

Model DFR 026 Rotary Actuator

Operation, Parts, and Instruction Manual



Figure 1 DFR 026
and 571 Control Valve

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NOTICE

These instructions are meant to be used with the Dyna-Flo DFR Technical Sales Bulletin as they refer to Figures and Tables therein. If you do not have the Technical Sales Bulletin, contact Dyna-Flo immediately, or visit www.dynaflo.com.

Each control valve is factory checked. Check the calibration for the specific application, before a valve or actuator is put into service.

It is the intention of this document to provide users with an accurate guide for safe installation and maintenance of the DFR Actuator. Revisions and updates are available at above mentioned website.

GENERAL

The following instructions are to be thoroughly reviewed and understood prior to installing, operating or performing maintenance on this equipment. Work on this equipment should be performed by experienced personnel. Throughout the manual, safety and caution notes appear and must be strictly followed to prevent serious injury or equipment malfunction.

SCOPE

The actuator configuration and construction materials were selected to meet particular pressure, temperature, operating medium, and process fluid conditions. Some material combinations are limited in their pressure and temperature ranges. Do not apply any other conditions to the actuator without first contacting your Dyna-Flo sales office.

This manual is written to be a practical and useful guide for maintaining the Dyna-Flo DFR Actuator.

PRINCIPLES OF OPERATION (For Top-Mounted Handwheel refer to Page 18)

The DFR actuator works by loading pressure on the top side of the diaphragm (Key 23), this loading pressure moves the diaphragm rod (Key 16) downwards. As the loading pressure is decreased, the spring (Key 14) forces the diaphragm rod upwards.

The spring and diaphragm have been selected to meet a specific application requirement, and while in service the actuator should produce full travel of the valve with the diaphragm pressure indicated on the nameplate (Key 33).

If there is no positioner being used with the control valve, a loading device (such as a 4-way switching valve) must be used. Loading devices do not come equipped standard with the actuator. Refer to appropriate positioner instruction manual as required.

SAFETY CAUTION

Only well trained experienced technicians should perform these procedures. Use safe work practices and lock out procedures when isolating valves and actuators. It is also important to wear the proper protective equipment when performing any installation or maintenance activity. Use only parts and materials rated for the process being used, operating conditions, and environmental conditions products will be used in.

To avoid personal injury or installation damage as a result of the sudden release of process pressure or damage to equipment, do not install the actuator assembly where service conditions could exceed the limits stated in this manual, sales bulletin or on the equipment nameplates. Use government codes, accepted industry standards and good piping practices, and select proper pressure-relieving equipment for protection of your installation. Always be aware of flammable process and instrument gas.

Always be aware of the hazards of actuators, especially spring-loaded actuators. Be sure that the actuator is de-energized or in the failed position before performing any maintenance procedure.

These actuators have dangerous pinch points. Never put your hands inside the valve or actuator unless you are certain that the valve or actuator will not suddenly move.

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SPECIFICATIONS

Actuator Size	Maximum Casing Pressure Psig (kPa)
026	60 (414)

Material Temperature Capabilities

Standard: -40 to 180 °F (-40 to 82 °C).

Construction Materials

See Parts list for construction materials.

Contact your Dyna-Flo sales office for more information and other options.

Valve Shaft Compatibility, inches (mm)

Size 026: 1/2 (12.7) & 5/8"x1/2"

Actuator Dimensions

Refer to Figures 3 & 4 of Sales Bulletin.

Refer to Tables 2, 3, & 4 of Sales Bulletin.

Output Torque

Refer to Tables 5 to 7 of Sales Bulletin.

Actuator Mounting Orientation And Valve Applications

Refer to Figure 10.

Refer to Table 2.

Standard Tubing Connection Size

1/4 inch NPT. Other sizes available.

Maximum Shaft Rotation

90 degrees.

Shaft Connection Types

The standard shaft connection is a splined shaft suitable for a Dyna-Flo 570 control valve.

Options

- Manual override
- Reduced rotation output
- Increased tubing connection size
- Travel stops

Diaphragm Casing Volume

Refer to Table 8 of Sales Bulletin.

For more information and other options contact your Dyna-Flo sales office.

Table 1

Approximate Actuator Weights - lb. (Kg)

Actuator Size	Standard Assembly	With Top Mounted Handwheel
026	30 (14)	41 (19)



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UNPACKING VALVE FROM SHIPPING CONTAINER

Special Tools Required:

- Properly Rated Lifting Straps (2 – 4 Straps) See Table 1 for actuator weights.
- Lifting Device (Example: Crane)

Check the packing list, verify that the list includes all the materials in the shipping container before unpacking. Valve information can be found on the nameplate (Key 33). Refer to Figure 3 for nameplate location.

When lifting the valve from shipping container, place properly rated lifting straps around the neck of the actuator (See Figure 2) to lift the valve/actuator assembly. Straps should be placed to avoid damage to tubing and other mounted accessories.

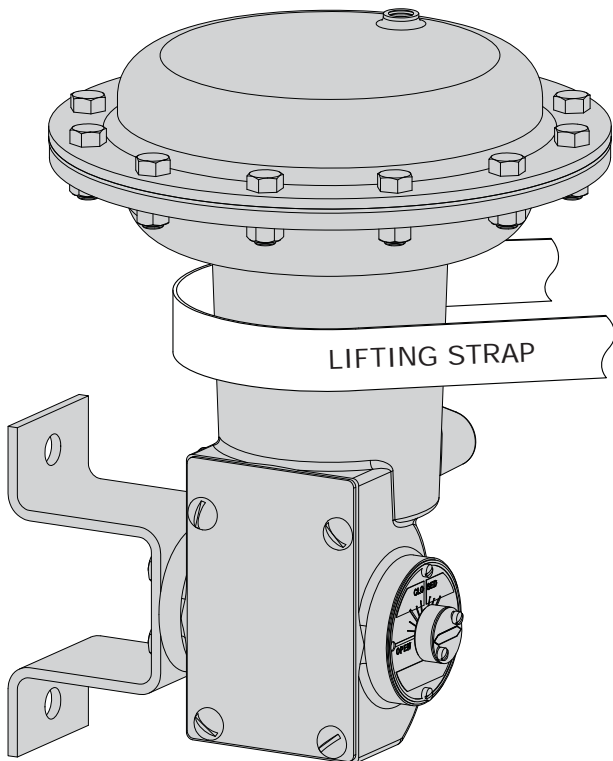


Figure 2 Actuator Lifting Suggestions

INSTALLATION

Before You Begin:

- Read the General and Scope section of this manual (Page 2).
- Read Safety Caution (Page 2).
- Sudden movement of actuator can cause damage or injury. It helps to have the actuator de-energized as long as the valve installation will permit.
- Use safe work practices and lock out procedures before placing valve in-line.

Actuators are typically shipped from factory as an assembly already mounted to the valve. Follow the appropriate valve installation instructions to install the actuator / valve assembly. If the actuator was shipped separately, it will be necessary to mount the actuator on the valve prior to installation, refer to the Actuator Mounting section.

Operating medium must be controlled and directed, if a positioner was not ordered or unavailable, use a loading device such as a 4-way switching valve (not provided with the actuator). For more information on positioner installation and operation, refer to the appropriate positioner instruction manual for your positioner type.

AIR PIPING

WARNING:

Property damage, environmental harm, and personal injury can result from the use of supply gas other than clean, non-corrosive, oil and moisture free air. Do not exceed the supply pressure indicated on the nameplate (Key 33) located on the actuator.

Before You Begin:

Note: Standard actuators accept 1/4" (6 mm) NPT connections.

Piping Installation Steps:

- 1 Use 3/8" (10 mm) outside diameter SST tubing (or equivalent) for air lines. Keep length of tubing as short as possible to prevent transmission lag in the control signal.
- 2 Install the required line vents, valves, drains, seals, and filters to the actuator.

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ACTUATOR MOUNTING

Before You Begin:

- Read the General and Scope section of this manual (Page 2).
- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Disconnect supply lines (air or gas), electric power, or control signal to the actuator. Sudden movement of actuator can cause damage or injury, make sure actuator will not operate.
- Vent any pneumatic actuator loading pressure.
- Relieve process pressure and drain the process fluid from up and down stream of valve.
- Be aware of potentially hazardous process material that may be present in-line and in-valve. Isolate the valve from process pressure. Use a bypass or block valve if necessary, or completely shut off the process. Relieve internal valve pressure (refer to the appropriate valve instruction manual).

Lubricants Required:

- Fluid Film® (Key D)

- 1 If the valve has been removed from the pipeline, secure the valve assembly in place on a flat work surface that will support the weight of the combined valve and actuator assembly.
- 2 Remove any positioners and/or instrumentation installed on the actuator.
- 3 Remove the access plate (Key 27) by removing the screws (Key 28).
- 4 Before placing the valve shaft (Key V) into the lever (Key 19), position the valve ball/disc as follows:
 - For push-down-to-close action (fail open):**
Rotate the valve ball/disc into the fully open position.
 - For push-down-to-open action (fail closed):**
Rotate the valve ball/disc into the fully closed position.

Note: Refer to the appropriate valve instruction manual.
- 5 Loosen the lever clamp (Keys 19A & 19B). Refer to Figure 26.
- 6 Apply Fluid Film® (Key E) to the teeth of the valve shaft (Key V).
- 7 Position the hub (Key 5) and travel indicator (Key 6) in the desired position. **Note:** It may be necessary to pull the valve shaft (Key V) back out of the hub after installation should the hub and travel indicator sit in an undesired position once the shaft is installed.

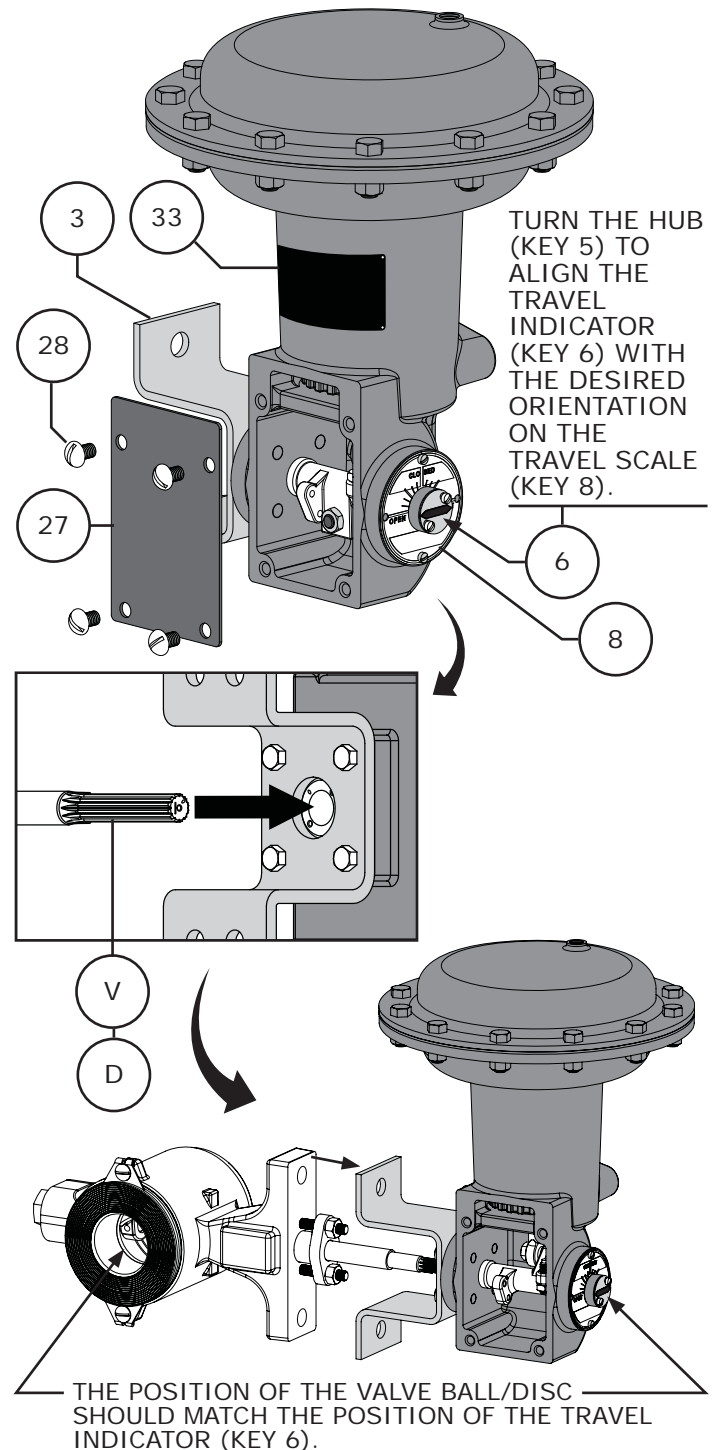


Figure 3 Actuator Mounting



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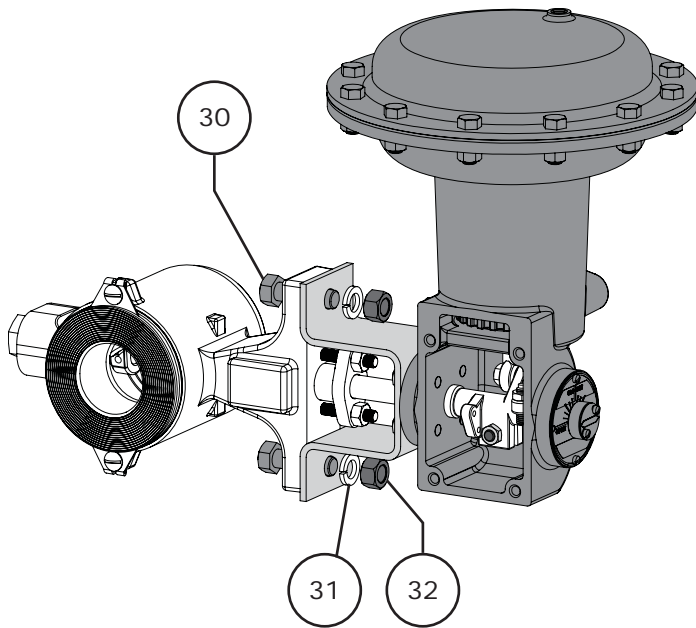


Figure 4 Actuator/Valve Body Bolting

ACTUATOR MOUNTING (Continued)

8 Slide the actuator onto the valve shaft as shown in Figure 3. Refer to Figures 10 for actuator mounting positions and orientations.

Note: The actuator is typically installed in a vertical orientation. Should the actuator be installed in a horizontal position, then it may be necessary to have external support for the actuator in this position.

9 Once the actuator is installed on the valve shaft in the proper orientation, secure the actuator in place using the mounting bolts (Key 30), lockwashers (Key 31), and hex nuts (Key 32). Refer to Figure 4, and Table 3 for torque values.

10 Center the lever (Key 19) and secure it by tightening the lever clamp cap screw (Key 19A) and jam nut (Key 19B).

11 Loosen the jam nut (Key 21) on the up travel stop. Adjust the up travel stop (Key 20) so that the valve ball/disc is in the fully open or closed position as required. Lock the travel stop in place by re-tightening the jam nut. Refer to Figure 6.

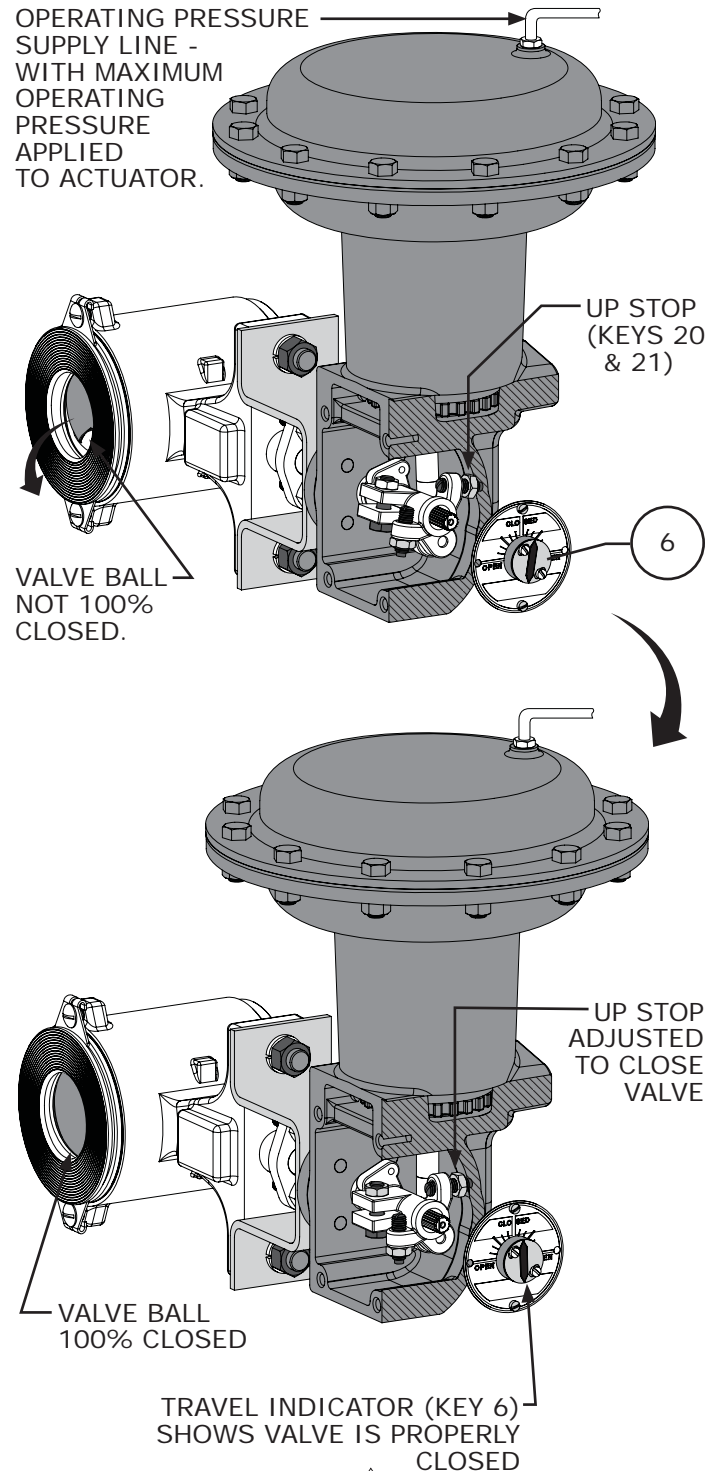


Figure 5 Mounting Adjustment for Push-Down-To-Open

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ACTUATOR MOUNTING (Continued)

- 12 Slowly stroke the actuator until the maximum operating pressure is reached as indicated on the nameplate (Key 33). **Note:** Use caution when stroking the actuator, avoid dangerous pinch points and equipment damage by keeping appendages and tools away from moving actuator parts.
- 13 With the maximum operating pressure applied to the actuator, loosen the jam nut (Key 21) and adjust the down travel stop (Key 20, Figure 5) until the valve ball/disc is in the fully closed or open position as required. Lock the travel stop in place by re-tightening the jam nut.
- 14 Relieve the operating pressure from the actuator casing.
- 15 Perform the SPRING ADJUSTMENT - Initial Set.

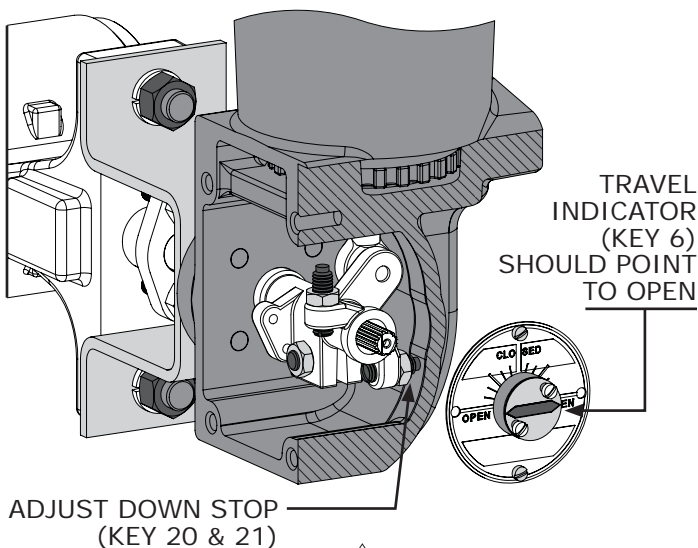


Figure 6 Mounting Adjustment for Push-Down-To-Close

SPRING ADJUSTMENT

Before You Begin:

- Read the General and Scope section of this manual (Page 2).
- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Disconnect supply lines (air or gas), electric power, or control signal to the actuator. Sudden movement of actuator can cause damage or injury, make sure actuator will not operate.

- Vent any pneumatic actuator loading pressure.
- Relieve process pressure and drain the process fluid from up and down stream of valve.
- Be aware of potentially hazardous process material that may be present in-line and in-valve. Isolate the valve from process pressure. Use a bypass or block valve if necessary, or completely shut off the process. Relieve internal valve pressure (refer to the appropriate valve instruction manual).

Special Tools Required:

- Flat-head screwdriver or flat-bladed tool.

INITIAL SET

Refer to the actuator nameplate (Key 33) for the Initial Set. The initial setting is the casing pressure at which the diaphragm (Key 23) begins to move the diaphragm plate (Key 17) and diaphragm rod (Key 16) away from the up travel stop.

The initial setting was selected to meet a specific set of service condition requirements. Proper initial setting will ensure that once the actuator and valve are in service, the valve will seat properly and full travel will be achieved within the specified diaphragm casing pressure range.

Note: If the actuator has been disassembled and reassembled, or if service requirements have changed, it will be necessary to perform the following steps for Initial Setting. Refer to the Actuator Mounting section (Page 5) before proceeding with the spring adjustment.

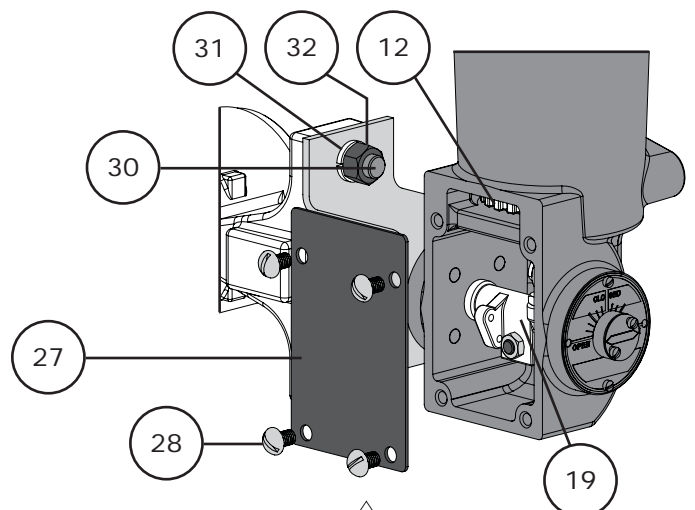
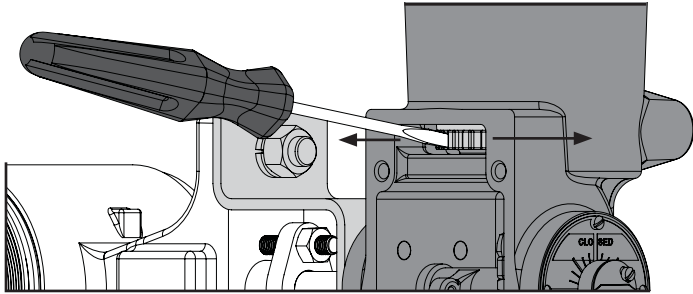


Figure 7 Access Plate Removal

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TURNING THE SPRING ADJUSTER (KEY 12) CLOCKWISE (TO THE LEFT) WILL INCREASE THE INITIAL SETTING.

TURNING THE SPRING ADJUSTER (KEY 12) COUNTER-CLOCKWISE (TO THE RIGHT) WILL DECREASE THE INITIAL SETTING.

Figure 8 Spring Adjustment

SPRING ADJUSTMENT (Continued)

INITIAL SET (Continued)

- 1 When performing spring adjustment on the DFR 026, it will be necessary to have a valve shaft (Key V) inserted into the actuator and to approximately pre-adjust the up travel stop to its desired position. **Note:** Travel error will occur if this step is not followed.
- 2 Disconnect any instrumentation attached to the actuator.
- 3 Remove the screws (Key 28) and the access plate (Key 27).
- 4 Apply operating pressure to the diaphragm casing, when the spring is properly adjusted, the diaphragm rod (Key 16) will start to move when the Initial Set pressure (indicated on the nameplate (Key 33) or in Table 5) is reached. Make note whether the diaphragm rod started to move before or after the Initial Set value.
- 5 Relieve actuator casing pressure.
- 6 Using a flat-head screwdriver or a flat-bladed tool, adjust the spring adjuster (Key 12) accordingly:
 - To increase Initial Setting (increase spring compression)
 - Turn the spring adjuster to the left (clockwise when viewed from above).
 - To decrease Initial Setting (decrease spring compression)
 - Turn the spring adjuster to the right (counter-clockwise when viewed from above).

- 7 Repeat Steps 4 – 6 until the Initial Set pressure is reached.
- 8 Re-install the access plate (Key 27) and screws (Key 28).
- 9 Check the position of the travel indicator (Key 6), adjust if necessary.

STROKE RANGE

Should the desired stroking range be unachievable during normal operating conditions with the casing pressure used, it may be possible to adjust the stroking range by making a spring adjustment. A spring adjustment will shift the casing pressure span and either increase or decrease the casing pressure at which the actuator begins its stroke, this will affect the pressure at which the actuator reaches full travel.

Refer to the Initial Set section and adjust the spring adjuster (Key 12) as follows:

To shift the casing pressure span downward – rotate the spring adjuster to the right (counter-clockwise when viewed from above).

To shift the casing pressure span upward – rotate the spring adjuster to the left (clockwise when viewed from above).

CHANGING ACTUATOR STYLE

Refer to the Before You Begin section of the Actuator Mounting instructions (Page 5).

Mounting Styles A and D

Style A is right-hand mounted and **Style D** is left-hand mounted, in all other ways **Styles A** and **D** are identical. Refer to Figure 10.

Mounting Styles B and C

Style B is right-hand mounted and **Style C** is left-hand mounted, in all other ways **Styles B** and **C** are identical. Refer to Figure 10.

Note: To convert a **Style A** or **D** into a **Style B** or **C** actuator, the actuator must first be separated from the control valve. Refer to Steps 1-4 of the Disassembly Section and 1-2 of Valve Removal Section (Page 11).

Refer to Figure 9.

- 1 Remove the machine screws (Key 10) and travel scale/hub assembly (Keys 5, 6, 7, 8, & 9).
- 2 Remove the cap screws (Key 4) and mounting yoke (Key 3).

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CHANGING ACTUATOR STYLE (Continued)

- 3 Swap the position of the travel scale/hub assembly (Keys 5, 6, 7, 8, & 9) and mounting yoke (Key 3) as shown in Figure 9. Install the travel scale/hub assembly on the opposite side of the actuator using the machine screws (Key 10).
- 4 Place the mounting yoke (Key 3) in the desired orientation (refer to Table 2 and Figure 10 for Mounting Positions) on the opposite side of the actuator. Secure the mounting yoke in place using the cap screws (Key 4), tighten the cap screws to the torque specification listed in Table 4.
- 5 Once an actuator has been converted to a different mounting style, the actuator must be re-adjusted. Refer to the Spring Adjustment section of this manual.

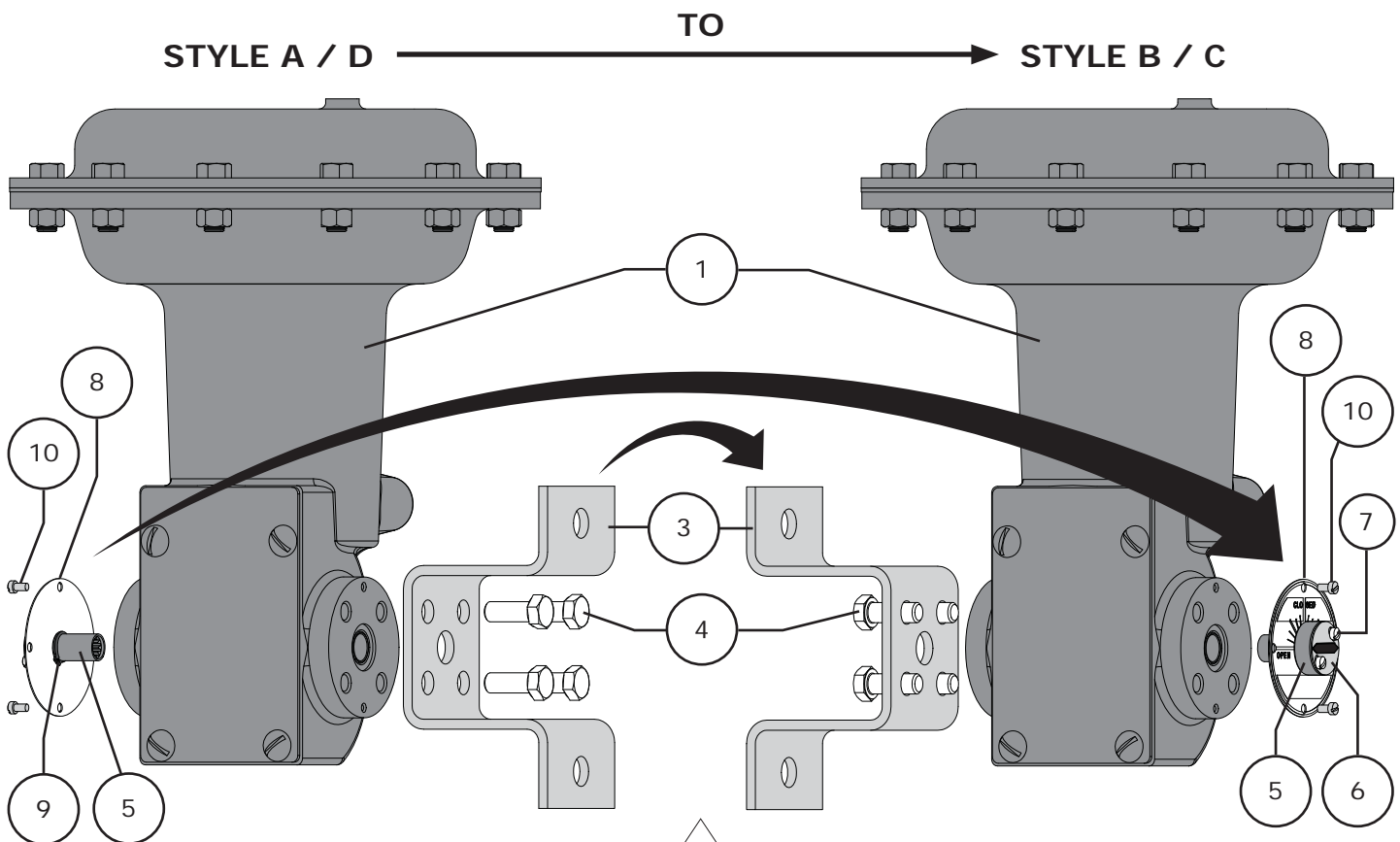


Figure 9 Changing Actuator Style

Table 2

Model DFR Mounting Styles and Positions

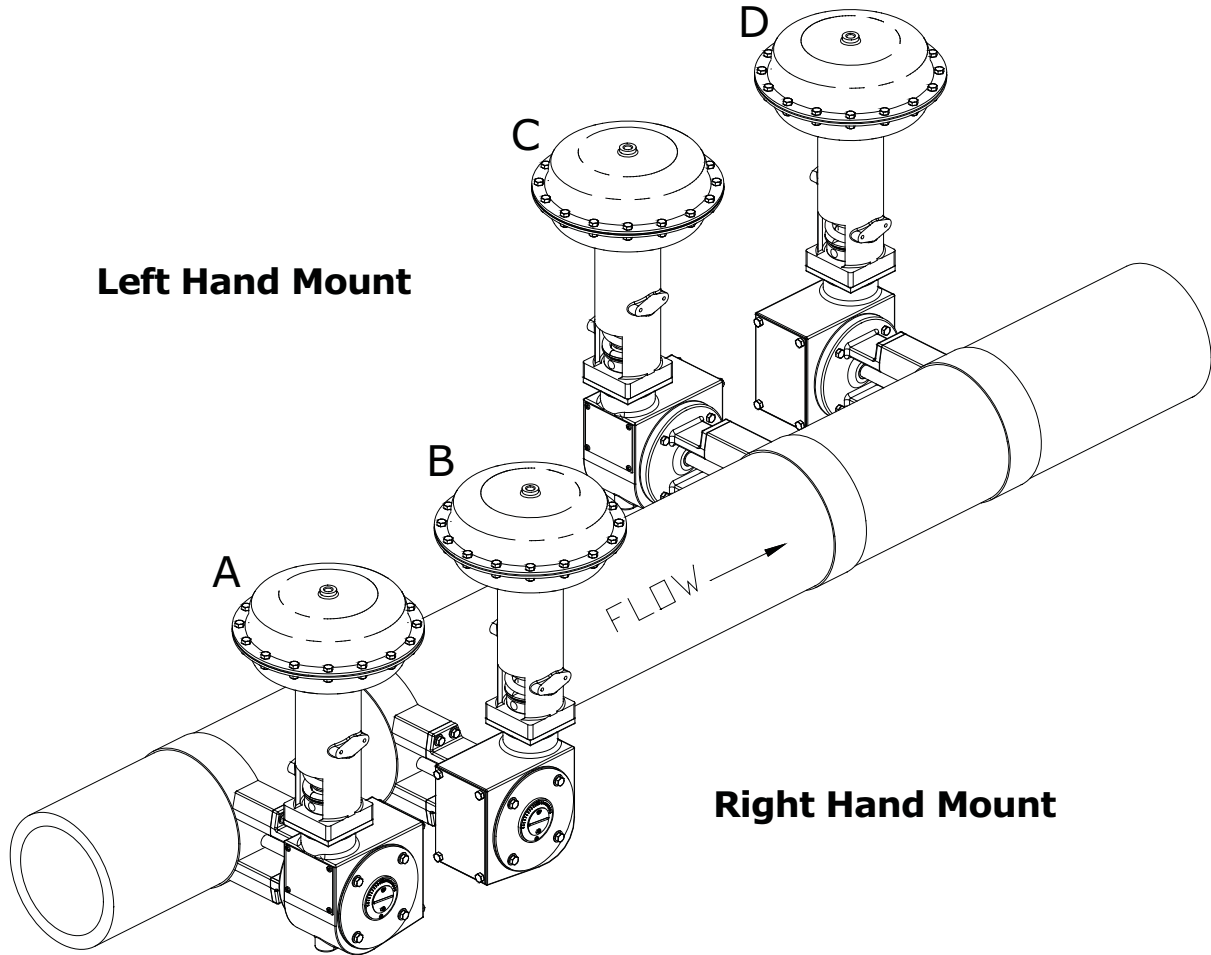
Mounting	Action	Model 570 Series Valves	Model 660 Butterfly Valve
Right Hand	Fail Open	Style A	Style B
Right Hand	Fail Close	Style B	Style A
Left Hand	Fail Open	Style C	Style C
Left Hand	Fail Close	Style D	Style D



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Left Hand Mount



Right Hand Mount

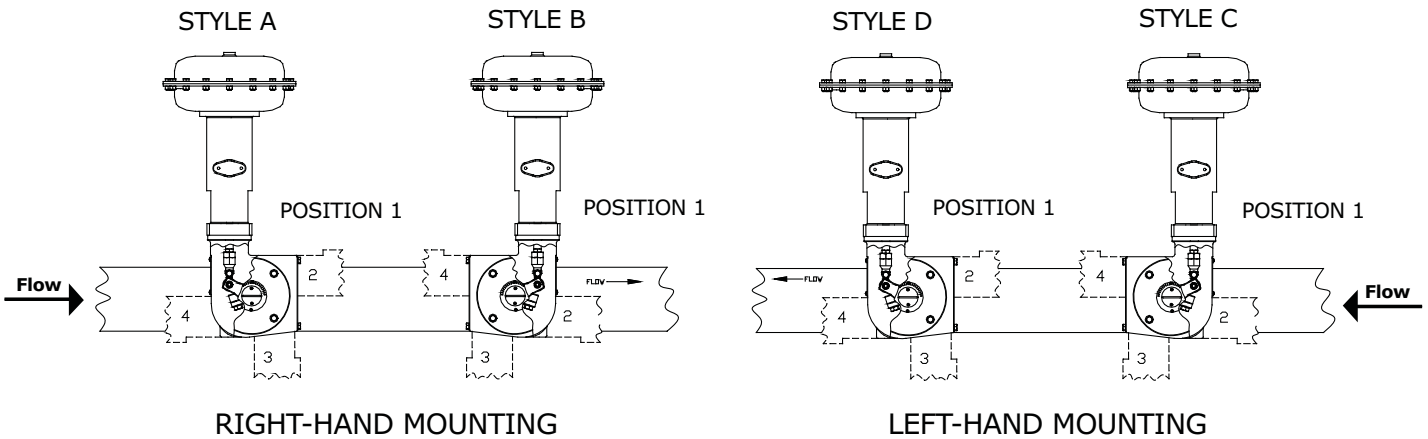


Figure 10 Mounting Orientation and Valve Applications

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ACTUATOR DISASSEMBLY

Before You Begin:

- Read the General and Scope section of this manual (Page 2).
- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Disconnect supply lines (air or gas), electric power, or control signal to the actuator. Sudden movement of actuator can cause damage or injury, make sure actuator will not operate.
- Vent any pneumatic actuator loading pressure.
- Relieve process pressure and drain the process fluid from up and down stream of valve.
- Be aware of potentially hazardous process material that may be present in-line and in-valve. Isolate the valve from process pressure. Use a bypass or block valve if necessary, or completely shut off the process. Relieve internal valve pressure (refer to the appropriate valve instruction manual).

Special Tools Required:

- Soft tip felt marker.
- Flat-head screwdriver or flat-bladed tool.
- Split-ring pliers.

- 1 If the actuator has been removed from the valve or the actuator/valve assembly has been removed from the pipeline, secure either assembly in place on a flat work surface that will support the weight.
- 2 Remove any instruments installed on the actuator.
- 3 Observe the position of the travel indicator (Key 6). Using a soft tip felt marker, mark the position of the travel indicator on the travel scale (Key 8).
- 4 Relieve all operating pressure and/or rotate the handwheel counterclockwise to remove spring tension if a handwheel is installed. For Handwheel Maintenance refer to Page 18.

VALVE REMOVAL

For complete actuator disassembly, it will be necessary to separate the actuator from the control valve in order to remove the lever (Key 19). If maintenance is being performed on the diaphragm (Key 23) or handwheel, separating the actuator from the valve will not be necessary.

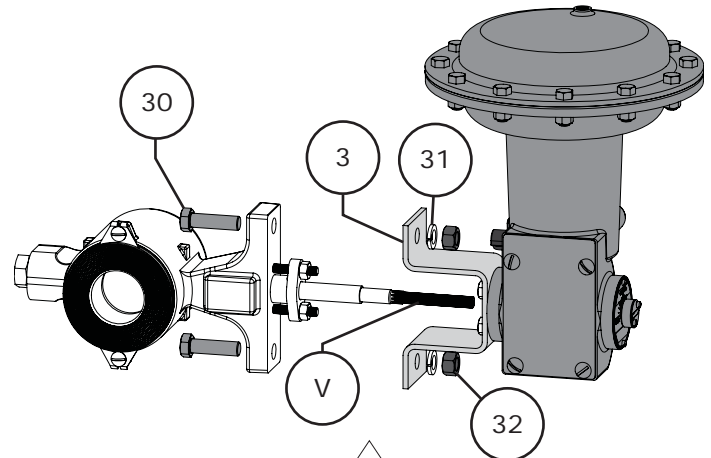


Figure 11 Valve Removal

- 1 Remove the mounting hex nuts (Key 32), lockwashers (Key 31), and mounting bolts (Key 30).
- 2 Separate the actuator from the valve and slide the actuator off of the valve shaft (Key V).

CASING DISASSEMBLY

- 1 **For maintenance purposes:** To replace the diaphragm (Key 23), it will not be necessary to remove spring tension when removing the upper casing (Key 24), the up travel stop will hold the spring in place. Proceed to Step 4.
- For complete actuator disassembly:** Proceed as follows.
- 2 Remove the screws (Key 28) and the access plate (Key 27). Refer to Figure 7.
- 3 Using a flat-head screw driver or flat-bladed tool, remove all spring tension by turning the spring adjuster (Key 12) counter-clockwise (to the right) as shown in Figure 8.
- 4 Remove the casing cap screws (Key 25) and hex nuts (Key 26).
- 5 Remove the upper casing (Key 24) and diaphragm (Key 23).
- 6 Inspect all parts for damage or wear, replace or repair parts as necessary. All soft parts such as diaphragm should be replaced.



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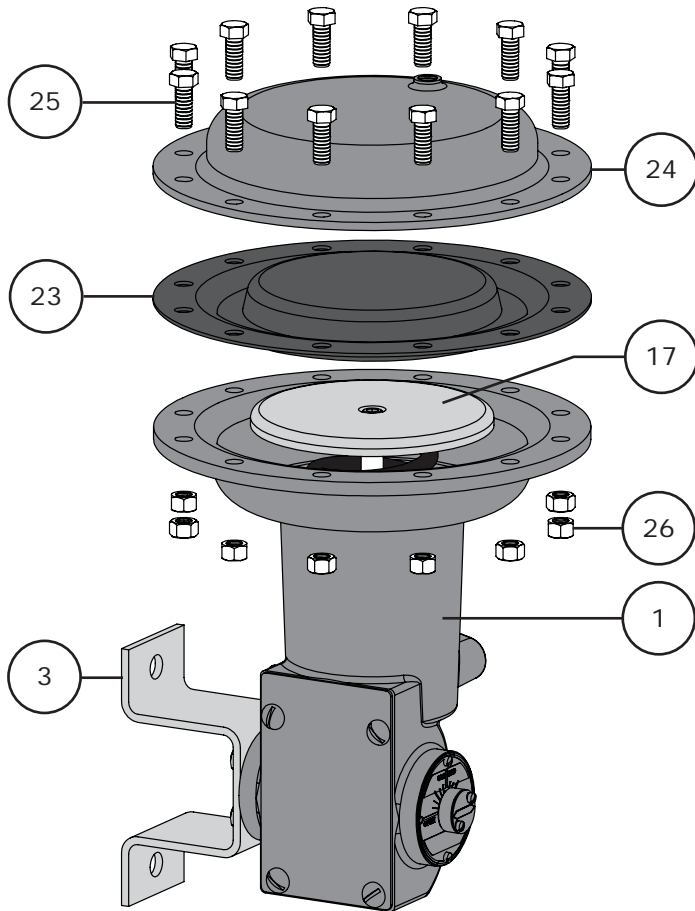


Figure 12 *Diaphragm Casing Disassembly*

ACTUATOR DISASSEMBLY (Continued)

DIAPHRAGM PLATE/ROD REMOVAL/DISASSEMBLY

- 1 Remove the cap screw (Key 22) from the diaphragm rod (Key 16) and lever (Key 19).
- 2 Remove the lever (Key 19) from inside the actuator housing (Key 1).
- 3 Remove the diaphragm plate assembly (Keys 15, 16, 17, & 18) from the actuator housing (Key 1).

- 5 Using a 5/16" socket bit, remove the socket head cap screw (Key 18) from the diaphragm rod (Key 16) and separate the diaphragm plate (Key 17) from the diaphragm rod.
- 6 If necessary, unscrew the rod end bearing (Key 15) from the diaphragm rod (Key 16).
- 7 Inspect and repair or replace parts as necessary.

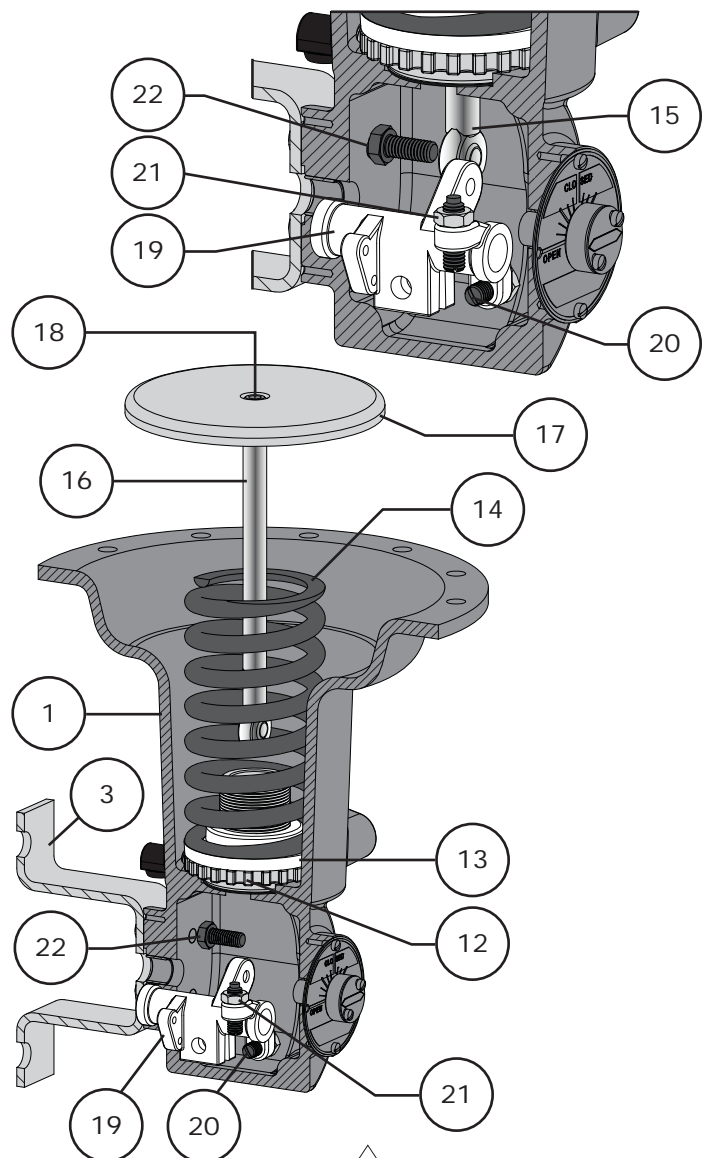


Figure 13 *Diaphragm Plate Assembly Removal*

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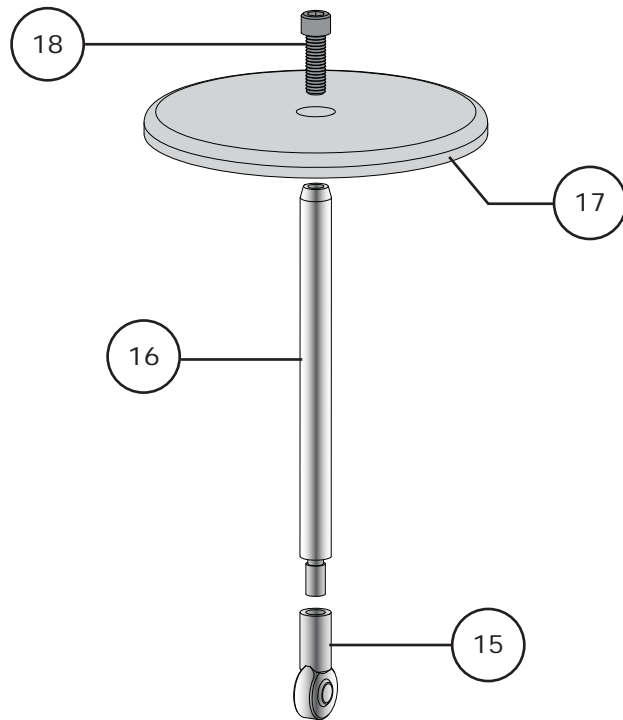


Figure 14 Diaphragm/Rod Plate Disassembly

ACTUATOR DISASSEMBLY (Continued)

SPRING / ADJUSTER / SEAT DISASSEMBLY

- 1 Remove the spring (Key 14) from the actuator housing (Key 1).
- 2 Remove the spring seat (Key 13) and spring adjuster (Key 12). Separate the spring seat from the spring adjuster if necessary.
- 3 Remove the thrust washer (Key 11).
- 4 Inspect all parts for damage or wear, replace or repair parts as necessary.

MOUNTING YOKE / HUB REMOVAL

- 1 Remove the cap screws (Key 4) and mounting yoke (Key 3).
- 2 Remove the machine screws (Key 10) and slide the hub/ travel scale assembly (Keys 5, 6, 7, 8, & 9) out of the actuator housing (Key 1).

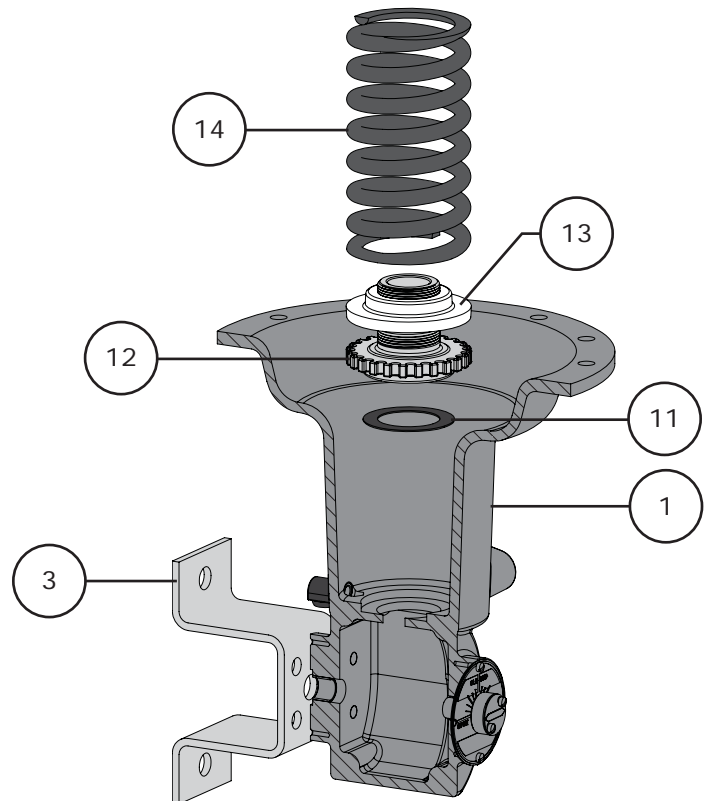


Figure 15 Spring / Adjuster / Seat Removal

- 3 Using split-ring pliers, remove the retaining ring (Key 9) from the hub (Key 5). Slide the travel scale (Key 8) off the hub.
- 4 Remove the machine screws (Key 7) from the hub (Key 5) and remove the travel indicator (Key 6).

BUSHING INSPECTION / REMOVAL

- 1 Inspect the bushings (Key 2) in the actuator housing (Key 1).
- 2 If the bushings look worn or damaged and need to be replaced, carefully press the bushings out of the housing from the inside pushing out.



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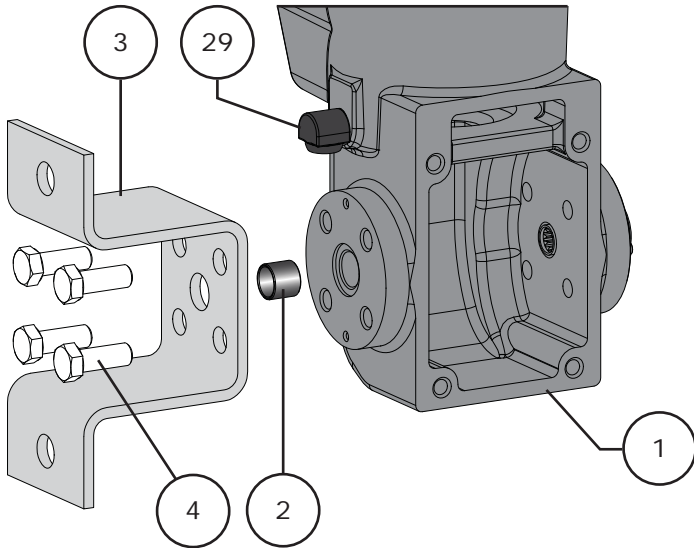


Figure 16 Mounting Yoke Removal

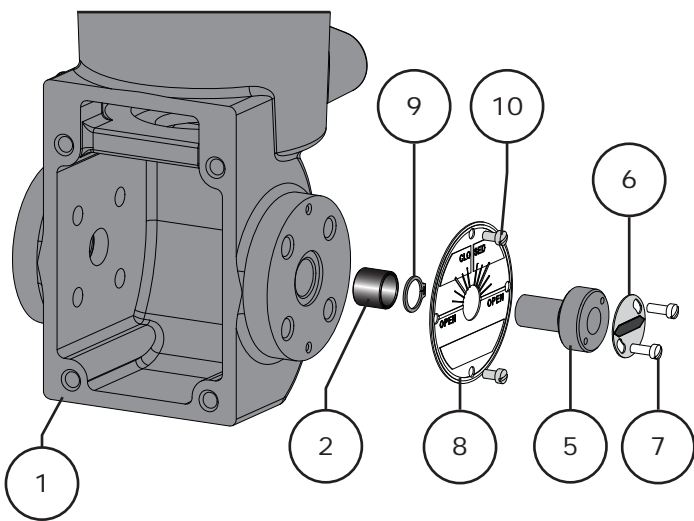


Figure 17 Hub Removal

ACTUATOR ASSEMBLY

Before You Begin:

- The Assembly section of this manual assumes that the actuator has been completely disassembled prior to assembly.
- Read the General and Scope section of this manual (Page 2).
- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.

Special Tools Required:

- Flat-head screwdriver or flat-bladed tool.
- Regulated air supply (to stroke the actuator).
- Vise grips.
- Split-ring pliers.
- 5/16" socket bit.

Lubricants Required:

- Permatex® Nickel Anti-Seize or equivalent (Key A)
- Lubriplate® No. 105 Grease or equivalent (Key C)
- Fluid Film® (Key D)
- Loctite® 242® (Key E)

Note: These assembly instructions assume that the control valve is still installed in the pipeline. If the control valve has been removed from the pipeline, make sure that the valve is placed securely on a flat work surface or clamping device that can support the combined weight of the control valve/actuator assembly.

BUSHING INSTALLATION

- 1 If the bushings (Key 2) have been removed from the housing (Key 1) insert new bushings. Bushings may need to be pressed into place.

MOUNTING YOKE / HUB ASSEMBLY

- 1 Refer to Figure 10 and Table 2, determine the desired mounting style and orientation. Install the mounting yoke (Key 3) onto the actuator housing (Key 1) with the cap screws (Key 4). Refer to Table 4 for cap screw torque values.
- 2 Install the travel indicator (Key 6) onto the hub (Key 5) using the machine screws (Key 7).

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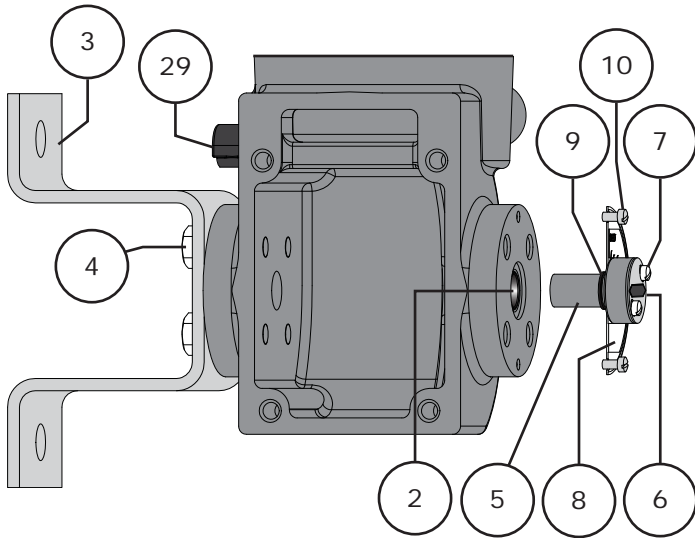


Figure 18 Hub Installation

ACTUATOR ASSEMBLY (Continued)

MOUNTING YOKE / HUB ASSEMBLY (Continued)

- 3 Slide the travel scale (Key 8) onto the hub (Key 5) and secure it in place using the retaining ring (Key 9) and split-ring pliers.
- 4 Install the hub/travel scale assembly (Keys 5, 6, 7, 8, & 9) onto the actuator housing (Key 1) using the machine screws. **Note:** The hub and travel indicator can be rotated into the proper orientation at any time before the valve shaft is installed.

SPRING / ADJUSTER / SEAT ASSEMBLY

- 1 Lubricate the thrust washer (Key 11) with Lubriplate® No. 105 Grease (Key C) and install it into the actuator housing (Key 1).
- 2 Apply Permatex® Nickel Anti-Seize (Key A) to the threads of the spring adjuster (Key 12). Thread the spring seat (Key 13) all the way onto the spring adjuster.
- 3 Install the spring adjuster/spring seat assembly (Keys 12 & 13) over top of the thrust washer (Key 11) inside the actuator housing (Key 1).
- 4 Install the spring (Key 14) onto the spring seat (Key 13) inside the actuator housing (Key 1).

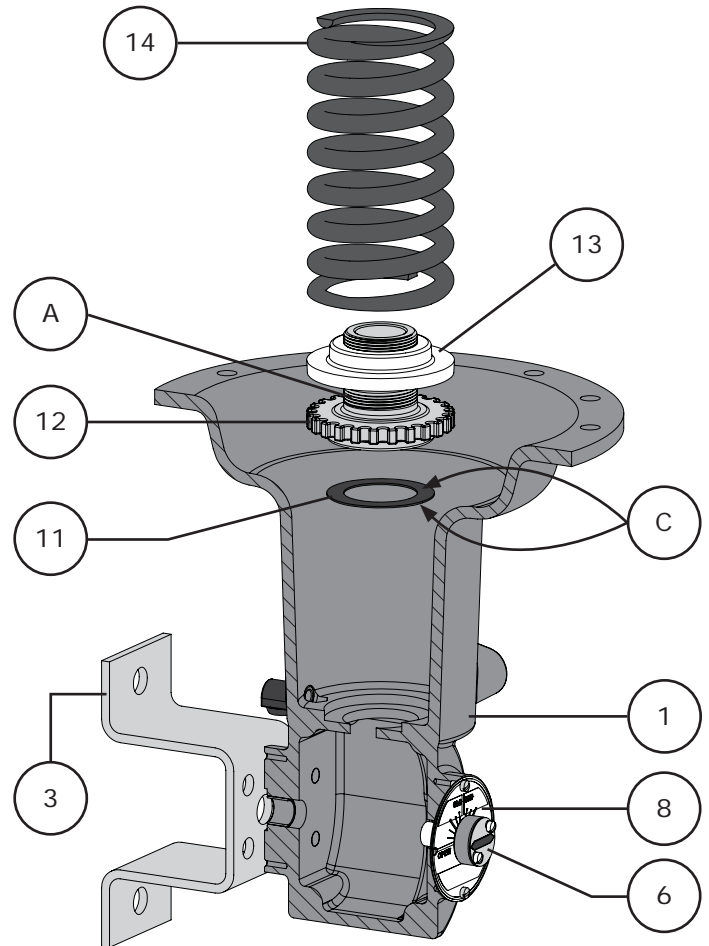


Figure 19 Spring / Adjuster / Seat Assembly

DIAPHRAGM ROD/PLATE ASSEMBLY

- 1 If the rod end bearing (Key 15) was removed from the diaphragm rod (Key 16), thread the diaphragm rod back into the rod end bearing.
- 2 Apply anti-seize compound (Key A) to the threads of the socket-head cap screw (Key 18).
- 3 Attach the diaphragm plate (Key 17) to the diaphragm rod (Key 16) using the socket-head cap screw (Key 18) and a 5/16" socket bit.
- 4 Torque the socket-head cap screw (Key 18) to the value listed in Table 4.



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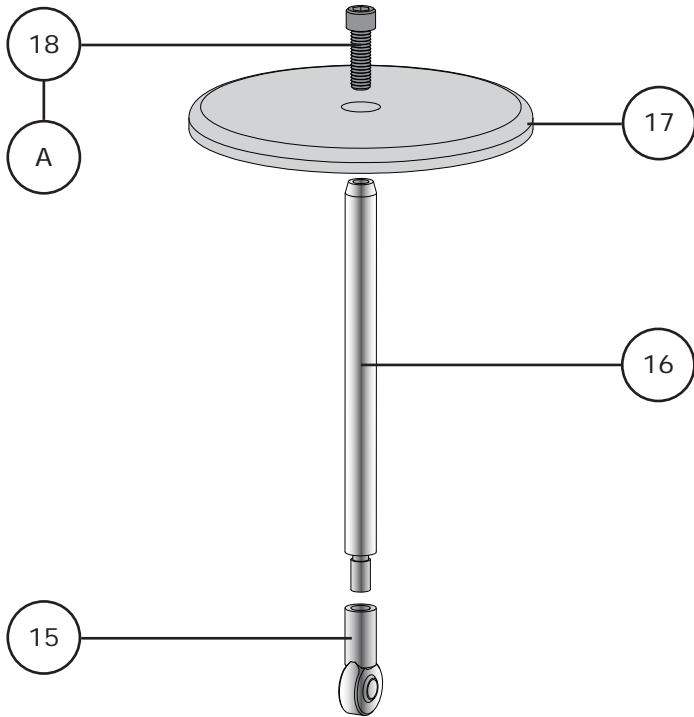


Figure 20 Diaphragm Plate/Rod Assembly

ACTUATOR ASSEMBLY (Continued)

LEVER ASSEMBLY AND INSTALLATION

- 1 If the set screws (Key 20) and jam nuts (Key 21) were removed from the lever (Key 19), re-install them as shown in Figure 21.
- 2 Place the lever assembly (Keys 19, 20, & 21) inside the actuator housing (Key 1) as shown in Figure 21.
- 3 Place the diaphragm plate assembly (Keys 15, 16, 17, & 18) into the actuator housing (Key 1). Be aware of the orientation of the rod end bearing (Key 15), the hole in the rod end bearing should be in alignment with the hole in the lever (Key 19). Refer to Figure 22.
- 4 Apply Loctite® 242® (Key E) to the threads of the cap screw (Key 22). Using the cap screw, connect the rod end bearing (Key 15) to the lever (Key 19). Torque the cap screw to the torque value listed in Table 4.

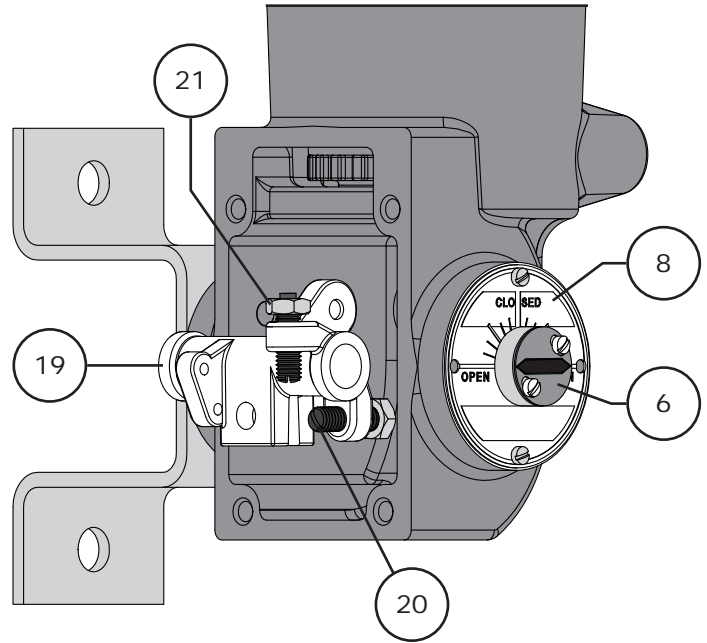


Figure 21 Lever Assembly / Installation

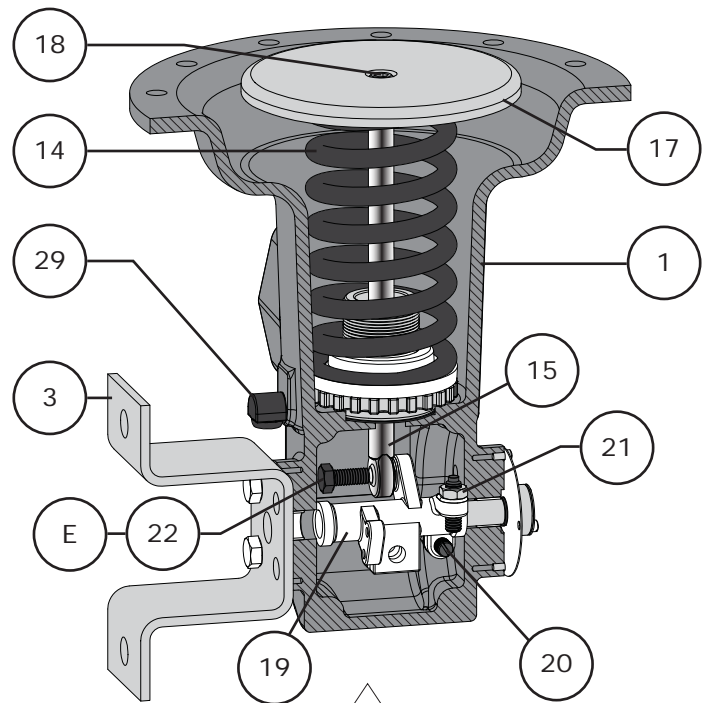


Figure 22 Lever Installation

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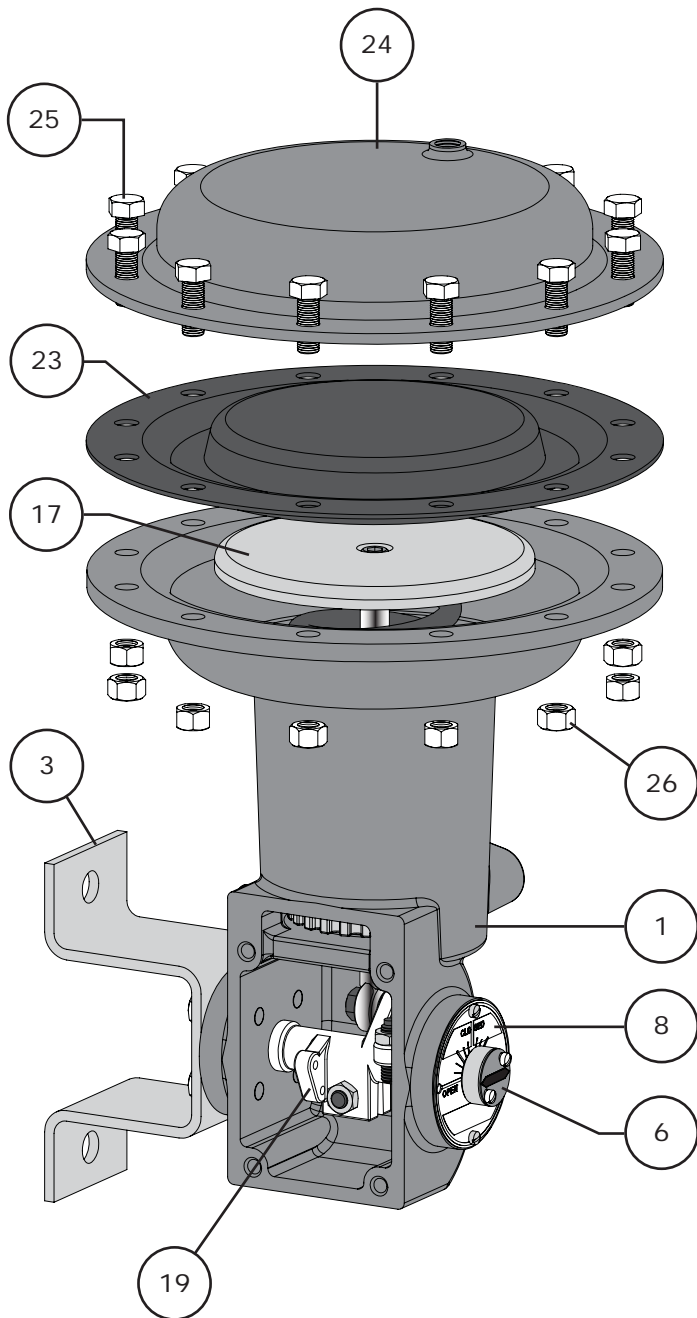


Figure 23 Diaphragm Casing Assembly

ACTUATOR ASSEMBLY (Continued)

DIAPHRAGM CASING ASSEMBLY

- 1 Place the diaphragm (Key 23) over the diaphragm plate (Key 17), align the holes in the diaphragm with the holes in the actuator housing (Key 1).
- 2 Set the upper diaphragm casing (Key 24) on top of the actuator housing (Key 1), align the holes. **Note:** If a Top-Mounted Handwheel is being used, it is advised that the position of the stem (Key 103) be adjusted so that the device will place no downward pressure on the actuator spring (Key 14).
- 3 Install the cap screws (Key 25) through the diaphragm casing (Keys 24).
- 4 Install the hex nuts (Key 26) and tighten them evenly in an alternating crisscross pattern to the torque specification listed in Table 4.
- 5 Mount the actuator to the valve before performing the SPRING ADJUSTMENT - Initial Set (Page 7).

ACCESS PLATE INSTALLATION

- 1 Install the access plate (Key 27) using the machine screws (Key 28).

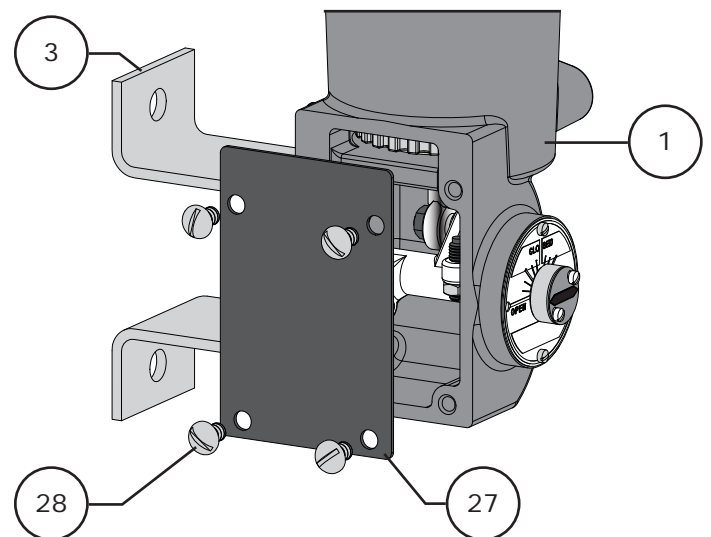


Figure 24 Access Plate Installation



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PRINCIPLES OF OPERATION AND ADJUSTMENT – HANDWHEEL

TOP-MOUNTED HANDWHEEL

DFR Top-Mounted Handwheel assemblies are attached to a modified upper diaphragm casing (Key 24A) using cap screws (Key 109). To lock the handwheel in position, tighten the lock nut (Key 104) into the body (Key 105) of the handwheel.

To compress the spring (Key 14) and move diaphragm rod (Key 16) down:

Turning the handwheel (Key 102) clockwise into the upper diaphragm casing (Key 24A) forces the pusher plate (Key 112) onto the diaphragm (Key 23) and diaphragm plate (Key 17) to compress the spring.

To decompress the spring (Key 14) and allow diaphragm rod (Key 16) to move up:

Turning the handwheel (Key 102) counterclockwise away from the upper diaphragm casing (Key 24A) allows the actuator spring to decompress which moves the diaphragm plate (Key 17) and diaphragm rod (Key 16) upward.

Note: If the valve is push-down-to-close, full valve opening can be restricted by adjusting the handwheel to the desired position.

If the valve is push-down-to-open, full valve closing can be restricted by adjusting the handwheel to the desired position.

MAINTENANCE - TOP-MOUNTED HANDWHEELS

Maintenance should be performed if actuator loading pressure appears to be leaking from either the handwheel or travel stop. It is possible that either of the o-rings (Keys 107 & 108) need to be replaced.

Before disassembling the handwheel or travel stop to replace o-rings, perform the following steps:

- Lubricate the threads of the stem (Key 103) with white petroleum grease, stroke the device a couple times after application.

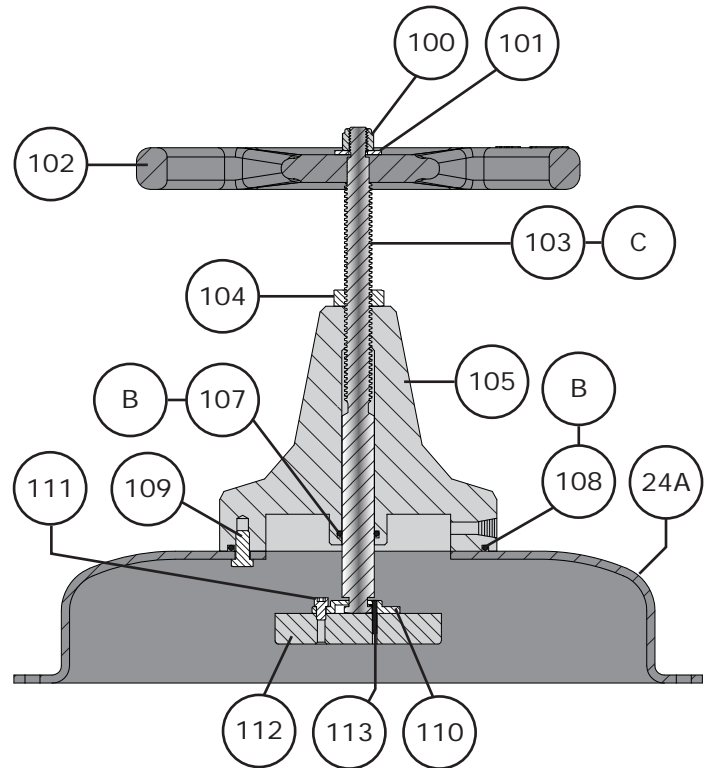


Figure 25 DFR Top-Mounted Handwheel

MAINTENANCE - TOP-MOUNTED HANDWHEELS O-RING REPLACEMENT

Before You Begin:

- Read the General and Scope section of this manual (Page 2).
- Read Safety Caution (Page 2).
- Use safe work practices and lock out procedures.
- Disconnect supply lines (air or gas), electric power, or control signal to the actuator. Sudden movement of actuator can cause damage or injury, make sure actuator will not operate.
- Vent any pneumatic actuator loading pressure.
- Relieve process pressure and drain the process fluid from up and down stream of valve.
- Be aware of potentially hazardous process material that may be present in-line and in-valve. Isolate the valve from process pressure. Use a bypass or block valve if necessary, or completely shut off the process. Relieve internal valve pressure (refer to the appropriate valve instruction manual).

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Special Tools Required:

- Flat-head screwdriver or flat-bladed tool.

Lubricants Required:

- Dow Corning Molykote® 111 or equivalent (Key B)
- Lubriplate® No. 105 Grease or equivalent (Key C)

- 1 Rotate the handwheel counterclockwise and remove any spring tension applied by the handwheel.
- 2 Relieve any actuator spring (Key 14) compression by turning the spring adjuster (Key 12) clockwise until it stops turning. Refer to Step 2 & 3 of the Casing Disassembly Section.
- 3 Refer to the Actuator Disassembly – Casing Disassembly Steps 1, 3 & 4 and remove the upper diaphragm casing (Key 24A).
- 4 Separate the handwheel assembly from the upper diaphragm casing (Key 24A) by removing the cap screws (Key 109).
- 5 Loosen the lock nut (Key 104).
- 6 Remove the hex nut (Key 100), flat washer (Key 101), and handwheel (Key 102).
- 7 Rotate the stem (Key 103) clockwise out of the body (Key 105).
- 8 Remove and replace the o-rings (Keys 107 & 108). Lubricate the new o-rings with Dow Corning Molykote® 111 (Key B).
- 9 Re-assemble the handwheel and diaphragm casing. Refer to the Actuator Assembly section (Page 11).
- 10 Perform spring adjustment.



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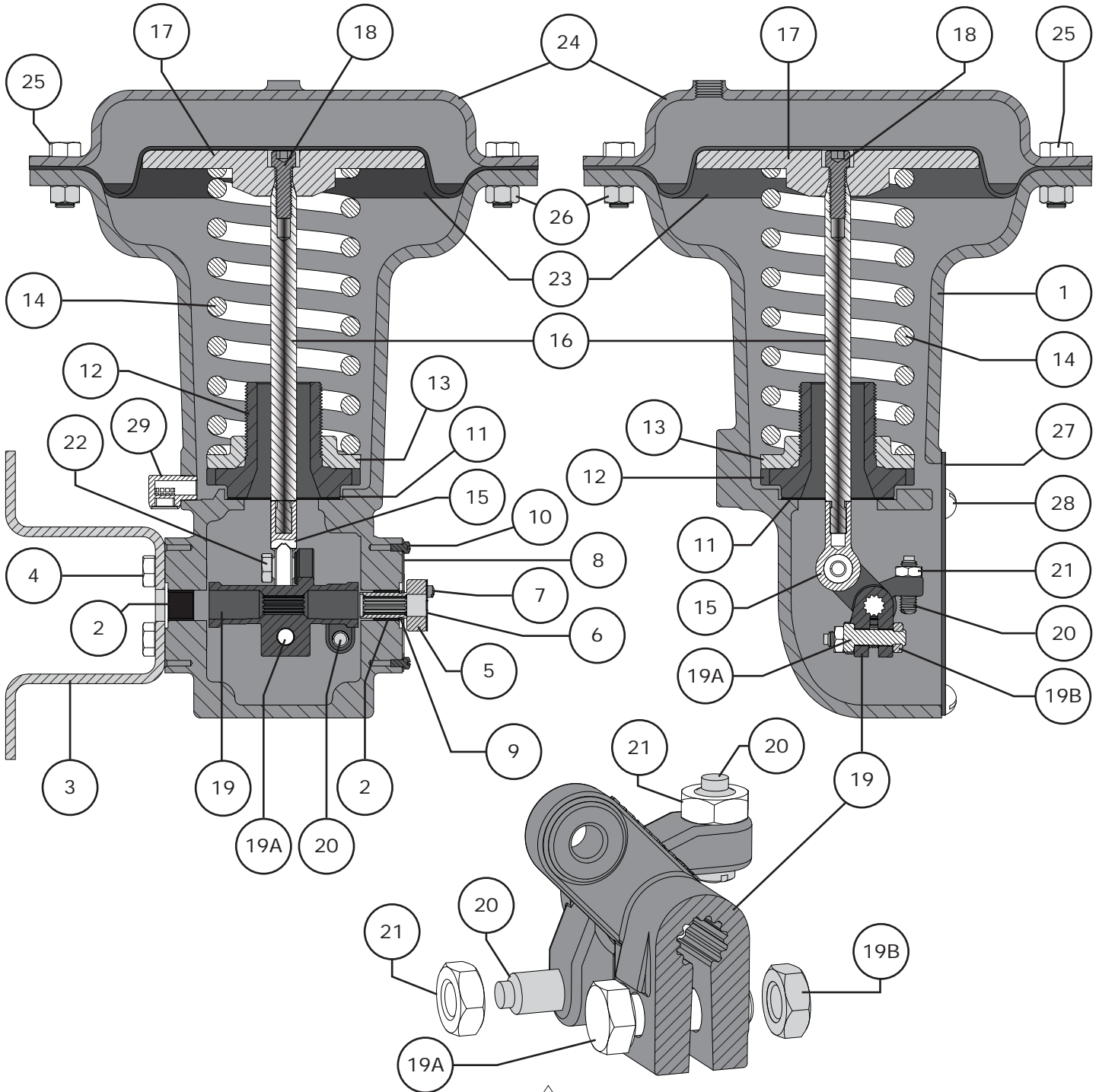


Figure 26 Actuator Cross Section

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Table 3

Torque Specifications for Valve Mounting Bolts (Key 30)

Valve Shaft Diameter	Mounting Bolts	
	lbf-ft	N•m
1/2 Inch & 5/8 Inch x 1/2 Inch	65	88

Table 4

DFR Torque Specifications

Key	Bolt Size	Torque	
		lbf-ft	N•m
4	3/8"-16	25	34
18	5/16"-18	16	22
21	5/16"-18	20	27
22	5/16"-18	16	22
25	3/8"-24	20	27



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Parts

Key	Description	Part Number
1	Housing Assembly , Cast Iron Includes Bushings (Key 2)	46A4670X01D
2	Bushing , Bronze, 2 Required	DFR0260001D
3	Mounting Yoke , Steel 1/2 inch shaft	36A4658X01D
4	Cap Screw , Mounting Yoke 4 Required	H5CZ38.100
5	Hub , Aluminum	26A4676X01D
6	Travel Indicator , SST	28A8529X01D
7	Machine Screw , Travel Indicator SST, 4 Required	1V74353522D
8	Travel Scale , SST	28A8527X01D
9	Retaining Ring , Steel	1A90292899D
10	Machine Screw , Travel Scale	Refer to Key 7
11	Thrust Washer , Steel	16A4681X01D
12	Spring Adjuster , Cast Iron	26A4665X01D
13	Spring Seat , Zinc Plated Steel	26A4664X01D
14	Spring	Refer to Table 5
15	Rod End Bearing , Zinc Plated Steel	Refer to Key 16
16	Diaphragm Rod Assembly , Zinc Plated Steel Includes Rod End Bearing	26A4651X01D
17	Diaphragm Plate , Cast Iron	33B9686X01D
18	Socket Head Cap Screw , Diaphragm Plate Steel	SCC516.100
19	Lever , WCC	34B8600X01D
19A	Cap Screw , Lever, Zinc Plated Steel	H5CZ516.100
19B	Jam Nut , Lever, Zinc Plated Steel	NHJCZ516
20	Set Screw , Travel Stop, 18-8 Steel, 2 Required	16A4667X02D
21	Jam Nut , Travel Stop Zinc Plated Steel, 2 Required	NHJC516
22	Cap Screw , Lever/Diaphragm Rod Zinc Plated Steel	H5CZ516.034
23	Diaphragm , Nitrile	26A4668X01D
24	Upper Diaphragm Casing , Steel	DF10408X01D
25	Cap Screw , Diaphragm Casing, Zinc Plated Steel, 12 Required	H5FZ38.114
26	Hex Nut , Diaphragm Casing Zinc Plated Steel, 12 Required	NHFZ38
27	Access Plate , Steel	26A4655X01D
28	Machine Screw , Access Plate Zinc Plated Steel, 4 Required	1C12252898D

Key	Description	Part Number
29	Elbow Vent , Plastic	Y602-12D
30	Mounting Bolt , Actuator / Valve, Zinc Plated Steel Mounting bolts are included with the valve assembly.	
31	Lockwasher , Actuator / Valve, Zinc Plated Steel lockwashers are included with the valve assembly.	
32	Hex Nut , Mounting Bolt, Zinc Plated Steel Hex nuts are included with a 570 valve assembly.	
33	Nameplate	NAMEXSRACTD

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PARTS - DFR Handwheel Parts List		
KEY	PART DESCRIPTION	PART NUMBER
100	NYLOCK HEX NUT	DFO30109X1D
101	FLAT WASHER	DF060110X1D
102	HANDWHEEL	DFO40106X1D
103	STEM	DFR40102X1D
104	LOCK NUT	DFO60107X1D
105	BODY	DFR40201X1D
107	O-RING, STEM	1D23750699D
108	O-RING, BODY/CASING	1D26730699D
109	CAP SCREW, BODY/CASING (6 REQUIRED)	1A36842405D
110	PUSHER PLATE RETAINER	DFO60111X1D
111	SOCKET HEAD CAP SCREW, PUSHER PLATE RETAINER (3 REQUIRED)	DFO20114X1D
112	PUSHER PLATE	DFO60103X1D
113	SPRING PIN	DFO60115X1D
24A	UPPER DIAPHRAGM CASING	DF10410X01D

Table 5

DFR Spring (Key 6) Information

Casing Pressure		Initial Spring Compression				Part Number
Psig	kPag	Push-Down-To-Open (Fail Closed)		Push-Down-To-Close (Fail Open)		
		Psig	kPag	Psig	kPag	
0 - 18	0 - 124	3.9	27	3.0	21	16A4660X01D
0 - 33	0 - 228	6.8	47	3.0	21	16A4659X01D
3 - 27	21 - 186	6.8	47	4.0	28	16A4659X01D
3 - 27	21 - 186	-	-	3.9	27	16A4660X01D

Parts Ordering

Whenever corresponding with Dyna-Flo about a DFR actuator, refer to the nameplate (Key 33) for the serial number of the unit. Please order by the complete part number (as given in the following parts list) of each part required.



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MODEL NUMBERING SYSTEM

SAMPLE PART NUMBER: DFR-026-C-04S1-A-RA1

						ACTUATOR		026	
026	SIZE 026								
						FAIL POSITION		C	
C	FAIL CLOSED	O	FAIL OPEN	N	NOT APPLICABLE				
						PAINT		-	
-	DFPS-01 (STANDARD PAINT)			2	DFPS-02 (SEVERE SERVICE PAINT)				
3	DFPS-03 (HI-TEMP PAINT)								
						SHAFT CONNECTION SIZE		04	
04	1/2 INCH								
						SHAFT CONNECTION TYPE		S	
S	SPLINED (STANDARD)								
						OPERATING PRESSURE RANGE / CASING NPT CONNECTION SIZE		1	
1	0-18 PSIG / 1/4" NPT		6	0-18 PSIG / 1/2" NPT		5	0-18 PSIG / 3/4" NPT		
9	0-33 PSIG / 1/2" NPT		7	0-33 PSIG / 3/4" NPT		0	3-27 PSIG / 1/4" NPT		
B	3-27 PSIG / 3/4" NPT								
						OPTIONS		-	
-	STANDARD			S	SST BOLTING				
						SPRING (REFER TO TABLES 5-7 OF SALES BULLETIN FOR RANGE AND FAIL POSITION)		A	
A	16A4660X01D			B	16A4659X01D				
						HANDWHEELS / TRAVEL STOPS		-	
-	NONE (STANDARD)			T	TOP-MOUNTED HANDWHEEL				
						MOUNTING		RA1	
R	RIGHT HAND MOUNT			L	LEFT HAND MOUNT				
A	STYLE A, B, C, D - REFER TO FIGURE 12								
1	POSITION A, B, C, D - REFER TO FIGURE 12 (RIGHT HAND POSITION 1 IS STANDARD)								
N	NOT APPLICABLE								

DFR - _____

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