



Product Specification

Automax Valve Automation System

Product Specification

APEX 8000 High Performance Positioner

FCD AXENPS0130-04

Introduction:

The Automax APEX 8000 positioner provides outstanding control for a wide range of valves and dampers. The APEX 8000'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 APEX 8000 is available with many options including position feedback limit switches, 4-20 mA position feedback transmitter, and our UltraDome visual position indicator.

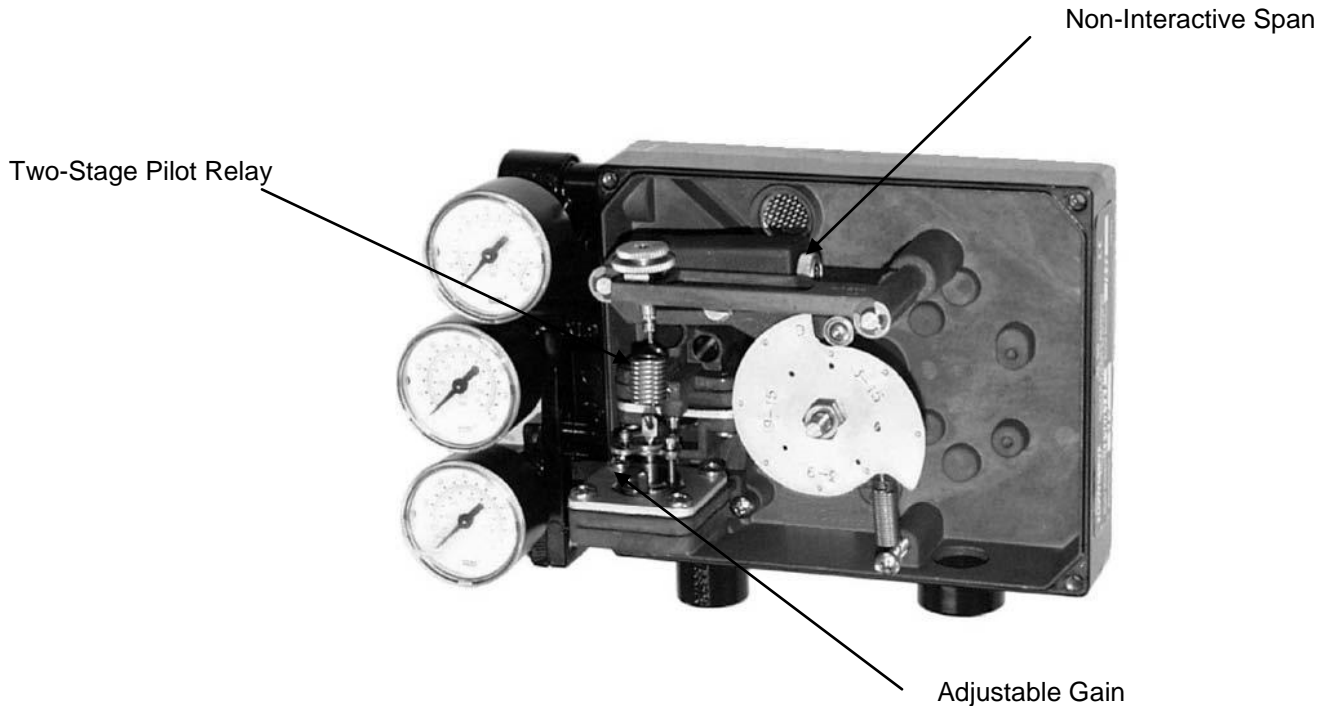


Applications:

Automax APEX 8000 positioners may be used to control quarter-turn control valves such as eccentric plug, butterfly, segmented ball, standard ball, and plug valves. The APEX 8000's sensitive two-stage relay also makes it ideal for precise damper control applications. Specify the APEX 8000 whenever valve rotation sensitivity is critical.

The APEX 8000 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 APEX 8000 on non-NAMUR actuators.

The APEX 8000 housing is constructed from durable die-cast aluminum. The housing is anodized for internal corrosion resistance, then coated with polyester powder for external resistance to harsh chemicals.

**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 APEX 8000 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 APEX 8000 unaffected by vibrations with accelerations up to 2 G's and frequencies to 500 Hz.

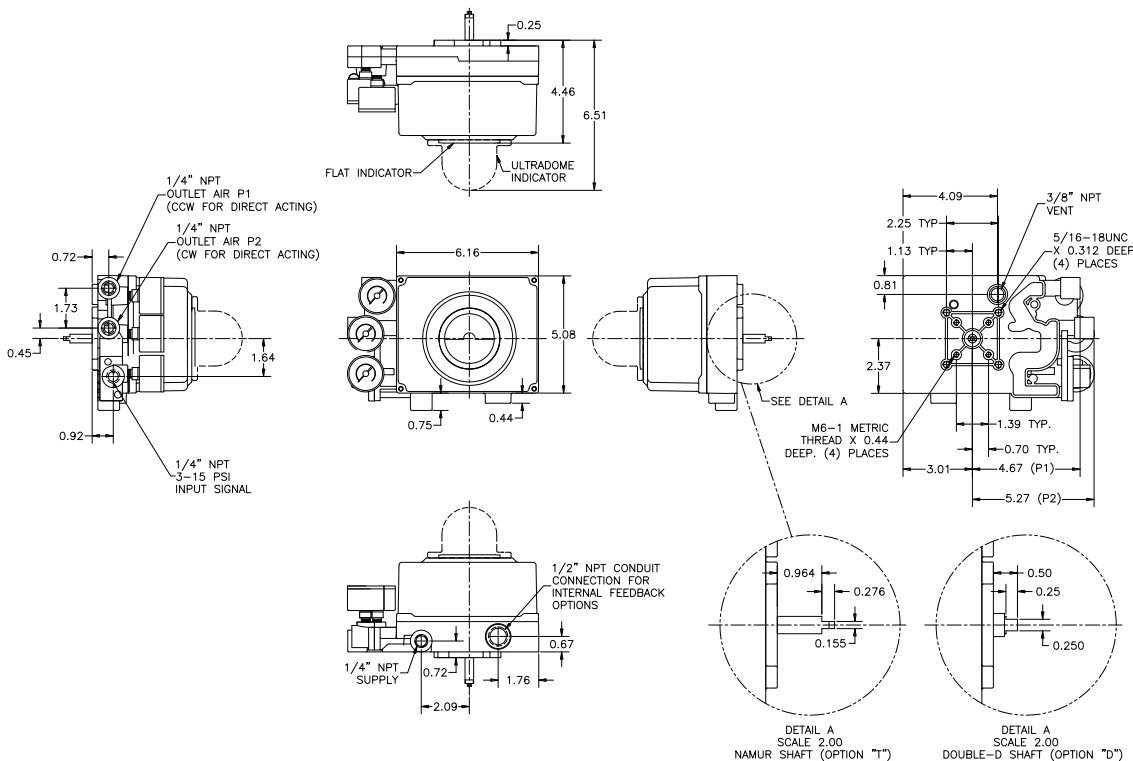
Materials of Construction

Part of Assembly	Materials
Housing	Anodized Aluminum w/ Polyester Powder Paint
Screen/Retainer	Stainless Steel
Cover	Anodized Aluminum w/ Polyester 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-Clip	Stainless Steel

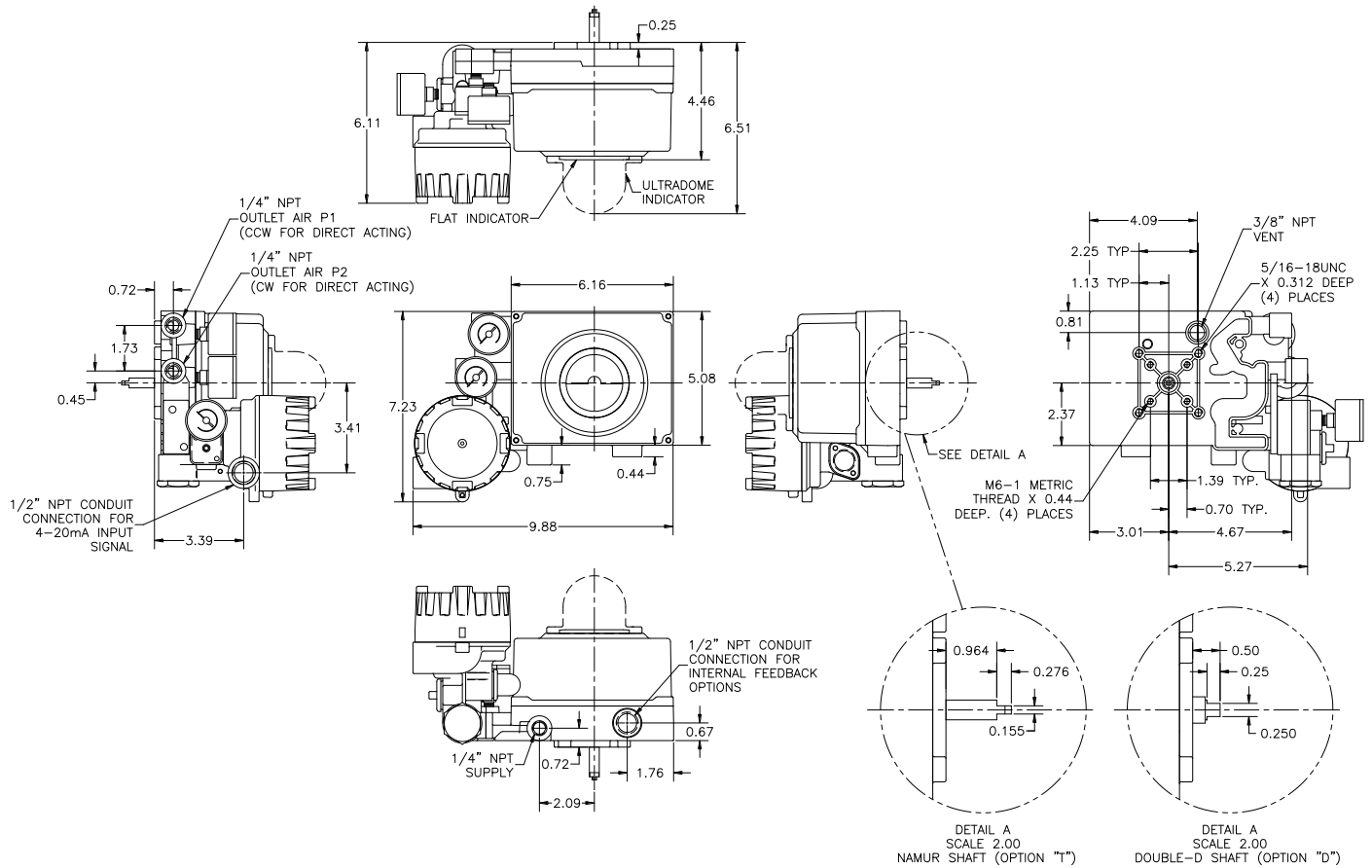
Performance Specifications

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
Steady State Air Consumption	SCFM @ 60 psi	0.38	0.35
Maximum Flow Capacity	SCFM @ 60 psi	16.5	16.5
Ambient Temp. Range - Standard	Degree F	-20° to 185°	-20° to 180°
Ambient Tem. Range - Extended	Degree F	-50° to 250°	-40° to 180°
Input Signal	PSIG/mA	3 to 15	4 to 20
Pneumatic	Inch NPT	1/4	1/4
Conduit Connection	Inch NPT	1/2	1/2
Net Weight	Lbs.	3.5	6

Dimensions: Pneumatic Input Models



Dimensions: Electro-Pneumatic Input Models



POSITIONER OPERATION

The positioner schematic (Figure 1) shows an APEX 8000 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, or 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.

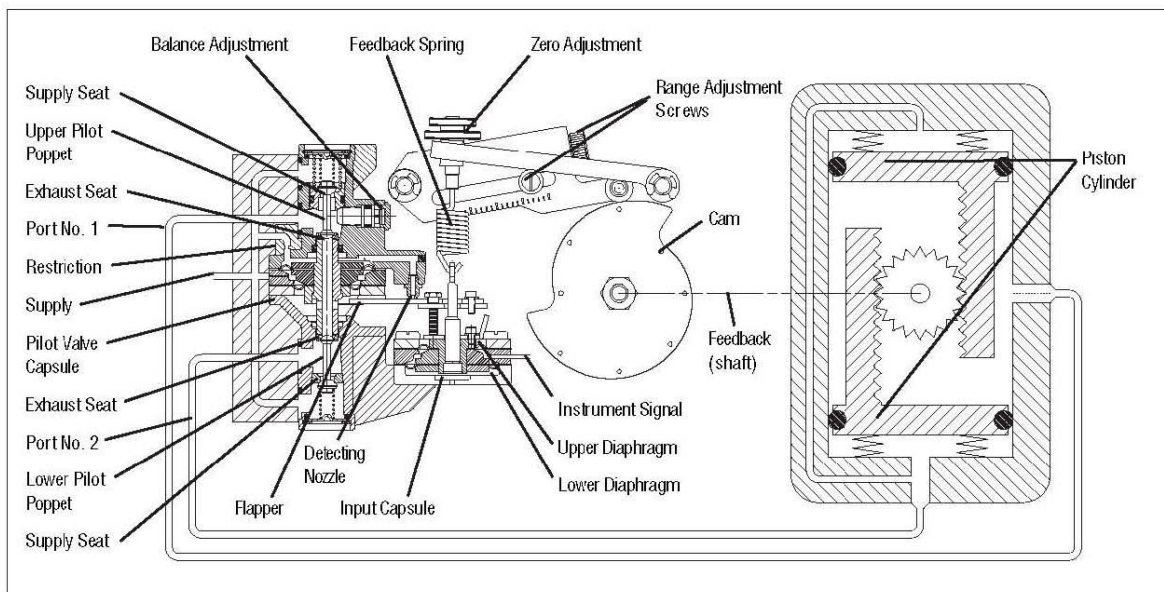


Figure 1: Apex 8000 Positioner Schematic Air-to-Open



Product Nomenclature

- **PREFIX I**
 - Blank – Automax Black Polyester Paint

- **MODEL**
 - 80 – PP Input 3-15 psi
 - 81 – EP Input 4-20 mA General Purpose
 - 82 – EP input 4-20 mA FM/CSA Explosionproof/Intrinsically Safe (See Note 1)
 - 83 – EP Input 4-20 mA ATEX/IEC EEx d IIb +H2 Explosionproof (See Note 2)
 - 84 – EP Input 4-20 mA ATEX/IEC EEx ia IIC Intrinsically Safe (See Note 3)
 - 85 – EP Input 4-20 mA SAA Explosionproof/Intrinsically Safe (See Note 4)

- **INDICATION**
 - 1 – Standard Flat with Green Indicator
 - 2 – UltraDome Indicator
 - K – EKTAR UltraDome Indicator
 - T – Top Mounted UltraSwitch Cover (NAMUR Switchbox)
 - D – Top Mounted UltraSwitch Cover (Double “D” Switchbox)

- **GAUGES**
 - 3 – No Gauges
 - 4 – Standard Gauges (SST casing w/ brass internals)
 - 5 – Stainless Steel Gauges

- **PNEUMATIC RELAY**
 - 6 – 2-Stage Pneumatic Relay – EPDM / -40° to +220°F (-40° to 104°C) (See Note 5)
 - 7 – 2-Stage Pneumatic Relay – Standard -20° to 180°F
 - 8 – 2-Stage Pneumatic Relay – Extended Temperature -40° to 180°F
 - 9 – 2-Stage Pneumatic Relay – VITON / -20° to +350°F (-29° to +121°C) (See note 6)

- **CAM TYPE**
 - A – Standard Linear Cam 3-15 psi, 3-9 psi, 9-15 psi, D or R, 180°
 - C – Characterized Cam, Square (Quick Opening), D or R

- **FEEDBACK OPTIONS**
 - 0 – none
 - F – 4-20mA Transmitter
 - K – (2) SPDT Mechanical Switches
 - M – (2) SPST Proximity Switches
 - N – (2) SPDT Proximity Switches
 - Q – (2) I.S. Rated Solid State Sensors

- **OPTIONS**
 - T – NAMUR Shaft – ½” NPT Conduit Entries
 - D – Double “D” Shaft (.250 flats) – ½” NPT Conduit Entries
 - U – NAMUR Shaft – M20 Conduit Entries
 - V – Double “D” Shaft (.250” flats) – M20 Conduit Entries

- **SPECIAL CUSTOMIZATION**
 - ZZ – Refer to Custom Code Log (See note 7)



Product Specification

Notes:

1. Explosionproof CI I Div 1 Gr. BCD CI II Div 1 Gr. EFG, I.S. CI I II Div 1 Gr ABCDEFG, Non-incendive CI I Div 2 Gr ABCD
2. ATEX Flameproof II 2 GD Ex d IIB+H2 T6(-40°C to +40°C) tD A21 T40°C
3. ATEX Intrinsically Safe II 1 G EEx ia IIC , II 3 GD (T70°C) EEx nL IIC T6 ((-40°C to +40°C)
4. Australia ANZEX Flameproof Ex d IIB+H2, IS EX ia IIC T5 @65°C, Ex n IIC T5
5. If an I/P is used, the temperature rating is -40° to +185°F (-40° to 85° C)
6. If an I/P is used, the temperature rating is -20° to +185°F (-29° to +85° C)
7. Customer options are available and will be assigned a code "ZZ"



Product Specification

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