

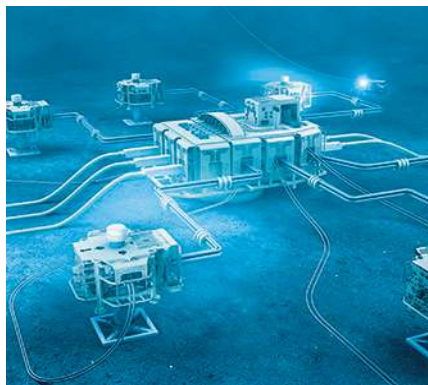


APPLICATION SPOTLIGHT

Offshore Chemical Injection - Subsea



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APPLICATION:

Accurate measurement of the chemicals injected subsea into a well's flow stream is of critical importance. This customer required a reading of the flow rate to ensure the correct amount of scale inhibitor and corrosion inhibitor was injected into the crude oil. This ensured that the piping which is being used for the crude oil transportation would stand up to the aggressive effects of the crude oil.

PRODUCT SUPPLIED:

LitreMeter's VFF MF15 690bar with subsea loop-powered 4-20mA signal output.

CHALLENGE:

At the time, the biggest challenge was combining each of the following four variables:

1. Subsea, with customer supplied connector
2. Very low flow
3. Loop-powered 4-20mA
4. 690 fluid pressure

While we had overcome each of these under individual challenges, we hadn't designed a system that combined all 4 challenges. The unit was required to be operational at depths of up to 5000 feet (2200 psi) with a flow rate of 2.5 to 32 gallons per day and 70 cSt. The output would require linearization. The 4-20mA board had to have very low power consumption and had to be packaged in a subsea enclosure with a large, customer-supplied subsea connector.

SOLUTION:

The smallest flow meter was the MF15, the workhorse of the range. Fortunately, with the viscosity of the customer's fluid, 70 cSt we were able to achieve a linearity of $\pm 1\%$ of reading over 2.5 to 32 gallons per day. Therefore, no on-board linearization was required.

The high pressure design dictated by pressures of 10,000psi (690 bar) provided a relatively large footprint. Coupled with a large face to accommodate the TRONIC K2-SE-G001/SS/003/PG connector meant a larger subsea housing than normal and, unusually, in cubic form, to allow for the pcb and internal configuration. This was designed with a long complex O-ring path to minimize lid thickness and for best sealing practice. 316 stainless steel was chosen for almost all materials but particularly the internals and externals to provide best resistance to seawater corrosion.

The digital-to-analog converter was selected for its minimal power consumption. It was able to handle the typically low frequency output and provide a 4-20mA output yet not consume too much power.

RESULTS

Litre Meter was able to provide a solution that had not previously been available on the market. The customer was very pleased to be able to measure and control the flow rate of the chemical and ensure the highest quality oil possible.