Foxboro® Conductivity Sensors Clean-in-place Procedures

Summary

Foxboro conductivity sensors can measure the conductivity of almost any conductive liquid. In process industries it allows for optimum ROI with clean-in-place (CIP) procedures. With the ability to consecutively and accurately measure conductivity by autoswitching between all three applications with one loop saves on equipment and maintenance costs.

Business Value

With more than 40 years experience in conductivity measurement, Foxboro offers the most complete line of instrumentation available. The proven reliability and robustness of the Foxboro conductivity flow-through sensor helps improve process performance, increases production yields and reduces equipment corrosion.

Benefits

- Reduced material and maintenance costs
- Improved production yields and reduced equipment corrosion
- Reduced exposure of personnel to a potentially hazardous chemical

About Foxboro Flow-Through Conductivity Sensors

Foxboro® conductivity sensors are a comprehensive family of flow-through, noninvasive electrodeless assemblies that measure the conductivity of almost any conductive liquid. The sensors are available in several line sizes and with a wide choice of wetted parts materials and end connections, including both industrial and sanitary types. Featuring a built-in calibration port, the sensors can be calibrated inline to improve applications with aggressive chemicals and those in industries such as pharmaceuticals where the process line cannot be broken.

Technical Challenge

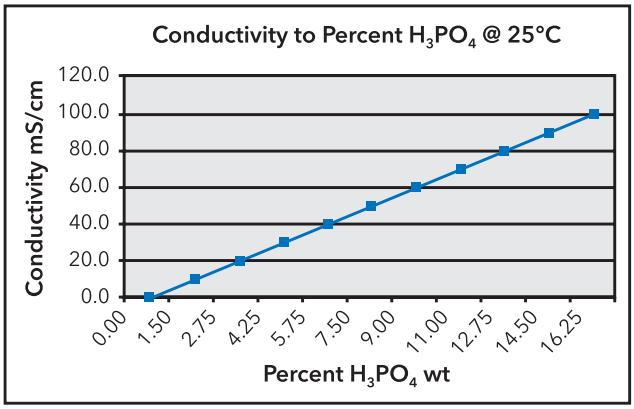
Clean-in-place (CIP) procedures are widely used in all types of processing industries after each batch run to prevent bacterial growth and contamination and to maintain the highest product quality. Examples of such industries include, dairy, brewery, food and beverage, pharmaceutical and chemical manufacturing. The primary purpose of the CIP process is to remove solids and bacteria from the processing vessels and piping.

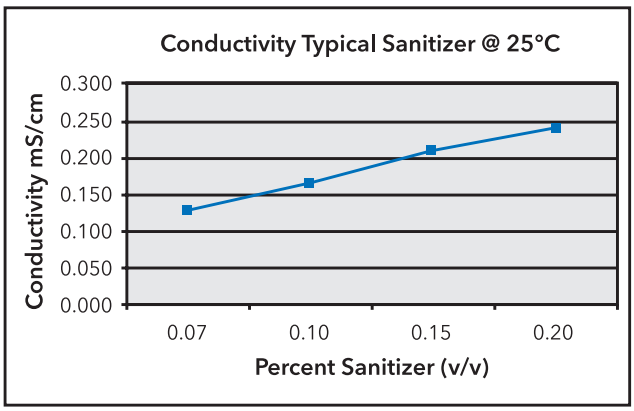
Technical Challenge (continued)

The majority of cleaning and sterilizing agents used in this process consist of caustic, acid, bleach, peroxide, ammonia or a mixture of these constituents. The CIP system allows for accurate dosing of the concentrated cleaning agent, normally into water, to yield a low concentration solution suitable for cleaning the processing system. Multiple fluids flow through the CIP process in a specific order and time frame, and rely on precise conductivity measurement equipment to monitor and control the efficiency of the cleaning process.

A typical CIP process involves dissimilar solutions traveling through the vessels and pipe work of the processing system in a deliberate and sequential manner. The change in conductivity at the interface of such fluids is a crucial measurement for the overall efficiency of the CIP process. A typical CIP cycle, after a batch of product is produced may include flushing the lines with a cleaning agent, followed by a sanitizing agent and finally a rinse. Inherently, the aforementioned cycle necessitates monitoring and measurement of conductivity ranges and changes for up to three consecutive conditions.

In addition to the challenge of measuring multiple ranges, the conductivity measurement accuracy is also dependant on the correct choice of temperature compensation. Perhaps the greatest challenge with the CIP process lies with the sanitizing stage. Sanitizers typically consist of various ratios of acid, caustic and antibacterial agents. These non-binary solutions make it difficult for the end user to determine the optimum percent concentration of the material to use as well as choosing the optimum temperature compensation type. To that end, inaccurate conductivity measurements will lead to excess chemical costs, cleaning cycles and neutralization costs.





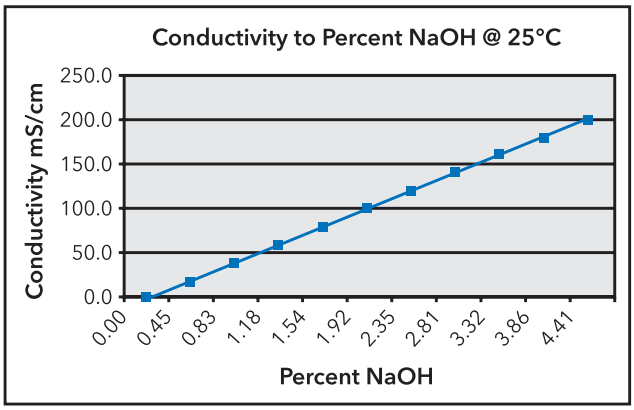


Figure 1. Foxboro analyzers offer pre-programmed curves such as H_3PO_4 and NaOH. They also offer custom curve generation for proprietary solutions such as sanitizers.

The Foxboro Solution

For optimum ROI, conductivity measurement equipment with the ability to consecutively and accurately measure conductivity by auto switching between all three applications with one loop saves on equipment costs and maintenance costs. The Foxboro 875EC analyzers can auto switch applications one of two ways. One way is by using a set point for high or low conductivity and the second is by using a digital contact signal from a host, e.g. PLC.

Any combination of our electrode less conductivity or flow-through sensors (871FT or 871EC) together with either analyzer (870ITEC or 875EC) provide rapid, accurate interface detection. These analyzers have the largest number of chemical and temperature compensation curves available (see Figure 1).

The Foxboro Company 871FT Flow-Through Non-Invasive Electrodeless Conductivity Sensor can be vertically or horizontally adapted to your process by threaded or flanged end connections. It is available in line sizes from 0.5 to 4.0 inches and in a variety of construction materials to insure materials compatibility.

The 871EC invasive electrodeless sensor installation requires a minimum three inch diameter pipe (to avoid errors in conductivity readings due to wall effect) or it can be vessel mounted. The 875EC Analyzer is a microprocessor based, menu-driven AC powered analyzer that provides a dual measurement indication and dual 4-20 mA isolated analog outputs. This analyzer offers an auto switch feature that minimizes the number of loops needed in a CIP application. Two independent configurable alarm relays can be utilized to activate diversion valves, alarms or diagnostics.

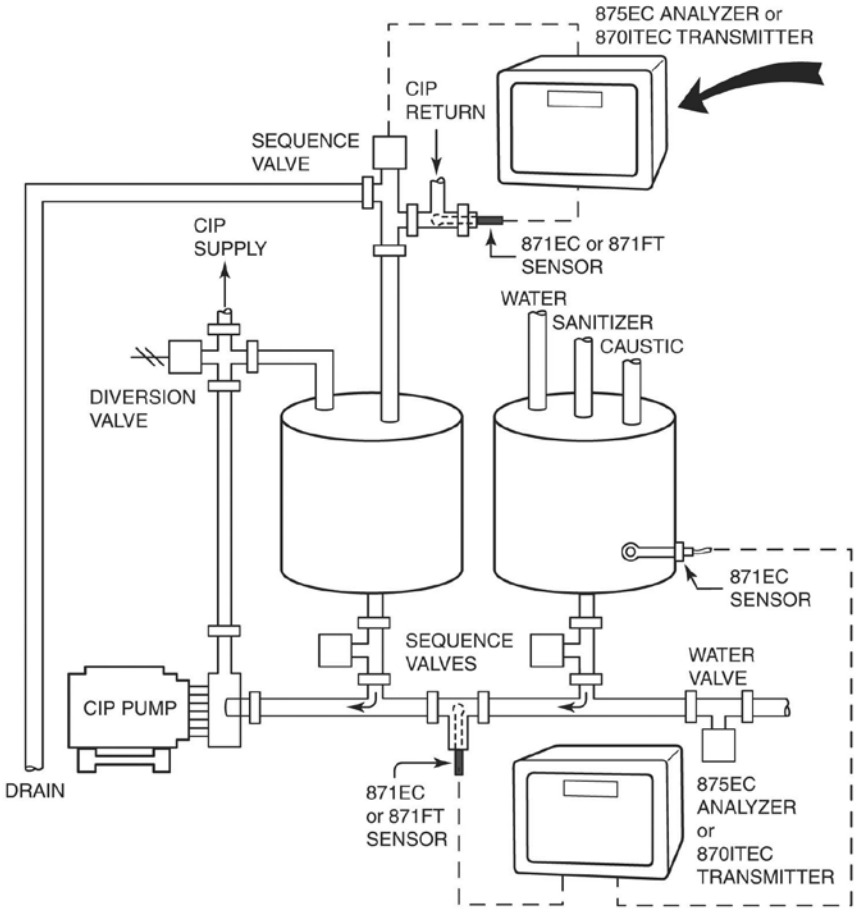


Figure 2. Clean-in-place process

The 870ITEC Transmitter is a microprocessor based two-wire intelligent transmitter that provides a measurement indication and a single 4-20 mA output. A menu-driven human interface guides the user through intuitive configuration, calibration and troubleshooting procedures.

Reference Documents

PSS 6-3N1 C..... 875EC Analyzer

PSS 6-3Q A..... 871FT Sensor

PSS 6-3N2 A..... 870ITEC Analyzer

PSS 6-3C4 A..... 871EC Sensor

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