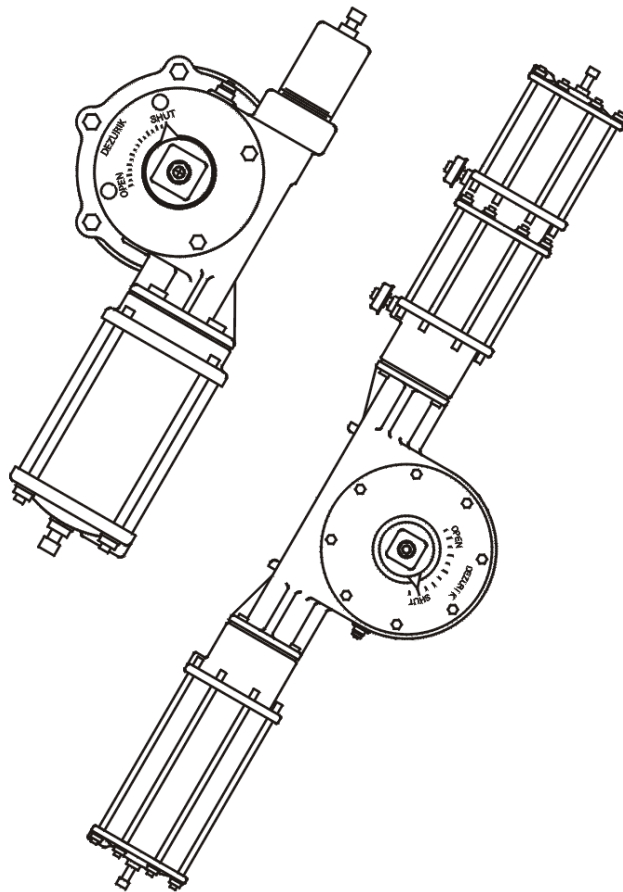




APCO | WILLAMETTE

**DeZURIK CYLINDER OPERATED
G-SERIES ACTUATOR
USED ON 100% AREA PEC
ECCENTRIC VALVES**



Instruction **D10264**
February 2012

DeZURIK

CYLINDER OPERATED G-SERIES ACTUATOR USED ON 100% AREA PEC ECCENTRIC VALVES

Instructions

These instructions provide information about G-series cylinder actuators. They are for use by personnel who are responsible for installation, operation and maintenance of G-series cylinder actuators.

Safety Messages

All safety messages in the instructions are flagged with an exclamation symbol and the 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 equipment damage, personal injury or death.

Safety label(s) on the product indicate hazards that can cause equipment damage, personal 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 G-series cylinder 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**) 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.

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CYLINDER OPERATED G-SERIES ACTUATOR USED ON 100% AREA PEC ECCENTRIC VALVES

Description

The G-series cylinder actuator is a totally enclosed actuator that operates DeZURIK eccentric valves. 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.

Identification

The G-series cylinder actuator is available in three sizes: 6, 12 and 16.

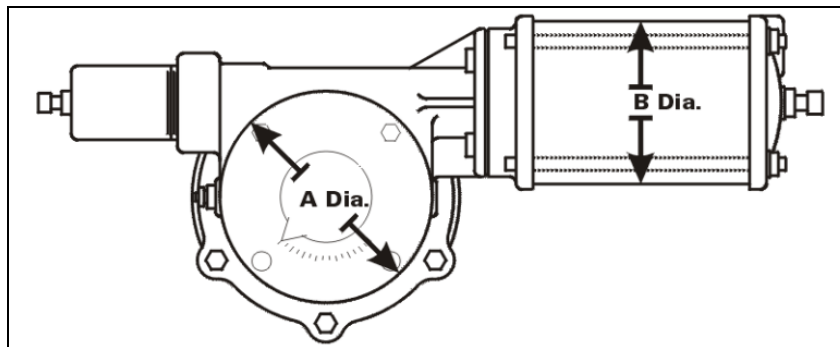


Figure 1—Identification

Identification *(continued)*

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

Position Stops

G-series cylinder actuators have both open and closed position stops.

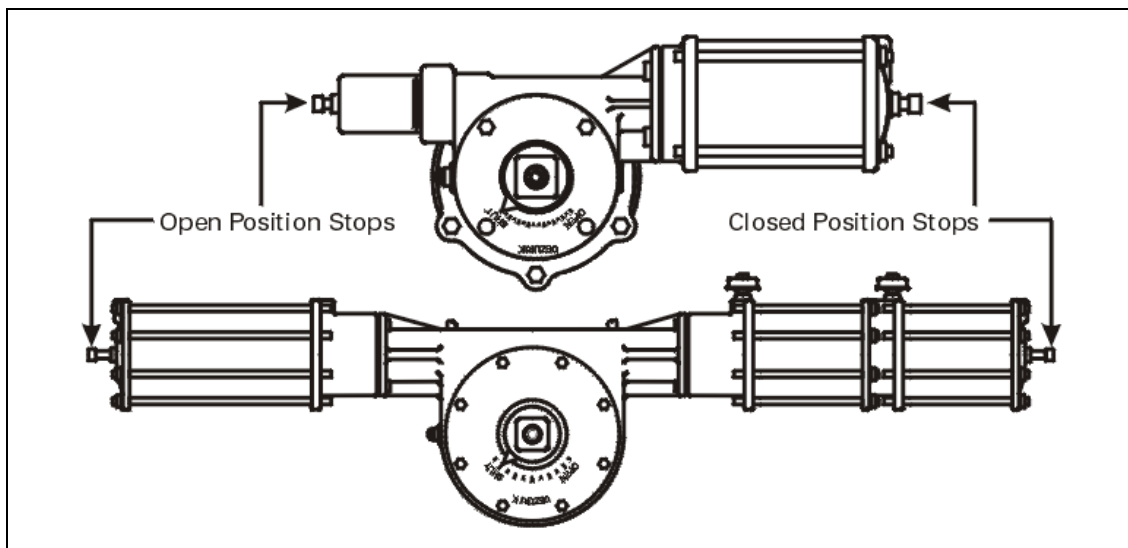


Figure 2 – Position Stops

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.

The cylinder must be mounted before adjusting the position stop.

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

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. The cylinder must be mounted before adjusting the position stop.

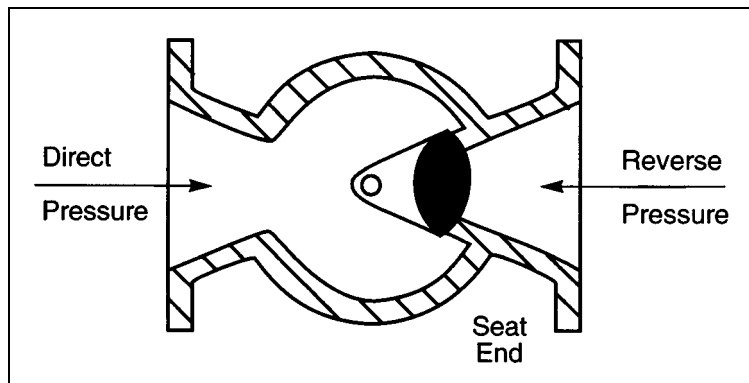


Figure 3 – Pressure Direction

1. Discontinue flow and relieve pipeline pressure and open the valve.
2. Back out the closed position stop 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 set screw in place with the jam nut.

CYLINDER OPERATED G-SERIES ACTUATOR USED ON 100% AREA PEC ECCENTRIC VALVES

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
0350	G6-C4	14	96	15	103	16	110	17	117	18	124
	G6-C6	7	48	7	48	8	55	9	62	9	62
0450	G6-C4	21	144	24	165	27	186	31	213	32	220
	G6-C6	10	68	11	75	12	82	13	89	14	96
0650	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
0850	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
1050	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
1250	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	—	—
1450	G16-C10B10	8	55	11	75	13	89	15	103	—	—
	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 USED ON 100% AREA PEC ECCENTRIC VALVES

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
1650	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
	G16-C12B10B10	12	82	16	110	20	137	23	158
1850	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
	G16-C12B10B10	14	96	18	124	23	158	27	186
2050	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
	G16-C12B12B12	12	82	17	117	21	144	26	179

* 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 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. If the actuator is powered, disconnect and lock out the pneumatic, hydraulic, or electrical 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 0350 – 1850, remove the lock nut, spring washers, wrenching nut and pointer from the plug stud, then go to step 6.
5. If the valve is 2050, follow the steps below.
 - a. Loosen the #1 lockscrews about 6 to 8 turns. Loosen the #2 lockscrews about 3 turns. See Figure 4.

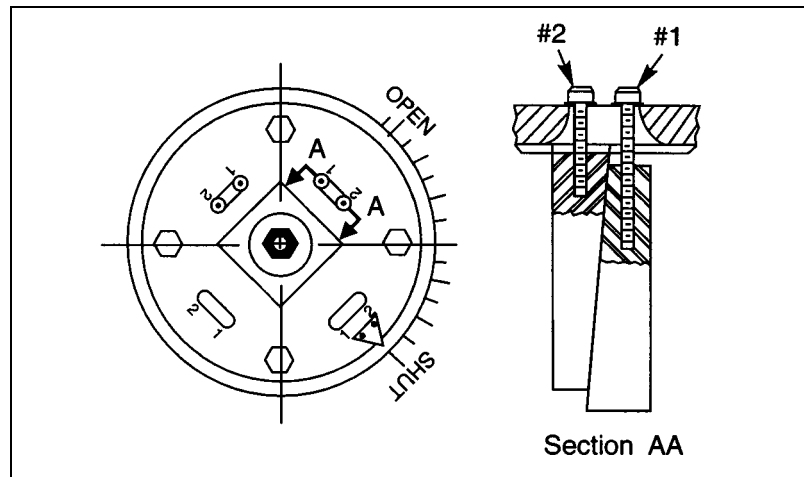


Figure 4— 2050 Valve Key and Lockscrew Arrangement

- 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 0350, 0450 and 0850 valves, the same bolts hold both the actuator and the bonnet. Removing the bolts on 0350, 0450 and 0850 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 0350, 0450 and 0850 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 a 2050, 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.

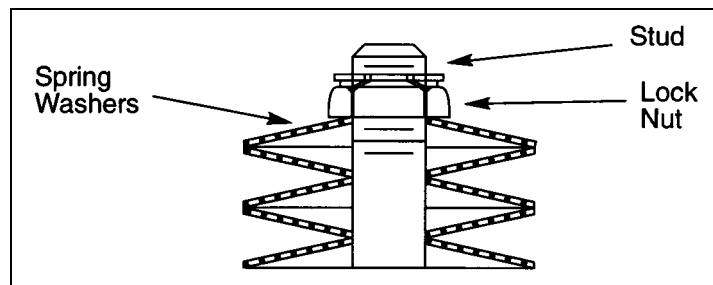


Figure 5—Spring Washer Detail

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 a 2050, tighten the #2 lockscrews and then the #1 lockscrews to hold the keys in place; if the valve is a 0350 – 1850, 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 pipeline flow.
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. Turn off the supply pressure to the cylinder and then disconnect the tubing from both cylinder ports.



WARNING!

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

3. If the actuator is powered, disconnect and lock out the pneumatic, hydraulic, or electrical power to prevent accidental operation of the actuator.
4. Remove the extension cap from the actuator housing. On units with booster cylinders, carefully remove the booster cylinder or cylinders.
5. Remove the nuts and spring 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. See cylinder instructions for details on rebuilding the cylinder.

Installing Cylinder

1. Scrape the old gasket material from the actuator housing and cylinder head and 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. If the actuator is a powered actuator, reconnect power to the actuator.
8. Adjust the position stops as described in the "Position Stop" section.

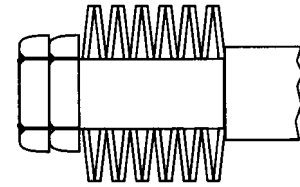
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CYLINDER OPERATED G-SERIES ACTUATOR USED ON 100% AREA PEC ECCENTRIC VALVES

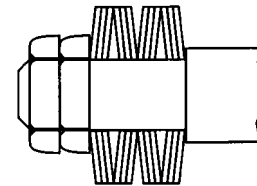
Installing Cylinder *(continued)*

Table E: Rack Rod Spring Washer Arrangement

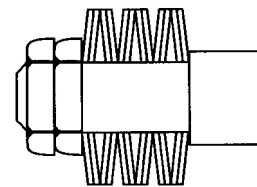
Valve Size	Actuator Size	Direct Pressure	Reverse Pressure
0350	ALL	A	A
0450	ALL	B	B
0650	G6 G12	B A	B A
0850	G6 G12	B A	B B
1050	G6 G12 G16	B B A	B B A
1250	G12 G16	B A	B A
1450	ALL	B	B
1650	ALL	B	B
1850	ALL	B	B
2050	G16-C8 G16-C10 G16-C12 G16-C10B10 G16-C10B12 G16-C12B12 G16-C12B10B10 G16-C12B12B12	B B B B B - B B	C B C B - 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.



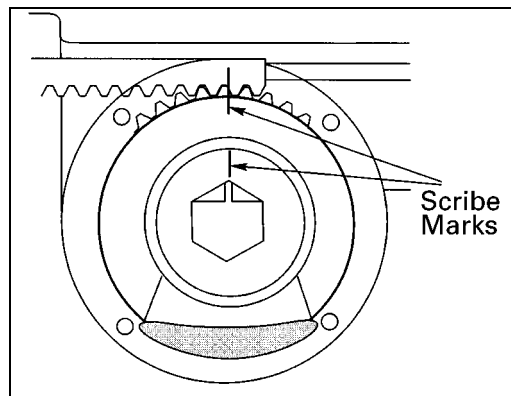
WARNING!

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

2. If the actuator is powered, disconnect and lock out the pneumatic, hydraulic, or electrical power to prevent accidental operation of the actuator.

Disassembling Actuator *(continued)*

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 a 0350 - 1850:
 - a. Remove lock nut, spring washers, wrenching nut & pointer from the plug stud.
 - b. Proceed to step 9.
8. If the valve is a 2050:
 - 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**

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.

Disassembling Actuator *(continued)*



WARNING!

This valve is a pressure vessel. On 0350, 0450 and 0850 valves, the same bolts hold both the actuator and the bonnet. Removing the bolts on 0350, 0450 and 0850 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 0350, 0450 and 0850 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 for proper placement.

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 lubricant to the rack teeth and the back of the rack that will contact the rack bearing and then install the rack in the housing.

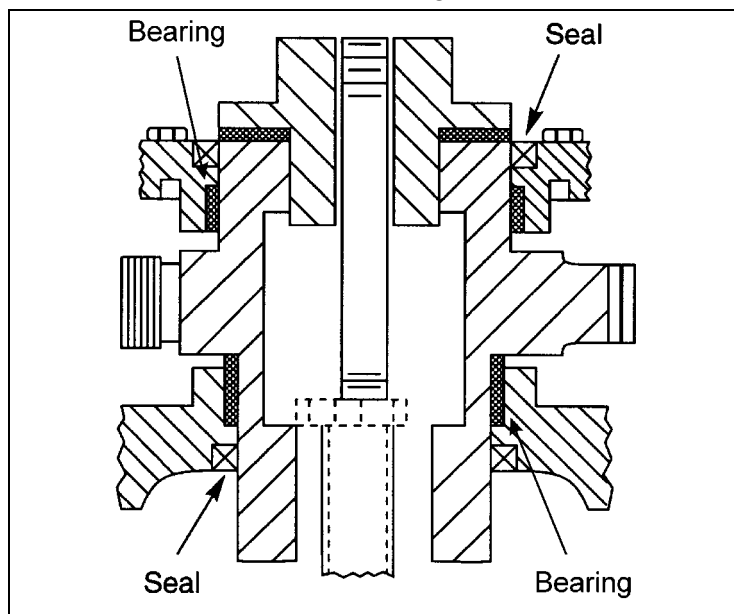


Figure 7—Location of Actuator Seals and Bearings

Reassembling Actuator *(continued)*

6. Apply a liberal amount of lubricant 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 a 2050, 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 2050, tighten the #2 lockscrews and then the #1 lockscrews to hold the keys in place. Skip this step if the valve is a 0350 –1850.
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 0350 - 1850 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 2050 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 0350 - 1850 Valves and 90° Increments on 2050 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. If the actuator is powered, disconnect and lock out the pneumatic, hydraulic, or electrical 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 0350 - 1850 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.
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WARNING!

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

2. If the actuator is powered, disconnect and lock out the pneumatic, hydraulic, or electrical 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)*

**WARNING!**

This valve is a pressure vessel. On 0350, 0450 and 0850 valves, the same bolts hold both the actuator and the bonnet. Removing the bolts on 0350, 0450 and 0850 valves before relieving pipeline pressure can result in personal injury or equipment damage. Always relieve pipeline pressure before removing the gear sector.

6. Remove the screws fastening the adapter to the valve. On the 0350, 0450 and 0850 valves, these screws also hold the bonnet to the valve body.
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 2050 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.
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**WARNING!**

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

2. If the actuator is powered, disconnect and lock out the pneumatic, hydraulic, or electrical 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 and 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.