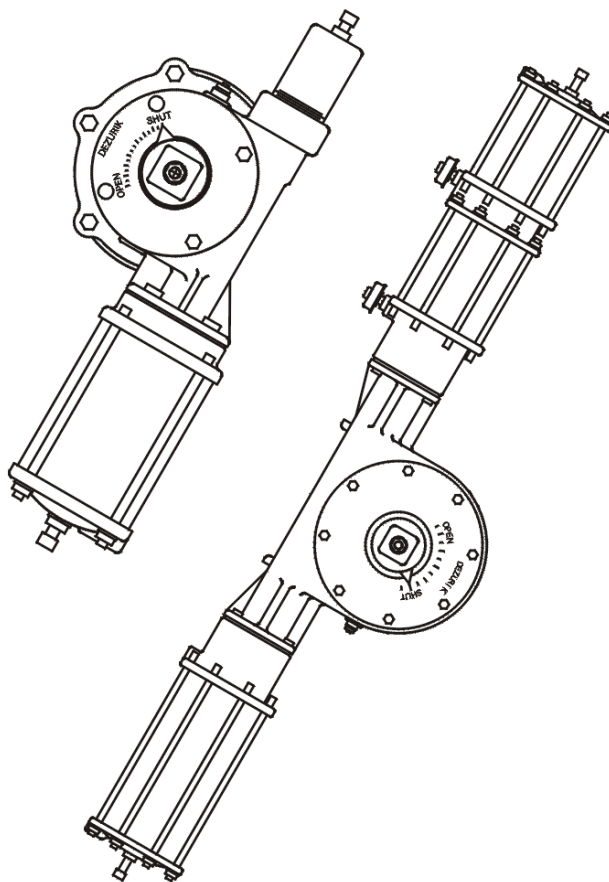


DEZURIK CYLINDER OPERATED G-SERIES ACTUATOR USED ON PEC ECCENTRIC VALVES



Instruction **D10022**
August 2012

Instructions

These instructions are for use by personnel who are responsible for the installation, operation and maintenance of DeZURIK valves, actuators or accessories.

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 to avoid 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 DeZURIK product has been packaged to provide protection during shipment; however, items 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

Replaceable wear parts are listed on the assembly drawing. These parts can be stocked to minimize downtime. Order parts from your local DeZURIK sales representative or directly from DeZURIK. When ordering parts please provide the following information:

If the valve has a data plate: please include the 7-digit part number with either 4-digit revision number (example: 9999999R000) or 8-digit serial number (example: S1900001) whichever is applicable. The data plate will be 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.

If there isn't any data plate visible on the valve: please include valve model number, part name, and item number from the assembly drawing. You may contact your local DeZURIK Representative to help you identify your valve.

DeZURIK Service

DeZURIK service personnel are available to 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 DeZURIK.com.

Table of Contents

| | |
|--|----|
| Description - - - - - | 4 |
| Air Supply - - - - - | 4 |
| Lubrication - - - - - | 4 |
| Actuator Identification - - - - - | 4 |
| Adjusting Position Stops | |
| <i>Adjusting the Open Position Stop</i> - - - - - | 5 |
| <i>Adjusting the Closed Position Stop</i> - - - - - | 6 |
| Removing Actuator - - - - - | 9 |
| Installing Actuator - - - - - | 10 |
| Removing Cylinder - - - - - | 11 |
| Installing Cylinder - - - - - | 11 |
| Disassembling Actuator - - - - - | 13 |
| Reassembling Actuator - - - - - | 14 |
| Changing Mounting Positions - - - - - | 16 |
| <i>Mounting Actuator in 60° Increments on 4–20" (100–500mm) Valves and 90°</i> | |
| <i>Increments on 24–36" (600–900mm) Valves</i> - - - - - | 16 |
| <i>Mounting Actuator in 30° Increments on 4–20" (100–500mm) Valves Only</i> - - - - - | 16 |
| <i>Mounting Actuator in 45° Increments on 24–36" (600–900mm) Valves Only</i> - - - - - | 17 |
| Troubleshooting - - - - - | 18 |

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Cylinder Operated G-Series Actuator

Description

The G-Series Cylinder Actuator is a totally enclosed, quarter turn, pneumatic operated actuator. A 2" (50mm) square nut on top of the actuator is provided for manual operation. It is supplied with a single cylinder, and single or double booster cylinders dependent on application.

Air Supply

The supply pressure to the cylinder should be between 50 and 100 psi (344 and 689 kPa).

Lubrication

The G-Series Cylinder Actuator has been lubricated at the factory and requires no routine lubrication. If the actuator is disassembled, lubricate the rack, rack guide, gear sector and bearings using one of these lubricants:

- Keystone Zeniplex-1 (**recommended**)
- Amoco Amolith Grease #1-EP (alternate)
- Amsoil GHD (alternate)
- Mobil Mobilux EP 1 (alternate)
- Petro-Canada Vultrex MPG EP 1 (alternate)
- Shell Alvania EP 1 (alternate)
- Texaco Multifak EP 1 (alternate)

If the cylinder is disassembled, it must be lubricated as described in the cylinder instructions.

Actuator Identification

The G-Series Cylinder Actuator is available in three sizes: G6, G12 and G16. See Figure 1 for actuator identification.

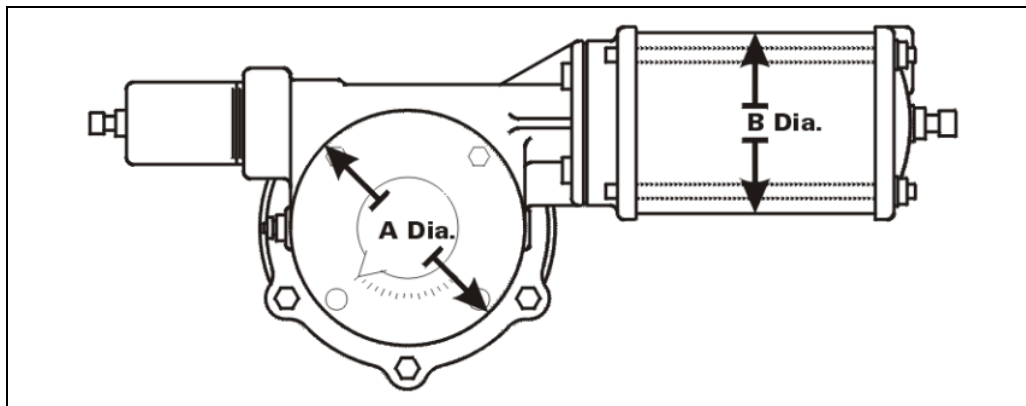


Figure 1 - Actuator Identification

To determine the actuator size, measure the diameter of the cover - see Figure 1 and Table A. To determine the cylinder size, measure the diameter of the cylinder - see Figure 1 and Table B.

Table A: Actuator Identification

| Actuator | Ø "A" | |
|----------|-------|-----|
| | IN | MM |
| G6 | 8 | 205 |
| G12 | 15 | 390 |
| G16 | 19 | 485 |

Table B: Cylinder Identification

| Cylinder | Ø "B" | |
|----------|-------|-----|
| | IN | MM |
| C4 | 4.5 | 115 |
| C6 | 6.5 | 165 |
| C8 | 8.5 | 215 |
| C10 | 10.5 | 265 |
| C12 | 12.5 | 320 |

Adjusting Position Stops

The G-Series Cylinder Actuators have both open and closed position stops. See Figure 2 for position stop identification.

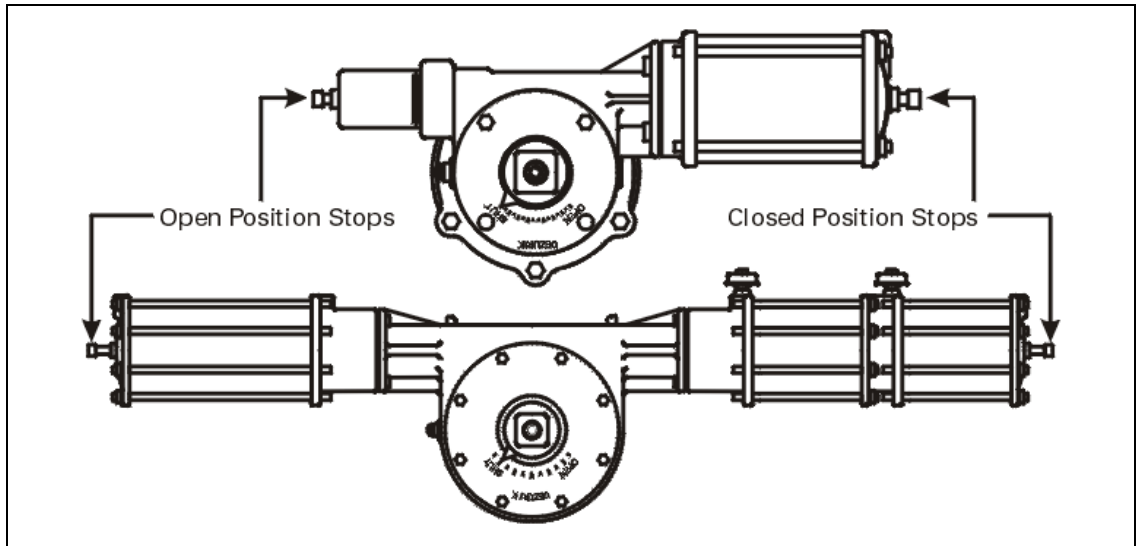


Figure 2 – Position Stops

The position stops are factory set and do not require adjustment unless the actuator has been disassembled or actuator orientation has been changed.

Adjusting the Open Position Stop

On actuators without booster cylinders, the open position stop is located in the end of the extension cap opposite the cylinder. On actuators with booster cylinders, the open position stop is located in the end of the power cylinder. See Figure 2.

1. Open the valve and loosen the Open Position jam nut.
2. Adjust the Open Position set screw to the proper position.
3. Lock the Open Position set screw in place with the jam nut.

Adjusting Position Stops *(Continued)*

Adjusting Closed Position Stop

On actuators without booster cylinders, the closed position stop is located in the end of the cylinder. On actuators with booster cylinders, the closed position stop is located in the end of the booster cylinder. See Figure 2.

Valves can be mounted with Direct or Reverse pressure.

Direct Pressure - When the higher pressure is at the end opposite the seat. See Figure 3.

Reverse Pressure - When the higher pressure is at the seat end of the valve. See Figure 3.

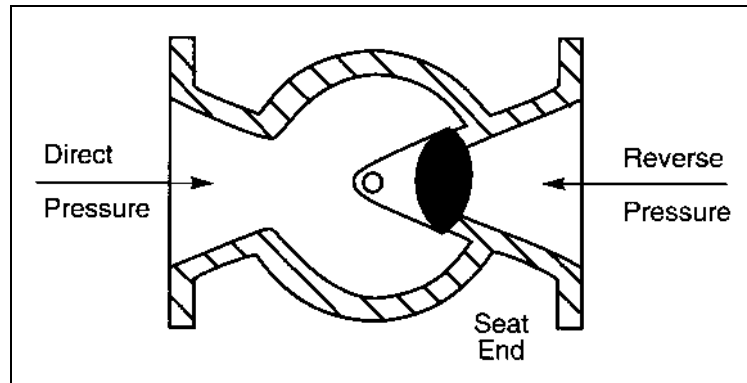


Figure 3 – Pressure Direction

1. Discontinue flow and relieve pipeline pressure.
2. Back out the Closed Position set screw about 1½ turns.
3. Close the valve with the pressure specified in Table C and Table D for the appropriate size and pressure direction—See Figure 3.

Direct Pressure (higher pressure is at end opposite the seat), use the cylinder pressure specified in Table C and Table D for 25 psi (172 kPa) reverse pressure drop.

Reverse Pressure (higher pressure is at seat end of valve), use the cylinder pressure specified in Table C and Table D for the amount of reverse pressure drop in your pipeline.

The pressure in Table C and Table D will provide tight shut off or minimum leakage (depending on pressure drop) with maximum plug life. If the reverse pressure drop in the pipeline is unknown, set closing pressure for the maximum pressure drop. Reset the closing pressure as soon as actual pressure drop can be determined because the maximum setting decreases plug life.

4. Maintain pressure for 5 minutes to allow the plug to seat, then tighten the set screw in until it comes into contact with the piston rod.

NOTE: Make sure the thread seal is positioned properly, and lock the setscrew in place with the jam nut.

Adjusting Position Stops *(Continued)*

Table C: Cylinder Closing Pressure - Reverse Pressure Drop*

| Valve Size | Actuator & Cylinder | Cylinder Closing Pressure (For Direct Pressure Drop Use Same as 25# Reverse) | | | | | | | | | |
|-------------|---------------------|---|---------|--------|---------|--------|---------|---------|---------|---------|---------|
| | | 25 psi | 172 kPa | 50 psi | 344 kPa | 75 psi | 517 kPa | 100 psi | 689 kPa | 125 psi | 861 kPa |
| 4" (100mm) | G6-C4 | 14 | 96 | 15 | 103 | 16 | 110 | 17 | 117 | 18 | 124 |
| | G6-C6 | 7 | 48 | 7 | 48 | 8 | 55 | 9 | 62 | 9 | 62 |
| 6" (150mm) | G6-C4 | 21 | 144 | 24 | 165 | 27 | 186 | 31 | 213 | 32 | 220 |
| | G6-C6 | 10 | 68 | 11 | 75 | 12 | 82 | 13 | 89 | 14 | 96 |
| 8" (200mm) | G6-C6 | 20 | 137 | 22 | 151 | 25 | 172 | 28 | 193 | — | — |
| | G6-C8 | 11 | 75 | 13 | 89 | 15 | 103 | 16 | 110 | — | — |
| | G12-C6 | 10 | 68 | 11 | 75 | 13 | 89 | 14 | 96 | 15 | 103 |
| | G12-C8 | 6 | 41 | 7 | 48 | 8 | 55 | 8 | 55 | 9 | 62 |
| 10" (250mm) | G6-C6 | 30 | 206 | 36 | 248 | — | — | — | — | — | — |
| | G6-C8 | 17 | 117 | 20 | 137 | — | — | — | — | — | — |
| | G12-C6 | 15 | 103 | 18 | 124 | 21 | 144 | 24 | 165 | 26 | 179 |
| | G12-C8 | 9 | 62 | 10 | 68 | 12 | 82 | 14 | 96 | 15 | 103 |
| | G12-C10 | 6 | 41 | 7 | 48 | 8 | 55 | 9 | 62 | 10 | 68 |
| 12" (300mm) | G6-C6 | 41 | 282 | — | — | — | — | — | — | — | — |
| | G6-C8 | 23 | 158 | — | — | — | — | — | — | — | — |
| | G12-C6 | 21 | 144 | 26 | 179 | 30 | 206 | 35 | 241 | — | — |
| | G12-C8 | 12 | 82 | 15 | 103 | 17 | 117 | 20 | 137 | 22 | 151 |
| | G12-C10 | 8 | 55 | 10 | 68 | 11 | 75 | 13 | 89 | 14 | 96 |
| | G16-C8 | 9 | 62 | 11 | 75 | 13 | 89 | 15 | 103 | 17 | 117 |
| | G16-C10 | 6 | 41 | 7 | 48 | 8 | 55 | 10 | 68 | 11 | 75 |
| | G16-C12 | 4 | 27 | 5 | 34 | 6 | 41 | 7 | 48 | 8 | 55 |
| 14" (350mm) | G12-C6 | 26 | 179 | 34 | 234 | — | — | — | — | — | — |
| | G12-C8 | 15 | 103 | 19 | 131 | 24 | 165 | 28 | 193 | — | — |
| | G12-C10 | 10 | 68 | 13 | 89 | 15 | 103 | 18 | 124 | — | — |
| | G16-C8 | 11 | 75 | 15 | 103 | 18 | 124 | 21 | 144 | — | — |
| | G16-C10 | 7 | 48 | 10 | 68 | 12 | 82 | 14 | 96 | — | — |
| | G16-C12 | 5 | 34 | 7 | 48 | 8 | 55 | 10 | 68 | — | — |
| | G16-C10B10 | 8 | 55 | 11 | 75 | 13 | 89 | 15 | 103 | — | — |
| 16" (400mm) | G12-C6 | 32 | 220 | — | — | — | — | — | — | — | — |
| | G12-C8 | 18 | 124 | 24 | 165 | — | — | — | — | — | — |
| | G12-C10 | 12 | 82 | 16 | 110 | 19 | 131 | — | — | — | — |
| | G16-C8 | 14 | 96 | 18 | 124 | 22 | 151 | 26 | 179 | — | — |
| | G16-C10 | 9 | 62 | 12 | 82 | 15 | 103 | 17 | 117 | — | — |
| | G16-C12 | 6 | 41 | 8 | 55 | 10 | 68 | 12 | 82 | — | — |
| | G16-C10B10 | 10 | 68 | 13 | 89 | 16 | 110 | 18 | 124 | — | — |
| | G16-C10B12 | 7 | 48 | 10 | 68 | 12 | 82 | 14 | 96 | — | — |

* Reverse Pressure Drop: The pressures specified for reverse pressure drop will provide tight pressure shutoff or minimum leakage with maximum plug life.

If a dead-tight shutoff with reverse pressure is required, contact DeZURIK

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Cylinder Operated G-Series Actuator

Adjusting Position Stops *(Continued)*

Table D: Cylinder Closing Pressure - Reverse Pressure Drop*

| Valve Size | Actuator & Cylinder | Cylinder Closing Pressure (For Direct Pressure Drop Use Same as 25# Reverse) | | | | | | | |
|-------------|---------------------|---|---------|--------|---------|--------|---------|---------|---------|
| | | 25 psi | 172 kPa | 50 psi | 344 kPa | 75 psi | 517 kPa | 100 psi | 689 kPa |
| 18" (450mm) | G12-C6 | 37 | 255 | — | — | — | — | — | — |
| | G12-C8 | 21 | 144 | 29 | 199 | — | — | — | — |
| | G12-C10 | 14 | 96 | 19 | 131 | — | — | — | — |
| | G16-C8 | 16 | 110 | 22 | 151 | 28 | 193 | 33 | 227 |
| | G16-C10 | 10 | 68 | 14 | 96 | 18 | 124 | 21 | 144 |
| | G16-C12 | 7 | 48 | 10 | 68 | 12 | 82 | 15 | 103 |
| | G16-C10B10 | 11 | 75 | 15 | 103 | 19 | 131 | 22 | 151 |
| | G16-C10B12 | 8 | 55 | 11 | 75 | 13 | 89 | 16 | 110 |
| | G16-C12B12 | 8 | 55 | 11 | 75 | 13 | 89 | 16 | 110 |
| 20" (500mm) | G16-C12B10B10 | 12 | 82 | 16 | 110 | 20 | 137 | 23 | 158 |
| | G12-C8 | 24 | 165 | 34 | 234 | — | — | — | — |
| | G12-C10 | 15 | 103 | 22 | 151 | — | — | — | — |
| | G16-C8 | 18 | 124 | 25 | 172 | 32 | 220 | 39 | 268 |
| | G16-C10 | 12 | 82 | 16 | 110 | 21 | 144 | 25 | 172 |
| | G16-C12 | 8 | 55 | 12 | 82 | 15 | 103 | 18 | 124 |
| | G16-C10B10 | 13 | 89 | 17 | 117 | 22 | 151 | 26 | 179 |
| | G16-C10B12 | 9 | 62 | 13 | 89 | 16 | 110 | 19 | 131 |
| | G16-C12B12 | 9 | 62 | 13 | 89 | 16 | 110 | 19 | 131 |
| 24" (600mm) | G16-C12B10B10 | 14 | 96 | 18 | 124 | 23 | 158 | 27 | 186 |
| | G16-C8 | 22 | 151 | 38 | 262 | — | — | — | — |
| | G16-C10 | 14 | 96 | 21 | 144 | 28 | 193 | 34 | 234 |
| | G16-C12 | 10 | 68 | 15 | 103 | 19 | 131 | 24 | 165 |
| | G16-C10B10 | 15 | 103 | 22 | 151 | 29 | 199 | 35 | 241 |
| | G16-C10B12 | 11 | 75 | 16 | 110 | 20 | 137 | 25 | 172 |
| | G16-C12B12 | 11 | 75 | 16 | 110 | 20 | 137 | 25 | 172 |
| | G16-C12B10B10 | 16 | 110 | 23 | 158 | 30 | 206 | 36 | 248 |
| 30" (750mm) | G16-C12B12B12 | 12 | 82 | 17 | 117 | 21 | 144 | 26 | 179 |
| | G16-C8 | 28 | 193 | — | — | — | — | — | — |
| | G16-C10 | 18 | 124 | 29 | 199 | — | — | — | — |
| | G16-C12 | 13 | 89 | 20 | 137 | 27 | 186 | 34 | 234 |
| | G16-C10B10 | 19 | 131 | 30 | 206 | 40 | 275 | 50 | 344 |
| | G16-C10B12 | 14 | 96 | 21 | 144 | 28 | 193 | 35 | 241 |
| | G16-C12B12 | 14 | 96 | 21 | 144 | 28 | 193 | 35 | 241 |
| | G16-C12B10B10 | 20 | 137 | 31 | 213 | 41 | 282 | 51 | 351 |
| 36" (900mm) | G16-C12B12B12 | 15 | 103 | 22 | 151 | 29 | 199 | 36 | 248 |
| | G16-C10B12 | 56 | 386 | — | — | — | — | — | — |
| | G16-C12B12 | 39 | 268 | 50 | 344 | — | — | — | — |
| | G16-C12B10B10 | 39 | 268 | 50 | 344 | — | — | — | — |
| 36" (900mm) | G16-C12B12B12 | 39 | 268 | 50 | 344 | — | — | — | — |

* Reverse Pressure Drop: The pressures specified for reverse pressure drop will provide tight pressure shutoff or minimum leakage with maximum plug life.

If a dead-tight shutoff with reverse pressure is required, contact DeZURIK

Removing Actuator

When eccentric valves are mounted in a vertical pipeline, or mounted in a horizontal pipeline with the plug stem horizontal, gravity can cause the plug to swing to a lower position in the valve body when the actuator is removed. To avoid this problem, place the plug in the lowest position before removing the actuator.

1. Discontinue flow, relieve pipeline pressure and close valve.



WARNING!

Accidental operation of power actuator can cause personal injury or equipment damage. Disconnect and lock out power to actuator before servicing.

2. Disconnect and lock out the pneumatic power to prevent accidental operation of the actuator.
3. Scribe corresponding lines on the valve and actuator to help align them during installation.
4. If the valve is **4–20" (100–500mm)**, remove the lock nut, spring washers, wrenching nut and pointer from the plug stud, then go to step 6.
5. If the valve is **24–36" (600–900mm)**, follow the steps below.
 - a. Loosen the #1 lockscrews about 6 to 8 turns. Loosen the #2 lockscrews about 3 turns. See Figure 4

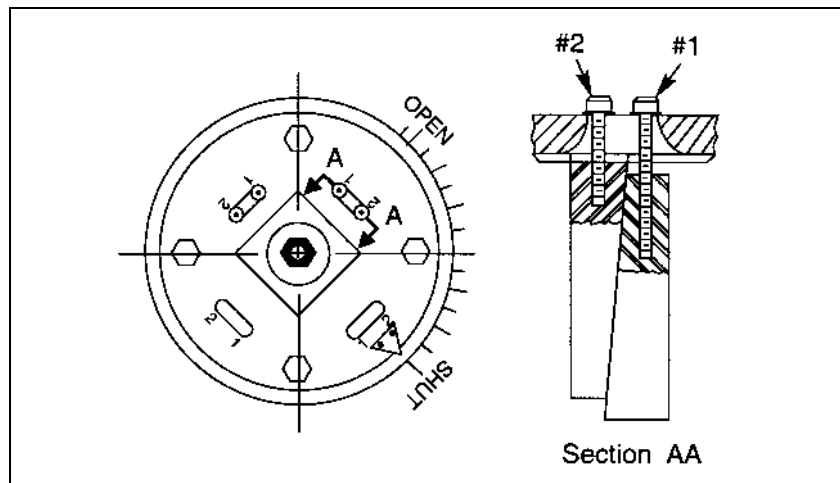


Figure 4 – 24-36" Valve Key and Lockscrew Arrangement

- b. Using a soft hammer, tap the heads of the #1 lockscrews to loosen the keys.
- c. Remove the four screws holding the wrenching nut to the gear sector, then remove the stud locknut, spring washers and the wrenching nut with the keys attached. Continue with step 6.

Removing Actuator *(Continued)*



WARNING!

This valve is a pressure vessel. On 4, 5, 6 and 10" (100, 125, 150 and 250mm) valves, the same bolts hold both the actuator and the bonnet.

Removing the bolts on 4, 5, 6 and 10" (100, 125, 150 and 250mm) valves before relieving pipeline pressure can result in personal injury or equipment damage.

Always relieve pipeline pressure before removing the actuator.

6. Remove the screws fastening the adapter to the valve. On the **4, 5, 6 and 10" (100, 125, 150 and 250mm)** valves, these screws also hold the bonnet to the valve body.
7. Lift the actuator and adapter off the valve.

Installing Actuator

1. Place the valve in the position it was in when the actuator was removed.
NOTE: Normally this will be so the plug is in the lowest position in the valve body.
2. Line up the scribe marks on the valve and actuator made during actuator removal, then set the actuator on the valve so that the valve shaft slides into the actuator gear sector.
3. Fasten the actuator adapter to the valve.
4. Slide the pointer and wrenching nut down the plug stud so that it rests on top of the gear sector; the pointer should point to the correct valve position. If the valve is **24–36" (600–900mm)**, hold the keys in position when you slide the wrenching nut over the plug stud and guide the keys into the gear sector and stem slots. Then install the four screws fastening the wrenching nut to the gear sector.
5. Place the spring washers on the plug stud as shown in Figure 5.

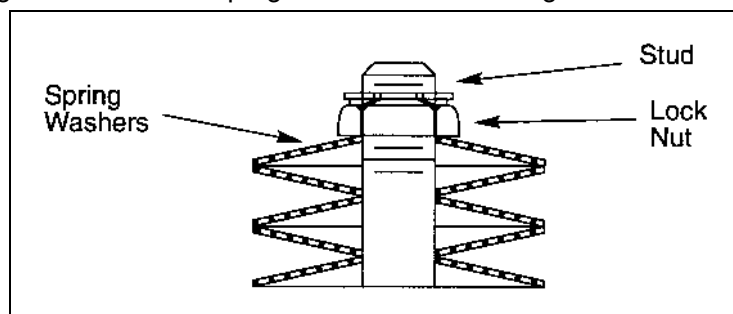


Figure 5 – Spring Washer Detail

6. Screw the lock nut down the plug stud until it is tight and the spring washers are completely compressed, then back the nut off one full turn.
7. If the valve is **24–36" (600–900mm)**, tighten the #2 lockscrews and then the #1 lockscrews to hold the keys in place; if the valve is **4–20" (100–500mm)**, go to step 8. See Figure 4

Removing Cylinder

This procedure can be performed with the actuator installed on the valve or removed.

1. Discontinue flow and relieve pipeline pressure.
2. Apply air pressure to the port in the cylinder cap (the end farthest from the actuator housing) until the valve has moved to the end of its stroke.



WARNING!

**Accidental operation of power actuator can cause personal injury or equipment damage.
Disconnect and lock out power to actuator before servicing.**

3. Disconnect and lock out the pneumatic power to prevent accidental operation of the actuator.
4. Disconnect the tubing from both cylinder ports.
5. Remove the extension cap from the actuator housing. On units with booster cylinders, carefully remove the booster cylinder or cylinders.
6. Remove the nuts and spring washers from the end of the rack rod.
7. Remove the screws or nuts fastening the cylinder assembly to the housing, and carefully remove the cylinder assembly by sliding it away from the actuator until the rack rod clears the actuator housing.
8. See cylinder instructions for details on rebuilding the cylinder.

Installing Cylinder

1. Scrape the old gasket material from the actuator housing and cylinder head, then place a new gasket on the cylinder head.
2. Install the cylinder/rack rod assembly by sliding the rack rod through the rack then fasten the cylinder to the housing.
Note: If the rack rod is not attached to the cylinder, clean the threads of both the rack rod and the cylinder shaft, then apply Loctite to the cylinder shaft threads, and screw the rack rod onto the cylinder shaft.
3. Slide the spacer, spring washers and nuts onto the rack rod. See Table E for arrangement of spring washers.
4. Screw one nut onto the rack rod. Screw the nut down until the spring washers are completely compressed, then back the nut off until the washers return to their normal shape.
5. Screw the other nut onto the rack rod and tighten the two nuts against each other.
6. Replace the extension cap. On units with booster cylinders, replace the booster cylinder or cylinders.
7. Reconnect power to the actuator.
8. Adjust the position stops as described in the “*Position Stop*” section.

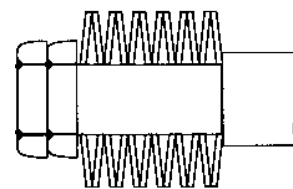
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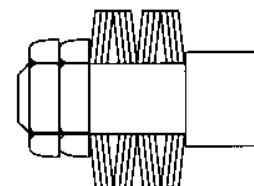
Installing Cylinder *(Continued)*

Table E: Rack Rod Spring Washer Arrangement

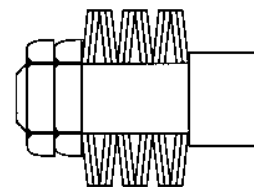
| Valve Size | | Actuator Size | Direct Pressure | Reverse Pressure |
|------------|-----|---------------|-----------------|------------------|
| in | mm | | | |
| 4 | 100 | ALL | A | A |
| 5 | 125 | ALL | B | B |
| 6 | 150 | ALL | B | B |
| 8 | 200 | G6 | B | B |
| | | G12 | A | A |
| 10 | 250 | G6 | B | B |
| | | G12 | A | B |
| 12 | 300 | G6 | B | B |
| | | G12 | B | B |
| | | G16 | A | A |
| 14 | 350 | G12 | B | B |
| | | G16 | A | A |
| 16 | 400 | ALL | B | B |
| 18 | 450 | ALL | B | B |
| 20 | 500 | ALL | B | B |
| 24 | 600 | G16-C8 | B | C |
| | | G16-C10 | B | B |
| | | G16-C12 | B | C |
| | | G16-C10B10 | B | B |
| | | G16-C10B12 | B | - |
| | | G16-C12B12 | - | C |
| | | G16-C12B10B10 | B | - |
| | | G16-C12B12B12 | B | - |
| 30 | 750 | G16-C8 | C | C |
| | | G16-C10 | B | B |
| | | G16-C12 | B | C |
| | | G16-C10B10 | - | C |
| | | G16-C10B12 | B | - |
| | | G16-C12B12 | C | C |
| | | G16-C12B10B10 | B | C |
| | | G16-C12B12B12 | B | C |
| 36 | 900 | G16-C10B12 | C | - |
| | | G16-C12B12 | - | C |
| | | G16-C12B10B10 | C | - |
| | | G16-C12B12B12 | C | C |



Arrangement A



Arrangement B



Arrangement C

Disassembling Actuator

When eccentric valves are mounted in a vertical pipeline, or mounted in a horizontal pipeline with the plug stem horizontal, gravity can cause the plug to swing to a lower position in the valve body when the actuator is removed. To avoid this problem, place the plug in the lowest position before removing the actuator.

1. Discontinue flow and relieve pipeline pressure.



WARNING!

Accidental operation of power actuator can cause personal injury or equipment damage. Disconnect and lock out power to actuator before servicing.

2. Disconnect and lock out the pneumatic power to prevent accidental operation of the actuator. Disconnect the tubing from the cylinder.
3. Remove the extension cap from the actuator housing. On units with booster cylinders, carefully remove the booster cylinder or cylinders.
4. Place the actuator in the open position, then shut off cylinder supply pressure and disconnect the tubing.
5. Remove the nuts and washers from the end of the rack rod.
6. Remove the screws or nuts fastening the cylinder assembly to the housing and carefully remove the cylinder assembly by sliding it away from the actuator until the rack rod clears the actuator housing.
7. If the valve is **4–20" (100–500mm)**:
 - a. Remove lock nut, spring washers, wrenching nut & pointer from the plug stud.
 - b. Proceed to step 9.
8. If the valve is **24–36" (600–900mm)**:
 - a. Loosen lockscrews #1 about 6 to 8 turns and loosen lockscrews #2 about 3 turns. See Figure 4.
 - b. Using a soft hammer, tap the heads of the #1 lockscrews to loosen the keys.
9. Remove the four screws holding the wrenching nut to the gear sector, then remove the stud locknut, spring washers and the wrenching nut with the keys attached.
10. Scribe corresponding lines on the actuator cover and housing, then remove the cover screws and cover from the top of the actuator.
11. Mark the teeth of the rack and gear as shown in Figure 6 and lift the gear sector out of the actuator.
12. Remove the rack from the housing.

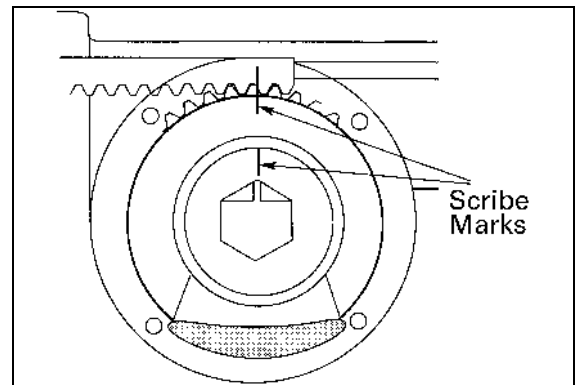


Figure 6 – Scribe Marks

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Cylinder Operated G-Series Actuator

Disassembling Actuator *(Continued)*

13. Remove the rack bearing (if noticeable wear to bearing) by driving the pin out of the rack bearing and actuator housing.
14. Scribe corresponding lines on the valve and adapter to be used for alignment during actuator reassembly.



WARNING!

This valve is a pressure vessel. On 4, 5, 6 and 10" (100, 125, 150 and 250mm) valves, the same bolts hold both the actuator and the bonnet.

Removing the bolts on 4, 5, 6 and 10" (100, 125, 150 and 250mm) valves before relieving pipeline pressure can result in personal injury or equipment damage.

Always relieve pipeline pressure before removing the actuator.

15. Remove the screws fastening the adapter to the valve; ensure the pipeline pressure is relieved before removing these screws on **4, 5, 6 and 10" (100, 125, 150 and 250mm)** valves.
16. Lift the rest of the actuator and the adapter off the valve.
17. Remove the screws fastening the adapter to the actuator housing, and separate the two parts.

Reassembling Actuator

Install new bearings and seals in the adapter and cover if necessary. See Figure 7 for proper placement.

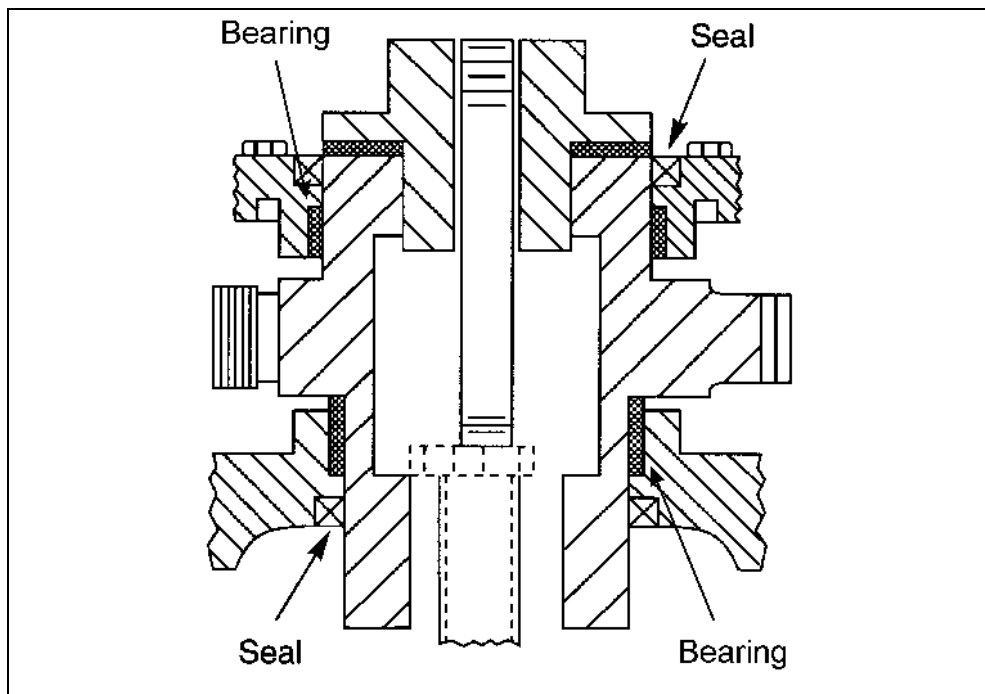


Figure 7 – Location of Actuator Seals and Bearings

Reassembling Actuator *(Continued)*

1. Scrape old gasket material from the actuator housing and the adapter, install a new gasket, then fasten the adapter to the actuator housing with the screws.
2. Line up the scribe marks on the valve and adapter made during actuator removal, then set the adapter and housing on the valve.
3. Fasten the adapter to the valve.
4. Drive the pin through the rack bearing and actuator housing (if replacing worn bearing).
5. Apply a liberal amount of grease to the rack teeth and the back of the rack, which will contact the rack bearing, then install the rack in the housing.
6. Apply a liberal amount of grease to the gear sector teeth and journals, then place the gear sector in the housing and carefully align the teeth with the rack as marked during disassembly..

NOTE: It may be necessary to loosen the adapter mounting screws and move the housing a small amount to align the gears. Be sure to retighten the mounting screws after aligning the gears.

7. Install the cylinder/rack rod assembly by sliding the rack rod through the rack then fasten the cylinder to the housing.

NOTE: If the rack rod is not attached to the cylinder, clean the threads of both the rack rod and the cylinder shaft, then apply Loctite to the cylinder shaft threads and screw the rack rod onto the cylinder shaft.

8. Slide the spacer, spring washers and nuts onto the rack rod. See Table E for spring washer placement.
9. Screw one nut onto the rack rod until the spring washers are completely compressed, then loosen the nut just until the washers return to normal shape.
10. Screw the other nut onto the rack rod and tighten the two nuts against each other.
11. Set a new cover gasket on the housing, then install and fasten the top cover on the housing; make sure the scribe marks line up.
12. Slide the pointer and wrenching nut down the plug stud so it rests on top of the gear sector; the pointer should point to indicate the correct valve position.
13. If the valve is **24–36" (600–900mm)**, hold the keys in position when you slide the wrenching nut over the plug stud, and guide the keys into the gear sector and stem slots. Then install the four screws fastening the wrenching nut to the gear sector.
14. Place the spring washers on the plug stud as shown in Figure 5.
15. Screw the lock nut down the plug stud until it is tight and the spring washers are completely compressed, then back the nut off one full turn.
16. If the valve is **24–36" (600–900mm)**, tighten the #2 lockscrews and then the #1 lockscrews to hold the keys in place. Skip this step if the valve is **4–20" (100–500mm)**.
17. Replace the extension cap. On units with booster cylinders, replace the booster cylinder or cylinders.
18. Adjust the open and closed position stops. See "*Position Stops*" section.

Changing Mounting Positions

On 4–20" (100–500mm) valves, the actuator can be mounted in 30° increments around the valve shaft. 30° position changes require changing the timing between the gear sector and the rack; 60° position changes do not require changing the timing.

On 24–36" (600–900mm) valves, the actuator can be mounted in 45° increments around the valve shaft. 45° position changes require changing the timing between the gear sector and the rack; 90° position changes do not require changing the timing.

Mounting Actuator in 60° Increments on 4–20" (100–500mm) Valves and 90° Increments on 24–36" (600–900mm) Valves

1. Remove the actuator from the valve. See “*Removing Actuator*” section.



WARNING!

Accidental operation of power actuator can cause personal injury or equipment damage. Disconnect and lock out power to actuator before servicing.

2. Disconnect and lock out the pneumatic power to prevent accidental operation of the actuator.
3. Rotate the actuator into position.
4. Install the actuator on the valve. See “*Installing Actuator*”.

Mounting Actuator in 30° Increments on 4–20" (100–500mm) Valves Only

When eccentric valves are mounted in a vertical pipeline, or mounted in a horizontal pipeline with the plug stem horizontal, gravity can cause the plug to swing to a lower position in the valve body when the actuator is removed. To avoid this problem, place the plug in the lowest position before removing the actuator.

1. Discontinue flow and relieve pipeline pressure.



WARNING!

Accidental operation of power actuator can cause personal injury or equipment damage. Disconnect and lock out power to actuator before servicing.

2. Disconnect and lock out the pneumatic power to prevent accidental operation of the actuator.
3. Remove the lock nut, spring washers, wrenching nut and pointer from the plug stud.
4. Scribe corresponding lines on the actuator cover and housing, then remove the cover screws and cover from the top of the actuator.
5. Mark which teeth of the rack and gear are engaged and lift the gear sector out of the actuator.

Changing Mounting Positions *(Continued)*

6. Remove the screws fastening the adapter to the valve. On the **4, 5, 6 and 10"** (100, 125, 150 and 250mm) valves, these screws also hold the bonnet to the valve body.



WARNING!

This valve is a pressure vessel. On 4, 5, 6 and 10" (100, 125, 150 and 250mm) valves, the same bolts hold both the actuator and the bonnet.

Removing the bolts on 4, 5, 6 and 10" (100, 125, 150 and 250mm) valves before relieving pipeline pressure can result in personal injury or equipment damage.

Always relieve pipeline pressure before removing the actuator.

7. Take out the screws fastening the actuator housing to the adapter.
8. Rotate the adapter on the valve, and the actuator on the adapter until the holes line up and the actuator is in the desired position. Replace all of the screws.
9. Find the tooth that was marked on the gear sector and count over clockwise four teeth on the size 4 and 6 actuators, and five teeth on the size 12 and 16 actuators. This is the tooth that will engage with the marked tooth on the rack. Install the gear sector using the new tooth engagement, and be sure the gear sector fits on the plug stem properly.
10. Set a new cover gasket on the housing, then install and fasten the top cover on the housing; make sure the scribe marks line up.
11. Slide the pointer and wrenching nut down the plug stud so it rests on top of the gear sector; the pointer should point to indicate the correct valve position.
12. Place the spring washers on the plug stud as shown in Figure 5.
13. Screw the lock nut down the plug stud until it is tight and the spring washers are completely compressed, then back the nut off one full turn.
14. Adjust the position stops. See "*Position Stops*" section.

Mounting Actuator in 45° Increments on 24–36" (600–900mm) Valves Only

When eccentric valves are mounted in a vertical pipeline, or mounted in a horizontal pipeline with the plug stem horizontal, gravity can cause the plug to swing to a lower position in the valve body when the actuator is removed. To avoid this problem, place the plug in the lowest position before removing the actuator.

1. Discontinue flow and relieve pipeline pressure.



WARNING!

Accidental operation of power actuator can cause personal injury or equipment damage. Disconnect and lock out power to actuator before servicing.

2. Disconnect and lock out the pneumatic power to prevent accidental operation of the actuator.
3. Loosen lockscrews #1 about 6 to 8 turns. Loosen lockscrews #2 about 3 turns. See Figure 4.
4. Using a soft hammer, tap the heads of the #1 lockscrews to loosen the keys.

Changing Mounting Positions *(Continued)*

5. Remove the four screws that hold the wrenching nut to the gear sector, then remove the stud locknut, spring washers and the wrenching nut with the keys.
6. Scribe corresponding lines on the actuator cover and housing, then remove the cover screws and cover from the top of the actuator.
7. Mark which teeth of the rack and gear are engaged, and lift the gear sector out of the actuator.
8. Remove the screws fastening the adapter to the valve.
9. Remove the screws fastening the actuator housing to the adapter.
10. Rotate the adapter on the valve and the actuator on the adapter until the holes line up and the actuator is in the desired position. Replace all of the screws.
11. Note the tooth that was marked on the gear sector and count clockwise five teeth on the size 16 actuator. This is the tooth that will engage with the marked tooth on the rack. Install the gear sector using the new tooth engagement, and be sure the keyways in the gear sector match the keyways in the plug stem.
12. Set a new cover gasket on the housing, then install the top cover on the housing, making sure the scribe marks line up.
13. Hold the keys in position and slide the wrenching nut over the plug stud, then guide the keys into the gear sector and stem slots.
14. Install the four screws fastening the wrenching nut to the gear sector.
15. Place the spring washers on the plug stud as shown in Figure 5.
16. Screw the lock nut down the plug stud until it is tight and the spring washers are completely compressed, then back the nut off one full turn.
17. Tighten the #2 lockscrews, and then the #1 lockscrews to hold the keys in place.
18. Adjust the position stops—see “*Position Stops*” section.

Troubleshooting

| Condition | Possible Cause | Corrective Action |
|---------------------------------------|---|--|
| Actuator closes to wrong position | Closed position stop is set incorrectly | Adjust closed position stop. See <i>Adjusting Position Stops</i> section |
| Actuator opens to wrong position | Open position stop is set incorrectly | Adjust open position stop. See <i>Adjusting Position Stops</i> section |
| Actuator will not fully operate valve | Cylinder pressure is low | Increase cylinder pressure. Do not exceed 100 psi (69 kPa). |
| | Piston seal in cylinder is leaking | Replace piston seal(s). See Cylinder instructions. |
| | Pipeline obstruction in valve is preventing closure | Remove obstruction |
| Actuator rotates wrong direction | Air connections to cylinder are incorrect | Reverse air connections to cylinder |

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