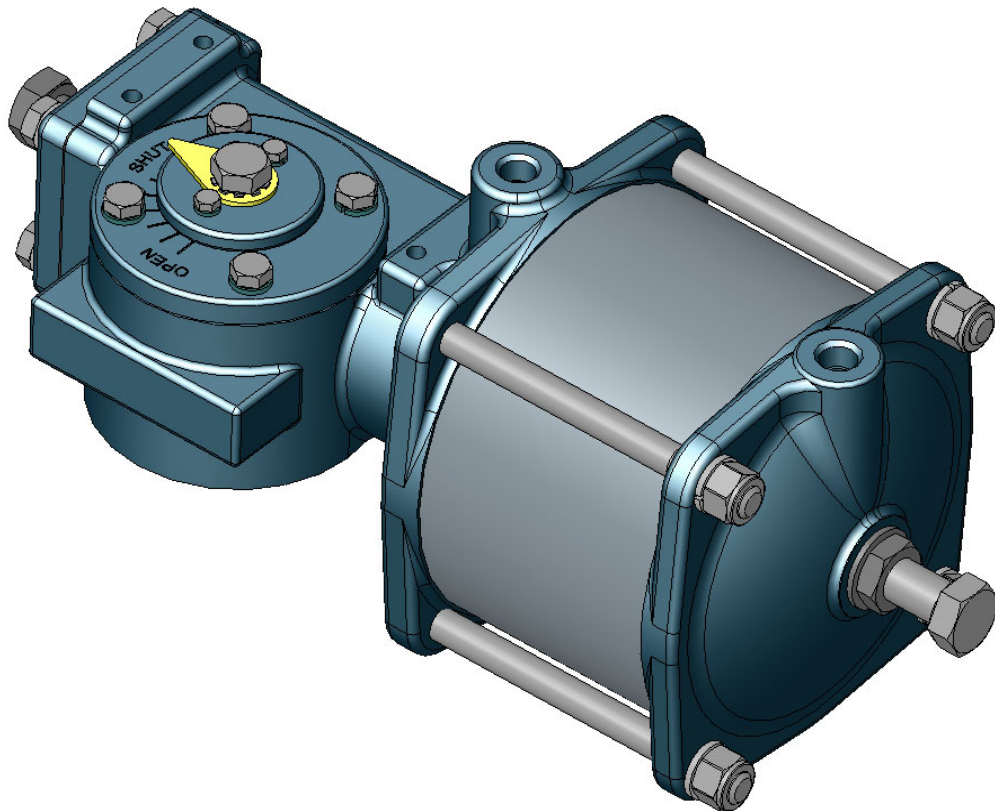




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APCO | WILLAMETTE

DeZURIK CYLINDER OPERATED G-SERIES ACTUATORS



Instruction D10462
July 2011

Instructions

These instructions provide information about the 2A and 4A 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. 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 local 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 Actuators

Description

The 2A and 4A G-Series Cylinder Actuators are quarter-turn, enclosed rack and gear cylinder actuators. The 2A and 4A actuators are used for on-off or modulating control. The 2A actuator features a 2" gear and 6" cylinder. The 4A actuator features a 4" gear and 8" cylinder.

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 (see Figure 4 and 5 for actuator parts identification);

apply a paint-like coating using one of these lubricants:

- Dow Corning Molykote No. 44 (**recommended**)
- Shell Retinax AM (alternate)
- Shell Lithall MDS (alternate)

to the following surfaces:

- Inside diameter of cylinder tube (B34)
- Chamfer for cylinder tube on cylinder cap (B39) and cylinder head of housing (B1)
- O-rings (B33, B36, and B43) and grooves
- Seals (B31 and B37) and grooves
- Thread seal (B44)
- Inside diameter of bearing (B30) located in cylinder head housing.
- Outside diameter of piston rod (B32).

apply a paint-like coating 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)

to the following surfaces:

- Flat side of rack bearing (B3), before assembly
- Back side of rack (B5) that contacts rack bearing, before assembly
- Both bearing hubs of gear (B8), before assembly
- Top cover O-ring (B10) and groove in top cover (B11), before assembly
- Teeth in rack (B5) and gear (B8) after assembly (so witness marks are visible during assembly).

Actuator Identification

See Figure 1 for actuator identification.

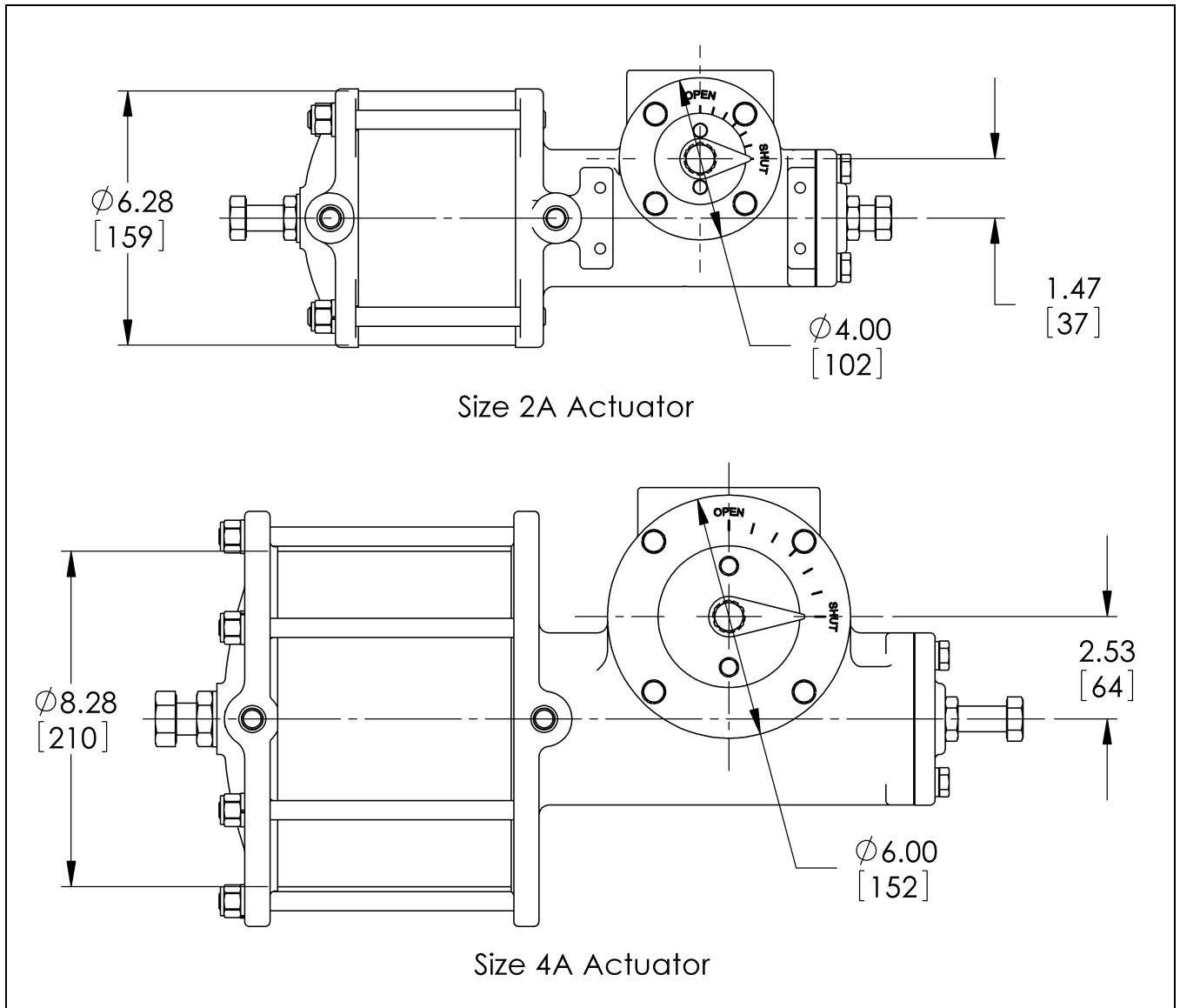


Figure 1 - Actuator Identification

Adjusting Position Stops

The 2A and 4A G-Series cylinder actuators have both open and closed position stops. See Figure 2 for position stop identification.

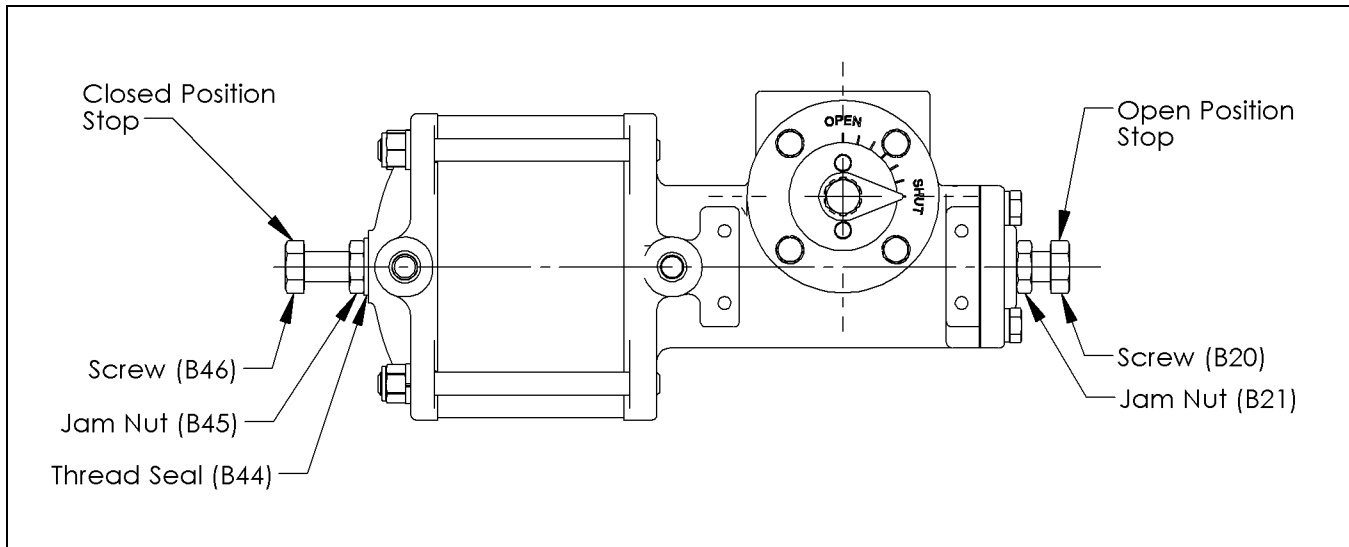


Figure 2 – Position Stops

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 2A and 4A G-Series cylinder actuators, the Open Position Stop is located in the end of the extension cap opposite the cylinder. See Figure 2 for position stop identification.

The actuator must be mounted to the valve before adjusting the position stop.

1. Loosen the Open Position jam nut (B21).
2. Adjust the Open Position screw (B20) to the proper position. Counterclockwise rotation of screw increases the stroke; clockwise rotation of screw decreases the stroke.
3. Lock the Open Position screw (B20) in place with the jam nut (B21).

Adjusting Closed Position Stop

On 2A and 4A G-Series cylinder actuators, the Closed Position Stop is located in the end of the cylinder. See Figure 2 for position stop identification.

The actuator must be mounted to the valve before adjusting the position stop.

1. Loosen the Closed Position jam nut (B45).
2. Adjust the Close Position screw (B46) to the proper position. Counterclockwise rotation of screw increases the stroke; clockwise rotation of screw decreases the stroke.
3. Lock the Closed Position screw (B46) in place with the jam nut (B45).

NOTE: Make sure the thread seal (B44) is positioned properly, and lock the screw in place with the jam nut.

Removing 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. Remove screws (B24) and lockwashers (B25) and lift actuator assembly off valve. See Figure 3 for connecting parts identification.

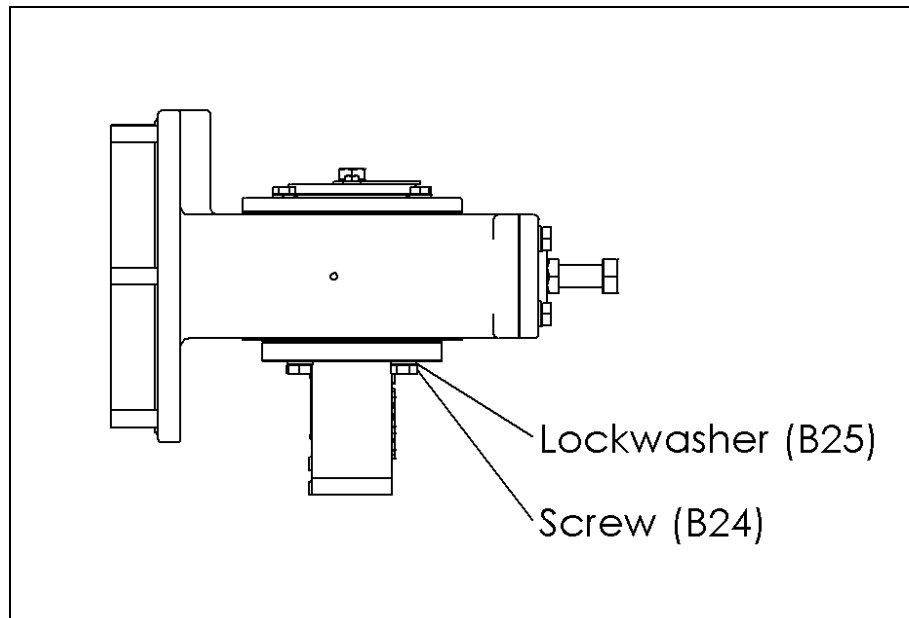


Figure 3 – Connecting Parts Identification

Disassembling Actuator

See Figure 4 and 5 for actuator parts identification.

1. Remove the screws (B18), lockwashers (B19) and end cover (B17) from the housing (B1).
2. Remove the nuts (B42) and lockwashers (B41) from the tie rods (B40) and remove the cylinder cap (B39).
3. Remove the tie rods (B40) from the housing (B1).
4. Slide the cylinder tube (B34) away from the housing (B1), then rotate the cylinder tube at about a 45° angle and slide it off the piston (B35).
5. While securing the nut (B38) on the end of the piston (B35), remove the screw (B7) and lockwasher (B6) from the rack (B5).
6. Remove the piston/piston rod assembly from the housing (B1).
Note: Use care while handling the piston/piston rod assembly to prevent damage to the piston rod.
7. Remove the screws (B47) and lockwashers (B48) fastening the pointer plate (B51) to the gear (B8) and remove pointer.
8. Scribe corresponding lines on the cover (B11) and housing (B1) to be used for alignment during assembly, then remove the screws (B15) and lockwashers (B14) fastening the cover to the housing and remove cover.
9. Remove the gear (B8) through the top of the housing (B1) and the rack (B5) through the end cover (B17) end of the housing.
10. Slide the rack bearing (B3) off the pin (B4) and remove from the housing (B1).

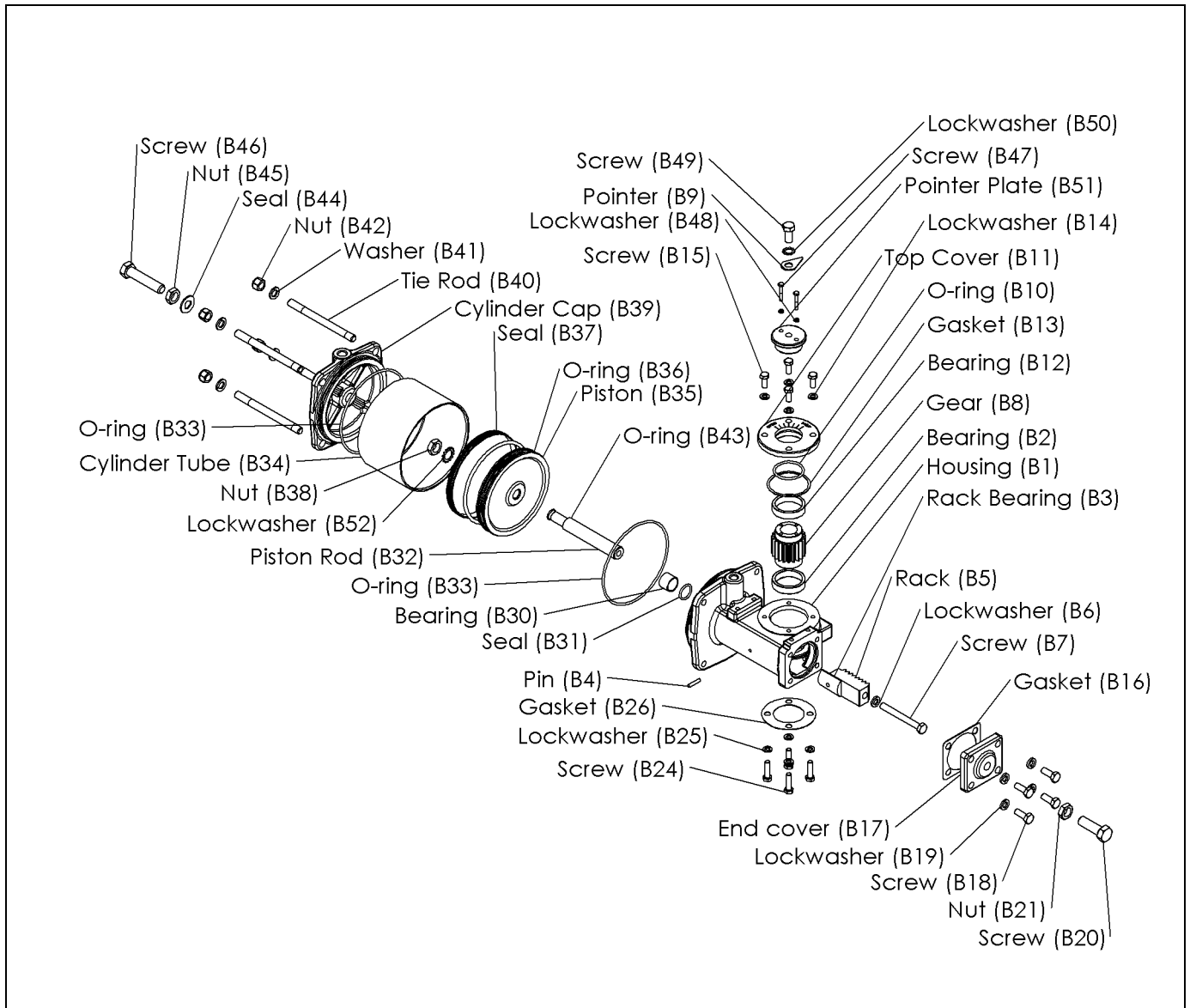


Figure 4 – Actuator Parts Identification

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Cylinder Operated G-Series Actuators

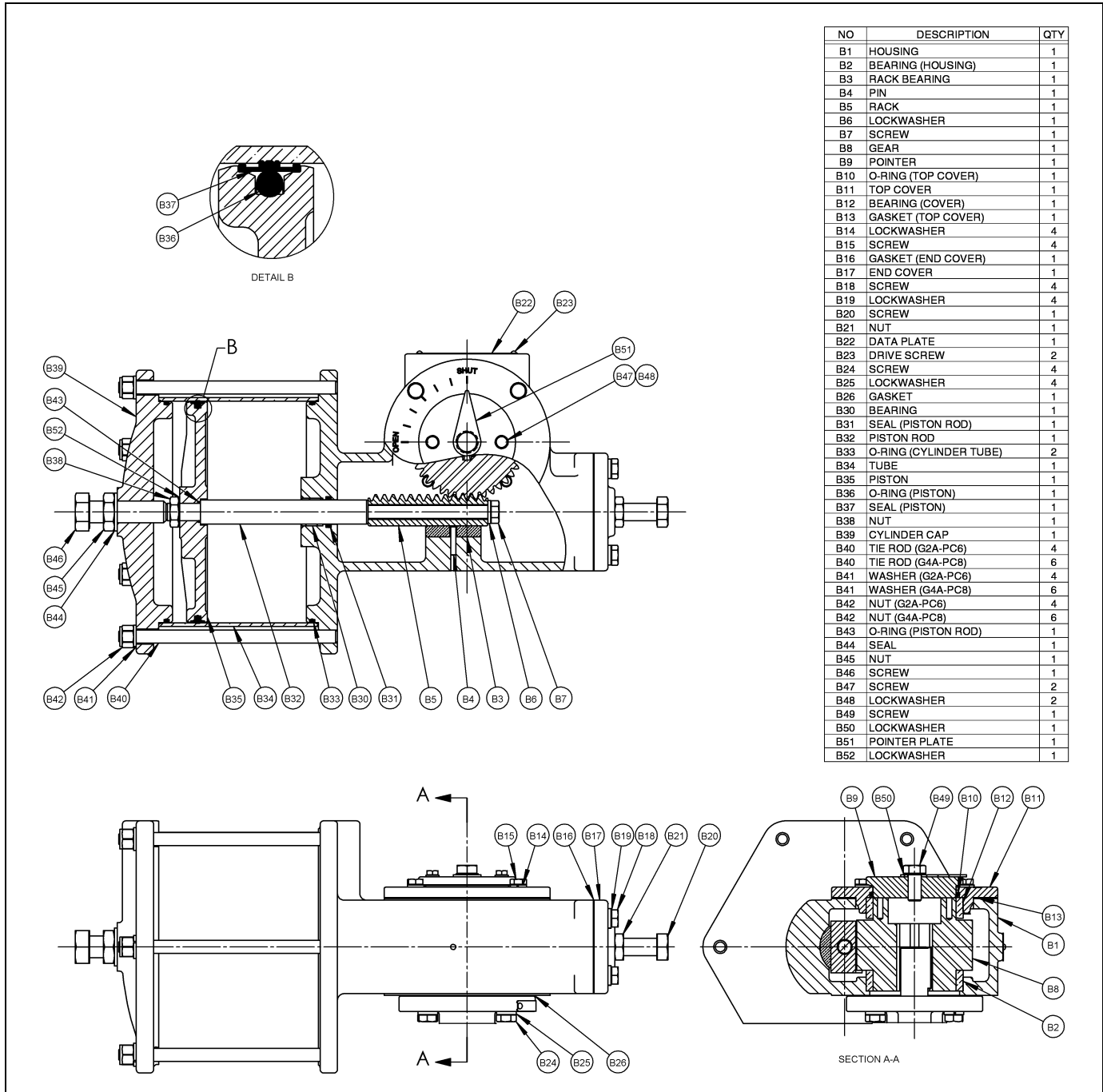


Figure 5 – Actuator Parts Identification

Reassembling Actuator

See Figure 4 and 5 for parts identification. See “*Lubrication*” section for lubricating requirements.

1. Scrape old gasket material off the housing (B1), cover (B11) and end cover (B17).
2. Remove the nut (B38) and lockwasher (B52) from the piston/piston rod assembly and remove the piston (B35) from the piston rod (B32).
Note: Use care while disassembling the piston/piston rod assembly to prevent damage to the piston rod.
3. Replace the piston seal (B37) and piston o-ring (B36) in the piston (B35);
 - a. Remove the old seal and o-ring.
 - b. Lubricate a new o-ring and the piston groove and place the o-ring in the inner groove of the piston.
 - c. Place the piston seal in the outer groove of the piston as far as possible without stretching the seal; then angle the remaining section of the seal, and carefully slip the seal over the edge of the piston, and into the groove. Lubricate the new piston seal.
4. Remove the old o-ring (B43) in the piston (B35). Lubricate a new o-ring and the piston groove and insert the o-ring into the piston.
5. Re-assemble the piston (B35) and piston rod (B32). Finger-tighten the nut (B38) and lockwasher (B52).
Note: Use care while re-assembling the piston/piston rod assembly to prevent damage to the piston rod.
6. Remove the old seal (B31) inside the cylinder head end of the housing (B1) and insert new seal into the housing.
7. Lubricate the inside diameter of the bearing (B30), seal (B31) located in cylinder head end of housing (B1) and the piston rod (B32), then slide the piston/piston rod assembly into the housing.
8. Lubricate the flat side of the rack bearing (B3) and slide it on to the pin (B4) in housing (B1).
9. Lubricate the flat side of rack (B5) and assemble the rack, lockwasher (B6) and screw (B7) with the timing mark end of the rack towards the lockwasher.
10. Slide the rack assembly into the housing (B1) with the flat side of the rack against the rack bearing (B3) and finger-tighten the assembly to the piston rod (B32).
11. Apply a liberal amount of lubricant to the teeth and journals of the gear (B8), then place the gear in the housing (B1) with the tapped holes facing up and carefully align the teeth with the rack as shown in Figure 6.
12. Remove the old o-ring (B10) in the cover (B11). Lubricate a new o-ring and the cover groove and insert the o-ring into the cover.
13. Place a new gasket (B13) on the cover (B11), line up the scribe marks on the cover and housing (B1) and attach the cover with screws (B15) and lockwashers (B14). Tighten the screws to 15 ± 2 foot pounds (20 ± 3 Nm).
14. Tighten both the nut (B38) on the piston end and screw (B7) on the rack end at the same time to:
 - 2A actuator - 40 ± 5 foot pounds (54 ± 7 Nm)
 - 4A actuator - 75 ± 5 foot pounds (102 ± 7 Nm)
15. Place a new gasket (B16) on the end cover (B17) and attach the end cover to the housing (B1) with screws (B18) and lockwashers (B19). Tighten the screws to 38 ± 5 foot pounds (52 ± 7 Nm).
16. Remove the old o-ring (B33) in the groove of the cylinder head end of the housing (B1), lubricate a new o-ring and the groove and insert the o-ring into the groove.

Reassembling Actuator *(Continued)*

17. Lubricate the inside diameter of the cylinder tube (B34), place it over the piston (B35) at about a 45° angle, and swing the tube into position on the piston. Slide the cylinder tube against the housing (B1).

Note: Use care while sliding the cylinder tube onto the piston to prevent damage to the piston seal (B37).

18. Apply Loctite Primer N and Loctite Stud Lock to the shorter threads on each of the tie rods (B40) and turn each tie rod as far as it will go into the housing (B1).

19. Remove the old o-ring (B33) in the groove of the cylinder cap (B39), lubricate a new o-ring and the groove and insert the o-ring into the groove.

20. Align the holes in the cylinder cap (B39) with the tie rods (B40) and align the NPT port in the cylinder cap with the NPT port in the housing (B1). Then slide the cylinder cap into the cylinder tube (B34). Place the nuts (B42) and lockwashers (B41) on the tie rods. Tighten the nuts to 16 ± 2 foot pounds (22 ± 3 Nm).

21. Remove the screw (B46), nut (B45) and old seal (B44) from the cylinder cap (B39), lubricate a new seal and re-assemble the seal, nut and screw into the cylinder cap.

Re-installing Actuator to Valve

22. Place a new gasket (B26) on the mounting flange of the valve.

Fasten the actuator assembly to the valve using screws (B24) and lockwashers (B25). Tighten the screws to:

- 2"-6" valves - 16 ± 2 foot pounds (22 ± 3 Nm)
- 8" & 10" valves - 33 ± 2 foot pounds (45 ± 3 Nm)
- 12" valves - 60 ± 2 foot pounds (81 ± 3 Nm)

23. Re-connect the tubing to both cylinder ports and turn on pneumatic power to the actuator.

24. Actuate the valve to the closed position.

25. Attach the pointer plate (B51) to the gear (B8) with screws (B47) and lockwashers (B48).

Tighten the screws to:

- 2A actuator - 4 ± 2 foot pounds (5 ± 3 Nm)
- 4A actuator - 6 ± 2 foot pounds (8 ± 3 Nm)

26. Adjust the open and closed position stops described in the "*Adjusting Position Stops*" section.

27. Actuate the valve to the closed position.

28. Attach the pointer plate (B51) to the pointer (B9) with screw (B49) and lockwasher (B50) aligning the pointer plate with the "SHUT" marking on the cover (B11). Tighten the screw (B49).

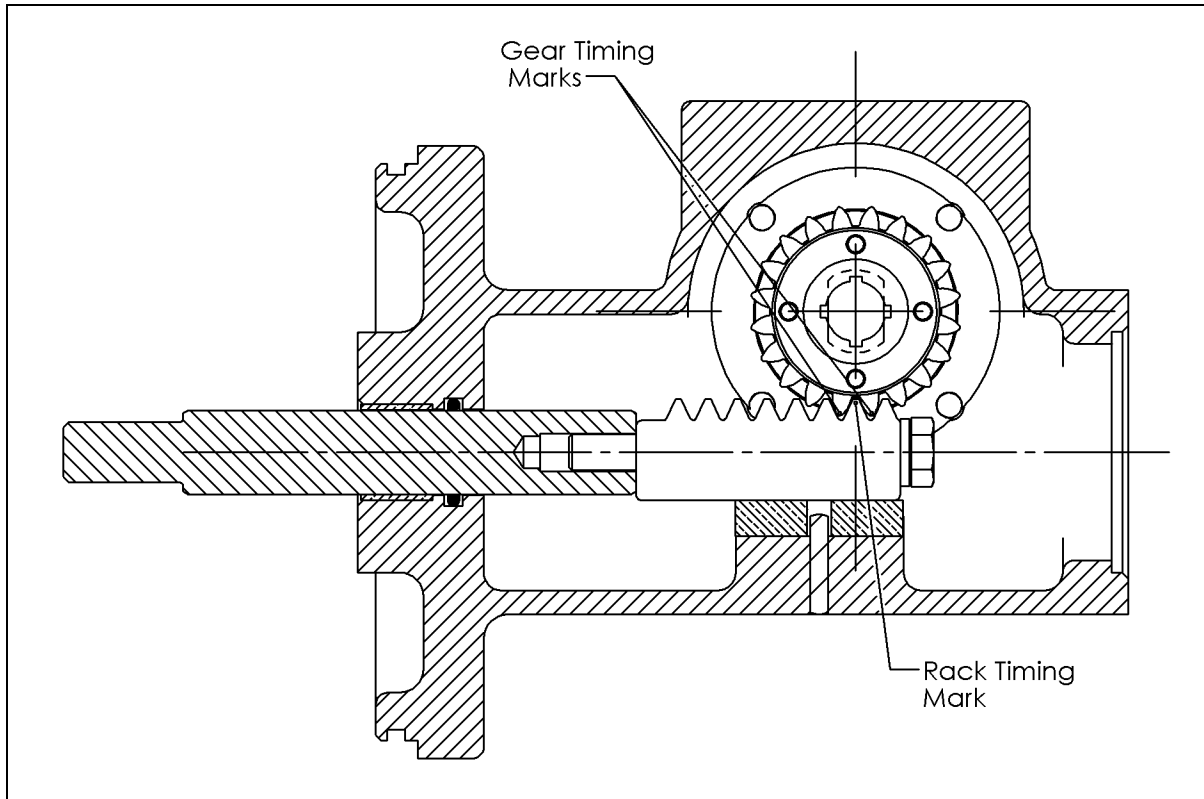


Figure 6 – Gear and Rack Alignment

Installing Actuator

See the “*Reassembling Actuator*” section to mount the actuator if the actuator has been disassembled.

Installing Actuator on a New Valve – Keyed Shaft

1. Remove the screws (B47), lockwashers (B48) and pointer plate (B51) from the gear (B8) in the actuator assembly.
2. Select an actuator mounting position and line up the keyway in the gear (B8) with the key slot in the valve shaft, then slide the actuator assembly onto the valve.
3. Fasten the actuator assembly to the valve with screws (B24) and lockwashers (B25). Tighten the screws to:
 - 2”-6” valves - 16 ± 2 foot pounds (22 ± 3 Nm)
 - 8” & 10” valves - 33 ± 2 foot pounds (45 ± 3 Nm)
 - 12” valves - 60 ± 2 foot pounds (81 ± 3 Nm)
4. Place the key into the key slot in the valve shaft and gear.
5. Secure the key by staking with a center-punch on the end of the shaft. Stake on both sides of the shaft as shown in Figure 7.

Note: Do not deform the outside diameter of the shaft.

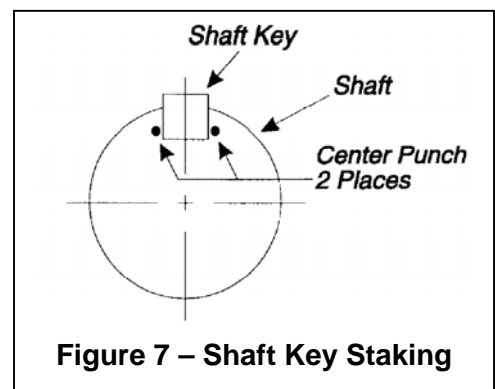


Figure 7 – Shaft Key Staking

Installing Actuator (Continued)

6. Attach the pointer plate (B51) to the gear (B8) with screws (B47) and lockwashers (B48). Tighten the screws to:
 - 2A actuator - 4 ± 2 foot pounds (5 ± 3 Nm)
 - 4A actuator - 6 ± 2 foot pounds (8 ± 3 Nm)
7. Adjust the open and closed position stops described in the “Adjusting Position Stops” section.
8. Actuate the valve to the closed position.
9. Loosen the screw (B49) and adjust the pointer (B9) aligning it with the “SHUT” marking on the cover (B11). Tighten the screw (B49).

Installing Actuator on a New Valve – Double-D Shaft

1. Remove the screws (B47), lockwashers (B48) and pointer plate (B51) from the gear (B8) in the actuator assembly.
2. **Standard and 180° Mounting Positions:** Line up the double-D in the gear (B8) with the valve shaft, then slide the actuator assembly onto the valve.

90° and 270° Mounting Positions:

- a. Remove the screws (B15) and lockwashers (B14) fastening the top cover assembly (B11) to the actuator assembly and remove the top cover.
- b. Slide the gear (B8) out of the actuator assembly, rotate clockwise 90° and install the gear with the 90° and 270° mounting position timing marks lined up with the timing mark on the rack (B5) (See Figure 8).
- c. Replace the top cover.

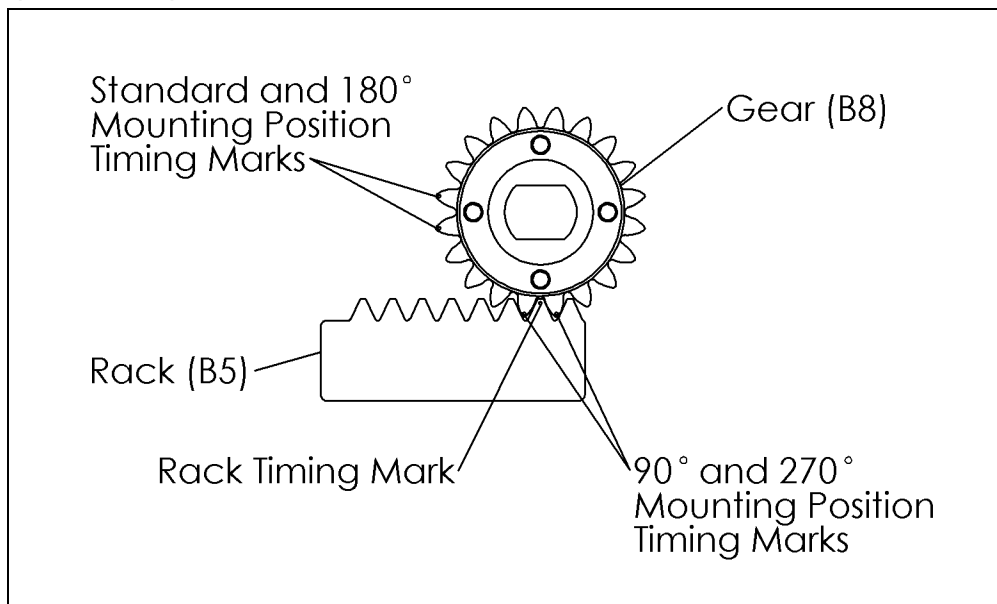


Figure 8 – 90° and 270° Mounting Position Gear and Rack Alignment

Installing Actuator *(Continued)*

3. Fasten the actuator assembly to the valve with screws (B24) and lockwashers (B25). Tighten the screws to:
 - 2"-6" valves - 16 ± 2 foot pounds (22 ± 3 Nm)
 - 8" & 10" valves - 33 ± 2 foot pounds (45 ± 3 Nm)
 - 12" valves - 60 ± 2 foot pounds (81 ± 3 Nm)
4. Attach the pointer plate (B51) to the gear (B8) with screws (B47) and lockwashers (B48). Tighten the screws to:
 - 2A actuator - 4 ± 2 foot pounds (5 ± 3 Nm)
 - 4A actuator - 6 ± 2 foot pounds (8 ± 3 Nm)
5. Adjust the open and closed position stops described in the "Adjusting Position Stops" section.
6. Actuate the valve to the closed position.
7. Loosen the screw (B49) and adjust the pointer (B9) aligning it with the "SHUT" marking on the cover (B11). Tighten the screw (B49).

Installing Actuator in a New Position – Keyed Shaft

1. Place the key into the key slot in the valve shaft.
2. Line up the keyway in the gear (B8) with the key in the valve shaft, then slide the actuator assembly onto the valve making sure the key stays in the valve shaft.
3. Fasten the actuator assembly to the valve with screws (B24) and lockwashers (B25). Tighten the screws to:
 - 2"-6" valves - 16 ± 2 foot pounds (22 ± 3 Nm)
 - 8" & 10" valves - 33 ± 2 foot pounds (45 ± 3 Nm)
 - 12" valves - 60 ± 2 foot pounds (81 ± 3 Nm)

Installing Actuator in a New Position – Double-D Shaft

1. Place the key into the key slot in the valve shaft.
2. **Standard and 180° mounting positions:** Line up the double-D in the gear (B8) with the valve shaft, then slide the actuator assembly onto the valve.

90° and 270° mounting positions:

- a. Remove the screws (B47), lockwashers (B48) and pointer plate (B51) from the gear (B8) in the actuator assembly.
- b. Remove the screws (B15) and lockwashers (B14) fastening the top cover assembly (B11) to the actuator assembly and remove the top cover.
- c. Slide the gear (B8) out of the actuator assembly, rotate clockwise 90° and install the gear with the 90° and 270° mounting position timing marks lined up with the timing mark on the rack (B5). (See Figure 8).
- d. Attach the top cover (B11) with screws (B15) and lockwashers (B14) to the actuator assembly. Tighten the screws to 15 ± 2 foot pounds (20 ± 3 Nm).

Installing Actuator *(Continued)*

- e. Line up the double-D in the gear (B8) with the valve shaft, then slide the actuator assembly onto the valve.
- f. Attach the pointer plate (B51) to the gear (B8) with screws (B47) and lockwashers (B48). Tighten the screws to:
 - 2A actuator - 4 ± 2 foot pounds (5 ± 3 Nm)
 - 4A actuator - 6 ± 2 foot pounds (8 ± 3 Nm)
3. Fasten the actuator assembly to the valve with screws (B24) and lockwashers (B25). Tighten the screws to:
 - 2"-6" valves - 16 ± 2 foot pounds (22 ± 3 Nm)
 - 8" & 10" valves - 33 ± 2 foot pounds (45 ± 3 Nm)
 - 12" valves - 60 ± 2 foot pounds (81 ± 3 Nm)

Changing Mounting Positions

The 2A and 4A G-Series cylinder actuators can be mounted in 90° increments around the valve shaft.

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. Remove the actuator from the valve. See *"Removing Actuator"* section.
3. Rotate the actuator to the desired position.
4. Install the actuator on the valve. See *"Installing Actuator in a New Position"* in the *"Installing Actuator"* 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 <i>Disassembling Actuator</i> and <i>Reassembling Actuator</i> sections
	Pipeline obstruction in valve is preventing closure	Remove obstruction
Actuator rotates wrong direction	Air connections to cylinder are incorrect	Reverse air connections to cylinder