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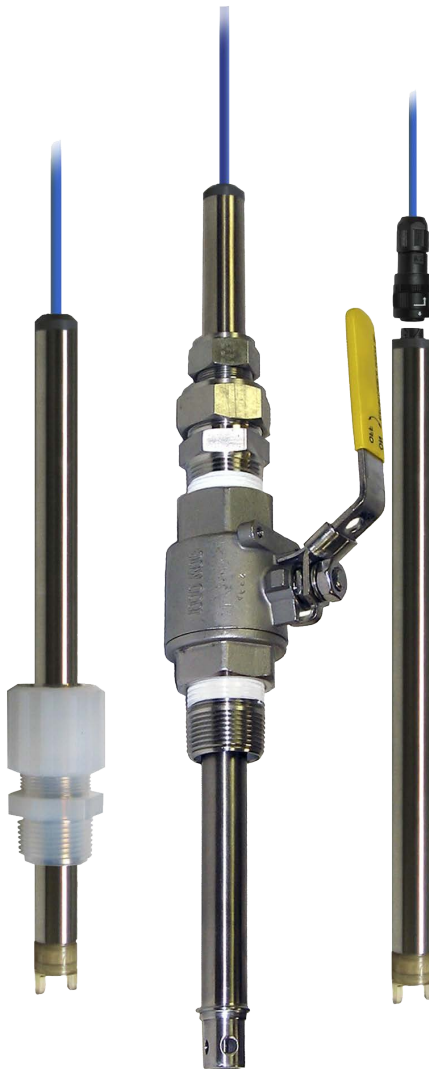
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MV7 Series ISE Intelligent Sensors



Measure pH, ORP, Specific Ion, Dissolved Oxygen,
Turbidity, Conductivity or Resistivity with
GDC Terminal



Delta-Phase Electronics, Inc.

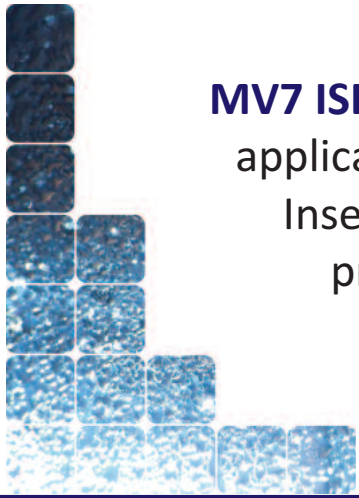
Delta-Phase offers a complete line of liquid analytical sensors - pH, ORP, Specific Ion, Dissolved Oxygen, Conductivity & Resistivity. The technical advantage of the MV7 series sensors is the 6 points of design flexibility to configure a sensor that best fits your application.



6 Point Advantage

- 1 Intelligent sensor design with digital communication**
The MV7 stores its identity/type, serial number and calibration data. The PV (Process Variable) and Temperature are digitally communicated.
- 2 Multiple individual measurement parameters** in the same mechanical configuration- pH, ORP, Specific Ion, Dissolved Oxygen, Conductivity & Resistivity
- 3** Readily available **application specific sensor 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 sensor cartridges** lowers the overall operating cost.
- 5** **Submersible and Retractable Sensors** Various process fittings with adjustable insertion lengths - 3/4" NPT compression fitting, sanitary fitting, 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" optional custom lengths.





MV7 ISE Sensor Overview - The intelligent sensor choice to fit your application. The MV7 sensors have two Universal Sensor Designs, Insertion/ Submersion and Valve Retractable with flaired end to prevent blow out. The standard Model MV7 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.

MV7 Sensor

Insertion/Submersion

The MV7 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 and if the fitting is reversed the sensor can be installed in a pipe for submersion in a tank.

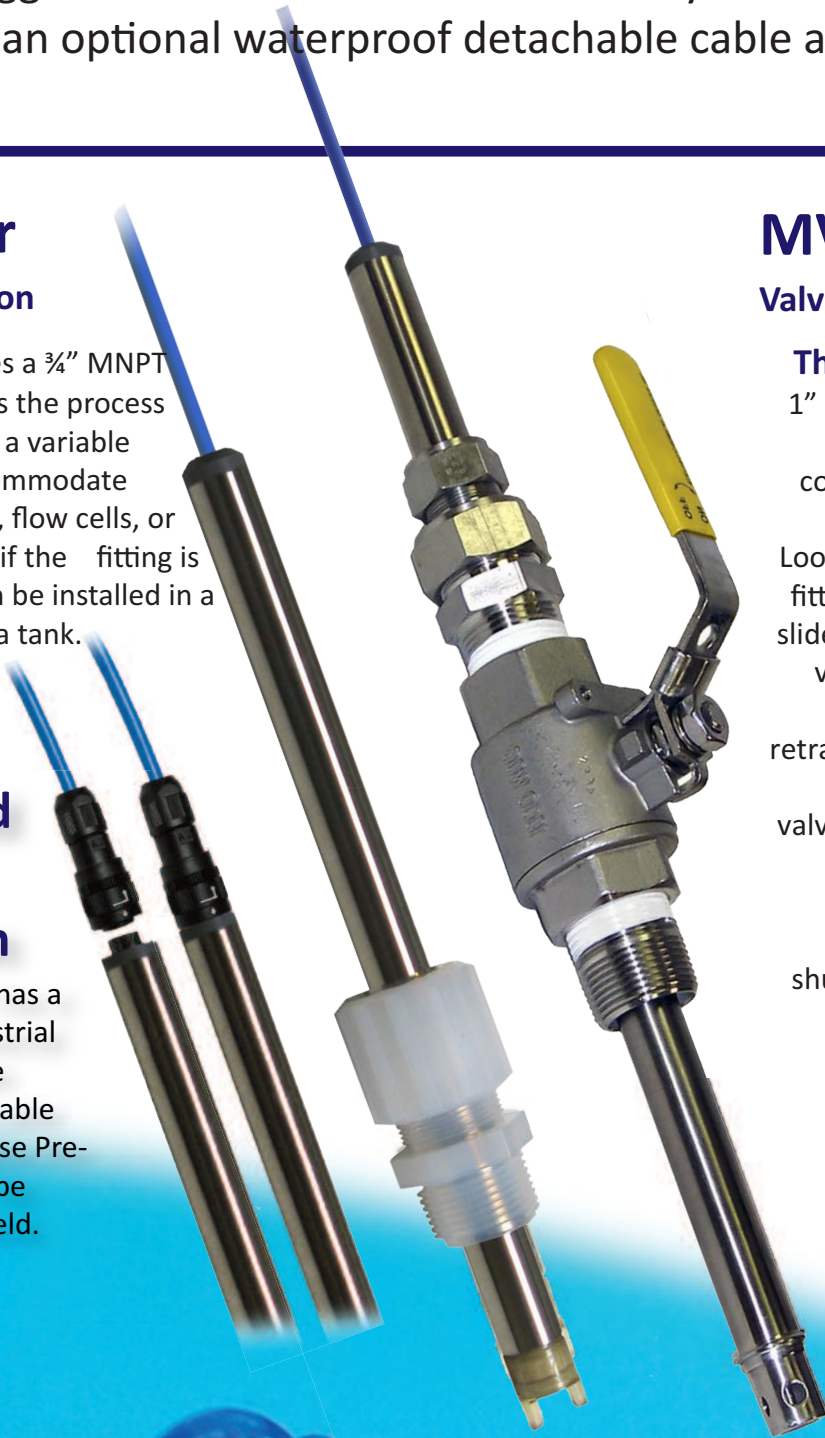
Pre-Calibrated Detachable Sensor Option

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.

MV7 Sensor

Valve Retractable

The MV7 Sensor uses a 1" MNPT ball valve, 1" x $\frac{3}{4}$ " reducer and a $\frac{3}{4}$ " MNPT compression fitting as the process connection. Loosening the 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 Electrode Cartridges

The Model MV7 Sensors use replaceable electrode cartridges to provide application specific solutions for the most demanding pH measurements. Available in either Radel (PES) or PEEK construction with full crown, double or single tine style pH bulb protection. Various pH glass formulations are available for General Purpose, High Temperature or Aggressive Chemical applications. These formulations are blown into spherical bulbs (best response), hemispherical bulbs (more durable) or a slightly radiused flat surface (easily cleaned) to address the process conditions. A Platinum tip replaces the pH glass bulb on ORP electrodes. The reference electrodes have double or triple junction reference cells with porous Teflon® and ceramic junctions and various electrolytes. This vast array of possibilities will solve most application problems.. We have refined this offering to three widely used electrodes for most installations.. Consult our technical support staff for other unique electrode configurations.

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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 Electrode Cartridges

Ion selective electrodes are not limited to laboratory use; some are suitable for continuous online measurement. Delta-Phase offers Specific Ion Electrode cartridges to measure Ammonium, Bromide, Calcium, Chloride, Cupric, Cyanide, Fluoride, Nitrate, Potassium, Silver, Sodium and Sulfide ions. 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 C22 Controller with a pH sensor to determine the total ion concentration. Most ion sensors are subject to interfering ion errors. A positive interferences caused by similar ions in the solution. Consult with the factory on all new installations to determine the suitability of the measurement.

Specific Ion (ion) Electrode Cartridges

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
2005043	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
2005042	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
2005063	Fluoride	0.02 - 2,000 ppm	5 - 8 pH	0°-80°C
2005086	Nitrate	0.1 - 1000 ppm	2 - 12 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
2005022	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 Electrode Cartridge

The Delta-Phase dissolved oxygen electrodes are galvanic cells with a lead anode, silver cathode and a 2 mil or 5 mil Teflon membrane. The cartridge 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 single tine PEEK body allowing for easy cleaning. Designed for ppm level measurements it is ideal for environmental water measurements, aerobic waste treatment and digesters.

Part#	Type	Measurement 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



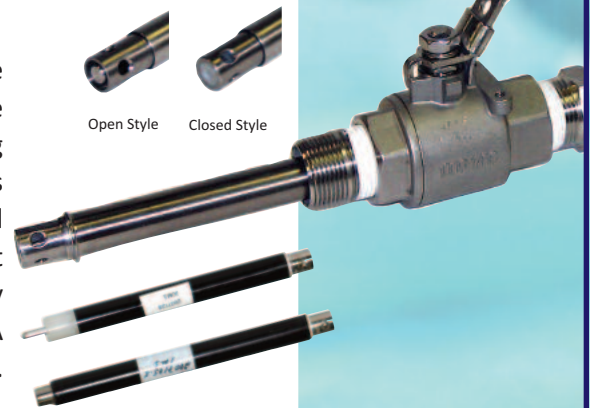
Conductivity Measurements

Two competing technologies are used to measure Conductivity; **Contacting Conductivity**; an impedance measurement made between two metal contacts in the solution or **Toroidal Conductivity**; a **non-contacting inductive measurement** made between two coils inside the sensor inductively coupled through the solution's conductivity. Toroidal sensors excel in the higher conductivity ranges and where coating is a problem. The chemically resistant PVDF 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, where the toroidal sensor excels. The Contacting Conductivity S80 sensors come in three ranges, Low Range, $1\mu\text{S} - 50\mu\text{S}$, High Range, $50\mu\text{S} - 50\text{mS}$ and Resistivity, $0 - 20\text{M}\Omega$. Inductive Toroidal Sensors measure from 50 mS to 1000 mS .

6 Point Advantage

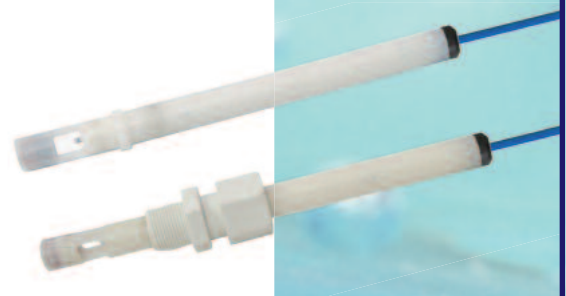
Conductivity and Resistivity Sensors

The CD7 Conductivity sensors use one of two replaceable electrode cartridges, a High Range cartridge ($50\mu\text{S} - 50\text{mS}$) or a Low Range cartridge ($1\mu\text{S} - 50\mu\text{S}$ or $0 - 20\text{M}\Omega$) for Resistivity. The cartridge provides the inner contact for the measurement with the housing providing the other contact. User input to the transmitter optimizes the cell for the desired measurement range. The standard wetted materials are 316 Stainless Steel, PVDF and VITON o-rings. Three front end guard styles are offered ; open for resistivity or low conductivity measurements, closed for high conductivity measurements and a 3A approved sanitary front end for food and pharmaceutical applications.



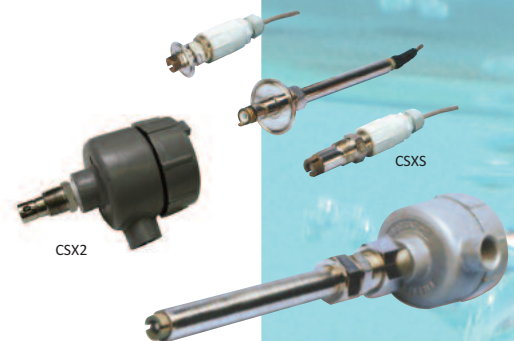
Toroidal Sensors - (non-contacting)

The CT7 Toroidal sensors have a $\frac{3}{4}$ " diameter PVDF body, not the stainless steel used for the other measurements. The sensors are sealed and there are no replaceable cartridges. These sensors are ideal for high conductivity solutions like % concentration measurements or any application that coats or corrodes the standard contacting conductivity sensors. The measurement range is from 50 mS to 1000 mS .



CSX Series Sensors

The **CSX2** High Temperature- High Pressure sensor is designed for service to 230°C and 660 psig . These insertion style $\frac{3}{4}$ " MNPT, 316 stainless steel sensors have PEEK insulators and are 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. The **CSXS** sensors are rated for service to 150°C and 225 psig and use RYTON®, KYNAR® or Teflon® insulators. These stainless steel insertion sensors are available in $\frac{3}{4}$ " MNPT or with various Sanitary flanges.



The proper installation and calibration of an analytical loop can make or break 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 a Delta-Phase Flow Cell with a spray cleaning port in the most troublesome 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 MV7 sensors require periodic calibration and Delta-Phase offers a full range of calibration solutions. For pH applications we offer pH 4.00, 7.00 and 10.00 either color coded or clear. 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 and +90 mV 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 μ S to 500 mS are available. Solutions to simulate % acid or % caustic are labeled 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 MV7 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 MV7 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.



GDC Transmitters and Controllers

The Delta-Phase GDC transmitter is a single channel, universal, multi parameter transmitter for the measurement of pH, ORP, pION, Conductivity, Resistivity, or Dissolved Oxygen. The GDC transmitter digitally communicates with any Delta-Phase intelligent digital sensor, automatically configuring the transmitter's menus and displays screens to the measured parameter. The Delta-Phase digital sensors facilitate two way communication with the GDC transmitters. The type of sensor, identity and serial number are stored in the sensor's memory along with calibration registers. The MV7 sensors are calibrated at the factory so they are ready to use when connected to a GDC transmitter.

MV7

All Sensors

Dimensions:

MV7 Insertion - 3/4" OD x 13 3/4" Length

MV7 Valve Retractable - 3/4" OD x 24"

Cable Length:

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

Housing Materials:

Standard: 316 Stainless Steel
Optional: Titanium (T), grade 2
Hastelloy C-22 (H),
PVDF (K)

O-Ring Materials:

Standard: Viton™ (VIT)
Optional: Ethylene Propylene (EPR),
Fluorosilicone (FSIL)
Silicone (SIL)
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
- 100 1" Teflon™ gland fitting for PVDF housing only

S80 Valve Retractable

- VSS 1" 316 SS valve retraction assembly
- VKY 1" PVDF valve retraction assembly

Shipping Weight:

- | | |
|-------|--------------------|
| (10") | 2.5 lbs (1.2 kg) |
| (17") | 2.75 lbs (1.25 kg) |
| VSS | 5.8 lbs (2.65 kg) |

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

Optional HP version:

0 - 300 psig @ 140° C **Temperature**

Compensation:

Automatic 0° - 100° C

Accuracy ± 0.2° C over the range

3,000 ohm BALCO RTD

ORP & Specific Ion

Measurement Range:

ORP: -2000 Mora to 2000 Mora
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, 3K ohm BALCO RTD

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 over the range

3,000 ohm BALCO RTD

CD7

Conductivity/Resistivity

Measurement Ranges:

Low Range Sensor: 1µS to 50µS

High Range Sensor: 50µS to 50 mS

Resistivity: 0- 2 MΩ TO 0-50 MΩ

Temperature Range:

-5° to 100° C

Optional HT version:

-5° to 150° C

Pressure Range:

0 - 100 psig

Optional HP version:

0 - 300 psig

Temperature Compensation:

Automatic 0° - 100° C

Accuracy ± 0.2° C, 100K ohm thermistor

CT7

Toroidal Conductivity

Measurement Ranges:

0.5mS to 1000mS

Temperature Range:

-5° to 100° C

Pressure Range:

0 - 100 psig

Temperature Compensation:

Automatic 0° - 100° C

Accuracy ± 0.2° C, 100K ohm thermistor

Body material:

KYNAR (PVDF)

CSX Series

High Temperature Conductivity

Measurement Ranges:

1.0µS to 50mS

Temperature Range:

0° to 150° C (CSX2 to 200° C)

Pressure Range:

0 - 250 psig (CSX2 to 400psig)

Temperature Compensation:

Automatic 0° - 150° C

Accuracy ± 0.2° C, 10K ohm platinum RTD

Wetted Materials:

316 SS and PEEK

Specifications subject to change without notice.

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