Automax Valve Automation Systems
Rotary Switches and Positioners
Workhorse, High Reliability, Hostile Environments

Experience In Motion
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

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.

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.

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

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.

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.

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.
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**

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

**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.

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

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

* Consult factory for additional switch options
** 2 SPST or 2 SPDT only. Maximum of 8 Terminals.

Note: Example: GL210, NGL130T
1 option valid for Type 4, 8, E, G and T switch types.
For replacement Pharos kit part numbers, see UltraSwitch nomenclature
**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.

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

<table>
<thead>
<tr>
<th>Optional Prefix</th>
<th>Model</th>
<th>Cover</th>
<th>Switch*</th>
<th>Analog Output</th>
<th>Solenoid Options</th>
<th>Options</th>
<th>Extra Terminal Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blank</td>
<td>PL - Zytel® Engineered Resin Housing, NEMA 4, 4x</td>
<td>1 - Flat Cover</td>
<td>0 - No Switches (Empty Housing)</td>
<td>0 - None</td>
<td>0 - No Option</td>
<td>Blank - 2 Open Terminal Locations (Standard)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>U - UltraDome Indicator</td>
<td>1 - (2) SPDT Mechanical</td>
<td>T - 4-20 mA Transmitter</td>
<td>M - Heavy-Duty Terminal Block***</td>
<td>4 - 4 Open Terminal Locations (2 SPDT switches)</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td></td>
<td>C - 90° 3-way</td>
<td>2 - (4) SPDT Mechanical</td>
<td>D - 180° Travel 4-20 mA Transmitter</td>
<td>P - Seal/Potted Leads</td>
<td>6 - 6 Open Terminal Locations (2 SPDT switches)</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>D - 180° 3-way</td>
<td>3 - (2) PDPT Mechanical</td>
<td>E - 45°/60° Travel 4-20 mA Transmitter</td>
<td>I - FM/CSA Intrinsically Safe Class I, II, IIl Div 1, A-G (See Notes)</td>
<td>8 - 8 Open Terminal Locations (2 or 4 SPST switches)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>E - 180° 3-way</td>
<td>4 - (2) SPST Proximity</td>
<td>A - 0-1k Ohm Potentiometer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Center Blocked</td>
<td>5 - (2) SPDT Proximity</td>
<td>B - 0-5k Ohm Potentiometer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 - (4) SPST Proximity</td>
<td>6 - (4) SPST Proximity</td>
<td>C - 0-10k Ohm Potentiometer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F - (2) Sabre SPDT Proximity</td>
<td>7 - (2) Phazer II SPDT Proximity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>G - (2) SPDT Mechanical, Gold Contacts</td>
<td>8 - (2) P&amp;F NJ2-V3-N (NAMUR)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D - DeviceNet Communication Card</td>
<td>U - (2) GO Proximity, 35-13319-A1A</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>H - (4) Phazer II SPDT Proximity</td>
<td>Z - A5-i Communications Card</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T - (2) Phazer II BRS SPDT Proximity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>W - (4) Phazer II BRS SPDT Proximity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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*Consult factory for additional switch options.

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.

### How To Order

(Select Bold Type Code from each column that applies)

<table>
<thead>
<tr>
<th>Shaft Option</th>
<th>Model</th>
<th>Indicator Option</th>
<th>No. of Switches</th>
<th>Switch Type*</th>
</tr>
</thead>
<tbody>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>1 - Flat Top (no indicator)</td>
<td>0 - No Switches</td>
<td>00 - No Switches</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>U - Red/Green (std)</td>
<td>1 - 1 Switch</td>
<td>M1 - SPDT Mechanical</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>C - 90° 3-way</td>
<td>2 - 2 Switches</td>
<td>MG - SPDT Mechanical - Construction for 250°F</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>E - 180° 3-way</td>
<td>4 - 4 Switches</td>
<td>MG - SPDT Mechanical - Gold Plated</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>E - 180° 3-way Blocked Center</td>
<td></td>
<td>M3 - DPDT Mechanical</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>K - Ektar Red/Green</td>
<td></td>
<td>MB - DPDT Mechanical - Licon</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>M - Black/Yellow</td>
<td></td>
<td>MA - 3-Position Control</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>R - Reverse (Red = Open, Green = Closed)</td>
<td></td>
<td>MD - DA 3-Position Control w/Indication</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>J - Four window UltraDome</td>
<td></td>
<td>MS - SR 3-Position Control w/Indication</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>F - 120° thru/divert UltraDome</td>
<td></td>
<td>P4 - SPST Proximity</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>W - White = closed, Blue = open</td>
<td></td>
<td>PS - SPDT Proximity</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td>X - Three position Type 6 White = closed, Blue = open</td>
<td></td>
<td>PE - SPDT Sabre</td>
</tr>
<tr>
<td>D - Double D Shaft (¾”) Flats</td>
<td>XCL-U2M1</td>
<td></td>
<td></td>
<td>PP - SPDT Phazer II</td>
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<table>
<thead>
<tr>
<th>Certifications</th>
<th>Analog Output Options</th>
<th>Wiring Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 14 - General Purpose</td>
<td>- B - None (std)</td>
<td>- 0 - None (std)</td>
</tr>
<tr>
<td>- 17 - UL/CSA/ATEX Explosionproof</td>
<td>- D - 4-20 mA Transmitter</td>
<td>- H - Heavy-Duty Terminal Strip****</td>
</tr>
<tr>
<td>- 19 - ATEX Explosionproof</td>
<td>- A - 0-1k Ohm Potentiometer</td>
<td>- 1 - Brad Harrison 3 pin</td>
</tr>
<tr>
<td>- 25 - IECEx Ex d IIB T5, Ex Id A21 IP 65</td>
<td>- B - 0-5k Ohm Potentiometer</td>
<td>- 2 - Brad Harrison 5 pin</td>
</tr>
<tr>
<td>- 26 - InMetro BR Ex d IIB T5</td>
<td>- C - 0-10k Ohm Potentiometer</td>
<td>- 3 - Brad Harrison 7 pin</td>
</tr>
<tr>
<td>- 27 - Factory Mutual/CUS Intrinsically Safe Cl II,III Div. 1, 2 GR A-G T5**</td>
<td>- P - Sealed / Potted Leads</td>
<td></td>
</tr>
<tr>
<td>- M1 - Metal Nameplate UL/CSA/ATEX Explosionproof (Mechanical Switch)</td>
<td>- N - No Switches</td>
<td></td>
</tr>
<tr>
<td>- M2 - Metal Nameplate UL/CSA/ATEX Explosionproof (Proximity Switch)</td>
<td>- E - White Epoxy</td>
<td></td>
</tr>
<tr>
<td>- M3 - Metal Nameplate ATEX Explosionproof</td>
<td>- W - White Epilon II</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Open Terminals (Minimum)</th>
<th>Special Options</th>
<th>Coating Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 - 2 open (std)</td>
<td>0 - None (std)</td>
<td>0 - Black Polyester Powdercoat (std)</td>
</tr>
<tr>
<td>4 - 4 open Terminal Locations (2 SPST Switches)</td>
<td>P - 180° Potentiometer Gearing</td>
<td>E - White Epoxy</td>
</tr>
<tr>
<td>6 - 6 open Terminal Locations (2 SPDT Switches)</td>
<td>V - Viton O-rings</td>
<td>W - White Epilon II</td>
</tr>
<tr>
<td>8 - 8 open Terminal Locations (2 or 4 SPDT Switches)</td>
<td>L - Lubricated cover bolts</td>
<td></td>
</tr>
<tr>
<td>14 - 14 open Terminal Locations (2 or 4 SPDT Switches)</td>
<td>N - No silicone</td>
<td></td>
</tr>
</tbody>
</table>

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.

Optional 4-20 mA transmitter shown.
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

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Method</th>
<th>Schematic</th>
<th>Enclosure*</th>
<th>Coil Classification</th>
<th>Shaft Option</th>
<th>Dome Option</th>
<th>Coil Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>3POS</td>
<td>DA - Double Acting Actuator</td>
<td>AC Circuits</td>
<td>X - XCL-Series UltraSwitch</td>
<td>W - Weatherproof NEMA 4, 4x</td>
<td>N - NAMUR Shaft (std)</td>
<td>Z - Red/Green UltraDome</td>
<td>1 - 110 VAC/50 Hz, 120 VAC/60 Hz</td>
</tr>
<tr>
<td></td>
<td>SR - Spring Return Actuator</td>
<td>DC Circuits</td>
<td>1 - DA Actuator w/o Electrical Position Indication (per sch. # 807444-A)</td>
<td>X - Explosionproof NEMA 4, 4x, 7, 9</td>
<td>S - Double-D Shaft (1/4” Flats)</td>
<td>C - 3-way 90° Indicator</td>
<td>2 - 220 VAC/50 Hz, 240 VAC/60 Hz</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>P - PL-Series UltraSwitch</td>
<td></td>
<td></td>
<td>D - 3-way 180° Indicator</td>
<td>3 - 22 VAC/50 Hz, 24 VAC/60 Hz</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E - 3-way 180° Blocked Center Indicator</td>
<td></td>
<td></td>
<td>4 - 24 VDC</td>
</tr>
</tbody>
</table>

**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

*XConsult 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

**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)

<table>
<thead>
<tr>
<th>Model</th>
<th>Indicator</th>
<th>Switch</th>
<th>Number of Coils</th>
<th>Solenoid Coil</th>
<th>Spool Valve</th>
<th>Shafts and Coatings</th>
<th>Spool Valve Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR</td>
<td>- Resin NEMA 4, 4x - Resin I.S., Class 1, Div. 1 Groups A-D *see note for sensor availability.</td>
<td>U - UltraDome Indicator</td>
<td>0 - Single Coil</td>
<td>A - 110 VAC 50/60 Hz</td>
<td>NAMUR VDI</td>
<td>N - NAMUR Shaft</td>
<td>R - Thermoplastic Rain Caps (Standard)</td>
</tr>
<tr>
<td>FR</td>
<td>- White Epoxy Coating</td>
<td>C - 90° 3-way</td>
<td>1 - Dual Coil</td>
<td>B - 240 VAC/60Hz</td>
<td>Polyester Powder Coating (std)</td>
<td>M - Thermoplastic Rain Caps/Momentary Manual Override</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D - 180° 3-way</td>
<td>E - 180° 3-way Center Blocked</td>
<td>2 - External Solenoid Coil (BUSwitch only F4 option)</td>
<td>F - 24 VDC</td>
<td>27</td>
<td>IECEx Exd IIB T3/T4 IP65</td>
<td>L - Sintered Bronze Exhaust Mufflers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H - 24 VDC Low Power</td>
<td></td>
<td>- 180° 3-way UltraDome</td>
<td>S - Stainless Steel Exhaust Mufflers/Momentary Manual Override</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>J - 24 VDC Low Power</td>
<td></td>
<td>- 90° 3-way UltraDome</td>
<td>T - Stainless Steel Exhaust Mufflers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>K - 24 VDC Intrinsically Safe</td>
<td></td>
<td>- 4 Switch Elements</td>
<td>U - Stainless Steel Exhaust Mufflers/Locking Manual Override</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BUSwitch Only</td>
<td></td>
<td>- 3-way Aluminum</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Only</td>
<td></td>
<td>- 3-way Stainless Steel</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 -</td>
<td></td>
<td>- 4-way Aluminum</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 -</td>
<td></td>
<td>- 4-way Stainless Steel</td>
<td></td>
</tr>
</tbody>
</table>

*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 Controller**

(Select Bold Type Code from each column that applies)

### Shaft Type

- D - Double D Shaft (1/4" Flats)
- N - NAMUR VDI / VDE 3845 Shaft

<table>
<thead>
<tr>
<th>Model</th>
<th>Indicator Option</th>
<th>No. of Switches</th>
<th>Switch Type*</th>
</tr>
</thead>
<tbody>
<tr>
<td>XV</td>
<td>- Aluminum Housing, Explosion-proof / Flame-proof, (2) 1/4&quot; NPT Conduit</td>
<td>0 - 0 Switch Elements</td>
<td>M1 - SPDT Mechanical</td>
</tr>
<tr>
<td>XM</td>
<td>- Aluminum Housing, Explosion-proof / Flame-proof, (2) M20 Conduit</td>
<td>1 - 1 Switch Element</td>
<td>MG - SPDT Mechanical - Gold Plated</td>
</tr>
<tr>
<td>U</td>
<td>- Standard UltraDome (Red/Green)</td>
<td>2 - 2 Switch Elements</td>
<td>MB - DPDT Mechanical - Licon</td>
</tr>
<tr>
<td>C</td>
<td>- 4-Windows UltraDome</td>
<td>3 - 3 Switch Elements</td>
<td>P+F SJ3.5N (NAMUR)</td>
</tr>
<tr>
<td>D</td>
<td>- 90° 3-way UltraDome</td>
<td>4 - 4 Switch Elements</td>
<td>FA - AS-i</td>
</tr>
<tr>
<td>E</td>
<td>- 180° 3-way UltraDome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>- 120° thru/divert UltraDome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>- Black Yellow UltraDome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>- Kekt UltraDome (Red/Green)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>- Reverse UltraDome (Red = Open, Green = Closed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>- White/Blue UltraDome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>- 180° 3-Way UltraDome (White/Blue)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Certifications

- 14 - General Purpose
- 19 - ATEX II 2 G Ex d IIB T5
- 24 - CSA CI.II, Div.I, Gr.III, CL II Div.1 GR E,F,G, Cl III T6, Cl I, Zone 1 Aex-d IIIB T3/T4
- 25 - IECEx Exd IIB T3/T4 IP65
- 27 - cFMus CI.III, Div 1 GR ABCDEFG T5 *see for sensor availability.

### Number of Coils

- 0 - Integral Single Coil
- 1 - External Solenoid Coil (F4 option only)

### Solenoid Coil Voltage

- 0 - None (F4 option only)
- 1 - 110VAC/50Hz, 120VAC/60Hz (2-Watt)
- 2 - 220VAC/50Hz, 240VAC/60Hz (2-Watt)
- 3 - 12VDC (2-Watt)
- 4 - 24VDC (2-Watt)
- 5 - 12VDC Low-Power (.67 Watt)
- 6 - 24VDC Low-Power (.67 Watt)
- 7 - 24VDC Ultra-Low-Power (Piezo.006 Watt) (F2 option only)

### Spool Valve

<table>
<thead>
<tr>
<th>Spool Valve</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>- None</td>
</tr>
<tr>
<td>3A2</td>
<td>- 3-Way Aluminum - 1.8 Cv</td>
</tr>
<tr>
<td>352</td>
<td>- 3-Way Stainless Steel - 1.8 Cv</td>
</tr>
<tr>
<td>3A4</td>
<td>- 3-Way Aluminum - 4.5 Cv</td>
</tr>
<tr>
<td>353</td>
<td>- 3-Way Stainless Steel - 4.5 Cv</td>
</tr>
<tr>
<td>4A2</td>
<td>- 4-Way Aluminum - 1.8 Cv</td>
</tr>
<tr>
<td>4S2</td>
<td>- 4-Way Stainless Steel - 1.8 Cv</td>
</tr>
<tr>
<td>4A4</td>
<td>- 4-Way Aluminum - 4.5 Cv</td>
</tr>
<tr>
<td>4S4</td>
<td>- 4-Way Stainless Steel - 4.5 Cv</td>
</tr>
</tbody>
</table>

### Coating Options

- P - Polyester Powder Coating (std)
- E - White Epoxy Coating
- R - Thermoplastic Rain Caps (Standard)
- S - Stainless Steel Exhaust Mufflers

### Spool Valve Exhaust Mufflers

- R - Thermoplastic Rain Caps (Standard)
- B - Sintered Bronze Exhaust Mufflers
- S - Stainless Steel Exhaust Mufflers

### Override Options

- N - No Override (Standard)
- M - Momentary Manual Override
- L - Locking Manual Override

### Other Options

- 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, NB, and N0 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

<table>
<thead>
<tr>
<th>Protocol</th>
<th>AS-i</th>
<th>FOUNDATION Fieldbus</th>
<th>DeviceNet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. No. of Devices/Segment</td>
<td>63</td>
<td>32</td>
<td>64</td>
</tr>
<tr>
<td>Max. Cable Length (ft)</td>
<td>328</td>
<td>2953</td>
<td>328</td>
</tr>
<tr>
<td>Data Speed (kbps)</td>
<td>167</td>
<td>31.25</td>
<td>125 to 500</td>
</tr>
</tbody>
</table>
Flowserv 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, Flowserv 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 explosion-proof enclosure.
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.

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 Series (Metallic)

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

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

**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. BCD/EF
3. FM/CSA Intrinsically Safe Cl.I, Div. 1 ABCD, ATEX II 2GD Ex ia IIC
4. FM/CSA Explosionproof Cl. I, II, III, Div. 1, Gr. BC/DE/FG Flameproof EExd IIC
5. FM/CSA Intrinsically Safe Cl.I, Div. 1 ABCD, ATEX II 2GD Ex ia IIC
6. FM/CSA Explosionproof Cl. I, II, III, Div. 1, Gr. BC/DE/FG Flameproof EExd IIC
7. FM/CSA Intrinsically Safe Cl.I, Div. 1 ABCD, ATEX II 2GD Ex ia IIC
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

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

How To Order
(Select bold type code from each column that applies)

<table>
<thead>
<tr>
<th>Model</th>
<th>Indicator</th>
<th>Gauges</th>
<th>Temperature</th>
<th>Cam Type</th>
<th>Feedback Options*</th>
<th>Output Shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>PP Input 3-15 psi</td>
<td>1 - Standard Flat with Green Indicator</td>
<td>3 - No Gauges</td>
<td>A - Standard Linear Cam 3-15 psi, 3-9 psi, 9-15 psi, D or R, 180 Degree</td>
<td>- None</td>
<td>T - NAMUR Shaft - Black Polyester Powder Coat, 1/2&quot; NPT Conduit Entries</td>
</tr>
<tr>
<td>81</td>
<td>EP Input 4-20 mA</td>
<td>2 - UltraDome Indicator</td>
<td>4 - Standard Gauges (SST casing w/ brass internals)</td>
<td>F - 4-20 mA Transmitter</td>
<td>- 4-20 mA Transmitter</td>
<td>D - Double &quot;D&quot; Shaft - Black Polyester Powder Coat, 1/2&quot; NPT Conduit Entries</td>
</tr>
<tr>
<td>83</td>
<td>EP Input 4-20 mA ExpP</td>
<td>D - Top-mounted UltraSwitch cover (Double &quot;D&quot; Switch Box)</td>
<td>6 - 2 Stage Pneumatic Relay - EPDM / -40 to +220 F (-40 to 104C)</td>
<td>M - (2) SPDT Proximity Switches</td>
<td>- (2) SPDT Proximity Switches</td>
<td>V - Double &quot;D&quot; Shaft - Black Polyester Powder Coat, M20 Conduit Entries</td>
</tr>
<tr>
<td>84</td>
<td>EP Input 4-20 mA IS</td>
<td>T - Top-mounted UltraSwitch cover (NAMUR Switch Box)</td>
<td>7 - 2-Stage Pneumatic Relay - Standard -20F to 180F</td>
<td>N - (2) SPDT Proximity Switches</td>
<td>- (2) SPDT Proximity Switches</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>EP Input 4-20 mA ExpP, IS</td>
<td>U - Top-mounted UltraSwitch cover (Double &quot;D&quot; Switch Box)</td>
<td>8 - 2-Stage Pneumatic Relay - Extend Temperature -40F to 180F</td>
<td>Q - (2) I.S. Rated Solid State Sensors</td>
<td>- (2) I.S. Rated Solid State Sensors</td>
<td></td>
</tr>
</tbody>
</table>

*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) Exi, Exd I, II, IIC, IIC, IIIA, IIIB, IIIIC
3. ATEX Flameproof, II 2GD Ex d IIB + H2 T6 (-40°C to +40°C), 1D A21 T80°C
4. ATEX Intrinsically Safe II 1 G Ex ia IIC
5. Australia ANZEAS Flameproof Ex d IIC-H2 T6 Intrinsically Safe Ex ia IIC T5 @65°C
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

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.

“UltraDome” or “Flat” Position Indicators

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

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)*

<table>
<thead>
<tr>
<th>Model</th>
<th>Diagnostics</th>
<th>Certifications</th>
<th>Paint Color</th>
<th>Threaded Connections</th>
<th>Feedback Shaft</th>
<th>Operating Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>4-20 mA Analog</td>
<td>0si - Standard Diagnostics</td>
<td>02 - Intrinsically-safe (FM/CSA)</td>
<td>1 - ½” NPT Conduit, ¼” NPT Pneumatic</td>
<td>D - Linear</td>
<td>8 - Standard (510si only)</td>
</tr>
<tr>
<td>52</td>
<td>4-20 mA HART</td>
<td>0si - Standard Diagnostics</td>
<td>02 - Intrinsically-safe (ATEX)</td>
<td>2 - M20 Conduit, ¼” NPT Pneumatic</td>
<td>R - NAMUR Rotary Shaft</td>
<td>-4°F to 185°F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language</th>
<th>Visual Indicator</th>
<th>Special Options</th>
<th>Add-in Electronic Options</th>
<th>Limit Switches</th>
<th>Manifold Options</th>
<th>Gauge Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>E - English</td>
<td>-F - Flat</td>
<td>0 - No Special Options</td>
<td>0 - No Limit Switches</td>
<td>DA - None</td>
<td>Blank - None</td>
<td></td>
</tr>
<tr>
<td>F - French</td>
<td>-D - Dome</td>
<td>1 - Two Mechanical Switches</td>
<td>1 - Two Reed Proximity Switches</td>
<td>GM - Gauge</td>
<td>1 - PSI/BAR/KPA</td>
<td></td>
</tr>
<tr>
<td>G - German</td>
<td></td>
<td>2 - Two Reed Proximity Switches</td>
<td>P+F NJ2-V3-N</td>
<td>Stainless with Brass Internals</td>
<td>2 - PSI/BAR/KPA</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1 FM/CSA certification to intrinsically-safe CI.I. Div.1, Gr. ABCD. Nonincendive Class I Div. 2 ATEX
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.
- **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)

<table>
<thead>
<tr>
<th>Model</th>
<th>Diagnostics</th>
<th>Material</th>
<th>Design Version</th>
<th>Certifications</th>
<th>Shaft Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>HART</td>
<td>0 - Standard</td>
<td>IQ</td>
<td>-06 - InMetro Flameproof BR Ex dIIIB + h2 T5 Intrinsically Safe BR Ex ia II CT5</td>
<td>-06 - Double-D (linear)</td>
</tr>
<tr>
<td>34</td>
<td>Foundation Fieldbus</td>
<td>1 - Advanced</td>
<td>2 - Automax Black Polyester Powder</td>
<td>-10 - Explosionproof Class I, Div 1, Groups B, C, D Intrinsically Safe Class I, Div 1, Groups A through G</td>
<td>-06 - NAMUR (rotary)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 - Automax White Epoxy</td>
<td></td>
<td>-14 - General Purpose</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-15 - Intrinsically Safe Ex ia IIC T4/T5, ATEX II 1 GD</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-16 - IECEx Exd IIB+H2</td>
<td></td>
</tr>
</tbody>
</table>

**Conduit Connections**

<table>
<thead>
<tr>
<th>Conduit Connections</th>
<th>Action</th>
<th>Temperature</th>
<th>Gauges</th>
<th>Feedback Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>E - ½” NPT</td>
<td>4 - 4-way (Double Acting)</td>
<td>-40°F to 176°F (-40°C to 80°C)</td>
<td>0G - PSI BAR/KPA Stainless w/ brass internals</td>
<td>Blank - None</td>
</tr>
<tr>
<td>M - M20</td>
<td></td>
<td></td>
<td>0S - PSI/BAR/KPA Stainless w/ stainless internals</td>
<td>0F - 4-20 mA Transmitter</td>
</tr>
</tbody>
</table>

**AutoTune™ Switch**

**Configuration DIP Switches**

**Jog Calibration Buttons**

**Gain Selector Switch**

**Quick-Cal™ Button**

**AutoTune™ Switch**
**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.

**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.
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.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Concentration</th>
<th>Noryl®</th>
<th>Zytel®</th>
<th>Lexan®</th>
<th>Polyester</th>
<th>Epoxy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic</td>
<td>5%</td>
<td>E</td>
<td>C</td>
<td>C</td>
<td>U</td>
<td>U</td>
</tr>
<tr>
<td>Acetic</td>
<td>90%</td>
<td>E</td>
<td>U</td>
<td>—</td>
<td>U</td>
<td>U</td>
</tr>
<tr>
<td>Citric</td>
<td>5%</td>
<td>—</td>
<td>C</td>
<td>C</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Formic</td>
<td>90%</td>
<td>—</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>E</td>
</tr>
<tr>
<td>Hydrochloric</td>
<td>10%</td>
<td>E</td>
<td>U</td>
<td>E</td>
<td>C</td>
<td>E</td>
</tr>
<tr>
<td>Nitric</td>
<td>10%</td>
<td>E</td>
<td>U</td>
<td>C (D)</td>
<td>U</td>
<td>E</td>
</tr>
<tr>
<td>Nitric</td>
<td>75%</td>
<td>C</td>
<td>U</td>
<td>C (D)</td>
<td>U</td>
<td>C</td>
</tr>
<tr>
<td>Phosphoric</td>
<td>5%</td>
<td>E</td>
<td>U</td>
<td>E</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Sulfuric</td>
<td>5%</td>
<td>E</td>
<td>U</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Sulfuric</td>
<td>30%</td>
<td>E</td>
<td>U</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Ammonium Hydroxide</td>
<td>10%</td>
<td>—</td>
<td>C (L)</td>
<td>U</td>
<td>U</td>
<td>E</td>
</tr>
<tr>
<td>Potassium Hydroxide</td>
<td>10%</td>
<td>E</td>
<td>C</td>
<td>U</td>
<td>U</td>
<td>E</td>
</tr>
<tr>
<td>Sodium Hydroxide</td>
<td>10%</td>
<td>E</td>
<td>C (L)</td>
<td>U</td>
<td>U</td>
<td>E</td>
</tr>
<tr>
<td>Acetone</td>
<td>—</td>
<td>C</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Ethyl Acetate (Ester)</td>
<td>C</td>
<td>E</td>
<td>U</td>
<td>C</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Methanol</td>
<td>E</td>
<td>E</td>
<td>U</td>
<td>E</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Methylene Chloride</td>
<td>—</td>
<td>C</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Toluene</td>
<td>—</td>
<td>E</td>
<td>U</td>
<td>C</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Sodium Bicarbonate</td>
<td>E</td>
<td>E</td>
<td>—</td>
<td>—</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>10%</td>
<td>E</td>
<td>C (L)</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Ammonia</td>
<td>E</td>
<td>C</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Chlorox</td>
<td>E</td>
<td>C</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Mineral Oil</td>
<td>E</td>
<td>—</td>
<td>—</td>
<td>E</td>
<td>E</td>
<td></td>
</tr>
</tbody>
</table>

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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To find your local Flowserve representative:

For more information about Flowserve Corporation, visit www.flowserve.com or call USA 1 800 225 6989.

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