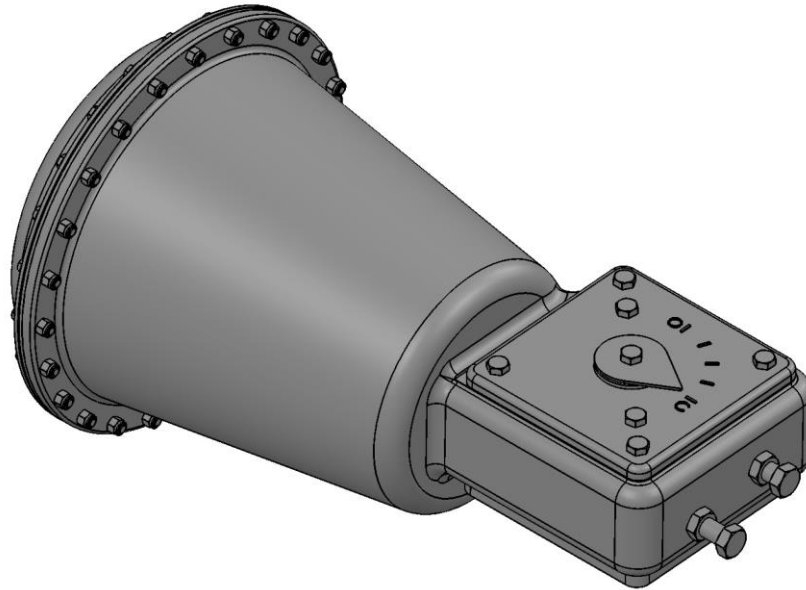




DeZURIK DR-125 ROTARY DIAPHRAGM ACTUATOR



Instruction **D10507**
January 2020

DeZURIK

DR-125 Rotary Diaphragm Actuator

Instructions

These instructions provide information about DR-125 Rotary Diaphragm Actuator. They are for use by personnel who are responsible for installation, operation and maintenance of DR Model 125 Diaphragm Actuators.

Safety Messages

All safety messages in the instructions are identified by a general warning sign and the signal word CAUTION, WARNING or DANGER. These messages indicate procedures that must be followed exactly to avoid equipment damage, personal injury or death. Safety label(s) on the product indicate hazards that can cause injury or death.

If a safety label becomes difficult to see or read, or if a label has been removed, please contact DeZURIK for replacement label(s).

⚠ WARNING

Personnel involved in the installation or maintenance of valves should be constantly alert to potential emission of pipeline material and take appropriate safety precautions. Always wear suitable protection when dealing with hazardous pipeline materials. Handle valves, which have been removed from service with suitable protection for any potential pipeline material in the valve.

Inspection

Your DR-125 Rotary Diaphragm Actuator has been packaged to provide protection during shipment, however, it can be damaged in transport. Carefully inspect the unit for damage upon arrival and file a claim with the carrier if damage is apparent.

Parts

Recommended spare parts are listed on the assembly drawing. These parts should be stocked to minimize downtime.

Order parts from your DeZURIK sales representative, or directly from DeZURIK. When ordering parts, please include the 7-digit part number and 4-digit revision number (example: **9999999R000**) and the serial number if available, located on the data plate attached to the valve assembly. Also include the part name, the assembly drawing number, the balloon number and the quantity stated on the assembly drawing.

DeZURIK Service

DeZURIK service personnel are available to install, maintain and repair all DeZURIK products. DeZURIK also offers customized training programs and consultation services.

For more information, contact your local DeZURIK sales representative or visit our website at www.dezurik.com.

Disposal

Your Rotary Diaphragm Actuator contains a permanently compressed spring assembly. Prior to disposal of the actuator or spring assembly, the spring pressure must be relieved. See Actuator Disposal section for complete instructions.

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DR-125 Rotary Diaphragm Actuator

Description

The DR-125 Rotary Diaphragm Actuator is a pneumatic spring-return rotary actuator used for on-off or modulating control of a quarter-turn valve. The model number 125 is the actuator size, and designates the effective pressure area in square inches of the spring-loaded diaphragm. The spring action may be spring-to-close or spring-to-open, and is reversible without additional parts.

A choice of two spring ranges is available—35 or 60 psi (240 or 420 kPa).

Installation

One pneumatic signal line connection is required to the ½ NPT port on the end of the actuator. The pneumatic signal pressure must equal, but not exceed by more than 10 psi (70 kPa), the spring rating of 35 or 60 psi (240 or 420 kPa) as shown on the actuator label.

For high vibration installations, additional mounting support is recommended on the diaphragm end of the actuator to prevent damage to the actuator and/or the piping system. Mount the support from the pipeline to at least two of the diaphragm cover screws (B2) shown in Figure 1. Tighten the screws to 18 ± 2 foot pounds (24 ± 3 Nm).

Operation

The actuator is powered pneumatically and rotates 90 degrees between the open and closed positions. The action of the actuator is either spring-to-close or spring-to-open, as determined by which side of the actuator is mounted to the valve, as shown in Figure 2. The action selected is shown on the actuator label. With spring-to-close, increasing signal pressure to the actuator opens the valve and decreasing pressure closes the valve; with spring-to-open, increasing pressure closes the valve and decreasing pressure opens the valve.

Lubrication

The actuator is lubricated at the factory and does not require further lubrication.

Parts Identification

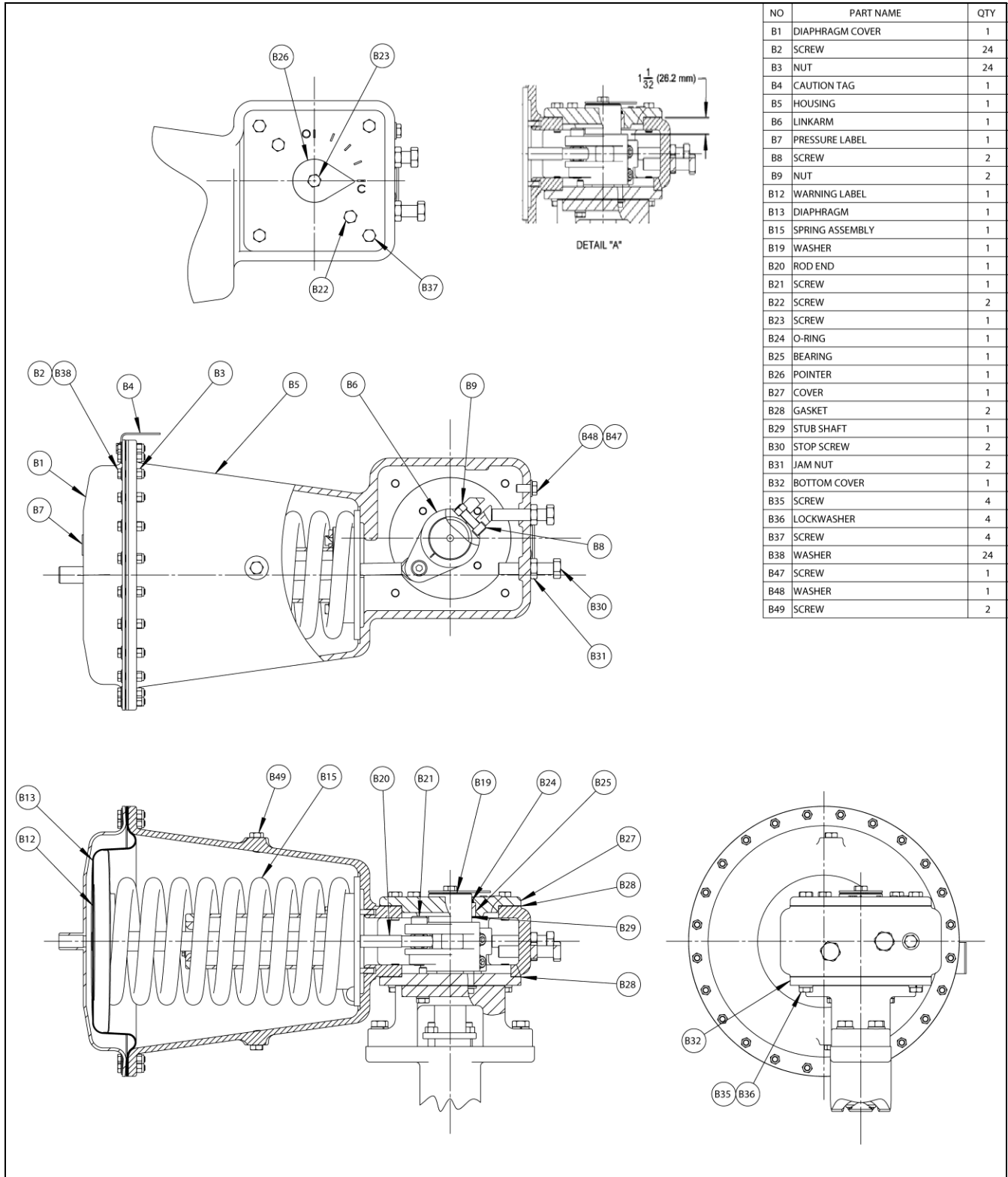


Figure 1 - Parts Identification

Open and Closed Position Stops

The open and closed position stops are the two hex head screws (B30) shown in Figure 1 and on Figure 2. The stops are adjustable and prevent the actuator from rotating beyond the open and closed positions of the valve. If the actuator is factory-mounted on the valve, the stops are preset and do not require further adjustment.

If the actuator is not factory-mounted on the valve, or if the actuator is removed and/or disassembled, the stops will require adjustment as described below. Refer to the valve Instructions for closed-position information and adjust the stops with the actuator mounted on the valve. Refer to Figure 1 for component identification.

For **closed** stop adjustment on spring-to-**close** actuators, or **open** stop adjustment on spring-to-**open** actuators:

1. Relieve the air pressure to the actuator.
2. Loosen the jam nut (B31) on the appropriate stop screw (B30). Refer to Figure 1.
3. Turn the stop screw in or out until the valve is in the correct position. The screw will turn easier if air pressure—just enough to relieve the force on the screw—is applied to the actuator. Relieve the pressure to check the stop screw adjustment.
4. Hold the stop screw from turning, and tighten the jam nut to 230 ± 30 foot pounds (312 ± 41 Nm) if carbon steel, or to 140 ± 18 foot pounds (190 ± 24 Nm) if stainless steel.

For **closed** stop adjustment on spring-to-**open** actuators, or **open** stop adjustment on spring-to-**close** actuators:

1. Apply—but do not exceed—the maximum air pressure to the actuator, as determined by the spring rating shown on the actuator label.
2. Loosen the jam nut (B31) on the appropriate stop screw (B30). Refer to Figure 1 and Figure 2.
3. Turn the stop screw in or out until the valve is in the correct position. The screw will turn easier if the air pressure to the actuator is reduced. Reapply the maximum pressure in step 1 above to check the stop screw adjustment.
4. Hold the stop screw from turning, and tighten the jam nut to 230 ± 30 foot pounds (312 ± 41 Nm) if carbon steel, or to 140 ± 18 foot pounds (190 ± 24 Nm) if stainless steel.
5. Relieve the air pressure to the actuator.

Open and Closed Position Stops *(continued)*

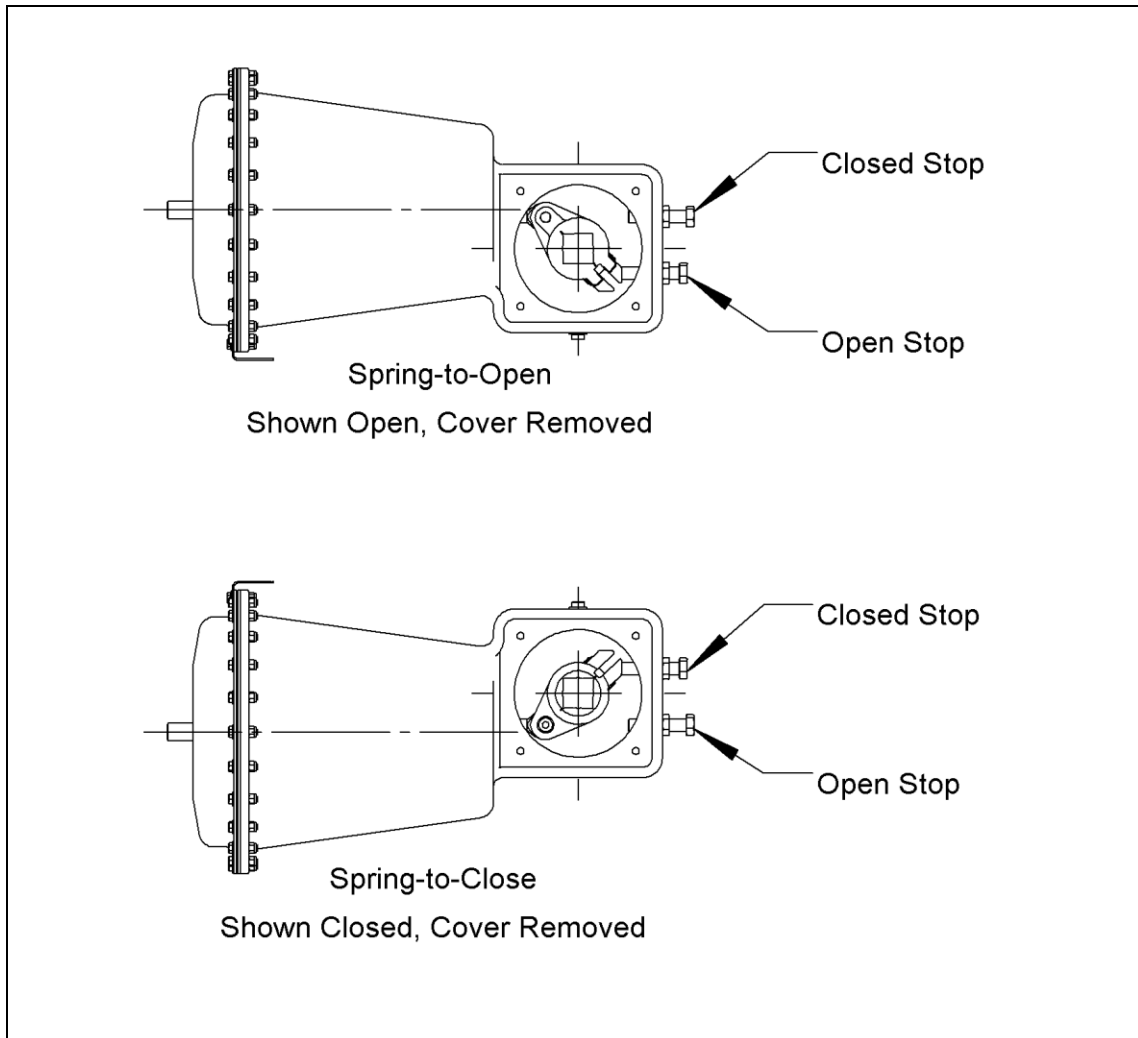


Figure 2 - Open and Closed Position Stops

Removing Actuator from Valve

Refer to Figure 1 for component identification.

1. Shut down the flow in the pipeline.

⚠ WARNING

Flow in the pipeline with the actuator removed can slam the valve closed causing personal injury and damaging the flow system. Shut down the flow in the pipeline before removing the actuator from the valve.

2. Disconnect and lock out the pneumatic power to the actuator to prevent accidental operation of the actuator. Ensure that the actuator and pipeline are de-energized.

⚠ WARNING

Moving parts from unexpected operation of a powered actuator can cause personal injury. Disconnect and lock out power to the actuator before servicing.

3. Remove the pointer screw (B23), pointer (B26), and washer (B19) from the actuator.
4. Apply about 10 psi (70 kPa) air pressure to the actuator, and remove the four top cover screws (B37) and the top cover (B27).

NOTICE

Removal or replacement of the top cover without pressure on the actuator is very difficult and could cause damage to the actuator or valve.

5. Remove the shoulder screw (B21) from the link arm (B6).
6. Relieve the air pressure to the actuator from step 4.
7. Loosen the two link arm screws (B8) and nuts (B9) and remove the link arm (B6) from the valve shaft.
8. Remove the four actuator mounting screws (B35) and lockwashers (B36) and remove the actuator.

Replacing Actuator on Valve

Refer to Figure 1 for component identification.

1. If the actuator lower cover (B32) has been removed from the valve adaptor, replace it tightening the valve adaptor fasteners as shown in Table A.
2. Place the valve in the closed position for a spring-to-close actuator or in the open position for a spring-to-open actuator.
3. Select the desired mounting orientation for mounting the actuator on the valve. Refer to limitations in the “Changing Actuator Mounting Position on Valve” section of this instruction.
4. Fasten the actuator to the bottom cover (B32) with the four ½-13 mounting screws (B35) and lockwashers (B36). Tighten the screws as shown in Table A.
5. Align the shaft hole in the link arm (B6) with the valve shaft and slide the link arm onto the shaft.

Replacing Actuator on Valve *(continued)*

Table A: Torque Requirements for Actuator Mounting Screws

Screw Size	Carbon Steel		Stainless Steel	
	Foot Pounds	Newton Meters	Foot Pounds	Newton Meters
1/2-13	108 ± 14	146 ± 19	49 ± 7	66 ± 9
M8 X 1.25	23 ± 3	31 ± 4	16 ± 2	22 ± 3
M12 X 1.75	83 ± 10	113 ± 14	58 ± 8	79 ± 11
M20 X 2.5	435 ± 60	590 ± 81	300 ± 40	400 ± 54

6. Position the link arm (B6) 1-1/32" (26.2 mm) below the top of the actuator as shown in Detail "A" of Figure 1.
7. Tighten the two link arm screws (B8) and nuts (B9) to 108 ± 14 foot pounds (146 ± 19 Nm).
8. Apply air pressure so that the rod end (B20) is aligned between the holes in the link arm (B6). Apply Loctite 243 to the threads of screw (B21), and connect the rod end to the link arm. Tighten the screw to 151 ± 20 foot pounds (205 ± 27 Nm).
9. Position the O-ring (B24) in the groove in the stub shaft (B29) and mount the gasket (B28) and cover (B27) to the actuator with the four screws (B37). Tighten the screws to 108 ± 14 foot pounds (146 ± 19 Nm) if carbon steel, or to 49 ± 7 foot pounds (66 ± 9 Nm) if stainless steel.
10. Relieve the air pressure to the actuator. Mount the pointer (B26) to the stub shaft (B29) with the screw (B23) and washer (B19) under the pointer. Tighten the screw to 55 ± 8 foot pounds (75 ± 11 Nm) if carbon steel, or to 33 ± 4 foot pounds (45 ± 5 Nm) if stainless steel.
11. Re-mount any accessories that were removed and connect all pneumatic and electrical connections.
12. Operate the valve to check the open and closed positions. Adjust the stops, if necessary, as described in the "Open and Closed Position Stops" section.

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DR-125 Rotary Diaphragm Actuator

Diaphragm Replacement

Refer to Figure 1 for parts identification.

⚠ DANGER

This actuator includes a compressed spring. Death or serious injury can result if the spring cover is removed improperly.

1. Shut down the flow in the pipeline.
-

⚠ WARNING

Flow in the pipeline with the actuator removed can slam the valve closed causing personal injury and damaging the flow system. Shut down the flow in the pipeline before removing the actuator from the valve.

2. Disconnect and lock out the pneumatic power to the actuator to prevent accidental operation of the actuator.
-

⚠ WARNING

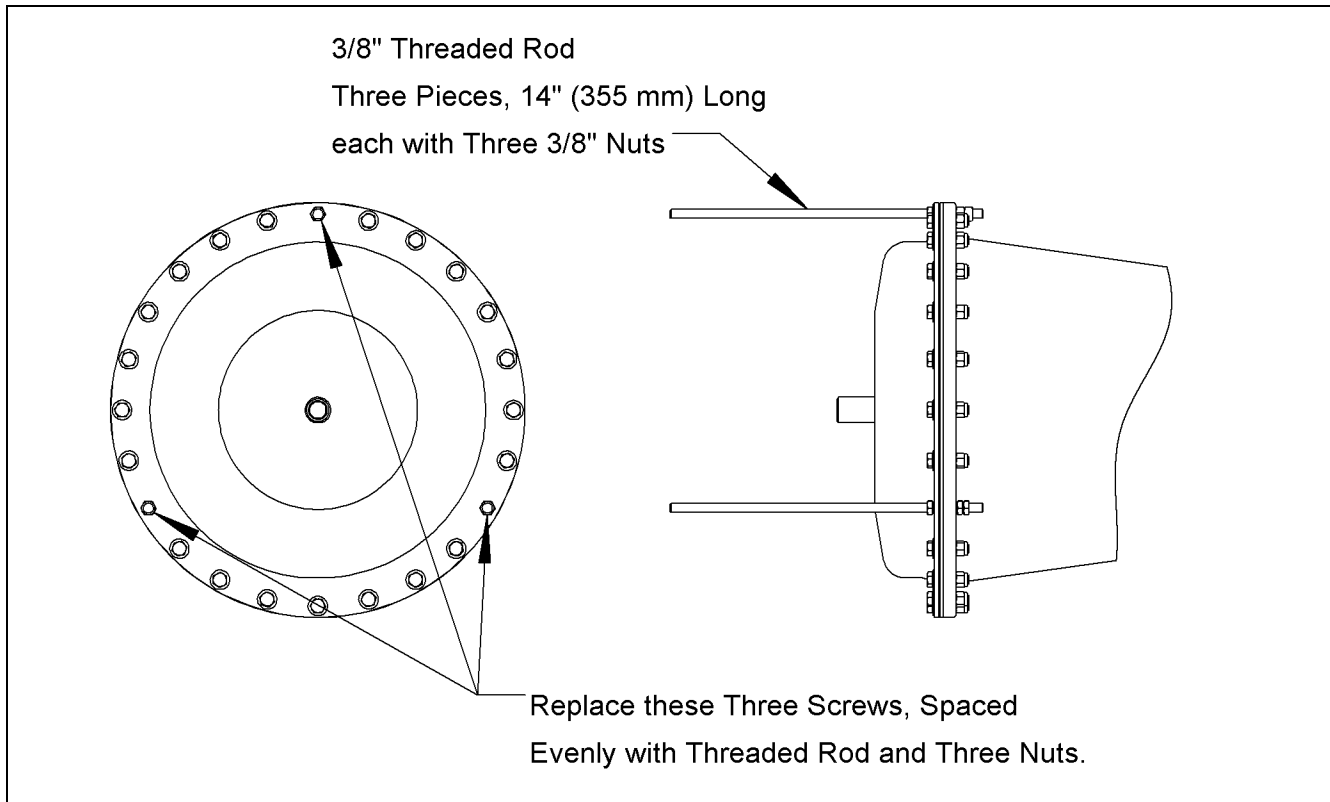
Moving parts from unexpected operation of a powered actuator can cause personal injury. Disconnect and lock out power to the actuator before servicing.

3. Remove the pointer screw (B23), pointer (B26), and washer (B19) from the actuator.
 4. Apply about 10 psi (70 kPa) air pressure to the actuator, and remove the four top cover screws (B37) and the top cover (B27).
-

NOTICE

Removal or replacement of the top cover without pressure on the actuator is very difficult and could cause damage to the actuator or valve.

5. Remove the shoulder screw (B21) from the link arm (B6).
6. Relieve the air pressure to the actuator from step 4.
7. Remove three screws (B2), nuts (B3), and washers (B38) from the diaphragm cover (B1). The three screws removed must be equally spaced as shown in Figure 3.

Diaphragm Replacement *(continued)***Figure 3 - Stud Requirements for Diaphragm Cover Removal**

8. Obtain three 3/8" diameter threaded rods, each at least 14" (355 mm) long, and nine 3/8" nuts. As shown in Figure 3, assemble one rod and three nuts in each of the holes from which the screws were removed in the previous step. Jam the double nuts together by tightening to 26 ± 3 foot pounds (35 ± 4 Nm); tighten the single nuts finger tight against the cover.
9. Remove the remaining screws (B2), nuts (B3), and washers (B38) from the diaphragm cover (B1).
10. Turn the single nuts counterclockwise—carefully, evenly, and slowly— from each of the three threaded rods. Continue turning each nut until the spring force is fully relieved from the diaphragm cover (B1). Then remove the nuts, the threaded rods, and the diaphragm cover from the actuator.
11. Remove the rubber diaphragm (B13) from the housing (B5).

⚠ DANGER**DO NOT DISASSEMBLE THE SPRING ASSEMBLY**

The spring assembly includes a compressed spring. Death or serious injury can result if the spring is disassembled.

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Diaphragm Replacement *(continued)*

12. Mount the new diaphragm (B13) and the diaphragm cover (B1) to the housing (B5) with screws (B2), washers (B38) and nuts (B3). Place the caution tag (B4) under one of the screws. Tighten the screws evenly until the rubber diaphragm is in contact with the cover and the housing. Then tighten the screws in a crisscross pattern to 18 ± 2 foot pounds (24 ± 3 Nm).
13. Apply air pressure so that the rod end (B20) is aligned between the holes in the link arm (B6). Apply Loctite 242 to the threads of screw (B21), and connect the rod end to the link arm. Tighten the screw to 151 ± 20 foot pounds (205 ± 27 Nm).
14. Position the O-ring (B24) in the groove in the stub shaft (B29), and mount the gasket (B28) and cover (B27) to the actuator with the four screws (B37). Tighten the screws to 108 ± 14 foot pounds (146 ± 19 Nm) if carbon steel, or to 49 ± 7 foot pounds (66 ± 9 Nm) if stainless steel.
15. Relieve the air pressure to the actuator. Mount the pointer (B26) to the stub shaft (B29) with the screw (B23) and washer (B19) under the pointer. Tighten the screw to 55 ± 8 foot pounds (75 ± 11 Nm) if carbon steel, or to 33 ± 4 foot pounds (45 ± 5 Nm) if stainless steel.
16. Re-connect all pneumatic and electrical connections.
17. Operate the valve to check the open and closed positions. Adjust the stops, if necessary, as described in the Open and Closed Position Stops section.

Reversing the Diaphragm Action

Refer to Figure 1 for parts identification.

1. Shut down the flow in the pipeline.

⚠ WARNING

Flow in the pipeline with the actuator removed can slam the valve closed causing personal injury and damaging the flow system. Shut down the flow in the pipeline before removing the actuator from the valve.

2. Disconnect and lock out the pneumatic power to the actuator to prevent accidental operation of the actuator.

⚠ WARNING

Moving parts from unexpected operation of a powered actuator can cause personal injury or equipment damage. Disconnect and lock out power to the actuator before servicing.

3. Remove the pointer screw (B23), pointer (B26), and washer (B19) from the actuator.
4. Apply about 10 psi (70 kPa) air pressure to the actuator, and remove the four top cover screws (B37) and the top cover (B27). Removal or replacement of the top cover without pressure on the actuator is very difficult and could cause damage to the actuator or valve.
5. Remove the shoulder screw (B21) from the link arm (B6).
6. Relieve the air pressure to the actuator and disconnect the actuator piping.
7. Remove the four actuator mounting screws (B35) and washers (B36), and remove the actuator.
8. Loosen the two link arm screws (B8) and remove the stub shaft (B29) from the link arm (B6); remove the link arm from the valve shaft, and replace the link arm on the valve shaft in the appropriate position as shown in Figure 2.
9. Turn the actuator over, verify position and re-mount the actuator to the bottom cover with the same screws (B35) and washers (B36). Tighten the screws as shown in Table A.
10. Position the link arm 1-1/32" (26.2 mm) below the top of the actuator as shown in Detail "A" of Figure 1.
11. Tighten the two link arm screws (B8) to 108 ± 14 foot pounds (146 ± 19 Nm).
12. Connect the actuator piping. Apply air pressure so that the rod end (B20) is aligned between the holes in the link arm (B6). Apply Loctite 242 to the threads of screw (B21) and connect the rod end to the link arm. Tighten the screw to 151 ± 20 foot pounds (205 ± 27 Nm).
13. Position the O-ring (B24) in the groove in the stub shaft (B29) and mount the gasket (B28) and cover (B27) to the actuator with the four screws (B37). Tighten the screws to 108 ± 14 foot pounds (146 ± 19 Nm) if carbon steel, or to 49 ± 7 foot pounds (66 ± 9 Nm) if stainless steel.

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Reversing the Diaphragm Action *(continued)*

14. Relieve the air pressure to the actuator. Mount the pointer (B26) to the stub shaft (B29) with the screw (B23) and washer (B19) under the pointer. Tighten the screw to 55 ± 8 foot pounds (75 ± 11 Nm) if carbon steel, or to 33 ± 4 foot pounds (45 ± 5 Nm) if stainless steel.
15. Re-mount any accessories that were removed and connect all pneumatic and electrical connections.
16. Operate the valve to check the open and closed positions. Adjust the stops, if necessary, as described in the Open and Closed Position Stops section.

Changing Actuator Mounting Position on Valve

Before changing the actuator mounting position, check to assure that pipeline flange clearance and room clearance is available for the proposed actuator location.

The actuator may be mounted on the valve in any of four mounting positions — standard, 90°, 180°, or 270°— as shown on the Installation Drawing. All four mounting positions may not be available on all valve sizes. Check installation drawings to verify valid mounting positions. To change the mounting position, follow the steps in the Removing Actuator from Valve section and the Replacing Actuator on Valve section

Actuator Disposal

Remove the actuator from the valve by following the instructions described in the Removing Actuator from Valve section.

Before disposing of the actuator or spring assembly, the compressed spring pressure must be relieved. For this to be completed safely, the spring assembly must be contained within the spring housing. Use a cutting torch to cut through the housing in at least 2 locations. Next, use the torch to cut through the spring coils in those locations. Ensure that all sections of the spring are loose within the housing before disposal.

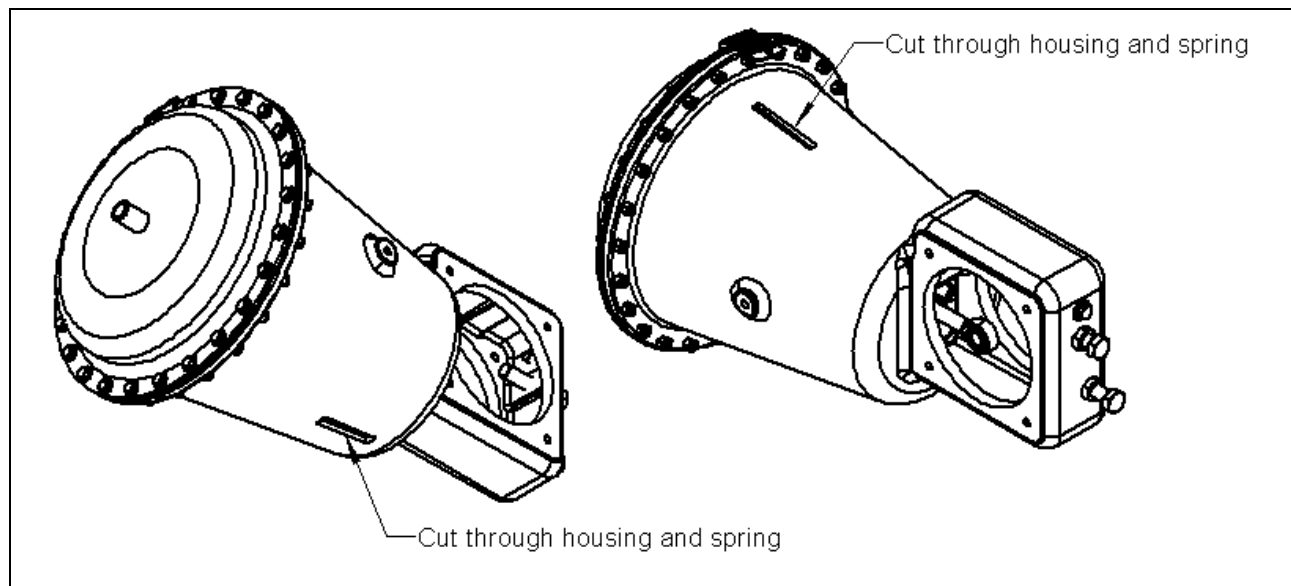


Figure 4 - Disposal Cutting

Troubleshooting

Condition	Possible Cause	Corrective Action
Actuator will not operate valve.	Rubber diaphragm is ruptured.	Replace diaphragm. See <i>Diaphragm Replacement</i> section.
		Place in unlocked condition..
Actuator closes to wrong position.	Closed position stop is set incorrectly.	Adjust closed position stop. See <i>Open and Closed Position Stops</i> section.
Actuator opens to wrong position.	Open position stop is set incorrectly.	Adjust open position stop. See <i>Open and Closed Position Stops</i> section.
Actuator will not fully operate valve.	Actuator air pressure is low.	Increase air pressure. Do not exceed spring rating.
	Actuator is sized incorrectly.	Use spring with increased rating, or use larger actuator.
	Pipeline obstruction in valve is preventing closure.	Remove obstruction.
Spring operates valve in wrong direction.	Spring-to-close should be spring-to-open or vice versa.	Reverse the action. See <i>Reversing Actuator Action</i> section.