

Fisher DSV High Performance Digester Switching Valve (Obsolete Product)

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Emerson Process Management
Marshalltown, Iowa 50158 USA
Sorocaba, 18087 Brazil
Chatham, Kent ME4 4QZ UK
Dubai, United Arab Emirates
Singapore 128461 Singapore

www.Fisher.com

Fisher® DSV High Performance Digester Switching Valve

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Figure 1. Fisher DSV High Performance Digester Switching Valve



W5977

Introduction

Scope of Manual

This instruction manual includes installation, maintenance, and parts information for NPS 4 through 14 Fisher DSV eccentric disc control valve packages (figure 1) that mate with ASME, EN, or JIS flanges.

Description

The DSV digester switching valve package is specifically designed for high cycle, full stroke applications. The flangeless control valves have eccentrically mounted discs that self-center in the line during installation. The valve includes built-in electrical bonding of the shaft to the valve body.

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

Specifications

Specifications for the DSV are shown in table 1.



Table 1. Specifications

Valve Body Sizes and End Connection Styles

NPS 4 through 14 (through NPS 12 with alloy materials) flangeless valve bodies; see table 2 for valves that install between ASME and EN flanges

Maximum Inlet Pressures, Temperatures, and Pressure Drops⁽¹⁾

CF8M Stainless Steel (316 SST) Valve Bodies:
Consistent with applicable pressure-temperature ratings per table 2 up to the maximum material temperature capabilities (see bulletin 51.6:DSV), but do not exceed the pressure, temperature, and pressure drop conditions of the valve construction. Also see the Installation section.

Available Configuration

Double-acting pneumatic piston rotary actuator for
 ■ throttling service when used with positioner, or
 ■ on-off service when used with switching devices
 ■ high cycle O-rings for extended life

Actuator Sizes

■ 30, ■ 40

Cylinder Operating Pressure

Minimum Recommended:

1.4 bar (20 psig)

Maximum Allowable⁽¹⁾:

Size 30: 6.9 bar (100 psig)

Size 40: 10.3 bar (150 psig)

Material Temperature Capabilities⁽¹⁾

See Bulletin 51.6:DSV

Flow Characteristic

Approximately linear

Flow Direction

Forward flow is standard

Disc Rotation

Clockwise to close (when viewed from actuator end of valve body) through 90 degrees of disc rotation

Actuator/Valve Action

Standard mounting:

■ push-down-to-close (extending actuator rod closes the valve)

Valve Body Classification

ASME face-to-face dimensions for NPS 2 through 6, CL300

Mating Flange Capabilities

All sizes compatible with welding-neck and slip-on flanges (schedule 80 or lighter for NPS 2 through 12; schedule 40 or lighter for NPS 14)

Shaft Diameters

See table 2

Approximate Weight DSV Control Valve Assembly

| Actuator Size | Valve Size, NPS | kg | Lbs |
|---------------|-----------------|-----|-----|
| 30 | 4 | 31 | 69 |
| | 6 | 41 | 90 |
| | 8 | 54 | 118 |
| 40 | 10 | 75 | 165 |
| | 12 | 100 | 221 |
| | 14 | 117 | 257 |

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

Table 2. Valve Sizes, Shaft Diameters, and Rating and Flange Compatibility

| VALVE SIZE, NPS | SHAFT DIAMETER | | ASME RATING COMPATIBILITY—STAINLESS STEEL | ASME FLANGE COMPATIBILITY | EN FLANGE COMPATIBILITY |
|-----------------|----------------|--------|---|---------------------------|--|
| | mm | Inches | | | |
| 4 | 19.1 | 3/4 | CL150/300/600 | CL150, 300, or 600 | PN 25, 40, 63, 100 PN 25, 40, 63, 100 PN 40, 63, 100 |
| 6 | 25.4 | 1 | | | |
| 8 | 31.8 | 1-1/4 | | | |
| 10 | 31.8 | 1-1/4 | CL150 CL300 | CL150 CL300 | PN 10, 16 PN 10, 16 |
| 12 | 38.1 | 1-1/2 | CL150 CL300 | CL150 CL300 | PN 16, 25 PN 16, 25 |
| 14 | 38.1 | 1-1/2 | CL150 | CL150 ⁽¹⁾ | PN 10, 16 |

1. This flange compatibility rating per MSS-SP44 only.

Installation

Key numbers in this procedure are shown in figures 7, 8 and 9.

⚠ WARNING

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

Personal injury or property damage caused by sudden release of pressure can result if the valve assembly is installed where service conditions could exceed either the valve body rating or the flange joint rating. Use pressure-relieving or pressure-limiting devices to prevent the service conditions from exceeding these limits.

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.

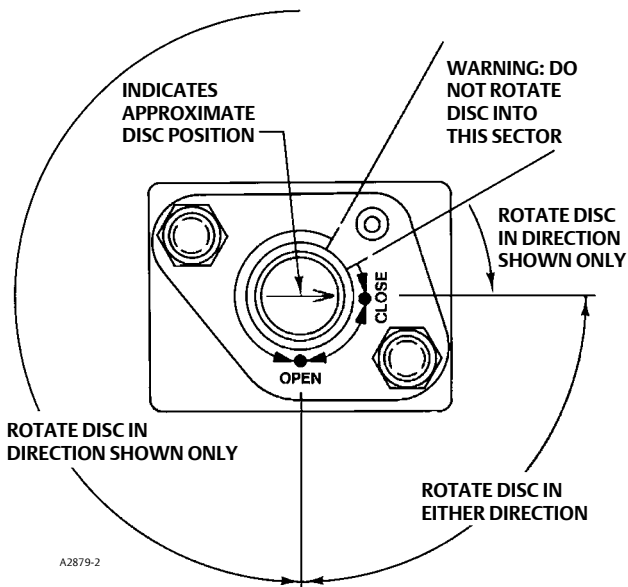
CAUTION

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

1. Install a three-valve bypass around the control valve assembly if continuous operation is necessary during inspection and maintenance of the valve.
2. Inspect the valve to be certain that it is free of foreign material.
3. The valve is normally shipped as part of a control valve assembly, with the actuator mounted on the valve.

If the actuator has been removed for maintenance, mount the actuator, and adjust actuator travel before inserting the valve into the line. This is necessary due to the measurements that must be made during the actuator adjustment process. Refer to the Actuator Mounting section of this manual for mounting and adjusting instructions before proceeding.

Figure 2. Disc Rotation Indication



4. Be certain that adjacent pipelines are free of any foreign material, such as pipe scale or welding slag, that could damage the valve body seating surfaces.

CAUTION

Damage to the disc (key 3) will occur if any pipe flanges or piping connected to the valve body interfere with the disc rotation path. However, the disc can be rotated without interference when the valve body is installed between adjacent pipe flanges or piping that has an inside diameter equal to or greater than either schedule 80 pipe for NPS 4 through 12, or schedule 40 pipe for NPS 14. If piping with a smaller inner diameter than specified above is connected to the valve, measure carefully to be certain the disc rotates without interference before putting the valve into operation.

5. Forward flow is the standard direction. Standard flow direction is also indicated by the flow direction arrow cast into the valve. Flow in the reverse direction is permissible.

CAUTION

Rotating the disc (key 3) past either the open or closed position could damage the seal and disc sealing surfaces and could cause the disc to jam in the valve body bore. Before rotating the disc, refer to either the packing follower (key 15) or the rotation tag (key 19, figures 7, 8 and 9). Both of these parts are located on the end of the valve that is opposite the actuator.

If the arrow or marking stamped on the end of the valve shaft lies between the open and closed positions, the disc may be rotated in either direction. If the arrow or marking indicates that the disc has been rotated beyond the open or closed position, the disc may be rotated in one direction only.

6. With the disc in the closed position, install line flange gaskets, and insert the valve between the pipeline flanges. Use either flat sheet gaskets or spiral-wound gaskets with compression-controlling centering rings. Spiral-wound gaskets without compression-controlling centering rings are not recommended for this purpose. Composition gaskets may be used to 343°C (650°F), and the optional FGM gaskets (key 29, not shown) are available with NPS 4 through 14 DSV valve bodies and may be used for -129 to 538°C (-200 to 1000°F) temperatures.

7. Proceed as appropriate to center the valve body on the flanges:

For NPS 4, the valve bodies are provided with centering holes (see figure 7). **For NPS 6 and 8**, four centering lugs are cast into the valve body (key 1, figure 8) and each lug engages one corresponding line flange stud. First, install two line flange studs into the line flanges, and then insert the valve between the flanges to roughly center the valve body in the pipeline. If the actuator is attached to the valve body during installation, it may be necessary to install more than two line flange studs between the flanges to securely hold the valve body and actuator.

For NPS 10 through 14, insert the valve into the pipeline, and support the valve in position. Then install the line flange studs through the pipeline flanges to roughly center and support the valve.

8. After centering the valve body, first lubricate and then install the remaining line flange studs to secure the valve in the pipeline. Tighten the nuts to the line flange studs in a crisscross sequence to ensure proper alignment of the valve body with the flanges.

⚠ WARNING

Personal injury could result from packing leakage. Valve packing was tightened prior to shipment; however, some readjustment will be required to prevent leakage at the specific conditions. Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

Maintenance

Valve parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions.

⚠ WARNING

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

- Do not remove the actuator from the valve while the valve is still pressurized.
- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.
- Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
- Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from both sides of the valve.
- Vent the power actuator loading pressure and relieve any spring precompression.

If the shaft is broken, pressure can force a portion of the broken shaft out of the valve as the actuator is being disassembled or as the packing flange or follower is being removed.

- 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 from under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

Packing Maintenance

Key numbers are referenced in figures 7, 8 and 9, unless otherwise indicated. All maintenance operations in this section may be performed with the valve body in the line.

Note

If the valve has ENVIRO-SEAL™ packing, refer to the ENVIRO-SEAL Packing System for Rotary Valves instruction manual, D101643X012.

Stopping Leakage

For packings covered in this manual, leakage around the packing followers can be stopped by tightening the packing flange nuts (key 12).

If the packing is relatively new and tight on the shaft, and if tightening the packing flange nuts does not stop leakage, it is possible that the shaft is worn or nicked so that a seal cannot be made. If the leakage comes from the outside diameter of the packing, it is possible that the leakage is caused by nicks or scratches around the packing box wall. Inspect the shaft and packing box wall for nicks and scratches when performing the following procedures.

Replacing Packing

This procedure may be performed without removing the actuator from the valve if adding split PTFE/composition packing rings as a temporary measure on the actuator side of the valve. However, the actuator must be removed from the valve if replacing any other kind of packing on the actuator side of the valve.

1. Isolate the control valve, and shut off all pressure lines to the power actuator. Release pressure from the valve body and actuator, and disconnect the pressure lines from the actuator if it will be removed from the valve.
2. Remove the packing flange nuts (key 12) and packing follower (key 15), plus the packing flange (key 9) if used, from the side of the valve opposite the actuator.

CAUTION

If removing the actuator in the following step, use a wheel puller to separate the actuator parts from the valve shaft. Do not drive the actuator parts off the valve shaft since this could move the valve bearings and disc away from the centered position, thereby damaging the disc and the valve body.

3. If it is necessary to remove the actuator, remove the cap screws (key 22) and, if used, the hex nuts (key 30).
4. Remove the packing flange nuts and pull out the packing follower (key 16), plus the packing flange (key 10) if used, from the actuator side of the valve.
5. Remove the old anti-extrusion rings (key 106), and the old packing rings (key 13). Carefully avoid scratching the shaft or packing box wall to avoid damage that could cause leakage around the shaft. Clean all accessible metal parts and surfaces to remove particles that would prevent the packing from sealing.

Note

Lightly lubricate new PTFE V-rings with silicone-base phenylmethyl siloxane lubricant to aid in assembly.

6. Install the new anti-extrusion rings and the new packing rings, making sure that PTFE/composition packing rings are installed so that the ring splits do not line up to form a leak path. With graphite ribbon packing, stack the packing rings and packing washers together and slide the stack into the packing box as far as it will go while carefully avoiding trapping air among the rings.
7. Install both packing followers, and, if used, the packing flanges.
8. Install the packing flange nuts, and tighten them only far enough to stop leakage under normal operating conditions.
9. Mount the actuator if it was removed from the valve and adjust actuator travel before returning the valve to service. This is necessary due to the measurements that must be made during the actuator adjustment process. Refer to the Actuator Mounting section of this manual for mounting and adjusting instructions before proceeding.
10. When the control valve is being put into operation, check around the packing follower for leakage; retighten the packing flange nuts as required according to accepted bolting procedures.

Replacing the Disc and Shaft Assembly or the Bearings

Perform this procedure to replace the valve disc, shaft, and taper pin assembly if the disc does not rotate in response to rotation of the actuator end of the valve shaft. Unless otherwise indicated, part key numbers are shown in figures 7, 8 and 9.

Disassembly

▲ WARNING

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

CAUTION

Use a wheel puller to separate actuator parts from the valve shaft. Driving the parts off the valve shaft could move the valve bearings and disc away from the centered position, damaging the disc and valve body.

1. Remove the cap screws (key 22) and, if used, the hex nuts (key 30). Remove the actuator from the valve body.
2. Rotate the disc (key 3) to the fully open position.
3. Locate the side of the disc that has two C markings cast into it. Drive the two taper pins (key 3C) out toward the C-marked side of the disc. Attempting to drive the taper pins in the opposite direction only tightens the pins.
4. Unscrew and remove the packing flange nuts (key 12), packing followers (keys 15 and 16), and packing flanges (keys 9 and 10) if used, from both sides of the valve.

▲ WARNING

Once the shaft has been removed in the following step, the disc may fall from the valve body. To avoid personal injury and disc damage, support the disc to prevent it from falling as the shaft is being removed.

5. Pull the shaft out through the actuator side of the valve. If the shaft cannot be pulled free, carefully use a pin punch to drive the shaft out from the side opposite the actuator. Do not damage the end of the shaft with the punch.

6. Remove the disc and spacers (key 7) from the valve.
7. Remove the anti-extrusion rings (key 106), the packing rings (key 13), and the packing box rings (key 14) from both sides of the valve.
8. If either of the bearings (key 6) require maintenance or replacement, press them out, or remove them using a bearing puller. For constructions with a metal bearing, a bearing stop (key 25) will also be removed with the bearing.

CAUTION

When replacing a valve disc or shaft, a new disc/shaft/taper pin assembly (key 3) should be used. Using a new disc with a used shaft requires drilling and reaming new taper pin holes in the shaft. The extra set of taper pin holes weakens the shaft and may cause it to fail in service.

9. Clean the packing boxes and metal packing box parts.

Assembly

⚠ WARNING

Do not lubricate parts when used in oxygen service, or where the lubrication is incompatible with the process media. Any use of lubricant can lead to the sudden explosion of media due to the oil/oxygen mixture, causing personal injury or property damage.

Note

Before performing the following step, lubricate the outer bearing surfaces—except on oxygen service—with dry-film lubricant to facilitate future removal. Do not lubricate the insides of PTFE-lined bearings. Do not lubricate bearings that will be used for oxygen service.

1. If new bearings and, if used, bearing stops (key 25) are required, insert them through the packing boxes. Press the bearings in until the bearing end is flush with the valve body bore at one point and the remainder of the bearing end protrudes into the valve body bore, or use a bearing puller to properly install and locate the new bearings and the bearing stops.
2. Install spacers (key 7) into the disc (key 3). The spacers fit loosely in the disc.

Note

Do not apply grease according to the following step if it is undesirable to contaminate the process fluid with grease and the thorough cleaning in step 7 cannot be performed.

3. A small amount of heavy grease applied to the spacers will help to hold them in place during the subsequent centering procedure.
4. Insert the disc into the valve. Be certain the taper pin holes in the disc are on the actuator side of the valve. Also be certain the letter C stamped on either face of the disc is on the same side of the valve as the letter C stamped on the outside of the valve.
5. Slide the shaft through the valve body and disc.

6. Rotate the disc to the closed position. Measuring carefully, center the disc in the valve body bore. With the disc centered, use a feeler gauge to measure the clearance between each spacer and bearing. The clearance between each spacer and bearing should be equal. If necessary, remove the disc and shaft, and reposition the bearings. Reinstall the disc and shaft, and repeat the centering and measuring process.
7. If the grease used to hold the spacers will contaminate the process fluid, disassemble the shaft and disc, remove the spacers, and clean the disc, valve body bore, and spacers thoroughly. Reinstall the disc and spacers into the valve. Insert the shaft into the valve and through the disc.
8. Slide the shaft all the way into the valve body.
9. To ensure that the direction of taper in the shaft taper pin holes matches that of the disc taper pin holes, proceed as appropriate:

Temporarily install the packing follower (key 15) or, if used, the packing flange (key 9) with rotation tag (key 19). With the disc fully opened, rotate the shaft until the arrow on the end of the shaft points to OPEN on the disc rotation tag. Insert the taper pins (key 3C), small end first, into the taper pin holes on the C-marked side of the disc. Do not drive in the pins. Remove the packing follower or flange.

10. Insert a packing box ring (key 14) into each packing box.
11. Install the packing according to the appropriate instructions presented in steps 5 through 8 of the Replacing Packing section.
12. Drive in the taper pins securely.
13. Rotate the disc to the closed position.

Actuator Mounting

Use the following steps to connect a valve and actuator that were separated for maintenance purposes.

⚠ WARNING

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

On the travel indicator side of the actuator:

1. Remove the cap screws and washers (keys 35 and 76), and remove the actuator cover (key 34).
2. If the lever (key 28) is attached to the rod end bearing (key 12), remove the cap screw and hex nut:
 - Remove the cap screw and hex nut (keys 13 and 14).

On the valve side of the actuator:

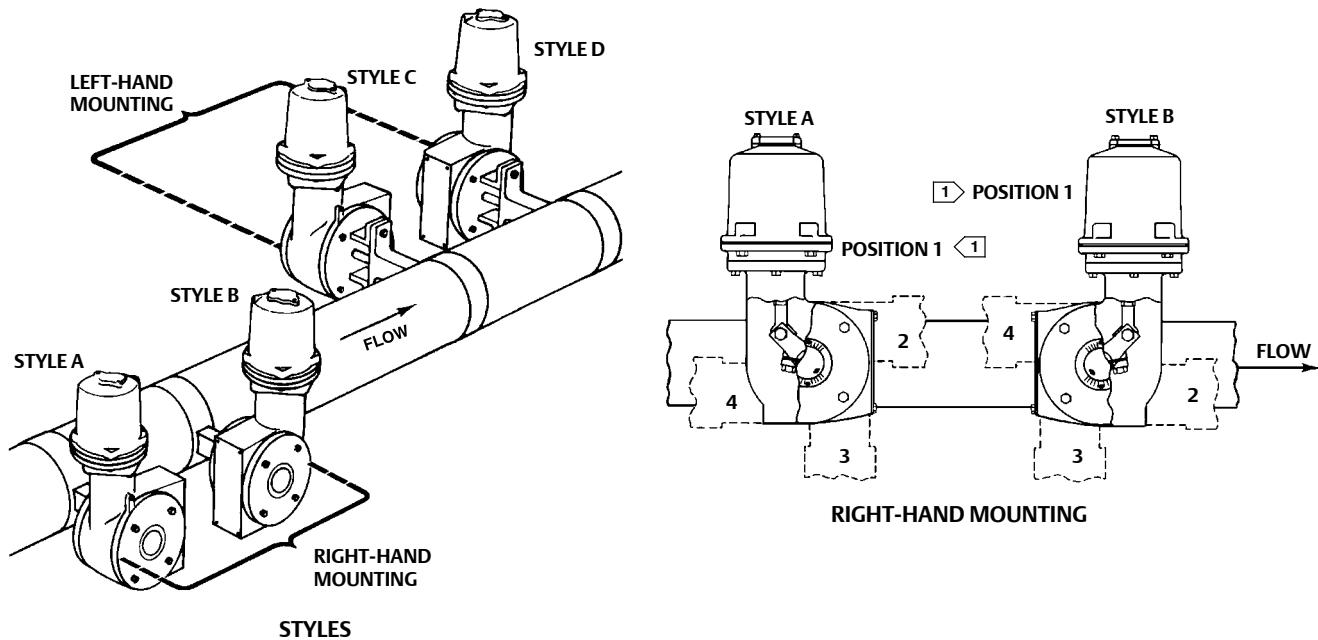
3. The actuator is normally positioned vertically with the valve in a horizontal pipeline. Refer to figure 3 for available mounting styles and positions that match your application. Also, refer to the lever/shaft orientation provided in the valve instruction manual.

Note

It is important, when installing the actuator on the valve, to be sure that the valve is positioned correctly.

- Note the actuator style, position, and lever in relationship to the valve body and drive shaft end marks (see step 15, below).
 - The valve internal components can be damaged if forced past its fully open or fully closed position.
-

Figure 3. Mounting Styles and Positions



NOTES:

1. POSITION 1 IS STANDARD; POSITIONS 2 THROUGH 4 (SHOWN IN DOTTED LINES) ARE ALTERNATES.
2. BY EMERSON PROCESS MANAGEMENT DEFINITION:
 - FORWARD FLOW IS INTO THE FACE SIDE OF DISC, OR BALL SEALING SURFACE.
 - REVERSE FLOW IS INTO THE HUB SIDE OF THE DISC OR BALL.

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4. Screw the mounting yoke (key 23) onto the actuator, and tighten the screws (key 24). Slide the actuator onto the valve shaft, and secure the mounting yoke to the valve body with the valve mounting screws.
5. Tighten the valve mounting cap screws to the bolting torque listed below:

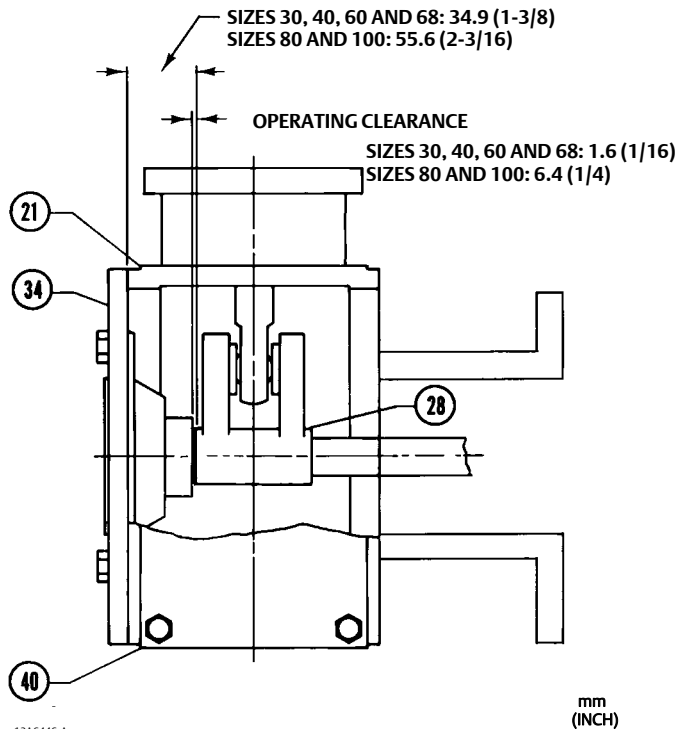
Use a bolting torque value of 41 N•m (30 lbf•ft) for 19.1 and 25.4 mm (3/4-inch and 1-inch) diameter valves shafts and 135 N•m (100 lbf•ft) for 31.8 and 38.1 mm (1-1/4 and 1-1/2 inch) diameter valve shafts.

6. Hold the valve in the correct position, and secure it with the cap screws (key 24).

On the travel indicator side of the actuator:

7. Screw the left-hand threaded hex nut (key 71) onto the piston rod (key 10) as far as possible.
8. Screw the turnbuckle (key 70) onto the piston rod as far as possible. Finger tighten it, as this adjustment will be changed in a later step.
9. Screw the hex nut (key 11) onto the rod end bearing. Then thread this assembly completely into the turnbuckle.
10. To aid installation of the lever, apply lithium grease (key 93) to the valve shaft spline.
11. Refer to the appropriate valve instruction manual for lever/shaft orientation marks, and slide the lever into place.
 - Refer to figure 4 for the appropriate lever operating clearance.
 - Hold the lever in position, and secure the assembly with the cap screw (key 29).

Figure 4. Lever Operating Clearance



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12. Rotate the lever until the cap screw hole is aligned with the rod end bearing (key 12). You may need to adjust the turnbuckle to make this alignment.
13. For all actuator sizes, apply thread locking adhesive (medium strength) (key 92) to the cap screw (key 13) threads.

▲ WARNING

Refer to table 3 for bolt torque requirements. Exceeding any torque requirements could damage actuator parts and impair safe operation.

14. Connect the lever to the rod end bearing with the cap screw and hex nut (keys 13 and 14). Torque cap screw and hex nut to the value listed in table 3.
15. Note the valve disc or ball position and direction of rotation.

Position the travel indicator (key 38) according to the valve disc or ball position just noted. Replace the cover (key 34), and secure it with the washers and cap screws (keys 76 and 35).

If the holes in the cover and housing (key 21) do not align, temporarily loosen the cap screws (key 24) and shift the housing slightly. Do not stroke the actuator while the cover is off.

Table 3. Recommended Bolting Torques

| KEY NUMBER | ACTUATOR SIZE | | | |
|------------|---------------|--------|-----|--------|
| | 30 | | 40 | |
| | N•m | lbf•ft | N•m | lbf•ft |
| 3 | 102 | 75 | 102 | 75 |
| 6 | 14 | 10 | 14 | 10 |
| 9 | 61 | 45 | 136 | 100 |
| 11 | 34 | 25 | 102 | 75 |
| 13 | 81 | 60 | 271 | 200 |
| 22 | 23 | 17 | 68 | 50 |
| 24 | 34 | 25 | 81 | 60 |
| 29 | 81 | 60 | 271 | 200 |
| 35 | 34 | 25 | 81 | 60 |
| 41 | 14 | 10 | 14 | 10 |
| 71 | 102 | 75 | 163 | 120 |

Table 4. Wrench Required for Turnbuckle Adjustments, Inches

| ACTUATOR SIZE | TURNBUCKLE (KEY 70) | LOWER LOCKNUT (KEY 11) | UPPER LOCKNUT (KEY 71) |
|---------------|---------------------|------------------------|------------------------|
| 30 | 1-1/8 | 3/4 | 1-1/8 |
| 40 | 1-5/16 | 1-1/8 | 1-5/16 |

Adjustment

The only adjustment on the Fisher 1061 actuator is to make sure that the valve disc or ball is correctly closed when the actuator piston is against the travel stop. For accurate adjustment to the zero-degree valve disc or ball position, you must remove the control valve from the pipeline.

Perform the following steps to adjust the actuator turnbuckle. A regulated air supply will be required to stroke the actuator during this procedure. Also, when you perform this adjustment, refer to table 4 for the sizes of open-end wrenches required to loosen and tighten the hex nuts and turnbuckle.

⚠ WARNING

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

1. Remove the access plate (key 72). Also remove the machine screws (key 73) if present.

Note

The cover (key 34) supports the outer end of the valve shaft and should not be removed during actuator adjustment.

2. Stroke the actuator until you can reach the lower hex nut (key 11) through the access opening. Loosen the hex nut.
3. Stroke the actuator until you can reach the left-hand threaded upper hex nut (key 71) through the access opening. Loosen the hex nut.
4. **For standard Push-down-to-close** (extending piston rod closed valve): Slowly stroke the actuator to the down travel stop. Determine the closed position of the valve. Adjust the turnbuckle (key 70) until the valve is in the closed position. Lock this adjustment with the left-hand threaded hex nut (key 71). Stroke the actuator to the up travel

stop, and tighten the lower hex nut (key 11). Check thread engagement distance. The thread engagement should be the distance of the diameter of the thread. Tighten the lower hex nut (key 11) using the torque values shown in table 3.

5. Replace the access plate (key 72).
6. Loosen the self-tapping screws (key 39), and adjust the travel indicator (key 38). Re-tighten the self-tapping screws.

Disassembly

The following procedure describes how to completely disassemble the actuator. When inspecting and replacing parts, perform only those steps necessary to accomplish the repair.

⚠ WARNING

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

1. Unscrew the cap screws and washers (keys 35 and 76), and remove the cover (key 34). If an optional manual handwheel actuator is used, it will be removed with the cover.
 2. Slide the hub (key 30) from the cover (key 34).
- If necessary, remove the travel indicator (key 38), by removing the screws (key 29) from the hub (key 30).
3. Check the condition of the cover bushing (key 32).
 4. Inspect and, if necessary, replace the cover bushing (key 32). Remove the travel indicator scale (key 36) by removing the self-tapping screws (key 37). Press the bushing out of the cover (key 34).
 5. Remove the cap screw and hex nut (keys 13 and 14).
 6. Note the lever/valve shaft orientation. Loosen cap screw (key 29).

CAUTION

Use a wheel puller to separate actuator parts from the valve shaft. Driving the parts off the valve shaft could move the valve bearings and disc away from the centered position, damaging the disc and valve body.

7. Unscrew the cap screws (key 6) and remove the cylinder cap (key 4). Inspect and, if necessary, replace the O-ring (key 5).
8. Remove the rod end bearing (key 12) and hex nut (key 11), remove the turnbuckle (key 70) and hex nut (key 71).
9. Remove the cap screws (key 3) and slide the cylinder assembly (key 1) from the cylinder flange (key 2).
10. Pull the piston (key 7) and piston rod (key 10) from the cylinder assembly.
11. Inspect and, if necessary, replace the Quad O-ring (key 8) and the O-ring (key 16).
12. To separate the piston (key 7) from the piston rod (key 10), unscrew the cap screw or hex nut and washer (keys 9 and 77).
13. Unscrew the cap screws (key 22) and remove the cylinder flange (key 2), sliding seal (key 19), and seal support cylinder (key 20).
14. Inspect, and if necessary, replace the Quad O-ring (key 17) the O-ring (key 18) and thrust washer (key 74).
15. Unscrew the cap screws (key 24) from the mounting yoke, and remove the actuator housing assembly (key 21).
16. Unscrew the mounting yoke (key 23) from the valve by removing the valve mounting cap screws. Slide the yoke off the valve shaft.

17. Inspect, and if necessary replace the mounting yoke bushing (key 81). It may be necessary to press out the bushing.

Assembly

This procedure assumes that the actuator was completely disassembled. If the actuator was not completely disassembled, start these instructions at the appropriate step. This procedure also assumes that the valve is removed from the pipeline for ease in actuator assembly and adjustment. When assembling parts, make sure that all O-rings and Quad O-rings are positioned correctly.

Key numbers used in the following procedures are shown in figures 5 and 6.

Note

Many of the replacement mounting yokes (key 23) are available only as assemblies that also include the bushing (key 81). However, replacement bushings are also available separately (see the parts list; keys 23 and 81).

1. If the bushing (key 81) was removed, press in the new bushing. The end of the bushing should be flush with the bottom of the recess in the mounting yoke (key 23).
2. Slide the mounting yoke over the valve shaft, and secure it to the valve with the valve mounting cap screws.
3. Tighten the valve mounting cap screws to the bolting torque listed below:
Use a bolting torque value of 41 N•m (30 lbf•ft) for 19.1 and 25.4 mm (3/4-inch and 1-inch) diameter valves shafts and 135 N•m (100 lbf•ft) for 31.8 and 38.1 mm (1-1/4 and 1-1/2 inch) diameter valve shafts.
4. Refer to figure 3 for the desired orientation of the housing (key 21). Secure the housing to the mounting yoke with the cap screws (key 24).
5. Apply lithium grease (key 93) to the surfaces of the sliding seal (key 19). Refer to torque values shown in table 2. Be sure the Quad O-ring (key 17) and O-ring (key 18) are inserted correctly.
6. Install the seal support cylinder (key 20), the thrust washer (key 74), the sliding seal, and the cylinder flange (key 2) and secure these parts with the cap screws (key 22).
7. **If 60-degree rotation is specified**, a travel stop (key 15) will be threaded into the cylinder flange.
8. Apply lithium grease (key 93) to the valve shaft. Refer to the appropriate valve instruction manual for lever/valve shaft orientation marks, and slide the lever (key 28) into place. See figure 4 for correct lever operating clearance.
9. Hold the lever in place (see figure 4), and clamp the lever to the valve shaft with the cap screw (key 29).
10. Apply lithium grease (key 93) to the sealing surface of the piston rod (key 10) and apply anti-seize sealant (key 91) to the tapered end of the piston rod.
11. Attaching the piston to the piston rod:
 - a. Attach the piston (key 7) to the piston rod, and secure it with the cap screw and washer (keys 9 and 77).
 - b. Tighten the screw or nut to the torque specified in table 3.
12. Insert the piston and piston rod assembly down through the sliding seal (key 19). Attach the hex nut (key 71), turnbuckle (key 70), hex nut (key 11), and rod end bearing (key 12) to the piston rod assembly.
13. Rotate the lever to align with the rod end bearing. This connection can be aided by carefully moving the piston/rod assembly up or down.
14. Apply thread locking adhesive (medium strength) (key 92) to the threads of the cap screw (key 13).
15. Connect the lever and the rod end bearing with the cap screw and hex nut (keys 13 and 14).

16. Install the Quad O-ring (key 8) on the piston edge. Apply lithium grease (key 93) to the inside wall of the cylinder. Install the cylinder (key 1).
17. Attach the cylinder assembly (key 1) to the cylinder flange with the cap screws (key 3).
18. Place the O-ring (key 5) in the cylinder cap, replace the cylinder cap (key 4), and secure it to the cylinder assembly with the cap screws (key 6). Tighten all cap screws to the torques specified in table 3.
19. Install the hub (key 30) plus bushing (key 32) into the cover (key 34).
20. Replace the travel indicator scale (key 36), and secure it with the self-tapping screws (key 37). Install the travel indicator (key 38), and secure it with the self-tapping screws (key 39).
21. Note the valve disc position and direction of rotation and position the travel indicator (key 38) according to the valve disc position. Replace the cover (key 34) and secure it with the cap screws and washers (key 35 and 76). If the holes in the cover and housing do not align, temporarily loosen the cap screws (key 24) and shift the housing slightly. Do not stroke the actuator while the cover is off.
22. Follow the instructions in the Adjustment section of this instruction manual for correct actuator turnbuckle adjustment.

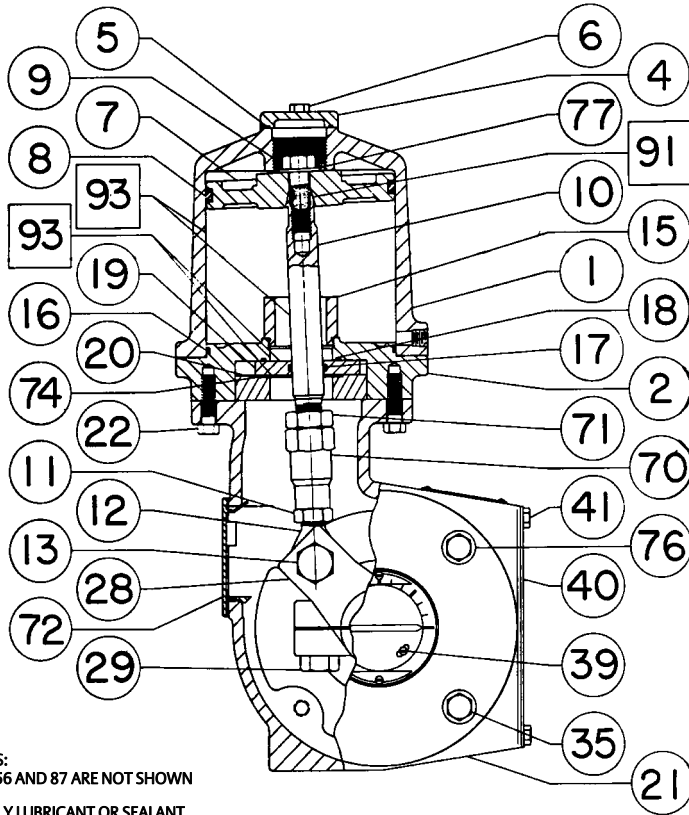
Parts Ordering

Each valve is assigned a serial number which can be found on the valve body. This same number also appears on the actuator nameplate when the valve is shipped from the factory as part of a control valve assembly. Refer to the serial number when contacting your Emerson Process Management sales office for technical assistance. When ordering replacement parts, refer to the serial number and to the 11-character part number for each part required from the following parts list.

▲ WARNING

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

Figure 5. Typical Assembly for Sizes 30 & 40 Fisher 1061 Actuators



NOTES:
KEYS 56 AND 87 ARE NOT SHOWN
□ APPLY LUBRICANT OR SEALANT
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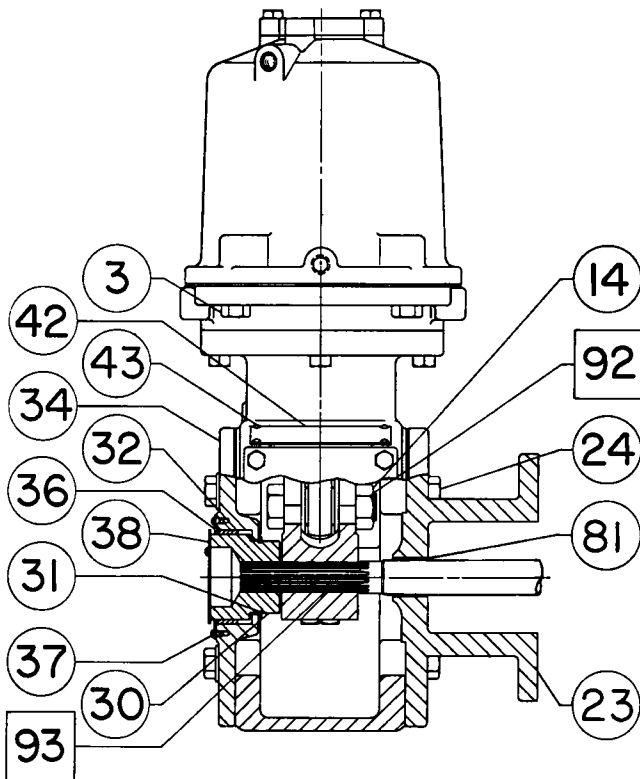
Parts List

Note
Part numbers are shown for recommended spares only. For part numbers not shown, contact your Emerson Process Management sales office.
Except where indicated, sizes shown are valve body sizes.

| Key | Description | Part Number |
|-----|---|-------------|
| 1 | Valve Body If you need a valve body as a replacement part, order by valve size, serial number, and desired material. | |
| 3 | Disc, Shaft & Taper Pin Assembly | |
| 3C* | Taper Pin (2 req'd) | |
| | S20910 | |
| | NPS 4 | G11940K0022 |
| | NPS 6 | 12A8817X062 |
| | NPS 8 & 10 | 12A8949X082 |
| | NPS 12 & 14 | 12A9029X062 |
| | N05500 | |
| | NPS 4 | G1194040022 |
| | NPS 6 | 12A8817X032 |

| Key | Description | Part Number |
|-----|---------------------------------|-------------|
| 3C* | Taper Pin (2 req'd) (continued) | |
| | N05500 | |
| | NPS 8 & 10 | 12A8949X042 |
| | NPS 12 | 12A9029X032 |
| | N10276 | |
| | NPS 4 | G1194040152 |
| | NPS 6 | 12A8817X042 |
| | NPS 8 & 10 | 12A8949X052 |
| | NPS 12 | 12A9029X042 |
| | N08020 | |
| | NPS 4 | G1194040092 |
| | NPS 6 | 12A8817X052 |
| | NPS 8 & 10 | 12A8949X062 |
| 6* | Bearing (2 req'd) | |
| | Lined | |
| | Stainless steel/PTFE/comp | |
| | NPS 4 | 12A8985X052 |
| | NPS 6 | 12A8819X052 |
| | NPS 8 & 10 | 12A8965X052 |
| | NPS 12 & 14 | 12A8928X052 |
| | S31600/PTFE/comp | |
| | NPS 4 | 12A8985X032 |
| | NPS 6 | 12A8819X032 |
| | NPS 8 & 10 | 12A8965X032 |
| | NPS 12 & 14 | 12A8928X032 |

Figure 6. Typical Assembly for Sizes 30 & 40 Fisher 1061 Actuators (continued)



□ APPLY LUBRICANT OR SEALANT

58A9228-A

| Key | Description | Part Number | Key | Description | Part Number |
|-----|-------------------------------|-------------|-----|---|-------------|
| 6* | Bearing (2 req'd) (continued) | | 7 | Spacer (2 req'd) | |
| | S31600/PTFE | | 9 | Packing Flange, Outboard | |
| | NPS 4 | 12A8985X032 | 10 | Packing Flange | |
| | NPS 6 | 12A8819X032 | 11 | Packing Flange Stud (4 req'd) | |
| | NPS 8 & 10 | 12A8965X032 | 12 | Packing Flange Nut (4 req'd) | |
| | N08020/PTFE | | 13* | Packing Set (2 req'd) | |
| | NPS 4 | 12A8985X132 | | TFE & Carbon filled TFE | |
| | NPS 6 | 12A8819X152 | | NPS 4 | 12A8995X022 |
| | NPS 8 & 10 | 12A8965X152 | | NPS 6 | 12A8832X022 |
| | NPS 12 | 12A8928X132 | | NPS 8 & 10 | 12A8951X022 |
| | All-metal | | | NPS 12 & 14 | 12A8935X022 |
| | S44004 (440C SST) | | | Packing parts included in packing set) | |
| | NPS 4 | 14A5698X012 | 14 | Packing Box Ring (2 req'd) | |
| | NPS 6 | 14A4618X012 | 15 | Packing follower | |
| | NPS 8 & 10 | 14A5699X012 | 16 | Packing follower | |
| | NPS 12 & 14 | 14A6549X012 | 17 | Groove Pin, stainless steel | |
| | R30016 (Alloy 6B) | | 18 | Drive Screw, stainless steel | |
| | NPS 4 | 14A6546X012 | 19 | Rotation Tag, stainless steel | |
| | NPS 6 | 14A6547X012 | 22 | Cap Screw | |
| | NPS 8 & 10 | 14A6548X012 | 23 | Nameplate, stainless steel | |
| | NPS 12 & 14 | 14A6550X012 | 25 | Bearing Stop (2 req'd) (use w/metal bearing only) (not shown) | |
| | R30016 (Alloy 6B)/silver | | 26 | Line Flange Stud (not shown) | |
| | NPS 4 | 14A6537X012 | | | |
| | NPS 6 | 14A2498X012 | | | |
| | NPS 8 & 10 | 14A6538X012 | | | |
| | NPS 12 & 14 | 14A6539X012 | | | |

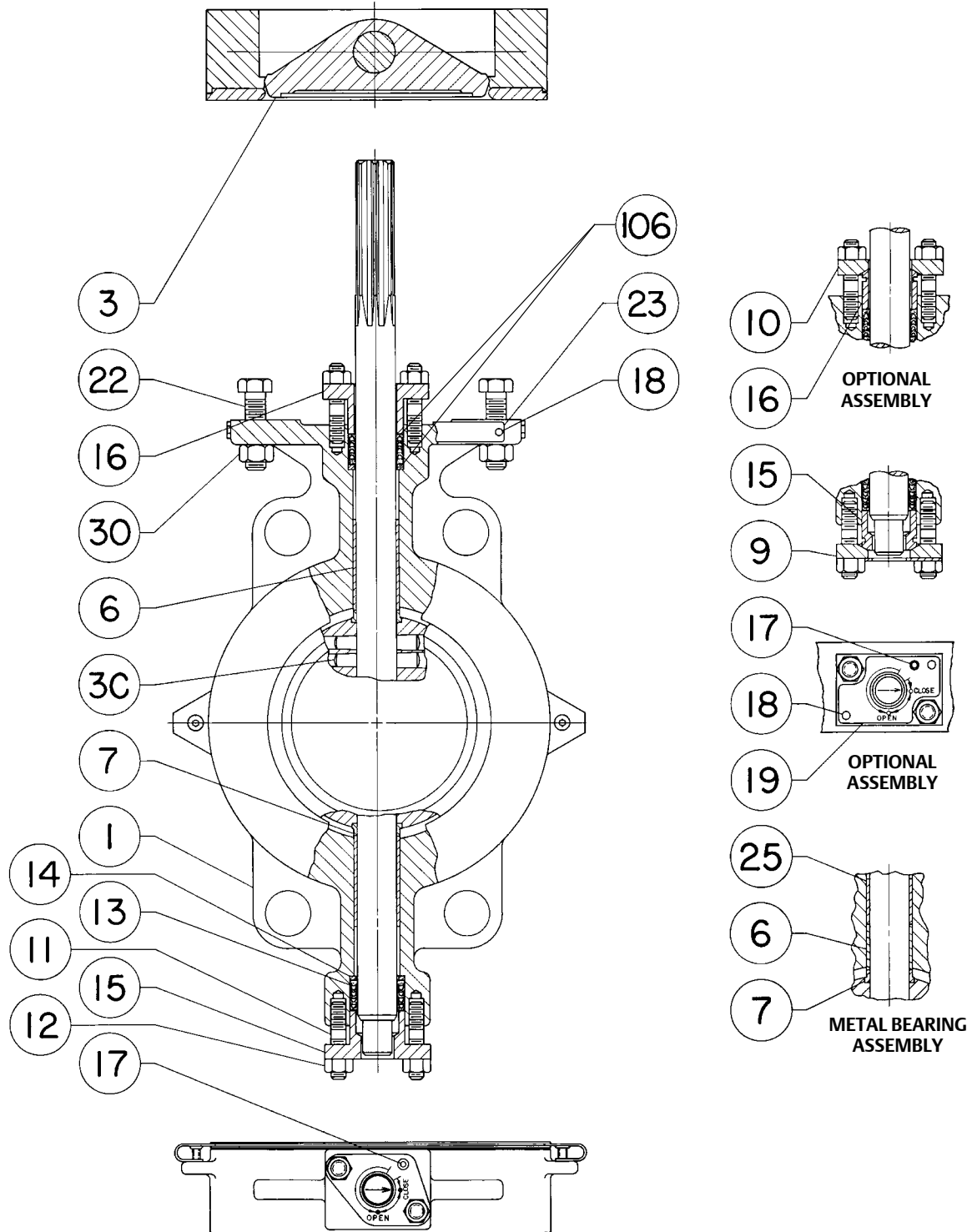
* Recommended spare parts

| Key | Description | Part Number | Key | Description | Part Number |
|-----|--|-------------|--------|---|-------------|
| 29* | Line Flange Gasket, FGM (2 req'd) (not shown) Recommended for temperatures above 343°C (650°F) | | 13 | Cap Screw | |
| | CL150 | | 14 | Hex Nut | |
| | NPS 4 | 16A6228X012 | 15 | Travel Stop (for 60-degree rotation only) | |
| | NPS 6 | 16A6231X012 | 16*(1) | O-Ring, nitrile | |
| | NPS 8 | 16A6234X012 | | Size 30 | 1H862006992 |
| | NPS 10 | 16A6237X012 | | Size 40 | 1D444806992 |
| | NPS 12 | 16A6239X012 | 17*(1) | Quad O-Ring, nitrile | |
| | NPS 14 | 16A6241X012 | | Size 30 | 16A0702X012 |
| | CL300 | | | Size 40 | 16A0680X012 |
| | NPS 4 | 16A6229X012 | 18*(1) | O-Ring, nitrile | |
| | NPS 6 | 16A6232X012 | | Size 30 | 12A9480X012 |
| | NPS 8 | 16A6235X012 | | Size 40 | 1V3234X0012 |
| | NPS 10 | 16A6238X012 | 19 | Sliding Seal | |
| | NPS 12 | 16A6240X012 | 20 | Seal Support Cylinder | |
| | CL600 | | 21 | Housing | |
| | NPS 4 | 16A6230X012 | 22 | Cap Screw | |
| | NPS 6 | 16A6233X012 | 23 | Mounting Yoke | |
| | NPS 8 | 16A6236X012 | 24 | Cap Screw | |
| 30 | Hex Nut | | 28 | Lever | |
| 31 | Cap Screw, steel (8 req'd) (not shown) | | 29 | Cap Screw | |
| 32 | Nameplate, stainless steel (not req'd when actuator is furnished) (not shown) | | 30 | Hub | |
| 33 | Nameplate Wire (not req'd when actuator is furnished) (not shown) | | 31 | Retaining Ring | |
| 106 | Anti-Extrusion Ring (4 req'd) | | 32* | Bushing, fiberglass | |
| | NPS 4 | 12B7418X012 | | Size 30 | 12A9373X012 |
| | NPS 6 | 12B7442X012 | | Size 40 | 12A9374X012 |
| | NPS 8 & 10 | 12B7454X012 | 34 | Cover | |
| | NPS 12 & 14 | 12B7466X012 | 35 | Cap Screw | |
| | | | 36 | Travel Indicator Scale | |
| | | | 37 | Self Tapping Screw | |
| | | | 38 | Travel Indicator | |
| | | | 39 | Self-Tapping Screw | |
| | | | 39 | Cap Screw | |
| | | | 40 | Positioner plate | |
| | | | 41 | Cap Screw | |
| | | | 42 | Nameplate | |
| | | | 43 | Drive Screw | |
| | | | 55 | Vent Screen (Not shown) | |
| | | | 56*(1) | O-Ring, nitrile | |
| | | | | (not shown) | 1C853806992 |
| | | | 84 | Washer | |
| | | | 85 | Hex Nut | |
| | | | 86 | Hex Nut | |
| | | | 87 | Cap Screw | |
| | | | 90* | O Ring | 1D348306992 |
| | | | 91 | Anti-Seize Sealant | |
| | | | 92 | Thread Locking Adhesive (Medium Strength) | |
| | | | 93 | Lithium Grease | |
| | | | 122 | Thrust Washer | |

Actuator Common Parts (figures 5 & 6)

| | | |
|-------|----------------------|-------------|
| 1 | Cylinder Assembly | |
| 2 | Cylinder Flange | |
| 3 | Cap Screw | |
| 4 | Cylinder Cap | |
| 5*(1) | O-Ring, nitrile | 10A3800X012 |
| 6 | Cap Screw | |
| 7 | Piston | |
| 8*(1) | Quad O-Ring, nitrile | |
| | Size 30 | 12B0491X012 |
| | Size 40 | 11B2915X012 |
| 9 | Cap Screw | |
| 10 | Piston Rod | |
| 11 | Hex Nut | |
| 12 | Rod End Bearing | |

Figure 7. Typical NPS 4 Valve Assembly



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Figure 8. Typical NPS 6 and 8 Valve Assembly

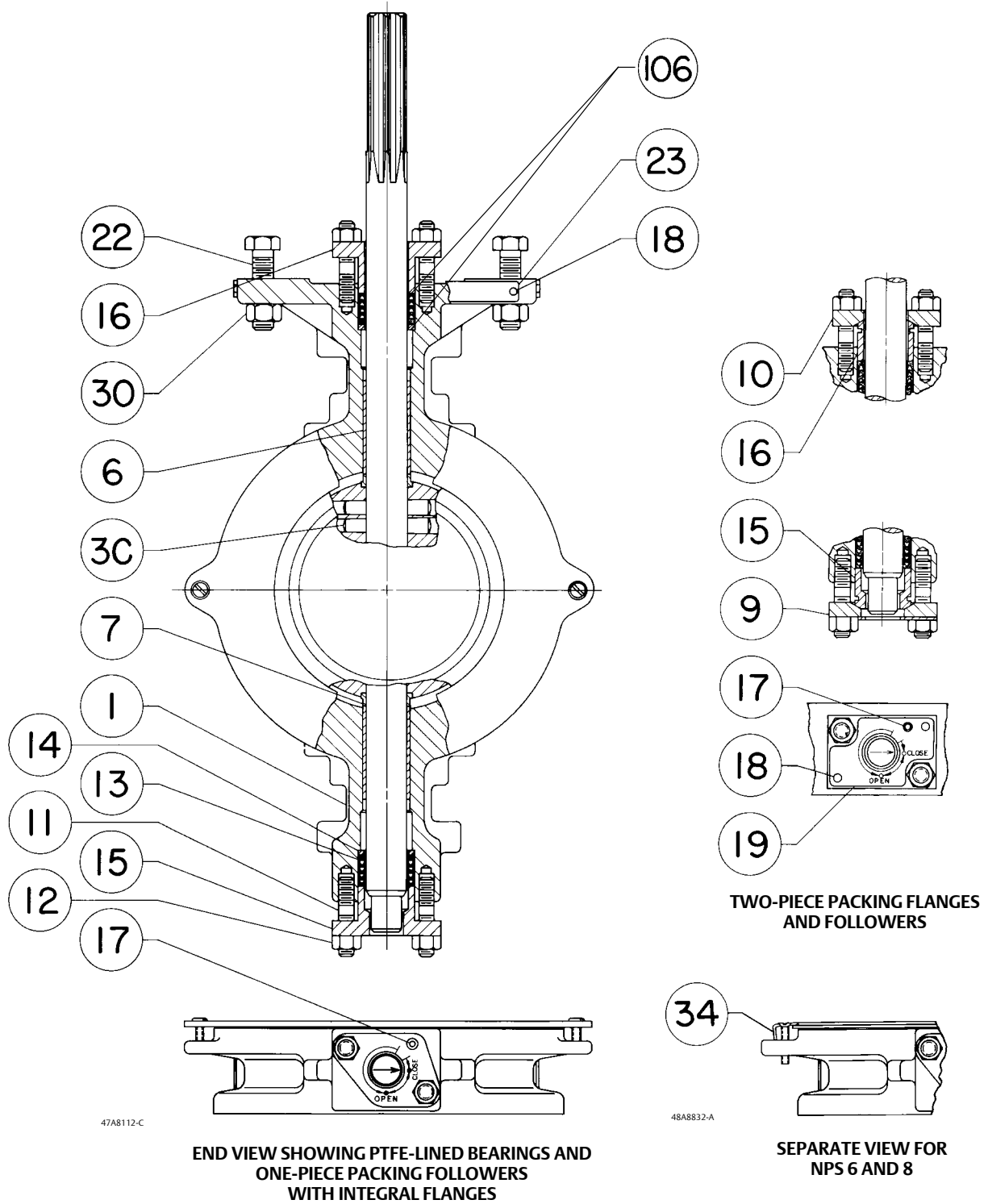
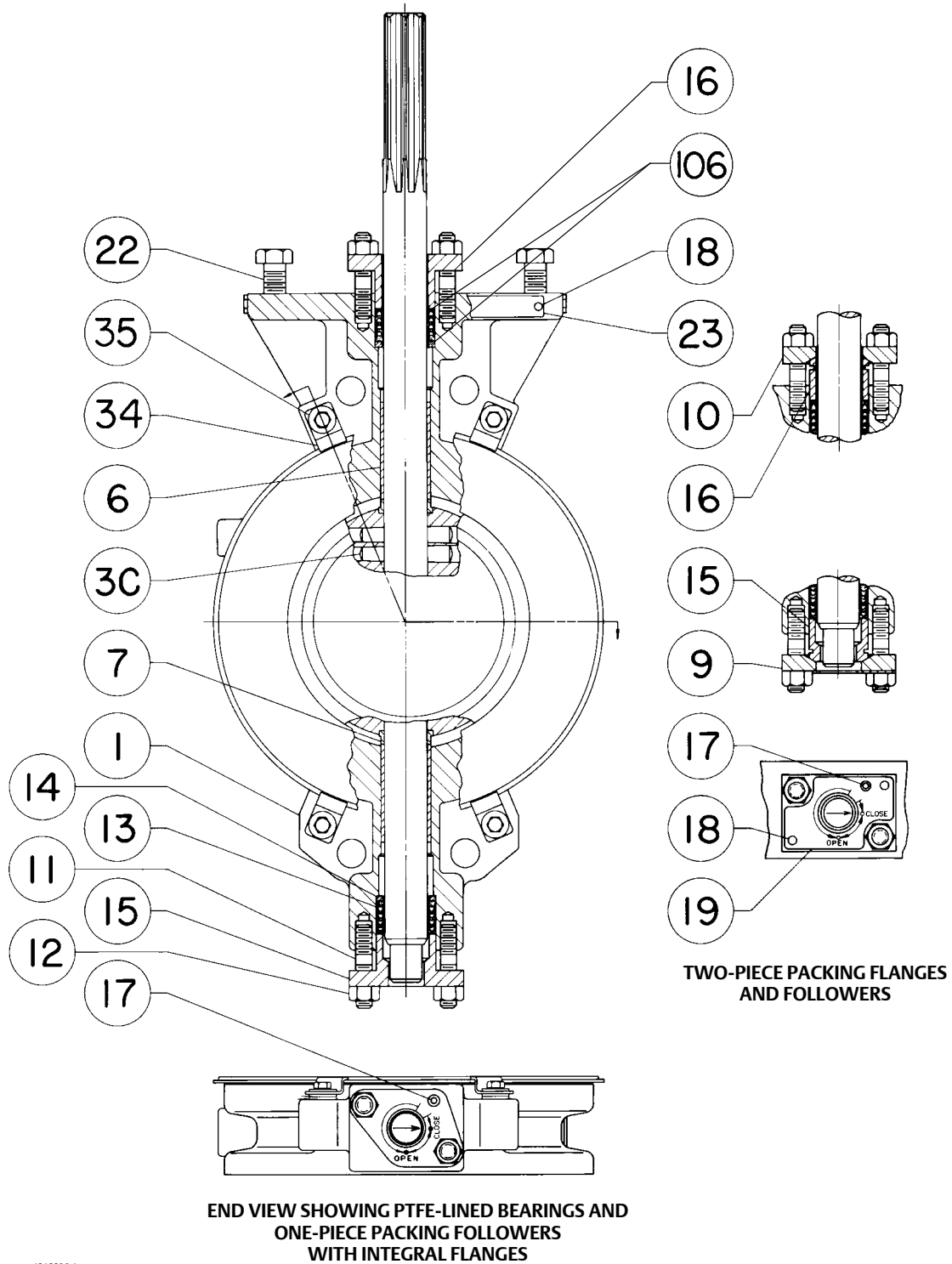


Figure 9. Typical NPS 10 and 14 Valve Assembly



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Emerson Process Management

Marshalltown, Iowa 50158 USA

Sorocaba, 18087 Brazil

Chatham, Kent ME4 4QZ UK

Dubai, United Arab Emirates

Singapore 128461 Singapore

www.Fisher.com

