Flow Line Options
1.877.FLO.LINE

Tracer *1000*™

Radar Level Transmitter for Liquids Data Sheet

Description

Featuring TDR (Time Domain Reflectometry) technology, the Tracer 1000™ provides continuous level measurement and point level detection in liquids, with analog and switching output. This innovative device has almost no installation restrictions - it can be mounted in small tanks, tall and narrow nozzles and it measures precisely even with difficult tank geometries or close to interfering structures. Factory settings may be configured via HART® Communication protocol. Tracer 1000 is ideal for various types of processing and storage applications and has an exceptional performance in liquids with low reflectivity such as oils and hydrocarbons.

Features & Benefits

- Revolutionary TDR Technology
- Precise continuous level measurement and reliable point level detection combined in one device
- Highly robust measurement due to 4-wire design and innovative signal analysis and disturbance signal suppression
- Fully modular probe design - Simple to install
- Features HART® Communication protocol
- 1.5” Dead Band
- Economically Priced

Tracer 1000™ Application Photo

Tracer 1000™ installation at waste water treatment plant

Technology

The Tracer 1000 uses TDR Technology: low-energy, high-frequency electromagnetic impulses, generated by the sensor’s circuitry, are propagated along the probe which is immerged in the liquid to be measured. When these impulses hit the surface of the liquid, part of the impulse energy is reflected back up the probe to the circuitry which then calculates the fluid level from the time difference between the impulses sent and the impulses reflected. The sensor can output the analyzed level as a continuous measurement reading through its analog output, or it can convert the values into freely positionable switching output signals. TDR-Sensors are also known as Guided Radars or Guided Wave Radars.

Specifications

Electrical Specifications	
Output Functions	Continuous level measurement through analog output and point level detection through switching output.
Analog Output (Active)	Current output 4-20mA: The span between the lower range value [4mA] and the uppser range value [20mA] is equal to 0-100% of the continuous level measurement reading. It is recommended that the span between those two range values stays within the measuring range [M].
Total Load Resistance	<500Ω: HART resistor approx. 250Ω + load resistance approx. 250Ω if the current output is connected to a device with an inner resistance of approx. 250Ω, then there is no additional, external HART resistor necessary. In that case, the HART modem is connected in parallel to the current output wires.
Lower Range Value	4.0mA (span 0%)
Upper Range Span	20.0mA (span 100%)
Response Time	0.5s (default), 2s 5s (selectable)
Temperature Drift	.0078 in/ºF from 65º
Switching Output DC PNP (Active)	Normally Closed (NC - Short circuit protected)
Current Consumption	<70mA at 24 VDC (no burden)
Start-Up Time	<6s
Cable Terminals	Screwless, cage clamp terminal block for stranded and solid wires AWG 22-14 **The usage of cable end sleeves with insulation collar is not recommended*
Measurement Specifications	
Accuracy	± 0.12”
Repeatability	< .08”
Resolution	< .04”
Probe Type	316 SS Rod: 3/16” Dia. (Coated Rod; 1/4” Dia.) 316 SS Coaxial: .68” (Std. Tube: NPS 3/8”, 10S) Wire Probe: .16”, Type 7 x 19
Probe Length [L]	316 SS Rod: 1.5” - 240” 316 SS Coaxial: 1.5” - 240” Wire Cable: 1.5” - 780” *(Length must be specified when ordering - The reference point is always the sealing surface of the connection thread - See dimensional drawings)*
Top Dead Band	Configurable below 1.5”
Bottom Dead Band	Configurable above 1.5”

Measuring Range [M]	Probe length [L] less both inactive areas at top and bottom [l1 and l2] in this range Tracer 1000™ will have the specified measurement performance. It is recommended that the maximum and minimum liquid levels to be measured in the tank are within the measuring range [M] of the sensor.
Switching Point [S]	Freely positionable within the measuring range [M] Hysteresis can be set by defining seperate uppse and lower thresholds; if those are set at the same position, the minimum hysteresis of 3mm applies
Application Specifications	
Dielectric Constant [ε_r]	316 SS Rod/Wire Cable: > 1.8 316 SS Coaxial: > 1.4
Conductivity	No restrictions
Density	No restrictions
Dynamic Viscosity	316 SS Rod/Wire Cable: < 5.00mPa s = 5.000cP 316 SS Coaxial: < 50mPa S = 500cP
Application Temperature	F: -40º to 302º C: -40 to 150º
Ambient Temperature	F: -13º to 176º C: -25º to 80º
Application Pressure	-1 bar to 40 bar
Velocity of Level Change	<3.2 fps
Interface (i.e. oil on top of water)	An oil layer of < 7cm thickness on top of water is not detected by the sensor; in this case the sensor will detect only the water level at a slightly lower position than actual. From an oil layer thickness > 7cm onwards, the sensor detects the total level, including the oil layer, according to specifications.
Mechanical Specifications	
Material Exposed to Tank Atmosphere	316 SS Rod: 1.4404 / 316L and PEEK 316 SS Coaxial: 1.4401 / 316L, PEEK & O-ring Wire Cable: 1.4401 / 316 and PEEK Gasket at connection thread: Klingersil C-4400, 0.2cm thick
Enclosure Material	Aluminum alloy EN AC-AlSi9Cu3 (DIN EN 1706), Epoxy Spray (~70µm)
Enclosure Rating	FM: Class I Groups A,B,C,D; Class II Groups E,F,G; Class III; Type 4X Class I, Zone 1, AEx d IIC; IP66 Class I, Zone 1, Ex d II C
Cable Glands/ Screw Plugs	1/2” NPT (2) or Cable Glands (2) or 1/2” NPT (1) & Cable Gland (1) or M20 (2) or M20 (1) & Cable Gland (1)

Specifications Continued

Connection Thread [CT]	3/4” NPT (US) or 3/4” G (Metric)
Weight	Aluminum housing, assembled with electronics and feedthrough: 950g Aluminum housing (empty): 650g
Certification	Standard: NEMA 6 (IP66 / IP68), General Purpose Optional: ATEX, Explosion Proof, Zone 1

Specifications are subject to change without notice.

Standard

Explosion Proof

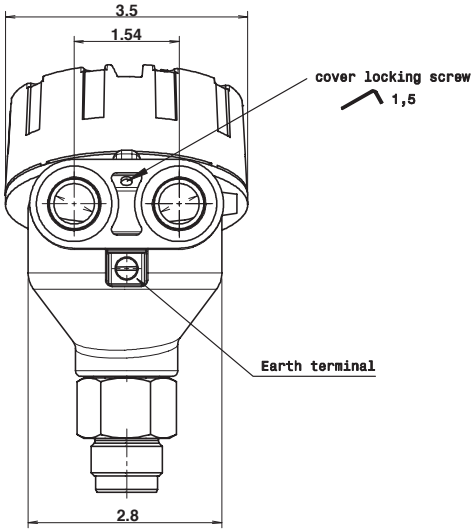
Probe Type Recommendations

	WIRE CABLE PROBE	316 SS ROD PROBE	316 SS COAXIAL PROBE
PROBE MOUNTING			
Tall & narrow nozzles	+	•	•
Difficult tank or nozzle geometries	+	•	•
Close to internal tank structures or tank wall	+	•	•
Probe might move or touch internal tank structures/tank wall	+	•	•
Liquid spray may touch probe above the liquid surface	+	•	•
Non-stationary interface targets, e.g. agitator blades	+	•	•
Measurement readings at the very top or bottom of the tank	+	•	•
Non-metallic tanks	+	•	•
Bypass chambers and stilling wells	•	+	-
Limited headroom for installation	•	•	+
Tall tanks	•	•	+
MEDIA CHARACTERISTICS			
Bulk solids	-	-	+
Measuring low reflectivity liquids (i.e. low dielectric constant)	+	•	•
Viscous, crystallizing, adhesive, coating, or sticky liquids	-	+	+
Fibrous liquids, sludge, slurry, pulp	-	+	+
Liquids containing solid particles	-	+	+
Clean-ability of probe is important	-	+	+

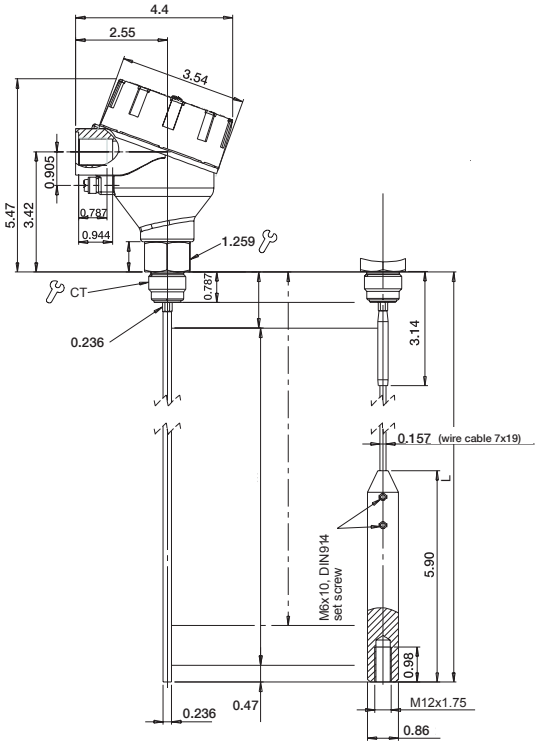
+ = Recommended
• = Possible, maybe with configuration and/or mounting adjustments
- = Not recommended

Dimensions (Inches)

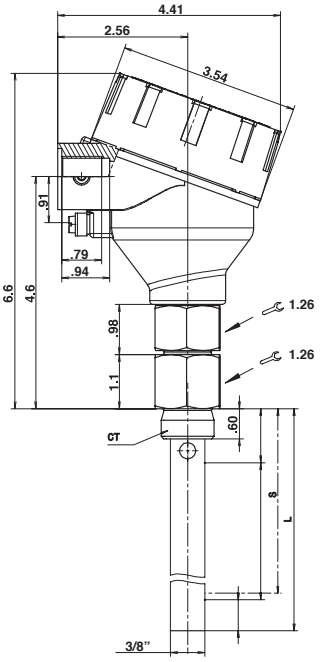
Housing



316 SS Rod Probe / Wire Cable Probe



316 SS Coaxial Probe

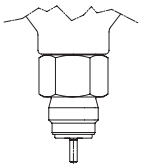


Sensor Components

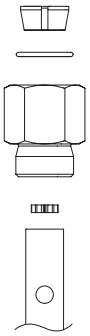

Housing


Feedthrough

Probe


Counter Nut


Rod / Cable


Ferrule

O-Ring

Lock Nut

Spacer

Tube

Ordering Information

FLO-CORP MODEL NUMBER BUILDER For Assistance Call **877.FLO.LINE**

Use the diagram below, working from left to right to construct your FLO-Corp Model Number.
Simply match the category number to the corresponding box number.

Example: LTT1-1-RN6-01-120 *Tracer 1000 with 10ft Probe Range, 316 SS Rod Probe Type, NEMA 6 Enclosure, 3/4" NPT Process Connection, 1/2" NPT Conduit Entries & Cable Glands, 120" Custom Probe Length*

LTT1 – □ – □ □ □ – □ □ – □ □ □

*Multiple configuration methods, please contact FLO-Corp to choose appropriate method

LTT1

Probe Range (1)
1) 10ft (120 in)
2) 24ft (288 in)
3) 40ft (480 in)
4) 65ft (780 in)

Probe Type (2)
R) 316 SS Rod
T) 316 SS Coated Rod
C) 316 SS Coaxial
W) Wire Cable

Enclosure Rating
N6) NEMA 6
XP) Explosion Proof (White Enclosure)

Process Connection (3)
0) 3/4" NPT (US)
1) 3/4" G (Metric)

Conduit Entries & Cable Glands
1) 1/2" NPT (2)
2) Cable Gland (2)
3) 1/2" NPT (1), Cable Gland (1)
4) M20 (2)
5) M20 (1), Cable Gland (1)

Custom Probe Length [L] (4)
L) Specify Length (inches)


Standard


Explosion Proof

Ordering Notes:
(1) Select the best configuration based on your requirements
(2) Viton O-Ring is supplied with Coaxial probe type. For additional O-Ring materials, please contact factory.
(3) For special process connections (i.e. flange, size, connection type) please contact factory.
(4) Specify the L-dimension at the end of the model number (ie: LTT1-1-RN6-00-120"). The L-dimension must be specified in inches (in) and fall within the 'Probe Range' selected.

** Additional probe lengths may be available upon request - Please contact factory.*