

Chemical Plant Gets Stable Level Measurement in Turbulent Freon Surge Drum

RESULTS

- Increased equipment protection by reducing risk of freon carryover
- Reduced maintenance costs
- Better control through more accurate and reliable level measurement

APPLICATION

Freon surge drum in industrial refrigeration system at a chlorine liquifaction plant

Application Characteristics: Dielectric of freon: 6; turbulent, variable density

CUSTOMER

Chlorine Liquifaction plant in North America

CHALLENGE

A US chemical plant needed to increase the reliability of the refrigeration equipment in their chlorine liquefaction unit. One goal was to have a more stable level control system on the refrigerant evaporator surge drum.

The surge drum is a separator that disengages the liquid and vapor R-22 refrigerant from the evaporator. A low surge drum level will result in reduced refrigeration capacity while a high level could cause liquid carryover into the compressor suction. If liquid carryover occurs, the lubrication of the compressor is impaired due to dilution of the oil, which can be returned into the refrigerant system.

The existing level control consisted of a displacer and a magnetically-coupled high level float. These measured level reliably, but were subject to wide fluctuations due to violent boiling and density changes of the application. The level indication to the DCS fluctuated five inches over the 14-inch operating range of the vessel.

SOLUTION

The plant selected the Rosemount 3300 Series Guided Wave Radar (GWR) Level transmitter for several reasons. GWR is immune to density changes. Any changes resulting from varying ratios of oil and refrigerant will not affect the accuracy of the level reading. The high signal-to-noise ratio of the 3300 results in a more stable signal in this turbulent application. No moving parts means that frequent mechanical adjustments are eliminated. The output of the 3300 can also be used in place of level switches, eliminating other mechanical pieces.



The 3300 provided an output that is ten times more stable than the previous technology.



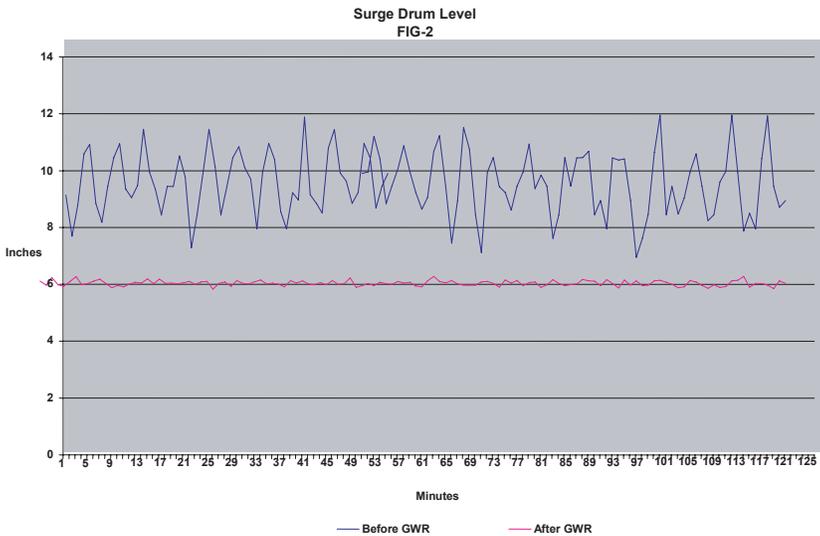
3300 Guided Wave Radar

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The overall result of the new installation is a much more stable level in the surge drum. The level went from readings that fluctuated from as much as five inches to less than 1/2 inch under steady state operating conditions. The 3300 provided an output that is ten times more stable than the previous technology.



This chart shows a comparison of the output of the 3300 with the output of the displacer. Both units were scaled 0 to 14" on the 4-20 analog output.

The more stable level reduced the risk of a high level swing that can cause liquid refrigerant carryover into the compressor, or a compressor trip. The use of this technology, coupled with the other modifications, increases the overall unit reliability and efficiency while decreasing maintenance costs.

RESOURCES

Rosemount 3300

<http://www.emersonprocess.com/rosemount/products/level/m3300.html>

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