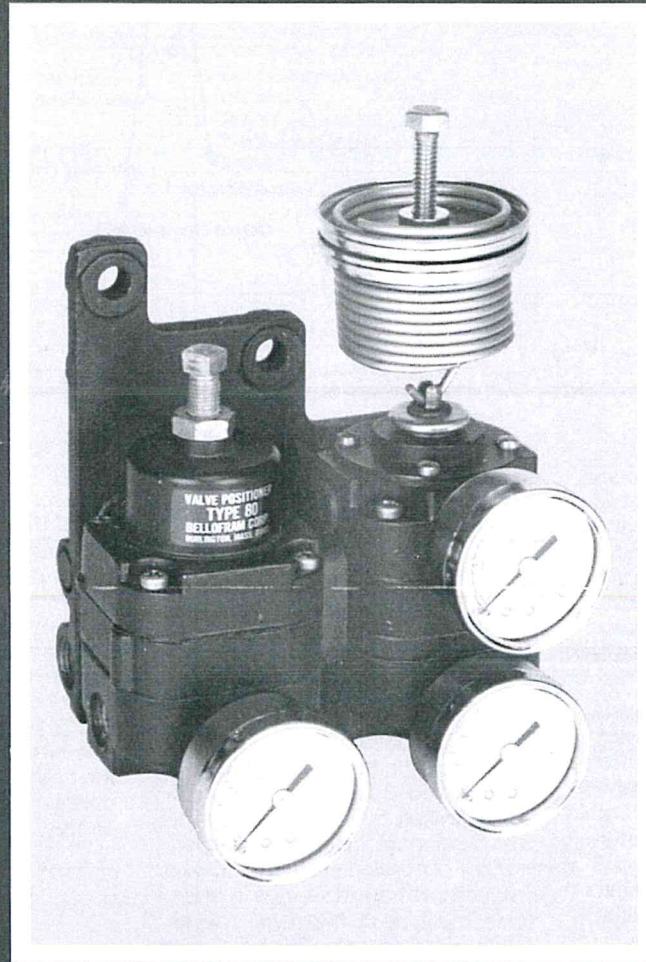


Bellofram

Bellofram Type 80 Universal Valve Positioner



Type 80 Universal Valve Positioner

Performance Features

- Excellent long-term stability
- Extremely low air consumption
- Simple, uncritical adjustment
- No need for supply pressure regulation
- Superior high-frequency response
- Economical cost, operation, maintenance
- Dual, built-in filters prevent orifice clogging
- Highest reliability
- Immune to normal vibration and shock
- Easily reversed in field with no additional parts

General Description

The Type 80 Universal Valve Positioner has been designed to provide stable, reliable control on pneumatic valve actuators. It responds instantly and accurately to command pressure signals, producing a proportional rectilinear or rotary motion of the actuator shaft that is independent of externally applied forces.

The Type 80 is a force balance instrument which incorporates a high-gain signal detection circuit in combination with dual, pilot-operated output valves to provide inverse, or "push-pull," control of double-acting pneumatic actuators. Full supply pressure differential can be developed across the actuator piston, permitting minimum actuator size for any specified output force.

The Type 80 is available in a simplified, single-acting version. However, the double-acting model can easily be converted to single action.

A unique, built-in filtration system protects all interior components from possible contamination, and prevents clogging of restrictions and orifices. The pilot section is further protected by a second in-line filter.

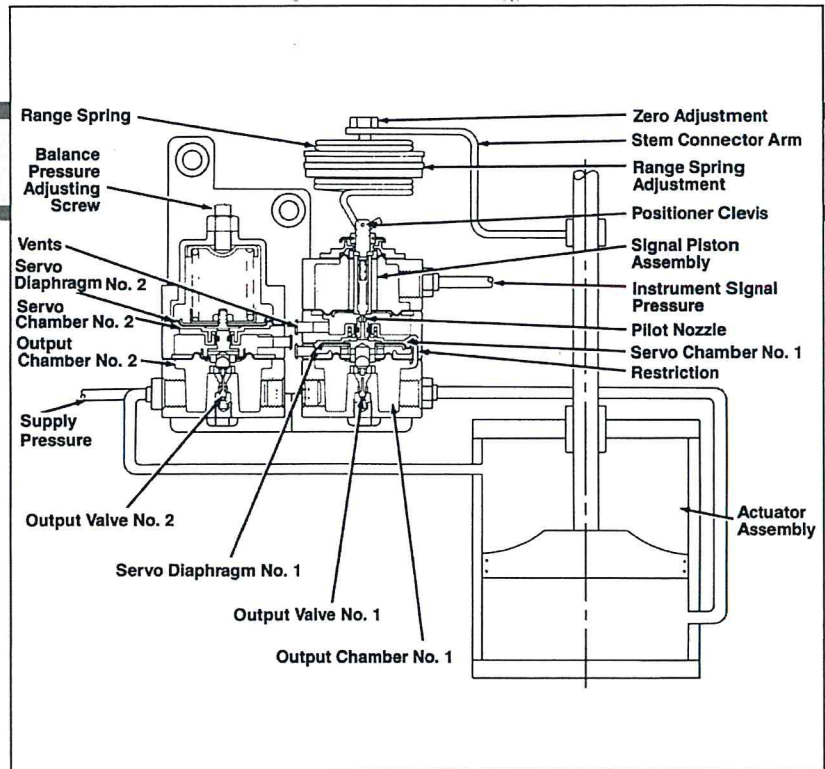


Figure 1. Cutaway Diagram of Type 80 Double Acting Valve Positioner (Rectilinear Motion Actuator)

Performance Benefits

High Stability

The Type 80 incorporates a high gain pilot stage with negative feedback. This results in excellent stability, providing better control under low operating pressures, and with actuators having effective pressure areas of less than 50 sq. in.

Low Air Consumption

The unique, pneumatic servo system incorporated in the Bellofram Type 80 serves to reduce air consumption to approximately 50% of that of comparable positioners. In facilities using a number of positioners, this feature can produce substantial savings in energy costs. The Type 80 has fewer orifices than most other units and those used are roughly twice as large, greatly reducing the possibility of clogging.

Unlike other positioners, the Type 80 is immune to the effects of dimensional changes in valve seats, caused by wear over extended time periods. This means that air consumption will not gradually increase, as it will with other units.

Custom Diaphragm Seals

The tough, long-life diaphragm seals used in the Type 80 are produced specifically for this purpose by Bellofram. Since we have been producing

the famous Bellofram Rolling Diaphragm (BRD) for over a quarter of a century, our broad experience in seal materials and configurations enables us to offer special units for positioners which are to be used in difficult environmental conditions. In cold climates, for example, the use of special low-temperature elastomers permits rapid response, repeatability, sensitivity, and linearity, even at temperatures of -20°F . Similarly, special materials are also available to permit operation of the positioner without deterioration of performance at temperatures as high as 180°F .

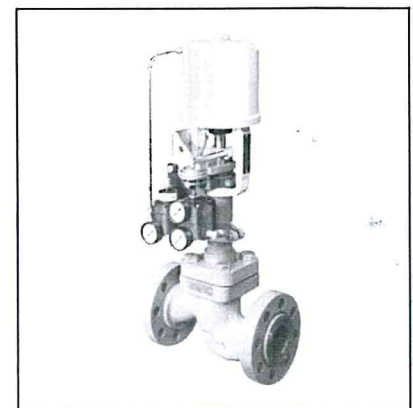


Figure 2. Type 80 Universal Valve Positioner Mounted on Valve

Built-In Filters

One of the most common causes of positioner malfunction has been the clogging of small orifices. In designing the Type 80, we took the logical, but unusual, precaution of building in filters. Two 40-micron filters exclude particles as small as 0.0016 in. from the air line before they have an opportunity to get to the internal components. These filters are easily serviced without removing the positioner from the valve. In addition, the design of the positioner permits continual self-purging, thereby maintaining stable performance over extended periods.

Vibration-Proof

In process lines, shock waves are constantly fed back to the control valve, and can cause substantial vibrations in the positioner. The Type 80 has been constructed to withstand operational shock and vibration, and extensive on-the-job tests under severe vibration conditions have produced no failures or deterioration of signal. We believe that it is the most rugged, most reliable positioner available today.

Principles of Operation

The Type 80 Positioner controls the position of the valve actuator stem through a stem connector arm and range spring as shown in Figure 1. A force balance condition is initially established at set-up between the range spring and the force developed by the signal piston assembly for the range of instrument signal pressures to be used. Any change in this force balance condition, either because of a change in instrument signal pressure or a change in valve stem position caused by external forces, immediately produces a change in the clearance between the signal piston and the pilot nozzle.

Air from output chamber 1 is fed to the servo chamber through a restriction with the pilot nozzle serving to control the servo chamber exhaust rate. Any change in clearance between the nozzle and signal piston produces a corresponding change in servo chamber pressure.

The servo diaphragms 1 and 2 are designed to produce 1:1 inverse operation of output valves 1 and 2. An increase in servo pressure opens valve 1, closes valve 2 and exhausts output chamber 2. A decrease in servo pressure closes valve 1, exhausts output chamber 1 and opens valve 2. The combined and simultaneous action of increasing pressure from valve 1 and decreasing pressure from valve 2, entering the actuator at opposite ends, causes a "push-pull" effect and moves the actuator shaft, stem connector arm, and range spring to the new position that satisfies the previously described force balance condition. The working or balance pressure in the actuator can be adjusted by means of the balance pressure adjustment screw. Turning the screw clockwise increases the spring force acting to open valve #2. This produces an increase in output pressure of valve #2 which is immediately balanced by an increase in output pressure of valve #1 in satisfying the original force balance condition. A decrease in balance pressure is accomplished in a similar manner by turning the adjusting screw counterclockwise.

Filter Maintenance

Two 40 micron air filters are located in the manifold mounting plate. Air supplied to output valve #2 passes through filter #2; air supplied to output valve #1 and to the pilot chamber passes through both filter #1 and filter #2.

The filters may be removed for cleaning or replacement by unscrewing the two 5/8" hex bolts located on the bottom side of the manifold.

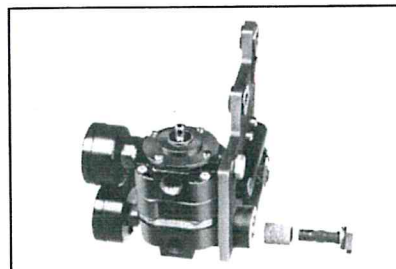
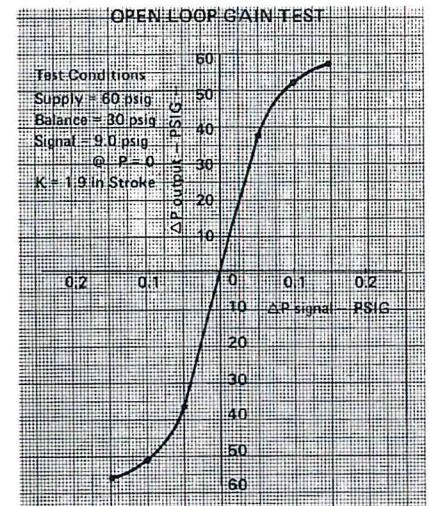


Figure 3. Type 80 Positioner, showing Location of Removable Filters

Type 80 Valve Positioner



Performance Specifications

Test Conditions:		
Supply Pressure	60 psig	
Output pressure	30 psig	
Signal pressure	3-15 psig	
Stroke	3/4 inch	
25 Sq. In. Actuator		Value
Independent Linearity — The maximum deviation of output vs. input from a straight line so located as to minimize the maximum deviation.		0.2%
Hysteresis — The maximum difference in position for the same input signal when approached from opposite ends of the span.		0.2%
Repeatability — The maximum difference in position for the same input signal when approached from the same end of the span.		0.2%
Response Level — Maximum change in signal pressure required to produce a change in valve stem position.		0.2%
Supply Pressure Effect — Change in position of valve stem for 40 psig change in supply (60 psig - 100 psig).		0.5%
Air Consumption —		
20 psig supply pressure — 0.14 SCFM		
60 psig supply pressure — 0.25 SCFM		
80 psig supply pressure — 0.30 SCFM		
100 psig supply pressure — 0.35 SCFM		
Flow Capacity —		
7 SCFM; 60 psig supply		
Exhaust Capacity —		
7 SCFM; 60 psig output		

Rotary Range Spring Kit

The Rotary Range Spring Kit permits the Bellofram Type 80 Valve Positioner to be easily coupled to a 90° Rotary Actuator.

Each kit contains a spiral range spring assembly, split clamp, mounting plate, and a cover. (See Fig. 4)

Materials of Construction

Cover Plastic (A.B.S.)
 Mounting Plate Steel
 Range Spring Stainless Steel
 Split Clamp Stainless Steel

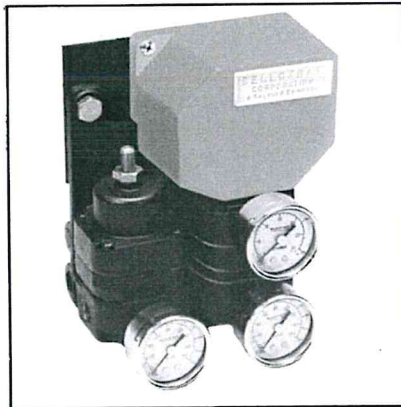
Installation

Actuator Shaft (.3125" ± .0010 DIA) must engage the shaft of the range spring assembly to a depth not to exceed 5/8"

Align the range spring link with the clevis on the input diaphragm assembly of the Type 80 Valve Positioner.

Clamp the range spring assembly to the actuator shaft by tightening the split clamp screw. Actuator extension shaft must be capable of withstanding 50 inch-pounds of torque.

NOTE: The rider bushing on the span adjustment screw should be at the approximate center of the screw as a starting point. The zero adjustment screw should be positioned centrally through the rider bushing to provide equal adjustment in either direction.



Zero and Span Adjustments

1. Apply full actuator operating pressure to the positioner supply.
2. Set the instrument input signal to the low end of the span (e.g. 3.0 psig for a 3.0 to 15.0 psig span).
3. Loosen the split clamp screw slightly and using a 3/8" wrench rotate range spring shaft until the valve actuator is at its approximate starting point.
4. Fine adjustment of zero is now accomplished by rotating the zero adjustment screw. To check the zero adjustment, adjust the input signal below 3 psig and increase it slowly. The actuator should start to move when the input signal reaches 3 psig.

5. Set the input signal to maximum span pressure (e.g. 15.0 psig for a 3.0 to 15.0 psig span).
6. Set the span adjustment screw so that the actuator shaft rotates its maximum. CW rotation of span adjustment screw reduces the span and CCW rotation increases the span. To check the span, adjust the input signal above 15 psig and decrease it slowly. The actuator should start to move when the input signal reaches 15 psig.
7. Check and reset zero adjustment if necessary.
8. Repeat steps 4 to 6 as necessary to obtain the desired 3 psig zero and 15 psig span settings.

9. Tighten locknut while holding zero adjustment screw to prevent any change in zero setting.

For Use with Opposite Valve Rotation the Following Must be Done:

1. Remove set screw from the end of the range spring assembly.
2. Remove spring assembly and turn it around so that outside tab is on the opposite side.
3. Secure range spring assembly to shaft using the same set screw.
4. The mounting plate and Type 80 Positioner must be remounted so that the appropriate feedback hole in the plate is concentric with the actuator shaft.

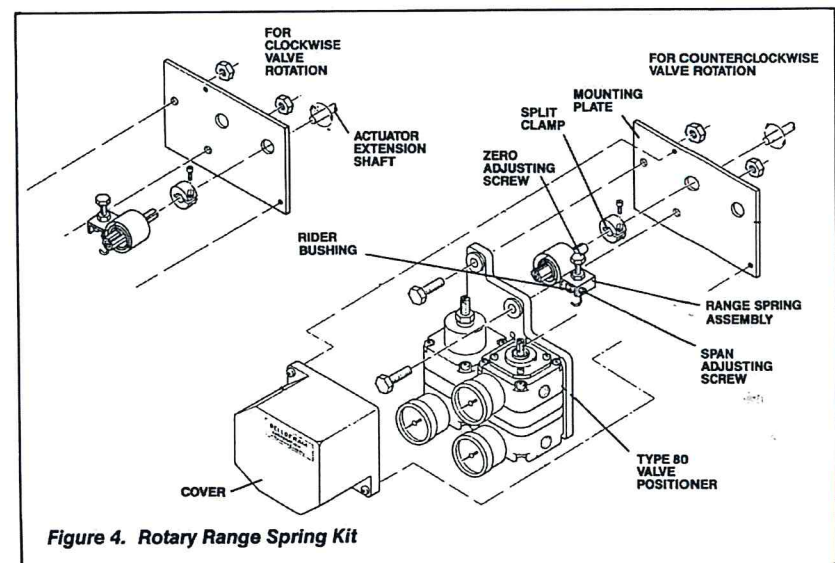
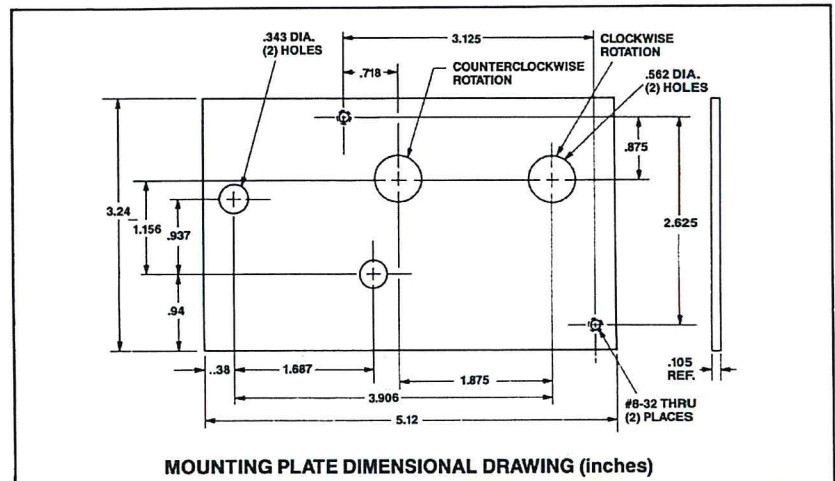
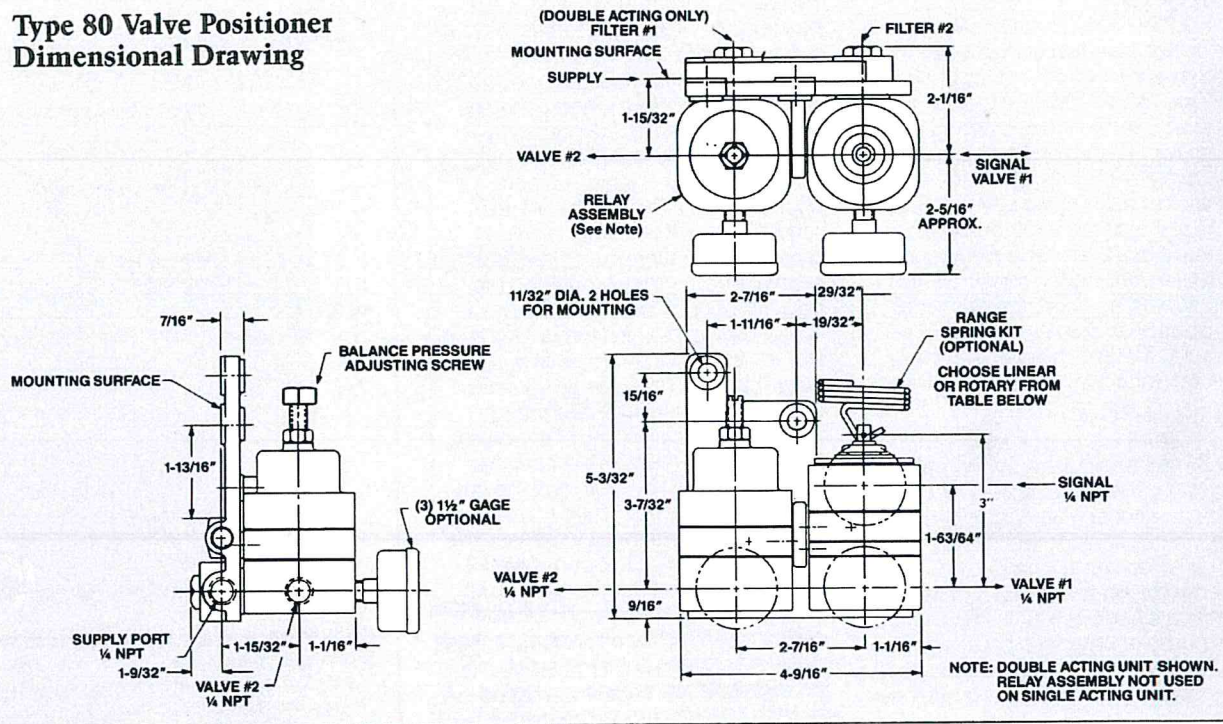


Figure 4. Rotary Range Spring Kit

Type 80 Valve Positioner Dimensional Drawing



Ordering Information:

Select Positioner and Range Spring Kit for your application from list below.

POSITIONER

DOUBLE ACTING	PART NO. WITH NITRILE DIAPHRAGMS	PART NO. WITH VITON DIAPHRAGMS
Without gages	960-400-000	960-405-000
With gages	960-401-000	960-404-000
SINGLE ACTING		
Without gages	960-450-000	960-457-000
With gages	960-451-000	960-458-000

RANGE SPRING KITS

FOR RECTILINEAR MOTION ACTUATORS (3-15 PSIG SIGNAL RANGE*)		
STROKE (Inches)	COLOR CODE	PART NO.
1/4 to 1 1/2	Black	823-000-400
1 1/2 to 2 3/4	White	823-000-401
2 3/4 to 4	Blue	823-000-402
4 to 6	Brown	823-000-403
6 to 9	Green	823-000-404
9 to 12	Red	823-000-405
12 to 18	Orange	823-000-407

*For 3-9 PSIG signal range select a Range Spring Kit that is capable of twice the desired stroke.

Bellofram Corporation
State Route 2, Box 305
Newell, WV 26050 U.S.A.
Tel: 304/387-1200
Fax: 304/387-1212

Bellofram Division
Desco International
Queens Drive Ind. Estate
Nottingham NG2 1LQ England
Tel: 602-861341
Fax: 602-860447

RANGE SPRING KITS

FOR ROTARY MOTION ACTUATORS (90° CW OR CCW ROTATION)			
SIGNAL RANGE PSIG	COLOR CODE	PART NO. WITH MTG. PLATE & COVER	PART NO. WITHOUT MTG. PLATE & COVER
3-15	White	971-040-000	823-000-406
3-9	Green	971-041-000	823-000-408
3-27	Black	971-063-000	823-000-416

6 PSIG SUPPRESSION
SPRING KIT

(To convert 3-9 PSIG signal —
ranges to 9-15 PSIG)

COLOR CODE
Orange

PART NO.
823-000-409

REPAIR KITS

	PART NO. WITH NITRILE DIAPHRAGMS	PART NO. WITH VITON DIAPHRAGMS
DOUBLE ACTING	971-044-000	971-070-000
SINGLE ACTING	971-045-000	971-069-000
REPLACEMENT FILTER (2 required on Double Acting units) P/N 677-000-004		

IMPORTANT NOTICE

Our recommendations, if any, for the use of this product are based on tests believed to be reliable. The greatest care is exercised in the selection of our raw materials and in our manufacturing operations. However, since the use of this product is beyond the control of the manufacturer, no guarantee or warranty, express or implied is made as to such use or effects incidental to such use, handling or possession or the results to be obtained, whether in accordance with the directions or claimed so to be. The manufacturer expressly disclaims responsibility therefor. Furthermore, nothing contained herein shall be construed as a recommendation to use any product in conflict with existing laws and/or patents covering any material or use.

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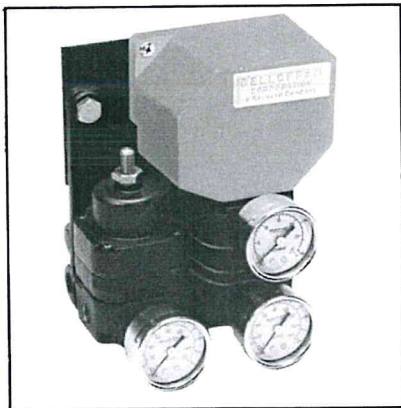
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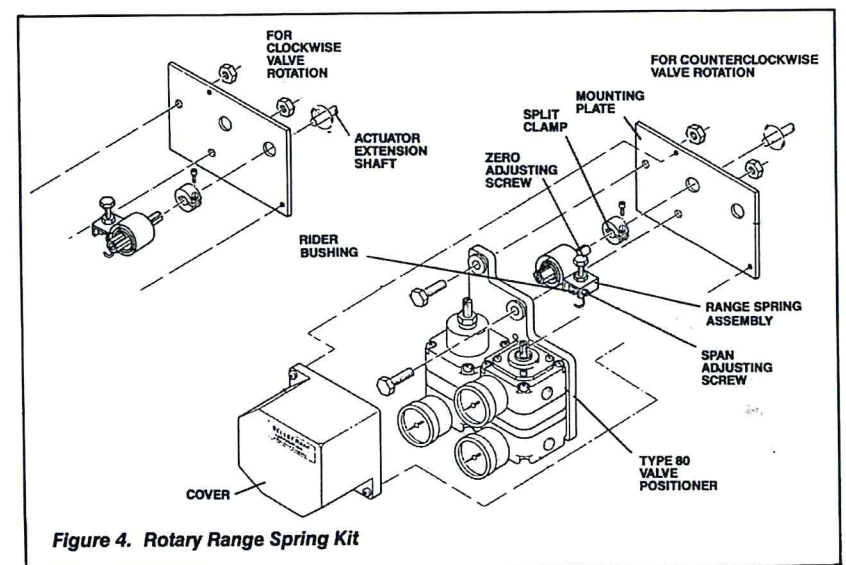
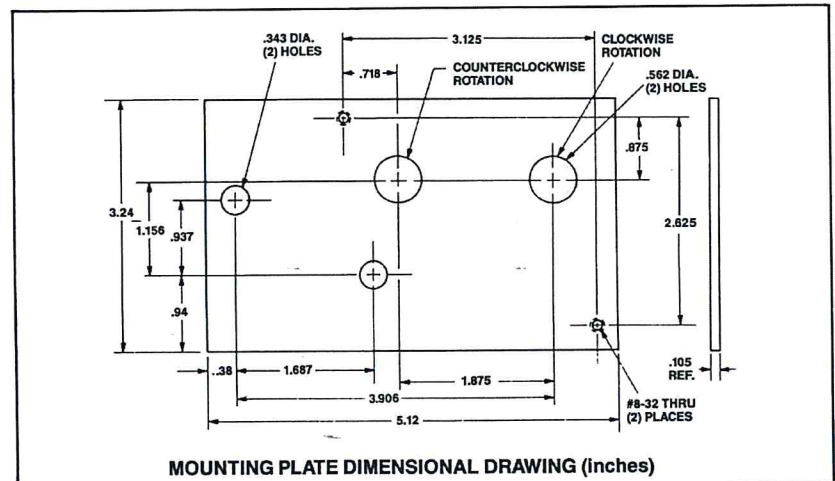


Figure 4. Rotary Range Spring Kit