

LPG high level monitoring



Oil and Gas Case Study 202-3

Application

At oil refineries and gas production facilities, liquefied gases such as LPG, Propane, Butadiene, etc. are typically stored at elevated pressures of 15 to 20 bar(g) [220 to 370 psig] to reduce required storage volumes. To withstand the higher pressure, the facility typically uses spherical or bullet shaped vessels due to their inherent design to hold large volumes of liquids at high pressures. The process of making these vessels gas free is very expensive. They normally operate continuously for 5 to 10 years with hot rework being avoided as much as possible.

Challenge

For operational and accounting purposes, a level gauge system is typically installed with a separate high-high level alarm required for safety. The high-high level alarm is extremely important to ensure that the vessel has an air space left available for liquefied gas expansion when temperature increases. Floats and optical sensors have been unsuccessful as high-high

level alarms in these applications. Floats lack self-testing capability and optical sensors have a quartz glass window that is prone to false alarms from hydrocarbons affecting the glass window.

Project parameters

User	Total refinery
Location	Various locations
Media	LPG, propane, butadiene
Pressure Range	174 to 232 psig [12 to 16 bar(g)]
Temperature Range	14° to 59°F [-10° to +15°C]

Solution

The refinery successfully replaced the optical systems with FCI's FLT93S FlexSwitch® thermal level switches. FCI's FLT93S level sensors were installed in operating pressures of 232 psig [16 bar(g)] using the FLT93S optional retractable packing gland assembly. This retractable assembly makes hot-tap installation

possible by using a 1 inch full bore ball valve. In the unlikely event of sensor failure, the entire level element can be safely retracted in a controlled manner under operating conditions.

The FLT93S FlexSwitch has two alarm set points that can be preset as high level and fail safe with alarm activation in the event of any possible failure. The FLT93S also features a manual electronics self-test that can simulate a high level alarm.

The FLT93F FlexSwitch also offers FM and ATEX approvals with explosion-proof protection for hazardous area applications. Electronics may be installed with local or remote configurations.

FCI level switch specifications

Model	FLT93S FlexSwitch®
Media	All liquids and gases
Process Connections	Optional retractable packing gland assembly
Accuracy	±0.25 inch [±6.4 mm]
Pressure Range	to 3500 psig [240 bar(g)]
Temperature Range	-100° to +850°F [-73° to +450°C]

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