



Level



Pressure



Flow



Temperature

Liquid
Analysis

Registration

Systems
Components

Services



Solutions

FTL51 Overfill Protection in a Propylene Oxide (PO) Storage Tank- Chemical

SIL2 rated Liquiphant high level switch and Nivotester FTL325P with push-button test for high level protection



Chemical plant



Liquiphant M FTL51 with FTL325P Nivotester



Steel storage tanks

Liquiphant FTL51 and Nivotester FTL325P are used as high level switches for overfill protection in a propylene oxide (PO) storage tank. This Pulse Frequency Modulation (PFM) signal transmission setup allows a periodically function test without dismantling the instrument. In addition, a radar instrument is used for continuous level measurement.

Company profile

Chemical plant in Michigan

This company manufactures several products at this site. The chemicals produced here primarily service the automotive market and OEM market.

Application

The project was to replace an aging carbon steel horizontal cylinder bulk storage tank, with a new stainless steel vertical cylinder bulk storage tank. The old tank had a capacitance probe that the instrument technician wanted to upgrade to radar. To prevent overflowing of the tank, a tuning fork point level instrument was installed.

Temperature: 68°F (20°C)
Pressure: 50 psig (1.5 bar)

Solution

A high level switch was required for overfill protection. The Endress+Hauser Liquiphant M FTL51 has been in use at this facility for several years as a high level switch, so the choice was simple. The Liquiphant was specified with an FEL57 electronic module and an FTL325P Nivotester to ensure an intrinsically safe installation. This also allowed the ability to test the complete instrument functionality without removal from the tank.

Results

The customer selected Endress+Hauser based on a combination of past experience, reduced equipment maintenance, and price.

Instrument description

The FTL51 tuning fork level switch vibrates continuously with its resonance frequency. If the tines are covered with liquid, the resonance frequency drops and the instrument detects the presence of material. In addition, the analysis of the frequency and the amplitude of the vibration also allows for a sensor reliability check. For example, corrosion of the fork resulting in an increase in resonance frequency, or blocking of the tines resulting in a loss of vibration, will be detected instantaneously.

The FEL57 electronics is a two-wire Pulse Frequency Modulation (PFM) transmission and is a very safe way of conveying information from the field instrument into the control room. In comparison to a 4 to 20 mA transmission, the information is encoded in the frequency of impulses, superimposed as a 10 mA current. A failure in this case is represented by no pulses (0 Hz).

This transmission allows for explosion proof and intrinsically safe installation. The Nivotester FTL325P is typically installed in the control room. It provides the power supply for the FTL51, the IS barrier and a relay output for level switch point and alarm.

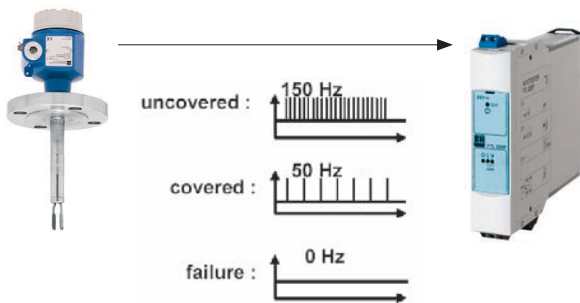
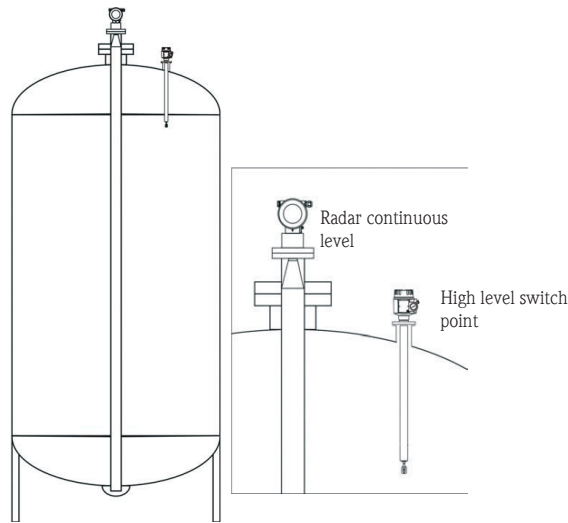
The FEL57 module is equipped with an internal test generator. As describe above, every Liquiphant model checks the frequency of the tuning fork and therefor the quality of the measured signal continuously. The internal test generator now checks if this continuous self-test is working properly.

This installation allows the customer to test the complete instrument functionality without removal from the tank by pushing a test button. This test procedure saves dismantling and mounting costs every time the overfill function has to be checked in the plant for routine maintenance.

SIL (Safety Integrity Level) rating

The Liquiphant and Nivotester combination with periodically push-button test functionality is SIL2 and SIL3 rated in accordance to the IEC 61508/61511 and ISA 84.01-96 standards and has been certified by the TÜV Rheinland of North America and the German TÜV.

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PFM transmission between Liquiphant and Nivotester

ISO 9001:2000 Certified

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