



**Flow Line Controls  
Installation & Operation Manual  
Series 56 4-20 mA Electro-Pneumatic**



**Flow Line Controls, Inc.**

P.O. Box 677 · Schriever, LA 70395 · Phone: 985-414-6003 · Toll Free 1-800-815-9226 · Fax 985-414-6072


[www.flowlinecontrols.com](http://www.flowlinecontrols.com)

## Description

Flow Line Controls Series 56 positioners are rugged control devices which stands up to harsh environments and it is engineered to meet the highest and most demanding control performance that the process industries of today require.

- Easy maintenance
- Precise calibration with simple PAN and ZERO adjustments
- Simple conversion to direct acting or reverse acting
- ½ split range available
- Rugged aluminum housing with corrosion-resistant coating
- Vibration resistant design for consistent performance in poor conditions, no resonance effect from 5 – 200 Hz
- Stainless steel gauges
- Restricted pilot valve orifice kit included to prevent hunting with small actuators
- Universal adjustable Namur bracket
- Optional built-in two SPDT mechanical limit switches and 4-20 mA position transmitter for position feedback
- Certified for ATEX Eex md IIB T5 (05 ATEX1076X) by NEMKO in conformance with EN50014:1997, EN50018:2000 and EN50028:1987
- Certified for EMC (K1046/E04) in conformance with EN61000-6-2:2001 and EN61000-6-4:2001 by RWTUV
- Certified for Ex md IIB T6 (99-1075-Q1), and Ex ia IIB T6 (2000-1056-Q1) by KOSHA

## Specifications

Input Signal	4~20mA @ 24V DC (Note. 1)	
Input Resistance	235 ± 15 Ω	
Air Supply	Max. 7.0bar (100psi) free of oil, water, and moisture	
Standard Stroke	10~80mm (Note. 2)	60~100 ° (Note. 2)
Pneumatic Connections	Rc 1/4 or NPT 1/4	
Electrical Connections	Rc 1/2 or NPT 1/2	
Protection Class	Ex md IIB T6, Ex md IIC(H2) T6, IP66, Ex ia IIB T6 Eex md IIB T5 for ATEX 	
Ambient Temperature	-20~70 °C	
Pressure Gauge	Stainless Steel	
Output Characteristics	Linear	
Linearity	Within ± 1.0 % F.S	Within ± 1.5 % F.S
Sensitivity	Within ± 0.2 % F.S	Within ± 0.5 % F.S
Hysteresis	Within ± 0.5 % F.S	Within ± 1.0 % F.S
Repeatability	Within ± 0.5 % F.S	
Air Consumption	5 LPM (Sup. 1.4kgf/cm <sup>2</sup> )	
Flow Capacity	80 LPM (Sup. 1.4kgf/cm <sup>2</sup> )	
Material	Aluminum Diecast Body	
Weight	2.9 kg (with a terminal box)	

Note: 1) 1/2 split range can be adjusted  
 2) Feedback lever for stroke 80~150mm is available  
 3) Stroke can be adjusted to 0~60° or 0~100°

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## Principle of Operation

The input of a 4-20 mA DC signal flows through an electric magnetic coil located in the magnetic field of a large permanent magnet.

The current variation of the 4-20 mA DC signal varies the flux of the permanent magnet thus creating movement of the flapper in relation to the nozzle without any microchip circuitry.

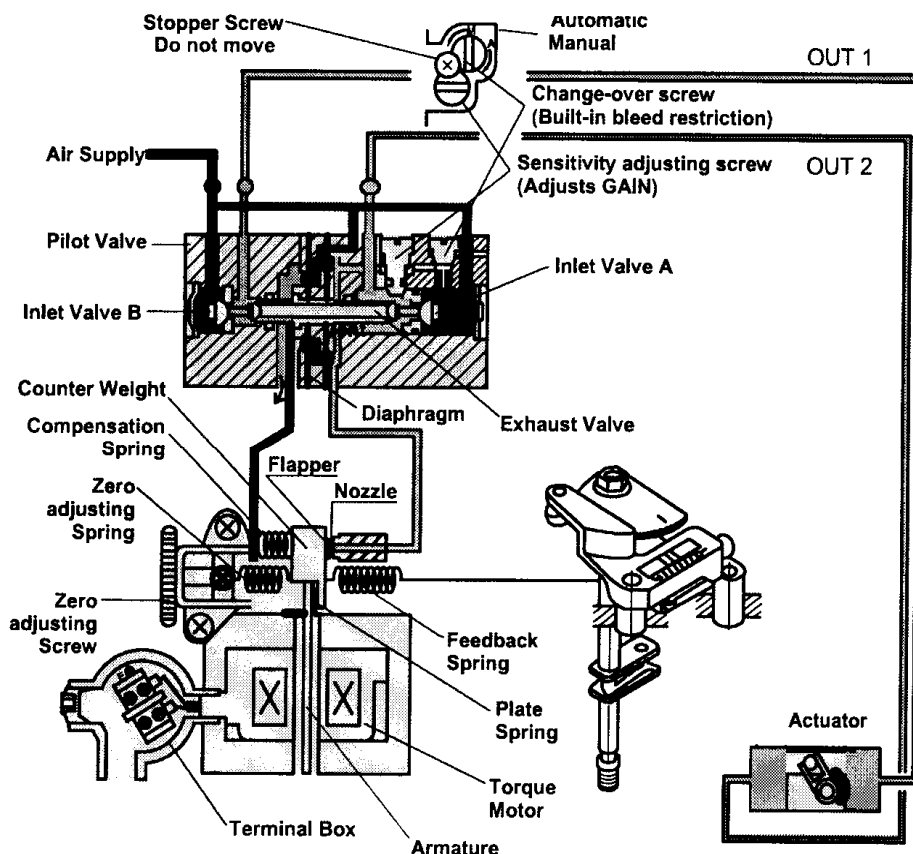
The movement of the flapper (which is held in place by the plate spring acting as a pivot) then increases the distance in-between the flapper and the nozzle. The resulting changes in back pressure in the nozzle assembly causes the globe valves in the pilot valve assembly to shift position simultaneously.

The result being line 1 Output to the actuator has an increase in air pressure filling the actuator cylinder, and line 2 Output has a decrease in air pressure draining air from the opposite side of the actuator cylinder causing the actuator to shift position.

The resulting movement of the actuator shaft creates feedback for the shaft /cam spring assembly.

The actuator stays in the position where the resulting force created by the change in the magnetic field of the permanent magnet is balanced by the feedback spring.

To further enhance the stability of the loop, the compensation spring, which is connected to the flapper counterweight, receives direct feedback on the motion of the exhaust valve.



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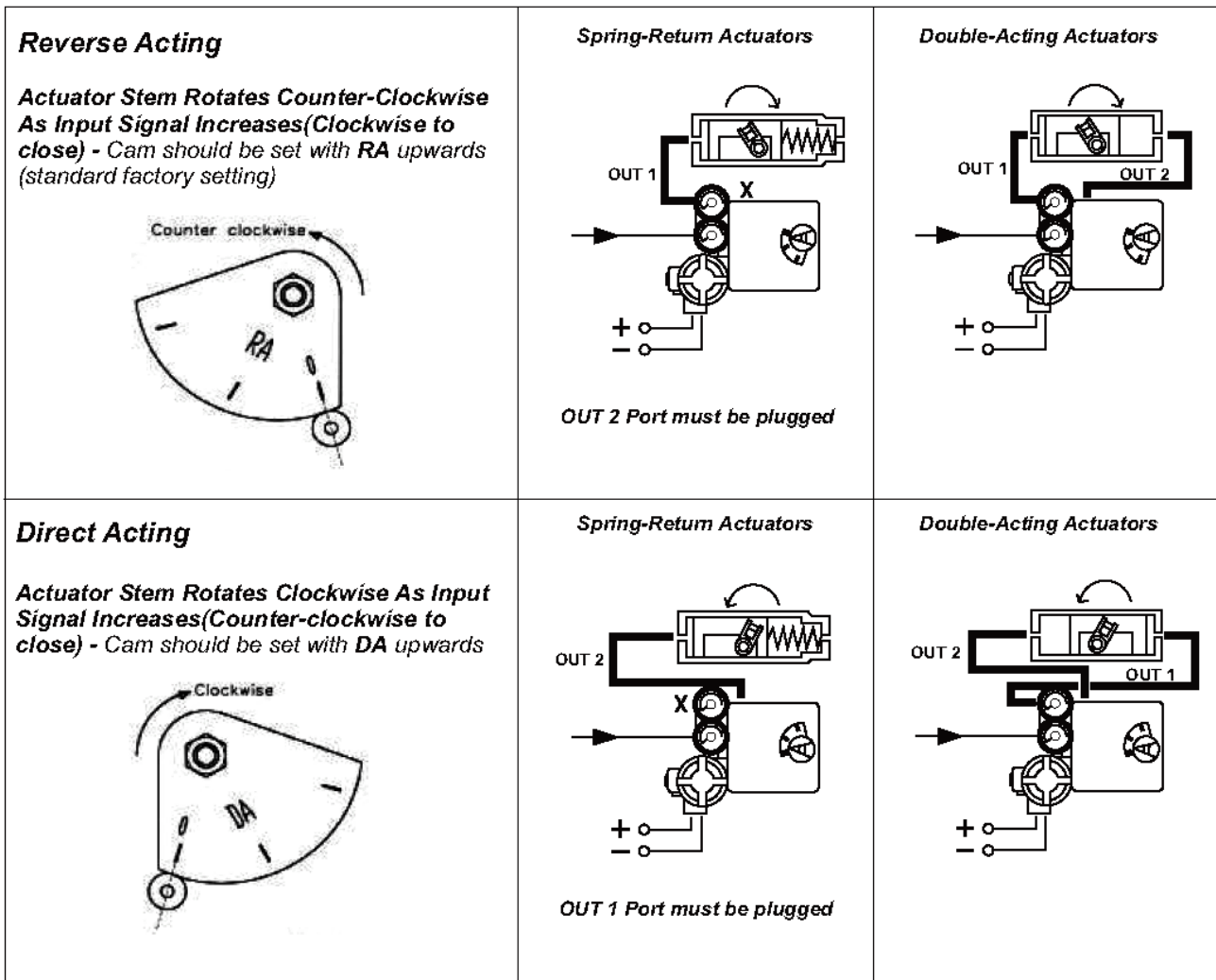
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## Mounting Positioner on Actuator

Flow Line Controls offers a universal Namur mounting bracket for installing the Series 56 Positioner on Flow Line Series 20 and Series 21 actuators and other actuators conforming to ISO 5211. The Positioner shaft will directly engage in the actuator pinion without the use of a coupler.

1. Mount the Namur bracket to the actuator. Do not fully tighten the mounting screws.
2. Mount the positioner to the bracket and insert the positioner shaft into the pinion shaft.
3. Ensure the positioner and actuator shafts are on the same axis and in alignment.
4. Tighten all the mounting screws.

## Air Line Connections



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## Span and Zero Adjustment

Before adjusting the Span and Zero, or making any other adjustments to the positioner, make sure all air line connections are correct and match your actuator type.

1. Set input signal to 4 mA (24 VDC) while positioner is at 0% starting point.
2. Turn the Zero adjustment screw clockwise or counter-clockwise to set the zero position.
3. Check the actuator stroke by increasing the input signal to 20 mA. If the stroke does not meet 100%, turn the Span adjusting screw clockwise or counter-clockwise until 100% is reached.
4. Set the input signal back to 4 mA and readjust the Zero screw if necessary.
5. Increase input signal to 20 mA and readjust Span screw if necessary.
6. Repeat the process until the desired set points are achieved.

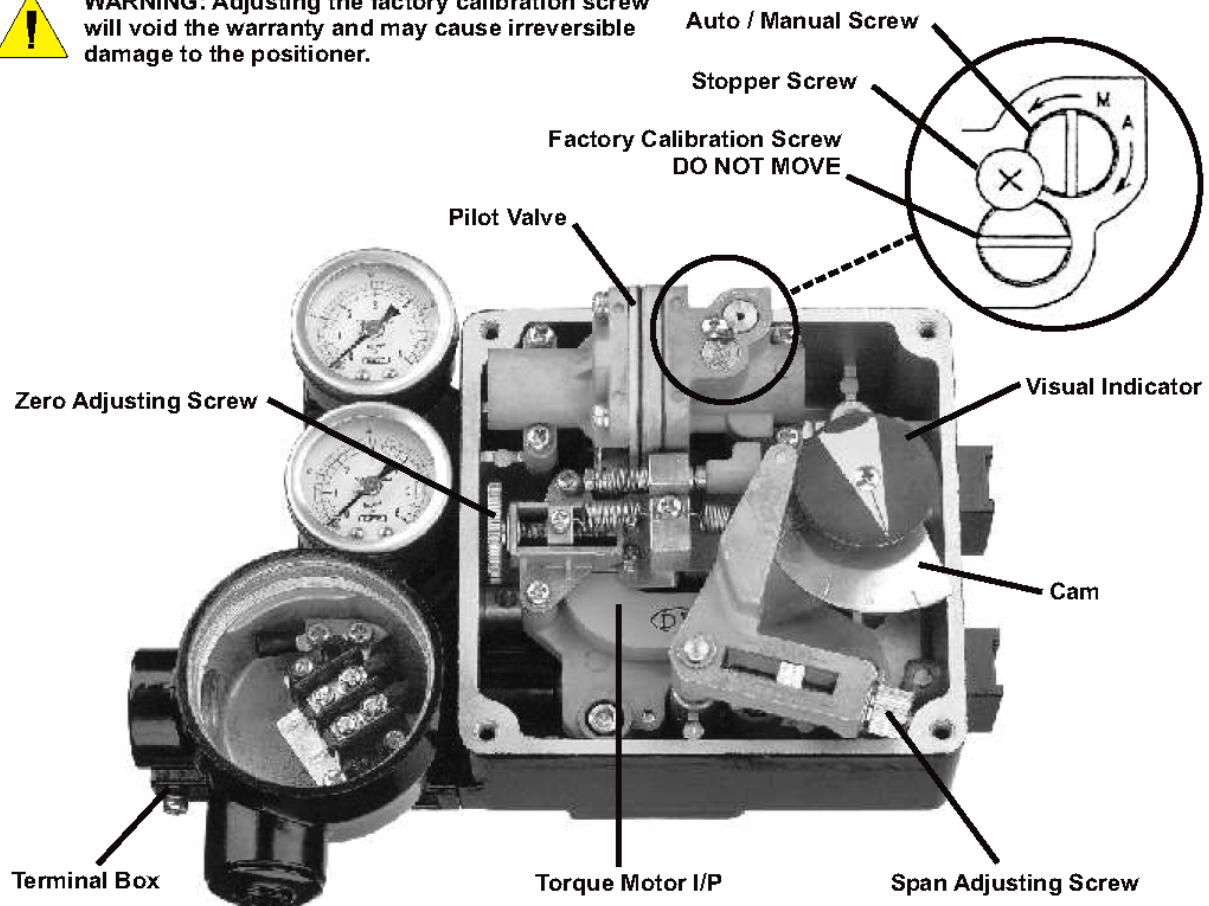
Due to variations in circuitry and environment 0% and 100% may not occur exactly at 4 mA and 20 mA.

The Pilot Valve is factory calibrated and no adjustments should be made.

**Auto / Manual Operation** For manual operation using an external regulator, set the Auto / Manual switch located on the Pilot Valve to M. This will bypass the 4-20 mA input signal. This function is not normally used



**WARNING:** Adjusting the factory calibration screw will void the warranty and may cause irreversible damage to the positioner.



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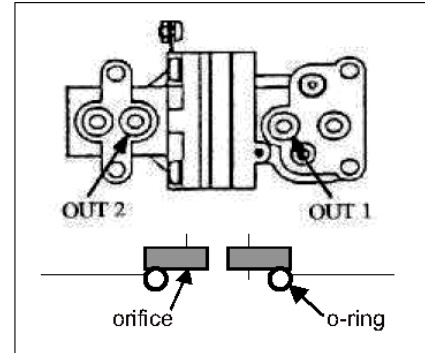
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## Optional Restricted Pilot Valve Orifice

### Disconnect air and signal from positioner before removing Pilot Valve

For improved control when using small actuators, a restricted Pilot Valve orifice kit is available for the positioner. The following procedures are for installing the restrictor.

1. Remove the four screws securing the Pilot Valve to the positioner and be sure to hold the compensation spring in place.
2. Turn over the Pilot Valve so the bottom faces you.
3. Remove the o-rings from the OUT 1 and OUT 2 as shown in the diagram at the right.
4. Install the orifice plates in their place with new o-rings above them.
5. Reinstall the Pilot Valve, making sure the compensation spring is back in place.



## Trouble Shooting Tips

### Hunting

If your actuator is small, install orifice restriction plates. The nozzle might be clogged. Take a metal wire located in the positioner cover and clean the nozzle.

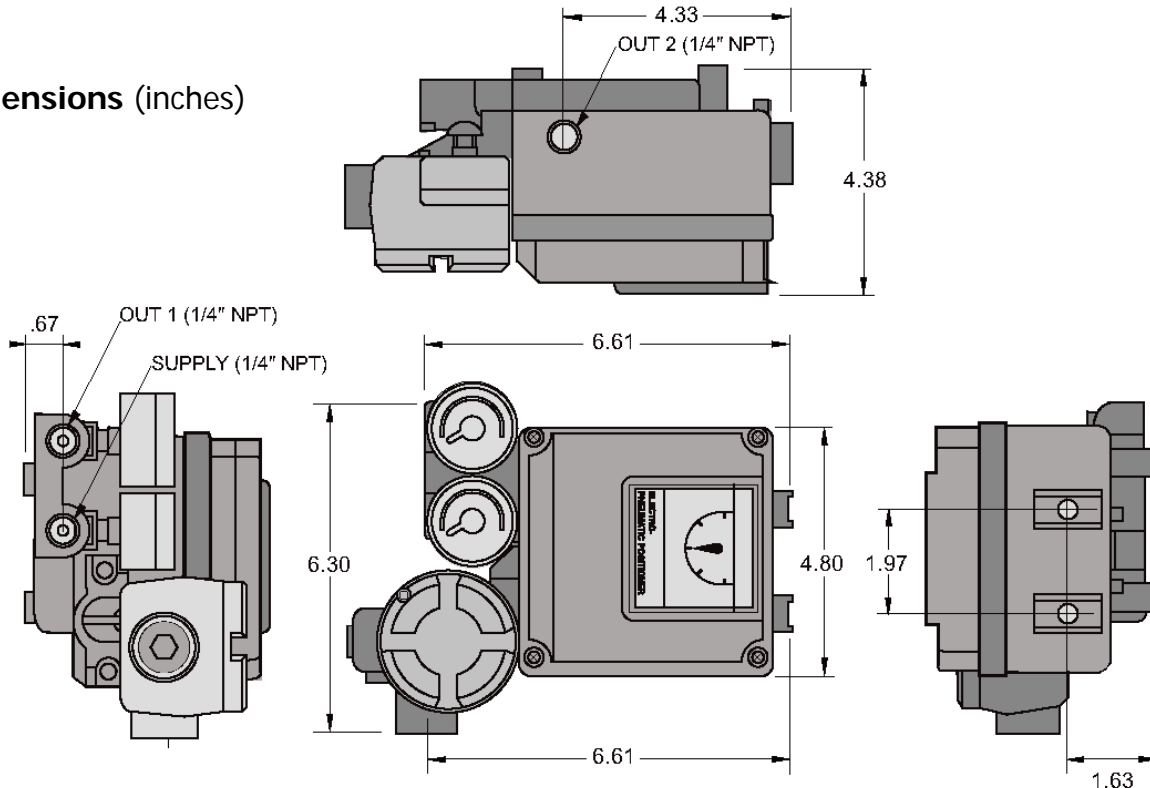
### Poor Linearity

Air supply might be unstable. Be sure to install a Flow Line Controls Filter-Regulator. Check Zero and Span adjustments.

### Poor Hysteresis

Loose mounting on the actuator, tighten mounting screws.  
Adjust the seat using the seat adjuster tool (double acting actuators only)

## Dimensions (inches)



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