



Practical solutions...at every level!

## **SafePoint**<sup>®</sup> Self - Validating Rotary Paddle Bin Monitor

- ▼ The Leader In Self-Validating Point Level Monitors
- ▼ "Fail - Safe" PLUS
- ▼ Microcontroller-based Reliability
- ▼ Material Sense and Fault Outputs
- ▼ Choice of Process Connections & Accessories
- ▼ Hazardous Location Approvals Available





- ▼ **Self-Validating Eliminates Costs Associated With Unexpected Sensor Failures**
- ▼ **Industry-First Magnetic Sensing Technology (Patented)**
- ▼ **Monitor Sensor Health, Not Just System Power Failure – “Fail-Safe” PLUS**
- ▼ **Twist On/Off Cover – No More Bolts!**
- ▼ **Wiring Access - 2 Conduit Entrances**
- ▼ **Motor Shuts Off When Paddle Is Impeded**
  - ▼ **Significantly Extends Motor Life**
  - ▼ **Reduces Maintenance Costs**
- ▼ **Local Status Indicating Light on Most Models**
- ▼ **Standard Units Rated to 250°F (121°C)**
- ▼ **Hi-Temp Models Rated to 750°F (399°C)**
- ▼ **Hazardous Location Approval Available**

Imagine a bin level sensor that is more than just an indicator of the presence or absence of material. Picture technology that allows intelligent devices to indicate when something is wrong. Dream that a level sensor provides real-time information when the quality of the sensor function no longer allows it to operate as you expect. That is a “self-validating” bin level indicator. Now you can wake up, your dream has arrived. Costly overfilling and out-ages due to sensor failure can now be avoided!

The **SafePoint**® self-validating bin monitor is the state-of-the-art in rotary paddle technology. Going beyond traditional fail-safe sensor technology that only protects against power failure, the **SafePoint** bin monitor is the most reliable, rotary paddle point level control sensor available.

The **SafePoint** bin monitor provides the ultimate in performance wherever critical continuous operation must be ensured. Detection of both material presence and its own operational status is performed on a continuous basis.



An installed **SafePoint**® unit in an aggregate application.

The **SafePoint** level sensor monitors its electrical and mechanical operating condition. This, in conjunction with separate outputs for material sense and unit status (fault conditions) make the **SafePoint** a self-validating device.

### PRINCIPLE OF OPERATION

While the **SafePoint** bin monitor is an evolution in rotary paddle technology, it continues to use tried-and-true operating techniques. Unlike many other available units, the **SafePoint** incorporates a feature that automatically shuts off its motor when the paddle is in a stalled condition. This extends the life of the unit and minimizes maintenance.

The operation of the **SafePoint**® rotary paddle bin monitor uses patented technology to detect material presence and operational status of the unit. The unit is installed through the wall of the vessel so that the paddle protrudes inside the vessel. A small electric motor drives the paddle, which rotates freely in the absence of material.

The rotation of the unit's shaft is continuously monitored by detection of a magnetized rotating disk. When the paddle is impeded by material, the shaft rotation stops. The motor rotates within the housing and magnetized sections of the motor mounting plate are detected. Use of these patented magnetic sensing techniques eliminates problems that occur with fouling of the optical systems used by other brands.

The built-in microcontroller performs self-validating diagnostics and monitors both shaft and motor mounting plate rotation. This allows the **SafePoint** to easily distinguish between material presence and any electrical and mechanical failure of the unit. When material presence is detected, the SENSE relay changes state and the drive motor is de-energized to extend motor life. This output is available to control a process function or alarm circuit. When the material level drops, a tension spring returns the drive motor to its original running condition and is reactivated.

A unit failure is detected by sensing a lack of shaft rotation while material presence has not been detected by rotation of the motor mounting plate. In a failure condition the independent FAULT relay will change state. Monitoring the state of both the SENSE and FAULT relays provides the most flexibility for control and monitoring that is beyond being just “fail-safe”.





TYPICAL APPLICATIONS INCLUDE,  
BUT ARE NOT LIMITED TO:

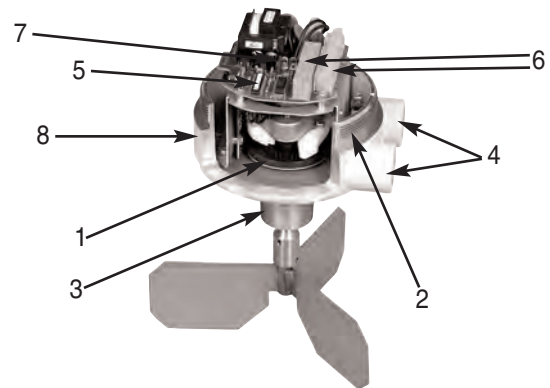
Feeds	Silica Sand	Pellets
Dust	Rubber	Metals
Regrind	Coal	Peanuts
Foundry Sand	Resin	Limestone
Grain	Cement	Sawdust

## APPLICATIONS

The rugged and reliable design of the **SafePoint**® self-validating bin monitor makes it the best choice for critical level control applications. The unit is compatible with many granular, pelletized and powder bulk applications. It can be utilized for high level indication of materials over 10 lb/ft<sup>3</sup> (160 kg/m<sup>3</sup>) and for low and intermediate level indication for materials over 5 lb/ft<sup>3</sup> (80 kg/m<sup>3</sup>). The **SafePoint** bin level monitor can be installed almost anywhere dry bulk materials are stored including bins, hoppers, silos and tanks.

## FEATURES

- ▼ Self-validating operation monitors electrical and mechanical status for critical applications-beyond “fail-safe”
- ▼ <sup>1</sup> Use of magnetic sensing technology ensures reliable operation even in dusty environments
- ▼ <sup>2</sup> Twist on/off cover for convenient and easy access – No bolts to lose or hold
- ▼ <sup>3</sup> 1-1/4” NPT or 1-1/2” BSPT process connections
- ▼ <sup>4</sup> Two conduit connections provides easy wiring access
- ▼ <sup>5</sup> Microcontroller-based electronics ensures consistent and reliable operation
- ▼ <sup>6</sup> Independent SPDT relays for “sense” and “fault” outputs



- ▼ <sup>7</sup> Local Indication (ordinary locations only) of operating status
- ▼ <sup>8</sup> Cast aluminum housing with rugged powder coat finish
- ▼ High Temperature version available (up to 750°F/399°C)



## AVAILABLE CONFIGURATIONS

### MOTOR VOLTAGES

The **SafePoint**® fail-safe rotary paddle bin monitor is available in configurations to serve 115VAC, 230VAC and 24VAC/DC power requirements.

### APPROVALS/LABELING

The **SafePoint** bin monitors are available approved to CSA<sub>US/C</sub> and ATEX/IECEx requirements. Approvals for either general purpose, dust-ignition-proof and/or explosion-proof hazardous area locations can be provided. All units carry the CE mark. Refer to “Specifications” for details.

### HIGH TEMPERATURE UNIT

The **SafePoint** high temperature model incorporates the standard features of the **SafePoint** bin monitor, but can be used in applications where bin temperatures reach as high as 750°F (399°C). The hi-temp models incorporate a specially designed mounting plate, pipe extension with air purge connection (recommended for all high temperature applications; must be used for > 500°F/260°C), shaft extension, couplings and bushings. The high-temp assembly is available in either a carbon steel or stainless steel version.



## ACCESSORIES

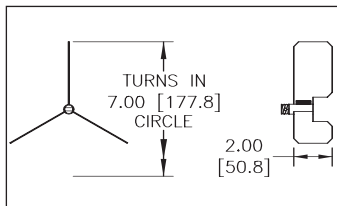
Dimensions are shown in inches with millimeter equivalent in brackets

### PADDLE ASSEMBLIES

Monitor offers a variety of interchangeable paddle assemblies to meet the needs of a wide variety of applications. Different material densities, particle sizes and flow characteristics require specific paddles to provide optimum performance. See Monitor's Paddle Selection Guide for more detailed application recommendations.

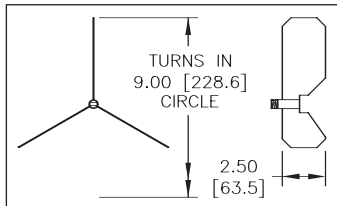
#### 1.) Standard Stainless Steel Three Vane Paddle:

The most popular of all paddles. For use with average weight materials. P/N 1-4146



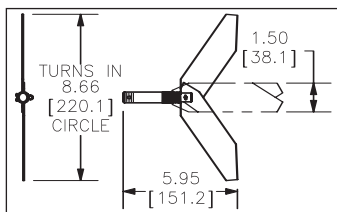
#### 2.) Large Stainless Steel Three Vane Paddle:

Provides accurate level control for lightweight materials. P/N 1-4141



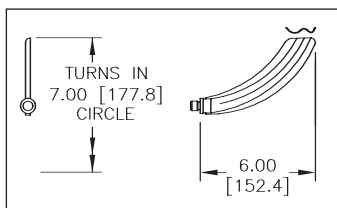
#### 3.) Insertable\*, Stainless Steel Two Vane Collapsible Paddle:

Provides low and high level control for average weight materials. P/N 1-4161



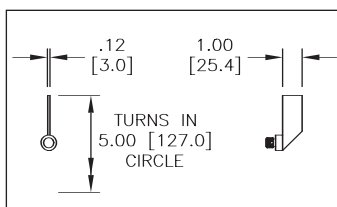
#### 4.) Insertable\*, Stainless Steel Scimitar Single Vane Paddle:

Provides low and high level control for light to average weight materials. P/N 1-4193



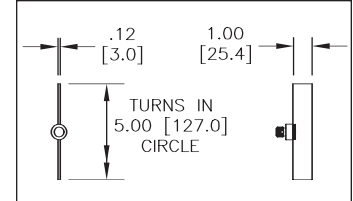
#### 5.) Insertable\*, Stainless Steel Single Vane Paddle:

Provides low level control for average weight materials and low to high level control for heavy materials under 1-1/2 inch (40 mm) in diameter. P/N 1-4145



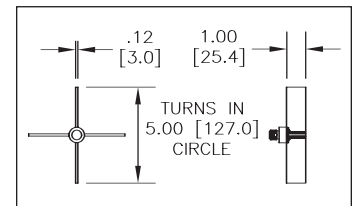
#### 6.) Stainless Steel Two Vane Paddle:

Provides low and high level control for heavy materials under 1-1/2 inch (40 mm) in diameter. P/N 1-4135



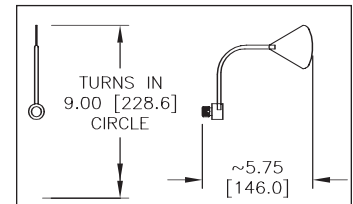
#### 7.) Stainless Steel Four Vane Paddle:

For use with average to heavy weight materials in low and high level control installations. P/N 1-4156



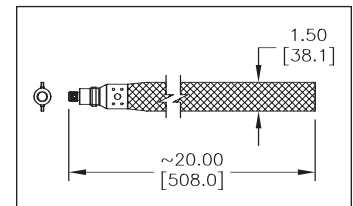
#### 8.) Stainless Steel Triangular Arc Single Vane Paddle:

Provides low and high level control for light to average weight materials. P/N 1-4144



#### 9.) Ex-Flex Three-Ply 20 inch (508 mm) Belt Vane Paddle:

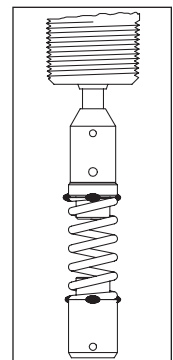
Provides low and high level control for heavy materials over 2 inch (50 mm) in diameter. Top mount only. P/N 1-4137



\*Insertable paddles eliminate the need for a mounting plate. P/N 1-4161 and P/N 1-4193 are insertable through either a half or full 1-1/4" or 1-1/2" coupling, that is welded to the bin wall. P/N 1-4145 is insertable through a half 1-1/4" or 1-1/2" coupling.

### FLEXIBLE COUPLING

The flexible coupling works to absorb heavy loads, side loads and loads caused by product surges, thus protecting the internal workings and extending the life of the paddle unit. A flexible coupling should be used with heavy materials and in top mount installations where a solid shaft extension is used. Monitor offers the following coupling option: Spring-Flex: P/N 1-3335



## MOUNTING PLATES

Mounting plates allow the paddle units to be mounted from the outside of a vessel to curved or flat surfaces. All mounting plates featured below mount via six bolts.

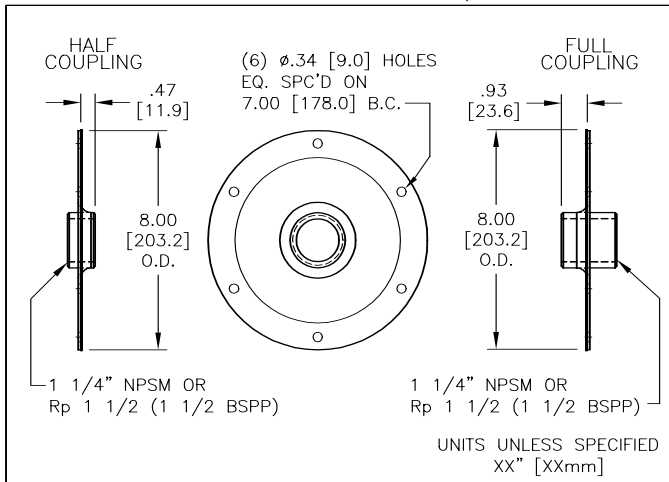
**1.) Half Coupling Mounting Plate:** For use in side mount installations. Available in powder coated carbon steel for general purpose applications and stainless steel for use in corrosive environments.

Stainless Steel Plate: P/N 1-0112. Carbon Steel Plate: P/N 1-0101 for 1-1/4" NPT connection and P/N 1-0100 for 1-1/2" BSPT connection.

**2.) Full Coupling Mounting Plate:** For use in top mount installations where a shaft extension and shaft guards are required. Available in powder coated carbon steel for general purpose applications and stainless steel for use in corrosive environments.

Stainless Steel Plate: P/N 1-0113. Carbon Steel Plate: P/N 1-0102 for 1-1/4" NPT connection and P/N 1-0115 for 1-1/2" BSPT connection.

Dimensions are shown in inches with millimeter equivalent in brackets

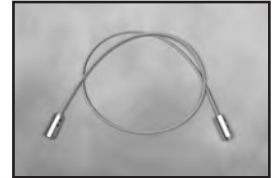


**3.) K-Flange Aluminum Mounting Plate:** For flat surfaces or thin walled vessels where extra strength is required. Ideal for semi-corrosive environments, including out doors.

P/N 1-3316.

## SHAFT EXTENSIONS

Many top mount installations require that the paddle extends into the vessel to a predetermined level. Solid shaft extensions are available in a variety of lengths up to 144 inches (3.6 m) to meet these demands. A flexible cable extension is also available. This 6.5 foot (2.0 m) flexible extension can be easily shortened in the field by the user. The use of the flexible cable extension for lengths greater than 3 feet (0.9m) requires the use of a guard to ensure proper activation of the rotary paddle bin monitor.

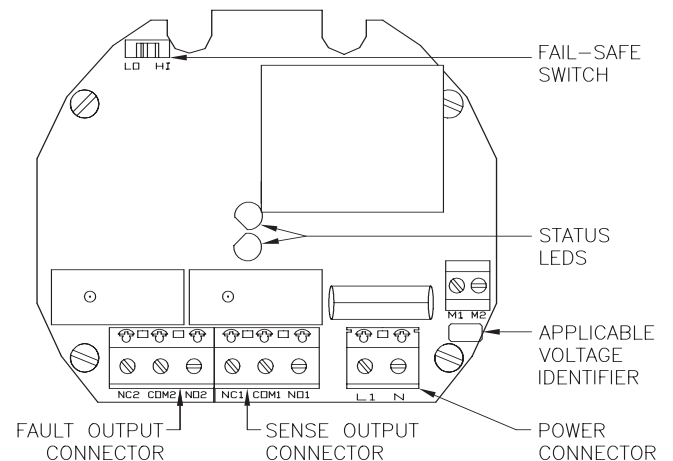


Flexible Cable Extension

## SHAFT GUARDS

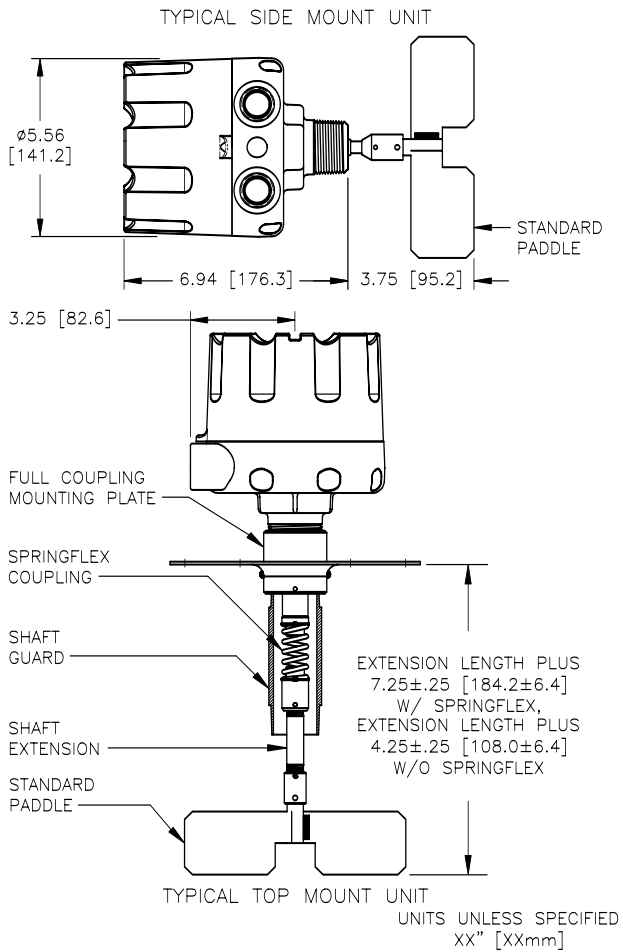
Shaft guards are recommended for use with solid shaft extensions to limit the movement caused by side loading that would otherwise damage the working components of the paddle unit. Shaft guards should be the same length as the extension and should always be used when the extension meets or exceeds 18 inches (460 mm) in length.

## WIRING DIAGRAM

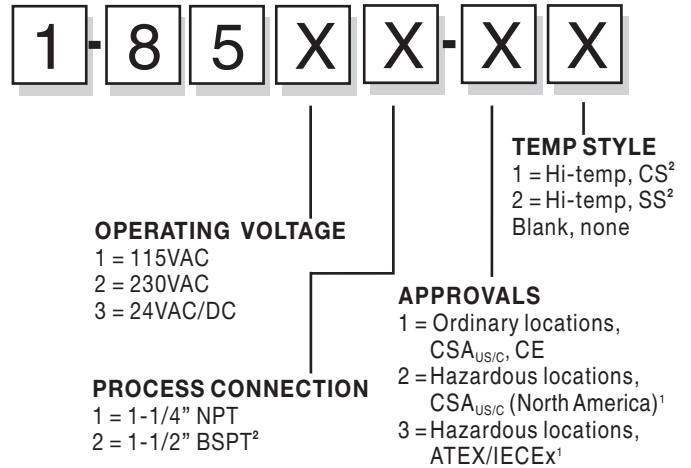


## MECHANICALS

Dimensions are shown in inches with millimeter equivalent in brackets



## ORDERING INFORMATION



### Note:

- External lights are not available with hazardous location approvals.
- On all **high temperature configurations** a mounting plate (either #1-0102, CS or #1-0113, SS) is automatically furnished as **the** process connection. Threaded mounts are not available. 1-1/2" BSPT process connection is not available with high temperature style selection.

## ACCESSORIES

### Flexible Coupling

1-3335 Spring flex

### Paddles

See "Accessories" section

### Cable Extension

1-1176-2-78: Flexible extension, 304 SS, 78 inches (2 m) length (can be modified in the field for shorter length)

### Solid Shaft Extensions:

1-1175-1-#\* 1/4" Pipe, SCH-40, Galvanized  
 1-1175-2-#\* 1/4" Pipe, SCH-40, 304 Stainless Steel

### Shaft Guards:

1-1174-1-#\* 1-1/4" Pipe, SCH-40, Galvanized  
 1-1174-2-#\* 1-1/4" Pipe, SCH-40, 304 Stainless Steel

### Mounting Plates

1-0100 Mounting plate, for R 1-1/2 (BSPT 1-1/2), half coupling, CS  
 1-0101 Mounting plate, for 1-1/4" NPT, half coupling, CS  
 1-0102 Mounting plate, for 1-1/4" NPT, full coupling, CS  
 1-0112 Mounting plate, for 1-1/4" NPT, half coupling, SS  
 1-0113 Mounting plate, for 1-1/4" NPT, full coupling, SS  
 1-0115 Mounting plate, for R 1-1/2 (BSPT 1-1/2), full coupling, CS  
 1-3316 Mounting plate, for 1-1/4" NPT, heavy duty alum.

\* # = Extension and guard lengths - not to exceed 144 inches (3.6 m) in length. Maximum available single piece length is 72 inches (1.8 m). Contact factory for more details.



## SPECIFICATIONS

<b>Power Requirements:</b>	115 VAC (+/- 15%); 9 VA; 50/60 Hz 230 VAC (+/- 15%); 9 VA; 50/60 Hz 24 VAC/DC (+/- 15%); 11 VA
<b>Altitude:</b>	6562 ft (2000 m) max
<b>Relative Humidity:</b>	Suitable for outdoors
<b>Installation Category:</b>	II
<b>Pollution Degree:</b>	4 (Reduced to 2 via enclosure)
<b>Ambient Operating Temp:</b>	-40°F (-40°C) to +150°F (+65°C)
<b>Internal Bin Temp:</b>	
Standard Unit:	to 250°F (121°C)
Hi-Temp Unit:	250 to 500°F (121 to 260°C) without air-cooling 500 to 750°F (260 to 400°C) with air-cooling [0.5 psig / 2.14 CFM]
<b>Conduit Connection:</b>	Two(2) 3/4" NPT; M20 cable glands (Ordinary Location units with 1-1/2" BSPT process connection only; Not provided on Haz Loc units)
<b>Outputs:</b>	
Material Sense:	One SPDT; 5A @ 250 VAC, 30 VDC max
Unit Status (Fault):	One SPDT; 5A @ 250 VAC, 30 VDC max
<b>Maximum Pressure:</b>	30 PSI (2 bar)
<b>Sensitivity:</b>	5 lb./ft <sup>3</sup> (80 kg/m <sup>3</sup> ) minimum material density (when using large 3-vane paddle)
<b>Indicators:</b>	Red and green high intensity LEDs indicate material sense and unit status conditions (Ordinary Location unit only)
<b>Housing:</b>	Die cast alum, NEMA 4 / ENCLOSURE TYPE 4, IP66
<b>Housing Finish:</b>	Powder coating
<b>Mounting Connection:</b>	1-1/4" NPT or R 1-1/2 (BSPT 1-1/2)
<b>Weight:</b>	Approx. 8-1/2 lb. (3.9 kg)
<b>Materials of construction/accessories:</b>	
Flexible Couplings:	304 stainless steel
Mounting Plates:	Carbon steel or 304 stainless steel
All Paddles except Ex-Flex:	304 SS
Ex-Flex Belt:	304 SS coupling, rubber/fabric blend belt
Flexible Cable Extension:	304 SS
<b>Listings/Approvals:</b>	CSA <sub>US/IC</sub> : Ordinary Locations; Class I, Div. 1&2, Groups C, D; Class II, Div. 1&2, Groups E, F, G ATEX: Ⓜ II 1/2 D c T 85°C ExtD A20/A21 T 85°C (Ta -40°C to +65°C) IP6x IEC Ex: DIP A21 IP6X T <sub>A</sub> 100°C -40°C to +65°C CE Mark

U.S. Patent 6,696,965 B2

## WARRANTY

Monitor Technologies LLC warrants each **SafePoint**® rotary paddle bin indicator it manufactures to be free from defects in material and workmanship under normal use and service within two (2) years from the date of purchase. The purchaser must give notice of any defect to Monitor within the warranty period, return the product intact and prepay transportation charges. The obligation of Monitor Technologies LLC under this warranty is limited to repair or replacement at its factory. This warranty shall not apply to any product which is repaired or altered outside of the Monitor Technologies LLC factory, or which has been subject to misuse, negligence, accident, incorrect wiring by others or improper installation. Monitor Technologies LLC reserves the right to change the design and/or specifications without prior notice.





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