

**Product Data Sheet**

IP2032, Rev AA  
March 2012

**Mobrey MSP Series**

# Mobrey MSP900SH Level and MSP900FH Flow Ultrasonic Transmitters

- *Non-contacting measurement with no moving parts*
- *Fast and simple to install and configure*
- *Continuous measurement of level, contents (volume), or open channel flow*
- *MCERTS certified version for use with Mobrey MCU900 Series Control Unit*
- *Loop-powered 4-20mA with HART<sup>®</sup> output*
- *Factory sealed (IP68) for use in wet-wells and sumps up to 39 ft. (12 m) deep*
- *Rugged all UPVC construction ideal for application on exposed sites such as reservoirs, rivers, remote works, and effluent treatment plants*



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# Mobrey MSP Series

## Reliable Performance...In Challenging Applications



Mobrey MSP900SH  
Level Transmitter

Mobrey MSP900FH  
Flow Transmitter

### MEASUREMENT PRINCIPLE

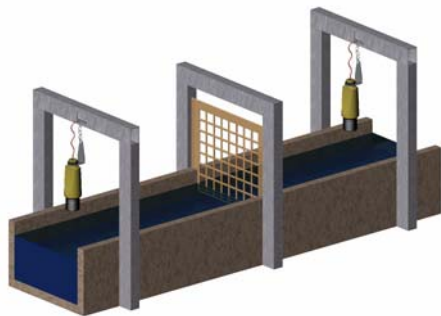
The MSP900SH and the MSP900FH are based on ultrasonic technology. Ultrasonic pulse signals are transmitted and reflected from the liquid surface. The transmitter 'listens' for reflected signals (echoes) and measures the time-delay between transmitting and receiving.

The distance to the liquid surface is automatically calculated using the computed time-delay.

The MSP900SH has an integrated sensor for automatically compensating the Distance for temperature effects.

The MSP900FH has a factory fitted remote temperature sensor to continuously measure the air temperature around the transmitter. It then computes the speed of sound in air, automatically compensating Distance for temperature effects.

The level measurement (Bottom Reference minus Distance) is sent through the 4–20 mA and HART output.



Differential Measurement with  
two MSP900FH MSP900SH Transmitters



Open Channel Flow Measurement  
with a Mobrey MSP900SH Transmitter and  
Mobrey MCU900 Series Controller Unit

### FEATURES AND BENEFITS

- Eliminates problems experienced with contacting instrumentation
- Simple set-up and operation
- Minimal maintenance after installed
- Low cost of installation and commissioning
- Process downtime minimized
- Non-contacting measurement with no moving parts
- Sealed rugged UPVC housing
- Corrosion resistant PVDF wetted material
- Factory fitted with up to 164 ft. (50 m) of two-core cable
- 4–20 mA loop-powered
- Operating range to 39 ft. (12 m)
- Measures liquid height, distance to liquid, volume, or flow in open channels
- Certified Intrinsically Safe and used for level (or distance) measurements in hazardous areas
- Automatic temperature compensation

## Product Data Sheet

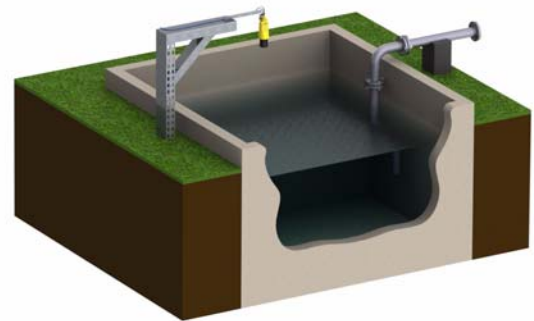
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# Mobrey MSP Series

## SPECIAL FEATURES

### Advanced Software Features

- Learn routine (false echo registration)  
The transmitter can learn to ignore up to four false echoes, caused by the pulse signal reflecting off obstructions, until the actual level is seen.
- Empty tank mapping  
When a tank is empty, the transmitter can learn to ignore up to four false echoes, without the need for user interaction.
- Present depth  
The bottom reference can be automatically set using a known user-entered depth.
- Set as empty  
When the tank is empty, the bottom reference can be automatically reset to the measured distance.
- Distance offset  
The distance to the surface can be adjusted by a user-entered positive or negative offset value.
- Level offset  
The level can be adjusted by a user-entered positive or negative offset value.
- Bottom blanking  
The transmitter can be set to ignore an area of the tank bottom to avoid false echoes from obstructions.



Reservoir Level Measurement  
with a Mobrey MSP900SH Transmitter



Mobrey MSP900FH Flow Transmitter  
with the Head Verification Device (HVD)  
accessory in the calibration position

## CHOOSING THE RIGHT MODEL

- Each model of the MSP Series has been designed for a specific purpose, as shown below:

Table 1. Choosing The Right MSP Series Transmitter

| Transmitter Purpose   | Model                      | Range                           |
|---|----------------------------|---------------------------------|
| Simple level measurement within a tank, sump, or reservoir              | MSP900SH                   | 39-ft. (12 m)                   |
| Differential level measurement (2 x Transmitters and 1 x Mobrey MCU900) | MSP900SH<br>or<br>MSP900FH | 39-ft. (12 m)<br>11-ft. (3,3 m) |
| Open channel flow or volume measurement                                 | MSP900FH                   | 11-ft. (3,3 m)                  |

## APPLICATIONS

- Storage tank levels
- Open channel flow
- Effluent pits
- Reservoir level
- Buffer tanks
- Filter bed level

# Mobrey MSP Series

## Mobrey MSP900SH Level Transmitter



MSP900SH Level Sump Transmitter

Mobrey MSP900SH capabilities include:

- HART 4-20 mA protocol
- Continuous measurement of level, or contents (volume)
- Configure using a Field Communicator or Mobrey MCU900 Series Control Unit
- Factory sealed with standard lengths of fitted cable
- Simple installation using stainless steel mounting bracket

### Additional Information

Specifications: page 7  
 Certifications: page 9  
 Dimensions: page 10

Table 2. MSP900SH Ordering Information

| Model                                     | Product Description                                    |
|---|--|
| MSP900S                                   | Ultrasonic level sump transmitter, 39 ft. (12 m) range |
| <b>Signal Output</b>                      |  |
| H-  | 4–20 mA with HART communication                        |
| <b>Product Certificates</b>               |  |
| A <sup>(1)</sup>                          | ATEX and CSA Intrinsically Safe                        |
| U <sup>(2)</sup>                          | FM and CSA Intrinsically Safe                          |
| <b>Cable Lengths</b>                      |  |
| /3  | 10 ft. (3 m) of PVC sheathed twisted-pair              |
| /20                                       | 65 ft. (20 m) of PVC sheathed twisted-pair             |
| /50                                       | 164 ft. (50 m) of PVC sheathed twisted-pair            |
| <b>Typical Model Number: MSP900SH-A/3</b> |  |

(1) Product Certificates code 'A' also selects the 1-in BSPP mounting thread version of the transmitter.

(2) Product Certificates code 'U' also selects the 1-in NPT mounting thread version of the transmitter.

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**Mobrey MSP900FH Flow Transmitter**



Sira Certificate No.  
 MC080131/00



**MSP900FH Flow Transmitter  
 with Remote Temperature Sensor**

Mobrey MSP900FH capabilities include:

- Enhanced accuracy for open channel flow
- Remote temperature sensor for accurate speed of sound compensation
- Simple installation using optional Mobrey Head Verification Device (HVD)
- IP68 submersible rated PVC housing

**Additional Information**

- Specifications: page 7  
 Certifications: page 9  
 Dimensions: page 10

Table 3. MSP900FH Ordering Information

| Model                                      | Product Description   |
|--|---|
| MSP900F                                    | Ultrasonic Open Channel Flow Transmitter, 11 ft. (3,3 m) level range, fitted with remote temperature sensor |
| <b>Signal Output</b>                       |   |
| H-   | 4–20 mA with HART communication   |
| <b>Product Certificates</b>                |   |
| <b>Standard</b>                            |   |
| A <sup>(1)</sup>                           | ATEX and CSA Intrinsically Safe   |
| U <sup>(2)</sup>                           | FM and CSA Intrinsically Safe   |
| <b>Cable Lengths</b>                       |   |
| /20  | 65 ft. (20 m) of PVC sheathed twisted-pair  |
| <b>Typical Model Number: MSP900FH-A/20</b> |   |

(1) Product Certificates code 'A' also selects the 1-in BSPP mounting thread version of the transmitter.  
 (2) Product Certificates code 'U' also selects the 1-in NPT mounting thread version of the transmitter.

# Mobrey MSP Series

## MSP Accessories

Table 4. MSP Accessories

| Accessories             |  |
|-------------------------|--|
| MSP-FLG4 <sup>(1)</sup> | Flange Mounting, 1-in. to 2-in. ASME B16.5 Class 150 / EN1092-1 PN10/16 (DN50), PVC  |
| MSP-SUB2                | Submersion shield  |
| MSP-BRK4                | 316 SST Steel Suspension Bracket and 1-in. locknut ( <i>same bracket as supplied with all transmitter versions</i> )             |
| 03100-1005-0001         | Conduit adaptor boss, 1-in. NPT female to <sup>3</sup> / <sub>4</sub> -in. NPT female ( <i>as supplied with the MSP900FH-U</i> ) |
| 03100-1005-0002         | Conduit adaptor boss, 1-in. BSPF female to M20 x 1.5 female ( <i>as supplied with the MSP900FH-A</i> )                           |
| MSP-HVD <sup>(2)</sup>  | Head Verification Device (HVD), 304 SST  |

(1) Supplied with EPDM gasket, suitable for low pressure plastic flanges only.

(2) The Mobrey Head Verification Device (HVD) is recommended for open channel flow applications to allow checking and certification of the transmitter. It features a target plate at a fixed distance from the transmitter face. The target plate is moved under the transmitter to verify the transmitter accuracy.

Figure 1. Mobrey Head Verification Device



The HVD is recommended for open channel flow applications to allow checking and certification of the transmitter. It features a target plate at a fixed distance from the transmitter face. The target plate is moved under the transmitter to verify the transmitter accuracy.

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# Mobrey MSP Series

## Specifications

| General   |  |
|---|--|
| Product   | Mobrey MSP900SH and MSP900FH Ultrasonic Transmitters:<br>Level, Content (Volume), and Open channel flow measurement  |
| Measurement Principle                                       | Ultrasonic, time-of-flight   |
| Measuring Performance                                       |  |
| Measurement Range   | MSP900SH: 1 to 39 ft (0,3 to 12 m)<br>MSP900FH: 1 to 11 ft (0,3 to 3,3 m)  |
| Blanking Distance (Dead Zone)                               | 12 in. (0,3 m)   |
| Level Resolution  | Better than 0.06 in. (1 mm)  |
| Level Accuracy<br>Under Reference Conditions <sup>(1)</sup> | ± 0.1 in. (2,5 mm) for measured distance < 3.3 ft. (1 m)<br>± 0.25% of distance for measured distance > 3.3 ft. (1 m)  |
| Ultrasonic Pulse Rate                                       | 1 per second (user configurable 0.5 to 2.0 seconds)  |
| Configuration   |  |
| Output Process Variable (PV)                                | Level (Linear or Scaled), Content (Volume), or Open Channel Flow   |
| Configuration Tools <sup>(2)</sup>                          | Field Communicator or Mobrey MCU900 Series Universal Control Unit  |
| Electrical  |  |
| Cable   | Factory fitted 2-core shielded cable for <b>external power supply and communication</b>  |
| Cable Sheath  | PVC  |
| Cable Length  | 10, 65, or 164 ft. (3, 20, or 50 m). All cables may be shortened or extended on site   |
| External Power Supply                                       | 12 to 40 Vdc (non-hazardous area), 12 to 30 Vdc (hazardous area)   |
| Earthing  | Connect the cable screen to earth  |
| Communication (Signal Output)                               | Analog 4–20 mA, HART   |
| Signal on Alarm   | Low = 3.6 mA. High = 21 mA   |
| Saturation Levels   | Low = 3.8 mA. High=20.5 mA   |
| Electrical parameters                                       | Ui = 30 V, li = 120 mA, Pi = 0,82 W, Ci = 5 nF, Li = 27 µH   |
| Materials of Construction                                   |  |
| Body  | UPVC (stabilized)  |
| Lock Nut  | Glass filled nylon   |
| Mechanical  |  |
| Mounting Thread Size  | 1-in. NPT or 1-in. BSPP. See MSP Accessories on page 6 for optional mounting accessories   |
| Weight of Transmitter                                       | 3.1 lb with 10 ft. cable, 4.1 lb with 65 ft. cable, and 5.8 lb with 164 ft. cable<br>(1,4 kg with 3 m cable, 1,9 kg with 20 m cable, and 2,6 kg with 50 m cable)     |
| Measuring   |  |
| Temperature compensation                                    | MSP900SH: Automatic with integral temperature compensation<br>MSP900FH: Automatic with factory fitted remote temperature sensor for dynamic temperature compensation |
| Environment   |  |
| Ambient Temperature   | –40 to 140 °F (–40 to 60 °C)   |
| Process Temperature   | –40 to 140 °F (–40 to 60 °C)   |
| Process Pressure  | –4 to 44 psi (–0,25 to 3,0 bar); (Canada –0,25 to 1,0 bar)   |
| Ingress Protection  | IP68 to 33 ft. (10 m)  |
| Electromagnetic Compatibility                               | EN 61326-1:2006  |
| Certifications  | CE-mark, FM, CSA, ATEX, dependent on order code. MSP900FH is MCERTS <sup>(3)</sup> certified.  |

(1) Temperature: 68 °F (20 °C), Pressure: 1013 mbar (atmospheric pressure), Relative Humidity: 50%, calm and stable water surface.

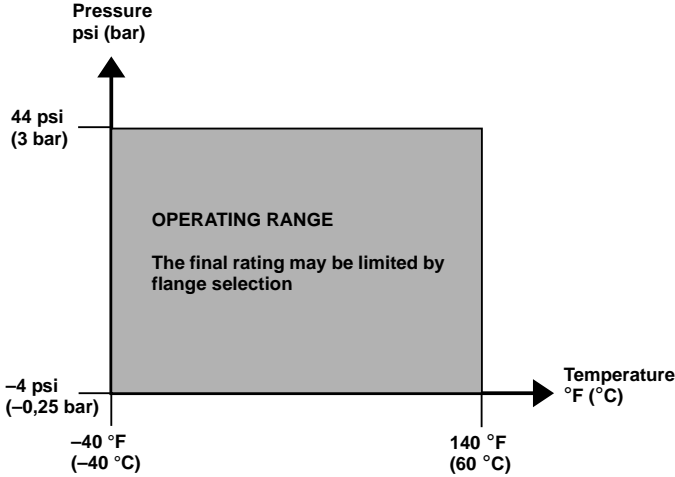
(2) The Mobrey MCU900 Series Control Unit software must be version 3.40 (or later).

(3) The Mobrey MSP900FH forms part of an MCERTS certified system when used with a Mobrey MCU900 Series Control Unit.

# Mobrey MSP Series

## TEMPERATURE AND PRESSURE RATINGS

The process temperature and pressure rating depends on the design of the transmitter in combination with the flange materials.

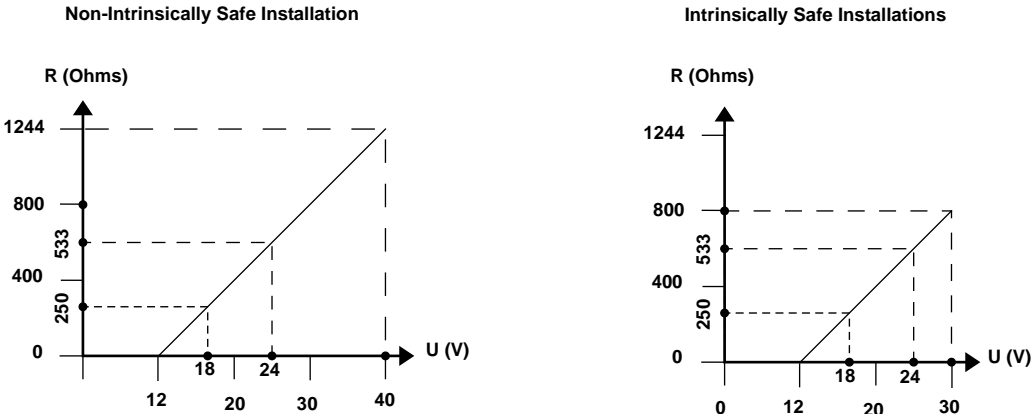


Process Temperature And Pressure Diagram For Mobrey MSP Series

## LOAD LIMITATIONS

A Field Communicator requires a minimum load resistance of 250 Ohm within the loop in order to function properly. Communication with a Mobrey MCU900 Universal Controller does not require additional resistance.

The maximum load resistance can be determined from these diagrams:



Mobrey MSP900SH and Mobrey MSP900FH

### NOTE

R = Maximum Load Resistance  
U = External Power Supply Voltage



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# Mobrey MSP Series

## Product Certifications

### Approved Manufacturing Locations

Mobrey Limited  
– Slough, United Kingdom

### European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Mobrey website at [www.Mobrey.com](http://www.Mobrey.com). A hard copy may be obtained by contacting your local sales office.

#### ATEX Directive (94/9/EC)

- Emerson Process Management complies with the ATEX Directive

#### Pressure Equipment Directive (PED) (97/23/EC)

- The MSP900SH and MSP900FH are outside the scope of PED Directive

#### Electro Magnetic Compatibility (EMC) (2004/108/EC)

- EN 61326-1:2006

### MCERTS Certification

#### MCERTS Certificate Number (MSP900FH Only)

- Sira Certificate No. MC080131/03

### Hazardous Locations Certifications

#### American and Canadian Approvals

#### Factory Mutual (FM) Approvals

Certificate Number: 3021193

FM Intrinsic Safety

Intrinsically Safe for Class 1, Division 1, Groups A, B, C, D

Zone Marking: Class I, Zone 0, AEx ia IIC

Temperature Code T6 ( $T_a = 55\text{ °C}$ )

Temperature Code T4 ( $T_a = 60\text{ °C}$ )

Intrinsically Safe when installed in accordance with Mobrey drawing 71097/1131

IP66, IP68

#### Canadian Standards Association (CSA) Approval

Certificate Number: 1352094

CSA Intrinsic Safety

Ex ia IIC

Intrinsically Safe when installed with certified barriers meeting transmitter entity parameters:

$U_i = 30\text{ V}$ ,  $I_i = 120\text{ mA}$ ,  $P_i = 0,82\text{ W}$ ,  $C_i = 5\text{ nF}$ ,  $L_i = 27\text{ }\mu\text{H}$

Temperature Codes:

T4 at  $T_a = -40\text{ to }60\text{ °C}$  or T6 at  $T_a = -40\text{ to }55\text{ °C}$

### European Certifications

#### ATEX Approval

Certificate Number: Sira 09ATEX2102X

ATEX Intrinsic Safety

Intrinsically Safe for II 1 G, Ex ia IIC Ga

T6 ( $T_a = -40\text{ to }55\text{ °C}$ ), T4 ( $T_a = -40\text{ to }60\text{ °C}$ )

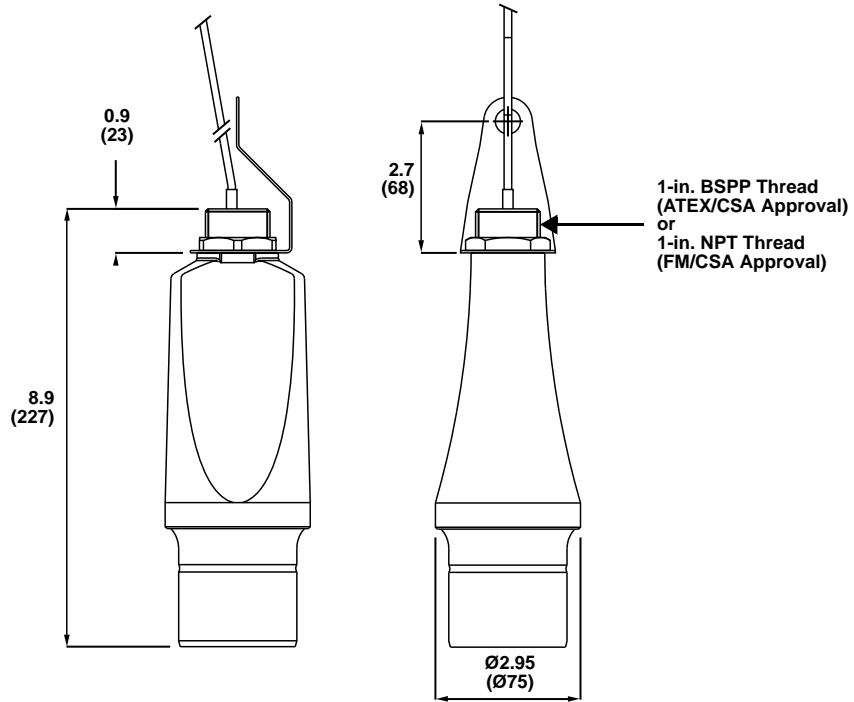
$U_i = 30\text{ V}$ ,  $I_i = 120\text{ mA}$ ,  $P_i = 0,82\text{ W}$ ,  $C_i = 5\text{ nF}$ ,  $L_i = 27\text{ }\mu\text{H}$

IP66, IP68

### Dimensional Drawings

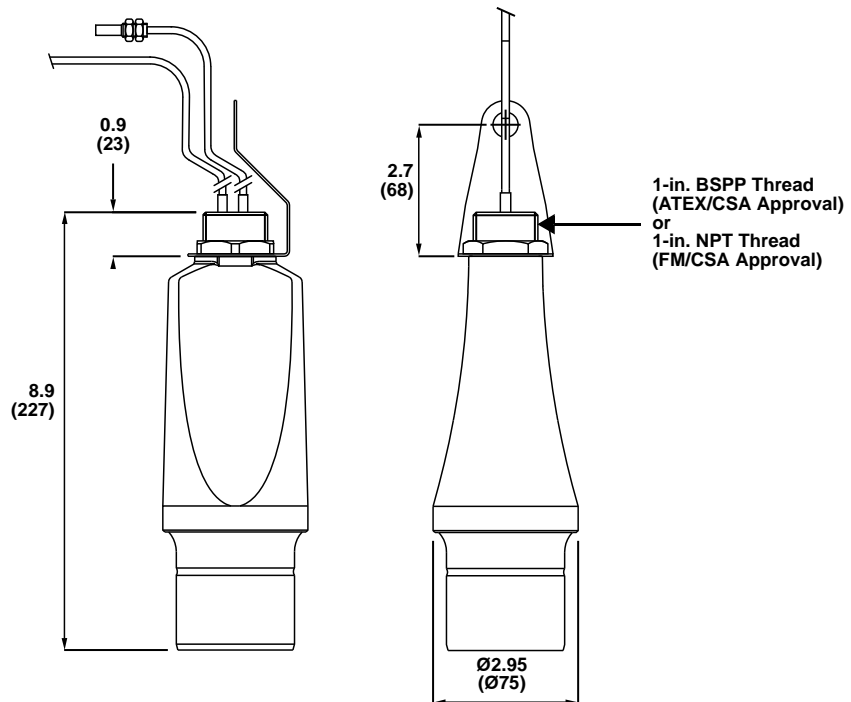
#### MSP900SH Threaded Mounting

Note: Dimensions are in inches (mm)



#### MSP900FH Threaded Mounting

Note: Dimensions are in inches (mm)



# Product Data Sheet

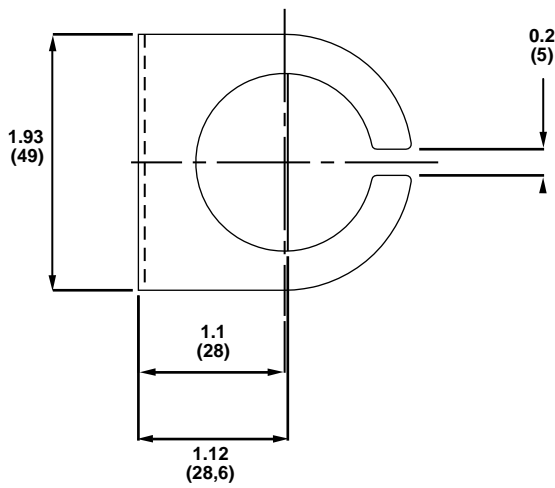
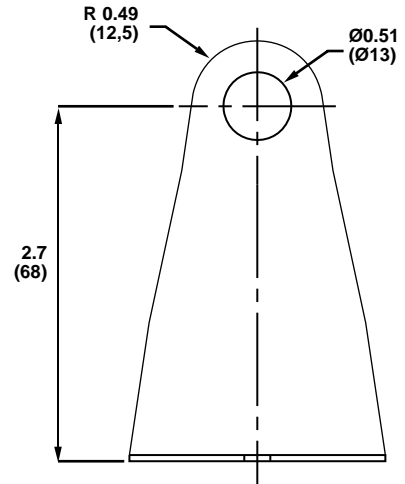
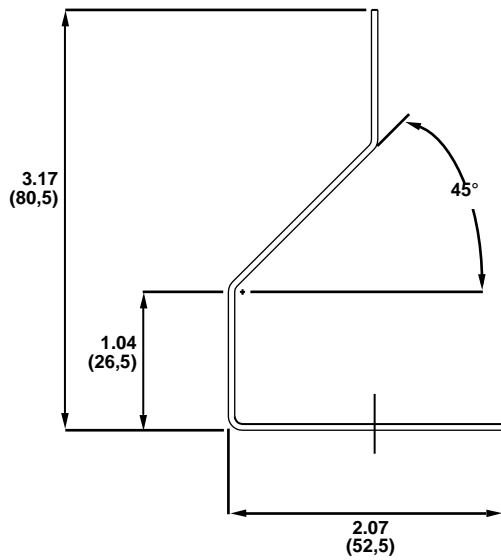
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# Mobrey MSP Series

## 1-inch NPT/BSPB Bracket Kits

Note: Dimensions are in inches (mm)



# Mobrey MSP Series

## 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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