

Automax XL90 High Performance Positioner



Introduction

The Automax XL90 positioner provides outstanding control for a wide range of valves and dampers. The XL90's two-stage relay provides fast, sensitive response characteristics to meet demanding control objectives. It may be used with 3-15 psi pneumatic control signals (as shown) or fitted with an I/P transducer for 4-20 mA signals. The XL90 is available with many options including position feedback limit switches, 4-20 mA position feedback transmitter, and our UltraDome visual position indicator.

Applications

Automax XL90 positioners may be used to control quarter-turn control valves such as eccentric plug, butterfly, segmented ball, standard ball, and plug valves. The XL90's sensitive two-stage relay also makes it ideal for precise damper control applications. Specify the XL90 whenever valve rotation sensitivity is critical.

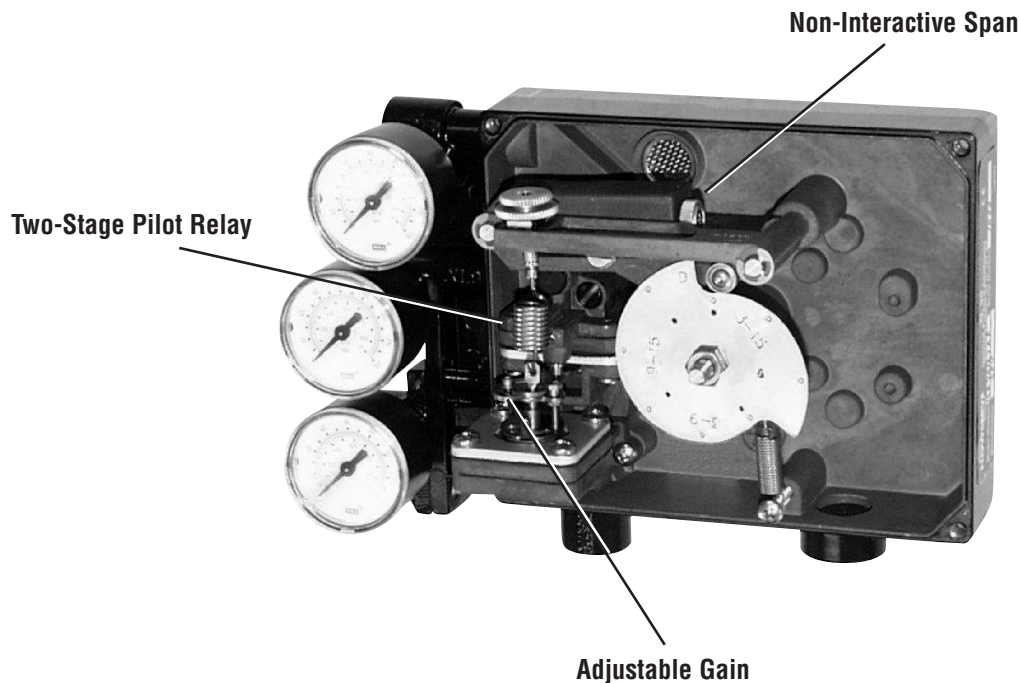
The XL90 may be installed on any quarter-turn valve actuator conforming to the NAMUR standard for accessory mounting bolt pattern and pinion height without a coupler. This reduces deadband and is less expensive. Contact your Flowserve distributor or representative for information about mounting the XL90 on non-NAMUR actuators.

The XL90 housing is constructed from durable die-cast aluminum. The housing is anodized for internal corrosion resistance, then coated with epoxy powder for external resistance to harsh chemicals.

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Features

1. **Two-Stage Pilot Relay** provides fast, sensitive response characteristics for precise control of critical control valves and dampers.
2. **Non-interactive Span Adjustment** reduces calibration time.
3. **Adjustable Gain** allows positioner sensitivity adjustment for a wide range of valve/actuator applications.
4. **Corrosion Resistant Materials.** All exposed parts are either stainless steel or epoxy powder coated anodized aluminum to permit use in corrosive environments.
5. Optional **UltraDome Visual Position Indicator** provides adjustable, high-contrast, full-angle viewing of valve position.
6. **Field Upgradable.** The XL90 is field-upgradable to a number of electro-pneumatic options without removing the cover. Limit switches or a 4-20 mA position transmitter may be installed with basic tools.
7. **Vibration Resistant.** High natural frequency and pneumatic dampening make the XL90 unaffected by vibrations with accelerations up to 2 G's and frequencies to 500 Hz.

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Materials of Construction:

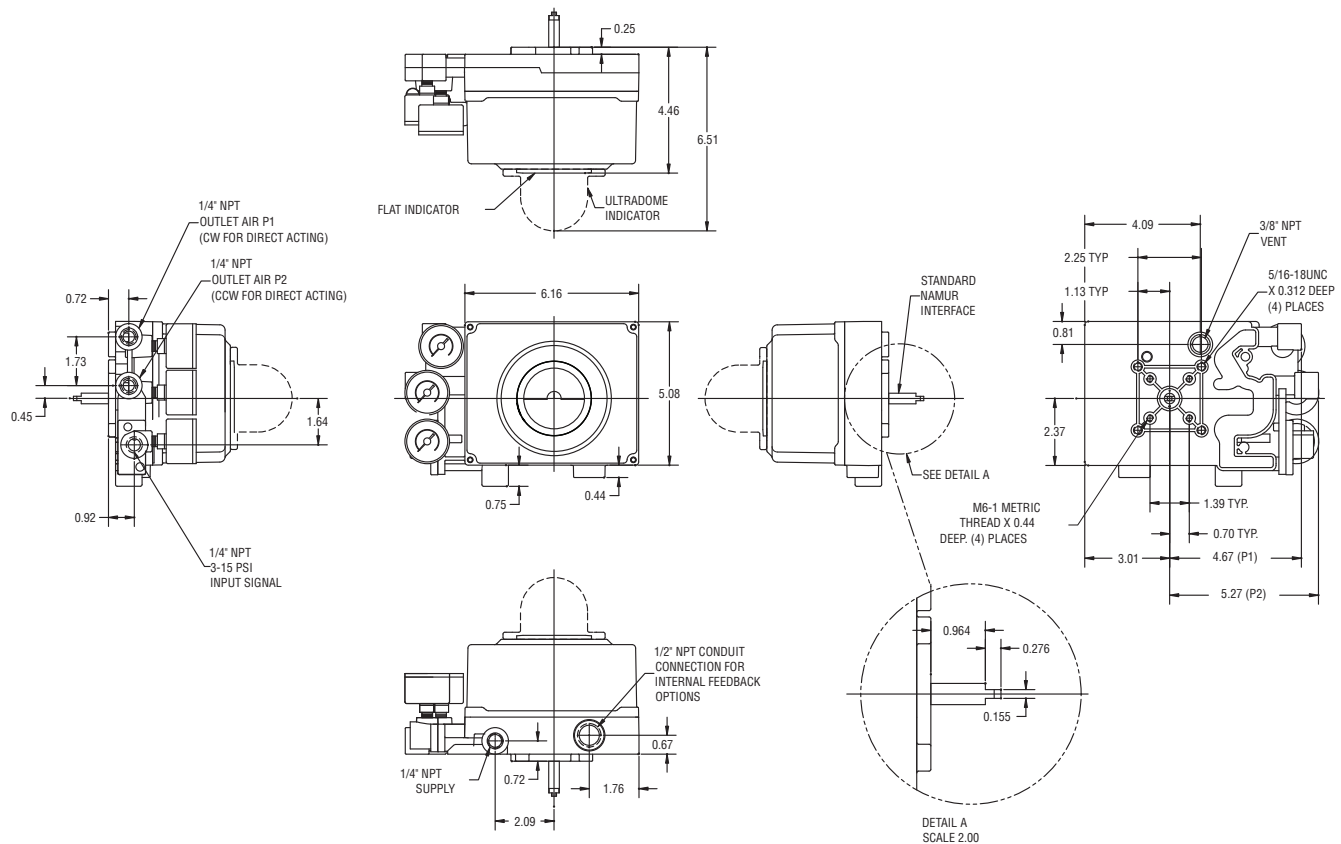
Part of Assembly	Materials
Housing	Anodized Aluminum with Epoxy Powder Paint
Screen/Retainer	Stainless Steel
Cover	Anodized Aluminum with Epoxy Powder Paint
Lens/UltraDome	Polycarbonate
Shaft	Stainless Steel
Bearings	Thermoplastic Alloy
Cam	Stainless Steel
Cam Follower Bearing	Hardened Steel
Span Arm	Anodized Aluminum
Span Arm Screws	Stainless Steel
Zero Arm	Anodized Aluminum
Relay Assembly	Anodized Aluminum and Stainless Steel
All Fasteners	Stainless Steel
O-rings*	Buna-N
Diaphragms*	Buna-N
Feedback and Cam Springs	Stainless Steel
Shaft Snap Rings	Stainless Steel
Posts and E-Clips	Stainless Steel

*Ext. Temp. Models utilized fluorosilicone diaphragms and dynamic O-rings.

Specifications:

Parameter	Units	P/P Value	I/P Value
Resolution	% Full Scale	0.1	0.1
Dead Band	% Full Scale	0.1	0.1
Repeatability	% Full Scale	0.1	0.1
Hysteresis	% Full Scale	0.5	0.5
Linearity	% Full Scale	1	1
Adjustable Open Loop Gain	psi/psi @ 60 psi	400 to 1100:1	400 to 1100:1
Supply Pressure Effect	% Full Scale	0.2	0.2
Supply Pressure Range	PSIG	30 to 150	30 to 150
Steady State Air Consumption	SCFM @ 60 psi	0.38	0.45
Maximum Flow Capacity	SCFM @ 60 psi	16.5	16.5
Ambient Temp. Range - Standard	Degrees F	-20 to 185	-20 to 180
Ambient Temp. Range - Extended	Degrees F	-50 to 250	-40 to 180
Input Signal	PSIG/mA	3 to 15	4 to 20
Pneumatic Connections	Inch NPT	1/4	1/4
Conduit Connection	Inch NPT	1/2	1/2
Net Weight	lbs.	3.5	6

Dimensions: Pneumatic Input Models

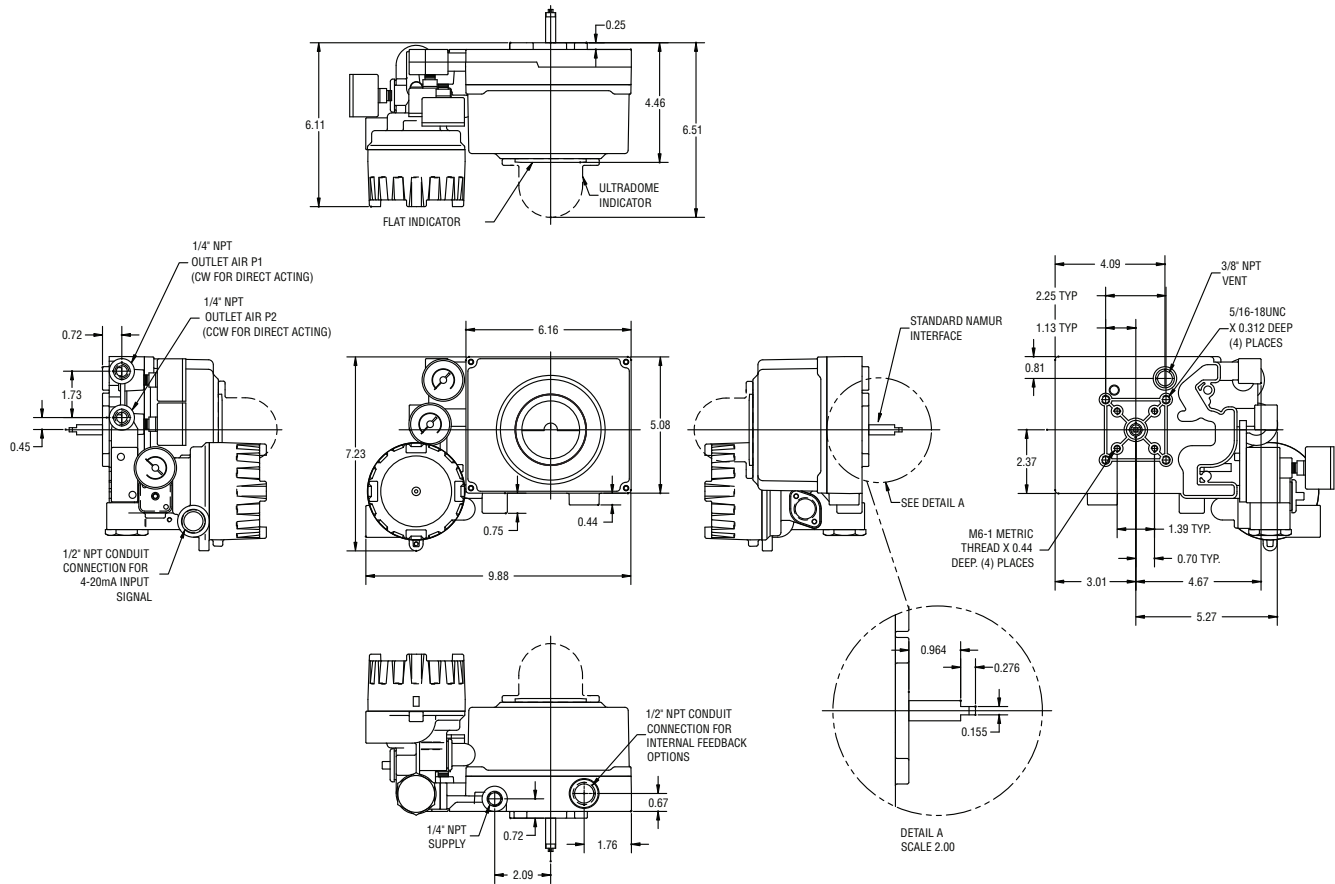


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Dimensions: Electro-Pneumatic Input Models



POSITIONER OPERATION

The positioner schematic (Figure 1) shows an XL90 Series positioner connected for double-acting service on a rotary rack-and-pinion actuator. Tension on the feedback spring provides feedback to the positioner, which varies as the stem position changes. The spring-loading force is applied through the feedback linkage and cam to the positioner's input capsule.

Instrument signal pressure is applied between the diaphragms in the input capsule. Therefore, the input capsule serves as a force-balance member, matching the valve stem position (as measured by tension on the feedback spring) to the instrument signal.

When the opposing forces balance exactly, the system will be in equilibrium and the stem will be in the exact position called for by the instrument signal. If the opposing forces are not in balance, the input capsule will move up or down and, by means of the pilot-valves, will change the output pressures, moving the stem until the tension on the feedback spring exactly opposes the instrument signal pressure.

The sequence of operation is as follows: An increase in instrument signal pressure forces the input capsule downward. Displacement of the capsule in turn moves the flapper away from the detecting nozzle. This allows a larger flow rate through the nozzle, decreasing the pressure exerted on the top of the pilot valve capsule.

Supply air biases the pilot-valve in an upward direction. As the capsule moves up, it will close the exhaust seat of the upper pilot poppet and open the supply seat, which applies increased air pressure to the bottom cylinder port. At the same time, the pilot-valve capsule will open the exhaust seat for the lower pilot poppet; thus, decreasing pressure to the top cylinder port.

This difference in pressure will drive the piston outward, rotate the pinion and stretch the feedback spring until the spring tension exactly opposes the force resulting from the instrument signal pressure. At this point, the flapper will be moved toward the detecting nozzle to restore the pressure above the pilot-valve capsule to its equilibrium value. As a force-balanced condition is approached, the pilot-valve capsule will be forced back to a neutral position where the pilots are neither supplying air to, nor exhausting air from, their respective sides of the piston.

A decrease in instrument signal pressure reverses the described actions and causes a proportional inward movement of actuator pistons and a reversal in pinion direction.

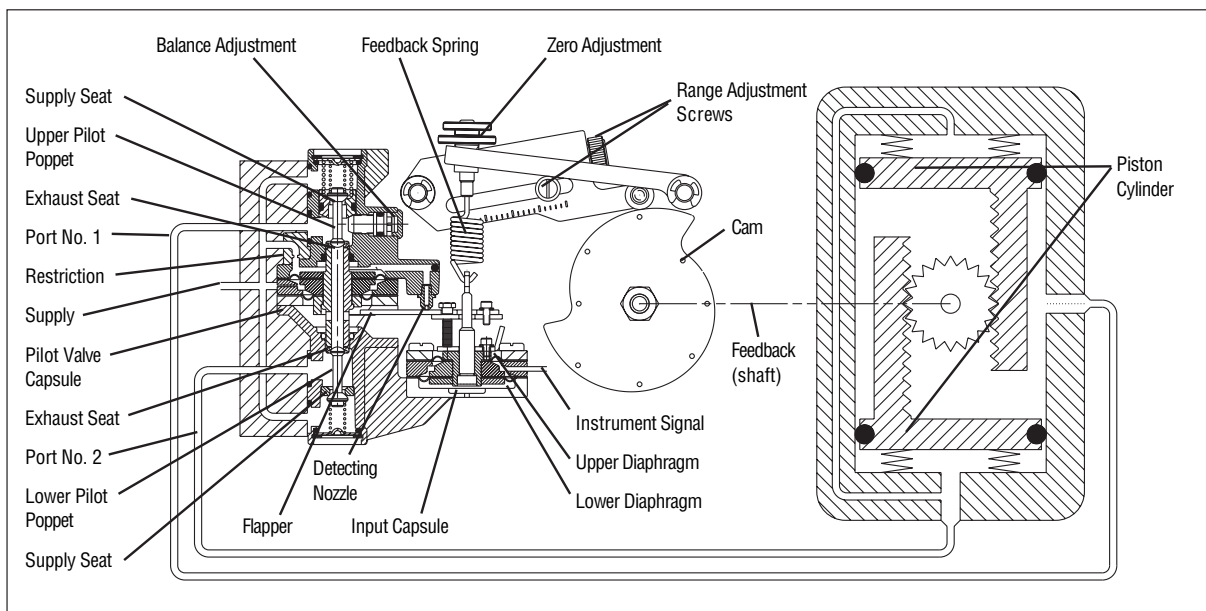


Figure 1: XL90 Positioner Schematic for Air-to-Open

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XL90 Part Numbering System

	Prefix	Input Model	Indication	Gages	Temp-erature	Cam	Conduit Thread Connection	Option
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Selection	PREFIX							
Black Epoxy	MB							
White Food Grade Epoxy								
Selection	INPUT MODEL							
Pneumatic Input 3-15 psi	90							
Electro-Pneumatic Input 4-20mA <i>General Purpose NT3000</i>								
Electro-Pneumatic Input 4-20mA <i>FM/CSA Explosion Proof and Intrins. Safe NT3000</i>	92							
Electro-Pneumatic Input 4-20mA <i>CENELEC EExd (Explosion Proof) NT3000</i>								
Electro-Pneumatic Input 4-20mA <i>CENELEC EExia & EExib (Intrinsically Safe) NT3000</i>	94							
Selection	INDICATION							
Flat Lens with Green Indicator (Standard)	1							
Ultradome with Green Indicator								
Cover for top-mounted Namur UltraSwitch <i>(includes UltraSwitch mounting kit)</i>	T							
Selection	GAGES							
3 Stainless Steel Gages with Brass Fittings <i>(Standard)</i>	2							
2 Stainless Steel Gage with Brass Fitting <i>(Standard)</i>								
3 Stainless Steel Gages	4							
2 Stainless Steel Gages	5							
No Gages	6							
Selection	TEMPERATURE							
Standard Temperature (Buna-N soft goods)	7							
Extended Temperature (Fluorosilicone soft goods)								
Selection	CAM							
Linear Cam	A							
30, 45, 60 & 90 Degree Linear Cam								
Linear, Square, Square Root (Damper) Cam	C							
0-60 Degree Cam (Butterfly Valves)	D							
Selection	CONDUIT THREAD CONNECTION							
1/2" NPT (Standard)	P							
M20 Threads								
OPTIONS - As Needed (See notes 1-4 below)								
Selection	ANALOG OUTPUTS							
4-20mA Transmitter	F							
Selection	INTERNAL LIMIT SWITCHES							
2-SPDT Mechanical Switches with High Resolution Cams	J							
2-SPDT Mechanical Switches	K							
2-SPST Proximity Switches	M							
2-SPDT Proximity Switches	N							
2-Intrinsically Safe Solid State Proximity Switches	Q							

Notes:

- Internal limit switches and an internal transmitter cannot be used simultaneously.
- When options F, J, K, M, or N are used with an I/P transducer, input model number 91 must be used.
- When option Q is used with an I/P transducer, input model numbers 90 or 92 must be used.
- Internal limit switches or an internal transmitter cannot be used in an explosion proof environment. As an alternative, the explosion proof UltraSwitch may be mounted on top of the positioner. (Use option T.)