Clean-In-Place (CIP) Applications in the Food and Beverage Industries

RESULTS

- Faster Change Overs
- Maximize Production
- Minimize Chemical Usage

BACKGROUND

Process piping and vessels used in the food and beverage industry require periodic cleaning without disassembly to remove residue from previous batches and to sanitize both the process piping and vessels. Depending upon the particular products involved, the cleaning can involve alternately flushing with water, caustic solutions, acid solutions and sanitizing (bleach) solutions.

PROCESS

Since the various cleaning solutions used are more conductive than the water used for flushing and final rinsing, conductivity can be used to monitor the various cleaning steps and the final rinse. Each cleaning solution's flush is typically followed by a water flush, so each step of the cleaning process will appear on a strip chart as a series of conductivity increases. The progress of the final rinse can be followed as a decrease in conductivity until the conductivity drops to the conductivity of the rinse water, which indicates that rinsing is complete.

The cleaning solutions used for CIP are used for several cleanings and gradually lose strength due to dilution with residual rinse water and through the cleaning action itself. Conductivity can often be used to monitor the strength of the cleaning solutions to indicate the need for replenishment (Figure 1).

In the high flow, low pressure system, a cascading action serves to clean the lower portions of the process vessels. A typical CIP program entails the following:

1. A pre-rinse with RO-treated water, consisting of three bursts, each of a one-minute duration to remove the bulk of the soil load;
2. A continuous 30-minute wash of from 0.5% to 1.0% alkaline detergent at 180°F (82°C);
3. A one-minute rinse with RO-treated water;
4. A 30-second rinse (sometimes ten minutes or more is requisite) of from 0.5% to 1.0% nitric or phosphoric acid solution at 150°-180°F (65°-82°C);
5. A two-minute rinse with RO-treated water to remove the phosphoric acid residues; and,
6. A final one-minute rinse with deionized water.

THE MEASUREMENT

One of the major requirements for equipment and sensors used in CIP applications is that they be sanitary in design. This means that the surface of a sensor should not contain contours or crevices that could trap residue from the product, that could then decay or harbor microorganisms.

The Model 225 Sanitary Toroidal Conductivity Sensor mounts directly into the cleaning lines via a tri-clamp flange. Toroidal sensor technology seldom requires cleaning and features smooth surfaces, unlike contacting conductivity sensors. Therefore, toroidal sensors are the ideal choice for CIP installations.

INSTRUMENTATION

Model 1056 Dual Input Intelligent Analyzer

- Dual field configurable inputs and outputs with a single analyzer
- Large, bright LCD display can be customized to show straight and cation conductivity simultaneously
- Intuitive menus with advanced diagnostics
- Optional HART®[1] or Profibus®[2] DP
- Improved performance on low conductive solutions (<25µS/cm)

Model 225 Clean-in-Place Toroidal Conductivity Sensor

- Toroidal (inductive) principle measurement of construction
- 3-A sanitary standards
- Robust design
- 21 CFR 177 compliant

[1] HART is a registered trademark of the Hart foundation
[2] Profibus is a registered trademark of Profibus & Profinet International

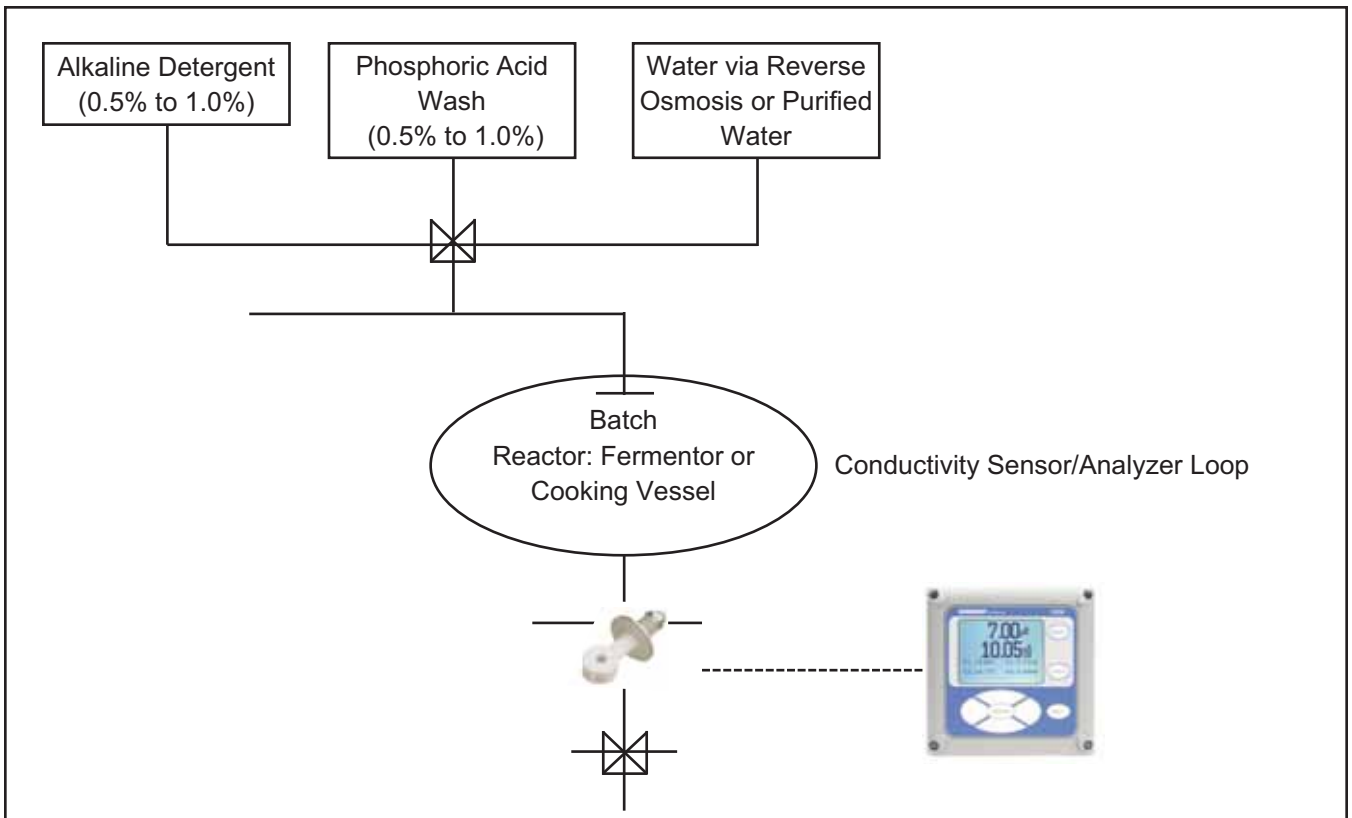

FIGURE 1. Clean-In-Place Applications

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