

# Mobrey MSP Series Ultrasonic Liquid Level Transmitters

- *Non-contacting measurement with no moving parts*
- *Integral LCD and push-buttons as standard for on-site programming*
- *Continuous measurement of level or distance-to-surface.*
- *Volume or open channel flow calculations for the Mobrey MSP400RH and MSP900GH*
- *Two integral signal relays for the Mobrey MSP400RH*
- *Easy to install and configure*
- *Rugged metal or plastic housing. PVDF wetted material*
- *Two-wire direct current loop-powered*



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# Mobrey MSP Series

## Reliable Performance...In Challenging Applications



Mobrey MSP422



Mobrey MSP400RH



Mobrey MSP900GH

### MEASUREMENT PRINCIPLE

The Mobrey MSP Series is a liquid level transmitter based on ultrasonic technology that is suitable for many liquid applications.

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.

An integral temperature sensor continuously measures the air temperature around the transmitter. It then computes the speed of sound in air, automatically compensating the Distance for temperature effects. The MSP400RH and MSP900GH have a Remote Temperature Sensor option.

The distance measurement can be sent through the 4–20 mA or HART<sup>®</sup> output.

### 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
- Two integral signal relays
- Corrosion resistant PVDF wetted material
- Two-wire 24 V direct current loop-powered
- M20 x 1.5 conduit entries, single or dual depending on model
- Operating range to 36 ft. (11 m)
- Measures liquid height, distance to liquid, volume, or flow in open channels
- Simple push button programming
- Built-in LCD display
- Automatic temperature compensation

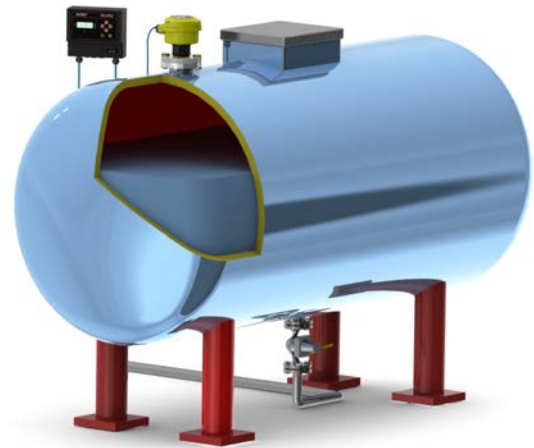
**SPECIAL FEATURES**

**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.



**Remote Temperature Sensor Option  
(For MSP400RH and MSP900GH)**



**Level Measurement with Mobrey MSP Series  
Transmitter and Mobrey MCU900 Controller Unit**

**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

Purpose	Model	Range
Simple level measurement	MSP422 MSP400RH	26-ft. (8 m) range 36-ft. (11 m) range
Level measurement and local relays	MSP400RH	36-ft. (11 m) range
Level measurement in hazardous areas	MSP900GH	36-ft. (11 m) range
Open channel flow or volume measurement	MSP400RH MSP900GH	Non-hazardous area Hazardous area

**APPLICATIONS**

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

# Mobrey MSP Series

## Mobrey MSP422 Level Transmitter



MSP422 Level Transmitter

- 26-ft. (8 m) operating range
- Two wire loop powered, 4–20mA output
- Integral LCD display and simple push button programming
- PVDF transducer housing wetside
- IP66/67 glass-filled nylon housing
- Ordinary Location FM approved

### Additional Information

Accessories: page 7  
 Specifications: page 8

Certifications: page 11  
 Dimensions: page 12

Table 2. MSP422 Ordering Information

Model	Product Description
MSP422	Ultrasonic Level Transmitter 4–20mA
<b>Process Connection</b>	
N2 <sup>(1)</sup>	2-in. NPT thread
B2 <sup>(2)</sup>	2-in. BSPT thread
<b>Wetted Material</b>	
8	PVDF
<b>Typical Model Number: MSP422 - B2 8</b>	

(1) Choosing this option implies US (Imperial) units of measurement are required for the default configuration. The configuration can be changed on-site.

(2) Choosing this option implies Metric units of measurement are required for the default configuration. The configuration can be changed on-site.

## Mobrey MSP400RH Level Transmitter



**MSP400RH Level Transmitter**

- 36-ft. (11 m) operating range
- 4–20 mA HART output, and two integral signal relays (SPST)
- Integral LCD display and simple push button programming
- Measures Level, distance, Tank volume, and Open Channel Flow
- Ordinary Location FM approved

**Additional Information**

Accessories:	page 7	Certifications:	page 11
Specifications:	page 8	Dimensions:	page 12

Table 3. MSP400RH Ordering Information

Model	Product Description
MSP400R	Ultrasonic Level Transmitter with 2 integral relays
<b>Signal Output</b>	
<b>Standard</b>	
H	4–20 mA with HART communication
<b>Process Connection</b>	
<b>Standard</b>	
N2 <sup>(1)</sup>	2-in. NPT thread
B2 <sup>(2)</sup>	2-in. BSPT thread
<b>Wetted Material</b>	
<b>Standard</b>	
8	PVDF
<b>Typical Model Number: MSP400R H - B2 8</b>	

(1) Choosing this option implies US (Imperial) units of measurement are required for the default configuration. Configuration can be changed on-site.  
 (2) Choosing this option implies Metric units of measurement are required for the default configuration. Configuration can be changed on-site.

# Mobrey MSP Series

## Mobrey MSP900GH Level Transmitter



MSP900GH Level Transmitter

- 36-ft. (11 m) operating range, and 4–20 mA HART output
- Integral LCD display and simple push button programming
- Measures Level, distance, Tank volume, and Open Channel Flow
- ATEX approved Intrinsically Safe

**Additional Information**

Spares and Accessories: page 7  
 Specifications: page 8

Certifications: page 11  
 Dimensions: page 12

Table 4. MSP900GH Ordering Information

Model	Product Description
MSP900G	Ultrasonic Level Transmitter for hazardous areas
<b>Signal Output</b>	
<b>Standard</b>	
H	4–20 mA with HART communication
<b>Process Connection and Approval</b>	
<b>Standard</b>	
A	2-in. BSPT thread, PVDF wetside, and ATEX approved Intrinsically Safe
<b>Typical Model Number: MSP900G H - A</b>	

## Product Data Sheet

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# Mobrey MSP Series

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## MSP Series Accessories

Table 5. MSP Series Accessories

Accessories	
MSP-FLG5	2-in. BSPT to PN16 DN50, PVC Flange
MSP-BRK3 <sup>(1)</sup>	2-in. NPT Mounting Bracket
MSP-BRK2 <sup>(1)</sup>	2-in. BSPT Mounting Bracket
MSP-RTP	Remote Temperature Sensor (Mobrey MSP400RH and Mobrey MSP900GH only)

(1) See "Dimensional Drawings" on page 12.

## Mobrey MSP Series

## Specifications

General	
Product	Mobrey MSP Series level transmitters: MSP422: Level and Distance measurement MSP400RH: Level, Distance, Content (Volume), and Flow measurement, with two integral signal relays MSP900GH: Level, Distance, Content (Volume), and Flow measurement for hazardous locations
Measurement Principle	Ultrasonic, time-of-flight
Measuring Performance	
Measurement Range	Mobrey MSP422: 1 to 26 ft. (0,3 to 8 m) Mobrey MSP400RH: 1 to 36 ft. (0,3 to 11 m) Mobrey MSP900GH: 1 to 36 ft. (0,3 to 11 m)
Level Resolution	Better than 0.06 in. (1 mm)
Level Accuracy Under Reference Conditions <sup>(1)</sup>	MSP422: $\pm 0.2$ in. (5 mm) for < 3.3 ft. (1 m), $\pm 0.5\%$ of measured distance for > 3.3 ft. (1 m) MSP400RH and MSP900GH: $\pm 0.1$ in. (2,5 mm) < 3.3 ft (1 m), $\pm 0.25\%$ of measured distance for > 3.3 ft. (1 m)
Blanking Distance (Dead Zone)	12 in. (0,3 m)
Update Interval	Display: 500 ms; Current Output: 200 ms
Display / Configuration	
Integral Display	4/5 digit display for live measurement, and for configuration purposes
Output Units	For Level or distance-to-surface: m, ft, in, or none For Contents: l, m <sup>3</sup> , gal, ft <sup>3</sup> , or none For Flow: l/s, l/m, m <sup>3</sup> /hr, gal/s, gal/m, ft <sup>3</sup> /m (cfm), ft <sup>3</sup> /hr, or none
Output Variables	MSP422: Level or distance-to-surface MSP400RH: Level (or distance-to-surface), Content (Volume), and Flow MSP900GH: Level (or distance-to-surface), Content (Volume), and Flow
Configuration Tools	Standard integral push-buttons with LCD Field Communicator Mobrey MCU900 Series Universal Control Unit
Electrical	
Power Supply	Loop-powered (two-wire) Mobrey MSP422: 12 to 30 Vdc Mobrey MSP400RH: 12 to 40 Vdc Mobrey MSP900GH: 12 to 40 Vdc (non-hazardous area), 12 to 30 Vdc (hazardous area)
Earthing	None required
Current Output	MSP422: Analog 4–20 mA MSP400RH: Analog 4–20 mA, HART MSP900GH: 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
Relay Output (MSP400RH)	Two integral signal relays, SPST rated 1A @ 30 Vdc (inductive) and 2A @ 30 Vdc (resistive)
Electrical Parameters (MSP900GH)	$U_i = 30$ V, $I_i = 120$ mA, $P_i = 0,82$ W, $L_i = 108$ $\mu$ H, $C_i = 0$ nF
Cable Entry	Two M20 x 1.5 conduit entries for cable glands.
Output Cabling	Single twisted-pair and shielded, min. 0,22 mm <sup>2</sup> (24 AWG), max. 1,5 mm <sup>2</sup> (15 AWG)
Materials of Construction	
Wet-side Material	PVDF
Body And Cover Material	Glass-filled nylon
Cover Seal	Silicone rubber
Cover Screws	316 Stainless Steel
Transducer Body Seal	EPDM
Mechanical	
Mounting Thread Size	2-in. NPT, or 2-in. BSP. Optional flange accessories available
Weight of Transmitter	MSP422: 2.0 lb (0,9 kg) MSP400RH: 2.2 lb (1,0 kg) MSP900GH: 3.1 lb (1,4 kg)



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# Mobrey MSP Series

Measuring	
Temperature Compensation <sup>(2)</sup>	MSP422: Automatic Integral temperature compensation MSP400RH: Automatic Integral temperature compensation. Optional remote temperature sensor for dynamic temperature compensation MSP900GH: Automatic Integral temperature compensation. Optional remote temperature sensor for dynamic temperature compensation
Environment	
Ambient Temperature <sup>(3)</sup>	MSP422: -4 to 158 °F (-20 to 70 °C) MSP400RH: -40 to 158 °F (-40 to 70 °C) MSP900GH: -40 to 140 °F (-40 to 60 °C)
Process Temperature	MSP422: -4 to 158 °F (-20 to 70 °C) MSP400RH and MSP900GH: -22 to 158 °F (-30 to 70 °C)
Process Pressure	-4 to 44 psi (-0,25 to 3,0 bar)
Ingress Protection	IP 66/67 ( <i>when using supplied cable gland/blanking plug</i> )
Electromagnetic Compatibility	EN61326 (Class B)
Certifications	CE-mark, FM, ATEX (dependent on order code)

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

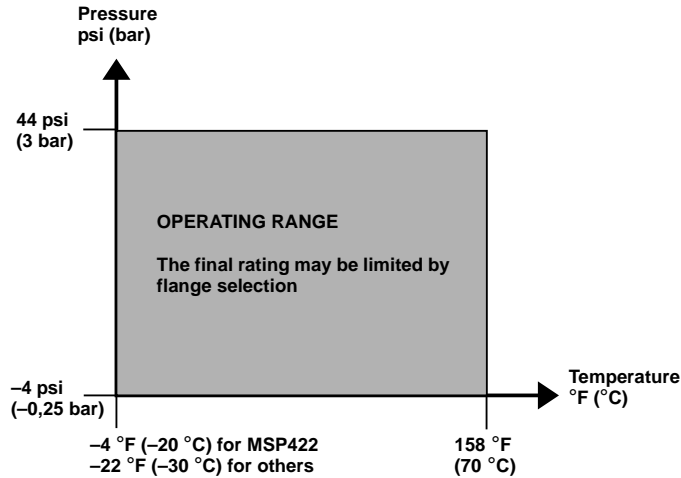
(2) See Table 5 on page 7 for optional accessories.

(3) See page 11 onwards for approval temperature ranges.

# Mobrey MSP Series

## Temperature and Pressure Ratings

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

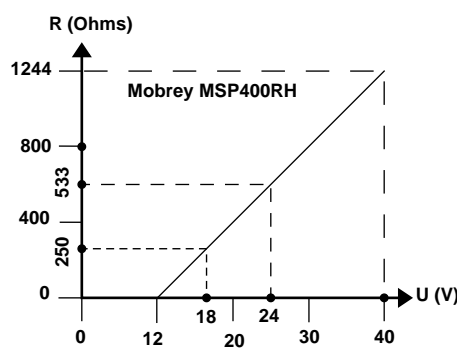
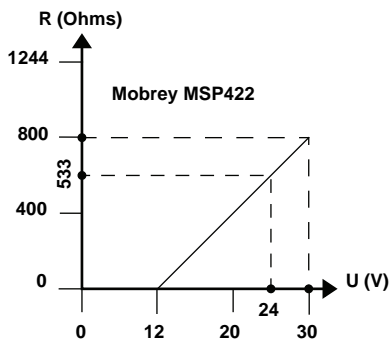


Process Temperature And Pressure Diagram For Mobrey MSP Series

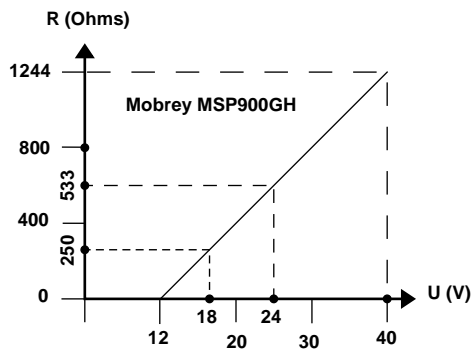
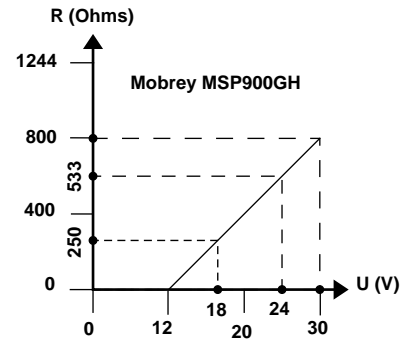
## Load Limitations

A Field Communicator requires a minimum load resistance of 250 Ohm within the loop in order to function properly. Communication with Mobrey MCU900 Universal Controller does not require additional resistance. The maximum load resistance can be determined from these diagrams:

### Non-Intrinsically Safe Installations



### Intrinsically Safe Installations



**NOTE**

R = Maximum Load Resistance  
U = External Power Supply Voltage

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## **Product Certifications**

### **Approved Manufacturing Locations**

Rosemount Measurement Limited

– Slough, United Kingdom

### **Ordinary Location Certification for FM (Mobrey MSP422 and MSP400RH Only)**

Project ID: 3015615

The transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

### **European Directive Information**

The EC declaration of conformity for all applicable European directives for this product can be found in the Safety Instructions document supplied with this product. A hard copy may be obtained by contacting your local sales office.

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

The MSP900GH complies with the ATEX directive.

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

The MSP Series is outside the scope of the PED directive.

#### **Electro Magnetic Compatibility (EMC) Directive**

EN 61326-1:2006, EN 61326-2.3:2006

#### **CE-mark**

MSP422 (EMC)

MSP400RH (EMC)

MSP900GH (EMC, ATEX)

### **Hazardous Locations Certifications (Mobrey MSP900GH Only)**

#### **ATEX Intrinsically Safe Approval**

Certificate Number: SIRA 02ATEX2405X

ATEX Intrinsic Safety (*Mobrey MSP900GH Only*)

II 1 G

Ex ia IIC T6 Ga ( $T_a$  –40 to 55 °C)

Ex ia IIC T4 Ga ( $T_a$  –40 to 60 °C)

Ui = 30 V, Ii = 120 mA, Pi = 0.82 W, Li = 108  $\mu$ H, Ci = 0  $\mu$ F

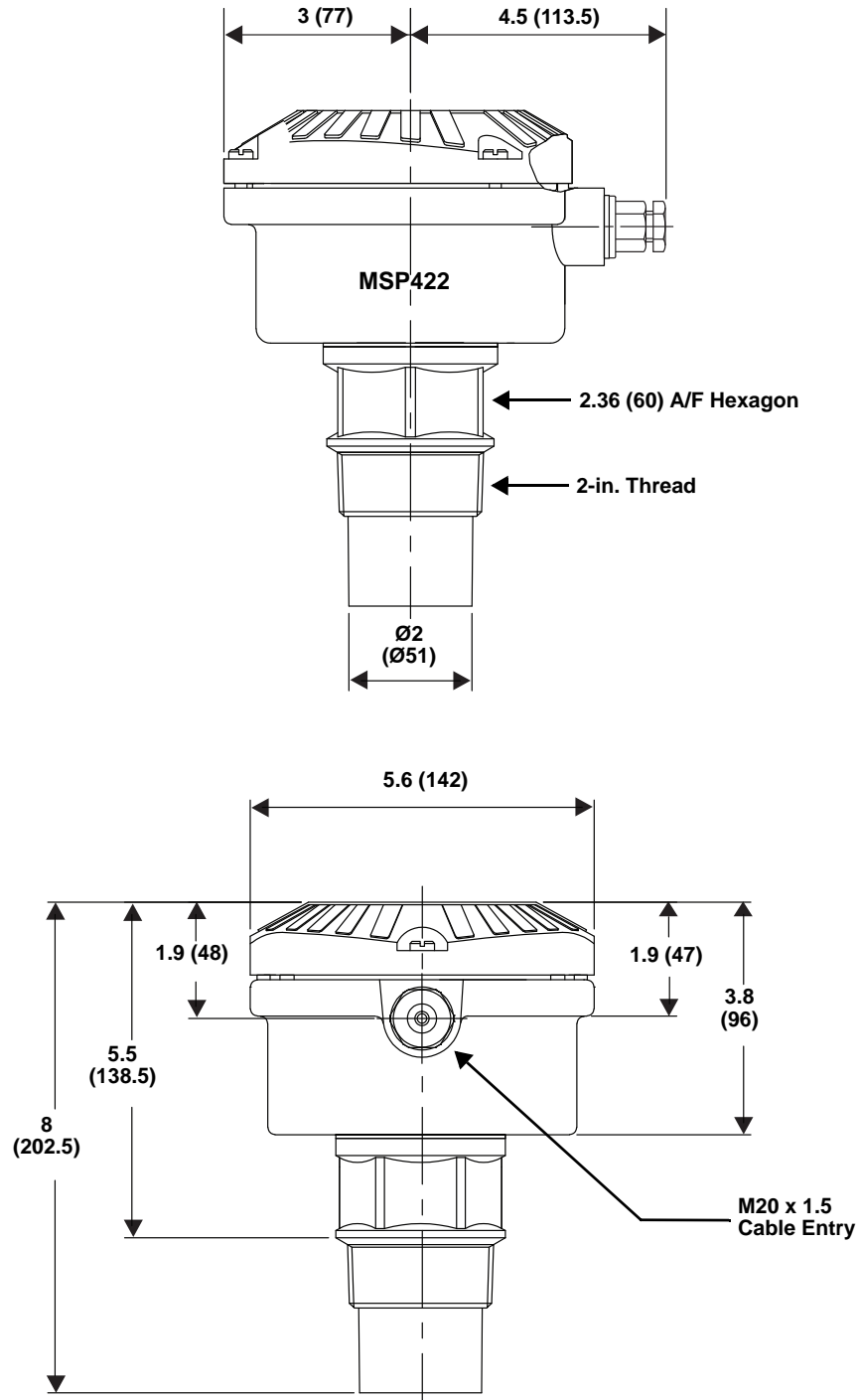
#### **Special Conditions For Safe Use:**

1. All transmitter models have external plastic parts, which could present a risk of ignition due to electrostatic charge build-up. They shall not be directly installed in any process where its enclosure might be charged by the rapid flow of non-conductive media.
2. All transmitter models shall only be cleaned with a damp cloth.
3. When the transmitter housing uses aluminum alloy in its construction, this presents a risk of ignition due to impact and shall be taken into consideration on installation and use.

## Dimensional Drawings

### Threaded Mounting (MSP422)

Note: Dimensions are in inches (mm)



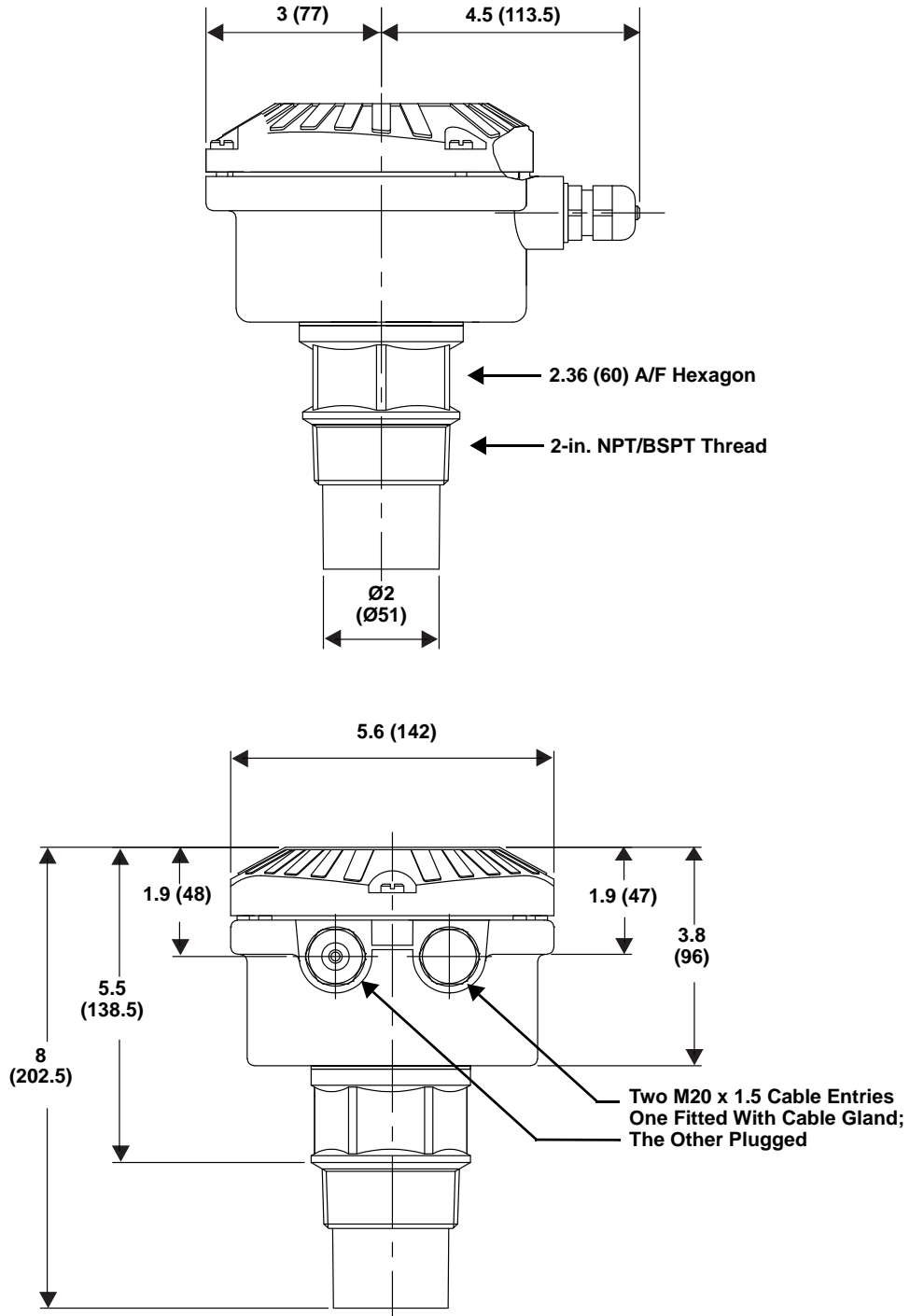
# Product Data Sheet

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# Mobrey MSP Series

## Threaded Mounting (MSP400RH/MSP900GH)

Note: Dimensions are in inches (mm)

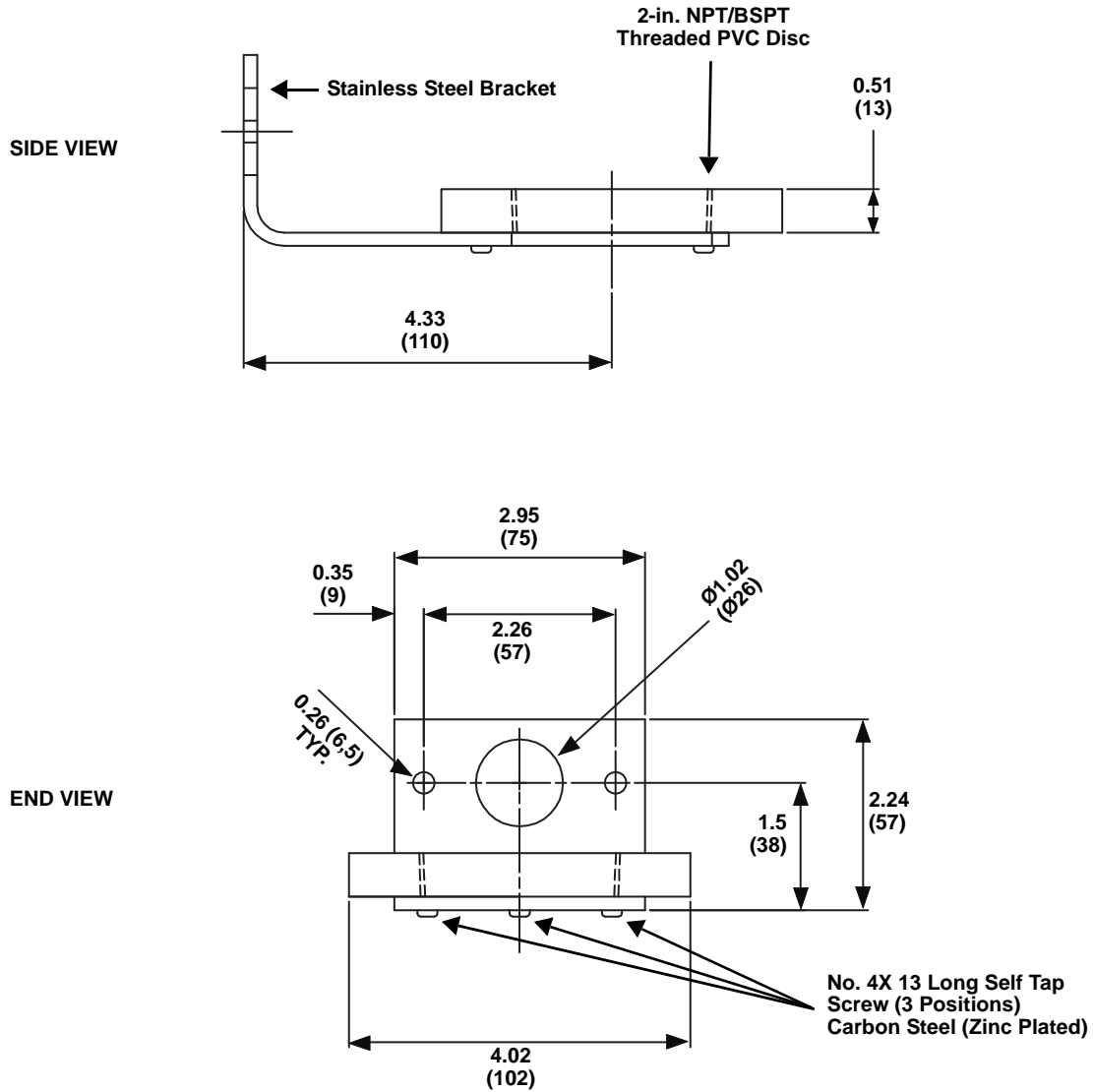


# Mobrey MSP Series

## 2-in. NPT/BSPT Bracket Kits

Note: Dimensions are in inches (mm)

Note: The combined weight of bracket and disc is 16 oz. (0,5 kg)



ACTUAL VIEW WITH TRANSMITTER MOUNTED



**Product Data Sheet**

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**Mobrey MSP Series**

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# 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

### 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 in Industrial and Municipal effluent treatment processes.

- Mobrey MSM400 – Sludge Density 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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