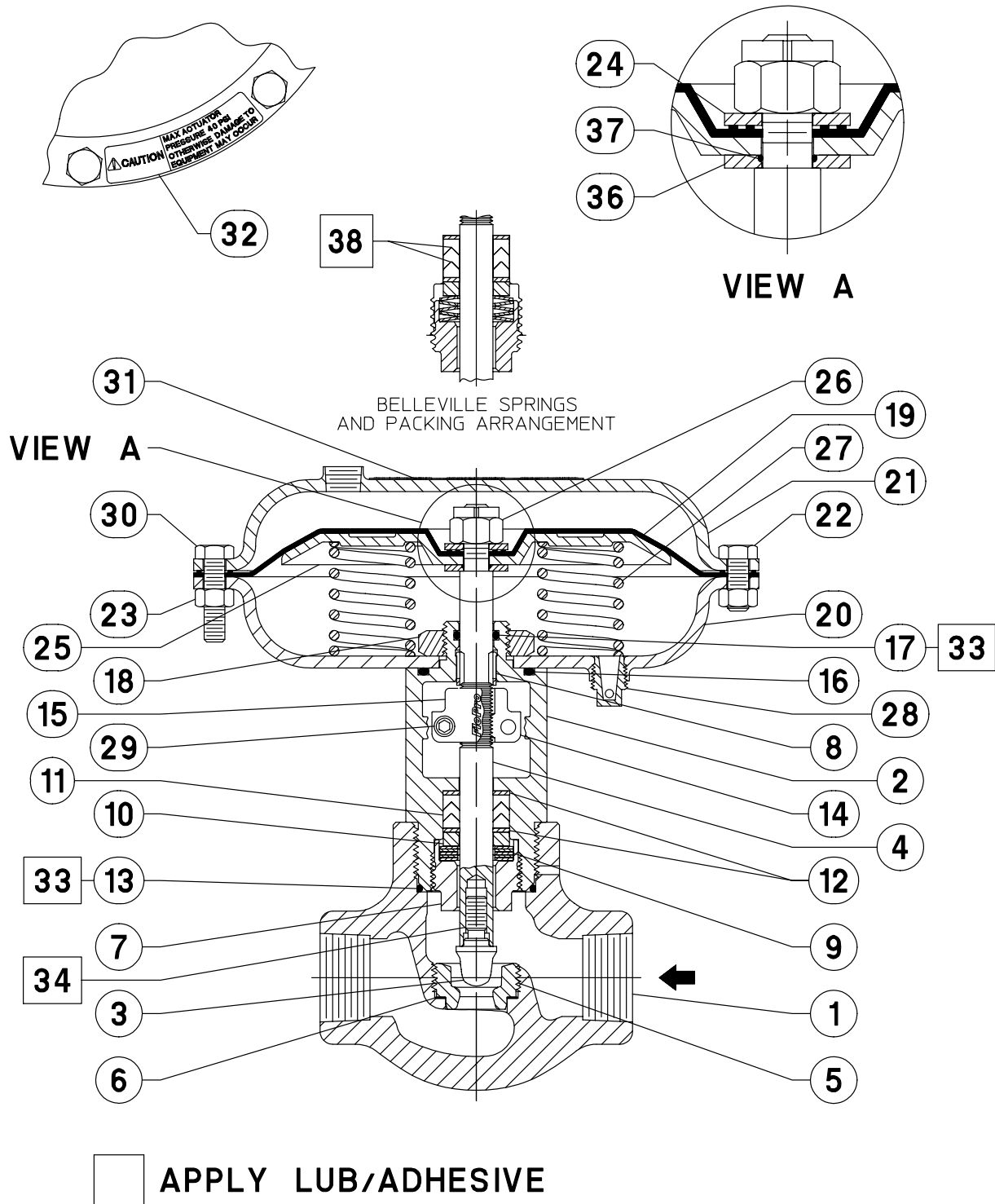
Part numbers are shown for recommended spares only. For part numbers not shown, contact your Emerson Process Management sales office.

| Key | Description | Part Number |
|-----|---|-------------|
| 1 | Valve Body | |
| 2 | Bonnet | |
| 3 | Valve Plug | |
| 4* | Valve Stem | 39B5914X012 |
| 5 | Seat Ring | |
| 6* | Seat Ring Gasket | 19B5887X012 |
| 7 | Packing Retainer | |
| 8 | Valve Stem Bushing | |
| 9 | Belleville Springs (3 req'd) | |
| 10 | Packing Spacer | |
| 11 | ENVIRO-SEAL D2 Packing Set | |
| 12 | Anti-Extrusion Ring (2 req'd) | |
| 13 | Valve Body O-ring | |
| 14 | Flow Adjuster Half | |
| 15 | Flow Adjuster Half | |
| 16 | Casing O-ring | |
| 17 | Valve Stem O-ring | |
| 18 | Hex Nut | |
| 19* | Diaphragm | 39B3849X012 |
| 20 | Bottom Casing | |
| 21 | Upper Casing | |
| 22 | Short Actuator Casing Cap Screws (6 req'd) | |
| 23 | Nut | |
| 24 | Washer | |
| 25 | Diaphragm Plate | |
| 26 | Diaphragm Hex Nut | |
| 27 | Springs | |
| | Air-to-Open (use 6 springs) | |
| | Air-to-Close (use 2 springs) | |
| 28 | Vent Plug | |
| 29 | Flow Adjuster Socket Head Cap Screws (2 req'd) | |
| 30 | Long Actuator Casing Cap Screws (2 req'd) | |
| 31 | Nameplate | |
| 32 | Caution Label | |
| 33 | Lubricant, Lithium Grease | |
| 36 | Washer | |
| 37* | O-ring | GE12527X012 |
| 38* | High Performance Fluorinated Grease Packing Lubricant | GE25891X012 |



39B5892-M

Figure 6. Design D2 FloPro Assembly—Air-to-Open



39B8450-M

Figure 7. Design D2 FloPro Assembly—Air-to-Close

Instruction Manual

Form 5738
February 2008

D2 FloPro Valve

D2 FloPro Valve

Appendix A (Packing Constructions with Lot Numbers Less Than 0410)

Appendix A provides information on packing constructions **manufactured with lot numbers less than 0410-xxxx**.

Packing and Valve Trim Maintenance (Appendix A)

Note

The following maintenance procedures apply to both air-to-open and air-to-close actuator configurations, except as noted.

Key numbers are referenced in figures 10 and 11.

1. Isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve.
2. **For air-to-open actuator action only**, apply pressure to the actuator to fully stroke it open. This will raise the plug off its seat so that the valve stem serrations are visible inside the flow adjuster window (see figure 9). Loosen the socket head screws (key 29) and lower the flow adjuster (key 14 and 15) to its lowest position on the valve stem. Retighten the socket head screws (key 29) to 3 N•m (26 lbf•in). Relieve pressure to the actuator, shut off all pressure lines to actuator, and disconnect. Use lockout procedures to be sure that the above measures stay in effect while you work on the equipment.

CAUTION

The preceding step is intended to prevent damage to the valve plug (key 3) and seat ring (key 5) during the removal of the bonnet and actuator.

3. Unscrew the bonnet from the valve body.

WARNING

Avoid personal injury from sudden release of process pressure. If the process media starts to escape from the safety vent (see figure 2) located in the bonnet neck of the valve body,

STOP DISASSEMBLY IMMEDIATELY!

The escape of process media indicates that the valve has NOT been isolated from the process media, or process pressure is trapped in the valve body.

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

4. Once the bonnet has been removed from the valve body, inspect the valve seat (key 5) for wear or damage. If the seating surface has been damaged, remove it from the valve body. Also remove the seat ring gasket (key 6). Clean and inspect the valve body gasket surface for damage. Visually inspect the valve body interior below the seat ring for erosion. Replace the valve body if necessary.

To replace the seat ring, first install a new seat ring gasket. Install the new seat ring and tighten to 230 N•m (170 lbf•ft).

Cover the opening in the valve body to prevent foreign material from getting into the valve body cavity.

WARNING

To prevent possible personal injury or property damage from removing the casing cap screws in the wrong sequence, follow the procedure as outlined below for removing the upper casing.

5. Remove the six **short** actuator casing cap screws (key 22) first. Once these have been removed from the actuator assembly, remove the two **long** actuator cap screws (key 30) by alternating between them as you loosen them, to keep the upper casing (key 21) level during this procedure..

Note

Be aware as you loosen and remove the actuator cap screws that the actuator springs are under compression for the air-to-open configuration.

6. Remove the upper casing (key 21) and the springs (key 27).
7. Do not turn the valve stem (key 4) while removing the diaphragm hex nut (key 26). Keep the stem from turning by using an open end wrench on the machined flats located on the valve stem above the flow adjuster for this procedure. Continue the actuator disassembly by removing these parts: washer (key 24) diaphragm plate (key 25), diaphragm (key 19), washer (key 36), and O-ring (key 37). Inspect the diaphragm for any wear or damage. Replace with a new one if necessary.

If you wish to inspect/replace the bonnet to actuator casing O-ring (key 16), mark the orientation of the actuator pressure connection to the bonnet for later reference (see figure 9). Unscrew the hex nut (key 18) from the bonnet. Remove the bottom casing (key 20).

8. Unscrew the flow adjuster socket head cap screws (key 29), and remove the flow adjuster halves.
9. Unscrew the packing retainer (key 7) from the bonnet (key 2). After the packing retainer has been unscrewed from the bonnet, pull the valve stem and plug out of the bonnet.
10. Remove the three Belleville springs (key 9), packing spacer (key 10), packing (key 11), and two anti-extrusion rings (key 12) from the bonnet. See figure 8.
11. Clean and inspect the packing box wall to ensure that the packing surfaces are not damaged. If the surface condition is damaged, and cannot be improved by light sanding, replace the bonnet by contacting your Emerson Process Management sales office.
12. Inspect the valve stem for scratches or wear, and valve plug for wear or damage. Replace if necessary.
13. If the valve plug requires replacement, use an appropriate tool on the machined flats located on the valve stem above the flow adjuster and unscrew the valve plug from the valve stem. Replace it with a new valve plug. Screw the valve plug into the valve stem, being careful not to damage the plug seat or plug contour. Tighten to 18 N•m (13 lbf•ft).

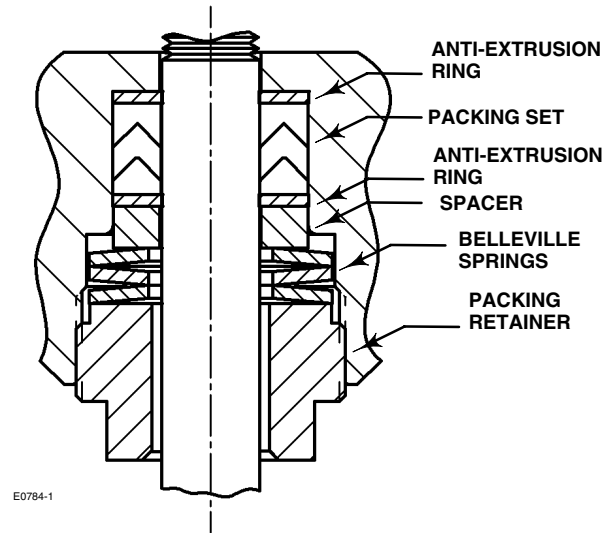


Figure 8. Packing and Belleville Spring Stacking Order (Appendix A)

14. Inspect the valve stem bushing (key 8) located in the upper end of the bonnet. If damaged, remove and replace it with new bushing (key 8). Replace the valve stem bushing by inserting the bushing, flange end first, into the bore located at the top of the bonnet flow adjuster window. Insert until the flange snaps into the groove provided for it.
15. Remove the O-ring (key 17) from the upper end of the bonnet. Replace it with a new one, and lubricate it with lithium grease.
16. Install new packing according to the packing arrangement shown in figure 8, Apply a light film of lithium grease to the threads of the packing retainer (key 7). Install the Belleville springs and packing retainer, as shown in figure 8, but do not tighten.
17. Apply a light film of lithium grease to the valve stem. Carefully slide the valve stem through the packing retainer and packing to a point where the serration extends completely into the flow adjuster window of the bonnet (see figure 9).
18. **Tighten the packing retainer to a range of 81 to 95 N•m (60 to 70 lbf•ft). Then loosen the packing retainer 30 degrees counter-clockwise. See figure 8.**
19. If the bottom casing (key 20) has been removed, place O-ring (key 16) into the groove provided in the top of the bonnet. Place the bottom casing on the bonnet, oriented in the same position as marked in step 7 on page 8. Screw the hex nut (key 18) onto the bonnet, and tighten to 203 N•m (150 lbf•ft).

D2 FloPro Valve

20. **For air-to-open actuator action only (see figure 10)**, assemble the actuator by first placing the O-ring (key 37) over the valve stem. Then place the washer (key 36) over the valve stem. Place the diaphragm (key 19) over the valve stem, and position it so the holes in the diaphragm match the holes in the casing. Place the diaphragm plate (key 25) over the valve stem. Install the washer (key 24), diaphragm hex nut (key 26). Tighten the diaphragm hex nut to 10 N•m (90 lbf•in), while holding the stem by the flats. Install six springs (key 27) and attach the upper casing (key 21) by first installing the two **long** cap screws (key 30) opposite one another.

21. **For air-to-close actuator action only (see figure 11)**, assemble the actuator by first placing 2 of the springs (key 27) from the actuator into the bottom casing (key 20), equally spaced, 180 degrees apart. Place the washer (key 36) over the valve stem, as shown in view A of figure 11. Then place the O-ring (key 37) over the valve stem. Next install the diaphragm plate (key 25) and, using the diaphragm plate, correctly position the actuator springs.

a. Place the diaphragm (key 19) over the stem, along with washer (key 24). Position the diaphragm so the holes in the diaphragm align with the holes in the bottom casing.

b. Insert a 1/8 inch diameter drift punch, or other suitable device through the 5/32 inch diameter hole in the valve stem located below the bottom of the previously removed flow adjuster. Install hex nut (key 26) and tighten to 10 N•m (90 lbf•in). Use the 1/8 inch drift punch or other holding device to turn the stem to align the holes of the diaphragm (key 19) to the lower casing (key 20).

22. Position the upper casing and install the two **long** cap screws (key 30) opposite one another.

Install the six shorter cap screws (key 22) and the hex nuts, tightening the actuator casing cap screws evenly using a cross-tightening procedure. Torque to 10 N•m (8 lbf•ft).

WARNING

Upon reassembly, ensure that no foreign material blocks the safety vent hole as shown in figure 2. If the safety vent hole is blocked or plugged, possible personal injury from the sudden release of process pressure during maintenance disassembly may occur.

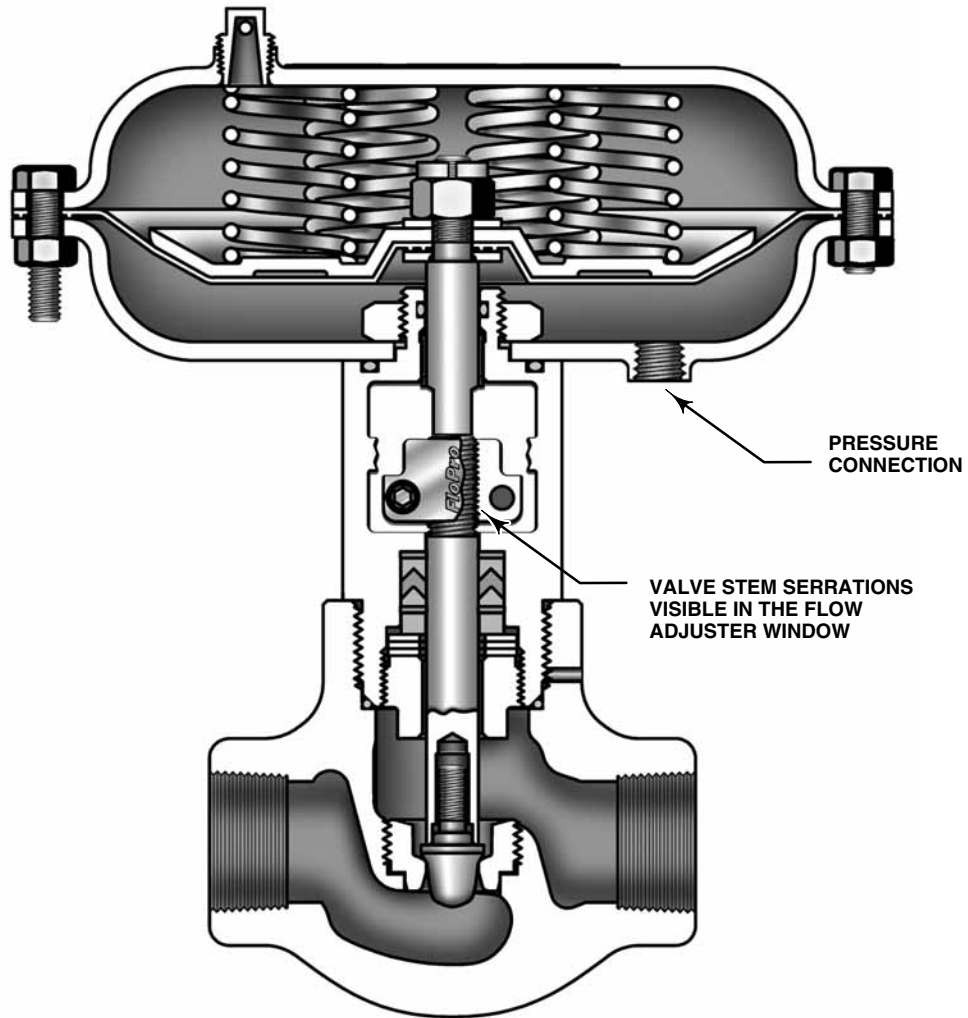
23. Lubricate a new O-ring (key 13) with lithium grease and place it into the valve body as shown in figure 10 or 11. Ensure that no foreign material blocks the safety vent hole. Screw the bonnet into the valve body, and torque to a range of 542 to 678 N•m (400 to 500 lbf•ft).

24. **For air-to-open actuator action only**, attach the pressure line to the actuator, and supply pressure to the actuator. Loosen the socket head screws (key 29) and remove the flow adjuster (keys 14 and 15). Release the pressure to the actuator. This allows the plug to find its seated position.

25. Set the flow adjuster to the desired travel position (see figure 2), and tighten the flow adjuster socket head cap screws to 3 N•m (26 lbf•in).

26. **For air-to-close actuator action only**, attach a pressure line to the actuator. Supply pressure to the actuator to seat the plug in the seat ring.

27. Set the flow adjuster to the desired travel position (see figure 2), and tighten the flow adjuster socket head cap screws to 3 N•m (26 lbf•in).



W9005-1

GLOBE STYLE AIR-TO-OPEN

Figure 9. Design D2 FloPro Construction (Appendix A)

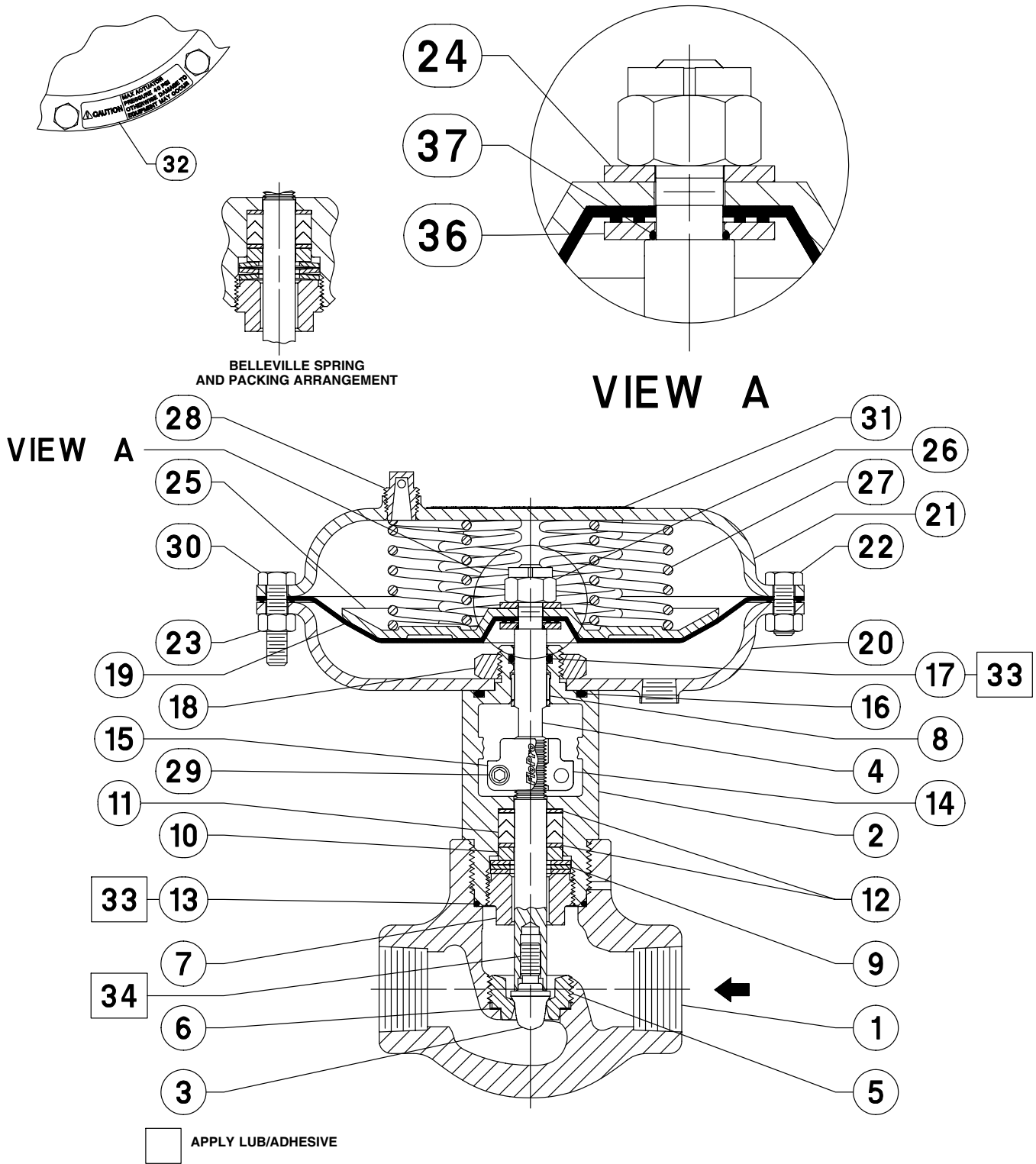


Figure 10. Design D2 FloPro Assembly—Air-to-Open (Appendix A)

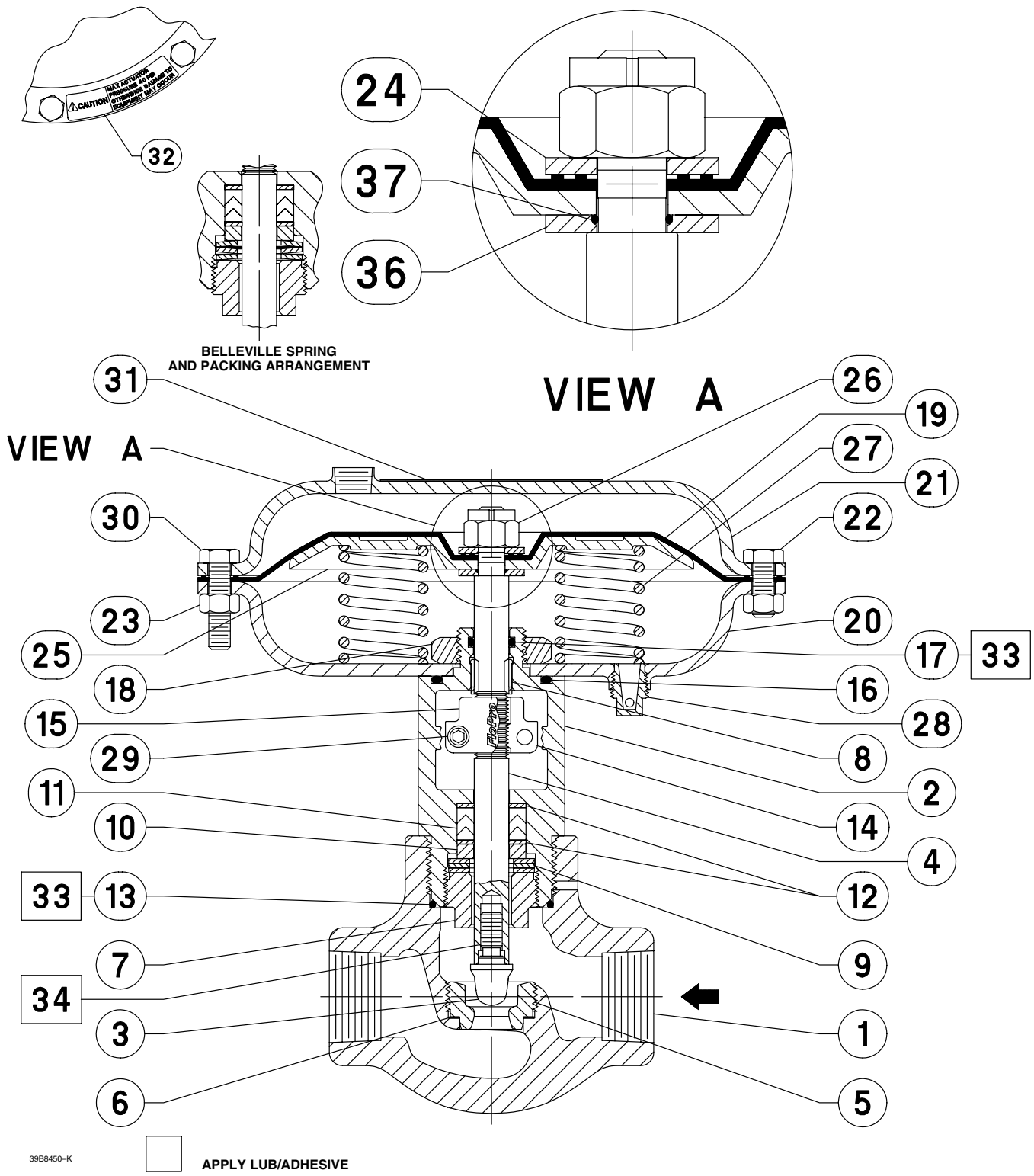


Figure 11. Design D2 FloPro Assembly—Air-to-Close (Appendix A)

D2 FloPro Valve

Parts Ordering (Appendix A)



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 will void your warranty, might adversely affect the performance of the valve, and could give rise to personal injury and property damage.

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

Parts Kits (Appendix A)

| Description | Part Number |
|--|-------------|
| * Valve Trim Kit | |
| R30006 Valve Plug and Seat | |
| Includes key numbers 3, 5, 6, and 13 | 19B8485X012 |
| S17400 double H1150 Valve Plug and Seat | |
| Includes key numbers 3, 5, 6, and 13 | 19B8485X022 |
| * Valve Packing Kit | |
| Includes key numbers 8, 11, 12 (2 req'd), 13, 16, and 17 | 19B8486X012 |

Parts List (Appendix A)

Note

Part numbers are shown for recommended spares only. For part numbers not shown, contact your Emerson Process Management sales office.

| Key | Description | Part Number |
|-----|--|-------------|
| 1 | Valve Body | |
| 2 | Bonnet | |
| 3 | Valve Plug | |
| 4* | Valve Stem | 39B5914X012 |
| 5 | Seat Ring | |
| 6* | Seat Ring Gasket | 19B5887X012 |
| 7 | Packing Retainer | |
| 8 | Valve Stem Bushing | |
| 9 | Belleville Springs (3 req'd) | |
| 10 | Packing Spacer | |
| 11 | ENVIRO-SEAL D2 Packing Set | |
| 12 | Anti-Extrusion Ring (2 req'd) | |
| 13 | Valve Body O-ring | |
| 14 | Flow Adjuster Half | |
| 15 | Flow Adjuster Half | |
| 16 | Casing O-ring | |
| 17 | Valve Stem O-ring | |
| 18 | Hex Nut | |
| 19* | Diaphragm | 39B3849X012 |
| 20 | Bottom Casing | |
| 21 | Upper Casing | |
| 22 | Short Actuator Casing Cap Screws (6 req'd) | |
| 23 | Nut | |
| 24 | Washer | |
| 25 | Diaphragm Plate | |
| 26 | Diaphragm Hex Nut | |
| 27 | Springs | |
| | Air-to-Open (use 6 springs) | |
| | Air-to-Close (use 2 springs) | |
| 28 | Vent Plug | |
| 29 | Flow Adjuster Socket Head Cap Screws (2 req'd) | |
| 30 | Long Actuator Casing Cap Screws (2 req'd) | |
| 31 | Nameplate | |
| 32 | Caution Label | |
| 33 | Lubricant, Lithium Grease | |
| 36 | Washer | |
| 37* | O-ring | GE12527X012 |

ENVIRO-SEAL and Fisher are marks owned by Fisher Controls International LLC, a member of the Emerson Process Management business division of Emerson Electric Co. Emerson Process Management, Emerson, and the Emerson logo are trademarks and service marks of Emerson Electric Co. All other marks are the property of their respective owners. This product may be covered by one or more of the following patents: 5,129,625; 5,131,666; 5,056,757; 5,230,498; 5,299,812; 6,698,449 B2; 6,695,000 B2; 6,769,666; and 6,866,244 or under pending patents.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such products at any time without notice.

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use and maintenance of any product remains with the purchaser and end-user.

Emerson Process Management

Marshalltown, Iowa 50158 USA

Cernay 68700 France

Sao Paulo 05424 Brazil

Singapore 128461

www.Fisher.com



Vee-Ball[®] Design V150, V200 and V300 Rotary Control Valves

This bulletin covers the 1- through 2-inch, 3- through 12-inch Series B, and the 14- through 20-inch Design V150, V200 and V300 Vee-Ball[®] control valves (shown in figure 1). The Type Vee-Ball valve combines globe valve ruggedness with the efficiency of a rotary valve. A shearing action between the V-notch ball and the ball seal (figure 2) promotes smooth, nonclogging operation. The unrestricted straight-through flow design provides high capacity for gas, steam, liquids, and fibrous slurries.

The Design V150, V200 and V300 valves mate with a variety of ASME raised face flanges, as well as with DIN flanges (see Specifications).

To meet specific application requirements, a variety of metal and soft ball seal materials are available. A

splined drive shaft combines with a variety of power operated and manual actuators to provide reliable, high-performance throttling or on-off operation for many different applications in the process industries.

Unless otherwise noted, all NACE references are to NACE MR0175-2002.

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.



W8172-2

V150



W9161-1

V200

Figure 1. Typical Vee-Ball[®] Valves with Type 1052 Actuators and DVC6020 Digital Valve Controllers



Specifications

Valve Sizes and End Connection Styles

Design V150: ■ 1, ■ 1.5, ■ 2, ■ 3, ■ 4, ■ 6, ■ 8, ■ 10, ■ 12-inch, flanged valves that mate with Class 150 raised-face flanges (see table 1). Also, sizes 3 through 12-inch mate with PN classes (see table 1)

Design V150: ■ 14, ■ 16 and ■ 20-Inch: Flanged raised-face valves. 14 and 16-inch valves are available in ASME B16.10 Short, face-to-face dimensions only (see table 1 and figure 9)

Design V200: ■ 1, ■ 1.5, ■ 2, ■ 3, ■ 4, ■ 6, ■ 8, or ■ 10-inch flangeless valves that mate with Class ■ 150, ■ 300, or ■ 600 raised-face flanges depending on size (see table 1)

Design V300: ■ 1, ■ 1.5, ■ 2, ■ 3, ■ 4, ■ 6, ■ 8, ■ 10, ■ 12, ■ 14, and ■ 16-inch valve sizes mate with Class 300 raised-face flanges. Also some sizes mate with PN classes (see table 1)

Maximum Inlet Pressures⁽¹⁾

Design V150 or V300 Steel, CF3M (316L Stainless Steel) or CG8M (317 Stainless Steel) Valves: Consistent with Class 150 for V150, or Class 300 for V300, pressure-temperature ratings per ASME B16.34 or with PN pressure-temperature ratings shown in table 1 but do not exceed the material temperature capabilities shown below or the pressure drop limitations. CF3M is available in all areas and is the standard material offering in Europe.

Design V200 Steel and CG8M (317 Stainless Steel) Valves: Consistent with applicable pressure-temperature ratings in table 1 per ASME B16.34, but do not exceed the material temperature capabilities shown below and the pressure drop limitations.

CW2M Valves: Consistent with applicable pressure-temperature ratings shown in table 6, but do not exceed the material temperature capabilities shown below and the pressure drop limitations.

Maximum Shutoff Pressure/Temperature Ratings⁽¹⁾

Composition (Fisher® TCM Plus or TCM Ultra), Flat Metal (3- through 12-inch valves only), HD

and High Temperature HD Metal Ball Seals and Flow Ring: See table 8.

Shutoff Classification⁽¹⁾

Fisher TCM Plus or Ultra Ball Seal (Forward Flow): Class VI per ANSI/FCI 70-2 and per IEC 60534-4,

Flat Metal Ball Seal for 3 through 12-inch valves only (Forward Flow): Class IV per ANSI/FCI 70-2 and per IEC 60534-4,

HD (Heavy Duty) Metal Ball Seal (Bidirectional Flow): 0.01% of valve capacity; Class IV per ANSI/FCI 70-2 and IEC 60534-4; Maximum allowable pressure drop in reverse flow is 6.9 bar (100 psi);

High Temperature HD (Heavy Duty) Metal Seal (Bidirectional Flow): Class III per ANSI/FCI 70-2 and IEC 60534-4

Flow Ring Construction (Bidirectional Flow): 5% of valve capacity at full travel

Construction Materials

See tables 3, 4 and 5

Temperature Capabilities^(1,2)

Composition Seals (Fisher TCM Plus or TCM Ultra): -46 to 232°C (-50 to 450°F)

HD Metal Seals: -46 to 288°C (-50 to 550°F)

High Temperature HD Metal Seal: 288 to 427°C (550 to 800°F). Contact your Emerson Process Management™ sales office if higher temperatures are required.

Ceramic Micro-Notch Ball: -46 to 93°C (-50 to 200°F)⁽⁴⁾.

Flow Ring or Flat Metal Seal : -198 to 425°C (-325 to 800°F)

PEEK/PTFE Bearings: -198 to 260°C (-325 to 500°F)

Packing Constructions

PTFE V-ring: -198 to 232°C (-325 to 450°F)

Graphite: -198 to 538°C (-325 to 1000°F)

ENVIRO-SEAL® Single PTFE V-ring: -46 to 232°C (-50 to 450°F)

ENVIRO-SEAL Graphite: -7 to 316°C (20 to 600°F)

Flow Characteristic

Modified equal percentage

Dimensions

See figures 6, 7, and 8 for dimensions

(continued)

Specifications (continued)

Optional Face-to-Face Dimensions

■ ASME B16.10 short face-to-face dimensions are available as an option for 1- through 12-inch valves. Note that ASME B16.10 short dimensions are actually longer than ISA S75.04. See figure 9 for dimensions.

Standard Flow Direction

Forward (into the convex face of the V-notch ball)

Flow Coefficients

See Catalog 12

Flow Coefficient Ratio⁽³⁾

See Catalog 12

Noise Levels

See Catalog 12

Maximum Ball Rotation

90 degrees

Actuator Mounting

Standard valve construction is for right-hand

mounting, as viewed from upstream end of valve. Left-hand (optional) mounting is available upon request.

Valve/Actuator Action

With diaphragm or piston rotary actuator, 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)

Approximate Weight

See table 2

Options

■ Pipe plug at end of follower shaft for all sizes, ■ Line flange bolting, ■ Materials that are compatible with NACE MR0175-2002 for sour service (see table 5), ■ Alloy construction materials, ■ ENVIRO-SEAL packing system: See figure 5 and Bulletin 59.3:041, ENVIRO-SEAL Packing Systems for Rotary Valves for more information, ■ Micro-Notch construction for 1-inch valves (see Micro-Notch Construction section), ■ S31254/CK3MCuN trim material

1. The pressure/temperature limits in this bulletin, and any applicable code or standard limitation, should not be exceeded.

2. Additional limits are shown in tables 6, 7 and 8.

3. Ratio of maximum flow coefficients to minimum usable flow coefficient can also be called rangeability.

4. For the CG8M and alloy 6 Micro-Notch constructions, pressure and temperature capabilities are the same as for standard constructions.

Features

● **Trim Versatility**—Trim components are interchangeable between Design V150, V200, and V300 valves. This feature allows you to reduce your spare parts inventory and maintenance procedures. The seal assembly can be changed without removing the actuator or without removing the ball from the valve body.

● **Easy Installation**—Flanged body design of the V150 and V300 eliminates exposed line flange bolting, reduces alignment and installation time, and promotes secure valve installations and piping integrity.

● **Application Versatility**—The valves are available with ISA S75.04 and IEC 534-3-2 face-to-face dimensions as a standard construction, and optional ASME B16.10 short face-to-face

dimensions. IEC 534.3.2 face-to-face dimensions are equivalent to S75.04 face-to-face dimensions.

● **Long Service Life**—The solid HD metal seal (figures 2 and 3) construction provides long service life in demanding applications. The constant wiping action of the seal across the ball's sealing surface prevents scale and sludge buildup, and provides excellent service on steam, gases, slurries, and various liquid applications.

● **Smooth Valve Operation**—Precision machined parts and pressure balanced seal designs allow smooth, precise movement of the ball.

● **Excellent Flow Control**—Precise contouring of the Vee-Ball provides a modified equal percentage flow characteristic. For very precise control of low flow rates, the Micro-Notch option is available on the 1-inch size valve. See the Micro-Notch Construction section of this bulletin for more information.

Table 1. Valve Body Materials, End Connections, and Ratings

| VALVE DESIGN | VALVE BODY MATERIAL | SIZE | RATINGS | SIZE | RATINGS |
|--------------|---|---------------------------------------|---|---------------------------------------|---------------|
| | | Inch | CLASS | DN | PN |
| V150 | CF3M | 1, 1.5, 2, 3, 4, 6, 8, 10, 12 | Class 150 | --- | --- |
| | EN STL 1.0619, EN SST 1.4581, or EN SST 1.4408 ⁽¹⁾ | --- | --- | DN 25, 40, 50, 80, 100, 150, 200, 250 | PN 10/16 |
| | | --- | --- | DN 300 | PN 16 |
| | WCC or CW2M | 1, 1.5, 2, 3, 4, 6, 8, 10 | Class 150 | DN 25, 40, 50, 80, 100, 150, 200, 250 | PN 10/16 |
| | | 12, 16, 20 | Class 150 | DN 300 | PN 16 |
| | | 14 | Class 150 | --- | --- |
| | CG8M | 1, 1.5, 2, 3, 4, 6, 8, 10, 12 and 14 | Class 150 | --- | --- |
| CK3MCUN | 1, 1.5, 2, 3, 4, 6, 8, 10 and 12 | Class 150 | --- | --- | |
| V200 | CF3M | 1, 1.5, 2 | Class 150/300/600 raised-face | Not Available | Not Available |
| | WCC, CG8M, or CW2M | 3, 4 | Class 150 and Class 300/600 raised-face | | |
| | | 6, 8 | Class 150/300 and 600 raised-face | | |
| | | 10 | Class 150 raised-face | | |
| | M35-1 | 1, 1.5, 2, 3, 4, 6, 8 | Class 150, 300 and 600 | | |
| | CK3MCUN | 1, 1.5, 2, 3, 4, 6, 8 | Class 150, 300 and 600 | | |
| | | 10 | Class 150 | | |
| V300 | CF3M | 1, 1.5, 2, 3, 4, 6, 8, 10, 12 | Class 300 | --- | --- |
| | WCC or CW2M | 1, 1.5, 2, 3, 4, 6, 8, 10, 12, 14, 16 | Class 300 | --- | --- |
| | EN STL 1.0619, EN SST 1.4581, or EN SST 1.4408 ⁽¹⁾ | --- | --- | DN 25, 40, 50, 80, and 100 | PN 25/40 |
| | CG8M | 1, 1.5, 2, 3, 4, 6, 8, 10, 12, 14, 16 | Class 300 | --- | --- |
| | M35-1 | 1, 1.5, 2, 3, 4, 6, 8 | Class 300 | --- | --- |

1. 216 WCC and EN Stl 1.0619 are dual certified. CF3M and EN SST 1.4408 are dual certified.

- **Sour Service Capability**—Materials are available for applications handling sour service. These materials comply with the requirements of NACE MR0175-2002.

- **Quick and Easy Maintenance**—Ball seal inspection and replacement is done at the valve body inlet without removing the actuator or disassembling the valve. Valve maintenance requires no special tools.

- **Structural Integrity**—One-piece valve body improves structural integrity of the pressure

boundary by eliminating leak paths that could be caused by the gaskets in two-piece, bolted valve designs.

- **Exceptional Environmental Capabilities**—The optional ENVIRO-SEAL packing systems are designed with very smooth shaft surfaces and live loading to provide exceptional sealing. The seal of the ENVIRO-SEAL system can restrict emissions to less than the EPA (Environmental Protection Agency) limit of 100 ppm (parts per million).

Product Bulletin

51.3:Vee-Ball
February 2007

Vee-Ball Valves

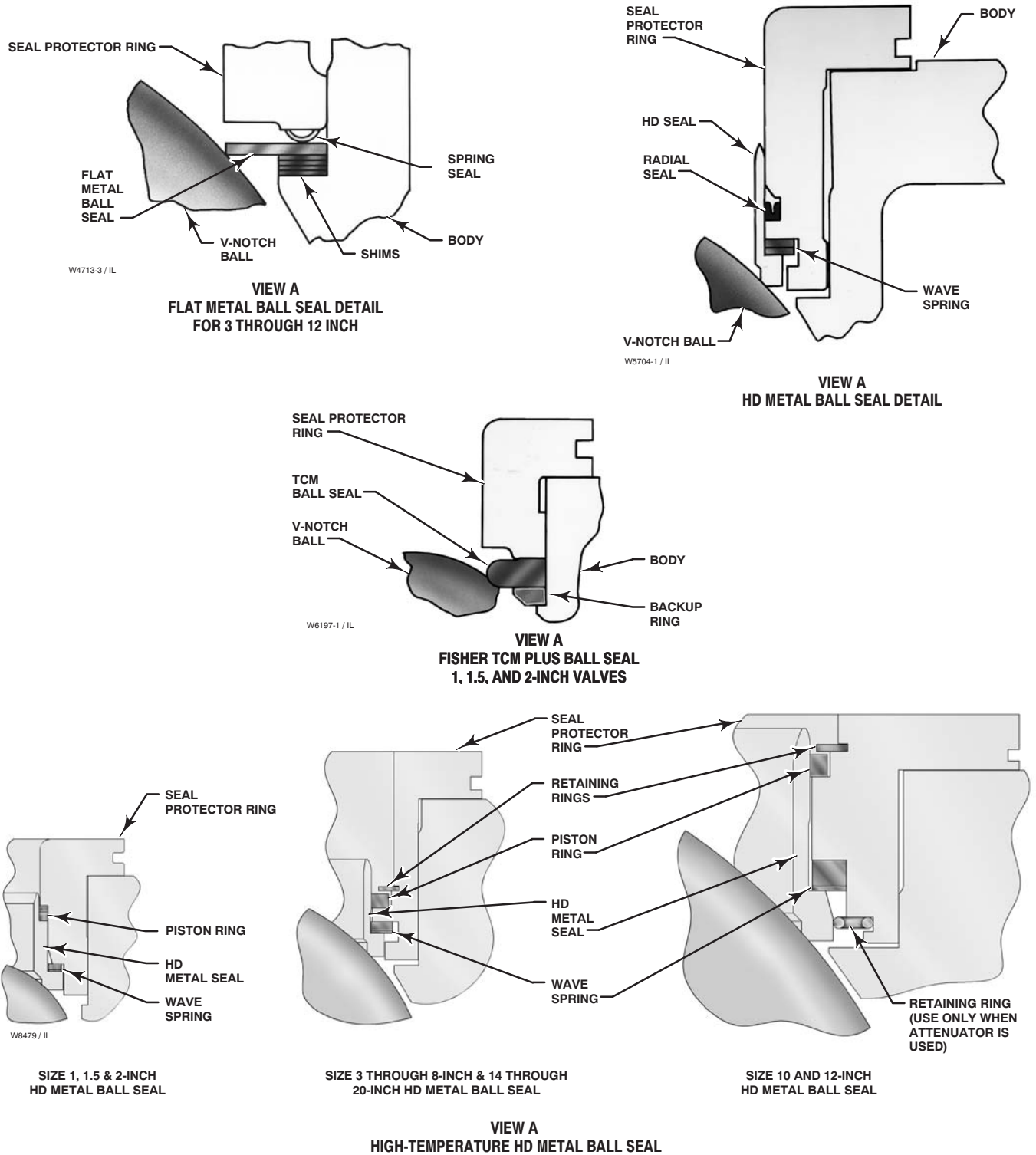
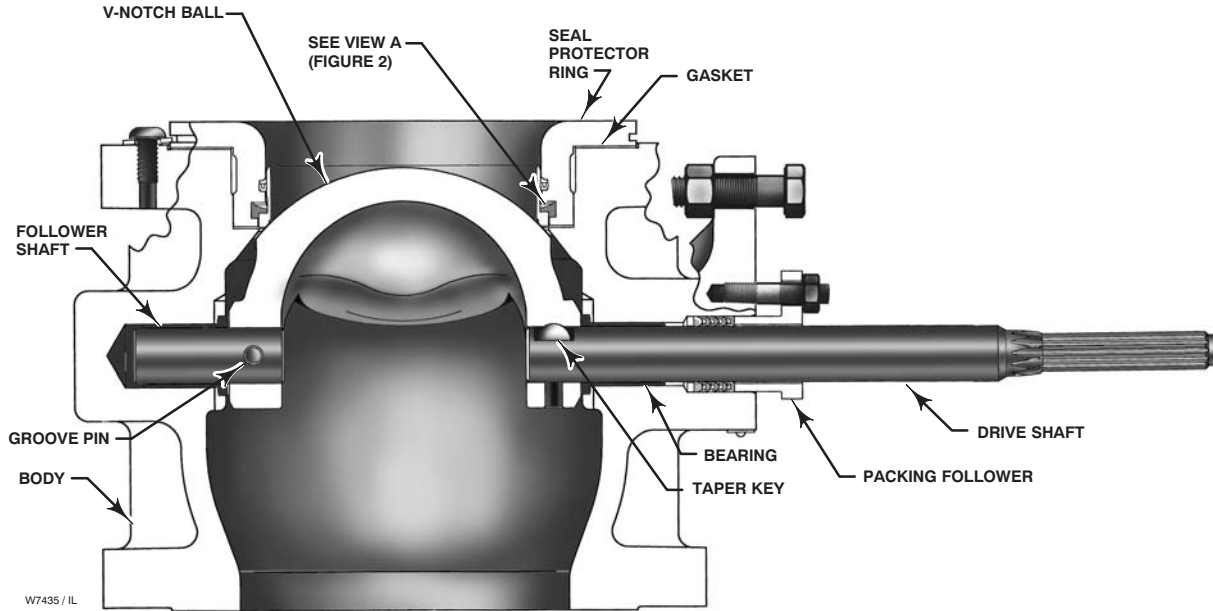
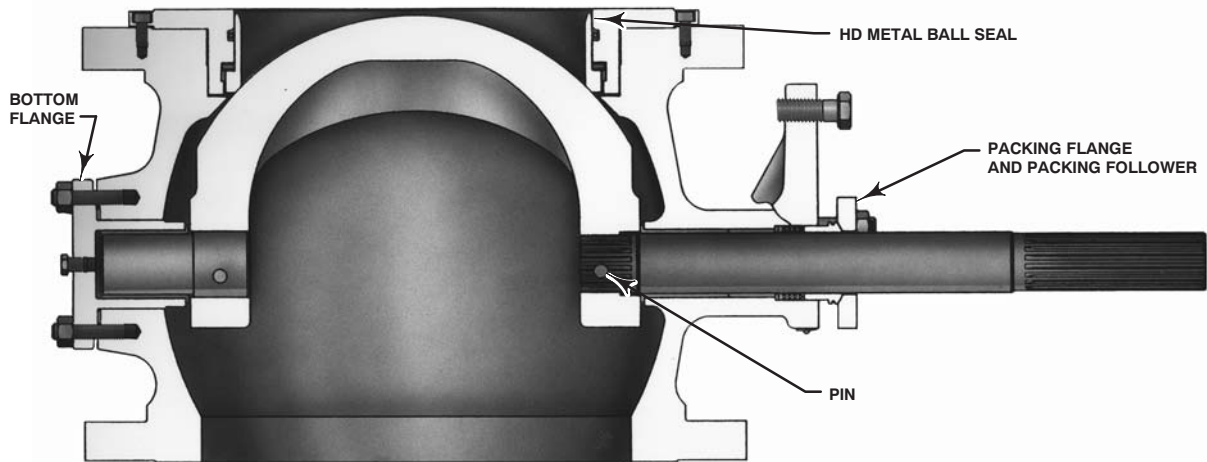


Figure 2. Vee-Ball® Construction Features, Seals (Design V150 Shown)



**3 THROUGH 12-INCH VALVES
(HD BALL SEAL SHOWN)**



**14, 16, AND 20-INCH VALVES
(HD METAL BALL SEAL)**

Figure 3. Vee-Ball® Construction Features (Design V150 Shown)

Product Bulletin

51.3:Vee-Ball
February 2007

Vee-Ball Valves

Table 2. Valve Weights, Approximate

| VALVE SIZE, INCH | V150 | | V200 | | V300 | |
|---------------------|------|------|------|-----|------|------|
| | kg | lbs | kg | lbs | kg | lbs |
| 1 | 5.6 | 13 | 4.5 | 10 | 8 | 17 |
| 1.5 | 8.2 | 19 | 6.4 | 14 | 12 | 27 |
| 2 | 9.1 | 21 | 10 | 23 | 17 | 38 |
| 3 | 13 | 43 | 15 | 34 | 28 | 61 |
| 4 | 26 | 57 | 22 | 48 | 37 | 81 |
| 6 | 42 | 93 | 36 | 80 | 60 | 133 |
| 8 | 72 | 158 | 62 | 136 | 103 | 226 |
| 10 | 107 | 235 | 114 | 252 | 200 | 440 |
| 12 | 157 | 347 | --- | --- | 293 | 645 |
| 14 | 247 | 545 | --- | --- | 374 | 825 |
| 16 | 333 | 735 | --- | --- | 510 | 1125 |
| 20 | 524 | 1155 | --- | --- | --- | --- |

Series B

The 3- through 12-inch sizes have been changed to reduce parts and to improve control performance. The V-notch Ball now resembles the 14- through 20-inch size V-notch Ball. The pressed-in bushings have been eliminated, as well as the thrust washer.

Micro-Notch Construction

For very precise control of low flow rates, the Micro-Notch construction (see figure 4) is available on 1-inch valves. Three Micro-Notch ball materials are available: chrome-plated CG8M (317 stainless steel), solid alloy 6, and solid VTC ceramic. A VTC ceramic HD seal is standard with the VTC ceramic ball. For the CG8M and alloy 6 constructions, pressure and temperature capabilities are the same as for standard constructions. For the ceramic construction, maximum temperature is 93°C (200°F).

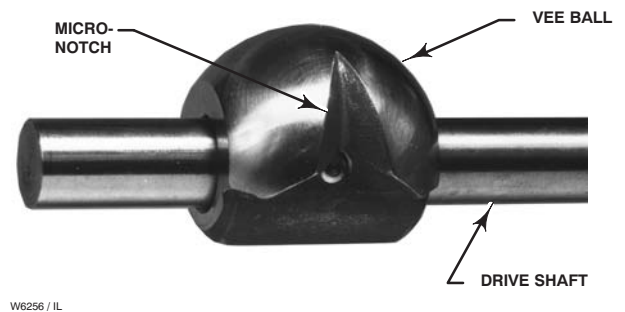


Figure 4. Typical Micro-Notch Ball and Shaft

For further information, please refer to the Vee-Ball Design V150, V200 and V300 Rotary Control Valves Sizes 1- through 12-inch instruction manual.

Table 3. Standard Construction Materials for 1 through 12-Inch Valves

| PART | | MATERIAL |
|--|--|---|
| Valve Body and Seal Protector Ring or Flow Ring | | WCC steel (NACE), WCC steel (EN 1.0619), CG8M (317 SST, NACE), CF3M ⁽¹⁾ (316L SST EN 1.4408 or optional EN 1.4581), CW2M (CW2M valve available with Fisher TCM Plus seal only), M35-1 or CK3MCuN |
| Backup Ring (1, 1.5 and 2-inch only) | | CG8M (NACE), CF3M ⁽¹⁾ (NACE) or CW2M |
| V-Notch Ball | | CG8M (NACE), CF3M, CW2M, chromium-plated CF3M, chromium-plated CG8M(NACE) and chromium-plated CG8M1/2 CF3M with alloy 6 notch (NACE), M35-1 or CK3MCuN |
| Seal | Fisher TCM | Fisher TCM Plus and Fisher TCM Ultra |
| | Flat Metal Seal, Shims, and Spring Seal ⁽⁷⁾ | Spring Tempered S31600 (316 stainless steel) or Spring Tempered S30200 (302 stainless steel) for 12-inch valves only |
| | HD (Heavy-Duty) Metal | CF10SMnN ⁽²⁾ , CD7MCuN ⁽³⁾ (alloy 255 duplex stainless steel) or R30006 (Alloy 6, NACE) |
| | High Temperature HD Metal Seal | R30006 (Alloy 6) |
| Wave Spring (use with HD seal) | | N07750 |
| HD Seal Radial Seal | | Graphite reinforced PTFE |
| High Temp HD Seal Piston Ring | | Graphite FMS 17F39 |
| Bearings | | PEEK ⁽⁴⁾ /Carbon-filled PTFE liner (NACE), S31603 Nitride, R30006 (alloy 6, NACE), silver-plated R30006, N10276 with carbon-filled PTFE liner, or N10276 with glass-filled PTFE liner |
| Seal Retainer Gasket | | Laminated graphite |
| Packing | | PTFE V-ring with one carbon-filled PTFE ring ⁽⁵⁾ , PTFE V-ring, or graphite ribbon. Packing is available with or without live loading. |
| Shafts | | S20910 (NACE), S17400 (17-4PH stainless steel), N10276, N05500, or S31254 ⁽⁸⁾ |
| Groove Pin | | S31600 (NACE) or N10276 |
| Taper Key | | R30006 ⁽⁶⁾ , S20910, or N10276 |
| Taper Pin (1, 1.5, and 2-inch only) | | S20910 (NACE) or N10276 |
| Pipe Plug (Optional) | | S31600 (NACE) N10276, or S31603 (316L stainless steel, NACE) |
| Seal Retainer Screws and Washers | | Stainless steel |
| Packing Follower and Packing Box Ring | | CF8M (316 stainless steel, NACE), N10276, S312254, or N10276 with separate S31600 packing box flange (NACE) |
| Actuator Mounting Bolts and Nuts | | Grade 5 steel or strain-hardened B8M stainless steel |
| Spacer and Bushing | | S31700 (NACE), N10276, or S31603 |
| Packing Follower Bolting and Optional Line Bolting | | SA-193-B7, SA-193-B7M, or strain-hardened SA-193-B8M |
| <p>1. CF3M is available in all areas as a special order and is the standard material offered in Europe. 2. Recommended for lubricated and non-lubricated service and where corrosion properties similar to 304 stainless steel are acceptable. 3. Recommended for lubricated service and where corrosion properties equal to or better than 317 stainless steel are required. 4. PEEK is poly-ether-ether-ketone. 5. The carbon-filled PTFE ring is used for grounding. 6. Standard material offered in North America. 7. Offered for lubricated service only. 8. S31254 shaft may cause the valve to be derated. Contact your Emerson Process Management sales office.</p> | | |

Product Bulletin

51.3:Vee-Ball
February 2007

Vee-Ball Valves

Table 4. Standard Construction Materials for 14-, 16- and 20-Inch Valves

| Part | | Material |
|--|-----------------------|--|
| Valve Body, Seal Protector Ring, and Flow Ring | | WCC steel or CG8M (317 stainless steel) |
| V-Notch Ball | | Chromium-plated CG8M, CG8M, Chromium-plated CG8M with alloy 6 notch |
| Ball Seal | Fisher TCM | Fisher TCM Plus and Fisher TCM Ultra |
| | HD (Heavy-Duty Metal) | CF10SMnN ⁽¹⁾ , CD7MCuM ⁽²⁾ (alloy 225 duplex stainless steel) or R30006 (alloy 6) |
| Wave Spring (use with HD seal) | | N07750 |
| Radial Seal (use with HD seal) | | PTFE with N10276 spring |
| Bearings | | PEEK/PTFE ⁽³⁾ , S44004 (440C stainless steel--use with S17400 [17-4PH stainless steel] shafts, alloy 6B, and silver plated alloy 6B |
| Thrust Washer (use with metal bearings) | | Alloy 6B |
| Seal Retainer Gasket | | Laminated Graphite |
| Packing | | PTFE V-ring with one conductive V-ring ⁽⁴⁾ , PTFE V-ring, or graphite ribbon |
| Shafts | | S17400 (17-4 stainless steel) or S20910 |
| Pins | | S20910 |
| Pipe Plug | | S31700 (317 stainless steel) |
| Packing Follower Bolting | | B7M steel or strain-hardened B8M stainless steel |
| Retainer Screw | | B8M stainless steel |
| Packing Follower and Packing Box ring | | S31600 (316 stainless steel) |
| Packing Flange | | Steel or S31600 |
| Actuator Mounting Bolts and Nuts | | Grade 5 steel or strain-hardened B8M stainless steel |
| Gasket (used with bottom flange) | | S31603 (316L stainless steel) spiral wound |
| Stud and Hex Nut (used with bottom flange) | | B7 steel or strain-hardened B8M stainless steel |

1. Recommended where corrosion properties similar to 304 stainless steel are acceptable.
 2. Recommended for lubricated service and where corrosion properties equal to or better than S31700 stainless steel.
 3. PEEK (Poly-ether-ether-ketone) w/PTFE liner.
 4. A carbon-filled PTFE ring is used for grounding.

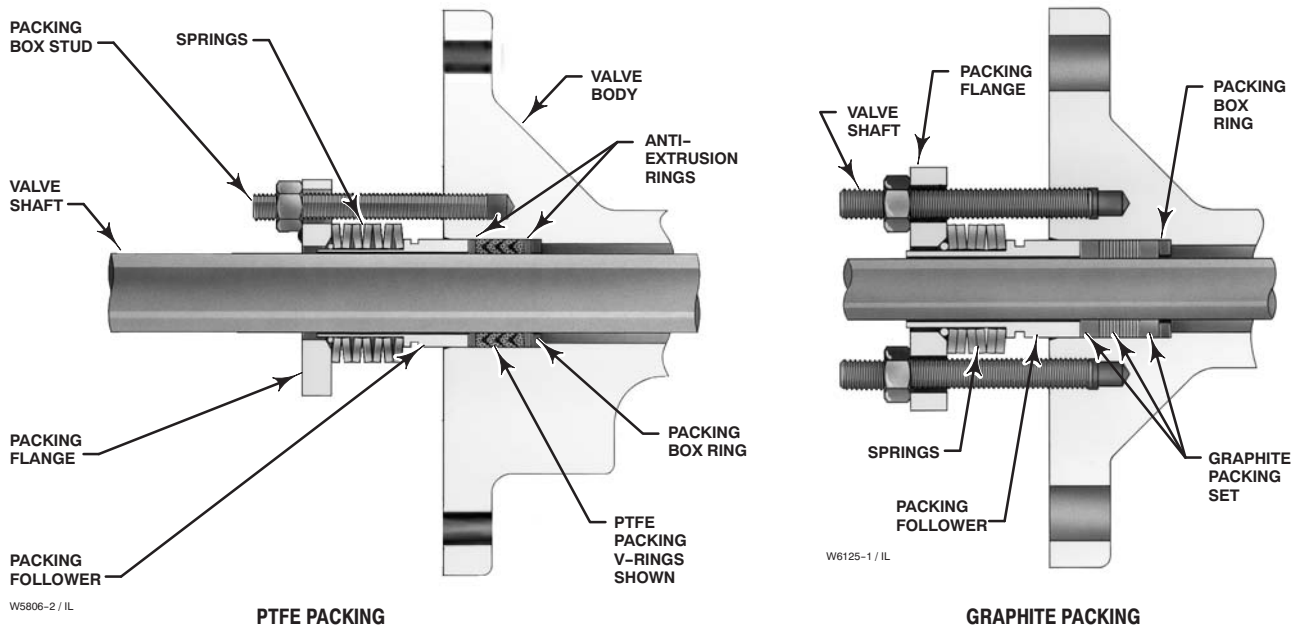


Figure 5. Typical ENVIRO-SEAL® Packing Arrangements

Table 5. Construction Materials for Compliance with NACE MR0175-2002

| Part | | Material |
|--|-----------------------|---|
| Valve Body and Seal Protector Ring or Flow Ring | | WCC steel ⁽¹⁾ , CG8M (317 stainless steel), CF3M ⁽²⁾ (316L stainless steel) or CW2M, M35-1, or CK3MCuN |
| Backup Ring (1, 1.5, and 2-inch) | | CG8M, CF3M ⁽²⁾ or CW2M |
| V-Notch Ball | | Chrome-plated CG8M, CW2M, CF3M, chrome-plated CG8M with alloy 6 notch, chrome-plated CF3M, and chrome-plated CF3M with alloy 6 notch, M35-1, or CK3MCuN |
| Seal | Fisher TCM | Fisher TCM Plus and Fisher TCM Ultra |
| | HD (Heavy-Duty) Metal | R30006 (alloy 6) |
| HD Seal Wave Spring | | N07750 |
| HD Seal Radial Seal | | PTFE |
| High Temp HD Seal Piston Ring | | Graphite FMS 17F39 |
| Bearings | | PEEK/PTFE ⁽³⁾ , 316L Nitride, alloy 6B, silver-plated alloy 6B, carbon-filled PTFE with N10276 sleeve, or glass-filled PTFE with N10276 sleeve |
| Thrust Washer (1, 1.5, and 2-inch only) | | S31600 or N10276 |
| Seal Retainer Gasket | | Laminated graphite |
| Packing | | PTFE V-ring with one carbon-filled PTFE conductive packing ring ⁽⁴⁾ , or ENVIRO-SEAL packing |
| Shafts | | S20910, N10276, N05500, or S31254 ⁽⁵⁾ |
| Groove Pin (1- through 12-inch only) | | S31600 (316 stainless steel) |
| Taper Key (1- through 12-inch) or Pins (14- through 20-inch) | | (1- through 12-inch) R30006, (14- through 20-inch) S20910 |
| Taper Pin (1, 1.5, and 2-inch) | | S20910 |
| Pipe Plug (optional 1 through 12-inch) | | S31700 (317 stainless steel) 14, 16 and 20-inch, S31600 (316 stainless steel 1- through 12-inch) |
| Seal Retainer Screws and Clips | | Stainless steel |
| Packing Follower and Packing Box Ring | | CF8M (316 stainless steel) or S31254 |
| Spacer and Bushing (3- through 12-inch sizes) | | S31700 |
| Packing Follower Bolting and Optional Line Bolting | | Grade B7 or B7M steel studs, 2H, 2HM, or B8M nuts |

1. Includes stress relief of body, seal protector ring or flow ring.
 2. CF3M is available in all areas and is the standard material offering in Europe (not available for 14- through 20-inch sizes).
 3. PEEK (Poly-ether-ether-ketone) w/PTFE liner.
 4. Carbon-filled PTFE ring is used for grounding.
 5. S31254 shaft may cause the valve to be derated. Contact your Emerson Process Management sales office.

Table 6. Maximum Allowable Inlet Pressure for CW2M and CG8M (317 Stainless Steel) Valves, Class 150⁽¹⁾

| TEMPERATURE | CW2M | CG8M | TEMPERATURE | CW2M | CG8M |
|-------------|------|------|-------------|------|------|
| °C | Bar | | °F | Psig | Psig |
| -29 to 38 | 20.0 | 19.0 | -20 to 100 | 290 | 275 |
| 93 | 17.9 | 16.2 | 200 | 260 | 235 |
| 149 | 15.9 | 14.8 | 300 | 230 | 215 |
| 204 | 13.8 | 13.4 | 400 | 200 | 195 |
| 232 | 12.8 | 12.6 | 450 | 185 | 183 |
| 260 | --- | 11.7 | 500 | --- | 170 |
| 316 | --- | 9.6 | 600 | --- | 140 |
| 343 | --- | 8.6 | 650 | --- | 125 |
| 371 | --- | 7.6 | 700 | --- | 110 |
| 399 | --- | 6.5 | 750 | --- | 95 |
| 427 | --- | 5.5 | 800 | --- | 80 |

1. These materials are not listed in ASME B16.34. The designation 150 is used only to indicate relative pressure-retaining capabilities and is not an ASME pressure-temperature rating class designation.

Pressure Drops

Pressure drop limits of any given valve are based on valve body, and trim material limits. To find the appropriate pressure drop limitation, choose the desired valve size and temperature range. Then search table 7 for body limitations and table 8 for trim limitations. Information on limits for S31254, CW2M, M35-1 and other alloy constructions can be obtained by contacting your Emerson Process Management sales office. The lowest number from the tables is the appropriate limit. **The tables for both trim and body limits must be consulted.**

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

Table 7. Maximum Allowable Shutoff Pressure Drops (Body Ratings) based on Carbon Steel and Stainless Steel Valve Body Types. The tables for both trim and body limits must be consulted.

| TEMPERATURE RANGE | PRESSURE CLASS | | | | | | | | |
|-------------------|----------------|-----------------|----------------|------------|-----------------|----------------|------------|-----------------|----------------|
| | WCC CL 150 | 316L SST CL 150 | 317 SST CL 150 | WCC CL 300 | 316L SST CL 300 | 317 SST CL 300 | WCC CL 600 | 316L SST CL 600 | 317 SST CL 600 |
| °C | Bar | | | | | | | | |
| -46 to -29 | --- | 15.9 | 19.0 | --- | 41.4 | 49.6 | --- | 82.7 | 99.3 |
| -29 to 38 | 20.0 | 15.9 | 19.0 | 51.7 | 41.4 | 49.6 | 103 | 82.7 | 99.3 |
| 93 | 17.9 | 13.4 | 16.2 | 51.7 | 34.8 | 42.7 | 103 | 70.0 | 85.5 |
| 149 | 15.9 | 12.1 | 14.8 | 50.3 | 31.4 | 38.6 | 100 | 62.7 | 77.2 |
| 204 | 13.8 | 11.0 | 13.4 | 48.6 | 28.6 | 35.5 | 97.2 | 56.9 | 70.6 |
| 232 | 12.8 | 10.7 | 12.8 | 47.2 | 27.9 | 34.5 | 94.5 | 54.8 | 68.6 |
| 260 | 11.7 | 10.0 | 11.7 | 45.9 | 26.2 | 33.1 | 91.7 | 52.7 | 65.8 |
| 316 | 10.7 | 9.9 | 10.7 | 43.8 | 25.5 | 32.1 | 87.6 | 51.0 | 64.1 |
| 343 | 9.65 | 9.7 | 8.62 | 41.7 | 23.8 | 31.0 | 83.4 | 49.6 | 62.4 |
| 371 | 8.62 | 8.6 | 7.58 | 40.7 | 23.8 | 30.7 | 81.0 | 48.3 | 60.0 |
| 399 | 6.55 | 6.6 | 6.55 | 34.8 | 23.1 | 29.3 | 69.6 | 46.2 | 58.9 |
| 427 | 5.52 | 5.5 | 5.52 | 28.3 | 22.8 | 29.0 | 56.9 | 45.5 | 58.3 |
| °F | Psi | | | | | | | | |
| -50 to -20 | --- | 230 | 275 | --- | 600 | 720 | --- | 1200 | 1440 |
| -20 to 100 | 290 | 230 | 275 | 750 | 600 | 720 | 1500 | 1200 | 1440 |
| 200 | 260 | 195 | 235 | 750 | 505 | 620 | 1500 | 1015 | 1240 |
| 300 | 230 | 175 | 215 | 730 | 455 | 560 | 1455 | 910 | 1120 |
| 400 | 200 | 160 | 195 | 705 | 415 | 515 | 1410 | 825 | 1025 |
| 450 | 185 | 155 | 185 | 685 | 405 | 500 | 1370 | 795 | 995 |
| 500 | 170 | 145 | 170 | 665 | 380 | 480 | 1330 | 765 | 955 |
| 550 | 155 | 143 | 155 | 635 | 370 | 465 | 1270 | 740 | 930 |
| 600 | 140 | 140 | 140 | 605 | 360 | 450 | 1210 | 720 | 905 |
| 650 | 125 | 125 | 125 | 590 | 350 | 445 | 1175 | 700 | 890 |
| 700 | 110 | 110 | 110 | 570 | 345 | 430 | 1135 | 685 | 870 |
| 750 | 95 | 95 | 95 | 505 | 335 | 425 | 1010 | 670 | 855 |
| 800 | 80 | 80 | 80 | 410 | 330 | 420 | 825 | 660 | 845 |

Table 8. Maximum Allowable Shutoff Pressure Drops based on Trim (Bearing and Seal).

Note: Do not exceed the PN or ASME pressure/temperature rating of the valve or mating flanges.

| BEARING MATERIAL | BALL SEAL | TEMPERATURE RANGE, °C | VALVE SIZE, INCHES | | | | | | | | | | | | |
|----------------------|-----------------------------------|-----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------|------|------|------|
| | | | 1 | 1.5 | 2 | 3 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 20 | |
| | | | Bar | | | | | | | | | | | | |
| PEEK/PTFE | Fisher TCM Plus or Ultra | -46 to 38 | 51.7 | 51.7 | 51.7 | 51.7 | 51.7 | 51.7 | 51.7 | 51.7 | 40.2 | 37.6 | 31.0 | 23.8 | 31.0 |
| | | 93 | 37.9 | 37.9 | 37.9 | 37.9 | 37.9 | 37.9 | 37.9 | 37.9 | 37.9 | 37.6 | 31.0 | 23.8 | 31.0 |
| | | 149 | 24.1 | 24.1 | 24.1 | 24.1 | 24.1 | 24.1 | 24.1 | 24.1 | 24.1 | 24.1 | 24.1 | 23.8 | 24.1 |
| | | 204 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 |
| | 232 | 3.45 | 3.45 | 3.45 | 3.45 | 3.45 | 3.45 | 3.45 | 3.45 | 3.45 | 3.45 | 3.45 | 3.45 | 3.45 | |
| | HD Metal ⁽¹⁾ | -46 to 260 | 51.7 | 51.7 | 51.7 | 51.7 | 51.7 | 51.7 | 51.7 | 51.7 | 40.9 | 38.1 | 31.0 | 26.5 | 31.0 |
| | Flat Metal ⁽²⁾ | -73 to 260 | --- | --- | --- | 20.7 | 20.7 | 20.7 | 20.7 | 20.7 | 10.3 | 10.3 | --- | --- | --- |
| Flow Ring | 260 | 103.4 | 103.4 | 103.4 | 103.4 | 72.4 | 75.2 | 73.8 | 40.5 | 37.7 | 40.5 | 35.0 | 44.7 | | |
| R30006 | HD Metal ⁽¹⁾ | -46 to 288 | 51.7 | 50.0 | 25.7 | 17.5 | 11.0 | 10.9 | 11.2 | 6.14 | 5.72 | 6.14 | 7.52 | 6.83 | |
| | High Temp HD Metal ⁽¹⁾ | 228 to 427 | 38.3 ⁽³⁾ | 37.5 ⁽³⁾ | 19.3 ⁽³⁾ | 13.2 ⁽³⁾ | 8.3 ⁽³⁾ | 8.2 ⁽³⁾ | 8.4 ⁽³⁾ | 4.6 ⁽³⁾ | 4.3 ⁽³⁾ | --- | --- | --- | |
| | Flat Metal ⁽²⁾ | -73 to 427 | --- | --- | --- | 17.0 | 10.1 | 10.7 | 10.6 | 5.86 | 5.52 | --- | --- | --- | |
| | Flow Ring | 427 | 74.5 | 49.6 | 26.8 | 18.8 | 10.9 | 11.2 | 11.1 | 6.07 | 5.65 | 6.07 | 7.31 | 6.69 | |
| R30006 Silver Plated | HD Metal ⁽¹⁾ | -46 to 288 | 51.7 | 51.7 | 51.7 | 35.0 | 22.1 | 21.8 | 22.5 | 12.3 | 11.4 | 12.3 | 13.2 | 13.7 | |
| | High Temp HD Metal ⁽¹⁾ | 228 to 427 | 38.3 ⁽³⁾ | 38.3 ⁽³⁾ | 38.3 ⁽³⁾ | 26.3 ⁽³⁾ | 16.5 ⁽³⁾ | 16.3 ⁽³⁾ | 16.9 ⁽³⁾ | 9.2 ⁽³⁾ | 8.6 ⁽³⁾ | --- | --- | --- | |
| | Flat Metal ⁽²⁾ | -73 to 427 | --- | --- | --- | 20.7 | 20.1 | 20.7 | 20.7 | 10.3 | 10.3 | --- | --- | --- | |
| | Flow Ring | 427 | 103.4 | 103.4 | 53.5 | 37.6 | 21.8 | 22.5 | 22.2 | 12.1 | 11.3 | 12.1 | 14.6 | 13.4 | |
| S31600L Nitride | HD Metal ⁽¹⁾ | -46 to 288 | 51.0 | 51.0 | 51.0 | 51.7 | 36.7 | 36.3 | 37.4 | 20.5 | 19.1 | --- | --- | --- | |
| | High Temp HD Metal ⁽¹⁾ | 228 to 427 | --- | --- | --- | 38.3 ⁽³⁾ | 27.6 ⁽³⁾ | 27.2 ⁽³⁾ | 28.1 ⁽³⁾ | 15.4 ⁽³⁾ | 14.3 ⁽³⁾ | --- | --- | --- | |
| | Flat Metal ⁽²⁾ | -73 to 427 | --- | --- | --- | 20.7 | 20.7 | 20.7 | 20.7 | 10.3 | 10.3 | --- | --- | --- | |
| | Flow Ring | 427 | 99.3 | 99.3 | 88.9 | 62.7 | 36.3 | 37.4 | 37.0 | 20.2 | 18.8 | --- | --- | --- | |
| BEARING MATERIAL | BALL SEAL | TEMPERATURE RANGE, °F | Psi | | | | | | | | | | | | |
| PEEK/PTFE | Fisher TCM Plus or Ultra | -50 to 100 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 583 | 545 | 450 | 345 | 450 | |
| | | 200 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 550 | 545 | 450 | 345 | 450 | |
| | | 300 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 350 | 345 | 350 | |
| | | 400 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | |
| | 450 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | | |
| | HD Metal ⁽¹⁾ | -50 to 500 | 750 | 750 | 750 | 750 | 750 | 750 | 750 | 593 | 553 | 450 | 384 | 450 | |
| | Flat Metal ⁽²⁾ | -100 to 500 | --- | --- | --- | 300 | 300 | 300 | 300 | 150 | 150 | --- | --- | --- | |
| Flow Ring | 500 | 1500 | 1500 | 1500 | 1500 | 1050 | 1090 | 1070 | 587 | 547 | 587 | 508 | 648 | | |
| R30006 | HD Metal ⁽¹⁾ | -50 to 550 | 750 | 725 | 373 | 254 | 160 | 158 | 163 | 89 | 83 | 89 | 109 | 99 | |
| | High Temp HD Metal ⁽¹⁾ | 550 to 800 | 555 ⁽³⁾ | 544 ⁽³⁾ | 280 ⁽³⁾ | 191 ⁽³⁾ | 120 ⁽³⁾ | 119 ⁽³⁾ | 122 ⁽³⁾ | 67 ⁽³⁾ | 62 ⁽³⁾ | --- | --- | --- | |
| | Flat Metal ⁽²⁾ | -100 to 800 | --- | --- | --- | 246 | 146 | 155 | 154 | 85 | 80 | --- | --- | --- | |
| | Flow Ring | 800 | 1080 | 720 | 388 | 273 | 158 | 163 | 161 | 88 | 82 | 88 | 106 | 97 | |
| R30006 Silver Plated | HD Metal ⁽¹⁾ | -50 to 550 | 750 | 750 | 750 | 508 | 320 | 316 | 326 | 178 | 166 | 178 | 192 | 198 | |
| | High Temp HD Metal ⁽¹⁾ | 550 to 800 | 555 ⁽³⁾ | 555 ⁽³⁾ | 555 ⁽³⁾ | 381 ⁽³⁾ | 240 ⁽³⁾ | 237 ⁽³⁾ | 245 ⁽³⁾ | 134 ⁽³⁾ | 125 ⁽³⁾ | --- | --- | --- | |
| | Flat Metal ⁽²⁾ | -100 to 800 | --- | --- | --- | 300 | 292 | 300 | 300 | 150 | 150 | --- | --- | --- | |
| | Flow Ring | 800 | 1500 | 1500 | 776 | 546 | 316 | 326 | 322 | 176 | 164 | 176 | 212 | 194 | |
| S31600L Nitride | HD Metal ⁽¹⁾ | -50 to 550 | 740 | 740 | 740 | 750 | 533 | 527 | 543 | 297 | 277 | --- | --- | --- | |
| | High Temp HD Metal ⁽¹⁾ | 550 to 800 | --- | --- | --- | 555 ⁽³⁾ | 400 ⁽³⁾ | 395 ⁽³⁾ | 407 ⁽³⁾ | 223 ⁽³⁾ | 208 ⁽³⁾ | --- | --- | --- | |
| | Flat Metal ⁽²⁾ | -100 to 800 | --- | --- | --- | 300 | 300 | 300 | 300 | 150 | 150 | --- | --- | --- | |
| | Flow Ring | 800 | 1440 | 1440 | 1290 | 910 | 527 | 543 | 537 | 293 | 273 | --- | --- | --- | |

1. Pressure drops shown for HD metal seals are for forward flow only. For reverse flow with HD metal seal, limit pressure drop to 6.9 bar (100 psig).
 2. Lubricated service only.
 3. Consult your Emerson Process Management sales office if higher pressure drops are required.

Product Bulletin

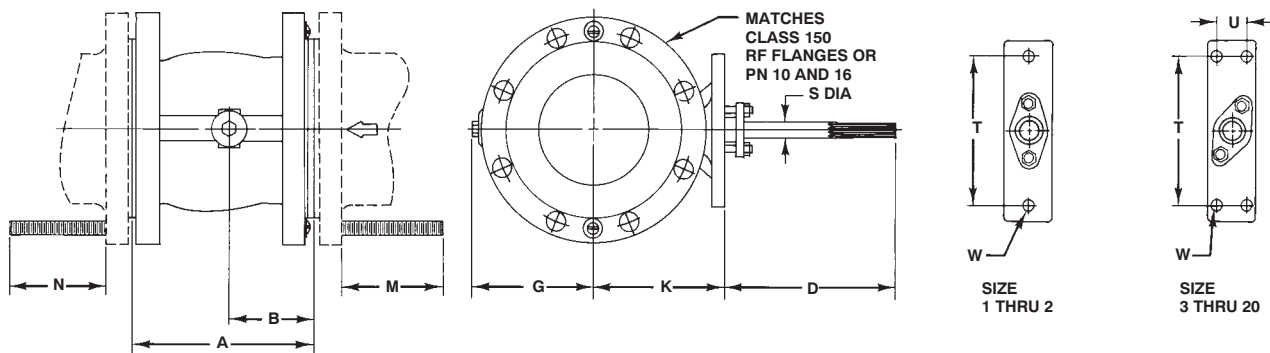
51.3:Vee-Ball
February 2007

Vee-Ball Valves

Table 9. Design V150 Dimensions

| VALVE SIZE | DESIGN V150 DIMENSIONS (ISA S75.04) ⁽¹⁾ | | | | | | | | | | |
|-------------------|--|------|-------|-------|-------|------------------|------------------|----------------------|-------|------|------|
| | A | B | D | G | K | M ⁽³⁾ | N ⁽³⁾ | S Diameter | T | U | W |
| DN | mm | | | | | | | | | | |
| 25 | 102 | 56 | | 83 | 95 | 78 | 71 | 13 | | | |
| 40 | 114 | 62 | 188 | 90 | 121 | 90 | 78 | 15.9 and 15.9 x 12.7 | 117 | --- | 14.2 |
| 50 | 124 | 67 | | 87 | 127 | 104 | 92 | 15.9 and 15.9 x 12.7 | | | |
| 80 | 165 | 79 | | 100 | 130 | 104 | 98 | 19.1 | | | 14.2 |
| 100 | 194 | 101 | 214 | 133 | 141 | 117 | 98 | 19.1 | 152 | 31.8 | 14.2 |
| 150 | 229 | 109 | | 151 | 164 | 124 | 112 | 25.4 | | | 17.5 |
| 200 | 243 | 124 | | 184 | 232 | 131 | 124 | 31.8 | | | |
| 250 | 297 | 147 | 208 | 222 | 260 | 145 | 132 | 31.8 | 235 | 46.0 | 17.5 |
| 300 | 338 | 174 | | 268 | 303 | 151 | 132 | 38.1 | | | |
| Inch | Inch | | | | | | | | | | |
| 1 | 4.00 | 2.21 | | 3.19 | 3.75 | 3.06 | 2.81 | 1/2 | | | |
| 1.5 | 4.50 | 2.46 | 7.38 | 3.38 | 4.75 | 3.56 | 3.06 | 5/8 and 5/8 x 1/2 | 4.62 | --- | 0.56 |
| 2 | 4.88 | 2.63 | | 4.19 | 5.00 | 4.11 | 3.61 | 5/8 and 5/8 x 1/2 | | | |
| 3 | 6.50 | 3.10 | | 4.62 | 5.12 | 4.11 | 3.86 | 3/4 | | | 0.56 |
| 4 | 7.62 | 3.99 | 8.44 | 5.25 | 5.56 | 4.61 | 3.86 | 3/4 | 6.00 | 1.25 | 0.56 |
| 6 | 9.00 | 4.29 | | 5.94 | 6.44 | 4.90 | 4.40 | 1 | | | 0.69 |
| 8 | 9.56 | 4.88 | | 7.69 | 9.12 | 5.15 | 4.90 | 1-1/4 | | | |
| 10 | 11.69 | 5.77 | 8.19 | 8.75 | 10.25 | 5.69 | 5.19 | 1-1/4 | 9.25 | 1.81 | 0.69 |
| 12 | 13.31 | 6.87 | | 10.56 | 11.94 | 5.94 | 5.19 | 1-1/2 | | | |
| 14 ⁽²⁾ | 15.00 | 8.12 | | 11.62 | 13.50 | 6.00 | 5.25 | 1-3/4 | 10.75 | 2.00 | 0.75 |
| 16 ⁽²⁾ | 16.00 | 9.00 | 14.00 | 13.00 | 14.38 | 6.00 | 5.25 | 2-1/8 | 10.75 | 2.00 | 0.75 |
| 20 | 20.00 | 9.25 | | 16.00 | 18.00 | 7.00 | 6.25 | 2-1/2 | 13.25 | 3.00 | 0.88 |

1. Inlet flange stud bolt length is longer than the standard length specified in ASME B16.5. See dimension M below.
 2. 14- and 16-inch valves are available in ASME B16.10 short, only. See dimension A for ASME B16.10 short shown in figure 9.
 3. Clearance necessary to remove flange bolts.



11B2625-K
B2153-5 / IL

Figure 6. Design V150 Dimensions (also see table 9)

Vee-Ball Valves

Table 10. Design V200 Dimensions

| VALVE SIZE, INCH | DESIGN V200 DIMENSIONS (ISA S75.04) | | | | | | | | | | | | | | ASME B16.5 RF FLANGES | |
|------------------|-------------------------------------|------|------|------|---------------------|-----------|-----------|-----------|-------|-------|----------------------|------|------|------|-----------------------|-------------------------|
| | A | B | D | G | K | M | | | R | R1 | S | T | U | W | | |
| | | | | | | Class 150 | Class 300 | Class 600 | | | | | | | | |
| mm | | | | | | | | | | | | | | | | |
| 1 | 102 | 56 | | 81 | 95 | 176 | 202 | 202 | 51 | 102 | 12.7 | | | | | Class 150, 300, and 600 |
| 1.5 | 114 | 62 | 188 | 89 | 121 | 189 | 224 | 224 | 73 | 119 | 15.7 and 15.7 x 12.7 | 117 | --- | 14.2 | | |
| 2 | 124 | 67 | | 106 | 127 | 211 | 236 | 236 | 92 | 137 | 15.7 and 15.7 x 12.7 | | | | | |
| 3 | 165 | 79 | | 117 | 130 | 254 | 279 | 286 | 127 | 167 | 19.1 | | | | | |
| 4 | 194 | 101 | 214 | 133 | 141 | 286 | 305 | 343 | 157 | 197 | 19.1 | 152 | 32 | 14.2 | | |
| 6 | 229 | 109 | | 159 | 164 ⁽¹⁾ | 343 | 362 | 413 | 216 | 260 | 25.4 | | | | | |
| 8 | 243 | 124 | | 195 | 232 | 343 | 387 | 426 | 270 | 314 | | | | | | |
| 10 | 297 | 147 | 208 | 222 | 260 | 419 | --- | --- | 324 | 368 | 31.8 | 235 | 46 | 17.5 | Class 150 | |
| Inch | | | | | | | | | | | | | | | | |
| 1 | 4.00 | 2.21 | | 3.19 | 3.75 | 6.94 | 7.94 | 7.94 | 2 | 4.00 | 1/2 | | | | | Class 150 and 300 |
| 1.5 | 4.50 | 2.46 | 7.38 | 3.50 | 4.75 | 7.44 | 8.81 | 8.81 | 2.88 | 4.68 | 5/8 and 5/8 x 1/2 | 4.62 | --- | 0.56 | | |
| 2 | 4.88 | 2.63 | | 4.19 | 5.00 | 8.31 | 9.31 | 9.31 | 3.63 | 5.38 | 5/8 and 5/8 x 1/2 | | | | | |
| 3 | 6.50 | 3.10 | | 4.62 | 5.12 | 10.00 | 11.00 | 11.25 | 5.00 | 6.56 | 3/4 | | | | | |
| 4 | 7.62 | 3.99 | 8.44 | 5.25 | 5.56 | 11.25 | 12.00 | 13.50 | 6.19 | 7.76 | 3/4 | 6.00 | 1.25 | 0.56 | | |
| 6 | 9.00 | 4.29 | | 6.25 | 6.44 ⁽¹⁾ | 13.50 | 14.25 | 16.25 | 8.50 | 10.24 | 1 | | | | | |
| 8 | 9.56 | 4.88 | | 7.69 | 9.12 | 13.50 | 15.25 | 16.75 | 10.63 | 12.38 | | | | | | |
| 10 | 11.69 | 5.77 | 8.19 | 8.75 | 10.25 | 16.50 | --- | --- | 12.75 | 14.50 | 1-1/4 | 9.25 | 1.81 | 0.69 | Class 150 | |

1. 179 mm (7.06 inches) for 6 inch, Class 600 valves only.

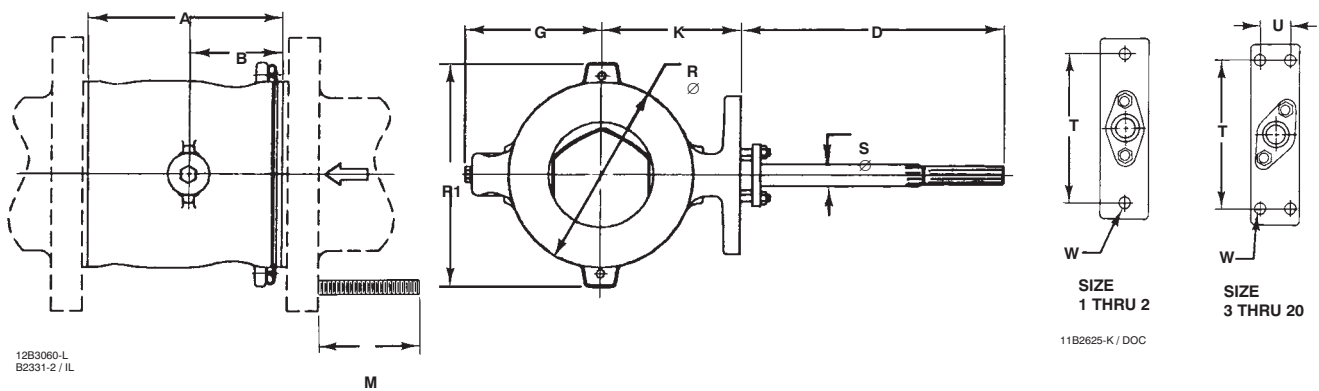


Figure 7. V200 Dimensions (also see table 10)

Product Bulletin

51.3:Vee-Ball
February 2007

Vee-Ball Valves

Table 11. Design V300 Dimensions

| VALVE SIZE, DN ⁽¹⁾ | DESIGN V300 DIMENSIONS (ISA S75.04) | | | | | | | | | | | |
|----------------------------------|-------------------------------------|------|-------|-------|-------|------------------|------------------|-------------------|-------|------|---|------|
| | A | B | D | G | K | M ⁽²⁾ | N ⁽²⁾ | S Diameter | T | U | W | |
| | mm | | | | | | | | | | | |
| 25 | 102 | 56 | | 81 | 95 | 98 | 85 | 13 | | | | 14.2 |
| 40 | 114 | 62 | 188 | 89 | 121 | 112 | 99 | 16 and 16 X 13 | 117 | --- | | |
| 50 | 124 | 67 | | 106 | 127 | 104 | 98 | 16 and 16 X 13 | | | | |
| 80 | 165 | 79 | | 117 | 130 | 131 | 118 | 19 | | | | 17.5 |
| 100 | 194 | 101 | 214 | 133 | 141 | 137 | 124 | 19 | 152 | 32 | | |
| 150 | 229 | 109 | | 159 | 164 | 150 | 137 | 25 | | | | |
| 200 | 243 | 124 | | 195 | 232 | 164 | 151 | 32 | | | | 19.5 |
| 250 | 297 | 147 | 208 | 222 | 260 | 184 | 172 | 32 | 235 | 46 | | |
| 300 | 338 | 174 | | 268 | 303 | 197 | 184 | 38 | | | | |
| 356 mm (14-in.) | 381 | 206 | 356 | 295 | 343 | 197 | 178 | 44.5 | 273 | 50.8 | | 19.5 |
| 406 mm (16-in.) | 406 | 228 | 356 | 338 | 356 | 210 | 191 | 53.8 | 273 | 50.8 | | |
| | Inch | | | | | | | | | | | |
| 1 | 4.00 | 2.21 | | 3.19 | 3.75 | 3.86 | 3.36 | 1/2 | | | | 0.56 |
| 1.5 | 4.50 | 2.46 | 7.38 | 3.50 | 4.75 | 4.40 | 3.90 | 5/8 and 5/8 X 1/2 | 4.62 | --- | | |
| 2 | 4.88 | 2.63 | | 4.19 | 5.00 | 4.11 | 3.86 | 5/8 and 5/8 X 1/2 | | | | |
| 3 | 6.50 | 3.10 | | 4.62 | 5.12 | 5.15 | 4.65 | 3/4 | | | | 0.69 |
| 4 | 7.62 | 3.99 | 8.44 | 5.25 | 5.56 | 5.40 | 4.90 | 3/4 | 6.00 | 1.25 | | |
| 6 | 9.00 | 4.29 | | 6.25 | 6.44 | 5.90 | 5.40 | 1 | | | | |
| 8 | 9.56 | 4.88 | | 7.69 | 9.12 | 6.44 | 5.94 | 1-1/4 | | | | 0.75 |
| 10 | 11.69 | 5.77 | 8.19 | 8.75 | 10.25 | 7.25 | 6.75 | 1-1/4 | 9.25 | 1.81 | | |
| 12 | 13.31 | 6.87 | | 10.56 | 11.94 | 7.75 | 7.25 | 1-1/2 | | | | |
| 14 | 15.00 | 8.12 | 14.00 | 11.62 | 13.50 | 7.75 | 7.00 | 1-3/4 | 10.75 | 2.00 | | 0.75 |
| 16 | 16.00 | 9.00 | 14.00 | 13.31 | 14.38 | 8.25 | 7.50 | 2-1/8 | | | | |

1. DN25, 40, 50, 80, and 100 are the only sizes offered in Design V300 for Europe.
2. Clearance necessary to remove flange bolts.

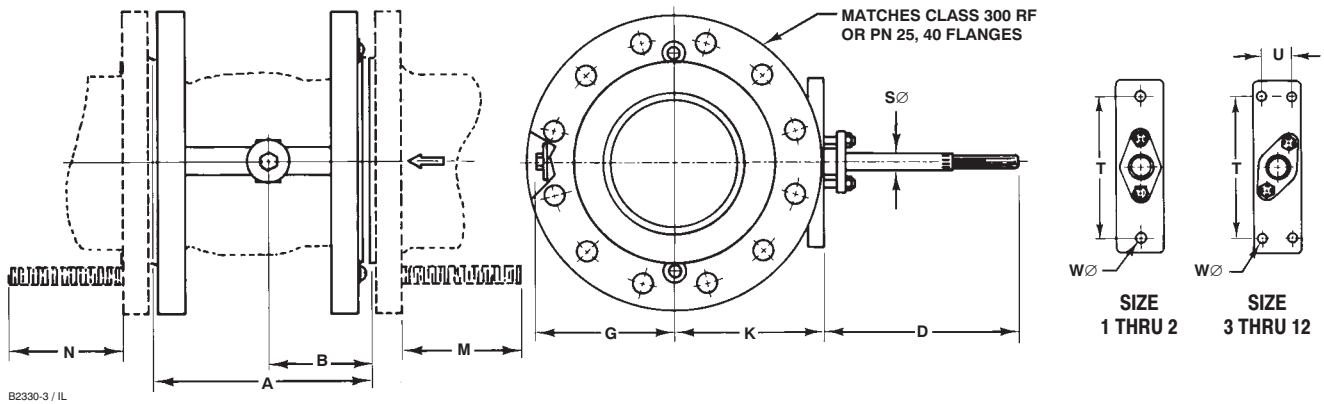


Figure 8. Design V300 Dimensions (also see table 11)

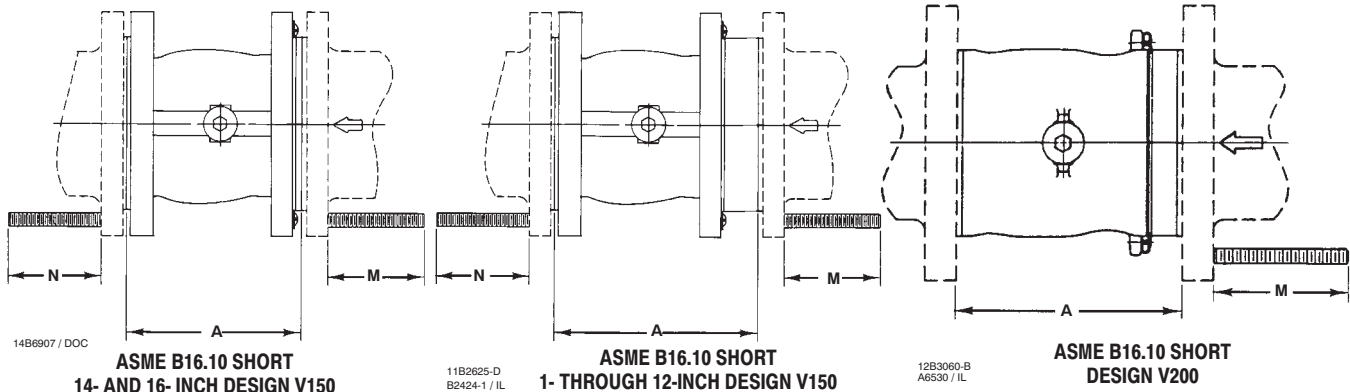
Table 12. Design V150 Optional Dimensions

| DESIGN V150 OPTIONAL DIMENSIONS FOR 1- THROUGH 12-INCH SIZES (ASME B16.10 SHORT) | | | | | | |
|--|-----|--------|-----|--------|-----|--------|
| VALVE SIZE, INCH | A | | M | | N | |
| | mm | Inches | mm | Inches | mm | Inches |
| 1 | 127 | 5.00 | 103 | 4.06 | 71 | 2.81 |
| 1.5 | 165 | 6.50 | 135 | 5.31 | 78 | 3.06 |
| 2 | 178 | 7.00 | 155 | 6.11 | 92 | 3.61 |
| 3 | 203 | 8.00 | 142 | 5.61 | 98 | 3.86 |
| 4 | 229 | 9.00 | 155 | 6.11 | 98 | 3.86 |
| 6 | 267 | 10.50 | 163 | 6.40 | 112 | 4.40 |
| 8 | 292 | 11.50 | 182 | 7.15 | 124 | 4.90 |
| 10 | 330 | 13.00 | 176 | 6.94 | 132 | 5.19 |
| 12 | 356 | 14.00 | 170 | 6.69 | 132 | 5.19 |

Table 13. Design V200 Optional Dimensions

| DESIGN V200 OPTIONAL DIMENSIONS (ASME B16.10 SHORT) ^(1,2) | | |
|--|-------|-------|
| VALVE SIZE, INCH | A | M |
| mm | | |
| 1 | 127 | 202 |
| 1.5 | 165 | 240 |
| 2 | 178 | 268 |
| 3 | 203 | 286 |
| 4 | 229 | 321 |
| 6 | 267 | 381 |
| 8 | 292 | 394 |
| 10 | 330 | 451 |
| Inch | | |
| 1 | 5.00 | 7.94 |
| 1.5 | 6.50 | 9.44 |
| 2 | 7.00 | 10.56 |
| 3 | 8.00 | 11.25 |
| 4 | 9.00 | 12.62 |
| 6 | 10.50 | 15.00 |
| 8 | 11.50 | 15.50 |
| 10 | 13.00 | 17.75 |

1. Available for Class 150 valves only.
2. ASME B16.10 short dimensions are actually longer than ISA S75.04 dimensions.



NOTES:

- 1- THROUGH 12-INCH VALVES ARE AVAILABLE WITH EITHER ISA S75.04 FACE- TO-FACE DIMENSIONS OR ASME B16.10 SHORT FACE-TO-FACE DIMENSIONS. 1-THROUGH 12-INCH VALVES WILL BE SUPPLIED IN ISA S75.04 UNLESS YOU SPECIFY OTHERWISE. NOTE THAT ASME B16.10 SHORT DIMENSIONS ARE ACTUALLY LONGER THAN ISA S75.04.
- 14- AND 16-INCH VALVES ARE AVAILABLE ONLY WITH ASME B16.10 SHORT FACE-TO-FACE DIMENSIONS.
- 20-INCH VALVES ARE AVAILABLE ONLY WITH A 508 MM (20-INCH) FACE-TO-FACE DIMENSION.
- M AND N DIMENSIONS SHOWN FOR DESIGN V150 ARE CLEARANCE NECESSARY TO REMOVE FLANGE BOLTS.

Figure 9. Design V150 and V200 Optional Dimensions (also see tables 12 and 13)

ENVIRO-SEAL, Vee-Ball and Fisher are marks owned by Fisher Controls International LLC, a member of the Emerson Process Management business division of Emerson Electric Co. Emerson Process Management, Emerson, and the Emerson logo are trademarks and service marks of Emerson Electric Co. All other marks are the property of their respective owners. This product may be covered under one or more of the following patents: 5,131,666; 5,056,757; 5,230,498; 5,299,812; 5,016,857; 5,823,540; 5,568,983 and 4,768,750 or under pending patents.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such products at any time without notice.

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use and maintenance of any product remains with the purchaser and end-user.

Emerson Process Management

Marshalltown, Iowa 50158 USA
Cernay 68700 France
Sao Paulo 05424 Brazil
Singapore 128461

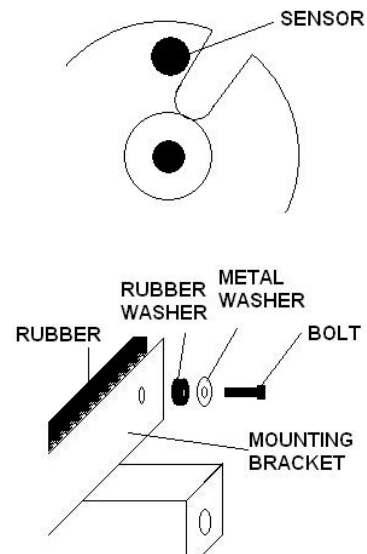
www.Fisher.com



The Madi-X sensor is the latest addition to the Madi slide valve position indicators. The Madi-X can replace existing potentiometer type position indicators on both Frick and Howden type screw compressors.

Installation Instructions (Howden):

1. If sensor is to be exchanged while the compressor is running, make sure that any slide valve transmitter shutdowns are bypassed in the program before removing existing transmitter.
2. Confirm that there is a spare analog input channel configured for a 4-20mA current signal.
3. Put slide valve control into Manual and unload the compressor to 0%, leave control in manual.
4. Remove slide valve cover and existing slide valve position indicator.
5. Slide the Madi cam onto the shaft as far as possible, but not touching the compressor, with spiral facing outwards.
6. Hold the mounting bracket over the cam with the sensor hole at the top / center position, do not screw mounting bracket in place. Looking through the sensor hole, line up the cam as shown.
7. Set the mounting bracket down, and lock the cam into position by tightening the set screw on the cam.
8. Insert the sensor through the sensor hole of the mounting bracket, leaving approximately ½ inch sticking out the cam side of the bracket and hand tighten sensor nuts.
9. Secure mounting bracket onto compressor.
10. Move sensor towards cam as close as possible without touching the cam, and tighten into place.
11. A program change should be made to use the chosen analog input in place of the old RTD input.
12. Wire the sensor as follows; (Use terminal block if sensor wire does not reach PLC)



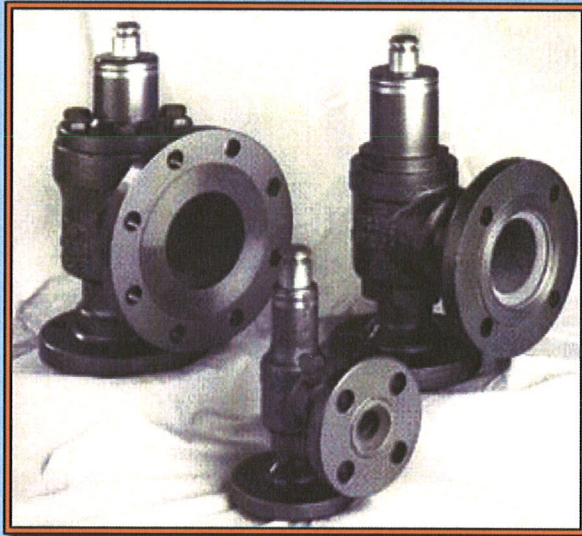
| <u>Color</u> | <u>Detail</u> |
|--------------|--------------------------|
| Brown | 15 -> 30 VDC |
| Blue | 0 V |
| Black | 4 -> 20 mA Output Signal |

13. If the output signal is approximately 5 mA, secure the sensor to the mounting bracket.
14. Calibrate the sensor. Enter the current raw value for the 0% unloaded. Manually load the compressor until the raw value peaks. Enter the peaked raw value for 100% loaded.
15. Put slide valve cover back onto compressor.
16. Calibrate transmitter again after compressor has been running for over an 1 hour.



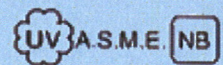
MERCER VALVE CANADA
TOLL FREE 1-800-661-3294

MERCER 9100 SERIES
FLANGED SAFETY RELIEF VALVES



[Introduction](#) || [Specifications](#) || [Bill of Materials](#) || [Product Numbering System](#)

INTRODUCTION



Mercer Valve 9100 Series Threaded Safety Relief Valves are the "State of the Art" in soft seat, high flow rate, pressure relieving devices. The field-proven soft seat is coupled with new, unique disk type PATENTED DESIGN. Expected seat life is hundreds of "pops". Full length guiding of "low rate" set pressure springs insures accurate, repeatable relief action. Standard, low blow downs are consistent with effective relieving of over pressure without expensive loss of process gas.

The valve is well suited for all industrial air, gas, or liquid relief applications, including compressors, separators, heater treaters, scrubbers, dehydrator, free water knockouts, thermal relief, gas production units, transmission and gathering lines, meter runs, gas plants, chemical plants, refineries and other industrial applications.

All 9100 Series Threaded Valves are built in accordance with the requirements of the ASME Boiler and Pressure Vessel Code. Capacity ratings were established by testing performed at the National Board of Boiler and Pressure Vessel Inspectors, Columbus, Ohio.

[Return to List](#)

SPECIFICATIONS

| | | | | | | | | | |
|------------------------|----------------|------------------|------------|------------|------------|---------|---------|---------|---------|
| API Orifice Letter | D | E | F | G | H | J | K | L | M |
| Orifice Diameter (In.) | .394 | .520 | .655 | .775 | 1.050 | 1.350 | 1.625 | 2.020 | 2.280 |
| Orifice Area (sq. In.) | .122 | .212 | .337 | .472 | .865 | 1.430 | 2.074 | 3.205 | 4.080 |
| *Inlet Sizes Offered | 1/2", 3/4", 1" | 3/4", 1", 1 1/2" | 1", 1 1/2" | 1 1/2", 2" | 1 1/2", 2" | 2", 3" | 3" | 3", 4" | 4", 6" |
| Pressure Ranges (PSIG) | 15-6500 | 15-3500 | 15-2500 | 15-2500 | 15-2000 | 15-2000 | 15-2000 | 15-2000 | 15-2000 |

TEMP. RANGES

Standard (°F) -20°F to +450°F

Extended (°F) -450°F to +600°F (Consult Factory for material specifications)

| | | | | | | | | | |
|----------------------------------|------------------------|------|------|------|-------|-------|-------|-------|-------|
| ASME Gas "Slope" (90%) | 1.83 | 3.18 | 5.06 | 7.08 | 12.98 | 21.51 | 31.12 | 48.11 | 61.25 |
| Flow Coefficient "K" (90%) Gas | .818 | .818 | .818 | .818 | .818 | .818 | .818 | .818 | .818 |
| Flow Coefficient "K" (90%) Fluid | .707 | .707 | .707 | .707 | .707 | .707 | .707 | .707 | .707 |
| Weight (Lbs.) | Consult Factory | | | | | | | | |

*NOTE: FOR INLET AND OUTLET SIZE COMBINATIONS SEE SELECTION CHART.

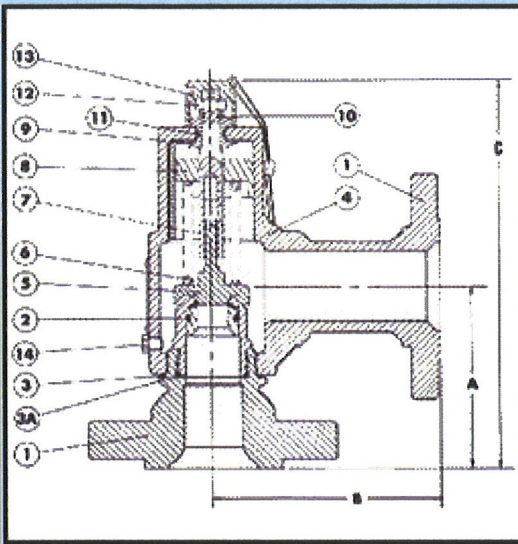
| Maximum Pressure Per Standard 526 | | |
|-----------------------------------|--------|--------|
| Pressure (PSI) | | |
| ANSI RATING | @100°F | @450°F |
| 150 | 285 | 185 |
| 300 | 740 | 615 |
| 600 | 1480 | 1235 |
| 900 | 2220 | 1845 |
| 1500 | 3705 | 3080 |

| SEAT DATA (For seat material consult factory) | | | | | |
|---|-----------|----------------|---------|---------------|---------|
| SEAT MATERIAL | DUROMETER | TEMPERATURE °F | | PRESSURE PSIG | |
| | | Maximum | Minimum | Maximum | Minimum |
| BUNA - N | 90 | 250 | -65 | 2000 | 15 |
| VITON | 90 | 275 | -65 | 3000 | 15 |
| TEFLON | N/A | 450 | -420 | 4500 | 15 |
| PEEK | N/A | 525 | 0 | 10,000 | 15 |
| KALREZ | 90 | 525 | 0 | 3000 | 15 |
| NEOPRENE | 90 | 300 | -65 | 3000 | 15 |
| EPDM | 90 | 325 | -65 | 3000 | 15 |

[Return to List](#)

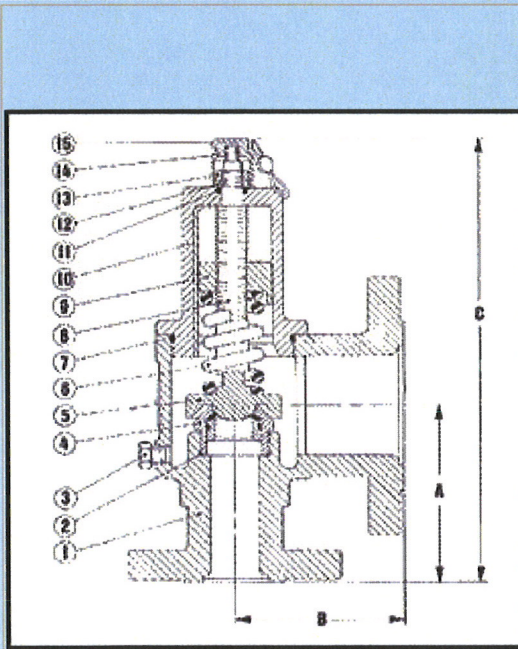
BILL OF MATERIALS

| "D", "E", "F", & "G" ORIFICES | | | |
|-------------------------------|-----------------------|---------------------------|-----------------------------|
| ITEM NUMBER | PART TIME | STANDARD MATERIALS | OPTIONS |
| 1 | Inlet, Outlet Flanges | SA105 Forged Steel | Stainless Steel |
| 2 | Nozzle/Seat | 316 Stainless Steel/Viton | 17-4 Stainless Steel/Teflon |
| 3 | Base Seal | Soft Steel | ----- |



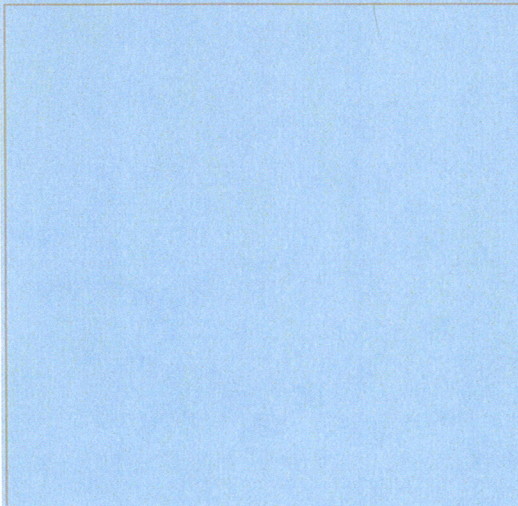
"D", "E", "F", and "G" Orifices

| | | | |
|----|--------------------|----------------------------|----------------------|
| 3A | O'Ring | Viton | Buna N |
| 4 | Body | SA 216 GR WCB Carbon Steel | Stainless Steel |
| 5 | Disk Sub Assembly | 316 Stainless Steel | 17-4 Stainless Steel |
| 6 | Spring | 17-7 Stainless Steel | Inconel X-750 |
| 7 | Adjustment Screw | 300 Series Stainless Steel | ----- |
| 8 | Guide Bushing | 300 Series Stainless Steel | ----- |
| 9 | Index Sub Assembly | Nickel Plated Carbon Steel | ----- |
| 10 | "O" Ring | Buna N | Viton |
| 11 | "O" Ring | Buna N | Viton |
| 12 | Lock Nut | Carbon Steel | ----- |
| 13 | Cap | Aluminum Anodized | Carbon Steel |
| 14 | Drain Plug | Carbon Steel | Stainless Steel |

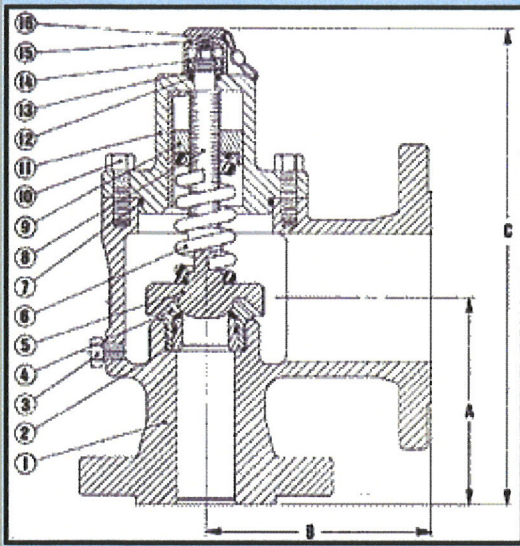


"H" Orifices

| "H" ORIFICES | | | |
|---------------------|--------------------------|----------------------------|-----------------------------|
| ITEM NUMBER | PART TIME | STANDARD MATERIALS | OPTIONS |
| 1 | Body | SA 216 GR WCB Carbon Steel | CF8M Stnls. Steel |
| 2 | "O" Ring | Viton | ----- |
| 3 | Drain Plug | Carbon Steel | ----- |
| 4 | Nozzle/Seat Sub Assembly | 316 Stainless Steel/Viton | 17-4 Stainless Steel/Teflon |
| 5 | Disk Sub Assembly | 316 Stainless Steel | 17-4 Stainless Steel |
| 6 | Spring | 17-7 Stainless Steel | Inconel X-750 |
| 7 | "O" Ring | Buna N | ----- |
| 8 | Adjustment Screw | 300 Series Stainless Steel | ----- |
| 9 | Adjustment Bushing | 300 Series Stainless Steel | ----- |
| 10 | Bonnet | Carbon Steel | ----- |
| 11 | "O" Ring | Buna N | ----- |
| 12 | Stem Washer | 300 Series Stainless Steel | ----- |
| 13 | Lock Nut | Carbon Steel Rust Proofed | ----- |
| 14 | Cap | Aluminum Anodized | Carbon Steel Rust Proofed |
| 15 | Lock Wire | Stainless Steel | ----- |



| "J", "K", "L", & "M" ORIFICES | | | |
|--|--------------------------|----------------------------|-----------------------------|
| ITEM NUMBER | PART TIME | STANDARD MATERIALS | OPTIONS |
| 1 | Body | SA 216 GR WCB Carbon Steel | CF8M Stnls. Steel |
| 2 | "O" Ring | Viton | ----- |
| 3 | Drain Plug | Carbon Steel | ----- |
| 4 | Nozzle/Seat Sub Assembly | 316 Stainless Steel/Viton | 17-4 Stainless Steel/Teflon |
| 5 | Disk Sub Assembly | 316 Stainless Steel | 17-4 Stainless Steel |
| 6 | Spring | 17-7 Stainless Steel | Inconel X-750 |
| 7 | "O" Ring | Buna N | Viton |



"J", "K", "L", & "M" Orifices

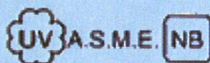
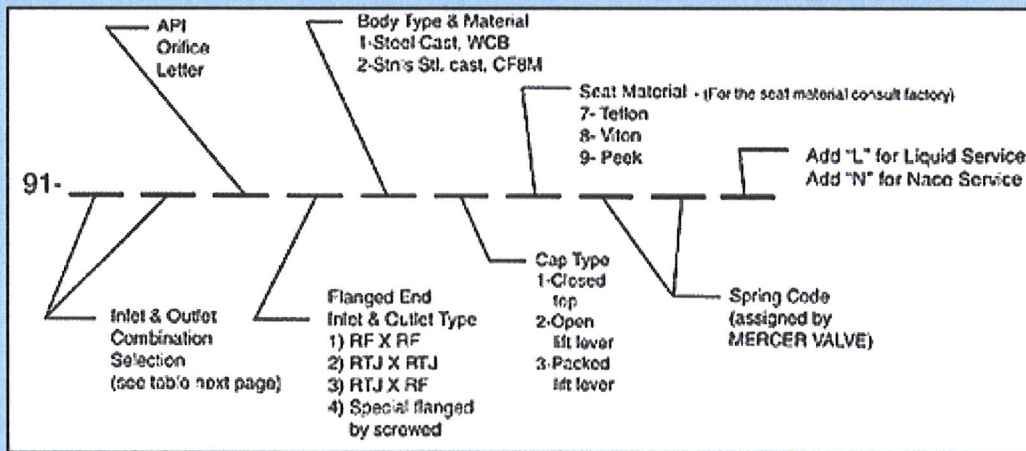
| | | | |
|----|--------------------|----------------------------|---------------------------|
| 8 | Adjustment Screw | 300 Series Stainless Steel | ----- |
| 9 | Adjustment Bushing | 300 Series Stainless Steel | ----- |
| 10 | Bolt | Carbon Steel | |
| 11 | Bonnet | Carbon Steel | ----- |
| 12 | "O" Ring | Buna N | Viton |
| 13 | Stem Washer | 300 Series Stainless Steel | ----- |
| 14 | Lock Nut | Carbon Steel Rust Proofed | ----- |
| 15 | Cap | Aluminum Anodized | Carbon Steel Rust Proofed |
| 16 | Lock Wire | Stainless Steel | ----- |

[Return to List](#)

PRODUCT NUMBERING SYSTEM

VALVE PRODUCT NUMBERING SYSTEM

A specific 91 Series Valve is described by a 11 digit product numbering code as follows:



[Return to List](#)

[Home](#) | [Threaded Safety Relief Valves](#) | [Pilot Operated Valves](#) | [Unified Valve Home Page](#)

Mercer Valve Canada

Head Office
5885 - 51st Street



Mercer
Valve Co.
Inc.

Calgary, Alberta, T2C 3V2

Phone: 403-215-7800

Fax: 403-215-7806

Toll Free: 1-800-858-3656

Email: info@mercervalvecanada.com

Contact information:

Distribution / Technical: Shane LeVoir - Technical Product Specialist

Toll free 1-800-858-3656 Direct: (403) 723-2506

Calgary Sales & Service inquiries: Steve Barratt, Service Manager

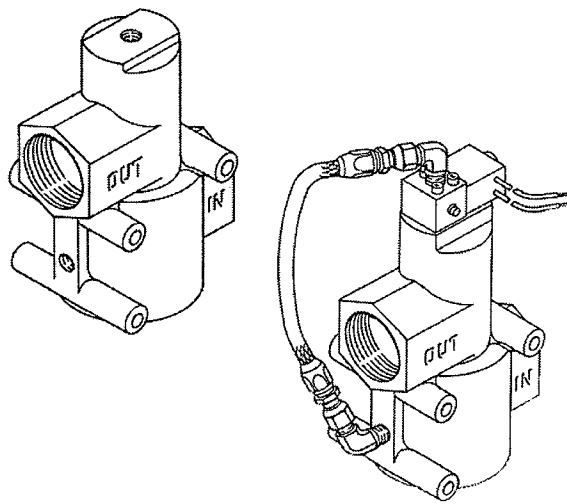
Phone: (403) 236-3656

Edmonton Sales & Service inquiries: George Roach, Service Manager

Phone: (780) 469-0090

Copyright 2005 - Unified Valve Ltd.

OPERATING & SERVICE MANUAL



TURBO VALVE

TABLE OF CONTENTS

| SECTION | SUBJECT | PAGE |
|---------|--|------|
| 1.0 | General Information..... | 1 |
| 2.0 | <i>TURBOVALVE</i> Operation..... | 1 |
| 3.0 | <i>TURBOVALVE</i> Installation..... | 2 |
| 4.0 | <i>TURBOVALVE</i> Disassembly..... | 2 |
| 5.0 | <i>TURBOVALVE</i> Assembly..... | 3 |
| 6.0 | Disassembly/Assembly (Electrical)..... | 3 |

LIST OF ILLUSTRATIONS

| FIGURES | TITLE | PAGE |
|---------|---|------|
| 1 | <i>TURBOVALVE</i> (Pneumatically Controlled)..... | 1 |
| 2 | <i>TURBOVALVE</i> (Electrically Controlled)..... | 2 |
| 3 | Opening Pressure vs. Supply..... | 2 |
| 4 | Piston Removal..... | 3 |
| 5 | <i>TURBOVALVE</i> Dimensional Data..... | 4 |
| 6 | T30-I Installation Diagram (Electrical)..... | 5 |
| 7 | T50-P Installation Diagram..... | 6 |
| 8 | T100 Series Installation Diagram..... | 7 |
| 9 | T100-V Installation Diagram..... | 8 |
| 10 | <i>TURBOVALVE</i> (Pneumatically Controlled)..... | 10 |
| 11 | <i>TURBOVALVE</i> (Electrically Controlled)..... | 12 |

TDI *TURBOTWIN*TM

FROM TECH DEVELOPMENT, INC.

1.0 GENERAL INFORMATION

The TDI *TURBOVALVE* is a versatile starting air or control relay valve available in a pilot operated version or with an integrated solenoid that eliminates extra plumbing. Its high flow capacity reduces pressure drop through the valve, providing for a broad range of applications.

An auxiliary port provides a convenient point for accessing the pressure at the supply (IN port) ... using it for indication, control or pilot actuation.

FEATURES

- Low pressure pilot
- Optional integrated solenoid versions
- 450 psig Rating (Pneumatically controlled version only)
- High flow capacity
- Replaceable O-Rings
- 1-1/4" or 1-1/2" pipe sizes
- 3-Point mounting for secure attachment
- Replaces Sealco (P/N: 10900, 11900, 14900, and 110250) and Ingersoll-Rand (P/N:SRV125 and SRV150) relay valves

SPECIFICATIONS

- Valve Housing: Aluminum (Nickel plated for corrosion resistance).
- Internal Parts: Aluminum
- O-Rings: VITON or Buna N
- Operating Temperature: -20 to 200°F (-29° to 93°C)
- Valve Working Pressure Rating: 450 psig (31 Bar) (Pneumatically controlled version only)
- Weight: 2.9 pounds (1.3 kg)
- Optional Solenoid Voltages: 12, 24, 48, 110 VDC/120 or VAC/60 Hz
- Cv = 41

2.0 OPERATION

2.1 Pneumatically controlled *TURBOVALVE*

- a. Air is supplied to the Applied Pressure Port (APP), which forces the piston to the open position. The pressure required to open the relay valve is based on the supply pressure. See figure 3.
- b. The main ports (IN and OUT) open to allow flow through the valve.
- c. When the pilot pressure is released, the spring allows the piston to retract, closing the main port.

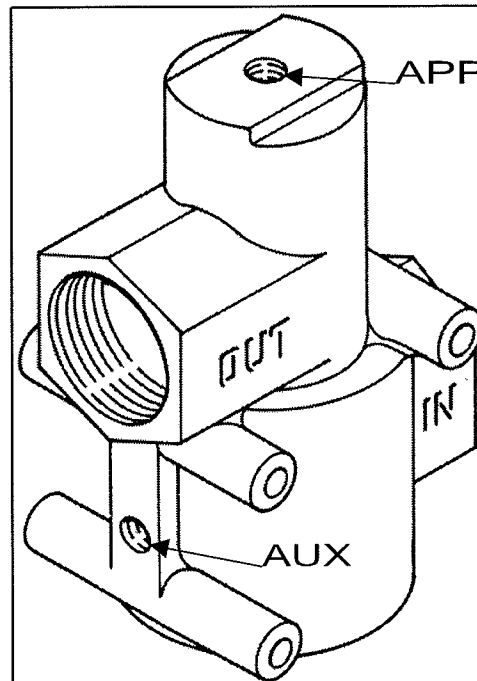


Figure 1. TurboValve-Pneumatically Controlled

2.2 Electrically controlled *TURBOVALVE*

- a. Electricity is applied to the solenoid valve allowing air to access the relay valve via the APP.

TDI TURBOTWIN™

FROM TECH DEVELOPMENT, INC.

- b. The main ports (IN and OUT) are opened to allow flow through the valve.
- c. When the start button is released, the electric solenoid vents, allowing the relay valve piston to retract, closing the main port.

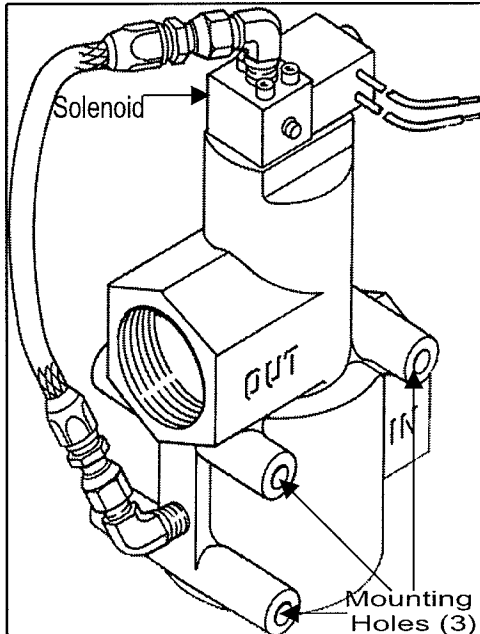


Figure 2. TurboValve-Electrically Controlled

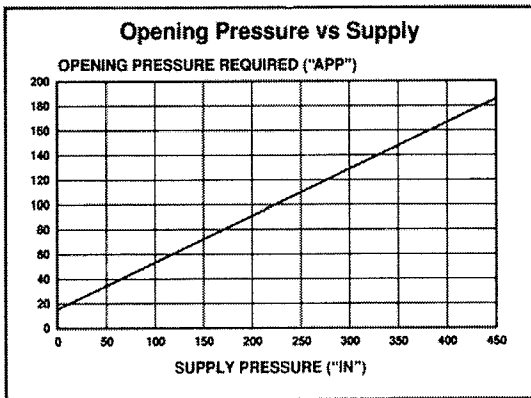


Figure 3. Opening Pressure vs. Supply

3.0 INSTALLATION

The valve may be mounted in any position using the three holes located

on the relay valve body as shown in figure 2. The air to the Applied Pressure Port (APP) should be clean and dry. Connection piping to the APP and IN ports should be cleaned to remove excess thread sealant, chips, and other foreign matter that could get trapped in the valve or the pilot chamber and cause seals to fail.

The TURBOVALVE may be ordered using the full description as shown or by specifying a Part Number using the Model Code System. Example: the Part Number for a standard pneumatic valve with a 1-1/2" NPT threads and Buna N O-Ring is RLVA-25683-001-1-01. (Please Note: TDI RLVA-25683-001-2-00 replaces TDI 42-23356, and TDI RLVA-25683-001-1-01 replaces TDI 52-93503.)

4.0 DISASSEMBLY

WARNING

Never attempt to remove the starter relay valve or retainer snap-ring from bottom side of valve until the air pressure has been bled off. Failure to do this could result in internal parts being blown out with considerable force.

Carefully remove retaining ring (11) from relay valve housing (1).

Remove end cap (9), spring (7), and piston (4) from relay valve housing.

WARNING

If necessary, apply low pressure air to the relay valve APP to disengage the piston from valve housing. The aft end of valve must be positioned toward workbench surface to block piston as shown in figure 4.

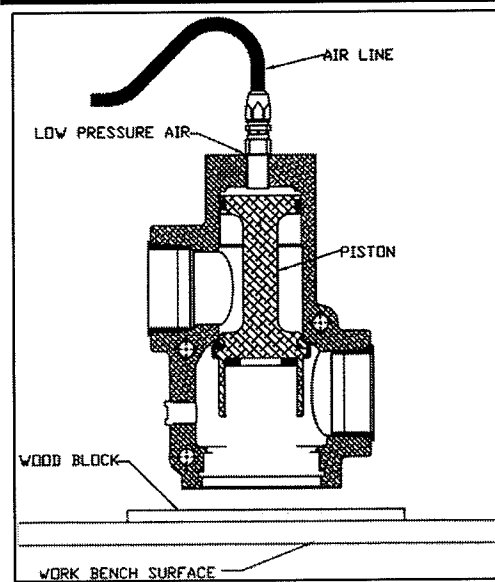


Figure 4. Piston Removal

Remove O-Rings (8,10) from end cap.

Remove O-Ring cap (6), shock dampener (5) and O-Rings (2,3) from piston (4).

5.0 ASSEMBLY

Use either 2-26119-001 (Buna N) or 2-26119-002 (Viton) repair kit to rebuild the TURBOVALVE.

Coat all O-Rings, end cap, piston, and bore of relay valve housing with a good grade of silicon based grease (TDI P/N 9-94082-001).

Place O-Rings (8,10) on end cap (9) and O-Rings (2,3) on piston (4).

Install shock dampener (5) into piston housing (4) bore.

Install O-Ring cap (6) onto piston (4) and seat over O-Ring (3).

Hand press piston assembly into relay valve housing (1) until seated.

Install spring (7) into bore of valve housing (1).

Install end cap assembly (8,9,10) into valve bore and secure with retainer ring (11).

6.0 DISASSEMBLY / ASSEMBLY (RELAY VALVE – ELECTRICALLY CONTROLLED)

Follow the above procedure to remove and install the internal parts in electrically controlled relay valve.

If necessary, rotate the connectors on the ends of the hose assembly (5) counter-clockwise to remove from relay valve assembly.

Rotate 90° elbows (4,6) counter-clockwise to remove from relay valve assembly.

Remove the screws (2) to separate the solenoid valve (1) from the relay valve housing (7).

TDI *TURBOTWIN*TM

FROM TECH DEVELOPMENT, INC.

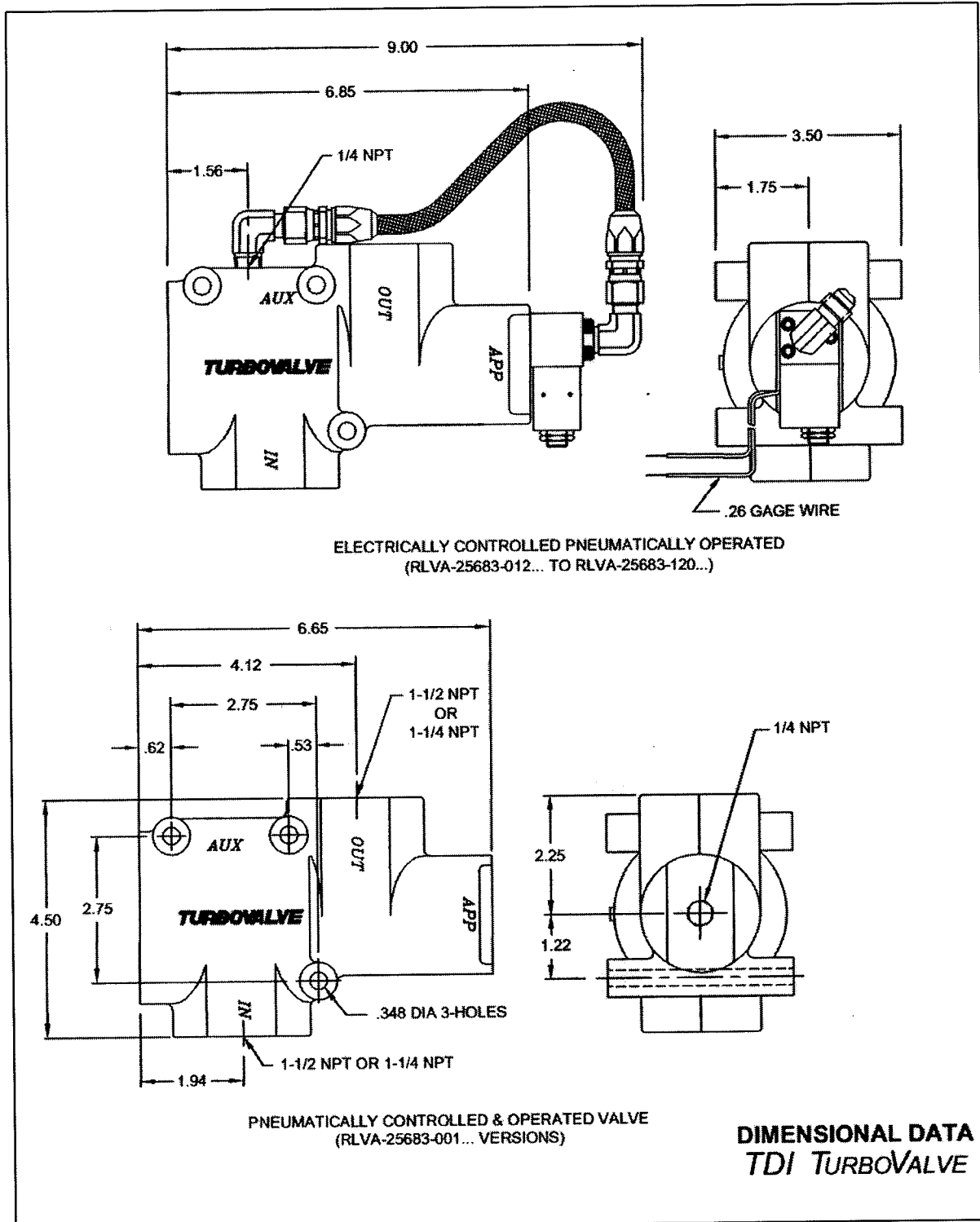


Figure 5. *TURBOVALVE* Dimensional Data

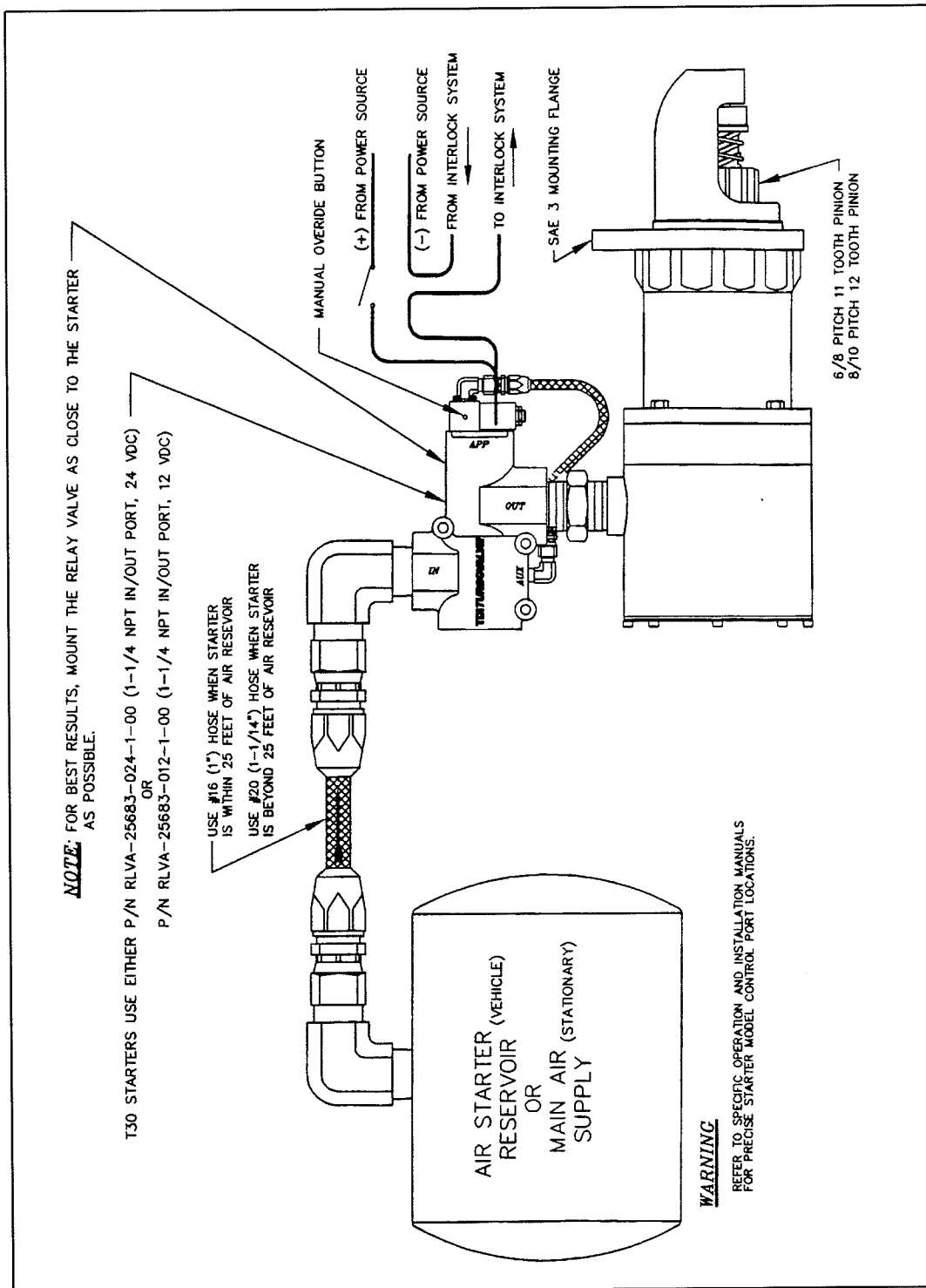


Figure 6. T30-I TURBOTWIN Air Starter Installation Diagram (Electrical)

TDI TURBOTWIN™

FROM TECH DEVELOPMENT, INC.

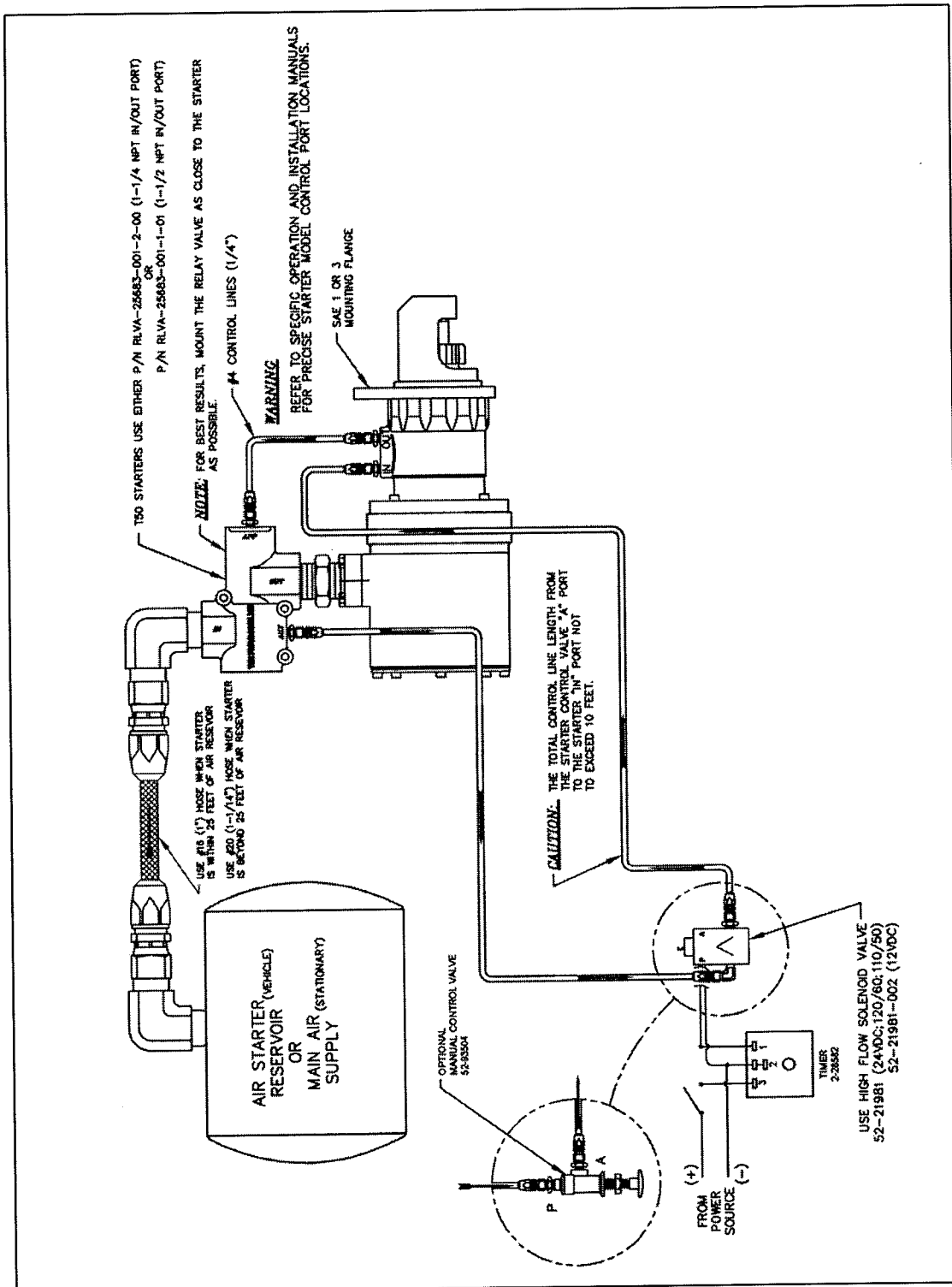


Figure 7. T50-P TURBOTWIN Air Starter Installation Diagram

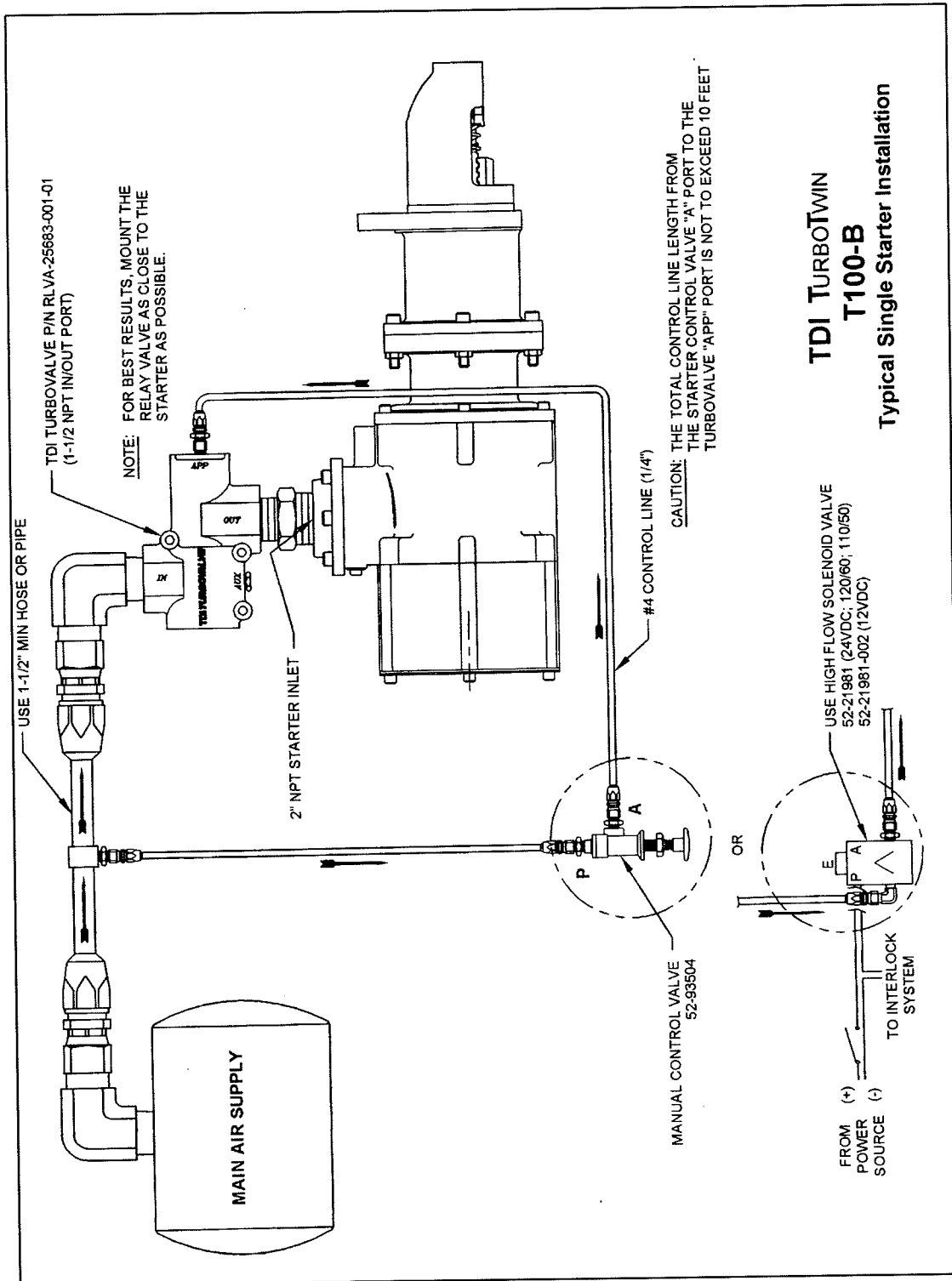


Figure 8. T100 Series *TURBOTWIN* Air Starter Installation Diagram

TDI TURBOTWIN™

FROM TECH DEVELOPMENT, INC.

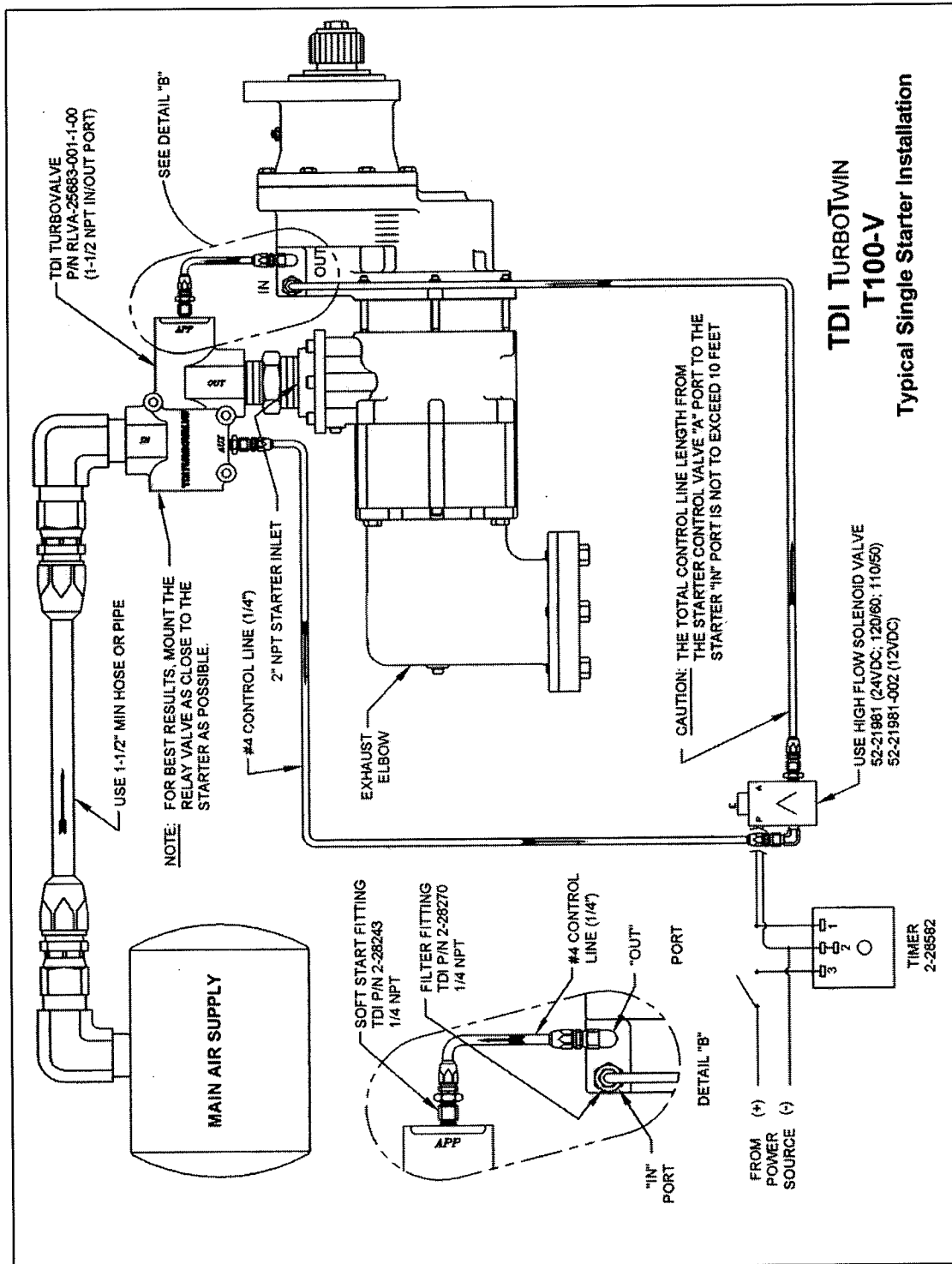


Figure 9. T100-V TURBOTWIN Air Starter Installation Diagram

6.0 ILLUSTRATED PARTS BREAKDOWN (Pneumatically Controlled)

| PART NUMBER | IN PORT | OUT PORT | O-RINGS | OVERHAUL KIT |
|---------------------|---------|----------|---------|--------------|
| RLVA-25683-001-1 | 1 ¼" | 1 ¼" | Buna-N | 2-26119-001 |
| RLVA-25683-001-2 | 1 ¼" | 1 ¼" | Viton | 2-26119-002 |
| RLVA-25683-001-1-01 | 1 ½" | 1 ½" | Buna-N | 2-26119-001 |
| RLVA-25683-001-2-01 | 1 ½" | 1 ½" | Viton | 2-26119-002 |

| KEY NO. | DESCRIPTION | PART NUMBER |
|---------|---------------------------------|-------------|
| 1 | Housing, Relay Valve (1 ¼" NPT) | 2-25764 |
| 1 | Housing, Relay Valve (1 ½" NPT) | 2-25764-001 |
| 2 | O-Ring, Buna - N | 9-90001-221 |
| 2 | O-Ring, Viton | 9-90002-221 |
| 3 | O-Ring, Buna - N | 9-90031-324 |
| 3 | O-Ring, Viton | 9-90030-324 |
| 4 | Piston | 2-25694 |
| 5 | Dampener, Shock | 2-25107 |
| 6 | Cap, O-Ring | 2-25106 |
| 7 | Spring, Compression | 9-90435 |
| 8 | O-Ring, Buna - N | 9-90001-218 |
| 8 | O-Ring, Viton | 9-90002-218 |
| 9 | End Cap | 2-25693 |
| 10 | O-Ring, Buna - N | 9-90001-035 |
| 10 | O-Ring, Viton | 9-90002-035 |
| 11 | Ring, Retaining | 9-92001-016 |

TDI TURBOTWIN™
FROM TECH DEVELOPMENT, INC.

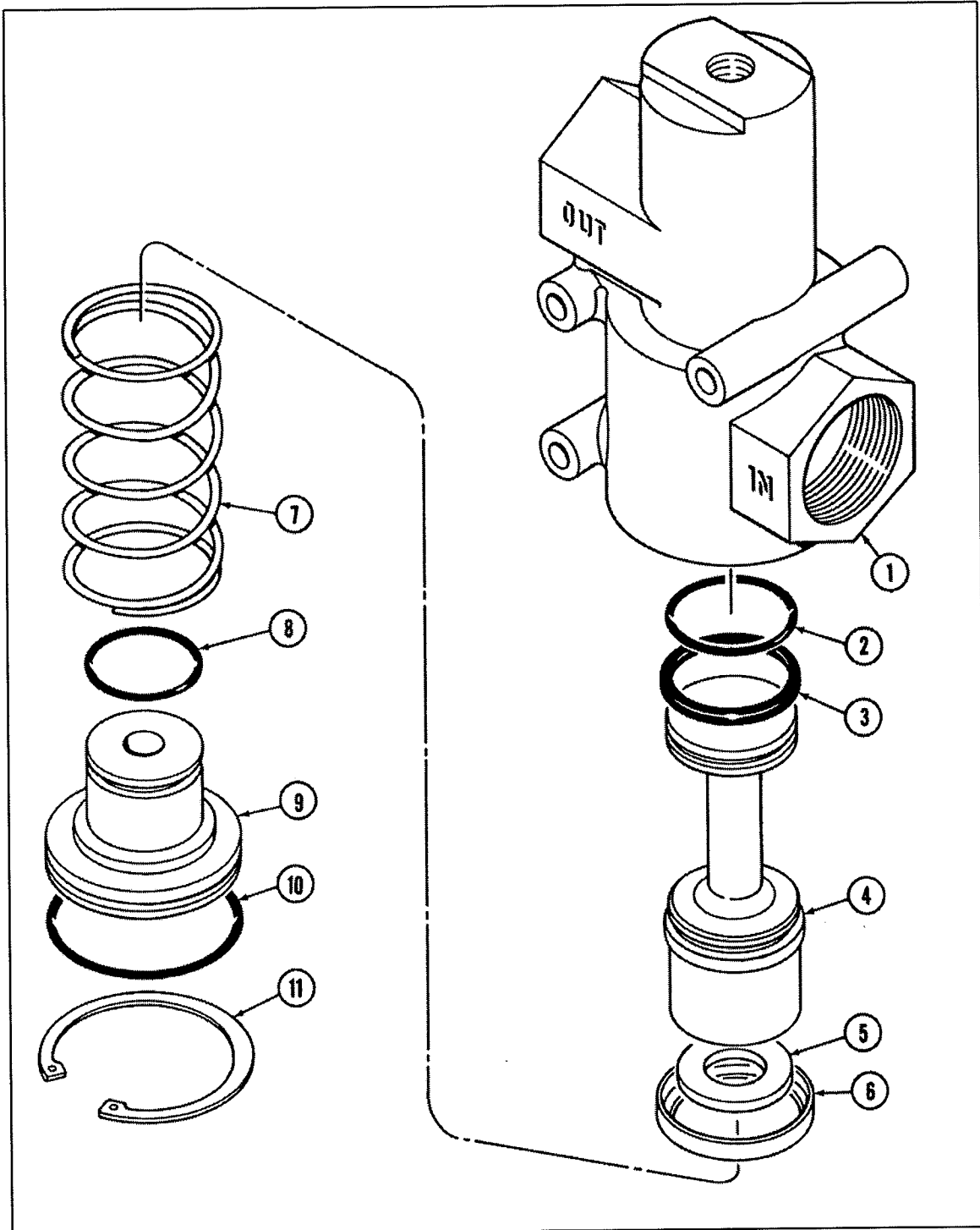


Figure 10. Exploded View of *TURBOVALVE* (Pneumatically Controlled)

7.0 ILLUSTRATED PARTS BREAKDOWN (Electrically Controlled)

| PART NUMBER | IN PORT | OUT PORT | O-RINGS | VOLTAGE | VALVE PART NUMBER | OVERHAUL KIT |
|---------------------|---------|----------|---------|---------|-------------------|--------------|
| RLVA-25683-012-1 | 1 ¼" | 1 ¼" | Buna-N | 12 VDC | 2-26324-001 | 2-26119-001 |
| RLVA-25683-012-2 | 1 ¼" | 1 ¼" | Viton | 12 VDC | 2-26324-001 | 2-26119-002 |
| RLVA-25683-012-1-01 | 1 ½" | 1 ½" | Buna-N | 12 VDC | 2-26324-001 | 2-26119-001 |
| RLVA-25683-012-2-01 | 1 ½" | 1 ½" | Viton | 12 VDC | 2-26324-001 | 2-26119-002 |
| RLVA-25683-024-1 | 1 ¼" | 1 ¼" | Buna-N | 24 VDC | 2-26324-010 | 2-26119-001 |
| RLVA-25683-024-2 | 1 ¼" | 1 ¼" | Viton | 24 VDC | 2-26324-010 | 2-26119-002 |
| RLVA-25683-024-1-01 | 1 ½" | 1 ½" | Buna-N | 24 VDC | 2-26324-010 | 2-26119-001 |
| RLVA-25683-024-2-01 | 1 ½" | 1 ½" | Viton | 24 VDC | 2-26324-010 | 2-26119-002 |
| RLVA-25683-110-2-01 | 1 ½" | 1 ½" | Viton | 110 VDC | 2-26324-003 | 2-26119-002 |
| RLVA-25683-120-2-01 | 1 ½" | 1 ½" | Viton | 120 VAC | 2-26324-004 | 2-26119-002 |

| KEY NO. | DESCRIPTION | PART NUMBER |
|---------|---------------------------------|---------------|
| 1 | Valve (12VDC) | 2-26324-001 |
| 2 | Screw (3) | 11F-19024-020 |
| 3 | O-Ring, Buna - N | 9-90001-010 |
| 3 | O-Ring, Viton | 9-90002-010 |
| 4 | Elbow, 90° Male | 9-93565-001 |
| 5 | Hose Assembly | 1P-23448-001 |
| 6 | Elbow, 90° Male | 9-93565-002 |
| 7 | Housing, Relay Valve (1 ¼" NPT) | 2-25692 |
| 7 | Housing, Relay Valve (1 ½" NPT) | 2-25692-001 |
| 8 | O-Ring, Buna - N | 9-90001-221 |
| 8 | O-Ring, Viton | 9-90002-221 |
| 9 | O-Ring, Buna - N | 9-90031-324 |
| 9 | O-Ring, Viton | 9-90030-324 |
| 10 | Piston | 2-25694 |
| 11 | Dampener, Shock | 2-25107 |
| 12 | Cap, O-Ring | 2-25106 |
| 13 | Spring, Compression | 9-90435 |
| 14 | O-Ring, Buna - N | 9-90001-218 |
| 14 | O-Ring, Viton | 9-90002-218 |
| 15 | End Cap | 2-25693 |
| 16 | O-Ring, Buna - N | 9-90001-035 |
| 16 | O-Ring, Viton | 9-90002-035 |
| 17 | Ring, Retaining | 9-92001-016 |

TDI TURBOTWIN™
FROM TECH DEVELOPMENT, INC.

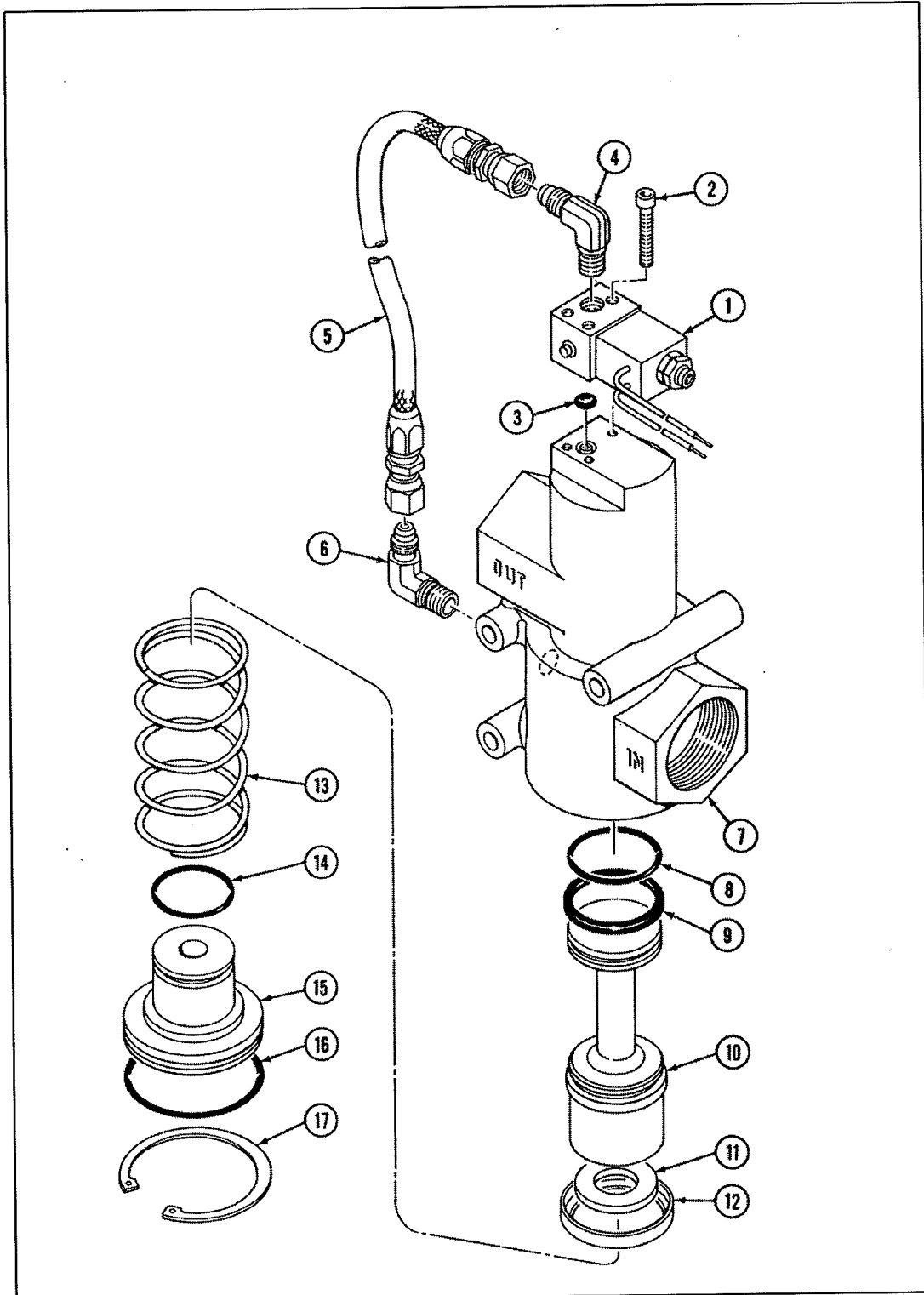


Figure 11. Exploded View of *TURBOVALVE* (Electrically Controlled)

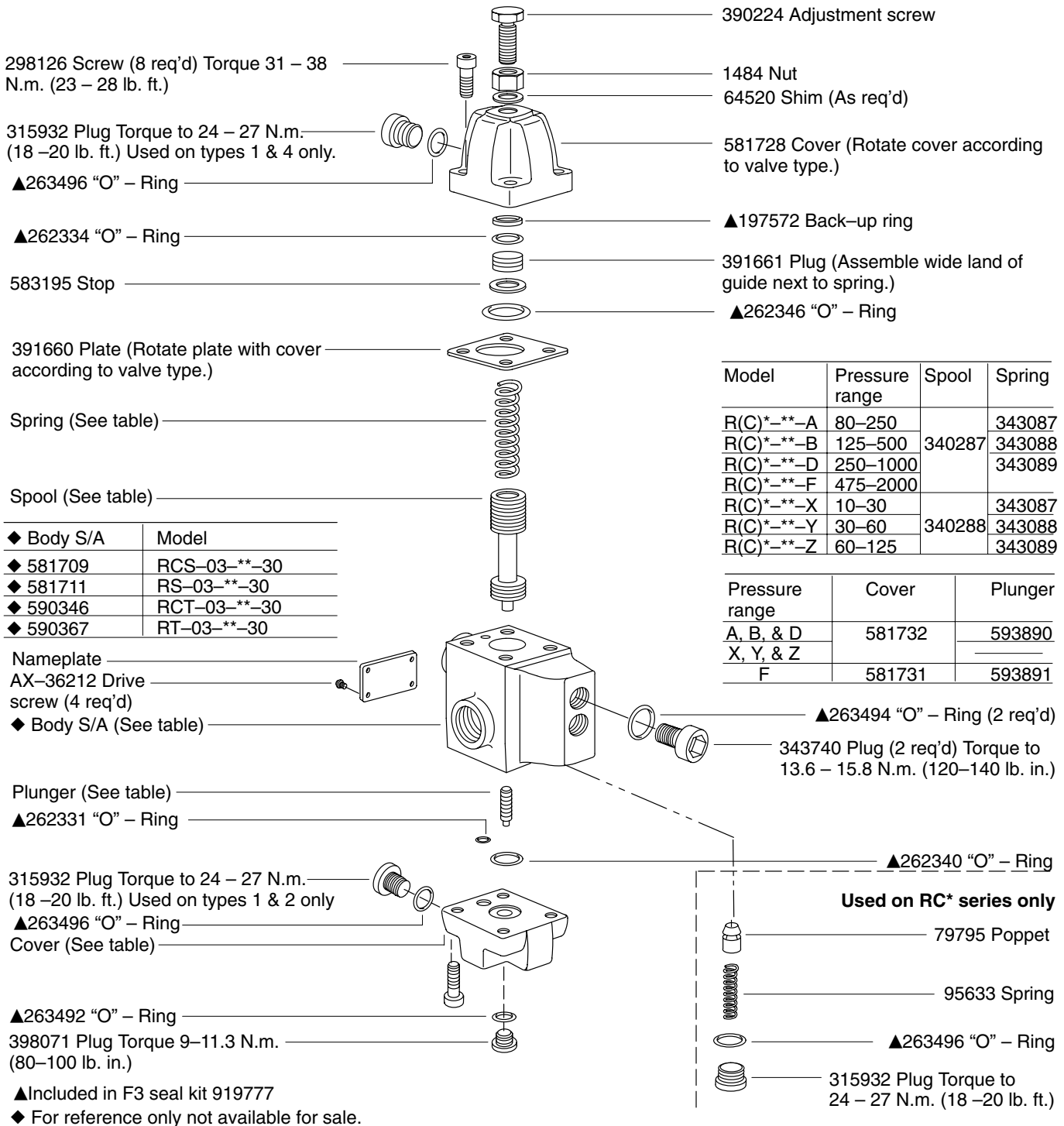
Pressure Relief



Pressure Control Valves

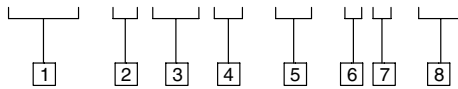
R(C)T-03-**-30

R(C)S-03-**-30



Model Code

(F3) - R (C) * - 03 - * * - 30



1 Special seals
(Omit on STD. models.)

2 Pressure control valve

3 Check valve option
C – With integral check valve
 (Reverse free flow)
Omit – No check valve

4 Mounting

S – .750–16 UNF–2B thread
T – 3/8" NPTF thread

5 Connection size

03 – 3/8"

6 Pressure range

A – 80 – 250 PSI
B – 125 – 500 PSI
D – 250 – 1000 PSI
F – 475 – 2000 PSI
X – 10 – 30 PSI
Y – 30 – 60 PSI
Z – 60 – 125 PSI

7 Valve types

(Inset views at bottom of page show cover positions for the (4) valve types.)

8 Design

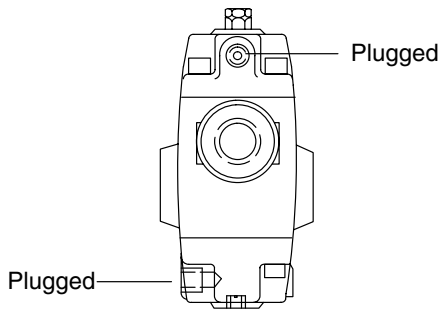
Typical model number
RCG-03-D4-30

Note

Assemble covers as shown to obtain valve action desired.

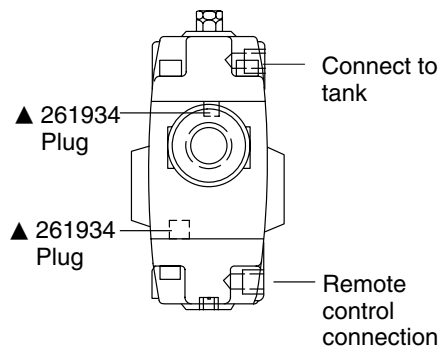
Type 1

RT series – Back pressure valve
 RCT series – Counterbalance valve
 Directly controlled internal drain



Type 3

RT or RCT series – Sequence valves
 Remotely controlled external drain

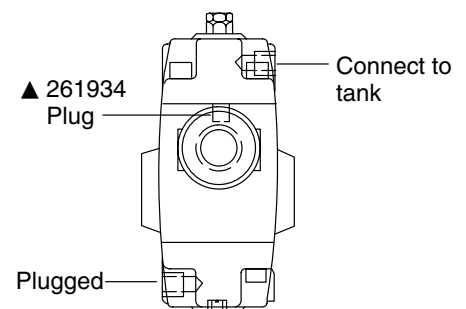


Note

Assemble covers as shown to obtain valve action desired.

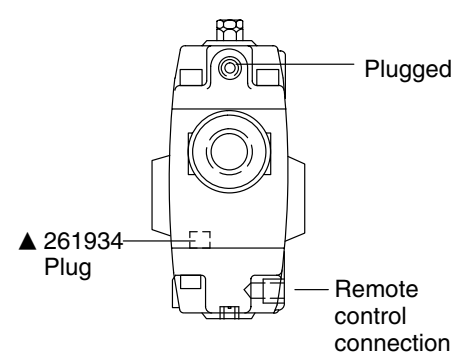
Type 2

RT or RCT series – Sequence valves
 Directly controlled external drain



Type 4

RT series – Unloading valve
 RCT series – Counterbalance valve
 Remotely controlled internal drain



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 16/13 or cleaner. Selections from pressure, return, and in-line filter series are recommended.