
Oil Water Interface Detection



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A leading oil and gas company contacted us directly a few years ago looking for an alternative solution for oil/water interface detection. They had been utilizing Coriolis meters for many years to sense the change of water to oil flowing through pipes. While the Coriolis meters worked well, they were expensive, had grown old and needed to be replaced. Due to projections in growth, the company was planning to build a large number of new facilities and was in search of a reliable, more cost-effective solution. Essentially, they wanted an instrument that could produce the same result, but at a fraction of the price. After discussing the application, LS6000 level switches with 4" HALAR probes and Teflon insulators were chosen. Initially, 4 units were to be shipped and used in a test application. If found successful, LS6000's would be used at allocation comingle facilities all throughout the State of Texas and Oklahoma.

After the oil and water is separated, oil is sent downstream while water is directed back through a different pipe at the facilities. The LS6000 was installed in the pipe as seen in the attached pic. Under normal conditions, only water flows through the pipe. The LS6000 was calibrated to sense the water and wired NC (FSL) so that the relay was de-energized. In the event that oil somehow made it into the pipe, the LS6000 would sense the absence of water, energizing the relay and sending a signal to shut down the pump/close a valve. The test application was a success! An initial order of 50 was received, which was split and sent to two different locations. Since the maintenance personnel were not familiar with the LS6000 units, Babbitt helped them draft a Standard Calibration Procedure (next page) that could be implemented at various locations. Subsequent orders of 50-75 units per month have since continued for the past year.

As a result, the oil company has been able to significantly reduce their cost of instrumentation. In addition, both production and efficiency are maintained because the LS6000 helps ensure that no oil escapes through the water line. The exact P/N in this application was LS6000-12VDC-H-4"-X (X=Teflon Insulator). HALAR coated probes are always recommended in interface applications because it allows the user to distinguish emulsion layers as either oil or water.

The above example is an oil/water interface application. We can easily detect the difference because the dielectric constants of the two liquids are very different – water (70) and oil (2). The same would hold true for a variety of other liquids/applications where the electrical properties are very different. Ex. Water/Heptane.

It is very common for customers in a variety of industries to want to detect the change of liquid flowing through a pipe. Just remember, as long as the two liquids being measured have different dielectric constants (greater than 20), then Babbitt Level Switches can distinguish the difference.

Calibration Procedure

Calibration is typically done in absence of material, but with interface applications, the calibration is performed in the non-conductive fluid. In the above oil/water application, the probe is submerged in oil. The sensitivity POT is turned clockwise to the right until the Red LED comes on. The POT is then turned counterclockwise to the left until the Red LED goes out. Once the Red LED is out, give it another full turn counterclockwise to the left. This will set the unit to detect water, but ignore oil. The unit should now be wired on NC when set to FSL or NO when set to FSH. In this situation, the relay will energize in the absence of water - when no product (oil) is touching the probe.

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