

Engineering Insights: Conductivity Measurement

Part 4 of 4

Conductive vs Inductive: Making the Right Choice

Matching the Measurement Principle to the Process

Comparison: Conductive vs Inductive Conductivity Sensors

Feature	Conductive Sensor	Inductive Sensor
Measuring principle	Electrodes contact the liquid	Electromagnetic induction
Electrodes exposed	Yes	No
Fouling resistance	Moderate	Excellent
Low conductivity measurement	Excellent	Limited
High conductivity measurement	Good	Excellent
Aggressive chemicals	Moderate	Excellent
Maintenance	Higher	Lower
Hygienic applications	Possible	Excellent
Typical applications	Pure water, laboratory, pharmaceutical water	CIP, food, beverage, chemical processing

When Should You Choose Each Technology?

Neither technology is universally better. The correct choice depends entirely on the process conditions and measurement objective.

A **conductive conductivity sensor** is generally the preferred option when measuring very low conductivity liquids, such as purified water or ultra-pure water, where maximum sensitivity and precision are required.

An **inductive conductivity sensor** is often the preferred solution where process reliability, hygiene and low maintenance are priorities. Applications involving CIP systems, product changeover, chemical concentration control or media that are prone to fouling typically benefit from the electrodeless measuring principle.

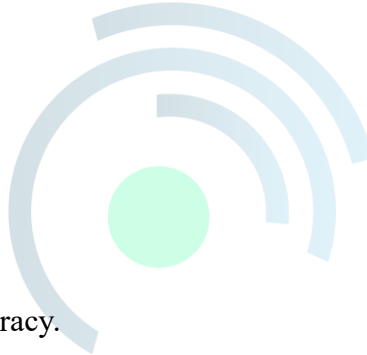


Engineering Perspective

One of the most common mistakes in instrumentation is selecting a sensor based solely on its measuring range.

Successful instrumentation selection requires consideration of the entire process environment, including:

- Conductivity range.
- Product characteristics.
- Temperature.
- Pressure.
- Fouling potential.
- Cleaning requirements.
- Hygienic design.
- Maintenance expectations.
- Required measurement accuracy.
- Total lifecycle cost.



The most suitable conductivity sensor is not simply the one capable of measuring the process—it is the one that continues to provide accurate, reliable measurements throughout the life of the installation with the lowest practical maintenance requirement.

As with all process instrumentation, selecting the correct measurement principle is often more important than selecting the instrument itself.

Engineering Takeaway

The right conductivity sensor is determined by the process—not simply the conductivity range—so measurement principle, media characteristics, operating conditions and lifecycle requirements must all be considered.

