

**P/P positioner**  
**Linear type (PPL)**  
Instruction manual



# Installation and Operating Instructions Pneumatic-Pneumatic Linear Positioner

## Description of Device

Pneumatic-Pneumatic Linear Positioner (3~15psi) is the advanced control device for a linear control valve that provides unparalleled stability in difficult environments

- Easy maintenance
- Precise Calibration with simple SPAN and ZERO adjustments
- Simple Conversion to Direct Acting or Reverse Acting
- 1/2 Spilt Range Available by simple adjustments without changing parts
- Simple Structure for feedback connection
- Corrosion-Resistant Aluminum Die Casting Body
- Sensitive and Correct Response for high performance
- Economical Energy Saving
- Extremely Vibration Resistant Design
- Stainless Steel Gauges Standard
- A Restricted Pilot Valve Orifice Kit for small actuators included

## Part Number System



Description	Code
<b>Actuator Operation:</b>	L : Linear Type R : Rotary Type
<b>Feedback Lever :</b> - Linear Type  - Rotary Type	A : Stroke (10~80mm) B : Stroke (80~150mm)  A : Fork Lever M6 x 40L B : Fork Lever M8 x 40L C : Fork Lever M6 x 60L D : Fork Lever M8 x 60L N : Namur Shaft (direct mounting)
<b>Pressure Gauge:</b>	0 : 2 Bar (30psi) 1 : 6 Bar (90psi) 2 : 10 Bar (150psi)

Description	Code
<b>Pilot Valve Orifice:</b>	S : Standard (actuator volume over 180 cm <sup>3</sup> ) M : Small Orifice ( ø1.0 or ø0.7 ) (actuator volume 90~180 cm <sup>3</sup> )
<b>Mounting Bracket:</b>  1~3 : for Namur shaft type 4~5 : for Fork lever type	N: None  1 : 80 x 30 x 20 (H) 2 : 80 x 30 x 30 (H) 3 : 130 x 30 x 30 (H) 4 : DHCT Bracket 80 x 30 5 : Box Bracket 130 x 30 6 : DIN / IEC 534 (for PPL)

# Installation and Operating Instructions

## Pneumatic-Pneumatic Linear Positioner

### Specifications

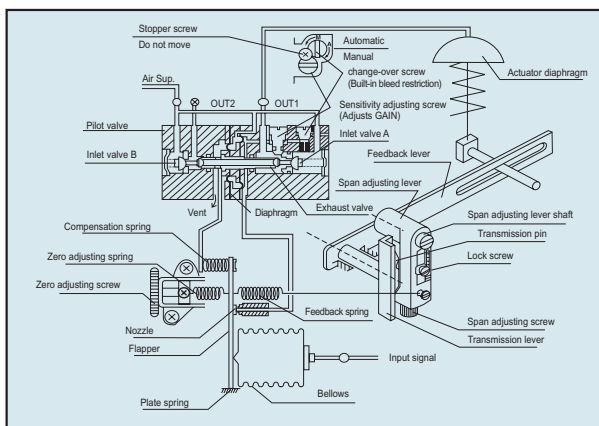
	<b>PPL</b>	
	Linear Type (Lever Feedback)	
	Single	Double
Input Signal	0.2~1.0 kgf/cm <sup>2</sup> (3~15psi) (Note. 1)	
Supply Air Pressure	Max. 7.0 kgf/cm <sup>2</sup> (100psi)	
Standard Stroke	10 ~ 80 mm (Note. 2)	
Air Piping Connection	PT 1/4 (NPT 1/4)	
Ambient Temperature	-20 ~ 70°C	
Pressure Gauge	Stainless Steel	
Output Characteristics	Linear	
Linearity	Within ± 1.0 % F.S	
Sensitivity	Within 0.1 % F.S	
Hysteresis	Within 0.5 % F.S	
Repeatability	Within ± 0.5 % F.S	
Air Consumption	5 LPM (Sup. 1.4 kgf/cm <sup>2</sup> )	
Flow Capacity	80 LPM (Sup. 1.4 kgf/cm <sup>2</sup> )	
Material	Aluminum Die Casting Body	
Weight	2.1 kg	

Note: 1) 1/2 spilt range can be adjusted  
 2) Feedback lever for stoke 80~150mm is available

### Principle of Operation

As the input signal (3~15psi) from the controller increases, pressure inside of the bellows increases and the plate spring works as a pivot. As the flapper receives the rotary torque in the counter-clockwise direction, the clearance between the nozzle and the flapper will increase, and the nozzle back pressure will decrease. As a result, the exhaust valve of the pilot valve moves to the right, and the output pressure of OUT1 increases to move the actuator diaphragm.

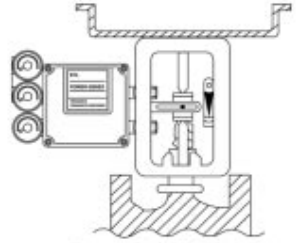
The valve stem goes up or down by the movement of the actuator diaphragm, and the feedback spring lengthens or shortens by the movement of the feedback lever. The valve stem stays in the position where the spring force is balanced with the force generated by the input signal supplied into the bellows. The compensation spring is for direct feedback of the motion of the exhaust valve and is connected to the flapper to enhance the stability of the loop. The zero point is adjusted by changing the zero adjustment spring tension.



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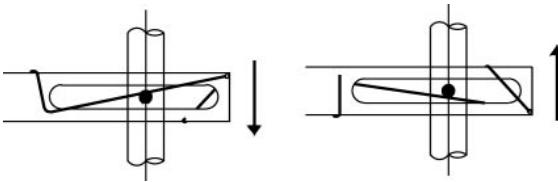
## Mounting the Positioner and Attaching the Feedback Lever

- (1) Mount the positioner to the control valve with bolts (2-M8) and the bracket as shown to the right.
- (2) Connect the feedback lever to the control valve stem at position where the angle between the valve stem and the feedback lever is 90 degrees as shown to the right below when the input signal is set to 12mA(50%). Be sure that the elimination spring should be installed as shown to the left below according to the actuator type (direct acting or reverse acting).
- (3) The stroke range for the best performance should be 10~80mm and the operation angle of the feedback lever should be between Min. 10 degrees and Max. 30 degrees to carry out accuracy and linearity perfectly.

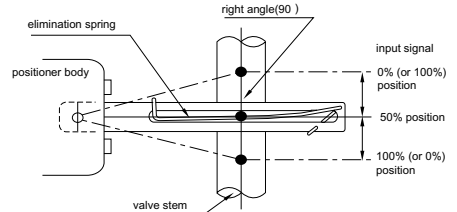


Direct Mounting Without Bracket

**⚠** Connect the feedback lever with the enclosed additional feedback lever if the stroke range of the control valve is over 80mm.

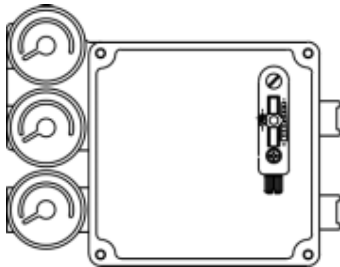


valve stem moves downwards (DA)    valve stem moves upwards (RA)  
**Elimination Spring Installation**

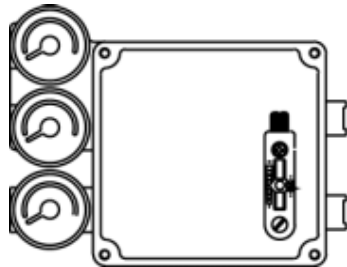


**FEEDBACK LEVER INSTALLATION**

## Position of the Span Adjuster According to the Actuator Type



Direct Acting (DA)



Reverse Acting (RA)

**⚠** Be sure that Reverse Acting (RA) is the standard factory setting.

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## Span and Zero Adjustment

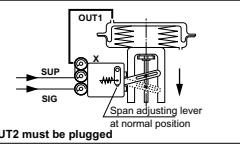
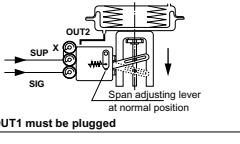
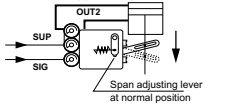
- (1) Check the proper installation of the positioner and the feedback lever.
- (2) Check the proper position of the span adjuster according to your actuator type (direct acting or reverse acting).
- (3) Connect all air connections.
- (4) Supply air and set input signal to 3psi. Turn the zero adjusting screw clockwise or counter clockwise to set the zero position.
- (5) Check the stroke of the control valve by setting input signal to 15psi. If the stroke does not meet 100%, turn the span adjusting screw clockwise or counter clockwise until 100% is reached.
- (6) Set input signal back to 3psi and adjust the zero adjusting screw until the zero point is reached.
- (7) Repeat the process of (4) to (6) until the desired set points are reached.
- (8) If the strokes of the control valve perfectly meet 0% and 100%, each setting point of 6, 9, and 12psi is automatically reached.

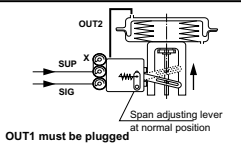
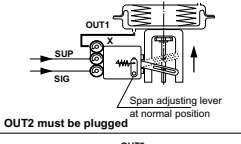
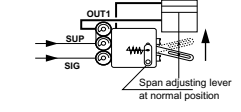
## Pilot Valve Seat Adjuster

The seat adjuster (sensitivity adjusting screw) located on the pilot valve is used to adjust the positioner for double-acting actuators. Normally, no adjustment is required.

When the sensitivity is not optimal, rotate this screw clockwise. If there is hunting, rotate the screw counterclockwise. For smaller actuators, it might be necessary to insert the small pilot valve orifice inserts if adjusting the seat does not improve performance.

## Air Connections

<b>Direct Acting (DA)</b>	
<p>As the input signal increases, Valve stem moves downwards. Actuator : <b>DA</b> Connection : Out 1</p>	 <p>OUT2 must be plugged</p>
<p>As the input signal increases, Valve stem moves downwards. Actuator : <b>DA</b> Connection : Out 2</p>	 <p>OUT1 must be plugged</p>
<p>As the input signal increases, Valve stem moves downwards</p>	 <p>OUT2 must be plugged</p>

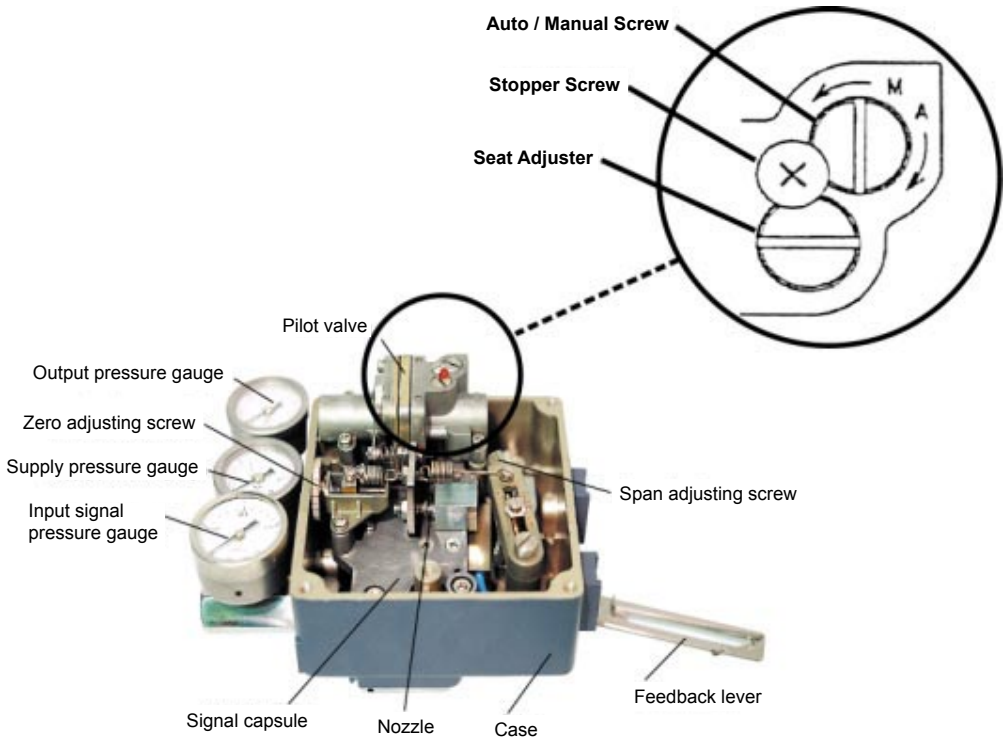
<b>Reverse Acting (RA)</b>	
<p>As the input signal increases, Valve stem moves upwards Actuator : <b>RA</b> Connection : Out 2</p>	 <p>OUT1 must be plugged</p>
<p>As the input signal increases, Valve stem moves upwards Actuator : <b>RA</b> Connection : Out 1</p>	 <p>OUT2 must be plugged</p>
<p>As the input signal increases, Valve stem moves upwards</p>	 <p>OUT1 must be plugged</p>

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## Auto / Manual Operation

For manual operation using an external air regulator, set the Auto / Manual switch located on the pilot valve to M. This will bypass the 3-15psi input signal.

## Internal View of the PIP Linear Positioner

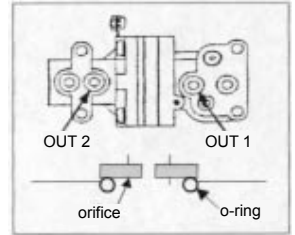


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## Optional Restricted Pilot Valve Orifice

**⚠ WARNING:** Before removing pilot valve, be sure to disconnect positioner from the signal and compressed air source.

For improved control using smaller actuators, a restricted pilot valve orifice kit is included with the positioner. To install, the pilot valve must be removed from the positioner. Remove the four screws holding the pilot to the positioner body. As you remove the valve, be sure to hold the compensation spring (see page 2) in place. Flip the valve so the bottom faces you. Remove the o-rings from the *out 1* and *out 2* ports (as shown in the diagram at right). Place the orifice plates in their place with new o-rings above them, and re-install the pilot valve, making sure the compensation spring is back in place. The positioner is now set up for smaller actuators.



## Troubleshooting Tips

### Hunting

- \* If your actuator is small, install orifice restrictions in ports 1 and 2 of the pilot valve. Then the control valve moves slowly.
- \* The nozzle might be clogged. Take the metal wire located in the positioner cover and clean the nozzle.

### Poor Linearity

- \* Air supply might be unstable- check or install a pressure regulator.

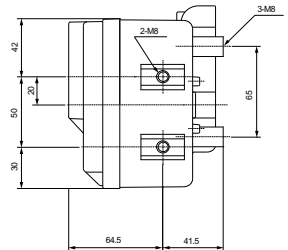
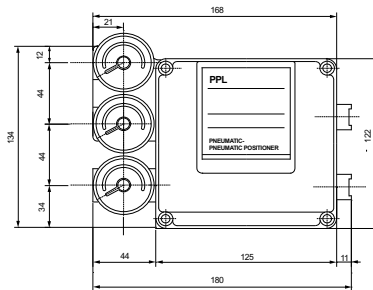
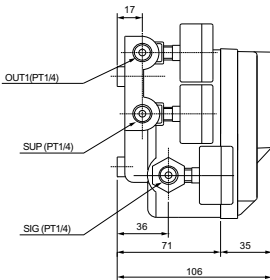
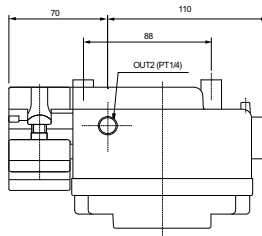
\* Check Zero and Span adjustments

\* Loose feedback lever – tighten feedback lever

### Poor Hysteresis

- \* Loose mounting of the actuator to the positioner – tighten the mounting bracket.
- \* Adjust the seat, using the seat adjuster (double acting actuators only)

## Dimensions





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