

SSI Technologies - Application Note FT-AN5

Fluid-Trac® Water Level Sensor

For Waste Water Holding Tanks

Waste Water Holding Tank Application

This application note covers the Fluid-Trac® 2-wire water level sensor used as a replacement for a standard 33-240 Ohm resistive float water level sender, reed-switch tube sensors, or capacitive tube senders in gray water and black water holding tanks.

Traditional Float Water Level Sender

Waste water holding tank monitoring systems on RVs, motor homes and boats consists of two components – a water level sender and a gauge. The water level sender measures the level of the water in the holding tank and sends the information to the gauge to display the water level.

A traditional float water level sender is a 33-240 Ohm resistive float level sender. It consists of a float attached to an actuating arm (rod) with a variable resistor (potentiometer) mounted at the end of this rod.

The resistive float water level sender interfaces with the gauge via a wiper that slides across the resistive material of the potentiometer. As the resistance of the float water level sender changes with the float's position, the current through the coil in the gauge changes causing a deflection of the needle.

The gray water holding tank collects dirty water from the kitchen sink, bathroom sink and shower. Grease and some dishwashing detergents build up on the resistive float water level sender often causing inaccurate gray water level readings.

The black water holding tank is for the toilet. Toilet paper and waste by-products have a tendency to collect on the resistive float water level sender. This buildup causes false holding tank level readings on your monitor panel. Float water level senders need to be cleaned either mechanically (manually or with wide angle spray rinsing systems) or chemically with sensor cleaners. In addition, some float water level senders are susceptible to chemical erosion due to holding tank treatments and deodorizers.

Fluid-Trac® Ultrasonic Water Level Sensor



The Fluid-Trac® 2-Wire water level sensor is a cost competitive replacement for the traditional resistive float water level sender. It is a more robust and accurate water level sender for water monitoring systems with stationary or mobile water holding tanks with ≤ 32 inch depths.

The Fluid-Trac® 2-Wire water level sensor is non-contact and does not protrude into the waste water holding tank. Since the Fluid-Trac® sensor has no components inside the water holding tank; there is nothing to clean as it does not collect grease, toilet paper or waste materials.

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The Fluid-Trac® 2-wire water level sensor is not affected by corrosive water holding tank treatments or deodorizers.

The Fluid-Trac® 2-Wire water level sensor does not have any parts to wear out. Resistive float water level sender's wiper slides across a resistive strip that can wear out over time which may result in intermittent or even a complete loss of the signal to the gauge.

The Fluid-Trac® 2-Wire water level sensor uses ultrasonic technology to generate a high frequency sound wave that reflects off of the water's surface. The time for the echo to reflect off of the water and return to the water level sensor is used to calculate the level of the water inside the water holding tank. The distance from the sensor to the water is calculated, using the speed of sound. This measured distance is then compared to a strapping table (unique for the water holding tank) and converted into a voltage that drives the gauge to indicate the correct water level.

The Fluid-Trac® 2-Wire water level sensor has a distance accuracy of +/- 0.125 inches.

The Fluid-Trac® 2-Wire water level sensor is mounted on top of the water holding tank. It mounts to the same opening as the resistive float water level sender.

The Fluid-Trac® 2-Wire water level sensor operates in temperature ranges from -40°C to +85°C.

The Fluid-Trac® 2-Wire water level sensor can be factory programmable with a digital filtering to reduce errors caused by fluid sloshing in mobile water holding tanks. With a float water level sender, as the water sloshes to one side of the tank, the needle on the gauge responds quickly to an incorrect water level.

Electrical Interface

Moving coil water gauges use magnetism to move the needle to indicate water level. Moving coil water gauges have a coil connected to the supply terminals. The magnetic field created is dependant on the supply voltage and the current flowing through the water gauge. As the magnetic field increases, the needle will move to indicate water level. The water level sender passes a current that will vary the magnetic field to indicate the correct water level.

The Fluid-Trac® 2-Wire water level sensor has a ratiometric PWM output (20 mA to 200mA). This current output emulates a 30-240 ohm resistive float water level sender.

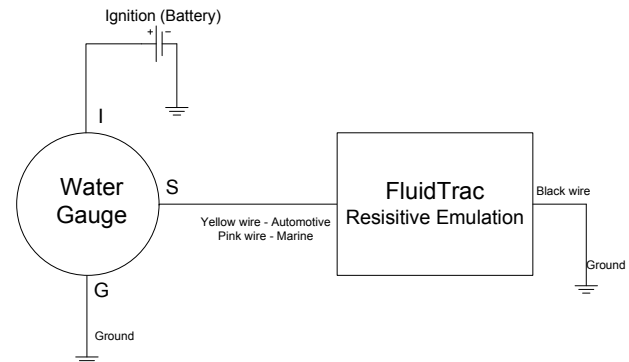


Figure 1. Fluid-Trac® 2-Wire Water Level Sensor Interface to Water Gauge

As shown in Figure 1, the Fluid-Trac® 2-Wire Water Level Sensor interfaces using the same two wires as the float water level sender. The Fluid-Trac® two wire water level sensor is designed to work with analog gauges that have nominal coil impedances from 90 to 150 ohms.