

Mobrey Ultrasonic

MSP900SH Level and MSP900FH Flow Transmitters



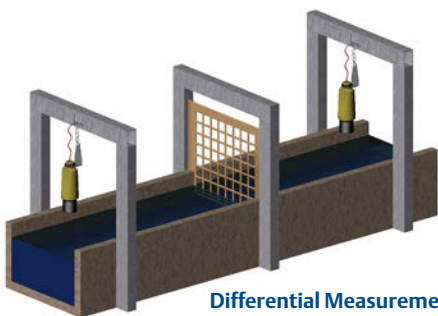
- Non-contacting measurement with no moving parts
- Fast and simple to install and configure
- Continuous measurement of level, contents (volume), or open channel flow
- MCERTS certified version for use with Mobrey MCU900 Series Control Unit
- Loop-powered 4-20 mA with HART[®] output
- Factory sealed (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

Overview of the Mobrey MSP900SH and MSP900FH



**Mobrey MSP900SH
Level Transmitter**

**Mobrey MSP900FH
Flow Transmitter**



**Differential Measurement with
two MSP900FH MSP900SH Transmitters**



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

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.

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 UPVC 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

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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

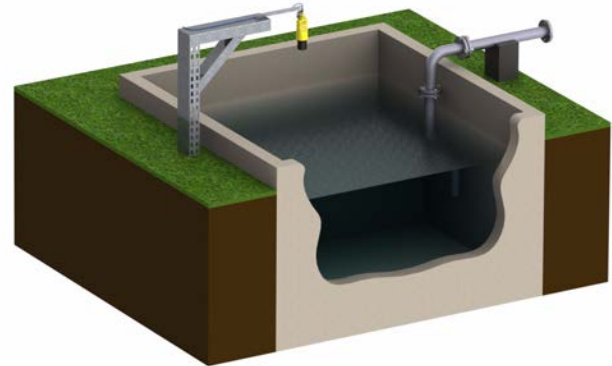
The bottom reference can be automatically set using a known user-entered depth.
- Set as empty

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.



Reservoir Level Measurement with a Mobrey MSP900SH Transmitter

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 within a tank, sump, or reservoir	MSP900SH	39-ft. (12 m)
Differential level measurement (2 x Transmitters and 1 x MCU900)	MSP900SH or MSP900FH	39-ft. (12 m) 11-ft. (3,3 m)
Open channel flow or volume measurement	MSP900FH	11-ft. (3,3 m)



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

Mobrey MSP900SH Level Transmitter Ordering

Table 1. MSP900SH Ordering Information

Model	Product Description
MSP900S	Ultrasonic level sump transmitter, 39 ft. (12 m) range
Signal Output	
H-	4–20 mA with HART communication
Product Certificates	
A ⁽¹⁾	ATEX and CSA Intrinsically Safe
U ⁽²⁾	FM and CSA Intrinsically Safe
Cable Lengths	
/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
Typical Model Number: MSP900SH-A/3	

(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 MSP900FH Flow Transmitter Ordering

Table 2. MSP900FH Ordering Information

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

(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.

MSP Accessories

Accessories	
MSP-FLG4 ⁽¹⁾	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 3/4-in. NPT female (<i>as supplied with the MSP900FH-U</i>)
03100-1005-0002	Conduit adaptor boss, 1-in. BSPP female to M20 x 1.5 female (<i>as supplied with the MSP900FH-A</i>)
MSP-HVD ⁽²⁾	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.

Specifications

General

Product

- Mobrey MSP900SH and MSP900FH Ultrasonic Transmitters: 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)
- 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 under reference conditions⁽¹⁾

- ± 0.1 in. (2,5 mm) for measured distance < 3.3 ft. (1 m)
- $\pm 0.25\%$ 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

- Field Communicator or Mobrey MCU900 Series Universal Control Unit

Electrical

Cable

- Factory fitted 2-core shielded cable for external power supply and communication

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 = 22.5 mA

Saturation levels

- Low = 3.8 mA. High = 20.5 mA

Electrical parameters

- $U_i = 30$ V, $I_i = 120$ mA, $P_i = 0,82$ W, $C_i = 5$ nF, $L_i = 27$ mH

Physical specifications

Materials selection

- Delta Mobrey 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. Delta Mobrey Limited 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 of Mobrey MSP900SH and MSP900FH

Body and wet-side material

- UPVC (stabilized)

Lock nut

- Glass filled nylon

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

Mechanical

Mounting thread size

- 1-in. NPT or 1-in. BSPP
- See “MSP Accessories” on page 4 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
(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
- 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)

Ingress protection

- IP68 to 33 ft. (10 m)

Electromagnetic compatibility

- EN 61326-1:2006

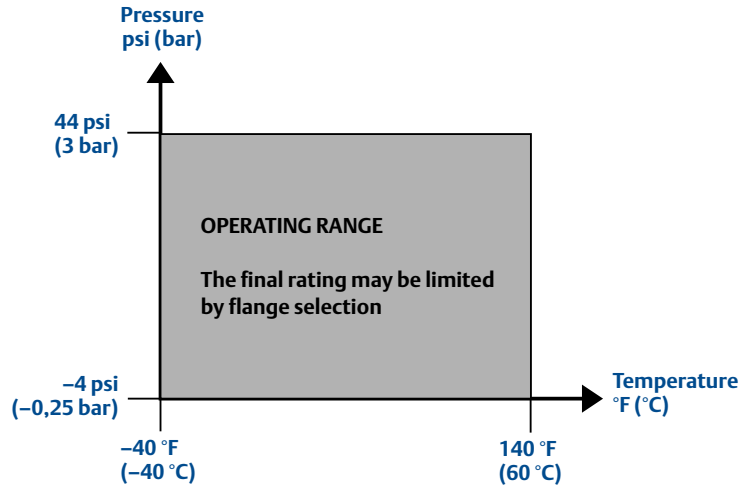
Certifications

- CE-mark, FM, CSA, or ATEX dependent on order code
- The Mobrey MSP900FH is MCERTS⁽¹⁾ certified

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

Temperature and pressure ratings

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

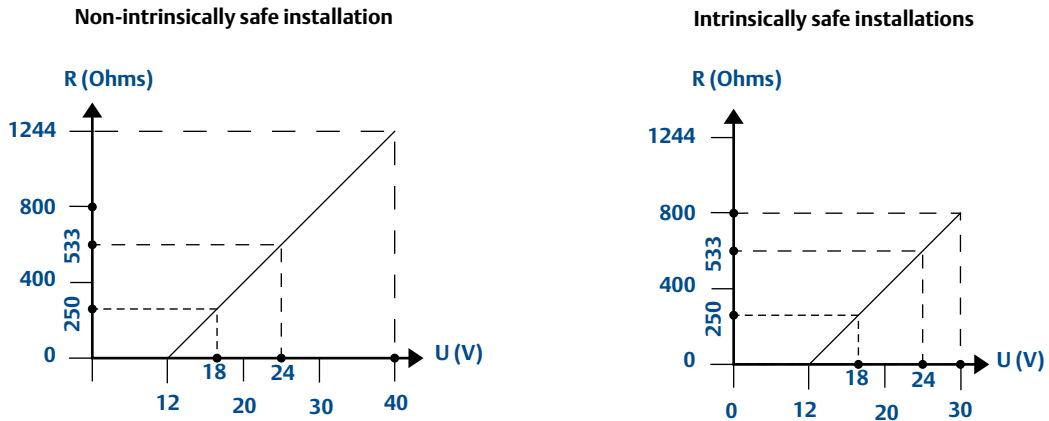


Process temperature and pressure diagram for Mobrey MSP900SH and MSP900FH

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

Product Certifications

Approved manufacturing locations

- Delta Mobrey Limited
 - Slough, United Kingdom

European directive information

The EC declaration of conformity for all applicable European directives for this product can be found in the MSP900SH/FH safety instructions booklet IP2040/SI, available to download from the Mobrey brand pages at www.emersonprocess.com. A hard copy may be obtained by contacting your local sales office.

ATEX directive (94/9/EC)

- Delta Mobrey Limited 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 (MSP900FH only)

- Sira certificate number: MC080131

Hazardous locations certifications

American and Canadian approvals

Factory Mutual (FM) intrinsically safe approval

Certificate number: 3021193
 Intrinsically safe for Class 1, Division 1, Groups A, B, C, and D
 Zone marking: Class I, Zone 0, AEx ia IIC
 Temperature code T6 ($T_a = 55^\circ\text{C}$)
 Temperature code T4 ($T_a = 60^\circ\text{C}$)
 Intrinsically safe when installed in accordance with Mobrey drawing 71097/1131
 IP66, IP68

Canadian Standards Association (CSA) intrinsically safe approval

Certificate number: 1352094
 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 code:
 T4 at $T_a = -40\text{ to }60^\circ\text{C}$ or T6 at $T_a = -40\text{ to }55^\circ\text{C}$

European certifications

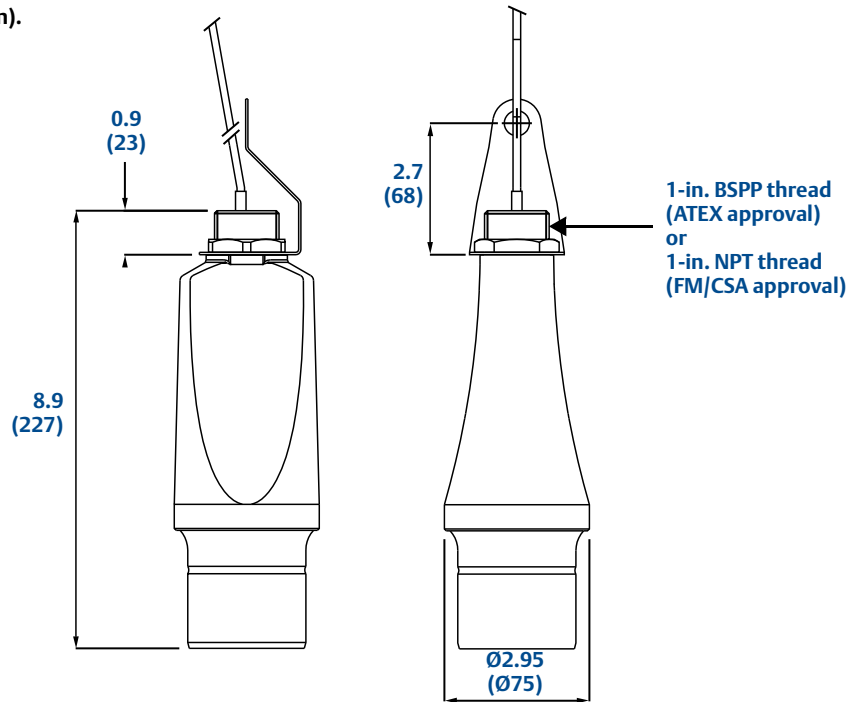
ATEX intrinsically safe approval

Certificate number: Sira 09ATEX2102X
 Intrinsically safe for II 1 G, Ex ia IIC Ga
 T6 ($T_a = -40\text{ to }55^\circ\text{C}$), T4 ($T_a = -40\text{ to }60^\circ\text{C}$)
 $U_i = 30\text{ V}$, $I_i = 120\text{ mA}$, $P_i = 0,82\text{ W}$, $C_i = 5\text{ nF}$, $L_i = 27\text{ }\mu\text{H}$
 IP66, IP68

Dimensional Drawings

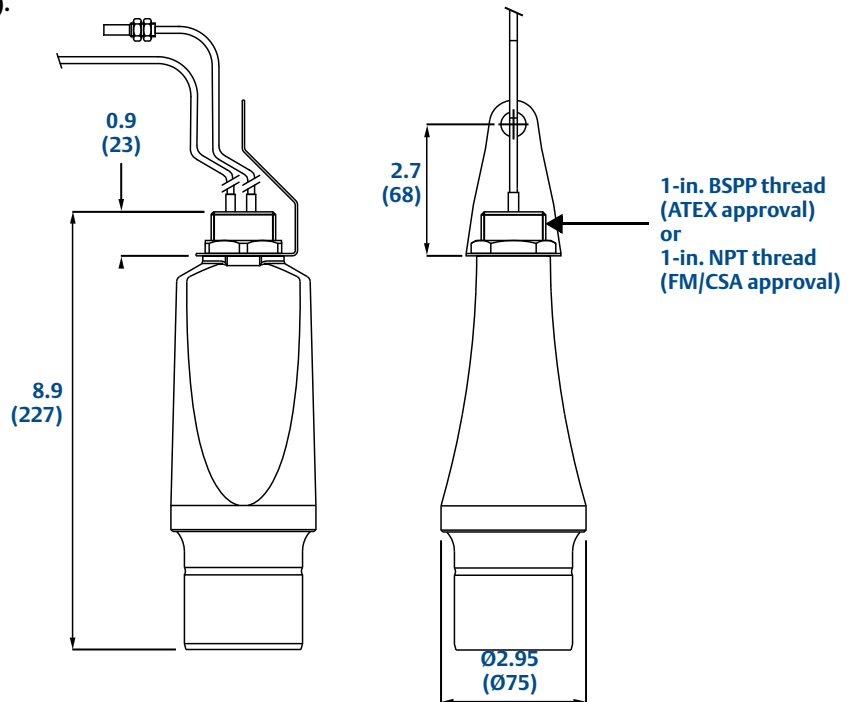
MSP900SH threaded mounting

Note: Dimensions are in inches (mm).



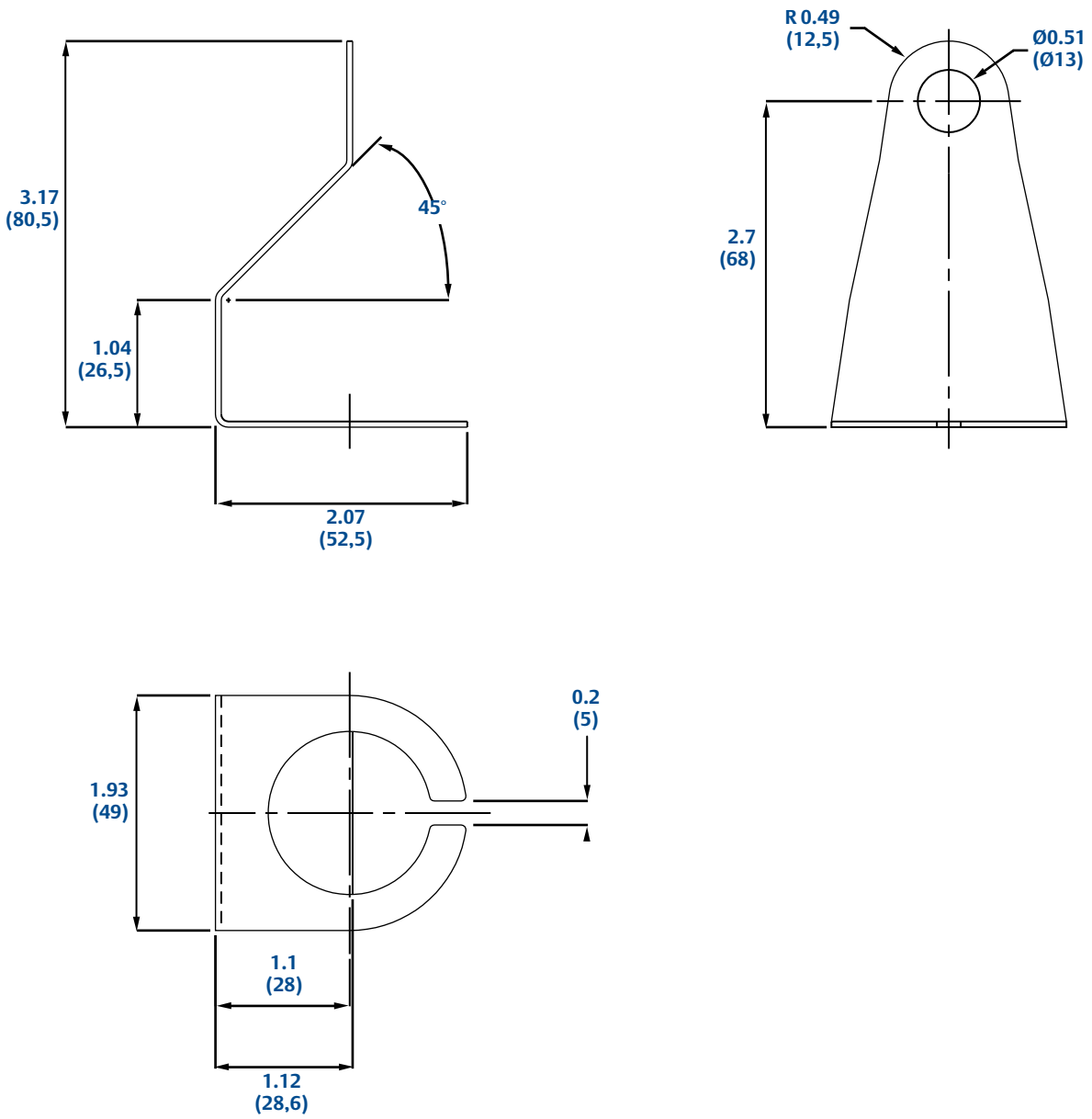
MSP900FH Threaded Mounting

Note: Dimensions are in inches (mm).



1-inch NPT/BSPP Bracket Kits


Note: Dimensions are in inches (mm)





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