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Why SME Fluid Level Sensors?

Fluid Level Sensors – More Than Just an On/Off Signal



Custom
Engineered
Solutions for
Tomorrow

Why SME Fluid Level, Pressure, and Flow Sensors

In the past, fluid level sensors provided a simple on/off signal, but now sensors are being called upon to supply a great deal more information. The trend towards increased control circuits begin employed in both residential and in industrial device application monitoring is driving the need for more complex and “smarter” liquid level sensors that are capable of more than just an open or closed signal line. In some instances additional information can be signaled with simple magnetic reed switches by adding many reed switches to a PCB to give multiple liquid level point measurements. In this application resistors can be placed in circuit to provide discreet voltage outputs that will indicate one of many possible level points along the travel path of a magnetic float.

If a digital signal or custom voltage signals are required by the customer this is accomplished through the use of either onboard or remote signal electronics. The environment in which the sensor will be employed can also determine whether a simpler mechanical float level sensor will work or if a more sophisticated conductivity sensor is more appropriate. A mechanical float switch can suffer failure due to contaminants restricting the movement of the magnet containing float, whereas a conductivity sensor must be able to discern between being submerged in fluid or just having a viscous fluid clinging to the probes of the sensor and of course a standard conductivity sensor that is always submerged in a fluid is highly susceptible to electrolysis.

The humble fluid level sensor is now taking center stage

Easily customizable and simple to install, magnetic level sensors are low power devices that don't require electronics, making them very appealing for most applications. For example, washing machines frequently used sensors to signal a danger level, so the machine could avoid overflow; another example is a sensor to signal a dangerously low brake fluid reservoir level in automotive applications. –Note: the dishwasher fluid level sensor used a micro-switch and not a reed switch BUT we did replace this technology with the R12580/R12581 which uses reed switches and a thermistor mounted on a PCB and packaged all in one piece with two magnet floats: one float and switch provide overflow protection that shuts down the dishwasher and the other float moves between two reed switches to give multiple level readings.

However, over the past few years, customers have begun expecting more from level sensors than just an on/off signal. The shift has been to provide much more information to the user. In addition to danger level conditions, customers also want primary warning conditions ahead of danger and before things get to a dire condition, as well as features strictly for ease of use or convenience. An example is the bulk detergent level sensing feature found in modern laundry equipment. While not required for a dishwasher to function, the sensor prevents the need for the customer from having to check detergent level every time they run the appliance.



Environmental trends affecting fluid level sensing

Environmental initiatives are another big driver of new sensor technology and applications, particularly in response to the trend toward closer energy monitoring, for both individual appliances and household and industrial water tanks.

There has been a movement towards devices “talk” wirelessly with each other – and we will need a smart sensor between the machine to machine (M2M) interactions, and the medium which they communicate. That’s where Standex-Meder steps in with innovative, high-quality reliable components that fit the bill for such applications. Picture a vacation interrupted by a text message from the air conditioner drain line with an alert that the sump pump has stopped working. This type of alert would definitely require a level sensor with onboard electronics. Standex-Meder matters during the moments where the application of sensing such HVAC, appliance, and other products require components that can handle such processes.

Clean water and water treatment is another environmental trend with huge implications for level sensing. In fact, water treatment in developing nations is perhaps the largest market for level sensors, including applications designed for industrial effluent, sewer water, gray water, and clean water. There is a significant push to be more efficient with the use of water and sensing applications are being used to ensure that fluid reservoirs are not overfilled, causing wastage.

Sensors are also being used to provide more accurate feedback on how much water can be reused. This is evident in newer appliance designs, in which engineers are trying to maintain a certain level of water in the wash cycle by using fluid sensors to measure how warm or dirty water is. This lets the sensor determine if water can be reused for rinsing or if fresh water has to be added to the wash cycle and heated. Simply, Standex-Meder products can intelligently provide the functionality necessary to help products be smarter, more efficient, and productive to where the results can be items such as less energy usage, improved resource management, lower costs, and increased performance.

Developing sensor designs that work

Standex-Meder has developed thousands of sensor designs, including simple reed switch magnetic sensors and conductive sensors, as well as passive devices with no electronics. With in-house capabilities for manufacturing the sensor, packaging, and electronics, the company has developed a proven process for developing designs that work. The process begins by asking a few simple questions:

- What liquid is to be measured?
- Are single or multiple measurement points required?
- Will a reed switch based, mechanical float sensor perform the operation or does the application demand a sensor without moving parts?
- Is electrolysis a concern?

- What is the desired output signal from the sensor?
- Does the customer have electronics for signal conditioning or should the sensor be integrated with a circuit?

Standex-Meder has diverse capabilities which allow for dynamic solutions in the field of fluid level, as well reed based sensors, and magnetics components. Expertise and manufacturing related to engineering, design, plastic/insert molding, in-house tooling, and more results in a completely customized package that fits the required form, function, and specifications as necessary.

Specific mold compound can be selected with a TCE (thermal coefficient of expansion) that exactly matches that of the reed switch, ensuring that the molding process does not put any stress on the glass to metal (hermetic) seal. In-house dynamic contact resistance (DCR) testing is used to determine any tiny flaws in the reed switch that could result in early life failures.

Many of the newer sensor designs Standex-Meder can deliver to include onboard electronics, usually a circuit on a PC board packaged with a sensor that completes an operation based off supplied power and what the product is sensing. Electrical and mechanical engineers work hand in hand without having to worry about coordination of any issues that may arise as the product progresses through the development design and manufacturing process.

Examples illustrate the breadth of new

sensors on the market

The desire for more information and convenience, along with worldwide water and energy conservation initiatives, has led to a flurry of new fluid level magnetic and conductive sensor designs. Appliances are the number one adopter of the technology, with HVAC (condensate level sensing) and automotive (coolant and other fluid sensors) following closely behind.

For example, Standex-Meder recently developed a solution for a major appliance manufacturer that needed an accurate sensor for a bulk dishwashing detergent level feature. The issue is that laundry detergent is very viscous, and detergent was sticking to the prongs of the original 2-probe conductive sensor design. As the detergent level dropped, residue was clinging to the sensor, creating a bridge that completed an electrical connection between the two metal probes – in effect tricking the sensor into thinking it was full all the time.

Standex-Meder developed a conductive sensor using a patented 3-probe design – the extra probe disrupts the signal in the liquid between 2 points. The electronics sense that condition and knows liquid is clinging to the sensor. The design was later carried over to a variety of laundry appliances. Developing designs can be challenging, especially given the fact that all conductive level sensors can give false readings. Standex-Meder has developed circuits with a patented bias ring technology that prevents this condition.

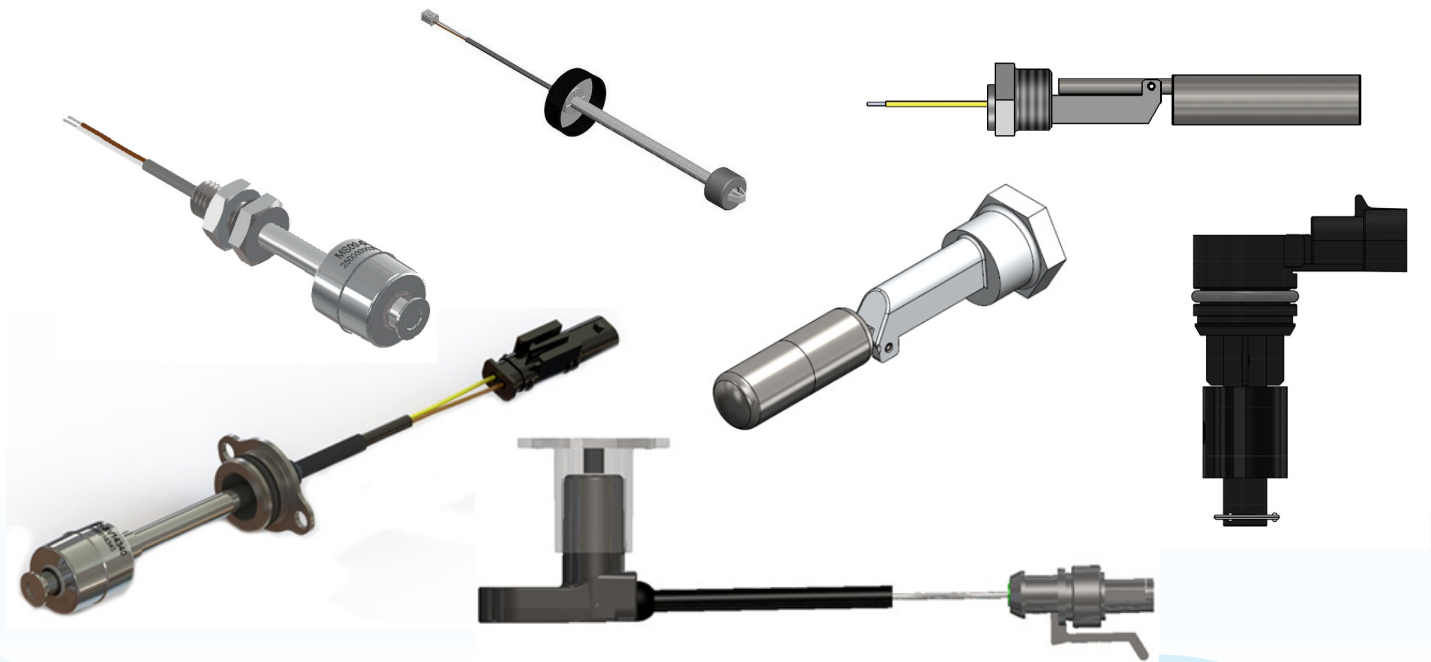


Another example is a multi-level coolant sensor for large over the road trucks. The company's earlier magnetic reed switch level sensor had issues with liquid intrusion damaging the switch during installation and assembly.

With the design a 2-piece sensor assembly is installed in the tank, including a mechanical float with encapsulated magnet that provides feedback on both a coolant warning level and a dangerously low level. The design gives truckers a window of opportunity to address the issue, so they can understand that there is a less than ideal coolant level in the vehicle and begin planning service. Older sensors would have been a full or empty situation and the operator would not have known that he had a coolant situation until the tank was almost empty which

puts the vehicle dangerously at risk of overheating. A magnetic switch-based level sensor for condensate measurement was designed for an HVAC company that required a basic and inexpensive overflow level sensor for a commercial air conditioning unit packaged in the ceiling or walls of buildings.

The unit produced condensate that would go down the drain and be evacuated; if the condensate backed up, it could pool up in the air conditioner, potentially causing a flood condition. The customer needed to accurately measure a very small amount of fluid that built up in the drain pan (less than .0200- inch) and the sensor needed to fit in a tight area with a very small amount of physical movement of the float to close the switch.



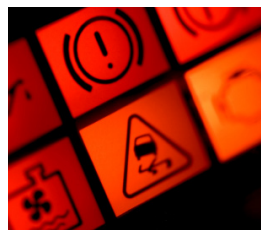
Normally this might be handled best by conductive technology, but the customer wanted a low cost but dependable solution that would not require additional electronics.

A final example is a smart conductive automotive sensor used to detect the amount of water in diesel fuel tanks, including off-road automotive, marine, trucking, buses, construction vehicles, and power generators. The new electronic solution has no moving parts inserted in the fluid, the sensor's unique design allows it to continuously sense resistance and measure different resistance levels. If too much water is collecting at the bottom of the filter ahead of the diesel fuel tank, the device alerts the vehicle

control device that action needs to be taken and water drained off.

The ability to collaborate in house through the full part development eliminates discontinuity that can arise with multiple suppliers and ensures that any issues that arise as the product progresses through development are quickly addressed.

Find out more about our ability to propel your business with our capabilities and solutions by visiting www.standexmeder.com. Give us a hello@standexelectronics.com today! One of our engineers or sales leaders will engage your team.



About Standex-Meder Electronics

Standex-Meder Electronics is a worldwide market leader in the design, development and manufacture of standard and custom electro-magnetic components, including magnetics products and reed switch-based solutions.

Our magnetic offerings include planar, Rogowski, current, and low- and high-frequency transformers and inductors. Our reed switch-based solutions include Meder, Standex and OKI brand reed switches, as well as a complete portfolio of reed relays, and a comprehensive array of fluid level, proximity, motion, water flow, HVAC condensate, hydraulic pressure differential, capacitive, conductive and inductive sensors.

We offer engineered product solutions for a broad spectrum of product applications in the automotive, medical, test and measurement, military and aerospace, as well as appliance and general industrial markets.

Standex-Meder Electronics has a commitment to absolute customer satisfaction and customer-driven innovation, with a global organization that offers sales support, engineering capabilities, and technical resources worldwide.

Headquartered in Cincinnati, Ohio, USA, Standex-Meder Electronics has eight manufacturing facilities in six countries, located in the United States, Germany, China, Mexico, the United Kingdom, and Canada.

For more information on Standex-Meder Electronics, please visit us on the web at www.standexmeder.com.

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