Worcester Controls
Rotary Switches
High Performance, Reliability and User Friendly
Flowserve Flow Control Worcester Switches

Flowserve Corporation’s Worcester 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, Worcester limit switch and positioner products provide unparalleled performance combined with ease of calibration and maintenance.

Worcester 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 Worcester 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, and Cookeville, Tennessee.

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

**UltraSwitch™ WGL/WXCL/WPL 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 and C-UL ratings suitable for NEMA 4, 4x and NEMA 4, 4x, 7 & 9 applications.

**Aviator™/BUSwitch™ Integrated Valve Controller**
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 Worcester BUSwitch provides all of the features of the Aviator but enables control and monitoring of automated on-off valves through digital fieldbus technology. Available in both aluminum and non-metallic enclosures, the Aviator/BUSwitch is suitable for NEMA 4, 4x and NEMA 4, 4x, 7 & 9 applications.

**Internal 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.
The WGL 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.
- **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.

**How To Order**

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

<table>
<thead>
<tr>
<th>Brand</th>
<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><strong>W</strong> - Worcester Controls</td>
<td><strong>Blank</strong> - Double D Shaft (1/4” Flats)</td>
<td><strong>GL</strong></td>
<td>1 - Flat Top</td>
<td>0 - No Switches (Empty Housing)</td>
<td>0 - No Solenoid</td>
<td>T - Heavy-Duty Terminal Block</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>H</strong> - NAMUR Shaft</td>
<td></td>
<td>2 - Pharos Indicator</td>
<td>1 - (2) SPDT Mechanical</td>
<td></td>
<td></td>
<td>Blank - 2 Open Terminal Locations (Standard)</td>
</tr>
<tr>
<td></td>
<td><strong>E</strong> - Epoxy Coated</td>
<td></td>
<td>3 - Pharos 90° 3-way</td>
<td>4 - (2) SPST Proximity</td>
<td></td>
<td></td>
<td>4 - 4 Open Terminal Locations (2 SPST Switches)</td>
</tr>
<tr>
<td></td>
<td><strong>B</strong> - Epoxy Coating/ NAMUR shaft</td>
<td></td>
<td>4 - Pharos 180° 3-way</td>
<td>5 - (2) SPDT Proximity</td>
<td></td>
<td></td>
<td>6 - 6 Open Terminal Locations (2 SPST Switches)</td>
</tr>
<tr>
<td></td>
<td><strong>H</strong> - Hex Head Cover Screws</td>
<td></td>
<td>5 - Pharos 180° 3-way</td>
<td>8 - (2) P&amp;F NJZ-V3-N (NAMUR)</td>
<td></td>
<td></td>
<td>8 - 8 Open Terminal Locations (2 SPST Switches)</td>
</tr>
<tr>
<td></td>
<td><strong>D</strong> - Hex Head Cover Screws/NAMUR Shaft</td>
<td></td>
<td>Center Blocked</td>
<td>E - (2) SPDT Sable Proximity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>T</strong> - Flat Indicator</td>
<td></td>
<td>T - Flat Indicator</td>
<td>G - (2) SPDT Mechanical Gold Contacts</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Terminal Strip** is multipoint and prewired.

**Dual 1/2” 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.

Note: Example: WGL210, WNGL130T

For Replacement Pharos Kit part numbers, see UltraSwitch Nomenclature

* Consult factory for additional switch options
The WPL-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. Also available with snap-on Pharos indicator or a low-profile flat indicator.
- **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)

<table>
<thead>
<tr>
<th>Brand</th>
<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>W - Worcester Controls</td>
<td>Blank - Double D Shaft (¼” Flats)</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></td>
<td>N - NAMUR Shaft</td>
<td></td>
<td>2 - Pharos Indicator</td>
<td>1 - (2) SPDT Mechanical</td>
<td>T - 4-20 mA Transmitter</td>
<td>H - Heavy-Duty Terminal Block</td>
<td>4 - 4 Open Terminal Locations (2 SPDT switches)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H - Hex Head Cover Screws</td>
<td></td>
<td>3 - Pharos 90° 3-way</td>
<td>2 - (4) SPDT Mechanical</td>
<td>D - 180° Travel 4-20 mA Transmitter</td>
<td>6 - 6 Open Terminal Locations (2 SPDT switches)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D - Hex Head Cover Screws/NAMUR Shaft</td>
<td></td>
<td>4 - Pharos 180° 3-way</td>
<td>3 - (2) DPDT Mechanical</td>
<td>E - 45°/60° Travel 4-20 mA Transmitter</td>
<td>8 - 8 Open Terminal Locations (2 or 4 SPDT switches)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5 - Pharos 180° 3-way Center Blocked</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></td>
<td>T - Flat Indicator</td>
<td>5 - (2) SPST Proximity</td>
<td>B - 0-Sk Ohm Potentiometer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>U - UltraDome Indicator</td>
<td></td>
<td>U - UltraDome Indicator</td>
<td>6 - (4) SPST Proximity</td>
<td>C - 0-10k Ohm Potentiometer</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Consult factory for additional switch options.
Zytel® is a registered trademark of DuPont.
The WXCL-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 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>Brand</th>
<th>Shaft Option</th>
<th>Model</th>
<th>Indicator Option</th>
<th>No. Switches</th>
<th>Switch Type*</th>
</tr>
</thead>
<tbody>
<tr>
<td>W - Worcester Controls</td>
<td>D - Double D Shaft (1/4″ Flats)</td>
<td>XCL - (2) ¾” NPT Conduit</td>
<td>1 - Flat Top (no indicator)</td>
<td>0 - No Switches</td>
<td>00 - No Switches</td>
</tr>
<tr>
<td></td>
<td>N - NAMUR Shaft</td>
<td>XML - (2) M25 Conduit</td>
<td>C - 90° 3-way</td>
<td>1 - 1 Switch</td>
<td>M1 - SPDT Mechanical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D - 180° 3-way</td>
<td>2 - 2 Switches</td>
<td>MG - SPDT Mechanical - Gold Plated</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E - 180° 3-way Blocked Center</td>
<td>3 - 3 Switches</td>
<td>M3 - DPDT Mechanical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>K - Ektar Red/Green</td>
<td>4 - 4 Switches</td>
<td>MA - 3-Position Control</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>H - Black/Gray/Yellow</td>
<td></td>
<td>MD - DA 3-Position Control w/Indication</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R - Reverse (Red - Open, Green - Closed)</td>
<td></td>
<td>MS - SR 3-Position Control w/Indication</td>
</tr>
</tbody>
</table>

**Certifications**
- 14 - General Purpose
- 16 - UL/CSA/ATEX Explosionproof
- 19 - ATEX Explosionproof
- M1 - Metal Nameplate UL/CSA/ATEX Explosionproof (Mechanical Switch)
- M2 - Metal Nameplate UL/CSA/ATEX Explosionproof (Proximity Switch)
- M3 - Metal Nameplate ATEX Explosionproof

**Analog Output Options**
- 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

**Wiring Options**
- 0 - None (std)
- 00 - None (std)
- T - Heavy-Duty Terminal Strip

**Open Terminals (Minimum)**
- 2 - 2 open (std)
- 4 - 4 open
- 6 - 6 open

**Special Options**
- 0 - None (std)
- P - 180° Potentiometer Gearing
- V - Viton O-rings

**Coating Options**
- 0 - Black Polyester Powdercoat (std)
- E - White Epoxy

Example: NWXCLU2M1-18-00200 = Worcester WXCL UltraSwitch, NAMUR Shaft, UltraDome indicator, (2) SPDT Mechanical switches, FM/CSA and ATEX certifications.

*Consult factory for additional switch options.
Aviator™ Integrated Valve Controller

WXV Series
The Aviator integrated valve controller enclosure and solenoid valve provides an integrated package for position indication and control of supply air to rotary actuators. The WXV Series housing is designed for hazardous locations for NEMA 4, 4x, 7 & 9 and CENELEC EEx d IIB.

WWR Series
The WWR Series offers many features of the WXV Series in an engineered resin housing. The WWR Series housing is a non-metallic engineered resin and provides an excellent enclosure for harsh corrosive environments. The WWR Series Aviator is designed for easy upgrading to fieldbus communication protocols.

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.

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

Switches are available in a wide range of options.

Three ½” conduit entries are standard (WXV Series).

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 WWR Series provides further protection with an engineered resin enclosure.
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, DeviceNet, and PROFIBUS DP 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.

• **PROFIBUS DP** BUSwitch features cycle counter, timer and alarm 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 WGL, WPL and WXCL UltraSwitches.

---

### How To Order

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

<table>
<thead>
<tr>
<th>Brand</th>
<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>W - Worcester Controls</td>
<td>XV - Aluminum NEMA 4, 4x, 7 &amp; 9</td>
<td>U - UltraDome Indicator</td>
<td>M1 - (2) SPDT Mechanical Gold Contacts</td>
<td>0 - Single Coil</td>
<td>A - 110 VAC 50/60 Hz</td>
<td>1 - 3-way Stainless Steel</td>
<td>N - NAMUR Shaft</td>
<td>R - Thermoplastic Rain Caps (Standard)</td>
</tr>
<tr>
<td>CV - Aluminum EEx d IIB</td>
<td>C - 90° 3-way</td>
<td>MG - (2) SPDT Mechanical Gold Contacts</td>
<td>G - 24 VDC</td>
<td>2 - External Solenoid Coil (BUSwitch only F4 option)</td>
<td>B - Stainless Steel</td>
<td>R - Sintered Bronze Exhaust Mufflers</td>
<td>Y - Sintered Bronze Exhaust Mufflers/Momentary Manual Override</td>
<td></td>
</tr>
<tr>
<td>WR - Resin NEMA 4, 4x</td>
<td>D - 180° 3-way</td>
<td>R4 - (2) SPST Proximity</td>
<td>J - 24 VDC Low Power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR - Resin I.S. Class 1, Div. 1 Groups A-D (F2 FoundationFieldbus protocol only)</td>
<td>E - 180° 3-way Center Blocked</td>
<td>P4 - (2) Sabre SPDT Proximity</td>
<td>H - 24 VDC Low Power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PP - (2) Phazer II SPDT Proximity</td>
<td>K - 24 VDC Intronically Safe BUSwitch Only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B4 - (2) BRS SPDT Proximity</td>
<td>G - 24 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S4 - (2) P&amp;F NJ2-V3-N (NAMUR)</td>
<td>J - 24 VDC Low Power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SE - (2) Efector Type IN-2002-ABOA</td>
<td>F - 12 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communication Protocol</td>
<td>C - 220 VAC 50/60 Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F2 - 2-wire FOUNDATION Fieldbus</td>
<td>F - 12 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>F4 - 4-wire FOUNDATION Fieldbus</td>
<td>G - 24 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FD - PROFIBUS DP</td>
<td>J - 24 VDC Low Power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FA - AS-i</td>
<td>P - 24 VDC Pico Ultra-Low Power (F2 Protocol only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FN - DeviceNet</td>
<td>O - None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Fieldbusses for Process Control**

**AS-i**
- WGL, WPL and WXCL Series UltraSwitch (requires external 24 VDC solenoid valve)
- WWR and WXV Series BUSwitch with integral coil and spool valve
- Series 75 electric actuator

**DeviceNet**
- WGL, WPL and WXCL Series UltraSwitch (requires external 24 VDC solenoid valve)
- WWR and WXV Series BUSwitch with integral coil and spool valve
- Series 75 electric actuator

**PROFIBUS DP**
- WWR and WXV Series BUSwitch with integral coil and spool valve
- Series 75 electric actuator

**FOUNDATION Fieldbus**
- WWR, WFR and WXV Series BUSwitch with integral coil and spool valve
- Series 75 electric actuator

**HART, Profibus PA, FOUNDATION Fieldbus**
- L93 “Pulsair” positioner

<table>
<thead>
<tr>
<th></th>
<th>AS-i(2.1)</th>
<th>PROFIBUS DP</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>32</td>
<td>64</td>
</tr>
<tr>
<td>Cable Length (ft)</td>
<td>328-984</td>
<td>32 to 3937</td>
<td>2953</td>
<td>328-1640</td>
</tr>
<tr>
<td>Data Speed (Kbps)</td>
<td>167</td>
<td>9.6 to 12,000</td>
<td>31.25</td>
<td>125 to 500</td>
</tr>
</tbody>
</table>
**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

**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

**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 / B 4 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.
**Material Guide for Harsh Environments**

Worcester limit switch products are designed with harsh chemical environments in mind. Although users do not normally expose valve automation accessories directly to concentrated chemicals, 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.

<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><strong>Acids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<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>E</td>
<td>E</td>
</tr>
<tr>
<td>Hydrochloric</td>
<td>10%</td>
<td>E</td>
<td>U</td>
<td>C</td>
<td>E</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><strong>Bases</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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><strong>Solvents</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetone</td>
<td>—</td>
<td>C</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
</tr>
<tr>
<td>Ethyl Acetate (Ester)</td>
<td></td>
<td>C</td>
<td>E</td>
<td>U</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Methanol</td>
<td>—</td>
<td>E</td>
<td>U</td>
<td>E</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Methylene Chloride</td>
<td>—</td>
<td>C</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
</tr>
<tr>
<td>Toluene</td>
<td>—</td>
<td>E</td>
<td>U</td>
<td>C</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td><strong>Salts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium Bicarbonate</td>
<td>—</td>
<td>E</td>
<td>E</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><strong>Miscellaneous</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonia</td>
<td>—</td>
<td>E</td>
<td>C</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Chlorox</td>
<td>—</td>
<td>E</td>
<td>C</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Mineral Oil</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>E</td>
<td>E</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

**WWR 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.

**WPL 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.

**WGL & WXCL Series UltraSwitch™, WXV Series Aviator™/BUSwitch™ - Dichromate Conversion Undercoat with Polyester Powder Top Coat**

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.
Flowserve Corporation
Flow Control
1978 Foreman Drive
Cookeville, Tennessee 38501
Phone: 931 432 4021
Fax: 931 432 3105
www.flowserve.com

To find your local Flowserve representative:

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

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

The purchaser/user should read and understand the Installation Operation Maintenance (IOM) instructions included with the product and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

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

© 2007 Flowserve Corporation, Irving, Texas, USA. Flowserve is a registered trademark of Flowserve Corporation.