Ultrasonic Point Level Sensor

Product Overview

The Fluid-Trac® PLS (Point Level Sensor) is a durable, economical control module for reliable limit level control OEM applications. The Fluid-Trac® PLS comes in a compact package that combines a smart point level ultrasonic level sensor, internal temperature compensation, embedded software and three low side output circuit drivers. The Fluid-Trac® PLS control module was designed for versatile external control capability. It can be interfaced to Relays, Switches, Pumps, Valves, Audible Alarms/Buzzers and Flashing Alarms. Listed below are a few of the typical OEM applications:

- **Single Point Control** – Fluid-Trac® PLS can keep a tank from running dry or overflowing. The PLS can be factory programmed with a critical level set point so that whenever the set point is reached, the low side driver will close the circuit to allow a pump to turn on or open a valve.

- **Multiple Point Control** – Fluid-Trac® PLS can be used for liquid level regulation to either keep a tank between two or three critical level set points or to activate two or three different external operations at each critical set point. Monitoring liquid levels to the factory programmable limit level set points allows for activation of pumps, valves and external alarms (audible, flasher, LED).

For original equipment manufacturers, SSI engineering can customize the Fluid-Trac® PLS embedded software to provide the best solution for your unique application needs. Some custom options include the following:

- **Latching of Output Driver Circuit**

- **Time Delays** – When the level limit is tripped, the timer is started and the output is energized. The output is de-energized after the factory preset time delay.

- **Pump Protection Automatic Shutoff** – When the level limit is tripped, the pump is energized for a fixed factory preset time period. If the level does not change, then the pump is shut off. This protects the pump in cases where the supply liquid is turned off.

- **Pump Down/Up** – Energize output 1 when liquid is above high/below low level set point. Output 1 remains energized until the liquid falls below/above the low level set point.

Product Overview

- **Switch point range:** up to 45 inches (at 24 V power 0 °C to 50 °C)
- **Triple, Dual or Single Point Control**
- **Operating Temperature:** -40 °C to 85 °C
- **Accuracy on Limit Set Points:** ± 2% Full Scale Distance
- **Tank Profiling Improves Accuracy:** Factory programmable strapping tables for unique tank shapes
- **Reliability and Durability:** Fluid-Trac® PLS has no parts to wear out.
- **Non-Contact:** Most problems with sump pumps are float related. If the pump does not start, the float may be hanging on something in the tank.
- **Nothing to Clean:** Fluid-Trac® PLS uses an ultrasonic non-contact sensor that does not protrude into the tank.
- **Factory programmable hysteresis eliminates pump chatter** when pumping liquids in or out of the tank.
- **Eliminates False Tripping** caused by floating debris.
- **Chemical compatibility:** Fluid-Trac® PLS works with a wide variety of media including wastewater, sludge, hydraulic fluid, oils, coolants, gasoline, diesel, urea (AdBlue)
- **Minimal Dead Band:** No bottom dead band like on reed switches. An optional Fluid-Trac® mounting adapter can be used to reduce or potentially eliminate the top dead band of 2 inches.

Measurement Technology

The Fluid-Trac® PLS's level sensor uses ultrasonic technology to generate a high frequency sound wave and measure the time for the echo to reflect off of the liquid's surface and return. The distance from the level sensor to the liquid is calculated based on the speed of sound.

The 3 FET low side drivers are controlled by their own liquid level set point which is factory programmable. The FET drivers can be interfaced to external alarms and/or relays for use in a wide variety of level control applications.

The Fluid-Trac® PLS can be used in numerous industrial sectors like wastewater, chemical, and pharmaceutical industries for the following applications:

- Pump up or Pump Down Control
- Overfill and Alarm
- Full and Empty Signaling
- Control of Filling Systems
- Leak Detection and Alarm
- Protection of Pumps (Dry Running/Draining Protection)
- Underfill and Alarm
- Limit Level Control of Liquids
- Level Regulation
- 3 Point Limit Level Signaling - Full and Empty

Electrical Interface

The Fluid-Trac® PLS has three factory programmable FET low side drivers. One typical Fluid-Trac® PLS application is to interface to a pump and an alarm.

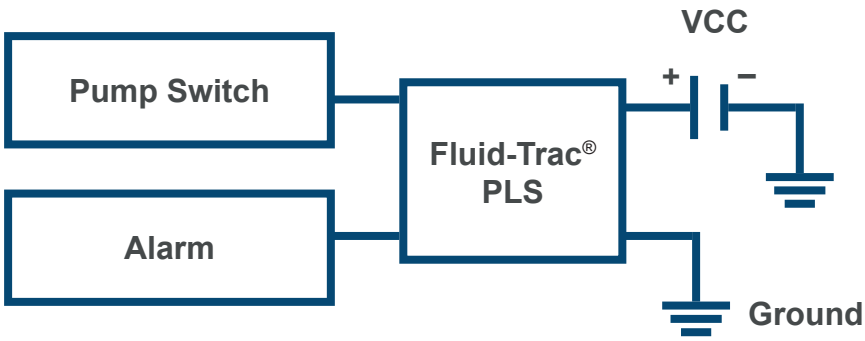

Figure 1: Fluid-Trac® PLS Fill and Alarm

Mounting

The Fluid-Trac® PLS uses the standard SAE J1810 5-bolt pattern mounting style. When mounting the FluidTrac® PLS, it is important to place the Fluid-Trac® PLS sensor's face in the center of the tank perpendicular to the liquid level and with no obstructions in the beam path to the liquid.

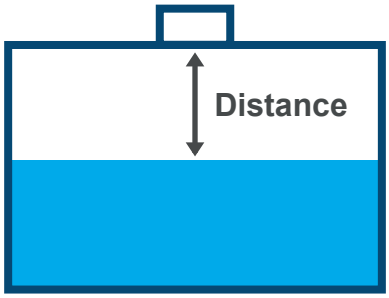

Figure 2: Fluid-Trac® PLS Tank Mounting

Cone Angle

Fluid-Trac® PLS mounting that is not perpendicular to the fluid causes a reduction in its sensor performance. As shown in Figure 3, the amount of returned sound energy is dependent on mounting cone angle.

The Fluid-Trac® PLS maximum operating range (tank depth) decreases with angle. The maximum cone angle is 6°.

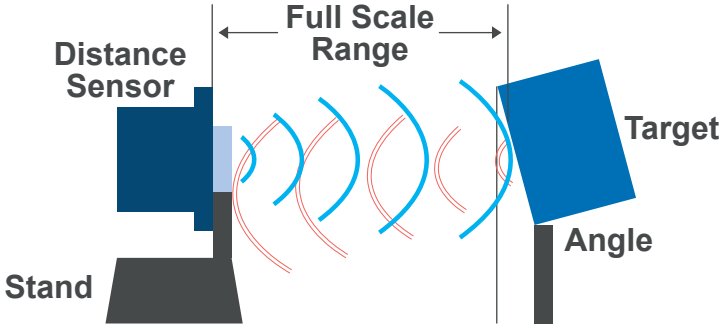

Figure 3: Mounting Considerations

Pump Problems

Perhaps the leading mechanical cause of pump problems is float switch related. The float switch is the part of the sump pump that activates the pump when water reaches a certain threshold. The float is responsible for the smooth operation of the on/off switch. The sump pump relies on both the switch and the float arm mechanisms to operate effectively.

- Pumps shift position inside the basin causing float problems.
- Floats protrude into the tank and can get contaminated by corrosive liquids.
- Floats will bob with the liquid as the tank is being filled and/or drained. This may cause the pump to chatter as the switch bounces on and off with the motion of the float.

Pump Chatter and Hysteresis

SSI engineering works with customers to assure the correct digital filtering is applied for their specific application needs.

Fluid-Trac® PLS has factory programmable hysteresis. Fluid-Trac® PLS prevents pump chatter by having separate programmable points versus off points.

As an example, the Fluid-Trac® PLS can be set up to turn on a pump when the level height of the liquid reaches 10 inches and turn off when the level is pumped down to 2 inches.

Electrical Specifications

Supply Voltage	8-32 VDC
FET Output	Factory Programmable to "Normally Closed" or "Normally Open"
Switch Point Range (Measured from the top of tank)	Up to 45 inches (24 V power 0 °C to 50 °C). Up to 32 inches over operating temperature range.
Volume Accuracy	2% Full Scale
Operating Temperature Range	-40 °C to 85 °C (-40 °F to 185 °F)
Storage Temperature Range	-40 °C to 100 °C (-40 °F to 212 °F)
Current Sink	210 mA (max)

Electrical Specifications

EMI	100 V/m
Mechanical Shock	18 G Shock
Drop Test	4 Foot Drop Test
Vibration	4 Grms – 8 hours each axis
Humidity	85% humidity at 85 °C for 1,000 hours
Chemical Compatibility	Water, Diesel Fuel, Motor Oil, Urea (AdBlue), Ethanol, Hydraulic Fluid, Engine Coolant, Grey/Black Water

Other Specifications

Cable Length	12 inches
Weather Resistant Rating	NEMA 4
Dead Band (Top Only)	2 inches (max)

Note: A European 6 hole adapter and 2” NPT adapter are available to mate with the SAE J1810 5 hole mount.

Note: The Fluid-Trac® PLS comes with an integral gasket that must be used when mounting.

Standard Mounting
SAE J1810 5 Hole
1 3/16" Straight Thread available upon request

Three Switch Wiring Guideline	
White	DC power in (8-32 Volts)
Green	DC power Common Ground
Brown	Switch One
Yellow	Switch Two
Grey	Switch Three

Contact

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