

Data Sheet

Level Plus[®] – LevelLimit

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 Temposonics 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 overflow 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.

| Standard | Rating |
|--|---|
| FM 3610 ISA 60079-11:2014 | Class I, Div. 1, Groups A, B, C, D T4 Class I, Zone 0, AEx ia IIC T4 Ga 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, Ex ia IIC T4 Ga Ta= -50 to 71°C: IP65 |
| EN 60079-11:2012 | FM14ATEX0068X Ex II 1 G Ex ia IIC T4 Ga Ta= -50 to 71°C: IP65 |
| IEC 60079-11:2011 | IECEX FMG 14.0032X Ex ia IIC T4 Ga 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 Ex II ½ 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 |

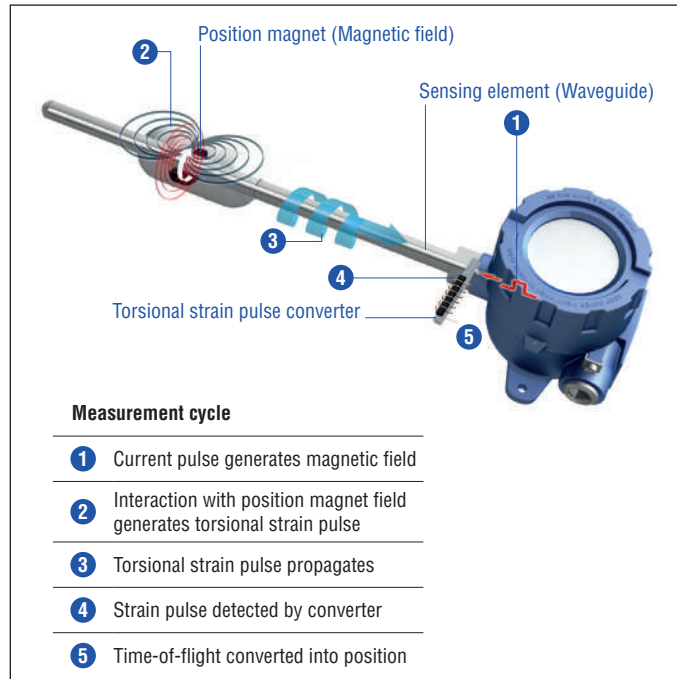


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

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

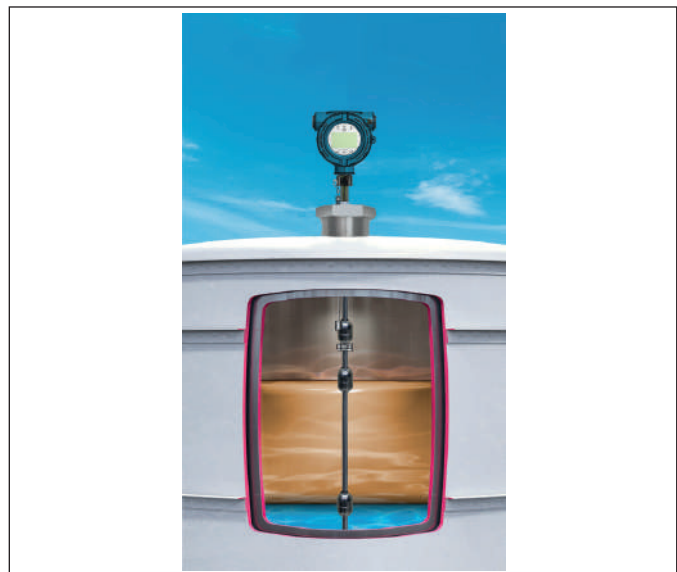
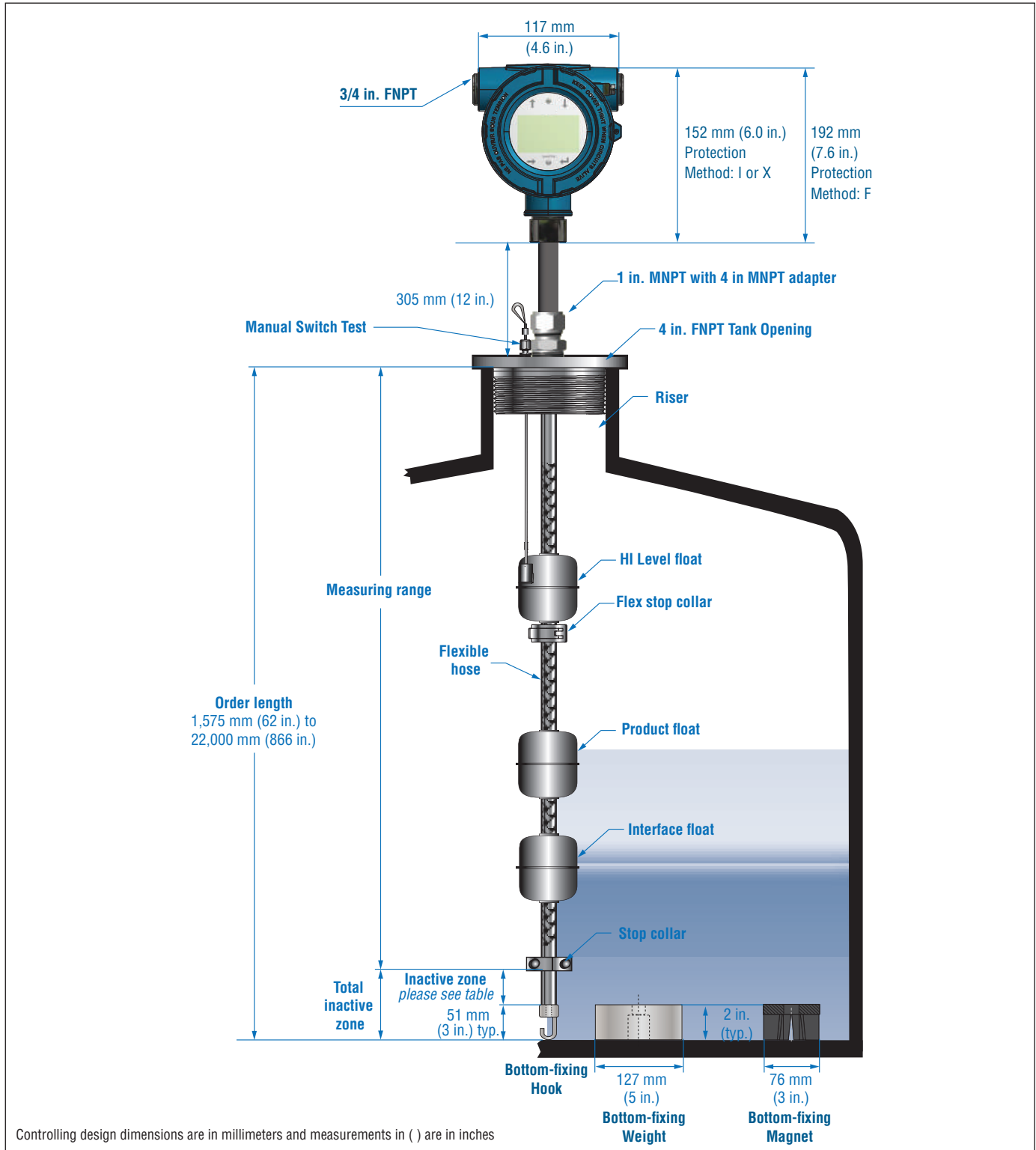


Fig. 2: Example of product and interface level measurement

TECHNICAL DATA

| Level Output | |
|--------------------------------------|---|
| Measured Variable | Product level and interface level |
| Output Signal /Protocol | Modbus RTU Analog (4-20mA), HART® |
| 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 | |
| Measured Variable | Average and multipoint temperature (Modbus) Single point temperature (Analog, HART®) |
| Temperature Accuracy (Modbus) | ±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) |
| Temperature Accuracy (Analog, HART®) | ±0.28 °C (0.5 °F) range -40...+105 °C (-40...+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 (Modbus) Low (3.5 mA, default) or High (22.8 mA) (Analog, HART®) |
| 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, ANSI and DIN Flanges |
| Wiring | |
| Connections | Terminal block |
| Electrical connections | |
| Dual cavity | ¾ in. FNPT conduit opening, M20 for ATEX/IECEx version |
| Display | |
| Measured variables | Product level, interface level and temperature |

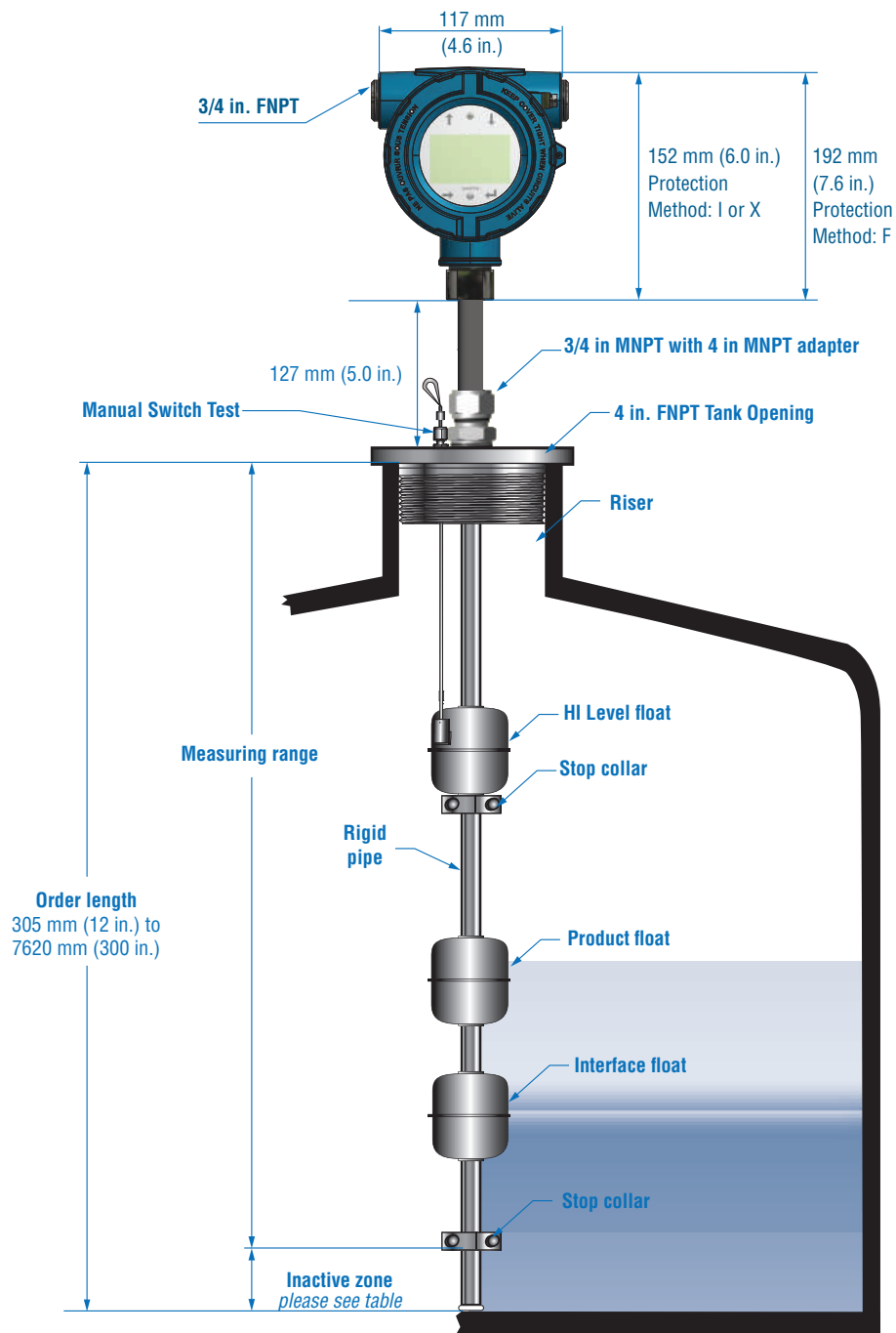
TECHNICAL DRAWING (FLEXIBLE HOSE)



TRANSMITTER INACTIVE ZONE REFERENCE

| Order Length | Inactive Zone |
|--------------------------------|------------------|
| <7.6 m (25 ft.) | 76 mm (3 in.) |
| 7.6 m to 12.2 m (25 to 40 ft.) | 97 mm (3.8 in.) |
| 12.3 m to 22 m (40 to 72 ft.) | 120 mm (4.7 in.) |

TECHNICAL DRAWING (RIGID PIPE)



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

TRANSMITTER INACTIVE ZONE REFERENCE

| Order Length | Inactive Zone |
|-----------------|---------------|
| <7.6 m (25 ft.) | 76 mm (3 in.) |

ORDER CODE

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| L | P | L | | | | | | | | | | | | | | | | | | | | | |
| a | | | b | c | d | e | f | g | h | i | j | k | l | | | | m | n | | | | | |

| a | Sensor model |
|-------|------------------------------|
| L P L | LevelLimit Level Transmitter |

| b | Output |
|---|---|
| 1 | 1 Loop with HART® |
| 2 | 2 Loop with HART® |
| 5 | 1 Loop with HART® and SIL 2 |
| 7 | 2 Loop with HART® and SIL 2 (Loop 1 only) |
| M | Modbus |

| c | 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 |

| d | Process Connection Type |
|---|---|
| 1 | NPT Adjustable (4 inch size only) |
| 6 | 150 lb. drilled and tapped flange |
| 7 | 300 lb. drilled and tapped flange |
| 8 | 600 lb. drilled and tapped flange |
| A | PN16, DIN 2572 drilled and tapped flange |
| B | PN40, DIN 2572 drilled and tapped flange |
| C | PN64, DIN 2572 drilled and tapped flange |
| D | PN100, DIN 2572 drilled and tapped flange |

| e | Process connection size |
|---|-------------------------|
| D | 2 in. (DN50) |
| E | 2.5 in. (DN65) |
| F | 3 in. (DN80) |
| G | 4 in. (DN100) |
| H | 5 in. (DN125) |
| J | 6 in. (DN150) |

| f | Number of DT's (Digital Thermometers) |
|---|---------------------------------------|
| 0 | None |
| 1 | One DT |
| 5 | 5 DTs |
| K | Twelve DTs |
| M | Sixteen DTs |

| g | DT's placement |
|---|-----------------------|
| F | Evenly spaced per API |
| C | Custom |
| X | None |

| h | Notified body |
|---|---------------|
| B | INMETRO |
| C | CEC (FMC) |
| E | ATEX |
| F | NEC (FM) |
| N | NEPSI |
| K | KC |
| I | IEC |
| T | CML/TIIS |
| X | None |

| i | Protection method |
|---|------------------------------|
| F | Explosionproof / Flame proof |
| I | Intrinsically safe |
| X | No approval |

| j | 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 (Intrinsically Safe only) |
| 4 | IIB + H2 (Explosion Proof / Flameproof only) |
| X | None |

| k | Unit of measure |
|---|-----------------------|
| M | Millimeters (Metric) |
| U | Inches (US customary) |

l m n Continued on next page

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

| l Length (no decimal spaces) | | | | | |
|------------------------------|---|---|---|---|---|
| X | X | X | X | X | Flexible sensor pipe: 1400...22000 mm (code as 01400 to 22000) |
| X | X | X | X | X | Flexible sensor pipe: 55...866 in. (code as 05500 to 86600) |
| X | X | X | X | X | Rigid sensor pipe: 275...7620 mm (code as 00275 to 76200) |
| X | X | X | X | X | Rigid sensor pipe: 10...300 in. (code as 01000 to 30000) |

| m Special | |
|-----------|------------------|
| S | Standard product |

| n HI Level Switch Position | | | | | |
|----------------------------|---|---|---|---|---|
| X | X | X | X | X | Flexible sensor pipe: 1575...22000 mm (code as 01575 to 22000) |
| X | X | X | X | X | Flexible sensor pipe: 55...866 in. (code as 05500 to 86600) |
| X | X | X | X | X | Rigid sensor pipe: 275...7620 mm (code as 00275 to 76200) |
| X | X | X | X | X | Rigid sensor pipe: 10...300 in. (code as 01000 to 30000) |

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.

| Long-gauge float | Pressure | Temperature | Magnet offset | Specific gravity | Material | Part number |
|------------------|-----------------------|--------------------|---------------|------------------|-----------------------|------------------|
| | 29.3 bar (425 psi) | 149 °C (300 °F) | Yes | 0.54 | Stainless steel | 252 961-2 |
| | | | | 0.65 | Nickel Alloy C-276 | 252 961-4 |
| | | | | 0.93 | Stainless steel | 252 962-2 |
| | | | | 0.93 | Nickel Alloy C-276 | 252 962-4 |

| Standard floats | Pressure | Temperature | Magnet offset | Specific gravity | Material | Part number |
|-----------------|-----------------------|--------------------|---------------|------------------|-----------------------|------------------|
| | 22.4 bar (325 psi) | 149 °C (300 °F) | No | 0.66 | Stainless steel | 201 232-2 |
| | | | | 0.70 | Nickel Alloy C-276 | 201 232-4 |

| Standard floats | Pressure | Temperature | Magnet offset | Specific gravity | Material | Part number |
|-----------------|----------------------|--------------------|---------------|------------------|-----------------------|------------------|
| | 29.3 bar (25 psi) | 149 °C (300 °F) | No | 0.67 | Stainless steel | 251 981-2 |
| | | | | 0.71 | Nickel Alloy C-276 | 251 981-4 |

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