Mobrey 9700 Transmitter
Submersible Hydrostatic Level Transmitters

- *Hydrostatic electronic level transmitters*
- *Factory sealed and tested for submersed duty*
- *4–20 mA output signal proportional to level*
- *Flush mounted ceramic sensor*
- *Good long term stability*
- *Ideal for industrial or marine applications*
- *Wide range of mounting options*
- *Low cost installation*
- *Readouts for control room or plant mounting*
- *Site adjustable specific gravity (SG) compensation*
- *Intrinsically safe certified*

Contents

Reliable Performance...In Challenging Applications

Mobrey 9710 Transmitter

THE MOBREY 9700 SERIES TRANSMITTERS

The 9700 Series range of tank level transmitters from Mobrey provide the measurement solution where in-tank problems such as foaming, vapor layers, and temperature gradients prohibit the use of other instrumentation.

The 9700 Series transmitter is designed to perform in the extreme conditions of today's industrial measurement applications.

Transmitters are available in both **submersible** and **externally mounted (floodable)** versions. Each transmitter version gives a high performance, has good long term stability, and is virtually maintenance free. A ceramic sensor ensures precise and reliable measurement with an accuracy of better than 0.1%.

OPERATION

At the heart is a Ceramic Capacitive Sensor (CCS). This pressure sensor provides a "flush" diaphragm, avoiding the risks of sensor clogging and ensures an extremely low hysteresis, minimal output drift, and high repeatability.

The sensor is manufactured using an aluminium oxide ceramic and r provides outstanding resistance to chemical attack. The measuring range is determined by the ceramic thickness, which is precisely controlled during the manufacturing process. The sensor works like a capacitor with electrode surfaces on the inside comprising one measuring and one reference capacitor.

The surfaces of the capacitors are gold-plated and linked to ASIC electronics. These electronics generate a signal proportional to the applied pressure, which is sent to the 4–20 mA signal conditioner.

Mobrey 9720 Transmitter

FEATURES

- Two-wire 24 Vdc loop-powered
- 4 to 20mA, remote zero and span option
- Accuracy ± 0.1% of calibrated span
- Ranges up to 200 m / 656 ft. H_20, and 10:1 rangeability
- Ceramic capacitive sensor
- Low maintenance
- Fully submersible IP68 / NEMA 6P
- Reverse polarity protection
- Intrinsically safe option
- Dedicated marine version

BENEFITS

- Unaffected by difficult ullage conditions
- Stable readings under adverse conditions
- Control electronics may be remote mounted

SPECIAL FEATURES

Accuracy Better than ±0.1% of Calibrated Span

The ceramic sensor is a “dry cell”, meaning that no isolating diaphragm and fill fluid is needed. The process fluid acts directly onto the rugged, corrosion resistant sensor.

The 9700 Series provides an accuracy of better than ±0.1% of calibrated span and good long term stability.

Protected from Aggressive Environments/Processes

The 9700 Series withstands the harshest of environments and processes. Its rugged ceramic sensor is inherently capable of withstanding attack from most chemicals.

Glanding System

The glanding system used with the submersible versions ensures absolute integrity of the IP68 / NEMA 6P rating.

IP68 / NEMA 6P units are generally factory fitted with the required length of vented cable.

Mounting options

The 9700 Series is available in various mounting configurations, all are rated IP68.

- 9710 – Cable suspended
- 9720 – Clamped, cable suspended
- 9780 – Pole mounted
- 9790 – Flanged

NOTE:
Threaded mounting is available upon request.

Optional Remote Zero and Span

To simplify installation, all 9700 Series transmitters can be supplied with remote zero and span.

Remote zero and span allows zero and full scale output to be set without removing the sensor from a process. This option includes an IP67 junction box.

Bellows

For humid environments or sea water applications, bellows must be selected (option code “4” of zero and span).

Mobrey 9780 Transmitter

Mobrey 9790 Transmitter

Mobrey 9700 Hydrostatic Electronic Level Transmitter (Commercial Version)

- Ranges up to 656 ft. (200 m) of H_20
- Fully submersible IP68 / NEMA 6P
- Two-wire 24 Vdc loop-powered
- 4–20 mA output
- Remote zero and span option

Additional Information

Specifications: page 8
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Table 1. Commercial Mobrey 9700 Ordering Information

Model	Product Description
97	9700 Series, electronic hydrostatic level transmitter (Commercial version)
Sensor Type	
10C	Cable suspended, submersible
20C	Clamped, cable suspended, submersible
80C	Pole mount, submersible
90C	Flanged, submersible
Enclosure and Process Connection Material	
S	Stainless steel 316
A	Aluminum bronze
O-ring(1)	
1	Fluorocarbon (FPM/FKM)
2	Nitrile
Nominal Range	
A	0 to 6.5 ft. (0 to 2 m) H_20 depth
B	0 to 16.4 ft. (0 to 5 m) H_20 depth
C	0 to 32.8 ft. (0 to 10 m) H_20 depth
D	0 to 65.6 ft. (0 to 20 m) H_20 depth
E	0 to 164 ft. (0 to 50 m) H_20 depth
F	0 to 328 ft. (0 to 100 m) H_20 depth
G	0 to 3.3 ft. (0 to 1 m) H_20 depth
H	0 to 11.5 ft. (0 to 3.5 m) H_20 depth
J	0 to 656 ft. (0 to 200 m) H_20 depth
Zero and Span	
1	Integral (Fixed)
2	Remote
4	Remote and bellows
Cable Material(2) — *Specify the required cable length with the order*	
P	Polyurethane
F	Fluorinated ethylene-propylene (F.E.P)
X	None
Approval	
0	Non-certified (non-hazardous area use only)
1(3)	ATEX II 1 GD, EEx ia IIB T4
2	CSA (Canada and USA)
3	ATEX II 1G EEx ia IIB T4

Table 1. Commercial Mobrey 9700 Ordering Information

Process Connection	
A[4]	Slip-on flange, DN25 PN40 (DIN 2635)
B	Fixed flange, DN40 PN40 (DIN 2635)
C	Fixed flange, DN50 PN40 (DIN 2635)
D	Fixed flange, DN80 PN40 (DIN 2635)
E[6]	Slip-on flange, 1-in. ASME B16.5 Class 150
F	Fixed flange, 2-in. ASME B16.5 Class 150
G	Fixed flange, 3-in. ASME B16.5 Class 150
X	None
Pole[5] – *Specify the pole length with the order*	
0	Pole without joints
1	Pole with one joint
2	Pole with two joints
3	Pole with three joints
4	Pole with four joints
9	No pole
Typical Model Number: 97 10C S 1 A 1 P 0 X 9	

(1) Not available on flanged versions.

(2) Specified suspended cable and pole length is from the transmitter front face. The maximum allowed cable length is 220 m.

(3) Approval Code 1 (ATEX II 1 GD EEx ia IIB T4) is not a standard option, but is available as a special.

(4) Not available for the 9780 version.

(5) For pole lengths over 2 m, the pole is divided into equal lengths using pole joints.
The maximum number of poles for assembly is 4 off with a maximum length of 2 m per pole.

Mobrey 9700 Hydrostatic Electronic Level Transmitter (Marine Approved Version)

- Marine approved 9710M, 9720M, 9780M, and 9790M
- Ranges up to 656 ft. (200 m) of H_20
- Fully submersible IP68 / NEMA 6P
- Two-wire 24 Vdc loop-powered
- 4–20 mA output
- Remote zero and span option

Additional Information

Specifications: page 8
Certifications: page 9

Table 2. Marine Approved Mobrey 9700 Ordering Information

Model	Product Description
97	9700 Series, electronic hydrostatic level transmitter (Marine approved version)
Sensor Type	
10M	Cable suspended, submersible
20M	Clamped, cable suspended, submersible
80M	Pole mount, submersible
90M	Flanged, submersible
Enclosure and Process Connection Material	
S(1)	Stainless steel 316 – *do not specify for sea water applications*
A(2)	Aluminum bronze – *for water and sea water applications*
O-ring(3)	
1	Fluorocarbon (FPM/FKM)
2	Nitrile
Nominal Range	
A	0 to 6.5 ft. (0 to 2 m) H_20 depth
B	0 to 16.4 ft. (0 to 5 m) H_20 depth
C	0 to 32.8 ft. (0 to 10 m) H_20 depth
D	0 to 65.6 ft. (0 to 20 m) H_20 depth
E	0 to 164 ft. (0 to 50 m) H_20 depth
F	0 to 328 ft. (0 to 100 m) H_20 depth
G	0 to 3.3 ft. (0 to 1 m) H_20 depth
H	0 to 11.5 ft. (0 to 3.5 m) H_20 depth
J	0 to 656 ft. (0 to 200 m) H_20 depth
Zero and Span	
1(1)	Integral (Fixed)
2(1)	Remote
4	Remote and bellows
Cable Material(4) – *Specify the required cable length with the order*	
P	Polyurethane
F	Fluorinated ethylene-propylene (F.E.P)
X	None

Table 2. Marine Approved Mobrey 9700 Ordering Information

Approval	
0	Non-certified (non-hazardous area use only)
1(5)	ATEX II 1 GD, EEx ia IIB T4
2	CSA (Canada and USA)
3	ATEX II 1G EEx ia IIB T4
Process Connection	
A(6)	Slip-on flange, DN25 PN40 (DIN 2635)
B	Fixed flange, DN40 PN40 (DIN 2635)
C	Fixed flange, DN50 PN40 (DIN 2635)
D	Fixed flange, DN80 PN40 (DIN 2635)
E(6)	Slip-on flange, 1-in. ASME B16.5 Class 150
F	Fixed flange, 2-in. ASME B16.5 Class 150
G	Fixed flange, 3-in. ASME B16.5 Class 150
X	None
Pole(7) – *Specify the pole length with the order*	
0	Pole without joints
1	Pole with one joint
2	Pole with two joints
3	Pole with three joints
4	Pole with four joints
9	No pole
Typical Model Number: 97 10M S 1 A 1 P 0 X 9	

(1) Do not specify for sea water applications.

(2) For use with water and sea water applications. The remote and bellows (Option 4 zero and span) must be selected

(3) Not available on flanged versions.

(4) Specified suspended cable and pole length is from the transmitter front face. The maximum allowed cable length is 220 m.

(5) Approval Code 1 (ATEX II 1 GD EEx ia IIB T4) is not a standard option, but is available as a special.

(6) Not available for the 9780 version.

(7) For pole lengths over 2 m, the pole is divided into equal lengths using pole joints.
The maximum number of poles for assembly is 4 off with a maximum length of 2 m per pole.

Specifications for 9710, 9720, 9780, and 9790

FUNCTIONAL

Output signal
Two-wire, 4-20mA

Power supply
10 to 30 Vdc

Load resistance
R=50 x (supply voltage-10V) Ù

Measuring range
Up to 200 m / 8 in. to 656 ft. H_20 (see note)

Overrange limit
5 x range up to a max 600m / 1968ft H20

Span adjustment
+10 to + 100% URL*

Process temp. limits
9710, 9720 & 9780 -20 to + 60°C / -4 to +140°F
9790 -20 to + 90°C (80°C Ex ia)

Ambient temp. limits
-20 to + 60°C

Humidity limits
0 to 100% RH when terminated using the 9710/077 vented terminal box

Hazardous area certification
ATEX II 1 G EEx ia IIB T4
CSA (Canada & USA)

PERFORMANCE

Accuracy
±0.1% ** of calibrated span
(includes effects of linearity, hysteresis and repeatability)

Stability
± 0.1% Upper Range Limit (URL) per 6 months

Temperature effect
±0.015% Upper Range Limit (URL) per °C / °F
(over ambient temp. range)

PHYSICAL

Cable entry
Glanding system supplied with required length of vented cable

Wetted Parts

Sensor
Ceramic

Sensor housing
316 Stainless steel, Aluminium bronze

Seal rings
Fluorocarbon (FPM/FKM), Nitrile

Cable
Polyurethane
Fluorinated Ethylyene Polypropylene (FEP)

Pole
316 Stainless Steel pole supplied with 316 Stainless Steel Housing option
Copper Nickel pole supplied Aluminium Bronze Housing option

Ingress protection
IP68 / NEMA 6P (200m / 656ft H20)

Approximate weight
0.7Kg / 1.54lbs (sensor only)

Remote Enclosure
Aluminium alloy IP67 Grey (RAL 7001) 0.7 kg

Bellows Enclosure
Polyester IP67 Grey (RAL 7001) 1.2 kg

Product Certifications

HAZARDOUS AREA CERTIFICATION

ATEX II 1 G
ATEX II 1 GD (available upon request)
EEx ia IIB T4 Intrinsically Safe
CSA (Canada & USA)
CLI, DIV1, GPS C & D
CL II DIV1, GPS E, F & G, CL III
Ex ia IIB T4
AEx ia IIB T4

MARINE APPROVALS

- Lloyds Register
- Bureau Veritas
- American Bureau of Shipping
- Korean Register
- Germanisher Lloyd
- DNV

Mobrey 9700 Transmitters

Product Data Sheet
IP0078, Rev BA
February 2012

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
- 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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