MONITOR TECHNOLOGIES LLC

Celebrating 60 Years

# Level Measurement and Process Control Instrumentation For Powders / Bulk Solids



Continuous Level Measurement



Point Level Indication



Solids Flow



Moisture Measurement



Dust Monitoring



Bin Aeration

# Continuous Level & Inventory Management










## NON-CONTACT RADAR

**FEATURES**

- Non-contact, Continuous Level Measurement...Nothing to "Touch" the Process
- Proven Pulse Radar Technology
- Small Beam Angle to Concentrate Energy for High Accuracy and Reliability
- Small "Dead Band" ("Blanking Zone") for Optimum Measurement In Vessel
- Advanced Micro-processor and Unique Echo Processing Technology
- No Moving Parts to Wear; Low Maintenance
- Easy Set-up / Configuration with LCD Push Button Display Module (Included)

**OPTIONS**

- Models Available for Various Applications
  - ***Series 400*** - For Powders & Bulk Solids in Vessels Up To 100 ft (30m) High
  - ***Series 200*** - For Liquids Up To 100 ft (30m)
- Variety of Antenna (Horn) Sizes
- Selection of Flanges
- Dust Protection Options (Air Purge or Dust Shield) for *Series 400*
- **SiloTrack™** *CLOUD* Web-based Remote Inventory Management App or HMI² Control Panel for RS-485 Version
- 4-20mA Analog or Smart RS-485 (Modbus Comp.)

**PRACTICAL APPLICATIONS**

- Use when it is important that the level instrument does not contact your process.
- Reliable choice for most powders & bulk solids.
- For real-time level measurements.
- Gimbal (swivel) mounting on *Series 400* to aim sensor for optimal measurements and to avoid vessel obstructions.
- *Series 200* is designed for liquid applications.

*Practical Tip*
Non-contact radar can be used to monitor the height of material on an open area conveyor belt system.

**BASIC SPECS**

**Power:** 24VDC (16-26 VDC)
**Ambient Temp:** -40 to +150°F (-40 to +65°C)
**Frequency Range:** 26 GHz
**Measurement Accuracy:** Series 400: ±0.39in (±10mm); Series 200: ±0.12in (±3mm)
**3dB Beam Angle:** 3" (78mm) Dia. Antenna: 12°, 4" (98mm) Dia. Antenna: 8°, 5" (123mm) Dia. Antenna: 6°,
**Dead Band:** 12" to 30" (305mm to 762mm) - Antenna and/or Application Dependent
**Signal Output:** Smart RS-485 / Modbus RTU (2-wire); 4-20mA Analog (2-wire, loop powered)
**Mounting:** Gimbal/Swivel (*400*) or 1-1/2" NPT (*200*); K-Flanges and ANSI Flanges
**Approvals:** CE Mark; TÜV Rheinland US/C, Ordinary Loc.
**Housing Enclosure:** Die cast aluminum, ENCLOSURE TYPE 4X, IP66

**AVAILABLE DOCUMENTS**

- Product Bulletins - 363P (*200*) and 363R (*400*)
- Installation & Operation Manual - 364A

## CABLE-BASED SMART SENSOR

**FEATURES**

- Sensor Performance Unaffected by Material Composition...Works in Tough and Dusty Conditions
- Intuitive, Wireless Set-up / Configuration Using a Free App on an Android™-based Device with Bluetooth®
- Modbus™ Connectivity
- Continuous or On-Demand Measurements with Lock Out Override
- Easy to Install & Virtually Maintenance Free
- Smart Sensing Reliability Combining Optic and Hall-Effect Technologies
- Measuring Range Up to 150 ft (46m)

**OPTIONS**

- Hazardous Location Approvals for Dust
- 0°, 5° or 10° Freeze-Resistant Mounting Flange
- Outputs: Smart RS-485 with Modbus Connectivity or 4-20mA Analog
- Local Indication (HMI²)
- **WirelessEZ** Communication Interface
- **SiloTrack™** *CLOUD* or **SiloTrack™ PC** Inventory Management Systems
- Auxiliary Output Enclosure (AOE) with Relay and/or Analog Outputs

**PRACTICAL APPLICATIONS**

- Use when target material characteristics may change thereby eliminating need for re-calibration.
- Reliable inventory management system.
- Great economical choice when accurate yet occasional measurements are required.

*Practical Tip*
SiloPatrol provides reliable long-range measurement of materials with low dielectric constants such as plastics.

**BASIC SPECS**

**Power:** 115 VAC; 230 VAC ±15%
**Ambient Temp:**
SMU: -40° to +150°F (-40° to 65°C);
HMI²/AOE: -4° to +131°F (-20° to 55°C)
**Int. Bin Temp:** Up to 300°F (149°C)
**SMU Output:**
Smart: RS-485 half-duplex, isolated
Analog: 4-20mA, isolated
**Mounting:** Flange with 7.0" (177.8mm) bolt circle
**Approvals: CSA**$_{US/C}$: Ordinary Locations;
**CSA**$_{US/C}$: Class II & III; **ATEX:** II 1/2 D c Ex tb IIIC T75°C Db IP66 (Ta -40°C to +65°C)
**IECEx**: Ex tb IIIC T75°C Db IP66 (Ta -40°C to +65°C);
**CE Mark**
**Enclosure Protection:** NEMA 4X; IP66

**AVAILABLE DOCUMENTS**

- Product Bulletins - 343P (SMU), 393P (SiloTrack™), 393Q (HMI²), 393R (AOE), 393S (WirelessEZ)
- Installation & Operation Manuals - 344A (SMU), 344N (Modbus Map), 344B (HMI²), 344F (AOE), 344H (WirelessEZ), 344J (SiloTrack™)

## INVENTORY MANAGEMENT

**FEATURES**

- Web-based Application to Access Real-time Material Inventory Data from Any Device that has an Internet Connection
- Intuitive, Flexible and Powerful Graphical User Interface for Monitor's RS-485 (Modbus Comp.) Continuous Level Sensors
- Securely View Distance, Level, Volume, Weight, Percentage and Ullages (Empty Space) for Silos
- Set Level Alarms and Monitor Sensor Status... Configure E-mail and Text Notifications
- Create, Save & Generate Configurable Reports

**OPTIONS**

- Universal 85-265VAC or 24VDC Operating Voltage (Gateway)
- Cellular or Ethernet Connectivity from Gateway(s) to the Cloud-based Server
- Standard or High Gain Antenna (Gateway)

**PRACTICAL APPLICATIONS**

- Optimize frequency of deliveries & transportation costs.
- Receive timely material inventory levels from anywhere.
- Access data history and create customizable reports to share information across functional departments.

*Practical Tip*
Ideal for Remote Managed Inventory / Vendor Managed Inventory (RMI / VMI) solutions.

**BASIC SPECS**

**SiloTrack™ CLOUD Gateway -**
**Power Requirements:**
AC: 115-230VAC ± 15%, 50/60 Hz; DC: 24VDC ± 15%
**Power Requirements:**
AC: 70W (1.5A max @ 115VAC); DC: 18W max
**AUX 24VDC Output:** 1.7A max ( AC Version Only)
**Cellular Wireless Interface** [LTE - North America (M5)]**:**
LTE CAT 4: 700(B12,13)/850(B5)/AWS(B4)/1900(B2); 3G HSPA+: 850/1900 MHz; Transfer rate (max): 150 Mbps down, 50 Mbps up
**Sensor Comm.:** RS-485 half-duplex, non-isolated, Modbus RTU protocol, 9600/8/N/1
**Sensor Channels:** One (1) 32-channel network (32 channels total)
**Ambient Temp:** -30° F to 149° F (-34° C to 65° C)
**Enclosure Material:** PBT / PC
**Environ. Protection:** ENCLOSURE TYPE 4X, IP65
**Approvals:** UL Listed (Power Supply & Router)

**AVAILABLE DOCUMENTS**

- Product Bulletins - 393T
- Installation & Operation Manuals - 394A (Gateway)

# Point Level



## SafePoint®

### ROTARY PADDLE, FAIL-SAFE

- Self–Validating "TRUE" Fail-Safe Design with Microcontroller-Based Reliability
- Patented Magnetic Sensing Technology
- Maximized Sensor Life via Motor Shut-Off Feature
- Externally Viewable LED Sensor Status Indicator (Except Hazardous Location Units)
- Independent Sense and Fault Outputs
- Enclosure Provides Ample Wiring Access and a Twist ON/OFF Cover

- Hazardous Location Approvals for Gases and Dust
- Variety of Paddle Designs for Material Detection and Sensor Longevity
- High Temperature Unit (Top Mount)
- Pipe Extension Models
  - 144" (365cm) Maximum Length
- Field Adjustable Cable Extension
  - 78" (2m) Maximum Length

- Use "true" fail-safe product if undetected sensor failure could result in catastrophic process problem.
- LED provides means for personnel to view sensor status without visiting control room.
- Capable of sensing materials as light as 5 lbs/ft$^3$ (80kg/m$^3$).

*Practical Tip*
SafePoint's independent "sense" and "fault" outputs can be wired in series to simplify wiring while still providing "true" fail-safe performance.

**Power:** 115 VAC; 230 VAC; 24 VAC/DC
**Ambient Temp:** -40˚ to +150˚F (-40˚ to +65˚C)
**Int. Bin Temp:** to 250˚F (121˚C)
With Hi-Temp Unit:
250-500˚F (121-260˚C) without air-cooling
500-750˚F (260-400˚C) with air-cooling [0.5 psig / 2.14 CFM]
**Sense Output:** SPDT, 5A @ 250 VAC/30 VDC
**Fault Output:** SPDT, 5A @ 250 VAC/30 VDC
**Mounting:** 1-1/4" NPT or R 1-1/2" (BSPT)
**Pressure:** 30 PSI (2 bar) max
**Approvals:** **CSA$_{us/c}$:** Ordinary Locations; **CSA$_{us/c}$:** Class I & II; **ATEX:** II 1/2 D c T 85˚C, ExtD A20/A21 T 85˚C, (Ta -40˚C to +65˚C), IP6x; **IECEx:** DIP A21 IP6X T$_A$ 100˚C, -40˚C to +65˚C; **CE Mark**
**Enclosure Protection:** NEMA 4; IP66

- Product Bulletin - 253
- Installation & Operation Manual - 254



## KA, KAX

### ROTARY PADDLE

- Basic Electro-Mechanical Operation
- Maximized Sensor Life via Motor Shut-Off Feature
- DC Powered Models Use Longer Life AC Motor
- Economical and Versatile
- Enclosure Provides Ample Wiring Access and a Twist ON/OFF Cover

*Practical Tip*
Rugged, aluminum enclosure is superior in applications where a fragile plastic enclosure is vulnerable to harsh installation conditions.

- Hazardous Location Approvals for Gases and Dust (Model KAX)
- Variety of Paddle Designs for Material Detection and Sensor Longevity
- High Temperature Unit (Top Mount)
- Pipe Extension Models
  - 144" (365cm) Maximum Length
- Field Adjustable Cable Extension
  - 78" (2m) Maximum Length

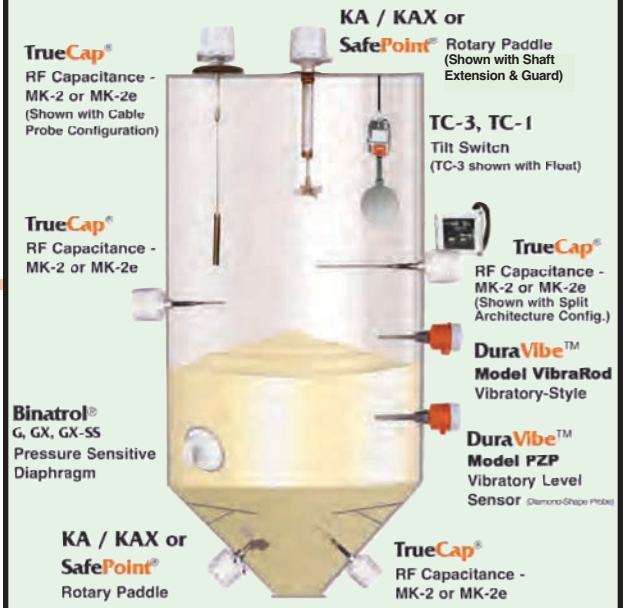
- Excellent when facility personnel are expected to perform in-field troubleshooting and maintenance with virtually no prior training.
- Low-cost and long-life can be achieved by specifying a DC powered model. A voltage converting circuit permits use of a reliable AC motor.
- Capable of sensing materials as light as 5 lbs/ft$^3$ (80kg/m$^3$).

**Power:** 115 VAC; 230 VAC; 24 VAC; 48 VAC; 12/24 VDC
**Ambient Temp:** -40˚ to +200˚F (-40˚ to +93˚C)
**Int. Bin Temp:** to 300˚F (150˚C)
Hi-Temp Unit: 300-500˚F (150-260˚C) without air-cooling, 500-750˚F(260-400˚C) with air-cooling[0.5 psig / 2.14 CFM]
**Output:** 2-Circuit Config - Two SPDT 15A @ 250 VAC ea. max; 3-Circuit Config - One SPDT 15A @ 250 VAC max, One DPDT 10A @ 250 VAC max
**Mounting:** 1-1/4" NPT or R 1-1/2" (BSPT)
**Pressure:** 30 PSI (2 bar) max
**Approvals:** **KA - UL & CSA:** Ordinary Loc.; **CE Mark** **KAX - UL & CSA:** Class I & II; **CE Mark**; **ATEX:** II 1/2 D c T 100˚C, ExtD A20/A21 T 100˚C, (Ta -40˚C to +93˚C), IP6x; **IECEx:** DIP A21 IP6X T$_A$ 100˚C, -40˚C to +93˚C; **Enclosure Prot:** NEMA 4; IP66

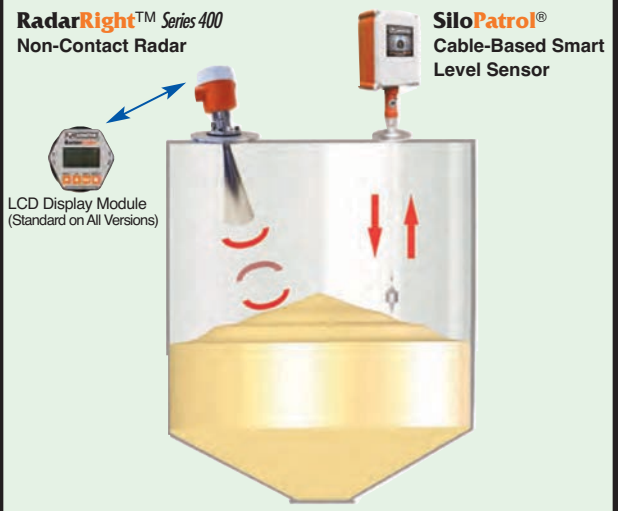
- Product Bulletin - 213
- Installation & Operation Manual - 214

# Level Sensor Location Overview

## Point Level




## Continuous Level




## OPERATOR INTERFACES AVAILABLE

(for RS-485 Versions of the Continuous Level Sensors)



**SiloTrack™ CLOUD**
**Remote Inventory Management**
Web-based software to view silo level measurements anytime, from any location using a device with Internet connection.



**SiloTrack™ PC**
**Inventory Management Software**
PC Based Server / Client Software with Multi-user Access via LAN or Internet. (Available for SiloPatrol only.)



**HMI$^2$**
**Operator Interface Control Console**



**WirelessEZ**
**Wireless Communication Interface (radio modem)**

# Point Level





## RF CAPACITANCE

| | TrueCap® MK-2 | TrueCap® MK-2e | PROXIMITY SWITCH |
|---|---|---|---|
| **FEATURES** | ▼ Maximized Reliability via Smart Sensing Algorithms Including "Self-Validating" Fail-Safe Protection<br>▼ Simple, Convenient Push-Button Calibration and Test<br>▼ Driven Shield Technology Overcomes Material Build-up<br>▼ Externally Viewable LED Sensor Status Indicator (Ordinary Loc. Unit)<br>▼ Universal Power Supply<br>▼ Superior 0.5pF Sensitivity<br>▼ Enhanced Temp. Compensation | ▼ Economical Design<br>▼ Potentiometer-Adjusted Calibration / Sensitivity and Delay<br>▼ Driven Shield Technology Overcomes Material Build-up<br>▼ Externally Viewable LED Sensor Status Indicator (Ordinary Loc. Unit)<br>▼ Superior 0.5pF Sensitivity<br>▼ Temperature Compensation | ▼ Compact Potted Packaging<br>▼ Versatile Application Sensing<br>▼ Electronic Solid State Outputs<br>▼ AC Model (PAC-30U) in 2-Wire Series Configuration<br>▼ DC Models (PDC-30) in 3-Wire Sinking / Sourcing Configurations<br>▼ Field Selectable Normally Open or Normally Closed<br>▼ Economical<br>▼ LED Status Indicator<br>▼ Adjustable Calibration |
| **OPTIONS** | ▼ Hazardous Location Approvals for Gases and Dust<br>▼ Split Architecture Model for High Temperatures or High Vibration<br>▼ Quick-Connect Tri-Clamp Process Connection<br>▼ Variety of Probe Variations for Chemical Compatibility, Food Grade, Abrasion Resistance<br>**Practical Tip**<br>Use RF capacitance sensors where a residual material build-up on probe would otherwise indicate a false material level indication. | ▼ Hazardous Location Approvals for Gases and Dust<br>▼ Split Architecture Model for High Temperatures or High Vibration<br>▼ Quick-Connect Tri-Clamp Process Connection<br>▼ Variety of Probe Variations for Chemical Compatibility, Food Grade, Abrasion Resistance | ▼ Mounting Well Converts 30mm to 1 1/4" NPT, Delrin®<br>▼ PDC-30 DC Models: 10-40 VDC<br>● NPN (Current Sinking) Output<br>● PNP (Current Sourcing) Output<br>▼ PAC-30U AC Model: 20-265 VAC<br>**Practical Tip**<br>Proximity Switch is ideal when mounting space is limited. Potted electronics protects circuitry in high vibration applications. |
| **PRACTICAL APPLICATIONS** | ▼ Smart sensing maximizes reliability with material having low dielectrics and applications with wide temperature swings.<br>▼ LED provides means for personnel to view sensor status without visiting control room.<br>▼ Excellent performance in solids over 15 lbs/ft$^3$ (240kg/m$^3$). | ▼ Perfect for tight budgets where excellent performance is still required but without the advanced features that increase the cost.<br>▼ LED provides means for personnel to view sensor status without visiting control room.<br>▼ Excellent performance in solids over 15 lbs/ft$^3$ (240kg/m$^3$). | ▼ Use for sensing materials that are solid, liquid, conductive, non-conductive, in direct contact or non-contact, slow moving or in part counting mode.<br>▼ A good choice when the output is required to be electronic, bounceless, long-life, and easily interfaced to other electronic equipment. |
| **BASIC SPECS** | **Power:** Universal 48-240 VAC, 24-48 VDC<br>**Ambient Temp:** -40˚ to +150˚F (-40˚ to +65˚C)<br>**Int. Bin Temp:** Alum mount: to +176˚F (80˚C); SS mount: to 400˚F (204˚C); Split architecture probe: to 450˚F (232˚C)<br>**Output Relay:** DPDT, 5A @ 250 VAC or 30 VDC<br>**Mounting:** 1-1/4" NPT or 1-1/2" BSPT alum, Optional 3/4" NPT 316SS<br>**Pressure:** 50-150 PSI (3.5 - 10 bar)<br>**Approvals:** $CSA_{US/C}$: Ordinary Locations; $CSA_{US/C}$: Class I & II; CE Mark<br>**Enclosure Protection:** NEMA 4; IP66 | **Power:** 115 VAC; 230 VAC; 24 VDC<br>**Ambient Temp:** -40˚ to +150˚F (-40˚ to +65˚C)<br>**Int. Bin Temp:** Alum mount: to +176˚F (80˚C); SS mount: to 400˚F (204˚C); Split architecture probe: to 450˚F (232˚C)<br>**Output Relay:** SPDT, 5A @ 250 VAC or 30 VDC<br>**Mounting:** 1-1/4" NPT or 1-1/2" BSPT alum, Optional 3/4" NPT 316SS<br>**Pressure:** 50-150 PSI (3.5 - 10 bar)<br>**Approvals:** $CSA_{US/C}$: Ordinary Locations; $CSA_{US/C}$: Class I & II; CE Mark<br>**Enclosure Protection:** NEMA 4; IP66 | **Power:** PAC-30U: 20-265 VAC; PDC-30: 10-40 VDC<br>**Operating Temp:** -13˚ to +176˚F (-25˚ to 80˚C)<br>**Output:** PAC-30U: N.O./N.C. field selectable; PDC-30: NPN or PNP<br>**Mounting:** 30mm thread<br>**Load Current:** PAC-30U: 10-500mA; PDC-30: 0-200mA<br>**Approvals:** UL & CSA: Ordinary Locations (PAC-30U Only); CE Mark<br>**Enclosure Protection:** NEMA 4; IP67 |
| **AVAILABLE DOCUMENTS** | ▼ Product Bulletin - 413<br>▼ Installation & Operation Manual - 434 | ▼ Product Bulletin - 413<br>▼ Installation & Operation Manual - 464 | ▼ Product Bulletin - 453<br>▼ Installation & Operation Manual - 454 |

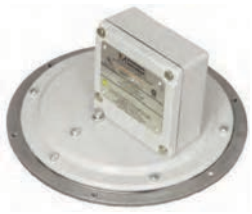
# Point Level



**DuraVibe™ Model PZP**



**DuraVibe™ Model VibraRod**



*G, GX, GX-SS*



*TC-1, TC-3*

## VIBRATORY

- Unaffected by Changes in Environment and Materials
- Exceptional Sensitivity with No Calibration Required
- ***Industry-Leading Probe Strength:*** Stainless Steel Diamond Shape Single-Probe with Gusset Reinforced Design
- Universal Power Supply
- Fail-Safe on Power Failure
- Adjustable Sensitivity
- Bi-color LED Status Indication

- Probe Extensions Available:
  - Cable Extension
  - Pipe Extension
- Remote Electronics Design for High Vibration or High Temperatures (Probe up to 302˚ F (150˚ C) Process Temp.)

**Practical Tip**
PZP's exceptional sensitivity can reliably sense lightweight material such as expanded polystyrene beads and fumed silica (Aerosil®).

- Ideal choice when material properties or environmental conditions are variable
- Excellent sensitivity for materials down to 1.5 lbs/ft$^3$ (24 kg/m$^3$)
- Tip sensitive probe eliminates false signals caused by product bridging between probe and vessel wall.
- Ordinary and Hazardous location approvals; Intrinsically safe probe

**Power:** 22-27VDC (±10%); 22-232VAC (±10%), 50/60 Hz
**Ambient Temp:** -22˚ to 149˚ F (-30˚ to 65˚ C)
**Process Temp:** -22˚ to 176˚ F (-30˚ to 80˚ C); High Temp. Probe: -22˚ to 302˚ F (-30˚ to 150˚ C)
**Output Relay:**
VAC: SPDT isolated; 3A @ 250VAC max
VDC: SPDT isolated; 3A @ 30VDC max
**Process Connect:** 1-1/2" NPT
**Pressure:** 145 PSI (10 bar)
**Approvals (Integral Unit):** $CSA_{US/C}$: Ordinary Loc; Class II, Div. 1 & 2, Groups E, F, G; Class III Hazardous Locations with Intrinsically Safe Probe
ATEX: Ex II 2D Ex tb [ia Da] IIIC T75˚C Db
IECEx: Ex tb [ia Da] IIIC T75˚C Db

- Product Bulletin - 563
- Installation & Operation Manual - 564

## DURAVIBE™ MODEL VIBRAROD

- Economical, Yet Versatile Design
- Unaffected by Changes in Environment and Materials
- Good Sensitivity with No Calibration Required
- Stainless Steel Single-Probe Design
- Universal Power Supply
- Fail-Safe on Power Failure
- Adjustable Sensitivity for Optimum Performance
- Bi-color LED Status Indication

- Pipe Extension Probes Available

**Practical Tip**
Ideal level probe for materials, like powders, that may normally get packed in a "tuning fork" style probe which could cause false signalling.

- Economical vibratory solution
- Ideal choice when material properties or environmental conditions are variable
- Good sensitivity for materials down to 10 lbs/ft$^3$ (160 kg/m$^3$)
- Tip sensitive probe eliminates false signals caused by product bridging between probe and vessel wall.
- Ordinary and Hazardous location approvals; Intrinsically safe probe

**Power:** 22-27VDC (±10%); 22-232VAC (±10%), 50/60 Hz
**Ambient Temp:** -22˚ to 149˚ F (-30˚ to 65˚ C)
**Process Temp:** -4˚ to 176˚ F (-20˚ to 80˚ C)
**Output Relay:**
VAC: SPDT isolated; 3A @ 250VAC max
VDC: SPDT isolated; 3A @ 30VDC max
**Process Connect:** 1-1/4" NPT
**Pressure:** 145 PSI (10 bar)
**Approvals:** $CSA_{US/C}$: Ordinary Locations; Class II, Div. 1 & 2, Groups E, F, G; Class III Hazardous Locations with Intrinsically Safe Probe
ATEX: Ex II 2D Ex tb [ia Da] IIIC T75˚C Db
IECEx: Ex tb [ia Da] IIIC T75˚C Db

- Product Bulletin - 553
- Installation & Operation Manual - 554

## DIAPHRAGM TYPE

- Basic Pressure-Sensing Operation
- Electrically-Passive Sensing Method
- Reliable, Durable, and Low Maintenance Operation
- Low-Profile, Non-Intrusive Mounting
- Adjustable Sensitivity
- Over-Pressure Protection

- Hazardous Location Approvals for Dust
- Ultra-Sensitive Switch Option
- Choice of Neoprene®, Teflon®, or Stainless Steel Diaphragm
- Hycar® Diaphragm Cover For Abrasive Materials

**Practical Tip**
G/GX is an ideal choice when minimizing ownership cost is the primary objective.

- Excellent when facility personnel are expected to perform in-field troubleshooting and maintenance with virtually no prior training.
- Provides "green" operation with no power consumption
- Low-profile eliminates need for internal baffles.
- Good performance in solids from 10 - 60 lbs/ft$^3$ (160 - 960 kg/m$^3$)
- Plugged chute applications

**Int. Bin Temp:**
Neoprene: -40˚ to +180˚F (-40˚ to 82˚C)
Teflon®: -40˚ to +250˚F (-40˚ to 121˚C)
321SS: -40˚ to +250˚F (-40˚ to 121˚C)
**Output:** SPDT, 15A @ 250 VAC
**Mounting:** Flange with 7.5" (190.5mm) bolt circle
**Pressure:** Atmospheric only
**Approvals:** $CSA_{US/C}$: Ordinary Loc. (G); UL & CSA: Class II (GX, GX-SS); CE Mark
**Enclosure Protection:** NEMA 4/ENCLOSURE TYPE 4, IP66 (Model G only); IP65 (Model GX and GX-SS)

- Product Bulletin - 623
- Installation & Operation Manual - 624

## TILT SWITCHES

- Basic Angular-Sensing Operation
- Electrically-Passive, Mercury-Free Sensing Method
- Durable, Low Maintenance and Low-Cost Performance
- No Calibration Required...Output Switch Closes When Tilted Approximately 17˚
- Easily Adjustable Sensing Point by Repositioning Hanging Height

- Ball Type Actuators available to limit material contact with tilt switch enclosure and provide increased "tilt" sensitivity (TC-3 only)

**Practical Tip**
Keep hanger for tilt switch as short as possible to maintain 17˚ detection sensitivity.

- Basic operation and minimal parts create a low-cost and easily maintained solution.
- Provides environmentally-safe, "green" operation with no power consumption
- **TC-3:** 15 - 60 lb/ft$^3$ (240-960 kg/m$^3$)
- **TC-1:** 45+ lb/ft$^3$ (>720 kg/m$^3$)
- Ideal for high level detection
- Works for open stock piles

**Operating Temp:**
TC-3: -40˚ to +175˚F (-40˚ to 80˚C)
TC-1: -40˚ to +250˚F (-40˚ to 121˚C)
**Output:**
TC-3: SPDT, 10A @ 250 VAC
TC-1: SPDT, 15A @ 250 VAC
**Mounting:**
TC-3: suspend by chain, 3/4" (19mm) ID eyebolt
TC-1: suspend by chain, 1-3/32" (27.7mm) ID eyebolt
**Approvals:** Ordinary Locations; CE Mark
**Enclosure Protection:** NEMA 4; IP56

- Product Bulletin - 633
- Installation & Operation Manual - 634

# Dust Monitoring

# Bin Aeration

# In-Line Mass Flow & Moisture Sensor Location Overview




## DustAlarm® ES

## DustTrend™ ES

ADVANCED TRIBOELECTRIC



## AIR PAD / EVASSER

BIN AERATION

### FEATURES

**DustAlarm® ES / DustTrend™ ES**

- Easy Auto Set-up Button to Automatically Configure Parameters / Alarms
- Exceptional and Reliable Sensitivity via Proven AC Triboelectric Technology with Advanced Algorithms to Filter Out Noise
- Excellent Repeatability Not Affected by Variations in Relative Humidity, Process Temperature or Pressure

**DustTrend™ ES *Adds...***

- Continuous Trend Measurements
- 4-20mA Analog Output and/or Enhanced Modbus(RS-485) output

**AIR PAD / EVASSER**

- Aeration Alternative to Vibration
- Quiet, Inexpensive, Non-Electrical Aeration Solution
- Simple Designs Facilitate Trouble-Free Operation
- Evasser Provides An Air Flow That Tends to Sweep the Vessel Wall
- Air Pad Comes in the Industry-Standard Low-Profile Footprint

### OPTIONS

**DustAlarm® ES / DustTrend™ ES**

- Connect with the Free **DustConfig™** Software to Set Custom Alarm Points, View Live Activity Within the Duct, or Review Data History for up to a 24-hour Period
- Customer Specified Stainless Steel Probe Lengths from 4.75" (120mm) to 20" (508mm)
- Available Probe Extensions to Provide up to an Additional 2" (51mm) to 24" (610mm) of Probe Length
- Quick-Connect Mounting Kits

*Practical Tip*

Ideal for detecting early failure of a filter within a baghouse before a catastrophic tear creates an environmental disaster.

**AIR PAD / EVASSER**

- Multiple Configurations Available
- Boot Options for Evasser:
  - White, Food Grade
  - Black, General Purpose
- Rectangular Air Pads:
  - Cotton or Fiberglass Diffuser

*Practical Tip*

Aerators can be used to fluidize material in place of a mechanical vibrator which can cause material to settle and increase the material's density.

### PRACTICAL APPLICATIONS

**DustAlarm® ES / DustTrend™ ES**

- Provides monitoring of dust levels where it is critical to safety, maintenance, equipment operation, plant efficiency, environment, etc.
- Ideal for exhaust ducts on dust collectors, baghouses and cyclones.
- Use triboelectric technology as a cost-effective alternative to opacity monitoring.
- Exceptional sensitivity is capable of detecting minute amounts of material (less than what is visible by the human eye).

**AIR PAD / EVASSER**

- Air-based solutions eliminate potential damage to surrounding equipment (such as level controls) that could be inflicted by pneumatic or electric vibrators.
- Aerators can reduce installation and maintenance expense associated with mechanical vibration systems.
- Solve problems such as arching, bridging, and rat-holing which reduce discharge flow.

### BASIC SPECS

**DustAlarm® ES / DustTrend™ ES**

**Power:** 95-240VAC (±10%), 50/60 Hz; 18-28VDC (±10%)
**Starting Ambient Temp:** 4° to 140°F (-20° to 60°C)
**Running Ambient Temp:** -40° to 140°F (-40° to 60°C)
**Process Temp:** Max: 300°F (150°C) at probe loc.
**Output (DustAlarm ES):** Relay(2 Isolated SPDT) and/or RS-485(Modbus)
**Output (DustTrend ES):** 4-20mA, Relay(2 Isolated SPDT) and/or RS-485(Modbus)
**Mounting:** 1" Tri-Clamp Quick-Disconnect, 316 SS
**Pressure:** 40 psi maximum
**Approvals:** CE Mark
**Enclosure Protection:** NEMA 4X, ENCLOSURE TYPE 4X, IP66

**AIR PAD / EVASSER**

**Int. Bin Temp:**
Air Pads:
to +180°F (82°C) w/external mounting kit;
to +650°F (343°C) w/internal mounting kit with fiberglass diffuser
Evasser:
Neoprene Boot: to +175°F (80°C);
Bronze Insert: to +900°F (480°C)
**Pressure Range:** Typically 3-5 PSI (0.2-0.35 bar)
**Air Consumption:** dependent on application (Consult Factory)

### AVAILABLE DOCUMENTS

**DustAlarm® ES / DustTrend™ ES**

- Product Bulletins - 763 (DustAlarm ES) / 773 (DustTrend ES)
- Installation & Operation Manuals- 764A, 764B / 774A, 774B / 764C (DustConfig™)

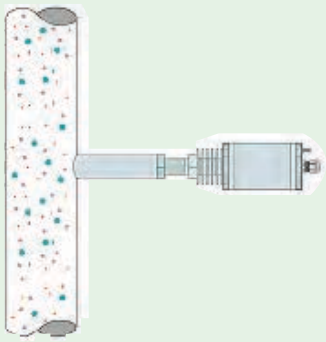
**AIR PAD / EVASSER**

- Product Bulletins - 933 (Air Pad) / 943 (Evasser)
- Installation & Operation Manuals - 934B (Air Pad) / 944A (Evasser)

## QuantiMass™

### In-Line Mass Flow Measurement

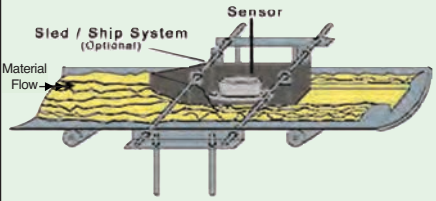
Sensor location should be in an area where the sensor's measurement energy will be exposed only to target materials that are fully suspended in the conveying air stream (pneumatic [dilute phase] or gravity conveying). Solid particulates should be evenly distributed in the air stream.



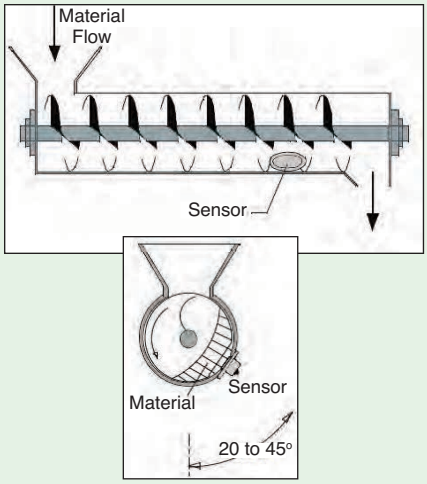
## HumiCore™

### In-Line Moisture Measurement

The sensor is designed to be installed in the production flow stream at a location that ensures the bulk material to be measured is fed over the sensor at a constant layer height.




Example - Sensor Location on Conveyor Belt




Example - Sensor Location on Screw Conveyor




## SFD-2 & SFI

MICROWAVE




## QuantiMass™

MICROWAVE DOPPLER




## HumiCore™

HIGH FREQUENCY FIELD

### FEATURES

- Non-Contact Flow Detection
- Non-Intrusive Flush Mounting
- Excellent Sensitivity
- Externally Viewable LED Sensor Status Indicator (SFD-2)
- Maintenance Free - No Moving Parts
- Relay Output (SFD-2) or Analog Output (SFI)
- Hazardous Location Approvals for Dust (Sensors Only)

- Continuous In-Line Mass Flow Measuring Without the Use of Weight Scales
- Measure Flow of Quantities in Pneumatic Conveying & Free-Falling Processes
- Microwave Doppler Effect Technology
- Sturdy, Non-Intrusive Design Minimizes Maintenance
- Compact Size for Easy Installation Into Existing Processes
- Fast Measuring & Adjustable Sensitivity
- Polyamide 6.6 Sensor Process Face

- Continuous In-Line Moisture Measurement System Provides Real-Time Data
- Ensure Product Quality Through Moisture Control...Provide Optimal Moisture Content for Finished Product
- High Frequency Field Technology
- Measures Moisture Inside the Material Core...Not Just the Surface
- Compact Size; Easy Installation and Calibration
- Integrated Temperature Compensation

### OPTIONS

- Electrical Enclosure for SFD-2 PS/Conditioning Board
- Saddle Clamp and Gasket
- 1 1/2" Mounting Adapters
- Tri-Clamp Adapters
- 1 1/4" NPT Lock Nut

*Practical Tip*
SFI has an analog output providing a "general indication" of flow consistency. It is not intended to measure flowrate.

- Choose from ***Ultra*** Version with a Controller for Local Interface & Data Logging or **PRO** Version with DIN-Rail Transmitter
- Standard or High Temperature Styles
- 304 SS or 316 SS Sensor Housing Construction

*Practical Tip*
QuantiMass is ideal for monitoring material flow rates to verify blending mixture ratios.

- Choose from ***Ultra*** Version with a Controller for Local Interface & Data Logging or **PRO** Version with DIN-Rail Transmitter
- 115 VAC / 24 VAC/DC -or- 230 VAC / 24 VAC/DC
- Polyacetal or Ceramic Process Surface
- Variety of Sled Plates

*Practical Tip*
HumiCore is ideal for automating the drying or moisturizing processes to minimize energy costs and maximize profit.

### PRACTICAL APPLICATIONS

- Use in flow applications where the non-contact attributes of microwave technology can eliminate challenges associated with temperature, light, acoustics and pressure.
- Non-intrusive mounting will allow natural flow of material, and will eliminate any risk of material being damaged by striking a sensing probe.
- Senses Flow / No Flow conditions in gravity chutes and pneumatic lines.

- Monitor for variable flow quantities due to disturbances like different densities.
- Measure for proper mixing of additives.
- Non-contact, in-line mass flow measurement system for most bulk solids and many dusts (Ex. coal dust, saw dust).
- Suitable for powders, dust, pellets, and granular up to 0.75 inch (2cm).

- Installation locations include: conveyor belts, screw conveyors, silos, funnels, etc.
- Suitable for grain, feed, seed, cereal, flour, sugar, coal, sand, wood shavings, dried food, fertilizer, tobacco, powder, pigments, plastic granules, sand, cement & more.
- Limit dusty areas by monitoring & controlling material moisture levels to reduce cleaning and/or filtering costs.

### BASIC SPECS

**Either Sensor:**
**Ambient Temp:** -40˚ to +185˚F (-40˚ to 85˚C)
**Process Temp:** to +250˚F (121˚C)
**Pressure:** Teflon®: 75 PSI (5bar) intermittent Ryton® (or equiv.): 300 PSI (20 bar)
**Mounting:** 1-1/4" NPT
**Approvals:** $CSA_{US/C}$: Class II, Div. 1, E,F,G; CE Mark
**Enclosure Protection:** NEMA 4; IP66
**SFD-2 Power Supply:**
**Power:** 100-240 VAC
**Operating Temp:** -40˚ to +158˚F (-40˚ to 70˚C)
**Output Relay:** DPDT, 5A @ 250 VAC, 30 VDC
**Approvals:** $CSA_{US/C}$: Ordinary Loc.; CE Mark
**SFI Only:**
**Output:** Analog 4-20mA, Detection range based on application

**Process Data:**
**Pipe Diameter:** 1" to 12" (25mm to 300mm)
**Particle Size:** .001 micron to 0.75" (1nm to 20mm)
**Moisture:** Depending on the product
**Pressure:** Up to 6 bar (Optional up to 30 bar)
**Temperature:** -4 to +194˚F (-20 to +90˚C)
(Higher temperatures on request)
**Sensor Data:**
**Material-touched Parts:** Polyamide 6.6 & 304SS or 316SS
**Housing Material:** 304 SS or 316 SS
**Protection Class:** IP 65
**Sensor Dimensions:** 11.42"L x 2.36"W x 2.36"H (290 x 60 x 60mm)
**Accuracy:** 1 to 3% typical
**Power:** Controller - 115 VAC / 24 VAC/DC; 230 VAC / 24 VAC/DC. Transmitter - 24 VAC/DC

**Process Data:**
**Process Temperature:**
+14 to +194˚F (-10 to +90˚C);
up to +284˚F (140˚C) with cooling
**Sensor Data:**
**Measuring Surface:** Polyacetal or Ceramic
**Housing Material:** 304 SS
**Protection Class:** IP67
**Sensor Dimensions:** 4.57" dia. x 2.02" H (116mm dia. x 51.5mm)
**Accuracy:** 0.1 to 0.3% typical
**Interconnection:** 4 wires, RS-485, 3,280 ft (1,000m) max
**Power:** Controller - 115 VAC / 24 VAC/DC; 230 VAC / 24 VAC/DC. Transmitter - 24 VAC/DC

### AVAILABLE DOCUMENTS

- Product Bulletin - 813
- Installation & Operation Manuals - 824 (SFD), 834 (SFI)

- Product Bulletins - 843P (Pro), 843R (Ultra)
- Installation & Operation Manuals - 844

- Product Bulletins - 753P (Pro), 753R (Ultra)
- Installation & Operation Manuals - 754

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All the best,

*Craig Russell*

Craig Russell
President, Monitor Technologies LLC


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