

# Bettis GVO-C Series

## GVO-CLP-SR Pneumatic Actuators





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# Section 1: Introduction

Bettis GVO-C Linear valve actuator has been designed to meet a wide variety of applications. It has been manufactured to close tolerances and specifications and has been factory inspected and tested prior to shipment. Each actuator is identified with a unique serial number for reference when ordering replacement parts.

The actuators have a special feature: they are single-acting, spring-return, to provide “Fail-Close” or “Fail-Open” action in case of loss of air pressure or electrical power.

The springs are located in a factory sealed canister, easy to remove and provide high safety standards during the operation and maintenance.

Each actuator was engineered to meet and exceed your specific application requirements.

The following guidelines are designed to help you with your maintenance procedures.

## Section 2: Operation

1. Use only filtered, pressure regulated and lubricated air to operate the actuator. The air must be filtered to remove **all contaminants in excess of 30 microns** particle size. Lubrication is recommended to reduce component friction and maximize seal life. Use ESSO-NUTO H-32 oil (or equivalent, compatible with seal materials).
2. Care must be exercised to ensure that operating pressure does not exceed the **maximum rating of 150 psi**.
3. Unless equipped with optional metallic rod-scraper and rod boot, the cylinder should be operated in an environment free of excessive dust and abrasive particles.
4. Standard **operating temperature is between  $-30^{\circ}\text{C}$  and  $+120^{\circ}\text{C}$  ( $-25^{\circ}\text{F}$  and  $+250^{\circ}\text{F}$ )** unless specially equipped with high or low temperature seals.
5. **For cylinders used in environments where the ambient temperature can drop below freezing point, only instrumental air, with Dew point  $-50^{\circ}\text{C}$  ( $-58^{\circ}\text{F}$ ) must be used. Lubrication is not recommended for such application.**

## Section 3: Maintenance

Bettis GVO-C Linear actuator has been designed to give you trouble free performance with a minimum of maintenance. Periodic inspection and replacement of seals, when required, is recommended in order to ensure continued product safety and reliability. Inspection and seal replacement intervals depend on your specific operating conditions.

The AS-Series actuators are specifically design for single action.

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**NOTE:**

This product is only intended for use in large-scale fixed installations excluded from the scope of Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 2).

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### 3.1 Inspection of Gland and Barrel Seals

1. Identify if the cylinder is a “Fail-Close” or “Fail-Open” type. The “Fail-Close” actuator has the pressure port at the rod end cap; the “Fail-Open” actuator has the pressure port located on the canister end cap.
2. Connect pressure line at the pressure port of the cylinder.
3. Apply Leak-Tek or similar soapy solution to the gland bushing end caps barrel juncture and inspect for signs of leakage.

### 3.2 Inspection of Piston Seals

1. Connect pressure line at the pressure port to allow actuator rod to fully extend or retract.
2. Install a pressure gauge at the opposite port and monitor reading for approximately 30 seconds. If the pressure reading remains at zero, piston seals performed properly. If a pressure rise is observed, seals should be replaced immediately.

## Section 4: Seal Replacement

1. **Make sure line pressure is shut off before disconnecting actuator from the valve.**
2. Remove the actuator to a clean working area. Remove all accessories installed on the cylinder (solenoid valves, filter-regulators, manual override jacks, and others).
3. Before proceeding at the seals replacement, the canister must first be removed from the cylinder.

### 4.1 Fail-Close Actuators

1. Unscrew the mounting bolts attaching the canister to the cylinder. This operation can be done in all safety, without any special precaution. The spring is contained in a factory sealed canister.
2. Remove the canister from the cylinder.
3. Unscrew the tie rod nuts and remove the tie rods.
4. Remove the cylinder rod end cap.
5. Pull the piston and piston rod assembly from barrel. Take care not to damage the rod and the barrel. **Do not disassemble the rod from the piston replacement parts.**
6. Unscrew the gland bushing from rod end cap.
7. Remove seals from piston and gland bushing, noting orientation of seal edges. The U-cups lips must face the pressure direction. Remove barrel O-rings from end caps grooves.
8. Verify barrel bore, gland bushing and rod surface for scratches or scoring, damage or excessive wear.
9. Replace piston rod assembly and/or gland bushing if damaged. Contact factory for replacement parts.

## 4.2 Fail-Open Actuators

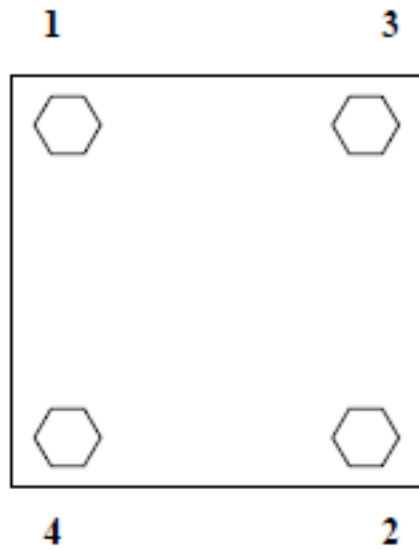
1. Remove the protective cover located on the canister top end.
2. Unscrew the nut attaching the shaft to the top spring guiding piston.
3. Unscrew the mounting bolts attaching the canister to the cylinder. This operation can be done in all safety, without any special precaution. The spring is contained in a factory sealed canister.
4. Remove the canister from the cylinder.
5. Unscrew the tie rod nuts and remove the tie rods.
6. Remove the cylinder head (rod end cap).
7. Pull the piston and piston rod assembly from barrel. Take care not to damage the rod and the barrel. **Do not disassemble the rod from the piston.**
8. Unscrew the gland bushing from rod end cap.
9. Remove seals from piston and gland bushing, noting orientation of seal edges. The U-cups lips must face the pressure direction. Remove barrel O-rings from end caps grooves.
10. Verify barrel bore, gland bushing and rod surface for scratches or scoring, damage or excessive wear.
11. Replace piston rod assembly and/or gland bushing if damaged. Contact factory for replacement parts.



## 4.3 Reassembling the Actuator

1. Carefully clean all components, grooves and surfaces prior to reassembly. Use compressed air to remove all solid particles.
2. Apply a light coat of grease (ESSO LIDOK EP2 or equivalent) to all packing and seal grooves.
3. Place O-rings in appropriate head and cap grooves.
4. Install piston seals. The U-cups must face pressure direction.
5. Install wear-band(s) on piston.
6. Slide piston and piston rod assembly into barrel. Take care not to damage seals.
7. Install gland seals, back-up rings and rod wiper in gland bushing.
8. Push gland bushing pilot diameter into actuator head. Tap with a rubber mallet, if necessary, to overcome resistance caused by O-ring.
9. Thread the bushing flange flush with actuator head. Tighten until snug.
10. Install cap on barrel. Ensure that barrel seal (O-ring) is properly seated in groove.
11. Slide actuator head over the piston rod and seat against barrel end. Make sure that bushing and barrel seals remain properly seated.
12. Install tie rods and hand tighten nuts. Make sure that head and cap are properly aligned.
13. Tighten tie rod nuts in cross sequence shown in Figure 1. Torque to values shown in Table 1.
14. Install the canister; secure it with mounting bolts. If the cylinder is “Fail-Open”, screw and tighten the nut connecting the shaft to the top spring guide piston.
15. Install the protective cover on top of the canister.

**Figure 1 Tie Rod Nut Torquing Sequence**



**Table 1. Torque Values**

Cylinder Bore (Inches)	Number of Tie Rods	Diameter of Tie Rods (Inches)	Torque (lb-ft) (No Lubrication)
4	4	3/8	15
5	4	1/2	25
6	4	1/2	30
7	4	5/8	35
8	4	5/8	60
10	4	3/4	90
12	4	3/4	125
14	4	7/8	150
16	6	7/8	150
18	6	7/8	180
20	10	7/8	150
22	10	7/8	180
24	10	7/8	200
26	12	7/8	150
28	14	7/8	150
30	14	7/8	200

## Section 5: Seal-Kit Selection

Use genuine parts only to ensure proper fit and function for continuous trouble free operation.

In order to supply you with the appropriate seal-kit for your actuator, we require the **part number and the serial number** shown on the identification tag located on the barrel of the actuator.

## Section 6: Storage Condition

Bettis GVO-C Linear pneumatic valve actuators are shipped pre-lubricated, with exposed machined parts protected against corrosion. Piston rods and extended tie rods are protected against physical damage with polyurethane mesh sleeving. Air supply ports are protected with plastic cap plugs. All actuators are ready to use when they are shipped from factory. If the actuators must be stored before installation for a period of time, following storage conditions are required:

1. Actuators must be stored indoors.
2. Actuators must be stored in vertical position to prevent packing deformation.
3. Ambient storage temperature:  $-20^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$  to  $+104^{\circ}\text{F}$ ).
4. Humidity: maximum 60%.
5. Do not remove protective cap plugs or protective covers.
6. Apply every 6 months a thin layer of metal protective coating on all machined exposed parts (threads).

Before installation and start-up, following steps must be taken:

1. Remove all protective plastic plugs from air supply ports.
2. Spray a small amount (approximately 10 ml) of clean mineral petroleum based oil into the air supply ports.
3. Run the actuator for 8 to 10 dry cycles (piston rod free, without being connected to any device).



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No. 9 Gul Road  
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P. R. China  
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F +86 22 8212 3308

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F +971 4 886 5465

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Saudi Arabia  
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24 Angus Crescent  
Longmeadow Business Estate East  
P.O. Box 6908 Greenstone  
1616 Modderfontein Extension 5  
South Africa  
T +27 11 451 3700  
F +27 11 451 3800

***EUROPE***

Berenyi u. 72- 100  
Videoton Industry Park  
Building #230  
Székesfehérvár 8000  
Hungary  
T +36 22 53 09 50  
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