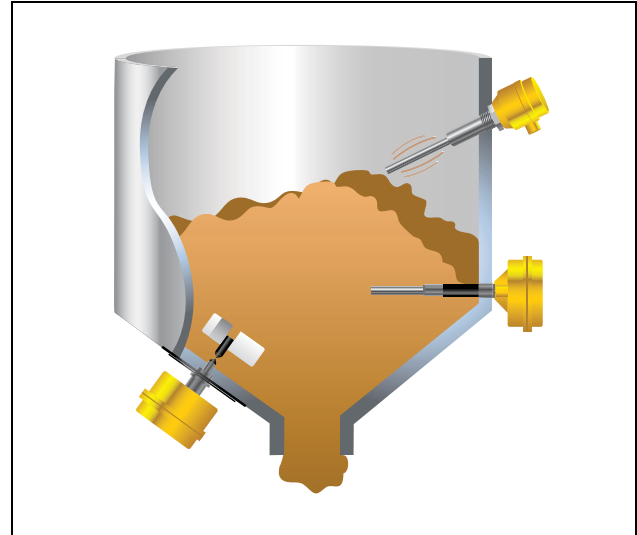


Mobrey dry products level measurement and control

- *Mobrey offer a range of technologies for reliable point-level detection in a variety of dry solid applications*
- *The Mobrey Series PLS is a paddle rotating level switch that detects high or low levels of most free-flowing bulk solids and powders*
- *The Mobrey Series VLS vibrating rod level switch has a single probe design that eliminates the clogging and ridging problems associated with forks*
- *The Mobrey Series CLS radio frequency capacitance level switch is self-calibrating and includes a microprocessor controlled Powershield probe for overcoming build-up effects of sticky dry solids*



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Dry Products Level Switches

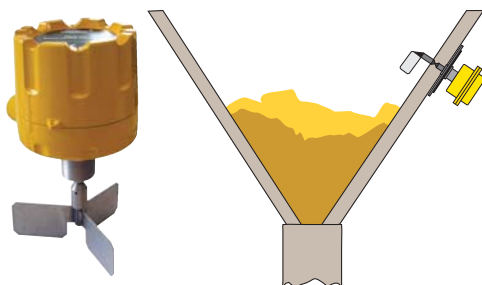
Proven And Reliable Level Detection

MEASUREMENT PRINCIPLE

The measurement and control of dry products is important in all industries, from mining through to fine chemicals. Such is the diversity of product to be measured, that no single instrument is capable of reliable operation in all materials.

Mobrey products offer a range of technologies to ensure that users are able to select the most appropriate instrument for the application.

Table 1 on page 3 is a guide to selecting a proven and reliable Mobrey product for your application.



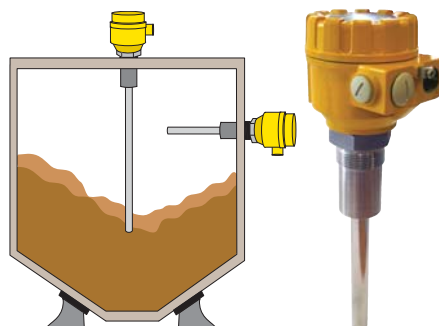
Series PLS Paddle Level Switch

Series PLS Paddle Level Switch

The paddle switch may be used as either a high or low level limit switch. It is easily mounted through a vessel wall. A small electric motor drives a paddle which rotates freely in the absence of material.

When the paddle is impeded by the presence of material, a microswitch actuates an alarm signal. As soon as the paddle is completely stopped from rotating, power to the motor is cut, thus extending motor life. After the material level falls, the motor is returned to its normal position and the paddle begins to rotate again.

Series PLS switches can be used with granular, pelletised, and powdered dry products. They may be used in high level applications with materials over 160 kg/m^3 and low or intermediate applications with materials over 80 kg/m^3 .

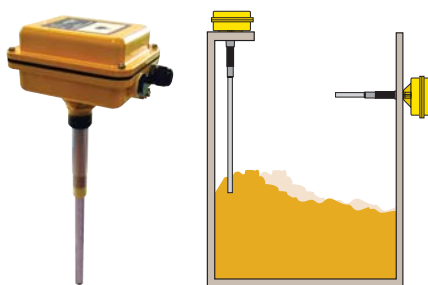


Series VLS Vibrating Rod Level Switch

Series VLS Vibrating Rod Level Switch

The vibrating rod level switch is the perfect solution for single point level switching in free flowing solids across a wide density range, from fine powders to grains. A single rod design provides the solution to tuning forks which may become blocked or bridged.

The vibration rod is energised and kept in resonance by an electronic circuit. When covered by material, the damping of the vibration is detected by the electronics which initiate the switching of the output relay after a built-in programmable time delay.



Series CLS RF Capacitance Level Switch

Series CLS RF Capacitance Level Switch

The CLS level switch is a microprocessor based, self-calibrating level control with no moving parts. It operates using the radio frequency (RF) capacitance principle.

This level switch can be used for high or low level alarm duties in silos and hoppers of dry products. The CLS detects the presence or absence of products by monitoring the change in capacitance around the probe as it becomes covered or uncovered. It operates reliably in metal, plastic, or wooden silos.

A built-in "Power Shield" is used to overcome the effects of product build-up on the probe when used with sticky or viscous products.

A variety of probe styles are available to allow side or top mounting, with the facility for users to modify the probe to suit application constraints.

Product Data Sheet

IP400, Rev DC
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Dry Products Level Switches

TABLE 1. Product selection guide

Product selection guide					
	Point level switches				
	Paddle PLSK	Paddle PLSH	Capacitance CLSK	Vibrating rod VLSK	Vibrating rod VLSH
Duty					
High level alarm	■	■	■	■	■
Low level alarm	■	■	■	□	□
Material					
Powder	■	■	■	■	■
Granular	■	■	■	■	■
Pellets	■	■	■	■	■
Aggregate	■	■			
Material density					
Very low ⁽¹⁾	■	■	■	□	□
Low ⁽²⁾	■	■	■	■	■
Medium ⁽³⁾	■	■	■	■	■
High ⁽⁴⁾	■	■	■	■	■
Very high ⁽⁵⁾	■	■			
Material moisture					
Low	■	■	■	■	■
High			■		
Material coating					
Minimal	■	■	■		
Heavy build-up			■		
Corrosive					
Low	■	■	■	■	■
High				■	■
Installation					
Vertical (top)	■	■	■	■	■
Horizontal (side)	■	■	■	■	■
Non-contact (top)					
Temperature					
Ambient	■		■	■	■
Low (to -20 °C)	■		■	■	■
High (to +110 °C)		■	■	■	
Pressure					
Atmospheric	■	■	■	■	■
Low 2 bar	■	■	■	■	■
Medium 10 bar				■	■
Atmosphere					
Dusty	■	■	■	■	■
Steamy				□	□
Vibration					
Low ⁽²⁾	■	■	■	■	■
High ⁽⁴⁾	■	■	■		

Recommended ■ Possible □ Not recommended □

- (1) Very low density examples (up to 100 kg/m³) include powdered carbon (80), bread crumbs (96), and polythene flakes (95).
 (2) Low density examples (100 to 250 kg/m³) include soap flakes (160), ground cork (160), charcoal (208), and sawdust (210).
 (3) Medium density examples (250 to 1000 kg/m³) include bran (256), rolled oats (304), powdered milk (450), flour (596), grain (6 to 800), and granulated sugar (849).
 (4) High density examples (1000 to 2000 kg/m³) include soot (1024), coal (1100), fine salt (1201), cement (1506) and dry sand (1602).
 (5) Very high density examples include gravels (2000 to 2500), aggregates (2000 to 2500), earth (2000), and slag (2100).

Dry Products Level Switches

Series PLS Paddle Level Switch



Series PLS Paddle

Traditional switch used to detect high or low levels of most free flowing bulk solids and powders. The paddle rotates freely in the absence of material but is impeded when material is present, operating a microswitch output

Features:

- Time proven
- Simple and reliable
- Top or side mounting
- Safepoint failsafe model option with fault relay

Applications

- Aggregates, granular, pelletised or powdered dry products
- High level applications with materials over 160 kg/ m³
- Low or intermediate applications with materials over 80 kg/m³

NOTE:

Use Table 2 to specify the PLS model options required for your application. See page 5 for ordering accessories.

Table 2. Series PLS Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.









Model	Product Description	
PLS	Paddle Level Switch series	
Model		
Standard		Standard
K	Standard model, 2 x SPDT alarm relays	★
H	High temperature standard model, 2 x SPDT alarm relays	★
P	Failsafe Safepoint model with fault relay and 1 x SPDT alarm relay	★
T	High temperature failsafe Safepoint model with fault relay and 1 x SPDT alarm relay	★
Mounting		
Standard		Standard
B1	R 1½" BSPT mounting (except high temperature)	★
N1	1¼" NPT mounting (all models)	★
Housing		
Standard		Standard
3	Aluminium alloy housing	★
Voltage		
Standard		Standard
0	115 Vac motor voltage	★
1	240 Vac motor voltage	★
2	24 Vdc motor voltage	★
Approvals		
Standard		Standard
A	ATEX Dust approval	★
Z	No hazardous area approvals	★
Typical Model Number: PLSK B1 3 1 Z (Order paddles and accessories separately)		

Product Data Sheet

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Dry Products Level Switches

PADDLES AND ACCESSORIES FOR SERIES PLS

Paddle selection	Scimitar	Single vane	3 Vane std	3 Vane large	2 Vane	4 Vane	Triangular	Belt Vane	
									
Order part no.	P4193	P4145	P4146	P4141	P4135	P4156	P4144	P4137	
Application									
Heavy material >2000 kg/m ³ >40 mm Ø	high							■ *1	
	low							■ *1	
Heavy material >2000 kg/m ³ <40 mm Ø	high	■ *1			■ *1	■ *1			
	low	■ *1			■ *1	■ *1			
Medium material 250 kg/m ³ to 1000 kg/m ³	high	■		■		■	■		
	low	■	■	■		■	■		
Light material up to 250 kg/m ³	high	■			■		■		
	low	■			■		■		
Mounting	Insertable	Insertable	Plate or flange	Plate or flange	Plate or flange	Plate or flange	Plate or flange	Plate or flange	
Notes	*1 Flexible coupling required					■ = Recommended			

Flexible coupling

The flexible coupling works to absorb heavy loads, side loads and loads caused by product surges. A flexible coupling should always be used in top mount installations where a solid shaft extension is used.

Shaft extensions

Many top mount installations require that the paddle extends into the vessel to a pre-determined level. Solid shaft extensions in stainless steel are available to customer order up to 1800 mm in length. Multiple sections can be supplied to achieve lengths of up to 3600 mm. Always specify a flexible coupling and a shaft guard with a solid shaft extension.

Order part no. P-1175-2/****mm

Alternatively a 2000 mm stainless steel flexible cable extension is available which may be cut to length on site and eliminates the need for the flexible coupling and shaft guard.

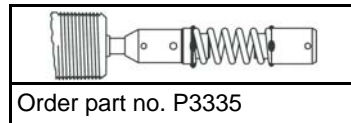
Order part no. P-1176-2

Shaft guard

A stainless steel shaft guard should be specified when a solid shaft extension is required. The shaft guard should be ordered as the same length as the shaft extension. Maximum length is 1800 mm for lengths of up to 3600 mm, multiple sections can be supplied complete with assembly coupling. Contact Mobrey sales office for details.

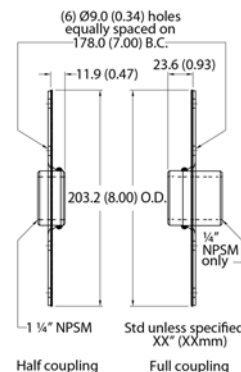
Order part no. P-1174-2/****mm

Flexible coupling



Mounting plate

A mounting plate allows mounting to a curved or flat surface and is particularly advantageous if the paddle to be used is not an insertion type. Two types are available: (Note: use only with NPT thread mounting paddle switches) Half coupling style in stainless steel for use in side mount applications. Full coupling style in stainless steel for use in top mount applications where a shaft extension and shaft guard is required. (Note: included as standard on high temperature option.)



Half coupling: order part no. P0112
Full coupling: order part no. P0113

Dry Products Level Switches

Series VLS Vibrating Rod switches



Series VLS Vibrating Rod

Single probe design of vibrating level switch for free flowing materials which eliminates the problems of clogging and bridging of fork designs

Features

- No moving parts
- High & low level failsafe
- Adjustable time delay
- Sensitivity adjustment
- Extended probe option
- Top or side mounting

Applications

- Granular, pelletised or powdered dry products
- High, intermediate or low level alarm
- High or low level switching in silos or bins containing free-flowing powders and granular materials such as carbon black, sugar, grain, cement, lime and sand with a material bulk density of 50 kg/m³ or more.

NOTE:

Use Table 3 to specify the VLS model options required for your application.

Table 3. Series VLS Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.

The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
VLS	Vibrating Rod Level Switch series	
Model		
Standard		Standard
K	Standard model with 1 x SPDT alarm relay	★
H	High temperature model with 1 x SPDT relay	★
Mounting		
Standard		Standard
B	R 1½-in. BSPT mounting	★
N	N1½-in. NPT mounting	★
Insertion Length		
Standard		Standard
1	Standard length rod, 207 mm insertion length	★
3	Extended rod, 300 to 3000 mm insertion length	★
4	Cable extended, 1000 to 20000 mm insertion length	★
8	Extended rod 300 to 3000 mm with adjustable gland	★
Housing		
Standard		Standard
3	Aluminium Alloy housing, powder coated	★
9	As code 3, but with Remote Electronics	★
Voltage		
Standard		Standard
1Z	20 - 255V ac / 20 - 255 V dc, no hazardous area approval	★
5A	20 - 250V ac / 20 - 50V dc, ATEX Dust Certification II 1/2 D	★
Special		
Standard		Standard
/****	Extension length (rod, cable)*see note	★
Typical Model Number: VLSK B1 3 1Z		

Product Data Sheet

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Dry Products Level Switches

VLS Series option

Sensitivity selection

Bulk materials vary greatly in their characteristics. The VLS will operate in bulk materials with density over 50 kg/m^3 - the user must however set the sensitivity selection switch to either LOW for products with density less than 100 kg/m^3 or to HIGH for products with density greater than 1000 kg/m^3 .

Failsafe operation

Each VLS may be set to either failsafe high or failsafe low using a switch in the electronics housing.

Side mounting

Ideal for use as a failsafe high level switch. When used in a low level application, it is desirable to protect the probe from excessive pressure exerted by the medium and from direct impact when the silo is being filled. A simple shield mounted above the probe is sufficient.

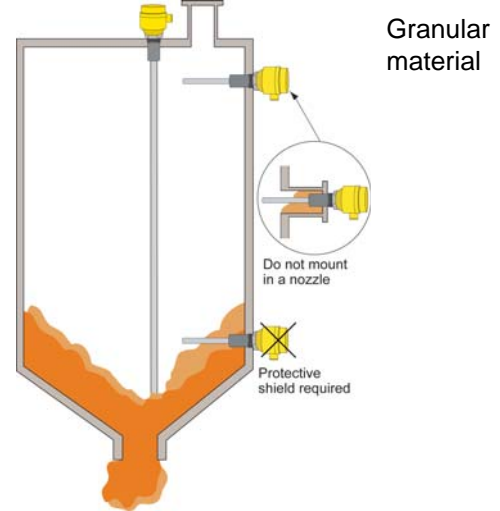
Top mounting

Either in standard length or extended length, mounted vertically in the silo. The cable extended probe which has a length of tough stainless steel cable between probe and mounting point, is ideal for very tall silos.

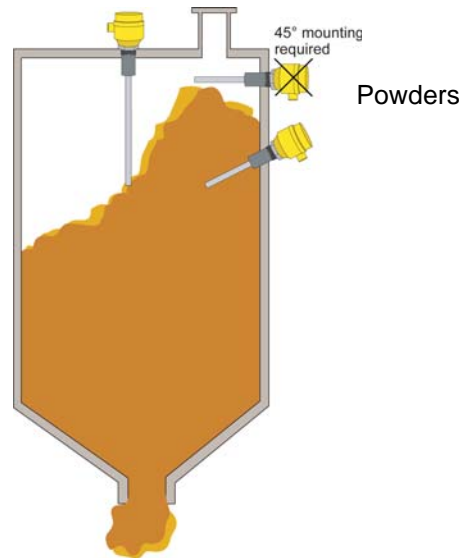
Adjustable

A top mounting extended probe fitted with an adjustable gland which allows the user to fix the probe at the desired switching level.

Installation examples



	High level	Low Level
Standard	Side mount	Side or bottom mount
Pipe extended	Top mount	Side or bottom mount
Cable extended	Top mount	Top mount



Dry Products Level Switches

Series CLS RF Capacitance Level Switch



Series CLS RF
Capacitance probes

This self calibrating RF capacitance level switch includes a microprocessor controlled Powershield probe which overcomes the effects of product build up on the probe, allowing reliable use in a wide range of free flowing and sticky dry products

Features

- No moving parts
- Material build up compensator
- Self calibrating
- Adjustable time delay
- Top or side mounting
- Rigid or flexible probe

Applications

- Granular, pelletised or powdered dry products
- Sticky or clinging products
- Sludges and slurries
- High, intermediate or low level alarm

NOTE:

Use Table 4 to specify the CLS model options required for your application.

Table 4. Series CLS Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
CLS	RF Capacitance Level Switch Series	
Model		
Standard		Standard
K	Standard model, 1 x SPDT alarm relay	★
Mounting		
Standard		Standard
B	G 1" BSPP mounting with power shield	★
Insertion length		
Standard		Standard
1	200mm Standard rod: 344mm insertion length	★
2	100mm Short rod: 244mm insertion length	★
3	880mm Long rod: 1024mm insertion length	★
4	Wire rope probe: 10000mm insertion length	★
Housing		
Standard		Standard
4	Glass filled nylon housing	★
Voltage		
Standard		Standard
1	110/230 Vac or 24 Vdc (selectable)	★
Approvals		
A	ATEX Dust approval	★
Typical Model Number: CLS K B 1 4 1 A		

Product Data Sheet

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Dry Products Level Switches

The Power Shield product build-up compensator

Simple capacitance probes operate by driving the probe to apply an RF signal between the stainless steel probe and the vessel wall. With the probe in free air, which has a dielectric value of 1.0, electronic circuitry measures the standing capacitance around the probe. When the air is displaced by material with a higher dielectric value, the capacitance measured increases and an alarm can be triggered.

In free flowing materials of sufficient dielectric value, this type of probe is generally acceptable. However, any material build-up on the probe will quickly change the capacitance and be seen as a false level.

The CLS switch solves this problem by the inclusion of a Power Shield. This is a second active section of the probe, termed the driven shield, which is insulated from the measuring probe. See illustration above.

The Power Shield is energised with the same voltage frequency and phase as the measuring probe and therefore no potential can be measured between the power shield and probe. This effectively creates a barrier or shield and prevents the probe from monitoring capacitance to the adjacent sidewall, substantially minimising the effect of build-up in the majority of cases.

Calibration

Having set the site adjustable High \ Low switch to the desired position for failsafe high of low level duty, the CLS must then be calibrated for the product in the silo. Automatic calibration is simply achieved by pressing one button when the probe is uncovered and then a second when the probe is covered by the product.

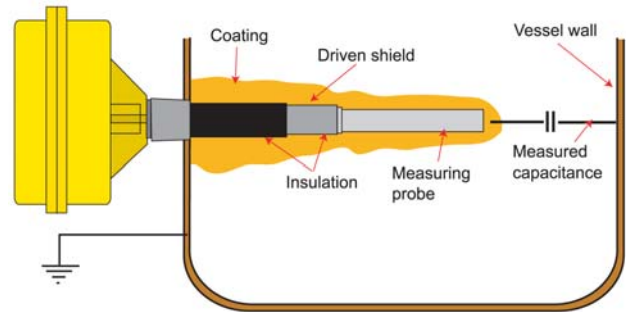
Sometimes it is not possible to fill the silo so a manual calibration facility is provided where the user manually enters a value of capacitance equivalent to a covered probe. The manual gives full guidance and a table of typical capacitance values.

Time delay

The CLS has a user adjustable time delay facility from instant to 128 seconds, which may be set to delay switching from covered to uncovered or vice versa.

Probe modification on site

It may be that application constraints prevent the use of the standard probe supplied. In such cases, local modification is permissible within limits. As the sensitivity of the CLS is proportional to the surface area of the sensing probe, any modification should maintain the surface area presented to the product in the silo unless the product has high density and dielectric properties.



Dry Products Level Switches

Technical Specifications

TECHNICAL SPECIFICATIONS FOR SERIES PLS

Series PLS Vibrating rod level switch	
Applications	Free flowing dry products, very low to very high density
Power Supply	Voltage order option code 0: 115 Vac \pm 15%, 50/60 Hz
	Voltage order option code 1: 230 Vac \pm 15%, 50/60 Hz
	Voltage order option code 2: 24 Vdc \pm 15%
Power Consumption	4 W maximum
Output	Standard models: 2 x SPDT control relays, 15A at 250 Vac
	Safepoint models: 1 x SPDT control relay, 5A at 250 Vac 1 x SPDT fault relay, 5A at 250 Vac
Conduit Connection	2 x $\frac{3}{4}$ in. NPT (NPT models) or 2 x M20 (BSPT models)
Operating Temperature	Standard models: -40 to 149 °C
	Safepoint models: -40 to 121 °C
	High temperature models: -40 to 399 °C
Ambient Temperature	Standard models: -40 to 93 °C
	Safepoint models: -40 to 65 °C
Operating Pressure	2 bar maximum
Wetside Material	Type 304 SST
Housing Material	Aluminium alloy, powder paint coated
Housing Rating	IP66
Weight	Typical Standard model: approximately 4 Kg
Approvals	ATEX II 1/2 D

Product Data Sheet

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Dry Products Level Switches

TECHNICAL SPECIFICATIONS FOR SERIES VLS

Series VLS Vibrating rod level switch	
Application	Free flowing powders & granules, Ø<10mm, low - high density
Power supply	Voltage order option code 1Z: 20 - 255 Vac (50/60Hz) / 20 - 255 Vdc
	Voltage order option code 5A: 20 - 250 Vac (50/60Hz) / 20 - 50 Vdc
Output	1 x SPDT control relay, 8A at 250 Vac
Conduit Connection	2 x ½" NPT (NPT models) or 2 x Pg16 (BSPT models)
Response time	Selectable 2 or 5 seconds
Operating Temperature	Standard models: -20 °C to +110 °C
	High temperature models: -20 °C to +160 °C
Ambient Temperature	-20 °C to +60 °C
Operating Pressure	10 bar maximum
Wetside Material	Type 316 stainless steel
Housing Material	Aluminium alloy, powder paint coated
Housing rating	IP67
Weight	Approx. 2 kg
Approvals	ATEX II 1/2 D

Dry Products Level Switches

TECHNICAL SPECIFICATIONS FOR SERIES CLS

Series CLS RF Capacitance level switch	
Application	Powders and granules Ø<20mm, very low - high density
Power supply	Voltage order option code 1: 110/230 Vac (50/60 Hz) or 24 Vdc (selectable)
Output	1 x SPDT control relay, 2.5A at 250 Vac
Minimum DK	2
Conduit Connection	2 x ¾" NPT (NPT models) or 2 x M20 (BSPP models)
Response time	Adjustable 1 to 128 seconds
Operating Temperature	When ATEX certification not required: -20 °C to +70 °C
	ATEX certification: -20 °C to +50 °C
Ambient Temperature	-15 °C to +50 °C
Operating Pressure	7 bar maximum
Wetside material	Probe: 304SS Powershield 316SS partially coated with PTFE. Insulation nylon 66
Housing material	Glass filled nylon, paint coated
Housing rating	IP65
Weight	Approx. 2.3 kg with standard rod
Approvals	ATEX II 1 D

Product Data Sheet

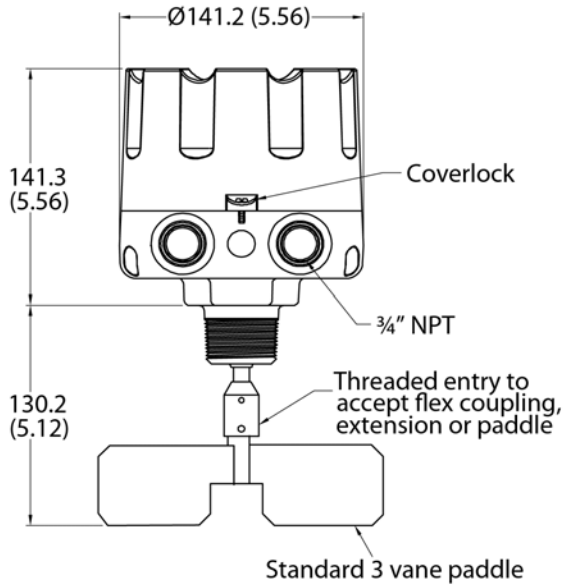
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Dry Products Level Switches

Dimensional Drawings

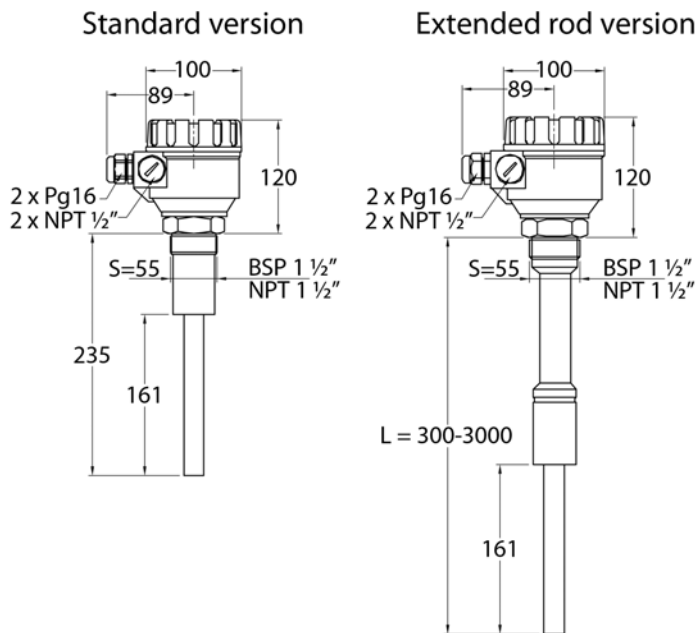
SERIES PLS DIMENSIONS

Note: Dimensions are in inches (mm)



SERIES VLS DIMENSIONS

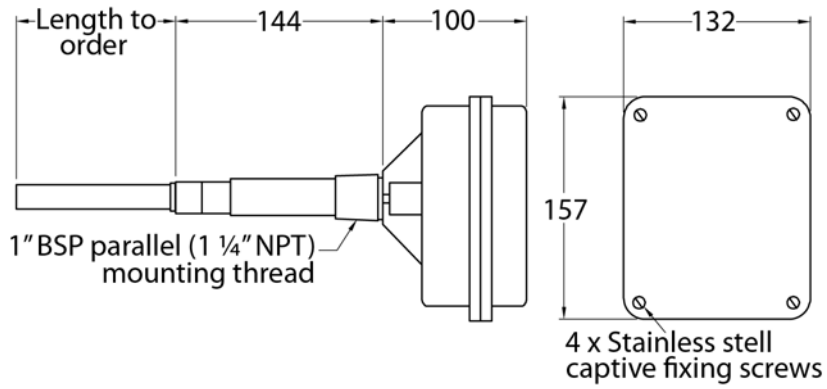
Note: Dimensions are in mm



Dry Products Level Switches

SERIES CLS DIMENSIONS

Note: Dimensions are in mm



Product Data Sheet

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Dry Products Level Switches

Dry Products Level Switches

Mobrey Level Solutions

Emerson provides a wide range of Mobrey products for level measurement applications.

POINT LEVEL DETECTION

Vibrating Fork Liquid Level Switches

For high and low alarms, overflow protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.

- Mobrey Mini-Squing (Compact)
- Mobrey Squing 2 (Full-featured)

Ultrasonic Gap Sensor Liquid Level Switches

For use in non-hazardous industrial processes to detect high or low liquid levels and liquid interface. Immune to changing density, and wide dielectric and pH variations. Suitable for use in most clean and non-aerated liquids, with options for sludges and slurries.

Float and Displacer Liquid Level Switches

Mobrey electromechanical float and displacer level switches are ideal for alarm and pump control duties, especially in critical applications or hazardous areas.

- Mobrey Horizontal Level Switches
- Mobrey Vertical Level Switches

Chambers are available for external mounting of these level switches on process vessels.

Dry Products Level Switches

For high and low level alarms. Including threaded mounting connections, extended lengths, high temperature capability, and multiple detection techniques. Suitable for a wide variety of powders, granules, and free flowing solids with wide variations in bulk densities.

- Mobrey VLS Series – Vibrating Rod Level Switch
- Mobrey PLS Series – Paddle Level Switch
- Mobrey CLS Series – Capacitance Level Switch

CONTINUOUS MEASUREMENT

Ultrasonic Continuous Level Transmitters and Controllers

Top mounted, non-contacting for simple tank and open-air process level measurements. Unaffected by fluid properties such as density, viscosity, dirty coating, and corrosiveness. Intrinsically Safe versions are available for operating in hazardous areas.

- Mobrey MSP Series Ultrasonic Level and Flow Transmitters
- Mobrey MCU900 Series Universal Controllers

Ultrasonic Sludge Density Blanket Monitoring and Control

Ultrasonic in-line pipe or tank mounted sensors for sludge density measurement and control, and top mounted ultrasonic sensors for continuous measurement of sludge blanket level in Industrial and Municipal effluent treatment processes.

- Mobrey MSM400 – Sludge Density Monitor
- Mobrey MSL600 – Sludge Blanket Level Monitor

Displacer Continuous Level Measurement

Top mounted in a vessel or externally mounted in a vertical chamber. For use in hazardous areas.

- Mobrey MLT100 – Displacer Level Transmitter

Hydrostatic Continuous Level Transmitter

For level measurements in non-pressurized tanks where in-tank problems such as foaming, vapor layers, and temperature gradients prohibit the use of other instrumentation.

- Mobrey 9700 Series hydrostatic electronic level transmitters

SPECIALIZED CONDUCTIVITY

Conductivity Water and Steam Interface Monitoring

Steam/water interface level gauges using specialized, high performance conductivity probes in external columns and manifolds, ideal for steam plants where reliable and redundant indication of boiler water level and turbine protection is critical.

- Hydratect 2462 – Water/Steam detection Systems
- Hydrastep 2468 – Water/Steam Monitoring Systems

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Emerson Process Management

Mobrey Measurement

158 Edinburgh Avenue
Slough, Berks, SL1 4UE, UK
Tel: +44 (0)1753 756600
Fax: +44 (0)1753 823589
www.mobrey.com