

Severn Glocon Series "W" Diaphragm Spring Opposed Pneumatic Actuators



SEVERN GLOCON

Specification Bulletin SG 1000A

Series "W" Actuator - Features

Application

The Series "W" spring opposed pneumatically operated diaphragm actuator is designed to satisfy the majority of general control valve applications. It is particularly suited to areas where high fire risk is present. The Series "W" actuator has proven dependability even when operating in the most adverse climatic conditions and temperatures. Three basic actuator sizes are available and these are combined with different spring ranges and travels up to 3½ins (89mm) for the largest size actuator.

The spring air fail action of the actuator provides a very positive and reliable feature which is specified for many critical applications, and a pre-compression bench set is available across the range of fitted springs.

Design Features

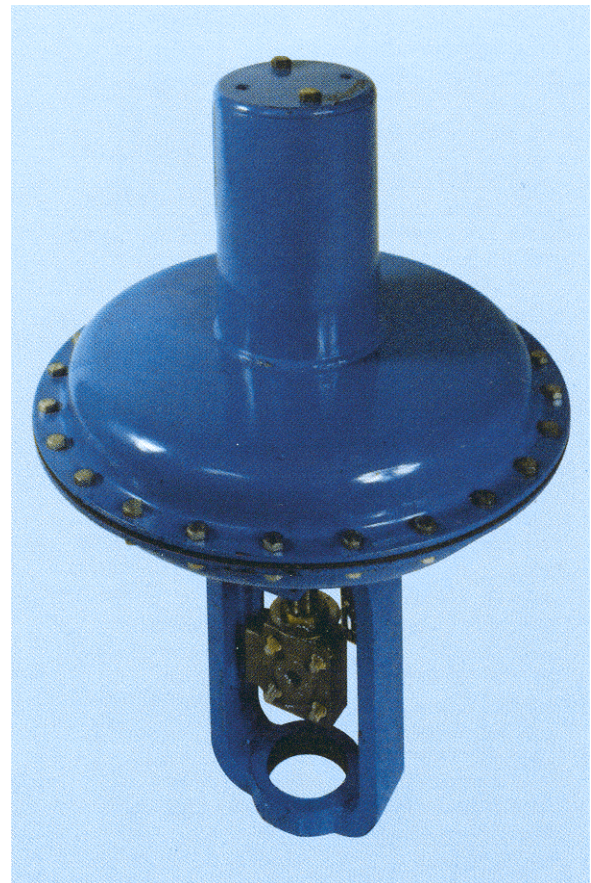
- High power.
- Fast response.
- Operates from low pressure air supply.
- Low stressed, positive spring fail action in either air fail open or air fail close operations.
- Field reversible operation.
- Simple pressed steel actuator construction with a minimum number of parts for low cost trouble free ownership.
- Fabricated assembly bolted to a cast yoke combines lightness with mechanical strength.

Benefits

- Fire resistant construction, with positive fail position.
- Adjustable pre-compression spring forces. High degree of reliability with low hysteresis.
- Simple low cost construction and maintenance.
- Epoxy paint system used as standard.

Quality Engineered

- Rigorously proven on-site performance.
- Produced by Quality Systems in accordance with BS EN ISO 9001: 1994.



Series "W" Pneumatic diaphragm / spring opposed actuator set for air fail close operation.

Engineering Data and Parts List

Actuator Sizes:

3 Sizes available 75, 150, 300in².

Pneumatic Supply Pressure & Connection Sizes:
 1/4in NPT Female. For other sizes consult factory.
 Minimum pneumatic supply pressure 5psig (0.35 bar) above calculated actuator requirement.
 Maximum pneumatic pressure for actuator sizes 75, 150in² is 60psig (4.1bar). For 300in² actuator maximum pneumatic pressure is 50psig (3.4bar).

Operating Supply Gases:

Standard Actuator : Air or Nitrogen.

Options: Methane (Natural Gas).

Filter regulator recommended for clean supply.

Ancillaries:

Pneumatic, I/P analogue and digital positioners, volume boosters, position lock-up valves, solenoid valves. For full listing consult factory.

Design Options:

Upper and lower limit stops.

Top mounted handwheel and jacking screw.

Geared side mounted handwheel.

Top mounted and geared manual operators.

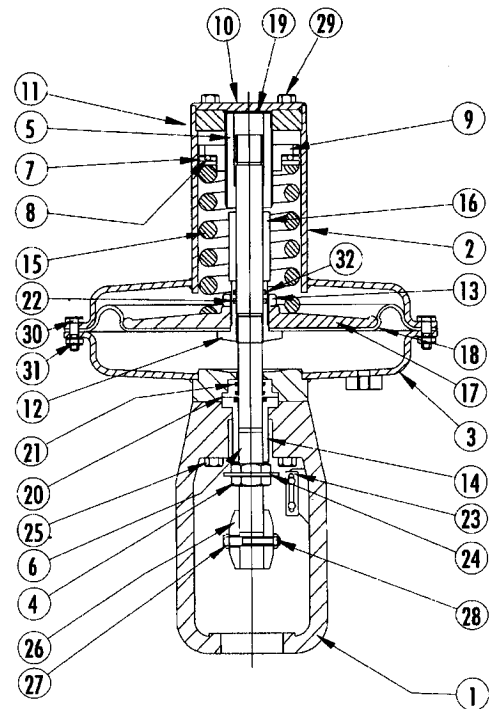


Figure 2. AIR FAIL CLOSE ACTUATOR

Table 1. Series W Actuator Parts Listing.

No	Component Part	Material
1	Yoke	Cast Steel or SG Iron
2	Spring Tube Assembly	Mild Steel
3	Diaphragm Case Assy.	Mild Steel
4	Travel Stop Nuts	Mild Steel
5	Spring Adjusting Screw	Mild Steel
6	Actuator Stem	Stainless Steel
7	Spring Carrier	Mild Steel
8	Spring Thrust Bearing	Steel
9	Spring Adjuster	Cast Iron
10	Cover Plate	Aluminium
11	Spring Cover Plate	Stainless Steel
12	Diaphragm Collar	Mild Steel
13	Collar Nut	Mild Steel
14	Stem Guide	13% Chr Stainless Steel
15	Spring	Chrome Vanadium Steel
16	Travel Stop Tube	Mild Steel
17	Diaphragm Button	Die Cast Aluminium
18	*Diaphragm	Laminate Nylon/Neoprene
19	*Cover Plate Joint	Rubber
20	Seal Box	13% Chr Stainless Steel
21	*Seal Box O rings	Neoprene
22	*Diaphragm Collar O ring	Neoprene
23	Travel Indicator Plate	Stainless Steel
24	Travel Indicator Pointer	Stainless Steel
25	Yoke Screws	Steel
26	Stem Coupling	Steel
27	Stem Coupling Screw	Steel
28	Stem Coupling Screw Nut	Steel
29	Cover Plate Screws	Steel
30	Diaphragm Case Screws	Steel
31	Diaphragm Case screw nut	Steel
32	Grub Screws	Steel

* Recommended Spares

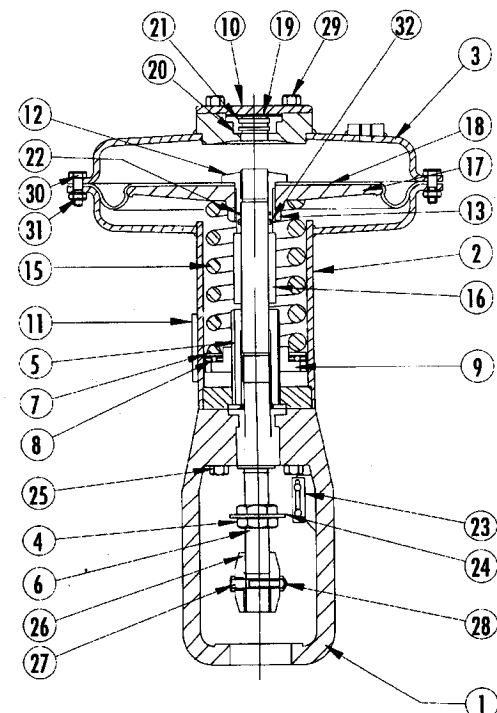


Figure 3. AIR FAIL OPEN ACTUATOR

Severn Glocon Series "P" Linear Spring Cylinder Actuators



SEVERN GLOCON

Specification Bulletin SGP 10

Series "P" Cylinder Actuator - Features

Application

The Severn Glocon Series P actuators were originally identified within the Severn range as the air cylinder actuators.

These high power actuating units, for use in on/off or modulating service, have a thrust capability which is much greater than similar size diaphragm-spring actuators due to air pressures up to 150 psig (10 bar) being used.

Designed for fitting onto a wide range of control valves, louvres or dampers these actuators are capable of being operated as either a single or double acting unit. A range of springs is available to provide positive air fail action, which is field reversible. Positioners are normally yoke mounted and of the double acting type, which by providing air to both sides of the piston, gives a very stiff and precise unit which is resistant to load fluctuations and transients.

Design Features

- High thrust capability.
- Capable of using air supplies up to 150 psig (10bar).
- Multi-size options with long stroke capability.
- Robust parts for trouble free, low cost, ownership.
- Positive spring air fail action, which is field reversible.
- Lightweight corrosion resistant construction.
- Rotary options available.

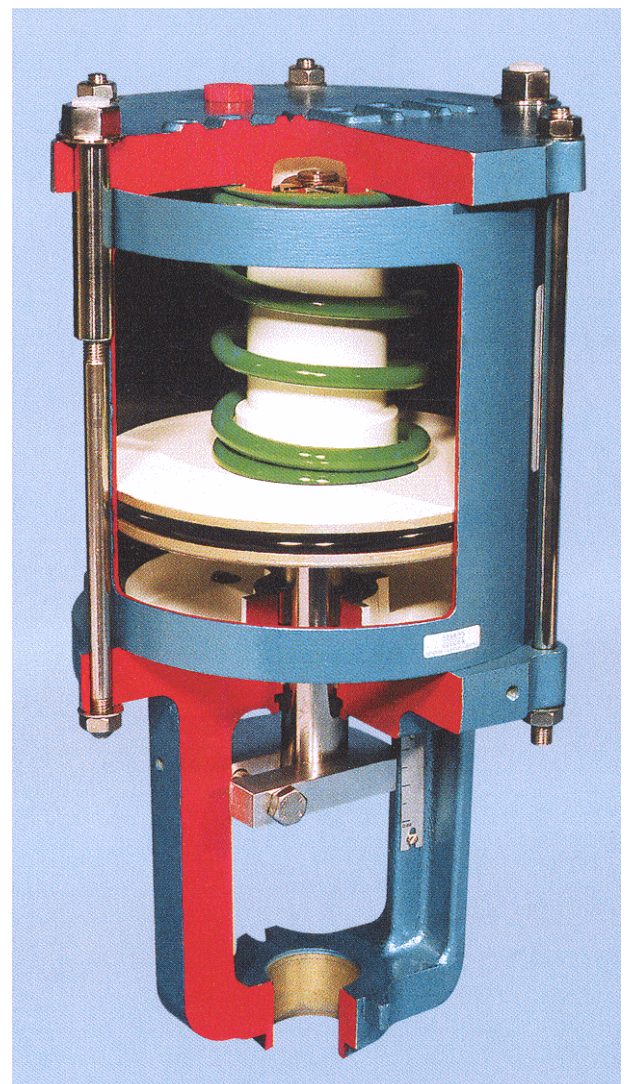
Benefits

- High degree of stem positioning accuracy.
- Cylinder design has lower air consumption than comparable diaphragm actuator.
- Highly stable providing inherent stiffness over full stroke.
- Very responsive with minimum latency on movement or positioning.
- High resolution of stem positioning for up to 5in strokes as standard with longer strokes available.
- Actuating forces adjustable to suit application.

Quality Engineered

- Rigorously proven on-site performance.
- Produced with Quality Systems certified to BS EN ISO 9001: 1994, Certificate No. FM01959.

At Severn Glocon "Specials" are "Standard"



**Figure 1. Severn Glocon Series "P"
Linear Spring Cylinder Actuator.**

Severn Glocon Series "P" Linear Spring Cylinder Actuators.

General

The Series "P" Linear Spring Cylinder Actuator range was developed to provide a source of cost effective, reliable and high thrust pneumatic actuators, capable of working in punishing environments.

These actuators, for use in on/off or modulating applications have the capability to work up to 150 psig (10 bar) pressure making very high thrusts attainable from a small and compact actuator unit.

An internally fitted spring provides for positive air fail action, and the actuator is fully field reversible without additional parts.

It is normal to fit a yoke mounted double acting positioner to the actuator, where the supply air is fed to both sides of the piston, as this provides a combined unit giving exceptionally stiff, precise movement together with very high frequency response.

These features provide stiffer resistance to flow transients with greater control and positional stability for the difficult applications where line pressure fluctuations cause problems.

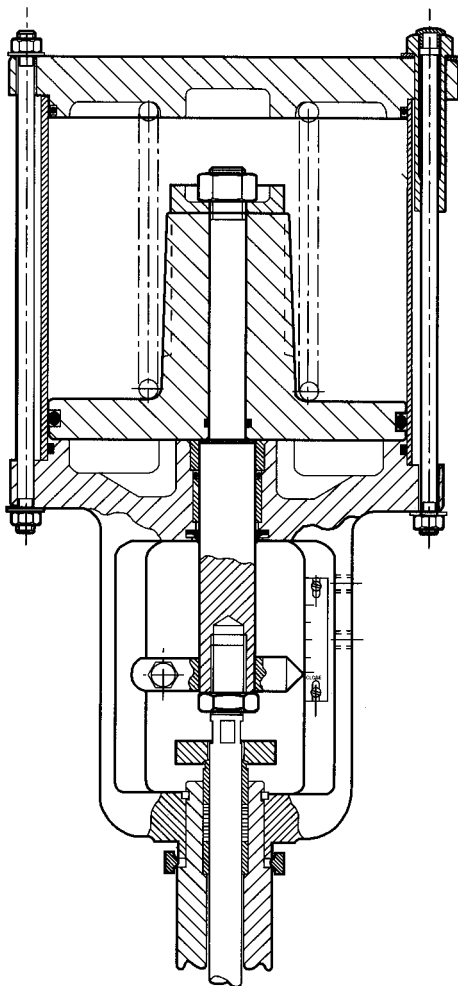


Figure 2. Linear Spring Cylinder Actuator

Ambient Operating Temperature:

Minus 20°C to plus 80°C.

Special materials minus 55°C to plus 100°C, consult factory.

Actuator Sizes:

Four standard sizes available: 25, 50, 100, 200sq in (nominal piston area). Oversized actuators available up to 600sq in, consult factory.

Actuator Strokes:

Standard range up to 5ins. See table 2. For longer strokes available consult factory.

Ancillaries:

Ancillaries available for fitting in conjunction with Series P Actuators includes volume boosters, position lock-up valves, solenoid valves etc. For full list consult factory.

Handwheels:

A range of geared handwheels for top or underside cylinder mounting is available.

Positioner Input Signals:

Using yoke mounted external positioners, normally double acting type, 3-15 psig (0.2-1.0 bar), 6-30 psig (0.4-2.0 bar), 4-20 mA. Also split ranges of the above signals. Digital "Smart" positioners available.

Pneumatic Supply Pressure:

Minimum 5psig (0.33 bar) above calculated actuator requirement. Maximum to actuator is 150 psig (10 bar)

Operating Supply Gases:

Air, Nitrogen, Oxygen. Options: Methane (Natural gas) Filter regulator recommended to ensure clean supply.

Air Fail Action:

Positive air fail action from internally mounted springs. Action is field reversible without additional parts.

Actuator Mean Thrust Capability:

Supply Pressure 150 psig (10bar).

Actuator Size	Thrust Available	
	lbF	kN
25	3,000	13.2
50	6,300	28.2
100	12,700	56.0
200	25,300	111.5

Hysteresis and Linearity:

Within +/- 1%.

Speed and Sensitivity:

Signal change of 0.01 psig (0.013mA) reverses

Severn Glocon Series "N" Numotor Pneumatically Operated Piston Actuators

Series "N" Numotor Actuator - Features

Application

The Severn Glocon Series N actuators were originally identified within the Glocon Numotor and the Severn Air-motor piston actuator ranges. These high power actuating units, fitted with integral positioners, are capable of providing much larger thrusts than similar size diaphragm-spring actuators due to the higher air pressures used.

Designed for fitting onto a wide range control valves, louvres or dampers these actuators are capable of being operated as either a single or double acting unit. In single acting mode the Series N actuator can be set to provide a pneumatic spring function to give a closing fail safe position in the event of air failure without the need for external air reservoirs.

Design Features

- Standard design with integral positioner.
- Capable of using air supplies up to 100psi (7bar).
- Multi-size options with long stroke capability.
- Robust parts for trouble free, low cost, ownership.
- Single acting option with built-in air spring.
- Lightweight corrosion resistant construction.
- Rotary option available.

Benefits

- Totally enclosed - no external feedback cams or levers.
- High degree of stem positioning accuracy.
- Compact with maximum power capability at any part of stem stroke.
- Highly stable providing inherent stiffness over full stroke.
- Very responsive with minimum latency on movement or positioning.
- High resolution of stem positioning for up to 7in strokes.
- Actuating forces adjustable to suit application.
- Low air consumption.

Quality Engineered

- Rigorously proven on-site performance.
- Produced with Quality Systems certified to BS EN ISO 9001: 1994, Certificate No. FM01959.

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Specification Bulletin SGN 10

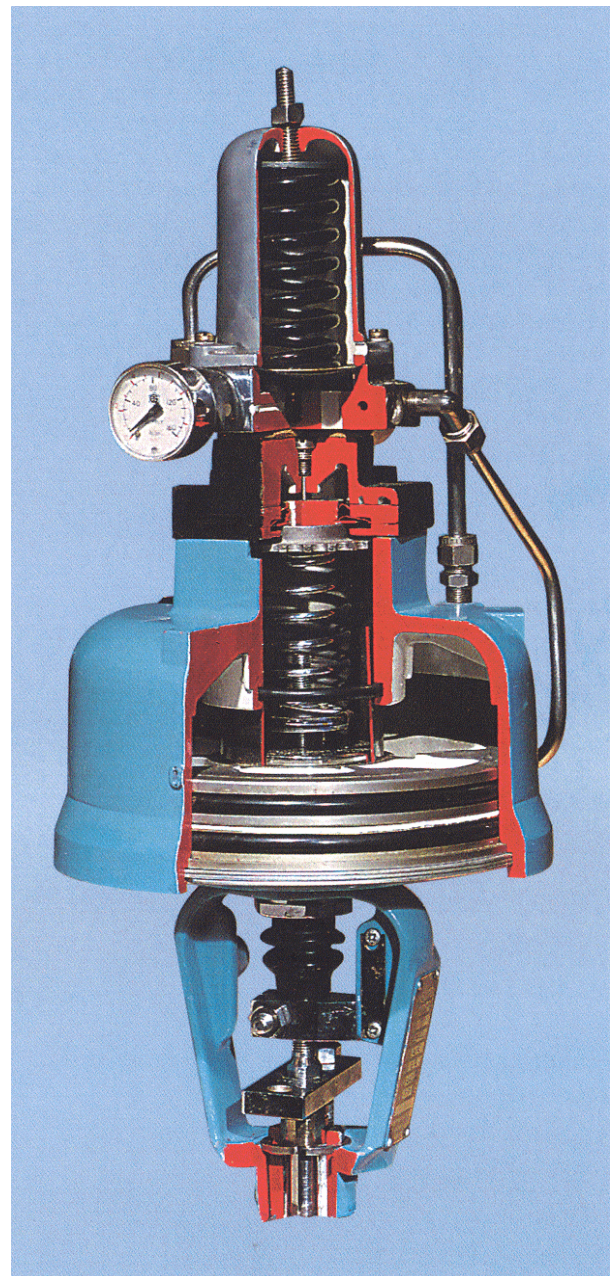


Figure 1. Severn Glocon Series "N"
Numotor Pneumatic Piston Actuator

Engineering Data - Severn Glocon Series "N" Numotor Actuators.

General

The Series "N" Numotor range was developed to provide a source of cost effective, reliable and high power actuators, capable of working in punishing environments. These totally enclosed actuators, with integral positioners and linkages, have adjustable output thrusts dependent upon the plant air supply available. Both double and single acting variants of the design are available. With the Series N single acting unit the setting of the of the set /loading pressure, in the upper chamber of the piston, produces a pneumatic spring capable of generating forces in excess of half the supply pressure available. An optional mechanical spring can be fitted within the piston chamber to produce an air fail action in either open or closed direction. Inherently more powerful than similar size diaphragm actuators, due to the higher pneumatic pressures used, the Series N Numotor can provide a much stiffer resistance to flow transients with greater control and positional stability for the difficult applications where line pressure fluctuations cause problems.

Input Signals:

3-15 psig (0.2-1.0 bar), 6-30 psig (0.4-2.0 bar)
4-20 mA.

Also split ranges of the above signals

Output Signal:

0 - 100% of pneumatic supply pressure.

Pneumatic Supply Pressure:

Minimum 5psig (0.33 bar) above calculated actuator requirement. Maximum to actuator is 100 psig (7 bar).

Operating Supply Gases:

Air, Nitrogen, Oxygen. Options: Methane (Natural gas)
Filter regulator recommended to ensure clean supply.

Steady State Air Consumption:

0.5 - 0.6 scfm (0.96 m3/hr). Low air consumption unit available.

Actuator Action Mode:

Direct or Reverse

Internal Adjustments:

Zero and span.

Hysterisis:

Better than 1%.

Linearity:

Within 1% of stroke.

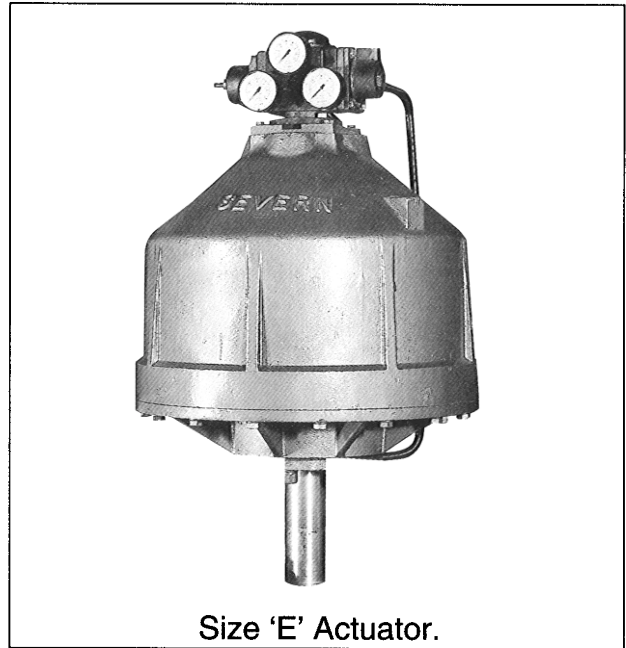
Repeatability:

Less than 0.5% of stroke.

Response:

Less than 0.05 psi signal change.

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Size 'E' Actuator.

Ambient Operating Temperature:

Minus 20°C to plus 80°C.

Special materials minus 55°C to plus 100°C, consult factory.

Actuator Sizes:

7 sizes available designated AA, A, B, C, D, E, F.
Corresponding sizes are 12, 25, 50, 100, 200, 400, 600sq in.

Connection Sizes:

1/4in NPT Female. For others consult factory.

Ancillaries:

Ancillaries available for fitting in conjunction with Series N actuators includes volume boosters, position lock-up valves, volume tanks, solenoid valves etc. For full list consult factory.

Actuator Mean Thrust Capability:(Both Directions) Single Acting Operation.

Supply Pressure 100psi with 50psi upper piston pressure.

Actuator Size	Thrust Available	
	lbF	kN
AA	750	3.3
A	1,500	6.6
B	2,500	11
C	5,000	22
D	10,000	44
E	20,000	88
F	30,000	132

Double Acting Operation. -Supply pressure 100psi. (Check Yoke Loading) (Consult Factory)

Actuator Size	Thrust Available	
	lbF	kN
AA	1,400	6.1
A	2,800	12.3
B	4,800	21
C	9,700	43
D	18,900	83
E	38,500	170
F	58,000	256

Series "N" Numotor Actuators - Principles of Operation

Series N Numotor Actuators may be operated, via the Standard Integral Positioner, either as single or double acting units. With the smaller sizes of actuator (up to size D) it is normal to operate in the single acting mode. Whilst this restricts the thrust output in both directions, it does benefit from providing an inherent instrument signal fail position by using the upper piston loading pressure to generate an air fail close thrust. Clearly this air fail action is built-in to the single acting actuator, without the need for auxiliary stand-by tanks, thereby often providing a satisfactory and cost effective solution for fitting to smaller valve sizes. The Standard Integral Positioner is available either as a direct acting unit where increasing signal opens the valve (retracts the actuator piston rod) or as a reverse acting unit where increasing signal closes the valve (extends the actuator piston rod).

Single Acting Positioners.

Actuator Positioning - Single Acting Operation - Direct Positioner Mode.

Supply air, normally fed via a filter /regulator at between 20 & 100 psi (1.4 - 7 bar) depending upon the actuator thrust required, passes through a combined reducing relief valve which maintains a constant pressure above the piston. (figure 2). This loading pressure, which is normally adjusted to a value equal to half the supply pressure, replaces the spring in a diaphragm actuator. Its advantage over a spring is that it provides constant force irrespective of piston position. The amount of air at supply pressure underneath the piston is regulated by a three-way pilot valve which is maintained against a double diaphragm unit by a light bias spring.

The instrument signal is admitted to the double diaphragm (Direct Acting Positioner) (see figure 3), and the increased pressure causes a downward movement of the double diaphragm against the rate spring. This, in turn, effects a downward movement of the three-way which now admits actuating air to the underside of the piston. (see figure 2). Increasing pressure in the actuating chamber causes the piston to rise until the rate spring has been sufficiently compressed to balance the force exerted by the double diaphragm assembly. Conversely reduction of the instrument signal pressure initiates an upward movement of the double diaphragm under the influence of the rate spring. The three-way valve then shuts off the air to the actuating chamber and vents the air present, allowing the piston to fall.

Actuator Positioning - Single Acting Operation - Reverse Positioner Mode.

With the reverse acting positioner fitted increasing signal air extends the piston rod. This is achieved by increasing signal pressure causing an upward movement of the double diaphragm assembly fitted to the Reverse Acting Positioner (see figure 4) assisted by the rate spring against the bias spring. This upward movement (see Figure 2) operates the three-way pilot valve so that the air supply to the actuating chamber is cut off and the actuating air is vented to atmosphere. The constant loading pressure is maintained above the piston, which causes it to move downwards until the upward force created via the diaphragm assembly and rate spring, balances the downward force of the bias spring. The three-way valve now takes up a neutral position in readiness for the next instrument air signal change. Clearly, a reversal of the foregoing operation occurs with reducing signal air pressure.

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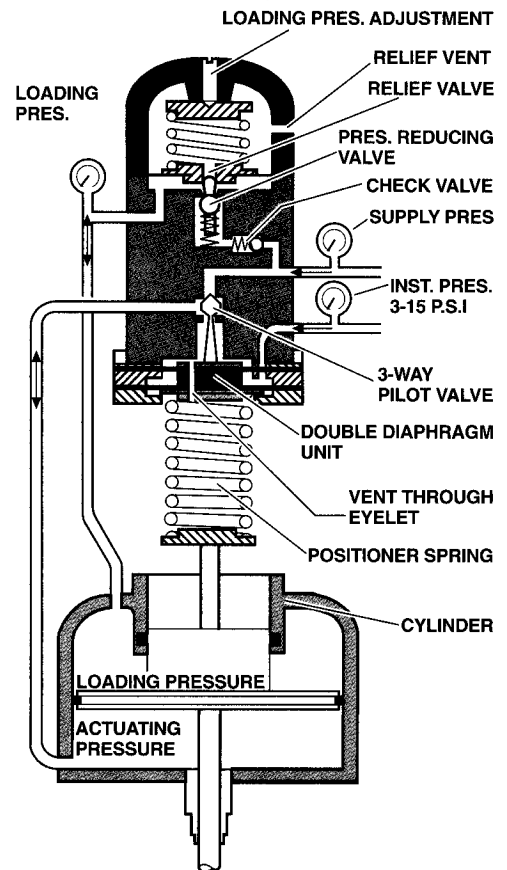


Fig 2. Numotor with Single Acting Positioner

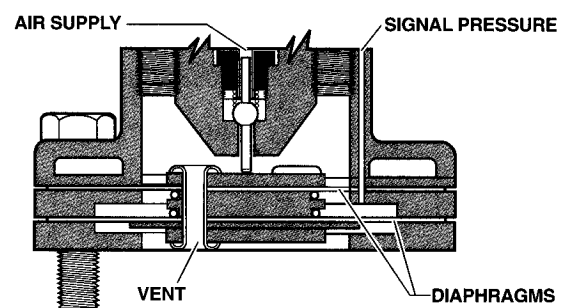


Fig 3. Diaphragm Unit-Direct Acting Positioner

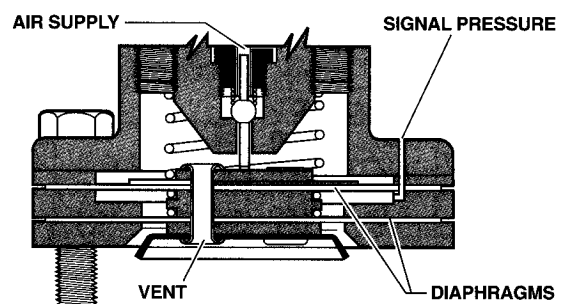


Fig 4. Diaphragm Unit-Reverse Acting Positioner

Air fail Actions - Single Acting Operation

Air fail Actions - Single Acting Operation

Air Fail - Direct Positioner Fitted. Piston rod extends as air decays

Air Fail - Reverse Positioner Fitted. Piston rod retracts as air decays

Note: Helper springs are available from Severn Glocon to help initiate the air fail action, also the flow direction within the valve may be used to assist air fail movement.

Double Acting Positioners

The double acting positioner is completely interchangeable with the single acting unit. Whereas the single acting positioner balances the actuator piston against a constant loading pressure, this unit varies the pressure on both sides of the piston. (see figure 5). It is therefore possible to achieve almost twice the force output from a given size of Series N Numotor Actuator.

Actuator Positioning - Double Acting Operation - Direct Positioner Mode.

In common with the single acting unit increasing signal air pressure retracts the actuator piston rod. In operation the signal air is admitted to the double diaphragm chamber of the Direct Acting Positioner, (see figure 6), where increasing pressure results in a downward movement against the feedback spring. This in turn transfers to a downward movement of the three-way pilot valve which admits actuating air to the underside of the piston. (see figure 5). The positioner controls the position of the actuator output via the feedback spring. Any change in the force balance condition, determined at set-up between the feedback spring and instrument signal double diaphragm output force, will be sensed by the 3-way pilot valve. (see figure 5). This output is fed to one side of the actuator and also into a 1:1 ratio reversing relay, whose output then feeds the opposite side of the actuator piston. This produces a "push-pull" effect giving an actuator with high inherent stability.

Actuator Positioning - Double Acting Operation - Reverse Positioner Mode

With the reverse acting positioner fitted increasing signal air extends the piston rod. A double diaphragm unit which now works in sympathy with the rate spring against the bias spring is used, (see figure 7). An increase of instrument signal pressure raises the pilot valves, and allows air to escape from the lower side of the piston while admitting full supply pressure to the reversing relay. The piston will move downwards until the rate spring and diaphragm unit again balance the bias spring. Conversely, a reduction in signal air will cause the piston to retract.

Air fail Actions - Single Acting Operation

No air failure mechanism is built into this type of positioner.

Note: Helper springs are available from Severn Glocon to help initiate the air fail action, also the flow direction within the valve may be used to assist air fail movement. On larger size actuators D, E, F it is usual to employ an auxiliary air circuit which includes an air reservoir to ensure satisfactory operation.

At Severn Glocon "Specials" are "Standard"

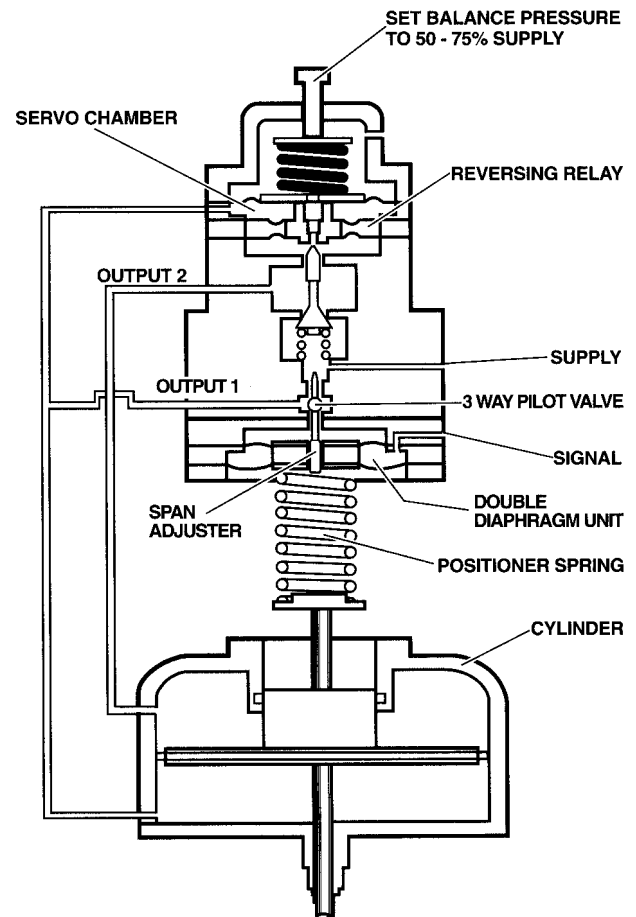


Fig 5. Numotor with Double Acting Positioner

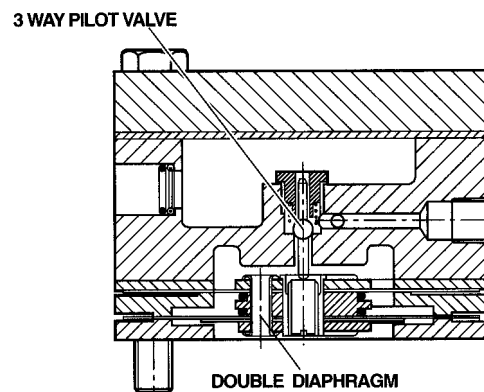


Fig 6. Diaphragm Unit-Direct Acting Positioner

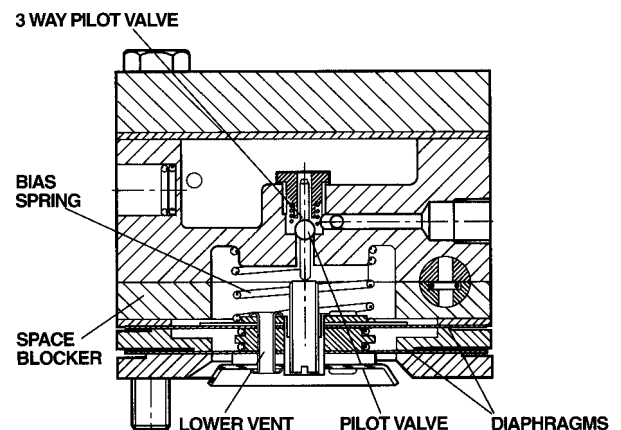


Fig 7. Diaphragm Unit-Reverse Acting Positioner