

# CONOFLOW POSITIONERS GP50 Series

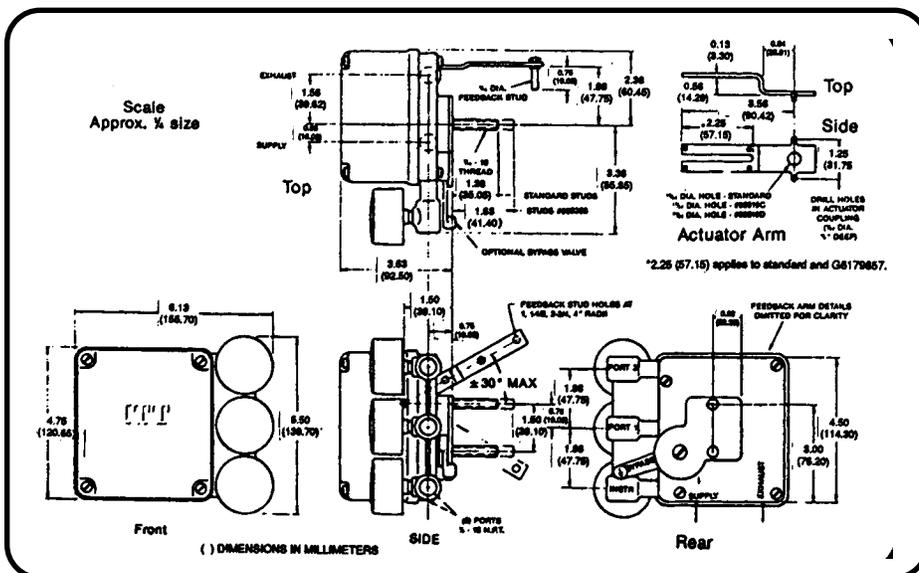


The GP50 Series Positioners are used to control the position of pneumatic actuators in precise relation to pneumatic signals. The compact, side mounted configuration allows the unit to be used in applications where space is limited. The GP50 Positioner can be used with actuator strokes from 3/4" to 4". Standard instrument signals are 3-7, 7-11, 3-15 and 6-30 PSI (21-48, 48-76, 21-103 and 41-207 kPa) with split ranging available.

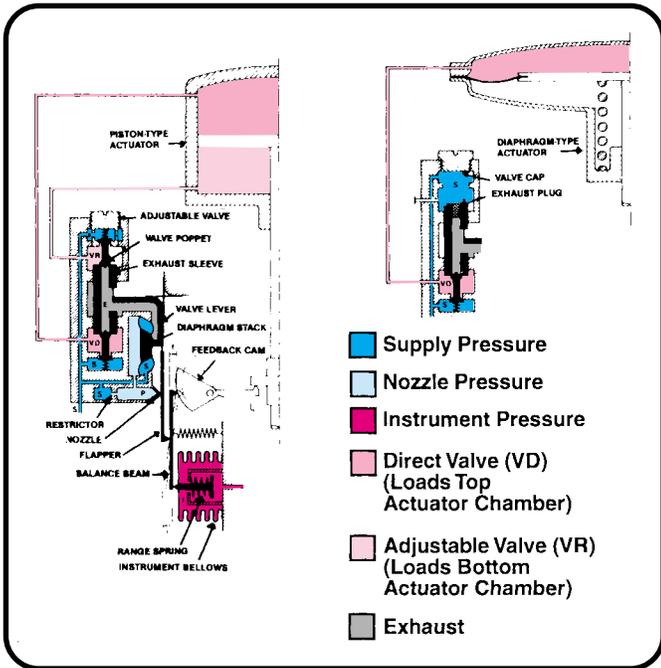
## SPECIFICATIONS

**Actuator Stroke:** 3/4" to 4" (Other strokes available, consult the factory)  
**Supply Pressure:** 20 PSI to 100 PSI (138 to 690 kPa)  
**Pressure Connections:** 1/4" NPT  
**Pressure Rating Bellows:** 35 PSI (241 kPa)  
**Linearity:** ± 1%  
**Proportional Gain:** 200:1  
**Flow Capacity:** 6.6 SCFM (0.187 m<sup>3</sup>/min) at 35 PSI (241 kPa) supply  
**Exhaust Capacity:** 9.0 SCFM (0.255 m<sup>3</sup>/min) at 35 PSI (241 kPa) supply  
**At Balance Air Consumption:**  
 0.26 SCFM (0.007 m<sup>3</sup>/min) Double Action  
 0.14 SCFM (0.004 m<sup>3</sup>/min) Single Action  
**Ambient Temperature Range:** -20°F to +150°F (-29°C to +66°C)  
**Pressure Gauges:** 0-30, 0-60 and 0-160 PSI (0-207, 0-414 and 0-1103 kPa) USA and Metric Markings  
**Stroking Speed:** 2.8 in./sec. Double Action  
 1.2 in./sec. Single Action  
**Weight:** Approximate Shipping Weight: 4.5 lbs. (2.04 Kg)

- **Technical Features.** **Booster Valving/** for fast response, extra-precise control. **Motion Balance/** for easy adjustment, total enclosure. **Characterization/** for modification of valve characteristic.
- **Performance Features.** **Fast Dynamic Response** via high pressure valves and large ports. **Precision Positioning/** via high gain circuit and rigid components. **Exceptional Stability/** high natural frequency design resists shock. **Reliability/** controlling parts sealed from environment.
- **Construction Features.** **Compact/** simplifies application in restricted space. **Simple Adjustment/** set range with screwdriver. **Easy Troubleshooting/** most moving parts visible while operating. **Maintenance ease/** control module can be replaced without disconnecting piping or feedback arm. Common manifold for by-pass or no by-pass service.
- **Variations and Options.** **Double or Single Action, Direct and Reverse/** changeable and reversible in the field. **Bypass/** factory option to by-pass control module or field alteration.



For Certified Dimensional Data, Refer to Drawing A21-12.



## PRINCIPLE OF OPERATION

### Double Acting Operation

Supply pressure (S) is directed to both booster valves (VD, VR) and bleeds constantly through the Restrictor and Nozzle. Nozzle pressure (P) increases as the Flapper moves toward the Nozzle.

An increase in instrument pressure (I) produces motion (i) at one end of the Balance Beam, which moves the Flapper toward the Nozzle.

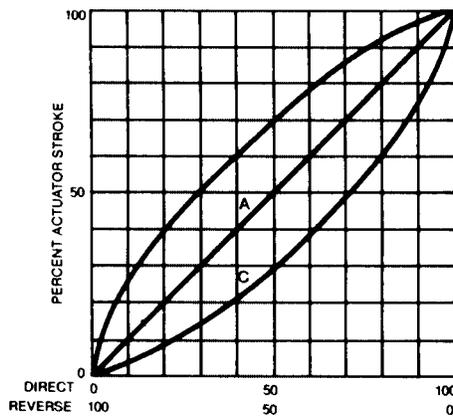
The resulting increase in nozzle pressure (P) overcomes supply pressure (S) in the diaphragm stack, causing its piston to move outward. This motion shifts the Exhaust Sleeve, opening Direct Valve (VD) to supply pressure (S) and Adjustable Valve (VR) to exhaust chamber (E).

The resulting motion of the actuator stem rotates the Feedback Cam which moves the Balance Beam by motion (f) in a direction opposite to motion (i) produced by the instrument signal.

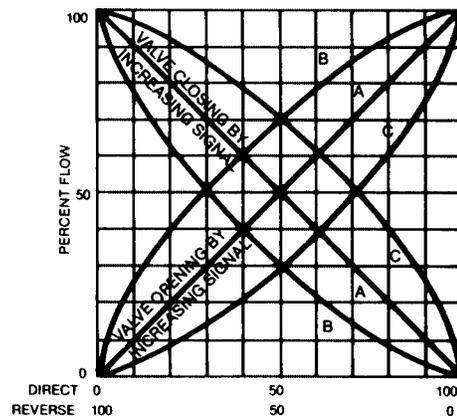
When feedback motion (f) returns the Flapper to its original position, the control system returns to equilibrium, holding the actuator stem in its new position.

### Single Acting Operation

This is identical to double acting, except that one valve is deactivated by removing its poppet, and plugging its internal exhaust port and external output port.



PERCENT SIGNAL PRESSURE SPAN  
Fig. 1  
Actuator Motion



PERCENT SIGNAL PRESSURE SPAN  
Fig. 2  
Flow Characteristics with Linear Valve Plug

## CAM SELECTION

### General

Three cams are provided with each positioner for the purpose of achieving different flow vs. signal characteristics with a given valve. Such variations are sometimes required to correct instability of oversized valves or to make the characteristic of the valve conform to that of the process or controller.

### Effects on Actuator Motion

Cam "A" produces linear actuator motion; that is, the same amount of motion for a given change in signal at any point in the range.

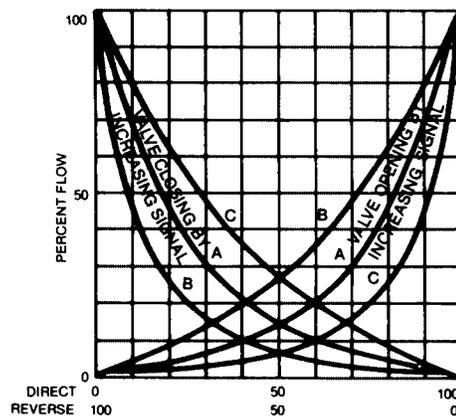
Cam "B" produces faster motion than Cam "A" at the low end of the signal range and slower motion at the high end of the signal range.

Cam "C" is the opposite of Cam "B," producing the same nonlinear motion but in opposite relationship to the signal range. Figure 1 illustrates the motion vs. signal characteristics produced by these cams.

### Effects on Flow Characteristics

Figure 2 illustrates the effects which these actuator motions have on the flow vs. signal characteristics with a linear valve plug.

Figure 3 illustrates the effects which these motions have on the flow characteristic when the valve has an equal-percentage plug.



PERCENT SIGNAL PRESSURE SPAN  
Fig. 3  
Flow Characteristics with Equal Percentage

## CONTROL ENGINEERING DATA

Control Engineering Data is intended to provide a single source from which one can determine, in detail, the full scope of the product line and communicate, by means of a code number, which is fully descriptive of the product selection.

1-4 Models	GP50 = Single acting - direct GP51 = Single acting - reverse GP52 = Double acting
5 Range Springs	A = 3-15 PSIG or 3-9, 9-15 PSIG (21-103 kPa or 21-62, 62-103 kPa) [Split range 3-15 (21-103 kPa)]* B = 6-30 PSIG or 6-18, 18-30 PSIG (41 kPa or 41-124, 124-207 kPa) [Split range 6-30 PSIG (41-207 kPa)]* Also 14-22, 22-30 PSIG (97-152, 152-207 kPa) C = 3-7, 7-11 PSIG (21-148, 48-76 kPa)* *A, B and C indicate range spring variations. Positioner may be calibrated for all ranges shown within each variation.
6 Gauges and High Temperature Options	0 = None 1 = Standard 2 = Test (A test gauge assembly is available for use where constant gauge readings are not necessary. Order part G6113401.) 2040 = Standard GP50/GP51 with Viton on Nomex elastomers for high temperature applications. 2040G = Same as 2040, except with 0-100 PSI (0-690 kPa) Supply and Output Gauges.  NOTES: 1. Options 2040 and 2040G are available in the GP50/GP51 series only. 2. If options 2040 and 2040G are specified the model number will be complete; i.e., GP50A2040.
7 Manifolds	0 = No Bypass 1 = Bypass (Single acting - direct only)
8 Variations	0 = Standard Cam "A" produces linear actuator motion; that is, the same amount of motion for a given change in signal at any point in the range. Unless otherwise specified by order, the positioner will be shipped with Cam "A" in place; Cams "B" and "C" will be shipped loose. 1 = Special (specify) 2 = Cam "B" produces faster motion than Cam "A" at the low end of the signal range and slower motion at the high end of the signal range. 3 = Cam "C" is the opposite of Cam "B," producing the same nonlinear motion but in opposite relationship to the signal range.

### Standard Gauge Ranges

	3-15 PSI (21-103 kPa) Instrument Signal Range	Supply	Output
<b>GP50 - GP51 Single Acting</b>	0-30 PSIG (0-207 kPa) G6188536	0-60 PSIG (0-414 kPa) G6124101	0-60 PSIG (0-414 kPa) G6124135
<b>GP52 Double Acting</b>	0-30 PSIG (0-207 kPa) G6188536	---	0-160 PSIG (0-1103 kPa) G6124143
	6-30 PSI (41-207 kPa) Instrument Signal Range	Supply	Output
<b>GP50 - GP51 Single Acting</b>	0-60 PSIG (0-414 kPa) G6124101	0-60 PSIG (0-414 kPa) G6124101	0-60 PSIG (0-414 kPa) G6124135
<b>GP52 Double Acting</b>	0-60 PSIG (0-414 kPa) G6124101	---	0-160 PSIG (0-1103 kPa) G6124143
<b>**Gauges for options</b>			
<b>2040</b> .....	G6385121	G6385122	G6385122
<b>2040G</b> .....	G6385121	---	G6385120