



## Linear Valve Position Sensors



## Silver Bullet™

### All Classes & Groups

Since 1981, an exception in the National Electrical Code states for conduit runs of 1 1/2 inches and smaller: "Apparatus which may produce arcs or sparks need not be sealed if the current interrupting contacts are enclosed within a chamber hermetically sealed against the entrance of gases or vapors." This exception in the Code offered large savings by the elimination of costly external seal fittings.

#### Environment

Careful consideration was given to the environment in which the sensor will operate. Caustics, acids, chlorides and saltwater can be a daily occurrence. The Silver Bullet, supported by UL and CSA Hazardous Location, Division 1 & 2 certification, isolates these critical interior contact areas from moisture and corrosion intrusion. Housed in a 316 stainless jacket, the highly corrosion-resistant tungsten contacts are hermetically sealed in an inert atmosphere, then encapsulated in a epoxy resin to cushion the sensor in case of shock and vibration and then re-encapsulated in a premium grade polymer impervious to moisture, chemicals and solvents. Contact reliability is maintained against the adverse effects of transients through the sensors inherent capabilities of withstanding momentary surges of up to 5 amps.

#### Commitment

Our confidence in this product is reflected in our decision to firmly stand behind the Silver Bullet with an unconditional **five year warranty**. A warranty that confirms our commitment to excellence in the performance of your equipment.

#### Silver Bullet™

The utilization of Magnum Silver Bullet hermetically sealed sensors is not only cost-effective but adds circuit reliability in the form of corrosion resistance and contact integrity. By utilizing hermetically sealed sensors in lieu of potted switches, up-front costs are reduced \$300 per single installation and extend to a total savings of \$30,000 per one hundred control valves.

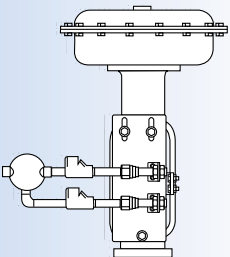
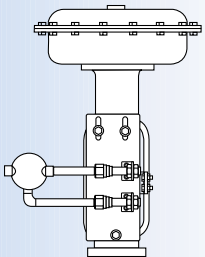


#### Knife Gate Valves

The MOD<sup>3</sup> has been expanded to include the monitoring and control of knife gate valves. Combined with the Magnum Silver Bullet, the MOD<sup>3</sup>/Silver Bullet combination offers the process industry a versatile range of optional configurations for position sensing and solenoid actuator control. Each assembly is UL and CSA certified and suitable for use in NEMA 4, 4x, 7, 9, Class I, Groups B, C & D, Class II, Groups E, F & G, Division 1 & 2 and Class I, Group A, Division 2 hazardous areas.

# Silver Bullet™

## COMPARATIVE COST ANALYSIS

CONVENTIONAL METHOD Potting		MAGNUM SILVER BULLET™ Hermetic Seal	
			
2 switches	\$322	2 sensors	\$264
junction box	\$50	junction box	\$50
seal fittings	\$80	seal fittings	N/R*
wire, conduit	\$30	wire, conduit	\$15
labor	\$270	labor	\$125
<b>TOTAL COST</b>	<b>\$752</b>	<b>TOTAL COST</b>	<b>\$454</b>

\* Not Required  
Comparative costs were based upon list prices from major manufacturers.

### National Electrical Code (1999):

#### Article 501-5(a) & (b). Conduit Seals, Class I, Div. 1 & 2

In each conduit run entering an enclosure for switches which may produce arcs, seals shall be placed no more than 18 inches from such enclosures.

**Exception:** Conduit runs 1 1/2 inches and smaller entering an explosion-proof enclosure for switches need not be sealed if the current-interrupting contacts are enclosed within a chamber hermetically sealed against the entrance of gases or vapors.

Note: For conformance to U.L. and CSA requirements, all conduit runs in Class 1, Division 1 hazardous locations must have a sealing fitting connected within 18 inches of the enclosure.

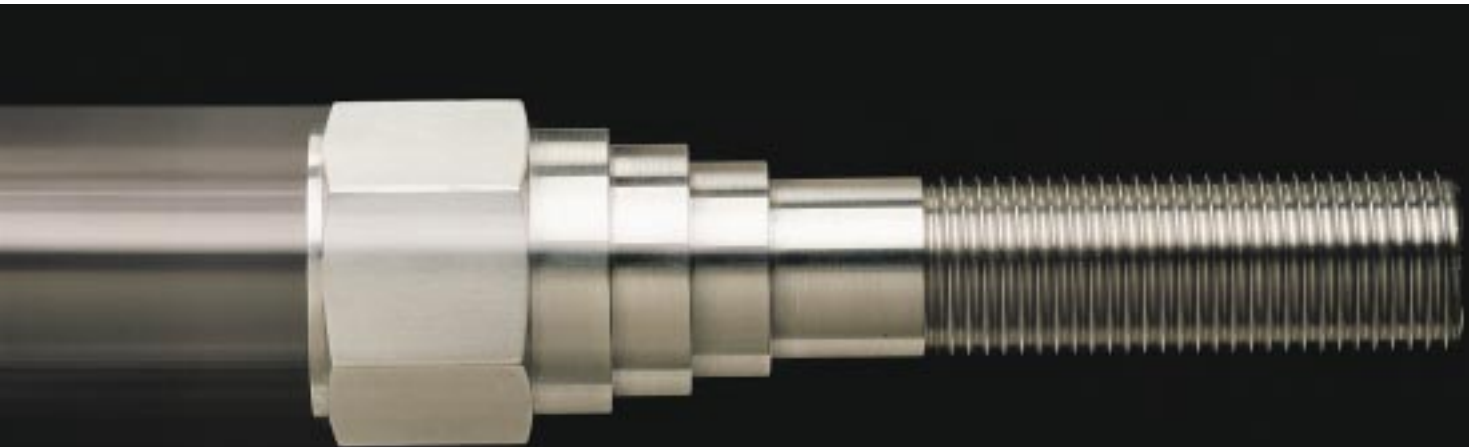
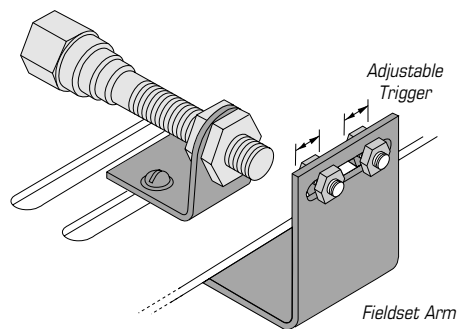
### Start-Up

All of a sensors capabilities are made and broken at the contact point. Sensors that are set for position at the factory do not always remain that way after arriving in the field or being connected to pipelines and conduit systems. Final field adjustment is usually a difficult task when sensors are firmly held in place by rigid conduit. A simply engineered slide-action Fieldset™ arm takes this fact into consideration by providing a unique double upper and lower trigger for ease of final field setting.

### Maintenance

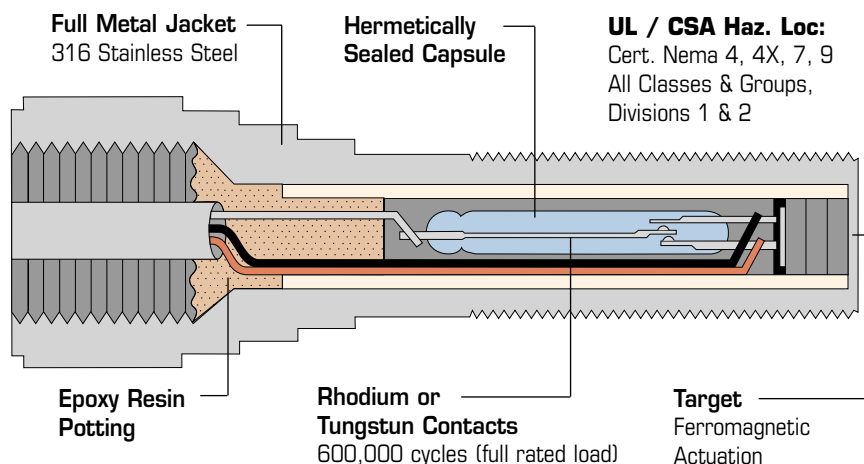
All Silver Bullets are bolted to heavyduty stainless steel brackets. Sensor triggering is accomplished by stainless steel encapsulated ferromagnetic actuators. Eventually, as valve seats wear, a slight readjustment of position sensors becomes necessary. The Fieldset™ triggering system allows fast resetting by the simple turning of a bolt rather than the disconnecting of rigid conduit systems.

### Fieldset™ Triggering System

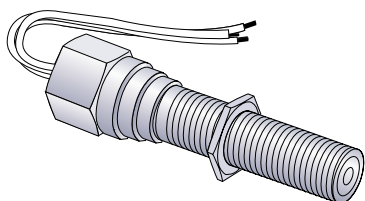


# Silver Bullet™

## MATERIALS OF CONSTRUCTION



## TECHNICAL SPECIFICATIONS



<b>Hermetically Sealed:</b>	corrosion-resistant / cost-effective
<b>Full Metal Jacket:</b>	316 stainless steel
<b>Agency Certification:</b>	UL, CSA, NEMA 4, 4X, 7, 9 Class I, Groups A, B, C, D; Class II, Groups E, F, G; Div. 1 & 2
<b>Repeatability:</b>	.005 in.
<b>Hysteresis:</b>	.040 in.
<b>Trigger:</b>	Ferromagnetic (stainless steel encapsulated)
<b>Operational Life:</b>	600,000 cycles (full rated load)

### Electrical Rating

<b>Rhodium</b>	SPST/SPDT Form C (Normally Open) 0.295 amps/120 VAC, 0.15 amps/240 VAC, 1 amp/24 VDC
<b>Tungsten</b>	SPST/SPDT Form C (Normally Open) 3 amps/120 VAC, 1.5 amps/240 VAC, 2 amps/24 VDC



ATTENTION

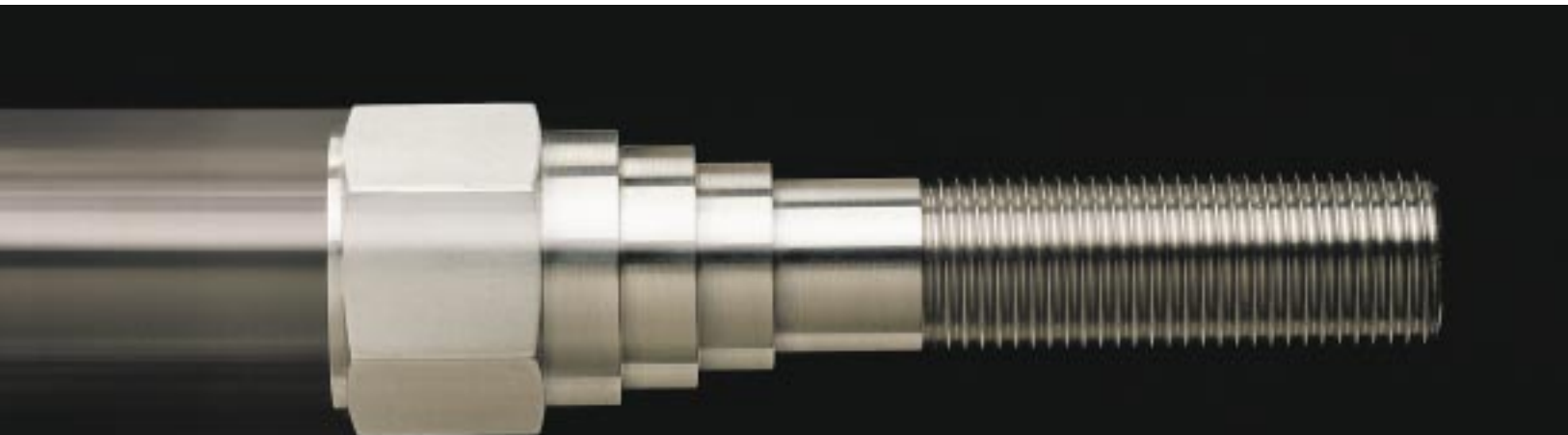
For very low power sensing applications, Power ≤ 240 mW (24 VDC @10 mA for example) Magnum sensors with Rhodium contacts must be used.



ATTENTION

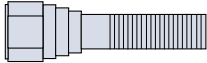

### Magnum and Proximity Sensors Only

PLC input modules utilize capacitors to filter out electrical noise. Newer, more sensitive designs have higher input impedances and lower operating currents and thus require higher values of capacitance for filtration. If the DI card Capacitance ≥ 0.01 mfd, a resistor of appropriate size MUST be used in series with the switch contacts to prevent the capacitive discharge from damaging the switch contacts. Please consult factory for resistor sizing, a procedure to measure the capacitance of your DI card and/or additional information.



# Silver Bullet™

## ORDERING GUIDE

SILVER BULLET	
<p><b>MODEL 316</b> SPDT</p> 	
<p><b>MODEL 316DB</b> DPDT</p>	
<p>316 Stainless Steel NEMA 1, 3, 4, 4X, 6, 7, 9, 12, 13 UL Listed, CSA certified 4, 4X, 7, 9 Hazardous Location Class I, Groups A, B, C, D; Class II, Groups E, F, &amp; G; Divisions 1 &amp; 2</p>	
	

### Suggested Specification

#### SILVER BULLET™

Valve position sensors shall be Westlock Controls Silver Bullet Model \_\_\_\_\_. Sensor shall be Hermetically sealed (UL & CSA Recognized) and rated at 3 amps/120 VAC, 2 amps/24 VDC, with Fieldset™ triggering mechanism. 316 Stainless Steel housing shall meet all NEMA 4, 4X, 7, 9 requirements having as standard one 1/2" conduit entrance.

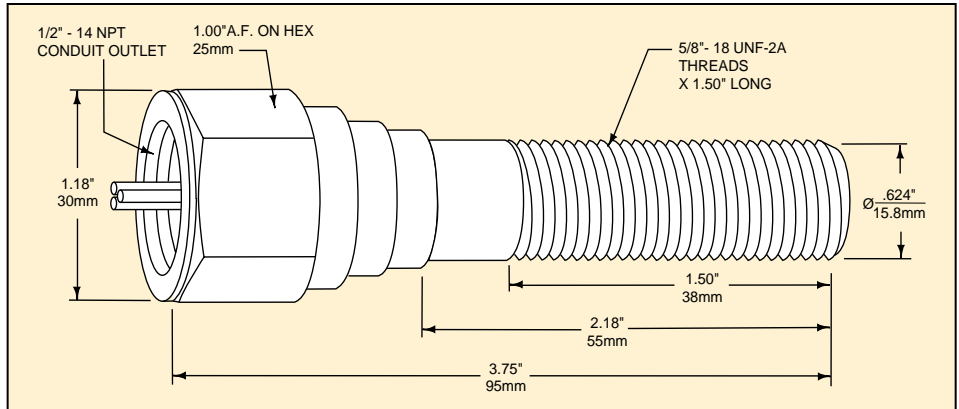
#### Testing

Every electrical component in every Silver Bullet is 100% tested at incoming inspection and every unit then receives a final, complete functional test.

#### Warranty

5 year unconditional warranty

## DIMENSIONS (inches/mm)



## MECHANICAL

<b>Full Metal Outer Jacket:</b>	316 Stainless Steel
<b>Hermetic Seal:</b>	Glass (vacuum)
<b>Coating:</b>	Acid / Alkali Resistant
<b>Potting:</b>	Epoxy Resin
<b>Contacts:</b>	Tungsten
<b>NEMA Rating:</b>	1, 3, 4, 4X, 6, 7, 9, 12, 13
<b>IP Rating:</b>	65, 67
<b>Temp. Range (°F):</b>	-40°F to 220°F
<b>Operational Life:</b>	600,000 cycles (full rated load)
<b>Sensor Actuation:</b>	Ferromagnetic (stainless steel encapsulated)
<b>Sensing Distance:</b>	0.100" (2.54mm) end sensing

## ELECTRICAL

<b>Contact Arrangement:</b>	SPDT, Form C (normally open), DPDT Form CC (normally open)
<b>Contacts:</b>	Rhodium or Tungsten
<b>Agency Certification:</b>	Underwriters Labs, Canadian Standards, NEMA 4, 4X, 7, 9 Class I, Groups A, B, C & D. Class II, Groups E, F & G, Division 1 & 2
<b>Operating Time:</b>	3.0 m Sec.
<b>Initial Contact Resistance:</b>	.50 ohms (Max)
<b>Repeatability:</b>	.005 in.
<b>Hysteresis:</b>	.040 in.
<b>Conduit Connection:</b>	1/2" - 14 NPT
<b>Leads:</b>	Factory Sealed with 18" minimum, 4 conductor PVC insulated
<b>Contact Ratings:</b>	
<b>Tungsten</b>	SPDT. Form C (Normally Open) 3 amps/120 VAC, 2 amps/24 VDC Wire: 4 conductor, 18 AWG. DPDT. Form CC (Normally Open) 3 amps/120 VAC, 2 amps/24 VDC Wire: 7 conductor, 18 AWG.
<b>Rhodium</b>	SPDT. Form C (Normally Open) 2.95 amps/120 VAC, 1 amp/24 VDC Wire: 4 conductor, 18 AWG.

## ADAPTION

<b>Bracket:</b>	Stainless Steel
<b>Hardware:</b>	Stainless steel
<b>Actuation Trigger:</b>	Ferromagnetic (stainless steel encapsulated)
<b>Sensing Distance:</b>	.100" (2.54 mm) end sensing
<b>Trigger Arm:</b>	Dual Fieldset™ Adjustment