



**LTX**

**RF LEVEL SENSOR**

**Instruction Manual**

**FOR MODELS**

**LTX20**

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## 1.3 Specifications

### 1.3.1 Electrical Specifications

Supply Voltage:	12VDC – 36 VDC
Output:	4-20mA, loop powered
Max. Loop Res.:	(Vs-10)/0.02 (i.e. 700Ω at 24VDC)
Calibration:	Via 4 push-button switches non-interactive Zero & Span
Capacitance Range:	10pF to 10,000pF
Accuracy:	± 1% of full span (Constant dielectric)
Repeatability:	± 1% of span
Damping adjust:	0-30 sec

### 1.3.2 Mechanical Specifications

Enclosure:	Alum., Alum Ex. Proof and Stainless (all NEMA 4), PVC
Mounting Thread:	¾" NPT standard, others available
Processes Temperature:	200°C max (392°F)-PFA clad probe 200°C+ Stainless 316 probe
Pressure Limits:	100 psi (7 bar) @ 25°C (75°F) 50 psi (3.5 bar) @ 150°C (300°F) 14.5 psi (1 bar) @ 200°C (392°F)
Probe Material:	PFA Teflon jacketed or bare SS316
Ambient Temperature:	-40 to 70°C (-40 to 158°C)

## 2.0 INSTALLATION

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Note: Unpack the instrument carefully. Inspect all components for damage. If any damage is found, please notify a INTEMPCO representative as soon as possible prior to installation.

The INTEMPCO series LTX RF level sensor should be located for easy access for service and monitoring. Sensor installed transmitter or remote electronics and DIN rail should not be exposed to temperature below -40°C (-40°F) or above 70°C (158°F). This is very important when process temperatures are high and heat can be conducted up to the enclosure and to the remote electronics. Special precaution should be made to prevent exposure to corrosive atmospheres, excessive vibration, shock or physical damage. It is preferable that the LTX is not installed in proximity to high voltage wires or other sources of high electrical noise.

### 2.1 Probes

For conductive liquids, such as water and acids PFA Teflon coated probes are always used. For non-conductive liquids, such as oils, diesel fuel and MEK solvents PFA Teflon coated probes can also be used up to temperatures of 100°C. Bare stainless probes are used for high temperature applications. The probe length is customer specified for the height of material desired to be measured.

## 2.3 Electrical Installation

### 2.3.1 Head Mounted Transmitter Connections (Refer Figure 1.)

**Note:** All wiring between the power supply and the head mounted hockey-puck transmitter should be done with 18 AWG to 22 AWG wiring. A shielded twisted pair cable may be used.

**CAUTION:** Units are designed to operate on 12 to 36 VDC power only. Application of 110 VAC will destroy the instrument.

1. Make sure the power source is turned OFF
2. Remove the head cover and pull supply wires through the conduit connection.
3. Verify that the positive side of the probe (Blue wire) is connected to the "P" terminal of the transmitter and that the probe reference ground (Green Wire) is connected to the "G" terminal of the transmitter.
4. Replace the transmitter enclosure (head) cover until time to calibrate.
5. Connect the positive side of the loop to the "+" terminal of the transmitter.
6. Connect the loop current meter in series with the negative supply wire as follows:
  - a) Negative "-" transmitter wire to the positive meter terminal.
  - b) Negative "-" meter terminal to negative "-" power source terminal.
7. Turn ON the power. The meter may read anywhere on the scale at either end. This is normal until calibration has been completed. Proceed to the calibration instructions.

**Note:** Leave the shield unattached at the transmitter and the power supply. If the output signal is noisy connect the shield to ground of the power source.

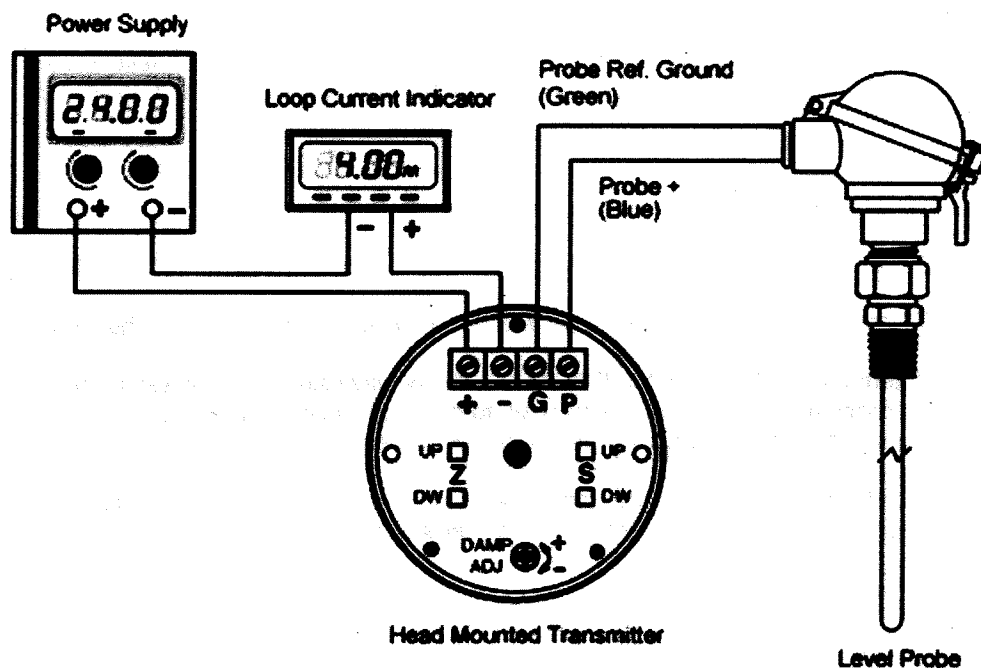


Figure 1. Head Mounted Transmitter

## 3.0 CALIBRATION

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Install the LTX RF Level Sensor as per installation instructions in section 2.0. In order to perform the calibration it is very important to be able to vary the level in the tank (empty or fill). If this cannot be done, proper calibration is not possible.

Decrease the level in the tank until only about 1 to 2 inches of the probe are covered or to the minimum level possible.

### 3.1 Current Meter

In order to calibrate the transmitter, you must use the loop current meter (as shown in Figure 1 or 2). It should read in the range of 1.00 to 25.00 mA, with a resolution of 0.01mA. Using a current meter with less resolution will somewhat reduce the calibration accuracy. To calibrate the instrument:

1. Remove cover of the enclosure head (in case of Head Mounted version).
2. Connect the loop current meter as per instructions in wiring section meter (as shown in Figure 1 or 2).
3. Turn the power ON. The loop current should now be in the range of 1.5 mA to 38 mA, which is normal at this point.

If the tank is nearly empty or somewhat below the mid-level and the output reads between 1.5 to 12 mA, press Z UP or Z DW push buttons. If the output varies accordingly, the Reset and Offset functions, as in section 3.2, needs not be performed. If pressing Z UP and Z DW push buttons does not vary the output, go to section 3.2.

### 3.2 Reset and Offset functions

**OFFSET** and **RESET** functions (or values) are factory set. They may have to be changed by the customer in special cases only. Follow the procedure below.

There may seem to be a malfunction with the transmitter when the 4-20 mA power loop is activated for the first time. The mA reading may be below 4 mA or above 20 mA and pressing the Z and S push buttons does not change the output.

**Note :** Push button may have to be depressed for up to a minute before the value may change.

The **OFFSET** function may have to be performed. To re-OFFSET the transmitter, lower the level in the tank to below the probe (material is not in contact with the probe, this is very important). Press Z UP and S UP push buttons at the same time, then release in 2 to 3 seconds. The transmitter should not show a default value close to 4 mA.

In very rare cases, a problem still may persist. This is because the values of the minimum and maximum are not properly distributed. The **RESET** function may have to be performed. To **RESET** the transmitter, simply press Z DW and S DW push buttons at the same time, then release the two push buttons after 2 to 3 seconds. Then re-OFFSET the transmitter as per instructions above. The transmitter should now show a default value close to 4 mA.

**NOTE:** Calibration procedure L-H gives the most accurate results and is the recommended procedure in all cases.

The following are the important points for all calibration procedures:

- (a) Set the "Damping" to the minimum value, CW direction.
- (b) If there is no change in output when performing "Zero" adjustment first, perform a "Reset" and "Offset", with the tank empty or at L (Figure 3.) level, before starting calibration.
- (c) Perform the "Zero" adjustment first.
- (d) During the first calibration, even if the "Zero" value is correct always press Z-UP or Z-DWN at least one or two times and re-adjust to the correct value. That will allow the transmitter to record that value as its "Zero" reference for the non-interactive calibration feature.
- (e) Never press Z-UP or Z-DWN push buttons when the tank is full or more than 50% full. That will cause the transmitter to record that value as its "Zero" reference and will affect the calibration.
- (f) When calibration is finished, be sure there is nothing that can interfere physically with the calibration push buttons.
- (g) When calibration is completed, avoid moving or touching the probe wire (Blue). That may cause an offset on the output reading.
- (h) After the first calibration, if a small re-adjustment is necessary, use Z-UP or Z-DWN if the tank is at less than 50% full and S-UP or S-DWN if higher than 50% full.
- (i) When calibration is completed, apply silicone over all the connectors to prevent corrosion where applicable.

### **3.4.1 Calibration procedure L-H**

**THE ZERO, TANK IN L (LOW) STATE, MUST ALWAYS BE CALIBRATED FIRST.**

**Turn the DAMP ADJ pot to max CW (neg.) direction**

1. Fill the tank to its L (0%) level (with probe covered).
2. Depress UP or DW buttons on Z until meter reads 4.00 mA. Do not change the zero controls from now on. If changed, the material will have to be returned to the L (0%) level.

**Note:** If a 4.00 mA value cannot be reached, then perform RESET and OFFSET functions as explained in section 3.2.

3. Fill the tank to the desired H (100%) level.

**Note:** The loop current may not rise in proportion to the rising material level in tank. Instead it may rise more rapidly or more slowly than the material level. The span, S, UP or DW buttons may be used occasionally to maintain the loop current approximately proportional to the tank filling or just below the 20.00 mA reading.

4. After the tank has been filled to H (100%), depress SPAN UP or DW buttons as required to obtain a meter reading of 20.00 mA. If 20.00 mA reading has been obtained, the calibration is complete.

1. Fill the tank to L1, some point above 0% level and record this level as L1 (Refer Figure 3.). To determine the loop current at L1 level use the following formula:

$$mA = \frac{(L1 - L)}{(H - L)} \times 16 + 4$$

Example:

L = 12" (30.5 cm) from the bottom of the tank  
L1 = 24" (61 cm) from the bottom of the tank  
H = 96" (244 cm) from the bottom of the tank

$$mA = \frac{(24 - 12)}{(96 - 12)} \times 16 + 4 = 6.28$$

The correct loop current is 6.28mA.

2. Depress Z-UP or Z-DW buttons on ZERO until meter reads 6.28mA. Do not change the ZERO controls from now on. If changed, the material will have to be returned to the L (0%) level.

**Note:** If a 6.28 mA value cannot be reached, then perform RESET and OFFSET functions.

3. Fill the tank to the highest point possible (under 100%), and record this level as H1. The most accurate calibration will be obtained with the greatest separation between L and H1.

**Note:** The loop current may not rise in proportion to the rising material level in tank. Instead it may rise more rapidly or more slowly than the material level. The SPAN, S-UP or S-DW buttons may be used occasionally to maintain the loop current approximately proportional to the tank filling or just below the 20.00mA reading.

4. To determine the loop current at H1 level use the following formula :

$$mA = \frac{(H1 - L)}{(H - L)} \times 16 + 4$$

Example:

L = 12" (30 cm) from the bottom of the tank  
H1 = 72" (183 cm) from the bottom of the tank  
H = 96" (244 cm) from the bottom of the tank

$$mA = \frac{(72 - 12)}{(96 - 12)} \times 16 + 4 = 15.43$$

The correct loop current is 15.43mA.

5. Depress SPAN S-UP or S-DW buttons as required to obtain a meter reading of 15.43 mA. If 15.43mA reading has been obtained, the calibration is complete.

**Note:** If a 15.43 mA value cannot be reached, then perform RESET and OFFSET functions and re-start the calibration.