OPERATING INSTRUCTIONS

TRACER 1000™ LTT1
GUIDED WAVE RADAR LEVEL TRANSMITTER

Introduction

Please read carefully! No liability can be accepted for damage caused by improper use or installation of the Tracer 1000 Level Transmitter.

Featuring TDR (Time Domain Reflectometry) technology, the Tracer 1000™ provides continuous radar level measurement and point level detection in liquids and solids, with analog and switching output. This innovative radar device has almost no installation restrictions – the 1" radar beam 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 even with low reflectivity such as light oils and hydrocarbons.

⚠ Safety Precautions

If you are unsure of the suitability of a Tracer 1000 for your installation, please consult your FLO-CORP representative for further information.

NOTE: REMOVE ALL PACKING INSERTS BEFORE OPERATING LEVEL TRANSMITTER.

Authorized Personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorized by the plant operator. During work on and with the device the required personal protection equipment must always be worn.

Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel over fill or damage to system components through incorrect mounting or adjustment.

General Safety Instructions

The user must take note of the safety instructions in this operating instructions manual , the country specific installation standards as well as all prevailing safety regulations and accident prevention rules. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for trouble-free operation of the instrument. During the entire duration of use, the user is obliged to determine the compliance of the required occupational safety measures with the current valid rules and regulations and also take note of new regulations.

Disclaimer

The information contained in this document is subject to change without notice. FLO-CORP makes no representations or warranties with respect to the contents hereof and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose.

SPECIFICATION

Electrical Specifications	
Output Functions	The Tracer 1000 is an active, single ended, non-isolated, 3 or 4 wire analog output transmitter.
Analog Output (Active)	Current output 4-20mA: The span between the lower range value [4mA] and the upper range value [20mA] is equal to 0-100% of the continuous level measurement reading as a factory default. Output can be inverted.
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	Less than .0078 in/°F change in ambient temperature
Switch Output	DC Switch, PNP, Active, Max. Load 200 mA Current.
Supply Voltage	12-30VDC (reverse-polarity protected)
Current Consumption	< 50mA at 24 VDC (no burden)
Start-Up Time	< 6s
Cable Terminals	Screwless, cage clamp terminal block for stranded and solid wires AWG 22-14.
Measurement Specifications	
Accuracy	± 0.12" or 0.03% of measured distance, whichever is greatest
Repeatability	< .08"
Resolution	< .04"
Probe Type	316 SS Rod: 1/4" Dia. (Coated Rod; 3/8" Dia.) 316 SS Coaxial: 3/8" Dia. Wire Cable: 1/2" Dia.
Probe Length [L]	316 SS Rod: 2.41" - 120" 316 SS Coaxial: 0" - 120" Wire Cable: 2.41" - 480" *(Length must be specified when ordering - The reference point is always the sealing surface of the connection thread - See dimensional drawings)*
Top Dead Band	0" Coaxial Probe 2.41" Rod or Wire Probe

Measuring Range [M]	Up to 780" depending on probe type
Switching Point [S]	Freely positionable within the measuring range [M] Hysteresis can be set by defining seperate upper and lower thresholds; if those are set at the same position, the minimum hysteresis of .11" applies
Application Specifications	
Dielectric Constant [ε_r]	Wire & Cable Probe: Configurable Coaxial Probe: 0
Conductivity	No restrictions
Density	No restrictions
Standard Application Temp.	F: -40° to 410° C: -40 to 150°
Optional Application Temp.	F: -320° to 500° C: -195 to 260°
Ambient Temperature	F: -13° to 176° C: -25° to 80°
Application Pressure	-14.50 PSI to 580 PSI
Velocity of Level Change	< 3.2 fps
Mechanical Specifications	
Wetted Materials	1.4404 / 316L and PEEK, PTFE
Enclosure Material	Aluminum alloy EN AC-AlSi9Cu3 (DIN EN 1706), Epoxy Spray (~70µm)
Enclosure Rating	Standard: NEMA 6 (IP68) Explosion Proof Option: ATEX NEMA 7
Cable Glands/Screw Plugs	1/2" NPT (2) or Cable Glands (2) or 1/2" NPT (1) & Cable Gland (1) or M20 x 1.5 (2) or M20 X 1.5 (1) & Cable Gland (1)
Connection Thread	3/4" NPT (US) or 3/4" G (Metric)
Weight (Less Probe)	1.99 lbs. (903.8 g)
Certification	FM: Class I Groups A,B,C,D Class II Groups E,F,G; Class III; Type 4X Class I, Div. I, AEx D IIC; IP66 Class I, Div. I, Ex d II C

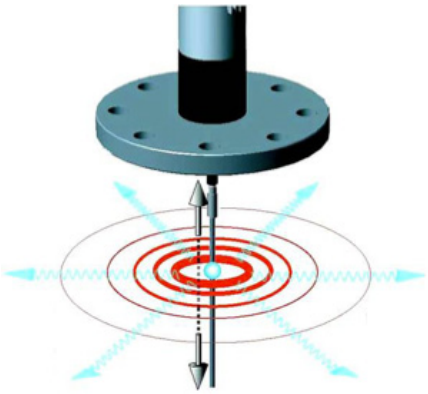
Specifications are subject to change without notice.

PROBE TYPE RECOMMENDATIONS

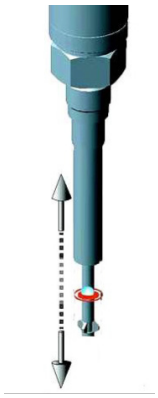
	WIRE CABLE PROBE	316 SS ROD PROBE	316 SS COAXIAL PROBE
PROBE MOUNTING			
Tall & narrow nozzles	+	•	•
Difficult tank or nozzle geometries	+	•	•
Close to internal tank structures or tank wall	+	•	•
Probe might move or touch internal tank structures/tank wall	+	•	•
Liquid spray may touch probe above the 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

Cable Probe

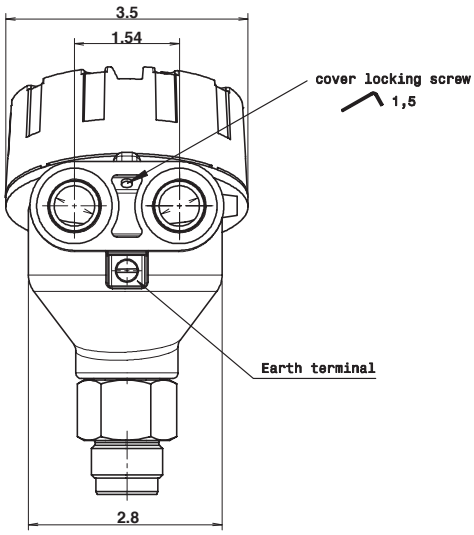


Coaxial Probe

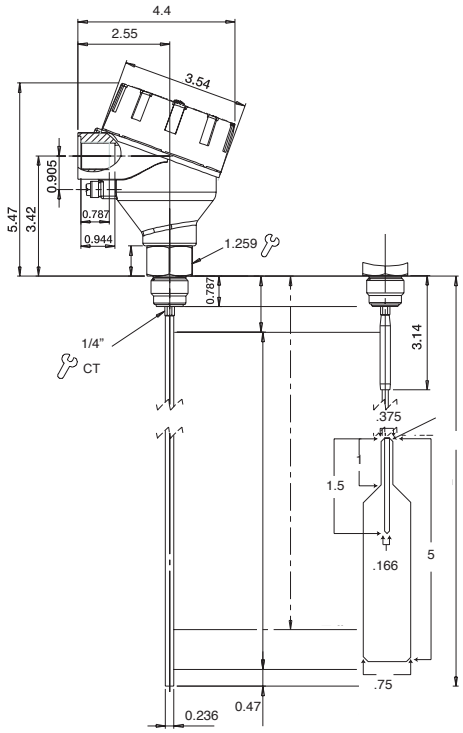


DIMENSIONS (Inches)

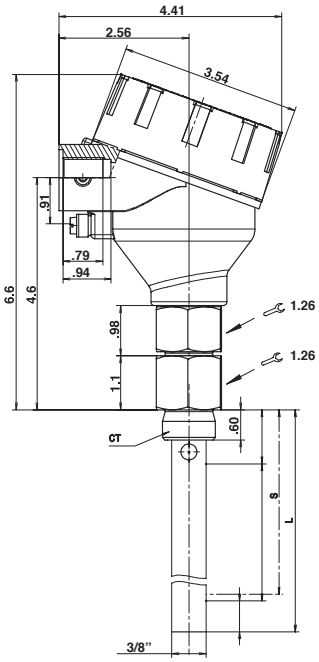
Housing



316 SS Rod Probe / Wire Cable Probe



316 SS Coaxial Probe



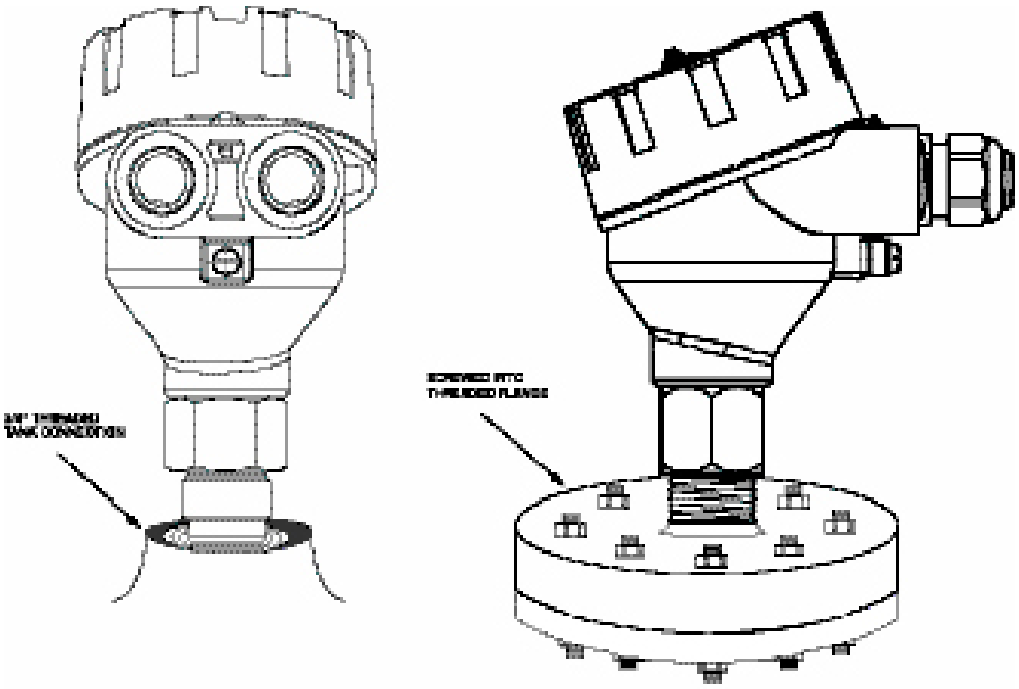
Installation/Mounting

Handling and Mounting:
The Tracer 1000 generally comes supplied with a 3/4" MNPT process connection used for mounting.

The Tracer 1000 is mounted vertically at the top of the tank via the process connection thread. The threaded process connection can be screwed directly into a standard female threaded tank connection. We recommend using Teflon tape on the process connection. Please ensure proper sealing of the sensor connection and take into consideration temperature, pressure and other process conditions. The tank connection can be either flanged or non-flanged, standard tank nozzle or pipe union. The Tracer 1000 should never be welded onto the tank connections. Welding directly on the metal parts of the Tracer 1000 will cause serious damage to the transmitter and void the warranty. The G fitting thread of the Tracer 1000 is supplied with a gasket made of Klingersil C-4400, thickness 0.0787". The suggested tightening torque is 25 Nm (max. permissible torque is 45 Nm) with a max. pressure of 580 PSIG.

Preparation:
FLO-CORP's Tracer 1000 level transmitters are ready to install as-is, and are completely pre-configured per the application data sheet or customer application information at time of order. The Tracer 1000 is shipped with a calibration tag secured to the safety chain of the transmitter head. The calibration tag indicates the 4 mA equivalent in level (usually 0.0") and 20 mA equivalent in level (high level reading). If changes are to be made with this configuration, please see section Operation and section Programming and Configuration.

Figure 1: Mounting



Things to Avoid:
Avoid lifting or handling the Tracer 1000 by its probe; this can potentially damage the probe or the probe connection. The Tracer 1000 should be handled by the hexagon connection or the lower section of the housing.

Avoid using the housing to screw the Tracer 1000 into the process connection. Use the hexagon fitting to tighten using a 1.25" wrench.

Avoid installing the Tracer 1000 probe so it is not directly impacted by liquids flowing out of the filling inlet. This may cause erroneous readings from the transmitter. If this situation is unavoidable, please consider the use of the Coaxial Probe option.

Avoid installing the Tracer 1000 probe so it is touching or swaying towards other objects inside the tank, including

the tank nozzle. This may cause erroneous readings from the transmitter. Anchoring fixtures are permissible and supplied by the end-user. Please contact FLO-CORP for further details about using anchoring fixtures.

Since the Tracer 1000 has an energy signature that is approximately a 1.5" to 2.0" radius from the center of the probe, considerations should be made when engineering the proper probe location for mounting. If it is not possible to mount the probe in a location that will be free of any objects that might interfere with the signal, than set-up configuration changes can be made to possibly accommodate the mounting location (See Configuration Section).

Probe Selection

Probes for Liquids and Paste Applications:
The Tracer 1000 uses 1 of 2 possible probe configurations. The Rod probe is the most common. It can be used for most liquids and is recommended for use with stilling wells and bypass chambers with a minimum inside diameter of 2.0". The maximum length of the rod probe is 10 feet. The Rod probe is made of 316L Stainless Steel, 1/4" diameter. The Rod probe can be ordered with an optional teflon isolation sleeve and connections. Both configurations have a threaded female connection on one end and bare end on the other. To install, thread the threaded connection into the male threaded adapter on the Tracer 1000 transmitter.

The Coaxial probe is the second probe type available with the Tracer 1000. The Coaxial probe is typically used with extremely low ∑r (dielectric) strength. It is also used if the agitation caused by influent flow or mixing blades make the level signal to erratic to read. The maximum length of the Coaxial probe is 10 feet. The Coaxial probe is made of 316 Stainless Steel, 1/2" diameter. To install, thread the threaded end of the inner rod into the threaded adapter of the Tracer 1000. Please make sure that the centering rod isolators are installed with approx. 20" space between each spacer. The outer tube will now be ready to slide over the inner rod, upward towards the transmitter head. Next, thread the threaded connection of the outer tube into the upper hex threaded connection. The Coaxial probe assembly should now be complete with the 3/4" male process connection and is now ready to be threaded into the 3/4" female tank connection.

Figure 2: Probes

Wiring

Wiring Diagrams:

FLO-CORP assumes no responsibility for users incorrectly wiring their device. Please refer to the wiring diagrams and read all wiring instructions for correct wiring of this device.

The Tracer 1000 is an active, single ended, non-isolated, 3 or 4 wire analog output transmitter. That is to say, the

common's (or returns) for both the 24 volt DC AND the 4 - 20 mA output are tied together internally in the Tracer 1000 transmitter electronics. Therefore, when connected to a receiving device such as a PLC or multi-channel recorder, please make sure to follow the devices connection instructions for single ended, non-isolated inputs. If in doubt, use an input loop isolator to reduce ground loop problems.

Cable Entries & Shielding:
The Tracer 1000 enclosure has two 1/2" NPT cable entries that can be ordered with cable glands or sealed screw plugs. In order to retain the IP-68 enclosure rating, both cable entries must be fitted with IP-68 rated glands and/or screws and/ or conduit entry systems properly sealed. When wiring with shielded or armored cable, suitable cable glands must be used. The contact between the metal housing and the shielding of the cable is made by using a suitable EMC type cable gland. For proper signal/noise shielding, ground the cable shield on the transmitter side ONLY, not on the supply side.

Wiring:
First, verify that the power supply for the Tracer 1000 is switched off. Next, open the Tracer 1000 enclosure by turning counterclockwise. It may be necessary to loosen the cover locking screw with a .15cm allen key. The grounding screw on the transmitter housing should only be connected if there is complete assurance that the earth ground it will be connected to is exactly equal to the ground potential of the transmitters power. If there is a ground offset you will potentially experience faulty signal outputs. The grounding screw is not necessary to connect to earth ground for the Tracer 1000 to work properly. Occasionally electrical codes will dictate the necessity for connection of the grounding screw and again, in these cases make sure the ground potentials are equivalent. After pulling the cable into the housing through the cable entry, install a drip loop outside the housing where the bottom of the loop is lower than the cable entry of the housing. Using 16 to 22 AWG twisted shielded instrument wire, strip the wire ends carefully exposing each conductor. The green terminals are screw-less, cage clamp terminals that only require a small flat ended instrument screwdriver to be simply pressed down on the orange lever. Insert the stripped end of the wire and release the screwdriver from the lever; the wire is now connected. Follow the upper wiring decal by the terminals or follow the wiring diagram on fig. 4 (below)

Things to Avoid:
Avoid connecting the cable shielding on both enc ı shield both ends of the instrument cable, you run the risk of receiving electrical (RFI) or magnetic (EMI) noise or interference with the measuring signal.

Avoid conduit system leaks or joints or connections that will allow water to enter into the transmitter housing. Any amount of water that will enter the housing will damage the electronics and will induce failure to the system.

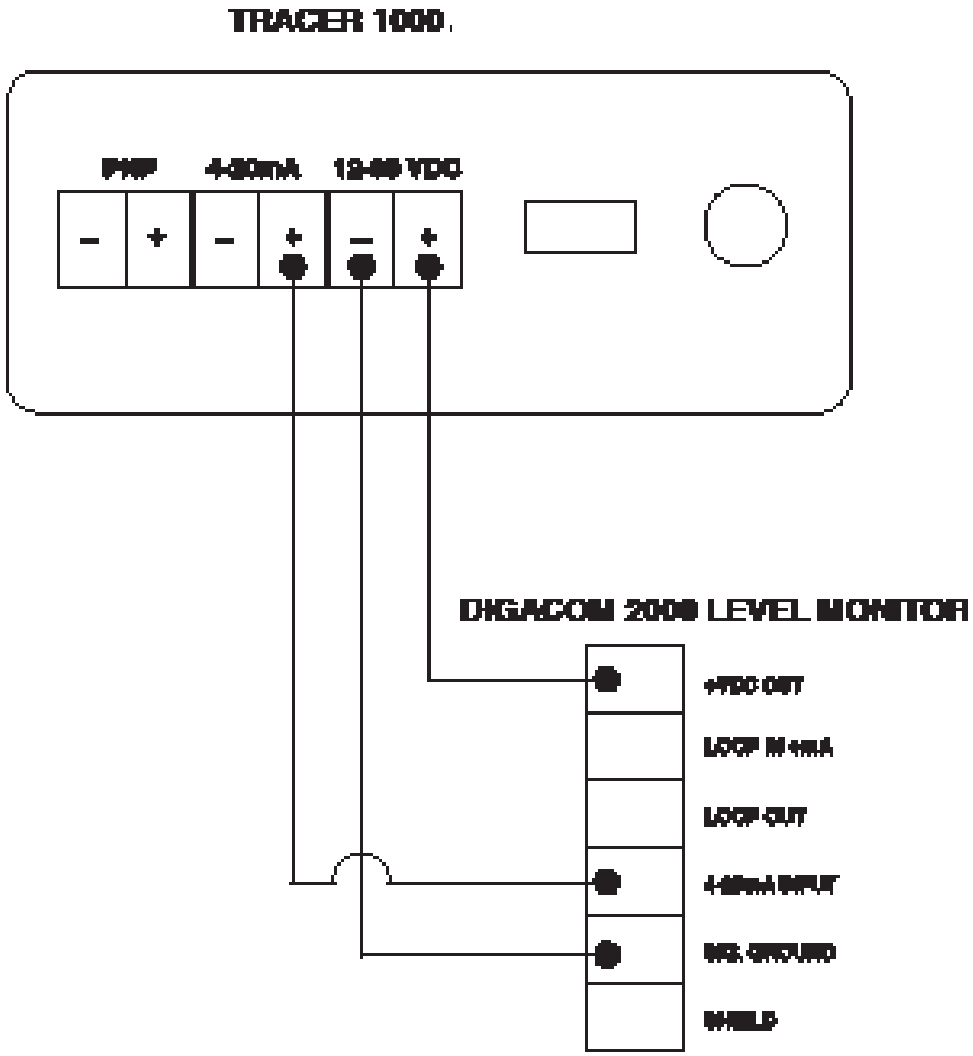
Avoid using cable end sleeves on the terminations of the instrument cable. The cage clamp terminals work best with bare conductors.

Operation

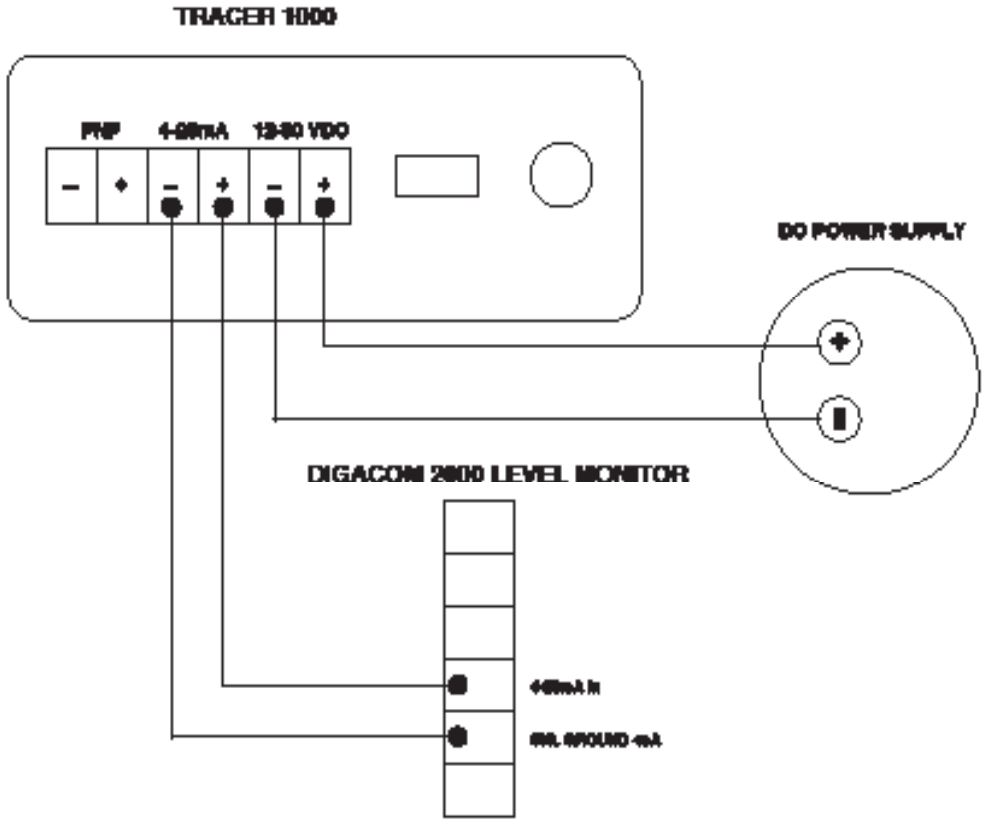
Human Interface:
The basic configuration of the Tracer 1000 can be changed from the customized settings as shipped from the factory. There are 2 ways that the user can change these settings. 1.) Tracer Configuration Tool: The Tracer Configuration Tool

Figure 3: Wiring Diagram

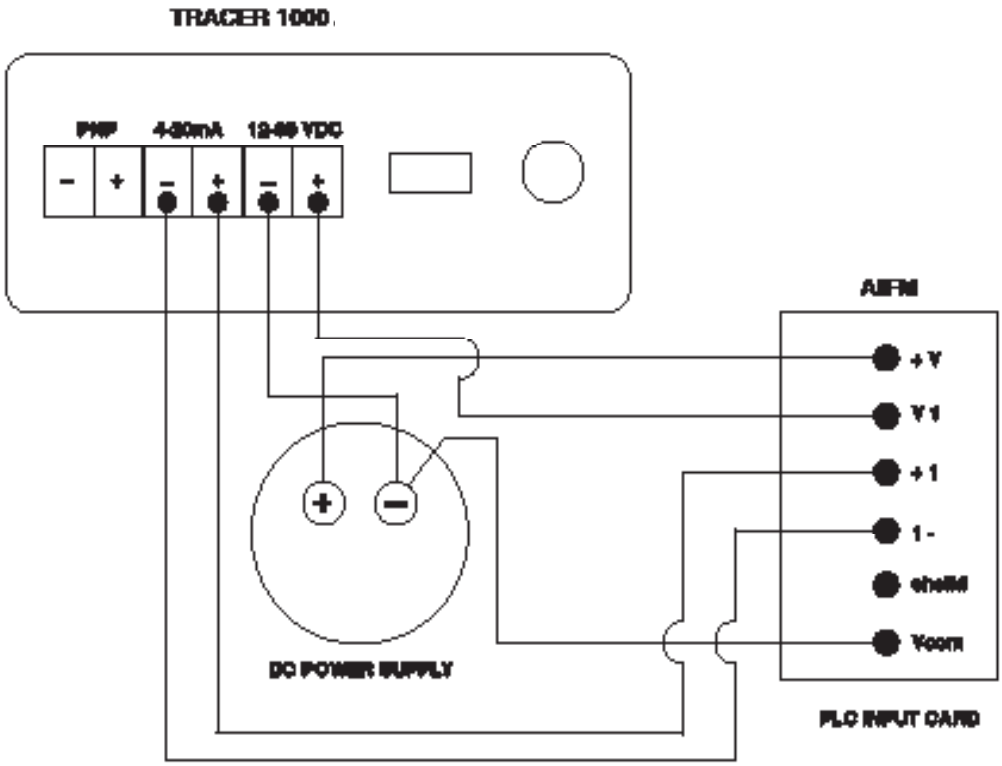
Interconnecting Wiring to DigaCom 2000
Typical 3-Wire Connection



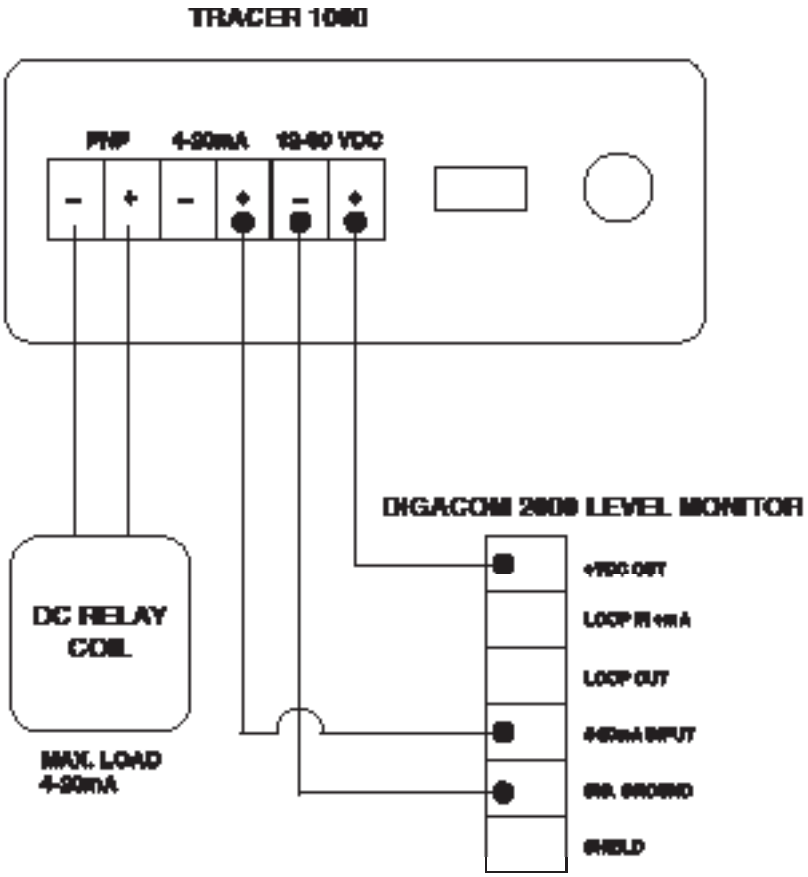
External Powered Wiring To DigaCom 2000 Level Monitor



External Power Wiring To Input (ie: PLC)



PNP Output Wiring



is a PC software based tool that allows the user to configure basic and advanced settings, diagnose and troubleshoot as well as save settings in a .CSV format. The Tracer Configuration Tool communicates to the PC via factory supplied HART® Modem. The Modem is connected to the USB port of the PC and the opposite end is connected with alligator clips to a factory supplied 250 Ω resister (please refer to the Tracer Configuration Tool information in the Appendix). 2.) Basic configuration changes can also be made from the interface on the transmitter electronics. Please see fig. 5; the DIP switch, a single push button and a LED for visual feedback are used for all settings. All settings required to get the Tracer 1000/2000 fully operational can be performed directly from the transmitter electronics. The DIP switch has 8 small white levers. Small numbers from 1 to 8 are printed underneath the levers. The DIP switches must be turned on in the proper sequence starting with DIP switch position 8 and move towards position 1. There is also a color code for these levers. DIP position 8 is red, DIP position 5,6,7 is blue, and 1,2,3,4 is gray. The upper position of the lever is off/0 and the lower position of the lever is on/1.

The color code on the DIP switches correspond to the color code on the switch settings guide in fig. 5.

RED: indicates the DIP switch position 8 which switches between measuring and configuration mode. When DIP switch 8 is on/1. the Tracer 1000/2000 can be configured. When entering into the configuration mode, the LED will change state to blinking alternately green and red. When switching DIP switch 8 back to off/0, the LED will switch back to blinking green ONLY.

BLUE: Indicates the DIP switch positions through which groups of functions are selected. example: all functions related to the analog current output or the switching output.

GRAY: Indicates the DIP switch positions through which individual functions/configurations are selected.
Push button and LED: After setting all DIP switch positions to represent the desired function you would like to program (as described in fig. 6), press the push button to execute the desired function. Execution of the function is indicated by the LED remaining green until the function has been properly executed. Upon execution the LED returns to blinking alternately green and red. The only exception to this push button sequence is for function group 4 (reset to the factory configuration the unit was received in) and function group 5 (measure probe length). For these function groups the push button must be pressed and held for a minimum of 10 seconds for the functions to be executed.

Programming and Configuration

Figure 4: Electronics

Configuration of the Rod Probe or Wire Cable Probe:

FLO-CORP's Tracer 1000 level transmitters are ready to install as-is, and are completely pre-configured per the application data sheet or customer application information at time of order. The Tracer 1000 is shipped with a calibration tag secured to the safety chain of the transmitter head. The calibration tag indicates the 4 mA equivalent in level (usually 0.0") and 20 mA equivalent in level (high level reading). If changes are to be made with this configuration, the following steps can be programmed. For most standard applications, execution the three basic configuration steps will be sufficient to achieve a fully functional sensor.

1. Perform a Disturbance Signal Scan:
The disturbance signal scan is a powerful disturbance signal suppression feature. The Tracer 1000 scans its entire probe length for any disturbance signals in the application that could potentially be misinterpreted as a level

reading.
The disturbance is memorized and suppressed during operation so only the actual level signals caused by the material level are measured. The disturbance signal scan works most effectively on stationary objects like a latter, pipes, tall and thin nozzles, chains or other objects that are in close proximity to the probe. The Tracer 1000 must be installed in the tank or silo to execute a disturbance signal scan and the tank or silo must be empty or near empty. Set the following DIP switches to the ON/1 position. 8 - 7 - 6 - 4 All other switches should be in the off position. The LED will blink alternately green and red. Press the push button. The LED will remain green for a few seconds while the disturbance signal scan is being performed.
Once the scan is completed successfully, the LED will return to blinking alternately green and red. If this is the only function you want to perform, set the following DIP switches to the OFF/0 position. Otherwise, continue to the next basic step:

2. Setting the Lower Range Value (4 mA): Please see fig. 7
Fill or empty the material in the tank to the level of the tank where you want the 4mA measuring range to be. It is recommended that the level stays within the measuring range indicated by the (M) in fig. 11. Set the following DIP switches to the ON/1 position. 8 - 7 - 4 All other switches should be in the off position. The LED will blink alternately green and red. Press the push button. The LED will remain green for a few seconds while the lower range signal value is being performed. Once the scan is completed successfully, the LED will return to blinking alternately green and red.

Figure 5: DIP Switch Settings

DIP SWITCH POSITION							
1	2	3	4	5	6	7	8

DIP SWITCH SETTINGS								DESCRIPTION
0	0	0	0	0	0	0	0	measuring mode
0	0	0	0	0	0	0	1	configuration mode
FUNCTION GROUP 1								**ANALOG CURRENT OUTPUT**
0	0	0	1	0	0	1	1	lower range value (4mA), span 0%
0	0	1	0					upper range value (20mA), span 100%
0	1	0	0					response time 0.5s (default)
0	1	0	1					response time 2s
0	1	1	0					response time 5s
FUNCTION GROUP 2								**SWITCHING OUTPUT**
0	0	1	0	0	1	0	1	lower switch point
0	0	1	1					upper switch point
0	1	0	0					NC
0	1	0	1					NO
FUNCTION GROUP 3								**DISTURBANCE SIGNAL SUPPRESSION**
0	0	0	1	0	1	1	1	perform disturbance signal scan
0	0	1	0					disturbance signal scan: utilize (default)
0	0	1	1					disturbance signal scan: do not utilize
0	1	0	0					upper dead band: short (default) 2.41" [1]
0	1	0	1					upper dead band: medium 7.4" [1]
0	1	1	0					upper dead band: long 15" [1]
1	0	0	0					amplitude threshold: low (default)
1	0	0	1					amplitude threshold: medium
1	0	1	0					amplitude threshold: high
1	1	0	0					coaxial probe
1	1	0	1					single rod probe
FUNCTION GROUP 4								**RESET**
0	0	0	1	1	0	0	1	reset to delivery configuration
FUNCTION GROUP 5								**MEASURE PROBE LENGTH**
0	0	0	1	1	0	1	1	measure probe length

[1] always measured from the reference point: sealing surface of the connection thread (see dimensional drawings)

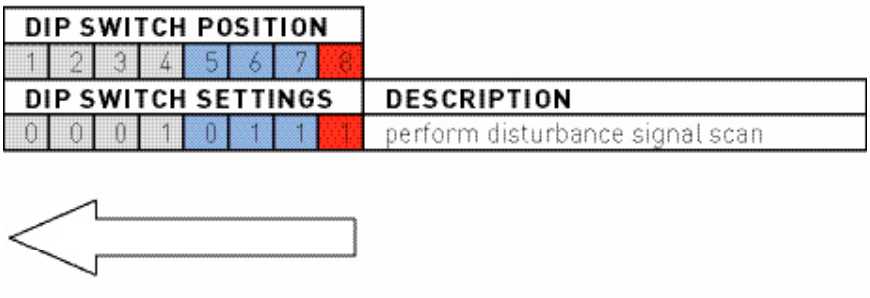
If this is the only function you want to perform, set the following DIP switches to the OFF/0 position. Otherwise, continue to the next basic step:

Setting the Upper Range Value (20 mA): Please see fig. 8
Fill or empty the material in the tank to the level of the tank where you want the 20 mA measuring range to be. It is required that the level stays within the measuring range indicated by the (M) in fig. 14. Set the following DIP switches to the ON/1 position. 8 - 7 - 3 All other switches should be in the off position. The LED will blink alternately green and red. Press the push button. The LED will remain green for a few seconds while the upper range signal value is being performed. Once the scan is completed successfully, the LED will return to blinking alternately green and red. If this is the only function you want to perform, set all of the DIP switches to the OFF/0 position. Once the DIP switches are set to the off position, the LED will change to blinking green indicating the transmitter is in the RUN or Operating mode.

NOTE: The factory default for the analog output settings are Lower Range Value setting at 4 mA and the Upper Range Value setting at 20 mA. It is possible however to reverse these settings. If the user desires to have the 4 mA setting represent the high tank value and the 20 mA setting represent the low tank value. Please follow the instructions below for programming of these settings.

3. Setting the Switching Output (Active PNP - Normally Closed is Factory Default)
The switch can be set to activate or change state at a single point or it can be set to activate or change state at one point (lower threshold), and then activate or change state at another point (upper threshold).
First, we will describe setting the switch to activate or change state at a single point: Fill or empty the material in the tank to the level of the tank where you want the switch point to be activated.

Figure 6: Perform Disturbance Signal Scan



Next, set the following DIP switch to the ON/1 position. 8 - 6 - 3 All other switches should be in the off position. The LED will blink alternately green and red. Press the push button. Once the set-point adjustment is completed successfully, the LED will return to blinking alternately green and red.

Next, set the following DIP switch to the ON/1 position. 8 - 6 - 4 - 3 All other switches should be in the off position. The LED will blink alternately green and red. Press the push button. Once the set-point adjustment is completed successfully, the LED will return to blinking alternately green and red. Now the switching output will be set to activate of change state at this single point of tank level. Every time this level point is reached the switch will change state.
Now we will describe setting the switch to activate or change state at one level of the tank, hold that state until another level in the tank is reached. Fill or empty the material in the tank to the level of the tank where you want the switch point to be activated. (Example: 80% fill level)

Figure 7: Set Lower Range Value

Next, set the following DIP switch to the ON/1 position. 8 - 6 - 4 - 3 All other switches should be in the off position. The LED will blink alternately green and red. Press the push button. Once the set-point adjustment is completed successfully, the LED will return to blinking alternately green and red. Fill or empty the material in the tank to the level of the tank where you want the switch point to be activated. (Example: 20% fill level)

Next, set the following DIP switch to the ON/1 position. 8 - 6 - 3 All other switches should be in the off position. The LED will blink alternately green and red. Press the push button. Once the set-point adjustment is completed successfully, the LED will return to blinking alternately green and red.

Reminder: When finished with programming and returning to RUN mode, switch all switches to the OFF/0 position by switching the least position and moving towards the switch 8 position.

When programming or changing the configuration of the Coaxial probe, the only values needed to be changed should be the Lower Range Value and the Upper Range Value, switch settings and response time. See programming steps 2 & 3 for setting these values.
Please remember to tighten the housing cover properly by turning it clockwise.

Figure 8: Set Upper Range Value

DIP SWITCH POSITION								
1	2	3	4	5	6	7	8	
DIP SWITCH SETTINGS								DESCRIPTION
0	0	1	0	0	0	1	1	upper range value [20mA]; span 100%

Things to Avoid:
Avoid reversing the sequence when setting the DIP switches to the ON/1 position or when switching them back to OFF/0 position. The DIP switches should always be turned on from the 8th position first to the least position last. Alternately, when setting the DIP switches to the off position, they should always be turned off from the least position first and the 8th position last.

Avoid cycling power while performing the programming steps. If power is interrupted in mid-programming mode, with power off return all DIP switches to the OFF/0 position and apply power. Then, start process from the beginning of the step that was interrupted.

Avoid lifting the DIP switch levers with pliers. Using a small flat instrument screwdriver or flat object will decrease the chances of lifting the lever off of the switch foundation.

Probe Length, Dead Band and Measuring Range

Probe Length:
The upper or top reference point for definition of the probe length (L) is always the sealing surface of the connection thread. The probe length is an important mechanical dimension which is needed to make sure the probe physically fits into the tank at the anticipated mounting location. The probe can touch the bottom of the tank, but it is not necessary. The actual measuring range (M) of the Tracer 1000 is not the probe length (L). The measuring range of the Tracer 1000 is the total probe length less the upper dead band (D1). The dead band is a small inactive area at the top (D1) of the probe. These are due to the presence of unavoidable signal disturbances at the top of the probe. In the top dead band the measurements are non-linear or have reduced accuracy. Therefore, it is not practical to actually measure level within those inactive or dead band area. The length of the dead band depends on the probe type and the ∑r (dielectric) strength of the material being measured.

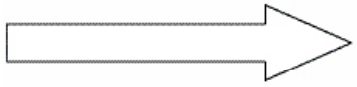
Restore Defaults

Set the following DIP switches to the ON/1 position. 8 - 5 - 4 All other switches should be in the off position. The LED will blink alternately green and red. Press the push button. The LED will remain green for a few seconds while the reset to factory configuration is being performed.

Once the configuration is completed

Figure 9: Restore DIP Switch Positions

DIP SWITCH POSITION								
1	2	3	4	5	6	7	8	
DIP SWITCH SETTINGS								DESCRIPTION
0	0	0	0	0	0	0	0	measuring mode



successfully, the LED will return to blinking alternately green and red. If this is the only function you want to perform, set all of the DIP switches to the OFF/0 position. Once the DIP switches are set to the off position, the LED will change to blinking green indicating the transmitter is in the RUN or Operating mode.

Troubleshooting

Typical Tracer 1000 Troubleshooting Scenarios
NOTE: Please read sections Operation, Programming Configuration, and Probe Length, Dead Band, and Measuring Range before attempting any of the suggested configuration and programming procedures.

1. Tracer 1000 Output FULL/Erratic Output
   - 1.1 Make sure the tank is empty or near empty.
     - Perform Disturbance Signal Scan
       - Set DIP Switches: 8 - 7 - 6 - 4
       - Press the push button.
       - The LED will remain green for a few seconds while the disturbance signal scan is being performed. Once the scan is completed successfully, the LED will return to blinking alternately green and red.
     - Turn Disturbance Scan ON
       - Set DIP Switches: 8 - 7 - 6 - 3
       - Press the push button.
       - The LED will remain green for a few seconds while the disturbance signal is turned on. Once the scan is completed successfully, the LED will return to blinking alternately green and red. Tank not empty/ unable to empty tank
       - Increase amplitude threshold to medium by turning on DIP switches 8 - 7 - 6 - 4 - 1 Push button. Verify output by returning to the RUN mode.
     - Tracer still reading high
       - Increase upper deadband to medium (7.4")
         - This may require adjustment of 20mA set point
   - 1.2 Tracer 1000 erratic output throughout the span of the probe (upon configuring either of the settings below in the indicated order the end user will see a significant improvement of the erratic output becoming more stable.
     - Adjust amplitude threshold to medium
       - Still erratic?
         - Perform disturbance signal scan
           - Still erratic?
             - Increase response time from .5 to 2
   - 1.3 Disturbance signal scan and amplitude threshold have been performed but the tracer is still reading full or is erratic
     - 4 and 20mA set points maybe misconfigured by end user
       - Reset to factory delivery configuration
       - Perform disturbance signal scan with empty tank always recommended by manufacturer

2. LED Visual Indicator is flashing at more than a rate of one flash per second
   - 2.1 Check input voltage wiring
     - Is it more than 30VDC?

3. LED Visual Indicator is flashing but LED is dim
   - 3.1 Check input voltage wiring
     - Is it less than 12VDC?

4. LED is flashing Red not Red and Green when in programming mode
   - 4.1 This identifies that there is an error within the programming configured by the end user - for instance the 20mA set point may be within the dead band
   - 4.2 Restore device to factory delivery setting

Troubleshooting

Typical Tracer 1000 Troubleshooting Scenarios
NOTE: Please read sections Operation, Programming Configuration, and Probe Length, Dead Band, and Measuring Range before attempting any of the suggested configuration and programming procedures.

5. Tracer 1000 Output FULL/Erratic Output
   5.1 Make sure the tank is empty or near empty.
   - Perform Disturbance Signal Scan
     - Set DIP Switches: 8 - 7 - 6 - 4
     - Press the push button.
     - The LED will remain green for a few seconds while the disturbance signal scan is being performed. Once the scan is completed successfully, the LED will return to blinking alternately green and red.
   - Turn Disturbance Scan ON
     - Set DIP Switches: 8 - 7 - 6 - 3
     - Press the push button.
     - The LED will remain green for a few seconds while the disturbance signal is turned on. Once the scan is completed successfully, the LED will return to blinking alternately green and red. Tank not empty/ unable to empty tank
     - Increase amplitude threshold to medium by turning on DIP switches 8 - 7 - 6 - 4 - 1 Push button. Verify output by returning to the RUN mode.
   - Tracer still reading high
     - Increase upper deadband to medium (7.4”)
       - This may require adjustment of 20mA set point

   5.2 Tracer 1000 erratic output throughout the span of the probe (upon configuring either of the settings below in the indicated order the end user will see a significant improvement of the erratic output becoming more stable.
   - Adjust amplitude threshold to medium
     - Still erratic?
       - Perform disturbance signal scan
         - Still erratic?
           - Increase response time from .5 to 2

   5.3 Disturbance signal scan and amplitude threshold have been performed but the tracer is still reading full or is erratic
   - 4 and 20mA set points maybe misconfigured by end user
     - Reset to factory delivery configuration
     - Perform disturbance signal scan with empty tank always recommended by manufacturer

6. LED Visual Indicator is flashing at more than a rate of one flash per second
   6.1 Check input voltage wiring
   - Is it more than 30VDC?

7. LED Visual Indicator is flashing but LED is dim
   7.1 Check input voltage wiring
   - Is it less than 12VDC?

8. LED is flashing Red not Red and Green when in programming mode
   8.1 This identifies that there is an error within the programming configured by the end user - for instance the 20mA set point may be within the dead band
   8.2 Restore device to factory delivery setting

Troubleshooting

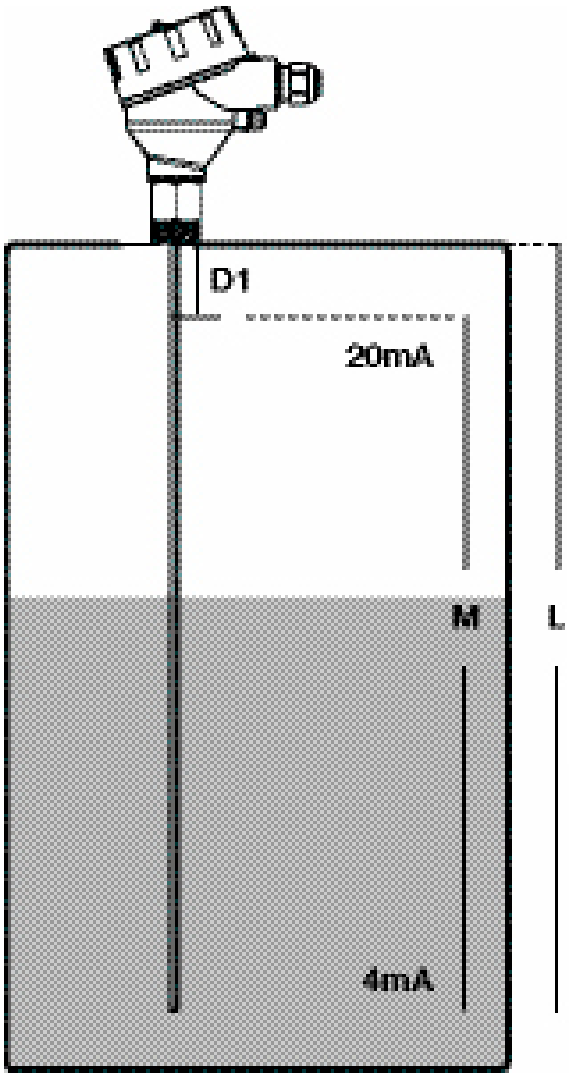
Typical Tracer 1000 Troubleshooting Scenarios
NOTE: Please read sections Operation, Programming Configuration, and Probe Length, Dead Band, and Measuring Range before attempting any of the suggested configuration and programming procedures.

9. Tracer 1000 Output FULL/Erratic Output
   9.1 Make sure the tank is empty or near empty.
   - Perform Disturbance Signal Scan
     - Set DIP Switches: 8 - 7 - 6 - 4
     - Press the push button.
     - The LED will remain green for a few seconds while the disturbance signal scan is being performed. Once the scan is completed successfully, the LED will return to blinking alternately green and red.
   - Turn Disturbance Scan ON
     - Set DIP Switches: 8 - 7 - 6 - 3
     - Press the push button.
     - The LED will remain green for a few seconds while the disturbance signal is turned on. Once the scan is completed successfully, the LED will return to blinking alternately green and red. Tank not empty/ unable to empty tank
     - Increase amplitude threshold to medium by turning on DIP switches 8 - 7 - 6 - 4 - 1 Push button. Verify output by returning to the RUN mode.
   - Tracer still reading high
     - Increase upper deadband to medium (7.4")
       - This may require adjustment of 20mA set point

   9.2 Tracer 1000 erratic output throughout the span of the probe (upon configuring either of the settings below in the indicated order the end user will see a significant improvement of the erratic output becoming more stable.
   - Adjust amplitude threshold to medium
     - Still erratic?
       - Perform disturbance signal scan
         - Still erratic?
           - Increase response time from .5 to 2

   9.3 Disturbance signal scan and amplitude threshold have been performed but the tracer is still reading full or is erratic
   - 4 and 20mA set points maybe misconfigured by end user
     - Reset to factory delivery configuration
     - Perform disturbance signal scan with empty tank always recommended by manufacturer

Figure 10: Probe Length, Dead Band, and Measuring Range



10. LED Visual Indicator is flashing at more than a rate of one flash per second
    10.1 Check input voltage wiring
    - Is it more than 30VDC?

11. LED Visual Indicator is flashing but LED is dim
    11.1 Check input voltage wiring
    - Is it less than 12VDC?

12. LED is flashing Red not Red and Green when in programming mode
    12.1 This identifies that there is an error within the programming configured by the end user - for instance the 20mA set point may be within the dead band
    12.2 Restore device to factory delivery setting

Ordering Information - Tracer 1000

FLO-CORP MODEL NUMBER BUILDER

For Assistance Call **877.356.5463**

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-RN6-01-120-N-000

Tracer 1000 GWR Level Transmitter with 316 SS Rod Probe Type, NEMA 6 Enclosure, 3/4" NPT Process Connection, 1/2" NPT Conduit Entries & Cable Glands, 120" Custom Probe Length, No Additional Options.

LTT1 – □ □ □ – □ □ – □ □ □ – □

LTT1

Probe Type (1) (2)
- **R)** 316 SS Rod
- **T)** 316 SS PTFE Coated Rod
- **C)** 316 SS Coaxial
- **W)** Wire Cable
- **X)** PTFE Coated Wire Cable

Enclosure Rating
- **N6)** NEMA 6
- **XP)** Explosion Proof

Process Connection (3)
- **0)** 3/4" NPT (US)

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)

Additional Options (5)
- **N)** None
- **4)** PTFE Isolation Gasket (4" Diameter)
- **6)** PTFE Isolation Gasket (6" Diameter)
- **T)** Extreme Temperatures (min: -320°F, max: 500°F)

Wire Cable Probe Shown

Rod Probe Shown

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) The L-dimension must be specified in inches (in) and fall within the 'Probe Range' selected.
(5) Isolation Gaskets are recommeded with Probe Type T and X (PTFE Coated Rod & Coated Cable). To purchase flanges contact the factory.

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