
Case Study # 20: Rugged, Low-Cost Solution for Conductivity Measurement in Steam Sterilizable and Clean in Place (CIP) Food, Beverage & Dairy Applications

- *Stainless steel contacting conductivity sensor will not crack with frequent temperature cycling*
- *Sensors provide longer service life at only about half the cost of torroidal sensors from competitors*
- *Complete system with sensor and transmitter costs little more than just a replacement torroidal sensor*
- *Sensors and transmitters can be customized for your specific installation needs*

AST40-TRI SANITARY CIP CONDUCTIVITY SENSOR



FEATURES:

- Longer service life with 316SS body
- Electropolished finish reduces coating
- Drop-in replacement for torroidals
- USDA 3A & FDA compliant; steam sterilizable and chemical CIP compatible for food, beverage, and dairy
- Precise temperature measurement & compensation with Pt100/ Pt1000 RTD
- 3TX-CON transmitter supports sensors with cable lengths up to 100 feet (30 m)

3TX-CON TRANSMITTER FEATURES:

- Up to 200 mS/cm range at 105°C or 100 mS/cm at 210°C; maximum pressure 150 psig (11.4 bar)
- Factory preset adjustment compensates for errors from sensor cable resistance and capacitance
- 35mm DIN-RAIL mounting is standard
- Optional wall, pipe, or panel mounted waterproof enclosures are available in single to four-channel packages
- Your choice of 24V DC or 115V AC power

3TX-CON TRANSMITTER OPTIONS:

- Scalable analog 4-20mA output is standard; Optional MODbus RS-485 digital output can be ordered for conductivity & temperature signals
- Connect to existing SCADA or PLC systems
- Optional datalogging available with 3TX-DAT module or with any Windows PC using MODbus interface kit
- Optional 3TX-REL Alarm and Control relay module provides both time proportional control (TPC) and variable frequency pulse algorithms for advanced local control needs



The Problem:

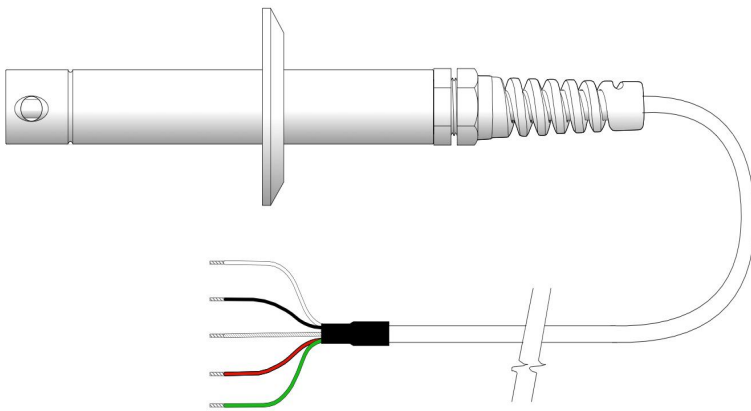
An international food manufacturing company performs periodic clean in place (CIP) on their process lines to ensure the safety and quality of its products. The CIP process involves using hot acid and base cleaning solutions run in succession with concentrations monitored by conductivity measurements. The systems the company had been using employed toroidal sanitary conductivity sensors that had great difficulty with the frequent temperature cycles that are typical of CIP. The plastic outer bodies of the expensive toroidal sensors would crack, causing maintenance problems, downtime, and high replacement costs. Failure of toroidals in this manner occurred with multiple suppliers, indicating a generic problem with the sensor type. Because no viable alternative appeared to exist, this costly maintenance cycle endured for years.

The Solution:

The company replaced the old toroidal sensors with ASTI contacting sanitary conductivity sensors with 316 stainless steel construction and mating conductivity transmitters that delivered the necessary measurement ranges of up to 0-200mS at 105 °C. The contacting sensors with their stainless steel outer bodies did not suffer any ill effects from temperature cycling, unlike the plastic-jacketed toroidal sensors. The contacting sensors are FDA compliant and compatible with steam sterilization or chemical clean in place processes for food grade applications. This high-ranging contacting system employs a unique pairing of a special sanitary contacting conductivity sensor suitable for drop-in inline replacement of the existing toroidal sensors (see drawing and notes below) and a mating contacting conductivity transmitter that can provide the high linear measurement ranges from a relatively low cell constant sensor. The transmitter will, when required, automatically correct for the resistance and capacitance errors of extended cable lengths to give stable, accurate readings. The resulting customized system offers a unique measurement solution, addressing all installation needs at about half the cost of the toroidal system while providing far longer sensor service life with minimal maintenance.

Typical Sensor Used for Such Measurements:

Model: AST40-TRI-1.5"-2.0-1000-20-TL Sanitary Contacting Conductivity Sensor for Inline CIP Measurement Applications: Sanitary Contacting Conductivity 2-Electrode Sensor; 1½" Sanitary Flange Connection; Cell Constant K=2.0/cm; Integrated Pt1000 Temperature Compensation Element; 20 feet of integral cable (custom lengths available).



Custom Sanitary CIP Conductivity Sensor Options:

- 1) Flange-face to sensor tip is 3.00 inches (7.62 cm) that enables installation as a drop-in replacement for most sanitary toroidal sensor installations. Custom flange to tip lengths are available.
- 2) Flange size choices are 1", 1½", 2" or 2½"
- 3) Standard cable length is 10 feet (3 meters), with options up to 100 feet (30 meters), integral or bridged from a 316SS waterproof J-Box. Mating 3TX-CON transmitter corrects for both resistance and capacitance of the sensor cable when its length is entered into memory.
- 4) Optional grommet strain relief (as illustrated on left).

Typical Transmitter & Analyzer Configuration Used for Such Measurements:

Model: 3TX-2M-CON-2.0/200-A-PS Single * Channel Contacting Conductivity Transmitter & Analyzer Assembly

Description: Single * Channel Contacting Conductivity Transmitter for Wall/Pipe Mounting; ** Isolated Contacting Conductivity Transmitter for use with K=2.0/cm conductivity sensor; Full Range Scaling 0-200mS; Universal 115/230 VAC power supply.

* Multi-channel configurations from dual up to quad channel available upon request

** Panel Mounting ½-DIN type configurations are available as well as wall & pipe mounting