June 11, 2013

Configuring the Cost-Effective Ultrasonic Liquid Level Sensor

Overview

The Flowline Ultrasonic Liquid Level Sensors are cost-effective sensors that can be used for small to medium capacity tanks. The product supports continuous level measurement models in ranges up to 9.8 ft (3m), 18 ft (5.5m), 26.2 ft (8m) or 32.8 ft (10m). They are ideal for open or enclosed tanks but not suitable for pressurized tanks. The liquid sensors are non-contact sensors making them ideal for corrosive, sticky or dirty liquids. This TechCorner will go through how to configure the Flowline EchoSonic II LU series liquid level transmitters, LU23-00.

In order to configure the Flowline liquid level sensors, the following products are required.

- WEBCAL
  1. This is the programming software that is free for download.
  2. If a hardcopy is required, an installation CD can be purchased.
- LI99-1001
  1. This is the USB adapter used in order to configure the Flowline liquid level sensors.

Wire the sensor to the USB adapter
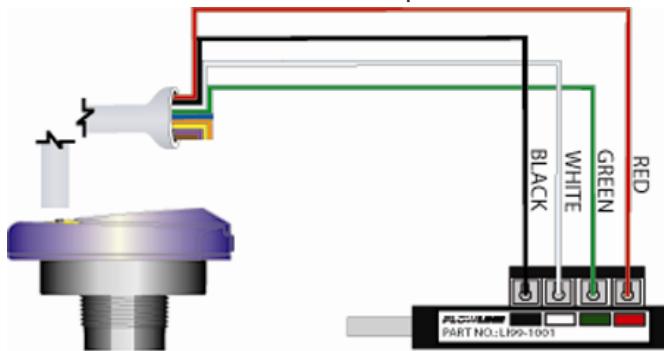
- In order to start programming the Flowline level sensors, wire the Red, Green, White and Black wires to the terminal block integrated on the USB.
    1. The USB has a color label to help indicate which wire goes to what pole.
- Plug the USB into the PC and run the Webcal software.
    1. Webcal automatically detects the USB and initiates the configuration process.
    2. During the configuration process options that indicate "Not Applicable" are options that do not apply as you progress through the configuration settings.
    3. Pressing the clear button will reset the configuration.
- Configuration Setting Breakdown
    1. **Tank Levels**
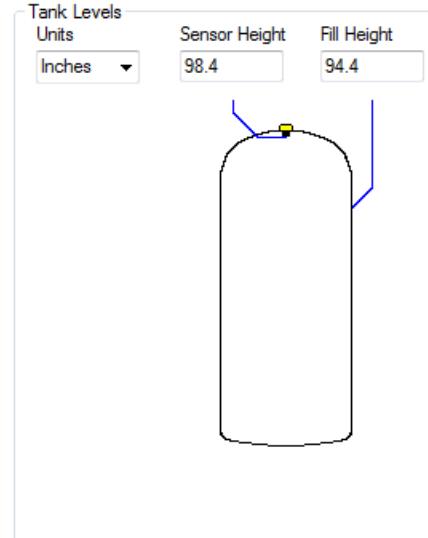
- - Sensor Height: The distance from the bottom of the tank to the bottom of the Flowline level sensor.
        - Fill Height: The distance from the bottom of the tank to the maximum liquid height.
        - Units: Measurement units that can be set to Inches or Centimeters.
    2. Configuring the tank levels is enough for the device to start operating and can be written to the Flowline by clicking on the write to unit button.
    3. Additional configuration can be done by changing settings at the right side of the screen inside the config box.
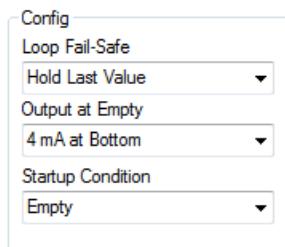
4. **Loop Fail-Safe**
5. This feature allows you to select the fail-safe current output if the sensor fails to detect a return signal (LOST). When the sensor regains signal, the output current will revert back to the current level condition.
   - Hold Last Value - The output will remain in the same state as the last echo detected. Example: If the output was 6.7 mA just prior to the LOST signal, the device will continue to output 6.7 mA. When the sensor regains signal, the output will indicate the level when the signal was regain.
   - Empty - The output will revert to the current value of an Empty tank. The empty state is dependent upon the Output at Empty setting. When 4 mA at Bottom is selected, the sensor will output 4 mA when a fail-safe condition occurs. If 20 mA at Bottom is selected, the sensor will output 20 mA when a fail-safe condition occurs
   - Full - The output will revert to the current value of a Full tank. The full state is dependent upon the Output at Empty setting. When 4 mA at Bottom is selected, the sensor will output 20 mA when a fail-safe condition occurs. If 20 mA at Bottom is selected, the sensor will output 4 mA when a fail-safe condition occurs
   - Overfill (21mA) - The output current will go to 21mA when the return signal is lost.
   - Overfill (22mA) - The output current will go to 22mA when the return signal is lost.
6. **Output at Empty**
7. This feature will allow you to select how the measurement is oriented.
8. The default setting is 4 to 20 mA where 4 mA is set at bottom.
   - 4mA at Bottom – The output current will be 4 mA when the tank is empty and 20mA when the tank is full
   - 20mA at Bottom – The output current will be 20 mA when the tank is empty and 4 mA when the tank is full
9. **Start Up Condition**
10. This feature sets the initial current when the Flowline level sensors powers up.
11. Once the Flowline level sensors receives a reading, the correct level will be transmitted
    - Empty - Selects the start up current established in Output at Empty. Example: Select 4 mA at Bottom, the output will remain at 4 mA until the unit acquires a true return echo. Select 20 mA at Bottom, the output will remain at 20 mA until the unit acquires a true return echo.
    - Mid Tank - When selected, the startup current will read 12 mA until the unit acquires a true return echo.

- Full Tank - Uses the opposite current that was selected in Output at Empty. Example: If you select 4 mA at Bottom then the start up current would be 20 mA. If you select 20 mA at Bottom then the start up current would be 4 mA.
- Overfill (22mA) - The output at startup would be 22 mA. This condition will remain until the unit acquires a true return echo.
- Once the configuration is done clicking on the Write to Unit will send the configurations to the Flowline level sensors.

| Write to Unit |
| Wiring Diagram |
| Advanced |
| Factory Config |
| Clear Screen |
| Config File Name |
| |

| Open Config File |
| Save Config File |
| Print Config File |
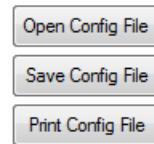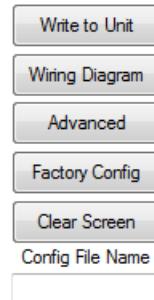
- The configurations can also be saved and uploaded to other Flowline level sensors.
- Wiring the Flowline level sensors to the PLC
  1. The Flowline level sensors has two wires in order to connect to an Analog Card that supports 4-20 mA
     - Red – Power
   - Black – Return
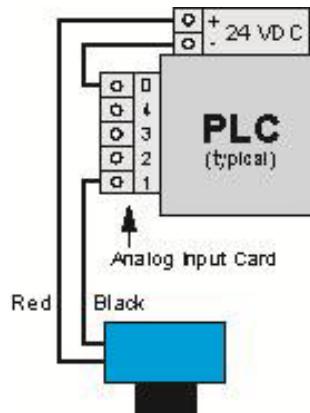
- Mounting the Flowline level sensor

1. The Flowline level sensor should be mounted perpendicular to the liquid surface.
2. The Flowline level sensor should be mounted at least 3 inches away from the wall.
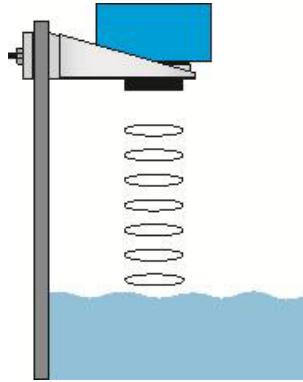
3. If the liquid contains foam and some turbulence, a standpipe can be used.
   - Use a pipe that is at minimum 3" inner diameter.
     - The inner width of the pipe should be wide enough so that it will reach the liquid surface without echoing off the pipe's walls.
   - Ensure that there is a ventilation hole inside the deadband of the pipe to prevent pressure build-up
   - Make sure the pipe extends beyond the lowest liquid level.
   - Cut the bottom of the pipe at a 45 degree angle in order to allow an even flow of the liquid.
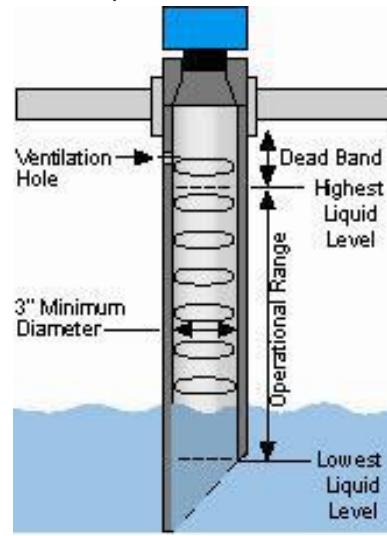
Part Number	Description	Range / Depth	Analog Output	Relay outputs
DL14-00	EchoPod Multi-Function Ultrasonic liquid level sensor	4.1 Ft (1.25m)	4-20ma	(4) SPST relays
DL24-00	EchoPod Multi-Function Ultrasonic liquid level sensor	9.8 Ft (3m)	4-20ma	(4) SPST relays
DL34-00	EchoPod Multi-Function Ultrasonic liquid level sensor	18.0 Ft (5.5m)	4-20ma	(4) SPST relays
DL10-00	EchoPod Ultrasonic Liquid Level Transmitter	4.1 Ft (1.25m)	4-20ma	
DX10-00	EchoPod Ultrasonic Liquid Level	4.1 Ft (1.25m)	0-5Vdc / 0-10Vdc	
DS14-00	EchoPod Ultrsonic Liquid Level Switch	4.1 Ft (1.25m)		(4) SPST relays
LU27-00	EchoSonic II Ultrasonic liquid level transmitter	9.8 Ft (3m)	4-20ma	
LU23-00	EchoSonic II Ultrasonic liquid level transmitter	18.0 Ft (5.5m)	4-20ma	
LU28-00	EchoSonic II Ultrasonic liquid level transmitter	26.2 Ft (8m)	4-20ma	
LU29-00	EchoSonic II Ultrasonic liquid level transmitter	32.8 Ft (10m)	4-20ma	
LI99-1001	Flowline USB Adapter required with WEBCAL software to configure Flowline EchoPod and EchoSonic II sensors			
WEBCAL	Level Sensor Programming Software CD - 169 level sensor configurations with pull down menu selections			
LM50-1001	Side Mount Bracked 2in FNPT with Reducer DL34, LU23, LU28, & LU29			
LM50-1001-1	Side Mount Bracket 2in FNPT with Reducer DL14, DL24, DS14, DL10, DX10 & LU27			
LM52-1400	Reducer Bushing 2in MNPT x 1in FNPT DL14, DL24, DS14, DL10, DX10 & LU27			
LM52-2400	Reducer Bushing 3 in MNPT x 2in FNPT DL34, LU23, LU28, & LU29			
LM52-1890	Bulkhead Fitting 1in FNPT x SLIP SKT DL14, DL24, DS14, DL10, DX10, & LU27			
LM52-2890	Bulkhead Fitting 2in FNPT x SLIP SKT DL34, LU23, LU28, LU29			
LM52-1850	Mounting Flange 1in FNPT x SLIP SKT DL14, DL24, DS14, DL10, DX10 & LU27			
LM52-2850	Mounting Flange 2in FNPT DL34, LU23, LU28, LU29			