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Enidine / Conoflow

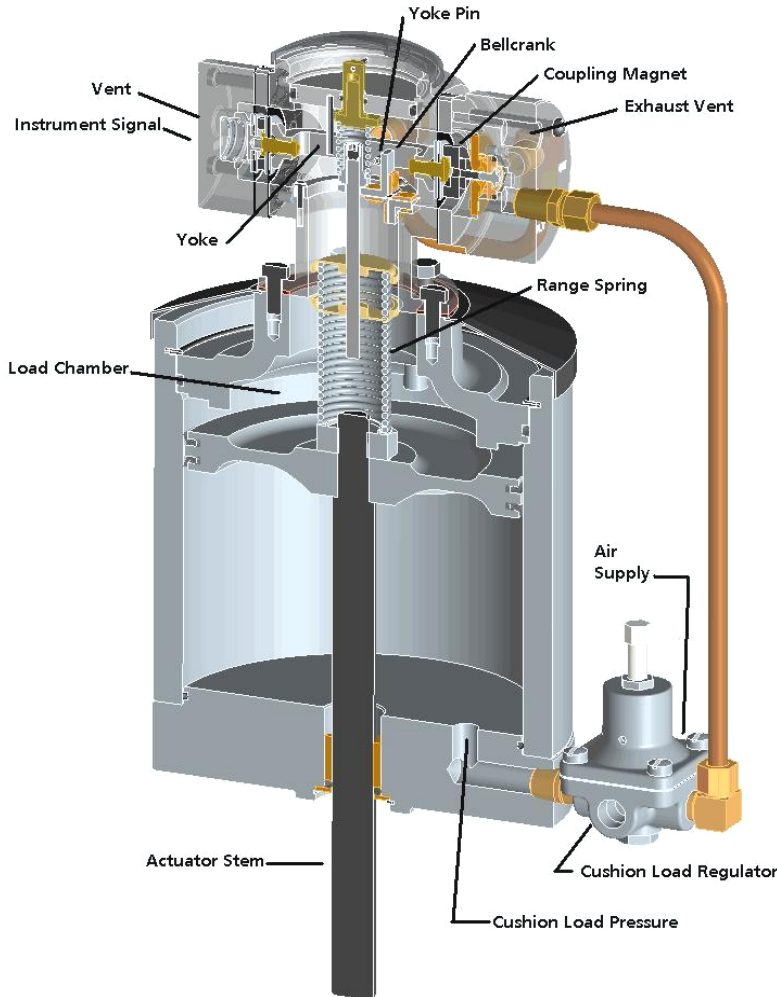
105 Commerce Way  
Westminster, SC 29693  
Tel: (864) 647-9521  
Fax: (864) 647-7993

**WARNING**

Conoflow products are designed and manufactured using materials and workmanship required to meet all applicable standards. The use of these products should be confined to services specified and/or recommended in the Conoflow catalogs, instructions, or by Conoflow application engineers.

To avoid personal injury or equipment damage resulting from misuse or misapplication of a product, it is necessary to select the proper materials of construction and pressure-temperature ratings which are consistent with performance requirements.

## INSTRUCTION AND MAINTENANCE MANUAL GC31 COMMANDAIRE POSITIONER



### PRINCIPLE OF OPERATION

The COMMANDAIRE Model GC31 positions the actuator by applying a sufficient air pressure in the load chamber to overcome the cushion load pressure, plus any external forces or load acting on the actuator stem. An increase in air signal pressure acts on a diaphragm and moves the yoke to the right. This closes an exhaust port and opens the supply valve. Air flows through the supply valve into the load chamber and drives the piston downward, extending the actuator stem. Piston movement extends the range spring, which in turn, causes the bellcrank to rotate counterclockwise. This rotation of the bellcrank exerts a force against the yoke pin and moves the yoke towards a balanced position. A decrease in instrument air pressure reverses the procedure, closing the supply valve and opening the exhaust port. This vents the pressure in the load chamber to atmosphere and allows the cushion load pressure to move the piston and retract the actuator stem.

THIS INFORMATION IS SUBJECT TO THE CONTROLS OF THE EXPORT ADMINISTRATION REGULATIONS (EAR). THIS INFORMATION SHALL NOT BE PROVIDED TO NON-U.S. PERSONS OR TRANSFERRED BY ANY MEANS TO ANY LOCATION OUTSIDE THE UNITED STATES CONTRARY TO THE REQUIREMENTS OF THE EAR.

## SUPPLY PRESSURE (20 to 100 psi / 138 to 690 kPa)

A regulated and filtered air supply should be used. A Conoflow model FR95 Airpak Filter Regulator or equal is recommended.

## ZERO ADJUSTMENT

Zero adjustment can be made by turning the zero adjust coupling, located on top of the headplate assembly (2), clockwise or counterclockwise. Connect supply and instrument air to the positioner. Set the instrument signal to the 0% value (e.g. 3 psi (21 kPa) for a 3-15 psi (21-143 kPa) range). Turn the zero adjust coupling to bring the actuator slightly off the fully retracted position. The starting point may then be checked by reducing the instrument signal below the 0% value and then slowly increasing it. As the 0% input signal is reached, extension of the actuator stem plus an audible increase in the air flow through the positioner should be observed.

Next, increase the instrument signal to the 100% value (e.g. 15 psi for a 3-15 psi (103 kPa for a 21-103 kPa range). Verify that the actuator stem moves to the fully extended position.

Set the instrument signal to the 50% value. Using a suitable measuring device, such as a scale, verify the actuator stem has extended to 50% of full stroke.

## SPAN

Positioner span determines the control range. A positioner with a 3-15 psi (21 to 103 kPa) range has a 12 psi (83 kPa) span and is set with a 3 psi (21 kPa) start point (retracted position). Positioner span has been factory calibrated as specified. Instrument signals of 3-9, 3-15 and 6-30 psi (21-62, 21-103, and 41-207 kPa) are available. For field changes, refer to page 4 of this manual and Range Spring Manual C-8053.

## REMOVING POSITIONER FROM ACTUATOR

**WARNING: Shut off supply and instrument air and assure all pressure is bled before performing any maintenance.**

Piston (or diaphragm) should be in the fully retracted position. Disconnect tubing and verify all air is bled from the actuator. Remove cap (1) and Spirolox ring (3) from positioner so the head plate assembly (2) can be lifted out. Loosen setscrew (24) using a 1/8" hex key wrench, and remove spring rod nut (16). Remove the six cap screws (14) and lift positioner from the actuator.

## INSTALLING POSITIONER ON ACTUATOR

The Model GC31 positioner is designed for actuators having a 2 1/4" dimension between the lower face of the range spring nut (8D) and the positioner mounting flange with the actuator stem in a retracted position. See dimensions on Page 5.

The range spring (8C) is adjusted and set at the factor y for the proper range and spring rod (8A) extension, as shown on page 6. With the actuator stem in the fully retracted position and the spring rod nut (16) removed from the spring rod (8A), thread the spring nut assembly (8D) onto the actuator stem. Hold the range spring assembly in a vertical position without applying any tension to the range spring (8C). Measure the distance between the positioner mounting surface on the actuator (without gasket)

and the top of the spring rod (8A). This distance must be 2-5/16" +/- 1/64" (58.75 +/- 0.41 mm) for proper operation of the positioner (see page 4). If adjustment is necessary, grasp the lower spring clip (8B) and range spring (8C) while retightening the upper clip securely. Measure the 2-5/16" (58.75) dimension again to make sure it is correct. Be sure the actuator stem is fully retracted when making this measurement.

Remove the cap (1) from the positioner and, using a small screwdriver, remove the Spirolox ring (3). Pull out the positioner headplate assembly (2) and set it aside. The zero spring (4) should also be attached to the headplate assembly. If not, remove it also. Place the gasket (13) and the positioner on the actuator, guiding the spring rod (8A) through the hole in the bell crank (17). Install the six hex head cap screws (14) that secure the positioner to the actuator.

Adjust the set screw (24) in the spring rod nut (16) such that the head of the screw is flush with the top of the nut. Install this assembly onto the spring rod (8A) finger tight. Hold the spring rod nut (16) with a wrench to prevent rotation, and tighten the set screw (24) securely. It is important to make sure that the spring rod nut (16) does not turn while tightening the set screw in order to maintain calibration of the range spring assembly.

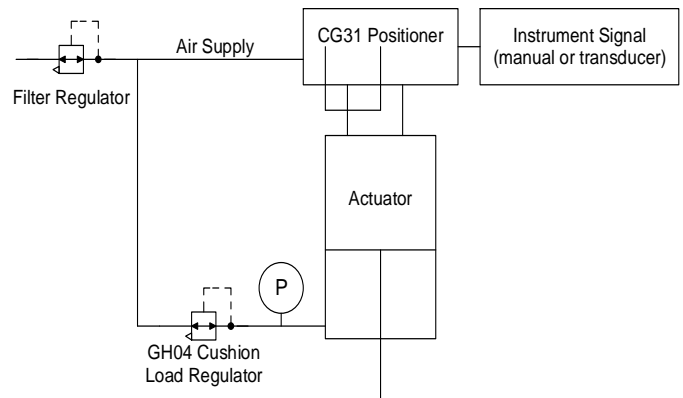
Insert the zero spring (4) onto the headplate and install the headplate assembly (2). Make sure the zero spring (4) is properly centered on the spring rod nut (16) when inserting this assembly. Replace the Spirolox ring (3). Connect the necessary piping. Proceed with the zero adjustment procedure previously outlined. When complete, replace the cap (1).

## SYSTEM CONFIGURATIONS

The operation of the Commandaire GC31 positioner with an actuator may be configured differently, depending on the needs of the system. The following schematics illustrate several common configurations for the model GC31 with a piston actuator.

### DOUBLE ACTING ACTUATOR WITH CUSHION LOAD

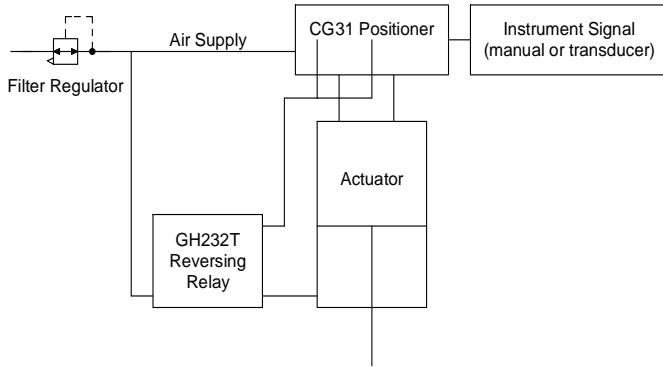
The use of a suitable cushion load regulator, such as the Conoflow GH04, will drive double acting actuator operation.



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## FULL REVERSAL OPERATION

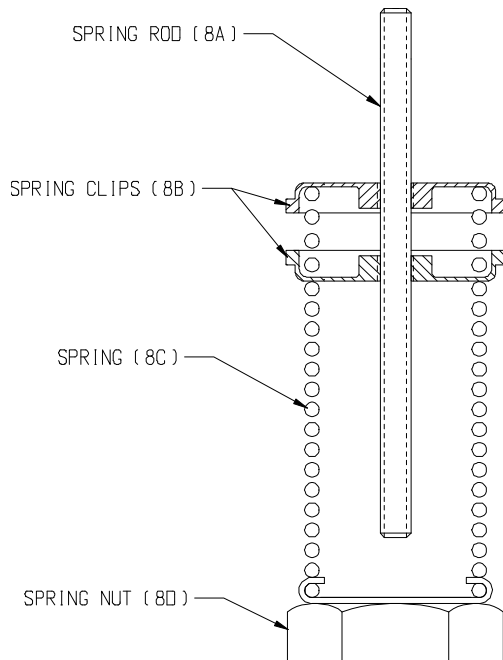
When used with a Conoflow model GH232T reversing relay rather than a cushion load regulator, the GC31 positioner will provide maximum actuator stem thrust loads in extension and retraction. The GH232T reversing relay must be connected as shown in the schematic below:



## OPERATING CHECKS

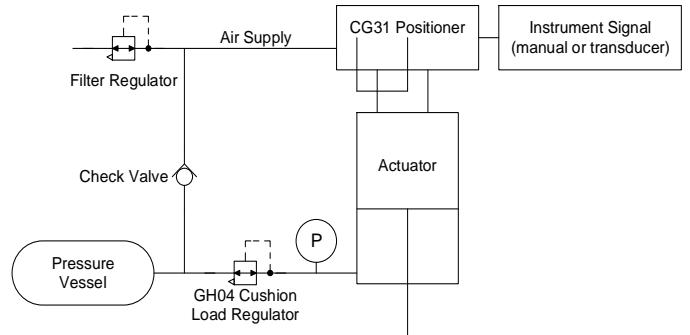
With positioner installed and adjusted in accordance with the preceding instructions, the actuator stem should react to variations in input control signal. By removing the cap (1) and depressing the zero adjust coupling of the headplate assembly (2) while the control signal is applied, step excursions of the stem should take place and the stem should return accurately to its previous position. If the actuator does not appear to function correctly, check to make sure that the filtered supply pressure and cushion loading pressure are set correctly.

## RANGE SPRING INFORMATION AND APPLICATIONS



## AIRLOCK OPERATION

The addition of an airlock system drives the actuator stem to retract when an air supply failure occurs. The airlock system consists of a volume tank (pressure vessel) and a check valve that drives the cushion load regulator and lifts the actuator piston when the air supply fails. This action will retract the actuator stem in the event of an air supply failure.



## OTHER CONFIGURATION POSSIBILITIES

A shut off valve can be piped between the load chamber and cushion load volumes for manual operator applications. Opening the valve will equalize the pressure. This allows manual operation override of the positioner when this valve is open, and instrument signal / positioner operation when the valve is closed.

Optional tapped exhaust ports on the pilot and instrument connections are also available for use with non-corrosive gas operation.

Example: Basic No.

Stem Nut Assembly  
Stroke Length Color

GJ800 4 Y

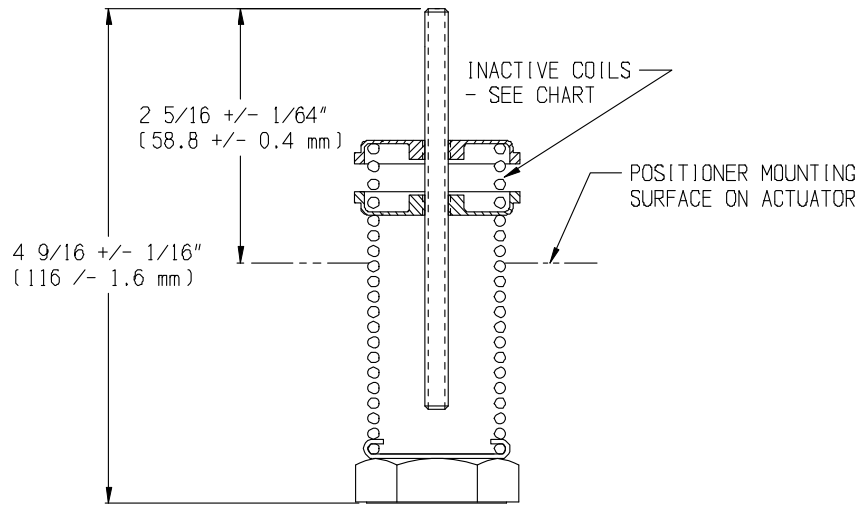
In this example, part number GJ8004Y would be a range spring assembly for the GB52 with a yellow spring. Refer to manual C-8053 for specific ordering information.

Table 1: Stem Nut Selection

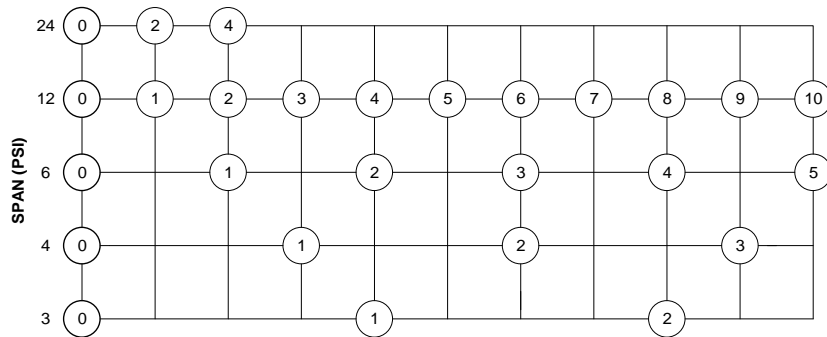
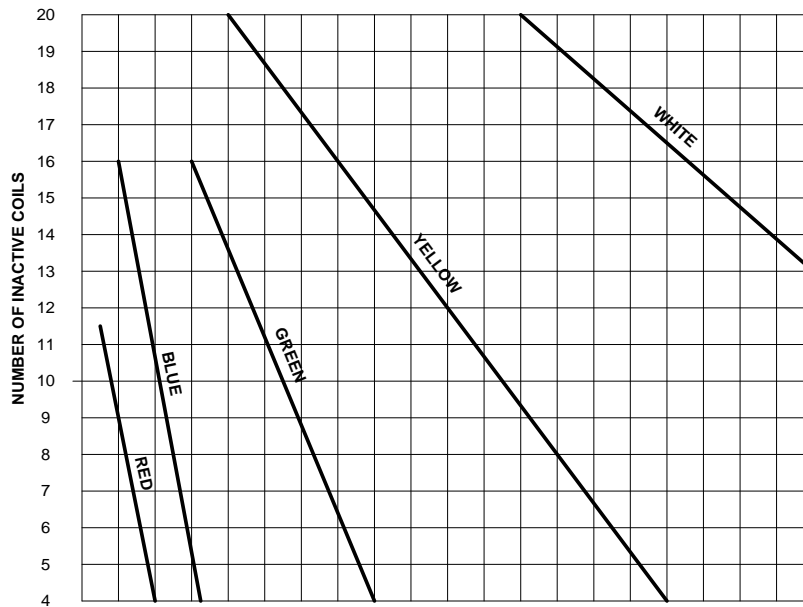
STEM NUT ASSY NO.	THREAD	ACTUATOR	CYLINDER SIZE
1	3/8-24	GB50	3"
3	1/2-20	GB51	4"
4	9/16-18	GB52	6"
5	5/8-18	GB53	8"
6	7/8-14	GB54	10"

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See manual C-8053 for full description of range spring configurations

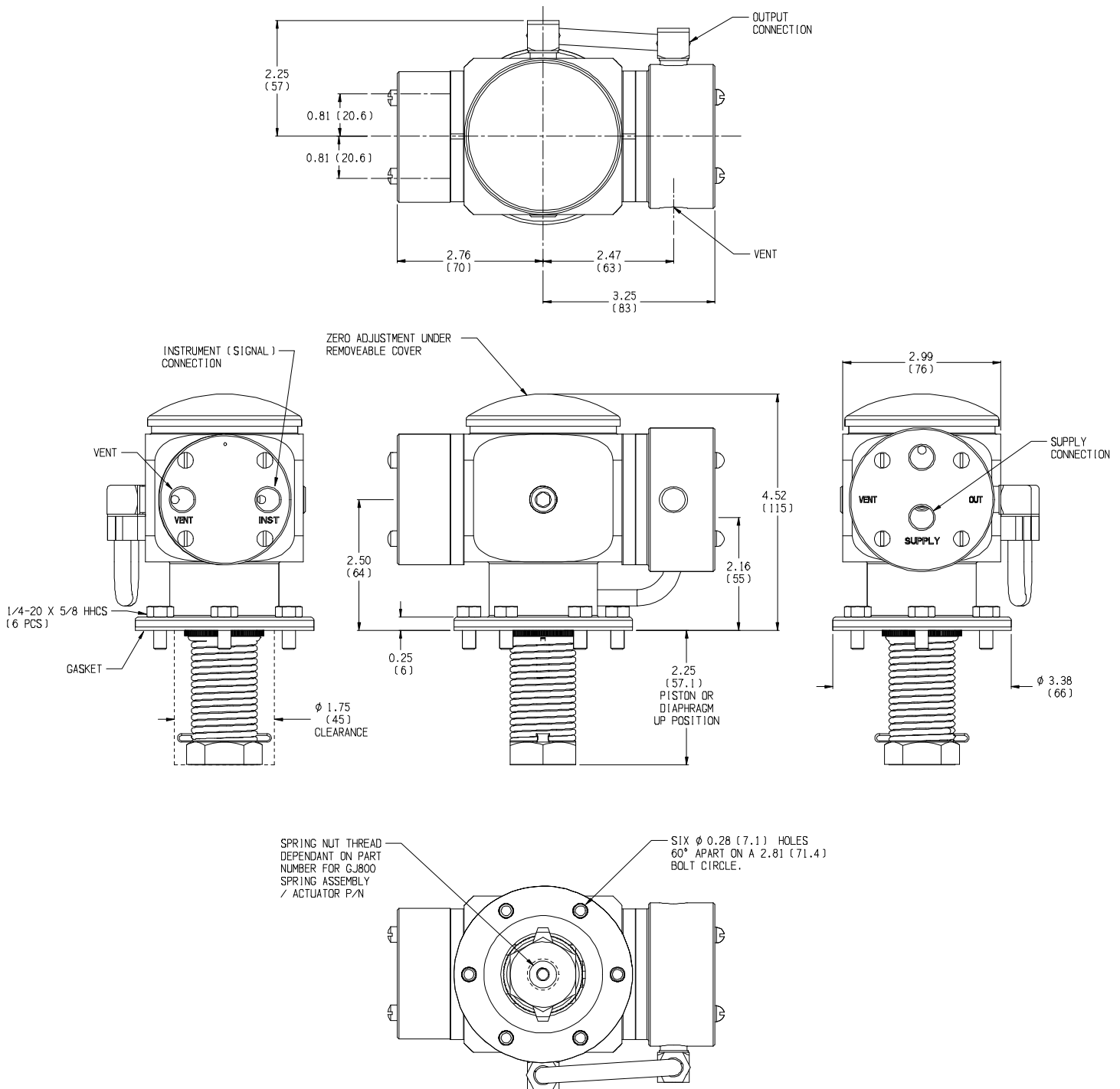


RANGE SPRING ADJUSTMENT CHART



TRAVEL IN INCHES FOR SPAN REQUIRED  
NOTE: For travels greater than 10" (254mm) consult factory

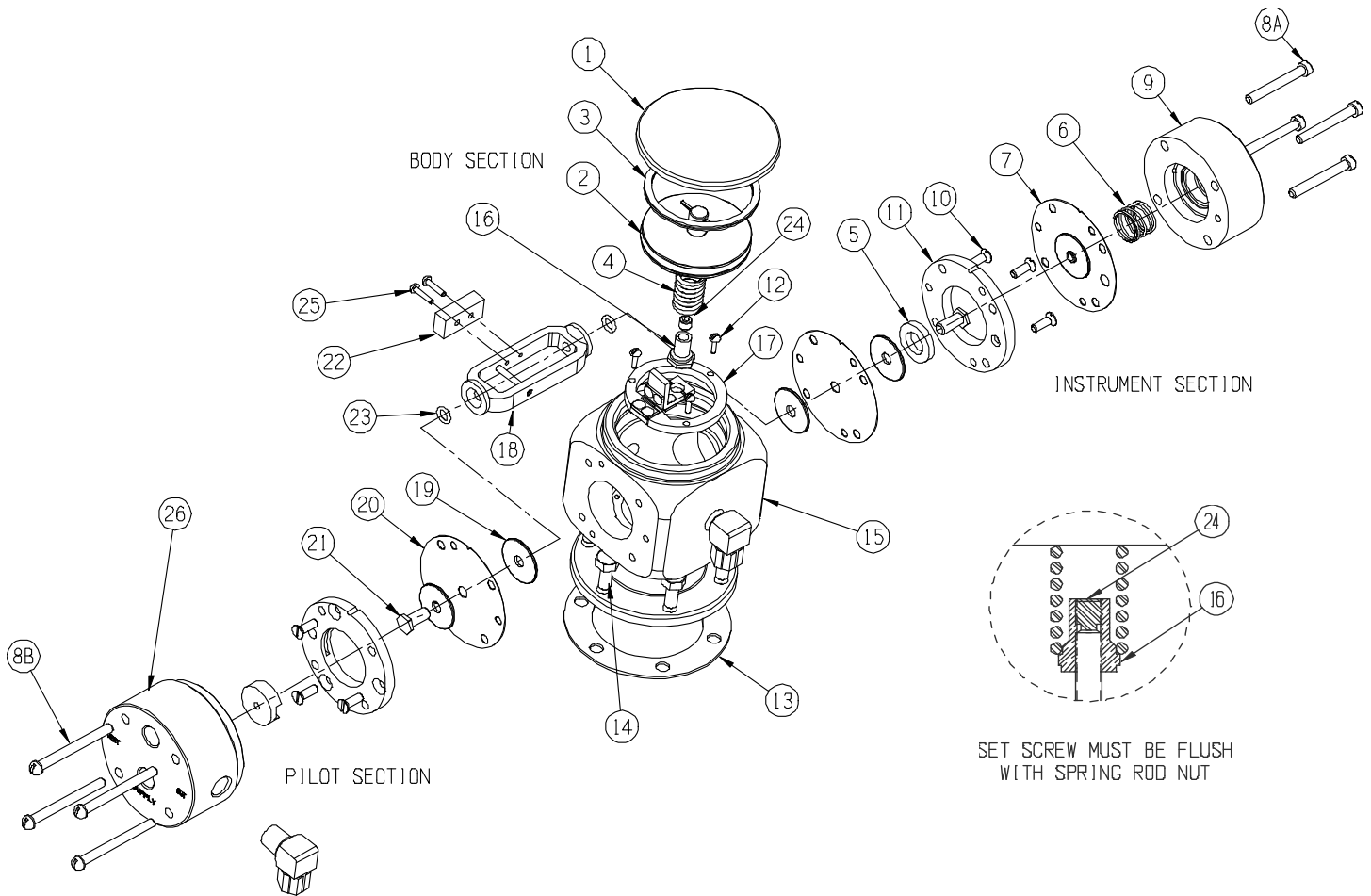
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**Notes:**

1. All connections are 1/4" NPT unless otherwise noted.
2. When ordering, specify model, range and stroke.
3. For additional piping schematics, see A50-48
4. Vent ports can be tapped 1/4" NPT for gas service.

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Item No.	Description	Qty. Req'd	Part No.
1	Top Cap	1	G6025969
2	Head Plate Assembly	1	G6027130
3	Spirolox Ring	1	G6004691
4	Zero Spring	1	G6025811
5	Magnet	1	G6078307
6	Instrument Spring	1	G6026843
7 <sup>(1)</sup>	Instrument Diaphragm Assy	1	G6026652
8A	Fillister Head Machine Screw 10-32 x 1-1/2" Long	4	G6900063
8B	Round Head Machine Screw 10-32 x 2" Long	4	G6900659
9	Instrument Cap	1	G6026801
10 <sup>(5)</sup>	Flat Head Machine Screw 8-32 x 1/2" Long	6	G6900574
11 <sup>(5)</sup>	Spacer	2	G6026785
12	#4 Self Tapping Screw 3/8" Long	3	G6900545
13 <sup>(1)</sup>	Gasket	1	G6001782

Item No.	Description	Qty. Req'd	Part No.
14	Hex Head Capscrew 1/4-20 x 5/8" Long	6	G6900095
15	Body	1	G6387173
16	Spring Rod Nut	1	G6025803
17	Flexure Ring Assembly (Bellcrank)	1	G6025753
18	Yoke Assembly	1	G6026579
19 <sup>(5)</sup>	Diaphragm Plate	4	G6026686
20 <sup>(1,5)</sup>	Diaphragm	2	G6026553
21 <sup>(5)</sup>	Diaphragm Screw	2	G6026546
22	Inside Stop Block	1	G6026538
23 <sup>(1,5)</sup>	O-Ring	2	G6076608
24	Socket Set Screw (Dog Point) 1/4-28 x 1/4" Long	1	G6900113
25	Round Head Machine Screw 4-40 x 1/2" Long	2	G6900007
26	Pilot Assembly	1	G6027148

SEE NOTES ON PAGE 7

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Notes:

1. *Recommended spare parts can be purchased individually, or as a spare parts kit, under part number G6385464, Spare Parts Kit GC31 (Consists of items 7, 13, 20 and 23).*
2. *When ordering spare parts, specify complete catalog no., item no., and part no. This will permit positive identification and rapid handling of order.*
3. *For body assembly, order item G6026504 (Consists of items 10 through 12, and items 15 through 25).*
4. *For tapped exhaust, use*
  - a. *G6026819 for item 9*
  - b. *G6027155 for item 26*
5. *Diaphragms and spacers are symmetric about body section and are not all identified by item no.s*
6. *Pilot section and instrument cap are machined bar parts (previously used to be castings). Pilot Assembly (26) requires longer (2 inch) screws. Pilot assembly and screws may be ordered by part no. GC31-PILOT*

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