

# WHAT IS A SMART SENSOR?

Electrochemical water quality sensors, like the ones we make at Sensorex, detect the concentrations of ions in solution and generate a corresponding electrical signal. However, these electrical signals are not immediately useful. In order to be recorded or used in process control applications, signals must undergo some processing. For example, the high impedance signal generated by a pH sensor must be amplified due to the high resistance of pH glass. When using a combination pH sensor, the millivolt signal from the pH glass and the millivolt signal from the reference electrode are compared to calculate the true pH value of a solution.

Typically, a pH/mV meter, transmitter, or controller is used to condition sensor signals, before recording data or programming process control. The same principle applies for other sensors and water quality parameters. Signals from conductivity/TDS, dissolved oxygen, chlorine, and oxidation reduction potential sensors are converted to useful data with instrumentation.

A smart sensor incorporates some of the signal processing and data manipulation capabilities of a transmitter or controller directly into the sensor. Smart sensor electronic modules essentially function as a "micro transmitter," eliminating the need for additional instrumentation. For example, a smart pH sensor with a direct 4-20mA or MODBUS signal can be connected directly to a PLC or SCADA system.

## SELECT SENSORS FEATURE A MODBUS RS485 SERIAL INTERFACE.

### Key features of RS-485 are:

- Differential interface with high common mode noise rejection (*immune to interference*)
- Operates from a single supply
- -7V to +12V bus common-mode range
- Up to 32 devices on the bus
- 10-Mbps maximum data rate (at 40 feet)
- 100kbps maximum data rate (at 4000 feet)



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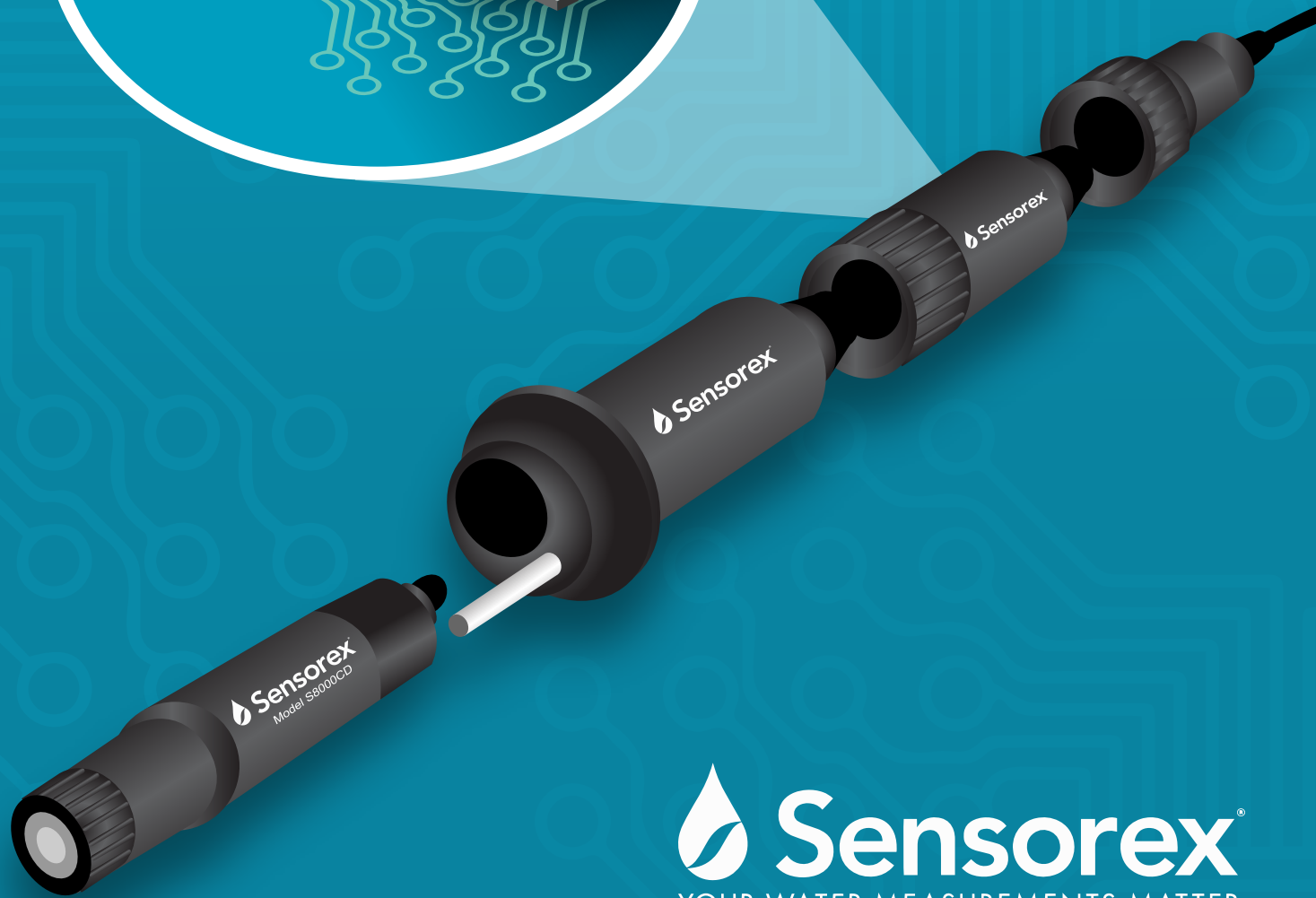
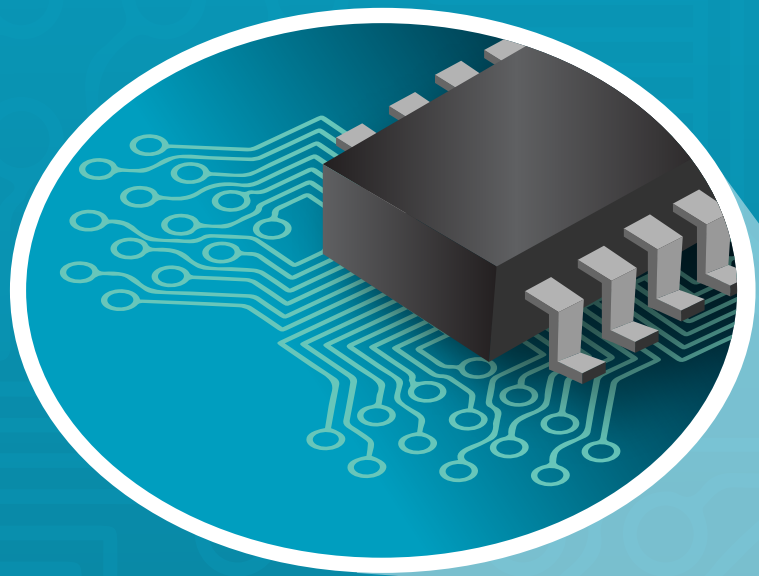
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# SMART SENSORS

Water quality sensors with built in digital & analog microtransmitters





# WHY CHOOSE A SMART SENSOR?

## CREATE VALUE WITH CUSTOMIZED SOLUTIONS.

Understanding water treatment processes and recommending the best equipment for a system is the most important thing you do. You know that every customer and every application is different and have the expertise to put together a system that meets an individual customer's needs. Smart sensors can help you add value for your customers by providing a cost effective alternative to transmitters and controllers. By helping your customers connect their sensors directly to a PLC or SCADA, you help them save on instrumentation costs.

## DESIGNING YOUR OWN WATER TREATMENT PRODUCT?

Smart sensors are a robust, small footprint solution: great for saving space in a panel. Our smart sensors feature open protocol analog (4-20mA) or digital (MODBUS) communications, which gives you the flexibility to build customized systems without being locked in to one manufacturer's instrumentation.

## SPEED, SAFETY, AND EFFICIENCY.

Water treatment equipment gets installed in all kinds of environments, from cooling towers to mining operations. Many customers require individualized, on-site support for their systems. When equipment fails or incidents arise, they expect service fast. Setting yourself apart from the competition means providing localized service, whenever needed, and having the right tools to get a problem solved quickly. MODBUS enabled smart sensors can store valuable data, like the part number and date of manufacture, making this information more readily available. That means you can get your customers the answers they need faster. Smart sensors can also be pre-calibrated at your facility, eliminating the need to calibrate in the field. Instead of bringing calibration solutions and other equipment on site, you can keep pre-calibrated sensors in stock, so that you are ready with fast replacements whenever your customers need them.

# PARAMETERS

Hardware available with direct 4-20mA or MODBUS outputs

Sensorex has specialized in the design and manufacture of water quality sensors since 1972. Our smart sensors feature the same reliable, field tested hardware thousands of customers have come to trust.

### A TOROIDAL CONDUCTIVITY (MODBUS only)

Toroidal or inductive conductivity measurement has become the standard in many industrial water and wastewater treatment applications. Unlike contacting conductivity probes, toroidal conductivity sensors can resist the effects of coating and polarization. This translates to longer sensor lifetime with virtually zero maintenance required. Any process with high concentrations of solids or chemicals, including salt water monitoring applications, will benefit from more stable readings with a toroidal sensor.

### B DIFFERENTIAL pH OR ORP (4-20mA only)

Differential pH and ORP sensors are specially designed to prevent reference poisoning, thereby increasing sensor lifetime. This has made differential technology extremely popular in applications such as wet scrubbers, dye baths, and pulp and paper. While combination pH sensors have 2 electrodes, a measuring and a reference electrode, differential pH sensors have 3 electrodes. In the differential design, 2 electrodes measure pH differentially with respect to a third metal ground electrode.

### E COMBINATION pH OR ORP (4-20mA or MODBUS)

In wastewater, chemical processing, and other dirty applications, an inline pH probe wears out fast. Constantly replacing pH probes can feel like a waste of time and money. We created our modular, quick disconnect S8000 sensor packages for these types of industrial applications. The sensor can be replaced in a few seconds with no tools or re-wiring required by swapping the Quick Change Replacement Cartridge. Reuse the cable assembly and other mounting hardware for a low cost of ownership.



### C OPTICAL DISSOLVED OXYGEN (MODBUS only)

Optical luminescence technology is replacing electrochemical sensing methods in many applications. Benefits of optical dissolved oxygen sensors include extended working life and simplified maintenance. Simply swap out the sensor cap when its working life (up to 2 years) comes to an end.

### D GALVANIC DISSOLVED OXYGEN (4-20mA or MODBUS)

A popular probe in aquaculture applications, the DO6400 features galvanic (electrochemical) dissolved oxygen measurement technology. The large electrolyte reservoir extends the working lifetime of this sensor, reducing scheduled maintenance.

### F CONTACTING CONDUCTIVITY (4-20mA or MODBUS)

Developed for continuous monitoring in cooling tower applications, the CS8000 is among the most economical conductivity probes for continuous monitoring. With a cell constant K=1.0, this probe can be used for industrial water monitoring, produce washing, reverse osmosis, and other similar applications. Like the S8000 pH probes, the CS8000 features a modular design for quick and easy sensor replacements.

### G FREE CHLORINE AND CHLORINE DIOXIDE (4-20mA or MODBUS)

Amperometric technology enables the direct measurement of free chlorine or chlorine dioxide in parts per million (ppm). Unlike other methods of measuring chlorine online, amperometric technology does not require the use of additional reagents.