# Electro-Pneumatic Positioner NIP600•NIP610



The NIP600 electro-pneumatic positioner is controlled by an electrical input signal and mechanical feedback. The output is pneumatic. Applications include operation of diaphragm actuated regulating values.

> Performance through Innovation SMC Pneumatics, Inc.

SMC

# **Electro-Pneumatic Positioner** NIP600 · NIP610

Converts a D.C input signal into a pneumatic output for positioning of control valves.

Wide supply pressure range 20~100PSI(1.4~7kgf/cm<sup>2</sup>).

Available in single or double acting mode.

Quick response time.

Easy conversion from direct to reverse action and vice versa.

Built-in automatic/manual(A/M)selector.

Linear, square and square root characterization cams.





NIP610



	NIP600 Lever type		NIP610       Cam type	
Туре				
	Single acting	Double acting	Single acting	Double acting
Input current	4 to 20 mADC (standard)			
Input resistance	3580Ω(1~5mA), 884Ω(2~10mA), 235Ω(4 to 20mA), 155Ω(5~25mA), 38Ω(10~50mA			
Supply air pressure	20 to 100 PSI (1.4 to 7kgf/cm <sup>7</sup> )			
Stroke*	0.40 to 3.35 inch (10 to 85mm) (standard) 60° to 100° (standard)		ird)	
Sensitivity	0.1% or less	0.5% or less		
Linearity	$\pm$ 1% or less	$\pm$ 2% or less	$\pm$ 2% or less	
Hysteresis	0.75% or less	1% or less	1% or less	
Repeatability	$\pm$ 0.5% or less			
Output flow	2.5SCFM (70Nℓ/min) at 20PSI (1.4kgf/cm <sup>2</sup> ) supply pressure			
Air consumption	0.25SCFM(7Nl/min) at 20PSI(1.4kgf/cm <sup>2</sup> ) supply pressure			
Ambient and fluid temperature	14° to 140°F(-10 to +60°C)			
Air connections	½NPTF (female)			
Electrical connections	½PF (female)			
Material of body	Aluminum diecast			
Weight lbs (kgf)	6.7 (3)			

\*For split range specifications, consult the factory.



Iow To Order



Optional F	arts
Part No.	Description

P2240181	Allen wrench	
21050-31	Serration joint assembly	

#### MILOUD-MIP610

# **Operation** / Construction

#### Model NIP600(Lever type) Single acting, Normal operation

When the input current increases, the armature will be subjected to a clockwise torque, pushing the flapper lever to the left. As a result, the clearance between the nozzle and flapper will increase and the nozzle back pressure will decrease. Consequently, the exhaust valve of the pilot valve assembly will move to the left, causing the output air pressure of OUT 1 to increase and drive the diaphragm actuator. The movement of the diaphragm actuator will act on the feedback spring via the feedback lever and the span adjusting lever, balancing the force generated by the input current.

The gain suppression spring is designed to immediately feedback the movement of the exhaust valve to the flapper lever, thereby contributing to loop stability. Zero point adjustment is performed by varying the tension force of the zero adjusting spring.

#### **Block Diagram Operation**



#### Model NIP610 (Cam type) Double acting, Normal operation





N1P600 • N1P610

## pe Connection Variations



### Precautions

#### Installation

When installing the positioner on a diaphragm actuator with a diameter of about 8.0 inch (200mm) or less, the gain suppression spring may have to be changed if instability occurs.

#### Model NIP600(Lever type)

Depending on the desired installation method, make a proper bracket and secure the positioner to the diaphragm actuator by making use of the applicable female threaded installation holes located on the side or rear of the positioner.

Fix the coupler, which transmits the displacement of the valve stem to the feedback lever, in such a position that when the input current is 50%, the feedback lever is at right angles to the valve stem.

The figure below shows the connection viewed from the front of the positioner.



So For direct operation mode in which the valve stem moves downwards when the input current increases, connect the feedback lever to the valve stem in such a manner that the slack eliminator may be on the top of the coupler as shown above.

For reverse operation mode, in which the valve stem moves upwards when the input current increases, connect the feedback lever with the face turned over to the valve stem so that the spring is on the bottom of the coupler.

OSpecified linearity can be obtained with an angular travel from 10° to 30°. A travel angle of approx. 20° is most suitable.

#### Model NIP610(Cam type)

Install the positioner to a rotary actuator in such a manner that the feedback shaft of the positioner is concentric with the main shaft of the actuator. In a correct mounting condition, the joint should slide up and down regardless of the position of the feedback shaft.

Por such an operation mode that the main shaft of the actuator rotates clockwise when the input current increases, use the DA side of the cam. For opposite operation mode, the main shaft of the actuator rotates counter clockwise when input current increases, use the RA side. Set the cam properly to the recessed face. Note that the terms "clockwise" and "counter clockwise" mean the rotating directions viewed from the front of the positioner.

Set the positioner cam at the actuator's starting position by aligning the base line, stamped on the cam, with the span adjustable arm unit bearing. If the actuator rotation angle is between MAX 60° to 80°, adjust the cam so that the starting point where the cam touches the bearing is offset 40° to 20° respectively from the base line mark.
For safety, do not apply the supply pressure while the cam is being installed.

#### Example with serration joint



#### Example of cam installation



# NIP600 • NIP610

#### lectrical Wiring

e figure below shows the terminal box h the cover removed.

nnect the lead wires from output minals "+" and "-" inside the terminal  $\kappa$  of the positioner, respectively. nduit pipe connection ports are female rallel pipe threads 1/2PF, 20 mm deep.



#### Piping

OUse clean, dust free, dry air for the supply.

**O**Be careful to prevent the entry of pipe scale into the positioner. Blow out all lines and fittings before use.

For single acting type actuator applications, refer to the diagragms on page 4, and plug either OUT 1 or OUT 2.
Be careful not to apply shock to the torque motor or apply excessive force to the armature arm, as this will jeopardize performance.

Do not remove the terminal cover in a hazardous location while the unit is running.

In the torque motor chamber is installed a pre-adjusted torque motor, do not attempt to remove the cover.
The unit must always be used with the terminal cover and body cover installed.
In applications where the unit is used outdoors. Avoid mounting the unit with the rear side (the torque motor cover side) faced upward.

### Adjustment

#### Span adjustment

Span can be adjusted by rotating the span adjusting knob with the lock screw loosened. Rotating the knob clockwise will increase the span and counter-clockwise will decrease. See the indication  $+ \leq SPAN \geq -$  on the span adjusting lever. After span adjustment is complete,

tighten the lock screw.

#### Zero adjustment

Set the input current at 0% (4 mA), and then rotate zero adjusting knob by hand to vary the tension of the zero adjusting spring so that the starting position is aligned. Rotating the knob clockwise will advance the starting position and counter-clockwise will retard.

#### Auto-manual (A/M) selector

When manual operation of a diaphragm valve is required, turn the A/M selector in the M direction, and then the supply air pressure can directly be fed to the OUT 1 side, allowing the diaphragm valve to be operated by control of the pressure regulating valve in the supply pressure line. When operating the diaphragm valve by the input current, rotate the A/M selector in the A direction. Note that this selector is operative only when OUT 1 is used under the single acting operation mode. It is in operative when OUT2 is used under the single acting mode or when the double acting operation mode is chosen. This selector is for manual adjustment in the field, and thus should not be used as a means for emergency purposes. Do not loosen the recessed head screw on the top of the selector, because it is for preventing the selector from slipping off.

#### Sensitivity adjusting device

This device is factory-adjusted before shipment, and usually does not require further adjustment. Rotating the sensitivity adjusting screw clockwise will cause sensitivity to increase, and counterclockwise to decrease. This device is used in a double acting mode. Do not loosen the recessed head screw on the top of the sensitivity adjusting screw, because it is for preventing the screw from slipping off.

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