



# Product Specification

## Accord Controls

## Product Specification

### APEX A8000 High Performance Positioner

FCD ACENPS0130-04

#### Introduction:

The Accord APEX A8000 positioner provides outstanding control for a wide range of valves and dampers. The APEX A8000'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 A8000 is available with many options including position feedback limit switches, 4-20 mA position feedback transmitter, and our UltraDome visual position indicator.

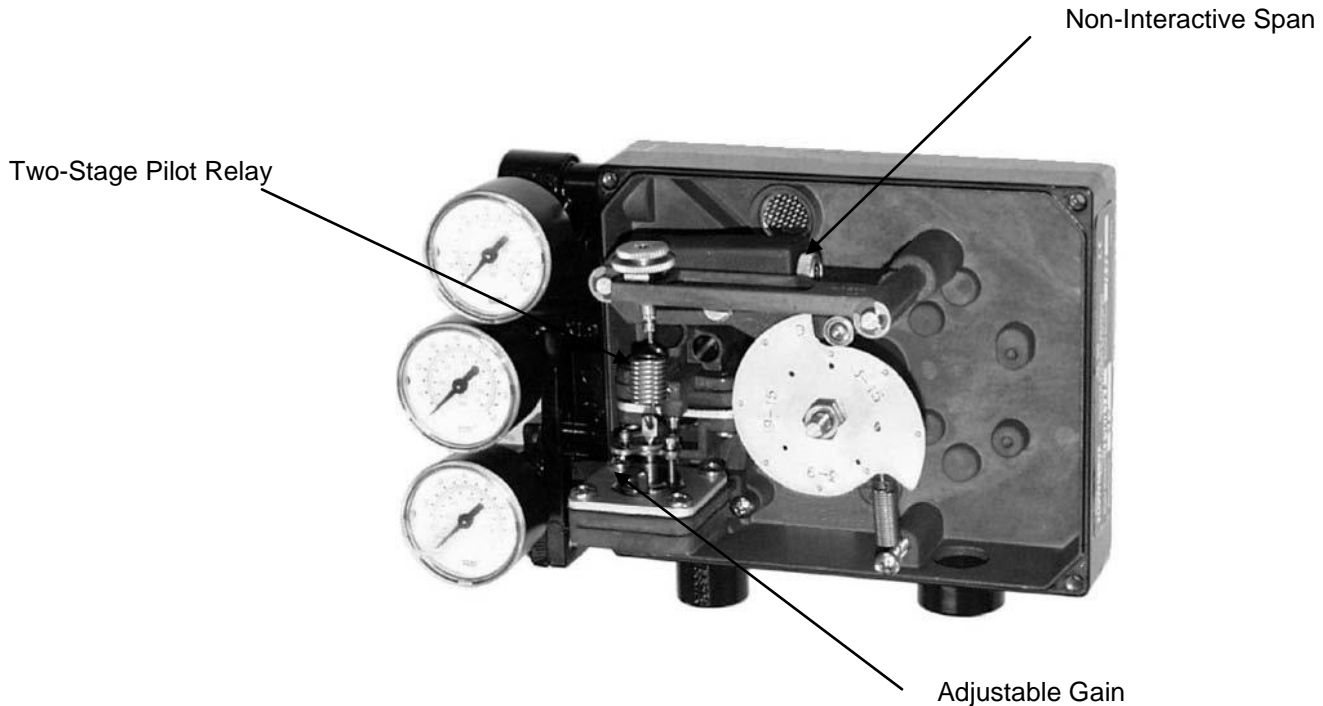


#### Applications:

Accord APEX A8000 positioners may be used to control quarter-turn control valves such as eccentric plug, butterfly, segmented ball, standard ball, and plug valves. The APEX A8000's sensitive two-stage relay also makes it ideal for precise damper control applications. Specify the APEX A8000 whenever valve rotation sensitivity is critical.

The APEX A8000 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 A8000 on non-NAMUR actuators.

The APEX A8000 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 A8000 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 A8000 unaffected by vibrations with accelerations up to 2 G's and frequencies to 500 Hz.

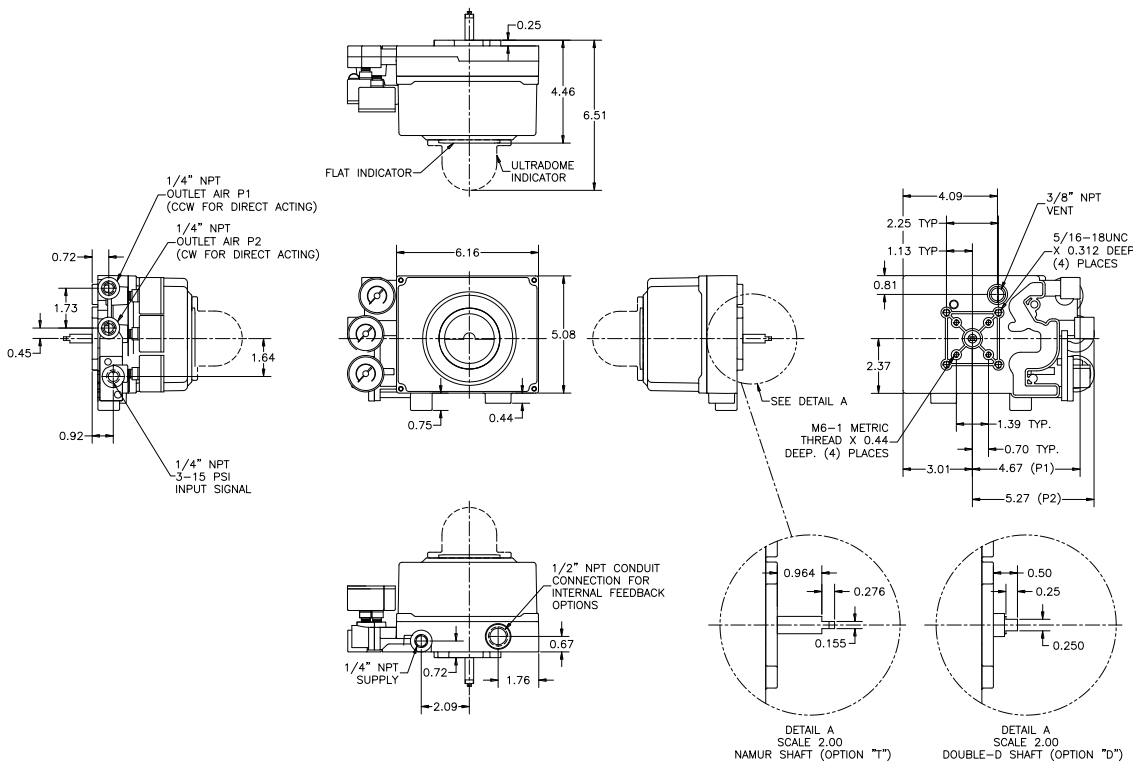
## Materials of Construction

| 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                             |

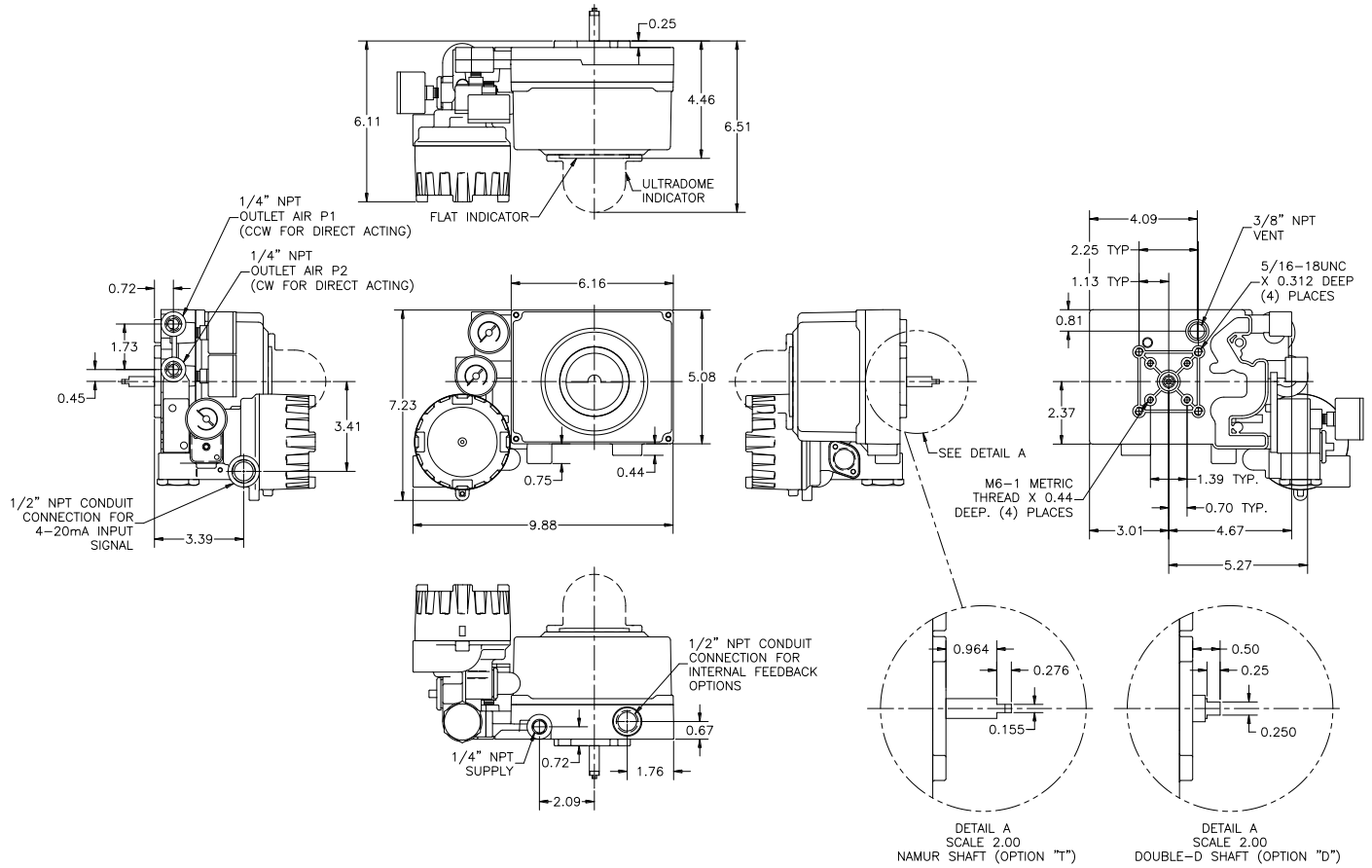
## Performance Specifications

| 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 A8000 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.

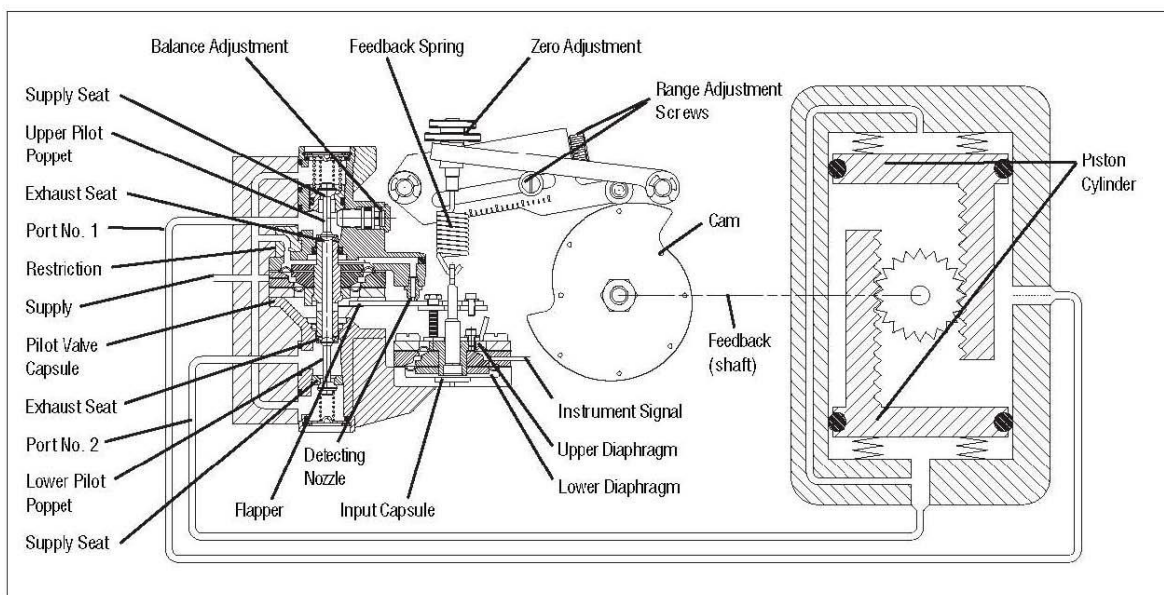
When the opposing forces balance exactly, the system will be in equilibrium and the stem will be in the exact position called for by the instrument signal. If the opposing forces are not in balance, the input capsule will move up or down and, by means of the pilot-valves, will change the output pressures, 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 A8000 Positioner Schematic Air-to-Open**



## Product Nomenclature

- **PREFIX I**
  - A – ACCORD 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) – (2) (2) (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

## Representative:

### **Flowserve Corporation**

Cookeville, Tennessee, USA, 38501  
931 432-4021

### **Flowserve Flow Control UK Ltd**

Haywards Heath, West Sussex, Uk  
44 (0)1444 314400

### **Flowserve Corporation**

12 Tuas Avenue 20  
Singapore  
68798900

### **Flowserve Corporation**

Rua Tocantins, 128  
São Caetano do Sul, SP, Brazil  
55 11 2169-6300

Bulletin FCD ACENPS0130-04

To find your local Flowserve representative please use the Sales Support Locator System found at [www.flowserve.com](http://www.flowserve.com)

Or call toll free: 1-931-432-4021

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation, and maintenance of Flowserve products. The purchaser/user should read and understand the (INSERT OFFICIAL USER INSTRUCTION TITLE) instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

While the information and specifications contained in this literature are believed to be accurate, they are supplied for informative purposes only and should not be considered certified or as a guarantee of satisfactory results by reliance thereon. Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding any matter with respect to this product. Because Flowserve is continually improving and upgrading its product design, the specifications, dimensions and information contained herein are subject to change without notice. Should any question arise concerning these provisions, the purchaser/user should contact Flowserve Corporation at any one of its worldwide operations or offices.

For more information about Flowserve Corporation, contact [www.flowserve.com](http://www.flowserve.com) or call USA 1-800-225-6989.