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Undeniable accuracy and precision

Thermo Scientific Orion Conductivity Probes

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Conclusive and accurate measurements

Make challenging measurements easier with Thermo Scientific™ Orion™ Conductivity Probes. These two- and four-electrode cells are durable, thoughtfully designed, feature integrated temperature compensation, and come with cell constants for high-, standard-, and low-conductivity ranges (0.1 cm^{-1} to 10 cm^{-1}). Difficult measurements in the field are made possible with optional extended cable lengths.

Constructed from sturdy materials, Orion probes are designed to achieve precise readings across subtle variations in conductivity, withstand the effects of concentrated acids, and measure highly conductive substances. They are well suited for resistivity, total dissolved solids (TDS), and salinity measurements when used with Orion multiparameter and conductivity meters and solutions. For more than 60 years, Orion electrochemistry testing products have helped scientists achieve optimal efficiency with precise and accurate measurements.

Sample conductivity range

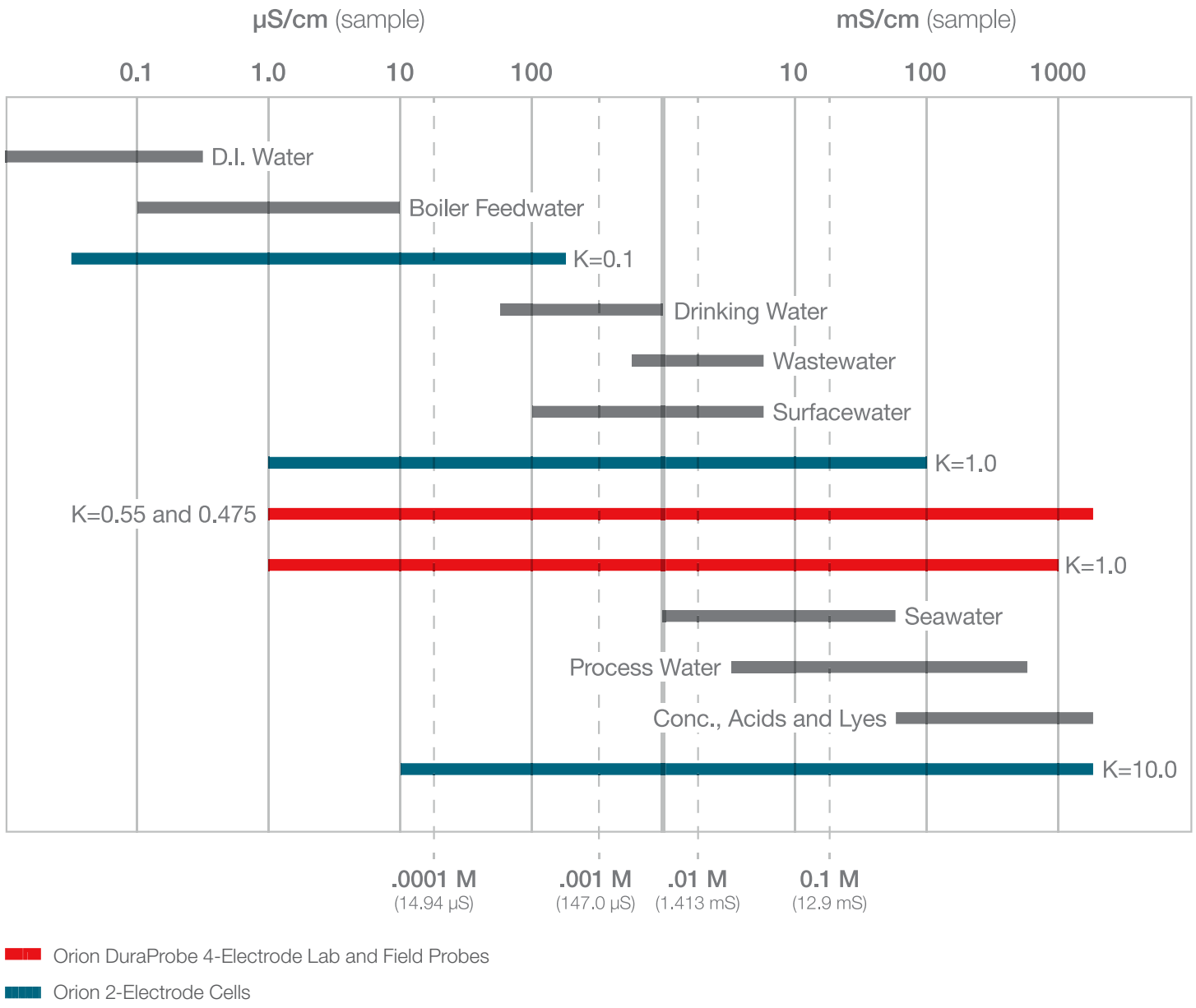
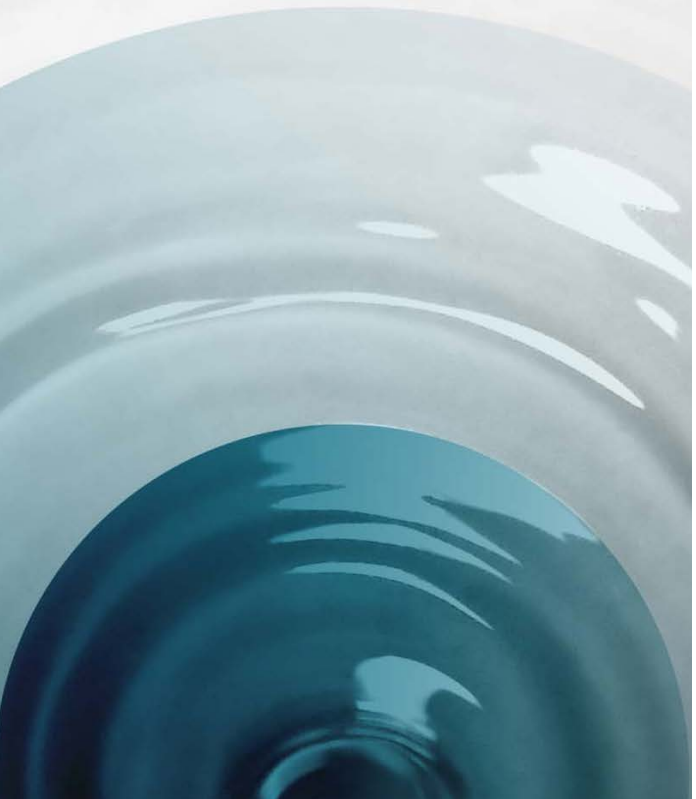


Figure 1. Sample conductivity range for a variety of common samples. Use this chart to help identify the appropriate measurement range for your application.

Utilizing the versatility of conductivity probes



Certain applications may call for measurements of other attributes in relation to conductivity, including resistivity, total dissolved solids, or salinity.

Resistivity

The reciprocal of conductivity is resistivity, which is an important parameter to measure when working with or making purified water, such as 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 (>18.18 MΩ/cm at 25°C) and therefore very low levels of conductivity (0.055 µS/cm at 25°C). Ultrapure water is often used for laboratory, pharmaceutical, semiconductor, or boiler applications.

Total dissolved solids

Often in environmental applications, TDS is used to determine the amount of minerals, salts, or metals dissolved in water, potentially indicating pollution. The standard method of determining TDS is by filtering the sample, then evaporating it to dryness at 180°C and weighing the residue. Conductivity is a quick method that can be used to estimate TDS. This allows for easy field testing and makes continuous measurement possible. The standard formula is TDS = k x EC (in 25°C) whereby k is a function of the type of water being measured and EC is conductivity. Typical applications for TDS include water quality, irrigation water salinity, water treatment, and various forms of brine and salt testing.

Salinity

Because of its high sensitivity and ease of measurement, conductivity is said to be the most commonly used method to determine the salinity of seawater. Practical salinity measurements compare the sample conductivity measurement to the reading of a standard potassium chloride solution at 15°C. The practical salinity (S) of reference seawater is 35. Thermo Scientific™ Orion™ Meters automatically calculate salinity using oceanographic equations compensated to 15°C per accepted conventions. When using an Orion Conductivity Probe, which has an integrated temperature sensor, and a conductivity meter, like a Thermo Scientific™ Orion Star™ A Portable Meter or Orion™ Versa Star™ Pro Bench Meter, salinity can be reported as practical salinity units (psu) or parts per thousand (ppt), depending on user preference.

Meet the needs of demanding field and lab applications

Measure the most challenging samples with Thermo Scientific™ Orion™ DuraProbe™ 4-Electrode Lab and Field Probes. These probes are appropriate for standard- to high-conductivity samples, including wastewater, runoff, and mud — no matter who's handling the probe.

The four-electrode design compensates for fouling, cable and connector resistance, polarization errors, and fringe field interference errors. Each conductivity cell is made from graphite and housed in an epoxy outer shell to withstand prolonged rough outdoor conditions. DuraProbe probes are designed to be chemical and corrosion resistant to help ensure accurate readings every time.

Perform your measurements with confidence and consistency when you choose DuraProbe products. Our 24-month warranty can give you peace of mind as you collect data from highly conductive samples time and again.

DuraProbe Rugged 4-Electrode Lab and Field Probe with 1.5 m cable (Cat. No. 013005MD) provides accurate measurements in the lab and easy readings in the field.

Thermo Scientific Orion DuraProbe 4-Electrode and Rugged 4-Electrode Lab and Field Probes

The epoxy body is durable and the graphite cell material never needs platinization or other special maintenance.

To determine the conductivity of a solution, the probe uses advanced circuitry to compensate for common interferences, including electrode fouling by dirty samples.

DuraProbe 4-Electrode Lab and Field Probe with one and a half-meter cable (Cat. No. 013605MD) is especially powerful for high-conductivity samples.

DuraProbe Rugged 4-Electrode Lab and Field Probe (left) with three-meter cable (Cat. No. 013010MD) and DuraProbe 4-Electrode Cell Rugged Probe (right) with six-meter cable (Cat. No. 013020MD) are designed for hard-to-reach samples.

DuraProbe Rugged 4-Electrode Lab and Field Probe with 10-meter cable (Cat. No. 013025MD) is suitable for outdoor measurements requiring extra length to reach the sample.

DuraProbe Rugged 4-Electrode Lab and Field Probes*

Each probe features an epoxy body containing a graphite cell and built-in ATC temperature sensor that can withstand temperatures of 0 to 90°C. Probes featuring an 8-pin mini-DIN connector are well suited for use with Orion Star, Dual Star, Star A, and Orion Versa Star Pro Series Meters. See page 11 for more information.

Description	Measurement range	Nominal constant (K)	Cable length	Temperature range	Minimum/maximum immersion length	Connector type	Cat. No.
DuraProbe Rugged 4-Electrode Lab and Field Probe	1 µS to 200 mS/cm	0.475 cm^{-1}	1.5 m	0 to 90°C (ATC sensor included)	35 mm minimum, no maximum	8-pin mini-DIN	**013005MD**
			3 m			8-pin mini-DIN	**013010MD**
			6 m			8-pin mini-DIN	**013020MD**
	1 µS to 200 mS/cm	0.475 cm^{-1}	10 m			8-pin mini-DIN	**013025MD**
	10 µS to 200 mS/cm	0.55 cm^{-1}	10 m			8-pin mini-DIN	**013605MD**

*DuraProbe 4-Electrode Lab and Field Probe warranty: 24 months from customer purchase date.

Conductivity probes for unique applications

Achieve accurate measurements from ultrapure water, sea water, and more with Thermo Scientific™ Orion™ 2-Electrode Cells. These probes use two electrode cells to measure low-, standard-, and high-conductivity samples based on the cell constant. They are a versatile option for precise measurements in the lab and field.

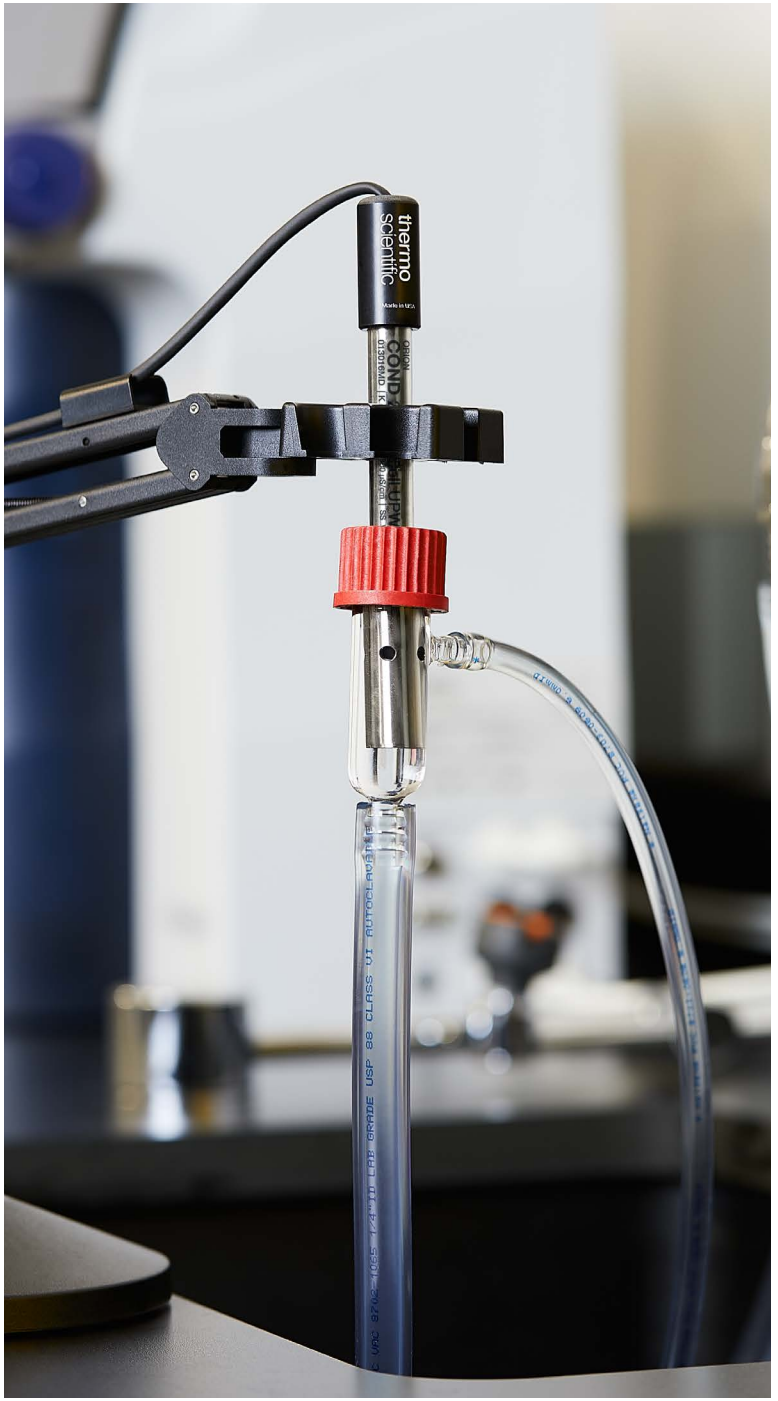
Choose the right probe for your application:

- Measure low ionic strength solutions, such as deionized water and ultrapure water, using cells with a 0.1 cm^{-1} cell constant; pair with a flow-cell assembly to help ensure accurate results
- Chemically reactive conductivity samples, including concentrated acids and bases, are best measured using glass and platinum cells with a 10 cm^{-1} cell constant because the cell material has a high chemical resistance, and the measuring range covers the highest conductivity readings
- Plastic and epoxy/graphite cells are durable, chemical resistant, and measure a wide range of conductivities in the lab or field

Conductivity of purified water

The Orion Ultrapure 2-Electrode Cell is uniquely designed with a stainless-steel body to measure purified waters. This clean material does not contaminate the sample or affect the cell constant for sensitive conductivity readings.

Orion Ultrapure 2-Electrode Cell with 0.1 cm^{-1} nominal constant (Cat. No. 013016MD) helps measure low-conductivity solutions in the lab, including ultrapure water. Glass flow-cell assembly (Cat. No. 013017) included. Tubing sold separately: Thermo Scientific™ Nalgene™ Clear Plastic Flexible Non-Phthalate PVC Tubing (Cat. No. 87010060), one and a half to three meters.



Thermo Scientific Orion 2-Electrode Cells

Rugged epoxy design for field applications.

Exposed temperature probe helps ensure quick temperature compensation.

Orion Rugged 2-Electrode Cells (Cat. No. 011510MD) are designed for rugged field and lab applications that require precision and versatility within a standard range.

Orion High-Range 2-Electrode Cells (Cat. No. 018020MD) measure high-conductivity samples, such as acids and bases, using the flow through or dip methods.

Orion Precise 2-Electrode Cells (Cat. No. 011050MD) are helpful for lab or field applications that require precision within a standard range.

Orion 2-Electrode Cells*

Probes featuring an eight-pin mini-DIN connector are well suited for use with Orion Star, Dual Star, Star A, and Orion Versa Star Pro Series Meters. See page 11 for more information.

Description	Recommended applications	Measurement range	Nominal constant (K)	Cable length	Cell Material	Temperature range	Connector type	Cat. No.
Ultrapure 2-electrode cell	• Boiler feedwater • Ultrapure water • Glass-flow cell assembly (Cat. No. 013017) included	0.01 to 300 µS/cm	0.1 cm^{-1}	1.5 m	V4A stainless steel	0 to 90°C (ATC sensor included)	8-pin mini-DIN	**013016MD**
Precise 2-electrode cell	• Lab and field use • Precision within a standard range	1 µS to 20 mS/cm	1.0 cm^{-1}	1.5 m	Epoxy body with platinized cells		8-pin mini-DIN	**011050MD**
Rugged 2-electrode cell	• Rugged lab and field applications • Measurements within a standard range	10 µS to 200 mS/cm	1.0 cm^{-1}	3 m	Epoxy body with graphite cells	0 to 80°C (ATC sensor included)	8-pin mini-DIN	**011510MD**
High-range 2-electrode cell	• Laboratory use • High-conductivity samples • Flow through or dip methods	10 µS to 2,000 mS/cm	10 cm^{-1}	1.5 m	Glass body with platinized cells	0 to 90°C	8-pin mini-DIN	**018020MD**

*Two-electrode cell warranty: 24 months from customer purchase date.

Achieving USP<645> using an Orion Ultrapure 2-Electrode Cell

Water conductivity is used as a measure of purity for United States Pharmacopeia (USP) purified water and water for injection in the pharmaceutical industry. Conductivity measurements are a useful indicator of the number of dissolved ions present in a water sample and can serve as a measure of water quality. Using the Orion Ultrapure 2-Electrode Cell (Cat. No. 013016MD) for USP<645> is more reliable and convenient than the wet chemistry tests previously used to test for water purity. Read the application note Measuring the Conductivity of Pure Water Using USP<645> for all workflow stages and to browse related products.

Reading your conductivity measurements

Achieve accurate and repeatable readings of your conductivity and TDS measurements when you pair your conductivity probe with a Thermo Scientific Orion Portable or Bench Conductivity Meter. Orion Star A and Versa Star Pro Bench Conductivity Meters deliver performance, a large display, and a variety of parameter options for a wide range of lab work. Orion Star A Portable Meters are rugged and waterproof to help you tackle the elements without missing a reading.

Orion Star A and Versa Star Pro Meters for Conductivity and TDS Measurements

Meter type	Measures	Meter model
Portable	Conductivity, TDS, temperature (one parameter)	Orion Star A122 Portable Conductivity Meter
	Conductivity, TDS, salinity, resistivity, temperature (one parameter)	Orion Star A222 Portable Conductivity Meter
	Conductivity, TDS, salinity, resistivity, temperature (one parameter)	Orion Star A322 Portable Conductivity Meter
	Conductivity, TDS, salinity, resistivity, pH, mV, RmV, ORP, temperature (two parameters)	Orion Star A325 Portable pH/Conductivity Meter
	Conductivity, TDS, salinity, resistivity, pH, mV, RmV, ORP, ISE, dissolved oxygen, temperature (two parameters)	Orion Star A329 Portable pH/ISE/Conductivity/DO Meter
Bench	Conductivity, TDS, temperature (one parameter)	Orion Star A112 Bench Conductivity Meter
	Conductivity, TDS, salinity, resistivity, temperature (one parameter)	Orion Star A212 Bench Conductivity Meter
	Conductivity, TDS, salinity, resistivity, pH, mV, RmV, ORP, temperature (two parameters)	Orion Star A215 Bench pH/Conductivity Meter
	Conductivity, TDS, salinity, resistivity, temperature (one parameter with option to add modules)	Versa Star Pro 20 Bench Conductivity Meter
	Conductivity, TDS, salinity, resistivity, pH, mV, RmV, ORP, temperature (two parameters with option to add modules)	Versa Star Pro 50 Bench pH and Conductivity Meter
	Conductivity, TDS, salinity, resistivity, pH, mV, RmV, ORP, ISE, dissolved oxygen, temperature (three parameters with option to add modules)	Versa Star Pro 90 Bench pH/ISE, Conductivity, and DO Meter
	Conductivity, TDS, salinity, resistivity, pH, mV, RmV, ORP, ISE, pH, mV, RmV, ORP, dissolved oxygen, temperature (four parameters)	Versa Star Pro 91 Bench pH/ISE, Conductivity, and DO Meter

Accuracy every time

Proper cleaning and storage of probes prolongs their life and helps ensure the accuracy of future readings. When deposits collect on the probe's surface, conductivity levels may appear artificially low.

For regulated labs, low-level conductivity standards will help you meet accuracy requirements. All Orion conductivity standards are traceable to NIST standard reference materials and are labeled with a lot code and expiration date. They're suitable for ultrapure water measurements and hold their value. The bottle material also mitigates losses and atmospheric contamination for USP<645> cell constant verification and other critical pure water applications. Orion conductivity standards, available in pouch or bottle format, are a great choice.

After use, a simple soak in conditioner followed by storage solution (up to two hours) cleans the surface of your conductivity probe for lasting accuracy.

Orion Conductivity Solutions

Conductivity standard value	Quantity	Cat. No.
100 µS/cm conductivity and TDS standard	5 x 60 mL bottles	**011008**
147 µS/cm conductivity standard	10 x 15 mL pouches	**01100910**
1413 µS/cm conductivity and TDS standard	5 x 60 mL bottles	**011007**
1413 µS/cm conductivity and TDS standard	10 x 15 mL pouches	**01100710**
12.9 mS/cm conductivity and TDS standard	5 x 60 mL bottles	**011006**
12.9 mS/cm conductivity and TDS standard	10 x 15 mL pouches	**01100610**
111.9 mS/cm conductivity standard	5 x 60 mL bottles	**011005**
111.9 mS/cm conductivity standard	10 x 15 mL pouches	**01100510**
0.1 M KCl conductivity standard	475 mL bottle	**990106**
Electrode rinse solution	10 x 15 mL pouches	**911110**

Orion Conductivity Conditioners and Accessories

Conductivity standard value	Cat. No.
Conditioning solution for conductivity probes (Cat. Nos. 011050 and 011050MD)	**011001**
Conductivity calibration resistor kit for Orion Star and Orion Star A Series Conductivity Meters, mini-DIN	**101000**
Replacement flow cell for two-probe conductivity cell in ultrapure water (Cat. Nos. 013016A, 013016D, and 013016MD)	**013017**
Nalgene tubing for flow cell use (one and a half to three meters), clear plastic flexible non-phthalate PVC tubing suitable for food packaging (6.35 mm ID, 9.53 mm OD, 1.59 mm wall thickness)	**87010060**
Plastic protective probe guard (for Cat. Nos. 013005MD, 013010MD, 013025MD, 013005A, 013010A, and 013060A)	**081045**
Orion swing arm stand, probe holder, and base	**090043**

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Find out more at **thermofisher.com/conductivityprobes**

21-557-1779 LS 08/21

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