

Valve Position Transmitters  
Positioners



Moniteur

Full Catalog PDF Rev. 12/15

# Moniteur



**Field Proven Valve Position Transmitters  
for All Industrial & Hazardous Areas**

**The New Standard for the Process Industries**

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<b>Sentinel - for Explosion-proof</b> Sentinel S3 - FM ATEX / IECEx Flameproof VPT with Global Approvals Sentinel - UL/USA Aluminum Nema 4, 4x, 7, 9 VPT Sentinel II - UL Aluminum Nema 4, 4x, 7, 9 VPT	Pages 4-9
<b>Watchman - for General Purpose</b> Watchman - Aluminum Nema 4, 4x VPT	Pages 10-11
<b>Survivor - for Corrosion Resistant / Division 2</b> Survivor - Corrosion Resistant Thermoplastic Nema 4, 4x VPT Survivor II - Corrosion Resistant Thermoplastic Nema 4, 4x VPT for Division 2	Pages 12-15
<b>Linear - for Linear Operated Valves</b> Companion - Stainless Steel Nema 4, 4x, 7, 9 Limit Switches Companion Limit Switch Kits for Fisher 657/667 Actuators Guardian - Nema 4, 4x, 7, 9 VPT for Linear and Junction Box Applications	Pages 16-21
<b>Sensing - Switch and Sensor Specifications</b> Mechanical Switches, Non-Contact Switches, Inductive Sensors Current or Resistive Output, Pneumatic Switches	Pages 22-27
<b>Accessories - Indicators &amp; Control Packages</b> Indicateur - Visual Valve Position Indicator, Indicator Options DSS Two-Stage Package, D3 Three Position Control Package, Indicator Selection Corrosion Resistance Options	Pages 28-36
<b>Networking - Valve Networking Products</b> Moniteur ASi, DeviceNet and Profibus Interface Modules	Pages 37-44
<b>Positioners - Valve Control Products</b> Series 40 Pneumatic Positioner Series 41 Electro-Pneumatic Positioner	Pages 45-56
<b>Tech Info - Technical and Engineering Information</b> Installation and Operation Manual, Wiring Diagrams Guide to Position Monitoring and Sensing Features and Benefits of Moniteur's VPTs	Pages 57-70
<b>Bracket Kits - Moniteur's Extensive Bracket Offering</b> NAMUR Bracket Kits & Dimensions, Polymer Resin Bracket Kits Bracket Kits for Non-NAMUR actuators	Pages 71-74

### Optimized to Outperform

Moniteur's third generation Valve Position Transmitters have been designed to provide the most reliable valve position feedback in difficult process environments. Every detail of its construction has been optimized to outperform.

*Features Include:*

- ▶ **Global Approvals** - Flameproof ATEX, IECEEx and Explosion-proof FM for North America allow you to use the same item number for all of your plant specifications worldwide
- ▶ No conduit seal required in Division 1 and 2 areas with non-contact switches
- ▶ Moniteur's patented Engineered Loc-Ring Cam and Shaft Retention System provides unsurpassed sensing accuracy over a multi-million cycle life of the physical platform.
- ▶ Industry's most reliable switches and sensors available to exceed the requirements of advanced control systems.
- ▶ Clear Ektar cover offers optimum chemical resistance and strength and is environmentally sealed to prevent fogging or entry of contaminants.
- ▶ Moniteur's patented field-proven indicator a rated life minimum of 1,000,000 cycles.
- ▶ Moniteur's materials of construction selected to outperform in high vibration, corrosive and dirty environments, either indoors or outdoors.

### Material Specifications

- ▶ Enclosure - Low Copper Content Aluminum A360  
Optional Hard Anodizing for Severe Applications
- ▶ Shaft - 303 or Optional 316 Stainless Steel
- ▶ Shaft Locking Ring - Stainless Steel
- ▶ Indicator Cover - Ektar Copolyester
- ▶ Bearing - Bronze or Optional 303 Stainless Steel
- ▶ Fasteners - 316 and 18-8 Stainless Steel
- ▶ O-rings - BUNA-N or Optional Viton
- ▶ Cams and Splines - Acetal



**Type 4X  
IP66 / IP67**

### Hazardous Area Ratings - ATEX / IECEEx



**II 2 G Ex d IIB +H2 T6**

**II 2 D Ex tb IIIC T85°C**

IECEEx FMG 09.0002X

FM09ATEX0020X

### Hazardous Area Ratings - North America



**Cl. I, Div. 1, Groups B\*, C, D**

**Cl. II, Div. 1, Groups E, F, G**

\* - Mech Switches Grp C & D Only

Operating Temperature [deg. C -40° to 79°]  
(-40°F to 174°F)

### Certified Options<sup>1</sup>

- ▶ 2 or 3 - M20, M25 or 3/4" NPT Conduit Entries
- ▶ 1, 2, 3, 4 or 6 Mechanical SPDT Switches.
- ▶ 1, 2, 3, 4 or 6 Tungsten or Rhodium TTL Hermetically Sealed Proximity Switches
- ▶ 1, 2, 3 or 4 DPDT Mechanical Switches
- ▶ 1,2,3, 4 or 6 Inductive Proximity
- ▶ NAMUR or Standard Shaft (1/4" flats)
- ▶ 4-20mA Transmitter, 0-1k, 0-10k ohm High Linearity Potentiometer for 0-100% Analog Output
- ▶ ASi, DeviceNet and Profibus DP Network Cards for Your Valve Monitor Network

<sup>1</sup> - Some Options Affect Approvals - Contact Moniteur





## Popular Switch and Sensor Specifications

► Mechanical SPDT Switches



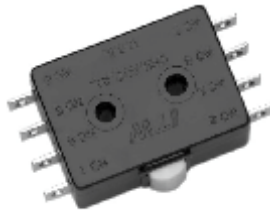
Electrical Ratings  
 15 A / 125-250 VAC  
 2.5 A / 24 VDC  
 0.5 A / 125 VDC  
 0.25 A / 250 VDC  
Operating Temperature  
 -40 to +174 °F

► TTL Hermetically Sealed Proximity Switches



Electrical Ratings  
 Rhodium (DC Signals):  
 1 A / 24VDC - 0.25 A / 120VAC  
 Tungsten (AC Signals):  
 3 A / 120 VAC - 2 A / 24VDC  
Operating Temperature  
 -40 to +174 °F

► Mechanical DPDT Switches



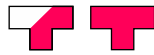
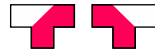
Electrical Ratings  
 10 A / 125-250 VAC  
 7 A / 24 VDC  
 0.25 A / 125 VDC  
Operating Temperature  
 -40 to +174 °F

► Pepperl & Fuchs NJ2-V3-N NAMUR Inductive Sensors (Intrinsically Safe)



Electrical Ratings  
 NAMUR 5-25 VDC  
 Target Present 3-15 mA  
 Target Absent <1mA  
Operating Temperature  
 -14 to +174 °F

## Open/Closed and 3-Way Path Indicators



## Intelligent Part Number System

**S** **M** **Y** **B** - **E** **1** **2** **0**

Series    Cover    Indicator    Bearing    Shaft    Switch    Quantity

Description	Code	Description	Code	Description	Code
Series: Sentinel S3	S	Bearing		Conduit Connection	
Moniteur		Bronze	B	2x - 3/4" F NPT	0
With Indicator	M	303 Stainless	S	3x - 3/4" F NPT	5
Flat Cover	F	Shaft		2x - 3/4" F NPT and	6
<u>Indicator Type (open/closed)</u>		Standard 303 SS	1	1x -1/2" F NPT	
No Indicator (Flat Cover)	N	Standard 316 SS	3	1x - 3/4" F NPT and	8
Black / Yellow (Standard)	Y	Low Profile NAMUR 303 SS	5	1x -1/2" M NPT	
Green / Red	A	Low Profile NAMUR 316 SS	7	2x - M20	A
Red / Green	C	NAMUR 303 SS	E	3x - M20	B
0-100% Digital	P	NAMUR 316 SS	G	2x - M25	E
3-Way Path O (90 deg.)	O	Switch/Sensor Type		3x - M25	F
3-Way Path T (90 deg.)	T	Mechanical SPDT 15A-250VAC	1	<u>Options</u>	
3-Way Path F (90 deg.)	F	Tungsten TTL Prox 3A-125 VAC	2	Transmitter 4 - 20mA	-WT1
4-Way Path S (90 deg.)	S	Mechanical SPDT Gold Plated 1A-24VDC	3	Potentiometer 0 - 1k	-WR1
180 degree T-port	1	ITW Mechanical DPDT 10A-250VAC	4	Hard Anodized Enclosure	-H1
180 degree L-Port - OcOc	5	P&F NJ2-V3-N, NAMUR	8	12 Terminal Points	-US12
180 degree L-Port - OOcc	6	Rhodium TTL Prox 1A-24VDC	T	16 Terminal Points	-US16
ANSI Green / White	G	Sensor Quantity	0-6	Contact Moniteur for additional option codes	
ANSI Blue / White	B				
ANSI Red / White	R				

### *The Perfect Choice for Explosion-Proof*

The SENTINEL VPT has been designed to provide the most visible and reliable valve position indication in explosion-proof environments. With a wide variety of switches and sensors available to match your application, the Sentinel is the perfect choice.

#### *Features Include:*

- ▶ UL and CSA Certified for Explosion-proof.
- ▶ Moniteur's patented Engineered Loc-Ring Cam and Shaft Retention System provides unsurpassed sensing accuracy over the multi-million cycle life of the physical platform.
- ▶ Clear Ektar cover offers optimum chemical resistance and strength and is environmentally sealed to prevent fogging or entry of contaminants.
- ▶ Careful material selection provides Moniteur's patented indicator a rated life of minimum 1,000,000 cycles.
- ▶ Materials of construction selected to excel in high vibration, corrosive and dirty environments, either indoors or outdoors.
- ▶ Indicator is fully adjustable to any valve or actuator.
- ▶ Internal Switches and terminal block are labeled for easier installation.
- ▶ The industry's only "true" visual valve position indicator available for multi-port valves, adjustable to match the actual physical flow pattern of the valve.
- ▶ "Flat cover" version is available without an indicator for areas with tight space requirements.

### *Material Specifications*

- ▶ Enclosure - Aluminum with Optional Iridite for Corrosion Resistance, Optional Hard Anodizing for Severe Applications
- ▶ Shaft - 303 or Optional 316 Stainless Steel
- ▶ Shaft Locking Ring - Stainless Steel
- ▶ Indicator Cover - Ektar Copolyester
- ▶ Bearing - Bronze or Optional 303 Stainless Steel
- ▶ Fasteners - 316 & 18-8 Stainless Steel
- ▶ O-rings - BUNA-N or Optional Viton
- ▶ Cams and Splines - Acetal



### **Industry Approvals:**

#### **Mechanical Switches: UL / CSA**

Class I, Division 1 & 2, Groups C & D;  
Class II, Division 1 & 2, Groups E, F & G

#### **TTL Switches: UL / CSA**

Class I, Division 1 & 2, Groups C & D;  
Class I, Division 2, Groups A & B;  
Class II, Division 1 & 2, Groups E, F & G

### *Certified Configurations*

- ▶ 2 or 3 - 3/4" NPT Conduit Entries
- ▶ Certified Male 1/2" NPT Hub for Easy Direct-Mounting of Explosion-proof Solenoid Valves
- ▶ 1, 2, 3, 4 or 6 Mechanical SPDT Switches.
- ▶ 1, 2, 3, 4 or 6 Tungsten or Rhodium TTL Hermetically Sealed Proximity Switches
- ▶ 1, 2, 3 or 4 DPDT Mechanical Switches
- ▶ 1, 2, 3 or 4 Inductive Proximity or Intrinsically Safe Sensors
- ▶ Standard NAMUR, Low Profile NAMUR or Standard Shaft (1/4" flats)
- ▶ 4-20mA Transmitter or 0-1k or 10k ohm High Linearity Potentiometer for 0-100% Analog Output

### Popular Switch and Sensor Specifications

- ▶ Mechanical SPDT Switches



Electrical Ratings  
 15 A / 125-250 VAC  
 2.5 A / 24 VDC  
 0.5 A / 125 VDC  
 0.25 A / 250 VDC  
Operating Temperature  
 -40 to +175 °F

- ▶ TTL Hermetically Sealed Proximity Switches



Electrical Ratings  
 Rhodium (DC Signals):  
 1 A / 24VDC - 0.25 A / 120VAC  
 Tungsten (AC Signals):  
 3 A / 120 VAC - 2 A / 24VDC  
Operating Temperature  
 -40 to +175 °F

- ▶ Mechanical DPDT Switches



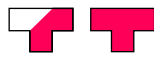
Electrical Ratings  
 10 A / 125-250 VAC  
 7 A / 24 VDC  
 0.25 A / 125 VDC  
Operating Temperature  
 -40 to +175 °F

- ▶ Pepperl & Fuchs NJ2-V3-N NAMUR Inductive Sensors (Intrinsically Safe)



Electrical Ratings  
 NAMUR 5-25 VDC  
 Target Present 3-15 mA  
 Target Absent <1mA  
Operating Temperature  
 -25 to +140 °C

### Open/Closed and 3-Way Path Indicators



### Intelligent Part Number System

**A** **M** **Y** **B** - **E** **1** **2** **0**  
 Series    Cover    Indicator    Bearing    Shaft    Switch    Quantity    Conduit

Description	Code	Description	Code	Description	Code
Series: Sentinel	A	Bearing		Conduit Connection	
Moniteur		Bronze	B	2 - 3/4" F NPT	0
With Indicator	M	303 Stainless	S	3 - 3/4" F NPT	5
Flat Cover	F	Shaft		1 - 3/4" F NPT +	
<u>Indicator Type (open/closed)</u>		Standard 303 SS	1	1 - 1/2" M NPT	8
No Indicator (Flat Cover)	N	Standard 316 SS	3	<u>Options</u>	
Black / Yellow (Standard)	Y	Low Profile NAMUR 303 SS	5	Transmitter 4 - 20mA	- 420
Green / Red	A	Low Profile NAMUR 316 SS	7	Potentiometer 0 - 1k	- 1K
Red / Green	C	NAMUR 303 SS	E	All Viton Seals	-V
0-100% Digital	P	NAMUR 316 SS	G	Hard Anodized Enclosure X14206	
3-Way Path O (90 deg.)	O	<u>Switch/Sensor Type</u>		12 Terminal Points	-12T
3-Way Path T (90 deg.)	T	Mechanical SPDT 15A-250VAC	1	16 Terminal Points	-16T
3-Way Path F (90 deg.)	F	Mechanical SPDT 0.5A-125 VDC	C	High Temperature	-HT
4-Way Path S (90 deg.)	S	PRISM SPDT Gold Plated 1A-24VDC	3	Contact Moniteur for	
180 degree T-port	1	ITW Mechanical DPDT 10A-250VAC	4	additional option codes	
180 degree L-Port - OcOc	5	Tungsten TTL Prox 3A-125 VAC	2	and custom requirements	
180 degree L-Port - OOCC	6	Rhodium TTL Prox 1A-24VDC	T		
ANSI Green / White	G	P&F NJ2-V3-N, NAMUR	8		
ANSI Blue / White	B	<u>Sensor Quantity</u>	1-6		
ANSI Red / White	R				

### **Moniteur's Indicator for Division 1, Group A&B Areas**

- The SENTINEL-II VPT has been designed to provide the most visible and reliable valve position indication in explosion-proof environments rated Class 1, Division 1, Groups A, B, C or D. With a wide variety of switches and sensors available to match your application, the Sentinel is the perfect choice.  
*Features Include:*
- No seal fitting required for Class 1, Division 1 areas.
- Moniteur's patented Engineered Loc-Ring Cam and Shaft Retention System provides unsurpassed sensing accuracy over the multi-million cycle life of the physical platform.
- Clear Ektar cover offers optimum chemical resistance and strength and is environmentally sealed to prevent fogging or entry of contaminants.
- Careful material selection provides Moniteur's patented indicator a rated life of minimum 1,000,000 cycles.
- Materials of construction selected to excel in high vibration, corrosive and dirty environments, either indoors or outdoors.
- Indicator is fully adjustable to any valve or actuator.
- Internal Switches and terminal block are labeled for easier installation.
- The industry's only "true" visual valve position indicator available for multi-port valves, adjustable to match the actual physical flow pattern of the valve.
- "Flat cover" version is available without an indicator for areas with tight space requirements.



## **explosion-proof nema 4, 4x, 7, 9**

### **Hazardous Areas**

Class I, Division 1 & 2, Groups A, B, C & D;  
Class II, Division 1 & 2, Groups E, F & G

### **Material Specifications**

- Enclosure - Cast Aluminum A356 with 2-part Polyurethane Paint
- Shaft - 303 Stainless Steel
- Shaft Locking Ring - Stainless Steel
- Indicator cover - Ektar Copolyester
- Bearing - Bronze or Optional 303 Stainless Steel
- Fasteners - 316 and 18-8 Stainless Steel
- O-rings - BUNA-N or Optional Viton
- Cams and Splines - Acetal

### **Certified Configurations**

- (1) 3/4" NPT plus (1) 1/2" NPT Conduit Entries with an Option for an Additional (1) 1/2" NPT Conduit Entry
- 1 or 2 Mechanical SPDT Switches.
- 1 or 2 Tungsten or Rhodium TTL Hermetically Sealed Proximity Switches
- 1 or 2 Inductive Proximity or Intrinsically Safe Sensors
- Standard NAMUR, Low Profile NAMUR or Standard Shaft (1/4" flats)
- 4-20mA Transmitter or 0-1k or 10k ohm High Linearity Potentiometer for 0-100% Analog Output



### Popular Switch and Sensor Specifications

Mechanical SPDT Switches



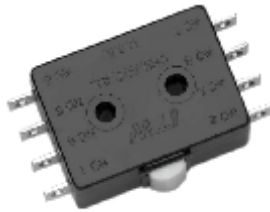
Electrical Ratings  
 15 A / 125-250 VAC  
 2.5 A / 24 VDC  
 0.5 A / 125 VDC  
 0.25 A / 250 VDC  
Operating Temperature  
 -40 to +175 °F

TTL Hermetically Sealed Proximity Switches



Electrical Ratings  
 Rhodium (DC Signals):  
 1 A / 24VDC - 0.25 A/120VAC  
 Tungsten (AC Signals):  
 3 A / 120 VAC - 2 A / 24VDC  
Operating Temperature  
 -40 to +175 °F

Mechanical DPDT Switches



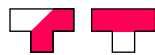
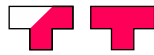
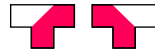
Electrical Ratings  
 10 A / 125-250 VAC  
 7 A / 24 VDC  
 0.25 A / 125 VDC  
Operating Temperature  
 -40 to +175 °F

Pepperl & Fuchs  
 NJ2-V3-N NAMUR  
 Inductive Sensors  
 (Intrinsically Safe)



Electrical Ratings  
 NAMUR 5-25 VDC  
 Target Present 3-15 mA  
 Target Absent <1mA  
Operating Temperature  
 -25 to +140 °C

### Open/Closed and 3-Way Path Indicators



### Intelligent Part Number System

<b>C</b>	<b>M</b>	<b>Y</b>	<b>B</b>	<b>-</b>	<b>E</b>	<b>1</b>	<b>2</b>	<b>0</b>
Series	Cover	Indicator	Bearing		Shaft	Switch	Quantity	Conduit

Description	Code	Description	Code	Description	Code
Series: Sentinel-II	C	<u>Bearing</u>		<u>Conduit Connection</u>	
Moniteur		Bronze	B	1 - 3/4" F NPT +	
With Indicator	M	303 Stainless	S	1 - 1/2" F NPT	4
Flat Cover	F	<u>Shaft</u>		1 - 3/4" F NPT +	
<u>Indicator Type (open/closed)</u>		Standard 303 SS	1	2 - 1/2" F NPT	7
No Indicator (Flat Cover)	N	Standard 316 SS	3	<u>Options</u>	
Black / Yellow (Standard)	Y	Low Profile NAMUR 303 SS	5	Transmitter 4 - 20mA	- 420
Green / Red	A	Low Profile NAMUR 316 SS	7	Potentiometer 0 - 1k	- 1K
Red / Green	C	NAMUR 303 SS	E	All Viton Seals	-V
0-100% Digital	P	NAMUR 316 SS	G	High Temperature	-HT
3-Way Path O (90 deg.)	O	<u>Switch/Sensor Type</u>		Contact Moniteur for additional option codes and custom requirements	
3-Way Path T (90 deg.)	T	Mechanical SPDT 15A-250VAC	1		
3-Way Path F (90 deg.)	F	Mechanical SPDT 0.5A-125 VDC	C		
4-Way Path S (90 deg.)	S	PRISM SPDT Gold Plated 1A-24VDC	3		
180 degree T-port	1	ITW Mechanical DPDT 10A-250VAC	4		
180 degree L-Port - OcOc	5	Tungsten TTL Prox 3A-125 VAC	2		
180 degree L-Port - OOcc	6	Rhodium TTL Prox 1A-24VDC	T		
ANSI Green / White	G	P&F NJ2-V3-N, NAMUR	8		
ANSI Blue / White	B	<u>Sensor Quantity</u>	1-2		
ANSI Red / White	R				

### **The Reliable Choice**

The WATCHMAN VPT has been designed to provide the most visible and reliable valve position indication in general purpose applications. With a wide variety of switches and sensors available to match your application, the Watchman is the best choice.

*Features Include:*

- ▶ CSA Certified for General Purpose applications
- ▶ Moniteur's patented Engineered Loc-Ring Cam and Shaft Retention System provides unsurpassed sensing accuracy over the multi-million cycle life of the physical platform.
- ▶ Clear Ektar Cover offers optimum chemical resistance and strength and is environmentally sealed to prevent fogging or entry of contaminants.
- ▶ Careful material selection provides Moniteur's patented indicator a rated life of minimum 1,000,000 cycles.
- ▶ Materials of construction selected to excel in high vibration, corrosive and dirty environments, either indoors or outdoors.
- ▶ Indicator is fully adjustable to any valve or actuator.
- ▶ Internal Switches and terminal block are labeled for easier installation.
- ▶ The industry's only "true" visual valve position indicator available for multi-port valves, adjustable to match the actual physical flow pattern of the valve.
- ▶ "Flat cover" version is available without an indicator for areas with tight space requirements.

### **Material Specifications**

- ▶ Enclosure - Aluminum with 2-part Polyurethane Paint
- ▶ Shaft - 303 or Optional 316 Stainless Steel
- ▶ Shaft Locking Ring - Stainless Steel
- ▶ Indicator Cover - Ektar Copolyester
- ▶ Bearing - Bronze or Optional 303 Stainless Steel
- ▶ Fasteners - 316 & 18-8 Stainless Steel
- ▶ O-rings - BUNA-N or Optional Viton
- ▶ Cams and Splines - Acetal

**NEMA 4**



**Industry Approvals:  
CSA General Purpose**

### **Certified Configurations**

- ▶ 2 or 3 - 1/2" NPT Conduit Entries
- ▶ 1, 2, 3 or 4 Mechanical SPDT Switches.
- ▶ 1 or 2 Tungsten or Rhodium TTL Hermetically Sealed Proximity Switches
- ▶ 1 or 2 DPDT Mechanical Switches
- ▶ 1, 2, 3 or 4 Inductive Proximity or Intrinsically Safe Sensors
- ▶ Standard NAMUR, Low Profile NAMUR or Standard Shaft (1/4" flats)
- ▶ 4-20mA Transmitter or 0-1k or 10k ohm High Linearity Potentiometer for 0-100% Analog Output

### Popular Switch and Sensor Specifications

- Mechanical SPDT Switches



Electrical Ratings  
 15 A / 125-250 VAC  
 2.5 A / 24 VDC  
 0.5 A / 125 VDC  
 0.25 A / 250 VDC  
Operating Temperature  
 -40 to +175 °F

- TTL Hermetically Sealed Proximity Switches



Electrical Ratings  
 Rhodium (DC Signals):  
 1 A / 24VDC - 0.25 A / 120VAC  
 Tungsten (AC Signals):  
 3 A / 120 VAC - 2 A / 24VDC  
Operating Temperature  
 -40 to +175 °F

- Mechanical DPDT Switches



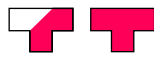
Electrical Ratings  
 10 A / 125-250 VAC  
 7 A / 24 VDC  
 0.25 A / 125 VDC  
Operating Temperature  
 -40 to +175 °F

- Pepperl & Fuchs NJ2-V3-N NAMUR Inductive Sensors (Intrinsically Safe)



Electrical Ratings  
 NAMUR 5-25 VDC  
 Target Present 3-15 mA  
 Target Absent <1mA  
Operating Temperature  
 -25 to +140 °C

### Open/Closed and 3-Way Path Indicators



### Intelligent Part Number System

<b>F</b>	<b>M</b>	<b>Y</b>	<b>B</b>	<b>-</b>	<b>E</b>	<b>1</b>	<b>2</b>	<b>0</b>
Series	Cover	Indicator	Bearing		Shaft	Switch	Quantity	Conduit

Description	Code	Description	Code	Description	Code
Series: Watchman	F	Bearing		Conduit Connection	
Moniteur		Bronze	B	2 - 1/2" F NPT	0
With Indicator	M	303 Stainless	S	3 - 1/2" F NPT	6
Flat Cover	F	Shaft		1 - 1/2" F NPT + 1 - 1/2" M NPT	8
<u>Indicator Type (open/closed)</u>		Standard 303 SS	1	<u>Options</u>	
No Indicator (Flat Cover)	N	Standard 316 SS	3	Transmitter 4 - 20mA	- 420
Black / Yellow (Standard)	Y	Low Profile NAMUR 303 SS	5	Potentiometer 0 - 1k	- 1K
Green / Red	A	Low Profile NAMUR 316 SS	7	All Viton Seals	-V
Red / Green	C	NAMUR 303 SS	E	12 Terminal Points	-12T
0-100% Digital	P	NAMUR 316 SS	G	16 Terminal Points	-16T
3-Way Path O (90 deg.)	O	<u>Switch/Sensor Type</u>		High Temperature	-HT
3-Way Path T (90 deg.)	T	Mechanical SPDT 15A-250VAC	1	Contact Moniteur for additional option codes and custom requirements	
3-Way Path F (90 deg.)	F	Mechanical SPDT 0.5A-125 VDC	C		
4-Way Path S (90 deg.)	S	PRISM SPDT Gold Plated 1A-24VDC	3		
180 degree T-port	1	ITW Mechanical DPDT 10A-250VAC	4		
180 degree L-Port - OcOc	5	Tungsten TTL Prox 3A-125 VAC	2		
180 degree L-Port - OOCC	6	Rhodium TTL Prox 1A-24VDC	T		
ANSI Green / White	G	P&F NJ2-V3-N, NAMUR	8		
ANSI Blue / White	B	<u>Sensor Quantity</u>	1-4		
ANSI Red / White	R				

### Optimized to Outperform

Moniteur's Survivor Valve Position Transmitter has been designed to provide the most reliable valve position feedback in difficult process environments. Every detail of its construction has been optimized to outperform. *Features Include:*

- ▶ Moniteur's patented Engineered Loc-Ring Cam and Shaft Retention System provides unsurpassed sensing accuracy over the multi-million cycle life of the physical platform.
- ▶ Clear Ektar cover offers optimum chemical resistance and strength and is environmentally sealed to prevent fogging or entry of contaminants.
- ▶ Careful material selection provides Moniteur's patented indicator a rated life of minimum 1,000,000 cycles.
- ▶ Materials of construction selected to excel in high vibration, corrosive and dirty environments, either indoors or outdoors.
- ▶ Indicator is fully adjustable to any valve or actuator.
- ▶ Internal Switches and terminal block are labeled for easier installation.
- ▶ The industry's only "true" visual valve position indicator available for multi-port valves, adjustable to match the actual physical flow pattern of the valve.
- ▶ "Flat cover" version is available without an indicator for areas with tight space requirements.



### Material Specifications

- ▶ Enclosure - SuperTough Zytel® Nylon with Molded-In Nickel-Plated Brass or Stainless Steel Inserts
- ▶ Shaft - 303 or Optional 316 Stainless Steel
- ▶ Shaft Locking Ring - Stainless Steel
- ▶ Indicator Cover - Ektar Copolyester
- ▶ Bearing - Bronze or Optional 303 Stainless Steel
- ▶ Fasteners - 303 Stainless Steel
- ▶ O-rings - BUNA-N or Optional Viton
- ▶ Cams and Splines - Acetal

### Certified Configurations

- ▶ 2 or 3 - 1/2" NPT Conduit Entries
- ▶ 1, 2, 3 or 4 Mechanical SPDT Switches.
- ▶ 1, 2, 3 or 4 Tungsten or Rhodium TTL Hermetically Sealed Proximity Switches
- ▶ 1 or 2 DPDT Mechanical Switches
- ▶ 1, 2, 3 or 4 Inductive Proximity or Intrinsically Safe Sensors
- ▶ Standard NAMUR, Low Profile NAMUR or Standard Shaft (1/4" flats)
- ▶ 4-20mA Transmitter or 0-1k or 10k ohm High Linearity Potentiometer for 0-100% Analog Output

*Zytel is a trademark of the DuPont Company*



### Popular Switch and Sensor Specifications

- Mechanical SPDT Switches



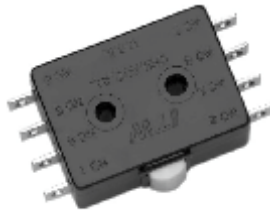
Electrical Ratings  
 15 A / 125-250 VAC  
 2.5 A / 24 VDC  
 0.5 A / 125 VDC  
 0.25 A / 250 VDC  
Operating Temperature  
 -40 to +175 °F

- TTL Hermetically Sealed Proximity Switches



Electrical Ratings  
 Rhodium (DC Signals):  
 1 A / 24VDC - 0.25 A / 120VAC  
 Tungsten (AC Signals):  
 3 A / 120 VAC - 2 A / 24VDC  
Operating Temperature  
 -40 to +175 °F

- Mechanical DPDT Switches



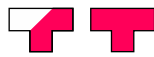
Electrical Ratings  
 10 A / 125-250 VAC  
 7 A / 24 VDC  
 0.25 A / 125 VDC  
Operating Temperature  
 -40 to +175 °F

- Pepperl & Fuchs NJ2-V3-N NAMUR Inductive Sensors (Intrinsically Safe)



Electrical Ratings  
 NAMUR 5-25 VDC  
 Target Present 3-15 mA  
 Target Absent <1mA  
Operating Temperature  
 -25 to +140 °C

### Open/Closed and 3-Way Path Indicators



### Intelligent Part Number System

<b>P</b>	<b>M</b>	<b>Y</b>	<b>B</b>	<b>-</b>	<b>E</b>	<b>1</b>	<b>2</b>	<b>0</b>
Series	Cover	Indicator	Bearing		Shaft	Switch	Quantity	

Description	Code	Description	Code	Description	Code
<u>Series: Survivor</u>	P	<u>Bearing &amp; Inserts</u>		<u>Conduit Connection</u>	
<u>Moniteur</u>		Bronze	B	2 - 1/2" F NPT	0
<u>With Indicator</u>	M	303 Stainless	S	3 - 1/2" F NPT 1	6
<u>Flat Cover</u>	F	<u>Shaft</u>		1 - 1/2" F NPT +	
<u>Indicator Type (open/closed)</u>		Standard 303 SS	1	1 - 1/2" M NPT	8
<u>No Indicator (Flat Cover)</u>	N	Standard 316 SS	3	<u>Options</u>	
<u>Black / Yellow (Standard)</u>	Y	Low Profile NAMUR 303 SS	5	Transmitter 4 - 20mA	- 420
<u>Green / Red</u>	A	Low Profile NAMUR 316 SS	7	Potentiometer 0 - 1k	- 1K
<u>Red / Green</u>	C	NAMUR 303 SS	E	All Viton Seals	-V
<u>0-100% Digital</u>	P	NAMUR 316 SS	G	12 Terminal Points	-12T
<u>3-Way Path O (90 deg.)</u>	O	<u>Switch/Sensor Type</u>		16 Terminal Points	-16T
<u>3-Way Path T (90 deg.)</u>	T	Mechanical SPDT 15A-250VAC	1		
<u>3-Way Path F (90 deg.)</u>	F	Mechanical SPDT 0.5A-125 VDC	C		
<u>4-Way Path S (90 deg.)</u>	S	PRISM SPDT Gold Plated 1A-24VDC	3		
<u>180 degree T-port</u>	1	ITW Mechanical DPDT 10A-250VAC	4		
<u>180 degree L-Port - OcOc</u>	5	Tungsten TTL Prox 3A-125 VAC	2		
<u>180 degree L-Port - OOcc</u>	6	Rhodium TTL Prox 1A-24VDC	T		
<u>ANSI Green / White</u>	G	P&F NJ2-V3-N, NAMUR	8		
<u>ANSI Blue / White</u>	B				
<u>ANSI Red / White</u>	R	<u>Sensor Quantity</u>	1-4		

### **The New Standard For Harsh Environments**

Moniteur's Survivor-II Valve Position Transmitter has been designed to provide the most visible and reliable valve position indication for hazardous areas rated Division 2. Molded from DuPont's SuperTough Zytel® Nylon with all-stainless steel trim, the SURVIVOR-II VPT will stand up to harsh washdowns and corrosives with ease.

#### *Features Include:*

- ▶ Dual Potting Wells
- ▶ Stainless Steel Molded-In Inserts and Bearing
- ▶ Moniteur's patented Engineered Loc-Ring Cam and Shaft Retention System provides unsurpassed sensing accuracy over the multi-million cycle life of the physical platform.
- ▶ Clear Ektar cover offers optimum chemical resistance and strength and is environmentally sealed to prevent fogging or entry of contaminants.
- ▶ Careful material selection provides Moniteur's patented indicator a rated life of minimum 1,000,000 cycles.
- ▶ Materials of construction selected to excel in high vibration, corrosive and dirty environments, either indoors or outdoors.
- ▶ Indicator is fully adjustable to any valve or actuator.
- ▶ Internal Switches and terminal block are labeled for easier installation.
- ▶ The industry's only "true" visual valve position indicator available for multi-port valves, adjustable to match the actual physical flow pattern of the valve.

**DIV 2**

**NEMA 4**



***SuperTough Zytel Housing  
rated nema 4, 4x***

#### **Industry Approvals: CSA**

Class I, Division 2, Groups A, B, C & D;  
Class II, Division 2, Groups E, F & G

### **Material Specifications**

- ▶ Enclosure - SuperTouch Zytel® Nylon with Molded-In Stainless Steel Inserts
- ▶ Shaft - 303 or Optional 316 Stainless Steel
- ▶ Shaft Locking Ring - Stainless Steel
- ▶ Indicator cover - Ektar Copolyester
- ▶ Bearing - Bronze or Optional 303 Stainless Steel
- ▶ Fasteners - 316 or 18-8 Stainless Steel
- ▶ O-rings - BUNA-N or Optional Viton
- ▶ Cams and Splines - Acetal

### **Options**

- ▶ 2 or 3 - 1/2" NPT Conduit Entries
- ▶ 1, 2, 3 or 4 Tungsten or Rhodium TTL Hermetically Sealed Proximity Switches
- ▶ 1, 2, 3 or 4 Inductive Proximity or Intrinsically Safe Sensors
- ▶ Standard NAMUR, Low Profile NAMUR or Standard Shaft (1/4" flats)
- ▶ 4-20mA Transmitter or 0-1k or 10k ohm High Linearity Potentiometer for 0-100% Analog Output

*Zytel is a trademark of the DuPont Company*

## Popular Switch and Sensor Specifications

TTL Hermetically Sealed Proximity Switches



### Electrical Ratings

Rhodium (DC Signals):  
1 A / 24VDC  
Tungsten (AC Signals):  
1 A / 30 VAC - 2 A / 24VDC  
Operating Temperature  
-40 to +175 °F

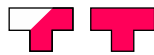
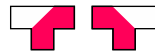
Pepperl & Fuchs  
NJ2-V3-N NAMUR  
Inductive Sensors  
(Intrinsically Safe)



### Electrical Ratings

NAMUR 5-25 VDC  
Target Present 3-15 mA  
Target Absent <1mA  
Operating Temperature  
-25 to +140 °C

## Open/Closed and 3-Way Path Indicators



## Intelligent Part Number System

<b>R</b>	<b>M</b>	<b>Y</b>	<b>S</b>	<b>-</b>	<b>E</b>	<b>T</b>	<b>2</b>	<b>0</b>
Series	Cover	Indicator	Bearing		Shaft	Switch	Quantity	

Description	Code	Description	Code	Description	Code
<u>Series: Survivor-II</u>	R	<u>Bearing</u>		<u>Conduit Connection</u>	
Moniteur		303 Stainless w/Loc-Ring	S	2 - 1/2" F NPT	0
With Indicator	M	<u>Shaft</u>		3 - 1/2" F NPT	6
Flat Cover	F	Standard 303 SS	1	<u>Options</u>	
<u>Indicator Type (open/closed)</u>		Standard 316 SS W/ Dual O-Rings	3	Transmitter 4 - 20mA	- 420
No Indicator (Flat Cover)	N	Low Profile NAMUR 303 SS	5	Potentiometer 0 - 1k	- 1K
Black / Yellow (Standard)	Y	Low Profile NAMUR 316 SS W/ Dual O-Rings	7	All Viton Seals	-V
Green / Red	A	NAMUR 303 SS	E	12 Terminal Points	-12T
Red / Green	C	NAMUR 316 SS W/ Dual O-Rings	G	16 Terminal Points	-16T
0-100% Digital	P	<u>Switch/Sensor Type</u>		Double O-rings	-DR
3-Way Path O (90 deg.)	O	Tungsten TTL Prox 1A-30VAC, 2A-24VDC	2		
3-Way Path T (90 deg.)	T	Rhodium TTL Prox 1A-24VDC	T	Contact Moniteur for additional option codes and custom requirements	
3-Way Path F (90 deg.)	F	P&F NJ2-V3-N, NAMUR	8		
4-Way Path S (90 deg.)	S	<u>Sensor Quantity</u>	1-4		
180 degree T-port	1				
180 degree L-Port - OcOc	5				
180 degree L-Port - OOCC	6				
ANSI Green / White	G				
ANSI Blue / White	B				
ANSI Red / White	R				

### Hermetically Sealed Proximity Switch

The Companion VPT series proximity limit switches are designed for monitoring linear control valves. Available with a choice of two low hysteresis switching elements, the Companion meets all of the process industry's most demanding electrical requirements, either high power or low voltage.

The Companion is constructed from 316 SS and engineered to withstand corrosive and physically demanding environments. The switching elements are hermetically sealed and encapsulated in a thermoplastic shock guard. Contact reliability is assured to a minimum of 800,000 cycles at full load (see table below). The magnetic trigger provides a 3/16" detection range.



### Applications

- Linear control valves and actuators
- Alarms for sea gates and bulkhead doors
- Rotary valves and actuators
- Submersible applications



**LISTED**

Class I, Division 1, Groups A, B, C, D  
Class II, Division 1, Groups E, F, G

### Switching Elements Available

**TUNGSTEN TTL** - The choice for high power AC and DC switching applications. Durable tungsten contacts handle up to 3A - 120VAC / 2A - 24VDC. MTBF minimum 800,000 cycles at full load.

**RHODIUM TTL** - The choice for reliable low power 24 VDC switching applications under 50mA. Rhodium contacts have 80% less contact resistance than Tungsten TTL, making them more reliable. Rated to 1A - 24VDC. MTBF minimum 1,000,000 cycles.

### Specifications - COMPANION VPT

Part Number	Switch Type	AC Rating	DC Rating	Contacts	Form	MTBF (cycles)
XNNN-0210	TUNGSTEN	3A - 120V	2A - 24V	SPDT	C	800,000
XNNN-0T10	RHODIUM	0.2A - 120V	1A - 24V	SPDT	C	1,000,000



### Intelligent Part Number System

X	N	N	N	-	0	2	1	0
Series						Switch	Quantity	Conduit

Description	Code	Description	Code	Description	Code
Series: Companion	X	Switch/Sensor Package		Conduit Connection	
		Tungsten TTL Prox 3A-125 VAC	2	1-1/2" F NPT	0
		Rhodium TTL Prox 1A-24VDC	T	Options	
		Sensor Quantity	1	Long Lead Length	-W**
				** = 25 or 100	
				(rated to 257 °F - 125°C)	-T3

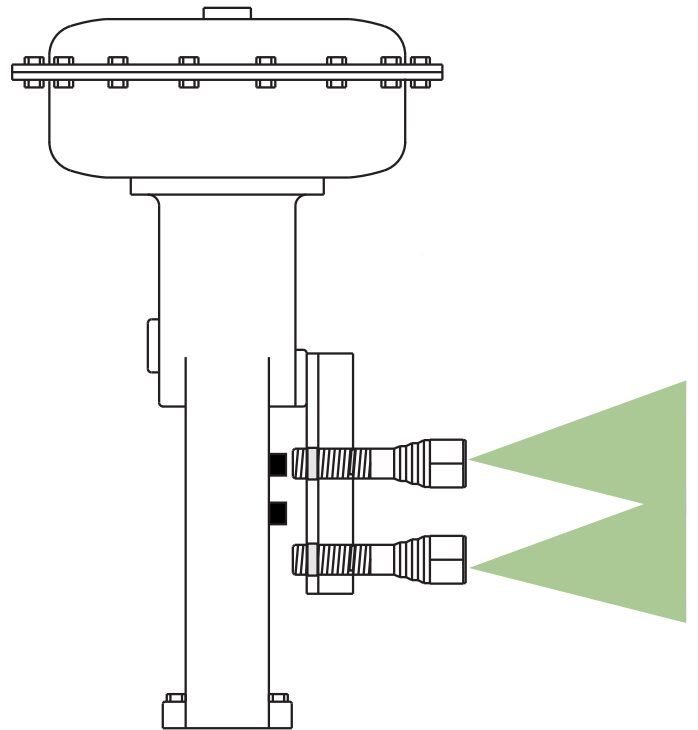
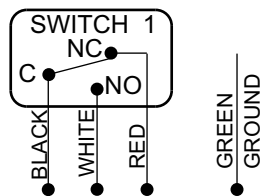
### Specifications

Contacts	Hermetically Sealed
Enclosure	316 SS
Repeatability	0.005"
Hysteresis	0.045"
Sensing Range	3/16"
Trigger	Encapsulated Magnet
Temperature Range	-40 - 175 °F (Standard)
Higher Temp Option	-40 - 257 °F (125°C) - Type 2

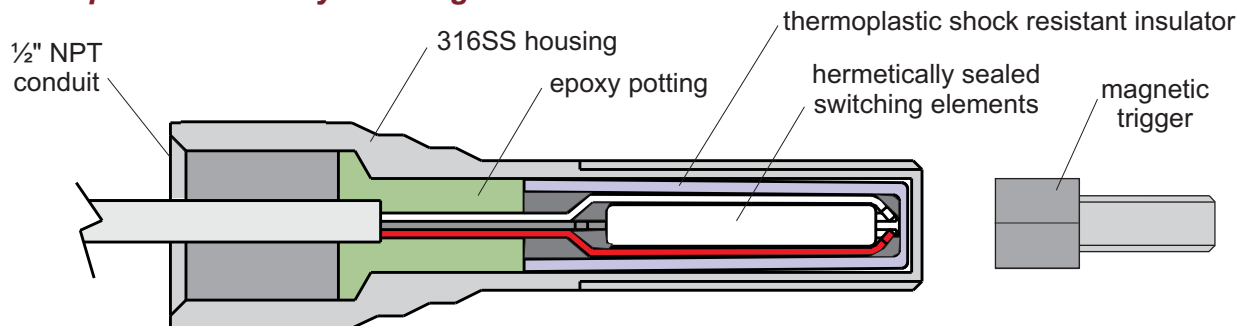
### Dimensions

Switch Length	3.625"
Wire Length	36" Standard Length
Switch Body Head	1" Hex
Switch Thread	5/8 - 18 UNC (1.50" long)
Conduit Entry	1/2" NPT
Trigger Length	1.25"
Trigger Head	1/2" Hex
Trigger Thread	5/16 - 18 UNC (0.75" long)

### Wiring Diagram



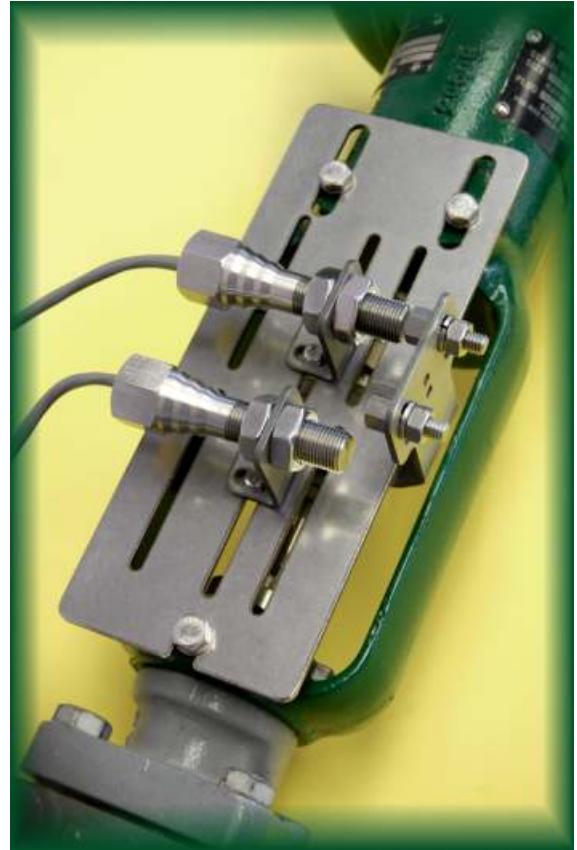
### Companion Cutaway Drawing



### Complete Valve Position Monitoring and Mounting Solutions for Fisher's Popular 657 and 667 Series Actuators

Moniteur's line of complete mounting solutions for the popular Fisher 657 and 667 actuators provides reliable end-of-travel position indication using our proven Companion VPT limit switches. *Features Include:*

- ▶ Fully adjustable mounts allow switches to be set to trip anywhere in the valve travel
- ▶ All stainless steel mounting hardware
- ▶ Easy assembly with precision laser cut parts designed to fit precisely for each actuator size
- ▶ Low hysteresis switching elements perfectly suited for short stroke linear actuators
- ▶ Heavy duty 316 SS housing for long life in harsh environments
- ▶ One-piece 316 SS magnetic target body for improved switching reliability when compared with typical two-piece designs
- ▶ High power switching elements for AC and DC signals
- ▶ Switching elements for low power DC signals



### Switching Elements Available

**TUNGSTEN TTL** - The choice for high power AC and DC switching applications. Durable tungsten contacts handle up to 3A - 120VAC / 2A - 24VDC. MTBF minimum 800,000 cycles at full load.

**RHODIUM TTL** - The choice for reliable low power 24 VDC switching applications under 50mA. Rhodium contacts have 80% less contact resistance than Tungsten TTL, making them more reliable. Rated to 1A - 24VDC. MTBF minimum 1,000,000 cycles.



Class I, Division 1, Groups A, B, C, D  
Class II, Division 1, Groups E, F, G

### Specifications - COMPANION VPT

Part Number	Switch Type	AC Rating	DC Rating	Contacts	Form	MTBF (cycles)
XNNN-0210	TUNGSTEN	3A - 120V	2A - 24V	SPDT	C	800,000
XNNN-0T10	RHODIUM	0.2A - 120V	1A - 24V	SPDT	C	1,000,000

### Popular Part Numbers

XNNN-0210	Tungsten TTL (for AC Signals)
XNNN-0T10	Rhodium TTL (for DC Signals)

### Series 657/667

Size	Kit Part #*
Size 30	BKT-LCS-001
Size 34	BKT-LCS-002
Size 40	BKT-LCS-003
Size 45 & 46	BKT-LCS-004
Size 50 & 60	BKT-LCS-005
Size 70	BKT-LCS-006
Size 80	BKT-LCS-007

\*for other sizes consult factory

### Mounting Kits Include:

- ▶ (1) Mounting Plate
- ▶ (2) Switch Mounting Brackets
- ▶ (1) Target Bracket to Attach to Valve Stem Coupler
- ▶ All Fasteners

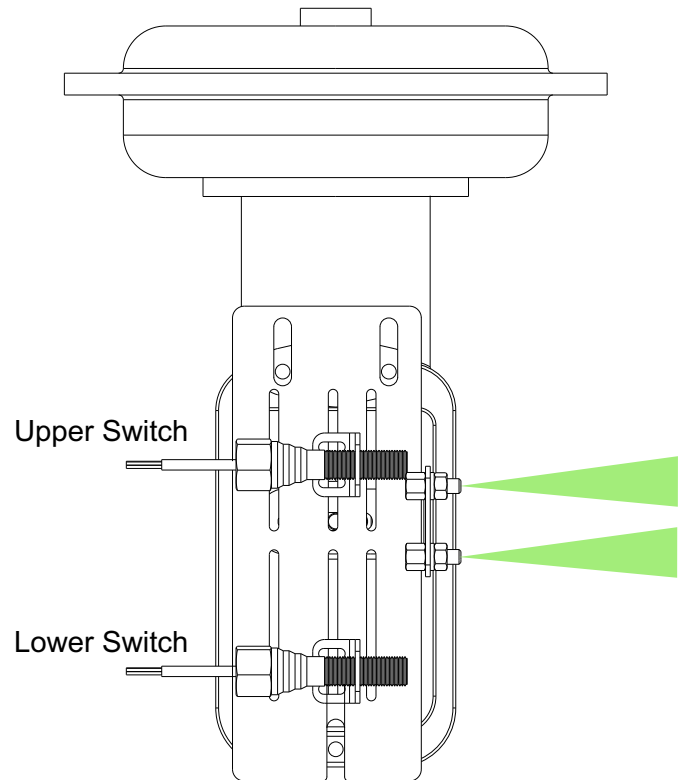
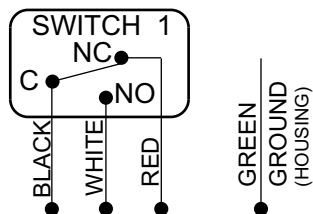
### Specifications

Contacts	Hermetically Sealed
Enclosure	316 SS
Repeatability	0.005"
Hysteresis	0.045"
Sensing Range	3/16"
Trigger	Encapsulated Magnet
Temperature Range	-40 - 175 °F (Standard) -40 - 320 °F (High Temperature)

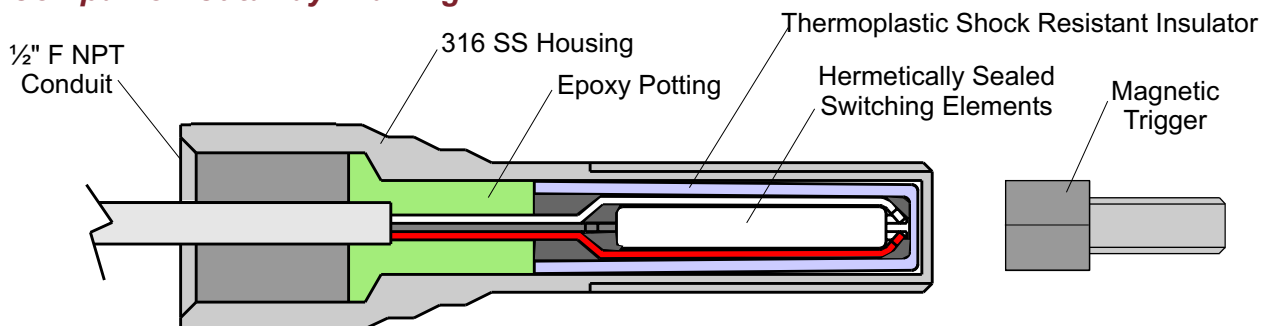
### Dimensions

Switch Length	3.625"
Switch Body Head	1" Hex
Switch Thread	5/8 - 18 UNC (1.50" long)
Conduit Entry	1/2" F NPT
Trigger Length	1.25"
Trigger Head	1/2" Hex
Trigger Thread	5/16 - 18 UNC (0.75" long)

### Wiring Diagram



### Companion Cutaway Drawing



### *A Versatile Position Transmitter for Linear and Junction Box Applications*

The GUARDIAN is a versatile valve position transmitter designed for a wide variety of applications:

**Linear Control Valves** - The picture to the right shows the GUARDIAN mounted to a linear control valve.

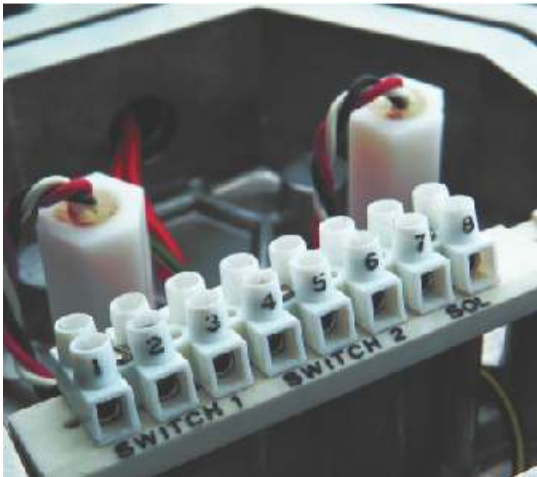
**Knife-Gate Valves** - The Guardian is adaptable to knife-gate valves, and can be used together with a Companion VPT to form an integrated package. The Guardian would provide the junction box and one limit switch, and the Companion would provide the second limit switch.

**Rotary Valves** - The Guardian can be used on an actuated rotary valve for a NEMA 6P (periodic submersion) applications.

**Junction Box Applications** - With 3 conduit entries and a maximum of 26 terminal points, the Guardian is a cost-effective alternative to standard junction boxes.

The Guardian is available with Moniteur's advanced line of TTL Non-Contact Switches or Inductive Sensors, providing the ability to interface with any plant control system.

***explosion-proof***  
***nema 4, 4x, 7, 9***



### Industry Approvals:

#### TTL Switches: UL / CSA

Class I, Division 1 & 2, Groups C & D;  
Class I, Division 2, Groups A & B;  
Class II, Division 1 & 2, Groups E, F & G

#### Inductive Sensors:

P&F Inductive Sensors listed are FM  
Intrinsically Safe Approved

### **Material Specifications**

- ▶ Enclosure - Aluminum with Optional Hard Anodizing for Severe Applications
- ▶ Fasteners - 316 and 18-8 Stainless Steel
- ▶ O-rings - BUNA-N or Optional Viton

### **Certified Configurations**

- ▶ 2 - 3/4" F NPT + 1 - 1/2" F NPT Conduit Entries Standard
- ▶ 1 or 2 Tungsten or Rhodium TTL Hermetically Sealed Proximity Switches
- ▶ 1 or 2 Inductive Proximity or Intrinsically Safe Sensors (Rated Nema 4 Only)
- ▶ Up to 26 Terminal Points



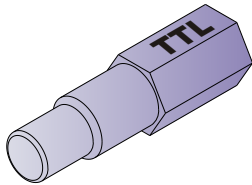
### Intelligent Part Number System

<b>K</b>	<b>F</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>6</b>
Series						Switch	Quantity	Conduit

Description	Code	Description	Code	Description	Code
Series: Guardian	K	Switch/Sensor		Options	
		No Switches - Junction Box Only	0	16 Terminal Points	-16T
		Tungsten TTL Prox 3A-125 VAC	2	26 Terminal Points	-26T
		Rhodium TTL Prox 1A-24VDC	T	Nema 6P Rating (No UL/CSA)	-6P
		P&F NJ 5-18GM-N, NAMUR	8	Contact Moniteur for additional option codes and custom requirements	
		Sensor Quantity	1-2		
		Conduit Connection			
		2 - 3/4" F NPT + 1 - 1/2" F NPT	6		

### Popular Switch and Sensor Specifications

- TTL Hermetically Sealed Proximity Switches



#### Electrical Ratings

Rhodium (DC Signals):  
1 A / 24VDC - 0.25 A / 120VAC  
Tungsten (AC Signals):  
3 A / 120 VAC - 2 A / 24VDC  
Operating Temperature  
-40 to +175 °F

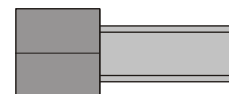
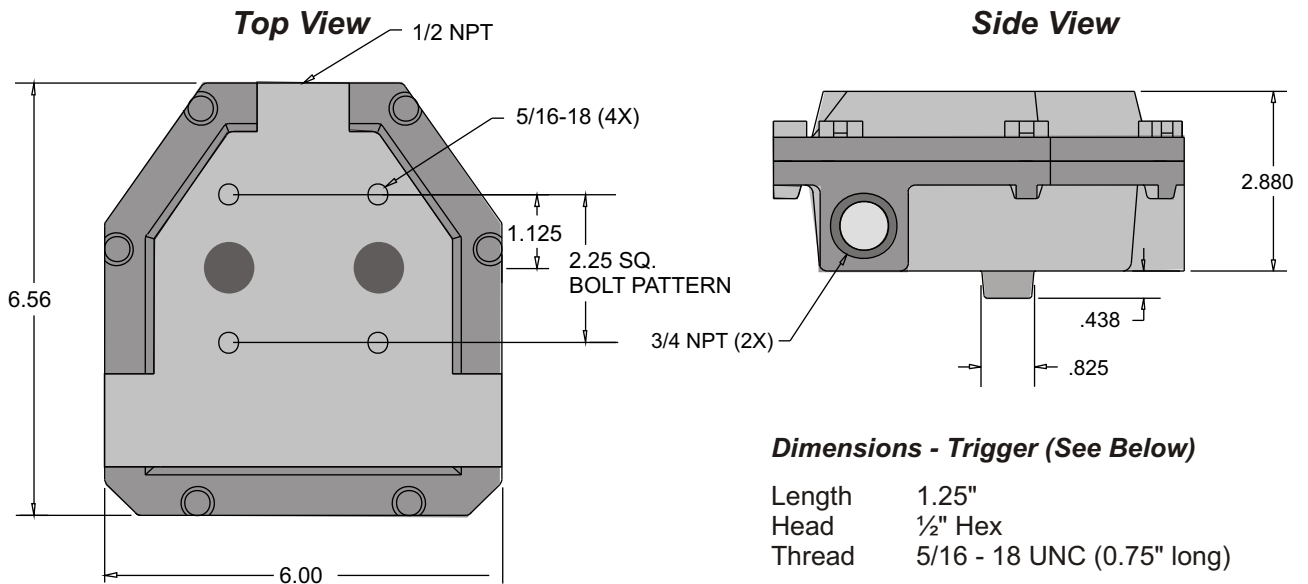
- Pepperl & Fuchs NJ 5-18GM-N NAMUR Inductive Sensors (Intrinsically Safe)

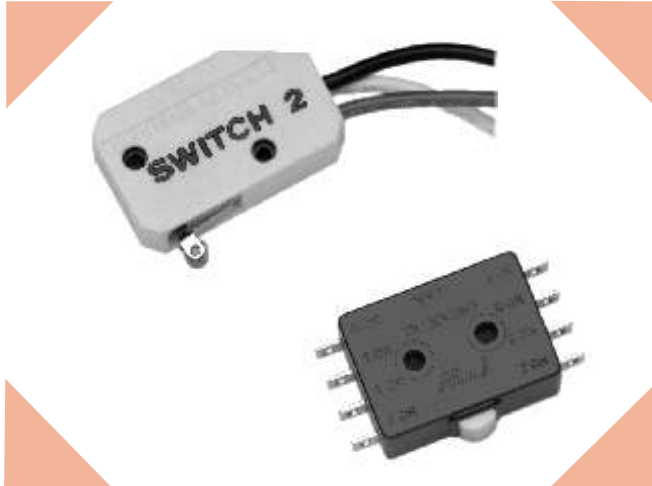


#### Electrical Ratings

NAMUR 5-25 VDC  
Target Present 3-15 mA  
Target Absent <1mA  
Operating Temperature  
-25 to +140 °C

### Dimensions





Moniteur offers the industry's best mechanical switches to handle a wide variety of applications, meeting the tough demands of today's process industries. A full range of mechanical snap-acting switches is available, including:

- ▶ Cherry 15A - 125-250 VAC SPDT
- ▶ ITW 10A - 125-250 VAC DPDT
- ▶ Prism 1A - 24 VDC Gold-Plated SPDT
- ▶ C&K SPDT for 125-250 VDC

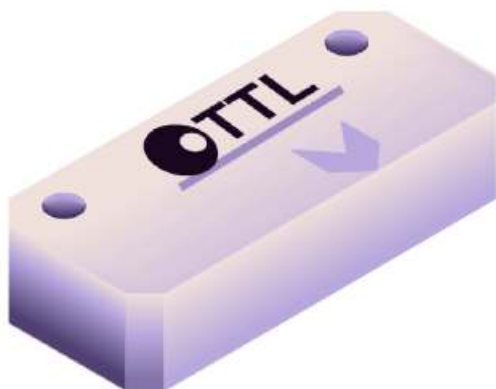
### Applications:

- ▶ **Mechanical SPDT** switches are the most common switch used due to their low cost and proven reliability for general purpose applications. In addition to transmitting valve position, the switch's high amp rating can control a relay, or other plant devices such as pumps or motors. Moniteur specifies stiffer contact springs that resist dirt and freeze-up in cold conditions.
- ▶ **Mechanical DPDT** are used for simultaneous switching functions when two independent signals must operate in tandem. An example is when one switch sends a low level signal back to the control room, and a second functions controls a relay or another device.
- ▶ **Gold plated Mechanical** switches are used in low current, low voltage (primarily DC) applications. Gold plated switch contacts assure signal stability at extremely low current and voltages, and are used as a low cost alternative in Intrinsically Safe systems.
- ▶ **Mechanical switches with 125VDC and 250VDC ratings** are also available for powerplants using battery voltage.

**Moniteur recommends that users check the current requirements of their devices to ensure the switches will not be used beyond their nameplate ratings.**

### Specifications - Mechanical Switches:

Switch Type	Moniteur Switch Code	AC Rating (resistive)	DC Rating	Form
SPDT (Cherry)	1	15A - 250VAC	2.5A - 24VDC	C
Gold Plated SPDT (Prism)	3	1A - 120VAC	1A - 24VDC	C
10A DPDT (ITW)	4	10A - 250VAC	7A - 24VDC	C
SPDT (C&K)	C	15A - 250VAC	0.5A - 125VDC 0.25A - 250VDC	C



Moniteur's TTL hermetically sealed proximity switches provide an advanced and reliable method of position monitoring for today's sophisticated process control systems. The highest quality reed switch elements available are enclosed and encapsulated in a flexible moisture-proof bedding compound, protecting them from contaminants and shock to 38g. Switching elements are actuated with neodymium magnets sealed in their cams to protect and prevent dislodgement and subsequent system failure. An internal stainless steel Loc-Ring is employed to prevent vertical shaft motion from corrupting output signals. A variety of switching elements are available, meeting different user needs.

### TTL Switching Elements Available

**TUNGSTEN TTL** - The choice for AC switching applications - use . Durable tungsten contacts handle up to 3A - 120VAC / 2A - 24VDC and 100 watts of power. TUNGSTEN TTL HV switches can handle 100 W at voltages up to 500 VAC or VDC. MTBF for both is 800,000 cycles.

**RHODIUM TTL** - The choice for DC switching applications. With 80% less contact resistance than Tungsten, these switches are best suited to modern control systems using low power DC feedback signals. Rated to 1A - 24VDC. MTBF 1,000,000 cycles.

**KRYSTAL TTL** - Rhodium TTL contacts combined with LED set lights make switch setting easier in the field. Rated to 0.3A - 120 VAC / 0.3A - 24 VDC. MTBF 1,000,000 cycles.

### Applications

- ▶ Areas with corrosive or humid environments that could corrode exposed contacts
- ▶ Critical position monitoring applications requiring reliability and higher cycle life
- ▶ Explosion-proof environments. Moniteur *Sentinel* series is UL listed and CSA\*\* approved for Class I, Division 2 - Groups A, B, Class 1, Division 1 Groups C, D and Class II, Division 1, Groups E, F, G.
- ▶ Class 1, Division 2 environments requiring hermetically sealed contacts or nonincendive circuits. Article 501-3 (b) of the NEC (National Electric Code) permits the use of general purpose enclosures (such as the Moniteur *Watchman* or *Survivor* Series) in Class 1, Division 2 locations when the current interrupting contacts are sealed within a hermetically sealed chamber.
- ▶ Intrinsically safe - Choose Rhodium TTL. These switches are passive devices (simple apparatus) and can be used in Intrinsically Safe applications with an approved current and voltage-limiting barrier.

### Specifications - TTL Switches

Switch Type	Moniteur Switch Code	AC Rating	DC Rating	Contacts	Form	MTBF (cycles) at full load
TUNGSTEN TTL	2	3A - 120VAC	2A - 24VDC	SPDT	C	800,000
TUNGSTEN TTL HV	E	0.4A - 250VAC	0.4A - 250VDC	SPDT	C	800,000
RHODIUM TTL	T	0.25A - 120VAC	1A - 24VDC	SPDT	C	1,000,000
KRYSTAL TTL	L	0.3A - 120VAC	0.3A - 24VDC	SPDT	C	1,000,000

\*\* Rhodium TTL only



Moniteur VPTs are available with a wide variety of industry proven inductive sensors for today's advanced process PLCs. Whether your process control system requires PNP, NPN, or NAMUR Intrinsically Safe rated sensors, Moniteur can supply the preferred position transmitter. Sensors available are shown in the table below.

Note: When specifying these sensors, be sure to determine from the end user whether their I/O card is compatible with the sensor specifications.

### Principle of Operation

- ▶ Inductive sensors are "solid state" (without moving parts) and are the most reliable of sensing methods, with a MTBF over 20 million cycles. Inductive Sensors have three parts of operation - the oscillator, triggering circuit and switching amplifier. The oscillator generates a high-frequency electromagnetic field in the sensor's target area. When a ferrous metal target enters the electromagnetic field (target area), eddy currents created in the target by the oscillator increase the load on the oscillator. At a specific load, the trigger circuit senses the reduction in oscillation and signals the switching amplifier to change the signal. Inductive Sensors consume electric power to operate, and must have approval to be used in hazardous areas (see table below).
- ▶ NAMUR inductive sensors operate without the amplifier circuitry in the sensor, allowing use in all hazardous areas. The required signal amplifier is installed externally in the safe area and is usually combined with the Intrinsically Safe barrier (sold separately).

### Applications

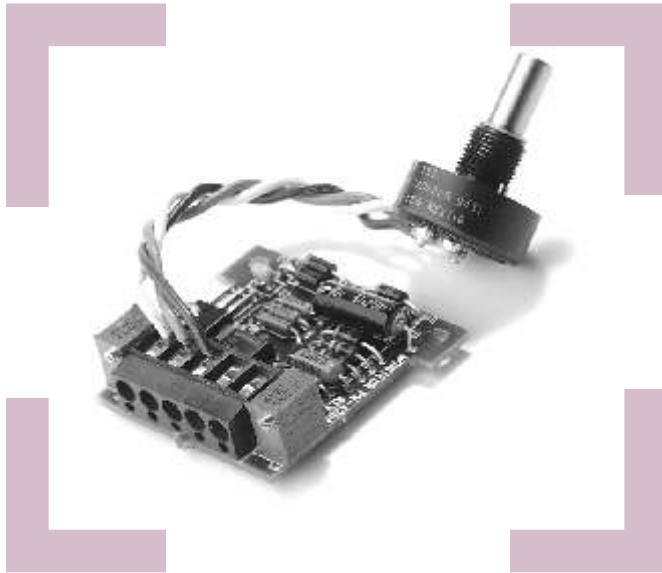
- ▶ Hazardous areas rated Division 2. The P&F sensors are UL and CSA listed approved for general purpose and FM approved Nonincendive or hazardous areas rated Division 2
- ▶ Intrinsically Safe. NAMUR Inductive Sensors are rated Intrinsically Safe and must be used with an approved current and voltage limiting barrier.
- ▶ To assist cam setting, the P&F NBB-V3-Z4 Sensors include setting lights in the sensor housing.

### Specifications - Inductive Sensors

P&F Sensor	Switch Code	Type	Supply Voltage	Load Current / Target Absent	Load Current / Target Present	Sensor FM Approval
NJ2-V3N	8	NAMUR	5-25 VDC	< 1 mA	3 - 15 mA	Intrinsically Safe
NBB3-V3-Z4	K	2 wire DC	5-60 VDC	< 1 mA	4 - 100 mA	Nonincendive Div. 2
NBB2-V3-US	Q	2 wire AC/DC	10-140 VDC	< 1 mA	5 - 200 mA	Nonincendive Div. 2
NBB2-V3-E0	M	3 wire DC-NPN	10-30 VDC	< 1 mA	5 - 100 mA	Nonincendive Div. 2
NBB2-V3-E2	N	3 wire DC-PNP	10-30 VDC	< 1 mA	5 - 100 mA	Nonincendive Div. 2

\*Moniteur can also supply Valve Position Transmitters with other adaptable sensors to your specifications.





Moniteur VPTs can be supplied with current (4-20mA) or resistive (0-1000 ohm) output, used to determine the precise position of the valve.

State of the art potentiometers resistant to drift, vibration and environmental effects are assembled with pressed-on drive gears utilizing a stabilizing o-ring. Field expedience has proved that hunting and vibration effects are reduced, resulting in feedback that is more stable and consistent over time.

Moniteur's transmitter electronics have been optimized for enhanced reliability and resistance to environmental effects with a double conformal coating. In addition, setting and adjusting the transmitter has been made simple with trimming pots located on the board.

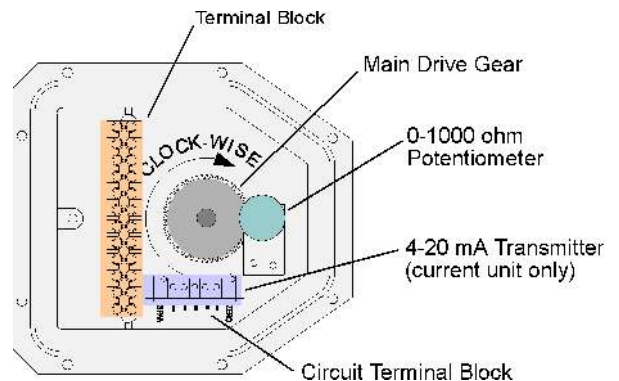
### Applications

- ▶ Critical valve position applications, computer interface, or trend analysis. The current or resistive output option provides precise valve position indication. A continuous analog signal in resistive or current form provides 0-100% readout of valve position.
- ▶ Valve positioners and actuation equipment that require additional, independent feedback signals.
- ▶ Additional monitoring of valve end-position. Up to two mechanical switches, non-contact switches or inductive sensors can be provided in the same enclosure with the current or resistive output electronics.

### Specifications - Current and Resistive Output Options

#### Current Output

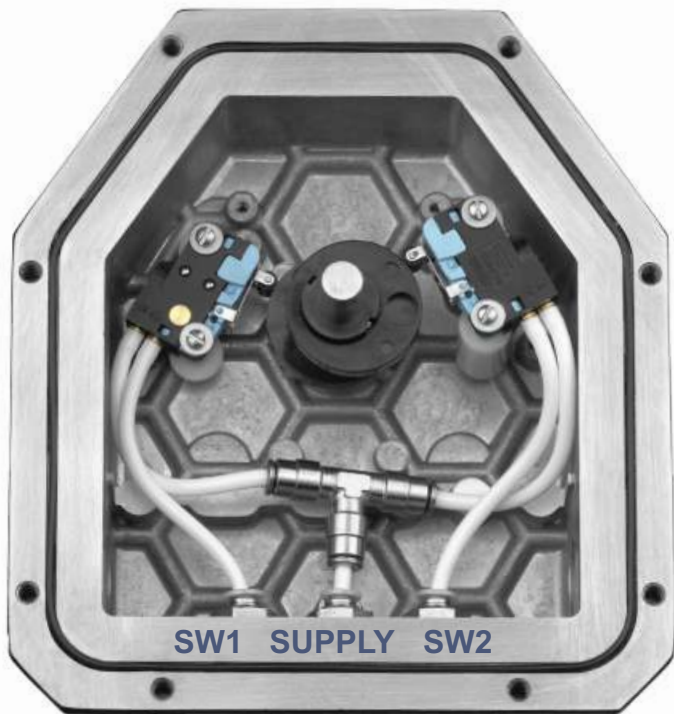
Power Supply Rating	10 - 38 VDC Loop Power
Recommended Power Supply	24 VDC
Output Signal	4 - 20 mA
Operating Temperature	-20° to 175° F
Load Impedance	0 - 1000 ohms at 24 VDC
Max. Output	55 mA DC
Rotation Range	85° - 105°
Linearity	+/- 1.0% of Full Scale
Hysteresis	0.55% of Full Scale
Repeatability	+/- 0.3% of Full Scale
Environmental Protection	Conformal Coating



#### Resistive Output

Standard Output	0-1000 ohm
Power Rating @ 70° C	1 Watt
Contact Elements	Plastic
Rotational Life (full load)	200,000 cycles
Options	50, 2k, 5k, 10k ohm

Note: results may vary depending on your specific application



The Moniteur Sentinel VPT is available with pneumatic switches for applications requiring pneumatic signaling. Features and benefits of the unit:

- ▶ The pneumatic switches withstand air and inert gases and can handle pressures up to 120 psi.
- ▶ Compact switch design (using the V3 pattern) allows easy cam setting.
- ▶ Full range of Moniteur visual indicators is available.
- ▶ Flat cover with no external plastics available.

***for hazardous areas***

### ***Principle of Operation***

- ▶ Three ports are provided on the back of the switch housing, labeled SW1, SW2, and Supply. The pneumatic pressure input is connected to the "Supply" port. Inside the housing, the supply pressure is connected to both of the switches (SW1 and SW2). When either of the switches are tripped, the pneumatic path is opened and the switch provides output to either the SW1 or SW2 port, depending on the switch tripped.
- ▶ To set the switches, simply adjust the touch-set cam in the same fashion as standard Moniteur units.
- ▶ Note: Output air is for signal pressure only.

### ***Specifications - Pneumatic Switches***

Orifice Diameter	5/64" (2 mm)
Operating Pressure	30 - 120 psi (2 - 8 bar)
Flow at 60 psi	4.5 cfm (4.5 NI/min)
Activation Force (@90 psi)	< 1.7 oz (< 50 g)
Permissible Fluid	Air or Inert Gases
Fluid Temperature Range	20 - 120 F (-10 to 50 C)
Operating Temp. Range	20 - 140 F (-10 to 60 C)
Mechanical Life	10 Million Cycles
Response Time	15 ms

### ***Specifications - Enclosure***

Nema Rating	4, 4x
Housing / Cover	Aluminum
Bearing	Bronze
Indicator Cover	Ektar
Seals	BUNA-N
Fasteners	Stainless Steel
Weight	4.25 lbs.
Ports (3)	1/8 NPT Female

### Intelligent Part Number System

<b>A</b>	<b>M</b>	<b>Y</b>	<b>B</b>	<b>-</b>	<b>5</b>	<b>P</b>	<b>2</b>	<b>P</b>
<i>Series</i>	<i>Cover</i>	<i>Moniteur</i>	<i>Bearing</i>		<i>Shaft</i>	<i>Switch</i>	<i>Quantity</i>	<i>Conduit</i>

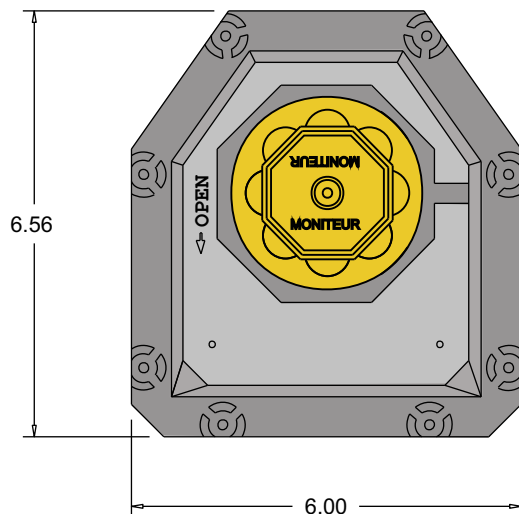
**Base unit includes:** Black / Yellow indicator  
Aluminum Enclosure  
Namur Shaft

2 Pneumatic switches  
Bronze bearings  
(1) 3/4" NPT conduit + (1) Sintered Filter

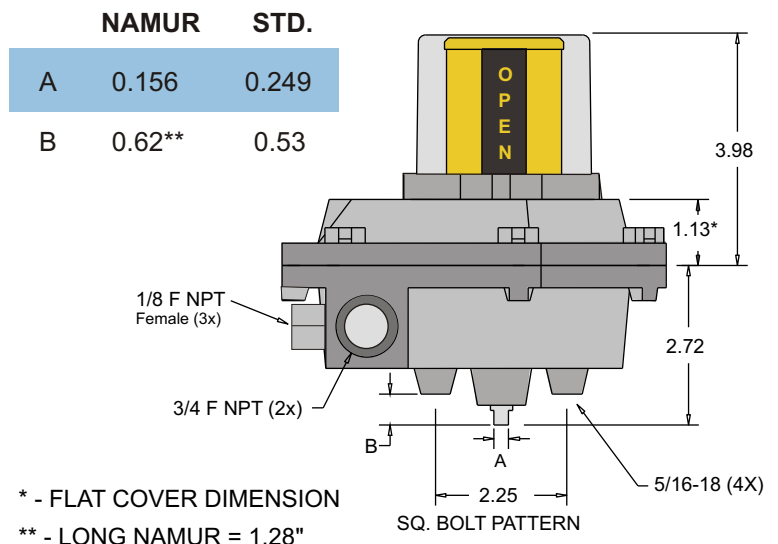
<u>Description</u>	<u>Code</u>	<u>Description</u>	<u>Code</u>
<b>Series: Sentinel</b>	A	<b>Bearing</b>	
<b>Cover</b>		Bronze	B
With Moniteur	M	303 SS	S
Flat Cover	F	<b>Shaft</b>	
<b>Moniteur</b>		Standard 303 SS	1
No Indicator	N	Standard 316 SS	3
Black / Yellow	Y	NAMUR 303 SS	5
3-Way Path O,T, F	O,T, F	Long NAMUR 303 SS	E
4-Way Path	S	<b>Switch Type</b> (2 switches)	
180 degree T port	1	Pneumatic	P
120 degree	3	<b>Switch Quantity</b>	2
Green / White	G	<b>Conduit</b>	
Red / White	R	(1) 3/4" F NPT + (1) Sintered Filter	P
Blue / White	B		
Green / Red	A		
Red / Green	C		

### Dimensions

### Top View



### Side View



### Superior Visual Valve Position Indicators

The INDICATEUR and INDICATEUR DIRECT are superior visual valve position indicators for virtually any rotary operated valve. Each has a rugged design suited to withstand harsh plant environments and operations. *Two versions are available:*

- 1 - The INDICATEUR DIRECT mounts directly to NAMUR actuators without a bracket (80 x 30mm patterns only).
- 2 - The INDICATEUR uses standard VPT shaft lengths and mounting patterns allowing use with virtually all types of pneumatic and manual actuators.

#### Features Include:

- Clear Ektar cover offers optimum chemical resistance and strength and is environmentally sealed to prevent fogging or entry of contaminants.
- Careful material selection provides Moniteur's patented indicator a rated life of minimum 1,000,000 cycles.
- Materials of construction selected to excel in high vibration, corrosive and dirty environments, either indoors or outdoors.
- Indicator is fully adjustable to any valve or actuator.
- The industry's only "true" visual valve position indicators available for a wide variety of multi-port valves, adjustable to match the actual physical flow pattern of the valve.
- Molded from DuPont's SuperTough Zytel Nylon for the ultimate in strength and corrosion resistance.

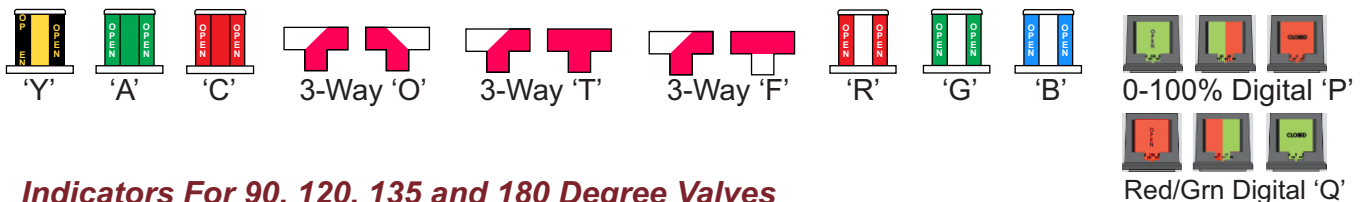


INDICATEUR



INDICATEUR DIRECT

### Indicators For 90 Degree Valves



### Indicators For 90, 120, 135 and 180 Degree Valves



See "Indicator Options Brochure" For More Available Indicators

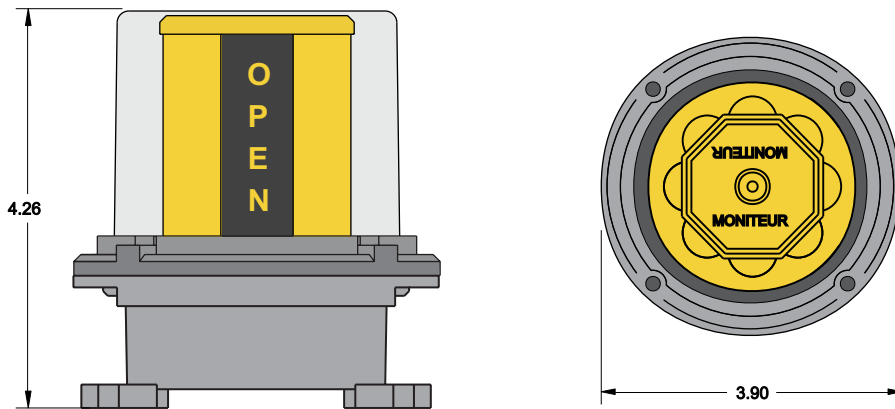


## Intelligent Part Number System

<b>I</b>	<b>M</b>	<b>Y</b>	<b>Z</b>	<b>-</b>	<b>D</b>	<b>000</b>	<b>-</b>	<b>1</b>
Series		Indicator	Bearing		Shaft			Mounting

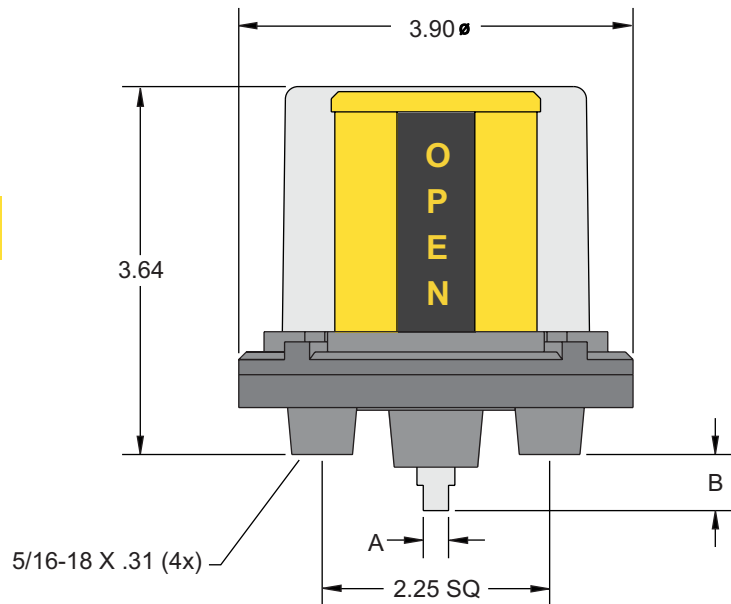
Description	Code	Description	Code	Description	Code
Series: Indicateur	I	4-Way Path S (90 degree)	S	Shaft - Indicateur	
Moniteur		180 degree T-port	1	Standard 303 SS	1
With Indicator	M	180 degree L-Port - OcOc	5	Low Profile NAMUR 303 SS	5
Indicator Type (open/closed)		180 degree L-Port - OOcc	6	NAMUR 303 SS	E
Black / Yellow (Standard)	Y	ANSI Green / White	G	Shaft - Indicateur Direct	
Green / Red	A	ANSI Blue / White	B	Delrin	D
Red / Green	C	ANSI Red / White	R	Mounting - Indicateur Direct (Only)	
0-100% Digital	P	Bearing - Indicateur		80 x 30 x 20	-1
3-Way Path O (90 degree)	O	Bronze	B	80 x 30 x 30	-2
3-Way Path T (90 degree)	T	303 Stainless	S		
3-Way Path F (90 degree)	F	Bearing - Indicateur Direct			
		Zytel	Z		

## Dimensions - Indicateur Direct



## Dimensions - Indicateur

	LONG NAMUR	NAMUR	STD.
A	0.156	0.156	0.249
B	1.28	0.62	0.53



### *The World's Largest Offering of Visual Valve Indicators for Virtually Any Flow Pattern*

Moniteur Devices offers the largest variety of visual indicators for on-off and multi-port valves, designed to match the physical location and layout of the valve. Because the Moniteur indicator platform is 100% adjustable, you can determine which indicator view is in the starting position and where in the window you would like it. *Features Include:*

- ▶ A wide variety of colors and styles match your plant standard
- ▶ Indication can start in any valve position
- ▶ Display is accurate at each 90° position through all 360° of indication
- ▶ High visibility with top and side views

All indicators can be supplied with the Sentinel, Watchman, Survivor, and Indicateur series. Contact Moniteur with your custom indicator requirement.



**Custom Flow Patterns, Colors and Languages are Available - Contact Us!**

### *Indicators for 90° / Quarter-Turn Valves*

Type (open/closed)	Code	Open	Closed	Notes
Black / Yellow	Y			
Full Green / Full Red	A			
Full Red / Full Green	B			
ANSI Red / White	R			
ANSI Green / White	G			
ANSI Blue / White	B			

### *Indicators in Other Languages*

Black / Yellow French	GY			Example Part Number: FGYB-5120
Black / Yellow Spanish	EY			Example Part Number: FEYB-5120
Black / Yellow Portugese	PY			Example Part Number: FPYB-5120

### Indicators for Multi-Port Valves (90°)

Type	Code	Views				
		Position 1	Position 2	Position 1	Position 2	
3-way Path O	O			or		
3-way Path T <i>Note: Four Viewing Configurations Possible</i>	T			or		
				or		
3-way Path F <i>Note: Four Viewing Configurations Possible</i>	F			or		
				or		
4-way Path S	S			or		

### Indicators for Multi-Port Valves (120° or 180°)

Type	Code	Views			
		Position 1	Position 2	Position 3	Position 4
180° T-port start in any position	1				
180° L-port OCOC (Open Closed Open Closed) start in any position	5		CLOSED		CLOSED
180° L-port OOCB (Open Open Closed Closed) start in any position	6			CLOSED	CLOSED
120° PIG start in any position	3				

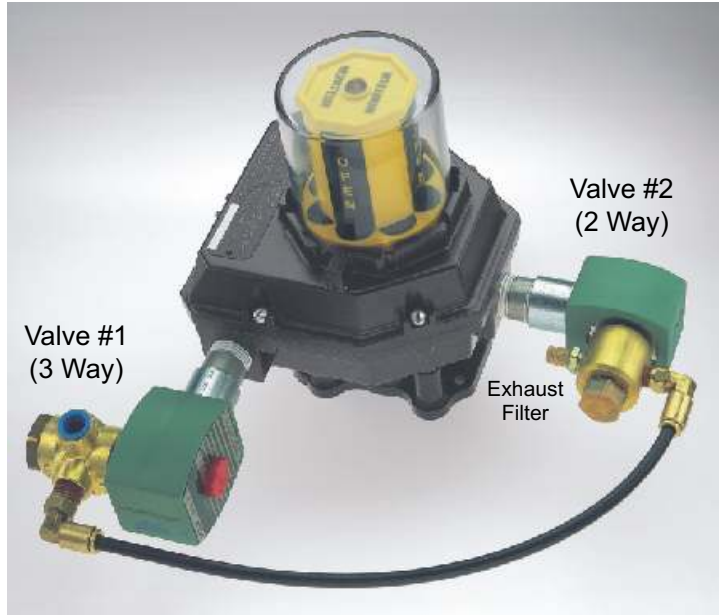
### Indicators for 0-100% Graduation and 135° Diverter Valves

Type	Code	Open	Mid Point	Closed
		0-100% Digital	P	
135° Diverter <i>start in open position</i>	4		Closed Positions Clockwise or Counterclockwise	

### Ideal Solution for Dribble Control

The Moniteur DSS Two Stage Package is a complete unit incorporating two solenoid valves and specially configured limit switches designed for two-stage operation. The package mounts to most rotary pneumatic actuators and allows users to transform an automated valve into a two stage shutoff package. The most common applications are:

- ▶ **Filling or metering vessels.** By being able to reduce the flow rate at a given point during a filling operation, it is possible to more accurately and efficiently fill a vessel.
- ▶ **Flow dampening.** With the two stage package, valves can be partially closed and then completely closed later. This dramatically reduces shock to pipes and valves due to water hammer.



### Requirements

- ▶ Two voltage sources to power both solenoid valves (#1 and #2).
- ▶ Contact logic (2), which may be provided by flow meters, scales, level sensors, or PLCs
- ▶ Spring return pneumatic actuator with a clean air source

### Features

- ▶ Dual flow positions for filling vessels or flow dampening
- ▶ Fully adjustable set points allow the user flexibility to determine proper stage switching
- ▶ Open / Closed limit switches provide additional valve end point monitoring
- ▶ Factory assembled and tested, saving users and assemblers time and money

### Ordering Information

Nema Rating	Package Model No.*	3-Way Solenoid ( ASCO® )	2-way solenoid ( ASCO® )	Solenoid Voltage	Solenoid Body Material
7,9	DSS-AMYB-51B1	EF8320G184	EF8262G93	120 VAC-60Hz	Brass
4,4x	DSS-FMYB-51B1	8320G184	8262G93	120 VAC-60Hz	Brass
7,9	DSS-AMYB-51B3	EF8320G184	EF8262G93	24 VDC	Brass
4,4x	DSS-FMYB-51B3	8320G184	8262G93	24 VDC	Brass
IS	DSS-FMYB-53B5	WBIS8314A300	WBIS8314A300	24VDC / Intrinsically Safe	Brass

\* Custom packages to your specifications available on request

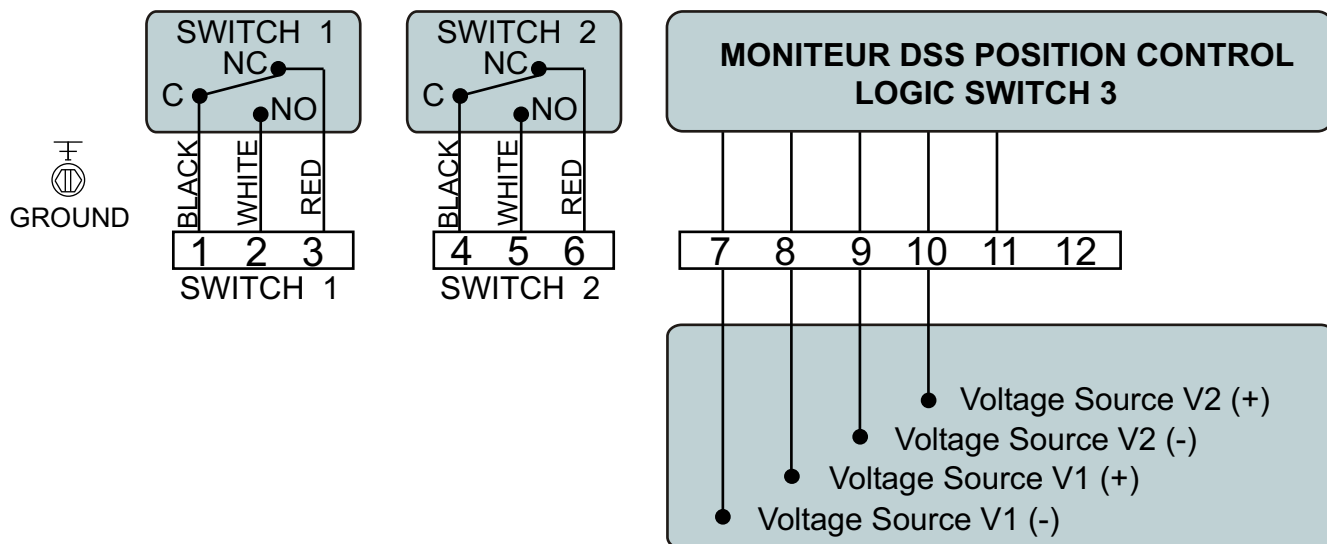
### Standard Solenoid Valve Porting Configuration

3-Way Solenoid	Cv	Air Supply Port	Air to Actuator Port	To 2-way Exhaust Port	2-Way Solenoid	Cv	From 3-way Exhaust Port	Filter Exhaust Port
8320G184	0.12	2	1	3	8262G93	0.15	IN	OUT

\*\* For larger actuators, solenoid valves with higher flow rates will be required. Contact Moniteur Devices with your requirements.  
 ASCO is a trademark of the Automatic Switch Company



### Wiring Diagram



**TWO STAGE DRIBBLE CONTROL CONNECTIONS**

### Installation Procedure / Sequence of Operation



**Warning:**

Be sure voltage and air pressure supplied match solenoid specifications.

1. Mount limit switch package to the rotary actuator with an appropriate mounting bracket.
2. Connect power and clean filtered air to proper connections (see table on other side for standard valves). Ensure that all air connections are tight and all electrical connections are secured at their proper terminal points.
3. With no power to V-1 and V-2, the valve should be in the fully closed position (sequence #1)
4. Energize V-1 and V-2 (sequence #2), solenoid #1 (sol1) will energize allowing the air pressure to rotate the valve/actuator package to the fully open position.
5. De-energize V-1 and the package will rotate in the opposite direction until the white cam trips switch 3 (blue) and energizes solenoid #2 (sol2). This will stop the valve rotation at the set mid position. If the mid position is incorrect, estimate approximately how many degrees of rotation the cam needs to be adjusted. CAUTION - do not adjust cam until the unit is in the fully closed position, as the unit might rotate unexpectedly if the cam is adjusted under power.
6. Finally, de-energize V-2 (both V-1 and V-2 will be de-energized) and solenoid #2 (sol2) will De-energize and the valve/actuator package will rotate to the fully closed position. One full cycle has just been completed. If the mid set position requires adjustment, adjust the package now.
7. Repeat steps 4-6 to verify adjustment and/or re-adjust dribble position.



**Caution:**

Do not adjust cams while cycling system as the unit might shift unexpectedly

Stage No.	Flow Condition Required	Supply Volt. 1 (V-1)	Supply Volt. 2 (V-2)	Solenoid #1 (Sol 1)	Solenoid #2 (Sol 2)
1	Shut off	De-energize	De-energize	De-energize	De-energize
2	Full Flow	Energize	Energize	Energize	De-energize*
3	Reduced Flow	De-energize	Energize	De-energize	Energize
4	Shut off	De-energize	De-energize	De-energize	De-energize

\* Solenoid #2 is de-energized through the limit switch

#### **A Full Three-Position Control Package with End-Position Signal Feedback**

The Moniteur D3 Three Position Control Package is a unique product incorporating specially configured solenoid valves and control switches designed for three-position operation. The package is used with rotary double-acting pneumatic actuators and allows users to transform any valve into a sophisticated three position control device.

The unit is available in General Purpose, Intrinsically Safe and Explosion-Proof configurations. In addition to the control switches, two switches are included for valve position monitoring.

#### **Applications:**

**180 Degree / Three Position Valves** - Set any mid position from any point in the valve cycle without a positioner.

**Dribble Control** - By utilizing the mid set point, one is able to reduce the flow rate during a filling operation to more accurately and efficiently fill a vessel.

*Note:* When fail-closed is a requirement, Moniteur recommends our Dribble Control package developed for spring-return actuators.

#### **Features**

- ▶ Fully Adjustable Mid Point
- ▶ Dual 3-way Solenoid Design Improves Valve Position Accuracy by Pressurizing Both Ports in the Mid Position
- ▶ Additional Limit switches Provided as Standard to Monitor End Points (open/closed)
- ▶ Factory Assembled and Tested, Saving Users and Assemblers Time and Money
- ▶ Explosion-proof Version Available Rated Nema 4, 4x, 7, 9

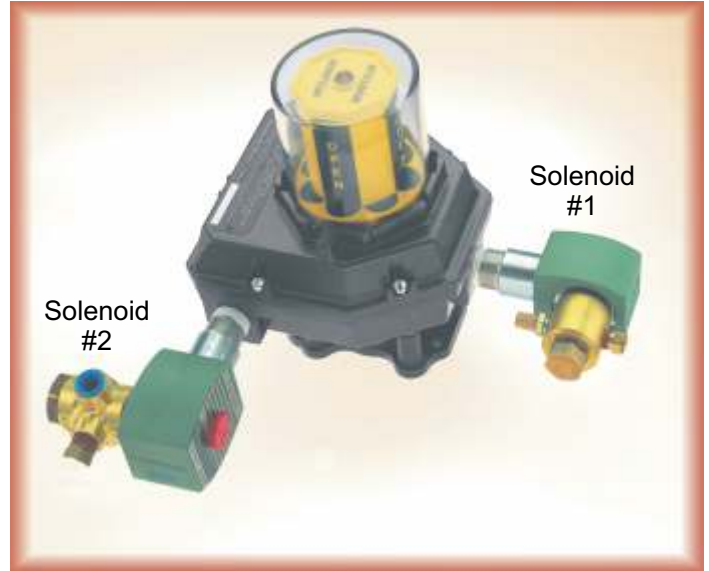
#### **Packages for Double-Acting Actuators, Including Two 3-way NO Solenoid Valves**

Rating	Package Model No.	3-Way Solenoid (2) (ASCO®)	Cv*	Solenoid Voltage	Solenoid Body Material
General Purpose	D3D-FMYB-51B1	8320G194	0.12	120 VAC-60Hz	Brass
Explosion-Proof	D3D-AMYB-51B1	EF8320G194	0.12	120 VAC-60Hz	Brass

#### **Standard Solenoid Valve Porting Configuration**

CW Port Sol 1	Cv	Air Supply Port	Air to Actuator Port	Exhaust Port	CCW Port Sol 2	Cv	Air Supply Port	Air to Actuator Port	Exhaust Port
8320G194	0.12	3	1	2	8320G194	0.12	3	1	2

\*\* For larger actuators, solenoid valves with higher flow rates will be required. Contact Moniteur Devices with your requirements.  
ASCO is a trademark of the Automatic Switch Company

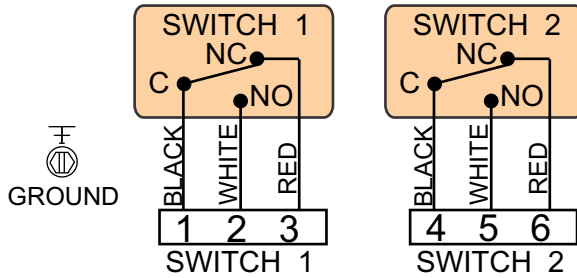


#### **Hazardous Area Rating Available:**

Class 1, Division 1 & 2, Group C & D  
Class 2, Division 1 & 2, Group E, F, G

#### **General Purpose Version Available**

### Wiring Diagram



### Requirements

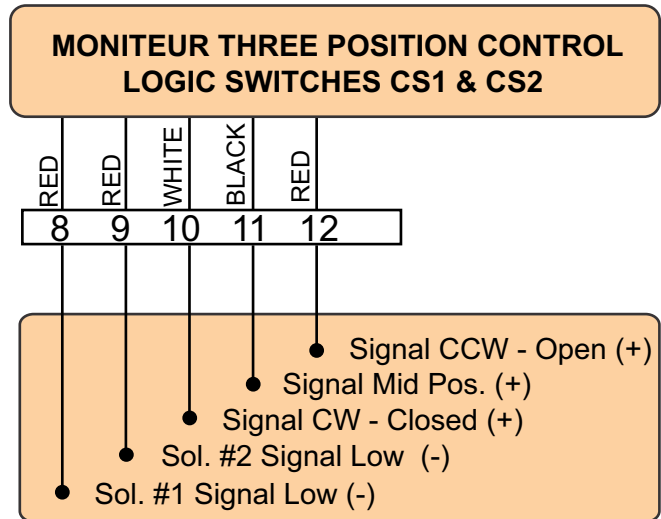
- ▶ Three independent signals are required for the closed, mid and open positions. These signals also provide power to the solenoid valves through the control logic switches. These signals must be electrically isolated and share a common ground. Two low signal lines need to be provided for the solenoids as well, as shown in the wiring diagram to the right.
- ▶ Double-acting pneumatic actuator with a clean air source.

### Installation Instructions

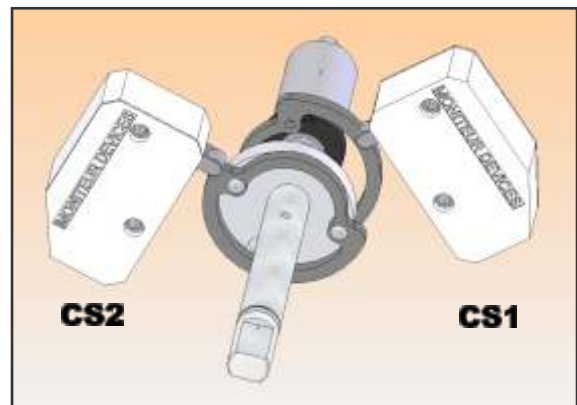


*NOTE: Operation Instructions depict an actuated package set for clockwise to close and counterclockwise to open operation.*

1. Mount limit switch package to the rotary actuator with an appropriate mounting bracket.
2. Connect power lines according to the three position control connections shown at right.
3. Connect clean filtered air to each of the 3-way solenoid valves, to port '3' as listed in table on page 1.
4. Connect solenoid 1 (use port '1' as listed in the table on page 1) to the actuator porting so that when pressurized the actuator rotates in the CCW direction. Connect solenoid 2 (use port '1' as listed in table on page 1) to the actuator porting so that when pressurized the actuator rotates in the CW direction. **Note:** The solenoid configuration is shown below. One solenoid valve is used for each actuator port - one to move the valve clockwise and the other counter-clockwise. Ensure that all air connections are tight and all electrical connections are secured at their proper terminal points.
5. The unit is designed to accept three control signals - one to open the valve, one to close it, and one to move to mid position.
6. The valve should be in the fully closed position with power sent to terminal 10.
7. The valve should be in the mid position with power sent to terminal 11. The logic switches marked "CS1" and "CS2" are both used to set the mid position with their custom cams - "CS1" for setting the mid position when the valve is rotating clockwise from the open position and "CS2" for setting the mid position when the valve is rotating counter-clockwise from the closed position. See the table below to understand how the logic switches need to be activated for each position.
8. The valve should be in the fully open position with power sent to terminal 12.
9. Connect speed controls to port 3 of each solenoid, if desired.



### THREE POSITION CONTROL CONNECTIONS

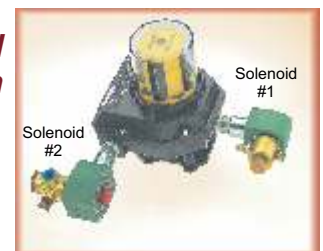


### CUSTOM CONTROL CAM CONFIGURATION

### Flow Positions

Stage No.	Flow Condition Required	Switch CS1	Switch CS2
1	Closed	Tripped	Not Tripped
2	Mid	Tripped	Tripped
3	Open	Not Tripped	Tripped

### Solenoid Configuration



**NOTE:** To hold the mid position, both logic switches must be tripped (CS1 and CS2)

### ***Solving Corrosion Problems - Profit From Moniteur's Expertise***

Moniteur Devices offers a range of methods to improve corrosion resistance in the field. Because environments are so different, a variety of options has been developed based on real-world experience and cost requirements. The different options are presented here with their features and benefits:

### ***Standard Polyurethane Coating***

With the standard 2-part polyurethane coating, BUNA-N O-ring seals, and the clear Ektar cover, the standard units have been developed to stand up well in most indoor and outdoor environments.

### ***Hard Anodizing (Post-Machining) to MIL-A-8625-F Type III Class II***



For the Sentinel series, Moniteur offers MIL Spec hard anodizing of the limit switch enclosure to prevent flange corrosion. The anodization process forms a protective aluminum oxide layer chemically bonded to the aluminum that greatly enhances corrosion resistance in virtually all corrosive environments. The castings are anodized *after* machining to assure there is no exposed aluminum. It is important to note that Explosion-proof enclosures with flange corrosion lose their hazardous area rating once opened, as the precise flamepath fitting is compromised. This option is becoming more popular as end users understand the benefits.

### ***Full Exterior and Interior Painting Epoxy Powder Coating***

In environments with large temperature shifts and areas with high humidity, condensation may form inside the enclosure. If harsh chemical vapors are also present, the combination can form corrosive compounds inside. By painting the inside of the enclosure with epoxy, corrosion is minimized. Exterior epoxy coating is also available to meet plant requirements and specifications.

### ***Thermoplastic Enclosures***

Choose the Survivor series of thermoplastic VPTs with SuperTough Zytel resin enclosures. Resin enclosures are the most cost-effective means of providing corrosion resistance. The Survivor II series includes stainless steel inserts and bearings for additional resistance. However, Resin enclosures do not meet explosion-proof requirements.

### ***More Options To Enhance Resistance***

**Non-Contact (Proximity Type) Switches and Sensors** are available to protect switching elements and sensitive circuitry from corrosion

**Stainless Steel Bearings** enhance corrosion resistance over the standard bronze.

**Viton O-ring seals** are available for environments where chemical vapors are incompatible with the standard BUNA-N seals

**Flat cover indicators** with no external plastics for areas where chemicals attack plastics

**Stainless Steel or Thermoplastic Brackets** are available for corrosion resistant packages



## Moniteur ASi Valve Position Controllers

ASi makes it simple. Moniteur's VPCs with encapsulated ASi interface cards adapt your on/off automated valves to an advanced 2-wire ASi valve network. Money and time will be saved as installation and maintenance are streamlined with reduced wiring and improved system diagnostics.

An ASi network can interface directly with your plant's PLCs or through other protocols such as DeviceNet, Foundation Fieldbus, Profibus or Modbus utilizing a gateway. Moniteur can supply total ASi packages including power supplies, gateways, hand-held programmers, cable and quick disconnect connectors.



## Moniteur's Advanced ASi Platform Improves Reliability

**The Network Card.** A full function encapsulated network card for the network protocol includes the following benefits:

- ▶ Encapsulated electronics and position sensors ensures reliability in corrosive, humid and dirty environments.
- ▶ Hall effect position sensors designed into the card provide optimum stability in areas of high vibration.
- ▶ Two transistor outputs with a combined output of up to 4w @ 24VDC are available for your solenoid valves
- ▶ High visibility LEDs are located on-board for local indication of on-board sensors, auxiliary inputs, outputs and network status.
- ▶ Two additional inputs are available for local pressure or temperature switches.

**The Physical Platform.** Moniteur's platform is available in many configurations:

- ▶ Housings in Aluminum, Hard Anodized Aluminum or SuperTough Zytel for General Purpose or Hazardous Areas
- ▶ Moniteur's proven Engineered Loc-Ring Cam and Shaft Retention System assures stable output signals in difficult environments over a multi-million cycle life.
- ▶ Optional Mini and Micro plug connectors can be fitted to the conduit entries of the enclosures to speed installation.

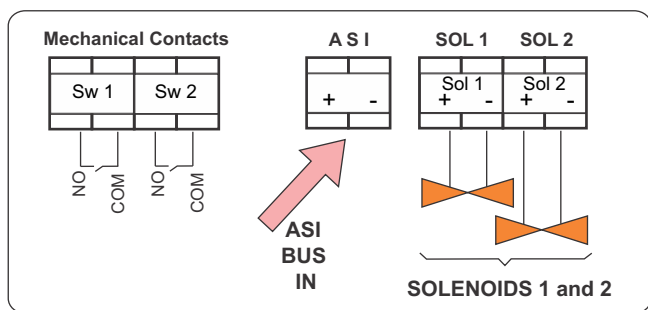
**The Visual Indicator.** Moniteur's High Visibility Valve Position Indication preferred by users worldwide are available in a wide variety of colors and flow patterns.

**The Solenoid Valve.** Low power solenoid valves optimized for the network card output are available with direct NAMUR actuator mounting or pre-wired to the VPC.

## ASi v2.1 Technical Information

- ▶ Supports up to 62 Addresses (1-31 A + B)
- ▶ Baud Rate at 167Kbit (No Termination Required)
- ▶ Scan Time < 10ms for a Fully Loaded System
- ▶ Deterministic - Each Slave Adds 150  $\mu$ s to the Scan Time
- ▶ Can Be Installed in Any Topology
- ▶ Bus Power and Communications Share the Same 2 wire Cable
- ▶ Standard 16AWG or Special AS-Interface Flat Cable Can Be Used
- ▶ 990 ft. Total Bus Length (with Maximum 2 Repeaters)
- ▶ High Level of Noise and Temperature Immunity Makes ASi an Excellent Choice for the Process Plant Environment.
- ▶ Each AS-Interface Node Requires its Own Unique Address (Master/Slave)
- ▶ No Configuration Software Required
- ▶ Nodes Can Be Addressed Using Buttons on Master, Hand-Held Programmer, or Through Serial Communications

## Wiring Diagram



## Standard ASi Bitmap Configuration

### Data Input Bits

Bit 0	Proximity Switch 1
Bit 1	Proximity Switch 2
Bit 2	Mechanical Contact 1
Bit 3	Mechanical Contact 2

### Output Bits

Bit 0	Solenoid 1
Bit 1	Solenoid 2
Bit 2	--
Bit 3	--

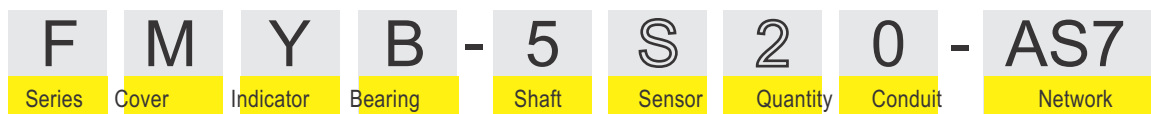
### Parameter Bits

Bits P0, P1, P2, P3

### IO/IDs

IO code	IO = B
ID code	ID = A
ID1 code	7 or F
	ID1=7 if Address=1A...31A
	ID1=F if Address=1B...31B
ID2 code	0

## Intelligent Part Number System



Description	Code
<u>Series:</u>	
Watchman (Nema 4)	F
Survivor (Plastic Nema 4)	P
Sentinel (Ex-Proof)	A
<u>Moniteur</u>	
With Indicator	M
Flat Cover	F
<u>Indicator Type (open/closed)</u>	
No Indicator (Flat Cover)	N
Black / Yellow (Standard)	Y

Description	Code
<u>Bearing</u>	
Bronze	B
303 Stainless	S
<u>Shaft</u>	
Standard 303 SS	1
Standard 316 SS	3
Low Profile NAMUR 303 SS	5
Low Profile NAMUR 316 SS	7
NAMUR 303 SS	E
NAMUR 316 S	G

Description	Code
<u>Switch/Sensor Type</u>	
On Board Sensors	S
<u>Sensor Quantity</u>	2
<u>Conduit Connection</u>	
2 - 1/2" F NPT (F & P Series)	0
3 - 1/2" F NPT (F & P Series)	6
2 - 3/4" F NPT (A Series)	0
3 - 3/4" F NPT (A Series)	5
<u>ASi</u>	-AS7

## Standard ASi Network Card Specifications

### Power

Voltage	30Vdc (ASi Standard)
Current	<30mA
Local Indication	Green LEDs

### Communication

Type	Slave
Addressing	1 to 31 A/B (Total=62)
Cycle Time	Less Than 5ms

### On Board Sensor Inputs

Type	(2) Hall Effect Solid-State Sensors, (1) for Each Valve Position
Local Indication	Red LEDs (Each Input)

### Auxiliary Inputs (Optional)

Type	(2) Namur (DIN 19234) or Mechanical Switch
Voltage	8Vdc $\pm$ 5% - Ripple 5%
Current	Active <1mA, Inactive >3mA
Local Indication	Red LED (Each Input)
Protection	Reverse Polarized

### Output

Type	(2) Transistor
Transistor Rating	2 x 120 mA @ 24 VDC Programmable NO or NC
Local Indication	Red LEDs

### Other

Address (from factory)	0
Watchdog	On
Parameter	7

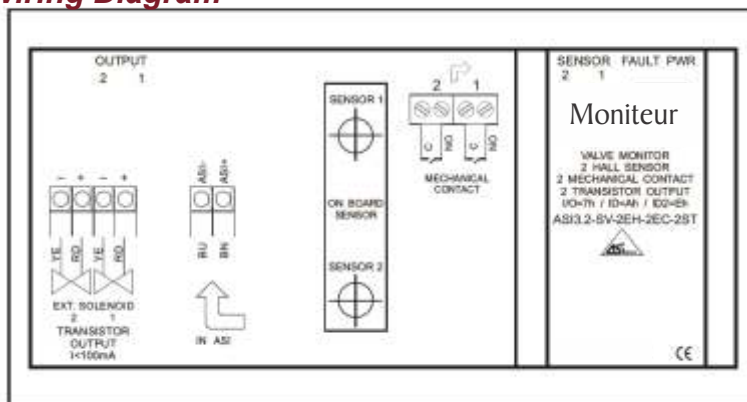
## Moniteur ASi Slave LEDs (in compliance with ASi specifications - Enhanced Mode)

Slave LEDs (compliant with ASi specifications - Enhanced Mode)		
POWER	FAULT	
●	○	Normal Operation
●	●	Without Data Exchange - Master In Stop Mode - Slave is Not in <b>LPS*</b> - Slave with Wrong IO/ID - Active Reset on Slave
○	●	Without Data Exchange - Slave with Address 00
○	○	Peripheral Fault: LEDs Green and Red Blinking Alternately
BLINKING ALTERNATELY		



\* **LPS** (List of Projected Slaves)

## Wiring Diagram



### DeviceNet Valve Position Controllers

Moniteur VPCs with encapsulated DeviceNet interface cards adapt your on/off automated valves to an advanced DeviceNet valve network. Money and time can be saved as installation and maintenance are streamlined, reducing wiring runs and improving system diagnostics.

Based on the CAN protocol, the DeviceNet protocol was developed by Allen Bradley to provide industry with a simple and cost effective method of networking field devices. Moniteur supplies a full range of accessories including cable and quick-disconnect connectors to simplify installation.



### Advanced DeviceNet Platform Improves Reliability

**The Network Card.** A full function encapsulated network card for the network protocol includes the following benefits:

- ▶ Encapsulated electronics and position sensors ensures reliability in corrosive, humid and dirty environments.
- ▶ Hall effect position sensors designed into the card provide optimum stability in areas of high vibration.
- ▶ Two transistor outputs with a combined output of up to 4.8w @ 24VDC are available for your solenoid valves
- ▶ High visibility LEDs are located on-board for local indication of on-board sensors, auxiliary inputs, outputs and network status.
- ▶ Two additional inputs are available for local pressure or temperature switches.

**The Physical Platform.** Moniteur's platform is available in many configurations:

- ▶ Housings in Aluminum, Hard Anodized Aluminum or SuperTough Zytel for General Purpose or Hazardous Areas
- ▶ Moniteur's proven Engineered Loc-Ring Cam and Shaft Retention System assures stable output signals in difficult environments over a multi-million cycle life.
- ▶ Optional Mini and Micro plug connectors can be fitted to the conduit entries of the enclosures to speed installation.

**The Visual Indicator.** Moniteur's High Visibility Valve Position Indication preferred by users worldwide are available in a wide variety of colors and flow patterns.

**The Solenoid Valve.** Low power solenoid valves optimized for the network card output are available with direct NAMUR actuator mounting or pre-wired to the VPC.

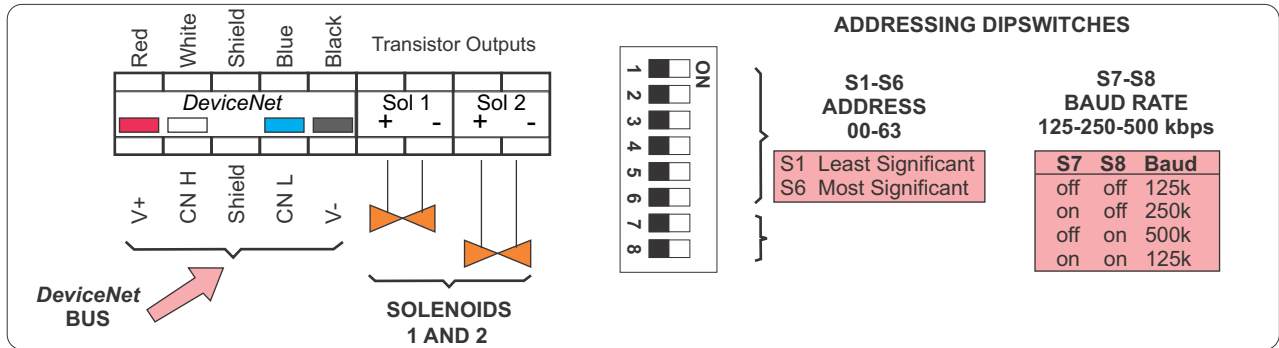
### DeviceNet Technical Information

- ▶ Each Network Supports up to 64 Nodes or Addresses
- ▶ 125K, 250K, and 500K Baud Rates
- ▶ Maximum Trunk Length = 1640 feet
- ▶ Thick and Thin Cable Types
- ▶ Trunkline / Dropline Topology
- ▶ Supports Online Node Insertion and Removal

*Zytel is a trademark of the DuPont Company*



## Wiring Diagram



## Standard DeviceNet Network Card Specifications

### Power

Voltage	24Vdc ±15%
Current	<70mA

### Communication

Type	Slave
Communication	Polled
Word	1 byte TX - 1byte RX
Addressing	0 to 63 Set by Dipswitch
Transmission Rate	125-250-500 Kbs Baud Set by Dipswitch
Digital Filter	25ms

### Configuration

Input - Byte 1	Bit 0 - Sensor 1 Bit 1 - Sensor 2
Output - Byte 1	Bit 0 - Output 1 (sol. 1) Bit 1 - Output 2 (sol. 2)

### Local Indication

Green (Light)	Active and Allocated
Green (Flashing)	Active and Allocated
Red (Flashing)	Wrong Baud Rate or Lost Communication
Red (Light)	Double Address or Lost Communication

### On-Board Sensor Inputs

Type	(2) Hall Effect Solid-State Sensors, (1) for Each Valve Position
Local Indication	LEDs

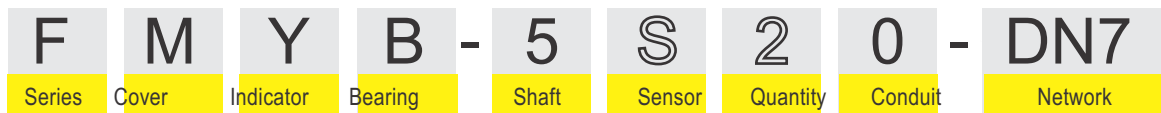
### Auxiliary Inputs

Type	(2) Namur, by DIN19234 or Mechanical Switch
Voltage	8Vdc ± 5% - Ripple 5%
Current	active <1mA Inactive >3mA
Indicator	(2) LEDs
Protection	Reversed Polarized

### Output

Type	(2) Transistor or Relay, Programmable NO or NC
Transistor Rating	24VDC / 2 x 200 mA
Relay Voltage	120 VAC, 220 VAC, 24 VDC
Relay Power	0.30A
Indicator	(2) LEDs

## Intelligent Part Number System



Description	Code	Description	Code	Description	Code
<u>Series:</u>		<u>Bearing</u>		<u>Switch/Sensor Type</u>	
Watchman (Nema 4)	F	Bronze	B	On Board Sensors	S
Survivor (Plastic Nema 4)	P	303 Stainless	S	<u>Sensor Quantity</u>	2
Sentinel (Ex-Proof)	A	<u>Shaft</u>		<u>Conduit Connection</u>	
<u>Moniteur</u>		Standard 303 SS	1	2 - 1/2" F NPT (F & P Series)	0
With Indicator	M	Standard 316 SS	3	3 - 1/2" F NPT (F & P Series)	6
Flat Cover	F	Low Profile NAMUR 303 SS	5	2 - 3/4" F NPT (A Series)	0
<u>Indicator Type (open/closed)</u>		Low Profile NAMUR 316 SS	7	3 - 3/4" F NPT (A Series)	5
No Indicator (Flat Cover)	N	NAMUR 303 SS	E	<u>DeviceNet</u>	-DN7
Black / Yellow (Standard)	Y	NAMUR 316 S	G		

### **Profibus Valve Position Controllers**

Moniteur VPCs with encapsulated Profibus interface cards adapt your on/off automated valves to an advanced Profibus DP valve network. The Profibus protocol was developed in 1989 by a group of factory automation suppliers.

Profibus-DP is a device level bus network that supports both analog and discrete signals. Profibus-DP has widespread usage for such items as remote I/O systems, motor control centers, and variable speed drives. Profibus-DP communicates at speeds from 9.6 Kbps to 12 Mbps over distances from 100 to 1,000 meters.



### **Advanced Profibus DP Platform Improves Reliability**

**The Network Card.** A full function encapsulated network card for the network protocol includes the following benefits:

- ▶ Encapsulated electronics and position sensors ensures reliability in corrosive, humid and dirty environments.
- ▶ Hall effect position sensors designed into the card provide optimum stability in areas of high vibration.
- ▶ Two transistor outputs with a combined output of up to 4.8w @ 24VDC are available for your solenoid valves
- ▶ High visibility LEDs are located on-board for local indication of on-board sensors, auxiliary inputs, outputs and network status.
- ▶ Two additional inputs are available for local pressure or temperature switches.

**The Physical Platform.** Moniteur's platform is available in many configurations:

- ▶ Housings in Aluminum, Hard Anodized Aluminum or SuperTough Zytel for General Purpose or Hazardous Areas
- ▶ Moniteur's proven Engineered Loc-Ring Cam and Shaft Retention System assures stable output signals in difficult environments over a multi-million cycle life.
- ▶ Optional Mini and Micro plug connectors can be fitted to the conduit entries of the enclosures to speed installation.

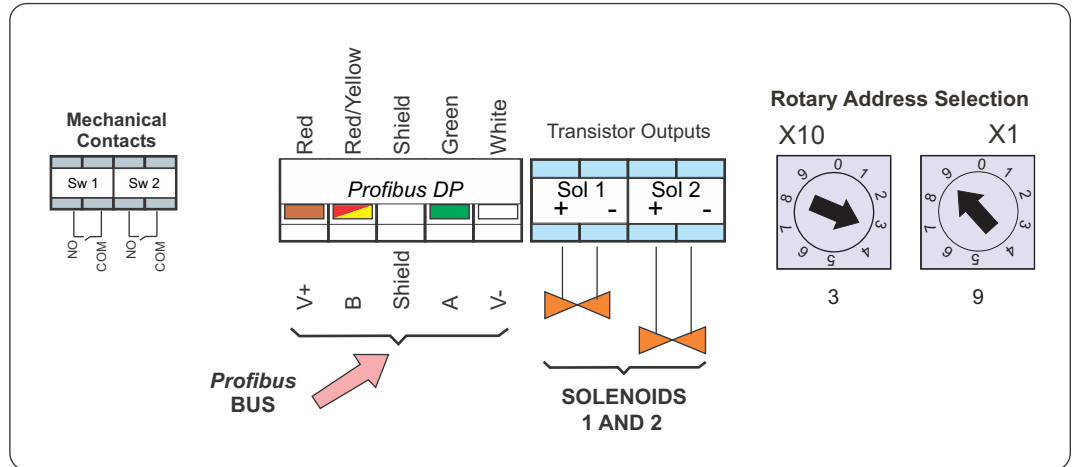
**The Visual Indicator.** Moniteur's High Visibility Valve Position Indication preferred by users worldwide are available in a wide variety of colors and flow patterns.

**The Solenoid Valve.** Low power solenoid valves optimized for the network card output are available with direct NAMUR actuator mounting or pre-wired to the VPC.

### **Profibus<sup>®</sup> DP Technical Information**

- ▶ Each Network Supports up to 32 Devices per Segment or 128 With Repeaters
- ▶ Automatic Baud Rate up to 1.5 mp/s.
- ▶ Up to 1000 m Maximum Trunk Length Without Repeaters, dependent upon the chosen Baud Rate.
- ▶ Supports Both Discrete and Analog Signals
- ▶ I/O Modules Allow Connection of Conventional Analog and Discrete Devices
- ▶ Interfaces Available for Many Variable Speed Drives, Motor Control Centers, and Field Devices
- ▶ Simple Integration of New Devices into an Existing Network
- ▶ Supports Mono-Master and Multi-Master Systems

## Wiring Diagram



## Standard Profibus<sup>o</sup> Network Card Specifications

### Power

Voltage 24Vdc ±10%  
Current <40mA

### On-Board Sensor Inputs

Type (2) Hall Effect Solid-State Sensors, (1) for Each Valve Position  
Local Indication Red LEDs

### Communication

Type Slave  
Communication Polled  
Word 1 Byte TX, 1 Byte RX  
Addressing 0 to 99, by Rotary Switch  
Transmission Rate up to 1.5 mp/s Baud

### Solenoid Output

Type (2) Transistor  
Programmable to NO or NC  
Transistor Rating 24VDC / 2 X 200 mA  
Indicator (2) Red LEDs

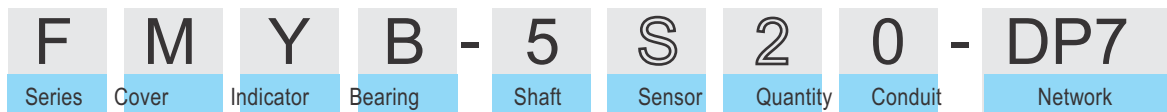
### Local Indication

Green (Light) Active and Allocated

### Mechanical Inputs

Type (2) Mechanical Contacts  
Activation Open / Closed Circuit

## Intelligent Part Number System



Description	Code	Description	Code	Description	Code
<u>Series:</u>		<u>Bearing</u>		<u>Switch/Sensor Type</u>	
Watchman (Nema 4)	F	Bronze	B	On Board Sensors	S
Survivor (Plastic Nema 4)	P	303 Stainless	S	<u>Sensor Quantity</u>	
Sentinel (Ex-Proof)	A	<u>Shaft</u>		2	
<u>Moniteur</u>		Standard 303 SS	1	<u>Conduit Connection</u>	
With Indicator	M	Standard 316 SS	3	2 - 1/2" F NPT (F & P Series)	0
Flat Cover	F	Low Profile NAMUR 303 SS	5	3 - 1/2" F NPT (F & P Series)	6
<u>Indicator Type (open/closed)</u>		Low Profile NAMUR 316 SS	7	2 - 3/4" F NPT (A Series)	0
No Indicator (Flat Cover)	N	NAMUR 303 SS	E	3 - 3/4" F NPT (A Series)	5
Black / Yellow (Standard)	Y	NAMUR 316 S	G	<u>Profibus DP</u>	-DP7

## Data Map for Profibus DP

### Diagnosis Bits

The Profibus DP valve monitor has diagnosis of short-circuit or solenoid open and the power supply voltage, indicating the fault locally through the PWR LED.

Input							Output	
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 0	Bit 1
sensor 1	sensor 2	MC1	MC2	Power Supply	output 1	output 2	sol 1	sol 2
hall sensor		mechanical contact		under or overvoltage < 19V or > 29V	short-circuit or open		solenoid	

The module also allows the bits to be viewed in configuration software, see the table below the meaning of each bit.

Input Bits				
Bit	Operation Description	Signaling LED	Bit Sent to PLC	
Bit 0	indicates the activation of the sensor 1	S1	-	0 - sensor 1 deactivated
			yellow	1 - sensor 1 activated
Bit 1	indicates the activation of the sensor 2	S2	-	0 - sensor 2 deactivated
			yellow	1 - sensor 2 activated
Bit 2	indicates the closing of mechanic contact 1	MC1	-	0 - contact 1 open
			yellow	1 - contact 1 closed
Bit 3	indicates the closing of mechanic contact 2	MC2	-	0 - contact 2 open
			yellow	1 - contact 2 closed
Bit 4	indicates the power supply state undervoltage < 19V - overvoltage > 29V	PW	PW - red	0 - under or overvoltage
			PW - green	1 - power supply in normal condition
Bit 5	indicates the output 1 state PW LED also indicates output in short-circuit or open	PW	PW - red	0 - output 1 short-circuited or open
			PW - green	1 - output 1 in normal condition
Bit 6	indicates the output 2 state PW LED also indicates output in short-circuit or open	PW	PW - red	0 - output 2 short-circuited or open
			PW - green	1 - output 2 in normal condition
Output Bits				
Bit	Operation Description	Signaling LED	Bit Sent to PLC	
Bit 0	indicates the activation of the output 1	SOL1	-	0 - output 1 deactivated
			yellow	1 - output 1 activated
Bit 1	indicates the activation of the output 2	SOL2	-	0 - output 2 deactivated
			yellow	1 - output 2 activated
Note: the indication of open or short-circuit of outputs indicated by PW LED only work when its output is activated.				



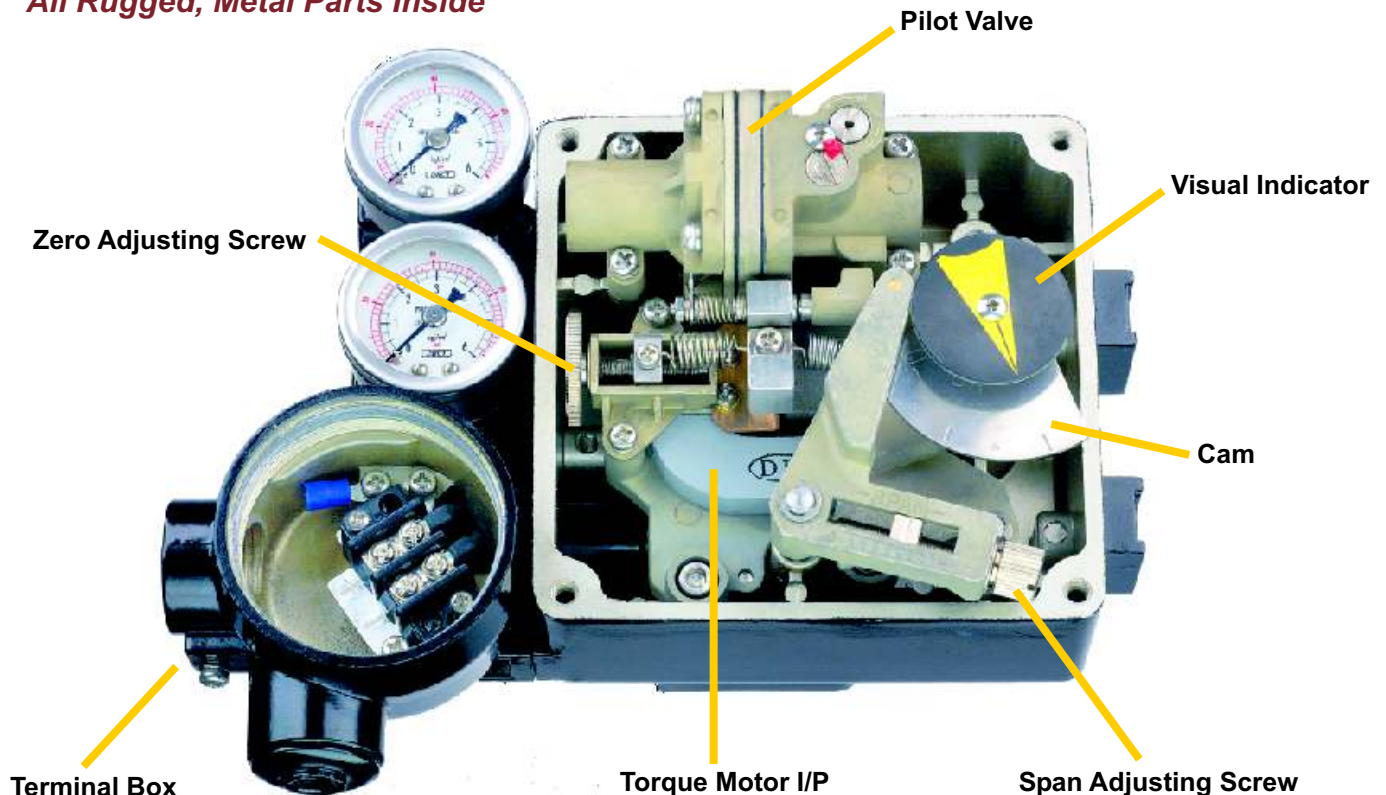
### *A Solid Workhorse You Can Depend On For Consistent, Reliable Control*

Moniteur's Series 40 Pneumatic (3-15psi) and Series 41 Electro-Pneumatic (4-20mA) positioners are advanced control devices which provide unparalleled stability in difficult environments.

- ▶ **Rugged Aluminum Housing** with a triple corrosion-resistant interior and exterior coating stands up to harsh environments
- ▶ **Reduced Bleed Pilot Valve** reduces air consumption by more than 50%
- ▶ **No Spool Valves** are used for air delivery, improving resistance to dirty plant air
- ▶ **Unique Magnetic 4-20 mA I/P** automatically compensates for supply pressure, atmospheric pressure and ambient temperature changes, and is unaffected by EMF. The vibration resistant design has no resonance effects from 5-200Hz
- ▶ **Precise Calibration** with simple SPAN and ZERO adjustments.
- ▶ **Precision Zero-Hysteresis Coupling System** for NAMUR actuators provides superior accuracy and repeatability by eliminating "slop".
- ▶ **Stainless Steel Gauges Standard**
- ▶ **Optional Limit Switches and 4-20mA Feedback**
- ▶ **Each Positoner Performance Tested** - Test results included in the box with each positioner guarantee consistent performance.



### *All Rugged, Metal Parts Inside*



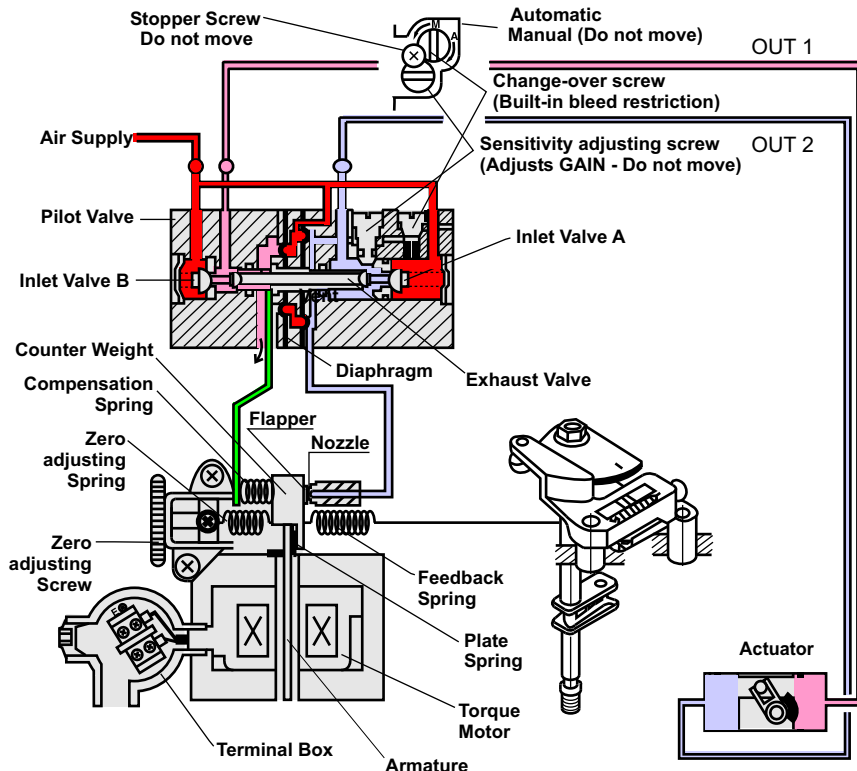
### Specifications -3-15 psi Pneumatic

Input Signal	3 - 15 psig Split Range Standard
Impedance	N/A
Stroke Range:	0 - 90°
Supply Range:	20 to 100 PSIG
Air Delivery:	7 SCFM
Air Consumption:	0.26 SCFM
Operating Temperature:	-4° to +158° F
Linearity	+/- 1%
Hysteresis	1% max.
Sensitivity	+/- 0.5%
Repeatability	+/- 0.5%
Pneumatic Connections:	1/8 NPT - Gauge Ports 1/4 NPT - Supply / Outlet
Enclosure:	Designed to NEMA 4, 4X
Enclosure Weight:	Approx. 4.8 lbs.

### Specifications - 4-20 mA Electro-Pneumatic

Input Signal	4 - 20 mA @ 24 VDC Split Range Standard
Impedance	250 +/- 15 ohms
Stroke Range:	0 - 90°
Supply Range:	20 to 100 PSIG
Air Delivery:	7 SCFM
Air Consumption:	0.15 SCFM
Operating Temperature:	-4° to +158° F
Linearity	+/- 1%
Hysteresis	1% max.
Sensitivity	+/- 0.5%
Repeatability	+/- 0.5%
Pneumatic Connections:	1/8 NPT - Gauge Ports 1/4 NPT - Supply / Outlet
Enclosure:	Designed to NEMA 4, 4X
Enclosure Weight:	Approx. 6.5 lbs.

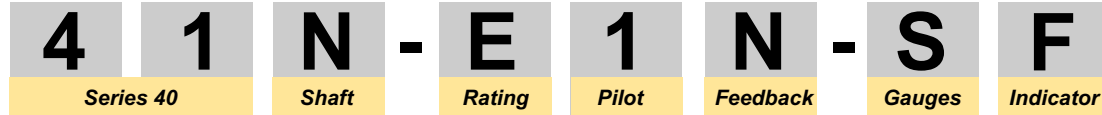
### Principle Of Operation - Rotary Positioner



As the signal current from the controller increases, the plate spring of the torque motor works as a pivot. As the armature receives the rotary torque in the counter-clockwise direction, the counter-weight is pushed to the left, the clearance between the nozzle and the flapper will increase, and the nozzle back pressure will decrease. As a result, the exhaust valve of the pilot valve moves to the right, and the output pressure of OUT1 increases (as OUT2 decreases) to move the actuator.

The movement of the actuator in turn rotates the feedback shaft and spring. The actuator stays in the position where the spring force is balanced with the force generated by the input current in the torque motor. The compensation spring is for direct feedback of the motion of the exhaust valve, and is connected to the counter weight to enhance the stability of the loop. The zero point is adjusted by changing the zero adjustment spring tension.

### Intelligent Part Number System



Description	Code
<b>Series:</b>	
Pneumatic	40
Electro-Pneumatic	41
<b>Shaft: Rotary NAMUR</b>	N
<b>Electrical Ratings</b>	
Standard (Pneumatic Only)	S
Ex md IIT6 (Standard for 4-20)	E
Intrinsically Safe	A

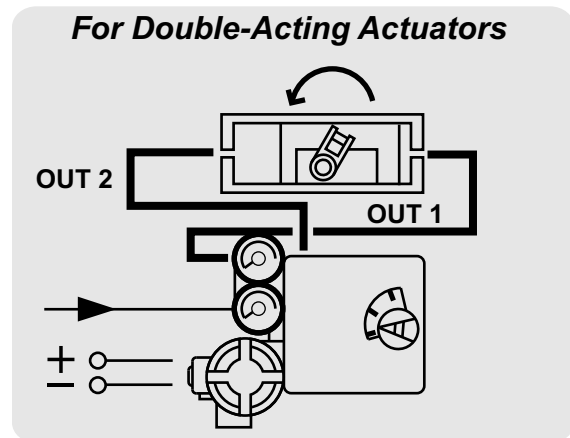
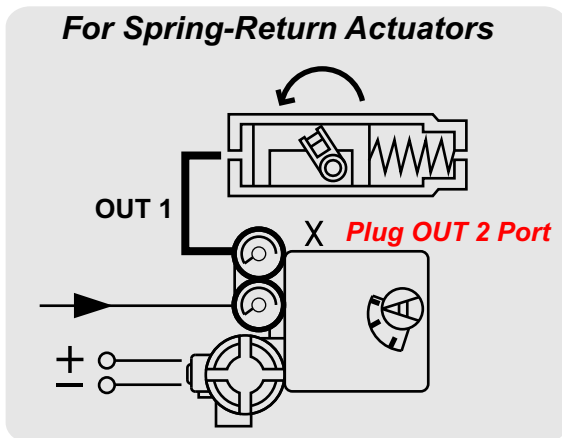
Description	Code
<b>Pilot Valve</b>	
Standard Orifice	1
<i>Small Orifice Kit Included</i>	
<b>Position Feedback</b>	
None	N
4-20 mA	T
2 SPDT Limit Switches	S
4-20 MA + Limit Switches	TS

Description	Code
<b>Gauges</b>	
Stainless Steel (Standard)	S
<b>Indication: Flat Dial</b>	F
<b>NAMUR Brackets</b>	
80x30x20	BKT-FS1206
80x30x30	BKT-FS1516
130x30x30	BKT-FS1306
130 x 30 x 50	BKT-FS1616

Positioners include: linear feedback cam, 7 SCFM spool valve and gauges

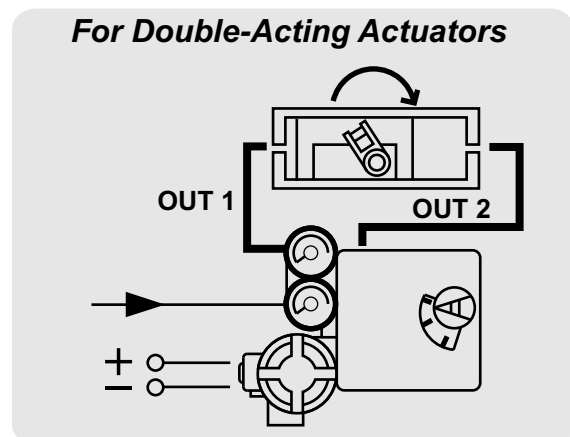
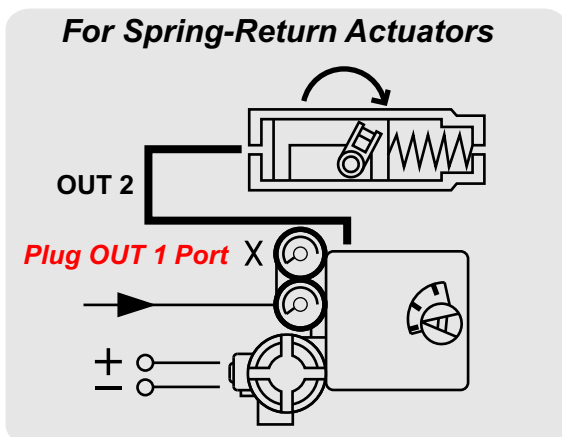
### Piping Configuration - Reverse Acting

- ▶ Actuator Stem Rotates **Counter-Clockwise** As Input Signal Increases
- ▶ Cam should be set with **RA** upwards (standard factory setting)

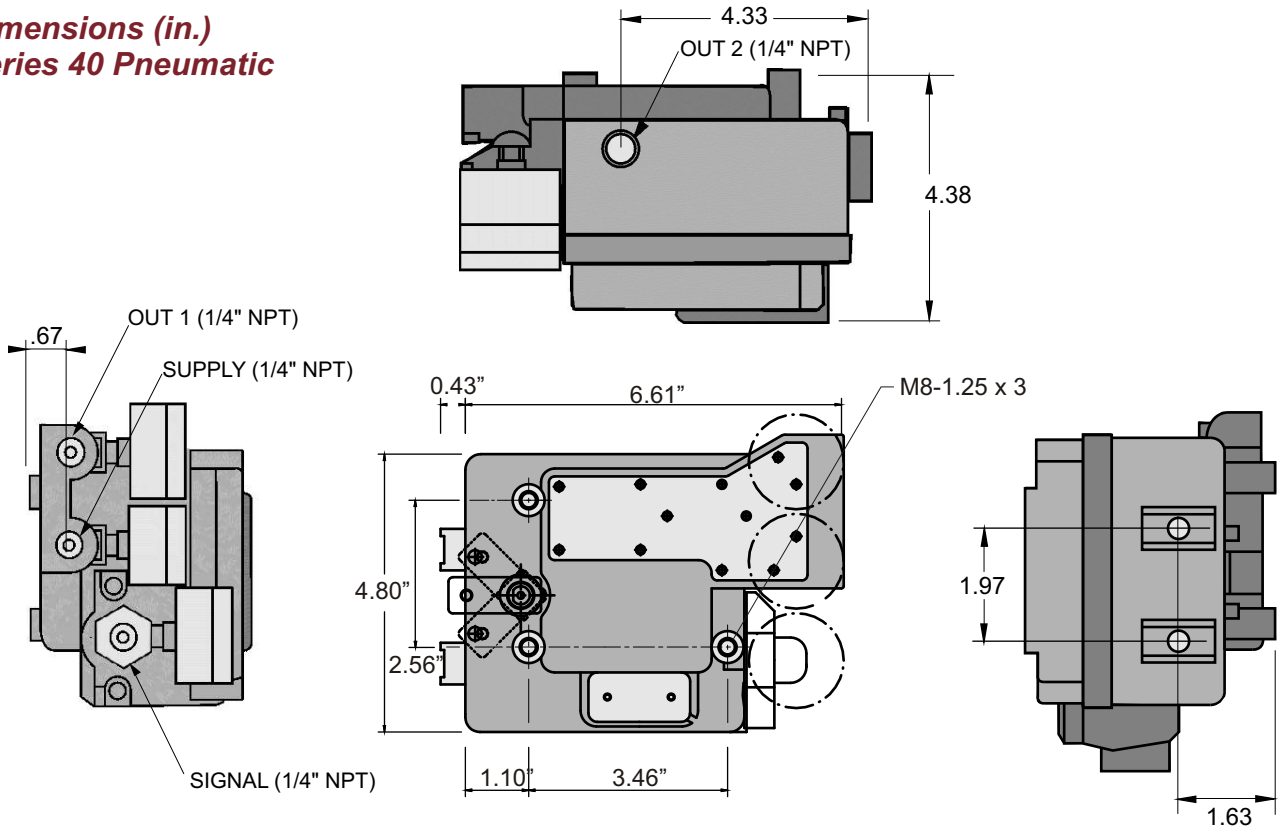


### Piping Configuration - Direct Acting

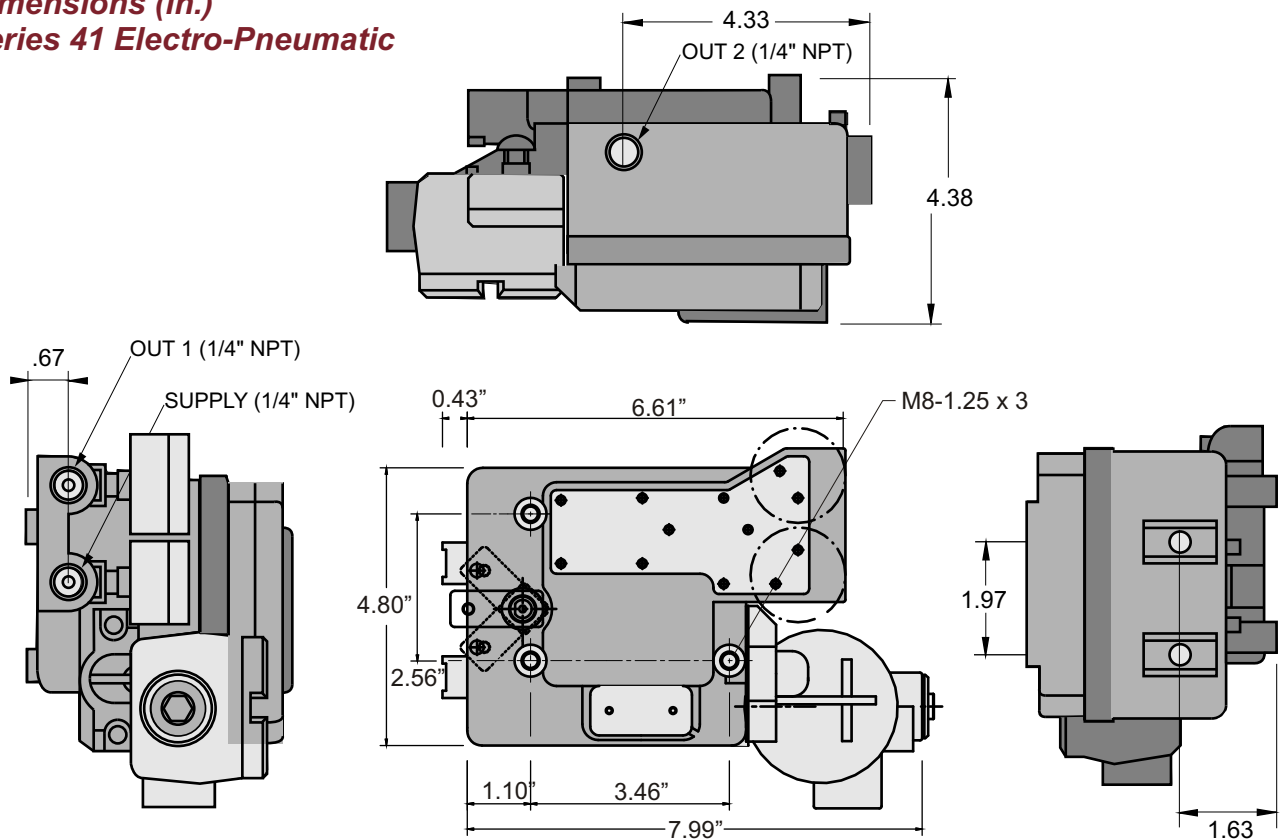
- ▶ Actuator Stem Rotates **Clockwise** As Input Signal Increases
- ▶ Cam should be set with **DA** upwards



**Dimensions (in.)  
Series 40 Pneumatic**

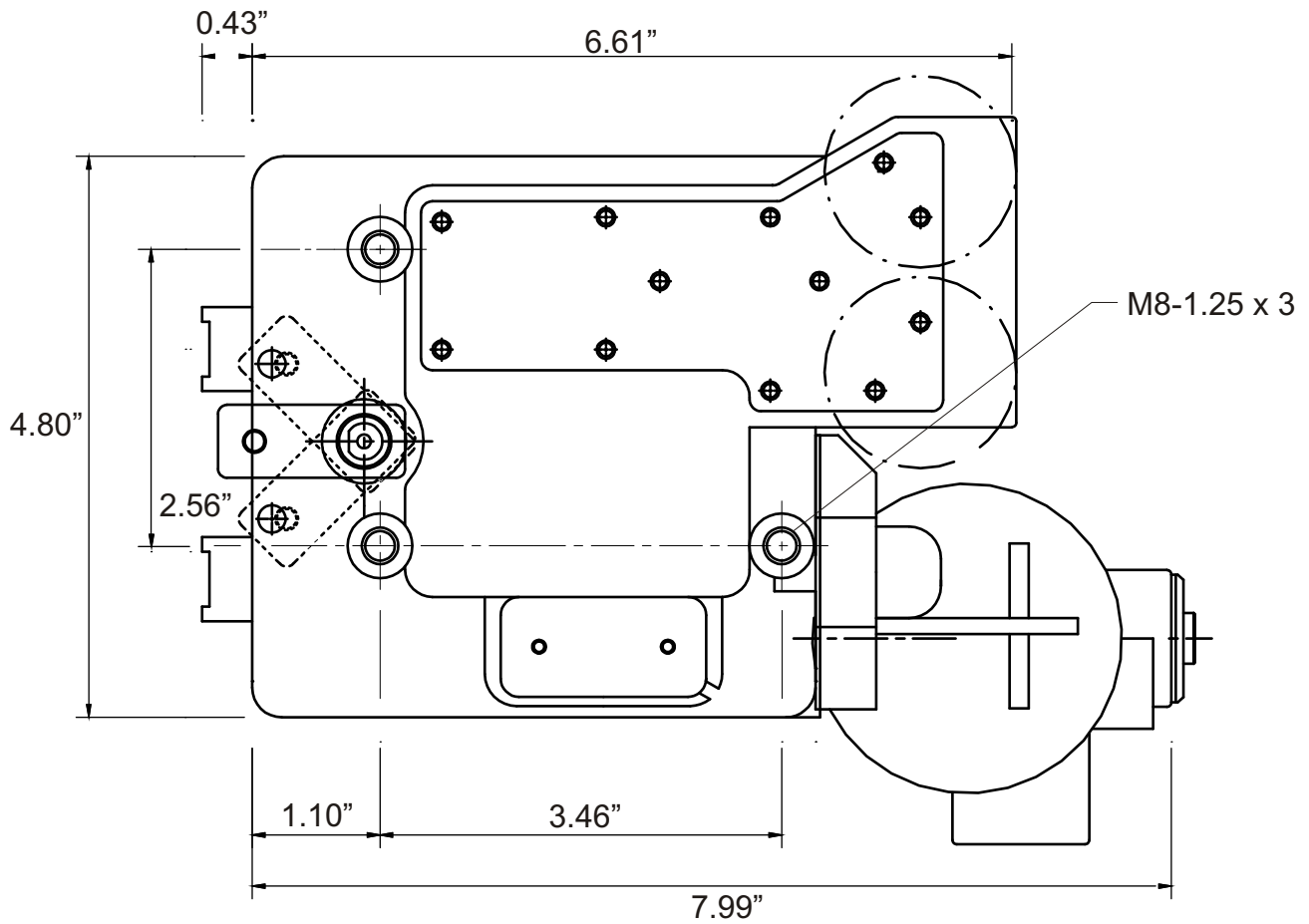


**Dimensions (in.)  
Series 41 Electro-Pneumatic**





### *Bottom Mounting Dimensions (in.)*





## **INSTALLATION & OPERATING INSTRUCTIONS**

### **SERIES 40 Positioners**

### Description of Device

Moniteur's Series 40 pneumatic (3-15psi) and electro-pneumatic (4-20mA) positioners are advanced control devices for rotary or linear valves which provide unparalleled stability in difficult environments.

- Rugged Aluminum Housing With a Triple Corrosion-Resistant Interior and Exterior Coating stands up to harsh environments
- Reduced Bleed Pilot Valve reduces air consumption by more than 50%
- Precise Calibration with simple SPAN and ZERO adjustments.
- Magnetic 4-20 mA I/P Converter provides automatic compensation for supply pressure, atmospheric pressure and ambient temperature changes, and is unaffected by EMF.
- Zero-Hysteresis Coupling System provides superior accuracy and repeatability by eliminating "slop".
- Vibration Resistant Design maintains consistent performance in poor conditions - no resonance effects from 5 - 200Hz
- Stainless Steel Gauges
- Optional Limit Switches and 4-20mA Feedback
- Each Positioner Performance Tested - Test results are included with each positioner



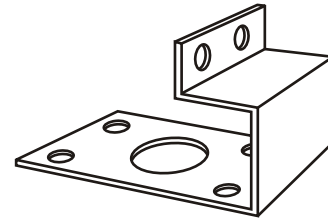
**CAUTION:** To reduce the risk of ignition of hazardous atmospheres, disconnect the device from the supply circuit before opening. Keep assembly tightly closed during operation.

### Positioning

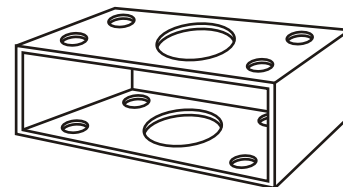
Moniteur Series 40 positioners can be mounted in any position.

### Mounting Brackets

For the installation of the rotary positioner, a mounting bracket has been designed for actuators with the 80 x 30 mm NAMUR accessory pattern. For the 130 x 30 pattern, the block-type mounting bracket is available. See diagrams below:



Bracket for the 80 x 30 NAMUR pattern



Bracket for the 130 x 30 NAMUR pattern

### Part Number System

The series and part number are located on the nameplate. The part number can be deciphered in the table below.

4	1	N	-	E	1	N	-	S	F
Series 40		Shaft		Rating	Pilot	Feedback		Gauges	Indicator

Description	Code	Description	Code	Description	Code
<b>Series:</b>		<b>Electrical Ratings</b>		<b>Position Feedback</b>	
Pneumatic	40	Standard / None	S	None	N
Electro-Pneumatic	41	Ex md IIT6	E	4-20 mA	T
<b>Shaft</b>		Intrinsically Safe	I	2 SPDT Limit Switches	S
Rotary NAMUR	N	<b>Pilot Valve</b>		<b>Gauges</b>	
Linear 10-80mm	L	Standard Orifice	1	None	N
Linear 80-150 mm	S	Small Orifice	2	Standard	S
		Extra-Small Orifice	3	<b>Indication</b>	
				Flat Dial	F
				Dome	D

### Specifications -3-15 psi Pneumatic

Input Signal 3 - 15 psig  
Split Range Available

Impedance N/A

Stroke Range: 0 - 90°

Supply Range: 20 to 100 PSIG

Air Delivery: 7 SCFM

Air Consumption: 0.26 SCFM

Operating Temperature: -4° to +158° F

Linearity +/- 1%

Hysteresis 1% max.

Sensitivity +/- 0.5%

Repeatability +/- 0.5%

Pneumatic Connections: 1/8 NPT - Gauge Ports  
1/4 NPT - Supply / Outlet

Enclosure: Designed to NEMA 4, 4X

Enclosure Weight: Approx. 4.8 lbs.

### Specifications - 4-20 mA Electro-Pneumatic

Input Signal 4 - 20 mA @ 24 VDC  
Split Range Available

Impedance 250 +/- 15 ohms

Stroke Range: 0 - 90°

Supply Range: 20 to 100 PSIG

Air Delivery: 7 SCFM

Air Consumption: 0.15 SCFM

Operating Temperature: -4° to +158° F

Linearity +/- 1%

Hysteresis 1% max.

Sensitivity +/- 0.5%

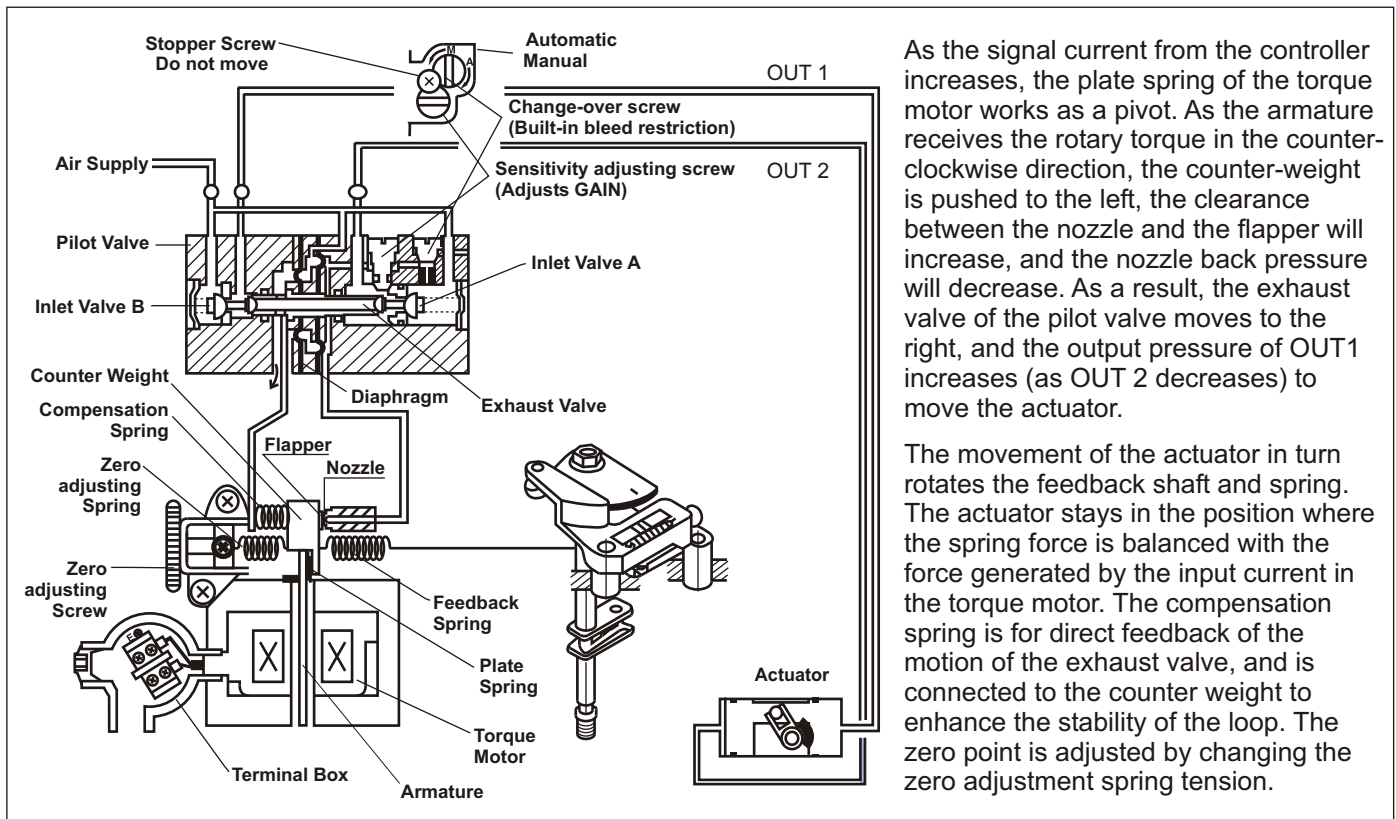
Repeatability +/- 0.5%

Pneumatic Connections: 1/8 NPT - Gauge Ports  
1/4 NPT - Supply / Outlet

Enclosure: Designed to NEMA 4, 4X

Enclosure Weight: Approx. 6.5 lbs.

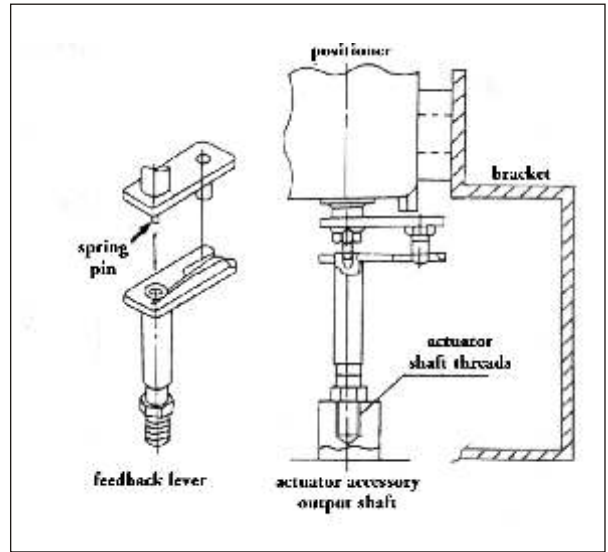
### Principle Of Operation





### Mounting the Positioner and Attaching the Feedback Lever

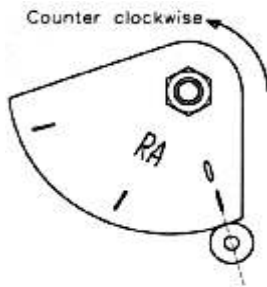
1. Mount the bracket to the actuator. The bracket kits include screws for both metric and English threads.
2. Mount Feedback lever to actuator -three different feedback levers are included in the bracket kit with different threads to match your actuator and are labeled accordingly. Thread the proper lever into the actuator first before mounting the positioner and bracket to the actuator.
3. Once the bracket has been mounted to the actuator, mount the positioner to the bracket. Be sure that the feedback lever is in perfect alignment with the rotary actuator output shaft. The spring pin of feedback shaft acts as a guide and should be placed in the orifice of the feedback lever. Please note that linearity and hysteresis will suffer if alignment is not correct.



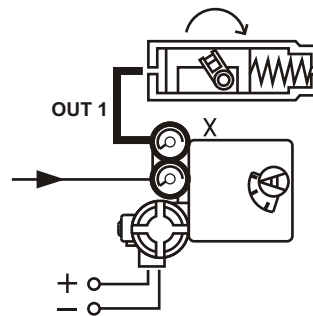
### Air Connections

#### Reverse Acting 6

**Actuator Stem Rotates Counter-Clockwise As Input Signal Increases (Clockwise to close) - Cam should be set with RA upwards (standard factory setting)**

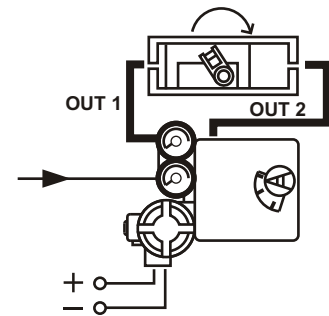


#### Spring-Return Actuators



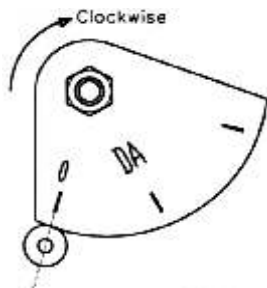
**OUT 2 Port must be plugged**

#### Double-Acting Actuators

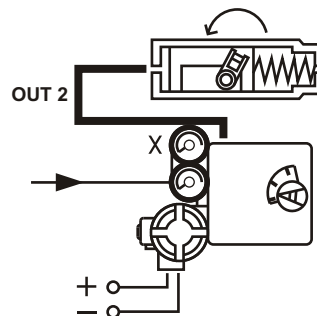


#### Direct Acting 6

**Actuator Stem Rotates Clockwise As Input Signal Increases (Counter-clockwise to close) - Cam should be set with DA upwards**

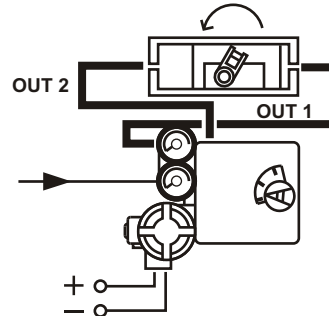


#### Spring-Return Actuators



**OUT 1 Port must be plugged**

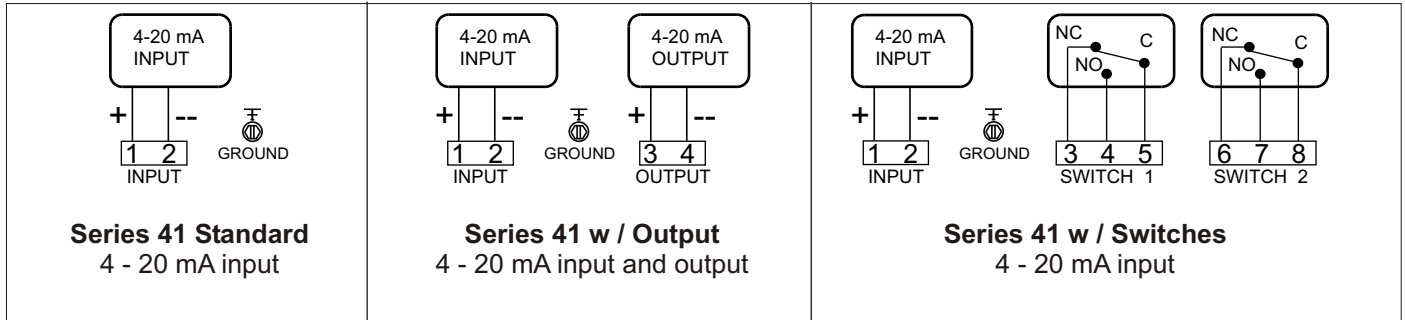
#### Double-Acting Actuators



### Wiring Diagrams

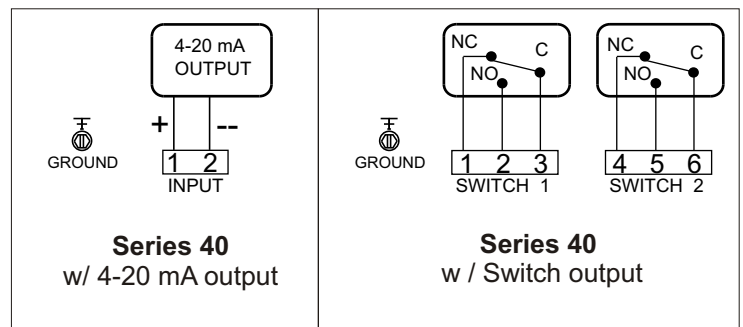


**CAUTION:** Always check that the electrical load is within the range stated on the nameplate. Failure to remain within electrical ratings may result in damage to or premature failure of the electrical switches, sensors or transmitter electronics.



### Specifications - Current Output

Power Supply Rating Recommended	15 - 28 VDC loop power
Power Supply	24 VDC
Output Signal	4 - 20 mA
Operating Temperature	-20° to 175° F
Load Impedance	0 - 10K ohms at 24 VDC
Max. Output	55 mA DC
Linearity	+/- 1.0%
Hysteresis	1.0% of full scale
Repeatability	+/- 0.5% of full scale
Adjustment	Zero and Span in Terminal Box



### Specifications - Limit Switches

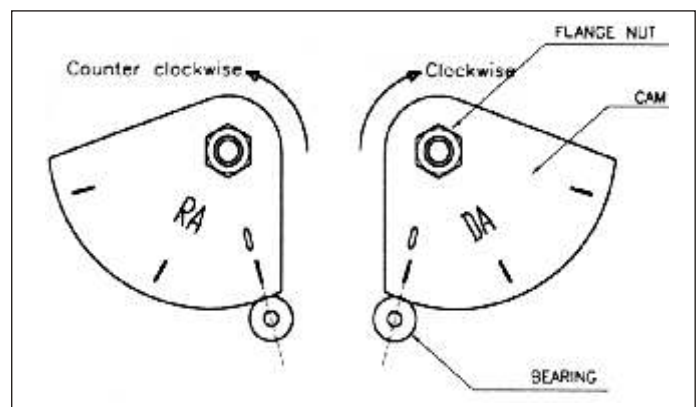
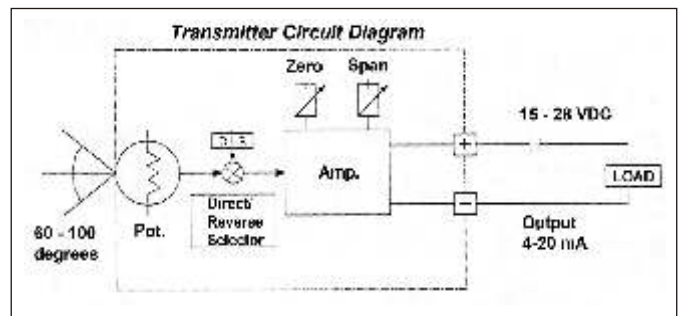
Contacts	SPDT Form C
AC Rating	5A - 125 VAC / 3A - 250 VAC
DC Rating	1A - 24 VDC
Adjustment	cams with set screws

### Cam and Indicator Adjustment



**WARNING:** When adjusting or replacing cams, be sure to shut off air supply to the positioner. Otherwise, the positioner might react suddenly and cause damage or injury.

1. Loosen the flange nut on the cam. Match the part of the cam with "0" marked on it with the center of bearing, as shown to the right. The span adjusting arm unit should now be aligned.
2. Tighten the flange nut of cam after setting the cam.
3. After cam installation, proceed to adjust zero and span. Once this is complete, secure the indicator with the blot (M3) to the feedback shaft. The position for indicator should be arranged according in the scale (0 - 90 degrees) shown on the cover.





**WARNING:** Before adjusting the Span and Zero, or making any other adjustments to the positioner, make sure all air connections are correct and match your actuator type. See page 3 for details.

### Span and Zero Adjustment

- 1) Set input signal to 4mA (24 VDC) while positioner is at the 0% or stroke starting point. Turn the zero adjustment knob clockwise or counter clockwise to set the zero position.
- 2) Check the stroke of actuator by setting the signal to 20 mA at 24 VDC. If the stroke does not meet 100%, turn the span adjustment screw clockwise or counter clockwise until 100% is reached.
- 3) Set input signal back to 4 mA (24 VDC) and adjust the zero adjustment screw until starting point is reached.
- 4) Repeat the process until the desired set points are reached.

NOTE: Due to variations in circuitry and environmental effects, often 0% is set at 4.5 mA and 100% 13.5 mA to make sure that at the end points the valve will be fully open or fully closed.

### Auto / Manual Operation - Pilot Valve Calibration

For manual operation using an external air regulator, set the Auto / Manual switch on the located on the pilot valve to M. This will bypass the 4-20 mA input signal. Normally this function is not used.

The pilot valve is calibrated at the factory. For reliable operation of the positioner, no adjustments should be made.



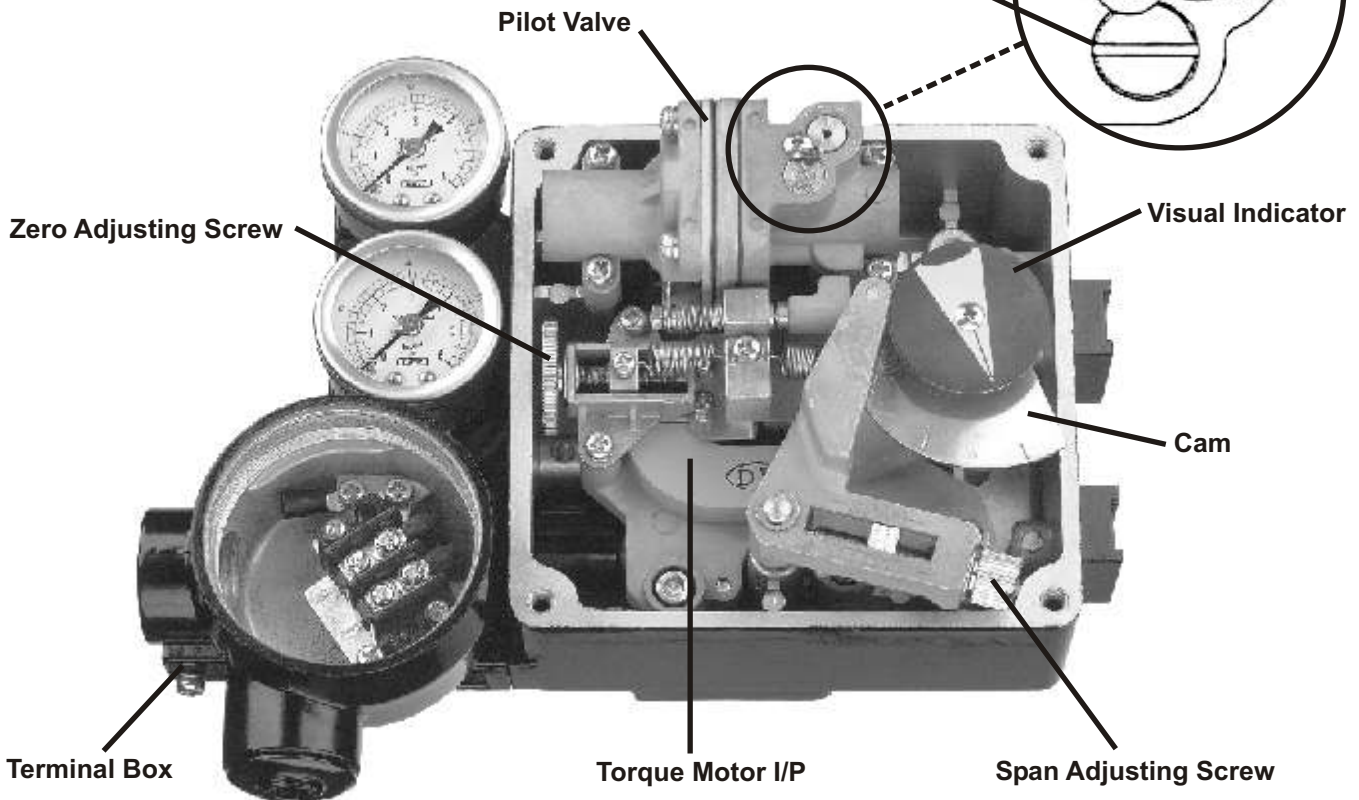
**WARNING:** Adjusting the factory calibration screw will void the warranty and may cause irreversible damage to the positioner.

Auto / Manual Screw

Stopper Screw

Factory Calibration Screw  
DO NOT MOVE

### Internal View Of the Series 40

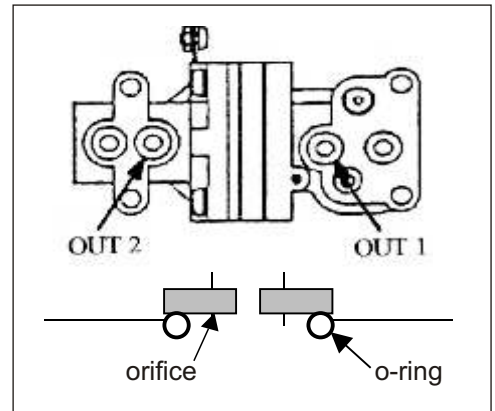


### Optional Restricted Pilot Valve Orifice



**WARNING:** Before removing pilot valve, be sure to disconnect positioner from the signal and compressed air source.

For improved control using smaller actuators, a restricted pilot valve orifice kit is included with the positioner. To install, the pilot valve must be removed from the positioner. Remove the four screws holding the pilot to the positioner body. As you remove the valve, be sure to hold the compensation spring (see page 2) in place. Flip the valve so the bottom faces you. Remove the o-rings from the *out 1* and *out 2* ports (as shown in the diagram at right). Place the orifice plates in their place with new o-rings above them, and re-install the pilot valve, making sure the compensation spring is back in place. The positioner is now set up for smaller actuators.



### Troubleshooting Tips

#### Hunting

- \* If your actuator is small, install orifice restrictions in ports 1 and 2 of the pilot valve.
- \* The nozzle might be clogged. Take the metal wire located in the positioner cover and clean the nozzle.

#### Poor Linearity

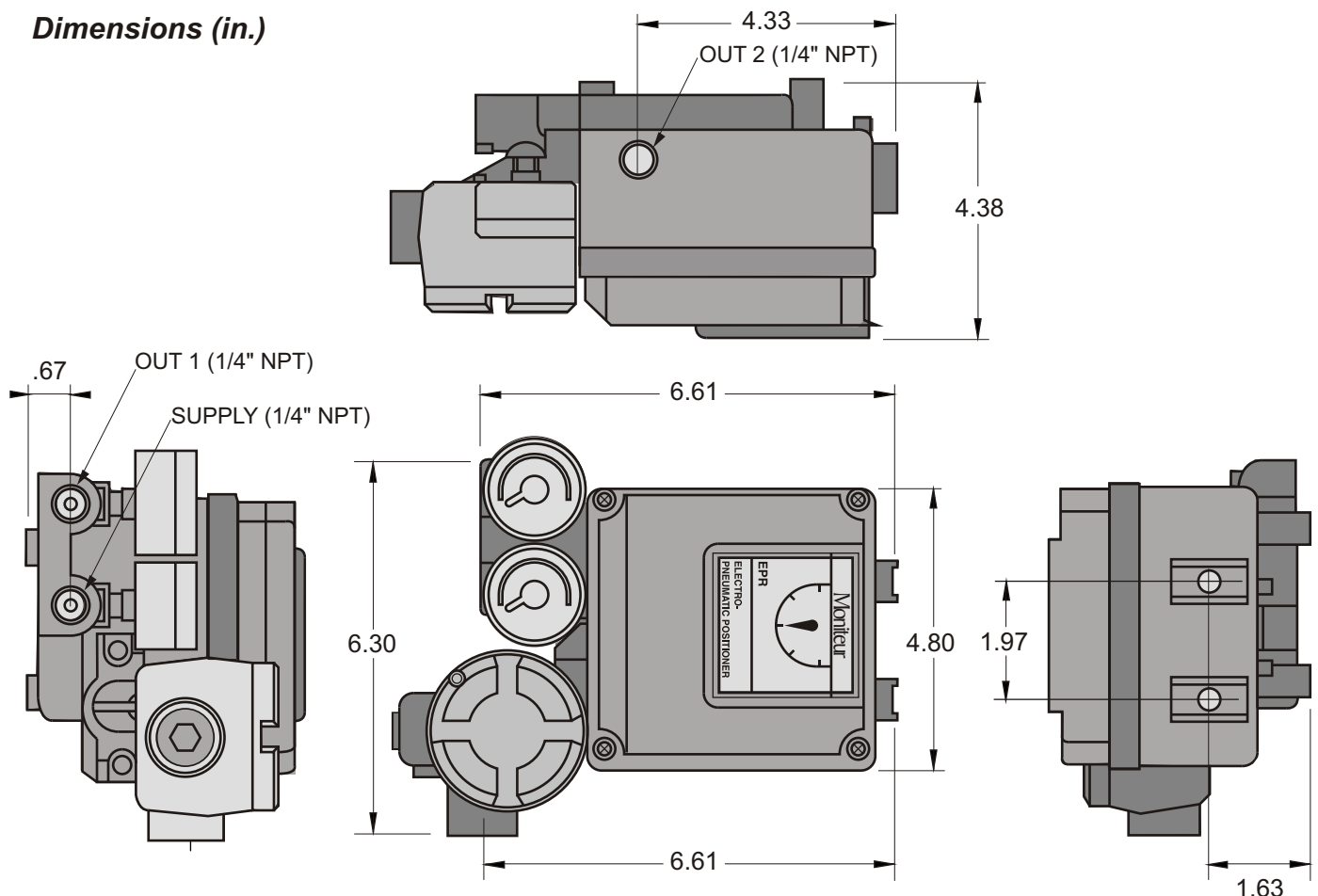
- \* Air supply might be unstable - check or install a pressure regulator.

- \* Check Zero and Span adjustments
- \* Loose feedback lever - tighten feedback lever

#### Poor Hysteresis

- \* Loose mounting of the actuator to the positioner - tighten the mounting bracket.
- \* Adjust the seat, using the seat adjuster (double acting actuators only)

### Dimensions (in.)





# Moniteur

## Installation and Operating Instructions VPT Series - Form IO1-0202

### DESCRIPTION OF DEVICE

The Moniteur Visual Indicator is a mechanical device that graphically displays the angular displacement of a quarter turn valve or any other device operating between 0 and 90 degrees. The Moniteur Indicator represents a true indication of valve position. It is infinitely adjustable, and delivers a 100% change of indication, displaying 90 degrees of rotation by utilizing an amplified mechanical drive. Moniteur Valve Position Transmitters have enclosures meeting the following requirements:

**Sentinel** - Nema 4, 4x - Watertight, Nema 7  
Explosion-proof and Nema 9 Dust - Ignition-proof,  
Class 1, Division 1 Groups C&D, Class I, Division 1  
Groups E, F, & G, Class 1, Division 2 Groups A, B  
(TTL switches and Inductive Sensors only)

**Sentinel II** - Nema 4, 4x Watertight, Nema 7  
Explosion-proof and Nema 9 Dust - Ignition-proof,  
Class 1, Division 1 Groups A, B, C&D, Class II,  
Division 1, Groups E, F, & G

**Watchman / Watchman II / Survivor / Scout** - Nema 4,  
4x -Watertight

**Survivor II** - Nema 4, 4x - Watertight,  
Series 'Q' (FM) Install per drawing no. S2CF  
Non-incendive Division 2 All Groups  
Series 'R' (CSA)  
Division 2 All Groups

The Survivor II unit must be supplied by an SELV  
source in accordance with C22.2 No. 1010.1 Annex H.

### PART NUMBER SYSTEM

The series and part number are located on the nameplate. The part number can be deciphered in the table below.

<b>A</b>	<b>M</b>	<b>Y</b>	<b>B</b>	<b>-</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>0</b>
Series	Cover	Moniteur	Bearing		Shaft	Switch	Quantity	Conduit

Description	Code
<b>Series</b>	
Sentinel	A
Sentinel-II	C
Watchman	F
Watchman-II	H
Survivor	P
Survivor-II (FM)	Q
Survivor-II (CSA)	R
Scout	V
Indicateur	I
<b>Cover</b>	
With Moniteur	M
Flat Cover (No Moniteur)	F
<b>Moniteur</b>	
No Indicator	N
Black / Yellow	Y
3-Way Path O,T,F	O,T,F
4-Way Path S	S
180 degree "T"	1
Green, Red, Blue / White	G,R,B
Green / Red	A
Red / Green	C
0-100%	P

Description	Code
<b>Bearing</b>	
Bronze	B
303 Stainless Steel	S
<b>Shaft</b>	
Standard 303 SS	1
Standard 316 SS	3
NAMUR 303 SS	5
Long NAMUR 303 SS	E
<b>Switch Type</b>	
Cherry 15A	
SPDT Mechanical	1
Tungsten TTL 3A	
SPDT Non-Contact	2
Prism Gold Plated 1A	
SPDT Mechanical	3
ITW 10A	
DPDT Mechanical	4
Rhodium TTL 1A	
SPST Non-Contact	7
Krystal TTL 0.3A	
SPDT Non-Contact	L
NEO-X 0.3A	
NO Sensor	A

Description	Code
Rhodium TTL 1A	
SPDT Non-Contact	T
Bifurcated TTL 3A	
SPST Non-Contact	B
P&F NJ2-V3 NAMUR	
Inductive Sensor	8
P&F NBB3-V3-Z4	
Inductive Sensor	K
<b>Switch Quantity</b>	1-6
<b>Conduit (Watchman / Survivor)</b>	
(2) 1/2" F NPT	0
(3) 1/2" F NPT	6
(1) 1/2" F + (1) 1/2" M NPT	8
<b>Conduit (Sentinel)</b>	
(2) 3/4" F NPT	0
(3) 3/4" F	5
(2) 3/4" F + (1) 1/2" F NPT	6
(1) 3/4" F + (1) 1/2" M NPT	8
<b>Output (add suffix to part number)</b>	
Current 4 - 20mA	- 420
Resistive 0 - 1kΩ	- 1K

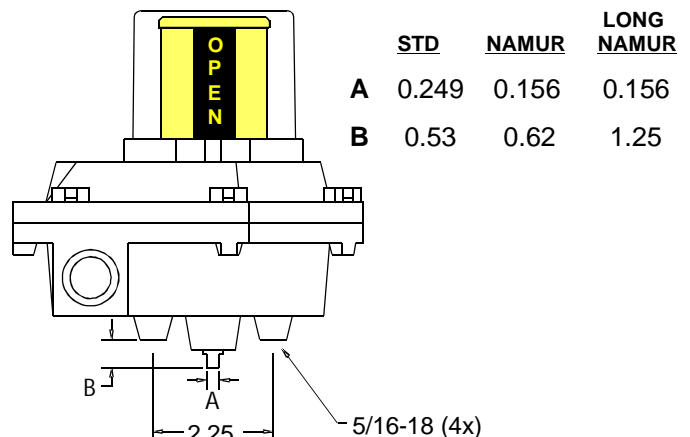


**CAUTION:** To reduce the risk of ignition of hazardous atmospheres, disconnect the device from the supply circuit before opening. Keep assembly tightly closed during operation.

**Pollution Degree - "4"**  
**Installation Category - "I"**  
**Operating Temperature (deg. C) -40 to 80**

**Positioning-** Moniteur Valve Position Transmitters can be mounted in any position.

### Mounting Dimensions (for all switches)



SQ. BOLT PATTERN



### INSTALLATION - ADJUSTING THE VISUAL INDICATOR

1. Mount the valve position transmitter to the valve or actuator with the correct mounting bracket.
2. Determine the true valve position and compare the Moniteur's Indication with the true valve position. If the Moniteur display is synchronized, proceed to Step 12. If it is not, continue to Step 3.
3. Remove the clear Moniteur cover by turning it counter-clockwise to disengage the detent and then lift it off. Determine the level of adjustment that needs to be made. If only a small adjustment is necessary (less than 20 degrees in either direction), proceed to step 4. If a larger adjustment is required, such as 45, 90 or 135 degrees from default, proceed to step 7.
4. Remove the Moniteur Visual Indicator by lifting it upward off the shaft and the Infinite Adjusting Ring. Loosen screws B and C shown in fig.1 (do not remove screws). The Infinite adjusting ring should rotate freely over the enclosure cover of the Valve Position Transmitter.
5. Return the Moniteur Indicator to the output shaft. As it slides down along the shaft, be sure that the Moniteur Indicator's base engages the Infinite Adjusting Ring on pins "E". (fig.1)
6. Rotate the Moniteur Indicator by applying a light rotational force to the vertical vanes to synchronize it with the true valve position. Once aligned, proceed to Step 9. If further adjustment is necessary, you will need to continue with Step 7.
7. Remove the Moniteur Visual Indicator by lifting it upward off the shaft and the Infinite Adjusting Ring. Remove screws B and C from the Infinite Adjusting Ring. Rotate the setting ring and match the number on the plastic ring with the number cast into the enclosure, according to the following requirements:
  - 90 - 90:** as shipped from the factory - shipped as "Open".
  - 45 - 45:** "Open" is 45 degrees CCW in travel from default.
  - 135 - 135:** "Open" is 45 degrees CW in travel from default.
  - 180 - 180:** "Open" is 90 degrees CW or CCW from default. (This is the setting to switch default indication from Open to Closed.)
 Return screws B and C to their appropriate threaded holes, but do not tighten them completely. Now return the Moniteur Indicator to the output shaft. Be sure that the Indicator's base engages the infinite adjusting ring on pins "E". (fig.1)
8. Rotate the Moniteur Indicator by applying a light rotational force to the vertical vanes to further synchronize the Indicator with the true valve position.
9. Remove the Moniteur Indicator, being careful not to rotate the Infinite Adjustment Ring. Hold Ring stationary and tighten screws B and C.
10. Return the Moniteur Indicator being certain that both the output shaft and pins "E" of the Infinite Adjusting Ring are engaged.
11. Return the clear Moniteur cover by inserting it into the breach lock on the enclosure cover and turning it Clock-wise until the unit engages the detent.
12. Cycle the valve to the opposite extremity. If the Moniteur Indicator is displaying the correct valve position, installation is complete. If not, it is probably because the actuator is not moving exactly 90 degrees. Adjust the stroke of the actuator so that it is rotating 90 degrees and the Moniteur Indicator will indicate the correct valve position. Installation is now complete.

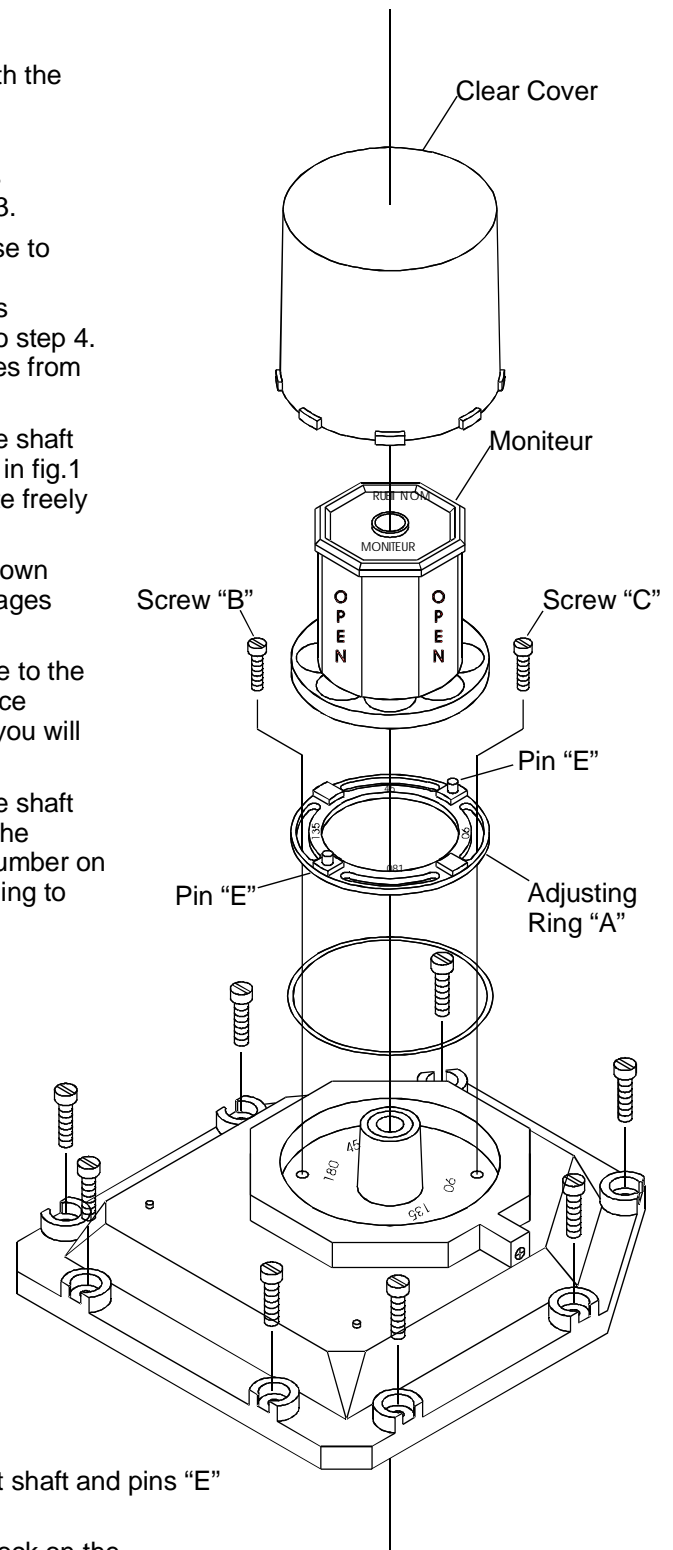
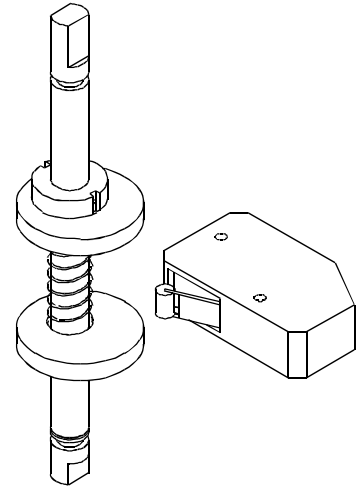


Fig. 1

**WARNING:** To prevent the possibility of personal injury or property damage, turn off electrical power before inspection, adjustment, or removal of the valve position transmitter.

### INSTALLATION - SETTING MECHANICAL SWITCHES (Switch Types 1, 3 and 4)

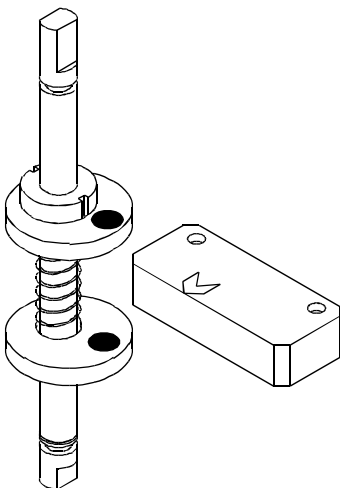
1. Remove VPT cover from the housing by loosening the screws holding the housing and cover assembly together.
2. Move the valve or valve actuator assembly to a position where one or more of the switches will be required to operate noting the direction of VPT shaft rotation.
3. Determine which switch is to be set and lift or depress the corresponding cam as required. Rotate the cam in the direction of shaft rotation until the cam engages the switch and closes the normally open contact for SPDT and DPDT switches.
4. Repeat Steps 2 and 3 until all of the switches are set.
5. Replace the VPT cover and tighten the screws. To ensure that the shaft alignment is secured, bring all of the screws in contact with the cover and then tighten them in stages moving from one screw to its diagonal counterpart.



### INSTALLATION - SETTING TTL MAGNETIC SWITCHES (Switch Types 2, T and B)

**NOTE:** To properly set switches, an ohm meter or equivalent devices will be required.

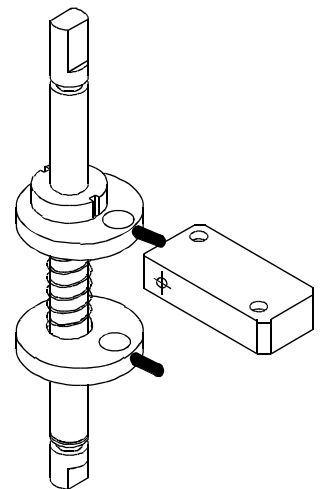
1. Remove VPT cover from the housing by loosening the screws holding the housing and cover assembly together.
2. Move the valve or valve actuator assembly to a position where one or more of the switches will be required to operate noting the direction of VPT shaft rotation.
3. Determine which switch is to be set and lift or depress the corresponding cam as required. Using the arrow only as a guide, rotate the cam in the direction of shaft rotation until the circle on the cam and the arrow on the switch are aligned with each other. **IMPORTANT** - To be sure the normally open contact is now closed, you must use an ohm meter or equivalent device to check the setting.
4. Repeat Steps 2 and 3 until all of the switches are set.
5. Replace the VPT cover and tighten the screws. To ensure that the shaft alignment is secured, bring all of the screws in contact with the cover and then tighten them in stages moving from one screw to its diagonal counterpart.



### INSTALLATION - SETTING INDUCTIVE SENSORS (Switch Types 8, K and M)

**NOTE:** To properly set sensors, an appropriate sensor tester will be required.

1. Remove VPT cover from the housing by loosening the screws holding the housing and cover assembly together.
2. Move the valve or valve actuator assembly to a position where one or more of the sensors will be required to operate noting the direction of VPT shaft rotation.
3. Determine which switch is to be set and lift or depress the corresponding cam as required. Using the target area only as a guide, rotate the cam in the direction of shaft rotation until the pin on the cam and the target area on the sensor are aligned with each other. If the sensor has an LED, it should light now. **IMPORTANT** - To be sure the sensor is now actuated you must use an appropriate sensor tester.
4. Repeat Steps 2 and 3 until all of the sensors are set.
5. Replace the VPT cover and tighten the screws. To ensure that the shaft alignment is secured, bring all of the screws in contact with the cover and then tighten them in stages moving from one screw to its diagonal counterpart.



**CAUTION:** Always check that the electrical load is within the range stated on the nameplate. Failure to adhere to the ratings may result in damage to or premature failure of the electrical switches or sensors.

### ELECTRICAL SPECIFICATIONS

MECH.	Code	Switch Type	AC Rating	DC Rating	Form
	1	Cherry - SPDT	15A - 250V	2.5A - 24V	C
	3	Prism Gold Plated - SPDT	1A - 120V	1A - 24V	C
	4	ITW - DPDT	10A - 250V	7A - 24V	CC

TTL	Code	Switch Type	AC Rating	DC Rating	Form
	2	Tungsten TTL - SPDT	3A - 120V	2A - 24V	C
	E	Tungsten TTL HV - SPDT	0.4A - 240V	0.4A - 240 V	C
	7	Rhodium TTL - SPST	1A - 120V	1A - 24V	A
	T	Rhodium TTL - SPDT	1A - 120V	1A - 24V	C
	L	Krystal TTL - SPDT	0.3A - 120V	0.3A - 24V	C
	B	Bifurcated TTL - SPST	3A - 120V	2A - 24V	A



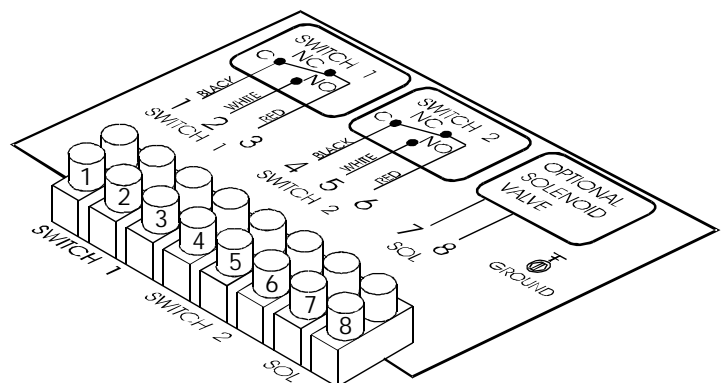
INDUCTIVE	Code	Sensor	Supply Voltage	Load Current / Target Absent	Load Current / Target Present	Operation
	8	P & F NJ2-V3	5-25 VDC	< 1 mA	3 - 15 mA	NAMUR
	K	P & F NBB3-V3-Z4	5-60 VDC	< 0.7 mA	4 - 100 mA	PNP
	M	Moniteur NAMUR	5-25 VDC	< 1 mA	3 - 15 mA	NAMUR
	A	Moniteur NEO-X	10-250 VAC/VDC	< 1 mA	3 - 300 mA	NO

Note: In Survivor II enclosures, Voltage and Current Ratings are lower, see Nameplate for appropriate ratings.

**WARNING:** All Inductive Sensors must be connected with the appropriate PLC, microprocessor or relay load. Otherwise, damage can result to the sensors. Check the sensor installation sheet in the box.

### WIRING OF VALVE POSITION TRANSMITTER

1. Remove VPT cover from the housing by loosening the screws. Holding the housing and cover assembly together, lift the cover from the housing.
2. Follow the wiring diagram located inside the cover of the VPT. Be sure to secure all the appropriate connections including the ground. The diagram at left relates the wiring diagram to the terminal block.
3. Replace the VPT cover and tighten the screws. To ensure that the shaft alignment mechanism functions properly, bring all of the screws in contact with the cover and then tighten them in stages moving from one screw to its diagonal counterpart.



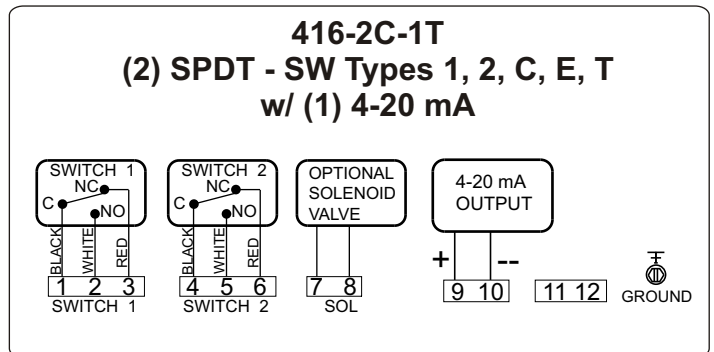
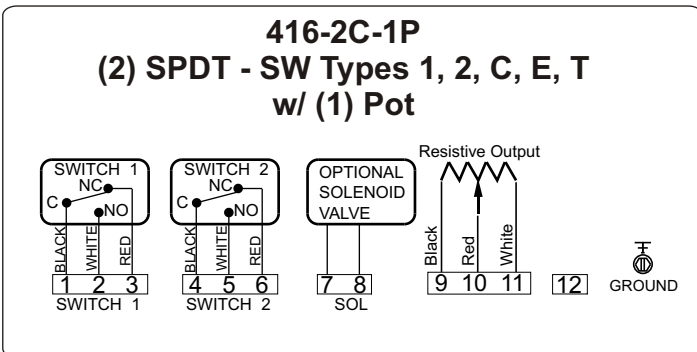
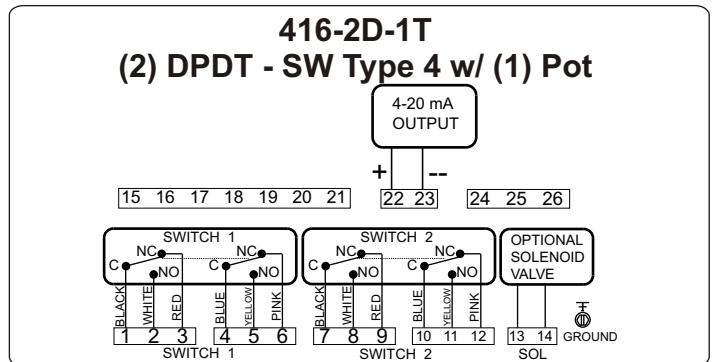
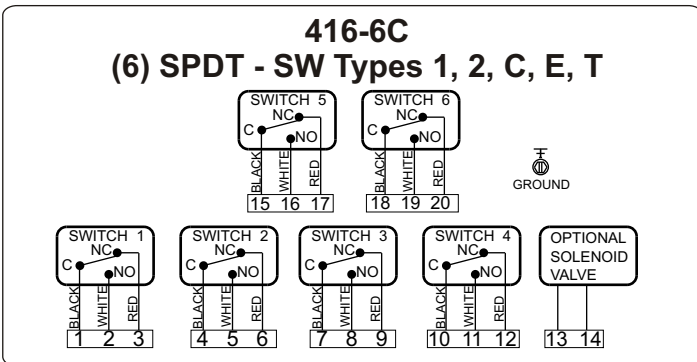
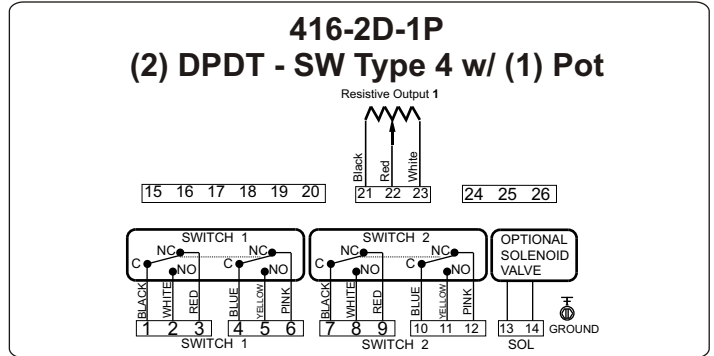
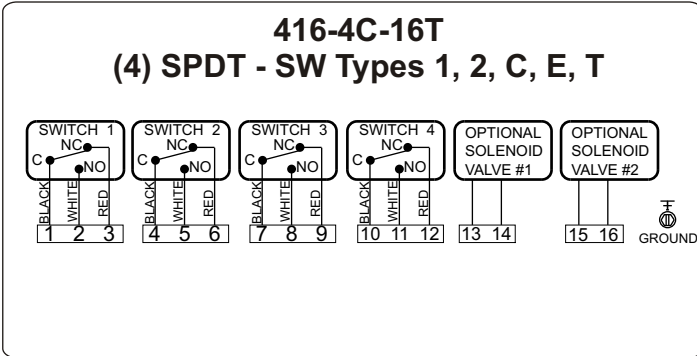
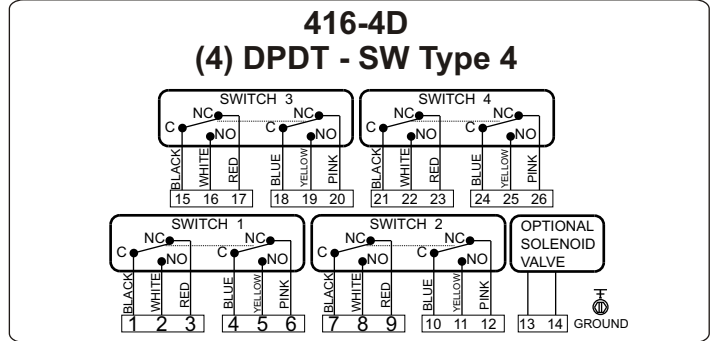
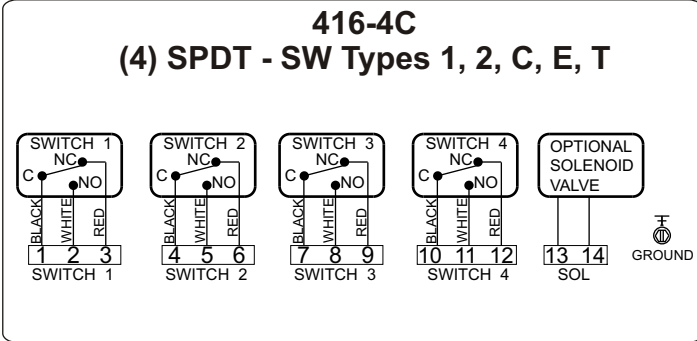
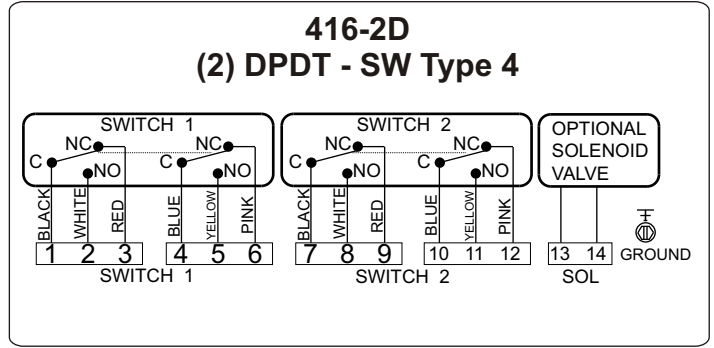
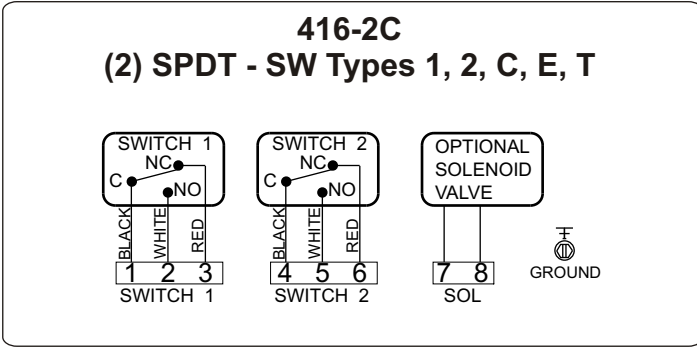
TERMINAL BLOCK AND WIRING DIAGRAM

**WARNING (FOR ENCLOSURE TYPES 4, 4x, 7 and 9 ONLY):** To prevent fire or explosion, use only with a seal fitting within 18 inches of the position transmitter enclosure.

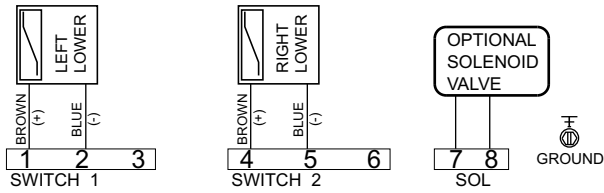
### CLEANING VALVE POSITION TRANSMITTER

If desired, use a damp rag or cloth to clean the outside of the position transmitter. No routine cleaning or maintenance is required for reliable, long term operation of the device.

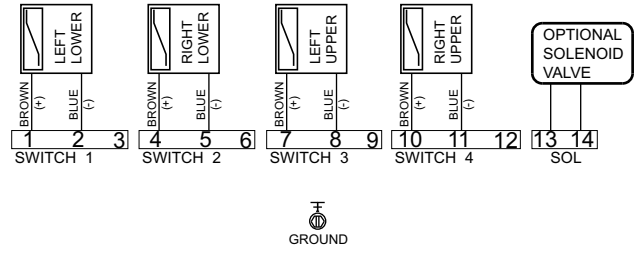
**WARNING:** If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



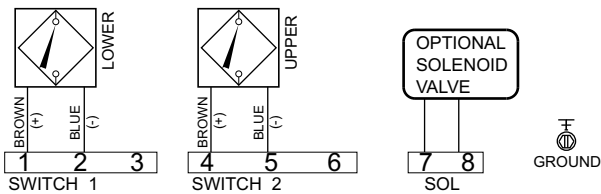
### 416-2PF - (2) SW 8 - NAMUR Sensor



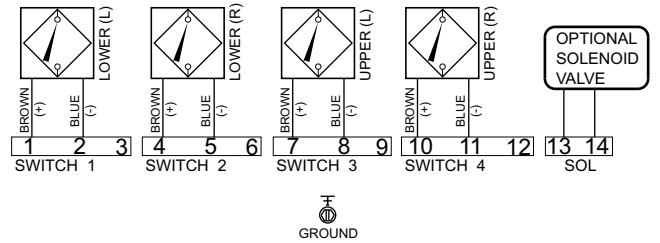
### 416-4PF - (4) SW 8 - NAMUR Sensor



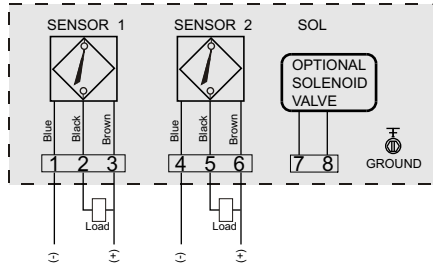
### 416-2PF-Z4 - (2) SW K - 2 Wire NO Sensor



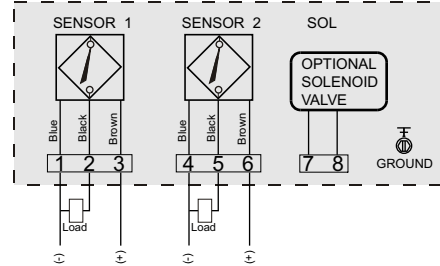
### 416-4PF-Z4 - (4) SW K - 2 Wire NO Sensor



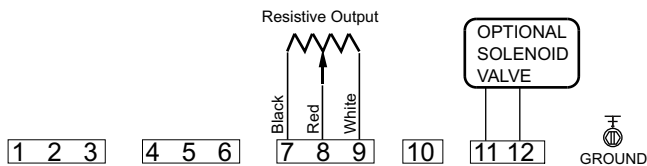
### 416-2PF-V3E0 - (2) SW M - 3 Wire NPN Sensor



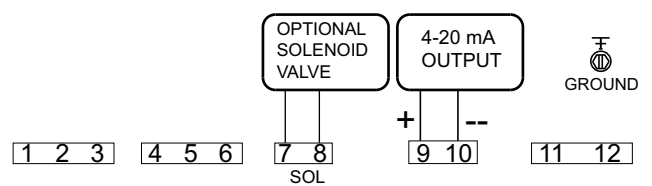
### 416-2PF-V3E2 - (2) SW M - 3 Wire PNP Sensor



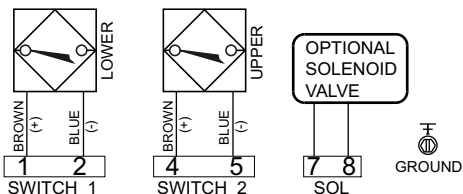
### 416-1P (1) Pot



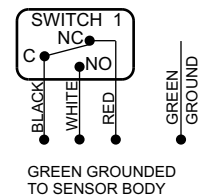
### 416-1T (1) 4-20mA



### 416-2PF-US - (2) SW Q - 2 Wire AC/DC Sensor



### 416-1CSS Companion





### DESCRIPTION OF DEVICE

The Moniteur Valve Position Transmitter is an electro-mechanical device that produces an analog output signal representative of the angular displacement of a quarter turn valve, or other device operating between 0 and 90 degrees.

### FACTORY SETTINGS

**Clockwise - to - Close operation (see fig A)**

**Resistive: 0 - 1k Ohms (selectable)**

**Current: 4mA Closed , 20mA Open**

### INSTALLATION

Install the Valve Position Transmitter to the valve/actuator package. Remove the enclosure cover and wire unit to the appropriate terminal points. Provided power must be within the operating specifications of the devices.



**CAUTION: To reduce the risk of ignition of hazardous atmospheres, disconnect the device from the supply circuit before opening. Keep assembly tightly closed during operation.**



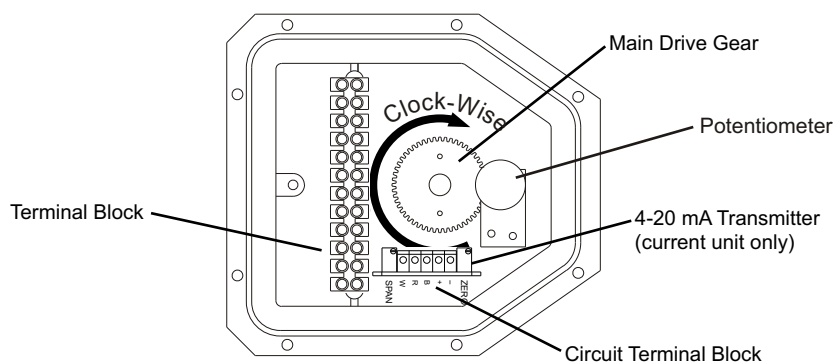
**CAUTION: Keep fingers and all objects away from moving gears. Never cycle or move the valve while adjusting the transmitter.**



### Calibration Procedure (Resistive Output Models)

1. Verify the position of the valve/actuator package to ensure that the valve is in the position where the resistive reading will be '0' ohms. (Normally the valve closed position)
2. For clockwise to close operation (see fig. A) use an ohmmeter to measure resistance between terminal points 9 and 10 on the terminal strip. For counter-clockwise rotation to close, measure resistance between terminal points 10 and 11 on the terminal strip. In this position, the meter should read "0 ohms" or slightly higher.
3. If the resistive output does not read near "0 ohms" then a macro adjustment must be made. This is adjusted by by disengaging the main drive gear. Lift the large center gear slightly from the main transmitter shaft and rotating the main gear until the desired reading is achieved. Release the main drive gear so that it re-engages with the main drive shaft.
4. Cycle the valve/actuator package to the full open position. Reading at 90 degrees of rotation should be close to 1000 ohms +/- 20% . (Less for smaller rotations, more for larger)
5. Cycle the valve, re-check the output. Re-calibrate if necessary.
6. Close the transmitter housing. **Tighten all screws.**

Figure A



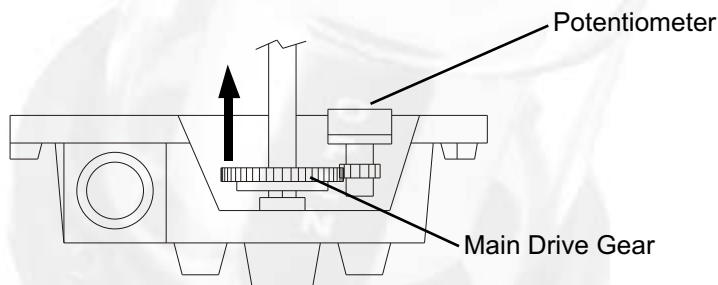
### Calibration Procedure (Resistive Output Models)

Instructions for clock-wise to close operation. See *reverse instructions* for counter-clock wise to close.

1. Verify the position of the valve/actuator package to ensure that the valve is in the 4mA reading position (normally the valve closed position).
2. Connect positive and negative leads to the appropriate terminal points. Insure that voltage values are within units rated values.
3. Connect a milliamp meter to the circuit. Lift the large center gear slightly from the main transmitter shaft and begin to rotate **clockwise**. Watch the amp meter while rotating. Reading will slowly decrease until the potentiometer's limit has been reached. At this point, the milliamp output will jump or zero out. Stop rotation of the main gear. Rotate the main gear **counter-clock-wise** approximately 1 tooth (10degrees).
4. Release the main drive gear so that it re-engages with the main drive shaft.
5. With a small screw driver, turn the adjustment screw on the transmitter board adjustment pot("zero") until the meter reads 4mA (See Fig A).
6. Cycle the valve 90 degrees to the full open position.
7. Turn the adjustment screw on the transmitter board adjustment pot ("span") (See Fig. A) until the meter reads 20mA.
8. Cycle the valve and recheck outputs at both ends of stroke. Make readjustments as necessary.
9. Close the transmitter housing. *Tighten all screws.*

#### Reverse Instructions

To use the transmitter with valve systems that rotate in the counter-clock-wise direct to close, remove all power from the system. On the circuit board terminal block, the BLACK and WHITE wire leads must be switched. Connect the BLACK lead to the terminal point marked (W) and the WHITE lead connected to the terminal point marked (B). Tighten terminal block screws. Lastly, when following directions listed above, reverse the rotation (words in bold print) of the directions. (i.e. clockwise becomes counter-clock-wise). Follow directions above.



### *Introduction - The Three Functions of the VPT*

With the growing trend towards greater manufacturing automation, Industry has embraced the Valve Position Transmitter (VPT) - also known as the Valve Position Indicator or Valve Monitor - as a must-have product when automating on-off valves. There are vast differences between the products available on the market, and since the product plays such an important role, we've put together this paper to address the questions users have asked us.

The VPT combines three major functions into one product, saving users time and money:

**1. Local (Visual) Position Indication** - Plant operators benefit from local visual indication of valve position that can be viewed from a distance. This external visual indicator is driven by the internal drive shaft and mounted on the top.

**2. Remote (Electrical) Position Indication** In the past, externally mounted limit switches were used on valves and actuators to allow plant engineers to determine the status of a valve remotely in the control room. These switches were bulky, expensive and unprotected from harsh plant environments. The VPT is a cost-effective alternative to these bulky switches. Cams mounted on a rotating shaft trip switches inside the VPT's electrical enclosure. The shaft is driven by the Actuator top accessory output shaft.

**3. Integral Junction Box For Limit Switches and Solenoid Valve** - With an integral terminal strip and sufficient conduit entries, the VPT serves as the electrical junction box to allow connection of the solenoid valve, switches or any additional device located near the enclosure. Separate junction boxes required for the switches and solenoid valves are eliminated, saving installation cost and reducing complexity.

### *Visual Valve Position Indication - Considerations*

Plant personnel require the visual indicator to visually determine valve status during a routine check and also to determine valve position in case of a feedback problem. The indicator should be viewable from a far distance and from any angle, because valves are often installed in locations difficult to access. Choose indicators with a 100% change of indication and that are viewable from every angle.

Valves and actuators are often located in harsh and corrosive environments, or outdoors exposed to the elements. The visual indicator should have a compression seal that resists ingress of water and fogging, stand up to wash-down jets (which can reach 300psi.) and inclement weather.

Many installations are outdoors, so the indicator must not fade or crack if exposed to sunlight over time. This is often a common problem. Users often use the indicators as steps when servicing hard-to-access areas, and the indicator must be rugged enough to withstand it. Additionally, many applications require a high cycle life. To guarantee optimum performance, the indicator should be designed and tested to last 1,000,000 cycles.

To reduce errors, the indicator should not be capable of being adjusted or installed incorrectly on the actuator. Many can be installed 90 degrees out of synch, and the only way to find out is after the automated valves are already installed!

### ***Withstanding the Environment: Physical Construction***

VPTs must withstand every environment - if they are found indoors, they can be subjected to hazardous and or corrosive environments. Outdoors, they are subject to the additional effects of weather, especially the constant changes in temperature and humidity. When selecting a VPT, start with the enclosure material.

*First Choice:* Die Cast Aluminum with protective polyurethane paint is sufficient for most applications. Explosion-proof enclosures must be made from cast metal, and for corrosive environments they can hard-anodized for extra corrosion resistance.

*Second Choice:* Thermoplastic or Zytel materials are selected for extremely corrosive environments where Aluminum would corrode easily.

*Stainless Steel* enclosures are rare, but available in certain instances where both Aluminum and Thermoplastic materials can't be used (severely corrosive environments or in hazardous areas requiring explosion-proof enclosures)

Important construction details that affect long-term reliability include:

- ▶ The enclosure shaft should be held to a bronze or stainless bearing with an internal stainless steel lock ring, protected from the environment with an O-ring. Standard designs use an external snap ring unprotected from dirt or corrosive air - these should be avoided as the snap rings corrode and eventually cause the shaft to "fall" into the enclosure, corrupting the alignment of the cams with the internal switches or sensors. Amazingly, low cost switches are made without any bearings at all - the shaft is allowed to run right against the aluminum housing! Avoid these at all costs.
- ▶ A compressed O-ring enclosure seal is required to keep out water many other products include gaskets particularly with thermoplastic enclosures and these should be avoided because water will enter them during a high-pressure wash-down or stormy weather.
- ▶ All enclosure threads should be "blind-tapped" to protect them from the environment, with enclosure bolts that seal the threads when closed.
- ▶ For thermoplastic enclosures, all inserts should be molded in during the production process for the best resistance to tear-out. Products with welded- or glued-in inserts should be avoided.

### ***Electrical Construction***

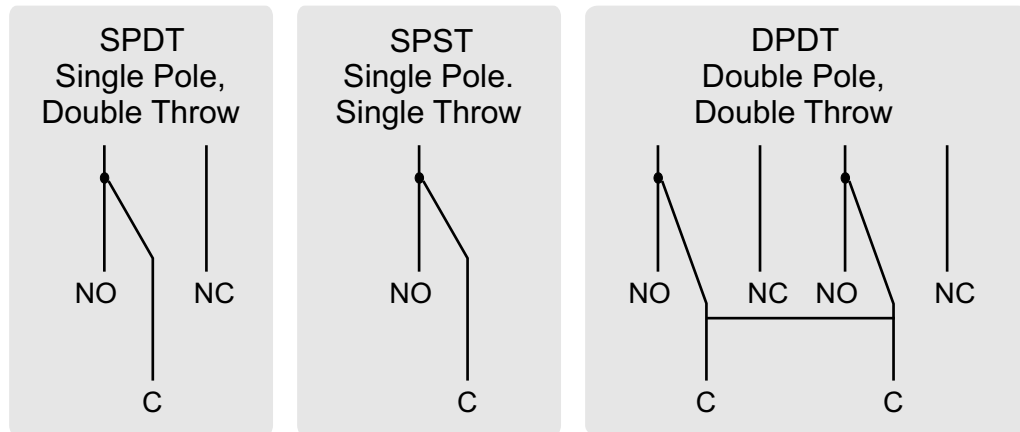
The ideal VPT is designed to speed installation and wiring, and look for features like labeled terminal strips and switches, protected mechanical switches, and terminal strips angled for easier installation.

### ***Choosing the Right Switch Or Sensor: Match Your Application***

VPTs are available with a wide variety of switches and sensors to interface with any plant control system. Process control systems vary in age and level of complexity. In general, unless the switches are used as control relays carrying the full load of the device, feedback signals are low (less than 1 Amp). The most common signal type in North American is roughly 500 mA at 120 VAC , with the rest being 24 V or lower DC signals. Advanced process control systems use low voltage (24, 12, or 8V) DC control signals of 200mA or less, requiring switches or sensors specific to the application.

It is important to select your switch or sensor based on the signal type in order to achieve a reliable installation, particularly when using low current/low voltage feedback signals.

### Understanding Feedback Circuit Types For VPTs



#### SPDT

Mechanical SPDT switches are the most common due to their low cost and proven reliability for most applications. The switch's high amp rating can control a relay, or other plant devices such as pumps or motors in addition to handling a simple feedback signal.

The SPDT switch has three connections - the NO (Normally Open), NC (Normally Closed) and the C (Common). Input current enters the switch through the common and makes the circuit either with the NO (normally open) or the NC (normally closed) contacts. In the control room, two lights are used for each of the valve positions. One light for "on" and one for "off", thus assuring that the switch is functioning regardless of its position. Look for switches that are specified with stiffer contact springs that resist dirt and freeze-up in cold conditions - a common problem with "off the shelf" switches.

#### SPST

The SPST switch (single pole, single throw) has two connections - the NO (Normally Open) and the C (common). When the switch is tripped, the circuit is made and current flows from the common through the Normally open contact. Otherwise, no circuit is made, analogous to a light switch that is either on or off. Advanced process control systems can use SPST switches in place of two wire sensors. As is commonly done, one can use two of the three contacts of a standard SPDT switch to mimic an SPST.

#### DPDT

The DPDT switch is, in effect, two SPDT switches that operate in tandem, actuated by a common lever inside the switch housing. Mechanical DPDT are used for simultaneous switching functions when two independent signals must operate in tandem. An example is when one switch sends a low level signal back to the control room, and the second functions as a relay for another device. Another application is for redundant signaling.

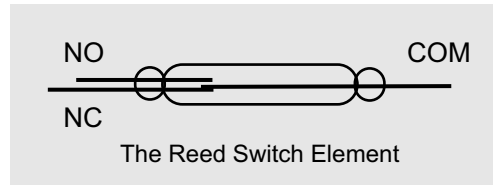
#### Other Considerations

Choose Gold plated Mechanical switches for low current, low voltage (primarily DC) applications. Gold plated switch contacts assure signal stability at extremely low current and voltages, and are used as a low cost alternative in Intrinsically Safe systems.

Standard Mechanical switches are not the best choice for critical applications or low current DC control signals. The plated silver contacts of mechanical switches are not sealed and are thus exposed to the environment. In corrosive or humid environments, these contacts can corrode, creating a microscopic oxide layer that can stop the signal path, even though the switch physically trips.



### Switch and Sensor Options For VPTs: About Non-Contact (Reed) Switches for SPDT and SPST



Non-Contact Hermetically Sealed (Proximity) Switches are magnetically operated SPST or SPDT “reed” switches with contacts hermetically sealed in a glass capsule. Positioning a magnet next to the switch causes the contact “reeds” to flex and touch, completing the circuit. Protective inert gas or a vacuum within the capsule keeps the contacts clean and protected for the life of the device.

In order to trip these switches, magnets are placed in the rotating cams located inside the limit switch enclosure. When the cam rotates to the set position, the magnet will trip the switch. A well-designed limit switch secures the vertical alignment of the shaft and cam assembly so that during operation vertical shaft motion is prevented, even under severe conditions. Limit Switches using c-clips to secure the shaft run into problems when the c-clip corrodes or snaps off during rough treatment, causing the shaft to move vertically in the enclosure, preventing the magnets from properly tripping the switches.

The most common applications are:

- ▶ **Corrosive or humid environments** - Non-contact switches eliminate the potential corrosion of exposed contacts found in mechanical switches
- ▶ **SPDT or SPST circuit configurations** - From an application standpoint, Non-Contact switches are interchangeable with mechanical switches - no rewiring or reprogramming is required.
- ▶ **Nonincendive (Class 1, Division 2) Applications** - Article 501-3 (b) of the NEC (National Electric Code) permits the use of general-purpose enclosures in Class 1, Division 2 locations when the current interrupting contacts are sealed within a hermetically sealed chamber.
- ▶ **Intrinsically Safe Applications** - Non-Contact Proximity switches are passive devices and can be used in intrinsically safe systems with an appropriate voltage and current limiting barrier.

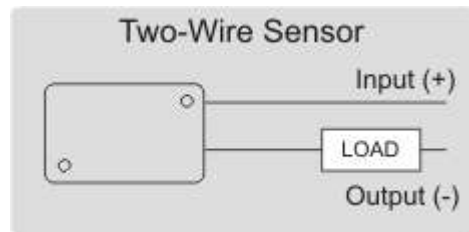
Available contact materials

- ▶ **Tungsten** - The choice for high power AC and DC switching applications. Tungsten contacts can handle up to 3A at 120VAC and 2A - 24VDC. These contacts are also available for 220V applications. Tungsten is not recommended for low power DC signals.
- ▶ **Rhodium** - The choice for reliable low power 24 VDC switching applications. Rhodium contacts have 80% less contact resistance than Tungsten, making it the ideal material for DC. These contacts are rated to 1A - 24VDC and are stable down to 1mA at 1V.

### **Switch and Sensor Options For VPTs: About Inductive Sensors**

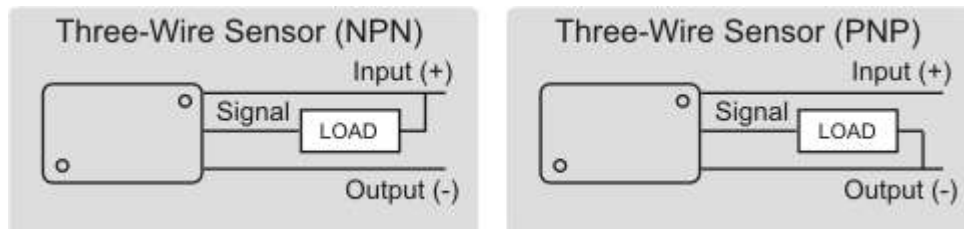
Inductive sensors are chosen to match the requirements of newer process control systems that require them, particularly with Intrinsically Safe applications. The different types are described below. The most obvious benefit to inductive sensors is their high cycle life from the lack of moving parts and their low hysteresis. Choose NAMUR inductive sensors for intrinsically safe applications. PNP or NPN sensors are available to match requirements.

#### **Two-Wire Sensor**



As a solid state device, a two wire sensor functions differently than a switch and cannot be used interchangeably. A continuous power input is fed to the sensor through the power wire, and depending on the state of the sensor, the feedback signal is either high or low through the combined signal and load wire. A leakage current, typically 1 or 2mA, is associated with the "low" state. When installing sensors, make sure the system will not mistake the leakage current for the sensor being in the high state. These sensors must be installed with a resistive load in series in the loop circuit.

#### **Three-Wire Sensor**



Three-wire sensors are similar to two wire sensors, but have separate signal, return and power wires. There are two types of three-wire sensors PNP (sourcing) and NPN (sinking). A sourcing circuit (PNP) has the load attached between the signal and return wires and when energized will "source" power to the load. Sinking circuits (NPN) have the load connected between the power and signal wires and when energized will "sink" the power from the load to the return.

#### **Options: Analog Current (4-20mA) or Resistive (0-1kohm) Output**

VPTs can be supplied with current or resistive output used to determine the precise position of the valve. This output signal can be resistive (0-1000 ohm) or current (4-20 mA). When choosing this option, be certain that the vendor adequately protects the electronics from the effects of the environment as many of these options fail in real world applications.

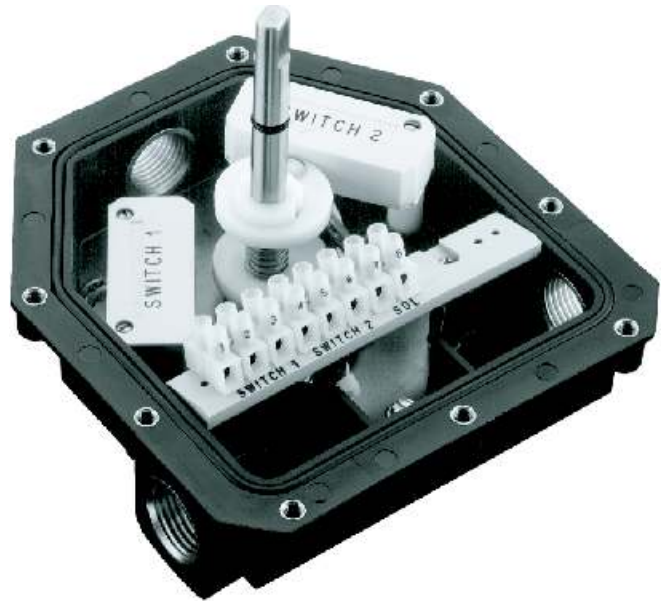
#### **Conclusion**

There are many options to consider when choosing the right Valve Position Monitor for your application, options which can seriously impact the reliability of your process and the bottom line.

### *Survivor - For Corrosion Resistance / Division 2*

#### **Standout Features:**

- ▶ SuperTough Zytel® nylon resin is ideal for corrosive, salt water and washdown environments
- ▶ Precision-molded housing and cover assure perfect o-ring compression seal
- ▶ Stainless steel conduit entries and inserts are molded-in, increasing strength
- ▶ Stainless steel bearing - unique for thermoplastic enclosures - for a long cycle life
- ▶ Available with up to four (4) Moniteur high cycle TTL proximity switches



### *Sentinel - For Explosion-Proof*



#### **Standout Features:**

- ▶ Cast Aluminum, Hard Anodized to Mil Spec MIL-A-8625-F Type III Class II provides the best corrosion resistance possible and protects flamepath.
- ▶ Precision machined housing and cover assure perfect compression seal and shaft alignment
- ▶ Available with up to six (6) Moniteur high cycle TTL proximity switches
- ▶ High-force mechanical switches suitable for sub-zero environments

#### **Patented Indicator Design**

- ▶ Acetal drive system allows a rated life of 1,000,000 cycles
- ▶ Extra large, 360° indication with 100% display change provides up to twice the viewing distance
- ▶ EKTAR® clear cover is chemically resistant and sealed with a compression o-ring to prevent fogging
- ▶ No screws or flanges prevent cover from cracking under hard use

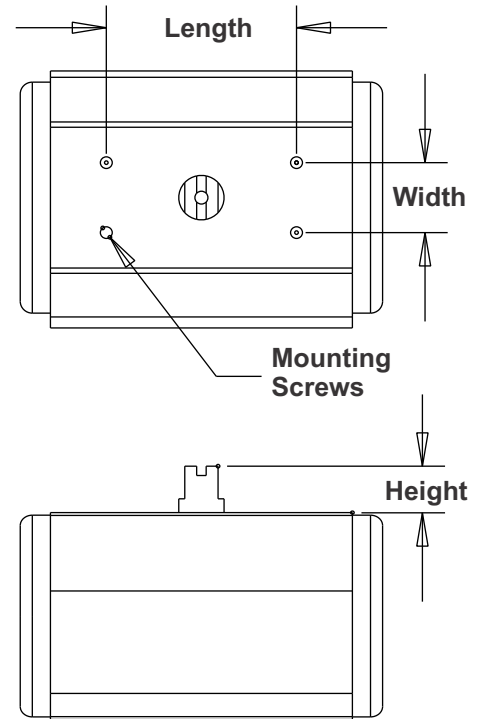
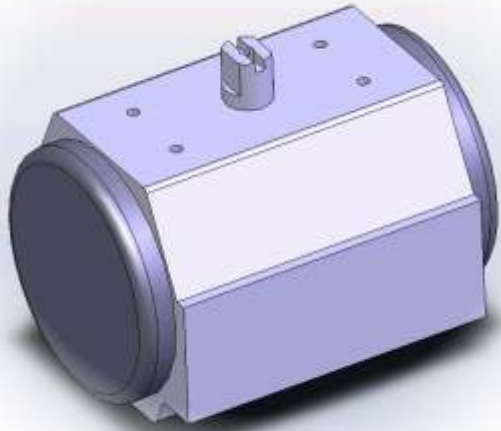


#### **Patented Loc-Ring Shaft and Cam Retention System**

- ▶ 10x stronger than retaining rings used in typical designs
- ▶ Stable output signals over 1,000,000 cycles
- ▶ Triple shaft lubrication with PTFE
- ▶ Large Acetal cams and splines eliminate cracking
- ▶ Stiffer stainless steel cam springs resist vibration

Zytel is a trademark of the DuPont Company, Ektar is a trademark of the Eastman Chemical Company.

### NAMUR Bracket Kits



Moniteur offers a comprehensive selection of bracket kits for every actuator that has NAMUR accessory mounting dimensions. Brackets are available for both Moniteur low-profile and standard NAMUR shaft styles. Plated and Stainless Steel brackets for both types are kept in stock.

Low Profile NAMUR	Standard (Long) NAMUR	Dimensions [mm]			Mounting Screws in Kit
		Length	Width	Height	
BKT-NP120	BKT-EP120	80	30	20	M5 and 10-24
BKT-NP120A	BKT-EP120A	80	30	20	10-32
BKT-NP130	BKT-EP130	130	30	30	M5 and 10-24
BKT-NP151	BKT-EP151	80	30	30	M5 and 10-24
BKT-NP151A	BKT-EP151A	80	30	30	10-32
BKT-NP153	BKT-EP153	80	30	14	M5 and 10-24
BKT-NP153A	BKT-EP153A	80	30	14	10-32
BKT-NP154	BKT-EP154	130	30	33	M5 and 10-24
BKT-NP156	BKT-EP156	50	25	20	M5 and 10-24
BKT-NP161	BKT-EP161	130	30	50	M5 and 10-24
BKT-NP166	BKT-EP166	130	30	20	M5 and 10-24

**For Stainless Steel Bracket Kit Part Numbers** replace the "P" in the part number with an "S".

*Example:* BKT-NP120 becomes BKT-NS120.

### Moniteur's Engineered Resin Bracket Kit

- ▶ Designed for the 80 x 30 x 20 pattern
  - ▶ Kit contains dual O-rings and all-stainless hardware
- Survivor/Survivor II BKT-XP20S - For Watchman BKT-XP20W  
 Note: Sentinel units shall use a metal bracket



### Standard Shaft Bracket Kits & Kits for Manual Valves

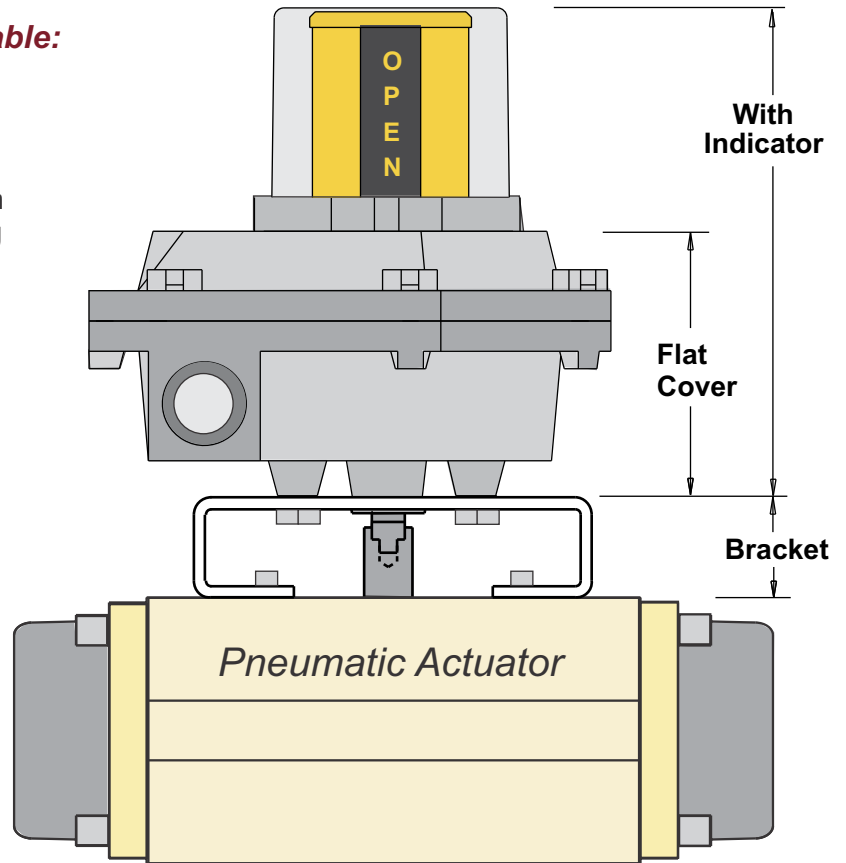
Bracket kits with precision-machined couplers are available to adapt your NAMUR style actuator to a Valve Position Transmitter with a standard shaft (1/4" flats). These brackets are available in both plated and stainless steel. A crossover list with part numbers for your actuator can be found on our website at <http://www.moniteurdevices.com>. *Example:* BKT-RP002. Bracket Kits for Manual Valves, Gear Operators or Linear Valves are also available - Contact Moniteur With Your Application

### Two NAMUR Mounting Types Available: Standard and Low-Profile

Moniteur Devices offers two types of NAMUR shafts designed to directly interface (without a transition coupler) with the NAMUR standard accessory mounting pattern found on most of today's actuators. The two are:

- ▶ Moniteur's low profile version has the ordering codes of "5" for the 303 SS version and "7" for the 316 SS version.
- ▶ The standard NAMUR shaft length is also available for compatibility with other manufacturers. The ordering code for this shaft is "E" for the 303 SS version and "G" for the 316 SS version.

The mounting height dimensions for both versions are shown in the table below.



### Bracket Height

Mounting Size	Low Profile NAMUR (Shaft Type "5" or "7")	Standard NAMUR (Shaft Type "E" or "G")
80 x 30 x 20 mm	BKT-NP120 1.14"	BKT-EP120 1.79"
80 x 30 x 30 mm	BKT-NP151 1.53"	BKT-EP151 2.19"
130 x 30 x 30 mm	BKT-NP130 1.53"	BKT-EP130 2.19"
130 x 30 x 50 mm	BKT-NP161 2.32"	BKT-EP161 2.97"

### Limit Switch Height

Product Type	Flat Cover	With Indicator
Sentinel	3.32"	7.30"
Sentinel-II	4.00"	6.88"
Survivor / Survivor-II	2.92"	6.90"
Watchman	2.81"	6.79"



### Unique Polymer Bracket for NAMUR Actuators

A unique ABS polymer resin bracket kit has been developed to mount Moniteur VPTs to actuators with the NAMUR standard accessory mounting configuration. The kit offers many advantages over conventional plated steel bracket kits:

- ▶ Corrosion resistance
- ▶ Faster mounting
- ▶ Dual O-rings seal the actuator shaft / VPT shaft area from the outside environment
- ▶ Standard stainless steel mounting hardware

The bracket is designed to fit Moniteur's **Sentinel**, **Watchman**, **Survivor**, **Survivor II** and **Indicateur** product series when fitted with the NAMUR direct interface shaft (code 5). (eg. RMYS-5220).



### Partial Listing of Compatible NAMUR Standard Actuators

#### Airtorque

PT 050 / 051  
PT 100 / 101  
PT 200 / 201  
PT 250 / 251  
PT 300 / 301

#### ABZ

40  
80  
130  
200

#### Amri

3  
6  
12  
25  
50  
100  
200

#### Automax

SNA 050  
SNA 063  
SNA 085  
SNA 100

#### Bettis

CBA Series  
G Series  
D025  
D040  
D 0100  
D 0200

#### Bray Series 92

63  
83  
92  
118

#### Compact 4 II

C20  
C25  
C30  
C35

#### Durair II

AP 050  
AP 063  
AP 075  
AP 085  
AP 100

#### Elomatic

E 25  
E 40  
E 100  
E 200

#### Flotite

DA/SR 050  
DA/SR 063  
DA/SR 075  
DA/SR 085  
DA/SR 100

#### Hytork

XL-45  
XL-70  
XL-130  
XL-185

#### Jamesbury

VP-VL 051  
VP-VL 100  
VP-VL 200  
VP-VL 250  
VP-VL 300

#### K-Tork

K-1  
K-2

#### QTRCO

Q, XB, X, P & R  
04, 05  
07, 10

#### Radius

AD/S 005  
AD/S 008  
AD/S 012  
AD/S 020  
AD/S 030

#### Remote Control

RC210 / 410  
RC220 / 420  
RC230 / 430  
RC240 / 440

#### Sharpe

SPN 050  
SPN 063  
SPN 075  
SPN 085  
SPN 100

#### Sure Torque

ST 20  
ST 30  
ST 52  
ST 73  
ST 103  
ST 148

#### Triac

TR 20  
2R 40  
2R 80  
2R 130  
2R 200

#### Unitorq

M20  
M30  
M52  
M73  
M103  
M148

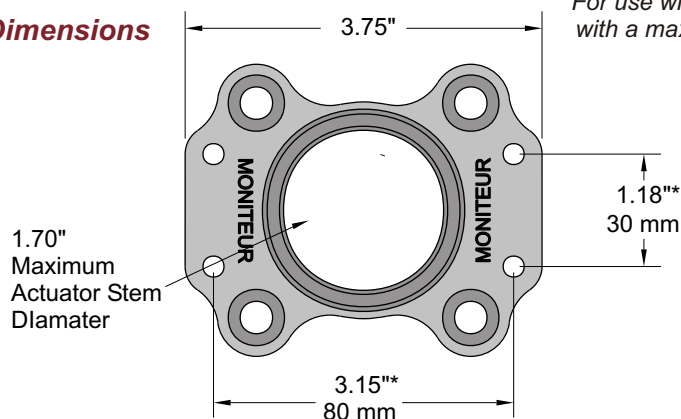
#### Worcester

1039N  
1539N  
2039N

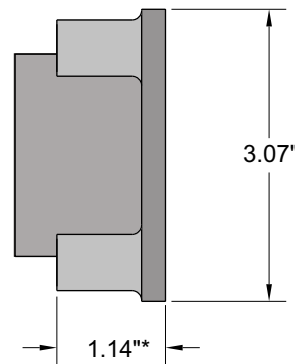
#### XOMOX

XRP 006  
XRP 012  
XRP 025  
XRP 050

### Dimensions



\* For use with the NAMUR 80 x 30 x 20 mm (L x W x H) mounting pattern with a maximum actuator stem diameter of 1.70 inches [43mm]



### Standard Shaft Bracket Kits for NON-NAMUR Actuators

Bracket kits with precision-machined couplers are available to adapt your NON-NAMUR style actuator to a Valve Position Transmitter with a standard shaft (1/4" flats). These brackets are available in both plated and stainless steel. The part numbers for the kits are listed below.

<u>ACTUATOR</u>	<u>PLATED STEEL</u>	<u>STAINLESS STEEL</u>	<u>ACTUATOR</u>	<u>PLATED STEEL</u>	<u>STAINLESS STEEL</u>
<b>BETTIS</b>			ST 160	BKT-RP126	BKT-RS126
CB-315	BKT-RP046	BKT-RS046	ST 240	BKT-RP126	BKT-RS126
CB-415	BKT-RP046	BKT-RS046	ST 290	BKT-RP126	BKT-RS126
CB-420	BKT-RP047	BKT-RS047	ST 440	BKT-RP126	BKT-RS126
CB-520	BKT-RP047	BKT-RS047	ST 200	BKT-RP157	BKT-RS157
CB-525	BKT-RP048	BKT-RS048	ST 400	BKT-RP157	BKT-RS157
CB-725	BKT-RP048	BKT-RS048	ST 600	BKT-RP179	BKT-RS179
HD-521	BKT-RP068	BKT-RS068	ST 1200	BKT-RP179	BKT-RS179
HD-721	BKT-RP068	BKT-RS068	ST 1800	BKT-RP179	BKT-RS179
HD-722	BKT-RP068	BKT-RS068	<b>KINETROL</b>		
HD-731	BKT-RP069	BKT-RS069	00	CALL	CALL
HD-732	BKT-RP069	BKT-RS069	01	BKT-RP114	BKT-RS114
HD-251	BKT-RP068	BKT-RS068	02	BKT-RP115	BKT-RS115
HD-352	BKT-RP069	BKT-RS069	03	BKT-RP116	BKT-RS116
T3	BKT-RP146	BKT-RS146	05	BKT-RP117	BKT-RS117
T4	BKT-RP147	BKT-RS147	07	BKT-RP118	BKT-RS118
T5	BKT-RP148	BKT-RS148	08	BKT-RP119	BKT-RS119
<b>FISHER</b>			09	BKT-RP120	BKT-RS120
1052-20	BKT-RP099	BKT-RS099	10	BKT-RP121	BKT-RS121
<b>JAMESBURY</b>			12	BKT-RP122	BKT-RS122
QP 1 ABCD	BKT-RP073	BKT-RS073	14	BKT-RP123	BKT-RS123
QP 2 ABCD	BKT-RP073	BKT-RS073	16	BKT-RP124	BKT-RS124
QP 3 ABCD	BKT-RP107	BKT-RS107	18	BKT-RP125	BKT-RS125
QP 4 ABCD	BKT-RP108	BKT-RS108	<b>MATRYX</b>		
QP 5 ABCD	BKT-RP108	BKT-RS108	MX 60	BKT-RP004	BKT-RS004
QP F (All)	BKT-RP074	BKT-RS074	MX 200	BKT-RP005	BKT-RS005
SP 25	BKT-RP044	BKT-RS044	MX 450	BKT-RP006	BKT-RS006
SP 50	BKT-RP044	BKT-RS044	MX 750	BKT-RP006	BKT-RS006
SP 100	BKT-RP045	BKT-RS045	MX 1250	BKT-RP006	BKT-RS006
SP 200	BKT-RP045	BKT-RS045	MX 3000	BKT-RP007	BKT-RS007
SP 6 SR 60	BKT-RP044	BKT-RS044	<b>WORCESTER Rev 5</b>		
SP 9 SR 80	BKT-RP044	BKT-RS044	0539	BKT-RP170	BKT-RS170
SP 8 SR 40	BKT-RP044	BKT-RS044	1039	BKT-RP016	BKT-RS016
SP 13 SR 60	BKT-RP044	BKT-RS044	1539	BKT-RP017	BKT-RS017
SP 18 SR 80	BKT-RP044	BKT-RS044	2039	BKT-RP018	BKT-RS018
SP 18 SR 40	BKT-RP045	BKT-RS045	2539	BKT-RP019	BKT-RS019
SP 26 SR 60	BKT-RP045	BKT-RS045	3039	BKT-RP020	BKT-RS020
SP 36 SR 80	BKT-RP045	BKT-RS045	3339	BKT-RP092	BKT-RS092
SP 36 SR 40	BKT-RP045	BKT-RS045	3539	BKT-RP021	BKT-RS021
SP 52 SR 60	BKT-RP045	BKT-RS045	4039	BKT-RP022	BKT-RS022
SP 72 SR 80	BKT-RP045	BKT-RS045	4539	BKT-RP023	BKT-RS023
ST 13	BKT-RP064	BKT-RS064	5039	BKT-RP024	BKT-RS024
ST 20	BKT-RP064	BKT-RS064			
ST 50	BKT-RP064	BKT-RS064			
ST 60	BKT-RP071	BKT-RS071			
ST 90	BKT-RP071	BKT-RS071			
ST 115	BKT-RP071	BKT-RS071			
ST 175	BKT-RP071	BKT-RS071			

### Custom Bracket Kits

For your custom applications, call Moniteur at 1-973-857-1600 today.

# TERMS AND CONDITIONS OF SALE

Moniteur Devices (here forth referred to as "Seller") agrees to sell the goods covered in this price list on the following terms and conditions of sale. Any additional or different terms supplied by the buyer will be rejected.

## A. ACCEPTANCE AND AGREEMENT

No order or quotation is binding on Seller, a New Jersey corporation, until an authorized representative of Seller at its home office issues to Buyer a written Sales Order Acknowledgement, whose provisions shall include these Terms and Conditions of Sale. The Sales Order Acknowledgement shall constitute the entire agreement between Seller and Buyer relating to the matters set forth therein and supersedes all other communications between the parties, whether written or oral. **ANY PROVISION OR CONDITION OF BUYER'S ORDER OR OTHER DOCUMENT WHICH IS IN ANY WAY DIFFERENT FROM OR IN ADDITION TO THESE TERMS AND CONDITIONS OF SALE AS INCORPORATED IN SELLER'S SALES ORDER ACKNOWLEDGEMENT ARE SPECIFICALLY REJECTED BY AND SHALL NOT BE BINDING UPON SELLER.** No purported modification or waiver of the provisions hereof or of the Sales Order Acknowledgment shall be binding upon Seller for any purpose unless it is contained in a writing signed by a Seller's Representative. Buyer's acceptance of the provisions of the Sales Order Acknowledgment including these Terms and Conditions of Sale shall be conclusively presumed if Seller thereto receives no written objection within ten (10) days from the date of the Sales Order Acknowledgment. Buyer's order for the products (the "Products") as evidenced by the Sales Order Acknowledgment shall be referred to herein as "Accepted Order."

## B. PRICES and DISCOUNTS

All prices and discounts are in accordance with the established price and discount schedule of the Seller and are subject to change without notice. Prices set forth in the Sales Order Acknowledgment are not subject to audit, price revisions or price re-determination by Buyer. All prices are F.O.B. shipping point. Merchandise will be invoiced at the prevailing price at the time of shipment.

## C. PAYMENT TERMS and CREDIT CONDITIONS

Terms are strictly 30 days net cash after invoice date payable in US funds, subject to the Seller's credit approval. Past due accounts will be assessed 1.5% interest per month, beginning the 31<sup>st</sup> day following the invoice date. All export sales are to be covered by an irrevocable letter of credit established with a reputable American bank, unless otherwise agreed to in writing. If at any time the financial condition of the Buyer, or the Buyer's payment performance, under the terms and conditions of this agreement, cause the Seller to question the Buyer's ability to perform, the Seller may demand adequate assurance of the Buyer's financial condition. This demand for insurance may require full payment of the amounts then due on outstanding invoices, and full or partial advance payment for goods scheduled for delivery. If Buyer fails within 10 days to provide this assurance, or in the event of Bankruptcy or Insolvency, the Seller reserves the right to cancel any outstanding orders and collect, without limitation, any sums due plus cancellation and damage charges if deemed applicable by the Seller. If collection procedures are required, Buyer shall pay all costs of collection, including but not limited to collection fees, reasonable attorneys' fees, court costs and interest.

## D. SHIPMENT AND DELIVERY

Shipments are made F.O.B. shipping point. While Seller will do everything possible to make sure shipment dates are held, shipment dates are approximate and not guaranteed. Seller shall not be liable for any delay or failure in the delivery or shipment of the Products, or for any resulting damages, when the delay or failure is directly or indirectly due to accident (in manufacture or otherwise), errors, omissions, fire, flood, riot, war, embargo, labor stoppages, computer malfunctions, inadequate transportation facilities, shortage of material or supplies, delay or default on the part of its vendors and other third parties, regulation by any governmental authority, or any other causes beyond Seller's reasonable control. **Moreover, SELLER SHALL HAVE NO LIABILITY FOR ANY LIQUIDATED DAMAGES OR PENALTY OR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES UNDER ANY CIRCUMSTANCES WHATSOEVER.** If any contingency occurs, Seller may allocate production and deliveries among Seller's customers. The title to the Products passes to Buyer and Seller's liability as to delivery ceases upon making delivery of the Products to the initial carrier at the delivery point with the carrier acting as Buyer's agent. All Products are shipped at Buyer's risk and expense, and all claims for damages must be filed with the carrier. All shipments will be made with United Parcel Service, DHL or Federal Express at Seller's discretion unless specific instructions from Buyer indicate an alternate carrier. Buyer shall be liable for detention, demurrage, storage or auxiliary charges assessed by carriers or warehousemen resulting from Buyer's requirements for special service or Buyer's failure to accept delivery in a timely manner.

## E. ORDER CANCELLATION

Buyer shall accept all Products as ordered. Cancellation of the order by the Buyer will not be allowed without the written consent of a Seller's Representative. In the event of an approved cancellation by the Buyer, for any reason whatsoever, in addition to all other charges and damages, Buyer shall be required to pay a cancellation fee which will be determined by Seller based on expenditures incurred as of the date of cancellation.

## F. WEIGHTS AND DIMENSIONS

Shipping weights and dimensions published are as accurate as possible but are not guaranteed.

## G. WARRANTY

The Seller warrants its products to be free of defects in material and workmanship for a period of one year from the date of shipment. The Seller is not responsible for damage to its products due to normal wear and tear, improper installation, use or maintenance, or unauthorized repairs. To the extent that the Seller has relied on the specifications and operating conditions supplied by the Buyer for selection of the products quoted, and in the event that the actual operating conditions differ from those supplied by the buyer, any warranties are declared null and void. No other representations, warranties, or guarantees, expressed or implied, are made by the Seller.

## H. LIMITATION OF LIABILITY

In no event will seller be liable to the buyer or any third party for any special, incidental, indirect or consequential damages of any kind in connection with this order, whether based on breach of contract, tort (including negligence), product nonconformance, product liability or otherwise, even if informed of in advance of the possibility of such damages. Seller's total liability to buyer will be limited to the payments received from buyer under this agreement.

## I. RETURNS OF NONCONFORMING MATERIAL

Should any Product not conform to such specifications due to a defect in material (excluding customer supplied materials) or workmanship, Seller shall accept returns during the applicable warranty period, which must be accompanied by a valid Seller Return Material Authorization ("RMA") number. Seller does not accept returned materials without a valid RMA number. In order to obtain an RMA number, the buyer must provide a detailed description of the nature of the defect, the original purchase order number, the part number, serial number and/or date code of the product(s) to be returned. The RMA number shall be valid for thirty (30) days after issuance by Seller. Products which are returned to Seller during the applicable warranty period in accordance with this Section and which are, after examination, deemed to Seller's satisfaction to be defective, will be replaced, reworked or credited at the original sale price at Seller's discretion. Buyer shall return the Products to Seller with transportation charges prepaid. The repair or replacement of any non-conforming Products by Seller pursuant to this Section does not extend the original limited warranty period. In the event Seller determines that the returned Products are not covered by the foregoing limited warranty, such Products will be returned to Buyer at Buyer's expense and may be subject to additional charges due to the lack of warranty coverage. Seller shall not be liable for re-inspection or rejection charges. Repair, replacement, or credit for returned parts will be made only after Seller has determined that the parts are covered by the terms of the warranty. Failure analysis of returned product shall be at Seller's sole discretion.

## J. RETURNS FOR CREDIT

No returns for credit will be accepted unless the Seller's written permission has been obtained in each case in advance, subject to the Seller's approval. Returns for credit must follow the procedure set forth in section H. No returns will be accepted without an RMA number. All returns will be subject to a minimum restocking charge of 25% unless agreed to in writing. Returns of product for credit that has been mounted on a bracket, actuator, or other device will not be accepted.

## K. COMPLIANCE WITH LAWS

Seller has complied with all applicable Federal, State and Local laws and regulations in connection with the manufacture and sale of all products. No responsibility will be taken for import duties, laws, regulations or taxes imposed by any foreign country.

## L. TAXES

Any manufacturer's excise tax, use tax, sales tax, or duty of any nature shall be added to the price invoiced and shall be paid by the Buyer, and in the event the Seller is required to pay such duties, the Buyer shall reimburse Seller therefore, unless Buyer shall provide Seller with exemption certificates or other documents acceptable to taxing or customs authorities.