Level Plus®
Magnetostrictive Liquid Level Transmitters
with Temposonics® Technology

– 5-IN-1 Measurement
– Integral HI level Digital I/O
– Level Inherent Accuracy +/- 1 mm
– API Temperature Corrected Volumes
– No Scheduled Maintenance or Recalibration
– Hazardous Area Certified
MEASURING TECHNOLOGY

The absolute, linear position sensors provided by MTS Sensors rely on the company’s proprietary Temposonics® magnetostrictive technology, which can determine position with a high level of precision and robustness. Each Temposonics® position sensor consists of a ferromagnetic waveguide, a position magnet, a strain pulse converter and supporting electronics. The magnet, connected to the object in motion in the application, generates a magnetic field at its location on the waveguide. A short current pulse is applied to the waveguide. This creates a momentary radial magnetic field and torsional strain on the waveguide. The momentary interaction of the magnetic fields releases a torsional strain pulse that propagates the length of the waveguide. When the ultrasonic wave reaches the end of the waveguide it is converted into an electrical signal. Since the speed of the ultrasonic wave in the waveguide is precisely known, the time required to receive the return signal can be converted into a linear position measurement with both high accuracy and repeatability.

LevelLimit®

The Level Plus® LevelLimit liquid level transmitter satisfies the demand for an accurate and robust liquid level transmitter with integral HI level overfill protection. The level transmitter offers the ability to measure the product level, interface level, temperature, and volume. The electrically isolated HI level detection uses a separate set of electronics and reed switch technology to offer a Digital I/O output based off of the movement of an independent HI level float. The HI level float offers mechanical testing for verification.

### Features:

- 5-in-1 Measurement:
  - Product Level
  - Interface Level
  - Temperature
  - Volume
  - HI level Digital I/O
- No scheduled maintenance or recalibration
- Level Inherent Accuracy +/- 1 mm
- Integral Display
- Intrinsically Safe
- Explosion Proof

### Applications:

- Inventory Control
- Bulk Storage
- Custody Transfer

### Industries:

- Petroleum
- LPG Terminals
- Food & Beverage

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**Standard** | **Rating** |
---|---|
FM 3610 | ISA 60079-11:2014 | Class I, Div. 1, Groups A, B, C, D T4 Class I, Zone 0/1, AEx ia IIC T4 Ta= -50 to 71°C: IP65 |
C22.2 No. 157 | C22.2 No. 60079-11:2014 | Class I, Div. 1, Groups A, B, C, D T4 Class I, Zone 0/1, Ex ia IIC T4 Ta= -50 to 71°C: IP65 |
EN 60079-11:2012 | FM14ATEX0068X | II 1/2 G Ex ia IIC T4 Ta= -50 to 71°C: IP65 |
IEC 60079-11:2011 | IECEx FMG 14.0032X | II 1/2 G Ex ia IIC T4 Ga/Gb Ta= -50 to 71°C: IP65 |
FM 3615 | ISA 60079-1 | Class I, Div. 1, Groups A, B, C, D T6...T3 Class I, Zone 0/1, AEx db IIB+H2 T6...T3 Ga/Gb Ta= -40 to 71°C: IP65 |
C22.2 No. 30 | C22.2 No. 60079-1 | Class I, Div. 1, Groups B, C, D T6...T3 Ex db IIB+H2 T6...T3 Ga/Gb Ta= -40 to 71°C: IP65 |
EN 60079-1:2014 | FM16ATEX0068X | II 1/2 G Ex db IIB+H2 T6...T3 Ga/Gb Ta= -40 to 71°C: IP65 |
IEC 60079-1:2011 | IECEx FMG 16.0033X | Ex db IIB+H2 T6...T3 Ga/Gb Ta= -40 to 71°C: IP65 |
### TECHNICAL DATA

#### Level Output

<table>
<thead>
<tr>
<th>Measured Variable</th>
<th>Product level and interface level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Signal /Protocol</td>
<td>Modbus RTU</td>
</tr>
</tbody>
</table>
| Order Length | Flexible hose: 1575...22000 mm (62...866 in.)
Rigid pipe: 305...7620 mm (12...300 in.) |
| Inherent Accuracy | ±1 mm (0.039 in.) |
| Repeatability | 0.001% F.S. or 0.381 mm (0.015 in.) whichever is greater (any direction) |

#### Temperature Output

<table>
<thead>
<tr>
<th>Measured Variable</th>
<th>Average and multipoint temperatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Accuracy</td>
<td></td>
</tr>
</tbody>
</table>
  ±0.2 °C (0.4 °F) range −40...−20 °C (−40...−4 °F),
  ±0.1 °C (0.2 °F) range −20...+70 °C (−4...+158 °F),
  ±0.15 °C (0.3 °F) range +70...+100 °C (+158...+212 °F),
  ±0.5 °C (0.9 °F) range +100...+105 °C (+212...+221 °F) |

#### Digital I/O

- **Input Voltage**: Up to 30 VDC
- **Resistance**: 500 Ohm
- **Current Switch Capability**: 50 mA @ 28 VDC
- **Compatibility**: ABB RMC 100, Emerson ROC 827, Xetawave I/O, and others
- **Cable**: Cat5 or equivalent type cable is required (15pF/ft. or 49pF/m) for a max run of 4000 ft. (1200 m)

#### Electronics

- **Input Voltage**: 10.5...28 VDC
- **Fail Safe**: High, Full scale
- **Reverse Polarity Protection**: Series diode
- **EMC**: EN 61326-1, EN 61326-2-3, EN 61326-3-2, EN 61000-6-2, EN 61000-6-3, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11

#### Environmental

- **Enclosure Rating**: NEMA Type 4X, IP65
- **Humidity**: 0…100% relative humidity, non-condensing
- **Operating Temperatures**: Electronics: −40...+71 °C (−40...+160 °F)
  Sensing element: −40...+125 °C (−40...+257 °F) (contact factory for specific temperature ranges)
  Temperature element: −40...+105 °C (−40...+221 °F)
- **Vessel Pressure**: Flexible Hose: 30 bar (435 psi)
  Rigid Pipe: 69 bar (1000 psi)
- **Materials**: Wetted parts: 316L stainless steel (contact factory for alternative materials)
  Non-wetted parts: 316L stainless steel, Epoxy coated aluminum

#### Field Installation

- **Housing Dimensions**: Dual cavity: 117 mm (4.6 in.) W × by 127 mm (5 in.) D × 206 mm (8.1 in.) H
- **Mounting**: Flexible hose or Rigid pipe 4 in. adjustable MNPT
- **Wiring**: Connections Terminal block

#### Electrical connections

- **Dual cavity**: ¾ in. FNPT conduit opening. M20 for ATEX/IECEEx version

#### Display

- **Measured variables**: Product level, interface level and temperature
TECHNICAL DRAWING (FLEXIBLE HOSE)

Controlling design dimensions are in millimeters and measurements in ( ) are in inches.

<table>
<thead>
<tr>
<th>Order Length</th>
<th>Inactive Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;7.6 m (25 ft.)</td>
<td>76 mm (3 in.)</td>
</tr>
<tr>
<td>7.6 m to 12.2 m (25 to 40 ft.)</td>
<td>97 mm (3.8 in.)</td>
</tr>
<tr>
<td>12.3 m to 22 m (40 to 72 ft.)</td>
<td>120 mm (4.7 in.)</td>
</tr>
</tbody>
</table>
TECHNICAL DRAWING (RIGID PIPE)

Order Length 305 mm (12 in.) to 7620 mm (300 in.)

Inactive zone please see table

Controlling design dimensions are in millimeters and measurements in ( ) are in inches

TRANSMITTER INACTIVE ZONE REFERENCE

<table>
<thead>
<tr>
<th>Order Length</th>
<th>Inactive Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;7.6 m (25 ft.)</td>
<td>76 mm (3 in.)</td>
</tr>
</tbody>
</table>
# ORDER CODE

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| L | P | L |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | |

**a** Sensor model

- **L** LevelLimit Level Transmitter

**b** Sensor pipe

- **B** 5/8" OD Rigid Pipe
- **M** Flexible, 7/8" OD tube w/bottom fixing eye
- **N** Flexible, 7/8"OD tube w/bottom fixing weight
- **P** Flexible, 7/8"OD tube w/bottom fixing magnet
- **S** Flexible, 7/8" OD tube w/o bottom fixing hardware

**c** Process connection size

- **G** 4 in. NPT adjustable
- **X** None

**d** Number of DT's (Digital Thermometers)

- **B** None
- **I** One DT
- **S** 5 DTs
- **K** Twelve DTs
- **M** Sixteen DTs

**e** DT's placement

- **F** Evenly spaced per API
- **C** Custom
- **X** None

**f** Notified body

- **C** CEC (FMC)
- **E** ATEX
- **F** NEC (FM)
- **I** IEC
- **X** None

**g** Protection method

- **F** Explosionproof / Flame proof - PENDING
- **I** Intrinsically safe
- **X** No approval

**h** Gas group

- **A** Group A (not available with "C = CEC (FMC)" notified body and "F = Flameproof/Explosion" proof protection method)
- **B** Group B
- **C** Group C
- **D** Group D
- **3** IIC (Instrinsically Safe only)
- **4** IIB + H2 (Explosion Proof / Flameproof only)
- **X** None

**i** Unit of measure

- **M** Millimeters (Metric)
- **U** Inches (US customary)

**j** Length (no decimal spaces)

- **X X X X** Flexible sensor pipe: 1575…22000 mm (code as 01575 to 22000)
- **X X X X** Flexible sensor pipe: 62…866 in. (code as 06200 to 86600)
- **X X X X** Rigid sensor pipe: 305…7620 mm (code as 000305 to 76200)
- **X X X X** Rigid sensor pipe: 12…300 in. (code as 01200 to 30000)

**k** Special

- **S** Standard product

**l** HI Level Switch Position

- **X X X X** Flexible sensor pipe: 1575…22000 mm (code as 01575 to 22000)
- **X X X X** Flexible sensor pipe: 62…866 in. (code as 06200 to 86600)
- **X X X X** Rigid sensor pipe: 305…7620 mm (code as 000305 to 76200)
- **X X X X** Rigid sensor pipe: 12…300 in. (code as 01200 to 30000)

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**NOTICE**

Accessories such as floats, cables, and remote displays have to be ordered separately. All accessories are shown in the Accessories Catalog (551103).

*/ Contact factory for other materials*
**FREQUENTLY ORDERED ACCESSORIES** – Additional options available in our Accessories Guide [551103]

**General Notes**
1. Be sure that the float specific gravity is at least 0.05 less than that of the measured liquid as a safety margin at ambient temperature.
2. For interface measurement: A minimum of 0.05 specific gravity differential is required between the upper and lower liquids.
3. When the magnet is not shown, the magnet is positioned at the center line of float.
4. Drawings contained in this document are for reference only. Contact the factory for engineering drawings.

<table>
<thead>
<tr>
<th>Long-gauge float</th>
<th>Pressure</th>
<th>Temperature</th>
<th>Magnet offset</th>
<th>Specific gravity</th>
<th>Material</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>29.3 bar</td>
<td>149 °C</td>
<td></td>
<td>0.54</td>
<td>Stainless steel</td>
<td>252 961-2</td>
</tr>
<tr>
<td></td>
<td>(425 psi)</td>
<td>(300 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22.4 bar</td>
<td>149 °C</td>
<td></td>
<td>0.65</td>
<td>Hastelloy C</td>
<td>252 961-4</td>
</tr>
<tr>
<td></td>
<td>(325 psi)</td>
<td>(300 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>29.3 bar</td>
<td>149 °C</td>
<td>Yes</td>
<td>0.93</td>
<td>Stainless steel</td>
<td>252 962-2</td>
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<tr>
<td></td>
<td>(425 psi)</td>
<td>(300 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>29.3 bar</td>
<td>149 °C</td>
<td>Yes</td>
<td>0.93</td>
<td>Hastelloy C</td>
<td>252 962-4</td>
</tr>
<tr>
<td></td>
<td>(425 psi)</td>
<td>(300 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard floats</th>
<th>Pressure</th>
<th>Temperature</th>
<th>Magnet offset</th>
<th>Specific gravity</th>
<th>Material</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 28 mm</td>
<td>22.4 bar</td>
<td>149 °C</td>
<td>No</td>
<td>0.66</td>
<td>Stainless steel</td>
<td>201 232-2</td>
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<tr>
<td>(1.1)</td>
<td>(325 psi)</td>
<td>(300 °F)</td>
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<td></td>
<td></td>
<td></td>
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<td>Ø 70 mm</td>
<td>22.4 bar</td>
<td>149 °C</td>
<td>No</td>
<td>0.70</td>
<td>Hastelloy C</td>
<td>201 232-4</td>
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<tr>
<td>(2.76)</td>
<td>(325 psi)</td>
<td>(300 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Standard floats</th>
<th>Pressure</th>
<th>Temperature</th>
<th>Magnet offset</th>
<th>Specific gravity</th>
<th>Material</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 18 mm</td>
<td>29.3 bar</td>
<td>149 °C</td>
<td>No</td>
<td>0.67</td>
<td>Stainless steel</td>
<td>251 981-2</td>
</tr>
<tr>
<td>(0.7)</td>
<td>(425 psi)</td>
<td>(300 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 47 mm</td>
<td>29.3 bar</td>
<td>149 °C</td>
<td>No</td>
<td>0.71</td>
<td>Hastelloy C</td>
<td>251 981-4</td>
</tr>
<tr>
<td>(1.85)</td>
<td>(425 psi)</td>
<td>(300 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>