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® 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*

Contents

Reliable Performance...In Challenging Applications . . . . . page 2
Mobrey MSP900SH Level Transmitter . . . . . page 4
Mobrey MSP900FH Flow Transmitter . . . . . page 5
Specifications . . . . . page 7
Product Certifications . . . . . page 9
Dimensional Drawings. . . . . page 10

Reliable Performance...In Challenging Applications

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 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

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 or MSP900FH	39-ft. (12 m) 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 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
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

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
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

Table 4. 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 (*same bracket as supplied with all transmitter versions*)
03100-1005-0001	Conduit adaptor boss, 1-in. NPT female to 3/4-in. NPT female (*as supplied with the MSP900FH-U*)
03100-1005-0002	Conduit adaptor boss, 1-in. BSPP female to M20 x 1.5 female (*as supplied with the MSP900FH-A*)
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.

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.

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) ± 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(2)	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 = 21 mA
Saturation Levels	Low = 3.8 mA. High=20.5 mA
Electrical parameters	Ui = 30 V, Ii = 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 (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); (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(3) 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.

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:

Non-Intrinsically Safe Installation

Intrinsically Safe Installations

Mobrey MSP900SH and Mobrey MSP900FH

NOTE
R = Maximum Load Resistance
U = External Power Supply Voltage

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. 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 °C)

Temperature Code T4 (T_a = 60 °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:

Ui = 30 V, Ii = 120 mA, Pi = 0,82 W, Ci = 5 nF, Li = 27 μH

Temperature Codes:
T4 at Ta = –40 to 60 °C or T6 at Ta = –40 to 55 °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 to 55 °C), T4 (T_a = –40 to 60 °C)

Ui = 30 V, Ii = 120 mA, Pi = 0,82 W, Ci = 5 nF, Li = 27 μH

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)

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, overfill 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, 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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