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# Sensors and Electrodes

## Model S80 Intelligent Sensors



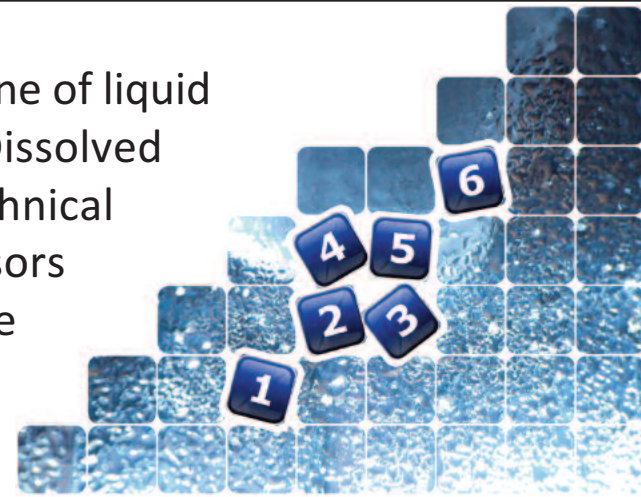
Measure pH, ORP, Specific Ion, Dissolved Oxygen,  
Turbidity, Conductivity or Resistivity with  
**Model T80 Universal Transmitter**



**ELECTRO-CHEMICAL DEVICES**



**Electro-Chemical Devices** offers a complete line of liquid analytical sensors: pH, ORP, Specific Ion, Dissolved Oxygen, Conductivity & Resistivity. The technical advantage of the Model S80 Intelligent Sensors are the 6 points of design flexibility to configure a sensor that best fits your application.



## 6 Point Advantage

1

### Intelligent sensor design with digital communication

Calibration data is stored in the sensor allowing field installation of a pre-calibrated sensor. Detachable cable option simplifies the installation of pre-calibrated sensors.

2

**Multiple individual measurement parameters** in the same mechanical configuration- pH, ORP, Specific Ion, Dissolved Oxygen, Conductivity & Resistivity

3

Readily available **application specific electrode cartridges**. Many unique pH electrode design formulations and materials of construction which are field proven and selected for long life and accuracy.

4

Long life **replaceable electrode cartridges** lower the over all operating cost.

5


**Submersible and Retractable Sensors** Various process fittings with adjustable insertion lengths - threaded fittings, sanitary fittings, flanges and valve retractable fittings.

6

**Industrial housing materials for compatibility with process fluid.** Stainless Steel, Titanium, Hastelloy C-22, Polypropylene or PVDF (Kynar™). Standard 10" or 17" lengths additional lengths available.



# Model S80 Intelligent Sensors



**ECD Model S80 Sensor Overview** - The intelligent sensor choice to fit your application. The S80 sensors have two Universal Sensor Designs; Insertion/Submersion or Valve Retractable with flaired end to prevent blow out. The standard Model S80 sensors have a rugged  $\frac{3}{4}$ " O.D. 316 stainless steel body with a 10 ft. cable or an optional waterproof detachable cable assembly.

## S80 Sensor

### Insertion/Submersion

The S80 Sensor uses a  $\frac{3}{4}$ " MNPT compression fitting as the process connection. This allows a variable insertion length to accommodate installation in pipe tees, flow cells, or through tank walls. If the fitting is reversed the sensor can be installed in a stand pipe for submersion into a tank.

## Pre-Calibrated Detachable Sensor Option

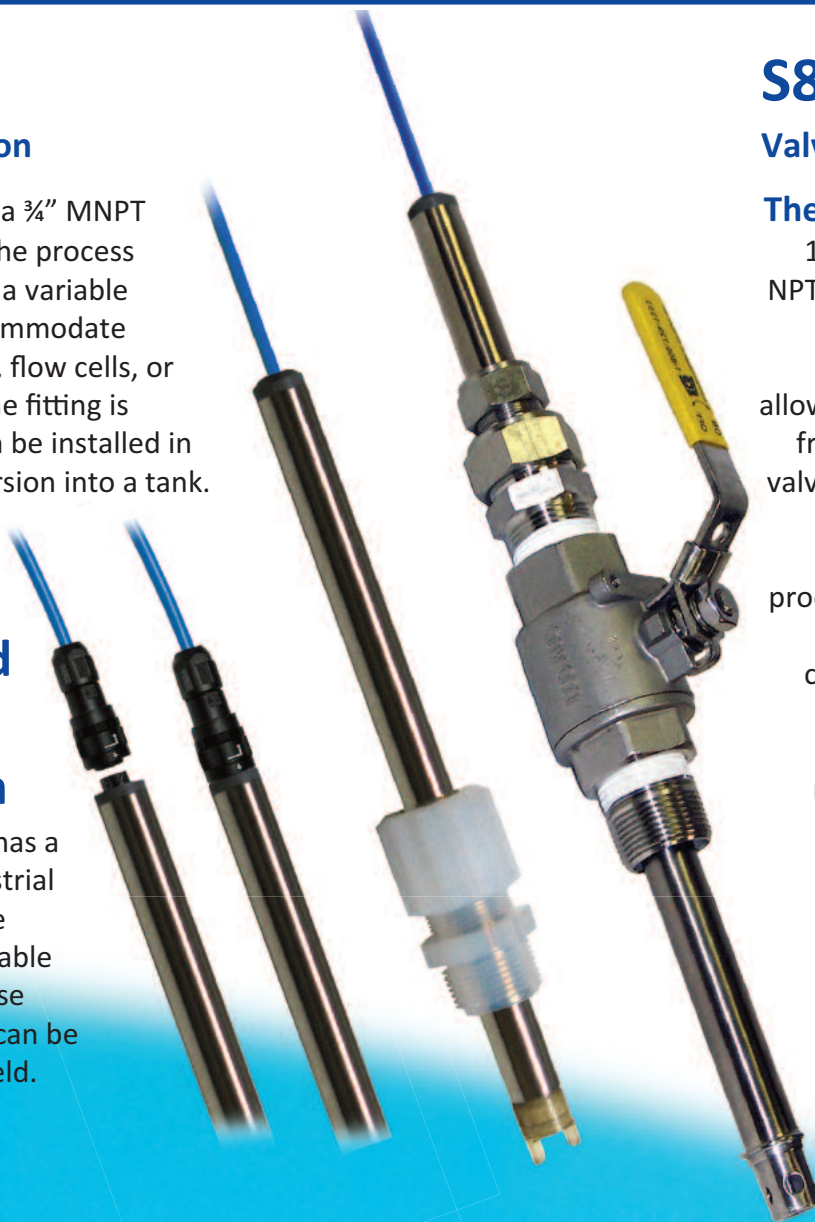
this detachable sensor has a rugged IP68 rated industrial connector. Just a simple quarter turn locks the cable connector in place. These Pre-Calibrated sensors can be easily installed in the field.

## S80 Sensor

### Valve Retractable

The S80 Sensor uses a 1" ball valve with a 1" NPT process connection.

Loosening the rear compression fitting allows the sensor to slide freely through the ball valve for either insertion into the process or retraction from the process. Once retracted, the ball valve can be closed and the sensor removed for maintenance or replacement without shutting down the process line.





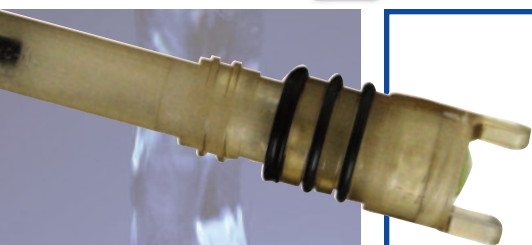
# pH and ORP Electrodes

The **Model S80 Intelligent Sensors** use **replaceable electrode cartridges** to provide application specific solutions for the most demanding pH measurements.

- Radel (PES) or PEEK construction
- Single tine, double tine or full crown style pH bulb protection.
- Spherical bulbs (best response), hemispherical bulbs (more durable) or a slightly radiused flat surface (easily cleaned)
- Platinum tip ORP electrodes.
- Double or Triple junction reference cells
- Porous Teflon® and ceramic junctions with various reference electrolytes.

One of these three widely used pH electrode cartridges will satisfy most installations, Consult our technical support staff for additional configurations.

## 6 Point Advantage



**2005145** – This **General Purpose Electrode** has a two tine Radel body, double junction reference and slightly radiused pH bulb. While suitable for higher temperatures it is optimized for fast and stable readings in ambient temperature applications. Neutralizations, waste effluent monitoring, rinse applications and potable water are just a few of the suggested applications.



**2005157** – This **High Temperature Electrode** has a two tine PEEK body, triple junction reference and hemispherical pH bulb. This electrode is designed for the process control or neutralization of most mineral acids and bases in applications up to 130°C. The triple junction design is resistant to sulfide ion poisoning making it ideal for use in petroleum refineries and metal processing plants.



**2005066** – This **Chemically Resistant Electrode** has a two tine PEEK body, double junction reference and slightly radiused pH bulb. The PEEK body is suitable for use in most aggressive solvents, oxidizing solutions and acids or bases. This electrode is optimized for a harsh chemical environment and is suitable for service up to 130°C. Chemical separations and solvent recovery in the CPI and pharmaceutical industries along with chlorine production and flotation in mining are suggested applications.



**2005167** – This **ORP (Oxidation Reduction Potential) Electrode** has a two tine PEEK body, double junction reference and a platinum tip. This general purpose sensor can be used for monitoring the oxidant level of cooling towers, swimming pools, aquariums or the de-chlorination of waste water. Metal finishing and mining also provide applications such as cyanide destruction and monitoring chrome plating baths.

# Specific Ion & Dissolved Oxygen Electrodes

**Ion selective electrodes** are not limited to laboratory use; some are suitable for continuous online measurement. ECD offers Specific Ion Electrode cartridges to measure the various ions listed below. Specific Ion electrodes measure the activity (concentration) of the ion in solution, the “free” ion, not a complexed version. Cyanide, Fluoride and Sulfide ions only exist in a specific pH range as free ions and outside this pH range some percentage of the total concentration is complexed as H(X) which is not seen by the sensor. These measurements can be pH compensated using the dual channel transmitter or controller with a pH sensor to determine the total ion concentration. Most plon sensors are subject to interfering ion errors. A positive interference caused by similar ions in the solution. Consult with the factory on all new installations to determine the suitability of the measurement.

## Specific Ion (plon) Electrodes

Part#	Type	Measurement Range	pH Range	Temperature Range
2005083	Ammonium	0.05 - 18,000 ppm	2-10 pH	0°-40°C
2005062	Bromide	1 - 80,000 ppm	2 - 12pH	0°-50°C
2005140	Cadmium	0.1 - 11,200 ppm	3 - 9 pH	0°-80°C
2005143	Calcium	0.1 - 40,000 ppm	2.5 - 10 pH	0°-40°C
2005008	Chloride	2 - 35,000 ppm	2 - 12 pH	0°-50°C
2005142	Cyanide	0.1 - 260 ppm	11 - 13 pH	0°-80°C
2005058	Cupric	1.0 ppb -6,300 ppm	2 - 6 pH	0°-80°C
2005163	Fluoride	0.02 - 2,000 ppm	5 - 8 pH	0°-80°C
2005141	Lead	2.0 - 20,700 ppm	4 - 8 pH	0°-80°C
2005086	Nitrate	0.1 - 1000 ppm	2 - 12 pH	0°-40°C
2005161	Nitrite	0.5 - 500 ppm	4.5 - 8 pH	0°-40°C
2005034	Potassium	0.1 - 40,000 ppm	2 - 12 pH	0°-40°C
2005031	Sodium	0.2 - 23,000 ppm	2 - 14 pH	0°-80°C
2005122	Sulfide	0.01 - 32,000 ppm	11 - 14 pH	0°-80°C
2005016	Silver	0.1 - 107,000 ppm	2 - 14 pH	0°-80°C



## Dissolved Oxygen Electrodes

**The ECD Dissolved Oxygen** electrodes are galvanic cells with a lead anode, silver cathode and either the quick response 2 mil or rugged 5 mil Teflon membrane. The electrode is ready to use as received, there are no solutions or membranes to install before the electrode can be used. The membrane is protected by a double tine PEEK body allowing for easy cleaning. Designed for ppm level measurements it is ideal for environmental water measurements and aerobic waste treatment.

Part#	Type	Range	Pressure Range	Temperature Range
2005622 (2 mil)	Dissolved or Gaseous Oxygen	0 - 20 ppm (mg/L) 250% Saturation	0 - 50 psig	-5° - 80°C
2005623 (5 mil)	Dissolved or Gaseous Oxygen	0 - 20 ppm (mg/L) 250% Saturation	0 - 50 psig	-5° - 80°C



# Conductivity Measurements

Two technologies are used to measure Conductivity. **Contacting Conductivity** is an impedance measurement made between two metal contacts in the solution. **Inductive Conductivity** is a non-contacting measurement made between two toroidal coils inside the sensor that are inductively coupled through the solution's conductivity. Inductive sensors excel in the higher conductivity ranges and where coating is a problem. The chemically resistant PVDF (KYNAR) body is excellent for corrosive environments. Contacting sensors can measure from very low conductivities, (resistivity measurements) to very high conductivities but they are subject to coating and corrosion issues, conditions where the inductive sensors excel. The Contacting Conductivity S80 sensors come in three ranges, Low Range, 0.5 $\mu$ S – 50 $\mu$ S, High Range, 50 $\mu$ S – 50mS and Resistivity, 0 – 20M $\Omega$ . Inductive Sensors measure from 50 mS to 1000 mS.

## 6 Point Advantage

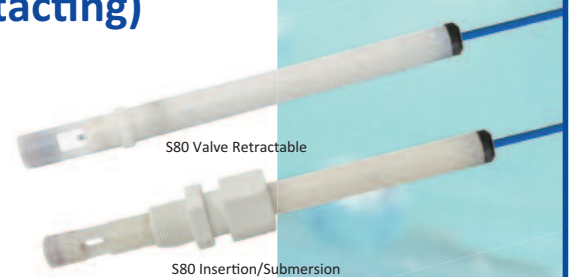
### Conductivity and Resistivity Sensors

The **Model S80 Conductivity** sensor is available in two ranges, a Low Range sensor for measurements from 0.05 $\mu$ S to 50 $\mu$ S and a High Range sensor for measurements from 50 $\mu$ S to 50mS. The **Model S80 Resistivity** sensor measures from 0 - 20 M $\Omega$ . The design of the inner electrode defines the measurement range of the sensor. The Open Style with its large surface area inner electrode and short path length is best for resistivity and low conductivity measurements while the Closed Style is best suited to high conductivity measurements. The standard wetted materials are 316 Stainless Steel, PEEK insulators and VITON o-rings.



### Inductive Conductivity Sensors - (non-contacting)

The **Model S80 Inductive** sensors have a 3/4" diameter PVDF body. These sensors are ideal for measuring high conductivity solutions and % concentration measurements. Since the toroidal electrodes are inside the PVDF body, the inductive sensors are ideal for any application that coats or corrodes the electrode of the standard contacting conductivity sensors. The measurement range of the inductive sensor is from 500  $\mu$ S to 1000 mS.



### High Temperature/Pressure Sensors

The **CSX2** High Temperature- High Pressure sensor is designed for service to 200°C and 250 psig, 400 psig at 100°C. This insertion style 3/4" MNPT, 316 stainless steel sensor has PEEK insulators and is available with or without an integral signal conditioner. An aluminum junction box is mounted on the rear of the sensor that contains a terminal block and optional signal conditioner. The junction box is rated Class I, Div I, Groups C & D, Class II, Groups E, F and G hazardous locations. It is an ideal choice for boiler control applications, blowdown control, condensate monitoring, leak detection on heat exchangers, and steam purity measurements.





The proper installation and calibration of an analytical loop is critical for a successful measurement. Using the flow of the sample in an insertion application to maximize the cleaning potential can be as simple as changing the size of the Pipe Tee, changing the insertion depth or using an ECD Flow Cell with a spray cleaning port in the most difficult applications. Spray Cleaning heads are also available for immersion applications where the sample velocity is much lower and fouling is more common. Valve retractable units allow the sensor to be removed, serviced and installed without shutting down the sample flow in a pipe or emptying a tank. A compression gland fitting seals the sensor into a ball valve, loosening the gland fitting allows the sensor to be retracted through the ball valve which is then closed, isolating the process solution, before removing the sensor for service. Materials of construction for the Valves, Glands, Flanges and Immersion Assemblies vary from PVC, PVDF and polypropylene plastics to 316 SS, Titanium and Hastelloy C-22. Contact our application specialists for the most cost effective solution to your application.

## Calibration Solutions



All of the S80 sensors require periodic calibration and ECD offers a full range of calibration solutions. For pH applications we offer pH 4.00, 7.00 and 10.00 buffers. ORP calibrations can be accomplished with a +465 mV ferric-ferrous solution or by adding quinhydrone to pH 4 and pH 7 buffer solutions creating +267 mV ORP and +90 mV ORP respectively. Specific ion calibration solutions are standardly 10 ppm and 100 ppm although any value can be formulated at no extra cost. Conductivity solutions are made with KCl and Deionized water, values from 10  $\mu$ S to 500 mS are available. Solutions to simulate % acid or % caustic are labelled as the actual solution, i.e. 4% NaOH, even though the solution is made from KCl with an equivalent conductivity providing a safe and accurate calibration system.

## Fittings and Flow cells



The Model S80 sensors are offered with a wide array of fittings, flow cells, immersion assemblies and valve retraction assemblies.  $\frac{3}{4}$ " MNPT compression fittings are available for S80 insertion into pipe Tees or flow cells and when reversed, for coupling with Stand Pipes for immersion applications. Flow cells of PVC, PVDF or 316 SS have  $\frac{3}{8}$ " or  $\frac{1}{2}$ " FNPT ports on a 2" O.D. by 5" body. 316 SS Sanitary 3A Flanges and 150# Flanges can be adapted for insertion or valve retractable service. Contact our Technical support staff for other configurations.

## Model T80 Universal Transmitters



The ECD Model T80 transmitter is a single or dual channel transmitter for the measurement of pH, ORP, pION, Conductivity, Resistivity, Dissolved Oxygen and Turbidity. The Model T80 transmitter digitally communicates with any ECD intelligent S80 digital sensor, automatically configuring the transmitter's menus and display screens to the measured parameter. The ECD S80 digital sensors facilitate two way communication with the Model T80 transmitters. The type of sensor, identity and serial number are stored in the sensor's memory along with calibration registers. Ordering pH, ORP or pION sensors with the SENTINEL option automatically activates the "Remaining Life" diagnostic shown in the picture.

## S80

All Sensors

### Dimensions:

**S80 Insertion** - 3/4" OD x 10" Length

**S80 Valve Retractable** - 3/4" OD x 17"

### Cable Length:

10 ft. standard, optional lengths in 10 ft increments, optional Detachable cable connection

### Housing Materials:

Standard: 316 Stainless Steel

Optional: Titanium (T), grade 2

Hastelloy C-22 (H),

PVDF (K)

Polypropylene (P)

### O-Ring Materials:

Standard: Viton® (VIT)

Optional: Ethylene Propylene (EPR),

VITON® 75 (VIT75)

Kalrez® (KLZ)

CV75 (CV)

### Process Connections:

#### S80 Insertion/Immersion

-75 3/4" 316 SS gland fitting with nylon ferrule

-75HT 3/4" 316 SS gland fitting with Teflon® ferrule

-75SF 3/4" 316 SS gland fitting with stainless steel ferrule

-75TFE 3/4" Teflon® gland fitting with Teflon™ ferrule

-100P 1" Polypropylene gland fitting for Polypropylene housing only

#### S80 Valve Retractable

-VSS 1" 316 SS valve retraction assembly

-VSSE 1" 316 SS valve retraction assembly for Inductive sensors

-VKY 1" PVDF valve retraction assembly

-VPP 1" Polypropylene Valve Retraction assembly

## PHS80

pH measurement

### Measurement Range:

0-14 pH

### Temperature Range:

0° - 90° C

### Optional HT version:

0° - 140° C

### Pressure Range:

0 - 100 psig @ 90° C

### Temperature Compensation:

Automatic 0° - 100° C

Accuracy ± 0.2° C

## MVS80

ORP & Specific Ion

### Measurement Range:

ORP: -2000 mV to 2000 mV

plon: Sensor Specific, ppb, ppm&ppt

### Temperature Range:

ORP -0° - 90° C, plon Sensor Specific

### Pressure Range:

0 - 100 psig @ 90° C

### Temperature Compensation:

Automatic 0° - 100° C

Accuracy ± 0.2° C

## DOS80

Dissolved Oxygen

### Measurement Range:

0-20 ppm, 0-150% SAT

### Temperature Range:

0° - 90° C

### Pressure Range:

0 - 65 psig @ 90° C

### Temperature Compensation:

Automatic 0° - 100° C

Accuracy ± 0.2° C

## CS80/RS80

Conductivity/Resistivity

### Measurement Ranges:

Conductivity: 0.5µS to 50 mS

Resistivity: 0 - 20 MΩ

### Temperature Range:

-5° to 100° C

### Optional HT version:

-5° to 150° C

### Pressure Range:

CS/RS80 0 - 100 psig

### Temperature Compensation:

Automatic 0° - 100° C

Accuracy ± 0.2° C, 100K thermistor

## CS80

Inductive Conductivity

### Measurement Ranges:

50 mS to 1000 mS

### Temperature Range:

-5° to 100° C

### Pressure Range:

0 - 100 psig

### Temperature Compensation:

Automatic 0° - 100° C

Accuracy ± 0.2° C, 100K thermistor

### Body material:

KYNAR (PVDF)

## CSX2 Series

High Temperature Conductivity

### Measurement Ranges:

1.0µS to 50mS

### Temperature Range:

0° to 200° C

### Pressure Range:

0 -250 psig ( 400psig @100° C)

### Temperature Compensation:

Automatic 0° - 200° C

Accuracy ± 0.2° C, 10K ohm platinum RTD

### Wetted Materials:

316 SS and PEEK

### Shipping Weight:

S80 (10") 2.5 lbs (1.2 kg)

S80 (17") 2.75 lbs (1.25 kg)

S80-VSS 5.8 lbs (2.65 kg)

Specifications subject to change without notice.

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