

# Mobrey Ultrasonic

## MSP422, MSP400RH, and MSP900GH 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

# Overview of the Mobrey MSP422/400RH/900GH



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® 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

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## 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
 

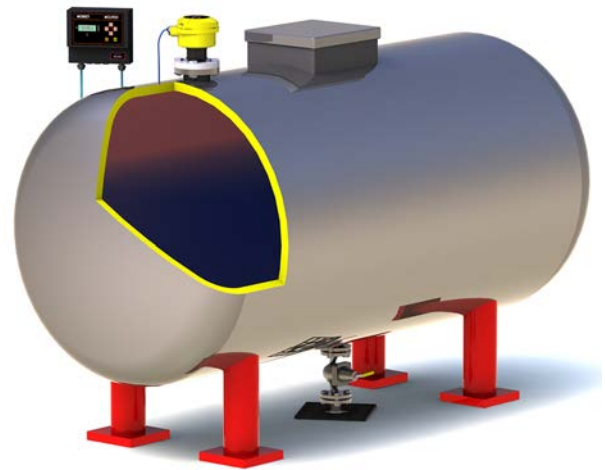
The distance to the surface can be adjusted by a user-entered positive or negative offset value.
- Level offset
 

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 a Mobrey MSP400RH Transmitter and a Mobrey MCU900 Series Control Unit

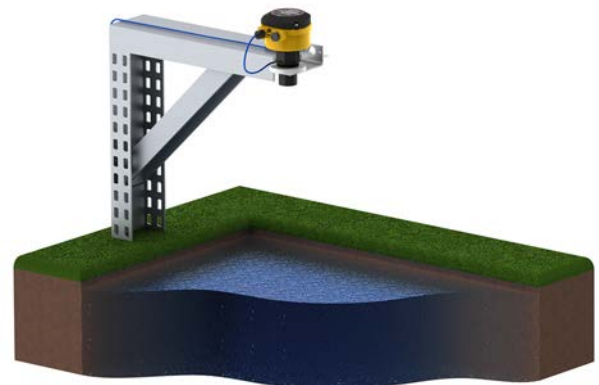
## Applications

- Storage tank levels, open channel flow, effluent pits, reservoir level, buffer tanks, and more

## Choosing the right model

- Each MSP Series transmitter has been designed for a specific purpose, as shown in the table here:

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



Open Channel Flow Measurement with a Mobrey MSP900GH Transmitter

## Mobrey MSP422 Level Transmitter

**Table 1. 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

**Table 2. MSP400RH ordering information**

Model	Product Description
MSP400R	Ultrasonic Level Transmitter with 2 integral relays
<b>Signal Output</b>	
H	4–20 mA with HART communication
<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: 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 MSP900GH Level Transmitter

**Table 3. MSP900GH ordering information**

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

## MSP Series Accessories

**Table 4. MSP Series accessories ordering information**

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 9.

# Specifications

## General

### Products

- Mobrey MSP422 Ultrasonic Transmitter:  
Level and Distance measurement
- Mobrey MSP400RH Ultrasonic Transmitter:  
Level, Distance, Content (Volume), and Flow measurement, with two integral signal relays
- Mobrey MSP900GH Ultrasonic Transmitter:  
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)

### Blanking distance (dead zone)

- 12 in. (0,3 m)

### Level resolution

- Better than 0.06 in. (1 mm)

### Level accuracy under reference conditions<sup>(1)</sup>

- MSP422:  
± 0.2 in. (5 mm) for < 3.3 ft. (1 m),  
± 0.5% of measured distance for > 3.3 ft. (1 m)
- MSP400RH and MSP900GH:  
± 0.1 in. (2,5 mm) < 3.3 ft (1 m),  
± 0.25% of measured distance for > 3.3 ft. (1 m)

### Update interval

- Display: 500 ms
- Current Output: 200 ms

## Display and 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 and 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)

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

**Electrical parameters (MSP900GH)**

- $U_i = 30 \text{ V}$ ,  $I_i = 120 \text{ mA}$ ,  $P_i = 0,82 \text{ W}$ ,  $L_i = 108 \text{ } \mu\text{H}$ ,  $C_i = 0 \text{ nF}$

**Cable entry**

- Two M20 x 1.5 conduit entries for cable glands

**Output cabling**

- Single twisted-pair and shielded,  
min.  $0,22 \text{ mm}^2$  (24 AWG),  
max.  $1,5 \text{ mm}^2$  (15 AWG)

**Physical specifications****Materials selection**

- Emerson provides a variety of product with various product options and configurations including materials of construction that can be expected to perform well in a wide range of applications. The product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options and components for the particular application. Emerson Process Management is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration or materials of construction selected.

**Materials used in 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)

**Measuring****Temperature compensation<sup>(1)</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>(2)</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 (when using supplied cable gland/blanking plug)

**Electromagnetic compatibility**

- EN61326 (Class B)

**Certifications**

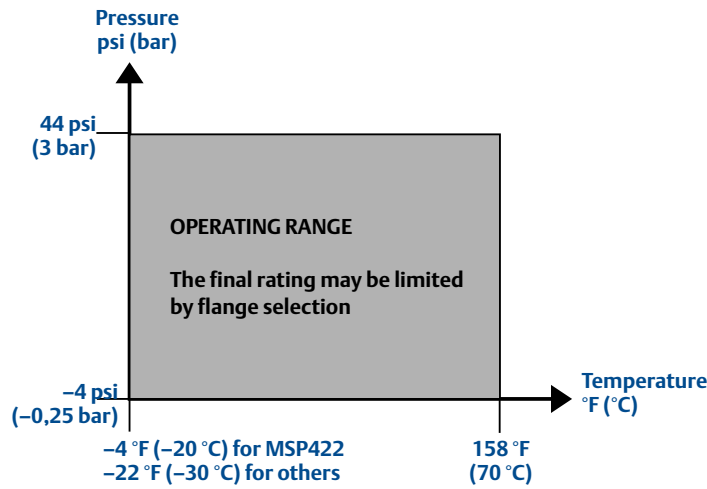
- CE-mark, FM, ATEX (dependent on order code)

(1) See [Table 4 on page 4](#) for optional accessories.

(2) See [page 8](#) onwards for approval temperature ranges.

## Temperature and pressure ratings

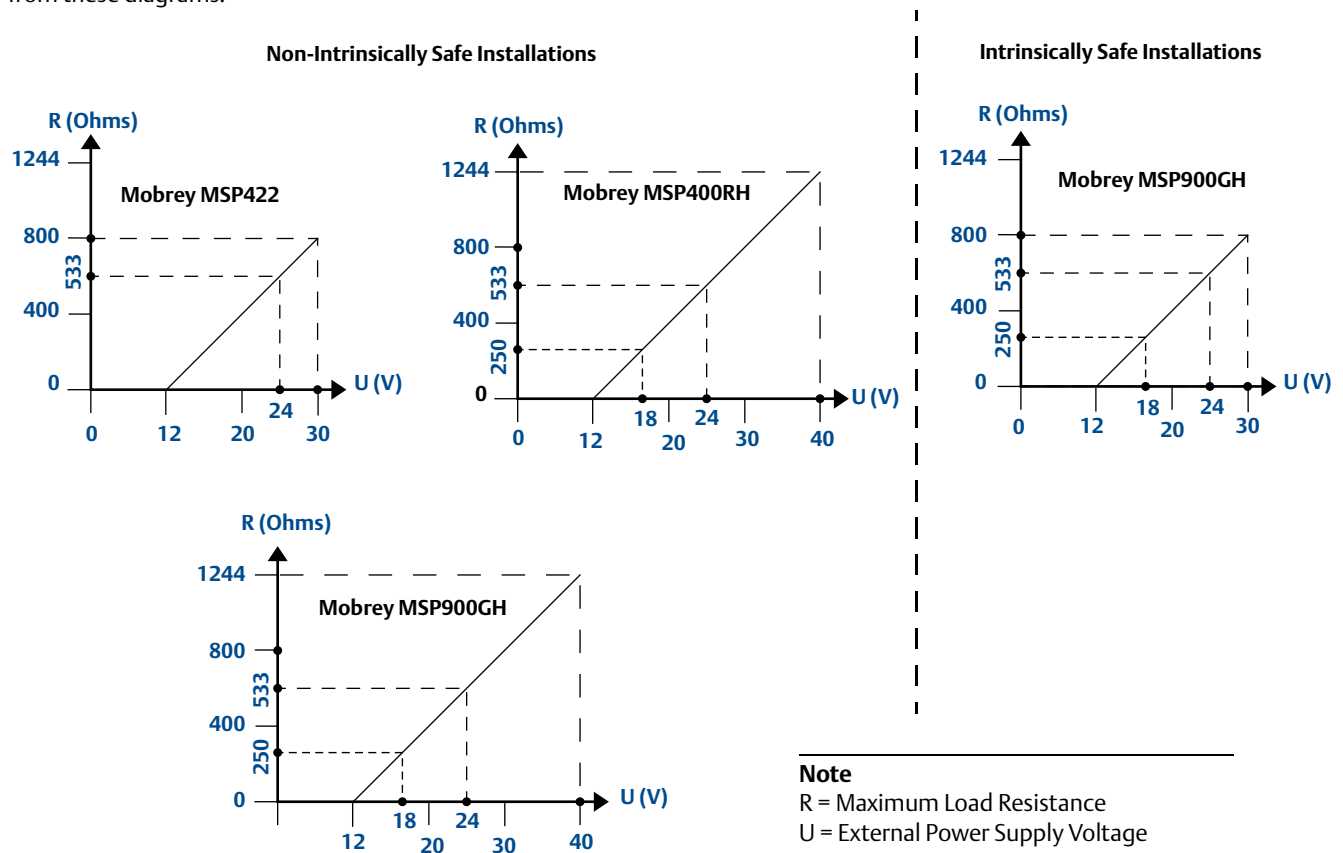
The process temperature/pressure rating depends on the design of the transmitter in combination with the flange materials.



Process Temperature And Pressure Diagram For Mobrey MSP422, MSP400RH and MSP900GH

## 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 Series Control Unit does not require additional resistance. The maximum load resistance can be determined from these diagrams:



## Product Certifications

### Approved manufacturing locations

- Rosemount Measurement Limited  
– Slough, United Kingdom

### European directive information

The EC declaration of conformity certificate 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)

### Ordinary locations certification (Mobrey MSP422 and MSP400RH only)

#### American certification

##### Factory Mutual (FM) ordinary locations approval

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).

### Hazardous locations certification (Mobrey MSP900GH only)

#### European certification

##### 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 μH, Ci = 0 μF

#### Special conditions for safe use

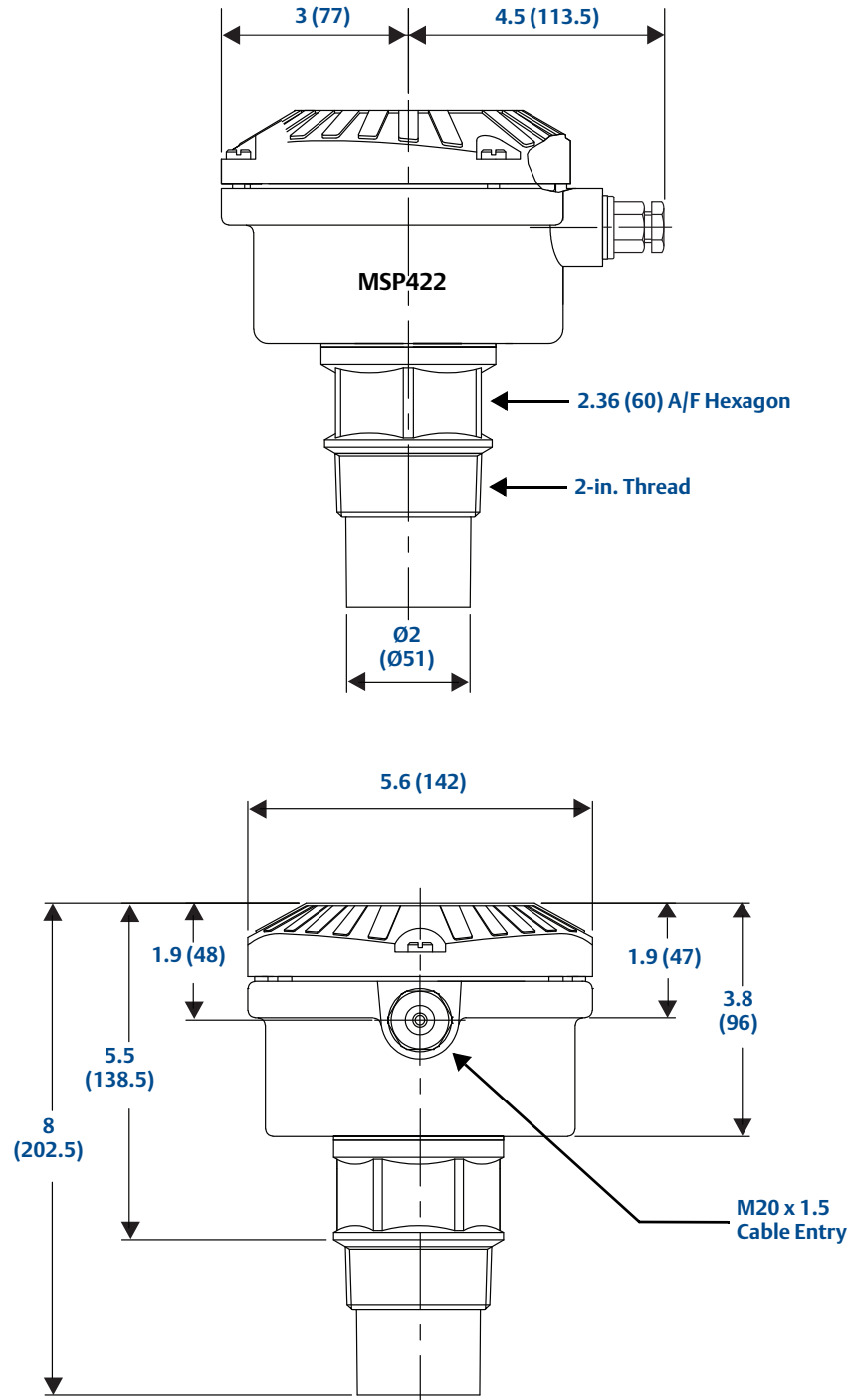
1. All transmitter models have external plastic parts, which could present a risk of ignition due to electrostatic charge build-up. They shall not be directly installed in any process where its enclosure might be charged by the rapid flow of non-conductive media.
2. All transmitter models shall only 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

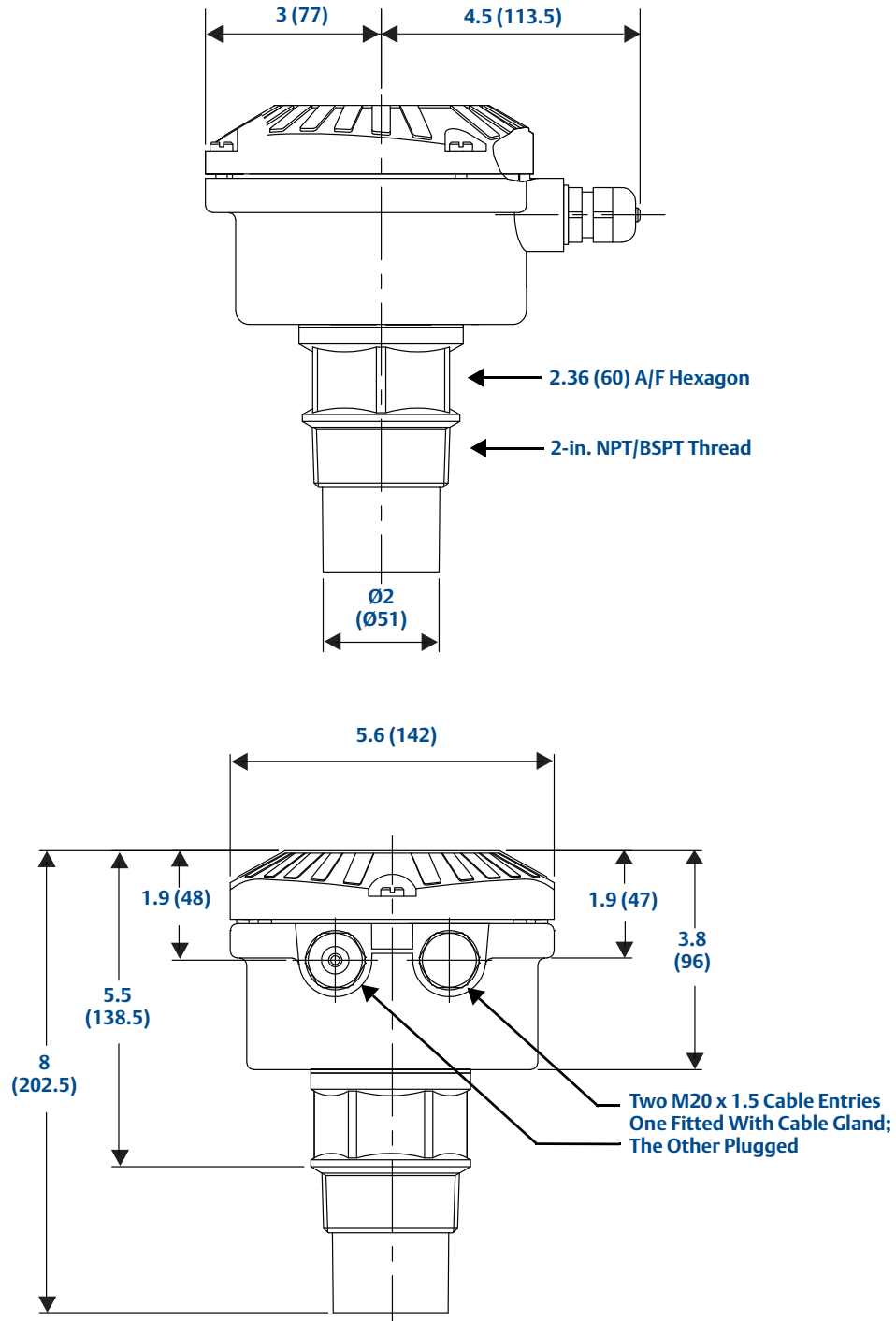
## Threaded mounting (MSP422)

Note: Dimensions are in inches (mm).



**Threaded mounting (MSP400RH/MSP900GH)**

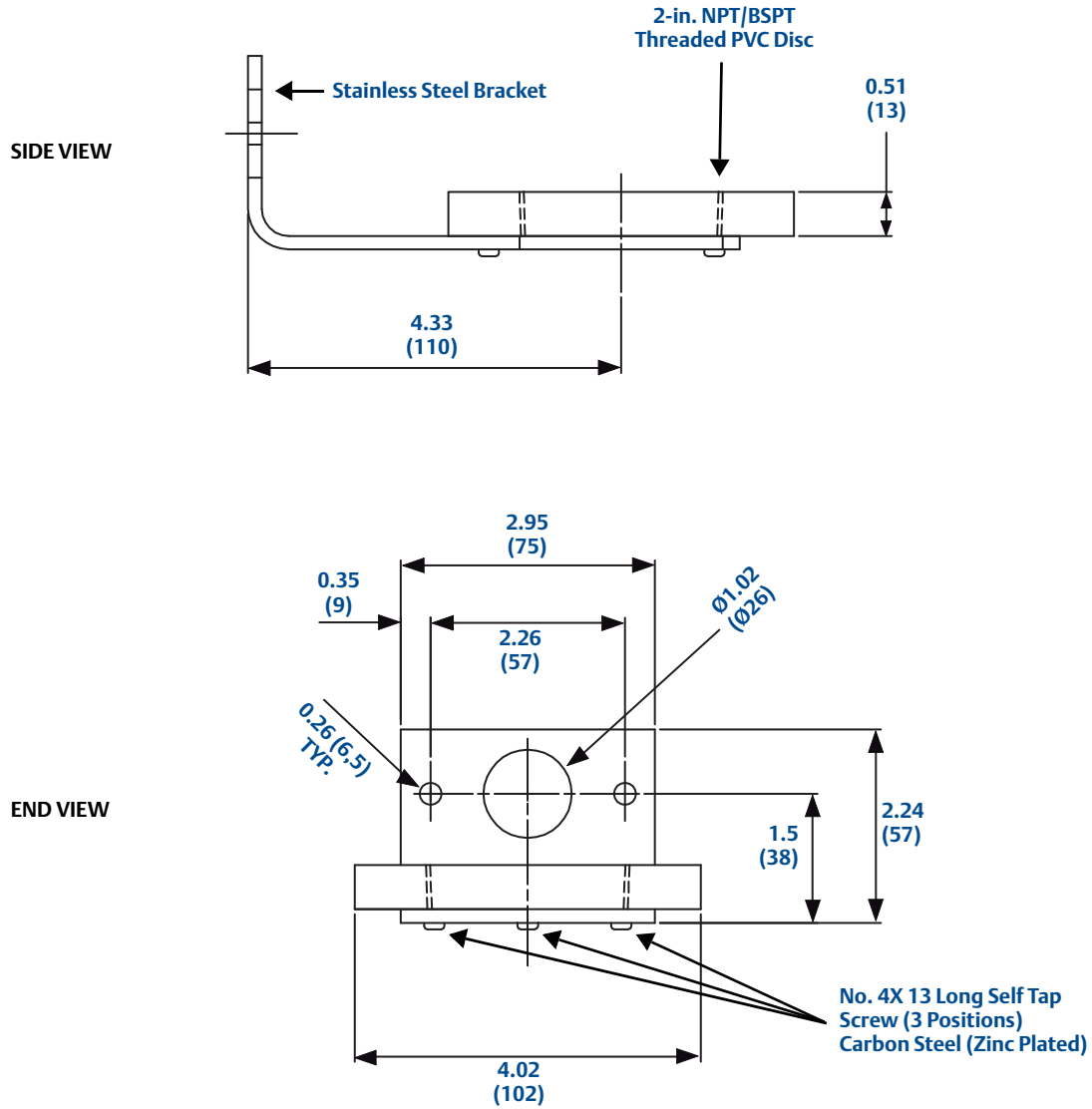
Note: Dimensions are in inches (mm).



### 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



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