FLOWSERVE

Automax Valve Automation Systems
Rotary Switches and Positioners

Workhorse, High Reliability, Hostile Environments

Experience In Motion

Flowserve Flow Control Automax Switches and Positioners

Flowserve Corporation's Automax Valve Automation Systems provides complete valve and damper automation to the worldwide processing industries. We provide maximum value to the end user through a broad offering of products, services, application engineering and our systematic approach to automation.

Quality, Dependability and Productivity

Recognized as the leaders in position indication and positioning control, Automax limit switch and positioner products provide unparalleled performance combined with ease of calibration and maintenance.

Automax rotary position indicators and positioners have a proven track record in industries such as chemical and petrochemical processing, oil and gas, pulp and paper, pharmaceutical, and energy-related industries. Hazardous location approvals and corrosion resistant materials make the Automax rotary position indicators and positioners ideal for even the most hostile environments.

Our ISO 9001 certified manufacturing facilities, R&D department and engineering headquarters are located in Springville, Utah; Cookeville, Tennessee and Solna, Sweden.

Sales and service facilities are strategically located in industrial centers throughout the world.

Featured Products

Page 4-6

UltraSwitch™ GL/PL/XCL Series Rotary Position Indicators

The UltraSwitch series of position indicators provides a compact and economical package for both visual and remote electrical indication of valve position. Models are available in both die cast aluminum and engineered resin versions with UL, CSA and ATEX ratings suitable for Class I Division 1,2 and Zone 0, 1, 2 applications.

Page 8, 10

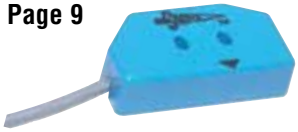
Aviator II™/BUSwitch™ Integrated Valve Controller With Internal Pilot Solenoid

The Aviator Integrated Valve Controller with internal pilot solenoid coil provides a truly integrated package for both visual and electrical position indication as well as control of supply air to rotary actuators. The Automax BUSwitch provides all of the features of the Aviator but enables control and monitoring of automated on-off valves through digital fieldbus technology.

Switch Options

An extensive range of both mechanical and proximity limit switches makes the UltraSwitch and Aviator the perfect choices for a wide range of applications.

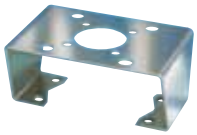
Page 9



AutoBrakits

Stainless steel NAMUR mounting kits provide consistent and reliable direct coupling to NAMUR compliant actuators.

Page 9



Apex 7000 Modular Positioner

Available in die-cast aluminum, the Apex positioner combines precise valve positioning with advanced features. Standard features include non-interactive zero/span and modular options such as 3-15 psi or 4-20 mA control signal, visual indication and top-mount limit switch feedback.

Page 12-15

Apex 8000 High Performance Positioner

A two-stage pneumatic relay gives the Apex 8000 outstanding dynamic response combined with precise throttling control. Features include adjustable gain, noninteractive zero/span, and modular options such as 3-15 psi or 4-20 mA control signal, visual indication and internal or top-mount limit switch feedback.

Page 16-17

Logix ™ Digital Positioner

The Logix positioner provides highly accurate positioning and outstanding dynamic response through advanced digital feedback and control. Two housings are available for general purpose, nonincendive, intrinsically safe, or explosionproof applications. Models are available in 4-20 mA analog input, FOUNDATION Fieldbus, or the industry standard HART protocol.

Page 19-21

GL-Series UltraSwitch™ Position Indicators

The GL-Series rotary limit switch enclosure provides a compact economical package for visual and remote electrical indication of valve position. The die cast aluminum housing is electrostatic powder coated and designed to meet NEMA 4x standards. The housing can also be configured for sanitary applications.

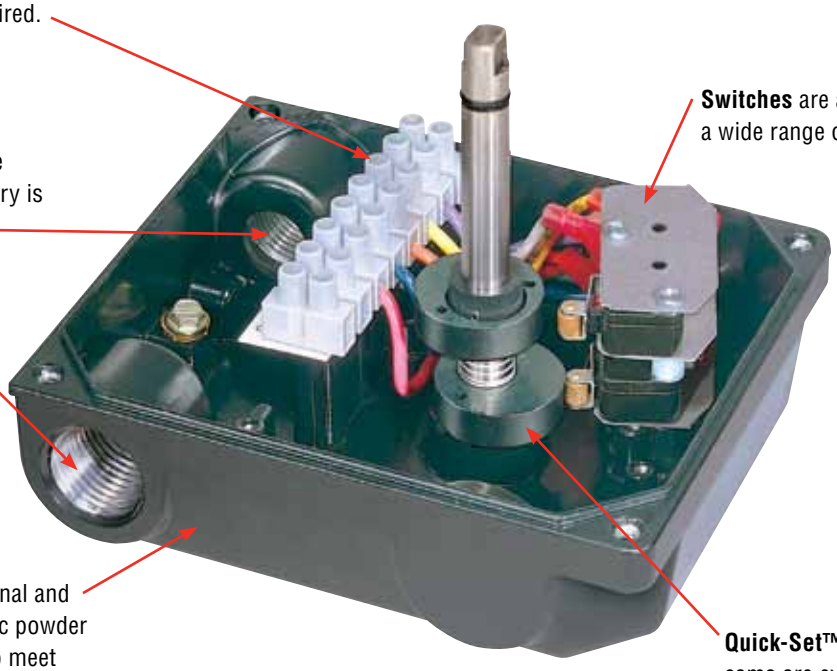
Features:

- **Pharos** visual indicator for high contrast, wide-angle viewing of valve position.
- **NAMUR** mounting compliance eliminates coupler and maximizes interchangeability.
- **Captive** stainless steel cover screws.
- **Sanitary** options include captive stainless steel hex head cover screws.

Standard housing offers a no "nooks and crannies" design to facilitate washdown.

Terminal Strip is multipoint and prewired.

Dual ½" conduit entries are standard; optional third entry is available



Switches are available in a wide range of options.

Housing is die cast aluminum with internal and external electrostatic powder coating, designed to meet NEMA 4x standards.

Quick-Set™ spring loaded cams are extra wide and splined to allow tool-free limit switch calibration.

How To Order *(Select **Bold Type Code** from each column that applies)*

Optional Prefix	Model	Cover	Switch*	Solenoid Options	Options	Extra Terminal Locations
Blank - Double D Shaft (¼" Flats) **N** - NAMUR Shaft **E** - Epoxy Coated **B** - Epoxy Coating/ NAMUR shaft **H** - Hex Head Cover Screws **D** - Hex Head Cover Screws/NAMUR Shaft	**GL**	**1** - Flat Top **2** - Pharos Indicator **C** - Pharos 90° 3-way **D** - Pharos 180° 3-way **E** - Pharos 180° 3-way Center Blocked **T** - Flat Indicator	**0** - No Switches (Empty Housing) **1** - (2) SPDT Mechanical **3** - (2) DPDT Mechanical **4** - (2) SPST Proximity **5** - (2) SPDT Proximity **8** - (2) P&F NJ2-V3-N (NAMUR) **D** - DeviceNet Communication Card **E** - (2) SPDT Sabre Proximity **G** - (2) SPDT Mechanical Gold Contacts **P** - (2) Phazer II SPDT Proximity **T** - (2) Phazer II BRS SPST Proximity **Z** - AS-i Communications Card	**0** - No Solenoid	**Blank** - No Option **T** - Third Conduit Entry **H** - Heavy-Duty** Terminal Block **I** - F.M. Intrinsically Safe Class I, II, III Div I Groups A-G (see notes)	**Blank** - 2 Open Terminal Locations (Standard) **4** - 4 Open Terminal Locations (2 SPST Switches) **6** - 6 Open Terminal Locations (2 SPDT Switches) **8** - 8 Open Terminal Locations (2 SPST Switches)

Note: *Example: GL210, NGL130T*
I option valid for Type 4, 8, E, G and T switch types.
For replacement Pharos kit part numbers, see UltraSwitch nomenclature
** Consult factory for additional switch options*
*** 2 SPST or 2 SPDT only. Maximum of 8 Terminals.*

PL-Series UltraSwitch™ Position Indicators

The PL-Series UltraSwitch is provided with an engineered resin enclosure making it ideal for harsh corrosive environments. It is certified to UL/CSA/ATEX standards for nonincendive Class 1, Div. 2 hazardous locations. Designed to meet NEMA 4, 4x standards, the housing features a unique labyrinth cover seal.

Features:

- **UltraDome™** visual indicator provides high contrast, wide-angle viewing of valve position.
- **Quick-Set™** spring loaded cams are extra wide and splined to allow tool-free limit switch calibration.
- **Switches** available in a wide range of options.
- **Terminal Strip** is multipoint and prewired.
- **Housing** is an engineered resin suitable for corrosive environments.
- **Dual** ¾" conduit entries are standard.
- **NAMUR** mounting compliance eliminates coupling and maximizes interchangeability.
- **Captive** stainless steel cover screws.
- **Internal Potting Wells** within housing at the conduit entries available for factory sealed leads. They may be filled with conduit potting compound or RTV silicone sealant to prevent the ingress of corrosive vapors or liquids.

How To Order *(Select **Bold Type Code** from each column that applies)*

Optional Prefix	Model	Cover	Switch*	Analog Output	Solenoid Options	Options	Extra Terminal Locations
Blank - Double D Shaft (¼" Flats) **N** - NAMUR Shaft **H** - Hex Head Cover Screws **D** - Hex Head Cover Screws/ NAMUR Shaft	**PL** - Zytel® Engineered Resin Housing, NEMA 4, 4x	**1** - Flat Cover **U** - UltraDome Indicator **C** - 90° 3-way **D** - 180° 3-way **E** - 180° 3-way Center Blocked	**0** - No Switches (Empty Housing) **1** - (2) SPDT Mechanical **2** - (4) SPDT Mechanical **A** - (2) SPDT Mechanical with 3-Position Control **D** - DeviceNet Communication Card **G** - (2) SPDT Mechanical, Gold Contacts **3** - (2) DPDT Mechanical **4** - (2) SPST Proximity **5** - (2) SPDT Proximity **6** - (4) SPST Proximity **E** - (2) Sabre SPDT Proximity **F** - (4) Sabre SPDT Proximity **P** - (2) Phazer II SPDT Proximity **H** - (4) Phazer II SPDT Proximity **T** - (2) Phazer II BRS SPDT Proximity **W** - (4) Phazer II BRS SPDT Proximity **8** - (2) P&F NJ2-V3-N (NAMUR) **U** - (2) GO Proximity, 35-13319-A1A **Z** - AS-i Communications Card	**0** - None **T** - 4-20 mA Transmitter **D** - 180° Travel 4-20 mA Transmitter **E** - 45°/60° Travel 4-20 mA Transmitter **A** - 0-1k Ohm Potentiometer **B** - 0-5k Ohm Potentiometer **C** - 0-10k Ohm Potentiometer	**0** - None	**0** - No Option **H** - Heavy-Duty Terminal Block** **P** - Seal/Potted Leads **I** - FM/CSA Intrinsically Safe Class I, II, III Div 1, A-G (See Notes)	**Blank** - 2 Open Terminal Locations (Standard) **4** - 4 Open Terminal Locations (2 SPST switches) **6** - 6 Open Terminal Locations (2 SPDT switches) **8** - 8 Open Terminal Locations (2 or 4 SPST switches)

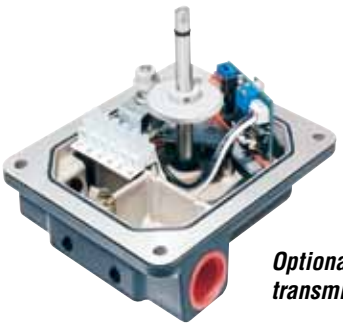
**Consult factory for additional switch options.*
Zytel® is a registered trademark of DuPont.
Note: I option valid for Type 4, 8, E, G and T switch types
*** 2 SPST or 2 SPDT only. Maximum of 8 Terminals.*

XCL-Series UltraSwitch™ Position Indicators

The XCL-Series UltraSwitch is a globally-certified explosionproof/flameproof position indicator for use throughout the world. The rugged die cast aluminum enclosure has a dichromate undercoat and electrostatic polyester powder topcoat for superior corrosion resistance. The housing is certified to UL/CSA/ATEX standards and is available with optional position transmitter and a wide range of switches.

Features:

- **UltraDome™** visual indicator provides high contrast, wide-angle viewing of valve position.
- **Quick-Set™** spring loaded cams are extra wide and splined to allow tool-free limit switch calibration.
- **Switches** available in a wide range of options.
- **Terminal Strip** is multipoint and prewired.
- **Housing** is die cast aluminum with dichromate undercoat and electrostatic powder topcoat, UL/CSA/ATEX approved for hazardous locations.
- **Dual** ¾" conduit entries are standard.
- **NAMUR** mounting compliance eliminates coupling and maximizes interchangeability.
- **Captive** stainless steel cover screws.
- **Potting** compartments available for factory sealed leads.



Optional 4-20 mA transmitter shown

How To Order *(Select **Bold Type Code** from each column that applies)*

Shaft Option	Model	Indicator Option	No. Switches	Switch Type*
D - Double D Shaft (¼" Flats) **N** - NAMUR Shaft	**XCL** - (2) ¾" NPT Conduit **XML** - (2) M25 Conduit	**1** - Flat Top (no indicator) **U** - Red/Green (std) **C** - 90° 3-way **D** - 180° 3-way **E** - 180° 3-way Blocked Center **K** - Ektar Red/Green **H** - Black/Yellow **R** - Reverse (Red = Open, Green = Closed) **3** - Four window Ultradome **F** - 120° thru/divert Ultradome **W** - White = closed, Blue = open **X** - Three position Type 6 White = closed, Blue = open	**0** - No Switches **1** - 1 Switch **2** - 2 Switches **4** - 4 Switches	**00** - No Switches **M1** - SPDT Mechanical **MC** - SPDT Mechanical - Construction for 250°F **MG** - SPDT Mechanical - Gold Plated **M3** - DPDT Mechanical **MB** - DPDT Mechanical - Licon **MA** - 3-Position Control **MD** - DA 3-Position Control w/Indication **MS** - SR 3-Position Control w/Indication **P4** - SPST Proximity **P5** - SPDT Proximity **PE** - SPDT Sabre **PP** - SPDT Phazer II **PL** - SPDT Phazer II Proximity with LED **PT** - SPST Phazer II BRS Proximity **PX** - SPST Phazer II BRS Proximity with LED **N8** - P+F NJ2-V3-N **NQ** - P&F NJ4-12GK-N (NAMUR) **NR** - P&F NJ4-12GM40-E1 (3-Wire NPN NO) **NS** - P&F NJ4-12GM40-E2 (3-Wire PNP NO) **NT** - P&F NJ4-12GK40-E2 (3-Wire PNP NO) **NP** - P&F SJ3.5-N (NAMUR) **NU** - GO Proximity 35-13319-A1 **SN** - 3-Way Pneumatic Valves **FZ** - AS-i Communications Card **FD** - DeviceNet Communications Card

Certifications	Analog Output Options	Wiring Options
- 14 - General Purpose **- 17** - UL/CSA CI.I,Div.I,Gr.CD/CI.1,Div.2 Gr.A-D / CL II Div.1, 2 GR E,F,G/CL III **- 18** - UL/CSA/ATEX Explosionproof **- 19** - ATEX Explosionproof **- 25** - IECEx Ex d IIB T5, Ex tD A21 IP 65 **- 26** - InMetro BR Ex d IIB T5 **- 27** - Factory Mutual/CUS Intrinsically Safe CI I,II,III Div. 1,2 GR A-G T5** **- M1** - Metal Nameplate UL/CSA/ATEX Explosionproof (Mechanical Switch) **- M2** - Metal Nameplate UL/CSA/ATEX Explosionproof (Proximity Switch) **- M3** - Metal Nameplate ATEX Explosionproof	**- 0** - None (std) **- T** - 4-20 mA Transmitter **- D** - 180° 4-20 mA Transmitter **- A** - 0-1k Ohm Potentiometer **- B** - 0-5k Ohm Potentiometer **- C** - 0-10k Ohm Potentiometer	**0** - None (std) **H** - Heavy-Duty Terminal Strip*** **1** - Brad Harrison 3 pin **2** - Brad Harrison 5 pin **3** - Brad Harrison 7 pin **P** - Sealed / Potted Leads

Open Terminals (Minimum)	Special Options	Coating Options
2 - 2 open (std) **4** - 4 open Terminal Locations (2 SPST Switches) **6** - 6 open Terminal Locations (2 SPDT Switches) **8** - 8 open Terminal Locations (2 or 4 SPST Switches)	**0** - None (std) **P** - 180° Potentiometer Gearing **V** - Viton O-rings **L** - Lubricated cover bolts **N** - No silicone	**0** - Black Polyester Powdercoat (std) **E** - White Epoxy **W** - White Epilon II

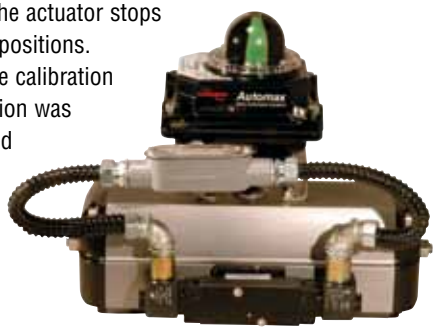
Example
NXCLU2M1-18-00200 = Automax XCL UltraSwitch, NAMUR Shaft, UltraDome indicator, (2) SPDT Mechanical switches, UL/CSA and ATEX certifications.
**Consult factory for additional switch options.*
*** -27 option valid for MG, P4, P5, PE, PT, and N8 switch options.*
****2 SPST or 2 SPDT only. Maximum of 8 Terminals.*

3-Position Control Systems

Automax offers a wide range of solutions for dribble control or 3-position control applications. The Limit Switch Method utilizes a specially configured UltraSwitch with Automax solenoid valves to control the actuator through three distinct positions. The Positioner Method utilizes an Apex positioner with a special 3-position control circuit kit that permits a fail-safe operation of the actuator to the CW, Mid or CCW position on loss of air and/or electric. Options are available for feedback at all three positions.

Limit Switch Method:

- **Dribble Control** – primarily used with spring return actuators installed on 2-way valves, this system is generally used on tank-filling applications. The fully adjustable mid-position, or "dribble" position, permits the valve to stop short of closing to minimize spilling or overfilling. Based on the actuator's fail direction, the package will fail CW or CCW on loss of air and/or electric.
- **3-Position Control** – used for 180° 3-way ball or plug valve applications where the actuator stops at 0°, 90° and 180° positions. The quick and simple calibration of the 90° mid-position was specifically developed for 3-way valve configurations utilizing 180° double acting actuators.



Positioner Method:

The most versatile system available, the Positioner Method can be used on dribble or 3-position control applications with 90° spring return/double acting or 180° double acting actuators. Primarily utilized on double acting actuator packages, this method provides actuator failure to the CW, Mid or CCW positions on loss of electric and/or air supply (with Automax Fail-Safe accumulator tank assembly).

Features:

- **Integral Cam Assembly.** Specially designed cams permit quick and easy mid-position calibration with pinpoint accuracy.
- **Feedback Options.** 3-way visual indicator and electrical position feedback available for remote indication of the CW, Mid or CCW position.
- **Independent Feedback Circuits.** Separate position indication loops permit alternate power source for feedback to PLC/DCS rather than voltage for solenoid valve control.
- **Mid-Position from CW/CCW.** Unlike other systems available today, the mid-position can be reached from either direction.
- **Pre-wired UltraSwitch simplifies installation.** The terminal strip features pre-wired jumpers and solenoid leads, permitting the operator to simply apply signal to the CW, Mid or CCW terminal locations.
- **AC or DC Circuits** available.

How To Order *(Select **Bold Type Code** from each column that applies)*

Prefix	Method	Schematic	Enclosure*	Coil Classification	Shaft Option	Dome Option	Coil Voltage
3POS	**DA** - Double Acting Actuator **SR** - Spring Return Actuator	**AC Circuits** **1** - DA Actuator w/o Electrical Position Indication (per sch.# 807448-A) **2** - SR Actuator w/o Electrical Position Indication (per sch.# 807451-A) **3** - DA Actuator w/ Electrical Position Indication (per sch.# 807523-A) **4** - SR Actuator w/ Electrical Position Indication (per sch.# 807524-A) **DC Circuits** **5** - DA Actuator w/o Electrical Position Indication (per sch.# 807644-A) **6** - SR Actuator w/o Electrical Position Indication (per sch.# 807645-A) **7** - DA Actuator w/ Electrical Position Indication (per sch.# 807613-A) **8** - SR Actuator w/ Electrical Position Indication (per sch.# 807622-A)	**X** - XCL-Series UltraSwitch **P** - PL-Series UltraSwitch	**W** - Weatherproof NEMA 4, 4x **X** - Explosionproof NEMA 4, 4x, 7, 9	**N** - NAMUR Shaft (std) **S** - Double-D Shaft (¼" Flats)	**2** - Red/Green UltraDome **C** - 3-way 90° Indicator **D** - 3-way 180° Indicator **E** - 3-way 180° Blocked Center Indicator	**1** - 110 VAC/50 Hz, 120 VAC/60 Hz **2** - 220 VAC/50 Hz, 240 VAC/60 Hz **3** - 22 VAC/50 Hz, 24 VAC/60 Hz **4** - 24 VDC
				Example 3POSDA3XWNE1 would have description and comments as follows: **Double Acting Actuator** DA Actuator w/ Position Indication (AC Circuit - per sch.# 807523-A) XCL-Series UltraSwitch with Weatherproof NEMA 4, 4x Controls NAMUR Shaft 3-way 180° Blocked Center Indicator 110 VAC/50 Hz, 120 VAC/60 Hz Coils		

**Consult factory for Positioner Method 3-Position Control Systems.*

Aviator II™ Integrated Valve Controller

The Aviator XV-Series Integrated Valve Controller enclosure and solenoid valve provide an integrated package for position indication and control of supply air to rotary actuators. The XV-Series housing is globally certified explosion proof / flameproof with UL / CSA / ATEX / IECEx approvals for use throughout the world.

WR-Series

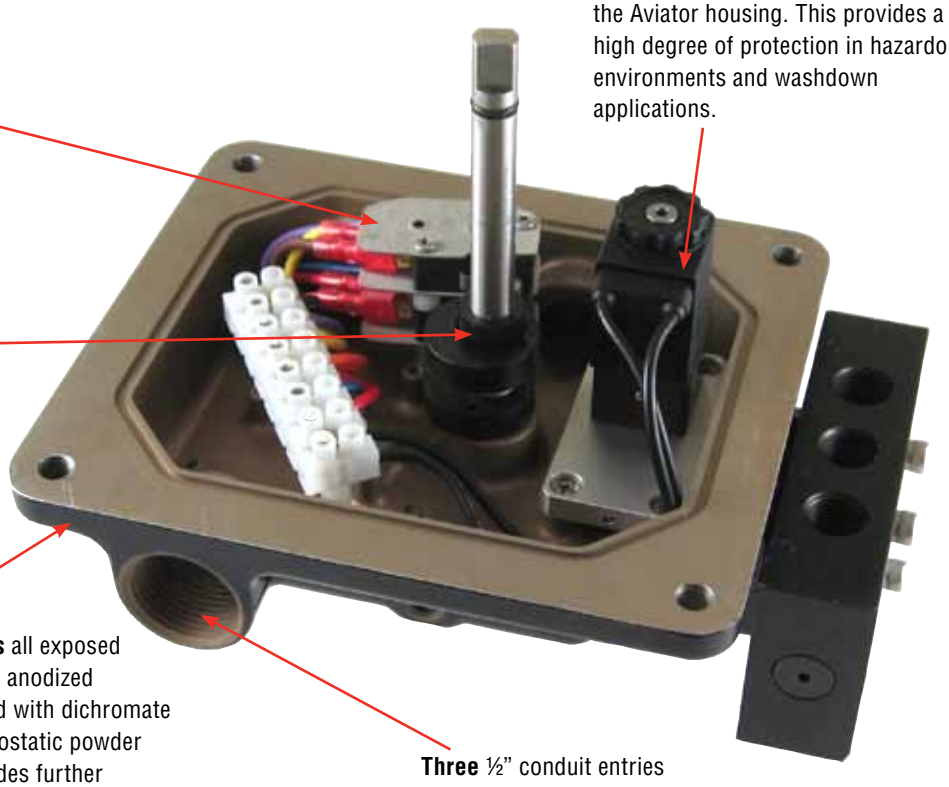
The WR-Series offers many features of the XV-Series in an engineered resin housing. The housing made of engineered resin provides an excellent enclosure for harsh chemical environments and can be rated for nonincendive and intrinsically-safe applications. In addition, dual internal solenoid coils are available in the WR-Series.

Features

- **Captive** stainless steel cover screws.
- **UltraDome** visual position indicator provides high contrast, wide-angle viewing of valve position.
- **Fieldbus Upgradeability.** The Aviator has been designed to accommodate the circuitry required to interface with various fieldbus protocols.
- **NAMUR** mounting compliance eliminates coupler and maximizes interchangeability.

Internal Pilot Solenoid Coil offers the advantage of having the solenoid coil contained and protected within the Aviator housing. This provides a high degree of protection in hazardous environments and washdown applications.

Switches are available in a wide range of options.



Quick-Set™ spring loaded cams are extra wide and splined to allow tool-free limit switch calibration.

Corrosion Resistant Materials all exposed parts are either stainless steel, anodized aluminum, or aluminum treated with dichromate undercoat and polyester electrostatic powder top coat. The WR-Series provides further protection with an engineered resin enclosure.

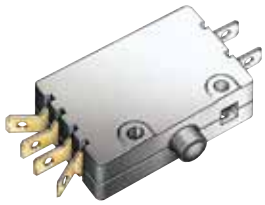
Three ½" conduit entries are standard (XV-Series).

UltraSwitch™/Aviator™ Internal Switch Options

Mechanical Switches

Type 1 / M1
(2) SPDT Mechanical
15 amp @ 125 VAC,
½ amp @ 125 VDC
Minimum 50 mA

Type G / MG
(2) SPDT Mechanical
Gold-Plated Contacts
1 amp @ 125 VAC
1 amp @ 24 VDC
Minimum 1 mA



Type 3
(2) DPDT Mechanical
15 amp @ 125 VAC
Minimum 50 mA
Consult factory for DC voltages

Proximity Switches

hermetically sealed for long life.

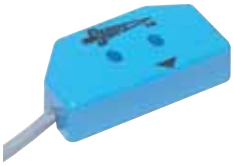
Type 4 / R4
(2) SPST Proximity
0.35 amp @ 140 VAC,
1 amp @ 50 VDC, 50 Watt Max.
Minimum 1 mA

Type 5
(2) SPDT Proximity
¼ amp @ 120 VAC,
¼ amp @ 28 VDC, 3 Watt Max.
Minimum 5 mA

Type 8
(2) Solid State Pepperl & Fuchs Proximity
2-wire NAMUR per DIN 19234

High Performance Proximity Switches

hermetically sealed for severe service and long life.



Type E / P1 Sabre Switch
(2) SPDT Proximity
1 amp @ 120 VAC,
1 amp @ 24 VDC, 25 Watt Max.
Minimum 1 mA

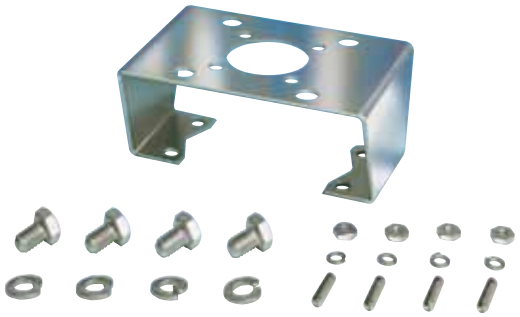
Type P / PP Phazer II
(2) SPDT Proximity
3 amp @ 120 VAC,
2 amp @ 24 VDC, 100 Watt Max.
Minimum 50 mA

Type T / B4 BRS
(2) SPST Proximity
3 amp VAC,
½ amp @ 24 VDC, 100 Watt Max.
Minimum 1 mA

Many additional switch options are available. Consult factory for details.

AutoBrakits

NAMUR mounting kits and NAMUR shaft options permit direct coupling of Automax limit switches or positioners to NAMUR actuators. Our NAMUR shaft options include an integral alignment pin to ensure accurate fit between accessory and actuator. The kits feature stainless steel construction at an economical price.



How To Order *WR / FR Series Resin Aviator/ BUSwitch (Select **Bold Type Code** from each column that applies)*

Model	Indicator	Switch	Number of Coils	Solenoid Coil	Spool Valve	Shafts and Coatings	Spool Valve Options
WR - Resin NEMA 4, 4x **FR** - Resin I.S. Class 1, Div. 1 Groups A-D **see note for sensor availability.*	**U** - UltraDome Indicator **C** - 90° 3-way **D** - 180° 3-way **E** - 180° 3-way Center Blocked	**M1** - (2) SPDT Mechanical **MG** - (2) SPDT Mechanical Gold Contacts **R4** - (2) SPST Proximity **P1** - (2) Sabre SPDT Proximity **PP** - (2) Phazer II SPDT Proximity **B4** - (2) BRS SPST Proximity **S4** - (2) P&F NJ2-V3-N (NAMUR) **SE** - (2) Efector Type IN-2002-ABOA **Communication Protocol** **F2** - 2-wire FOUNDATION Fieldbus **F4** - 4-wire FOUNDATION Fieldbus **FA** - AS-i **FN** - DeviceNet	**0** - Single Coil **1** - Dual Coil **2** - External Solenoid Coil (BUSwitch only F4 option)	**A** - 110 VAC 50/60 Hz **C** - 220 VAC 50/60 Hz **F** - 12 VDC **G** - 24 VDC **H** - 12 VDC Low Power **J** - 24 VDC Low Power **K** - 24 VDC Intrinsically Safe **BUSwitch Only** **G** - 24 VDC **J** - 24 VDC Low Power **P** - 24 VDC Piezo Ultra-Low Power (F2 Protocol only) **O** - None (F4 option only)	**1** - 3-way Aluminum **2** - 3-way Stainless Steel **3** - 4-way Aluminum **4** - 4-way Stainless Steel	**N** - NAMUR Shaft	**R** - Thermoplastic Rain Caps (Standard) **M** - Thermoplastic Rain Caps/Momentary Manual Override **L** - Thermoplastic Rain Caps/Locking Manual Override **X** - Sintered Bronze Exhaust Mufflers **Y** - Sintered Bronze Exhaust Mufflers/Momentary Manual Override **Z** - Sintered Bronze Exhaust Mufflers/Locking Manual Override **S** - Stainless Steel Exhaust Mufflers **T** - Stainless Steel Exhaust Mufflers/Momentary Manual Override **U** - Stainless Steel Exhaust Mufflers/Locking Manual Override

***Note:** IS approval valid for Aviator with Type MG, R4, B4 and S4 with "K" coil. Also valid for BUSwitch F2 option and "P" coil.*

How To Order *Aviator II Discrete Valve Contoller (Select **Bold Type Code** from each column that applies)*

Shaft Type	Model	Indicator Option	No. Switches	Switch Type*
D - Double D Shaft (¼" Flats) **N** - NAMUR VDI / VDE 3845 Shaft	**XV** - Aluminum Housing, Explosion-proof / Flame-proof, (2) ¾" NPT Conduit **XM** - Aluminum Housing, Explosion-proof / Flame-proof, (2) M20 Conduit	**U** - Standard UltraDome (Red/Green) **3** - 4-Window UltraDome **C** - 90° 3-way UltraDome **D** - 180° 3-way UltraDome **E** - 180° 3-way Blocked Center UltraDome **F** - 120° thru/divert UltraDome **H** - Black Yellow UltraDome **K** - Ektar UltraDome (Red/Green) **R** - Reverse UltraDome (Red = Open, Green = Closed) **W** - White/Blue UltraDome **X** - 180° 3-Way UltraDome (White/Blue)	**0** - 0 Switch Elements **1** - 1 Switch Element **2** - 2 Switch Elements **3** - 3 Switch Elements **4** - 4 Switch Elements	**M1** - SPDT Mechanical **MG** - SPDT Mechanical - Gold Plated **MB** - DPDT Mechanical - Licon **P4** - SPST Proximity **PE** - Sabre SPDT Proximity **PP** - Phazer SPDT Proximity **PL** - Phazer SPDT Proximity with LED **PT** - BRS SPDT Proximity **PX** - BRS SPDT Proximity with LED **N8** - P+F NJ2-V3-N / NJ2-V3-N-V5 (NAMUR) **NP** - P+F SJ3.5N (NAMUR) **FA** - AS-i **F2** - FOUNDATION Fieldbus-2-Wire **F4** - FOUNDATION Fieldbus-4-Wire **FN** - DeviceNet

Certifications	Number of Coils	Solenoid Coil Voltage	Spool Valve
- 14 - General Purpose **- 17** - CSA Cl.I,Div.I,Gr.CD T6/Cl.1,Div.2 Gr.ABCD T3C/ CL II Div.1 GR E,F,G - Div.2 GR E,F,G, CL III T6, CL I, Zone 1 Aex-d IIB T3/T4 - CL I Zone 1 Ex-d IIB T3/T4 **- 19** - ATEX II 2 G EEx d IIB T5 **- 24** - CSA Cl.I,Div.I,Gr.CD / CL II Div.1 GR E,F,G, Div.2 GR E,F,G / CL III T6 - CL I, Zone 1 Aex-d IIB T3/T4 / CL I Zone 1 Ex-d IIB T3/T4 **- 25** - IECEx Exd IIB T3/T4 IP65 **- 27** - cFMus Cl I,II,III Div 1 GR ABCDEFG T5 **see for sensor availability.*	**- 0** - Integral Single Coil **- 1** - External Solenoid Coil (F4 option only)	**- 0** - None (F4 option only) **- A** - 110VAC/50Hz, 120VAC/60Hz (2-Watt) **- C** - 220VAC/50Hz, 240VAC/60Hz (2-Watt) **- F** - 12VDC (2-Watt) **- G** - 24VDC (2-Watt) **- H** - 12VDC Low-Power (.67 Watt) **- J** - 24VDC Low-Power (.67 Watt) **- K** - 24VDC Intrinsically Safe **- P** - 24VDC Ultra Low-Power (Piezo.006 Watt) (F2 option only)	**000** - None **3A2** - 3-Way Aluminum - 1.8 Cv **3S2** - 3-Way Stainless Steel - 1.8 Cv **3A4** - 3-Way Aluminum - 4.5 Cv **3S2** - 3-Way Stainless Steel - 4.5 Cv **4A2** - 4-Way Aluminum - 1.8 Cv **4S2** - 4-Way Stainless Steel - 1.8 Cv **4A4** - 4-Way Aluminum - 4.5 Cv **4S4** - 4-Way Stainless Steel - 4.5 Cv

Coating Options	Spool Valve Exhaust Mufflers	Override Options	Other Options
P - Polyester Powder Coating (std) **E** - White Epoxy Coating	**R** - Thermoplastic Rain Caps (Standard) **B** - Sintered Bronze Exhaust Mufflers **S** - Stainless Steel Exhaust Mufflers	**N** - No Override (Standard) **M** - Momentary Manual Override **L** - Locking Manual Override	**1** - Silicone Free Aviator (Magnalube Grease or Equivalent) **E** - Wiedmuller Terminal (European Style) **P** - High Temp Phenolic **L** - Low Temp Spool

**IS approval valid for: MG, P4, PE, PT, N8, and NP sensors with K coil. Also valid for F2 option & "P" coil.*

BUSwitch™ Integrated Valve Controller

The BUSwitch™ Integrated Valve Controller provides all of the features of the Aviator but enables control and monitoring of automated on-off valves through fieldbus technology. The BUSwitch communication cards provide a gateway to fieldbus networks allowing seamless integration of the limit switches and solenoid valves. The integral BUSwitch functions assist the user with predictive and preventative maintenance. The intelligent valve automation package features AS-i, Foundation Fieldbus and DeviceNet protocols. The BUSwitch is available in both explosionproof aluminum or corrosion resistant engineered resin housings.

Protocol-Specific Features:

- **Foundation Fieldbus** BUSwitch controls include cycle counter and timer functions. User-selectable failure modes permit valves to move to desired position on loss of communications. Dry-contact external input enables integration of emission-detecting pressure switch or other simple device.
- **DeviceNet** BUSwitch offers basic on-off valve control with limited diagnostic capabilities. Solenoid coil continuity, stroke timer, and stroke counter provide important information for effective valve and actuator maintenance. A dry-contact external input enables integration of emission-detecting pressure switch or other simple device.
- **AS-i** BUSwitch provides simple on-off valve control in a very economical package. It is available in all limit switch enclosures, including the GL, PL and XCL UltraSwitches.

AS-i

- GL, PL and XCL-Series UltraSwitch (requires external 24 VDC solenoid valve)
- WR and XV-Series BUSwitch with integral coil and spool valve
- Centura CE-Series electric actuator (independent circuit permits use of any motor voltage option)

DeviceNet

- GL, PL and XCL-Series UltraSwitch (requires external 24 VDC solenoid valve)
- WR and XV-Series BUSwitch with integral coil and spool valve

Foundation Fieldbus

- WR, FR and XV-Series BUSwitch with integral coil and spool valve
- Centura CE-Series electric actuator (24 VDC motor only)
- Logix 3400IQ/MD series digital positioner

HART

- Logix 520si/MD digital positioner
- Logix 3200IQ/MD series digital positioner

	AS-i	Foundation Fieldbus	DeviceNet
Max. No. of Devices/ Segment	63	32	64
Max. Cable Length (ft)	328	2953	328
Data Speed (kbps)	167	31.25	125 to 500

Flowserve Flow Control Automax Positioners

Flowserve is a leader in the integration of microprocessor technology and digital communications into control valve and quarter-turn actuation products. Whether you are looking to interface with the latest fieldbus protocol or for the highest performance digital technology, Flowserve can answer your needs.

The **Automax family** of positioners provides a full line for your control valve requirements, from basic analog positioners to high performance digital positioners. All analog positioners are offered in pneumatic or electro-pneumatic versions. Digital positioners are available for HART or FOUNDATION Fieldbus communication protocols. Positioners are available with global certifications including FM, CSA, SAA and ATEX approvals.

Apex 7000

High performance, modular analog positioner with advanced features.

Apex 8000

Top of the line analog positioner with advanced features.

Logix 500si

Full-featured, high performance, digital positioner for general purpose, nonincendive and intrinsically safe applications.

Logix 3200IQ

Full-featured, top of the line performance, digital positioner with explosionproof enclosure.

Apex 7000 Series

Apex 7000 Series

The Apex 7000 Series Positioner provides accurate valve positioning with advanced features. It may be used with 3-15 psi pneumatic control signals, or fitted with an optional current-to-pressure transducer for 4-20 mA signal input. The Apex is available with many options including: top-mount limit switches, position feedback transmitter, speed controls, and our UltraDome Visual Position Indicator.

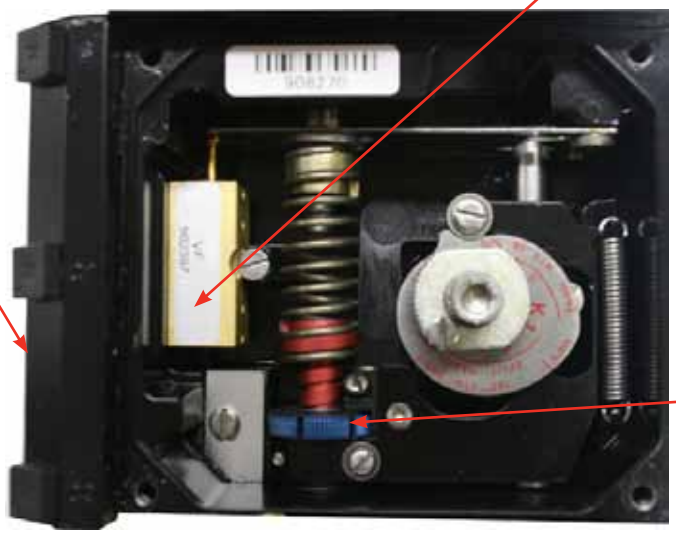
Features

- **NAMUR** mounting compliance eliminates coupler and maximizes interchangeability.
- **Captive Cover Screws** permit calibration while minimizing the potential for lost screws.
- **Optional UltraDome Visual Position Indicator** provides high contrast, wide-angle viewing of valve position.
- **Vibration Resistant**. Low spool mass, outboard spool bearings, and locking calibration adjustments provide reliable operation under high vibration.
- **Field Upgradeable**. The Apex is field upgradeable to various electro-pneumatic options. Switches and/or a position transmitter are field installable via top-mount UltraSwitches.

Pneumatic Positioner
APEX 7000

Housing is die cast aluminum with electro-deposited epoxy paint or with optional TUFRAM R-66 coating.

Spool Valves available in low flow and high flow versions to match actuator valve/load requirements.



Non-interactive Span adjustment

Apex 7000

Apex 7000 Series (Metallic)

Electro-pneumatic Positioner
Apex 7200 shown with explosionproof I/P housing

Electro-pneumatic Positioner
Apex 7100 shown with weatherproof I/P housing and UltraDome indicator

How To Order *(Select **Bold Type Code** from each column that applies)*

Model	Indicator	Gauges	Spool Valves	Cam Type	Feedback Options**	Options
70 - PP Input 3-15 psi **71** - EP Input 4-20 mA General Purpose[1] **72** - EP Input 4-20 mA FM/CSA/ ATEX/IECEx Explosionproof[2] **73** - EP Input 4-20 mA FM/CSA/ ATEX/IECEx Explosionproof[3] **74** - EP Input 4-20 mA FM/CSA/ATEX/IEC Intrinsically Safe[4] **75** - EP Input 4-20 mA Signal Loss Fail-in-Place[1] **76** - PP Input 6-30 psi	**1** - Standard Flat with Green Indicator **2** - UltraDome Indicator	**3** - No Gauges **4** - Standard Gauges (SST casing w/ brass internals) **5** - Stainless Steel Gauges	**6** - Low Flow Spool Valve **7** - High Flow Spool Valve	**A** - Standard Linear Cam 3-15 psi, 3-9 psi, 9-15 psi, D or R, 180 Degree **B** - 30 or 60 Degree Linear Cam D or R **C** - Characterized Cam, Squared, Square Root, D or R	**O** - None **T** - Top-Mounted UltraSwitch Cover	**R** - NAMUR Shaft - Tufram R-66 Severe Service Coating **T** - NAMUR Shaft - Standard Epoxy Coating **Q** - NAMUR Shaft - Silicone Seals for -40° to 185° F **D** - Double "D" Shaft - Standard Epoxy Coating **U** - Double "D" Shaft - Turfram R-66 Severe Service Coating **V** - Double "D" Shaft - Silicone Seals for -40° 185° F

***Feedback options are not rated for hazardous locations. Use top-mounted UltraSwitch if hazardous location approvals are required.*

Note: *1 NEMA Type 4/4x*
2 FM/CSA NEMA (North America) Explosionproof Cl.I, II, III, Div. 1, Gr. BCDEFG Flameproof II 2G, EExd IIB+H_2
3 FM/CSA Explosionproof Cl. I, II, III, Div. 1, Gr. BCDEFG Flameproofe EExd IIC
4 FM/CSA Intrinsically Safe Cl.I, Div. 1 ABCD, ATEX II 2GD Ex ia IIC

Apex 8000 High Performance Positioner

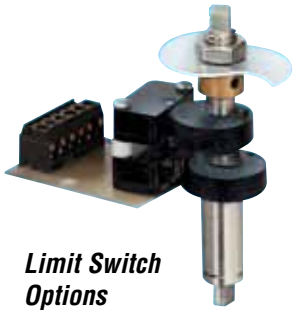
The Automax Apex 8000 positioner provides outstanding control for a wide range of valves and dampers. The two-stage pneumatic relay provides fast, sensitive response characteristics to meet demanding control objectives. It may be used with 3-15 psi pneumatic control signals or fitted with an I/P transducer 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.

Features:

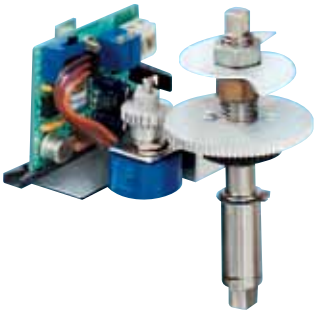
- **Two-Stage Pneumatic Relay** provides fast, sensitive response characteristics for precise control of critical control valves and dampers.
- **Non-Interactive Span Adjustment** reduces calibration time.
- **Adjustable Gain** allows positioner sensitivity adjustment for a wide range of valve/actuator applications.
- **Corrosion Resistant Materials.** All exposed parts are either stainless steel or polyester powder coated anodized aluminum to permit use in corrosive environments.
- **Optional UltraDome Visual Position Indicator** provides adjustable, high-contrast, full-angle viewing of valve position.
- **Field Upgradeable.** The Apex 8000 is field-upgradeable 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.
- **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.

Apex 8000 High Performance Positioner

Top-Mounted UltraSwitch
For hazardous area transmitter and switch feedback applications



Limit Switch Options



4-20 mA Transmitter Option

Electro-Pneumatic Positioner Apex 8000
Shown with explosionproof I/P housing

Limit Switches

Type K
SPDT Mechanical
10 amp 125 VAC
5 amp 250 VAC
½ amp 125 VDC
¼ amp 250 VDC

Type M
SPST Proximity
¼ amp 200 VDC
½ amp 100 VDC
1 amp 50 VDC
0.35 amp 140 VAC
Maximum Contact:
50 Watt Resistive

Type N
SPDT Proximity
¼ amp @ 120 VAC
¼ amp @ 28 VDC
Minimum 5 mA

Type Q
(2) Solid State Pepperl & Fuchs Proximity
2-wire NAMUR per DIN 19234

Position Transmitter
Position transmitter can be factory or field installed to provide a direct feedback from the positioner shaft. Leads are terminated within the electronic module.

2-wire Current Output Signal
Standard output signal: 4-20 mA 2-wire
Power requirements: 6 to 30 VDC
Output loading: 0 to 750 Ohms @ 24 VDC

How To Order *(Select **Bold Type Code** from each column that applies)*

Model	Indicator	Gauges	Temperature	Cam Type	Feedback Options*	Output Shaft
80 - PP Input 3-15 psi **81** - EP Input 4-20 mA General Purpose[1] **82** - EP Input 4-20 mA ExP, IS[2] **83** - EP Input 4-20 mA ExP[3] **84** - EP Input 4-20 mA IS[4] **85** - EP Input 4-20 mA ExP, IS[5]	**1** - Standard Flat with Green Indicator **2** - UltraDome Indicator **K** - EKTAR UltraDome **D** - Top-mounted UltraSwitch cover (Double "D" Switch Box) **T** - Top-mounted UltraSwitch cover (NAMUR Switch Box)	**3** - No Gauges **4** - Standard Gauges (SST casing w/ brass internals) **5** - Stainless Steel Gauges	**6** - 2 Stage Pneumatic Relay-EPDM / -40 to +220 F (-40 to 104c) **7** - 2-Stage Pneumatic Relay - Standard -20F to 180F **8** - 2-Stage Pneumatic Relay - Extend Temperature -40F to 180F **9** - 2-Stage Pneumatic Relay - VITON / -20 to +350 F (-29 to +121 C)	**A** - Standard Linear Cam 3-15 psi, 3-9 psi, 9-15 psi, D or R, 180 Degree **C** - Characterized Cam Square, D or R (Quick Opening)	**O** - None **F** - 4-20 mA Transmitter **K** - (2) SPDT Mech. Switches **M** - (2) SPST Proximity Switches **N** - (2) SPDT Proximity Switches **Q** - (2) I.S. Rated Solid State Sensors	**T** - NAMUR Shaft - Black Polyester Powder Coat, ½" NPT Conduit Entries **D** - Double "D" Shaft - Black Polyester Powder Coat, ½" NPT Conduit Entries **U** - NAMUR Shaft - Black Polyester Powder Coat, M20 Conduit Entries **V** - Double "D" Shaft - Black Polyester Powder Coat, M20 Conduit Entries

**Feedback options are not rated for hazardous locations. Use top-mounted UltraSwitch if hazardous location approvals are required.*

Note: *1 NEMA Type 4/4x*
2 FM/CSA NEMA (North America)
Explosionproof Cl. I, Div. 1, Gr. BCD, Cl. II, Div. 1, Gr. EFG
Intrinsically Safe Cl. I II, Div. 1, Gr. ABCDEFG
Nonincendive Cl. I, Div. 2, Gr. ABCD

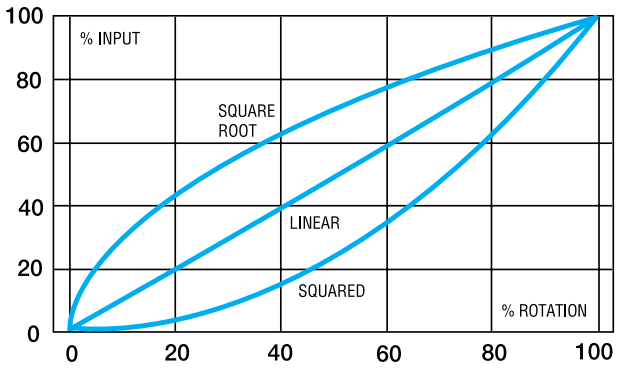
3 ATEX Flameproof II 2GD Ex d IIB + H2 T6(-40° C to +40° C); tD A21 T40°C

4 ATEX Intrinsically Safe II 1 G EEx ia IIC
II 3 GD (T70° C) EEx nL IIC T6 (-40° C to +60° C)

5 Australia ANZEX Flameproof
Ex d IIB+H2 T6
Intrinsically Safe Ex ia IIC T5 @65° C
Ex n IIC T6

Apex 8000 Modular Positioning System Options

Apex 8000 Cam Features and Options



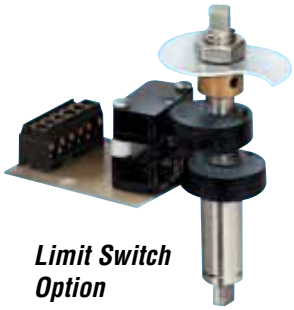
The Standard Apex 8000 Cam (Designated by letter "A")

- Provides linear characterization
- Allows 90 or 180 degree rotation
- Accepts 3-15, 3-9 or 9-15 psi input
- Is suitable for direct or reverse acting applications

Optional cams are available for:

- Squared or square root characterization

Limit Switches



Limit Switch Option

Type K SPDT Mechanical

10 amp 125 VAC / 5 amp 250 VAC
½ amp 125 VDC / ¼ amp 250 VDC

Type M SPST Proximity

0.35 amp 140 VDC
1 amp 50 VDC / ½ amp 100 VAC / ¼ amp 200 VDC
Max. Contact: 50 Watt Resistive

Type N SPDT Proximity

¼ amp @ 120 VAC
¼ amp @ 28 VDC / Minimum 5 mA

Type Q Switch

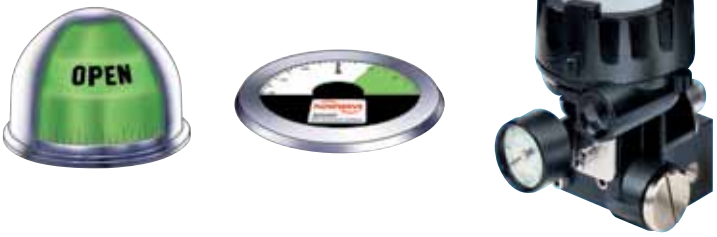
(2) Solid State Pepperl & Fuchs Proximity 2-wire NAMUR per DIN 19234

Position Transmitters

Position Transmitters can be factory or field installed to provide a direct feedback from the positioner shaft. Leads are terminated within the electronic module.

Non-hazardous Location I/P

- Input 4-20 mA
- I/P Housing is corrosion resistant and weatherproof
- Automatic supply pressure and ambient temperature compensation
- Internal I/P filter regulator



"UltraDome" or "Flat" Position Indicators

Hazardous Location I/P

- Input 4-20 mA
- I/P Housing NEMA 4x and 7 UL, C-UL, ATEX, SAA
- Automatic supply pressure and ambient temperature compensation
- Internal I/P filter regulator

Logix Digital Positioners and Accessories

Logix digital positioners offer Flowserve customers the best in performance and features for their demanding applications. The Logix 500si is available in intrinsically safe, nonincendive or general purpose configurations for more competitive situations. The Logix 3200IQ is provided with an explosionproof enclosure and offers the highest level of performance and features.

Logix 520SI/3200IQ Information Chart

The following information is accessible from the Logix Digital Valve Controller:

Identification
Spool identification
Air action
Tag number
Spring type
Valve style
Valve material
Valve body size
Valve serial number
Valve manufacturer
Valve pressure class
Valve end connections
Fail position
Stroke length
Flow direction
Trim number/size
Trim characteristic
Stem/shaft diameter
Trim type and material
Leakage class
Inlet/outlet pressure
Actuator size and type
Device name/description
Embedded software version
Electronic serial number
Engineering units
Message - up to 32 characters

Calibration
Stroke
4-20 mA signal
Pressure sensor
Calibration date
Calibrated by initials

Data Acquisition
Valve position
4-20 mA signal
Command signal
Clockwise actuator pressure
Counter clockwise actuator pressure

Diagnostics and Signatures
Step test
Ramp test
Internal power test

Preventive Maintenance
Actual travel
Rated travel
Travel alert
Packing style
Cycle counter
Cycle alert

Logix Series 3200IQ Variables
Noise filter
Integral gain
Board current
Travel position
Supply pressure
Digital input signal
Analog input signal
Stroke open speed
Stroke closed speed
Internal temperature
Position deviation alert
Minimum position cutoff
Communication error log
Minimum proportional gain
Maximum proportional gain
Proportional gain multiplier
Upper and lower travel alert
Upper and lower soft limit stop
Multiple characterization library
Actuator pressure sensor check
21-point custom characterization
Two-level security (ValTalk)

Red denotes additional functionality available on model with advanced diagnostics.

Digital Positioners: Automax Logix 500si

The Logix 500si digital positioner provides highly accurate positioning and very responsive control of quarter-turn valves and dampers. It combines state-of-the-art piezo valve technology with inner-loop feedback for precise control. The Logix 500si is available with North American or ATEX intrinsically safe and nonincendive approvals.

The Logix 510si is available as a 4-20 mA I/P digital positioner. Utilizing industry standard HART protocol, the Logix 520si provides dual gain tuning, 21-point custom characterization and signatures for diagnostic purposes and accuracy measurements. It is available with limit switch or transmitter position feedback.

Features:

- **Quick-Cal™** function provides fast, push-button automatic commissioning of positioner. The Direct User Interface allows local access to positioner control.
- **Two-Stage Control** utilizes piezo technology combined with inner-loop feedback for precise control.
- Using **HART Protocol**, the Logix 520si can use existing handheld communicators and supply extensive information. SoftTools software allows the operator to run diagnostics and signatures, calibrates, displays parameters, logs data, sets alarms, and performs other functions in a Windows environment with on-line help screens.
- **21-Point Custom Characterization** allows the valve to be in virtually any position the operator desires for a given input signal.
- **Local Status LED's** provide instant information relating to internal diagnostic codes, indicating 36 different conditions. These codes indicate positioner status and alarms without the need for a handheld communicator or laptop computer.
- **Jog Calibrate** function allows users to easily calibrate the positioner on all actuators without travel stops.
- **AutoTune™ Function** starts the self-calibration and auto tuning process to reduce commissioning time and ensure consistency between one valve and the next. A gain selector switch allows the user to increase or decrease the calculated gain for optimal performance.
- **NAMUR Interfaces**, combined with compact and lightweight design, provide direct mounting to various rotary or linear actuators.

How To Order *(Select **Bold Type Code** from each column that applies)*

Model	Diagnostics	Certifications	Paint Color	Threaded Connections	Feedback Shaft	Operating Temperature
51 - 4-20 mA Analog **52** - HART 4-20 mA	**0si** - Standard Diagnostics	**-02** - Intrinsically-safe (FM/CSA)[1] **-14** - General Purpose **-15** - Intrinsically-safe (ATEX)[2]	**-B** - Automax Black Polyester Powder Coat	**1** - ½" NPT Conduit, ¼" NPT Pneumatic **2** - M20 Conduit, ¼" NPT Pneumatic	**D** - Linear - D Shaft **R** - NAMUR Rotary Shaft	**S** - Standard (510si only) -4°F to 185°F (-20°C to 85°C) **E** - Extended (-40°F to 185°F) (-40°C to 85°C)

Language	Visual Indicator	Special Options	Add-in Electronic Options	Limit Switches	Manifold Options	Gauge Options
E - English **F** - French **G** - German	**-F** - Flat **-D** - Dome	**0** - No Special Options	**0** - No Add-in Circuits **F** - 4-20 mA Feedback (510si only)	**0** - No Limit Switches **1** - Two Mechanical Switches **2** - Two Reed Proximity Switches **3** - Two NAMUR V3 Type Proximity Switches P+F NJ2-V3-N **4** - Two Slot Type NAMUR Sensor P+F SJ2 S1N **5** - Two Slot Type NAMUR Sensor P+F SJ2 SN **6** - Two Slot Type NAMUR Sensor P+F SJ2N	**Blank** - None **DA** - Double Acting **GM** - Gauge Manifold	**Blank** - None **1** - PSI/BAR/KPA Stainless with Brass Internals **3** - PSI/BAR/KPA Stainless with Stainless Internals

Notes: *1 FM/CSA certification to intrinsically-safe Cl.I, Div.1, Gr. ABCD, Nonincendive Class I Div. 2 ABCD*
2 ATEX II 1G EEx ia IIC Intrinsically Safe certification

Ordering example: ***510si-02-B1RSE-F002.*** *Automax Logix 500si positioner with basic 4-20 mA input, I.S. approvals, black aluminum enclosure, ½" NPT conduit, ¼" NPT pneumatic, NAMUR rotary mounting, standard temperature range, English language, flat visual indicator. No special options or add-ins, two proximity reed switches for end of travel feedback.*

Digital Positioners: Automax Logix 3200IQ

The Logix 3200IQ digital positioner is available in an explosionproof enclosure with intrinsically safe ratings available for North American and European hazardous locations. The Logix 3200IQ combines a responsive 16-bit microprocessor and two-stage electronic relay with features such as local status LED's and an on-board QUICK-CAL™ button, Configuration DIP switches, jog buttons and variable gain selector switch.

In addition to high sensitivity and fast response, the positioner offers real-time diagnostics to assist in predictive/preventative valve maintenance and extensive configuration capabilities to optimize various valve types and sizes. The Logix 3200IQ is available in the popular HART or FOUNDATION Fieldbus protocols.

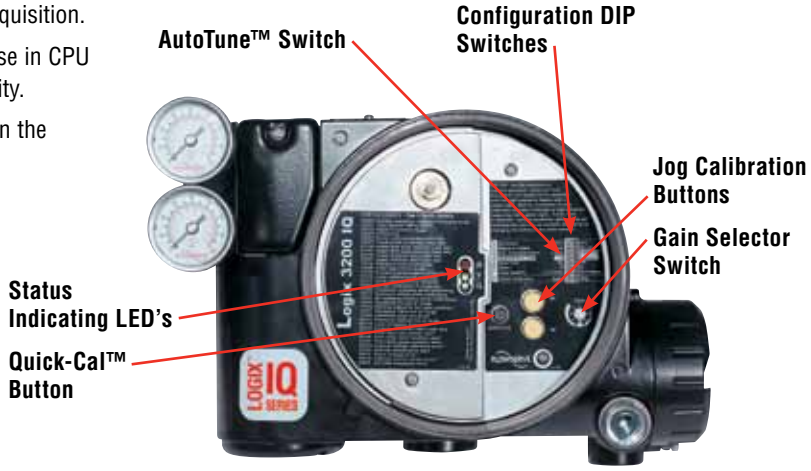
Features:

- **Two-Stage Electronic Relay** facilitates quick, accurate response to both large and small signal changes.
- **Enhanced Data-Packing Technique**. Using an enhanced data-packing technique and SoftTools™ software, data transfer with the Logix Series positioner is many times faster than current HART-compatible systems, resulting in a dramatic speed increase in configuration and diagnostic signature acquisition.
- A fast **16-bit Processor** provides a substantial increase in CPU speed, allowing greater on-board diagnostics capability.
- **Low Operating Current**. The positioner operates when the current drops as low as 3.6 mA.

- **SoftTools Software** allows the operator to run diagnostics and signatures, calibrate, display parameters, log data, set alarms, and perform many other functions in a familiar Windows environment with on-line help files.

316 SST Logix Positioner

- **21-point Custom Characterization** allows the valve to be in virtually any position the operator desires for a given signal.
- **Local Status LED's** provide information relating to internal diagnostic codes indicating 36 different conditions. These codes indicate positioner status and alarms without the need for a handheld communicator or laptop computer.
- The **Direct User Interface** allows local access to positioner control without requiring multi-level menus, a handheld communicator or laptop computer. Commissioning is performed by simply setting a few switches and pressing the QUICK-CAL™ button.



How To Order *(Select **Bold Type Code** from each column that applies)*

Model	Diagnostics	Material	Design Version	Certifications	Shaft Connection
32 - HART **34** - FOUNDATION Fieldbus	**0** - Standard **1** - Advanced	**1** - Stainless Steel **2** - Automax Black **Polyester** Powder **3** - Automax White Epoxy	**IQ**	**-06** - InMetro Flameproof BR Ex dIIB + h2 T5 Intrisically Safe BR Ex ia II CT5 **-10** - Explosionproof Class I, Div 1, Groups B, C, D Intrinsically Safe Class I, Div 1, Groups A through G **-14** - General Purpose **-15** - Intrinsically Safe EEx ia IIC T4/T5, ATEX II 1 GD **-16** - IECEx Exd IIB+H2	**-D6** - Double-D (linear) **-N6** - NAMUR (rotary)

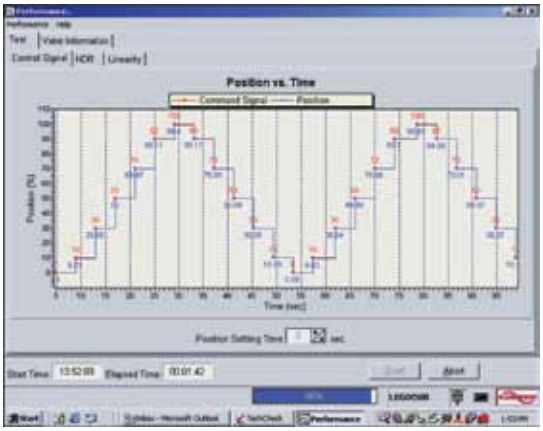
Conduit Connections	Action	Temperature	Gauges	Feedback Options
E - ½" NPT **M** - M20	**4** - 4-way (Double Acting)	**40** - Extended -40°F to 176°F (-40°C to 80°C)	**0G** - PSI BAR/KPA Stainless w/ brass internals **0S** - PSI/BAR/KPA Stainless w/ stainless internals **KG** - kg/cm² Stainless w/ brass internals **KS** - kg/cm² Stainless w/ stainless internals **0U** - None	**Blank** - None **0F** - 4-20 mA Transmitter **00** - None

SoftTools™ Suite

Our SoftTools™ software package provides all tools necessary to establish communications with your Logix positioner using a personal computer via the HART protocol. SoftTools version 7.0 introduces the most advanced and comprehensive set of valve and positioner diagnostics available today.

Logix/SoftTools Features:

- Valve/package identification, including tag number, valve specifications, and actuator configuration.
- Custom characterization, allowing the user to adjust a 21-point characterization curve to change the response of the positioner to meet process requirements.
- Positioner performance tests measure hysteresis, deadband, linearity, and repeatability.
- Signature comparisons can be performed by evaluating a stored "installed" signature curve to current performance.
- Dual gain tuning of the Logix positioner allows the user to make large step changes with minimal overshoot, while achieving the resolution to respond to very small step changes.

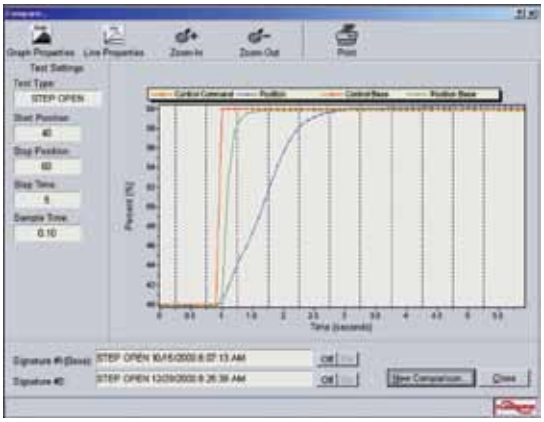


SoftTools Performance Testing

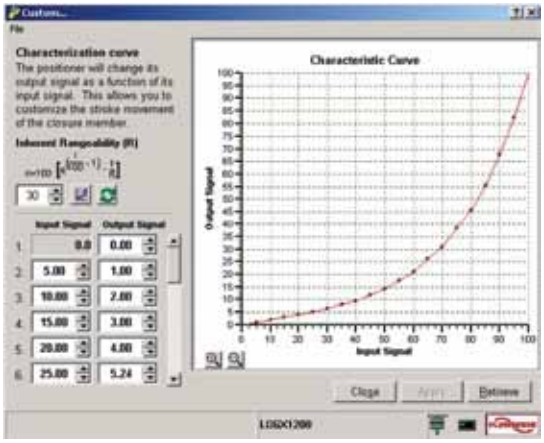
HART Accessories

Automax also offers a variety of accessories to complete your HART installation.

- **HART Handheld** – offers single tool, remote configuration, calibration, and control of HART devices.
- **HART Cable Modem** – enables communication between a laptop or desktop PC through PCMCIA or RS232 interface.
- **HART Filter** – protects HART digital communication imposed on 4-20 mA signal from noise generated by DCS.



SoftTools Signature Comparison



SoftTools 21-point Characterization Curve

Limit Switch and Positioner Products

Automax limit switch and positioner products were designed with harsh chemical environments in mind. Users do not normally expose valve automation accessories directly to concentrated chemicals continually, however, mild concentrations do exist in plant atmospheres. This guide provides chemical compatibility for materials used in exposed parts, i.e., housings, covers and visual indicators.

WR & FR - Series Aviator™/BUSwitch™ – General Electric Noryl®

Noryl, a modified PPO resin, features high hydrolytic stability, meaning that it does not absorb moisture readily, making it well suited for high humidity and steam environments. Noryl offers good resistance to most acids, bases, detergents and aqueous solutions. Halogenated and aromatic solvents may soften or dissolve this material.

PL-Series UltraSwitch™ – DuPont Zytel®

Zytel®, a polyamide resin, features resistance to low concentrations of bases, solvents and salts. This high-strength engineered resin provides an excellent enclosure for harsh corrosive environments.

UltraDome™ & Pharos™ Visual Indicators – General Electric Lexan®

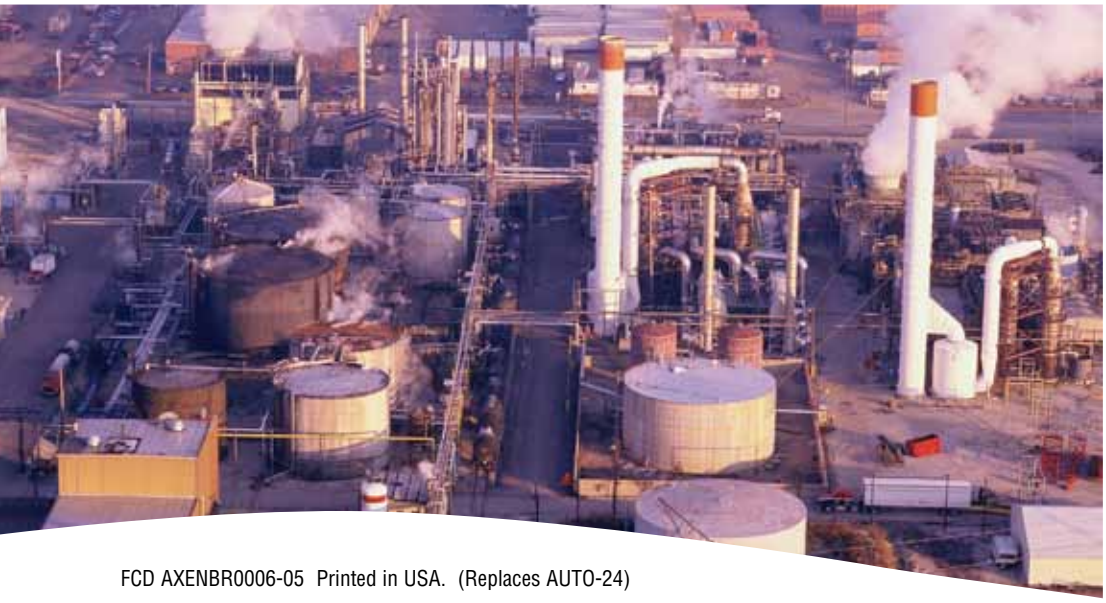
Lexan, a polycarbonate resin, is extremely tough and generally is not affected by low concentrations of acids, alcohols and alkalis. High concentrations should be avoided. Mild detergents, pure petroleum greases and pure silicone greases are generally compatible. Avoid solvents.

GL & XCL-Series UltraSwitch™, Apex™ 7000/8000 & Logix™ Positioners, XV-Series Aviator™/BUSwitch™ - Dichromate Conversion Undercoat with Polyester Powder Top Coat or Epoxy Coating

The dichromate conversion coating provides improved adhesion of the top-coat, retards mildew formation, and provides extra protection against oxidation, particularly on unpainted surfaces such as the interior. Polyester provides general protection against low concentrations of some acids and alkalis. Avoid bases. Optional epoxy coating provides better chemical resistance, but has a tendency to chalk under direct exposure to ultraviolet light.

Chemical	Concentration	Noryl®	Zytel®	Lexan®	Polyester	Epoxy
Acids						
Acetic	5%	E	C	C	U	U
Acetic	90%	E	U	—	U	U
Citric	5%	—	C	C	E	E
Formic	90%	—	U	U	U	E
Hydrochloric	10%	E	U	E	C	E
Nitric	10%	E	U	C (D)	U	E
Nitric	75%	C	U	C (D)	U	C
Phosphoric	5%	E	U	E	C	C
Sulfuric	5%	E	U	C	C	C
Sulfuric	30%	E	U	C	C	C
Bases						
Ammonium Hydroxide	10%	—	C (L)	U	U	E
Potassium Hydroxide	10%	E	C	U	U	E
Sodium Hydroxide	10%	E	C (L)	U	U	E
Solvents						
Acetone		—	C	U	U	U
Ethyl Acetate (Ester)		C	E	U	C	C
Methanol		E	E	U	E	E
Methylene Chloride		—	C	U	U	U
Toluene		—	E	U	C	E
Salts						
Sodium Bicarbonate		E	E	—	E	E
Sodium Chloride	10%	E	C (L)	E	E	E
Miscellaneous						
Ammonia		E	C	—	—	—
Chlorox		E	C	—	—	—
Mineral Oil		E	—	—	E	E

E = Excellent (chemical has no effect)
C = Compatible, but material slightly affected by chemical:
L = greater than 1% dimensional change
D = discoloration
U = Unsatisfactory (chemical attacked material)
— = No test data or experience available



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