



APPLICATION NOTE

Food & Beverage

Monitoring and control of CIP return lines in a dairy

- Improved detection of transition phases to ensure multiple use of costly detergents
- Inductive conductivity measurement for the separation of water, caustic and acid solutions
- Significant reduction of operating and purchasing costs thanks to increased sensor lifetime

1. Background

One of the world's leading manufacturers of dairy products, plant-based nutrition and beverages operates a production facility for yogurt products in Brazil. To ensure safe and high quality products, the company globally follows stringent hygienic procedures. This involves thorough cleaning of all their closed systems such as pipes and vessels applying the Clean-in-Place (CIP) method.

2. Measurement requirements

The CIP cycle at the plant consists of several cleaning steps. At first, purified water is rinsed through the lines followed by a caustic solution as the main disinfectant. Subsequently, intermediate cleaning with purified water is carried out before the lines are flushed with an acid solution to remove all residuals.

Given the high costs for the cleaning agents, the food company runs a recirculation system to feed back all liquids to their corresponding tanks for reuse in the next CIP cycle. Reusing the detergents requires the liquids to be separated precisely. The whole system has a high degree of automation depending on the inductive conductivity as a control input to identify the transition phase between each liquid.

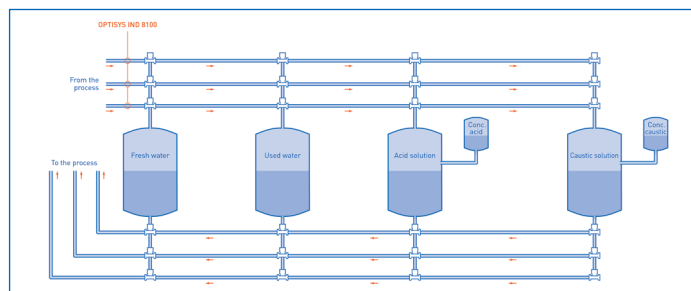
The customer had so far used an inductive conductivity sensor from a major supplier of process instrumentation. However, this sensor type frequently needed maintenance and replacement due to damages caused by mechanical stress and temperature shocks. The quality issues and the poor lifetime of this sensor prompted the company to search for an alternative solution for CIP return control.

3. KROHNE solution

The food company decided to trial the OPTISYS IND 8100. The inductive conductivity measuring system is particularly designed for transition phase monitoring to control CIP return. Its flexible design allows installation with a wide range of hygienic adapters in accordance with EU1935/2004 and FDA regulations. In this application, the PEEK sensor with EHEDG and 3A certified VARIVENT® adapter was used. The adapter has a surface roughness of Ra <0.8 for food applications.

The customer decided in favour of the remote version of the measuring system that allows the converter to be mounted up to 10 m / 32.8 ft away from the sensor. This enables comfortable on-site monitoring when needed. The stainless steel housing of the inductive conductivity measuring system is IP69K rated and thus suitable for high pressure water jet cleaning.

The KROHNE system enables the dairy operator to select up to 14 different measurement ranges. Prior to delivery, an 80 point linearization of the OPTISYS IND 8100 had been carried over the whole of the measurement ranges, which enables reliable and long-term stable conductivity measurement. As the inductive conductivity of each cleaning agent is temperature-dependent, the conductivity system also features a Pt100 temperature sensor (Class A) to compensate for the temperature impact on the measurement.



CIP cycle schematic with the OPTISYS IND 8100 inductive conductivity sensor



OPTISYS IND 8100 shortly after commissioning



Inductive conductivity measurement of cleaning agents

4. Customer benefits

While the competitor's system caused extensive maintenance and had to be replaced every six months, the tested OPTISYS IND 8100 provided long-term stable measurement without interruption for three years. The dairy was so satisfied with the KROHNE measuring system that they decided to replace the old system with the OPTISYS IND 8100, reducing operating and even purchasing costs.

Due to the much more accurate inductive conductivity measurement, the transition phase of the different cleaning agents is reliably detected. The CIP return lines are properly controlled. The liquids can thus be effectively separated and fed back to their corresponding tanks, ensuring multiple use of process water as well as caustic and acid solutions.

5. Product used

OPTISYS IND 8100

- Inductive conductivity measuring system for food and beverage applications
- 4-wire, 4...20 mA, with head-mounted or remote transmitter
- Hygienic PEEK sensor, robust (IP69K), with temperature compensation
- 14 selectable measuring ranges: 0.05...1000 mS/cm; fully calibrated



Contact

Would you like further information about these or other applications?
Do you require technical advice for your application?
application@krohne.com

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