

Rugged design to withstand your toughest conductivity challenges

Specifications for Orion DuraProbe 4-Electrode Lab and Field Probes



Thermo Scientific™ Orion™ DuraProbe™ 4-Electrode Lab and Field Probes. Cat. No. 013010MD (top), 013005MD (middle), and 013605MD (bottom).

Applications

- Environmental use, including analysis of wastewater, runoff, lakes, rivers, and estuaries
- Drinking water analysis
- Salinity testing
- Food and beverage quality control and clean-in-place
- Aquaculture
- Analysis of pharmaceutical raw materials and intermediates, quality control

Orion DuraProbe 4-Electrode Lab and Field Probes have a rugged design that is ideal for daily use in the lab or out in the field to measure the electrical conductivity in solutions. The 4-electrode design provides superior functionality over the widest possible range of conductive solutions.

The 4-electrode conductivity advantage

Orion DuraProbe 4-Electrode Lab and Field Probes contain two drive electrodes and two sensing electrodes. The 4-electrode design helps minimize the effects of electrode polarization and contamination or fouling of the electrodes on measurement accuracy and eliminates the risk of error due to cable and connector resistance. The drive electrodes are powered by an alternating voltage, and the flowing alternating current is measured to determine conductivity. The amplitude of the alternating voltage applied to the drive electrodes is controlled by the voltage measured at the sensing electrodes. The sensing electrodes are positioned in a low-current area of the cell, and the voltage is measured using a high-impedance circuit, so the strength of the electric field within the cell is accurately represented. Maintaining the field strength at a constant, the current that flows at the drive electrodes is proportional to the conductivity of the sample. Errors due to polarization, contamination of the electrodes, and cable resistances are minimal.

Measure more than conductivity

Some applications may call for measuring parameters that are related to conductivity. These include resistivity, salinity, and total dissolved solids (TDS).

Resistivity

The reciprocal of conductivity is resistivity, which is an important parameter to measure when working with or making ultrapure, deionized, distilled, or reverse-osmosis water. Depending on the application, purified water may also be known as reagent water, reagent grade water, clinical lab reagent water, or Type I water. Other terms may apply depending on the purity. Ultrapure water has a high resistivity at 25°C (>18.18 MΩ·cm) and therefore very low conductivity at 25°C (0.055 μS/cm). Ultrapure water is often used for laboratory, pharmaceutical, semiconductor, or boiler applications.

Total dissolved solids (TDS)

The TDS content in water is often measured in environmental applications to quantify dissolved minerals, salts, or metals that potentially indicate pollution. The standard method of determining TDS is to filter the sample, evaporate it to dryness at 180°C, and weigh the residue. Measuring conductivity is a quick way to estimate TDS. This enables easy field testing and makes continuous measurement possible. The standard formula is $TDS = k \times EC$ at 25°C. The value k is a function of the type of water being analyzed, and EC is its conductivity. Typical applications that require TDS measurement include water quality analysis, irrigation water salinity determination, water treatment, and various types of brine and salt testing.

Salinity

Due to its high sensitivity and ease of measurement, conductivity measurement is the most common way to determine seawater salinity. In a practical salinity measurement, the measured sample conductivity is compared to that of a standard potassium chloride solution at 15°C. The practical salinity (S) of reference seawater is 35. With a Thermo Scientific™ Orion™ meter, salinity is automatically calculated using oceanographic equations compensated to 15°C according to accepted conventions. The Orion DuraProbe cells have integrated temperature sensors. When used with the Thermo Scientific™ Orion™ Star™ A Portable Meter or Orion™ Versa Star™ Pro Bench Meter, salinity can be measured and reported as practical salinity units (psu) or parts per thousand (ppt) depending on user preference.

Benefits of Orion DuraProbe 4-Electrode Lab and Field Probes

- Designed for a variety of solutions over the widest range of conductivities (Table 1).
- Constructed with graphite and epoxy - rugged and able to withstand temperatures up to 90°C.
- Built-in automatic temperature compensation (ATC) sensors for measurement accuracy.
- Minimize errors due to polarization and fouling of the electrodes surfaces. Suitable for dirty and high conductivity samples.
- Appropriate for lab or field measurements with extended cord lengths up to 10 meters.
- Appropriate for related measurements, including resistivity, salinity, and TDS.
- Compatible with a wide range of Thermo Scientific™ Orion Star™ A and Versa Star™ Pro benchtop and portable conductivity meters (Table 2).
- Over 60 years of experience and innovation in the field of electrochemistry—achieve consistent measurements every time.

Table 1. Thermo Scientific Orion™ DuraProbe™ Rugged 4-Electrode Lab and Field Probes.* Each probe features a temperature sensor with built-in automatic temperature compensation to withstand temperatures of 0 to 90°C. The probes are built with an epoxy body containing a graphite cell and use an 8-pin mini-DIN connector, making them ideally suited for use with Orion Star™ A and Orion™ Versa Star™ Pro Multiparameter and Conductivity Meters. See Table 2 for more details.

Description	Measurement range	Nominal constant (k)	Cable length	Dimensions (D x L)	Temperature range	Minimum immersion length	Connector type	Cat. No.
DuraProbe Rugged 4-Electrode Cell	1 µS/cm to 200 mS/cm	0.475 cm ⁻¹	1.5 m	15 x 120 mm	0–90°C	35 mm	8-pin mini-DIN	013005MD
			3 m				8-pin mini-DIN	013010MD
DuraProbe Rugged 4-Electrode Cell			6 m				8-pin mini-DIN	013020MD
DuraProbe Rugged 4-Electrode Cell			10 m	15 x 120 mm			8-pin mini-DIN	013025MD
DuraProbe 4 4-Electrode Cell	10 µS/cm to 200 mS/cm	0.55 cm ⁻¹	1.5 m	12 x 120 mm			8-pin mini-DIN	013605MD

* Warranty: 24 months from date of purchase, other terms and conditions may apply.

Table 2. Compatible Orion Star and Orion Versa Star Pro meters for conductivity and related measurements.

Meter format	No. of available parameters	Parameter options	Meter model
Portable	1 with temperature	Conductivity, TDS	Orion Star A122 Conductivity Portable Meter
	1 with temperature	Conductivity, TDS, salinity, resistivity	Orion Star A222 Conductivity Portable Meter
	1 with temperature	Conductivity, TDS, salinity, resistivity	Orion Star A322 Conductivity Portable Meter
	2 with temperature	Conductivity, TDS, salinity, resistivity, pH, mV, relative mV (RmV), oxidation reduction potential (ORP)	Orion Star A325 pH/Conductivity Portable Multiparameter Meter
	2 with temperature	Conductivity, TDS, salinity, resistivity, pH, mV, RmV, ORP, dissolved oxygen (DO); ion-selective electrode (ISE)	Orion Star A329 pH/ISE/Conductivity/ Dissolved Oxygen Portable Multiparameter Meter
Bench	1 with temperature	Conductivity, TDS	Orion Star A112 Conductivity Bench Meter
	1 with temperature	Conductivity, TDS, salinity, resistivity	Orion Star A212 Conductivity Bench Meter
	2 with temperature	Conductivity, TDS, salinity, resistivity, pH, mV, RmV, ORP	Orion Star A215 pH/Conductivity Multiparameter Bench Meter
	1 with temperature, option to add modules for more parameters	Conductivity, TDS, salinity, resistivity	Orion Versa Star Pro 20 Conductivity Bench Meter
	2 with temperature, option to add modules for more parameters	Conductivity, TDS, salinity, resistivity, pH, mV, RmV, ORP	Orion Versa Star Pro 50 pH/Conductivity Multiparameter Bench Meter
	3 with temperature, option to add modules for more parameters	Conductivity, TDS, salinity, resistivity, pH, mV, RmV, ORP, DO; ISE	Orion Versa Star Pro 90 pH/ISE/Conductivity/ Dissolved Oxygen Multiparameter Bench Meter
	4 with temperature	Conductivity, TDS, salinity, resistivity, pH, mV, RmV, ORP, DO; ISE	Orion Versa Star Pro 91 pH/ISE/Conductivity/ Dissolved Oxygen Multiparameter Bench Meter



Thermo Scientific™ Orion™ conductivity standards and solutions are available to help you clean, calibrate, and store your conductivity probes between uses.

Electrode maintenance and care

You can achieve consistently accurate conductivity measurements when your conductivity probe is maintained with care, which includes calibration, cleaning, and proper storage. Conductivity and TDS standards help ensure accurate readings. A variety of Orion conductivity standards are available, including pouches to prevent contamination between measurements. After repeated or prolonged use in dirty samples, soaking your probe first in conditioner and then in storage solution for up to two hours after use will help ensure that the surface area of your conductivity probe remains unaltered. Store dry between uses.

Ordering information

Product	Quantity	Cat. No.
Solutions		
147 $\mu\text{S}/\text{cm}$ conductivity standard	10 pouches	01100910
111.9 mS/cm conductivity standard	5 x 60 mL bottles	011005
111.9 mS/cm conductivity standard	10 pouches	01100510
12.9 mS/cm (0.1 M KCl) conductivity standard	475 mL bottle	990106
100 $\mu\text{S}/\text{cm}$ conductivity/TDS standard	5 x 60 mL bottles	011008
1413 $\mu\text{S}/\text{cm}$ conductivity/TDS standard	5 x 60 mL bottles	011007
1413 $\mu\text{S}/\text{cm}$ conductivity/TDS standard	10 pouches	01100710
12.9 mS/cm conductivity/TDS standard	5 x 60 mL bottles	011006
12.9 mS/cm conductivity/TDS standard	10 pouches	01100610
Electrode rinse solution	10 pouches	911110
Accessories		
Conductivity calibration resistor kit for Star Series conductivity meters, 8 pin mini DIN connection		1010001
Orion Protective Guards for Conductivity and Dissolved Oxygen Probes		081045
Orion Swing Arm Electrode Stand		090043
Orion Star A Series Electrode Holder for Electrode Stands		STARA-ELHD

Find out more at
thermofisher.com/conductivityprobes

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