

Flowserve Corporation
Flow Control Division
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Apex 4100 Electro-Pneumatic Positioner

Introduction:

The Apex 4100 I/P Module provides accurate 3-15 psi pneumatic signals for the Apex 4000 Positioner. It receives a 4-20 mA current input and only requires 6 volts to operate. The Apex 4000 Pneumatic Positioner provides accurate valve positioning for rotary and linear actuators in either double acting or spring return configurations. The compact, lightweight positioner also conforms to NAMUR VDI/VDE 3845 mounting standards and features a low profile visual position indicator. The 4100 I/P has many advanced features including: RFI protection, replaceable filter, and the electronics are environmentally sealed from the conduit entry.



Applications:

The Apex 4100 I/P Module's internal closed loop control system makes it insensitive to the installed position. In addition, this feature enables steady output under the most severe vibration applications. This transducer may only be used with the Apex 4000 positioner.

The Apex 4100 I/P is designed to NEMA 4/IP66 ingress protection. It requires only 6 volts minimum DC power, enabling series operation with other devices on 24 VDC current loops.

The I/P housing is constructed of durable die-cast aluminum that is protected with an epoxy powder coating to provide protection against the toughest applications in all process industries including:

1. Chemical and Petrochemical
2. Power
3. Food and Beverage
4. Pharmaceutical
5. Municipal and Wastewater

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Features:

1. **Corrosion Resistant Materials.** All exposed parts are either stainless steel or epoxy powder coated aluminum to permit use in corrosive environments. The gold-plated spool valve offers a high degree of protection against moisture laden and/or corrosive supply air.
2. **Captive Cover Screws** permit calibration without potential for losing screws.
3. **Multiple Cam Options.** The standard Apex 4000 linear cam allows operation for 0-90°, 0-180°, split ranging, and direct or reverse action applications. Optional characterized cams are available for a wide range of applications.
4. **Compact, Rugged Design** has few moving parts, adding to its reliability and performance.
5. **Low Profile Visual Position Indicator** provides high-contrast viewing of valve position.
6. **Quick and Simple Calibration** is done with thumbwheels, requiring only a flat head screwdriver for calibration. The span and zero can be adjusted internally and the zero adjustment can be performed without removing the cover.
7. **RFI Immunity** to both externally radiated RF and cable-conducted RF is provided by a conductive housing.
8. **Environmentally Sealed Conduit Connection.** Provides protection for I/P electronics by isolating conduit connection. The current loop connections are highly accessible and removable for simplified installation.
9. **Replaceable Filter** provides initial startup protection against tubing scale or dirt.
*Note: the integral filter is **not** designed to act as a permanent source of clean, dry air.*

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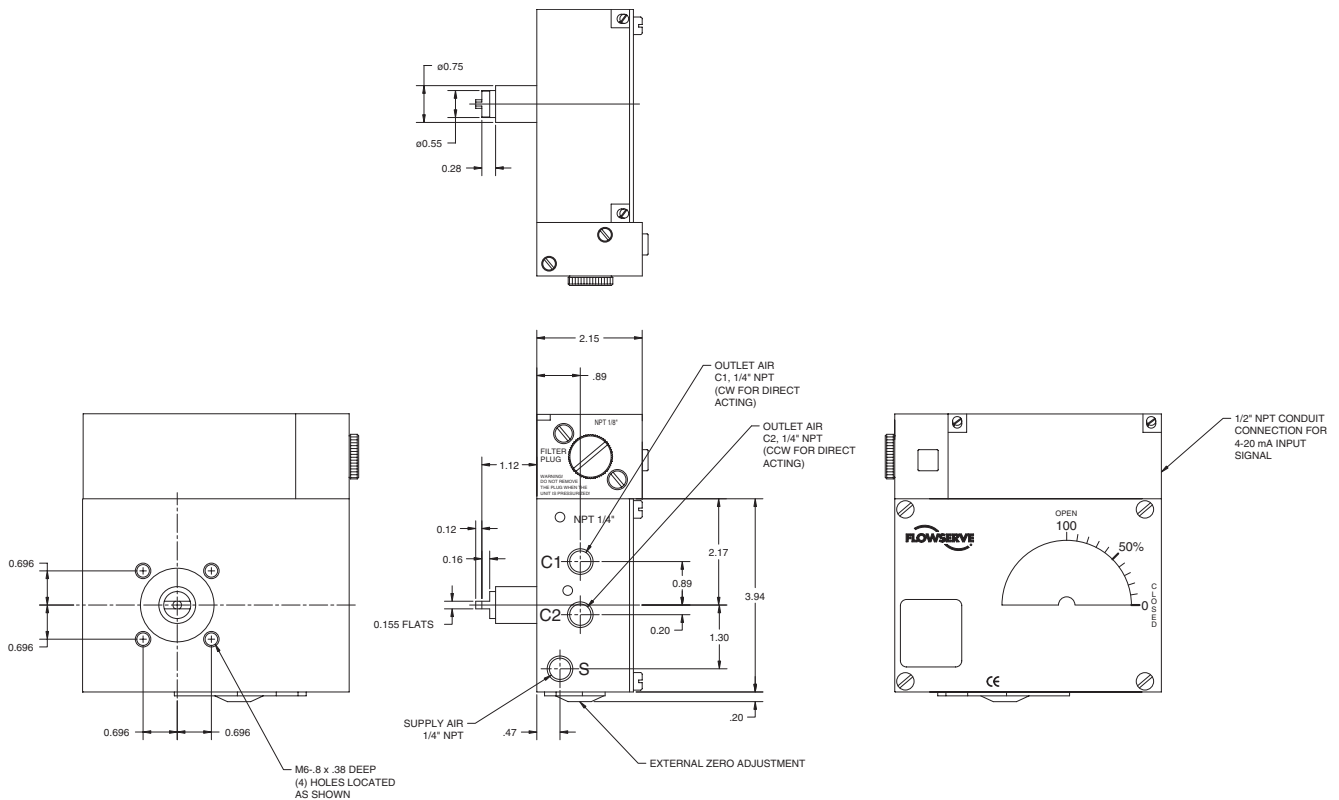
Materials of Construction:

Part	Materials
Housing/Cover	Epoxy Coated Aluminum
I/P Converter	Aluminum/SST/Nitrile
Filter Plug	Epoxy Coated Steel
Filter	20 Micron HDPE
Relief Valve Spring	Stainless Steel
All Fasteners	Stainless Steel
All O-rings/Gaskets	Nitrile

Performance Specifications:

Parameter	Value
Repeatability	.5% Full Scale
Hysteresis & Deadband	.8% Full Scale
Linearity	.7% Full Scale
Flow Capacity	Std. 9.6 SCFM
@ 60 psi	High 18 SCFM
Position Sensitivity	.2% of Span
Air Consumption	.31 SCFM @ 87 psi
Temperature Range	-4°F to 185°F
Input Signal	4-20 mA
Signal Voltage	6 Volts
Max. Supply Pressure	150 psi
Weight	3.4 lbs

Dimensions:



Principles of Operation:

The I/P transducer converts a 4-20 mA input signal to a 3-15 psi pneumatic output. The 3-15 psi output pressure is transmitted to the diaphragm on the balance arm. The unit operates on a force balance principle. The opposing force is achieved through the feedback spring and is proportional to the position of the lower arm. The lower arm position is determined by the position of the cam that is secured to the spindle and connected to the actuator shaft, thus providing the feedback from the actuator/valve. When these two forces are equal, the balance arm and the spool in the pilot valve are in the neutral position, the complete unit is in a balanced position. Air is supplied to the pilot valve through Port S and controls the air flow through Ports C1 and C2.

Assume an equilibrium position. An increased control signal will deflect the diaphragm (1) down, compressing the feedback spring (3). The balance arm (2) moves the spool (7) in the pilot valve (8) supplying air to the actuator. At the same time, air is exhausted from the actuator and is vented to atmosphere through the pilot valve. When the pressure imbalance exists, the actuator rotates moving the positioner shaft (6). The shaft and cam (5) rotate, forcing the lower arm (4) upwards compressing the feedback spring (3). The motion will continue until the two forces are equal and the unit is in an equilibrium position.

